NATIONAL
SERVICE DATA

NATIONAL
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SERVICE

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SERVICE

1955 FINAL NATIONAL SERVICE DATA

NATIONAL AUTOMOTIVE SERVICE

INSTALLING NEW DATA IN BINDER

Remove Screws and top Binder Cover. Lift off entire "Car Models" section of pages and any previous "Annual Data" down to "Carburetors" section.

Place this 1955 FINAL DATA in Binder on top of "Carburetors" section.

Replace all pages removed EXCEPT ADVANCE DATA. Make certain the metal Sleeves are installed in pages before refastening Binder Cover with Screws.

If a supplementary Binder is being used, place this FINAL DATA to follow previous "Annual Data."

▶ ***DISCARD ADVANCE DATA.*** *The Final Data contains all information given in the Advance Data plus many important changes.*

OOK FOR DATA

ion has its own Tab and separate Index.

Cross References direct you to the
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ct appears on the Car Model Pages and
Systems. There are Special Indexes in

	CAR MODEL SECTION Page Sub-Heading	OTHER SECTIONS Equip. Units & Systems
S		
	Engine & Special Data	
	Misc. Mechanical	Miscellaneous Section
	Cooling	
NGS	Engine & Special Data	
S	Regulator	Electrical Equip. Section
	Cutout Relay Or Regulator	Electrical Equip. Section
	Engine & Special Data	
	Engine & Special Data	
	Engine & Special Data	
	Lighting	Electrical Equip. Section
	Tune-Up & Ignition	Electrical Equip. Section
	Engine	
	Engine & Special Data	
	Model Identification	
	Engine & Special Data	
	Tune-Up	
	Carb. Equipment	Carburetion Equip. Section
	Tune-Up	
	Tune-Up & Carburetor	Carburetor Section
	Fluid Drive	Transmission Section

CONTINUED ON NEXT PAGE

CAR MODELS
56 SERVICE DATA AND MANUALS
54 TUNE-UP AND IGNITION
55 ELECTRICAL DATA
56 ADVANCE DATA
BRAKES
FRONT SUSPENSIONS
CARBURETORS
CLUTCHES
UNIVERSALS
CARBURETION EQUIPMENT
FLUID SUSPENSIONS
WATER PUMPS
REAR AXLES
MISCELLANEOUS
STEERING

HOW AND WHERE TO LOOK FOR DATA

The Service Data is arranged by Sections. Each Section has its own Tab and separate Index.

All subjects appear on the Car Model Pages. Here, Cross References direct you to the "Special Data & Shop Notes" ahead of each Car Make and to separate Sections for the complete treatment of Individual Units, Types of Equipment, or Systems installed.

IMPORTANT: Use the special "Car Application" Indexes for each Section.

LOCATION OF SUBJECTS

This guide directs you to the SUB-HEADING under which the Subject appears on the Car Model Pages and to other Sections for complete treatment of Equipment Units and Systems. There are Special Indexes in each separate Section.

SUBJECT	CAR MODEL SECTION Page Sub-Heading	OTHER SECTIONS Equip. Units & Systems
ACCELERATING PUMP	Tune-Up (Carburetor)	Carburetion Section
AIR CLEANER	Carb. Equipment	
AIR CONDITIONING	Misc. Mechanical	Miscellaneous Section
ARMATURE NUMBERS	Starter & Generator	
AXLES (FRONT)	Front Suspension	Suspension Section
AXLES (REAR)	Rear Axle	Rear Axle Section
AUTOMATIC ADVANCE	Tune-Up (Ignition)	
AUTOMATIC CHOKE	Tune-Up (Carburetor)	Carburetion Section
AUTOMATIC TRANSMISSION	Transmission	Transmission Section
BATTERY	Battery	
BEARINGS	Engine & Special Data	
BRAKES & BOOSTERS	Brakes	Brake Section
BREAKER GAP	Tune-Up (Ignition)	
CAM ANGLE	Tune-Up (Ignition)	Electrical Section
CAMBER	Front Suspension	Suspension Section
CAMSHAFT & BEARINGS	Engine & Special Data	
CAR WIRING DIAGRAM	Car Page	
CARBURETOR	Tune-Up (Carburetor)	Carburetion Section
CASTER	Front Suspension	Suspension Section
CIRCUIT BREAKERS	Misc. Electrical	
CLUTCH & CONTROLS	Clutch	Clutch Section
COIL	Tune-Up (Ignition)	
COMPRESSION PRESSURE	Tune-Up	
CONDENSER	Tune-Up (Ignition)	
CONNECTING RODS & BEARINGS	Engine & Special Data	
CONTACT POINT SET	Tune-Up (Ignition)	
CONVERTIBLE TOP CONTROLS	Misc. Mechanical	Miscellaneous Section
COOLING SYSTEM	Cooling	
CRANKSHAFT & BEARINGS	Engine & Special Data	
CURRENT REGULATORS	Regulator	Electrical Section
CUTOUT RELAYS	Regulator	
CYLINDER BORE	Engine & Special Data	
CYLINDER HEAD	Engine & Special Data	
CYLINDER SLEEVES	Engine & Special Data	
DIRECTION SIGNALS	Misc. Electrical	Electrical Section
DISTRIBUTOR	Tune-Up (Ignition)	Electrical Section
ENGINE	Engine	
ENGINE MOUNTINGS	Engine & Special Data	
ENGINE NUMBER	Model Identification	
ENGINE REMOVAL	Engine & Special Data	
ENGINE TUNE-UP	Tune-Up	
FAST IDLE	Tune-Up (Carburetor)	Carburetion Section
FIRING ORDER	Tune-Up	
FLOAT LEVEL	Tune-Up (Carburetor)	Carburetion Section
FLUID DRIVES	Fluid Drive	Transmission Section

CONTINUED ON NEXT PAGE

LOCATION OF SUBJECTS (C ntinued)

SUBJECT	CAR MODEL SECTION Page Sub-Heading	OTHER SECTIONS Equip. Units & Systems
FRONT SUSPENSION	Front Suspension	Suspension Section
FRONT WHEEL ALIGNMENT	Front Suspension	Suspension Section
FUEL GAUGE	Carb. Equipment	Carburetion Section
FUEL PUMP	Carb. Equipment	Carburetion Section
FUEL PUMP PRESSURE	Tune-Up	Carburetion Section
FUSES	Misc. Electrical	
GASOLINE GAUGE	Carb. Equipment	Carburetion Section
GEARSHIFTS	Transmission	Transmission Section
GENERATOR	Generator	
GENERATORS (SPECIAL)	Generator	Electrical Section
HAND BRAKE	Brakes	Brake Section
HEADLAMPS	Misc. Electrical	Electrical Section
HEAT CONTROL	Tune-Up	
HORNS	Misc. Electrical	
HORN BUTTON & RING REMOVAL		Steering Section
HYDRAULIC VALVE LIFTERS	Engine (Valves) & Special Data	
IDLE SPEED	Tune-Up	Carburetion Section
IGNITION COIL	Tune-Up (Ignition)	
IGNITION CONDENSER	Tune-Up (Ignition)	
IGNITION TIMING	Tune-Up (Ignition Timing)	
JET SPECIFICATIONS		Carburetion Section
KICK-DOWN SWITCH	Transmission & Overdrive	Electrical Section
LIGHTING	Misc. Electrical	
LIGHT CIRCUIT BREAKERS	Misc. Electrical	
LIGHTING FUSES	Misc. Electrical	
MAIN BEARINGS	Engine & Special Data	
MANIFOLD HEAT CONTROL	Tune-Up	
OIL GAUGE	Lubrication	Miscellaneous Section
OIL PUMP	Lubrication & Special Data	
OILING SYSTEM	Lubrication & Special Data	
OIL PAN REMOVAL	Engine & Special Data	
ORIGINAL BEARING SIZES	Engine & Special Data	
ORIGINAL BORE SIZES	Engine & Special Data	
ORIGINAL PISTON SIZES	Engine & Special Data	
OVERDRIVES	Overdrives	Transmission Section
PISTONS	Engine & Special Data	
PISTON PINS	Engine & Special Data	
PISTON RINGS	Engine & Special Data	
PROPELLER SHAFT	Special Data	Rear Axle Section
RADIATOP	Cooling & Special Data	
RADIATOR PRESSURE CAP	Cooling	
REAR AXLE & SUSPENSION	Rear Axle	Rear Axle Section
REGULATOR	Regulator	Electrical Section
RELAY (CUTOUT)	Regulator	
RELAY (HORN)	Misc. Electrical	
RELAY (OTHERS)		Electrical Section
REPLACEMENT BEARINGS	Engine & Special Data	
REPLACEMENT PISTONS	Engine & Special Data	
REPLACEMENT PINS	Engine & Special Data	
REPLACEMENT RINGS	Engine & Special Data	
REPLACEMENT RODS	Engine & Special Data	
SEAT CONTROL (POWER)		Miscellaneous Section
SERIAL NUMBER	Model Identification	
SHOCK ABSORBERS	Shock Absorbers	
SLOW-CLOSING THROTTLES	Carb. Equipment	Carburetion Section
SPARK PLUGS	Tune-Up	
SPRING SPECIFICATIONS		Suspension Section Or Rear Axle Section
STARTER & CONTROLS	Starter	Electrical Section
STEERING GEAR	Steering Gear	Steering Section
STEERING LINKAGE		Steering Section
STEERING WHL. REMOVAL		Steering Section
SWITCHES (STARTING)	Starter	Electrical Section
TAPPET CLEARANCE	Tune-Up & Valve Timing	
TEMPERATUPE GAUGE	Cooling	Miscellaneous Section
TESTING (AUTOMATIC TRANSMISSION)		Transmission Section
THERMOSTAT	Cooling	
THERMOSTATIC RELAYS	Misc. Electrical	
TIGHTENING SPECS.	Special Data	
TIMING CHAIN	Engine (Camshaft)	
TIMING GEARS	Engine (Camshaft)	
TOE IN	Front Suspension	Suspension Section
TOPS (POWER OPERATED)		Miscellaneous Section
TORQUE CONVERTER	Transmission	Transmission Section
TORQUE WRENCH READINGS	Special Data	
TRANSMISSION & CONTROLS	Transmission	Transmission Section
TRANSMISSION, AUTOMATIC	Transmission	Transmission Section
TROUBLE SHOOTING (AUTOMATIC TRANSMISSIONS)		Transmission Section
TUNE-UP	Tune-Up	
TWO-SPEED REAR AXLES	Rear Axle	Rear Axle Section
UNIVERSAL JOINT	Universals	
VACUUM ADVANCE	Tune-Up (Ignition)	
VACUUM READING	Tune-Up	
VALVES	Engine	
VALVE LIFTERS	Engine (Valves) & Special Data	
VALVE SPRINGS	Engine (Valves)	
VALVE TIMING	Valve Timing	
VIBRATION DAMPENER	Special Data	
VOLTAGE REGULATOR	Regulator	Electrical Section
WATER PUMP	Cooling	Water Pump Section
WINDOW REGULATORS	Misc. Mechanical	Miscellaneous Section
WINDSHIELD WIPERS	Misc. Mechanical	Miscellaneous Section
WIRING DIAGRAM	Car Model Page	

CAR MODEL INDEX

		Page
BUICK	Special Data	8
1946	All	16
1947	All	16
1948	All	16
1949	All	21
1950	All	26
1951	All	26
1952	All	32
1953	Series 40	38
	Series 50 & 70	43
1954	All	48
1955	All	48
CADILLAC	Special Data	56
1946	All	62
1947	All	62
1948	All	62
1949	All	67
1950	All	67
1951	All	72
1952	All	72
1953	All	79
1954	All	79
1955	All	86
CHEVROLET	Special Data	92
1946	Pass. Cars	103
1947	Pass. Cars	103
	Trucks	109
1948	Pass. Cars	103
	Trucks	109
1949	Pass. Cars	115
	Trucks	109
1950	Pass. Cars	119
	Trucks	125
1951	Pass. Cars	119
	Trucks	125
1952	Pass. Cars	130
	Trucks	142
1953	Pass. Cars	135
	Trucks	142
	Corvette 6	148
1954	Pass. Cars	158
	Corvette 6	148
	Trucks	152
1955	Pass. Cars 6	163
	Pass. Cars V8	169
	Corvette 6	148
	Corvette V8	174
	Trucks (Early)	152
	Trucks (Late)	177

		Page
CHRYSLER	Special Data	183
1946	Six	190
	Eight	194
1947	Six	190
	Eight	194
1948	Six	190
	Eight	194
1949	Six	199
	Eight	203
1950	Six	208
	Eight	203
1951	Six	208
	Eight	213
1952	Six	219
	Eight	213
1953	Six	219
	Eight	224
1954	Six	230
	Eight	235
1955	Eight (Windsor)	240
	Eight (Exc. Windsor)	246
CROSLEY	Special Data	252
1946-48	All	254
1949-50	All	259
1951-52	All	259
DE SOTO	Special Data	263
1946	All	269
1947	All	269
1948	All	269
1949	All	273
1950	All	277
1951	All	277
1952	Six	282
	Eight	287
1953	Six	282
	Eight	287
1954	Eight	293
1955	Eight	293
DODGE	Special Data	300
1946	All	306
1947	All	306
1948	All	306
1949	All	310
1950	All	315
1951	All	315
1952	All	320
1953	Six	320
	Eight	325

		Page
DODGE (Continued)		
1954	Six	332
	Eight	325
1955	Six	332
	Eight	339
FORD	Special Data	345
1946	Six	356
	Eight	360
	Trucks	364
1947	Six	356
	Eight	360
	Trucks	364
1948	Six	356
	Eight	360
	Trucks	364
1949	Six	371
	Eight	375
	Trucks	364
1950	Six	379
	Eight	384
	Trucks	364
1951	Six	379
	Eight	384
	Trucks	389
1952	Six	396
	Eight	401
	Trucks	389
1953	Six	396
	Eight	401
	Trucks	389
1954	Six	406
	Eight	413
	Trucks	418
1955	Six	406
	Eight	426
	Thunderbird	433
	Truck	418
FRAZER	Special Data	438
1947-48	All	440
1949-50	All	444
1951	All	448
HENRY J	Special Data	452
1951	Four	454
	Six	458
1952	Four (Auto-Lite)	454
	Four (Delco-Remy)	462
	Six (Auto-Lite)	458
	Six (Delco-Remy)	466

CONTINUED ON NEXT PAGE

CAR MODEL INDEX

HENRY J (Continued) Page

1953 ..... Four 462
Six 466
1954 ..... Four 462
Six 466

HUDSON Special Data 470

1946 ..... Six 478
Eight 482
1947 ..... Six 478
Eight 482
1948 ..... Six 486
Eight 491
1949 ..... Six 486
Eight 491
1950 ..... Six (Exc. 500 & 5010) 501
Six (Pacemaker) 496
Rambler 869
Eight 506
1951 ..... Six (Exc. 4A & 5110) 501
Six (Pacemaker) 496
Rambler 869
Eight 506
1952 ..... Six 512
Rambler 873
Eight 506
1953 ..... All (Exc. Jet & Rambler) 512
Jet 518
Rambler 873
1954 ..... Wasp & Hornet 523
Jet 518
Metropolitan 622
Rambler 878
1955 ..... Wasp & Hornet Six 528
Hornet V8 534
Metropolitan 622
Rambler 878

JEEP

1946 & Later Models ..... See Willys

KAISER Special Data 538

1947-48 ..... All 542
1949-50 ..... All 546
1951-52 ..... All 550
1953 ..... All 555
1954 ..... All (Exc. Darrin) 555
Darrin 560
1955 ..... All 555

Page

LINCOLN Special Data 563

1946-48 ..... All 569
1949-51 ..... All 573
1952-53 ..... All 578
1954-55 ..... All 584

MERCURY Special Data 591

1946 ..... All 598
1947 ..... All 598
1948 ..... All 598
1949 ..... All 602
1950 ..... All 602
1951 ..... All 602
1952 ..... All 607
1953 ..... All 607
1954 ..... All 612
1955 ..... All 612

METROPOLITAN Special Data 620

1954-55 622

NASH Special Data 626

1946 ..... "600" 632
Ambassador 637
1947 ..... "600" 632
Ambassador 637
1948 ..... "600" 632
Ambassador 637
1949 ..... "600" 642
Ambassador 647
1950 ..... Rambler 869
Statesman 642
Ambassador 647
1951 ..... Rambler 869
Statesman 642
Ambassador 647
1952 ..... Rambler 873
Statesman 652
Ambassador 657
1953 ..... Rambler 873
Statesman 652
Ambassador 657
1954 ..... Metropolitan 622
Rambler 878
Statesman 662
Ambassador 6 668

NASH (Continued) Page

1955 ..... Metropolitan 622
Rambler 878
Statesman 662
Ambassador 6 668
Ambassador V8 673

OLDSMOBILE Special Data 677

1946 ..... Six 682
Eight 687
1947 ..... Six 682
Eight 687
1948 ..... Six 682
Eight 687
1949 ..... Six 692
Eight 697
1950 ..... Six 692
Eight 697
1951 ..... Eight 697
1952 ..... Eight 697
1953 ..... Eight 704
1954 ..... Eight 704
1955 ..... Eight 712

PACKARD Special Data 718

1946 ..... Eight 724
Super & Custom 728
1947 ..... Eight 724
Super & Custom 728
1948 ..... Eight 732
Super Eight 732
Custom Eight 737
1949 Early .. 2200 Eight 732
2200 Super Eight 732
2200 Custom Eight 737
1949 Late .... 2300 Eight 741
2300 Super Eight 741
2300 Custom Eight 746
1950 ..... Eight 741
Super Eight 741
Custom Eight 746
1951 ..... All 750
1952 ..... All 750
1953 ..... All 757
1954 ..... All 763
1955 ..... All 769

CONTINUED ON NEXT PAGE

CAR MODEL INDEX

Page

PLYMOUTH Special Data 775
1946 ..... All 781
1947 ..... All 781
1948 ..... All 781
1949 ..... All 785
1950 ..... All 785
1951 ..... All 785
1952 ..... All 791
1953 ..... All 791
1954 ..... Six 797
1955 ..... Six 797
1955 ..... Eight 803

PONTIAC Special Data 808
1946 ..... Six 816
Eight 822
1947 ..... Six 816
Eight 822
1948 ..... Six 816
Eight 822
1949 ..... Six 828
Eight 833
1950 ..... Six 828
Eight 833
1951 ..... Six 838
Eight 843
1952 ..... Six 838
Eight 843
1953 ..... Six 848
Eight 854
1954 ..... Six 848
Eight 854
1955 ..... Eight 860

Page

RAMBLER Special Data 867
1950-51 869
1952-53 873
1954-55 878

STUDEBAKER Special Data 883
1947 ..... Champion 894
Comm. & Land Cruiser 898
1948 ..... Champion 894
Comm. & Land Cruiser 898
1949 ..... Champion 894
Comm. & Land Cruiser 898
1950 ..... Champion 902
Comm. & Land Cruiser 907
1951 ..... Champion 902
Comm. & Land Cruiser 911
1952 ..... Champion 917
Comm. & Land Cruiser 911
1953 ..... Champion 917
Comm. & Land Cruiser 923
1954 ..... Champion 930
Comm. 923
1955 ..... Champion 930
Comm. & President 936

WILLYS Special Data 942
1946 ..... CJ-2A, Jeep 947
4-63, Sta. Wgn. & Sed. Del. 953
1947 ..... CJ-2A, Jeep 947
4-63, Sta. Wgn. & Sed. Del. 953
Trucks 962
1948 ..... CJ-2A, Jeep 947
4-63, Sta. Wgn. & Sed. Del. 953
VJ-2, Jeepster 953
Trucks 962
6-63, Sta. Wgn. & Sed. Del. 957

Page

WILLYS (Continued)
1949-50 ..... CJ-3A, Jeep 947
4-63, Sta. Wgn. & Sed. Del. 953
VJ-3, Jeepster 953
6-63, Sta. Wgn. & Sed. Del. 957
4 WD, Sta. Wgn. & Trucks 962
1950 ..... 473 Sta. Wgn. & Sed. Del. 967
473 VJ, Jeepster 967
475 Sta. Wgn. & Sed. Del. 967
673 Sta. Wgn. 957
673 VJ Jeepster 957
1951 ..... CJ-3A, Jeep 947
Trucks 962
4WD, Sta. Wgn. 962
473 Sta. Wgn. & Sed. Del. 967
473 VJ, Jeepster 967
673 Sta. Wgn. 957
673 VJ, Jeepster 957
1952 ..... Trucks 962
4WD, Sta. Wgn. 962
473, Sta. Wgn. & Sed. Del. 967
475, Sta. Wgn. & Sed. Del. 967
685, Sta. Wgn. 957
CJ-3A, Jeep 972
675 & 685 Pass. Cars 978
1953 ..... Trucks 962
4 WD, Sta. Wgn. 962
475, Sta. Wgn. & Sed. Del. 967
685, Sta. Wgn. 957
CJ-3A Jeep 972
CJ-3B Jeep 972
475A, Pass. Cars 978
675A & 685A, Pass. Cars 978
1954 ..... Utility 982
Jeep 972
Pass. 987
1955 ..... Utility 982
Jeep 972
Pass. 987

HOOD ASSEMBLY

1946-47 MODELS

HOOD ADJUSTMENT: Hood Lock. Hood fastener tension can be adjusted by loosening bolt at each side of fastener loop and adjusting clips up or down until correct tension obtained. Hood fastener handle can be adjusted for proper opening and closing by loosening three bolts (two at top, one at bottom) on anchor plate and shifting plate to front or rear until handle seats properly. Fastener lever arm on anchor plate must snap past center and against stop to lock hood (check lever arm when adjusting lock handle).

Alignment—⅛" clearance between hood and shroud, front doors, and fenders should be maintained. To adjust hood, loosen two bolts at each hinge and shift hinges to front or to rear until proper hood fit obtained. Alignment between hood and body can be adjusted by loosening attaching bolts at ends of hood reinforcement rods (bolt holes in ends of rods slotted providing variation of overall width of hood to fit hood to fender and body uniformly).

1948-49 MODELS

HOOD ADJUSTMENT: Hood Lock. The pilot plates on hood top panel reinforcements must be set flat and be drawn tight against the hinge plates when the hood is locked. When closing either side of the hood the hinge pilot pins must align with the holes in the pilot plates, so that they enter without interference. For best locking condition, the pilot plate should always contact the hinge plate along the inner edge first. If this condition does not exist, check hinge plates with straight edge to see if they are flat. If plates are not flat, they should be straightened. Check pilot plates on hood panel and see they are not distorted. Make sure the bent-down edge is straight and not curved. Check to see that the hood fastening handle seats fully. With hood open and handle in locked position there should be 1/32" clearance between both sides of the handle and body. Adjust by loosening the two center stud nuts which secure the handle body to hood panel. Place 1/32" shims each side of handle body outward. Tighten nuts and remove shims. If handle has good clearance but does not seat in handle body, loosen the three bolts on fastener plate which will permit it to be shifted forward or to rear. The fastener plate must be moved forward slightly if fastener locks properly but handle does not lock securely (past center), causing handle to snap out of recess and unlock.

1950-52 MODELS

HOOD ADJUSTMENT: Hood Lock. Hood fastener tension is non-adjustable, as the latches are spring loaded, causing them to seek a firmly locked position. The hood release rod is attached to the front fastener trunnion by means of checknuts on both sides of the trunnion. When fasteners are in full open position the shoulder on rear end of releasing rod should just contact the trunnion of rear fasteners. When the fasteners are at open position and release cable knob is pulled into its seat by the cable return spring, a distance of 3" should exist between rear end of cable pulley housing and the shoulder on releasing rod. This distance is obtained by adjusting the cable where it is anchored to the rear hood hinge.

1953-55 MODELS

HOOD ADJUSTMENT: Hood Lock. The hood latch dovetail bolt may be turned to move up or down when lock nut on upper end is loosened. Adjust bolt so that hood engages under lower latch lock lever without excessive vertical play when front end of hood rests firmly on rubber bumpers mounted on radiator grille frame. Slotted bolt holes in lower latch permit sidewise movement of latch to provide alignment with dovetail bolt in hood. Adjust so there is no sidewise strain or interference.

TIGHTENING SPECIFICATIONS

EXCEPT V8 ENGINES

	Ft. Lbs.	In. Lbs.
Spark Plugs (14 mm. type)	22-28	264-336
Cylinder Head Capscrews	65-70	780-840
Main Bearing Bolts	90-100	1080-1200
Connecting Rod Bolts (40,50)	45-50	540-600
Connecting Rod Bolts (70)	60-65	720-780
Piston Pin Clamp Bolt	25-30	300-360
Rocker Arm Bracket Capscrew	30-35	360-420
Flywheel to Crankshaft (40,50)	35-40	420-480
Flywheel to Crankshaft (70)	45-50	540-600
Manifold Studs	25-30	300-360
Timing Chain Cover	15-20	180-240
Balancer Bolt	100-110	1200-1320

V8 ENGINES

	Ft. Lbs.
Cylinder Head	63-73
Intake Manifold	25-30
Exhaust Manifold	10-15
Oil Pan	6-15
Main Bearing Caps	100-110
Flywheel	50-55
Vibration dampener	100-110
Con Rod Caps	40-45
Piston Pin Clamp Bolt	25-30
Rocker Arm Support Bracket	30-35
Rocker Arm Cover	4-5
Engine Front Cover	20-25
Water Manifold	25-30

ENGINE MOUNTINGS

1946-47 MODELS

ENGINE MOUNTINGS: Loosen all mountings on frame, loosen transmission support rod at mounting, loosen transmission support crossmember at frame ends (with mounting tight at torque ball), and center torque tube and ball joint in frame crossmember. For proper engine mounting adjustment proceed as follows: Tighten right and left front engine mountings to frame and engine. Tighten center engine mounting to transmission and frame crossmember (use shims to take up space between forward web of frame crossmember and lower mounting flange at lower bolt). Tighten transmission support mounting to transmission and crossmember. Shim transmission support at frame ends without disturbing its normal position. Tighten rod at transmission support with no 'push' or 'pull' tension on rod.

1948-53 MODELS (EXC. V8)

ENGINE MOUNTINGS: With torque tube disconnected from torque tube ball make adjustments as follows:

1) At front engine mountings. Tighten brackets at frame and crankcase, loosen front mounting pad top stud nuts at engine bracket on each side.
2) At rear mounting. Tighten at following points: a) transmission support ends at frame X-member, b) mounting pad at support and at transmission rear bearing retainer, c) thrust pad to thrust plate stud nuts **at rear.** Then loosen thrust pad to transmission support stud nuts **at front.** Remove steel shims ahead of thrust pad.
3) Then center engine as follows: Distance between front edge of crankshaft balancer (at horizontal center line) and center of nearest shock absorber bolt head at each side must be equal. If required, shift engine sidewise (oversize holes in engine bracket at rubber mounting permit engine movement) until distance equal at each side (engine centered in frame). Tighten front mounting pad top stud nuts at each engine bracket.
4) Shimming rear mounting. Insert steel shims from above (shim tabs UP on left side on Dynaflow UP on right side on Synchro-mesh Trans. cars) to snugly fill space between front face of rubber thrust pad and rear face of transmission support (CAUTION—Engine and transmission must be seated normally on mounting pads). Tighten thrust pad to transmission support stud nuts at front. Then retighten front engine mounting pad stud nuts at each side of engine. Connect torque tube to ball.

1953-55 V8 MODELS

ENGINE MOUNTINGS: The engine and transmission assembly must rest in a normal position which does not impose any side strain on the three rubber mountings. To adjust, tighten engine front mounting pad stud nuts under supports on frame and tighten mounting bracket-to-crankcase bolts. Loosen upper mounting pad-to-bracket bolts. Disconnect torque tube from torque ball, then tighten transmission support-to-frame X member attaching bolts. Tighten transmission mounting pad-to-transmission support and to transmission rear bearing retainer. Tighten thrust pad-to-thrust plate stud nuts (rear) and loosen thrust pad-to-transmission support stud nuts (front). Remove shims located between thrust pad and transmission support. Shake engine sideways to let assembly rest freely and normally on all mounting pads, then install sufficient shims between thrust pad and transmission support to snugly fill the existing space. Tighten thrust pad front stud nuts and connect torque tube to torque ball. Tighten front mounting pad-to-bracket bolts.

TORQUE BALL ADJUSTMENT

1948-55 MODELS

TORQUE BALL: Operates between inner and outer retainer bolted to transmission rear bearing retainer. Universal joint seal is provided at front of torque tube. Shims provided between front flanged ends of inner and outer retainers for adjustment.

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►*CAUTION: Correct adjustment of the torque ball is extremely important to insure correct operation. Ball is adjusted during reassembly as directed below.*

1948 Models—Rear end of outer packing fitted with retainer packing and packing tension spring (to keep packing bearing on torque ball).

1949-55 Models—Synthetic rubber boot fitted from outer retainer to flange of torque ball (replaces spring washer and packing formerly used on inner edge of outer retainer).

Disassembly: With rear axle assembly disconnected and moved back out of way, mark edge of torque ball outer retainer to insure re-installation in original position, then remove torque ball boot, torque ball, retainers, and gaskets from rear bearing retainer (on 1948 Models, remove packing and spring washer and retainer. DO NOT REPLACE UNTIL AFTER ADJUSTMENT IS MADE). Clean and inspect spherical surface of torque ball and inner and outer retainers, inspect seal and gasket at forward end of torque tube, replace all worn or damaged parts.

Reassembly & Adjustment—Proceed as follows:

►*1948-52 OIL SEAL NOTE:* When installing a new universal joint oil seal in torque tube ball, place seal in position with feather edge pointing into torque ball, then press seal squarely into place, using a flat piece of metal to avoid disturbing seal. Press new seal flush with flange of torque ball. *NOTE*—If seal hard and dry, soak in neatsfoot oil.

►*1953-55 OIL SEAL NOTE:* Propeller shaft oil seal used on these models not interchangeable with previous models. The later seal fits tight in torque tube front flange with lip edge toward front of car, and rides on sleeve pressed shaft stub. This seal eliminates former universal joint oil seal and propeller shaft spline seal.

1)—Install guide pins in upper bolt holes in transmission rear bearing retainer.

►**NOTE**—Guide Pins are headless pins ⅜" x 1⅜" having ⅜"-16 threads ½" long and screwdriver slot cut in unthreaded end.

2)—Install one shim (with 3 notches in outer edge) and inner ball retainer (with oil drain hole and notch in edge down) on guide pins.

3)—Oil bearing surfaces of retainers and torque ball with transmission lubricant.

4)—Install torque ball (with "TOP" mark up), and outer retainer (align marks made before disassembly).

►*1948 NOTE:* Do not install the retainer packing and spring at this time (installed after the torque tube ball adjustment made).

5)—Use Installing Tool J-2597 (Except 1953 and later models with seal in propeller shaft housing—See 1953-55 Oil Seal Note above), and push tool (sleeve and plug) through rear side of torque ball until feather edge of seal is on plug (sleeve will drop off plug). Assemble torque ball and outer retainer (with TOP marks up) on guide pins, fill space between flanges of inner and outer retainers with shims (see Torque Ball Shims below). See that oil seal has seated on universal joint.

Torque Ball Shims—Five thicknesses (marked by notches on outer edge) as follows:

4 Notches .....002-.004"	3 Notches .....004-.006"
2 Notches .....009-.011"	1 Notch .....011-.013"
Unmarked.....013-.015"	

6)—Install thrust plate and bolts in retainers (remove guide pins and install short bolts at these holes). DO NOT TIGHTEN BOLTS.

►*ADJUSTING TOOL NOTE:* A "Hardwood Club" should be used to move universal joint during tightening and to measure the tightness of the torque ball for correct adjustment. Make this club to the following dimensions:

1948-50 Models—Diameter 1¼". Length 13¾". Turn 2⅝" of one end of club down to 1" diameter then measure 5⅝" from offset and cut a 3/16" groove around large diameter of club.

1951-55 Models—Diameter 1¼". Length 18½". Turn 2⅝" of one end of club down to 1" diameter then measure 14⅜" from offset and cut a 3/16" groove around large diameter of club.

7)—Tighten retainer bolts evenly while continually moving torque ball by means of hardwood club inserted in end of universal joint. Use a soft mallet and tap outer retainer if ball binds while tightening bolts. *CAUTION—For proper centering of ball and retainers, torque ball must be moved while tightening retainer bolts.*

8)—Attach spring scale to club at groove located 5⅝" (1948-50); 14⅜" (1951-55) from end of universal joint and test pull required to move torque ball when all bolts are tight. A drag of 5 to 10 lbs. (1948-49 Models); 10 to 35 lbs. (1950 Models) with scale in groove 5⅝" from universal joint. 15 to 25 lbs. (1951-55 Models) with scale in groove 14⅜" from universal joint. If torque ball tension not within these limits, repeat centering operation and recheck tension. Adjust by adding or removing shims (see Torque Ball Shims above).

For 1948 Models proceed as follows:

9)—Install spring washer in retainer with gap at top, and edge away from flange. Select new packing (furnished 7/16", 5/32" and 1/2" long) to give snug fit in retainer against spring washer with thin forward edge extending into rounded portion of retainer. Re-install torque ball assembly. Spring washer will be almost flat if packing correctly installed.

10)—Check torque ball tension. CORRECT ADJUSTMENT WITH OUTER RETAINER AND SPRING WASHER INSTALLED should be 15 to 20 lbs. with 5⅝" leverage. If tension too small, install longer packing. If tension too great, install shorter packing. *CAUTION—Always use Tool J 2597 when installing torque ball to avoid damage to universal oil seal.*

For 1949-55 Models proceed as follows:

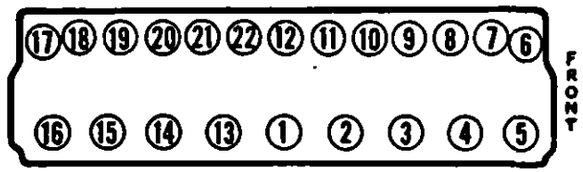
9)—Install torque ball boot by turning large end over small end, engage small end in groove on flange of torque ball then turn large end to front to engage rear end of outer retainer.

►*CAUTION: On 1949-52 Models always use Tool J-2597 when installing torque ball to avoid damaging universal joint oil seal.*

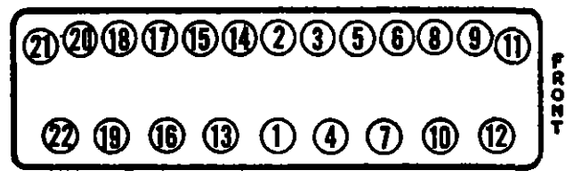
10)—Reinstall shims between thrust plate and thrust pad and tighten thrust plate stud nuts.

11)—Reinstall rear axle assembly.

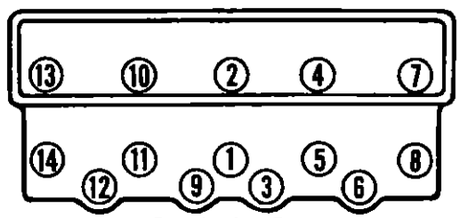
CYLINDER HEAD & MANIFOLD



BUICK 1946-50 IN-LINE CYLINDER HEAD



BUICK 1951-53 IN-LINE CYLINDER HEAD



EXHAUST SIDE

BUICK V8 CYLINDER HEAD

1946-53 MODELS (EXC. V8)

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in the diagram. Cast Iron heads should be tightened cold and rechecked after engine has been run sufficently to bring all parts to normal operating temperature. NOTE—On models using "crimped" cylinder head gaskets cylinder head should be tightened initially and then the entire tightening procedure repeated to compensate for gradual flattening of crimping. Tightening Torque—See Tightening (Torque Wrench) Specifications above.

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1953-55 V8 MODELS

MANIFOLD GASKETS: Gaskets are used on the intake manifold (to head) only. When installing a new exhaust manifold, coat the manifold with a mixture of graphite and oil. In production a special compound is used for this purpose and the original manifold can be re-installed without using additional compound.

►***CAUTION—Do not remove the exhaust manifold while it is hot because warpage is liable to occur.***

PISTONS

1951 SERIES 40 & 50

CAST IRON & ALUMINUM PISTONS (SERIES 40 & 50) PRODUCTION CHANGE & REPLACEMENT CAUTION: Beginning 1951 Series 40 Eng. No. 63319254, Cast Iron Pistons were used in partial or complete production in place of regular aluminum alloy pistons (use of aluminum pistons resumed later in 1951).

►***CAUTION—CAST IRON & ALUMINUM PISTONS INTERCHANGEABLE ONLY IN COMPLETE SETS & CORRECT TYPE CONNECTING ROD MUST BE USED. See CONNECTING ROD & BEARING data below.***

PISTON IDENTIFICATION

Cast Iron Piston Identification—Pistons are heavier and have bronze piston pin bushings with oval shaped depressions in piston skirt at piston pin holes. These pistons have "Lubrite" finish.

Aluminum Piston Identification—Pistons have rectagular depressions in piston skirt at piston pin holes with embossed part number and "Buick" designation. These pistons have anodized finish.

1953-55 V8 MODELS

►*REPLACEMENT PISTON CAUTION (1953-54-55):* Use of 1955 type Press-fit Piston Pin does not change piston specifications for these models. Pistons are interchangeable (within year model limitations) and the only precautions necessary are that the piston fit in the cylinder, and the piston pin fit in the piston, are correct as specified on the Buick car model pages.

ALL MODELS

REPLACEMENT PISTONS: Furnished Standard size, .005", .010", .020", .030" Oversize. Replacement pistons are furnished with piston pins fitted.

PISTON PINS

1953-55 V8 MODELS

►*REPLACEMENT PISTON PIN CAUTION (1953-54-55):* Press-fit Piston Pins (used in production on later 1955 cars) are furnished in Standard Size only as listed below and can be identified by absence of clamp bolt groove. These pins must be used only with Press-fit Connecting Rod Part No. 1162054. Standard Size Clamp-bolt Piston Pins can be used with both type connecting rods but should be checked for size (Diameter .9397-.9394") before any attempt is made to use them with the press-fit connecting rod. Oversize piston pins (.003" & .005" Oversize furnished in Clamp-bolt Type only with groove) can be used only with the clamp-bolt type rod. *BOTH types of pins will be furnished for service.*

Model	Press-fit Piston Pins	Part No.
Series 40 (Std. size only)		1166391
Series 50, 60, 70 (Std. Size only)		1162051

PRESS-FIT PISTON PIN REMOVAL & INSTALLATION: *CAUTION—Special tools (see Tool Note below) must be used to avoid damage to piston assembly parts.*

Pin Removal: Install Piston Support Sleeve J-6047-5 in fixture Base Plate J-6047-1 making certain that **plain flat end upward** (1955 pistons), opposite end with **two machined flats upward** (1953-54 pistons). Slide pin and rod assembly sideways in piston so that pin protrudes from piston, place assembly on fixture so that the protruding pin fits down into the piston support sleeve. Place Drive Pin J-6047-4 on upper end of piston pin with shoulder on pin against end of pin, thread power ram down until drive ball on lower end of ram engages drive pin, press piston pin out of rod and piston assembly.

Pin Installation: Install Piston Support Sleeve J-6047-5 in fixture Base Plate J-6047-1 making certain that **plain flat end upward** (1955 pistons), opposite end with **two machined flats upward** (1953-54 pistons). Install Return Spring J-6047-3 and Guide Pin J-6047-2 (small end of guide pin in spring) in base plate. Assemble rod and piston together with oil spurt hole in rod bearing parting surface on same side as valve clearance depressions on piston head, place assembly on fixture *(CAUTION*—Make certain that guide pin protrudes into connecting rod; on 1953-54 pistons, see that flats on piston support sleeve provide clearance above and below piston pin hole). Lubricate piston pin and inside diameter of rod with Lubriplate, push pin in through piston by hand until it reaches connecting rod. Place Drive Pin J-6047-4 on upper end of piston pin with shoulder on drive pin against end of pin, thread drive ram down until drive ball on end of ram engages drive pin, use just enough pressure to align all drive parts and make certain that there is no side thrust on pin, then press pin in until lower guide pin bottoms in base plate *(NOTE*—Guide pin will insure proper position of piston pin in piston and rod). Remove piston and rod assembly from press. Check pin fit in piston by rocking piston on pin to insure that fit has not been changed by pin installation. Piston should rotate freely on pin at room temperature.

►*PISTON PIN TOOL NOTE (Press-fit Pins):* Special tool set consists of Piston Pin Remover & Replacer J-6047 (Base Plate, Piston Support, Guide Pins, & Spring) used in an arbor press or with 12 Ton Ram J-6180 (with Power Screw & Cross Yoke) adapted for this use by installation of screws furnished in Ram Adapter Kit J-6208.

PISTON RINGS

1953 V8 MODELS

►***REPLACEMENT OIL RINGS (For Improved Oil Consumption Performance):*** Special type ring as used in later production furnished in sets, Part No. 1391624, for cars with low mileage. This ring is special double steel rail type with separator and expander (all temporarily cemented together for ease of installation). Install these rings in accordance with regular procedure placing expander joint in solid area of groove above either end of piston pin (away from oil return slots) with ring gap on high side of cylinder in line with valve head recesses in piston head.

ALL MODELS

REPLACEMENT PISTON RINGS: Furnished Std., .010", .020", & .030" Oversizes in the "Production Type" ring, and in Ring Sets with "Service Type" rings in the following oversizes: Std. to .019", .020" to .039".
NOTE—Manufacturer recommends that when new rings are being installed without reboring cylinders, the glazed cylinder walls should be slightly dulled with a very fine hone.

CONNECTING ROD & BEARINGS

1946-49 MODELS

REPLACEMENT CONNECTING RODS: Replacement rods furnished by the manufacturer are the insert bearing type in place of the babbitted rods used originally. The later type rods can be used either *singly or in complete sets. After the first 5,000 1949* engines, all engines have the insert bearing type rods.

1951 SERIES 40 & 50

CONNECTING RODS FOR CAST IRON & ALUMINUM PISTONS (SERIES 40 & 50) PRODUCTION CHANGE & REPLACEMENT CAUTION: Special rods and matching bearing caps used with Cast Iron pistons due to increased weight of pistons (see PISTONS above). *THESE RODS & BEARING CAPS MUST BE USED WITH CAST IRON PISTONS (can also be used with aluminum pistons if necessary).*

►***CAUTION: Connecting rods and bearing caps intended for Aluminum Pistons MUST NOT BE USED with Cast Iron pistons.***

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CONNECTING ROD IDENTIFICATION

Cast Iron Piston Type—Part No. 1390669 (Assy. with Bearing Cap). Has two raised dots on rear face of connecting rod web and forging number 1344306 on front face. Bearing cap has two ribs on rear face. **Aluminum Piston Type**—Part No. 1393912 (Assy. with Bearing Cap). Has one raised dot on rear face of connecting rod web and forging number 1339643 on front face. Bearing cap marked correspondingly.

1953-55 V8 MODELS

►*REPLACEMENT CONNECTING ROD CAUTION (1953-54-55):* New Press-fit Connecting Rod Part No. 1162054 used with press-fit type piston pin in later 1955 production will be furnished for service on all 1953-54-55 cars after previous type Clamp-bolt Connecting Rod stock exhausted. *Whenever press-fit type connecting rod installed, it must be used with a STANDARD size piston pin (either press-fit or clamp-bolt type pin can be used) and special pin removal and installation procedure (see Piston Pins above) must be followed.*

CRANKSHAFT & MAIN BEARINGS

1948-53 MODELS (EXC. V8)

CRANKSHAFT REPLACEMENT (Dynaflow Cars): It will be necessary to ream dowel pin holes and install oversize dowel pins when a new crankshaft is installed with either the old flywheel or a new one. Proceed as follows:

1) Install crankshaft, clean crankshaft flange and flywheel and remove any burrs. Install flywheel with dowel pin holes aligned and install the six bolts securely. Check flywheel for runout.

2) Remove rear main bearing cap and turn crankshaft so that a dowel hole can be reamed. Ream both dowel holes through crankshaft flange and flywheel, using Reamer J-808-4.

3) Make two dowel pins from 17/32" drill rod cut to 9/16" long. Round off ends of dowel and tap into place through flywheel and flange until ends are flush with rear face of flywheel.

4) Install main bearing cap and complete assembly of engine and transmission.

EARLY 1946 MODELS

REPLACEMENT MAIN BEARINGS (Not Reamed to Size): Replacement bearings for the following cars are not reamed to size and require special equipment for reaming and fitting:

Series 40-50—Up to 1946 Eng. No. 4625584.

Series 70—Up to 1946 Eng. No. 4675200.

LATE 1946 & 1947 MODELS

REPLACEMENT MAIN BEARINGS (Semi Precision Type): Replacement main bearings for the following cars are "Semi-Precision" type and require special fitting:

Series 40-50—After 1946 Eng. No. 4625584, up to 1947 Eng. No. 4918702, and between Eng. Nos. 4919899 and 4922786.

Series 70—After 1946 Eng. No. 4675200, up to 1947 Eng. No. 4918703, and between Eng Nos. 4919900 and 4922786.

1947-53 MODELS

REPLACEMENT MAIN BEARINGS (Full Precision Type): Replacement bearings for the following cars are "Full Precision" type. Shimming or reaming not required:

Series 40-50—After 1947 Eng. No. 4918702, up to 1947 Eng. No. 4919898 inclusive; and after 1947 Eng. No. 4922736, up to 1953 Models.

Series 70—After 1947 Eng. No. 4918703, up to 1947 Eng. No. 4919899 inclusive; and after 1947 Eng. No. 4922786, up to 1953 Models.

1946-48 MODELS

REAR MAIN BEARING OIL SEAL: (Installation)—Use new cork gaskets and special packing ring gasket. Install packing ring gasket in crankcase and allow 3/64" of gasket to protrude above face of bearing, repeat operation for cap. Packing will be compressed to a tight fit when cap tightened in place.

CAUTION—Run engine slowly when first started to prevent damage to packing.

1949-55 MODELS

CRANKSHAFT REAR OIL SEAL: Braided fabric seal fitted in groove behind slinger groove in crankcase and bearing cap. Vertical joint between cap and crankcase fitted with cork seals at each side.

Installation—With crankshaft removed, place new braided fabric seal in groove in crankcase with both ends extending out from bearing parting line, force seal in groove with hammer handle or smooth piece of wood so that seal seats within 1/16" of crankcase. Cut ends of seal off flush with crankcase (use razor blade or sharp knife). Repeat operation for bearing cap. Coat vertical grooves in cap with gasket cement (allow to set until tacky), use new cork gasket and fit into groove with putty knife (ends will project beyond cap). Place cap in vise to lightly compress seals in grooves, cut ends of cork seals flush with cap surface. Coat cork gaskets with vaseline, install cap in crankcase.

►*CAUTION—Engine must be operated at slow speed when first started after new braided seal installed.*

ENGINE FRONT COVER

1953-55 V8 MODELS

TIMING CHAIN COVER: Removal—Drain cooling system, remove radiator core, shroud, fan belt, fan and pulley, and vibration dampener. Take out all bolts attaching timing chain cover and water manifold to cylinder head heads and crankcase (DO NOT remove the five water pump mounting bolts). Remove cover and water pump as an assembly. *CAUTION—Use care to avoid damaging oil pan gasket.*

1946-51 MODELS

FRONT OIL SEAL: Installation—With timing chain cover out of engine and old seal and gasket removed from hole in cover, clean oil seal seat in cover. Install new gasket in hole, then press new seal in place with the small diameter (or side with garter spring) to rear. Timing chain cover oil seal driver, Tool J-1870 is available for properly seating seal in cover

1952-55 MODELS

FRONT OIL SEAL: Installation—*After removing* braided fabric packing with a screw driver and tapping pressed steel shedder out of timing chain cover, work the new packing into the shedder, then drive shedder into recess in timing chain cover using Installer Tool J-5250-1. Push the Packing Expander Tool J-5250-2 through the seal to expand packing into place. Apply a light coat of vaseline to packing.

►*CAUTION: Engine must be operated at slow speed when first started after new braided seal installed.*

FLYWHEEL

ALL MODELS

FLYWHEEL REPLACEMENT: Flywheel or Ring Gear can be replaced separately on Synchro-mesh Cars (gear is shrink fit on flywheel), but must be replaced as an assembly on Dynaflow Drive Cars (gear is welded in place and not furnished separately).

Ring Gear Replacement (Synchro-mesh Cars): Remove old ring gear by drilling 5/16" hole in gear between two teeth, split the gear at this point with a chisel and remove the old gear. Polish several spots on new ring gear with emery cloth, heat gear uniformly on a hot plate or with a torch until polished spots turn blue which will indicate a temperature of approximately 600°F. *(CAUTION*—Heating gear in excess of 800°F. will destroy factory heat treatment). Install ring gear on flywheel with beveled end of teeth out or away from shoulder, allow gear to cool.

►*1948-53 DYNAFLOW MODELS (EXCEPT V8) FLYWHEEL REPLACEMENT:* When replacing flywheel only, it is necessary to ream the two dowel holes to avoid deforming flywheel when bolted to crankshaft. *See "Crankshaft Replacement" under Crankshaft & Main Bearings above.*

Installation of Flywheel (All Models): Make certain that flywheel and crankshaft flange are clean and free from burrs which might cause run-out (remove burrs with a mill file). Install flywheel and tighten all bolts evenly to 50-55 ft.lbs. torque. On Dynaflow Drive Cars, check flywheel run-out (see below). On all cars, check engine for vibration after transmission installed and correct any unbalance caused by replacement of parts. *See ENGINE BALANCING*

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Flywheel Run-out (Dynaflow Drive Cars): Mount dial indicator on flywheel housing so that indicating stem bears on rear ground face of flywheel at inner side of large holes in rim. Turn flywheel making certain that crankshaft end thrust held in one direction and note run-out at flywheel face. Run-out must not exceed .008". If run-out exceeds .008" and cannot be corrected by tapping high side of flywheel with a mallet, remove flywheel and check for dirt or burrs between flywheel and face of crankshaft flange. If run-out still exceeds .008" after re-installation of flywheel, check run-out of crankshaft flange rear face.

ENGINE BALANCING

1948-55 MODELS

▷*IF VIBRATION NOTED AFTER INSTALLATION OF CRANKSHAFT, FLYWHEEL, AND OTHER ROTATING PARTS, CORRECT THIS UNBALANCED CONDITION AS FOLLOWS:*

▷*CAUTION:* Procedure below will correct minor unbalance caused by replacement of individually balanced parts. Extreme vibration caused by parts abnormally out of balance, or different in weight from corresponding parts, should be corrected by replacement of these parts.

Critical Speed of Vibration—Determine speed at which vibration is most evident (use tachometer) and operate engine at this speed to check results from the following corrective procedures.

SYNCHRO-MESH ENGINE UNBALANCE CORRECTION:

1)—If clutch assembly has been removed and re-installed, make certain all clutch cover bolts are same type and length and that lockwasher used with each bolt. See that alignment marks on clutch cover and flywheel (made before clutch removal) are together. If vibration not caused by clutch, mark clutch cover and flywheel and remove clutch assembly.

2)—Operate engine with clutch removed and check for vibration. If vibration eliminated (indicating unbalance is in clutch), re-install clutch and balance the assembly as directed in step (3) following. If vibration still present, balance the flywheel as follows: Install one clutch cover bolt in successive flywheel bolt holes and operate engine with bolt in each location until a position is found in which vibration is eliminated (this test weight can be varied by using a shorter bolt or by adding washers to the bolt). When engine runs smoothly, remove bolt and drill shallow holes on DIAMETRICALLY OPPOSITE side of flywheel (*CAUTION*—use ⅜" drill and DO NOT drill any hole more than ¼" deep). When engine runs smoothly, re-install clutch as follows:

3)—Install clutch assembly (*CAUTION*—align marks made before removal), operate engine and check for vibration. If vibration noted, balance clutch by installing plain washer successively under each mounting bolt lockwasher until engine runs smoothly. *NOTE*—If necessary, plain washers can be installed on two adjacent bolts to obtain sufficient weight for clutch balance.

DYNAFLOW DRIVE ENGINE UNBALANCE CORRECTION: *See Buick "Variable Pitch Dynaflow Drive" in Transmission Section.*

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT

CONVENTIONAL TYPE LIFTERS (1946-53 EXCEPT V8 MODELS): .015" setting is road operating clearance (with oil and water temperatures stabilized). Since road operating oil and water temperatures cannot be obtained by running engine in shop for warm-up, car manufacturer recommends the following procedure (with variation in setting to compensate for different temperatures) for securing this setting: Run engine in shop at fast idle (700 RPM. min.) for 20 minutes, 30 minutes maximum, then adjust tappets using a .017" feeler as "GO" gauge, .018" feeler as "NO GO" gauge (if car has been run previously and engine oil is warm when shop warming up run started), or use .001" larger gauges (if car not run previously and engine and oil are cold or at room temperature when shop warming up run started). *CAUTION*—Cars brought in from a hard run should be allowed to stand for 1 hour before tappet adjustment is made.

HYDRAULIC VALVE LIFTERS INITIAL ADJUSTMENT (1948-53 EXCEPT V8 MODELS): Required only when cylinder head has been removed, valves refaced, valve lifters removed, or when setting of adjusting ball stud disturbed.

▷*V8 ENGINE HYDRAULIC VALVE LIFTER NOTE: Initial adjustment of lifters not required on these engines.*

▷*CAUTION—Lifters must be at the lowest position (on heel of cam) when making initial adjustment.*

Adjustment—Set engine in firing position for cylinder to be worked on, this locates lifters *(if all valves being adjusted use table below to avoid setting firing position for each cylinder).* Turn adjusting ball stud to point where all play just removed at each end of push rod and all lash clearance removed from valve train, then turn adjusting ball stud down exactly two (2) turns. Oil groove on ball stud must be at least halfway down in rocker arm (ball stud can be turned down one additional turn—if this does not bring oil groove down, replace push rod or lifter).

Adjusting All Valves—By using the flywheel mark "U.D.C. 1-8" and setting engine in firing position for #1 cylinder, valves in left half of table below can be adjusted, then set #8 cylinder firing position and valves in right half of table can be adjusted.

Hydraulic Valve Adjusting Table

No. 1 Cyl. Firing		No. 8 Cyl. Firing	
Valve No.	Valve	Valve No.	Valve
1	#1 Exh.	3	#2 Int.
2	#1 Int.	5	#3 Exh.
4	#2 Exh.	6	#3 Int.
7	#4 Int.	9	#5 Exh.
8	#4 Exh.	10	#5 Int.
11	#6 Int.	13	#7 Exh.
12	#6 Exh.	15	#8 Int.
14	#7 Int.	16	#8 Exh.

ROCKER ARMS

1946-53 MODELS (EXC. V8)

ROCKER ARMS AND COVERS: Rocker arms are mounted on tubular shaft and held against side of shaft brackets by spring installed on shaft between adjacent rocker arms. Shaft retained in brackets by pilot setscrew installed in top of #2 bracket. When installing rocker arms, make certain that lug on side of arm at adjusting screw end is toward bracket (all rocker arms Series 40, 50, intake rocker arms Series 60, 70, 80, 90). Exhaust rocker arms for Series 60, 70, 80, 90 are straight (no offset or reference lug). Rocker Arm Clearance—.002-.004".

Rocker Arm Lubrication Connection:—Metering restriction for oil feed to hollow rocker arm shaft located in cylinder head and oil pipe fitted directly into top of #1 bracket. #1 and #2 brackets are same part and shaft pilot screw is self-tapping type.

1946-49 Series 40, 50 (Conventional Lifters)
1946-48 Series 70 (Conventional Lifters)

Part Number	Identification Mark① Upper	Lower	40-50-70 Intake	40-50 Exhaust
1303840	2 Dots	0	1-3-5-7	2-4-6-8
1303841	1 Dot	1	2-4-6-8	1-3-5-7
1303842	42	X	(All Series 70 Exhaust)	

1950-53 Series 40 (All Lifters)
1949-52 Series 50 (Hydraulic Lifters)
1948-52 Series 70 (Hydraulic Lifters)

Part Number	Identification Mark① Upper	Lower	50-70 Intake	50 Exhaust
1324123	2 Dots	0	1-3-5-7	2-4-6-8
1342122	1 Dot	1	2-4-6-8	1-3-5-7
1337336	42	X	(All Series 70 Exhaust)	

①—Stamped on adjusting screw end of rocker arm.

▷*VALVE PUSH ROD NOTE*—On all Early 1950 Series 40 with adjustable valve lash, and all engines with hydraulic valve lifters, the push rod ends are drilled for oil passage to lifters. On LATER SERIES 40 with adjustable valve lash, the hole in the upper end of rod is eliminated. (These rods can be identified by copper finished rod socket end.)

Rocker Arm Installation (Except V-8): Offset of each rocker arm is toward centerline of bracket it rests against. Install rocker arms marked "1" & "1 Dot" on front-of-engine side of bracket, and rocker arms marked "0" & "2 Dots" on rear side of bracket.

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1953-55 V8 MODELS

►*1954 ROCKER ARM SHAFT PRODUCTION CHANGE FOR IMPROVED VALVE STEM LUBRICATION:* Rocker arm shaft diameter reduced .001" (First Type Diameter .810-.811", Later Type Diameter .809-.810"). Later type shaft was used in production on later cars and is furnished for replacement on ALL engines.

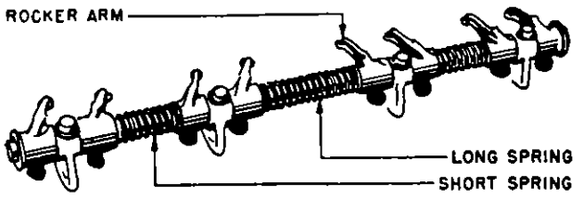
ROCKER ARM ASSEMBLY: One assembly mounted on each cylinder head (see illustration).

Disassembly: Remove cotter pin, flat washer, and spring washer from each end of shaft. Pull mounting bolts out of support brackets, slide shaft out of rocker arms and brackets.

Reassembly: See illustration for location of parts. Install longer spring at center of shaft and install rocker arms with offset (slant) toward center of shaft (two types of rocker arms used—see table below for proper location of each type). Turn shaft so that notch in one end of shaft is upward or toward top of bracket and install bolt through bracket and shaft to maintain this position *(CAUTION*—Notch must be upward to place rocker shaft oil holes in proper relationship to rocker arms).

Rocker Arms

Part No.	Location
1343454	4 Right Front & 4 Left Rear
1343455	4 Left Front & 4 Right Rear



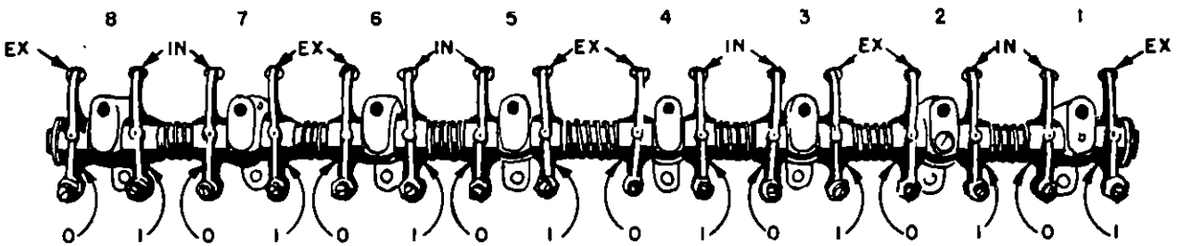
BUICK V8 ROCKER ARM ASSEMBLY (ONE ASSEMBLY FOR EACH BANK)

Installation: Make certain that notch in one end of rocker arm shaft is upward, position assembly on head with dowels engaging blind holes in brackets, tighten all bracket bolts evenly to 30-35 ft.lbs.

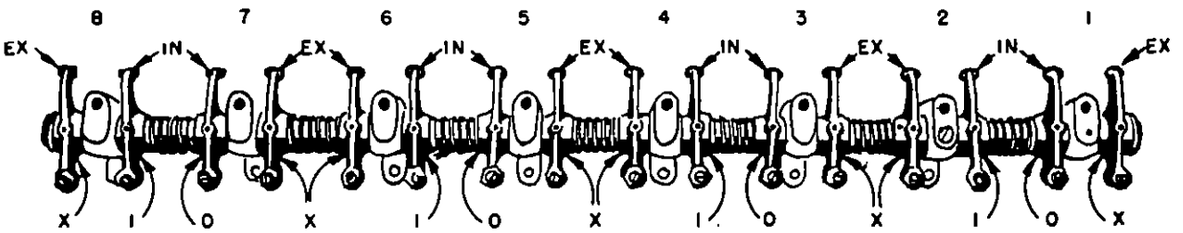
HYDRAULIC LIFTERS

1948-55 MODELS

HYDRAULIC VALVE LIFTERS: Barrel type, consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet or body (See illustration). Oil is introduced to this unit through rocker arm and pushrod assembly (All Series Except V-8), through main oil gallery in block (All V-8 Series).



IDENTIFICATION MARKS ON LOWER SIDE OF ARM
1946-53 SERIES 40 & 1946-52 SERIES 50 ROCKER ARM ASSEMBLY



IDENTIFICATION MARKS ON LOWER SIDE OF ARM
1946-52 SERIES 70 ROCKER ARM ASSEMBLY

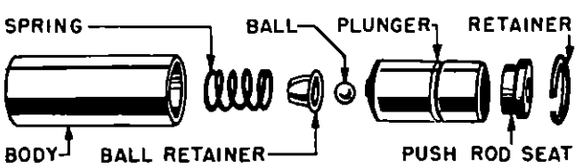
Removal (Except V-8 Series): Hydraulic lifter can be removed from crankcase by inserting the slightly bent end of a stiff wire into the oil hole in push rod seat. If carbon formation in bore above lifter prevents removal, clean with a suitable solvent being careful not to get dirt or carbon into lifter.

Removal (V8 Models): Remove air cleaner, disconnect all pipes and wires from carburetor and intake manifold, remove carburetor and manifold as an assembly. Thoroughly clean cylinder heads, rocker arm covers, and adjacent areas to prevent dirt entering engine. Remove rocker arm covers and rocker arm assemblies, remove pushrods. Remove valve lifter cover, lift out individual valve lifters ***and place them in numbered compartments of a holding fixture to insure re-installation in original position in engine.***

Disassembly: Use a push rod to hold down the push rod seat in lifter while removing plunger retainer from body with Retainer Remover J-5238. Remove push rod seat and plunger from lifter body. Body bore above plunger may be caked with carbon and varnish. In this case, place lifter in large end of Plunger Remover Tool J-4160-A, with plunger inward. While holding lifter with thumb, rap open end of remover against a block of wood with just enough force to jar plunger from body.

►*IMPORTANT NOTE*—Disassemble one lifter at a time to avoid interchanging parts. Be careful not to score or nick lifter parts.

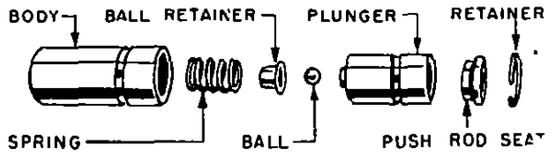
Cleaning and Inspection: Wash all parts in a suitable carbon solvent and remove all trace of carbon and varnish. Inspect plunger and lifter body for scoring or other damage that would prevent free movement. Inspect lower end of lifter body for nicks or identations. If any exist, replace complete lifter assembly. Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement. Plunger should drop of own weight into body bore.



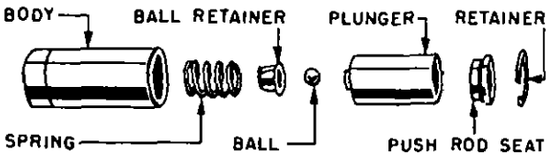
BUICK 1948-50 HYDRAULIC VALVE LIFTER

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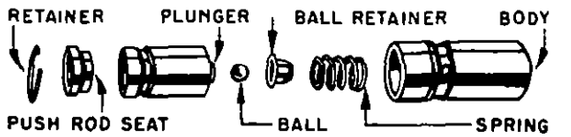
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BUICK 1951 HYDRAULIC VALVE LIFTER



BUICK 1952 HYDRAULIC VALVE LIFTER



BUICK 1953-55 HYDRAULIC VALVE LIFTER

Reassembly: Test check ball travel before reassembling lifter (see Testing below). It is recommended that all parts be rinsed in clean kerosene and then assembled without drying (this will eliminate all lint and dust adhering to parts). Hold plunger in vertical position with feed hole up, install check ball, ball retainer, spring, and body over the plunger. Invert assembly and install push rod seat and plunger retainer in end of body, use handle of tool J-5238 to depress these parts until retainer engages groove in body. Test lifter for "leak down rate" (see Testing below). Protect lifter assembly by wrapping in clean paper until it is installed in the engine.

Testing: (Check Ball Travel)—Install Sleeve KMO-30-K on Test Fixture J-5095, to mount dial indicator so that stem of indicator bears squarely on upper end of pin in attachment. Place a new ball check in seat in lifter plunger, then hold plunger and ball firmly against attachment arm with plunger centered over pin and stepped flange. While holding ball and plunger firmly in place, set dial indicator to "0." Remove plunger and ball, place ball in retainer, and install these parts on plunger. Center plunger over pin and stepped flange of check attachment and while pressing plunger and retainer firmly against attachment arm, note dial indicator reading. Ball travel must be .004-.008" to insure satisfactory lifter operation.

Leakdown Rate—Prepare a special test fluid by placing 20 ozs., of Special Buick Oil for Dynaflow Drive in a clean and accurate container, then fill container to the "one gallon" mark with kerosene. Stir and shake container to thoroughly mix oil and kerosene. Clean cup of Test Fixture J-5095 and fill it to within ½" of top with test fluid. Install Gauge Sleeve J-5180-5 in cup, install Gauge Rod Nose J-5182-2 in ram. Swing weight arm up out of the way, raise the ram and place the valve lifter (top side up) in the sleeve in cup. Make certain lifter is completely covered by fluid. Lower ram to rest in lifter push rod seat, then lower weight arm to rest on roller of ram. Operate lifter plunger through its full travel to force out all air by using a pumping action on weight arm. Continue pumping until considerable resistance is built up in lifter and a definite grab point is felt at top of the stroke, when indicator pointer is at bottom of the scale. Finally pump vigorously for approximately 10 additional strokes to make sure all air is out of lifter. (NOTE—If one stroke offers noticeable weak resistance during the last 10 strokes, replace the check ball in lifter and repeat leakdown test to this point). Raise arm to allow lifter plunger to come up to its retainer, then lower the arm to rest on ram roller. As the pointer starts moving upward, start rotating fluid cup by turning handle one revolution every two seconds. Use a stop watch to check time required for pointer to move from lower to upper mark on scale (upper mark labeled "8-in-line" or "V-8"). The leakdown rate, (time between marks) must be 12-14 seconds. Check doubtful lifters 3-4 times and replace any lifter which does not test within these limits.

OILING SYSTEM

OIL PUMP

1949-53 MODELS (EXC. V8)

OIL PUMP OVERHAUL: Pump removed from engine. Disassembly—Remove screen and float assembly from pump cover by removing cotter pin. Remove oil pressure valve and spring and take out idler gear. Remove pump shaft and gear assembly. Wash all parts thoroughly with solvent and blow out screen assembly with light air pressure.

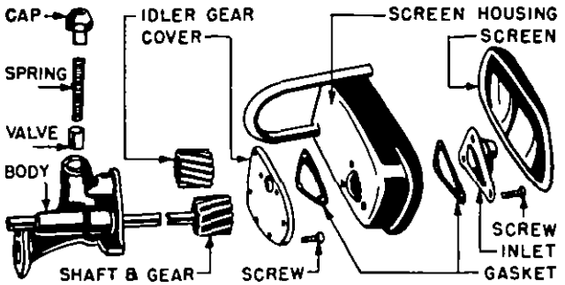
Reassembly—Before reassembling pump, inspect pressure valve for free movement in pump body. Check hole in pump body for roundness (if worn, replace pump body). Replace spring if collapsed or worn. Check position of gear on drive shaft, measurement should be (Series 40 & 50) 7⅝" minus .010", (Series 70) 8" minus .010", from gear to end of shaft. Install gear and shaft assembly in pump body and then install idler gear with rounded end of teeth inward. Lay a straightedge across pump body and check clearance of gears. Clearance should not exceed .004". Install pump cover and tighten cover screws evenly. Shaft and gears must turn freely with a slight amount of endplay. Attach screen assembly, making sure it swings freely and stops permit full range of movement.

Installation—Attach pump assembly to engine using the correct gasket. Tighten attaching screws evenly. Test pump alignment by twisting shaft with fingers; shaft should turn freely within limits of gear backlash. Make this test every 180° through two full revolutions. If pump is not free, loosen attaching screws and shift pump to relieve binding. If binding continues to exist, remove pump and distributor and grind a slight amount from ends of pump and distributor shafts. Distributor gear must be removed.

V8 ENGINES

OIL PUMP: Gear Type. Driven by distributor shaft which is driven from camshaft through spiral gears.

Disassembly: Carefully pry screen out of housing, remove attaching screws and remove parts in following order: Pump Inlet, Gasket, Screen Housing, Gasket, Body Cover, Shaft & Gear, and Idler Gear. Remove plug on side of body and take out pressure regulator spring and valve.



BUICK V8 OIL PUMP

Cleaning & Inspection: Wash screen and all pump parts in solvent and dry with air. See that oil pressure valve operates freely in body and that hole is not oversize, check spring for wear, distortion or collapsed coils. Inspect pump body, gears, and shaft for wear or scoring. Check gear end clearance by installing gears in body and placing straightedge across cover flange. Clearance between straightedge and face of gears must be less than .004" and gears must turn freely. For other clearances, see table:

Oil Pump Clearances

Drive Shaft Bearing Clearance	.001-.0025"
Idler Gear Bearing Clearance	.001-.0025"
Driving Gear Backlash	.003-.006"
Pump Gears Backlash	.006-.012"
Pump Gear End Clearance in Body	.0005-.004"
Regulator Valve Clearance in Body	.003-.006"

Reassembly: Reverse disassembly procedure above.

Installation: Install oil pump with gasket on crankcase, turning pump shaft as required to engage driving tongue on distributor shaft. Install pump attaching bolts with lockwashers, then tighten bolts alternately a little at a time with one hand while turning pump shaft back and forth through gear lash with other hand. Pump shaft must be free of bind when bolts are securely tightened. If shaft binds, rap pump body lightly with a rawhide mallet.

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IGNITION NOTES

V8 ENGINES

SPARK PLUG CABLE WIRING AFTER WORK ON ENGINE (To prevent mis-firing): Cables should be arranged in following order in grommets on cylinder head to prevent consecutively firing plug cables from being adjacent to each other:

Right Bank Cables—Arrange cables in following order in grommet on head and at entrance to spark plug cover: 3, 5, 7, 1 (front to rear). Arrange #1 plug cable over rear cover stud and #5 spark plug, under #3 spark plug, and over front cover stud. Arrange #3 plug cable under rear cover stud and #5 spark plug. This will prevent #1 and #3 cables from being parallel.

Left Bank Cables—Arrange cables in following order in grommet on head and at entrance to spark plug cover: 4, 6, 2, 8 (front to rear). Arrange #2 plug cable under rear cover stud and #6 spark plug, and over #4 spark plug. Arrange #4 plug cable over rear cover stud and under #6 spark plug.

DETONATION CORRECTION (ALL SERIES): Proceed as follows:

1) Check spark plug cable wiring (see above).

2) Check for excessive oil consumption. Correct as necessary.

3) Check initial distributor setting and if necessary reset to 5° BTDC.

4) Check to see if centrifugal and vacuum advance of distributor falls within specified limits. Check distributor for dwell angle variation. Dwell should not vary more than 3° total between idle speed and 1500 RPM.

5) Make sure fuel is highest octane conveniently available.

6) If the above procedures do not correct the detonation the initial distributor setting may be retarded to TDC without any noticeable loss in performance or economy. If detonation still occurs, remove all traces of carbon from combustion chambers.

LOCATING IGNITION TIMING MARK (If mark obscured or lost): Rotate the crankshaft until the flywheel counterweight cam (flat surface on crankshaft flange where it attaches to flywheel) is parallel with bottom of engine and pointing toward starter (left) side of engine. Note primary pump converter cover-to-flywheel bolt (only one should be visible), then note first converter cover bolt flywheel clearance hole to the **right** of the bolt (facing toward rear of engine), draw an imaginary line through the center of the flywheel gear and through the center of this clearance hole. Count five teeth back or to the left of the point where the line intersects the gear teeth—this **fifth** tooth is the ignition timing point and should be marked with yellow paint and have figure "5" stamped on side toward rear of car.

ELECTRICAL NOTES

1946-47 MODELS

DISTRIBUTOR SHEARED DRIVE PIN CORRECTION & IMPROVED LUBRICATION: Some distributors on early cars did not have sufficient grease or facilities for greasing. These distributors (and distributors with frozen bearings) should be replaced (replaced by manufacturer under warranty). Distributors on which drive gear pin has sheared should be repaired by installing new pin, No. 822273, with sufficient number of No. 1848595 and No. 1848596 washers for correct shaft endplay of .002-.007".

1946-47 MODELS

STARTER PINION ENGAGEMENT & DISENGAGEMENT CORRECTION: If starter drive clutch pinion does not engage with flywheel (on starters built before August 1, 1946), replace Shift Lever, Part No. 1884808, with redesigned part of same number which may be identified by zinc-plated finish (original lever painted black) which will correct interference between shift lever and collar. NOTE—Starters on which this correction has been made may be identified by spot of white paint on frame above name plate and by zinc-plated finish of lever. Starters built after Aug. 1, 1946 (Serial No. 6-H-1 up) have this new lever.

If Starter does not engage or cranks continuously (with new type Shift Lever described above)—Check for binding of solenoid contact disc and pushrod on terminal plate guide pin. Replace contact disc and pushrod assembly if guide hole is eccentric (replaced by manufacturer under warranty), straighten guide pin if bent.

1951 MODELS

►**STARTER RELAY "STICKING" CORRECTION (1951 Cars)**—The following five types of starter relays were used in production. Type #1 and Type #2 have a tendency to stick in the closed position and should be replaced by either of the Types 3, 4, or 5.

Relay Identification—
Type #1. No marks between bracket mounting screws.

Type #2. "A" stamped in ink between bracket mounting screws.

Type #3. "B" stamped in ink between bracket mounting screws.

Type #4. "C" stamped in ink between bracket mounting screws.

Type #5. A line ¼" long stamped in bracket between mounting screws.

CLUTCH NOTES

1946-50 MODELS

CLUTCH OVER-CENTER RETURN SPRING: Used on all models. Consists of spring connected to angular link attached to lower end of pedal or equalizer shaft and anchored to frame. This design allows spring to exert pressure to hold pedal down with clutch disengaged and out with clutch engaged.

Adjustment—Angular link is self positioning on pedal shaft or equalizer shaft. Tighten frame mounting bolt nut as much as possible by turning nut up to limit of threads so that maximum spring tension secured.

►*CAUTION*—Spring tension must always be relieved (by backing off eye-bolt nut) before disconnecting clutch linkage.

1946-53 MODELS (EXC. V8)

CLUTCH YOKE BOOT ASSEMBLY: Consists of a flexible boot installed on release yoke to seal opening in flywheel housing. Boot is mounted on yoke at outer end by bolt which also attaches release rod nut lock and has a retainer spring at inner end which engages rim of hole in housing. When installing boot, make certain that spring fingers are properly engaged in housing and that release rod nut lock is correctly positioned.

BRAKE NOTES

1948-53 MODELS

RECONDITIONING BRAKE DRUMS: Brake drums must not be machined to more than .060" over the original inside diameter. Brake drums requiring more than .060" to clean up should be replaced. Drums requiring more than .010" should be turned to .030", and .030" oversize lining used.

BRAKE DRUM BALANCE: Brake drums must not be out of balance more than 6 inch ounces. During manufacture, drums are balanced within this limit by welding weights (as required) to the flange near the rim. These weights must never be removed. After brake drums have been machined, or if difficulty is experienced in maintaining wheel balance, drums should be checked for static balance. Drums out more than 6inch ounces may be corrected by installation of service balance weights. Weights are installed by drilling a 17/64 hole in face of drum 4½" out from the center, and bolted to drum. ⅝ oz., 1¼ oz., and 1⅞ oz. weights are available for this purpose. Drums can be tested on any machine used for checking wheel balance.

HOOD ADJUSTMENT: *See Buick Special Data.*

MODEL IDENTIFICATION

STARTING SERIAL NUMBERS

Year	Flint Mich.	South Gate, Cal.	Linden N. J.	Kansas City, Kan.
1946	1 4364445	2 4380001	3 4390001	
1947	1 4524131	2 4530001	3 4542001	4 4536001
1948	1-4801266	2-4820001	2-4824001	4-4830001

	Atlanta Ga.
1948	6-4834001

Location—On plate on right side of cowl under hood ('46-47), on left front door hinge post ('48).
Identification—First digit of number indicates the assembly plant as follows: 1) Flint, 2) California, 3) Linden, 4) Kansas City, 6) Atlanta.

ENGINE NUMBER: Stamped on boss on right side of crankcase below pushrod cover.
1946 Numbers—First numbers as follows:
4558037 4 (for 40), 4558037 5 (for 50), 4558297 7 (70).
1948 Numbers—First numbers as follows:
49998814 (for 40), 49998815 (for 50), 49998817 (70).
Identification—Last digit of number indicates the Series: 4—Series 40, 5—Series 50, 7—Series 70.

TUNE-UP

COMPRESSION PRESSURE: 112 lbs. (for 40 and '46-47 50), 114 lbs. (1948 50 and All 70), 118 lbs. (for 1948 Dynaflow) at cranking speed.

VACUUM READING: Steady 18-20" idling at 8 MPH. or 450 RPM. for all models.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plug Type: AC No. 48. 14 mm. Metric.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.015". Limits .0125-.0175".
Cam Angle or Dwell—31° closed, 14° open.
►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".*
Breaker Arm Spring Tension—19-23 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 4° BTDC. (40, 50), 6° BTDC. (70).
►*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance.*
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"ADV. 4°" (for 40, 50), "ADV. 6°" (for 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for 40, 50; 6-7° for 70). Index mark located on edge of timing hole under cover on housing above starter.
Final Ignition Setting—Very light "ping" may occur with part throttle on a hard pull, or during acceleration between 10-20 MPH. with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—Both idle screws approximately 1 turn (½-1) turn open and set for smooth idle (turn screws out for richer mixture). Idle speed 8 MPH. or 450 RPM.
Float Level (Carter)—3/16" (608S, SA; 609S, SA), 5/32" (608SC, 609SC, 663S, 664S) top of each float to gasket seat on cover with valve seated (invert to check). Fuel level even with bottom of inspection hole on side of float bowl with engine idling.
Float Level (Stromberg Carb.)—Fuel level 19/32" below top edge of float bowl or even with bottomof inspection hole on side of bowl, engine idling.
Accelerating Pump (Carter Carb.)—2 holes in arm. Inner hole minimum charge, Outer hole maximum. NOTE—No seasonal pump adjustment on 608S, SA and 609S, SA carburetors.
Accelerating Pump (Stromberg Carb.)—Center hole (med. stroke) normal for all-seasonal operation.
Fuel Pump Pressure—4½-5½ lbs. at pump outlet port or 4-5 lbs. at carburetor inlet.

Throttle Linkage Adjustment & Dashpot Setting: *See CARBURETOR.*

MANIFOLD HEAT CONTROL: Thermostatic coil type. Setting—Thermostatic coil wind-up should be ¼ turn at 70° F. Adjust counterweight spring clip so that edge of counterweight is approximately 7/16" past vertical center line of pivot with valve closed

►**VALVE TAPPET CLEARANCE:** *CAUTION—Feeler gauge used depends on engine temperature (do not use .015" feeler). See "Tappet Clearance Adjustment Procedure" in Buick Shop Notes to secure .015" lash at Road Operating Temperature.*
Valve Timing Check—*See Valve Timing.*

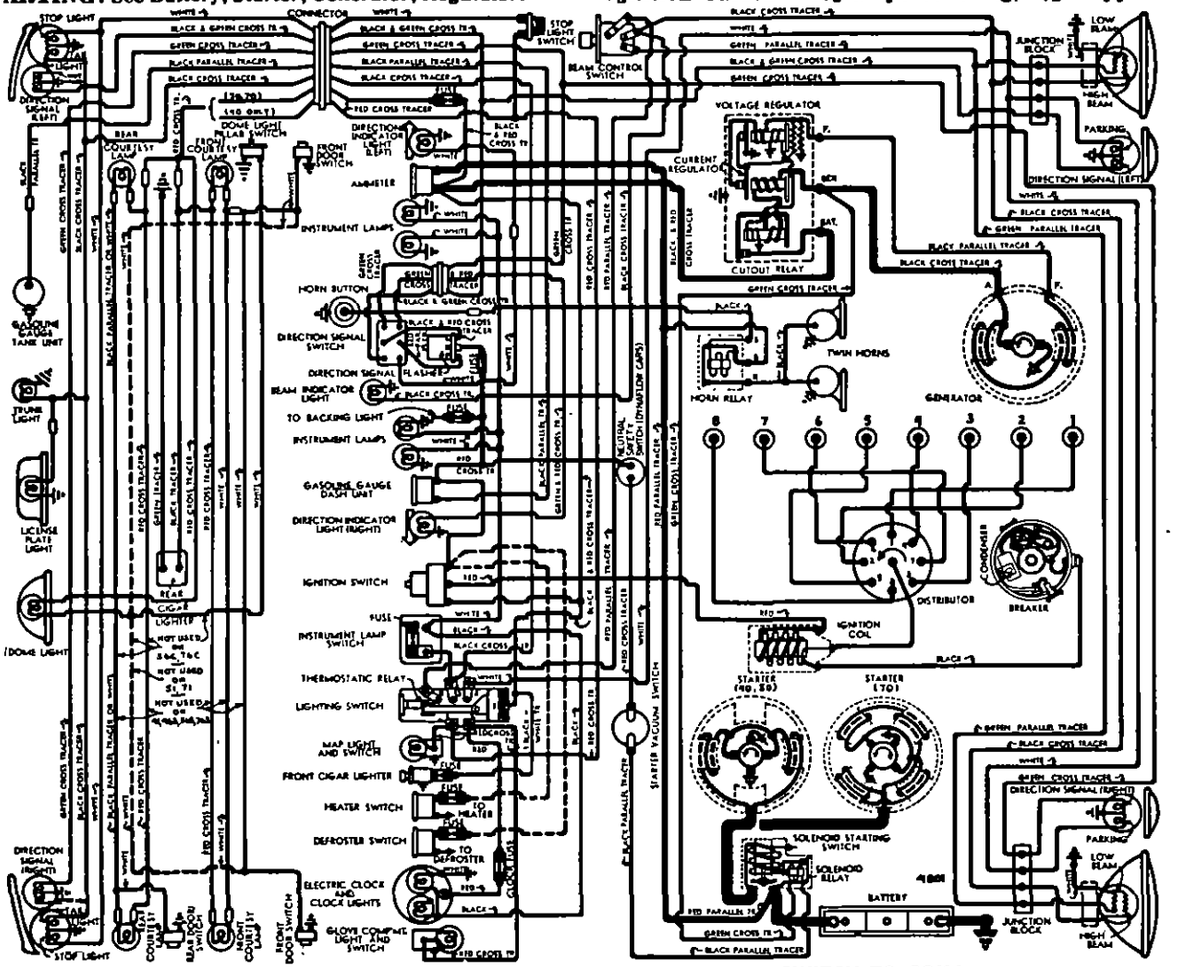
STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH ('46-47): D-R No. 1116296 (Series 40 LHD.), 1116297 (Series 40 RHD.), 1116325 (Series 50, 70 LHD. exc. Conv.), 1116357 (Series 50, 70 LHD. Convertible), 1116332 (Series 50, 70 RHD.).
NOTE—Armored cable used on 1946-47 cars only.

IGNITION SWITCH (1948): Delco-Remy Numbers:
Special—1116359 (LHD), 1116297 (RHD).
Super & Rdmstr.—1116360 (LHD), 1116332 (RHD).
Convertible (Super & Rdmstr.)—1116361 (LHD).
NOTE—Switch on Convertible has silver contacts.
Ignition Lock—Briggs & Stratton No. 85370 (Lock Cylinder), No. 85317 (Lock Case).
Key Series—8000 to 9499. **Groove**—No. 15.

COIL: Delco-Remy Nos.: 1115024 (Early 1946), 1115026 with radio condenser (Late 1946, All 1947, RHD Cars 1948), 1115328 (1948 LHD Cars). NOTE—Armored cable not used with 1115328 coil.
Location—On engine side of dash (1946-47 cars), on right side of engine (1948 cars).
Ignition Current—2½ amperes idling, 4½ stopped.



►1946-47 CARS HAVE ARMORED IGNITION CABLE (IGNITION SWITCH TO COIL)

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110801. Single breaker, full automatic advance type with auxiliary vacuum spark control and manual adjustment

►*1946-47 CAUTION—To Correct Sheared Drive Gear Pins and Improve Lubrication on Early Distributors, see "Electrical System Notes" in Buick Shop Notes.*

Breaker Gap—.015". Limits .0125-.0175".
Cam Angle—31° closed, 14° open.

►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".*

Breaker Arm Spring Tension—19-23 ounces.
Rotation—Counter-clockwise viewed from above.

Distributor **Automatic Advance** Engine

Degrees	R.P.M.	Degrees	R.P.M.
Start	250	3.5	500
7	400	14	800
13	1500	26	3000

Vacuum Spark Control: Delco-Remy No. 681-H. Integral type (mounted on distributor, linked directly to breaker plate). Provides additional advance at speeds above 18 MPH. except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. Maximum plunger travel ⅛".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
5½°	11°	10-13"

Distributor Removal: Mounted on right side of crankcase. To remove, disconnect vacuum line, take out two hold-down screws in advance arm, lift out.

IGNITION TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
Series 40①, 50③	4° BTDC	.0063" BTDC.
Series 70②	6° BTDC	.0149" BTDC.

①—Regular Fuel. ②—Ethyl Fuel.
③—Regular Fuel 1946-47, Ethyl Fuel 1948.

►*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance.*

Flywheel Mark—"ADV. 4°" (for 40, 50), "ADV. 6°" (for 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for 40, 50; 6-7° for 70). Index mark located on edge of timing hole under cover on housing above starter.

►**TIMING MARK NOTE**—On first 1946 cars, timing mark on Series 40, 50 is a ¼" wide knurled section on flywheel, painted yellow, with leading edge marked "ADV. 4°" and trailing edge marked *"2°"*; on Series 70, mark is a yellow painted line stamped "ADV. 6°". *On these early 1946 cars, set ignition at leading edge of timing mark or within ⅛" (1°) of leading edge.*

Timing (With Synchroscope)—Connect synchroscope to #1 spark plug lead, direct light on flywheel through inspection hole in right front face of housing. Idle engine at **speed not greater than 350 RPM.**, loosen two distributor hold-down screws, rotate distributor until "ADV" mark on flywheel (see Flywheel Mark Note above) lines up with indicator, tighten hold-down screws. Refer to Final Ignition Setting

Timing (Without Synchroscope)—With #1 cylinder on compression, turn engine over until "ADV" mark on flywheel lines up with indicator in inspection hole in right front face of housing. Loosen two distributor hold-down screws, rotate distributor until contacts begin to open, tighten hold-down screws.

Final Ignition Setting—*Must be within yellow band of flywheel mark (leading edge desired).* If timing advanced, engine roughness may result even with high octane fuel. If timing retarded to overcome heavy "ping", engine performance and economy will be lessened (higher octane fuel should be used). A very light "ping" may occur with part throttle on a hard pull, or during acceleration with wide open throttle between 10-20 MPH. Do not retard timing to eliminate this light "ping."

CARBURETOR

Carter WCD or Stromberg AAV types. Dual (double barrel) downdraft types with Automatic Choke.

Series	Carter WCD	Stromberg
40, 50 ('46-47)	608S, SA, SC	AAV-16 Code 7-66
40, 50 (1948)	663S	①AAV-167 Code 7-69
70 (1946-47)	609S, SA, SC	AAV-26 Code 7-57
70 (1948)	664S	①AAV-267 Code 7-70

①—Equipped with new Stromberg Vacuum Starting Switch.

Code No. (Stromberg)—Stamped either on body or on a metal tag attached to the body.
See Carburetor Section for complete data.
Adjustment (Idle Setting, Accelerating Pump Setting, and Float Level)—*See Tune-up data.*
Metering Jets & Rods—*See Carburetor Section for Carter & Stromberg Jet Specifications.*

Throttle Linkage Adjustment (Synchro-Mesh Transmission): Check linkage for smooth operation of throttle valve from closed to wide open position (pedal correctly secured to floor, pedal rod free in hole in floor mat, return spring proper tension for closed position). Wide open throttle stop should be accelerator pedal striking floor mat (not throttle lever stop striking boss on carburetor). Adjust as follows: With linkage disconnected at throttle operating ball joint, open throttle valve to wide open position against stop, have man press accelerator against floor mat, adjust ball joint so screw will just enter upper hole in throttle lever, turn ball joint 1 or 2 turns clockwise, connect ball joint to throttle lever. Check choke unloader operation.

Throttle Linkage Adjustment (Dynaflow Drive Cars): With engine idling at 450 RPM., clearance between **edge of bracket** (attached to dash at lower end of vertical equalizer shaft) and ear on lever (just above shaft operating lever) should be 1/32-1/16" (adjust at ball joint end of throttle operating rod). Check wide open position of throttle valve with engine stopped and adjust at ball joint (as above) to secure wide open throttle position with pedal striking floor mat (not throttle lever stop striking boss on carburetor). Check choke unloader operation. Check Dash-Pot Setting (following).

Dash Pot Setting (Dynaflow Drive Cars): Turn adjusting screw on lever ahead of dash pot plunger for 1/64-1/32" clearance between fast idle cam and fast idle screw with choke valve held closed.

Fast Idle: Carter Dual (WCD) Carburetor type or Stromberg Type (AAV-16, 26, 167, 267 Carburetors).
See Carburetion Equipment Section for data.
Setting (Carter Carb.)—*Adjust fast idle screw on* throttle shaft lever for .012" (Ser. 40, 50: 608S, SA), .015" (40, 50: 608SC, 663S), .018" (70: All carbs.) throttle opening with choke valve tightly closed and screw on "high" step of fast idle cam.
Setting (Stromberg)—Close choke valve on #53 (.0595") drill rod, adjust by bending fast idle cam rod so that locking lever on throttle valve shaft just clears loose lever on fast idle cam stud as throttle is opened and closed.

Automatic Choke: Carter Climatic Control (Dual Carb.) or Stromberg AAV-16, 26, 167, 267 Type.
See Carburetion Equipment Section for complete data.
Setting (Carter Carb.)—Centered (index mark on cover centered on reference mark on housing).
Setting (Stromberg)—"V" mark on cover one graduation Lean (40, 50), Centered (70).

CARB. EQUIPMENT

Air Cleaner: AC. No. 1542101 (40, 50), 1542436 (70) heavy duty oil-bath type.
Filter Element—AC 1543732 (40, 50), 1528460 (70).
Servicing—Clean and refill with 1 pint of SAE. No. 50 engine oil at 5000 mile intervals.

Fuel Pump: AC. Type AJ. Diaphragm type combination fuel-and-vacuum pump.
Exchange Pump Type—AC No. 529 (40, 50), 530 (70).
Pressure—4½-5½ lbs. at fuel pump outlet port or 4-5 lbs. at carburetor inlet.
See Carburetion Equipment Section for data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1516304 ('46-47), 1517078 ('48).
Tank Unit—AC No. 1516277.
See Carburetion Equipment Section for data.

BATTERY

Delco Type 15E2 or 15E4 (40, 50), 17E2 or 17E4 (70), 17K4 (Export 50, 70), 19E4 (Opti. Comm'l). 6 Volt.

Capacity—No. Plates	20 Hr. Rate	Starting (20 Min.)
15E2, 4	85 A.H.	120 Amperes
17E2, 4	120 A.H.	140 Amperes
17K4	115 A.H.	137 Amperes
19E4	130 A.H.	150 Amperes

Zero Capacity—	300 Amps. (0°F)	5-Second Voltage
15E2, 4	3.5 Minutes	4.25 Volts
17E2, 4	4.5 Minutes	4.4 Volts
17K4	4.3 Minutes	4.4 Volts
19E4	5.3 Minutes	4.35 Volts

Grounded Terminal—Negative (—) to engine block.
Location—On right hand side under engine hood.

STARTER

Delco Model No. 1107049 (40, 50 LHD.), 1107929 (70 LHD.), 1107057 (40, 50 RHD.), 1107935 (70 RHD.).
Armature 1867897 (1107049, 57), 820158 (1107929, 35).

►*1946-47 CAUTION—To correct Starter Shifts which will not engage or disengage, see "Electrical System Notes" in Buick Shop Notes.*

Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.
Cranking Engine—40, 50) 90 RPM, 150 amperes, 4.5 volts; (70) 90 RPM, 175 amperes, 5 volts.

Performance Data—1107049, 57

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.0	65
12 "	Lock	3.37	525

Performance Data—1107929, 35

0 ft. lbs.	5500	5.67	65
16 "	Lock	3.0	600

Removal: Starter is flange mounted on right front face of flywheel housing. To remove, disconnect cables, remove flange mounting screws.

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Starting Switch: Delco-Remy Solenoid No. 1118019 controlled by Vacuum Switch on Carburetor.
See Electrical Equipment Section for complete data.
Vacuum Switch (Carter Carburetors)—Carter Car Starter Model 192-11U.
Vacuum Switch ('46-47 Stromberg)—Delco-Remy No. 1990127 for AAV-16 & AAV-26 carburetors.
Vacuum Switch (1948 Stromberg)—Stromberg No. 385000 for AAV-167 & AAV-267 carburetors.
▷*1948 STROMBERG VACUUM SWITCH CHANGES FOR IMPROVED PERFORMANCE: See "Stromberg Starter Switch" in Electrical Equipment Section.*
Dynaflow Neutral Safety Switch—Delco-Remy 1997838. Connected in starter control curcuit so that starter operative only with selector lever in "N" Neutral or "P" Parking position.
See Dynaflow Drive article in Transmission Section for Neutral Safety Switch Adjustment.

GENERATOR

Delco-Remy Model No. 1102679 (40, 50), 1102668 (70). Two brush (shunt) type with voltage and current regulation. NOTE—Generators are interchangeable between models if correct pulley is installed.
Armature—Delco-Remy No. 1877806.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—32-34 amperes, 8.0 volts, 2400 RPM or approx. 25 MPH.

Performance Data

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1825

①—Not maximum output. See Current Regulator.
Brush Spring Tension—25 ounces each.
Field Current—1.75-1.9 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Removal: Generator pivot mounted at left front of engine. To remove, disconnect leads, take out pivot and clamp bolts.
Belt Adjustment: ½" belt deflection with light pressure at point midway between generator and fan.

REGULATOR

Delco-Remy Model 1118201. Single Core Type. Voltage and current regulator.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts hot (operating temperature). Regulator over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).
Checking & Adjustment—*See Electrical Equip. Section.*

Current Regulator

Setting—34-36 amperes hot (operating temp.).
Air Gap—.080" (check same as Voltage Regulator).
Checking & Adjustment—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—In upper edge of speedometer dial. Lighted when Upper (Country) Beam in use.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—In center of right and left instrument clusters. Lighted when direction signal operating.

Switches

Lighting—Delco-Remy No. 1995016.
Beam Selector—D-R No. 1997008, 1997015 (RHD).
Instrument—Delco-Remy No. 1997762.
Glove Compt.—Delco-Remy 1997747 (40), 1997771 (50, 70).
Direction Signal ('46-47)—D-R 1995527 LHD Metallic Brown), 1995503 (LHD—Brown), 1995507 (LHD—Light Grey), 1995525 (LHD—Dark Grey), 1995528 (RHD—Metallic Brown), 1995504 (RHD—Brown), 1995508 (RHD—Light Grey), 1995526 (RHD—Dark Grey), 1995535 (LHD-Beige), 1995536 (RHD-Beige).
Direction Signal (1948)—Delco-Remy 1995537 (std. LHD), 1995539 (Dynaflow Cars), 1995538 (RHD).
Back-Up Light—Delco-Remy No. 1997825 (regular transmission), 1997839 (Dynaflow Drive Cars).

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	45-35 Watt	92500
Park & Frt. Dir. Sig.	21-3	1154
Rear Dir. Sig. (50, 70)	21-3①	1154
Rear Dir. Sig. (40)	21	1129
Beam & Dir. Sig. Indicators	1	51
Instr., Map, Clock, Radio	1.5	55
Glove & Trunk Compt.	1.5	55
Dome & Courtesy	6	82
Stop & Tail	21-3	1154
Rear License	3	63L

①—21 cp. (3 cp. filament not used).

MISC. ELECTRICAL

THERMOSTATIC RELAY: Delco-Remy. On lighting switch (protects lighting circuits). Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adjustable.

FUSES: Clock—2 ampere SFE. In clock lead.
Instr. & Clock Lights—14 amp. SFE. On switch.
Direction Signal—14 ampere SFE. In flasher lead.
Cigar Lighter (Front)—15 ampere. In lighter.
Cigar Lighter (Rear) & Dome Light (50, 70)—30 ampere. In connector back of instrument panel.

HORNS: Delco-Remy No. 1999519 (Low Note—Right Horn), 1999520 (High Note—Left Horn). Vibrator type, blended tone, twin horns operated by relay.

	Current (at 6 volts)	Air Gap
1999519 (Low Note)	19-21 amperes	.044-.049"
1999520 (High Note)	18-20 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025" **Air Gap** .015" (contacts closed).

ENGINE

ENGINE SPECIFICATIONS (SERIES 40, 50): Eight Cylinder, Overhead Valve ("I" Head) type.
Bore—3 3/32". **Stroke**—4⅛".
Displacement—248 cu. ins. **Rated H. P.**—30.63.
Developed H.P. (All 40, '46-47 50)—110 at 3600 RPM.
Developed H.P. (1948 50)—115 at 3600 RPM.
Compression Ratio (All 40, '46-47 50)—6.3-1.
Compression Ratio (1948 50)—6.6-1.
1948 NOTE—.050" thick Steelbestos gasket on 40, .015" thick sheet steel gasket used on Series 50.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE SPECIFICATIONS (SERIES 70): Eight cylinder, Overhead Valve ("I" Head) type.
Bore—3 7/16". **Stroke**—4 5/16".
Displacement—320.2 cu. ins. **Rated H. P.**—37.81.
Developed Horsepower—144 (70), 150 (Dynaflow Drive) at 3600 RPM.
Compression Ratio—6.6-1 Std., 6.9-1 Dynaflow Cars.
Compression & Vacuum Reading—*See Tune-Up data.*

MANIFOLD GASKET INSTALLATION: *See "MANIFOLDS" in Buick Special Data.*

TIGHTENING TORQUES: *See Buick Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Buick Shop Notes.*
▷**New 1946-47 Type Cylinder Head & Gasket:** See Buick Shop Notes for new type Cylinder Head and Head Gasket required for use with new 1946-47 Engine
▷*CAUTION—1942 type Cylinder Head and Gasket must not be used on 1946-47 engines (smaller water passages at #8 cylinder will restrict water circulation and cause overheating).*

▷**1948 NEW "CONTROLLED FREQUENCY" ENGINE MOUNTINGS:** *See Buick Shop Notes.*

PISTONS: New light weight aluminum alloy, four ring, Turbulator Top, Cam ground, transverse slot type with Anodized finish.
Weight—13.776 ozs. (40, 50), 17.94 ozs. (70) stripped.
Length—4 21/64" (40, 50), 4 9/16" (70).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.

	Top Land	Top — Skirt — Bottom
Series 40, 50	.023-.030"	.0021"①
Series 70	.026-.033"	.0023"②

①—.00185" clearance ('46-47), .0016" ('48).
②—.0020" clearance ('46-47), .0018" ('48).
Replacement Pistons: *See Buick Shop Notes.*
Fitting New Pistons: Use feeler stock ¼" wide ("GO" gauge), ½" wide ("NO GO" gauge) and 12" long suspended in cylinder at right angles to engine centerline, invert piston in cylinder. With piston and cylinder clean and dry and at 70°F., piston should pass through cylinder of own weight with "GO" gauge and should hold its own weight with "NO GO" gauge as follows:

Clearance Limits	"GO" Feeler Gauge	"NO GO"
Series 40, 50	.0018-.0023"	.0015" .002"
Series 70	.0020-.0026"	.0015" .002"

▷NOTE—Cylinder walls on 1946-47 engines are "Lubrited" after finishing to provide protective coating and prevent scuffing and scoring during break-in. This coating is black and will wear through in service. Cylinders in service showing this black-and-bright surface are normal.
1948 Note—Cylinder walls not Lubrited (coated).
Installing Pistons: Hollow side of piston head toward camshaft side of engine.
PISTON RINGS: Two compression, two slotted oil control rings per piston, all above pin.
1948 Note—New "Flex-fit" bottom oil ring used.

1946-47 Piston Rings

Ring	Width	End Gap	Side Clearance
①Comp. (#1, 2)	3/32"	.015"	.0015-.0035"
Oil (#3, 4)	3/16"	.015"	.0015-.003"

ENGINE

CONTINUED FROM PRECEDING PAGE

1948 Piston Rings

Ring	Width	End Gap	Side Clearance
①Compr. (#1,2)	.3/32"	.015"	.0015-.0035"
Oil (#3)	.1875"	.015"	.0015-.0035"
Oil (#4)	.1860"	②	.0015-.0035"

①—Wall Thickness .160" (40, 50 Upper), .140" (40, 50 Lower), .170" (70 Upper), .150" (70 Lower).
②—Width of oil ring gap .0015" (segmental).

Replacement Rings: *See Buick Shop Notes.*

PISTON PIN: Clamped in rod (pin hole in new pistons diamond-bored and oil-grooved).
Diameter—13/16" (40, 50), 7/8" (70).
Length—2 11/16" (40, 50), 3 1/16" (70).
Pin Fit in Piston—.0003-.0004" clearance or easy finger push fit at 70°F.

Replacement Pins: Pins are fitted and furnished with new pistons (pistons not furnished without pins).

CONNECTING ROD: Length—7⅝" (40, 50), 8¼" (70).
Weight—28.464 ozs. (40, 50), 35.584 ozs. (70).
Crankpin Journal Diameter—(40, 50) 1.997-1.999". (70)—2.248-2.249".
Lower Bearing—Centrifugal cast (spun) babbitt.
Clearance—.0008-.0018". **Sideplay**—.005-.010".

Bearing Adjustment: Shims. Do not file rods or caps.

Replacement Rods & Bearings: *See Buick Special Data.*

Installing Rods: Marks on rods and bearing caps together and toward rear of engine. Oil hole toward camshaft.

CRANKSHAFT: Five bearing, counterweighted type.

►*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

►*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*

semi-precision type (both with shims) during 1946, and from semi-precision to full-precision (no shim) type during 1947 production. Full-precision type bearings used on all 1948 cars.

►*CAUTION—Series 40, 50 crankshaft used with full-precision type bearings has different journal diameters.*

Line-bored Bearings (with Shims)

40, 50 (1946)	To Eng. No. 4625584 incl.
70 (1946)	To Eng. No. 4675200 incl.

Semi-precision Bearings (with Shims)

40, 50 (1946)	Eng. No. 4625585 Up
70 (1946)	Eng. No. 4675201 Up
40, 50 (1947)	To Eng. No. 4918702 & Nos. 4919899 to 4922786 incl.
70 (1947)	To Eng. No. 4918703 & Nos. 4919900 to 4922786 incl.

Full-precision Bearings (No Shims)

40, 50 (1947)	Eng. Nos. 4918703 to 4919898 & Nos. 4922787 Up
70 (1947)	Eng. Nos. 4918704 to 4919899 & Nos. 4922787 Up
40, 50, 70 (1948)	All Engines

►*CAUTION—Different Journal Diameters used on Series 40, 50 crankshaft with full-precision (no shim) bearings See Crankshaft Production Change Note above.*
Journal Diameters (40, 50—with line-bored or semi-precision Bearings)—#1, 2.3095-2.3115"; #2, 2.3725-2.3745"; #3, 2.4345-2.4365"; #4, 2.4975-2.4995"; #5, 2.5595-2.5615".
Journal Diameters (40, 50—with full-precision bearings)—#1, 2.3105-2.3115"; #2, 2.3735-2.3745"; #3, 2.4355-2.4365"; #4, 2.4985-2.4995"; #5, 2.5605-2.5615".
Journal Diameters (70)—#1, 2.5605-2.5615"; #2, 2.6235-2.6245"; #3, 2.6855-2.6865"; #4, 2.7485-2.7495"; #5, 2.8105-2.8115".
NOTE—Series 70 journal diameters same for all types of bearings.
Bearings—Steel-backed, Durex lined, slip-in type.
►*CAUTION—Three types used. See Crankshaft & Main Bearing Production Change Note (above).*
Clearance—.0007-.0025".

Bearing Adjustment: Shims (line-bored & semi-precision type bearings). No shims (full-precision bearings). Where no shims used, replace bearings. Do not file bearing caps.

Replacement Bearings: *See Buick Shop Notes for data and Rear Main Bearing Oil Seal installation.*

End Thrust: *#3 (center bearing). Endplay .004-.008"*

CAMSHAFT: 5 bearing. Non-adjustable chain drive.
Bearing Diameters (All Series)—#1, 2 5/32"; #2, 2⅛"; #3, 2 3/32"; #4, 2 1/16"; #5, 1¾".
Bearing Type—Steel-backed, babbitt bushings.
Clearance—.0005-.0035".

End Thrust: Thrust plate between front bearing and camshaft sprocket. **Endplay**—.004-.008".

Timing Chain: Link belt. Width 1". Pitch .500". Length 49 links or 24½" (40, 50), 50 links or 25" (70).

Camshaft Setting: Mesh copper-plated washers on chain (10 links apart) with sprocket marks (crankshaft and camshaft turned so that marks are up).

VALVES:

Series 40, 50

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.3715-.3725"	5 7/64"
Exhaust	1 11/32"	.3715"	5 7/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.348"	.0015-.0035"
Exhaust	45°	.342"	.0021-.0039"

Valve Seat Width—Nominal width .062" (1/16"). Seats wider than 5/64" should be narrowed down using proper 20° and 70° cutters.

Series 70

	Head Diameter	Stem Diameter	Length
Intake	1 25/32"	.3720"	5¼"
Exhaust	1 7/16"	.3715"	5¼"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.347"	.0015-.0035"
Exhaust	45°	.348"	.0021-.0039"

Valve Seat Width—Nominal width .062" (1/16"). Seats wider than 5/64" should be narrowed down using proper 20° and 70° cutters.

Valve Guides: Press fit in head. Install with stepped end up. Ream for proper clearance of valve stem.

Valve Springs: Double Springs on all valves. Spring free length 1 29/32" (inner), 2 11/32" (outer).

	Inner Spring		Outer Spring	
	Pressure	Length	Pressure	Length
Closed	20 lbs.	1 21/32"	32 lbs.	1 15/16"
Open	51 lbs.	1 5/16"	77 lbs.	1 19/32"

Valve Lifters: Diameter .9975-.9985". Barrel type. **Clearance**—.0005-.0025".

Rocker Arms: *See Buick Shop Notes.*

VALVE TIMING

►**Tappet Clearance:** *CAUTION—Feeler gauge used depends on engine temperature (do not use .015" feeler). See "Tappet Clearance Adjustment Procedure" in Buick Shop Notes to secure .015" lash at Road Operating Temperature.*

Valve Timing: See Camshaft Setting above.

Timing Points (Valve .004" Open)

Series 40, 50
Intake Valves—Open 13° BTDC. Close 68° ALDC.
Exhaust Valves—Open 55° BLDC. Close 22° ATDC.

Series 70
Intake Valves—Open 14° BTDC. Close 71° ALDC.
Exhaust Valves—Open 56° BLDC. Close 25° ATDC.
Valve Timing Check—With .015" tappet clearance, #2 or #7 exhaust valve should be .145" open (Series 40, 50), .155" open (Series 70), with #1 & 8 pistons at top dead center and flywheel mark "UDC/1&8" at indicator in inspection hole in right front face of housing. NOTE—This is actual valve opening and should be checked with dial indicator mounted on cylinder head.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing chain, and rocker arms. Oil pump mounted in crankcase. NOTE—Screen located in cylinder head under rocker arm oil lead restricted fitting should be removed and cleaned at 10000 mile intervals (disconnect oil line and remove fitting).
Crankcase Capacity—Refill—5½ qts. (40, 50), 7 qts. (70). Dry Capacity 6½ qts. (40, 50), 8 qts. (70)
NOTE—If oil filter is dry, add 1½ qts. to capacities
Normal Oil Pressure—35 lbs. at 35 MPH.
Oil Pressure Regulator—On oil pump housing. Opens at 45 lbs. No adjustment.

Oil Pump: *See Buick Shop Notes.*

Crankcase Ventilation: Filter in oil filler breather cap and in crankcase ventilator inlet on left side of engine. Outlet pipe mounted on right side of engine.
Servicing—Wash **both** filter elements in kerosene every 5000 miles (when carb. air cleaner serviced).

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap. Re-circulation of water through engine (with thermostat closed) is controlled by separate spring-loaded by-pass valve
Capacity—Without Heater—13 qts. (40, 50), 16¾ qts. (70). With heater—14¼ qts. (40, 50), 18 qts. (70).
Pressure Valve—AC No. 850509 (Std. pressure cap). Opens at 7 lbs. (std.), 13 lbs. (Dynaflow cars).

Water Pump: Packless, sealed ball-bearing type.
►*1948 NOTE*—2 types of pumps used (different seal design), interchangeable as assemblies (parts not furnished for first type). *NOTE—Pumps identified by casting number 1330139 (1st), 1336756 (2nd).*
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head water outlet.
Setting—Starts to open 152°F. Fully open 173°F.

Temperature Gauge: AC 1511070 '46-47, 1512091 '48.
See Miscellaneous Section for complete data.

CLUTCH

Own Make with Borg & Beck or Long Driven Member. Single plate, dry disc type. Series 40, 50 clutches are "Crown Spring" type.
See Clutch Section for complete data.
Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
Series 40, 50	6"	10"	.125" (⅛")
Series 70	6½"	10½"	.125" (⅛")

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Pedal Adjustment: Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod linking cross-shaft lever to clutch fork. Pedal positioned by rubber bumper under toeboard.

Clutch Over-Center Spring Installation & Adjustment: *See Clutch Notes in Buick Special Data.*

Removal:—Remove Rear Axle & Transmission (see below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws. **Clutch Yoke Boot Installation**—*See Clutch Notes in Buick Special Data.*

TRANSMISSION
SYNCHRO-MESH

Own Make. All Helical Gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with steering column mounted shift control. ***See Transmission Section for complete data.***

Transmission Control: Buick type remote control. ***See Transmission Section for complete data.***

Removal (1946-47): Remove Rear Axle, then remove rear transmission support (wire shims to ends of support for correct replacement) and steady rest rod, place engine jacks (J-1580) on frame cross member with pilot end in hole in housing at each side of engine mounting, tighten jacks to take load off mounting, remove selector and shift levers, transmission mounting bolts (install guide pins J-851), remove 2 nuts freeing rear engine mounting (bolt heads seat in notches), adjust jacks to take strain off mounting bolts, remove transmission. ***See Buick Shop Notes for Transmission Support Mounting adjustment data on 1946-47 cars.***

Removal (1948): Disconnect Rear Axle (see Rear Axle), drain transmission, fill with clean gasoline or kerosene and run approx. 15 seconds in Neutral, drain cleaner. Disconnect speedometer cable, lower shift rod, and selector rod. (On 40, 50 only, take out toggle spring and extension, remove shift lever and lock washer from selector shaft—hold shift lever in neutral when removing attaching bolt—remove outer selector lever). Install support bar (see Note below) under rear end of oil pan positioning left hook over frame between brake master cylinder and clutch release equalizer, tighten nuts on two hooks evenly. Remove transmission mounting as follows: Disconnect rubber thrust pad from rear of transmission support by taking off 3 nuts and bolt plate, remove shims from behind support, disconnect mounting pad on top of support by taking out 2 attaching bolts and bolt plate, raise engine by turning up on nuts on two support hooks evenly to take load off transmission support, take out transmission support (disconnect at frame ends), and remove thrust pad from thrust plate. Install guide pins J-851 in place of two top mounting bolts, remove remaining mounting bolts, pull transmission straight back and lower from car.

For instructions on Shimming Rear Mounting when installing transmission on 1948 cars, see "Engine Mountings" in Buick Shop Notes.

Engine Support Bar Note—Consists of length of 2 x 4 (approx. width of frame) with hole through each end to take hooked rods (hook rests on top of frame. Raise and lower support by nuts on rods.

Lubrication Note—When transmission reinstalled in car, inject ½ pint of transmission lubricant through universal joint yoke before attaching torque tube to transmission.

DYNAFLOW DRIVE TRANSMISSION
OPTL. ON 1948 ROADMASTER SERIES 70

Own Make. Torque Converter and hydraulically operated planetary unit with manual control. ***See Transmission Section for complete data including Testing & Trouble Shooting.***

▷**Dynaflow Production Changes & Interchangeability Data for new type parts**—***See "Buick Dynaflow" in Transmission Section.***

▷*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*

▷*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

Dynaflow Linkage Adjustment: *See "Buick Dynaflow Drive" in Transmission Section.*

Throttle Linkage Adjustment & Dashpot Setting: *See CARBURETOR.*

Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.

▷***Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type "A."***

Capacity—(70) 10 quarts. NOTE—Add 1¾ pints more when transmission completely dry.

Checking Fluid Level—Engine must be idling with selector lever at "P" (Parking) and transmission oil warm. Raise right side of floor mat, take off cover in floor above transmission, lift out oil gauge rod. Add fluid to "FULL" mark level with engine idling.

Draining & Refilling—***See "Buick Dynaflow Drive" in Transmission Section.***

▷***CAUTION—Engine must be idling with transmission in Parking and transmission oil warm when checking Dynaflow Drive Fluid Level.***

Removal: ***See "Buick Dynaflow Drive" in Transmission Section.***

UNIVERSALS

Saginaw (All Series) or Spicer 202-13X (40, 50). One used (in torque ball at rear of transmission).

Torque Ball Adjustment—*See Buick Special Data.*

REAR AXLE

Own Make. Hypoid Gear, Semi-floating type with Torque Tube Drive. ***See Rear Axle Section for data.***

▷**1948 Pinion Rear Bearing Production Change**—Double roller bearing used on pinion shaft on late 1948 Cars. *See "Buick Hypoid" in Rear Axle Section.*

▷**CAUTION**—Gear Set and Case Assembly on 1946-47 cars are heavier than parts used on 1942 cars. ***See Buick Rear Axle article in Rear Axle Section for parts identification and interchangeability data.***

Ratio—4.454-1: Std. 40, 50. 4.1-1: Std. 70 and Late Dynaflow, Optl. 40, 50. 3.9-1: Std. on Early Dynaflow. 3.64-1: Optl. 70.

Backlash—.006-.010". Screw adjustment.

Removal:—Hoist rear end of car. Disconnect parking brake at equalizer, hydraulic brake line at fitting anchored to left channel iron-strut, lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs (tie springs to bumper for clearance). Disconnect torque tube at universal joint ball, remove axle assembly from beneath car.

▷***CAUTION—Torque tube should not be disconnected from carrier (except for gasket replacement).***

Torque Ball Adjustment—*See Buick Special Data.*

Axle Shaft Removal:—See Buick Rear Axle article.

Wheel Bearing Adjustment—None.

Rear Suspension: Coil springs & conventional axle. ***See Rear Axle Section for complete data.***

SHOCK ABSORBERS

Delco Model 1948-A (front), Model 2105-C,D (rear). Double acting, hydraulic (parallel cylinder rear).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs. ***See Front Suspension Section for complete data.***

Kingpin Inclination—4¼° crosswise for ⅜° Camber.

Camber—⅜° Positive (⅞° Pos. to ⅝° Neg.) and equal for both wheels within ¾°. At curb weight.

Caster—⅜° Positive (¼° Pos. to 1½° Pos.) equal for both wheels within ½°. At curb weight. Adjustable.

Toe In—1/16-⅛". Adjust both tie rods equally.

Steering Geometry (Toe out on Turns)—With outer wheel turned 20°, inner wheel turned 21½° ± ¾°.

STEERING GEAR

Saginaw. Ball bearing Worm-and-Nut type. ***See Steering Gear Section for complete data.***

BRAKES

Service: Bendix Hydraulic, Duo-servo, Single Anchor type without Eccentric Adjustment. Parking "Step-on" lever applies rear wheel service brakes. ***See Brake Section for complete data.***

Drums—Cast Iron type. Diameter 12".

▷*BRAKE DRUM RECONDITIONING & BALANCING: See Brake Notes in Buick Special Data.*

Lining—Moulded type (all shoes). Width 1¾" (40, 50), 2¼" (70). Thick. 3/16". Lgth. per whl. 23 1/16". Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced against drum.

Hand (Parking) Brake: See Service Brakes (above).

NoRol: Optional. ***See Brake Section for complete data.***

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure). ***See Miscellaneous Section for complete data.***

HOOD ADJUSTMENT: *See Buick Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post and on right side of cowl.
1949 Numbers—First number for All Series:
1-5020984..... Flint
2-5030001..... Southgate
3-5036001..... Linden
4-5043001.... Kansas City
5-5050001.... Wilmington
6-5054001..... Atlanta
7-5057001.. Framingham
Identification—First digit of serial number indicates assembly plant as listed above.

ENGINE NUMBER: Stamped on boss on right side of crankcase below pushrod cover.
1949 Numbers—First numbers as follows:
52209724 (for 40), 52209725 (for 50), 52209727 (70).
Identification—Last digit of engine no. indicates Series: 4—Series 40, 5—Series 50, 7—Series 70.

TUNE-UP

COMPRESSION PRESSURE: 112 lbs. (40), 114 lbs. (50), 118 lbs. (Dynaflow 50, 70), at cranking speed.

VACUUM READING: Steady 18-20" idling at 8 MPH. or 450 RPM. for all models.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plug Type—AC No. 48. 14 mm. Metric.

DISTRIBUTOR: Breaker Gap—.015" (.0125-.0175").
Cam Angle—Test limits with .016" gap—21-30°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
►***CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".***
Breaker Arm Spring Tension—19-23 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 4° BTDC. (40, 50), 6° BTDC. (70).
►***CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance.***
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"ADV. 4°" (for 40, 50), "ADV. 6°" (for 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for 40, 50; 6-7° for 70). Index mark located on edge of timing hole under cover on housing above starter.
Final Ignition Setting—Very light "ping" may occur with part throttle on a hard pull, or during acceleration between 10-20 MPH. with wide open throtle.

CARBURETION:
Idle Setting (Carter)—⅞-1⅜ turns open (725S,SA); ¾-1¼ turns open (726S, SA); 1¼-1¾ turns open (882S); 1-1½ turns open (883S).
Idle Setting (Stromberg)—1¾ turns open.
Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed—450 RPM. (or 8 MPH. on level road in 3rd gear).
Float Level (Carter)—5/32" from top of each float to gasket seat on cover with valve seated (invert to check). Fuel level even with bottom of inspection hole on side of float bowl with engine idling.
(Stromberg)—Fuel level 19/32" below top edge of float bowl or even with bottom of inspection hole on side of bowl with engine idling.
Accelerating Pump (Carter)—Two holes in arm. Inner hole minimum charge, Outer hole maximum.
(Stromberg)—3 holes. Center hole (med. stroke) normal setting.
Choke Setting (Carter): Centered (index mark on cover centered on reference mark on housing).
(Stromberg)—"V" mark on cover one graduation Lean or clockwise (40, 50), Centered (Series 70).
Throttle Linkage Adjustment & Dashpot Setting: *See CARBURETOR.*

Fuel Pump Pressure: 4½-5½ lbs. at the pump outlet, 4-5 lbs. at carburetor.

MANIFOLD HEAT CONTROL: Setting—Thermostatic coil wind-up ¼ turn at 70°F. (valve closed). To prevent valve rattles, counterweight should have 1/16-1/8" movement at extreme end positions, adjust by bending anti-rattle spring lower clip.

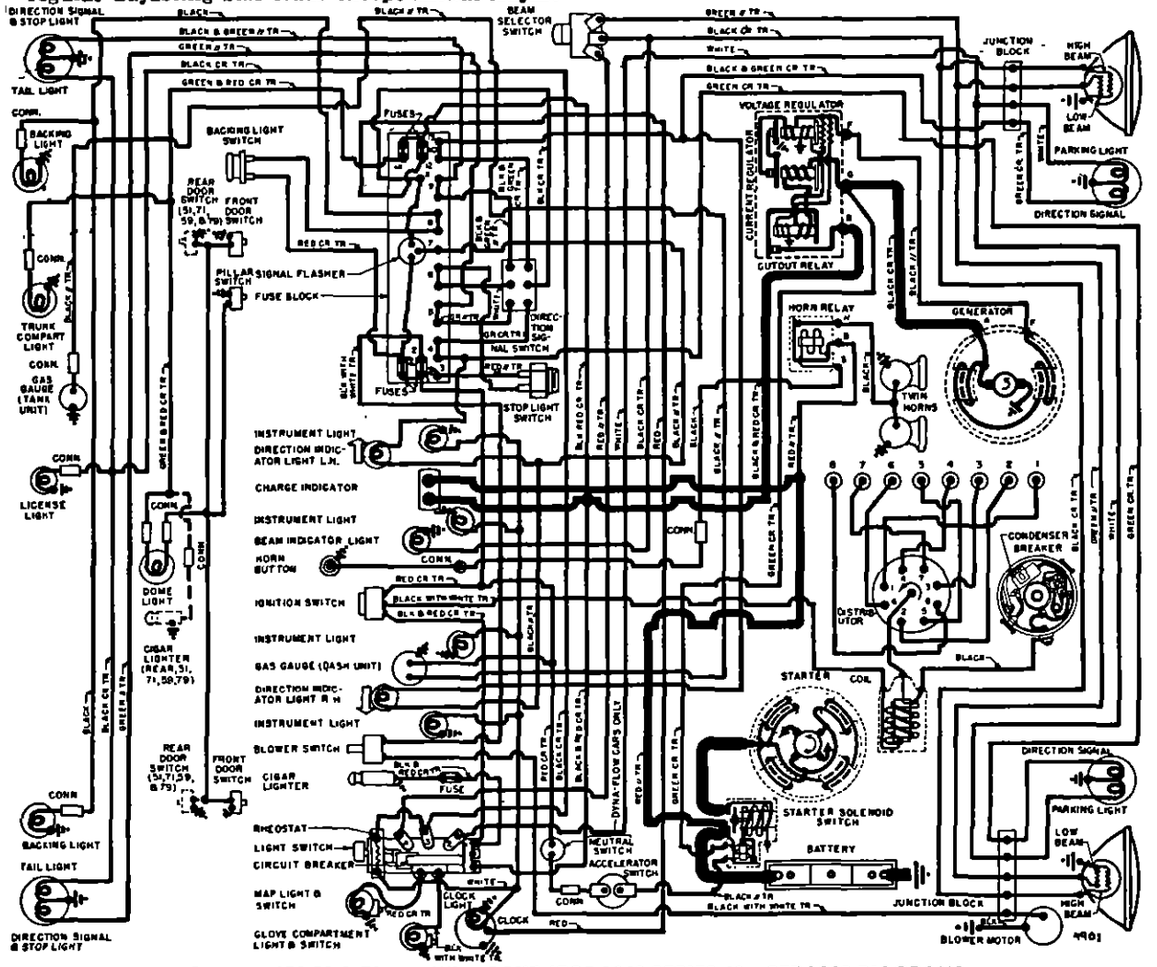
VALVE TAPPET CLEARANCE: *CAUTION*—**Two types of valve lifters used,** Hydraulic & Conventional (*conventional type on Series 40 & 50 with synchro-mesh trans.,* Hydraulic type on Dynaflow cars).
Identification: *Hydraulic Type,* **Red lettering "BUICK FIREBALL"** on valve cover. *Conventional Type.* **Blue** lettering on valve cover.
►**HYDRAULIC TYPE SETTING:** *NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have regular adjusting ball studs except **Initial Adjustment** required when installing cylinder head or if ball studs disturbed.
►**Initial Adjustment**—*See "Valve System" in Buick Special Data.*
►**CONVENTIONAL TYPE SETTING:** To secure .015" road operating clearance, stabilize temperatures by running engine at fast idle (700 RPM. min.) for 20 minutes with radiator cap removed, then adjust clearance **using .017" feeler gauge as "GO", .018" as "NO GO."**
Anti-Freeze Caution—Replace with water for warming up (will boil out if left in radiator).

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116359 (40 LHD), 1116297 (40 RHD), 1116452 (50 & 70).
Ignition Lock—Briggs & Stratton or Delco-Remy. Buick No. 1393108.

COIL: Delco-Remy No. 1115328 (LHD), 1115026 (RHD).
Ignition Current—2½ amperes idling, 4½ stopped

CONTINUED ON NEXT PAGE



1949 SERIES 50 & 70 SHOWN ABOVE (FOR 1949 SERIES 40—SEE 1948 DIAGRAM)

CONTINUED FROM PRECEDING PAGE

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy 1110815. Automatic and vacuum advance type with new "center-bearing" breaker plate.

▷**Breaker Plate Bearing Assembly**—Plate rotates on 3 bakelite buttons on support plate with spring tension adjustment (shim washers) on underside of support plate. Pull required to move plate should be 8 oz. min., 16 oz. max. with breaker plate assembly out of housing.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.
Breaker Gap—.015". Limits .0125-.0175".
Cam Angle—Test limits with .016" gap—21-30°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
▷*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".*
Breaker Arm Spring Tension—19-23 ounces.
Rotation—Counter-clockwise viewed from above.

Distributor		Automatic Advance	Engine
Degrees	R.P.M.	Degrees	R.P.M.
Start	250	2	500
7	400	14	800
13	1500	26	3000

Vacuum Spark Control: Delco-Remy No. 1116048.
Plunger Travel—⅛".

Vacuum Advance		
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
5½°	11°	10½-12½"

IGNITION TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
Series 40①, 50②	4° BTDC	.0063" BTDC.
Series 70②	6° BTDC	.0149" BTDC.

①—Regular Fuel. ②—Ethyl Fuel.

▷*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance.*
Flywheel Mark—"ADV. 4°" (for 40, 50), "ADV. 6°" (for 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for 40, 50; 6-7° for 70). Index mark located on edge of timing hole under cover on housing above starter.
Timing (With Synchroscope)—Connect synchroscope to #1 spark plug lead, direct light on flywheel through inspection hole in right front face of housing. Idle engine at **speed not greater than 350 RPM.**, loosen two distributor hold-down screws, rotate distributor until "ADV" mark on flywheel (see Flywheel Mark Note above) lines up with indicator, tighten hold-down screws. Refer to Final Ignition Setting.
Timing (Without Synchroscope)—With #1 cylinder on compression, turn engine over until "ADV" mark on flywheel lines up with indicator in inspection hole in right front face of housing. Loosen two distributor hold-down screws, rotate distributor until contacts begin to open, tighten hold-down screws.
Final Ignition Setting—*Must be within yellow band of flywheel mark (leading edge desired).* If timing advanced, engine roughness may result even with high octane fuel. If timing retarded to overcome heavy "ping", engine performance and economy will be lessened (higher octane fuel should be used). A very light "ping" may occur with part throttle on a hard pull, or during acceleraion with wide open throttle between 10-20 MPH. Do not retard timing to eliminate this light "ping."

CARBURETOR

Carter WCD (All Series) or Stromberg AAV-167 (Series 40, 50), AAV-267 (Series 70). Dual downdraft types with Automatic Choke.

	Carter	Stromberg
Series 40, 50	WCD 663S	AAV-167 Code 7-69
Series 70	WCD 664S	AAV-267 Code 7-70

Casting No. (Carter)—546 (for 663S), 573 (664S) on face of flange.
Code No. (Stromberg)—Stamped either on body or on a metal tag attached to the body.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*
Metering Jets & Rods—*See Carburetor Section for Carter & Stromberg Jet Specifications.*

Throttle Linkage Adjustment (Synchro-Mesh Transmission): Check linkage for smooth operation of throttle valve from closed to wide open position (pedal correctly secured to floor, pedal rod free in hole in floor mat, return spring proper tension for closed position). Wide open throttle stop should be accelerator pedal striking floor mat (not throttle lever stop striking boss on carburetor). Adjust as *follows: With linkage disconnected at throttle operating* ball joint, open throttle valve to wide open position against stop, have man press accelerator against floor mat, adjust ball joint so screw will just enter upper hole in throttle lever, turn ball joint 1 or 2 turns clockwise, connect ball joint to throttle lever. Check choke unloader operation.

▷**Throttle Linkage Adjustment (Dynaflow Drive Cars):** With engine idling at 450 RPM., clearance between **edge of bracket** (attached to dash at lower end of vertical equalizer shaft) and **ear on lever** (just above shaft operating lever) should be 1/32-1/16" (adjust at ball joint end of throttle operating rod). Check wide open position of throttle valve with engine stopped and adjust at ball joint (as above) to secure wide open throttle position with pedal striking floor mat (not throttle lever stop striking boss on carburetor). Check choke unloader operation. Check Dash-Pot Setting (following).

▷**Dash Pot Setting (Dynaflow Drive Cars):** Turn adjusting screw on lever ahead of dash pot plunger for 1/64-1/32" clearance between fast idle cam and fast idle screw with choke valve held closed.

Fast Idle: Carter Dual (WCD) Carburetor type or Stromberg Type (AAV-167, AAV-267 Carburetors).
See Carburetion Equipment Section for data.
Setting (Carter Carb.)—Adjust fast idle screw on throttle shaft lever for .015" (663S), .018" (664S) throttle opening with choke valve tightly closed and screw on "high" step of fast idle cam.
Setting (Stromberg)—Close choke valve on #53 (.0595") drill rod, adjust by bending fast idle cam rod so that locking lever on throttle valve shaft just clears loose lever on fast idle cam stud as throttle is opened and closed.

Automatic Choke: Carter Climatic Control (Dual Carb.) or Stromberg AAV-16, AAV-26 Type.
See Carburetion Equipment Section for complete data.
Setting (Carter Carb.)—Centered (index mark on cover centered on reference mark on housing).
Setting (Stromberg)—"V" mark on cover one graduation Lean (40, 50), Centered (70).

CARB. EQUIPMENT

Air Cleaner: AC No. 1544236 (40, 50 incl. Early Dynaflow), 1544838 (50 Later Dynaflow), 1544239 (70).
Filter Element—AC No. 19 (all).
Servicing—Clean and refill with 1 pint of SAE No. 50 engine oil at 5000 mile intervals.

Fuel Pump: AC Type AJ, No. 1537337 (40, 50), 1537338 (70), diaphragm type fuel-and-vacuum pump.
Replacement Pump—AC No. 529 (40, 50), 530 (70).
Pressure—4½-5½ lbs. at fuel pump outlet port or 4-5 lbs. at carburetor inlet.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517078 (40), 1517040 (50, 70).
Tank Unit—AC No. 1516277 (40), 1517146 (50, 70).
See Carburetion Equipment Section for complete data.

BATTERY

Delco 15E4 (40, 50); 17E4 (70); 19E4 (Optl. 50, 70); 17K4 (Export 50, 70). 6 Volt, 15 plate (15E4), 17 plate (17E4, 17K4), 19 plate (19E4).
Grounded Terminal—Negative (—) to engine block.
Location—On right side under engine hood.

STARTER

Delco-Remy Model 1107049 (40 LHD), 1107078 (50 RHD), 1107953 (70 LHD), 1107057 (40, 50 RHD), 1107935 (70 RHD).
Armature—1867897 (Series 40, 50), 820158 (Series 70).
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.
Cranking Engine (40, 50)—90-110 RPM., 150 amps., 4.5 volts.
(70)—105 RPM., 175 amperes, 5 volts.

Performance Data—1107049, 57, 78

Torque		R.P.M.	Volts	Amperes
0 ft. lbs		5000	5.7	80①
12	"	Lock	3.4	525

Performance Data—1107935, 53

0 ft. lbs		5500	5.7	80①
15	"	Lock	3.0	600

①—Includes current draw of starter switch.

Starting Switch: Delco-Remy Solenoid Switch No. 1118019 controlled by Stromberg Starter Switch No. 385000 (Cars with Stromberg Carb.), Carter Car Starter Model 192-11U (Cars with Carter Carb.).

▷*STROMBERG STARTER SWITCH CHANGES FOR IMPROVED PERFORMANCE: See "Stromberg Starter Switch" in Electrical Equipment Section.*
Starter Switch Setting: *See Electrical Equipment Section.*

▷**Dynaflow Neutral Safety Switch**—Delco-Remy No. 1997838. At lower end of steering column. Connected in starter control circuit so that starter operative only with lever in "N" Neutral or "P" Parking.

▷**Neutral Safety Switch Adjustment**—*See "Buick Dynaflow Drive" in Transmission Section.*

GENERATOR

Delco-Remy 1102679 (40), 1102709 (50), 1102708 (70). Two brush types with voltage & current regulation.
Armature—D-R 1877806 (1102679), 1912599 (1102708, 9).
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—(1102679) 34-36 amperes, 8.0 volts, 2600 RPM., 25 MPH. (1400 Eng. RPM), Hot.

(1102708, 9)—40 amperes, 8.0 volts, 2400 RPM., 25 MPH. (1250 Eng. RPM.), Hot.

Performance Data—Cold

	Amperes	Volts	R.P.M.
1102679	30①	8.0	1825
1102708, 9	40	8.0	1950

①—Not maximum output. See Current Regulator.

Brush Spring Tension—25 ounces each.
Field Current—1.75-1.9 amperes (for 1102679 generator), 1.90-2.05 amperes (1102708, 9), at 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: ½" belt deflection with light pressure at point midway between generator and fan.

REGULATOR

Delco-Remy 1118301.....for 1102679 Generator
Delco-Remy 1118357.....for 1102708 & 9 Generators

►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs. *See Electrical Equipment Section for complete data.*

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustm't—*See Electrical Equip. Section.*

Current Regulator

Setting (1118301)—32-40 amps. hot (set at 36).
(1118357) 40-46 amps. hot (set at 42 amps. hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustm't—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—In upper edge of speedometer dial. Lighted when Upper (Country) Beam in use.

Direction Signal: Buick. *See Electrical Equip. Section.*
Direction Signal Indicators—Left and right arrows in left and right instrument clusters.

Switches

Lighting—D-R No. 1995016 (40), 1995031 (50, 70).
Beam Selector—D-R No. 1997008, 1997015 (RHD).
Instrument—(Series 40) Delco-Remy No. 1997762.
(Series 50 & 70) Part of Lighting Switch. Rheostat operated by turning Light Switch Knob.
Glove Box—D-R No. 1997747 (40), 1997771 (50, 70).
Direction Signal—(40) D-R 1995537, 1995538 (RHD).
(Series 50 & 70) D-R No. 1995529, 1995530 (RHD).
(Dynaflow) D-R No. 1995534, 1995545 (50 RHD).
Back-Up Light—Delco-Remy No. 1997825 (synchro-mesh transmission), 1997847 (for Dynaflow).

MISC. ELECTRICAL

►**DASH PANEL INSPECTION HOLE FOR ACCESS TO WIRING ON BACK SIDE OF INSTRUMENTS (SERIES 50 & 70):** Located on left side of dash under hood with removable plate screwed to dash.

THERMOSTATIC RELAY: Delco-Remy. On lighting switch (protects lighting circuits). Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adjustable.

SERIES 40

FUSES: Clock—3 ampere SFE. In clock lead.
Instrument Lights—14 ampere SFE. On instr. switch.
Direction Signal—14 ampere SFE. In flasher lead.
Blower—14 ampere SFE. On back of switch.
Defroster—14 ampere SFE. On back of switch.

SERIES 50 & 70

►**FUSE BLOCK:** On lower flange of instrument panel at left of steering column. Four fuses:
1)—**Direction Signal.** 15 ampere 3AG for Dir. Sig. Lamps and Back-Up & Stop Lamps.
2)—**Dome.** 30 ampere SFE for Dome Lamp, Trunk Lamp, and Rear Cigar Lighter.
3)—**Blower.** 14 ampere SFE for Heater Blower.
4)—**Clock.** 3 ampere 1AG. Clock power.

HORNS: Delco-Remy No. 1999519 (Low Note—Right Horn), 1999520 (High Note—Left Horn). Vibrator type, blended tone, twin horns operated by relay.

	Current (at 6 Volts)	Air Gap
1999519 (Low Note)	19-21 amperes	.044-.049"
1999520 (High Note)	18-20 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027". **Air Gap** .014" (contacts closed).

ENGINE

►**ENGINES WITH HYDRAULIC VALVE LIFTERS: Used on cars with Dynaflow Drive.** These engines use different camshaft, push rods, rocker arms, ball studs, and valve springs.
Identification—By RED "Buick Fireball" lettering on valve rocker arm cover and label reading "This Engine Equipped with Hydraulic Lifters."

ENGINE SPECIFICATIONS (for SERIES 40 and 50): Eight cylinder, Overhead Valve ("I" Head) type.
►**Bore**—3.091-3.094". *NOTE*—.010" Oversize production standard engine marked by stamped dash (—) approx. ¼" long following engine number.
Stroke—4⅛". **Displacement**—248.1 cu. ins.
Rated Horsepower—30.63.
Developed Horsepower—110 (40), 115 (50 std.), 120 (40, 50 with Dynaflow) at 3600 RPM.
Compression Ratio—6.3-1 (40), 6.6-1 (50 Synchro-Mesh), 6.9-1 (50 Dynaflow).

►**CYLINDER HEAD**—*CAUTION.* Two cylinder heads are used on Series 50. Different gasket and block combinations as follows:

	Head No.	Gasket No.	Thickness
40 Synchro-mesh	1336718	1333696	.050"
50 Synchro-mesh	1336718	1328773	.015"
50 Dynaflow	1338993	1328773	.015"

GASKET NOTE—Steelbestos gasket used on Series 40; Lacquered steel gasket used on Series 50.
NOTE—Cylinder Head on Series 50 (Dynaflow) is milled to provide higher compression ratio.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE SPECIFICATIONS (SERIES 70 Engines): Eight cylinder, Overhead Valve ("I" Head) type.
►**Bore**—3.436-3.439". *NOTE*—.010" Oversize production standard engine marked by stamped dash (—) approx. ¼" long following engine number.
Stroke—4 5/16". **Displacement**—320.2 cu. ins.
Rated Horsepower—37.81.
Developed Horsepower—150 at 3600 RPM.
Compression Ratio—6.9-1.
Compression & Vacuum Reading—*See Tune-Up.*

MANIFOLD GASKET INSTALLATION: *See "MANIFOLDS" in Buick Special Data.*

TIGHTENING TORQUES: *See Buick Special Data.*

CYLINDER HEAD INSTALLATION: *See Buick Special Data.*

"CONTROLLED FREQUENCY" ENGINE MOUNTINGS: *See Buick Special Data.*

PISTONS: Light weight, aluminum alloy, four ring, Turbulator top, cam ground, transverse slot type with Anodized finish.
Weight (stripped)—13.776 ozs. (40, 50), 17.94 ozs. (70).
Length—4 21/64" (40, 50), 4 9/16" (70).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons below.

	Top Land	Top—Skirt—Bottom
Series 40, 50	.023-.030"	.0021" .0015"
Series 70	.026-.033"	.0023" .0017"

NOTE—Car manufacturer recommends reboring if taper exceeds .005", or out-of-round over .003".

Replacement Pistons: *See Buick Special Data.*

Fitting New Pistons: Use feeler stock ¼" wide (for "GO" gauge), ½" wide ("NO GO" gauge) and 12" long suspended in cylinder at right angles to engine center-line, invert piston in cylinder. With piston and cylinder clean and dry and at 70°F., piston should pass through cylinder of own weight with "GO" gauge and should hold its own weight with "NO GO" gauge as follows:

	Clearance Limits Top of Skirt	Feeler Gauges "GO"	Feeler Gauges "NO GO"
Series 40, 50	.0018-.0024"	.0015"	.002"
Series 70	.0020-.0026"	.0015"	.002"

Installing Pistons: Hollow side of head to camshaft.

PISTON RINGS: Two compression (upper inner edge stepped or beveled), one slotted oil ring in #3 groove, "Flex-fit" oil ring in #4 groove. All rings above pin. #1, #2, and #4 rings are coated.

Ring	Width	End Gap	Side Clearance
①Compr. (#1, 2)	3/32"	.010-.020"	.0015-.0035"
Oil (#3)	.1875"	.010-.020"	.0015-.003"
Oil (#4)	.1860"	②	.0015-.0035"

①—Wall thickness .160" Upper (40, 50), .140" Lower (40, 50); .170" Upper (70), .150" Lower (70).
②—End Gap .0015" (segmental). No checking or fitting required on this "Flex-fit" ring.

Replacement Rings: *See Buick Special Data.*

PISTON PIN: Clamped in rod (pin hole in new pistons diamond-bored and oil-grooved).
Diameter—.8124-.8129" (40, 50), .8744-.8749" (70).
Length—2 11/16" (40, 50), 3 1/16" (70).
Pin Fit in Piston—.0003-.0004" clearance or easy finger push fit at 70°F.

Replacement Pins: Std. and .003", .005" oversize. Pins fitted and furnished with new pistons (pistons not furnished without pins).

►**CONNECTING ROD (CAST BEARING): 1st 5000 Eng.**
Length—7⅝" (40, 50), 8¼" (70).
Weight—(40, 50) 1.779 lbs., (70) 2.224 lbs.
Crankpin Journal Diameter—(40, 50) 1.997-1.999". (70) 2.248-2.249".
Lower Bearing—Centrifugal cast (spun) babbitt.
Clearance—.0015-.002". **Sideplay**—.005-.010".
Bearing Adjustment: Shims. Do not file rods or caps. Remove shims until slight drag secured when rocking crankshaft or moving rod back and forth on

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

crankpin, then install 3 additional shims (shim pack should be equal on each side as near possible).

Replacement Rods & Bearings: *See Buick Special Data.*

Installing Rods: Ridge on edge of cap and boss in web of rod must be toward rear of engine. Oil hole in rod toward camshaft.

▷**CONNECTING ROD (REPLACEABLE PRECISION BEARING): After Approx. First 5000 Engines.**

Length—7⅝" (40, 50), 8¼" (70).

Weight—(40, 50) 1.804 lbs., (70) 2.224 lbs.

Crankpin Journal Diameter—(40, 50) 1.998-1.999". (70) 2.248-2.249".

Lower Bearing—Replaceable, precision type. No shims used.

Clearance—.0008-.0015" (new), .002" max. (used).

Sideplay—.005-.010".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

Replacement Bearings: Undersize bearings marked with number on outer surface near tang indicating size. Furnished Std., .001", .002", .020", .021" Undersize.

Installing Rods: Same as for Cast Bearing type above.

▷**SERIES 40, 50 CRANKSHAFT PRODUCTION CHANGE:** Crankpin (connecting rod bearing) diameter changed when new type "full-precision" no-shim bearings used. *See Connecting Rod data (above).*

CRANKSHAFT: Five bearing, counterweighted type.

▷*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

▷*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*

Journal Diameters—(40, 50) #1, 2.3105-2.3125"; #2, 2.3735-2.3745"; #3, 2.4355-2.4365"; #4, 2.4985-2.4995"; #5, 2.5605-2.5615".

(Series 70) #1, 2.5605-2.5615"; #2, 2.6235-2.6245"; #3, 2.6855-2.6865"; #4, 2.7485-2.7495"; #5, 2.8105-2.8115".

NOTE—Car manufacturer recommends crankshaft be replaced or reground if journal out-of-round over .0015".

Bearings—Steel-backed, Durex 100-A, slip-in type.

NOTE—Bearings "full-precision" (no shim) type.

Clearance—.0008-.0015" (new), .002" max. (used).

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

▷*CAUTION*—Arrow on main bearing caps must point toward front of engine when installed.

Replacement Bearings: Standard and .0012", .002", .020", .022" Undersize.

Rear Bearing Oil Seal Installation: *See Buick Special Data.*

End Thrust: #3 (center bearing). **Endplay** .004-.008".

CAMSHAFT: 5 bearing .Non-adjustable chain drive.

▷*CAUTION—Two types of camshafts used,* one for engines with plain sleeve valve lifters, one for engines with hydraulic valve lifters (identified by ½" wide machined cut 60% around shaft between #6 & #7 cams). *Engine operation will be rough and noisy if shafts are interchanged on either engine.*

Bearing Diameters (for All Series)—#1, 2 5/32"; #2, 2 1/8"; #3, 2 3/32"; #4, 2 1/16"; #5, 1 3/4".

Bearings—Steel-backed, babbitt-lined.

Clearance—.0005-.0035". NOTE—Replacement bearings must be line reamed after installation.

End Thrust: Spacing ring between front bearing journal and thrust plate (on front of crankcase behind camshaft sprocket). **Endplay**—.004-.008".

Timing Chain: Link Belt. Width 1". Pitch .500". Length (40, 50) 49 links or 24½", (70) 50 links or 25".

Camshaft Setting: Mesh copper-plated washers on chain (10 links apart) with sprocket marks (crankshaft and camshaft turned so that marks are up).

▷**VALVES:** *CAUTION*—**Engines with hydraulic valve lifters** use different camshaft, push rods, rocker arms, ball studs, and valve springs.

VALVE SPECIFICATIONS—SERIES 40 & 50

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.3715-.3725"	5 7/64"
Exhaust	1 11/32"	.3711-.3719"	5 7/64"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	45°	.348"	.0025" (.0015-.0035")
Exhaust	45°	.342"	.003" (.0021-.0039")

Valve Seat Width—Nominal width .062" (1/16"). Seats wider than 5/64" should be narrowed down using proper 20° and 70° cutters.

VALVE SPECIFICATIONS—SERIES 70

	Head Diameter	Stem Diameter	Length
Intake	1 25/32"	.3715-.3725"	5 1/4"
Exhaust	1 7/16"	.3711-.3719"	5 1/4"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	45°	.347"	.0025" (.0015-.0035")
Exhaust	45°	.348"	.003" (.0021-.0039")

Valve Seat Width—Nominal width .062" (1/16"). Seats wider than 5/64" should be narrowed down using proper 20° and 70° cutters.

Valve Guides: Upper end of guide 1 5/32" above head. Finish ream replacement guides after installation to .374-.375" (use Valve Guide Reamer J129-3).

▷**Valve Springs:** *CAUTION*—Engines with hydraulic valve lifters use different valve springs.

Free Length—1 29/32" (inner), 2 11/32" (outer).

VALVE SPRING SPECIFICATIONS

▷**ENGINES WITH ADJUSTABLE VALVE LASH**

	Inner Spring			Outer Spring		
	Lbs. Press.		Lgth.	Lbs. Press.		Lgth.
Closed	17½-22½	—1	21/32"	29½-34½	—1	15/16"
Open	48-54	—1	5/16"	74-80	—1	19/32"

▷**ENGINES WITH HYDRAULIC VALVE LIFTERS**

Closed	22-26	—1	21/32"	49-55	—1	15/16"
Open	49-55	—1	5/16"	116-124	—1	19/32"

Valve Lifters (Engines with Adjustable Valve Lash): Plain sleeve, barrel type. Diameter .9975-.9985" **Clearance in Crankcase**—.0005-.0025".

Hydraulic Valve Lifters (Dynaflow Cars): *See "Valve System" in Buick Special Data.*

Identification—By RED "Buick Fireball" lettering on valve rocker arm cover and label reading "This Engine Equipped with Hydraulic Lifters."

▷*CAUTION*—If lifter operating properly, DO NOT disassemble when removed from engine for other work (wrap in clean paper to keep dirt out).

▷**Initial Adjustment (required only when installing cylinder head or when adjusting ball stud setting has been disturbed):** *See "Valve Tappet Clearance" in Buick Special Data.*

Rocker Arms: *CAUTION*—Engines with hydraulic valve lifters use different rocker arms and ball studs. Rocker arms used with hydraulic valve lifters do not have small oil hole on underside of arm. Ball studs used with hydraulic lifters have drilled oil hole in center for lifter oil feed (through pushrod).

Rocker Arm Installation—*See Buick Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION*—**Two types of valve lifters used,** Hydraulic & Conventional (conventional type on Series 40 & 50 with synchro-mesh trans., Hydraulic type on Dynaflow cars).

Identification: *Hydraulic Type,* **Red lettering "BUICK FIREBALL"** on valve cover. *Conventional Type.* **Blue** lettering on valve cover.

▷**HYDRAULIC TYPE SETTING:** *NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have regular adjusting ball studs except **Initial Adjustment** required when installing cylinder head or if ball studs disturbed.

▷**Initial Adjustment**—*See "Valve Tappet Clearance" in Buick Special Data.*

▷**CONVENTIONAL TYPE SETTING:** To secure .015" road operating clearance, stabilize temperatures by running engine at fast idle (700 RPM. min.) for 20 minutes with radiator cap removed, then adjust using .017" feeler gauge "GO," .018" "NO GO."

Anti-Freeze Caution—Replace with water for warming up (will boil out if left in radiator).

Valve Timing: See Camshaft Setting above.

VALVE TIMING—SERIES 40 & 50

Intake Valves—Open 13° BTDC. Close 68° ALDC.
Exhaust Valves—Open 55° BLDC. Close 22° ATDC.

VALVE TIMING—SERIES 70

Intake Valves—Open 14° BTDC. Close 71° ALDC.
Exhaust Valves—Open 56° BLDC. Close 25° ATDC.

Valve Timing Check—For engines with adjustable valve lash set tappet clearance for .015" road operating lash (see above), on engines with hydraulic lifters run engine for approx. 1 minute to fill lifters with oil. #2 or #7 exhaust valve should be .145" open (Series 40 & 50), .155" open (Series 70), with #1 & #8 pistons at top dead center and flywheel mark "UDC/1&8" visible through inspection hole in right front face of housing. NOTE—This is actual valve opening and should be checked with dial indicator mounted on cylinder head.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and restricted flow to rocker arm bearings, push rods and hydraulic valve lifters. *NOTE*—Valve system feed taken from outlet side of oil filter.

Crankcase Capacity—Refill—5½ qts. (40, 50), 7 (70). **Dry Capacity**—6½ qts. (40, 50), 8 qts. (70).

NOTE—If oil filter is dry add 1½ qts. to capacities.

Normal Oil Pressure—35 lbs. at 35 MPH.

Oil Pressure Regulator—Non-adjustable spring and valve type on oil pump. Opens at 35 lbs.

Oil Pump: Helical gear type in crankcase.

Oil Pump Clearances—*See Buick Special Data.*

Crankcase Ventilation: Filter in oil filler breather cap and in crankcase ventilator inlet on left side of engine. Outlet pipe mounted on right side of engine.

Oil Filter: AC with by-pass valve (opens 7-9 lbs.).

Filter Element—AC No. P-127 folded paper low-restriction type. CAUTION—Element not inter-

changeable with 1948 type. Change element 1st 2000 & 5000 miles, then every 5000 miles.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valves) in filler cap. Re-circulation of water through engine (with thermostat closed) permitted by fixed bypass passage.

Capacity—No Heater—(Series 40 and 50) 13 qts., (40 & 50 Dynaflow) 14 qts., (70) 16¾ qts.

With Heater—Add 1¼ qts. to above capacities.

►**Pressure Valve**—*CAUTION—Two types used:*

1)—AC No. 850563—*7 lb. type.* For all Series 40 & 50, and Series 70 after Serial Nos. below.

2)—AC No. 850559—*13 lb. type.* For Series 70 UP TO Serial Numbers: Flint 15122924, California 25093697, Linden 35099981, Kansas City 45107724, Wilmington 55112152, Atlanta 65116047, Framingham, 75118525.

Water Pump: Packless, sealed ball-bearing type.
See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head water outlet. Buick No. 3122282 Std. 151°, No. 3122285 Hi. T. 182°. Setting—(151°) starts to open 148-155°F. Fully open not over 175°F.

Temperature Gauge: AC No. 1512091 (40), 1512013 (50, 70). Thermo (not electric) gauge.
See Miscellaneous Section for complete data.

CLUTCH

Own "Crown Spring" with Borg & Beck or Long Driven Member. Single plate, dry disc type.
See Clutch Section for complete data.

Facings—Woven type, 2 used. Inside diameter 6". Outside Diameter 10". Thickness .125" (⅛").

Pedal Adjustment: Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod linking cross-shaft lever to clutch fork. Pedal positioned by rubber bumper under toeboard.

►**Correction of Low & Reverse Gear Clash due to Spinning Clutch Plate**—Car manufacturer permits reducing pedal lash to ½" in exceptional cases where gear clash continues (with regular ¾-1" lash) beyond normal plate stopping period.

Clutch Over-Center Spring Installation & Adjustment: *See Clutch Notes in Buick Special Data.*

Removal: Remove Rear Axle and Transmission (see below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.

Clutch Yoke Boot Installation—See Clutch Notes in Buick Special Data.

TRANSMISSION
SYNCHRO-MESH

Own Make. All Helical Gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with steering column mounted shift control. *See Transmission Section for complete data.*

Transmission Control: Buick type remote control.
See Transmission Section for complete data.

Removal: Disconnect Rear Axle (see data following), disconnect the speedometer cable, lower gear shift rod, and selector rod. Take out toggle spring and extension, remove shift lever and lock washer from selector shaft—hold shift lever in neutral when removing attaching bolt—remove outer selector lever. Install the special engine support bar under rear end of oil pan positioning left hook over frame between brake master cylinder and clutch release equalizer, tighten nuts on two hooks evenly. Remove transmission mounting as follows: Disconnect rubber thrust pad from rear of transmission support by taking off 3 nuts and bolt plate, remove shims from behind support, disconnect mounting pad on top of support by taking out 2 attaching bolts and bolt plate, raise engine by turning up on nuts on two support hooks evenly to take load off transmission support, take out transmission support (disconnect at frame ends), and remove thrust pad from thrust plate. Install guide pins J-851 in place of two top mounting bolts, remove remaining mounting bolts, pull transmission straight back and lower from car.

For instructions on shimming Rear Mounting when installing transmission, see "Engine Mounting" in Buick Special Data.

Lubrication Note—When transmission reinstalled in car, inject ½ pint of transmission lubricant through universal joint yoke before attaching torque tube to transmission.

DYNAFLOW DRIVE

Own Make. Torque Converter and hydraulically operated planetary unit with manual control.
See Transmission Section for complete data including Testing & Trouble Shooting.

►*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

►*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*

►**Dynaflow Production Changes & Interchangeability Data for new type parts**—*See "Buick Dynaflow" in Transmission Section.*

Dynaflow Linkage Adjustment: *See "Buick Dynaflow Drive" in Transmission Section.*

Throttle Linkage Adjustment & Dashpot Setting: See CARBURETOR.

Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.

►*Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type "A".*

Capacity—(50) 8½ quarts, (70) 10 quarts.

Draining & Refilling—*See "Buick Dynaflow Drive" in Transmission Section.*

Checking Fluid Level—Engine must be idling with selector lever at "P" (parking) & transmission oil warm. Raise right side of floor mat, take off cover in floor above transmission, lift out oil gauge rod. Add fluid to "FULL" mark level with engine idling.

►**Late 1949 Cars**—Oil gauge rod under right side of hood between battery and engine.

►*CAUTION—Engine must be idling with transmission in Parking position and transmission oil warm when checking Dynaflow Drive Fluid Level.*

Removal: *See "Buick Dynaflow Drive" in Transmission Section.*

UNIVERSALS

Saginaw (All Series) or Spicer (Series 40 & 50). One used (in torque ball at rear of transmission).

►**Torque Ball Adjustment**—*See Buick Special Data.*

REAR AXLE

Own Make. Hypoid Gear, semi-floating type with Torque Tube Drive. *NOTE*—Pinion rear bearing now consists of 2 roller bearings (formerly one).
See Rear Axle Section for complete data.

Ratio—4.454-1 (49:11) Std. 40 & All 50.

4.1-1 (41:10) Std. 70, Optl. 40 & 50 S-M trans.

NOTE—Stamped nos. under housing indicate ratio.

Backlash—.008-.010" (desired), .008-.012" (limits).

Removal: Raise rear end of car and set on car stands. Disconnect parking brake cable at rear brake sheave and at bracket of front end of torque tube, hydraulic brake line from pipe at frame X member and remove retainer. Disconnect lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs, and torque tube from torque ball.

►*CAUTION—Torque tube should not be disconnected from carrier (except for gasket replacement).*

Torque Ball Adjustment—*See Buick Special Data.*

Axle Shaft Removal: *See Rear Axle Section.*

Wheel Bearing Adjustment—None.

Rear Suspension: Coil springs & conventional axle.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco Model 1948-A (front), Model 2105-C, D (rear). Double acting, Hydraulic (parallel cylinder rear).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—4¼° crosswise for ⅜° Camber.

Camber—⅜° Positive (⅞° Pos. to ⅝° Neg.) and equal for both wheels within ¾ °at curb weight.

Caster—¾° Positive (1¼° Pos. to 1½° Pos.) equal for both wheels within ½° at curb weight. Adjustable.

Toe In—1/16-1/8". Adjust both tie rods equally.

►*CAUTION*—Tie rod clamps must be within ⅛" of end of tube and ear of clamp must overlap slot in tube not less than 1/16".

Steering Geometry (Toe Out on Turns)—With outer wheel turned 20°, inner wheel turns 21½° ± ¾°.

STEERING GEAR

Saginaw. Ball bearing Worm-and-Nut type.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type **without Eccentric Adjustment.** Parking brake "Step-on" lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Cast-iron with steel flange. Drum diameter 11.997-12.003". Max. rebore .060" O.S. (.030" cut).

►*BRAKE DRUM RECONDITIONING & BALANCING: See Brake Notes in Buick Special Data.*

Lining—Moulded. Width (40, 50) 1¾", (70) 2¼". Thickness 3/16". Length per shoe: Primary (40, 50) 9 15/16", (70) 10"; Secondary: (40, 50) 12 3/4", (70) 12 15/16".

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Step On (Parking Brake): See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type.
See Miscellaneous Section for complete data.

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

HOOD ADJUSTMENT: *See Buick Special Data.*

MODEL IDENTIFICATI N

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post and stamped on left front frame side rail.

1950 Numbers—First numbers:

1-5360001..... Flint	5-5388001.... Wilmington
2-5370001..... Southgate	6-5393001..... Atlanta
3-5374001..... Linden	7-5397001.. Framingham
4-5380001.... Kansas City	

1951 Numbers—First numbers:

1-6031301 ..... Flint	5-6070001 .. Wilmington
2-6050001 .... Southgate	6-6075001 ..... Atlanta
3-6055001 ..... Linden	7-6080001 ..Framingham
4-6061001 ..Kansas City	

Identification—First digit of serial number indicates assembly plant as listed above.

ENGINE NUMBER: Stamped on boss on right side of crankcase below pushrod cover.

Series	1950 Starting Number	1951
40	55680004	62401004
50	56247345	62401005
70	56350217	62401007

Identification—Last digit of engine no. indicates Series: 4—Series 40, 5—Series 50, 7—Series 70.

TUNE-UP

►*AIR CLEANER BLOW-UP PREVENTION: See "Carter WCD" and "Stromberg AAUVB & AAVB" in Carburetor Section.*

COMPRESSION PRESSURE:

	Std.	Dynaflow Cars
Series 40	114 lbs.	120 lbs.
Series 50	118 lbs.	120 lbs.
Series 70		120 lbs.

VACUUM READING: Steady 18-20" idling at 8 MPH. or 450 RPM.

FIRING ORDER: 1-6-2-5-8-3-7-4. See Diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plug Type—AC No. 46X. 14 mm. Metric.

DISTRIBUTOR: Breaker Gap—.015" (.0125-.0175").
Cam Angle—Test limits with .016" gap—21-30°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*

►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".*
Breaker Arm Spring Tension—19-23 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 4° BTDC. (40, 50), 6° BTDC. (70).

►*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance.*
Flywheel Mark—"ADV. 4°" (for 40, 50), "ADV. 6°" (for 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for 40, 50; 6-7° for 70). Index mark located on edge of timing hole under cover on housing above starter.
Timing Procedure—*See Ignition Timing.*
Final Ignition Setting—Very light "ping" may occur with part throttle on a hard pull, or during acceleration between 10-20 MPH. with wide open throttle.

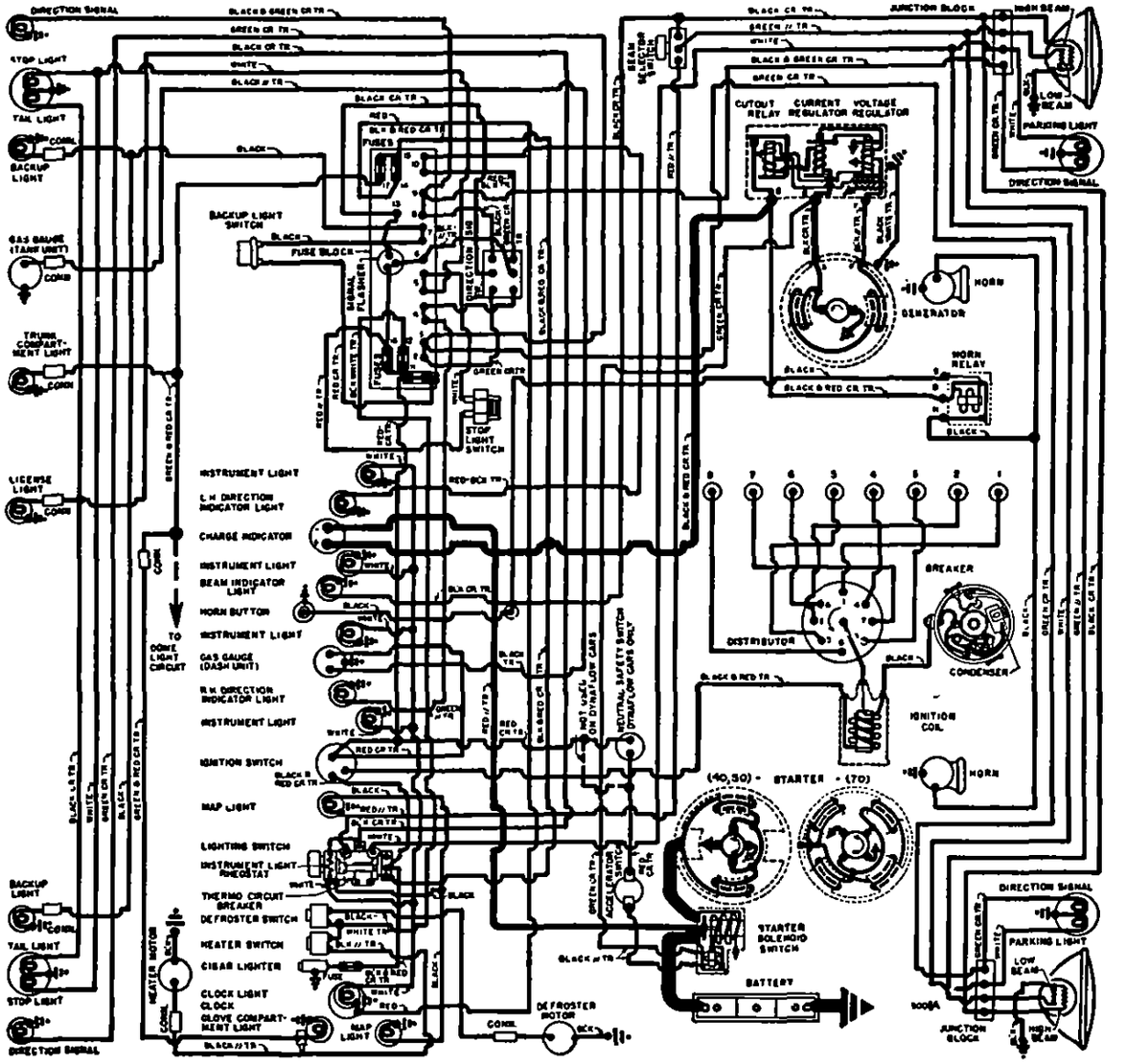
CARBURETION: CARTER "WCD"

►*CARBURETOR VENTING TO PREVENT AIR CLEANER "BLOW-UP": See "Carter WCD" in Carburetor Section.*

►*725S & 726S CARBURETOR PRODUCTION CHANGE—Superseded Late 1950 by 725SA & 726SA. (To correct gasoline odors noticeable in car). See Carburetor Section for complete data.*
Idle Setting—Both screws 1 turn open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed—450 RPM. (or 8 MPH. on level road in 3rd gear).
Float Level—5/32" from top of each float to gasket seat on cover with valve seated (invert to check).
Fuel Level—Even with bottom of inspection hole on side of float bowl with engine idling.
Accelerating Pump—Two holes in arm. Inner hole minimum charge. Outer hole maximum charge.
Fast Idle Setting: Adjust fast idle screw on throttle shaft lever for throttle opening of .015" (All carburetors except 882S, SA), .012" (882S, SA) with choke valve closed and screw on high step of fast idle cam.
Automatic Choke Setting: 1 Point Rich (all models). *See Stromberg carburetor data (following).*
Throttle Linkage Adjustment & Dashpot Setting:
Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor.

CARBURETION:
STROMBERG "AAUVB" & "AAVB"

►*CARBURETOR VENTING TO PREVENT AIR CLEANER "BLOW-UP": See "Stromberg AAUVB & AAVB" in Carburetor Section.*



1950 MODELS

Idle Setting—1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Float Level—(On gauge No. T-24971), 5/64" above top of gauge guides.

Fuel Level—(Checked thru inspection hole). **Early type** with plain inspection hole boss, fuel should be **1/32"-1/16"** below bottom of threads on inspection hole. **Later type** with ¼" long horizontal rib on each side of hole boss, fuel should be **even** with bottom of threads in inspection hole.

Accelerating Pump—3 holes. Center hole (med. stroke) normal setting.

►*PUMP LEVER SPRING PRODUCTION CHANGE—See Carburetor Section for complete data.*

Fast Idle Setting: With choke valve closed against #53 drill, bend fast idle cam rod so that locking lever on throttle shaft just clears loose lever on fast idle cam stud as throttle is opened and closed.

Automatic Choke Setting: Centered (all models). *See Carburetion Equipment Section for complete data.*

Throttle Linkage Adjustment (Synchro-Mesh Transmission): Check linkage for smooth operation of throttle valve from closed to wide open position (pedal correctly secured to floor, pedal rod free in hole in floor mat, return spring proper tension for closed position). Wide open throttle stop should be accelerator pedal striking floor mat (not throttle lever stop striking boss on carburetor). Adjust as follows: With linkage disconnected at throttle operating ball joint, open throttle valve to wide open position against stop, have man press accelerator against floor mat, adjust ball joint so screw will just enter upper hole in throttle lever, turn ball joint 1 or 2 turns clockwise, connect ball joint to throttle lever. Check choke unloader operation.

►**Throttle Linkage Adjustment (Dynaflow Drive Cars):** With engine idling at 450 RPM., clearance between **edge of bracket** (attached to dash at lower end of vertical equalizer shaft) and **ear on lever** (just above shaft operating lever) should be 1/32-1/16" (adjust at ball joint end of throttle operating rod). Check wide open position of throttle valve with engine stopped and adjust at ball joint (as above) to secure wide open throttle position with pedal striking floor mat (not throttle lever stop striking boss on carburetor). Check choke unloader operation. Check Dash-Pot Setting (following).

Dash Pot Setting: (Dynaflow cars). Hold choke valve in fully closed position. Insert .030" feeler gauge between the fast idle cam (at the widest part) and the idle adjusting screw. Turn the adjusting screw on the lever (ahead of the dash pot plunger) until it just contacts the dash pot plunger.

Fuel Pump Pressure: 4½-5½ lbs. at the pump outlet, 4-5 lbs. at carburetor.

MANIFOLD HEAT CONTROL: Setting—Thermostatic coil wind-up ¼ turn at 70°F. (valve closed). To prevent rattles, counterweight should have 1/16-1/8" movement at extreme end positions, adjust by bending anti-rattle spring lower clip.

VALVE TAPPET CLEARANCE: *CAUTION*—**Two types of valve lifters used,** Hydraulic & Conventional (conventional type on Series 40 with synchro-mesh trans. only. Hydraulic type on all other cars). **Identification: Hydraulic Type, Red** lettering **"BUICK FIREBALL"** on valve cover. **Conventional Type, Blue** lettering on valve cover.

►**HYDRAULIC TYPE SETTING:** *NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have regular adjusting ball studs. **Initial Adjustment** required when installing cylinder head or if ball studs disturbed.

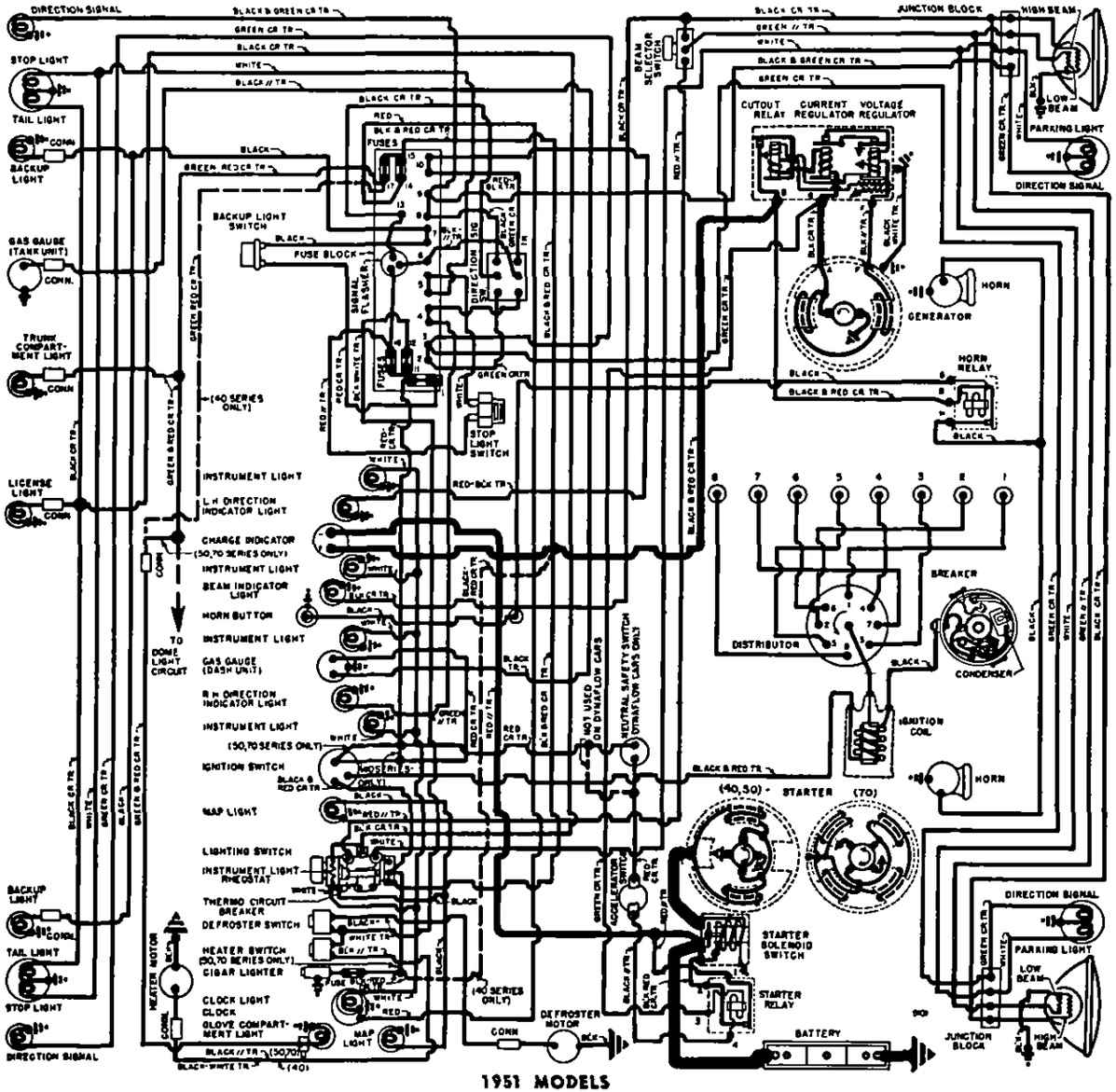
►**Initial Adjustment**—*See "Valve System" in Buick Special Data.*

►**CONVENTIONAL TYPE SETTING:** To secure .015" road operating clearance, stabilize temperatures by running engine at fast idle (700 RPM. min.) for 20 minutes with radiator cap removed, then adjust clearance **using .017" feeler gauge as "GO", .018" as "NO GO."**

Anti-Freeze Caution—Replace with water for warming up (will boil out if left in radiator).

Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*



1951 MODELS

IGNITI N

IGNITION SWITCH: Delco-Remy No. 1116452.
Ignition Lock—(Series 40 1950, Series 50, 70 1950-51) **Buick No. 1393108,** (Series 40 1950) **Buick No. 1390644.**

COIL: Delco-Remy 1115328. On pushrod cover.
Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18- 23 microfarad.

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DISTRIBUTOR: Delco-Remy 1110815. Automatic and vacuum advance type with new "center-bearing" breaker plate.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.
Breaker Gap—.015". Limits .0125-.0175".
Cam Angle—Test limits with .016" gap—21-30°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".*
Breaker Arm Spring Tension—19-23 ounces.
Rotation—Counter-clockwise viewed from above.

Distributor Automatic Advance		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	250	2	500
7	400	14	800
13	1500	26	3000

Vacuum Spark Control: Delco-Remy No. 1116046.
Plunger Travel—⅛".

Vacuum Advance		
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
5½°	11°	10½-12½"

IGNITI N TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
Series 40①, 50②	4° BTDC	.0063" BTDC.
Series 70②	6° BTDC	.0149" BTDC.

①—Regular Fuel. ②—Ethyl Fuel.
►*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance.*
Flywheel Mark—"ADV 4°" (for 40, 50), "ADV. 6°" (for 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for 40, 50; 6-7° for 70). Index mark located on edge of timing hole under cover on housing above starter.
Timing (With Synchroscope)—Connect synchroscope to #1 spark plug lead, direct light on flywheel through inspection hole in right front face of housing. Idle engine at **speed not greater than 350 RPM.**, loosen two distributor hold-down screws, rotate distributor until "ADV" mark on flywheel (see Flywheel Mark Note above) lines up with indicator, tighten hold-down screws. Refer to Final Ignition Setting.
Final Ignition Setting—*Must be within yellow band of flywheel mark (leading edge desired).* If timing advanced, engine roughness may result even with high octane fuel. If timing retarded to overcome heavy "ping", engine performance and economy will be lessened (higher octane fuel should be used). A very light "ping" may occur with part throttle on a hard pull, or during acceleration with wide open throttle between 10-20 MPH. Do not retard timing to eliminate this light "ping."

CARBURETOR

CARTER

Carter WCD. 1⅛" (40, 50), 1¼" (70) Dual downdraft type with automatic choke.

Model	Carter Carburetor No.
1950 & Early 1951 Series 40, 50	725S, SA
1950 & Early 1951 Series 70	726S, SA
Late 1951 Series 40, 50	882S, SA
Late 1951 Series 70	883S

►*CARBURETOR VENTING TO PREVENT AIR CLEANER "BLOW-UP" (except 882SA): See "Carter WCD" in Carburetor Section.*
►*725S & 726S CARBURETOR PRODUCTION CHANGE—Superseded Late 1950 by 725 SA & 726 SA.(To correct gasoline odors noticeable in car). See Carburetor Section for complete data.*
Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*
Metering Jets & Rods—*See Carburetor Section for Carter Jet Specifications.*
Fast Idle: Carter Dual (WCD) Carburetor Type.
Setting—Adjust fast idle screw for throttle opening of .015" (All carburetors except 882S, SA), .012" (882S, SA) with choke valve closed and screw on high step of fast idle cam.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control.
Setting—1 Point Rich (all models).
See Carburetion Equipment Section for complete data.
See Carburetion Equipment Section for complete data.
Throttle Linkage Adjustment & Dashpot Setting: *See TUNE-UP data.*

STROMBERG

Stromberg AAUVB-267 (Series 40, 50), AAVB-267 (70). 1⅛" (40, 50), 1¼" (70) Dual downdraft types with Automatic Choke.

Model	Stromberg Code No.
1950-51 Series 40, 50	7-88, 7-88A, 7-88B
1950-51 Series 70	7-89, 7-89A, 7-89B
Late 1951 Series 40, 50	7-90, 7-90B
Late 1951 Series 70	7-91, 7-91A

►*CARBURETOR VENTING TO PREVENT AIR CLEANER "BLOW-UP": See "Stromberg AAUVB & AAVB" in Carburetor Section.*
See Carburetor Section for complete data.
►*PUMP LEVER TORSION SPRING PRODUCTION CHANGE—See Carburetor Section for complete data.*
Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*
Metering Jets—*See Stromberg Jet Specifications in Carburetor Section.*
Fast Idle: Stromberg AAUVB & AAVB type.
Setting—Close choke valve on #53 (.0595") drill rod, adjust by bending fast idle cam rod so that locking lever on throttle valve shaft just clears loose lever behind fast idle cam as throttle opened and closed.
See Carburetion Equipment Section for complete data.
Automatic Choke: Stromberg type.
Setting—Centered.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: (Series 40,50) AC No. 1544638. **(70)** 1544639. Oil Bath Type.
►*AIR CLEANER "BLOW-UP" PREVENTION: See "Carter WCD" and "Stromberg AAUVB & AAVB" in Carburetor Section for venting of carburetors.*
Fuel Pump: AC. Combination fuel & vacuum type.
Replacement Pump (Series 40, 50) AC No. 529. **(70)** 530.
Pressure—4½-5½ lbs. at fuel pump outlet, or 4-5 lbs. at carburetor.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517040.
Tank Unit—AC No. 1517200.
See Carburetion Equipment Section for complete data.

BATTERY

Series 40, 50 Delco Type 15E4W. 6 volt, 15 plate, 100 ampere hour capacity. (20 hour rate).
(70) 17E6W. 6 volt, 17 plate, 120 ampere hour capacity. (20 hour rate).
Grounded Terminal—Negative (—) to engine block.
Location—Under hood, right side.

STARTER

Delco-Remy	Starter No.	Armature No.
1950 Series 40, 50	1107078①	1917855
1950 Series 70	1107953	1867897
1951 Series 40, 50	1107097, 1107110②	1917855
1951 Series 70	1107981	1912697

①—No. 1107057 (RHD. Cars).
②—Nos. 1107098 & 1107114 (Series 50 RHD.).
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

Performance Data
1107057, 78, 97, 98, 110, 114

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 "	Lock	3.25	550

Performance Data—1107953, 81

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.0	65
16 "	Lock	3.0	600

Starting Switch: Delco-Remy Solenoid Switch No. (1950) 1118019, (1951) 1118148, controlled by Stromberg Starter Switch No. 385000 (1950), 385611 (1951) or Carter Car Starter No. 192-11U. Solenoid Relay is integral (1950), separate Delco-Remy No. 1116855 (1951).
►*1950 STROMBERG STARTER SWITCH CHANGES FOR IMPROVED PERFORMANCE: See "Stromberg Starter Switch" in Electrical Equipment Section.*
►*1951 STARTER RELAY "STICKING" CORRECTION—See "Electrical System Notes" in Buick Special Data.*
Starter Switch Setting—*See "Carter Car Starter" and "Stromberg Starter Switch" in Electrical Equipment Section.*
►**Dynaflow Neutral Safety Switch**—Delco-Remy No. 1997838 (1950), 1998023 (1951). Connected in starter circuit so starter operative only with lever in "N" Neutral or "P" Parking position.
►**Neutral Safety Switch Adjustment**—*See "Buick Dynaflow Drive" in Transmission Section.*

GENERATOR

Delco-Remy	Generator No.	Armature No.
1950 All Series	1102709	1912599
1951 Early	1102754	1912599
1951 Later	1102774	

Two brush type with voltage & current regulation.
Charging Rate Adjustment. None. See Regulator.

Performance Data—Cold

	Amperes	Volts	R.P.M.
1102709, 1102754	40①	8.0	2150
1102774	45①	8.0	2450

①—Not maximum output. **See Current Regulator.**
Brush Spring Tension—28 ozs. each.
Field Current—1.87-2.0 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: ½" belt deflection with light pressure at point midway between generator and fan.

REGULATOR

Delco-Remy	Regulator No.	For Gen. No.
1950-51	1118364	1102709, 54
Late 1951	1118729	1102774

►*REGULATOR NON-INTERCHANGEABILITY CAUTION—45-ampere Regulator must not be used with previous 40-ampere generator.*
See Electrical Equipment Section for complete data.

Cutout Relay
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustm't—*See Electrical Equip. Section.*

Current Regulator

Setting (1118364)—40-46 amperes hot (set to 42).
Setting (1118729)—45-51 amperes hot (set to 47).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustm't—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—In upper edge of speedometer dial.
Direction Signal: Buick. *See Electrical Equip. Section.*

Switches

Lighting—Delco-Remy No. 1995045, (Except early 1950 Series 40; Delco-Remy No. 1995044).
Beam Selector—Delco-Remy No. 1997008.
Directional Signal—Delco-Remy No. (1950 Dynaflow) 1995546, (1950 Synchro-mesh) 1995547). (1951 Series 40 optional & Series 50) 1995561, (1951 Series 70) 1995562.

MISC. ELECTRICAL

►**DASH PANEL INSPECTION HOLE FOR ACCESS TO WIRING ON BACK SIDE OF INSTRUMENT PANEL:** *Located on left side of dash under hood with* removeable plate screwed to dash.

THERMOSTATIC RELAY: Delco-Remy. On lighting switch (protects lighting circuits). Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adjustable.

FUSE BLOCK: On lower flange of instrument panel at left of steering column. Five fuses:
1)—**Dome, Glove Box, & Trunk Lights.** 30 ampere.
2)—**Clock.** 3 ampere.
3)—**Defroster and Heater.** 30 ampere.
4)—**Direction Signal and Stop Lamp.** 14 ampere.
5)—**Back-Up Lights.** 14 ampere.

HORNS: Delco-Remy No. 1999649 or 1999669 (Low Note), 1999650 or 1999670 (High Note). Twin Horns.

	Current (at 6 volts)	Air Gap
Low Note	19-21 amperes	.044-.049"
High Note	18-20 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027". **Air Gap**—.014" (contacts closed)

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder, in line, with overhead valves.

Series	Bore	Stroke	Displacement
40 (1950)	3 3/32"	4 1/8"	248.1 cu.in.
40 (1951)	3 3/16"	4 1/8"	263.3 cu. in.
50 (1950-51)	3 3/16"	4 1/8"	263.3 cu. in.
70 (1950-51)	3 7/16"	4 5/16"	320.2 cu. in.

Series	Rated HP	Comp. Ratio	Dev. HP①
40 (1950)	30.63	6.6-1	115
40 (1950)	30.63	7.2-1②	122
40 (1951)	32.51	6.6-1	120
40 (1951)	32.51	7.2-1②	128
50 (1950-51)	32.51	6.9-1	124
50 (1950-51)	32.51	7.2-1②	128
70 (1950-51)	37.81	7.2-1	152

①—At 3600 R.P.M. ②—With Dynaflow.

►*NOTE*—.010" oversize bore production engines are marked by stamped dash (—) approx. ¼" long following engine number.

►**SERIES 40 ENGINE (Synchro-mesh).** These engines are equipped with conventional type valve lifters, and use different camshaft, push rods, rocker arms, ball studs, and valve springs.
Identification: Conventional type lifters, Blue lettering "BUICK FIREBALL" on valve cover. **Hydraulic lifters, Red** lettering.

►**CYL. HEAD PARTIAL PRODUCTION CHANGE (1951 Series 40 & 50)**—A lower compression cylinder head is used with CAST IRON PISTONS. This head is .020" thicker than the standard head and is identified by letter "L" stamped on right front side under overhead oil line fitting. *CAUTION—This head continued in production after use of Aluminum Pistons resumed. See PISTONS below.*

►**CYLINDER HEAD:** *CAUTION*—**Different head and gasket combinations used for each particular compression ratio:**

Series	Head No.	Gasket Thickness	Comp. Ratio
40 (1950)①	1340248	.050"	6.6-1
40 (1950)②	1340830	.015"	7.2-1
40 (1951)①	1340248	.075"	6.6-1
40 (1951)②	1340248	.015"	7.2-1
50 (1950-51)①	1340248	.050"	6.9-1
50 (1950-51)②	1340248	.015"	7.2-1
70 (1950-51)②	1340868	.050"	7.2-1

①—Synchro-mesh. ②—Dynaflow.

MANIFOLD GASKET INSTALLATION: *See "MANIFOLDS" in Buick Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Buick Special Data.*

"CONTROLLED FREQUENCY" ENGINE MOUNTINGS: *See Buick Special Data.*

COMPRESSION & VACUUM READINGS: *See Tune-Up.*

PISTONS: Light weight, aluminum alloy, four ring, Turbulator top, cam ground, transverse slot type, with Anodized finish.

►*CAST IRON PISTON PARTIAL PRODUCTION CHANGE*—Cast iron pistons used in partial production on 1951 Series 40 & 50 engines. Cast iron pistons MUST NOT BE INTERMIXED with Aluminum Pistons in an engine. *See CYLINDER HEAD data above.*

►*CAST IRON & ALUMINUM PISTON IDENTIFICATION & REPLACEMENT PARTS CAUTIONS: See "Pistons" in Buick Special Data.*

►*CAUTION—Cast iron pistons must not be used with connecting rods designed for aluminum pistons. See CONNECTING RODS.*

Series	Weight (Stripped)	Length
40 (1950)	13.776 oz.	4 21/64"
40 (1951)	12.912 oz.	3 49/64"
50 (1950-51)	12.912 oz.	3 49/64"
70 (1950-51)	17.94 oz.	4 5/8"

Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons below.

	Top Land	Top—Skirt—Bottom
Series 40, 50	.023-.030"	.0021" .0015"
Series 70	.026-.033"	.0023" .0017"

NOTE—Car manufacturer recommends reboring if taper exceeds .005", or out-of-round over .003".

Replacement Pistons: *See Buick Special Data.*

Fitting New Pistons: Use feeler stock ¼" wide (for "GO" gauge), ½" wide ("NO GO" gauge) and 12" long suspended in cylinder at right angles to engine center-line, invert piston in cylinder. With piston and cylinder clean and dry and at 70°F., piston should pass through cylinder of own weight with "GO" gauge and should hold its own weight with "NO GO" gauge as follows:

	Clearance Limits Top of Skirt	Feeler Gauges "GO"	"NO GO"
Series 40, 50	.0012-.0018"	.0015"	.002"
Series 70	.0014-.0020"	.0015"	.002"

Installing Pistons: Hollow side of head to camshaft.

PISTON RINGS: Two compression (upper inner edge stepped or beveled), one slotted oil ring in #3 groove, "Flex-fit" oil ring in #4 groove. All rings above pin. #1, #2, and #4 rings are coated.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"	.010-.020"	.0015-.0035"
Oil (#3)	3/16"	.010-.020"	.0015-.003"
Oil (#4 Flex-fit)	3/16"	.0015"①	.001-.003"

①—No fitting required for Flex-fit Ring.

Replacement Rings: *See Buick Special Data.*

PISTON PIN: Clamped in rod.
Diameter—(40, 50) .8124-.8129", (70) .8744-.8749".
Length—(40, 50) 2 11/16", (70) 3 1/16".
Pin Fit in Piston—**.0003-.0004" clearance or easy** finger push fit at 70°F.

Replacement Pins: Std. and .003", .005" oversize. Pins furnished with new pistons and separately also.

CONNECTING ROD:	Length	Weight
Series 40 (1950)	7 5/8"	29.20 ozs.
Series 40 (1951)	7 3/8"	28.096 ozs.
Series 50 (1950-51)	7 3/8"	28.096 ozs.
Series 70 (1950-51)	8 1/4"	36.272 ozs.

►*CONNECTING RODS FOR CAST IRON PISTONS (1951 SERIES 40 & 50):* Special connecting rods and mating bearing caps must be used with cast iron pistons. *CAUTION—Rods and bearing caps intended for Aluminum Pistons MUST NOT BE USED with Cast Iron Pistons. See PISTONS above.*

►*CONNECTING ROD IDENTIFICATION & REPLACEMENT PARTS CAUTION (For Cast Iron & Aluminum Pistons): See "Connecting Rod & Bearings" in Buick Special Data.*

Crankpin Journal Diameter: (Series 40 1950) 1.998-1.999", (Series 40 1951 & Series 50 1950-51) 2.125-2.126", (Series 70 1950-51) 2.248-2.249".
Bearings—Durex 100-A "full-precision" insert type without shims.
Clearance—.0005-.0018". **Sideplay**—.005-.010".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Furnished in Std. and .001", .002", .020", .021" undersize. Undersize bearings marked with number on outer surface near tang indicating size.

Installing Rods: Ridge on edge of cap and boss in web of rod must be toward rear of engine. Oil hole in rod toward camshaft.

CRANKSHAFT: Five bearing, counterweighted.

►*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

►*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*
NOTE—Stepped journals used on Series 40 1950 & Series 70 (1950-51), uniform journals on Series 40 (1951) and Series 50 (1950-51.)

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ENGINE

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Main Bearing Journal Diameters

Series—	"40" 1950	"50" 1950-51	"70" (1950-51) "40" 1951
#1	2.3105-2.3115"	2.5625-2.5635"	2.5605-2.5615"
#2	2.3735-2.3745"	2.5625-2.5635"	2.6235-2.6245"
#3	2.4355-2.4365"	2.5625-2.5635"	2.6855-2.6865"
#4	2.4985-2.4995"	2.5625-2.5635"	2.7485-2.7495"
#5	2.5605-2.5615"	2.5625-2.5635"	2.8105-2.8115"

NOTE—Car manufacturer recommends crankshaft be replaced or reground if journal out-of-round over .0015".

Bearings—Steel-backed, Durex 100-A, slip-in type. *NOTE*—Bearings "full-precision" (no shim) type.

Clearance—.0005- 002".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

▷*CAUTION*—Arrow on main bearing caps must point toward front of engine when installed.

Replacement Bearings: Standard and .0012", .002", .020", .022" Undersize.

Rear Oil Seal Installation: *See Buick Special Data.*

End Thrust: #3 (center bearing). **Endplay** .004-.008".

CAMSHAFT: 5 bearing. Non-adjustable chain drive.

▷*CAUTION—Two types of camshafts used,* one for engines with plain sleeve valve lifters, one for engines with hydraulic lifters. *ENGINE WILL BE ROUGH AND NOISY IF WRONG SHAFT USED.*

Camshaft Identification—All shafts have ¼" land between #6 & #7 cams (visible from below with pan off) with different finish on land as follows:

Plain Sleeve Lifter Type Shaft—Land has dark rough-turned surface with 1/16" groove in center.

Hydraulic Lifter Type Shaft—Land has bright finished-ground surface without any groove.

Bearing Diameters (for All Series)—#1, 2 5/32"; #2, 2 1/8"; #3 2 3/32"; #4, 2 1/16"; #5, 1 3/4".

Bearings—Steel-backed, babbitt-lined.

Clearance—.0015-.004". *NOTE*—Replacement bearings must be line reamed after installation.

End Thrust: Spacing ring between front bearing journal and thrust plate (on front of crankcase behind camshaft sprocket). **Endplay**—.004-.008".

Timing Chain: Link Belt. **Width** 13/16", **Pitch** .500". **Length (40, 50)** 24 1/2", 49 links. **(70)** 25" 50 links.

Camshaft Setting: Two teeth on timing chain (10 links apart) are marked with copper plated washers. Facing the front of engine, center the crankshaft sprocket timing mark on right side. Set camshaft sprocket, (mark to right side) and install chain with marked teeth matching sprocket marks.

▷**VALVES:** *CAUTION*—**Engines with hydraulic valve lifters** use different camshaft, push rods, rocker arms, ball studs, and valve springs.

VALVE SPECIFICATIONS—SERIES 40 & 50

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.3715-.3725"	5 7/64"
Exhaust	1 11/32"	.3711-.3719"	5 7/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.348"	.0025" (.0015-.0035")
Exhaust	45°	.342"	.003" (.0021-.0039")

VALVE SPECIFICATIONS—SERIES 70

	Head Diameter	Stem Diameter	Length
Intake	1 25/32"	.3715-.3725"	5 1/4"
Exhaust	1 7/16"	.3711-.3719"	5 1/4"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.347"	.0025" (.0015-.0035")
Exhaust	45°	.348"	.003" (.0021-.0039")

Valve Seat Width—Nominal width .062" (1/16"). Seats wider than 5/64" should be narrowed down using proper 20° and 70° cutters.

Valve Guides: Upper end of guide 1 5/32" above head. Finish ream replacement guides after installation to .374-.375" (use Valve Guide Reamer J129-3).

▷**Valve Springs** *CAUTION*—Engines with hydraulic valve lifters use different valve springs.

Free Length—1 29/32" (inner), 2 11/32" (outer).

Valve Spring Specifications

▷**Engines with Adjustable Valve Lash**

	Inner Spring Lbs. Press.	Lgth.	Outer Spring Lbs. Press.	Lgth.
Closed	17½-22½	—1 21/32"	29½-34½	—1 15/16"
Open	48-54	—1 5/16"	74-80	—1 19/32"

▷**Engines with Hydraulic Valve Lifters**

Closed	22-26	—1 21/32"	49-55	—1 15/16"
Open	49-55	—1 5/16"	116-124	—1 19/32"

Valve Lifters (Engines with Adjustable Valve Lash): Plain sleeve, barrel type. Diameter .9975-.9985". **Clearance in Crankcase**—.0005-.0025".

Hydraulic Valve Lifters: Used on all cars with Dynaflow Drive and Series 50 with synchro-mesh trans. *See "Valve System" in Buick Special Data.*

Identification—By RED "Buick Fireball" lettering on valve rocker arm cover and label reading "This Engine Equipped with Hydraulic Lifters."

▷*CAUTION*—If lifter operating properly, DO NOT disassemble when removed from engine for other work (wrap in clean paper to keep dirt out).

▷**Initial Adjustment (required only when installing cylinder head or when adjusting ball stud setting has been disturbed):** *See "Valve Tappet Clearance" in Buick Special Data.*

Rocker Arms: *CAUTION*—**Engines with hydraulic valve lifters** use different rocker arms and ball studs. Rocker arms used with hydraulic valve lifters do not have small oil hole on underside of arm. Ball studs used with hydraulic lifters have drilled oil hole for oil feed to lifter (through pushrod).

▷**Series 40 Pushrod Change (Engines with Adjustable Lash)**—*See "Valve System" in Buick Special Data.*

Rocker Arm Installation—*See Buick Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION*—**Two types of valve lifters used,** Hydraulic & Conventional (conventional type on Series 40 with synchro-mesh trans. only. Hydraulic type on all other cars).

Identification: Hydraulic type, Red lettering "BUICK FIREBALL" on valve cover. **Conventional type,** Blue lettering on valve cover.

▷**HYDRAULIC TYPE SETTING:** *NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have regular adjusting ball studs. **Initial Adjustment** required when installing cylinder head or if ball studs disturbed.

▷**Initial Adjustment**—*See "Valve System" in Buick Special Data.*

▷**CONVENTIONAL TYPE SETTING:** To secure .015" road operating clearance, stabilize temperatures by running engine at fast idle (700 RPM. min.) for 20 minutes with radiator cap removed, then adjust using .017" feeler gauge "GO," .018" "NO GO."

Anti-Freeze Caution—Replace with water for warming up (will boil out if left in radiator).

Timing Chain Setting: *See Camshaft Setting.*

VALVE TIMING—SERIES 40 & 50

Intake Valves—Open 13° BTDC. Close 68° ALDC.
Exhaust Valves—Open 55° BLDC. Close 22° ATDC.

VALVE TIMING—SERIES 70

Intake Valves—Open 14° BTDC. Close 71° ALDC.
Exhaust Valves—Open 56° BLDC. Close 25° ATDC.

VALVE TIMING CHECK

Series 40 (with Adjustable Valve Lash)—Set tappet clearance for .015" road operating lash (see above), use dial indicator to check actual valve opening. #2 or #7 exhaust valve should be .145" open with #1 and #8 pistons at top dead center with flywheel mark "UDC/1&8" visible through inspection hole in right front face of housing.

All Series (With Hydraulic Lifters)—Use dial indicator set up over #2 or #7 exhaust valve to check actual valve movement. With valve fully closed, set indicator to zero, tighten adjusting ball stud until indicator reads .015", wait until leak-down allows indicator to return to zero, repeat process until indicator fails to return to zero (indicating that lifter plunger bottoming in body so that lifter is "solid"). Back off ball stud just enough so that indicator reads zero. Turn crankshaft slowly until indicator reads .145" (Series 40, 50), .155" (70). Flywheel mark "UDC/1&8" should be visible through inspection hole in right front face of housing at this point.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and restricted flow to rocker arm bearings, push rods and hydraulic valve lifters (if used).

NOTE—Valve system oil feed taken from outlet side of filter with restricted fitting in head at point where rocker shaft oil lead connected (all oil for valve system passes through filter).

Oil Filter: AC Low-restriction type. Filter has by-pass valve which opens at 7-9 lbs. (all oil for valve system passes through filter).

Replacement Element—AC No. P-127.

Crankcase Capacity—Refill—5½ qts. (40, 50), 7 (70).

Dry Capacity—6½ qts. (40, 50), 8 qts. (70).

NOTE—If oil filter is dry add 1½ qts. to capacities.

Normal Oil Pressure—35 lbs. at 35 MPH.

Oil Pressure Regulator—Non-adjustable spring and valve type on oil pump. Opens at 35 lbs.

Oil Pump: Helical gear type in crankcase.

Oil Pump Clearances—*See Buick Special Data.*

Crankcase Ventilation: Filter in oil filler breather cap and in crankcase ventilator inlet on left side of engine. Outlet pipe mounted on right side of engine.

Oil Pressure Gauge: AC No. (1950 All Series) **1507210,** (Series 40 1951) **1507603,** (Series 50 & 701951) **1517413.**

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valves) in filler cap. Re-circulation of water through engine (with thermostat closed) permitted by fixed by-pass passage.

Water Pump Outlet Pipe for Dynaflow Drive—Separate pipe on right side below pump inlet. Used only on cars with Dynaflow Drive.

Capacity:	Without Heater	With Heater
Series 40, 50 (Std.)	12 qts.	13½ qts.
Series 40, 50 (Dynaflow)	13½ qts.	15 qts.
Series 70	18 qts.	19½ qts.

Pressure Valve—AC No. 850563 Radiator Filler Cap. 7 lb. type.

Water Pump: Packless, sealed ball-bearing type. *See Water Pump Section for complete data.*

Thermostat: Harrison. In cylinder head water outlet. Buick No. 3122282 Std. 151°, No. 3122285 Hi. T. 182°.

Setting—(151°) starts to open 148-155°F. Fully open at not over 176°F. (182° Type) Starts to open at 178-185°F., fully open at not over 211°F.

Temperature Gauge: AC No. (1950 All Series) 1512013, (Series 40 1951) 1512317, (Series 50 & 70 1951) 1512315.

CLUTCH

Own "Crown Spring" with Borg & Beck or Long Driven Member. Single plate, dry disc type.
See Clutch Section for complete data.

Facings—Woven type, 2 used. Inside diameter 6". Outside Diameter 10". Thickness .125" (⅛").

Pedal Adjustment: Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod linking cross-shaft lever to clutch fork. Pedal positioned by rubber bumper under toeboard.

►**Correction of Low & Reverse Gear Clash due to Spinning Clutch Plate**—Car manufacturer permits reducing pedal lash to ½" in exceptional cases where gear clash continues (with regular ¾-1" pedal lash) beyond normal plate stopping period.

Clutch Over-center Spring Installation & Adjustment (1950 Cars): *See "Clutch Notes" in Buick Special Data.*

Removal: Remove Rear Axle and Transmission (see below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.

Clutch Yoke Boot Installation—*See "Clutch Notes" in Buick Special Data.*

TRANSMISSION
SYNCHRO-MESH

Own Make. *All Helical Gear, constant-mesh, synchro-mesh* (Second & High), sliding gear (Low & Reverse) with steering column mounted shift control. *See Transmission Section for complete data.*

Transmission Control: Buick type remote control.
See Transmission Section for complete data.

Removal: Disconnect Rear Axle (see data following), disconnect the speedometer cable, lower gear shift rod, and selector rod. Take out toggle spring and extension, remove shift lever and lock washer from selector shaft—hold shift lever in neutral when removing attaching bolt—remove outer selector lever. Install the special engine support bar under rear end of oil pan positioning left hook over frame between brake master cylinder and clutch release equalizer, tighten nuts on two hooks evenly. Remove transmission mounting as follows: Disconnect rubber thrust pad from rear of transmission support by taking off 3 nuts and bolt plate, remove shims from behind support, disconnect mounting pad on top of support by taking out 2 attaching bolts and bolt plate, raise engine by turning up on nuts on two support hooks evenly to take load off transmission support, take out transmission support (disconnect at frame ends), and remove thrust pad from thrust plate. Install guide pins J-851 in place of two top mounting bolts, remove remaining mounting bolts, pull transmission straight back and lower from car.
For instructions on shimming Rear Mounting when installing transmission, see "Engine Mounting" in Buick Special Data.

Lubrication Note—When transmission reinstalled in car, inject ½ pint of transmission lubricant through universal joint yoke before attaching torque tube to transmission.

DYNAFLOW TRANSMISSION

Own Make. Torque Converter and hydraulically operated planetary unit with manual control.
PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Dynaflow Drive in Transmission Section.
TESTING & TROUBLE SHOOTING: See Dynaflow Drive in Transmission Section.

►*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

►*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*

Dynaflow Linkage Adjustment: *See "Buick Dynaflow Drive" in Transmission Section.*

Throttle Linkage Adjustment & Dashpot Setting: *See Carburetion in TUNE-UP data.*

Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.

►***Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type "A".***

Capacity—(Ser. 40, 50) 8½ qts. (Ser. 70) 10 qts.

Checking Fluid Level—Engine must be idling with selector lever at "P" (parking) and transmission oil warm. Raise right side of hood, lift out oil gauge rod between battery and engine. Add fluid to "FULL" mark level with engine idling.

►***CAUTION—Engine must be idling with transmission in Parking and transmission oil warm when checking Dynaflow Drive Fluid Level.***

OTHER DYNAFLOW SERVICE DATA: See "Buick Dynaflow Drive" in Transmission Section.

UNIVERSALS

Saginaw or Spicer. One used (in Torque Ball at rear of transmission).

Torque Ball Adjustment—*See Buick Special Data.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with Torque Tube Drive.
See Rear Axle Section for complete data.

Ratios—	Standard	Optional
1950 Synchro-mesh Cars		
41, 41D, 43, 43D, 46D, 46S	4.1-1 (41-10)	3.9-1 (43-11)
52, 56C, 56R, 59	4.1-1 (41-10)	3.9-1 (43-11)
46, 51, 56S	3.9-1 (43-11)	3.6-1 (47-13)
1951 Synchro-Mesh Cars		
41, 41D, 45R, 46, 46S, 48, 48D	3.9-1 (43-11)	3.6-1 (47-13)
46C, 52, 56C, 59, 79	4.1-1 (41-10)	3.9-1 (43-11)
51, 56R, 56S	3.9-1 (43-11)	3.6-1 (47-13)
72, 76C, 76R	4.1-1 (41-10)	3.9-1 (43-11)
1950 Dynaflow Cars		
40 (All)	3.9-1 (43-11)	3.6-1 (47-13)
52, 56C, 56R, 59	3.9-1 (43-11)	3.6-1 (47-13)
71, 75R, 76S	3.6-1 (47-13)	3.9-1 (43-11)
72, 76C, 76R, 79	3.9-1 (43-11)	3.6-1 (47-13)
1951 Dynaflow Cars		
41, 41D, 45R, 46, 46S, 48, 48D	3.6-1 (47-13)	3.9-1 (43-11)
51, 56S, 56R	3.6-1 (47-13)	3.9-1 (43-11)
46C, 52, 56C, 72, 76C, 76R	3.9-1 (43-11)	3.6-1 (47-13)
59, 79	3.9-1 (43-11)	

►**Ring Gear and Pinion Interchangeability:** All rear axle gear sets are completely interchangeable for service. That is, any 1950-51 gear set can be used in any 1950-51 Model regardless of ratio.

Ratio Identification: Axle ratio is indicated by numbers stamped on bottom center of housing (3/6 for 3.6-1, 4/1 for 4.1-1 etc.).

Backlash—.008-.010" (desired), .008-.012" (limits). Screw adjustment.

Removal: Raise rear end of car and set on car stands. Disconnect parking brake cable at rear brake sheave and at bracket of front end of torque tube, hydraulic brake line from pipe at frame X member and remove retainer. Disconnect lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs, and torque tube from torque ball. Hoist rear end of car and roll axle assembly out.

►***CAUTION—Torque tube should not be disconnected from carrier (except for gasket replacement).***

Torque Ball Adjustment—*See Buick Special Data.*

Axle Shaft Removal: *See Rear Axle Section.*

Wheel Bearing Adjustment—None.

Rear Suspension: Coil springs & conventional axle.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco Model 1948-A (front), Model 2105-C, D (rear). Double acting, Hydraulic (parallel cylinder rear).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—4¼° crosswise for ⅜° Camber.

Camber—⅜° Positive (⅞° Pos. to ⅝° Neg.) and equal for both wheels within ¾° at curb weight.

Caster—¾° Pos. (¼° Pos. to 1½° Pos.) equal for both wheels within ½° at curb weight. Adjustable.

Toe In—1/16-1/8". Adjust both tie rods equally.

►***CAUTION***—Tie rod clamps must be within ⅛" of end of tube and ear of clamp must overlap slot in tube not less than 1/16".

Steering Geometry (Toe Out on Turns)—With outer wheel turned 20°, inner wheel turns 21½° ± ¾°.

STEERING GEAR

Saginaw. Ball bearing Worm-and-Nut.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without Eccentric Adjustment. Parking brake "Step-on" lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Cast-iron with steel flange. Drum diameter 11.997-12.003". Max. rebore .060" O.S. (.030" cut).

►*BRAKE DRUM RECONDITIONING & BALANCING: See Brake Notes in Buick Special Data.*

Lining—Moulded. Width (40, 50) 1¾", (70) 2¼". Thickness 3/16". Length per shoe: Primary (40, 50) 9 15/16", (70) 10"; Secondary: (40, 50) 12 3/4", (70) 12 15/16" (1950), (See Note).

NOTE (Series 70 1951)—Segmented lining used. Lining is bonded to shoes and not furnished separately.

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Step On (Parking Brake): See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure).
See Miscellaneous Section for complete data.

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

HOOD ADJUSTMENT: *See Buick Special Data.*

MODEL IDENTIFICATI N

SERIAL NUMBER: Stamped on plate on left front door pillar post and on left front frame side rail.

1952 Starting Numbers—

1—6436001	Flint	5—6483001	Wilmington
2—6456001	Southgate	6—6499001	Atlanta
3—6464001	Linden	7—6696001	Framingham
4—6471001	Kansas City		

Identification—First digit of serial number indicates assembly plant as listed above.

ENGINE NUMBER: Stamped on boss on right side of crankcase below pushrod cover.

1952 Starting Numbers—

40 Series (Synchro-mesh)	6646232-4
40 Series (Dynaflow)	6646230-4
50 Series (Synchro-mesh)	6647024-5
50 Series (Dynaflow)	6646230-5
70 Series (Standard steering)	6652000-7
70 Series (Power steering)	6652220-7

Identification—Last digit of number indicates series. Dash ¼" long following engine number indicates cylinder bores are .010" Oversize.

TUNE-UP

►*SERIES 70 PROLONGED CRANKING WITH HOT ENGINE (Cars with first Carter & Stromberg 4-Barrel Carburetors): See Carburetor Section for recommended changes to shorten cranking time.*

COMPRESSION PRESSURE: At cranking speed.

	Synchro-mesh	Dynaflow
40 Series	114 lbs.	120 lbs.
50 Series	118 lbs.	120 lbs.
70 Series		120 lbs.

VACUUM READING: Steady 18-20" idling at 8 mph. or 450 RPM.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUG GAPS: .025". Limits .023-.028".

Plug Type—AC No. 46X. 14 mm. Metric.

DISTRIBUTOR: Delco-Remy 1110832. Automatic and vacuum advance. "Center. bearing" breaker plate. *See "Delco-Remy Center Bearing Breaker Plate Distributor" in Electrical Equipment Section.*

Breaker Gap—.015". Limits .0125-.0175".

Cam Angle—Test limits with .016" gap—21-30°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*

►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".*

Automatic & Vacuum Advance—*See Ignition.*

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

COIL: Delco-Remy 1115328. On pushrod cover.

Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Delco-Remy 1869704.

Capacity—.18-.24 microfarad.

IGNITION TIMING: 4° BTDC (Series 40 & 50), 6° BTDC (Series 70).

Flywheel Mark—"ADV. 4°" (Series 40), "ADV 6°" (Series 50 & 70) followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° for Series 40 & 50, 6-7° for Series 70). Index mark located on edge of timing hole under cover on housing above starter.

►*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance. If timing light used, idle engine below 350 RPM.*

Timing Procedure—*See Ignition Timing.*

Final Ignition Setting—Very light "ping" may occur with part throttle on a hard pull, or during acceleration between 10-20 MPH with wide open throttle.

CARBURETION

SERIES 50—CARTER 2-BARREL

CARTER WCD No. 882SA. Dual (2-barrel) downdraft type with automatic choke.

Idle Setting—1¼-1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—450 RPM (or 8 MPH. on level road in 3rd gear).

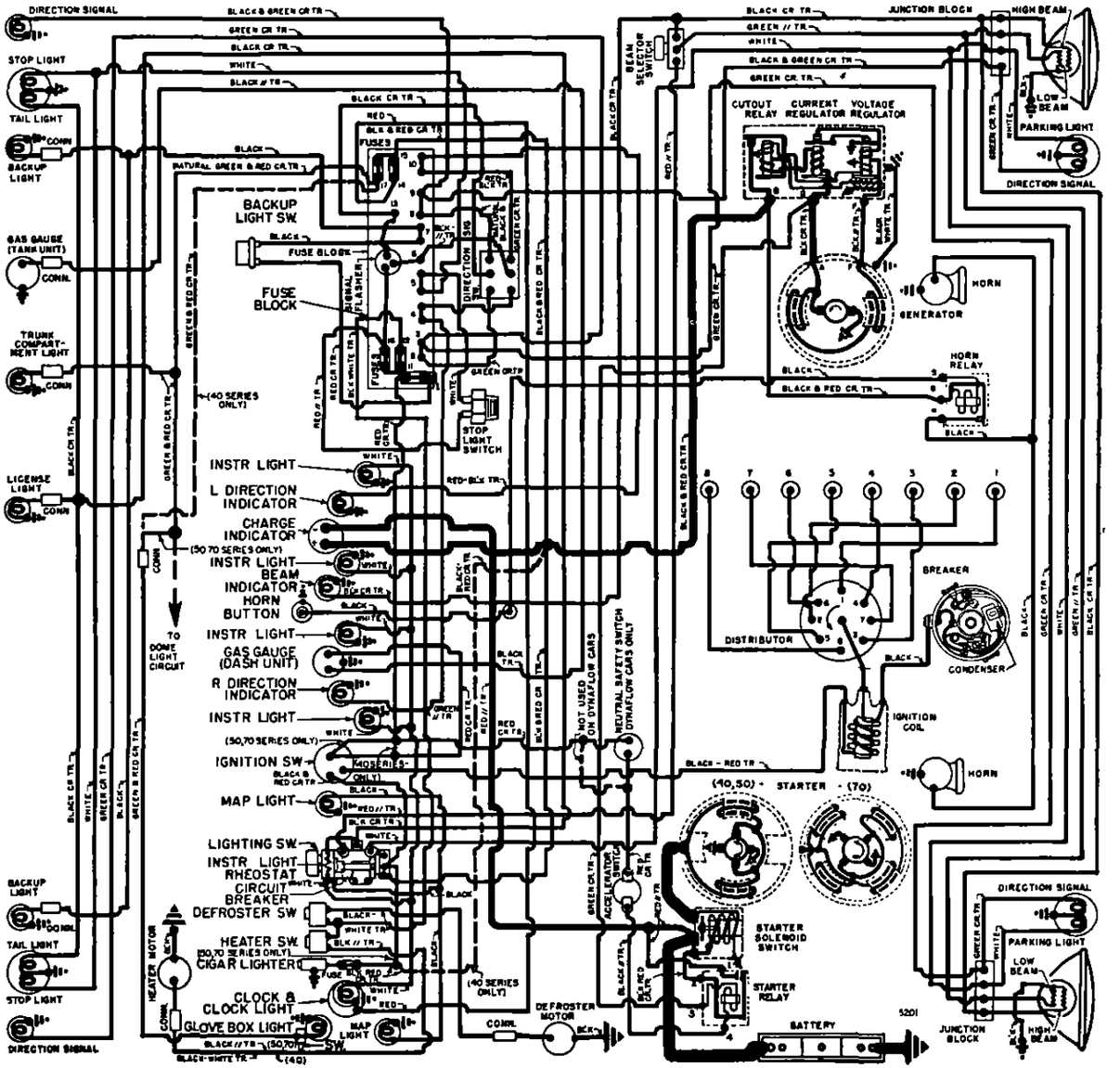
Float Level—5/32" from top of each float to gasket seat on cover with valve seated (invert to check).

Fuel Level—Even with bottom of inspection hole on side of float bowl with engine idling.

Accelerating Pump—Two holes in arm. Inner hole minimum charge. Outer hole maximum charge. Standard setting is inner hole.

Fast Idle: (WCD) Setting—Adjust fast idle screw on throttle shaft lever for .012" throttle opening with choke valve tightly closed and screw on high step of fast idle cam.

Automatic Choke Setting (WCD)—1 notch rich.



Throttle Linkage Adjustment & Dashpot Setting: *See "Throttle Linkage Adjustment" below.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor.

SERIES 50—STROMBERG 2-BARREL

STROMBERG AAUVB-267, Code 7-90 & 7-90B. Dual (2-barrel) downdraft type with automatic choke.

Idle Setting—1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—450 RPM. or 8 MPH. on level road in 3rd gear.

Float Level—(On gauge No. T-24971), 5/64" above top of gauge guides.

Fuel Level—(Checked through inspection hole). Fuel must be level with bottom of threads in inspection hole.

Accelerating Pump—3 holes. Center hole (medium stroke) normal setting.

Fast Idle: (AAUVB-267) Setting—Close choke valve on #53 (.0595") drill rod, adjust by bending fast idle cam rod so that locking lever on throttle valve shaft just clears loose lever on fast idle cam stud as throttle is opened and closed.

Automatic Choke Setting: (AAUVB-267), Centered.

Throttle Linkage Adjustment & Dashpot Setting: *See "Throttle Linkage Adjustment" below.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor.

SERIES 70—CARTER 4-BARREL

CARTER WCFB No. 894S, SA. Four-barrel downdraft type with automatic choke. *See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section for complete data.*

►*FLOAT LEVEL SETTING CHANGE & PARTS PRODUCTION CHANGES: See Carburetor Section.*

►*RECOMMENDED CHANGE TO SHORTEN CRANKING TIME WITH HOT ENGINE (Early Cars with first type carburetors): See Carburetor Section.*

Idle Speed—450 RPM.

Other Settings—*See Carburetor Section.*

SERIES 70—STROMBERG 4-BARREL

STROMBERG 4-AUV-267, Code 7-92 (Early), 7-92B (Later). Four-barrel downdraft type with automatic choke. *See "Stromberg 4A 4-Barrel Carburetor" in Carburetor Section for complete data.*

►*RECOMMENDED CHANGE TO SHORTEN CRANKING TIME WITH HOT ENGINE (First Code 7-92 Carburetor): See Carburetor Section.*

Idle Speed—450 RPM.

Other Settings—*See Carburetor Section.*

THROTTLE LINKAGE ADJUSTMENT (ALL)

THROTTLE LINKAGE ADJUSTMENT (Synchro-mesh Transmission): Check linkage for smooth operation of throttle valve from closed to wide open position (pedal correctly secured to floor, pedal rod free in hole in floor mat, return spring proper tension for closed position). Wide open throttle stop should be accelerator pedal striking floor mat (not throttle lever stop striking boss on carburetor). Adjust as follows: With linkage disconnected at throttle operating ball joint, open throttle valve to wide open position against stop, have man press accelerator against floor mat, adjust ball joint so screw will just enter upper hole in throttle lever, turn ball joint 1 or 2 turns clockwise, connect ball joint to throttle lever. Check choke unloader operation.

Dynaflow Drive Cars: With engine idling at 450 RPM., clearance between **edge of bracket** (attached to dash at lower end of vertical equalizer shaft) and **ear on lever** (just above shaft operating lever) should be 1/32-1/16" (adjust at ball joint end of throttle operating rod). Check wide open position of throttle valve with engine stopped and adjust at ball joint (as above) to secure wide open throttle position with pedal striking floor mat (not throttle lever striking boss on carburetor). Check choke unloader operation. Check dashpot setting:

Dash Pot Setting: (Dynaflow cars). Hold choke valve in fully closed position. Insert .030" feeler gauge between the fast idle cam (at the widest part) and the idle adjusting screw. Turn the adjusting screw on the lever (ahead of the dash pot plunger) until it just contacts the dash pot plunger.

MANIFOLD HEAT CONTROL: Setting—Thermostatic coil wind-up ¼ turn at 70° (valve closed). To prevent rattles, counterweight should have 1/16-1/8" movement at extreme end positions, adjust by bending anti-rattle spring lower anchor bracket (40, 50), loosen screw and move bracket (70).

VALVE TAPPET CLEARANCE: *CAUTION*—**Two types of valve lifters used,** Hydraulic & Conventional (conventional type on Series 40 with synchro-mesh trans. only, Hydraulic type on all other cars).

Identification—Hydraulic Type, Red lettering **"BUICK FIREBALL"** on valve cover. **Conventional Type, Blue** lettering on valve cover.

►**HYDRAULIC TYPE SETTING**—*NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have adjusting ball studs. **Initial adjustment** required when installing cylinder head or if ball studs disturbed.

Initial Adjustment—*See Valve Timing.*

►**CONVENTIONAL TYPE SETTING: To secure .015" operating clearance, stabilize temperature by running engine at fast idle (700 RPM. minimum) for 20 minutes with radiator cap removed, then adjust clearance using .017" feeler gauge as "GO", .018" as "NO GO."**

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116452.

COIL: Delco-Remy No. 1115328. On pushrod cover.
Ignition Current—2½ amperes idling. 4½ stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.24 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110832. Automatic and vacuum advance type with "center-bearing" breaker plate.

See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

Breaker Gap—.015". Limits .0125-.0175".
Cam Angle—Test limits with .016" gap—21-30°.

►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used make final check that gap within .0125-.0175".*

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr.	R.P.M.	Degrees	Eng.	R.P.M.
Start		275	0-4		550
5-7		400	10-14		800
9-11.		1150	18-22.		2300
12-14.		1675	24-28.		3350

Vacuum Spark Control: Delco-Remy 1116032. Integral type. **Plunger Travel**—¼".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7"
6	12	11.5-13.5"

IGNITION TIMING

Standard Setting: 4° BTDC (Series 40 & 50); 6° BTDC (Series 70).

►*CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance. If timing light used, idle engine below 350 RPM.*

Flywheel Mark—"ADV. 4°" (Series 40 & 50); "ADV. 6°" (Series 70), followed by yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5° Series 40-50, 6-7° Series 70). Index mark located on edge of timing hole under cover on housing above starter.

Timing Procedure—Use Synchroscope or Power Timing Light connected to # 1 spark plug. Idle engine at **not more than 350 RPM** (to prevent automatic advance operating). Adjust distributor so that timing mark on flywheel appears in line with index mark on housing

Final Ignition Setting—Set for very light "ping" with part throttle on hard pull, or during acceleration between 10-20 MPH. with wide open throttle.

CARBURET R

CARTER TW -BARREL

SERIES 40 & 50—CARTER WCD No. 882SA. Dual (2-barrel) downdraft type with automatic choke.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Setting and Accelerating Pump Setting): *See Tune-Up.*

Metering Jets & Rods—*See Carburetor Section for Carter Jet Specifications.*

Throttle Linkage Adjustment: *See Tune-Up.*

Fast Idle: Carter Dual (WCD) Carburetor type.

Setting—Adjust fast idle screw on throttle shaft lever for .012" throttle opening with choke valve tightly closed and screw on high step of fast idle cam.

See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.

Setting—1 notch rich.

See Carburetion Equipment Section for complete data.

CARTER FOUR-BARREL

SERIES 70—CARTER WCFB No. 894S, SA. Four-barrel downdraft type with automatic choke.

►*RECOMMENDED CHANGE TO SHORTEN CRANKING TIME WITH HOT ENGINE (Early Cars with first type carburetors): See Carburetor Section.*

►*FLOAT LEVEL SETTING CHANGE & PARTS PRODUCTION CHANGES: See Carburetor Section.*

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Idle Speed—450 RPM.
Other Settings—*See Carburetor Section.*
Throttle Linkage Adjustment: *See Tune-Up.*

STROMBERG TWO-BARREL

SERIES 40 & 50—STROMBERG AAUVB-267, Code 7-90 & 7-90B. Dual (2-barrel) downdraft type with automatic choke.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*
Metering Jet Specifications: *See Stromberg Metering Jets in Carburetor Section.*
Throttle Linkage Adjustment: *See Tune-Up.*
Fast Idle: Stromberg type.
Setting—Close choke valve on #53 (.0595") drill rod, adjust by bending fast idle cam rod so that locking lever on throttle valve shaft just clears loose lever on cam stud as throttle is opened and closed.
See Carburetion Equipment Section for complete data.
Automatic Choke: Stromberg type.
Setting—Centered on index.
See Carburetion Equipment Section for complete data.
Throttle Linkage Adjustment: *See Tune-Up.*

STROMBERG FOUR-BARREL

SERIES 70—STROMBERG 4AUV-267, Code 7-92 (Early), Code 7-92B (Later). Four-barrel downdraft type with automatic choke.
▷*RECOMMENDED CHANGE TO SHORTEN CRANKING TIME WITH HOT ENGINE (First Code 7-92 Carburetor): See Carburetor Section.*
See "Stromberg 4AUV 4-Barrel Carburetor" in Carburetor Section for complete data.
Idle Speed—450 RPM.
Other Settings—*See Carburetor Section.*
Throttle Linkage Adjustment: *See Tune-Up.*

CARB. EQUIPMENT

Air Cleaner: Oil bath type.
Fuel Pump: AC. Combination fuel-and-vacuum pump.
Replacement Pump—AC No. 9761 (40, 50), 9762 (70).
See Carburetion Equipment Section for complete data.
Pressure—4½-5½ lbs., at fuel pump outlet, or 4-5 lbs. at carburetor.
Gasoline Gauge: AC Electric type.
Dash Unit—No. 1517712 (Series 40); No. 1517413 (Series 50, 70).
Tank Unit—No. 1517475 (Series 40); No. 1517200 (Series 50, 70).
See Carburetion Equipment Section for complete data.

BATTERY

Series 40, 50: Delco Type 15E6. 6 volt, 15 plate, 100 ampere hour capacity. (20 hour rate).
Series 70—Delco Type 17E6. 6 volt, 17 plate, 120 ampere hour capacity. (20 hour rate).
Grounded Terminal—Negative (—) to right engine mounting bracket.
Location—Under hood right side.

STARTER

Delco-Remy. (Series 40, 50) No. 1107110, (Series 50 RHD) No. 1107114, (Series 70) No. 1107981.
Armature—Delco-Remy No. 1917855 (for 1107110); **No. 1917857** (for 1107981).
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data—1107110, 114

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 "	Lock	3.25	550

Performance Data—1107981

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.0	65
16 "	Lock	3.0	600

Starting Switch: Delco-Remy Solenoid Switch No. 1118148 with SEPARATE relay, Delco-Remy No. 1116855. Controlled by following switches mounted on carburetor (accelerator pedal starting):
Two-Barrel Carburetors—Stromberg Starter Switch No. 386030 (Cars with Stromberg Carburetors).
Carter Car Starter Model 192-11U (Cars with Carter Carburetors).
▷*STROMBERG SWITCH RECOMMENDED CHANGES:*
See "Stromberg Starter Switch" in Electrical Equipment Section for complete data.
Four-Barrel Carburetors—Stromberg Starter Switch No. 385611 (Cars with Stromberg Carburetors).
Carter Car Starter (Cars with Carter Carburetors).
Starter Switch Setting—*See "Carter Car Starter" and "Stromberg Starter Switch" in Electrical Equipment Section.*
Dynaflow Neutral Safety Switch: Delco-Remy No. 1998023. At lower end of steering column. Connected in starter control circuit so that starter operative only with selector lever in "N" Neutral or "P" Parking position.
Neutral Safety Switch Adjustment—*See "Buick Dynaflow Drive" in Transmission Section.*

GENERATOR

Delco-Remy No. 1102779. Two brush type with voltage and current regulation.
Armature—Delco-Remy No. 1921621.
Charging Rate Adjustment: None. See Regulator.

Performance Data—Cold

	Amperes	Volts	R.P.M.
Cold	45①	8.0	2450

①—Not maximum charging rate. See Voltage Regulator.

Brush Spring Tension—28 ozs., each.
Field Current—1.87-2.0 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment—½" belt deflection with light pressure at point midway between generator pulley and fan pulley.

REGULATOR

Delco-Remy No. 1118729. Voltage & Current Regulator.
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot).
Air Gap—.075" (with contacts just closed).
Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—45-51 amperes hot (set to 47 amperes hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Directional Signal: *See Electrical Equip. Section.*
Directional Signal Indicators—(Series 40) Located to the right and left of light indicator emblem. **(Series 50, 70)** Located in the gauges to the right and left of the speedometer.

Switches

Lighting—Delco-Remy No. 1995045.
Beam Selector—Delco-Remy No. 1997008.
Directional Signal—Delco-Remy. (Series 40, 50) No. 1995565, (Series 70) No. 1995566.
Back-Up Light—Delco-Remy No. 1998013 (Synchromesh); Delco-Remy No. 1998015 (Dynaflow).

MISC. ELECTRICAL

▷**DASH PANEL INSPECTION HOLE—(For access to wiring on back side of instrument panel).** Located on left side of dash under hood, with removable plate screwed to dash.
THERMOSTATIC RELAY: Delco-Remy. On lighting switch (protects lighting circuits). Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adjustable.
FUSE BLOCK: On lower flange of instrument panel at left of steering column. Five fuses as follows:
1)—**Dome, Glove Box & Trunk Lights.** 30 amperes.
2)—**Clock.** 3 amperes.
3)—**Defroster and Heater.** 30 amperes.
4)—**Directional Signal and Stop Lamp.** 14 amperes.
5)—**Back-Up Lights.** 14 amperes.
HORNS: Delco-Remy No. 1999649 (Low Note—RH); **1999650** (High Note—LH). Vibrator type, twin horns operated by relay.

	Current (at 6 volts)	Air-Gap
Low Note	19-21 amperes	.044-.049"
High Note	18-20 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027".
Air Gap—.014" (contacts closed).

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder, in line, with overhead valves.

Series	Bore	Stroke	Displacement
40 & 50	3 3/16"	4 1/8"	248.0 cu. in.
70	3 7/16"	4 5/16"	320.2 cu. in.

▷*NOTE*—.010" oversize bore production engines are marked by stamped dash (—) approximately ¼" long following engine number.

Form 28—1956-M

ENGINE

CONTINUED FROM PRECEDING PAGE

Series	Rated HP	Comp. Ratio	Dev. HP
40 (Synchro-mesh)	32.5	6.6-1	①120
40 (Dynaflow)	32.5	7.2-1	①128
50 (Synchro-mesh)	32.5	6.9-1	①124
50 (Dynaflow)	32.5	7.2-1	①128
70 (Dynaflow)	37.8	7.5-1	②168

①—At 3600 RPM. ②—At 3800 RPM.

►**SERIES 40 ENGINE (Synchro-mesh).** These engines are equipped with conventional type valve lifters and use different camshaft, pushrods and valve springs.

Identification—Conventional type lifters, **Blue** lettering *"BUICK FIREBALL"* on valve cover. Hydraulic Lifters, **Red** lettering.

►***CYLINDER HEAD CAUTION—Different head and gasket combination used for each particular compression ratio.***

Series	Head No.	Gasket Thickness	Comp. Ratio
40 (Synchro-mesh)	1340248	.075"	6.6-1
40 (Dynaflow)	1340248	.015"	7.2-1
50 (Synchro-mesh)	1340248	.050"	6.9-1
50 (Dynaflow)	1340248	.015"	7.2-1
70 (Dynaflow)	1343707	.050"	7.5-1

CYLINDER HEAD & TIGHTENING TORQUES: *See Buick Special Data.*

COMPRESSION & VACUUM READINGS: *See Tune-Up.*

PISTONS: Anodized aluminum alloy, cam ground, turbulator top. Four rings above pin.

►**Piston Note**—Series 40, 50 pistons have pin offset 1/16" toward camshaft side. Bottom oil ring groove has two transverse slots. Series 70 pistons have pin centered. Transverse slot below oil ring.

Series	Weight (Stripped)	Length
40 & 50	13.44 ozs.	3 49/64"
70	17.94 ozs.	4 9/16"

Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons below.

Replacement Pistons—*See Buick Special Data.*

Fitting New Pistons: Use feeler stock ¼" wide (for "GO" gauge), ½" wide ("NO GO" gauge) and 12" long suspended in cylinder at right angles to engine center line, invert piston in cylinder. With piston and cylinder clean and dry and at 70°F., piston should pass through cylinder of own weight with "GO" gauge and should hold its own weight with "NO GO" gauge, as follows:

Series	Clearance Limits Top of Skirt	Feeler Gauges "GO"	Feeler Gauges "NO GO"
40, 50	.0012-.0018"	.0015"	.002"
70	.0014-.0020"	.0015"	.002"

Installing Pistons: Hollow side of head to camshaft. *See Connecting Rods (below).*

PISTON RINGS: Two compression (upper inner edge stepped or beveled). One slotted oil ring in #3 groove, "Flex-Fit" oil ring in #4 groove. All rings above pin. #1, #2, & #4 rings are coated.

Ring	Width	End Gap	Side Clearance
Comp.	3/32"	.010-.020"	.0015-.0035"
Upper Oil	3/16"	.010-.020"	.0015-.003"
Flex-Fit	.186-.187"	①	.001-.003"

①—No checking or fitting required.

Replacement Rings: *See Buick Special Data.*

PISTON PIN: Clamped in rod.
Diameter—(40, 50) .8124-.8129", (70) .8744-.8749".
Length—Series 40,50 2 11/16". Series 70 3 1/16".
Pin Fit in Piston—.0003-.0005" at 70°F., or easy push fit at 70°F.

Replacement Pins: Std., .003", .005" oversize. Pins fitted and furnished with new pistons (pistons not furnished separately). Pins furnished separately.

CONNECTING ROD:	Length	Weight
Series 40, 50	7⅜"	28.096 ozs.
Series 70	8¼"	36.272 ozs.

Crankpin Journal Diameter: (Series 40, 50)—2.125-2.126". (Series 70)—2.248-2.249".
Bearings—Durex 100-A "full-precision" insert type without shims.
Clearance—.0005-.0016". **Sideplay**—.005-.010".

Replacement Bearings: Furnished in Std., .001", .002", .020", .021" undersize. Undersize bearings marked with number on outer surface near tang, indicating size.

Installing Rods: Install in piston with oil hole toward hollow side of piston. Install in engine with oil hole toward camshaft.

CRANKSHAFT: Five bearing, counterweighted.

►***CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.***

►***FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.***

Main Bearing Journal Diameters

Bearing No.	Series 40 & 50	Series 70
1)	2.5625-2.5635"	2.5605-2.5615"
2)	2.5625-2.5635"	2.6235-2.6245"
3)	2.5625-2.5635"	2.6855-2.6865"
4)	2.5625-2.5635"	2.7485-2.7495"
5)	2.5625-2.5635"	2.8105-2.8115"

NOTE—Car manufacturer recommends that crankshaft be replaced or reground if journal out-of-round more than .0015".
Bearings—Steel-backed, Durex 100-A.
Clearance—.0006-.0018" (Series 40, 50). .0006-.0020" (Series 70).

►***CAUTION***—Arrow on main bearing caps must point to front of engine when installed.

Replacement Bearings: Std., .0012", .002", .020", .022" Undersize.

Rear Bearing Oil Seal Installation: *See Buick Special Data.*

End Thrust: #3 (center bearing). **Endplay**—.004-.008".

CAMSHAFT: Five bearing, non-adjustable chain drive.

►***CAMSHAFT CAUTION (Different camshafts used for Conventional and Hydraulic type lifters)***—Camshafts have a ¼" land located between #6 & #7 valve cams (visible from below with oil pan off).

Conventional Lifter type Camshaft—Land has dark rough-turned surface with 1/16" groove in center.

Hydraulic Lifter type Camshaft—Land has bright finish-ground surface without any groove.

Bearing Diameters (All Series)—(1) 2 5/32"; (2) 2 1/8"; (3) 2 3/32"; (4) 2 1/16"; (5) 1 3/4".
Clearance—.0015-.004". *NOTE*—Replacement bearings must be line-reamed after installation.

End Thrust: Spacing ring between front bearing journal and thrust plate (on front of crankcase behind camshaft sprocket). **Endplay**—.004-.009".

Timing Chain: Link-belt. **Width**—13/16". **Pitch**—.500". **Length (40, 50)**—24 1/2" or 49 links. **(70)** 25" or 50 links.

Camshaft Setting: Two teeth on timing chain (10 links apart) are marked with copper plated washers. Facing the front of engine, center the crankshaft sprocket timing mark on right side. Set camshaft sprocket (mark to right side), and install chain with marked teeth matching sprocket marks.

VALVES: *CAUTION*—Engines with hydraulic valve lifters use different camshaft *(See Camshaft Caution above)*, push rods and valve springs than engine with conventional valves.

Valve Specifications—Series 40, 50

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.3715-.3725"	5 7/64"
Exhaust	1 11/32"	.3711-.3719"	5 7/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.348"	.0015-.0035"
Exhaust	45°	.342"	.0021-.0039"

Valve Specifications—Series 70

	Head Diameter	Stem Diameter	Length
Intake	1 25/32"	.3715-.3725"	5 1/4"
Exhaust	1 7/16"	.3711-.3719"	5 1/4"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.347"	.0015-.0035"
Exhaust	45°	.348"	.0021-.0039"

Valve Seat Width: Nominal width 1/16". Seat wider than 5/64" should be narrowed down using the proper 20° and 70° cutters.

Valve Guides: Upper end of guide 1 5/32" above head. Finish ream guides after installation to .374-.375" use Valve Guide Reamer J-129-3).

Valve Springs: *CAUTION*—Springs used with hydraulic valve lifters are different than springs used with conventional type lifters.
Free Length (Conventional Lifters)—2 11/32" (Outer Spring). 1 29/32" (Inner Spring).
Free Length (Hydraulic Lifter)—2.380" (Outer Spring) 2.100" (Inner Spring).

Valve Spring Specifications
►Engines with Conventional Lifters

Valve	Inner Spring Lbs. Press.	Inner Spring Lgth.	Outer Spring Lbs. Press.	Outer Spring Lgth.
Open	48-54	1 5/16"	74-80	1 19/32"
Closed	17½-22½	1 21/32"	29½-34½	1 15/16"

►Engines with Hydraulic Valve Lifters

Valve	Inner Spring Lbs. Press.	Inner Spring Lgth.	Outer Spring Lbs. Press.	Outer Spring Lgth.
Open	49-55	1 5/16"	96-104	1 19/32"
Closed	22-26	1 21/32"	49-55	1 15/16"

Valve Lifters (Conventional Type): Plain sleeve, barrel type. **Diameter**—.9975-.9985".
Clearance in Crankcase—.0005-.0025".

Valve Lifters (Hydraulic Type): Used on all cars with Dynaflow Drive, and Series 50 with Synchro-mesh. *See "Valve System" in Buick Special Data.*

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Identification—*"Buick Fireball"* lettered in RED on valve rocker arm cover and a label reading, "This Engine Equipped with Hydraulic Lifters."

▷*CAUTION*—If lifter operating properly, DO NOT disassemble when removed from engine for other work (wrap in clean paper to keep dirt out).

▷**Initial Adjustment**—Required only when installing cylinder head or when adjusting ball stud setting has been disturbed. *See "Valve System" in Buick Special Data.*

▷*ROCKER ARM NOTE*—Rocker arms used on engines with hydraulic valve lifters are the same as those used on engines with conventional lifters. *See "Valve System" in Buick Special Data.*

Series 40 Pushrod Note—Hole in upper end of push rod is eliminated on engine with conventional valve lifters. (These rods can be identified by copper finished rod socket end).

Rocker Arm Installation—*See "Valve System" in Buick Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION*—Two types of valve lifters used. **Conventional type** on Series 40 with Synchro-mesh transmission. **Hydraulic type** on all others.

Identification—Conventional type lifters, **Blue** lettering *"BUICK FIREBALL"* on valve cover. Hydraulic lifters, **Red** lettering.

Clearance (Hydraulic Type)—*NO CLEARANCE ADJUSTMENT REQUIRED IN SERVICE* although rocker arms have regular adjusting ball studs. *INITIAL ADJUSTMENT required when installing cylinder head or when ball studs disturbed.*

Initial Adjustment—*See "Valve System" in Buick Special Data.*

Clearance (Conventional Type)—To secure .015" road operating clearance, stabilize temperatures by running engine at fast idle (700 RPM.) for 20 minutes with radiator cap removed, then adjust clearance using **.017" feeler gauge as "GO," .018" as "NO GO."**

Anti-Freeze Caution—Replace with water for warming up (will boil out if left in radiator).

Timing Chain Setting—See Camshaft Setting.

VALVE TIMING: "Timing Points" below are with valve .004" off seat.

Series 40 with Synchro-Mesh

Intake Valves—Open 13° BTDC. Close 68° ALDC.

Exhaust Valves—Open 55° BLDC. Close 22° ATDC.

All Series 50 and 70
Series 40 with Dynaflow

Intake Valves—Open 14° BTDC. Close 71° ALDC.

Exhaust Valves—Open 56° BLDC. Close 25° ATDC.

VALVE TIMING CHECK

Series 40 (with conventional type lifters)—Set tappet clearance for .015" road operating lash, use dial indicator to check actual valve opening. No. 2 or No. 7 exhaust valve should be .145" open with No. 1 & No. 8 pistons at top dead center with flywheel mark "UDC/1-8" visible through inspection hole in right front face of housing.

All Series (with hydraulic valve lifters)—Use dial indicator set up over No. 2 or No. 7 exhaust valve to check actual valve movement. With valve fully closed, set indicator to zero, tighten adjusting ball stud until indicator reads .015", wait until leakdown allows indicator to return to zero, repeat process until indicator fails to return to zero (indicating that lifter plunger bottoming in body so that lifter is "solid"). Back off ball stud just enough so that indicator reads zero. Turn crankshaft slowly (in running direction) until indicator reads .145" (Series 40 & 50); .155" (Series 70). Flywheel mark "UDC/1-8" should be visible through inspection hole in right front face of housing.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and restricted flow to rocker arm bearings, push rods and hydraulic valve lifters (if used).

Crankcase Capacity—Refill—5½ qts. (40, 50); 7 qts. (70). **Dry Capacity**—1 additional qt.

NOTE—If oil filter is dry, add 1½ qts. to capacities.

Normal Oil Pressure—35 lbs. at 35 MPH.

Oil Pressure Regulator—Non-adjustable spring and valve type on oil pump. Opens at 35 lbs.

Oil Filter: AC low-restriction. Filter has by-pass valve which opens at 7-9 lbs., (all oil for valve system passes through filter).

NOTE—Valve system oil feed taken from outlet side of filter with restricted fitting in head at point where rocker shaft oil lead connected.

Replacement Element—AC No. P-127.

Oil Pump: *See Buick Special Data.*

Oil Pressure Gauge: AC No. 1507839 (40), 1507600 (50, 70).

Crankcase Ventilation: Filter in oil filler breather cap and in crankcase ventilator inlet on left side of engine. Outlet pipe mounted on right side of engine.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap. Recirculation of water through engine (with thermostat closed) permitted by fixed by-pass passage between water outlet and pump inlet.

Pump Outlet for Dynaflow Drive—Separate pipe on right side below pump inlet. Used only on cars with Dynaflow Drive.

Capacity (No Heater)—Series 40 & 50 12 qts., (add 1½ qts. with Dynaflow Drive. **Series 70** 18 qts.

Heater Note—Add 1½ qts. to above capacities when heater is installed.

Pressure Valve—AC No. 850563 Radiator Filler Cap. 7 lb. type.

Water Pump: Packless sealed ball-bearing type.
See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In housing above water pump. Buick No. 3122282 (Std. 151°). No. 3122283 (160°). No. 3122285 (180°).

Setting—(151°) starts to open 148-155°F. Fully open at not over 176°F. (182° Type) Starts to open at 178-185°F., fully open at not over 211°F.

Temperature Gauge: AC No. 1512317 (Series 40); **No. 1512315** (Series 50 & 70).

CLUTCH

Own "Crown Spring" with Borg & Beck or Long Driven Member. Single plate, dry disc type.
See Clutch Section for complete data.

Facings—Woven type, 2 used. Inside diameter 6", Outside diameter 10". Thickness .125".

Pedal Adjustment: Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod linking cross-shaft lever to clutch fork. Pedal positioned by rubber bumper under toe board.

Removal: Remove rear axle and transmission (see below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse) with steering column mounted shift control.

See Transmission Section for complete data.

Transmission Control—*See Transmission Section for complete data.*

Removal: Disconnect rear axle (see data following). Drain transmission, fill with clean gasoline or kerosene and run approximately 15 seconds in NEUTRAL, drain cleaner. Disconnect speedometer cable, lower shift rod and selector rod. Take out toggle spring and extension, remove shift lever and lock washer from selector shaft—hold shift lever in neutral when removing attaching bolt—remove outer selector lever. Reinstall support bar (see note below) under rear end of oil pan positioning left hook over frame between brake master cylinder and clutch release equalizer, tighten nuts on two hooks evenly. Remove transmission mounting as follows: Disconnect rubber thrust pad from rear of transmission support by taking off 3 nuts and bolt plate, remove shims from behind support, disconnect mounting pad on top of support by taking out two attaching bolts and bolt plate, raise engine by turning up on nuts on two support hooks evenly to take load off transmission support, take out transmission support (disconnect at frame ends), and remove thrust pad from thrust plate. Install guide pins J-851 in place of two top mounting bolts, remove remaining mounting bolts, pull transmission straight back and lower from car.

▷*NOTE*—To shim Rear Mounting when installing transmission, *see "Engine Mounting" in Buick Special Data.*

Engine Support Bar Note—Consists of a length of 2x4 (approx. width of frame) with hole through each end to take hooked rods (hook rests on top of frame), raise and lower support by nuts on rods.

Lubrication Note—When transmission re-installed in car, inject ½ pint of transmission lubricant through universal joint yoke before attaching torque tube to transmission.

DYNA-FL W DRIVE TRANSMISSION

Own Make. Torque Converter and hydraulically operated planetary unit with manual control.

See Transmission Section for complete data.

►*PRODUCTION & REPLACEMENT PARTS CHANGES: See Transmission Section.*
TESTING & TROUBLE SHOOTING: See Dynaflow Drive in Transmission Section.

►*CRANKSHAFT REPLACEMENT CAUTION—See Crankshaft Replacement in Buick Special Data.*

►*FLYWHEEL BALANCING DYNAFLOW CARS (To correct vibration caused by replacement parts): See BUICK DYNAFLOW DRIVE in Transmission Section.*

Dynaflow Linkage Adjustment: *See "Buick Dynaflow Drive" in Transmission Section.*

►**Throttle Linkage Adjustment and Dash Pot Setting on Dynaflow Drive Cars**—*See Carburetor Data.*

Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.

►*Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type "A" with AQ-ATF embossed on can.*

Checking Fluid Level—Engine must be idling with selector lever at "P" (parking) and transmission oil warm. Raise right side of hood, lift out oil gauge rod between battery and engine. Add fluid to "FULL" mark level with engine idling.

►*CAUTION—Engine must be idling with transmission in Parking and transmission oil warm when checking Dynaflow Drive Fluid Level.*

Capacity—(Series 40, 50) 8½ qts. (Series 70) 10 qts

►*NOTE—A completely dry transmission requires 1¾ pints more than amounts given above.*

►*OTHER DYNAFLOW SERVICE DATA—See "Buick Dynaflow Drive" in Transmission Section.*

UNIVERSALS

Saginaw or Spicer. One used (in Torque ball at rear of transmission).

Torque Ball Adjustment—*See Buick Special Data*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with torque tube drive.

See Rear Axle Section for complete data.

Ratios—*NOTE—Ratio is stamped on bottom center of axle housing with the first two figures of the ratio placed one over the other with a bar between. (Example: 3.9-1 would appear with the 3 over the 9 and separated by a bar).*

Rear Axle Ratios

Models	Synchro-mesh	Dynaflow
41, 41D, 45R, 46, 46S	43-11 (3.9) ①	47-13 (3.6) ②
48, 48D, 56R, 72R, 76R, 76C	43-11 (3.9) ①	47-13 (3.6) ②
46C, 52, 56C	41-10 (4.1) ②	43-11 (3.9) ①
59, 79R	41-10 (4.1) ③	43-11 (3.9) ③

①—Optl. 47-13 (3.6). ②—Optl. 43-11 (3.9).
③—No optional ratios.

Backlash—.008-.010" (desired), .008-.012" (max.).

Removal: Raise rear end of car and place on car stands. Disconnect parking brake cable at rear brake sheave and at bracket of front end of torque tube, hydraulic brake line from pipe at frame X member and remove retainer. Disconnect lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs, and torque tube from torque ball. Hoist rear end of car and roll axle assembly out.

►*CAUTION—Torque tube should not be disconnected from carrier (except for gasket replacement).*

Torque Ball Adjustment—*See Buick Special Data.*

Axle Shaft Removal: *See Rear Axle Section.*

Wheel Bearing Adjustment—None.

Rear Suspension: Coil springs and conventional axle. *See Rear Axle Section for complete data.*

SHOCK ABSORBERS

Delco Double Acting, Hydraulic. Parallel cylinder type used on the rear.

Front Shock Absorbers

Series	Shock Number
40 (All Models)	1948A-3.5D-4B
50 (All Models)	1948A-3.5E-4.5B
70 (All Models)	1948-3.5F-4.5D

Rear Shock Absorbers

Series	Shock Number
40, 50 (Right) (Exc. 59)	2105C-.60K-2CD5
40, 50 (Left) (Exc. 59)	2105D-.60K-2CD5
59, 70 (Right) Exc. 79)	2105C-.70L-2CD5
59, 70 (Left) (Exc. 79)	2105D-.70L-2CD5
79 (Right)	2105C-.7M-2CD5
79 (Left)	2105D-.7M-2CD5

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.

►*SERIES 40 & 50 CASTER PRODUCTION CHANGE: See Caster data below and Front Suspension Section.*

See Front Suspension Section for complete data.

Kingpin Inclination—4¼° crosswise at ⅜° camber.

Camber—⅜° Pos. (⅞° Pos. to ⅝° Neg.) and equal for both wheels within ⅜°.

Caster (Series 40, 50)—*CAUTION—Following recommendations supersede original specifications:*

Series 40, 50 (Cars before Oct. 20, 1952)—Set caster as low as possible within adjustment range (to secure benefits of "zero" caster) without causing excessive drag. *NOTE—Original specification range was Pos. ¼° to Pos. 1½°.*

Series 40, 50 (Cars after Oct. 20, 1952)—"Zero" caster desired (0°), Limits ¾° Pos. to ½° Neg. Both wheels must be equal within ½°. *NOTE—These cars have "Zero Caster Knuckles" permitting this setting.*

Caster (Series 70)—Pos. ¾° desired. Limits Pos. ¼° to Pos. 1½° and equal for both wheels within ½°.

Toe-In—1/16-1/8". Adjust both tie rods equally.

►*CAUTION*—Tie rod clamps must be within 1/8" of end of tube and ear of clamp must overlap slot in tube not less than 1/16".

Toe-Out on Turns—With outer wheel turned 20°, inner wheel turns 21½° ± ¾°. *NOTE*—With inner wheel turned 38°, outer wheel should be turned 31½° (right turn), 30¼° (left turn).

STEERING GEAR

Standard Equipment (All Models): Saginaw. Ball bearing Worm-and-Nut type. *See Steering Gear Section for complete data.*

Power Steering (Optional on Series 70): Saginaw. Ball bearing Worm-and-Nut type steering gear to which hydraulic power has been added. *See "Power Steering" in Steering Gear Section for complete data.*

Checking Fluid Level (Power Steering)—Remove reservoir filler plug, wipe off the attached gauge rod and insert rod in reservoir with plug seated on edge of filler opening. Remove plug and check oil level, which should be at mark on rod. Add oil as necessary to bring level to mark on rod. **Use only Buick Dynaflow Oil or Automatic Transmission Fluid, Type "A."**

BRAKES

Service: Bendix Hydraulic, duo-servo, single anchor type without eccentric adjustment. Parking brake "Step-On" lever applies rear wheel service brakes.

►*SERIES 70 BRAKE PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION (Beginning Serial No. 16668190 on Sept. 12, 1952):* FRONT brake shoes of new design (different geometry due to lowering of anchor pin 3/16") used, and these shoes furnished for replacement use on earlier cars. *WHEN INSTALLING THESE SHOES ON EARLY CARS, SPECIAL OFFSET TYPE BRAKE ANCHOR PIN MUST BE INSTALLED. See "Bendix Hydraulic Brakes" in Brake Section for replacement shoes and anchor pin.*

See Brake Section for complete data.

Drums—Cast-iron with steel flange. **Drum Diameter**—11.997-12.003". Maximum rebore .060" O.S. (.030" cut).

►*BRAKE DRUM RECONDITIONING & BALANCING: See "Brake Notes" in Buick Special Data.*

Lining—Molded type, riveted to shoe (all models).

	Front Wheels		Rear Wheels	
	Width	Thickness	Width	Thickness
40, 50 (exc. 59)	2.25"	.187"	1.75"	.187"
59	2.25"	.187"	2.25"	.187"
70	2.50"	.25"	2.25"	.187"

Length—(Primary Shoe) 10 3/32". (Secondary Shoe) 12 13/32".

Clearance—.015" at both ends of secondary shoe (rear) with primary shoe forced out against drum.

Braking Power—53% (frt. whls.), 47% (rear whls.).

Step-On (Parking) Brake: See service brakes (above).

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor driven pump supplying oil under pressure). *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable operated—Vacuum type. *See Miscellaneous Section for complete data.*

M DEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door pillar post and on left front frame side rail.
1953 Starting Numbers—16740050. *NOTE*—First digit of number indicates assembly plant as follows:

1	Flint	5	Wilmington
2	Southgate	6	Atlanta
3	Linden	7	Framingham
4	Kansas City		

Engine Number: Stamped on boss on right side of crankcase below pushrod cover (between distributor and ignition coil).
1953 Starting Numbers (last digit indicates series).
Synchro-mesh Trans. Cars 6952425-4
Dynaflow Drive Cars 6952400-4
NOTE—Dash following engine number indicates that cylinder bores and pistons are .010" Oversize.

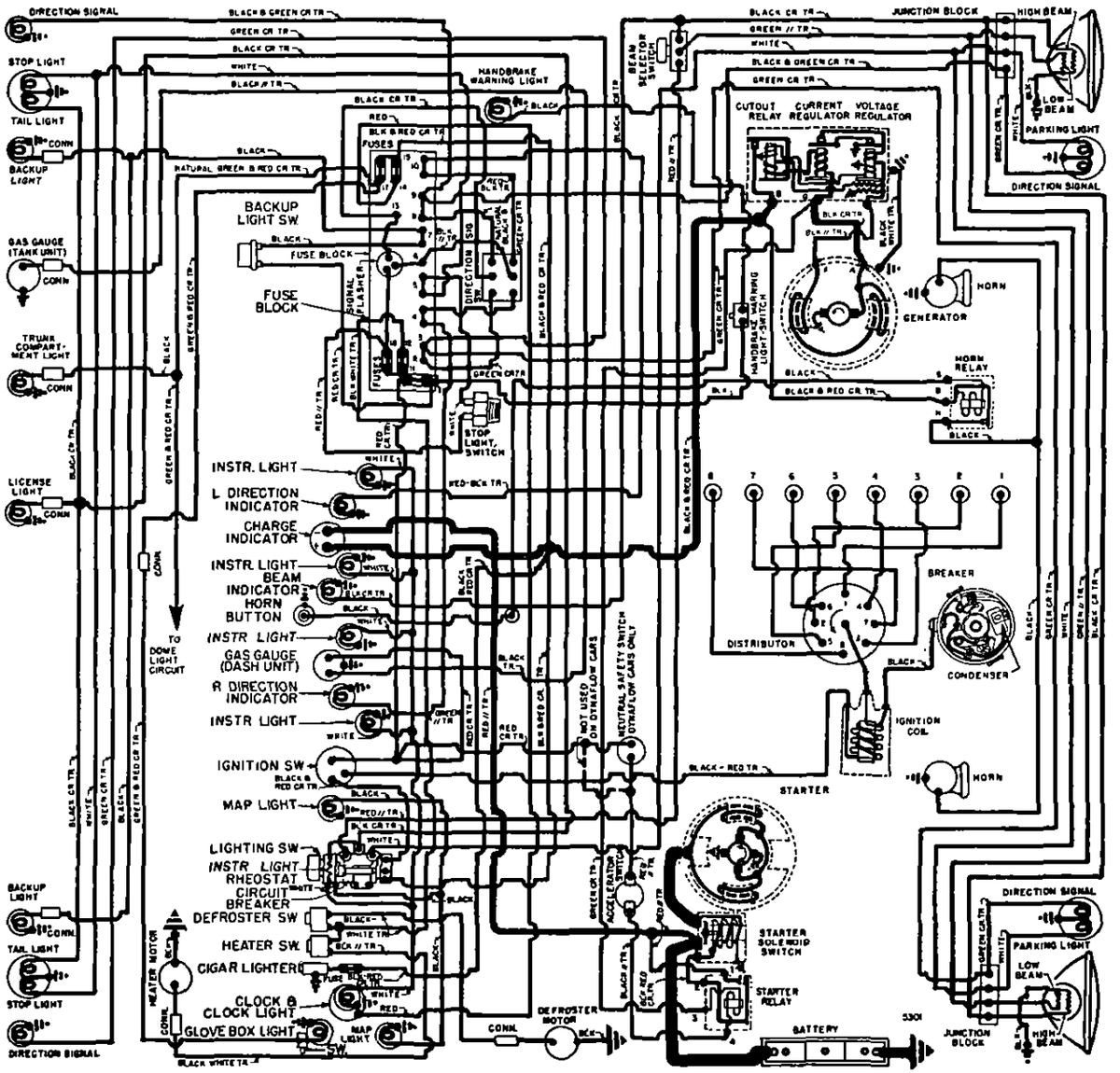
TUNE-UP

COMPRESSION PRESSURE: (Synchro-mesh) 120 lbs., **(Dynaflow)** 130 lbs. At cranking speed.
VACUUM READING: Steady 18-20" idling at 8 MPH. or 450 RPM.
FIRING ORDER: 1-6-2-5-8-3-7-4.
SPARK PLUG GAPS: .025". Limits .023-.028".
Plug Type—AC No. 46X. 14 mm. Metric.
COIL: Delco-Remy No. 1115380. On pushrod cover.
Ignition Current—2½ amperes idling. 4½ stopped.
CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.24 microfarad.
DISTRIBUTOR: Delco-Remy No. 1110838. Automatic and vacuum advance.
Breaker Gap—.0125-.0175".
Cam Angle—Test limits with .016" gap—26-33°.
CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
►***CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance. If timing light used, idle engine below 350 RPM.***
Flywheel Mark—"ADV. 4°" followed by yellow knurled section of flywheel ⅛" wide which gives timing range of 1° (4° to 5°). Index mark located in timing hole under housing cover above starter.
Final Ignition Setting—Very light "ping" may occur with part throttle on a hard pull, or during wide-open throttle acceleration at 10-20 MPH.
CARBURETION: CARTER WCD No. 882SA. Dual (2-barrel) downdraft with automatic choke.
Idle Setting—1¼-1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed—450 RPM or 8 MPH.
Float Level—5/32" from top of each float to gasket seat on cover with valve seated (invert to check).
Fuel Level—Even with bottom of inspection hole on side of float bowl with engine idling.
Accelerator Pump—Two holes in arm. Inner hole minimum charge. Outer hole maximum charge. Standard setting is inner hole.
Fast Idle: ***CAUTION—Two different settings required:*** (1) Loosen choke lever clampscrew on choke shaft. Insert gauge T109-29 (.020") between lip of fast idle cam and boss on throttle body, hold choke valve tightly closed and remove slack from linkage by pressing choke lever toward closed position, tighten choke lever clampscrew.

(2) With choke valve tightly closed and fast idle screw on high step of cam, adjust fast idle screw for throttle opening of .012" (Gauge T-109-200) between edge of valve and wall on side opposite idle ports.

Automatic Choke Setting (WCD)—1 notch rich.
Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor.

CARBURETION: STROMBERG AAUVB-267, Code No. 7-90B. Dual (2-barrel) with automatic choke.
Idle Setting—1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed—450 RPM or 8 MPH.
Float Level—(On gauge No. T-24971), 5/64" above top of gauge guides.
Fuel Level—(Checked through inspection hole). Fuel must be level with bottom of threads in inspection hole.
Accelerating Pump—3 holes. Center hole (medium stroke) normal setting.



Fast Idle (AAUVB-267) Setting: ***CAUTION—Two different Settings required:***

Fast Idle Cam—Close choke valve against #26 drill (.147"), see that fast idle cam spring holds cam upward against end of fast idle rod. Close throttle *until stopscrew contacts fast idle cam. If screw does* not just clear edge of highest step on cam and bear against second step, adjust by bending fast idle rod at the large curve.

Lever Clearance—Close choke valve against #53 drill, adjust clearance between ear on locking lever on throttle valve shaft and lug on loose lever on fast idle cam stud so that these levers just clear as throttle valve is opened and closed. Adjustment is made by bending end of loose lever up or down as required.

Automatic Choke Setting: (AAUVB-267), Centered.

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor.

THROTTLE LINKAGE ADJUSTMENT:

Synchro-mesh Trans. Cars—Check linkage for smooth operation of throttle valve from closed to wide open position (pedal correctly secured to floor, pedal rod free in hole in floor mat, return spring proper tension for closed position). Wide open throttle stop should be accelerator pedal striking floor mat (not throttle lever stop striking boss on carburetor). Adjust as follows: With linkage disconnected at throttle operating ball joint, open *throttle valve to wide open position against stop,* have man press accelerator against floor mat, adjust ball joint so screw will just enter upper hole in throttle lever, turn ball joint 1 or 2 turns clockwise, connect ball joint to throttle lever. Check choke unloader operation.

Dynaflow Drive Cars—***See "Dynaflow Drive" in Transmission Section for Linkage Adjustment.***

MANIFOLD HEAT CONTROL: Setting—Thermostatic coil wind-up ¼ turn at 70° (valve closed). To prevent rattles, counterweight should have 1/16-1/8" movement at extreme end positions, adjust by bending *anti-rattle spring* lower anchor bracket.

VALVE TAPPET CLEARANCE: ***CAUTION—Two types of valve lifters used:***

Synchro-mesh Cars—Conventional adjustable type.
Dynaflow Drive Cars—Hydraulic type.
Identification—(Conventional Type) RED lettering "BUICK FIREBALL" on valve cover, **(Hydraulic Type)** BLUE lettering on valve cover.

►**HYDRAULIC TYPE SETTING**—***NO CLEARANCE ADJUSTMENT REQUIRED*** although rocker arms have adjusting ball studs. **Initial adjustment** required when head or ball studs disturbed.
Initial Adjustment—***See Valve Timing.***

►**CONVENTIONAL TYPE SETTING:** To secure .015" operating clearance, stabilize temperature by running engine at fast idle (700 RPM. minimum) for 20 minutes with radiator cap removed, **then adjust clearance using .017" feeler gauge as "GO", .018" as "NO GO."**

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116499.

COIL: Delco-Remy No. 1115380. On pushrod cover.
Ignition Current—2½ amperes idling. 4½ stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.24 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110838. Automatic and vacuum advance type with "center-bearing" breaker plate.

►**Breaker Plate Bearing Assembly**—Plate rotates on three bakelite buttons on support plate with spring *tension adjustment (shim washers) on underside of* support plate. Pull required to move plate should be 8 ozs. min., 16 ozs. max., with breaker plate assembly out of housing.

Breaker Gap—.015". Limits .0125-.0175".
Cam Angle—Test limits with .016" gap 26-33°.
CAUTION—Use of Cam Angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap within .0125-.0175".
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0-4	700
5-7	625	10-14	1250
8-10	1300	16-20	2600
11-13	2000	22-26	4000

Vacuum Spark Control: Delco-Remy No. 1116073.
Plunger Travel—13/64-15/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
4.5-5.5	9-11	13"

IGNITION TIMING

Std. Setting.....**4° BTDC.**

►***CAUTION—Ignition timing should be set within yellow band of flywheel mark for proper engine performance. If timing light used, idle engine below 350 RPM.***
Flywheel Mark—"ADV. 4°", following yellow knurled section on flywheel ⅛" wide which gives timing range of 1° (4-5°). Index mark located on edge of timing hole under cover on housing above starter.
Timing Procedure—Use Synchroscope or Power Timing Light connected to #1 spark plug. Idle engine at **not more than 350 RPM** (to prevent automatic advance operating). Adjust distributor so that timing mark on flywheel appears in line with index mark on housing.
Final Ignition Setting—Set for very light "ping" with part throttle on hard pull, or during acceleration between 10-20 MPH. with wide open throttle.

CARBURETOR
CARTER

Carter WCD No. 882SA. Dual down-draft type with automatic choke.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Setting and Accelerating Pump Setting): ***See Tune-Up.***
Metering Jets & Rods—***See Carburetor Section for Carter Jet Specifications.***

Fast Idle: Carter Dual (WCD) Carburetor type.
Setting—***CAUTION: Two different settings required:*** (1) Loosen choke lever clampscrew on choke shaft. Insert gauge T109-29 (.020") between lip of fast idle cam and boss on throttle body, hold choke valve tightly closed and remove slack from linkage by pressing choke lever toward closed position, tighten choke lever clampscrew.

See Carburetion Equipment Section for complete data.

(2) With choke valve tightly closed and fast idle screw on high step of cam, adjust fast idle screw for throttle opening of .012" (Gauge T109-200) between edge of valve and wall on side opposite idle ports.

Automatic Choke: Carter Climatic Control.
Setting—1 Point Rich.

See Carburetion Equipment Section for complete data.

Throttle Linkage Adjustment:

Synchro-mesh Trans. Cars—***See Tune-Up data.***

Dynaflow Drive Cars—***See "Dynaflow Drive" in Transmission Section for Linkage Adjustment.***

STROMBERG

Stromberg Model AAUVB-267. Code No. 7-90B. Dual, downdraft type with automatic choke.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): ***See Tune-Up.***

Fast Idle: Stromberg AAUVB type.
Setting—***CAUTION—Two different settings required:***
Fast Idle Cam—Close choke valve against #26 drill (.147"), see that fast idle cam spring holds cam upward against end of fast idle rod. Close throttle until stopscrew contacts fast idle cam. If screw does not just clear edge of highest step on cam and bear against second step, adjust by bending fast idle rod at the large curve.

Lever Clearance—Close choke valve against #53 drill, adjust clearance between ear on locking lever on throttle valve shaft and lug on loose lever on fast idle cam stud so that these levers just clear as throttle valve is opened and closed. Adjustment is made by bending end of loose lever up or down as required.

See Carburetion Equipment Section for complete data.

Automatic Choke: Stromberg AAUVB type.
Setting—Centered (at index).

See Carburetion Equipment Section for complete data.

Throttle Linkage Adjustment:
Synchro-mesh Trans. Cars—***See Tune-Up data.***
Dynaflow Drive Cars—***See "Dynaflow Drive" in Transmission Section for Linkage Adjustment.***

CARB. EQUIPMENT

Air Cleaner: AC Oil-bath type.
Fuel Pump: AC Combination fuel-and-vacuum pump.
Replacement Pump—AC No. 9761.

See Carburetion Equipment Section for complete data.

Pressure—4½-5½ lbs., at fuel pump outlet, or 4-5 lbs., at carburetor.

Gasoline Gauge: AC Electric type.
Dash Unit—*AC No. 1517878.* **Tank Unit**—*AC No.* 1517779.

See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15E6-W. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).

Grounded Terminal—Negative (—) to right engine mounting bracket.

Location—Under hood on right side.

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STARTER

Delco-Remy No. 1107110. Armature No. 1917855.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 "	Lock	3.25	550

Starting Switch: Delco-Remy Solenoid Switch No. 1118148 with SEPARATE Relay No. 1116855 controlled by starter switches on carburetor:
Carter Carburetor—Carter No. 192-11U.
Stromberg Carburetor—Stromberg No. 386030.
Starter Switch Setting—*See "Carter WCD" and "Stromberg AAUVB" Carburetors in Carburetor Section.*

Dynaflow Neutral Safety Switch: Delco-Remy No. 1998023. At lower end of steering column. Connected in starter control circuit so that starter operative only with selector lever in "N" Neutral or "P" Parking position.
Neutral Safety Switch Adjustment—*See "Buick Dynaflow Drive" in Transmission Section.*

GENERATOR

Delco-Remy No. 1102798. Armature No. 1912599. Two brush type with voltage and current regulation.
Charging Rate Adjustment: None. See Regulator.

Performance Data—Cold

	Amperes	Volts	R.P.M.
Cold	45①	8.0	2350

①—Not maximum. See Regulator data.
Brush Spring Tension—28 ozs., each.
Field Current—1.87-2.0 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment—½" belt deflection with light pressure at point midway between generator pulley and fan pulley.

REGULATOR

Delco-Remy No. 1118729. Voltage & Current Regulator.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot).
Air Gap—.075" (with contacts just closed).
Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—45-51 amperes hot (set to 47 amperes hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.

Directional Signal: *See Electrical Equip. Section.*
Directional Signal Indicators—Located to the right and left of light indicator emblem. (Optional Equipment).

Switches
Lighting—Delco-Remy No. 1995045.
Beam Indicator—Delco-Remy No. 1997008.
Directional Signal—Delco-Remy No. 1995574.
Back-Up Light—Delco-Remy No. 1998013 (Synchro-mesh); Delco-Remy No. 1998015 (Dynaflow).

▷**DASH PANEL INSPECTION HOLE—(For access to wiring on back side of instrument panel).** Located on left side of dash under hood, with removable plate screwed to dash.

MISC. ELECTRICAL

THERMOSTATIC RELAY: Delco-Remy. On lighting switch (protects lighting circuits). Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adjustable.

FUSE BLOCK: On lower flange of instrument panel at left of steering column. Five fuses as follows:
1)—**Dome, Glove Box & Trunk Lights.** 30 amperes.
2)—**Clock.** 3 amperes.
3)—**Defroster & Heater.** 14 amperes.
4)—**Directional Signal & Stop Lamp.** 14 amperes.
5)—**Back-Up Lights.** 14 amperes.

HORNS: Delco-Remy No. 1999639 (Low Note); 1999640 (High Note). Vibrator type, operated by relay.

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027".
Air Gap—.014" (contacts closed).

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder, in line, with overhead valves.
Bore—3 3/16". **Stroke**—4 1/8".
Displacement—263.3 cu. in. **Rated H.P.**—32.51.

	Compression Ratio	Developed H.P.
Synchro-mesh	7.0-1	125 at 3800 RPM.
Dynaflow	7.6-1	130 at 3800 RPM.

▷*OVERSIZE CYLINDER BORE CAUTION*—Engines with ¼" long dash following engine number have .010" Oversize cylinder bores and pistons.

▷*SYNCHRO-MESH ENGINE NOTE*—These engines are equipped with conventional type valve lifters and use different camshaft, pushrods and valve springs.
Identification—Conventional type lifters, **Blue** lettering *"BUICK FIREBALL"* on valve cover. Hydraulic Lifters, **Red** lettering.

▷**CYLINDER HEAD:** *CAUTION—Same head used with different gasket for each compression ratio:*
Cylinder Head—Part No. 1318873.

	Compr. Ratio	Head Gasket Part No.	Thickness
Synchro-mesh Cars	7.0-1	1340901	.075"
Dynaflow Cars	7.6-1	1343737	.015"

CYLINDER HEAD & TIGHTENING TORQUES: *See Buick Special Data.*

COMPRESSION & VACUUM READINGS: *See Tune-Up.*

PISTONS: Anodized aluminum alloy, cam ground, turbulator top. Four rings above pin.

▷**Piston Note**—Pistons have pin offset 1/16" toward camshaft side. Bottom oil ring groove has two transverse slots.
Weight (Stripped)—13.44 ozs. **Length**—3 49/64".
Removal—Pistons and rods removed from above.
Clearance (Top of Skirt)—.0012-.0018". See Fitting New Pistons.
Replacement Pistons—*See Buick Special Data.*

Fitting New Pistons: Use feeler stock ¼" wide (for "GO" gauge), ½" wide ("NO GO" gauge) and 12" long suspended in cylinder at right angles to engine center line, invert piston in cylinder. With piston and cylinder clean and dry and at 70°F., piston should pass through cylinder of own weight with .0015" "GO" feeler gauge, and should hold its own weight with .002" "NO GO" feeler gauge.

Installing Pistons: Hollow side of head to camshaft. *See Connecting Rods (below).*

PISTON RINGS: Two compression (upper inner edge *stepped or beveled). One slotted* oil ring in #3 groove, "U-Flex" in the #4 groove. All rings above pin, #1, #2, & #4 rings are coated.

Ring	Width	End Gap	Side Clearance
Comp.	3/32"	.010-.020"	.0015-.0035"
Upper Oil	3/16"	.010-.020"	.0015-.003"
U-Flex	.186-.187"	①	.001-.003"

①—No checking or fitting required.

Replacement Rings: *See Buick Special Data.*

PISTON PIN: Clamped in rod.
Diameter—.8124-.8129". **Length**—2 11/16".
Pin Fit in Piston—.0003-.0005" at 70°F., or easy push fit at 70°F.

Replacement Pins: Std., .003", .005" oversize. Pins fitted and furnished with new pistons (pistons not *furnished without pins). Pins also furnished* separately.

CONNECTING ROD: Length—7⅜". **Weight** 28.096 ozs.
Crankpin Journal Diameter—2.125-2.126".
Bearings—Durex 100-A "full-precision" insert type without shims.
Clearance—.0005-.0016". **Sideplay**—.005-.010".

Replacement Bearings: Furnished in Std., .001", .002", *.020", .021"* undersize. *Undersize* bearings marked with number on outer surface near tang, indicating size.

Installing Rods: Install in piston with oil hole toward hollow side of piston. Install in engine with oil hole toward camshaft.

CRANKSHAFT: Five bearing, counterweighted.

▷*CRANKSHAFT OR FLYWHEEL REPLACEMENT ON DYNAFLOW CARS: See Buick Special Data.*

▷*FLYWHEEL BALANCING ON DYNAFLOW CARS (To correct vibration caused by replacement parts): See "Buick Dynaflow Drive" in Transmission Section.*
Main Bearing Journal Diameter—2.5625-2.5635".
NOTE—Car manufacturer recommends that crankshaft be replaced or reground if journal out-of-round more than .0015".
Bearings—Steel-backed, Durex 100-A.
Clearance—.0006-.0018".

▷*CAUTION*—Arrow on main bearing caps must point to front of engine when installed.

Replacement Bearings: Std., .0012", .002", .020", .022" Undersize.

Rear Bearing Oil Seal Installation: *See Buick Special Data.*

End Thrust: #3 (center bearing). **Endplay**—.004-.008".

CAMSHAFT: Five bearing, non-adjustable chain drive.

▷*CAMSHAFT CAUTION (Different camshafts used for Conventional and Hydraulic type lifters)*—Camshafts have a ¼" land located between #6 and #7 valve operating cams. *FOR CONVENTIONAL LIFTERS*—Land has rough-turned surface, with a 1/16" x 1/16"

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ENGINE

CONTINUED FROM PRECEDING PAGE

groove cut in center. *FOR HYDRAULIC LIFTERS*—Land has a bright finish ground surface and no groove. Land can be seen when oil pan is removed.
Bearing Diameters—(1) 2 5/32"; (2) 2 1/8"; (3) 2 3/32"; (4) 2 1/16"; (5) 1 3/4".
Clearance—.0015-.004". *NOTE*—Replacement bearings must be line-reamed after installation.

End Thrust: Spacing ring between front bearing journal and thrust plate (on front of crankcase behind camshaft sprocket). **Endplay**—.004-.009".

Timing Chain: Link-belt. **Width**—13/16". **Pitch**—.500". **Length**—24½" or 49 links.

Camshaft Setting: Two teeth on timing chain (10 links apart) are marked with copper plated washers. Facing the front of engine, center the crankshaft sprocket timing mark on right side. Set camshaft sprocket (mark to right side), and install chain with marked teeth matching sprocket marks.

VALVES: *CAUTION*—Engines with hydraulic valve lifters use different camshaft *(See Camshaft Caution above)*, push rods and valve springs than engines with conventional valves.

Valve Specifications

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.3715-.3725"	5 7/64"
Exhaust	1 11/32"	.3711-.3719"	5 7/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.348"	.0015-.0035"
Exhaust	45°	.342"	.0021-.0039"

Valve Seat Width: Nominal width 1/16". Seat wider than 5/64" should be narrowed down using the proper 20° and 70° cutters.

Valve Guides: Upper end of guide 1 5/32" above head. Finish ream guides after installation to .374-.375" use Valve Guide Reamer J-129-3).

Valve Springs: *CAUTION*—Springs used with hydraulic valve lifters are different than springs used with conventional type lifters.
Free Length (Conventional Lifters)—2 11/32" (Outer Spring). 1 29/32" (Inner Spring).

Valve Spring Specifications
►Engines with Conventional Lifters

Valve	Inner Spring Lbs. Press.	Lgth.	Outer Spring Lbs. Press.	Lgth.
Open	48-54	1 5/16"	74-80	1 19/32"
Closed	17½-22½	1 21/32"	29½-34½	1 15/16"

►Engines with Hyydraulic Valve Lifters

Valve	Inner Spring Lbs. Press.	Lgth.	Outer Spring Lbs. Press.	Lgth.
Open	49-55	1 5/16"	96-104	1 19/32"
Closed	22-26	1 21/32"	49-55	1 15/16"

Valve Lifters (Conventional Type): Plain sleeve, barrel type. **Diameter**—.9975-.9985".
Clearance in Crankcase—.0005-.0025".

Valve Lifters (Hydraulic Type): Used on all cars with Dynaflow Drive.
See Buick Special Data for complete data.
Identification—*"Buick Fireball"* lettered in RED on valve rocker arm cover and a label reading, "This Engine Equipped with Hydraulic Lifters."

►*CAUTION*—If lifter operating properly, DO NOT disassemble when removed from engine for other work (wrap in clean paper to keep dirt out).

►**Initial Adjustment**—Required only when installing cylinder head or when adjusting ball stud setting has been disturbed. *See "Valve System" in Buick Special Data.*

►*ROCKER ARM NOTE*—Rocker arms used on engines with hydraulic valve lifters are the same as those used on engines with conventional lifters. *See "Valve System" in Buick Special Data.*
Push Rod Note—Hole in upper end of pushrod is eliminated on engine with conventional valve lifters. (These rods can be identifled by copper finish rod socket end).
Rocker Arm Installation—*See "Valve System" in Buick Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION*—Two types of valve lifters used. **Conventional type** on Series 40 with Synchro-mesh transmission. **Hydraulic type** on all others.
Identification—Conventional type lifters, **Blue** lettering *"BUICK FIREBALL"* on valve cover. Hydraulic lifters, **Red** lettering.
Clearance (Hydraulic Type)—*NO CLEARANCE ADJUSTMENT REQUIRED IN SERVICE* although rocker arms have regular adjusting ball studs. *INITIAL ADJUSTMENT required when installing cylinder head or when ball studs disturbed.*
Initial Adjustment—*See "Valve System" in Buick Special Data.*
Clearance (Conventional Type)—To secure .015" road operating clearance, stabilize temperatures by running engine at fast idle (700 RPM.) for 20 minutes with radiator cap removed, then adjust clearance using **.017" feeler gauge as "GO," .018" as "NO GO."**
Anti-Freeze Caution—Replace with water for warming up (will boil out if left in radiator).

Timing Chain Setting—See Camshaft Setting.

VALVE TIMING: "Timing Points" below are with valve .004" off seat.

Synchro-mesh
Intake Valves—Open 13° BTDC. Close 68° ALDC.
Exhaust Valves—Open 55° BLDC. Close 22° ATDC.

Dynaflow
Intake Valves—Open 14° BTDC. Close 71° ALDC.
Exhaust Valves—Open 56° BLDC. Close 25° ATDC.

VALVE TIMING CHECK

Series 40 (with conventional type lifters)—Set tappet clearance for .015" road operating lash, use dial indicator to check actual valve opening. No. 2 or No. 7 exhaust valve should be .145" open with No. 1 & No. 8 pistons at top dead center with flywheel mark "UDC/1-8" visible through inspection hole in right front face of housing.

Series 40 (with hydraulic valve lifters)—Use dial indicator set up over No. 2 or No. 7 exhaust valve to check actual valve movement. With valve fully closed, set indicator to zero, tighten adjusting ball stud until indicator reads .015", wait until leakdown allows indicator to return to zero, repeat process until indicator fails to return to zero (indicating that lifter plunger bottoming in body so that lifter is "solid"). Back off ball stud just enough so that indicator reads zero. Turn crankshaft slowly (in running direction) until indicator reads .145". Flywheel mark "UDC/1-8" should be visible through inspection hole in right front face of housing.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and restricted flow to rocker arm bearings, push rods and hydraulic valve lifters (if used).
Crankcase Capacity—Refill 5½ qts. Add 1 qt. if engine dry.
NOTE—If oil filter is dry, add 1½ qts. to capacities.
Normal Oil Pressure—35 lbs. at 35 MPH.
Oil Pressure Regulator—Non-adjustable spring and valve type on oil pump. Opens at 35 lbs.

Oil Filter: AC low-restriction. Filter has by-pass valve which opens at 7-9 lbs., (all oil for valve system passes through filter).
NOTE—Valve system oil feed taken from outlet side of filter with restricted fitting in head at point where rocker shaft oil lead connected.
Replacement Element—AC No. P-127. Change every 5000 miles.

Oil Pump: *See Buick Special Data.*

Oil Pressure Gauge: AC No. 1508012.

Crankcase Ventilation: Filter in oil filler breather cap and in crankcase ventilator inlet on left side of engine. Outlet pipe mounted on right side of engine.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap. Recirculation of water through engine (with thermostat closed) permitted by fixed by-pass passage between water outlet and pump inlet.
Pump Outlet for Dynaflow Drive—Separate pipe on right side below pump inlet. Used only on cars with Dynaflow Drive.
Capacity (No Heater)—12 qts. (add 1½ qts. with Dynaflow Drive).
Heater Note—Add 1½ qts. to capacities when heater is installed.
Pressure Cap—AC No. 850549. Stamped 549/7#. Radiator Filler Cap, 7 lb. type.

Water Pump: Packless sealed ball-bearing type.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In housing above water pump. Buick No. 3122282 (Std. 151°). No. 3122283 (160°). No. 3122285 (180°).
Setting—(151°) starts to open 148-155°F. Fully open not over 176°.

Temperature Gauge: AC No. 1512686.

CLUTCH

Own "Crown Spring" with Borg & Beck or Long Driven Member. Single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven type, 2 used. Inside diameter 6". Outside diameter 10". Thickness .125".

Pedal Adjustment: Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod linking cross-shaft lever to clutch fork. Pedal positioned by rubber bumper under toe board.

Removal: Remove rear axle and transmission (see below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.

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SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse) with steering column mounted shift control.
See Transmission Section for complete data.

Transmission Control—*See Transmission Section for complete data.*

Removal: Disconnect rear axle (see data following). Drain transmission, fill with clean gasoline or kerosene and run approximately 15 seconds in NEUTRAL, drain cleaner. Disconnect speedometer cable, lower shift rod and selector rod. Take out toggle spring and extension, remove shift lever and lock washer from selector shaft—hold shift lever in neutral when removing attaching bolt—remove outer selector lever. Reinstall support bar (see note below) under rear end of oil pan positioning left hook over frame between brake master cylinder and clutch release equalizer, tighten nuts on two hooks evenly. Remove transmission mounting as follows: Disconnect rubber thrust pad from rear of transmission support by taking off 3 nuts and bolt plate, remove shims from behind support, disconnect mounting pad on top of support by taking out two attaching bolts and bolt plate, raise engine by turning up on nuts on two support hooks evenly to take load off transmission support, take out transmission support (disconnect at frame ends), and remove thrust pad from thrust plate. Install guide pins J-851 in place of two top mounting bolts, remove remaining mounting bolts, pull transmission straight back and lower from car.

▷*NOTE*—To shim Rear Mounting when installing transmission, *see "Engine Mounting" in Buick Special Data.*

Engine Support Bar Note—Consists of a length of 2x4 (approx. width of frame) with hole through each end to take hooked rods (hook rests on top of frame), raise and lower support by nuts on rods.

Lubrication Note—When transmission re-installed in car, inject ½ pint of transmission lubricant through universal joint yoke before attaching torque tube to transmission.

DYNAFLOW DRIVE

"Twin Turbine" Dynaflow Drive (Torque Converter & hydraulically operated planetary transmission).
See Transmission Section for complete data.

▷*CRANKSHAFT REPLACEMENT CAUTION—See Crankshaft Replacement in Buick Special Data.*

▷*FLYWHEEL BALANCING ON DYNAFLOW CARS (To correct vibration caused by replacement parts): See "Buick Dynaflow Drive" in Transmission Section.*

▷**Throttle Linkage Adjustment and Dash Pot Setting on Dynaflow Drive Cars**—*See Transmission Section.*

Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.

▷*Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type "A" with AQ-ATF embossed on can.*

Checking Fluid Level—Engine must be idling with selector lever at "P" (parking) and transmission oil warm. Raise right side of hood, lift out oil gauge rod between battery and engine. Add fluid to "FULL" mark level with engine idling.

▷*CAUTION—Engine must be idling with transmission in Parking and transmission oil warm when checking Dynaflow Drive Fluid Level.*

Capacity—10 qts. An additional 1¾ pts. required if transmission dry.

▷*OTHER DYNAFLOW SERVICE DATA—See "Buick Dynaflow Drive" in Transmission Section.*

UNIVERSALS

Saginaw or Spicer. One used (in Torque ball at rear of transmission).

Torque Ball Adjustment—*See Buick Special Data.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with torque tube drive.
See Rear Axle Section for complete data.

Gear Ratios—(Synchro-mesh) 43-11 (3.9). (Dynaflow) 43-12 (3.6).

RATIO NOTE—Gear ratio stamped on bottom center of axle housing with the first two figures of the ratio placed one over the other with a bar between. (Example: 3.9-1 would appear with the 3 over the 9 and separated by a bar).

Backlash—.008-.010" (desired), .008-.012" (max.).

Removal: Raise rear end of car and place on car stands. Disconnect parking brake cable at rear brake sheave and at bracket on front end of torque tube, hydraulic brake line from pipe at frame X member and remove retainer. Disconnect lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs, and torque tube from torque ball. Hoist rear end of car and roll axle assembly out.

▷*CAUTION—Torque tube should not be disconnected from carrier (except for gasket replacement).*

Axle Shaft Removal: *See Rear Axle Section.*
Wheel Bearing Adjustment—None.

Rear Suspension: Coil springs and conventional axle.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco Double Acting, Hydraulic. Parallel cylinder type used on the rear.

Delco Part Nos.

Front (left & right)	1948-A
Rear (left)	2105-D
Rear (right)	2105-C

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—4¼° crosswise at ⅜° camber.
Camber—⅜° Pos. (⅞° Pos. to ⅝° Neg.) and equal for both wheels within ⅜°.
Caster—0° preferred (limits ¾° Pos. to ½° Neg.) and equal for both sides within ½°.
Toe-In—1/16-1/8". Adjust both tie rods equally.

▷*CAUTION*—Tie rod clamps must be within ⅛" of end of tube and ear of clamp must overlap slot in tube not less than 1/16".

Toe-Out on Turns—With outer wheel turned 20°, inner wheel turns 21½° ± ¾°.

STEERING GEAR

Standard Steering Gear: Saginaw Ball-bearing Worm & Nut recirculating ball type.
See Steering Gear Section for complete data.

Optl. Power Steering: Saginaw (G.M.) Ball-bearing Worm & Nut recirculating ball type with hydraulic power.
See Steering Gear Section for complete data.

Checking Fluid Level (Power Steering)—Remove reservoir filler plug, wipe off the attached gauge rod and insert rod in reservoir **with plug seated on edge of filler opening.** Remove plug and check oil level, which should be at mark on rod. Add oil as necessary to bring level to mark on rod. **Use only Buick Dynaflow Oil or Automatic Transmission Fluid, Type "A."**

BRAKES

Service: Bendix-Hydraulic, duo-servo, single anchor type **without eccentric adjustment.** Parking brake "Step-On" lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Cast-iron with steel flange. **Drum Diameter**—12" (11.997-12.003"). Maximum rebore limit .030" cut (.060" O.S.). *See "Brake Notes" in Buick Special Data.*
Lining—Molded type riveted to shoe. **Width**—2¼" (Front wheels). 1¾" (Rear wheels). **Thickness**—3/16" (all shoes).
Length—(Primary Shoe) 10 3/32". (Secondary Shoe) 12 13/32".
Clearance—.015" at both ends of secondary shoe (rear) with primary shoe forced out against drum.

Step-On (Parking) Brake: See service brakes (above).

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor driven pump supplying oil under pressure).
See Miscellaneous Section for complete data.

Windshield Wiper: Cable operated—Vacuum type.
See Miscellaneous Section for complete data.

►*1953 AIR-CONDITIONED CAR SERVICING CAUTION: Use extreme care when disconnecting any part of air-conditioning equipment or lines. See "Air-Conditioning" in Miscellaneous Section for complete data.*

►*NOTE—These cars have 12-volt electrical system.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door pillar post and on left front frame side rail.

1953 Starting Numbers—

1—6740001	Flint	5—6799001	Wilmington
2—6765001	Southgate	6—6808001	Atlanta
3—6774001	Linden	7—6815001	Framington
4—6783001	Kansas City		

Identification—First digit of serial number indicates assembly plant as listed above.

ENGINE NUMBER: Stamped on outside of left bank of cylinders on extension of top face of block, halfway back.

1953 Starting Numbers—

50 Series V-2415-5
70 Series V-2001-7

Identification—Last digit indicates series.

NOTE—Dash following engine number indicates that cylinder bores and pistons are .010" Oversize.

TUNE-UP

►*ACCELERATION HESITATION (First Cars): If this condition persists AFTER complete and careful tune-up of engine, see MANIFOLD HEAT CONTROL for further corrective procedure.*

►*DETONATION OR SPARK RAP ON ACCELERATION —Other than full throttle detonation caused by carbon accumulation or use of low-octane fuel.*

1) If noted during Light and Medium Throttle Acceleration—Install spacer in distributor vacuum spark control unit to increase control spring pressure. *See Vacuum Spark Control under IGNITION.*

2) If noted during Sudden Acceleration (from part-to-wide open throttle) on first Series 50 & 70 Carter Carburetors (tag dated prior to "E3"), Series 50 Stromberg Carburetor (Code 7-95), Series 70 Stromberg Carburetor (Code 7-94 or 7-94A): Condition can be improved by increasing size of vacuum spark control port in carburetor. *See "Carter WCD", "Carter WCFB", "Stromberg AAVB-267", and "Stromberg 4A" Carburetors in Carburetor Section.*

►*HIGH-SPEED PRE-IGNITION: See Distributor under IGNITION for production change limiting maximum automatic (centrifugal) advance.*

►*ENGINE IMPROVED WARM-UP & ELIMINATION OF STALLING (First cars with Stromberg Two-barrel Code 7-95 and Four-barrel Code 7-94 or 7-94A Carburetors):* Modify automatic choke and adjust Fast Idle and Unloader. *See "Stromberg AAVB-267" and "Stromberg 4A" Carburetors in Carburetor Section.*

►*ENGINE SURGE ON TURNS (Early Series 50 with Stromberg Code 7-95 Carburetor): See "Stromberg AAVB-267" Carburetor in Carburetor Section for recommended change.*

►*SPARK PLUG WIRING CAUTION (to prevent misfiring):* See "Ignition Notes" in Buick Special Data for correct grouping of spark plug cables in support grommets on engine.

COMPRESSION PRESSURE: At cranking speed (allowable variation between cylinders 10 lbs.).

	Synchro-mesh	Dynaflow
50 Series	160 lbs.	170 lbs.
70 Series		170 lbs.

VACUUM READING: Steady 18-20" at idling speed (450 RPM).

FIRING ORDER: 1-2-7-8-4-5-6-3.
Cylinder Numbering—Right Bank 1-3-5-7. Left Bank 2-4-6-8. Viewed from front.

SPARK PLUG GAPS: .032" exactly.
Plug Type—AC No. 44-5. 14 mm.

DISTRIBUTOR: Delco-Remy No. 1107827. *Same as 6 Volt Type.* Automatic and vacuum advance type with "center bearing" breaker plate.

►*HIGH-SPEED PRE-IGNITION: See Distributor under IGNITION for production change limiting maximum automatic (centrifugal) advance.*
Breaker Gap—.015-.017". Use dial indicator.
Cam Angle—26-33° test limits with .016" gap.

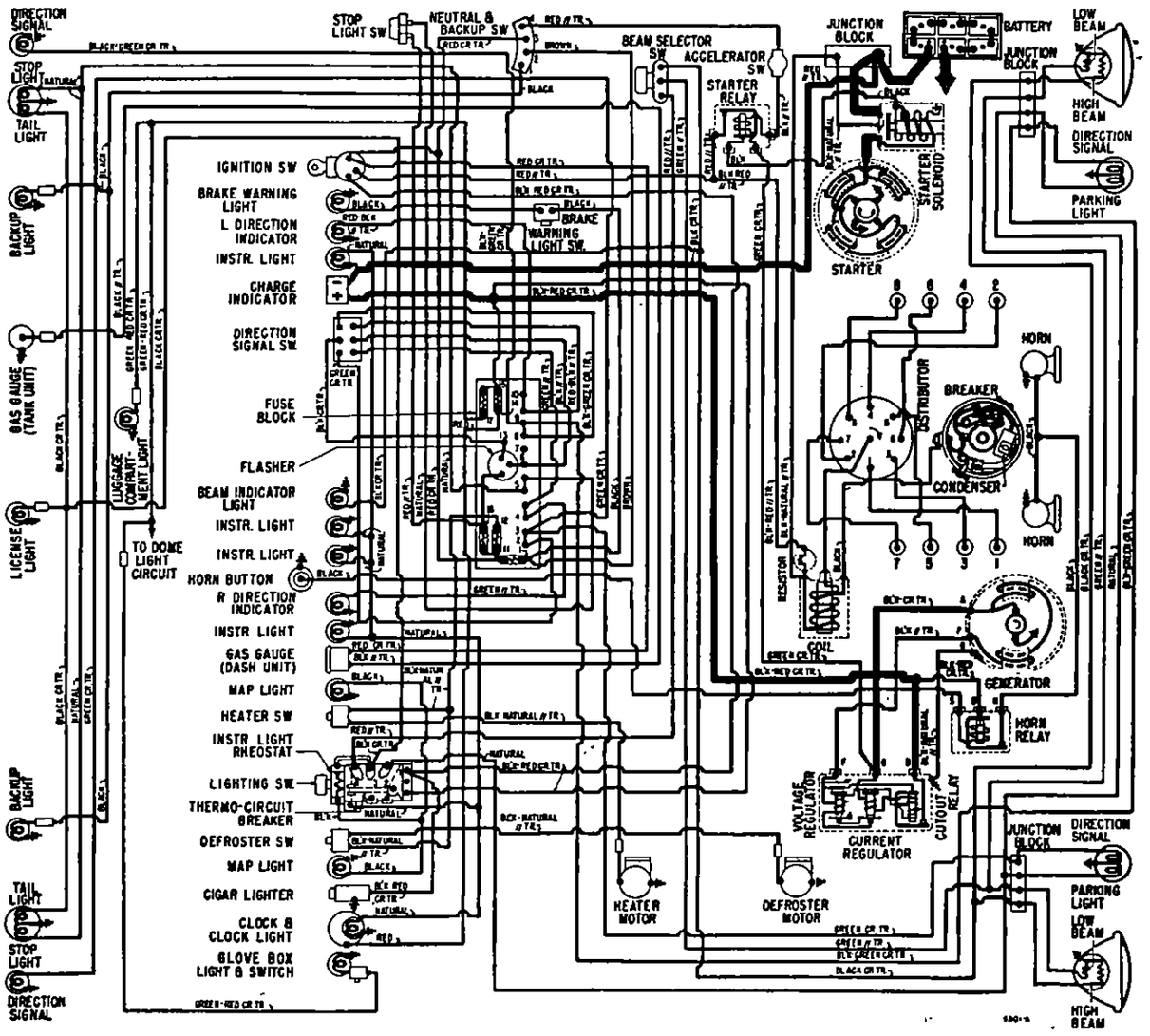
►*CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap between .015-.017".*
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115082. *12 Volt.* Used with resistor. On bracket directly in front of distributor.
Resistor—Delco-Remy No. 1923681. On coil bracket.

►*COIL RESISTOR NOTE*—Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from the starter solenoid-to-coil.

CONDENSER: Delco-Remy No. 1869704. *Same as 6 Volt.*
Capacity—.18-.23 microfarad.

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IGNITION TIMING: 5° BTDC.
Timing Mark—Yellow mark on top edge of one flywheel ring gear tooth aligned with pointer in sight hole in left side of flywheel housing.
NOTE—Flywheel also stamped with figure "5" on side of this marked tooth facing toward rear of car.
Timing Procedure—*See Ignition Timing.*
▷***LOCATING TIMING MARK (If mark obscured or lost):*** *See "Ignition Notes" in Buick Special Data.*

CARBURETION

SERIES 50—CARTER 2-BARREL

CARTER WCD No. 2017S. Dual (2-barrel) downdraft type with automatic choke.
▷***CARBURETOR CHANGE TO CORRECT SPARK RAP ON SUDDEN ACCELERATION (Carburetors tag dated prior to "E3"):*** *See "Carter WCD" in Carburetor Section for increasing size of vacuum port.*
Idle Setting—One turn (½-1½ turns) open. Adjust both screws alike (turn out for richer mixture).
Idle Speed—450 RPM.
Float Level—15/64" from top of each float to gasket seat on cover with valve seated (invert float assembly to check). Use Gauge T109-240 installed directly under floats and adjust floats vertically to just clear horizontal portion of gauge and laterally so sides of floats barely touch uprights on gauge.
Accelerating Pump—Install connector link in outer hole of pump arm for long stroke.
Fast Idle: ***CAUTION—Two different settings required:***
(1) Loosen choke lever clampscrew on choke shaft. Insert gauge T109-29 (.020") between lip of fast idle cam and boss on throttle body, hold choke valve tightly closed and remove slack from linkage by pressing choke lever toward closed position, tighten choke lever clampscrew.
(2) With choke valve tightly closed and fast idle screw on high step of cam, adjust fast idle screw for throttle opening of .015" (Gauge T109-44) between valve edge and wall (side opposite idle ports).
Automatic Choke Setting: Centered (at index).
Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

SERIES 50—STROMBERG 2-BARREL

STROMBERG AAVB-267, Code 7-95 (Early), 7-95A (Later). Dual downdraft type with automatic choke.
▷***CARBURETOR CHANGES TO CORRECT SPARK RAP ON SUDDEN ACCELERATION & ENGINE SURGE ON TURNS (First Code 7-95 Carb.): See "Stromberg AAVB" in Carburetor Section for recommended procedure.***
Idle Setting—1¼ turns open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed—450 RPM.
Float Level—Using Gauge T-24971 installed on air horn gasket (air horn and float assembly inverted), floats should be 5/64" above vertical guides on gauge.
Accelerating Pump—Place pump rod in lower hole of throttle lever.
Fast Idle Setting: ***CAUTION—Two different settings required.***
Fast Idle Cam—Close choke valve against #41 drill, make certain that fast idle cam spring holds cam upward against end of fast idle rod. Close throttle until stopscrew contacts fast idle cam. If screw does not just clear edge of highest step on cam and bear against second step, adjust by bending fast idle rod at the large curve.
Lever Clearance—Close choke valve against #53 drill, adjust clearance between ear on locking lever on throttle valve shaft and lug on loose lever on fast idle cam stud so that these levers just clear as throttle valve is opened and closed. Adjustment is made by bending end of loose lever up or down
Automatic Choke Setting: Set on index.
Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

SERIES 70—CARTER 4-BARREL

CARTER WCFB, No. 996S (First), 2053S (Later). Four-barrel downdraft type with automatic choke.
▷***CARBURETOR CHANGE TO CORRECT SPARK RAP ON SUDDEN ACCELERATION (Carter 996S and first 2053S Carburetors tag dated prior to "E3"): See "Carter WCFB 4-Barrel" in Carburetor Section for increasing size of vacuum spark port.***
Idle Speed—450 RPM.
Other Data—*See "Carter WCFB 4-Barrel" in Carburetor Section.*

SERIES 70—STROMBERG 4-BARREL

STROMBERG 4AUV-267, Code 7-94 & 7-94A (Early), 7-94B (Later). Four-barrel downdraft type with automatic choke.
▷***CARBURETOR CHANGES TO CORRECT SPARK RAP ON SUDDEN ACCELERATION AND TO IMPROVE WARM-UP AND ELIMINATE STALLING (First Code 7-94 & 7-94A Carbs.): See "Stromberg 4-Barrel 4A" in Carburetor Section for recommended procedure.***
Idle Speed—450 RPM.
Other Data—*See "Stromberg 4-Barrel 4A" in Carburetor Section.*
LINKAGE ADJUSTMENT & DASHPOT SETTING (ALL DYNAFLOW CARS): *See "Buick Dynaflow Drive" in Transmission Section.*
MANIFOLD HEAT CONTROL: Thermostatic type, located in left exhaust manifold. With cold engine, and freely operating valve, valve is closed (counterweight in "up" position), and back pressure in manifold forces exhaust gases through crossover chambers to right exhaust manifold. As engine warms up, valve opens, reducing flow of hot gas into crossover chambers.
▷***ENGINE ACCELERATION HESITATION (AFTER COMPLETE TUNE-UP)***—Check for counterweight bind against starter motor splash pan. If binding, reshape pan to allow clearance. Next, check thermostat spring to determine whether on backwards or hooked on wrong peg. If hesitation still present, on first engines, make following corrections:
Engines before No. V15828—Shorten free end of thermostat coil 5/16" (form new hook, cut off excess length). ***NOTE—Later engines have free end of thermostat coil moved 25° to increase tension.***
Engines before No. V14764—Enlarge ½" heat holes in intake manifold gasket to ⅝" by redrilling or install new No. 1343631 gasket with ⅝" holes. ***NOTE—Later engines have these ⅝" heat holes.***
VALVE TAPPET CLEARANCE: None in service (Hydraulic type lifters).

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116499.
COIL: Delco-Remy No. 1115082. ***12 Volt.*** Used with resistor. On bracket directly in front of distributor.
Resistor—Delco-Remy No. 1923681. On coil bracket.
▷***COIL RESISTOR NOTE***—Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from the starter solenoid-to-coil.
CONDENSER: Delco-Remy No. 1869704. ***Same as 6 Volt.*** **Capacity**—.18-.23 microfarad.
DISTRIBUTOR: Delco-Remy No. 1110827. ***Same as 6 Volt type.*** Automatic and vacuum advance type with "center-bearing" breaker plate.
▷***DISTRIBUTOR CENTRIFUGAL ADVANCE PRODUCTION CHANGE (Limiting maximum advance to prevent possibility of pre-ignition at high speeds):*** Distributors code dated "3C23" and later have maximum advance change (see Automatic Advance below). ***Earlier carburetors cannot be converted.***
Breaker Gap—.015-.017". Use dial indicator.
Cam Angle—26-33° test limits with .016" gap.
▷***CAUTION—Use of cam angle to set point gap not recommended by car manufacturer. If dwell meter used, make final check that gap is between .015-.017".***
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0-3	700
3.5-5.5	600	7-11	1200
9.5-11.5	1750	19-23	3500
14-18	2150①	28-36	4300
12.5-15.5	2000②	15-31	4000

①—Maximum for distributors before "3C23".
②—Maximum for distributors after "3C23".

Vacuum Spark Control: Delco-Remy No. 1116068 (Early), No. 1116083 (Later). Integral type.
Plunger Travel (1116068) ¼-9/32", (1116083) 17/64".
▷***INSTALLATION OF SPACER TO PREVENT SPARK RAP (Vacuum Control D-R. No. 1116068 Only):*** Make up spacer from piece of pipe with ¼" inside diameter and ⅜" long (spacer must have outside diameter of ½-17/32" and hole in center must be at least ⅛" diameter—do not use thin wall tubing). Remove spring retaining nut on vacuum unit (DO NOT allow housing to rotate while removing nut, install spacer on end of spring in housing, re-install retaining nut. Check ignition timing after installing spacer. ***CAUTION—DO NOT install spacer on later Vacuum Control Unit No. 1116083.***

Vacuum Advance—No. 1116068.

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
11-12.5	22-25°	14"

Vacuum Advance—1116083

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6.5-8.5
11-12.5	22-25	13.5-16.5

IGNITION TIMING

Standard Setting.....Exactly 5° BTDC.
Timing Mark—Yellow mark on top edge of one flywheel ring gear tooth aligned with pointer in sight hole in left side of flywheel housing. ***NOTE—Flywheel stamped "5" on side of tooth toward rear.***
▷***LOCATING TIMING MARK (If mark obscured or lost):*** *See "Ignition Notes" in Buick Special Data.*
Timing—Turn engine over until #1 piston approaching top dead center on compression stroke, stop when yellow-marked tooth on flywheel aligned with pointer in inspection hole on left side of flywheel housing (remove inspection hole cover). Loosen distributor clamp hold-down screw, rotate distributor until contacts begin to open, tighten hold-down screw. Make certain rotor opposite #1 segment in distributor cap (see diagram).

CARBURETOR

CARTER TWO-BARREL

SERIES 50: CARTER WCD No. 2017S. Dual (2-barrel) downdraft type with automatic choke.

►***CARBURETOR CHANGE TO CORRECT SPARK RAP ON SUDDEN ACCELERATION (Carburetors tag dated prior to "E3"): See "Carter WCD" in Carburetor Section for increasing size of vacuum port.***

Settings (Idle Setting, Float Setting and Accelerating Pump Setting): *See Tune-Up.*

Metering Jets & Rods—*See Carter Jet Specifications in Carburetor Section.*

Fast Idle: Carter "WCD" type.

Setting—*CAUTION—Two different settings required:* (1) Loosen choke lever clampscrew on choke shaft. Insert Gauge T109-29 (.020") between lip of fast idle cam and boss on throttle body, hold choke valve tightly closed and remove slack from linkage by pressing choke lever toward closed position, tighten choke lever clampscrew.

(2) With choke lever tightly closed and fast idle screw on high step of cam, adjust fast idle screw for throttle opening of .015" (Gauge T109-44) between edge of valve and wall opposite idle ports.

See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.

Setting—Centered on index.

See Carburetion Equipment Section for complete data.

Throttle Linkage Adjustment (Dynaflow Drive Cars): *See "Buick Dynaflow Drive" in Transmission Section.*

CARTER FOUR-BARREL

SERIES 70: CARTER WCFB No. 996S (Early), No. 2053S (Later). Four-barrel, downdraft type with automatic choke.

►***CARBURETOR CHANGE TO CORRECT SPARK RAP ON SUDDEN ACCELERATION (Carter 996S and first 2053S Carburetors tag dated prior to "E3"): See "Carter WCFB 4-Barrel" in Carburetor Section for increasing size of vacuum spark port.***

Idle Speed—450 RPM.

Other Data—*See "Carter WCFB 4-Barrel" in Carburetor Section.*

Throttle Linkage Adjustment: (Dynaflow Cars) *See "Buick Dynaflow Drive" in Transmission Section.*

STROMBERG TWO-BARREL

SERIES 50: STROMBERG AAVB-267, Code 7-95 (early), 7-95A (Later). Dual (2 barrel) downdraft type with automatic choke.

►***CARBURETOR CHANGES TO CORRECT SPARK RAP ON SUDDEN ACCELERATION & ENGINE SURGE ON TURNS (First Code 7-95 Carb.): See "Stromberg AAVB" in Carburetor Section for changes.***

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*

Metering Jets—*See Stromberg Downdraft Carburetor Jet Specifications in Carburetor Section.*

Fast Idle: Stromberg AAVB type.

Setting: *CAUTION—Two different settings required:*

Fast Idle Cam—Close choke valve against #41 drill, make certain that fast idle cam spring holds cam upward against end of fast idle rod. Close throttle until stopscrew contacts fast idle cam. If screw does not just clear edge of highest step on cam and bear against second step, adjust by bending fast idle rod at the large curve.

Lever Clearance—Close choke valve against #53 drill, adjust clearance between ear on locking lever on throttle valve shaft and lug on loose lever on fast idle cam stud so that these levers just clear as throttle valve is opened and closed. Adjustment is made by bending end of loose lever up or down *See Carburetion Equipment Section for complete data.*

Automatic Choke: Stromberg type.

Setting—Set on index.

See Carburetion Equipment Section for complete data.

Throttle Linkage Adjustment (Dynaflow Drive Cars): *See "Buick Dynaflow Drive" in Transmission Section.*

STROMBERG FOUR-BARREL

SERIES 70: STROMBERG 4AUV-267, Code 7-94 & 7-94A (Early), Code 7-94B (Later). Four-barrel, downdraft type with automatic choke.

►***CARBURETOR CHANGES TO CORRECT SPARK RAP ON SUDDEN ACCELERATION AND TO IMPROVE WARM-UP AND ELIMINATE STALLING (First Code 7-94 & 7-94A Carbs.): See "Stromberg 4-Barrel 4A" Carburetor in Carburetor Section for changes.***

Idle Speed—450 RPM.

Other Data—*See "Stromberg 4-Barrel 4A" in Carburetor Section.*

Throttle Linkage Adjustment: (Dynaflow Cars) *See "Buick Dynaflow Drive" in Transmission Section.*

CARB. EQUIPMENT

Air Cleaner: Oil-bath type.

Filter Element—AC No. 26 (50), No. 27 (70).

Fuel Pump: AC. Combination fuel-and-vacuum type.

Replacement Pump: AC No. 9763.

Pressure—4½-5½ lbs. at fuel pump.

See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.

Dash Unit—AC No. 1517854.

Tank Unit—AC No. 1517200.

See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 3EE70W. *12 Volt,* 11 plate, 70 ampere hour capacity.

Grounded Terminal—Negative (—).

Location—Under hood, left side.

STARTER

Delco-Remy No. 1107601. *12 Volt type.*

Armature—Delco-Remy No. 1923917.

Drive—Overruning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	6500	10.3	75
11.5 "	Lock	5.2	460

Starting Switch: Delco-Remy No. 1116499 *(12 Volt).* Solenoid controlled by SEPARATE relay No. 1116876 with Carburetor Switches as follows:

Carter Carburetors—Carter No. 192-11U.

Stromberg Carburetors—Stromberg No. 386030.

Starter Switch Setting—*See Carter and Stromberg Carburetors in Carburetor Section.*

Dynaflow Neutral Safety & Back-Up Light Switch: Delco-Remy No. 1998025. At lower end of steering column. Connected in starter control circuit so that starter operative only when selector lever in "N" Neutral or "P" Parking positions.

Adjustment—*See "Buick Dynaflow Drive" in Transmission Section.*

►***NEUTRAL SAFETY & BACK-UP SWITCH CONNECTION CAUTION: Wires must be connected in correct order as shown on wiring diagram.***

GENERATOR

Delco-Remy No. (Std. First Cars) 1102003, (Std. Later Cars) 1102008, (70 Air-conditioned Cars) 1102006. *12 Volt Types.* Two brush with voltage and current regulation.

Armature—Delco-Remy No. 1923535 (for 1102008 Gen.), No. 1925210 (for 1102006 Gen.).

Maximum Charging Rate—30 amperes, 14 volts, at 2300 RPM. (Hot).

Performance Data—Cold

Amperes	Volts	R.P.M.
30①	14	2150

①—Not necessarily maximum. See Regulator.

Brush Spring Tension—24-32 ozs.

Field Current—1.48-1.62 amperes at 12 volts.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: ⅜" deflection with normal thumb pressure midway between generator and fan pulleys.

REGULATOR

Delco-Remy No. 1118749 *(12 Volt).* Voltage and current regulator.

►***CAUTION***—Check generator for grounded field coils and leads before changing regulator settings to correct high charging rate and high voltage.

Cutout Relay

Cuts-In—11.8-13.6 volts hot (set to 12.8 volts).

Contact Gap—.020" (same for both contacts).

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—14.0-15.0 volts hot (set to 14.5 volts).

Air Gap—.075" (with contacts just closed).

Regulator is over compensated for temperature. Should be checked with cover in place and hot.

Current Regulator

Setting—27-33 amperes hot (set to 30 amperes).

Air Gap—.075" with armature pressed down to point where contacts are just touching.

Checking & Adjusting—*See Elect. Equip. Section.*

LIGHTING

►***LIGHTING CAUTION—Lights are 12 volt.***

Headlamps: Guide "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Directional Signal: *See Electrical Equip. Section.*

Directional Signal Indicators—Located in gauges to right and left of speedometer.

Switches

Lighting—Delco-Remy No. 1995054.

Beam Selector—Delco-Remy No. 1997008.

Directional Signal (Dynaflow) Delco-Remy No. 1995571, (50 Synchro-mesh) No. 1995575.

Back-Up Light—(50 Synchro-mesh Optl.) Delco-Remy No. 1998037, (Dynaflow) See Dynaflow Neutral Safety Switch & Back-Up Lights under Starter above.

Hand Brake Warning—Delco-Remy No. 1998028.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: *12 Volt.* **Delco-Remy.** On light switch (protects lighting circuits).

FUSE BLOCK: On lower flange of instrument panel to left of steering column. Five fuses.

1)—Clock. AGA 2 amperes.

2)—Blower, Defroster, Heater. SFE 9 amperes.

3)—Stop & Direction Signal Lamps. SFE 9 amps.

4)—Dome, Trunk, Glove Box Lamps. SFE 20 amps.

5)—Back-Up Lamps. SFE 9 amperes.

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HORNS: Delco-Remy No. 1999755 (Low Note), No. 1999756 (High Note). *12 volt type.* Vibrator type twin horns operated by relay.

	Current (at 12 volts)
Low Note	10.5 amperes
High Note	9.5 amperes

Horn Relay: Delco-Remy No. 1116781. *12 volt type.* **Contacts Close**—5.5-7.5 volts. **Contact Gap**—.027". **Air Gap**—.014".

ENGINE

ENGINE SPECIFICATIONS: V8, Valve-in-head. **Bore**—4". **Stroke**—3.2". **Displacement**—322 cu. in. **Rated HP**—51.2.

Series	Comp. Ratio	Developed HP
50 (Synchro-mesh)	8.0-1	164 at 4000 RPM
50 (Dynaflow)	8.5-1	170 at 4000 RPM
70 (Dynaflow)	8.5-1	188 at 4000 RPM

▷*OVERSIZE CYLINDER BORE CAUTION*—Engines with ¼" long dash following engine number have .010" Oversize cylinder bores and pistons.

▷*CYLINDER HEAD INTERCHANGEABILITY:* Same cylinder head used on right and left cylinder banks (both ends of head have threaded bolt holes for water manifold attachment and water ports). *NOTE—Water port on rear end of cylinder head must be closed by a plug.*

▷*CYLINDER HEAD CAUTION—Different head and gasket combination for each compression ratio:*

Series	Head No.	Gasket & Thickness	Comp. Ratio
50 (Synchro-mesh)	1344214	1343995 (.045")	8.0-1
50, 70 (Dynaflow)	1344214	1343484 (.015")	8.5-1

EXHAUST MANIFOLD INSTALLATION: *CAUTION*—Use special bolt locking plates No. 1162793 (7 required), and 1162795 (1 required) under bolt heads, tighten bolts to 10-15 ft. lbs. torque, lock bolts by turning up one lock plate tab against bolt head flat. *CAUTION*—Above tightening torque supersedes previous recommendation (25-30 ft. lbs.) and will allow manifold to move slightly to compensate for temperature changes (bolt holes slotted).

CYLINDER HEAD & TIGHTENING TORQUES: *See Buick Special Data.*

COMPRESSION & VACUUM READING: *See Tune-Up.*

PISTONS: Anodized aluminum alloy, cam ground, transverse slot. Three rings above pin. **Weight**—21.76 ozs. **Removal**—Pistons and rods removed from above. **Clearance**—.0007-.0017". See Fitting New Pistons. **Original Bore Size**—3.9985-4.0015". *NOTE*—Dash (¼" long) following engine number indicates cylinder bore .010" Oversize.

Fitting New Pistons (Engine in Chassis): Use .003" feeler stock ½" wide by 12" long. With piston and cylinder bore clean and dry, install feeler on lower (outer) side of bore 90° from normal piston pin location. Install piston in inverted position in bore with piston pin parallel to crankshaft. Withdraw feeler with steady pull in straight line. Pull to withdraw feeler must be within 7-13 lbs. **(Engine out of Car—with Cylinder Bore vertical).** Use .0015" feeler stock, ¼" wide for "GO" gauge, .002" stock ½" wide for "NO GO" gauge, and 12" long, suspended in cylinder at right angle to engine center line, invert piston in cylinder. With piston and cylinder dry and at 70°F., piston should pass through cylinder of own weight with .0015" "GO" gauge and should hold its own weight with .002" "NO GO" gauge.

Replacement Pistons: *See Buick Special Data.*

Installing Pistons: Assemble rod and pistons so that clamp bolt in rod is on same side as valve depression in piston head. When pistons installed, valve depressions in head of all pistons should be upward or toward inner side of cylinder block. *See Connecting Rod Installation also.*

PISTON RINGS: Three rings, all above pin. Oil ring is "Flex-S" (early—installed without end gap) or later 4-piece type consisting of two rails, spacer, and expander located in each piston third groove.

Ring	Width	End Gap	Side Clearance
Comp.	.078"	.010-.020"	.002-.004"①
Oil	.187"	Flex-S	.0002-.0025"

①—Install with groove on inner diameter UP.

Replacement Rings: *See Buick Special Data.*

▷*REPLACEMENT OIL RINGS (For Improved Oil Consumption performance): See "Piston Rings" in Buick Special Data.*

PISTON PIN: Clamped in rod. **Length**—3.40". **Diameter**—.940". **Pin Fit in Piston**—.0003-.0005" clearance or easy finger push fit at 70°F.

Replacement Pins: Std., .003", .005" oversize. New pistons are furnished with fitted pins (pistons not furnished without pins (pins furnished separately).

CONNECTING ROD: Journal Diameter—2.2490-2.250" **Length**—6.00". **Weight**—22.16 ozs. **Bearings**—Durex 100A "full-precision" insert type without shims. **Clearance**—.0002-.0022". **Sideplay**—.006-.011".

Replacement Bearings: Std., .001", .002", .020", .021" undersize. Marked with number on outer surface near tang indicating size.

Installing Rods: Install piston and rod assemblies with boss on connecting rod web pointing toward rear of engine (right bank), toward front of engine (left bank) so that valve depressions in piston head are upward or toward center on block on all pistons. Install bearing caps with boss on edge of cap on same side as boss on web of rod. This will correctly position notch in parting face of rod (oil squirt hole for cylinder wall lubrication). *See Piston Installation*

CRANKSHAFT: Five bearing, counterweighted.

▷*FLYWHEEL BALANCING ON DYNAFLOW CARS (To correct vibration caused by replacement parts): See "Buick Dynaflow Drive" in Transmission Section.*

Main Bearing Journal Diameters—2.498-2.499".

▷*CAUTION—First four bearings identical, rear bearing longer and flanged to match flanges on crankshaft.*

Bearings—Steel backed, Durex 100A slip-in type. **Clearance**—.0005-.003".

Bearing Adjustment: None (no shims) replace bearings. Do not file rods or caps.

Replacement Bearings: Std., .001", .002" undersize.

Oil Seal Installation (Front & Rear Bearings): *See "Crankshaft & Main Bearings" in Buick Special Data.*

End Thrust: #5 (Rear bearing). **Endplay**—.006".

CAMSHAFT: Five bearing, non-adjustable chain **Bearing Diameters**—#1, 1.685-1.686"; #2, 1.655-1.656"; #3, 1.625-1.626"; #4, 1.595-1.596"; #5, 1.565-1.566". **Clearance**—.0005-.0035". **End Thrust**—Taken by plate mounted behind camshaft sprocket. **Endplay**—.004-.008". Provided by spacer between sprocket and camshaft front bearing journal.

Timing Chain: Link-belt. **Width**—.688". **Pitch**—.500" **Length**—26" or 52 links.

Camshaft Setting: Timing chain must be installed so that camshaft sprocket key straight down and "0" timing marks on both sprockets toward left of engine, there will be 12 teeth between the "0" timing marks, including teeth aligned with the marks. To install chain, turn crankshaft so that Nos. 1 and 4 pistons are on top dead center. Turn camshaft so that sprocket key points straight down toward crankshaft. Place timing chain over camshaft and crankshaft sprockets so that copper plated washers on chain are aligned with "0" marks on front face of sprockets, then install chain on two shafts.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1.750"	.3720"	4.346"
Exhaust	1.250"	.3715"	4.346"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.378"	.0025"
Exhaust	45°	.350"	.0030"

Valve Seat Width—1/16" (3/64" to 5/64").

Valve Guides: Drive old guides out from combustion chamber side using Driver J-269. Install new guides from top side of head using Valve Guide Aligner J-5240-2 over guide hole and Installer J-5240-1 to drive guide down until shoulder on installer contacts top of aligner tool which will correctly position guide. Finish ream guides with Reamer J-129-2 for correct valve stem clearance.

Valve Springs: Double concentric springs used on all valves.

Valve Spring Specifications

	Inner Spring		Outer Spring	
Valve	Lbs. Press.	Lgth.	Lbs. Press.	Lgth.
Open	53.0-59.0	1.15"	85.0-91.0	1.12"
Closed	19.5-24.5	1.53"	37.5-42.5	1.50"

Hydraulic Valve Lifters: No adjustment required in service or at time of assembly. Rocker arms have no adjustment studs. **Diameter**—.8425"; **Clearance**—.0015-.003". *See Buick Special Data for complete data.*

Rocker Arm Installation: *See "Valve System" in Buick Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: No clearance adjustment required in service (Hydraulic type lifters).

VALVE TIMING: *See Camshaft Setting above.* "Timing Points" below are with valve .004" off seat. **Intake Valves**—Open 25° BTDC. Close 77° ALDC. **Exhaust Valves**—Open 70° BLDC. Close 42° ATDC.

Valve Timing Check: Timing case cover must be removed to check valve timing. *See Camshaft Setting*

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, restricted flow to rocker arm bearings, lifters, and valves. **Crankcase Capacity—Refill**—6 qts. **Dry Engine**—7 qts. Add one additional qt. for dry filter. **Normal Oil Pressure**—35 lbs. at 35 MPH.

Oil Filter: Full-flow type located on right side of crankcase. All oil passes through filter except when pressure differential between inlet and outlet ports reaches 4½-5½ lbs. when valve in filter body bypasses oil directly to engine. Replace filter element every 5000 miles or more often in dusty areas. **Replacement Filter Element**—AC Type PF-122.

Oil Pump: *See Buick Special Data.*
Oil Pressure Gauge: AC No. 1507965.
Crankcase Ventilation: Provided by ventilating type oil filler cap located at front end of valve lifter cover and the crankcase ventilator pipe connected to rear end of lifter cover. Each contains gauze filter element.

COOLING

Cooling System: Pressure type with pressure (relief valve) in filler cap. Re-circulation with thermostat closed provided by by-pass in pump body.
Capacity (No Heater)—(50 Synchro-mesh) 16.5 qts. **(All Dynaflow Cars)** 18 qts. **Heater Note**—Add 1½ qts. for cars with heater.
Pressure Valve—AC No. 850549 Radiator Filler Cap (stamped 549/7#). 7 lb. type.
Water Pump: Packless sealed ball-bearing type.
See Water Pump Section for complete data.
Thermostat: "Pellet" type. Buick No. 1391014 (Std. 160° (starts to open at 157-162°F., fully open at 182° F. max.). No. 1390992 (Optl. 180°—starts to open at 177-182°F., fully open at 202°F. max.). Located in water manifold above pump.
Temperature Gauge: AC No. 1512688.

CLUTCH

Own Make (Series 50 Synchro-mesh Cars only). Single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven type, 2 used. Inside diameter 6½", Outside diameter 10½". Thickness .125" ± .003".
Pedal Adjustment: Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod linking cross-shaft lever to clutch fork. Pedal positioned by rubber bumper under toe board.
Removal: Remove rear axle and transmission (see below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse) with steering column mounted control.
See Transmission Section for complete data.
Transmission Control: *See Transmission Section.*
Removal: Disconnect rear axle (see data following). Disconnect speedometer cable, shift rods, toggle spring and extension, remove shift lever and lock washer from selector shaft—hold shift lever in neutral when removing attaching bolt—remove outer selector lever. Reinstall support bar (see note below) under rear end of oil pan positioning left hook over frame between brake master cylinder and clutch release equalizer, tighten nuts on two hooks evenly. Remove transmission mounting as follows: Disconnect rubber thrust pad from rear of transmission support by taking off 3 nuts and bolt plate, remove shims from behind support, disconnect mounting pad on top of support by taking out two attaching bolts and bolt plate, raise engine by turning up on nuts on two support hooks evenly to take load off transmission support, take out transmission support (disconnect at frame ends), and remove thrust pad from thrust plate. Install guide pins J-851 in place of two top mounting bolts, remove remaining mounting bolts, pull transmission straight back and lower from car.

►*NOTE*—To shim Rear Mounting when installing transmission, *see "Engine Mounting" in Buick Special Data.*
Lubrication Note—When transmission re-installed in car, inject ½ pint of transmission lubricant through universal joint yoke before attaching torque tube to transmission.

DYNAFLOW DRIVE

"Twin Turbine" Dynaflow Drive. Torque Converter & hydraulically operated planetary transmission.
See Transmission Section for complete data.
►*FLYWHEEL BALANCING ON DYNAFLOW CARS (To correct vibration caused by replacement parts): See "Buick Dynaflow Drive" in Transmission Section.*
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Buick Dynaflow Drive" in Transmission Section for data.*
►*TESTING & TROUBLE SHOOTING: See Trans. Sect'n.*
►**Throttle Linkage Adjustment and Dash Pot Setting on Dynaflow Drive Cars**—*See Transmission Section.*
Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.
►*Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type A.*
Checking Fluid Level—Engine must be idling with selector lever at "P" (parking) and transmission oil warm. Add fluid to "FULL" mark on dipstick.
►*CAUTION—Engine must be idling with transmission in Parking and oil must be warm when checking.*
Capacity—10 quarts.
►*NOTE—A completely dry transmission requires 1¾ pints more than amounts given above.*
►*OTHER DYNAFLOW SERVICE DATA—See "Buick Dynaflow Drive" in Transmission Section.*

UNIVERSALS

Saginaw or Spicer. One used (in Torque ball at rear of transmission).

Torque Ball Adjustment—*See Buick Special Data.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with torque tube drive.
See Rear Axle Section for complete data.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Rear Axle Section for complete data.*
Ratios: 3.6-1 Std. 3.9-1 Optl.
Backlash—.008-.010" (desired), .008-.012" (max.).
Removal: Raise rear end of car and place on car stands. Disconnect parking brake cable at rear brake sheave and at bracket of front end of torque tube, hydraulic brake line from pipe at frame X member and remove retainer. Disconnect lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs, and torque tube from torque ball. Hoist rear end of car and roll axle assembly out.
►*CAUTION—Torque tube should not be disconnected from carrier (except for gasket replacement).*
Axle Shaft Removal: *See Rear Axle Section.*
Rear Suspension: Coil springs and conventional axle.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco. Double acting hydraulic type.
Front Shock Absorbers—Buick No. 5303279.

Rear Shock Absorbers

Series	Right	Left
Except 59 & 79R	5303277	5303278
59 & 79R	5394508	5394509

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4¼° crosswise at ⅜° camber.
Camber—⅜° Pos. (⅞° Pos. to ⅝° Neg.) and equal for both wheels within ⅜° at curb weight.
Caster—0° (½° Neg. to ¾° Pos.) equal for both wheels within ½° at curb weight.
Toe-In—1/16-1/8". Adjust both tie rods equally.
►*CAUTION*—Tie rod clamps must be within 1/8" of end of tube and ear of clamp must overlap slot in tube not less than 1/16".
Toe-Out on Turns—With outer wheel turned 20°, inner wheel should be 21½° ± ¾°.

STEERING GEAR

Standard Steering Gear: Saginaw Ball-bearing Worm and Nut recirculating ball type.
See Steering Gear Section for complete data.
Power Steering: Std. on Series 70, Optl. on others. Saginaw (G.M.) Ball-bearing Worm and Nut recirculating ball type with hydraulic power.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix-Hydraulic, duo-servo, single anchor type **without eccentric adjustment.** Parking brake "Step-on" lever applies rear wheel service brakes.
See Brake Section for complete data.
►*SERIES 70 SECONDARY SHOE IDENTIFICATION NOTE (Foot Powered Brakes):* Identified by orange paint mark on edge of lining.
Drum Diameter—12" (11.97-12.003"). Maximum re-bore limit .030" cut (.060" O.S.). *See "Brake Notes" in Buick Special Data.*
►*LINING CAUTION (Power Brakes)—Special high pressure type lining must be used with power brakes. Lining can be identified by orange color and black edge.*
Lining—Molded extruded (riveted to shoes).
Width—(Series 50)—All shoes 2.25". (Series 70)—2.50" (Front wheels); 2.25" (Rear wheels).
Thickness—(Series 50) All shoes .187". (Series 70) Primary .250". Secondary .187".
Length—(Primary Shoes) 10 3/32". (Secondary Shoes) 12 31/32".
Clearance—.015" at both ends of secondary (rear) shoe with primary shoe out against drum.
Power Brakes: (Std.) Model 76X Convt. (Optional) Other Series 70 and all Series 50.
See "Buick Power Brakes" in Brake Section for complete data.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Buick Power Brakes" in Brake Section for complete data.*

MISC. MECHANICAL

Air Conditioning: Frigidaire type Optl.
See "Air-conditioning" in Miscellaneous Section for complete data.
Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor driven pump supplying oil under pressure).
See Miscellaneous Section for complete data.
Windshield Wiper: Cable operated—Vacuum type.
See Miscellaneous Section for complete data.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Series	Model Designation
40	SPECIAL
50	SUPER
60	CENTURY
70	ROADMASTER
M/100 (1954)	SKYLARK

SERIAL NUMBER: Stamped on plate on left front door pillar post and on left front frame side rail.

Starting Serial Number (Each Year)—001001 (at each plant).

►*1954 SERIAL NUMBER NOTE: Beginning 4/1/54, the serial number includes identification data as indicated below.*

►*SERIAL NUMBER NOTE: Serial number (example 4B-2001001) includes the following identification data in sequence:*

Series ①	Year ②	Assy. Plant ③	Serial No.
4	B	2	001001

①—See Series Designation following.

②—Year designation "A" (1954), "B" (1955).

③—See Assembly Plant Designation following.

Series Designation

4—40 Special	6—60 Century
5—50 Super	7—70 Roadmaster & M/100 Skylark

Assembly Plant Designation

1 Flint	5 Wilmington
2 South Gate	6 Atlanta
3 Linden	7 Framingham
4 Kansas City	8 Arlington

ENGINE NUMBER: Stamped on outside of left bank of cylinders on extension of top face of block between middle branches of exhaust manifold.

Starting Engine Number— **V-273956** (1954), **V-720080** (1955). Followed by a suffix numeral as indicated in Series Designation above.

►*1955 ENGINE NUMBER NOTE: The "V" Engine Number Prefix not used after Engine Number 1,000,000.*

►*ENGINE NUMBER NOTE:* Dash following engine number indicates that cylinder bores and pistons are .010" Oversize. *NOTE*—Do not confuse dash with vertical groove on pad designating Series 40 engine.

TUNE-UP

►*1954 SKYLARK MODEL 100 NOTE: All specifications for this model are same as Series 70 except as noted.*

►*DETONATION CORRECTION (ALL SERIES): See "Ignition Notes" in Buick Special Data.*

►*SPARK PLUG CABLE ROUTING (To Prevent Misfiring): See "Ignition Notes" in Buick Special Data.*

COMPRESSION PRESSURE: At cranking speed (140 RPM). All cylinders must be equal within 10 lbs.

	Synchro-mesh		Dynaflow	
Series	1954	1955	1954	1955
40	130 lbs.	140 lbs.	145 lbs.	155 lbs.
50,60,70	150 lbs.	155 lbs.	160 lbs.	170 lbs.

VACUUM READING: Steady 18-20" at idling speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatically controlled valve in forward end of left exhaust manifold. Valve must operate freely.

Checking Thermostatic Coil Spring—With engine at 70°F., unhook end of spring from anchor stud on manifold, hold valve closed. End of spring should be 3/8 turn clockwise from anchor stud (3/8 turn "wind-up" to engage spring on stud). Replace thermostatic spring if setting incorrect or if distorted or otherwise damaged.

IGNITION

FIRING ORDER: 1-2-7-8-4-5-6-3.

Cylinders—RIGHT BANK 1-3-5-7, LEFT BANK 2-4-6-8.

SPARK PLUG GAP: .030-.035".

Spark Plugs—AC No. 44-5. 14mm. Torque to 22-28 ft. lbs.

COIL: Delco-Remy 1115082. *12 Volt.*

Ignition Current—2.5 amps. idling, 4.5 stopped.

Resistor—Delco-Remy 1927809. On cowl near ignition coil. Resistance 1.4-1.65 ohms at 75°F.

►*COIL RESISTOR NOTE*—Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from starter solenoid-to-coil.

DISTRIBUTOR: Delco-Remy 1110849. *12 Volt.*

Condenser—Delco-Remy 1869704 (Closed-end terminal), 1928111 (Open-end terminal). **Capacity** .18-.23 mfd.

Contact Point Set—Delco-Remy 1924499.

Breaker Gap—.0125-.0175".

Cam Angle—26-33° (with .016" gap).

►*BREAKER GAP CAUTION*—Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set point gap.

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Clockwise viewed from above.

►*DISTRIBUTOR REMOVAL NOTE*—Removal of distributor can be facilitated by use of Special Wrench J-5727 (Kent-Moore) or S-9832 (Snap-On).

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-1.5	375	0-3	750
6-8	850	12-16	1700
9.5-11.5	1450	19-23	2900
11-13.5	1750	22-27	3500

Vacuum Spark Control: Delco-Remy 1116090.

Plunger Travel—7/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6.5-8.5
9-10.5	18-21	11.5-15

IGNITION TIMING

Setting—5° BTDC exactly.

►*IGNITION TIMING CAUTION—Lower engine idle speed to not exceed 350 RPM when setting ignition timing with timing light. Reset to 450 RPM when completed.*

Timing Mark—Timing indicator marked with four lines indicating 0°, 2.5°, 5°, 7.5° BTDC, located on right side of timing chain cover below fuel pump. Line up mark on Fan Drive Pulley (Series 40), Harmonic Balancer (Other Series) with correct line (5°) on timing indicator for normal operating conditions.

CARBURETOR

►*CARBURETOR APPLICATION: Various carburetors used on 1954-55 cars as follows:*

Series	Carburetor Make & Type
40 (1954-55)	①Carter WCD or Stromberg AAVB
40 (Late 1955)	①Carter WGD or Stromberg WW
50 (1954)	① Carter WCD or Stromberg AAVB
60, 70 (1954)	②Carter WCFB or Stromberg 4AUV
50, 60, 70 (1955)	②Carter WCFB or Rochester 4GC

①—2-Barrel Carburetor. ②—4-Barrel Carburetor.

►*1954 DYNAFLOW CARS THROTTLE LINKAGE ADJUSTMENT:* The procedure for adjusting throttle linkage on 1954 Dynaflow cars is the same as for "Dynaflow Cars (Without Overtravel)" below, except for adjustment on "stretch-link".

►*1954-55 SYNCHRO-MESH THROTTLE LINKAGE ADJUSTMENT NOTE:* The procedure for adjusting throttle linkage on synchro-mesh cars is the same as for "Dynaflow Cars (Without Overtravel)" below, except for adjustment on "stretch-link", stator control linkage and dashpot.

►*1955 THROTTLE LINKAGE ADJUSTMENT (DYNAFLOW CARS):* The throttle operating rod contains an adjustable spring loaded stretch link which may be optionally adjusted to provide "overtravel" for delayed action of the variable pitch stator. In production the stretch link is locked solid to eliminate overtravel and the throttle linkage is adjusted so that the stator shifts to high angle performance position just as wide open throttle is reached. If car is operated consistently at high speed it may be preferred to have the high angle shift occur after wide open throttle is reached. In this case "overtravel" may be obtained as outlined in "Adjustment With Overtravel" below. *CAUTION—Adjust throttle linkage WITHOUT overtravel on all Synchro-mesh cars.*

THROTTLE LINKAGE ADJUSTMENT: With floor mat properly installed and all throttle linkage well lubricated and operating freely, adjust throttle stop screw for proper HOT idling speed of 450 RPM. Turn engine off and check operation of unloader (adjust if necessary). Proceed as follows:

1) Disconnect throttle return spring and throttle operating rod from lever on equalizer shaft. Back off stator pick-up lever adjusting screw until screw end is flush with lever surface.

2) Adjust throttle operating rod in rod end at carburetor so that approximately 5/8" of thread is exposed, then tighten lock nut.

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3) For Adjustment Without Over-travel—Turn rear end of throttle operating rod until stretch link is locked. While another person presses accelerator pedal firmly against the floor mat, hold throttle lever in wide open position and hold rear end of operating rod at hole in throttle lever. Rod must be approximately 1/16" **short** of entering hole in lever. Change position of lever on shaft as required to obtain this condition, then tighten clamp bolt securely.

4) For Adjustment With Over-travel (Do not Use on Synchro-mesh Cars)—Turn rear end of throttle operating rod until rod can be stretched approximately 7/16" against tension of stretch link spring, measured at forward end of link. While another person holds throttle UPWARD as far as possible, hold throttle lever closed to HOT idle position and hold rear end of throttle operating rod at hole in throttle operating lever. Rod *must extend 1/16" BEYOND hole in lever. Change* position of lever on shaft as required to obtain this condition, then tighten clamp bolt securely.

5) Connect operating rod to operating lever, snap retaining clip over rod and connect return spring. With throttle closed to HOT idle position, check clearance between equalizer shaft lower lever and the stop lug in the shaft-to-cowl mounting bracket. A minimum clearance of 1/16" (Carter), 3/16" (Rochester) must exist at this point

6) Hold choke valve closed while accelerator pedal is pressed to floor mat to check operation of unloader. If clearance between lower lever and stop lug is less than 1/16", or choke unloader does not operate properly, readjust the operating rod length at rod end on throttle lever or change position of upper lever on equalizer shaft one serration at a time until proper settings are obtained.

7) On Dynaflow Cars have accelerator pedal depressed firmly against floor mat, then turn stator pick-up lever adjusting screw against stator operating lever, raising lever until all vertical play is removed from stator operating control rod. Turn screw back ½ turn to provide a slight clearance between stator control valve operating lever and the **bottom side** of its stop pin on the high accumulator

8) Finally check for smooth operation of linkage from fully closed to wide open position of throttle valve. Make sure that throttle closes firmly against stop screw. *NOTE—On Dynaflow Cars (Without Over-Travel), and on Synchro-mesh Cars, throttle valve should be wide open when accelerator pedal strikes floor mat. On Dynaflow Cars (With Over-travel), the stop on throttle lever must strike boss on throttle body before accelerator pedal can be pressed to floor against tension of stretch spring.*

DASHPOT ADJUSTMENT (Dynaflow Cars): Adjust dash pot only after throttle linkage has been adjusted and engine is at normal operating temperature. Rotate fast idle cam to extreme cold idle position (choke closed), hold throttle lever against a .030" feeler gauge placed between stop screw and highest step of fast idle cam. Adjust dash pot until it just clears arm of throttle lever, tighten lock nut. With transmission in Direct Drive and brakes firmly applied speed engine up to about 1500 RPM and *immediately release throttle, noting engine* operation as throttle valves close. If engine stalls from too rapid closing of throttle valves, move dash pot forward until its action prevents engine stalling. If excessive time is required for throttle valves to reach closed position, move dash pot rearward. Tighten lock nut after each adjustment. If proper control cannot be obtained by adjustment, replace dash pot.

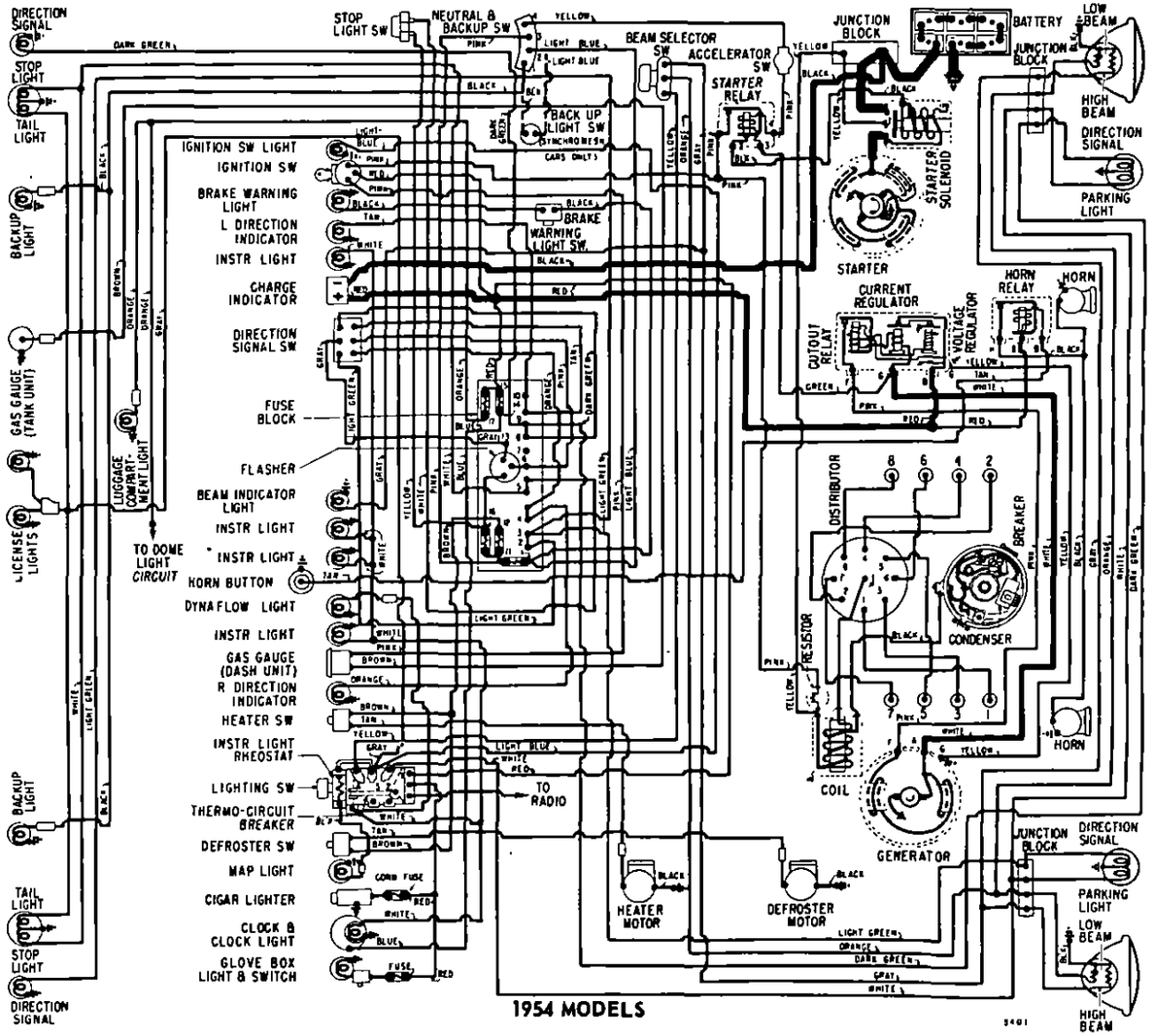
CARTER 2-BARREL WCD

Carter WCD 2081S (Early 1954), 2081SA (Late 1954), 2179S (Early 1955). *NOTE—See "Carter WGD Carburetor" below for Late 1955 Carburetor.*

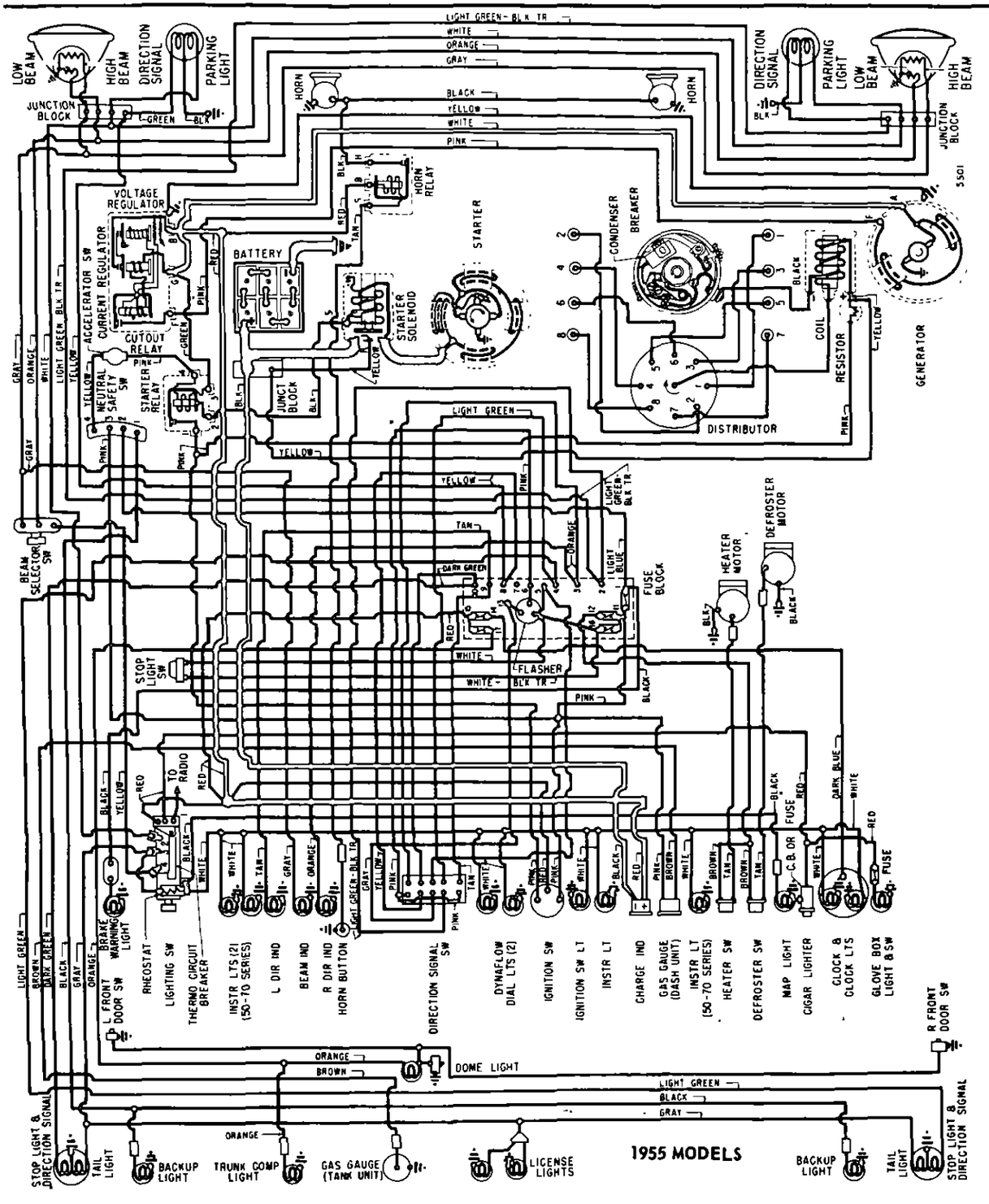
►*1954 METERING ROD PRODUCTION CHANGE FOR IMPROVED PERFORMANCE (Early 2081S Carburetors): Metering rods changed from No. 75-994 to 75-1107. See "Carter WCD Carburetor" in Carburetion Section.*

►*1954 COLD STUMBLE OR LOW SPEED BUCK ON SYNCHRO-MESH CARS (Cars with 2081S Carburetors):* Correct by changing Choke Cover & Coil Assembly and installing reducer bushing in choke warm air orifice hole in bowl cover. *See "Carter WCD Carburetor" in Carburetion Section. NOTE—Later 2081SA carburetors have these changes.*

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1954 MODELS



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▷*1955 SERIES 40 (SYNCHRO-MESH) CARS WARM-UP PERFORMANCE IMPROVEMENT & ROUGH IDLE CORRECTION: See "Carter WCD Carburetor" in Carburetion Section.*

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting—One turn (½-1½) open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—450 RPM (With selector lever in Neutral on Dynaflow Cars).

Float Level—15/64" (2081S, SA); 3/16" (2179S) from top of each float to gasket seat on cover with needle valve seated (invert float assembly to check). Use Gauge T109-240 (15/64"), T109-162 (3/16") installed directly under floats and adjust floats vertically to just clear horizontal portion of gauge and laterally so side of floats barely touch gauge uprights.

Accelerating Pump—Install pump connector link in outer hole of pump arm for long stroke.

Fast Idle: *CAUTION—Two different setting required:*

1) Loosen choke lever clampscrew on choke shaft. Insert Gauge T109-29 (.020") between lip of fast idle cam and boss on throttle body, hold choke valve closed and remove slack from linkage by pressing choke lever toward closed position, tighten choke lever clamp screw.

2) With choke valve tightly closed and fast idle screw on high step of cam, adjust fast idle screw as follows: If carburetor on bench, adjust for a throttle opening of .025" (Gauge T109-189), between edge of valve and wall on side opposite idle ports. If carburetor on engine, adjust idle speed to 1800 RPM.

Automatic Choke Setting: Centered (At Index).

Throttle Linkage Adjustment: *See "Carburetor" above.*

▷*OTHER DATA: See "Carter WCD Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

CARTER 2-BARREL WGD

Carter WGD 2292S (Late 1955 Cars). *NOTE—See "Carter WCD Carburetor" above for Early 1955 Carburetor.*

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting—¼-1¼ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—450 RPM (With selector lever in Neutral on Dynaflow Cars).

Float Level—¼" from top of float (center) to gasket seat on cover with needle valve seated (invert float assembly to check). Use Gauge T109-31 and adjust float so side is parallel to edge of casting.

Accelerating Pump—No seasonal adjustment.

Fast Idle: .015" (Gauge T109-44) clearance between lower edge of throttle valve and carburetor bore with adjusting screw on high step of fast idle cam.

Automatic Choke Setting: Centered (at Index).

Throttle Linkage Adjustment: See "Carburetor" above.

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►*OTHER DATA: See "Carter WGD Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

STROMBERG 2-BARREL AAVB-267

Stromberg AAVB, Code 7-96 (1954), 7-102 & 7-102A (Early 1955). *NOTE–See "Stromberg WW" below for Late 1955 Carburetors.*

►*MANIFOLD FUEL DISTRIBUTION:* Carburetor RIGHT barrel feeds Cyl. 1-4-6-7, LEFT barrel 2-3-5-8.

Idle Setting–1¼ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–450 RPM (With Selector Lever in Neutral).

Float Level–5/64 "above vertical guides on Gauge T-24971, or 1 7/16" from bowl cover gasket to top edge of float with assembly inverted.

Accelerating Pump–Pump rod in middle hole of throttle lever.

Fast Idle Setting: Close choke valve against a No. 51 drill (Code 7-96), No. 54 drill (Code 7-102 & 7-102A) placed between wall of air horn and center of upper edge of choke valve and hold valve firmly against drill. See that fast idle cam spring holds cam upward against end of fast idle rod. Close throttle until stop screw contacts fast idle cam. If screw does not clear edge of highest step on fast idle cam and bear against second step, adjust by bending fast idle rod at large curve.

Lever Clearance–Close choke valve against a No. 53 drill, adjust clearance between ear on locking lever and lug on loose lever on fast idle cam stud so that these levers just clear as throttle valve is opened. Adjustment is made by bending end of loose lever up or down as required.

Automatic Choke Setting: Centered (at index).

►*OTHER DATA: See "Stromberg AAVB Carburetor" in Carburetion Section.*

Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

STROMBERG WW

Stromberg WW, Code 7-104 (Late 1955). *NOTE–See Stromberg AAVB Carburetor" above for Early 1955 Carburetors.*

Idle Setting–1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–450 RPM (With selector lever in Neutral on Dynaflow Cars).

Automatic Choke Setting: Centered (at index).

Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Stromberg WW Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

STROMBERG 4-BARREL

Stromberg 4-AUV, Code 7-98 (1954). Four barrel downdraft type with automatic choke .

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 1-4-6-7. LEFT barrels 2-3-5-8.*

Idle Setting–1 1/8 turns open (two screws–primary side only). Set both screws alike. Turn screws out for richer mixture.

Idle Speed–450 RPM (With selector lever in Neutral).

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Stromberg 4A 4-Barrel Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

CARTER 4-BARREL WCFB

Carter WCFB 2082S (1954), 2197S (Early 1955), 2358S (Late 1955). Four barrel downdraft type with automatic choke.

►*1954 ACCELERATING PUMP LEATHER TURNING BACK (Causing improper acceleration performance and throttle resistance on Early Cars): See "Carter WCFB Carburetors" in Carburetor Section.*

►*1954 METERING ROD CHANGE: See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section.*

►*1955 CARBURETOR CHOKE PISTON CHANGE TO IMPROVE WARM-UP PERFORMANCE (First Cars): See "Carter WCFB 4-Barrel" in Carburetion Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting–½-1½ (1954) ¾-1¾ (1955) turns open (two screws–primary side only). Set both screws alike. Turn screws out for richer mixture.

Idle Speed–450 RPM (With selector lever in Neutral).

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetor" in Carburetion Section.*

Fuel Pump Pressure: *4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.*

ROCHESTER 4-BARREL 4GC

Rochester 4GC, No. 7006200 (1955). Four barrel downdraft type with automatic choke.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-4-6-7. LEFT barrel 2-3-5-8.*

Idle Setting–Adjust idle mixture needle valves for smooth idle and check for correct idle speed.

Idle Speed–450 RPM (With selector lever in Neutral).

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Rochester 4GC Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

CARB. EQUIPMENT

Fuel Pump: AC. **Replacement No. 9763** (Fuel & Vacuum). **Pressure**–4½-5½ lbs. at pump outlet, 4-5 lbs. at carburetor inlet.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: AC Electric type.

Dash Unit (1954)–AC No. 1518011 (Series 40, 60, 100); AC No. 1518877 (Series 50, 70).

Dash Unit (1955)–AC No. 1518212 (Series 40 & 60); AC No. 1518203 (Series 50 & 70).

Tank Unit (1954-55)–AC 1518138 (Series 40, 60, 100); AC No. 1518137 (Series 50 & 70).

See "Fuel Gauges" in Carburetion Section.

BATTERY

1954-Delco 3EM60W. *12 Volt,* 11 plate, 60 ampere hour capacity (20 hr. rate).

1955-Delco 3KM60. *12 Volt,* 9 plate, 60 ampere hour capacity (20 hr. rate).

Battery Ground–Negative (-) terminal.

Engine Ground–Between engine and cowl.

STARTER

Delco-Remy 1107621. *12 Volt.* **Armature**–1926626. **Drive**–Overrunning clutch (solenoid pinion shift). **Rotation**–Counter-clockwise at commutator end. **Brush Spring Tension**–30-40 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
11 ft. lbs.	Lock	5.2	460

Starting Switch: Delco-Remy Solenoid 1119760. *12 Volt.* Starter solenoid controlled by separate relay, Delco-Remy 1116876, and Accelerator Vacuum Switch (on carburetor). *See "Starter Controls" in Electrical Equipment Section.*

Accelerator Vacuum Switch: Carter 192-11U (Carter & Stromberg 2-Barrel), 192-21U (Carter 4-Barrel), Stromberg 386030 (Stromberg 4-Barrel) .

Accelerator Vacuum Switch Setting–*See data on each carburetor type in Carburetion Section.*

Dynaflow Neutral Safety & Back-Up Light Switch: (1954) Delco-Remy 1998025 at lower end of steering column. (1955) Delco-Remy 1998101, mounted on steering column jacket under cowl. Switches are connected in starter control circuit so that starter operative only when selector lever in "N" Neutral, or "P" Parking position.

Adjustment–*See "Buick Dynaflow Drive" in Transmission Section.*

►*NEUTRAL SAFETY & BACK-UP LIGHT SWITCH CONNECTION CAUTION: Wires must be connected in correct order as shown on wiring diagram.*

GENERATOR

Delco-Remy 1102008 (Without Air-Conditioning). 1102006 (With Air-Conditioning). *12 Volt.*

Generator No.	Armature No.
1102008 Ⓒ	1923535
1102006	1925210

Ⓒ–With pulley. Delco-Remy 1102005(without pulley).

Performance Data–Cold

Amperes	Volts	RPM
30 Ⓒ	14	2150

Ⓒ–Not maximum. See Regulator.

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Brush Spring Tension—24-32 ozs.

Field Current—1.48—1.62 amperes at 12 volts.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: ¾" belt deflection with normal thumb pressure midway between generator and fan pulleys.

REGULATOR

Delco-Remy 1118825. *NOTE—Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cutout Relay

Cuts In—12.8 volts (hot).

Contact Gap—.020".

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—14.5 volts (hot).

Air Gap—.075" with armature pressed down to point where contacts just opening.

Checking & Adjusting—*See Electrical Equip.Section.*

Current Regulator

Setting—30 amperes (hot).

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Direction Signal: *See Electrical Equip. Section.*

Lighting Switch Removal: Disconnect battery cable from junction block and disconnect wires from lighting switch. Pull switch knob out to last notch, then depress spring loaded latch button on switch body while pulling rod and knob assembly out of switch. Remove switch mounting nut with wrench J1589 and remove switch and escutcheon from instrument panel.

Stop Light Switch: (Location)—On brake pipe distributor fitting near master cylinder on left side at transmission support.

FUSES: Located on fuse panel under cowl unless otherwise specified.

Back-Up Light—9 amps.

Dome & Luggage Compartment Light—20 amps.

Electric Clock—2 amps.

Heater & Defroster—9 amps.

Parking Brake Warning Signal—9 amps.

Stop & Direction Signal Lamps—9 amps.

Cigar Lighter—Special Fuse (In back of lighter).

Glove Box Light—2 amps. (in wiring connector).

Air Conditioner Feed—20 amps. (In wiring connector near controls).

Air Conditioner Temp. Control—2 amps. (in wiring connector near controls).

Power Brake Vacuum Pump—14 amps. (in wiring connector near fuse block).

CIRCUIT BREAKER: 22 amps. Located in headlamp switch.

HORNS: Delco-Remy 1999755 (Low Note), 1999756 (High Note). *12 Volt.*

Horn Relay: Delco-Remy 1116781. *12 Volt.*

Contacts Close—2.75-4.0 volts.

Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►**1954 IMPROVED VALVE STEM LUBRICATION: Rocker Arm shaft diameter decreased on later engines. See "Valve System" in Buick Special Data.**

►**1955 ENGINE KNOCK ON STARTING CORRECTION: This noise may be present after starting an engine that has not been in operation for at least 30 minutes, and may last as long as 10 seconds. This noise is usually accompanied by a lack of oil pressure and disappears when pressure rises. It is recommended that bearing clearances be checked and undersize inserts be installed where clearance is found to exceed .0025". *Before proceeding with the above bearing check, make sure that the exhaust heat manifold control thermostat spring is not broken as this condition may cause the same noise as bearings.***

ENGINE SPECIFICATIONS: Own 90° V8 (All Series).

Series	Bore	Stroke	Displmnt.	Rated HP.
40	3.625"	3.2"	264 cu.ins	42.05
50, 60, 70	4.000"	3.2"	322 cu.ins.	51.2

Series	Compr.Ratio	Developed HP
1954 40 Synchro-mesh	7.2-1	143 at 4200 RPM
1954 40 Dynaflow	8.1-1	150 at 4200 RPM
1954 50 Synchro-mesh	8.0-1	177 at 4100 RPM
1954 50 Dynaflow	8.5-1	182 at 4100 RPM
1954 60 Synchro-mesh	8.0-1	195 at 4100 RPM
1954 60 & 60 Dynaflow	8.5-1	200 at 4100 RPM
1955 40 Synchro-mesh	7.5-1	
1955 40 Dynaflow	8.4-1	188 at 4800 RPM
1955 50 Synchro-mesh	8.4-1	
1955 50 Dynaflow	9.0-1	236 at 4600 RPM
1955 60 Synchro-mesh	8.4-1	
1955 60 & 70 Dynaflow	9.0-1	236 at 4600 RPM

Compression & Vacuum Reading—*See TUNE-UP.*

►*ENGINE IDENTIFICATION NOTE:* See Engine Number for suffix digit designating each series. Series 40 engine also has vertical groove 3/8" wide and 1/8" deep) cast in engine number pad approximately 1¼" to rear of pad centerline.

►*ENGINE COMPRESSION RATIO NOTE:* Same cylinder head used for all engines, different compression ratios secured by use of different pistons (Series 40), different head gaskets (50,60). *See Cylinder Head and Piston data below.*

►*ENGINE PARTS INTERCHANGEABILITY:* Parts are interchangeable on Series 50, 60, 70 engines and are also used in Series 40 engine with following exceptions: Cylinder Block, Pistons, Pins, Rings, Harmonic Balancer (Pulley used on Series 40), Camshaft, & Flywheel.

ENGINE MOUNTINGS: *See "Engine Mountings" in Buick Special Data.*

OIL PAN REMOVAL: Disconnect steering idler arm bracket from right frame side rail and lower steering linkage for clearance, then remove pan. *CAUTION*—Do not allow bracket to turn on idler arm (will change toe-in adjustment).

►*OIL PAN PRODUCTION CHANGE & REPLACEMENT PARTS NOTE:* Later type oil pans for production cars and for service replacement have 18 attaching bolt holes which replaces the early type pan having 24 attaching bolt holes. Both type pans are interchangeable

CYLINDER HEAD & GASKET: Cylinder Head No. 1391745 (1954) used on all 1954 engines. Cylinder Head No. 1391947 (1955) used on all 1955 engines. Different compression ratios secured by using special head gasket as listed below (except Series 40 where same gasket used with different pistons).

Series	Compr.Ratio	Cyl. Head Gasket No.
1954 40 (All)	7.2-1 & 8.1-1	1343484 (.015")
1954 50, 60	8.0-1	1343995 (.045")
1954 50, 60, 70	8.5-1	①1343484 (.015")
1955 40 (All)	7.5-1 & 8.4-1	1165307 (.015")
1955 50, 60	8.4-1	1391261 (.045")
1955 50,60,70	9.0-1	①1165307 (.015")

①—Low Compression (Export) No. 1343995 (.045").

Cylinder Head & Gasket Installation—*See "Cylinder Head & Manifold" in Buick Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Buick Special Data.*

PISTONS

Pistons—Aluminum alloy, dome head, cam ground, full skirt with transverse slots in oil ring groove, Anodized finish.

►*SERIES 40 PISTON CAUTION: Special HIGHER DOME pistons used in high compression (8.1-1 & 8.4-1) engines. Lower compression (7.2-1 & 7.5-1) pistons can be identified by letters "L.C." on top shoulder of piston on valve side.*

►*ORIGINAL CYLINDER BORE CAUTION:* Engines with ½" long dash following engine number have .010" Oversize Cylinder Bore and Pistons. Standard cylinder bore size (40) 3.6235-3.6265", (50, 60, 70) 3.9985-4.0015".

►*REPLACEMENT PISTON NOTE:* Pistons not changed by Piston Pin Production Change (See Piston Pins below for later Press-fit type) and same piston and pin fitting data applies to both types.

Removal—Pistons and rods removed from above.

►*CAUTION*—Mark pistons, rods, and bearing caps with cylinder number before removal to insure correct reinstallation. Use Rod Bolt Guides (short guide J-5239-1 on lower bolt, long guide J-5239-2 on upper bolt) to retain bearing shell and assist in pushing assemblies out.

Fitting New Pistons: Clearance .0007-.0017". If micrometer used on pistons, measure at top and bottom of skirt 90° from pin hole (top diameter very slightly

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less than bottom in service). Use .003" x ½" x 12" feeler gauge to fit pistons with cylinder block in normal position. Insert feeler on lower side of bore 90° from piston pin hole. Pull to withdraw feeler should be 7-13 lbs. at 70°F. (piston and bore clean and dry).

Replacement Pistons: Standard ("High Limit" or maximum diameter production size) and .005", .010", .020", .030" Oversize. *NOTE*—Pistons furnished only with fitted pins.

Installing Pistons: Assemble pistons on rods with valve depressions in head on same side as clamp bolt in rod. Install pistons with valve depressions toward camshaft. *See Rod Installation.*

PISTON PINS

►*1955 PISTON PIN PRODUCTION CHANGE & REPLACEMENT CAUTION:* Clamp-bolt Piston Pins (clamped in rod) used on 1954 & Early 1955 cars. Press-fit Piston Pins (pressed in rod) used on later 1955 Cars. *See "Piston Pins" in Buick Special Data for non-interchangeability cautions and special servicing data.*

Diameter—.940". **Length**—3.100" (40), 3.400" (others). **Clearance in Piston**—.0003-.0005" or easy finger push fit at 70°F. *NOTE*—Pin fit in piston is same for both early Clamp-bolt and later Press-fit pins.

Piston Pin Removal & Installation (Later Press-fit type Pins): *See "Piston Pins" in Buick Special Data. CAUTION—Pistons may be damaged if special procedure and tools not used.*

Replacement Pins: (Clamp-bolt Type) Std. & .003", .005" Oversize. **(Press-fit Type)** Std. size only. Fitted pins furnished with all pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr	.078"	.010-.020"	.002-.004"
Oil	.186"	015-.035"	.0035-.0095"

►*OIL RING NOTE:* Ring is three-piece (two rails and spacer) with expander. New rings are cemented assembly for ease in handling (will separate in service).

Replacement Rings: Production type rings furnished singly and in sets Standard & .010", .020", .030" Oversize. Special Service Ring sets furnished Standard (use up to .019" O.S.), & .020", .030" Oversize.

Installing Rings: Compression ring groove or bevel (on inner edge) upward. Oil ring expander gap ends should be at either end of piston pin (in unslotted portion of groove) and side rail gaps must be on valve depression side of piston (upward when installed in cylinder).

CONNECTING RODS

►*1955 CONNECTING ROD PRODUCTION CHANGE & REPLACEMENT CAUTION:* **Different rods used with 1954 and Early 1955 Clamp-bolt Piston Pin and Later 1955 Press-fit Piston Pin. Later type rods only will be furnished for service.** ***See "Piston Pins" in Buick Special Data for special pin removal and installation data.***

Length—6" **Weight**—22.16 ozs.
Crankpin Journal Diameter—2.249-2.250"
Out-of-round limit . 0015".

Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.

Clearance—.0002-.0023" (service limit .003").

Sidep lay—.004-.008" (total for both rods).

Replacement Bearings: Standard & .001", .002", .020", .021" Undersize. Size is stamped on back of bearing at or near tang.

Installing Rods: *See Installing Pistons above.* Install bearing cap with ridge on edge of cap on same side as conical boss on web of rod, install assemblies in engine with this ridge & boss toward other connecting rod on same crankpin and with rod clamp bolt toward camshaft (valve depressions in piston head must also be toward camshaft).

CRANKSHAFT

►*1955 WORN REAR MAIN BEARING THRUST SURFACE CORRECTION (caused by misalignment of rear main bearing cap):* **Align the thrust faces as follows: Assemble crankshaft and all main bearing caps leaving rear main bearing caps loose. Use a bar or wedge and force crankshaft as far to rear as possible (this will align front thrust faces since bearings and caps are free to move axially). Force crankshaft as far forward as possible and while holding crankshaft in the forward position, tighten rear main cap bolts to specified torque.**

►*CRANKSHAFT & FLYWHEEL UNBALANCE OR VIBRATION (After replacement of parts - Synchro-mesh & Dynaflow Cars): See "Engine Balancing" in Buick Special Data.*

Journal Diameter—2.498-2-499". Five bearings.
Out-of-round limit .0015".

Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.

BEARING NOTE—Bearing upper halves can be rotated out and in by using tool KMO-734 in oil hole.

Clearance—.0005-.003" (service limit .0036").

Replacement Bearings: Standard & .001", .002" Undersize. *NOTE*—First four bearings identical and interchangeable. Rear bearing longer and flanged.

End Thrust: Taken by rear (#5) flanged bearing.
Endplay—.004-.008".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Buick Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Buick Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Buick Special Data.*

CAMSHAFT

►*CAMSHAFT IDENTIFICATION NOTE & NON-INTERCHANGE CAUTION:* **Camshafts are identified by grooves in land just forward of No. 3 journal as follows: 1954-55 Series 40—1 groove. 1954-55 Series 50, 60 Synchro-mesh—No groove. 1954 Series 50, 60, 70 Dynaflow—No groove. 1955 Series 50, 60, 70 Dynaflow—2 grooves. Do NOT use Series 40 camshaft in other engines.**

Journal Diameters—(1) 1.685-1.686", (2) 1.655-1.656", (3) 1.625-1.626", (4) 1.595-1.596", (5) 1.565-1.566".

Bearings—Steel-backed, babbitt lined bushings.

Clearance—.0005-.0035" (service limit .0015-.004").

End Thrust: Spacer ring installed on shaft between front bearing journal and thrust plate bolted to crankcase *behind camshaft sprocket.* **Endplay**—.004-.008".

Timing Chain: Link Belt. **Width** .688", **Pitch** .500" **Length** 26" or 52 links.

Camshaft Setting: Mesh chain on sprockets with two copper-plated washers (12 links apart) in line with "O" marks on sprockets with marks toward left side of engine. Turn camshaft so that keyway is straight downward, turn crankshaft so that #1 and #4 pistons are on top dead center, install sprockets and chain as an assembly.

Engine Front Cover Removal: *See "Engine Front Cover" in Buick Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Buick Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

Valve	Head Diameter	Stem Diameter	Length
Intake	1.750"	.3720"	4.704"
Exhaust	1.375"	.3715"	4.704"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	①	.0025"
Exhaust	45°	②	.0030"

①—Series 40 - .358". Series 50, 60, 70 - .378".

②—Series 40 - .350". Series 50, 60 (Synchro-mesh) .350". Series 50, 60, 70 (Dynaflow) - .378".

Valve Seat Width—1/16" (3/64-5/64").

►*VALVE GRINDING CAUTION:* If height of valve stem end raised .075" by valve grinding, height must be reduced by grinding end of stem or replacing valve to insure correct operation of hydraulic lifter.

Valve Springs: Double springs used on all valves. Install springs with closed-coil end toward cylinder head.

Valve Spring Specifications

	Inner Spring		Outer Spring	
Valve	Lbs.Press.	Length	Lbs.Press.	Length
Closed	19.5-24.5	1.53"	37.5-42.5	1.5"
Open	53-59	1.15"	85-91	1.12"

Valve Guides: Drive old guides out from combustion chamber side using Driver J-269. Install new guides from top of head using Valve Guide Aligner J-5240-2 over guide hole and Installer J-5240-1 to drive guide down until installer shoulder contacts top of aligner which will position guide correctly in head. Finish ream guides with Valve Guide Reamer J-129-3.

Hydraulic Valve Lifters: Barrel type.
Diameter—.8425". **Clearance in Block**—.0015-.003".
Lifter Overhaul & Testing—*See "Valve System" in Buick Special Data.*

►*VALVE GRINDING CAUTION: See Valves (above).*

Rocker Arm Assembly: *See "Valve System" in Buick Special Data.*

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VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

1954-55 Series 40 ①
Intake Valves–Open 25° BTDC. Close 67° ALDC.
Exhaust Valves–Open 70° BLDC. Close 42° ATDC.

1954-55 Series 50, 60 (Synchro-mesh) ①
1954 Series 50, 60, 70 (Dynaflow) ①
Intake Valves–Open 25° BTDC. Close 77° ALDC.
Exhaust Valves–Open 70° BLDC. Close 42° ATDC.

1955 Series 50, 60, 70 (Dynaflow) ①
Intake Valve–Open 28° BTDC. Close 79° ALDC.
Exhaust Valves–Open 75° BLDC. Close 42° ATDC.
①–Timing points are with valve .004" off seat.

Valve Timing Check–Timing chain cover must be removed to check chain and sprocket marks. *See Camshaft Setting under CAMSHAFT above.*

OILING SYSTEM

Crankcase Capacity: 6 qts. (refill), 8 qts. (dry engine). NOTE– 1 qt. additional for dry filter.
Normal Oil Pressure: 35 lbs. at 35 MPH.
Pressure Regulator Valve: In oil pump body. Not adjustable.

Oil Pressure Indicator–(1954) AC No. 1508046 (Series 50 & 70). No. 1508115 (Series 40, 60, 100). **(1955)** AC No. 1508238 (Series 40, 60). No. 1508226 (Series 50, 70). Not electrical.

Oil Pump: Helical gear (early cars), spur gear (later cars), in crankcase at rear of engine.
Pump Overhaul–*See "Oiling System" in Buick Special Data.*

Oil Filter: Full-flow. On pad at right rear of engine. NOTE–Ball check valve in filter base by-passes oil directly to engine when pressure differential between inlet and outlet ports reaches 4½-5½ lbs.
Replacement Filter Element–AC No. PF-122.

Crankcase Ventilation: Filter element in oil filler cap (air intake) and in rear end of valve lifter cover (air outlet) to which ventilator pipe is connected.

COOLING

Water Capacity: (Synchro-mesh Cars) 16.5 qts (without heater), 18 qts. (with heater); **(Dynaflow Cars)** 18.5 qts. (without heater), 20 qts. (with heater).
Pressure Valve: AC No. 850549 (7 lb.–Without Air Conditioning). No. 850559 (13 lb.–With Air Conditioning). Radiator Filler Cap.

Thermostat: Pellet type in water manifold above pump. (Std.) Buick No. 1391226 opens at 157-162°F. (High Temp.) Buick No. 1391225 opens at 177-182°F.
Water Pump: Packless, sealed ball bearing type.
See "Buick V8" in Water Pump Section.

Pump Removal–Remove fan blade assembly, spacer, and pulley from pump shaft hub, then remove pump cover assembly and gasket from timing chain cover.

Temperature Gauge (1954): AC No. 1512808 (Series 40, 60, 100); No. 1512736 (Series 50, 70). Not electric. *See "Temperature Gauges" in Miscellaneous Section.*
Temperature Gauge (1955): AC No. 1512971 (Series 40, 60); No. 1512948 (Series 50, 70). Not electric. *See "Temperature Gauges" in Miscellaneous Section.*

CLUTCH

Own. (Series 40) "Crown" spring, (Series 50, 60) conventional springs.
See "Buick Crown Spring" & "Buick Single Plate" in Clutch Section.
Clutch Disc No.–1393704 (Series 40), 1391632 (Series 50, 60).
Pedal Adjustment–Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod at clutch fork.
Removal–Remove rear axle and transmission (See below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.
►*Series 40 Installation Note – Install release bearing with rounded surface to contact "Crown" spring.*

SYNCHRO-MESH TRANSMISSION

Own. Series 40 transmission differs in design and size with series 50, 60. *See "Buick 40" and "Buick 50" Synchro-mesh in Transmission Section.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect and remove rear axle assembly. On Series 40 only, place shift lever in neutral, and remove toggle spring and extension, shift lever and selector lever for increased clearance. All cars, remove thrust pad and shims from trans. support. Disconnect discharge and suction lines from compression on "Air-Conditioned" cars, to prevent damage to flexible adapters. *See "Frigidaire Air-Conditioning" in Miscellaneous Section before disconnecting lines.* Remove nuts securing transmission to support. Lift engine to raise transmission off of support. Remove support noting location and number of shims. Remove transmission to flywheel housings bolts, pull transmission back and lower to remove.

DYNAFLOW DRIVE

1954 Series–"Twin-Turbine" Dynaflow Drive. Torque converter and hydraulically operated planetary transmission. *See "Buick (Twin Turbine) Dynaflow" in Transmission Section.*

1955 Series–"Variable Pitch" Dynaflow Drive. Torque converter and hydraulically operated planetary transmission. A two position (high & low) stator is used in the torque converter to multiply engine output torque when required (controlled by accelerator pedal at wide open position). *See "Buick (Variable Pitch) Dynaflow" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Buick Twin Turbine Dynaflow" (1954); "Buick Variable Pitch Dynaflow" (1955) in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Buick Variable Pitch Dynaflow Drive" in Transmission Section.*

Throttle Linkage Adjustment and Dash Pot Setting on Dynaflow Drive Cars. *See "Tune-up".*
Lubrication–Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.
Checking Fluid Level–Engine must be idling with selector lever at "P" (parking) and transmission at normal operating temperature. Add oil to "Full" mark on dip stick only.
Capacity–10 quarts. (Add 1¾ pints for dry transmission). *Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type A.*

►*OTHER DYNAFLOW SERVICE DATA: See "Buick Twin Turbine Dynaflow" (1954); "Buick Variable Pitch Dynaflow" (1955) in Transmission Section.*

UNIVERSALS

Saginaw & Spicer. One used (in torque ball at rear of transmission).
Torque Ball Adjustment–*See Buick Special Data.*

REAR AXLE

Own Make: Semi-floating type with Hypoid gear and torque tube drive.
See "Buick Hypoid" in Rear Axle Section.

►*REAR AXLE HOUSING FILLER PLUG TIGHTENING CAUTION: Plug will break if tightened excessively. Correct torque is 20-30 ft. lbs.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Buick Hypoid" in Rear Axle Section.*

►*1955 SERIES 50, 60 & 70 REAR AXLE RATIO PRODUCTION CHANGE AND SERVICE REPLACEMENT NOTE:* A 3.36-1 ratio rear axle ring gear and pinion replaces the 3.4-1 ratio unit used in early cars. *See "Buick Hypoid" in Rear Axle Section.*

Model	Rear Axle Ratio Series	Synchro-mesh	Dynaflow
1954-55	40	3.9-1	3.6-1
1954, Early 1955	50 & 60	3.9-1	3.4-1
1954, Early 1955	70		3.4-1
Late 1955	50 & 60	3.9-1	3.36-1
Late 1955	70		3.36-1
1954	100		3.6-1

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Rear Axle Ratio Note—*Ratio is stamped on bottom of axle housing. Example 3/9 indicates a 3.9 to 1 ratio.* **Backlash**—.008-.010" *desired, .008-.012" maximum.*

Axle Shaft Removal: Axle shaft lock washer at inner end of axle. *See "Buick Hypoid" in Rear Axle Section for disassembly procedure.*

Rear Axle Assembly Removal: Raise rear end of car and place car on stands. Disconnect parking brake cable at rear brake sheave and at bracket on front end of torque tube, hydraulic brake line from pipe at X member and remove retainer. Disconnect lower end of shock absorber links, rear radius rod at axle end, lower end of chassis springs, and torque tube from torque ball. Hoist rear end of car and roll axle assembly out.

Wheel Bearing Adjustment—None

Rear Suspension: *See "Buick Rear Suspension" in Rear Axle Section.*

SHOCK ABSORBERS

Delco. Direct-acting hydraulic (front). Double acting "parallel cylinder" (rear). New independent front shocks mounted within coil springs.

Buick Shock Absorber Nos.

Model	Front	① Rear
40, 60 (Exc. 49, 69) Std.	5515818	5594488, 89
49, 69	5329769	5519694, 95
50, 70 Std.	5329769	5519694, 95
40, 60 (Exc. 49, 69) ②	5329769	5519694, 95
50, 70 ②	1076248	5511194, 93

①- Right and Left respectively.

②- Used with Export High & Overload Spring.

FRONT SUSPENSION

Independent. New design with Direct Acting Shock Absorbers. Independent upper control arm with Shock Absorbers within coil springs.

See "Buick" in Front Suspension Section.

►*FRONT STABILIZER BAR INTERFERENCE WITH RADIATOR OUTLET HOSE:* Install necessary spacer between bar and frame to provide a clearance of 3/16" between bar and hose. Longer bracket mounting bolts mounting bolts will be required for proper assembly.

►*ADJUSTMENT CAUTION: Check Spring height and position of Idler Arm before changing adjustments.*

King Pin Inclination—0° crosswise at 7/8° Camber.
Caster—1/4° Neg. desired. (1/2° Pos. to 3/4° Neg.).
Camber—3/8° Pos. desired. (7/8° Pos. to 5/8° Neg.) Both wheels to be within 3/4° of each other.

Toe-In: (1954) 0" to 1/16". **(1955)** 1/16" to 1/8". *1955 NOTE—This supersedes previous setting of 0"-1/16".*

Toe-out on Turns—Outer wheel 20°, inner wheel 22½° ± 3/4°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut type.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

►*1955 STEERING COLUMN RATTLE-CORRECTION (SHIFT CONTROL HOUSING): See "Buick Variable Pitch Dynaflow" in Transmission Section.*

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder. *See "Saginaw (GM) Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic (Single Anchor): Conventional two shoe with short molded lining front (Primary) and long molded lining rear (Secondary). Parking "Step-On" lever applies rear wheel service brakes.
See "Bendix Hydraulic (Without Eccentric)" in Brake Section.

►*BRAKE LINING REPLACEMENT CAUTION (POWER BRAKE MODELS):* Special front wheel primary linings are used which can be identified by BROWN edge.

NOTE—Rear wheel primary linings are same as used on cars without Power Brakes and have WHITE edge All secondary linings (with & without Power Brakes) have YELLOW edge

Drums—Diameter 12" Rebore limits. .060"
Wheel Cyl. Diameter—Front 1-1/8", Rear 1".
Replacement Lining & Shoes—Linings or shoes with linings come in Standard and .030" oversize, and differ between Regular and Power brakes, as well as between car Series.

Lining Width & Thickness

Model	Front	Rear
50,60,M/100	2.25" X 0.187"	2.25" X 0.187"
40	2.25" X 0.187"	1.75" X 0.187"
70	2.50" X 0.25"	2.25" X 0.187"

Braking Power—57% Front, 43% Rear.
Clearance—Heavy drag and back off 15 to 17 notches.

Standard Master Cylinder—On bracket on left side of frame near transmission support.

Checking Fluid—Access hole in front floor pan at left corner of drivers seat. (Move seat back and fold mat to expose hole cover). Fluid level should be ½-1" below top of filler opening.
Removal—Remove from beneath car. Not necessary to disturb other parts.

Power Brakes (1954): Kelsey-Hayes Vacuum Suspended type power brake cylinder (replaces conventional master cylinder). *See "Buick Power Unit" in Brake Section.*

Power Brakes (1955): Moraine Air Suspended type power brake unit (replaces conventional master cylinder). A separate vacuum reservoir is located under hood on left side. *See "Moraine Power Unit" in Brake Section.*

Checking Fluid—Maintain fluid level 1" below top of separate reservoir tank on left side under engine hood.

Removal of Power Unit—Remove cranking motor splash pan. Disconnect return spring, loosen lock nut on cylinder push rod, remove clevis pin at brake pedal, then unscrew push rod from cylinder push rod. Disconnect air inlet hose at air filter on brake cylinder and disconnect hoses from vacuum tee on opposite side of cylinder. Disconnect reservoir to hydraulic cylinder pipe and allow reservoir and pipe to drain. Disconnect distributor to cylinder pipe and allow to drain. Discard old fluid and cover pipe ends with tape. Remove nuts and lock washers attaching power cylinder to its support and remove cylinder from car.

Electric Vacuum Pump (1954): Moraine or Trico. Pump is connected in engine intake manifold vacuum line and supplements vacuum supply or provides vacuum when engine not running. *See "Buick Power Unit" in Brake Section.*

MISC. MECHANICAL

Windshield Wipers—Cable operated Vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning—Frigidaire type with solenoid controlled compressor clutch (compressor operates only with air-conditioning switch turned on. *See "Frigidaire Air-Conditioning" in Miscellaneous Section.*

Power Window Regulators: Two systems used:
Electric (1954-55)—Reversible motor in each window. *See "GM Electric Window Regulators" in Miscellaneous Section.*
Hydro-Lectric (1954)—Window raised hydraulically, lowered by return spring. Motor and pump assembly mounted on left side of firewall. *See "Hydro-Lectric Top Control (With Window & Seat Control)" in Miscellaneous Section.*

Power Seat Adjusters: Two systems used:
Electric (1954-55)—Individual motors for vertical and horizontal adjustment. *See "GM Electric Seat Regulators" in Miscellaneous Section.*
Hydro-Lectric (1954)—Hydraulic type with individual cylinders for vertical and horizontal adjustment. *See "Power Top Control (With Window & Seat Control)" in Miscellaneous Section.*

Power Top Control: Hydro-Lectric type. *See "Power Top Control" in Miscellaneous Section.*

HOOD ASSEMBLY

1946-47 MODELS

HOOD LOCK: Radiator ornament controls manual and automatic safety catch. To raise hood, tilt ornament back, lift up on forward edge of hood. CAUTION—Do not hold radiator ornament down when closing hood (will damage manual catch).

Hood Latch Bar Adjustment—Hood latch bar should be ¾" above lower edge of hood reinforcing panel (under hood nose) with radiator ornament down. This clearance can be obtained by lengthening or shortening radiator ornament link at turnbuckle. Latch bar catches on radiator shroud provided with elongated mounting holes and catches should be moved forward until hood fits snugly when closed.

1948-53 MODELS

HOOD LOCK (60S, 61, 62—1948, All Series—1949-53: Hood hinged at cowl with locking handle at lower left side of instrument panel. Safety catch under front edge of hood.

Lock Plate Adjustment—Loosen lock plate capscrews at radiator shroud, lower hood slowly to allow pilot to center lock plate, raise hood without disturbing position of plate, tighten capscrews. Check hood safety catch as directed below.

CAUTION—If lock plate tightened out of position, it is possible hood may be locked so that it cannot be opened.

Hood Lock Control Cable Adjustment—Raise hood, push hood lock handle on instrument panel in, loosen lock cable anchor block screw, adjust for 1/16" clearance between anchor block and lock plate action lever, tighten anchor block screw.

Hood Safety Lock Catch Adjustment—Raise hood, loosen 2 safety lock catch capscrews on radiator shroud, lower hood until safety latch engages catch, position catch for a minimum of ¼" engagement on latch, tighten capscrews.

1948 MODELS

HOOD LOCK (75, 76): Hood hinged at cowl with radiator ornament hood lock. Ornament controls both lock and safety catch.

Hood Ornament Adjustment—Close hood, set ornament on high point of cam (midway between locked and unlocked position), insert ¼" drill between goddess and top of ornament base just ahead of and touching ornament hook (setting correct when drill touches at these three points). To adjust, loosen lower jam nuts, shift striker pin to rear (if clearance excessive) or to front (if insufficient clearance), tighten jam nuts. Tension to unlock hood should be 25-30 lbs. (check with spring scale hooked under neck of goddess). Adjust by raising or lowering striker pin and roller (without disturbing fore-and-aft position).

1946-47 MODELS

HOOD REMOVAL: All Models except 75. To remove hood, raise hood and prop front end up. Disconnect hood prop at each side by taking out pivot pin in lower end of prop at fender alignment bracket. Mark hood hinge position on cowl (when re-assembled to these marks hood alignment will be retained). Remove three cap screws at each hinge and lift off hood assembly.

Model 75—To remove hood, raise hood, prop front end up. Remove counter-balancing springs at bottom using Tool J-1638, take out two shoulder cap screws from hood links to cowl bracket, lift off hood.

1948-49 MODELS

HOOD REMOVAL: Remove nut in strainer at hood center moulding. Take out two hood-to-hinge bolts at each hinge (if shims used at this point, replace same number when reassembling). Lift off hood panel.

Hood Alignment—Hood fit to cowl can be adjusted by adding or removing shims at hood-to-hinge bolts. Hood panel bolt holes are enlarged to permit fore-and-aft or side-to-side hood adjustments.

1950-55 MODELS

HOOD REMOVAL: Scribe location of hinge where it is attached to hood, to aid in repositioning hood on installation. Remove nut holding center of hood hinge reinforcement to hood panel center moulding. Remove three screws holding each side of hood hinge assembly to hood panel. Remove hood, being careful not to damage finish.

Hood Adjustment—Loosen hinge to cowl mounting screws, install a short ⅜" diameter pin in hole in hinge, and move hinge until pin will also enter hole in cowl. Rotate hinge assembly upward and rearward around pin as far as possible and tighten screws. Loosen three hinge to hood panel attaching screws at each side. Elongated holes at each side provide fore, aft, and side to side adjustment of hood. Loosen hinge reinforcement to hood center moulding attaching nut. Move hood forward or rearward until clearance between rear edge of hood panel and body cowl is equal on both sides. Position rubber bumpers in channel along top of cowl ledge so hood is level with body at the cowl. (NOTE—variable thickness rubber bumpers are available). Adjust hood rear guide to prevent binding when opening hood. Tighten hinge to cowl screws on both sides, and hinge reinforcement to center moulding nut. Loosen hinge to cowl screws on both sides, and with pins in locating holes, revolve hinge slightly to secure the tightness, while maintaining an even spacing between cowl and rear edge of hood. Tighten hinge to cowl screws. Adjust the rubber bumpers on each side of cowl above fenders to contact sides of hood when in closed position. Three notches in hood spring lower bracket provide additional adjustment of hood if necessary.

TIGHTENING SPECIFICATIONS

1946-47-48 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	70-75	840-900
Main Bearing Caps	140-150	1680-1800
Connecting Rod Bolts	60-65	720-780
Flywheel to Crankshaft	65-70	780-840
Engine Rear Supports	50-60	600-720
Intake & Exhaust Manifold	25-30	300-360
Crankshaft Counterweights	145-155	1620-1740
Clutch Cover Mounting Screws	20-25	240-300
Axle Shaft Hub Nuts	285-315	3420-3780
Hydra-Matic Drive Cars:		
Trans. to Bell Housing	80-90	960-1080
Bell Housing to Crankcase	45-50	540-600
Flywheel to Flywheel Cover	30-35	360-420
Flywheel to Crankshaft	70-75	840-900

1949-52 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	65-70	780-840
Main Bearing Caps	90-100	1080-1200
Connecting Rod Nuts	35-40	420-480
Flywheel to Crankshaft (H-M)	70-75	840-900
Flywheel to Crankshaft (S-M)	65-70	780-840
Manifolds to Head	25-30	300-360

1953-55 MODELS

	Ft. Lbs.
Cylinder Head	65-70
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan Screws	10-12
Oil Pan Nuts	15-18
Main Bearing Caps	90-100
Flywheel	80-85
Vibration Dampener	60-65
Con Rod Caps	40-45
Camshaft Sprocket	15-18
Water Pump Mounting	25-29
Oil Pump Mounting	25-30
Flywheel Housing (Upper)	45-50
Flywheel Housing (Lower)	25-30

ENGINE

1946-48 MODELS

ENGINE REMOVAL: Remove the engine assembly from car as follows: Jack up all four wheels and install a stand at each wheel, drain cooling system; disconnect battery cables, engine ground strap (at right front engine support), universal joints at each end of propeller shaft, and support engine at rear with a bar or jack. Loosen transmission and slide back into frame X-member and place support under front end of transmission. (NOTE—Hydra-Matic transmission must be removed from car—Refer to Transmission Section for the Hydra-Matic Drive article for removal data). Remove clutch release mechanism from clutch housing. Take off hood (see Hood Removal above). Disconnect and remove accessories from cowl and engine (heater hose, radio ground cables, windshield washer, etc.). Take off all water hoses, air cleaner, carburetor, carburetor control linkage, fan belt, generator and water pump belt, generator, fan, and distributor. Disconnect exhaust pipe at right manifold and gasoline line at fuel pump. Place board or piece of sheet metal over radiator core to prevent damage to core while hoisting engine out of car. Loop rope under crankshaft pulley, then up and around exhaust crossover manifold. Attach hoist to rope and tighten hoist to take slack out of rope, then disconnect front engine supports (one on each side). Engine can then be lifted out of chassis.

1948 Cars—Remove distributor on these cars to avoid hitting cowl when engine hoisted from chassis.

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1949-53 MODELS

ENGINE REMOVAL: Engine and transmission assembly can be removed as follows: Drain crankcase and cooling system. Remove hood by taking out nut on center moulding-to-strainer assembly and two panel-to-hinge bolts at each side (if shims used, replace same number when re-assembling to maintain alignment). Raise front of car and place on wheel stands at each front wheel. Disconnect battery cables. Remove starter (with solenoid). Take off Backup Light switch bracket from rear of transmission. Free clutch pedal to release yoke rod (cars with synchro-mesh trans.). Take out support bolts at transmission extension housing. Disconnect shift linkage at transmission, and propeller shaft at front universal. Disconnect exhaust pipe from rear end of right exhaust manifold. Remove generator, and fan blade and pulley. Remove radiator (see Radiator Removal). Remove carburetor and air cleaner. Disconnect ignition switch wire at coil, oil pressure gauge line at rear of block, and flexible fuel pump hose at pipe. Take off windshield washer bottle and bracket, disconnect heater hoses. Loop rope (or chain) around intake manifold. Attach rope to hoist and tighten hoist to take slack out of rope, then disconnect front engine supports (one each side). Engine and transmission can then be raised out of car.

1954-55 MODELS

ENGINE REMOVAL (WITH TRANSMISSION IN CAR): *(CAUTION—If car is equipped with Air Conditioning, see Air Conditioning Section for precautions to take when removing equipment or disconnecting refrigerant lines).* Proceed as follows:

1—Drain cooling system, crankcase and transmission. Remove hood top panel (see Hood Removal above). Disconnect battery, and wires from generator. Remove upper and lower radiator hoses and remove radiator core.

2—Disconnect power steering pump to valve body hoses at pump and install caps on fittings to prevent oil leakage. Disconnect refrigerant lines (See Air Conditioning Section). Disconnect all heater hoses at water pump and remove right heater hose from thermostatic valve

3—If car is equipped with power brakes, disconnect vacuum line at intake manifold. Remove carburetor air cleaner, disconnect throttle linkage and fittings and remove carburetor. Disconnect flexible fuel line at fuel pump and remove line from clips. Disconnect ground straps, primary wire at distributor, oil pressure and cooling system temperature switch wires. Disconnect wires at porcelain resistor.

4—Disconnect windshield wiper vacuum hoses at manifold line and vacuum pump line. Raise front of car and install stands.

5—Disconnect propeller shaft at rear axle and remove assembly from car by sliding yoke out of transmission extension housing. Remove transmission linkage slush deflector, and disconnect speedometer cable and shift linkage at transmission. Remove starter from car.

6—Disconnect front engine supports at frame. Disconnect exhaust pipes from exhaust manifold. Remove idler arm support screws from frame and lower idler arm and steering connector link. Loosen hand brake cable at relay Remove stands from front of car and lower car to floor.

7—Install a chain or rope around intake manifold and attach chain hoist above engine. Take up all slack and then remove rear engine support bracket from frame and extension housing. Lift engine, with transmission, out of car.

1949-55 MODELS

OIL PAN REMOVAL: Remove oil level indicator, exhaust cross-under pipe nuts, pipe, gaskets, and manifold heat control valve. Take off starter and lay on frame side rail. Remove two oil pan nuts and eighteen screws, take off oil pan.

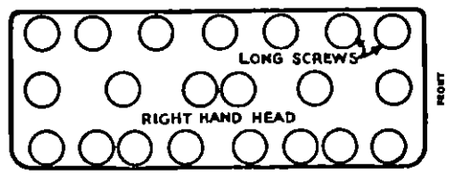
Oil Pan Installation: Cement new pan gaskets to pan, install new cork seals in rear main bearing cap and engine front cover with ends of seals seated in grooves. Coat each end of pan gaskets with chassis grease so that ends will slip over front and rear seals. Position pan over two studs on left side of crankcase, then raise right side and insert two pan screws opposite the two studs, put on washers and nuts on two studs. Tighten remaining screws, tightening two screws and nuts originally installed last.

CYLINDER HEAD & MANIFOLD

1946-48 MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews tighten in sequence from the center of the head outwards. Cast Iron heads should be tightened cold and rechecked after the engine has been run and thoroughly warmed up. CAUTION—Two capscrews at water outlet connection are ½" longer and must not be used at any other location (will break through water jacket and damage block). These two capscrews may be identified by larger heads.

Tightening Torque—See Tightening (Torque Wrench) Specifications below.



CADILLAC 1946-48 CYLINDER HEAD

1949-55 MODELS

CYLINDER HEAD INSTALLATION: Use a Torque Wrench and tighten cylinder head capscrews starting from the center row of bolts and working outward and toward each end.

►*CYLINDER HEAD TIGHTENING CAUTION—Loosen intake manifold before checking the cylinder head capscrew torque. This will prevent the upper row of screws from being under-torqued due to the bridging effect of the manifold.*

Cylinder Head Gasket. Install with side stamped "Top" UP

Cylinder Head Capscrews. 8 short screws in outside row, 5 medium length screws in center row, 4 long screws at rocker arm shaft.

Tightening Torque. See Tightening (Torque Wrench) Specifications.

ORIGINAL BORE & PISTONS

ALL MODELS

ORIGINAL PRODUCTION ENGINE BORE & PISTON SIZES: Piston and cylinder size variation indicated by letter ("A" through "M") stamped on top of block at outer edge of cylinder bore. Each letter indicates two sizes ("—" if letter to left of bore, "+" if to right of bore center). These letters used in production for selective fitting of pistons.

►*1951-55 OVERSIZE BORE NOTE:* An asterisk, placed before the engine unit number, indicates that cylinders bored .010" Oversize. Cylinder size variation is stamped to right and left of cylinder bore with a double letter "AA," "BB," etc., as indicated for standard size bore above.

PISTONS

ALL MODELS

REPLACEMENT PISTONS (WITH FITTED PIN): Furnished in Standard size, .010", .020", .030" Oversizes.

ALL MODELS

FITTING NEW PISTONS: Pistons should be fitted by Micrometer Gauge Method or Feeler Gauge Method as described below. Measure piston for clearance ⅛" below horizontal slot of "T" slot.

Piston Skirt Clearances

Engine	Skirt Clearance
1946-48	.0023-.0025"
1949	.0020-.0022"
1950-51	.0013-.0017"
1952-54	.0015"
1955	.0009"

Micrometer Gauge Method:—Measure cylinder bore with micrometer gauge at point 1¼" below top edge and at right angles to crankshaft. Set inside micrometer at cylinder bore size, **then measure this gauge length with same outside micrometer used to measure piston.** This method will eliminate any error introduced by using different gauges to measure cylinder and piston. Use outside micrometer to measure piston diameter at upper corner of 'T' slot (adjacent to 'T' slot and ⅛" below horizontal slot).

►*TEMPERATURE VARIATION NOTE:* Skirt clearance shown above is for block and piston at 70°F. Subtract .0001" (or add 2/5 Lb. pull on feeler gauge) for each 6° increase in piston temperature above 70°F. Add .0001" clearance (or subtract 2/5 Lb. pull) for each 6° decrease in piston temperature below 70°F.

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Feeler Gauge Method:—Use ½" feeler stock .002", .0025", or .003" thick (see Feeler Gauge Note and table below) on side of piston directly over 'T' slot (center feeler on slot) with lower rounded end of feeler extending ½" down on piston skirt past horizontal slot (feeler must not extend further down on piston skirt because skirt is tapered with greater diameter at bottom). Install piston and feeler in cylinder with piston right side up and feeler toward side, measure pull required to withdraw feeler. Pull will vary in accordance with thickness of feeler gauge used and with piston temperature. See table below for correct pull for each feeler gauge thickness to obtain proper skirt clearance listed above.

Feeler Pull	Piston Clearance (70°F.)		
(In lbs.)	.002" Feeler	.0025" Feeler	.003" Feeler
1	.00225"	.00275"	.00326"
2	.002"	.00252"	.00304"
3	.00175"	.00228"	.0028"
4	.0015"	.00205"	.00258"
5	.00125"	.00182"	.00235"
6	.001"	.00157"	.00213"
7	.00075"	.00133"	.0019"

Feeler Gauge Note—Feeler gauges used for piston clearance measurement should be clean and smooth with lower end rounded. Rusted or wrinkled feelers should be discarded and rough edges should be honed to prevent scratching cylinder wall.

PISTON PINS

1946-49 MODELS

PISTON PIN FITTING: Piston pin holes in piston have bearingized finish and if oversize pins are installed, hole should be reamed to proper size as follows: Use Piston Pin Hone KMO-332 (1946-48), KMO-754 (1949). Mount hone in vise and revolve piston on hone slowly by hand *(CAUTION—Do not use electric drill to drive hone)*. Use very fine abrasive (Grit No. 240A), washing abrasive out frequently with gasoline or kerosene. *(CAUTION—Always wash piston thoroughly before inserting pin to gauge for size)*. Pins should be free hand press fit in each piston boss with no perceptible play at 70°F. (clearance .00005"-.0001").

1950-55 MODELS

PISTON PIN FITTING: *(NOTE—Special tool J-3848 is required to fit pins to connecting rods)*. See following for Removal and Installation:

Removal—Install pilot of tool J-3848 on puller screw and insert this assembly through piston and pin from side of piston stamped "REAR." Install support (part of tool J-3848) over puller screw with small end of support against front side of piston (side opposite to that stamped "REAR"). Install nut loosely on puller screw and place assembly in arbor press with support positioned over slot in press table to allow screw to extend down. Press piston pin out of piston and rod assembly. Remove tool from piston and rod

Installation—Lubricate pin holes and install pilot (part of tool J-3848) through piston and rod, lubricate pin and insert it in piston pin hole on "REAR" side of piston. Install puller screw through pin and pilot from "REAR" side of piston. Insert spacer (part of tool J-3848) between connecting rod and front side of piston until it is seated on the pilot. Install support over puller screw with smaller end toward front of piston (opposite to side stamped "REAR"). Mount piston and tool assembly in vise with side of piston stamped "REAR" down and flats of puller screw gripped in vise Install nut on threaded end of puller and tighten with torque wrench to start piston pin into connecting rod. *(CAUTION*—If pin can be started into rod with less than 15 ft.lbs. minimum torque, the clearance between piston pin and rod is excessive and either the piston and pin assembly or connecting rod must be replaced). Remove assembly from vise and install in arbor press with large side of support down. Install collar (part of tool J-3848) over piston pin and press puller screw down until top of pin is level with top of collar. *REMOVE COLLAR and SPACER*. Pin will be projecting slightly from rod, and must be guided into pin boss next to support to assure correct alignment When aligned, press pin in until pilot bottoms in support This properly positions pin in rod.

PISTON RINGS

ALL MODELS

REPLACEMENT PISTON RINGS: Rings are furnished separately and in complete sets as follows: Standard size, .010", .020", .030" Oversize.

CRANKSHAFT & MAIN BEARINGS

1946-48 MODELS

CRANKSHAFT REMOVAL (Engine in Car): Raise car and support it securely on stand at each wheel, support engine at rear on jack or cross bar. Remove driveshaft, disconnect transmission and slide it back into frame X-member *(CAUTION*—Hydra-Matic Transmission must be completely removed from car). Disconnect clutch release mechanism, remove flywheel housing lower pan, remove clutch and flywheel. Drain oil and remove oil pan, oil pump, and pan baffle. Free steering idler arm from right frame side bar and lower steering linkage to the floor. Disconnect fan, water pump, and generator belts. Remove fuel pump, fan, crankshaft pulleys, timing chain cover, camshaft sprocket and timing chain. Disconnect all connecting rods and push piston and rod assemblies up in cylinders. Remove front and rear main bearing caps, support crankshaft while removing center bearing cap, lower crankshaft from engine.

1949-55 MODELS

CRANKSHAFT REMOVAL (Engine in Car): Jack up all four wheels and install a stand at each wheel. Drain crankcase and cooling system. Remove oil pan (see Oil Pan Removal), oil pump (see Oil Pump Removal), timing chain (see Timing Chain Removal), and flywheel (see Flywheel Removal). Take off steering idler at right frame side bar and lower linkage to floor. Remove spark plugs. Take off rod caps and push rod and piston assemblies up into bores to clear shaft. Remove front and rear main bearing caps, support shaft at front and rear and remove three remaining caps, lower shaft out

1946-55 MODELS

MAIN BEARING REMOVAL: Upper bearing halves can be rotated out with flattened cotter pin inserted in oil hole in crankshaft and turning shaft clockwise. Crankshaft does not have to be taken out. Installation—Reverse removal instructions given above. *CAUTION*—Do not interchange caps. Install caps with marking numbers (not casting nos.) on left side and in order from front-to-rear of engine.

1946-48 MODELS

REAR MAIN BEARING OIL SEAL INSTALLATION: Remove crankshaft and rear main bearing shells (to avoid damage), clean all old packing out of groove in crankshaft and bearing cap, use tool J-1177 to install new packing as follows: Install length of new packing in groove in crankcase, drive packing up into place with tool J-1177 by pounding on tool handle with hammer, hold tool in position and cut off each end of packing flush with bearing edge. Install packing in bearing cup in same manner. When installing rear main bearing cap in engine, install new cork plugs in grooves on each side of bearing cap to prevent oil leaks at this point. Plugs should be well greased to facilitate installation.

1949-55 MODELS

REAR MAIN BEARING OIL SEAL: Wiper seal installed in rear groove in bearing cap and block (oil slinger operates in front groove).

Oil Seal Installation—With crankshaft out of engine (see Crankshaft Removal), and bearing cap off, install length of new packing in groove in block. Use Tool J-3048 and drive seal in place. With tool in place, cut ends of packing flush at each end. Repeat operation for bearing cap.

FLYWHEEL

1949-55 MODELS

FLYWHEEL REMOVAL: Jack up car 8" off floor, install stand at each wheel. Remove Hydra-Matic Transmission (see Cadillac Hydra-Matic Drive in Transmission Section), or transmission, clutch, and flywheel housing lower cover on cars so equipped (see Transmission and Clutch Removal on car page). Remove flywheel-to-crankshaft bolts, flywheel, and gasket.

Crankshaft Pilot Bearing and Retainer—If replacement required, Tool No. J-164 can be used for removal, and Tool J-2985 for installation. Flywheel should be attached to crankshaft for this operation.

Flywheel Installation: Reverse removal instructions given above. Use new gasket on crankshaft and dip flywheel mounting bolts in sealer before installing.

CAMSHAFT & BEARINGS

1946-48 MODELS

CAMSHAFT: Removal—Remove engine front dust pan, fan, generator, carburetor and manifolds, distributor, fuel pump, valve lifter assemblies, radiator core, crankshaft pulley, and timing chain cover. Remove timing chain and sprockets as an assembly. Remove camshaft retaining plate, pull camshaft forward into radiator grille until rear end clears front end of engine, then lift camshaft out.

▷*CAUTION*—Camshaft is cast iron and must be handled carefully to prevent damage. DO NOT pry shaft out of engine and use extreme care not to drop or spring shaft.

Camshaft Alignment Check: Check camshaft for proper alignment whenever it is removed from the engine. *See "Camshaft Alignment Check" below.*

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Camshaft Bushing Removal & Installation: Remove bronze distributor idler gear (meshs with gear on rear end of camshaft). Use Bearing Remover & Replacer Tool J-2250 to pull old bushings out. Install new bushings with same tool *(CAUTION—* make certain that oil holes in bushings line up with oil holes in block). If necessary use tool arbors and brass hammer to move bearings forward or backward slightly for alignment. Install bronze distributor idler gear.

Camshaft Installation: Re-install camshaft by reversing removal procedure as given above.

►***CAUTION—Camshaft thrust plate must be installed with widest space to left of camshaft (to the right when viewed facing front of engine).***

1949-55 MODELS

CAMSHAFT REMOVAL: Remove radiator (see Radiator Removal), radiator shroud support, timing chain (see Timing Chain Removal), valve lifters (see Valve Lifter Removal), distributor (see Ignition on car page), lift out distributor drive gear. Slide camshaft forward carefully until it is clear of the engine and lift out.

►*CAUTION*—Camshaft is cast iron and must be handled carefully to prevent damage. DO NOT pry shaft out of engine and use extreme care not to drop or spring shaft.

Camshaft Alignment Check: Check camshaft for proper alignment whenever it is removed from the engine. *See "Camshaft Alignment Check" below.*

Camshaft Bushing Removal & Installation: Use Bearing Remover & Installer Tool J-3063 to pull old bushings out. Install new bushings with same tool and see that oil holes in bushing line up with oil holes in block (check oil leads with piece of wire after tool removed).

Camshaft Installation: Re-install camshaft by reversing removal procedure as given above. Install distributor drive gear as follows:

►**Distributor Drive Gear Installation**—Turn crankshaft so that #1 piston on top dead center entering power stroke (mark "C" on dampener in line with pointer on timing case cover). Turn oil pump drive shaft until flat is on right side and parallel with center-line of engine. Install distributor drive gear over oil pump shaft with flat on gear engaging flat on shaft, lower gear until it is fully meshed with camshaft gear. NOTE—With gear installed, slot in top of gear should point about 15° to right of engine center-line. Gear must seat freely and should have slight amount of backlash with camshaft gear.

►***CAUTION—Distributor drive gear must be installed exactly as above or it will not be possible to time engine correctly.***

1946-55 MODELS

CAMSHAFT ALIGNMENT CHECK: Put shaft on surface plate and support at front and rear bearing journals on "V" blocks, or on centers. Mount dial indicator on surface plate over centerline of camshaft with pointer touching shaft. Check heel of each cam through 180° rotation with dial set at zero. Replace camshaft if dial reading greater than .0015".

TIMING CHAIN

1946-48 MODELS

TIMING CHAIN REMOVAL: Remove timing chain as a unit with the sprockets (after removing nut and fuel pump drive eccentric from camshaft).

Timing Chain Installation: Mesh sprockets in chain with marks on sprockets adjacent and in line with a straightedge across the shaft centers, install complete assembly on engine.

1949-55 MODELS

TIMING CHAIN REMOVAL: Set engine in firing position for No. 6 cylinder. Remove water pump (see Cooling on car page), oil pan (see Oil Pan Removal), crankshaft pulley and engine front cover. Take out the two camshaft sprocket screws and lockwashers. Remove sprocket with chain from camshaft, remove crankshaft sprocket.

Timing Chain Installation: Reverse removal instructions given above. Timing marks on sprocket must be together and aligned with straightedge across shaft centers.

VALVE SYSTEM

1946-48 MODELS

VALVE SERVICING: Valve Removal & Installation. Valve lifter assemblies must be removed before valves can be taken out. Use Valve Lifter Tool J-257-X to compress springs for removal and installation of valve spring retainers and locks. Check valves for correct length (before installing lifters) with Tool J-1055, measuring distance from end of valve stem to heel of cam (cam lobe turned 180° away from valve). If valve stem too long, grind off end of stem so that gauge will slide into place with valve seated. If tool not available, check clearance between end of valve stem and valve lifter plunger with plunger pressed down in lifter cylinder (lifter must be drained of oil for this check). Clearance should be .030-.070".

1949-55 MODELS

►***STICKING VALVES 1949-50 ENGINES: In engines*** where a build-up of carbon on the exhaust valve stems causes a sticking condition, remove the counterbored section of the valve guide. The removal of the counterbored section can be done with the guides in the head by using a 19/32" drill, ground almost flat, and carefully drilling out the guide to the TOP of the chamfer. *(CAUTION—*Extreme care must be exercised so that the chamfer is not removed, as any sharp edges or a reduced valve bearing surface in the guide will cause more damage than the carbon deposits).

►***NOTE—***If a modified valve guide is removed for any reason, it is important that a ferrule of equal length to the discarded guide counterbored section be added to the small diameter of special tool J-3066 so that correct guide to valve seat relationship will be maintained.

VALVE REMOVAL: With cylinder head removed, take out spark plugs. Install head upside down on Cylinder Head Holding Stand J-3064. Install Holding Strap J-3046-6 over heads of valves. Turn head right side up, compress valve springs with compressor bar and stirrup of Head Holding Tool, remove valve keepers. Release bar and remove valve spring retainer, also rubber seal from lower groove on valve stem. Turn head over, remove Holding Strap, take out valves. *CAUTION*—Note location of each valve, must be re-installed in same location.

Installation: Reverse removal procedure. *NOTE—Install long skirted valve spring retainers on intake valves.*

VALVE STEM SEALS

1949-55 M DELS

VALVE STEM OIL SEALS: Seals are installed in lower groove (nearest valve head) ahead of valve keepers. Check for proper sealing after keepers installed by striking end of valve stems to seat keepers, then using suction cup (similar to type used for grinding valves), compress cup on valve spring retainer. If cup will not stick, seal is broken and a new seal should be installed.

ROCKER ARMS

1949-55 MODELS

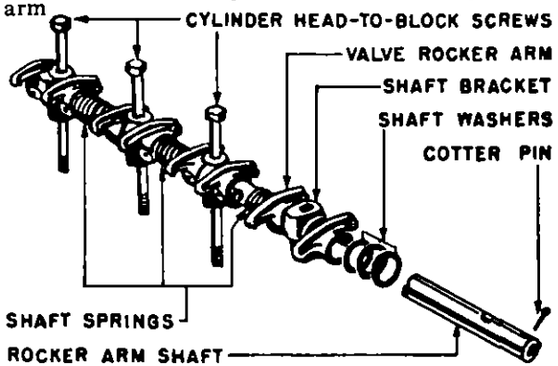
ROCKER ARM ASSEMBLIES: Drain radiator, remove radiator hoses, six radiator-to-air-deflector screws, and radiator anchor nut and spacers at frame bracket (check number of spacers and reinstall same number when radiator replaced). Lift out radiator.

Disassembly & Reassembly: See illustration for correct order of parts. Parts can be removed from shaft by removing cotter pin at end.

Installation: When installing rocker arm assemblies on cylinder head note the following precautions:

Rocker Arm Shafts—Locating notch on front end of shaft must point inward and down.

Rocker Shaft Brackets—Front and rear rocker shaft brackets have screw hole for rocker arm cover screws. These screw holes must be upward and toward outside of engine from rocker shaft center arm



CADILLAC 1949-55 ROCKER ARM ASSY.

HYDRAULIC LIFTERS

1946-48 MODELS

VALVE LIFTERS: Hydraulic. *(NOTE—2 Types of Valve Lifters used; "Body & Plunger" type 1946 to Early 1948, "Unit" type Late 1948. Lifters must be replaced with the same type that were removed).* Valve lifters are mounted on engine block in a valve lifter bracket (4 lifters in each bracket). Oil is supplied to lifters through bracket assembly by tubing from

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main oil header. Valve lifters and bracket assemblies must be removed before valve can be taken out of engine.

Removal: Drain cooling system and disconnect upper radiator hoses. Remove carburetor air cleaner and generator, defroster blower motor, cylinder heads, intake manifold, carburetor, and exhaust manifold. Remove valve covers, and remove oil lines to valve lifter bracket assemblies.

Disassembly ("Body & Plunger" Type): Remove lock ring from top of lifter body and slide valve lifter complete out of bottom of lifter bracket. Remove cylinder and plunger from lifter body. Remove plunger from cylinder by twisting plunger counterclockwise to release spring on plunger *(CAUTION —Cylinder and plunger are matched parts and must remain in sets).* Wash lifter parts in clean kerosene. Do not use gasoline or other fast drying agents.

Reassembly ("Body & Plunger" Type): Insert plunger in cylinder and lock plunger spring in cylinder body by twisting plunger clockwise. Insert lifter body in lifter bracket and install lock ring holding lifter in bracket. Fill lifter body with clean engine oil and insert plunger and cylinder assembly.

Disassembly ("Unit" Type): Remove lock ring from top of valve lifter body and slide lifter completely out of bracket. Press down on plunger cap and remove lock ring holding cap in lifter body. Turn lifter upside down and slide out plunger cap, plunger ball, ball retainer and spring. (CAUTION—Plunger is matched with lifter body and the two must remain in sets.)

Reassembly ("Unit" Type): Place ball on its seat in lower end of plunger while holding plunger upside down. Position ball retainer and spring (ends are interchangeable) over ball on lower end of plunger. Lower lifter body over plunger, ball retainer and spring assembly. Turn assembly right side up and fill plunger with oil. Jiggle ball using a small piece of wire until oil drains out of plunger into body and trapped air is released from body. Refill plunger with oil. Place plunger cap on plunger and lock in place with lock ring using Lock Wire Installer Tool J-2730. (NOTE—Do not depress plunger cap further than recess for ring before installing in engine because this will force oil out). Place lifter assembly in lifter bracket and lock in place with lock ring.

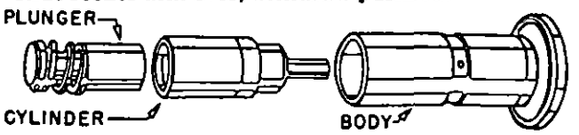
1949-55 MODELS

VALVE LIFTERS: Hydraulic, Barrel Type. Consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet or body (See illustration). Oil is introduced to this unit from main oil gallery through hole in side of lifter plunger and body.

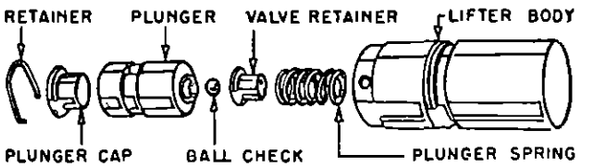
Removal: Remove rocker arm covers (hang on cowl), intake manifold, three valve compartment cover screws. Loosen crankcase ventilator pipe screw at flywheel housing, move pipe to permit removal of valve cover. Remove rocker arm assemblies and push rods. Take out lifters (use Tool J-3049), turn lifter while removing to remove any carbon or varnish deposit from lifter base.

***CAUTION*—Keep lifters in order—must be re-assembled in same holes.**

Partial Removal Note—If one or two lifters only to be removed, rocker arm assembly need not be removed, proceed as follows: Compress valve spring, slide rocker arm over, withdraw pushrod.



CADILLAC 1946-48 VALVE LIFTER



CADILLAC 1949-55 VALVE LIFTER

Disassembly: Press down on center of valve lifter push rod cup, and with a pointed tool, remove lockwire from groove. Invert lifter and slide out push rod cup, plunger, ball retainer and spring. *NOTE*—If plunger is stuck in body, place lifter push rod end down, in Valve Lifter Plunger Remover Tool J-4160. Holding tool firmly in hand with thumb over lifter body, strike tool sharply on block of wood until plunger falls out of body.

Cleaning & Inspection: Wash all parts in a suitable carbon solvent and remove all trace of carbon and varnish. Inspect plunger and lifter body for scoring or other damage that would prevent free movement. Inspect lower end of lifter body for nicks or indentations. If any exist, replace complete lifter assembly. Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement. Plunger should drop of own weight into body bore.

Reassembly: Place ball on its seat in lower end of plunger while holding plunger upside down. Position ball retainer and spring over ball and end of plunger. Lower lifter body over plunger assembly then turn assembly right side up and fill plunger with clean oil. Jiggle ball with small piece of wire until oil drains into body and trapped air is released from body. Refill plunger with oil, place push rod cup on plunger, and position lock wire over cup. Press lock wire into groove with Lock Wire Installer Tool J-2730.

Testing (Leak Down Rate)—Remove distributor cap, coil and rocker arm covers as an assembly. Set timing mark "C" on harmonic balancer to the pointer and observe position of distributor rotor. Check each lifter as outlined in following table, using Valve Lifter Leakdown Tool J-3074:

With rotor at No. 1 firing position (pointing toward rear of engine), check:

No. 1 Intake	No. 3 Exhaust	No. 6 Exhaust
No. 1 Exhaust	No. 4 Exhaust	No. 7 Intake
No. 2 Intake	No. 5 Intake	No. 8 Intake
No. 2 Exhaust	No. 6 Intake	No. 8 Exhaust

With rotor at No. 6 firing position (pointing toward front of engine) check:

No. 3 Intake	No. 5 Exhaust
No. 4 Intake	No. 7 Exhaust

Insert feeler gauge of tool between valve stem and rocker arm, at the same time compressing the tool "pop-out" spring against valve spring *(NOTE*—Tool should be installed as quickly as possible to avoid any unnecessary leakdown of lifter). Note the interval of time during which the tool is held in place by valve spring pressure. It will be found through this test that bad lifters or lifter will have the shortest leakdown time.

OILING SYSTEM

▷*1954-55 AIR IN OILING SYSTEM (Causing oil foaming or noisy Hydraulic Lifter operation): See Oil Pump Reassembly below for sealing of pump intake float tube and Oil Pump Installation for correct positioning of oil pan baffle.*

OIL PUMP

1946-48 MODELS

OIL PUMP REMOVAL: Drain oil and remove oil pan, remove baffle. Remove nuts on two studs retaining oil pump on rear main bearing cap, remove oil pump and float and screen assembly as a unit.

Disassembly: Remove float and screen assembly, take out cotter pin and remove pressure regulator parts. Remove pump lower cover and remove pump gears and shaft.

Oil Pump Specifications: Pump body and drive shaft clearance—.0010-.0025" (new), .005" (worn limit). Pump body and pump gear clearance—.002-.004" (new), .006" (worn limit). Pump gear endplay —.001-.004" (new), .006" (worn limit). Pump drive gear backlash—.008-.012" maximum.

Oil Pressure Regulator Specifications—Clearance between valve plunger and housing—.0020-.0035" (new), .005" (worn limit). Regulator spring pressure—5¾-6¼ lbs. at 1 13/32". Spring free length 2 25/64".

Oil Pump Reassembly & Installation: Reverse disassembly and removal procedure given above. Use new gasket between pump and bearing cap when installing pump.

1949-53 MODELS

OIL PUMP REMOVAL: Take off oil pan (see Oil Pan Removal). Remove oil pan baffle, and two nuts securing pump to rear main bearing cap. Remove pump and float and screen as an assembly.

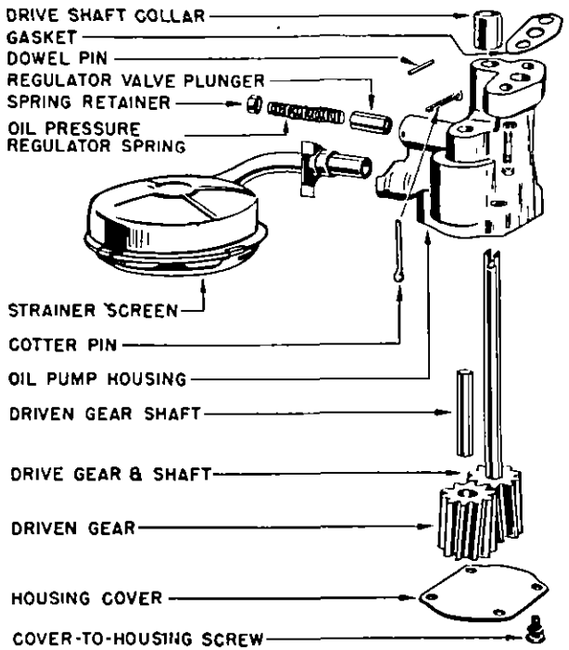
Disassembly: Remove float and screen assembly. Take out retaining cotter pin and withdraw pressure regulator parts from pump body. Remove pump lower cover for pump gear and shaft removal.

Oil Pump Specifications: Backlash between gears .008-.012". Driveshaft to Body Clearance .0010-.0025" (new), .005" max. (worn). Endplay between cover and gears .001-.004" (new), .006" max. (worn). **Pressure Regulator**—Valve Plunger to Body Clearance .0020-.0035" (new), .005" (worn). Spring Free Length 2 25/64". Spring Pressure at 1 13/32"—5 3/4 to 6 1/4 lbs.

Oil Pump Reassembly & Installation: Reverse disassembly and removal procedure given above. Use new gasket between pump and bearing cap when installing pump.

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CADILLAC 1949-53 OIL PUMP

1954-55 PUMP (LESS VACUUM UNIT) SIMILAR

1954-55 MODELS

OIL PUMP REMOVAL: Remove oil pan (see Oil Pan Removal). Remove oil pan and disconnect vacuum pump line at engine block. Remove nuts holding pump to rear main bearing cap and remove oil pump, vacuum pump, float and screen as an assembly. Remove drive shaft.

Dissassembly: Remove six screws holding vacuum pump to oil pump and remove vacuum pump with oil pump idler gear. Remove cotter pin holding oil pressure regulator valve and remove valve and spring. Slide idler gear off idler shaft in pump. Remove pin from collar on end of drive shaft and press collar off shaft. Slide oil pump drive gear out of pump body.

Reassembly: To correct for air in system, remove pump float and inspect float tube and tube bore in pump body for burrs, remove burrs with fine sand paper. Install an "O" ring seal, Part No. 5665829 on float tube against the shoulder 1 1/16" from end of tube. Insert float tube in body and secure with new cotter pin. Check float for free movement. Complete pump assembly by reversing disassembly procedure (above).

Installation: When installing pump, use new gasket between pump and bearing cap. Make certain that clearance between oil pan baffle and sides of pan are at least ¼" on each side. Bend baffle as necessary to secure this clearance. *CAUTION*—Insufficient clearance will prevent oil from returning to pump on hills or during sudden stops and will allow air to enter system. Install oil pump assembly over studs, guiding vacuum line into fitting in engine block. Tighten nuts to 25-30 ft. lbs.

VACUUM PUMP

1954-55 MODELS

VACUUM PUMP (Removal): Drain engine oil and remove oil pan. Remove oil pan baffle and disconnect vacuum line at engine block. Remove six screws holding vacuum pump to oil pump, and remove vacuum pump with the oil pump idler gear. Remove hexagonal drive shaft. *CAUTION*—Oil pump idler gear may fall when pump removed.

Disassembly—Remove two screws holding plate to vacuum pump and remove plate from dowels. Turn pump upside down and shake out rotor assembly. Remove springs and vanes from pump rotor.

Vacuum Pump Clearances—Vane to cover plate .002-.005". Rotor to cover plate .004-.007". Socket to cover plate .0144-.0324". Socket to rotor face .0104-.0254". Rotor to shaft .0010-.0023". Rotor to depression in body cavity .0005-.0034"

Installation—Install vacuum lines to pump and replace hexagonal shaft. Install idler gear in oil pump and install vacuum pump below oil pump with six screws. Connect vacuum line to engine block. Install oil pan baffle, then install oil pan.

Reassembly—Inspect inside of body for scores or wear Inspect plate for wear and dress down on surface plate. (CAUTION—Make sure that all parts are clean and that no foreign material is in housing). Install vanes and spring in rotor. Compress vanes and install rotor in pump body. Position plate on doweled pump body so that hole in plate lines up with hexagonal hole in rotor. Install screws in cover plate.

COOLING SYSTEM

1949-55 MODELS

RADIATOR CORE REMOVAL: Drain radiator, remove radiator hoses, six radiator-to-air deflector screws, and radiator anchor nut and spacers at frame bracket (check number of spacers and reinstall same number when radiator replaced). Lift out radiator.

Radiator Core Installation: Reverse removal instructions given above. NOTE—Core must be properly positioned for spacing between core and fan—this space must be ½" to 1".

DETONATION CORRECTION

1949-51 MODELS

To correct detonation complaint, perform the following modifications as necessary. NOTE—The complete procedure outlined should not be performed on every engine, but should be used as required.

Ignition Timing—Retard the ignition timing toward the "C" mark to provide a tolerance for fuel variables and premature detonation from a slight build-up of carbon in the combustion chambers.

Exhaust Valve Spring Seats—Prior to engine No. 24380, the new exhaust valve spring seats should be installed and the carbon removed. On later engines a suitable solvent should be used to remove carbon.

Thermostat—If the engine is equipped with a Fulton bellows type unit, remove and install a Dole thermostat, Part No. 1454979.

Manifold Heat Control—Check heat control valve located on right bank exhaust manifold for free operation and free-up if necessary.

Distributor Advance Spring—If the detonation occurs immediately after the 2-3 upshift on cars before Engine No. 50053, installing Part No. 1873551 vacuum advance spring, in place of the regular spring will reduce it. However, if detonation occurs constantly at open throttle, do not change the spring, as part throttle performance is decreased slightly by the change.

Spark Plugs—Clean and reset to .038".

Air Cleaner—Refill to proper level with SAE 40 oil.

Carburetor Metering Rods—Install modified rods and 1949 carburetor vacuum piston spring in carburetor, (furnished in kit as Cadillac No. 1458068 or Carter Unitized Package No. 75-772U).

Fuel—Use fuel with highest possible octane rating.

CLUTCH NOTES

1946-53 MODELS

CLUTCH BALANCING: Make certain that balance marks lined up when clutch installed on flywheel, then check balance by running engine at speed of 24-30 MPH with rear wheels jacked up and note if any excessive vibration apparent. If vibration noted, re-balance clutch as follows: Install one or two ⅛" washers with 5/16" hole on clutch cover mounting capscrew (start at point where clutch drilled for balancing), repeat test and note if vibration increased or decreased. Add or remove washers at each mounting capscrew until balance secured.

PROPELLER SHAFT NOTES

►*1950-55 SERIES 60S, 61, 62 UNIVERSAL JOINT FRONT YOKE REPLACEMENT TO CORRECT DRIVE LINE "THUMP":* New front yoke (as used in later 1955 production has increased spline line (no counterbore) and will prevent axial movement of the output shaft and yoke. This yoke furnished under same part number as previous type.

1) Remove propeller shaft. Inspect output shaft and remove all sharp edges from shaft splines, using a small stone. Inspect new yoke and remove all sharp edges from splines similarly.

2) Coat yoke splines with E.P. 90 hypoid rear axle lubricant, install yoke on propeller shaft, install shaft.

BRAKE NOTES

►*1954-55 SERIES BRAKE PEDAL BIND CAUSING EXCESSIVE PEDAL EFFORT (1955 Cars before Eng. No. 22750):* Check for misalignment at the following points.

1) Brake pedal moving out on shaft over lock ring in groove at end of shaft resulting in binding of pedal and misalignment with master cylinder. Correct by installing later type shaft No. 3510310 with rectangular groove, and later type lock ring No. 1463434 with larger outer diameter. *NOTE*—These parts used in 1955 production beginning Engine No. 22750.

2) Binding at brake pedal clevis and bellcrank linkage caused by misalignment in linkage. Correct by installing ⅛" flat washers between master cylinder attaching bosses and frame. Check entire linkage for binding and shim as required. NOTE—These master cylinder washers used in production beginning Engine No. 12725.

HOOD LOCK (1946-47): Press back on radiator ornament to free manual and safety catches, lift hood up.

HOOD LOCK (48-61, 62, 60S): Pull release knob at lower left side of instrument panel, release safety catch under front edge of hood, raise front end of hood.

HOOD LOCK ADJUSTMENT, HOOD REMOVAL & INSTALLATION: *See Cadillac Special Data.*

MODEL IDENTIFICATION

ENGINE SERIAL NUMBER: Stamped on right front of crankcase above water pump and on right frame side member to rear of engine support bracket.

1946-47 ENGINE SERIAL NUMBERS

Series	Wheelbase	1946 First Number:	1947
60S Special	133"	6,400,001	6,420,001
61	126"	5,400,001	5,420,001
62	129"	8,400,001	8,420,001
75	136"	3,400,001	3,420,001
75 Comm'l	163"	3,400,001	3,420,001

1948 ENGINE SERIAL NUMBERS

Series	Wheelbase	First 1948 Number
48-61	126"	486100000
48-62	126"	486200000
48-60S Special	133"	486000000
48-75	136"	487500000
48-76 Commercial	163"	487600000

Identification—First two figures indicate year, third and fourth figures indicate model (last five figures numbered consecutively regardless of series).

ENGINE UNIT NUMBER: Stamped on lower end of rough flat surface on crankcase behind right hand block (directly above boss for clutch housing locating pin).

1948 Numbers	Engine Unit Number Std. Transmission	Hydra-Matic
48-60S, 61, 62	8-K-1 up	9-K-1 up
48-75, 76	2-K-1 up	9-K-1 up

TUNE-UP

COMPRESSION: Pressure—100-105 lbs. at cranking speed (7.25-1 Std. Cast iron head).

VACUUM READING: Steady 20-21" idling at 7-8 MPH.

FIRING ORDER: 1-8-7-3-6-5-4-2 (Cyl. Nos. 1-3-5-7 Left Bank, 2-4-6-8 Right Bank, front-to-rear).

SPARK PLUG GAP: .028-.032".
Plugs—AC No. 104. 10 mm. Metric type.

▷*CAUTION—Tighten plugs just enough for good gasket seal. Do not use Torque Wrench.*

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.015" Limits .0125-.0175".
Cam Angle—31° closed (with .015" gap).
Breaker Arm Spring Tension—19-23 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 5° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—'IG/A' on timing disc behind crankshaft pulley lined up with pointer on chain case.
Manual Adjustment Setting—Set for slight ping accelerating-with wide throttle below 15 MPH.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—Adjust both screws exactly alike for smooth idle (½-1½ turns open for Carter). Turning screws out gives richer mixture.

Idle Speed (standard)—375-380 RPM.
Idle Speed (Hydra-Matic)—375 RPM. with selector lever in drive (DR) position.
Float Level (Carter)—9/64" from top of each float to gasket seat on cover with valve seated (invert to check). Fuel level even with bottom of inspection plug hole on side of bowl with engine idling.
Float Level (Stromberg)—Fuel level ⅝" below top edge of bowl or even with bottom of inspection hole on side of bowl with engine idling.
Accelerating Pump (Carter)—No adjustment.
Accelerating Pump (Stromberg)—Inner hole Normal, outer hole (max. stroke) used when required.

Throttle Linkage Adjustment (Hydra-Matic Cars): *See "Hydra-Matic Linkage Adjustment" in Transmission Section.*

Fuel Pump Pressure: 4¾ lbs. (3½-5) max.

VALVE TAPPET CLEARANCE: None in service (automatic hydraulic type tappet take-up).

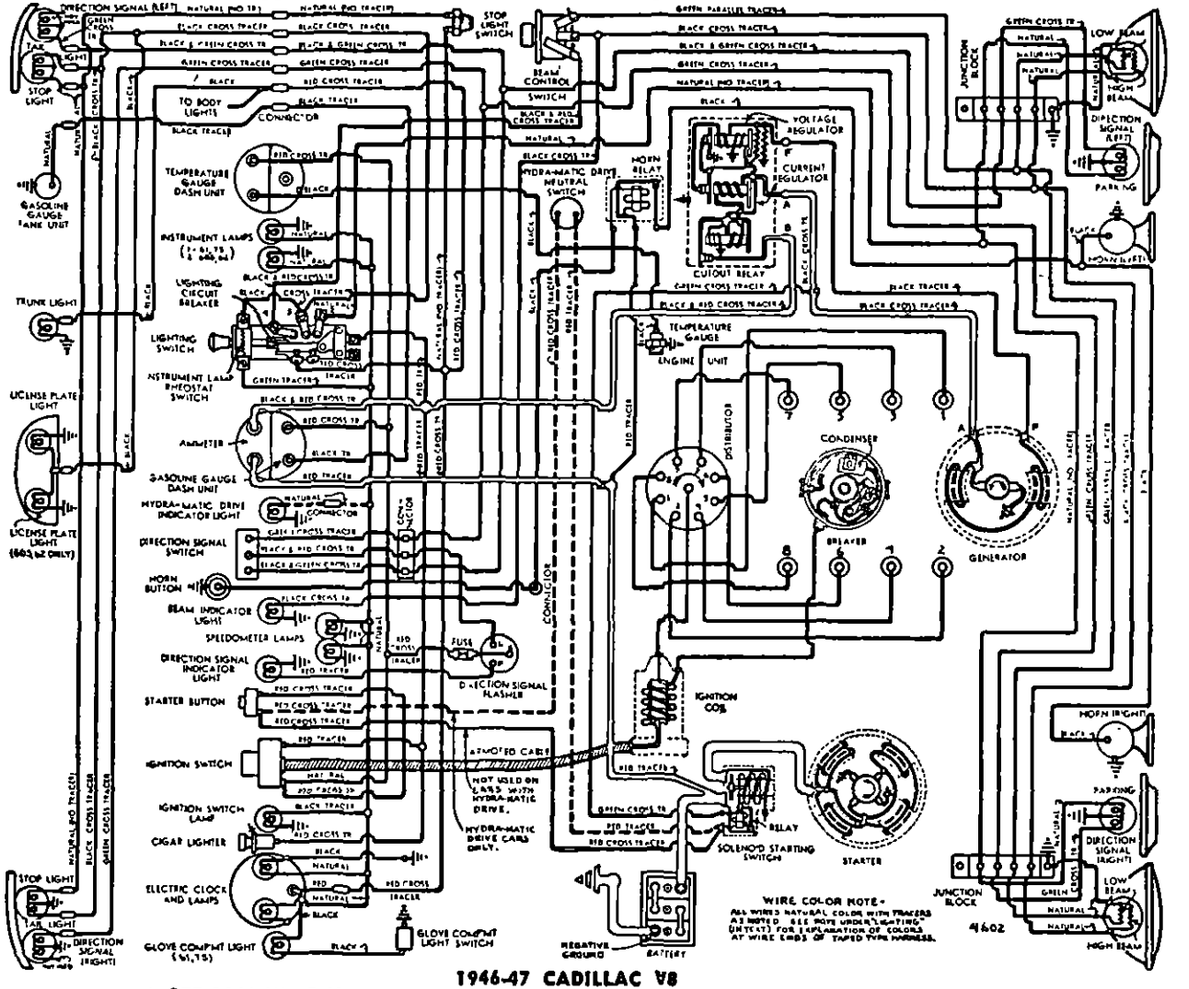
IGNITION

IGNITION SWITCH ('46-47) Delco-Remy 1116327 (60S 62), 1116328 (61, 75, 75 Comm'l '46), 1116383 (75 Comm'l '47). Connected to ignition coil by armored cable.
Ignition Lock—Briggs & Stratton No. 85373 (Uncoded), 85372 (Coded).
Key Series—8000 to 9499. **Groove**—No. 15.

IGNITION SWITCH (1948): Delco-Remy No. 1116451.
Ignition Lock—Briggs & Stratton No. 45791 (Uncoded), 45792 (Coded).
Key Series—8000 to 9499. **Groove**—No. 15.

COIL: Delco-Remy 1115129 ('46-47), 1115380 ('48). On dash. Armored cable on 1946-47 only.
Ignition Current—2.2 amperes idling, 4.4 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.25 microfarad.



1946-47 CADILLAC V8
▷SEE 1946 WIRE HARNESS CHANGE NOTE (UNDER LIGHTING) FOR WIRE COLORS

DISTRIBUTOR: Delco-Remy No. 1110807. Full automatic advance type with auxiliary vacuum spark control and manual adjustment ("octane selector").
Breaker Gap—.015". Limits .0125-.0175".
Cam Angle—31° closed (with .015" gap).
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	500	1	1000
12	2000	24	4000

Manual Adjustment—Permits 10° advance or retard from center position. See Ignition Timing (below).
Vacuum Spark Control: Delco-Remy No. 1116030. Integral type linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. **Plunger Travel**—13/64" total.

Vacuum Advance

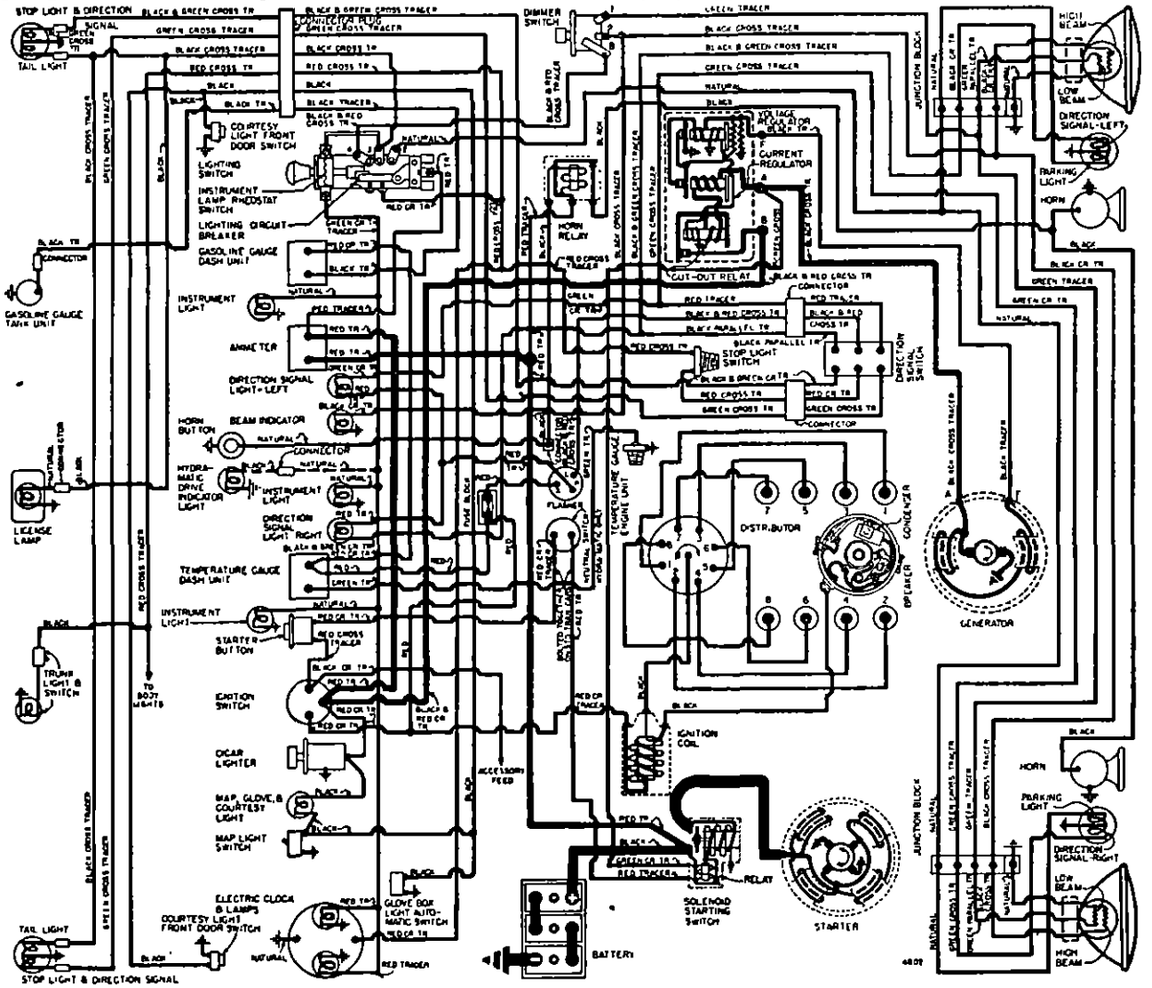
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5.5-7.5"
9°	18°	15-18"

Removal:—To remove distributor, disconnect vacuum line, remove 2 hold-down screws in advance arm.
Installation Note—Turn crankshaft to top dead center position for No. 1 cylinder ("C. 1/6" timing disc mark in line with pointer on chain case cover). Set distributor loosely in support, mesh distributor driven gear with bronze idler gear so that distributor rotor is at No. 1 plug wire in cap. CAUTION—See that oil pump drive shaft properly lined up (to avoid damaging pump).

IGNITION TIMING

	Flywheel Degrees	Piston Position
Std. Setting	5° BTDC	.0114" BTDC.

For 80 octane fuel. See Manual Adjustment (below) for other fuels.



1948 CADILLAC V8

Timing Mark—"IG/A" on timing disc behind crankshaft pulley lined up with pointer on chain case.
Timing (With Synchroscope)—Recommended method. Disconnect vacuum line at distributor (to avoid damage to unit), clip synchroscope lead to #1 spark plug, idle engine and direct synchroscope light on timing disc behind crankshaft pulley at front of engine. Loosen advance arm hold-down screw, center pointer on scale, tighten screw. Loosen advance arm clamp bolt, rotate distributor until 'IG/A' mark on timing disc (5° before top dead center mark 'C.1/6' lines up with pointer on chain case cover, tighten clamp bolt, reconnect vacuum line (hold connection with wrench while tightening). See Manual Adjustment (below).
Timing (Without Synchroscope)—Disconnect vacuum line at distributor (to avoid damaging vacuum unit). Turn engine over to firing position for #1 piston (front cylinder, left bank) with 'IG/A' mark (5° before top dead center mark 'C.1/6') on timing disc behind crankshaft pulley lined up with pointer on chain case cover. Adjust distributor as directed above until contacts just open.
Manual Adjustment—Should be set for slight ping when accelerating engine with wide open throttle at speeds below 15 MPH. To adjust, loosen holddown screw in advance arm, rotate distributor clockwise (if ping too severe), counter-clockwise (if no ping noted) one graduation at a time. CAUTION—Check engine for faulty spark plugs, excessive carbon deposits, localized hot spots or lean carburetor setting before changing adjustment to correct pinging.

CARBURETOR

Year	Carter WCD	Stromberg
1946-47	595S	AAV-26 Code 205-14, A, B
1948	595S, SA	AAV-26 Code 205-14B

1¼" dual (double barrel) downdraft types with automatic choke.
Casting No. (Carter)—No. 456 on face of flange.
Code No. (Stromberg)—Stamped either on the body or on a metal tag attached to body.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Throttle Linkage Adjustment (Hydra-Matic Cars): ***See "Hydra-Matic Linkage Adjustment" in Transmission Section.***
Metering Jets & Rods—***Refer to Carburetor Index for Carter & Stromberg Downdraft Carb. Jet Tables.***
Fast Idle: Carter Dual (WCD) Carburetor type or Stromberg Type (for AAV-26 Carburetor).
See Carburetion Equipment Section for data.
Setting (Carter)—Hold choke valve tightly closed, adjust fast idle screw (on opposite end of throttle shaft from regular throttle stopscrew) for .018" throttle opening (use Gauge T109-44).
Setting (Stromberg) Hold throttle stopscrew against high lobe of fast idle cam, move choke valve toward closed position as far as possible, check choke valve opening. Adjust by bending fast idle connector rod so that choke valve opening is .098" (#40 drill rod).
Automatic Choke: Carter Climatic Control (Dual carburetor) or Stromberg Type (AAV-26 Carburetor).
See Carburetion Equipment Section for data.

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Setting (Carter)—Reference mark on thermostat coil housing centered on scale on choke housing.

Setting (Stromberg)—"V" mark on thermostat cover in line with reference mark on housing.

CARB. EQUIPMENT

Air Cleaner:—AC #1542260 heavy duty oil-bath type. Use Replacement Filter Element Assembly #1542261.

Servicing—Drain, clean, and refill with 1 pint SAE No. 50 (Summer), No. 40 (Winter) engine oil at 2000 mile intervals. NOTE—Clean filter element in oil filler cap when crankcase drained.

Fuel Pump: AC Type AX. No. 1523575, 1537088, or 1539089. Fuel & Vacuum type.

Replacement Pump—AC No. 575.
Pressure—4¾ lbs. (3½-5) maximum.
See Carburetion Equipment Section for data.

Gasoline Gauge: AC. Electric type.

Dash Unit ('46-47 Series 60S, 62)—AC No. 1516372.
Dash Unit ('46-47 Series 61, 75)—AC No. 1515368.
Dash Unit (1948 All Series)—AC No. 1516971.
Tank Unit—AC 1516269 (60S, 61, 62), 1516155 (75, 76).
See Carburetion Equipment Section for data.

BATTERY

STANDARD

Delco 17K3 or 4. 6 volt, 17 plate, 115 Ampere Hour Capacity (20 hour rate).

▷*CAUTION—Battery is reversed in carrier from previous models and NEGATIVE TERMINAL is now grounded.*
Starting Capacity—137 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.3 minutes. Five second voltage, 4.4 volts.
Grounded Terminal—Negative (—) to frame.
Engine Ground—Strap connector from right front engine mounting bracket to frame bracket.
Location—In engine compartment on right side.
Dimensions Length 10⅜". Width 7". Height 8 11/16".

COMMERCIAL MODELS

Delco 19Q3 or 4. 6 volt, 19 plate, 125 Ampere Hour Capacity (20 hour rate).

Starting Capacity—145 amperes for 20 minutes.
Zero Capacity—300 amperes for 5.0 minutes. Five second voltage 4.5 volts.
Dimensions & Grounded Terminal—Same as above.

STARTER

Delco-Remy Model 1107931. Armature No. 820158.

▷NOTE—On cars with Hydra-Matic Drive, starter operative only with Selector Lever in neutral (starter solenoid relay circuit controlled by Hydra-Matic Drive Neutral Safety Switch).

Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs	5500	5.67	65
16	"	Lock	3.0	600

Removal:—Starter flange mounted on right front face of flywheel housing. To remove, take out flange mounting screws, pull starter out.

Starting Switch:—Delco-Remy Solenoid Switch No. 1118102. Mounted on starter and controlled by Push-button Switch No. 1996009 on instrument panel and Neutral Safety Switch 1997766 (on Hydra-Matic).
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy Model 1102693. Armature No. 1879002. Two brush type with voltage and current regulation.

▷*NOTE—Same generator as used on previous cars but polarity is reversed for Negative Ground.*

▷**Pulley Note to Increase Charging Rate**—Use No. 1882988 pulley (O. D. of front flange 3 1/16"—std. pulley No. 1878203 O. D. 3 17/32").

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—34-36 amperes at 8.0 volts, 27 MPH (current regulator setting—with load or discharged battery). Actual charging rate controlled by voltage regulator and dependent on battery condition.

Performance Data

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—25 ozs. each.

Field Current—1.75-1.9 amperes at 6.0 volts.

Removal:—Generator flange mounted between cylinder banks at front of engine and belt driven in tandem with water pump (separate drive belt for fan). To remove, take out flange mounting bolts.

Belt Adjustment:—Loosen generator mounting bolts, raise generator (pivots on left bolt, right bolt hole slotted) until belt deflection is ¾-⅞" when pushing belt inward midway between generator and crankshaft pulleys.

▷*CAUTION—Belts are new heat-and-oil resistant synthetic rubber type (must be set to exact specifications).*
Fan Belt—Adjust to same specifications as Generator Belt by changing fan bracket position.

REGULATOR

Delco-Remy Model No. 1118242. Single Coro Type. Vibrating type voltage and current regulator.
See Electrical Equipment Section for complete data.

▷*CAUTION—This regulator used with Negative Battery Ground and generators used with it must be Polarized for this same polarity.*

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—6.2-6.7 volts hot, 800 gen. RPM.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts hot (operating temperature).
Regulator over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).
Checking & Adjustment—*See Electrical Equip. Section.*

Current Regulator

Setting—34-36 amperes hot (operating temp.).
Air Gap—.080" (check same as Voltage Regulator).
Checking & Adjustment—*See Electrical Equip. Section.*

LIGHTING

▷**1946 WIRE HARNESS PRODUCTION CHANGE:** Two types of harness with different wire colors used as follows:

1. Braided Loom Assembly—Individual wires in this type harness are marked with colored tracers as indicated on wiring diagram.

2. Taped Assembly—Individual wires in this type harness are any color and do not follow color code shown in wiring diagram. Ends of each wire are stained with individual colors to provide identification. These stained-end wires can be related to the color code shown in the wiring diagram as follows:

Stained End (Taped Wiring Harness)	Tracer Color (Braided Wiring Harness)
Black	Black or Natural, Black Tracer
Blue	Natural, Black Cross Tracer
Brown	Natural, Black & Red Cross Tracer
Green	Natural, Green Cross Tracer
Orange	Natural, Red Cross Tracer
Orange & Black	Natural, Black & Green Cross Tr.
Red	Natural, Red Tracer
Yellow	Natural, Green Tracer
Yellow & Orange	Natural, Green Parallel Tracer
Not stained	Natural

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—In upper left face of speedometer dial ('46-47), in center of instr. panel (1948). Lighted when Country (upper) Beam in use.

Direction Signal: *See Electrical Equipment Section.*
Dir. Signal Indicator ('46-47)—In upper right face of speedometer dial. One indicator only.
Dir. Signal Indicators (1948)—Left and Right Turn Indicators located below each end of speedometer dial.

Switches

Lighting ('46-47)—Delco-Remy No. 1995023.
Lighting (1948)—Delco-Remy No. 1995031.
Instrument—Part of Lighting Switch. Rheostat operated by turning Lighting Switch Knob.
Beam Selector—Delco-Remy No. 1997008.
Direction Signal ('46-47)—Delco-Remy No. 1995523 (1995524 for cars with Hydra-Matic Drive).
Direction Signal (1948)—Delco-Remy No. 1995531.
Stop Light—Cadillac No. 1328118.

1946-47—Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	
Park & Front Dir. Signal	21-3	1154
Rear Direction Signal①	21-3	1154
Beam & Dir. Sig. Indicators	1	51
Hydra-Matic Drive Indic.	1	51
Instr., Clock, Ign. Switch	1.5	55
Glove Comp't., Trunk	1.5	55
Stop & Tail	21-3	1154
Rear License	3	63
Dome, Quarter, Courtesy	15	88

①—21 cp. filament only used.

1948—Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Park & Front Dir. Signal	21-3	1154
All Indicators	1	51
Instrument, Clock, Trunk	1.5	55
Map Light	3	64
Stop (Rear Dir. Sig.) & Tail	21-3	1154
Rear License	3	63
Dome	15	88
Back Up Light	21	1129

MISC. ELECTRICAL

FUSES: Direction Signal—9 ampere behind panel.
Automatic Heating System—6 ampere (60S, 61, 62), 9 ampere (75). On heater switch.
Ventilating Defroster Heater—20 ampere. In blower lead.

THERMOSTATIC RELAY: Delco-Remy. On lighting switch. Contacts remain closed with 30 amperes, open in 3 minutes with 42 amps. at 70° F. Not adj.

HORNS: Delco-Remy No. 1999537 (Low Note, right horn), No. 1999538 (High Note, left horn). Vibrator type, blended tone, twin horns operated by relay.

Type	Current (at 6 volts)	Air Gap
1999537 (Low Note)	19-21 amperes	.044-.049".
1999538 (High Note)	18-20 amperes	.034-.039"

Horn Relay:—Delco-Remy Model 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: Own. 8 cylinder, 90° Vee L head type. Upper crankcase and cylinder blocks cast Enbloc. **Bore**—3½". **Stroke**—4½".
Displacement—346 cu. ins. **Rated HP**—39.20.
Developed Horsepower—150 at 3400 RPM.
Compression Ratio—7.25-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Cadillac Shop Notes.*

TIGHTENING TORQUES: *See Cadillac Shop Notes.*

CYLINDER HEAD: Tightening Torque—*See Cadillac Shop Notes.*

PISTONS: Aluminum alloy, three-ring, cam ground, T-slot type with Anodized finish.
NOTE—Rings are mounted lower than on previous type pistons and piston has heat-dam groove above top ring.
Weight—1.197 lbs. (stripped), 1.593 lbs. (complete).
Length—4⅛".
Removal—Pistons and rods remove from above.
Clearance—.0023-.0025".

Original Piston & Cylinder Bore Sizes: *See Cadillac Shop Notes.*

Replacement Pistons: *See Cadillac Shop Notes.*

Fitting New Pistons: *See Cadillac Shop Notes.*

Installing Pistons: T-slot to left on all pistons.

PISTON RINGS: Two compression, one oil control ring per piston, all above pin.

Ring	Width	End Gap	Side Clearance
Compr. (#1,2)	5/64"	.007-.023"	.0022-.0035"
Oil Contr. (#3)	3/16"	.007-.023"	.0013-.0026"

Installing Rings—Notched inner edge of both compression rings must be upward.

Replacement Rings: Furnished Std. Size and .010", .020", .030" Oversize.

PISTON PIN: Diameter ⅞". Length 3 1/16".
Floating type with locking ring at each end. Pin hole in piston bosses have bearingized finish.
Pin Fit in Piston—.00005-.0001" (new), .0007" (worn) or free hand-press fit at 70° F. in each boss.
Pin Fit in Rod Bushing—.0002-.0008" clearance (new), .0014" (worn limit).

Replacement Pins: Std., .001", .003" Oversize. *Piston Pin Fitting, see Cadillac Shop Notes.*

CONNECTING ROD: Length 8¾". Weight 2.355 lbs.
Crankpin Journal Diameter—2.4590-2.4595".
Lower Bearing—Removable, steel-backed, Morraine Durex 100A (copper nickel matrix with babbitt overlay) lined type. No shims.
Clearance—.0008-.0025" (new), .005" max. (worn).
Sideplay—.008-.014".

Bearing Adjustment:—None (no shims). Replace bearings. Do not file rods or caps.

Installing Rods:—Numbers on rods and bearing caps on same side and toward bottom of engine.

CRANKSHAFT: 3 bearing with 6 counterweights.
Journal Diameters—2.4990-2.[illegible]5" (all bearings).
Bearings—Removable, steel-backed, Morraine Durex "300" (copper nickel matrix with babbitt overlay) lined type. No shims.
Clearance—.0008-.0025" (new), .005" max. (worn).

Bearing Adjustment:—None (no shims). Replace bearings. Do not file bearing caps.

End Thrust:—Taken by center (#2) bearing.
Endplay—.001-.005" (new), .010" Max. (worn).

Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

CAMSHAFT: 3 bearing. Non-adjustable chain drive.
NOTE—Camshaft is cast iron. Use care to prevent misalignment when removing & installing shaft. *Refer to Cadillac Shop Notes for Camshaft Removal and Camshaft Bushing servicing data.*
Journal Diameters—#1 and #2, 2.4071-2.4078"; #3, 2.0009-2.0016".
Bearing Type—Steel-backed, babbitt bushings.
Clearance—.0015-.0033" (new), .0045" Max. (worn).

End Thrust:—Taken by thrust plate behind camshaft sprocket. No endplay should be permitted.

Timing Chain:—Link-Belt Type 3766-TC-15. Width 1⅛". Pitch ⅜". Length 23¼" or 62 links. NOTE—Install chain 'endless' as an assembly with sprockets. Use Pilot Tool J-836 on end of camshaft.

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1.876-1.886"	.3415-.3425"	5 33/64"
Exhaust	1.626-1.636"	.3408-.3415"	5 33/64"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.335"	.0023"①
Exhaust	45°	.345"	.0025"②

①—.0005-.0025" (new), .005" (worn limit).
②—.0015-.0035" (new), .005" (worn limit).
See Cadillac Shop Notes for Valve & Lifter servicing.

Valve Guides:—Press in block (long step end down). Guides have "Ferrox" finish for longer service.

Valve Lifters:—Wilcox-Rich 'Zero-lash' type hydraulic lifters (Mushroom type) in removable brackets.
►1948 Note—Two types of valve lifters are used:
Body & Plunger Type. Same as used on earlier models. Can be identified by exposed plunger spring at top.
Unit Type. Serviced as complete unit only. No spring used at upper end.
See "Valve System" in Cadillac Special Data.
Clearance—.0010-.0024" (new), .0035" (worn).

Valve Springs:—Free length 2.210".

	Spring Pressure	Spring Length
Valve Closed	60-67 lbs.	1 59/64"
Valve Open	139.5-150.5 lbs.	1 37/64"

VALVE TIMING

Tappet Clearance:—None in service (hydraulic type lifter). *See Valve Servicing in Cadillac Shop Notes.*

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open at TDC. Close 42° ALDC.
Exhaust Valves—Open 52° BLDC. Close 10° ATDC.
Valve Timing Check—#1 cylinder (front-left bank) intake valve should open with piston at TDC and mark 'C.1/6' on crankshaft pulley aligned with chain case cover pointer (on right side).

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, timing chain, and hydraulic valve lifters. Oil pump located at rear of engine in oil pan.
►NOTE—An "Inertia type" fitting is located in the oil line to hydraulic valve lifters (oil forced to make 90° turn before entering lifter line, foreign particles in oil tend to be carried past this line).
Crankcase Capacity—7 quarts.
Normal Oil Pressure—25 lbs. at 30 MPH. (15 lbs. idling).
Oil Pressure Regulator—Located on oil pump. Opens at 30 lbs. Not adjustable.
See Cadillac Shop Notes for Oil Regulator data.

Oil Pump: *See Cadillac Shop Notes for Specifications.*

Crankcase Ventilation: Filter in oil filler (inlet) cap. Exhausts through openings in valve cover into conduit leading to cored opening in rear of block and out through outlet pipe in right rear corner of oil pan.
Servicing—Wash and re-oil filter in filler cap every 2000 miles (oil change period).

Oil Gauge ('46-47 Series 60S, 62): AC No. 1506290.
('46-47 Series 61, 75)—AC No. 1505912.
(1948 All Series)—AC No. 1507086.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap. Re-circulation (with thermostat closed) provided by by-pass from left cylinder bank outlet to water pump inlet.
Capacity—25 quarts (without heater).
27 quarts with Cadillac Automatic Heating System.
26 quarts with Cadillac Ventilating Defroster Heater.
Pressure Cap—AC No. 850558 (Radiator Filler Cap). Opens at 8¼-9¼ lbs.
NOTE—15 lb. cap available for extreme service.

Water Pump: Self-adjusting packing type.
See Water Pump Section for complete data.

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Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat ('46-47): Cadillac No. 1444874. Dole.
1948 Type—Cadillac No. 1453784 (std.), No. 1454715 (high opening). Fulton Sylphon. Blocking type in radiator inlet elbow (accessible by removing elbow).
Setting (standard)—Starts to open 150-155°F.①
Setting (High Opening)—Starts to open 165-170°F.①
①—When testing at atmospheric pressure.

Temperature Gauge: AC. Electric Thermo-gauge.
Dash Unit ('46-47 Series 60S, 62)—AC No. 1511732.
Dash Unit ('46-47 Series 61, 75)—AC No. 1511737.
Dash Unit (1948 All Series)—AC No. 1511896.
Engine Unit—AC No. 1511734 ('46-47), 1512015 ('48).
See Miscellaneous Section for complete data.

CLUTCH

Long 11CF-10½TI (60S, 61, 62) 11CF-TI (75, 76). Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.

Facings—Woven type. I.D. 7" (all models). O.D. 10½" (60S, 61, 62), 11" (75, 76). Thickness .137" (all).

Pedal Adjustment:—Pedal free travel ⅞-1⅛" (adjusting nut on connector link at clutch fork).

Removal:—Remove transmission (see below), drop clutch housing pan, remove release yoke and sleeve, punch mark clutch cover, pressure plate and flywheel, remove 6 cover screws. NOTE—Install driven member with oil guard to rear.

Clutch Balancing: *See "Clutch Notes" in Cadillac Special Data.*

▷Replacement Clutch Caution—Clutches furnished with locking pin or block at each release lever. *Locking pins must be removed when clutch installed.*

TRANSMISSION

SYNCHRO-MESH

Own Make. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse), all helical gear type with remote (steering column mounted) control.
See Transmission Section for complete data.

Transmission Control: Remote (steering column mounted) type.
See Transmission Section for complete data.

Removal:—Support engine with jack under rear end of oil pan (use wooden block to avoid damage to pan), disconnect rear universal joint and remove propeller shaft, free transmission extension at engine rear support, remove crossmember with engine rear support, disconnect speedometer cable, remove shifter rods from levers at transmission, support transmission at rear, take out mounting screws, pull straight back (plug clutch connection shaft bearing drain hole as soon as accessible to prevent lubricant loss), lower front end of transmission and remove.

HYDRA-MATIC DRIVE TRANSMISSION

Own Make. Consists of Fluid Coupling and automatic self-shifting Four-Speed Transmission. Optional on all models.
See Transmission Section for complete data including Testing & Trouble Shooting.

Lubrication—Check fluid level in transmission every month or each 1000 miles. Drain and refill at 25,000 mile intervals.

Recommended Fluid—Use only "Cadillac Hydra-Matic Fluid" or Automatic Transmission Fluid Type A.

Capacity—Approximately 12½ qts. (refill).

Checking Fluid Level—Clean all sand, lint, and dirt away from sheet metal cover in floor under right front corner of front compt. rug. Run engine for approx. 1½ minutes at speed equivalent to 20 MPH, with selector lever in "Neutral". Remove sheet metal cover from floor for access to dip stick, reduce engine speed to slow idle, measure level with dip stick, add fluid until level is at "FULL" mark with engine idling.

▷*CAUTION—Engine must be running at slow idle speed when checking Hydra-Matic Drive Fluid Level.*

Throttle Linkage Adjustment (Hydra-Matic Cars): *See "Hydra-Matic Linkage Adjustment" in Transmission Section.*

Removal: *See Hydra-Matic Drive in Transmission Section.*

UNIVERSALS

Mechanics Model 3-C. Needle bearing type. Two used (three used on Commercial Cars).

Propeller Shaft (Pass. Cars): One shaft used of one-piece design with slip joint formed on rear of transmission mainshaft in extension housing.

(Commercial Cars)—Two shafts used with center bearing support at rear of front shaft.

REAR AXLE

Own Make. Hypoid Gear, Semi-floating type with Hotchkiss Drive.
See Rear Axle Section for complete data.

NOTE—Manufacturer recommends that Carrier Assembly be serviced by the factory (see Carrier Assembly Removal below).

Ratio—Hydra-Matic Drive ratio is available as special "economy ratio" on cars with std. synchro-mesh transmission.

	Synchro-mesh Trans.	Hydra-Matic Drive
60S, 61, 62	3.77-1 (no mark)	3.36-1 (6)
75 & Comm'l	4.27-1 (4)	3.77-1 (7)

NOTE—Ratio identification mark (following ratios in table above) stamped on bottom of differential case beneath center of pinion shaft.

Backlash—.003-.010". Screw adjustment.

Removal:—Disconnect rear universal (do not disengage spline joint at transmission), remove axle shafts (see below) and carrier mounting bolt nuts.

Axle Shaft Removal:—Remove hub cap, wheel, and axle shaft nut. Pull hub and drum, disconnect brake line, remove brake backing plate. Pull shaft and bearing assembly (Tool J-838). NOTE—Install new oil seal & bleed brake line which was disconnected

Wheel Bearing Adjustment—None.

▷*CAUTION—Wheel bearings are sealed (permanently lubricated) and should be checked when axle shafts are out. Replace bearings that spin freely indicating lack of grease.*

SHOCK ABSORBERS

Delco. Double acting, opposed piston, hydraulic types (front & rear). Model Nos. as follows:

	Front	Rear
60S, 61, 62	1946-G,H	1754-N,P
75	1946-G,H	2007-N,P
Commercial (75 & 76)	1946-G,H	1751-V,W

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

NOTE—Specifications below correct with car at curb weight (car unloaded with full gas tank).

Kingpin Inclination—5°51' crosswise (0° Camber).

Caster ('46-47)—Neg. 1¾° to Neg. 2¾°.

Caster (Late 1947 & 1948)—Neg. ½° to Pos. ½°. Equal within ½°.

Camber—Neg. ⅜° to Pos. ⅜°. Equal within ½°.

Toe In—1/32-3/32" (at rest). Loosen clamp bolts, turn adjusters at outer end of each rod equally.

Steering Geometry (Toe-out on turns)—Outer wheel turned 20°. Inner wheel as follows:

	Left Turn	Right Turn
60S, 61, 62	25°25'	24°42'
75 & Comm'l. (75 & 76)	24°7'	23°6'

STEERING GEAR

Saginaw. Ball bearing Worm-and-Nut type (re-circulating ball type).
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-servo, Single Anchor type without Eccentric Adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Centrifuse. Diameter 12" (11.995-12.005").

NOTE—Drum out-of-round limit is .007" and re-machining limit (to true up drums) is .030" max.

Lining—Molded type (all models).

	60S,61,62	75	Commercial
Width (Front)	2¼"	2¼"	2¼"
Width (Rear)	2"	2½"	2½"
Thickness	3/16"	3/16"	3/16"
Length (Fwd.Shoe)	11 17/32"	11 17/32"	12 31/32"
Length (Rev.Shoe)	12 31/32"	12 31/32"	12 31/32"

Fwd.—Forward or Primary (front) shoe.
Rev.—Reverse or Secondary (rear) shoe.

Clearance—.007-.010" at each end of each shoe or .015" at both ends of secondary shoe with primary shoe forced out against drum.

Braking Power—55.8% Front, 44.2% Rear (60S, 61, 62, 75); 50% Front & Rear (Commercial 75 & 76).

Hand (Parking) Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Form 38—1956-M

HOOD LOCK ADJUSTMENT, HOOD REMOVAL & INSTALLATION: *See Cadillac Special Data.*

MODEL IDENTIFICATION

ENGINE SERIAL NUMBER: Stamped on right front of crankcase below cylinder head and on right frame side member to rear of engine support bracket.
Identification—First two figures indicate year, third and fourth figures indicate model (last five figures numbered consecutively regardless of series).

Series	1949—First Nos.—1950
60S Special	496000000—506000000
61	496100000—506100000
62	496200000—506200000
75	497500000—507500000
86 Comm'l	498600000—508600000

ENGINE UNIT NUMBER: Stamped on top of crankcase, behind left hand block (behind distributor).

	Engine Unit Number	
1949 Numbers	**Std. Transmission**	**Hydra-Matic**
49-60S, 61, 62	**8-L-1 Up**	**9-L-1 Up**
49-75, 86	**2-L-1 Up**	**9-L-1 Up**
1950 Numbers		
60S, 62		9-M-1 Up
61	8-M-1 Up	9-M-1 Up
75	2-M-1 Up	9-M-1 Up
86	2-M-1 Up	7-M-1 Up

TUNE-UP

►*DETONATION "PING" CORRECTION: See "Detonation Correction" in Cadillac Special Data.*

COMPRESSION PRESSURE: 120-140 lbs. at cranking speed (Std. 7.5-1 Cast Iron head).

VACUUM READING: Steady 20-21" idling at 375 RPM. (for Hydra-Matic), 400 RPM. (with Synchro-Mesh).

FIRING ORDER: 1-8-4-3-6-5-7-2. (Cyl. Nos. 1-3-5-7 Left Bank, 2-4-6-8 Right Bank, front-to-rear). See diagram.

SPARK PLUG GAPS: .033-.038".
Plugs—AC No. 48X. *NOTE*—Use 46-5 for high speed operation.

►*CAUTION—Tighten plugs to 20-25 ft. lbs. torque.*

DISTRIBUTOR: Breaker Gap—.013-.018" (new), .010-.015" (used points).
Cam Angle—31°±1½° (new), 28°±1½° (used). Test limits with .016" gap—21-30°.

►*CAUTION—Manufacturer recommends final check with feeler gauge or dial indicator if dwell-meter used to set contact gap.*
Breaker Arm Spring Tension—19-23 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.25 microfarad.

IGNITION TIMING: 5° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—"A/" on harmonic balancer at front of engine lined up with pointer on front cover (for fuel of 80 Octane Rating).

►*CAUTION*—If fuel of less than 80 Octane Rating used, and detonation ping noted, timing may be retarded to "/C" mark on balancer (top dead center).

CARBURETION: Carter WCD. (Early 1949) No. 682S, (Late 1949) No. 722S, (1950) No. 742S.

►*SLIGHT ACCELERATION STUMBLE (1949 Cars with first 722S Carburetors): See "Carter WCD" in Carburetor Section for recommended jet changes.*

►*DETONATION COMPLAINTS (1950 Cars with 742S Carburetors): See "Carter WCD" in Carburetor Section and "Detonation Correction" in Cadillac Special Data.*

Idle Setting—Both screws ½-1½ turns open (1949 682S & 722S), ¾-1¼ turns open (1950 742S). Turn screws out for richer mixture and set for smooth idle with engine warm.
Idle Speed—375 RPM (Hydra-Matic Trans.), 400 RPM (Synchro-mesh Trans.) with engine warm and Hydra-Matic selector lever in "Dr" position.

►*CAUTION—Use tachometer to set idling speed.*
Float Level—9/64" (1949 682S, 722S), 11/64" (1950 742S) from top of each float to gasket seat on cover with valve seated (invert to check). Fuel level should be even with bottom of inspection plug hole on side of bowl with engine idling.
Accelerating Pump—No seasonal adjustment.

Fast Idle Setting: .020" throttle opening (Gauge T109-29) with choke valve tightly closed. Adjust fast idle adjusting screw for this throttle opening.

►**Choke Setting:** *CAUTION—Different setting used on each carburetor.*
(682S)—1 Point Rich.
(722S)—Centered (housing centered on scale).
742S—1 Point Lean.

Throttle Linkage Adjustment (Hydra-Matic Cars): *See "Hydra-Matic Linkage Adjustment" in Transmission Section.*

Fuel Pump Pressure: 4-5¼ lbs. at carburetor.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Blocker type valve located between left bank exhaust manifold and cross-under pipe (diverts exhaust through bypass under intake manifold when valve closed).

►*CAUTION*—Valve assembly must be installed with coil toward left side and dampener weight toward rear of engine.

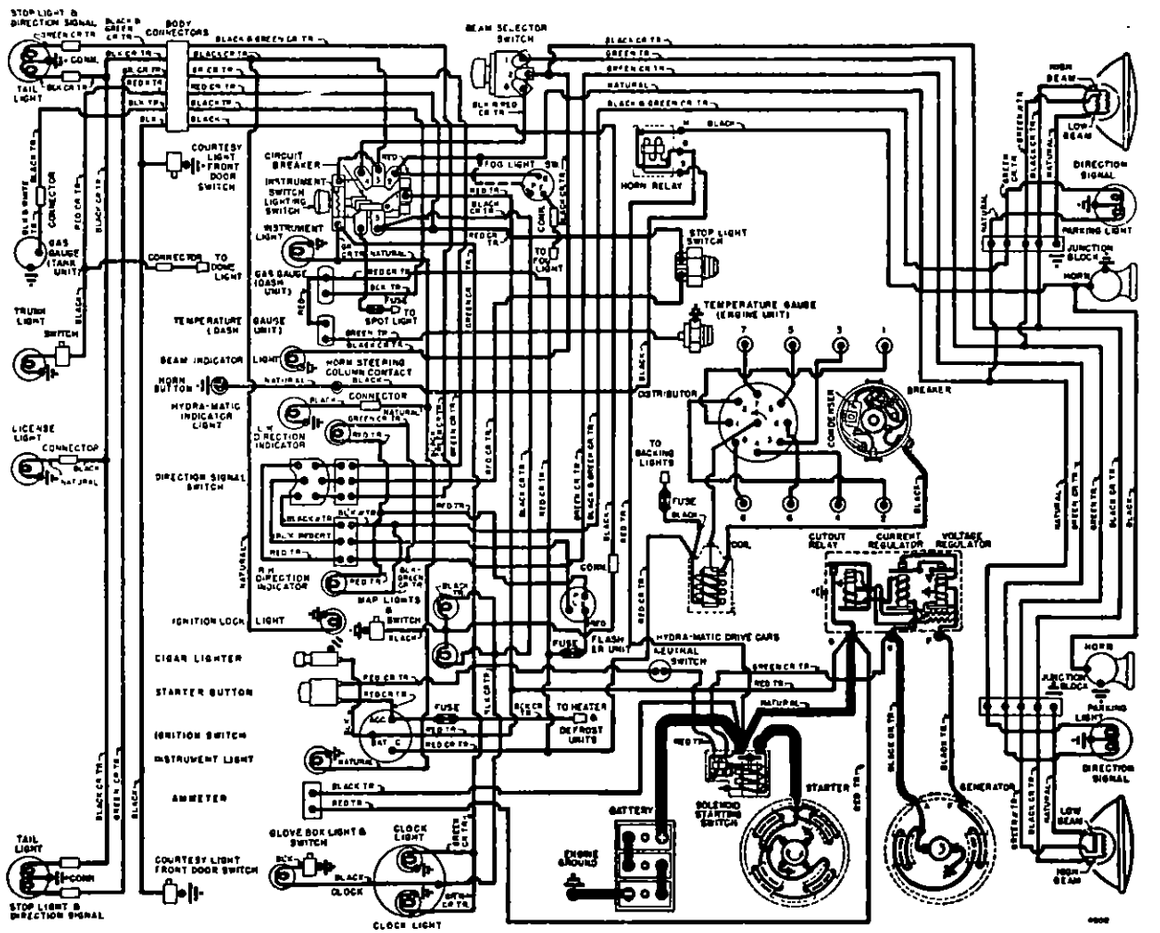
VALVE TAPPET CLEARANCE: None in service (automatic hydraulic type tappet take-up).

IGNITI N

►*DETONATION "PING" CORRECTION: See "Detonation Correction" in Cadillac Special Data.*

IGNITION SWITCH: Delco-Remy No. 1116462.
Ignition Lock—Briggs & Stratton or Delco.

CONTINUED ON NEXT PAGE



1949 MODELS

CONTINUED FROM PRECEDING PAGE

COIL: Delco-Remy 1115380. Mounted on manifold directly in front of distributor.

Ignition Current—2.2 amperes (engine running).

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy. (1949) No. 1110812, (1950) No. 1110819. Automatic and vacuum advance type with "center bearing" breaker plate.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

Breaker Gap—.013-.018" (new), .010-.015" (used points).

Cam Angle—31°±1½° (new), 28°±1½° (used). Test limits with .016" gap—21-30°.

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110812

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	375	0-3	750
6-7.5	1000	12-15	2000
12-14	1450	24-28	2900
17-19	1800	34-38	3600

Automatic Advance—1110819

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	400	0-3	800
8-10	1200	16-20	2400
14-16	1800	28-32	3600

Vacuum Spark Control: Delco-Remy No. 1116047 (1949 No. 1110812 Distr.), 1116055 (1950 No. 1110819 Distr.). Integral type on distributor.

Plunger Travel—7/32" (1949), 13/64" (1950).

Vacuum Advance—1116047

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6-8
6	12	9-11
10	20	13-15

Vacuum Advance—1116055

Start	0	4-6
10	20	12-16

Removal: Turn crankshaft to top dead center position for #1 piston (mark "/C" on vibration balancer in line with pointer on front cover), remove distributor cap, disconnect breaker lead and vacuum line, remove nut on hold-down clamp stud, hold rotor clockwise (against direction of rotation), lift distributor straight up to disengage drive tongue using care not to lose gasket or nick tongue.

▷**Installation Caution**—*If distributor drive gear disturbed* (by oil pump removal), see Oil Pump installation data.

IGNITION TIMING

▷*DETONATION "PING" CORRECTION: See "Detonation Correction" in Cadillac Special Data.*

Flywheel Degrees

Standard Setting①.....5° BTDC.

①—For fuel of 80 Octane Rating. See Manual Adjustment (below) for other fuels.

Timing Mark—"A/" on vibration balancer (located 5° ahead of dead center mark "/C" in line with pointer on right side of engine front cover.

Timing (Using Timing Light)—Loosen distributor hold-down clamp nut just enough to permit distributor adjustment, disconnect vacuum line (to prevent vacuum advance operating), connect timing light to #1 cylinder spark plug lead, direct light on vibration balancer from right side of engine. Warm up engine. With engine idling, rotate distributor until balancer mark "A/" lines up with pointer on front cover, tighten hold-down clamp nut to 15-18 ft. lbs. Recheck timing, connect vacuum line.

Manual Adjustment—If fuel of less than 80 Octane Rating used and detonation "ping" noted with std. setting (above), timing can be retarded to "/C" mark on balancer (top dead center), by loosening hold-down clamp nut and rotating distributor counter-clockwise (in direction of rotation).

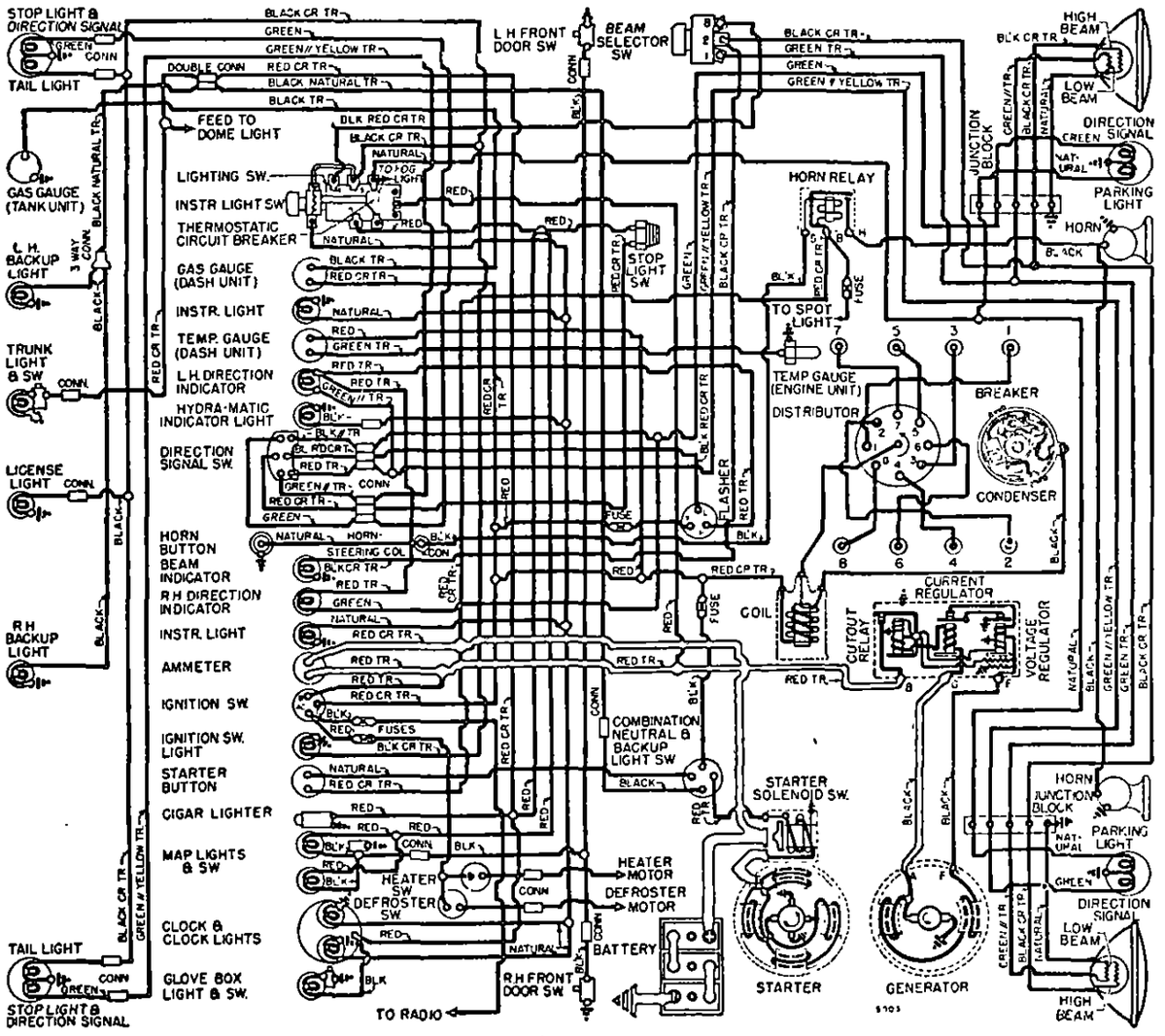
CARBURETOR

Carter WCD Models. 1¼" Dual (double barrel) downdraft types with automatic choke.

Model	Carter No.
1949 (First Cars)	682S
1949 (After 6566 Cars)	722S
1950	742S

▷*SLIGHT ACCELERATION STUMBLE (1949 Cars with first 722S Carburetors): See "Carter WCD" in Carburetor Section for recommended jet changes.*

▷*DETONATION COMPLAINTS (1950 Cars with 742S Carburetors): See "Carter WCD" in Carburetor Section and "Detonation Correction" in Cadillac Special Data. See Carburetor Section for complete data.*



1950 MODELS

Settings (Idle Setting, Float Level & Accelerating Pump): *See Tune-Up data.*
Metering Jets & Rods—*See "Carter Downdraft Carburetor Jet Specifications" in Carburetor Section.*

Fast Idle: Carter Dual (WCD) Carburetor type.
Setting—.020" throttle opening (Gauge T109-29 with choke valve tightly closed. Adjust by turning fast idle adjusting screw.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Dual Carburetor).
►**Setting**—*CAUTION—Three different settings used.*
(682S)—1 Point Rich.
(722S)—Centered (housing centered on scale).
(742S)—1 Point Lean.
See Carburetion Equipment Section for complete data.

Hydra-Matic Throttle Linkage Adjustment: *See "Cadillac Hydra-Matic Drive" in Transmission Section.*

CARB. EQUIPMENT

Air Cleaner: AC No. 1544432 (1949), No. 1544741 (1950). Oil-bath type.
Filter Element—AC No. 20.

Fuel Pump: AC. Combination fuel-and-vacuum pump.
Replacement Pump—AC No. 9143 (1949), No. 9535 (1950).
Pressure—4-5¼ lbs. (at carburetor).
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC. Electric type.
Dash Unit—AC No. 1517131.
Tank Unit—AC No. 1517068 (1949), 1517215 (1950).
See Carburetion Equipment Section for complete data.

BATTERY

STANDARD

Delco Type 17K-4—6 Volt, 17 Plate, 115 Ampere Hour Capacity (20 hour rate).
Starting Capacity—137 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.3 minutes.
Five Second Voltage—4.4 volts.
Grounded Terminal—Negative (—) terminal connected to engine at starter mounting flange.
Location—In engine compartment on right hand side (mounted outside frame side rail).

COMMERCIAL MODELS

Delco Type 19Q-4. 6 Volt, 19 Plate, 125 Ampere Hour Capacity (20 hour rate).
Starting Capacity—145 amperes for 20 minutes.
Zero Capacity—300 amperes for 5.0 minutes.
Five Second Voltage—4.5 volts.
Grounded Terminal & Location—Same as Std. models above.

STARTER

Delco-Remy	Starter No.	Armature No.
1949	1107945	820158
1950	1107969	1917855

►**Hydra-Matic Drive Car Starter**—Starter operative only with Selector lever in Neutral (Neutral Safety Switch connected in starter solenoid relay circuit).
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.7	80①
15 "	Lock	3.0	600

①—Includes current draw of starter switch.

Starting Switch: Delco-Remy Solenoid Switch No. 1118141 (1949), 1118148 (1950) mounted on starter and controlled by Pushbutton Switch No. 1996009 on instrument panel. **Hydra-Matic Cars**—Neutral Safety Switch, Delco-Remy No. 1997844 (1949), No. 1997871 (1950—includes Back-up switch) connected in series with pushbutton.
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy Model 1102700. Armature No. 1880550. Two brush type with voltage and current regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—40-46 amperes reached at 28 MPH. Actual charging rate controlled by regulator and dependent on battery condition.

Performance Data

	Amperes	Volts	R.P.M.
Cold	40①	8.0	2150

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs. each.
Field Current—1.87-2.0 amperes at 6.0 volts.

Belt Adjustment: Tighten belt to 24 ft. lbs. torque measured as follows: Loosen both pivot bolts and adjusting strap screw, install Fan Belt Adjusting Tool J-3046 on head of lower front mounting bolt, rotate tool until arm contacts edge of generator end plate. Use ⅞" socket and torque wrench on tool to pull generator out away from engine until 24 ft. lb. reading secured on wrench, tighten adjusting strap screw securely, then remove tool and tighten pivot bolts to 15-18 ft. lbs. torque.

Generator Charge Indicator (Ammeter): *TWO different types used as follows:*
1949—Cadillac No. 1501179. SHUNT type ammeter (connected in parallel with main charging line, carries only proportional part of charging current).
See "Shunt Type Ammeter" in Electrical Equipment Section.
1950—Cadillac No. 1501261. Conventional type ammeter connected in main charging line.

REGULATOR

Delco-Remy (1949) No. 1118300, (1950) No. 1118357. Voltage and current regulator.
►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator
Setting—40-46 amperes hot (set to 42 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—At center of panel above speedometer. Lighted when country (upper) beam in use.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—Left & Right Turn Indicator located at either end of speedometer dial. Lights when direction signal on same side of car operating (Stop Light flashes at rear).

Switches
Lighting—Delco-Remy No. 1995031 (1949), 1995047 (1950).
Instrument—Part of lighting switch (rheostat operated by rotating light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Map Light—Delco-Remy No. 1997848.
Direction Signal—Delco-Remy (1949-50 Synchro-mesh Cars) No. 1995541, (Later 1950 Synchro-mesh) No. 1995552, (1949-50 Hydra-Matic) No. 1995540, (Later 1950 Hydra-Matic) No. 1995551.
Back-up Light—Delco-Remy (1949-50 Synchro-mesh) No. 1997774 (1950 Hydra-Matic—combined with Neutral Safety Switch) No. 1997871.

MISC. ELECTRICAL

FUSES: Direction Signal—9 ampere. On Flasher under back of instrument panel on left side.
Defroster & Heater Motor—30 ampere. In lead from "Acc" terminal on ignition switch.
Back Up Light—20 ampere. In lead from switch terminal of ignition coil.

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy #1999621, 641 (Low Note), #1999622, 642 (High Note). Vibrator type, blended tone, twin horns operated by relay.
1949 NOTE—Welded type horns, Delco-Remy No. 1999649 (Low Note), 1999650 (High Note) also used.

Type	Current (at 6 volts)	Air Gap
1999621, 641 (Low)	19-21 amperes	.044-.049"
1999622, 642 (High)	18-20 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: New 90° V8 with Overhead Valves. Both cylinder blocks and crankcase cast Enbloc.
Bore—3 13/16" (3.8125-3.8145"). *See "Original Bore & Pistons" in Cadillac Special Data.*
Stroke—3⅜". **Displacement**—331 cu. ins.
Rated Horsepower—46.5.
Developed Horsepower—160 at 3800 RPM.
Compression Ratio—7.5-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Cadillac Special Data.*
CYLINDER HEAD INSTALLATION: *See Cadillac Special Data.*
ENGINE REMOVAL: *See Cadillac Special Data.*
OIL PAN REMOVAL: *See Cadillac Special Data.*

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

PISTONS: Aluminum alloy, three-ring, T-slot.
Weight—19.296 ozs. (without rings or pin).
Length—3 15/16".
Removal—Pistons and rods removed from above.
Clearance—.0020-.0022" at 70° measured ⅛" below upper cross slot and at right angles to piston pin.
Original Piston & Bore Sizes—*See Cadillac Special Data.*
Replacement Pistons: *See Cadillac Special Data.*
Fitting New Pistons: *See Cadillac Special Data.*
Installing Pistons: Mark "REAR" on piston pin boss toward right (#1, 3, 5, 7), toward left (#2, 4, 6, 8) of number on boss on connecting rod when facing this numbered boss end of rod. Install pistons with mark "REAR" toward rear of engine on all pistons.

PISTON RINGS: Two compression, one oil control ring per piston, all above pin. Oil ring slotted type with oil drain holes in groove.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	5/64"	.010-.020"	.0017-.0035"
Oil Contr. (#3)	3/16"	.010-.020"	.0013-.0026"

Installing Rings—Beveled inner edge of compression rings must be upward.

PISTON PIN: *CAUTION—1949 Pins are "Floating Type" with lock rings, 1950 Pins are Press Fit in Rod.*

▷**1949 PISTON PINS: Diameter** 1". **Length** 2¾". "Floating" type with lock ring in piston boss at each end of pin.

▷*CAUTION*—Install lock rings with tang pointing away from pin and toward piston head at 45° angle.
Pin Fit in Piston—.00005-.0001" at 70°F. (new), .0007" (worn limit). Pin should be light push fit at 70°F.
Pin Fit in Rod Bushing—.00005-.00035" (new), .0007" (worn limit). Pin should be hand-press fit at 70°F.

▷*CAUTION*—Do not attempt to replace pin bushing (hone for oversize pin or replace connecting rod).
Fitting New Pins—*See Cadillac Special Data.*

▷**1950 PISTON PINS: Diameter** 1". **Length** 3 3/32" Pin is press-fit in rod (floats in piston but lock rings not used).

▷*PIN REMOVAL & INSTALLATION CAUTION—Requires special tools and procedure. See "Piston Pins" in Cadillac Special Data.*
Pin Fit in Piston—.00005-.0001" clearance at 70°F. (new), .0007" (worn limit).
Pin Fit in Connecting Rod—25 ft. lbs. minimum torque on puller screw should be required to start pin in rod. *See Piston Pins in Cadillac Special Data.*

Replacement Pins: (1949) Pins furnished Std. size and .001", .003" Oversize. (1950) Fitted pins furnished with new pistons (not furnished separately).

CONNECTING ROD: Length 6⅝".
▷*CAUTION—1949 rods have bushing for piston pin, 1950 rods do not have bushing (pin is press fit).*
Crankpin Journal Diameter—2.2488-2.2493" (out-of-round limit .00025" maximum). Connecting rod diameter (without bearing) 2.3740-2.3745".
Lower Bearing—Removable steel-backed, Moraine-Durex lined type. No shims.
Clearance—.0005-.0020" (new), .0045" (worn limit).
Sideplay—.008-.014" (total both rods).
Bearing Adjustment: None. Replace bearings.
▷*CAUTION*—Tang on bearings must register with grooves in rod and cap and oil spit hole register with oil groove in bearing cap.
Installing Rods: Cylinder No. mark on rod and cap (on small boss on end) must be together and installed in same numbered cylinder with piston mark "REAR" toward rear of engine (lubrication groove in rod cap will be on upper side).

CRANKSHAFT: 5-bearing, integral counterweights.
Removal & Installation—*See Cadillac Special Data.*
Journal Diameters—2.4985-2.4990" all bearings (out-of-round limit .00025" maximum).
Bearings—Removable, steel-backed, Moraine-Durex lined type. No shims.
Clearance—.0008-.0025" (new), .005" (worn limit).
Bearing Adjustment: None. Replace bearings.
▷*CAUTION*—Bearing caps must not be interchanged. Install caps with marking numbers (not casting nos.) on left side and in order from front-to-rear
End Thrust: Taken by flanged rear (#5) bearing.
Endplay—.001-.005" (new), .010" (worn limit).
Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*
FLYWHEEL Removal & Installation—*See Cadillac Special Data.*

CAMSHAFT: 5-bearing, Cast-iron type with non-adjustable chain drive.
▷*CAUTION*—Handle shaft with care to avoid damage or misalignment. Check whenever removed.
Removal, Alignment & Installation—*See Cadillac Special Data.*
Bearing Type—Steel-backed, babbitt bushings.
Clearance—.001-.0022" (new), .004" (worn limit).
End Thrust: *NOTE*—Early 1949 Engines (Before Engine Unit Nos. 2-L-1102, 8-L-805, 9-L-51822) have a spring-loaded plug in forward end of camshaft bearing against thrust plate in cover. Later 1949 engines (after above nos.) and 1950 engines do not have this spring-loaded plug.
▷*1949 CAUTION*—On first engines, make certain that plug and spring in place in end of camshaft when installing chain case cover.
Timing Chain: Link-Belt side-guide type. Width 11/16". Pitch .500". Length 23" or 46 links.
Timing Chain Removal—*See Cadillac Special Data.*
Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1.745-1.755"	.3415-.3425"	4 5/8"
Exhaust	1.4325-1.4425"	.3405-.3415"	4 5/8"

	Seat Angle	Lift	Stem Clearance
Intake	44°②	.327"	.0005-.0025"①
Exhaust	44°②	.327"	.0015-.0035"①

①—New valves & guides. Worn limit .005" max.
②—New valves (valves in service can be refaced to 45° if seat width recommendations not exceeded).
▷*CAUTION*—Do not lap new valves in so that seat width is more than 1/64" (1° difference between valve and block angle to provide "hairline" contact.
▷**Valve Seat Width Recommendations**—3/64-1/16" (moderate speeds or city driving), 1/16-3/32" (high speed driving). Cut seat so that distance from outer edge to valve head flange edge not more than 1/32".
▷**Valve Stem Oil Seal**—New rubber oil seal installed in lower groove on valve stem (below valve keeper).
Oil Seal Installation—*See "Valve Removal & Installation" in Cadillac Special Data.*
Valve Removal & Installation: *See "Valves" in Cadillac Special Data.*
Valve Guides: Pressed in cylinder head with counterbored end down toward valve head. Use Remover tool J-3062 to drive old guides out toward top of head, Installer tool J-3066 to drive in new guides.
Valve Springs: Free Length 1.968".

	Pressure	Length
Valve Closed	57.5-62.5 lbs.	1.696"
Valve Open	130-140 lbs.	1.366"

▷*CAUTION*—Lower end of spring must seat in recess in cylinder head.
Valve Lifters: New hydraulic type which maintains zero tappet clearance in service.
See "Valve System" in Cadillac Special Data.
Valve Lifter Removal—*See Cadillac Special Data.*
Rocker Arms: No adjustment screws on rocker arms.
Rocker Arm Installation—*See Cadillac Special Data.*

VALVE TIMING

Tappet Clearance: None in service (hydraulic type lifters which maintain zero clearance).
Valve Timing: *See Camshaft Setting above.*
Intake Valves—Open 14° BTDC. Close 58° ALDC.
Exhaust Valves—Open 48° BLDC. Close 24° ATDC.
Valve Timing Check—Not practical to check in field. Manufacturer recommends removing timing chain cover and check timing marks.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and hydraulic valve lifters and to rocker arms.
Oil Pan Removal: *See Cadillac Special Data.*
Crankcase Capacity—5 quarts.
Normal Oil Pressure—25 lbs. min. at 30 MPH. 15 lbs. with engine idling.
Oil Pressure Regulator—Located on oil pump. Opens at 30 lbs. Non-adjustable.
Pressure Regulator Spring—Free length 2 25/64". Pressure should be 5¾-6¼ lbs., at 1 13/32".
Oil Pump: Gear type. In crankcase at rear of engine.
Oil Pump Overhaul: *See Cadillac Special Data.*
▷**Pump Installation Caution**—Flat on upper end of pump driveshaft must engage flat in distributor drive gear in valve compartment. If drive shaft and gear disturbed when pump removed, install pump and driveshaft with distributor gear out, turn crankshaft until #1 piston at TDC entering power stroke, with vibration dampener mark "C" at indicator, install distributor drive gear on end of pump drive shaft engaging shaft flat in gear, turn gear and shaft until flat is on right side and parallel with engine centerline, then mesh gear with camshaft gear. Distributor drive slot in upper end of gear should be approx. 15° to right of engine centerline.
Oil Pressure Gauge: AC No. 1507364. Not electrical.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap. Re-circulation with thermostat closed provided by by-pass in pump body.
Capacity—18 qts. (1 qt. addt'l with heater).
Pressure Cap—AC No. 850559. Radiator Filler Cap. Opens at 12-15 lbs.
Radiator Removal: *See Cadillac Special Data.*
Water Pump: Packless type with ball bearing shaft.
See Water Pump Section for complete data.
Thermostat: Harrison type in water outlet connection
Setting (Std. Type)—Begins to open at 162-168°F. Fully open at 190-195°F.
Setting (High Temp. Type)—Begins to open at 177-183°F. Fully open at 205-210°F.
Temperature Gauge: AC. Electric type.
Dash Unit—AC No. 1512143.
Engine Unit—AC No. 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Long 11CF-10½TI (60S, 61, 62), 11CF-TI (75, 86). Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven type. I.D. 7" (all), O.D. 10½" (60S, 61, 62), 11" (75, 86). Thickness .137" (all).

Pedal Adjustment: Pedal free travel ⅞-1⅛". Adjust by turning nut on connector rod at clutch fork.

Removal: Remove transmission (see Transmission Removal), remove starter, remove lower flywheel housing, remove clutch release yoke-to-lever rod. Remove flywheel housing with clutch release yoke, release bearing, and bearing retainer as an assembly. Punch mark flywheel and clutch cover to insure correct re-installation. Take out six clutch cover mounting screws (CAUTION—turn all screws out evenly), lift clutch assembly out.

►**Driven Member Installation Caution**—Oil guard must be toward rear.

►**Replacement Clutch Caution**—Clutches furnished with locking pin or block at each release lever. *Pins must be removed when clutch installed.*

Clutch Balancing: *See "Clutch Notes" in Cadillac Special Data.*

TRANSMISSION
SYNCHRO-MESH

Own Make. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse), all helical gear type with remote shift control.
See Transmission Section for complete data.

Transmission Control: Remote control type.
See Transmission Section for complete data.

Removal: Support engine on stand, Tool No. J-3068, or use jack under rear end of oil pan (use block of wood on jack to prevent damage to pan). Disconnect rear universal joint, remove propeller shaft. Disconnect speedometer cable and shift rods at levers on transmission case. Disconnect rear engine support at transmission extension housing and remove cross-member on which support mounted. Loosen transmission mounting capscrews (CAUTION—support transmission so that it does not hang on driveshaft in clutch), remove screws, move transmission straight back to free shaft from clutch (CAUTION—plug clutch connection shaft oil drain hole as soon as accessible to prevent loss of lubricant), lower front end of transmission and remove from car.

HYDRA-MATIC DRIVE TRANSMISSION

Own Make. Consists of Fluid Coupling and automatic self-shifting four-speed transmission.

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level in transmission every month or every 1000 miles. Drain and refill after first 6000 miles and every 25000 miles thereafter.

Draining & Refilling—*See "Hydra-Matic Drive" in Transmission Section.*

Capacity—Approximately 11 qts. (refill).

Checking Fluid Level—Clean all sand, lint, and dirt away from sheet metal cover in floor under right front corner of front compt. rug. Run engine for approx. 1½ minutes at speed equivalent to 20 MPH. with selector lever in "Neutral". Remove sheet metal cover from floor for access to dip stick, reduce engine speed to normal idling speed, measure fluid level as indicated on dipstick, add fluid as required to bring level up to "FULL" mark on dipstick.

►*CAUTION—Engine must be running at slow idle speed with selector lever in "Neutral" when checking Hydra-Matic Drive fluid level.*

Linkage Adjustment: *See "Hydra-Matic Linkage Adjustment" in Transmission Section.*

►*OTHER HYDRA-MATIC DRIVE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics Model 3C. Needle bearing types, two used (3 on Comm'l Cars with center bearing).

Pinion Bearing Pre-load Adjustment: Should be adjusted whenever nut on end of pinion shaft disturbed (for universal yoke or oil seal replacement). *See Rear Axle Section for complete data.*

Propeller Shaft (Pass. Cars): One shaft used (no slip joint—front universal yoke slides on transmission mainshaft in extension housing).
(Commercial Cars)—Two shafts used with center bearing at rear of front shaft. Slip joint provided at rear end of rear shaft.

REAR AXLE

Own Make. Hypoid gear, semi-floating type with Hotchkiss Drive.
See Rear Axle Section for complete data.

►*CAUTION*—Manufacturer recommends that Carrier Assembly be serviced by replacement.

►**Axle Identification**—Axles marked by number stamped on bottom of differential case below center of pinion shaft as indicated in ratio table below.

Series	Synchro-mesh Trans. Ratio	Mark	Hydra-Matic Drive Ratio	Mark
60S, 61, 62	3.77-1	None	3.36-1	6
75	4.27-1	4	3.77-1	7
86 ('49)	4.27-1	4	3.77-1	①7
86 ('50	4.27-1	4	4.27-1	②4

①—Also has blue paint mark at spring seats.
②—Change from 3.77-1 at Eng. No. 6730 (this axle also has daub of pink paint as well as "4" mark).

►**Pinion Bearing Pre-load Caution**—Must be readjusted each time pinion shaft nut loosened. *See "Cadillac Hypoid" in Rear Axle Section.*

Backlash—.003-.010" Screw Adjustment.

Removal: Disconnect propeller shaft at rear universal joint, lower shaft out of the way. Drain rear axle. Remove axle shafts (see below). Remove nuts and washers on carrier mounting bolts, lift out carrier

Axle Shaft Removal: Remove wheel. Take out two screws holding brake drum on axle shaft flange, remove drum. Remove nuts and lockwashers from four bolts holding bearing retainer and backing plate on axle housing, use Puller J-942-1 and Slide Hammer Tool J-2619 to remove axle shaft.

►*CAUTION*—Use care not to damage axle shaft oil seal when sliding shaft out and do not disturb position of backing plate on housing.

Wheel Bearings: Sealed ball-bearing type.

►*CAUTION*—Check bearings for loss of lubricant when shaft removed. If bearing spins freely indicating loss of lubricant, install new bearing.

SHOCK ABSORBERS

(1949) Delco—Double action, opposed piston, hydraulic types (front & rear). Front shock absorbers are part of front suspension system.
(1950) Delco—Direct acting hydraulic type (front and rear). Front shock absorbers are located within the front coil springs.

1949 Shock Absorbers

	Front	Rear
60S, 61 62	1946-G,H	1754-N,P
75	1946-G,H	2007-N,P
86 Comm'l	1946-G,H	1751-V,W

1950 Shock Absorbers

	Front	Rear
60S, 61, 62	1075-F	1071-Y
75, 86	968-G	961-BB

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs. *NOTE*—1949 shock absorbers form upper control arms, 1950 cars have separate upper control arms and direct acting shock absorbers located within the coil springs.
See Front Suspension Section for complete data.
NOTE—Specifications below correct with car at curb weight (car unloaded with full gas tank).
Kingpin Inclination—5°51' crosswise (0° Camber).
Caster—Neg. ½° to Pos. ½°. Equal within ½°.
Camber—Neg. ⅜° to Pos. ⅜°. Equal within ½°.
Toe In—1/32-3/32" (at rest). Loosen clamp bolts, turn adjusters at outer end of each rod equally.
Steering Geometry (Toe-out on turns)—Outer wheel turned 20°. Inner wheel as follows:

	Left Turn	Right Turn
60S, 61 62	25°25'	24°42'
75, 86 Comm'l	24°7'	23°6'

STEERING GEAR

Saginaw. Ball bearing Worm-and-Nut type (re-circulating ball type).
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-servo, Single Anchor type without Eccentric Adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Centrifuse (cast iron, steel back). Diameter (All 1949, 1950 75 & 86) 12" (11.995-12.005"), (1950 60S, 61, 62) 11" (10.995-11.005").
NOTE—Drum out-of-round limit .007". Remachining limit (to true up drums) .060". Use .030" oversize lining for remachined drums.
Lining—Molded type (all models).

	Width — 1949 Lining — Length			
	Frt. Wheel	Rear Wheel	Fwd. Shoe	Rev. Shoe
1949 60S, 61, 62	2¼"	2¼"	11 17/32"	12 31/32"
1949 75	2¼"	2½"	11 17/32"	12 31/32"
1949 86	2¼"	2½"	12 31/32"	12 31/32"

	Width — 1950 Lining — Length (All Whls.)	Fwd. Shoe	Rev. Shoe
1950 60S, 61, 62	2½"	10.55"	11.90"
1950 75, 86	2½"	12.92"	12.92"

Fwd.—Forward or Primary (front) shoe.
Rev.—Reverse or Secondary (rear) shoe.
Lining Thickness—3/16" (All models).
Clearance—.007-.010" at each end of each shoe or .015" at both ends of secondary shoe with primary shoe forced out against drum.

Hand (Parking) Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type.
See Miscellaneous Section for complete data.

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

HOOD LOCK ADJUSTMENT, HOOD REMOVAL & INSTALLATION: *See Cadillac Special Data.*

MODEL IDENTIFICATION

ENGINE & SERIAL NUMBER: Stamped on the upper right corner on the front face of the right hand block and on the right frame side bar just behind the engine support bracket.
Identification—First two figures indicate year, third and fourth figures indicate model (last five figures are numbered consecutively regardless of series).

Series	1951 First Numbers	1952
60S Special	51600000	526000000
61	516100000	①
62	516200000	526200000
75	517500000	527500000
86 Comm'l	518600000	528600000

①—This model discontinued.

ENGINE UNIT NUMBER: Stamped on top of crankcase, behind left hand block (behind distributor).

1951 Numbers	Engine Unit Numbers Std. Trans.	Hydramatic
60S, 61, 62, 75		9-N-1 Up
86	2-N-1 Up	7-N-1 Up

1952 Numbers	Engine Unit Numbers Hydra-Matic	②Power Steering
60S, 62	9R	4R
75	9R③	4R
86	7R③	5R

②—Hydra-Matic Cars with Power Steering.
③—2R for cars with Synchro-mesh Transmission.

▷*OVERSIZE BORE NOTE—Mark ° preceding Engine Unit No. indicates pistons & cylinders .010" O.S.*

TUNE-UP

▷*DETONATION "PING" CORRECTION: See "Detonation Correction" in Cadillac Special Data.*

▷*POOR GASOLINE MILEAGE (1951-52 Cars with Rochester Carburetors): See Carburetor Section for installation of improved type Accelerator Pump Boot.*

▷*ENGINE STALLING DURING WARM-UP (1951 Cars with Rochester Carburetor): See Carburetor TUNE-UP data for latest setting recommendations.*

▷*STALLING ON QUICK STOPS OR THROTTLE STICKING (1952 Cars with Carter Carburetors): See "Carter WCFB" in Carburetor Section for correction.*

▷*CUTTING OUT ON SHARP TURNS OR STEEP HILLS (1952 Cars with Rochester Carburetor): See "Rochester 4GC" in Carburetor Section.*

▷*ROUGH IDLING (1952 Cars with Rochester Carburetors): See "Rochester 4GC" in Carburetor Section for recommended changes.*

COMPRESSION PRESSURE: 120-140 lbs. at cranking speed (Std. 7.5-1 Cast Iron head).

VACUUM READING: Steady 20-21" idling at 375 RPM. (for Hydra-Matic), 400 RPM. (with Synchro-Mesh).

FIRING ORDER: 1-8-4-3-6-5-7-2. (Cyl. Nos. 1-3-5-7 Left Bank, 2-4-6-8 Right Bank, front-to-rear). See diagram.

SPARK PLUG GAPS: .033-.038".
Plugs—AC No. 48X *(NOTE—"X" indicates special terminal nut).* Use No. 46-5 for high-speed operation.

▷*CAUTION—Tighten plugs to 20-25 ft. lbs. torque.*

DISTRIBUTOR: Breaker Gap—.013-.018" (new), .010-.015" (used points).
Cam Angle—31°±1½° (new), 28°±1½° (used). Test limits with .013" gap 28-34°.

▷*CAUTION—Manufacturer recommends final check with feeler gauge or dial indicator if dwell-meter used to set contact gap.*
Breaker Arm Spring Tension—19-23 ozs.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115380. Mounted on manifold directly in front of distributor.
Ignition Current—2.2 amperes (engine running).

CONDENSER: Delco-Remy No. 1869704.
Condenser Capacity—.18-.25 microfarad.

IGNITION TIMING: 5° BTDC (80 Octane Fuel).
Timing Procedure—*See Ignition Timing.*
Timing Mark—"A/" on harmonic balancer at front of engine lined up with pointer on front cover (for fuel of 80 Octane Rating).

▷*CAUTION*—If fuel of less than 80 Octane Rating used, and detonation ping noted, timing may be retarded to "/C" mark on balancer (top dead center).

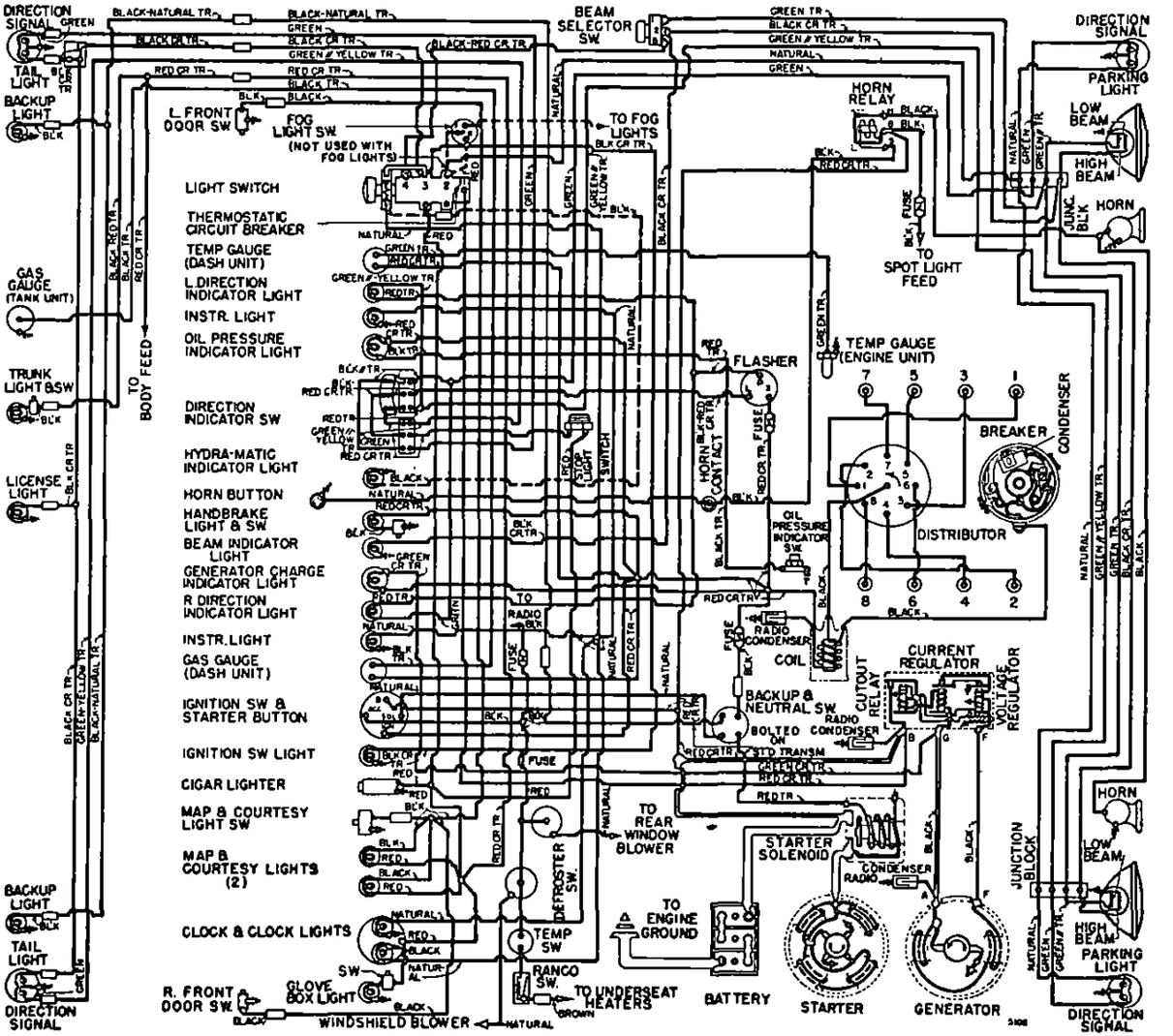
▷*IGNITION TIMING CAUTION—Timing should be checked for both No. 1 and No. 6 cylinders. First, set timing at "A" mark when checking on No. 1 cylinder, then check No. 6 cylinder. If light flashes before or after the "A" mark, set the distributor to divide the variance.*

CARBURETION

1951 CARTER 2-BARREL

Carter WCD, No. 845S. Dual downdraft type.

▷*DETONATION COMPLAINTS (Cars with 845S Carburetor). See "Carter WCD" in Carburetor Section and "Detonation Correction" in Cadillac Special Data.*



1951 MODELS

Idle Setting—Both screws ¾-1¼ turns open. Turn screws out for richer mixture and set for smooth idle with warm engine.

Idle Speed—375 RPM (Hydra-Matic Trans.), 400 RPM (Synchro-mesh Trans.) with engine warm and Hydra-Matic selector lever in "Dr" position.

►*CAUTION—Use tachometer to set idling speed.*

Float Level—11/64" from top of each float to gasket seat on cover with valve seated (invert to check). Fuel level even with bottom of inspection plug hole on side of bowl with engine idling.

Accelerating Pump—Outer hole (long stroke) normal setting.

Fast Idle Setting: .020" throttle opening (Gauge T109-29) with choke valve tightly closed. Adjust by turning fast idle adjusting screw.

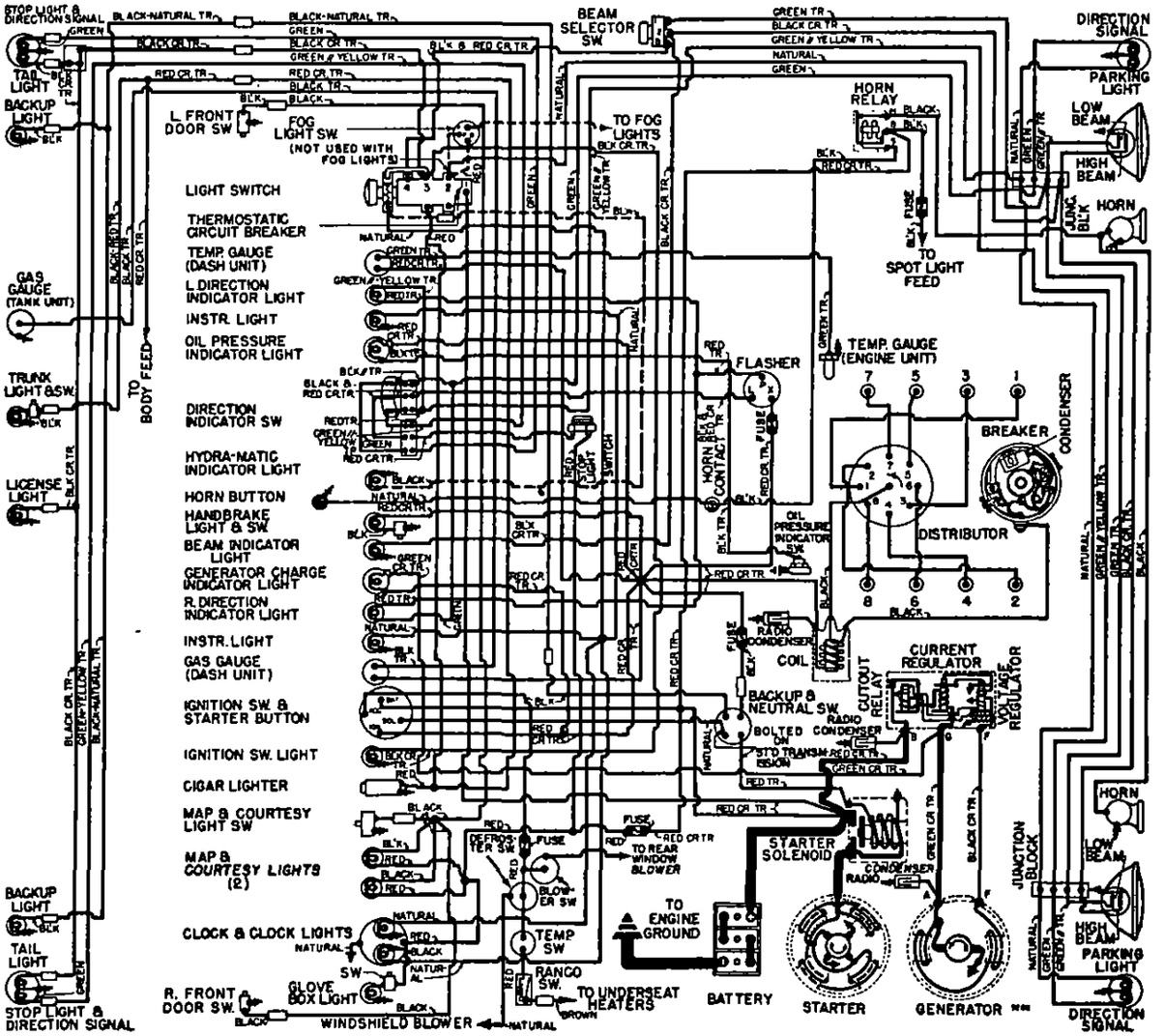
Choke Setting: *CAUTION—Choke Modifier must be adjusted as part of choke setting adjustment.*

Carter (845S)—1 Point Rich. See Choke Modifier.

Choke Modifier Setting (845S): Disconnect throttle-to-choke rod, set choke 1 Point Rich (loosen retainer screws, rotate cover, tighten screws). Loosen modifier arm clampscrew, rotate metal pointer until it is in line with fixed pointer on cover, hold pointer in this position, rotate modifier arm until scribed line on face of arm is vertical, tighten clampscrew.

Throttle Linkage Adjustment (Hydra-Matic Cars): *See Hydra-Matic Linkage Adjustment in Transmission Section.*

Fuel Pump Pressure: 4-5¼ lbs. at carburetor.



1952 MODELS

1951 ROCHESTER 2-BARREL

Rochester BB, No. 7004200. Dual downdraft type.

►*POOR GASOLINE MILEAGE (Caused by Air Leaks due to cracking of Accelerator Pump Boot): See Carburetor Section for installation of improved boot.*

►*ROCHESTER CARBURETOR SETTING CHANGES (To Prevent Possibility of Stalling During Warm-up): Use latest settings as given below.*

Idle Setting—Screw idle adjustment needles and springs into throttle body until they are finger tight. Back out screw 1½ turns as a temporary idle adjustment, make final adjustment for smooth idling after engine warmed up.

Idle Speed—375 RPM (Hydra-Matic Trans.), 400 RPM (Synchro-mesh Trans.), with engine warm and Hydra-Matic lever in "Dr" position.

►*CAUTION—Use tachometer to set idling speed.*

Float Level: Use Gauge No. J-4715 installed over floats and resting on bowl cover gasket (cover and float assembly inverted) with locating tangs inserted in secondary venturis. Adjust each float so that it is centered in gauge cutout and just touches upper edge of cutout. Check and adjust Float Travel or Drop by holding cover and float assembly upright so that floats drop to bottom of travel, measure from underside of cover gasket to bottom of float which should be 1¾". Adjust by bending tang at rear of float.

Accelerating Pump—No seasonal adjustment.

Fast Idle Setting: With engine warm, rotate fast idle cam so that fast idle screw rests on high step of cam, adjust screw for engine speed of 1500 RPM.

Choke Setting: *CAUTION—Choke Modifier must be adjusted as part of choke setting.*

Setting—Centered (supersedes 2 Points Lean)..

Choke Modifier Adjustment—Back off idle stop screw and fast idle screw so throttle valves are fully closed, and loosen modifier lever retaining screw. Rotate index pointer counter-clockwise until choke valve closes. Index pointer should be close to scribed line on the thermostat cover at 75°. Set index pointer at scribed line (centered setting). With modifier lever pointing away from fuel inlet and throttle valve closed, tighten screws.

Throttle Linkage Adjustment (Hydra-Matic Cars): *See Hydra-Matic Linkage Adjustment in Transmission Section.*

Fuel Pump Pressure: 4-5¼ lbs. at carburetor.

1952 CARTER 4-BARREL

Carter WCFB, No. 896S. Four-barrel downdraft type with automatic choke. *See "Carter WCFB 4-Barrel" in Carburetor Section for complete data.*

►*ENGINE STALLING ON QUICK STOPS & SECONDARY THROTTLE STICKING CORRECTION: See Carburetor Section.*

►*FLOAT SETTING CHANGE & FLOAT PARTS PRODUCTION CHANGE: See Carburetor Section.*

Idle Speed—375 RPM. with selector lever in "Dr" position (Hydra-Matic Cars), 400 RPM. (Synchro-mesh Cars) with warm engine.

Other Settings—*See Carburetor Section.*

1952 ROCHESTER 4-BARREL

Rochester 4GC, No. 7004500. Four-barrel downdraft type with automatic choke. *See "Rochester 4GC 4-Barrel" in Carburetor Section for complete data.*

►*ENGINE CUTTING OUT ON SHARP TURNS OR STEEP HILLS: See Carburetor Section.*

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▷*ROUGH IDLING (Caused by Improper Seating of Secondary Throttle Valves): See Carburetor Section.*

▷*POOR GASOLINE MILEAGE (Caused by Air Leaks due to cracking of Accelerator Pump Boot): See Carburetor Section for installation of improved type boot.*

Idle Speed—375 RPM. with selector lever in "Dr" position (Hydra-Matic Cars), 400 RPM. (Synchro-mesh Cars) with warm engine.

Other Settings—*See Carburetor Section.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Blocker type valve located between left bank exhaust manifold and cross-under pipe (diverts exhaust through bypass under intake manifold when valve closed).

▷*CAUTION*—Valve assembly must be installed with coil toward left side and dampener weight toward rear of engine.

VALVE TAPPET CLEARANCE: None in service (automatic hydraulic type tappet take-up).

IGNITION

▷*DETONATION "PING" CORRECTION: See "Detonation Correction" in Cadillac Special Data.*

IGNITION SWITCH: Delco-Remy No. 1116470. Combination switch for ignition key starting.

COIL: Delco-Remy 1115380. Mounted on manifold directly in front of distributor.

Ignition Current—2.2 amperes (engine running).

CONDENSER: Delco-Remy Part No. 1869704.

Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy (1950) No. 1110820, (1951 to Eng. No. 13075) No. 1110829, (1951 beginning Eng. No. 13076) No. 1110833. Automatic and vacuum advance with "center bearing" breaker plate.

See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

Breaker Gap—.013-.018" (new), .010-.015" (used).

Cam Angle—31° ± 1½° (new), 28° ± 1½° (used). Test limits with .013" gap 28-34°.

▷*CAUTION—Car manufacturer recommends final check with feeler gauge or dial indicator if dwell-meter used to set contact gap.*

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110820

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	400	0-3	800
8-10	1200	16-20	2400
14-16	1800	28-32	3600

Automatic Advance—1110829

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	500	1-4	1000
7.5-9	1050	15-18	2100
12-14	1550	24-28	3100
15-17	1850	30-34	3700

Automatic Advance—1110833

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	475	0-3	950
7-8.5	1100	14-17	2200
15-17	1850	30-34	3700

Vacuum Spark Control: Delco-Remy (1951 1110820 Distr.) No. 1116056, (1952 1110829 & 1110833 Distr.) No. 1116069. Integral type linked to breaker plate.

Plunger Travel—7/32" (1116056), ¼-17/64" (1116069)

Vacuum Advance—1116056

Distr. Degrees	Eng Degrees	Vacuum (" of HG)
Start	0	6-8
9-11	18-22	15

Vacuum Advance—1116069

Distr. Degrees	Eng Degrees	Vacuum (" of HG)
Start	0	6-8
10-11.5	20-23	16

Removal: Turn crankshaft to top dead center position for #1 piston (mark "/C" on vibration balancer in line with pointer on front cover), remove distributor cap, disconnect breaker lead and vacuum line, remove nut on hold-down clamp stud, hold rotor clockwise (against direction of rotation), lift distributor straight up to disengage drive tongue using care not to lose gasket or nick tongue.

▷**Installation Caution**—If distributor drive gear disturbed, see Oil Pump Installation data.

IGNITION TIMING

▷*DETONATION "PING" CORRECTION: See "Detonation Correction" in Cadillac Special Data.*

Standard Setting.....5° BTDC

Timing Mark—"A/" on vibration balancer (located 5° ahead of dead center mark "/C") in line with pointer on right side of engine front cover.

▷*IGNITION TIMING CAUTION—Timing should be checked for both No. 1 and No. 6 cylinders. First, set timing at "A" mark when checking on No. 1 cylinder, then check No. 6 cylinder. If light flashes before or after the "A" mark, set the distributor to divide the variance.*

Timing (Using Timing Light)—Loosen distributor hold-down clamp nut just enough to permit distributor adjustment, disconnect vacuum line (to prevent vacuum advance operating), connect timing light to #1 cylinder spark plug lead, direct light on right side of vibration balancer. Idle engine, rotate distributor until mark "A/" lines up with pointer on front cover, tighten hold-down clamp nut to 15-18 ft. lbs. Recheck timing, connect vacuum line.

Manual Adjustment—If detonation "Ping" noted with std. setting (above), timing can be retarded to "/C" mark on balancer (top dead center), by loosening hold-down clamp nut and rotating distributor counter-clockwise (in direction of rotation).

CARBURETOR

1951 CARTER 2-BARREL

Carter WCD, No. 845S. 1¼" Dual, downdraft type with automatic choke and Choke Modifier.

▷*DETONATION COMPLAINTS (Cars with 845S Carburetor): See "Carter WCD" in Carburetor Section and "Detonation Correction" in Cadillac Special Data. See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level & Accelerating Pump): *See Tune-Up data.*

Metering Jets & Rods: *See "Carter Downdraft Carburetor Jet Specifications" in Carburetor Section.*

Fast Idle: Carter Dual (WCD) Carburetor type.

Setting—.020" throttle opening (Gauge T109-29) with choke valve tightly closed. Adjust by turning fast idle adjusting screw.

See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Dual Carburetor). *CAUTION—Choke Modifier must be adjusted as part of choke setting.*

Setting—1 Point Rich.

Choke Modifier Setting (845S): Disconnect throttle-to-choke rod, set choke 1 Point Rich (loosen retainer screws, rotate cover, tighten screws). Loosen modifier arm clampscrew, rotate metal pointer until it is in line with fixed pointer on cover, hold pointer in this position, rotate modifier arm until scribed line on face of arm is vertical, tighten clampscrew.

See Carburetion Equipment Section for complete data.

Hydra-Matic Throttle Linkage Adjustment: *See "Cadillac Hydra-Matic Drive" in Transmission Section.*

1951 ROCHESTER 2-BARREL

Rochester Model BB, No. 7004200. Dual downdraft type with automatic choke and Choke Modifier.

▷*POOR GASOLINE MILEAGE (Caused by Air Leaks due to cracking of Accelerator Pump Boot): See Carburetor Section for installation of improved pump boot.*

▷*ROCHESTER CARBURETOR SETTING CHANGES (To Prevent Possibility of Stalling During Warm-up): See Tune-Up data for latest setting specifications. See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level & Accelerating Pump): *See Tune-Up Data.*

Metering Jets: *See "Rochester Carburetor Jet Specifications" in Carburetor Section.*

Throttle Return Check—(Rochester): *See Carburetion Equipment Section for complete data.*

Return Check Setting—Align adjusting screw on return check plunger with contact arm on throttle lever and bend return check mounting bracket, as necessary, to center adjusting screw on radius of contact arm. Open throttle valves partly by inserting 27/64" drill rod between pump rocker arm and return check mounting bracket on top of bowl cover (locate drill against head of air horn screw). Set plunger adjusting screw so that it just contacts throttle arm.

Automatic Choke: Rochester Dual "BB" type. *CAUTION—Choke Modifier must be adjusted as part of choke setting.*

Setting—Centered (supersedes 2 Points Lean setting originally specified).

Choke & Modifier Setting—Back off idle stopscrew and fast idle screw so throttle valves are fully closed, and loosen modifier lever retaining screw. Rotate index pointer counter-clockwise until choke valve closes. Index pointer should be close to scribed line on thermostat cover at 75°F. Set and hold index pointer at scribed line (centered setting). With modifier lever pointing away from fuel inlet and with throttle valves closed, tighten retainer screws.

See Carburetion Equipment Section for complete data.

Fast Idle: Rochester Dual "BB" type.

Setting—After choke modifier adjustment made (above) and with engine warm, rotate fast idle cam so that fast idle screw rests on high step of cam, adjust screw for engine speed of 1500 RPM.

See Carburetion Equipment Section for complete data.

Hydra-Matic Throttle Linkage Adjustment: *See "Cadillac Hydra-Matic Drive" in Transmission Section.*

1952 CARTER 4-BARREL

Carter WCFB, No. 896S. Four-barrel downdraft type with automatic choke. *See "Carter WCFB 4-Barrel" in Carburetor Section for complete data.*

▷*ENGINE STALLING ON QUICK STOPS & SECONDARY THROTTLE STICKING CORRECTION: See Carburetor Section.*

►*FLOAT SETTING CHANGE & FLOAT PARTS PRODUCTION CHANGE: See Carburetor Section.*

Idle Speed—375 RPM. with selector lever in "Dr" position (Hydra-Matic Cars), 400 RPM. (Synchro-mesh Cars) with warm engine.

Other Settings—*See Carburetor Section.*

1952 ROCHESTER 4-BARREL

Rochester 4GC, No. 7004500. Four-barrel downdraft type with automatic choke. *See "Rochester 4GC 4-Barrel" in Carburetor Section for complete data.*

►*ENGINE CUTTING OUT ON SHARP TURNS OR STEEP HILLS: See Carburetor Section.*

►*ROUGH IDLING (Caused by Improper Seating of Secondary Throttle Valves): See Carburetor Section.*

►*POOR GASOLINE MILEAGE (Caused by Air Leaks due to cracking of Accelerator Pump Boot): See Carburetor Section for installation of improved type boot.*

Idle Speed—375 RPM. with selector lever in "Dr" position (Hydra-Matic Cars), 400 RPM. (Synchro-mesh Cars) with warm engine.

Other Settings—*See Carburetor Section.*

CARB. EQUIPMENT

Air Cleaner: AC No. 1544741 (1951), No. 1551561 (1952). Heavy duty oil-bath type.
Filter Element—AC No. 20 (1951), 28 (1952).

Fuel Pump: AC. Combination fuel and vacuum type.
Replacement Pump—AC No. 9535 (1951 to Eng. No. 67000), No. 9648 (1951 after above No. and 1952).
Pressure—4-5¼ lbs. (at carburetor).
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517657.
Tank Unit—AC No. 1517215 (all models).
See Carburetion Equipment Section for complete data.

BATTERY

STANDARD

Delco Type 17K4 (1951), Type 17K6 (1951-52). 6 volt, 17 plate, 115 ampere hour (20 hour rate).
Starting Capacity—137 amperes for 20 minutes.
Grounded Terminal—Negative (—) terminal connected to engine at starter mounting flange.
Location—In engine compartment on right hand side (mounted outside frame side rail).

COMMERCIAL MODELS

Delco Type 19Q4 (1951), Type 19Q6 (1951-52). 6 volt, 19 plate, 125 ampere hour (20 hour rate).
Starting Capacity—145 amperes for 20 minutes.
Grounded Terminal & Location—Same as Std. models above.

STARTER

Delco-Remy Model 1107969. Armature No. 1917855.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.7	80①
15 "	Lock	3.0	600

①—Includes current draw of starter switch.

Starting Switch: Delco-Remy Solenoid Switch No. 1118148 mounted on starter and controlled by Ignition & Starting Switch No. 1116470 (hold key full right against spring tension for starting).

►**Hydra-Matic Drive Car Starter**—Starter operative only with selector lever in Neutral "N", (Neutral Safety Switch connected in starter solenoid circuit).
Neutral Safety Switch (Hydra-Matic Drive Cars only)—Delco-Remy (1951) 1997879, (1952) 1998012.
NOTE—These switches are combined with backing light switch (separate backing light switch used on cars with Synchro-mesh Transmission).
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy	Generator No.	Armature No.
1951 (First)	1102700	1880550
1951 (Later)	1102770	1921621
1952	1102781	1921621

►*GENERATOR PRODUCTION CHANGE 1951—Beginning with Engine No. 68721 a new generator and regulator (rated at 45 amperes) was used in production. CAUTION—45 AMPERE REGULATOR MUST NOT BE USED WITH PREVIOUS TYPE 40 AMPERE GENERATOR.*

Two brush type with voltage and current regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—40-46 amperes reached at 28 MPH. Actual charging rate controlled by regulator and dependent on battery condition.

Performance Data

	Amperes	Volts	R.P.M.
1102700 (Cold)	40①	8.0	2150
1102770, 81 (Cold)	45①	8.0	2450

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs. each.
Field Current—1.87-2.0 amperes at 6.0 volts.

Belt Adjustment: Tighten belt to 24 ft. lbs. torque measured as follows: Loosen both pivot bolts and adjusting strap screw, install Fan Belt Adjusting Tool J-3046 on head of lower front mounting bolt, rotate tool until arm contacts edge of generator end plate. Use ⅞" socket and torque wrench on tool to pull generator out away from engine until 24 ft. lb. reading secured on wrench, tighten adjusting strap screw, remove tool and tighten pivot bolts to 15-18 ft. lbs. torque.

Generator Charge Indicator: Consists of red light to right of mileage indicator on instrument panel. Lights when ignition turned on, goes out when generator begins to charge.

REGULATOR

Delco-Remy	Regulator No.	For Generator
1951 (First)	1118357	1102700
1951 (Later)	1118727	1102770
1952	1118725	1102781

►*REGULATOR PRODUCTION CHANGE 1951—45 amp. regulator and generator went into production beginning Engine No. 68721. DO NOT USE 45 AMPERE REGULATOR WITH PREVIOUS TYPE 40 AMPERE GENERATOR.*

►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator

Setting (1118357)—40-46 amperes hot (set to 42).
Setting (1118727 & 1118725)—47-51 amperes hot, (set to 47 amperes hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—At center of panel above speedometer. Lighted when country (upper) beam in use.

Autronic Eye: Automatic headlight beam control.
See Electrical Equipment Section for complete data.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—Left & Right Turn Indicator located at either end of speedometer dial. Lights when direction signal on same side of car operating (Stop Light flashes at rear).

Switches

Lighting—Delco-Remy. ('51) 1995047, ('52) 1995051.
Instrument—Part of lighting switch (rheostat operated by rotating light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Directional Signal—Delco-Remy (1951) No. 1995558, (1952) No. 1995568.
Backing Light (Synchro-mesh Trans. Cars)—Delco-Remy. (1951) 1997774, (1952) 1998016. *NOTE*—Backing Light Switch on Hydra-Matic Cars combined with Neutral Safety Switch.
Stop-Lite Switch—Delco-Remy No. 1997901. Mechanical type, located under toe-board and operated by contact with foot brake lever.

MISC. ELECTRICAL

FUSES: Fuses located on Fuse Panel on cowl insulation board under instrument panel (to left of center line of car) except as noted:
Direction Signal—9 ampere.
Backing Light—14 ampere.
Clock, Map, & Courtesy Lights (1952)—14 ampere (same fuse as Stop Light).

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Stop Light (1952)—14 ampere.
Heater & Defroster—30 ampere. *NOTE*—Individual 14 ampere fuses located on control switches.
Spot Light—14 ampere. On defroster opening cover under engine hood.
Radio—14 ampere.

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy No. 1999639 or 1999675 (Low Note), No. 1999640 or 1999676 (High Note). Twin horns.

Type	Current (at 6 volts)	Air Gap
1999639, 75 (Low)	19-21 amperes	.045-.049"
1999640, 76 (High)	17-19 amperes	.035-.039"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: 90° V8 with Overhead Valves. Both cylinder blocks and crankcase cast Enbloc.
Bore—3 13/16" (3.8125-3.8145").
Stroke—3⅝". **Displacement**—331 cu. ins.
Rated Horsepower—46.5.
Developed Horsepower (1951)—160 at 3800 RPM.
Developed Horsepower (1952)—190 at 4000 RPM.
Compression Ratio—7.5-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Cadillac Special Data.*

CYLINDER HEAD INSTALLATION: *See Cadillac Special Data.*

ENGINE REMOVAL: *See Cadillac Special Data.*

OIL PAN REMOVAL: *See Cadillac Special Data.*

PISTONS: Aluminum alloy, 3 ring, T-T slot tin plated "Slipper-Skirt" type (skirt cutaway at pin bosses). *NOTE*—Limits for new or rebored cylinders: Taper .0007", Out-of-round .0005".

Original Piston & Bore Sizes—*See Cadillac Special Data.*
Weight—19.296 ozs. (without rings or pin).
Length—3 15/16".
Removal—Pistons and rods removed from above.
Clearance—.0013-.0017" at 70° measured ⅛" below upper cross slot and at right angles to piston pin.

Replacement Pistons: *See Cadillac Special Data.*

Fitting New Pistons: Use micrometer or feeler gauges. *See Cadillac Special Data.*

Installing Pistons: Mark "REAR" on piston pin boss toward right (#1, 3, 5, 7), toward left (#2, 4, 6, 8) of number on boss on connecting rod when facing this numbered boss end of rod. Install pistons with mark "REAR" toward rear of engine on all pistons.

PISTON RINGS: Two compression, one oil control ring per piston, all above pin. Oil ring slotted type with oil drain holes in groove.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	5/64"	.010-.020"	.0017-.0035"
Oil Contr. (#3)	3/16"	.010-.020"	.0008-.0026"

Installing Rings—Beveled inner edge of compression rings must be upward.

PISTON PIN: Diameter 1". Length 3 3/32". Pin is locked in rod (press fit in rod—no locking rings).
▷*PIN REMOVAL & INSTALLATION CAUTION—Requires special tools and procedure. See "Piston Pins" in Cadillac Special Data.*
Pin Fit in Piston—.00005-.0001" at 70°F (new), .0007" (worn limit). Pin should be light push fit at 70° with no perceptible play.
Pin Fit in Connecting Rod—25 ft. lbs. minimum torque on puller screw should be required to start pin in rod. *See Piston Pins in Cadillac Special Data.*
Fitting Pins—*See Cadillac Special Data.*

Replacement Pins: Fitted pins furnished with new pistons. Pins not furnished separately.

CONNECTING ROD: Length 6⅝". Weight 23.95 ozs.
Crankpin Journal Diameter—2.2488-2.2493" (out-of-round limit .00025" maximum). Connecting rod diameter (without bearing) 2.3740-2.3745".
Lower Bearing—Removable steel-backed, Moraine-Durex lined type. No shims.
Clearance—.0005-.0020" (new), .0045" (worn limit).
Sideplay—.008-.014" (total both rods).

Bearing Adjustment: None. Replace bearings.
▷*CAUTION*—Tang on bearings must register with grooves in rod and cap and oil spit hole register with oil groove in bearing cap (for cylinder wall lubrication).

Installing Rods: Cylinder No. mark on rod and cap (on small boss on end) must be together and installed in same numbered cylinder with piston mark "REAR" toward rear of engine (lubrication groove in rod cap will be on upper side).

CRANKSHAFT: 5-bearing, integral counterweights.
Removal & Installation—*See Cadillac Special Data.*
Journal Diameters—2.4985-2.4990" all bearings (out-of-round limit .00025" maximum).
Bearings—Removable, steel-backed, Moraine-Durex lined type. No shims.
Clearance—.0008-.0025" (new), .005" (worn limit).

Bearing Adjustment: None. Replace bearings.
▷*CAUTION*—Bearing caps must not be interchanged. Install caps with marking numbers (not casting nos.) on left side and in order from front-to-rear.

End Thrust: Taken by flanged rear (#5) bearing.
Endplay—.001-.005" (new), .010" (worn limit).

Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

FLYWHEEL Removal & Installation—*See Cadillac Special Data.*

CAMSHAFT: 5-bearing, Cast-iron type with non-adjustable chain drive.
▷*CAUTION*—Handle shaft with care to avoid damage or misalignment. Check whenever removed.
Removal, Alignment & Installation—*See Cadillac Special Data.*
Bearing Type—Steel-backed, babbitt bushings.
Clearance—.001-.0022" (new), .004" (worn limit).

Timing Chain: Link-Belt side-guide type. Width 11/16". Pitch .500". Length 23" or 46 links.
Timing Chain Removal—*See Cadillac Special Data.*
▷*CAUTION*—Install chain "endless" and as a unit with camshaft sprocket (sprocket press fit on shaft with locating dowel and two retaining capscrews).

Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.745-1.755"	3415-.3425"	①4⅝"
Exh. (1951)	1.4325-1.4425"	3415-.3420"	①4⅝"
Exh. (1952)	1.5575-1.5675"	3415-.3420"	②4⅝"

	Seat Angle	Lift	Stem Clearance
Intake	44°③	.327"	④.0005-.0025"
Exh. (All)	44°③	.327"	④.0010-.0025"

①—4.539-4.559".
②—Eaton Valves 4.529-4.544". Rich Valves 4.539-4.559".
③—New Valves (valves in service can be refaced to 45° if seat width recommendations not exceeded).
④—New valves and guides. Worn limit .005" max.

▷*STICKING VALVE CORRECTION—See Valve System in Cadillac Special Data.*

▷**Valve Seat Width Recommendations**—3/64-1/16" (moderate speeds or city driving), 1/16-3/32" (high speed driving). Cut seat so that distance from outer edge to edge of flange on valve head is not more than 1/32".

▷*CAUTION*—Do not lap new valves in so that seat width is more than 1/64" (1° difference between valve and block angle designed to provide "hairline" contact).

▷**Valve Stem Oil Seal**—New rubber oil seal installed in lower groove on valve stem (below valve keeper).
Oil Seal Installation—*See "Valve Removal & Installation" in Cadillac Special Data.*

Valve Removal & Installation: *See "Valves" in Cadillac Special Data.*

Valve Guides: Pressed in cylinder head with counterbored end down toward valve head. Use Remover tool J-3062 to drive old guides out toward top of head, Installer tool J-3066 to drive new guides in (tool plate serves as stop for driver).

Valve Springs: Free length 1.968".

	Pressure	Length
Valve Closed	57.5-62.5 lbs.	1.696"
Valve Open	130-140 lbs.	1.366"

▷*CAUTION*—Lower end of spring must seat in recess in cylinder head.

Valve Lifters: New hydraulic type which maintains zero tappet clearance in service. Lifters operate in guide holes integral with block.
Lifter Clearance in Crankcase—.0010-.0023".
See "Valve System" in Cadillac Special Data.
Valve Lifter Removal—*See Cadillac Special Data.*

Rocker Arms: Rocker arm and shaft assemblies are mounted on each cylinder head. NOTE—No adjusting screws provided on rocker arms.
Rocker Arm Installation—*See Cadillac Special Data.*

VALVE TIMING

Tappet Clearance: None in service (hydraulic type lifters which maintain zero clearance).

Valve Timing: *See Camshaft Setting above.*
Intake Valves—Opens 14° BTDC. Close 58° ALDC.
Exhaust Valves—Opens 48° BLDC. Close 24° ATDC.
Valve Timing Check—Not practical to check in field. Manufacturer recommends removing timing chain cover and check timing marks.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and hydraulic valve lifters (from right and left oil channels in block); and to rocker arms (through hollow rocker arm shafts). Timing chain lubricated by oil return from forward end of right hand cylinder head (return line from rear of right block and front and rear of left block lead directly to crankcase).

Oil Pan Removal: *See Cadillac Special Data.*
Crankcase Capacity—5 quarts.
Normal Oil Pressure—25 lbs. min. at 30 MPH, 15 lbs. with engine idling.
Oil Pressure Regulator—Located on oil pump. Opens at 30 lbs. Not adjustable.
Pressure Regulator Spring—Free length 2 27/64". Pressure should be 4.3-4.8 lbs. at 1 7/16".

Oil Pump: Gear type. In crankcase at rear of engine.
Pump Removal & Overhaul—*See Cadillac Special Data.*

►**Pump Installation Caution**—Flat on upper end of pump driveshaft must engage flat in distributor drive gear in valve compartment. If drive shaft and gear disturbed when pump removed, install pump and driveshaft with distributor gear out, turn crankshaft until #1 piston at TDC entering power stroke, with vibration dampener mark "C" at indicator, install distributor drive gear on end of pump drive shaft engaging shaft flat in gear, turn gear and shaft until flat is on right side and parallel with engine centerline, then mesh gear with camshaft gear. Distributor drive slot in upper end of gear should be approx. 15° to right of engine centerline.

Oil Pressure Switch: AC No. 1997884. Sending unit mounted on engine operates warning light on instrument panel.

Crankcase Ventilation: Air intake in oil filler cap (oil-wetted type cleaner) with outlet connection at rear of valve compartment cover and outlet pipe extending down below engine at right rear corner.
Servicing—Wash filter element in gasoline and re-oil by dipping in engine oil whenever crankcase oil changed (every 2000 miles).

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap. Re-circulation with thermostat closed provided by by-pass in pump body.
Capacity—(1951) 18 qts. (1952) 19 qts. *NOTE*—1 qt. additional with heater.
Pressure Cap—AC No. 850559 (marked 859/13#). Radiator Filler Cap. Opens at 12-15 lbs.

Radiator Removal: *See Cadillac Special Data.*

Water Pump: Packless type with ball bearing shaft.
See Water Pump Section for complete data.
Removal—Drain cooling system. Loosen and remove generator drive belt. Remove upper and lower radiator hoses (and heater hose). Take out eight capscrews mounting pump and water manifold assembly on front of engine, lift out pump and fan.
NOTE—Water manifold and thermostat are part of pump body casting.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In water outlet connection on top of pump.

	Starts to Open	Fully Open
1951 Std. Type	167-169°F.	190-195°F.
1952 Std. Type	163-168°F.	188°F.
1951 High Temp.	175-177°F.	205-210°F.
1952 High Temp.	177-182°F.	202°F.

Temperature Gauge: AC Electric type.
Dash Unit—AC No. 1512323.
Engine Unit—AC No. 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Long 11CF-10½TI (60S, 61, 62) 11CF-TI (75, 86). Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.

Facings—Woven type. I.D. 7" (all), O.D. 10½" (60S, 61, 62), 11" (75, 86). Thickness .137" (all).

Pedal Adjustment: Pedal free travel ⅞-1⅛". Adjust by turning nut on connector rod at clutch fork.

Removal: Remove transmission (see Transmission Removal), remove starter, remove lower flywheel housing, remove clutch release yoke-to-lever rod. Remove flywheel housing with clutch release yoke, release bearing, and bearing retainer as an assembly. Punch mark flywheel and clutch cover to insure correct re-installation. Take out six clutch cover mounting screws (CAUTION—turn all screws out evenly to relieve spring pressure), lift clutch and driven member out.

►**Driven Member Installation Caution**—Oil guard must be toward rear.

►**Replacement Clutch Caution**—Clutches furnished with locking pin or block at each release lever. *These locking pins must be removed when clutch installed.*

Clutch Balancing—*See Cadillac Special Data.*

TRANSMISSION

SYNCHRO-MESH

Own Make. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse), all helical gear type with remote shift control.
See Transmission Section for complete data.

Transmission Control: Remote control type mounted on steering column.
See Transmission Section for complete data.

Removal: Support engine on stand, Tool No. J-3068, or use jack under rear end of oil pan (use block of wood on jack to prevent damage to pan). Disconnect rear universal joint, remove propeller shaft. Disconnect speedometer cable and shift rods at levers on transmission case. Disconnect rear engine support at transmission extension housing and remove cross-member on which support mounted. Loosen transmission mounting capscrews (CAUTION—support transmission so that it does not hang on driveshaft in clutch), remove screws, move transmission straight back to free shaft from clutch (CAUTION—plug clutch connection shaft oil drain hole as soon as accessible to prevent loss of lubricant), lower front end of transmission and remove from car.

HYDRA-MATIC TRANSMISSION

Own Make. Consists of Fluid Coupling and automatic self-shifting four-speed type. All models have "Modulated Throttle Pressure" and Hydraulically Controlled "cone type clutch" Reverse.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TROUBLE SHOOTING & TESTING: See "Hydra-Matic Drive" in Transmission Section.*

►*OIL LEAKAGE CORRECTIONS—See "Hydra-Matic Transmission" in Transmision Section for complete data.*

►*SELECTOR LEVER STICKING IN REVERSE CORRECTION—See "Hydra-Matic Transmission" in Transmission Section for complete data.*

►*BUZZING NOISE WHEN SHIFTING INTO REVERSE (1951)—See "Hydra-Matic Transmission" in Transmission Section for complete data.*

Lubrication—Check fluid level in transmission every 2000 miles along with car lubrication. Drain and refill after 6000 miles and every 25000 miles thereafter. Use only "Cadillac Hydra-Matic Fluid."
Draining & Refilling—*See "Hydra-Matic Drive" in Transmission Section.*
Capacity—Approximately 11 qts. (refill).
Checking Fluid Level—Clean all sand, lint, and dirt away from sheet metal cover in floor under right front corner of front compt. rug. Run engine for approx. 1½ minutes at speed equivalent to 20 MPH. with selector lever in "Neutral". Remove sheet metal cover from floor for access to dip stick, reduce engine speed to slow idle, measure fluid level with dipstick, add fluid as necessary to bring level up to "FULL" mark on dipstick.

►*CAUTION—Engine must be running at slow idle speed when checking Hydra-Matic Drive fluid level.*

Linkage Adjustment: *See Hydra-Matic Drive Linkage Adjustment in Transmission Section.*

►*OTHER HYDRA-MATIC DATA: See Transmission Section.*

UNIVERSALS

Mechanics Model 3-RCR. Needle bearing type. Two used (three on Comm'l cars with center bearing).

►*CAUTION*—Do not disturb nut on end of pinion shaft retaining rear universal yoke unless yoke or oil seal being replaced. *Pinion bearing pre-load must be adjusted whenever this nut disturbed.*

Propeller Shaft (Pass. Cars): One shaft used (no slip joint—front universal yoke slides on transmission mainshaft in extension housing).
(Commercial Cars)—Two shafts used with center bearing at rear of front shaft. Slip joint provided at rear end of rear shaft.

Pinion Bearing Pre-load Adjustment: Should be adjusted whenever nut on end of pinion shaft disturbed (for universal yoke or oil seal replacement).
See Rear Axle Section for complete data.

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REAR AXLE

Own Make. Hypoid gear, semi-floating type with Hotchkiss Drive.

See Rear Axle Section for complete data.

►*CAUTION*—Manufacturer recommends that Carrier Assembly be serviced by replacement. Do not disassemble this unit or attempt service work other than oil seal and universal yoke replacement.

►**Axle Identification**—Axles marked by number stamped on bottom of differential case below center of pinion shaft as indicated in ratio table below.

Rear Axle Ratios

Series	Ratio	Ident. Mark
60S, 61 62	3.36-1①	6
75	3.77-1②	7
86	4.27-1	4

①—3.07-1 Opti. in 1952.
②—4.27-1 used with Synchro-mesh Transmission.

►**Pinion Bearing Pre-Load Caution**—Must be readjusted each time pinion shaft nut loosened. *See "Cadillac Hypoid" in Rear Axle Section.*

Backlash—.003-.010" Screw Adjustment.

Removal: Disconnect propeller shaft at rear universal joint, lower shaft out of the way. Drain rear axle. Remove axle shafts (see below). Remove nuts and washers on carrier mounting bolts, lift out carrier.

Axle Shaft Removal: Remove wheel. Take out two screws holding brake drum on axle shaft flange, remove drum. Remove nuts and lockwashers from four bolts holding bearing retainer and backing plate on axle housing, use Puller J-942-1 and Slide Hammer Tool J-2619 to remove axle shaft.

►*CAUTION*—Use care not to damage axle shaft oil seal when sliding shaft out and do not disturb position of backing plate on housing.

(Commercial Cars)—Remove wheel, remove nut and washer on end of shaft. Use puller (Snap-On No. S-4567 or similar 5-jaw type) to remove wheel hub and brake drum. Disconnect brake line. Take out retaining screws and remove dust shield (bearing retainer) and backing plate. Use Puller J-838 to pull axle shaft and bearing assembly out using care not to damage oil seal in housing.

Wheel Bearings: Sealed ball-bearing type.

►*CAUTION*—Check bearings for loss of lubricant when shaft removed. If bearing spins freely indicating loss of lubricant, install new bearing.

SHOCK ABSORBERS

Delco—Direct acting permanently sealed, airplane type located within coil springs (front), "Sea-Leg" type installation (rear) as follows:

Shock Absorber Part Nos.

Series	Front (1951-52)	1951—Rear—1952
60S, 62	872-F	871-Y 873-Y
61 ('51 Only)	852-F	871-Y
75, 86	968-G	961-BB 967-BB

FRONT SUSPENSION

Front Suspension: Independent type with new airplane direct acting shock absorbers located inside coil springs.

See Front Suspension Section for complete data.

NOTE—Specifications below correct with car at curb weight (car unloaded with full gas tank).

Kingpin Inclination—5°51' crosswise (0° Camber).

Caster—Neg. ½° to Pos. ½°. Equal within ½°.

Camber—Neg. ⅜° to Pos. ⅜°. Equal within ½°.

Toe In—1/32-3/32" (at rest). Loosen clamp bolts, turn adjusters at outer end of each rod equally.

Steering Geometry (Toe-out on turns)—Outer wheel turned 20°. Inner wheel as follows:

	Left Turn	Right Turn
60S, 61, 62	25°25'	24°42'
75, 86 Comm'l	24°7'	23°6'

STEERING GEAR

Saginaw. Ball bearing Worm-and-Nut type (re-circulating ball type).

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

1951 "SELF-ADJUSTING" BRAKE ANCHOR PINS (SERIES 60S, 61, 62): Anchor pins are spring-loaded slipper type and are self-adjusting (brake application tends to move anchor pin upward to center brake shoes in drum). *NO ANCHOR PIN ADJUSTMENT REQUIRED FOR THESE BRAKES.*

See Brake Section for complete data.

Drums—Centrifuse (cast-iron, steel back).

	Front—Diameter—Rear
60S, 61, 62 (1951)	11"① 11"①
60S, 62 (1952)	12"② 11"①
75, 86 (1951-52)	12"② 12"②

①—10.995-11.005". ②—11.995-12.005".

NOTE—Drum out-of-round limits is .007" and re-machining limit (to true up drums) is .060" maximum (use .030" Oversize lining for these drums).

Lining—Molded type (all models).

Width—2½". **Thickness**—(1951) 3/16", (1952) 1/4".

Lining Length— (Per Shoe)	Front Whls. Fwd.	Front Whls. Rev.	Rear Whls. Fwd.	Rear Whls. Rev.
60S, 61, 62 ('51)	10.55"	11.90"	10.55"	11.90"
60S, 62 ('52)	12.92"	12.92"	10.55"	11.90"
75, 86 ('51-52)	12.92"	12.92"	12.92"	12.92"

Fwd.—Forward or Primary (front) shoe.
Rev.—Reverse or Secondary (rear) shoe.

Clearance—.007-.010" at each end of each shoe or .015" at both ends of secondary shoe with primary shoe forced out against drum.

Braking Power—55.8% Front, 44.2% Rear (60S, 61, 62, 75); 50% Front, 50% Rear (86 Comm'l).

Hand (Parking) Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

Windshield Wiper: Cable Operated—Vacuum type.

See Miscellaneous Section for complete data.

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*NOTE: Electrical System is 12 Volt.*

MODEL IDENTIFICATION

ENGINE & SERIAL NUMBER: Stamped on upper right corner on the front face of the right hand block, on right frame side member just to rear of engine support bracket, and on the plate on front side of left body pillar.

Starting Serial Numbers

Series	1953	1954
60S	536000001	546000001
62	536200001	546200001
75	537500001	547500001
86 Commercial	538600001	548600001

Identification—First two figures indicate year, third and fourth indicate model (last five figures are numbered consecutively regardless of series).

Engine Unit Number Note: Use for identification. Stamped on top of crankcase to rear of left hand block with prefix indicating model:

1953 Models

Series	Prefix
60S, 62, 75 (Hydra-Matic)	9S
60S, 62, 75 (Hydra-Matic & Power Steering)	4S
75, 86 (Synchro-mesh)	2S
86 (Hydra-Matic)	7S
86 (Hydra-Matic & Power Steering)	5S

1954 Models

60S, 62, 75 (Standard)	4-T-1 Up
60S, 62, 75 (Air Conditioning)	4-TK-1 Up
86 (Standard)	7-T-1 Up
86 (Air Conditioning)	7-TK-1 Up
86 (Power Steering)	5-T-1 Up
86 (Power Strg. & Air Cond.)	5-TK-1 Up

►*ENGINE NUMBER NOTE*—"L.C." will be added as a suffix to engine unit numbers on all engines built to low compression specifications.

NOTE—Mark • preceding Engine Unit Number indicates cylinder bore and pistons are .010" oversize.

TUNE-UP

►*1953 CADILLAC HIGH SPEED SURGE ON CARS WITH ROCHESTER CARBURETOR (At 60-70 MPH. in "Dr. 3"): See "Rochester 4GC 4 Barrel" in Carburetor Section.*

►*1953 CADILLAC CROSSFIRE PREVENTION (First Cars):* On cars prior to Eng. No. 00657, it is recommended that **two center** spark plug wires in bracket on left side of engine be interchanged in both grommets, retaining the parallel routing of the wires and crossing the wires between the grommets and the spark plugs. This will separate No. 5 and No. 7 wires and prevent cross-firing between them (new wire arrangement 1-5-3-7; old arrangement 1-3-5-7).

►*1953 IGNITION SHORTING OUT ON FIRST CARS (Due to shorting of Radio Suppression Condenser Lead):* On first cars with condenser lead at coil terminal pointing toward coil resistor unit, lead may become pinched between resistor and coil body developing a short circuit. On cars before Engine No. 01700, this can be prevented by reversing condenser leads on coil terminal so that lead points away from resistor.

►*1954 CADILLAC STALLING (AFTER COLD START) CORRECTION: Fast idle throttle clearance between plate and bore increased from .023" to .026". See "Rochester 4GC 4-Barrel Carburetor" in Carburetor Section for complete data.*

COMPRESSION PRESSURE: 150 lbs. at cranking speed.

VACUUM READING: Not specified (varies with altitude and barometric pressure).

VALVE TAPPET CLEARANCE: None in service (Hydraulic lifters).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve diverts exhaust gases of left cylinder bank through carburetor heating passage in intake manifold to right hand exhaust system.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2. *See diagram.*

SPARK PLUG GAP: .035".

Spark Plug—AC No. 46-5, 14mm. *NOTE*—AC No. 44-5 (cooler plug) can be used if electrodes burn excessively.

COIL: Delco-Remy 1115082. 12 Volt.

Ignition Current—1.25 amperes idling, 3 stopped.

Resistor—Delco-Remy 1927809. On coil bracket.

►*COIL RESISTOR NOTE—Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy No. 1110835 (1953), No. No. 1110844 (1954). 12 Volt.

Condenser—Delco-Remy 1869704. Capacity—.18-.23 mfd.

Contact Point Set—Delco-Remy No. 1918148.

Breaker Gap—.016" (new & used points).

Cam Angle—26° - 33°.

►*BREAKER GAP CAUTION—Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor RPM	Engine Degrees	Engine RPM
0-1.5	500	0-3	1000
7-9	950	14-18	1900
9-11	1450	18-22	2900
11-13	1950	22-26	3900

Vacuum Spark Control: Delco-Remy 1116074.

Plunger Travel—19/64-5/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6.5-9
13-14.5	26-29	16-17

IGNITION TIMING

Setting—2½° BTDC. *CAUTION—Ignition timing mark "A" is 5° BTDC and does not indicate timing point. DO NOT set at timing point "A".*

Timing Mark—With engine idling at 400 RPM, set timing at point HALF-WAY BETWEEN "A" and "C/" marks on vibration dampener in line with pointer on chain case cover.

►*CAUTION*—If fuel less than 80 Octane Rating used and detonation ping noted, timing may be retarded to "C/" mark on dampener (top dead center).

►*IGNITION TIMING NOTE—Timing should be checked for both No. 1 and No. 6 cylinders. First set timing for No. 1 cylinder (at point half-way between "A" and "C/" marks), then check timing on No. 6 cylinder. If light flashes before or after the No. 1 cylinder firing point, set distributor to divide the variance.*

CARBURETOR

►*CARBURETOR APPLICATION: "Carter" and "Rochester" 4-Barrel Carburetors used on all models.*

►*1953-54 REPLACEMENT CARBURETOR (Carter WCFB-2043S): See "Carter WCFB 4-Barrel" in Carburetor Section.*

►*IDLE SPEED (AIR CONDITIONED CARS)—Summer and Winter Idle Speed Adjustment is different and must be made as follows:*

Summer Setting (Air-Conditioner in Operation)—With transmission selector lever in either "Dr" range, and with Air-Conditioner "ON", set idle speed at 400 RPM.

Winter Setting (Air-Conditioner not in Operation)—With transmission selector lever in either "Dr" range, and with Air-Conditioner "OFF", set idle speed at 400 RPM.

Idle Speed-Up Control Adjustment (Cars With Air Conditioning)—With engine at normal operating temperature and slow idle adjustment completed (see above), turn air-conditioner "ON", and place transmission selector lever in "N" neutral position. Adjust engine idle speed to 900 RPM by loosening locknut on diaphragm shaft and turning knurled nut to obtain specified RPM. Tighten locknut.

Throttle Linkage Adjustment: 1) Disconnect throttle rod at throttle lever on transmission case. Check lever position by installing checking gauge J-3065-A on rear face of transmission case with long leg of tool extending forward along left side of case. Move throttle lever to extreme rear position. Insert clevis pin through hole in lever and hole in checking gauge. If pin does not enter hole in gauge freely, bend lever as required using bending tool J-2029. Remove gauge, connect throttle rod to lever.

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2) Disconnect carburetor throttle rod at dash relay lever by removing spring clip and freeing trunnion from lever. Install ¼" drill rod through hole in relay lever and hole in bracket to position lever. See that throttle lever in correct hot or slow idle position and set for correct idling speed of 400 RPM (maximum) all models. Adjust trunnion on rear end of throttle rod until it enters relay lever freely, connect trunnion and install spring clip. Back off both nuts on throttle rod at carburetor throttle lever, push on end of rod so that transmission throttle lever and valve is against stop (in transmission), turn rear nut on throttle rod up against the throttle lever trunnion, then back the nut off 3 **complete turns,** finally tighten the front nut on the rod securely against trunnion. Check to see that linkage moves freely. Remove drill rod from relay lever. Check and adjust accelerator pedal position.

3) Depress pedal fully and see that it touches floor mat with slight pressure when carburetor throttle valve wide open *(NOTE–*If floor mat removed, allow ½" clearance between pedal and floor in wide open position). Adjust pedal position as required by changing length of pedal to relay lever rod (adjust trunnion located at pedal end of rod).

CARTER WCFB

Carter Model WCFB. Four barrel downdraft type with automatic choke control. *NOTE–Idle Speed-up Control used with Air Conditioned Cars. Throttle Return Check used with Dynaflow Cars.*

Carter Carburetor Application

Car Model	Carter No.
1953 (Without Air-Cond.)	2005S,SA
1953 (Hydra-Matic & Air Cond.)	2072S
1953 (Dynaflow & Air-Cond.)	2119S,SA
1953 (Dynaflow, Without Air.Cond.)	2088S
1953-54 (Replacement Carburetor) ①	2043S
1954 (Except Air Cond.)	2109S
1954 (Air Conditioned)	2110S

①–This carburetor is a service replacement for 2109S & 2110S carburetors. Unitized Package No. 202-44U (containing Speed-up Control) must be used on Air Conditioned Cars.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting–¾-1¾ (Exc. 2005S, SA, 2072S); 1¼-2¼ (2005S, SA, 2072S) turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–400 RPM maximum (with selector lever in "Dr" range on Hydra-Matic Drive Cars). *For "Idle Speed Setting" and "Idle Speed-up Control" on Air-Conditioned Cars see "Carburetor" above.*

►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section.*

Idle Speed-Up Control (Air Conditioned Cars): *See "Carburetor" above.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

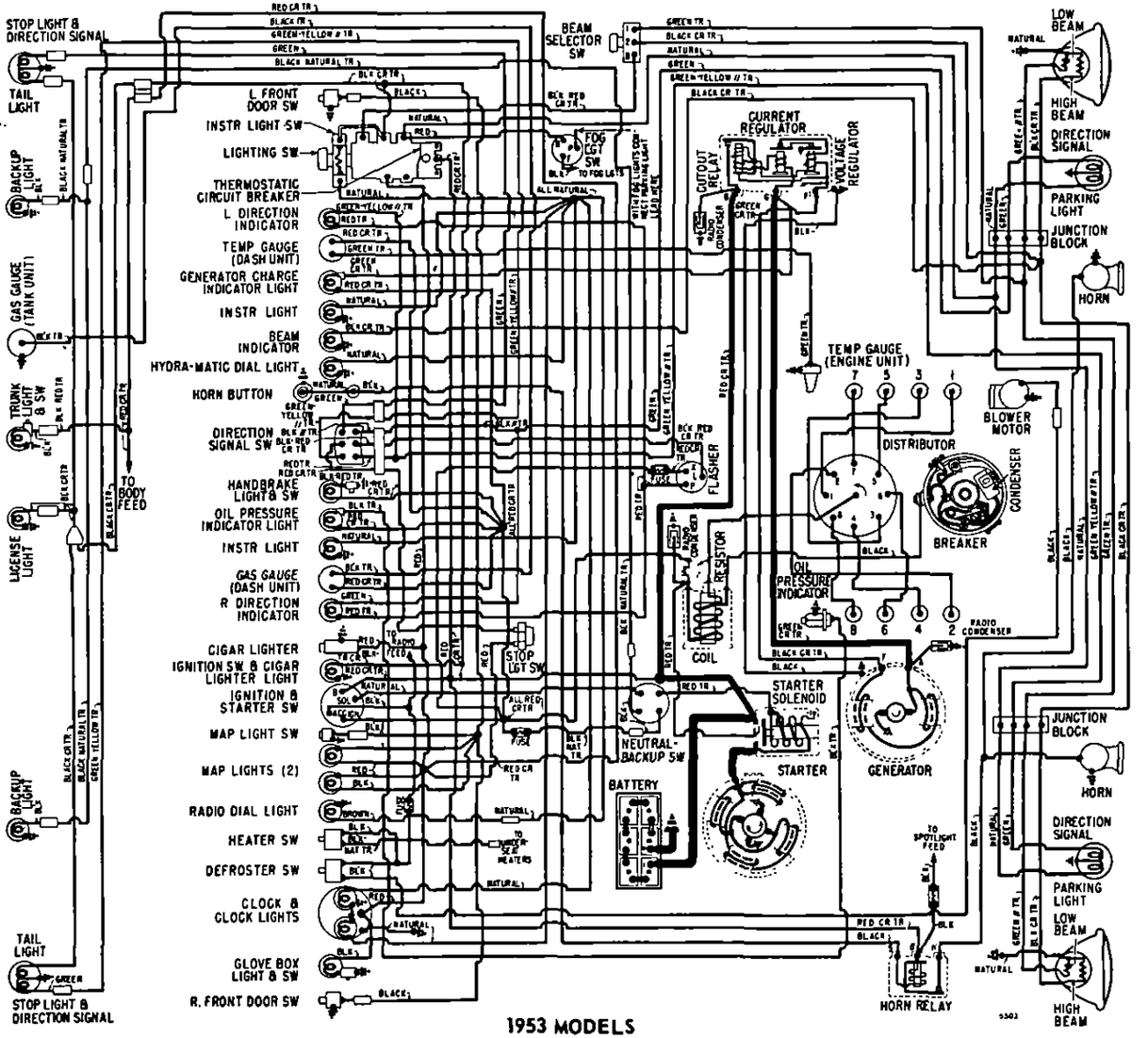
Throttle Return Check Adjustment (1953 Dynaflow Cars): With engine at normal operating temperature and carburetor adjusted to correct idle speed, loosen the locknut on the throttle return check mounting stud and turn the return check in, or out, as necessary to obtain .047" clearance between the throttle lever tang and the return check plunger (throttle lever must be in normal position and the throttle check plunger fully seated when adjusting for this clearance). Check operation by placing transmission in "Dr" range, apply brakes, and increase engine speed. Quickly release the throttle. If engine should stall, decrease the above clearance. If engine fails to return to idle immediately, increase the above clearance.

Fuel Pump Pressure: 3½-5¼ lbs., at idle speed (1953); 4-5½ lbs., at 1800 RPM (1954).

ROCHESTER 4GC

Rochester 4GC. Four barrel downdraft type with automatic choke control. *NOTE–Idle Speed-up Control used with Air Conditioned Cars. Throttle Return Check used with Dynaflow Cars).*

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1953 MODELS

CONTINUED FROM PRECEDING PAGE

Rochester Carburetor Application

Car Model	Rochester No.
1953 (Hydra-Matic)	7005100
1953 (Dynaflow)	7006215
1954 (Exc. Air Conditioned) ①	7006220
1954 (Air Conditioned) ①	7006221
1954 (Exc. Air Conditioned) ②	7006962
1954 (Air Conditioned) ②	7006963

①—Before Engine No. 57962.
②—After Engine No. 57962.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*1954 CADILLAC STALLING (AFTER COLD START) CORRECTION: Fast idle throttle clearance, unloader setting and choke setting changed to prevent stalling. See "Rochester 4GC-4-Barrel Carburetor" in Carburetor Section.*

Idle Setting—Adjust with engine at normal operating temperature, automatic choke not operating and engine idling at hot or slow idle speed. Adjust idle speed (see below) to 400 RPM, then adjust each idle mixture screw (one screw for each primary throttle valve) until engine idles smoothly and RPM is at maximum. Recheck idle speed.

Idle Speed—400 RPM maximum (with selector lever in "Dr" range on Hydra-Matic Drive Cars). *For "Idle Speed Setting" and "Idle Speed-up Control" on Air-Conditioned Cars see "Carburetor" above.*

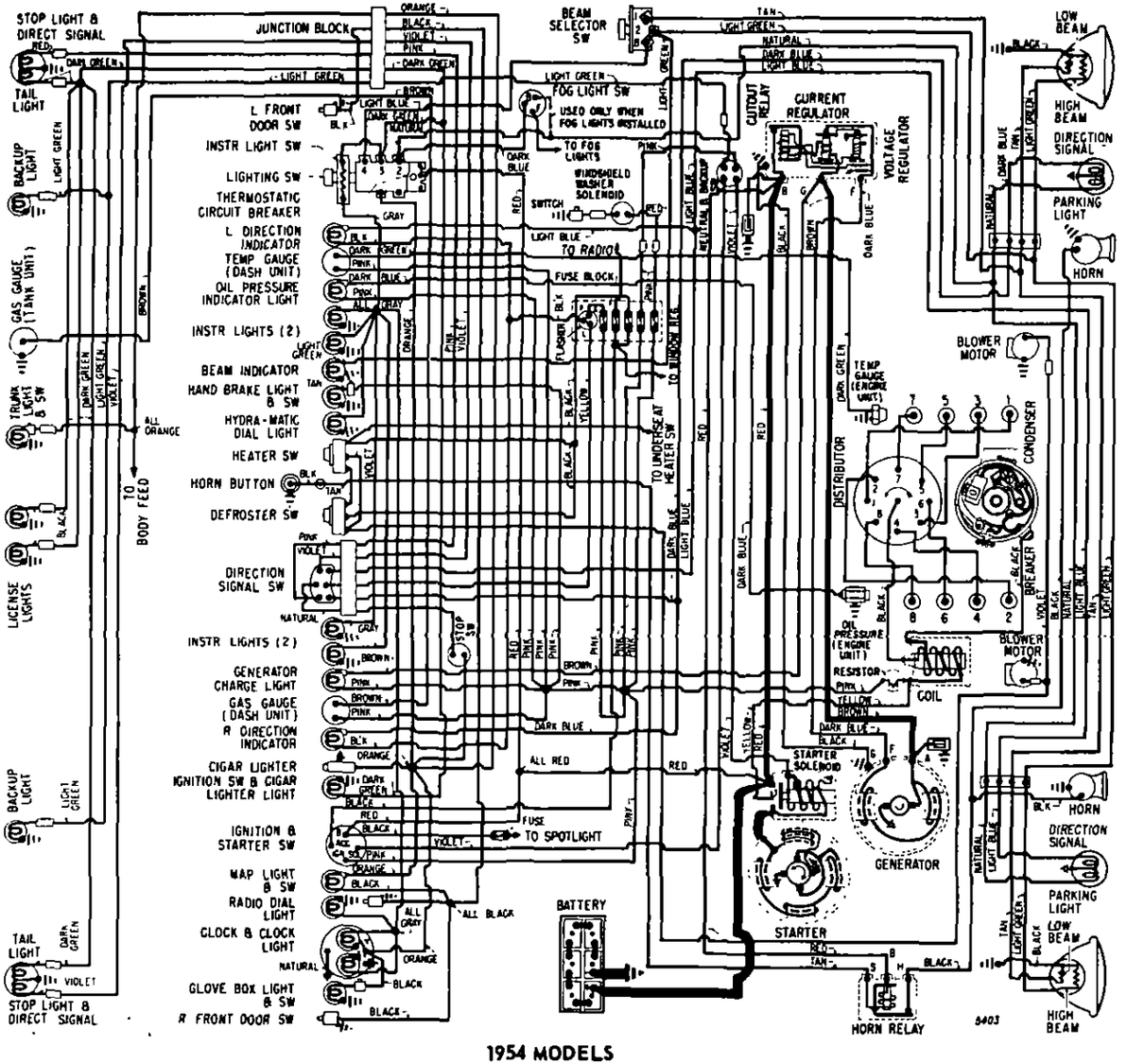
►*OTHER DATA: See "Rochester 4GC 4-Barrel Carburetor" in Carburetor Section.*

Idle Speed-up Control (Air Conditioned Cars): *See "Carburetor" above.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Throttle Return Check Adjustment (1953 Dynaflow Cars): Check alignment of adjusting screw and contact arm on secondary throttle lever, bend return check bracket as necessary to center screw on contact lever radius. Check performance with selector lever in "Dr" or "L", by opening throttle and quickly releasing accelerator pedal (*CAUTION*—Apply brakes firmly when making this test). If engine stalls, adjust by turning adjusting screw (*hold shaft with 3/8" wrench while turning screw*), repeat test and readjust until stalling condition eliminated.

Fuel Pump Pressure: 3½-5¼ lbs., at idle speed (1953); 4-5½ lbs., at 1800 RPM (1954).



1954 MODELS

Fuel Pump (1953): AC. Combination fuel & vacuum pump.
Fuel Pump (1954): AC. Fuel only. Vacuum pump is part of engine oil pump.
Replacement Pump—AC No. 9648 (1953); No. 4075 (1954).
Pressure—3½-5¼ lbs., at idle speed (1953); 4-5½ lbs., at 1800 RPM (1954).
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: AC Electric.
Dash Unit—AC No. 1517800 (1953); No. 1517153 (1954).
Tank Unit—AC No. 1517215 (1953-54).
See "Fuel Gauges" in Carburetion Equipment Section.

CARB. EQUIPMENT

BATTERY

1953-Delco 3EE70W. *12 Volt.* 11 plate 70 ampere hour capacity (20 hr. rate).
1954-Delco 3EM60W (Exc. Comm'l). *12 Volt.* 9 plate, 60 ampere hour capacity (20 hr. rate).
1954-Delco 3EM70W (Comm'l. Models). *12 Volt.* 11 plate, 70 ampere hour capacity (20 hr. rate).
Battery Ground—Negative.
Engine Ground—Connected between engine and cowl.

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STARTER

Delco-Remy 1107602 (1953); No. 1107622 (1954). *12 Volt.*
Armature–Delco-Remy 1917855 (1107602); No.1926626 (1107622).
Drive–Overrunning clutch (solenoid pinion shift).
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension– 24-28 ozs. (1107602); 30-40 ozs. (1107622).

Performance Data (1107602)

Torque	R PM	Volts	Amperes
0 ft. lbs.	6500	10.3	75
11.0 ft. lbs.	Lock	5.2	460

Performance Data (1107622)

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.3	95
10.5 ft. lbs.	Lock	5.4	470

Starting Switch: Delco-Remy Solenoid Switch No. 1118148 (1953); No. 1119760 (1954), mounted on starter and controlled by combination Starter & Ignition Switch No. 1116470. Turn key full RIGHT against spring tension to start.
See Electrical Equipment Section for complete data.

Neutral Safety & Backup Light Switch (Hydra-Matic Drive Cars): Delco-Remy 1998012 (1953); 1998054 (1954).
Adjustment: *See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy 1102005 (Less Pulley & Fan, replacement for all models) –*12 Volt.*
Armature–Delco-Remy 1923535.
Maximum Charging Rate–See Current Regulator.

Performance Data

	Amperes	Volts	RPM
Cold	30	14	2150

Generator Charge Indicator: Red light on instrument panel. *See diagram.*
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs. each.
Field Current–1.48-1.62 amperes at 12 volts.
Belt Adjustment: Loosen both pivot bolts and adjusting strap screw, pull generator out until belt just tight enough to drive pulley without slip.

REGULATOR

1953 Models–Delco-Remy 1118750. Current & voltage regulator.
See "Delco-Remy 1118700 Series Regulator" in Electrical Equipment Section.
1954 Models–Delco-Remy 1118826. Current & voltage regulator.

►*1954 REGULATOR NOTE: Checking procedure is different than for 1953 regulators. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. Specifications below are "Normal" settings for this regulator.*

Cutout Relay
Cuts In–12.8 volts (hot).
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator
Setting–14.5 volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator
Setting–30 amperes (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*
Stop Light Switch: (Location)–Mechanical type mounted on underside of toe board and operated by brake pedal.
FUSES: Located on fuse panel under instrument panel on cowl insulating board just to left of car center line. NOTE–Special equipment fuses located as indicated below.
Windshield Washer–6 amps.
Back-Up Light–9 amps.
Automatic Heating System–7.5 amps.
Autronic Eye–14 amps. Located in Autronic Eye amplifier.
Air Conditioner–Two fuses, 2 amps. & 20 amps. located under instrument panel near side of glove box.
CIRCUIT BREAKERS: 22 ampere, located in main lighting switch. Protects all lighting circuits.
►*NOTE: Hydro-Lectric system (where used) has 15 amp. circuit breaker located in feed circuit.*
HORNS: Delco-Remy 1999755 (Low Note), 1999756 (High Note). *12 Volt.*
Horn Relay: Delco-Remy 1116781. *12 Volt.*
Contacts Close–2.75-4.0 volts.
Contact Gap–.025". **Air Gap**–.015" (closed).

ENGINE

►*1954 ENGINE "CLICKING" NOISE CORRECTION (Sounds like loose spark plug wire):* This condition may be caused by oil trapped in vacuum pump. Corrected by installing Divider Plate, Part No. 5593537 between vacuum and oil pump.

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air-conditioning system. See "Frigidaire Air-Conditioning" in Miscellaneous Section.*
ENGINE SPECIFICATIONS: Own 90° V8 (All Series).

Bore	Stroke	Displacement	Rated H.P.
3 13/16"	3 5/8"	331 Cu. Ins.	46.5

Compr. Ratio	1953 Developed HP	1954
8.25-1	210 at 4150 RPM	230 at 4400 RPM

Compression Pressure–*See TUNE-UP*
►*OVERSIZE CYLINDER BORE CAUTION*– Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have .010" oversize bores and pistons. *See "Original Bore & Pistons" in Cadillac Special Data.*
ENGINE REMOVAL: *See Cadillac Special Data.*
OIL PAN REMOVAL: *See Cadillac Special Data.*
CYLINDER HEAD & TIGHTENING TORQUES: *See Cadillac Special Data.*

PISTONS

►*ORIGINAL CYLINDER BORE CAUTION:* Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have .010" oversize pistons and cylinder bore. Standard cylinder bore size: 3.8125-3.8145".
Pistons–Aluminum alloy, T-T slot, tin plated, "Slipper Skirt" (skirt cutaway at pin bosses).
Weight–19.68 ozs.
Removal–Piston and rod assemblies removed from above. Install connecting rod guide Guide Studs J-3224, on connecting rod bolts to guide rod out through bore without nicking or scratching. CAUTION–*Do not nick lower edge of bore when pushing rod up.*
Fitting New Pistons: Use micrometer or feeler gauge. *See "Pistons" in Cadillac Special Data.*
Replacement Pistons: Standard "High Limit" or maxi-production size), and .010", .020", .030" oversize. Pistons furnished only with fitted pins.
Installing Pistons: Install in cylinder with piston pin boss marked "Rear" toward rear of engine. *See "Connecting Rods" (below) for installation of pistons on rods.*

PISTON PINS

Pin is pressed in connecting rod.
Diameter–1.000". **Length**–3 3/32".
Pin Fit in Piston–.00005-.0001" clearance at 70°F. Not fitted in field (replace piston & pin assembly).
Pin Fit in Rod–(NOTE–Special tools required). *See "Pistons" in Cadillac Special Data.*

PISTON RINGS

Top compression ring is chrome plated rolled steel and the other two rings are cast iron. An expander is not used behind the oil ring in production.

Ring	Width	End Gap	Side Clearance
Compr. (#1 & 2)	5/64"	.010-.020"	.0017-.0035"
Oil (#3)	3/16"	.010-.020"	.0008-.0026"

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Replacement Rings: Standard, .010", .020", .030" oversize.

►*REPLACEMENT RING NOTE–If re-ring set is to be installed in new or low mileage bores, it is not necessary to install oil ring expander.*

Installing Rings: Chamfered face of both compression rings must be installed toward top of piston.

CONNECTING RODS

Length–6 5/8" (center-to-center).
Weight–23.49 ozs.
Crankpin Journal Diameter–2.2488-2.2493".
Out-of-Round Limits–.00025".
Bearings–Moraine-Durex, bearing shell is steel backed aluminum. Bearing halves interchangeable. No shims.
Clearance–.0002-.0020" (Service limit .0045").
Sideplay–.008-.014" (total both rods).
Replacement Bearings: Furnished in standard size only.
Installing Rods (In Pistons): On pistons Nos. 2-4-6-8, install rod so mark 'REAR' on piston pin boss is to **left** side of rod (with stamped number on rod facing operator). On pistons Nos. 1-3-5-7, install rod so mark 'REAR' on piston pin boss is to **right** side of rod (with stamped number on rod facing operator).

CRANKSHAFT

Journal Diameters–2.4985-2.4995". Five bearings.
Out-of-Round Limits–.00025".
Clearance–.0008.,0015" (service limit .005" max.).
End Thrust–Taken by flanged rear bearing.
End Play–.001-.005" (service limit .010" max.).
Bearings–Moraine Durex. Bearing shell is steel backed aluminum. Bearing halves interchangeable. No shims.
Replacement Bearings: Furnished in standard size only.
Main Bearing Removal & Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

►*MAIN BEARING CAP CAUTION*–Bearing caps must not be interchanged. Install caps with marking numbers (not casting number) on left side and in order from front to rear.

Crankshaft Removal & Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*
Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*
FLYWHEEL REPLACEMENT: *See "Flywheel" in Cadillac Special Data.*

CAMSHAFT

►*CAUTION*–Handle shaft with care to avoid damage or mis-alignment. Check whenever removed.
Removal, Alignment & Installation–*See "Camshaft" in Cadillac Special Data.*
Bearings–Steel backed babbitt bushings.
Clearance–.001-.0022" (service limit .004" max.).
Bearing Out-of-Round Limit–.002" max.
Timing Chain: Link-Belt side guide type. Width 11/16", Pitch .500", Length 23" or 46 links.
Installation & Removal–*See "Timing Chain" in Cadillac Special Data.*
Camshaft Setting: Both sprockets marked 'O'. Mesh chain with sprockets turned so that marks adjacent and in line with straightedge across shaft.

►*CAUTION*–Install chain as a unit with camshaft sprocket (sprocket press fit on shaft with locating dowel and two retaining capscrews).

VALVES

Tappet Clearance: None in service (hydraulic)

Valves	Head Diam.	Stem Diam.	Length
Intake	1.750"	.3415-.3425"	ℂ 4.628-4.648"
Exhaust	1.562"	.3415-.3420"	4 21/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	ℭ 44°	.365"	ℭ .0005-.0025"
Exhaust	ℭ 44°	.365"	ℭ .001-.0025"

ℂ–"Rich" Valves. "Eaton" Valves 4.628-4.653".
ℭ–New valves. (Valves in service can be refaced to 45° if seat width recommendation not exceeded).
ℭ–*New valves and guides. Worn limit. 005" max.*

►*VALVE SEATING CAUTION*–Do not lap or grind so that seat width is more than 1/64" (1° difference between valve and seat angle designed to provide "hair-line" contact.

►**Valve Seat Recommendations**–3/64-1/16" (moderate speed or city driving, 1/16-3/32" (high speed driving). Cut seat so that distance from outer edge to edge of flange on valve head not more than 1/32"
Valve Stem Oil Seal–*Rubber* oil seal installed in lower groove on valve stem (below valve keeper).
Oil Seal Installation: *See "Valves System" in Cadillac Special Data.*
Valve Removal & Installation: *See "Valves System" in Cadillac Special Data.*
Valve Guides: Pressed in cylinder head with counterbored end down toward valve head. Use Remover Tool J-3062 to drive old guides out toward top of head, Installer Tool J-3066 to drive new guides in (tool plate serves as stop for driver).
Valve Springs: (Free Length)–1.968".

Valve Spring Specifications

	Pressure	Length
Valve Closed	61 lbs.	1.696"
Valve Open	140 lbs.	1.326"

►*SPRING INSTALLATION CAUTION*–Lower end of valve spring must seat in recess in cylinder head.
Valve Lifters: Hydraulic.
See "Hydraulic Valve Lifters" in Cadillac Special Data.

Valve Lifter Removal–*See "Valves System" in Cadillac Special Data.*
Rocker Arms: Rocker arm end shaft assemblies are mounted on each cylinder head NOTE–No adjustment screws provided on rocker arms.
Rocker Arm Installation–*See "Valve System" in Cadillac Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing

Intake Valves–Open 22° BTDC. Close 67° ALDC.
Exhaust Valve–*Open 63° BLDC. Close 27° ATDC.*
Valve Timing Check–Not practical to check in field. Manufacturer recommends removing timing chain cover and checking timing marks.

OILING SYSTEM

Crankcase Capacity: 5 qts. One quart additional for dry filter.

Normal Oil Pressure (1953)–25 lbs. at 30 MPH., 15 lbs. with engine idling.
Normal Oil Pressure (1954)–30-35 lbs. min. at 30 MPH. 15 lbs. with engine idling.
Pressure Regulator Valve–On oil pump. Not adjustable.
Oil Pressure Indicator–Light on instrument panel controlled by pressure switch AC No. 1998113 mounted on engine.

Oil Pump: Helical gear. In crankcase at rear of engine.
Oil Pump Removal & Overhaul: *See "Oil Pump" in Cadillac Special Data.*

Vacuum Pump (1954): Part of oil pump assembly. *See "Vacuum Pump" in Cadillac Special Data.*

Oil Filter: *Partial flow. Replace element every 6000 miles or more frequently in dusty areas.*
Replacement Filter Element–AC No. 1P-115.
Crankcase Ventilation: Air intake in oil filler cap (oil wetted type) with outlet connection at rear of valve compartment cover, and outlet pipe extending down below engine at right corner.

COOLING

►*THERMOSTAT INSTALLATION CAUTION:-Install with spring strap parallel to car center line otherwise right engine bank will operate at a higher temperature.*

Water Capacity (1953): 20 qts., with heater.
Water Capacity(1954): (Exc. Series 75) 22 qts. with heater, 19¾ qts. without heater. (Series 75) 24½ qts. with heater, 19¾ qts. without heater.

Pressure Valve: AC No. 850559. Radiator filler cap. Opens at 12-15 lbs.
Thermostat: Dole type. In water outlet at top of pump body.
Standard Setting–Starts to open at 163° to 168°F.
High Temp.–*Starts to open at 177° to 182°F.*
Water Pump: Packless, sealed ball bearing type.

See "Cadillac" in Water Pump Section.
Pump Removal–Remove upper and lower Radiator hoses after draining cooling system. Remove generator drive belt and take out capscrews mounting pump and water manifold assembly on front of engine, lift out pump and fan. NOTE–Water manifold and thermostat housing are part of pump casting.
Belt Adjustment–*See Generator Belt Adjustment.*

Radiator Removal & Installation: *See "Radiator" in Cadillac Special Data.*

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Temperature Gauge: AC Electric.

Dash Unit– AC No. 1512609 (1953); No. 1512789 (1954).
Engine Unit–AC No. 1512678.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

1953 MODELS

Long 11CF-TI (75,86). Semi-centrifugal, single plate dry disc type.
See Clutch Section for complete data.
Facings–Woven type, I.D. 7", O.D. 11". Thickness .137".
Pedal Adjustment: Pedal free travel 7/8-1 1/8". Adjust by turning nut on connector rod at clutch fork.
Removal: Remove transmission (see Transmission Removal), remove starter, remove lower flywheel housing, remove clutch release yoke-to-lever rod. Remove flywheel housing with clutch release yoke, release bearing, and bearing retainer as an assembly. Punch mark flywheel and clutch cover to insure correct re-installation. Take out six clutch cover mounting screws. *(CAUTION–*Turn all screws out evenly to relieve spring pressure), lift clutch and driven member out.
►**Driven Member Installation Caution:** Oil guard must be toward rear.
►**Replacement Clutch Caution:** Clutches furnished with locking pin or block at each release lever. *These locking pins must be removed when clutch installed.*
Clutch Balancing–*See Cadillac Special Data.*

SYNCHRO-MESH TRANSMISSION

1953 MODELS

Own Make. Constant-mesh synchro-mesh (second & high), sliding gear (low & reverse), all helical gear type with remote shift control.
See Transmission Section for complete data.
Transmission Control: Remote control type mounted on steering column.
See Transmission Section for complete data.
Removal: Support engine on stand, tool J-3068, or use jack under rear end of oil pan (use block of wood on jack to prevent damage to pan). Disconnect rear universal joint, remove propeller shaft. Disconnect speedometer cable and shift rods at levers on transmission case. Disconnect rear engine support at transmission extension housing and remove crossmember on which support mounted. Loosen transmission mounting capscrews *(CAUTION–* support transmission so that it does not hang on driveshaft in clutch), remove screws, move transmission straight back to free shaft from clutch *(CAUTION–*plug clutch connection shaft oil drain hole as soon as accessible to prevent loss of lubricant), lower front end of transmission and remove from car.

DYNAFLOW DRIVE

1953 MODELS

►*FOR CARS WITH "TWIN TURBINE DYNAFLOW DRIVE", See "Buick Dynaflow" in Transmission Section.*

HYDRA-MATIC DRIVE

►*1954 CADILLAC HARD DOWN-SHIFT CORRECTION–May be caused by excessive thickness of jute under floor mat. Adjust accelerator pedal (see Linkage Adjustment in Hydra-Matic Section) and make sure that thickness of jute under floor mat is less than ½". Check wiring harness bracket, throttle relay, and speedometer cable for possible interference with throttle rod.*

►*1954 HYDRA-MATIC OIL LEAK (At Vent on Front of Transmission Case) CORRECTION: May be caused by out-of-round or undersize pressure regulator valve. See "Hydra-Matic Drive" in Transmission Section.*

Dual-Range four speed automatic transmission and fluid coupling.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*
Lubrication–Check fluid level in transmission every 2000 miles at time of car lubrication. Drain and refill after 6000 miles and every 25,000 miles thereafter. Use only "Cadillac Hydra-Matic Fluid".

Capacity–Approximately 11 qts. (1953), 10 qts. (1954).

Checking Fluid Level–With selector lever in "N" (neutral) position, run engine at a speed of 20 MPH for about 1½ minutes. Reduce engine speed to slow idle (375-400 RPM). Raise engine hood and remove transmission dipstick (located at right rear side of engine) wipe it clean and check fluid level. With engine still running, add fluid to bring level to "F" (full) mark on dipstick. CAUTION–Do not fill above "F" mark on dipstick - foaming will result.
►*OTHER HYDRA-MATIC SERVICE DATA: "See Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

►*EARLY 1954 CADILLAC DRIVE LINE VIBRATION. This sound usually develops within the 40-35 MPH range, and in some cases as low as 20 MPH and as high as 60 MPH. Insert spring seat shims, Part No. 1462614, (with thick part of shim toward front of car) between rear axle housing and spring seat supports, then weld shims to spring seat support. CAUTION–Shims should not be installed on Series 60 & 62 after Engine No. 08270, nor on Series 75 after Engine No. 18097. This correction does not apply to Series 86 cars.*
Mechanics. Needle bearing type. Two used (three on Comm'l cars with center bearing).
See Universals Section for complete data.

►*REAR UNIVERSAL YOKE CAUTION–*Do not disturb nut on end of pinion shaft retaining rear universal joint yoke unless yoke or oil seal being replaced. *Pinion bearing preload must be adjusted whenever this nut distrubed.*

REAR AXLE

Own Make. Hypoid gear, semi-floating with Hotchkiss Drive.
See "Cadillac Hypoid" in Rear Axle Section.
►*OVERHAUL CAUTION–*Manufacturer recommends that Carrier Assembly be serviced by replacement. Do not disassemble this unit or attempt service work other than oil seal and universal joint replacement.
Axle Identification–Axles marked by number stamped bottom of differential case below center of pinion shaft as indicated in ratio table below.

Series	Ratio	Mark
60S, 62 (Std.)	3.07-1	"3"
60S, 62 (Optl.) Ⓒ	3.36-1	"6"
75	3.77-1	"7"
86	4.27-1	"4"

Ⓒ–Standard on 1954 Air Conditioned cars.

►*PINION BEARING PRELOAD CAUTION: Must be adjusted each time pinion shaft nut loosened. See "Cadillac Hypoid" in Rear Axle Section.*

Backlash–.003-.010" Screw adjustment.
Axle Shaft Removal: Remove wheel and take out screws holding brake drum on axle shaft flange and remove drum. Remove nuts and lockwashers from bolts holding bearing retainer and backing plate on axle housing, use Puller J-942-1 and Slide Hammer J-2619 to remove axle shaft.
►*CAUTION–*Use care not to damage axle shaft oil seal when sliding axle shaft out and do not disturb position of backing plate on housing.
Commercial Cars–Remove wheel, remove nut and washer on end of shaft. Use Puller (Snap-On No. S-4567 or similar five jaw type), to remove wheel hub and brake drum. Disconnect brake line. Take out retaining screws and remove dust shield (bearing retainer) and backing plate. Use Puller J-838 to pull axle shaft and bearing assembly out, using care not to damage oil seal in housing.
Differential Carrier Removal: Disconnect rear universal joint and remove lubricant from rear axle housing. Remove axle shafts (see above). Remove nuts and washers holding carrier to axle housing and remove entire assembly with gasket. *See "Overhaul Caution" above.*
Wheel Bearings: Sealed ball-bearing type.
*CAUTION–*Check bearings for loss of lubricant when shaft removed. If bearings spin freely indicating loss of lubricant, replace bearings.
Pinion Bearing Preload Adjustment: Pinion should be adjusted whenever nut on end of pinion shaft disturbed (for universal joint yoke or oil seal replacement).
See "Cadillac Hypoid" in Rear Axle Section.

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SHOCK ABSORBERS

Delco. Direct acting permanently sealed, airplane type located within coil springs (front), "Sea-Leg" type installation (rear), as follows:

1953 Shock Absorbers

Series	Front	Rear
60S, 62	872F	871Y
75, 86	968G	961BB

1954 Shock Absorbers

Series	Front	Rear
60S, 62	542G	542G
75, 86	①	542G

①—Cadillac No. 5342846.

FRONT SUSPENSION

Independent type with direct acting shock absorbers located within coil springs.

See Front Suspension Section for complete data.

NOTE—Specifications below are correct with car at curb weight (car unloaded with full gas tank).

1953 Specifications

Kingpin Inclination—5°51' with 0° Camber.
Caster—0° preferred (limits Neg. ½° to Pos. ½°, and equal within ½°).
Camber—0° preferred (limits Neg. 3/8° to Pos. 3/8°, and equal within ½°).
Toe-In—1/16-1/8" (at rest). Loosen clamp bolts and turn adjusters at outer end of each tie rod equally.
Toe Out on Turns—Outer wheel turned 20°, Inner wheel should be turned as follows:

Series	Left Turn	Right Turn
60S, 62	25°25'	24°42'
75, 86	24°7'	23°6'

1954 Specifications

Kingpin Inclination—5°51' with 0° Camber.
Caster—0° to Neg. 1°, and equal within ½°.
Camber—Pos. 3/16° (Left Wheel), Neg. 3/16° (Right Wheel) desired. Limits Neg. 3/8° to Pos. 3/8° with ¼° to ½° more positive camber on left wheel.
Toe-In—3/16" to ¼", at rest. Loosen clamp bolts and turn adjusters at outer end of each tie rod equally.
Toe-Out on Turns—With outer wheel turned 20°, inner wheel should be 22°40'.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm & nut type.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder.

See "Saginaw (GM)" in Steering Section.

►*1954 POWER STEERING GEAR CHATTER (NOT CHUCKLE) CORRECTION (Cars prior to Eng. No. 01688):* This chatter, particularly noticeable after reversing direction of steering wheel rotation when backing into parking space, correct by replacing valve body assembly.

►*1953 REPLACEMENT POWER STEERING HYDRAULIC PUMP:* Furnished in Kit, Part No. 3630359, consists of power steering pump with special return line reducing union and seal (required when used on 1952 cars).

Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*
Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix (Hydraulic) Single Anchor—Conventional two-shoe. Parking brake applies rear wheel service brakes.
Drums—Diameter 12". Regrinding limits .060".
See "Bendix Hydraulic Single Anchor (Without Eccentric) in Brakes Section.

1953 Brake Lining

	Length	Width	Thickness
All Shoes	12.92"	2½"	¼"

1954 Brake Lining

	Length	Width	Thickness
Primary	11.45"	2¼"	¼"
Secondary	12.92"	2¼"	¼"

Clearance—.010" (top), .015" (bottom). Adjusting screw backed off 14 notches from point where wheel can just be turned by hand.

Master Cylinder: On left frame member directly forward of brake pedal.

Checking Fluid Level Note—Remote fluid reservoir above master cylinder, on firewall. Maintain to within ¾" of top of container.
Master Cylinder Removal—Remove splash shield from flywheel housing, and remove master cylinder in usual manner.

Power Brakes: Bendix "Hydrovac" Power Unit connected in hydraulic brake line between master cylinder and wheel cylinders (no mechanical connection).
Removal of Power Unit—Disconnect brake lines at power cylinder end plate. Loosen vacuum line hose clamp at check valve and slide hose off check valve. Remove three nuts and lockwashers from cylinder mounting bracket and remove assembly from car.

MISC. MECHANICAL

Windshield Wipers: Cable operated—Vacuum type.
See "Windshield Wipers" in Miscellaneous Section.

Windshield Washer: Connected with windshield wiper so that when windshield washer is operated, wiper motor automatically operates to clean windshield.
See "Cadillac Windshield Washer" in Miscellaneous Section.

Window Regulators: Electric, with reversible motor in window.
See "Electric Window Regulators" in Miscellaneous Section for data.

Power Top Control: Hydro-Lectric with "sealed" system which does not require periodic draining and refilling.
See "Top Controls" in Miscellaneous Section.

Power Seat Adjusters: Electric reversible motors for vertical and horizontal adjustment.
See "Electric Seat Adjusters" in Miscellaneous Section.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

ENGINE & SERIAL NUMBER: Stamped on upper right corner on front face of right hand block, on right frame side member just to rear of engine support bracket, and on the plate on front side of left body pillar.

Series	First 1955 Nos.
60S	556000001
62	556200001
75	557500001
86 Commercial	558600001

Identification—First two figures indicate year, third and fourth indicate model (last five figures are numbered consecutively regardless of series).

Engine Unit Number Note: Use for identification. Stamped on top of crankcase to rear of left hand block with prefix indicating model:

Series	Engine Unit Prefix
60S, 62, 75 (Standard)	4-V-00001 up
60S, 62, 75 (Air-Conditioning)	4-VK-00001 up
86 (Standard)	5-V-00001 up
86 (Air-Conditioning)	5-VK-00001 up
60S, 62 (Eldorado Engine) ①	7-V-00001 up
60S, 62 (Eldorado Engine) ②	7-VK-00001 up

①—Without Air-Conditioning. ②—With Air-Conditioning.

►*ENGINE NUMBER NOTE:* "L.C." will be added as a suffix to engine unit number on all engines built to low compression specifications.

►*NOTE:* Mark * preceding Engine Unit Number indicates cylinder bore and pistons are .010" oversize.

TUNE-UP

►*ROUGH IDLE & DETONATION: May be caused by excessive advance due to vacuum ports in carburetor being too low. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

COMPRESSION PRESSURE: 165 to 185 lbs., (at cranking speed). 212 to 230 lbs., (at 1000 RPM).

VACUUM READING: Not specified (varies with altitude and barometric pressure).

VALVE TAPPET CLEARANCE: None in service (Hydraulic Lifters).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve diverts exhaust gases of left hand cylinder bank through carburetor heating passages in intake manifold to right hand exhaust system.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035"

Spark Plugs—AC No. 44-5 (All Engines). 14mm. Torque to 20-25 ft. lbs.

►*SPARKPLUG CAUTION: AC No. 46-5 should not be used under any circumstances on 1955 engines.*

COIL: Delco-Remy 1115082. *12 Volt.*

Ignition Current—1.25 amperes idling. 3 amperes stopped.

Resistor—Delco-Remy 1927809. On coil bracket.

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110852. *12 Volt.*

Condenser—Delco-Remy 1869704.

Contact Point Set—Delco-Remy 1918148.

Breaker Gap—.016" (new & used points).

Cam Angle—26°-33°.

►*BREAKER GAP CAUTION: Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-1.5	500	0-3.	1000
9-11	1550	18-22	3100
11-13	2075	22-26	4150

Vacuum Spark Control: Delco-Remy 1116091.

Plunger Travel—19/64-5/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6-8.5
13-14.5	26-29	15-16

IGNITION TIMING

Setting—2½° BTDC. *CAUTION—Ignition timing mark "A" is 5° BTDC and does not indicate timing point.*

Timing—Disconnect vacuum line to distributor and and with engine idling at 400 RPM, set timing at point HALF-WAY BETWEEN "A" &"C/" marks on vibration dampener in line with pointer on chain case cover.

►*IGNITION TIMING NOTE: Timing should be checked for both No. 1 and No. 6 cylinders. First set timing for No. 1 cylinder (at point half-way between "A" and "C/" marks), then check timing on No. 6 cylinder. If light flashes before or after the No. 1 cylinder firing point, set distributor to divide the variance.*

►*ROUGH IDLE & DETONATION: May be caused by excessive advance due to vacuum ports in carburetor being too low. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

CARBURETOR

►*IDLE SPEED (AIR-CONDITIONED CARS): Summer and Winter Idle Speed Adjustment is different as follows:*

Summer Setting (Air-Conditioner in Operation)—With transmission selector lever in either "Dr" range, and with Air-Conditioner "ON" set idle speed at 400 RPM (Cars with Std. Engine), 480 RPM (Cars with Eldorado Engine).

Winter Setting (Air-Conditioner not in Operation)—With transmission selector lever in either "Dr" range, and with air-conditioner "OFF", set idle speed at 400 RPM (Cars with Std. Engine), 480 RPM (Cars with Eldorado Engine).

Idle Speed-Up Control Adjustment (Cars with Air-Conditioning): With engine at normal operating temperature and slow idle adjustment completed, turn air-conditioner "ON", and place transmission selector lever in "N" neutral position. Adjust engine idle speed to 900 RPM by loosening locknut on diaphragm shaft and turning knurled nut to obtain specified RPM. Tighten locknut.

Throttle Linkage Adjustment: *CAUTION—On cars with Air-Conditioning and Rochester Carburetors, the engine must be running when throttle linkage is adjusted.*

1) Remove transmission throttle control lever clevis pin at transmission and check lever position with Tool J-3065-C. Fit tool on rear face of transmission case and insert clevis pin through lever and hole in gauge marked '49E '50, while lever is in its rearward position. If throttle lever is misaligned, correct by bending lever with Tool J-2029. Assemble linkage to transmission throttle lever and install new cotter pin.

2) Disconnect spring between carburetor and relay rod at trunnion and remove trunnion from dash relay lever. Place a ¼" drill shank through gauging hole in dash relay lever and into dash relay bracket. Set Carburetor throttle in hot idle position with transmission in "Dr" range (400 RPM-Std. Engine. 480 RPM-Eldorado Engine).

3) Adjust carburetor-to-dash relay rod trunnion to allow free entry into dash relay lever. Connect spring in trunnion.

4) **On Cars With Single Carburetor:** Back off both jam nuts on throttle valve rod at carburetor to allow free movement of rod in trunnion. Push end of throttle valve rod to position transmission throttle valve against its stops. Bring rear jam nut up against trunnion and back off **8 flats** (1 1/3 turns). (NOTE—This adjustment may be changed to improve shift characteristics after road test). Tighten front jam nut, check to be sure there is no bind in linkage.

5) **On Cars With Two Carburetors:** Remove lock nut, adjusting nut and spring from forward end of throttle valve control rod. Back off rear lock nut and adjusting nut and throttle valve rod to permit free movement of rod in trunnion. Push on end of throttle valve rod to position transmission throttle valve against its stop. Bring rear adjusting nut up against trunnion and back off **3 complete turns.** Tighten rear lock nut. Install spring and adjusting nut on front end of throttle valve rod. Adjust nut until the distance between the front face of the trunnion and the rear face of the adjusting nut is 1 13/32". Hold adjusting nut in this position and install lock nut. Recheck above dimension.

6) Remove ¼" drill rod from dash relay and check position of accelerator pedal with wide open throttle. Pedal should touch floor mat with slight pressure (allow ½" clearance if mat has been removed) when throttle is wide open. Adjust accelerator pedal position at pedal end of dash relay-to-accelerator pedal rod. Road test car to insure proper shifting characteristics.

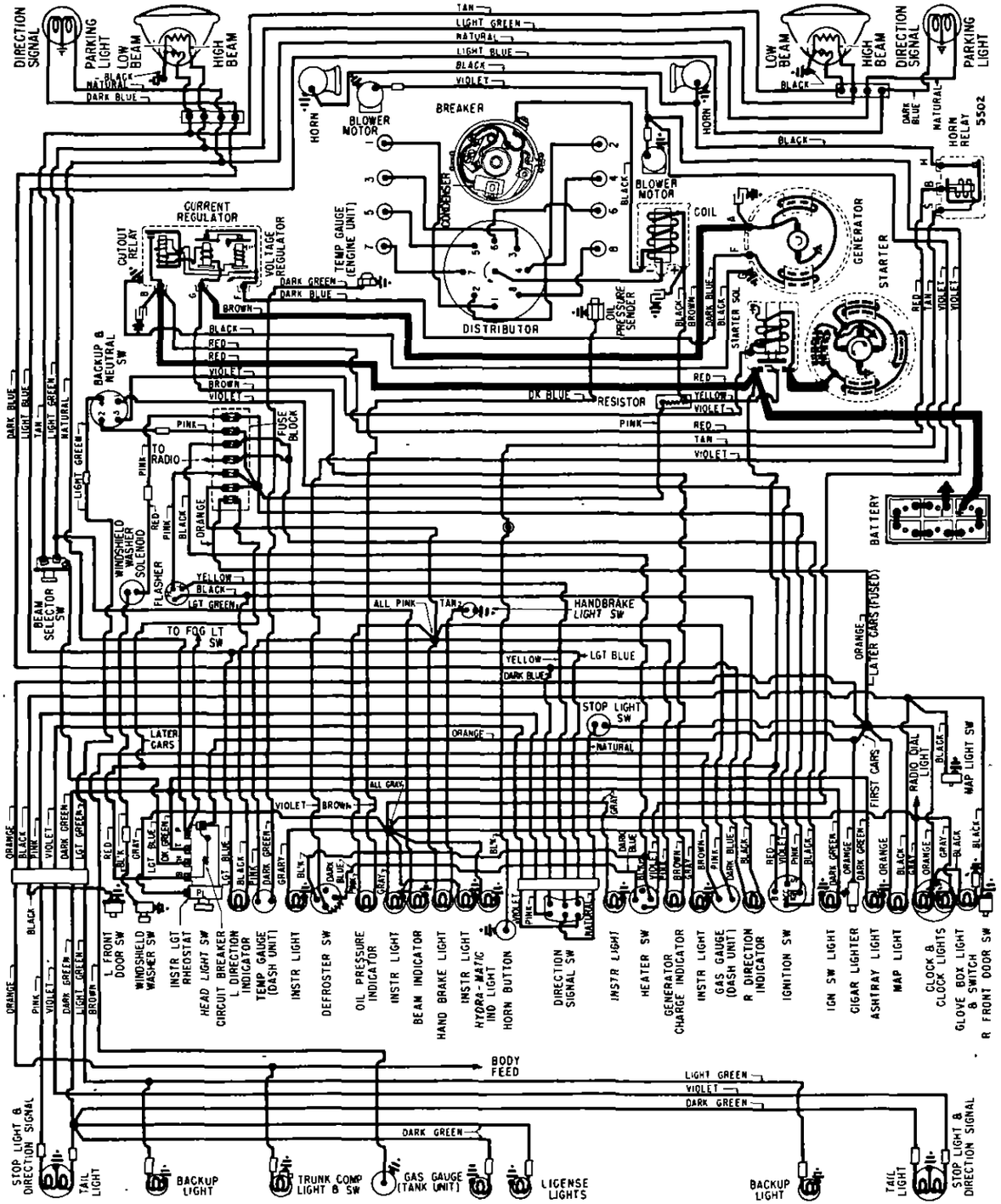
CARTER WCFB
(Standard Engine)

Carter WCFB 2185S (Early), 2266S (Later), 2354S (Latest) Without Air Conditioning. Carter WCFB 2186S (Early), 2267S (Later), 2355S (Latest) With Air Conditioning. *NOTE—Later and latest carburetors have larger secondary system (Throttle Bore, Main Venturi & Metering Jets).*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 2-3-5-8, LEFT barrel 1-4-6-7.*

►*NOTE: 2186S & 2267S have Idle Speed-Up Control for use with Air-Conditioning.*

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Service Replacement Carburetor Note—Carter WCFB 2255S is service replacement for above carburetors. Carter Unitized Package No. 202-44U (Containing Speed-Up Control) must be used on Air-Conditioned Cars.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

►*FLAT SPOT OR SHUDDER AT 20-40 MPH. ON PART THROTTLE ACCELERATION: May be caused by over-rich Idle Mixture Setting (below).*

►*ROUGH IDLE & DETONATION OR HIGH IDLE SPEED:* May be caused by excessive advance due to vacuum ports in carburetor being too low, or by loose or improperly positioned throttle valves. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

►*CARBURETOR "ICING" CORRECTION: See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section for installation of radiator baffle.*

Idle Mixture & Idle Speed Setting—*Special procedure required to insure correct mixture and speed (idle air) screw settings. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section for detailed procedure.*

►*IDLE SPEED ADJUSTMENT NOTE: Idle Air By-Pass screw on throttle body is used to adjust idle speed. The throttle adjusting screw used on previous carburetors has been eliminated and the throttle valves are normally closed at slow idle.*

►*OTHER DATA: See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5½ lbs. (First Cars), 4½-6½ lbs. (beginning Engine No. 58981).

ROCHESTER 4GC.
(Standard Engine)

Rochester 4GC No. 7006655 (Early), No. 7007970 (Late) Without Air-Conditioning. Rochester 4GC No. 7006656 (Early), No. 7007971 (Late) With Air-Conditioning. *NOTE—Later carburetors have larger secondary system (Throttle Bore, Main Venturi, & Metering Jets).*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*OFF-IDLE LEANNESS CORRECTION (Carburetors with brass tag stamped "A5" have had the correction made in production): This condition noted between 20-30 MPH, and is sometimes accompanied by a slight vibration. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

►*FLAT SPOT OR SHUDDER AT 20-40 MPH. ON PART THROTTLE ACCELERATION: May be caused by over-rich Idle Mixture Setting (below).*

►*ROUGH IDLE & DETONATION OR HIGH IDLE SPEED:* May be caused by excessive advance due to vacuum ports in carburetor being too low, or by loose or improperly positioned throttle valves. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

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►*CARBURETOR "ICING" CORRECTION: See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section for installation of radiator baffle.*

Idle Mixture & Idle Speed Setting–*Special procedure required to insure correct mixture and speed (idle air) screw settings. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section for detailed procedure.*

►*IDLE SPEED ADJUSTMENT NOTE: Idle Air By-Pass screw on throttle body is used to adjust idle speed. The throttle adjusting screw used on previous carburetors has been eliminated and the throttle valves are normally closed at slow idle.*

►*OTHER DATA: See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5½ lbs. (First Cars), 4½-6½ lbs. (beginning Engine No. 58981).

ROCHESTER 4GC (2). (Eldorado Engine)

Rochester 4GC No. 7007240 (Front), 7007942 (Rear) Without Air-Conditioning. Rochester 4GC No. 7007440 (Front), 7007241 (Rear) With Air-Conditioning.

►*CARBURETOR INSTALLATION NOTE: Front & Rear Carburetors operate together as follows:*

►*MANIFOLD FUEL DISTRIBUTION (FRONT CARB.):* Right PRIMARY & Left SECONDARY barrels feed Cyl. 2-3-5-8, Left PRIMARY & Right SECONDARY barrels feed 1-4-6-7.

►*MANIFOLD FUEL DISTRIBUTION (REAR CARB).:* Left PRIMARY & Right SECONDARY barrels feed Cyl. 2-3-5-8, Right PRIMARY & Left SECONDARY barrels feed 1-4-6-7.

►*OFF-IDLE LEANNESS CORRECTION(Carburetors with brass tag stamped "A5" have had the correction made in production): This condition noted between 20-30 MPH, and is sometimes accompanied by a slight vibration. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

►*ROUGH IDLE & DETONATION OR HIGH IDLE SPEED:* May be caused by excessive advance due to vacuum ports in carburetor being too low, or by loose or improperly positioned throttle valves. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

►*FLAT SPOT OR SHUDDER AT 20-40 MPH. ON PART THROTTLE ACCELERATION: May be caused by over-rich Idle Mixture Setting (below).*

►*CARBURETOR "ICING" CORRECTION: See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section for installation of radiator baffle.*

Idle Mixture & Idle Speed Setting–*Special procedure required to insure correct mixture and speed (idle air) screw settings. See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section for detailed procedure.*

►*IDLE SPEED ADJUSTMENT NOTE: Idle Air-By-Pass screw on throttle body is used to adjust idle speed. The throttle adjusting screw used on previous carburetors has been eliminated and the throttle valves are normally closed at slow idle.*

►*OTHER DATA: See "Cadillac (Carter & Rochester) Carburetors" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5½ lbs. (First Cars), 4½-6½ lbs. (beginning Engine No. 58981).

CARB. EQUIPMENT

Fuel Pump: AC (Fuel only). Vacuum pump is part of engine oil pump.

Replacement Fuel Pump–AC No. 4269.

Pressure–4-5½ lbs. (first cars), 4½-6½ lbs. (beginning Engine No. 58981).

See "Fuel Pump" in Carburetion Equipment Section.

Gasoline Gauge: AC Electric.

Dash Unit–AC No. 1517953.

Tank Unit–AC No. 1517215.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco–3EM60 (Exc. Comm'l). *12 Volt*, 9 plate, 60 ampere hour capacity (20 Hr. rate).

Delco–3EM70 (Comm'l). *12 Volt*, 11 plate, 70 ampere hour capacity (20 Hr. rate).

Battery Ground–Negative.

Engine Ground–Connected between engine and cowl.

STARTER

Delco-Remy 1107629. *12 Volt.* **Armature 1926626.**

Drive–Overrunning clutch (solenoid pinion shift).

Rotation–Counter-clockwise at commutator end.

Brush Spring Tension–35 ozs. minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
10.5 ft. lbs.	Lock	5.4	470

Starting Switch: Delco-Remy Solenoid Switch No. 1119760 mounted on starter and controlled by Ignition & Starter Switch No. 1116470. Turn key full RIGHT against spring tension to start.

See Electrical Equipment Section for complete data.

Neutral Safety & Back-up Light Switch (Hydra-Matic Drive Cars only): Delco-Remy 1998108.

Adjustment–*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy 1102002 (Std.), 1102011 (Air Conditioned Cars). Armature No. 1923535 (All).

►*GENERATOR ARMATURE REPLACEMENT CAUTION:* Std. Generator No. 1102002 with "N" stamped on frame next to name plate have new type armature with nylon insulated windings. If replacement of this armature required, install regular No. 1923535 armature.

►*REPLACEMENT GENERATOR:* Delco-Remy 1102005 (Less Fan & Pulley).

Maximum Charging Rate–See Current Regulator.

Performance Data

	Amperes	Volts	RPM
Cold	30	14	2150

Rotation–Counter-clockwise at commutator end.

Brush Spring Tension–28 ozs. each.

Field Current–1.48-1.62 amperes at 12 volts.

Generator Charge Indicator: Red light on instrument panel. *See Diagram.*

Belt Adjustment: Loosen both pivot bolts and adjusting strap screw pull generator out until belt just tight enough to drive generator without slip.

REGULATOR

Delco-Remy 1118826. Service Replacement–Delco-Remy 1118825.

►*REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment section. Specifications below are "Normal" settings.*

Cutout Relay

Cuts In–12.8 volts (hot).

Contact Gap–.020".

Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–14.5 volts (hot).

Air Gap–.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–30 amperes (hot).

Air Gap–.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equipment Section.*

Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*

Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*

Stop Light Switch: (Location) –Mechanical type mounted on underside of toe board and operated by brake pedal.

FUSES: Located on fuse panel under instrument panel on cowl insulating board just to left of car centerline except as noted below

►*WIRING & FUSE PRODUCTION CHANGES:* On later cars, Courtesy & Map Light, Trunk Light, Clock Light, Glove Box Light, and Stop Lights are protected by 14 ampere fuse (see diagram). Ash tray light added.

Windshield Washer–6 amps.

Back-up Light–9 amps.

Automatic Heating System– 20 amps.

Radio–7.5 amps.

Direction Signal–6 amps.

Spotlight–9 amps. Under hood at Defroster mounting screw.

Air Conditioner–Two fuses, 6 amps., and 20 amps., located under instrument panel above air-conditioner control.

Map, Trunk, Clock, Glove Box, & Stop Light (Later Cars–see Production Change above): 14 ampere. On block located beneath instrument panel.

CIRCUIT BREAKERS: (Lighting)– 22 amps., located in main lighting switch. Protects all lighting circuits.

HORNS: (Exc. Eldorado)–Delco-Remy 1999765 (Low Note), 1999766 (High Note). *12 Volt.*

Eldorado–Delco-Remy 1999585 (Trumpet type), *12 Volt.*

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Horn Relay: Delco-Remy 1116908. *12 Volt.*
Contacts Close–5.0-9.5 volts.
Contact Gap–.027". **Air Gap**–.014".

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

Bore	Stroke	Displacement	Rated HP
3 13/16"	3 5/8"	331 cu. ins.	46.5

Engine	Compr. Ratio	Developed HP
Standard	9.0-1	250 at 4600 RPM
Eldorado	9.0-1	270 at 4800 RPM

►*OVERSIZE CYLINDER BORE CAUTION: Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have a .010" oversize cylinder bore and pistons.*

ENGINE REMOVAL: *See "Engine" in Cadillac Special Data.*

OIL PAN REMOVAL: *See "Oil Pan" in Cadillac Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Cadillac Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Cadillac Special Data.*

PISTONS

►*ORIGINAL CYLINDER BORE CAUTION:* Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have .010" oversize pistons and cylinder bore. Standard cylinder bore size: 3.8125-3.8145".
Original Bore & Pistons–*See "Original Bore & Pistons" in Cadillac Special Data.*
Pistons–Aluminum alloy, T-T slot, tin plated, "Slipper Skirt" (skirt cutaway at pin bosses).
Weight–19.68 ozs.
Removal–Piston and rod assemblies removed from above. Install connecting rod Guide Studs J-3224, on connecting rod bolts to guide rod out through bore without nicking or scratching. *CAUTION–Do not nick lower edge of bore when pushing rod up.*
Fitting New Pistons: Use micrometer or feeler gauge. *See "Pistons" in Cadillac Special Data.*
Replacement Pistons: Standard "High Limit" or maximum production size, and .010", .020", .030" oversize. Pistons furnished only with fitted pins.
Installing Pistons: Install in cylinder with piston pin boss marked "Rear" toward rear of engine. *See "Connecting Rods" (below) for installation of pistons on rods.*

PISTON PINS

Pin is pressed in connecting rod.
Diameter–1.000". **Length**–3 3/32".
Pin Fit in Piston–.00005"-.0001" clearance at 70°F. Not fitted in field (replace piston & pin assembly).
Pin Fit in Rod–(NOTE–Special tools required). *See "Piston Pins" in Cadillac Special Data.*

PISTON RINGS

Top compression ring is chrome plated rolled steel and the other two rings are cast iron. An expander is not used behind the oil ring in production.

Ring	Width	End Gap	Side Clearance
Compr. (#1 & 2)	5/64"	.010-.020"	.0017-.0035"
Oil (#3)	3/16"	.010-.020"	.0008-.0026"

Replacement Rings: Standard, .010", .020", .030" oversize.
►*REPLACEMENT RING NOTE–If re-ring set is to be installed in new or low mileage bores, it is not necessary to install oil ring expander.*
Installing Rings: Chamfered face of both compression rings must be installed toward top of piston.

CONNECTING RODS

Length–6 5/8" (center-to-center).
Weight–23.49 ozs.
Crankpin Journal Diameter–2.2488-2.2493".
Out-of-Round Limits–.00025".
Bearings–Moraine-Durex, bearing shell is steel backed aluminum. Bearing halves interchangeable. No shims.
Clearance–.0002-.0020" (Service limit .0045").
Sideplay–*.008-.014" (total both rods).*
Replacement Bearings: Furnished in standard size only.
Installing Rods (In Pistons): On pistons Nos. 2-4-6-8, install rod so mark 'REAR' on piston pin boss is to **left** side of rod (with stamped number on rod facing operator). On pistons Nos. 1-3-5-7, install rod so mark 'REAR' on piston pin boss to to **right** side of rod (with stamped number on rod facing operator).

CRANKSHAFT

►*CRANKSHAFT BEARING CAP PRODUCTION CHANGE & INSTALLATION CAUTION:* Heavier bearing caps used on later cars. These caps used WITHOUT lockwashers on retaining screws. *CAUTION–Use of lockwashers on these caps will result in insufficient thread engagement of retaining screws.*
Journal Diameters–2.4985-2.4995". Five bearings.
Out-of-Round Limits–.00025".
Clearance–.0008-.0015" (service limit .005" max.).
End Thrust–Taken by flanged rear bearing.
End Play–.001-.005" (service limit .010" max.).
Bearings–Moraine Durex. Bearing shell is steel backed aluminum. Bearing halves interchangeable. No shims.
Replacement Bearings: Furnished in standard size only.
Main Bearing Removal & Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

►*MAIN BEARING CAP INSTALLATION CAUTION:* Bearing caps must not be interchanged. Install caps with marking number (not casting number) on left side and in order from front to rear. DO NOT use lockwashers on LATER HEAVIER bearing caps (see Production Change above).

Crankshaft Removal & Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Cadillac Special Data.*

CAMSHAFT

►*CAUTION:* Handle shaft with care to avoid damage or mis-alignment. Check whenever removed.
Removal, Alignment & Installation–*See "Camshaft & Bearings" in Cadillac Special Data.*
Bearings–Steel backed babbitt bushings.
Clearance–.001-.0022" (service limit .004" max.).
Bearing Cut-of-Round Limit–.002" max.
Timing Chain: Link-Belt side guide type. Width 11/16", Pitch .500", Length 23" or 46 links.
Installation & Removal–*See "Timing Chain" in Cadillac Special Data.*
Camshaft Setting: Both sprockets marked '0'. Mesh chain with sprockets turned so that marks adjacent and in line with straightedge across shaft.
►*CAUTION:* Install chain as a unit with camshaft sprocket (sprocket press fit on shaft with locating dowel and two retaining capscrews).

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diam.	Stem Diam.	Length
Intake	1.750"	.3415-.3425"	①4.628-4.648"
Exhaust	1.562"	.3415-.3420"	4 21/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	②44°	.411"	③.0005-.0025"
Exhaust	②44°	.411"	③.001-.0025"

①–"Rich" Valves. "Eaton" Valves 4.628-4.653".
②–New valves (Valves in service can be refaced to 45° if seat width recommendation not exceeded).
③–New valves and guides. Worn limit. .005" max.

►*VALVE SEATING CAUTION:* Do not lap or grind so that seat width is more than 1/64" (1° difference between valve and seat angle designed to provide "hairline" contact.
►**Valve Seat Recommendations:** 3/64-1/16" (moderate speed or city driving), 1/16-3/32" (high speed driving). Cut seat so that distance from outer edge to edge of flange on valve head not more than 1/32".
Valve Stem Oil Seal–Rubber oil seal installed in lower groove on valve stem (below valve keeper).
Oil Seal Installation: *See "Valve System" in Cadillac Special Data.*
Valve Removal & Installation: *See "Valve System" in Cadillac Special Data.*
Valve Guides: Pressed in cylinder head with counterbored end down toward valve head. Use Remover Tool J-3062 to drive old guides out toward top of head, Installer Tool J-3066 to drive new guides in (tool plate serves as stop for driver).
Valve Springs: (Free Length) 1.980".

Valve Spring Specifications

	Pressure	Length
Valve Closed	62-68 lbs.	1.696"
Valve Open	152-162 lbs.	1.285"

►*SPRING INSTALLATION CAUTION: Lower end of valve spring must be seated in recess in cylinder head.*

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Valve Lifters: Hydraulic.
See "Valve System" in Cadillac Special Data.
Valve Lifter Removal—*See "Valve System" in Cadillac Special Data.*

►*LIFTER NOISE CORRECTION:* If noise noted when engine hot, oil level low, after sudden stops, or when descending steep grades, see OILING SYSTEM below for correction to prevent air entering pump.

Rocker Arms: Rocker arm end shaft assemblies are mounted on each cylinder head. *NOTE*—No adjustment screws provided on rocker arms.

Rocker Arm Installation—*See "Valve System" in Cadillac Special Data.*

►*VALVE PUSH ROD CAUTION: 1955 Push Rods are shorter (identified by single groove at upper end), and are not interchangeable with previous models.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing

Intake Valves—Open 19° BTDC. Close 70° ALDC.
Exhaust Valves—Open 60° BLDC. Close 30° ATDC.

Valve Timing Check—Not practical to check in field. Manufacturer recommends removing timing chain cover and checking timing marks.

OILING SYSTEM

►*AIR IN OILING SYSTEM (Causing oil foaming or noisy hydraulic lifter operation): See Oil Pump Installation under "Oiling System" in Cadillac Special Data for installation of "O" ring seal on float tube and inspection of oil pan baffle for clearance.*

Crankcase Capacity: 5 qts. One quart additional for dry filter.
Normal Oil Pressure: 30-35 lbs. min. at 30 MPH. 15 lbs. at idle speed.
Pressure Regulator Valve—On oil pump. Not adjustable.
Oil Pressure Indicator—Light on instrument panel controlled by pressure switch AC No. 1997884 mounted on engine.

Oil Pump: Helical gear. In crankcase at rear of engine.

Oil Pump Removal & Overhaul: *See "Oiling System" in Cadillac Special Data.*

Vacuum Pump: Part of Oil Pump assy. See *"Vacuum Pump" in Cadillac Special Data.*

Oil Filter: Partial flow. Replace element every 6000 miles or more frequently in dusty areas.

Replacement Filter Element—AC No. 1P-115

Crankcase Ventilation: Air intake in oil filler cap (oil wetted type) with outlet connection at rear of valve compartment cover, and outlet pipe extending down below engine at right corner.

CO LING

►*THERMOSTAT INSTALLATION CAUTION: Install with spring strap parallel to car center line otherwise right engine bank will operate at higher temperature.*

Water Capacity: (Exc. Series 75) 20¼ qts. with heater. 18 qts. without heater. (Series 75) 22¾ qts. with heater. 18 qts. without heater.

Pressure Valve: AC No. 850559. Radiator filler cap. Opens at 12-15 lbs.
Thermostat: Dole type. In water outlet at top of pump body.
Standard Setting—Starts to open at 163° to 168°F.
High Temp.—Starts to open at 177° to 182°F.
Water Pump: Packless, sealed ball bearing type.
See "Cadillac" in Water Pump Section.
Pump Removal—Remove upper and lower radiator hoses after draining cooling system. Remove generator drive belt and take out capscrew mounting pump and water manifold assembly on front of engine, lift out pump and fan. NOTE—Water manifold and thermostat housing are part of pump casting.
Radiator Removal & Installation: *See "Cooling System" in Cadillac Special Data.*
Temperature Gauges: AC Electric.
Dash Unit—AC No. 1512789.
Tank Unit—AC No. 1512678.
See "Temperature Gauges" in Miscellaneous Section.

HYDRA-MATIC DRIVE

Dual-Range four speed automatic transmission and fluid coupling.

►*HYDRA-MATIC CLUTCH PRODUCTION CHANGE (270 HP ENGINES):* Thinner clutch discs used in front and rear units and an extra driving disc has been installed in both units. *CAUTION—This type clutch disc is to be used only on the 270 HP Engine equipped cars.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 2000 miles at time of car lubrication. Drain and refill after 6000 miles and every 25,000 miles thereafter Use only Cadillac Hydra-Matic Fluid.

Capacity—Approximately 10 qts. (refill).

Checking Fluid Level—With selector lever in "N" (neutral) position, run engine at speed of 20 MPH for about 2½ minutes. Reduce engine speed to slow idle (375-400 RPM). Raise engine hood and remove transmission dipstick (located at right rear side of engine) wipe it clean and check fluid level. With engine still idling, add fluid to bring level to "F" (full) mark on dipstick. *CAUTION*—Do not fill above "F" mark on dipstick, foaming will result.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type. Two used (three on commercial cars with center bearing).
See Universals Section for complete data.

►*UNIVERSAL JOINT YOKE PRODUCTION CHANGES & REPLACEMENT CAUTION:* New yokes used in production and furnished for replacement as follows:

Front Joint (Slip) Yoke—New yoke (same part number as previous type) has longer yoke splines (counterbore eliminated) which provide more contact area between output shaft and yoke splines which eliminates possibility of drive line thump developing in service. *See "Propeller Shaft Notes" in Cadillac Special Data for installation of this yoke on early cars.*

Rear Joint (Pinion Shaft) Yoke—Stronger yoke (thicker flange and without body taper) used on later cars (beginning approx. Eng. No. 27403). *When installing this yoke, longer mounting screws, No. 1463229, MUST be used (shorter screws used with previous type yoke will not have sufficient thread engagement).*

►*REAR UNIVERSAL YOKE CAUTION: Do not disturb nut on end of pinion shaft retaining rear universal joint yoke unless yoke or oil seal should be replaced. Pinion bearing preload must be adjusted whenever this nut disturbed.*

REAR AXLE

Own Make. Hypoid gear, semi-floating with Hotchkiss Drive.
See "Cadillac Hypoid" in Rear Axle Section.

►*DRIVE LINE THUMP CORRECTION: See Front Joint Yoke data under "Universal Joint Yoke Production Changes & Replacement Caution" above.*

►*OVERHAUL CAUTION:* Manufacturer recommends that Carrier Assembly be serviced by replacement. Do not disassemble this unit or attempt service work other than oil seal and universal joint replacement.

Axle Identification—Axles marked by number stamped bottom of differential case below center of pinion shaft (First Cars) or on oil return hole boss at front end of differential case (beginning Engine No. 94850). Ratios and marks are as follows:

Series	Ratio	Mark
60S, 62 (Std.)	3.36-1	"6"
60S, 62 (Optl.)	3.07-1	"3"
75	3.77-1	"7"
86	4.27-1	"4"

►**Pinion Bearing Pre-Load Caution:** Must be adjusted each time pinion shaft nut loosened. *See "Cadillac Hypoid" in Rear Axle Section.*
Backlash—.003-.010" Screw adjustment.
Axle Shaft Removal: Remove wheel and take out screws holding brake drum on axle shaft flange and remove drum. Remove nuts and lockwashers from bolts holding bearing retainer and backing plate on axle housing, use Puller J-942-1 and Slide Hammer J-2619 to remove axle shaft.

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►*CAUTION:* Use care not to damage axle shaft oil seal when sliding axle shaft out and do not disturb position of backing plate on housing.

Commercial Cars—Remove wheel, remove nut and washer on end of shaft. Use Puller (Snap-On No. S4567 or similar five jaw type) to remove wheel hub and brake drum. Disconnect brake line. Take out retaining screws and remove dust shield (bearing retainer) and backing plate. Use Puller J-838 to pull axle shaft and bearing assembly out, using care not to damage oil seal in housing.

Differential Carrier Removal: Disconnect rear universal joint and remove lubricant from rear axle housing. Remove axle shafts (see above). Remove nuts and washers holding carrier to axle housing and remove entire assembly with gasket. *See "Overhaul Caution" above.*

Wheel Bearings: Sealed ball-bearing type.
CAUTION—Check bearings for loss of lubricant when shaft removed. If bearings spin freely indicating loss of lubricant, replace bearings.

Pinion Bearing Preload Adjustment: Pinion should be adjusted whenever nut on end of pinion shaft disturbed (for universal joint yoke or oil seal replacement).

See "Cadillac Hypoid" in Rear Axle Section.

SHOCK ABSORBERS

Delco. Direct acting permanently sealed, airplane type located within coil springs (front), "Sea-Leg" type installation (rear), as follows:

Series	Front	Rear
60S, 62	①542-G	②5513717
75, 86	②5513718	②5513719

①—Delco number. ②—Cadillac number.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within coil springs.

►*FRONT SPRING PRODUCTION CHANGE & REPLACEMENT CAUTION:* Longer coil springs WITHOUT lower insulators used on later cars. When installing this late type spring on early cars, lower insulator should be removed and discarded.

Kingpin Inclination—5°51' with 0° camber.

Caster—0° to Neg. 1°. Adjustment must be equal within ½° or less on both sides of car.

Camber—Neg. 3/8° to Pos. 3/8° with ¼-½° more positive camber on left side.

Toe-In—3/16-¼" (at rest). Loosen clamp bolts, turn adjusters at outer end of each rod equally.

Toe-Out on Turns—With outer wheel turned 20°, inner wheel should be 22°40'.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm & nut type.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder.
See "Saginaw (GM)" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix (Hydraulic) Single Anchor. Conventional two-shoe. Parking lever applies rear wheel service brakes.

Drums—Diameter 12" (all Series). Regrinding limits .060".
See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

►*BRAKE PEDAL BIND & EXCESSIVE PEDAL EFFORT (Cars before Engine No. 22750): See "Brake Notes" in Cadillac Special Data.*

	Brake Lining Length	Width	Thickness
Primary	11.52" ①	2½"	¼"
Secondary	12.98"	2½"	¼"

①—(60S & 62). 12.98" (75 & 86 Series).

Braking Power—(Exc. 86 Series) 55.8% (front), 44.2% (rear). (86 Series) 52.8% (front), 47.2% (rear).

Clearance—.010" (top), .015" (bottom). Adjusting screw backed off 14 notches from point where wheel can just be turned by hand.

Master Cylinder: On left frame member directly forward of brake pedal.
Checking Fluid Level Note—Remote fluid reservoir above master cylinder on firewall. Maintain level to within ¾' of top of container.
Master Cylinder Removal—Remove splash shield from flywheel housing and remove master cylinder in usual manner.

Power Brakes: Bendix "Hydrovac" Power Unit connected in hydraulic line between master cylinder and wheel cylinders (no mechanical connection).
See "Hydrovac Power Unit" in Brake Section.
Removal of Power Unit—Disconnect brake lines at power cylinder end plate. Loosen vacuum line hose clamp at check valve and slide hose off check valve. Remove three nuts and lock washers from cylinder mounting bracket and remove assembly from car.

MISC. MECHANICAL

Windshield Wipers: Cable operated—Vacuum type.
See "Windshield Wipers" in Miscellaneous Section.

Windshield Washer: Connected with windshield wiper so that when windshield washer is operated, wiper motor automatically operates to clean windshield.

►*WINDSHIELD WASHER PRODUCTION CHANGE:* Solenoid Switch (for wiper control when washer operated) discontinued on cars beginning Engine No. 97096.
See "Windshield Washers" in Miscellaneous Section.

Power Window Regulators: Electric, with reversible motor in each window.

See "Electric Window Regulators" in Miscellaneous Section for data.

Power Top Control: Hydro-Lectric with "sealed" system which does not require periodic draining and refilling.
See "Top Controls" in Miscellaneous Section.

Power Seat Adjusters: Electric reversible motors for vertical and horizontal adjustment.

►*POWER SEAT CHUCK & NOISE CORRECTION:* May be corrected by adjustment and by installation of Tension Springs (used in production beginning Engine No. 57610). *See "Power Seat Adjusters" in Miscellaneous Section.*

Air Conditioning: *See "Frigidaire (GM) Air Conditioning in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-54 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Capscrews	75-80	900-960
Main Bearing Bolts	100-110	1200-1320
Con. Rod Nuts	40-50	480-600
Rocker Arm Support Bolts	25-30	300-360
Crankcase Frt. End Plate	15-20	180-240
Timing Gear Cover Screws	6-7½	72-90
Manifold Clamp Bolts	15-20	180-240
Manifold Stud Nuts	25-30	300-360
Clutch Mounting Bolts	25-30	300-360
Clutch Housing Bolts	45-55	540-660
Flywheel Bolts	50-65	600-780
Oil Pan Flange Bolts	6-7½	72-90
Oil Pan Corner Bolts	12½-15	150-180
Oil Distr. Cover Screws	6-7½	72-90
Water Pump Mtg. Bolts	25-30	300-360
Fuel Pump Mtg. Bolts	15-20	180-240
Spark Plugs (14 mm.)	20-25	240-300
Spark Plugs (10 mm.)	10-12	120-144
Pitman Arm Bushing Nuts	30-40	360-480
Prop. Shaft Flange Nut	160-280	1920-3360
Axle Flange Bolts (Trucks)	85-95	1020-1140

1955 MODELS

	6 Cyl. Ft. Lbs.	V8 Ft. Lbs.
Cylinder Head	90-95	60-70
Intake Manifold	① 15-20	25-35
Exhaust Manifold	① 15-20	25-35
Oil Pan	12 1/2-15	② 12-15
Main Bearing Caps	100-110	60-70
Flywheel	50-65	55-65
Con Rod Caps	35-45	30-35
Rocker Arm Support Bracket	25-30	
Rocker Arm Cover		2 1/2
Engine Front Cover	6-7 1/2	6-8
Clutch Housing	45-55	25-35

①—Tighten two end clamp bolts to 25-30 ft. lbs.
②—Corner bolts. Tighten other flange bolts to 6-7-1/2 ft. lbs.

ENGINE

1946-48 PASSENGER CARS

ENGINE REMOVAL: Drain radiator and cylinder block of all cooling liquid and remove the hood. Remove Fenders, Radiator, and Grille as an assembly (see Front End Removal above). Disconnect generator leads and free wiring loom from support clip, remove battery and starting cables. Disconnect distributor low and high tension leads, take out ignition coil mounting screws, lay coil on cowl. Disconnect gas line at fuel pump, throttle and choke controls at carburetor, and accelerator rod at bellcrank. Disconnect exhaust pipe from manifold. Remove front floor mat and floor plate over transmission, disconnect vacuum and air lines at transmission shift cylinder. Remove outer half of the reactionary metal boot (work under car) by taking out two bolts fastening halves together. On all cars except Cabriolet proceed as follows: Loosen reactionary lever assembly-to-transmission operating shaft clamp bolt, drive assembly from shaft carefully, disconnect selector rod from selector lever by taking out cotter pin in transmission end of rod, remove 3 vacuum cylinder bracket-to-transmission capscrews and move assembly clear of transmission. On Cabriolet only proceed as follows: Disconnect vacuum cylinder piston rod and valve link from reactionary lever system (to prevent upsetting vacuum valve adjustment, replace clevis pin thru piston rod yoke and valve link). Then for all cars continue as follows: Disconnect clutch pedal link and pullback spring. Remove bolts in universal joint ball retainer, slide retainer and ball back on shaft, take out 4 screws holding universal trunnion bearings on front yoke, remove trunnion bearings. Remove 4 bolts from transmission rear support, remove front and side engine mounting bolts, remove bolts in starter cross-shaft. Remove third cylinder head bolt from rear on left side, install engine lifting eye bolt in this bolt hole, attach hoist and lift engine until clear of mountings, pull engine forward and lift to clear front cross-member, then roll chassis back until engine is free. When engine re-installed, adjust mountings, align hood (see above).

1949-54 PASSENGER CARS

ENGINE REMOVAL: Engine, clutch, and transmission can be removed as an assembly as follows: Drain radiator, block, oil pan, and transmission. Take off hood by disconnecting hood springs (use Tool J-3181) and removing two hinge support arm-to-hood bolts at each side (hold hood to prevent dropping down when bolts removed). Remove radiator (see Radiator Removal), battery with ground strap attached, and air cleaner. Disconnect wire harness at right junction block and pull harness through header bar. Remove header bar. Disconnect starter and generator wires, coil lead, windshield wiper vacuum line, gas line at pump, choke and throttle cables at carburetor, line at temperature gauge and oil pressure gauge, exhaust pipe flange at manifold, accelerator pedal from rod, transmission control rods from levers on side of case (work through opening in floor), speedometer cable at transmission, and clutch link to pedal arm. (On Powerglide models, disconnect transmission oil cooler lines and vacuum line). Split the universal joint retainer, sliding the ball back, taking out bearing capscrews and removing trunnion bearings. Remove transmission-to-support bolts, engine side mounting-to-frame bracket bolts, and front engine mounting bolts. Take off rocker arm cover. Remove 4th cylinder head bolt from the rear on left side, 3rd from rear on right side and install engine lifting tool No. J-2967. Use a hoist and lift engine, clutch, and transmission assembly from car.

NOTE—On all models (except Powerglide with Automatic Transmission) after engine has been installed and torque tube connected, fill universal housing through speedometer connection (remove driven gear) with ½ pint of SAE 90 transmission lubricant.

1955 6 CYL. PASSENGER CARS

ENGINE REMOVAL: Drain cooling system, crankcase, and transmission and proceed as follows:

1) Scribe alignment marks on hood around hood hinges. Disconnect right hand headlamp, parking lamp, and horn wires and remove wires from radiator core support brace. Remove both horns. Remove radiator hoses and heater hoses on models so equipped. On Powerglide models, remove and plug oil cooler lines.

2) Remove radiator core support to fender bolts, core support to fender side baffle bolts and core support to front cross member bolts. Remove radiator core and core support. Remove battery, battery support and battery cables.

3) Disconnect starter and generator wires, engine to body ground strap, oil pressure indicator wire at switch on block and coil primary lead at coil. Remove windshield wiper motor. Remove temperature indicator element from cylinder head. Remove air cleaner.

4) Disconnect gasoline feed pipe from fuel pump and disconnect vacuum lines at intake manifold. Remove exhaust pipe to manifold bolts. Disconnect carburetor control rod from dash panel bell crank. Remove transmission control rods. Remove clutch control bellcrank and control rods on conventional transmission models. On overdrive models, disconnect overdrive wires and cables. On Powerglide models, remove oil filler tube and plug opening.

5) Disconnect speedometer cable at transmission. Split universal joint. Remove propeller shaft. Remove rocker arm cover and install lifting hooks from Kit J-4536 in cylinder head bolt holes. Raise engine slightly and remove all four engine mounts. Remove the engine and transmission from chassis as a unit.

1955 V8 MODELS

ENGINE REMOVAL: Drain cooling system, crankcase, and transmission and proceed as follows:

1) Scribe alignment marks on hood around hood hinges and remove hood from hinges. Remove radiator hoses and heater hoses. Remove radiator core support to core bolts and shims. On Powerglide models, remove and plug oil cooler lines. Remove radiator core.

2) Remove battery, battery support and battery cables. Disconnect starter and generator wires, engine to body ground strap, oil pressure indicator wire at switch on block and coil primary lead at coil.

3) Remove windshield wiper motor. Remove temperature indicator element from cylinder head. Remove air cleaner, fan blade and pulley. Disconnect gasoline feed pipe from carburetor and vacuum lines from intake manifold. Remove distributor and coil. Disconnect carburetor control rod from dash panel bell crank.

4) Disconnect exhaust cross over pipe from exhaust pipe and muffler assembly. Remove transmission control rods. Remove clutch bell crank and control rods on conventional transmission models. On Overdrive models, disconnect overdrive wires and cables. On Powerglide models, remove oil filler tube, plug opening and disconnect oil cooler lines. Disconnect speedometer cable at transmission.

5) Split rear universal joint and remove propeller shaft. Remove choke heat tube and rocker arm cover

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and install two eye bolts and spacers from Kit J-4536-A in cylinder head bolt holes. Raise engine slightly and remove all four engine mounts. Remove engine and transmission from chassis as a unit, tilting engine to clear radiator core support.

1947-53 TRUCKS

ENGINE REMOVAL (TRUCKS): Drain radiator, cylinder block, and oil pan. Remove hood assembly. Remove front end sheet metal assembly (1947 Trucks). (On later models, remove radiator support bracket and radiator.) Disconnect starter switch cables, coil lead and engine ground strap. Disconnect generator leads at generator and disconnect horn wire. Disconnect fuel line at pump, choke and throttle controls at carburetor and remove air cleaner. Disconnect oil gauge line at engine, remove temperature gauge engine unit and disconnect vacuum lines from manifold. Remove exhaust manifold bolts, remove starter pedal and disconnect accelerator pedal from rod. Remove floor pan cover in cab and disconnect transmission control rods (models with steering column shift), or remove transmission cover and gearshift lever assembly and install temporary cardboard cover on case. Remove hand brake lever, disconnect speedometer cable and clutch link to pedal arm. Drain transmission, disconnect propeller shaft. Take out bolts in rear engine mounting, remove front engine mounting. Remove third cylinder head bolt from rear on left side, install engine lifting eye bolt in this position, attach hoist. Remove engine, clutch and transmission from chassis as a unit. When re-installing engine, see Engine mounting instructions (following).

1954 TRUCKS

ENGINE REMOVAL (TRUCKS): Drain cylinder block, and oil pan. Remove hood assembly, radiator support bracket and radiator. Disconnect starter switch cables, coil leads and engine ground strap. Disconnect generator leads at generator and disconnect horn wire. Disconnect fuel lines at pump, choke and throttle controls at carburetor and remove air cleaner. Disconnect oil gauge line at engine, remove temperature gauge engine unit and disconnect vacuum lines at manifold. Remove exhaust manifold bolts, remove starter pedal and disconnect accelerator pedal from rod. Remove floor pan cover in cab and disconnect transmission controls (models with steering column shift), or remove transmission cover and gearshift assembly and install temporary cardboard cover on case. Remove hand brake lever, disconnect speedometer cable and clutch link to pedal arm. Drain transmission, disconnect propeller shaft. Take out bolts in rear engine mounting, remove front engine mounting. Remove third cylinder head bolt from rear on left side, install engine lifting eye bolt in this position, attach hoist. Remove engine, clutch, and transmission from chassis as a unit When re-installing engine, see Engine Mounting instructions (following).

1955 6 CYL. TRUCKS

ENGINE REMOVAL: Same as 1955 6 Cyl. Pass. Cars except as follows: Disconnect parking brake linkage at transmission where necessary. Remove propeller shaft. On 1½ & 2 Ton models remove transmission cover and gearshift lever assembly (cover opening with cardboard).

1955 V8 TRUCKS

ENGINE REMOVAL: Same as 1955 V8 Pass. Cars except as follows: Remove windshield wiper motor. Disconnect Hydra-Matic oil cooler (if so equipped)

ENGINE MOUNTINGS

1946-47 PASSENGER CARS

ENGINE MOUNTINGS: *See Replacement Mountings (following) which are adjusted like 1948 type.*

Adjustment (Original Equip. Type)—Tighten front engine mounting bolts (replace mounting if oil-soaked), tighten rear mounting bolts at transmission and frame cross-member (studs tight in case). Clearance between cross-member and "U" section plate should be .005-.015" and equally spaced fore-and-aft (limits the fore-and-aft engine movement). If clearance excessive, remove mounting and bend plate to obtain correct clearance. Tighten side engine mounting bracket bolts. Take out engine side mounting bolts, check clearance between mounting and bracket at each side, clearance must be 1/32-1/16" (if clearance excessive, use a ⅜" plain washer for proper clearance. If clearance less than 1/32", loosen bracket mounting bolts and push mounting up (if necessary, remove brackets and file mounting holes with round file to secure proper clearance). Tension on both side mountings must be equal.

1946-47 MODELS

REPLACEMENT ENGINE MOUNTINGS (1946-1947 Passenger Cars): New 1948 type Side Support Cushion Assemblies (Side Mountings) and Transmission Support Assembly (Rear Mounting) as listed below can be installed on all cars except Cabriolet models. Side mountings must be installed in pairs (can be used on 1946-47 cars). Rear Mounting can be installed separately or with new side mountings on 1946-47 cars. Rear mounting is new one-piece type and requires installation of new type lock plate which also serves as a stop for transmission countershaft. Adjust mountings as directed for 1948 cars.

NOTE—These mountings used on late 1947 cars.

1946-47 Replacement Mountings

Side Support Cushion Assy. (R. H.)	756056
Side Support Cushion Assy. (L. H.)	756057
Transmission Support Assy.	756100
Transmission Support Bolt Lockplate	3683693

1948 PASSENGER CARS

ENGINE MOUNTINGS (1948 Passenger Cars): Mountings consist of one-piece vulcanized rubber type assemblies as follows:

Front Mounting—Same as used on previous cars.

Side Mountings—New right and left hand (not interchangeable) type with rubber in "shear". These mountings must be adjusted when installed on car

Rear Mounting—New one-piece vulcanized assembly which does not require adjustment (replaces former "U" channel plate type).

Adjustment of Pass. Car Engine Mountings: Install side mountings with lug on mounting at edge of engine bracket. Shim between mounting and brackets so that clearance is zero plus or minus 1/16" before tightening mounting bolts. Bolt holes in frame bracket are offset. Rear engine mounting should be bolted to frame cross-member first and then bolted to transmission with engine and transmission weight on mounting (bolt holes slotted to provide alignment between transmission and mounting). Lock the mounting bolts in the transmission with the special lock plate. Replace engine mountings whenever they become oil-soaked.

1948-54 PASSENGER CARS

ENGINE MOUNTING REPLACEMENT: Front Mounting. Remove engine front mount bolts from engine mounting plate and frame cross-member. Raise front end of engine until front mounts can be moved out from between plate and frame. With front support mounting surfaces clean (no oil, etc.), bolt new supports to frame, lower engine, install mounting plate, bolt support to engine.

Side Mountings. Unbolt mounting from clutch housing and frame brackets and remove mounting. Install new mounting with serrated face toward frame bracket. Bolt mounting to clutch housing bracket first, then tighten mounting to frame bracket bolts (bolt hole in frame bracket slotted and serrated face of frame bracket and mounting permit proper positioning without use of shims).

Transmission Mounting (except Powerglide Cars). Remove mounting attaching bolts (tangs of lock plate must be bent back from bolt heads). Raise rear of engine until mounting can be moved out from between transmission and frame cross-member. Use new bolt lock plate and bolt new mounting to frame, lower engine, use new bolt lock plate and bolt mounting to transmission (transmission attaching bolt holes slotted permitting alignment between transmission and support).

1955 PASSENGER CARS

ENGINE MOUNTING REPLACEMENT: (Front Mounts)—Remove top and bottom stud nuts and remove washer and cushion between each nut and the cross member or engine bracket. Raise front of engine (On V8 models, remove the distributor cap before raising engine). *CAUTION—Raise engine only far enough for clearance.* Replace necessary cushions.

Rear Mounts: Support engine weight to relieve rear mounts. Remove mount attaching bolts from frame outrigger and flywheel housing (or Powerglide Transmission) and remove support. Install new support and bolts and tighten securely with engine weight resting on mounts.

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1946-47 TRUCKS

ENGINE MOUNTINGS: Adjustment. Tighten front engine mounting bolts and side engine mounting bracket bolts securely.

1948-54 TRUCKS

ENGINE MOUNTINGS (Trucks): Consist of insulated type front and rear mountings as follows:

Front Mounting—Engine mounting bushings are imbedded in rubber insulator assembled between lower retainer and upper plate with a shield on top of the assembly. This mounting should be checked for clearance when installed and periodically in service.

Rear Mounting—Two insulated units. Bolted to bracket on clutch housing and bracket on frame. No adjustment required (keep mounting bolts tight).

Adjustment of Truck Engine Mountings: Check new front engine mounting, and remove and check mounting in service, as follows: With mounting removed from engine, fit insulator into lower retainer and place upper plate on top. Hold parts firmly together and make certain that rubber insulator fits tightly between retainer and plate and that engine mounting bushings project above upper plate (necessary to prevent oil shield contacting upper plate). Replace insulators which do not pass this test. Check clearance between upper edge of lower retainer and lower face of upper plate. If clearance more than 5/64", replace lower retainer. If clearance less than 3/64", grind off top edge of lower retainer. (CAUTION—do not attempt to shim the support). When installing mounting, tighten engine-to-mounting bolts tightly, mounting-to-frame bolts securely but not excessively tight (self-locking type nuts). Rear engine mountings do not require adjustment and mounting bolts should be kept tight.

1955 TRUCKS

ENGINE MOUNTING REPLACEMENT: Same as 1955 Passenger Cars. See above.

TORQUE TUBE & BALL ADJUSTMENT

1950-54 POWERGLIDE MODELS

UNIVERSAL JOINT BALL ADJUSTMENT (POWERGLIDE MODELS): ***Due to the fact the universal joint is lubricated under pressure (fed by automatic transmission line pressure through channel in output shaft) leakage will develop if the ball joint is not properly adjusted.***

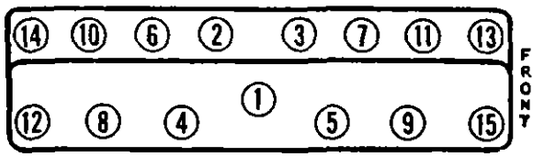
To adjust, remove universal joint ball from torque tube. Clean thoroughly, and inspect for roughness, and clean up with fine emery paper if necessary before making adjustment. Use 4 new universal ball collar shims as a starting point, install joint ball and collar to transmission case and tighten bolts to 8-12 ft. lbs. torque. **NOTE**—Do not install the ball joint collar oil seal (cork) at this time. With bolts tight grasp the ball at the sliding seal (to tube) end with both hands, and test for tightness of ball, up and down. If ball assembly can be moved and is a snug fit, the ball is properly adjusted. If it cannot be moved by hand or is too loose add or remove shims until proper adjustment is secured. After correct adjustment is made disassemble joint and install cork seal after first lubricating it with a graphite grease, and reassemble to transmission tightening bolts to 8-12 ft. lbs. torque.

CYLINDER HEAD & MANIFOLD

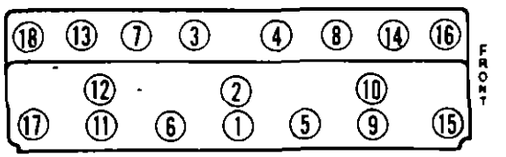
6 CYL. MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in diagram. Cast Iron heads should be tightened cold and rechecked after engine has been run sufficiently to bring all parts to normal operating temperature.

Tightening Torque—See Tightening (Torque Wrench) Specifications.



CHEVROLET 6 CYL. CYLINDER HEAD
(EXC. 1953 235" ENGINE)

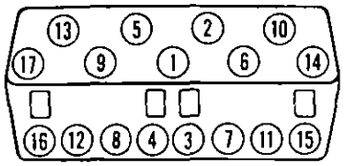


CHEVROLET 6 CYL. CYLINDER HEAD
1953 & LATER 235" & 261" ENGINE

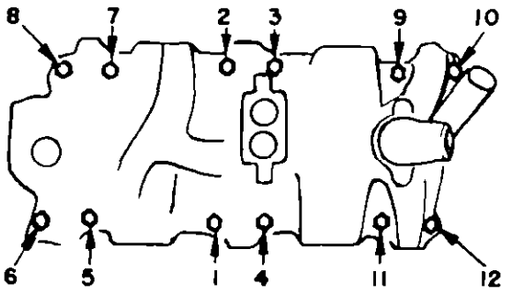
V8 MODELS

CYLINDER HEAD INSTALLATION (V8 ENGINES): Coat steel cylinder head gaskets with a good head gasket paste and install gaskets in position on cylinder block. Install heads over dowel pins in the block. Oil threads of all long cylinder head bolts and coat threads of all short bolts with Permatex No. 3 (short head bolts protrude into water passages). Use a torque indicating wrench and tighten bolts a little at a time to 60-70 ft. lbs., in the sequence shown in diagram.

INTAKE MANIFOLD INSTALLATION (V8 ENGINES): Install manifold end gaskets on cylinder block. Coat ends of intake manifold side gaskets around water passages with a good sealing compound and install heads. Tighten bolts a little at a time to 25-35 ft. lbs. torque.



CHEVROLET V8 CYLINDER HEAD



CHEVROLET V8 INTAKE MANIFOLD

PISTONS

1946-53 MODELS

►*NEW "HIGH LIMIT" STANDARD PISTONS—Available for "216" & "235" Engines (1946-53).*

REPLACEMENT PISTONS: Finished pistons with fitted pins and bushings furnished as follows:

1946-52 Pass. Cars (216" Engine)

Part No.	Size
605260	Standard
3699254	.001" Oversize
605263	.020" Oversize
605280	.030" Oversize
605281	.040" Oversize

1953 Pass. Cars (216" Engine)
1946-53 Trucks (216" Engine)

Part No.	Size
605276	Standard
3699255	.001" Oversize
605279	.020" Oversize
605280	.030" Oversize
605281	.040" Oversize

1950-52 Pass. Cars. (235" Engine)
1946-53 Trucks (235" Engine) ①

Part No.	Size
3693984	Standard
3699256	.001" Oversize
3693994	.020" Oversize
3693995	.030" Oversize
3693996	.040" Oversize

1953 Pass. Cars (235" Powerglide) ②

Part No.	Size
3707453	Standard
3703846	.001" Oversize
3704534	.020" Oversize
3704535	.030" Oversize
3704536	.040" Oversize

①—When these pistons are installed on models prior to 1950 it will be necessary to use Ring Unit which contains 3/32" top compression ring.
②—Engines with aluminum pistons.

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►*PISTON SIZE NOTE—Standard pistons marked S1, S2, S3, S4 to denote size limits in steps of .0005".*

PISTON PINS

V8 MODELS

PISTON PINS (V8 ENGINE): Removal—Install pilot of *Tool J-5538 on puller screw and install puller screw,* with pilot, through piston and pin. Install tool support over threaded end of puller screw with small end of support against piston. Install nut loosely on puller screw and place assembly in arbor press so that pin can be pressed out through support.

Installation: Lubricate pin holes and position connecting rod in its respective piston so that flange or heavy side of rod at bearing end will be toward **front** of piston (cast depression in head of piston and "F" marks on piston struts) on #1-#3-#5-#7 pistons and rod flange to **rear** of piston on #2-#4-#6-#8 pistons. Install piston pin on puller screw and pilot on screw. Install puller screw through piston and rod, indexing pilot through piston and rod. Install support over threaded end of puller screw with small diameter toward piston. Install nut on puller screw and tighten with a torque wrench to start piston pin into connecting rod *(CAUTION—If pin can be started into connecting rod with less than 10 ft. lbs. torque, clearance is excessive).*

CRANKSHAFT & MAIN BEARINGS

1946-54 MODELS

MAIN BEARING INSTALLATION (Without Removing Engine or Crankshaft from Chassis): Upper bearing halves can be replaced by following procedure (bearings doweled in place and cannot be "rotated" out):

Main Bearing Replacement (Pass. Cars): Remove radiator (see Radiator removal), remove fan belt and vibration dampener (see Vibration Dampener removal). Loosen all rocker arm screws to relieve tension on camshaft. Remove spark plugs. Raise car and support securely on stands so car is level and approximately 8" off floor. Remove transmission floor pan cover. Remove clutch housing underpan. Remove transmission rear support-to-crossmember bolts. Disconnect shift rods from transmission levers. Raise rear of engine, place 1" square bar behind flywheel and under clutch housing with ends resting on second cross-member brace (this will support engine weight). Release clutch fork from ball. Remove transmission mounting bolts, slide transmission back approximately ¾". Remove oil pan and timing gear cover. Remove oil pump and screen cover assembly. Rotate crankshaft to position allowing removal of all bearing caps. Mark timing gears to insure re-meshing gears in same relative position. Then install new bearings as follows:

Bearing Installation—Loosen but do not remove all main bearing cap bolts sufficiently to allow crankshaft to drop down approximately ⅛". Remove front intermediate and rear main bearing caps (other bearing caps will support crankshaft), remove old bearings from bearing cap and crankcase (if old bearings do not drop down with crankshaft, tap bearings lightly to free dowel). Install new bearings, locating dowel on back of bearing shell in hole in crankcase, and pressing bearing up in place (bearing should snap into place and hold if it has correct spread). Re-install bearing cap, using .006" shim thickness (three .002" shims) on each side of cap, tighten bearing caps just enough to support crankshaft. Repeat above procedure at front and rear intermediate bearings (NOTE—Rear intermediate bearing is close fit in crankcase and may not go up into place until crankshaft lifted up). After all bearings replaced, place a jack under rear intermediate bearing cap and carefully raise crankshaft into position. Keep crankshaft horizontal during this operation (CAUTION—Make certain that timing gears meshed in accordance with marks made before crankshaft dropped). Tighten all bearing caps snugly, then adjust main bearings as directed on car model page.

Main Bearing Replacement (Trucks): Remove radiator (see Radiator removal), remove fan belt and vibration dampener (see Vibration Dampener removal). Loosen all rocker arm screws to relieve tension on camshaft. Remove spark plugs. Take off transmission floor pan cover and clutch housing underpan and extension. Disconnect transmission control rods on side of transmission case (½ & ¾ Ton), remove hand brake lever from transmission mounting stud (Other Trucks). Remove transmission (see Transmission removal instructions for each model on car model page). Remove oil pan and timing gear cover. Remove oil pump and screen cover assembly. Rotate crankshaft to position allowing removal of all bearing caps. Mark timing gears to insure re-meshing of gears in same relative position. Then install new bearings as directed for Pass. Cars

1946-54 MODELS

CRANKSHAFT OIL SEALS: Rear Seal. Special rear *main bearing cap (mounted on four bolts with two* locating dowels) with wick type oil seal installed in groove in cap and crankcase used. Seal bears on outer rim of crankshaft flange (oil slinger and check valve in oil return hole in bearing cap have been discontinued). To install new seal in bearing cap, insert packing in groove and roll firmly in place with rounded tool (roll from both ends toward center). Use round block of wood (same diameter as crankshaft flange) to hold packing in place, cut both ends off evenly and flush with bearing cap face. Install upper half of seal in crankcase in same manner with engine out of car.

Front (Timing Gear Cover) Oil Seal—Spring-loaded leather type installed in pocket in timing gear cover. To install new seal, place seal on special Oil Seal Replacer J-995 with free end of leather toward end of tool, seat seal in cover with few light hammer blows on tool. NOTE—Timing gear cover must be centered on crankshaft when installed on engine to prevent balancer damaging oil seal. To install cover, coat seal with grease, install centering guide J-966 on crankshaft, install cover and tighten cover screws.

1955 6 CYL. MODELS

6 CYL. ENGINE MAIN BEARING REPLACEMENT (With Engine in Car): Upper bearing halves are doweled in position. Proceed as follows:

1) Remove radiator, harmonic balancer, and timing gear cover. Remove rocker arm cover and loosen all rocker arm screws to relieve tension on camshaft. Remove spark plugs.

2) Remove transmission (see Transmission Removal on Car Page). Drain oil, remove oil pan and oil pump. Rotate crankshaft to best possible position for removal of all bearing caps and mark the meshing teeth of timing gears for remeshing in same position.

3) Loosen all four main bearing caps evenly until crankshaft is lowered approximately 3/8". Remove front intermediate and rear bearing caps and remove upper and lower bearing shells (If upper shells do not come out with crankshaft, tap lightly to loosen).

4) *NOTE—Always replace bearings in pairs.* Install new upper half bearing shells in rear and front intermediate bearing bores by rolling into position, centering and pressing up into place *(CAUTION—*Be sure to install upper halves so smaller of the two holes will be toward camshaft when rolled into place). Install new lower half bearing shells in caps, and replace caps, using three .002" shims on each side of bearing as a starting point for adjustment. Tighten bearing *cap bolts until caps are snug to journals.*

5) Repeat this procedure with other main bearings. *NOTE*—Due to close fit the upper half of rear intermediate bearing may not go all the way into place. Start it evenly and it will go all the way when crankshaft is raised into place.

6) After all bearings have been replaced, raise crankshaft by tightening bearing cap bolts evenly and alternately *(NOTE*—At the same time, check meshing of timing gears with marks made at disassembly). With the crankshaft up in place, force it all the way fore and aft and check end clearance at rear intermediate bearing. Adjust main bearings.

7) Reassemble engine by reversing above procedure.

1955 6 CYL. M DELS

REAR MAIN BEARING OIL SEAL (6 CYLINDER ENGINE): Remove rear main bearing cap and remove old seal *from groove. Insert new packing in bearing cap* and roll firmly into place with a rounded tool (roll from both ends toward center). Use a round block of wood, same diameter as crankshaft flange, to hold packing in place. Cut off both ends of packing evenly and flush with bearing cap face. Install upper half of seal in crankcase in same manner, with engine out of car.

V8 MODELS

V8 ENGINE MAIN BEARING REPLACEMENT (With Engine in Car): Upper bearing halves can be "rolled" out for replacement. Proceed as follows:

1) Remove spark plugs and remove engine oil pan.

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Remove bearing cap and bearing shell.

2) *Install main bearing shell removing and installing* tool (or use a cotter pin bent as required). Rotate crankshaft in direction of usual rotation and roll upper bearing shell out of engine.

3) Oil new bearing shell and insert plain (un-notched) end of shell between crankshaft and block on the indented or notched side. Rotate bearing into place. Install new bearing shell in bearing cap.

4) Check bearing clearance with Plastigage. Install oil pan and spark plugs.

V8 MODELS

REAR MAIN BEARING OIL SEAL (V8 ENGINE): Remove rear main bearing cap and remove old seal from groove. Insert new seal in groove with fingers, and then with Tool J-5788 (Oil Seal Installer), and a hammer, pound seal firmly into groove. Cut the small portion of the seal that protrudes from groove flush with surface of bearing cap. Replace upper half of seal in crankcase in same manner, with engine out of car.

VIBRATION DAMPENER

1946-54 MODELS

HARMONIC BALANCER: Balancer furnished as a complete assembly only. Separate parts not available for service replacement.

Removal (Passenger Cars)—Remove radiator (see Radiator Removal), and Radiator Grille and Filler Panel Baffle as an assembly. Take off fan belt. Remove engine front mounting bolts, raise front end of engine approx. ½" (to permit balancer puller head to clear radiator support cross-member) Use puller J-1287, attach puller body to balancer by means of two capscrews screwed in tapped holes in balancer, pull balancer by turning puller screw.

Removal (Trucks)—Remove Front End Sheet Metal Assembly (see Front End Sheet Metal Assembly removal preceding). Then remove balancer with puller tool as described for Passenger Cars (above).

Installation—Place drive adapter of puller tool J-1287 in starting crank jaws of balancer, install puller body (as above), line up keyway in balancer and key in crankshaft, turn puller screw down to *contact driver, then use puller screw as driver* and drive balancer in place until it bottoms against crankshaft gear.

1955 6 CYL. MODELS

VIBRATION DAMPENER (6 CYL. ENGINE): Removal—Remove radiator. On Powerglide models, remove oil cooler lines and plug outlets, Remove fan belt and install Puller J-1287-B and pull dampener assembly from crankshaft.

Installation: *Remove puller and install two 3/16" x 1"* (16 thread) capscrews in dampener to support wheel portion during installation. Position dampener on crankshaft with key and keyway on alignment and drive dampener on shaft until it bottoms against crankshaft gear. Use a heavy hammer and bar through the grille, taking care that a straight installation is made. Remove the two 3/16" capscrews previously installed. Install radiator.

1955 V8 MODELS

VIBRATION DAMPENER (V8 ENGINE): Removal—Remove radiator. On Powerglide models, remove oil cooler lines and plug outlets. Remove fan belt, fan, and pulley, and install Puller J-1287-B and pull dampener assembly from crankshaft.

Installation: Install two 3/16"—16 x 1½" capscrews to hold hub and flywheel portion of dampener together during assembly. Coat cover seal contact on dampener with engine oil and position dampener on crankshaft. Use Transmission Front Bearing Installer J-5590 and drive dampener on shaft until hub bottoms on timing sprocket. Remove the two screws installed previously and install pulley, fan, and fan belt. Install radiator.

ENGINE FRONT COVER

1955 MODELS

FRONT OIL SEAL INSTALLATION: Pry old seal out of front cover. Install new seal so that open end of seal is toward inside of cover and drive it into position with Oil Seal Driver J-996. *CAUTION—Support cover at sealing area while installing seal.*

FLYWHEEL

6 CYL. MODELS (EXCEPT POWERGLIDE)

FLYWHEEL INSTALLATION: Sealing of Mounting Bolts. To prevent oil leaks through flywheel bolt holes into clutch, it is recommended that a small amount of Permatex Formagasket No. 2 be placed in each bolt hole in crankshaft flange before installing the flywheel. Wipe face of flange and flywheel mounting surface clean (any foreign material on mounting surface will cause loosening and failure of the mounting bolts).

Installing Flywheel—Use new lock plates each time flywheel bolts are disturbed. Tighten all bolts evenly to 50-65 ft.lbs. and lock each bolt by bending corner of lock plate up against flat on bolt. Check flywheel for runout after installation with a dial indicator. Runout at face and rim of flywheel must not exceed .008".

CAMSHAFT & BEARINGS

1946-55 6 CYL. MODELS

CAMSHAFT BEARINGS: Installation. Oil groove extends 70° around bearing from oil hole. To insure proper alignment with oil hole in block, mark front of bore opposite oil hole. Align oil hole in bearing with mark (with groove toward bottom of engine away from oil hole in block), press bearings in, stake in place, and line ream (see below).

Reaming: Special reamer with four cutters on one bar *recommended by car manufacturer (for proper alignment).* Insert reamer through #1, #2, & #3 bearings. Start reamer cutter in all four bearings at the same time (wash metal cuttings away with a liberal supply of kerosene while reaming), turn reamer slowly until cutters pass through bearings. Remove reamer by rotating in same direction as when reaming bearings and withdraw from engine. Bearing cuttings must be blown out with compressed air. Install camshaft and check bearing clearances with narrow feeler gauge. Clearance should be .002-.004". Install expansion plug to rear of rear bearing.

TIMING GEARS

1946-55 6 CYL. MODELS

REPLACEMENT TIMING GEARS: Fibre type camshaft gear and steel crankshaft gear used on all passenger car and truck engines (except 2-ton models). Aluminum camshaft gear and steel crankshaft gear used on 2-ton models, and as special heavy duty equipment on all other models (except Powerglide).

►*1946-53 CAMSHAFT THRUST PLATE REPLACEMENT NOTE:* The gaskets located between thrust plate and block are no longer furnished for service replacement. Thrust plate is now furnished with a spacer ring which provides correct camshaft endplay when installed as directed below.

1946-55 6 CYL. MODELS

TIMING GEAR INSTALLATION: Gears are press fit on crankshaft and camshaft and must be removed and installed as follows:

Crankshaft Gear—To remove gear, attach Puller T126-R by threading puller screws in tapped holes in gear, pull gear off. When installing gear, make certain that two woodruff keys installed in crankshaft keyways, drive gear on shaft until it seats against shoulder on shaft.

Camshaft Gear—To remove gear, attach Gear Remover J-971-A on shaft in back of gear (remover consists of support sleeve), place camshaft assembly in arbor press (*CAUTION*—Thrust plate must be positioned so that it will not be damaged by woodruff key in shaft as shaft pressed out), press shaft out of gear. To install gear, firmly support shaft at back of front journal in arbor press. Place gear spacer ring and thrust plate over end of shaft, and install woodruff key in shaft keyway. Install camshaft gear and press it onto shaft until it bottoms against the gear spacer ring. The end clearance of the thrust plate should be .001-.005".

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TIMING CHAIN

V8 MODELS

TIMING CHAIN: Removal—Remove vibration dampener, timing chain cover, and oil slinger. Rotate engine until timing marks on sprockets are in alignment and in alignment and adjacent. Remove three camshaft sprocket screws and remove camshaft sprocket and chain together.

Installation: Install chain on camshaft sprocket. Hold sprocket vertical with chain hanging below, and line up 'O' timing marks on both sprockets so they are adjacent and in line with a straight edge across shaft centers. Align dowel in camshaft with dowel hole in sprocket and install sprocket on camshaft. Draw camshaft sprocket onto shaft using the three mounting bolts. Tighten to 15-20 ft. lbs. *CAUTION—Do not attempt to drive sprocket onto shaft as welch plug at rear of engine can be dislodged.*

VALVE SYSTEM

►*FIRST 1954 POWERGLIDE ENGINE VALVE "SQUAWK" CORRECTION:* To provide additional lubrication of valve stems at rocker arm and in guide, drill additional holes in rocker arms as follows. *CAUTION*—Other methods of correcting this squawk (grooving arms, revolving seals, reaming guides, etc.) should not be used as they cause other adverse conditions and excessive oil consumption.

Drilling Intake Rocker Arms—Drill additional 7/64" hole in rib on top of rocker arm at point 5/16" toward *valve end of arm from present oil hole. Drill this hole* **directly into oil groove** in rocker arm bore.

Drilling Exhaust Rocker Arms—Drill additional 7/64" hole in wide side of rocker arm bearing boss 13/16" toward valve end from present oil hole and 5/16" in from edge of wide side of bearing boss. Drill this hole at an angle so that it enters rocker arm bore on valve side of bore center line. *CAUTION*—This hole **must not break into oil groove** in rocker arm bore.

NOTE—Remove all burrs from rocker arm bore. **Do not** plug original oil holes in rocker arms.

ALL MODELS

ENGINE NORMALIZING PROCEDURE (For Valve Tappet Clearance Adjustment): Clearance changes while engine is warming up. Adjust only after engine has been 'normalized' as follows: Run engine at 600 RPM and check oil temperature with thermometer at overflow pipe on valve rocker arm shaft connector until no change noted in oil temperature for a period of five minutes (oil temperature will become stabilized at some point between 150° and 225°F). This normalizing period will be from 5 to 30 minutes depending on engine temperature when started.

1946-55 TRUCKS

VALVE ROTATORS: (Std. on 1953 235" Engines, 1954 Loadmaster & Jobmaster Engines, and on all engines used in 1955 5000 & 6000 Series Trucks. Optional equipment on all other engines 1946-55). Rotators are furnished in sets of six for installation on exhaust valves.

1950-55—Rotators can be installed on present valves. *CAUTION—Valve spring height should be checked when rotators installed. See data on earlier models following:*

Earlier Models (1946-49)—On earlier models it will be necessary to use 1950 type exhaust valves (Part No. 3845606, with 45° seats), and re-working the head for these valves. Where the valve seats have been ground to such an extent that the valve spring height (*head to top of spring*), with rotators installed is greater than 1 55/64" it will be necessary to install a .060" or .065" washer under the spring seat, otherwise they will not function properly. Washers, Part No. 346704 and 355913 can be used for this purpose.

SET VALVE CLEARANCE AT .018-.020" AFTER INSTALLING ROTATORS.

VALVE TAPPET ADJUSTMENT
ALL MODELS
(WITH HYDRAULIC VALVE LIFTERS)

INITIAL ADJUSTMENT HYDRAULIC VALVE LIFTERS: *(Required when cylinder head has been removed or rocker arm or valve assemblies have been replaced).*

6 Cylinder Engines: The hydraulic lifters must be at the lowest point of travel when adjusted (piston in firing position). Remove distributor cap and turn engine until rotor is in firing position (points just breaking) for cylinder being set. Starting with #1 cylinder, turn valve adjusting screw down until rocker arm just contacts valve. This can be determined by checking push rod side play at adjusting screw end while turning the adjusting screw. At the point where no side play can be felt, continue turning the adjusting screw down 1-1/2 turns and tighten lock nut securely. Adjust each cylinder following the same sequence as the firing order (1-5-3-6-2-4).

V8 Engines: With No. 1 Cyl. at TDC firing position, adjust Exhaust valves 1-3-4-8, Intake valves 1-2-5-7 by backing off the adjusting nut on rocker arm until there is play in valve push rod, then tighten adjusting nut to just remove all push rod-to-rocker arm clearance, **then tighten adjusting nut an additional 3/4 turn** to place hydraulic lifter in center of its travel. Crank engine one revolution so that #6 cylinder is in firing position, and then proceeding as above, adjust Exhaust valves 2-5-6-7, and Intake valves 3-4-6-8.

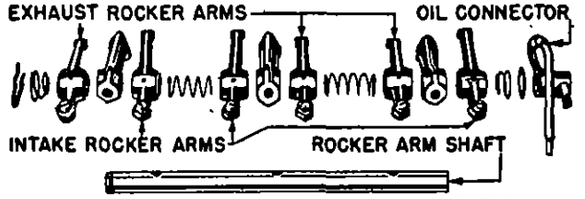
VALVE STEM SEALS
ALL MODELS

VALVE STEM OIL SEAL INSTALLATION: *(NOTE—An additional "umbrella" type shedder is installed over valve spring and retained in place with valve spring retainer on all V8 Engines).* Install synthetic rubber seals as follows: With valve in place in cylinder head, install valve spring with closed coil end down against head and install valve cap or spring retainer. Compress spring and cap so that lower groove on valve stem is exposed and install seal in lower groove (*CAUTION*—Seal must seat in groove and be flat), install valve locks and relieve tension on spring. Check to see that cap retains spring and locks properly. *NOTE—"Umbrella" type shedders not used on 6 Cyl. Engine.*

ROCKER ARMS
1946-55 6 CYL. MODELS

ROCKER ARMS: Rocker arms are precision bored and fit directly on rocker arm shafts (no bushings).

►*ROCKER ARM IDENTIFICATION NOTE:* A number is cast on side of rocker arm (either a single digit or a casting number. If a multiple digit number, use the last digit for identification) to aid in correct assembly to rocker arm shaft. See tables below for identification numbers. Left Hand Exhaust, and Right Hand Intake rocker arms are used on Cyls. 1-3-5. Right Hand Exhaust and Left Hand Intake rocker arms used on Cyls. 2, 4, 6.



CHEVROLET 6 CYL. ROCKER ARM ASSEMBLY
(REAR ASSY. SHOWN—FRONT ASSY. SIMILAR)

Rocker Arm Identification

1946-53 Pass. Car & Truck 216" Engine
1954-55 1st Series Truck 261" Engine

Location	Ident. No.
Left Hand Exhaust	1
Right Hand Exhaust	2
Left Hand Intake	5
Right Hand Intake	6

1950-54 Pass. Car & Truck 235" Engine
1955 1st Series Truck 235" Engine
1955 Pass. Car 235" Engine (Except Powerglide)

Left Hand Exhaust	9
Right Hand Exhaust	0
Left Hand Intake	3
Right Hand Intake	4

1955 2nd Series Truck 235" Engine

Left Hand Exhaust	1
Right Hand Exhaust	2
Left Hand Intake	11
Right Hand Intake	12

1955 2nd Series Truck 261" Engine

Left Hand Exhaust	3
Right Hand Exhaust	4
Left Hand Intake	7
Right Hand Intake	8

Installation: Assemble rocker arms as indicated in illustration with open end of shaft toward center, and baffle in rear shaft open end in vertical position.

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V8 MODELS

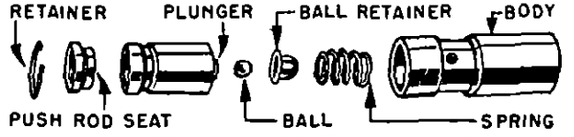
ROCKER ARM STUD REPLACEMENT (V8 ENGINES): Oversize rocker arm studs are available in .003" & .013" oversizes for service replacement. Remove old stud by placing Spacer J-5802 over stud, installing nut and flat washer and removing stud by turning nut. Ream hole for oversize stud with Reamer J-5715 (.003"), J-6036 (.013"). Coat press-fit area of stud with hypoid lubricant and install stud to correct height as follows: 1-3/4" (Early Production "Low Boss" head), 1-41/64" (Later Production "High Boss" head). See "Head Identification" & "Tool Rework" below.

►*V8 CYLINDER HEAD IDENTIFICATION NOTE:* "Low Boss" & "High Boss" heads may be identified by placing a straight edge across rocker cover gasket surfaces. The low stud boss (early head) will be approximately flush with lower edge of scale while the high stud boss (later head) will be approximately 1/4" above lower edge of scale.

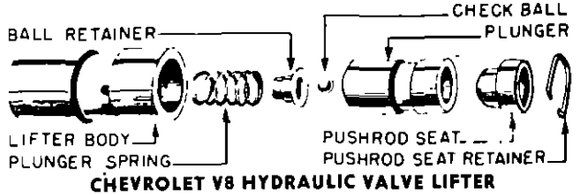
►*STUD INSTALLER TOOL J-5801 REWORK (For installing Stud to 1-1/4" Height):* Grind 3/32" off bottom of tool. When installing studs in "High Boss" (later type head), use Installer Tool J-5801 to drive stud in to the 1-3/4" height, after which studs will have to be pressed in further to the 1-41/64" height.

HYDRAULIC LIFTERS
ALL MODELS

HYDRAULIC VALVE LIFTERS: Barrel type, consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet or body (see illustration). Oil is introduced to this unit through oil gallery in block.



CHEVROLET 6 CYL. HYDRAULIC VALVE LIFTER



CHEVROLET V8 HYDRAULIC VALVE LIFTER

Removal: On 6 cylinder engines, remove rocker arm assemblies, push rods and push rod cover. On V8 engines, remove intake manifold and back off the rocker arm nuts until rocker arm can be swung away from push rods. Remove push rods.

Disassembly: Hold plunger down with a push rod and using a small screw driver or pointed awl, remove plunger retainer. Remove push rod seat, plunger, ball check valve, ball retainer and spring. Clean all parts in solvent and inspect each part carefully for nicks and burrs, or wear. Replace complete assembly if any parts are damaged.

Reassembly (6 Cyl. Engines): Invert plunger and set check valve ball into hole in plunger and place check valve ball retainer over ball and on plunger. Place check valve retainer spring over retainer and then assemble lifter body over the complete assembly, being careful to line up the feed holes in plunger and lifter body. Turn assembly over and fill with S.A.E. 10 engine oil, then insert end of Tool J-4274 through ball seat hole in bottom of plunger and press down solid, at which point holes in lifter body and plunger will be aligned. Insert pin (part of Tool J-4274) through both holes to hold plunger down against spring tension, then remove tool from top of lifter. Fill assembly with S.A.E. 10 engine oil, install push rod seat and spring retainer. Press down on push rod seat and remove pin.

Reassembly (V8 Engines): Invert plunger and set ball into hole in plunger, and place check valve ball retainer over ball and on plunger. Place check valve retainer spring over retainer. Assemble valve lifter body over the complete assembly. Turn assembly over and install push rod seat. Compress plunger with push rod and install retainer. Compress plunger to open oil holes and fill plunger with S.A.E. 10 engine oil. Work plunger up and down to refill.

Installation: Reverse removal procedure.

OILING SYSTEM
1946-53 216" ENGINE

OIL DISTRIBUTOR: Distributor is located in recess in left side of engine block (under valve cover plate).

CAUTION—Inner and outer gaskets used with valve assembly plate must not be interchanged.

Removal—To dismantle oil distributor, take out three screws in cover plate, remove cover plate, outer gaskets, valve assembly plate, inner gasket.

***CAUTION*—Do not alter oil distributor valve spring tension (will upset proper oiling of engine). If trouble suspected in oil distributor, replace oil distributor valve assembly.**

Assembly—Install cork gasket with two center holes between valve assembly plate and block, and use cork gasket with center cut out between valve assembly plate and cover, tighten cover screws.

1950-55 235" ENGINE

OIL LEAD TO VALVE ROCKER ARMS (6 CYL. ENGINES): Rocker arm shaft oil line pipe extends forward to push rod compartment from a fitting in tappet ledge just above rear camshaft bearing, to center of engine then upward to a fitting between the hollow rocker arm shafts. To replace this pipe, cut a new pipe to proper length, install new nipples at each end and install pipe to cylinder block fitting, then bend pipe to contour so that clearance is provided for the push rods and push rod cover and so that end of pipe extends straight up for cylinder head lubrication.

1946-48 MODELS

REPLACEMENT TIMING GEAR OIL NOZZLE: On these models, regular production timing gear oil nozzle is pressed and flared in place in the engine front end plate. Nozzle cannot be serviced, and if replacement is necessary, new front end plate No. 607872 must be installed..

1946-53 MODELS (EXCEPT 1953 POWERGLIDE)

CHECKING OIL SYSTEM (Exc. 1953 Powerglide Engine): Oil nozzle height, oil trough height, aiming of nozzles, and connecting rod dipper height should be checked whenever oil pan removed. This check requires special gauges. *CAUTION*—Beginning with 1947, all engines (216" & 235") have same oil pan and special checking gauge used for each type (see below). *NOT REQUIRED ON 1953 POWERGLIDE ENGINE.*

Oil Pan Trough Height—Use combination Oil Trough Depth & Connecting Rod Dipper Height Gauge No. J-969-2A (216" Engine); J-1646-A (1941-46 235" Engine); J-1541 (1947-53 235" Engine—Except 1953 Powerglide). With oil pan gasket removed, place gauge on pan flanges with center pin extending down toward troughs. Slide pin along pan so that pin passes over edges of trough at center. Pin should clear edge of trough and clearance at this point should not exceed .015". If pin strikes trough, grind edge of trough down for clearance. If clearance greater than .015", reweld any loose trough welds or replace oil pan. Check each trough in this manner.

***Connecting Rod Dipper Height—Use same gauge* as for Oil Pan Trough Height check (above). Turn crankshaft until connecting rod is at bottom of stroke, place gauge over connecting rod with the two gauge side pins resting on the oil pan mounting face of the crankcase, slide gauge over dipper. Low "Go" step of gauge should pass over dipper and high "No Go" step should not. If low step does not pass over dipper, tap dipper down with light hammer, if high step of gauge clears dipper, install new higher dipper. Check all dippers in this manner.**

Oil Nozzle Height and Nozzle Aim—To check, with Oil Pan Target Gauge J-696-1 (for regular and heavy duty engines). Install gauge and position it with dowels engaging screw holes in pan. Install Water Nozzle J-793-3 in main oil line. Tilt oil pan 45° so that nozzles are not covered with water in troughs. Use enough water to just straighten water streams from nozzles. Nozzle streams must hit holes in gauge. Use Nozzle Wrench J-793-5 to adjust nozzles so that each water stream passes through center of its target hole. Recheck oil nozzle height.

OIL PUMP
1946-55 6 CYL. MODELS

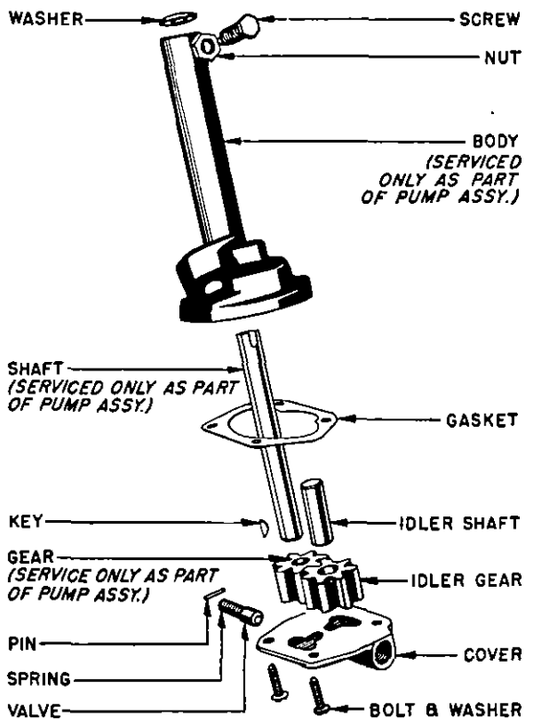
►*1955 6 CYLINDER ENGINE OIL PUMP SUCTION PIPE PRODUCTION CHANGE & REPLACEMENT ON EARLIER MODELS (To prevent loss of oil pump prime at oil change):* The new pipe, Part No. 3836768 is bent in such a manner as to trap oil and prevent draining oil pump. Pipe can be installed on earlier engines. Tighten pipe in pump cover until lower end of pipe is 7 1/8" below pan gasket surface on block. Check pipe for clearance at side of oil pan.

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6 CYL. OIL PUMP (Removal & Disassembly): Drain oil, remove oil pan and disconnect oil pump-to-block oil line. Remove oil pump retaining sleeve lock screw and remove oil pump and oil pump-to-block oil line. Remove pressure oil line from pump and remove pump cover attaching screws, cover, gasket, idler gear and drive gear and shaft. Remove regulator valve pin and valve parts. Remove floating intake screen from pipe by bending tang on float travel control and sliding assembly off pipe *(CAUTION—Do not disturb pick-up pipe as this pipe is located at assembly and controls float travel level).* Wash all parts in solvent and inspect pump body for cracks or excessive wear. Check shaft for looseness in housing and gear and cover for wear.

Assembly: Install drive gear and shaft in body. Install idler gear with smooth side toward cover. Install cover and new gasket. Tighten screws securely and check to see that shaft turns free. Install pump oil line to pump, leaving it loose.



CHEVROLET 6 CYL. OIL PUMP

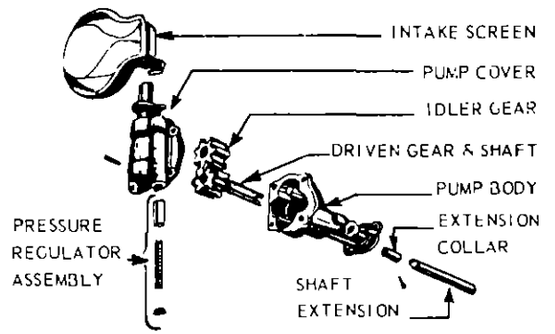
Installation: Install pump in block and align oil lines and install retaining sleeve lock screw and tighten securely. *(CAUTION—Make sure tapered end of lock screw draws down into hole in oil pump body).* Tighten oil pump-to-block oil line and pump-to-screen oil line connector nuts securely. Replace pump screen.

V8 MODELS

V8 OIL PUMP (Removal & Disassembly): Drain oil, remove oil pan, and remove pump-to-rear main bearing cap bolt and remove pump, extension shaft and collar. Remove pump cover attaching screws, cover, idler gear and drive gear and shaft. Remove floating intake screen from pipe by bending tang on float control and sliding float assembly off pipe. *(CAUTION—Do not disturb pick-up pipe as this pipe is located at assembly and controls float level travel).* Wash all parts in solvent and inspect pump body for cracks or excessive wear. Check shaft for looseness in housing and gear and cover for wear.

Assembly: Place drive gear and shaft in pump body and install idler gear so that smooth side of gear will be toward cover. Install cover and attaching screws. Tighten screws to 6-9 ft .lbs. and check to see that shaft turns freely. Install pick-up screen on pipe and bend float travel control tang back in place. Assemble collar end of extension shaft assembly over pump drive shaft, aligning tang of extension shaft with slot in end of pump drive shaft. Install retaining clip with flat end of clip in groove of pump drive shaft.

Installation; Assemble pump and extension shaft to rear main bearing cap, aligning slot at top end of extension shaft with drive tang on lower end of distributor drive shaft. Install pump to rear main bearing cap bolt and tighten to 45-50 ft. lbs. Install oil pan.



CHEVROLET V8 OIL PUMP

COOLING SYSTEM

1946-48 PASSENGER CARS

RADIATOR CORE REMOVAL: Passenger Cars. To remove radiator core, prop up hood in wide open position, drain cooling system, then working from under front end of car remove radiator drain cock and drain hose (on lower right front side of radiator). Disconnect radiator hoses at radiator (loosen hose clamps at water pump and cylinder head outlet so that hoses can be turned to provide clearance when lifting out core). Free wiring harness from radiator support and top tank. Remove carburetor air cleaner. Remove 4 core band-to-radiator support bolts (one at top, one at bottom, on each side). Turn fan to place wide spacing between blades at side, lift core straight up until outlet strikes cross brace on support, lay core back toward engine so outlet clears brace, lift core out.

1949-54 PASSENGER CARS & 1947-55 TRUCKS

RADIATOR CORE REMOVAL: Raise engine hood and block in open position. Drain cooling system by removing drain plug. Disconnect and remove inlet and outlet hoses. Remove radiator mounting bolts from radiator support, lift radiator up and out. NOTE—On models with radiator shroud, push shroud back and down over fan blades for clearance.

1955 PASSENGER CARS

RADIATOR REMOVAL (Passenger Cars): Drain radiator and remove radiator hoses. On models equipped with Powerglide transmission, remove oil cooler lines from radiator and plug lines and radiator fittings. Remove radiator core to radiator support bolts and lift radiator core straight up to remove. *NOTE*—When removing radiator note the shims at support bolts and install at the same location when radiator is installed.

►*POWERGLIDE OIL COOLER CAUTION:* If foreign matter of any kind is allowed to enter cooler, the core should be cleaned with an air stream and flushed thoroughly with automatic transmission oil. Serious damage will be done to transmission if dirt or foreign matter remains in cooler.

PROPELLER SHAFT NOTES

1946-47 TRUCK MODELS

PROPELLER SHAFT SUPPORT BEARING (¾ Ton Short Wheelbase and Special Models): Equipped with three universal joints (the intermediate and rear joints are exposed needle bearing types, front universal is equipped with bushing type joint enclosed in ball housing), two propeller shafts (rear shaft exposed, front shaft enclosed type), and a support bearing ahead of intermediate universal mounted in rear end of front propeller shaft housing. Support bearing Assembly consists of a single row sealed type ball-bearing on rear end of front propeller shaft ahead of intermediate universal front yoke mounted in rear end of front propeller shaft housing. A ring is assembled on the shaft ahead of bearing, and a dust shield behind the bearing. A rubber cushion is assembled on end of housing and seats in sleeve in support bracket.

Removal and Installation—Remove Front Propeller Shaft by disconnecting intermediate universal, slide front universal ball retainer back on housing after removing 4 attaching bolt, and removing support bearing bracket-to-frame bolt nuts. Remove front yoke of intermediate universal, and bearing dust shield. Wet rubber cushion (to soften

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the soap used to install cushion), clamp the support bracket in vise and withdraw housing. Remove rubber cushion by hand. Slip ball retainer off over end of housing. Remove bearing retainer snap ring and drive shaft and bearing out of housing with a brass drift. Use arbor press to remove bearing from shaft. Wash all parts of assembly (except bearing) in good cleaner. Check bearing and replace if endplay excessive or bearing runs rough. Check leather oil seal in housing (do not remove unless a new seal to be installed—leather should be soaked in light engine oil and edge should curl towards the front when installed). Check bushing in front end of housing and replace if worn. To reassemble, press bearing on shaft with an arbor press, install shaft and bearing in housing (tap outer race of bearing with soft drift to seat bearing), insert snap ring, slip universal ball retainer over housing (a new cork packing should be shellacked to retainer), install rubber cushion on housing, coat cushion with soft soap, install support bracket over rubber cushion, install bearing dust shield and intermediate universal front yoke. When installing assembly on truck, lubricate universal ball before assembling ball retainer. Also fill front universal housing with 1 pint of S.A.E. 90 transmission lubricant (use also for intermediate joint).

1946 TRUCK MODELS

▷**Replacement Support Bearing (For 1946 Trucks):** New 1947 type (with improved sealing and greater stability) furnished for replacement use on these trucks. Complete assembly furnished in special Propeller Shaft Bearing Support Kit, Part No. 609037 (same part number as first type support kit). *See 1947 data below.*

1947 TRUCK MODELS

PROPELLER SHAFT SUPPORT BEARING: 1 Ton, 1½ Ton, 2 Ton Trucks (Except Cab-Over-Engine 109" WB Models)—Two propeller shafts with 3 needle bearing universal joints and a support bearing ahead of intermediate universal (some long wheel base School Bus models use 4 universals and 3 propeller shafts, with 2 support bearings). Support bearing is double row ball, (not sealed) with grease fitting for lubrication. Bearing Retainer is new type with wide neoprene insulator band, and is used in combination with felt-and-neoprene dust shields. Support bracket is attached to frame with two bolts.

Removal: Remove front propeller shaft by disconnecting front and intermediate universals and removing two support bolts. Remove front yoke of intermediate universal. Wet rubber cushion (to soften the soap used when cushion installed), clamp support bracket in vise and work shaft out of support. Remove rubber cushion from bearing by hand. Use screw type puller J-1619 mounted in vise to withdraw bearing from shaft (jaws on tool engage outer race of bearing). Tap dust shield off outer race of bearing. Wash all parts of assembly (except bearing) in good cleaner. Check bearing and replace if rough or excessive end play apparent.

Installation: Install double row bearing in retainer (both sides of bearing are the same), install snap ring in retainer on each side of bearing making certain that rings are seated in grooves. Install dust shield spacer in rear end of retainer with prongs in toward bearing. Soak dust shields (combination felt and neoprene) in SAE. No. 40 or 50 engine oil until thoroughly saturated (or until all bubbling stops), press one dust shield in each end of bearing retainer with **neoprene side in toward bearing**, stake dust shields in place securely at six points around retainer rim. Install retainer insulator in groove on outer surface of bearing retainer, install retainer assembly in propeller shaft bearing support (NOTE—Insulator is impregnated with paraffin to facilitate installation) making certain that lubricant fitting boss on bearing retainer engages slot in support, install lubricant fitting in this boss. Install bearing support assembly on rear end of front propeller shaft (see Propeller Shaft Note below) with lubricant fitting end of assembly toward splined end of shaft, so that bearing seats against shoulder on shaft (bearing should be snug on shaft and can be forced to seating position against shoulder with universal joint flange). Install propeller shaft flange and dust shield assembly (see Note) on shaft, inserting end of flange through bearing dust shield, until flange seats against bearing, screw flange retaining nut in threaded hole in end of shaft, tighten nut with torque of 160-280 ft.lbs., secure nut with cotter pin. Install assembly in truck. Lubricate bearing (see Lubrication data below)

Propeller Shaft Flange & Dust Shield Assembly—If dust shield not installed on propeller shaft flange, install shield as follows: Press dust shield on flange hub, with open (concave) side of shield away from yoke end of flange, until shield seats firmly against shoulder on flange. Polish hub of shaft flange with fine emery or crocus cloth to remove all rough spots which might damage support bearing dust shield when flange installed (end of flange hub passes through dust shield and bears against bearing).

Lubrication of Support Bearing: Lubricate bearing with chassis lubricant through special lubricant fitting until lubricant appears at pop-off valve in fitting. When new bearing assembly first placed in service, lubricant will leak past seals at both ends of bearing until proper clearance secured for operation of the bearing. No further leakage should occur after this initial period.

Periodic Lubrication—Lubricate this bearing at each regular chassis lubrication period.

1948-53 TRUCK MODELS

PROPELLER SHAFT SUPPORT BEARING: 1 Ton, 1½ Ton, 2 Ton Trucks (except Cab-over-Engine Short WB. Model): Support bearing is new single row permanently lubricated ball bearing in new type mounting with "grease traps" packed with water proof grease to prevent entrance of dirt and water. Propeller shaft design unchanged.

Removal & Installation: Propeller shafts are removed and installed in same manner as on previous models. Support bearing should be serviced as follows:

Removal—Split intermediate universal joint by removing two trunnion bearing "U" bolts (tape or wire bearings in place). Remove bolts attaching bearing support bracket to frame cross-member. Remove universal flange retaining nut, remove flange, pull support assembly off rear end of front propeller shaft. Place support assembly in arbor press using a piece of tubing to apply pressure on rubber cushion (tubing should clear slinger and be snug fit in bracket), press bearing and cushion assembly out of bracket. Remove cushion and grease retainers from bearing.

Servicing—Clean rubber cushion with pure denatured alcohol, replace cushion if cracked, hardened, or distorted. Check bearing by rotating inner race slowly by hand. CAUTION—Do not attempt to remove oil seal retainers from bearing and do not clean bearing with gasoline or solvent which will wash lubricant out (requiring new bearing).

Assembly & Installation—See that grease deflectors on propeller shaft and universal joint yoke are tight (staked on shaft by prick punching at two points). Assemble grease slinger on outer bearing race (one at each side), force bearing and slinger assembly into rubber cushion. Coat outer surface of rubber cushion with brake fluid, place support bracket on arbor press with flanged side up, position bearing and cushion squarely in flanged end of bracket bore, use piece of tubing to press on rubber cushion only and press assembly in bracket until face of grease retainer is flush with flanged end of bracket (CAUTION—this position important to provide clearance between grease retainers and grease deflectors, if assembly pressed too far in bracket, turn bracket over and press assembly out to correct position). Pack grease retainers on both sides of bearing with waterproof grease (grease used to keep out dirt and water—does not lubricate bearing). Install support bearing and bracket assembly on end of front propeller shaft making certain that grease slingers lined up with bearing hole and that flanged end of bracket is forward. Install intermediate universal joint yoke on end of shaft, tighten yoke retaining nut to 160-280 ft. lbs. Then check clearance between rear edge of propeller shaft dust shield and front face of bearing support bracket. This clearance should be ½" plus or minus 1/32" Install bolts, lockwashers, and nuts attaching bearing support to frame cross-member, tighten nuts

REAR AXLE NOTES

1946-54 MODELS

AXLE SHAFT (PASSENGER CARS): Installation. Assemble new oil deflector, gasket (with shellac or paint on both sides), line up extra hole (center of three closest together) with notch in hub flange in axle shaft (also oil pocket in oil deflector with this notch), insert six new bolts and peen into place in countersink around bolt holes in flange using special Peening Tool and Anvil so that these parts are riveted together. NOTE—Axle shafts are of unequal length, longer shaft used on right side.

Axle Shaft Note—Shafts unequal in length (right shaft longer). Part numbers are as follows:

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1946-48 Passenger Cars

	Part No.	Length	Marking
Left Shaft	3657313	29 19/32"	"GM-13"
Right Shaft	3657314	30 19/32"	"GM-14"

1949-50 Passenger Cars

	Part No.	Length	Diam.①
Left Shaft	3687767	28 1/2"	3 1/4"
Right Shaft	3687768	29 1/2"	3 1/4"

1951-54 Passenger Cars

	Part No.	Length	Diam.①
Left Shaft	3694755	28 1/2"	2 13/16"
Right Shaft	3694756	29 1/2"	2 13/16"

①—Diameter of flange pilot.

Endplay Adjustment—When installing shaft, select correct spacer block (see below) so that when installed on pinion shaft between inner ends of axle shafts, shaft endplay will be from a Free Fit to .014" maximum clearance.

Passenger Car Spacer Blocks

Part No.	Type & Size
597251	Narrow (1.012")
597254	Medium (1.0195" & 1.0295")
473603①	Wide (1.0345")

①—Marked by blue paint on rough side.

Above dimensions are measured across the ground surfaces and spacers should be installed with ground surface toward the axle shaft end. Medium spacer ground on all four sides and may be installed either way to secure the two different sizes.

1946-54 HALF-TON TRUCK

AXLE SHAFT (HALF-TON TRUCK): Shafts are heavier construction than Passenger Car type.
Installation—Assemble new oil deflector, gasket (coat both sides with heavy shellac or paint), line up extra hole (center hole of closely grouped three holes) with notch in hub flange on axle shaft (oil pocket in oil deflector should also be aligned with this notch), install six special bolts, forcing heads down to deflector, and peen shoulder on bolts into countersink around bolt holes in flange using Special Peening Tool and Anvil so that these parts are riveted together. Check endplay (below).

Axle Shaft Note—Shafts unequal in length (right shaft longer). Part numbers are as follows:

1946-47 Half-Ton Truck

	Part No.	Length	Marking
Left Shaft	3652341	28 11/16"	"41"
Right Shaft	3652342	29 11/16"	"42"

Late 1947 & 1948-50 Half-Ton Truck

	Part No.	Length	Marking
Left Shaft	3683161	29 1/2"	"GM-161"
Right Shaft	3683162	30 1/2"	"GM-162"

1951-54 Half-Ton Trucks

	Part No.	Length	Marking
Left Shaft	3694769	29 9/16"	"GM-769"
Right Shaft	3694770	30 9/16"	"GM-770"

Endplay Adjustment—When installing shaft, select correct spacer block (see below) so that with spacer installed on pinion shaft between inner ends of axle shafts, shaft endplay will be from a Free fit to .014" maximum clearance.

Axle Spacer (Trucks)—Two spacer blocks furnished which provide three sizes as follows:
Part No. 370217—Narrow (1.1485").
Part No. 372515—Wide (1.1575" & 1.1675").
These dimensions are taken across ground surfaces. NOTE—Spacers should be installed with ground surface toward axle shaft end. Wide Spacers are ground on all four sides (giving two sizes listed).

1952-54 TRUCKS

Axle Shaft Removal (¾ & 1 Ton): Remove 8 capscrews and lockwashers in axle shaft flange, install two ½" x 13 screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft, withdraw shaft from housing, remove and discard gasket. *Use new gasket when installing shaft.*
CAUTION—Thoroughly clean all lubricant from axle shaft flange and end of wheel hub before installing axle shaft. Grease at this point will cause loosening of axle shaft flange capscrews.

Axle Shaft Removal (1½ & 2 Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. NOTE—When re-installing shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align splines on shaft with both wheel hub and differential side gear splines), use new hub gasket.
Axle Shaft Note—Shafts unequal length (right shaft longer) and may be identified by part number stamped on shaft or lengths as follows:

¾ & 1 Ton Truck

	Part No.	Length
Left Shaft	3680977	31 3/16"
Right Shaft	3680978	37 1/16"

1½ Ton Truck (Splined Shaft)

	Part No.	Length
Left Shaft	3685191	34 3/32"
Right Shaft	3685192	40 15/32"

2 Ton & C-O-E (Splined Shaft)

	Part No.	Length
Left Shaft (stamped 01)	3702201	36½"
Right Shaft (stamped 02)	3702202	41"

Wheel Bearing Adjustment: Remove wheels and axle shaft (see above). Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight, using special wrench J-2222 (¾ & 1 Ton), J-870 (1½ & 2 Ton) while turning hub by hand, then back nut off 45°, check for free turning, install adjusting nut lock (with lock tangs aligned with slots in adjusting nut), bend tang down into notch in adjusting nut, install locknut and tighten securely, bend tang of lock down into notch of locknut.

1946-48 TRUCKS

TWO-SPEED AXLE SHIFTING COMPLAINTS (With Vacuum Shift Control): If vacuum shift is hard to operate or sticks in one position, this may be caused by vacuum shift control valve shaft being tight or frozen in valve body. Correct this trouble as follows: Disconnect pipe fittings at back of valve body and speedometer adapter operating rod at lever on end of valve shaft. Take off cap nut and * washer and remove valve operating lever from valve shaft. Remove two screws mounting valve assembly on instrument panel, remove valve assembly. Remove cotter pin from valve shaft, drive valve shaft out of valve body by carefully tapping on threaded end of shaft with a soft hammer. Examine shaft for evidence of seizing (usually occurs near washer brazed on shaft). Remove excess metal from shaft with a file, then polish shaft with fine emery or crocus cloth. Lubricate shaft lightly with Gredag No. 213½ or other graphite grease (CAUTION—Do not use mineral oil—will cause failure of rubber disc in valve assembly). Re-install shaft, reassemble valve assembly and install on truck.

1946-47 TRUCKS

INCORRECT SPEEDOMETER READING (1946-47 Trucks with Two-Speed Rear Axle): If speedometer reads too high in Low Gear, and too low in High Gear, this may be caused by incorrect assembly of speedometer adapter shift lever. To correct this complaint, remove small shift lever on top of speedometer adapter case, turn lever ½ turn or 180°, re-install lever. This will reverse direction of shift and speedometer should read correctly.
NOTE—When lever correctly installed, small hole for attachment of operating rod will be toward front of truck. The other end of the operating rod should be connected in the outer hole of the lever on the vacuum shifter valve shaft.

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SUSPENSION NOTES

1946-48 PASSENGER CARS

REAR SPRING SEATS (ALL PASSENGER CARS): Bracket welded on front of housing at each spring. Spring seat attached to bracket by means of rubber bushed bolt (spacer sleeve through which bolt passes, used to prevent collapse of bracket when tightening bolts with great deal of pressure). Rubber washers used between bracket and each end of spring seat. Spring seat attached to springs through conventional U-bolts. IMPORTANT—When reassembling spring seat to bracket (when installing rear axle), eye bolt nut must not be tightened until all other connections made and car weight resting on all 4 wheels

STEERING NOTES

1953 MODELS

STEERING GEAR BRACKET REINFORCEMENT (Forward Control Models): To install bracket on earlier models proceed as follows:

1. Remove necessary body parts to make area at rear of steering gear housing and frame in that vicinity accessible for the installation.
2. Enlarge the two holes in section of reinforcement that mounts on frame to approximately ⅝" diameter so that the frame rivets will enter holes allowing reinforcement to set flat against frame.
3. Bolt reinforcement to steering gear housing and bracket using a 7/16"-20x1½" hex head bolt. Clamp reinforcement to frame and weld to frame by welding up all holes (over frame rivets and at bracket), then weld outline of reinforcement along frame, and the raised portion along steering gear bracket.

BRAKE NOTES

1955 MODELS

SLOW POWER BRAKE PEDAL RETURN CORRECTION: When this condition is encountered, check the following points and correct as necessary.

Push Rod Lever Assembly—Power brake unit pushrod has been installed on the outboard side of lever assembly at pedal linkage. Correct by assembling on inboard side. Lubricate all linkage pivot points.

Power Brake Rubber Boot—Bellows or rubber boot may be gathered at front side of dash panel causing a bind on pushrod. Correct by pulling bellows through smaller hole in dash panel and mounting plate at same time power unit is being assembled to mounting plate.

Power Unit Valve Sleeve—Remove power unit from dash. Remove rubber boot from end plate of unit and squirt rubber lubricant (Ru-Glyde) between valve sleeve into which pushrod is assembled and the sleeve bore in valve assembly to lubricate "O" ring seal on valve sleeve.

CAB-OVER-ENGINE NOTES

1946-54 MODELS

REMOTE CONTROL TYPE GEARSHIFT LEVER: Removal. Disconnect gearshift lever at top of engine cover, loosen wire on cloth boot, raise boot above transmission cover tower. Remove nut from stub gearshift lever and raise reverse latch Bowden cable support onto top of lever. Use gearshift lever removing tool K-353 to remove lever assembly from transmission cover. When installing lever, see that end of reverse latch shift rod seats in upper part of 'U' shaped bracket at end of reverse latch Bowden cable and that retaining nuts are tight so that rod anchored in bracket.

HOOD LOCK: Hood is Alligator type. To raise hood, pull out lock button on instrument panel, pull forward on safety catch under front edge of hood.

MODEL IDENTIFICATION

Series 1946	1947	1948	Model Designation
DJ	EJ	FJ	Stylemaster
DK	EK	FK	Fleet Master & Fleetline

FLEET MODEL NOTE: Special Economy Engine available for all models. May be identified by special Tune Up Specification Plate on Push Rod Cover listing special settings and Fleet Car Identification Plate on instrument panel to right of the glove compartment. Special carburetor used (has stop-pin which limits throttle opening to ½ throttle).

SERIAL NUMBER: First No. 1001 with model prefix as indicated in model designation above. Stamped on plate on right front body hinge pillar (Pass. Cars).

ENGINE NUMBER: Stamped on right side of crankcase to rear of distributor with prefix to indicate engine type and plant as follows:

Engine Type	Flint	Tonawanda
1946 Pass. Cars	DAA	DAM
1947 Pass. Cars	EAA	EAM
1948 Pass. Cars	FAA	FAM

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. minimum (cylinders equal within 5-10 lbs.) at cranking speed of 210-220 RPM.

VACUUM READING: Steady 17-21" at idling speed.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .040".

Plug Type—AC No. M-8 (see Note). 10 mm.

►*No. 104 can be used for sustained high speeds.*

M-8 Spark Plug Note—Improved type plug with increased clearance between insulator and shell (to prevent carbon and lead deposits forming in this area and causing short or misfiring at 45-60 MPH car speed) now available and can be identified by groove at base of shell directly above threads. All M-8 plugs are new aluminum oxide insulator type with skirt at lower end around electrode designed to retain heat and burn off carbon deposits.

►M-8 Installation Caution—Use steel gasket with these plugs. Install plugs finger tight, then tighten with wrench (11/16" deep socket) an additional ½-¾ turn (with new gasket), ⅛-¼ turn (old gasket) or with torque of 15 ft. lbs. (except new type M-8 plugs with identifying groove—10-12 ft. lbs). CAUTION—Do not overtighten new type M-8 plugs (with identifying groove). These plugs have thin shell and must not be tightened more than 10-12 ft. lbs.

IGNITION: *See Coil, Condenser, and Distributor.*

Breaker Gap—.018" in service. Limits .015-.022". Set new points at .020-.024" (to allow for seating).

Cam Angle or Dwell—39° closed, 21° open.

Breaker Arm Spring Tension—17-21 ozs.

Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 5° BTDC.

Timing Procedure—*See Ignition Timing.*

Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set at "0". Then adjust Octane Selector as follows:

Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*

Idle Setting—1¼-2¼ turns open (screw set for smooth idle with warm engine—turn out for richer mixture).

Idle Speed—450-500 RPM. with warm engine.

Float Level—½" top of float to gasket seat (machined surface) on cover with valve seated (invert to check).

Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure—4 lbs. maximum.

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Spring should be wound up just enough to slip end over manifold pin (approx. ½ turn). CAUTION—Excessive tension may cause valve to stick with detonation and poor performance.

►**VALVE TAPPET CLEARANCE:** *CAUTION—Engine temperature must be "normalized" before adjusting. See "Tappet Clearance Adjustment" in Chevrolet Shop Notes.*

Std. Engine—.006" (.006-.008") Intake, .013" (.013-.015") Exhaust with engine normalized.

Economy Engine—.010" Intake, .016" Exhaust with engine normalized.

Valve Timing Check: *See Valve Timing.*

►*CAUTION—1948 Engines have new Valve Timing (applies also to 1946-47 Engines with new Replacement Timing Gear).*

IGNITION

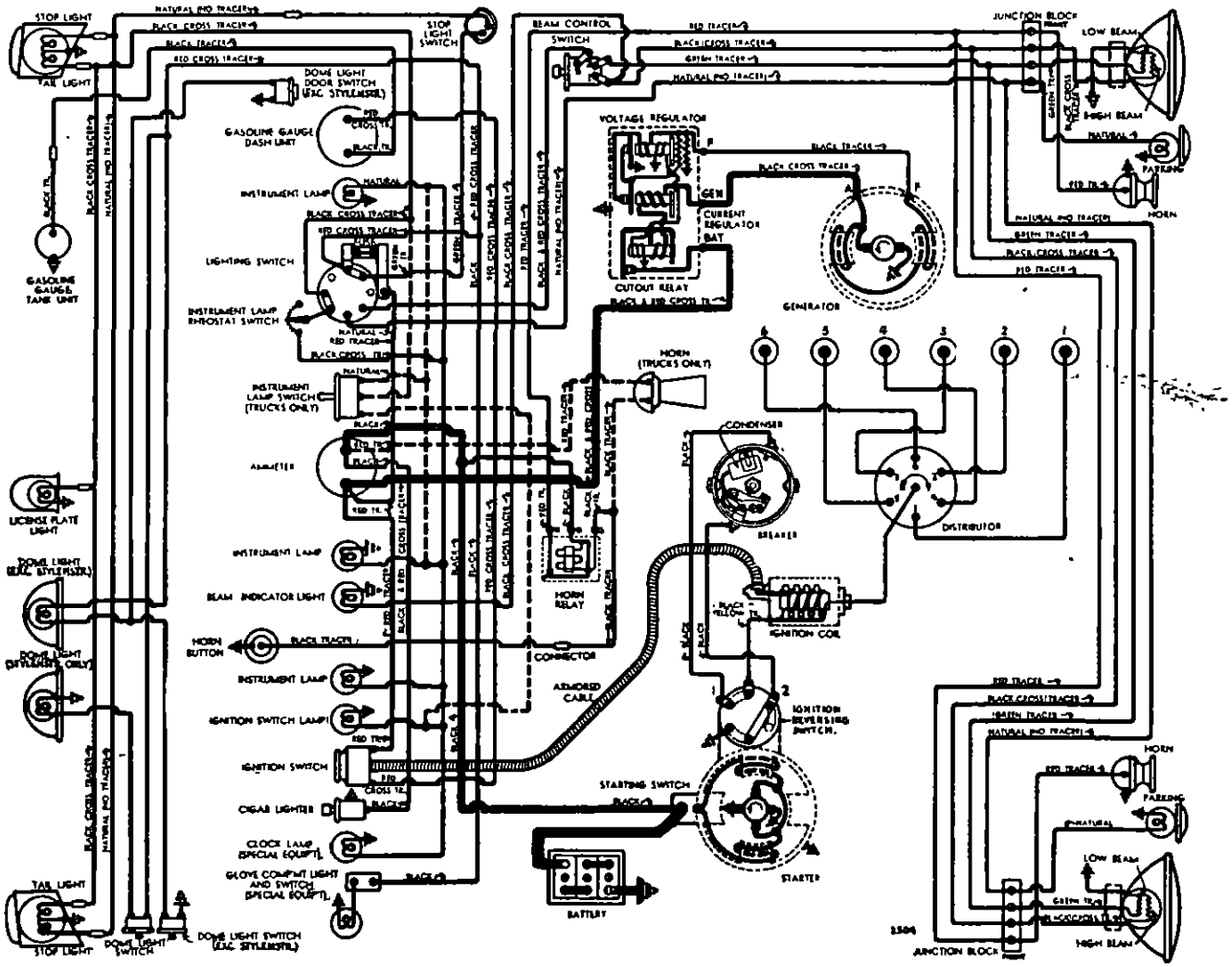
1946-47-48 (WITH REVERSING SWITCH)

IGNITION SWITCH: Delco-Remy. (1946) No. 1116304, (1947) No. 1116454, (1948) No. 1116452. Armored cable (switch to coil) used on 1946 type only.

1948 Switch Note—Has special "Off-Unlocked" position (to right of "On" position).

Ignition Lock—Briggs & Stratton Lock Cylinder. (1946-47)—No. 45792 (Coded), 45791 (Uncoded). (1948)—No. 600114 (Coded), 600088 (Uncoded).

Key Series—No. 8000 to 9499. Groove—No. 15.



1946-47 CARS (SEE 1948 DIAGRAM FOR IGNITION WIRING WITHOUT REVERSING SWITCH)
►NOTE—ARMORED CABLE (IGNITION SWITCH TO COIL) NOT USED ON 1947 CARS

Ignition Reversing Switch: Delco-Remy No. 1907122. Mounted on starter and operated by starting pedal

►**Removing Reversing Switch from Ignition Circuit**—*If switch removal necessary, see "Removal of Reversing Switch" below.*

IGNITION COIL: Delco-Remy (1946) No. 1115141, ('47-48) No. 1115380. On engine above distributor.
1946 Note—Armored cable from coil to switch.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy Part No. 1882239.

►*CAUTION—This condenser used only on cars with REVERSING SWITCH. Must not be used without switch.*
Capacity—.28-.34 microfarad.

DISTRIBUTOR: Delco-Remy No. 1116090. Single breaker, 6 lobe cam full automatic advance type with vacuum spark control and Octane Selector
NOTE—Distributor has insulated breaker plate and ground terminal for use with Reversing Switch.

►**Distributor Change for use Without Reversing Switch**—*See "Removal of Reversing Switch" below.*

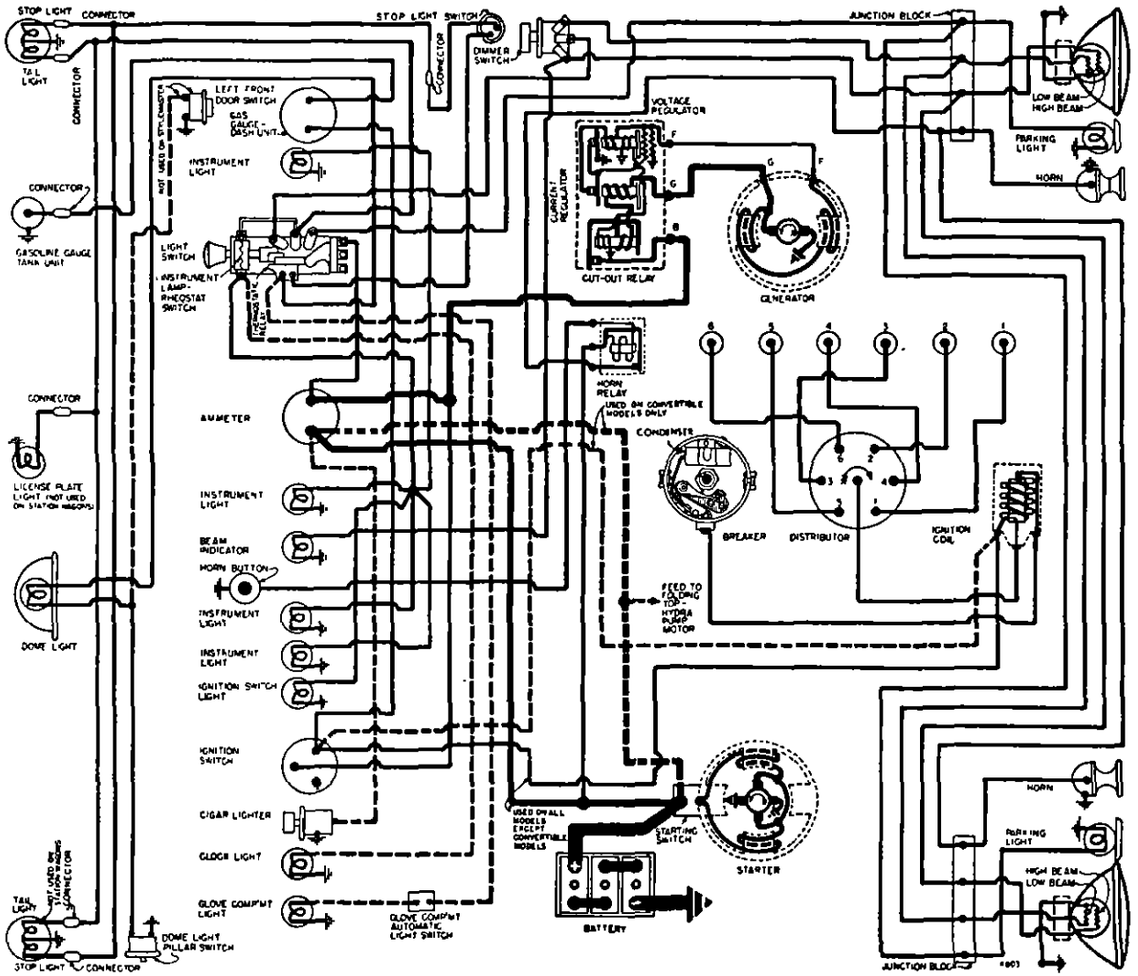
Breaker Point Set—Delco-Remy No. 1882391.
Breaker Gap—.018" in service. Limits .015-.022". Set new points at .020-.024" (to allow for seating).
Cam Angle—39° closed, 21° open.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Distr. Degrees	Automatic Advance RPM	Eng. Degrees	RPM
Start	350	3	700
6.5	600	13	1200
12.25	1000	20.5	2000
19	1700	38	3400

Octane Selector—Adjustment on distributor provides 10° advance or retard from center '0' position. See Ignition Timing for adjustment instructions.

Vacuum Spark Control: Delco-Remy No. 1116043. On Octane Selector, linked to advance arm.

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	16-19"



1948 CARS (SEE 1946-47 DIAGRAM FOR REVERSING SWITCH USED ON FIRST CARS)

Removal:—Distributor mounted on right side of crankcase. To remove, loosen advance arm clamp bolt (does not disturb vacuum connections).

IGNITION

LATE 1948 (WITHOUT REVERSING SWITCH)

IGNITION SWITCH: Same as listed above.

COIL: Delco-Remy No. 1115380. Above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.

►*CAUTION—This condenser must be used for ignition systems without reversing switch.*
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112353. Single breaker, 6 lobe cam, full automatic advance type with vacuum spark control and Octane Selector.

►**NOTE**—This distributor has larger breaker plate grounded directly to housing and special breaker point set.

Breaker Point Set—Delco-Remy No. 1855720.
Breaker Gap—.018" in service. Limits .015-.022". Set new points at .020-.024" (to allow for seating).
Cam Angle—39° closed, 21° open.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Spark Advance—See first type No. 1100090 Distributor above.

REMOVAL OF REVERSING SWITCH

REMOVAL OF REVERSING SWITCH FROM CARS & TRUCKS: If necessary to remove the reversing switch on models equipped with this unit, make all changes as noted below (CAUTION—Condenser must be changed to new lower capacity unit when ignition system operated without reversing switch):

1. **Remove Reversing Switch from Starter**—Disconnect wires at reversing switch, remove switch from starter. Grind off unthreaded portion of switch attaching screws and re-install these screws in starter frame to plug holes.

2. **Discard Reversing Switch Harness**—Disconnect reversing switch wires at distributor and ignition coil and discard this harness.

3. **Install New Coil-to-Distributor Lead**—Connect new low tension wire, Part No. 5288968, between ignition coil terminal and outer terminal (away from engine) on distributor.

4. **Install new lower-capacity Condenser**—Remove and discard original .3 mfd. condenser, No. 1882239, (can be identified by figure .3 stamped on terminal clip). Install new .2 mfd. condenser, No. 1869704, (can be identified by longer lead), using same mounting clamp bracket.

►*CAUTION—This lower-capacity condenser must be used in all ignition systems without reversing switch.*

5. **Ground Distributor Breaker Plate**—Disassemble inner (toward engine) distributor terminal and remove insulator washer from terminal post. Remove paint and thoroughly clean distributor housing around terminal post so that a good ground secured at this point, re-install flat washer and nut on terminal post (omission of insulator washer will ground terminal to housing when nut tightened).

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IGNITION TIMING

Std. Setting	Flywheel Degrees	Piston Position
All Engines	5° BTDC	.0091" BTDC

NOTE—See Octane Selector Setting (below) for final setting dependent on operating conditions

Timing (Neon Light)—Recommended method. Connect neon light to #1 spark plug, direct light on flywheel through inspection hole in right front face of housing. Set Octane Selector pointer at '0'. Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert in flywheel) lines up with pointer. Tighten clamp bolt and check Octane Selector setting.

Timing (Without Neon Light)—With #1 piston on compression, turn engine over until piston is 5° or .0091" before top dead center with ignition mark (steel ball insert in flywheel) at pointer in inspection hole in right front face of housing. Adjust distributor as directed above.

Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle. To adjust, loosen hold-down screw, move distributor and scale counter-clockwise to advance spark (if no ping), clockwise to retard spark (if too severe).

CARBURETOR

Carter (Chevrolet) Type 574S (Std.), 616S (Econ. Models). 1¼", single barrel, downdraft types with manual choke control. NOTE—Carburetors marked by Casting No. 421 (574S), 432 (616S) on flange. *See Carburetor Section for complete data.*

►**Engine Surge (22-35 MPH.) Correction (for 574S Carb.):** *See "Carter W1 (Chevrolet) Carburetor" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rod & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Throttle Cracker (1946): Opens throttle 1/3 for starting. To adjust, with idle speed correctly set at 450-500 RPM., loosen locknut and adjust bolt on accelerator pedal rod lug for ⅛" clearance between head of bolt and lug on starter pedal cross-shaft.

CARB. EQUIPMENT

Air Cleaner (Pass. Cars): AC No. 1529667 oil-wetted type Std. No. 1528964 heavy duty oil-bath type Optl. Filter Element AC No. 1528152.

Fuel Pump: AC Type AF, No. 1523089. Diaphragm type.
Replacement Pump—AC No. 429.
Pressure—4 lbs. maximum.
See Carburetion Equipment Section for data.

Gasoline Gauge: AC electric type. AC Nos.:
Dash Unit—(1946) No. 1516405, (1947-48) 1516991.
Tank Unit—No. 1516280 (All Models).
See Carburetion Equipment Section for data.

BATTERY

Delco Type 15X-3 (First), 15AA-4 (Later). 6 volt, 15 Plate, 100 Ampere Hour (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.6 minutes. Five second voltage 4.2 volts.
Grounded Terminal—Negative (—) terminal.
Dimensions—Length 9", Width 7", Height 8⅝".
Location—In engine compartment on right side

STARTER

Delco-Remy—Various models used as follows:
1107061 (With Rev. Switch)—First LHD. cars.
1107055 (No Rev. Switch)—Later LHD. cars.
1107063 (With Rev. Switch)—First RHD. cars.
1107076 (No Rev. Switch)—Later RHD. cars.
Armature—Delco-Remy No. 1867897.
Drive—Overrunning clutch and manual pinion shift (LHD. Starters), solenoid pinion shift (RHD. Starters).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.
Cranking Engine—65 RPM., 150 amperes, 5.5 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.0	65
12 "	Lock	3.37	525

Starting Switch (1107055 & 1107061 Starters): Delco-Remy No. 820052. Mounted on starter. Pedal operated.
(1107063 & 1107076 Starters)—Delco-Remy solenoid switch on starter, controlled by pushbutton switch No. 1996031 on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy Model 1102667 (Std.), 1102677 (Spec. Equip.), 1106403 (City Police). Two brush (shunt) types with voltage and current regulation. Ventilated by fan on drive pulley.
Armature No.—1879002 (1102667), 1881389 (1102677).
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate (Std. Gen.)—36 amperes, 7.4 volts, 2400 RPM. or 25.7 MPH. (Pass. Cars).

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102667	30	8.0	1750
1102677	26	8.0	1450
1106403	35	8.0	1040

①—Not maximum output—See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. each.
Field Current—1.75-1.9 amperes (1102667 & 1102677), 1.77-2.0 amperes (1106403) at 6.0 volts.

Belt Adjustment: Loosen clamp bolt, swing generator out for ¾" belt deflection (light pressure) midway between generator and fan pulleys.

REGULATOR

Delco-Remy Model 1118201 (1102667 Gen.), 1118233 (1102677 Gen.), 1118229 (1106403 Gen.). Vibrating type Voltage and Current Regulators in case with Cutout Relay.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings

Cutout Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts Hot (1118201), 7.0-7.2 volts Hot (All Others) at operating temperature.
Checking & Adjustment—*See Electrical Equipment Section.*
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).

Current Regulator

Setting—34-36 amperes (1118201, 1118229), 24-26 amperes (1118233) Hot or at operating temperatures.
Checking & Adjustment—*See Electrical Equipment Section.*
Air Gap—.080" (check same as Voltage Regulator).

LIGHTING

Headlamps: Guide "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red dot on speedometer dial. Lighted when upper beams in use.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—Pilot light in switch case. Lighted when Right or Left Dir. Signal "on".

Switches

Lighting—Delco-Remy. (1946-47) No. 1994022 (1948) 1995031. Switch has instrument light rheostat (controlled by rotating switch knob).
Beam Selector—Delco-Remy No. 1997008.
Glove Box—Delco-Remy 1997742 or 1997834.
Stop Light—Delco-Remy No. 1997901 (mechanical type operated by brake pedal arm).
Stop Light (Panel & Suburban)—Delco-Remy No. 594504 or 594505.

MISC. ELECTRICAL

LIGHTING FUSE (1946-47): 30 ampere. On back of lighting switch (protects lighting circuits).

LIGHTING CIRCUIT BREAKER (1948): 30-ampere thermostatic type. On back of lighting switch (protects lighting circuits).

HORNS (Passenger Cars): Delco-Remy No. 1999533 (Low Note), 1999534 (High Note). Vibrator type twin horns operated by horn relay.

Type	Current (at 6 volts)	Air Gap
1999533 (low note)	19-21 amperes	.044-.049"
1999534 (high note)	18-20 amperes	.034-.039"

Horn Relay (Pass. Cars):—Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: Own 216". Six Cylinder, Valve-in-Head type.
Bore—3½" (3.4995-3.5015"). **Stroke**—3¾".
Displacement—216.5 cubic inches. **Rated HP**—29.4.
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.5-1 Std. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

REPLACEMENT CYLINDER BLOCK: *See "Replacement Cylinder Blocks" in Chevrolet Special Data.*

ENGINE REMOVAL: *See Chevrolet Shop Notes.*

ENGINE MOUNTINGS INSTALLATION & ADJUSTMENT (& 1946-47 REPLACEMENT MOUNTINGS): *See Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Chevrolet Shop Notes.*
Cylinder Head Gasket Note—Use new gasket and install with side marked "THIS SIDE UP" as indicated. Use two cylinder head guide pins (installed in front and rear holes on manifold side) to align head with block and maintain head gasket position.

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ENGINE

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PISTONS: Passenger Cars. Cast alloy iron, flat head, cam ground, tin plated type with slipper skirt.

Trucks—Same as Passenger Car type except heavier. Truck pistons marked with small boss on underside of each piston pin boss. CAUTION—Do not interchange pistons (must be alike in one engine).

Weight—1.56 lbs. (Pass. Cars). Length—3.75" min.

Removal—Pistons and rods removed from above.

Clearance—Top .0155-.0235". Skirt selective fit. See Fitting Pistons.

Replacement Pistons: *See Chevrolet Shop Notes.*

NOTE—To install new pistons, hone cylinder for .005" oversize, rebore and hone for other sizes (rebore .002" less than piston oversize, finish by honing for piston clearance below). Bore taper and out-of-round must not exceed .001".

Fitting New Pistons:—Use feeler gauge between piston and cylinder wall at right angles to pin bosses. Piston should pass through bore with light pressure on .0015" feeler and lock on .003" feeler.

PISTON RINGS: Two taper face compression rings (with greatest diameter at bottom), one oil control ring per piston, all above pin. Oil ring groove drilled for oil drainage. NOTE—New wide-slot, quick-seating oil rings used on 1947-48 engines.

Ring	Width	End Gap①	Side Clearance
Compr.	.1235-.1240"	.006-.015"	.0015-.003"
Oil Conr.	.1860-.1865"	.005-.015"	.002-.0035"

①—End Gap limit 1/32" max. (worn).
②—Side clearance check—smaller feeler should be free, larger feeler should produce a heavy drag.

Installing Rings—Mark "TOP" on side of compression rings must be upward.

Replacement Rings:—Furnished Standard size and .005", .020", .030", .040" Oversize.

Expander Type Rings—Furnished for use in cylinder bores of indicated oversizes as follows: Standard (Bore Std. to .009" Oversize), .020" Oversize (Bore .010" to .029" Oversize—ring gaps must be filed for bores less than .020" Oversize), .030" Oversize (Bore .030" to .039" Oversize), .040" Oversize (Bore .040" to .049" Oversize).

PISTON PIN: Diameter—.8645-.8650". Length 3.135-3.165". Pin locked in rod (piston bronze bushed). Pin Fit in Piston—Thumb push fit (at room temp.).

Replacement Pins:—Std. & .003", .005", .010" oversize. NOTE—New pistons fitted with bushings and pins. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.

CONNECTING ROD: Length 6 13/16". Weight 30.7 ozs. Crankpin Journal Diameter—2.311-2.312".
Lower Bearing—Spun high-lead babbitt lined.

▷*NOTE*—1948 bearings are new thin-wall babbitt type and rods are 1/16" narrower to fit new crankshaft.

Clearance—.0003-.0013" selective fit (see Bearing Adjustment following).

Sideplay—.004-.012" at lower end (rod to crankpin), .015" minimum at upper end (rod to piston pin boss).

Bearing Adjustment:—Solid shims. Remove shims equally at both sides to secure 'snap fit' (rod tight to hand but should snap from one side to the other with light tap of 8 oz. hammer), then replace one .002" shim on one side for clearance (if unequal number, place extra shim on camshaft side). Bearing clearance correct when rod can be snapped back and forth on crankpin with one hand (grasp bearing cap between thumb and index finger to test).

Palnut Note—Palnuts used to lock rod bolt nuts. Use new palnut (install with open side toward end of bolt), turn palnut up finger tight against rod bolt nut, then tighten palnut ½ turn additional.

Installing Rods:—Numbers on rods and caps must be together and installed in same numbered cylinder with numbers and pin clamp bolt toward camshaft side. Install oil dippers on rods with mouth toward camshaft side of engine. Check dipper height.

Dipper Height Adjustment—*See "Oiling System" in Chevrolet Shop Notes.*

CRANKSHAFT: 1948 crankshaft new heavier four-bearing type with integral counterweights and vibration dampener (harmonic balancer).

Vibration Dampener Data—*See Chevrolet Shop Notes.*

Journal Diameters—#1, 2.6835-2.6845"; #2, 2.7145-2.7155"; #3, 2.7455-2.7465"; #4, 2.7765-2.7775".

NOTE—Journal taper or out-of-round limits .001". Run-out limits for #2 and #3 journals .002".

Bearing Type—Steel-backed, babbitt-lined type. Bearings are "doweled" in place by projection on shell engaging hole in crankcase and bearing cap.

▷*NOTE*—1948 bearings are new "Precision" type thin-wall babbitt (can be replaced singly).

▷*Precision type bearings do not require line-boring or reaming (all replacement bearings precision type).*

▷*CAUTION—#1 (front) and #2 (front intermediate) bearings similar in appearance but must not be interchanged. #2 bearing marked by letter "I" in oil groove.*

Clearance—(1946-47) .002-.004", (1948) .0007-.0024" selective fit. See bearing Adjustment (below).

▷*NOTE—Precision type bearings can be replaced singly. Entire set must be installed initially on 1946-47 engines not previously equipped with "precision" bearings.*

Bearing Adjustment:—Solid shims. Remove shims until slight drag secured when shaft turned by hand, then replace one .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side for all bearings).

Replacement Bearings: New "Precision" type bearings furnished for all engines Std. size and .002", .010", .020", .030" Undersize. NOTE—Bearings for 1947 & previous engines stamped "V" on inner surface of dowel.

▷*CAUTION—Complete bearing set (4 bearings) must be installed initially on 1946-47 engines not previously equipped with these precision bearings.*

▷**Bearing Installation**—*Not necessary to remove crankshaft or engine from car. See "Crankshaft & Main Bearings" in Chevrolet Shop Notes.*

Bearing Cap Installation—Intermediate (#2 & 3) bearing caps marked for identification. Install #2 cap with mark "FRONT" toward front of engine, #3 cap with mark "REAR" toward rear of engine.

▷*CAUTION—Rear intermediate (#3) bearing is special flanged type (takes end thrust).*

Crankshaft Oil Seal Servicing: *See Chevrolet Shop Note for Front (Timing Gear Cover) and Rear Oil Seals.*

End Thrust: Taken by #3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of #3 bearing. Adjust by replacing bearing.

Endplay—.004-.007".

FLYWHEEL REPLACEMENT: *See Chevrolet Special Data.*

CAMSHAFT: Four bearing type. Helical gear drive.

Journal Diameters—#1, 2.0282-2.0292"; #2, 1.9657-1.9667"; #3, 1.9032-1.9042"; #4, 1.8407-1.8417".

NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).

Bearing Type—Steel-backed, babbitt-lined bushings (staked in place). NOTE—New bearings must be line-reamed. Clearance—.002-.004".

Bearing Installation—*See Chevrolet Shop Notes.*

End Thrust:—Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).

End Play Adjustment—*See Chevrolet Shop Notes.*

Endplay—Free fit to .003" maximum.

Timing Gears: Crankshaft gear steel. Camshaft gear Bakelite and Fabric composition.

Timing Gear Backlash—.003-.004".

Max. Gear Runout—.003" crankshaft, .004" camshaft.

▷1948 235" Truck Engine Timing Gear Set—New aluminum camshaft gear with bonded steel hub used with crankshaft gear having crowned teeth.

Replacement Timing Gears—*See Chevrolet Shop Notes.*

▷*CAUTION—Replacement crankshaft gear (with relocated keyway) will change Valve Timing on 1946-47 engines equipped with previous type gear. See Valve Timing.*

Timing Gear Installation & Alignment—*See "Timing Gears" in Chevrolet Shop Notes.*

▷Timing Gear Oil Nozzle Replacement—*See "Oiling System" in Chevrolet Special Data.*

Camshaft Setting:—Gears punch marked. Punch marks on both gears must be lined up and directly opposite each other.

▷*CAUTION—Above timing marks correct for all engines but valve timing different on Late 1947 & 1948 engines with new crankshaft gear (and earlier engines with this gear as replacement). See Valve Timing.*

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1 41/64"	.3410-.3417"	6.205-6.235"
Exhaust	1 15/32"	.3400-.3407"	4.839-4.869"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.2941"	.001-.003"
Exhaust	30°	.3118"	.002-.004"

▷Valve Identification Note—1946-47 Valves (without valve stem oil seals) marked "41" and have 1 stem groove. 1947-48 Valves (with valve stem oil seal) marked "GM" and have 2 stem grooves.

Valve Installation (1946-47 Type without Valve Stem Oil Seals): Use special valve spring cap for each valve (INTAKE—.080" thick, round, double flanged

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ENGINE

CONTINUED FROM PRECEDING PAGE

or stamped "IN", EXHAUST—Octagonal or round and stamped "X") and umbrella type cap cover (INTAKE—⅝" overall height, EXHAUST—¼" overall height). NOTE—Cap covers reduce amount of oil on valve stems, controlling oil consumption and smoking when idling.

Valve Installation (1947-48 Type with Valve Stem Oil Seals): Special synthetic rubber oil seal ring installed in groove in valve stem directly below seat locks (retained by valve cap). NOTE—New type longer valve spring cap is used (interchangeable for intake & exhaust valves—may be identified by 1/16" annular groove on top surface). No cap covers used with this type assembly.
Valve Stem Oil Seal Installation—*See "Valve System" in Chevrolet Shop Notes.*

Valve Guides: New precision type. Pressed in head.
Valve Guide Installation—*See "Valve System" in Chevrolet Shop Notes.*

Valve Springs: Install springs with closed-coil end toward cylinder head. Check springs with KMO-607 Tester, replace if outside limits of 124-140 lbs. at 1½". Spring free length 2⅛".

	Spring Pressure	Length
Valve Closed	53-63 lbs	1.821"
Valve Open	124-140 lbs	1.505"

Valve Lifters: Barrel type with pushrod seat brazed on upper end. Lifter diameter .989-.990".
Clearance—.001" (selective free fit).

Rocker Arm Assembly: Armasteel type (no bushings). Four types of rocker arms used as follows:
Intake—No. 839463 (Left), 839464 (Right).
Exhaust—No. 839459 (Left), 839460 (Right).
Rocker Shaft Diameter—.7910-.7917" (bore diameter in rocker arm .7925-.7935").
Rocker Arm Assembly & Installation—*See "Valve System" in Chevrolet Shop Notes.*

VALVE TIMING

►**VALVE TAPPET CLEARANCE:** *CAUTION—Engine temperature must be "normalized" before adjusting. See "Tappet Clearance Adjustment" in Chevrolet Shop Notes.*
Std. Engine—.006" (.006-.008") Intake, .013" (.013-.015") Exhaust with engine normalized.
Economy Engine—.010" Intake, .016" Exhaust with engine normalized.

VALVE TIMING: See Camshaft Setting above.

►**1946-47 VALVE TIMING CHANGE**—*On engines before 1947 Flint No. 572254, new replacement crankshaft gear (same Part No. as old type) changes Valve Timing to "1947-48 Valve Timing" given below.*

►**1947-48 NEW VALVE TIMING**—*Late 1947 Engines (Beginning Flint No. 572254) and All 1948 Engines have new Crankshaft Gear (with relocated keyway) and NEW "1947-48 Valve Timing" given below.*
NOTE—This gear same as replacement gear which changes valve timing on earlier engines.

1946-47 VALVE TIMING
►Before 1947 Flint Engine No. 572254
►(with Original Crankshaft Gear)

Intake Valves—Open 3° BTDC. Close 35° ALDC.
Exhaust Valves—Open 46° BLDC. Close 5° ATDC.

1947-48 VALVE TIMING
►Beginning 1947 Flint Engine No. 572254

►*CAUTION—This new Valve Timing applies also to 1946-1947 Engines with new Replacement Crankshaft Gear.*
Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.
Valve Timing Check—Remove all tappet clearance from #1 exhaust valve, turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right front face of flywheel housing, mount dial indicator on rocker shaft support with stem contacting #1 exhaust valve adjusting screw, set indicator dial at .036" (1946 and 1947 Engines before Flint No. 572254 with original crankshaft gear only), .044" (1947 Engines beginning Flint No. 572254, All 1948 Engines, and 1946-47 engines with replacement crankshaft gear). Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset tappet clearance at correct running figure (above).

LUBRICATION

Engine Oiling System: Pressure and positive splash system. Pressure to main bearings, camshaft bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from troughs (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by Oil Distributor Valve on left side of engine.
CAUTION—Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs, and nozzles which must be checked each time the oil pan is removed (requires special gauges).
Checking Oiling System—*See "Oiling System" in Chevrolet Shop Notes.*
Crankcase Capacity—5½ qts. (dry), 5 qts. (refill).
Normal Oil Pressure—14 lbs. at 39 MPH.
Oil Pressure Regulator—Located oil pump cover. Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Shop Notes.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.
Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Shop Notes.*

Checking Oiling System: Check entire system (Dipper Height, Oil Pan Trough Height, Oil Nozzle Height & Aim) each time oil pan removed.
See "Oiling System" in Chevrolet Shop Notes.
CAUTION—Special checking gauges required for each type engine (Oil pan changed beginning 1947, same pan now used on all engines).

Crankcase Ventilation: Air intake through valve rocker cover (air cleaner on some models), outlet through pipe on right side of engine (combination oil filler and crankcase ventilator outlet).
Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure type (relief valve) radiator cap used on 1948 cars.
Pressure Valve—AC No. 850501 (Radiator Filler Cap). Opens at 4 lbs.
Capacity—15 quarts.

Radiator Core Removal: *See Chevrolet Shop Notes.*

Water Pump: Double-outlet, packless type with sealed ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head outlet.
Std.—No. 3113995 stamped "143". Starts to open at 140-147°F. Fully open at 170°F.
Optl. (For Anti-freeze)—As follows:
3121254—stamped 151 (for Alcohol Anti-freeze), 3121251—stamped 160 (for permanent anti-freeze only), 3121280—stamped 180 (for permanent anti-freeze only).

Temperature Gauge: AC No. (1946) 1511201, (1947) 1511895, (1948) 1512078. Not electric.

CLUTCH

Own Make. Diaphragm spring, single plate, dry disc type. NOTE—9" clutch used on all cars.
See Clutch Section for complete data.
Facings—Moulded Asbestos, 2 required as follows: 6⅛" I. D., 9⅛" O. D., .132-.138" thick.
NOTE—Borg & Beck Driven Member used on some cars.

Adjustment:—Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.

Removal:—Remove transmission (see Transmission Removal below). Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

Own Make. Three-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control (Passenger Cars): Remote control, vacuum power type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal (except Cabriolet):—Remove front floor mat and floor cover over transmission. Remove outer half of reactionary lever metal boot (work under car) by taking out two bolts fastening halves together. Loosen 3 vacuum cylinder bracket-to-transmission capscrews and reactionary lever assembly-to-transmission operating shaft clamp bolt. Drive assembly from end of shaft with care. Disconnect selector rod from selector lever after removing cotter pin from transmission end of selector rod. Remove 3 vacuum cylinder bracket-to-transmission capscrews and move assembly (bracket, vacuum cylinder and reactionary levers) away from transmission. Disconnect pull rod and brake cables from brake cross shaft and remove cross-shaft. Disconnect speedometer cable. Remove 4 universal joint ball collar-to-retainer capscrews and slide ball back on propeller shaft housing. Remove 4 capscrews which secure front trunnion bearings to the front yoke. Remove 2 front yoke trunnion bearings and split the joint. Push front end of propeller shaft down for clearance. Remove 4 rear transmission mounting-to-frame cross member bolts. Remove two upper transmission-to-clutch housing capscrews and insert guide pins. Remove clutch underpan and two lower transmission-to-clutch housing capscrews. Slide transmission back and lift out through opening in floor.

Removal (Cabriolet):—Transmission removal on this model differs from regular passenger car removal (above) due to use of special 'VK' frame. Removal procedure for Cabriolet as follows: Remove front floor mat and floor cover over transmission. Remove outer half of reactionary lever metal boot by taking out two bolts fastening halves together. Disconnect selector rod from selector lever after removing cotter pin from transmission end of selector rod. Disconnect gearshift control rod by removing cotter pin, washer and anti-rattle spring from transmission end of rod. Disconnect vacuum cylinder piston rod and valve link from reactionary levers. **To prevent upsetting vacuum valve adjustment, replace clevis pin through piston rod yoke and valve link.** Remove vacuum cylinder from mounting bracket. Disconnect pull rod and brake cables from brake cross-shaft and remove cross-shaft. Disconnect speedometer cable. Remove 4 universal joint ball collar-to-retainer capscrews and slide ball back on propeller shaft housing. Remove 4 capscrews which secure front trunnion bearings to front yoke. Remove 2 front yoke trunnion bearings and split the joint. Push front end of propeller shaft down for clearance. Remove 4 rear transmission mounting-to-frame cross member bolts. Remove two upper transmission-to-clutch housing capscrews and insert guide pins. Remove clutch underpan and two lower transmission-to-clutch housing capscrews. Slide transmission back until clutch shaft just free of driven member, raise rear end sufficient to remove transmission rear mounting (free mounting from transmission and move it forward enabling removal of mounting through opening in frame). Pull transmission back and turn it toward the left for clearance and lift out through opening in floor.

UNIVERSALS

Passenger Cars: Own Make. No. 606779. Cross type with surface treated trunnions and bearings. One used (in torque ball behind transmission).

▷*TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Pass. Car & Half-Ton" Rear Axle in Rear Axle Section.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube drive. NOTE—Passenger car axles have Revacycle differential pinion and side gears. Revacycle and Involute type gears must not be used together (noise & premature gear failure will result). Interchangeable in complete sets only.
See Rear Axle Section for complete data.
Ratio—4.11-1 Std., 3.73-1 Optl. on Pass. Cars.
NOTE—Axle ratios may be identified by prefix letters of serial number stamped on front face of carrier mounting flange on right side as follows:

▷4.11-1 Axle Identification Mark
Detroit Production—('46) DA, ('47) EA, ('48) FA.
Tonawanda—('46) DB, ('47) EB, ('48) FB.

▷3.73-1 Axle Identification Mark
Detroit Production—('46) DC, ('47) EC, ('48) FC.
Tonawanda—('46) DD, ('47) ED), ('48) FD.
Backlash—.005-.007". Screw adjustment.

Removal:—Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber links from anchor plate. Remove spring 'U' bolts, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly from beneath car.

▷*INSTALLATION CAUTION: See "Rear Spring Seat & Shackle" in Chevrolet Special Data.*

Axle Shaft Removal:—Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum (on second wheel stud at either side of drain hole in drum), remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove "C" washer on inner end, pull shaft out.
Axle Shaft Endplay—Free fit to .014" maximum.
Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Shop Notes.*

SHOCK ABSORBERS

Passenger Cars—Delco Models 2200-A, B (Front), 2100-A, B (rear). Double acting, Hydraulic, Parallel Cylinder type. NOTE—Front shock absorbers are part of front suspension (upper control arms).

FRONT SUSPENSION

Passenger Cars—Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
NOTE—Make checks with car weight on wheels and special gauge installed at front to provide proper frame height.
Kingpin Inclination—4¾° ± ½°.
Caster—0° ± ½°. Adjustable.
Camber—Negative ¼° ± ½°. Adjustable.
Toe In—0-⅛". To adjust, loosen clamp bolts at each end of left tie rod and turn rod. When tightening clamp bolts, tie rod ends must be in alignment with ball studs (to prevent binding).
Steering Geometry (toe-out on turns)—Outer wheel turned 20°. Inner wheel turned 24° ± 2°.

STEERING GEAR

Passenger Cars—Saginaw Model. Special Chevrolet Passenger Car) Worm-and-Roller type. Chevrolet Part No. 267164 (marked by casting No. 265759).
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Own Make, Hydraulic type. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Diameter: 1¼" (front), 1 3/16" (rear). Sizes stamped under adjusting cup lock spring on wheel cylinder housing.
Drums—Cast iron rim, steel web. Diameter 11".
Lining—Moulded type. Width 1¾". Thickness 3/16". Length per wheel 22⅝".
Clearance—Adjusting Cover (on wheel cylinder) backed off 4 Notches from slight drag position.
Braking Power—47½% rear wheels, 52½% front.
Hand Brake:—See Service brakes above.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydro-Lectric type (top mechanism operated by two hydraulic cylinders actuated by oil under pressure supplied by motor driven pump).
See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

Serial Prefix

Series	①1947	1948	1949	Wheelbase	Type
3100	EP	FP	GP	116"	Half-Ton
3600	ER	FR	GR	125¼"	¾-Ton
3742	ET	FT	GT	125¼"	②¾-Ton
3800	ES	FS	GS	137"	1-Ton
3802				137"	School Bus
3942	EU	FU	GU	137"	②1-Ton
4100	QJ	RJ	SJ	137"	1½-Ton
4400	QK	RK	SK	161"	1½-Ton
4502	QL	RL	SL	161"	School Bus
5100	QP	RP	SP	110"	COE 2-Ton
5400	QR	RR	SR	134"	COE 2-Ton
5700	QS	RS	SS	158"	COE 2-Ton
5100S	QPS	RPS	SPS	110"	③COE 1½-Ton
5400S	QRS	RRS	SRS	134"	③COE 1½-Ton
5700S	QSS	RSS	SSS	158"	③COE 1½-Ton
6100	QV	RV	SV	137"	2-Ton
6400	QW	RW	SW	161"	2-Ton
6702	QX	RX	SX	199"	School Bus
6100S	QVS	RVS	SVS	137"	③1½-Ton
6400S	QWS	RWS	SWS	161"	③1½-Ton

①—Late 1947.
②—Forward Control.
③—Special.

SERIAL NUMBER: Stamped on plate on cab left front hinge pillar (Flat Face Cowl models have plate on left hand cowl inner panel).
1949 Serial Numbers—First number 1001 with Serial Prefix for each Series as indicated in table above.

ENGINE NUMBER: Stamped on right side of crankcase to rear of distributor.
1949 Engine Numbers—First number 1001 with prefix indicating year, engine type & plant as follows:

Late 1947 & 1948 Series

Engine Type	Flint	Tonawanda
Half-Ton Truck	FBA	FBM
¾ & 1 Ton (216" Eng.)	AFCA	AFCM
1½ Ton (216" Engine)	FCA	FCM
1½ & 2 Ton (235" Eng.)	FEA	FEM
Cab-over-Engine Mdls.	FDA	FDM

1949 Truck Engine No. Prefixes

Engine Type	Flint	Tonawanda
Half-Ton Truck	GBA	GBM
¾ & 1 Ton (216" Eng.)	AGCA	AGCM
1½ Ton (216" Engine)	GCA	GCM
1½ & 2 Ton (235" Eng.)	GEA	GEM
Cab-over-Engine Mdls.	GDA	GDM

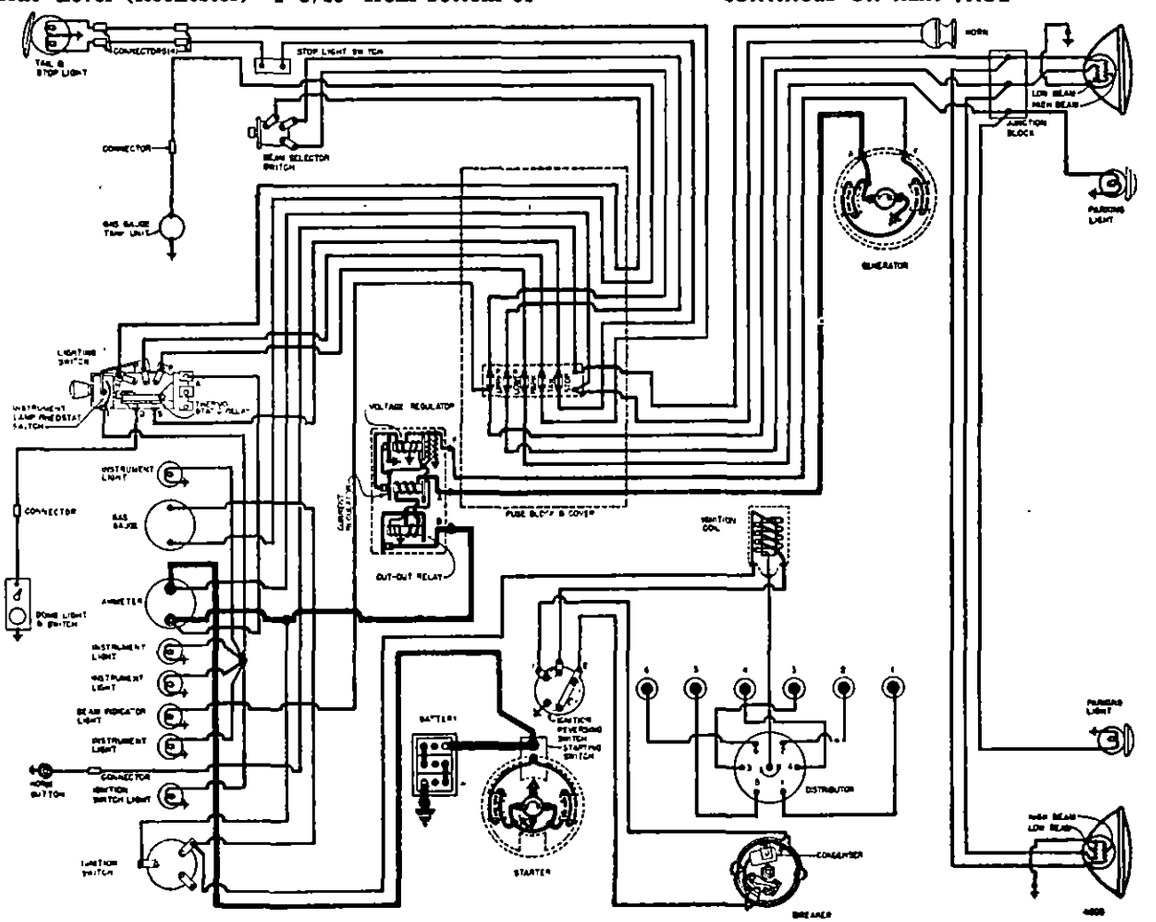
TUNE-UP

COMPRESSION PRESSURE: 110 lbs. minimum (with cylinders equal within 5-10 lbs.) at cranking speed.
VACUUM READING: Steady 17-21" at idling speed.
FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: (1947-48) .040", (1949) .035".
Plugs—(1947-48) AC No. 104. 10 mm. (1949) AC No. 46-5. 14 mm.
►*1947-48 SPARK PLUG NOTE—For sustained low speed operation use M-8 plugs.*
►*CAUTION—Tighten 10 mm. plugs to 10-12 ft. lbs., and 14 mm. plugs to 20-25 ft. lbs. torque.*
DISTRIBUTOR: Breaker Gap—.018" (limits .018-.022") standard setting, or .022-.024" for new points (to allow for seating).
Cam Angle—34°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.
IGNITION TIMING: 5° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set at "O". Then adjust Octane Selector as follows:
Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

►**CARBURETION Downdraft Carburetors**
Conventional Trucks
►*ROCHESTER CARBURETOR TROUBLE SHOOTING & CORRECTIONS: See "Rochester B (Chevrolet)" in Carburetor Section.*
Idle Setting—(Carter) 1¼-2¼ turns, (Rochester) 1½ turns open (turn out for richer mixture).
Idle Speed—450-500 RPM. with warm engine.
Float Level (Carter)—½" top of float to gasket seat on cover with valve seated (invert to check).
Float Level (Rochester)—1 5/16" from bottom of each float to cover gasket (**do not remove gasket**) with cover inverted so that needle valve closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly. *Above specifications supersede earlier data.*
►*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*
Accelerating Pump—No seasonal adjustment.
Fuel Pump Pressure: 4 lbs. maximum.

►**CARBURETION: Updraft Carburetor**
Cab-Over-Engine & Forward Control Trucks
Idle Setting—½-1¼ turns open (517S, 699S), ½-1½ turns open (745S). Turn out for richer mixture.
Idle Speed—450-500 RPM. with warm engine.
Float Level—Top of float 1/32-1/16" (517S, 599S), 0-1/32" below top edge of bowl with needle valve seated.

CONTINUED ON NEXT PAGE



LATE 1947 & 1948 SERIES TRUCKS
►SEE 1949 TRUCK DIAGRAM FOR IGNITION WIRING WITHOUT REVERSING SWITCH

CONTINUED FROM PRECEDING PAGE

Accelerating Pump—Inner hole Summer, Outer hole Winter.
Fuel Pump Pressure: 4 lbs. maximum.
MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Spring should be wound up just enough to slip end over manifold pin (approximately ½ turn).
▷*CAUTION*—Excessive spring tension may cause valve to stick (causes detonation and poor performance).
▷**VALVE TAPPET CLEARANCE:** *CAUTION—Engine must be "normalized" by running at fast idle of approximately 600 RPM. for 30 minutes or until oil temperature stabilized before adjusting.*
Normal Operation—.006-.008" Intake. .013-.015" Exhaust, with engine "normalized."
Heavy Duty (Full Throttle) Operation—.010" Intake, .020" Exhaust, with engine "normalized."

IGNITION

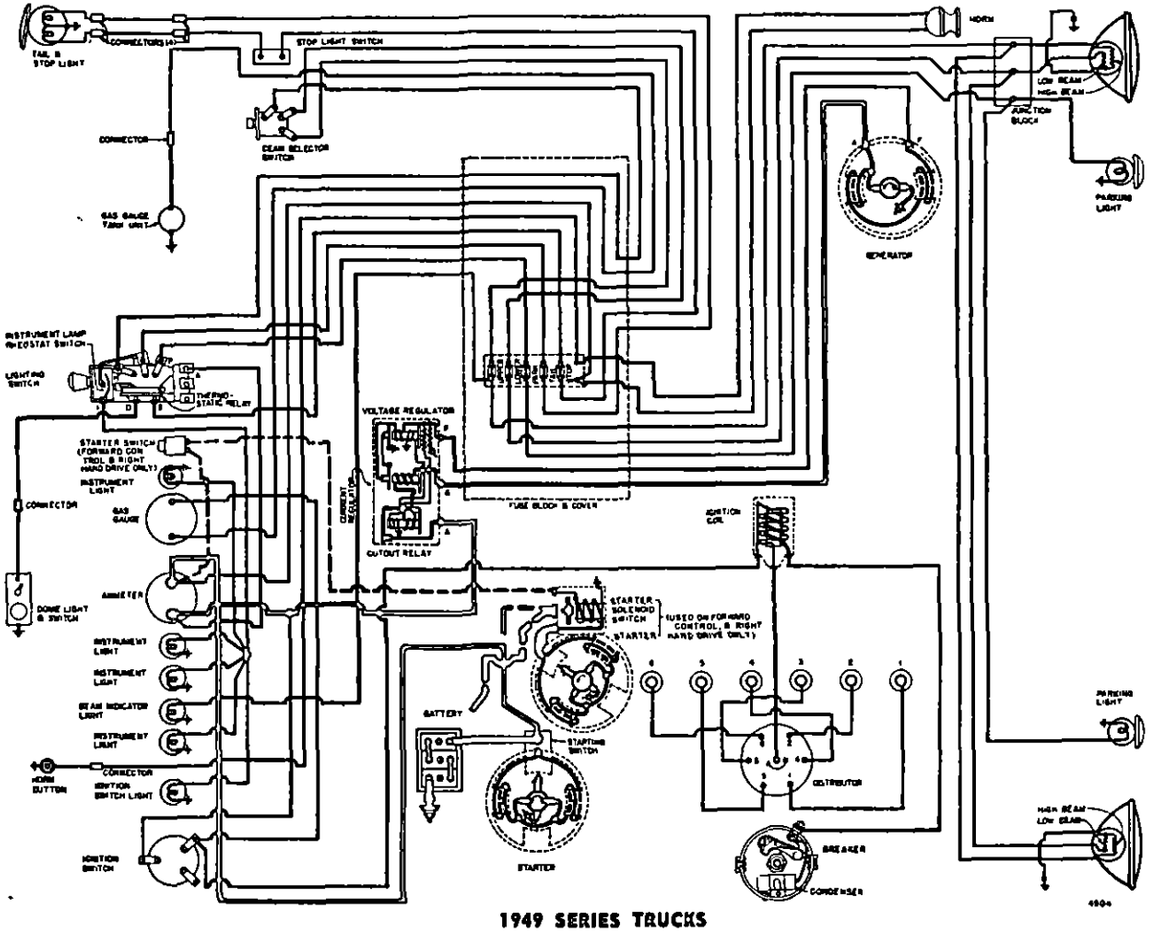
1947-48 (WITH REVERSING SWITCH)

IGNITION SWITCH: Delco-Remy No. 1116452. NOTE—This switch has special "Off-Unlocked" position (to right).
Ignition Lock—Briggs & Stratton. No. 600114 (Coded), 600088 (Uncoded).
Key Series—No. 8000 to 9499. **Groove**—No. 15.
Ignition Reversing Switch: Delco-Remy No. 1907122. Mounted on starter and operated by starting pedal linkage (reverses ignition circuit each time starter operated—see wiring diagram for connections).
▷**Removing Reversing Switch from Ignition Circuit:** *If switch removal necessary, see "Removal of Reversing Switch" under IGNITION on Chevrolet 1946-47-48 Pass. Car Model page.*
COIL: Delco-Remy No. (1947-48) 1115380. On right side of engine above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.
CONDENSER: Delco-Remy No. 1882239.
▷*CAUTION—This condenser used only on cars with REVERSING SWITCH. Must not be used without switch.*
DISTRIBUTOR: Delco-Remy No. 1110090. Single breaker, 6 lobe cam full automatic advance type with vacuum spark control and Octane Selector.
NOTE—Distributor has insulated breaker plate and ground terminal for use with Reversing Switch.
▷**Distributor Change for use without Reversing Switch:** *See "Removal of Reversing Switch" under IGNITION on Chevrolet 1946-47-48 Pass. Car Model page.*
Breaker Point Set—Delco-Remy No. 1882381.
Breaker Gap—.018" in service. Limits .015-.022". Set new points at .020-.024" (to allow for seating).
Cam Angle—39° closed. 21° open.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	350	3	700
6.5	600	13	1200
12.25	1000	24.5	2000
19	1700	38	3400

Octane Selector—Adjustment on distributor provides 10° advance or retard from center '0' position. See Ignition Timing for adjustment instructions.
Vacuum Spark Control: Delco-Remy No. 1116043. On Octane Selector, linked to advance arm.
Plunger Travel—17/64".

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	16-19"



1949 SERIES TRUCKS

IGNITION

LATE 1948 & 1949 (WITHOUT REVERSING SWITCH)

IGNITION SWITCH: Delco-Remy No. (Late 1948 without Reversing Switch) 1116452, (1949) 1116464.
COIL: Delco-Remy No. 1115380. Mounted directly above distributor.
CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.
DISTRIBUTOR: Delco-Remy No. 1112353. Automatic and vacuum advance with Octane Selector.
Breaker Gap—.018" standard setting, or .022-.024" for new points (to allow for seating).
Cam Angle—34°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—No. 1112353

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	3	700
6.5	600	13	1200
12.0	1200	24	2400
19.0	1700	38	3400

Octane Selector—Adjustment on distributor provides 10° advance or retard from center "0" position. See Ignition Timing for adjustment instructions.
Vacuum Spark Control: Delco-Remy No. 1116043. On Octane Selector, linked to advance arm.
Plunger Travel—17/64".

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	16.5-18.5"

Removal: Distributor mounted on right side of crankcase. To remove, loosen advance arm clamp bolt (does not disturb vacuum connections).

IGNITION TIMING

	Flywheel Degrees	Piston Position
Std. Setting①	.5° BTDC	.0091" BTDC.

①—Adjust Octane Selector for grade of fuel being used. See Octane Selector Setting below.
Timing (Neon Light)—Recommended method. Connect neon light to #1 spark plug, direct light in fly-

wheel through inspection hole in right front face of housing. Set Octane Selector pointer at "0". Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert in flywheel) lines up with pointer. Tighten clamp bolt and check Octane Selector Setting (see below).
Timing (without Neon Light)—With #1 piston on compression, turn engine over until piston is 5° or .0091" before top dead center with ignition mark (steel ball insert in flywheel) at pointer in inspection hole in right front face of housing. Adjust distributor as directed above.
Octane Selector Setting—Set for the grade of fuel being used to produce slight "ping" on acceleration.

CARBURETOR
CARTER (CHEVROLET) W1

Carter (Chevrolet)—(1947-48) Type 574S (Std.) 616S (Economy Model). (1949) Carter W1, No. 684S 1¼" Single barrel, downdraft type with manual choke control.
Casting No. on Flange—421 (574S), 432 (616S), 603 (684S).
See Carburetor Section for complete data.
Settings: (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rods & Jets—*See Carter Jet Tables in Carburetor Section for complete data.*
Fast Idle: (684S) Linkage connected to choke and operates whenever choke closed to open throttle. No adjustment.

CARBURETOR
ROCHESTER

Rochester G.M. Model B. ***CAUTION—Different carburetor used on each engine:***
216" Engine—Chevrolet No. 7002050. 1½" Bore.
235" Engine—Chevrolet No. 7002051. 1 9/16" Bore.
Single Barrel downdraft type with concentric bowl and twin floats. Choke is manual type with throttle kicker and fast idle.
See Carburetor Section for complete data.
►*ROCHESTER CARBURETOR TROUBLE SHOOTING & CORRECTIONS: See "Rochester B (Chevrolet)" in Carburetor Section.*
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Throttle Kicker: Operates by cam on choke lever—opens throttle when choke closed—no adjustment.

CARBURETOR
CARTER (B&B) UPDRAFT

Carter (BB) Modsl 517S or 699S. 1¼" single barrel, updraft types with manual choke control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jets—*See Carter (BB) Updraft Jet Table in Carburetor Section for data.*

CARB. EQUIPMENT

Air Cleaner: AC types as follows:
864133—Spec. Equip. (¾ Ton).
1529264 oil-wetted—Std. All (exc. 2 Ton & C-O-E).
1529192 oil-bath—Optl. All (exc. 2 Ton & C-O-E).
1542078 oil-bath—Std. on 2 Ton Conventional Truck.
1543889 oil-bath—Std. on Cab-Over-Engine.
Filter Element—AC #2 (1529264), #9 (1529192), #7-S (for 1542078), None (for 1543889).
Fuel Pump: AC Type AF, No. 1523089. Diaphragm type. **Optl.** AC No. 1539126 or 1539448 combination fuel-and-vacuum pumps.
Replacement Pump—AC No. 429 (for 1523089), 9126 (for Optl. 1539126 or 1539448 combination pumps).
Pressure—4 lbs. maximum.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: AC Electric type. AC Nos.:
Dash Unit—(*1947-48*) *No. 1516973,* (*'49*) *No. 1517169.*
Tank Unit—Various Types as follows:
1947-49—Half-Ton & ¾ Ton Std., No. 1515466.
1947-48—¾ Ton Panel & Chassis, No. 1516280.
1947-48—1, 1½, 2 Ton, No. 1516983.
1947-48—C-O-E, No. 1515467.
1947-48—School Bus, No. 1516334.
1949—¾ Ton Panel & Chassis, 1 Ton Chassis, Cab and Pickup, No. 1516999.
1949—1 Ton Panel, 199" School Bus, No. 1516334.
1949—1 Ton (other Models), No. 1516983.
1949—1½, 2 Ton C-O-E, 110" WB, 2 Ton Cab, No. 1517140.
1949—2 Ton (Others) & 2 Ton C-O-E, No. 1515467.
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA-4. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) terminal.
Dimensions—Length 9". Width 7". Height 8 11/16".
Location—Under front floor on right side (Forward Control Trucks on frame on right side of engine).
School Bus—Delco Type 19Q-4. 6 Volt, 19 Plate, 125 Ampere Hour Capacity (20 hour rate).
Starting Capacity—145 amperes for 20 minutes.
Grounded Terminal—Negative (—) terminal.
Dimensions—Length 10 3/8". W. 7". Height 8 11/16".
Location—Under hood.

STARTER

Delco-Remy No. (1947-49 Exc. Forward Control Models) 1107055.
Forward Control Models—Delco-Remy No. (1947-48) 1107076, (1949) 1107075.
Drive—Overrunning clutch with manual pinion shift (1107055), solenoid pinion shift (1107075 & 1107076).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.7	65
12 "	Lock	3.4	525

Removal: Flange mounted on right side of flywheel housing. To remove, take out mounting screws.
Starting Switch (1107055): Delco-Remy No. 820052. On starter. Operated by pedal.
(1107075 & 1107076 Starter). Delco-Remy Solenoid Switch No. 1118135 (no relay used) mounted on starter and controlled by pushbutton switch No. (1947-48) 1996031, (1949) 1106037).
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy. Two-brush types (as listed below) with voltage and current regulation.

	Gen.—D-R Nos.—Arm.
1947-48 (Standard)	1102667—1879002
1947-48 (Spec. Equip.)	1102671—1881389
1949 (Standard)	1102710—1879002
1949 (Door-to-Door Del.)	1102677, 726—1881309
1949 (Optional 50 Amp.)	1106751, 757—1881309
Optl. (50-amp.) Equip.	**1106751 & 757**

Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate (Reg. Gen.)—36 amperes, 7.4 volts, 2400 RPM.

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102677	30	8.0	1750
1102710	30	8.0	1750
1102677 & 726	26	8.0	1450
1106751 & 757	50	7.5	1410

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. each.
Field Current—1.75-1.9 amps. (1.70-1.95 amps. on 1106751 & 757) at 6.0 volts.
Removal: Generator pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment: Loosen clamp bolt, swing generator out for ¾" belt deflection (light pressure) midway between generator and fan pulleys.

REGULATOR

Delco-Remy. Voltage-current types as follows:

Standard	1118301
Door-to-Door (for 1102677 Gen.)	1118349
Door-to-Door (for 1102726 Gen.)	1118361
Optional (50 Amp.)	1118334

►*"1118300 SERIES" REGULATORS* have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator

Settings (hot):	Set to:	Range
1118301	36 amps.	32-40 amps.
1118334	50 amps.	48-52 amps.
1118349	25 amps.	23-27 amps.
1118361	25 amps.	23-27 amps.

Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red dot on lower edge of speedometer. Lighted when upper beams in use.

Switches

Lighting—Delco-Remy No. 1995031.
Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Stop Light—D-R No. 1997901 (mechanical type).
NOTE—Hydraulic switch used on some models.

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MISC. ELECTRICAL

FUSES: Lighting. Five 20-ampere fuses in fuse box on engine side of dash. Protects individual light circuits as follows:

Top Fuse Upper Beams	**4th Fuse** Tail Lights
2nd Fuse Lower Beams	**5th Fuse** Stop Lights
3rd Fuse Parking Lights	

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable. Protects lighting circuits together with fuses listed

HORNS: Delco-Remy No. 1999801. Vibrator type.
Horn Current—7-9 amperes at 6.0 volts.
Air Gap—.027-.033".

ENGINE

▷**ENGINE SPECIFICATIONS:** *TWO ENGINES USED:*
216" Thrift-Master—Std. on ½, ¾, 1, 1½ Ton, and 137" & 161" WB. School Bus.
235" Load-Master—Std. on 2 Ton, C-O-E Trucks, and 199" School Bus. Optl. on 1½ Ton and 161" WB. School Bus.

Engine	Bore	Stroke	Displacement
"216"	3 1/2"①	3 3/4"	216.5 cu. in.
"235"	3 9/16"②	3 15/16"	235.5 cu. in.

①—3.4995-3.5015". ②—3.5620-3.5640".

Engine	Comp. Ratio	Rated HP	Developed HP
"216"	6.6-1	29.4	90 at 3300 RPM
"235" Std.	6.7-1	30.4	93 at 3100 RPM
"235" C-O-E	6.7-1	30.4	90 at 3100 RPM

Compression & Vacuum Reading—*See Tune-Up.*

▷**Non-Interchangeable Parts:** Parts interchangeable between the 216" and 235" engines except as follows: Cylinder Block and Crankcase, Cylinder Block Assembly (Short Motor), Push Rods (approx. ¾" longer on 235" Engine and identified by shoulder just below cup at top end), Valve Lifters, Camshaft, Piston and Pin Assembly, Piston Rings, Crankshaft, Oil Pan Pipe Assembly, Oil Distributor to Valve Rocker Shaft Pipe Assembly, Oil Pump Screen Cover Support Assembly.

▷**VALVE ROTATORS AVAILABLE FOR TRUCK ENGINES:** To promote longer valve life. *See "Valve System" in Chevrolet Special Data.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

ENGINE MOUNTINGS INSTALLATION & ADJUSTMENT: *See Chevrolet Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Chevrolet Special Data.*

OTHER ENGINE DATA: *See 1948 and 1949 Passenger Car pages for all engine data (Pistons, Connecting Rods, Crankshaft, Bearings, Valves, etc.).*

VALVE TIMING

▷**VALVE TAPPET CLEARANCE:** *CAUTION—Engine temperature must be "normalized" before adjusting. See "Tappet Clearance Adjustment" in Chevrolet Special Data.*
Normal Operation—.006-.008" Intake, .013-.015" Exhaust, with engine "normalized."
Heavy Duty (Full Throttle) Operation—.010" Intake, .020" Exhaust, with engine "normalized."

▷*CAUTION—If Valve Rotators are used set Exhaust Valve Clearance at .018-.020".*

VALVE TIMING: Camshaft Setting. Timing gears punchmarked. Punchmarked tooth of camshaft gear must be meshed with punchmarked space on crankshaft gear.

Valve Timing
Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.
Valve Timing Check—Remove all tappet clearance from #1 exhaust valve, turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right front face of flywheel housing, mount dial indicator on rocker shaft support with stem contacting #1 exhaust valve adjusting screw, set indicator dial at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004".

LUBRICATION

Engine Oiling System: Pressure and positive splash system. Pressure to main bearings, camshaft bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from troughs (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by Oil Distributor Valve on left side of engine.
CAUTION—Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs, and nozzles which must be checked each time the oil pan is removed (requires special gauges).
Checking Oiling System—*See "Oiling System" in Chevrolet Special Data.*
Crankcase Capacity—5½ qts. (dry), 5 qts. (refill).
Normal Oil Pressure—14 lbs. at 2000 RPM.
Oil Pressure Regulator—Located in oil pump cover Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special Data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.
Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Special Data.*

Checking Oiling System: Check entire system (Dipper Height, Oil Pan Trough Height, Oil Nozzle Height & Aim) each time oil pan removed.
See "Oiling System" in Chevrolet Special Data.
CAUTION—Special checking gauges required for each type (216" & 235") engine.

Crankcase Ventilation (All Trucks except Forward Control Models): Regular velocity type with air intake through valve rocker cover (air cleaner on some models) and outlet pipe on right side of engine.
Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

▷**Positive Crankcase Ventilation (Forward Control Truck Models only):** Vacuum operated ventilator consisting of vacuum pipe from oil filler pipe to a ventilator valve in fitting on intake manifold. Valve is spring-loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling speed to maintain proper air fuel mixture.**
Servicing. Every 5000 miles (or oftener if required), clean vacuum pipe, valve, and filler pipe thoroughly. Oil filler cap gasket must seal tightly. Test vacuum valve as follows:
Vacuum Valve. With valve disassembled, check spring tension—must be 7.5 ozs. with spring compressed to .418-.432". If defective replace with new valve assembly, Part No. 1543979.

▷*CAUTION*—When assembling valve, make certain end coil of spring engages groove under head of valve.

COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure type (relief valve) radiator cap used on Cab-Over-Engine Trucks.
Pressure Valve (C-O-E Trucks)—AC No. 850501 (Radiator Filler Cap). Opens at 4 lbs.
Capacity—15 qts. (with 216" Engine), 17½ qts. (with 235" engine). NOTE—Heavy Duty 17½ qt. radiator Optl. on ¾, 1, 1½ Ton and 137" & 161" WB. School Bus.

Radiator Core Removal: *See Chevrolet Special Data.*

Water Pump: Double-outlet, packless type with sealed ball-bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat. Harrison. In cylinder head water outlet.
Setting—No. 3113995 stamped "143". Starts to open 140-147°F. Fully open 170°F.

Temperature Gauge: AC No. (1947-48) 1511898 (exc. COE), 1512011 (COE). (1949) 1512148 (exc. COE), 1512150 (COE).

CLUTCH

Own Make. Diaphragm spring, single plate, dry disc type. NOTE—Half-Ton Trucks use 9" clutch, all other models 10¾" type.
See Clutch Section for complete data.
Facings—Moulded Asbestos, 2 required as follows:

	I. D.	O. D.	Thickness
9" type	6⅛"	9⅛"	.132-.138"
10¾" type	7"	10¾"	.137-.143"

Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.

Removal: Remove transmission (see Transmission Removal below). Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

1947 3-SPEED TRUCK TYPE

Own Make. Three-speed, all helical gear type; Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with floor-mtd. gearshift.
NOTE—4-Speed transmission optional equipment.
See Transmission Section for complete data.

▷**Low Speed Disengagement Complaints (with Replacement Cover Plate Assembly)**—*See Chevrolet Special Data.*

Removal (½-Ton): Remove floor boards. Disconnect speedometer cable. Remove hand brake lever from

transmission. Remove 4 universal joint ball collar-to-retainer capscrews, slide ball back on propeller shaft housing. Remove 4 capscrews from trunnion bearings on front yoke, remove these bearings and split the universal joint. Push front end of propeller shaft down for clearance (NOTE—On 4-speed transmission, frame cross member must be removed to drop shaft). Remove 2 upper transmission-to-clutch housing capscrews and insert guide pins, remove clutch underpan and take out 2 lower mounting capscrews and slide transmission out and remove. NOTE—On 4-speed type transmission, 2 brake master cylinder bracket capscrews must be removed.

Removal (¾-Ton): Remove floor boards. Disconnect speedometer cable. Remove hand brake lever from transmission. Split center universal joint by removing two trunnion bearing 'U' clamps (tape or wire trunnions together to prevent losing bearings) Remove 4 universal ball retainer-to-transmission bolts and slide retainer back on tube. Remove center bearing support bracket-to-frame cross member bolt nuts. Pull front propeller shaft assembly to rear, free of front universal. Remove transmission in same manner as on ½-Ton model.

TRANSMISSION

1948-49 3-SPEED TRUCK TYPE

Own Make. Three-speed, all helical gear type, Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Mechanical type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal (Half-Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Remove battery. Remove four capscrews holding universal joint collar on rear bearing retainer, remove bolts holding transmission support on frame cross-member. Support propeller shaft with jack, slide universal joint ball and collar back on shaft, split front universal by removing capscrews retaining front trunnion bearings on front yoke. Raise propeller shaft as far as possible with jack to provide clearance. Remove two top transmission mounting screws, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove two lower transmission mounting screws, slide transmission straight back on guide pins until main drive gear shaft is free from clutch driven member, lift transmission up and remove through floor opening.

Removal (¾ Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Split intermediate universal by removing trunnion bearing "U" bolts, lower rear propeller shaft to floor. Remove four capscrews holding universal joint collar on rear bearing retainer, slide ball collar and retainer back on housing. Remove two bolts and nuts mounting intermediate universal support bracket on frame cross-member, pull front propeller shaft assembly to rear and free of front universal joint. Remove transmission in same manner as on Half-Ton (above).

1947 4-SPEED TRUCK TYPE

(1, 1½, 2 TON TRUCKS)

Own Make. Four Speed, sliding spur gear type with floor mounted gear shift lever.

See Transmission Section for complete data.

Removal (C-O-E 109" WB.): Split front universal, remove transmission as given for ¾-Ton.

Removal (All Others): Remove floor boards. Disconnect speedometer cable. Remove hand brake lever from transmission. Split front universal joint by removing two trunnion bearing 'U' clamps (tape or wire trunnions together to prevent losing bearings). Remove center bearing support bracket-to-frame cross member bolts. Unscrew oil seal retainer from rear yoke of center universal. Pull front propeller shaft assembly to front to free from rear shaft. Remove transmission as given for 3-Speed (above).

1948-49 4-SPEED TRUCK TYPE

(1, 1½, 2 TON TRUCKS)

Own Make. Four-speed, constant-mesh, synchro-mesh, helical gear (2nd, 3rd, and 4th), sliding spur gear (Low & Reverse). Floor mounted gearshift.

See Transmission Section for complete data.

►**Locking in 3rd & 4th Gear Correction**—New design 3rd & 4th speed clutch hub and clutch keys used.

See Chevrolet 4-Speed Helical Gear Transmission in Transmission Section.

►**Gear Disengagement & High Gear Noise Correction:** *See "Chevrolet 4-Speed Helical Gear Transmission" in Transmission Section.*

Transmission Control (Cab-Over-Engine): *See Chevrolet Special Data for Removal & Installation data.*

NOTE—Floor-mtd. gearshift used on Other Trucks.

Removal (½ & ¾ Ton): See 3-speed Transmission data above. NOTE—On Forward Control Models shift lever and rear floor pan must be removed.

Removal (Other Trucks): Free steering gear grommet from floor, remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Split front universal joint by removing trunnion bearing "U" bolts (tape or wire trunnions together to prevent losing bearings), slide shaft down to one side to clear transmission. Remove two top transmission mounting capscrews, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove 2 lower transmission mounting capscrews, slide transmission straight back on guide pins until main drive gear shaft is free from clutch driven-member, remove transmission.

UNIVERSALS

Half-Ton: Own Make. No. 591642 (3-Spd. Trans.), 605118 (4-Spd. Trans.). Same type as Pass. Car. One used (in torque ball back of transmission).

►*TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Pass. Car & Half-Ton" Rear Axle in Rear Axle Section.*

¾ Ton Truck: Front Universal—Own Make. Chevrolet No. 591646 (3-Spd. Trans.), 3689288 (4-Spd. Trans.). Same type as used on Half-Ton (above).

Intermediate & Rear Universal—Spicer Model No. 1351-5107X (Intermediate—slip joint), 1358-5104X (rear—permanent joint). Needle bearing type.

See Universals Section for complete data.

1, 1½, 2 Ton Trucks (Regular & C-O-E): Spicer Needle bearing type. Slip-joint used at intermediate position, permanent type at transmission and rear axle.

Spicer Model Nos.	Front	Intermediate	Rear
C-O-E 110" WB	1351-5107X	①	1358-5105X
Bus 199" WB	1358-5104X	②	1358-5104X
All Others	1358-5104X	1351-5107X	1358-5104X

①—No intermediate joint used (1 propeller shaft).
②—Two intermediate universals as follows: First—1358-5104X, Second 1351-5107X (3 section shaft).

See Universal Section for complete data.

Propeller Shaft Intermediate Bearing & Support. *See "Propeller Shaft" in Chevrolet Special Data.*

NOTE—Support Bearing is sealed single-row ball bearing with "grease traps" packed with waterproof grease to prevent entrance of dirt and water.

REAR AXLE

SEMI-FLOATIN TRUCK TYPE

(HALF-TON)

Own Make. Semi-floating, hypoid gear type with Torque Tube drive.

NOTE—This axle same design as passenger car type.

See Rear Axle Section for complete data.

Ratio—4.11-1 Standard.

Axle Identification—Can be identified by prefix letter of axle serial number stamped on front face of carrier flange on right side as follows:

Detroit Prod.—(1947) EE, (1948) FE, (1949) GE.
Tonawanda—(1947) EF, (1948) FF, (1949) GF.

Backlash—.005-.007". Screw adjustment.

Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly from beneath car.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove "C" washer on inner end, pull shaft out.

Axle Shaft Endplay—Free fit to .014" maximum.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

FULL-FLOATIN TRUCK TYPE

(ALL EXCEPT HALF-TON)

Own Make. Full-floating, hypoid gear (straddle mounted pinion) with Hotchkiss Drive.

►**¾ & 1 Ton Note**—"Revacycle" differential side gears and pinions used.

►**1½ & 2 Ton Note**—Axle shaft splined to wheel hubs.

See Rear Axle Section for complete data.

►**Axle Identification**—Axles can be identified by prefix letters of axle serial number stamped on top of carrier housing between reinforcing ribs as follows:

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1947 Axle Markings

	Ratio	Marking①
¾-Ton	4.57-1	EG or EH
1 Ton (Single tires)	5.14-1	QA or QB
1 Ton (Dual tires)	5.14-1	QC or QD
1½-Ton	5.43-1	"Q"②
1½-Ton	6.17-1	"Q"②
2 Ton & C-O-E	6.17-1	QG or QH

1948 Axle Markings

¾ Ton (exc. Dubl-Duti)	4.57-1	FG or FH
1 Ton (Single Tires)	5.14-1	RAB or RB
1 Ton (Dual Tires)	5.14-1	RC or RD
1½ Ton	6.17-1	RE or RF
1½ Ton	5.43-1	RL or RM
2 Ton & C-O-E	6.17-1	RG or RH

1949 Axle Markings

¾ Ton (exc. Fwd. Contr.)	4.57-1	GG or GH
1 Ton (Single Tires)④	5.14-1	SAB or SB
1 Ton (Dual Tires)④	5.14-1	SC or SD
1½ Ton	6.17-1	SE or SF
1½ Ton	5.43-1	SL or SM
2 Ton & C-O-E③	6.17-1	SG or SH

①—First mark—Detroit, or Second—Tonawanda.
②—Std. axle ratio changed from 5.43-1 to 6.17-1 in August, 1947 (axle markings changed—see 1948).
③—1½ Ton Special Model also.
④—3/4 Ton Forward Control Models also.

Backlash—.005-.008". Screw Adjustment.

Removal:—Remove differential cover and axle shafts (see below). Disconnect rear universal by removing two U-bolts from rear yoke (wire trunnions to retain bearings). Slide shaft forward and lower to floor. Remove differential carrier mounting bolts.

Axle Shaft Removal (¾ & 1 Ton): Remove 8 capscrews and lockwashers in axle shaft flange, install two ½" x 13 screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft, withdraw shaft from housing, discard gasket.

Axle Shaft Removal (1½ & 2 Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. NOTE—When re-installing shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align **Axle Shaft Note**—Shafts unequal length (right shaft longer) and may be identified by part number

¾ & 1 Ton Truck

	Part No.	Length
Left Shaft	3680977	31 3/16"
Right Shaft	3680978	37 1/16"

1½ Ton Truck (Splined Shaft)

Left Shaft	3685191	34 3/32"
Right Shaft	3685192	40 15/32"

2 Ton & C-O-E (Splined Shaft)

Left Shaft (Stmpd. 05)	3702205①	36½"
Right Shaft (Stmpd. 06)	3702206②	40¾"

①Supersedes No. 3685193. ②Supersedes No. 3695194.

Wheel Bearing Adjustment: Remove wheels and axle shafts (see above). Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight using special wrench J-2222 (¾ & 1 Ton), J-870 (1½ & 2 Ton) while turning hub by hand, then back nut off 45°, check for free turning, install adjusting nut lock (with lock tangs aligned with slots in adjusting nut), bend tang down into notch in adjusting nut, install locknut and tighten securely, bend tang of lock down into notch of locknut.

REAR AXLE

TWO-SPEED TRUCK TYPE

Own Make (2 Ton Optl.). Full-floating, Two-speed Double reduction type with Hypoid Gears (First reduction), Helical Gears (Second reduction) and new vacuum shift control.

▷*HARD SHIFTING OR STICKING OF SHIFT CONROL: See "Rear Axle Notes" in Chevrolet Special Data.*

Identification Note—Serial number prefix (on flat top of carrier on right side) is "RN" (1947-48), "SN" (1949), (Detroit). "RP" (1947-48), "SP" (1949), (Tonawanda).

See Rear Axle Section for complete data.

Ratio—6.13-1 (High), 8.10-1 (Low).

Two-Speed Shift Control: Vacuum power type with selector valve on instrument panel.

See Rear Axle data in Rear Axle Section for data.

Removal: Carrier Assembly can be removed (without disturbing axle housing) as follows: Remove axle shaft flange mounting bolts, pull both axle shafts out of housing approximately 8" (to clear differential). Drain axle lubricant and remove inspection plate. Loosen hose clamps and slip hoses off vacuum cylinder hose connections. Disconnect rear universal joint by removing trunnion bearing "U" bolts from rear flange, slide propeller shaft assembly forward, tape universal bearing trunnions in place to prevent loss of needle bearing, swing propeller shaft out of the way (tie up to frame side rail). Remove capscrews mounting carrier on axle housing (support carrier by means of long punch inserted through one upper mounting screw hole in housing before removing last mounting screw). Place support jack under carrier assembly, roll assembly straight forward until differential clears housing.

Axle Shaft Removal & Wheel Bearing Adjustment: Same as for regular rear axle (see above).

SHOCK ABSORBERS

Delco Hydraulic type. Single or double acting piston types, or Direct acting type.

Direct Acting Types

Front—1052-M (½, ¾, 1 Ton).
Rear—1066-Z (½ Ton), 1066-T (¾ Ton).

Single Acting Types

Front—1430-CA, DA (½ & ¾ Ton).
Rear—1430-MA, LA (½ Ton), 1431-Y, X (¾ Ton).

Double Acting Types

Front—1730-B, A (exc. C-O-E), 1730-C, D (C-O-E).
Rear—1731-U, T (½ Ton), 1722-D, C (¾ Ton), 1722-F, E (1 & 1½ Ton), 2000-W, V (1½ Ton & School Bus).

FRONT SUSPENSION

Front Suspension: Conventional "I" beam section front axle

Kingpin Inclination—7°10'±1° crosswise (All).

Camber—1°±½° (All). Bend axle for corrections (when kingpin inclination is likewise off).

Caster—See table below. All specifications ±½°.

	Caster	Toe-In
½ & ¾ Ton exc. Fwd. Contr.	1¾°	1/16-3/16"
¾ Ton Fwd. Control	3¼°	1/16-1/4"
1 Ton Fwd. Control	2¼°	1/16-1/4"
1, 1½, 2 Ton exc. C-O-E	2¾°	1/16-1/4"
C-O-E Trucks	3°	1/16-1/4"

Toe-In—See table above. Adjust by turning tie rod. *CAUTION*—Tie rod ends must be aligned with studs.

Steering Geometry—Outer wheel turned 20°, inner wheel 23°±2° (All Models).

STEERING GEAR

Saginaw Model. Ball bearing (re-circulating ball) Worm-and-Nut. Chevrolet Part Nos. as follows: 270927 (½ Ton & ¾ Ton with 3-Spd. Transmission), 270221 (¾, 1, 1½ Ton with 4-Spd Transmission), 270224 (2 Ton & School Bus), 270635 (C-O-E).

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Own Make. Hydraulic type. Hand Lever (Pedal type on ½ & ¾ Ton and all Forward Control Models) applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Size stamped on housing under adjusting cup lock spring as follows:

	Front Wheels	Rear Wheels
Half-Ton	1 1/4"	1 3/16"
3/4 Ton	1 1/4"	1 3/8"
1 Ton	1 3/8"	1 3/8"
All Others	1 1/4"	1 1/2"

Drums—Cast iron rim with steel web.

	Front		Rear	
	Diam.	Width	Diam.	Width
Half-Ton	11"	1¾"	11"	1¾"
¾-Ton①	11"	1¾"	12"	2"
" Fwd. Cont.	12"	2"	12"	2"
1-Ton②	12"	2"	14"	2½"
137" Sch. Bus	12"	2"	14"	2½"
1½, 2-Ton	14"	2"	16"	3"

①—Except Fwd. Cont. ②—Includes Fwd. Cont.

Lining—Moulded type (bonded type on ½ & ¾ Ton).

Width—See Drum width above.

Thickness: .187-.194" (11"), .265-.272" (Others).

Clearance (½ & ¾ Ton)—Adjusting cover on wheel cylinder backed off **4 Notches** from slight drag position (All shoes—front and rear wheels).

Clearance (All Others)—Front Wheels: Adjusting cover on wheel cylinder backed off **4 Notches** from slight drag position.

Rear Wheels: Adjusting pinion shaft backed off **2/3 turn** from slight drag position.

HAND BRAKE

Hand Brake (Pedal Type used on ½ Ton, ¾ Ton and Forward Control Models): Pedal applies rear wheel service brakes. Release lever below instrument panel, **Adjustment**—This pedal-operated brake adjusted in same manner as other trucks (below) and release rod handle (under instrument panel) must be adjusted for ½" minimum clearance at support bracket.

Hand Brake (Lever Type used on Other Models): Place hand lever in fully released position, disconnect rear wheel cables at cross-shaft levers on frame by taking out clevis pin, loosen locknut, pull cable out of conduit by hand until a positive stop is felt, adjust clevis on cable end, tighten locknut and install clevis pin.

HYDROVAC

Hydrovac Brake System: Std. on 2 Ton, Cab-Over-Engine, and 1½ Ton Special Models. Consists of special power unit (vacuum power used to augment regular hydraulic brake actuation) in hydraulic regular hydraulic brake actuation) in hydraulic line between master cylinder and wheel cylinders.

See Brake Section for complete data.

M DEL IDENTIFICATION

Series	Serial Prefix	Model Designation
1500	GJ	Special Styleline & Fleetline
2000	GK	Deluxe Styleline & Fleetline
1508	GJ	Sedan Delivery

SERIAL NUMBER: Stamped on plate on left front body hinge pillar post.
1949 Serial Numbers—First number 1001 with model prefix as indicated in model identification above.

ENGINE NUMBER: Stamped on right side of crankcase to rear of distributor.
Engine Number Prefix—Indicates manufacturing plant as follows: GAA—Flint, GAM—Tonawanda.
1949 Engine Numbers—First number 1001 with engine plant prefix as indicated above.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. minimum (with cylinders equal within 5-10 lbs.) at cranking speed.
VACUUM READING: Steady 17-21" at idling speed.
FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: .035".
Plugs—AC No. 46-5. 14 mm.
►*CAUTION—Tighten plugs to 20-25 ft. lbs. torque or finger tight plus one-half turn.*

DISTRIBUTOR: Breaker Gap—.018" (limits .018-.022") standard setting, or .022-.024" for new points (to allow for seating).
Cam Angle—34°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 5° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set at "0".
Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

CARBURETION (Carter W1 & Rochester):
►*ROCHESTER CARBURETOR TROUBLE SHOOTING & CORRECTIONS: See "Rochester B (Chevrolet)" in Carburetor Section.*
Idle Setting—(Carter) 1-2 turns, (Rochester) 1½ turns open. Turn screw out for richer mixture.
Idle Speed—450-500 RPM. with warm engine.
Float Level (Carter)—½" top of float to gasket seat on cover with valve seated (invert to check).
Float Level (Rochester)—1 5/16" from bottom of each float to cover gasket **(do not remove gasket)** with cover inverted so that needle valve closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.
►*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3-4 lbs. (1523089), 3½-4½ lbs. (1539126, 448).

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. *Distorted springs should be replaced.*

VALVE TAPPET CLEARANCE: .006-.008" Intake, .013-.015" Exhaust *after engine "normalized" by running at fast idle of approximately 600 RPM. for 30 minutes or until oil temperature stabilized.*

Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116452.
Ignition Lock—Chevrolet No. 3692503 less keys.

COIL: Delco-Remy No. 1115380. Above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy 1112353. Automatic and vacuum advance with Octane Selector.
Breaker Gap—.018" standard setting, or .022-.024" for new points (to allow for seating).
Cam Angle—34°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

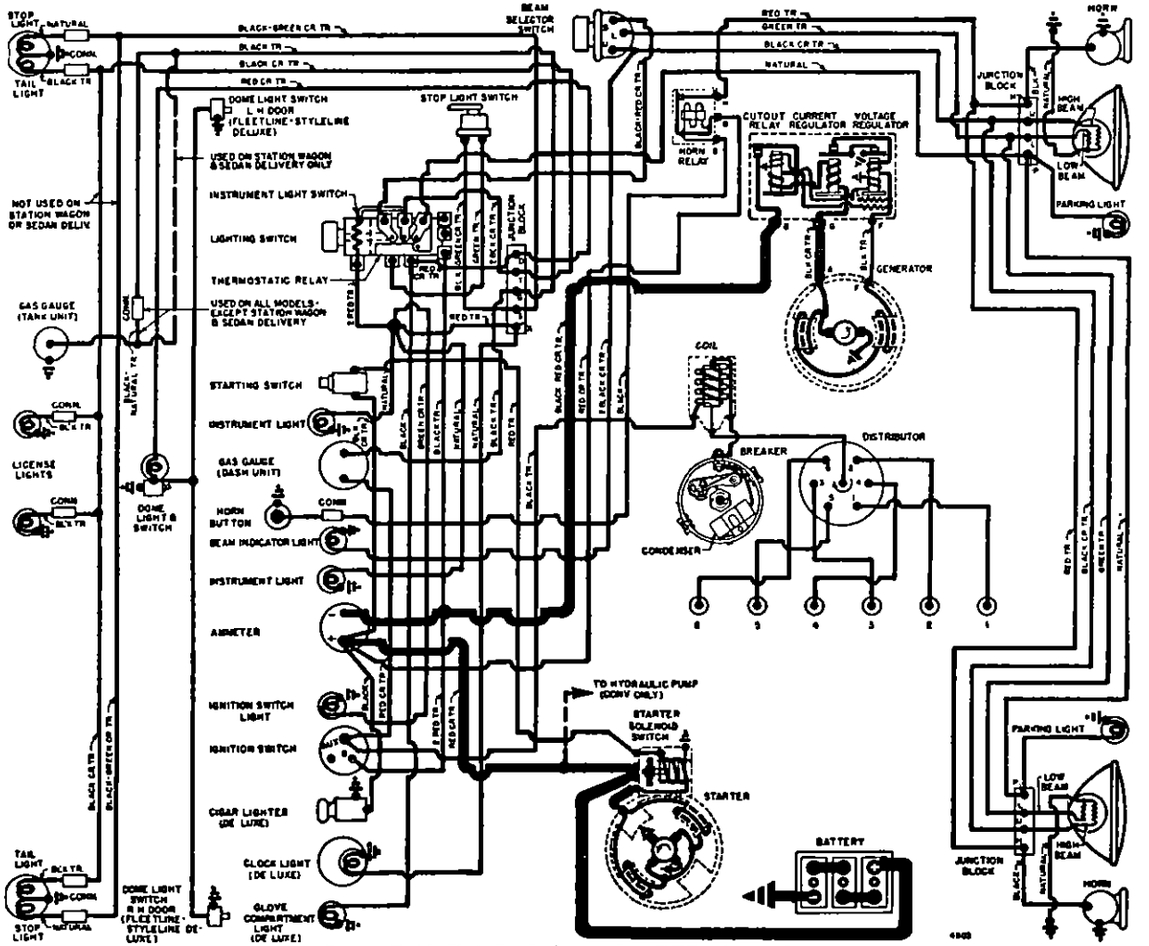
Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	Eng. R.P.M.
Start	350	3	700
6.5	600	13	1200
12.0	1200	24	2400
19.0	1700	38	3400

Octane Selector—Adjustment on distributor provides 10° advance or retard from center "0" position.
Vacuum Spark Control: Delco-Remy No. 1116043. On Octane Selector, linked to advance arm. Provides additional advance at speeds above idling except when accelerating or with wide open throttle.
Plunger Travel—17/64".

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	16.5-18.5"

Removal: Distributor mounted on right side of crankcase. To remove, loosen advance arm clamp bolt

CONTINUED ON NEXT PAGE



►*Gas Gauge Tank Unit lead changed to RED wire on later cars.*

CONTINUED FROM PRECEDING PAGE

IGNITION TIMING

	Flywheel Degrees	Piston Position
Std. Setting①	5° BTDC	.0091" BTDC.

①—Adjust Octane Selector for fuel used.

Timing (Neon Light)—Recommended method. Connect neon light to #1 spark plug, direct light in flywheel through inspection hole in right front face of housing. Set Octane Selector pointer at "0". Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert in flywheel) lines up with pointer. Tighten clamp bolt and check Octane Selector Setting (see below).

Timing (without Neon Light)—With #1 piston on compression, turn engine over until piston is 5° or .0091" before top dead center with ignition mark (steel ball insert in flywheel) at pointer in inspection hole in right front face of housing. Adjust distributor so contacts just opening.

Octane Selector Setting—Set for the grade of fuel being used to produce slight "ping" on acceleration.

CARBURETOR

CARTER (CHEVROLET) W1

Carter (Chevrolet) W1, No. 6848. 1¼" single barrel, downdraft type with manual choke control and new fast idle and accelerating pump design.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Fast Idle: Linkage connected to choke and operates when choke closed to open throttle. No adjustment.

CARBURETOR

ROCHESTER

Rochester Model B No. 7002050. Single, downdraft type with manual choke control and fast idle.
See Carburetor Section for complete data.

▷*ROCHESTER CARBURETOR TROUBLE SHOOTING & CORRECTIONS: See "Rochester B (Chevrolet)" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*

Throttle Kicker: Operates by cam on choke lever—opens throttle when choke closed—no adjustment.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544448 oil-wetted type (std.). 1544498 (or 1529264 with governor) oil bath types.
Filter Element—AC #6 (std.), #22 (heavy duty), #2 (heavy duty with governor).
Servicing—Clean and re-oil std. cleaner (use SAE 50 oil) every 2000 miles. On heavy duty, clean and refill oil reservoir with SAE 50 oil (1 pint) every 2000 miles.

Fuel Pump (Std.): AC Type AF, No. 1523089. Diaphragm type. (Optl.) AC No. 1359126 or 1539448 combination fuel-and-vacuum pump.
Replacement Pump—AC #429 (Std.), 9126 (Optl.).

Fuel Pump Pressure: 3-4 lbs. (1523089), 3½-4½ lbs. (1539126, 448).
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1516931.
Tank Unit—AC 1516280 (1517100 Sta. Wn., Sed. Del.).
See Carburetion Equipment Section for complete data.

▷**Tank Unit Production Change:** On Cars after June 1, 1949, Tank Unit lead was changed from a natural black tracer to all RED.

BATTERY

Delco Type 15AA-4. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) terminal.
Location—In engine compartment on right side.

STARTER

Delco-Remy Model 1107075. Armature No. 1867897.

▷*CAUTION—Starter operates whenever pushbutton depressed.*

Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.7	80①
12 "	Lock	3.4	525

①—Includes current draw of starter switch.

Starting Switch: Delco-Remy Solenoid Switch No. 1118135 (no relay used) mounted on starter and controlled by Pushbutton Switch No. 1996037.

▷*CAUTION*—Overrunning clutch pinion clearance must be adjusted whenever solenoid removed from starter. *See Electrical Equipment Section for data.*

GENERATOR

Delco-Remy. Two-brush types (as listed below) with voltage and current regulation.

	Generator—D-R Nos.	Armature
Passenger Cars	1102710	1879002
Taxi	1102729	———
Taxi & City Police	1106752 & 758	———
State Police	1106751 & 757	———

Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate (Pass. Cars)—32-40 amperes reached at car speed of 25 MPH. Actual charging rate controlled by regulator and dependent on battery condition.

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102710	30	8.0	1750
1102729	40	8.0	1900
1106751 & 757	50	7.5	1410
1106752 & 758	40	7.5	1165

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. (1102710 and 729, 1106751 and 757), 20 ozs. (1106752 and 758).
Field Current—1.75-1.9 amps. at 6 volts (1102710), 1.9-2.05 amps. at 6 volts (1102729), 1.70-1.95 amperes at 6.0 volts (1106751, 52, 57, 58).

Belt Adjustment: Loosen clamp bolt, swing generator out for ¾" belt deflection (light pressure) midway between generator and fan pulleys.

REGULATOR

Delco-Remy. Voltage-current types as follows:

Passenger Cars	1118301 (for 1102710 Gen.)
Taxi	1118300 (for 1102729 Gen.)
Taxi & City Police	1118343 (for 1106752, 8 Gen.)
State Police	1118334 (for 1106751, 7 Gen.)

▷*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjust'mt—*See Electrical Equip. Section.*

Current Regulator

Settings (hot): Set to	Range
1118301 — 36 amps.	32-40 amps.
1118300 — 42 amps.	40-46 amps.
1118334 — 50 amps.	48-52 amps.
1118343 — 40 amps.	37-41 amps.

Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjust'mt—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red dot below 50 figure on speedometer. Lighted when upper beams in use.
Direction Signal: Optl. *See Electrical Equipment Section.*

Switches
Lighting—Delco-Remy No. 1995031.
Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Stop Light—D-R No. 1997901 (mechanical type).

MISC. ELECTRICAL

▷**DASH PANEL INSPECTION HOLE FOR ACCESS TO WIRING ON BACK SIDE OF INSTRUMENTS:** Located on left side under hood with removable door

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy No. 1999627 or 643 (Low Note, Right), No. 1999628 or 644 (High Note, Left). Vibrator

Type	Current (at 6.0 volts)	Air Gap
1999627 (Low Note)	19-21 amperes	.044-.049"
1999628 (High Note)	17-19 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: Own 216". Six Cylinder, Valve-in-Head type.
Bore—3½" (3.4995-3.5015"). **Stroke**—3¾".
Displacement—216.5 cubic inches. **Rated HP**—29.4.
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.6-1 Std. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

ENGINE MOUNTINGS (Installation & Adjustment): *See Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

CYLINDER HEAD INSTALLATION: *See Chevrolet Special Data.*

PISTONS: Passenger Cars. Cast alloy iron, flat head, cam ground, tin plated type with slipper skirt.
Truck Pistons. Same as Pass. Cars except heavier. Truck pistons marked with small boss on underside of each pin boss. *CAUTION*—Do not interchange pistons (must be same type in one engine).

ENGINE

CONTINUED FROM PRECEDING PAGE

Weight—1.56 lbs. (Pass. Cars). **Length**—3.75" (min.).
Removal—Pistons and rods removed from above.
Clearance—Top: .0155-.0235", Skirt: Selective Fit. See Fitting New Pistons below.

Replacement Pistons: *See Chevrolet Special Data.*
NOTE—To install new pistons, hone cylinder for .005" oversize, rebore and hone for other sizes (rebore .002" less than piston oversize, finish by honing for piston clearance—see fit below). Cylinder bore taper and out-of-round must not exceed .001".

Fitting New Pistons: Use feeler gauge between piston and cylinder wall at right angles to pin bosses. Piston should pass through bore with light pressure on .002" feeler, and lock on .003" feeler.

PISTON RINGS: Two taper face compression rings (with greatest diameter at bottom), one slotted oil ring per piston, all above pin. Oil ring groove drilled for oil drainage.

Ring	Width	End Gap①	Side Clearance
Compr.	.1235-.1240"	.005-.015"	.0015-.003"②
Oil Cont.	.1860-.1865"	.005-.015"	.002-.0035"②

①—*End Gap Worn Limit—1/32" max.*
②—Side Clearance Checking—smaller feeler should be free, larger feeler should give a heavy drag.

Installing Compr. Rings—Side marked "TOP" up.

Replacement Rings: Furnished Standard size and .005", .020", .030", .040" Oversize.
Expander Type Rings—Furnished for use in cylinder bores of indicated oversizes as follows: Standard (Bore Std. to .009" Oversize), .020" Oversize (Bore .010" to .029" Oversize—(ring gaps must be filed for bores less than .020" Oversize), .030" Oversize (Bore .030" to .039" OS.), .040" OS. (Bore .040" to .049" OS.).

PISTON PIN: Diameter—.8645-.8650". **Length** 3.135-3.165". Pin locked in rod (piston bronze bushed).
Pin Fit in Piston—Thumb push fit (at room temp.).

Replacement Pins: Std. & .003", .005", .010" oversize. NOTE—New pistons fitted with bushings and pins. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.

CONNECTING ROD: Length—6 13/16". **Wgt.** 30.7 ozs.
Crankpin Journal Diameter—2.311-2.312".
Lower Bearing—Spun high-lead, thin-wall babbitt.
Clearance—.0003-.0013" selective fit (see Bearing Adjustment following).
Sideplay—.004-.012" at lower end (rod to crankpin), .015" minimum at upper end (rod to piston pin boss).

Bearing Adjustment: Solid shims. Remove shims equally at both sides to secure 'snap fit' (rod tight to hand but should snap from one side to the other with light tap of 8 oz. hammer), **then replace one .002" shim on one side for clearance** (if unequal number, place extra shim on camshaft side). Bearing clearance correct when rod can be snapped back and forth on crankpin with one hand (grasp bearing cap between thumb and index finger to test).
Palnut Note—Palnuts used to lock rod bolt nuts. Use new palnut (install with open side toward end of bolt), turn palnut up finger tight against rod bolt nut, then tighten palnut ½ turn additional.

Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinder with numbers and pin clamp bolt toward camshaft side. Install oil dippers on rods with mouth toward camshaft side of engine. Check dipper height.

Dipper Height Adjustment—*See "Oiling System" in Chevrolet Special Data.*

CRANKSHAFT: Four-bearing type with integral counterweights and vibration dampener.
Vibration Dampener—*See Chevrolet Special Data.*
Journal Diameters—#1, 2.6835-2.6845"; #2, 2.7145-2.7155"; #3, 2.7455-2.7465"; #4, 2.7765-2.7775".
NOTE—Journal taper or out-of-round limits .001". Run-out limits for #2 and #3 journals .002".
Bearing Type—Steel-backed "Precision" type thin-wall babbitt. *Do not require line-boring or reaming.*

►***CAUTION—#1 (front) and #2 (front intermediate) bearings similar in appearance but must not be interchanged. #2 bearing marked by letter "I" in oil groove.***
Clearance—.0007-.0024" selective fit. See Bearing Adjustment (below).

►***NOTE—Precision type bearings can be replaced singly.***

Bearing Adjustment: Solid shims. Remove shims until slight drag secured when shaft turned by hand, **then replace one .002" shim on one side for clearance** (if unequal number of shims used, place extra shim on same side for all bearings).

Replacement Bearings: New "Precision" type bearings furnished for all engines Std. size and .002", .010", .020", .030" Undersize.

►**Bearing Installation**—*Not necessary to remove crankshaft or engine from car. See "Crankshaft & Main Bearings" in Chevrolet Special Data.*
Bearing Cap Installation—Intermediate (#2 & 3) bearing caps marked for identification. Install #2 cap with mark "FRONT" toward front of engine, #3 cap with mark "REAR" toward rear of engine.

►***CAUTION—Rear intermediate (#3) bearing is special flanged type (takes end thrust).***

Crankshaft Oil Seal Servicing: *See Chevrolet Special Data for Front (Timing Gear Cover) and Rear Oil Seals.*

End Thrust: Taken by #3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of #3 bearing. Adjust by replacing bearing. **Endplay**—.003-.009".

FLYWHEEL REPLACEMENT: *See Chevrolet Special Data.*

CAMSHAFT: Four bearing type. Helical gear drive.

►***CAMSHAFT CAUTION: Camshafts on 216" and 235" engines NOT interchangeable and can be identified by Forging No. (same as Part No.) as follows:***
216" Eng.—No. 838733 (forged on shaft).
235" Eng.—No. 3660474 (forged on shaft).
Journal Diameters—#1, 2.0282-2.0292"; #2, 1.9657-1.9667"; #3, 1.9032-1.9042"; #4, 1.8407-1.8417".
NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).
Bearing Type—Steel-backed, babbitt-lined bushings (staked in place). NOTE—New bearings must be line-reamed. **Clearance**—.002-.004".
Bearing Installation—*See Chevrolet Special Data.*

End Thrust: Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).
Endplay Adjustment—*See Chevrolet Special Data.*
Endplay—Free fit to .003" maximum.

Timing Gears: Crankshaft gear steel. Camshaft gear Bakelite and Fabric composition.
Max. Gear Runout—.003" crankshaft, .004" camshaft.

►**235" Truck Engine Timing Gear Set**—Aluminum camshaft gear with bonded steel hub used with crankshaft gear having crowned teeth.
Replacement Timing Gears, and Gear Installation & Alignment—*See Chevrolet Special Data.*
Timing Gear Backlash—.003-.004".

Camshaft Setting: Gears punch marked. Punch marks on both gears must be lined up and directly opposite each other.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 41/64"	.3410-.3417"	.6.260-6.290"
Exhaust	1 15/32"	.3400-.3407"	.4.839-4.869"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.2941"	.001-.003"
Exhaust	30°	.3118"	.002-.004"

NOTE—Intake valves have flat head.

Valve Installation (with rubber Valve Stem Oil Seals): Special synthetic rubber oil seal ring installed in groove in valve stem directly below seat locks (retained by valve cap).
NOTE—Longer valve spring cap is used (interchangeable for intake & exhaust valves—may be identified by 1/16" annular groove on top surface). No cap covers used with this type assembly.
Valve Stem Oil Seal Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Guides: New precision type. Pressed in head.
Valve Guide Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install springs with closed-coil end toward cylinder head. Check springs with KMO-607 Tester, replace if outside limits of 124-140 lbs. at 1½". Spring free length 2⅛".

	Spring Pressure	Length
Valve Closed	53-63 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Valve Lifters: Barrel type with pushrod seat brazed on upper end. Lifter diameter .989-.990".
Clearance—.001" (selective free fit).

Rocker Arm Assembly: Armasteel type (no bushings). Four types of rocker arms used as follows:
Intake—No. 839463 (Left), 839464 (Right).
Exhaust—No. 839459 (Left), 839460 (Right).
Rocker Shaft Diameter—.7910-.7917" (bore diameter in rocker arm .7925-.7935").
Rocker Arm Assembly & Installation—*See "Valve System" in Chevrolet Special Data.*

VALVE TIMIN

VALVE TAPPET CLEARANCE: .006-.008" Intake, .013-.015" Exhaust *after engine "normalized" by running at fast idle of approximately 600 RPM, for 30 minutes or until oil temperature stabilized.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.
Valve Timing Check—Remove all tappet clearance from #1 exhaust valve, turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right front face of flywheel housing, mount dial indicator on rocker shaft support with stem contacting #1 exhaust valve adjusting screw, set indicator dial at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset tappet clearance at correct running figure (above).

LUBRICATI N

Engine Oiling System: Pressure and positive splash system. Pressure to main bearings, camshaft bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from troughs (low

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speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by Oil Distributor Valve on left side of engine.
CAUTION—**Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs, and nozzles which must be checked each time the oil pan is removed** (requires special gauges).
Crankcase Capacity—5½ qts. (dry), 5 qts. (refill)
Normal Oil Pressure—14 lbs. at 2000 RPM.
Oil Pressure Regulator—Located in oil pump cover Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special Data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.
Oil Pump Overhaul: *See Chevrolet Special Data.*
Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Special Data.*

Checking Oiling System: Check entire system (Dipper Height, Oil Pan Trough Height, Oil Nozzle Height & Aim) each time oil pan removed.
See "Oiling System" in Chevrolet Special Data.

Crankcase Ventilation: Air intake through valve rocker cover (air cleaner on some models), outlet through pipe on right side of engine.
Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure type radiator filler cap used (with relief valve).
Pressure Valve—AC No. 850501 Radiator Filler Cap. Marked "501." Opens at 4 lbs.
Capacity—16 quarts.

Radiator Core Removal: *See Chevrolet Special Data.*

Water Pump: Double-outlet, packless type with sealed ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head outlet.
Std.—No. 3121301 stamped "143". Starts to open at 140-147°F. Fully open at 170°F.

Temperature Gauge: AC No. 1511842. Not electric.

CLUTCH

Own Make—Diaphragm spring, single plate, dry disc type. NOTE—9" clutch used on all cars.
See Clutch Section for complete data.
Facings—Moulded Asbestos, 2 required as follows: 6⅛" I. D., 9⅛" O. D. .132-.138" thick.

Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.

Removal: Remove transmission (see Transmission Removal below). Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

Own Make. Three-speed, all helical gear type, Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). Similar to 1948 3-Spd. Truck.

▷ *HIGH GEAR DISENGAGEMENT: Can be corrected by installing 1953 type parts. See "Chevrolet 3-Speed Tranmission" in Transmission Section.*

Transmission Control: New mechanical type with shift lever mounted on steering column. NOTE—Similar to 1948 ½ & ¾ Ton 3-Speed Truck type.
See Transmission Section for complete data.

▷**Gearshift Control Lever Rattle Correction**—New spring released to correct this condition. *See "Chevrolet Pass. Car Transmission" in Transmission Section.*

Removal: Remove floor mat and floor cover over transmission. Disconnect speedometer cable, and shifter rods from levers on transmission. Drain lubricant. Disconnect hand brake pull back spring, and hand brake cable clevis from idler lever, remove idler lever. Remove universal joint collar-to-support capscrews and slide ball back on propeller shaft housing. Place jack under propeller shaft, remove 4 capscrews securing front trunnion bearings to front yoke, split joint and lower front end of propeller shaft. Remove rear transmission support-to-frame cross member bolts, install support under rear of engine. Remove two upper transmission-to-clutch housing capscrews and insert guide pins. Remove clutch underpan and two lower transmission-to-clutch housing capscrews. Slide transmission back and lift out through opening in floor.
Convertible Note—Transmission support must be removed and transmission turned for removal.

UNIVERSALS

Own Make. No. 591642. Cross type with surface treated trunnions and bearings. One used (in torque ball behind transmission rear support).

▷*TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Pass. Car & Half-Ton" Rear Axle in Rear Axle Section.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube drive. "Revacycle" differential side gears and pinions used.
See Rear Axle Section for complete data.
Ratio—4.11-1 standard. 3.73-1 optional.

▷**Axle Ratio Identification**—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratio as follows:
4.11-1—GA Detroit, GB Tonawanda.
3.73-1—GC Detroit, GD Tonawanda.
Backlash—.005-.007". Screw adjustment.

Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove "C" washer on inner end, pull shaft out.
Axle Shaft Endplay—Free fit to .014" maximum.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

SHOCK ABSORBERS

Delco. Chevrolet No. 5383591 (front), 5394330 (rear). Direct acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

FRONT SUSPENSION

Front Suspension: New linked parallelogram type with direct acting shock within each coil spring.
See Front Suspension Section for complete data.

▷**Lower Control Arm Production Change**—Two types used. *See "1949 Chevrolet" in Front Susp. Section.*
Kingpin Inclination—4° ± ½° crosswise.
Caster—Pos. ½° ± ½°. Adjustable.
Camber—Pos. ½° ± ½°. Adjustable.
Toe In—0-⅛". Loosen clamp bolts at each end of **left hand tie-rod** and turn rod, tighten clamp bolts.
CAUTION—Align tie rod ends before tightening clamp bolts (ball studs will bind if not aligned).
Steering Geometry (toe-out on turns)—Outer wheel turned 20°. Inner wheel turned 24° ± 2°.

STEERING GEAR

Saginaw. Chevrolet No. 5660113. New worm-and-roller type with push-pull lash adjustment.
See Steering Gear Section for complete data.

▷**STEERING GEAR CHANGE FOR EASIER STEERING:** Late 1950 steering gear, Part No. 5662113 (with 19.4-1 ratio), can be installed on 1949 cars for easier steering, especially when parking. *This steering gear can be identified by embossed "X" ½" wide on top of steering gear housing.*

BRAKES

Service Brakes: Own Make, hydraulic type. Hand lever applies rear wheel service brakes.
NOTE—Bonded brake lining used.
See Brake Section for complete data.
Wheel Cylinder Bore—Front wheels 1 5/16", Rear 1 1/8". Sizes stamped under adjusting cup lock spring on wheel cylinder housing.
Drums—Cast iron rim, steel web. Diameter: 11".
Lining—Moulded type (bonded). Width 1¾". Thickness .187-.194". Length per wheel 22⅝".
Clearance—Adjusting cover (on wheel cylinder) backed off 4 Notches from slight drag position.
Braking Power—57.7% front wheels, 42.3% rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

Series	Serial Prefix 1950	1951	Model Designation
1500	HJ	JJ	Spec. Styleline & Fleetline
2100①	HK	JK	Deluxe Styleline & Fleetline
1508	HJ	JJ	Sedan Delivery

①—Deluxe models with Powerglide Automatic transmission and "235" engine.

SERIAL NUMBER: Stamped on plate on left front body hinge pillar post.

First Serial Number: 1001 for each year with model prefix listed above. *NOTE*—Number preceding prefix is plant designation (see data below), letter following serial prefix indicates month of manufacture (A January, etc.).

Assembly Plant Designation—1 Flint, 2 Tarrytown, 3 St. Louis, 5 Kansas City, 6 Oakland, 8 Atlanta, 9 Norwood, 14 Balitimore, 20 Los Angeles, 21 Janesville.

ENGINE NUMBER: Stamped on right side of crankcase to rear of distributor.

First Engine Number—1001 for each year with model and plant prefix as follows:

Engine No. Prefix	Flint 1950	Flint 1951	Tonawanda 1950	Tonawanda 1951
"216" Engine	HAA	JAM	HAM	JAM
"216" Eng. Spec.①	HAC	JAC	HAP	JAP
"235" Eng. (Powerglide)	HAD	JAD	HAQ	JAQ

①—With Heavy Duty 10¾" Clutch Disc.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. minimum (with cylinders equal within 5-10 lbs.) at cranking speed.

VACUUM READING: Steady 17-21" at idling speed.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035".

Plugs—AC No. 46-5. 14 mm.

►***CAUTION—Tighten plugs to 20-25 ft. lbs. torque or finger tight plus one-half turn.***

DISTRIBUTOR: Breaker Gap—.018" (limits .018-.022") standard setting, or .022-.024" for new points (to allow for seating).

Cam Angle—34°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*

Automatic & Vacuum Advance—*See Ignition.*

Breaker Arm Spring Tension—17-21 ozs.

Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 5° BTDC.

Timing Procedure—*See Ignition Timing.*

Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set at "O". Then adjust Octane Selector as follows:

Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

CARBURETION (Rochester Carburetors):

►*CARBURETOR TROUBLE SHOOTING & RECOMMENDED CORRECTIONS: See "Rochester B (Chevrolet)" Carburetor in Carburetor Section.*

Idle Settings—1-2 turns open.

Idle Speed (conventional trans.)—450-500 RPM.

Idle Speed (Powerglide trans.)—430-450 RPM.

Float Level (Rochester)—1 5/16" from bottom of each float to cover gasket (do not remove gasket) with cover inverted so that needle valve closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly. *Above specifications supersede earlier data.*

►*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*

Accelerating Pump—No seasonal adjustment.

Throttle Return Check (Powerglide Cars): Not used on first carburetors but can be installed.

Adjustment—With engine warm and carburetor correctly adjusted (use tachometer to set idle speed at 430-450 RPM.), insert .090" feeler between carburetor choke lever and fast idle lever on air horn, turn throttle return check adjusting screw in until it just contacts throttle lever arm (*CAUTION*—use 9/32" wrench on shaft to prevent it turning).

Fuel Pump Pressure: 4 lbs. maximum.

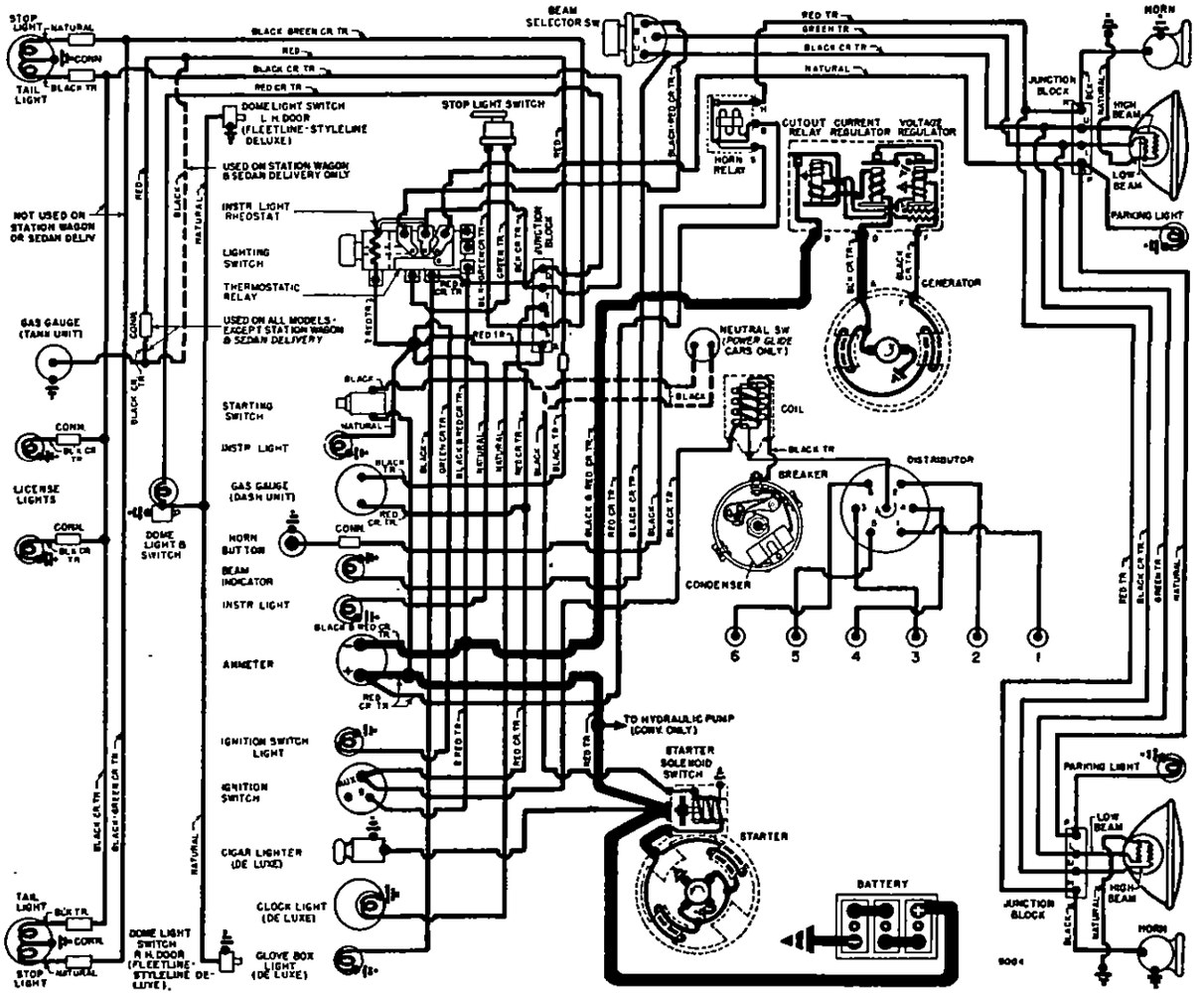
MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. *Distorted springs should be replaced.*

VALVE TAPPET CLEARANCE: *CAUTION*—Two types of valve lifters used. CONVENTIONAL TYPE in 216" Engines with Synchro-mesh Transmission. HYDRAULIC TYPE in 235" Engines with Powerglide.

►**CONVENTIONAL TYPE SETTING (216" Eng.):** .006-.008" Intake, .013-.015" Exhaust *after engine "normalised" by running at fast idle for approximately 30 minutes or until oil temperature stabilised.*

►**HYDRAULIC TYPE SETTING (235" Eng.):** *NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have regular adjusting screws. Initial

CONTINUED ON NEXT PAGE



1950 MODELS

CONTINUED FROM PRECEDING PAGE

Adjustment required when installing cylinder head or when adjusting screws disturbed.

►**Initial Adjustment**—*See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

►**Hydraulic Valve Lifter Noise.** Lifters may be noisy when first starting cars that have been idle for a considerable length of time. This noise will disappear as soon as the oil pressure refills the lifters. This is due to the "leakdown" on lifters holding valves open when the engine was stopped.

IGNITION

IGNITION SWITCH: Delco-Remy No. (1950) 1116452, (1951) 1116469.

Ignition Lock—Chevrolet No. (1950) 3692503, (1951) 3696338 (less keys uncoded).

Key Series—No. 8000 to 9499. **Groove**—No. 15.

COIL: Delco-Remy No. 1115380. Above distributor.
Ignition Current—2.5 amperes idling. 4.5 stopped.

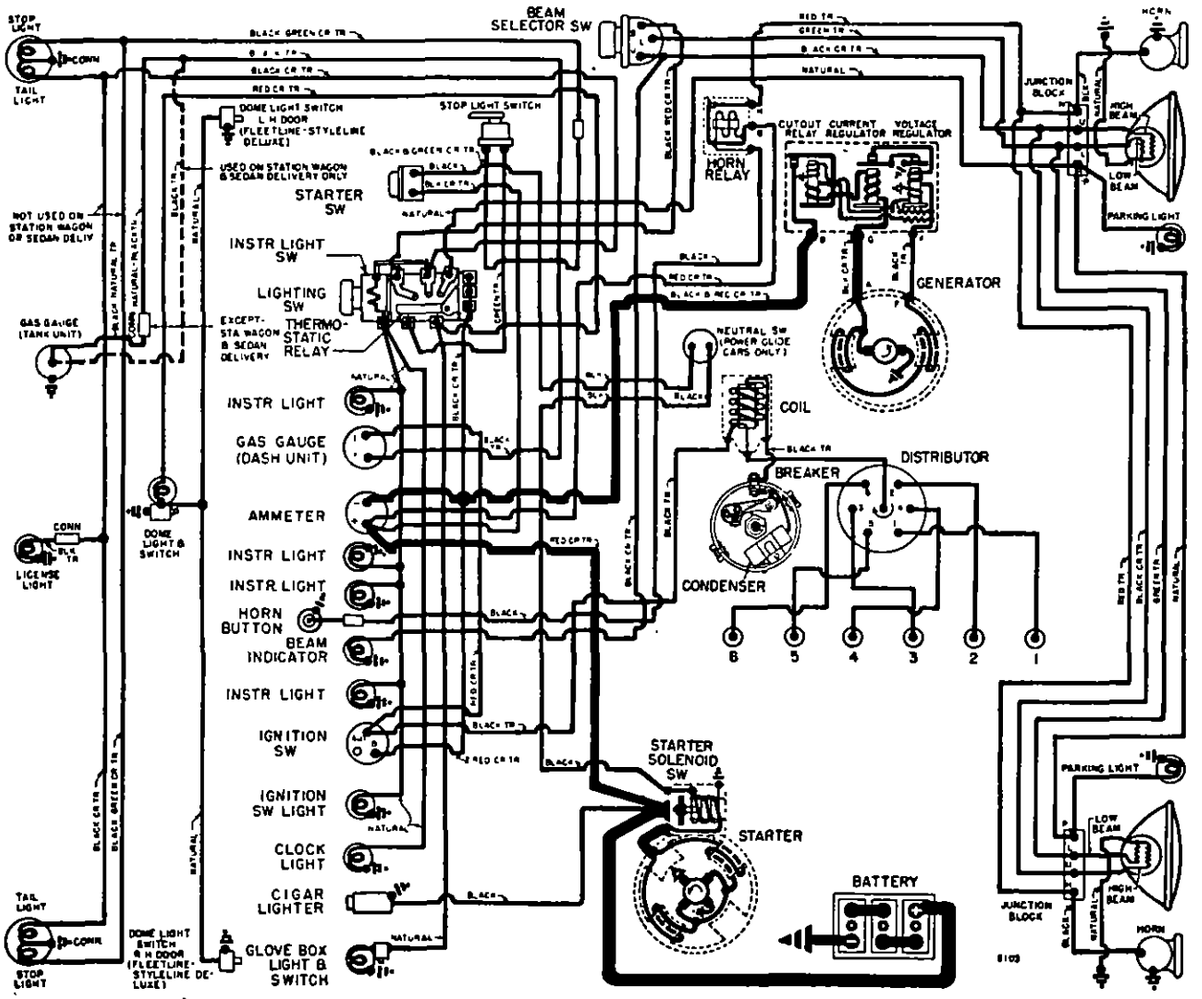
CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy. Automatic and vacuum advance with Octane Selector.

Delco-Remy No.	1950	1951
"216" Engine	1112353	1112362
"235" Engine	1112358	1112363

Breaker Gap—.018" standard setting or .022-.024" for new points (to allow for seating).
Cam Angle—34°. Test limits with .022" gap 31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.

Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.



1951 MODELS

Automatic Advance—1112353, 1112362

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
1.5	350	3	700
6.5	600	13	1200
12	1200	24	2400
19	1700	38	3400

Automatic Advance—1112358, 1112363

1	300	2	600
6	700	12	1400
16.5	1850	33	3700

Octane Selector—Adjustment on distributor provides 10° advance or retard from center "0" position. See Ignition Timing for adjustment instructions.

Vacuum Spark Control: Delco-Remy No. 1116043. On Octane Selector, linked to advance arm. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring.
Plunger Travel—17/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	16.5-18.5"

Removal: Distributor mounted on right side of crankcase. To remove, loosen advance arm clamp bolt (does not disturb vacuum connections).

IGNITION TIMING

	Flywheel Degrees	Piston Position
Std. Setting①	5° BTDC	.0091" BTDC.

①—Adjust Octane Selector for grade of fuel being used. See Octane Selector Setting below.

Timing (Neon Light)—Recommended method. Connect neon light to #1 spark plug, direct light in flywheel through inspection hole in right front face of housing. Set Octane Selector pointer at "0". Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert in flywheel) lines up with pointer. Tighten clamp bolt and check Octane Selector Setting (see below).

Octane Selector Setting—Set for the grade of fuel being used to produce slight "ping" on acceleration.

CARBURETOR

Rochester Model B—Single barrel, downdraft type, with concentric bowl and twin floats. Manual choke with throttle kicker and fast idle.

Rochester Carb. No.	216" Eng.	235" Eng.
1950 (First)	7002050	7002051
1950 (Later)	7002050	7003060
1951 (First)	7003152	7003160
1951 (Later)	7003865	7004495

See Carburetor Section for Replacement Carburetor Packages (including Automatic Choke Carburetors).

►*CARBURETOR TROUBLE SHOOTING & RECOMMENDED CORRECTIONS: See "Rochester B (Chevrolet)" Carburetor in Carburetor Section.*

Settings (Idle Settings, Float Level, and Accelerating Pump): *See Tune-Up.*

Throttle Kicker: Operates by cam on choke lever. Opens throttle when choke closed, no adjustment.

Throttle Return Check (Powerglide Cars): Can be installed on 7002051 Carb., used on later carburetors.
Adjustment—*See Carburetion under TUNE-UP.*
See Carburetor Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Std. AC No. 1544734 Oil wetted type. Optional Heavy Duty Oil Bath type. AC No. 1544754. (1544771 with governor).

Filter Element—Std. AC No. 6. Heavy Duty No. 23.

Servicing—Clean and re-oil Standard type cleaner (use SAE 50 engine oil) every 2000 miles. On Heavy Duty type, clean and refill oil reservoir (1 pint SAE 50) every 2000 miles.

Fuel Pump: AC Type AF. No. 1523089. Diaphragm type.
Replacement Pump—AC No. 429.
Optl. Fuel & Vacuum type AC No. 1539126 or 1539448. (Replacement No. AC -9126)
Pressure—4 lbs. maximum.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. (1950) 1517341, (1951) 1517255.
Tank Unit—Pass. Car AC No. 1560280. Sed. Del. & Sta. Wgn. AC No. 1517100.
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA-4. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) terminal.
Dimensions—Length 9". Width 7". Height 8 11/16".
Location—In engine compartment on right side.

STARTER

Delco-Remy Model 1107075. Armature No. 1867897.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—*24-28 ozs. each.*

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.7	80①
12 "	Lock	3.4	525

①—Includes current draw of starter switch.

Starting Switch: Delco-Remy Solenoid Switch No. 1118135 (no relay used) mounted on starter and controlled by Push-Button Switch No. 1996045.

►*CAUTION*—Overruning clutch pinion clearance must be adjusted whenever solenoid removed from starter. *See Electrical Equipment Section for data.*

►**Neutral Safety Switch (Powerglide transmission cars)**—Delco-Remy No. 1997845. Connected in starter control circuit. Prevents starter operation unless selector lever is in "N" or "P" position. Located at lower end of steering column.

►**Neutral Safety Switch Adjustment**—*See "Powerglide Automatic Transmission" in Transmission Section.*

GENERATOR

Delco-Remy. Two-brush types (as listed below) with voltage and current regulation.

Model	Generator (D-R No.)	Armature
Pass. Cars (1950)	1102710	1879002
Pass. Cars (1951)	1102749	1879002
Taxi (1950-51)	1102629	1880550
City Police & Taxi (1950-51)	1106758	1909996
State Police (1950 & 1951)	1106757	1910073

Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate (Pass. Cars)—32-40 amperes reached at car speed of 25 MPH. Actual charging rate controlled by regulator and dependent on battery condition.

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102710	30	8.0	1750
1102729	40	8.0	1900
1106751 & 757	50	7.5	1410
1106752 & 758	40	7.5	1165

①—Not maximum output. See current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. (1102710 and 729, 1106751 and 757), 20 ozs. (1106752 and 758).
Field Current—1.75-1.9 amps. at 6 volts (1102710), 1.9-2.05 amps. at 6 volts (1102729), 1.70-1.95 amperes at 6.0 volts (1106751, 52, 57, 58).

Belt Adjustment: Loosen clamp bolt, swing generator out for ¾" belt deflection (light pressure) midway between generator and fan pulleys.

REGULATOR

Delco-Remy. Voltage-current types as follows:

Model	Delco-Remy No.	For Generator No.
Pass. Cars (1950)	1118301	1102710
Pass. Cars (1951)	1118301	1102749
Taxi	1118300	1102629
Taxi & City Police	1118343	1106758
State Police	1118334	1106757

►*"1118300 SERIES"* have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjust'mt—*See Electrical Equip. Section.*

Current Regulator Settings (hot):	Set to	Range
1118301	36 amps.	32-40 amps.
1118300	42 amps.	40-46 amps.
1118334	50 amps.	48-52 amps.
1118343	40 amps.	37-41 amps.

Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjust'mt—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot 3" below lamp center height).
Beam Indicator—Red dot below 50 figure on speedometer. Lighted when upper beams in use.

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicator—Pilot light on switch case. Lighted when Right or Left Dir. Signal "on".

Switches
Lighting—Delco-Remy No. (1950) 1995031, (1951) 1995048.
Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Glove Box—Delco-Remy No. 3693641.
Back-Up Light—Delco-Remy No. 1997911.
Stop Light—Delco-Remy No. (1950) 1997901, (1951) 1997913 (mechanical type).

MISC. ELECTRICAL

►**DASH PANEL INSPECTION HOLE FOR ACCESS TO WIRING ON BACK SIDE OF INSTRUMENTS:** Located on left side under hood with removable door screwed to dash.

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy No. 1999643 (Low Note, Right), No. 1999644 (High Note, Left). Vibrator types operated by relay.
NOTE—1999643 and 644 are welded.

Type	Current (at 6.0 volts)	Air Gap
1999643 (Low Note)	19-21 amperes	.044-.049"
1999644 (High Note)	17-19 amperes	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: Own make. Two used.
"216" Engine—Used with Synchro-mesh transmission cars.
New "235" Engine—Used with Powerglide Automatic transmission cars. Has larger bore, longer stroke, larger valves, hydraulic valve lifters, and improved manifolding.

Eng.	Bore	Stroke	Displacement
216	3 1/2"	3 3/4"	216.5 cu. in.
235	3 9/16"	3 15/16"	235.5 cu. in.

	Comp. Ratio	Rated H.P.	Developed H.P.
216	6.6-1	29.4	92 at 3400 RPM
235	6.7-1	30.4	105 at 3600 RPM

Compression & Vacuum Readings—*See Tune-Up.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

ENGINE MOUNTINGS (Installation & Adjustment): *See Chevrolet Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS: Passenger Cars. Cast alloy iron, flat head, cam ground, tin plated type with slipper skirt.

Truck Pistons. Same as Pass. Cars except heavier. Truck pistons marked with small boss on underside of each pin boss. *CAUTION*—Do not interchange pistons (must be same type in one engine).
Weight—1.56 lbs. (Pass. Cars). **Length**—3.75" (min.).
Removal—Pistons and rods removed from above.
Clearance—Top: .0155-.0235". Skirt: Selective Fit. See Fitting New Pistons below.

Replacement Pistons: *See Chevrolet Special Data.*
NOTE—To install new pistons, hone cylinder for .005" oversize, rebore and hone for other sizes (rebore .002" less than piston oversize ,finish by honing

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

for piston clearance—see fit below). Cylinder bore taper and out-of-round must not exceed .001".

Fitting New Pistons: Use feeler gauge between piston and cylinder wall at right angles to pin bosses. Piston should pass through bore with light pressure on .002" feeler, and lock on .003" feeler.

PISTON RINGS: Three used per piston.

216 Engine

Ring	Width	End Gap①	Side Clearance
#1 Comp.③	1/8"	.005-.015"	.0015-.003"
#2 Comp.②	1/8"	.005-.015"	.0015-.003"
#3 Oil	3/16"	.005-.015"	.002-.0035"

235 Engine

Ring	Width	End Gap①	Side Clearance
#1 Comp.③	3/32"	.005-.015"	.0015-.003"
#2 Comp.②	1/8"	.007-.020"	.0015-.003"
#3 Oil	3/16"	.005-.015"	.002-.0035"

①—End Gap Worn Limit 1/32" maximum.
②—Taper Face type. ③—Deep section twist type.

Installing Compr. Rings—Side marked "TOP" up.

Replacement Rings: Furnished Standard size and .005", .020", .030", .040" Oversize.

Expander Type Rings—Furnished for use in cylinder bores of indicated oversizes as follows: Standard (Bore Std. to .009" Oversize), .020" Oversize (Bore .010" to .029" Oversize—(ring gaps must be filed for bores less than .020" Oversize), .030" Oversize (Bore .030" to .039" OS), .040" OS. (Bore .040" to .049" OS.).

PISTON PIN: Diameter—.8645-.8650". **Length** 3.135-3.165". Pin locked in rod (piston bronze bushed).

Pin Fit in Piston—Thumb push fit (at room temp.).

Replacement Pins: Std. & .003", .005", .010" oversize. NOTE—New pistons fitted with bushings and pins. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.

CONNECTING ROD: Length—6 13/16". **Weight** 31.2 ounces.

Crankpin Journal Diameter—2.311-2.312".

Lower Bearing—Spun high-lead, thin-wall babbitt. **Clearance**—.0003-.0013" selective fit (see Bearing Adjustment following).

Sideplay—.004-.012" at lower end (rod to crankpin), .015" minimum at upper end (rod to piston pin boss).

Bearing Adjustment: Laminated shims. Remove shims equally at both sides to secure 'snap fit' (rod tight to hand but should snap from one side to the other with light tap of 8 oz. hammer), **then replace one .002" shim on one side for clearance** (if unequal number, place extra shim on camshaft side). Bearing clearance correct when rod can be snapped back and forth on crankpin with one hand (grasp bearing cap between thumb and index finger to test).

Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinder with numbers and pin clamp bolt toward camshaft side. Install oil dippers on rods with mouth toward camshaft side of engine. Check dipper height.

Dipper Height Adjustment—*See "Oiling System" in Chevrolet Special Data.*

CRANKSHAFT: Four-bearing type with integral counterweights and vibration dampener.

Vibration Dampener—*See Chevrolet Special Data.*

Journal Diameters—#1, 2.6835-2.6845"; #2, 2.7145-2.7155"; #3, 2.7455-2.7465"; #4, 2.7765-2.7775". NOTE—Journal taper or out-of-round limits .001". Run-out limits for #2 and #3 journals .002".

Bearing Type—Steel-backed "Precision" type thin-wall babbitt. *Do not require line-boring or reaming.*

▷***CAUTION—#1 (front) and #2 (front intermediate) bearings similar in appearance but must not be interchanged. #2 bearing marked by letter "I" in oil groove.***

Clearance—.0007-.0024" selective fit. See Bearing Adjustment (below).

▷***NOTE—Precision type bearings can be replaced singly.***

Bearing Adjustment: Solid shims. Remove shims until slight drag secured when shaft turned by hand, **then replace one .002" shim on one side for clearance** (if unequal number of shims used, place extra shim on same side for all bearings).

Replacement Bearings: New "Precision" type bearings furnished for all engines Std. size and .002", .010", .020", .030" Undersize.

▷**Bearing Installation**—*Not necessary to remove crankshaft or engine from car. See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Bearing Cap Installation—Intermediate (#2 & 3) bearing caps marked for identification. Install #2 cap with mark "FRONT" toward front of engine, #3 cap with mark "REAR" toward rear of engine.

▷***CAUTION—Rear intermediate (#3) bearing is special flanged type (takes end thrust).***

Crankshaft Oil Seal Servicing: *See Chevrolet Special Data for Front (Timing Gear Cover) and Rear Oil Seals.*

End Thrust: Taken by #3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of #3 bearing. Adjust by replacing bearing. **Endplay**—.003-.009".

FLYWHEEL REPLACEMENT: *See Chevrolet Special Data.*

CAMSHAFT: Four bearing type. Helical gear drive.

▷***CAMSHAFT CAUTION: Different camshaft used on each type engine. NOT INTERCHANGEABLE. Identify camshafts as follows:***

216" Engine Camshaft—Forging No. 838733 (same as Part No.) located between #11 and #12 cams.

235" Powerglide Engine—Forging No. 3660474 (not same as Part No. 3835771) located between #10 and #11 cams. Shaft also has "X" stamped on front end and painted green. *CAUTION*—Forming number is same as 235" Truck engine.

235" Truck Engine—Forging No. 3660474 (same as Part No.) located between #11 and #12 cams. Shaft has NO other identification (see 235" Powerglide camshaft identification above).

Journal Diameters—#1, 2.0282-2.0292"; #2, 1.9657-1.9667"; #3, 1.9032-1.9042"; #4, 1.8407-1.8417".

NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).

Bearing Type—Steel-backed, babbitt-lined bushings (staked in place). NOTE—New bearings must be line-reamed. **Clearance**—.002-.004".

Camshaft Bearing Replacement: *See Chevrolet Special Data.*

End Thrust: Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).

Endplay Adjustment—*See "Timing Gear Installation" in Chevrolet Special Data.*

Endplay—Free fit to .003" maximum.

Timing Gears: Crankshaft gear steel. Camshaft gear Bakelite and Fabric composition.

Timing Gear Runout—.003" (crankshaft), .004" (camshaft) maximum.

Timing Gear Backlash—.003-.004".

Replacement Timing Gears, and Gear Installation & Alignment—*See Chevrolet Special Data.*

Camshaft Setting: Gears punch marked. Punch marks on both gears must be lined up and directly opposite each other.

VALVES:

"216" Engine

	Head Diam.	Stem Diam.	Length
Intake	1 41/64"	.3410-.3417"	6.26-6.29"
Exhaust	1 1/2"	.3400-.3407"	4.917-4.947"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.2941"	.001-.0027"
Exhaust	45°	.3118"	.002-.0037"

235 Engine

	Head Diam.	Stem Diam.	Length
Intake	1 15/16"	.3410-.3417"	6.364-6.394"
Exhaust	1 1/2"	.3400-.3407"	4.904-4.934"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3275"	.001-.0027"
Exhaust	45°	.3275"	.002-.0037"

Valve Stem Oil Seal Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Guides: Precision type. Pressed in head.

Valve Guide Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install springs with closed coil end down. Check with spring tester and replace if outside limits shown below.

Valve Springs—"216" Engine

	Spring Pressure	Length
Valve closed	53-63 lbs.	1.821"
Valve open	124-140 lbs.	1.505"

216 Engine—Valve spring free length 2 1/8".

▷***CAUTION—Aluminum colored valve springs used on 235 (Powerglide) engine must not be used on other models.***

Valve Springs—"235" Engine

	Spring Pressure	Length
Valve closed	62-68 lbs.	1.821"
Valve open	155-165 lbs.	1.505"

235 Engine—Valve spring free length 2 5/32".

Valve Lifters (216" Engine): Plain barrel type with pushrod seat brazed on upper end.

Diameter—.989-.990".

Clearance—.001" (selective free fit).

Hydraulic Valve Lifters (235" Engine): Used with Powerglide Transmission.

See "Valve System" in Chevrolet Special Data.

▷**Initial Adjustment (required only when installing cylinder head or when adjusting screw setting has been disturbed):** *See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

▷***REMOVING HYDRAULIC VALVE LIFTERS: When removing lifters and push rods use a rack to keep them in proper sequence. They should be installed in their original location when re-assembling.***

Rocker Arm Assembly & Installation: *See "Valve System" in Chevrolet Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION*—**Two types of valve lifters used. CONVENTIONAL TYPE in 216" Engines with Synchro-mesh Transmission. HYDRAULIC TYPE in 235" Engines with Powerglide Transmission.**

►**CONVENTIONAL TYPE SETTING (216" Eng.):** .006-.008" Intake, .013-.015" Exhaust *after engine "normalized" by running at fast idle for approximately 30 minutes or until oil temperature stabilized.*

►**HYDRAULIC TYPE SETTING (235" Eng.):** *NO CLEARANCE ADJUSTMENT REQUIRED* although rocker arms have regular adjusting screws. **Initial Adjustment** required when installing cylinder head or when adjusting screws disturbed.

►**Initial Adjustment**—*See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

Timing Gear Settings—*See Camshaft Setting.*

VALVE TIMING: "216" Engine

Intake Valves—Open 1° ATDC. Close 39° ALDC.

Exhaust Valves—Open 42° BLDC. Close 9° ATDC.

"235" Engine

"Theoretical" Valve Timing with Hydraulic Lifters.

Intake Valves—Open 16° BTDC. Close 48° ALDC.

Exhaust Valves—Open 46°30' BLDC. Close 17°30' ATDC.

Valve Timing Check—"216" Engine. Remove all tappet clearance from #1 exhaust valve. Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right face of flywheel housing, mount dial indicator on rocker shaft with stem contacting #1 exhaust valve adjusting screw, set indicator dial at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset tappet to correct running clearance.

"235" Engine—Use same procedure as for the "216" engine except that it is necessary to replace the hydraulic lifter operating #1 exhaust valve with a conventional type lifter while making the check.

LUBRICATION

Engine Oiling System: "216" Engine. Pressure and positive splash system. Pressure to main bearings, camshaft bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from troughs (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by the Oil Distributor Valve on left side of engine.

"235" Engine—Lubrication system similar to "216" engine except that the rocker arms are fed from an extension of the passage to the rear camshaft bearing. This same extension also feeds the oil channel supplying the hydraulic lifters.

CAUTION—Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs, and nozzles which must be **checked each time the oil pan is removed** (requires special gauges).

Crankcase Capacity—5½ qts. (dry), 5 qts. (refill).

Normal Oil Pressure—14 lbs. at 2000 RPM.

Oil Pressure Regulator—Located in oil pump cover Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special Data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.

Oil Pump Overhaul: *See Chevrolet Special Data.*

Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Special Data.*

Checking Oiling System: Check entire system (Dipper Height, Oil Pan Trough Height, Oil Nozzle Height & Aim) each time oil pan removed.

See "Oiling System" in Chevrolet Special Data.

Crankcase Ventilation: Air intake through valve rocker cover (air cleaner on some models), outlet through pipe on right side of engine.

Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure type radiator filler cap used (with relief valve).

Pressure Valve—AC No. 850501 Radiator Filler Cap. Marked "501." Opens at 4 lbs.

Capacity—15 quarts.

Radiator Core Removal: *See Chevrolet Special Data.*

Water Pump: Double-outlet, packless type with sealed ball bearing shaft.

See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head outlet.

Std.—No. 3123992 stamped "143". Starts to open at 140-147°F. Fully open at 170°F.

Temperature Gauge: AC No. (1950) 1511842, (1951) 1512241.

CLUTCH

Own Make—Diaphragm spring, single plate, dry disc type. NOTE—9" clutch used on all cars.

See Clutch Section for complete data.

Facings—Moulded Asbestos, 2 required as follows: 6⅛" I.D., 9⅛" O.D. .132-.138" thick.

Adjustment: Pedal free travel ¾-1". To adjust loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.

Removal: Remove transmission (see Transmission Removal below). Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

SYNCHRO-MESH

Synchro-mesh Transmission—Three-speed, synchro-mesh (Second & High), sliding gear (Low & Reverse).

► *HIGH GEAR DISENGAGEMENT: Can be corrected by installing 1953 type parts. See "Chevrolet 3-Speed Transmission" in Transmission Section.*

Transmission Control & Linkage: *See Transmission Section for complete data.*

Removal: Remove floor mat and floor cover over transmission. Disconnect speedometer cable, and shifter rods from levers on transmission. Drain lubricant. Disconnect hand brake pull back spring, and hand brake cable clevis from idler lever, remove idler lever. Remove universal joint collar-to-support capscrews and slide ball back on propeller shaft housing. Place jack under propeller shaft, remove 4 capscrews securing front trunnion bearings to front yoke, split joint and lower front end of propeller shaft. Remove rear transmission support-to-frame cross member bolts, install support under rear of engine. Remove two upper transmission-to-clutch housing capscrews and insert guide pins. Remove clutch underpan and two lower transmission-to-clutch housing capscrews. Slide transmission back and lift out through opening in floor.

POWERGLIDE TRANSMISSI N

Powerglide Automatic Transmission (used with "235" Engine only). Torque Converter type, hydraulically operated planetary unit with manual control.

►*POWERGLIDE PRODUCTION CHANGES, CORRECTIONS, & REPLACEMENT PARTS CAUTION:* *See "Chevrolet Powerglide" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubrication—Check fluid level in transmission every 1000 miles. Oil should be added only when the oil gets down to the "Add One Quart" mark on the dipstick. Change oil, remove and clean oil suction screen every 25000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing a "AQ-ATF" marking on container.

Capacity—9 qts. (10 qts. dry).

Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in the "D" range when taking dipstick readings. Dipstick is located under hood right side just opposite starter.

Draining and Refilling—*See "Chevrolet Powerglide Automatic Transmission" in Transmission Section.*

Removal—*See "Transmission Removal" under Chevrolet Powerglide Automatic Transmission in Transmission Section.*

Transmission Control & Linkage—*See Transmission Section for complete data.*

►**Neutral Safety Switch, Powerglide Automatic transmission cars:** Connected in starter control circuit to prevent starter operating unless shift lever is in "N" Neutral or "P" position. Located at lower end of steering column.

►**Neutral Safety Switch Adjustment**—*See "Powerglide Automatic Transmission" in Transmission Section.*

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UNIVERSALS

Own Make. Cross type with surface treated trunnions and bearings. One used in torque ball behind transmission rear support).

►*TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Pass. Car & Half-Ton" Rear Axle in Rear Axle Section.*

►**UNIVERSAL JOINT BALL ADJUSTMENT (POWERGLIDE MODELS):** Improper adjustment will cause leakage. *See "Torque Tube & Ball" in Chevrolet Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube drive. "Revacycle" differential side gears and pinions used.
See Rear Axle Section for complete data.

Ratio—(Synchro-mesh Cars) 4.11-1.
(Powerglide Cars) 3.55-1.

Axle Identification—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratios as follows:

	Detroit		Tonawanda	
Ratio	1950	1951	1950	1951
4.11-1	HA	JA	HB	JB
3.55-1	HJ	JJ	HK	JK

Backlash—.005-.007". Screw adjustment.

Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove 'C' washer on inner end, pull shaft out.

Axle Shaft Endplay—Free fit to .014" maximum.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

SHOCK ABSORBERS

Delco. Chevrolet No. 5394583 (front), 5394584 (rear). Direct acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

FRONT SUSPENSION

Front Suspension: New linked parallelogram type with direct acting shock within each coil spring.
See Front Suspension Section for complete data.

Kingpin Inclination—4° ± ½° crosswise.

Caster—Pos. ½° ± ½°. Adjustable.

Camber—Pos. ½° ± ½°. Adjustable.

Toe In—0-⅛". Loosen clamp bolts at each end of left hand tie-rod and turn rod, tighten clamp bolts.
CAUTION—Align tie rod ends before tightening clamp bolts (ball studs will bind if not aligned).

Steering Geometry (toe-out on turns)—Outer wheel turned 20°. Inner wheel turned 24° ± 2°.

STEERING GEAR

Saginaw. Worm and roller type with push-pull lash adjustment.
See Steering Gear Section for complete data.

►**STEERING GEAR PRODUCTION CHANGE:** Steering Gear assembly, Part No. 5662075 supersedes previous assemblies Part No. 5661893 & 5662113, on 1950 & 1951 cars. This later assembly provides easier steering (ratio 19.4-1). *Can be identified by embossed "X" ½" wide on top of steering gear housing. Parts not interchangeable with earlier assemblies.*

►**STEERING GEAR CHANGE FOR EASIER STEERING ON EARLY 1950 CARS:** Late 1950 steering gear (above) can be installed on first cars with No. 5661893 gear (with 17.4-1 ratio) for easier steering.

BRAKES

1950 CARS

Service Brakes: Own Make, hydraulic type. Hand lever applies rear wheel service brakes.
NOTE—Bonded brake lining used.
See Brake Section for complete data.

Wheel Cylinder Bore—Front wheels 1 5/16", Rear 1 1/8". Sizes stamped under adjusting cup lock spring on wheel cylinder housing.

Drums—Cast iron rim, steel web. Diameter: 11".

Lining—Moulded type (bonded). Width 1¾". Thickness .187-.194". Length per wheel 20⅝".

Clearance—Adjusting cover (on wheel cylinder) backed off 4 Notches from slight drag position.

Braking Power—57.7% front wheels, 42.3% rear.

Hand Brake: See Service Brakes above.

1951 CARS

Service Brakes: Chevrolet-Bendix Duo-Servo single anchor hydraulic type. Hand lever applies rear wheel secondary shoe.
NOTE—Bonded brake lining used.
See Brake Section for complete data.

Wheel Cylinder Bore—Front wheels 1⅛", Rear 1". Sizes stamped under adjusting cup lock spring on wheel cylinder housing.

Drums—Cast iron, steel web. Diameter: 11".

Lining—Molded type, (bonded). Width 2" (Front) 1¾" (Rear). Thickness .202-.222". Length per wheel 21".

Clearance—Single adjusting screw located at bottom of backing plate. A snap plate covers hole in backing plate. Back off adjusting screw 7 notches from slight drag position. If wheels not free of drag, Major Adjustment is required. *NOTE—This setting supersedes original specifications.*

Braking Power—55.9% front wheels, 44.1% Rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATI N

Series	Special Prefix 1950	1951	Wheelbase	Type
3100	HP	JP	116"	Half-Ton
3600	HR	JR	125¼"	¾-Ton
3742	HT	JT	125¼"	¾ T. Fwd.-Contr
3800	HS	JS	137"	1-Ton
3802			137"	School Bus
3942	HU	JU	137"	1 T. Fwd-Contr
4100	TJ	UJ	137"	1½-Ton
4400	TK	UK	161"	1½-Ton
4502	TL	UL	161"	School Bus
5100	TP	UP	110"	COE 2-Ton
5400	TR	UR	134"	COE 2-Ton
5700	TS	US	158"	COE 2-Ton
5100S	TPS	UPS	110"	COE 1½ T. Spec
5400S	TRS	URS	134"	COE 1½ T. Spec
5700S	TSS	USS	158"	COE 1½ T. Spec
6100	TV	UV	137"	2-Ton
6400	TW	UW	161"	2-Ton
6702	TX	UX	199"	School Bus
6100S	TVS	UVS	137"	1½-Ton Spec
6400S	TWS	UWS	161"	1½-Ton Spec

SERIAL NUMBER: Stamped on plate on cab left front hinge pillar (Flat Face Cowl models have plate on left hand cowl inner panel).

First Serial Number—1001 for each year with series prefix as indicated in model identification table above. *NOTE*—Number preceding serial prefix is plant designation (see data below), letter following serial prefix indicates month of manufacture (A—January, etc.).

Assembly Plant Designation—1 Flint, 2 Tarrytown, 3 St. Louis, 5 Kansas City, 6 Oakland, 8 Atlanta, 9 Norwood, 14 Balitimore, 20 Los Angeles, 21 Janesville.

ENGINE NUMBER: Stamped on right side of crankcase to rear of distributor.

First Engine Number—1001 for each year with model and plant prefix as follows:

Truck Series	216" ENGINE Flint 1950	Flint 1951	Tonawanda 1950	Tonawanda 1951
3100 Std.	HBA	JBA	HBM	JBM
3100 Spec.①	BHCA	BJCA	BHCM	BJCM
3600, 3800 Std.①	AHCA	AJCA	AHCM	AJCM
4000 Std.①	HCA	JCA	HCM	JCM
3800, 4000 Spec.②	HCD	JCD	HCQ	JCQ
	235" ENGINE			
4000 Spec.	AHEA	AJEA	AHEM	AJEM
3742, 3942 Std.③	HCF	JCF	HCS	JCS
5000 C-O-E③	HDA	JDA	HDM	JDM
6000 Std.	HEA	JEA	HEM	JEM

①—With Heavy Duty 10¾" Clutch Disc.
②—With "Hydrovac" Brake Power Unit.
③—With Updraft Carburetor.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. minimum (with cylinders equal within 5-10 lbs.) at cranking speed.

VACUUM READING: Steady 17-21" at idling speed.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035".
Plugs—AC No. 46-5. 14 mm.

►*CAUTION—Tighten plugs to 20-25 ft. lbs. torque or finger tight plus one-half turn.*

DISTRIBUTOR: Breaker Gap—*.018" (limits .018-.022")* standard setting, or .022-.024" for new points (to allow for seating).
Cam Angle—34°. *Test limits with .022" gap 31-37°.*
See Delco-Remy Cam Angle in Elec. Equip. Section.
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

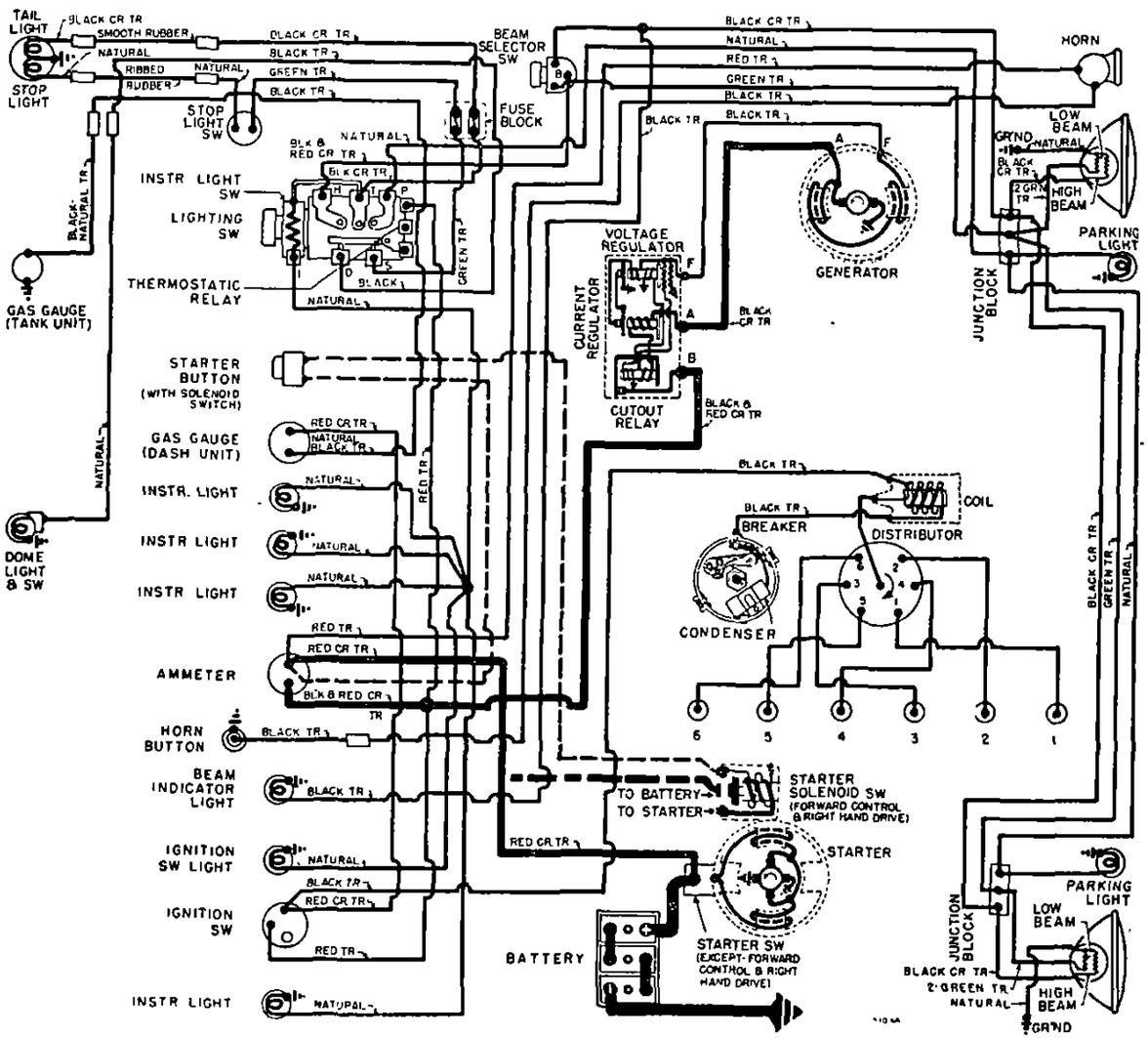
IGNITION TIMING: 5° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set at "O". Then adjust Octane Selector as follows:
Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

CARBURETION: Rochester—Downdraft type. (Conventional Trucks).

►*IMPORTANT CARBURETOR CORRECTIONS: See Carburetor Section for complete data.*
Idle Setting—1½ turns open (turn out for richer mixture).
Idle Speed—450-500 RPM. with warm engine.
Float Level (Rochester)—1 5/16" from bottom of each float to cover gasket **(do not remove gasket)** with cover inverted so that needle valve closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.

►*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*

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Accelerating Pump—No seasonal adjustment.
Fuel Pump Pressure: 4 lbs. maximum.
CARBURETION: Carter—Updraft type. (Cab-Over-Engine & Forward Control Trucks).
Idle Setting—½-1½ turns open. Turn out for richer mixture.
Idle Speed—450-500 RPM. with engine warm.
Float Level—Top of float 0-1/32" below edge of bowl with needle valve seated.
Accelerating Pump—Inner hole Summer, Outer hole Winter.
Fuel Pump Pressure: 4 lbs. maximum.
MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Spring should be wound up just enough to slip end over manifold pin (approximately ½ turn).
▷*CAUTION*—Excessive spring tension may cause valve to stick (causes detonation and poor performance).
▷**VALVE TAPPET CLEARANCE:** ***CAUTION—Engine must be "normalized" by running at fast idle of approximately 600 RPM. for 30 minutes or until oil temperature stabilized before adjusting.***
Normal Operation—.006-.008" Intake. .013-.015" Exhaust, with engine "normalized."
Heavy Duty (Full Throttle) Operation—.010" Intake. .020" Exhaust, with engine "normalized."

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116464.
Key Series—No. 8000 to 9499. **Groove**—No. 15.
COIL: Delco-Remy No. 1115380. Mounted directly above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.
CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.
DISTRIBUTOR: Delco-Remy. Automatic and vacuum advance with Octane Selector.

Delco-Remy No.	1950	1951
"216" Engine	1112353	1112362
"235" Engine	1112358	1112363

Breaker Gap—.018" standard setting, or .022-.024" for new points (to allow for seating).
Cam Angle—34°. Test limits with .022" gap 31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—1112353 & 1112362

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	3	700
6.5	600	13	1200
12.0	1200	24	2400
19.0	1700	38	3400

Automatic Advance—1112358 & 1112363

Start	300	2	600
6	700	12	1400
16.5	1850	33	3700

Octane Selector—Adjustment on distributor provides 10° advance or retard from center "0" Position.
Vacuum Spark Control: Delco-Remy No. 1116043.
Plunger Travel—17/64".

Vacuum Advance		
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	16.5-18.5"

IGNITION TIMING

	Flywheel Degrees	Piston Position
Std. Setting①	5° BTDC	.0091" BTDC.

①—Adjust Octane Selector for grade of fuel being used. See Octane Selector Setting below.

Timing (Neon Light)—Recommended method. Connect neon light to #1 spark plug, direct light in flywheel through inspection hole in right front face of housing. Set Octane Selector pointer at "O". Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert in flywheel) lines up with pointer. Tighten clamp bolt and check Octane Selector Setting (see below).

CARBURETOR

ROCHESTER DOWNDRAFT

Rochester G.M. Model B (as listed below). Single barrel downdraft type with manual choke control.
▷***CAUTION—DIFFERENT carburetor used on each engine.***

	216" Eng.	235" Eng.
1950	7002050	7002051
1951 (First)	7003152	7002051
1951 (Later)	7003863	7003864

▷***ROCHESTER CARBURETOR TROUBLE SHOOTING & RECOMMENDED CORRECTIONS: See "Rochester Model B (Chevrolet)" Carburetor in Carburetor Section. See Carburetor Section for complete data.***
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Throttle Kicker: Operates by cam on choke lever—opens throttle when choke closed—no adjustment.

CARTER UPDRAFT

Carter (BB) Model 745S (First), 871S (Later). 1¼" Single Barrel, Updraft type with manual choke control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jets—*See Carter (BB) Updraft Jet Table in Carburetor Section for data.*

CARB. EQUIPMENT

Air Cleaner: AC types as follows:
864133—Forward Control Models.
1529264 oil-wetted—Std. All (exc. 2 Ton & C-O-E).
1529192 oil-bath—Optl. All (exc. 2 Ton & C-O-E).
1542078 oil-bath—Std. on 2 Ton Conventional Truck.
1543889 oil-bath—Std. on Cab-Over-Engine.
Filter Element—AC #2 (1529264), #9 (1529192), #7-S (for 1542078), None (for 1543889).
Fuel Pump: AC Type AF, No. 1523089. Diaphragm type.
Optl. AC No. 1539126 or 1539448 combination fuel-and-vacuum pumps.
Replacement Pump—AC No. 429 (for 1523089), 9126 (for Optl. 1539126 or 1539448 combination pumps).
Pressure—4 lbs. maximum.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: AC Electric type. AC Nos.:
Dash Unit—No. 1517169 (all models).
Tank Unit—AC types as follows:

Model	AC Tank Unit No.
Forward Control	1515466
School Bus Chassis	1516334
1 Ton (with Cab)	1515566
All Others (with Cab)	①1517500
½ Ton Chassis	1515466
¾ Ton Chassis	1516999
1 Ton Chassis	②1516983
1½ & 2 Ton Chassis (exc. Sch. Bus)	③1515467

①—1950 No. 1517140.
②—Inside Tank. ③—Outside Tank.
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA-4. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.6 minutes.
Five Second Voltage—4.2 volts.
Grounded Terminal—Negative (—) terminal.
Dimensions—Length 9". Width 7". Height 8 11/16".
Location—Under front floor on right side (Forward Control Trucks on frame on right side of engine).
School Bus—Delco Type 19Q-4. 6 Volt, 19 Plate, 125 Ampere Hour Capacity (20 hour rate).
Starting Capacity—145 amperes for 20 minutes.
Zero Capacity—300 amperes for 5.0 minutes.
Five Second Voltage—4.5 volts.
Grounded Terminal—Negative (—) terminal.
Dimensions—Length 10⅜". W. 7". Height 8 11/16".
Location—Under hood.

STARTER

Delco-Remy 1107055 (1107075 on Forward Control Trucks). Armature No. 1867897.
Drive—Overrunning clutch with manual pinion shift (1107055), solenoid pinion shift (1107075).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.7	65①
12 "	Lock	3.4	525

①—80 amperes on 1107075 (includes current draw of solenoid starter switch).
Starting Switch (1107055): Delco-Remy No. 820052. On starter. Operated by pedal.
(1107075 Starter). Delco-Remy Solenoid Switch No. 1118135 (no relay used) mounted on starter and controlled by pushbutton switch No. 1996045.
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy:	Generator No.	Armature No.
Std. Equip. (1950)	1102710	1879002
Std. Equip. (1951)	1102749	1879002
	1102761	1879002
Door-to-Door	1102726	1879002
Spec. Equip. (55 amp.)	1106757	1910073
Spec. Equip. (50 amp.)	1106758	1909996

2 Brush types with voltage and current regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate (Reg. Gen.)—36 amperes, 7.4 volts, 2400 RPM.

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102710, 49, 61	30	8.0	1750
1102726	26	8.0	1450
1106757	50	7.5	1410
1106758	40	7.5	1165

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. each.
Field Current—1.75-1.9 amps., (1.70-1.95 amps. on 1106757 & 1106758) at 6.0 volts.

Belt Adjustment: Loosen clamp bolt, swing generator out for ¾" belt deflection (light pressure) midway between generator and fan pulleys.

REGULATOR

Delco-Remy Regulator No.	Used With Generator No.
1118301	1102710, 1102749, 1102761
1118361	1102726
1118334	1116757
1118343	1116758

►***"118300 SERIES"*** regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Electrical Equipment Section.***

Current Regulator

Settings (hot)	Set to	Range
1118301	36	32-40
1118361	25	23-27
1118334	50	48-52
1118343	40	37-41

Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Electrical Equipment Section.***

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 4½" below lamp center height).
Beam Indicator—Red dot on lower edge of speedometer. Lighted when upper beams in use.

Switches

Lighting—Delco-Remy No. (1950) 1995031, (1951) 1995048.
Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Stop Light—D-R No. 1997901 (mechanical type).
NOTE—Hydraulic switch used on some models.

MISC. ELECTRICAL

FUSES: Lighting—Fuse box mounted on engine side of dash (under instrument panel on Forward Control Models) contains two fuses and spare fuse mounted on inside of cover. Fuses protect circuits as follows:
Tail Light—20 ampere. In fuse box.
Stop Light—20 ampere. In fuse box.
NOTE—These fuses used together with circuit breaker.

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy No. 1999801. Vibrator type.
Horn Current—7-9 amperes at 6.0 volts.
Air Gap—.027-.033".

ENGINE

►**ENGINE SPECIFICATIONS:** ***TWO DIFFERENT ENGINES:***

216" Thrift-Master—Std. on ½, ¾, 1, 1½ Ton, and 137" & 161" WB. School Bus.
235" Load-Master—Std. on 2 Ton, C-O-E Trucks, and 199" School Bus. Optl. on 1½ Ton and 161" WB. School Bus.

Engine	Bore	Stroke	Displacement
216"	3½" ①	3¾"	216.5 Cu. In.
235"	3 9/16" ②	3 15/16"	235.5 Cu. In.

①—3.4995-3.5015". ②—3.520-3.5640".

Engine	Comp. Ratio	Rated HP.	Developed HP.
216"	6.6-1	29.4	92 at 3400 RPM
235"	6.7-1	30.4	105 at 3600 RPM
235" (1950 COE)	6.7-1	30.4	102 at 3600 RPM
235" (1951 COE)	6.7-1	30.4	100 at 3500 RPM

Compression & Vacuum Reading—***See Tune-Up.***

►**Non-Interchangeable Parts:** Parts interchangeable between the 216" and 235" engines except as follows: Cylinder Block and Crankcase, Cylinder Block Assembly (Short Motor), Push Rods (approx. ¾" longer on 235" Engine and identified by shoulder just below cup at top end), Valve Lifters, Camshaft, Piston and Pin Assembly, Piston Rings, Crankshaft, Oil Pan Pipe Assembly, Oil Distributor to Valve Rocker Shaft Pipe Assembly, Oil Pump Screen Cover Support Assembly.

►**VALVE ROTATORS AVAILABLE FOR TRUCK ENGINES:** To promote longer valve life. ***See "Valve System" in Chevrolet Special Data.***

ENGINE REMOVAL: ***See Chevrolet Special Data.***

ENGINE MOUNTINGS (Installation & Adjustment): ***See Chevrolet Special Data.***

CYLINDER HEAD & TIGHTENING TORQUES: ***See Chevrolet Special Data.***

OTHER ENGINE DATA: ***See 1950-51 Passenger car pages for all engine data (Pistons, Connecting Rods, Crankshaft, Bearings, Valves, etc).***

VALVE TIMING

►**VALVE TAPPET CLEARANCE:** ***CAUTION—Engine temperature must be "normalized" before adjusting. See "Tappet Clearance Adjustment" in Chevrolet Special Data.***
Normal Operation—.006-.008" Intake, .013-.015" Exhaust, with engine "normalized."
Heavy Duty (Full Throttle) Operation—.010" Intake, .020" Exhaust, with engine "normalized."
►***CAUTION—If Valve Rotators are used set Exhaust Valve Clearance at .018-.020".***

VALVE TIMING: Camshaft Setting. Timing gears punchmarked. Punchmarked tooth of camshaft gear must be meshed with punchmarked space on crankshaft gear.

Valve Timing

Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.
Valve Timing Check—Remove all tappet clearance from #1 exhaust valve, turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right front face of flywheel housing, mount dial indicator on rocker shaft support with stem contacting #1 exhaust valve adjusting screw, set indicator dial at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004".

LUBRICATION

Engine Oiling System: Pressure and positive splash system. Pressure to main bearings, camshaft bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from troughs (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by Oil Distributor Valve on left side of engine.
CAUTION—Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs and nozzles which must be **checked each time the oil pan is removed** (requires special gauges).
Checking Oiling System—***See "Oiling System" in Chevrolet Special Data.***

Crankcase Capacity—5½ qts. (dry), 5 qts. (refill).
Normal Oil Pressure—14 lbs. at 2000 RPM.
Oil Pressure Regulator—Located in oil pump cover. Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: ***See "Oiling System" in Chevrolet Special Data.***

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.
Oil Pump Overhaul: ***See Chevrolet Special Data.***
Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: ***See "Oiling System" in Chevrolet Special Data.***

Checking Oiling System: Check entire system (Dipper Height, Oil Pan Trough Height, Oil Nozzle Height & Aim) each time oil pan removed.
See "Oiling System" in Chevrolet Special Data.
CAUTION—Special checking gauges required for each type (216" & 235") engine.

Crankcase Ventilation (All Trucks except Forward Control Models): Regular velocity type with air intake through valve rocker cover (air cleaner on some models) and outlet pipe on right side of engine.
Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

►**Positive Crankcase Ventilation (Forward Control Truck Models only):** Vacuum operated ventilator consisting of vacuum pipe from oil filler pipe to a ventilator valve in fitting on intake manifold. Valve is spring-loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling speed to maintain proper air fuel mixture.**
Servicing. Every 5000 miles (or oftener if required), clean vacuum pipe, valve, and filler pipe thoroughly. Oil filler cap gasket must seal tightly. Test vacuum valve as follows:
Vacuum Valve. With valve disassembled, check spring tension—must be 7.5 ozs. with spring compressed to .418-.432". If defective replace with new valve assembly, Part No. 1543979.
►*CAUTION*—When assembling valve, make certain end coil of spring engages groove under head of valve.

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COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure type (relief valve) radiator cap used on Cab-Over-Engine Trucks.
Pressure Valve (C-O-E Trucks)—AC No. 850501 Radiator Filler Cap). Open at 4 lbs.
Capacity—15 qts. (with 216" Engine), 17½ qts. (with 235" engine). NOTE—Heavy Duty 17½ qt. radiator Optl. on ¾, 1, 1½ Ton and 137" & 161" WB. School Bus.
Radiator Core Removal: *See Chevrolet Special Data.*
Water Pump: Double-outlet, packless type with sealed ball-bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat. Harrison. In cylinder head water outlet.
Setting—No. 3113995 stamped "143." Starts to open 140-147°F. Fully open 170°F.
Temperature Gauge: AC No. 1512148 (1512150 for C-O-E Trucks). Not electric.

CLUTCH

Own Make. Diaphragm spring, single plate, dry disc type. NOTE—Half-Ton Trucks use 9" clutch, all other models 10¾" type.
See Clutch Section for complete data.
Facings—Moulded Asbestos, 2 required as follows:

	I. D.	O. D.	Thickness
9" type	6⅛"	9⅛"	.132-.138"
10¾" type	7"	10¾"	.137-.143"

Adjustment: Pedal-free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.
Removal: Remove transmission (see Transmission Removal below). Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

3-SPEED

Own Make. Three-speed, all helical gear type, Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
▷ *HIGH GEAR DISENGAGEMENT: Can be corrected by installing 1953 type parts. See "Chevrolet 3-Speed Tranmission" in Transmission Section.*
Transmission Control: Mechanical type with shift lever mounted on steering column.
See Transmission Section for complete data.
Removal (Half-Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Remove battery. Remove four capscrews holding universal joint collar on rear bearing retainer, remove bolts holding transmission support on frame cross-member. Support propeller shaft with jack, slide universal joint ball and collar back on shaft, split front universal by removing capscrews retaining front trunnion bearings on front yoke. Raise propeller shaft as far as possible with jack to provide clearance. Remove two top transmission mounting screws, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove two lower transmission mounting screws, slide transmission straight back on guide pins until main drive gear shaft is free from clutch driven member, lift transmission up and remove through floor opening.
Removal (¾ Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Split intermediate universal by removing trunnion bearing "U" bolts, lower rear propeller shaft to floor. Remove four capscrews holding universal joint collar on rear bearing retainer, slide ball collar and retainer back on housing. Remove two bolts and nuts mounting intermediate universal support bracket on frame cross-member, pull front propeller shaft assembly to rear and free of front universal joint. Remove transmission in same manner as on Half-Ton (above).

4-SPEED

Own Make. Four-speed, constant-mesh, synchro-mesh, helical gear (2nd, 3rd, and 4th), sliding spur gear (Low & Reverse). Floor mounted gearshift.
See Transmission Section for complete data.
▷**Locking in 3rd & 4th Gear Correction**—New design 3rd & 4th speed clutch hub and clutch keys used.
See Chevrolet 4-speed Helical Gear Transmission in Transmission Section.
▷**Gear Disengagement & High Gear Noise Correction:** *See "Chevrolet 4-Speed Helical Gear Transmission" in Transmission Section.*
Transmission Control (Cab-Over-Engine): *See Chevrolet Special Data for Removal & Installation data.*
NOTE—Floor-mtd. gear shift used on Other Trucks.
Removal (½ & ¾ Ton): See 3-speed Transmission data above. NOTE—On Forward Control Models shift lever and rear floor pan must be removed.
Removal (Other Trucks): Free steering gear grommet from floor, remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Split front universal joint by removing trunnion bearing "U" bolts (tape or wire trunnions together to prevent losing bearings), slide shaft down to one side to clear transmission. Remove two top transmission mounting capscrews, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove 2 lower transmission mounting capscrews, slide transmission straight back on guide pins until main drive gear shaft is free from clutch driven-member, remove transmission.

UNIVERSALS

Half-Ton: Own Make. No. 591642 (3-Spd. Trans.), 605118 (4-Spd. Trans.). Same type as Pass. Car. One used (in torque ball back of transmission).

▷*TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Pass. Car & Half-Ton" Rear Axle in Rear Axle Section.*
¾ Ton Truck: Front Universal—Own Make. Chevrolet No. 591646 (3-Spd. Trans.), 3689288 (4-Spd. Trans.). Same type as used on Half-Ton (above).
Intermediate & Rear Universal—Spicer Model No. 1351-5107X (Intermediate—slip joint), 1358-5104X (rear—permanent joint). Needle bearing type.
See Universals Section for complt data.
1, 1½, 2 Ton Trucks (Regular & C-O-E): Spicer Needle bearing type. Slip-joint used at intermediate position, permanent type at transmission and rear axle.

Spicer Model Nos.	Front	Intermediate	Rear
C-O-E 110" WB	1351-5107X	①	1358-5105X
Bus 199" WB	1358-5104X	②	1358-5104X
All Others	1358-5104X	1351-5107X	1358-5104X

①—No intermediate joint used (1 propeller shaft).
②—Two intermediate universals as follows: First—1358-5104X, second 1351-5107X (3 section shaft).
See Universal Section for complete data.

REAR AXLE

SEMI-FLOATING (HALF-TON)

Own Make. Semi-floating, hypoid gear type with Torque Tube drive.
NOTE—This axle same design as passenger car type.
See Rear Axle Section for complete data.
Ratio—4.11-1 Standard.
▷**Axle Identification**—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratio as follows:
Detroit—(1950) HE, (1951) JE.
Buffalo—(1950) HF, (1951) JF.
Backlash—.005-.007". Screw adjustment.
Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly from beneath car.
Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove "C" washer on inner end, pull shaft out.
Axle Shaft Endplay—Free fit to .014" maximum.
Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

FULL-FLOATING (EXC. HALF-TON)

Own Make. Full-floating, hypoid gear (straddle mounted pinion) with Hotchkiss Drive.
▷**1½ & 2 Ton Note**—Axle shaft splined to wheel hubs.
See Rear Axle Section for complete data.
Ratios: The following rear axle ratios are standard equipment as indicated.

		Detroit		Buffalo	
Series	Ratio	1950	1951	1950	1951
3600 Std.	4.57-1	HG	JG	HH	JH
3600 Optl.	5.14-1	HQ	JQ	HR	JR
3742 Std.	5.14-1	HQ	JQ	HR	JR
3800 Std.	5.14-1	TJ	UJ	TK	UK
3800 Optl.①	5.14-1	TQ	UQ	TR	UR
3942 Std.	5.14-1	TC	UC	TD	UD
3942 Optl.①	5.14-1	TA	UA	TB	UB
4000 Std.	6.17-1	TL	UL	TM	UM
4000 Optl.	5.43-1	TE	UE	TF	UF
5000, 6000	6.17-1	TG	UG	TH	UH

①—Dual wheel type.
▷**Axle Identification**—Axles can be identifed by prefix letters of axle serial number stamped on top of carrier housing between reinforcing ribs as listed in Ratio table above (different prefix for Detroit & Buffalo plants as indicated).

Backlash—.005-.008". Screw adjustment.

Removal:—Remove differential cover and axle shafts (see below). Disconnect rear universal by removing two U-bolts from rear yoke (wire trunnions to retain bearings). *Slide shaft forward and lower to* floor. Remove differential carrier mounting bolts.

Axle Shaft Removal (¾ & 1 Ton): Remove 8 capscrews and lockwashers in axle shaft flange, install two ½" x 13 screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft, withdraw shaft from housing, remove and discard gasket. NOTE—Use new gasket when re-installing shaft.

CAUTION—Thoroughly clean all lubricant from axle shaft flange and end of wheel hub before installing axle shaft. Grease at this point **will cause loosening of axle shaft flange capscrews.**

Axle Shaft Removal (1½ & 2 Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. NOTE—When re-installing shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align splines on shaft with both wheel hub and differential side gear splines), use new hub gasket.

Axle Shaft Note—Shafts unequal length (right shaft longer) and may be identified by part number stamped on shaft or lengths as follows:

¾ & 1 Ton Truck

	Part No.	Length
Left Shaft	3680977	31 3/16"
Right Shaft	3680978	37 1/16"

1½ Ton Truck (Splined Shaft)

Left Shaft	3685191	34 3/32"
Right Shaft	3685192	40 15/32"

2 Ton & C-O-E (Splined Shaft)

Left Shaft (Stmpd. 05)	3702205①	36½"
Right Shaft (Stmpd. 06)	3702206②	40¾"

①Supersedes No. 3685193. ②Supersedes No. 3695194.

Wheel Bearing Adjustment: Remove wheels and axle shaft (see above). Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight, using special wrench J-2222 (¾ & 1 Ton), J-870 (1½ & 2 Ton) while turning hub by hand, then back nut off 45°, check for free turning, install adjusting nut lock (with lock tangs aligned with slots in adjusting nut), bend tang down into notch in adjusting nut, install locknut and tighten securely, bend tang of lock down into notch of locknut.

REAR AXLE
TWO-SPEED

Own Make (2 Ton Optl.). Full-floating, Two-speed Double reduction type with Hypoid Gears (First reduction), Helical Gears (Second reduction) and vacuum shift control.

See Rear Axle Section for complete data.

Ratio—6.13-1 (High), 8.10-1 (Low).

►**Axle Identification**—Serial No. prefix (stamped on flat top of carrier on right side) for each year and plant is as follows:

Detroit—(1950) TN, (1951) UN.
Buffalo—(1950) TP, (1951) UP.

Two-Speed Shift Control: Vacuum power type with selector valve on instrument panel.

Removal: Carrier Assembly can be removed (without disturbing axle housing) as follows: Remove axle *shaft flange mounting bolts, pull both axle shafts* out of housing approximately 8" (to clear differential). Drain axle lubricant and remove inspection plate. Loosen hose clamps and slip hoses off vacuum cylinder hose connections. Disconnect rear universal joint by removing trunnion bearing "U" bolts from rear flange, slide propeller shaft assembly forward, tape universal bearing trunnions in place to prevent loss of needle bearing, swing propeller shaft out of the way (tie up to frame side rail). Remove capscrews mounting carrier on axle housing (support carrier by means of long punch inserted through one upper mounting screw hole in housing before removing last mounting screw). Place support jack under carrier assembly, roll assembly straight forward until differential clears housing, remove carrier assembly from beneath tuck.

Axle Shaft Removal & Wheel Bearing Adjustment: Same as for regular rear axle (see above).

SHOCK ABSORBERS

Delco Hydraulic type. Single or double acting piston types or Direct acting type.

Direct Acting Types

Front—1052-M (½, ¾, 1 Ton).
Rear—1066-Z (½ Ton), 1066-T (¾ Ton).

Single Acting Types

Rear—1431-Y, Z (¾ Ton 1950).

Double Acting Types

Front—1730-B (exc. C-O-E), 1730-C, D (C-O-E.)
Rear—1722-F, E (1 Ton Dubl. Duty), 2000-W, V (1½ Ton, School Bus, & C-O-E).

FRONT SUSPENSION

Front Suspension: Conventional "I" beam section front axle with Reverse Elliott ends and semi-elliptic springs.

Kingpin Inclination—7° 10' ± 1° crosswise (All).

Camber—1° ± ½° (All). Bend axle for corrections (when kingpin inclination is likewise off).

Caster—See table below. All specifications ± ½°. Use wedge shims for minor corrections (up to 2°), bending tools for greater corrections.

	Caster	Toe-In
½ Ton	1¾°	1/16-3/16"
¾ Ton (exc. Fwd. Contr)	2½°	1/16-3/16"
¾ Ton Fwd. Contr.	3¼°	1/16-¼"
1 Ton Fwd. Contr.	2¼°	1/16-¼"
1, 1½, 2 Ton (exc. (C-O-E)	2¾°	1/16-¼"
C-O-E Trucks	3°	1/16-¼"

Toe-In—See table above. Adjust by turning tie rod.

CAUTION—Tie rod ends must be aligned with studs.

Steering Geometry—Outer wheel turned 20°, inner wheel 23° ± 2° (All Models).

STEERING GEAR

Saginaw Model. Ball bearing (re-circulating ball) Worm-and-Nut. Chevrolet Part Nos. as follows:

270927 (½ Ton & ¾ Ton with 3-Spd. Transmission), 270221 (¾, 1, 1½ Ton with 4-Spd. Transmission), 270224 (2 Ton & School Bus), 270635 (C-O-E).

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Three different hydraulic types used as follows:

Chevrolet Hydraulic—(1950) All Models, (1951) ¾ & 1 Ton (Front & Rear), 1½ & 2 Ton (Front only).
Chevrolet Bendix—(1951) ½ Ton.
Chevrolet Twinplex—(1951) 1½&2 Ton (Rear only).
See Brake Section for complete data.

Wheel Cylinders—Size stamped on housing under adjusting cup lock spring.

Drums—Cast iron rim with steel web.

	Diameter Front	Rear
½ Ton	11"	11"
¾ Ton	11"	12"
1 Ton	12"	14"
1½ & 2 Ton (1950)	14"	16"
1½ & 2 Ton (1951)	14"	15"

Lining—Molded type. (Riveted on 1½ & 2 Ton), Bonded on others.

Thickness—.187-.194" (11" Drum except 1951 ½ Ton), .202-.222" (11" Drum 1951 ½ Ton), .265-.272" (12", 14" & 16" Drum), .392-.412" (15" Drum, 1951 Twinplex).

Clearance—Adjust for clearance as follows:

½ Ton 1950 (Front & Rear), ¾ Ton 1950-51 (Front & Rear), 1, 1½ & 2 Ton (Front Only)—Turning adjusting wheel until shoe drags slightly, then turn wheel back 5 notches.

1 Ton 1950-51 (Rear Only), 1½ & 2 Ton 1950 (Rear Only)—Turn adjusting pinion stud in clockwise direction (facing flange plate from center of truck) until shoe drags slightly, then back off stud 2/3 of a turn or 4 sides of the hex stud.

½ Ton 1951 (Front & Rear)—Remove adjusting hole cover and turn brake adjusting screw until light drag is felt (Tap backing plate until drag remains constant), then back off adjusting screws 7 notches. If wheel not free of drag, Major Adjustment needed.

1½ & 2 Ton 1951 (Rear Only)—Remove adjusting covers from flange plate and turn rear adjusting screw until slight drag is felt, then back off 3 notches. Repeat on front adjusting screw. (2 adjustments on each wheel).

Parking Brake (Except 1951 1½ & 2 Ton): Hand lever or Foot pedal operated. Applies rear wheel service brakes. ***See Service Brakes above.***

Parking Brake (1951 1½ & 2 Ton): Hand brake consists of brake drum attached to output shaft of transmission ahead of universal joint, and an internal and external shoe which grips the drum between them, contacting about ¼ of drum circumference.

Adjustment—Set hand lever in fully released position. Loosen locknut and tighten adjusting bolt on bracket under outer brake shoe for clearance of .010-.015" between outer shoe facing and drum at point directly above adjusting bolt. Loosen locknut on operating link (directly above shoe operating lever) and tighten nut on lower end of link for clearance of .010-.015" between inner shoe lining and drum. Tighten locknuts securely and recheck clearances.

Hydrovac Brake System: Std. on 2 Ton, Cab-Over-Engine, and 1½ Ton Special Models. Consists of special power unit (vacuum power used to augment regular hydraulic brake actuation) in hydraulic line between master cylinder and wheel cylinders.

See Brake Section for complete data.

MODEL IDENTIFICATION

Series	Serial Prefix	Model Designation
1500	KJ	Special Styleline
2100①	KK	Deluxe Fleetline & Styleline
1508	KJ	Sedan Delivery

①—*Powerglide & "235" Engine optional on deluxe models.*

SERIAL NUMBER: Stamped on plate on left front body hinge pillar post. **First Number 1001** with model prefix as indicated in model identification above.

NOTE—Number preceding serial prefix designates assembly plant (as listed below), letter following serial prefix indicates month of manufacture (A—January, etc.).

Assembly Plant Designation

1—Flint, 2—Tarrytown, 3—St. Louis, 5—Kansas City, 6—Oakland, 8—Atlanta, 9—Norwood, 14—Baltimore, 20—Los Angeles, 21—Janesville.

prefix designating engine type and plant as listed in table below.

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor. **First Number 1001** with

Engine	Flint	Tonawanada
216" Std.	KAA	KAM
216" Spec.①	KAC	KAP
235" Powerglide	KAD	KAQ

①—With Heavy Duty 10¾" Clutch Disc.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. minimum (with cylinders equal within 5-10 lbs.) at cranking speed.

VACUUM READING: Steady 17-21" at idling speed.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .035".

Plugs—AC No. 46-5. 14 mm.

►***CAUTION—Tighten plugs to 20-25 ft.lbs. torque or finger tight plus one-half turn.***

DISTRIBUTOR: Delco-Remy No. (216" Eng.) 1112362, (235" Eng.) 1112363. Automatic and vacuum advance with Octane Selector adjustment.

Breaker Gap—.018" (.015-.022") Std. setting or .022" (.018-.024") for new points to allow for seating.

Cam Angle—34°. Test limits with .022" gap 31-37°. ***See "Delco-Remy Cam Angle" in Electrical Equipment Section.***

Automatic & Vacuum Advance—***See Ignition.***

Breaker Arm Spring Tension—17-21 ozs.

Rotation—Clockwise viewed from above.

Octane Selector: Adjustment on distributor provides 10° advance or retard from center '0' position.

COIL: Delco-Remy No. 1115380. Above distributor.

Ignition Current—2.5 amperes idling. 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.

Capacity—.18-.23 microfarad.

IGNITION TIMING: 5° BTDC.

Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set at '0'. Then adjust Octane Selector as follows:

Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

Timing Procedure—***See Ignition Timing.***

CARBURETION (216" ENG.): Rochester No. 7004477. Downdraft type with manual choke control.

Idle Setting—1-2 turns open.

Idle Speed—450-500 RPM.

Float Level—1 5/16" from bottom of each float to cover gasket (**do not remove gasket**) with cover inverted so that needle valve closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.

►***CAUTION—Both floats must be set alike and must not be twisted out of alignment.***

Accelerating Pump—No seasonal adjustment.

Throttle Kicker: Operates by cam on choke lever. Opens throttle when choke closed, no adjustment.

Fuel Pump Pressure: 4 lbs. maximum.

CARBURETION (235" POWERGLIDE ENG.): Rochester No. 7003526. Downdraft type with automatic choke control and Throttle Return Check.

Idle Setting—1 to 2½ turns open.

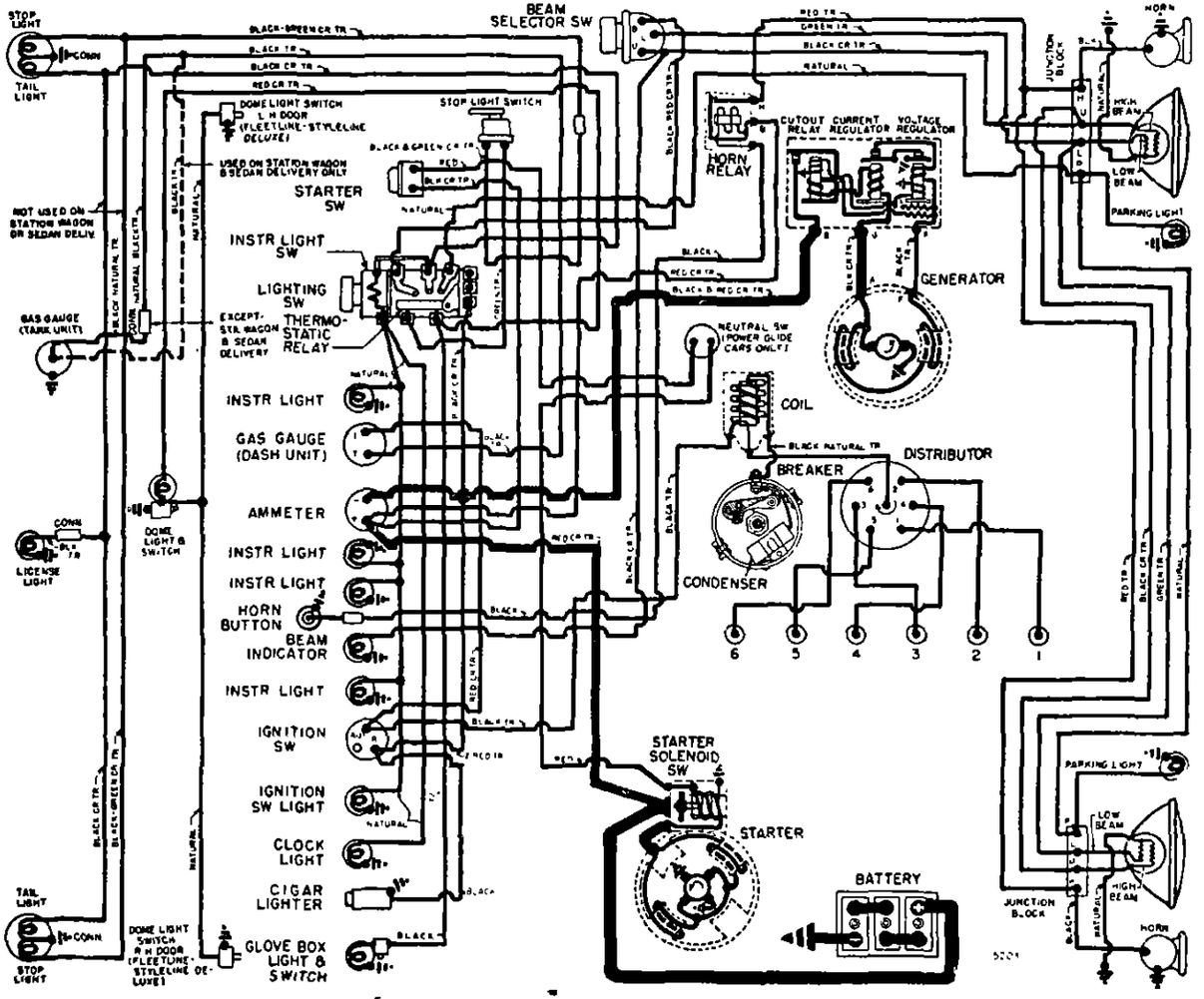
Idle Speed—425 RPM.

Float Level—Use Gauge M-250. Invert bowl cover and float assembly but **do not remove gasket.** Place gauge in position over floats with gauge tang engaged in discharge nozzle. Adjust each float vertically so they just touch top portion of gauge and bend float arms horizontally to center each float in gauge cut-out. Tilt assembly 90° to each side and see that floats do not touch gauge. Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.

►***CAUTION—Both floats must be set alike and must not be twisted out of alignment.***

Choke Adjustment: Index mark on cover aligned with long cast mark on top of choke housing casting.

Fast Idle: With idle adjusting screw on next to highest



step of fast idle cam, Gauge J-5150 (.073") should just slide between lower edge of choke valve and bore of carburetor. Adjust by bending choke rod.

Throttle Return Check Adjustment: Have engine at full operating temperature. Align throttle return check adjusting screw with contact arm on throttle lever by bending return check bracket. With parking brake set tight, place selector lever in "D" range and adjust throttle stop screw and idle adjusting screw in combination with each other to obtain a smooth idle at 425 RPM., this adjustment should be made with choke valve in wide open position with throttle stop screw resting on low step of fast idle cam. Shut off engine. Close choke valve and position throttle stop screw on highest step of cam. Using a 9/32" wrench, on the flat section of throttle return check shaft, hold shaft from turning, and with a 3/8" wrench, turn the adjusting screw until it just contacts the throttle lever contact arm.

►***NOTE—If screw projects more than ½" from shaft when head of screw just touches lever contact arm, reposition throttle check on manifold stud.***

►**MANIFOLD HEAT CONTROL:** Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. ***Distorted springs should be replaced.***

VALVE TAPPET CLEARANCE: ***CAUTION—Two type of valve lifters used.***

►**Conventional Type (216" Engine)**—.006-.008" Intake, .013-.015" Exhaust after engine "normalized" by running at fast idle for approximately 30 minutes or until oil temperature stabilized.

►**Hydraulic Type (235" Engine)**—No clearance adjustment required in service. ***If head removed or rocker arms or valve lifters replaced see Initial Setting (below).***

Initial Adjustment of Hydraulic Valves: Lifters must be at lowest point of travel when adjusted (piston in firing position). Remove distributor cap and turn engine until rotor is in firing position for cylinder being set. Starting with #1 cylinder, turn adjusting screw down until rocker arm just contacts the valve. This can be determined by checking push rod side play at adjusting screw end while turning the adjusting screw. At the point where no side play can be felt, continue turning the adjusting screw down 1½ turns and tighten locknut securely. Adjust each cylinder following the same sequence as the firing order (1-5-3-6-2-4).

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116469 Std., No. 1116452 (RHD. Cars).

COIL: Delco-Remy No. 1115380. Above distributor.
Ignition Current—2.5 amperes idling. 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112362 (216" Engine); Delco-Remy No. 1112363 (235" Engine). Automatic and vacuum advance type with Octane Selector.

►***CAUTION—These distributors have different advance.***

Breaker Gap—.018" (.015-.022") Std. setting for used points, or .022" (.018-.024") for new points to allow for seating.

Cam Angle—34°. Test limits with .022" gap 31-37°. ***See "Delco-Remy Cam Angle" in Electrical Equipment Section.***

Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—1112362

Degrees Distr.	RPM.	Degrees Eng.	RPM.
0-2	375	0-4	750
4.5-6.5	600	9-13	1200
10-12	1200	20-24	2400
17-19	1700	34-38	3400

Automatic Advance—1112363

Degrees Distr.	RPM.	Degrees Eng.	RPM.
0-2	375	0-4	750
4-6	700	8-12	1400
10-12	1350	20-24	2700
14.5-16.5	1850	29-33	3700

Octane Selector: Adjustment on distributor provides 10° advance or retard from center "0" position.
See Ignition Timing for adjustment instructions.

Vacuum Spark Control: Delco-Remy No. 1116061. On Octane Selector, linked to advance arm.
Plunger Travel—17/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7.0-8.5
9-11	18-22	18.5

IGNITION TIMING

Standard Setting① ..... **5° BTDC**

①—Adjust Octane Selector with grade of fuel being used. See Octane Setting below.

Timing (with Timing Light)—Connect Timing Light to No. 1 spark plug, direct light on flywheel through inspection hole in right front face of housing. Set Octane Selector pointer on "0." Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball inserted in flywheel) lines up with pointer. Tighten clamp bolt and check Octane Selector Setting (see below).

Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

CARBURETOR

ROCHESTER MODEL B, No. 7004477. Single barrel down-draft type, with concentric bowl and twin floats. Manual choke wiht throttle kicker and fast idle.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump Settings): ***See Tune-Up.***

Metering Jets: ***See "Rochester Jet Specifications" in Carburetor Section.***

Throttle Kicker—Operated by cam on choke lever. Opens throttle when choke closed, no adjustment.

ROCHESTER MODEL BC, No. 7003526. Down-draft type with automatic choke control and Throttle Return Check.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): ***See Tune-Up.***

Metering Jets: ***See "Rochester Jet Specifications" in Carburetor Section.***

Throttle Return Check—***See Tune-Up.***

CARB. EQUIPMENT

Air Cleaner: AC Oil Wetted Type (Std.); Oil Bath Type (Optional).
Filter Element—AC No. 6 (Std.), No. 23 (Optl.).

Fuel Pump: AC Diaphragm Type, Fuel pump Std., Combination fuel-and-Vacuum Optl.
Replacement Pump—AC No. 9798 (Fuel Pump), No. 9803 (Early 1952), No. 9797 (Late 1952) Fuel-and-vacuum pump.
Pressure—4 lbs. maximum.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC. Electric type.
Dash Unit—AC No. 1517255.
Tank Unit—AC No. 1516280 (Pass. Car), No. 1517100 (Sedan Del. and Station Wagon).
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA6—6 volt, 15 plate, 100 ampere hour capacity.
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative.
Location—In engine compartment on right side.

STARTER

Delco-Remy No. 1107109. Armature No. 1917855.
Drive—Overrunning Clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: Delco-Remy Solenoid (no relay type) mounted on starter and controlled by Push-button Switch No. 1996055.
Neutral Safety Switch (Powerglide Cars)—Delco-Remy No. 1997845. Connected in starter control circuit, prevents starter operating unless selector lever in "N" or "P" position.
►**Neutral Safety Switch Adjustment**—***See "Powerglide Transmission" in Transmission Section.***

GENERAT R

Delco-Remy. Two-brush with voltage and current regulation. Various models used as follows:

Model	Generator (D-R No.)	Armature
Pass. Cars (Early)	1102749	1921235
Pass. Cars (Late)	1100013	1921351
Taxi	1102786	1912599
State Police	1105001	1918009
City Police	1105002	1920909

►***CAUTION—1951 Armature No. 1879002 (4 turn type) MUST NOT BE USED on 1952 generator Model No. 1102749 with Regulator No. 1118720 (will be overloaded). See Regulator data.***
Maximum Charging Rate (Pass. Cars)—34-42 amperes reached at car speed of 25 MPH. Actual charging rate controlled by regulator and dependent on battery condition.

Performance Data—Cold

Generator	Amperes①	Volts	RPM
1102749③	30	8.0	2050
1100013④	35	8.0	2650
1102786	45	8.0	2350
1105001	50	7.0	2100
1105002	40	7.0	1700

①—Not maximum output. See Current Regulator.
③—Current & Voltage Regulators Nos. 1118720 or 1118301 MUST BE USED WITH THIS GENERATOR.

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Brush Spring Tension—28 ozs.
Rotation—Counterclockwise at commutator end.
Field Current—1.75-1.95 amperes (1102749 Gen.), 1.85-2.03 amperes (1100013 Gen.), 1.87-2.0 amperes (1102786 Gen.), 1.77-1.93 amperes (1105001 & 1105002 Gen.), all at 6.0 volts.
Belt Adjustment: Loosen clamp bolt, swing generator out for ¾" belt deflection (light pressure) midway between generator and fan pulleys.

REGULATOR

Delco-Remy. Voltage and current type.

Model	Regulator (D-R No.)	For Generator No.
Pass. Cars (Early)	1118720	1102749
Pass. Cars (Late)	1118720	1100013
Taxi	1118725	1102786
State Police	1118722	1105001
City Police	1118721	1105002

▷*CAUTION—Regulator No. 1118720 used only with 1952 Generators Nos. 1102749 & 1100013 and Armatures Nos. 1921235 & 1921351 (3½ turn type). Use Regulator No. 1118301 for replacement (can be used on both 4 turn and 3½ turn armatures).*
See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct high charging rate or high voltage.

Cutout Relay (All)

Cuts In—5.9-6.7 volts hot (set to 6.4 hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Regulator No.	Setting (Hot)①	Set To (Hot)
1118720, 1118725	7.0-7.7 volts	7.4 volts
1118721, 1118722	6.8-7.5 volts	7.2 volts

①—Regulator is over compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Regulator No.	Set To (Hot)	Range
1118720	38 amps.	34-42 amps.
1118725	47 amps.	45-51 amps.
1118722	50 amps.	48-52 amps.
1118721	42 amps.	40-46 amps.

Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red dot below '50' figure on speedometer. Lighted when upper beams in use.
Directional Signal: *See Electrical Equipment Section.*
Directional Signal Indicator—Pilot light on switch case. Lighted when right or left signal on.

Switches

Lighting—Delco-Remy No. 1995048.
Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Stop Light—Delco-Remy No. 1997913 Std., No. 1997901 (RHD. Cars). Mechanical type. Mounted under toeboard, operated by brake pedal.

MISC. ELECTRICAL

▷*DASH PANEL INSPECTION HOLE FOR ACCESS TO WIRING ON BACK SIDE OF INSTRUMENTS—Located on left side under hood with removable door screwed to dash.*

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assembly). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy No. 1999643 (Low Note, Right); No. 1999644 (High Note, Left). Vibrator types operated by relay.

Type	Current (at 6 volts)	Air Gap
1999643 (R.H.)	19-21 amps.	.044-.049"
1999644 (L.H.)	17-19 amps.	.034-.039"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: Own make, 6 Cylinder, Valve-in-head. *TWO DIFFERENT ENGINES USED:*

216" ENGINE—With Synchro-mesh transmission.

235" ENGINE—With Powerglide transmission.

Engine	Bore	Stroke	Displacement
216"	3½"	3¾"	216.5 cu. in.
235"	3 9/16"	3 15/16"	235.5 cu. in.

	Comp. Ratio	Rated HP	Developed HP
216"	6.6-1	29.4	92 at 3400 RPM
235"	6.7-1	30.4	105 at 3600 RPM

Compression & Vacuum Readings—*See Tune-Up.*
ENGINE REMOVAL: *See Chevrolet Special Data.*
ENGINE MOUNTINGS: *See Chevrolet Special Data.*
CYLINDER HEAD & TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS: Passenger Cars. Cast alloy iron, flat head, cam ground, tin plated type with slipper skirt.
Truck Piston—Same as Pass. cars except heavier. Truck pistons marked with small boss on under side of each pin boss. *CAUTION*—Do not interchange pistons (must be same type in one engine).
Weight—(216" Engine) 28 ozs.; (235" Engine) 32 ozs.
Removal—Pistons and rods removed from above.
Clearance—Top: .0155-.0235". Skirt: Selective fit. See Fitting New Pistons below.

Replacement Pistons: Furnished Std. size, .005", .010", .020", .030", .040" oversize.
NOTE—To install new pistons, hone cylinders for .005" oversize, rebore and hone for other sizes (rebore .002" less than piston oversize, finish by honing for piston clearance—see fit below). Cylinder bore taper and out-of-round must not exceed .001".

Fitting New Pistons: Use feeler gauge between piston and cylinder wall at right angle to pin bosses. Piston should pass through bore with light pressure on .0015" feeler, and lock on .003" feeler.
NOTE—New pistons fitted with bushings and pins. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.

PISTON RINGS: Three rings used per piston.

216" Engine

Ring	Width	End Gap①	Side Clearance
#1 Comp.②	⅛"	.005-.015"	.0015-.003"
#2 Comp.②	⅛"	.005-.015"	.0015-.003"
#3 Oil	3/16"	.005-.015"	.002-.0035"

235" Engine

Ring	Width	End Gap①	Side Clearance
#1 Comp.③	3/32"	.005-.015"	.0015-.003"
#2 Comp.②	⅛"	.007-.020"	.0015-.003"
#3 Oil	3/16"	.005-.015"	.002-.0035"

①—End gap worn limit 1/32" maximum.
②—Taper face type. ③—Deep section twist type.

▷*NOTE*—Install Comp. Rings with side marked "TOP" up.

Replacement Rings: Std. & .005", .010", .020", .030", .040" Oversize.

PISTON PIN: Diameter—.8645-.8650". **Length**—3.135-3.165". Pin locked in rod (piston bronze bushed).
Pin Fit in Piston—Thumb push fit (at room temp.).

Replacement Pins: Std., .003", .005", .010" oversize.
NOTE—New pistons fitted with pins and bushings. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.

CONNECTING ROD: Length—6 13/16". **Weight**—31.2 ozs.
Crankpin Journal Diameter—2.311-2.312".
Lower Bearing—Spun high-lead, thin-wall babbitt.
Clearance—.0003-.0013" selective fit (see Bearing Adjustment following).
Sideplay—.004-.012" at lower end (rod to crankpin), .015" min. at upper end (rod to piston pin boss).

Bearing Adjustment: Laminated shims. Remove shims equally at both sides to secure 'snap fit' (rod tight to hand but should snap from side to side with light tap of eight ounce hammer), then replace one .002" shim on one side for clearance (if unequal number, place extra shim on camshaft side). Bearing clearance correct when rod can be snapped back and forth on crankpin with one hand (grasp bearing cap between thumb and finger to test).

Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinder with numbers and pin clamp bolt toward camshaft side. Install oil dippers on rod with mouth toward camshaft side of engine. Check dipper height.
Dipper Height Adjustment—*See "Oiling System" in Chevrolet Special Data.*

CRANKSHAFT: Four bearing type with integral counterweights and vibration dampener.
Vibration Dampener—*See Chevrolet Special Data.*
Journal Diameters—(1) 2.6835-2.6845"; (2) 2.7145-2.7155"; (3) 2.7455-2.7465"; (4) 2.7765-2.7775".
NOTE—Journal taper or out-of-round limits .001". Run-out limits for Nos. 2 & 3 journals is .002".
Bearing Type—Steel-backed precision type thin-walled babbitt. *Boring or reaming not required.*

▷*CAUTION—Bearing Nos. 1 & 2 are similar in appearance but MUST NOT BE INTERCHANGED. No. 2 marked by letter "I" in oil grooves.*
Clearance—.0007-.0024" selective fit. See Bearing Adjustment below.

▷*NOTE—Precision bearings can be replaced singly.*

Bearing Adjustment: Solid shims. Remove shims until light drag secured when shaft turned by hand, then replace .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side of all bearings).

Replacement Bearings: Precision type bearings furnished for all engines Std. size and .002", .010", .020", .030" undersize.
Bearing Installation—Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

ENGINE

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Bearing Cap Installation—Bearings caps Nos. 2 & 3 marked for identification; (2) marked "Front"; (3) marked "Rear." Install in engine with "**Front**" to front of engine, and "**Rear**" to rear of engine. *NOTE—Rear intermediate bearing (3) is special flanged type, and takes crankshaft end thrust.*

Crankshaft Oil Seal Servicing: *See Chevrolet Special Data for Front and Rear Oil Seals.*

End Thrust: Taken by No. 3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of No. 3 bearing. Adjust by replacing bearing. **Endplay**—.003-.009".

FLYWHEEL REPLACEMENT: *See Chevrolet Special Data.*

CAMSHAFT: Four bearing type. Helical gear drive.

CAMSHAFT CAUTION: CAMSHAFTS IN 216" & 235" ENGINE ARE NOT INTERCHANGEABLE and can be identified by marks and forging numbers as follows:

216" Engine Camshaft—Forging No. 838733 (same as Part No.) located between #11 and #12 cams.

235" Powerglide Engine—Forging No. 3660474 (not same as Part No. 3835771) located between #10 and #11 cams. Shaft also has "X" stamped on front end and painted green. *CAUTION*—Forging number is same as 235" Truck engine camshaft.

235" Truck Engine—Forging No. 3660474 (same as Part No.) located between #11 and #12 cams. Shaft has NO other identification (see 235" Powerglide camshaft identification above).

Journal Diameters—(1) 2.0282-2.0292"; (2) 1.9657-1.9667"; (3) 1.9032-1.9042"; (4) 1.8407-1.8417".

NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).

Bearing Type—Steel-backed, babbitt-lined bushings (staked in place). *NOTE*—New bearings must be line-reamed.

Clearance—.002-.004".

Camshaft Bearing Replacement: *See Chevrolet Special Data.*

End Thrust—Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).

Endplay Adjustment—*See "Timing Gear Installation" in Chevrolet Special Data.*

Endplay—Free fit to .003" maximum.

Timing Gears: Steel crankshaft gear. Bakelite and fabric composition camshaft gear.

Maximum Gear Runout—.003" crankshaft gear. .004" camshaft gear.

Replacement Timing Gears & Installation—*See Chevrolet Special Data.*

Timing Gear Backlash: .003-.004".

Camshaft Setting: Gears punch marked. Punch marks on both gears must be lined up and directly opposite each other.

VALVES:

216" Engine

	Head Diam.	Stem Diam.	Length
Intake	1 41/64"	.3410-.3417"	6.26-6.29"
Exhaust	1 1/2"	.3400-.3407"	4.917-4.947"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.2941"	.001-.0027"
Exhaust	45°	.3118"	.002-.0037"

235" Engine

	Head Diam.	Stem Diam.	Length
Intake	1 15/16"	.3410-.3417"	6.364-6.394"
Exhaust	1 1/2"	.3400-.3407"	4.904-4.934"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3275"	.001-.0027"
Exhaust	45°	.3275"	.002-.0037"

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*

Valve Guides: Precision type. Pressed in head.

Valve Guide Installation: *See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install springs with closed coil end down. Check with spring tester and replace if not within limits shown below.

Free Length—2⅛" (216" Engine). 2 5/32" (235" Engine).

►*CAUTION—Aluminum colored valve springs used on 235" Engine must not be used on other models.*

Spring Specifications—216" Engine

	Pressure	Length
Valve Closed	53-63 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Spring Specifications—235" Engine

	Pressure	Length
Valve Closed	62-68 lbs.	1.821"
Valve Open	155-165 lbs.	1.505"

Valve Lifters (Conventional): 216" Engine—Plain barrel type with pushrod seat brazed on upper end.

Diameter—.989-.990".

Clearance—.001" (Selective free fit).

Valve Lifter (Hydraulic): 235" Engine—Used with Powerglide transmission.

See "Valve System" in Chevrolet Special Data.

Initial Adjustment—(Required only when installing cylinder head or when adjusting screw setting has been disturbed). *See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

►*REMOVING HYDRAULIC VALVE LIFTERS: When removing lifters and pushrods use a rack to keep them in proper sequence. Install in their original locations when reassembling.*

Rocker Arm Assembly & Installation: *See "Valve System" in Chevrolet Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE CAUTION—Two types of valve lifters used. Conventional type in 216" Engine with synchro-mesh transmission. Hydraulic type in 235" Engine with Powerglide transmission.

►**CONVENTIONAL TYPE SETTING (216" Engine):** .006-.008" Intake; .013-.015" Exhaust *(after running engine for approximately 30 minutes at fast idle), or until oil temperature stabilized (to "normalize" engine).*

►**HYDRAULIC TYPE SETTING (235" Engine): NO CLEARANCE ADJUSTMENT REQUIRED IN SERVICE.** *See "Valve Tappet Clearance Adjustment" in Chevrolet Special Data.*

Initial Adjustment—Required when cylinder head removed or when adjusting screws disturbed. *See "Valve Tappet Clearance Adjustment" in Chevrolet Special Data.*

VALVE TIMING: See Camshaft Setting Above.

216" Engine Valve Timing

Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.

①235" Engine Valve Timing

Intake Valves—Open 16° BTDC. Close 48° ALDC.
Exh. Valves—Open 46°30' BLDC. Close 17°30' ATDC.
①—Theoretical timing with Hydraulic Lifters.

Valve Timing Check (216" Engine): Remove all tappet clearance from No. 1 exhaust valve. Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right face of flywheel housing, mount dial indicator on rocker arm shaft with stem contacting No. 1 exhaust valve adjusting screw, set dial indicator at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO, plus or minus .004". Reset tappet to correct running clearance.

235" Engine—Use same procedure as for the "216" engine except that it is necessary to replace the hydraulic valve lifter operating #1 exhaust valve with a conventional type lifter while making the check.

LUBRICATION

Engine Oiling System: 216" Engine. Pressure and positive splash system. Pressure to main bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from trough (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by the Oil Distributor Valve on left side of engine.

235" Engine—Lubrication system similar to 216" engine except that the rocker arms are fed from an extension of the passage to the rear of the camshaft bearings. This same extension also feeds the oil channel supplying the hydraulic lifters.

►*CAUTION*—Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs, and nozzles which must be **checked each time the oil pan is removed** (requires special gauges). *See "Oiling System" in Chevrolet Special Data.*

Crankcase Capacity—5½ qts. (dry); 5 qts. (refill).

Normal Oil Pressure—14 lbs. at 2000 RPM.

Oil Pressure Regulator—Located in oil pump cover. Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special Data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.

Oil Pump Overhaul: *See Chevrolet Special Data.*

Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil Pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Special Data.*

Checking Oiling System: Check entire system (Dipper Height, Oil Pan Trough Height, Oil Nozzle Height & Aim) each time pan removed.

See "Oiling System" in Chevrolet Special Data.

Crankcase Ventilation: Air intake through valve rocker arm cover (air cleaner on some models), outlet through pipe on right side of engine.

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COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure system.
Capacity—15 qts.
Pressure Cap—AC No. 850501. Radiator Filler Cap. 4 lb. type.
Radiator Core Removal: *See Chevrolet Special Data.*
Water Pump: Double outlet, packless type with sealed ball-bearing shaft.
See Water Pump Section for complete data.
Thermostat: Harrison. In cylinder head outlet.
Standard—No. 3123992 stamped "143". Starts to open at 140-147°F. Fully open at 170°F.
Temperature Gauge: AC No. 1512241.

CLUTCH

Own Make—Diaphragm spring, single plate, dry disc type. NOTE—9" clutch used on all cars (except Powerglide).
See Clutch Section for complete data.
Facings—Moulded asbestos. 2 required as follows: 6⅛" I.D., 9⅛" O.D., .132-.138" thick.
Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.
Removal: Remove transmission (see Transmission Removal below). Remove throwout bearing. Remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch, align 'X' mark on cover with 'X' mark on flywheel.

SYNCHRO-MESH TRANSMISSION

Own Make. Three-speed, all helical gear type, Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.
▷*HIGH GEAR DISENGAGEMENT: Can be corrected by installing 1953 type parts. See "Chevrolet 3-Speed Synchro-mesh" in Transmission Section.*
Transmission Control & Linkage: *See Transmission Section for complete data.*
Removal: Remove floor mat and floor cover over transmission. Disconnect speedometer cable, and shifter rods from levers on transmission. Drain lubricant. Disconnect hand brake pull back spring, and hand brake cable clevis from idler lever, remove idler lever. Remove universal joint collar-to-support capscrews and slide ball back on propeller shaft housing. Place jack under propeller shaft, remove four capscrews securing front trunnion bearings to front yoke, split joint and lower front end of propeller shaft. Remove rear transmission support-to-frame cross member bolts, install support under rear of engine. Remove two upper transmission-to-clutch housing capscrews and insert guide pins. Remove clutch underpan and two lower transmission-to-clutch housing capscrews. Slide transmission back and lift out through opening in floor.

POWERGLIDE TRANSMISSION

Powerglide Transmission used only with 235" Engine. Consists of Torque Converter and hydraulically operated planetary gear unit with manual control.
▷*POWERGLIDE PRODUCTION CHANGES, CORRECTIONS, & REPLACEMENT PARTS CAUTION: See "Chevrolet Powerglide" in Transmission Section.*
▷*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*
Lubrication—Check fluid level in transmission every 1000 miles. Oil should be added only when the oil gets down to the "Add One Quart" mark on the dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing a "AQ-ATF" marking on container.
Capacity—9 qts. (10 qts. dry).
Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in the "D" range when taking dipstick readings. Dipstick is located under hood right side just opposite starter.
▷*OTHER POWERGLIDE SERVICE DATA—See "Chevrolet Powerglide" in Transmission Section.*
▷**Neutral Safety Switch, Powerglide Automatic transmission cars:** Connected in starter control circuit to prevent starter operating unless shift lever is in "N" Neutral or "P" position. Located at lower end of steering column.
▷**Neutral Safety Switch Adjustment**—*See "Powerglide Automatic Transmission" in Transmission Section.*

UNIVERSALS

Own. No. 591642 (Synchro-mesh Cars), No. 3693692 (Powerglide Cars). Cross type with surface treated trunnions and bearings. One used (in torque ball at rear of transmission).

TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Semi-floating Hypoid" Passenger Car & Half-Ton Rear Axle in Rear Axle Section.
UNIVERSAL JOINT BALL ADJUSTMENT (POWERGLIDE CARS): Improper adjustment will cause oil leakage. See "Torque Tube & Ball" in Chevrolet Special Data.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube drive. "Revacycle" differential side gears and pinions used.
NOTE—Axles with "Double Row Pinion Bearing" are a factory option (same gear ratios).
See Rear Axle Section for complete data.
Ratio—(Synchro-mesh Cars) 4.11-1.
(Powerglide Cars) 3.55-1.
Axle Identification—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratios and plant as follows:

Ratio	Detroit	Buffalo
4.11-1	KA	KB
4.11-1①	KL	KM
3.55-1	KJ	KK
3.55-1①	KS	KT

①—With "Double Row Pinion Bearing."
Backlash—.005-.007". Screw adjustment.
Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly.
Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove 'C' washer on inner end, pull shaft out.
Axle Shaft Endplay—Free fit to .014" maximum.

SHOCK ABSORBERS

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*
Delco. Chevrolet No. 5394583 (front), 5394584 (rear). Direct acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

FRONT SUSPENSION

Front Suspension: Linked parallelogram type with direct acting shock within each coil spring.
See Front Suspension Section for complete data.
Kingpin Inclination—4° ± ½° crosswise.
Caster—Pos. ½° ± ½°. Adjustable.
Camber—Pos. ½° ± ½°. Adjustable.
Toe In—0-⅛". Loosen clamp bolts at each end of **left hand tie-rod** and turn rod, tighten clamp bolts.
CAUTION—Align tie rod ends before tightening clamp bolts (ball studs will bind if not aligned).
Toe-out on Turns—With outer wheel turned 20°, inner wheel should turn 24° ± 2°.

STEERING GEAR

Saginaw. Worm and roller type with push-pull lash adjustment.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Chevrolet-Bendix Duo-Servo single anchor hydraulic type. Hand lever applies rear wheel service brakes.
NOTE—Bonded brake lining used.
See Brake Section for complete data.
Wheel Cylinder Bore—Front wheels 1⅛", Rear 1".
Drums—Cast iron, steel web. Diameter: 11".
Lining—Molded type (bonded). Width 2" (Front), 1¾" (Rear). Thickness .202-.222". Length per wheel 21".
Clearance—Single adjusting screw located at bottom of backing plate. A snap plate covers hole in backing plate. Back off adjusting screw 7 notches from slight drag position. If wheels not free of drag, a Major Adjustment is required.
Braking Power—55.9% front wheels, 44.1% Rear.
Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.
Windshield Wiper: Vacuum Link-&-Crank Arm type.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATI N

Model Designation

Series	Serial Prefix	Model
1500	A	①ONE-FIFTY
2100	B	①②TWO-TEN
2400	C	①②BEL-AIR
1508	D	③SEDAN DELIVERY

①—CONVENTIONAL ENGINE (108 H.P.) Standard.
②—POWERGLIDE ENGINE (115 H.P.) Used when Powerglide option is added.
③—216" ENGINE (92 H.P.) Standard.

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post.
Starting Serial Number—001001 up, at each assembly plant.

►***SERIAL NUMBER NOTE—Serial number (example B53F 001025) includes following identification data in sequence:***

Series①	Year	Assy. Plant②	Serial No.
B	53	F	001025

①—See "Serial Prefix" in Model Designation above.
②—See "Assembly Plant Designation" following:

Assembly Plant Designation

A—Atlanta	**J**—Janesville	**O**—Oakland
B—Baltimore	**K**—Kansas City	**S**—St. Louis
F—Flint	**L**—Los Angeles	**T**—Tarrytown
		N—Norwood

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor.
Starting Engine Number—1001 Up (All Engines) with prefix indicating type and plant as follows:

Engine Type & Plant Designation

Engine —	Flint	Tonawanda
235" Conventional	LAA	LAM
235" Conventional①	LAC	LAP
235" Conventional②	LAE	LAR
235" Conventional③	LAF	
235" Powerglide		LAQ
235" Powerglide③		LAS
216"	LAG	LAT
216"①	LAJ	LAV

①—With 10¾" clutch disc.
②—With Power Steering.
③—With aluminum timing gears.

TUNE-UP

►***ENGINE SURGE ON FIRST CARS (Part-throttle Float Operation at 20-25 MPH. or during 40-25 MPH. overrun):*** May be caused by too much vacuum advance or by slightly lean carburetor. Correct as follows:
1) Limit Vacuum Advance—On engines before No. LAA-391110 (without Powerglide), No. LAQ-178807 (with Powerglide), with 20° Vacuum Spark Advance Link (stamped "774"), limit link travel to 15° by inserting 1/8" cotter pin in link slot. ***See IGNITION for new type link used on later engines.***
2) Change Carburetor Metering Jet (All Engines), change Carburetor Main Well & Power Valve Support Assembly (First Powerglide Engines): ***See "Rochester B & BC" Carburetors in Carburetor Section.***

►***ENGINE PING OR COMBUSTION CHAMBER RATTLE (Engines before No. LAA-283230 (without Powerglide), No. LAQ-117209 (with Powerglide):*** Correct by retarding ignition timing at distributor, as necessary, to meet individual requirements. ***See IGNITION TIMING for different ignition setting used on later cars.***

COMPRESSION PRESSURE: 130 lbs. minimum with all cylinders equal within 5-10 lbs. at cranking speed (for Std. engine).

VACUUM READING: 17-21" at idling speed.
FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: .035". **Plugs**—AC No. 44-5 14 mm.

►***CAUTION—Tighten plugs to 20-25 ft. lbs. torque or finger tight plus one-half turn.***

DISTRIBUTOR: Delco-Remy. As follows:

Delco-Remy No.	
1112362	216" Engine
1112389	235" Reg. Car & Trk. Engine
1112388	235" Powerglide Engine

Breaker Gap	New Points	Used Points
1112362 Distr.	.018-.024"	.015-.022"
1112388, 9 Distr.	.016-.021"	.0125-.0175"

Cam Angle—(1112362) 34° (new points), 39° (used). (1112388, 9) 38° (new points), 42° (used).
Automatic & Vacuum Advance—***See Ignition.***
Breaker Arm Spring Tension—(1112362) 17-21 ozs., (1112388 & 1112389) 19-23 ozs.

COIL: Delco-Remy No. 1115380. Above distributor.
Ignition Current—2.5 amperes idling. 4.5 stopped.

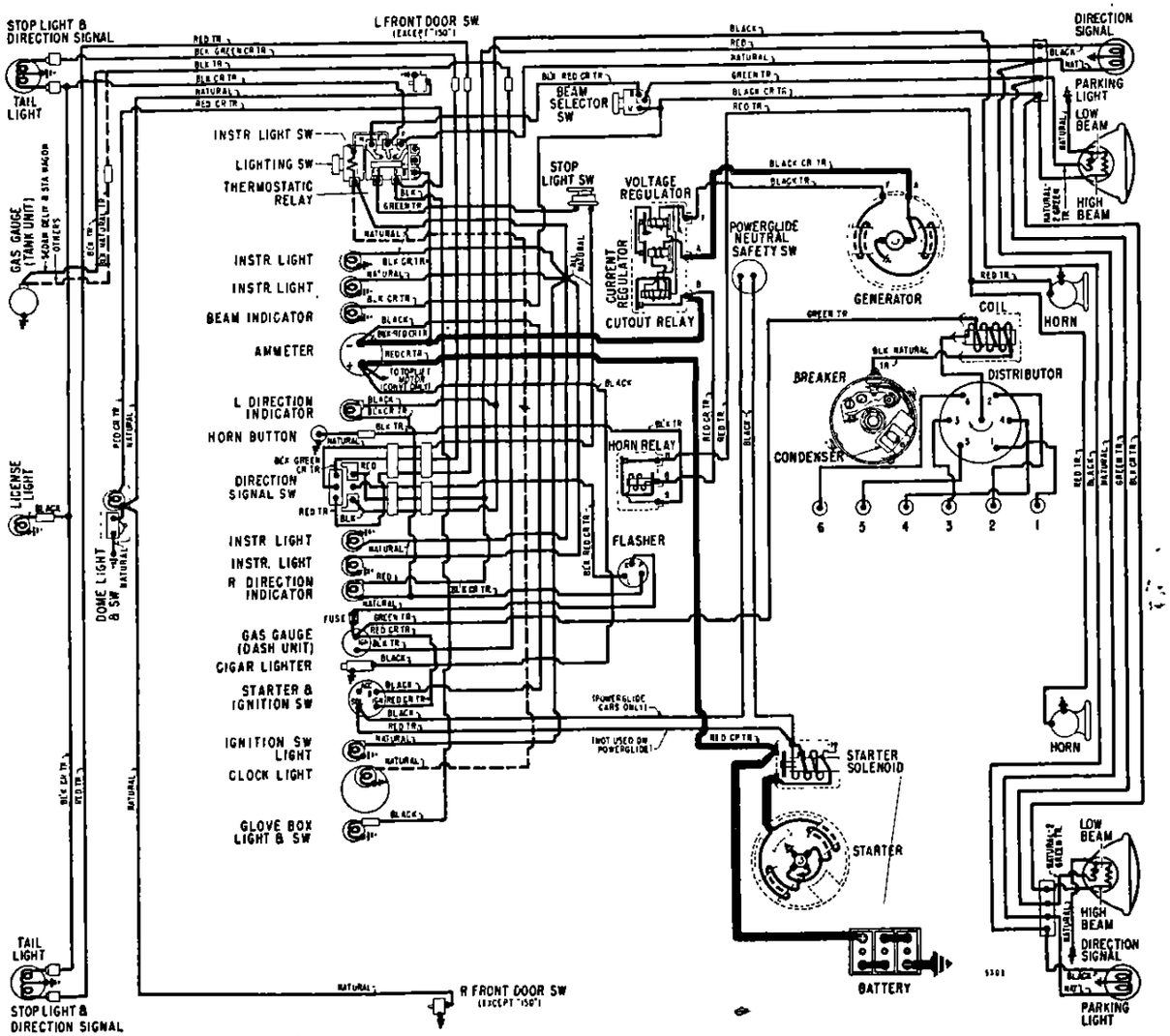
CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: ***CAUTION—Timing changed in production as follows:***

All 216" Engines	5° BTDC.
First 235" Engines①	5° BTDC
Later 235" Engines②	2° ATDC.

①—Before Engine No. LAA-283230 (without Powerglide), No. LAQ-117209 (with Powerglide).
②—After above Engine Numbers.

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▷*ENGINE PING OR COMBUSTION CHAMBER RATTLE (First 235" Engines):* Correct by retarding ignition timing at distributor (see Octane Selector Setting) as necessary to meet individual requirements.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on '0'.

▷*TIMING MARK CAUTION:* On cars with 2° ATDC. setting, DO NOT use steel ball as timing point if ball is located between letters "UC" (will give TDC. ignition timing). On these cars, set ignition at point 7/32" after timing ball. If steel ball is located AFTER "UC," use mark for timing.
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

▷*VACUUM ADVANCE LINK CHANGE (To correct engine surge)—See Ignition for production change and recommended change on first type link.*

CARBURETION (216" Engine): Rochester No. 7004475. Downdraft type with manual choke control.
Idle Setting—1-2 turns open.
Idle Speed—450-500 RPM.
Float Level—1 5/16" from bottom of each float to cover gasket (do not remove gasket) with cover inverted so that needle valve closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that float drops down. Distance from gasket on cover to bottom of each float must be 1 3/4". Adjust by bending tang at rear of float assembly.

▷*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*
Accelerator Pump—No seasonal adjustment.

Fuel Pump Pressure: 4 lbs. maximum.

CARBURETION (235" Conventional Engine): Rochester No. 7004915. (235" Powerglide Engine)—Rochester No. 7004478. Downdraft type with automatic choke control.

▷*CARBURETOR PRODUCTION & RECOMMENDED CHANGES (for Engine Surge correction): See "Rochester B & BC" Carburetor in Carburetor Section.*
Idle Setting—1-2½ turns open.
Idle Speed—(Synchro-mesh Cars) 475 RPM, (Powerglide Cars) 425 RPM. selector lever in "D."
Float Level—Use Gauge No. 3696192. Invert bowl cover and float assembly **but do not remove gasket.** Place gauge in position over floats with gauge tang engaged in discharge nozzle. Adjust each float vertically so they just touch top portion of gauge and bend float arms horizontally to center each float in gauge cut-out. Tilt assembly 90° to each side and see that floats do not touch gauge. Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.

▷*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*

Choke Adjustment: Index mark on cover aligned with long cast mark on top of choke housing casting.

Fast Idle: With idle adjusting screw on next to highest step of fast idle cam, Gauge J-5150 (.073") should just slide between lower edge of choke valve and carburetor bore. To adjust, bend connector rod.

Powerglide Throttle Linkage Adjustment: *See "Chevrolet Powerglide Transmission" in Transmission Section.*

Throttle Return Check Adjustment (235" Powerglide Engine): Have engine at full operating temperature. Align throttle return check adjusting screw with contact arm on throttle lever by bending return check bracket. With parking brake set tight, place selector lever in 'D' range and adjust throttle stop screw and idle adjusting screw in combination with each other to obtain a smooth idle at 425 RPM, this adjustment should be made with choke valve in wide open position with throttle stop screw resting on low step of fast idle cam. Shut off engine. Close choke valve and position throttle stop screw on highest step of fast idle cam. Using a 9/32" wrench on the flat section of throttle return check shaft, hold shaft from turning, and with a 3/8" wrench turn the adjusting screw until it just contacts the throttle lever contact arm.

▷*NOTE—If screw projects more than ½" from shaft when head of screw just touches lever contact arm, reposition throttle check on manifold stud.*

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. *Distorted springs should be replaced.*

VALVE TAPPET CLEARANCE: *CAUTION—Two types of valve lifters with DIFFERENT tappet settings.*

▷**216" Engine & 235" Conventional Engine**—.006" Intake, .013" Exhaust, after engine "normalized" by running at fast idle for approximately 30 minutes or until oil temperature stabilized.

▷**235" Powerglide Engine**—No clearance adjustment required in service. If head removed or rocker arms or valve lifter replaced see Initial Setting below.

Initial Adjustment of Hydraulic Valves: Lifters must be at lowest point of travel when adjusted (piston in firing position). Remove distributor cap and turn engine until rotor is in firing position for cylinder being set. Starting with #1 cylinder, turn adjusting screw down until rocker arm just contacts the valve. This can be determined by checking push rod side play at adjusting screw end while turning the adjusting screw. At the point where no side play can be felt, continue turning the adjusting screw down 1½ turns and tighten locknut securely. Adjust each cylinder in firing order sequence (1-5-3-6-2-4).

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116478. Combination Ignition and Starting switch.

COIL: Delco-Remy No. 1115380. Above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy (as listed below). Automatic advance type with separate Vacuum Spark Control and Octane Selector.

Delco-Remy No.	
1112362	216" Engine
1112389	235" Reg. Car & Truck Engine
1112388	235" Powerglide Engine

Breaker Gap	New Points	Used Points
1112362 Distr.	.018-.024"	.015-.022"
1112388, 9 Distr.	.016-.021"	.0125-.0175"

Cam Angle—(1112362) 34° (new points), 39° (used). (1112388, 9) 38° (new points), 42° (used).

Breaker Arm Spring Tension—(1112362) 17-21 ozs., (1112388 & 1112389) 19-23 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance—1112362

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	375	0-4	750
4.5-6.5	600	9-13	1200
10-12	1200	20-24	2400
17-19	1700	34-38	3400

Automatic Advance—1112388

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Automatic Advance—1112389

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	350	0-4	700
7-9	750	14-18	1500
11-13	1200	22-26	2400
16-18	1800	32-36	3600

Octane Selector: Adjustment on distributor provides 10° advance or retard from center position.

Vacuum Spark Control: Delco-Remy No. 1116076 (use with Distributor Nos. 1112388 & 1112389). Delco-Remy No. 1116061 (use with Distributor No. 1112362).

▷*VACUUM ADVANCE LINK PRODUCTION CHANGE 235" Engine beginning Eng. No. LAA-391110 (without Powerglide), No. LAQ-178807 (with Powerglide):* New link with stop at 15° point used to limit vacuum advance to 15° instead of 20°. This link stamped "845" for identification. See Surge Correction following for recommended change on earlier cars.

▷*VACUUM ADVANCE LINK RECOMMENDED CHANGE ON FIRST CARS (For Engine Surge Correction):* On cars with first type 20° link (stamped "774"), insert a 1/8" cotter pin in slot in link which will limit advance to 15° (same as later type link). See Production Change above.
Plunger Travel—(1116076) 15/64-9/32" with first type 20° link, 11/64-15/64" with later 15° link. (1116061) 17/64".

Vacuum Advance—Distr. No. 1112362

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7-8.5
9-11	18-22	18.5

Vacuum Advance—Distr. No. 1112388 & 1112389
(First type with 20° Link)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
9-11	18-22	13

(Later type with 15° Link)

Start	0	4-6
6.5-8.5	13-17	10

IGNITION TIMING

▷*IGNITION TIMING CAUTION: Timing changed in production as follows:*

All 216" Engines	5° BTDC.
First 235" Engines①	5° BTDC
Later 235" Engines②	2° ATDC.

①—Before Engine No. LAA-283230 (without Powerglide), No. LAQ-117209 (with Powerglide).
②—After above Engine Numbers.

▷*ENGINE PING OR COMBUSTION CHAMBER RATTLE (First 235" Engines):* Correct by retarding ignition timing at distributor (see Octane Selector Setting) as necessary to meet individual requirements.

▷*TIMING MARK CAUTION:* On cars with 2° ATDC. setting, DO NOT use steel ball as timing point if ball is located between letters "UC" (will give TDC.

ignition timing). On these cars, set ignition at point 7/32" after timing ball. If steel ball is located AFTER letters "UC," it may be used as the timing point.

Timing (with Timing Light)—Connect Timing Light to No. 1 spark plug, direct light on flywheel through inspection hole in right front face of housing. Set Octane Selector pointer on "0". Idle engine, loosen advance arm clamp bolt, rotate distributor until steel ball insert in flywheel lines up with pointer (see TIMING MARK CAUTION above), tighten clamp bolt. Check Octane Selector setting

Octane Selector Setting—Set for slight ping when accelerating engine with wide open throttle.

CARBURETOR

216" ENGINE TYPE

ROCHESTER MODEL B, No. 7004475. Single barrel down-draft type, with concentric bowl and twin floats and manual choke control.

►*CARBURETOR PRODUCTION & RECOMMENDED CHANGES (for Engine Surge correction): See "Rochester B & BC" Carburetor in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*

Metering Jets: *See "Rochester Jet Specifications" in Carburetor Section.*

Throttle Kicker—Operated by cam on choke lever. Opens throttle when choke closed, no adjustment.

235" ENGINE TYPE

ROCHESTER MODEL BC, No. 7004478 & 7004915. Downdraft type with automatic choke control. (Throttle Return Check used on No. 7004478).

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up.*

Metering Jets: *See "Rochester Jet Specifications" in Carburetor Section.*

Throttle Return Check—*See Tune-Up.*

Powerglide Throttle Linkage Adjustment: *See "Chevrolet Powerglide Transmission" in Transmission Section.*

CARB. EQUIPMENT

Air Cleaner: AC Oil-wetted type or Oil-bath type.

Filter Elements—Oil Wetted Type, AC No. 6 (Cars), No. 2 (Trks.). Oil Bath Type, AC No. 23 (Cars), No. 9 (½, ¾, 1, 1½ Ton Trks.), No. 7S (2 Ton Trks.).

Fuel Pump: AC Type AF. Diaphragm type Std.

Replacement Pump—AC No. 9798 (Fuel only). AC No. 9797 (Fuel & Vacuum) optional.

Pressure—4 lbs. maximum.

See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.

Dash Unit—AC No. 1517598.

Tank Unit—*AC No. 1517761 (Pass. Cars), No. 1517100* (Sta. Wgn. & Sedan Del.).

See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA6-W—6 volt, 15 plate, 100 ampere hour capacity.

Starting Capacity—120 amperes for 20 minutes.

Grounded Terminal—Negative.

Location—In engine compartment on right side.

STARTER

Delco-Remy No. 1107109. Armature No. 1917855.

Drive—Overrunning Clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Starting Switch: Delco-Remy Solenoid Switch No. 1118135 mounted on starter and controlled by Ignition & Starting Switch No. 1116478. Turn key full RIGHT against spring tension to start.

Neutral Safety Switch (Powerglide Cars only): Delco-Remy No. 1997845 (without Back-up Light & Power Steering). No. 1998040 (with Back-up Light and Power Steering). Connected to starter control circuit, prevents starter operating unless selector lever in "N" or "P" position.

►**Neutral Safety Switch Adjustment**—*See "Powerglide Transmission" in Transmission Section.*

GENERATOR

Delco-Remy. Two-brush types as listed below.

Model	Generator No.	Armature No.
Standard	1100018	1925348
Taxi	1102793	1924893
State Police	1105008	1925556
City Police	1105009	1925630

Performance Data—Cold

Generator	Amperes①	Volts	R.P.M.
1100018	45	8.0	3000
1102793	45	8.0	2250
1105008	50	7.0	1900
1105009	40	7.0	1540

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—28 ozs.

Field Current—1.87-2.0 amps. (1100018, 1102793). 1.77-1.93 amps. (1105008, 1105009). All at 6.0 volts.

Belt Adjustment: Loosen clamp bolt, swing generator out for 7/16"-1/2" belt deflection at point midway between pulleys with 15 lbs. pressure. *CAUTION*—Above setting applies to new narrow fan belts. Recheck new belts after 1000 miles of operation.

REGULATOR

Delco-Remy. Voltage and current regulators.

Model	Regulator No.	For Generator No.
Standard	1118725	1100018
Taxi	1118725	1102793
State Police	1118722	1105008
City Police	1118721	1105009

See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct high charging rate or high voltage.

Cutout Relay (All)

Cuts In—5.9-6.3 volts hot (set to 6.4 volts hot).

Contact Gap—.020" (same for both sets).

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Regulator No.	Setting (Hot)①	Set to (Hot)
1118725	7.0-7.7 volts	7.4 volts
1118722	6.8-7.5 volts	7.2 volts
1118721	6.8-7.5 volts	7.2 volts

①—Regulator is over-compensated for temperature.

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Regulator No.	Set To (Hot)	Range
1118725	47 amps.	45-51 amps.
1118722	50 amps.	48-52 amps.
1118721	42 amps.	40-46 amps.

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: *Guide "Sealed Beam" type.*

See Electrical Equipment Section for complete data.

Beam Indicator—Red dot below '50' figure on speedometer. Lighted when upper beams in use.

Autronic Eye: Automatic beam deflector. *See Electrical Equipment Section for complete data.*

Directional Signal: *Std. See Elect. Equip. Sect.*

Switches

Lighting—Delco-Remy No. 1995048.

Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).

Beam Selector—Delco-Remy No. 1997008.

Stop Light—Delco-Remy No. 1997913. Mechanical type on underside of toeboard.

MISC. ELECTRICAL

►*DASH PANEL INSPECTION HOLE FOR ACCESS TO WIRING ON BACK SIDE OF INSTRUMENTS—Located on left side under hood with removable door screwed to dash.*

►*WIRE HARNESS INTERFERENCE (CONVERTIBLE)—Make sure that wire harness is secured behind clip in left door hinge lower hinge box. If not enough slack, remove kick-pad for access to other harness clips.*

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assembly). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

HORNS: Delco-Remy No. 1999681 (Low note, Right); No. 1999682 (High note, Left). Vibrator type operated by relay.

Horn Relay: Delco-Remy No. 1116775.

Contact Gap—.027". **Air Gap**—.014" (closed).

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

216" & 235" C NVENTIONAL

ENGINE SPECIFICATIONS: *Own make. 6 cyl., valve-in-head. Used on all models except Powerglide.*

►*TWO ENGINE SIZES USED: 216" & 235". See Passenger Car & Truck Model Identification for engine application.*

Engine	Bore	Stroke	Displacement
216"	3½"	3¾"	216.5 cu. in.
235"	3 9/16"	3 15/16"	235.5 cu. in.

Engine	Comp. Ratio	Rated HP	Developed HP
216"	6.6-1	29.4	92 at 3400 RPM
235"	7.1-1	30.4	108 at 3600 RPM

Compression & Vacuum Readings—*See Tune-Up.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

ENGINE MOUNTINGS: *See Chevrolet Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Chevrolet Special Data.*

FRONT END SHEET METAL REMOVAL (For Engine Work): *See Chevrolet Special Data.*

PISTONS: Passenger Cars. Cast alloy iron, flat head, cam ground, tin plated type with slipper skirt.

Truck Piston—Same as Pass. cars except heavier. Truck pistons marked with small boss on under side of each pin boss. *CAUTION*—Do not interchange pistons (must be same type in one engine).

Weight—(216" Engine) 27.392 ozs. (235" Engine) 31.456 ozs. Without pin.

CONTINUED ON NEXT PAGE

ENGINE
216" & 235" C NVENTIONAL (Cont.)

Removal—Pistons and rods removed from above.
Clearance—Top: .0155-.0235". Skirt: Selective fit. See Fitting New Pistons below.
Replacement Pistons: Furnished Std. size, .005", .010", .020", .030", .040" oversize.
NOTE—To install new pistons, hone cylinders for .005" oversize, rebore and hone for other sizes (rebore .002" less than piston oversize, finish by honing for piston clearance—see fit below). Cylinder bore taper and out-of-round must not exceed .001".
Fitting New Pistons: Use feeler gauge between piston and cylinder wall at right angle to pin bosses. Piston should pass through bore with light pressure on .0015" feeler, and lock on .003" feeler.
NOTE—New pistons fitted with bushings and pins. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.
PISTON RINGS: Three rings used per piston.

216" Engine

Ring	Width	End Gap①	Side Clearance
#1 Comp.③	1/8"	.005-.015"	.0015-.003"
#2 Comp.③	1/8"	.005-.015"	.0015-.003"
#3 Oil	3/16"	.005-.015"	.002-.0035"

235" Conventional Engine

Ring	Width	End Gap①	Side Clearance
#1 Comp.③	3/32"	.007-.017"	.0015-.003"
#2 Comp.③	1/8"	.005-.015"	.0015-.003"
#3 Oil	3/16"	.005-.015"	.002-.0035"

①—End gap worn limit 1/32" maximum.
③—Taper face type. ③—Deep section twist type.

►*SERIES 5000 & 6000 TRUCK RING CHANGE:* Chrome upper compression ring used beginning with Engine No. LEA-58005.
RING INSTALLATION NOTE: Install compression rings with side marked "TOP" up.
Replacement Rings: Furnished Std. and .005", .010", .020", .030", .040" Oversize. *NOTE*—Chrome upper compression ring (as used on later trucks—above) may be used on all 1950-53 "235" engines except Powerglide engines with aluminum pistons.
PISTON PIN: Diameter—.8645-.8650". **Length**—3.135-3.165". Pin locked in rod (piston bronze bushed).
Pin Fit in Piston—Thumb push fit (at room temp.).
Replacement Pins: Std., .003", .005", .010" oversize. NOTE—New pistons fitted with pins and bushings. If bushings reamed, use piston pin bushing fixture to insure reaming at right angles to piston skirt.
CONNECTING ROD: Length 6 13/16". **Weight** 30.88 ounces.
Crankpin Journal Diameter—2.311-2.312".
Lower Bearing—Spun high-lead, thin-wall babbitt.
Clearance—.0003-.0013" selective fit (see Bearing Adjustment following).
Sideplay—.004-.012" at lower end (rod to crankpin), .015" minimum at upper end (rod to piston pin boss).
Bearing Adjustment: Laminated shims. Remove shims equally at both sides to secure 'snap fit' (rod tight to hand but should snap from side to side with light tap of eight ounce hammer), then replace one .002" shim on one side for clearance (if unequal number, place extra shim on camshaft side). Bearing clearance correct when rod can be snapped back and forth on crankpin with one hand (grasp bearing cap between thumb and index finger to test).
Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinder with numbers and pin clamp bolt toward camshaft side. Install oil dippers on rod with mouth toward camshaft side of engine. Check dipper height.
Dipper Height Adjustment—*See "Oiling System" in Chevrolet Special Data.*
CRANKSHAFT: Four bearing type with integral counterweights and vibration dampener.
Vibration Dampener—*See Chevrolet Special Data.*
Journal Diameters—(1) 2.6835-2.6845"; (2) 2.7145-2.7155"; (3) 2.7455-2.7465"; (4) 2.7765-2.7775".
NOTE—Journal taper or out-of-round limits .001". Run-out limits for Nos. 2 & 3 journals is .002".
Bearing Type—Steel-backed precision type thin-walled babbitt. *Boring or reaming not required.*
►*CAUTION—Bearing Nos. 1 & 2 are similar in appearance but MUST NOT BE INTERCHANGED. No. 2 marked by letter "I" in oil grooves.*
Clearance—.0005" min., .003" max. (new bearings). Service limits .0005" min., .0045" max.
►*NOTE—Precision bearings can be replaced singly.*
Bearing Adjustment: Solid shims. Remove shims until light drag secured when shaft turned by hand, then replace .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side of all bearings).
Replacement Bearings: Precision type bearings furnished for all engines Std. size and .002", .010", .020", .030" undersize.
Bearing Installation—Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*
Bearing Cap Installation—Bearings caps Nos. 2 & 3 marked for identification; (2) marked "Front"; (3) marked "Rear." Install in engine with "Front" to front of engine, and "Rear" to rear of engine. *NOTE—Rear intermediate bearing (3) is special flanged type, and takes crankshaft end thrust.*
Crankshaft Oil Seal Servicing: *See Chevrolet Special Data for Front and Rear Oil Seals.*
End Thrust: Taken by No. 3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of No. 3 bearing. Adjust by replacing bearing. **Endplay**—.003-.009".
CAMSHAFT: Four bearing type. Helical gear drive.
►*CAUTION—Camshafts used in these engines are different and are not interchangeable. Camshaft for 235" Powerglide Engine must not be used in 235" Conventional Engine.*

Camshaft Identification

Engine	Camshaft No.	Forging No.
216"	838733	①838733
235" Conventional	3660474	②3660474
235" Powerglide	3701414	3701414

①—Number stamped on shaft between #11 & #12 cams.
②—Number stamped on shaft between #10 & #11 cams.
Journal Diameters—(1) 2.0282-2.0292"; (2) 1.9657-1.9667"; (3) 1.9032-1.9042"; (4) 1.8407-1.8417".
NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).
Bearing Type—Steel-backed, babbitt-lined bushings (staked in place). *NOTE*—New bearings must be line-reamed.
Clearance—.002-.004".
End Thrust—Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).
Endplay Adjustment—*See "Timing Gear Installation" in Chevrolet Special Data.*
Endplay—Free fit to .003" maximum.
Timing Gears: Steel crankshaft gear. Bakelite and fabric composition camshaft gear.
Maximum Gear Runout—.003" crankshaft gear. .004" camshaft gear.
Replacement Timing Gears & Installation—*See Chevrolet Special Data.*
Timing Gear Backlash: .003-.004".
Camshaft Setting: Gears punch marked. Punch marks on both gears must be lined up and directly opposite each other.
VALVES:

216" Engine

	Head Diam.	Stem Diam.	Length
Intake	1 41/64"	.3410-.3417"	6.26-6.29"
Exhaust	1 1/2"	.3400-.3407"	4.917-4.947"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.2941"	.001-.0027"
Exhaust	45°	.3118"	.002-.0037"

235" Conventional Engine

	Head Diam.	Stem Diam.	Length
Intake	1 7/8"	.3410-.3417"	6.364-6.394"
Exhaust	1 1/2"	.3400-.3407"	4.902-4.932"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.2941"	.001-.0027"
Exhaust	45°	.3118"	.002-.0037"

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*
Valve Guides: Precision type. Pressed in head.
Valve Guide Installation—*See "Valve System" in Chevrolet Special Data.*
Valve Springs: Install springs with closed coil end down. Check with spring tester and replace if not within limits shown below.
Free Length—2 1/8" (216" Engine). 2 5/32" (235" Engine).

Spring Specifications—216" Engine

	Pressure	Length
Valve Closed	53-63 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Spring Specifications—235" Engine

	Spring Pressure		Length
	Intake	Exhaust	
Valve Closed	53-63 lbs.	62-68 lbs.	1.821"
Valve Open	120-140 lbs.	155-165 lbs.	1.505"

Valve Lifters: Plain barrel type with push rod seat brazed on upper end.
Diameter—.989-.990".
Clearance—.001" (Selective free fit).

ENGINE
235" POWERGLIDE

ENGINE SPECIFICATIONS: Own make. 6 cyl., valve-in-head, with hydraulic valve lifters, aluminum pistons, and force-feed lubrication.
►*ENGINE NOTE—This engine used on Powerglide Models only.*
Bore—3 9/16". **Stroke**—3 15/16".
Displacement—235.5 cu. ins.
Rated Horsepower—30.4.
Developed Horsepower—115 at 3600 RPM.
Compression Ratio—7.5-1.
Compression & Vacuum Reading—*See Tune-Up.*
ENGINE REMOVAL: *See Chevrolet Special Data.*
CYLINDER HEAD & TIGHTENING TORQUES: *See Chevrolet Special Data.*
PISTONS: Aluminum alloy, cam ground, tin plated.
Removal—Pistons and rods removed from above.

ENGINE
235" POWERGLIDE (Cont.)

Clearance—Top Land: .0115-.0135". Skirt: .0005-.0011" Selective fit. See Fitting Pistons below.
NOTE—When installing new pistons, hone cylinders for .005" Oversize, and rebore and hone for greater oversizes (rebore cylinders .002" less than piston oversize, then finish by honing for piston clearance—see fit below). Cylinder bore taper and out-of-round must not exceed .001".

Replacement Pistons: Furnished Std. size, .020", .030", .040" Oversize. *STD. PISTON NOTE*—Std. pistons furnished in four sizes with size stamp and size range as follows: S4 (3.5625-3.5630"), S5 (3.5630-3.5635"), S6 (3.5635-3.5640"), S7 (3.5640-3.5645").

Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.

►*CAUTION—Above procedure supersedes original fitting instructions for aluminum pistons.*

PISTON RINGS: Three rings used per piston.

Ring	Width	End Gap①	Side Clearance
#1 Comp.②	3/32"	.007-.017"	.0015-.003"
#2 Comp②	3/32"	.007-.017"	.0015-.003"
#3 Oil③④	3/16"	.005-.015"	.002-.0036"

①—End Gap Worn Limit 1/32" max.
②—Taper face type. ③—Deep section twist type.
④—Expander behind oil ring.
NOTE—Compression ring side marked "TOP" up.

►*CHROME EXPANDER TYPE REPLACEMENT RINGS:* Ring sets furnished Std., .020", .030", .040" Oversize. Use these rings only with Powerglide aluminum pistons.

Replacement Rings: Std., & .005", .010", .020", .030", .040" oversize.

PISTON PIN: Diameter—.8660-.8665". **Length**—3.198-3.228". Locked in rod. No bushing used in piston.
Pin Fit in Piston—Thumb push fit (at room temp.). *To check fit, with piston and pin at 70°F,* apply light oil film to pin, insert pin vertically in one piston boss (one end of pin in either piston boss). Pin should hold own weight but should install easily with thumb pressure.

Replacement Pins: Furnished Std., .0015", .003", .005" oversize.

CONNECTING ROD: Length 6 13/16". **Wgt.** 31.76 ozs.

►*CONNECTING ROD BOLT CAUTION:* Bolts are No. 3701531 special type with knurled section to pilot bearing cap (special type for pressure lubrication). *CAUTION*—DO NOT use regular No. 3835449 bolts as used in other engines (May cause early bearing failure).
Crankpin Journal Diameter—2.311-2.312".
Lower Bearing—Replaceable precision type. Replace bearing, do not file rod or cap.
Clearance—.0007-.0028" (see bearing adjustment below).
Sideplay—.005-.012", at lower end.

Replacement Bearings: Std., .001", .002", .010", .020" Undersize.

Bearing Adjustment: Not adjustable. Replace bearings.

Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinders with numbers and pin clamp bolt toward camshaft side.

CRANKSHAFT: Four bearing type with integral counter-weights and vibration dampener.

►*MAIN BEARING PRODUCTION CHANGE—Beginning with Serial No. LAQ96435 main bearings have wider grooves than used in early production.*
Vibration Dampener—*See Chevrolet Special Data.*
Journal Diameters—(1) 2.6835-2.6845"; (2) 2.7145-2.7155"; (3) 2.7455-2.7465"; (4) 2.7745-2.7775".
NOTE—Journal taper or out-of-round limits .001". Run-out limits for Nos. 2 & 3 journals is .002".
Bearing Type—Steel backed precision type thin-walled babbitt. *Boring or reaming not required.*
Clearance—.0005" min., .003" max. (new bearings). Service limits .0005" min., .0045" max.

►*NOTE—Precision type bearings can be replaced singly.*

Bearing Adjustment: Solid shims. Remove shims until light drag secured when shaft turned by hand, then replace .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side of all bearings).

Replacement Bearings: Precision type bearings furnished for all engines Std. size, and .002", .010", .020", .030" undersize.

Bearing Installation: Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Crankshaft Oil Seal Servicing: *See Chevrolet Special Data for Front & Rear Oil Seals.*

End Thrust: Taken by No. 3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of No. 3 bearing. Adjust by replacing bearing. **Endplay**—.0035-.0095".

CAMSHAFT: Four bearing type. Helical gear type.

►*CAMSHAFT BEARING PRODUCTION CHANGE—Rear bearing has new wider groove beginning with Engine Serial No. LAQ73552.*

►*CAUTION—CAMSHAFT USED IN POWERGLIDE 235" ENGINE NOT INTERCHANGEABLE WITH CAMSHAFT USED IN CONVENTIONAL 235" ENGINE.*
Identification—Forging No. 3701414 cast in shaft.
Journal Diameters—(1) 2.0282-2.0292"; (2) 1.9657-1.9667"; (3) 1.9032-1.9042"; (4) 1.8407-1.8417".
NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).
Bearing Type—Steel-backed, babbitt lined bushing (staked in place). *NOTE*—New bearings must be line-reamed.
Clearance—.002-.004".

End Thrust: Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).
Endplay Adjustment—*See "Timing Gear Installation" in Chevrolet Special Data.*
Endplay—Free fit to .003" maximum.

Timing Gears: Steel crankshaft gear. Bakelite and fabric composition camshaft gear.

Replacement Timing Gears & Installation: *See Chevrolet Special Data.*

Timing Gear Backlash: .003-.004".

Camshaft Setting: Gears punch marked. Punch marks on both gears must be lined up and directly opposite each other.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1⅞"	.3410-.3417"	6.364-6.394"
Exhaust	1½"	.3400-.3407"	4.902-4.932"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3275"	.001-.0027"
Exhaust	45°	.3275"	.002-.0037"

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*

Valve Guides: Precision type. Pressed in head.
Valve Guides Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install valve springs with closed coil end down. Check with spring tester and replace if not within limits shown below.
Free Length—2 5/32".

Spring Specifications

	Pressure		Length
	Intake	Exhaust	
Valve Closed	62-68 lbs.	62-68 lbs.	1.821"
Valve Open	155-165 lbs.	155-165 lbs.	1.505"

Valve Lifters: Hydraulic type.
See Miscellaneous Section for complete data.
Initial Adjustment—(Required only when installing cylinder head or when adjusting screw setting has been disturbed). *See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

►*REMOVING HYDRAULIC VALVE LIFTERS: When removing lifters and pushrods use a rack to keep them in proper sequence. Install in their original location when reassembling.*

VALVE TIMING

►*VALVE TAPPET CLEARANCE CAUTION—Two types of valve lifters used. Conventional type in 216" Engine and in 235" Conventional Engine. Hydraulic type used in 235" Powerglide engine.*

►**CONVENTIONAL TYPE SETTING (216" & 235" Conventional Engine):** .006" Intake, .013" Exhaust, after engine 'normalized' by running at fast idle for approximately 30 minutes or until oil temperature stabilized.

►**HYDRAULIC TYPE SETTING (235" Powerglide Engine):** NO CLEARANCE ADJUSTMENT REQUIRED IN SERVICE. *See "Valve Tappet Clearance Adjustment" in Chevrolet Special Data.*
Initial Adjustment (Hydraulic Lifters)—Required when cylinder head removed or when adjusting screws disturbed. *See "Valve Tappet Clearance Adjustment" in Chevrolet Special Data.*

VALVE TIMING: See Camshaft Setting above.

Valve Timing (Except Powerglide)

Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.

Valve Timing (Powerglide Engine)①

Intake Valves—Open 16° BTDC. Close 48° ALDC.
Exhaust Valves—Open 46° 30' BLDC. Close 17° 30' ATDC.
①—**Theoretical valve timing test with Hydraulic valve lifters.**

Valve Timing (Conventional Type Lifter): Remove all tappet clearance from #1 exhaust valve. Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right face of flywheel housing, mount dial indicator on rocker arm shaft with stem contacting #1 exhaust valve adjusting screw, set dial indicator at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO, plus or minus .004". Reset tappet clearance to correct running clearance.
Hydraulic Type Lifters—Use same procedure as with conventional lifter except that it is necessary to replace the hydraulic lifter operating #1 exhaust valve with a conventional type lifter while making the check.

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LUBRICATION
216" & 235" CONVENTIONAL

Engine Oiling System (216" & Conventional 235" Engine): Pressure and positive splash system. Pressure to main bearings, timing gears, and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from trough (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by the Oil Distributor Valve on left side of engine.

▷*CAUTION*—Engine lubrication dependent on adjustment of connecting rod dippers, oil troughs, and nozzles which must be **checked each time the oil pan is removed** (requires special gauges). *See "Oiling System" in Chevrolet Special Data.*

Crankcase Capacity—5½ qts. (dry), 5 qts. (refill).

Normal Oil Pressure—14 lbs. at 2000 RPM.

Filter Element—AC No. P115 or C115. Change element every 5000 miles.

Oil Pressure Regulator (Exc. Powerglide Engine): Located in oil pump cover. Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine, which opens at 15 lbs.

Oil Pressure Gauge: AC No. 1507701 (Not electric).

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.

Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil Pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Special Data.*

Crankcase Ventilation: Air intake through valve rocker arm cover (air cleaner on some models), outlet through pipe on right side of engine.

235" POWERGLIDE

235" Powerglide Engine—Full pressure lubrication to main & connecting rod bearings, camshaft bearings, hydraulic valve lifters, timing gears, and to valve rocker arm assembly. Piston and cylinder walls lubricated by oil squirt holes in connecting rod.

▷*OIL PRESSURE PRODUCTION CHANGE (POWERGLIDE ENGINE)—New Oil Pump Relief Valve Spring, Part No. 3702367 entered production at Serial No. LAQ-63342. Pump pressure is increased with new spring to 45 lbs. This change made to overcome hydraulic valve lifter leakdown at high speeds.*

Crankcase Capacity—5½ qts. (dry), 5 qts. (refill).

Normal Oil Pressure—35 lbs. (first cars), 45 lbs. (later cars). *See Oil Pressure Production Change.*

Oil Pressure Regulator: Located in oil pump cover. Non-adjustable type. Relief Spring is No. 3702367 (45 lb. type), superseding No. 3835896 (35 lb. type).

Oil Pressure Gauge: AC No. 1507960 (not electric).

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special Data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.

Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil Pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Crankcase Ventilation: Air intake through valve rocker arm cover (air cleaner on some models), outlet through pipe on right side of engine.

COOLING

Cooling System: Positive circulation with water pump. (235" Engines have "by-pass" cooling which allows a more even engine warm-up).

Capacity—15 qts. (16 qts. with heater).

Pressure Cap—AC No. 850501 (marked 501/4#) Radiator Filler Cap. 4-lb. type.

Water Pump: Double outlet, packless type with sealed ball-bearing shaft.

See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head outlet.

Std.—No. 3123993 (stamped 151). 151° type. Can be used for alcohol anti-freeze.

Opti.—No. 3123994 (stamped 160) 160° type or No. 3123995 (stamped 180) 180° type. Use for permanent anti-freeze.

Temperature Gauge: AC No. 1512456 (not elec.).

CLUTCH

Own Make—Diaphragm spring, single plate, dry disc type. NOTE—9" clutch used on all cars (except Powerglide).

See Clutch Section for complete data.

Facings—Moulded asbestos. 2 required as follows: **6⅛" I.D., 9⅛" O.D., .132-.138" thick.**

Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.

Removal: Remove transmission (see Transmission Removal below). Remove throwout bearing. Remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch, align 'X' mark on cover with 'X' mark on flywheel.

SYNCHRO-MESH TRANSMISSION

Synchro-mesh Transmission—Three-speed, synchro-mesh (2nd. & High), sliding gear (Low & Rev.).

▷*PRODUCTION CHANGE TO REDUCE GEAR RATTLE IN 2ND. & HIGH AND REPLACEMENT PARTS CAUTION: See "Chevrolet Synchro-mesh" in Transmission Section.*

▷*GEARSHIFT LEVER RATTLE: May be caused by loose spring in lever. See "Chevrolet Synchro-mesh Transmission" in Transmission Section.*

Transmission Control & Linkage: *See Transmission Section for complete data.*

Removal: Remove floor mat and floor cover over transmission. Disconnect speedometer cable, and shifter rods from levers on transmission. Drain lubricant. Disconnect hand brake pull back spring, and hand brake cable clevis from idler lever, remove idler lever. Remove universal joint collar-to-support capscrews and slide ball back on propeller shaft housing. Place jack under propeller shaft, remove four capscrews securing front trunnion bearings to front yoke, split joint and lower front end of propeller shaft. Remove rear transmission support-to-frame cross member bolts, install support under rear of engine. Remove two upper transmission-to-clutch housing capscrews and insert guide pins. Remove clutch underpan and two lower transmission-to-clutch housing capscrews. Slide transmission back and lift out through opening in floor.

POWERGLIDE TRANSMISSION

Powerglide Transmission with Automatic Shift (used with 235" Powerglide Engine): Torque Converter and hydraulically operated planetary gear unit with manual control. This unit different from previous type in having AUTOMATIC SHIFTING and new Torque Converter.

▷*GEARSHIFT LEVER RATTLE: May be caused by loose spring in lever. See "Chevrolet Synchro-mesh Transmission" in Transmission Section (corrective procedure same regardless of transmission type).*

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS—See "Chevrolet Powerglide" in Transmission Section.*

Lubrication—Check fluid level in transmission every 1000 miles. Oil should be added only when the oil gets down to the "Add One Quart" mark on the dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing a "AQ-ATF" marking on container.

Capacity—10 qts. (refill), 11 qts. (after overhaul).

▷*POWERGLIDE DRAINING CAUTION*—Converter drain plug eliminated on transmissions beginning No. LT-123492 D-7-D. On these transmissions, drain transmission case only, add 5 qts. of fluid initially, recheck after idling engine.

Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in the "D" range when taking dipstick readings. Dipstick is located under hood right side just opposite starter.

▷*OTHER POWERGLIDE SERVICE DATA—See "Chevrolet Powerglide" in Transmission Section.*

▷**Neutral Safety Switch, Powerglide Automatic transmission cars:** Connected in starter control circuit to prevent starter operating unless shift lever is in "N" Neutral or "P" position. Located at lower end of steering column.

Neutral Safety Switch Adjustment—*See "Powerglide Automatic Transmission" in Transmission Section.*

UNIVERSALS

Own Make. No. 591642 (exc. Powerglide), No. 3704232 (Powerglide Cars). Cross type with surface-treated trunnions and bearings. One used (in torque ball behind transmission rear support).

TORQUE TUBE BUSHING INSTALLATION: *See Rear Axle Section for complete data.*

▷**UNIVERSAL JOINT BALL ADJUSTMENT (POWERGLIDE MODELS):** Improper adjustment will cause leakage. *See "Torque Tube & Ball" in Chevrolet Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube drive. "Revacycle" differential side gears and pinions used.

►*PROPELLER SHAFT COUPLING PRODUCTION CHANGE:* Later axles have coupling which is loose fit on rear axle pinion shaft (changed from hard press fit) and this coupling must be used with new type Pinion Bearing Nut No. 3703782 and Coupling Spring No. 3703792 (to provide tension on shaft). *See Rear Axle Section for complete data.*

Ratio—As follows (see Identification Note).

	Axle Ratio	Serial No. Prefix
Cars (exc. Powerglide)	3.70-1	LL- or LM-
Powerglide Cars	3.55-1	LS- or LT-
Sedan Delivery	4.11-1	LA- or LB-

Axle Identification—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratios (see Ratio table above).

Backlash—.005-.007". Screw adjustment.

Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove 'C' washer on inner end, pull shaft out. **Axle Shaft Endplay**—Free fit to .014" maximum.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

SHOCK ABSORBERS

Delco Chevrolet No. 5519443 (front), 5519444 (rear). Direct acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

FRONT SUSPENSION

Front Suspension: Linked parallelogram type with direct acting shock within each coil spring. *See Front Suspension Section for complete data.*

Kingpin Inclination—4° ± ½° crosswise.

Caster—Pos. ½° ± ½°. Adjustable.

Camber—Pos. ½° ± ½°. Adjustable.

Toe-In—¼" ± 1/16. *This setting supersedes previous specification.* Adjust by loosening clamp bolts at each end of left hand tie-rod and turning rod.

CAUTION—Align tie rod ends before tightening clamp bolts (ball studs will bind if not aligned).

Toe-out on Turns—With inner wheel turned 20°, outer wheel should be turned 17°40'.

STEERING GEAR

Standard (All Models): Saginaw. Worm and roller type with push-pull adjustments. *See Steering Gear Section for complete data.*

Power Steering (Optl. Pass. Cars): Saginaw (G. M.). Ball-bearing Worm and Nut type steering gear with hydraulic power. *See "Saginaw (G. M.) Power Steering" in Steering Section for complete data.*

BRAKES

Service Brakes: Chevrolet-Bendix Duo-Servo single anchor hydraulic type. Hand lever applies rear wheel service brakes.
NOTE—Bonded brake lining used.
See Brake Section for complete data.

Wheel Cylinder Bore—Front wheels 1⅛", Rear 1".

Drums—Cast iron, steel web. Diameter: 11".

Lining—Molded type (bonded). **Width**—2" (Front Wheels), 1¾" (Rear Wheels). **Thickness** .202-.222".

Length per Shoe—9.3125" (Primary), 11.6875" (Secondary).

Clearance—Single adjusting screw located at bottom of backing plate. A snap plate covers hole in backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjusting.

CAUTION—Above clearance setting supersedes previous specifications.

Braking Power—55.9% front wheels, 44.1% Rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders). *See Miscellaneous Section for complete data.*

Windshield Wiper: Vacuum type, cable operated.

►*WINDSHIELD WIPER PRODUCTION CHANGE & ADJUSTMENT CAUTION:* Wiper drive changed approximately February 1953, and first and later types adjusted differently. *See Miscellaneous Section for complete data.*

MODEL IDENTIFICATION

Serial Prefix

Series	1952	1953	Wh'lbase	Type
3100	KP	H	116"	Half-Ton
3600	KR	J	125¼"	¾-Ton
3700	KT	K	125¼"	¾-T.Fwd. Cont.
3800	KS	L	137"	1-Ton
3900	KU	M	137"	1-T. Fwd.-Cont.
4100	VJ	N	137"	1½-Ton
4400	VK	P	161"	1½-Ton
4500	VL	R	161"	1½-T. Schl. Bus
5100	VP	S	110"	C-O-E 2-Ton
5400	VR	T	134"	C-O-E 2-Ton
5700	VS	U	158"	C-O-E 2-Ton
6100	VV	V	137"	2-Ton
6400	VW	W	161"	2-Ton
6500	VY	X	179"	2-Ton
6700	VX	Y	199"	2-T. Schl. Bus
6800		Z	212"	2-T. Schl. Bus
5100S	VPS	SS	110"	1½-Ton Spec.
5400S	VRS	ST	134"	1½-Ton Spec.
5700S	VSS	SU	158"	1½-Ton Spec.
6100S	VVS	SV	137"	1½-Ton Spec.
6400S	VWS	SW	161"	1½-Ton Spec.
6500S	VYS	SX	179"	1½-Ton Spec.

SERIAL NUMBER: Stamped on plate on cab left hinge pillar (On plate on left hand cowl inner panel on Flat Face Cowl Models). *NOTE—DIFFERENT numbering system used each year as follows:*

▷**1952 SERIAL NUMBERS:** 1001 Up (All Models) with Serial Prefix as listed in model table above. *NOTE*—Number preceding serial prefix indicates Assembly Plant as listed below, letter following serial prefix indicates month (A—January, etc.).

1952 Assembly Plant Designation

1—Flint, 2—Tarrytown, 3—St. Louis, 5—Kansas City, 6—Oakland, 8—Atlanta, 9—Norwood, 14—Baltimore, 20—Los Angeles, 21—Janesville.

▷**1953 SERIAL NUMBER:** 001001 Up (All Models). *NOTE—Complete serial number (Example "V53K001-001") includes following data in sequence:*

Series①	Year	Assy. Plant②	Serial No.
V	53	K	001083

①—Serial Prefix in model table above.
②—See 1953 Assembly Plant designation below.

1953 Assembly Plant Designation

A—Atlanta, B—Baltimore, F—Flint, J—Janesville, K—Kansas City, L—Los Angeles, N—Norwood, O—Oakland, S—St. Louis, T—Tarrytown.

ENGINE NUMBER: Stamped on boss on right side of engine block to rear of distributor.

First Engine Number—1001 for **each year** with prefix indicating model and engine plant:

216" ENGINE

	Flint		Tonawanda	
Truck Series	1952	1953	1952	1953
3100 Std.	KBA	LBA	KBM	LBM
3100 Spec.①	BKCA	BLCC	BKCM	BLCP
3600 Std.①	AKCA	LCC	AKCM	LCP
3800 Std.①	AKCA	ALCC	AKCM	ALCP
3600, 3800 Spec.②	KCD		KCQ	
3802 Spec.③		LCH		LCU
4000 Std.①	KCA	LCA	KCM	LCM
4000 Spec.④	KCD	LCD	KCQ	LCQ

235" ENGINE

3742, 3942 Std.⑤	KCF	LCF	KCS	LCS
4000 Spec.	AKEA	ALEA	AKEM	ALEM
5000 C-O-E	KDA	LDA	KDM	LDM
6000 Std.	KEA	LEA	KEM	LEM

①—With Heavy Duty 10¾" Clutch Disc.
②—With "Hydrovac" Brake Power Unit.
③—With Positive Crankcase Ventilation.
④—With Positive Crankcase Ventilation (1953 only) and "Hydrovac" Brake Power Unit.
⑤—With Updraft Carburetor.

TUNE-UP

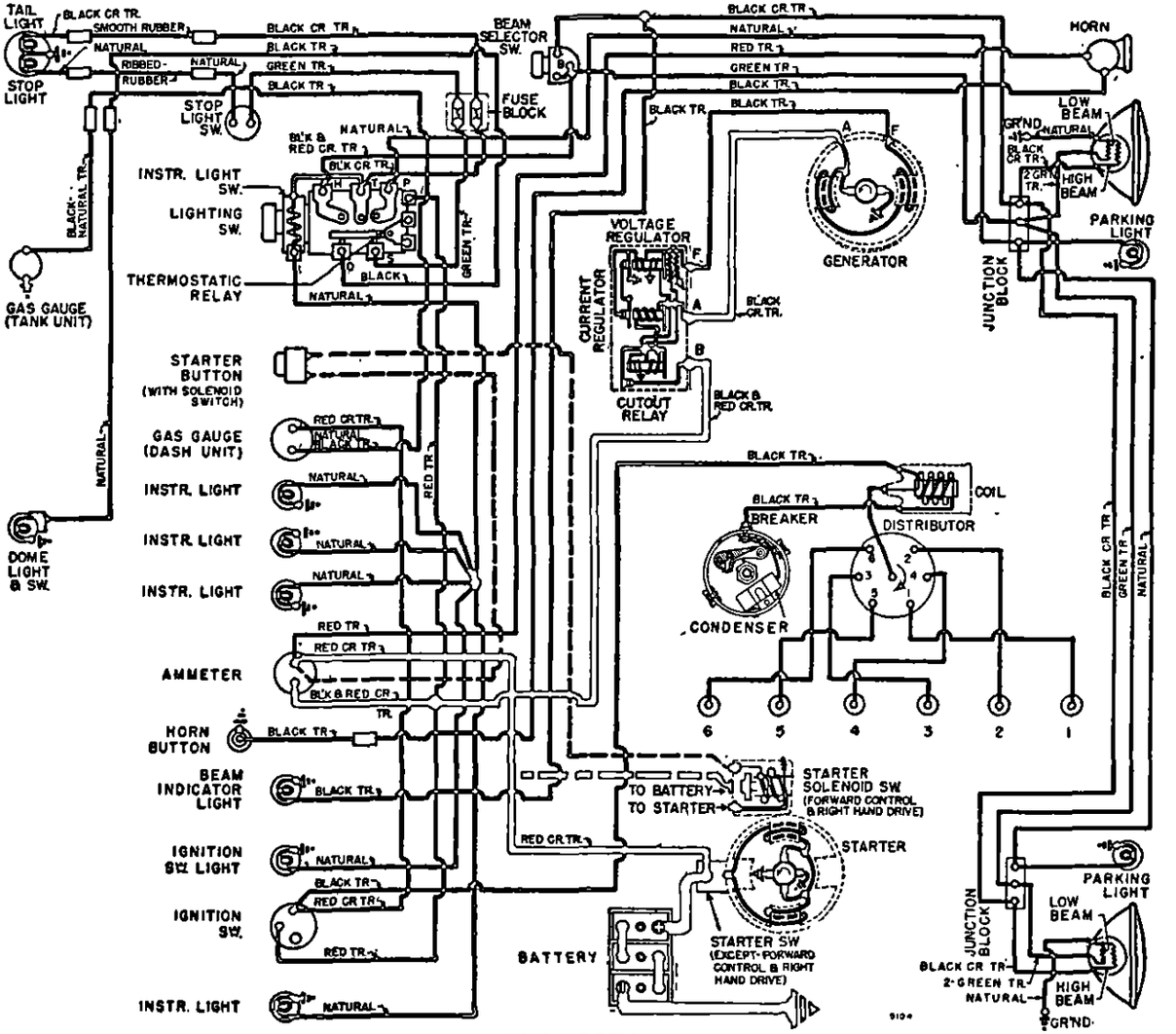
COMPRESSION PRESSURE: 110 lbs. minimum (all cylinders equal within 5-10 lbs.) at cranking speed.
VACUUM READING: Steady 17-21" at idling speed.
FIRING ORDER: 1-5-3-6-2-4.
SPARK PLUG GAPS: .035".
Plugs—AC No. 44-5 Comm. 14 mm. type.
▷***CAUTION—Tighten plugs to 20-25 ft. lbs. torque or finger-tight plus one-half turn.***

DISTRIBUTOR: Delco-Remy No. 1112362 (216" Engine), No. 1112363 (1952 235" Engine), No. 1112389 (1953 235" Engine). Automatic and vacuum advance type with Octane Selector adjustment.

Breaker Gap:	New Points	Used Points
1112362, 63 Distr.	.018-.024"	.015-.022"
1112389 Distr.	.016-.021"	.0125-.0175"

Cam Angle—(1112362, 63) 34°, new points; 39°, used. (1112389 Distr.) 38° (new points), 42° (used points).
Breaker Arm Spring Tension—(1112362, 63) 17-21 ozs. (1112389) 19-23 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115380 (Exc. C.O.E. Models). Delco-Remy No. 1115378 (C.O.E. Models). On right side of engine above distributor.



1952 MODELS

Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: 5° BTDC.
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on 'O.'
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.
Timing Procedure—*See Ignition Timing.*

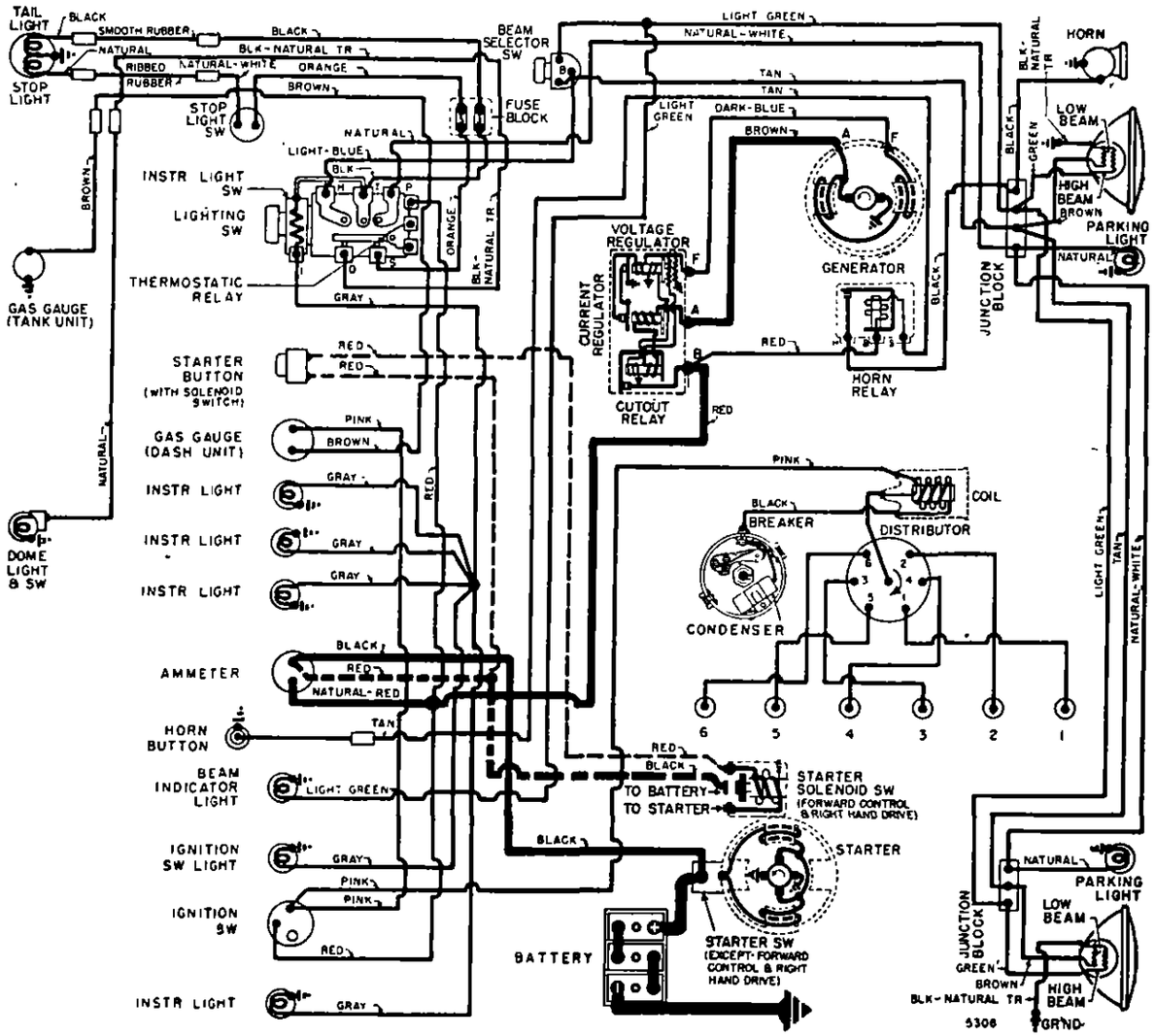
CARBURETION: (Except C.O.E. & Fwd. Control)—Rochester B, (216" Engine) No. 7004475, (1952 235" Engine) No. 7004476, (1953 235" Engine) No. 7004468. Downdraft type with manual choke control.

Idle Setting—1-2½ turns open (turn screw out for richer mixture).

Idle Speed—450-500 RPM.

Float Level—1 5/16" from bottom of each float to cover gasket **(do not remove gasket)** with cover inverted so that needle closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.

►***CAUTION—Both floats must be set alike and must not be twisted out of alignment.***



1953 MODELS
PLASTIC COVERED WIRE COLORS SHOWN. SEE "EARLY PRODUCTION WIRE COLORS."

Accelerating Pump—No seasonal adjustment.

Throttle Kicker: Operated by cam on choke lever. Opens throttle when choke closed. No adjustment.

CARBURETION: (COE & Fwd. Control)—Carter (BB) No. 871SA & 871SB. Updraft type.
Idle Setting—½-1½ turns open (turn screw out for richer mixture).
Idle Speed—450-500 RPM.
Float Level—Top of float (not seam) 0" to 1/32" below top of bowl with needle valve seated. Use Gauge J-818-13A on top edge of bowl (gasket removed), press float lever lip firmly against needle.
Accelerating Pump—Inner holes (in plunger shaft and throttle lever) Summer, Outer holes Winter.

Fuel Pump Pressure: 4 lbs. maximum.

CRANKCASE VENTILATOR VALVE (Std. on FWD. Control, Optional on other Trucks): Remove and clean valve and tube (from valve to oil filler pipe) at 10,000 mile intervals or more often if required. *See LUBRICATION for servicing data.*

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Spring should have approximately ½ turn wind-up from free position. ***CAUTION—Replace distorted springs. Excessive tension will cause valve sticking.***

VALVE TAPPET CLEARANCE: ***CAUTION—Engine must be "normalized" by running at fast idle of approximately 600 RPM for 30 minutes or until oil temperature stabilized. Then set as follows:***
Normal Operation—.006-.008" Intake, .013-.015" Exhaust, with engine "normalized."
Heavy Duty (Full-Throttle) Operation—.010" Intake, .020" Exhaust, with engine "normalized."

CONTINUED ON NEXT PAGE

WIRE COLORS—EARLY PRODUCTI N

►***1953 WIRING COLOR CHANGE & IDENTIFICATION***

CAUTION: Both FABRIC covered and PLASTIC covered wires used in production. DIFFERENT wire colors used with each type and wires can be identified as follows:

Plastic Covered Wires—Colors are shown on the 1953 wiring diagram.

Fabric Covered Wires—All wires are NATURAL with tracer colors. The equivalent Plastic covered wire colors (as shown on diagram) are as follows:

Fabric Colors	Plastic Colors
10 Gauge Wire	
Red or Red Cross Tracer	Red
Red & Black Cross Tracer	Red
Black Cross Tracer	Brown
12 Gauge Wire	
Red Tracer	Black
Black Cross Tracer	Light Green
Black & Red Cross Tracer	Light Blue
14 Gauge Wire	
Red Tracer	Red
Green Tracer	Tan
Black Cross Tracer	Light Green
16 Gauge Wire	
Natural	Natural White or Gray
Black Tracer	Light Green
Black Cross Tracer	Black
Green Tracer	Tan or Orange
18 Gauge Wire	
Natural	Natural White
Black Tracer	Tan, Dark Blue, or Brown
Black Cross Tracer	Black
Red Cross Tracer	Pink
Green Tracer	Orange

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IGNITION

IGNITION SWITCH: Delco-Remy No. 1116464.

COIL: Delco-Remy No. 1115380 (Exc. COE); No. 1115378 (COE). On right side of engine.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112362 (216" Engine), No. 1112363 (1952 235" Engine), No. 1112389 (1953 235" Engine). Automatic and vacuum advance type with Octane Selector adjustment.

Breaker Gap:	New Points	Used Points
1112362, 63 Distr.	.018-.024"	.015-.022"
1112389 Distr.	.016-.021"	.0125-.0175"

Cam Angle—(1112362, 63) 34°, new points; 39°, used. (1112389 Distr.) 38° (new points), 42° (used points).
Breaker Arm Spring Tension—(1112362, 63) 17-21 ozs. (1112389) 19-23 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—1112362

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	375	0-4	750
4.5-6.5	600	9-13	1200
10-12	1200	20-24	2400
17-19	1700	34-38	3400

Automatic Advance—1112363

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	375	0-4	750
4-6	700	8-12	1400
10-12	1350	20-24	2700
14.5-16.5	1850	29-33	3700

Automatic Advance—1112389

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	350	0-4	700
7-9	750	14-18	1500
11-13	1200	22-26	2400
16-18	1800	32-36	3600

Vacuum Spark Control: Delco-Remy No. 1116043 (All Trucks). Separate unit linked to advance arm.
Plunger Travel—17/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
9-11°	18-22°	18.5"

IGNITION TIMING

Standard Setting① ..... **5° BTDC**
①—Adjust Octane Selector for grade of fuel being used. See Octane Selector Setting below.
Timing (with Timing Light)—Connect timing light to No. 1 spark plug, direct light on flywheel through inspection hole in right front face of housing. Set Octane Selector pointer at "0". Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball inserted in flywheel) lines up with pointer. Tighten clamp bolt.
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETOR

R CHESTER

CONVENTIONAL TRUCKS—ROCHESTER Model B, (216" Engine) No. 7004475, (1952 235" Engine) No. 7004476, (1953 235" Engine) No. 7004468. Single barrel downdraft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*

Metering Jets—*See Rochester Jet Specifications in Carburetor Section.*

Throttle Kicker: Operates by cam on choke lever—opens throttle when choke closed. No Adjustment.

CARTER (B&B)

C.O.E. & FORWARD CONTROL—CARTER (BB) No. 871SA & 871SB. 1¼" Single barrel updraft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*

Metering Jets—*See Carter (BB) Updraft Jet Specifications in Carburetor Section.*

CARB. EQUIPMENT

Air Cleaner: AC Oil Bath & Oil-Wetted types.

Fuel Pump: AC. Type AF diaphragm type Std. Combination fuel-and-vacuum type Optl.
Replacement Pump—AC No. 9798 (Std. pump), No. 9803 (Early 1952 Optl. Fuel-and-Vacuum), No. 9797 (Late 1952 & 1953 Optl. Fuel-and-Vacuum).
Pressure—4 lbs. maximum.
See Carburetion Equipment Section for complete data.

Crankcase Ventilator: AC Valve No. 1544935 or No. 1543979. Optl. *See Tune-Up.*

Gasoline Gauge: AC Electric type.
Dash Unit—1517169 (all models).

Tank Unit—	AC Number
½ & ¾ Ton	①1517500 & ②1515466
¾ Ton (3602, 3612)	1516999
1 Ton (3803, 4, 8)	1515466, (Other) 1516983
1½ Ton (4102 thru 4112)	1516983, (4502) 1516334
(Others)	1517500
2 Ton exc. COE (6702)	6103, 8; 6403, 8, 18) 1517500
(Others)	1516334
2 Ton COE (VP & S 5100)	1517500, (Other) 1515467

①—11 1/32" float travel. ②—12 1/16" travel.
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA-6. 6 volt, 15 plate, 100 ampere hour capacity (20 hour rate).
Grounded Terminal—Negative (—).
Location—Under front floor on right side (Forward Control Trucks on frame on right side of engine).

School Bus: Delco Type 19Q6. 6 volt, 19 plate, 125 ampere hour capacity (20 hour rate).
Grounded Terminal—Negative (—).
Location—Under hood.

STARTER

Model	Delco-Remy Starter	Armature
All (exc. Fwd. Control)	1107108	1917855
Fwd. Control Models	1107109	1917855

Drive—(Exc. Fwd. Control)—Overrunning clutch and pedal operated manual pinion shift.
Drive—(Fwd. Control Models)—Overrunning clutch and solenoid pinion shift with pushbutton control.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Starting Switch: 1107108 Starter—Delco-Remy No. 820052. On starter, operated by starting pedal.
(1107109 Starter) Delco-Remy Solenoid No. 1118102 (no relay) mounted on starter and controlled by Pushbutton No. 1996055 on instrument panel.

GENERATOR

Delco-Remy. Two brush type with voltage and current regulation as listed below.

Model	Delco-Remy Nos. Generator	Armature
1952 Early Trucks	1102749	①1921235
1952 Later Trucks	1100013	①1921235
1953 ½, ¾, 1 Ton	1100018	1925348
1953 1½, 2 Ton	1102793	1924893
Optl. Dr.-to-Dr. ('52)	1105002	1918009
Optl. Dr.-to-Dr. ('53)	1105009	1925630
Optl. (Heavy Duty)	1106757	1920909

①*CAUTION—1951 Armature No. 1879002 (4 turn type) must not be used on these 1952 generators with Regulator No. 1118720 (will be overloaded).*
Maximum Charging Rate—Controlled by regulator and dependent on battery condition.

Performance Data—Cold

Generator	Amperes①	Volts	RPM
1102749②	30	8.0	2050
1100013②	35	8.0	2650
1100018	45	8.0	3000
1102793	45	8.0	2450
1105002, 9	40	7.0	1700
1105008	50	7.0	2100
1106757	50	7.5	1410

①—Not maximum output. See Current Regulator.
②—*Current and Voltage Regulator Nos. 1118720 or 1118301 MUST BE USED WITH THESE GENERATORS.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs. (Exc. 1106757). 20 ozs. (1106757).
Field Current—1.85-2.03 amperes (1100013), 1.87-2.0 amperes (1100018, 1102793), 1.75-1.95 amperes (1102749), 1.77-1.93 amperes (1105002, 8, 9), 1.70-1.95 amperes (1106757), all at 6.0 volts.

Belt Adjustment: *CAUTION "Narrow" belts require special setting:*
Narrow Belt (½, ¾, 1 Ton)—Adjust to 7/16-½" deflection with thumb pressure midway between generator and fan pulleys. **Recheck new belts after 1000** miles service, and readjust if deflection (as above) more than ½" with 15 lbs. pressure.
Regular Belt (Other Trucks)—Adjust to ¾" deflection midway between generator and fan pulleys. These belts not as critical as narrow type.

REGULATOR

Delco-Remy. Current and voltage regulator.

Regulator No.	For Generator No.
1118720 (See Caution)	1102749 & 1100013
1118725	1100018 & 1112793
1118722	1105001 & 1105008
1118390	1106757
1118721	1105002 & 1105009

▷*CAUTION—Regulator No. 1118720 used only with 1952 Generator Nos. 1102749 & 100013 with Armature Nos. 1921235 & 1921351 (3½ turn type). Regulator No. 1118301 can be used for replacement on these generators.*
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct for high charging rate or high voltage.

Cutout Relay (All)
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Regulator No.	Setting (Hot)①	Set (Hot)
1118720	7.0-7.7 volts	7.4 volts
1118725	7.0-7.7 volts	7.4 volts
1118722	6.8-7.5 volts	7.2 volts
1118721	6.8-7.5 volts	7.2 volts
1118390	6.8-7.4 volts	7.2 volts

①—Regulator is over compensated for temperature.

Check after 15 minutes charging at 8-10 amperes.

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Regulator No.	Set To (Hot)①	Range
1118720	48 amps.	34-42 amps.
1118725	47 amps.	45-51 amps.
1118722	50 amps.	48-52 amps.
1118721	42 amps.	40-46 amps.
1118390	55 amps.	53-57 amps.

①Regulator is over compensated for temperature.

Check after 15 minutes charging at 8-10 amperes.

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" Type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red dot on lower edge of speedometer. Lighted when upper beams in use.

Switches

Lighting—Delco-Remy No. 1995048.
Instrument—Part of lighting switch (rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.
Stop Light—Delco-Remy No. 1997901 (mech. type). On underside of toe pan between brake and clutch pedals.

MISC. ELECTRICAL

FUSES: Fuse Block No. 1998781 (with snap-on cover) located on engine side of dash (exc. Forward Control), under instrument panel (Forward Control).
NOTE—Spare fuse mounted in fuse block cover.
Stop Light—20 ampere (in fuse box).
Tail Light—20 ampere (in fuse box).

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable. Protects lighting circuits together with fuses listed

HORNS: Delco-Remy. (1952) No. 1999801, (1953) No. 1999657. Vibrator type.

HORNS: Delco-Remy No. 1999657. Vibrator type.
Horn Current—7-9 amperes at 6.0 volts.
Air Gap—.027-.033".

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. Valve-in-head.

►*TWO DIFFERENT ENGINES USED:*

216" **Thrift-master**—Std. on Half-Ton, ¾ Ton, 1 Ton, 1½ Ton, except Forward Control Models.
235" **Load-Master**—Std. on 2 Ton, Forward Control Models & C.O.E. Models. Optional on all 1½ Ton Models. *NOTE*—Engines on C.O.E. & Forward Control Models have updraft type carburetors and different horsepower output.

Engine	Bore	Stroke	Displacement
216"	3½"	3¾"	216.5 cu. ins.
235"	3 9/16"	3 15/16"	235.5 cu. ins.

1952 Engines

Engine	Compr. Ratio	Rated H.P.	Developed H.P.
216"	6.6-1	29.4	92 at 3400 RPM
235"	6.7-1	30.4	105 at 3500 RPM
235" C-O-E	6.7-1	30.4	100 at 3500RPM
235" Fwd. Cntr.	6.7-1	30.4	92 at 3500 RPM

1953 Engines

Engine	Compr. Ratio	Rated HP	Developed HP
216"	6.6-1	29.4	92 at 3400 RPM
235"	7.1-1	30.4	108 at 3600 RPM
235"①	7.1-1	30.4	107 at 3600 RPM

①—C.O.E. & Forward Control Models.

Compression & Vacuum Reading—*See Tune-Up.*

►**Non-Interchangeable Parts**—Parts interchangeable between the 216" and 235" engines except as follows: Cylinder Block and Crankcase, Cylinder Block Assembly (Short Block), Push Rods (approx. ¾" longer on 235" engine and identified by shoulder just below cup at top end), Valve Lifters, Camshaft, Piston and Pin Assemblies, Piston Rings, Crankshaft, Oil Pan Pipe assembly, Oil Distributor to Valve Rocker Shaft Pipe Assembly, Oil Pump Screen Cover Support assembly.

ENGINE REMOVAL: *See Chevrolet Special Data.*

ENGINE MOUNTINGS (Installation & Adjustment): *See Chevrolet Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Chevrolet Special Data.*

►*CAMSHAFT CAUTION: See 1952 and 1953 Chevrolet Passenger Car Engine Data for Camshaft used in each engine. CAMSHAFTS NOT INTERCHANGEABLE.*

OTHER ENGINE DATA: *See 1952 and 1953 Chevrolet Passenger Car pages for all engine data (Pistons, Connecting Rods, Crankshaft, Camshaft, Bearings, Valves, etc.).*

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—Engine temperature must be "normalized" by running at fast idle of approximately 600 RPM. for 30 minutes or until oil temperature stabilized before adjusting tappet clearance. See "Tappet Clearance Adjustment" in Chevrolet Special Data.*
Normal Operation—.006-.008" Intake, .013-.015" Exhaust, with engine "normalized".
Heavy Duty (Full Throttle Operation)—.010" Intake, .020" Exhaust, with engine "normalized".

►*CAUTION—If Valve Rotators are used set Exhaust Valve Clearance at .018-.020".*

VALVE TIMING: Camshaft Setting—Timing gears punchmarked. Punchmarked tooth of camshaft gear must be meshed with punchmarked space on crankshaft gear.

Valve Timing

Intake Valves—Open 1° ATDC. Close 39° ALDC.
Exhaust Valves—Open 42° BLDC. Close 9° ATDC.
Valve Timing Check—Remove all tappet clearance from #1 exhaust valve, turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer in right front face of flywheel housing, mount dial indicator on rocker shaft support with stem contacting #1 exhaust valve adjusting screw, set dial indicator at .044". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004".

LUBRICATI N

Engine Oiling System: Pressure and positive splash system. Pressure to main bearings, camshaft bearings, timing gear and to overhead valve system (low pressure). Connecting rod bearings lubricated by oil dippers which scoop oil from troughs (low speed) and directly from nozzles (high speed). Oil is divided between high and low pressure systems by OIL DISTRIBUTOR VALVE on left side of engine.
CAUTION—Engine lubrication dependent upon adjustment of connecting rod dippers, oil troughs and nozzles which must be **checked each time oil pan is removed** (requires special gauges).
Crankcase Capacity—5½ qts. (dry), 5 qts (refill).
Normal Oil Pressure—14 lbs. at 2000 RPM.
Oil Pressure Regulator—Located in oil pump cover. Opens at 60 lbs. Non-adjustable type. Pressure normally controlled by Oil Distributor Valve on left side of engine which normally opens at 15 lbs.

Rocker Arm Oil Lead & Overflow Pipe Servicing: *See "Oiling System" in Chevrolet Special Data.*

Oil Pump: Located in crankcase. Driven independently through short shaft by gear on camshaft.
Oil Pump Overhaul: *See Chevrolet Special Data.*
Oil Pump Installation—Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered setscrew. See that screw seated firmly in tapered hole in pump housing before tightening locknut.

Oil Distributor: *See "Oiling System" in Chevrolet Special Data.*

Checking Oiling System: Check entire system (Dipper height, Oil pan trough height, Oil nozzle height & aim) each time oil pan removed.
See "Oiling System" in Chevrolet Special Data.

Oil Filter: Optl. Replace filter cartridge every 5000 miles or more often if required.
Filter Cartridge—AC No. P-115 or C-115.

Crankcase Ventilation (All Trucks except Forward Control Models): Regular velocity type with air intake through valve rocker cover (air cleaner on some models), outlet pipe on right side of engine.
Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and reoil at 2000 mile intervals or more often if required by operating conditions.

►**Positive Crankcase Ventilation (Std. on all Forward Control Models, Optional equipment on others):** Vacuum operated ventilator consisting of vacuum pipe from oil filler pipe to a ventilator valve in fitting on intake manifold. Valve is spring loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling to give proper air fuel mixture.**
Servicing—Every 5000 miles (or oftener if required), clean vacuum pipe, valve, and filler pipe thoroughly. Oil filler cap gasket must seal tightly. Test vacuum valve as follows:

Vacuum Valve—With valve disassembled, check spring tension—must be 7.5 ozs. with spring compressed to .418-.432". If defective, replace with new valve assembly, Part No. 1543979.

►*CAUTION—Make certain that spring attached to valve (end coil pushed over ridge and into groove under head of valve) to insure valve closing properly when idling (mixture will be too lean if valve not closed).*

Oil Pressure Gauge: AC No. 1507401. Not electric.

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COOLING

Cooling System: Positive circulation with water pump on front of engine. Pressure type (relief valve) radiator cap used on Cab-Over-Engine Trucks.
Capacity—15 qts. (with 216" Engine), 17½ qts. (with 235" engine). NOTE—Heavy Duty 17½ qt. radiator Optl. on ¾, 1, 1½ Ton & 137" & 161" School Bus.

Pressure Valve (All Models exc. Forward Control): AC No. 850501 (stamped 501/4#). Radiator Filler Cap. Opens at 4 lbs.

Radiator Core Removal: *See Chevrolet Special Data.*

Water Pump: Double-outlet, packless type with sealed ball-bearing shaft.
See Water Pump Section for complete data.

Thermostat. Harrison. In cylinder head water outlet.
Std.—No. 3123993 (stamped 151). 151° type. Can be used for alcohol anti-freeze.
Optl.—No. 3123994 (stamped 160) 160° type or No. 3123995 (stamped 180) 180° type. Use for permanent anti-freeze.

Temperature Gauge: AC. Not Electric.

	1952	1953
All exc. C-O-E & Fwd. Contr.	1512148	1512701
C-O-E & Fwd. Contr.	1512150	1512703

CLUTCH

Own Make. Diaphragm spring, single plate, dry disc type. NOTE—Half-Ton Trucks use 9" clutch, all other models 10¾" type.
See Clutch Section for complete data.
Facings—Moulded Asbestos, 2 required as follows:

	I.D.	O.D.	Thickness
9" type	6⅛"	9⅛"	.132-.138"
10¾" type	7"	10¾"	.137-.143"

Adjustment: Pedal-free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking pedal free travel.

Removal: Remove transmission (see Transmission Removal below). Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

3-SPEED

Own Make. Three-speed, all helical gear type, Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

▷*GEARSHIFT LEVER RATTLE: May be caused by loose spring in lever. See "Chevrolet Synchro-mesh Transmission" in Transmission Section.*

▷*1952 HIGH GEAR DISENGAGEMENT: Can be corrected by installing 1953 type parts. See "Chevrolet 3-Speed Synchro-mesh" in Transmission Section.*

▷*1953 TRANSMISSION PRODUCTION CHANGE (TO MINIMIZE GEAR RATTLE) & REPLACEMENT PARTS CAUTION: See "Chevrolet 3-Speed Synchro-mesh" in Transmission Section.*

Transmission Control: Mechanical type with shift lever mounted on steering column.
See Transmission Section for complete data.

Removal (Half-Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Remove battery. Remove four capscrews holding universal joint collar on rear bearing retainer, remove bolts holding transmission support on frame cross-member. Support propeller shaft with jack, slide universal joint ball and collar back on shaft, split front universal by removing capscrews retaining front trunnion bearings on front yoke. Raise propeller shaft as far as possible with jack to provide clearance. Remove two top transmission mounting screws, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove two lower transmission mounting screws, slide transmission straight back on guide pins until main drive gear shaft is free from clutch driven member, lift transmission up and remove through floor opening.

Removal (¾ Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Split intermediate universal by removing trunnion bearing "U" bolts, lower rear propeller shaft to floor. Remove four capscrews holding universal joint collar on rear bearing retainer, slide ball collar and retainer back on housing. Remove two bolts and nuts mounting intermediate universal support bracket on frame cross-member, pull front propeller shaft assembly to rear and free of front universal joint. Remove transmission in same manner as on Half-Ton (above).

4-SPEED

Own Make. Four-speed, constant-mesh, synchro-mesh, helical gear (2nd, 3rd, and 4th), sliding spur gear (Low & Reverse). Floor mounted gearshift.
See Transmission Section for complete data.

▷*1952 TRANSMISSION PRODUCTION CHANGE (Eccentric Adjustment for Reverse Idler Gear): See "Chevrolet Truck 4-Speed Synchro-mesh" in Transmission Section.*

▷*1953 TRANSMISSION GEAR RATTLE CORRECTION & PRODUCTION CHANGE: Transmissions beginning Serial No. WP-34357 have Friction Dampener in Low & Reverse Sliding Gear. See "Chevrolet Truck 4-Speed Synchro-mesh" in Transmission Section.*

Transmission Control (Cab-Over-Engine): *See Chevrolet Special Data for Removal & Installation data.*
NOTE—Floor-mtd. gear shift used on Other Trucks.

Removal (½ & ¾ Ton): See 3-Speed Transmission data above. NOTE—On Forward Control Models shift lever and rear floor pan must be removed.

Removal (Other Trucks): Free steering gear grommet from floor, remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Split front universal joint by removing trunnion bearing "U" bolts (tape or wire trunnions together to prevent losing bearings), slide shaft down to one side to clear transmission. Remove two top transmission mounting capscrews, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove 2 lower transmission mounting capscrews, slide transmission straight back on guide pins until main drive gear shaft is free from clutch driven-member, remove transmission.

UNIVERSALS

▷*1953 UNIVERSAL JOINT PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION (3800 & 4000 Series, 3942, 5403, 5703 Models—Part Production):* Have modified universal joints for propeller shaft (larger-diameter trunnion with increased number of smaller-diameter rollers). *SPECIAL KITS (replacing both Old and New Style Joints as a unit, or individual new style assemblies are furnished as follows:*

Part	Old Part No.	New Part No.
Universal Joint Kit	609515	3707163
Cup & Roller Assy.	3661395	3707472
Trunnion Assy.	3660990	3705376

Half-Ton: Own Make. No. 591642 (3-Speed Trans.), 3689266 (4 Spd.). Same type as on Pass. Car. One used (in torque ball back of transmission).

▷*TORQUE TUBE BUSHING INSTALLATION (½ Ton Truck). See "Chevrolet Pass. Car & Half-Ton Truck Rear Axle" in Rear Axle Section.*

¾ Ton Truck: Front Universal—Own Make. Chevrolet No. 591646 (3-Spd. Trans.), 3689288 (4-Spd. Trans.). Same type as used on Half-Ton (above).
Intermediate & Rear Universal—Spicer Model No. 1351-5107X (Intermediate—slip joint), 1358-5104X (rear—permanent joint). Needle bearing type.

1, 1½, 2 Ton Trucks (Regular & C-O-E): Spicer Needle bearing type. Slip-joint used at intermediate position, permanent type at transmission and rear axle.

Spicer Model Nos.	Front	Intermediate	Rear
C-O-E 110" WB	1351-5107X	①	1358-5105X
Bus 199" WB	1358-5104X	②	1358-5104X
All Others	1358-5104X	1351-5107X	1358-5104X

①—No intermediate joint used (1 propeller shaft).
②—Two intermediate universals as follows: First—1358-5104X, second 1351-5107X (3 section shaft).

REAR AXLE

SEMI-FLOATING (HALF-TON)

Own Make. Semi-floating, hypoid gear type with Torque Tube drive. *NOTE*—Axle is same design as passenger car type.

▷*PROPELLER SHAFT COUPLING PRODUCTION CHANGE:* Later axles have coupling which is loose fit on rear axle pinion shaft (changed from hard press fit) and this coupling must be used with new type Pinion Bearing Nut No. 3703782 and Coupling Spring No. 3703792 (to provide tension on shaft).
See Rear Axle Section for complete data.

Ratio—4.11-1 Standard.

IDENTIFICATION NOTE—Axle may be identified by Serial No. prefix stamped on front face of carrier flange on right side as follows:
Detroit—(1952) KE, (1953) LU.
Buffalo—(1952) KF, (1953) LV.

▷**Axle Shaft Note**—Shafts unequal length (right shaft longer) and may be identified by identification mark stamped on shaft or by length as follows:

	Part No.	Length
Left (stamped "GM 769")	3694769	29 9/16"
Right (stamped "GM 770")	3694770	30 9/16"

Backlash—.005-.007". Screw adjustment.

Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel brake cylin-

ders, disconnect hand brake cables from idler lever and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolt and anchor plate. Remove spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly from beneath car.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove "C" washer on inner end, pull shaft out.

Axle Shaft Endplay—Free fit to .014" maximum.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

FULL-FLOATING (EXC. HALF-TON)

Own Make. Full-floating, hypoid gear (straddle mounted pinion) with Hotchkiss Drive.

►**1½ & 2 Ton Note**—Axle shaft splined to wheel hubs. *See Rear Axle Section for complete data.*

Ratios—As follows:

		Serial No. Prefix			
		Detroit		Buffalo	
Series	Ratio	1952	1953	1952	1953
3600 Std.	4.57-1	KG	LG	KH	LH
3600 Optl.	5.14-1	KQ	LQ	KR	LR
3742 Std.	5.14-1	KQ	LQ	KR	LR
3800 Std.	5.14-1	VJ	WJ	VK	WK
3800 Optl.①	5.14-1	VQ	WQ	VR	WR
3942 Std.	5.14-1	VC	WC	VD	WD
3942 Optl.①	5.14-1	VA	WA	VB	WB
4000 Std.	6.17-1	VL	WL	VM	WM
4000 Optl.	5.43-1	VE	WE	VF	WF
5000, 6000	6.17-1	VG	WG	VH	WH

①—Dual Wheel type.

Axle Identification Note—Axles may be identified by Axle serial number prefix letters stamped on top of carrier housing between reinforcing ribs. *See "Serial No. Prefix" in Ratio table above.*

Backlash—.005-.008". Screw adjustment.

Removal—Remove differential cover and axle shafts (see below). Disconnect rear universal by removing two U-bolts from rear yoke (wire trunnions to retain bearings). Slide shaft forward and lower to floor. Remove differential carrier mounting bolts.

Axle Shaft Removal & Wheel Bearing Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

TWO-SPEED REAR AXLE

Own Make (2 Ton Optl.). Full-floating, Two-speed Double reduction type with Hypoid Gears (First reduction), Helical Gears (Second reduction) and vacuum shift control.

See Rear Axle Section for complete data.

Ratio—6.13-1 (High), 8.10-1 (Low).

Axle Identification Note—Axle may be identified by Axle serial number prefix letters stamped on flat top of carrier on right side as follows:

Detroit—(1952) VN, (1953) WN.

Buffalo—(1952) VP, (1953) WP.

Two-Speed Shift Control: Vacuum power type with selector valve on instrument panel.

Removal: Carrier Assembly can be removed (without disturbing axle housing) as follows: Remove axle shaft flange mounting bolts, pull both axle shafts out of housing approximately 8" (to clear differential). Drain axle lubricant and remove inspection plate. Loosen hose clamps and slip hoses off vacuum cylinder hose connections. Disconnect rear universal joint by removing trunnion bearing "U" bolts from rear flange, slide propeller shaft assembly forward, tape universal bearing trunnions in place to prevent loss of needle bearings, swing propeller shaft out of the way (tie up to frame side rail). Remove capscrews mounting carrier on axle housing (support carrier by means of long punch inserted through one upper mounting screw hole in housing before removing last mounting screw). Place support jack under carrier assembly, roll assembly straight forward until differential clears housing, remove carrier assembly from beneath truck.

Axle Shaft Removal & Wheel Bearing Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

SHOCK ABSORBERS

Delco Hydraulic type. Single or double acting piston types or Direct acting type.

Direct Acting Types

Front—1052-M (½, ¾, 1 Ton).

Rear—1066Z (½ Ton), 1066T (¾ Ton), 967U (1 Ton).

Double Acting Types

Front—1730-A & B (Exc. C-O-E), 1730-C & D (C-O-E).

Rear—1722-E & F (1 Ton Forward Control), 2000-V & W (All models exc. 1 Ton Forward Control).

NOTE—Nos. shown as 1730-A & B indicate **Right** and **left** hand shock absorbers.

FRONT SUSPENSION

Front Suspension: Conventional "I" beam section front axle with Reverse Elliott ends and semi-elliptic springs.

Kingpin Inclination—7° 10' ± 1° crosswise (All).

Camber—1° ± ½° (All). Bend axle for corrections (when kingpin inclination is likewise off).

Caster—See table below. All specifications ± ½°. Use wedge shims for minor corrections (up to 2°), bending tools for greater corrections.

	Caster	Toe-In
½ Ton	1¾°	1/16-3/16"
¾ Ton (exc. Fwd. Contr.)	2½°	1/16-3/16"
¾ Ton Fwd. Contr.	3¼°	1/16-¼"
1 Ton Fwd. Contr.	2¼°	1/16-¼"
1, 1½, 2 Ton (exc. (C-O-E)	2¾°	1/16-¼"
C-O-E Trucks	3°	1/16-¼"

Toe-In—See table above. Adjust by turning tie rod. *CAUTION*—Tie rod ends must be aligned with studs.

Toe Out on Turns—Outer wheel turned 20°, inner wheel turned 23° ± 2° (all models).

STEERING GEAR

Saginaw Model. Ball bearing (re-circulating ball) Worm-and-Nut. Chevrolet Part Nos. as follows:

Truck Model	Part No.
½, ¾, 1½ Ton (exc. following)	270927
¾ & 1 Ton Forward Control	5660833
2 Ton & School Bus	270224
C-O-E Models	5662982

See Steering Gear Section for complete data.

►*STEERING GEAR BRACKET (FORWARD CONTROL MODELS) PRODUCTION CHANGE—New steering gear bracket reinforcement to increase the stability is now in production and can be used on previous models. See Chevrolet Special Data.*

BRAKES

Service Brakes: *THREE different types used:*

1) **Chevrolet Hydraulic (1952 only)**—¾ & 1 Ton (Front & Rear), 1½ & 2 Ton (Front Only).

2) **Chevrolet-Bendix Hydraulic**—(1952) ½ Ton (Front & Rear), (1953) All Models (exc. 1½ & 2 Ton Rear).

3) **Chevrolet Twinplex Hydraulic**—1½ & 2 Ton (Rear only).

See Brake Section for complete data.

Drums—Cast iron rim with steel web.

Model	Front — Diameter	— Rear
½ Ton	11"	11"
¾ Ton	11"	12"
1 Ton	12"	14"
1½ & 2 Ton	14"	15"

Lining—Molded type. (Riveted on 1½ & 2 Ton), Bonded on others.

Thickness—.202-.222" (11" Drum). .265-.272" (12 & 14" Drum). .392-.412" (15" Drum).

Clearance—Adjust for clearance as follows:

(1952 ¾-Ton Front & Rear, 1-Ton, 1½-Ton & 2-Ton Front Only)—Turn adjusting cover at end of wheel cylinder until shoe drags, then back off 5 notches (separate adjustment for each shoe).

(1952 1-Ton Rear Only)—Turn adjusting pinion stud in clockwise direction (facing flange plate from center of truck) until shoe drags slightly, then back off stud 2/3 turn (or four sides of the hex. head stud). Separate adjustment for each shoe.

(1952-53 ½-Ton Front & Rear, 1953 ¾ & 1-Ton Front & Rear, 1953 1½ & 2-Ton Front Only)—Remove adjusting hole cover on backing plate and turn notched adjusting screw until light drag is felt, then back off adjusting screw 7 notches and check for drag. If any drag noted, a Major Adjustment is required.

1½ & 2 Ton (Rear Only)—Remove adjusting covers from flange plate and turn rear adjusting screw until slight drag is felt, then back off 3 notches. Repeat on front adjusting screw, (2 adjustments on each wheel).

Hand Brake: ½, ¾, 1 Ton—Step-on pedal applies rear wheel service brakes. **1½ & 2 Ton**—Hand lever applies independent brake on propeller shaft.

Adjustment—Adjust each type as follows:

Half-Ton—With parking brake pedal released, adjust pedal pull rod clevis for ⅛" clearance between cross-shaft and frame cross-member at center. Depress foot pedal 1½", adjust clevis on forward end of each wheel cable to remove all slack (pull cable out of conduit by hand until positive stop is felt, adjust clevis and reconnect cable). Release rod handle under instrument panel must have ½" minimum clearance at support bracket.

¾ & 1 Ton—With parking brake pedal released, adjust brake pedal pull rod clevis until hole in end of cross shaft outer lever is correct distance to rear of center of cross-shaft: 29/32" (¾ Ton), ¾" (¾ Ton Fwd. Control), 11/32" (1 Ton), 19/32" (1 Ton Fwd. Control). Then adjust each wheel cable clevis at cross shaft lever end in same manner as Half-Ton (above).

1½ & 2 Ton—.010-.015" clearance between each shoe and brake drum (adjust the adjusting bolt for outer shoe clearance, nut on link rod for inner shoe.

Hydrovac Brake System—Standard on 2 Ton, Cab-Over-Engine and 1½ Ton Special Models. *See "Hydrovac Power Unit" in Brake Section of Manual for data.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to left front door hinge pillar post.
Starting Serial Number—001001 up.
Serial Number Prefix—'E', designating Series 2934.

►*SERIAL NUMBER NOTE—Serial Number example (E54F 001025) includes following identification data in sequence.*

Series ①	Year	Assy Plant ②	Serial No.
E	54	F	001025

①—See Serial Number Prefix above.
②—Assembled only at the Flint Plant.

ENGINE NUMBER: Stamped on boss on right side of cylinder block to rear of distributor.
Starting Engine Number—0001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ('F' for Flint, and 'T' for Tonawanda), Model Year, and Model Type.
Model Type Designation—'YG', Corvette 235" engine.

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. minimum with all cylinders equal within 5-10 lbs., at cranking speed.

VACUUM READING: At 500 RPM.—14.4" (with transmission in Drive Range). 16.7" (with transmission in Neutral). At 450 RPM. 14.5" (with transmission in Drive Range), 16.3" (with transmission in Neutral).
NOTE—Manifold vacuum reading at idle speed is lower than for 235" Conventional engine because of "high lift" cam used.

VALVE TAPPET CLEARANCE: .008" Intake. .020" Exhaust.

MANIFOLD HEAT CONTROL: Located in forward half of divided exhaust manifold.

►*MANIFOLD HEAT CONTROL NOTE*—Under normal operating conditions the heat control is not used and manifold is shielded by a plate installed between exhaust and intake manifolds to divert gases away from intake manifold. Manifold heat control valve spring has been reversed to hold valve in "off" position. If operation of manifold heat control valve is desired, it will be necessary to remove manifold shield and install heat control valve spring in correct position.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See Diagram.

SPARK PLUG GAP: .035".
Spark Plug—AC 44-5 (Use AC COM for continuous high speed driving).

COIL: Delco-Remy 1115394.
Ignition Current—3.0 amperes (idling), 5.4 amperes (stopped).

DISTRIBUTOR: Delco-Remy 1112314.
Condenser—Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set—Delco-Remy 1925852.
Breaker Gap—.019" (new points), .016" (used points).
Cam Angle—40.5-47.5° with .016" gap.

►*BREAKER GAP CAUTION*—Manufacturer recommends *final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension—19-23 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	2500

Octane Selector: Adjustment on distributor provides 10° spark advance or retard from center 'O' position.

Vacuum Spark Control: Delco-Remy 1116076
Plunger Travel—11/64-15/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
7.5	15.0	7.5-10

IGNITION TIMING

Setting—2° ATDC.
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing, with Octane Selector set on '0'. Then set Octane Selector as follows:
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETOR

Carter YH 2066S (1953 & Early 1954), YH 2066SA (Late 1954 & 1955). Horizontal type with manual choke control. *Three Carburetors Used per Engine.*

Idle Setting—½-1½ turns open. Turn screws out for richer mixture. *See Throttle Valve Synchronization below.*
Idle Speed—450 RPM with selector lever in "D" (Drive) position. *See Throttle Valve Synchronization below.*
Float Level—3/8" from bowl cover to top of float with bowl cover inverted and gasket removed.
Float Drop—With bowl cover in upright position, distance between float seam (at free end) and bowl cover should be 2". Adjust by bending stop tab on float arm.

Throttle Valve Synchronizing: (Preliminary)—With engine turned off and all three choke valves in wide open position, remove the throttle lever stop screw from each carburetor. Loosen the fillister head screws on carburetor shaft universal which secures couplings to throttle shaft at forward end of both center and rear carburetors. Snap accelerator pedal several times to allow couplings to find their normal position so there is no end pressure on throttle valves. Then tighten fillister-head screws. Loosen the two Allen head screws at front end of rear carburetor (*NOTE*—Clearance provided for throttle valve adjustment by holes in flexible couplings being larger than Allen head screws). Manually close throttle valve in rear carburetor, hold it tightly closed and then tighten the two Allen head screws on rear carburetor flexible coupling. Loosen the two Allen head screws at front end of center carburetor and manually close throttle valve in FRONT carburetor. Hold valve tightly closed and tighten the two Allen head screws on flexible coupling on front of center carburetor.

Checking Throttle Valve Synchronization: Throttle valves must be checked separately and in the following sequence and manner.

Rear Carburetor—Check closing of **rear** throttle valve by twisting (in closing direction) the **rear** lever of **rear** carburetor. *There should not be any noticeable signs of rotating on front end of REAR carburetor throttle shaft.* If rotation is noticeable, loosen Allen screws on rear of **center** carburetor and hold throttle valve in **rear** carburetor closed and tighten Allen screws. If rotation is still noticeable, loosen Allen screws at front of **rear** carburetor and hold **rear** carburetor throttle valve closed and tighten Allen screws.

Front Carburetor—Check closing off of front carburetor throttle valve by twisting (in closing direction) front lever of **front** carburetor. *There should not be any noticeable signs of rotating on rear end of FRONT carburetor throttle shaft.* If rotation is noticeable, loosen Allen screws at rear of **front** carburetor and hold throttle valve in **front** carburetor closed and tighten Allen screws. If rotation is still noticeable, loosen Allen screws on front of **center** carburetor and hold throttle valve in **front** carburetor closed and tighten Allen screws.

Center Carburetor—Check **center** carburetor throttle valve as follows: Disconnect accelerator rod at **center** carburetor. Close throttle valve in **rear** carburetor manually at rear end of **rear** carburetor. Hold closed and press throttle lever on **center** carburetor and check for rotation of **center** throttle shaft at front end. *There should not be any noticeable signs of rotating on front end of CENTER carburetor throttle shaft.* If rotation noticeable, correct by the Allen screws between **center** and **rear** carburetors. Close throttle valve in **front** carburetor manually at front end of front carburetor and check as outlined above. Correct by the four Allen screws between **center** and **front** carburetors.

Idle Speed & Mixture Adjustment: Assemble throttle lever stop screw and spring on center carburetor only, and adjust so throttle valves are slightly open. Set Idle Adjustment (mixture) screws ¾ turns open. Start engine and run until warm. Pull hand brake lever on and move transmission selector lever to "P" (Park) position. Adjust throttle lever stop screw on center carburetor for 500 engine RPM. Turn idle mixture screw on **rear carburetor 1/8 turn - no more,** in either direction to increase engine RPM or manifold vacuum. If there is no change, leave adjustment at ¾ turn. Repeat same with center and front carburetors. If RPM changed, correct speed adjustment on center carburetor. Repeat this adjustment more than once to make sure engine RPM or manifold vacuum remain at their highest point. Assemble throttle lever stop screws and springs in front and rear carburetors. Turn front and rear throttle lever stop screws until engine speeds up slightly, then back off screw at least one turn. **The center throttle lever stop screw is the only one which should control engine idle speed.**

Accelerating Pump—No seasonal adjustment required.

Fast Idle: With choke valve held tightly closed, there should be .020" (Gauge T109-29) clearance between throttle lever and bore of carburetor (side opposite idle port). Adjust by bending offset portion of choke connector link (use bending tool T109-213).

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►*OTHER DATA: See "Carter YH Carburetor" in Carburetor Section.*

Powerglide Throttle Linkage Adjustment: *See "Chevrolet Powerglide" in Transmission Section.*

Fuel Pump Pressure: 3½-5 lbs.

CARB. EQUIPMENT

Fuel Pump: AC (Fuel & Vacuum).
Replacement Pump—AC No. 4132.
Pressure—3½-5 lbs.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: AC Electric.
Dash Unit—AC No. 1517901.
Tank Unit—AC No. 1517911.
See "Fuel Gauges" in Carburetion Equipment Section.

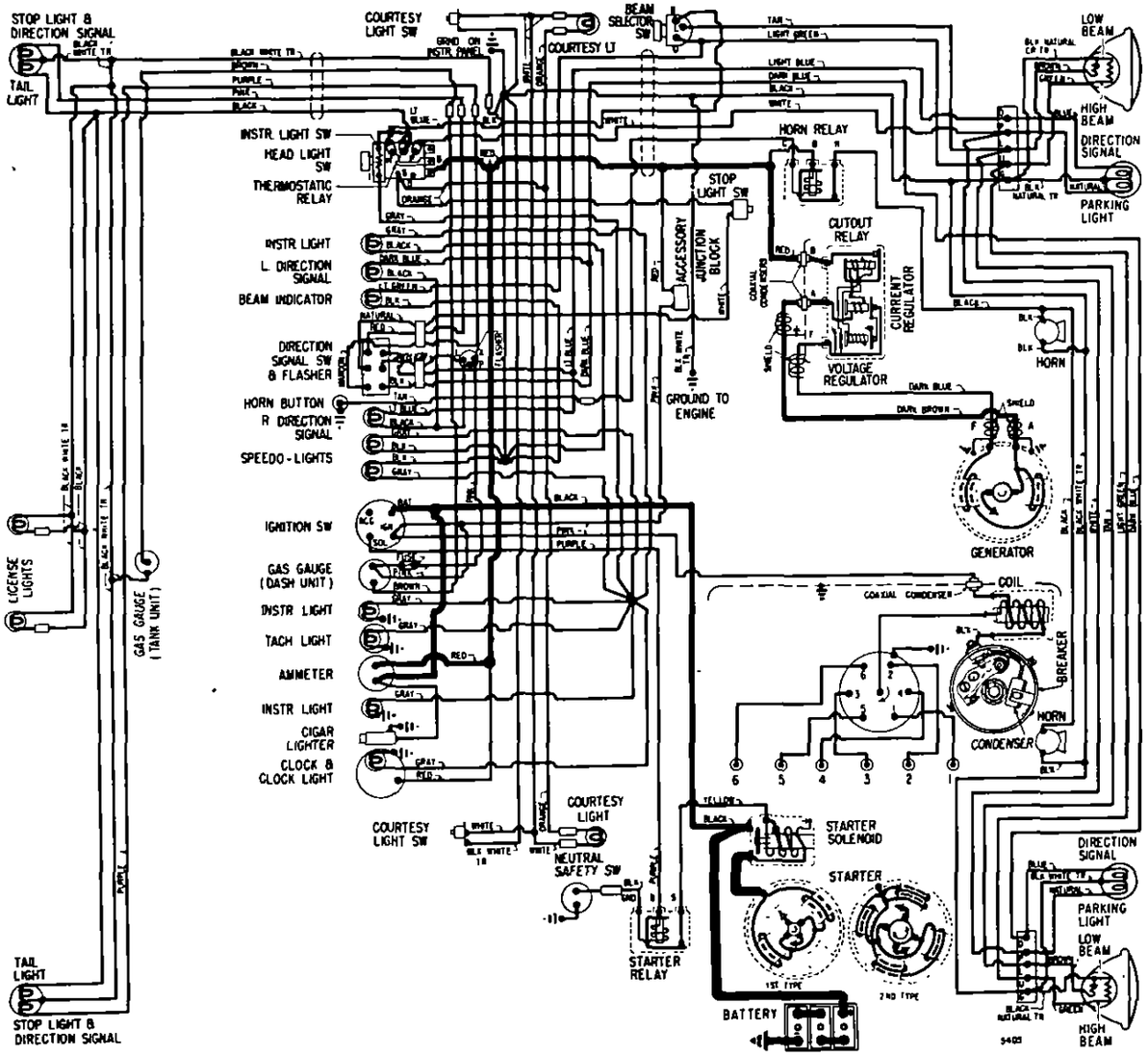
BATTERY

Delco 15AA6. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Battery Ground—Negative terminal.

STARTER

Delco-Remy 1107109 (First Cars), 1108035 (Later Cars).

►*STARTER NOTE: First 1107109 (two-coil) starter was superseded by later 1108035 (four-coil) starter.*



Armature No.—Delco-Remy 1917855 (All).
Drive—Overrunning clutch (solenoid pinion shift).
Brush Spring Tension—24-28 ozs.
Rotation—Counter-clockwise at commutator end.

Performance Data—1108035

Torque	RPM	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 ft. lbs.	Lock	3.0	600

Performance Data—1107109

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Starting Switch: Delco-Remy Solenoid Switch 1118135 *mounted on starter with separate relay,* Delco-Remy 1116886. Controlled by Starter & Ignition Switch, Delco-Remy 1116478. Turn key full RIGHT against spring tension to start.
See "Starter Controls" in Electrical Equipment Section.
Neutral Safety Switch: Delco-Remy 1998053.
Adjustment—See "Chevrolet Powerglide" in Transmission Section.

GENERAT R

Delco-Remy 1100018 (Early), 1100028 (Later).
Armature—Delco-Remy 1925348 (Gen. No. 1100018), 1929558 (Gen. No. 1100028).

Performance Data

Gen. No.	Ⓒ Amperes	Volts	RPM
1100018	45	8.0	3000
1100028	40	8.0	3000

Ⓒ—Not maximum output. See Regulator.
Brush Spring Tension—28 ozs.
Field Current—1.87-2.0 at 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: 7/16-1/2" belt deflection at point midway between pulleys with 15 lbs. pressure.

REGULATOR

1953 MODELS

Delco-Remy 1118725 (Use with Gen. No. 1100018).
►**Regulator Note**—Regulators have screw adjustment for settings and single regulator spring.
►*CAUTION—Check generator for grounded field coils and leads before changing regulator setting to correct high voltage or high charging rate.*

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—45-51 amperes (set to 47 amperes hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

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REGULATOR

1954-55 MODELS

Delco-Remy 1118827 (Use with Gen. No. 1100018), No. 1118843 (Use with Gen. No. 1100028).

►*REGULATOR NOTE–Checking procedure is different than for previous regulators. See "Delco-Remy 1118825 Series Regulators" in Electrical Equipment Section. Following Specifications are for "Normal" settings.*

Cutout Relay

Cuts In–5.9-6.7 volts (hot).

Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–6.9-7.4 volts (hot).

Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting (1118827)–42-47 amperes (hot).
Setting (1118843)–37-42 amperes (hot).

Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*

Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel). Remove switch retaining nut and switch assembly.

Stop Light Switch Location: Mechanical type mounted on underside of toeboard and operated by brake pedal.

FUSES: Located as indicated below.

Direction Signal–14 amperes. Located at end of lead at gasoline gauge terminal.
Radio–14 amperes. Located at end of lead at accessory junction block.
Heater–14 amperes. Located at end of lead at gasoline gauge terminal.
Parking Brake Alarm–14 amperes. Located at end of lead at accessory junction block.

CIRCUIT BREAKER: Located in main lighting switch. Protects all lighting circuits not protected by fuses.

HORNS: Delco-Remy 1999681 (Low Note). 1999682 (High Note).

Horn Relay: Delco-Remy 1116775.
Contacts Close–2.75-4.0 volts (set to 3.5 volts).
Contact Gap–.027". **Air Gap**–.014 " (closed).

ENGINE

ENGINE SPECIFICATIONS: Own 6 cylinder valve-in-head.
Bore–3 9/16". **Stroke**–3 15/16".
Displacement–235.5 cu. ins. **Rated H.P.** 30.4
Developed Horsepower–150 at 4200 RPM.
Compression Ratio–8.0-1
Compression & Vacuum Reading–*See Tune-Up.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

OTHER ENGINE DATA: *See 1954-55 Chevrolet 6 Cyl. Pass. Car Pages and note the following:*

CAMSHAFT: *NOTE–1953 & Early 1954 camshafts are different than later 1954 and 1955 camshafts. Later type camshafts are identified by 3 large raised dots located between No. 5 and No. 6 inlet cams.*
Camshaft Setting–Timing gears are punch marked, and punch marks on both gears must be lined up and directly opposite each other.

VALVES: *CAUTION–1954 & 1955 Exhaust valves are longer than 1953 valves. See below.*

Valves	Head Diam.	Stem Diam	Length
Intake	1 7/8"	.3410-.3417"	①6.364-6.394"
Exhaust	1 1/2"	.3400-.3407"	①4.902-4.932"

①–1953 valve length is 4.628".

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.405"	.001-.003"
Exhaust	45°	.414"	.002-.004"

Valve Springs: Two springs used per valve. Install springs with closed coil end down.

Outer Spring Specifications ①

	Spring Pressure	Length
Valve Closed	55.0 lbs.	1.880"
Valve Open	150.0 lbs.	1.490"

Inner Spring Specifications ①

	Spring Pressure	Length
Valve Closed	25.0 lbs.	1.810"
Valve Open	57.0 lbs.	1.420"

①–Intake and exhaust valve springs.

Valve Lifters: Barrel type identified by shallow groove around lifter. Not hydraulic.

VALVE TIMING

►*VALVE TIMING CAUTION: Timing is different with early and late type camshaft. See "Camshaft Setting" under CAMSHAFT above.*

First Type Camshaft

Intake–Opens 19°30' BTDC. Close 44°30' ALDC.
Exhaust–Opens 59° BLDC. Close 5° ATDC.

Later Type Camshaft

Intake–Opens 11°30' BTDC. Close 52°30' ALDC.
Exhaust–Opens 51° BLDC. Close 13° ATDC.
Valve Timing Check–Remove all tappet clearance from #1 exhaust valve. Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer on right face of flywheel housing. Mount dial indicator on rocker arm shaft with stem of indicator contacting #1 exhaust valve adjusting screw and set dial indicator to .090". Turn crankshaft until indicator reading is ZERO plus or minus .004". Reset tappet clearance to correct running clearance.

OILING SYSTEM

Crankcase Capacity: 5½ qts. (dry), 5 qts. (refill).
Normal Oil Pressure: 45 lbs. maximum.
Pressure Regulator Valve–In oil pump body. Not adjustable.
Oil Pressure Indicator–AC No. 1508063. Not electric.
Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

Oil Pump Overhaul–*See "Oil Pump" in Chevrolet Special Data.*
Oil Pump Installation–Assemble ground side of idler gear toward cover (use Chevrolet cover gasket only - controls pump clearance). Pump assembly mounted in crankcase by tapered screw. See that tapered screw seated firmly in hole in pump housing before tightening locknut.
Rocker Arm Lead & Overflow Pipe: *See "Oiling System" in Chevrolet Special Data.*
Crankcase Ventilation: Air intake through valve rocker arm cover, outlet through pipe on right side of engine.

COOLING

Water Capacity: 17.8 qts. (without heater), 18.3 qts. (with heater).
Pressure Valve: AC No. 850778 (Chrome). Radiator filler cap. 4 lb. type.
Thermostat: Harrison. Cylinder head water outlet.
Standard–No. 3123993 (stamped 151), 151°.
Temperature Gauge: AC No. 1512756. Not electric. *See "Temperature Gauges" in Miscellaneous Section.*
Water Pump: Double outlet, packless type with sealed ball-bearing shaft.
See "Chevrolet" in Water Pump Section.
Belt Adjustment–See Generator Belt Adjustment.

POWERGLIDE TRANSMISSION

Torque converter and hydraulically operated planetary gear unit with manual controls. Selector lever is mounted directly on transmission.

►*POWERGLIDE TORQUE CONVERTER DRIVE LUG PRODUCTION CHANGE: Three additional drive lugs have been added to cars in production (beginning with Serial No. C-409-D) and can be installed in cars before this serial number. See "Chevrolet Powerglide" in Transmission Section.*

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►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Chevrolet Powerglide" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubrication—Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing and "AQ-ATF" marking on container.

Capacity—(Refill) 10 qts. (Cars with converter drain plug). 5 qts. (cars without converter drain plug (See "Powerglide Draining Caution" below). **After Overhaul** 11 qts. (all cars).

►*POWERGLIDE DRAINING CAUTION: Converter drain plug eliminated during 1953 production. Drain transmission case only on cars without drain plug. Converter and transmission case on cars with drain plug.*

Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and control lever in "N" position when taking dipstick readings.

►*OTHER "POWERGLIDE" SERVICE DATA: See "Chevrolet Powerglide" in Transmission Section.*

UNIVERSALS

Own. Two used, with open propeller shaft.

REAR AXLE

Own. Semi-floating hypoid gear type with Hotchkiss Drive.

See "Chevrolet Hypoid" in Rear Axle Section.

Ratio—3.55-1. **Serial Prefix**—NW.

Axle Identification—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratio. See Serial Prefix (above).

Backlash—.005-.007". Screw adjustment.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washers on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove brake drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove 'C' washer on inner end, pull shaft out.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

SHOCK ABSORBERS

Delco. Direct acting non-adjustable. Serviced by replacement.

Front—Delco No. 538F. **Rear**—Delco No. 561P.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil spring.

See "Chevrolet" in Front Suspension Section.

Kingpin Inclination—3½-4½° plus or minus ½° crosswise.

Caster—Pos. ½°±½°. Adjustable.

Camber—Pos. ½°±½°. Adjustable.

Toe-In—0-1/8".

►*CAUTION—Align tie rods before tightening clamp bolts (ball studs will bind if not aligned).*

STEERING

Manual Steering: Saginaw Worm & Roller. With push-pull adjustment.

See "Saginaw Worm & Roller" in Steering Section.

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic. Hand lever applies rear wheel service brakes.

See "Chevrolet-Bendix Hydraulic" in Brake Section.

Drums—Diameter 11".

Wheel Cylinder Diameter—Front 1 1/8". Rear 1".

	Brake Lining Width	Thickness
Front Wheels	2"	.202-.222"
Rear Wheels	1¾"	.202-.222"

Length Per Shoe—9.3125" (Primary), 11.6875" (Secondary).

Braking Power—55.9% (front wheels), 44.1% (rear wheels).

Clearance—Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.

MISC. MECHANICAL

Windshield Wipers: Vacuum, cable operated.

See "Windshield Wipers" in Miscellaneous Section.

MODEL IDENTIFICATI N

Model Designation

Series	Serial Prefix	Wheelbase	Type
3100	H	116"	Half Ton
3600	J	125¼"	¾ Ton
3700	K	125¼"	⑦¾ Ton
3800	L	137"	One Ton
3900	M	137"	① One Ton
4100	N	137"	1½ Ton
4400	P	161"	1½ Ton
4500	R	161"	②1½ Ton
5100	S	110"	⑤2 Ton
5400	T	134"	⑤2 Ton
5700	U	158"	⑤2 Ton
6100	V	137"	2 Ton
6400	W	161"	2 Ton
6400	X	179"	2 Ton
6700	Y	199"	⑦2 Ton
6800	Z	212"	⑦2 Ton
5100S	SS	110"	⑦1½ Ton
5400S	ST	134"	③1½ Ton
5700S	SU	158"	③1½ Ton
6100S	SV	137"	⑨1½ Ton
6400S	SW	161"	⑨1½ Ton
6500S	SX	179"	⑨1½ Ton

⑦—Forward Control. ⑦—School Bus Chassis. ⑦—C.O.E. Special. ⑨—Special. ⑤—C.O.E.

SERIAL NUMBER: Stamped on plate on cab left hinge pillar post (Flat Face Cowl models have number on left hand cowl inner panel).

Starting Serial Number: 001001 (each plant—all models).

►*SERIAL NUMBER NOTE: Serial number (example V54K 001083) includes following identification data in sequence.*

Series①	Year②	Assy. Plant③	Serial No.
V	54	K	001083

①—Serial Prefix (see Model Designation above).
②—Year (1954) 54, (Early 1955) 55.
③—Assembly Plant Designation (see below).

Assembly Plant Designation

A—Atlanta	K—Kansas City	S—St. Louis
B—Baltimore	L—Los Angeles.	T—Tarrytown
F—Flint	N—Norwood	O—Oakland
J—Janesville		

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor.

Starting Engine Number: 0001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ("F" for Flint, and "T" for Tonawanda), Model Year, and Model Type. See following for Model Type Designation:

Series	Engine	Type Designation
3100-3600-3800	Thriftmaster 235"	①X
3100-3600-3800	Thriftmaster 235"②	⑦U
3100-3600-3800	Thriftmaster 235"③	⑦M
3700-3900	Loadmaster 235"⑧	⑤T
3700-3900	Loadmaster 235"③④	⑤L
4000	Thriftmaster 235"⑥	S
5000	Loadmaster 235"	R
5000	Jobmaster 261"	Q
6000	Loadmaster 235"	P
6000	Jobmaster 261"	N

⑦—"A" stamped following suffix when this engine used in 3600 Series, and "B" when used in 3800 Series.
②—With Heavy Duty Disc Clutch.
③—With Hydra-Matic Transmission.
④—With Updraft Carburetor.
⑤—"A" stamped following suffix when this engine in 3900 Series.
⑥—"A" stamped following suffix when "P" engine in 4000 Series.

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. minimum with all cylinders equal within 5-10 lbs., at cranking speed.

VACUUM READING: *CAUTION—Vacuum reading on 235" Thriftmaster & Loadmaster engines is different than on 261" Jobmaster engine.*

235" Thriftmaster & Jobmaster—17-21" at idling speed.

261" Jobmaster—At 500 RPM. 16.7" (in Neutral), **At 450 RPM.** 16.3" (in Neutral). *NOTE—Manifold vacuum reading at idle speed is lower than other models because of the "high lift" cam used.*

VALVE TAPPET CLEARANCE: (3000 Series Trucks)—Intake .006", Exhaust .016". **(All Others)**—Intake .006", Exhaust .020".

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. Distorted springs should be replaced.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See Diagram.

SPARK PLUG GAP: .035".

Spark Plug—AC No. 44-5 (Exc. 2-Ton). AC No. 43-5 (2-Ton). 14mm. types.

►*CAUTION: Tighten plugs to 20-25 ft. lbs. torque or finger tight plus one-half turn.*

COIL: Delco-Remy 1115380.

Ignition Current—2.5 amperes idling. 4.5 stopped.

DISTRIBUTOR: Delco-Remy 1112388 (Exc. 261" Engine), Delco-Remy 1112392 (261" Engine).

Condenser—Delco-Remy 1869704 (First type), Delco-Remy 1928111 (Second type with spade terminal).

Capacity—.18-.23 microfarad.

Contact Point Set—Delco-Remy 1924571.

Breaker Gap—.016-.021" (New Points), .0125-.0175" (Used points).

Cam Angle—38-45° with .016" gap.

►*BREAKER GAP CAUTION—Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension—17-21 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance—1112388

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Automatic Advance—1112392

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	350	0-4	700
7-9	750	14-18	1500
11-13	1200	22-26	2400
16-18	1800	32-36	3600

Octane Selector: Adjustment on distributor provides 10° spark advance or retard from center 'O' position.

VacuumSpark Control: Delco-Remy 1116043. Used with all truck distributors.

Plunger Travel—17/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-8.5"
10°	20°	18.5"

IGNITION TIMING

Setting (235" Engines)—2° ATDC. **261" Engines**—5° BTDC.

Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on 'O'. Then adjust Octane Selector as follows:

Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETOR
ROCHESTER

Downdraft types with automatic or manual choke.

Models	Rochester No.
235" Engine ⑦	②7004468
235" Engine ③	⑨7005921
261" Engine ⑤	②7005140

⑦—Except Forward Control, C.O.E. & Automatic Transmission models.

②—With Manual Choke.

③—With Automatic Transmission (Except Forward Control models).

⑨—With Automatic Choke.

⑤—Except C.O.E. models.

Idle Setting (Exc. 7005140)—1 to 2½ turns open, (turn screw out for richer mixture).

Idle Setting (7005140)—1 to 1½ turns open, (turn screw out for richer mixture).

Idle Speed—400-450 RPM. (Exc. Automatic Trans. models), 425 RPM. with Selector Lever in "N" position (Automatic Transmission models).

Float Level (All Models)—1 5/16" from bottom of each float to cover gasket (do not remove gasket) with cover inverted so that needle closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so floats drop down. Distance from gasket on cover to bottom of each float should be 1¾". Adjust by bending tang at rear of float assembly.

►*CAUTION: Both floats must be set alike and must not be twisted out of alignment.*

Accelerating Pump—No seasonal adjustment.

Fast Idle (7005921): To check setting, hold throttle in wide open position, check choke valve opening or clearance between lower edge of valve and air horn

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wall. This clearance should be .073" (Gauge BT-64 or Chevrolet Gauge J-5120). If clearance not correct, adjust by bending connector rod using tool BT-18 (Chevrolet Tool J-4552).

Throttle Kicker (Not used on 7005921)—Operated by cam on choke lever. Opens throttle when choke closed. No adjustment.

►*OTHER DATA–See "Rochester 'B' & 'BC' Carburetors" in Carburetor Section.*

Fuel Pump Pressure: 4 lbs. maximum.

Throttle Linkage Adjustment (Hydra-Matic): *See "Hydra-Matic Drive" in Transmission Section.*

CARTER

Carter (BB) 2075S (C.O.E), 8715B (Forward Control). Single barrel updraft type with manual choke control.

Idle Setting—½-1½ turns open (turn screw out for richer mixture).

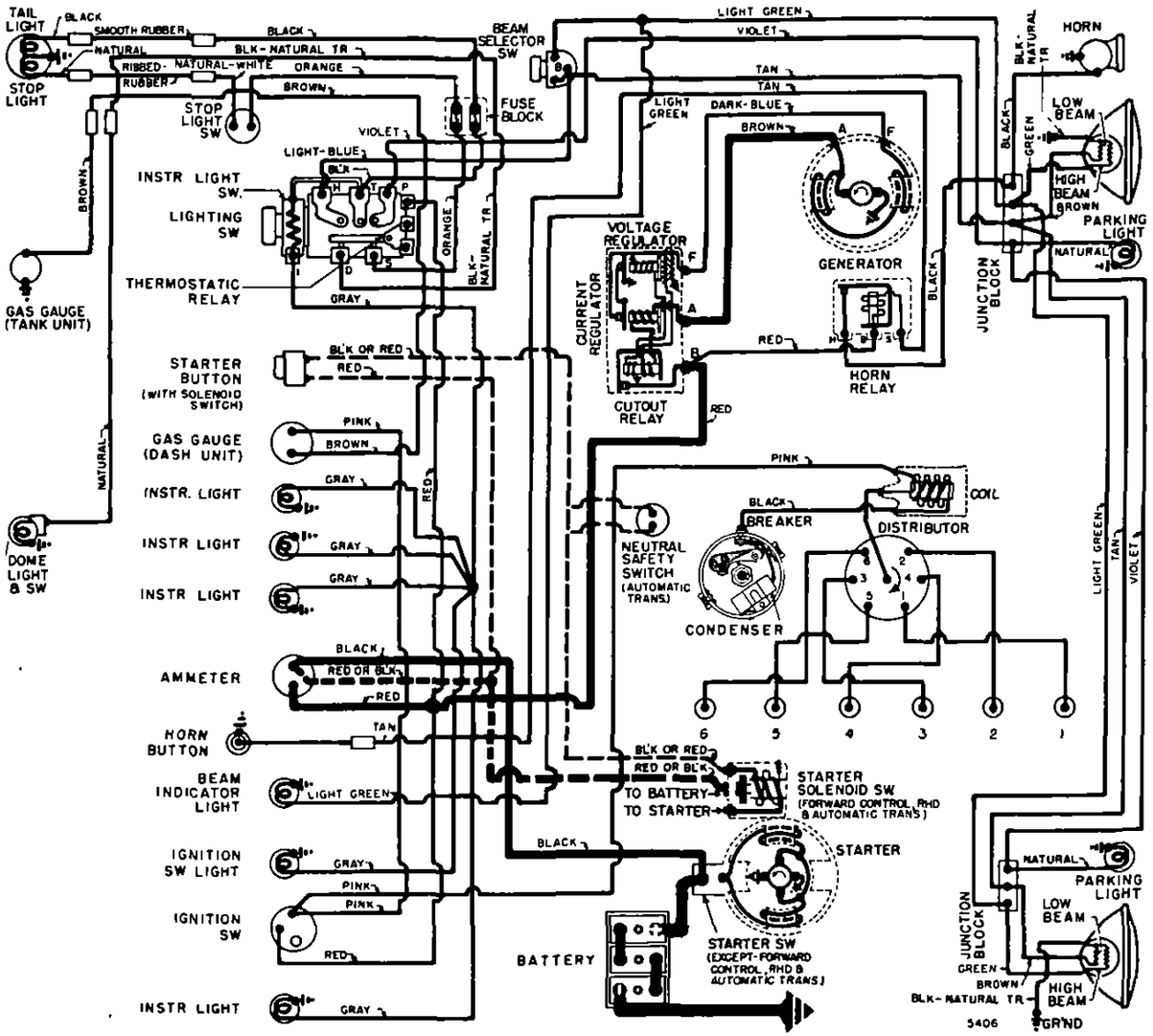
Idle Speed—450-500 RPM.

Float Level—Top of float (not seam) 0" to 1/32" below top of bowl with needle valve seated. Use Gauge J-818-13A on top edge of bowl (gasket removed), press float lever lip firmly against needle.

Accelerating Pump—Inner holes (in plunger shaft and throttle lever) Summer, Outer hole Winter.

►*OTHER DATA–See "Carter (BB) Carburetors" in Carburetor Section.*

Fuel Pump Pressure: 4 lbs. maximum.



CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.

Replacement Pump—AC No. 9798 (Fuel only), AC No. 9797 (Fuel & Vacuum).

Pressure—4 lbs. maximum.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: AC Electric.

Dash Unit—AC No. 1517880 (Exc. Flat Face Cowl). No. 1517168 (Flat Face Cowl).

Tank Unit—AC No. 1517951 (Exc. Forward Control, and Flat Face Cowl). No. 1517952 (Forward Control), No. 1517950 (Flat Face Cowl).

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco–15AA6 (Std. Exc. School Bus). 6 volt, 15 plate. 100 ampere hour capacity (20 hr. rate).

Delco–19Q6 (School Bus). 6 volt, 19 plate.

Battery Ground—Negative terminal.

Engine Ground— Engine to cowl.

STARTER

Model	Delco-Remy No.
All (Exc. F.C., Hydra-Matic & R.H.D.)	1107108
Forward Control & R.H.D.	1107109
Hydra-Matic Trucks	1107135

Armature—Delco-Remy 1917855 (All Starters).

Drive–(Exc. Forward Control & Hydra-Matic Models)—Overrunning clutch and pedal operated manual pinion shift.

Drive–(Forward Control & Hydra-Matic Models)—Overrunning clutch with solenoid pinion shift.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Starting Switch: 1107108 Starter—Delco-Remy 820052. On starter, operated by starting pedal.

1107109 & 1107135 Starter—Delco-Remy Solenoid 1118135 (no relay) mounted on starter and controlled by Pushbutton Switch 1996055 on instrument panel.

Hydra-Matic Neutral Safety Switch: Delco-Remy 1997845. Connected to starter control circuit prevents starter operating unless selector lever in "N" position.

Adjustment–*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy. Different generators used as follows:

Model	Generator No.	Armature No.
½, ¾, 1-Ton (Early)	1100018	1925348
½, ¾, 1-Ton (Late)	1100028	©1929558
2-Ton	1102793	1924893
Optl	1105008	1925556
Optl	1105009	1925630
Optl	1106757	1910073

©—Alternate wound (3½ turn) armature.

Maximum Charging Rate—Controlled by regulator and dependent on battery condition.

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Performance Data—Cold

Generator	Amperes ①	Volts	RPM
1100018	45	8.0	3000
1100028	40	8.0	2850
1102793	45	8.0	2450
1105008	50	7.0	2100
1105009	40	7.0	1700
1106757	50	7.5	1410

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—(Exc. 1106757)—28 ozs. (1106757) —20 ozs.

Field Current—(1100018, 1100028, 1102793) 1.87-2.0 amps.; (1105008, 1105009) 1.77-1.93 amps.; (1106757) 1.70-1.95 amps. All at 6.0 volts.

Belt Adjustment: (½, ¾, 1-Ton Models)—7.16-½" deflection with thumb pressure midway between generator and fan pulleys. Recheck new belt after 1000 miles service, and readjust if deflection (as above) more than ½" with 15 lbs. pressure.

1½ & 2-Ton Models—Adjust to ¾" deflection midway between generator and fan pulleys.

REGULATOR

Delco-Remy Regulator No.	Generator No.
1118827	1100018
1118843	1100028
1118827	1102793
1118835	1105008
1118831	1105009
1118833	1106757

►*REGULATOR NOTE—Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. All Specifications are "Normal" settings.*

Regulator "Normal" Settings

Regulator Number	Cutout Relay Closing Volts	Voltage Regulator Volts	Current Regulator Amperes
1118827	6.4	7.3	47
1118843	6.4	7.3	42
1118835	6.4	7.3	52
1118831	6.4	7.3	42
1118833	6.4	7.3	55

Cutout Relay Air Gap—.020". (with contacts just closed).

Cutout Relay Contact Gap—.020".

Voltage & Current Regulator Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel). Remove switch retaining nut and switch assembly.

Stop Light Switch Location: Mechanical type mounted on underside of toeboard and operated by brake pedal.

FUSES: Fuse block (with snap on cover) located on engine side of dash (exc. Forward Control), under instrument panel (Forward Control). *NOTE*—Spare fuse located in fuse block cover.

Stop Light—20 amps. (in fuse box).

Tail Light—20 amps. (in fuse box).

CIRCUIT BREAKER: 42 amps. Located in Lighting Switch (part of switch assembly). Protects lighting circuits together with fuses listed above.

HORNS: Delco-Remy 1999639 (Low Note), 1999640 (High Note).

Horn Relay: Delco-Remy 1116774.

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

Contact Gap—.027". **Air Gap**—.014" (closed).

ENGINE

►*THREE ENGINES USED ON TRUCKS: 235" Thriftmaster, 235" Loadmaster, & 261" Jobmaster. See Truck Model Identification for engine application.*

►*1954 THRIFT MASTER & LOADMASTER ENGINE CAMSHAFT PRODUCTION CHANGE: See "Camshaft" in Engine Section of 1954 Passenger Car pages.*

►*1954 261" JOBMASTER ENGINE ROCKER ARM PRODUCTION CHANGE: See "Rocker Arms" in Chevrolet Special Data.*

ENGINE SPECIFICATIONS: Own 6 cylinder valve-in-head.

Engine	Bore	Stroke	Displacement
235" Thriftmaster	3 9/16"	3 15/16"	235.5"
235" Powermaster	3 9/16"	3 15/16"	235.5"
261" Jobmaster	3 3/4"	3 15/16"	261.0"

Engine	Compr. Ratio	Developed H.P.
235" Thriftmaster	7.5-1	①112 at 3700
235" Powermaster	7.5-1	①112 at 3700
261" Jobmaster	7.17-1	②135 at 4000

①—107 at 3600 RPM., on Fwd. Control & C.O.E. models.

②—125 at 4000 RPM., on C.O.E. models.

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

ENGINE MOUNTINGS: *See Chevrolet Special Data.*

CYLINDER HEAD: *See Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

OTHER ENGINE DATA: *See 1954 Chevrolet Passenger Car pages for all engine data and note the following:*

►*LOADMASTER 235" ENGINE PISTON RING NOTE*—Upper compression ring is chrome plated, and oil control ring is new design with spiral piano wire expander.

VALVES: *NOTE*—Valve Rotators used on 235" Loadmaster, 261" Jobmaster engines, and on all Forward Control models. *See "Valve System" in Chevrolet Special Data.*

VALVE TIMING: Camshaft Setting—Timing gears are punchmarked. Marks on both gears must be lined up and adjacent to each other.

Valve Timing

Thriftmaster & Loadmaster

Intake Valves—Open 1° ATDC. Close 39° ALDC.

Exhaust Valves—Open 42° BLDC. Close 9° ATDC.

Jobmaster

Intake Valves—Open 11°30' BTDC. Close 52°30' ALDC.

Exhaust Valves—Opens 51° BLDC. Close 13° ATDC.

Valve Timing Check—Remove all tappet clearance from #1 exhaust valve. Turn engine over until this valve opens and just starts to close and until triangular mark on flywheel lines up with pointer in flywheel housing opening. Mount dial indicator on rocker arm shaft support with stem contacting #1 exhaust valve adjusting screw, set dial indicator to .044" (Thriftmaster & Loadmaster); .063" (Jobmaster). Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset #1 exhaust valve to correct running clearance.

OILING SYSTEM

Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

Oil Pump Overhaul—*See "Oil Pump" in Chevrolet Special Data.*

Oil Pump Installation—Assemble ground side of idler gear towards cover (use Chevrolet cover gasket only - controls pump clearance). Oil pump assembly mounted in crankcase by tapered screw. See that tapered screw seated firmly in tapered hole in pump housing before tightening locknut.

Crankcase Capacity—5 qts. (refill), 5½ qts. (dry).

Normal Oil Pressure—45 lbs. maximum.

Pressure Regulator—In pump body. Not adjustable.

Oil Pressure Indicator—AC No. 1508014 (Exc. Flat Face Cowl Models). AC No. 1507953 (Flat Face Cowl Models). Not electric.

Crankcase Ventilation (Except Forward Control Models): Regular velocity type with air intake pipe through valve rocker cover, (air cleaner on some models), outlet pipe on right side of engine.

Servicing—On all models with air cleaner mounted on valve rocker cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

Positive Crankcase Ventilation (Std. on all Fwd. Control Models, Optional on others): Vacuum operated ventilator consisting of vacuum pipe from oil filler pipe to a ventilator valve in fitting on intake manifold. Valve is spring loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling to give proper air-fuel mixture.**

Servicing—Every 5000 miles (or oftener if required), clean vacuum pipe, valve, and filler pipe thoroughly. Filler cap gasket must seal tightly. Test vacuum as follows:

Vacuum Valve—With valve disassembled, check spring tension (must be 7.5 ozs., with spring compressed to .418-.432"). If defective, replace with new valve assembly.

►*CAUTION*—When assembling valve, make certain end of spring engages groove under valve head.

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COOLING

Water Capacity: (½, ¾-Ton, & Fwd. Control) 16 qts. **(1, 1½-Ton)** 17 qts. **(2-Ton & C.O.E.)** 18 qts.

Pressure Valve: AC No. 850501. Opens at 4 lbs.

Thermostat: Harrison. In water outlet of cylinder head.

Standard—No. 3123993 (stamped 151) 151° type. Can be used for alcohol anti-freeze.

Optional—No. 3123994 (stamped 160) 160° type or No. 3123995 (stamped 180) 180° type. Use for permanent anti-freeze.

Temperature Gauge: AC No. 1512692 (Exc. Fwd. Control, C.O.E. & Flat Face Cowl). AC No. 1512750 (Fwd. Control, & C.O.E.L. AC No. 1512701 (Flat Face Cowl). Not electric.

See "Temperature Gauges" in Miscellaneous Section.

Water Pump: Double outlet, packless type with sealed ball-bearing shaft.

See "Chevrolet" in Water Pump Section.

Belt Adjustment: See Generator Belt Adjustment.

CLUTCH

Own. Diaphragm spring, single plate, dry disc type. *See "Chevrolet (Own)" in Clutch Section.*

Clutch Disc No. 3836097 (10" molded—Exc. Hvy. Duty, and Forward Control Models). Identified by No. 3836097 stamped on metal part of disc. No. 3836021 (11" woven—Fwd. Control and Hvy. Duty). Identified by pink paint on hub.

Pedal Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. NOTE—Use finger pressure only when checking clutch free travel.

Removal: Remove transmission (see Transmission Removal) Remove throw-out bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. CAUTION—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align 'X' mark on cover with 'X' mark on flywheel.

TRANSMISSION

3-SPEED (LIGHT DUTY)

Own. Three speed, all helical gear type. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

See "Chevrolet 3-Speed (Light Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever. *See "Transmission Controls" in Transmission Section.*

Removal (Half-Ton): Remove accelerator pedal, floor mat, and transmission cover on floor. Disconnect speedometer cable from rear bearing retainer, remove hand brake lever from transmission case. Drain transmission. Remove battery. Remove four capscrews holding universal joint collar on rear bearing retainer, remove bolts holding transmission support on frame cross-member. Support propeller shaft with jack, slide universal joint ball and collar back on shaft, split front universal by removing capscrews retaining front trunnion bearings on front yoke. Raise propeller shaft as far as possible with jack to provide clearance. Remove two top transmission mounting screws, install special J-1116 guide pins in these holes. Take off clutch housing underpan. Remove two lower transmission mounting screws, slide transmission straight back on guide pin until main drive shaft is free from clutch driven member, lift transmission up and remove through floor opening.

Removal (¾-Ton): Remove accelerator pedal, floor mat and transmission cover from floor. Disconnect speedometer cable from driven gear on transmission housing. Disconnect shift control rods from shifter levers at transmission. Disconnect front universal joint. Remove propeller shaft intermediate bearing support and lower propeller shaft to floor. Remove the two top transmission to clutch housing capscrews and insert two J-1116 guide pins. Remove flywheel underpan and remove two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until clutch gear shaft is free of splines in clutch disc. Remove transmission through opening in floor.

3-SPEED (HEAVY DUTY)

Own. Three speed, constant mesh (second & high), sliding gear (low & reverse).

See "Chevrolet (3-Speed Heavy Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever.

See "Transmission Controls" in Transmission Section.

Removal: Same as for "3-Speed (Light Duty)" above.

4-SPEED

Own. Four-speed, constant mesh, synchro-mesh, helical gear (2nd, 3rd, & 4th), sliding spur gear (low & reverse). Floor mounted gearshift.

See "Chevrolet 4-Speed" in Transmission Section.

Transmission Control: (All Models exc. Forward Control)—Floor mounted gearshift lever.

Transmission Control: (Forward Control Models)—*See "Cab-Over-Engine Notes" in Chevrolet Special Data.*

Removal (½ & ¾-Ton): See "3-Speed (Light Duty)" above.

Removal (Other Trucks): Remove screws fastening steering jacket grommet and slide grommet up out of way. Remove accelerator pedal and floor mat. Remove sheet metal screws attaching transmission cover to body floor and remove cover. On Forward Control models remove both front and rear floor pans. Remove speedometer cable from transmission rear bearing retainer. On 1-Ton, remove cotter key and pin attaching parking brake pull rod to parking lever. On 1½ & 2-Ton, disconnect parking brake lever return spring from parking brake operating lever, and remove cotter key and pin attaching inner and outer levers to parking brake operating lever. Remove parking brake lever lock, flat washer and spring and remove parking brake lever. Drain lubricant from transmission. On 1-Ton, break universal joint at transmission joint flange and tape trunnions and bearings together. On 1½ & 2-Ton, disconnect intermediate universal joint by removing two trunnion bearing "U" clamps, split joint and lower front end of rear propeller shaft to floor. Remove the four universal joint flange nuts. Remove nuts attaching propeller shaft bearing support bracket to frame cross member and remove front propeller shaft and bearing assembly. On all models, remove the two capscrews attaching transmission to clutch housing and insert two Guide Pins J-1126 in these holes. Remove flywheel underpan and remove two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until transmission free of splines in clutch disc. Remove transmission.

HYDRA-MATIC DRIVE

"Dual-Range" four speed automatic transmission and fluid coupling.

►*HYDRA-MATIC OIL LEAK AT UNIVERSAL JOINT (¾ & 1-TON TRUCKS): See "Hydra-Matic Drive" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level in transmission every day. Drain & refill every 25,000 miles. Use only "Automatic Transmission Fluid" Type A.

Checking Fluid Level—With selector lever in "N" position, parking brake set, and transmission at normal operating temperature, remove access hole cover plate in floor pan, and **check fluid level with engine at idling speed.** Add sufficient fluid to bring level in transmission up to "F" mark on dipstick (with engine at idling speed). *CAUTION—Do not overfill transmission.*

Capacity—8½ qts. (refill), 9 qts. (after overhaul). *NOTE—Add 1 quart extra on trucks equipped with oil cooler.*

►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Half-Ton: Own. Bushing type.

►*TORQUE TUBE BUSHING INSTALLATION (Half-Ton Truck): See "Chevrolet Pass. Cars & Half-Ton Truck Rear Axle" in Rear Axle Section.*

¼, 1, 1½, 2-Ton Trucks: Spicer needle bearing types.

See "Spicer" in Universals Section.

REAR AXLE

SEMI-FLOATING (HALF-TON).

Own. Semi-floating, hypoid gear with Torque Tube drive.

NOTE—Axle is same design as passenger car.

See "Chevrolet Hypoid Semi-Floating" in Rear Axle Section.

Ratio—3.90-1 (37:9) (Synchro-mesh & Hydra-Matic).

►*IDENTIFICATION NOTE*—Axle is identified by Serial No. Prefix stamped on front face of carrier flange on right side: **MU, MV** (Synchro-mesh), **MA, MB** (Hydra-Matic).

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►*AXLE SHAFT NOTE: Shafts unequal length (right shaft longer) and may be identified by mark stamped on shaft, or by length as follows:*

Axle	Part No.	Length
Left	3694769 ①	29 5/8"
Right	3694770 ①	30 5/8"

①–Part No. Stamped on axle for identification.
Backlash–.005-.007". Screw adjustment.

Removal: Raise rear of car, remove rear wheels and brake drums, install clamps on wheel cylinders, disconnect hand brake cable from idler levers and remove cables from cable clamps on frame, disconnect brake line at axle housing and shock absorber from rear spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly from beneath car.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of axle in differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, install clamp on wheel cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove 'C' washer on inner end, pull shaft out.

Axle Shaft Endplay–Free fit to .014" maximum.

FULL-FLOATING (EXC. HALF-TON)

Own. Full-floating hypoid gear (straddle mounted pinion) with Hotchkiss drive.

►**1½ & 2-Ton Note**–Axle shaft splined to wheel hubs. *See "Chevrolet Truck Hypoid Full-Floating" in Rear Axle Section.*

►*IDENTIFICATION NOTE:* Axles are identified by Axle Serial Number prefix letters stamped on top of carrier housing between reinforcing ribs. The letter indicates model year "M" or "X" (1954); "N" or "Y" (1955). The second letter indicates axle model. See Axle Ratio table following:

Axle Ratios & Identification

Truck Model	Ratio	①Ident. Prefix
¾-Ton (Std.) ②	4.57-1	G or H
¾-Ton (Dual)	4.57-1	D
¾-Ton (Dual)	5.14-1	C
¾-Ton (Optl.)	5.14-1	Q
¾-Ton (Fwd. Cont.)	5.14-1	Q
1-Ton ②	5.14-1	J or Q
1-Ton (Fwd. Cont.)	5.14-1	C or A
1½-Ton (Std.)	6.17-1	L
1½-Ton (Optl.)	5.43-1	E
2-Ton	6.17-1	G or K

①–See Identification above.

②–Except Forward Control Models.

Backlash–.005-.008". Screw adjustment.

Removal: Remove differential cover and axle shafts (see below). Disconnect rear universal by removing two U-bolts from rear yoke (wire trunnions to retain bearings). Slide shaft forward and lower to floor. Remove differential carrier mounting bolts.

Axle Shaft Removal (¾ & 1-Ton): Remove eight capscrews and lockwashers in axle shaft flange, install two ½X13 screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft, withdraw shaft from housing, remove and discard gasket. *Use new gasket when installing shaft.*

CAUTION–Thoroughly clean all lubricant from axle shaft flange and end of wheel hub before installing axle shaft. *Grease at this point will cause loosening of axle shaft flange capscrews.*

Axle Shaft Removal (1½ & 2-Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. *NOTE*–When reinstalling axle shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align splines on shaft with both wheel hub and differential side gear splines), use new hub gasket.

Axle Shaft Note–Shafts unequal length (right shaft longer) and may be identified by part number stamped on shaft, or by length as follows:

TWO-SPEED

Own. Full-floating, two-speed double reduction with hypoid gears (first reduction), helical gears (second reduction). Vacuum shift control.

See "Chevrolet Two-Speed Hypoid Gear" in Rear Axle Section.

►*IDENTIFICATION NOTE*–Axle identified by Serial Number stamped on flat top of carrier on right side.

NOTE–Two ratios available as follows:

Two-Speed Shift Control: Vacuum power type with selector valve on instrument panel.

Carrier Assembly Removal: Remove axle shaft flange mounting bolts, pull both axle shafts out of housing approximately 8" (to clear differential). Drain axle lubricant and remove inspection plate. Loosen hose clamps and slip hoses off vacuum cylinder hose connections. Disconnect rear universal joint by removing trunnion bearing "U" bolts from rear flange, slide propeller shaft assembly forward, tape universal bearing trunnions in place to prevent loss of needle bearings, swing propeller shaft out of the way (tie up to frame side rail). Remove capscrews mounting carrier on axle housing (support carrier with a punch inserted through one upper mounting screw hole in housing before removing last mounting screw). Place support jack under carrier assembly, roll assembly straight forward until differential clears housing, remove carrier assembly from beneath truck.

Axle Shaft Removal & Wheel Bearing Adjustment: Same as for regular rear axle (see above).

Ratio	①Ident. Prefix
6.13-1 (High), 8.10-1 (Low)	N or R
6.7-1 (High), 8.86-1 (Low)	S or D

¼ & 1-Ton Trucks

Axle Shaft	Part No.	Length
Left	3680977	31¼"
Right	3680978	37"

1½-Ton Truck (Splined Shaft)

Axle Shaft	Part No.	Length
Left	3685191	34¼"
Right	3685192	40 5/8"

2-Ton Truck (29 Splines)

Axle Shaft	Part No.	Length
Left	3702295	36¾"
Right	3702296	41¼"

Wheel Bearing Adjustment: Remove wheels and axle shaft (see above). Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight, using special wrench J-2222 (¾ & 1-Ton), J-870 (1½ & 2-Ton) while turning hub by hand, then back nut off 45°, check for free turning, install adjusting nut lock (with lock tangs aligned with slots in adjusting nut), bend tang down into notch in adjusting nut, install locknut and tighten securely, bend tang of lock down into notch of locknut.

SHOCK ABSORBERS

Delco. Direct Acting (Airplane Type), or Double Acting (Piston Type) hydraulic shock absorbers as follows:

Direct Acting

Location & Model	Delco No.
Front (½, ¾, 1-Ton)	808M
Front (1½, 2-Ton Exc. C.O.E.)	682P
Front (C.O.E.)	682K
Rear (½-Ton)	843V
Rear (¾-Ton)	843T
Rear (1-Ton Utility)	660V

Double Acting

Location & Model	Delco No.
Left Rear (1-Ton Fwd. Control)	1722 F
Right Rear (1-Ton Fwd. Control)	1722 E

FRONT SUSPENSION

Conventional "I" Beam Section, with Reverse Elliot ends and semi-elliptic springs.
Kingpin Inclination–7°10'±1° crosswise (all).
Camber–1°±½° (all). Bend axle for correction (when kingpin inclination is likewise off).
Caster–See Table below. All specifications ±½°.
Toe-In–See Table below. Adjust by turning tie rod.
CAUTION–Tie rod ends must be aligned with studs.

Model	Caster	Toe-In
½-Ton	1°±½°	1/16-3/16"
¾-Ton (Exc. Fwd. Cont.)	¾°±½°	1/16-3/16"
¾-Ton Fwd. Control	2¼°±½°	1/16-1/4"
1-Ton (Exc. Fwd. Cont.)	1¾°±½°	1/16-1/4"
1-Ton Forward Control	1¼°±½°	1/16-1/4"

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Model	Caster	Toe-In
1½-Ton	1¾°±½°	1/16-1/4"
2-Ton (Exc. C.O.E.)	¾°±½°	1/16-1/4"
2-Ton C.O.E.	2¾°±½°	1/16-1/4"

Toe Out on Turns—Outer wheel turned 20°, inner wheel turned 23°±2°.

STEERING GEARS

Saginaw. Ball Bearing Worm & Nut. (re.circulating ball). *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

NOTE—Two different type brakes used as indicated below:

Chevrolet-Bendix (Except Rear Wheels of 1½ & 2-Ton Models)—Duo-servo, single anchor, hydraulic (without eccentric adjustment).
See "Chevrolet-Bendix Hydraulic" in Brake Section.

Chevrolet Twinplex (Rear Wheels 1½ & 2-Ton Models)—Two-cylinder, four anchor type hydraulic. Shoes are self-centering and self-energizing.

See "Chevrolet Twinplex" in Brake Section.

Wheel Cylinders—Size stamped on housing under adjusting cup lock spring.

Drums—Cast iron with steel web.

Model	Front - Diameter - Rear
½-Ton	11" - 11"
¾-Ton	12" - 12"
1-Ton	12" - 14"
1½ & 2-Ton	14" - 15"

Lining—Molded type. Riveted on 1½ & 2-Ton Models and bonded on all others.

Thickness—.202-.222" (11"Drum); .264-.284" (12" Drum); .267-.287" (14" Drum); .392-.412" (15" Drum).

Clearance—Adjust for clearance as follows:

All (Exc. 1½ & 2-Ton Rear Brakes)—Remove adjusting hole cover and turn brake adjusting screw until light drag is felt, then back off adjusting screw 7 notches (½-Ton), just enough to eliminate drag (Other models) but not more than 7 notches.

Rear Wheels 1½ & 2-Ton Models—Remove adjusting covers from flange plate and turn rear adjusting screw until slight drag is felt, then back off 3 notches. Repeat on front adjusting screw (2 adjustments on each wheel).

Hand Brake: Step-on pedal applies rear wheel service brakes on ½, ¾, 1-Ton Models. Hand lever applies independent brake on propeller shaft on all other models.

Adjustment: Adjust each type as follows:

½-Ton—With parking brake pedal released, adjust pedal pull rod clevis for 1/8" clearance between cross shaft and frame cross member at center. Depress foot pedal 1½", adjust clevis on forward end of each wheel cable to remove all slack (pull cable out of conduit by hand until positive stop is felt, adjust clevis and reconnect cable). Release rod handle under instrument panel must have ½" minimum clearance at support bracket.

¾ & 1-Ton—With parking brake pedal released, adjust brake pedal pull rod clevis until hole in end of cross shaft outer lever is correct distance to rear of center of cross shaft: 29/32" (¾-Ton), ¾" (¾-Ton Fwd. Control), 11/32" (1-Ton), 19/32" (1-Ton Fwd. Control). Then adjust each wheel cable clevis at cross shaft lever end in same manner as ½-Ton above.

1½ & 2-Ton—.010-.015" clearance between each shoe and brake drum (adjust the adjusting bolt for outer shoe clearance, nut on link for inner shoe).

Power Brakes: *See "Hydrovac Power Unit" in Brake Section.*

MODEL IDENTIFICATION

Series	Serial Prefix	Model
1500①	A	②ONE-FIFTY
2100	B	②③TWO-TEN
2400	C	②③BEL-AIR
1508	D	②SEDAN DELIVERY

①—Except Sedan Delivery.
②—CONVENTIONAL ENGINE (115 H.P.) Standard.
③—POWERGLIDE ENGINE (125 H.P.). Used when Powerglide option added.

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post.
Starting Serial Number—001001 (at each plant), for all models except the Corvette.

►*SERIAL NUMBER NOTE—Serial Number (example B54F 001025) includes following identification data in sequence.*

Series①	Year	Assy. Plant②	Serial No.
B	54	F	001025

①—See Model Designation above.
②—See Assembly Plant Designation below.

Assembly Plant Designation

A—Atlanta	J—Janesville	O—Oakland
B—Baltimore	K—Kansas City	S—St. Louis
F—Flint	L—Los Angeles	T—Tarrytown
		N—Norwood

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor.
Starting Engine Number—0001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ("F" for Flint, and "T" for Tonawanda), Model Year, and Model Type. See following for model type designation.

Engine	Suffix
Regular "235"	Z
Regular "235" (With H.D. Clutch)	ZC
Regular "235" (with aluminum cam gear)	ZH
Powerglide "235"	Y

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. minimum with all cylinders equal within 5-10 lbs. at cranking speed.

VACUUM READING: *CAUTION—Vacuum reading on Standard transmission Cars and Powerglide Cars is different as follows:*
Standard Transmission Cars—17-21" at idling speed.
Powerglide Cars—At 500 RPM.—14.4" (with transmission in Drive Range). 16.7" (with transmission in Neutral). **At 450 RPM.** 14.5" (with transmission in Drive Range). 16.3" (with transmission in Neutral). *NOTE—Manifold vacuum reading at idle speed is lower than previous models because of "high lift" cam used.*

VALVE TAPPET CLEARANCE: (Pass. Cars & 3000 Series Trucks with Conv. Valve Lifters)—.006" Intake. .016" Exhaust.
Other Trucks—.006" Intake. .020" Exhaust.

►*POWERGLIDE ENGINE NOTE—Hydraulic valve lifters used in these models and adjustment required only when cylinder head removed or valve lifters replaced. See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. *Distorted springs should be replaced.*

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See Diagram.

SPARK PLUG GAP: .035".
Spark Plug—AC No. 44-5. 14mm.

COIL: Delco-Remy 1115380.
Ignition Current—2.5 amperes idling. 4.5 stopped.

DISTRIBUTOR: Delco-Remy 1112388 (With Std. Trans.); Delco-Remy 1112396 (With Powerglide).
Condenser—Delco-Remy 1869704 (first type), Delco-Remy 1928111 (Second type with spade terminal).
Capacity—.18-.23 microfarad.
Contact Point Set—Delco-Remy 1924571.
Breaker Gap—.016-.021" (New points), .0125-.0175" (Used points).
Cam Angle—38-45° with .016" gap.

►*BREAKER GAP CAUTION—Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Octane Selector: Adjustment on distributor provides 10° spark advance or retard from center 'O' position.
Vacuum Spark Control: Delco-Remy 1116076
Plunger Travel—11/64"-15/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6"
7.5	15	7.5-10"

IGNITION TIMING

Setting—2° ATDC.
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on 'O'. Then adjust Octane Selector as follows:
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETOR

Model	Rochester No.
Standard Transmission	7005921
Powerglide	7005922

Downdraft types with automatic choke. Throttle Return Check used on Powerglide Models.
Idle Setting—1-2½ turns open.
Idle Speed (Synchro-mesh)—475 RPM.
Idle Speed (Powerglide)—425 RPM with Powerglide selector lever in 'D' position.
Float Level—Use Gauge No. 3696192. Invert bowl cover and float assembly **but do not remove gasket.** Place gauge in position over floats with gauge tang in discharge nozzle. Adjust each float vertically so they just touch top portion of gauge and bend float arms horizontally to center each float in gauge cut-out. Tilt assembly 90° to each side and see that floats do not touch gauge. Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¾". Adjust by bending tang at rear of float assembly.
►*CAUTION—Both floats must be set alike and must not be twisted out of alignment.*
Choke Adjustment: Index mark on cover aligned with long cast mark on top of choke housing casting.
Fast Idle: With idle adjusting screw on next to highest step of fast idle cam, Gauge J-5150 (.073") should just slide between lower edge of choke valve and carburetor bore. To adjust, bend connector rod.
Throttle Return Check Adjustment (235" Powerglide Engine): Have engine at full operating temperature. Align throttle return check adjusting screw with contact arm on throttle lever by bending return check bracket. With parking brake set tight, place selector lever in 'D' range and adjust throttle stop screw and idle adjusting screw in combination with each other to obtain a smooth idle at 425 RPM, this adjustment should be made with choke valve in wide open position with throttle stop screw resting on low step of fast idle cam. Shut off engine. Close choke valve and position throttle stop screw on highest step of fast idle cam. Using a 9/32" wrench on the flat section of throttle return check shaft, hold shaft from turning, and with a 3/8" wrench turn the adjusting screw until it just contacts the throttle lever contact arm.
►*NOTE—If screw projects more than ½" from shaft when head of screw just touches lever contact arm, reposition throttle check on manifold stud.*
►*OTHER DATA: See "Rochester B & BC" Carburetors in Carburetor Section.*
Powerglide Throttle Linkage Adjustment: *See "Chevrolet Powerglide Transmission" in Transmission Section.*
Fuel Pump Pressure—4 lbs. maximum.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.
Replacement Fuel Pump—AC No. 9798 (Fuel only), AC No. 9797 (Fuel & Vacuum).
Pressure—4 lbs. maximum.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: AC Electric.
Dash Unit—AC No. 1517598.
Tank Unit—AC No. 1517761.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco—15AA6-W. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Battery Ground—Negative terminal.
Engine Ground—Engine to cowl at rear head bolt.

STARTER

►*POWERGLIDE CAR STARTER PRODUCTION CHANGE: In later 1954 production, a four coil starter motor replaced the two coil starter. See following for starter motor application.*

Model	Delco-Remy No.
All Std. Trans. & Early Powerglide	1107109
Later Powerglide Cars	1108035

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Armature—Delco-Remy 1917855 (1107109, 1108035).
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data—1107109

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Performance Data—1108035

Torque	RPM	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 ft. lbs.	Lock	3.0	600

Starting Switch: Delco-Remy Solenoid Switch No. 1118135 mounted on starter and controlled by Ignition & Starter Switch No. 1116478. Turn key full RIGHT against spring tension to start.
See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Equipment Section.

Neutral Safety Switch: (Powerglide Cars only). Delco-Remy 1997845 (without Back-Up Light & Power Steering). Delco-Remy 1998040 (with Back-Up Light & Power Steering).

Adjustment—See *"Chevrolet Powerglide" in Transmission Section.*

GENERATOR

Delco-Remy. *CAUTION—Alternate wound (3½ turn) armature used on late production passenger cars. Correct regulator must be used with each model generator as indicated below.*

Model	Generator No.	Armature No.
Standard (Early)	1100018	1925348
Standard (Late)	1100028	①1925558
Taxi	1102793	1924893
State Police	1105008	1925556
City Police	1105009	1925630

①—Alternate wound (3½ turn) armature.

Performance Data

Generator	Amperes ①	Volts	RPM
1100018	45	8.0	3000
1100028	40	8.0	2850
1102793	45	8.0	2450
1105008	50	7.0	2100
1105009	40	7.0	1700

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.87-2.0 amperes (1100018, 1100028, 1102793). 1.77-1.93 amperes (1105008, 1105009). All at 6.0 volts.
Belt Adjustment: 7/16-½" deflection with light pressure midway between generator and pump pulleys.

REGULATOR

Delco-Remy. *"1118825 SERIES" REGULATORS.*

Regulator No.	For Generator No.
1118827	1100018, 1102793
1118843	1100028
1118835	1105008
1118831	1105009

►*REGULATOR NOTE: Checking procedure for "1118825 Series" is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. All specifications below are "Normal" settings.*

Cutout Relay (All Regulators)
Cuts In—6.4 volts (hot).
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator (All Regulators)
Setting—7.3 volts (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Regulator No.	Setting (hot)
1118827	27 amps.
1118843	42 amps.
1118835	52 amps.
1118831	42 amps.

Air Gap—.075" (with armature pressed down to point where contacts just touching).
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*
Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identi-

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fication). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) and pull shaft and knob out. Remove switch retaining nut and switch assembly.

Stop Light Switch Location (Manual Brakes): Mechanical type mounted on underside of toeboard and operated by brake pedal.

Stop Light Switch Location (Power Brakes): Pressure switch located in fitting at forward end of master cylinder.

FUSES: Located as indicated below.

Direction Signal—Fuse located on front side of instrument panel adjacent to gasoline gauge terminal.

Autronic Eye—14 amps. Located in Autronic Eye amplifier.

CIRCUIT BREAKER: 30 amperes. Located in lighting switch.

HORNS: Delco-Remy 1999681 (Low Note), 1999682 (High Note).

Horn Relay: Delco-Remy 1116775.

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

Contact Gap—.027". **Air Gap**—.014" (closed).

ENGINE

►*TWO ENGINES USED ON PASSENGER CARS: Conventional 235" & Powerglide 235". See Passenger Car & Truck Model Identification for engine application.*

►*1954 235" (POWERGLIDE) & 261" (JOBMASTER) ENGINE ROCKER ARM PRODUCTION CHANGE: See "VALVES" (below) for rocker arm identification.*

►*NOTE—The following repair data applies to all Pass. Car & Truck Engines.*

ENGINE SPECIFICATIONS: Own 6 cylinder valve-in-head.

Bore—3 9/16". **Stroke**—3 15/16".

Displacement—235.5 cu. in. **Rated H.P.** 30.4.

Developed Horsepower—115 at 3700 RPM (Conventional). 125 at 4000 RPM (Powerglide).

Compression Ratio—7.4-1

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

OIL PAN REMOVAL: Remove bolts attaching steering idler and third arm and bracket assembly to frame cross member and drop down. *CAUTION— Note number of shims between bracket and cross arm and replace this same amount at reassembly.*

ENGINE MOUNTINGS: *See Chevrolet Special Data.*

CYLINDER HEAD: *See Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS

Aluminum alloy, cam ground, tin plated, with piston pin offset 5/64".

Weight—1.18 lbs. (235" Engine), 1.36 lbs. (261" Engine).

Removal—Pistons and rods removed from above.

Clearance—.0005-.0011" at bottom of skirt, .0115-.0135" at top land. Selective fit.

Replacement Pistons: Furnished Std. Size & .020", .030", .040" oversize. *STANDARD SIZE PISTON NOTE*—Std. *pistons furnished in four sizes with size stamp and* size range as follows: **S4**(3.5625"-3.5630"), **S5**(3.5630"-3.5635"), **S6** (3.5635"-3.5640"), **S7** (3.5640"-3.5645").

Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to a point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.

Installing Pistons: Install piston with notch in piston and mark "Front" toward front of engine.

PISTON PINS

Locked in rod. No bushing used in piston.

Diameter—.8660-.8665" (exc. Jobmaster), .9270-.9275" (Jobmaster). **Length**—3.198-3.228" (All).

Pin Fit in Piston—Thumb push fit (at room temp.). To check fit, with piston and pin at 70°F, apply light oil film to pin, insert pin vertically in one piston boss (one end of pin in either piston boss). Pin should hold own weight but should install easily with thumb pressure.

Replacement Pins: Furnished Std. .0015", .003", .005 oversize.

PISTON RINGS

Passenger Cars

Ring	Width	End Gap	Side Clearance
Compr. ①	3/32"	.007-.020"	.002-.0035"
Oil ②	3/16"		③

Trucks

Compr. ①	3/32"	.007-.020"	.002-.0035"
Oil ③	3/16"	⑤	.0015-.003"

①—Deep section, twist type. Top Ring on Loadmaster & Jobmaster engines is Chrome plated.

②—4-Piece type (Upper & Lower Rails, Steel Spacer, & Expander Spring behind rails and spacer).

③—Wide slot expander type. Expander is flat spring (Thriftmaster), coil spring type (Loadmaster & Jobmaster—ring has semi-circular seat for spring).

④—Free fit to .010" maximum.

⑤—.005-.015" (Thriftmaster), .010-.018" (Loadmaster & Jobmaster).

►*RING INSTALLATION CAUTION—Install compression rings with side marked "TOP" upward.*

Replacement Rings: Furnished Std. .005", .010", .020", .030", .040" oversize.

CONNECTING RODS

►*CONNECTING ROD REPLACEMENT CAUTION— Rods for 261" Jobmaster engine not interchangeable with other engines. Casting No. 3701491 (Exc. 261" Engine), No. 3702448 (261" Engine).*

Length—6 13/16". **Weight**—31.76 ozs. (Exc. 261").

Crankpin Journal Diameter—2.311"-2.312", all engines.

Lower Bearing—Replaceable precision type.

Clearance—.0007-.0028". *Not adjustable.*

Sideplay—.005-.012" at lower end.

Replacement Bearings: Std. .001", .002", .010", .020" undersize.

Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinders with numbers and pin clamp bolt toward camshaft side.

CRANKSHAFT

►*CAUTION—No. 1 (front) and No. 2 (front intermediate) bearings similar in appearance but must not be interchanged. No. 2 bearing marked by "1" in oil groove.*

Journal Diameters—(1) 2.6835" 2.6845". (2) 2.7145"-2.7155", (3) 2.7455"-2.7465", (4) 2.7765"-2.7775".

NOTE—Journal taper or out-of-round limits .001". Run-out Limits for Nos. 2 & 3 journals is .002".

Clearance—.0005" minimum. .003 "maximum (new bearings), Service limits .0005" min. .0045" maximum. Adjustment below.

NOTE—Precision type bearings can be replaced singly.

Bearings—Steel backed thin wall babbitt.

Bearing Adjustment: Solid shims. Remove shims until light drag secured when shaft turned by hand, then replace .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side of all bearings).

Replacement Bearings: Furnished Std. .002", .010", .020", .030" undersize.

Bearing Installation: Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Bearing Cap Installation—No. 2 & No. 3 bearing caps marked for identification. Install No. 2 cap with mark "FRONT" toward front of engine, No. 3 cap with mark "REAR" toward rear of engine.

Crankshaft Oil Seal Servicing: *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

End Thrust: Taken by No. 3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of No. 3 bearing. Adjust by replacing bearing. **Endplay**—.0035"-.0095".

Vibration Dampener: *See "Vibration Dampener" in Chevrolet Special Data.*

CAMSHAFT

►*CAMSHAFT CAUTION—Different camshafts used in Conventional and Powerglide engines (261" Truck engine uses same camshaft as used on Corvette). Early type Conventional engine camshaft is forged steel. Later Conventional engines and all Powerglide engines have a cast iron alloy camshaft and a cast iron alloy distributor drive gear.*

Camshaft Part Numbers	Camshaft	Dist. Gear
235" Pass. (Powerglide)	④ 3836045	⑫ 1929578
235" Pass. (Powerglide)	⑬ 3836386	⑫ 1929578
235" (Exc. P.G. & Corvette)	⑭ 3836489	⑤ 1865180
235" (Exc. P.G. & Corvette)	⑥ 3713919	⑫ 1929578
235" Corvette	⑦ 3836484	⑫ 1929578
261" Truck	⑦ 3836484	⑫ 1929578
235" Truck (Early)	⑧ 3836490	⑤ 1865180

④—**Used on First 10,000 cars.** Identified by 7/16" wide cam lobes. NOTE—This camshaft not furnished for service replacement. *See "Camshaft No. 3836045 Replacement Caution" below.*

⑫—Cast Iron distributor gear identified by circular groove between teeth and rivet hole.

⑬—**Used after First 10,000 cars.** Identified by 9/16" wide cam lobes and **two large raised dots** between #5 & #6 inlet cams.

⑭—**Used before 3-1-54 on Pass. Cars & Trucks** (*See "Early 1954 Truck Camshaft Caution" below*). Forged steel. Identified by large journal, and No. 3836366 forged on shaft.

⑤—Steel distributor gear.

⑥—**Used after 3-1-54 on Pass. Cars & Trucks** (*See "Early 1954 Truck Camshaft Caution" below*). Cast Iron. Identified by 9/16" wide cam lobes and **one large raised dot** between #5 & #6 inlet cams.

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⑦—Cast iron. Identified by 9/16" cam lobes and **three large raised dots** between #5 & #6 inlet cams.

⑧—**Used on 15,000 Early 235" Truck engines.** Forged steel. Identified by 1/8" smaller journal than Camshaft No. 3836489. *See "Early 1954 Truck Camshaft Caution".*

►*CAMSHAFT NO. 3836045 REPLACEMENT CAUTION:* When replacing this camshaft with No. 3836386, connecting rods must be relieved approximately 1/16" by grinding rear side of lower end of connecting rod adjacent to bolt on camshaft side. This will allow connecting rod to clear larger (9/16") cam lobes.

►*EARLY 1954 TRUCK CAMSHAFT CAUTION:* Approximately 15,000 235" Truck engines were equipped in production with Camshaft No. 3836490, which have a smaller journal than later production.

Journal Diameters (Camshaft No. 3836490)—(1) 2.0282"-2.0292", (2) 1.9657-1.9667", (3) 1.9032-1.9042", (4) 1.8407-1.8417".

Journal Diameters (All Others)—(1) 2.1537-2.1547", (2) 2.0912-2.0922", (3) 2.0287-2.0297" (4) 1.9662-1.9672".

NOTE—Journal out-of-round limits .001". Run-out limits .002" (straighten if run-out excessive).

Bearing Type—Steel backed babbitt lined bushing (staked in place). *NOTE*—New bearings must be line reamed.

Clearance—.002-.004" (Camshaft No. 3836490), .0015-.0035" (All Others).

End Thrust: Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).

Endplay Adjustment—*See "Timing Gears" in Chevrolet Special Data.*

Endplay—Free fit to .003" maximum.

Timing Gears: Fibre (Pass Cars, Exc. Corvette), Aluminum (Corvette and Trucks). Steel crankshaft gear.

Replacement Timing Gears & Installation: *See "Timing Gears" in Chevrolet Special Data.*

Timing Gear Backlash—.003-.004".

Camshaft Setting: Gears punch marked. Punch marks on both gears must line up directly opposite each other.

VALVES

Tappet Clearance: (Pass Cars & 3000 Series Trucks with Conv. Valve Lifters)— .006" Intake. .016" Exhaust.

Other Trucks: .006" Intake. .020" Exhaust.

►*EARLY POWERGLIDE ENGINE VALVE "SQUAWK" See "Valve System" in Chevrolet Special Data.*

►*NOTE: "XCL" exhaust valves used in 235" Powerglide, H.D. Trk. & 261" Engine (stamped "XCL").*

Valve	Head Diam.	Stem Diam.	Length
Intake	1 7/8"	.3410-.3417"	6.364-6.394"
Exhaust	1 1/2"	①	4.902-4.932"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30° ②	④	.001-.0027"
Exhaust	45° ③	⑤	⑥

①—.3400-.3407" (Pass. Cars), .339-.3397" (Trucks).

②—Valve seat (Seat Angle in Block 31°).

③—Valve Seat (Seat Angle in Block 46°).

④—.294" (Conv. 235"), .400" (Powerglide 235"), .405" (Corvette & 261" Jobmaster).

⑤—.312" (Conv. 235"), .400" (Powerglide 235"), .414" (Corvette & 261" Jobmaster).

⑥—.002-.0037" (Pass. Cars), .003-.0047" (Trucks).

Valve Seat Width—3/64-1/16" (Intake), 1/16-3/32" (Exhaust).

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*

Valve Guides: Precision type. Pressed in head.

Valve Guide Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install springs with closed coil end down.

Free Length—2 5/32" (Conv. 235"), 2 9/32" (Powerglide 235" & Jobmaster 261").

Spring Specifications
(235" Conventional Engine)

	Pressure	Length
Valve Closed	62-68 lbs.	1.821"
Valve Open	155-165 lbs.	1.505"

Spring Specifications
(235" Powerglide & 261" Jobmaster Engine)

	Pressure	Length
Valve Closed	62-68 lbs.	1.908"
Valve Open	177-187 lbs.	1.518"

Valve Lifters (Conventional 235" Engine): Plain barrel type. Identified by plain barrel and spot of yellow paint below push rod seat. *NOTE*—Valve Lifters used on Corvette has shallow groove around barrel.

Valve Lifters Powerglide 235" Engine): Hydraulic type. 1954 lifter is different than previous lifters and is identified by two raised rings below oil holes in barrel.

Hydraulic Lifter Adjustment—Required only when installing cylinder head or when adjusting screw setting has been disturbed. *See "Tappet Clearance Adjustment" in Chevrolet Special Data.*

Hydraulic Lifter Overhaul & Testing—*See "Hydraulic Valve Lifters" in Chevrolet Special Data.*

►*REMOVING HYDRAULIC VALVE LIFTERS: When removing lifters and push rods use a rack to keep them in proper sequence. Install in their original location when reassembling.*

Rocker Arm Assembly: *See "Rocker Arms" in Chevrolet Special Data.*

►*235" POWERGLIDE ENGINE & 261" JOBMASTER ENGINE ROCKER ARM PRODUCTION CHANGE: See "Rocker Arms" in Chevrolet Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

235" Conventional Engine

Intake Valves—Open 1° ATDC. Close 39° ALDC.

Exhaust Valves—Open 42° BLDC. Close 9° ATDC.

235" Powerglide Engine

Intake Valves—Open 10° 30' BTDC. Close 53° 30' ALDC.

Exhaust Valves—Open 49° BLDC. Close 15° ATDC.

Valve Timing Check—(*CAUTION*—On 235" Powerglide engine with hydraulic valve lifters, it will be necessary to replace the hydraulic valve lifter and pushrod operating #1 exhaust valve, with a conventional lifter and pushrod). Remove all tappet clearance from #1 exhaust valve. Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer on right face of flywheel housing. Mount dial indicator on rocker arm shaft with stem of indicator contacting #1 exhaust valve adjusting screw and set dial indicator to **.044"** (235" Conventional Engine), **.058"** (235" Powerglide Engine). Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset tappel to correct running clearance.

OILING SYSTEM

Crankcase Capacity: 5½ qts. (dry), 5 qts. (refill).

Normal Oil Pressure: 45 lbs. maximum. Full pressure system of all engines.

Pressure Regulator Valve—In oil pump body. Not adjustable.

Oil Pressure Gauge—AC No. 1507960. Not electric.

Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

Oil Pump Overhaul—*See "Oil Pump" in Chevrolet Special Data.*

Oil Pump Installation—Assemble ground side of idler gear towards cover (use Chevrolet cover gasket only—controls pump clearance). Oil pump assembly mounted in crankcase by tapered screw. See that tapered screw seated firmly in tapered hole in pump housing before tightening locknut.

Rocker Arm Oil Lead & Overflow Pipe: *See "Oiling System in Chevrolet Special Data.*

Crankcase Ventilation: Air intake through valve rocker arm cover (air cleaner on some models), outlet through pipe on right side of engine.

COOLING

Water Capacity: 16 qts. (17 qts. with heater).

Pressure Valve: AC No. 850549. Radiator filler cap. 7 lb. type.

Thermostat: Harrison. In cylinder head water outlet.

Standard—No. 3123993 (stamped 151), 151°. Can be used for alcohol anti-freeze.

Optional—No. 3123994 (stamped 160) 160°, or No. 3123995 (stamped 180) 180°. Use for permanent anti-freeze.

Temperature Gauge: AC No. 1512818. Not electric. *See "Temperature Gauges" in Miscellaneous Section.*

Water Pump: Double outlet, packless type with sealed ball-bearing shaft. *See "Chevrolet" in Water Pump Section.*

Belt Adjustment—*See Generator Belt Adjustment.*

Radiator Removal & Installation: *See "Radiator" in Chevrolet Special Data.*

CLUTCH

Own (Exc. Powerglide Cars). Diaphragm spring type. *See "Chevrolet (Own)" in Clutch Section.*

Clutch Disc—Chevrolet No. 3835216 (moulded), No. 3835343 (woven), No. 3835454 (heavy duty).

Pedal Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch fork. *NOTE*—Use finger pressure only when checking pedal free travel.

Removal: Remove transmission (see Transmission Removal below). Remove throwout bearing. Remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support

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clutch), loosen all six cover bolts evenly, remove cover assembly from below. *CAUTION*—Do not allow pressure plate to hang from retracting springs, (support by hand). When installing clutch, align 'X' mark on cover with 'X' mark on flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh.
See "Chevrolet 3-Speed" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Remove floor mat and floor cover over transmission. Disconnect speedometer cable, and shifter rods from levers on transmission. Drain lubricant. Disconnect hand brake pull back spring, and hand brake cable clevis from idler lever, remove idler lever. Remove universal joint dollar-to-support capscrews and slide ball back on propeller shaft housing. Place jack under propeller shaft, remove four capscrews securing front trunnion bearings to front yoke, split joint and lower front end of propeller shaft. Remove rear transmission support-to-frame cross member bolts. Remove two upper transmission-to-clutch housing capscrews. Slide transmission back and lift out through opening in floor.

POWERGLIDE TRANSMISSION

Powerglide Transmission (Used with 235" Powerglide Engine)—Torque converter and hydraulically operated planetary gear unit with manual controls.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS—See "Chevrolet Powerglide" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubrication—Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing an "AQ-ATF" marking on container.
Capacity—5 qts. (refill), 11 qts. (after overhaul).

►*POWERGLIDE DRAINING CAUTION—There is no drain plug on converter. Drain transmission case only, add 5 qts. of fluid initially, recheck after idling engine.*
Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in "N" range when taking dipstick readings. Dipstick is located under hood on right side just opposite starter.

►*OTHER DATA: See "Chevrolet Powerglide" in Transmission Section.*

UNIVERSALS

Own. One used (in torque ball at rear of transmission).

TORQUE TUBE BUSHING INSTALLATION: See "Chevrolet Rear Axle" in Rear Axle Section.

►*UNIVERSAL BALL JOINT ADJUSTMENT (POWERGLIDE MODELS): Improper adjustments will cause leakage. See "Torque Tube & Ball" in Chevrolet Special Data.*

REAR AXLE

Own. Semi-floating, hypoid gear type with Torque Tube drive.
See "Chevrolet Hypoid" in Rear Axle Section.

Axle Ratios

Car Model	Axle Ratio	Serial Prefix
Without Powerglide	3.70-1	ML or MM
With Powerglide	3.55-1	MS or MT
Optional Without Powerglide	4.11-1	ME or MF

Axle Identification—Prefix of axle serial number (stamped on front face of carrier flange on right side) indicates ratios (see Ratio table above).
Backlash—.005-.007". Screw adjustment.

Removal: Raise rear of car and remove rear wheels and brake drums, install clamps on wheel brake cylinders, disconnect hand brake cables from idler lever and remove cables from cable clamp on frame. Disconnect brake line at axle housing and shock absorbers from rear spring 'U' bolts and plate, disconnect spring shackles and drop springs. Pull axle assembly back to free front end of torque tube, withdraw assembly.

Axle Shaft Removal: Wheel bolted directly on flange on outer end of axle shaft. Shaft retained by 'C' washer on inner end of differential case. To remove axle shaft, remove wheel, take out two 'zipon' nuts retaining brake drum, remove drum, install clamp on wheel brake cylinder. Remove axle housing cover, differential pinion shaft lock screw, pinion shaft and axle shaft spacer. Push axle shaft in, remove 'C' washer on inner end, pull shaft out.

Axle Shaft Installation & Endplay Adjustment: *See "Rear Axle Notes" in Chevrolet Special Data.*

SHOCK ABSORBERS

Delco. Direct acting non-adjustable. Serviced by replacment.

Model	Front	Rear
All	5519443 Ⓒ	5519444 Ⓒ

Ⓒ—Chevrolet Part No.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs.
See "Chevrolet" in Front Suspension Section.
Kingpin Inclination—4° plus or minus ½° crosswise.
Caster—Pos. ½ ±½°. Adjustable.
Camber—Pos. ½° ± ½°. Adjustable.
Toe-In—0-1/8". Loosen clamp bolts at each end of left hand tie rod and turn rod, tighten clamp bolts.

►*CAUTION—Align tie rods before tightening clamp bolts (ball studs will bind if not aligned).*
Toe-Out On Turns—With inner wheel turned 20°, outer wheel should be 17°40'.

STEERING

Manual: Saginaw Worm & Roller. With push-pull adjustment.
See "Saginaw Worm & Roller" in Steering Section.

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder.
See "Saginaw (GM) Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Saginaw Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic. Hand lever applies rear wheel service brakes.
See "Chevrolet Bendix Hydraulic" in Brake Section.
Drums—Diameter 11".
Wheel Cylinder Diameter—Front 1 1/8", Rear 1".

Brake Lining

	Width	Thickness
Front Whl	2"	.202"-.222"
Rear Whl	1¾"	.202"-.222"

Length Per Shoe—9.3125" (Primary), 11.6875" (Secondary).
Braking Power—55.9% (front wheels), 44.1% (rear wheels).
Clearance—Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.
Std. Master Cylinder: On bracket at left side of frame below front floor boards. Master cylinder supports clutch and brake pedal levers.
Checking Fluid—Access hole in front floor board directly under steering wheel. Maintain level in master cylinder to lower edge of filler hole.
Removal—Disconnect hydraulic line and remove eccentric bolt from brake pedal extension and main cylinder push rod. Remove clutch link from clutch pedal extension. Remove plug from forward end of master cylinder and insert a stiff wire into shaft lock pin and remove lock pin. Remove clutch and brake pedal extension pivot shafts from master cylinder body. Remove master cylinder to frame mounting bolts and remove cylinder from below.
Brake Pedal Clearance: Toe board clearance is 7/16" obtained by turning eccentric bolt at forward end of master cylinder. *NOTE*—If proper clearance cannot be obtained by turning eccentric bolt, place shims under front or rear master cylinder mounting bolts as necessary.
Power Brakes: Bendix vacuum type power brake cylinder (replaces conventional Master Cylinder).
See "Bendix Power Unit" in Brake Section.

MISC. MECHANICAL

Windshield Wipers: Cable operated vacuum type.
See "Windshield Wipers" in Miscellaneous Section.
Window Regulators: (Front Door Windows)—Electric with reversible motor in each front door. Not used on rear doors.
See Miscellaneous Section for type and Model application.
Power Top Control: Hydro-Lectric with reversible pump motor.
See "Power Top Controls" in Miscellaneous Section.
Power Seat Adjuster: Reversible electric motor controls horizontal front seat movement.
See "Electric Seat Controls" in Miscellaneous Section.

MODEL IDENTIFICATION

Series	Serial Prefix	Model
1500①	A	ONE-FIFTY
2100	B	TWO-TEN
2400	C	BEL-AIR
1508	D	SEDAN DELIVERY

①—Except Sedan Delivery.

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post.

Starting Serial Number—001001 (at each plant).

►*SERIAL NUMBER NOTE: Serial Number (example B55F001025) includes following identification data in sequence.*

Series①	Year	Assy. Plant②	Serial No.
B	55	F	001025

①—See Model Designation above.

②—See Assembly Plant Designation below.

Assembly Plant Designation

A—Atlanta	**J**—Janesville	**O**—Oakland
B—Baltimore	**K**—Kansas City	**S**—St. Louis
F—Flint	**L**—Los Angeles	**T**—Tarrytown
	N—Norwood	

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor.

Starting Engine Number—0001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ("F" for Flint, and "T" for Tonawanda), Model Year and Model Type as follows:

Engine	Suffix
Regular "235"	Z
Regular "235" (With H.D. Clutch)	ZC
Regular "235" (With aluminum cam gear)	ZH
Regular "235" (With H.D. Clutch & Alum. gear)	ZJ
Powerglide "235"	Y

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. minimum with all cylinders equal within 5-10 lbs. at cranking speed.

VACUUM READING: *CAUTION—Vacuum reading on Standard transmission Cars and Powerglide Cars is different as follows:*

Standard Transmission Cars—At 500 RPM.—17-21" at idling speed.

Powerglide Cars—At 500 RPM.—14.4" (with transmission in Drive Range). 16.7" (with transmission in Neutral) **At 450 RPM.**—14.5" (with transmission in Drive Range). 16.3" (with transmission in Neutral). *NOTE—Manifold vacuum reading at idle speed is lower than previous models because of "high lift" cam used.*

VALVE TAPPET CLEARANCE: (Pass. Cars With Conv. Valve Lifters)—.006" Intake, .016" Exhaust, with engine "normalized". *See "Valve System" in Chevrolet Special Data.*

(Powerglide Cars with Hydraulic Lifters)—Adjustment required only when cylinder head removed or lifters replaced. *See Tappet Clearance Adjustment under "Valve System" in Chevrolet Special Data.*

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. *Distorted springs should be replaced.*

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .035".

Spark Plug—AC No. 44-5. 14mm. Torque to 20-25 ft. lbs.

COIL: Delco-Remy 1115087. *12 Volt.*

Ignition Current—2.5 amperes idling. 4.5 stopped.

Resistor—Delco-Remy 1927809. On firewall.

►*COIL RESISTOR NOTE:* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when **key turned to "Start Engine" position).**

DISTRIBUTOR: Delco-Remy 1112403. *12 Volt.*

Condenser: Delco-Remy 1928111. **Capacity**—.18-.23 mfd.

Contact Point Set—Delco-Remy 1924571.

Breaker Gap—.016-.021" (New points), .0125-.0175" (Used points).

Cam Angle—28-35° with .016" gap.

►*BREAKER GAP CAUTION: Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Octane Selector: Adjustment on distributor provides 10° spark advance or retard from center 'O' position.

Vacuum Spark Control: Delco-Remy 1116089.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
7.5	15	7.5-10

IGNITION TIMING

Setting—TDC.

Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on 'O'. Then adjust Octane Selector as follows:

Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETOR

THROTTLE LINKAGE ADJUSTMENT (POWERGLIDE CARS): Engine must be at normal operating temperature and transmission warm (choke valve wide open and fast idle inoperative with throttle stopscrew against low step of fast idle cam) when adjustments are made.

►*POWERGLIDE LINKAGE ADJUSTMENT PRODUCTION CHANGE:* On later cars the part throttle upshift has been lowered to 12-18 MPH by changing the angle of the transmission throttle control outer lever, and shortening the throttle valve control rod. **Throttle Linkage Adjustment differs from early cars** as indicated in the procedure following. To identify early and late type cars it will be necessary to check the part throttle upshift speed. Early cars will be 26-28 MPH. **Later cars will be 12-18 MPH.**

►*DECREASING PART THROTTLE UPSHIFT ON EARLY CARS:* If it is desired to decrease part throttle upshift from 26-28 MPH to 12-18 MPH, replace the early type Throttle Valve Outer Lever, Part No. 3710634, with later type Part No. 3720323. Replace early type Throttle Valve Control Rod, Part No. 3710632 with later type Part No. 3715711. Adjust throttle linkage as indicated below for later type cars.

1) Adjust engine idle speed to 425 RPM with selector lever in "D" range (set hand brake firmly to hold car while making adjustments).

2) *Disconnect control rod from throttle lever on transmission cover.* On early type cars (see Production Change above), remove the extreme lower rear transmission side cover bolt. On later type cars remove the top bolt at rear edge of transmission side cover. Rotate throttle valve control outer lever assembly counter-clockwise to the open throttle position.

3) Hold lever in this position and with throttle valve outer lever positioning gauge J-5906 (See "Rework of Transmission Outer Lever Positioning Gauge J-5906" below) set at 7 3/32" (early cars), 6" (late cars), measure distance between bolt hole in side cover and hole in throttle lever. If pins of gauge will enter holes, adjustment is correct. If necessary to adjust, loosen lever to clamp attaching bolt and adjust lever on throttle shaft as necessary. Reconnect control rod.

4) Disconnect bellcrank-to-carburetor throttle rod at throttle valve lever. Disconnect accelerator-to-bellcrank rod at bellcrank.

5) Force bellcrank-to-transmission throttle lever rod forward against stop in transmission (open throttle position) and adjust bellcrank-to-carburetor throttle rod for free entry of swivel pin in throttle valve lever, with carburetor throttle valve in wide open position.

6) With carburetor throttle valve held in wide open position and accelerator fully depressed, adjust accelerator-to-bellcrank rod for free entry of swivel pin into hole in bellcrank.

►*REWORK OF TRANSMISSION OUTER LEVER POSITIONING GAUGE J-5906 (For use on both 6 Cyl. & V8 Cars):* Remove bolt hole locating pin (larger pin) from gauge, pressing pin from back of lever leg to remove. Cut 5/16" from pin and replace pin in lever leg, pressing it into place to allow apex of pin to project ¾" above lever leg surface. Stake pin in place securely. Separate lever leg and place a 3/16" spacer between legs. Reassemble lever gauge. *NOTE—In some cases it may be necessary to grind a beveled radius on the outer end of bolt lever leg as required. It will also be necessary to elongate the pivot hole slightly to provide the recommended 7 3/32" setting on earlier cars with first type lever and rod (this 7 3/32" setting supersedes previous 6 3/8" setting).*

ROCHESTER BC

Model	Rochester No.
Std. Transmission	7007181
Powerglide	7007180

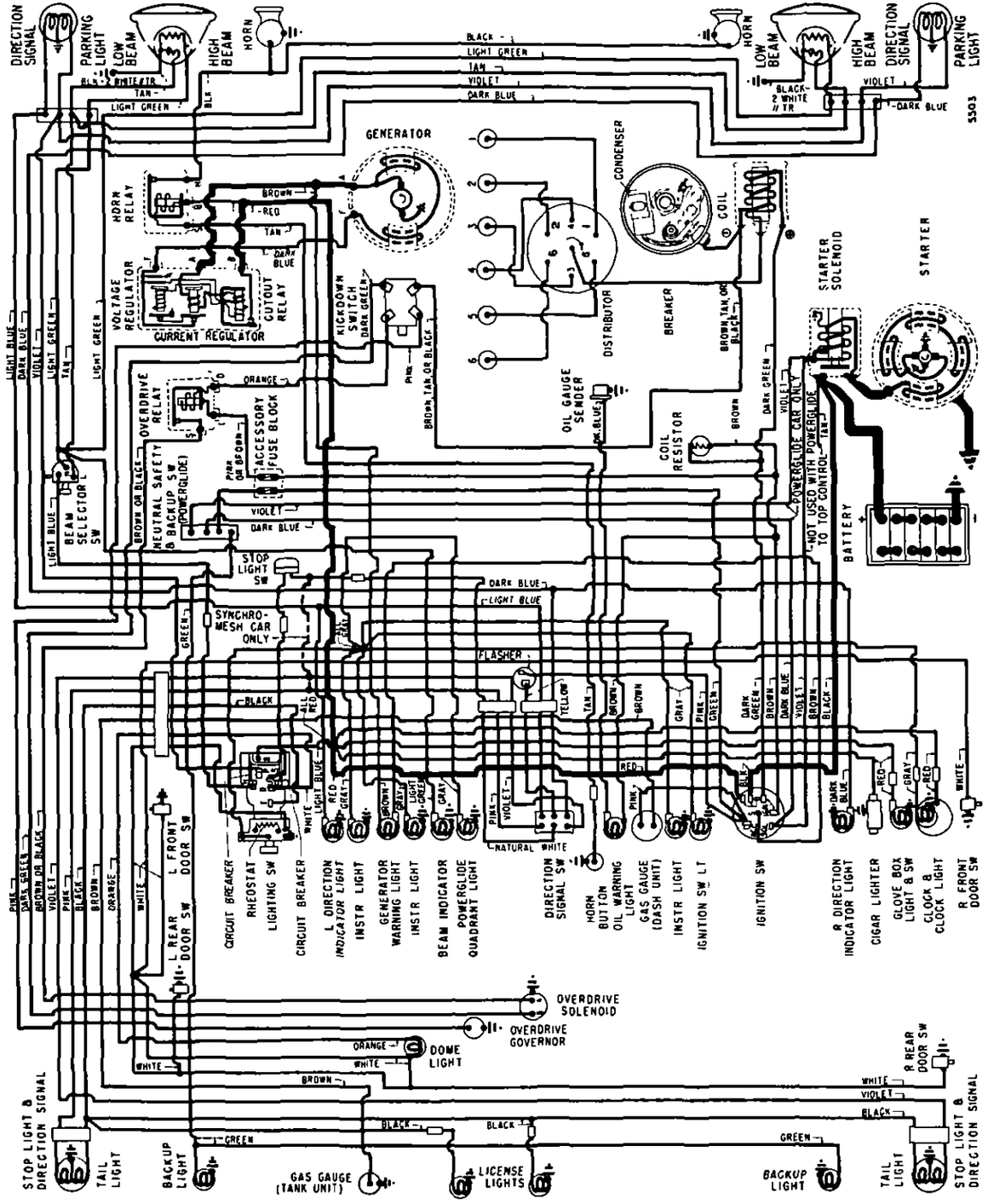
Idle Setting—1-2½ turns open.

Idle Speed (Synchro-mesh)—475 RPM.

Idle Speed (Powerglide)—425 RPM with Powerglide Selector lever in 'D' position.

Float Lever—Use Gauge No. 3696192. Invert bowl cover and float assembly **but do not remove gasket.** Place gauge in position over floats with gauge tang in discharge nozzle. Adjust each float vertically so they just touch top portion of gauge and bend float arms horizontally to center each float in gauge cutout.

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Tilt assembly 90° to each side to see that floats do not touch gauge. Check float drop or travel by turning cover right side up so that floats drop down. Distance from gasket on cover to bottom of each float must be 1¼". Adjust by bending tang at rear of float assembly.

Choke Adjustment: Index mark on cover aligned with long cast mark on top of choke housing casting.

Fast Idle: With idle adjusting screw on next to highest step of fast idle cam, Gauge J-5120 (.073") should just slide between lower edge of choke valve and carburetor bore. To adjust, bend connector rod.

Throttle Return Check Adjustment (235" Powerglide Engine): With the engine idle speed set at 425 RPM, shut off engine, close choke valve and position throttle stop screw on highest step of fast idle cam. Using a 9/32" wrench on the flat section of throttle return check shaft, hold shaft from turning, and with a 3/8" wrench turn the adjusting screw until it just contacts the throttle lever contact arm.

►*OTHER DATA: See "Rochester B & BC Carburetors" in Carburetor Section.*

Powerglide Throttle Linkage Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 4 lbs. maximum.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.
Replacement Fuel Pump—AC No. 4149 (Fuel only), No. 4138 (Fuel & Vacuum).
Pressure—3½-4½ lbs.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: AC Electric.
Dash Unit—AC No. 1518407.
Tank Unit—AC No. 1518158 (Exc. Sed. Del. & Sta. Wgn.). AC No. 1518180 (Sed. Del. & Sta. Wgn.).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco 2SM50. *12 Volt.* 9 Plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground—Negative terminal.
Engine Ground—Engine to cowl at rear head bolt.

STARTER

Delco-Remy 1107626. *12 Volt.* **Armature**—1926626.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35 ozs. minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: Delco-Remy Solenoid Switch 1119767 mounted on starter and controlled by Ignition & Starter Switch 1116512.
See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Equipment Section.

Neutral Safety & Back-Up Light Switch: Delco-Remy 1998105 (Powerglide Cars only).
Adjustment—*See "Chevrolet Powerglide" in Transmission Section.*

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GENERATOR

Delco-Remy 1100310 (Std.), 1102020 (Power Steering).
Armature–Delco-Remy 1928952 (Gen. 1100310), Delco-Remy 1929640 (Gen. 1102020).
Maximum Charging Rate–*See Voltage Regulator.*

Performance Data

Generator	Amperes	Volts	RPM
1100310	25	14.0	2780
1102020	30	14.0	2150

Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs.
Field Current–(1100310) 1.5-1.62 amps. (1102020) 1.48-1.62 amps. at 12 volts.
Belt Adjustment: 5/16" belt deflection with light thumb pressure midway between generator and pump pulleys.

REGULATOR

Delco-Remy 1118945 (Use with Gen. 1100310), Delco-Remy 1118826 (Use with Gen. 1102020). *NOTE–Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cut-Out Relay

Cuts In–11.8-13.5 volts (hot).
Contact Gap–.020".
Air Gap–. 020" (with contacts just closed).

Voltage Regulator

Setting–13.8-14.8 volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section*

Current Regulator

Setting (1118945)–23-27 amperes (hot).
Setting (1118826)–27-33 amperes (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*
Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) and pull shaft and knob out. Remove switch retaining nut and switch assembly
Stop Light Switch Location: Mechanical type mounted under instrument panel adjacent to brake pedal lever.
Adjustment–Adjust position of switch so that stop light goes on when brake pedal is depressed 5/8" from fully released position.

FUSES: All accessory fuses except as indicated below are contained on the accessory fuse and junction block located on upper inside of dash panel to left of steering column.
Overdrive–14 amps. Located in Lucite cartridge in overdrive relay feed line on engine side of dash to left of steering column.
Radio–In feed line adjacent to radio.
Back-up Light–On accessory fuse block.

CIRCUIT BREAKER: Two 13 amp. circuit breakers located on main light switch, protects all lighting circuits.

HORNS: Delco-Remy 1999759 (Low Note), 1999760 (High Note).
Horn Relay: Delco-Remy 1116781
Contacts Close–5.0-9.5 volts **Contact Gap**–.027".

ENGINE

►*TWO ENGINE USED ON PASSENGER CARS: Conventional 235" & Powerglide 235". See Passenger Car & Truck Model Identification for engine application.*
►*NOTE: The following repair data applies to all Pass. Car & Truck Engines.*

Bore	Stroke	Displacement	Rated HP
3 9/16"	3 15/16"	235.5 cu. ins.	30.4

Engine	Compr. Ratio	Developed HP
Standard	7.5-1	123 at 3800 RPM
Powerglide	7.5-1	136 at 4200 RPM

Compression & Vacuum Reading–*See Tune-Up.*
ENGINE REMOVAL: *See Chevrolet Special Data.*
OIL PAN REMOVAL: Remove bolts attaching steering idler arm bracket to frame side rail and drop for clearance. Remove pan retaining bolts and remove pan.
CYLINDER HEAD: *See "Cylinder Head & Manifold" in Chevrolet Special Data.*
ENGINE MOUNTINGS: *See Chevrolet Special Data.*
TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS

Aluminum alloy, cam ground, tin plated, with pin offset 5/64".
Weight–1.18 lbs. (235" Engine), 1.36 lbs (261" Engine).
Removal–Pistons and rods removed from above.
Clearance–.0005-.0011" at bottom of skirt, .0115-.0135" at top land. Selective fit.
Replacement Pistons: Furnished Std. Size & .020", .030", .040" oversize. *STANDARD SIZE PISTON NOTE*–Std. pistons furnished in four sizes with size stamp and size range as follows: **S4**(3.5625"-3.5630"), **S5** (3.5630"-3.5635"), **S6**(3.5635"-3.5640"), **S7**(3.5640"-3.5645").
Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to a point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.
Installing Pistons: Install piston with notch in piston mark "Front" toward front of engine.

PISTON PINS

Locked in rod. No bushing used in piston.
Diameter–.8660"-.8665". **Length** 3.198"-3.228".
Pin Fit in Piston–Thumb push fit (at room temp.). To check fit, with piston and pin at 70°F, apply light oil film to pin, insert pin vertically in one piston boss (one end of pin in either piston boss). Pin should hold own weight but should install easily with thumb pressure.
Replacement Pins: Furnished Std. .0015", .003", .005" oversize.

PISTON RINGS

Passenger Cars

Ring	Width	End Gap	Side Clearance
Compr. ①	.0930-.0935"	.007-.020"	.001-.003"
Oil ②	.180-.185"	.015"-.035" ③	④

Trucks

Ring	Width	End Gap	Side Clearance
Compr. ①	.0930-.0935"	.007-.020"	.002-.0035"
Oil ⑤	181-.188"	.015-.055" ③	.000-.008"

①–Deep section "Twist" type. Top ring on Loadmaster & Jobmaster Engines is chrome-plated.
②–4-piece type (two steel rails, spacer, and expander).
③–Gap on rails.
④–Free fit to .010" clearance.
⑤–3-piece type (two chrome-plated steel rails and spacer).
►*RING INSTALLATION CAUTION–Install compression rings with side marked "TOP" upward.*
Replacement Rings: Furnished Std. .005", .010", .020", .030", .040" oversize.

CONNECTING RODS

►*CONNECTING ROD REPLACEMENT CAUTION–Rods for 261" Jobmaster engine not interchangeable with other engines. Casting No. 3701491 (Exc. 261" Engine), No. 3702448 (261" Engine).*
Length–6 13/16". **Weight**–31.76 ozs. (Exc. 261" Engine).
Crankpin Journal Diameter–2.311"-2.312", all engines.
Lower Bearing–Replaceable precision type
Clearance–.001-.003" (new), .001-.004" (used). No adjustment. Replace bearings.
Sideplay–.005-.012" at lower end.
Replacement Bearings: Std. .001", .002", .010", .020" undersize.
Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinders with numbers and pin clamp bolt toward camshaft side.

CRANKSHAFT

►*CAUTION: No. 1 (front) and No. 2 (front intermediate) bearings similar in appearance but must not be interchanged. No. 2 bearing marked by "1" in oil groove.*
Journal Diameters–(1) 2.6835"–2.6845", (2) 2.7145"–2.7155", (3) 2.7455"–2.7465", (4) 2.7765"–2.7775". *NOTE*–Journal taper or out-of-round limits .001". Run-out Limits for Nos. 2 & 3 journals is .002".
Clearance–.0005" minimum,. .003" maximum (new bearings), *Service limits* .0005" min. .0045" maximum. See Adjustment below.
NOTE–Precision type bearings can be replaced singly.
Bearings–Steel backed thin wall babbitt. *Boring or reaming not required*
Bearing Adjustment: Solid shims. Remove shims until light drag secured when shaft turned by hand, then replace .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side of all bearings).
Replacement Bearings: Furnished Std. .002", .010", .020", .030" undersize.

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Bearing Installation: Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Bearing Cap Installation–No. 2 & No. 3 bearing caps marked for identification. Install No 2 cap with mark "FRONT" toward front of engine, No. 3 cap with mark "REAR" toward rear of engine.

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chevrolet Special Data.*

End Thrust: Taken by No. 3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of No. 3 bearing. Adjust by replacing bearing. **Endplay**–.0035"-.0095".

Vibration Dampener: *See "Vibration Dampener" in Chevrolet Special Data.*

CAMSHAFT

►*CAMSHAFT REPLACEMENT CAUTION: Different camshafts used in Conventional and Powerglide Engines. The 261" Truck Engine uses same camshaft as used in Corvette (6 Cyl.).*

Camshaft Identification

Model	Camshaft No.	Cast No.①
235" Pass. (Powerglide)②	3836483	3836386
235" All (Exc. Powerglide)②③	3836489	3836366
235" Corvette	3636484	3836390
261" Truck	3636484	3836390

①–Number forged or cast on camshaft.
②–Except Corvette.
③–When replacing cast iron camshaft (Identified by one large raised dot between No. 5 & No. 6 inlet cams), Steel Distributor Drive Gear, Part No. 1865180 MUST BE USED.

Journal Diameters–(1) 2.1537–2.1547". (2) 2.0912–2.0922". (3) 2.0287–2.0297". (4) 1.9662-1.9672".

►*NOTE:* Journal out-of-round limits .001". Run-out limits .002".

Bearing Type–Steel backed babbitt lined bushing (staked in place). *NOTE*–Bearings must be line reamed. *See "Camshaft & Bearings" in Chevrolet Special Data.*

Clearance–.0015-.0035".

End Thrust: Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).

Endplay Adjustment–*See "Timing Gears" in Chevrolet Special Data.*

Endplay–Free fit to .003" maximum.

Timing Gears: Fibre (Pass. Cars. Exc. Corvette), Aluminum (Corvette and Trucks). Steel crankshaft gear.

Replacement Timing Gears & Installation: *See "Timing Gears" in Chevrolet Special Data.*

Timing Gear Backlash–.003-.004".

Camshaft Setting: Gears punch marked. Punch marks on both gears must line up directly opposite each other.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chevrolet Special Data.*

VALVES

Tappet Clearance (Pass. Cars with Conventional Valve Lifters): .006" Intake, .016" Exhaust, with engine "normalized". *See "Valve System" in Chevrolet Special Data.*

(Powerglide Cars with Hydraulic Lifters)–Adjustment required only when cylinder head removed or lifters replaced. *See Tappet Clearance Adjustment under "Valve System" in Chevrolet Special Data.*

►*NOTE: "XCR" exhaust valves used in 235" Powerglide, H.D. Trk. & 261" Engine (stamped "XCR").*

Valve	Head Diam.	Stem Diam.	Length
Intake	1 7/8"	.3410-.3417"	6.364-6.394"
Exhaust	1 1/2"	.3410-.3417	4.905-4.930"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°③	①	.001-.0027"
Exhaust	45°③	②	.001-.0027"

①–.294" (Conventional 235"), .400" (Powerglide 235"), .405" (Corvette & 261" Jobmaster Engine).
②–.312" (Conventional 235"), .400' (Powerglide 235"), .414" (Corvette & 261" Jobmaster Engine).
③–Seat angle in block 1° additional.

Valve Seat Width–.035-.060" (Intake), .062-.093" (Exhaust).

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*

Valve Guides: Precision type. Pressed in head.

Valve Guide Installation–*See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install springs with closed coil end down. Check with spring tester and replace if not within limits shown below. *NOTE–Conventional Engine and Powerglide Engine valve springs are different.*

Spring Specifications (235" Conventional Engine)

	Pressure	Length
Valve Closed	62-68 lbs.	1.821"
Valve Open	155-165 lbs.	1.505"

Free Length–2 5/32".

Spring Specifications (235" Powerglide Engine)

	Pressure	Length
Valve Open	194-210 lbs.	1.462"

Free Length–2 15/64".

Spring Specifications (261" Truck Engine)

	Pressure	Length
Valve Closed	74-82 lbs.	1.858"
Valve Open	177-187 lbs.	1.518"

Free Length–2.281".

Valve Lifters (Conventional 235" Engine): Plain barrel type. Identified by plain barrel and spot of yellow paint below push rod seat. *NOTE*–Valve Lifters used on Corvette has shallow groove around barrel.

Valve Lifters (Powerglide 235" Engine): Hydraulic type. Identified by rib around oil groove.

Hydraulic Lifter Adjustment–*Required only when installing cylinder head or when adjusting screw setting has been disturbed. See "Valve System" in Chevrolet Special Data.*

Hydraulic Lifter Overhaul & Testing–*See "Valve System" in Chevrolet Special Data.*

►*REMOVING HYDRAULIC VALVE LIFTERS: When removing lifters and push rods use a rack to keep them in proper sequence. Install in their original location when reassembling.*

Valve Lifters (261" Truck Engine): Conventional type lifter identified by single groove around body.

Rocker Arm Assembly: *See "Valve System" in Chevrolet Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

235" Conventional Engine

Intake Valves–Open 1° ATDC. Close 39° ALDC.
Exhaust Valves–Open 42° BLDC. Close 9° ATDC.

235" Powerglide Engine

Intake Valves–Open 10° 30' BTDC. Close 53° 30' ALDC.
Exhaust Valves–Open 49° BLDC. Close 15° ATDC.

Valve Timing Check–*(CAUTION–On 235" Powerglide engine with hydraulic valve lifters, it will be necessary to replace the hydraulic valve lifter and pushrod operating No. 1 exhaust valve, with a conventional lifter and pushrod). Remove all tappet clearance from No. 1 exhaust valve. Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer on right face of flywheel housing.* Mount dial indicator on rocker arm shaft with stem of indicator contacting No. 1 exhaust valve adjusting screw and set dial indicator to .044" (235" Conventional Engine), .058" (235" Powerglide Engine). Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004'. Reset tappet to correct running clearance.

OILING SYSTEM

►*ENGINE OIL PUMP SUCTION PIPE PRODUCTION CHANGE (To Prevent Oil Pump Losing Prime at Oil Change): See "Oiling System" in Chevrolet Special Data.*

Crankcase Capacity: 5½ qts. (dry), 5 qts. (refill).

Normal Oil Pressure: 35 lbs. (approx.).

Pressure Regulator Valve–In oil pump body. Not adjustable.

Oil Pressure Indicator–Light located at right side of instrument cluster, controlled by a pressure operated switch AC No. 1508245, located in main oil gallery on left side of engine. Switch closes at 4-6 lbs. pressure.

Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

Oil Pump Overhaul–*See "Oiling System" in Chevrolet Special Data.*

Oil Filter Element: AC P-115.

Rocker Arm Oil Lead & Overflow Pipe: *See "Oiling System" in Chevrolet Special Data.*

Crankcase Ventilation–Air intake through valve rocker arm cover (air cleaner on some models), outlet through pipe on right side of engine.

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COOLING

►*RADIATOR REMOVAL CAUTION (POWERGLIDE CARS): Transmission oil cooler is part of radiator lower tank, and must be TIGHTLY SEALED after removal or during repairs to avoid entrance of foreign material.*

Water Capacity: 16 qts. (17 qts. with heater).

Pressure Valve: AC No. 850549. Radiator filler cap, 7 lb. type.

Thermostat: Harrison. In cylinder head water outlet.

Standard—No. 3123993 (stamped 151) 151°. Can be used for alcohol anti-freeze.

Optional—No. 3123994 (stamped 160) 160°, No. 3133597 (stamped 170) 170°, No. 3123995 (stamped 180) 180°.

NOTE—Do not use a 180° thermostat with 7 lb. radiator cap.

Temperature Gauge: AC No. 1512931. Not electric.

Water Pump: Double outlet, packless type with sealed ball-bearing shaft.

See "Chevrolet" in Water Pump Section.

►*WATER PUMP & FAN PULLEY REINFORCEMENT:* Part No. 3720616 has been released for installation on engines where greater pulley durability is required. Later type pumps have this reinforcement. On early type pumps when the reinforcement is installed a slight fan belt misalignment will result, in any case clearance between pulley and pump body should not be less than .065".

Radiator Removal & Installation: *See "Radiator" in Chevrolet Special Data.*

CLUTCH

Own (Exc. Powerglide Cars)—Diaphragm spring type.

See "Chevrolet (Own)" in Clutch Section.

Clutch Disc—Chevrolet No. 3836103 (Molded), 3836121 (Woven), 3836119 (Hvy. Duty).

Pedal Adjustment: Pedal free travel ¾-1". Loosen check nut at connecting link at clutch fork. Turn adjusting nut to remove all lash at fork, **then back off two turns.** Tighten check nut.

Removal: Remove transmission (see Transmission Removal below). Remove throwout bearing. Remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove cover assembly from below. *CAUTION*—Do not allow plate to hang from retracting springs, (support by hand). When installing clutch, align 'X' mark on cover with 'X' mark on flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh.

See "Chevrolet 3-Speed" in Transmission Section.

►*HARD SHIFTING CORRECTION: See "Chevrolet Transmission Control" and "Chevrolet 3-Speed" in Transmission Section for shift linkage rework and installation of new transmission parts.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Drain Transmission and disconnect speedometer cable and shift rods. Disconnect propeller shaft at rear universal and slide shaft toward rear to disengage from transmission. Remove two top transmission to clutch housing screws and install Guide Pins J-1126. Remove the two lower screws and slide transmission back until clutch spines are disengaged. Remove transmission from below car.

OVERDRIVE

Warner Model AS1-R10H. Solenoid operated type with governor control and throttle operated kickdown. Lockout Switch not used.

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh transmission (above) after disconnecting control cable and wiring.

POWERGLIDE TRANSMISSION

Powerglide Transmission (Used with 235" Powerglide Engine)—Torque converter and hydraulically operated planetary gear unit with manual controls.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Chevrolet Powerglide" in Trans. Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubrication: Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing an "AQ-ATF" marking on container.

Capacity—5 qts. (refill), 11 qts. (after overhaul).

►*POWERGLIDE DRAINING CAUTION—There is no drain plug on converter. Drain transmission case only, add 5 qts, of fluid initially, recheck after idling engine.*

Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in "N" range when taking dipstick readings. Dipstick is located under hood on right side just opposite starter.

►*OTHER DATA: See "Chevrolet Powerglide" in Transmission Section.*

UNIVERSALS

Own. Needle Bearing type.

►*CAUTION:* Rear bearing companion flange nut controls rear axle pinion bearing preload. Preload must be adjusted whenever companion flange nut loosened. *See "Chevrolet Pass. Car (Hotchkiss Drive) in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type, with Hotchkiss Drive. Pinion bearing adjustment is different than on previous models.

See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.

►*PINION BEARING PRELOAD CAUTION:* Rear universal joint companion flange controls rear axle pinion bearing preload. Bearing preload must be adjusted whenever companion flange nut is loosened.

Car Model	Axle Ratio	Serial Prefix
Std. Transmission	3.70-1	AA or BA
Overdrive	4.11-1	AC or BC
Powerglide	3.55-1	AB or BB

Backlash—.005-.008".

Removal: Raise car and support with jack stands under frame side rails. Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cables from clamps at frame. Disconnect hydraulic brake lines at rear axle housing. Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor.

Axle Shaft Removal: Raise car and place jack stands under axle housing. Remove tire, wheel and brake drum assembly. Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange). Attach axle Puller J-5748, with slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate. *NOTE*—If bearing retainer and parking brake strut interfere, raise strut slightly with screw driver to obtain clearance.

SHOCK ABSORBERS

Delco. Direct acting non-adjustable. Serviced by replacement.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs and new spherical type joints connecting control arms and steering knuckles.

See "Chevrolet (Spherical Joint)" in Front Suspension Section.

Kingpin Inclination—3½°±½°.
Caster—0°±½°.
Camber—Pos. ½°±½°.

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►*CAMBER & CASTER ADJUSTMENT NOTE: Adjusted by shims located between upper control arm inner support shaft and support bracket.*

Toe-In–1/8-3/16".

Toe-Out on Turns–With outer wheel turned 20°, inner wheel should be 22½°±2".

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Own (Linkage Type). *See "Chevrolet Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic, without anchor pin adjustment. Hand lever applies rear wheel service brakes.
See "Chevrolet-Bendix Hydraulic" in Brake Section.

►*REPLACEMENT BRAKE SHOE GRINDING CAUTION:* To compensate for lack of brake anchor adjustment, brake shoes are ground to a .057-.087" smaller diameter than the drum diameter. Grinding shoes to the true drum diameter on bench grinders will cause heel and toe contact, resulting in erratic brake action. *NOTE–If spindle mounted type grinder is used, the shoes should be ground to the true drum diameter.*

Drums–Diameter 11".

Wheel Cylinder Diameter–Front 1 1/8", Rear 1".

	Brake Lining Width	Thickness
Front Whl.	2"	.187-.194"
Rear Whl.	1 3/4"	.187-.194"

Length Per Shoe–9.3125" (Primary), 11.6875" (Secondary).

Braking Power–55.9% (front wheels), 44.1% (rear wheels).

Clearance–Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.

Standard Master Cylinder: Located on engine side of firewall in line with brake pedal.

Checking Fluid–Reservoir is integral with master cylinder. Maintain level in cylinder to lower edge of filler hole.

Removal–Disconnect hydraulic line from end of cylinder and remove bolted brass fitting. Remove four retaining nuts and lock washers holding master cylinder to firewall and remove cylinder.

Installation–Reverse removal procedure making sure that push rod clevis is straddling the brake pedal. Refill master cylinder and bleed all brake lines. Adjust push-rod-to-main cylinder clearance as follows: Make sure brake pedal returns to fully released position with no binding, and that pedal retracting spring has not lost its tension, then adjust brake pedal clevis to give a barely perceptible end play between main cylinder piston and brake push rod (approximately 1/16" pedal clearance).

Power Brakes: Bendix Vacuum Type Power Unit replaces conventional master cylinder.
See "Bendix Power Unit" in Brake Section.

►*SLOW POWER BRAKE PEDAL RETURN CORRECTION:*
See "Brake Notes" in Chevrolet Special Data.

MISC. MECHANICAL

Windshield Wipers: Cable operated type (Std.). Electric type (Optional).
See "Windshield Wipers" in Miscellaneous Section.

Window Regulators: Electric type with reversible motor operating each door window assembly.
See "Power Window Regulators" in Miscellaneous Section.

Power Top Control: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjuster: Reversible electric motor controls horizontal front seat movement. *See "Power Seat Adjusters" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Series	Serial Prefix	Model
1500	VA	ONE-FIFTY
2100	VB	TWO-TEN
2400	VC	BEL-AIR

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post.

Starting Serial Number–001001 (at each plant) for all models except Corvette.

►*SERIAL NUMBER NOTE: Serial Number (example VB55F001025) includes following identification information in sequence.*

Series ①	Year	Assy. Plant ②	Serial No.
VB	55	F	001025

① –See Model Designation above.
② –See Assembly Plant Designation below.

Assembly Plant Designation

A–Atlanta	**J**–Janesville	**O**–Oakland
B–Baltimore	**K**–Kansas City	**S**–St. Louis
F–Flint	**L**–Los Angeles	**T**–Tarrytown
	N–Norwood	

ENGINE NUMBER: Stamped on pad at front right hand side of cylinder block behind water pump.

Starting Engine Number–001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ("F" for Flint), Model Year and Model Type.

Type	Suffix
V8 with 3-Speed Trans.	G
V8 with Overdrive	GC
V8 with 4-Barrel Carburetor	GD
V8 with 4-Barrel Carburetor & Overdrive	GE
V8 with 3-Spd. Trans. & Air Cond.	GF
V8 with 3-Spd. Trans., Air Cond. & 4-Bbl. Carb.	GG
V8 with Hvy. Duty Clutch	GJ
V8 with H.D. Clutch & Air. Cond.	GK
V8 with H.D. Clutch & 4 Bbl. Carb.	GL
V8 with H.D. Clutch, Air Cond. & 4 Bbl. Carb.	GM
V8 with Powerglide	F
V8 with Powerglide & 4-Bbl. Carb.	FB
V8 with Powerglide & Air Cond.	FC
V8 with Powerglide, Air Cond. & 4-Bbl. Carb.	FD

TUNE-UP

COMPRESSION PRESSURE: 130 lbs., minimum with all cylinders within 10 lbs., at cranking speed.

VACUUM READING: 17-21" at idling speed.

VALVE TAPPET CLEARANCE: *(NOTE–Conventional lifters used on first Synchro-mesh cars, Hydraulic lifters used on later Synchro-mesh and all Powerglide cars.*

Cars with Conventional Lifters–.008" Intake, .016" Exhaust, with engine "normalized".

Cars with Hydraulic Lifters–No adjustment required unless cylinder head removed or lifters replaced. *See "Valve Tappet Adjustment" under VALVE SYSTEM in Chevrolet Special Data.*

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders–RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plug–AC 44-5 (Std.), AC 46-5 (Use for continuous city driving), AC 43-5 (Use for heavy duty operation). *14mm. Torque to 20-25 ft. lbs.*

COIL: Delco-Remy 1115087. *12 Volt.* At distributor. **Ignition Current**–1.8 amps. idling, 4.0 amps. stopped. **Resistor**–Delco-Remy 1927809 (1.40-1.65 ohms). On firewall.

►*COIL RESISTOR NOTE:* Resistor is connected to ignition switch by two leads and is by-passed during cranking (2nd. lead provides direct connection to coil when key turned to "Start Engine" position).

DISTRIBUTOR: Delco-Remy 1110847.

Condenser–Delco-Remy 1869704, **Capacity** .18-.23 mfd.

Contact Point Set–Delco-Remy 1924499.

Breaker Gap–.019" (new points), .016" (used points).

Cam Angle–26-33° *with .016" gap.*

►*BREAKER GAP CAUTION: Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension–19-23 ozs.

Rotation–Clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
8-10	1150	16-20	2300
15-17	1800	30-34	3600

Vacuum Spark Control: Delco-Remy 1116085 (early), 1116100 (later). **Plunger Travel**–19/64-5/16" (1116085), 15/64-1/2" (1116100).

Vacuum Advance–No. 1116085

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
14	28	13.5-15.5

Vacuum Advance–No. 1116100

Start	0	5-7
11 75	23.5	12-20.5

IGNITION TIMING

Setting–4° BTDC. Set timing to 8° BTDC at 1000 Engine RPM using suggested procedure following:

►*SUGGESTED TIMING SETTING PROCEDURE:* Disconnect distributor vacuum advance and run engine at 1000 RPM. Rotate distributor body until index line on harmonic balancer lines up with **8° BTDC** mark on indicator bolted to left side of timing chain cover.

Timing Mark–Mark on vibration dampener and an indicator on left side of valve chain cover. Indicator marked with 5-2° lines each side of "O" TDC mark.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: Rochester 2GC Dual carburetor is Std. on all models. Carter WCFB 4-Barrel Carburetor is Optl. "Power Package".*

THROTTLE LINKAGE ADJUSTMENT: *(POWERGLIDE NOTE–Adjust Transmission Throttle Control Linkage BEFORE adjusting carburetor throttle linkage).*

Carburetor Throttle Linkage (All Models)–With accelerator pedal depressed full and with throttle valve wide open, adjust accelerator-to-throttle lever rod (upper throttle rod) swivel for free entry into throttle lever. Then lengthen throttle rod by turning swivel **two full turns.** Connect rod to throttle lever.

Transmission Throttle Lever Adjustment (Powerglide Models)–With selector lever in "D" (Drive) range and with hand brake applied, adjust engine idle speed to 425 RPM (engine and transmission at normal operating temperature). Turn engine off and check choke valve to make sure it is fully open and that throttle stop screw is against low step of fast idle cam. Disconnect transmission throttle rod at lever on transmission. Remove extreme lower rear bolt in side cover on transmission. Rotate transmission throttle valve outer lever counter-clockwise to the open throttle position (against stop). Hold in this position and with throttle valve outer lever positioning gauge J-5906 set to 2-7/8", measure the distance between the bolt hole in side cover and hole in throttle lever. If pin of gauge enters hole, adjustment of lever is correct. If necessary to adjust, loosen lever to clamp attaching screw and adjust outer lever to obtain correct adjustment. Install bolt in side cover and attach throttle rod to transmission lever. Disconnect upper and lower rods from carburetor throttle lever. Force transmission throttle control rod forward against stop in transmission (open throttle) and adjust lower rod on carburetor throttle lever until swivel pin freely enters hole in lever with throttle valves wide open. Adjust upper throttle rod (see Carburetor Throttle Linkage above).

THROTTLE RETURN CHECK ADJUSTMENT (POWERGLIDE CARS): Have engine at full operating temperature. Align throttle return check adjusting screw with contact arm on throttle lever by bending return check bracket. With parking brake set tight, place selector lever in 'D' range and adjust throttle stop screw and idle adjusting screw in combination with each other for smooth idle at 425 RPM with stopscrew on low step of fast idle cam. Shut off engine, close choke valve so that stopscrew on high step of fast idle cam, adjust throttle check screw until it contacts throttle lever arm (use wrench to hold shaft).

ROCHESTER 2GC 2-BARREL

Rochester Model 2GC No. 7005810 (Early–Powerglide), 7008004 (Late–Powerglide), 7006825 (Early–Synchro-mesh), 7008005 (Late–Synchro-mesh).

►*LEAN SURGE CONDITION AT 55-75 MPH (First Cars with No. 7006825 & 7005810 Carburetors): See "Rochester 2GC" Carburetor in Carburetor Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

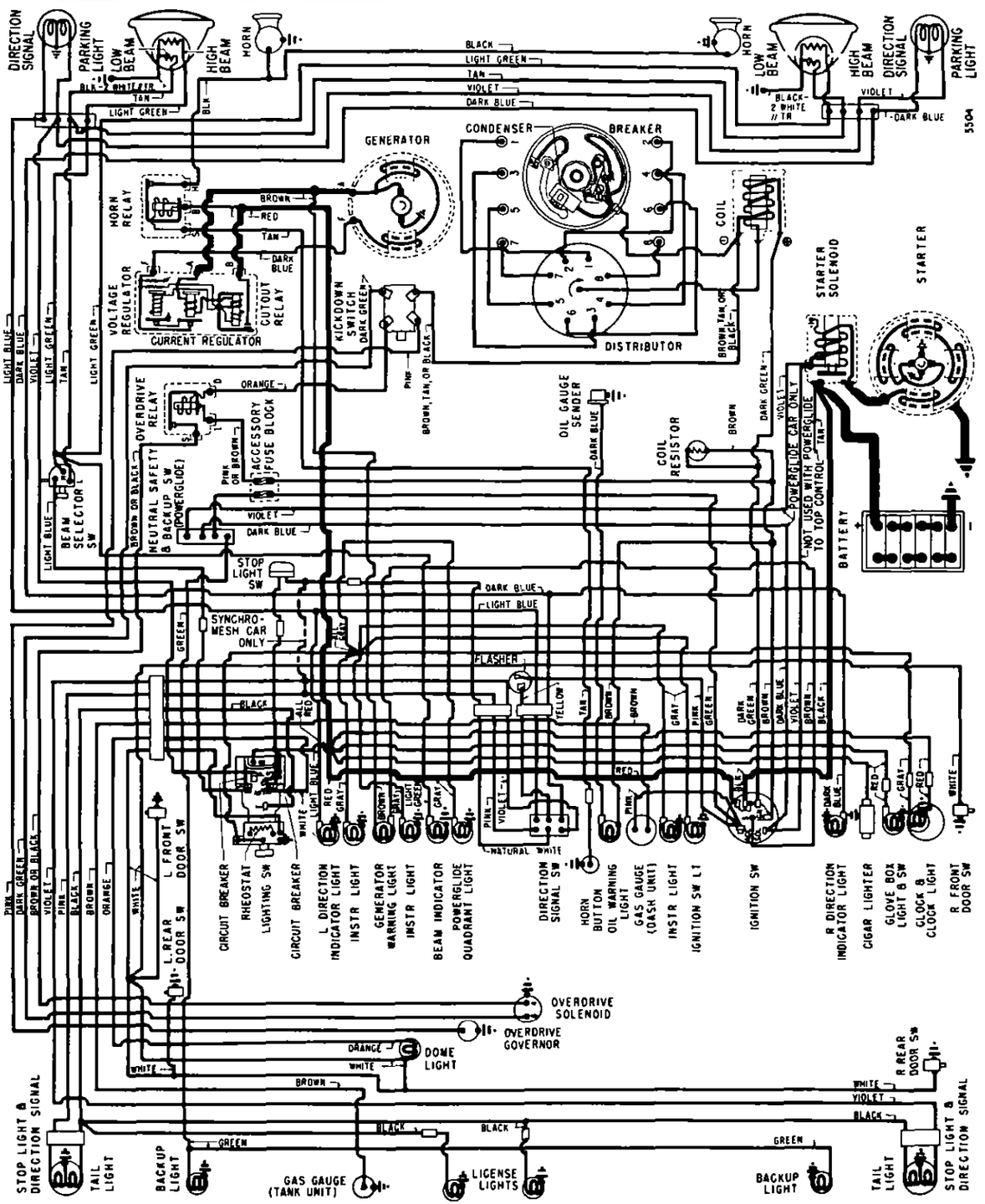
Idle Setting–After idle speed set to correct specifications (see Idle Speed below), turn both idle mixture screws for smooth idle with highest vacuum reading and engine RPM.

Idle Speed–450-500 RPM (Synchro-mesh), 400-450 RPM (Powerglide–with Selector lever in "D" range).

Float Level–1 5/32" *from air-horn gasket to top of* float with assembly inverted. Use Gauge BT-107 so it rests against power piston shaft with outer leg in line with center of float.

Float Drop–1 29/32" between air horn gasket and lowest point on bottom of float with air horn held up-

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right (Gauge BT-107). Adjust by bending float tang.

Fast Idle: No adjustment of fast idle speed is provided. It is necessary however, to have correct relationship between fast idle cam position and choke valve position. Check & adjust as follows: Place end of idle adjusting screw on next to highest step of fast idle cam. Using Gauge J-5921, small end of gauge must slide easily between upper edge of choke valve and bore of carburetor, with gauge held vertically. If necessary, bend choke rod until correct clearance is obtained.

Unloader Adjustment—With throttle in wide open position, wide end of Gauge J-5921 must slide freely between upper edge of choke valve and carburetor bore. Bend tang of throttle lever to obtain necessary clearance.

Automatic Choke Setting: Centered (at index).

►*OTHER DATA: See "Rochester 2GC Carburetor" in Carburetor Section.*

Fuel Pump Pressure: 4-5½ lbs., at 450-1000 RPM.

Powerglide Throttle Linkage Adjustment: *See "Carburetor" above.*

Throttle Return Check Adjustment (Powerglide Cars): *See "Carburetor" above.*

CARTER 4-BARREL WCFB 2218S & 2351S

►*HARD STARTING (AFTER FLOODING): See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section.*

►*LOADING (WHEN STARTING PARTIALLY WARM ENGINE): See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section.*

►*AIR CLEANER INSTALLATION CAUTION (CARS WITH 4-BARREL CARBURETORS):* Before installing air cleaner, the cutouts in the gasket should be matched up with the vent pipes to prevent blocking off vent.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting—1/4—1-1/4 turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—450-500 RPM (Synchro-mesh), 400-450 RPM (Powerglide—with Selector lever in "D" range).

►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section.*

Powerglide Throttle Linkage Adjustment: *See "Carburetor" above.*

Throttle Return Check Adjustment (Powerglide Cars): *See "Carburetor" above.*

Fuel Pump Pressure: 4-5½ lbs., at 450-1000 RPM.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.

Replacement Fuel Pump—AC No. 4150 (Fuel only), No. 4141 (Fuel & Vacuum).

Pressure—4-5¼ lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: AC Electric.

Dash Unit—AC No. 1519407.

Tank Unit—AC No. 1518158 (Exc. Sed. Del. & Sta. Wgn.). AC No. 1518180 (Sed. Del. & Sta. Wgn.).

See "Fuel Gauges" in Carburetion Equipment Section.

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BATTERY

Delco 2SM50. *12 Volt.* 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground–Negative terminal.
Engine Ground–Engine to cowl at rear head bolt.

STARTER

Delco-Remy 1107627 & 1107640. *12 Volt.*
Armature–Delco-Remy 1926626.
Drive–Overrunning clutch (solenoid pinion shift).
Rotation–Counter-clockwise at commutator end.
***Brush Spring Tension**–35 ozs. minimum.*

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs	*6900*	*10.3*	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: Delco-Remy Solenoid Switch 1119767 mounted on starter and controlled by Ignition & Starter Switch 1116512. Turn key full RIGHT against spring tension to start.
See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Equipment Section.
Neutral Safety & Back-up Light Switch: Delco-Remy 1998105 (Powerglide Cars only).
Adjustment–*See "Chevrolet Powerglide" in Transmission Section.*

GENERATOR

Delco-Remy 1100310 (Std.), 1102020 (Power Steering). *12 Volt.*
Armature–Delco-Remy 1928952 (Gen 1100310), Delco-Remy 1929640 (Gen. No. 1102020).
Maximum Charging Rate–*See Voltage Regulator.*

Performance Data–Cold

Generator	Amperes	Volts	RPM
1100310	25	14.0	2780
1102020	30	14.0	2150

Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs.
Field Current–(1100310) 1.5-1.62 amps. (1102020) 1.48-1.62 amps. at 12 volts.
Belt Adjustment: 13/16" belt deflection midway between fan and generator pulleys with a light pressure applied.

REGULATOR

Delco-Remy 1118945 (Use with Gen. 1100310), Delco-Remy 1118826 (Use with Gen. 1102020). *NOTE–Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cut-Out Relay

Cuts In–11.8-13.5 volts (hot).
Contact Gap–.020".
***Air Gap**–.020" (with contacts just closed).*

Voltage Regulator

Setting–13.8-14.8 volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section.*

Current Regulator

Setting (1118945)–23-27 amperes (hot).
Setting (1118826)–27-33 amperes (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equipment Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*
Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) and pull shaft and knob out. Remove switch retaining nut and switch assembly.
Stop Light Switch Location: Mechanical type mounted under instrument panel adjacent to brake pedal lever.
Adjustment–Adjust position of switch so that stop light goes out when brake pedal depressed 5/8" from fully released position.

FUSES: All accessory fuses except as indicated below are contained on the accessory fuse and junction block located on upper inside of dash panel to left of steering column.
Overdrive–14 amps. Located in Lucite cartridge in overdrive relay feed wire on engine side of dash panel to left of steering column.
Radio–In feed wire adjacent to radio.
Back-up Light–On accessory fuse block.

CIRCUIT BREAKER: Two 13 amp., circuit breakers located on main lighting switch, protects all lighting circuits.

HORNS: Delco-Remy 1999759 (Low Note), 1999760 (High Note).
Horn Relay: Delco-Remy 1116781.
Contacts Close–5.0-9.5 volts.
Contact Gap–.027".

ENGINE

►*TWO ENGINES ON PASSENGER CARS: "Conventional V8" (Early Synchro-mesh Cars–with "solid" valve lifters), and "Powerglide V8" (All Powerglide & Later Synchro-mesh Cars–hydraulic valve lifters).*

ENGINE SPECIFICATIONS: Own "V8" Valve-in-head.

Bore	Stroke	Displacement	Rated H.P.
3⅜"	3"	265 cu. ins.	45

Engine	Compr. Ratio	Developed H.P.
Standard	8.0-1	162 at 4400 RPM
With Power-Pack	8.0-1	180 at 4600 RPM

Compression & Vacuum Reading–*See Tune-Up.*

ENGINE REMOVAL: *See "Engine" in Chevrolet Special Data.*
OIL PAN REMOVAL: Disconnect steering idler arm bracket from frame side rail and drop for clearance.
ENGINE MOUNTINGS: *See "Engine Mountings" in Chevrolet Special Data.*
CYLINDER HEAD & MANIFOLDS: *See Chevrolet Special Data.*
TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS

Cast aluminum, slipper skirt, with piston pin offset 5/64".
Weight–18.77 ozs.
***Removal**–Pistons and rods removed from above.*
Replacement Pistons: Furnished Std. Size & .020", .030", .040" oversize.
►*STANDARD SIZE PISTON NOTE:* Standard pistons furnished in four sizes with size code stamped on piston. The sizes and codes are: **S4** (3.7500-3.7505"), **S5** (3.7505-3.7510"), **S6** (3.7510-3.7515"), **S7** (3.7515-3.7520").
Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to a point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.
Installing Pistons: Install pistons with cast depression in head and "F" mark cast in side of piston toward front of block. *See Rod Installation.*

PISTON PINS

Piston pin is pressed into connecting rod and retainers are not used.
Diameters–.9270-.9273". **Length**–3.1200".
Pin Fit in Piston–.00015-.00025". Pins should be capable of supporting own weight in either pin boss at 60°F.
Pin Fit in Connecting Rod–*NOTE–Special tools required for removal & installation. See "Piston Pins" in Chevrolet Special Data.*
Replacement Pins: Furnished only in assembly with piston. Oversizes not available.

PISTON RINGS

Upper compression ring is chrome plated and oil control ring is the four piece type (two steel rails, separator, and expander).

Ring	Width	End Gap	Side Clearance
Compr.	.077-.078"	.007-.020"	.001-.003"
Oil	.181-.188"	.015-.055" ①	.000-.008"

①–Gap on rails.
►*RING INSTALLATION CAUTION: Install compression rings with side marked "TOP" upward.*
Replacement Rings: Furnished in Standard size, .020", .030", .040" oversize.

CONNECTING RODS

Length–5.700" (center-to-center).
Crankpin Journal Diameter–1.999-2.000".
Lower Bearing–Replaceable precision type.
Clearance–.001-.003" (new), .001-.004" (used).
Sideplay–.008-.014" (both rods).
Replacement Bearings: Furnished Standard size, .001", .002", .010", .020" Undersize.
Installing Rods: Install rod in piston so that flange or heavy side of rod at bearing end will be toward front of piston (cast depression in head of piston and "F" mark on piston strut) on Nos. 1, 3, 5, and 7 pistons, and rod flange to rear of piston on Nos. 2, 4, 6, and 8 pistons. Install rod and piston assembly in cylinder with cast depression in piston head and "F" mark on strut toward front of cylinder block.

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CRANKSHAFT

Journal Diameter–2.2978-2.2988".
►*NOTE: Journal runout at intermediate bearing .002" max.*
Clearance–.001-.003" (new bearings), .001-.004" (used).
End Thrust–Taken at No. 5 (rear) main bearing.
Endplay–.002-.006". Check at front of rear bearing.
Replacement Bearings: Furnished Standard size, .001", .002", .010", .020" Undersize.
Bearing Installation: Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chevrolet Special Data.*
Vibration Dampener: *See "Vibration Dampener" in Chevrolet Special Data.*

CAMSHAFT

►*CAMSHAFT CAUTION: TWO camshafts used as follows:* **No. 3713453 (Cast No. 3713103)**–Cars with solid (conventional mechanical) valve lifters.
No. 3704212 (Cast No. 3703906)–Cars with hydraulic valve lifters.
Journal Diameters–1.8682-1.8692" (all journals).
Clearance–.0015-.0035".
Bearings–Steel backed babbitt lined bushing.
Replacement Bearings: "Precision" type (do not require reaming). Use Tool Set J-6098 to remove and install bearings.
Camshaft Setting: Both sprockets marked '0'. Install chain with sprocket marks adjacent and in line with straight edge across shaft centers.
►*CAUTION: When installing sprocket on camshaft, line up dowel holes in sprocket and shaft. DO NOT DRIVE SPROCKET ON SHAFT, use three mounting bolts and DRAW sprocket into place.*
Timing Chain: Silent Link Type.
Removal & Installation–*See "TIMING CHAIN" in Chevrolet Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chevrolet Special Data.*

VALVES

Tappet Clearance: *NOTE–"Solid" (conventional) lifters used on Early Synchro-mesh Cars, Hydraulic lifters used on all Powerglide and Later Synchro-mesh Cars.*
Cars with Conventional Lifters–.008" Intake, .016" Exhaust, with engine "normalized". *See "Valve System" in Chevrolet Special Data.*
Cars with Hydraulic Lifters–No adjustment required unless cylinder head removed or valve lifters replaced. *See "Valve System" in Chevrolet Special Data.*

Valve	Head Diam.	Stem Diam.	Length
Intake	1.720"	.3415-.3422"	4.902-4.922"
Exhaust	1½"	.3410-.3417"	4.913-4.933"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°③	①	.001-.0027"
Exhaust	45°③	②	.0015-.0032"

①–.336" (Solid lifters), .324" (Hydraulic lifters).
②–.343" (Solid lifters), .324" (Hydraulic lifters).
③–Seat angle in block is 46°.

Valve Seat Width–3/64"-1/16" (Intake), 1/16"-3/32" (Exhaust).
Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*
Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance is excessive. Valves are furnished with .003", .015", .030" oversize stems. Use Reamer Set J-5830 for reaming guide holes.
Valve Springs: Install springs with closed coil end of spring toward cylinder head. On intake valve springs a baffle is used inside spring.
Valve Spring Specifications: 71-79 lbs. pressure when spring compressed to 1 45/64".
Free Length–2.03" **Installed Height**–1 11/16-1 47/64".
►VALVE SPRING INSTALLED HEIGHT CAUTION: Check installed height of valve spring after grinding valves by measuring the distance from spring seat in cylinder head to top of valve spring. If this dimension exceeds 1 47/64" install a valve spring seat shim approximately 1/16" thick.
Valve Lifters (Conventional "Solid" Type): Plain barrel type. Remove in same manner as hydraulic lifters. *See "Valve System" in Chevrolet Special Data.*
Valve Lifters (Hydraulic Type): Identified by rib in center of oil feed relief at center of body. *See "Valve System" in Chevrolet Special Data.*
Rocker Arms: Mounted individually on studs pressed into cylinder head.
Rocker Arm Stud Replacement–*See "Valve System" in Chevrolet Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Cars with Conventional Lifters
Intake Valves–Open 12° BTDC. Close 54° ALDC.
Exhaust Valves–Open 52° BLDC. Close 14° ATDC.

Cars with Hydraulic Lifters
Intake Valves–Open 18° BTDC. Close 54° ALDC.
Exhaust Valves–Open 52° BLDC. Close 14° ATDC.

OILING SYSTEM

Crankcase Capacity: 4 qts. (refill), 5 qts. (Dry).
Normal Oil Pressure: 35 lbs. (approx.).
Pressure Regulator Valve–In oil pump body. Not adjustable.
Oil Pressure Indicator–Light located at right side of instrument cluster, controlled by a pressure operated switch AC No. 1508245, located in main oil gallery on left side of engine. Switch closes at 4-6 lbs.
Oil Filter Element: AC P-115.
Oil Pump: Gear type. Located in crankcase, driven by distributor gear.
Oil Pump Overhaul–*See "Oiling System" in Chevrolet Special Data.*
Crankcase Ventilation–Air intake through valve rocker arm cover, outlet through pipe on right side of engine.

COOLING

►*RADIATOR REMOVAL CAUTION (POWERGLIDE CARS): Transmission oil cooler is part of radiator lower tank, and must be TIGHTLY SEALED after removal or during repairs to avoid entrance of foreign material.*
Water Capacity: 16 qts. (17 qts. with heater).
Pressure Valve: AC No. 850549. In radiator cap. 7 lb. type.
Thermostat: Harrison. In water outlet in intake manifold.
Standard–No. 3123993 (stamped 151), 151°. Can be used for alcohol anti-freeze.
Optional–No. 3123994 (stamped 160) 160°, No. 3133597 (stamped 170) 170°, No. 3123995 (stamped 180) 180°. *NOTE*–Do not use a 180° thermostat with 7 lb. radiator cap.
Temperature Gauge: AC No. 1512931. Not electric.
Water Pump: Packless type with sealed ball bearing shaft.
See "Chevrolet" in Water Pump Section.
Radiator Removal & Installation: *See "Cooling System" in Chevrolet Special Data.*

CLUTCH

Own (Exc. Powerglide Cars)–Diaphragm spring type. *See "Chevrolet (Own)" in Clutch Section.*

Model	Clutch Disc No.
Standard (Exc. O.D., Hvy. Duty)	3836708
Standard (Exc. O.D., H.D. & 4-Bbl. Carb.)	3836534
Overdrive (Exc. Hvy. Duty & 4-Bbl. Carb.)	3720227
Heavy Duty	3836119

Pedal Adjustment: Pedal free travel ¾-1". Loosen check nut at connecting link at clutch fork. Turn adjusting nut to remove all lash at fork, **then back off two turns.**
Removal: Remove transmission (see Transmission Removal below). Remove throw-out bearing. Remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove cover assembly from below. *CAUTION*–Do not allow pressure plate to hang from retracting springs (support by hand). When installing clutch, align 'X' marks on cover and on flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh.
See "Chevrolet 3-Speed" in Transmission Section.
►*HARD SHIFTING CORRECTION: See "Chevrolet Transmission Control" and "Chevrolet 3-Speed" in Transmission Section for shift linkage rework and installation of new transmission parts.*
Transmission Control: *See "Transmission Controls" in in Transmission Section.*
Removal: Drain transmission and disconnect speedometer cable and shift rods. Disconnect propeller shaft at rear universal and slide shaft toward rear to disengage from transmission. Remove two top transmission to clutch housing screws and install Guide Pins J-1126. Remove the two lower screws and slide transmission back until clutch splines disengage. Remove transmission from below car.

OVERDRIVE

Warner Model AS1-R10H. Solenoid operated type with with governor control and throttle operated kickdown.
See "Warner R10 Overdrive" in Transmission Section.
Overdrive Control: *See "Overdrive Control" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

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POWERGLIDE TRANSMISSION

Powerglide Transmission–Torque converter and hydraulically operated planetary gear unit with manual controls.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Chevrolet Powerglide" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubrication–Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing an "AQ-ATF" marking on container.

Capacity–5 qts. (refill), 11 qts. (after overhaul).

►*POWERGLIDE DRAINING CAUTION: There is no drain plug on converter. Drain transmission case only, add 5 qts, of fluid initially, recheck after idling engine.*

►*CHECKING FLUID LEVEL & FILLING TRANSMISSION NOTE:* A filler plug has been added to transmission side cover for use in checking fluid level and adding fluid to transmission. This change made necessary because filler tube and dipstick is not accessible from under hood on air conditioned cars.

Checking Fluid Level–Engine must be idling with parking brake set, transmission warm, and the selector lever in "N" position when taking dipstick readings (on cars without air conditioning), or checking level at filler plug on side of transmission (cars with air conditioning). Maintain fluid level to "F" mark on dipstick (cars without air conditioning), or to bottom of filler plug hole on side of transmission (cars with air conditioning).

►*OTHER DATA: See "Chevrolet Powerglide" in Transmission Section.*

UNIVERSALS

Own. Needle bearing type.

►*CAUTION:* Rear bearing companion flange nut controls rear axle pinion bearing preload. Preload must be adjusted whenever companion flange nut loosened. *See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type, with Hotchkiss Drive. Pinion bearing adjustment is different than on previous models.

See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.

►*PINION BEARING PRELOAD CAUTION:* Rear universal joint companion flange controls rear axle pinion bearing preload. Bearing preload must be adjusted whenever companion flange nut is loosened.

Car Model	Axle Ratio	Serial Prefix
Std. Transmission	3.70-1	AA or BA
Overdrive	4.11-1	AC or BC
Powerglide	3.55-1	AB or BB

Backlash–.005-.008".

Removal: Raise car and support with jack stands under frame side rails. Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cable from clamps at frame. Disconnect hydraulic brake lines at rear axle housing Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor.

Axle Shaft Removal: Raise car and place jack stands under axle housing. Remove tire, wheel and brake drum assembly. Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange). Attach Axle Puller J-5748, with slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate. *NOTE*–If bearing retainer and parking brake strut interfere, raise strut slightly with screwdriver to obtain clearance.

SHOCK ABSORBERS

Delco. Direct acting non-adjustable. Serviced by replacement.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs and new spherical type joints connecting control arms and steering knuckles.

See "Chevrolet (Spherical Joint)" in Front Suspension Section.

Kingpin Inclination–3½° ±½°.

Caster–0° ±½°.

Camber–Pos. ½° ±½°.

►*CAMBER & CASTER ADJUSTMENT NOTE: Adjusted by shims located between upper control arm inner support shaft and support bracket.*

Toe-In–1/8-3/16".

Toe-Out on Turns–With outer wheel turned 20°, inner wheel should be 22½° ±2".

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut.

See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Own (Linkage Type). *See "Chevrolet Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic, without anchor pin adjustment. Hand lever applies rear wheel service brakes.

See "Chevrolet-Bendix Hydraulic" in Brake Section.

►*REPLACEMENT BRAKE SHOE GRINDING CAUTION:* To compensate for lack of brake anchor adjustment, brake shoes are ground to a .057-.087" smaller diameter than the drum diameter. Grinding to the true diameter on a bench grinder will cause heel and toe contact, resulting in faulty brake action. *NOTE–If spindle mounted type grinder is used, the shoes should be ground to the true drum diameter.*

►*SLOW BRAKE PEDAL RETURN CORRECTION: See "Brake Notes" in Chevrolet Special Data.*

Drums–Diameter 11".

Wheel Cylinder Diameter–Front 1 1/8", Rear 1".

Lining	Width	Thickness
Front Whl.	2"	.187-.194"
Rear Whl.	1¾"	.187-.194"

Length Per Shoe–9.3125" (Primary), 11.6875" (Secondary).

Braking Power–55.9% (Front Wheels), 44.1% (Rear Wheels).

Clearance–Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.

Standard Master Cylinder: Located on engine side of firewall in line with brake pedal.

Checking Fluid–Reservoir is integral with master cylinder. Maintain level in cylinder to lower edge of filler hole.

Removal–Disconnect hydraulic line from end of cylinder and remove bolted brass fitting. Remove four retaining nuts and lock washers holding master cylinder to firewall and remove cylinder.

Installation–Reverse removal procedure making sure that push rod clevis is straddling the brake pedal. Refill master cylinder and bleed all brake lines. Adjust push rod-to-main cylinder clearance as follows: Make sure brake pedal returns to fully released position with no binding, and that pedal retracting spring has not lost its tension, then adjust brake pedal clevis to give a barely perceptible end play between main cylinder piston and brake push rod (approximately 1/16" pedal clearance).

Power Brakes: Bendix Vacuum Type Power Unit replaces conventional master cylinder.

See "Bendix Power Unit" in Brake Section.

MISC. MECHANICAL

Air Conditioning: *See "Chevrolet Air Conditioning" in Miscellaneous Section.*

Windshield Wipers: *Cable operated type (Std.). Electric* type (Optional).

See "Windshield Wipers" in Miscellaneous Section.

Power Window Regulators: Electric type with reversible motor operating each door window assembly.

See "Power Window Regulators" in Miscellaneous Section.

Power Top Controls: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjuster: Reversible electric motor controls horizontal front seat movement. *See "Power Seat Adjusters" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to left front door hinge pillar post.
Serial Number Prefix–'VE' designating Series 2934.
►*SERIAL NUMBER NOTE: Serial Number example (VE55F 000000) includes following identification data in sequence.*

Series①	Year	Assy.Plant②	Serial No.
VE	55	F	000000

①–See Serial Number Prefix above.
②–Assembled only at the Flint Plant.

ENGINE NUMBER: Stamped on pad at right hand side of cylinder block behind water pump.
Starting Engine Number–All V8 engines (regardless of model) are numbered in sequence **starting with 001001.** Suffix letters and numerals indicate at which plant engine built ('F' for Flint), Model Year and Model Type (example 1001 F 55.FG).
Model Type Designation–'FG' (V8 Corvette Engine).

TUNE-UP

COMPRESSION PRESSURE: 130 lbs., minimum with all cylinders within 10 lbs., at cranking speed.
VACUUM READING: 17-21" at idling speed.
VALVE TAPPET CLEARANCE: .008" (Intake). .018" (Exhaust).
MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders–RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.
SPARK PLUG GAP: .035".
Spark Plugs–AC 43-5R. Tighten to 20-25 ft. lbs.
COIL: Delco-Remy 1115086. *12 Volt.*
Ignition Current–1.8 amps. idling, 4.0 stopped.
Resistor–Delco-Remy 1927809 (1.40-1.65 ohms). On firewall.
►*COIL RESISTOR NOTE:* Resistor is connected to ignition switch by two leads and is by-passed during cranking (2nd. lead provides direct connection to coil when key turned to "Start Engine" position).

DISTRIBUTOR: Delco-Remy 1110855. *12 Volt.*
Condenser–Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set–Delco-Remy 1924499.
Breaker Gap–.019" (new points), .016" (used points).
Cam Angle–26-33° (with .016" gap).
Breaker Arm Spring Tension–19-23 ozs.
Rotation–Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	400	0-4	800
8-10	1150	16-20	2300
15-17	1800	30-34	3600

Vacuum Spark Control: Delco-Remy 1116085.
Plunger Travel–19/64-5/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
14	28	13.5-15.5

IGNITION TIMING

Setting–4° BTDC. *Set timing to 8° BTDC at 1000 Engine RPM using suggested procedure following:*
►*SUGGESTED TIMING SETTING PROCEDURE:* Disconnected distributor vacuum advance and run engine at 1000 RPM. Rotate distributor body until index line on harmonic balancer lines up with **8° BTDC** mark on indicator bolted to left side of timing chain cover.
Timing Mark–Mark on vibration dampener and an indicator on left side of valve chain cover. Indicator is marked with five lines on both sides of "0". Each line represents 2°.

CARBURETOR

Carter WCFB, No. 2218S or 2351S. 4-Barrel downdraft type with automatic choke.
►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*
►*HARD STARTING (AFTER FLOODING) CORRECTION: See "Carter WCFB" in Carburetor Section.*
►*CARBURETOR LOADING (WHEN STARTING PARTIALLY WARM ENGINE) CORRECTION: See "Carter WCFB" in Carburetor Section.*
►*AIR CLEANER INSTALLATION CAUTION:* When installing air cleaner, see that cutouts in gasket are lined up with vent pipes to prevent blocking off vent.
Idle Setting–¼-1¼ turns open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed–400-450 RPM, with Selector lever in "D" range.
►*OTHER DATA: See "Carter WCFB" in Carburetor Section.*

THROTTLE LINKAGE ADJUSTMENT (Powerglide): *Adjust Accelerator Linkage and Powerglide Throttle Linkage in order as follows:*
Accelerator Linkage: Remove carpet from area around accelerator pedal, remove air cleaner and carburetor throttle pull back spring. Depress pedal to wide open position, check clearance between pedal and toeboard. This clearance should be 3/8". Adjust by shortening or lengthening accelerator rod at carburetor by turning trunnion nut. Install air cleaner and pull back spring.
Powerglide Throttle Linkage: Remove rod linking throttle lever on left side of transmission case to bellcrank on engine. Rotate transmission throttle valve outer lever assembly counter-clockwise to the open throttle position (against stop), measure distance from lower hole in lever to center of lower rear bolt in side cover (NOTE–Positioning Gauge J-5906 used on V8 Passenger car can be used for this purpose by setting the gauge at 2.88" and removing the bolt to allow installation of the gauge). Distance from lever to bolt should be 2.88". To adjust, loosen lever-to-clamp attaching screw and adjust outer lever as required. Install rod linking lever to bellcrank on engine. Disconnect rod linking bellcrank to carburetor. Pull upward on transmission throttle control rod so that transmission lever is against stop, see that carburetor throttle lever in wide open position, adjust swivel on rear end of carburetor-to-bellcrank rod so that rod can be connected without disturbing bellcrank or carburetor throttle lever position. Connect rod. Check adjustment by opening throttle fully and noting if further counter-clockwise rotation of the transmission throttle valve lever is possible. Lever should be against stop in this position.
Fuel Pump Pressure: 4-5½ lbs. at 450-1000 RPM.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.
Replacement Fuel Pump–AC No. 4150 (Fuel only).
Pressure–4-5¼ lbs.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: AC Electric.
Dash Unit–AC No. 1517901.
Tank Unit–AC No. 1517911.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco 2SM50. *12 Volt.* 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground–Negative terminal.

STARTER

Delco-Remy 1107627 or 1107645. *12 Volt.*
Armature–Delco-Remy 1926626 (All Models).
Drive–Overrunning clutch (solenoid pinion shift).
Rotation–Counter-clockwise viewed from above.
Brush Spring Tension–35 ozs. minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs	6900	10.3	75
10.5 ft. lbs	Lock	5.8	435

Starting Switch: Delco-Remy Solenoid Switch 1119767 mounted on starter with separate relay Delco-Remy 1116904. Controlled by Ignition & Starter Switch 1116512.
See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Equipment Section.
Neutral Safety & Back-up Light Switch: Delco-Remy 1998112.
Adjustment–*See "Chevrolet Powerglide" in Transmission Section.*

GENERATOR

Delco-Remy 1102025. *12 Volt.* **Armature– 1929640.**
Maximum Charging Rate–*See Voltage Regulator.*

Performance Data

Amperes	Volts	RPM
30	14.0	2150

Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs.
Field Current–1.48-1.62 amps. at 12 volts.
Belt Adjustment: 13/16" belt deflection midway between fan and generator pulleys with a light pressure applied.

REGULATOR

Delco-Remy 1118826. *12 Volt. NOTE–Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cutout Relay

Cuts In–11.8-13.5 volts (hot).
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–13.8-14.8 volts (hot).
Air Gap–.075" with points pressed down to point where contacts just touching.

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Checking & Adjusting—*See "Delco-Remy 1118825 Series Regulator" in Electrical Equip. Section.*

Current Regulator

Setting—27-33 amperes (hot).

Air Gap—.075" with points pressed down to point where contacts just touching.

Checking & Adjusting—*See "Delco-Remy 1118825 Series Regulator" in Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equipment Section.*

Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*

Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*

Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) and pull shaft and knob out. Remove switch retaining nut and switch assembly.

Stop Light Switch Location: Mechanical type mounted on underside of toeboard and operated by brake pedal.

CIRCUIT BREAKER: Located in main lighting switch.

HORNS: Delco-Remy 1999759 (Low Note), 1999760 (High Note).

Horn Relay: Delco-Remy 1116781.

ENGINE

ENGINE SPECIFICATIONS: Own. "V8" Valve-in-head.

Bore	Stroke	Displacement
3¾"	3"	265 cu. ins.

Compr. Ratio	Rated HP	Developed HP
8.0-1	45	195 at 5000 RPM

TIGHTENING TORQUES: *See Chevrolet Special Data.*

OTHER ENGINE DATA: *See 1955 Chevrolet V8 Pass. Car Pages and note the following:*

CAMSHAFT: *CAUTION—The Corvette camshaft is different than the camshaft used in V8 Pass. Cars, and is identified by No. 3711354 cast into shaft.*

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.720"	.3415-.3422"	4.902-4.922"
Exhaust	1½"	.3410-.3417"	4.913-4.933"

Valve	Seat Angle①	Lift	Stem Clearance
Intake	45°	.4043"	.001-.0027"
Exhaust	45°	.4136"	.0015-.0032"

①—Angle in head is 46°.

Valve Springs: Install springs with closed coil end down. Intake and exhaust springs are the same.

	Spring Pressure	Length
Valve Closed	65-72 lbs.	1.696"
Valve Open	151-161 lbs.	1.306"

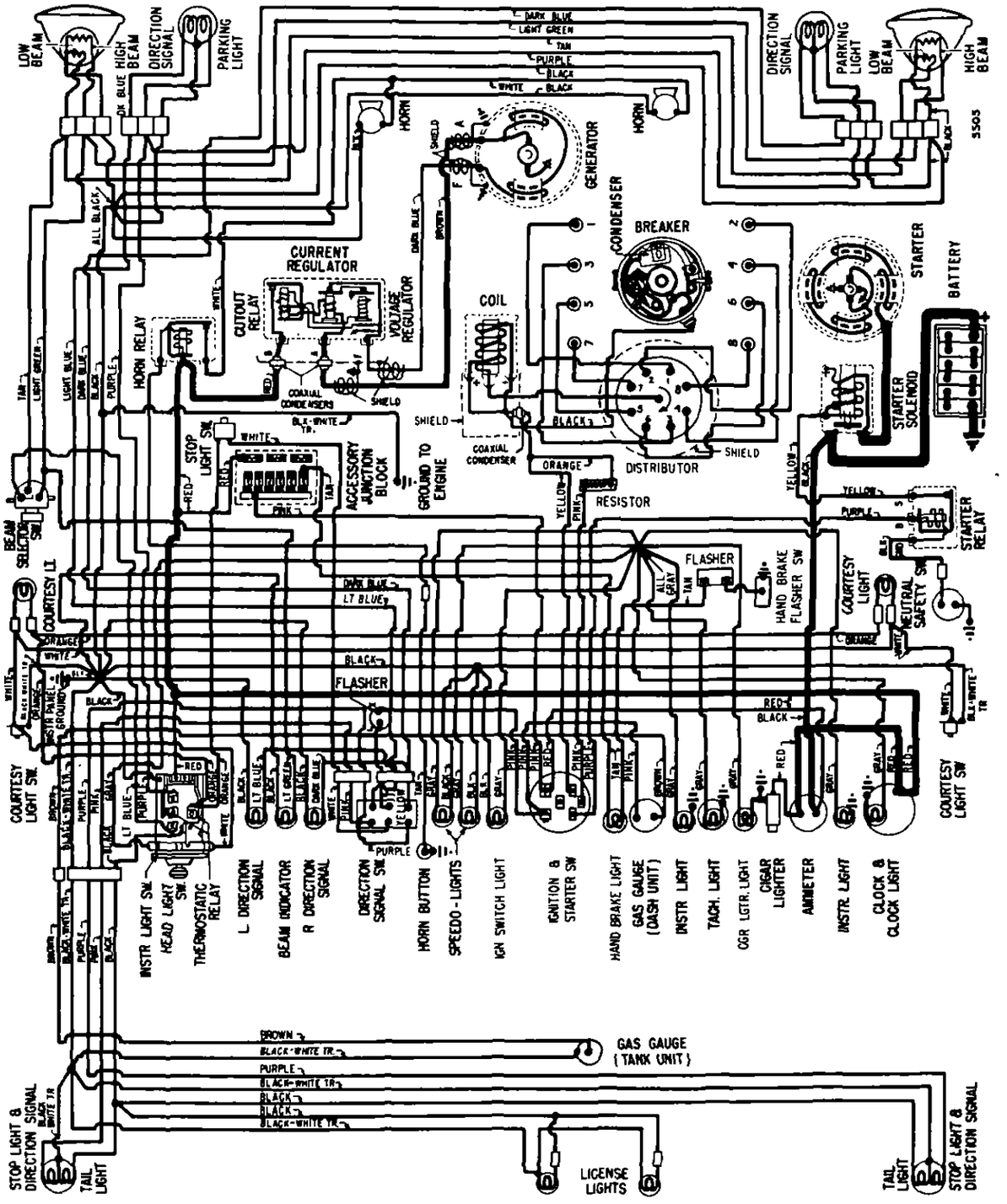
Valve Lifters: Barrel type. Not hydraulic.

VALVE TIMING: *NOTE—Valve timing is different than on the V8 Passenger Car.*

Intake Valves—Open 21°30' BTDC. Close 63°30' ALDC.

Exhaust Valves—Open 62°30' BLDC. Close 23°30' ATDC.

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OILING SYSTEM

Crankcase Capacity: 4 qts. (refill), 5 qts. (dry).
Normal Oil Pressure: 30 lbs. at 1170-1200 RPM.
Pressure Regulator Valve—In oil pump body. Not adjustable.
Oil Pressure Indicator: AC No. 1508063 (not electric).
Oil Pump: Gear type. Located in crankcase, driven by distributor.
Oil Pump Overhaul—*See "Oil Pump" in Chevrolet Special Data.*
Crankcase Ventilation: Air intake through valve rocker arm cover, outlet through pipe at right side of engine.

COOLING

Water Capacity: 16 qts. (17 qts. with heater).
Pressure Valve: AC Type RC-2. Opens at 6¼-7½ lbs.
Thermostat: Harrison. In water outlet in intake manifold.
Standard—No. 3123993 (stamped 151), 151°. Can be used for alcohol anti-freeze.
Optional—No. 3123994 (stamped 160) 160°. No. 3133597 (stamped 170) 170°. No. 3123995 (stamped 180) 180°. *NOTE—Do not use a 180° thermostat with a 7 lb. radiator cap.*
Temperature Gauge: AC No. 1512756 (not electric).
See "Temperature Gauges" in Miscellaneous Section.
Water Pump: Packless type with sealed ball bearing.
See "Chevrolet V8 Water Pump" in Water Pump Section.

POWERGLIDE TRANSMISSION

Powerglide Transmission—Torque converter and hydraulically operated planetary gear unit with manual controls.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Chevrolet Powerglide" in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*
Lubrication—Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID TYPE "A" bearing an "AQ-ATF" marking on container.
►*POWERGLIDE DRAINING CAUTION: There is no drain on converter. Drain transmission case only, add 5 qts., of fluid initially, recheck after idling engine.*
►*OTHER DATA: See "Chevrolet Powerglide" in Transmission Section.*

UNIVERSALS

Own. Needle bearing type.
See Universals Section for complete data.
►*CAUTION:* Rear bearing companion flange nut controls rear axle pinion bearing preload. Preload must be adjusted whenever companion flange nut loosened. *See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type, with Hotchkiss Drive. Pinion bearing preload adjustment is different than on previous models.
See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.
►*PINION BEARING PRELOAD CAUTION:* Rear universal joint companion flange controls rear axle pinion bearing preload. Bearing preload must be adjusted whenever companion flange nut is loosened.
Ratio—3.55-1 (11-39).
Backlash—.005-.008".

Removal: Raise car and support with jack stands under frame side rails. Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cable from clamps at frame. Disconnect hydraulic brake lines at rear axle housing. Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor.

Axle Shaft Removal: Raise car and place jack stands under axle housing. Remove tire, wheel and brake drum assembly. Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange). Attach Axle Puller J-5748, with a slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate. NOTE—If bearing retainer and parking brake strut interfere, raise strut slightly with screwdriver to obtain clearance.

SHOCK ABSORBERS

Delco. Direct acting non-adjustable. Service by replacement.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs, and new spherical type joints connecting control arms and steering knuckles.
See "Chevrolet (Spherical Joint)" in Front Suspension Section.
Kingpin Inclination—3½-4½°.
Caster—0° to Pos. 1°.
Camber—0° to Pos. 1°.
►*CAMBER & CASTER ADJUSTMENT NOTE: Adjusted by shims located between upper control arm inner* support shaft and support bracket.
Toe-In—0-1/8".
Toe-Out on Turns—With inner wheel at 20°, outer wheel should be 17°.

STEERING

Saginaw Worm & Roller. With push-pull adjustment.
See "Saginaw Worm & Roller" in Steering Section.

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic. Hand lever applies rear wheel service brakes.
See " Chevrolet-Bendix Hydraulic" in Brake Section.
►*REPLACEMENT BRAKE SHOE GRINDING CAUTION:* To compensate for lack of brake anchor adjustment, brake shoes are ground to a .057-.087" smaller diameter than the drum diameter. Grinding brake shoes to the true drum diameter on a bench grinder will cause heel and toe contact, resulting in faulty brake action. *NOTE—If spindle mounted type grinder is used, the shoes should be ground to the true diameter of the drum.*
Drums—Diameter 11".
Wheel Cylinder Diameter—Front 1 1/8", Rear 1".

	Width	Thickness
Front Whl.	2"	.187-.194"
Rear Whl.	1¾"	.187-.194"

Length Per Shoe—9.3125" (Primary), 11.6875 (Secondary).
Braking Power—55.9% (Front Wheels), 44.1% (Rear Wheels).
Clearance—Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.

MISC. MECHANICAL

Windshield Wiper: Vacuum, cable operated.
See "Windshield Wipers" in Miscellaneous Section.

MODEL IDENTIFICATION

Series	Serial Prefix	Wheelbase	Type
3100	H	114"	Half Ton
3200	M	123 1/4"	Half Ton
3400	F	104"	① 3/4 Ton
3500	G	125"	① 3/4 Ton
3600	J	123 1/4"	3/4 Ton
3700	K	137"	① 3/4 Ton
3800	L	135"	1 Ton
4100	N	130"	1 1/2 Ton
4400	P	154"	1 1/2 Ton
4500	R	154"	② 1 1/2 Ton
5100	S	112 5/8"	③ 2 Ton
5400	T	136 5/8"	③ 2 Ton
5700	U	160 5/8"	③ 2 Ton
6100	V	130"	2 Ton
6400	W	154"	2 Ton
6500	X	172"	2 Ton
6700	Y	194"	② 2 Ton
6800	Z	220"	② 2 Ton
5100S	SS	112 5/8"	④ 1 1/2 Ton
5400S	ST	136 5/8"	④ 1 1/2 Ton
5700S	SU	160 5/8"	④ 1 1/2 Ton
6100S	SV	130"	⑤ 1 1/2 Ton
6400S	SW	154"	⑤ 1 1/2 Ton
6500S	SX	172"	⑤ 1 1/2 Ton

①—Forward Control. ②—School Bus Chassis.
③—Low Cab Forward. ④—Low Cab Forward Special.
⑤—Special.

SERIAL NUMBER: Stamped on a metal plate and attached to the body as follows: **Forward Control Models**—On instrument panel support. **Flat Face Cowl Models**—On cowl inner panel. **All Other Models**—Left front door hinge pillar.

Starting Serial Number: 001001 at each assembly plant regardless of series.

►*SERIAL NUMBER NOTE: Serial number (example V255K 001083) includes following identification data in sequence.*

Series ①	Year	Assy. Plant ③	Serial No.
V	255②	K	001083

①—Serial Prefix for each model.
②—Second Series 1955.
③—See Assembly Plant Designation (below).

Assembly Plant Designation

A—Atlanta	K-Kansas City	S—St. Louis
B—Baltimore	L—Los Angeles	T—Tarrytown
F—Flint	N—Norwood	O—Oakland
J—Janesville		

ENGINE NUMBER (V8): Stamped on pad at front right hand side of cylinder block behind water pump.

ENGINE NUMBER (6 CYL.): Stamped on right side of block to rear of distributor.

Starting Engine Number: 0001001 (at each plant). Engine numbers will run concurrently with 1st Series Trucks. Suffix letters and numerals indicate plant at which engine built ("F" for Flint, "T" for Tonawanda, "C" for Canadian), Model Year, and Model Type. *See following for Series Type Designation.*

►*ENGINE NUMBER NOTE: Engine number (example 0001025 F 255 T) includes following identification data in sequence.*

Serial No.	Engine Plant ①	Year	Series ②
0001025	F	255③	T

①—See Starting Engine Number (above).
②—*See Series Type Designation (below).*
③—Second Series 1955.

Series Type Designation

Series	Engine	Designation
3100, 3200, 3600, 3800	Thriftmaster 235"	① X
3100, 3200, 3600, 3800	Thriftmaster 235"②	① M
3400, 3500, 3700	Thriftmaster 235"③	T
3400, 3500, 3700	Thriftmaster 235"④	L
4000	Thriftmaster 235"⑤	⑥ S
5000	Taskmaster V8	E
6000	Loadmaster 235"	P
6000	Jobmaster 261"	⑦ N

①—"A" stamped following suffix when this engine used in 3600 Series, and "B" when used in 3800 Series.
②—With Hydra-Matic Transmission.
③—With Updraft carburetor.
④—With Updraft carburetor and Hydra-Matic.
⑤—With Heavy Duty Clutch.
⑥—"A" stamped following suffix when this engine used in 3600 Series, "B" if used in 3800 Series, and "C" if used in 3100 & 3200 Series.
⑦—"A" stamped following suffix when this engine used in 4000 Series.

TUNE-UP

COMPRESSION PRESSURE: 6 Cyl. Engine—130 lbs. minimum with all cylinders equal within 5-10 lbs. at cranking speed.
V8 Engine—160 lbs. minimum with all cylinders equal within 10 lbs. at cranking speed.

VACUUM READING: 6 Cyl. Engine—17-21" at idling speed.
V8 Engine—Adjust to highest steady vacuum reading.

VALVE TAPPET CLEARANCE: *(NOTE—Conventional type lifters used on 6 Cyl. engines. Hydraulic valve lifters used on V8 Engines. See Production Change*

►*V8 ENGINE VALVE LIFTER PRODUCTION CHANGE:* Conventional type lifters used in Early V8 Trucks without Automatic Transmissions. All later trucks were equipped with hydraulic valve lifters.

6 Cyl. Engines—(3000 Series)—Intake .006". Exhaust .016". **(Other Series)**—Intake .006". Exhaust .020". with engine "normalized". *See "Valve System" in Chevrolet Special Data.*
V8 Engines (With Conventional Lifters)—.008" Intake, .016" Exhaust, with engine "normalized". *See "Valve System" in Chevrolet Special Data.*
V8 Engines (With Hydraulic Lifters)—No adjustment required unless cylinder head removed or valve lifters replaced *See "Valve System" in Chevrolet Special Data.*

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. On 6 Cyl. engines, ½ turn from unhooked position should be required to place spring in hooked position. Distorted springs should be replaced.

IGNITION

FIRING ORDER: 6 Cyl. Engines—1-5-3-6-2-4. gram.
V8 Engines—1-8-4-3-6-5-7-2. See diagram.

SPARK PLUG GAP: .035".
Spark Plug—AC No. 44-5 (Std.). AC 46-5 (Continuous operation). AC 43-5 (*Use for heavy duty operation*). 14mm. Torque to 20-25 ft. lbs.

COIL: Delco-Remy 1115087. *12 Volt.*
Ignition Current—1.8 amps. idling, 4.0 stopped.
Resistor—Delco-Remy 1931614. On firewall.

►*COIL RESISTOR NOTE:* Resistor is connected to ignition switch by two leads and is by-passed during cranking as follows: **(Trucks with Key Starting)**—2nd. lead provides direct connection to coil when key turned to "Start Engine" position. **(Trucks with Pedal Starting)**—2nd. lead provides direct connection to coil while starter cranking (feed through lead from starter switch to ignition switch—see diagram).

DISTRIBUTOR: Delco-Remy. (235" Eng.) 1112403, (261" Eng.) 1112407, (V8 Eng.) 1110847. *12 Volt.*
Condenser—Delco-Remy 1928111 (6 Cyl. Distr.), 1869704 (V8 Distr.). **Capacity**—.18-.23 mfd.
Contact Point Set—Delco-Remy 1924571 (6 Cyl. Distr.), 1924499 (V8 Distr.).
Breaker Gap—.019" (new points). .016" (used points).
Cam Angle—28-35° (6 Cyl. Distr.), 26-33° (V8 Distr.). all at .016" gap.

►*BREAKER GAP CAUTION: Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—1110847

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
8-10	1150	16-20	2300
15-17	1800	30-34	3600

Automatic Advance—1112403

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Automatic Advance—1112407

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	350	0-4	700
7-9	750	14-18	1500
11-13	1200	22-26	2400
16-18	1800	32-36	3600

Vacuum Spark Control: Delco-Remy 1116089 (6 Cyl. Distr.). 1116085 (V8 Distr.).
Plunger Travel—3/16-7/32" (1116089). 19/64-5/16" (1116085).

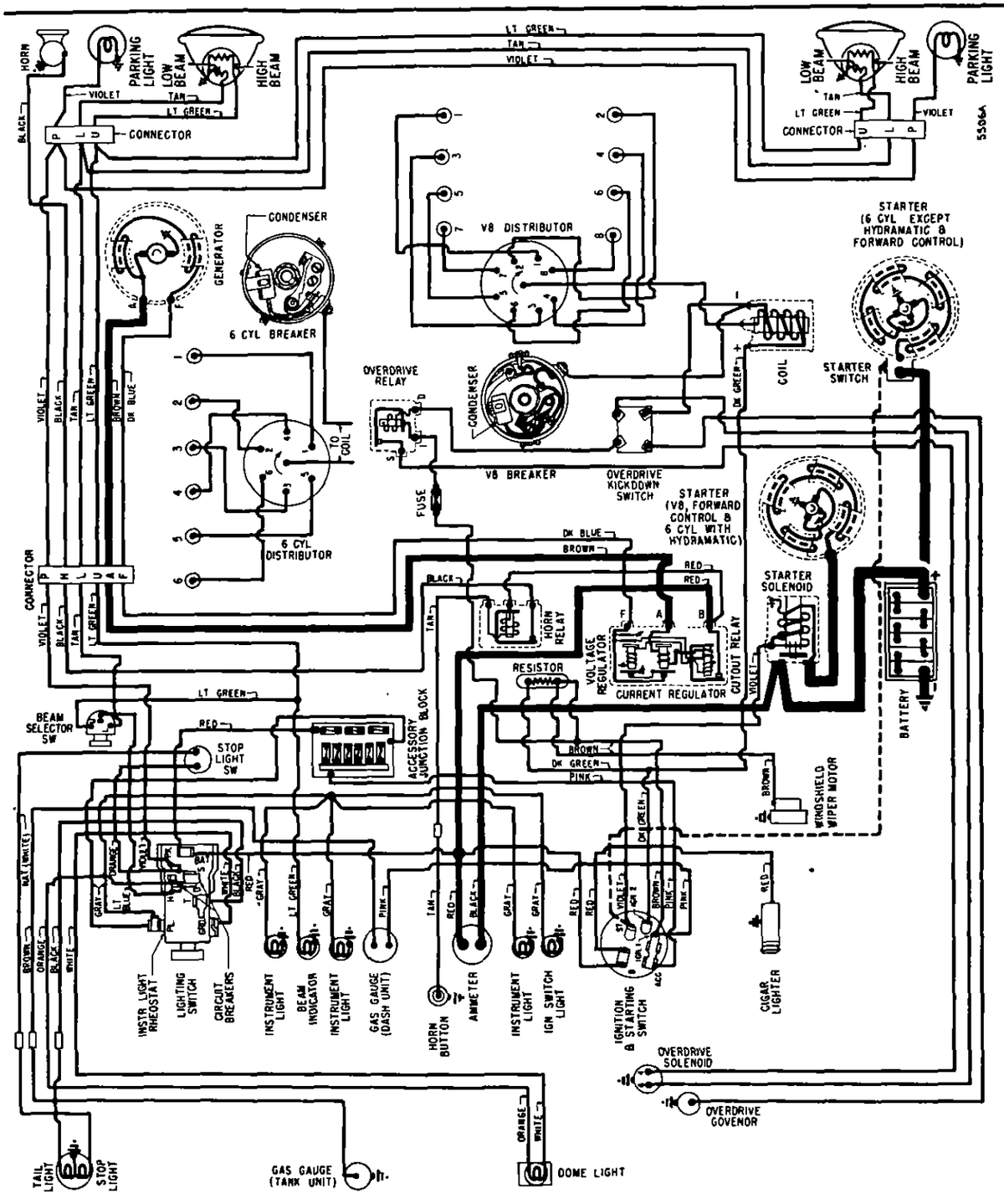
Vacuum Advance—1110847

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
14	28	13.5-15.5

Vacuum Advance—1112403 & 1112407

Start	0	4-6
7.5	15	7.5-10

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IGNITION TIMING

6 CYL. ENGINE

Setting (6 Cyl. Engines)–TDC (with engine at normal idle speed).

Timing Mark (6 Cyl. Engines)–Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing, with Octane Selector set on "O". Then adjust Octane Selector as follows:

Octane Selector Setting (6 Cyl. Engines)–Set for slight ping when accelerating with wide open throttle.

V8 ENGINE

Setting (V8 Engines)–4° BTDC. *Set timing to 8°BTDC at 1000 Engine RPM using suggested procedure following.*

►*SUGGESTED TIMING SETTING PROCEDURE:* Disconnect vacuum advance and run engine at 1000 RPM. Rotate distributor body until index line on harmonic balancer lines up with **8° BTDC** mark on indicator bolted to left side of timing chain cover.

Timing Mark (V8 Engines)–Mark on vibration dampener and an indicator on left side of timing chain cover. Indicator is marked with five lines on both sides of "O". Each line represents 2°.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: Rochester "B" & "BC" Carburetors are standard on all 6 Cyl. Models (except Forward Control). Rochester "2G" & "2GC" Carburetors are standard on all V8 Models. Carter Updraft Carburetor is standard on Forward Control Models.*

THROTTLE LINKAGE ADJUSTMENT (Hydra-Matic Drive Trucks): *See "Hydra-Matic Drive" in Transmission Section.*

ROCHESTER "B" & "BC"

Downdraft types with manual choke (Rochester Model "B"), and automatic choke (Rochester Model "BC").

Models	Rochester No.
235" Engine ①	②7004468
235" Engine ③	④7007181
261" Engine	②7005140

①–Except Forward Control & Automatic Transmission models.

②–With Manual Choke.

③–With Automatic Transmission (Except Forward Control models).

④–With Automatic Choke.

Idle Setting (Exc. 7005140)–1 to 2½ turns open, (turn screw out for richer mixture).

Idle Setting (7005140)–1 to 1½ turns open, (turn screw out for richer mixture).

Idle Speed–400-450 RPM. (Exc. Automatic Trans. models), 425 RPM. with Selector Lever in "N" position (Automatic Transmission models).

Float Level (All Models)–1 5/16" from bottom of each float to cover gasket (do not remove gasket) with cover inverted so that needle closed. Use No. 3696192 gauge to set float level and align floats (twisted floats may hang up or rub on bowl). Check float drop or travel by turning cover right side up so floats drop down.

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Distance from gasket on cover to bottom of each float should be 1¾". Adjust by bending tang at rear of float assembly.

►*CAUTION: Both floats must be set alike and must not be twisted out of alignment.*

Accelerating Pump–No seasonal adjustment.

Fast Idle (7007181): To check setting, hold throttle in wide open position, check choke valve opening or clearance between lower edge of valve and air horn wall. This clearance should be .073" (Gauge BT-64 or Chevrolet Gauge J-5120). If clearance not correct, adjust by bending connector rod using tool BT-18 or Chevrolet Tool J-4552.

Unloader Adjustment (7007181): With throttle valve in wide open position, clearance between lower edge of choke valve and carburetor bore should be .166" (large end of Gauge BT-64 or Chevrolet Gauge J-5120). Bend tang of throttle lever with tool J-4552 to obtain necessary clearance.

Automatic Choke Setting (7007181): Centered setting. Scribe mark on cover in line with long mark on housing.

Throttle Kicker (Not used on 7007181): Operated by cam on choke lever. Opens throttle when choke closed. No adjustment.

►*OTHER DATA: See "Rochester B & BC Carburetor" in Carburetor Section.*

Throttle Linkage Adjustment (Hydra-Matic Trucks): *See "Hydra-Matic Drive" in Transmission Section.*

Fuel Pump Pressure: 3½ -4¼ lbs.

ROCHESTER "2G" & "2GC"

Dual downdraft type with manual choke (Rochester Model "2G"), automatic choke (Rochester "2GC").

Models	Rochester No.
265" Engine (V8) ①	②7006770
265" Engine (V8) ③	④7008399

①–Except Forward Control models and models equipped with Overdrive or governor.
②–With Automatic Choke.
③–Models equipped with Overdrive.
④–Manual Choke.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–After idle speed set to correct specifications (see Idle Speed below), turn both idle mixture screws for smooth idle with highest vacuum reading and engine RPM.

Idle Speed–475 RPM (Synchro-mesh) Trans.). 425 RPM (Hydra-Matic–with selector lever in "N").

Float Level–1 5/32" from air horn gasket to top of float with assembly inverted. Use Gauge BT-107 or Chevrolet Gauge J-5915 so it rests against power piston shaft with outer leg in line with center of float. Adjust by bending float arm between pivot and float with Tool BT-69.

Float Drop–1 29/32" between air horn gasket and lowest point on bottom of float with air horn held upright (Gauge BT-107). Adjust by bending float tang.

Fast Idle: No adjustment of fast idle speed is provided, it is necessary, however, to have correct relationship between fast idle cam position and choke valve position. Check & adjust as follows: Place end of idle adjusting screw on next to highest step of fast idle cam. Using Gauge J-5921, small end of gauge must slide easily between upper edge of choke valve and bore of carburetor, with gauge held vertically. If necessary, bend choke rod for correct clearance.

Unloader Adjustment: With throttle in wide open position, wide end of Gauge J-5921 must slide freely between upper edge of choke valve and carburetor bore. Bend throttle lever tang for correct clearance.

Automatic Choke Setting: Centered (at index).

►*OTHER DATA: See "Rochester 2G & 2GC Carburetor" in Carburetor Section.*

Throttle Linkage Adjustment (Hydra-Matic Trucks): *See "Hydra-Matic Drive" in Transmission Section.*

Fuel Pump Pressure: 4-5¼ lbs.

CARTER

Carter (BB) 871SB (Forward Control Models). Single barrel updraft type with manual choke control.

Idle Setting–½-1½ turns open (turn screw out for richer mixture).

Idle Speed–450-500 RPM (Synchro-mesh), 400-450 RPM (Hydra-Matic).

Float Level–Top of float (not seam) 0" to 1/32" below top of bowl with needle valve seated. Use Gauge J-818-13A on top edge of bowl (gasket removed). Press float lever lip firmly against needle.

Accelerating Pump–Inner holes (in plunger shaft and throttle lever) Summer. Outer hole Winter.

►*OTHER DATA: See "Carter (BB) Carburetors" in Carburetor Section.*

Throttle Linkage Adjustment (Hydra-Matic Trucks): *See "Hydra-Matic Drive" in Transmission Section.*

Fuel Pump Pressure: 3½-4¼ lbs.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type. **Replacement Pump**–As follows:

Model	AC Pump No.
6 Cyl. (exc. School Bus)	①4149
6 Cyl. (exc. School Bus)	②4138
6 Cyl. (School Bus)	②9797
V8	①4150
V8	②4141

①–Fuel only. ②–Fuel & Vacuum.

Pressure–3½-4¼ lbs. (6 Cyl.), 4-5¼ lbs. (V8).

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: AC Electric.

Dash Unit–AC No. 1518461.

Tank Unit–AC No. 1518235 (Cab Models, except Forward Control). No. 1518236 (Forward Control Models & Utility Models with Cowl). No. 1518258 (Cowl–Single Unit Models). No. 1518234 (School Bus Chassis).

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco–2SM50 (Exc. School Bus). 12 Volt, 9 plate, 50 ampere hour capacity (20 hr. rate).

Delco–3SM70 (School Bus). 12 Volt, 11 plate, 70 ampere hour capacity (20 hr. rate).

Battery Ground–Negative ground.

Engine Ground–Engine to frame (6 Cyl.). Engine to dash (V8).

STARTER

Model	Delco-Remy No.
6 Cyl. (Exc. Fwd. Cont. & Hydra-Matic)	①1107634
6 Cyl. (With Hydra-Matic)	②1107633
6 Cyl. (Fwd. Cont. W/O Hydra-Matic)	②1107626
V8 (Exc. Hydra-Matic)	②1107627
V8 (With Hydra-Matic)	②1107643

①–Manual Pinion Shift. ②–Solenoid Pinion Shift.

Armature–Delco-Remy 1926626 (all models).

Drive (6 Cyl. Synchro-mesh Trans., Exc. Fwd. Cont.)–Overrunning clutch (pedal operated pinion shift).

Drive (6 Cyl. Fwd. Control & Hydra-Matic, All V8 Models)–Overrunning clutch (solenoid pinion shift).

Rotation–Counter-clockwise at commutator end.

Brush Spring Tension–35 ozs. minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: (Solenoid Pinion Shift Models)–Delco-Remy Solenoid Switch No. 1119767 mounted on starter and controlled by Ignition & Starter Switch 1116522 (exc. Hydra-Matic), 1116514 (Hydra-Matic). Turn key full RIGHT against spring tension to start.

Starter Switch (Manual Pinion Shift Models): Delco-Remy. Mounted on starter and controlled by pedal operated lever. *NOTE*–Switch has small terminal on side connected to Ignition Switch for coil resistor by-passing while cranking.

Hydra-Matic Neutral Safety Switch Adjustment–*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy. Different generators used as follows:

Model	Generator No.	Armature No.
All Models (Std.)	1100310	1928952
Optl. (30 Amp.)	1105947	
Optl. (40 Amp.)	1106981	1929360
Optl. (Power Strg.)	1106982	

Performance Data–Cold

Generator	Amperes①	Volts	RPM
1100310	25	14.0	2780
1105947	32	14.0	1850
1106981	40	13.0	1500
1106982	40	13.0	1500

①–Not maximum output. See Current Regulator.

Rotation–Counter-clockwise at commutator end.

Brush Spring Tension–28 ozs.

Field Current–1.5-1.62 amperes (1100310), 1.54-1.67 amperes (1105947), 1.37-1.50 amperes (1106981, 2), all at 12.0 volts.

Belt Adjustment: ¾" (6 Cyl. Engine), 13/16" (V8 Engine) deflection midway between water pump and generator pulleys, with a light force applied to belt.

REGULATOR

Delco-Remy. Different regulators used as follows:

Regulator No.	For Generator No.
1118945	1100310
1118826	1105947
1118948	1106981 & 1106982

►*NOTE: Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

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Cut-Out Relay

Cuts In–11.8-13.5 volts (1118826 & 1118945). 11.5-13.0 volts (1118948).
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting (1118826 & 1118945)–13.8-14.8 volts hot.
Setting (1118948)–13.6-14.3 volts hot.
Air Gap–.075" (1118826 & 1118945). .063" (1118948) with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electric Equipment Section.*

Current Regulator

Setting (1118945)–23-27 amperes hot.
Setting (1118826)–27-33 amperes hot.
Setting (1118948)–37-42 amperes hot.
Air Gap–.075" with contacts pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel). Remove switch retaining nut and switch assembly.
Stop Light Switch Location: Mechanical type mounted on underside of toeboard and operated by brake pedal.
CIRCUIT BREAKERS: Two 13 amperes circuit breakers located in main lighting switch.
HORNS: Delco-Remy 1999760 (High), 1999759 (Low).
Horn Relay: Delco-Remy 1116781.

ENGINE

►*FOUR ENGINES USED ON TRUCKS: 235" Thriftmaster, 235" Loadmaster, 261" Jobmaster. 265" Taskmaster. See Truck Model Identification for application.*

ENGINE SPECIFICATIONS: Own. 6 Cylinder &V8 valve-in-head engines.

Engine	Bore	Stroke	Displmnt
235" 6 Cyl. Thriftmaster	3 9/16"	3 15/16"	235.5"
235" 6 Cyl. Loadmaster	3 9/16"	3 15/16"	235.5"
261" 6 Cyl. Jobmaster	3 3/4"	3 15/16"	261.0"
265" V8 Taskmaster	3 3/4"	3"	265.0"

Engine	Comp. Ratio	Rated HP	Dev. HP
235" 6 Cyl. Thriftmaster	7.5-1	30.4	123 at 3800
235" 6 Cyl. Loadmaster	7.5-1	30.4	©123 at 3800
261" 6 Cyl. Jobmaster	7.17-1	33.7	140 at 4000
265" V8 Taskmaster	7.5-1	45.0	154 at 4200

©–119 at 3600 RPM on Forward Control models.

Compression & Vacuum Reading–*See Tune-Up.*

ENGINE REMOVAL: *See "Engine" in Chevrolet Special Data.*

OIL PAN REMOVAL: (V8 Engines)–Disconnect steering idler arm bracket from right frame side rail and drop for clearance.

ENGINE MOUNTINGS: *See "Engine Mountings" in Chevrolet Special Data.*

CYLINDER HEAD & MANIFOLDS: *See "Cylinder Head & Manifold" in Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

OTHER ENGINE DATA: *See 1955 Chevrolet Passenger Car pages for all engine data and note the following:*

►*LOADMASTER 235" & JOBMASTER 261" ENGINE PISTON RING NOTE: Upper compression ring is chrome plated and oil ring has spiral spring expander.*

►*VALVE ROTATOR NOTE: New type valve rotators are standard equipment on 235" Loadmaster, 261" Jobmaster & 265" Taskmaster Engines on 5000 & 6000 Series (special equipment on other trucks). See "Valve System" in Chevrolet Special Data.*

►*V8 ENGINE HYDRAULIC VALVE LIFTER PRODUCTION CHANGE:* Hydraulic valve lifters are standard equipment on all Late 1955 V8 Engines. Early 1955 V8 Engines when used with Synchro-mesh Transmissions were equipped with conventional type lifters.

TAPPET CLEARANCE: *NOTE–Conventional type lifters used on 6 Cyl. and Early V8 Engines, Hydraulic lifters used on Later V8 Engines.*

6 Cyl. Engine (3000 Series)–.006" Intake, .016" Exhaust. **(Other Series)**–.006" Intake, .020" Exhaust with engine "normalized". *See "Valve System" in Chevrolet Special Data.*

V8 Engines (Conventional Lifters)– .008" Intake, .016" Exhaust with engine "normalized". *See "Valve System" in Chevrolet Special Data.*

V8 Engine (Hydraulic Lifters)–Adjustment required only when cylinder head removed or lifters replaced. *See "Tappet Clearance Adjustment" under VALVE SYSTEM in Chevrolet Special Data.*

VALVE TIMING: As indicated below:

235" Thriftmaster & 235" Loadmaster

Intake Valves–Open 1° ATDC. Close 39° ALDC.
Exhaust Valve–Open 42° BLDC. Close 9° ATDC.

261" Jobmaster

Intake Valves–Open 11°30'BTDC. Close 52°30'ALDC.
Exhaust Valves–Open 51° BLDC. Close 13° ATDC.

265" V8 Taskmaster (Conventional Lifters)

Intake Valves–Open 12° BTDC. Close 54° ALDC.
Exhaust Valves–Open 52° BLDC. Close 14° ATDC.

265" V8 Taskmaster (Hydraulic Lifters)

Intake Valves–Open 18° BTDC. Close 54° ALDC.
Exhaust Valves–Open 52° BLDC. Close 14° ATDC.

Valve Timing Check (235" & 261" Engines): Remove all tappet clearance from No. 1 exhaust valve. Turn engine over until this valve opens and just starts to close and until triangular mark on flywheel lines up with pointer in flywheel housing opening. Mount dial indicator on rocker arm shaft support with stem contacting No. 1 exhaust valve adjusting screw, set dial indicator to .044" (Thriftmaster & Loadmaster), .063" (Jobmaster). Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset No. 1 exhaust valve to correct running clearance.

OILING SYSTEM

Crankcase Capacity: (6 Cyl.)–5 qts. (refill). 5½ qts. (dry). **(V8)**–4 qts. (refill). 5 qts. (dry).
Normal Oil Pressure: (6 Cyl.–45 lbs. **(V8)**–35 lbs.
Pressure Regulator Valves–In oil pump body. Not adjustable.
Oil Pressure Indicator–AC No. 1508246. Not electric.
Oil Pump: Gear type. Located in crankcase, driven by distributor gear.
Oil Pump Overhaul–*See "Oiling System" in Chevrolet Special Data.*
Crankcase Ventilation (Standard): Air intake through valve rocker arm cover, outlet through pipe on right side of engine.
Servicing–On all models with air cleaner mounted on valve rocker arm cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.
Crankcase Ventilation (Optional): Positive Type. Vacuum operated ventilator consisting of a vacuum pipe from oil filler pipe to ventilator valve in fitting on intake manifold. Valve is spring loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling to give proper air-fuel mixture.**
Servicing–Every 10,000 miles (or oftener if required), clean vacuum pipe, valve, and filler pipe thoroughly. Filler cap gasket must seal tightly.
►*VACUUM VALVE CAUTION:* If improper action of spring is suspected due to spring being distorted, or etched from corrosive action, the valve assembly should be replaced.

COOLING

Water Capacity: Standard–17 qts., (½, ¾, 1-Ton & Forward Control). 18 qts. (1½ & 2-Ton). Add one quart for heater on any model.
Optional–18.5 qts. (All except Forward Control). 17 qts. (2-Ton).
Pressure Valve: AC No. 850549. In radiator cap. 7 lb. type.
Thermostat: Harrison. In cylinder head water outlet (6 Cyl.). In water outlet in intake manifold (V8).
Standard–No. 3123993 (stamped 151), 151°. Can be used for alcohol anti-freeze.
Optional–No. 3123994 (stamped 160), 160°. No. 3133597 (stamped 170), 170°. No. 3123995(stamped 180), 180°. *NOTE*–Do not use 180° thermostat with 7 lb. radiator cap.
Temperature Gauge: AC No. 1512979. Not electric.
Water Pump: Packless type with sealed ball bearing shaft.
See "Chevrolet" in Water Pump Section.

CLUTCH

6 CYL. ENGINES

Own. Diaphragm spring, single plate, dry disc type. *See "Chevrolet (Own)" in Clutch Section.*

Clutch Disc	Diameter	Chevrolet No. Woven	Molded
Standard	10"	3826119	3836097
Heavy Duty ©	11"	3836021	...

©–Standard on Forward Control Models.

Pedal Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. *NOTE*–Use finger pressure only when checking clutch free travel.
Removal: Remove transmission (see Transmission Removal). Remove throwout bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch).

CONTINUED ON NEXT PAGE

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loosen all six cover bolts evenly, remove assembly from below. *CAUTION*–Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align "X" mark on cover with "X" mark on flywheel.

V8 ENGINES

Borg & Beck 11A7. Chevrolet Part No. 3837155. Single plate.

See "Borg & Beck 11A7" in Clutch Section.

Clutch Disc–Chevrolet No. 3727585.

Pedal Adjustment: Adjust clutch pedal until free travel is 1". Make sure that pedal pad contacts toeboard when pedal pressed down.

Removal: Remove transmission (see Transmission Removal). Before removing clutch assembly, punch mark flywheel, clutch cover and one pressure plate lug so these parts may be assembled in their same relative positions. Loosen hold-down screws evenly and remove cover. *NOTE*–Mark flywheel side of driven plate for correct reassembly.

TRANSMISSION

3-SPEED LIGHT DUTY

Own. Three speed, all helical gear type. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

See "Chevrolet 3-Speed (Light Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever. *See "Transmission Controls" in Transmission Section.*

Removal (½ & ¼ Ton): Drain transmission. Disconnect speedometer cable at transmission and shift control rods from transmission levers. Remove propeller shaft. Remove the two top transmission to clutch housing capscrews and insert two transmission guide pins, Tool J-1126, in these holes. Remove the two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until clutch gear is free of splines in the clutch disc.

3-SPEED (HEAVY DUTY)

Own. Three speed, constant mesh (second & high), sliding gear (low & reverse).

See "Chevrolet 3-Speed (Heavy Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever.

See "Transmission Control" in Transmission Section.

Removal: Same as for "3-Speed (Light Duty)" above.

4-SPEED

Own. Four-speed, constant mesh, synchro-mesh, helical gear (2nd, 3rd, & 4th), sliding spur gear (low & reverse). Floor mounted gearshift.

See "Chevrolet 4-Speed" in Transmission Section.

Transmission Control: (All Models exc. Forward Control)–Floor mounted gearshift lever.

Removal (½ & ¼-Ton): See "3-Speed (Light Duty)" above.

Removal (Other Trucks): Remove screws fastening steering jacket grommet and slide grommet up out of way. Remove accelerator pedal and floor mat. Remove sheet metal screws attaching transmission cover to body floor and remove cover. On Forward Control models remove both front and rear floor pans. Remove speedometer cable from transmission rear bearing retainer. On 1-Ton, remove cotter key and pin attaching parking brake pull rod to parking lever. On 1½ & 2-Ton, disconnect parking brake lever return spring from parking brake operating lever and remove cotter key and pin attaching inner and outer levers to parking brake operating lever. Remove parking brake lever lock, flat washer and spring and remove parking brake lever. Drain lubricant from transmission. On 1-Ton, break universal joint at transmission joint flange and tape trunnions and bearings together. On 1½ & 2-Ton, disconnect intermediate universal joint by removing two trunnion bearing "U" clamps, split joint and lower front end of rear propeller shaft to floor. Remove the four universal joint flange nuts. Remove nuts attaching propeller shaft bearing support bracket to frame cross member and remove front propeller shaft and bearing assembly. On all models, remove the two capscrews attaching transmission to clutch housing and insert two Guide Pins J-1126 in these holes. Remove flywheel underpan and remove two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until transmission free of splines in clutch disc. Remove transmission.

OVERDRIVE

Warner R10. Used with Chevrolet Truck 3-Speed (Light Duty) Transmission.

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cables have been disconnected.

HYDRA-MATIC DRIVE

Dual Range. Four speed type with fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication–Check fluid level in transmission every day. Drain & refill every 25,000 miles. Use only "Automatic Transmission Fluid" Type A.

Checking Fluid Level–With selector lever in "N" position, parking brake set, and transmission at normal operating temperature, remove access hole cover plate in floor pan, and **check fluid level with engine at idling speed.** Add sufficient fluid to bring level in transmission to "F" mark on dipstick.

Capacity–8½ qts. (refill), 9 qts. (after overhaul). *NOTE*–1 qt. additional with oil cooler.

►*OTHER HYDRA-MATIC SERVICE DATA–See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

REAR AXLE

SEMI-FLOATING (HALF-TON)

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE*–Same design as passenger car axle.

See "Chevrolet Hypoid Semi-Floating" in Rear Axle Section.

Ratio–(Synchro-mesh & Hydra-Matic) 3.90-1 (39:10). **(Overdrive)** 4.11-1 (37:9).

►*AXLE SHAFT NOTE: Shafts unequal length (right shaft longer) and may be identified by mark stamped on shaft, or by length as follows:*

Axle	Part No.	Length
Left	3694769Ⓒ	29 5/8"
Right	3694770Ⓒ	30 5/8"

Ⓒ–Part No. stamped on axle for identification.

Backlash–.005-.008".

Removal of Rear Axle Assembly: Disconnect and remove parking brake pull back spring. Remove cotter pins and clevis pins from each parking brake cable clevis, and remove clevis. Remove springs and retaining clips from cables at frame brackets. Disconnect universal joint trunnion bearing "U" bolts and split rear universal joint. Disconnect shocks from anchor plates. Disconnect hydraulic brake line to connector at rear frame bracket. Remove spring "U" bolts, nuts and anchor plates. Raise rear of truck and roll assembly out toward rear. *CAUTION–Be careful when pulling parking brake cables through openings in frame.*

Axle Shaft Removal: *See "Chevrolet Hypoid Semi-Floating" in Rear Axle Section.*

Axle Shaft Endplay–Free fit to .014" maximum.

STANDARD FULL-FLOATING (1½ & 2-TON) (EXC. LCF MODELS)

Own. Full-floating hypoid gear (straddle mounted pinion) with Hotchkiss drive.

►*AXLE ASSEMBLY NOTE; ¾ & 1-Ton axle assemblies are different design than used on 1½ & 2-Ton with standard rear axle assemblies.*

See "Chevrolet Truck Hypoid Full-Floating" in Rear Axle Section.

►*AXLE RATIO IDENTIFICATION NOTE: Axle ratios are identified by prefix letters in rear axle numbers stamped on top of carrier housing between reinforcing ribs. See Axle Ratios following:*

Axle Ratio Identification

Ratio	Prefix Letters
5.14-1 (36:7)	CA, CB, CE, CF
4.57-1 (32:7)	CC, CD
6.17-1 (37:6)	CG, CH, CJ
7.2-1 (36:5)	CM

Backlash–.005-.008". Screw adjustment.

Removal of Axle Assembly: Remove differential cover and axle shafts (see below). Disconnect rear universal by removing two "U" bolts from rear yoke (wire trunnions to retain bearings). Slide shaft forward and lower to floor. Remove differential carrier mounting bolts.

Axle Shaft Removal (¾ & 1-Ton): Remove eight capscrews and lockwashers in axle shaft flange, install two ½"x13" screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft, withdraw shaft from housing, remove and discard gasket. *Use new gasket when installing shaft.*

►*CAUTION:* Thoroughly clean all lubricant from axle shaft flange and end of wheel hub before installing axle shaft. *Grease at this point will cause loosening of axle shaft flange capscrews.*

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Axle Shaft Removal (1½ & 2-Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. *NOTE*—When reinstalling axle shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align splines on shaft with both wheel hub and differential side gear splines), use new hub gasket.

►**Axle Shaft Note:** Shafts unequal length (rightshaft longer than left). Install in correct position.

¼ & 1-Ton Trucks

Axle Shaft	Part No.	Length
Left	3680977	31¼"
Right	3680978	37"

1½-Ton Trucks (27 Splines)

Axle Shaft	Part No.	Length
Left & Right	3714735	37½"

2-Ton Trucks, Exc. LCF (29 Splines)

Axle Shaft	Part No.	Length
Left & Right	3709890	39 3/8"

Wheel Bearing Adjustment: Remove wheels and axle shafts (see above). Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight, using special wrench J-2222 (¾ & 1-Ton), J-870 (1½ Ton), J-5670 (2-Ton) while turning hub by hand, then back off nut 45°, check for free turning, install adjusting nut lock with lock tangs aligned with slots in adjusting nut. Bend tang down into notch in adjusting nut, install locknut and tighten securely. Bend tang of lock down into notch of locknut.

HEAVY DUTY FULL-FLOATING (2-TON & LCF MODELS)

Own. Full floating, hypoid gear, roller pinion bearings (straddle mounted pinion), with Hotchkiss drive.
See "Chevrolet Truck Heavy Duty Hypoid Full Floating" in Rear Axle Section.
Ratios—Same as for "Standard Full-Floating" above.
Backlash—.005-.008".
Removal Of Rear Axle Assembly: Same as for "Standard Full-Floating" above.
Axle Shaft Removal: Same as for 1½ & 2-Ton "Standard Full-Floating" above.
►**Axle Shaft Note:** Shafts unequal length (right shaft longer than left). Install in correct position.

2-Ton & LCF Truck (29 Splines)

Axle Shaft	Part No.	Length
Left	3711457	38 9/64"
Right	3711458	40 9/16"

Wheel Bearing Adjustment: Same as for "Standard Full-Floating" above.

PLANETARY 2-SPEED

Own. Full-floating, two-speed planetary reduction type. with hypoid primary pinion and ring gear.
See "Chevrolet Truck Planetary 2-Speed" in Rear Axle Section.
►*NOTE: Two gear ratios available as follows:*
Power Ratio—6.40-1 (high), 8.72-1 (low). 32:5 Primary gears.
Speed Ratio—5.83-1 (high), 7.95-1 (low). 35:6 Primary gears.
Two-Speed Shift Control: Vacuum power type with control on gearshift lever.
Carrier Assembly Removal: *See "Chevrolet Truck Planetary 2-Speed" in Rear Axle Section.*
Axle Shaft Removal & Wheel Bearing Adjustment: Same as for "Standard Full-Floating" above.

SHOCK ABSORBERS

Delco. Direct Acting (Airplane Type) shock absorbers as follows:

Front Shocks

Model	Delco No.
½, ¾, 1-Ton	820R
1½ & 2-Ton (Except LCF)	682Z
Low Cab Forward	660AA

Rear Shocks

Model	Delco No.
½-Ton (114" W.B)	800W
½ & ¾-Ton (123¼" W.B.)	800Z
1½-Ton (Exc. School Bus Chassis)	660V
Utility	660U
Forward Control	684U

FRONT SUSPENSION

Conventional "I" Beam section, with Reverse Elliot ends and semi-elliptic springs.
Kingpin Inclination—6.16° to 8.16°.
Camber—1½° to 1¾°.
Caster (At designed load)—See table below.
Toe-In—See table below.

Model	Caster Ⓒ	Toe-In
3100, 3200	Pos. 3°	.132-.219"
3400, 3500, 3700	Pos. 2°	.26-.33"
3600	Pos. 1½°	.26-.33"
3800	Pos. 2¼°	.26-.33"
4000, 5000	Pos. 2°	.26-.33"
6000	Pos. 2¼°	.26-.33"

Ⓒ—At designed load, NOT curb weight.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut (recirculating ball).
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.
Power Steering: Own (Linkage Type). *See "Chevrolet Power Steering" in Steering Section.*
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*
Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

►*NOTE: Two different type brakes used on trucks as indicated below.*
Chevrolet-Bendix (Except Rear Wheels of 1½ & 2-Ton Models—Duo-servo, single anchor, hydraulic (without eccentric adjustment).
See "Chevrolet-Bendix Hydraulic" in Brake Section.
►*HALF-TON TRUCK BRAKE SHOE GRINDING CAUTION:* If bench type grinder used, grind shoes to .057" to .087" smaller diameter than drum size. If spindle type grinder used, grind shoe to drum diameter.
Chevrolet-Twinplex (Rear Wheels 1½ & 2-Ton Models)—Two-cylinder, four-anchor type hydraulic. Shoes are self-centering and self-energizing.
See "Chevrolet Twinplex" in Brake Section.
Wheel Cylinders—Size stamped on housing under adjusting lock spring.
Drums—Cast iron with steel web.

Drum Diameter

Model	Front	Rear
½-Ton	11"	11"
¾-Ton	12"	12"
1-Ton	12"	14"
1½ & 2-Ton	14"	15"

Lining—Molded type. Riveted on 1½ & 2-Ton Models and bonded on all others.

Thickness & Width

Model	Thickness	Width
½-Ton (Front Whl.)	.202-.222"	2"
½-Ton (Rear Whl.)	.202-.222"	1¾"
¾-Ton (Front & Rear)	.264-.284"	2"
1-Ton (Front Whl.)	.264-.284"	2"
1-Ton (Rear Whl.)	.267-.287"	2½"
1½ & 2-Ton (Front Whl.)	.267-.287"	2½"
1½ & 2-Ton (Rear Whl.)	.392-.412"	4"

Clearance—Adjust for clearance as follows:
All Models (Except 1½ & 2-Ton Rear Brakes)—Remove adjusting hole cover and turn brake adjusting screw until light drag is felt, then back off adjusting screw 7 notches (Half-Ton Models), or just enough to eliminate brake drag (Other Models), but not more than 7 notches.
Rear Wheels (1½ & 2-Ton Models)—Remove adjusting hole covers from flange plate and turn rear adjusting screw until slight drag is felt, then back off 3 notches. Repeat on front adjusting screw (2 adjustments on each wheel).
Parking Brakes: Hand lever applies rear wheel service brakes on Half-Ton & ¾-Ton Models, and an independent brake on propeller shaft on all other models.
Adjustment (½ & ¾-Ton Models)—*See "Chevrolet-Bendix Hydraulic" in Brake Section.*
Adjustment (1, 1½, 2-Ton Models & ¼-Ton with 4-Speed Transmission)—*See "Chevrolet Twinplex" in Brake Section.*
Master Cylinder: Located under floorboard on left hand side of truck.
Checking Fluid—Maintain fluid level to lower edge of filler hole.
Removal—Remove from below. *CAUTION*—On 1½ & 2 Ton Low Cab Forward, spacer between cylinder and body bracket will fall out when mounting bolts removed.
Installation—Reverse removal procedure. On LCF Models make sure the spacers are reinstalled.
Power Brakes: See "Hydrovac Power Unit" in Brake Section.

MISC. MECHANICAL

Windshield Wipers: Linkage type. Vacuum motor (Std. Equip.), Electric motor (Optional Equip.).
See "Windshield Wipers" in Miscellaneous Section.

TIGHTENING SPECIFICATI NS

ALL ENGINES (EXC. V8)

	Ft.Lbs.	In.Lbs.
Spark Plugs (14 MM. Type)	30-32	360-384
Cyl. Head Nuts 7/16"	52-57	624-684
Cyl. Head Nuts 1/2"	85-90	1020-1080
Cyl. Head Capscrews (Plain hd.)	65-70	780-840
Cyl. Head " (Cupped hd.)	67-72	804-864
Main Bearing Cap Nuts	75-80	900-960
Main Bearing Capscrews	80-85	960-1020
Connecting Rods Nuts 3/8"	45-50	540-600
Connecting Rods Nuts 7/16"	50-75	600-900
Flywheel Nuts	55-60	660-720
Manifold Stud Nuts	15-20	180-240
Starting Crank Jaw	108 min.	1296

1951-53 V8 MODELS

	Ft.Lbs.
Spark Plug Assembly	30-32
Cylinder Head Cover Stud	12-17
Cylinder Head Cap Screw	80-85
Cylinder Head Water Outlet Elbow Screw	30-35
Crankshaft Bearing Cap Screw	80-85
Crankshaft Balancer Screw	130-140
Connecting Rod Bearing Cap Nut	45-50
Camshaft Sprocket Hub Nut	120-130
Chain Case Cover Screw	30-35
Oil Filter Attaching Screw	25-30
Fan Attaching Screw	12-17
Fan Belt Idler Pulley Nut	40-45
Water Pump Inlet Elbow Screw	25-30
Water Pump Body Screw	25-30
Intake Manifold Screw	25-30
Exhaust Manifold Stud	30-35

1954-55 V8 MODELS

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	125
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Single Shaft)	30
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover (Single Rocker Shaft)	4.2
Rocker Arm Cover (Double Rocker Shaft)	25
Engine Front Cover (Single Rocker Shaft)	15
Engine Front Cover (Double Rocker Shaft)	30
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	30
Transmission Companion Flange	150

ENGINE

1946-53 MODELS (EXC. V8)

ENGINE ASSEMBLY REMOVAL: Engine assembly, clutch and transmission assembly can be removed from car as a unit as follows: Remove hood and radiator core. Remove propeller shaft (cars with 2 propeller shafts see Propeller Shaft Center Bearing Removal following). On cars with Powershift remove the vacuum control unit. Disconnect the following: Fuel pump flexible line at pump, exhaust pipe at manifold, throttle controls, heat indicator tube and bulb at head, oil gauge line at flexible tube, generator wires, speedometer cable, hand brake, gear shift and selector rods at transmission, clutch pedal linkage and torque tube, windshield wiper vacuum hose (if so equipped). Remove crankcase ventilator breather pipe and front and rear engine support bolts. Connect hoist to engine (remove air cleaner and horns) lift assembly out of chassis. When re-installing assembly reverse procedure indicated above, check hood locks and hood alignment.

1954 6 CYL. MODELS

ENGINE ASSEMBLY REMOVAL: Engine assembly, clutch, and transmission assembly can be removed from car as a unit as follows: Remove hood and radiator core. Remove propeller shaft (cars with two propeller shafts see Propeller Shaft Center Bearing Removal following). On cars with power shift remove the vacuum control unit. Disconnect the following: Fuel pump flexible line at pump, exhaust pipe at manifold, throttle controls, heat indicator tube and bulb at head, oil gauge line at flexible tube, generator wires, speedometer cable, hand brake, gear shift and selector rods at transmission, clutch pedal linkage and torque tube, windshield wiper vacuum hose (if so equipped). Remove crankcase ventilator breather tube and front and rear engine support bolts. Connect hoist to engine (remove air cleaner and horns) lift assembly out of chassis. When re-installing assembly, reverse procedure indicated above, check hood alignment and hood lock operation.

1954-55 V8 MODELS

ENGINE ASSEMBLY REMOVAL: Drain cooling system (both cylinder bank drain cocks and radiator). Disconnect propeller shaft at transmission and disconnect wires and linkage at transmission and clutch. Remove exhaust pipes, hood, and battery. Disconnect the usual items under hood such as fuel lines, radiator hoses, wires, etc. If using engine lifting fixture C-3162, remove carburetor assembly after disconnecting integral choke tube, fuel lines as listed above.. Remove radiator shroud (if so equipped). Attach lifting fixture to carburetor flange studs on intake manifold, and hook chain hoist to eyebolt. Place a jack under transmission to relieve weight. Then remove engine rear support mounting bolts and cross-member. Then remove engine front support mounting bolts. Lower jack at transmission and remove from under car. Raise engine and at the same time, work engine out of chassis toward the left front fender.

OIL PAN

1946-54 MODELS (EXC. V8)

OIL PAN REMOVAL: Drain oil, replace oil pan drain plug. Remove clutch cover housing underpan to avoid damaging oil pan gaskets on underpan dust shield. (NOTE—On Eight cylinder cars (Except V-8), raise rear of engine slightly so that pan clears frame cross-member). Remove oil level indicator, drop oil pan on the tie rod. Pan can then be removed by reaching in under crankcase and raising oil strainer to clear baffle while sliding pan out to rear.

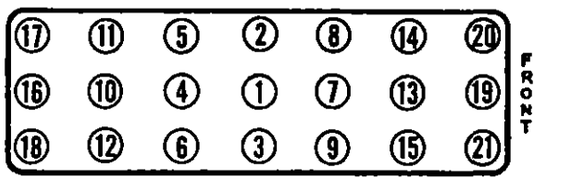
Installation (6 Cylinder Engines)—When installing new gaskets, end gasket should extend ¼" to ⅛" above level of oil pan (these ends must not be cut off). Side gasket installed with ends resting on top of protruding end gaskets. Gaskets will be compressed into place when pan screws tightened.

CYLINDER HEAD & MANIFOLD

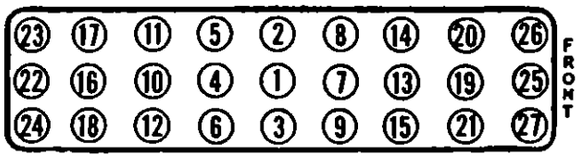
1946-55 MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

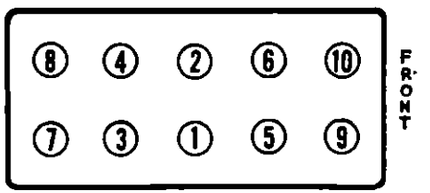
Tightening Torque—See Tightening (Torque Wrench) Specifications above.



CHRYSLER SIX CYLINDER HEAD



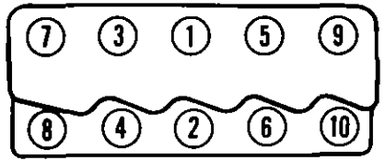
CHRYSLER 8-IN-LINE CYLINDER HEAD



V8 ENGINES (DOUBLE ROCKER ARM SHAFT) CYLINDER HEAD

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V8 ENGINES (SINGLE ROCKER ARM SHAFT) CYLINDER HEAD

1946-54 6 CYL. MODELS

INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN. Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install assembled manifolds. While holding manifold and gaskets evenly against engine block, install long center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer). Install remaining washer and nuts. *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 15-20 ft. lbs. torque. Tighten the four bolts holding exhaust manifold to intake manifold.

MANIFOLD HEAT CONTROL

1951-55 V8 MODELS

MANIFOLD HEAT CONTROL VALVE: Attached to right cylinder block exhaust manifold, and can be removed and repaired without removing manifold.

Removal: Remove the two exhaust manifold flange bolts and nuts and apply pressure to exhaust pipe to separate and remove the heat control valve. Remove counter-weight tightening bolt and nut and remove counter-weight. Remove thermostatic spring, spacer washer, then remove horseshoe lock and remove the anti-rattle spring.

►*CAUTION—Do not operate the engine without heat control valve in the manifold.*

Installation: Install the anti-rattle spring and horseshoe lock, and secure lock to shaft by squeezing end of horseshoe lock together. Check valve and shaft for free movement. Install spacer washer and place inner tongue of coil spring in shaft slot with outer tongue of spring toward forward side of valve and in a down position. Install bumpers on each side of counter-weight, and insert the counter-weight shaft key into counter-weight, securing it in position with the lock bolt. Hold heat control valve in the open position, and move the outer end of thermostatic spring around and up ¾ of a turn, hooking end of spring under forward stop screw. Hold valve in closed position and install counter-weight assembly on shaft. Center butterfly valve in valve body and line up bumpers to clear stop pin, then press counter-weight all the way onto the shaft, with the anti-rattle spring adjusted so that when the valve shaft is pulled up against anti-rattle spring there will be about 1/16" tensional drag on the shaft. Install manifold heat control valve assembly on exhaust manifold. Check assembly for free operation.

ORIGINAL BORE & PISTONS

1946-54 MODELS (EXC. V8)

ORIGINAL PISTON & CYLINDER BORE SIZES: Original production (new engine) piston and bore sizes indicated by letter located as follows:

Piston Size—Letter stamped on piston head.

Bore Size—Letter stamped on pad on distributor side of engine at top of block. Do not confuse this letter with "Special Standard" size letter indicating oversize bore.

"Special Standard" Size Bore—Letter "A" or "AB" following engine number indicates engine has .020" oversize standard cylinder bore.

NOTE—When measuring piston diameter take readings at right angles to the pin hole and ¾" from bottom of skirt.

PISTONS

ALL MODELS

REPLACEMENT PISTONS: Finished (Aluminum Alloy) Pistons—Furnished in standard size and .005", .020", .030", .040", .060" oversize.

Semi-Finished (Aluminum Alloy) Pistons—These pistons furnished in two sizes: (1) for cylinder bores from standard to .023" oversize. (2) For bores .025-.060" oversize. Pistons are finished (head and ring grooves) except for skirt. **Pistons must be finished on cam grinding equipment.** Do not finish pistons circular. Skirt is elliptical (.010-.014"), with smaller diameter across pin bosses than across thrust faces, and piston is tapered (.0005-.0015"), with smaller diameter at top of piston.

IMPORTANT—Use same type pistons when replacing only a partial set. All pistons in engine must be of the same type.

PISTON RINGS

ALL MODELS

REPLACEMENT PISTON RINGS: Three types of piston ring sets furnished by car manufacturer for service replacement, as follows:

Mopar Oil Master Ring Sets—These ring sets are designed to be installed in cylinders with walls tapered .005" to .030" when cylinder walls are not to be reconditioned. No. 4 oil ring is special 4-piece type (upper and lower rail with stepped segment between rails and slotted expander). Mopar Oil Master Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Oil Saver Ring Sets—These ring sets are designed to be installed in cylinders with .005" or less taper, or where cylinder walls have been reconditioned. This set consists of same rings as used in Oil Master set except that No. 3 & No. 4 rings are alike (slotted oil ring with slotted expander). Mopar Oil Saver Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Chrome Master Ring Sets—These ring sets are designed to be installed in cylinders with walls tapered .005" to .030" when cylinder walls are not to be reconditioned. Top and Bottom rings are chromed.

Oil Ring Set Sizes—All piston ring sets are available in the following sizes: Standard (for standard to .009" oversize cylinders); **.010"** (for .010" to .019" oversize cylinders); **.020"** (for .020" to .029" oversize cylinders); **.030"** (for .030" to .039" oversize cylinders); **.040"** (for .040" to .049" oversize cylinders); .050" (for .050" to .060" oversize cylinders).

ORIGINAL BEARING SIZES

1946-54 MODELS (EXC. V8)

ENGINE NUMBER LETTERS ('SPECIAL STANDARD BORE & BEARING SIZES):—Letters used with engine number (not in circular pads) denote following 'special standard' sizes: 'A'—.020" larger standard cylinder bore. 'B'—.010" smaller standard main and connecting rod bearings. 'AB'—Cylinder bore, main and connecting bearings 'special standard'.

CONNECTING ROD & BEARINGS

►*CAUTION—See ORIGINAL BEARING SIZES for markings indicating production engines equipped with bearings other than standard size.*

ALL MODELS

CONNECTING ROD BEARINGS: Removal & Installation. Bearing shells can be removed after taking off bearing caps. When installing bearing shells, oil hole in rod and bearing must be aligned and ear on bearing halves fitted in notch in rod and cap.

Fitting Bearings—To check bearing clearance, place an oiled piece of shim stock, .0015" thick, ½" wide, ¾" long between bearing and crankshaft. Tighten bearing cap nuts. Bearing clearance is correct when slight drag is felt when turning crankshaft by hand. If no drag felt, and crankshaft out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshafts which show slight wear, .010" for 'Special Standard' .010" crankshafts (See Engine Lettering 'Special Standard' Bore & Bearing Sizes Note above), .012" bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

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CRANKSHAFT & MAIN BEARINGS

ALL MODELS

►*CAUTION—See ORIGINAL BEARING SIZES for markings indicating production engines equipped with bearings other than standard size.*

REPLACEMENT MAIN BEARING CAPS: Furnished for service where original cap damaged or broken. These replacement caps same as original caps except for stud holes being 1/64" larger and bearing cap length which is 1/16" shorter.

Fitting—Replacement caps must be fitted to engine by filing or shimming to obtain proper bearing clearance. This is only necessary when replacement cap originally fitted to engine (caps should not be shimmed or filed to compensate for wear.

ALL MODELS

MAIN BEARINGS: Removal & Installation (with engine in car). Bearing shells can be removed and installed without removing crankshaft as follows: Remove oil pan, and oil suction pipe and screen assembly. Punch mark bearing caps and crankcase to insure re-installation of caps to same position. Remove caps in pairs (2 front or 2 rear). Upper bearing halves can be removed by using tool C-584 inserted in oil hole in crankshaft and rotating crankshaft to turn bearing out.

Fitting Bearings—To check bearing clearance, place an oiled piece of shim stock, .0015" thick, ½" wide, ¾" long between bearing and crankshaft. Tighten bearing cap nuts. Bearing clearance is correct when slight drag is felt when turning crankshaft by hand. If no drag felt, and crankshaft out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshafts which show slight wear, .010" for 'Special Standard' .010" crankshafts (See Engine Lettering 'Special Standard' Bore & Bearing Sizes Note above), .012" bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

1946-54 MODELS (EXC. V8)

CRANKSHAFT OIL SEALS: Servicing—Car manufacturer recommends that new oil seals be installed if chain cover or rear bearing cap removed.

Front Oil Seal (6 Cyl.)—Oil seal located in timing chain cover. Consists of spring backed composition seal in a stamped steel housing pressed in chain case cover with composition gasket installed between seal and cover. To install proceed as follows: Insert new composition gasket in chain case cover, drive new seal in place with drift or similar tool slightly larger than seal (seal is press fit in cover). Center seal on crankshaft when installing chain case cover as follows: Install chain case cover on engine with cover screws tightened just enough to hold cover in place, install Centering Tool C-522 on end of crankshaft and hold it in place by tightening crankshaft starting jaw finger tight, tighten chain case cover screws and as cover is being compressed, tighten crankshaft starting jaw nut so as to maintain slight tension between centering tool and seal. Remove tool after chain case cover screws secured. Tighten starter jaw to 108 ft.lbs. torque.

Rear Oil Seal (2-Piece Type—6 Cyl.)—Located at rear main bearing. Consists of oil seal packing assembled on rear face of bearing cap and crankcase (upper half held by retainer assembled on rear face of crankcase, lower half by retainer assembled on rear face of bearing cap). Gaskets used on top face of bearing cap at each side, around oil slinger grooves and along shoulder across cap. Install new packing in retainer on crankcase and cap, place new gaskets on cap and install on engine without disturbing position of gaskets.

NOTE—Some models equipped with additional two-piece oil gasket. This gasket assembled between seal retainer and crankcase (upper half), between retainer and bearing cap (lower half).

Rear Oil Seal (2-Piece Type—Straight 8 Cyl.)—At rear main bearing. Consists of seal assembled on rear face of bearing cap and crankcase (upper half held by retainer assembled on rear face of crankcase, lower half by retainer asembled on rear face of bearing cap), and by rubber seals assembled in vertical grooves on each side of bearing cap. When installing rubber seals, upset grooves on each side of cap with prick punch to anchor seals in grooves and prevents seals sliding out when cap installed. These rubber seals also used on front bearing cap.

NOTE—Some models equipped with additional two-piece oil gasket. This gasket assembled between seal retainer and crankcase (upper half), between retainer and bearing cap (lower half).

Rear Oil Seal (1-Piece Type)—New one-piece type with lip on forward edge engaging shoulder in crankcase and bearing cap to rear of crankshaft oil slinger. This seal is split at the top.

Installation—Remove oil pan (see Oil Pan Removal following). Back off all main bearing capscrews three turns. Remove rear main bearing cap (use Puller C-305 for 8 cylinder). Pull out old seal with pliers. Coat one end of new seal with tire soap or cup grease (avoid getting any grease between ends of seal). Insert one end of seal over shoulder in crankcase, work up until end approximately at top, then work other end in same manner on other side until ends come together at top. Coat lower lip of seal so that bearing cap will seat on seal easily. Check rear bearing cap for holes (either sand holes or tapped holes for 2-piece type seal retainer). If holes extend through oil slinger groove shoulder, sand holes should be plugged by welding or tapped holes plugged by installing screws which have been coated with sealing compound. Re-assemble main bearing caps and oil pan.

REPLACEMENT NOTE—If one-piece seal to be installed on engine where two-piece type seal used, removal of transmission, clutch, and fluid drive may be required to remove both halves of old seal.

1951-55 V8 MODELS

CRANKSHAFT OIL SEALS: Front Seal—Remove old seal with tool C-3050. Place new seal on chain cover with projecting flange facing inside the cover. Insert seal gasket and drive into place with tool C-3051.

Rear Oil Seal—Rope type seal of braided asbestos. With bearing cap, bearing, and seal removed, install a new seal into position in cap so that both ends of seal protrude above cap. Tap seal into position with tool C-3131 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when the cap is in position the long seal will be on the oil filter side of engine.

ENGINE FRONT COVER

1951-55 V8 MODELS

(DOUBLE ROCKER SHAFT ENGINE)

ENGINE FRONT COVER (Double Rocker Shaft Engines): Proceed as follows:

Removal: Remove water pump. Remove vibration dampener retainer bolt and washer. Remove two of the vibration dampener pulley bolts and install puller Tool C-3033. Remove crankshaft pulley and vibration dampener as an assembly. Remove felt dust seal and vibration dampener hub key from crankshaft slot. Remove left cylinder bank exhaust pipe. Disconnect fuel lines at fuel pump, remove fuel pump. Remove oil level indicator. Remove starter using Tool C-455. Drain engine oil and remove oil pan. Remove chain case cover bolts and lockwashers, **including one inside the pump opening.** Drive chain case cover off the two dowel pins, using soft hammer.

Installation: Be sure mating surfaces of cylinder block and cover are clean. Apply moderate coat of sealing compound to block and cover faces, install new gasket. Make sure crankcase oil slinger is in proper position (flange end pointing toward seal). Position cover on two dowel pins and gently tap cover in place. Install cover bolts and lockwashers and tighten to 30 ft. lbs. Install other items be reversing removal procedure.

1955 V8 MODELS

(SINGLE ROCKER SHAFT ENGINE)

ENGINE FRONT COVER (Single Rocker Shaft Engines): Proceed as follows:

Removal: Drain and remove radiator. Disengage fan belt and remove generator. Install Tool C-3033 over pulley and force pulley off end of crankshaft. Support engine with suitable chain hoist fastened to intake manifold. Remove motor support "U" bolts and nuts. Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads. Lift water pump housing, water pump, front motor support and insulator up and away from front of engine. Discard gaskets. Loosen bolts that hold oil pan to cylinder block. Drop pan slightly to clear chain case cover. Disconnect inlet and outlet fuel lines at fuel pump. Remove bolts that hold pump to chain case cover. Slide pump out and away from engine. Discard gasket. Remove bolts and washers from cover. Disengage cover from locating dowels, remove from engine. Discard gasket.

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Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs. Install new gasket and position cover locating dowels. Coat screws with suitable sealer and tighten to 15 ft. lbs. *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil.

1951-55 V8 MODELS

FRONT OIL SEAL: Remove old seal by driving it out with Tool C-3050. Place new seal on the chain case cover with the projecting flange facing the inside of the cover. Insert seal gasket and drive new seal in place with Tool C-3051.

CAMSHAFT & BEARINGS

1946-54 MODELS (EXC. V8)

CAMSHAFT REMOVAL: Remove Front End Assembly as a unit (see removal data on preceding pages). Remove cylinder head, fuel pump, oil pump, valve tappet cover plates, crankshaft pulley, front motor support (with front of engine jacked up), timing chain cover, camshaft sprocket and timing chain. If valves and valve springs are not to be removed, prop valves up by inserting wooden wedges at opposite sides under valve head. Raise tappets and hold in this position (use spring type clothes pins or similar tool to hold tappets up). Withdraw camshaft (rotate shaft to clear any obstructions). Chrysler 8 Note—In addition to instructions listed above, two oil feeder lines in valve chamber must be removed and #4 piston must be on top dead center in order to remove camshaft.

1951-55 V8 MODELS

(DOUBLE ROCKER SHAFT ENGINE)

CAMSHAFT REMOVAL: Remove valve tappet cover, cylinder head cover and rocker arm assemblies and push rods. Remove valve tappet assemblies, remove distributor. Remove timing chain cover case *(CAUTION*—One cover attaching bolt located in case back of water pump), timing chain and camshaft sprocket. Camshaft sprocket and timing chain can be removed by taking off the camshaft hub nut, fuel pump eccentric and dowel assembly. Chain and sprocket can then be removed. Remove four camshaft thrust plate screws, distributor and oil pump drive gear. Pull out the camshaft being careful not to damage camshaft bearings.

1955 V8 MODELS

(SINGLE ROCKER SHAFT ENGINE)

CAMSHAFT REMOVAL: Drain radiator, remove radiator and crankshaft pulley. Support engine with chain hoist attached to intake manifold. Remove engine support U-bolts. Remove fan, water pump, and water pump housing assembly. Loosen oil pan bolts sufficiently in order that oil pan clears chain case cover, camshaft gear hub nut, fuel pump eccentric and dowel. Then remove camshaft gear and timing chain. Support engine at front of oil pan. Then remove intake manifold, distributor, distributor drive gear, tappet chamber cover, rocker cover, rocker shaft assemblies and push rods. Use Tool C-3158 to pull out hydraulic tappets. If varnish build-up is excessive, use puller part of Tool C-3158 and work tappet out of bore. Remove four camshaft thrust bolts, then remove camshaft.

TIMING CHAIN

1946-54 MODELS (EXC. V8)

TIMING CHAIN REMOVAL: Remove water pump, hoses, radiator core, belt and front crankshaft pulley. Support engine from underneath and remove front engine support. Remove chain cover. Remove 4 cap screws holding camshaft sprocket to camshaft, and pull off sprocket. Chain can now be removed. Cap screw holes in sprocket are offset and gear can be installed in one position only on camshaft.

1951-55 V8 MODELS

TIMING CHAIN REMOVAL: Remove radiator (see Radiator Removal), remove fan and both belts, and water pump pulley. Remove the four water pump attaching capscrews and remove water pump. Remove bolts holding chain case cover to cylinder block. Attach Puller C-3072 by hooking it under chain case cover then installing two of the water pump mounting bolts. Pull cover off locating dowels by tightening up on puller bolt.

VALVE SYSTEM

1946-55 MODELS

(EXC. SINGLE ROCKER SHAFT ENGINE)

EXHAUST VALVE SEAT INSERTS (Refacing): Exhaust valve seat inserts must be reground with special high speed grinding tool MTH-JB-41, using the correct size valve guide pilot. Check concentricity of valve seat using a dial indicator. Total runout should not exceed .002". Check valve seat with prussian blue to get seat centralized on valve face. Use a 20° stone at the top or a 60° stone at the bottom, whichever is necessary to centralized the valve seat. Width of valve seats should be 3/64" to 1/16".

Replacement Inserts—Furnished .010" Oversize. Use special tool C-732 (Exc. V8); C-3140 (Double Rocker Arm Shaft Engines) to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be .002-.004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with installing tool C-767.

ROCKER ARMS

1951-55 V8 MODELS

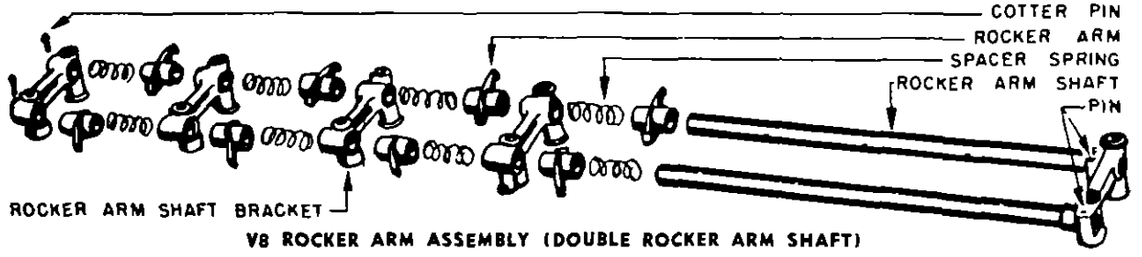
(DOUBLE ROCKER SHAFT ENGINE)

ROCKER ARM ASSEMBLY (Double Rocker Arm Shaft):

Removal: Remove rocker arm covers. Place cotter pins in holes of first and last rocker arm brackets to last rocker arm brackets (if not already there) to prevent springs on rocker from pushing assembly apart when cylinder bolts removed. Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block. Grasp support bracket at each end of head, pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068. ***CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.***

Installation: Insert cylinder head bolts in brackets, with **short** bolts in intake side. Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes). Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms. Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above. ***When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.*** Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly.

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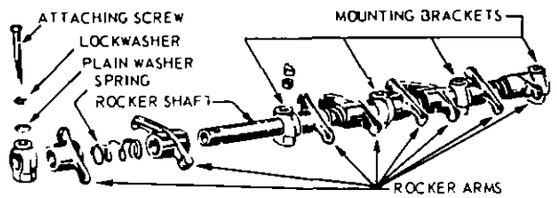


V8 ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

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1955 V8 MODELS
(SINGLE ROCKER SHAFT ENGINE)

ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft): Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down. Slide an intake rocker arm over shaft and down against bracket, with diagonal slant of arm close to bracket. Then slide a spacer spring over shaft and down against intake rocker arm. Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed. Slide push rods into push rod holes. Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head. Install flatwashers and nuts.



ROCKER ARM ASSEMBLY (SINGLE ROCKER ARM SHAFT)

HYDRAULIC VALVE LIFTER

1950 8 CYL. C49 & C50 MODELS

►*NOTE: Hydraulic Valve Lifters used on some 1950 C49 & C50 models only (8 Cyl.). Can be identified by "X" after engine number.*

►**HYDRAULIC VALVE LIFTER CLEARANCE:** Required when valves are reconditioned or replaced (used on some C49 & C50 8 Cyl. Engines). Insert shank of a new 3/32" drill between valve face and seat. Hold valve tight on drill shank and check clearance between lifter and valve stem. A .016" feeler should pass freely, if not, grind off the end of valve stem until a .026" feeler will pass freely between lifter and valve stem. Lifter must be in down position when setting.

INSTALLING NEW OR SERVICED HYDRAULIC VALVE LIFTERS: After re-installing valve lifters run engine at fast idle until lifters become quiet. This may take as long as 1 hour of running. **Do not run over fast idle until lifters are quiet or damage to valve train may result.**

1950-53 8 CYL. MODELS

HYDRAULIC VALVE LIFTERS (Two Piece Type): Consists of three separate units: tappet body, cylinder, and plunger. Oil is introduced from pressure system to lower part of tappet body, then through a ball check valve to cylinder below plunger. When lifter is raised by engine cam, the ball check valve closes, preventing escape of oil, and the cam action is transmitted to the engine valve.

►*2-PIECE TYPE LIFTER REPLACEMENT NOTE: The "One Piece" integral type lifter can be used to replace the "Two Piece" type. See "One Piece Integral Type" below.*

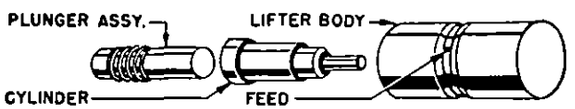
Removal (1950 8 Cyl. Models): Remove valve spring chamber cover plate, and engine cylinder head. Remove valve, spring and retainer assembly over tappet unit which is being removed, being careful not to damage plunger return spring with the valve spring compressor tool. Remove cylinder and plunger assembly by lifting and sliding it out from under bottom of valve stem guide.

Removal (1951-53 V-8 Engines): To remove complete valve lifter assembly, remove cylinder head cover, rocker arm assembly, push rods and valve chamber cover. On early production engines the above procedure must also be followed to remove valve lifter plunger assembly from valve lifter body. On later engines the valve push rod hole has been enlarged, making it only necessary to remove the cylinder head cover, and then proceed as follows: Install valve spring compressing tool C-3034 over the rocker arm so heel of tool is resting on valve side. Make certain valve is seated on low part of cam lobe. (See following for camshaft position). Using handle of tool for leverage, compress valve springs sufficiently to raise rocker arm above push rod. While holding in this position, slide rocker arm to one side. Remove push rod, and insert tool C-3039 (standard spring jaw type holding tool) into push rod hole, positioning it over valve lifter plunger assembly. Pull the assembly from valve lifter body being careful not to pull body from lifter bore.

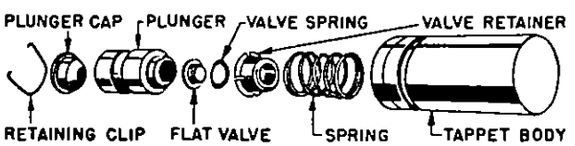
1951-55 V8 MODELS

HYDRAULIC LIFTERS (One-Piece Integral Type): Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body or tappet. Oil is introduced to this unit through a hole in side of lifter plunger.

►***1951-53 V-8 VALVE LIFTER REPLACEMENT CAUTION***—The integral type lifter can be used to replace the former "Two-Piece" type lifter providing the correct valve push rods are also installed. Valve push rods for use with "Integral" type lifters are as follows: No. 1486907 (Exhaust), No. 1486906 (Intake). ***DO NOT REPLACE "INTEGRAL" TYPE LIFTERS WITH "TWO-PIECE" TYPE LIFTERS ON ENGINES AFTER SERIAL NO. C53-8-48654.***



CHRYSLER V8 TWO-PIECE VALVE LIFTER



CHRYSLER V8 ONE-PIECE VALVE LIFTER

Removal (All V-8 Engines): Remove cylinder head cover, rocker arm assembly, intake manifold, and valve chamber cover (NOTE—Lifters cannot be removed through cylinder head as with some previous lifters). Install valve spring compressor tool C-3034 over the rocker arm so heel of tool is resting on valve side. Make certain valve is seated on low part of cam lobe (see following Camshaft Position). Using handle of tool for leverage, compress valve spring sufficiently to raise rocker arm above push rod. While holding spring in this position, slide rocker arm to one side. Remove push rod and then remove valve lifter from lifter bore.

Disassembly: Depress lifter plunger with a push rod and remove plunger retaining spring clip, plunger cap, plunger, flat valve, valve spring, valve retainer, and plunger spring from lifter body. (CAUTION—Disassemble ONE valve lifter at a time to avoid the possibility of interchanging lifter parts. If lifter parts are interchanged, lifters should be replaced with new ones). Inspect plunger, valves, and valve seats for signs of scoring, wear or pitting. Check to see that the flat check valve exerts slight pressure on valve spring to insure valve closing. Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene (*CAUTION*—Kerosene and container must be absolutely clean). Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace the lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing. This will prevent possible scoring of lifter plunger when engine is first started.

Reassembly: Reverse the disassembly procedure as noted above.

1951-55 V8 MODELS

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos. 1 and 6 cylinders. Set timing mark "DC" located on crankshaft pulley to pointer. With rotor at No. 1 firing position, the following lifters will be on the low side of the cam lobe: No. 2 intake and exhaust, No. 4 exhaust, No. 7 intake, No. 8 intake and exhaust (*NOTE*—To remove No. 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed). With rotor at No. 6 position, following lifters will be on low side of cam lobe: No. 3 intake and exhaust, No. 4 intake, No. 5 intake and exhaust, No. 7 exhaust (*NOTE*—To remove No. 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed).

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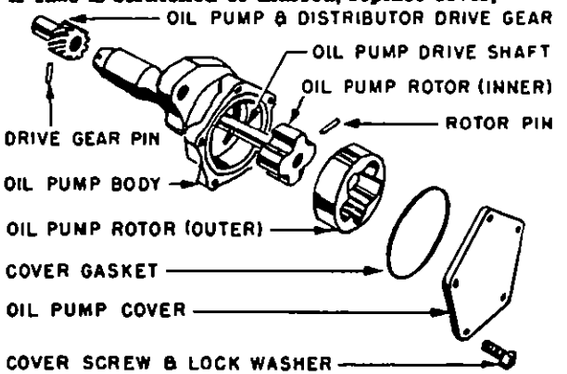
OILING SYSTEM

OIL PUMP

1946-54 MODELS (EXC. V8)

ROTOR TYPE OIL PUMP: Removal—Take off distributor cap, turn engine over until #1 cylinder is at firing position (allow engine to remain in this position while pump off engine). Remove two oil pump Allen-head screws. Take pump off engine.

Pump Servicing—Disassemble pump by taking off cover and drive gear (drive out pin and press gear off shaft). Thoroughly clean parts and dry with compressed air. Check pump parts as follows: 1)—With rotors in pump body, turn shaft so that one lobe on inner rotor pushed into notch in outer rotor, check clearance between opposite lobe of inner rotor and inner face of outer rotor. If clearance greater than .010" replace both rotors. 2)—Height (or thickness) of both rotors should be at least .748". Diameter of outer rotor should be at least 2.245". Replace if measurements are less. 3)—With rotors in pump body, turn body up, place straightedge across face of body between screw holes. Clearance between straightedge and rotors should be .004" max. If greater, replace pump body. 4)—With outer rotor pressed to one side of body, clearance at opposite side should be .008" maximum. If greater, replace pump body. ..5)—Check cover by placing straightedge across inner face and if .001" feeler can be inserted between cover and straightedge, or if face is scratched or marred, replace cover.



CHRYSLER SIX OIL PUMP

Pump Assembly—If new rotor installed on shaft, it must be installed with rotor square to shaft and pressed on until flush with end of shaft. Pin rotor to shaft after drilling 5/32" pin hole. Drive gear should be pressed on shaft to give .003-.010" clearance between underside of gear and pump body with rotor (on opposite end of shaft) seated in pump body. Install pin. If necessary, drill new 5/32" hole at right angles to old hole. With rotors in place, install new cover gasket on body and install cover.

Pump Installation—Oil pump must be installed on engine with #1 piston in firing position with rotor on distributor opposite #1 terminal in cap.

1951-55 V8 MODELS

ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe. Remove cover bolts and cover. Discard oil seal ring. Remove pump rotor shaft and lift out pump outer rotor. Remove oil pressure relief valve plug and lift out spring and plunger. Wash all parts in a suitable solvent and inspect for damage or excessive wear. Check all pump parts as follows:

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers. If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors.

Inner Rotor—Measure thickness of inner rotor with micro-calipers. If thickness measures less than .998", replace both inner and outer rotors.

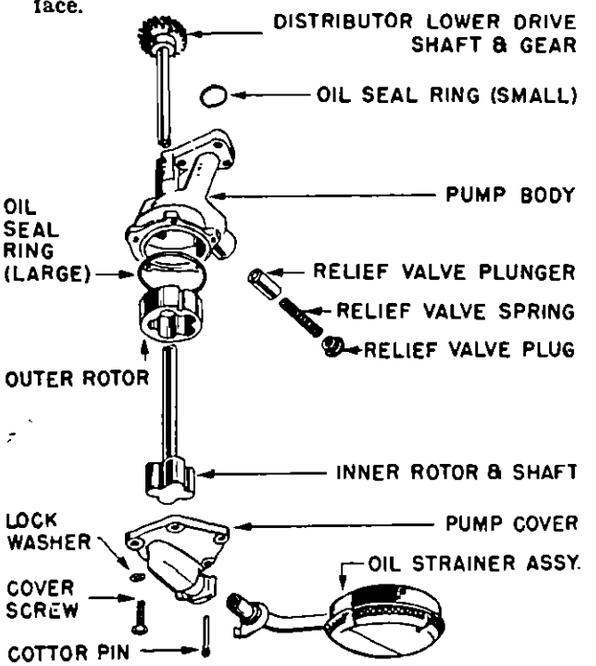
Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body. Use a feeler gauge and measure clearance between top of rotors and straightedge. If clearance in excess of .004", replace pump body.

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors. If clearance in excess of .010", replace both inner and outer rotors.

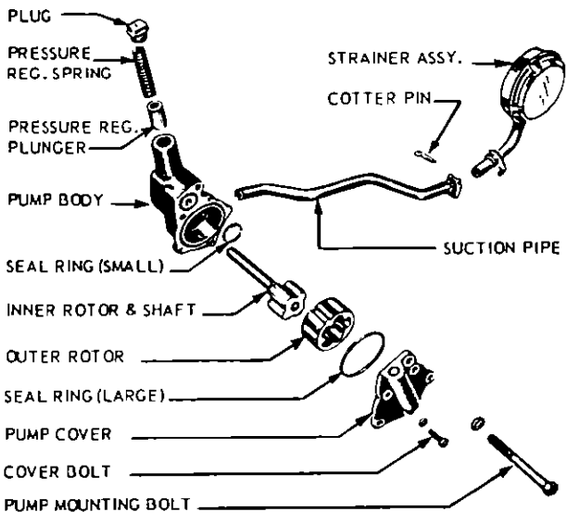
Reassembly: Use new oil seal ring between cover and body. Tighten cover bolts to 10-15 ft. lbs. Prime pump and then install new oil seal ring in pump mounting face.

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

Reassembly—Reverse disassembly instructions and install a new oil seal ring between cover and body. Tighten cover bolts to 10-12 ft. lbs. Prime the pump and place a new oil seal ring in the pump mounting face.



V8 OIL PUMP (DOUBLE ROCKER ARM SHAFT ENGINE)



V8 OIL PUMP (SINGLE ROCKER ARM SHAFT ENGINE)

COOLING SYSTEM

1946-54 MODELS (EXC. V8)

WATER DISTRIBUTOR TUBE: Removable one-piece tube installed between cylinders and valve ports (on six cylinder engines), on right side of engine just above valve spring chamber (on 8 cyl. engines) and distributes water from pump to exhaust valve ports through holes in tube.

Servicing—A new tube should be installed whenever engine overhauled or when rusted or corroded in order to provide correct water circulation in engine block. To replace tube proceed as follows: Remove front end assembly. On 6 cylinder engines remove water pump which will expose front end of tube. On eight cylinder engines, remove welch plug to right of water pump to expose front end of tube. Remove tube by using rod with hook formed on end and engage it in slot on upper edge of tube just inside block, pull tube out. NOTE—On 8 cylinder engines, see that front end of tube flared in same manner as tube which was removed from engine.

1946-55 MODELS

RADIATOR CORE REMOVAL: Raise hood, drain cooling system, disconnect hoses, free headlight wires from radiator, remove shroud (if used), take out nuts and capscrews in support at each side, lift core out, tilting top toward rear. *NOTE*—Fan blades on some models must be removed if additional clearance required.

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IGNITION NOTES

1951-55 V8 MODELS

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block.

Installation: Slide new bushing over burnishing end of Tool C-3053. Insert tool and bushing into bore of block. Drive bushing and tool down into position, using a soft hammer. As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. ***DO NOT REAM THE BUSHING.***

1951-55 V8 MODELS

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

CLUTCH NOTES

1946-48 MODELS

CLUTCH OVER-CENTER SPRING: Serviced only if linkage disturbed or spring bracket on frame bent. Original setting can be obtained by using Miller Gauge C-705 as follows: Check spring bracket on frame and straighten if necessary, install gauge over linkage pivot pins with lower end engaging coil spring bracket on frame (turn pedal rod turnbuckle until gauge fits properly). Then re-set pedal position and free travel as directed on car page.

1949-54 MODELS

CLUTCH OVER-CENTER SPRING: Use Miller Gauge C-853. Place gauge on the pin at lower end of pedal and against spring hook. Raise or lower the vertical spring bracket until it just contacts the gauge. Move pointer on gauge to setting marked for the car model being worked. Adjust eyebolt until the inside edge is in line with the pointer where spring makes contact with eyebolt.

Adjusting Over-center Spring Tension—Adjustment is made by turning the sleeve nut on the spring eyebolt. If pedal is soft and sluggish on return, back off the sleeve nut. If pedal requires excessive effort to depress, tighten sleeve nut until desired action is obtained.

PROPELLER SHAFT

1946-55 MODELS

PROPELLER SHAFT CENTER BEARING: To remove assembly, remove nuts and lockwashers from differential and transmission companion flanges to free propeller shafts at front and rear. Take out four center bearing housing-to-frame crossmember mounting bolts, remove propeller shaft and center bearing as an assembly

REAR AXLE NOTES

1946-55 MODELS

REAR AXLE SHAFT OIL SEAL: Leather type seal mounted on brake support and bearing on axle shaft.

Installation—With brake support removed and old seal driven out of support, new seal can be installed as follows: Soak new seal in thin oil for 30 minutes. Roll leather with smooth bar until pliable. Check seal bearing surface on axle shaft making sure surface is smooth. Install seal on front side of support and stake to support at three points on outer edge. Install sleeve (Tool C-745) in seal (protects seal from damage while installing support). Assemble brake support on housing. CAUTION—Lip of seal must not be folded when installing in support.

BRAKE NOTES

1946-55 MODELS

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for .015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015-.020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut.

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed .005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

MODEL IDENTIFICATION

STARTING SERIAL NUMBERS

	Royal	Windsor Twn. & Country
1946	70,011,001	70,515,001 71,000,001
1947	70,023,023	70,564,429 71,000,128
1948	70,029,674	70,633,017 71,002,880

Location—On left front door hinge post.

ENGINE NUMBER: Stamped on boss on left side of cylinder block between #1 & #2 cylinders.

TUNE-UP

COMPRESSION: Pressure—125-135 lbs. (100 lbs. min.) at cranking speed of 150 RPM. or 155-165 lbs. at 1000 RPM. (for Std. 6.6-1 Cast Iron Head).

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Auto-Lite Type A5. 14 mm. Metric. Gaps—.030" ± .002".

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020" Cam Angle—38° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.
Std. Setting—2° After top dead center.
Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with 2° graduation after DC mark at pointer on chain case then set manual (octane selector) adjustment:
Manual (Octane Selector) Adjustment—Set for slight ping in 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ¾-1¼ turns open), turn screw out for richer mixture. Idle speed 6 MPH. (450-475 Eng. RPM. with Hydraulic Trans.).
Float Level—Top of float (not soldered seam) 5/64" (for EX1 carburetor on cars with Std. Trans.), 1/16" (for EV1 carburetor on cars with Hydraulic Transmission), plus or minus 1/64" below top edge of bowl.
Accelerating Pump—Center Hole (med. stroke) Normal. Inner Hole—Summer, Outer Hole—Winter, for extreme temperatures.
Fuel Pump Pressure—3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approx. ¾ turn, not over one turn or under ½ turn, hook end on stop stud.

VALVES: See Valve Timing.
Tappet Clearance—.008" Intake. .010" Exhaust, Hot.
NOTE—Tappet adjusting screws are self-locking type (no locknuts).

STARTING: See Battery, Starter, Generator, and Regulator.

IGNITION

IGNITION SWITCH: Briggs & Stratton or Mitchellock. NOTE—No armored cable used.
Briggs & Stratton—B & S Switch No. 85985.
Mitchellock Type 42-R—No. E-10182 (Yale & Towne lock), No. E-10663 (Hurd lock).
Lock Cylinder—Yale & Towne, Hurd, or Briggs & Stratton. B & S No. 85915 (Key Series CA1-CA800)

COIL: Auto-Lite No. IG-4806 or IG-4809. Mounted directly above distributor on ignition cable bracket.
Ignition Current—2.25 amperes idling, 5 stopped.

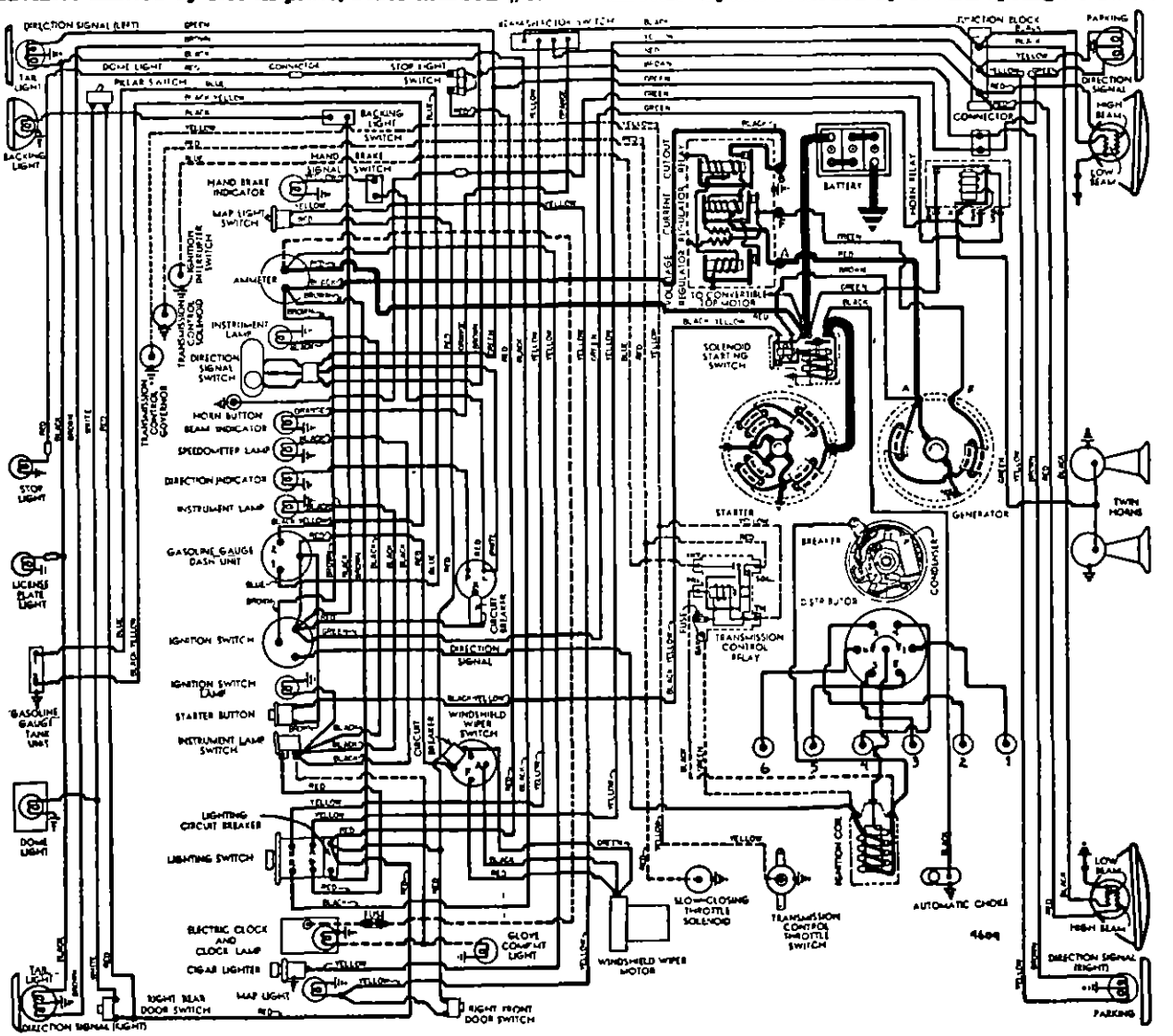
CONDENSER: Auto-Lite Part No. IG-3927A.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IGS-4208A-1. Full automatic advance type with auxiliary vacuum spark control and manual (octane selector) adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #9.
Breaker Gap—Set at .020".
Cam Angle or Dwell—38° closed, 22° open (distr. °).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	350	0	700
3	400	6	800
6	780	12	1560
9	1160	18	2320
12	1530	24	3060

Vacuum Spark Control: Auto-Lite Unit. On distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring in unit).



Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7¼"
4°	8°	9⅜"
6°	12°	11⅝"
9°	18°	15"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing

Distributor Removal:—Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	2° ATDC	.002" ATDC

NOTE—Impulse neutralizer marked 'DC' at TDC point with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following).

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor as directed above.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping noted), clockwise to retard spark (if ping too severe), tighten screw.

CARBURETOR

Carter (B&B) EX1, 2, 3.....No Fluid Drive

Carter (B&B) EV1, 2....Fluid Dr. & Hydraulic Trans.

1½" single barrel, downdraft type with Sisson automatic choke control. NOTE—EV1 has Slow-closing Throttle and Step-down Switch for hydraulically operated transmission.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for idle speed of 6 MPH min. (Std.), 450-475 Eng. RPM (for Cars with Hydraulic Transmission). Adjust idle adjusting screw for smooth idle (¾-1¼ turns open, turn screw in for leaner mixture). Recheck idle speed.

NOTE—If vacuum gauge used, adjust for highest obtainable vacuum (see Vacuum Gauge data above).

Accelerating Pump Setting—Pump lever has three holes for pump link engagement. Set as follows: Inner Hole (minimum stroke)—Extreme hot temperatures or altitudes above 3000 feet.

Center Hole (med. stroke)—Normal summer setting.

Outer Hole (max. stroke)—Winter temperatures.

Float Level—5/64" (EX1 carburetor), 1/16" (for EV1), from top of float (not seam) to top edge of bowl with valve seated. Check with tool C-449 (exc. EV1).

Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*

NOTE—If lean metering jet (High Altitude calibration) used at lower altitudes for increased economy, speed and power are reduced (not recommended).

Slow-closing Throttle (EV1): Electro-magnetic dashpot type. No adjustment required.

See Carburetion Equipment Section for complete data.

Fast Idle: Throttle stopscrew stop dog linked to choke valve so that stop dog rotated and throttle opened to fast idle position when choke valve closed for starting. No adjustment required.

Automatic Choke:—Sisson Type AC-758B.

See Carburetion Equipment Section for complete data.

Setting—With throttle ⅓ open, adjust by inserting gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is closed tightly.

CARB. EQUIPMENT

Air Cleaner: AC No. 1542284 Heavy Duty Oil-bath type. Filter Element AC No. 1544091.

Servicing—Clean filter element in kerosene, clean out oil reservoir and fill to indicated level with SAE No. 50 oil (20W oil below 32°F., approx. 1 pint required). Service cleaner whenever sump is half filled with oil and dust sludge. NOTE—Crankcase ventilator air cleaner in oil filler cap should be cleaned in kerosene and re-oiled by dipping in *SAE No. 50* engine oil at 1000 mile intervals.

Fuel Pump: AC No. 1539042 or Carter Type M594S or M639S. Diaphragm type fuel pumps.

Replacement Pump—AC No. 577 (for 1539042).

Pressure—3½-5½ lbs.

See Carburetion Equipment Section for complete data.

Fuel Tank Filter: New Ollite metal filter in tank.

Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit—Auto-Lite NG-10896D (block lettering), No. NG-11238D (with script lettering).

Tank Unit—Auto-Lite No. NG-10862-T.

See Carburetion Equipment Section for complete data.

BATTERY

Willard Type WHT-2-17R. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—152 amperes for 20 minutes.
Zero Capacity—300 amperes for 5.0 minutes. Five second voltage 4.4 volts.
Grounded Terminal—Positive (+) to engine.
Dimensions—Length 10¼". Width 7". Height 9⅜".
Location—Under hood in left fender shield.

STARTER

Auto-Lite Model MAX-4050. Armature MAW-2030.
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 175 amperes, 5.4 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5300	5.5	65
2.75 "	1630	5.0	200
5.5 "	970	4.5	300
8.7 "	600	4.0	400
12.0 "	300	3.5	500
16.5 "	Lock	3.0	640
25.0 "	Lock	4.0	880

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).

Starting Switch: Auto-Lite Solenoid Type SS-4705 with pushbutton on instrument panel.

See Electrical Equipment Section for complete data.

GENERAT R

Std.—Auto-Lite GDZ-4801A. Armature GDZ-2006F.
Spec. Equip.—Auto-Lite GEG-4823A or GEG-4823B
Armature No. GEG-2006F (both).
Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.
SEE CHRYSLER 8 C39 PAGE FOR ALL DATA.

REGULAT R

Std.—VRP-4401A, VRP-4501A, or VRP-4503A. (VRP-4001A used on Canadian cars).
Spec. Equip.—VRP-4001F (for GEG-4823A), VRP-4401B (for GEG-4823B). VRP-4005E used for negative ground.
SEE CHRYSLER 8 C39 PAGE FOR ALL DATA.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. Beam selector switch on toeboard controls upper and lower beams.

See Electrical Equipment Section for complete data.

Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).

Beam Indicator—Lighted when Country (upper) beams in use. Located above center of speedometer face on early cars, in upper left corner of speedometer face on later cars.

Direction Signal: Two types used (see Indicators).

See Electrical Equipment Section for complete data.

Direction Signal Indicators—In upper edge of speedometer face. Early type has LEFT and RIGHT arrow. Later type use one jewel light in upper right corner only (left jewel light on these cars is High Beam Indicator).

Direction Signal Flasher—Chrysler No. 1161586.

Direction Signal Circuit Breaker—Chrysler No. 1161568.

Switches

Lighting—Chrysler No. 1163581.
Beam Selector—Chrysler No. 859974.
Instrument—Chrysler No. 1235694.
Map Light—Chrysler No. 1154278.
Stop Light—Chrysler No. 920355.
Hand Brakes—Chrysler No. 867077.
Dome Lamp Pillar—Chrysler No. 317180.
Door Switches—Chrysler No. 882943.
Direction Signal—Chrysler No. 1163984.

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Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	45-35 watts	Sealed Beam
Front Dir. Sig. & Parking	21-3	1158
Instrument	3	63
Clock, Glove Compt.	1½	55
Beam & Dir. Sig. Ind., Ign. Sw.	1	51
Rear Dir. Sig. & Tail	21-3	1158
Stop Light, Map Light	21	1129
Rear License	3	63
Dome①	15	87

①—Town & Country and Convertibles (Quarter Lights) 6 cp. No. 81. 7-Pass. (Pillar Lights) 3 cp. No. 63.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—On back of lighting switch. Vibrating type, protects lighting circuits.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects direction signal
Windshield Wiper—Vibrating, thermostatic type. Starts to operate with current of 12 amperes.

FUSES: Transmission Solenoid (Hydraulic Trans.)—30 ampere. Under transmission relay on left fender.
Clock—2 ampere. In clock lead wire.

HORNS: Auto-Lite Model HT-4007 (Low Pitch), HT-4008 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite Model HRL-4101. Connected through ignition switch, operates only with ignition "on".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" head. **Bore** 3 7/16". **Stroke**—4½".
Displacement—250.6 cu. ins. **Rated H.P.**—28.36.
Developed Horsepower—114 at 3600 RPM.
Compression Ratio—6.6-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Chrysler Shop Notes.*

ENGINE REMOVAL: *See Chrysler Shop Notes.*

TIGHTENING TORQUES: *See Chrysler Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Chrysler Shop Notes.*

PISTONS: Aluminum alloy, U-slot, cam ground type. NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See Chrysler Special Data.*
Length—3⅞". **Weight**—18.5 ozs. (stripped).
Clearance—.0008" on thrust face ¾" from bottom of skirt.
Removal—Pistons and rods removed from above.

Fitting New Pistons:—Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (inverted, pin removed) on side opposite slot. Feeler pull 5-7 lbs. (with piston and block at 70° F).

Replacement Pistons: *See "Pistons" in Chrysler Shop Notes.*
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3, 4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Rings: *See "Piston Rings" in Chrysler Shop Notes.*

PISTON PIN: Diameter 55/64". Length 2⅞". Floating type with locking ring at each end.
Pin Fit in Piston—Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—Tight thumb push fit at normal room temperature.

Replacement Pins: Standard size and .0006", .003", .008" oversize.

CONNECTING ROD: Length 7⅞". Weight 32.4 ozs. with bolts less bearings. NOTE—Piston pin hole (upper bearing) bronze bushed.
Crankpin Journal Diameter—2.124-2.125". *See "Original Bearing Sizes" in Chrysler Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps. *See "Connecting Rods & Bearings" in Chrysler Shop Notes.*

Replacement Bearings: *See "Connecting Rods & Bearings" in Chrysler Shop Notes.*

Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearings, 9 integral counterweights with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in Chrysler Special Data.*
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.001-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in Chrysler Shop Notes.*

Replacement Bearings: *See "Crankshaft and Main Bearings" in Chrysler Shop Notes.*

End Thrust:—Taken by flange faces on rear (#4) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Chrysler Shop Notes.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1¼".
Bearing Type—Removable steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

End Thrust:—Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Shop Notes.*

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal & Installation: *See Chrysler Special Data.*

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 23/32"	.3405-.3415"	4 25/32"
Exhaust	1 17/32"	.3395-.3405"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.002-.004"

Exhaust Valve Seat Insert Servicing—*See "Valve System" in Chrysler Shop Notes.*

Valve Guides:—Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (Tool CM-83), finish ream to .3425-.3435".

Valve Springs:—Install with closely coiled end to top.

Free length 2".	Spring Pressure	Length
Valve Closed	40- 45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters:—Mushroom type (remove from below). Stem diam. ⅜". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030" & .060".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance:—.008" Intake, .010" Exh. (hot and idling), .002" additional exh. clearance desirable for sustained high speeds. NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance #6 intake valve should open with #6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure through new Full-flow oil filter to main and connecting rod bearings, camshaft bearings, and timing chain. New "Rotor" type oil pump used.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—55-65 lbs. above 30 MPH. with warm oil. CAUTION—Pressure of 35-45 lbs. at driving speeds indicates oil filter may be clogged and should be replaced.
Oil Pressure Relief Valve—Under plug ahead of starter. Has new bleed duct which connects with new idle oil line to provide additional oil at idling speeds. Adjustable by replacing spring. 3 types: 1) Plain—unpainted. 2) Light—painted Red. 3) Heavy—painted Green. CAUTION—Install replacement spring of same color as original spring.

Oil Pump: New "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in Chrysler Shop Notes.*

Oil Filter: New "Full-flow" type. All oil under full pressure passes through filter before entering oil passage. Safety valve in filter opens if element is clogged allowing oil to pass directly to engine.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time. **Checking:** If oil pressure drops to 35-45 lbs. with warm oil, filter element may be clogged and should be replaced, to bring oil pressure to normal 55-65 lbs. above 30 MPH.

Oil Pressure Gauge: Auto-Lite G-10893 (block lettering), No. G-11235 (script lettering). Not electric.

C LING

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and water distribution tube in cylinder block behind pump.
Capacity—17 quarts.
Radiator Core Removal: *See "Radiator" in Chrysler Shop Notes.*
Water Distribution Tube Servicing: *See "Cooling System" in Chrysler Shop Notes.*
Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: By-pass type in cyl. head water outlet.
Setting—Starts to open 157-162°F. Fully open 183°F.
Temperature Gauge: Auto-Lite H-10895 (block lettering), No. H-11237 (script lettering). Not electric.

CLUTCH

Borg & Beck Models 10A7 (Std.), 9A7 (With Fluid Drive), 11A6 (Taxicab). Single plate, dry disc.
See Clutch Section for complete data.
Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) & have 1" free travel (adjusting nut on connector link at fork).
Clutch Over-Center Spring—*See "Clutch Notes" in Chrysler Shop Notes for setting procedure.*
Removal:—Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine. Optl.
See Transmission Section for complete data.
Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*
Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.
Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION

SYNCHRO-MESH

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
►*HARD SHIFTING CORRECTION—See "Chrysler, De Soto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*
Transmission Control: Manual steering col. shift.
See Transmission Section for complete data.
Removal:—Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see Chrysler Shop Notes for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods, vacuum and air hose (if Power Shift used). Remove trans.-to clutch housing capscrews and nuts. Pull unit to rear, down and out of car. NOTE—Use pilot studs when installing assembly.

TRANSMISSION

AUTOMATIC

Hydraulically Operated Type (with Fluid Drive). New design semi-automatic, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
Transmission Oil—3 pints, 10-W engine oil.
►**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Transmission Control: See Transmission article for adjustment instructions.
See Transmission Section for complete data.
Kickdown Solenoid—Auto-Lite No. SSS-4002.
Kickdown Relay—Auto-Lite No. HRM-4102.
Governor—Auto-Lite No. TG-4202R, 3R, or 4R.
Kick-down Switch—Part of carburetor assembly.
See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.
Ignition Interrupter Switch—On right side of transmission above Governor.
Fuse—30 ampere. On Kickdown Relay.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupt switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, replace drain plug. Disconnect transmission mounting bolts and lower assembly out of car.
INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 7200. Cross type with roller bearings.

Propeller Shaft Center Bearing: Used on 7 Passenger.
See "Propeller Shaft" in Chrysler Shop Notes.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Axle Ratio	Std. Trans.	Hydr. Trans.
All exc. T&C & 7 Pass.	3.9-1①	3.54-1②
T&C & 7 Pass.	4.3-1③	3.91-1④

①—Special Ratios: 4.1-1, 4.3-1 (Exp.), 4.56-1 (Exp.), 4.78-1 (Exp.).
②—Special Ratios: 3.9-1 (Exp.).
③—Special Ratios: 4.1-1, 4.56-1 & 4.89-1 (Exp.).
④—Special Ratios: 4.1-1 (Exp.).
Backlash—.006-.010". Screw adjustment.
Removal:—Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.
Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate)
Oil Seal Servicing—*See "Rear Axle" in Chrysler Shop Notes.*
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Delco—Model 1030-C (Front), 1030-T (Rear).
Monroe—Model K-11148 (Front), K-11149 (Rear).
Direct acting, hydraulic types.
Hydraulic Transverse Sway Absorber: Rear sway bar with built-in shock absorber used on Conv. Coupe, Town & Country, and 7 Passenger models.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6°.
Camber—Positive ¼°. Limits 0° to Pos. ¾°.
Caster—Negative 1° to Positive 1°. Not adjustable.
Toe In—0-1/16". Turn both tie rods equally.
Steering Geometry—Inner wheel 22½°. Outer 20°.

STEERING GEAR

Own Make. Similar to Gemmer models as follows:
All (except later Town & Country & 7 Pass.)—305.
7 Passenger and Town & Country (After Serial No. 71,000,965)—Model 335.
NOTE—See Gemmer 305 & 335 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic
See Brake Section for complete data.
►**Brake Squeek Correction**—*See "Chrysler Brakes" in Brake Section.*
Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).
Drums—Centrifuse. Diameter 11" (12" on Town & Country and 7 Passenger models).
Lining—Molded Asbestos. 2" wide. 13/64" thick. Length per shoe: 11" type—8⅞" (rear wheel rear shoe), 11½" (all others). 12" type—9⅝" (rear wheel rear shoe), 12 9/16" (all others).
Clearance—.006" at each end of all shoes.
Braking Power—60% front wheels, 40% rear.
Hand Brake: On drum at rear of transmission.
Adjustment—*See "Hand Brake Notes" in Chrysler Shop Notes.*
Drum—Cast-iron. 6" (7" on cars with Hydraulic trans. and all Town & Country and 7 Pass.).
Lining—Width 2" (2½" on 7" type). Thickness 5/32". Length 16 11/16" (20" on 7" type).
Clearance—.015-.020" around band.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWH-5001, EWH-5003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.
See Miscellaneous Section for complete data.
Circuit Breaker—Vibrating, thermostatic type.
CONVERTIBLE TOP CONTROL: Electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

STARTING SERIAL NUMBERS

	Saratoga	New Yorker	Town & Country	Crown Imperial
1946	6,765,001	7,025,001	7,400,001	7,810,001
1947	6,766,546	7,037,249	7,402,037	7,810,167
1948	6,768,486	7,062,598	7,405,174	7,810,908

Location—On left front door hinge post.

ENGINE NUMBER: Stamped on boss on left side of crankcase between #2 and #3 cylinders.

TUNE-UP

COMPRESSION: Pressure—125-135 lbs. at cranking speed of 150 RPM. for Std. 6.7-1 Cast Iron head.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUGS: Auto-Lite Type A5. 14 mm. Metric. Gaps—.030" ± .002".

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.018" Cam Angle—27° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.
Std. Setting—2° After top dead center.
Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with 2° graduation after DC mark at pointer on chain case cover, then set manual (octane selector) adjustment:
Manual (Octane Selector) Adjustment—Set for slight ping in 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ¾-1¼ turns open on Carter B&B), turn screw out for richer mixture. Idle speed 7-8 MPH. or 500 RPM (450-475 RPM. on cars with Hydraulic Transmission).
Float Level (Stromberg)—Fuel level ⅝" below top of bowl (even with bottom of inspection hole plug on left side of bowl with engine idling.
Float Level (Carter B&B)—Top of float (not soldered seam) 1/16" ± 1/64" below top edge of bowl. Accelerating Pump—Center Hole (med. stroke) Normal. Inner Hole—Summer. Outer Hole—Winter. Center hole not used on Stromberg Carburetors.
Fuel Pump Pressure—3½-5½ lbs

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approx. 1¼ turns, not over 1½ turns or under 1 turn, hook end over stop stud.

VALVES: See Valve Timing.
Tappet Clearance—.008" Intake, .010" Exhaust, Hot
NOTE—Tappet adjusting screws are self-locking (no locknuts).

STARTING: See Battery, Starter, Generator, and Regulator.

IGNITION

IGNITION SWITCH: Briggs & Stratton or Mitchellock. NOTE—No armored cable used.
Briggs & Stratton—B & S Switch No. 85985.
Mitchellock Type 42-R—No. E-10182 (Yale & Towne lock), No. E-10663 (Hurd lock).
Lock Cylinder—Yale & Towne, Hurd, or Briggs & Stratton. B & S No. 85915 (Key Series CA1-CA800) or No. 80592 on Early cars (Key Series 1BP-1000BP).

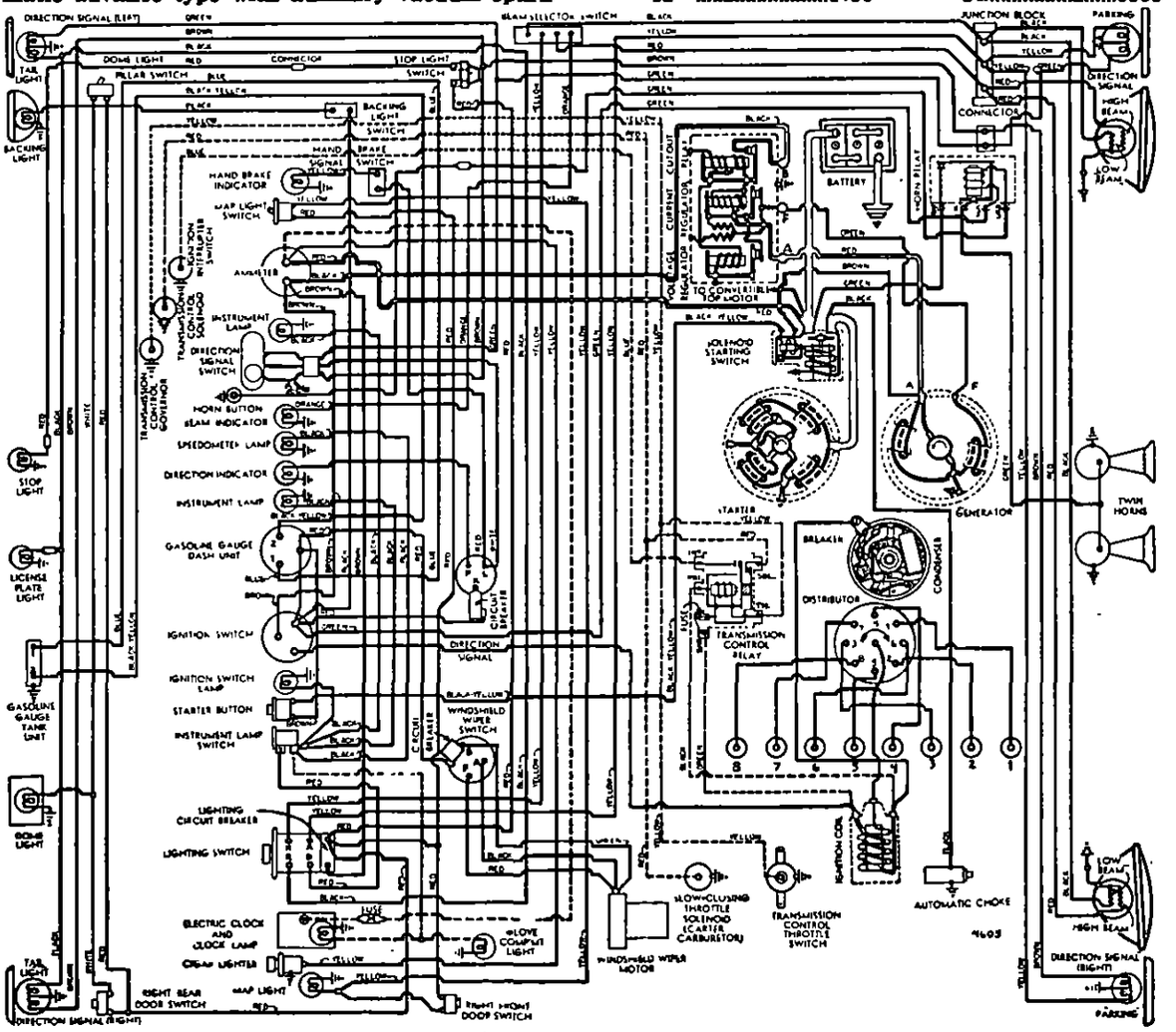
COIL: Auto-Lite CE-4030 or CE-4034. Mounted directly above distributor on ignition cable bracket.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-3927.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IGT-4201-1. Full automatic advance type with auxiliary vacuum spark control and manual (Octane Selector) adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #8.
Breaker Gap—Set at .018." Limits .015-.019".
Cam Angle—27° closed, 18° open (.017" gap).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from the top.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	350	0	700
3	400	6	800
6	850	12	1700
9	1300	18	2600
12	1750	24	3500



CHRYSLER 8 MODEL C39

Vacuum Spark Control: Auto-Lite Unit. On distributor, linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring in unit).

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
	Vacuum Advance	
Start	0°	5"
2°	4°	8"
4°	8°	11"
6°	12°	14"
8°	16°	17"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing

Distributor Removal:—Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position and rotor opposite #1 segment in cap.

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

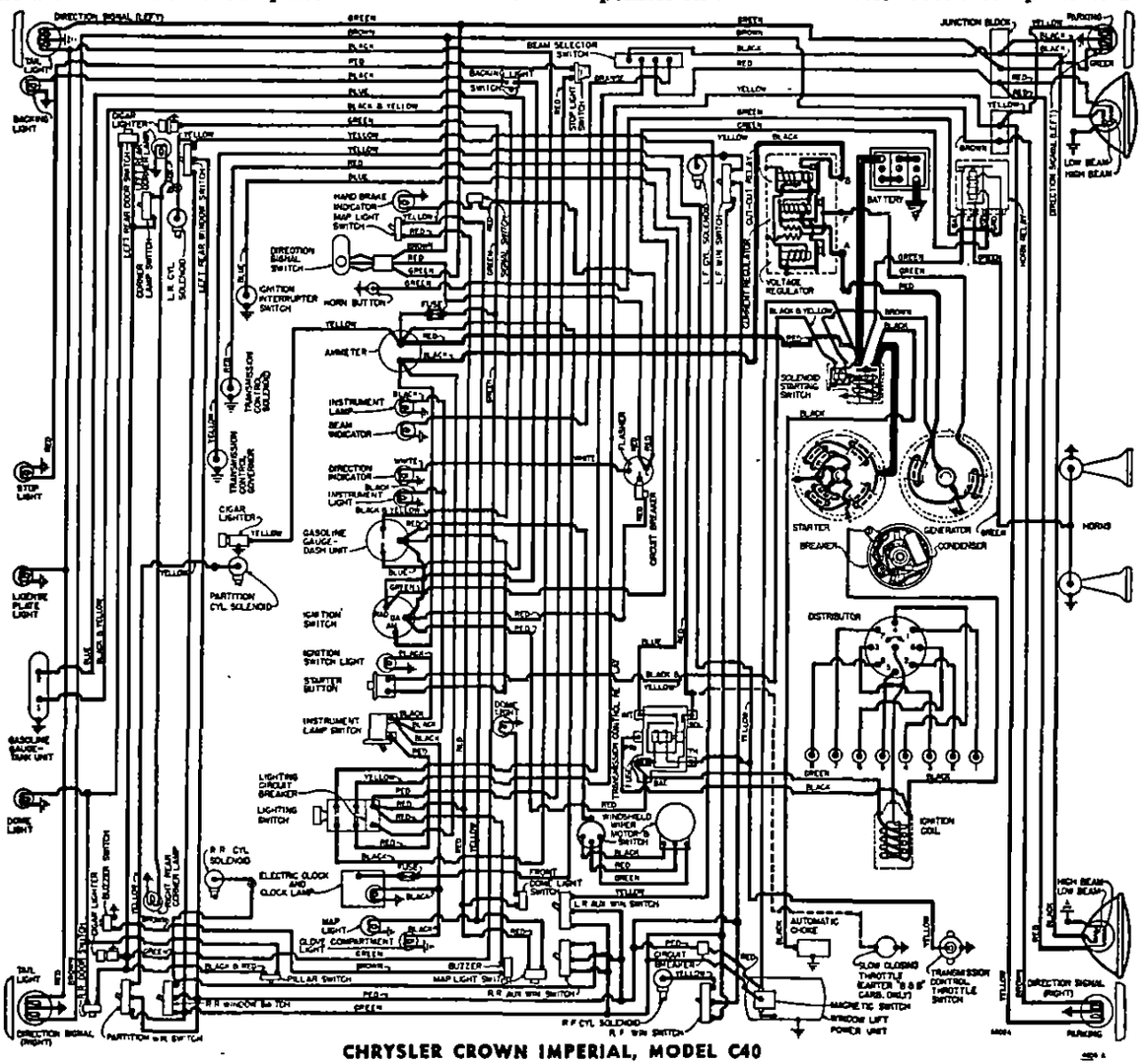
	Flywheel Degrees	Piston Position
All Engines	2° ATDC	.002" ATDC

NOTE—Impulse neutralizer marked at TDC with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #8 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt.

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor (as above)

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise to retard spark (if too severe).



CHRYSLER CROWN IMPERIAL, MODEL C40

CARBURETOR

STROMBERG

Stromberg Model AAVS-2. Two types as follows:
1)—Square Air Horn. Stromberg No. 380165 marked with Code No. 4-111. Chrysler No. 1072857.
2)—Round Air Horn. Stromberg No. 380169 marked with Code No. 4-112. Chrysler No. 1122911.
Type—1¼" dual (double barrel) downdraft type with new single idle adjusting screw. NOTE—Cars with Fluid Drive have Throttle Guard and Transmission Kick-down Switch (part of carburetor). *See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up Data.*
Metering Jet—*See Stromberg Jet Table in Carburetor Section for complete jet data.*

Fast Idle (Stromberg): Rotary cam, adjustable type. *See Carburetion Equipment Section for complete data.* **Setting**—Adjust connector rod so choke valve ⅛" open with fast idle screw against first step on cam.

Automatic Choke:—Sisson Type AC-600. *See Carburetion Equipment Section for complete data.* **Setting**—Remove air cleaner and choke cover. Line up hole in armature and magnet core with shank end of ⅛" drill, holding armature tight against magnet (Tool AC-620 available for use in place of drill). Loosen automatic choke lever clampscrew. Hold throttle open approx. 1/3 open, move choke lever to close choke valve tight, tighten clampscrew.

Throttle Guard (on cars with Stromberg Carburetors): Vacuum operated throttle kicker. *See Carburetion Equipment Section for complete data.* **Setting**—.010" clearance between throttle valve lever adjusting screw and throttle control plunger with engine idling at correct hot or slow idling speed.

CARTER (B&B)

Carter (B&B) Model E7A1. 1½" single barrel, downdraft type with Slow-closing Throttle and Kick-down Switch for Hydraulic Transmission. *See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up Data.*
Metering Jet—*See Carburetor Section for Carter (B&B) Downdraft Carburetor Jet Specification Table.*

Fast Idle (Carter B&B): Throttle stopscrew stop dog linked to choke valve so that stop dog rotated and throttle opened to fast idle position when choke valve closed for starting. No adjustment required.

Automatic Choke: Sisson Type AC-600. See data under Stromberg Carburetor (above).

Slow-Closing Throttle (on Carter B&B Carburetors): Electro-magnetic dashpot type. No adjustment. *See Carburetion Equipment Section for complete data.*

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CARB. EQUIPMENT

Air Cleaner: AC No. 1543852 Heavy Duty oil-bath type. Filter Element AC No. 13.
Servicing—Clean filter element in kerosene, clean out oil reservoir and fill to indicated level with SAE No. 50 oil (20W oil below 32°F., approx. 1 pint required). Service cleaner whenever sump half-filled with oil and dust sludge. NOTE—Crankcase ventilator air cleaner in oil filler cap should be cleaned in kerosene and re-oiled by dipping in SAE No. 50 engine oil at 1000 mile intervals.

Fuel Pump: AC No. 1539215. Diaphragm type.
Replacement Pump—AC No. 514 or 590.
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: New Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—Auto-Lite NG-10896D (block lettering), No. NG-11238D (with script lettering).
Tank Unit—Auto-Lite No. NG-9330-T.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type CF-2-19R. 6 volt, 19 plate, 135 Ampere Hour Capacity (20 hour rate).
Starting Capacity—170 amperes for 20 minutes.
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

Auto-Lite Model MAX-4050. Armature MAW-2030.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM., 175 amperes, 5.4 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5300	5.5	65
2.75 "	1630	5.0	200
8.7 "	600	4.0	400
16.5 "	Lock	3.0	640

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).
Starting Switch: Auto-Lite Solenoid Type SS-4705 with pushbutton on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

C-39—Auto-Lite GDZ-4801A. Armature GDZ-2006F.
C-38 & C-39 Spec. Equip.—Auto-Lite GEG-4823-A or GEG-4823B. Armature No. GEG-2006F (both).
C-40—Auto-Lite GEG-4823-1. Armature GEG-2006F.
Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes (C39 GDZ Gen.), 8.0 volts, 2200 Gen. RPM or approx. 26 MPH, 40 amperes (C40 GEG Gen.), 8.0 volts, 1700 Gen. RPM or approx. 24 MPH and above with load or discharged battery (Current Regulator setting).

Performance Data—GDZ-4801A

Cold Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
10	6.85	1200	10	6.85	1290
20	7.3	1480	20	7.3	1590
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

Performance Data—GEG-4823

0	6.4	780	0	6.4	820
10	6.8	960	10	6.8	990
20	7.2	1130	20	7.2	1170
30	7.6	1310	30	7.6	1380
40①	8.0	1520	40	8.0	1680

①—Current regulator setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ounces max. (GDZ Gen.), 64-68 ozs. (GEG Gen.) with new brushes.
Field Current—1.60-1.78 amperes at 6.0 volts (all).
Motoring Current—4.16-4.60 amps. (for GDZ Gen.), 4.7-5.2 amperes (GEG Gen.) at 6.0 volts.
Removal:—Pivot mounted at left side of engine at front. To remove, take out pivot and clamp bolts.
Belt Adjustment:—Loosen pivot and clamp bolts, pull out on generator until belt is snug or 40-50 lbs. tension secured on scale attached to field frame

REGULATOR

C-39—VRP-4401A, VRP-4501A, VRP-4503A (for GDZ Generator), VRP-4001F (for GEG-4823A Gen.), VRP-4401B (for GEG-4823B Gen.). VRP-4005E for negative ground.
C-40—Auto-Lite VRP-4001F (for GEG Generator). Vibrating type Voltage and Current Regulators in case with Cutout Relay.
NOTE—VRP-4001A settings same as for VRP-4401A.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70° F. See Electrical Equipment Section for settings at other temperatures.
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal (use short heavy leads), voltmeter between 'B' terminal and ground. Operate generator at speed equivalent to 30 MPH., charging fully charged battery, until voltage is steady. Voltage reading should agree with setting given above.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting (VRP-4001A, 4401A)—34-36 amperes ("35").
Setting (VRP-4001F, 4005E, 4401B)—39-41 amperes, marked "40".
Setting (VRP-4501A, 4503A)—35 amperes (42 amperes at 70°F. after 15 minutes run, 33-37 amperes at 70° after additional 15 minutes run). CAUTION—These current regulators are temperature-compensated and setting decreases with temperature rise in service as above.
To Check (without breaking seals)—Connect test meters as for voltage check (above). Operate generator at speed equivalent to 30 MPH. charging battery, turn on car lights and accessories or connect load (bank of headlamp bulbs etc.) between ammeter and battery so that generator charges at peak rate and Current Regulator operates. Current reading should agree with setting given above. If more than slight excess noted, regulator is defective.
To Adjust (with cover removed)—Same as for Voltage Regulator (above).
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. Beam selector switch on toeboard controls upper and lower beams.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—Lighted when Country (upper) beams in use. Located above center of speedometer face on early cars, in upper left corner of speedometer face on later cars.

Direction Signal: Two types used (see Indicators).
See Electrical Equipment Section for complete data.
Direction Signal Indicators—In upper edge of speedometer face. Early type has LEFT and RIGHT arrow. Later type use one jewel light in upper right corner only. (Left jewel light on these cars is High Beam Indicator).
Direction Signal Flasher—Chrysler No. 1161586.
Direction Signal Circuit Breaker—Chrysler No. 1161568.

Switches

Lighting—Chrysler No. 1163581.
Beam Selector—Chrysler No. 859974.
Instrument—Chrysler No. 1235694.
Map Light—Chrysler 1154278 (C39), 1232660 (C40).
Stop Light—Chrysler No. 920355.
Hand Brakes—Chrysler No. 867077.
Dome Lamp Pillar—Chrysler No. 317180.
Door Switches—Chrysler No. 882943.
Direction Signal—Chrysler No. 1163984.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—On back of lighting switch. Vibrating type, protects lighting circuits.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects dir. signal circuit.
Windshield Wiper—Vibrating, thermostatic type. Starts to operate with current of 12 amperes.
Window Lift (C40)—Mounted on dash alongside Window Lift Motor.
Convertible Top—Mounted near control switch. Thermostatic type. Opens at 80 amperes in 1 minute
FUSES: Transmission Solenoid (Hydraulic Trans.)—30 ampere. Under transmission relay on left fender.
Clock—3 ampere. In clock lead.
Body Wiring (C40)—30 amp. Near ammeter.
HORNS: Auto-Lite Model HT-4007 (Low Pitch), HT-4008 (High Pitch). Dual horns operated by relay.
Horn Relay: Auto-Lite Model HRL-4101. Connected through ignition switch, operates only with ignition "on".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed). .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.
Bore—3¼". **Stroke**—4⅞".
Displacement—323.5 cu. ins. **Rated H. P.**—33.80.
Developed Horsepower—135 at 3400 RPM.
Compression Ratio—6.7-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Chrysler Shop Notes.*

ENGINE REMOVAL: *See Chrysler Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Chrysler Shop Notes.*

PISTONS: Aluminum alloy, U-slot, cam ground type.
NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See Chrysler Special Data.*
Length—3⅞". **Weight**—16.5 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—.0008" on thrust face ¾" from bottom of skirt.

Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses) ¾" from bottom of skirt. Fit piston in bore using .002" x ½" feeler, *insert piston upside down* in bore with feeler 90° from pin bosses on side opposite slot. Clearance correct when 5-7 lbs. pull required to withdraw feeler at 70° F.
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Replacement Pistons: *See "Pistons" in Chrysler Shop Notes.*

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Rings	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3, 4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Rings: *See "Piston Rings" in Chrysler Shop Notes.*

PISTON PIN: Diameter 55/64", Length 2¾". Floating type with locking ring at each end.
Pin Fit in Piston—Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—Tight thumb push fit at normal room temperature.

Replacement Pins: Standard size and .0006", .003", .008" oversize.

CONNECTING ROD: Length—9".
Crankpin Journal Diameter—2.1865-2.1875". *See "Original Bearing Sizes" in Chrysler Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015". Sideplay—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps. *See "Connecting Rods & Bearings" in Chrysler Shop Notes.*

Replacement Bearings: *See "Connecting Rods & Bearings" in Chrysler Shop Notes.*

Installing Rods: Offset type. Wide side of bearing to rear for #1, 3, 5, 7; to front for #2, 4, 6, 8. Oil spray hole in rod toward camshaft on all rods.

CRANKSHAFT: 5 bearings, 8 integral counterweights with vibration dampener on front end.
Journal Diameters—2.7025-2.7035". *See "Original Bearing Sizes" in Chrysler Special Data.*
Bearings—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.001-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in Chrysler Shop Notes.*

End Thrust: Taken by flange faces on rear (#5) main bearing. Endplay—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Chrysler Shop Notes.*

CAMSHAFT: 6 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2 1/16"; #2, 2 1/32"; #3, 2"; #4, 1 31/32"; #5, 1 15/16"; #6, 1⅜".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #6—machined in crankcase).
Clearance—.001-.003" (#1), .0015-.0035" (all others).
NOTE—Replacement bearings are finished (reaming, scraping, or burnishing not required).

End Thrust: Taken by thrust plate behind camshaft sprocket hub. Endplay—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Shop Notes.*

Timing Chain: Width 1¼". Pitch .500" (½"). Length 23½" or 47 links.
Timing Chain Removal & Installation—*See Chrysler Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that "O" marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	5⅞
Exhaust	1 11/32"	.3395-.3405"	5⅞"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.0015-.0035"
Exhaust	45°	⅜"	.002-.004"

Exhaust Valve Seat Insert Servicing—*See "Valve System" in Chrysler Shop Notes.*

Valve Guides: Remove from above. Press new guides in with stepped end down and upper end 1" (Intake), 1 3/32" (Exhaust), below top of block. Ream guides to inside diameter of .3425-.3435" (Tool DD-849). Exhaust guides counterbored on upper end.

Valve Springs: Install springs with close-coil end to top. Spring Free Length 2".

	Spring Pressure	Spring Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅝". Service by reaming lifter holes (work from above piloting reamer Tool C-265 in valve guide) and installing oversize lifters. Clearance—.000-.001".
Replacement Lifters—.001", .008", .030", .060" oversize.

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot. Additional .002" Exhaust clearance recommended for sustained high speed driving. Self-locking tappet screws used. NOTE—Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #8 intake valve should open with #8 piston 5° to 17° or .012" to .135" BTDC. with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to .008" Hot running clearance.

LUBRICATION

Engine Oiling System: Pressure through new Full-flow oil filter to main and connecting rod bearings, camshaft bearings, and timing chain.
Crankcase Capacity—6 quarts (refill).
Normal Oil Pressure—55-65 lbs. above 30 MPH. with warm oil. CAUTION—Pressure of 35-45 lbs. at driving speeds indicates oil filter may be clogged.
Oil Pressure Relief Valve—Under cap on lower left side of crankcase. Has new bleed duct which connects with new idle oil passage to provide additional oil at idling speeds. Valve has screw adjustment but seldom requires changing. Opens at 40-45 lbs.

Oil Pump: "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in Chrysler Shop Notes.*

Oil Filter: New "Full-flow" type. All oil under full pressure passes through filter before entering oil passage. Safety valve in filter opens if element is clogged allowing oil to pass directly to engine.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time. **Checking:** If oil pressure drops to 35-45 lbs. with warm oil, filter element may be clogged and should be replaced, to bring oil pressure to normal 55-65 lbs. above 30 MPH.

Oil Pressure Gauge: Auto-Lite G-10893 (block lettering), No. G-11235 (script lettering). Not electric.

COOLIN

Cooling System: Pressure type with pressure valve (relief valve) in filler cap, by-pass type thermostat, and water distribution tube in block.
Capacity—26 quarts.
Pressure Valve—In filler cap. Opens at 3 lbs.

Radiator Core Removal: *See "Radiator" in Chrysler Shop Notes.*

Water Distribution Tube Servicing: *See "Cooling System" in Chrysler Shop Notes.*

Water Pump: Packless type with shaft mounted on 2 ball bearings with lubricant fitting for bearing lubrication and grease nipple for seal lubrication. *See Water Pump Section for complete data.*
Removal—Drain cooling system. Remove fan blade assembly, fan belt, by-pass hose and elbow, inlet hose, pump mounting capscrews. Take pump off.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet.
Setting—Starts to open 157-162°F. Fully open 183°F.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, 2 ports to rear. Some thermostats equipped with heavy shield welded on bottom (for bellows protection at high speeds), this type thermostat cannot be installed on earlier cars.

Temperature Gauge: Auto-Lite H-10895 (block lettering), No. H-11237 (script lettering). Not electric.

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CLUTCH

Borg & Beck Model 10A6 with "Borglite" driven member. Single plate, dry disc type. NOTE—Cover Assembly No. 961 stamped on cover.
See Clutch Section for complete data.
Facings—Woven type, 2 used. Inside Diameter 6". Outside Diameter 10". Thickness .125" (⅛").
Pedal Adjustment: Set pedal to just clear toeboard by loosening locknut and turning stopscrew at lower end of pedal arm above shaft. Set pedal for 1" free travel by turning clutch release fork adjusting nut on connector link at clutch release fork.
CAUTION—Do not disturb turnbuckle on pedal link (controls pedal over-center spring tension).
Clutch Over-Center Spring—*See "Clutch Notes" in Chrysler Shop Notes for setting procedure.*
Removal: Remove Transmission (see TRANSMISSION). Remove clutch housing underpan and clutch release bearing and sleeve. Mark clutch and fluid drive clutch driving plate for re-assembly. Remove all clutch cover mounting screws evenly, lower cover and driven member out through opening in housing.

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine.
See Transmission Section for complete data.
Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*
Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.
Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION
SYNCHRO-MESH

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
▷*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*
Transmission Control: Manual steering col. shift.
See Transmission Section for complete data.
Removal: Jack up front end of car. Disconnect front universal (loosen companion flange nut if transmission to be dismantled). Disconnect speedometer cable, hand brake cable at brake band, gearshift control rod and selector rod at transmission. Remove transmission mounting screws and nuts at clutch housing, pull transmission straight back to free clutch shaft, and lower assembly out of car.

TRANSMISSION
AUTOMATIC

Hydraulically Operated Type (with Fluid Drive). New design semi-automatic, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
▷**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Transmission Control: *See Transmission Section.*
Kickdown Solenoid—Auto-Lite No. SSS-4002.
Kickdown Relay—Auto-Lite No. HRM-4102.
Governor—Auto-Lite No. TG-4202R, 3R, or 4R.
Kick-down Switch—Part of carburetor assembly.
See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.
Ignition Interrupter Switch—On right side of transmission above Governor.
Fuse—30 ampere. On Kickdown Relay.
Transmission Oil—3 pints, 10-W engine oil.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.
INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 7300. Cross type with roller bearings. Two used (3 with center bearing on 7 Pass.).

Propeller Shaft Center Bearing: Used on 7 Passenger.
See "Propeller Shaft" in Chrysler Shop Notes.

REAR AXLE
MODEL C39

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.
Ratio (Std. Trans.)—3.9-1 Std.; 4.3-1, 4.56-1, 4.89-1 Special Equip.
Ratio (Hydr. Trans.)—3.36-1 Std.; 3.9-1 (Spec. Exp.), 4.1-1 (Spec. Exp.).
Backlash—.006-.010". **Screw adjustment.**
Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.
Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle" in Chrysler Shop Notes.*
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

REAR AXLE
MODEL C40

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive. Barrel type differential with adjustable ring gear thrust pad used.
See Rear Axle Section for complete data.
Ratio—3.58-1.
Ring Gear Thrust Pad Setting—Loosen locknut on left side of carrier housing, tighten thrust pad screw finger tight, back screw off ⅛ turn, tighten locknut.
ALL OTHER DATA SAME AS FOR C39 REAR AXLE

SHOCK ABSORBERS

C39 (Delco)—Model 1030-C (Front), 1030-T (Rear).
C39 (Monroe)—K-11148 (Front), K-11149 (Rear).
C40—Delco Model 942-D (Front), 940-W (Rear).
Direct acting, hydraulic types.
Hydraulic Transverse Sway Absorber: Rear sway bar with built-in shock absorber used on all models.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6°.
Camber—Positive ¼°. Limits 0° to Pos. ¾°.
Caster—Negative 1° to Positive 1°. Not adjustable.
Toe In—0-1/16". Turn both tie rods equally.
NOTE—Turn clamp bolt beneath tie rod on left end of long rod for clearance on extreme turns.
Steering Geometry—Inner wheel 22½°. Outer 20°.

STEERING GEAR

Own Make. (Gemmer design) Model 335 "3-tooth" type worm-and-roller with "push-pull" adjustment.
NOTE—See Gemmer 335 steering gear article.
See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic
See Brake Section for complete data.
▷**Brake Squeek Correction**—*See "Chrysler Brakes" in Brake Section.*
Wheel Cylinders—1¼" bore (front wheel front shoe—top cylinder), 1⅛" bore (all others). Single acting (front), double acting (rear wheels).
Drums—Centrifuse. Diameter 12".
Lining—Moulded asbestos. Width 2". Thickness 13/64". Length 9⅝" (rear wheel rear shoe), 12 9/16" (all other shoes).
Clearance—.006" at each end of all shoes.
Braking Power—60% front wheels, 40% rear.
Power Brake Unit (C40): New diaphragm type with internal valve.
See Brake Section for complete data.
Hand Brake: On drum at rear of transmission.
Adjustment—*See "Hand Brake Notes" in Chrysler Shop Notes.*
Drum—Cast-iron. Diameter 7".
Lining—Molded asbestos. Width 2½". Thickness 5/32". Length 20".

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWH-5001, EWH-5003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.
See Miscellaneous Section for complete data.
CONVERTIBLE TOP CONTROL: Electric type.
See Miscellaneous Section for complete data.
WINDOW REGULATORS (C40): Hydro-electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATI N

SERIAL NUMBER: On left front door hinge post.

1949 Numbers	Detroit	Los Angeles
Royal	70,041, Up	65,002,001 Up
Windsor	70,725,001 Up	67,005,001 Up

TUNE-UP

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 1 and 2 cylinders.

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035". Limits plus or minus .001". **Plugs**—Auto-Lite Resistor Type AR5, 14 mm.

DISTRIBUTOR: Breaker Gap—.020".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC).
Timing Procedure—*See Ignition Timing.*
Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual (octane selector) adjustment.
Manual (Octane Selector) Adjustment—Set for slight ping with 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION:
Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ½-1½ turns open), turn screw out for richer mixture.
Idle Speed—6 MPH. (450-475 Eng. RPM. with Hyd. Trans.).
Float Level—Top of float (not soldered seam) 5/64", plus or minus 1/64", below top edge of bowl.
Accelerating Pump—Center Hole (med. stroke) Normal. Inner Hole—Summer, Outer Hole—Winter.

Choke Setting: Adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Thermostatic type. Wind free end ¾ turn to install.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust, Hot.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable through fire wall.

COIL: Auto-Lite No. CR-4001 (U.S.), IG-4809 (Early & Canada). On bracket above distributor.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IG-3927G.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAP-4102C-1 (U.S.), IAP-4102B-1 (Canada). Automatic advance type with Vacuum Spark Control.

►***DISTRIBUTOR CAP POPPING OFF CORRECTION (Early IAP Distributors)—See "IAP" Distributors in Electrical Equipment Section.***

Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #9.
Breaker Gap—.020".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAP-4102B-1

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
3	400	6	800
6	780	12	1560
9	1160	18	2320
12	1530	24	3060

Automatic Advance—IAP-4102C-1

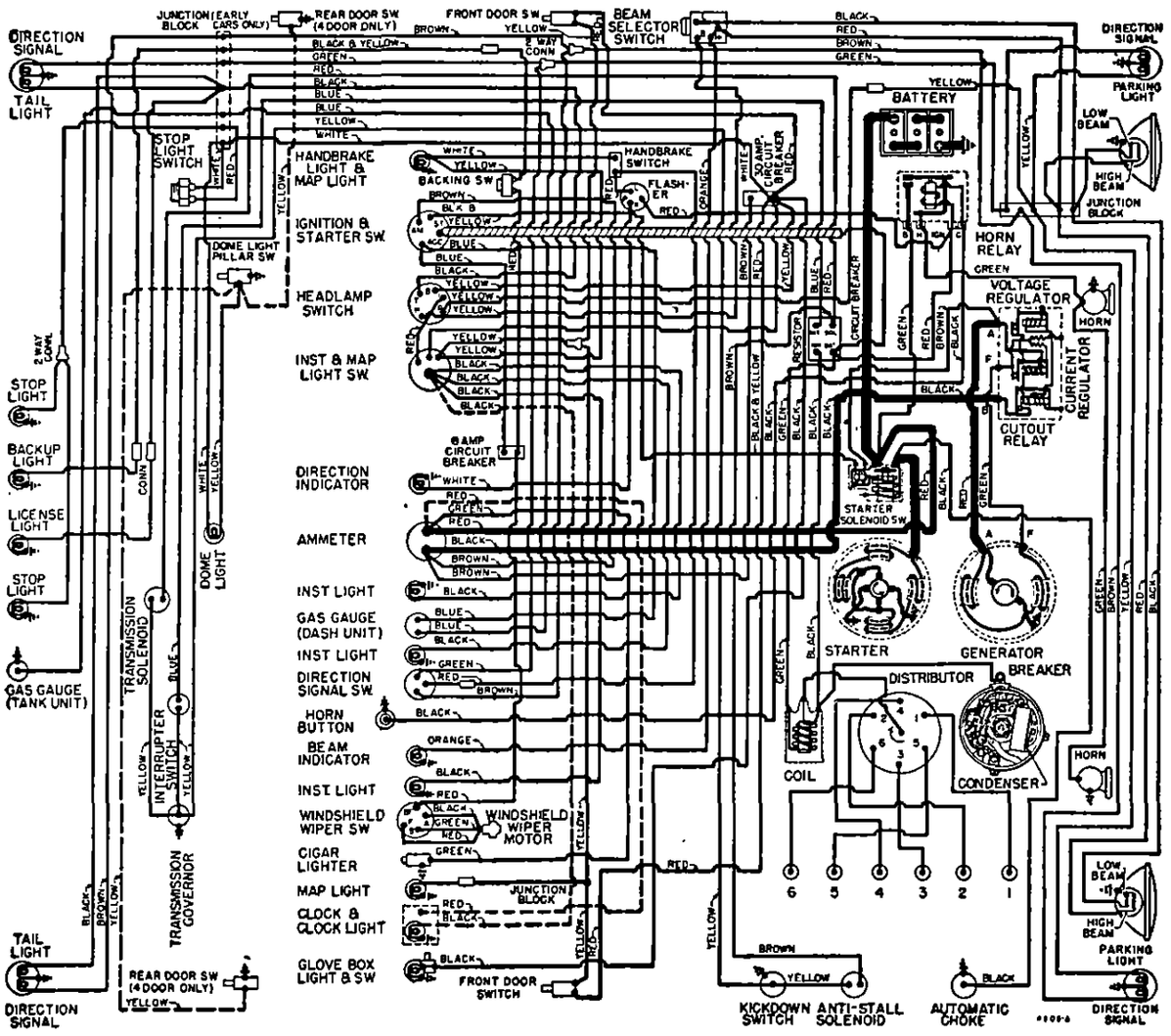
Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite Unit. Integral type (on distributor, linked directly to breaker plate).

Vacuum Advance—IAP-4102B-1 & 4102C-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG
Start	0°	5"
2°	4°	7¼"
4°	8°	9⅜"
6°	12°	11⅝"
9°	18°	15"

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Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing.

Distributor Removal: Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position.

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	At TDC	.000" TDC.

This setting supersedes previous data.

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor as directed above.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move the plate (not more than 4° before or after initial setting) counter-clockwise (if no ping noted), clockwise to retard spark (if ping too severe), tighten screw.

CARBURETOR

Carter (B&B) E7L1, L2, L3, or E7L4. 1½" Single barrel, downdraft type with Sisson automatic choke control, Slow-closing Throttle and Step-down Switch for hydraulically operated transmission.

Carter (B&B) EX3. 1½" Single barrel downdraft type with Sisson automatic choke control. Used on synchro-mesh cars.

See Carburetor Section for complete data.

▷**E7L1, L2 L3 Note**—*To bring these carburetors up to latest E7L4 carburetor, see Carter (B&B) Carburetors in Carburetor Section.*

Settings (Idle, Choke, Float Level and Accelerating Pump): *See Tune-Up Data.*

Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*

Slow-closing Throttle: Solenoid type. Non-adjustable. *See Carburetion Equipment Section for complete data.*

Fast Idle: No adjustment required.

Automatic Choke: Sisson type. *See Carburetion Equipment Section for complete data.*

CARB. EQUIPMENT

Air Cleaner: AC No. 1544349 Heavy Duty Oil-bath type. Filter Element AC No. 21.

Fuel Pump: AC No. 1539042 or Carter M639SL, M639SZ. Diaphragm type fuel pump.

Replacement Pump—AC No. 577 or 588.

Pressure—3½-5½ lbs.

See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oillite metal filter in tank.

Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit—Auto-Lite No. 11821A.

Tank Unit—Auto-Lite No. 11538A.

See Carburetion Equipment Section for complete data.

BATTERY

Willard or Auto-Lite—17 Plate, 6 Volt, 120 Ampere Hour Capacity (20 hour rate).

Starting Capacity—152 amperes for 20 minutes.

Grounded Terminal—Positive (+) to engine.

Location—Under hood in left fender shield.

STARTER

Auto-Lite Models MCL-6101 (US), MAX-4090 (Canada after Eng. Nos. C45-1-1268C and C45-2-1619C). Armature—Auto-Lite Nos. MCH-2039 (MCL-6101), **MAW-2213** (MAX-4090).

Drive—Solenoid pinion shift & overrunning clutch.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid Type SS-4707 controlled by turning ignition switch past "on" position.

See Electrical Equipment Section for complete data.

GENERATOR

	Auto-Lite No.	Armature No.
Standard	GGW-6001A	GGW-2006F
Early Cars	GDZ-4801R	GDZ-2006F
State Police	GGJ-6001B	GGJ-2101F
	GGU-6001E	GGU-2006F
City Police & Taxi	GGJ-6001A	GGJ-2101F
Auto Trans. Cars	GGU-6001A	GGU-2006F

Two brush type current-voltage regulators.

Maximum Charging Rate—See table below.

Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001A)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350

Performance Data (GDZ-4801R)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
35	8.0	1800-2000 — 2150-2350

Performance Data (GGJ-6001A, B)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750

Performance Data (GGU-6001A, E)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850

Rotation—Counterclockwise at commutator end.

Brush Spring Tension—(GGW, GDZ, GGU) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes).

Field Current—(GGW, GDZ) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes, (GGU) 1.7-1.8 amperes, all at 6.0 volts.

Motoring Current—(GGW) 4.6-5.2 amps., (GDZ) 4.2-4.6 amps., (GGJ) 4.3-4.8 amps., (GGU) 5.5-6.5 amps., all at 6.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs. tension secured on scale attached to field frame) or ¼" belt deflection between generator and pump.

REGULATOR

Auto-Lite Regulator No.	for Auto-Lite Generator
VRP-4503B, VRP-6004A	GGW-6001A
VRP-4503A	GDZ-4801R
①**VBA-4101A or VAV-4404A**	GGJ-6001A, B
②**VBA-4101B**	GGU-6001A, E

①—VBA-4104A for negative ground.

②—VAV-4404B (Early Cars), VBA-4104B (Neg. Gd.).

See Electrical Equipment Section for complete data.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In (VAV)—6.4-6.9 volts. **(VBA, VRP)** 6.3-6.8 volts. Set to 6.4-6.6 volts.

Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. dis.)

Contact Gap (All)—.015" minimum.

Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (VAV & VRP-4503A, 3B)—7.2-7.5 volts, **(VRP-6004A)** 7.1-7.4 volts, **(VBA)** 7.0-7.2 volts, all at 70°F. while charging at ½ max. rate (VAV), 10 amperes (VBA & VRP).

Air Gap (All)—.048-.052" with contacts just opening.

Checking (without breaking seals) & Adjustment: *See Electrical Equipment Section.*

Current Regulator

▷*CAUTION—"Temperature compensated" type. Set to following specifications at 70° F.*

	Test A—Operating Amperes	Test B
VAV-4404A	55	48-52
VAV-4404B	50	43-47
VBA-4101A	56	48-52
VBA-4101B, 4B	51	43-47
VRP-4503A	42	33-37
VRP-4503B, 6004A	46	38-42

Test A—After 15 minutes charging at ½ maximum rate (VAV), 10 amperes (VBA & VRP).

Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV), 6.7-7.0 volts (VRP), 6.7 volts (VBA).

Air Gap (All)—.048-.052" with contacts just opening.

Checking (without breaking seals) & Adjustment: *See Electrical Equipment Section.*

LIGHTING

Headlamps: Sealed Beam. *See Electrical Equipment Section.*

Direction Signal: *See Electrical Equipment Section.*

Direction Signal Flasher—Chrysler No. 1257223.

Switches

Lighting—Chrysler No. 1300601.

Beam Selector—Chrysler No. 1253460.

Map Light—Chrysler No. 1244605.

Direction Signal—Chrysler No. 1235606.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—On back of lighting switch. Vibrating type, protects lighting circuits.

Direction Signal—On flasher behind instrument panel. Vibrating type. Protects direction signal.

Auxiliary Circuit Breaker—8 ampere. Protects the Windshield Wipers and Back-up Light.

Transmission Solenoid—Vibrating type mounted as an assembly with resistor unit.

FUSES: Clock—2 ampere. In clock lead.
Clock—2 ampere. In clock lead wire.

HORNS: Auto-Lite Models HT-4011 or HW-4201 (Low Pitch), HT-4012 or HW-4202 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite Models HRL-4103 or 4104. Connected through ignition switch, operates only when ignition "on."
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" head.
Bore—3 7/16". **Stroke**—4½".
Displacement—250.6 cu. ins. **Rated H.P.**—28.36.
Developed Horsepower—116 at 3600 RPM.
Compression Ratio—7.0-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN & ENGINE REMOVAL: *See Chrysler Special Data.*

TIGHTENING TORQUES: *See Chrysler Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Chrysler Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type. NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0002-.0012" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See Chrysler Special Data.*
Length—3⅞". **Weight**—18.5 ozs. (stripped).
Clearance—.0008" on thrust face ¾" from bottom of skirt.
Removal—Pistons and rods removed from above.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (inverted, pin removed) on side opposite slot. Feeler pull 5-7 lbs. (with piston and block at 70°F.).

Replacement Pistons: .005", .020", .030", .040", .060" OS. *See "Pistons" in Chrysler Special Data.*
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS. *See "Piston Rings" in Chrysler Special Data.*

PISTON PIN: Diameter—55/64". **Length**—2⅞". Floating type with locking ring at each end.
Pin Fit in Piston—.0000" to .0005". Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at normal room temperature.

Replacement Pins: Standard size and .0006", .003", .008" Oversize.

CONNECTING ROD: Length—7⅞". **Weight**—32.4 ozs. with bolts less bearings. NOTE—Piston pin hole (upper bearing) bronze bushed.
Crankpin Journal Diameter—2.124-2.125".

Original Bearing Sizes: *See Chrysler Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps. *See "Connecting Rods & Bearings" in Chrysler Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Connecting Rod & Bearings" in Chrysler Special Data.*

Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearings, 9 integral counterweights with vibration dampener on front end.
Crankshaft Journal Diameter—2.4995-2.5005".

Original Bearing Sizes: *See Chrysler Special Data.*
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in Chrysler Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

End Thrust: Taken by flange faces on rear (#4) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Chrysler Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearing Type—Removable steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal & Installation—*See Chrysler Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 23/32"	.3405-.3415"	4 25/32"
Exhaust	1 17/32"	.3395-.3405"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	3/8"	.001-.003"
Exhaust	45°	3/8"	.002-.004"

Exhaust Valve Seat Insert Servicing—*See "Valve System" in Chrysler Special Data.*
Valve Seat Width (Max.) 7/64".

Valve Guides: Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (Tool CM-83), finish ream to .3425-.3435".

Valve Springs: Install with closely coiled end to top. Free Length 2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below). Stem Diam. ⅝". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030" & .060".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exh. (hot and idling). NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance #6 intake valve should open with #6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure through new Full-flow oil filter to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump used.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—45-60 lbs. at 45 MPH. with warm oil.
Oil Pressure Relief Valve—Opens at 40-45 lbs. Under plug on left side of crankcase ahead of the oil line to provide additional oil at idling speeds. Adjustable by replacing spring. 3 types: 1) Plain—unpainted. 2) Light—painted Red. 3) Heavy—painted Green. CAUTION—Install replacement spring of same color as original spring.

Oil Pump: "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in Chrysler Special Data.*

Oil Filter: "Full-flow" type. All oil under full pressure passes through filter before entering oil passage. Safety valve in filter opens if element is clogged allowing oil to pass directly to engine.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time. **Checking:** If oil pressure drops to 35-45 lbs. with warm oil, filter element may be clogged and should be replaced, to bring oil pressure to normal 45-60 lbs. above 45 MPH.

Oil Pressure Gauge: Auto-Lite No. 11823A. Not electric.

COOLIN

Cooling System: Circulated by pump through by-pass thermostat and water circulation tube.
Capacity—17 qts.

Radiator Core Removal: *See "Radiator" in Chrysler Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Chrysler Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.

Thermostat: By-pass type in cyl. head water outlet.
Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite No. 11822A. Not elect.

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CLUTCH

Borg & Beck. Model 10A7 (Royal with Synchro-mesh Trans.), 9A7 (Royal & Windsor with Fluid Drive & Auto. Trans.), 11A6 (Taxicab). Single plate, dry disc type.

Identification Note—Cover stamped 953 (9A7), 930 (10A7), 931 (11A6).

See Clutch Section for complete data.

Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) and have 1" free travel (adjusting nut on connector link at fork).

Clutch Over-Center Spring—*See "Clutch Notes" in Chrysler Special Data for setting procedure.*

Removal: Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine. Optl.

See Transmission Section for complete data.

Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*

Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.

Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION
SYNCHRO-MESH

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*

▷*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*

Transmission Control: Manual steering column shift.

See Transmission Section for complete data.

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see Chrysler Special Data for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods. Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car. NOTE—Use pilot studs when installing assembly.

TRANSMISSION
AUTOMATIC

Hydraulically Operated Type (with Fluid Drive). Semi-automatic, four-speed transmission with hydraulic actuation and electrical control.

See Transmission Section for complete data including Testing & Trouble Shooting.

Transmission Oil—3 pints, 10-W engine oil.

▷**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Transmission Control: See Transmission article for adjustment instructions.

See Transmission Section for complete data.

Kickdown Solenoid—Auto-Lite No. SSS-4003.

Governor—Auto-Lite No. TG-4205R.

Kick-down Switch—Part of carburetor assembly. *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Ignition Interrupter Switch—On right side of transmission above Governor.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.

▷*INSTALLATION CAUTION*—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal. Cross type with roller bearings. **(Royal)** Series 7200. **(Windsor)** Series 7300.

Propeller Shaft Center Bearing: Used on 7 Passenger.

See "Propeller Shaft" in Chrysler Special Data.

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Axle Ratio	Std. Trans.	Hydr. Trans.
Royal & Windsor	3.9-1 (39:10)	3.73-1 (41:11)①
Station Wagon	4.1-1 (41:10)	3.91-1 (43:11)
Long WB.	4.3-1 (43:10)	3.91-1 (43:11)

①—Optl. ratio 3.54-1 (39:11).

Backlash—.006-.010". Screw adjustment.

Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly capscrews.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).

Oil Seal Servicing—*See "Rear Axle" in Chrysler Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

New "Hydra-Lizer" hydraulic, direct-acting, non-adjustable type.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.

See Front Suspension Section for complete data.

▷**Steering Knuckle Change (to use different type wheel bearings)**—Two types of steering knuckles have been used on 1949 C45 Models. Starting Serial No. 70041023 on Royal, and 70726716 on Windsor, the inner wheel bearing seat on the knuckle was changed to permit use of different type bearings. On cars prior to this change, original type bearings must be used otherwise bearings will not seat properly.

Kingpin Inclination—4¾° to 6° crosswise.

Camber—0° to Pos. ¾°. (¼-½° higher on left).

Caster—Neg. 2° preferred. Limits Neg. 1° to Neg. 3°.

Toe In—0" preferred. Limits 0" to 1/16". Adjust both tie rods equally.

Steering Geometry—Inner wheel 21½° plus or minus 1°. Outer 20°.

STEERING GEAR

Own Make—3 tooth Worm-and-Roller. Similar to Gemmer model 335.

NOTE—See Gemmer 305, 335 & 375 article for data.

See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic.

Front Wheels—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top and actuated by lower cylinder).

Rear Wheels—Double anchor type with single double-acting wheel cylinder.

See Brake Section for complete data.

▷**Brake Squeak Correction**—*See "Chrysler Brakes" in Brake Section.*

Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).

Drums—Centrifuse. Diameter 11".

Lining—Molded asbestos. 2" wide. 13/64" thick. Length per wheel, 23" (front), 20⅜" (rear wheels).

Clearance—.006" at each end of all shoes.

Braking Power—60% (front wheels), 40% (rear).

Hand Brake: On shaft at rear of transmission. External contracting type.

Adjustment—*See "Hand Brake Notes" in Chrysler Special Data.*

Drum—Cast iron. Diam. 6" (Royal), 7" (Windsor)

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Ext. Type	2 1/2"	5/32"	20"
7" Int. Type	2"	5/32"	13 1/8"

Clearance—.015-.020" around band.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWJ-4001, EWJ-4003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.

See Miscellaneous Section for complete data.

CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1949 Numbers—
C-46—Saratoga 6,772,001
C-46—New Yorker 7,094,001
C-46—Town & Country 7,410,001
C-47—Imperial 7,813,001

1950 Numbers—
C-49—Saratoga 6,774,501
C-49—New Yorker 7,119,001
C-49—Town & Country 7,411,501
C-50—Imperial 7,813,501

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 2 and 3 cylinders. NOTE—Letter "X" after the engine number on some C49 and C50 models indicate engine is equipped with hydraulic valve lifters.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .035". Limits plus or minus .001". Plugs—Auto-Lite Resistor Type AR5, 14 mm.

DISTRIBUTOR: Breaker Gap—.018".
Cam Angle—27° to 30½° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC).

Timing Procedure—*See Ignition Timing.*

Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual. (octane selector) adjustment.

Manual (Octane Selector) Adjustment—Set for slight ping in 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION:

Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ½-1½ turns open), turn screw out for richer mixture.

Idle Speed—450-475 RPM with warm engine.

Float Level—Top of float 5/64", ±1/64" below top surface of carburetor body casting.

Accelerating Pump—Center hole (med. stroke) Normal. Inner hole—Summer, Outer hole—Winter, for extreme temperatures.

Choke Setting: Adjust by inserting gauge pin (Tool C-723 or straight round pin fitting hole in choke unit shaft snugly) through hole in choke lever shaft and slot in base mounting flange to line up choke unit, loosen choke arm clampscrew, position carburetor choke valve so that it is fully closed, tighten clampscrew, remove gauge pin.

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approx. 1¼ turns, not over 1½ turns or under 1 turn, hook end over stop stud.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust, Hot. NOTE—Self-locking tappet screws used.

►**HYDRAULIC VALVE LIFTERS USED ON SOME C49 & C50 MODELS:** Identified by "X" after engine number. No adjustment required except when valves are reconditioned.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable through fire wall.

COIL: Auto-Lite No. CR-4001. Mounted directly above distributor on ignition bracket.

Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IG-3927F.

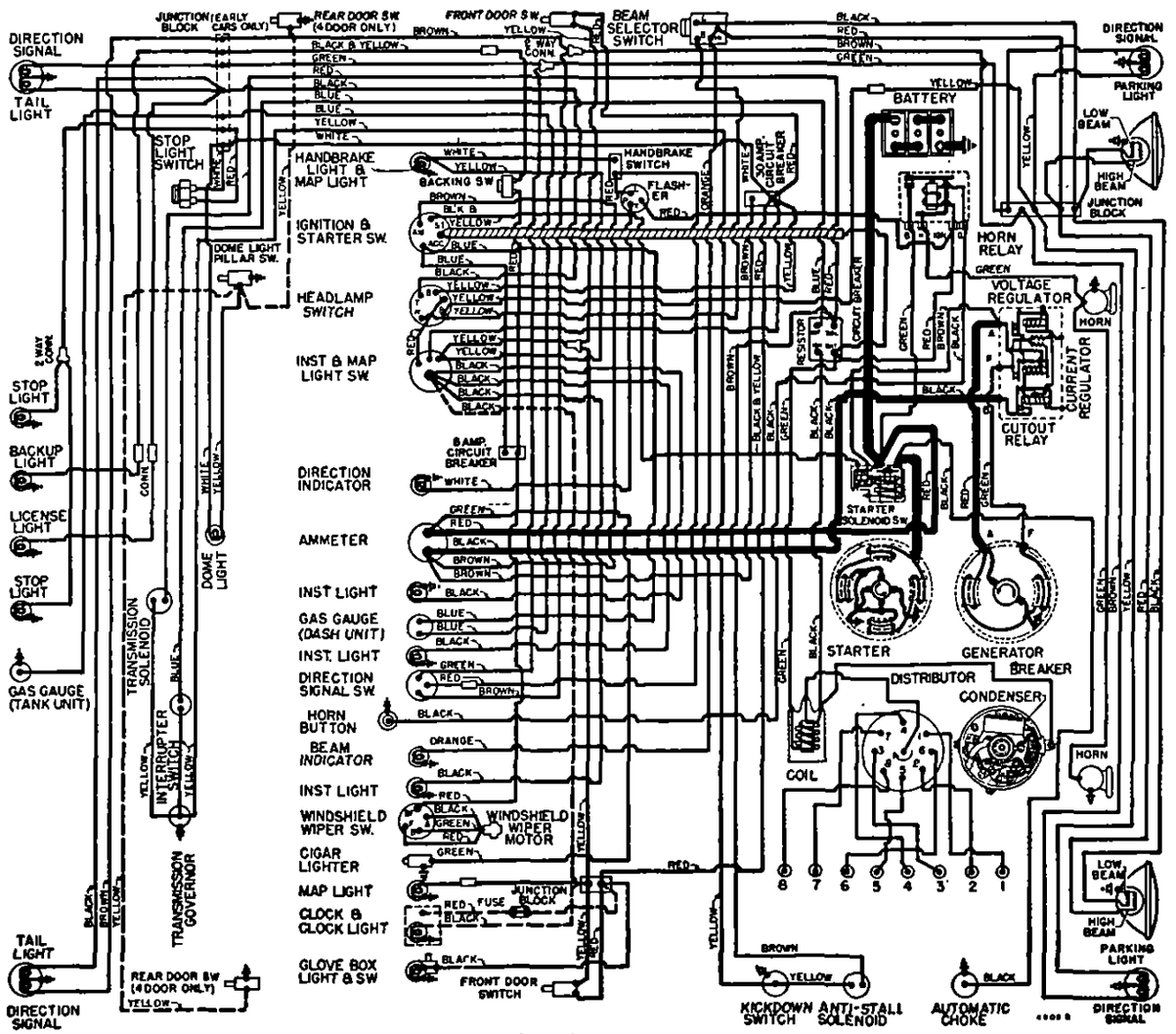
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAR-4101-L Automatic advance type with Vacuum Spark Control.

►***DISTRIBUTOR CAP POPPING OFF CORRECTION (Early "IAR" Distributors): See "Auto-Lite IAR Distributors" in Electrical Equipment Section.***

Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #10.

CONTINUED ON NEXT PAGE



1949 MODELS

CONTINUED FROM PRECEDING PAGE

Breaker Gap—.018".
Cam Angle—27° to 30½° (closed).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from the top.

Automatic Advance

Degrees Start	Distr. R.P.M.	Degrees Eng.	R.P.M.
1	350	0	700
5	450	2	900
9	800	10	1600
10	1400	18	2800
	1550	20	3100

Vacuum Spark Control: Auto-Lite Unit. On distributor, linked directly to breaker plate.

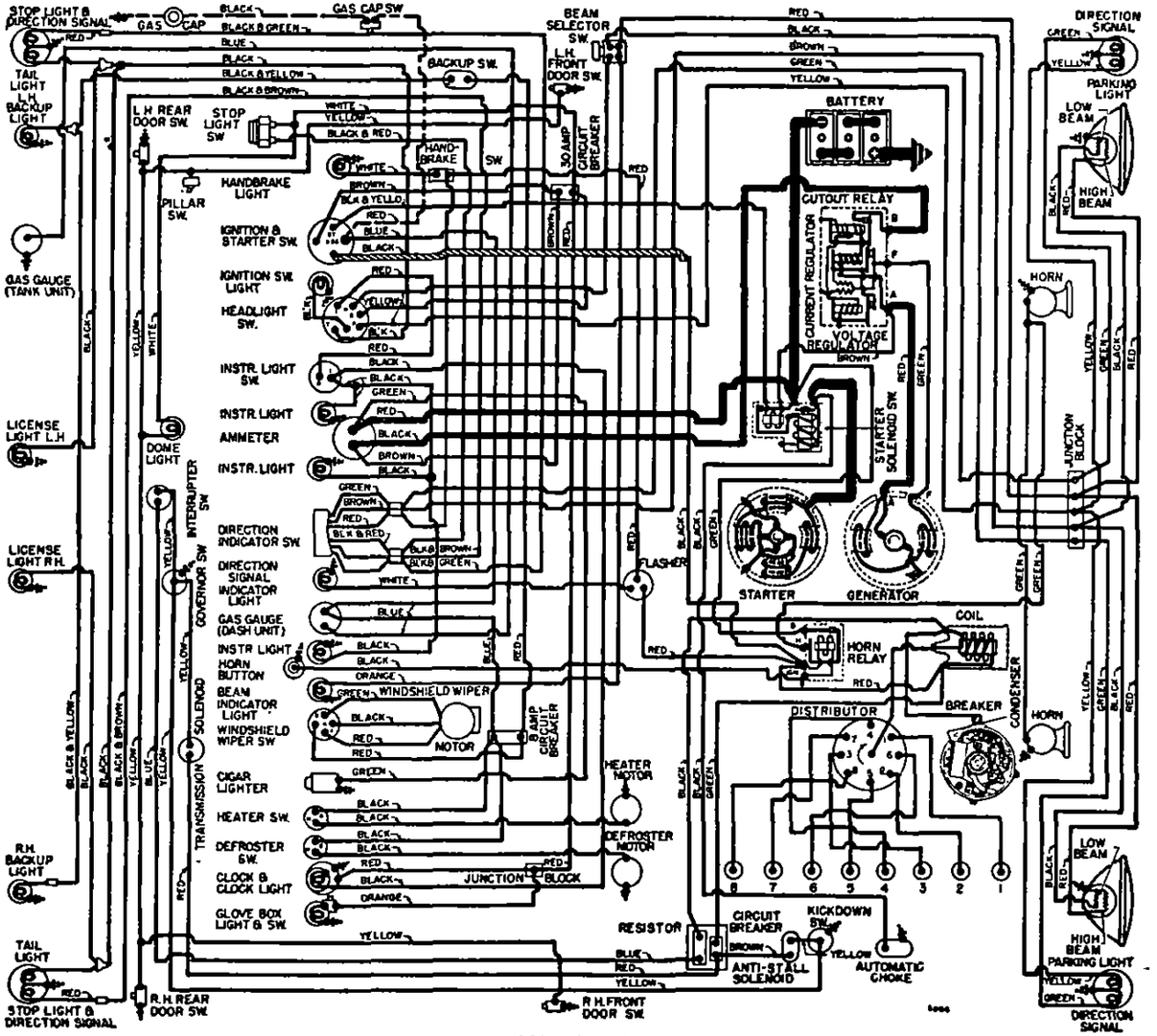
Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	8"
4°	8°	11"
6°	12°	14"
8°	16°	17"

Manual Adjustment: Provides for minor changes in ignition timing at distributor. See Ignition Timing.

IGNITION TIMING

Std. Setting.....**At TDC.**
Initial setting. See Manual Adjustment (below) for Final Setting.
NOTE—Impulse neutralizer marked at TDC with 12 (1°) graduations on either side.
Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor (as above).
Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move the plate (not more than 4° before or after initial setting) counter-clockwise (if no ping), clockwise to retard spark (if too severe).



1950 MODELS

CARBURETOR

Carter (B&B) E7J1, J2, J3, or E7J4. 1½" Single barrel downdraft type with Sisson Automatic choke control, Slow-closing Throttle and Step-Down Switch for hydraulically operated transmission.
See Carburetor Section for complete data.

►**E7J1, J2, J3 Note**—*To bring these carburetors up to latest E7J4 carburetor, see Carter (B&B) Carburetors in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Carburetor Section for Carter (B&B) Downdraft Carburetor Jet Specification Table.*

Slow-Closing Throttle: Solenoid type. Non-adjustable. *See Carburetion Equipment Section for complete data.*

Fast Idle: Throttle stopscrew stop dog linked to choke valve so that stop dog rotated and throttle opened to fast idle position when choke valve closed for starting. No adjustment required.

Automatic Choke: Sisson type.
Setting—With throttle 1/3 open place pin gauge (Tool No. C-723 or a straight round pin that fits the hole in choke unit shaft snugly) so that pin lines up slot in choke base with hole in shaft. With choke lined up in this position the carburetor choke valve should be fully closed. If not, loosen the choke arm clamp screw (on choke) and set as above, and tighten screw to lock in this position.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544405 Heavy Duty oil-bath type. Filter Element AC No. 20.

Fuel Pump: AC No. 1539215. Diaphragm type.
Replacement Pump—AC No. 514 or 590.
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—Auto-Lite No. (C-46, C-47) 11821A, (C-49) 12136A, (C-50) 12137A.
Tank Unit—Auto-Lite No. (C-46, C-47, C-49) 11539A, (C-50) 11783A.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 2H-135RD. 6 volt, 19 plate, 135 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

Auto-Lite Model MCL-6101. Armature MCH-2039.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM., 175 amperes, 5.4 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5300	5.5	65
8.0 "	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid Type SS-4707 controlled by turning ignition switch past "on" *See Electrical Equipment Section for complete data.*

GENERATOR

Auto-Lite—2-brush. Voltage & Current regulation.

Model	Auto-Lite Generator No.
1949 C-46 Synchro-mesh Tr.	GGW-6001A
1949 C-46 Automatic Trans.	GGU-6001A
1949 C-47	GGJ-6001A
1950 (Early) C-49 Synchro-mesh Tr.	GGW-6001A
1950 (Late) C-49 Synchro-mesh Tr.	GGW-6001J①
1950 (Early) C-49 Automatic Trans.	GGU-6001A
1950 (Late) C-49 Automatic Trans.	GGU-6001G①
1950 (Early) C-50	GGJ-6001A
1950 (Late) C-50	GGJ-6001F①

①—Narrow Groove Pulley.
For State Police, City Police & Taxi, see 1950-51 Chrysler 6.
Charging Rate Adjustment—None. See Regulator.

Performance Data (*GGU-6001A, G*)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850

Performance Data (GGJ-6001A, J)

0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750

Performance Data (GGW-6001A, J)

0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGU, GGW) 35-53 ozs. (new brushes), (GGJ) 30-37 ozs. (new brushes).
Field Current—(GGU) 1.7-1.8 amperes, (GGW) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes, all at 6.0 volts.
Motoring Current—(GGU) 5.5-6.5 amps., (GGJ) 4.3-4.8 amps., (GGW) 4.6-5.2 amps., all at 6.0 volts.
Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug or 40-50 lbs. tension secured on scale attached to field frame.

REGULATOR

Auto-Lite Regulator No.	for Auto-Lite Generator
VBA-4104A, 4202A, or 4204A①	GGJ-6001A, F
VAV-4404B or VAV-6001A	GGU-6001A, G
VBA-4101B or VBA-4104B①	GGU-6001A, G
VRP-4503B or VRP-6004A	GGW-6001A, J

①—For Negative ground.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—(VRP, VBA, VAV exc. VAV-4404B)—6.3-6.8 volts. (VAV-4404B) 6.4-6.9 volts. Set all models to 6.4-6.6 volts.
Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. disch.).
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (VRP-4503B, VAV-4404B) 7.2-7.5 volts, **(VRP-6004A, VAV-6001A, VBA-4202A & 4204A)** 7.1-7.4 volts, **(VBA-4101B, 4A, 4B)** 7.0-7.2 volts, all at 70° F. while charging at ½ maximum rate (VAV), 10 amperes (VRP & VBA).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

➤*CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VRP-4503B, 6004A	46	38-42
VAV-4404B, 6001A	50	43-47
VBA-4101B, 4104B	51	43-47
VBA-4104 A	56	48-52
VBA-4202A, 4204A	56	48-52

Test A—After 15 minutes charging at ½ maximum rate (VAV), 10 amperes (VBA & VRP).
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV), 6.7-7.0 volts (VRP), 6.7 volts (VBA).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type with new "Bull's-eye lens". Beam selector switch on toeboard controls upper and lower beams.
See Electrical Equipment Section for complete data.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Flasher—Chrysler No. 1257223.

Switches

Lighting: Chrysler (1949) 1300601, (1950) 1339720.
Beam Selector—Chrysler No. 1253460.
Direction Signal—Chrysler No. 1235606.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—30 ampere. Vibrating type, protects lighting circuits.
Aux. Circuit Breaker—8 ampere. Protects Windshield Wipers and Back-Up Light.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects dir. signal circuit.
Convertible Top—Mounted near control switch. Thermostatic type. Opens at 80 amperes in 1 minute

FUSES: Clock—3 ampere. In clock lead.

HORNS: Auto-Lite Model HW-4101 (Low Pitch), HW-4102 (High Pitch). Dual horns operated by relay.
Horn Relay: Auto-Lite No. HRL-4104. Connected through ignition switch, operated only with ignition "ON".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 8 cyl., "L" head type.
Bore—3¼". **Stroke**—4⅞".
Displacement—323.5 cu. ins. **Rated H.P.**—33.86.
Developed Horsepower—135 at 3200 RPM.
Compression Ratio—7.25-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-Up data.*

OIL PAN & ENGINE REMOVAL: *See Chrysler Special Data.*

CYLINDER HEAD & TIGHTENING TORQUE: *See Chrysler Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type.
Original Bore & Pistons—*See Chrysler Special Data.*
NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Length—3⅞". **Weight**—16.5 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—.0005" to .0015" on thrust face at center of skirt.
Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses) ¾" from bottom of skirt. Fit piston in bore using .002" x ½" feeler, insert piston upside down in bore with feeler 90° from pin bosses on side opposite slot. Clearance correct when 5-7 lbs. pull required to withdraw feeler, bore and piston at 70°F.
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.
Replacement Pistons: .005", .020", .030", .040", .060" OS.
Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	.5/32"	.007-.015"	.001-.0025"

***Installing Rings**—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.*
Replacement Rings: .005" .020" .030" .040" .050" .060" OS.

PISTON PIN: Diameter—55/64". **Length**—2¾". Floating type with locking ring at each end.
Pin Fit in Piston—.0000" to .0005". Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at normal room temperature.
Replacement Pins: Standard size and .0006", .003", .008" oversize.

CONNECTING ROD: Length—9". **Weight**—34 ozs. with bolts less bearings.
NOTE—Pin hole in rod bronze-bushed.
Crankpin Journal Diameter—2.1865-2.1875".
Original Bearing Sizes—*See Chrysler Special Data.*
Lower Bearing—Removable, precision type.
Clearance—.0005-.0015". **Endplay**—.006-.011".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
Replacement Bearings: .001", .002", .010", .012" U.S.
Installing Rods: Offset type. Wide side of bearing to rear for #1, 3, 5, 7; to front for #2, 4, 6, 8. Oil spray hole in rod toward camshaft on all rods.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CRANKSHAFT: 5 bearing, 8 integral counterweights with vibration dampener on front end.
Journal Diameters—2.7025-2.7035". *See "Original Bearing Sizes" in Chrysler Special Data.*
Bearings—Removable, precision type.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: .001", .002", .010", .012" U.S.

End Thrust: Taken by flange faces on rear (#5) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

CAMSHAFT: 6 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2 1/16"; #2, 2 1/32"; #3, 2"; #4, 1 31/32"; #5, 1 15/16"; #6, 1 3/8".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #6—machined in crankcase).
Clearance—.001-.003" (#1), .0015-.0035" (all others). NOTE—Replacement bearings are finished (reaming, scraping, or burnishing not required).

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width 1¼". Pitch .500" (½"). Length 23½" or 47 links.
Timing Chain Removal & Installation—*See Chrysler Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that "0" marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	5 7/8"
Exhaust	1 11/32"	.3395-.3405	5 7/8"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.0015-.0035"
Exhaust	45°	⅜"	.002-.004"

Exhaust Valve Seat Inserts—*See Chrysler Special Data.*
Valve Seat Width (Max.) 7/64".

Valve Guides: Remove from above. Press new guides in with stepped end down and upper end 1" (Intake), 1 3/32" (Exhaust), below top of block. Ream guides to inside diameter of .3425-.3435" (Tool DD-849). Exhaust guides counterbored on upper end.

Valve Springs: Install springs with close-coil end to top. Spring Free Length 2".

	Spring Pressure	Spring Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅜". Service by reaming lifter holes (work from above piloting reamer Tool C-265 in valve guide) and installing oversize lifters. **Clearance**—.000-.001".
Replacement Lifters—.001", .008", .030", .060" oversize.

HYDRAULIC VALVE LIFTERS: Used on some C-50 engines (marked by "X" following engine number). *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot. Self-locking tappet screws used. NOTE—Remove right front wheel and lower wheel housing panel for access to valves.

TAPPET ADJUSTMENT NOT REQUIRED ON HYDRAULIC VALVE LIFTERS: Except when valves are reconditioned. For initial adjustment, proceed as follows: Insert shank of ⅜" drill between valve face and valve seat. With the valve held tightly down on the drill shank, a .016" feeler must pass freely between the top of the plunger and the valve stem tip. If there is less than .016" clearance, grind valve stem tip in a suitable fixture until a .026" feeler will pass through freely.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #8 intake valve should open with #8 piston 5° to 17° or .011" to .122" BTDC. with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to .008" Hot running clearance.

LUBRICATION

Engine Oiling System: Pressure through Full-flow oil filter to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump on right side of engine.
Crankcase Capacity—6 quarts (refill).
Normal Oil Pressure—45-60 lbs. above 45 MPH. with warm oil. CAUTION—Pressure of 40-45 lbs. at driving speeds indicates oil filter may be clogged and should be replaced.
Oil Pressure Relief Valve—Under cap on lower left side of crankcase. Has bleed duct which connects with new idle oil passage to provide additional oil at idling speeds. Valve has screw adjustment but factory setting seldom requires changing. Opens at 40-45 lbs.

Oil Pump: "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in Chrysler Special Data.*

Oil Filter: "Full-flow" type. All oil under full pressure passes through filter before entering oil passage. Safety valve in filter opens if element is clogged allowing oil to pass directly to engine.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time. **Checking:** If oil pressure drops to 40-45 lbs. with warm oil, filter element may be clogged and should be replaced, to bring oil pressure to normal 45-60 lbs. above 45 MPH.

Oil Pressure Gauge: Auto-Lite No. (1949) 11823A, (1950) 12138A. Not electric.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap, and positive circulation with pump on front of engine, by-pass type thermostat, and water distribution tube in block.
Capacity—21 quarts.
Pressure Valve—In filler cap. Opens at 3 lbs.

Radiator Core Removal: *See "Radiator" in Chrysler Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Chrysler Special Data.*

Water Pump: Packless type with shaft mounted on 2 ball bearings with lubricant fitting for bearing lubrication and grease nipple for seal lubrication. *See Water Pump Section for complete data.*
Removal—Drain cooling system. Remove fan blade assembly, fan belt, by-pass hose and elbow, inlet hose, pump mounting capscrews. Take pump off. Spacer behind pump need not be taken off engine.

Thermostat: In cylinder head water outlet.
Setting—Starts to open 157-162°F. Fully open 183°F.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, 2 ports to rear. Some thermostats equipped with heavy shield welded on bottom (for bellows protection at high speeds), this type thermostat cannot be installed on earlier cars.

Temperature Gauge: Auto-Lite No. (1949) 11822A, (1950) 12139A. Not electric.

CLUTCH

Borg & Beck Model 10A6 with "Borglite" driven member. Single plate, dry disc type. NOTE—Cover Assembly No. 961 stamped on cover
See Clutch Section for complete data.
Facings—Woven type, 2 used. Inside Diameter 6". Outside Diameter 10". Thickness .125" (⅛").

Pedal Adjustment: Set pedal to just clear toeboard by loosening locknut and turning stopscrew at lower end of pedal arm above shaft. Set pedal for 1" free travel by turning clutch release fork adjusting nut on connector link at clutch release fork.
CAUTION—Do not disturb turnbuckle on pedal link (controls pedal over-center spring tension).
Clutch Over-center Spring Setting—*See "Clutch Notes" in Chrysler Special Data.*

Removal: Remove Transmission (see TRANSMISSION). Remove clutch housing underpan and clutch release bearing and sleeve. Mark clutch and fluid drive clutch driving plate for re-assembly. Remove all clutch cover mounting screws evenly, lower cover and driven member out through opening in housing.

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine.
See Transmission Section for complete data.

Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*

Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.

Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION

SYNCHRO-MESH

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*

▷*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*

Transmission Control: Manual steering column shift. *See Transmission Section for complete data.*

Removal: Jack up front end of car. Disconnect front universal (loosen companion flange nut if transmission to be dismantled). Disconnect speedometer cable, hand brake cable at brake band, gearshift control rod and selector rod at transmission. Remove transmission mounting screws and nuts at clutch housing, pull transmission straight back to free clutch shaft, lower transmission and remove from under car.
NOTE—When installing transmission, use pilot

studs installed in upper mounting screw holes to maintain alignment and prevent springing clutch driven member.

PRESTO-MATIC

Hydraulically Operated Type (with Fluid Drive). New design semi-automatic, four-speed transmission with hydraulic actuation and electrical control. *See Transmission Section for complete data including Testing & Trouble Shooting.*

►**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Transmission Control: *See Transmission article for adjustment directions.*

Kickdown Solenoid—Auto-Lite No SSS-4003.

Governor—Auto-Lite No. TG-4205R.

Kick-down Switch—Part of carburetor assembly. *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Ignition Interrupter Switch—On right side of transmission above Governor.

Transmission Oil—3 pints, 10-W engine oil.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.

INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 7300—Cross type with roller bearings. Two used (3 on Crown Imperial and other long-wheelbase cars with center bearing).

Propeller Shaft Center Bearing: *See "Propeller Shaft" in Chrysler Special Data.*

REAR AXLE

C46 & C49

Own Make—Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—3.54-1 Std. (39-11). C49 Town & Country 3.91-1 (43-11).

Backlash—.006-.010". Screw adjustment.

Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.

Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

C47 & C50

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive. Barrel type differential with adjustable ring gear thrust pad used.

See Rear Axle Section for complete data.

Ratio—3.58-1 (43:12).

Ring Gear Thrust Pad Setting—Loosen locknut on left side of carrier housing, tighten thrust pad screw *finger tight*, back screw *off 1/8 turn.*

Removal, Oil Seal, & Wheel Bearing Adjustment: See C-49 Rear Axle above.

SHOCK ABSORBERS

New "Hydra-Lizer" hydraulic, direct acting type.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram, coil springs and direct acting shock absorbers.

See Front Suspension Section for complete data.

Kingpin Inclination—(1949) 4¾-6°, (1950) 6¼-7½° crosswise.

Camber—0° to Pos. ¾°. (¼-½° higher on left).

Caster—Neg. 2° preferred. Limits Neg. 1° to Neg. 3°.

Toe In—0" preferred. Limits 0" to 1/16". Adjust both tie rods equally.

Steering Geometry—Inner wheel 21½°, plus or minus 1°. Outer 20°.

STEERING GEAR

Own Make—3 tooth Worm-and-Roller. Similar to Gemmer model 335.

NOTE—See Gemmer 305, 335 & 375 article for data.

See Steering Gear Section for complete data.

BRAKES

L CKHEED

Service: Chrysler "Safe-guard" Lockheed Hydraulic. *See Brake Section for complete data.*

►*BRAKE SQUEAK OR SQUEAL CORRECTION—See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*

Drums—Centrifuse. Diameter 12".

Lining—Molded asbestos. Width 2". Thickness 13/64". Length per wheel—(1949 Frt. Whls) 25 1/8". (1949 Rear Whls) 20 3/8", (1950 All wheels) 25 1/8"

Clearance—.006" at each end of all shoes.

Braking Power—60% front wheels, 40% rear.

Power Brake (C-46, C-49)—Vacdraulic vacuum power unit.

See Brake Section for complete data.

Hand Brake: On shaft at rear of transmission. External type (1949 & Early 1950), Internal type (Late 1950).

Adjustment—*See "Hand Brake Notes" in Chrysler Special Data.*

Drum—Cast-iron. Diameter 7".

Lining—	Width	Thickness	Length
External Type	2 1/2"	5/32"	20"
Internal Type	2"	5/32"	13 1/8"

Clearance (External Type)—.015-.020" around band.

Clearance (Internal Type)—Adjusting nut on shoe link backed off one notch from point where shoes firm against drum.

DISC TYPE

Service: Hydraulic self-energizing, two-shoe, DISC type. NOTE—No power booster used.

See Brake Section for complete data.

Disc Face Diameter—I.D. 9", O.D. 12".

Lining—Molded Asbestos segments (12 used). Thickness .170".

Clearance—Brakes are self-adjusting.

►**Bleeding Disc Type Brakes**—Manufacturer recommends bleeding all four lower wheel cyls. first, then all four upper ones last. *See "Chrysler Disc Brake" in Brake Section for complete data.*

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWJ-4001, EWJ-4003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.

See Miscellaneous Section for complete data.

CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric type.

See Miscellaneous Section for complete data.

WINDOW REGULATORS: Hydro-electric type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1950 Numbers—	Detroit	Los Angeles
C-48S Royal	70,058,001	65,004,001
C-49W Windsor	70,794,001	67,011,001
1951 Numbers—		
C-51 Windsor	70,081,001	65,007,001
C-51 Windsor Deluxe	70,891,001	67,026,001

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 1 and 2 cylinders.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035". Limits plus or minus .001". Plugs—Auto-Lite Resistor Type AR5 ('50), AR8 ('51).

DISTRIBUTOR: Breaker Gap—.020". Cam Angle—34½° to 38°. Do NOT exceed Breaker Gap limits (.018 to .022") to obtain cam dwell. Breaker Arm Spring Tension—17-20 ozs. Automatic & Vacuum Advance—*See Ignition.* Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: (1950) At TDC. (1951) 2° BTDC. Timing Procedure—*See Ignition Timing.* Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing at correct mark on dampener, then set manual (octane selector) adjustment. Manual (Octane Selector) Adjustment—Set for slight ping with 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION: Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ½-1½ turns open), turn screw out for richer mixture. Idle Speed—(Std. Trans.). Adjust to 6 MPH. (Automatic Trans.). (1950) 450-475 RPM., (1951) 475-500 RPM. Float Level—Top of float (not soldered seam) 5/64", plus or minus 1/64", below top edge of bowl. Accelerating Pump—Center Hole (med. stroke) Normal. Inner Hole—Summer, Outer Hole—Winter. Choke Setting—(1950) Adjust by inserting a gauge pin through the hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjust carburetor choke valve lever so that choke valve is tightly closed. Choke Setting—(1951) Cover "mark" centered on index.

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approx. ¾ turn, not over one turn or under ½ turn, hook end on stop stud.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust, Hot.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable through fire wall.

COIL: Auto-Lite No. CR-4001. On bracket above distributor.

Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IG-3927G. Capacity—.25-.28 microfarad.

DISTRIBUTOR:

Year	U. S. Prod. Auto-Lite No.	Canada Auto-Lite No.
1950 Early	IAP-4102C	IAP-4012B-1
1950 Late	IAT-4004	IAT-4004C
1951	IAT-4012	IAT-4012C

Automatic advance type with vacuum spark control.

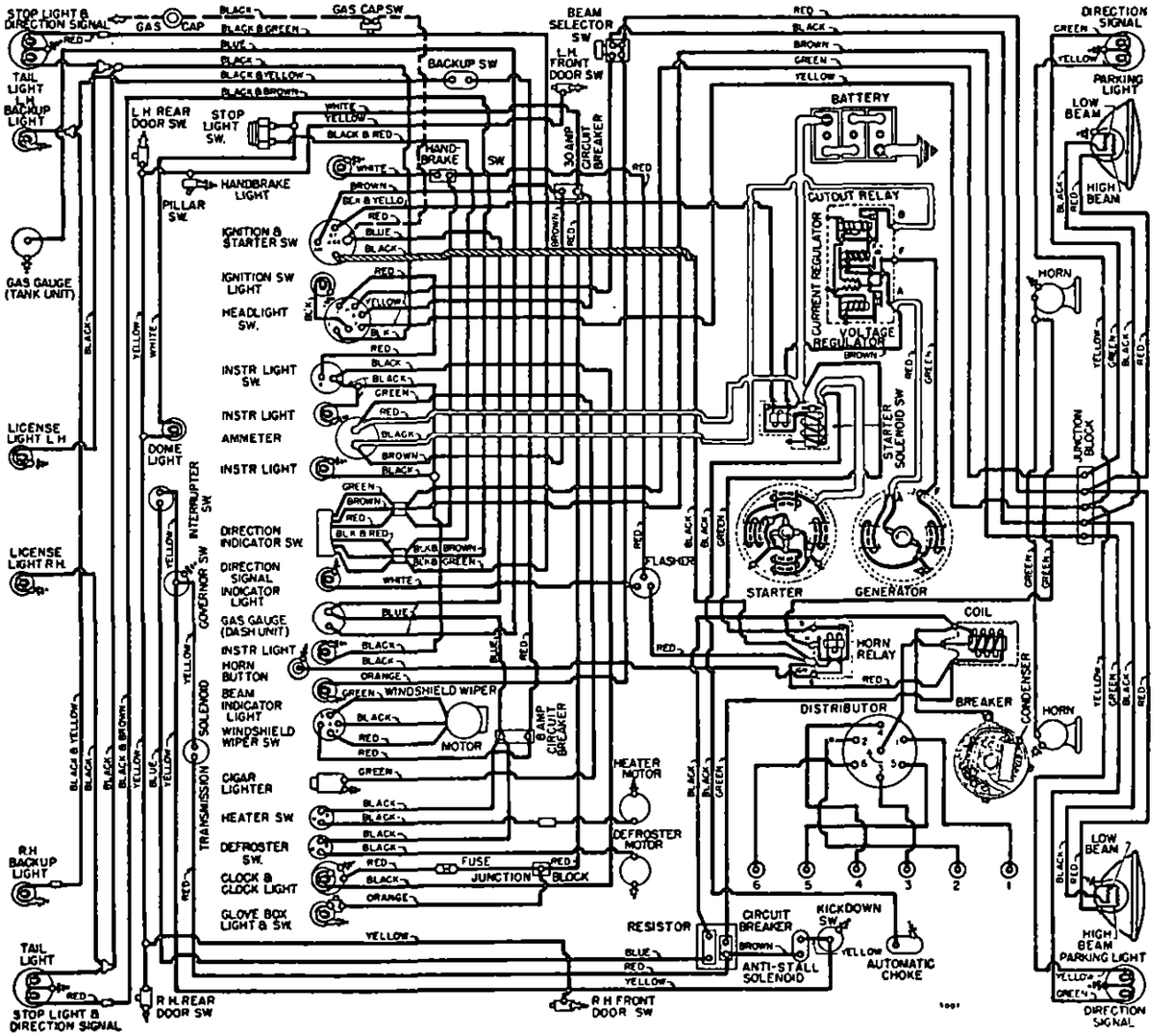
▷*DISTRIBUTOR CAP POPPING OFF CORRECTION (Early "IAP" Distributors): See "Auto-Lite IAP Distributors" in Electrical Equipment Section.*

▷**"IAT" Distributor Note**—New "Pivoted Breaker Plate" type. *See Electrical Equipment Section for data.*

Breaker Gap—.020".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAP-4102B-1, IAT-4004C, IAT-4012C

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
3	400	6	800
6	780	12	1560
9	1160	18	2320
12	1530	24	3060



1950 MODELS

Automatic Advance—IAP-4102C-1, IAT-4004, IAT-4012

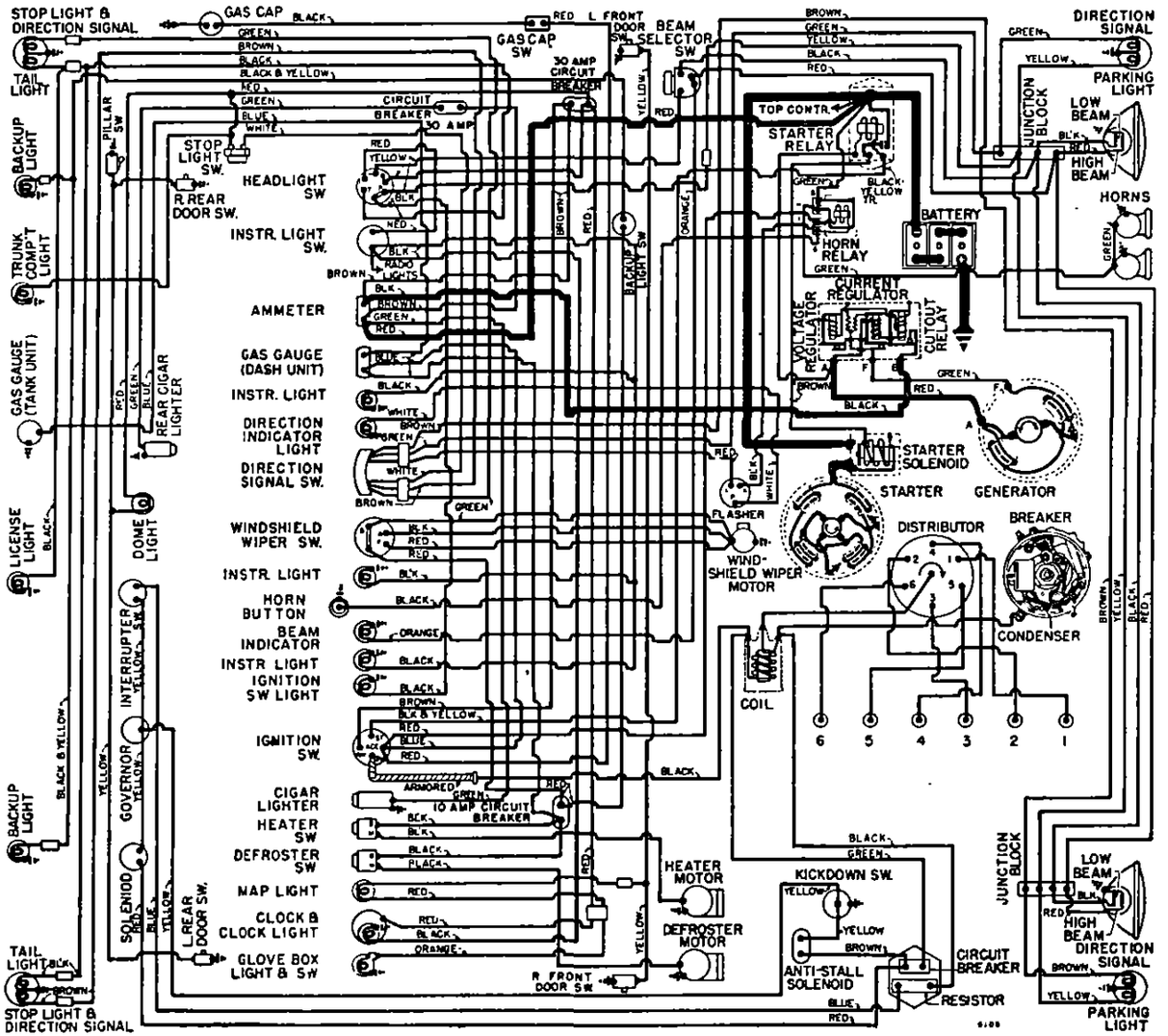
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite Unit. Integral type

Vacuum Advance—IAP-4102C, IAP-4012B-1, IAT-4004, IAT-4004C, IAT-4012, IAT-4012C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7¼"
4°	8°	9⅜"
6°	12°	11⅝"
9°	18°	15"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing.



1951 MODELS

IGNITI N TIMIN

Standard Setting

1950 ..... At TDC.
1951 ..... 2° BTDC.

Initial setting. See Manual Adjustment (below) for Final Setting.

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following).

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor as directed above.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move the plate (not more than 4° before or after initial setting) counter-clockwise (if no ping noted), clockwise to retard spark (if ping too severe), tighten screw.

CARBURET R

Carter (Ball & Ball)—Used on all models. 1½" single barrel, downdraft type. Slow closing throttle and Kick-down switch used for hydraulic operated transmission.

Year	*Application*	*Carb. No.*
1950	Synchro-mesh Trans.	EX3①
1950	Automatic Trans.	E7L4
1951	Synchro-mesh Trans.	E9C1
1951	Automatic Trans.	E9A1

①—Superseded by Carb. No. EX3R.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*

Slow-closing Throttle: Solenoid type. Non-adjustable. ***See Carburetion Equipment Section for complete data.***

Fast Idle: Setting—(EX3, E7L4) Throttle stop dog linked to choke valve so that stop dog rotated and throttle opened to fast idle position when choke closed for starting. No adjustment required.

Fast Idle: Setting—(E9C1, E9A1) .018" throttle opening with choke valve held closed and throttle stop screw backed off.

Automatic Choke: Sisson Type (1950). Carter Climatic Control (1951).

Setting—Sisson Type. With throttle 1/3 open, insert gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft), adjust carburetor choke valve lever so that choke valve is closed tightly.

Setting—Carter Climatic Control. Centered (coil housing at index mark). ***Do not change setting for hot or cold climate.***

See Carburetion Equipment Section for complete data.

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CARB. EQUIPMENT

Air Cleaner: AC No. 1544349 Heavy Duty Oil-bath type. Filter Element AC No. 21.

Servicing—Clean filter element in kerosene, clean out oil reservoir and fill to indicated level with SAE No. 50 oil (20W oil below 32°F., approx. 1 pint required). Service cleaner whenever sump is half filled with oil and dust sludge. *NOTE*—Crankcase ventilator air cleaner in oil filler cap should be cleaned in kerosene and re-oiled by dipping in SAE No. 50 engine oil at 1000 mile intervals.

Fuel Pump: Carter No. M639SL, SZ. Vacuum diaphragm type.
Pressure—3½ to 5 lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Ollite metal filter in tank.

Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit (1950)—Auto-Lite No. 12129A.

Dash Unit (1951)—Auto-Lite No. 12462A. (Estate Wagon) 12463A.

Tank Unit—Auto-Lite No. 11538A.

See Carburetion Equipment Section for complete data.

BATTERY

Willard or Auto-Lite—17 Plate, 6 Volt, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—152 amperes for 20 minutes.
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

Auto-Lite No. (1950) MCL-6101, MCL-6109, MCL-6108. (1951) MCL-6109. (Canada 1950) MAX-4090.
Armature—Auto-Lite No. MCH-2039 (MCL-6101), MAW-2213 (MAX-4090), MCH-2070 (MCL-6108,6109).
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data (MAX-4090)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5300	5.5	65
9.0 "	Lock	2.0	410

Performance Data (MCL-6101, MCL-6108, MCL-6109).

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
8.0 "	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid type controlled by turning ignition switch past "ON" position.

Switch No.	Use with Auto-Lite Starter
SS-4707	MAX-4090, MCL-6101
SSX-4001	MCL-6109
SSX-4101	MCL-6108

See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite—2-brush. Voltage & Current regulation.

Model	Auto-Lite Generator No.
1950 (Early) Synchro-mesh Trans.	GGW-6001A
1950 (Late) Synchro-mesh Trans.	GGW-6001J①
1950 (Early) Automatic Trans.	GGU-6001A
1950 (Late) Automatic Trans.	GGU-6001G①
1950 (Canada)	GDZ-4801R
1951	GGW-6001J①
1950 (Early) City Police & Taxi	GGU-6001A
1950 (Early) State Police	GGU-6001E
1950 (Early) City Police & Taxi	GGJ-6001A
1950 (Early) State Police	GGJ-6001B
1950-51 City Police & Taxi	GGU-6001G①
1950-51 State Police	GGU-6001H①
1950-51 City Police & Taxi	GGJ-6001F①
1950-51 State Police	GGJ-6001G①

①—Narrow groove pulley.

Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001A, J)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350

Performance Data (GDZ-4801R)

0	6.4	870-970 — 950-1050
35	8.0	1800-2000 — 2150-2350

Performance Data (GGJ-6001A, F, B, G)

0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750

Performance Data (GGU-6001A, G, E, H)

0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GDZ, GGU) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes).
Field Current—(GGW, GDZ) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes, (GGU) 1.7-1.8 amperes, all at 6.0 volts.
Motoring Current—(GGW) 4.6-5.2 amps., (GDZ) 4.2-4.6 amps., (GGJ) 4.3-4.8 amps., (GGU) 5.5-6.5 amps., all at 6.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs. tension secured on scale attached to field frame) or ½" belt deflection between generator and pump.

REGULATOR

Auto-Lite Regulator No.	for Auto-Lite Gen. No.
VRP-4503A	GDZ-4801R
VRP-4503B, 6004A	GGW-6001A, J
VBE-6001A	GGW-6001A, J
VAV-4404A, 4405A①	GGJ-6001A, B, F, G
VBA-4101A, 2A, 4104A①	GGJ-6001A, B, F, G
VAV-4404B, 6001A, 6002A①	GGU-6001A, E, G, H
VBA-4101B, 4104B①	GGU-6001A, E, G, H

①—For negative ground.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover)

Cutout Relay

Cuts In—(All "VRP," "VBA," "VBE;" VAV-6001A & 2A) 6.3-6.8 volts, (VAV-4404A, 4B, 5A) 6.4-6.9 volts. Set all models to 6.4-6.6 volts.
Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. dis.)
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—(VRP-4503A, 3B; VAV-4404A, 4B, 5A) 7.2-7.5 volts, (VRP-6004A, VAV-6001A, 2A; VBE-6001A) 7.1-7.4 volts, (All "VBA") 7.0-7.2 volts at 70°F. while charging at 10 amperes (VRP & VBA), ½-maximum rate (VAV & VBE).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

▷*CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Operating Amperes Test A	Test B
VRP-4503A	42	33-37
VRP-4503B, 6004A	46	38-42
VAV-4404A, 5A	55	48-52
VAV-4404B, 6001A, 2A	50	43-47
VBA-4101A, 2A, 4A	56	48-52
VBA-4101B, 4B	51	43-47
VBE-6001A	52	43-47

Test A—After 15 minutes operation charging at 10 ampres (VRP & VBA), ½ maximum rate (VAV & VBE).
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV & VBE), 6.7-7.0 volts (VRP), 6.7 volts (VBA).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type
See Electrical Equipment Section for complete data.
Beam Indicator—Lighted when Country (upper) beams in use. Located on lower right corner of speedometer face.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Flasher—Chrysler No. 1257223.

Switches

Lighting—Chry. No. (1950) 1339720, (1951) 1339691.
Beam Selector—Chry. No. (1950) 1253460, (1951) 1253003.
Directional Signal—Chry. No. (1950) 1235606, (1951) 1370454.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—On back of lighting switch. Vibrating type, protects lighting circuits.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects direction signal
Auxiliary Circuit Breaker—8 ampere. Protects the Windshield Wipers and Back-Up Light.

FUSES: Clock—2 ampere. In clock lead.

HORNS: Auto-Lite No. (1950) HW-4101 (Low Pitch), HW-4102 (High Pitch). (1951) HW-4107 (Low Pitch), HW-4108 (High Pitch).

Horn Relay: Auto-Lite No. 4104. Connected through ignition switch, operates only when ignition "ON".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". Air Gap—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" head.
Bore—3 7/16". **Stroke**—4½".
Displacement—250.6 cu. ins. **Rated H.P.**—28.36.
Developed Horsepower—116 at 3600 RPM.
Compression Ratio—7.0-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN & ENGINE REMOVAL: *See Chrysler Special Data.*

TIGHTENING TORQUES: *See Chrysler Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Chrysler Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type. NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0002-.0012" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See Chrysler Special Data.*
Length—3⅞". **Weight**—18.5 ozs. (stripped).
Clearance—.0005" to .0015" on thrust face at center of skirt.
Removal—Pistons and rods removed from above.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (inverted, pin removed) on side opposite slot. Feeler pull 5-7 lbs. (with piston and block at 70°F).

Replacement Pistons: .005", .020", .030", .040", .060" OS. NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS.

PISTON PIN: Diameter—55/64", **Length**—2⅞". Floating type with locking ring at each end.
Pin Fit in Piston—.0000" to .0005". Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at normal room temperature.

Replacement Pins: Standard size and .0006", .003", .008" Oversize.

CONNECTING ROD: Length—7⅞". **Weight**—32.4 ozs. with bolts less bearings. NOTE—Piston pin hole (upper bearing) bronze bushed.
Crankpin Journal Diameter—2.124-2.125".
Original Bearing Sizes—*See Chrysler Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

Replacement Bearings: .001", .002", .010", .012" U.S.

Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearings, 9 integral counterweights with vibration dampener on front end.
Crankshaft Journal Diameter—2.4995-2.5005".
Original Bearing Sizes—*See Chrysler Special Data.*
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

Replacement Bearings: .001", .002", .010", .012" U.S.

End Thrust: Taken by flange faces on rear (#4) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearing Type—Removable steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal & Installation—*See Chrysler Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 23/32"	.3405-.3415"	4 25/32"
Exhaust	1 17/32"	.3395-.3405"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	3/8"	.001-.003"
Exhaust	45°	3/8"	.002-.004"

Valve Seat Width (Max.) 7/64".

Valve Guides: Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (Tool CM-83), finish ream to .3425-.3435".

Valve Springs: Install with closely coiled end to top. Free Length 2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	110-120 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below). Stem Diam. ⅝". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030" & .060".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exh. (hot and idling). NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance #6 intake valve should open with #6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure through new Full-flow oil filter to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump used.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—40-50 lbs. at 20 MPH. with warm oil.
Oil Pressure Relief Valve—Opens at 40-45 lbs. Under plug on left side of crankcase ahead of the oil line to provide additional oil at idling speeds. Adjustable by replacing spring. 3 types: 1) Plain—unpainted. 2) Light—painted Red. 3) Heavy—painted Green. CAUTION—Install replacement spring of same color as original spring.

Oil Pump: "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in Chrysler Special Data.*

Oil Filter: "Full-flow" type. All oil under full pressure passes through filter before entering oil passage. Safety valve in filter opens if element is clogged allowing oil to pass directly to engine.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time. **Checking:** If oil pressure drops to 35-45 lbs. with warm oil, filter element may be clogged and should be replaced, to bring oil pressure to normal 40-50 lbs. at 20 MPH.

Oil Pressure Gauge: Auto-Lite No. (1950) 12126A, (1951) 12461A. Not electric.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump.
Capacity—(1950) 17 qts., (1951) 15 qts.

Radiator Core Removal: *See "Radiator" in Chrysler Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Chrysler Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: By-pass type in cyl. head water outlet.
Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite No. (1950) 12127A, (1951) 12459A. Not electric.

CLUTCH

Borg & Beck, Model 10A7 (Synchro-mesh Trans.), **9A7** (Fluid Drive & Automatic Trans.), **11A6** (Taxicab). Single plate, dry disc type.

Identification Note—Cover stamped 953 or 1329 (9A7), 930 or 1331 (10A7), 929 or 931 (11A6).

See Clutch Section for complete data.

Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) and have 1" free travel (adjusting nut on connector link at fork).

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Clutch Over-center Spring Setting—*See "Clutch Notes" in Chrysler Special Data.*

Removal: Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine. Opti. *See Transmission Section for complete data.*

Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.

Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*

Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION

SYNCHRO-MESH

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*

▷*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*

Transmission Control: Manual steering column shift. *See Transmission Section for complete data.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see Chrysler Special Data for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods. Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car. NOTE—Use pilot studs when installing assembly.

PRESTO-MATIC

Hydraulically Operated Type (with Fluid Drive). Semi-automatic, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
Transmission Oil—3 pints, 10-W engine oil.

Transmission Control: See Transmission article for adjustment instructions.
See Transmission Section for complete data.
Kickdown Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. (1950) TG-4205R, (1951) TGG-4001.
Kick-down Switch—Part of carburetor assembly. *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Ignition Interrupter Switch—On right side of transmission above Governor.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, replace drain plug. Disconnect transmission mounting bolts and lower assembly out of car.

▷*INSTALLATION CAUTION*—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal. Cross type with roller bearings. **(Royal)** Series 7200, **(Windsor)** Series 7300.

Propeller Shaft Center Bearing: Used on 7 Passenger. *See "Propeller Shaft" in Chrysler Special Data.*

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Car Model	Std. Trans.	Auto. Trans.
C-48 Royal	3.9-1 (39-10)	3.73-1 (41-11)
C-48 Royal (Limo.)	4.1-1 (41-10)	3.91-1 (43-11)
C-48 Windsor (5 Pass.)	3.73-1 (41-11)	——
C-48 Windsor (Limo.)	3.91-1 (43-11)	——
C-48 Sta. Wgn.	4.1-1 (41-10)	3.91-1 (43-11)
C-51 5 Pass.	3.9-1 (39-10)	3.9-1 (39-10)
C-51 Sta. Wgn.	4.1-1 (41-10)	3.9-1 (39-10)
C-51 8 Pass.	4.1-1 (41-10)	4.1-1 (41-10)

Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly capscrews. **Axle Shaft Removal**—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

New "Oriflow" direct acting hydraulic type. Non-adjustable, non-refillable.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.

Kingpin Inclination—5° to 6½° crosswise.
Camber—Neg. ⅜° to Pos. ⅜° (¼-½° higher on left).
Caster—Neg. 1° to Neg. 3°. Neg. 2° preferred.
Toe In—0" preferred. Limits 0" to 1/16". Adjust both tie rods equally.
Steering Geometry—Inner wheel 21½° plus or minus 1°. Outer 20°.

STEERING GEAR

Own Make—3 tooth Worm-and-Roller. Similar to Gemmer model 335.
NOTE—See Gemmer 305, 335 & 375 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic.
▷*BRAKE SQUEAK OR SQUEAL CORRECTION—See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*

Front Wheels—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top and actuated by lower cylinder).
Rear Wheels—Double anchor type with single double-acting wheel cylinder.
See Brake Section for complete data.

Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).
Drums—Centrifuse. Diameter 12".
Lining—Molded Asbestos. 2" wide. 13/64" thick.
Length per Wheel—25⅛".
Clearance—.006" at each end of all shoes.
Braking Power—60% (front wheels), 40% (rear).

Hand Brake: On shaft at rear of transmission. 6" External contracting band used with Synchro-mesh Transmission. 7" Internal expanding used with Automatic Transmission.
Adjustment—*See "Hand Brake Notes" in Chrysler Special Data.*
Drum—Cast Iron.

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Int. Type	2"	5/32"	13 1/8"

Clearance—**(External Type)** .015-.020" around band, **(Internal Type)**—Adjusting nut on shoe link backed off one notch from point where shoes firm against drum.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite electric type.
EWJ-4001—1950 (exc. Convt.) & 1951 8 Pass.
EWJ-4003—1950 Convt. & 1951 (exc. 8 Pass.).
See Miscellaneous Section for complete data.

CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

Model	1951—Serial Nos.—1952
C-52 New Yorker	7,165,001 7,199,901
C-53 Crown Imperial	7,814,501 7,815,101
C-54 Imperial	7,736,501 7,753,601
C-55 Saratoga	①76,500,001 ..... ②76,512,101

①—66,500,001 for Los Angeles.
②—66,501,801 for Los Angeles.

ENGINE NUMBER: Stamped on boss on top front side of block just back of water pump.

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number)—Identified as follows:*
"A"—ALL Cylinders .020" oversize.
"B"—ALL Crankshaft Journals .010" undersize.
"AB"—BOTH above conditions exist.
"MALTESE CROSS" (⅜" high)—ONE OR MORE Crankshaft Journals .001" Undersize. *See "Connecting Rods" & "Crankshaft" (below).*
"DIAMOND" (⅜" high)—On cars after Engine No. C52-8-18506. ALL Valve Lifters .008" oversize. *See "Valves" for identification before above engine number.*

TUNE-UP

►*ENGINE CUTTING OUT ON TURNS (1951 Cars with 830S & SA Carburetors): See "Carter WCD" in Carburetor Section.*

►*SLOW WARM-UP CORRECTION (Early 1951 Cars with 830S Carburetor): See "Carter WCD" in Carburetor Section.*

►*DIFFICULT STARTING WHEN HOT (1951-52 Cars): See "Carter WCD" in Carburetor Section.*

►*ACCELERATION HESITATION (1951-52 Cars with 931S & SA Carburetors): See "Carter WCD" in Carburetor Section.*

►*ENGINE STALLING ON QUICK STOPS (1951-52 Cars with 931S, SA & SB Carburetors): See "Carter WCD" in Carburetor Section.*

COMPRESSION PRESSURE: 135 to 165 lbs. at 150 RPM. cranking speed. Minimum allowable pressure of 90 lbs. with a 15 lb. maximum allowable variation between cylinders.

VACUUM READING: Steady 18-21" idling.

FIRING ORDER: 1-8-4-3-6-5-7-2. See wiring diagram.

SPARK PLUG GAPS: .035".
Plugs—Auto-Lite Resistor Type 4S140, 14 mm.

DISTRIBUTOR: Auto-Lite No. (1951) IAZ-4001 or IAZ-4001A. (1952) IAZ-4001B. Double breaker type with automatic advance and vacuum spark control.
Breaker Gap—.015" to .018".
Cam Angle—27½° to 30° (one set of points) 34° to 36° (Total dwell).

►*NOTE—Set both contacts alike. No other adjustment required.*
Breaker Arm Spring Tension—17 to 20 ozs.
Rotation—Clockwise viewed from above.
Automatic and Vacuum Advance—*See Ignition.*

COIL: Auto-Lite No. (1951) CR-4001. (1952) CR-6007B.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No.
Capacity—.25-.28 microfarad.

IGNITION TIMING: *CAUTION—DIFFERENT setting required for each type distributor:*

Distributor Type	Std. Ignition Setting
1951 IAZ-4001 & IAZ-4001A	At TDC.
1951-52 IAZ-4001B	4° BTDC.

See Manual Adjustment for final setting.

Timing Mark—Vibration dampener marked "DC" with 15-1° graduations on either side. Use "DC" mark (for TDC setting) or 4th. graduation before DC mark (for 4° BTDC. setting).

Manual Adjustment—Adjust distributor to give slight ping in 15-30 MPH. range when accelerating from 15 MPH. in fourth grear with wide open throttle. *CAUTION*—Do not set timing more than 4° earlier or later than specified setting.

Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter WCD (1951) Nos. 830S, SA, SB; (1951-52) Nos. 931S, SA, SB, SC. Dual downdraft type with Carter Climatic Control, slow-closing throttle, and kick-down switch for transmission control.

►*CARBURETOR PRODUCTION CHANGES & RECOMMENDED CHANGES FOR IMPROVED PERFORMANCE: See "Carter WCD" in Carburetor Section.*

Idle Setting—Set idle adjustment screw for smooth idling with engine warm (idle screw ¾ to 1¼ turns open), turn screw out for richer mixture.

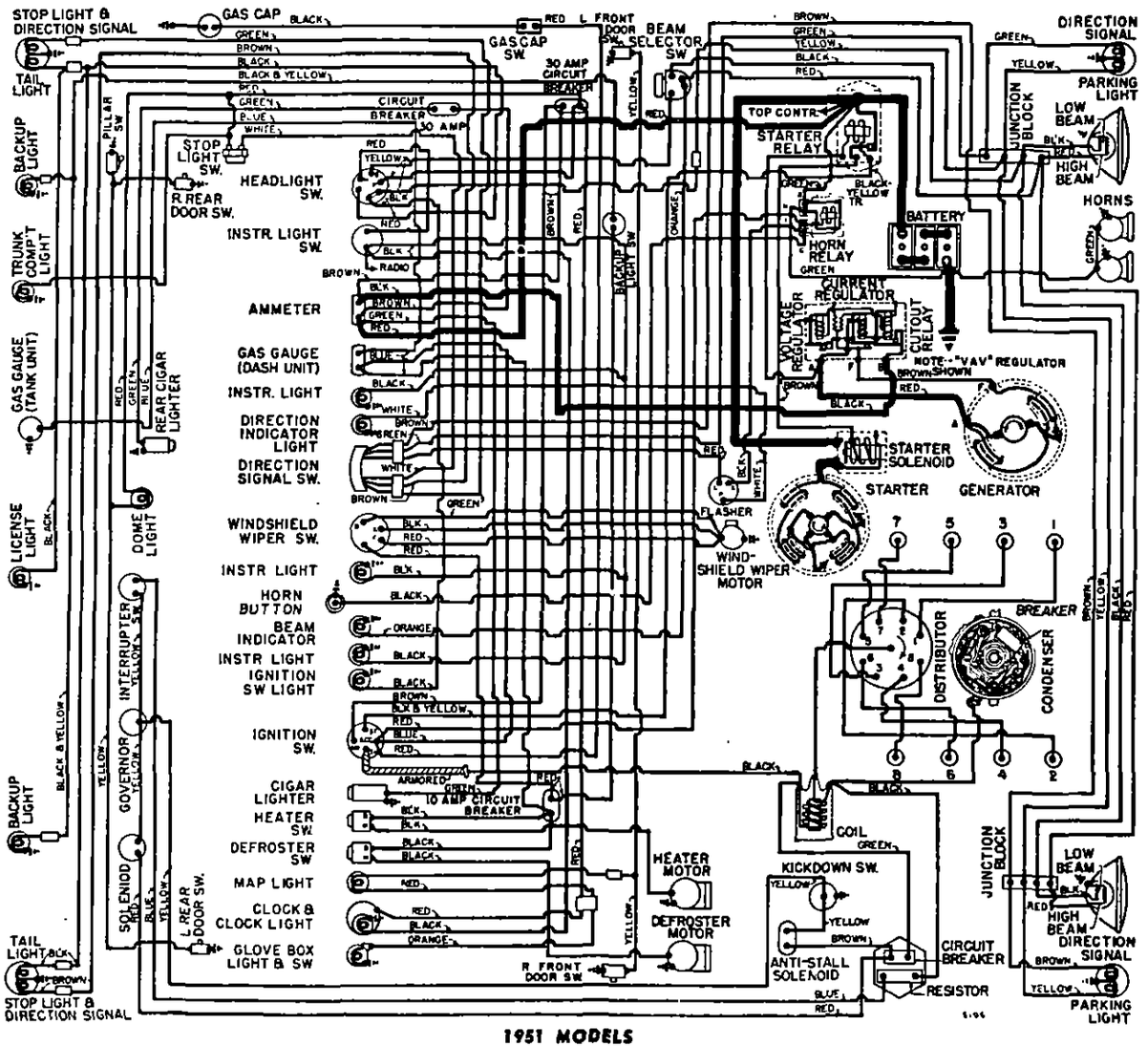
Idle Speed—475 to 500 RPM.

Float Level—11/64" between top of float and machined surface of cover casting. Use Gauge T109-205 for correct vertical and lateral adjustment.

Accelerating Pump—Outer hole (long stroke), Normal setting.

Fast Idle Setting: .017-.021" throttle opening (use Gauge T109-44—.018") with choke valve tightly closed. Adjust by turning fast idle screw.

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1951 MODELS

CONTINUED FROM PRECEDING PAGE

Choke Setting: Indicator mark on Climatic Control must line up with Center Index mark on air horn.

▷*CAUTION*—Do not change setting for hot or cold climates.

Fuel Pump Pressure: 3½ to 5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approx. 1¼ turns, not over 1½ turns or under 1 turn, hook end over stop stud. *NOTE*—If clearance between shaft and bushing exceeds .002-.005", replace parts.

See "Manifold Heat Control" in Chrysler Special Data.

▷***CAUTION—Do not install control valve with counterweight toward rear of engine.***

VALVE TAPPET CLEARANCE: Hydraulic valve lifters used. No adjustment required except when valves reconditioned.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable

COIL: Auto-Lite No. (1951) CR-4001, (1952) CR-6007B Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAU-3076LA. Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite. (1951) No. IAZ-4001 or IAZ-4001A, (1952) IAZ-4002B. Double breaker type with automatic advance and vacuum spark control.

▷*1951-52 DISTRIBUTOR & IGNITION TIMING CAUTION:* Distributor No. IAZ-4001B (Chrysler No. 1479139) has different automatic advance and requires different Ignition Timing than 1951 No. IAZ-4001A (Chrysler No. 1345967). Distributors may be interchanged (or later type Cam & Stop Plate and Governor Weight Springs installed in previous type distributor) but ***Correct Ignition Timing and Advance specifications (for checking) must be used for each type distributor.***

Breaker Gap—.015" to .018".

Cam Angle—27½° to 30° (one set points) 34° to 36° (Total dwell). Both points to be set alike. No other adjustment required.

Breaker Arm Spring Tension—17 to 20 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance (IAZ-4001)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
3°	400	6°	800
7°	820	14°	1640
11°	1240	22°	2480
13°	1450	26°	2900

Automatic Advance (IAZ-4001-A)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
1°	370	2°	740
2.5°	400	5°	800
12°	1525	24°	3050
13.5°	1700	27°	3400

Automatic Advance (IAZ-4001B)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	400	0	800
1	525	2	1050
6	1150	12	2300
10	1650	20	3300
11	1775	22	3550

Vacuum Spark Control: Auto-Lite Unit. On distributor, linked directly to breaker plate.

Vacuum Advance (IAZ-4001)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4¾"
1°	2°	6"
4°	8°	9½"
7°	14°	13¼"
8.5°	17°	15"

Vacuum Advance (IAZ-4001A & 4001B)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5¼"
5	10	9¼"
10	20	17⅞"
11.5	23	17"

▷***DISTRIBUTOR INSTALLATION CAUTION:*** Drive gear slot position changed during 1951 production. To insure correct distributor drive position on all cars (if drive gear and shaft disturbed), ***see OIL PUMP & DISTRIBUTOR DRIVE GEAR INSTALLATION in Chrysler Special Data.***

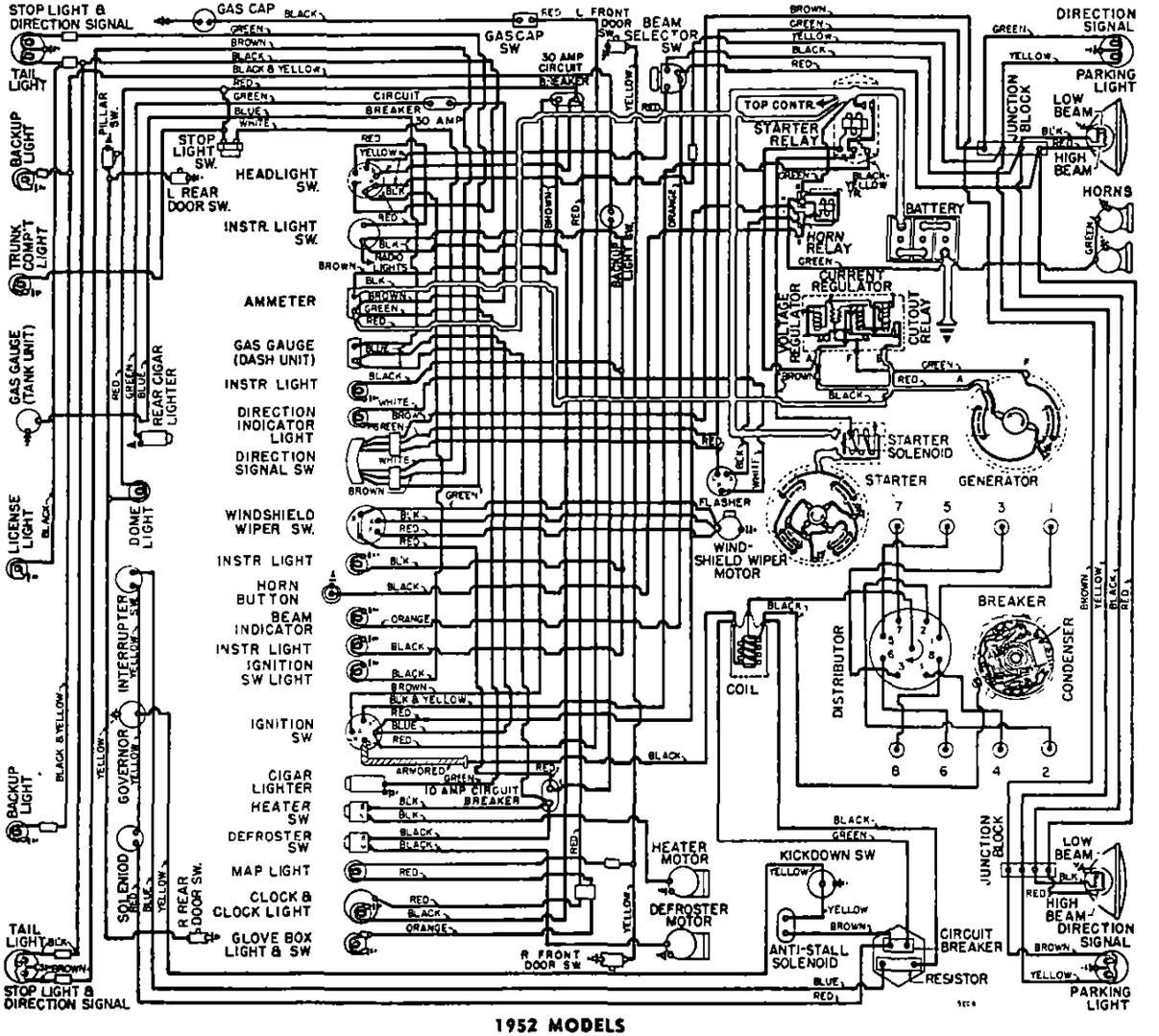
IGNITION TIMING

CAUTION—DIFFERENT setting required for each type distributor:

Distributor Type	Std. Ignition Setting
1951 IAZ-4001 & IAZ-4001A	At TDC.
1951-52 IAZ-4001B	4° BTDC.

See Manual Adjustment below for final setting.

Timing Mark—Vibration dampener marked "DC" with 15-1° graduations on either side. Use "DC"



1952 MODELS

mark (for TDC setting) or 4th graduation before DC mark (for 4° BTDC setting).

Timing (Using Synchroscope)—Mark correct graduation on vibration dampener with white chalk. Connect one lead of Synchroscope to #1 spark plug wire at the distributor (Using Tool C-3066 Adapter). Connect other lead to negative terminal of battery and direct the light on vibration dampener. Idle engine and loosen distributor lock plate. Rotate distributor (clockwise to retard, counter-clockwise to advance) until pointer is aligned with chalk mark on vibration dampener. Tighten lock plate clamp.

Manual Adjustment—Adjust distributor to give slight ping when accelerating from 15 MPH, with wide open throttle in fourth speed. NOTE—Do not set timing more than 4° early or 4° later than initial setting.

CARBURETOR

Carter WCD (1951) Nos. 830S, SA, SB (1951-52) Nos. 931S, SA, SB, SC. Dual downdraft types with Carter Climatic Control, slow-closing throttle, and kick-down switch for transmission control.

►*CARBURETOR PRODUCTION CHANGES & RECOMMENDED CHANGES FOR IMPROVED PERFORMANCE: See "Carter WCD" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jet—*See Carburetor Section for "Carter (WCD) Downdraft" Carburetor Jet Specification Table.*

Slow Closing Throttle: Solenoid type. Adjustable.
See Carburetion Equipment Section for complete data.

Fast Idle: Carter Dual (WCD) Carburetor type.
Setting—.017-.021" throttle opening (use Gauge T109-44—.018") with choke valve tightly closed. Adjust by turning fast idle screw.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Dual Carburetor).
Setting—Centered with index mark on air horn.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Fuel Pump: Carter No. M-840-S. Diaphragm type.
Pressure—3½-5½ lbs.
See Carburetor Equipment Section for complete data.

Fuel Tank Filter: Oillite metal filter in tank.
Servicing—If more than 2 pints of water in tank, fuel will not pass filter. Remove filler cap and drain plug, drain tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.

Model	Dash Unit	Tank Unit
1951		
C52	12475A	11539A
C52 (Estate Wgn.)	12476A	12436A
C53	12468A	11783A
C54	12467A	11539A
C55	12462A	11539A
C55 (Estate Wgn.)	12463A	12195A
1952		
C52, C54, C55	12841A	11539A
C53	12851A	11783A
C55 (Estate Wgn.)	12847A	12436A

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 2H-135RD or Willard MW-2-135R, 6 volt, 19 plate, 135 Ampere Hour capacity (20 hour rate).
Starting Capacity—170 Amperes for 20 minutes.
Grounded Terminal—Positive (+) grounded.
Location—Under hood in left fender shield.

STARTER

Auto-Lite No. (1951-52) MCL-6109, (Late 1952) MCL-6119. Armature No. MCH-2070 (All).
Drive—Overrunning Clutch. (Solenoid Pinion Shift)
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (New brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Removal: Special box wrench C-455 is required.
Starting Switch: Auto-Lite Solenoid No. (1951) SSX-4001, (1952) SSX-4003 for Starter MCL-6109, SSX-4002 for Starter MCL-6119. Used with separate relay, Auto-Lite No. (1951-52) HRW-4001, (1952) HRW-4001A. Controlled by turning ignition switch past "ON" position.
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite. Two-brush types with voltage and current regulation.

Model	Auto Lite Gen.
1951—C52, C54, C55 (Early)	GGU-6001T
1951-52—C52, C54, C55	GGU-6001R
1951—C53 (Early)	GGJ-6003A
1951-52—C53	GGJ-6004A
1952—C52, C54, C55 (Underdrive)	GGU-6001V
1951-52—All (City Police, Taxi)	①GGU-6001G
1951-52—All (State Police)	①GGU-6001H
1951-52—All (City Police, Taxi)	①GGJ-6001F
1951-52—All (State Police)	①GGJ-6001G
1951—C52 (Early Hydra-Guide)	GGJ-6003A
1951-52—C52, C54, C55 (Hydra-Guide)	GGJ-6004A
1952—C52, C54, C55 (Hydra-Guide)	GGU-6004A
1952—C55 (Hydra-Guide)	GGW-6007A

①—Narrow Groove Pulley.
Maximum Charging Rate—See Performance data.
Charging Rate Adjustment—See Regulator.

Performance Data—(GGJ)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750
55	8.0	1500-1700 — 1650-1850

Performance Data—(GGU)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850
50	8.0	1550-1750 — 1750-1950

Performance Data—(GGW)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350
45	8.0	1925-2125 — 2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGU, GGW) 35-53 ozs. **(GGJ)** 30-37 ozs. (with new brushes).
***Field Current*—(GGJ & GGU)** 1.4-1.6 amperes, **(GGW)** 1.4-1.5 amperes, all at 5.0 volts.
Motoring Current—(GGJ) 4.1-4.6 amperes, **(GGU)** 5.0-6.0 amperes, **(GGW)** 4.8-5.3 amperes, all at 5.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, adjust generator so that ¾" slack will be obtained when pressure is applied between pulleys.
Fan Belt Adjustment—*See "Cooling" for belt adjustment.*

REGULATOR

Auto-Lite. Voltage and current types.

Auto-Lite Regulator No.	For Generator
VBA-4202A or ①VBA-4204A	"GGJ" Gen.
VBF-6001A or ①VBF-6002A	"GGJ" Gen.
VAV-6001B or ①VAV-6002B	"GGU" Gen.
VBE-6001A	"GGW" Gen.

①—For Negative Ground.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seal not broken (to remove cover).

Cutout Relay

Cuts In (All)—6.3-6.8 volts. Set to 6.4-6.6 volts.
Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. disch).
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—(VAV, VBA, VBE) 7.1-7.4 volts, **(VBF)** 7.15-7.45 volts at 70°F. while charging at ½-maximum rate (VAV & VBE), 10 amperes (VBA & VBF). *See Electrical Equipment Section for settings at other temperatures.*
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

►*CAUTION—"Temperature Compensated" types. Set to following specifications at 70°F. See Electrical Equipment Section for settings at other temperatures.*

Regulator	Operating Amperes Test A	Test B
VAV-6001A, 2B	55	50 (48-52)
VBA-4202A, 4A	56	50 (48-52)
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	66	55 (53-57)

Test A—After 15 minutes run at 10 amperes (VBA, VBF), at ½ maximum output (VAV, VBE).
Test B—After additional 15 minutes operation with current regulator operating and with load applied to hold voltage down to 6.7-6.9 volts (VAV, VBE), 6.7 volts (VBA), 6.7-7.0 volts (VBF).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type with "Bull's Eye" lense.
See Electrical Equipment Section for complete data.
Beam Indicator—Lighted when Country (upper) beams in use. Located on lower right corner of speedometer face.
Directional Signal: *See Electrical Equipment Section.*
Directional Signal Indicator—In lower left corner of speedometer face.
Directional Signal Flasher—Chrysler No. 1257223.

Switches

Lighting—Chrysler No. 1339691.
Beam Selector—Chrysler No. 1253003.
Direction Signal—Chrysler No. 1370454 (exc. following models), No. 1370455 (C53 8-Pass. Sedan & C54 4-Dr.), No. 1345562 (C53 Limo).

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MISC. ELECTRICAL

CIRCUIT BREAKERS Lighting—30 ampere. Vibrating type, protects lighting circuits.
Aux. Circuit Breaker—8 ampere. Protects Windshield Wipers and Back-Up Light.
Transmission Solenoid—Vibrating type mounted as an assembly with resistor unit.
Convertible Top—Mounted near control switch. Thermostatic type. Opens at 80 amperes in 1 minute or less.

FUSES: Clock—3 amperes. In clock lead.
Radio—14 amperes. In fuse connector at radio.

HORNS: Auto-Lite No. (1951) HW-4107 (Low Pitch), HW-4108 (High Pitch); (1952) No. HW-4203 (Low Pitch), HW-4204 (High Pitch).

Horn Relay: Auto-Lite Model HRL-4104. Connected through ignition switch. Operated only with ignition "on".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volts min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATION: 8 cyl. "V" type, valve-in-head.
Bore—3 13/16". **Stroke**—3 5/8".
Displacement—331.1 cu. in. **Rated HP.**—46.5.
Developed Horsepower—180 at 4000 RPM.
Compression Ratio—7.5-1 Std. cast iron head.
Compression & Vacuum Reading—*See Tune-Up data.*

ENGINE REMOVAL: Work engine out toward left front fender. Not necessary to remove heater assembly or transmission.

OIL PAN REMOVAL: Remove oil level indicator, drain oil, and remove starter motor and exhaust crossover pipe. Remove oil pan attaching bolts and drop pan straight down and away from engine. To install, reverse removal procedure.

TIGHTENING TORQUES: *See Chrysler Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Chrysler Special Data.*

PISTONS: Aluminum alloy, Steel-strut, Slipper type, cam ground and tin plated.

▷*OVERSIZE CYLINDER BORE & PISTON CAUTION*—*Engine with letter "A" following engine number indicates that cylinder bore and pistons .020" Oversize. See "Original Bore & Pistons" in Chrysler Special Data.*
Length—3 7/8". **Weight**—20.8 ozs.
Removal—Pistons and rods removed from above.
Clearance—.0005 to .0015" between the thrust face of the piston and the cylinder wall measured ¾" from bottom of piston.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 5-12 lbs., at room temperature (70°F.).

▷*CAUTION—Letter "F" embossed in side of piston near piston pin hole must face front of engine when installed.*

▷*NOTE*—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Replacement Pistons: Standard, .010", .020", .030", .040", .050", .060" Oversize. *See "Pistons" in Chrysler Special Data.*

Installing Pistons: Letter "F" embossed in side of piston near piston pin hole must face front of engine.

PISTON RINGS: Two compression, one slotted oil control, all above pin. Oil ring groove drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.010-.020"	.002-.0035"
Oil Control	3/16"	.010-.020"	.001-.0025"

Replacement Piston Rings: *See Chrysler Special Data.*

PISTON PIN: Diameter—63/64". **Length**—3 9/64".
Floating type with locking ring at each end.
Pin Fit in Piston—Thumb push fit in piston at normal room temperature (70°F.).
Pin Fit in Rod—.0001-.0004". Tight thumb push fit at normal room temperature (70°F.).

Replacement Pins: Standard and .003", .008" Oversize.

CONNECTING ROD: Length—6⅝". **Weight**—25.2 ozs. with bolts less bearings.
Crankpin Journal Diameter—2.249-2.250".

▷*JOURNAL DIAMETER CAUTION (ONE OR MORE Journals machined UNDERSIZE). See "CRANKSHAFT" below.*

Lower Bearing—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005" to .0015".
End Play—.006-.011" total endplay for two rods.

Bearing Adjustment: None (no shims). Replace bearings. *See "Connecting Rods & Bearings" in Chrysler Special Data.*

Replacement Bearings: Standard size and .001", .002", .010" Undersize.

Installing Rods: Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet.

▷*CAUTION*—Rods are **interchangeable**, however, when rods are assembled to piston the assemblies of one engine bank are **not interchangeable** with the other bank.

▷*CONNECTING ROD BEARING CAP CAUTION*—The "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston pin. When installing the bearing cap make certain the "V" slot oil passage is toward the top of engine.

CRANKSHAFT: 5 bearing with vibration dampener on front end.
Journal Diameter—2.4995" to 2.5005".

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION*—*Engines with undersize journals identified as follows:* **.010" UNDERSIZE (All Main & Connecting Rod Journals)**—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (⅜" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counter-weight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).
Bearings—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005" to .0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

Replacement Bearings: Standard and .001", .002", .010", .012" undersize.
End Thrust—Taken on flange faces of center (#3) main bearing. **Endplay**—.002" to .007".

Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

CAMSHAFT: 5 bearing. Non adjustable chain drive.
JournalDiameters—Nos. 1-2-3-4, 1.998-1.999". No. 5, 1.4355-1.4365".
Bearings—Removable, steel backed, babbitt lined bushings.
Clearance—.001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

Timing Chain: Width 1⅛". Pitch .375". Length 68 links.
Chain Removal & Installation: *See "Timing Chain" in Chrysler Special Data.*

Camshaft Setting: Place crankshaft sprocket "Zero" mark exactly in line with center of camshaft. Temporarily install camshaft sprocket (less chain) and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft sprocket "Zero" mark exactly in line with center of crankshaft. (Use a straight edge to check accuracy of alignment). Remove camshaft sprocket and position it in timing chain and reinstall assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" marks should be in line with shaft centers. Install fuel pump eccentric and camshaft nut. Tighten to 120-130 ft. lbs.

▷*TIMING CASE COVER REMOVAL CAUTION—One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing case cover.*

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 13/16"	.3725"	5"
Exhaust	1 1/2"	.3715"	4 29/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.378"	.001-.003"
Exhaust	45°	.362"	.002-.004"

Valve Seat Width—.060-.085" (Int.) .040-.060" (Exh.)
Exhaust Valve Seat Inserts—*See Chrysler Special Data.*
Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.
NOTE—If Valve Guide Tool C-3150 is not available,

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

drive guides in, measuring from top of valve seat as follows: **Intake**—31/32". **Exhaust**—1 7/32".

►*CAUTION*—When installing exhaust valve guide, make certain the oil holes in the top of the guide are facing up.

Valve Springs: Two springs used per valve. Install with closed coil toward cylinder head.
Free Length—Outer 2". Inner 1⅞".

Outer	Spring Pressure	Length
Valve Closed	46-51 lbs.	1 11/16"
Valve Open	124-132 lbs.	1 5/16"
Inner	**Spring Pressure**	**Length**
Valve Closed	12-14 lbs.	1 9/16"
Valve Open	35-40 lbs.	1 3/16"

►*CAUTION—Spring ends must be square within 1/16" (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION*—If valves or seats are reground, check installed height of spring. If height is 1 23/32" or greater, install a 1/16" spacer (Part No. 1400482) in the head counter-bore to bring spring height back to normal 1⅝-1 11/16".

►*VALVE SPRING LOAD CAUTION—Hydraulic lifter "pump up" will restrict engine speed and cause valves to burn if valve spring loads are not maintained.*

Valve Lifters: Hydraulic type.
Diameter—.9040-.9045". **Clearance**—.0005-.0015".
See "Valve System" in Chrysler Special Data.

►*VALVE LIFTER OVERSIZE CAUTION—.008" OVERSIZE valve lifters used in some engines.* On engines before Engine No. C52-8-18506 the numeral "8" stamped on the machined face of the cylinder block at the right front corner of the valve chamber; and on engines after above number, with a "Diamond" (⅜" high) stamped in engine number pad following engine numbers, indicates that all valve lifters are .008" OVERSIZE.

Removal: *See "Valve System" in Chrysler Special Data.*

►*VALVE GRINDING CAUTION*—If the position of the valve in the head has been changed (due to valve or seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from the valve spring seat in the head to the tip of the valve should be checked with gauge C-3061. If the tip exceeds the maximum, grind tip to approach (but do not go below) the minimum allowable on the gauge. Improper valve clearance at high speed will result if this condition is not corrected.

VALVE TIMING

Tappet Clearance: No adjustment required, except when valves are reconditioned.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 15° BTDC. Close 57° ALDC.
Exhaust Valves—Open 49° BLDC. Close 15° ATDC.
Valve Timing Check—Turn crankshaft until #1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at Zero, turn crankshaft until dial indicator shows that valve has lifted .016". Pointer on chain cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft counter-clockwise until lifter backed down and valve closed, remove spacer from valve stem.

►*CAUTION—Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

►*TIMING CASE COVER REMOVAL CAUTION—One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing case cover.*

LUBRICATION

Engine Oiling System: Pressure through "Full-Flow" oil filter to main and connecting rod bearings, camshaft bearings, timing chain and hydraulic valve lifters. "Rotor" type oil pump mounted below rear main bearing cap. Floating type oil strainer is used.
Crankcase Capacity—5 quarts, (add one quart when "Full-Flow" oil filter element is replaced).
Normal Oil Pressure—40-65 lbs. at 40 to 50 MPH.

►*CLOGGED OIL FILTER CAUTION—An oil pressure drop of 15-20 lbs. below normal oil pressure indicates a clogged "Full-Flow" oil filter. Replace filter element.*
Oil Pressure Relief Valve—Mounted in oil pump.

Oil Filter: "Full-Flow" type. All oil enters the lubricating system of engine through filter at full pump pressure. Safety valve in filter opens if element is clogged allowing oil to pass into lubricating system under a reduced pressure of 25-45 lbs.
Filter Element—Chrysler No. 1324999.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is replaced.

Oil Pump: Rotor type. Mounted on rear main bearing cap in crankcase.
Servicing—*See Chrysler Special Data.*

►*OIL PUMP & DISTRIBUTOR DRIVE GEAR INSTALLATION CAUTION: See Chrysler Special Data.*
Priming Oil Pump (After Installation)—Before installing filter assembly, introduce about ½ pint of engine oil into the lower hole of the filter pad with a pressure gun or long nosed oil can.

►*CAUTION—When first starting a new engine or one that has been overhauled, DO NOT EXCEED 650 RPM until oil pressure registers on gauge.*

Oil Pressure Gauge: (1951) Auto-Lite No. (C52) 12479A, (C53, C54) 12466A, (C55) 12461A; (1952) All 12482A. Not electric.

COOLING

Cooling System: Non-Pressure type (under ordinary operating conditions). A pressure vent type radiator cap is used. Under normal operating conditions, pressure is not built up in the system. However, if an abnormal condition develops, such as overheating, or car is driven at excessively high speeds, the valve at the bottom closes, seating against gasket. This action pressurizes the system up to approximately 4 lbs., at which time the valve and seat raise and allow the built-up pressure to escape through the overflow tube.
Pressure Valve—Chrysler No. 1373136. Radiator Filler Cap. Operates at 4 lbs. (see above).
Capacity—25 qts. (without heater).

Water Pump: Packless type with shaft mounted on two ball bearings with lubricant fitting for bearing lubrication.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belts and belt pulley. Remove four bolts attaching pump to water manifold and remove pump.

►*NOTE*—Three drain cocks. One on radiator, one on each engine bank.
Fan Belt Adjustment—Loosen idler pulley pivot bolts and adjust fan to have ½" slack when applying pressure midway between pulleys.
Generator Belt Adjustment—*See "Generator" for adjustment.*

Thermostat: In cylinder head water outlet.

Temperature Gauge: Auto-Lite. Not electric.
C52—(1951 exc. Estate Wagon) No. 12478A & 12600A, (1951 Estate Wagon) No. 12478A, (1952 All) No. 12839A.
C53—(1951 Early) No. 12465A & 12570A, (1951 Late) No. 12596A, (1952) No. 12853A.
C54—(1951) No. 12465A & 12599A, (1952) 12839A.
C55—(1951) No. 12533A & 12601A, (1952) 12839A.

CLUTCH

Borg & Beck Model No. 9.5E (Fluid Drive C52, C54, C55). 10E (Torque Converter—All Models). Single plate, dry disc type.
Identification Note—Assembly No. (9.5E) 1213, (10E) 1211, stamped on cover.
See Clutch Section for complete data.
Facings—Woven type. 2 used. Inside diameter (9.5E) 6", (10E) 6½". Outside diameter (9.5E) 9½", (10E) 10¼". Thickness .125".

Pedal Adjustment: Set pedal to just clear toeboard by loosening locknut and turning stopscrew at lower end of pedal arm above shaft. Set pedal for 1" free travel by turning clutch release fork adjusting nut on connector link at clutch release fork.

►*CAUTION*—Do not disturb turnbuckle on pedal link (controls pedal over-center spring tension).
Clutch Over-center Spring—*See "Clutch Note" in Chrysler Special Data.*

Removal (with Fluid-Matic Drive): Remove transmission (see TRANSMISSION) and unhook clutch release fork pull-back spring. Disconnect one end of clutch fork rod assembly from fork by removing cotter key, pin and two washers. Disconnect other end from clutch release bearing torque shaft by removing cotter key, pin and three washers. (*CAUTION*—As soon as rod assembly is removed, push clutch pedal until over-center spring brings it to floor board. This will avoid danger of injury should pedal be pushed in while linkage is disconnected.) To remove release bearing from clutch fork, do not force bearing and pull-back springs straight off from fork prongs. Pivot the release bearing away from the fork. Assembly and springs will slide off easily. Remove two screws holding shaft pivot bracket assembly to clutch housing. Remove opposite end of pivot bracket assembly from torque shaft. Place jack under engine oil pan to support engine (block of wood between jack and pan). Remove clutch housing-to-cross member bolts, then cross member-to-frame bolts and drop cross member from frame. Jack engine down about three inches so clutch housing is far enough below floorboard to permit removal of housing cap screws. Remove cap screws and housing, and remove clutch assembly from clutch drive plate.

Removal (with Fluid-Torque Drive): Remove oil reservoir from bottom of clutch housing and oil lines from converter support plate before proceding as outlined above.
See Chrysler Fluid-Torque Drive in Transmission Section.

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AUTOMATIC TRANSMISSION

Hydraulically Operated Type (with Fluid Drive & Fluid Torque). New design semi-automatic, four speed transmission with hydraulic actuation and electrical control.

▷*TESTING & TROUBLE SHOOTING: See "Chrysler Automatic" Transmission in Transmission Section.*

▷**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Transmission Control: *See Transmission article for adjustment directions.*
Kickdown Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TGG-4001.
Kick-down Switch—Part of carburetor assembly. *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Ignition Interrupter Switch—On right side of transmission above Governor.
Transmission Oil—3 pints, 10-W engine oil.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, replace drain plug. Disconnect transmission mounting bolts and lower assembly out of car.
INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

▷*OTHER DATA: See "Chrysler Automatic" Transmission in Transmission Section.*

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine.
See Transmission Section for complete data.

Slippage Test—*See 'Fluid Drive" in Transmission Section for complete data.*

Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.

Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

FLUID-TORQUE DRIVE

Own Make. Torque Converter (four element, single stage type). *NOTE—This type has SEPARATE OIL SYSTEM.*

Oil Level: Bottom of filler plug hole. Replenish to this point if fluid is low.
Capacity—10½ qts.

Draining & Refilling: Check every 1000 miles and change oil every 20,000 miles using MOPAR Fluid Drive Fluid. *NOTE—This supersedes previous change interval of 10,000 miles.*
See Transmission Section for complete data.

Removal: *See "Chrysler Fluid-Torque Drive" in Transmission Section.*

UNIVERSALS

Detroit Universal Series 7300—Cross type with roller bearings. Two used (3 on C53, 8 pass., and Limo.).

Propeller Shaft Center Bearing: Used on C53.
See "Propeller Shaft" in Chrysler Special Data.

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive. Barrel type differential with adjustable ring gear thrust pad used.
See Rear Axle Section for complete data.
Ratio—(C52, C53, C54) 3.73-1 (C53) 3.54-1
Backlash—.006-.010". Screw adjustment.
Ring Gear Thrust Pad Setting—Loosen locknut on left side of carrier housing, tighten thrust pad screw finger tight, back screw off ⅛ turn, tighten locknut.

Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.

Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030", thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow" hydraulic, direct acting, non-adjustable type. Service by replacement.

FRONT SUSPENSION

Front Suspension: Independent linked parallelogram type with coil springs and direct acting shock absorbers.

▷*FRONT SUSPENSION PRODUCTION CHANGE & "SHIMMY" CORRECTION—See Front Suspension Section for complete data.*

Kingpin Inclination—(C52, C54, C55) 5° to 6½° (C53) 6½° to 8° crosswise.
Camber—Neg. ⅜° to Pos. ⅜°. (¼-½° higher on left).
Caster—Neg. 1° to Neg. 3°, (Neg. 2° preferred).
Toe-In—0" to 1/16", (0" preferred).
Toe-Out on Turns—Inner wheel 21½° with outer wheel at 20°.

STEERING GEAR

Own Make. Standard (C52, C54, C55), 3 tooth worm-and-roller. Similar to Gemmer Model 335.
See "Gemmer 335" steering gear in Steering Gear Section for complete data.

Power Steering (Hydraguide): Gemmer. Standard (C53), Optional (All others). Gemmer hydraulic steering unit. Oil pump on generator operates piston connected to steering cross-shaft. Controlled through a valve block assembly actuated by steering shaft. *See Steering Gear Section for complete data.*

▷*FRONT WHEEL SHIMMY CORRECTION (Power Steering Cars): See "Chrysler, DeSoto, Dodge, Plymouth Front Suspension" in Front Suspension Section.*

▷*PRODUCTION & REPLACEMENT PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Gemmer Hydraguide" in Steering Section.*

BRAKES

SAFE GUARD TYPE

Service: Chrysler "Safe-guard" Lockheed Hydraulic.
See Brake Section for complete data.

▷*BRAKE SQUEAK OR SQUEAL CORRECTION—See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*
Drums—Centrifuse. Diameter 12".
Lining—Molded asbestos, bonded to shoe. Width 2". Thickness (1951) 3/16", (1952) 13/64". Length per wheel 25⅛".
Clearance—.006" at each end of shoes.
Braking Power—60% front wheels, 40% rear.

Power Brake: Vacu-Ease vacuum power unit.
See Brake Section for complete data.

Hand Brake: On shaft at rear of transmission. Internal type.
Adjustment—*See "Hand Brake Notes" in Chrysler Special Data.*
Drum—Cast iron. Diameter 7".
Lining—Width 2". Thickness 5/32". Two shoes, total length 13 1/16".
Clearance—Adjusting nut on shoe link backed off one notch from point where shoes firm against drum.

DISC TYPE

Service: Hydraulic self-energizing, two-shoe, DISC type. NOTE—No power booster used.
See Brake Section for complete data.
Disc Face Diameter—I.D. 9", O.D. 12".
Lining—Molded asbestos segments (12 used).
Lining—Molded asbestos segments bonded to disc. Thickness (1951) 3/16", (1952) 5/32".

▷**Bleeding Disc Type Brakes**—Manufacturer recommends bleeding all four lower wheel cyls. first, then all four upper ones last.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite "EWJ" electric type.
1951 (Early)—Auto-Lite No. EWJ-4003 (exc. 8 Pass. & Limo.), No. EWJ-4001A (8 Pass. & Limo. only).
1951 (Late) & 1952 (Early)—Auto-Lite EWJ-4001A.
1952 (Late)—Auto-Lite No. EWJ-4007A.
See Miscellaneous Section for complete data.

WINDOW REGULATORS: Auto-Lite Electric type. Windows are individually powered.
See Miscellaneous Section for complete data.

CONVERTIBLE TOP CONTROL: Hydro-Lectric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post. First Serial Nos. as follows:

	Detroit	Los Angeles
1952 Models:		
C51-1 Windsor	70,094,301	65,008,901
C51-2 Windsor Deluxe	70,952,301	67,033,301
1953 Models:		
C60-1 Windsor	70,110,001	65,011,001
C60-2 Windsor Deluxe	71,005,001	67,040,001

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 1 and 2 cylinders.

►***ENGINE NUMBER LETTERS (Following Engine Number)—Identified as follows:***
"A"—ALL Cylinders .020" oversize.
"B"—ALL Crankshaft Journals .010" undersize.
"AB"—BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21 idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .035". Limits plus or minus .001". **Plugs**—Auto-Lite Resistor Type AR8 (1952-53), Type 4S140 (Late 1953), 14 mm. *NOTE*—4S140 is in same heat range as AR8 and can be used for replacement.

DISTRIBUTOR: Auto-Lite (1952) No. IAT-4012, (1953) No. IAT-4102 (U.S. Cars), No. IAT-4012 (Canada). Automatic and vacuum advance type with "pivoted breaker plate."
Breaker Gap—.018-.022" (Set at .020" maximum).
Cam Angle—36-42°. DO NOT exceed breaker gap limits to obtain dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

►***DISTRIBUTOR REMOVAL CAUTION—To avoid damage to No. 3 & No. 4 pistons when removing distributor, make sure that No. 3 & No. 4 pistons are at the top of their stroke.***

COIL: Auto-Lite CR-4001 (U.S. Cars), CR-6007B (Canada), On bracket above distributor.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA.
Capacity—.25-.28 microfarad.

IGNITION TIMING: TDC (Standard Setting). Distributor may be advanced 4° or retarded 4° depending on fuel and altitude.
Timing Mark—On vibration dampener.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter (B&B) Model E9C1 (Synchro-mesh Trans. Cars), Model E9A1 (Auto. Trans. Cars) Downdraft type with automatic choke control.

►***NOTE—Carburetor Specifications are the same for both carburetors, except where noted.***
Idle Setting—Set idle adjusting screw for smooth idling with engine warm (idle screw ½ to 1½ turns open). Turn screw out for richer mixture.
Idle Speed—**(Std. Trans).** Adjust to 6 MPH.
Automatic Transmission—475-500 RPM.
Float Level—Top of float (not soldered seam) 5/64" plus or minus 1/64", below top edge of bowl.
Accelerating Pump—**Normal Setting,** center hole. **Summer,** Inner hole. **Winter,** Outer hole.

Fast Idle: .018" throttle opening with choke valve held closed and throttle stop screw backed off.

Choke Adjustment: Cover 'mark' centered on index. *Do not change setting for hot or cold weather.*

Slow-Closing Throttle: Solenoid type. Non-adjustable.

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approximately ¾ turn, hook end on stop stud.

VALVE TAPPET CLEARANCE: .008" Intake. .010" Exhaust. Engine must be hot and idling. NOTE—Tappet screws self locking. Remove right front wheel and lower wheel housing panel for access to valves.

IGNITION

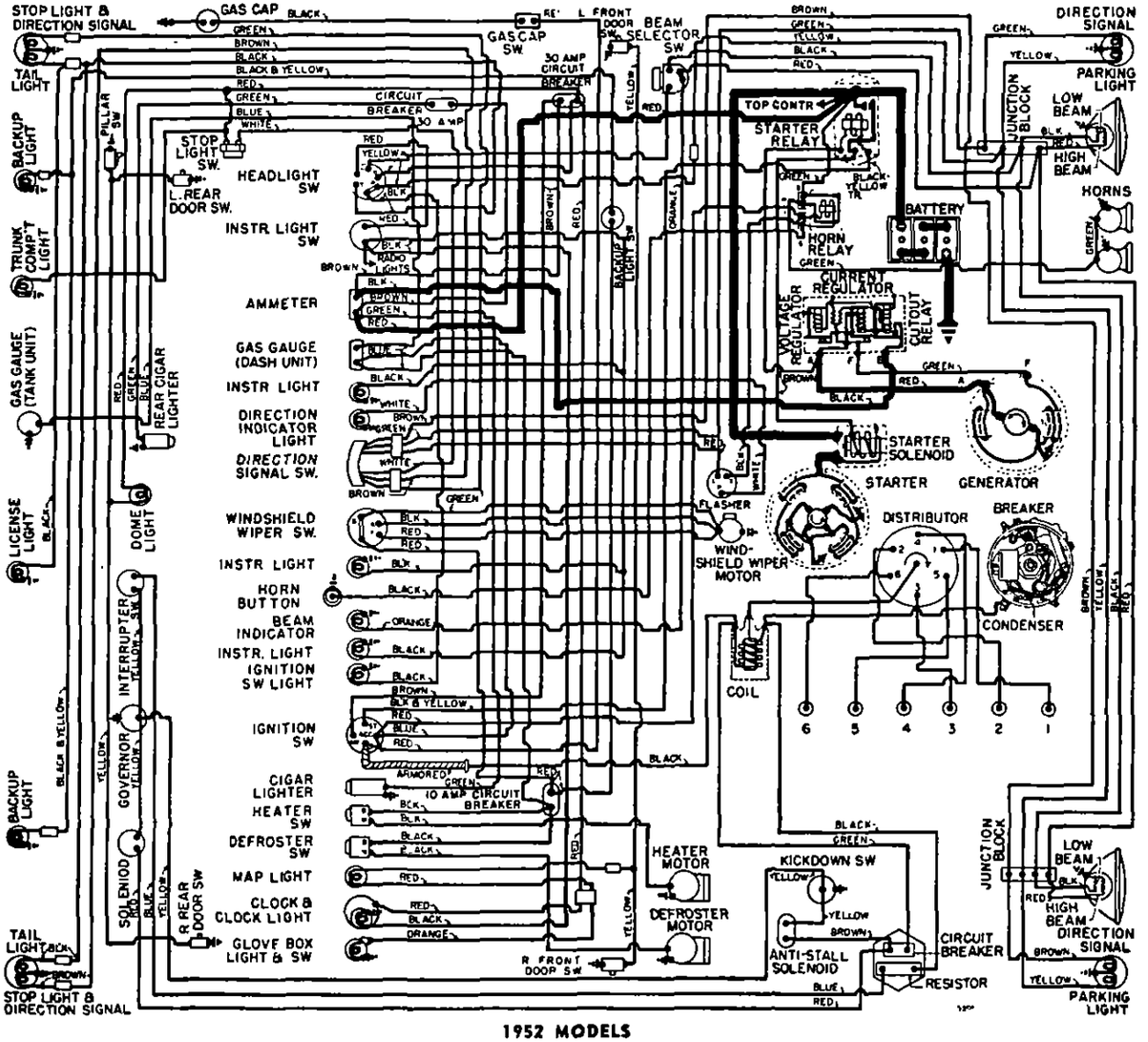
IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "On" position when released.

COIL: Auto-Lite CR-4001 (U.S. Cars), CR-6007B (Canada). On bracket above distributor.
Ignition Current—2.25 amperes idling. 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite (1952) No. IAT-4012, (1953) No. IAT-4102 (U.S. Cars), No. IAT-4012 (Canada). Automatic and vacuum advance type with "pivoted breaker plate."
Breaker Gap—.018-.022" (Set at .020" maximum).
Cam Angle—36-42°. DO NOT exceed breaker gap limits to obtain dwell.

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1952 MODELS

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Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise view from above.

Automatic Advance—IAT-4012, 4102

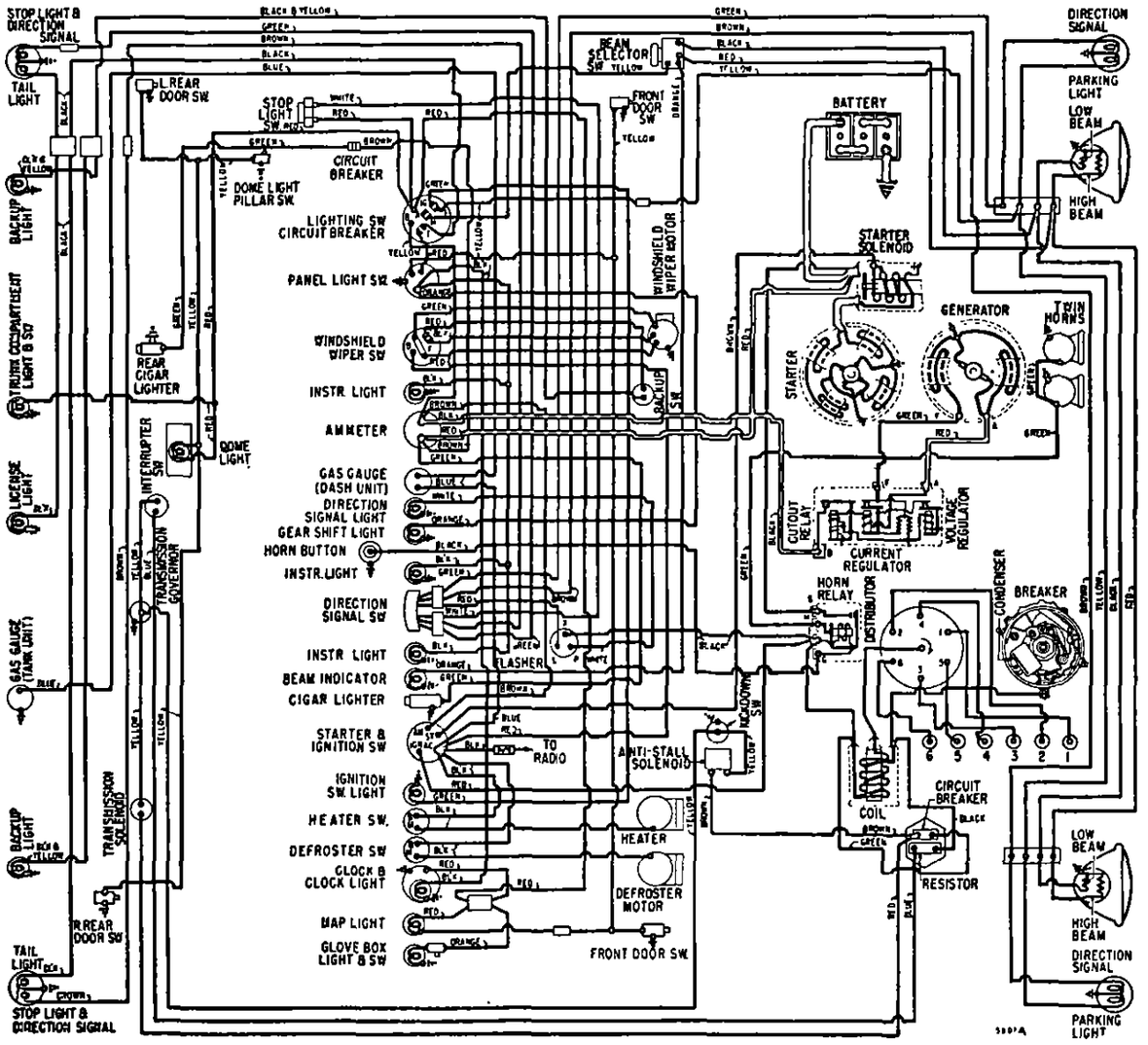
Distributor Degrees	RPM	Engine Degrees	RPM
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAT-4012, 4102

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7¼"
4°	8°	9⅜"
6°	12°	11⅝"
9°	18°	15"

▷***DISTRIBUTOR REMOVAL CAUTION—To avoid damage to No. 3 & No. 4 pistons when removing distributor, make sure that No. 3 & No. 4 pistons are at the top of their stroke.***



1953 MODELS

IGNITION TIMING

Setting ..... **TDC**

NOTE—This is standard setting for regular non-premium fuel at sea level. See Manual Adjustment (following):

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor by loosening lockplate hold-down screw and centering pointer on scale, tighten screw. Loosen lock plate clamp bolt, rotate distributor until correct mark in line with pointer.

Manual Adjustment—Set to give slight ping between 10-30 MPH when accelerating from 10 MPH with wide open throttle. Adjust distributor (not over 4° before or after initial setting).

CARBURETOR

Carter (Ball & Ball)—Model E9C1 (Synchro-mesh Trans. Cars), Model E9A1 (Automatic Trans. Cars). 1½" single barrel down-draft type. Slow closing throttle and Kick-down Switch used for hydraulic operated transmission.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level and Accelerating Pump): ***See Tune-Up.***

Metering Jet—***See Carter (B&B) Jet Table in Carburetor Section for complete data.***

Slow Closing Throttle: Solenoid type. Non-adjustable.

See Carburetion Equipment Section for complete data.

Fast Idle: Setting .018" throttle opening with choke valve held closed and throttle stop screw backed off.

Automatic Choke: *Carter Climatic Control.*

Setting—Centered (coil housing at index mark). ***Do not change setting for hot or cold climate.***

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC Heavy Duty Oil-bath type. Replacement Filter Element AC No. 21.

Fuel Pump: Carter No. M-639SL, SZ, SA. Vacuum diaphragm type.

Pressure—3½ to 5 lbs.

See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oillite metal filter in tank.

Servicing—If more than 2 pints of water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit—Auto-Lite No.	Early 1952	1952-53
All exc. Estate Wgn.	12462A	12841A
Estate Wagon	12463A	12847A
Tank Unit—Auto-Lite No.	1952	1953
All exc. Estate Wgn.	11538A	12617A
Estate Wagon	12195A	12195A
8 Pass. Sedan		11538A

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 2H-120-D or Willard HW-2-120C. 6 Volt, 17 Plate, 120 Ampere Hour (20 hr. rate).

Grounded Terminal—Positive to engine.

Location—Under hood on left fender shield.

STARTER

Auto-Lite MCL-6109 (First 1952 Cars), MCL-6116 (Late 1952 Cars), MCL-6117 (1952 Hydra-guide & All 1953 Cars).

Armature No.—Auto-Lite MCH-2070 (All models).
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—*42-53 ozs. (new brushes).*

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid No. SSX-4003 (Early 1952 & All 1953), SSX-4002 (Late 1952). Combination solenoid pinion shift and starting switch controlled by ignition switch (by turning key past "on" position) with SEPARATE relay on Fluid Torque Drive Cars only.
Starter Relay—Auto-Lite No. HRW-4001 (Early 1952), No. HRW-4001A (Late 1952 & 1953).
See Electrical Equipment Section for complete data.
►**Neutral Safety Switch (1953 Fluid Torque Drive Cars):** Connected in relay-to-regulator line so that starter operative only with gear selector lever in Neutral.

GENERATOR

Auto-Lite. Two brush type with voltage and current regulation.

Auto-Lite Gen. No.	1952	1953
Standard	GGW-6001J	GGW-6001K
Auto. Trans.	GGU-6001V	
Hydraguide (Early)	GGW-6007B	GGW-6008B,D GGJ-6004A,B,C,D GGU-6006B,C
Hydraguide (Later)	GGW-6008B	①GGW-6008G ①GGU-6006G,H
Police	GGJ-6001F,G GGU-6001G,R	GGJ-6001F,G GGU-6001G,H

①—With Single V-belt pulley.
Charging Rate Adjustment—None. See Regulator.

Performance Data—GGJ

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Performance Data—GGU

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850
50	8.0	1550-1750	1750-1950

Performance Data—GGW

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GGU) 35-53 ozs., (GGJ) 30-37 ozs. with new brushes.
Field Current—(GGW) 1.4-1.5 amperes, (GGJ & GGU) 1.4-1.6 amperes, all at 5.0 volts.
Motoring Current—(GGW) 4.8-5.3 amperes, (GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, all at 5.0 volts.
Belt Adjustment: ¼" belt deflection or 40-50 lbs. tension with scale attached to field frame.

REGULATOR

Auto-Lite—Voltage and current type, "Temperature Compensated" Current regulator.

Auto-Lite Regulator No.	Generator
VBE-6001A	All "GGW" Gen.
VBF-6001A & VBF-6002A①	All "GGJ" Gen.
VAV-6001B & VAV-6002B①	All "GGU" Gen.

①—For Negative Ground.

Cutout Relay
Cuts In—6.3-6.8 volts.
Cut Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—*.015" minimum.*
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—(VBE & VAV) 7.1-7.4 volts (VBF) 7.15-7.45 volts at 70°F. after 15 minutes operation charging at ½ maximum rate (VBE & VAV), 10 amperes (VBF).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator
►***SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.***

Test A—Operating Amperes—Test B	
All "VBE" Reg.	52 — 45 (43-47)
All "VBF" Reg.	66 — 55 (53-57)
All "VAV" Reg.	55 — 50 (48-52)

Test A—After 15 minutes operation charging at 10 amperes (VBF), ½ maximum rate (VBE & VAV).
Test B—After aditional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-7.0 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

►***EARLY 1953 CARS CAUTION: 1952 type Lighting Switch and SEPARATE Lighting Circuit Breaker used on some early 1952 cars. See data below and 1952 Wiring Diagram for these cars.***
Headlamps: "Sealed Beam" type with "Bulls-eye" lens. *See Electrical Equipment Section for data.*
Beam Indicator—Lighted when upper beam in use. Located on lower right corner of speedometer face.
Directional Signal: *See Electrical Equipment Section.*
Directional Signal Indicator—In lower left corner of speedometer dial.

Switches
Lighting—Chrysler (1952) 1339691, (1953) 1495860.
Beam Selector—Chrysler No. 1253003.
Instrument—Chrysler No. 1383903.
Directional Signal—Chrysler No. (1952) 1370454, (1953) 1495297.

MISC. ELECTRICAL

CIRCUIT BREAKERS (1952): Lighting—30 ampere. Mounted on rear of instrument panel to left of ammeter. Protects Headlights, Tail & Stop Lights, and Instrument panel lights.
Accessory Circuit Breaker—8 amperes. Mounted on rear of instrument panel to right of fuel gauge. Protects Back-up Light, and Windshield Wiper Motor.

CIRCUIT BREAKER (1953): In headlight switch assembly. Two 10 amperes, and one 20 amperes circuit breakers protect headlight, tail & stop light, accessory and interior lighting circuits. Back-up lights protected by windshield wiper circuit breaker.
►***CAUTION—See "Early Cars Caution" under LIGHTING for SEPARATE Circuit Breaker used on first cars.***

FUSES: Clock—2 amperes. In clock lead wire.
Radio—14 amperes. In fuse connector at radio.

HORNS: Auto-Lite. Twin horns with relay.

Auto-Lite No.	Low Pitch	High Pitch
1952	HW-4203	HW-4204
1953 (Early)	HW-4107	HW-4108
1953 (Late)	HAB-4103	HAB-4104

Horn Relay: Auto-Lite No. HRL-4104. Connected through ignition switch, operates only when ignition "ON."
Contacts Close—*1.5-3.0 volts (seal to core with 4.0 volts maximum).*
Contacts Open—.5 volts min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder "L" head
Bore—3 7/16". **Stroke**—4¾".
Displacement—264.5 cu.in. **Rated HP**—28.36.
Developed Horsepower—119 at 3600 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*
ENGINE REMOVAL: *See Chrysler Special Data.*
OIL PAN REMOVAL: *See Chrysler Special Data.*
CYLINDER HEAD & TIGHTENING TORQUES: *See Chrysler Special Data.*
►***MANIFOLD INSTALLATION CAUTION: See "Manifolds" in Chrysler Special Data.***
►***CRANKSHAFT REAR MAIN BEARING PRODUCTION CHANGE & REPLACEMENT CAUTION: See CRANKSHAFT below.***
PISTONS: Aluminum alloy, U-slot, cam ground type.
►***CYLINDER BORE OVERSIZE CAUTION—Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.***
Weight—18.5 ozs. (Stripped).
Clearance—.0005-.0010", ¾" from piston bottom.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002 x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 6-9 lbs., at room temperature (70°F).
Replacement Pistons: Furnished Std., .005", .020", .030", .040", .060" Oversize. *See "Pistons" in Chrysler Special Data.*
►***NOTE***—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" requires reboring and honing to above limits.
Installing Pistons: Slot away from camshaft.
PISTON RINGS: Two compression, 2 slotted oil rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil (#3, 4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down if step on outer edge).
Replacement Rings: Std., .005", .020", .030", .040", .050", .060" Oversize. *See "Piston Rings" in Chrysler Special Data.*
PISTON PIN: Diameter—55/64". **Length**—2⅞". Floating type with locking ring at each end.
Pin Fit in Piston—.0000-.0005". DOUBLE THUMB push fit at room temperature (70°F.).
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at room temperature (70°F).
Replacement Pins: Std. & .003", .008" O.S.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CONNECTING ROD: Length—7⅞". Weight—32.4 ozs.
Crankpin Journal Diameter—2.124-2.125".
▷*JOURNAL DIAMETER CAUTION—(ONE OR MORE journals machined UNDERSIZE)—See "CRANKSHAFT" below.*
Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015" desired. Maximum—.0025".
Sideplay—.006-.011".
Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Chrysler Special Data.*
Replacement Bearings: Std., .001", .002", .010", .012", .020", .030", .040", Undersize.
Installing Rods: Oil metering hole toward camshaft.
CRANKSHAFT: 4 bearings with vibration damper.
▷*REAR MAIN BEARING PRODUCTION CHANGE (Fluid Torque Drive Cars Beginning Eng. No. C-53-32527):* New type bearing (Part No. 1450665—Std.), used in production and MUST BE USED for replacement on Fluid Torque Drive Cars. This bearing should be installed in all replacement engines for cars with Fluid Torque Drive.
IDENTIFICATION NOTE—Bearing has single oil groove (in center of bearing surface) and upper and lower bearing halves are identical in appearance.
Journal Diameters—2.4995-2.5005".
▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Engines with undersize journals identified as follows:*
.010" UNDERSIZE (ALL Main & Connecting Rod Journals)—Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (⅜") stamped on the machined surface at the upper right hand corner of the block (adjacent to front cylinder exhaust port) to signify that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the crankshaft center counter-weight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).
Bearing Type—Removable, precision type, thin babbit on steel. No shims.
Clearance—.0005-.0015".
Bearing Adjustment: None. Replace bearings. *See "Crankshaft & Main Bearings" in Chrysler Special Data.*
Replacement Bearings: Furnished Std., .001", .002", .010", .012", .020", .030", .040", Undersize.
Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*
End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**—.003-.007".
CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—(1) 2"; (2) 1 31/32"; (3) 1 15/16"; (4) 1 1/4".
Bearing Type—Removable steel backed babbitt lined bushings (except #4 machined in block).
Clearance—.0015-.0035". NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry cam toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.
Camshaft Removal—*See "Camshaft & Bearings" in Chrysler Special Data.*
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Timing Chain: Width 1". Pitch .500". Length 24".
Timing Chain Removal—*See "Timing Chain" in Chrysler Special Data.*
Camshaft Setting: Sprockets marked. Mesh chain with sprockets so that "O" marks on sprockets are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.718"	.3405-.3415"	4 27/32"
Exhaust	1.531"	.3395-.3405"	4 27/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.365"	.001-.003"
Exhaust	45°	.365"	.002-.004"

Valve Seat Width—7/64" maximum.
Valve Seat Insert (Exhaust)—Removal & Installation. *See "Valve System" in Chrysler Special Data.*
Valve Guides: Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (Tool CM-83), finish ream to give correct valve stem clearance (See Valve Stem Clearance above).
Valve Springs: Install with closely coiled end up.
Free Length—2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	110-120 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below).
Stem Diameter—.6235-.6240". Ream holes from above (pilot in guide). **Oversizes** .001", .008", .030".
Lifter Clearance in Block—.0000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust (hot and idling). NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance, No. 6 intake valve should open with No. 6 piston with range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on timing chain cover case. Reset tappet clearance.

LUBRICATION

Engine Oiling System: Pressure through "Full-flow" oil filter to main and connecting rod bearings, camshaft bearings and timing chain.
Crankcase Capacity (Fl. Dr. Cars)—5 qts. refill.
Crankcase Capacity (Fluid-Torque Cars with COMBINED Fluid Torque & Eng. Oil System)—13 qts. *See "Chrysler Fluid-Torque Drive" in Transmission Section for complete Lubrication data.*
Normal Oil Pressure—40-60 lbs. at 40-50 MPH with warm oil. (40-65 lbs., with torque converter).
▷*OIL PRESSURE CAUTION—Oil pressure will drop to 25-40 lbs. WHEN FILTER ELEMENT IS CLOGGED. Replace filter element.*
Oil Pressure Relief Valve—Oil pressure relief valve opens at 40-60 lbs. Under plug on left side of crankcase ahead of the oil line to provide additional oil at idling speeds. Adjustable by replacing spring (3 types). (1) Standard Spring painted BLUE. (2) Lighter than Standard painted RED. (3) Heavier than Standard GREEN. *CAUTION—Replace spring with new spring of same color.*
Oil Pan Removal: *See Chrysler Special Data.*
Oil Pump: Rotor type on right side of crankcase.
Oil Pump Overhaul—*See Chrysler Special Data.*
Removal—Remove distributor cap and turn engine over until #1 cylinder is in firing position (allow engine to remain in this position while pump off engine). Remove two oil pump Allen-head screws.
Oil Filter: "Full-flow" type. All oil (including torque converter oil on Fluid Torque Drive Cars) passes through filter before entering engine oil channels. Safety valve in filter will open, if element is clogged, allowing oil to pass directly to engine.
Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required).
▷*OIL FILTER CAUTION—If oil pressure drops to 25-40 lbs., FILTER IS CLOGGED. Replace filter element.*
Oil Pressure Gauge: Auto-Lite (not electric).

Auto-Lite No.	First Cars	Later Cars
1952	12461A	12482A
1953	12842A	13209A

COOLING

Cooling System: Positive circulation with pump on front of engine. By-pass thermostat, and water distributor tube in cylinder block behind pump.
Pressure Valve—Chrysler No. (1952) 1346849, (1953) 1373136. Radiator Filler Cap. Opens at 7 lbs.
Capacity—15 quarts. (16 quarts with heater).
Radiator Removal: *See Chrysler Special Data.*
Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for complete data.*
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs. Remove pump.
Belt Adjustment: See Generator Belt Adjustment.
Thermostat: By-pass type in cyl. head water outlet.
Setting—Starts to open 157-162°. Fully open 183°
Temperature Gauge: Auto-Lite (not electric).
Auto-Lite No. (Early 1952) 12792A, (Late 1952 & 1953) 12839A.

CLUTCH

Borg & Beck	Model	Assy. No.
Synchro-mesh Cars	10A7	1331
Fluid Dr. & Auto. Trans.	9A7	1329
Fluid-Torque Drive	9.5E	1220

See Clutch Section for complete data.
Facings—Molded woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
9.5E	6"	9¼"	.125" (⅛")

Pedal Adjustment: Adjust stop screw on lower end of pedal and adjusting nut on connector link at fork.
Pedal Free Play (at outer end of clutch fork)—⅛" to 5/32". (At Pedal Pad)—1" to 1⅛".
Removal: Remove release fork pull-back spring. Remove Transmission (See Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, assembly.
Clutch Over-center Spring—*See "Clutch Notes" in Chrysler Special Data.*

FLUID DRIVE

Chrysler—Fluid coupling at rear of engine. Optl. *See Transmission Section for complete data.*
Slippage Test: Maximum engine RPM should be 1100

RPM in direct drive with car stationary and engine properly tuned up. If speed higher, check for leakage low oil level. Use Mopar Fluid Drive Oil.
See "Fluid Drive" in Transmission Section for data.
Removal: Remove Transmission and Clutch (See Transmission Removal), take off driver flange stud nuts (Tool C-589), lower fluid coupling out.

FLUID-TORQUE DRIVE

Own Make. Four element, single stage type Torque Converter used with hydraulically-operated transmission. *Torque Converter unit cannot be disassembled and should be replaced if repairs necessary.*
►*1953 FLUID TORQUE REACTION & TURBINE SHAFT PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION: See "Chrysler Fluid-Torque Drive" in Transmission Section.*
►*FLUID TORQUE NOTE:* Oiling system is combined with that of the engine and no separate oil pump or oil reservoir is used. Torque converter is fed from engine oiling system through a main oil gallery opening at the rear of the block into the torque converter housing inlet oil passage. Pressure is regulated by ball regulator valve in turbine shaft.
See "Chrysler Fluid-Torque Drive" in Transmission Section for complete data.
Oil Level: Maintain engine oil level at correct level as indicated on engine oil level dipstick.
Draining & Refilling: Drain and refill twice each year (Spring and Fall) or as required by seasonal temperature changes. Special driving conditions will require more frequent oil changes.
►*CAUTION—CHANGE FILTER ELEMENT EVERY 5000 MILES. See Lubrication.*
Removal: *See "Chrysler Fluid-Torque Drive" in Transmission Section.*

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse). *See Transmission Section for complete data.*
Transmission Control: Manual steering column shift.
See Transmission Section for complete data.
Removal: Jack up front of car, disconnect front universal (loosen companion flange nut if disassembling transmission—See Chrysler Special Data for Propeller Shaft Center Bearing Removal on 8-pass.). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove transmission-to-clutch housing cap screws and nuts. Pull unit to rear, down and out of car. NOTE—Use pilot studs when installing assembly.

AUTOMATIC TRANSMISSION

Fluid-Matic Drive (with Fluid Coupling), Fluid-Torque Drive (with Torque Converter). Semi-automatic 4-speed transmission with hydraulic actuation.
See Transmission Section for complete data.
►*TRANSMISSION SELECTOR LEVER ADJUSTMENT (To correct difficult shifting)—See Transmission Section for complete data.*
►*TESTING & TROUBLE SHOOTING: See Transmission Section.*
Capacity—3 pints, 10-W engine oil.
Transmission Control: *See Transmission Section.*
Kickdown Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TGG-4001.
Neutral Safety Switch (Fluid-Torque Drive)—Chrysler No. 1440209.
Kick-down Switch—Part of carburetor assembly.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gear shift rods at transmission. Drain Transmission, REPLACE DRAIN PLUG. Disconnect transmission mounting bolts and lower assembly out of car.
►*INSTALLATION CAUTION*—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting.
►*OTHER TRANSMISSION SERVICE DATA: See Transmission Section.*

UNIVERSALS

Detroit Universal. Cross type with roller bearings.

Propeller Shaft Center Bearing: Used on 8-Passenger.
See Chrysler Special Data.

REAR AXLE

Own Make. Semi-floating hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

1952 Ratios:	Except 8 Pass.	8 Pass. & Sta. Wgn.
Std. & Fluid-Matic	3.9-1 (39-10)	3.73-1 (41-11)
Fluid-Torque Cars	4.1-1 (41-10)①	3.73-1 (41-11)

1953 Ratios:	Except 8 Pass.	8 Pass. Cars
Std. & Fluid-Matic	3.9-1 (39-10)	4.1-1 (41-11)
Fluid-Torque Cars	3.73-1 (41-11)	3.91-1 (43-11)

①—3.54-1 (39-11) on Sta. Wgn. models.
Removal: Disconnect rear universal, remove axle shafts (see below), and carrier assembly capscrews. Withdraw carrier assembly from housing.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at brake cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (Use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.
Axle Shaft Outer Seal: Leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle Notes" in Chrysler Special Data.*
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow." Direct acting, hydraulic type. Serviced by replacement.

Chrysler No.	Front	Rear
1952 (Early)	1321127	1321128
1952 (Late)	1326164	1321128
1953	1326164	1326165
1952-53 H.D. (exc. 8 Pass.)	1450041	1450039
1953 H.D. (8 Pass.)	1450346	1326166

FRONT SUSPENSION

Front Suspension: Independent linked parallelogram with coil springs, direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5° to 6½° with 0° camber.
Camber—Neg. ⅜° to Pos. ⅜° (left ¼°-½° higher).
Caster—Neg. 1° to Neg. 3°. (Neg. 2° preferred).
Toe-In—0" to 1/16". (0" preferred). Adjust both tie rods equally.
Toe-Out on Turns—Inner wheel 21½°, plus or minus 1°, with outer wheel turned 20°.

STEERING GEAR

Std. Steering Gear: Own (similar to Gemmer 335). Three-tooth Worm and Roller type.
See Steering Gear Section for complete data.
Power Steering (Hydraguide): Gemmer. Optional equipment on all models. Gemmer hydraulic steering unit with engine driven hydraulic pump.
►*POWER STEERING "HIGH SPOT" OR "LUMPY" FEELING AT OR NEAR STRAIGHT-AHEAD POSITION: See "Gemmer Hydraguide" in Steering Section for complete data.*
►*FRONT WHEEL SHIMMY CORRECTION (Power Steering Cars): See "Chrysler, DeSoto, Dodge, Plymouth Front Suspension" in Front Suspension Section.*
►*PRODUCTION & REPLACEMENT PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Gemmer Hydraguide" in Steering Section.*

BRAKES

Service: Chrysler "Safe-Guard" Lockheed hydraulic.
Front Wheels—Two cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top, actuated by lower).
Rear Wheels—Double anchor with single cylinder.
See Brake Section for complete data.
Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).
Drums—Centrifuse. Diameter 12".
Lining—Molded Asbestos. 2" wide, 13/64" thick.
Length Per Wheel—25⅛".
Clearance—.006" at each end of all shoes.
Braking Power—60% (front), 40% (rear).
Hand Brake: On shaft at rear of transmission. 6" external contracting band used with Synchro-mesh Trans. 7" Internal expanding with Auto. Trans.

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Int. Type	2"	5/32"	13 1/16"

Clearance (External Type): .015-.020" around band.
Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".
Adjustment—*See "Hand Brake Notes" in Chrysler Special Data.*
Brake Power Unit: Chrysler Vacu-ease Vacuum Power unit.
See Brake Section for complete data.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite electric type.
1952 Models—Auto-Lite No. EWJ-4001A (First Cars), No. EWJ-4007A (Later Cars).
1953 Models—Auto-Lite No. EWJ-4008, EME-4001, or EMG-4101 (First Cars), No. EMG-4103 (Later Cars).
►*WINDSHIELD WIPER PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION ON EARLY TYPE: See "Auto-Lite Electric Windshield Wiper" in Miscellaneous Section.*
WINDOW REGULATORS: Auto-Lite Electric Type.
See Miscellaneous Section for complete data.
CONVERTIBLE TOP CONTROL: Hydro-Lectric type.
See Miscellaneous Section for complete data.

▷*MODEL C59 ELECTRICAL SYSTEM CAUTION—12 VOLT system used on this model and special 12-volt units used except as noted below.*

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

	Los Angeles	Detroit
C-56-1 New Yorker	67,040,001	76,540,001
C-56-2 New Yorker Deluxe	69,001,001	7,222,001
C-58 Custom Imperial		7,765,001
C-59 Crown Imperial		7,816,001

ENGINE NUMBER: Stamped on boss on top front side of block just back of water pump.

▷*ENGINE NUMBER LETTERS & MARKS (Following Engine Number)—Identified as follows:*
"A"—ALL Cylinders .020" oversize.
"B"—ALL Crankshaft Journals .010" undersize.
"AB"—BOTH above conditions exist.
"MALTESE CROSS" (⅜" high)—ONE OR MORE Crankshaft Journals .001" Undersize. *See "Connecting Rods" & "Crankshaft" (below).*
"DIAMOND" (⅜" high)—All Valve Lifters .008" Oversize.

TUNE-UP

COMPRESSION PRESSURE: 135 to 165 lbs. at 150 RPM. cranking speed (min. pressure 90 lbs., max. variation between cylinders 15 lbs.).

VACUUM READING: Steady 18-21" idling.

FIRING ORDER: 1-8-4-3-6-5-7-2. See diagram.
Cylinder Numbering—Left bank 1-3-5-7. Right bank 2-4-6-8.

SPARK PLUG GAPS: .035".
Plugs—Auto-Lite Resistor Type 4S140. 14 mm.

DISTRIBUTOR: Auto-Lite No. IAZ-4001B. Double breaker type with automatic advance and vacuum spark control. *NOTE—Same distributor used on 6 volt and 12 volt models.*
Breaker Gap—.015" to .018".
Cam Angle—26-28° (One set points). 32-36° (Total Dwell). Set both points alike.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite (6 volt Exc. C-59) CR-6015. (C-59) CZ-4001 *12 Volt Type.*
Ignition Current—(CR-6015 6 volt) 2.25 amperes idling, 5 amperes stopped. (CZ-4001 12 Volt) 2.2 amperes idling, 3 amperes stopped.

CONDENSER: Auto-Lite No. IAU-3076LA.
Capacity—.25-.28 microfarad.

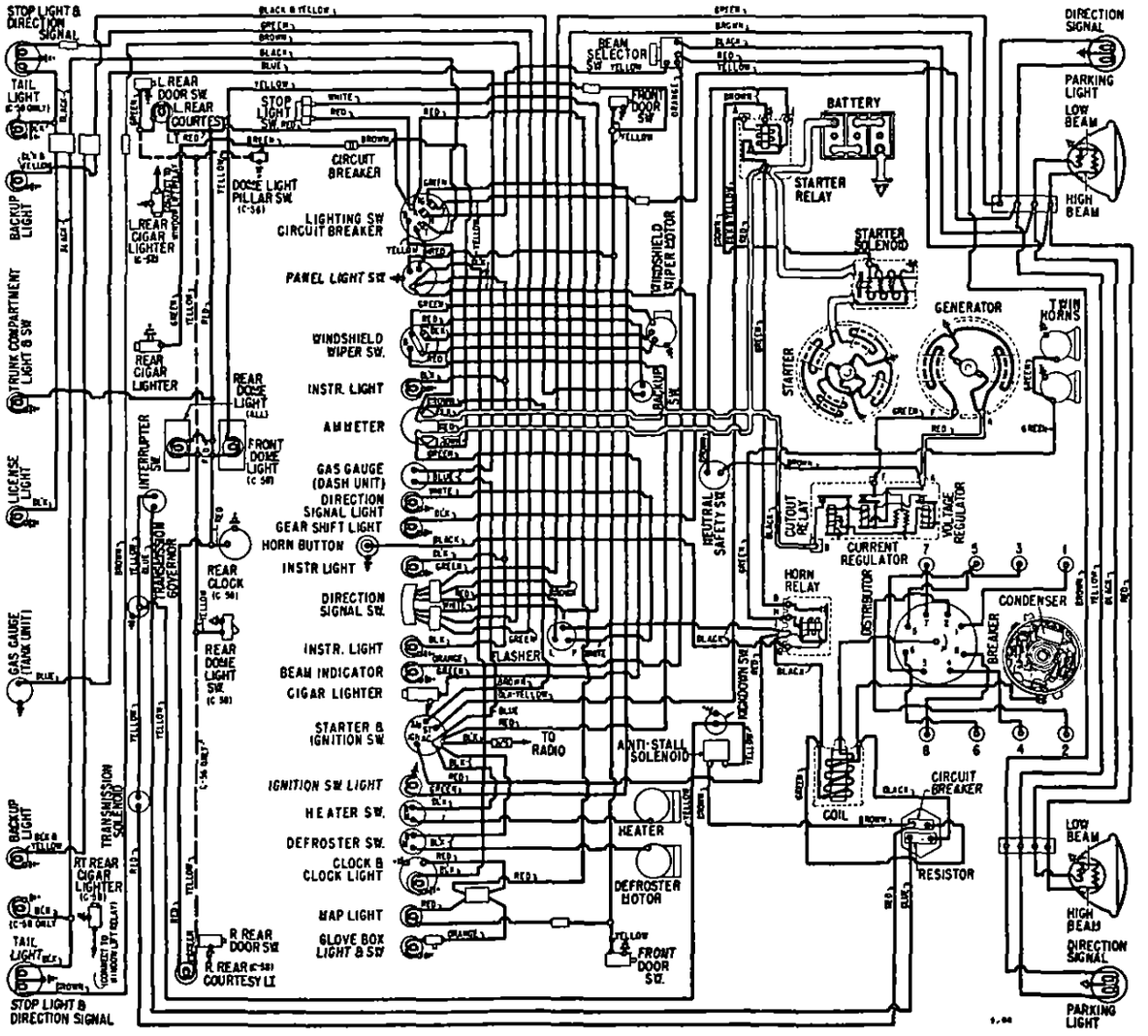
IGNITION TIMING: 4° BTDC. See Man. Adjustment.
Timing Mark—4th graduation before "DC" mark on vibration dampener in line with pointer on chain case cover. NOTE—Dampener has 15-1° graduations on each side of top dead center "DC" mark.
Manual Adjustment—Adjust distributor to give slight ping in 15-30 MPH. range when accelerating from 15 MPH. in fourth gear with wide open throttle. CAUTION—Do not set timing more than 4° early or 4° later than specified setting.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter WCD (C56 & C58) No. 935S & 935SA, (C59) No. 992S, (C58 & C59 with PowerFlite Trans.) No. 2039S & 2039SA. Dual downdraft type with Climatic Control, Fast Idle, and Slow-closing Throttle Dashpot.

▷*NOTE—Carter No. 992-S carburetor has a 12 volt dashpot magnet.*

▷*CARBURETOR REMOVAL CAUTION: Drain 3 to 4 gallons of water from cooling system before removing carburetor from engine.*
Idle Setting—Set idle adjustment screws for smooth idling with engine warm (idle screws ½ to 1 turn open), turn screws out for richer mixture. Adjust both screws alike.
Idle speed—500 RPM. Transmission shift lever in neutral position.
Float Level—11/64" between top of float and machined surface of cover casting. Use Gauge T109-205 for correct vertical and lateral adjustment.
Accelerating Pump—Outer hole (long stroke) Normal setting.
Fast Idle: .017-.021" throttle opening (Gauge T109-44) with choke valve tightly closed. Adjust by turning fast idle adjusting screw.
Slow Closing Throttle: After carburetor adjustments completed, turn dashpot travel adjusting screw (on actuating arm on throttle shaft) until dashpot plunger can be moved in approximately 1/16" from normal position against actuating arm. This will provide maximum dashpot action.
Choke Setting: Centered (at index).
Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. *NOTE*—Shaft must rotate freely in bushings without excessive free play. If clearance between shaft and bushing exceeds .002-.005" clearance, replace necessary parts.



MODELS C56 & C58 V8 (6 VOLT SYSTEM)

►*CAUTION—Do not install control valve with counterweight toward rear of engine.*
See "Manifold Heat Control" in Chrysler Special Data.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition starter switch. Starter operates when key held fully right. Key automatically returns to "on" position when released.

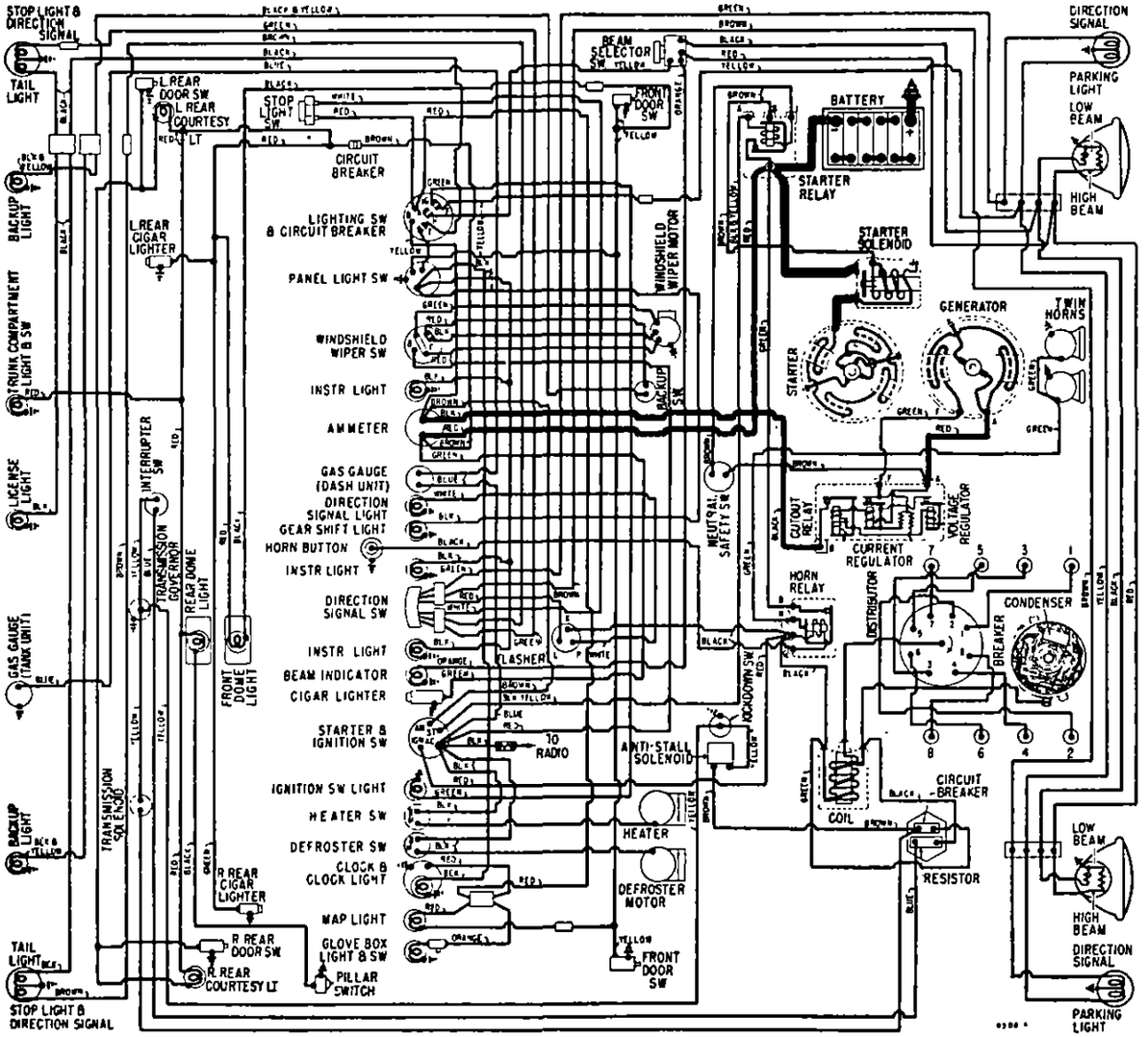
COIL: Auto-Lite (C56 & C58-6 volt) No. CR-6015. (C59) No. CZ-4001. *12 Volt type.*
Ignition Current—(CR-6015 6 volt) 2.25 amperes idling, 5 amperes stopped. (CZ-4001 12 volt) 2.2 amperes idling, 3 amperes stopped.

CONDENSER: Auto-Lite No. IAU-3076LA.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAZ-4001B. Double breaker type with automatic advance and vacuum spark control.

►*12 VOLT NOTE—Same distributor used for both 6 volt and 12 volt systems.*

Breaker Gap—.015-.018".
Cam Angle—26-28° (one set points), 32° to 36° (Total Dwell). Set both points alike.
Breaker Arm Spring Tension—17-20 ozs.



MODEL C59 V8 (12 VOLT SYSTEM)

Rotation—Clockwise viewed from above.

Automatic Advance

Start	400	0°	800
1°	525	2°	1050
6°	1150	12°	2300
10°	1650	20°	3300
11°	1775	22°	3550

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5¼"
1°	2°	6"
5°	10°	9¼"
10°	20°	14⅞"
11.5°	23°	17"

Installation (and Basic Distributor Timing)—Rotate Crankshaft until No. 1 cylinder is at TDC (firing position) and pointer on timing chain case cover over "DC" mark on vibration damper. Use tool C-327 and position the oil pump shaft so that it lines up with the slot in the drive gear. Coat the drive gear shaft with engine oil and install so that after the gear spirals into place, it will index with the oil pump shaft, and the slot in the top of the drive gear will be parallel with the centerline of the crankshaft.

IGNITION TIMING

Std. Setting ..... **4° BTDC**
See Distributor Installation (and Basic Timing) above.

Timing Mark—4th graduation before "DC" mark on vibration damper in line with pointer on chain case cover. NOTE—Damper has 15-1° graduations on each side of top dead center "DC" mark.

Manual Adjustment—Adjust distributor to give slight ping in 15-30 MPH range when accelerating from 15 MPH in fourth gear with wide open throttle. CAUTION—Do not set timing more than 4° early or 4° later than specified setting.

Timing (Using Synchroscope)—Mark correct graduation on vibration dampener with white chalk. Connect one lead of synchroscope to #1 spark plug wire at the distributor (Using Tool C-3066 Adapter). Connect other lead to negative terminal of battery and direct the light on vibration damper. Idle engine and rotate distributor (clockwise to retard, counter-clockwise to advance) until pointer is aligned with chalk mark on vibration damper. Tighten lock plate clamp.

Manual Adjustment—Adjust distributor to give slight ping when accelerating from 15 MPH with wide open throttle in fourth speed. NOTE—Do not set timing more than 4° early or 4° later than initial setting.

CARBURETOR

Carter WCD (C56 & C58) No. 935S & 935SA, (C59) No. 992S, (C58 & C59 with PowerFlite Trans.) 2039S & 2039SA. Dual downdraft type with Climatic Control, Fast Idle, and Slow Closing Throttle Dashpot.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jet—*See Carburetor Section for "Carter Carburetor Jet Specification Table."*

Slow Closing Throttle: Solenoid type. After carburetor adjustments completed, turn dashpot travel adjusting screw (on actuating arm on throttle shaft) until dashpot plunger can be moved in approxi-

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mately 1/16" from normal position against actuating arm. This will provide maximum dashpot action.
See Carburetion Equipment Section for complete data.

Fast Idle: Carter Dual (WCD) type.
Setting—.017-.021" throttle opening (Gauge T109-44 with choke valve tightly closed). Adjust by turning fast idle screw.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.
Setting—Centered with index mark on air horn.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Heavy Duty oil bath type.

Fuel Pump: Carter No. M-840-S. Diaphragm type.
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oilite metal filter in tank.
Servicing—If more than two pints of water in tank, fuel will not pass filter. Remove filler cap and drain plug, drain tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. 12841A (C56 & C58 Exc. C56 Estate Wgn.), **No. 12847A** (C56 Estate Wgn.), **No. 13087A—12 Volt** (C59).
Tank Unit—Auto-Lite No. 12618A (C56 & C58 except C56 Estate Wgn. & 8 Pass.), **No. 12195A** (C56 Estate Wgn.), **No. 11538A** (C56 8-Pass.), **No. 13089A—12 Volt** (C59).
See Carburetion Equipment Section for complete data.

BATTERY

►*NOTE—12 Volt battery used on C59.*
C56 & C58)—Auto-Lite 2H-135-RD or Willard MW-135-R. 6 Volt, 19 Plate, 135 Ampere Hour.
(C59—12 Volt) Auto-Lite 12H-65-R. 12 Volt, 13 Plates, 65 Ampere Hour capacity.
Grounded Terminal—Positive.
Location—Under hood on left fender shield.

STARTER

►*NOTE—12 Volt starter used on C59.*

Model	Auto-Lite Starter	Armature
C56 & C58 (Early)	MCL-6116	MCH-2070
C56 & C58	MCL-6121	MCH-2110
C56 & C58 (Late)	MCL-6121A	MCH-2110
C59 (Early)	(12 V) MDB-6001	MDB-2006F
C59 (Late)	(12 V) MDB-6001A	MDB-2006F

Drive—Pinion shift and overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data—MCL

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Performance Data—MBD

Torque	RPM	Volts	Amperes
0 ft. lbs.	3600	10.0	31
4 "	Lock	4.0	145

Removal: Special box wrench C-455 required.
Starting Switch: Auto-Lite No. SSX-4002 (MCL-6116 Starter), No. SSX-4004 (MCL-6121 & 6121A Starter), No. SSY-4002 12 Volt (MDB-6001 & 6001A Starter). Solenoid pinion shift and starting switch used with Neutral Safety Switch (on Transmission) and SEPARATE relay. Controlled by starting-ignition switch.

Starter Relay—Auto-Lite No. HRW-4001A (6 Volt). No. RAA-4001 (12 Volt).

Cuts In—1.5-3.0 volts (HRW-4001A). 3.0-6.0 volts (RAA-4001).

Cuts Out—0.5 volts (HRW-4001A). 1.0 volts (RAA-4001).

Air Gap—.012-.020" with contacts closed.
Contact Gap—.020-.040".

GENERATOR

►*NOTE: 12 Volt Generator used on C59.*
Auto-Lite. Two brush types with voltage & current regulation.

Car Model	Auto-Lite Generator
C56	GGW-6001K
C56 (Hydraguide)	GGW-6008D
C58	GGU-6001R
C58 (Hydraguide)	GGU-6006C
C59	(12 Volt) GHM-6002A
C56 (Spec. Equip.)	GGU-6001V
C56 (Spec. Equip.-Hydraguide)	GGU-6006C
C56 (Spec. Equip.-Hydraguide)	GGJ-6004D
C56, C58 (Spec. Equip.-Hydraguide)	GGJ-6004A,C
C56 (Spec. Equip.)	GGW-6001J
C58 (Spec. Equip.-Hydraguide)	GGJ-6004D

Maximum Charging Rate—See Regulator.
Charging Rate Adjustment—None. See Regulator.

Performance Data—GGJ

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750
55	8.0	1500-1700 — 1650-1850

Performance Data—GGU

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850
50	8.0	1550-1750 — 1750-1950

Performance Data—GGW

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350
45	8.0	1925-2125 — 2350-2550

Performance Data—GHM—12 Volt

Amperes	Volts	R.P.M.—Cold
5.0	15.00	850-950
25.0	15.00	1400-1600

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—**(GGU, GGW, GHM)** 35-53 ozs. **(GGJ)** 30-37 ozs. (with new brushes).

Field Current—**(GGU, GGJ)** 1.4-1.6 amperes, **(GGW)** 1.4-1.5 amperes, all at 5.0 volts.
(GHM—12 Volt) 1.1-1.3 amperes at 10.0 volts.

Motoring Current—**(GGJ)** 3.9-4.4 amps., **(GGU)** 5.0-6.0 amps., **(GGW)** 4.1-4.6 amps., all at 5.0 volts.
(GHM—12 Volt type) 3.0-3.8 amps., at 10.0 volts.

Belt Adjustment: Adjust generator belt so there is ¼" deflection midway between pulleys.

REGULAT R

►*NOTE—12 Volt Regulator used on C59.*
Auto-Lite. Voltage & Current type "Temperature Compensated" Current Regulator.

Auto-Lite Regulator No.	Generator
VAV-6001B	GGU-6001R,V,6C
VBE-6001A	GGW-6001J,K,8D
VBF-6001A ①	GGJ-6004A, C, D
VRX-6003A (12 Volt)	GHM-6002A

①—VBF-6002A for Negative battery ground.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seal not broken (to remove cover).

Cutout Relay

Cuts In (VAV, VBE, VBF)—6.3-6.8 volts.
Cuts In—(VRX) 13.0-13.75 volts.
Cuts Out—(VAV, VBE, VBF)—4.1-4.8 volts (approx. 4-6 amps. disch.)
Cuts Out—(VRX) 8.2-9.3 volts (approx. 3-5 amps. disch.)
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.1-7.4 volts (VBE & VAV Reg.). 7.15-7.45 volts (VBF Reg.). 14.2-14.8 volts (VRX Reg.) after 15 minutes operation charging at 10 amperes (VBF & VRX), ½ maximum rate (VAV & VBE).
Air Gap (All)—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VAV	55	50 (48-52)
VBE	52	45 (43-47)
VBF	66	55 (53-57)
VRX	29	23 (21-25)

Test A—After 15 minutes operation charging at 10 amperes (VBF & VRX), ½ maximum rate (VAV & VBE).
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF), 13.6-13.8 volts (VRX).
Air Gap (All)—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

►*EARLY C56 CAUTION: If 1952 type Lighting Switch and SEPARATE Circuit Breaker used, see 1952 Chrysler V8 in 1952 Annual Data for wiring diagram and data.*
►*C59 LAMP BULB CAUTION—12 Volt type used.*

Headlamps: "Sealed Beam" type with "Bulls-eye" lens. *See Electrical Equipment Section for data.*
Beam Indicator—Lighted when upper beam in use. Located on lower right corner of speedometer face.

Directional Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—In lower left corner of speedometer dial.

Switches

Lighting—Chrysler No. 1495860 (C56, C58), 1495932 (C59).
Beam Selector—Chrysler No. 1253003.
Instrument—Chrysler No. 1383903.
Directional Signal—Chrysler No. 1495297.

Form 8B—1956-M

MISC. ELECTRICAL

CIRCUIT BREAKER: Located in headlight switch assembly. Two 10 amperes, and one 20 amperes (One 10 amp., and two 8 amp., on 12 volt system), protect headlight, tail & stop light, accessory and interior lighting circuits. Back-up lights protected by windshield wiper switch circuit breaker.

►*CAUTION—See "Early C56 Caution" under LIGHTING for SEPARATE Circuit Breaker used on first cars.*

Rear Seat Cigar Lighter—30 amperes.

FUSES: Clock—2 ampere. In clock lead wire.
Radio—14 amperes. In fuse connector at radio.

HORNS: *NOTE—12 Volt type used on C59.*

Car Model	Auto-Lite Horn No. Low Pitch	High Pitch
C56 & C58 (early)	HW-4107	HW-4108
C56 & C58 (late)	HAB-4617	HAB-4618
C59 (12 Volt)	HAA-4103	HAA-4104

►*NOTE*—Horns have resistance unit connected across circuit breaker points. Resistance for 6 volt horns should be 2.5-2.8 ohms, 12 volt horns 5.7-6.3 ohms.

Horn Relay: *NOTE—12 Volt type used on C59.*
Auto-Lite (C56 & C58) No. HRL-4104. (C59) No. RAB-4001. Connected through ignition switch, operates when ignition "ON".

Performance Data—No. HRL-4104

Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).

Contacts Open—.5 volts min. (open from seal).

Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Eight Cyl. "V" type, Valve-in-Head.

Bore—3 13/16". **Stroke**—3 5/8".

Displacement—331.1 cu. in. **Rated HP.**—46.5.

Developed Horsepower—180 at 4000 RPM.

Compression Ratio—7.5-1.

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: (Not necessary to remove transmission). Work engine out of frame toward left front fender, (not necessary to remove heater assembly).

OIL PAN REMOVAL: Remove oil level indicator, drain oil, and remove starter motor and exhaust crossover pipe. Remove oil pan attaching bolts and drop pan straight down and away from engine. To install, reverse removal procedure.

CYLINDER HEAD & TIGHTENING TORQUES: *See Chrysler Special Data.*

PISTONS: Aluminum alloy, steel-strut, slipper type, cam ground and tin plated.

►*CYLINDER BORE OVERSIZE CAUTION—Engine with letter "A" following engine number indicates that cylinder bore .020" oversize.*

Length—3 7/8". **Weight**—20.8 ozs.

Removal—Pistons and rods removed from above.

Clearance—.0005-.0015" measured ¾" from bottom of piston between the thrust face and cylinder wall.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 5-12 lbs., at room temperature (70°F.).

►*CAUTION—Letter "F" embossed on side of piston near piston pin hole must face front of engine when installed.*

►*NOTE*—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to above limits.

Replacement Pistons: Standard, .010", .020", .030", .040", .050", .060" oversize.

Installing Pistons: Letter "F" embossed on side of piston near piston pin hole must face front of engine.

PISTON RINGS: Two compression, one slotted oil control, all above pin. Oil ring groove drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.010-.020"	.002-.0035"
Oil Control	3/16"	.010-.020"	.001-.0025"

PISTON PIN: Diameter—63/64". **Length**—3 9/64".
Floating type with lock ring at each end.
NOTE—Pin is offset in piston toward right side of engine.
Pin Fit in Piston—Tight thumb push fit in piston at normal room temperature (70°F.).
Pin Fit in Rod—.0001-.0004". Tight thumb push fit at normal room temperature (70°F.).

Replacement Pins: Standard, .003", .008".

CONNECTING ROD: Length—6⅝". **Weight**—25.2 ozs. with bolts less bearings.
Crankpin Journal Diameter—*2.249-2.250".*

►*JOURNAL DIAMETER CAUTION—(ONE OR MORE journals machined UNDERSIZE). See "CRANKSHAFT" below.*

Lower Bearing—Removable precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".
Endplay—.006-.014" (total for both rods).

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Standard, .001", .002", .010" undersize.

Installing Rods: Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet.

►*CAUTION*—Rods are **interchangeable**, however when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

►*CONNECTING ROD BEARING CAP CAUTION*—The "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston pin. When installing the bearing cap make certain the "V" slot oil passage is toward the top of engine.

CRANKSHAFT: Five bearing with vibration damper on front end.
Journal Diameter—2.4995-2.5005".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Engines with undersize journals identified as follows:* **.010" UNDERSIZE (All Main & Connecting Rod Journals)**—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (⅜" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counter-weight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).
Bearing Type—Removable, precision type, steel-backed, babbitt-lined. No shims.
Clearance—.0005-.0015".
End Thrust—Taken by No. 3 (center bearing).
Endplay—.002-.007".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Standard, .001", .002", .010", .012" Undersize.

Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

CAMSHAFT: Five bearing. Non-adjustable chain drive.
Journal Diameters—Nos. 1-2-3-4, 1.998-1.999". No. 5, 1.4355-1.4365".
Bearings—Removable steel backed, babbitt lined bushings.
Clearance—.001-.003".

End Thrust—Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

Timing Chain: Width 1⅛". Pitch .375". Length 68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with the center of the camshaft. Temporarily install camshaft sprocket less chain, and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft "Zero" mark exactly in line with center of crankshaft. (Use straightedge to check accuracy of alignment). Remove camshaft sprocket and position it in timing chain and reinstall assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" marks should be in line with shaft center. Install fuel pump eccentric and camshaft nut. Tighten to 120-130 ft.lbs.

►*TIMING CASE COVER REMOVAL CAUTION—Remove water pump before removing timing case cover. (Cover attaching bolt behind water pump).*

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 13/16"	.372-.373"	5"
Exhaust	1 1/2"	.371-.372"	4 29/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.378"	.001-.003"
Exhaust	45°	.361"	.002-.004"

Valve Seat Width—.060-.085" (In.); .040-.060" (Ex.).
Exhaust Valve Seat Inserts—*See Chrysler Special Data.*
Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

►*VALVE GRINDING CAUTION*—If the position of the valve in the head has been changed (due to valve or seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

position, the dimension from the valve spring seat in the head to the tip of the valve should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

▷***CAUTION—Oil hole in top of exhaust guide must face up.***

NOTE—If Valve Guide Tool C-3150 is not available, drive guides in, measuring from top of valve seat as follows: **Intake**—31/32". **Exhaust**—1 7/32".

Valve Springs: Two springs used per valve. Install with closed coil toward cylinder head.

Free Length—Outer 2". Inner 1⅞".

Outer Spring	Pressure	Length
Valve Closed	46-51 lbs.	1 11/16"
Valve Open	124-132 lbs.	1 9/16"
Inner Spring	**Pressure**	**Length**
Valve Closed	12-14 lbs.	1 9/16"
Valve Open	35-40 lbs.	1 3/16"

▷***CAUTION—Spring ends must be square within 1/16" (Use steel square on surface plate—revolve spring against square noting alignment of top coil).***

▷***VALVE SPRING HEIGHT CAUTION***—If valves or seats are reground, check installed height of spring. If height is 1 23/32" or greater, install a 1/16" spacer (Part No. 1400482) in the head counter-bore to bring spring height back to normal 1⅝-1 11/16".

▷***VALVE SPRING LOAD CAUTION—Hydraulic lifter "pump up" will restrict engine speed and cause valves to burn if valve spring loads are not maintained.***

Valve Lifters: Hydraulic type.

See Miscellaneous Section for complete data.

Diameter—.9040-.9045". **Clearance**—.0005-.0015".

▷***VALVE LIFTER OVERSIZE CAUTION—.008" OVERsize valve lifters used in some engines."*** "Diamond" (⅜" high) stamped in engine number pad following engine numbers, indicates that all valve lifters are .008" OVERSIZE.

Removal—*See "Valve System" in Chrysler Special Data.*

Rocker Arm Assembly Removal & Installation: *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

Tappet Clearance: No adjustment required.

Valve Timing: See Camshaft Setting above.

Intake Valves—Opens 15° BTDC. Close 57° ALDC.

Exhaust Valves—Opens 49° BLDC. Close 15° ATDC.

Valve Timing Check—Turn crankshaft until #1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at Zero, turn crankshaft until dial indicator shows that valve has lifted .016". Pointer on chain cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft **counter-clockwise** until lifter backed down and valve closed, remove spacer from valve stem.

▷***CAUTION—Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.***

▷***TIMING CASE COVER REMOVAL CAUTION—One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing cover case.***

LUBRICATION

Engine Oiling System: Pressure through "Full-Flow" oil filter to main and connecting rod bearings, camshaft bearings, timing chain and hydraulic valve lifters. "Rotor" type oil pump mounted below rear main bearing cap. Floating type oil strainer is used.

Crankcase Capacity—5 quarts, (add one quart when "Full-Flow" oil filter element is replaced).

Normal Oil Pressure—60 lbs. at 30 MPH

▷***CLOGGED OIL FILTER CAUTION—An oil pressure drop of 15-20 lbs. below normal oil pressure indicates a clogged "Full-Flow" oil filter. Replace filter element.***

Oil Filter: "Full-flow" type. All oil enters lubrication system of engine through filter at full pump pressure. Safety valve in filter opens if element is clogged, allowing oil to pass into lubricating system under a reduced pressure (25-45 lbs.).

Filter Element—Install a new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is replaced.

Oil Pressure Relief Valve—Mounted in oil pump.

Oil Pump: "Rotor" type. Mounted on rear main bearing cap in crankcase.

Oil Pump Removal & Overhaul: *See Chrysler Special Data.*

Priming Oil Pump (After Installation)—Before installing filter assembly, introduce about ½ pint of engine oil into the lower hole of the filter pad with a pressure gun or long nosed oil can.

▷***CAUTION—When first starting a new engine or one that has been overhauled, DO NOT EXCEED 650 RPM until oil pressure registers on gauge.***

Oil Pressure Gauge: Auto-Lite No. 12842A (Early C56 only). No. 13209A (Later C56 & All C58, C59). Not electric.

COOLING

Cooling System: Non-pressure type, (under ordinary operating conditions). A pressure vent type radiator cap is used. Under normal operating conditions, pressure is not built up in the system, however if an abnormal condition develops, such as over-heating, or car is driven at excessively high speeds, the valve at the bottom closes, seating against gasket. This action pressurizes the system up to approximately 7 lbs., at which time the valve and seat raise and allow the built up pressure to escape through the overflow tube.

Pressure Valve—Chrysler No. 1373136. Radiator Filler Cap. Operates at 7 lbs. (see above).

Capacity—25 qts. (26 qts. with heater).

Water Pump: Packless type with shaft mounted on two ball bearings with lubricant fitting for bearing lubrication.

See Water Pump Section for complete data.

Removal: Drain cooling system, remove fan belts and belt pulley. Remove four bolts attaching pump to water manifold and remove pump.

NOTE—Three drain cocks, one on radiator and one on each engine bank.

Fan Belt Adjustment—*See "Generator" for adjustment.*

Thermostat: Bypass type. In cylinder head water outlet. Begins to open at 157-162° F.

Temperature Gauge: Auto-Lite No. 12839A (Exc. C58); No. 12853A (C58). Not electric.

See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 9.5E Assy. No. 1213 (C56 with Fluid-Matic Drive), 10E Assy. No. 1211 (C56 with Fluid-Torque Drive, All C58 & C59).

See Clutch Section for complete data.

Facings—Woven type. Inside Diameter (9.5E) 6"; (10E) 7". Outside Diameter (9.5E) 9½"; (10E) 10¼". Thickness .125".

Pedal Adjustment: Set pedal to just clear toeboard by loosening locknut and turning stopscrew at lower end of pedal arm above shaft. Set pedal for 1" free travel by turning clutch release fork adjusting nut on connector link at clutch release fork.

Removal (with Fluid-Matic Drive): Remove transmission (See TRANSMISSION) and unhook clutch release fork pull-back spring. Disconnect one end of clutch fork rod assembly from fork by removing cotter key, pin, and two washers. Disconnect other end from clutch release bearing torque shaft by removing cotter key, pin and three washers (CAUTION—As soon as rod assembly is removed, push clutch pedal until over-center spring brings it to toeboard. This will avoid danger of injury should pedal be pushed in while linkage is disconnected). To remove release bearing from clutch fork, do not force bearing and pull-back springs straight off from fork prongs. Pivot the release bearing away from the fork. Assembly and springs will slide off easily. Remove two screws holding shaft pivot bracket assembly to clutch housing. Remove opposite end of pivot bracket assembly from torque shaft. Place jack under engine oil pan to support engine (block of wood between jack and pan). Remove clutch housing-to-cross member bolts, then cross member-to-frame bolts and drop cross member from frame. Jack engine down about three inches so clutch housing is far enough below floor board to permit removal of housing capscrews and housing, and remove clutch assembly from clutch driven plate.

Removal (with Fluid-Torque Drive): Remove oil reservoir from bottom of clutch housing, and oil lines from converter support plate before proceeding as outlined above.

See Chrysler Fluid-Torque Drive in Transmission Section for complete data.

FLUID DRIVE

Chrysler. Fluid coupling at rear of engine.

See Transmission Section for complete data.

Slippage Test—*See "Fluid Drive" in Transmission Section for complete data.*

Removal: Remove transmission (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid assembly out of car.

FLUID-TORQUE DRIVE

Own Make. Four element, single stage type Torque Converter with SEPARATE oil system (oil reservoir, oil pump, and oil cooler). ***Torque converter unit cannot be disassembled. Replace assembly if repairs necessary.***

Lubrication: Maintain oil level to bottom of filler plug hole. Check every 1000 miles, drain and refill every 20,000 miles (once every two years, whichever occurs first).

Capacity—10½ quarts. Manufacturer recommends MOPAR Fluid Drive Fluid or a good grade of SAE 10W engine oil.

See Transmission Section for complete data.

Removal: ***See "Chrysler Fluid-Torque Drive" in Transmission Section for complete data.***

AUTOMATIC TRANSMISSION

Hydraulically Operated Type (with Fluid-Drive & Fluid-Torque). Semi-automatic, four speed transmission with hydraulic actuation and electrical control.

See Transmission Section for complete data.

►***TRANSMISSION SELECTOR LEVER ADJUSTMENT (to correct difficult shifting): See Transmission Section for complete data.***

►***TESTING & TROUBLE SHOOTING: See Transmission Section.***

Transmission Control: ***See Transmission Section for complete data.***

Kick-down Solenoid—Auto-Lite (C56, C58) No. SSS-4003 ***(6 Volt)*****; (C59) No. SSZ-4001.** ***12 Volt type.***

Neutral Safety Switch (Fluid-Torque Drive)—Chrysler No. 1440209.

Governor—Auto-Lite No. TGG-4001.

Kickdown Switch—Part of carburetor assembly.

Ignition Interrupter Switch—On right side of transmission above governor.

Transmission Oil—3 pints, 10W engine oil.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gear shift rods at transmission, ***replace drain plug.*** Disconnect transmission mounting bolts and lower assembly out of car.

►***INSTALLATION CAUTION***—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

►***OTHER TRANSMISSION SERVICE DATA: See Transmission Section.***

UNIVERSALS

Detroit Universal. Front universals are ball and trunnion type, rear cross type. C59 has center universal that is ball and trunnion type.

Propeller Shaft Center Bearing: Used on C56 8 Pass. Sedan and all C59. ***See Chrysler Special Data.***

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive. Barrel type differential with adjustable ring gear thrust pad used.

See Rear Axle Section for complete data.

Rear Axle Ratios

Car Model	Fluid-Matic	Fluid-Torque
C-56 (Exc. 8 Pass.)	3.54-1 (39-11)	3.36-1 (37-11)
C-56 (8 Pass.)	3.73-1 (41-11)	3.54-1 (39-11)
C-58, C-59		3.54-1 (39-11)

Backlash—.006-.010". Screw adjustment.

Ring Gear Thrust Pad Setting—Loosen locknut on left side of carier housing, tighten thrust pad screw finger tight, back screw off ⅛ turn, tighten locknut.

Removal: Disconnect rear universal, remove axle shafts (see below), take out carier capscrews, lift off carrier assembly.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.

Axle Shaft Outer Seal: Leather type mounted on brake support (backing plate).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow" hydraulic, direct acting, non-adjustable type. Serviced by replacement.

Std. Shock Absorbers

Chrysler Part No.	Front	Rear
C56 (Club Coupe, 4-Dr.)	1326164	1326165
C56 (Others)	1326164	1326166
C58	1326164	1326165
C59	1326164	1326167

Heavy Duty Shock Absorbers

C56 8 Pass. & Est. Wgn	1450346	1450075
C56 (Others), C58	1450041	1450075
C59	1450041	

FRONT SUSPENSION

Front Suspension: Independent linked parallelogram type with coil springs and direct acting shock absorbers.

See Front Suspension Section for complete data.

Kingpin Inclination—(C56, C58) 5-6½°, (C59) 6½-8° with 0° Camber.

Camber—Neg. ⅜° to Pos. ⅜° (¼-½° higher on left).

Caster—Neg. 1° to Neg. 3° (Neg. 2° preferred).

Toe-In—0" to 1/16" (0" preferred).

Toe-Out on Turns—Inner wheel 20°, outside wheel 18¼°.

STEERING GEAR

Own Make. Standard (C56, C58), 3 tooth worm-and-roller. Similar to Gemmer Model 335.

See "Gemmer 335" steering gear in Steering Gear Section for complete data.

Power Steering (Hydraguide): Gemmer. Standard (C59) Optional (All Others). Gemmer hydraulic steering unit. Oil pump on generator operates piston connected to steering cross-shaft. Controlled through a valve block assembly actuated by steering shaft. ***See Steering Gear Section for complete data.***

►***POWER STEERING "HIGH SPOT" OR "LUMPY" FEELING AT OR NEAR STRAIGHT AHEAD POSITION—See "Gemmer Hydraguide" in Steering Section for complete data.***

BRAKES

SAFE-GUARD TYPE

Service: (C56, C58) Chrysler "Safe-Guard" Lockheed hydraulic.

See Brake Section for complete data.

Drums—Centrifuse. Diameter 12".

Wheel Cylinder Diameter—1⅛" (all).

Lining—Molded asbestos, bonded to shoe. Width 2". Thickness 13/64". Length 12.57" (each shoe).

Clearance—.006" at each end of shoes.

Braking Power—60% front, 40% rear.

Power Brake: Vacu-Ease vacuum power unit.

See Brake Section for complete data.

Hand Brake: On shaft at rear of transmission. Internal expanding type.

Adjustment—***See "Hand Brake Notes" in Chrysler Special Data.***

Drum—Cast iron. Diameter 7".

Lining—Width 2". Thickness 5/32". Two shoes, total length 13 1/16".

Clearance—Adjusting nut on shoe link backed off one notch from point where shoe firm against drum.

DISC TYPE

Service: (C59) Hydraulic, self-energizing, two-shoe, DISC type. NOTE—No power booster used.

See Brake Section for complete data.

Pressure Plate Diameter—I.D. 9½". O.D. 12".

Wheel Cyl. Diameter—1¼" (all).

Lining—Molded asbestos segments bonded to disc, 12 used (6 each side).

Bleeding Disc Type Brakes—Manufacturer recommends bleeding all four lower wheel cylinders first, then all four upper cylinders last.

Hand Brake: On shaft at rear of transmission. Internal expanding type. ***See C56 & C58 (above) for all data.***

MISC. MECHANICAL

AIR CONDITIONING: Chrysler Airtemp type. Optl. ***See "Chrysler Air-Conditioning" in Miscellaneous Section for complete data.***

WINDSHIELD WIPER: Auto-Lite Electric type.

C56, C58—EWJ-4008, EME-4001, EMG-4001, 4101, 4103.

C59 (12 Volt)—EMF-4001, EMK-4001, EMK-4102.

►***WINDSHIELD WIPER PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION ON EARLY TYPES: See "Auto-Lite Electric Windshield Wiper" in Miscellaneous Section.***

See Miscellaneous Section for complete data.

WINDOW REGULATORS: Auto-Lite Electric type. ***See Miscellaneous Section for complete data.***

CONVERTIBLE TOP CONTROL: Hydro-Lectric type. ***See Miscellaneous Section for complete data.***

►*1954 AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Chrysler, DeSoto, Dodge Air-temp" Air Conditioning in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Designation
Windsor DeLuxe	C-62

SERIAL NUMBER: On metal plate attached to left front door hinge post.
Starting Serial Number—70,141,001 **(Detroit)**, 65,014,001 **(Los Angeles).**

ENGINE NUMBER: Stamped on boss on left front side of cylinder block.

►*ENGINE NUMBER LETTERS (Following Engine Number): Identified as follows:*
"A"—All Cylinders .020" oversize.
"B"—All Crankshaft Journals .010" undersize.
"AB"—BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM. Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21" idling at 6 MPH.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up approximately 3/4 turn, hook end on stop stud.

VALVE TAPPET CLEARANCE: .008" Intake. .010" Exhaust. Engine must be hot and idling. *NOTE*—Tappet screws are self locking. Remove right front wheel and lower wheel housing for access to valves.

►*CONTINUOUS HIGH SPEED TAPPET CLEARANCE:* An additional .002" clearance for **exhaust** tappets is desirable.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAP: .035"
Plugs—Auto-Lite Resistor 4S-140. 14 mm.
COIL: Auto-Lite CR-4001 (U.S. Cars), CR-6007B (Canada).
Ignition Current—2.25 amps idling, 5.0 stopped.
DISTRIBUTOR: Auto-Lite No. IAT-4102 (U.S. Cars), **IAT-4012** (Canada).
Condenser—Auto-Lite IAT-3076RA. **Capacity**—.250-.285 microfarad.
Contact Point Set—Auto-Lite IGW-3028BS.
Breaker Gap—.018-.020".
Cam Angle—36-42°. DO NOT exceed breaker gap limits to obtain dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance - IAT-4012, 4102

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance - IAT-4012, 4102

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5
2	4	7¼
4	8	9 3/8
6	12	11 5/8
9	18	15

►*DISTRIBUTOR REMOVAL CAUTION: To avoid damage to No. 3 & No. 4 pistons when removing distributor, make sure that No. 3 & No. 4 pistons are at the top of their stroke.*

IGNITION TIMING

Setting—2° BTDC.
Timing Mark—On crankshaft vibration damper.
►*IGNITION TIMING CAUTION: For accurate reading, be sure engine is at operating temperature and carburetor is at slow idle.*

CARBURETOR

Carter (Ball & Ball)—Model E9C1 (Synchro-mesh Trans. Cars), Model E9B1 (PowerFlite Trans. Cars).
Idle Setting—½-1½ turns open. For richer mixture turn screw out. Idle engine at 450-500 RPM. (E9C1), 500 RPM. (E9B1).
Idle Speed—450-500 RPM. (Synchro-mesh), 500 RPM. (PowerFlite).
Float Level—5/64" plus or minus 1/64" from top surface of body casting to top of float.
Accelerating Pump—(E9C1) Inner hole summer, center hole normal, outer hole winter. (E9B1) Long stroke for cold weather, short stroke for hot weather.
Fast Idle: .015-.019" clearance between throttle valve and bore of carburetor, side opposite idle port, with choke valve held closed and throttle stop screw backed off.
Slow Closing Throttle (Dashpot): (E9B1) Adjustment screw located on top of carburetor on side opposite thermostatic coil housing. To adjust, tighten adjustment screw, then turn counterclockwise 5 turns. Further adjustment outward will increase action of dashpot and lengthen its retarding effect.
Throttle Linkage Adjustment (E9B1): *See "PowerFlite Transmission" in Transmission Section for data.*
►*OTHER DATA: See "Carter (B&B)" in Carburetor Section for complete data.*
Fuel Pump Pressure: 3½-5 lbs.

CARB. EQUIPMENT

Fuel Pump: Carter M-639-S. Vacuum diaphragm type.
Pressure—3½-5 lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite Electric Type.
Dash Unit—Auto-Lite 13463A (Exc. Sub. & Estate Wgn.), 13466A (Sub. & Estate Wgn.).
Tank Unit—Auto-Lite 12617A (Exc. Sub. & Estate Wgn.), 12195A (Sub. & Estate Wgn.).

NOTE—Gauge on Suburban is "Two Wire" thermostatic type. Gauge on other models is "One Wire" type.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 2H-120-D or Willard HW-2-120-C. 6 Volt, 17 plate, 120 ampere hour capacity.
Grounded Terminal—Positive.
Engine Ground—Left front of engine.

STARTER

Auto-Lite MCL-6117. Armature MCH-2070.
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs, (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	410

Starting Switch: Auto-Lite SSX-4003 combination starting switch and solenoid pinion shift. Controlled by starter-ignition switch. PowerFlite cars have Neutral Safety Switch and Starter Relay. *See Chrysler V8 wiring diagram and starter data.*
Starter Relay (PowerFlite Cars): Auto-Lite HRW-4001A. *See "Auto-Lite Starter Controls" in Electrical Equipment Section.*

GENERATOR

Auto-Lite Generator No.	Armature No.
GGW-6001K (U.S. S-M) Ⓒ	GGW-2006F
GGW-6001J (Can. S-M) ①	GGW-2006F
GGW-6008G (U.S. Pow. St.) ②	GGW-2045F
GGW-6008FA (Can. Pow. St.) ②	
GGW-6008D (U.S. Pow. St. & A.C.) ③	GGW-2045F
GGU-6006B (U.S. Pow. St. & A.C.) ③	GGU-2042F
GGW-6008BA (Can. Pow. St. & A.C.) ③	
GGW-6008GA (Can. Pow. St.) ②	
GGU-6006G (U.S. Pow. St.) ②	GGU-2042F
GGU-6006GA (Can. Pow. St.) ②	
GGU-6001G, H (Police)	GGU-2006F
GGJ-6001F, G (Police)	GGJ-2101F
GGW-6001Q (Special)	GGW-2006F
GGU-6001R, V (Special)	GGU-2006F

Ⓒ—Synchro-mesh.
②—Power Steering.
③—Power Steering & Air Conditioning.

Performance Data - GGJ

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750
55	8.0	1500-1700 — 1650-1850

Performance Data - GGU

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850
50	8.0	1550-1750 — 1750-1950

Performance Data - GGW

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350
45	8.0	1925-2125 — 2350-2550

Brush Spring Tension—(GGU, GGW) 35-53 ozs., (GGJ) 30-37 ozs., with new brushes.

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Field Current—(GGW) 1.4-1.5 amperes, (GGJ, GGU) 1.4-1.6 amperes, all at 5.0 volts.
Motoring Current—(GGJ) 4.1-4.6 amperes,(GGU)5.0-6.0 amperes, (GGW) 4.8-5.3 amperes, all at 5.0 volts.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Approximately ½" slack (when pushed from a straight line, midway between fan and generator pulley).

Generator Charge Indicator Light: In lower cluster of instrument panel. Light glows when ignition turned on, goes out when generator charging properly.

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW

Cutout Relay

Cuts In—6.3-6.8 volts.
Cuts Out—4.1-4.8 volts.
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.1-7.4 volts *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A—Operating Amperes—Test B
VBF-6001A, 2A	.66 .55 (53-57)
VAV-6001B, 2B	55 . 50 (48-52)
VBE-6001A	.52 .45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B— After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF).

Air Gap-.048"-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Directional Signal: *See Electrical Equip. Section.*

Lighting Switch Removal: Remove knob (use small screwdriver to raise up small clip in knob or remove small cross-head screw depending on method used to hold knob). Remove hexagonal headed nut and collar holding assembly in place, remove switch (switch has threaded sleeve with two flat sides and sleeve is snug fit in switch hole in panel).

Stop Light Switch Location: In brake line fitting on left frame side rail.

►*IGNITION STARTER SWITCH CAUTION:* When installing accessories, use accessory terminal *only* on ignition starter switch and *not* the ammeter terminal post.
Removal & Installation of Ignition Lock Cylinder—Turn ignition key clockwise to "ON" position. Loosen set screw holding switch in instrument panel. Pull switch assembly out from dash towards firewall enough to allow lock cylinder locking pin to clear instrument panel. With ignition key in "ON" position, use pointed punch to push in on cylinder locking pin, while pulling on cylinder. Remove ignition lock cylinder. To install lock cylinder in switch, line up locking pin with slot in housing. Press in on cylinder lock assembly. Install switch in instrument panel and tighten locking screw.

FUSES: Clock—3 amperes. In clock lead wire.
Radio—14 amperes. Behind instrument panel.

CIRCUIT BREAKERS: Lighting System—One 30 ampere and one 20 ampere to protect lighting circuits. On lighting switch.
Windshield Wiper—10 ampere. On wiper switch. Backup lights protected by windshield wiper circuit breaker.

HORNS: Auto-Lite (Low Pitch) HAB-4659, (High Pitch) HAB-4664.

Horn Relay: Auto-Lite HRL-4104.
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).

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Contacts Open—.5 volts min. (open from seal).
Contact Gap—.026". **Air Gap**—016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

►*AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air-conditioning system. See "Chrysler, DeSoto, Dodge Airtemp" Air Conditioning in Miscellaneous Section.*

ENGINE SPECIFICATIONS: Six cylinder "L" head.
Bore—3 7/16". **Stroke**—4 3/4".
Displacement—264.5 cu. in. **Rated HP**—28.36.
Developed Horsepower—119 at 3600 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-up.*

ENGINE REMOVAL: *See Chrysler Special Data.*

OIL PAN REMOVAL: Drain engine oil. Remove clutch housing pan to prevent damaging oil pan gaskets on clutch housing pan dust seal. Remove oil level indicator and drop pan on tie rod. Lift up oil strainer so it clears baffle inside pan. With strainer lifted, slide pan to rear and remove. NOTE—New end gaskets should protrude 1/4" to 1/8" above oil pan. *Ends must not be cut off.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Chrysler Special Data.*

►*MANIFOLD (Intake & Exhaust) INSTALLATION CAUTION—See "Manifolds" in Chrysler Special Data.*

PISTONS

Aluminum alloy, U-slot, cam ground type.

►*CYLINDER BORE OVERSIZE CAUTION—Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.*

Weight—18.5 ozs. (stripped).
Removal—Pistons and rods removed from above.
Fitting New Pistons: Clearance .0002-.0012" 1½" from bottom of skirt. Check piston size with micrometer across large diameter at bottom of skirt. Insert .002 x 1/2" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 6-9 lbs., at room temperature (70°F.)
Replacement Pistons: Std., .005", .020", .030", .040", .060" Oversize.

►*NOTE:* Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" requires reboring and honing to above limits.

Installing Pistons: Slot away from camshaft.

PISTON PINS

Full floating type.
Diameter—55/64". **Length**—2 7/8".
Pin Fit in Piston—.0000-.0005". DOUBLE THUMB push fit at room temperature (70°F.)
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at room temperature (70°F.).
Replacement Pins: .003", .008" oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32".	.007-.017".	.0025-.004"
Compr. (#2)	3/32".	.007-.017"	.0020-.0035"
Oil (#3,4)	5/32"	.007-.017"	.0010-.0025"

Installing Rings—#1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down if step on outer edge).
Replacement Rings: Std., .005", .020", .030", .040", .050", .060" Oversize.

CONNECTING RODS

Length (Center to Center)—7¾". **Weight**—32.4 ozs. with bolts, less bearings. *NOTE*—Piston pin hole is bronze bushed.
Crankpin Journal Diameter—2.124-2.125".Maximum out-of-round and taper limits—.001".

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE journals machined UNDERSIZE)—See "CRANKSHAFT" below.*

Lower Bearings—Removable, precision type, thin babbitt *on steel. No shims.*

Clearance—.0005-.0015" desired. Maximum—.0025".
Sideplay—.003-.007" desired. Maximum—.010".
Bearing Adjustment: None. Replace bearings.
Replacement Bearings: Std., .001", .002", .010", .012", .020", .030", .040" Undersize.
Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Four bearing.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*
.010" UNDERSIZE (All Main & Connecting Rod Journals)—Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (3/8") stamped on the machined surface at the upper right hand corner of the block (adjacent to front cylinder exhaust port) to signify that ONE OR MORE crankshaft main and connecting rod journals are machined. 001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the crankshaft center counter-weight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).

Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Replacement Bearings: Std., .001", .002", .003", .010", .012", .020", .030", .040" undersize. Upper and lower halves of Nos. 1, 2 and 3 are alike and interchangeable; Upper and Lower No. 4 are interchangeable.

Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*
End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**—.003-.007".

CAMSHAFT

Journal Diameters—(1) 2", (2) 1 31/32", (3) 1 15/16", (4) 1 1/4".
Bearing Type—Steel-backed babbitt.
Clearance—.0015-.0035". NOTE—If clearance exceeds .005"(measure with dial indicator placed against cam lobe and pry cam toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Timing Chain: Width 1". Pitch .500". Length 24" or 48 links.
Camshaft Setting: Sprockets marked. Mesh chain with sprockets so that "O" marks on sprockets are adjacent and in line with a straightedge across shaft centers.

VALVES

Tappet Clearance: .008" Intake. .010" Exhaust. Engine must be hot and idling.

Valve	Head Diam.	Stem Diam.	Length
Intake	1 23/32"	.3405-.3415"	4 27/32"
Exhaust	1 1/2"	.3395-.3405"	4 27/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.379"	.001-.003"
Exhaust	45°	.379"	.002-.004"

Valve Seat Width—7/64" maximum.

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Chrysler Special Data.*

Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, finish ream to give correct valve stem clearance. (See Valve Stem Clearance above). *CAUTION*—Guides must be installed with counterbore end UP for exhaust valves and with counterbore end DOWN for intake valves.
Valve Springs: Install with closely coiled end up.
Free Length—2"

Valve Spring Specifications

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1 3/4"
Valve Open	110-120 lbs.	1 3/8"

Valve Lifters: Mushroom type (remove from below).
Stem Diameter—.6235-.6240". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".
Lifter Clearance in Block—.000-.002".

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing

Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance, No. 6 intake valve should open with No. 6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on timing chain cover case. Reset tappet clearance at .008". Intake, ..010" Exhaust (hot and idling). *See "Camshaft Setting" under CAMSHAFT above.*

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OILING SYSTEM

Crankcase Capacity—5 qts. refill. Add 1 additional quart when filter changed.

Normal Oil Pressure—40-60 lbs. at 40-50 MPH with warm oil (40-65 lbs. with PowerFlite).

►*OIL PRESSURE CAUTION—Oil pressure will drop to 25-40 lbs. WHEN FILTER ELEMENT IS CLOGGED. Replace filter element.*

Oil Pressure Relief Valve—Oil pressure relief valve opens at 40-60 lbs. Under plug on left side of crankcase ahead of oil line to provide additional oil at idling speeds. Adjustable by replacing spring (3 types). **(1)** Standard spring painted BLUE. **(2)** Lighter than standard painted RED. **(3)** Heavier than standard painted GREEN. *CAUTION—Replace spring with new spring of same color.*

Oil Pressure Warning Light: In lower cluster of instrument panel. Light glows when ignition turned on, goes out when oil pressure reaches 10 lbs.

Oil Pressure Switch—Auto-Lite No. 13411A.

Oil Pump: Rotor type on right side of crankcase.

Oil Pump Overhaul & Installation—*See Chrysler Special Data.*

Oil Filter: "Full-flow" type. All oil delivered under full pressure to working parts goes through the filter before entering oil passages in engine. Safety valve in filter opens if element is clogged, allowing oil to pass directly to engine.

Servicing—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required).

►*OIL FILTER CAUTION—If oil pressure drops to 25-40 lbs., FILTER IS CLOGGED. Replace filter element.*

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 15 quarts (16 quarts with heater).

Pressure Valve: Chrysler No. 1373136. Radiator filler cap. Opens at 7 lbs.

Thermostat: By-pass type in cyl. head water outlet. Starts to open 157-162°F.

Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for complete data.*

Pump Removal: Drain cooling system, remove fan belt and disconnect water pump hose. Remove bolts holding water pump to engine block and lift out water pump and fan assembly.

Temperature Gauge: Auto-Lite No. 13464A.

CLUTCH

Borg & Beck	Model	Assy. No.	Disc No.
Standard	10A7	1331	382151
Heavy Duty	11A6	1330	381850
Police, Taxi	11A6	929	381850

Clutch Disc No.—See clutch listing above.

See Clutch Section for complete data.

Pedal Adjustment: Adjust stop screw on lower end of pedal and adjusting nut on connector link at fork. **Pedal Free Play (at outer end of clutch fork)**—1/8" to 5/32". **(At Pedal Pad)**— 1" to 1 1/8".

Removal: Remove release fork pull-back spring. Remove Transmission (See Synchro-Mesh Transmission), and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel. Take out cover screws. Remove clutch assembly and clutch disc assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own Make. *See "Chrysler Synchro-mesh" Transmission in Transmission Section.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up front of car, disconnect front universal (loosen companion flange nut if disassembling transmission - See Chrysler Special Data for Propeller Center Bearing Removal on 8-pass.). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove transmission-to-clutch housing cap screws and nuts. Pull unit to rear, down, and out of car. NOTE—Use pilot studs when installing assembly.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary Transmission.

See "PowerFlite" Transmission in Transmission Section for complete data.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section for data.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: *Check* fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level—Apply hand brake and place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.

Oil Filler Tube (Location)—At right rear of engine compartment.

Capacity—12 qts. (refill). 13 qts. (after overhaul).

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Cross type with roller bearings.

Propeller Shaft Center Bearing: Used on 8-Passenger. *See "Propeller Shaft" in Chrysler Special Data.*

REAR AXLE

Own Make. Semi-floating types with hypoid gear and Hotchkiss Drive. Two types used as follows:

Model	Rear Axle Type
Synchro-mesh (Exc. 8-Pass. & Est. Wgn.)	Cage
Synchro-mesh (8 Pass. & Est. Wgn.)	Barrel
PowerFlite	Barrel

See "Chrysler Hypoid" in Rear Axle Section.

Ratios	Exc. 8 Pass. & Est. Wgn.	8 Pass. & Est. Wgn.
Synchro-mesh	3.9-1 (39-10)	4.1-1 (41-10)
PowerFlite	3.73-1 (41-11)	3.91-1 (43-11)

REAR AXLE NOTE—Thrust pad, screw and nut, has been eliminated on PowerFlite equipped cars.

Backlash—.006-.010".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), and carrier assembly capscrews. Withdraw carrier assembly from housing.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller - Tool C-675), block brake pedal, disconnect brake line at brake cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (Use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. Endplay—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

Standard Shock Absorbers

Car Model	Chrysler Part No. Front	Rear
4-Door Sedan, Club Cpe.	1450630	1450633
Others	1450631	
8-Pass. Sedan, Est. Wgn.		1450635
Club Cpe., Conv.		1450634

Heavy Duty Shock Absorbers

8-Pass. Sedan, Est. Wgn.	1450346	
Others	1450041	1450635
All (Special)		1450075

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.

See Front Suspension Section for complete data.

Kingpin Inclination—5° to 6½° with 0° camber.

Camber—Neg. 3/8° to Pos. 3/8° (left 1/4° greater than right within limits).

Caster—Neg. 1° to Neg. 3° (Neg. 2° preferred).

Toe-In—0" to 1/16" (0" preferred).

Toe-Out on Turns—Inner wheel 21½°, plus or minus 1°, with outer wheel turned 20°.

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STEERING

Manual Steering Gear: Gemmer. Worm and three-tooth roller.
See Steering Gear Section for complete data.

Power Steering: Hydraulic steering unit with engine driven hydraulic pump. Two types used as follows:

Power Steering Unit	Type
Gemmer Hydraguide (Early)	Internal Oil Passage
Chrysler Full Time (Later)	Coaxial

See "Power Steering" in Steering Section for complete data.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Chrysler "Safe-Guard" Lockheed hydraulic. *See "Chrysler Safe-Guard" Brakes in Brake Section for complete data.*

Drums—Centrifuse. Diameter 12".

Wheel Cylinders—1 1/8" bore. Single acting (front), double acting (rear wheels).

Replacement Linings & Shoes—Linings or shoes with linings come in Standard and .030" oversize.

Linings—Molded asbestos (bonded to shoe). Length-12.57" per shoe. Width—2". Thickness—13/64".

Braking Power—60% Front. 40% Rear.

Clearance—.006" at each end of all shoes.

Master Cylinder: On frame bracket at base of brake pedal.

Checking Fluid—Access hole at left of front floor pan.

Removal—Remove floor mat and toe board. Disconnect push rod. Remove horse shoe clip and slide brake pedal off shaft. Disconnect brake line tubes at master cylinder fittings. Remove bolts from master cylinder body. Cylinder can then be lifted off frame bracket. When re-installing use new horse shoe clip.

Power Brakes: Chrysler "Vacu-Ease". Available on 8-Passenger and Town & Country Wagon.
See "Chrysler Vacu-Ease" Power Brakes in Brake Section.

Parking Brake: On shaft at rear of transmission. 6" external contracting band type used with Synchro-mesh Trans. 7" internal expanding used with Auto. Trans.

Adjustment—See "Hand Brake Notes" in Chrysler Special Data.

Lining	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Int. Type	2"	5/32"	13 1/16"

Clearance (External Type)—.015-.020" around band.

Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMG-4102. Electric Type.
See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Chrysler "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Window Regulators: Auto-Lite Electric Type.
See "Auto-Lite Window Regulators" in Miscellaneous Section.

Convertible Top Control: Hydro-Lectric Type.
See "Hydro-Lectric" Power Operated Tops in Miscellaneous Section.

►*MODEL C66 ELECTRICAL SYSTEM CAUTION: 12 VOLT system used on this model and special 12-volt units used as noted below.*

►*1954 AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Chrysler, DeSoto, Dodge Airtemp" Air Conditioning in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: On metal plate attached to left front door hinge post.

Starting Serial Nos.	Detroit	Los Angeles
C-63-1 New Yorker	76,591,001	66,510,001
C-63-2 New Yorker DeLuxe	7,249,001	69,005,001
C-64 Custom Imperial	7,775,001	
C-66 Crown Imperial	7,817,001	

ENGINE NUMBER: Stamped on boss on top front side of cylinder block just back of water pump.

Starting Engine Number—C54-8-1001.

►*ENGINE NUMBER LETTERS & MARKS (Following Number): Identified as follows:*

"A"—All Cylinders .020" oversize.

"B"—All Crankshaft Journals .010" undersize.

"AB"—BOTH above conditions exist.

"MALTESE CROSS"(3/8" high)—ONE OR MORE Crankshaft Journals .001" undersize. *See "Connecting Rods" and "Crankshaft" (below).*

"DIAMOND"—(3/8" high)—All Valve Lifters .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: 135-165 lbs. at cranking speed of 150 RPM. Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21" idling.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatically controlled valve in exhaust manifold of right cylinder block. Valve must operate freely. When installing coil, move outer end of thermostatic spring around and up ¾ turn, hooking end of spring under stop stud. *See Chrysler Special Data.*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2. See diagram.

SPARK PLUG GAP: .035".

Spark Plug—Auto-Lite Resistor 4GS-150. 14 mm.

COIL: Auto-Lite (C-63, C-64 6 Volt) CR-6015, (C-66 12 Volt) CZ-4001.

Ignition Current—(CR-6015) 2.25 amperes idling, 5.0 amperes stopped. (CZ-4001) 1.8 amperes idling, 3.0 amperes stopped.

DISTRIBUTOR: Auto-Lite IAZ-4001C.

Condenser—Auto-Lite IBB-2015R. **Capacity**—.25-.28 microfarad.

Contact Point Set—Auto-Lite IGP-3028ZS.

Breaker Gap—.015-.018".

Cam Angle—26-28° (one set of points), 32-36° (total dwell). Set both points alike.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	425	2	850
6	825	12	1650
11	1900	22	3800
12	2100	24	4200

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance

Dist. Degrees	Eng. Degrees	Vacuum(" of HG)
Start	0	5¼
1	2	6
5	10	9¼
10	20	14 7/8
11.5	23	17

IGNITION TIMING

Setting—4° BTDC.

►*IGNITION TIMING CAUTION: For accurate reading, be sure engine is at operating temperature and carburetor is at slow idle.*

►*IGNITION SETTING CAUTION: Optional setting is up to 8° BTDC depending on octane rating of fuel being used. Do not exceed 8° limit to prevent harmful preignition.*

Timing Mark—On crankshaft vibration damper.

CARBURETOR

►*CARBURETOR APPLICATION: Carter WCD 2039SA, 2-Barrel Carburetor used on C-63-1. Carter WCFB 2041S, 4-Barrel Carburetor used on C-63-2, C-64, and C-66.*

CARTER 2-BARREL

Carter WCD 2039SA. Dual downdraft type with automatic choke.

►*1954 POPPING BACK ON ACCELERATION (Between 5-50 MPH. after hard run at high speed):* If not corrected by regular tune-up procedure, install special Vacuum Piston Spring No. 61-485. *See "Carter WCD" in Carburetor Section.*

Idle Setting: ½ to 1 turn open. Turn screws out for richer mixture. Set both screws alike.

Idle Speed—500 RPM.

Float Level—11/64" distance between top of floats and machined surface of casting (Gauge T109-205). Adjust by bending arms of floats. Floats should have a free movement of ½" at free end of float. Adjust by bending lip of float bracket.

Accelerating Pump—Install connector link in outer hole of pump arm for long stroke.

Fast Idle: *CAUTION—Two different settings required:*

1) Loosen choke lever clamp screw on choke shaft. Insert .040" feeler gauge (T109-193) between lip of fast idle cam and boss of flange casting. Hold choke valve tightly closed and take slack out of linkage by pressing choke lever toward closed position. Hold in place and tighten clamp screw.

2) With choke valve tightly closed, tighten fast idle adjusting screw until there is an .017-.021" opening (wire gauge T109-44 may be used) between throttle valve and bore of carburetor (side opposite idle port). Be sure fast idle adjusting screw is on high step of cam while making this adjustment.

Automatic Choke Setting: Centered (at index).

Slow Closing Throttle (Dashpot): Distance from end of diaphragm stud to diaphragm bracket should be 3/8". To adjust, loosen lock nut, turn diaphragm to specified amount and tighten lock nut. With dashpot operating lever adjusting screw backed out and throttle valves seated, fully depress diaphragm by pressing against dashpot operating lever. Tighten screw until it just contacts throttle shaft arm, then back out ¼ turn. With throttle valves in wide open position there should be 3/64" clearance between dashpot operating lever and stop. Adjust by bending stop (Tool T109-22).

Throttle Linkage Adjustment (PowerFlite Cars): *See "PowerFlite" Transmission in Transmission Section for data.*

►*OTHER DATA: See "Carter WCD" in Carburetor Section for complete data.*

Fuel Pump Pressure: 3½-5½ lbs.

CARTER 4-BARREL

Carter WCFB 2041S. Four barrel downdraft type with automatic choke.

Idle Setting: 1 to 2 turns open; For richer mixture, turn screws out. Do not idle engine below 500 RPM., with shift lever in neutral position.

Idle Speed—500 RPM.

►*OTHER DATA: See "Carter WCFB" in Carburetor Section for complete data.*

Fuel Pump Pressure: 3½-5½ lbs.

CARB. EQUIPMENT

Fuel Pump: Carter M-840-S. Vacuum diaphragm type.

Pressure: 3½-5½ lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite Electric Type.

Car Model	Dash Unit	Tank Unit
C63 (Exc.Sub. & Est. Wgn)	13463A	12618A
C63 (Sub. & Est. Wgn.)	13466A	12195A
C64	13463A	12618A
C66 (12V.)	13465A	13089A

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

►*NOTE: 12 Volt battery used on C66.*

C63 & C64 —Auto-Lite 2H-135-RD or Williard MW-2-135-R- 6 volt, 19 plate, 135 ampere hour capacity.

C66—Auto-Lite 12H-65-R. 12 volt, 13 plate, 65 ampere hour capacity.

Grounded Terminal—Positive.

Engine Ground—Left front of engine.

STARTER

►*NOTE: 12 Volt starter used on C66.*

Car Model	Auto-Lite Starter	Armature
C63, C64	MCL-6121A	MCH-2110
C66 (12 V.)	MDB-6001A	MDB-20006F

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data—MCL

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	410

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Performance Data—MDB

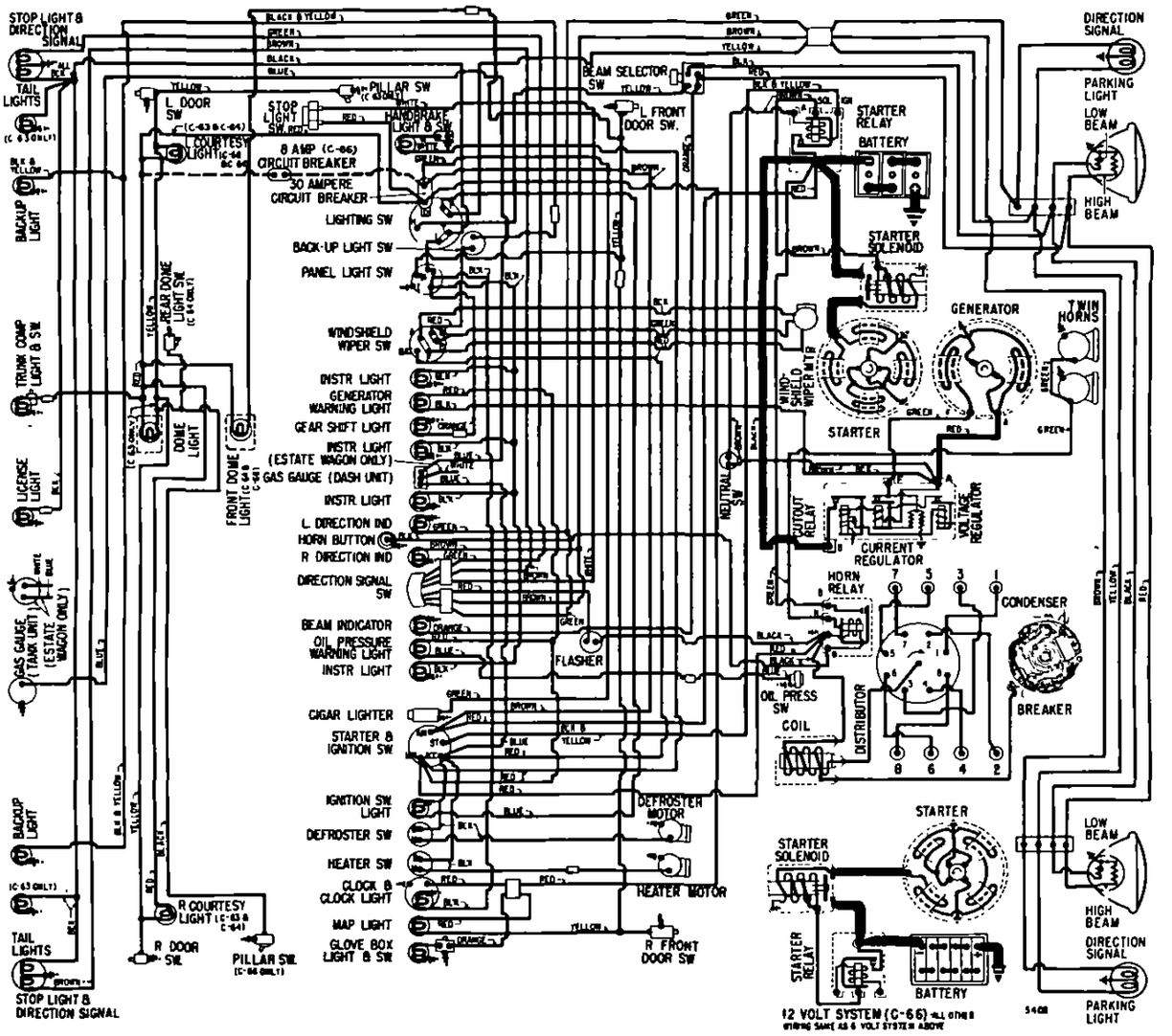
Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	3600	10.0	31
4.0 ft. lbs.	Lock	4.0	145

Starting Switch: Auto-Lite SSX-4004 (MCL-6121A Starter), SSY-4002 12 Volt (MDB 6001A Starter). Solenoid pinion shift and starting switch used with neutral safety switch (on Transmission) and SEPARATE relay Auto-Lite HRW-4001 (6 volt), RAA-4001 (12 volt). *See "Starter Controls" in Electrical Equip. Section.*

Neutral Safety Switch Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

GENERATOR

Car Model	Auto-Lite Generator	Armature
C63, 64	GGW-6001K (S-M)①	GGW-2006F
C63, 64	GGW-6001J (S-M)①	GGW-2001F
C63, 64	GGW-6008G (P.S.)②	GGW-2045F
C63, 64	GGW-6008FA (P.S.)②	
C63, 64	GGU-6006G (P.S.)②	GGU-2042F
C63, 64	GGW-6008GA (P.S.)②	
C63, 64	GGU-6006GA (P.S.)②	
C63, 64	GGW-6008BA (P.S. & A.C)③	
C63, 64	GGW-6008D (P.S. & A.C.)③	GGW-2045F
C63, 64	GGU-6006B (P.S. & A.C.)③	GGU-2042F
C63, 64	GGU-6001G, H (Police)	GGU-2006F
C63, 64	GGJ-6001F, G (Police)	GGJ-2101F



Car Model	Auto-Lite Generator	Armature
C63, 64	GGW-6001Q (Special)	GGW-2006F
C63, 64	GGU-6001R, V (Special)	GGU-2006F
C66 (12 V.)	GHM-6002A, E	GHM-2042F

①—Synchro-mesh. ②—Power Steering.

③—Power Steering & Air Conditioning.

Performance Data—GGJ

Amperes	Volts	Cold - R.P.M.- Hot
0	6.4	600-700 650-750
50	8.0	1400-1600 1550-1750
55	8.0	1500-1700 1650-1850

Performance Data - GGU

Amperes	Volts	Cold - R.P.M.- Hot
0	6.4	750-850 800 900
45	8.0	1450-1650 1650-1850
50	8.0	1550-1750 1750-1950

Performance Data - GGW

Amperes	Volts	Cold - R.P.M.—Hot
0	6.4	870-970 950-1050
40	8.0	1800-2000 2150-2350
45	8.0	1925-2125 2350-2550

Performance Data—GHM—12 Volt

Amperes	Volts	R.P.M. — Cold
5.0	14.0	875
25.0①	14.0	1325
25.0①	15.0	1350

①—Do not operate at higher outputs and do not operate *at this output without ventilating fan for any length of* time. To do so may result in burned armature and fields.

Brush Spring Tension—(GGU. GGW, GHM) 35-53 ozs., (GGJ) 30-37 ozs. New brushes.

Field Current—(GGW) 1.4-1.5 amperes, (GGJ, GGU) 1.4-1.6 amperes, all at 5.0 volts. (GHM) 1.1-1.3 amperes at 10.0 volts.

Motoring Current—(GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, (GGW) 4.8-5.3 amperes, all at 5.0 volts. (GHM) 3.0-3.5 amperes at 10.0 volts with field terminal grounded to frame.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Approximately ½" slack (when pushed from a straight line midway between pulleys).

Generator Charge Indicator Light: In lower cluster of instrument panel. Light glows when ignition turned on, goes out when generator charging properly.

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW
VRX-6003A (12 V.)	GHM

Cutout Relay

Cuts In (VAV, VBE, VBF)—6.3-6.8 volts.
Cuts In (VRX)—13.0-13.75 volts.

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Cuts Out (VAV, VBE, VBF)—4.1-4.8 volts (approx. 4-6 amps. disch.)
Cuts Out (VRX)—8.2-9.3 volts (approx. 3-5 amps.disch.)
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.1-7.4 volts (VAV, VBE, VBF), 14.2-14.8 volts (VRX), *after 15 minutes operation charging at ½ maximum rate.*
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A - Operating Amperes	Test B
VAV-6001B, 2B	55	50 (48-52)
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	66	55 (53-57)
VRX-6003A	29	23 (21-25)

Test A—After 15 minutes operation charging at 10 amperes (VRX), ½ maximum rate (VAV, VBE, VBF).
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF), 13.6-13.8 volts (VRX).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: Remove knob (use small screwdriver to raise up special clip in knob, or remove small cross-head screw, depending on method used to hold knob). Remove hex nut and collar that holds assembly in place. Pry out switch (switch has threaded sleeve with two flat sides. Sleeve fits snugly in switch hole in panel).
Stop Light Switch Location: In brake line fitting on frame left side rail.
►*IGNITION STARTER SWITCH CAUTION:* When installing accessories, use accessory terminal **only** on ignition-starter switch and **not** the ammeter terminal post.
FUSES: Clock—3 amperes. *In clock lead wire.*
Radio—(6 Volt) 14 amperes, (12 Volt) 9 amperes. Behind instrument panel.
CIRCUIT BREAKERS: Lighting System—(6 Volt) One 30 ampere protects lighting circuits. (12 Volt) One 15 ampere protects lighting circuits. On lighting switch.
Windshield Wiper—(6 Volt) 10 ampere, (12 Volt) 6 ampere. On wiper switch. Backup lights protected by windshield wiper circuit breaker.
HORNS: Auto-Lite. *12 Volt type used on C66.*

Car Model	Auto-Lite Horn No. Low Pitch	High Pitch
C63, C64	HAB-4659	HAB-4664
C66 (12 V.)	HAA-4103	HAA-4104

►*NOTE:* Horns have resistance unit connected across circuit breaker points. Resistance for 6 volt horns should be 2.5-2.8 ohms, 12 volt horns 5.7-6.3 ohms.
Horn Relay: (6 Volt) HRL-4104, (12 Volt)RAB-4001.

Performance Data—HRL 4104

Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volts min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

►*AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system. See "Chrysler, DeSoto, Dodge Airtemp" Air Conditioning in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).
Bore—3 13/16". **Stroke**—3 5/8".
Displacement—331.1 cu. ins. **Rated HP**—46.51.
Developed Horsepower—(C63-1) 195 at 4400 RPM., (C63-2, C64, C66) 235 at 4400 RPM.
Compression Ratio—7.5-1.
Compression & Vacuum Reading—*See "Tune-Up".*
ENGINE REMOVAL: *See Chrysler Special Data.*
OIL PAN REMOVAL: Remove oil level indicator, drain engine oil. Remove starting motor and exhaust pipe cross-over. Remove oil pan attaching bolts and drop oil pan straight down and away from engine.
CYLINDER HEAD & TIGHTENING TORQUES: *See Chrysler Special Data.*

PISTONS

Aluminum alloy, steel strut, slipper type, cam ground and tin plated.
►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.*
Weight—*20.8 ozs.*
Removal—Pistons and rods removed from above.
Fitting New Pistons: Clearance .0005-.0015" measured 1½" from bottom of piston between thrust face and cylinder wall. Check piston size with micrometer across large diameter at bottom. Insert .002" x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 5-12 lbs. at room temperature of 70° F.
►*NOTE:* Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .020" or out-of-round over .005" require reboring and honing to above limits.
Replacement Pistons: Standard, .010", .020", .030", .040", .060" oversize. Fitted pins are included with new pistons.
Installing Pistons: Letter "F" embossed on side of piston near piston pin hole must face front of engine. *See "Connecting Rods (Installation)" below.*

PISTON PINS

Floating type with lock ring in each end.
NOTE—Pin is offset in piston toward right side of engine.
Diameter—63/64". **Length**—3 9/64".
Clearance in Piston—.0000-.0005" or thumb press fit at 70° F.
Clearance in Rod—.0001-.0004". *Selective fit.*
Replacement Pins: Standard, .003". .008" oversize.
NOTE—Fitted pins are furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	5/64"	.010-.020"	.002-.0035"
Compr. (#2)	5/64"	.010-.020"	.001-.0025"
Oil (#3)	3/16"	.010-.020"	.001-.0030"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .040", .060" oversize.
Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length—6 5/8". **Weight** 25.2 ozs.
Crankpin Journal Diameter—2.249-2.250". Out-of-round and taper limits .001".
►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals machined UNDERSIZE). See "Crankshaft" below.*
Bearings (Lower)—Removable precision type, steel-backed babbitt. No shims.
Clearance—.0005-.0015".
Endplay—.006-.014" (total for both rods).
Replacement Bearings: Standard, .001", .002", .003", .010", .012" undersize.
Installing Rods: *See "Pistons (Installation)" above.* Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet. "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston pin. When installing bearing cap make certain "V" slot oil passage is toward top of engine.
►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Five bearings. Out-of-round limit .001".
►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*
.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counterweight in following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).
Bearings—Removable, precision type, steel-backed, babbitt lined. No shims.
Clearance—.0005-.0015" .

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Replacement Bearings: Std., .001", .002", .003", .010", .012" undersize. Upper and lower halves of bearings Nos. 1, 2, and 4 are alike and interchangeable; Upper No. 3 is interchangeable with Lower No. 3; Upper & Lower No. 5 are **not interchangeable.**

End Thrust: Taken by center (#3) main bearing.

Endplay: .002-.007".

Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

CAMSHAFT

Journal Diameters—(Nos. 1, 2, 3, 4) 1.998-1.999. (No.5) 1.4355-1.4365".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width 1 1/8". **Pitch** .375". **Length** 68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with the center of the camshaft. Temporarily install camshaft sprocket, less chain, and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft "Zero" mark exactly in line with center of crankshaft. (Use straightedge to check accuracy of alignment). Remove Remove camshaft sprocket and position it in timing chain and re-install assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" marks should be in line with shaft center. Install fuel pump eccentric and camshaft nut. Tighten to 130 ft. lbs. torque.

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

►*TIMING CASE COVER REMOVAL CAUTION: Remove water pump before removing timing case cover. (Cover attaching bolt behind water pump).*

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diameter	Stem Diameter	Length
Intake	1 15/16"	.372-.373"	5 1/32"
Exhaust	1 3/4"	.371-.372"	5 1/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.375"	.001-.003"
Exhaust	45°	.358"	.002-.004"

Valve Seat Width—1/16-3/32" (In.), 3/64-1/16" (Ex.)

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Chrysler Special Data.*

Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from the valve spring seat in the head to the tip of the valve should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: Two springs used for each valve. Install with closed coil toward cylinder head.

Free Length—Outer 2 3/64". Inner 2 1/16".

Valve Spring Specifications

	Inner Spring		Outer Spring	
Valve	Lbs. Press.	Length	Lbs. Press.	Length
Closed	20-23	1 9/16"	52-58	1 11/16"
Open	40-45	1 3/16"	122-130	1 5/16"

►*CAUTION: Spring ends must be square within 1/16" (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height is 1 23/32" or greater install a 1/16" spacer (Part No. 1400482) in the head counter-bore to bring height back to a nominal 1 5/8-1 11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump up" will restrict engine speed and cause valves to burn if valve spring loads are not maintained.*

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

►*CAUTION: Oil hole in top of exhaust guide must face up.*

NOTE—If Valve Guide Tool C-3150 is not available, drive guides in, measuring from top of valve seat as follows: Intake—31/32". Exhaust—1 7/32".

Hydraulic Valve Lifters: Integral flat-valve type.

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are .008" oversize.

Diameter—.9040-.9045". **Clearance in Block**—.0005-.0015".

Lifter Overhaul & Testing—*See "Valve System" in Chrysler Special Data.*

►*VALVE GRINDING CAUTION:* See Valves (above).

Rocker Arm Assembly: *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing

Intake Valves—Open 15° BTDC. Close 57° ALDC.

Exhaust Valves—Open 49° BLDC. Close 15° ATDC.

Valve Timing Check—Turn crankshaft until #1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at "Zero", turn crankshaft until dial indicator shows that valve has lifted .020". Pointer on cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft **counter-clockwise** until lifter is back down to the valve closed position. Remove spacer from between rocker arm and valve stem. *See "Camshaft Setting" under CAMSHAFT above.*

►*CAUTION: Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

►*TIMING CASE COVER REMOVAL CAUTION—One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing case cover.*

OILING SYSTEM

►*AIR-CONDITIONED CAR FILTER CARTRIDGE CHANGE NOTE:* Due to interference from fender skirt or air conditioning lines immediately above filter cover, filter assembly must be removed from engine to change filter cartridge.

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed..

Normal Oil Pressure: 40-65 lbs. with warm oil operating at 40-50 MPH.

►*OIL PRESSURE CAUTION: Oil pressure will drop to 25-45 lbs. when FILTER ELEMENT IS CLOGGED. Replace filter element.*

Oil Pressure Relief Valve—Mounted in oil pump.

Oil Pressure Warning Light: Located in lower cluster of instrument panel. Light glows when ignition turned on, goes out when oil pressure reaches 10 lbs.

Oil Pressure Switch—Auto-Lite 13411A.

Oil Pump: Rotary type. In crankcase at rear end. Driven by lower distributor drive shaft.

Oil Pump Overhaul—*See "Oil Pump" in Chrysler Special Data.*

Priming Oil Pump (After Installation)—Before installing filter assembly, introduce ½ pint of engine oil into the lower hole of the filter pad with a pressure gun or long nosed oil can.

Oil Filter: Full-flow. At right rear engine. All oil enters lubrication system of engine through filter at full pump pressure. Safety valve in filter opens if element is clogged, allowing oil to pass into lubrication system under a reduced pressure of 25-45 lbs.

Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

►*AIR-CONDITIONED CAR FILTER CARTRIDGE CHANGE: See Note above.*

►*OIL LEAK AT FILTER BASE CORRECTION:* A new Oil Filter-to-Block Gasket, Part No. 1617786, is available to correct this condition on steel reservoir type Full-Flow filters. *CAUTION*—Both faces of aluminum adapter must be smooth.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 25 qts. (26 qts. with heater).

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Pressure Valve: Chrysler 1373136. Radiator filler cap. Opens at 7 lbs.

Thermostat: By-pass type in cylinder head water outlet. Starts to open 157-162° F.

Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for complete data.*

Pump Removal—Drain cooling system, remove fan belts and belt pulley. Remove four bolts attaching pump to water manifold and remove pump.

Temperature Gauge: Auto-Lite 13464A. Not electric.

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission.

See "PowerFlite" Transmission in Transmission Section for complete data.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section for data.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Dashpot Setting: *See "Tune-Up".*

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level—Apply hand brake and place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.

Oil Pan Filler Tube (Location)—At right rear of engine compartment.

Capacity—12 qts. (refill). 13 qts. (after overhaul).

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section for data.*

UNIVERSALS

Detroit Universals. Cross and Ball & Trunnion types used as follows:

Car Model	Front	Rear
C63-1 (Twn. & Ctry., 8-Pass.) Ⓓ	Cross	Cross
C63-1 (Others)	Ball & Trunnion	Cross
C63-2	Ball & Trunnion	Cross
C64	Ball & Trunnion	Cross
C66 Ⓓ	Cross	Cross

Ⓓ—Have center universal that is ball and trunnion type.

Propeller Shaft Center Bearing: *See "Propeller Shaft" in Chrysler Special Data.*

REAR AXLE

Own. Semi-floating type with hypoid gear with Hotchkiss Drive. Barrel type differential with adjustable ring gear thrust pad used.

See "Chrysler Hypoid" in Rear Axle Section.

Axle Ratios: (C63) 3.36-1 (37-11), (C64, C66) 3.54-1 (39-11).

Backlash—.006-.010". Screw adjustment.

Ring Gear Thrust Pad Setting—Loosen locknut on left side of carrier housing, tighten thrust pad screw finger tight, back screw off 1/8 turn, tighten locknut.

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic, non-adjustable. Serviced by replacement.

Standard Shock Absorbers

Car Model	Chrysler Part No. Front	Rear
4-Door Sedan, Club Cpe	1450630	1450633
Others	1450631	
Club Cpe., Conv.		1450634
8-Pass., Est. Wgn., Limo		1450635

Heavy Duty Shock Absorbers

8-Pass., Est. Wgn., Limo. (exc. C66)	1450346	
Others	1450041	1450635
All (Special)		1450075

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.

See "Chrysler" in Front Suspension Section for complete data.

Kingpin Inclination—(C63, C64) 5-6½°, (C66) 6½-8° with 0° Camber.

Camber—Neg. 3/8° to Pos. 3/8° (¼-½° higher on left).

Caster—Neg. 1° to Neg. 3° (Neg. 2° preferred).

Toe-In—0" to 1/16"" (0" preferred).

Toe-Out on Turns—Inner wheel 20°, outside wheel 18¼°.

STEERING

Manual Steering Gear: Gemmer. Worm and three-tooth roller.

See "Gemmer Worm & Roller" in Steering Section.

Power Steering: Hydraulic steering unit with engine driven hydraulic pump. Two types used as follows:

Power Steering Unit	Type
Gemmer Hydraguide (Early)	Internal Oil Passage
Chrysler Full Time (Later)	Coaxial

See "Gemmer Hydraguide" & "Chrysler Full Time" Power Steering in Steering Section for data.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" Steering Section.*

BRAKES (SAFEGUARD)

Service: (C63, C64) Chrysler "Safe-Guard" Lockheed hydraulic.

See "Chrysler Safe-Guard" Brakes in Brake Section for data.

Drums—Centrifuse. Diameter 12".

Wheel Cylinder Diameter—1 1/8" bore. Single acting (front), double acting (rear wheels)

Replacement Linings & Shoes—Linings or shoes with linings furnished in Standard & .030" oversize.

Lining—Molded asbestos (bonded to shoe). Length—12.57" per shoe. Width 2". Thickness 13/64".

Braking Power—60% Front. 40% Rear.

Clearance—.006" at end of all shoes.

Master Cylinder—On frame bracket at base of brake pedal.

Checking Fluid—Access hole at left of front floor pan.

Removal—Remove floor mat and toe board. Disconnect push rod. Remove horse shoe clip and slide brake pedal off shaft. Disconnect brake line tubes at master cylinder fittings. Remove bolts from master cylinder body. Cylinder can then be lifted off frame bracket. When reinstalling use new horse shoe clip.

Power Brakes: Chrysler "Vacu-Ease". *See "Chrysler Vacu-Ease" Power Brakes in Brake Section.*

Parking Brake: On shaft at rear of transmission. Internal expanding type.

Adjustment— *See "Hand Brake Notes" in Chrysler Special Data.*

Lining—Width 2". Thickness 5/32". Length 13 1/16".

Clearance—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

BRAKES (DISC)

Service: (C66) Hydraulic, self-energizing, two-shoe, DISC type. NOTE—No power booster used.

See "Chrysler Disc Brakes (Without Spider)" in Brake Section for data.

Pressure Plate Diameter—I.D. 9½". O.D. 12".

Wheel Cylinder Diameter—1¼" (front), 1" (rear).

Lining—Molded asbestos segments (6 on each plate) bonded to disc.

Bleeding Disc Type Brakes—Manufacturer recommends bleeding all four lower wheel cylinders first, then all four upper cylinders.

Parking Brake: On shaft at rear of transmission. *See C63 & C64 (above) for data.*

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMG-4102 (C63, C64), EMK-4101 (C66). Electric type.

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Chrysler "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Window Regulators: Auto-Lite Electric type. *See "Auto-Lite Window Regulators" in Miscellaneous Section.*

Convertible Top Control: Hydro-Lectric type. *See "Hydro-Lectric" Power Operated Tops in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section*

MODEL IDENTIFICATION

Series	Model Identification
Windsor Deluxe	C-67

SERIAL NUMBER: On metal plate attached to left front door body hinge post.

Starting Serial Nos.	Detroit	Los Angeles
Windsor Deluxe	W551001	W55L1001

ENGINE NUMBER: On boss on top front side of cylinder block just back of water pump.
Starting Engine Number—WE551001.

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*
"A"—ALL Cylinders .020" oversize.
"B"—ALL Crankshaft Journals .010" undersize.
"AB"—BOTH above conditions exist.
"MALTESE CROSS" (3/8" high)—ONE OR MORE Crankshaft Journals .001" undersize. *See "Connecting Rods" and "Crankshaft" (below).*
"DIAMOND" (3/8" high)—ALL Valve Lifters .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: 130-160 lbs. at cranking speed of 150 RPM. Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21" idling.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatically controlled valve in exhaust manifold of right cylinder block. Valve must operate freely. When installing coil, move outer end of thermostatic spring around and up 3/4 turn (counter-clockwise), hooking end of spring under right stop stud. *See Chrysler Special Data.*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".
Plugs—Auto-Lite Resistor Type 4S-165, 14mm. Torque to 30 ft. lbs.

COIL: Auto-Lite CAC-4001.
Ignition Current—2.25 amperes idling, 5.0 amperes stopped.

DISTRIBUTOR: Auto-Lite (U.S.) IAZ-4001D, (Can. Early) IAZ-4001D, (Can. Later) IAZ-4001E.
Condenser—Auto-Lite IBB-2015R. **Capacity**—.25-.28 microfarad.
Contact Point Set—Auto-Lite IGP-3028ZS.
Breaker Gap—.015-.018". Set maximum gap to .017".
Cam Angle—34° ± 3° with both sets of contacts. Do not adjust gap outside limits to obtain specified cam dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAZ-4001D

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	0	700
1	365	2	730
6	450	12	900
16	2125	32	4250
17	2300	34	4600

Automatic Advance—IAZ-4001E

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	0	700
1	375	2	750
4	450	8	900
13	1900	26	3800
14	2050	28	4100

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAZ-4001D, E

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-1/4
1	2	6
5	10	9-1/4
10	20	14-7/8
11.5	23	17

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in Chrysler Special Data.*

IGNITION TIMING

Setting—7° BTDC.
Timing Mark—On crankshaft vibration damper.
Manual Adjustment—Timing may be advanced with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR
CARTER BBD

Transmission	Carter Carb. No.
Standard	BBD-2180S, SA, SB
PowerFlite	BBD-2162S, SA, SB

►*HESITATION OR SAG ON LIGHT ACCELERATION* (BBD-2162S Carb.): *See "Carter BBD" in Carburetor Section for unitized Pkg. installation data.*

►*CARBURETOR CHANGE FOR IMPROVED GAS MILEAGE: See "Carter BBD" in Carburetor Section for Unitized Pkg. installation data.*

►*IDLE SPEED (AIR CONDITIONED CARS): Summer and winter Idle Speed Adjustments are different and must be made as follows:*

Winter Setting (Air Conditioner not in Operation)—Back off round adjusting nut on diaphragm shaft away from pawl to prevent interference with idle adjustment. Start engine, attach tachometer and with transmission control in neutral ("N") position and engine at operating temperature adjust engine idle to 475-500 RPM.
Summer Setting (Air Conditioner in Operation)—Adjust engine idle as for winter operation, then adjust fast idle device as follows:
Idle Speed-Up Control Adjustment (Cars with Air Conditioning)—Turn blower control switch to first position, temperature control switch to second position. Adjust round adjusting nut on fast idle diaphragm shaft to increase engine RPM to from 700 to 800 RPM. With hand brake on, move transmission control lever to drive ("Dr") range then back to neutral ("N") Readjust fast idle if necessary. Lock round nut with hex nut.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*
Idle Setting—1/4—1-1/4 turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—475-500 RPM. *For "Idle Speed Setting" and "Idle Speed-Up Control Adjustment" on Air Conditioned cars see CARBURETOR above.*

Float Level—7/32" (Gauge T109-239) from top surface of body casting to top of each float. If one float lower than other, equalize by bending float arm. If both floats require same correction, adjust by bending lip on float arm.
Accelerating Pump—Normal setting, outer hole (medium stroke).

Fast Idle: .015-.019" clearance between throttle valve and bore of carburetor (side opposite idle port), with throttle valve tightly closed. Adjust by bending choke connector rod at lower angle (Tool T109-213).
Automatic Choke Setting: Centered (set at index).
Unloader Adjustment: Make fast idle adjustment. With throttle valve held wide open and choke valve fully closed, clearance between upper edge of choke valve and inner wall of air horn should be 1/4". Adjust by bending arm on choke trip lever (Tool T109-214).
Slow Closing Throttle Dashpot Adjustment (2162S,SA,SB): Loosen lock nut and adjust dashpot unit so that plunger shaft can be bottomed with a 1/16" gauge placed between shaft and operating lever with throttle valves tightly closed. Tighten lock nut.
Throttle Linkage Adjustment: *See "PowerFlite" Transmission Data in Transmission Section.*
►*OTHER DATA: See "Carter BBD" in Carburetor Section.*
Fuel Pump Pressure: 5-6½ lbs.

CARB. EQUIPMENT

Fuel Pump: Auto-Lite FB-4006. Mechanical type.
Pressure—5-6½ lbs.
See "Fuel Pumps" in Carburetion Equip. Section.
Gasoline Gauge: Auto-Lite Electric Type.

Car Model	Dash Unit	Tank Unit
C67 (Exc. Sub. & Est. Wgn.)	13703A	13795A
C67 (Sub. & Est. Wgn.)	13705A	13872A

See "Fuel Gauges" in Carburetion Equip. Section.

BATTERY

Auto-Lite 2H-120-D or Willard MW-2-120-C. 6 volt, 17 plate, 120 ampere hour capacity (20 hr. rate).
Battery Ground—Positive.
Engine Ground—Left front of engine.

STARTER

Auto-Lite MCL-6304. Armature MCH-2110.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8 ft. lbs.	Lock	2.0	410

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Starting Switch: Auto-Lite SSX-4004. Solenoid pinion shift and starting switch used, with neutral safety switch (on Transmission) and SEPARATE relay Auto-Lite HRW-4001. *See "Starter Controls" in Electrical Equip. Section.*

Neutral Safety Switch Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

GENERATOR

Auto-Lite Generator No.	Armature No.
GGW-6001K (U.S. Std.)	GGW-2006F
GGW-6016D (U.S. Pow. St.)	GGW-2090F
GGW-6001J (Can. Std.)	GGW-2006F
GGW-6016F (Can. Pow. St.)	GGW-2090F
GGW-6001J (Spec. Equip.)	GGW-2006F
GGU-6001G (Spec. Equip.)	GGU-2006F
GGU-6001H (Spec. Equip.)	GGU-2006F
GGJ-6001F (Spec. Equip.)	GGJ-2101AF
GGJ-6001G (Spec. Equip.)	GGJ-2101AF
GGW-6016C (Spec. Pow. St.)	GGW-2090F
GGU-6013B (Spec. Pow. St.)	GGU-2071F
GGJ-6008A (Spec. Pow. St.)	GGJ-2107F
GGW-6017B (Air Cond.)	GGW-2098F
GGU-6008D (Air Cond.)	GGU-2063F
GGJ-6001L (Air Cond.)	GGJ-2101AF

►*GENERATOR BRACKET INTERFERENCE WITH GENERATOR WIRING HARNESS CAUTION:* It is possible that edge of generator bracket may interfere with generator wiring harness, causing a "short" in this wiring. If visual inspection shows this interference, re-route harness to rear of generator and generator bracket. Later production cars have this change made.

►*SPECIAL GENERATOR NOTE:* GGJ, GGU, and GGW type generators used. Performance specifications below apply equally to all generators, within any one of the three groups specified.

Performance Data—GGJ

Amperes	Volts	Cold —RPM—	Hot
0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Performance Data—GGU

Amperes	Volts	Cold —RPM—	Hot
0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850
50	8.0	1550-1750	1750-1950

Performance Data—GGW

Amperes	Volts	Cold —RPM—	Hot
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Brush Spring Tension—(GGJ) 34-41 ozs., (CGU, GGW) 35-53 ozs., with new brushes.

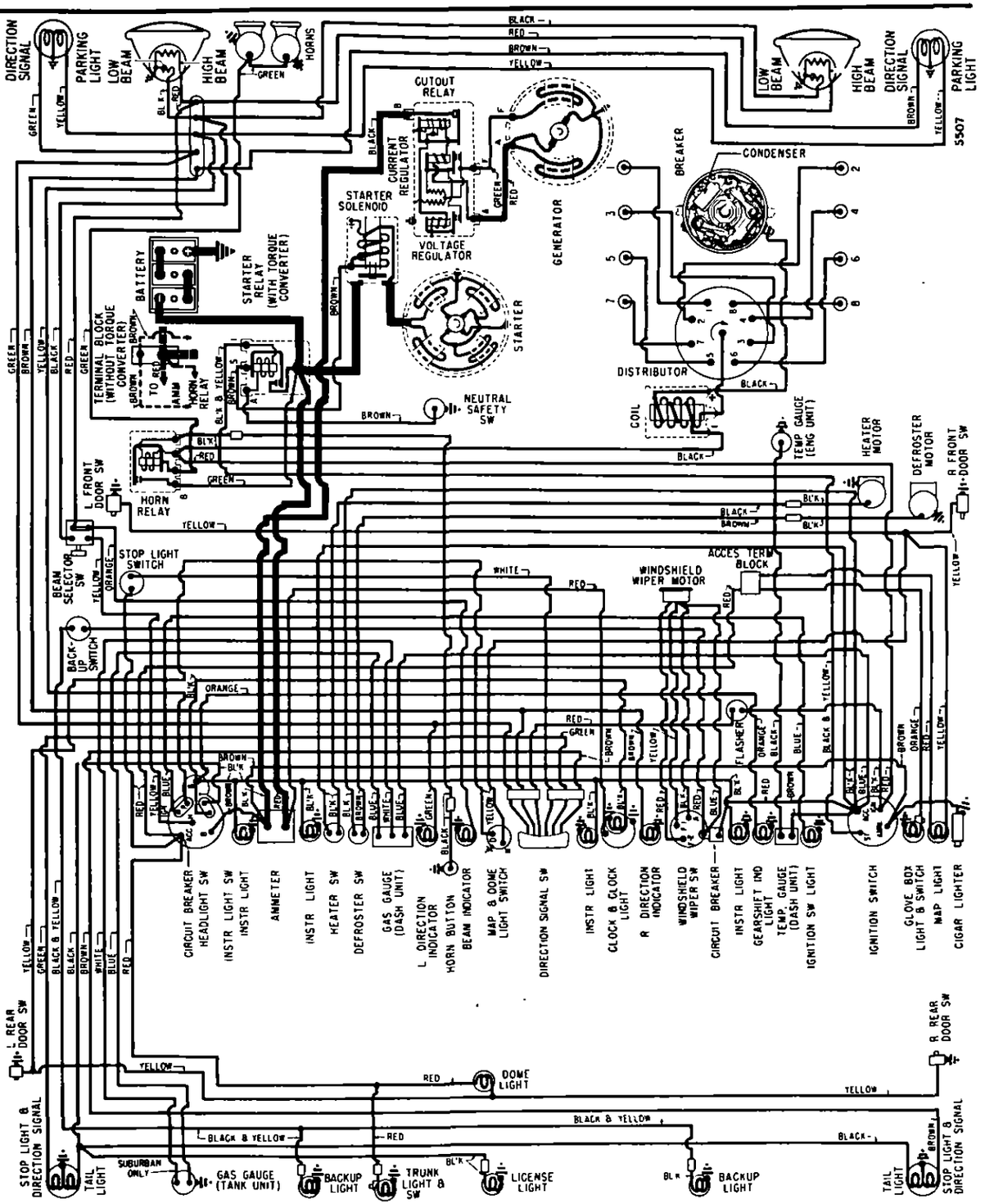
Field Current—(GGJ) 1.4-1.7 amperes, (GGU) 1.4-1.6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts.

Motoring Current—(GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Approximately ½" slack (when pushed from a straight line midway between pulleys).

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REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW

Cutout Relay

Cuts In–6.3-6.8 volts.
Cuts Out–4.1-4.8 volts.
Contact Gap–.015" minimum.
Air Gap–.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting–7.1-7.4 volts *after 15 minutes operation charging at ½ maximum rate.*
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A	–Operating Amperes–	Test B
VBE-6001A	52		45 (43-47)
VBF-6001A	66		55 (53-57)
VAV-6001B,2B	55		50 (48-52)

Test A–After 15 minutes operation charging at ½ maximum rate.
Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF).
Air Gap–.048"-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: Remove knob (use small screwdriver to raise up special clip in knob, or remove small cross-head screw, depending on method used to hold knob). Remove hex nut and collar that holds assembly in place. Pry out switch (switch has threaded sleeve with two flat sides. Sleeve fits snugly in switch hole in panel).
Stop Light Switch Location: On forward end of brake master cylinder.
►*IGNITION STARTER SWITCH CAUTION:* When installing accessories, use accessory terminal **only** on ignition-starter switch and **not** the ammeter terminal post.
FUSES: Clock–3 amperes. In clock lead wire. **Radio**–14 amperes. Behind instrument panel.
CIRCUIT BREAKERS: Lighting–Located in headlight switch assembly. Three in number, as follows:
27 Ampere Circuit Breaker–Protects headlights, high beam indicator light, and parking lights.
10 Ampere Circuit Breaker–Protects tail lights, license plate lights, clock light, and instrument panel light.
10 Ampere Circuit Breaker–Protects stop lights, map light, dome light, glove box light, courtesy light, and trunk compartment light.
Windshield Wiper: 10 amperes. On wiper switch.
HORNS: Auto-Lite. Dual horns with relay.
Low Pitch–A-L HAB-4029.
High Pitch–A-L HAB-4030.
Horn Relay: Auto-Lite RAF-4001.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ENGINE NOTE: Engine has polyspherical combustion chamber together with a single rocker shaft valve mechanism, and lateral valves.*

ENGINE SPECIFICATIONS: Spitfire. 90° V8 Valve-in-head.

Bore	Stroke	Displmt.
3 5/8"	3 5/8"	300 cu. ins.

Compr. Ratio	Rated HP	Developed HP
8.0-1	37.8	188 at 4400 RPM.

Compression & Vacuum Reading–*See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Chrysler Special Data.*

OIL PAN REMOVAL: Remove oil level indicator. Remove crankcase plug and drain lubricating oil. Disconnect steering linkage at idler arm support bracket, and allow linkage to settle away from bottom of oil pan. Remove bolts that hold oil pan to cylinder block. Slide pan out and down away from engine.

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Chrysler Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Chrysler Special Data.*

PISTONS

Aluminum alloy, elliptically turned, steel-banded, tin-coated with pin offset to right .06".

►*CYLINDER BORE OVERSIZE CAUTION: Engine with letter "A" following engine number indicates that cylinder bores are .020" oversize.*
Weight–20.1 ozs. (Std. through .060" oversize).
Removal–Pistons and rods removed from above.

Fitting New Pistons: Clearance .0005-.0015" measured 1½" from bottom of piston between thrust face and cylinder wall. Check piston size with micrometer across large diameter at bottom. Insert .002" x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 5-12 lbs. at room temperature of 70°F.

►*NOTE:* Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .020" or out-of-round over .005" require reboring and honing to above limits.

Replacement Pistons: Standard, .010", .020", .030", .040", .060" oversize. Fitted pins are included with new pistons.

Installing Pistons: Assemble pistons to connecting rod on right hand cylinder bank (2-4-6-8) with indent on top of piston on side opposite to large chamfer at insert end of connecting rod. On left bank (1-3-5-7) assemble with indent on same side as large chamfer at insert end of connecting rod. *See Rod Installation.*

PISTON PINS

Floating type with lock ring in each end.
NOTE–Pin is offset in piston toward right side of engine.
Diameter–.9841-.9843". **Length**–3.040-3.050".
Clearance in Piston–.0000-.0005" or thumb press fit at 70°F.
Clearance in Rod–.0001-.0004". Selective fit.
Replacement Pins: Standard .003", .008" oversize.
NOTE–Fitted pins are furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775-.0780"	.010-.020"	.0015-.003"
Compr. (#2)	.0775-.0780"	.010-.020"	.001-.0025"
Oil (#3)	140-.150"	.010-.020"	.001-.0025"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .040", .060" oversize.
Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length–6.621-6.625". **Weight**–25.2 ozs.
Crankpin Journal Diameter–2.249-2.250". Out-of-round and taper limits .001".

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals machined UNDERSIZE). See "Crankshaft" below.*
Bearings (Lower)–Removable precision type, steel-backed babbitt. No shims.
Clearance–.0005-.0015".
Endplay–.006-.014" (total for both rods).
Replacement Bearings: Standard, .001", .002", .003", .010", .012" undersize.
Installing Rods: *See "Pistons (Installation)" above.* Install rod and piston assembly with indent on top of piston pointing toward front of engine. *NOTE*–Connecting rod bores are chamfered more on one side than the other. Large chamfer must be installed toward crankshaft journal fillet.

►*BEARING INSERT CAUTION:* When installing lower bearing insert, make certain that "V" groove in insert is in line with "V" groove in cap. Tighten bearing cap nuts to 45 ft. lbs. torque.

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter–2.4995-2.5005". Five bearings. Out-of-round limit .001".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*
.010" UNDERSIZE (Main & Connecting Rod Journals)–Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)–A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counterweight in following manner: "R" indicates connecting rod

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journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).

Bearings—Removable, precision type, steel-backed, babbitt lined. No shims.

Clearance—.0005-.0015".

Replacement Bearings: Std., .001". .002", .003", .010", .012" undersize Upper and lower halves of bearings Nos. 1, 2, and 4 are alike and interchangeable; Upper No. 3 is interchangeable with Lower No. 3, Upper & Lower No. 5 are **not interchangeable.**

End Thrust—Taken by center (No.3) main bearing.

Endplay—.002-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Chrysler Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chrysler Special Data.*

CAMSHAFT

Journal Diameters—(Nos. 1, 2, 3, 4) 1.998-1.999.(No.5) 1.4355-1.4365".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width 1 1/8". **Pitch** .375". **Length** 68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with the center of the camshaft. Temporarily install camshaft sprocket, less chain, and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft "Zero" mark exactly in line with center of crankshaft. (Use straightedge to check accuracy of alignment). Remove camshaft sprocket and position it in timing chain and re-install assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" marks should be in line with shaft center. Install fuel pump eccentric and camshaft nut.

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

►*TIMING CASE COVER INSTALLATION CAUTION:* **Install short bolt at oil filler pipe location.** Install bolts and washers after coating two top and four bottom bolts with suitable sealer for oil, and four center bolts with suitable sealer for water.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chrysler Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diam.	Stem Diam.	Length
Intake	1 13/16"	.372-.373" ①	4 25/32"
Exhaust	1 1/2"	.371-.372" ①	4 3/4"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.381"	.001-.003"
Exhaust	45°	.365"	.002-.004"

①—Standard. *See Valve Guides below.*

Valve Seat Width—1/16-3/32" (Intake), 3/63-1/16" (Exhaust).

►*VALVE OVERSIZE NOTE:* "I" or "E" stamped on cylinder head at rocker cover gasket boss, indicates that all intake or exhaust valves are oversize in that bank depending upon what letter is stamped.

Intake Valve Stem Oil Seal—Slide valve stem seal over stem (open end down) and down against valve guide (seals will automatically seat themselves in correct position when engine is first run).

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from the valve spring seat in the head to the tip of the valve should be checked with gauge C-3436 If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: Single spring used for each valve.
Free Length—2".
Specifications—Both intake and exhaust valve springs should have 134-146 lbs. pressure when compressed to 1 5/16". Discard springs that test less than 130 lbs. at 1 5/16".

►*CAUTION: Spring ends must be square within 1/16" (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height is 1 23/32" or greater install a 1/16" spacer (Part No 1400482) In the head counter-bore to bring height back to a nominal 1 5/8-1 11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump up" will restrict engine speed and cause valves to burn if valve spring loads are not maintained.*

Valve Guides: Cast integral with cylinder head. Service as follows: When valve stem clearance excessive, use Reamer Tool Set to ream guides for NEXT OVERSIZE Valve as follows: Tool C-3433 (.005" O.S.), Tool C-3430 (.015" O.S.), Tool C-3427 (.030" O.S.). Valves furnished Std. and .005", .015", .030" Oversize.

Hydraulic Valve Lifters: One-piece integral type.

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are .008" oversize.

Diameter—.9040-.9045". **Clearance in Block**—.0005-.0015".

Lifter Overhaul & Testing—*See "Valve System" in Chrysler Special Data.*

►*VALVE GRINDING CAUTION:* See Valves (above).

Rocker Arm Assembly: *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 15° BTDC. Close 57° ALDC.

Exhaust Valves—Open 49° BLDC. Close 15° ATDC.

Valve Timing Check—Turn crankshaft until No. 1 intake valve closed. Insert a .210" spacer between rocker arm and No. 1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at "Zero"., turn crankshaft until dial indicator shows that valve has lifted .024". Pointer on cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft **counter-clockwise** until lifter is back down to the valve closed position. Remove spacer from between rocker arm and valve stem. *See "Camshaft Setting under CAMSHAFT above.*

►*CAUTION: Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

OILING SYSTEM

►*AIR CONDITIONED CAR FILTER CARTRIDGE CHANGE NOTE:* Due to interference from fender skirt or air conditioning lines immediately above filter cover, filter assembly must be removed from engine to change filter cartridge.

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed.

Normal Oil Pressure: 40-65 lbs. with warm oil operating at 40-50 MPH.

►*OIL PRESSURE CAUTION: Oil pressure will drop to 25-45 lbs. when FILTER ELEMENT IS CLOGGED. Replace filter element.*

Oil Pressure Relief Valve—Mounted in oil pump. Adjustable.

NOTE—When replacing relief valve spring, use same color spring.

Oil Pressure Gauge—Auto-Lite 13700A. Not electric.

Oil Pump: Rotor type. In crankcase at rear end. Driven by lower distributor drive shaft.

Pump Overhaul—*See "Oiling System" in Chrysler Special Data.*

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Priming Oil Pump (After Installation)– Before installing filter assembly, introduce ½ pint of engine oil into the lower hole of the filter pad with a pressure gun or long nosed oil can.

Oil Filter: Full flow. At right rear of engine. All oil enters lubrication system of engine through filter at full pump pressure. Safety valve in filter opens if element is clogged, allowing oil to pass into lubrication system under a reduced pressure of 25-45 lbs.

Filter Element–Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

►*AIR CONDITIONED CAR FILTER CARTRIDGE CHANGE: See Note above.*

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 24 quarts (25 qts. with heater).

Pressure Valve: Chrysler 1373136 (Opens at 7 lbs.). Radiator filler cap. 14 lb. type used with Air Conditioning.

Thermostat: Choke type in cylinder head water outlet. Starts to open 159-165° F.

Water Pump: Ball bearing type. No lubrication required. *See "Chrysler" in Water Pump Section for data.*

Pump Removal–Drain cooling system. Remove radiator shroud assembly, fan belt, pulley and fan. Remove radiator outlet hose from thermostat housing. Remove wire from temperature gauge sending unit. Remove pump housing-to-cylinder block attaching bolts, remove pump housing assembly.

Temperature Gauge: Auto-Lite (Dash Unit) 13701A, (Engine Unit-mounted in pump housing assembly) 13550A. Electric type.

CLUTCH

Borg & Beck	Model	Assy. No.	Disc No.
Standard	10A7	361376	382366

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Turn clutch release fork rod adjusting nut until 3/16" free play at outer end of clutch fork is obtained. This adjustment will give necessary 1" free play at pedal.

Over-Center Spring Adjustment: With clutch pedal in fully released position, and with over-center spring eyebolt finger tight, hold spring eyebolt, spring and bracket assembly as a single unit and with an adjusting wrench tighten adjusting nut seven full turns.

Removal: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods. Remove transmission (See Synchro-mesh Transmission). Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh.
See "Chrysler Synchro-mesh" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up car at front and place floor jacks under lower control arms. Disconnect propeller shaft at front end. If transmission is to be disassembled, loosen companion flange nut. Disconnect speedometer cable, and hand brake cable at brake band. Disconnect gearshift and gearshift selector control rods at transmission. Remove capscrews and nuts which attach transmission to clutch housing. Remove transmission assembly by pulling it back, down and out of car.

NOTE–When installing transmission use pilot studs to avoid springing clutch disc.

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission.

See "PowerFlite" Transmission in Transmission Section for complete data.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section for data.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level–Apply hand brake and place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.

Oil Filler Tube (Location): At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission, make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite Transmission" in Transmission Section.*

UNIVERSALS

Detroit Universals. Ball and Trunnion type used at front, Cross type used at rear.

REAR AXLE

Own. Separate carrier, semi-floating types with hypoid gear and Hotchkiss Drive. Two types used as follows:

Model	Rear Axle Type
Synchro-mesh	Cage
PowerFlite	Barrel

See "Chrysler Hypoid" in Rear Axle Section.

Ratios	Exc. Est. Wgn.	Est. Wgn.
Synchro-mesh	3.9-1 (39-10)	3.91-1 (43-11)
PowerFlite	3.54-1 (39-11)	3.73-1 (41-11)

Backlash–.006-.008".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub, and drum assembly (use screw type hub puller–Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE–Use puller C-293-C to remove bearing from shaft, Tool C-637 to remove inner oil seal, drift C-241 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels.
Endplay–.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic Serviced by replacement.

Car Model	Chrysler Part No. Front	Rear
Conv. Cpe.	1614406	1450919
4-Door	1614405	1450918
Estate Wagon	1614406	1450920
Others	1614406	1450918
Heavy Duty		1450920
Heavy Duty (Spec.)		1450037

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers. Shock absorbers located within coil springs. *See Front Suspension Section for data.*
Kingpin Inclination–5½° at 0° camber.
Caster–Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° with Power Steering with left side 0-¾° greater than right side within these limits).
Camber–Neg. 1/8° to Pos. 5/8° (Left side Pos. 1/2°, Right side 0° preferred).
Toe-In–0" to Pos. 1/16" (0" preferred).
Toe-Out on Turns–Inner wheel 20°, outer wheel 18½° ±½°.

STEERING

Manual: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.
See "Coaxial" Power Steering in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*

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Steering Wheel & Horn Button Removal: See *"Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: See *"Gemmer Worm & Roller" Steering Section.*

BRAKES

Service: Chrysler "Safe-Guard" Lockheed hydraulic. See *"Chrysler Safe-Guard" Brakes in Brake Section for data.*

Drums—Centrifuse. Diameter 12".

Wheel Cylinder Diameter—1 1/8" bore. Single acting (front), double acting (rear wheels).

Replacement Linings & Shoes—Linings or shoes with linings furnished in Standard & .030" oversize.

Lining—Molded asbestos (bonded to shoe). Length—12.57" per shoe. Width 2". Thickness 13/64".

Braking Power—60% Front. 40% Rear.

Clearance—.006" at each end of all shoes.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid—Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal—Disconnect pushrod. Disconnect brake line tubes at master cylinder fittings Remove four stud nuts from studs, remove master cylinder.

Power Brakes: Combination vacuum power unit and master cylinder. Unit mounted on engine side of firewall and replaces regular master cylinder. See *"Chrysler Power Unit" in Brake Section.*

Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7"internal expanding type is used with PowerFlite Transmission.

Adjustment—See *"Hand Brake Notes" in Chrysler Special Data.*

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	16 11/16"
7" Int. Type	2"	5/32"	13 1/16"

Clearance (External Type)—.015-.020" around band.

Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMZ-4001. See *"Auto-Lite Electric Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Airtemp. See *"Chrysler Airtemp" Air-Conditioning in Miscellaneous Section.*

Power Window Regulators: Auto-Lite Electric Type. Reversible type motor in each window. Controlled by door switch and master control switch. See *"Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Auto-Lite Electric Type. See *"Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Auto-Lite. Electrical-hydraulic type. See *"Chrysler Top Controls" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Designation
New Yorker DeLuxe	C-68
Imperial	C-69
Crown Imperial	C-70
"300"	C-300

SERIAL NUMBER: On plate attached to left front door hinge post.

►*SERIAL NUMBER NOTE: 1955 Serial Numbers (example N551001) include the following information: Model "N" (New Yorker), "C" (Imperial), "3N" (300). Year Built "55". Serial Number "1001". Los Angeles built cars will have an "L" following the year "55L".*

Starting Serial Numbers	Detroit	Los Angeles
C-68	N551002	N55L1001
C-69	C551001	
C-70	C551001	
C-300	3N551001	

ENGINE NUMBER: On boss on top front side of cylinder block just back of water pump.

►*ENGINE NUMBER NOTE: 1955 Engine Numbers (example NE551001) include the following information: Model "N" (New Yorker), "C" (Imperial), "3N" (300). Engine "E". Year Built "55" Serial Number "1001".*

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A"—ALL Cylinders .020" oversize.
"B"—ALL Crankshaft Journals .010" undersize.
"AB"—BOTH above conditions exist.
"MALTESE CROSS" (3/8" high)—ONE OR MORE Crankshaft Journals .001" undersize. *See "Connecting Rods" and "Crankshaft" below.*
"DIAMOND" (3/8" high)—ALL Valve Lifters .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: 140-170 lbs. at cranking speed of 150 RPM. Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21' idling.

VALVE TAPPET CLEARANCE: (C-300 Models only)—.015" (Intake), .024" (exhaust), with engine hot. Set as follows for COLD engine: .015" (Intake), .028" (Exhaust). *Hydraulic valve lifters used on all other models and adjustment not required in service.*

MANIFOLD HEAT CONTROL: Thermostatically controlled valve in exhaust manifold of right cylinder block. Valve must operate freely. When installing coil, move outer end of thermostatic spring around and up ¼ turn (counter-clockwise), hooking end of spring under right stop stud. *See Chrysler Special Data.*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.
SPARK PLUG GAP: .035".
Spark Plugs—Auto-Lite Resistor 4GS-200 (C-300) 4GS-175 (Others), 14mm. Torque to 30 ft. lbs.

COIL: Auto-Lite CZ-4001 (Early C-70 *12 V.*) **CAE-4001** (Later C-70 *12 V.*), **CAC-4001** (Others *6 V.*).

Ignition Current—1.8 amperes idling, 3.0 amperes stopped (CZ, CAE), 2.25 amperes idling, 5.0 amperes stopped (CAC).

DISTRIBUTOR: (Except C-300)—IAZ-4001E (Early), 4001F (Later), 4001G (Late). (C-300)—IAZ-4001G.

Condenser—Auto-Lite IBB-2015R. **Capacity** .25-.28 microfarad.
Contact Point Set—Auto-Lite IGP-3028ZS.
Breaker Gap—.015-.018". Set maximum gap to .017".
Cam Angle—34°±3° with both sets of contacts. Do not adjust gap outside limits to obtain specified cam dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAZ-4001E

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	375	2	750
4	450	8	900
13	1900	26	3800
14	2050	28	4100

Automatic Advance—IAZ-4001F

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	375	2	750
4	450	8	900
11	1575	22	3150
12	1725	24	3450

Automatic Advance—IAZ-4001G

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	370	2	740
2.5	400	5	800
7	725	14	1450
8	800	16	1600

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAZ-4001E, F

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5 1/4
1	2	6
5	10	9 1/4
10	20	14 7/8
11.5	23	17

Vacuum Advance—IAZ-4001G

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5 1/4
1	2	6 1/8
4	8	8 1/2
6	12	10 1/8
7	14	11 1/4

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in Chrysler Special Data.*

IGNITION TIMING

Setting (Except C-300)—6° BTDC.
Setting (C-300)—10° BTDC.
Timing Mark—On crankshaft vibration dampener.

►*C-300 TIMING CAUTION: When setting ignition timing, reduce engine idle speed to 500 RPM. After timing completed, reset idle speed to 600 RPM.*

Manual Adjustment—Timing may be advanced with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR

►*CARBURETOR APPLICATION: Carter 4-Barrel Carburetors used on all models. One carburetor used C-69, and C-70. Two carburetors used on C-300.*

Car Model	Carter Carb. No.
C-68, C-69., C-70	WCFB-2126S
C-300	(Two) WCFB-2317S

►*IDLE SPEED (AIR CONDITIONED CARS): Summer and winter Idle Speed Adjustments are different and must be made as follows:*

Winter Setting (Air Conditioner not in Operation)—Back off round adjusting nut on diaphragm shaft away from pawl to prevent interference with idle adjustment. Start engine, attach tachometer and with transmission control in neutral ("N") position and engine at operating temperature adjust engine idle to 475-500 RPM.

Summer Setting (Air Conditioner in Operation)—Adjust engine idle as for winter operation, then adjust fast idle device as follows:

Idle Speed-Up Control Adjustment (Cars with Air Conditioning)—Turn blower control switch to first position, temperature control switch to second position. Adjust round adjusting nut on fast idle diaphragm shaft to increase engine RPM to from 700 to 800 RPM. With hand brake on, move transmission control lever to drive ("Dr") range then back to neutral ("N") position. Readjust fast idle if necessary. Lock round nut with hex nut.

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CARTER 4-BARREL WCFB

(C-68, C-69, C-70) No. 2126S

(C-300) Two No. 2317S

►*C-300 CARBURETOR NOTE:* Two 4-barrel carburetors used (front and rear). Linkage should be adjusted for balanced operation of both carburetors.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting—¾-1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—500 RPM (Exc. C-300), 600-650 RPM (C-300). *For "Idle Speed Setting" and "Idle Speed-Up Control Adjustment" on Air Conditioned Cars see CARBURETOR above.*

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See Carter "WCFB" in Carburetor Section.*

Fuel Pump Pressure: 5-6½ lbs.

CARB. EQUIPMENT

Fuel Pump: Auto-Lite FB-4006. Mechanical type.
Pressure—5-6½ lbs.
See "Fuel Pumps" in Carburetion Equip. Section.
Gasoline Gauge: Auto-Lite Electric Type.

Car Model	Dash Unit	Tank Unit
C68 (Exc. Est Wgn.)	13703A	13795A
C68 (Est Wgn)	13705A	13872A
C69	13703A	13795A
C70 (12V)	13704A	13886A
C300	13703A	13795A

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

►*NOTE: 12 volt battery used on C70 models.* **Auto-Lite 2H-135-RD or Willard MW-2-135-R (C68, C69, C300).** 6 volt, 19 plate, 135 ampere hour capacity (20 hr.rate). **Auto-Lite 12H-65-R (C70).** 12 volt, 13 plate, 65 ampere hour capacity (20 hr. rate).

Ground Terminal—Positive
Engine Ground—Left front of engine

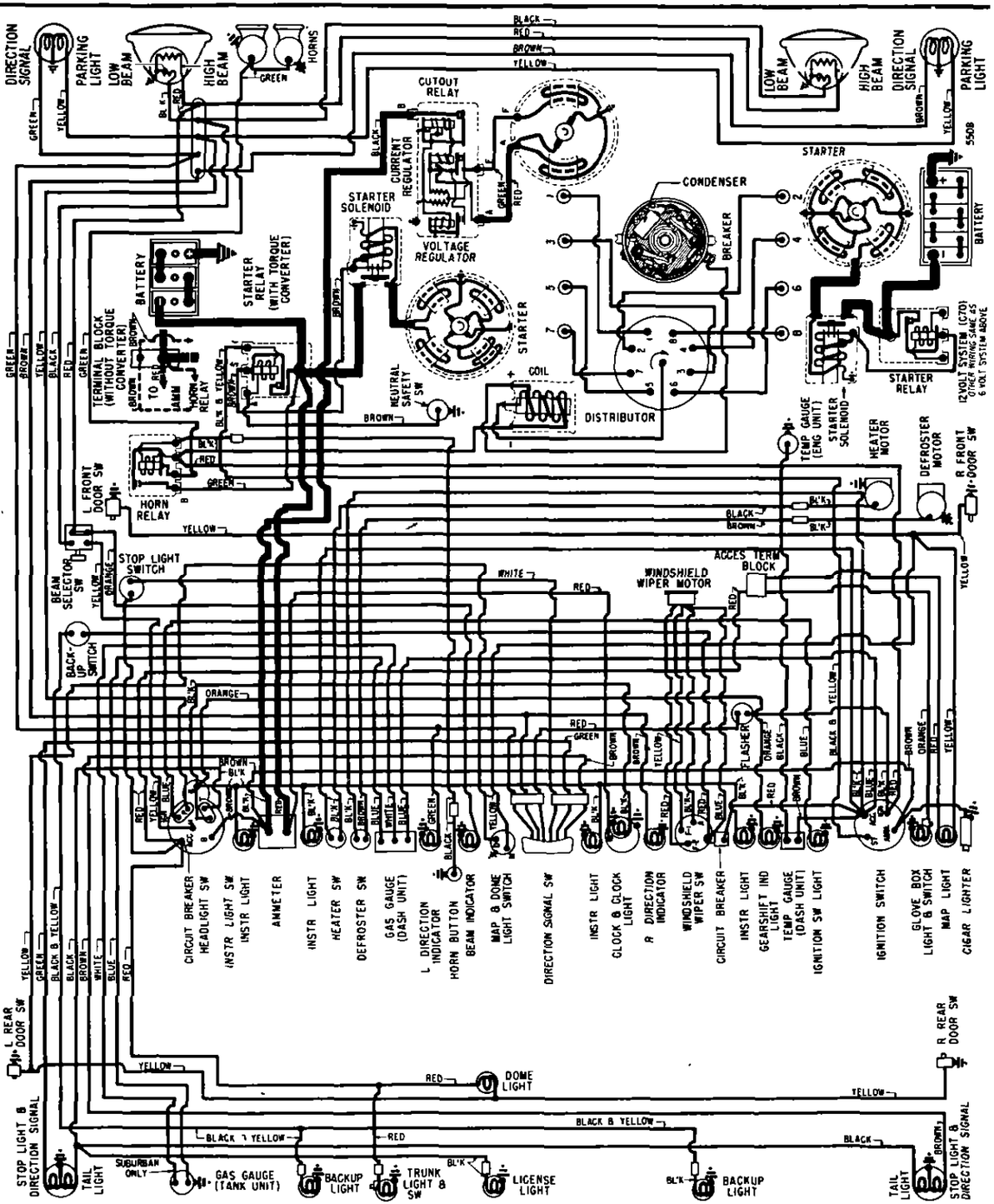
STARTER

►*NOTE: 12 Volt starter used on C70.*

Car Model	Auto-Lite Starter	Armature
C68, C69, C300	MCL-6304	MCH-2110
C68 (Canada)	MCL-6121A	MCH-2110
C70 (12 V.)	MDC-6301	MDC-2006

Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

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Performance Data–MCL

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	.65
8.0 ft. lbs.	Lock	2.0	410

Performance Data-MDC-6301

Torque	RPM	Volts	Amperes
0 ft. lbs.	5000	10.0	42
3 ft. lbs. min.	Lock	4.0	150

Starting Switch: Auto-Lite SSX-4004 (MCL Starters), SSY-4002 (MDC Starter). Solenoid pinion shift and starting switch used with neutral safety switch (on Transmission) and SEPARATE relay, Auto-Lite HRW-4001 (6 volt), RAA-4001A (12 volt). *See "Starter Controls" in Electrical Equip. Section.*

GENERATOR

Car Model	Auto-Lite Generator	Armature
C68, C300 (Std.)	GGW-6001K	GGW-2006F
C68, C300 (Pow. St.)	GGW-6016D	GGW-2090F
C68 (Can. Std.)	GGW-6001J	GGW-2006F
C68 (Can Pow. St.)	GGW-6016F	GGW-2090F
C69 (Pow St.)	GGU-6013B	GGU-2071F
C70 (Pow. St.-12V.)	GHM-6003A	GHM-2071F
C68 (Air Cond.)	GGW-6017B	GGW-2098F
C69 (Spec. Equip.)	GGJ-6008A	GGJ-2107F

►*GENERATOR BRACKET INTERFERENCE WITH GENERATOR WIRING HARNESS CAUTION:* It is possible that edge of generator bracket may interfere with generator wiring harness, causing a "short" in this wiring. If visual inspection shows this interference, re-route harness to rear of generator and generator bracket. Late production cars have this change made.

►***SPECIAL GENERATOR NOTE:* GGJ, GGU, GGW and GHM type generators used. Performance specifications below apply equally to all generators, within any one of the four groups specified.**

Performance Data–GGJ

Amperes	Volts	Cold - R.P.M.- Hot
0	6.4	600-700 . . 650-750
50	8.0	1400-1600 . 1550-1750
55	8.0	1500-1700 . . 1650-1850

Performance Data - GGU

Amperes	Volts	Cold - R.P.M.- Hot
0	6.4	750-850 . . . . 800 900
45	8.0	1450-1650 1650-1850
50	8.0	1550-1750 1750-1950

Performance Data - GGW

Amperes	Volts	Cold - R.P.M.–Hot
0	6.4	870-970 . . . 950-1050
40	8.0	1800-2000 . . 2150-2350
45	8.0	1925-2125 2350-2550

Performance Data–GHM–12 Volt

Amperes	Volts	R.P.M. - Cold
5.0	14.0	875
25.0 ①	14.0	1325
30.0 ①	15.0	1350

①–Do not operate at higher outputs and do not operate at this output without ventilating fan for any length of time. To do so may result in burned armature and fields.

Brush Spring Tension–(GGJ) 34-41 ozs., (GGU, GGW, GHM) 35-53 ozs., with new brushes.
Field Current–(GGJ) 1.4-1.7 amperes, (GGU) 1.4-1.6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts. (GHM) 1.1-1.3 amperes at 10.0 volts.
Motoring Current–(GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts. (GHM) 3.0-3.5 amperes at 10.0 volts.
Rotation–Counter-clockwise at commutator end.

Belt Adjustment: Approximately ½" slack (when pushed from a straight line midway between pulleys).

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A (Early)	GGW
VBE-6201A (Late)	GGW
VRX-6003B (12 V.)	GHM

Cutout Relay

Cuts In (VAV, VBE, VBF)–6.3-6.8 volts.
Cuts In (VRX)–13.0-13.75 volts.

Cuts Out (VAV, VBE, VBF)–4.1-4.8 volts (approx. 4-6 amps. disch.)
Cuts Out (VRX)–8.2-9.3 volts (approx. 3-5 amps.disch.)
Contact Gap (All)–.015" minimum.
Air Gap (All)–.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (VAV, VBF)–7.1-7.4 volts (at 70°), *after 15 minutes operation charging at ½ maximum rate.*
Setting (VBE)–7.1-7.4 volts (at 70°). Test with regulator in operation at 10 amperes output.
Setting (VRX)–14.2-14.8 volts (at 80°). Test with regulator in operation at 10 amperes output, or with a .25 ohm resistor between regulator and battery.
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F (VAV, VBF, VBE); 80° (VRX).*

Regulator	Test A–Operating Amperes–Test B
VAV-6001B, 2B	55 (48-52)
VBE-6001A, 6201A	52 (45 (43-47)
VBF-6001A, 2A	66 (55 (53-57)
VRX-6003B	36 (30 (28-32)

Test A–After 15 minutes operation charging at 10 amperes (VRX), ½ maximum rate (VAV, VBE, VBF).
Test B–After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF), 13.6-13.8 volts (VRX).
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: Remove knob (use small screwdriver to raise up special clip in knob, or remove small cross-head screw, depending on method used to hold knob). Remove hex nut and collar that holds assembly in place. Pry out switch (switch has threaded sleeve with two flat sides. Sleeve fits snugly in switch hole in panel).

Stop Light Switch Location: On forward end of master cylinder.

►*IGNITION STARTER SWITCH CAUTION:* When installing accessories, use accessory terminal **only** on ignition-starter switch and **not** the ammeter terminal post.

FUSES: Clock–3 amperes. In clock lead wire.
Radio–(6 Volt) 14 amperes, (12 Volt) 9 amperes. Behind instrument panel.

CIRCUIT BREAKERS: Located in headlight switch assembly. Three in number, as follows:
27 Ampere Circuit Breaker–Protects headlights, high beam indicator light, and parking lights.
10 Ampere Circuit Breaker–Protects tail lights, license plate lights, clock light, and instrument panel light.
10 Ampere Circuit Breaker–Protects stop lights, map light, dome light, glove box light, courtesy light, and trunk compartment light.
Windshield Wiper: (6 volt) 10 ampere, (12 volt) 6 ampere. On wiper switch.

HORNS: Auto-Lite. (C68, C300) Dual horns with relay, (C69, C70) Triple horns with relay. *12 volt type used on C70.*

Car Model	Low Pitch	High Pitch
C68, C69, C300 (Early)	HAB-4029	HAB-4030
C68, C69, C 300 (Late)	HAB-4627	HAB-4644
C70 (12V)	HAD-4029	HAD-4030

Horn Relay: (6 volt) RAF-4001, (12 volt) RAH-4002.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ENGINE NOTE: Engines have hemispherical combustion chamber together with double rocker shaft valve mechanism and laterally inclined valves.*

ENGINE SPECIFICATIONS: 90° V8 (All Models). "FirePower" Engine.

Model	Bore	Stroke	Displacement
All Models	3 13/16"	3 5/8"	331.1 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
C-300	8.5-1.	46.51	300 at 5200 RPM
Other Models	8.5-1	46.51	250 at 4600 RPM

Compression & Vacuum Reading–*See TUNE-UP.*

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ENGINE REMOVAL: *See "Engine" in Chrysler Special Data.*

OIL PAN REMOVAL: Remove oil level indicator. Remove crankcase plug and drain lubricating oil. Disconnect steering linkage at idler arm support bracket, and allow linkage to settle away from bottom of oil pan. Remove bolts that hold oil pan to cylinder block. Slide pan out and down away from engine.

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Chrysler Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Chrysler Special Data.*

PISTONS

Aluminum alloy, steel strut, slipper type, elliptically turned, tin plated. Pin offset to right .06".

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.*

Weight—20.8 ozs.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Clearance .0005-.0015" measured 1½" from bottom of piston between thrust face and cylinder wall. Check piston size with micrometer across large diameter at bottom. Insert .002" x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to remove feeler should be 5-12 lbs. at room temperature of 70° F.

►*NOTE:* Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .020" or out-of-round over .005" require reboring and honing to above limits.

Replacement Pistons: Standard, .005", .020",, .030", .040", .060" oversize. Fitted pins included with new pistons.

Installing Pistons: Assemble pistons to connecting rod on right hand cylinder bank (2-4-6-8) with indent on top of piston on side opposite to large chamfer at insert end of connecting rod. On left bank (1-3-5-7) assemble with indent on same side as large chamfer at insert end of connecting rod. *See Rod Installation.*

PISTON PINS

Floating type with lock ring in each end.

NOTE—Pin is offset in piston toward right side of engine.

Diameter—.9841-.9842". **Length**—3.140-3.150".

Clearance in Piston—.0000-.0005" or thumb press fit at 70° F.

Clearance in Rod—.0001-.0004". Selective fit.

Replacement Pins: Standard, .003", .008" oversize.

NOTE—Fitted pins are furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	.0775-.0780"	.010-.020"	.002-.0035"
Compr. #2	.0775-.0780"	.010-.020"	.002-.0035"
Oil	.1860-.1865"	.010-.020"	.001-.0025"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .040", .060" oversize.

Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length—6 5/8". **Weight** 25.2 ozs.

Crankpin Journal Diameter—2.249-2.250". Out-of-round and taper limits .001".

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals machined UNDERSIZE). See "Crankshaft" below.*

Bearings (Lower)—Removable precision type, steel-backed babbitt. No shims.

Clearance—.0005-.0015".

Endplay—.006-.014" (total for both rods).

Replacement Bearings: Standard, .001", .002", .003", .010", .012" undersize.

Installing Rods: *(NOTE*—Connecting rod bores are chamfered more on one side than other. This larger chamfer *must be installed toward crankshaft fillet). When* installing lower bearing shell, make certain that "V" groove in shell is in line with "V" groove in cap. This allows lubrication of cylinder wall. Bearing shells should always be installed so that small formed tang fits into machined grooves of rod. Oil ring expander gap should be toward outside of "V" of engine. Oil ring gap should be toward inside of "V" of engine. *See Piston Installation above.*

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Five bearings. Out-of-round limit .001".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE *Main & Connecting* Rod Journals)—A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counterweight in following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).

Bearings—Removable, precision type, steel-backed, babbitt lined. No shims.

Clearance—.0005-.0015"

Replacement Bearings: Std., .001", .002", .003", .010", .012" undersize. Upper and lower halves of bearings Nos. 1, 2, and 4 are alike and interchangeable; Upper No. 3 is interchangeable with Lower No. 3; Upper & Lower No. 5 are **not interchangeable.**

End Thrust: Taken by center (#3) main bearing.

Endplay: .002-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chrysler Special Data.*

CAMSHAFT

Journal Diameters—(Nos. 1, 2, 3, 4) 1.998-1.999. (No.5) 1.4355-1.4365".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width 1 1/8". **Pitch** .375". **Length** 68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with the center of the camshaft. Temporarily install camshaft sprocket, less chain, and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft "Zero" mark exactly in line with center of crankshaft. (Use straightedge to check accuracy of alignment). Remove Remove camshaft sprocket and position it in timing chain and re-install assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" marks should be in line with shaft center. Install fuel pump eccentric and camshaft nut. Tighten to 130 ft. lbs. torque.

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Chrysler Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chrysler Special Data.*

►*TIMING CASE COVER REMOVAL CAUTION: Remove water pump before removing timing case cover. (Cover attaching bolt behind water pump).*

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diameter	Stem Diameter	Length
Intake	1 15/16"	.372-.373"	5 1/32"
Exhaust	1 3/4"	.371-.372"	5 1/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.375"	.001-.003"
Exhaust	45°	.358"	.002-.004"

Valve Seat Width—1/16-3/32" (In.), 3/64-1/16" (Ex.)

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►*VALVE SEAT INSERT CAUTION: See "Valve System" in Chrysler Special Data.*

Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from the valve spring seat in the head to the tip of the valve should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: Two springs used for each valve. Install with closed coil toward cylinder head.

***Free Length**—Outer 2 3/64". Inner 2 1/64".*

Valve Spring Specifications

	Inner Spring		Outer Spring	
Valve	Lbs. Press.	Length	Lbs. Press.	Length
Closed	20-23	1 9/16"	52-58	1 11/16"
Open	40-45	1 3/16"	122-130	1 5/16"

►*CAUTION: Spring ends must be square within 1/16" (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height is 1 23/32" or greater install a 1/16" spacer (Part No. 1400482) in the head counter-bore to bring height back to a nominal 1 5/8-1 11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump up" will restrict engine speed and cause valves to burn if valve spring loads are not maintained.*

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

►*CAUTION: Oil hole in top of exhaust guide must face up.*

NOTE—If Valve Guide Tool C-3150 is not available, drive guides in, measuring from top of valve seat as follows: Intake—31/32". Exhaust—1 7/32".

Hydraulic Valve Lifters: Integral flat-valve type.

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are .008" oversize.

Diameter—.9040-.9045". **Clearance in Block**—.0005-.0015".

Lifter Overhaul & Testing—*See "Valve System" in Chrysler Special Data.*

►*VALVE GRINDING CAUTION:* See Valves (above).

Rocker Arm Assembly: *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing—C68, C69, C70

Intake Valves—Open 15° BTDC, Close 57° ALDC.
Exhaust Valves—Open 49° BLDC. Close 15° ATDC.

Valve Timing—C300

Intake Valves—Open 35° BTDC. Close 65° ALDC
Exhaust Valves—Open 65° BLDC. Close 25° ATDC.

Valve Timing Check (Exc. C-300)—With No. 1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at "Zero", turn crankshaft until dial indicator shows that valve has lifted .020". Pointer on cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft **counter-clockwise** until lifter is back down to the valve closed position. Remove spacer from between rocker arm and valve stem. *See "Camshaft Setting" under CAMSHAFT above.*

►*CAUTION: Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

►*TIMING CASE COVER REMOVAL CAUTION—One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing case cover.*

OILING SYSTEM

►*AIR-CONDITIONED CAR FILTER CARTRIDGE CHANGE NOTE:* Due to interference from fender skirt or air conditioning lines immediately above filter cover, filter assembly must be removed from engine to change filter cartridge.

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed..

Normal Oil Pressure: 40-65 lbs with warm oil operating at 40-50 MPH.

►*OIL PRESSURE CAUTION: Oil pressure will drop to 25-45 lbs. when FILTER ELEMENT IS CLOGGED. Replace filter element.*

Oil Pressure Relief Valve—Mounted in oil pump. Adjustable. *NOTE*—When replacing relief valve spring, use same color spring.

Oil Pressure Gauge—Auto-Lite 13700A. Not Electric.

Oil Pump: Rotor type. In crankcase at rear end. Driven by lower distributor drive shaft.

Pump Overhaul—*See "Oiling System" in Chrysler Special Data.*

Priming Oil Pump (After Installation)—Before installing filter assembly, introduce ½ pint of engine oil into *the lower hole of the filter pad with a pressure gun or* long nosed oil can.

Oil Filter: Full-flow. At right rear engine. All oil enters lubrication system of engine through filter at full pump pressure. Safety valve in filter opens if element is clogged, allowing oil to pass into lubrication system under a reduced pressure of 25-45 lbs.

Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

►*AIR-CONDITIONED CAR FILTER CARTRIDGE CHANGE NOTE:* Due to interference from fender skirt or air conditioning lines immediately above filter cover, filter assembly must be removed from engine to change filter cartridge.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 25 qts. (26 qts. with heater).

Pressure Valve: Chrysler 1373136 (Opens at 7 lbs.). Radiator filler cap 14 lb. type used with Air Conditioning.

Thermostat: Choke type in cylinder head water outlet. Starts to open 159-165°F.

Water Pump: Ball bearing type. No lubrication required. *See "Chrysler" in Water Pump Section for data.*

Pump Removal—Drain cooling system Remove radiator shroud assembly, fan belt, pulley and fan. Remove radiator outlet hose from thermostat housing. Remove wire from temperature gauge sending unit Remove pump housing-to-cylinder block attaching bolts, remove pump housing assembly.

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit—(C68, C69, C300) 13701A, (C70 12V.) 13702A.

Engine Unit—(All) 13550A. Mounted in pump housing assembly.

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmission Section for complete data.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section for data.*

►*TESTING & TROUBLE SHOOTING:* See *"PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

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Checking Fluid Level—Apply hand brake and place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.

Oil Pan Filler Tube (Location)—At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission, make sure oil level indicator is properly seated in filler tube.

Linkage Adjustments: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section for data.*

UNIVERSALS

Detroit Universals. (C68, C69, C300) Ball and Trunnion type used at front, Cross type used at rear. (C70) Cross type used at front, rear, and center bearing joints.

Propeller Shaft Center Bearing: *See "Propeller Shaft" in Chrysler Special Data.*

REAR AXLE

Own. Semi-floating type with hypoid gear and Hotchkiss Drive. Barrel type. *NOTE*—Axle gear thrust screw and pad no longer used.

See "Chrysler Hypoid" in Rear Axle Section.

Axle Ratios	Est. Wgn.	Standard
C68	3.54-1 (39-11)	3.36-1 (37-11)
C69		3.54-1(39-11)
C69 Optl.		3.36-1 (37-11)
C70		3.54-1(39-11)
C300		3.54-1 (39-11)

Backlash—.006-.008".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft. Tool C-637 to remove inner oil seal, drift C-241 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels.

Endplay—.003-.008"

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic, non-adjustable. Serviced by replacement.

Car Model	Chrysler Part No. Front	Rear
C68 Conv.	1614406	1450919
C68 4-Door	1614405	1450918
C68 Est. Wgn	1614406	1450920
C69	1614406	1450919
C70	1614406	1450920
C300	1614406	1450920
Others	1614406	1450918
Heavy Duty (Exc. C70).		1450920
Heavy Duty (Spec.-Exc. C70)		1450037

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.

See "Chrysler" in Front Suspension Section for complete data.

Kingpin Inclination—6½-8° (C70), 5-6½° (Others).

Caster—Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° with Power Steering. Left side should be 0° to ¾° greater than right side within these limits)

Camber—Neg 1/8° to Pos. 5/8° (Left side Pos. 1/2°, Right side 0° preferred)

Toe-In—0" to Pos. 1/16" (0" preferred).

Toe-Out on Turns—With outer wheel at 20°, inner wheel should be 21½°±1°.

STEERING

Manual: Gemmer. Worm and three-tooth roller

See "Gemmer Worm & Roller" in Steering Section.

Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.

See "Coaxial" Power Steering in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" Steering Section.*

BRAKES (SAFEGUARD)

Service: (C68, C69, C300) Chrysler "Safe-Guard" Lockheed hydraulic.

See "Chrysler Safe-Guard" Brakes in Brake Section for data.

Drums—Centrifuse. Diameter 12".

Wheel Cylinder Diameter—1 1/8" bore. Single acting (front), double acting (rear wheels)

Replacement Linings & Shoes—Linings or shoes with linings furnished in Standard & .030" oversize.

Lining—Molded asbestos (bonded to shoe). Length—12.57" per shoe. Width 2". Thickness 13/64".

Braking Power—60% Front. 40% Rear.

Clearance—.006" at each end of all shoes.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid—Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal—Disconnect pushrod. Disconnect brake line tubes at master cylinder fittings. Remove four stud nuts from studs, remove master cylinder.

Power Brakes: Combination vacuum power unit and master cylinder. Unit mounted on engine side of firewall and replaces regular master cylinder. *See "Chrysler Power Unit" in Brake Section.*

Removal of Power Unit—Same as for standard master cylinder, after hydraulic lines and stop light wires removed.

Parking Brake: On shaft at rear of transmission. 7" Internal expanding type

Adjustment— *See "Hand Brake Notes" in Chrysler Special Data.*

Lining—Width 2". Thickness 5/32". Length 13 1/16".

Clearance—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010"

BRAKES (DISC)

Service: (C70) Hydraulic, self-energizing, two-shoe DISC type. *NOTE*—No power booster used.

See "Chrysler Disc Brakes (Without Spider)" in Brake Section for data.

Pressure Plate Diameter—I.D. 9½". O.D. 12".

Wheel Cylinder Diameter—1¼" (front), 1" (rear).

Lining—Molded asbestos segments (6 on each plate) bonded to disc.

Bleeding Disc Type Brakes—Manufacturer recommends bleeding all four lower wheel cylinders first, then all four upper cylinders.

Parking Brake: On shaft at rear of transmission. *See C68, C69, C300 (above) for data.*

MISC. MECHANICAL

Windshield Wipers: Auto-Lite (C68, C69, C300) EMZ-4001, (C70-12V.) EPF-4001. Electric type. *See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.*

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Chrysler "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Auto-Lite. Electric type. Reversible type motor in each window. Controlled by switch and master control switch. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Auto-Lite. Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Auto-Lite. Electrical-Hydraulic type. *See "Chrysler Top Control" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-52 MODELS

	In. Lbs.
Spark Plugs	225-250
Cyl. Block Hold-down Stud Nuts	125-165
Main Bearing Cap Stud Nuts	150-180
Connecting Rod Cap Stud Nuts	200-280
Camshaft Bearing Capscrew	75-100
Flywheel Mounting Capscrew	225-285
Flywheel Housing Capscrews	225-285
Clutch Mouting Capscrews	150-180
Oil Pump Housing Capscrews	50-80
Oil Pump Mounting Capscrews	125-165
Intake & Exhaust Manifold Capscrews	225-285

ENGINE REMOVAL

1946-52 MODELS

ENGINE REMOVAL (FOR SERVICING): Engine should be removed from chassis as follows: Remove hood, drain radiator. Disconnect battery cable at battery, disconnect and remove starting switch-to-starter cable. Disconnect all ignition leads at distributor, fuel line at fuel pump, throttle and choke cables at carburetor, oil pressure gauge line at right rear corner of engine, windshield wiper hose at manifold, generator wire at Cutout Relay, hose connections at engine block outlet and water pump, exhaust pipe at manifold connection, engine ground strap at flywheel housing, clutch release cable at release lever under flywheel housing, temperature indicator cable and bulb at engine outlet connection. Remove radiator brace rod connected to top of radiator, take out two base bolts under radiator and carefully lift radiator out of engine compartment. Remove hood latch cable. Slack off fan drive belt, remove fan assembly and belt. Place support jack under engine, split front & rear flywheel housing by taking out 5 bolts, remove nut and lock washer on right front engine mounting stud (goes through frame), remove left front engine mounting bolt. Attach lifting sling to engine (loop sling under oil pan), support engine weight with sling and hoist, move engine straight forward approximately 4" (to clear clutch shaft), lift engine out tilting the front end up slightly for clearance.

1946-52 MODELS

CYLINDER BLOCK REMOVAL (FOR VALVE SERVICING): With the engine out of the car (see Engine Removal), remove water pump, fuel pump, carburetor, manifolds, and spark plugs. Remove camshaft cover, take out mounting bolts in all camshaft bearings and lift off camshaft and bearings (oil metering tube in upper end of towershaft at front of camshaft will come out with camshaft). Unscrew and remove towershaft adjuster, lift out towershaft upper bevel gear. Remove oil pan, connecting rod caps, and oil pump. Turn crankshaft to top center. Remove 11 elastic stopnuts holding cylinder block on crankcase, lift off cylinder block and piston assembly.

Cylinder Block Installation: Install pistons (with ring gaps staggered) and connecting rods (with upper halves of bearings in place and rod numbers on distributor side) in block. Turn crankshaft to top center. Place block on crankcase. Install 11 plain washers and elastic nuts. Install connecting rod caps (with numbers on rod on cap on distributor side of engine). Install oil pump and towershaft gear. See Towershaft Assembly Servicing following.

Cylinder Block Installation—Before Eng. No. 31599 (With 3-ring Pistons): See that face of cylinder block and crankcase clean and that gasket is in good condition. Turn crankshaft until two pistons are at top dead center. Use "split" type ring compressor to compress rings on these two pistons, slide block half-way down over these pistons, then turn crankshaft until other two pistons are in contact with block, compress rings on these pistons, lower block into position on crankcase (use locating dowel), use plain washer under mounting stud nuts, tighten all nuts evenly (see Tightening Torques).

Cylinder Block Installation—After Eng. No. 31599 (With 4-ring Pistons): Disconnect piston and connecting rod assemblies from crankshaft and insert these in cylinder block before installing block on crankcase. See that face of cylinder block and crankcase are clean, use new gasket and elastic stop nuts. Install cylinder block on crankcase (use locating dowel) making certain that connecting rods turned so that rod markings are on distributor (left) side of engine. Use plain washer under cylinder block mounting stud nuts, tighten all nuts evenly (see Tightening Torque data). Install connecting rod bearing caps, install oil pan.

CRANKSHAFT & MAIN BEARINGS

1946-52 MODELS

CRANKSHAFT SERVICING: Crankshaft Removal— With engine out of car (see Engine Removal), remove oil pan, remove oil pump (see Oil Pump Servicing), remove gear on lower end of distributor shaft, remove all crankshaft bearing caps, lift crankshaft out (not necessary to remove clutch).

Crankshaft Installation—Reverse removal instructions (above), tighten bearing cap nuts evenly (see Tightening Torque Wrench data), use new lockwashers, palnuts and gaskets. Replace oil seals

BEFORE ENGINE NO. 60929

OIL SEALS: Front & Rear Main Bearing Seals—Carefully clean out seal groove, press new seal in groove with fingers and "roll" it in place with round tool (roll seal from both ends toward center to insure full seating in bottom of groove). Hold seal in place with wooden block and cut ends off flush with face of crankcase and bearing cap for rear seals.

NOTE—Front seal is installed in groove in crankcase and oil pan and bears on hub of crankshaft pulley. Ends should protrude 3/32" above & below.

AFTER ENGINE NO. 60929

CRANKSHAFT OIL SEALS: Front Seal. Metal enclosed neoprene seal. To remove, take off oil pan and crankshaft pulley, slide seal off. Coat outside of new seal with Permatex No. 2, slide into position against shoulder at rear of its groove. Install crankshaft pulley, adjust lower gear backlash.

Rear Seal. With crankshaft out of engine, remove old seal. Turn new one-piece seal on shaft with edge of internal lip to front. Use Permatex No. 3 in seal groove. Install crankshaft so that seal gap will be in the center of the rear bearing cap.

1947-48 MODELS

OIL PAN INSTALLATION: Re-inforcement strips must be installed under the pan flange at each front corner of the pan.

CAMSHAFT & BEARINGS

1946-52 MODELS

CAUTION—Each type towershaft serviced differently as detailed below.

Towershaft Assembly Servicing (Before Eng. No. 3708). This type is locked in crankcase by nut on shaft.

Disassembly—To remove towershaft and lower bevel gear (integral with shaft) with engine out of car and cylinder block removed, remove special nut and thrust washer on shaft in crankcase, pull towershaft out of the bushing from below.

Towershaft Assembly—Insert bushing in crankcase from below, insert towershaft (see Engine Assembly Note below for gear marks and meshing data), install thrust washer and special nut, tighten nut until endplay or clearance between back face of lower gear and face of bushing is .004". Towershaft clearance in bushings should be .0005-.002". Backlash in gears should be .001-.003" (lower bevel gears—see Towershaft Gear Backlash Adjustment below), .003-.005" (upper bevel gears—see Camshaft Endplay Adjustment below).

CAUTION—Install bushing in upper end of towershaft housing on cylinder block before installing upper towershaft gear (see Camshaft Drive Gear Meshing Data below).

Towershaft Assembly Servicing (After Eng. #3708). Disassembly—Towershaft and lower bevel gear (integral with shaft) can be withdrawn from below after towershaft adjuster has been unscrewed from upper end of shaft and upper bevel gear lifted out.

Towershaft Assembly—Insert bushing in crankcase from below, insert towershaft, install crankshaft and mesh bevel gears (see Camshaft Drive Gear Meshing Data below), check and adjust lower bevel gear backlash. After cylinder block installed on crankcase, see that upper bushing in place in upper end of towershaft housing, install towershaft upper bevel gear, install towershaft adjuster, tighten adjuster until clearance between shoulder on upper gear and face of upper bushing is .004" (measure with feeler gauge while prying upward on adjuster). Towershaft clearance in bushings should be .0005-.002" (lower bushing), .0005-.0015" (upper gear hub in upper bushing). Backlash in gears should be .003-.005" (lower bevel gears—see Towershaft Gear Backlash Adjustment below), .003-.005" (upper bevel gears—see Camshaft Endplay Adjustment).

Towershaft Lower Gear Backlash Adjustment: To check backlash, push crankshaft forward until thrust flange is against rear main bearing. Mount dial indicator so as to measure movement of towershaft lower bevel gear, rock towershaft back and forth. Backlash .003-.005" and adjusted as follows:

Backlash Adjustment (Before Engine No. 29880). With crankshaft pulley removed, add or remove shims from between pulley hub and shoulder on bevel gear until backlash correct. Shims furnished as follows: W-300159-1 (.003"), W-300159-2 (.005"), W-300159-3 (.015"). NOTE—See that gasket installed between pulley hub and adjusting shims.

Backlash Adjustment (After Engine No. 29880). When installing towershaft assembly, screw the crankshaft adjuster (slotted stud in forward end of crankshaft) in until lower bevel gears are snug. Start the engine. If gears are noisy, stop engine,

unscrew crankshaft adjuster slightly, repeat test. When gears run quietly, tighten nut on adjuster securely (hold adjuster with screwdriver to prevent change in adjustment).

Towershaft Upper Gear Backlash Adjustment: See Camshaft Endplay Adjustment (below).

1946-52 MODELS

CAMSHAFT ENDPLAY ADJUSTMENT: To check endplay with camshaft installed on engine, push camshaft forward as far as possible, measure clearance between rear face of camshaft gear hub and front bearing with a feeler gauge. Endplay should be .003-.005". Adjust camshaft endplay as follows:

Adjustment (Before Serial No. CC-24199): Remove camshaft assembly from engine, remove camshaft gear (remove nut and lockwasher, press gear off shaft, using care not to damage oil hole in shaft), install thrust washer of correct thickness behind gear, re-install camshaft assembly.

Adjustment (After Serial No. CC-24199): Not necessary to remove camshaft or camshaft gear (horseshoe type thrustwasher). To adjust endplay, loosen front camshaft bearing capscrews, slip bearing strap up on capscrews for access to thrust washer, lift thrustwasher out and replace with washer of correct thickness.

CAUTION—Make certain that closed end of thrustwasher is upward (under bearing strap tab) and that bearing strap tab is forward so as to retain thrustwasher when bearing capscrews tightened.

1946-52 MODELS

CAMSHAFT DRIVE GEAR MESHING MARKS: With engine completely disassembled, install and mesh all gears of the valve system as follows:

Crankshaft Gear—Install gear on crankshaft splines with marked spline on shaft in line with punchmark on gear hub. NOTE—On first cars where gear hub not marked, marked spline on shaft should be on same side and in line with marked tooth on gear.

Tower Shaft Lower Gear—Gear is integral with shaft. The two punch-marked teeth on tower gear should straddle punch-marked tooth on crankshaft gear.

Tower Shaft Upper Gear—Install gear on shaft with punch marks in line. Mesh punch-marked tooth on gear between two punch-marked teeth of camshaft gear.

Camshaft Gear—Gear is keyed on shaft.

1946-52 MODELS

CAMSHAFT OIL METERING HOUSING ASSEMBLY: Install oil metering housing (90° fitting between upper end of towershaft and camshaft) in forward end of camshaft with camshaft off engine, then engage lower end of housing in upper end of towershaft as camshaft is placed in position on cylinder block. Housing clearance should be .0002-.0023" in camshaft and .0005-.0025" in towershaft gear adjuster. Backlash between camshaft and towershaft gears should be .003-.005".

TAPPET CLEARANCE ADJUSTMENT

1946-52 MODELS

TAPPET CLEARANCE ADJUSTMENT PROCEDURE:

First Cars without Adjusting Shims—Must be checked with camshaft and cam follower assemblies installed on engine. Turn camshaft until heel of cam is directly over cam follower, press valve in so that it rests firmly on seat, check clearance with feeler gauge. If clearance insufficient, grind valve stem tip. If clearance too great, replace valve. CAUTION—Valve stem tip must be ground square

Later Cars with Adjusting Shims—Check clearance in same manner as first cars (above), select adjusting shim pack of correct thickness for correct tappet clearance, insert shims through slot in head of cam follower (above spacer washer), lock shims in place by bending up ends. Shims furnished in following sizes:

Cam Follower Shims

Thickness	Part No.	Thickness	Part No.
.008"	209855-8	.022"	209855-22
.010"	209855-10	.024"	209855-24
.012"	209855-12	.026"	209855-26
.014"	209855-14	.028"	209855-28
.016"	209855-16	.030"	209855-30
.018"	209855-18	.032"	209855-32
.020"	209855-20		

Tappet Clearance

Intake—.004-.005" **Exhaust**—.005-.007".

VALVE SYSTEM

1946-52 MODELS

VALVE SERVICING: With engine removed from chassis, remove cylinder block (see Cylinder Block Removal above), lift out valve lifters (cam followers) and number these to insure re-installation in same positions (CAUTION—Do not lose tappet clearance adjusting shims and spacer washers on later cars). Use special bar type valve lifter to compress valve springs, remove split locks, spring retainer, and spring from each valve, remove valve from inside cylinder. Reface valves in usual manner (see data below for refacing valve seats), re-install assemblies, check tappet clearance.

Valve Seat Resurfacing—Special tools must be used to avoid marring cylinder walls (valve seats must be serviced from within cylinder). Use special Blue Point Stone Carrier, VG-10-2B, turned down to 1" diameter, and 5/16" pilot with following stones: SE-400-R Valve Seat Stone (Roughing), SE-400-F (finishing). Stones must be turned to 1 3/16" diameter for Intake Valves, 1 1/16" for Exhaust.

OIL PUMP

1946-52 MODELS

OIL PUMP OVERHAUL: Gear type assembly.

Disassembly—Take out center capscrew on the lower cover, remove cover, gasket, and screen. Take out four capscrews in pump cover, remove cover and gasket, lift out idler gear and shaft. To remove pump shaft and gear, file off end of pin in pump drive gear, drive pin out and remove gear.

Reassembly—Use new gaskets. Make certain that plain washer and lockwasher used on each cover screw and that lower cover (with oil inlet pipe) is tight. See Tightening Torque Wrench data for housing and mounting screw torques.

COOLING SYSTEM

1947-48 M DELS

WATER PUMP (GENERATOR BRACKET) ALIGNMENT: This procedure required for first type Water Pump C-205175, only (with Generator GAS-4190). NOTE—Later type Water Pump, C-207187, used with Generator GDZ-4806B, does not require alignment.

Water Pump Alignment—Whenever the generator bracket mounting bolts have been disturbed, bracket must be aligned with special fixture, No. 206923, as directed below to prevent water pump misalignment and rapid wear of water pump bushing.

Alignment (with Fixture 206923). Attach water pump to crankcase, tightening mounting bolts only finger tight. With generator mounting bracket bolts and clamp bolts loose, install special fixture No. 206923 on bracket in place of generator (slide water pump shaft into recessed hole in end of fixture). Tighten generator bracket mounting bolts securely (through slot in fixture), then tighten water pump attaching bolts. Remove fixture. Assemble water pump drive coupling and install generator.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on front face of dash panel in engine compartment.
1946 Numbers—CC-46-100 Up.
1947 Numbers—CC-47-10000 to CC-32434.
1948 Numbers—CC-32434 Up.
Car Body Model Designation—Body type letter as follows: A—Sedan, C—Convertible Sedan, D—Station Wagon, G—Sports Utility, E—Panel Delivery, B—Pick-up, F—Cab & Chassis.

ENGINE NUMBERS: Stamped on pad on left side of crankcase below #1 cylinder.
1946 Numbers—CC-46-100 Up.
1947 Numbers—CCE-7-5587 to CE-7-21999 (January 1947 to Sept. 24, 1947), No. 22000 to No. 28803 except as noted for 1948 (Sept. 24, 1947 to Jan. 1948).
1948 Numbers—No. 28,804 Up (and also the following earlier Nos.: 27270, 27611, 27677, 27689 to 97, 27699, 27704, 27711, 27725, 27763 to 65, 27924, 28153, 28317, 28711, 28712, 28720 to 24, 28726 to 29, 28731, 28732, 28734 to 38, 28740 to 43, 28745 to 47, 28749, 28752, 28754, 28757, 28758, 28760 to 63, 28765, 28767, 28770, 28771, 28773 to 78, 28781 to 83, 28788 to 94, 28796 to 99, 28800 to 28803.

TUNE-UP

COMPRESSION: Pressure—135 lbs. (110 lbs. min. hot) at cranking speed of 260 RPM. All cylinders must be equal within 10 lbs.

VACUUM READING: Steady 18-20" idling at 7 MPH.

FIRING ORDER: 1-3-4-2.

SPARK PLUG GAPS: .025".
Plug Type—Auto-Lite Type A5. 14 mm. Metric.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020". Limits .020-.024".
Cam Angle or Dwell—41° closed, 49° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic Advance—*See Distributor.*

IGNITION TIMING: 12° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—First flywheel mark (second mark is TDC) in inspection hole in right front face of flywheel housing.

CARBURETION: *See Carburetor & Carb. Equipment.*
Main (High Speed) Adjustment—Initial setting 2 full turns open of adjusting screw. With engine warm and running with 1/3 throttle opening, turn screw in until engine loses speed, then out until maximum speed secured (1½-2¼ turns open).
Idle Adjustment—After making Main Adjustment (above), close throttle and set stopscrew for slightly faster than normal idle speed, turn idle adjusting screw in until engine misses, then turn screw out until engine fires smoothly. Final setting ¾-1¼ turns open.
Idle Speed—7 MPH.
Float Level—Fuel level 23/32" below top edge of bowl or even with bottom of inspection plug hole on side of bowl. CAUTION—Remove idle adjusting screw, spring, and idle tube before removing air horn and float bowl cover assembly.
Accelerating Pump—None.
Fuel Pump Pressure—1½-3¼ lbs.

VALVE TAPPET CLEARANCE: .004-.005" Intake, .006-.007" Exhaust, Cold.
Tappet Clearance Adjustment Procedure—*See "Valve System" in Crosley Shop Notes.*
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Crosley No. 200102.

COIL: Auto-Lite Model IG-4065 or IG-6001. On dash.
Service Coil—IG-4070 with IG-1944 Service Bracket.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IGB-1025E (for IGW-4181), No. IGB-1025 (for IGW-4181A distributor).
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGW-4181 & IGW-4181A. Single breaker, four lobe cam, full automatic advance type (no vacuum control).
Rotation—Counter-clockwise viewed from above.
Distributor Settings—*See Tune-Up data.*

Distributor **Automatic Advance** Engine

Degrees	R.P.M.	Degrees	R.P.M.
Start	350	0	700
3	515	6	1030
6	675	12	1350
9	840	18	1680
12	1000	24	2000

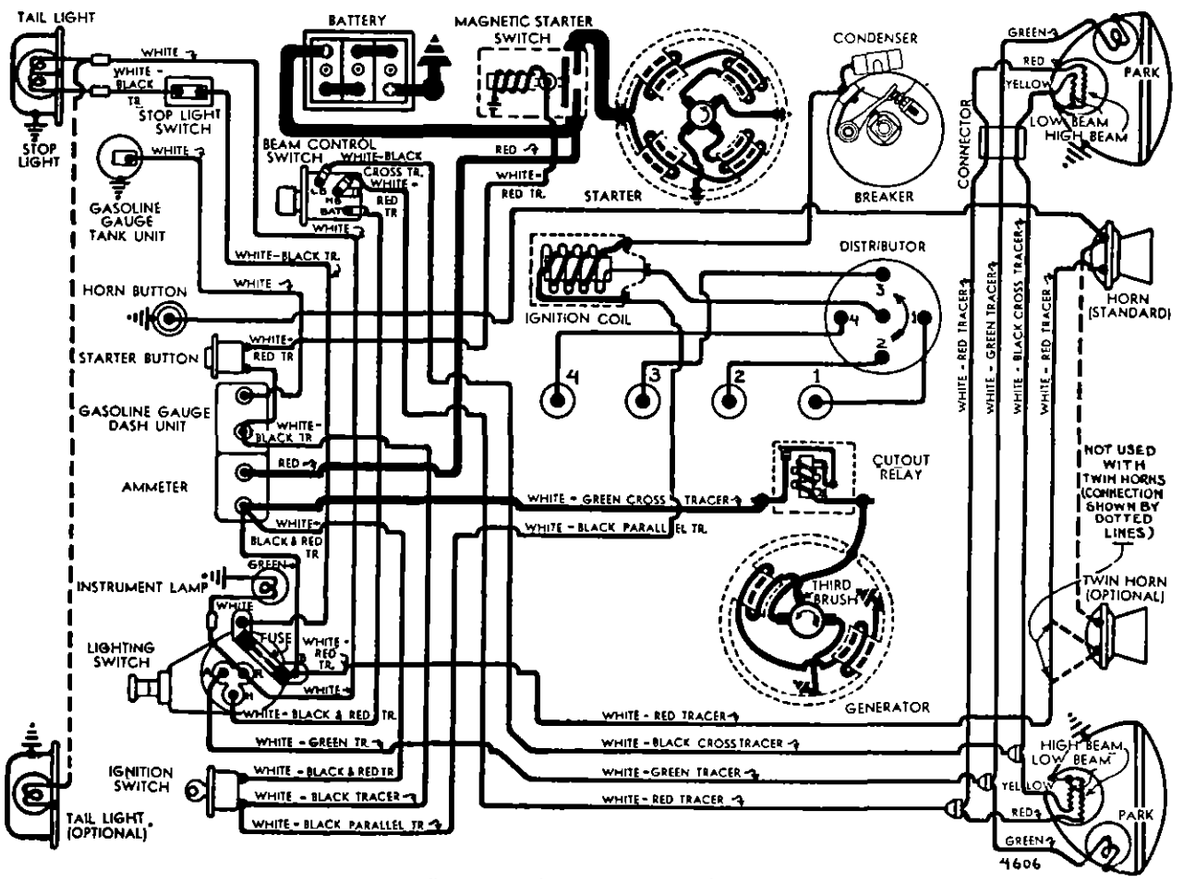
Removal: Distributor mounted on crankcase at left front of engine. To remove distributor, drain engine oil, remove oil pan, remove distributor drive gear by removing palnut and regular nut on lower end of distributor shaft. (CAUTION—Do not lose Woodruff key in shaft). Then remove hold-down screw in advance arm, lift distributor out.

Distributor Installation Note—When installing distributor, first turn crankshaft to #1 cylinder firing position (#1 piston on compression, ignition timing mark on flywheel in center of inspection hole in right front face of housing), turn distributor shaft until rotor is at #1 segment in distributor cap (see diagram) with contacts just opening, install distributor on engine and tighten hold-down screw in advance arm. With oil pan removed, install drive gear on lower end of distributor shaft (CAUTION make certain that Woodruff key in place), being careful not to disturb relative position of distributor shaft and crankshaft when meshing gears, install regular nut and palnut on distributor shaft. Check Ignition Timing.

IGNITION TIMING

Std. Setting.....12° BTDC.

To Set Timing—With #1 piston on compression, turn engine over until piston reaches firing position



CARS WITH THIRD-BRUSH GENERATOR & CUTOUT RELAY

when first timing mark on flywheel is in center of inspection hole in right front face of housing. Loosen advance arm clamp bolt, rotate distributor housing until contacts begin to open, tighten clamp bolt. Check rotor and make certain it is at #1 segment in distributor cap, check spark plug connections

To Check Timing (with Neon Timing Light)—Attach neon timing light to #1 spark plug, direct light on flywheel through inspection hole in right front face of housing. Start engine and allow it to idle (speed must not exceed 700 RPM to avoid automatic advance action). Loosen distributor clamp bolt in advance arm, rotate distributor until timing mark (located 12° before TDC mark) appears to be in center of inspection hole, tighten clamp bolt.

CARBURETOR

Tillotson Model DY-9B (superseding DY-9A). ⅞", Single barrel, plain tube, downdraft type with manual choke control.

See Carburetor Section for complete data.

NOTE—This carburetor has Main (High Speed) adjustment as well as conventional Idling (Low Speed) adjustment.

Adjustment & Float Level—***See Tune-up for data.***

Metering Jets—***See Tillotson DY-9A, B Carburetor article in Carburetor Section for complete data.***

CARB. EQUIPMENT

Air Cleaner: Oil-wetted type Std. Heavy duty oil-bath type available as an accessory.

Servicing (Oil-wetted type)—Remove cleaner, wash, dry, and re-oil filter element at 2000 mile intervals or more often if required by operating conditions.

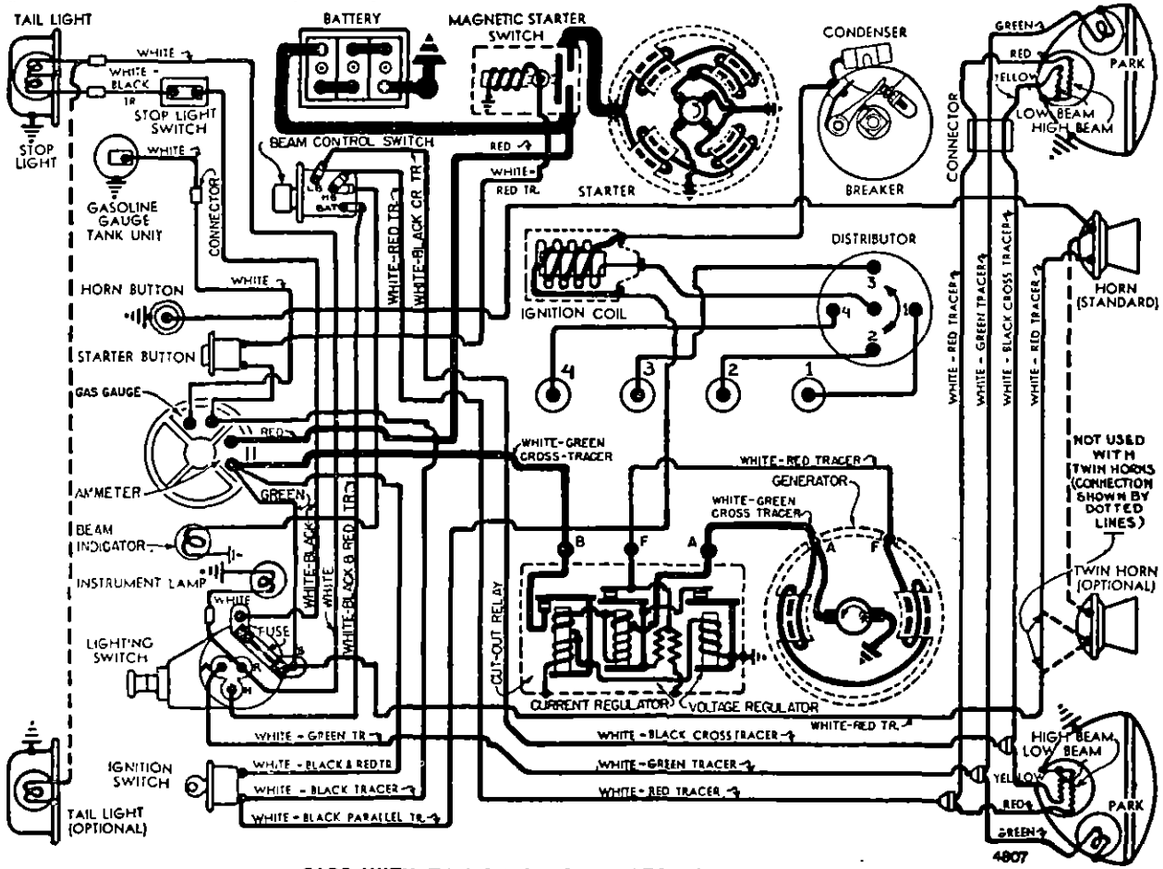
Servicing (Oil-bath type)—Remove and disassemble cleaner, wash out with gasoline (including filter), refill reservoir with light engine oil to indicated level (approx. ¼ pint) every 5000 miles or more often if required (inspect every 1000 miles).

Fuel Pump: AC No. 1538923 (Crosley No. 300042).
Replacement Pump—AC No. 573.
See Carburetion Equipment Section for data.
Pressure—1½-3¼ lbs.

Gasoline Gauge: Stewart (Stewart-Warner) Electric
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type AB-13 or 1M-80. 6 volt, 13 Plate, 80 Ampere Hour capacity (20 hour rate).
Starting Capacity—96 amperes for 20 minutes.
Zero Capacity—300 amperes for 2.0 minutes. Five second voltage 3.8 volts.



CARS WITH TWO-BRUSH GENERATOR & REGULATOR

Grounded Terminal—Positive (+) terminal.

Location—On left hand side in engine compartment.

Dimensions—Length 8 15/16". Width 7". Height 8⅝"

STARTER

Auto-Lite MAK-4027 (First Cars), MZ-4147 with No. B-206550 Adapter (Later Cars).
Armature—Auto-Lite No. MAK-2074 (MAK-4207).
Drive—Bendix Drive No. A2920.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—38-61 ozs. (MAK-4027), 42-53 ozs. (MZ-4147) with new brushes.

Performance Data—MAK-4027

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	5000	5.5	70
.3	"	3240	5.5	100
1.35	"	1880	5.0	200
3.1	"	1000	4.5	300
4.8	"	220	4.0	400
7.0	"	Lock	4.0	520

Performance Data—MZ-4147

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4300	5.5	70
.65	"	2500	5.5	100
2.55	"	1325	5.0	200
4.95	"	750	4.5	300
7.65	"	220	4.0	400
7.8	"	Lock	3.0	420
4.4	"	Lock	2.0	280

Removal (MAK-4027): Starter flange mounted directly on left front face of flywheel housing. To remove, disconnect cable, take out flange mounting bolts.

Removal (MZ-4147): Starter flange mounted on adapter bolted on left front face of flywheel housing. To remove, disconnect cable, take out capscrews mounting starter on adapter (do not disturb adapter).

Starting Switch: Auto-Lite Model SS-4007 Magnetic Switch and Pushbutton Model XA-456 or XA-456E. Switch is mounted on dash and controlled by pushbutton on instrument panel.
See Electrical Equipment Section for complete data.

GENERAT R

THIRD-BRUSH TYPE

Auto-Lite Model GAS-4190. Armature GAS-2336.
Third brush control type with Cutout Relay mounted on generator mounting bracket.

Charging Rate Adjustment—Shift third brush by hand counter-clockwise to increase, or clockwise to decrease, charging rate. Brush is held in position by friction. NOTE—Std. third brush position is with space of 2 commutator bars (minimum), to 2 commutator bars plus 1 mica strip (maximum) between third brush and nearest (insulated) main brush.

Maximum Charging Rate—12 amperes at 8.0 volts.

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	880	0	6.4	975
2	6.6	985	2	6.8	1135
4	6.9	1100	4	7.0	1310
6	7.2	1230	6	7.35	1540
8	7.3	1420	8	7.7	1860
10	7.6	1650	10.2	8.0	2300
12	7.8	2000			
14	8.0	2300			

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Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—15-20 ounces.
Field Current—4.09-4.52 amperes at 6.0 volts.
Motoring Current—5.3-5.9 amperes at 6.0 volts.

Removal: Generator is cradle mounted on right side of engine with fan belt drive (water pump driven by armature shaft extension). To remove generator, disconnect water pump drive coupling and generator lead, slack off drive belt tension and remove belt, remove two bolts at lower end of mounting clamp band, slide generator out. NOTE—Generator has locating dowel pin on field frame which engages dowel pin hole in mounting band. Dowel must be disengaged when removing generator and dowel must be engaged in dowel pin hole in band when installing generator.

▷*CAUTION—Do not disturb the generator mounting bracket bolts. Bracket must be properly aligned (using fixture) to prevent water pump misalignment and rapid wear whenever bracket bolts loosened.*
Generator Bracket Alignment—*See Crosley Shop Notes.*

Belt Adjustment: Loosen nuts on two bolts mounting fan shaft bracket on front of engine, move fan upward (right hand bolt hole slotted) until belt deflection is ½" (thumb pressure) midway between generator and fan pulleys, tighten nuts and recheck NOTE—Two holes provided in bracket for left hand fan mounting bolt. Additional range of adjustment can be secured by shifting bolt to upper hole.

GENERATOR

TWO-BRUSH TYPE

Auto-Lite Model GDZ-4806-A or 4806B. Two brush type with voltage and current regulation.
Maximum Charging Rate—35 amperes at 8.0 volts.
Charging Rate Adjustment—None. See Regulator.

Cold Performance Data			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amperes at 6.0 volts.

Removal: Generator cradle mounted on right side of engine with fan belt drive (water pump driven by armature shaft extension). To remove generator, disconnect leads, slack off belt adjustment and remove fan belt, remove front bolt in water pump coupling. Remove two 5/16" elastic stop nuts on generator mounting band, lift generator out.

Belt Adjustment: Same as for 3-brush generators. See instructions above.

CUTOUT RELAY

USED WITH THIRD-BRUSH GENERATOR

Auto-Lite Model CB-4025. Mounted on generator mounting clamp band directly above generator.
See Electrical Equipment Section for complete data.
Cuts In—6.5-7.25 volts.
Cuts Out—.5-2.5 ampere discharge current (after charging at 15 amperes).
Contact Gap—.015-.045" (armature against stop).
Air Gap—.010-.030" (contacts closed).

REGULATOR

USED WITH TWO-BRUSH GENERATOR

Auto-Lite Model VRP-4004F. Voltage-current type. *See Electrical Equipment Section for complete data.* NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Double filament, pre-focused type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
Adjustment—Aim upper beams straight ahead with top of "hot spot" 3" below lamp center height at 25 feet.

Switches

Lighting—Crosley No. 205936.
Beam Selector—Crosley No. 205956.

Lamp Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	32-21	2320
Parking	1.5	55
Instrument, Beam Ind.	1.5	55
Stop & Tail (L. H.)	21-3	1158
Tail (R. H.)	3	67

MISC. ELECTRICAL

FUSE: Lighting—20 ampere. On lighting switch.

HORN: Crosley No. 205288. Single horn standard. Dual horns consists of two single horns.

ENGINE

ENGINE SPECIFICATIONS: Four cylinder, Overhead Valve type with Overhead Camshaft. Cylinder block (with integral Head) is built-up type bolted on aluminum crankcase with pressed steel oil pan.
Bore—2.5". **Stroke**—2.25".
Displacement—44 cu. ins. **Rated H. P.**—10.
Developed Horsepower—26.5 at 5400 RPM.
Compression Ratio—7.5-1.
Compression & Vacuum Reading—*See Tune-Up data.*

ENGINE SERVICE NOTE: Cylinder Heads are integral with cylinder barrels and cylinder block must be removed from crankcase for work on Valves, Pistons, Rings, etc.

ENGINE REMOVAL and Cylinder Block Removal: *See Crosley Shop Notes.*

TIGHTENING (TORQUE WRENCH) SPECIFICATIONS: *See Crosley Shop Notes.*

PISTONS: Aluminum alloy, heat treated, cam ground, three-ring type (Before Eng. No. 31599), four-ring type (Eng. No. 31599 Up). Length—1.906".
Weight (3-ring type)—4.92 ozs. (equal within ⅛ oz.)
Clearance—.002-.0035" (skirt). See Fitting New Pistons.
Removal—Pistons and rods removed through lower end of cylinder when cylinder block removed from crankcase (cylinder head integral with block).
See Crosley Shop Notes for Cylinder Block Removal.

Fitting New Pistons: Use .002" feeler gauge, ½" wide, to check clearance. Place feeler gauge 90° from piston pin holes in piston on maximum thrust side. Pull required to withdraw feeler should be 4-6 lbs.

Replacement Pistons: Furnished Std. Size and .005", .010", .020", .030" Oversize.

PISTON RINGS (Before Eng. No. 31599): Two compression, one oil control ring, all above pin. Drain holes provided in oil ring groove.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	1/16"	.007-.017"	.0025-.004"
Oil Cont. (#3)	3/32"	.007-.015"	.0015-.003"

Installing Rings—Compression rings have inner bevel which must be upward (mark "TOP" on side of rings upward).

PISTON RINGS (Eng. No. 31599 Up): Two compression, one oil control ring above pin, additional oil control ring below pin (4-ring type piston). Drain holes provided in both oil ring grooves.

Ring	Width	End Gap	Side Clear.
Compr. (#1,2)	.0620-.0625"	.007-.017"	.0025-.005"
Oil (#3, 4)	.1545-.1550"	.007-.015"	.0015-.003"

Installing Rings—Side marked "TOP" on compression rings must be upward.

Replacement Rings: Furnished Std. Size and .010", .020", .030" Oversize.

PISTON PIN: Floating type with aluminum plug insert in each end of pin. Pin hole in rod has lead-bronze bushing.
Pin Fit in Piston—.0001-.0006" clearance (3-ring type piston), .0004" Loose to .0003" Tight (4-ring type piston) at room temperature or 70°F.
CAUTION—Heat piston to 160°F. when inserting pin to avoid distorting piston skirt.
Pin Fit in Rod Bushing—.0000-.0005" clearance or tight thumb push fit at room temperature (70°F). NOTE—Bushing is split leaded-bronze type and of size for press fit in connecting rod hole (.6875-.6880"). Hone bushing for correct pin fit after installation (pressing bushing into place will close up gap and leave pin hole undersize).
Piston Pin Plugs—Must be snug fit in ends of pin.

Replacement Piston Pins: .001", .002", .003" Oversize.

CONNECTING ROD: Length—4.125". **Weight**—9.62 ozs. (all rods equal within ⅛ oz.).
NOTE—Bearing cap bolts are forged integrally with the connecting rod.
Crankpin Journal Diameter—1.374-1.375".

ENGINE

CONTINUED FROM PRECEDING PAGE

Lower Bearing Type—Replaceable, precision type steel-backed, babbitt-lined. No shims.

NOTE—Connecting rod bearings are interchangeable with the three intermediate lower main bearing halves (not interchangeable with crankshaft upper bearings).

Clearance—.0015-.003" **Sideplay**—.0175".

Bearing Adjustment: None (no shims). Replace bearings (precision type, no fitting required). Do not file bearing caps. NOTE—Palnuts used on connecting rod bolts. Always use new Palnuts.

Replacement Bearings: Furnished Std. Size and .001", .010", .020" Undersize.

Installing Rods: Numerical marking on rod and bearing cap together and on same side of engine as similar marking on bottom of crankcase (left hand or distributor side).

CRANKSHAFT: Five main bearing type with individually counterweighted crankpins.

Journal Diameters—1.374-1.375" (except rear bearing), 1.499-1.500" (rear bearing only).

Bearing Type—Replaceable, precision type, steel-backed, babbitt-lined. Rear bearing is flanged (for end thrust).

NOTE—The three intermediate main bearings are interchangeable and these lower bearing halves are interchangeable with connecting rod bearings. Upper and lower bearing halves are not interchangeable (upper halves may be identified by oil holes which must register with oil channels in crankcase).

Clearance—.0015-.003".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Engine must be removed from chassis and crankshaft removed for main bearing work.

See Crosley Shop Notes for Engine Removal and Crankshaft Removal Instructions.

NOTE—When installing bearings, make certain that oil holes in bearing upper halves register with oil channels in crankcase (see Bearing Note above). Bearings are numbered (1 to 5) on left side of engine and cannot be interchanged.

Crankshaft Oil Seals—Replace rear main bearing oil seal whenever rear main bearing is disturbed.

►**Front Oil Seal Change (Beginning Eng. No. 60929):** One piece metal-enclosed neoprene type.

Oil Seal Replacement—*See "Crankshaft & Main Bearings" in Crosley Shop Notes.*

Replacement Bearings: Furnished Std. Size and .001", .010", .020" Undersize.

End Thrust: Taken by flanges on #5 (rear bearing). Replace rear main bearing when endplay exceeds .008". **Endplay**—.003-.008".

CAMSHAFT: Five bearing type mounted on top of engine and driven through bevel gears by vertical tower shaft at front of engine.

Bearing Type—Consist of five split aluminum bearings bolted individually on pads on top of engine. On first engines, integral studs provided on upper halves of all bearings except rear (#5) for camshaft cover retaining nuts. On later engines, top of all bearing upper halves are machined flat and a separate bearing strap is assembled on top of bearing under bearing capscrews. These bearing straps have stud for camshaft cover retaining nuts (except rear #5 bearing strap which is plain type).

Bearing Interchangeability—All lower bearing halves except front (#1) interchangeable on all engines. Intermediate (#2,3,4) upper halves of first type (with integral studs) interchangeable. All except front upper bearing halves of later type (with separate bearing straps) are interchangeable. Bearing straps used with this type are interchangeable on intermediate bearings (#2,3,4). Rear bearing strap is plain type.

Clearance—.0015-.0027".

Endplay—Taken by thrust washer between camshaft gear and front camshaft bearing. With correct endplay, backlash between camshaft gear and upper towershaft gear will be .003-.005".

Endplay Adjustment—*See "Camshaft & Bearings" in Crosley Shop Notes.*

Camshaft Drive (Towershaft) Assembly: *See "Camshaft & Bearings" in Crosley Shop Notes.*

Camshaft Setting: For correct valve timing, with camshaft out of engine, proceed as follows:

1) Turn engine over slowly until the following three conditions occur simultaneously: a) Top dead center mark on flywheel is in center of inspection hole in right front face of housing, b) Distributor rotor points toward #1 cylinder segment in distributor cap, c) Punch-marked tooth of upper tower gear (see below) points toward rear of engine and is in line with center-line of camshaft bearings.

2) With engine positioned as above, assemble the camshaft, pushing the oil metering housing into upper tower shaft gear and meshing punch-marked tooth of upper tower shaft gear between two punch-marked teeth of camshaft gear. Complete camshaft assembly by installing bearing caps.

3) Check camshaft endplay (see data above).

4) Turn engine over slowly by hand for at least two revolutions.

VALVES: Engine must be dismantled (removed from chassis, cylinder block taken off) for valve work.

Valve Servicing—*See "Valve System" in Crosley Shop Notes.*

	Head Diameter	Stem Diameter	Length
Intake	1 11/64"	.3135-.3140"	3.934"
Exhaust	1 3/64"	.3125-.3130"	3.934"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.225"	.0015-.003"
Exhaust	45°	.225"	.0025-.0040"

VALVE INSTALLATION CAUTION—(On Cars with new type guides). Valve spring washer (intake valves), Thompson Roto Cap (exhaust valves) must be installed below valve springs with cupped side of washer and extruded lip on Roto Cap up toward camshaft.

Valve Springs: Intake & exhaust valve springs interchangeable.

	Spring Pressure	Length
Before Engine No. 49500		
Valve Open	48 lbs.	1 7/32"
After Engine No. 49500		
Valve Closed	30 lbs.	1 1/2"
Valve Open (Intake)	46-51 lbs.	1 7/32"
Valve Open (Exh.)	46-51 lbs.	①1 5/64"

①—With Thompson Roto-Cap.

Valve Guides (Before Eng. No. 62725): Pressed in cylinder head. To remove guides, invert cylinder block on arbor press, use a shoulder drift pin (max. O. D. 13/32") to press guide out. Press new guides in place (coat stem with Permatex #3 or equivalent) from above until shoulder on guide seats solidly on bushing in cylinder head. Ream guides for correct valve stem clearance. NOTE—Reface valve seats using the new guide hole to pilot the facing tool, grind valves before installing.

CAUTION—Support Valve Guide Bushing when installing guide to prevent distorting ports.

Valve Guides (After Eng. No. 62725): Press old guide out from top to bottom. Press new guide in until top of guide protrudes ¾" above bottom of cam follower guide. Ream for .0015-.003" clearance (intake), .002-.004" (exhaust). Reface valve seats.

Valve Lifter (Cam Follower): Consists of an inverted cup operating in guide hole in cylinder block directly above each valve assembly (cam follower spacer and tappet clearance adjusting shims located within cam follower above valve stem).

Cam Follower Clearance—.0005-.0015".

VALVE TIMING

Tappet Clearance: .004-.005" Intake; .006-.007" Exhaust Cold. Clearance adjusted on first cars by grinding off end of valve stem, adjusting shims located within cam follower on later cars.

Tappet Clearance Adjustment Procedure—*See "Valve System" in Crosley Shop Notes.*

Valve Timing: See Camshaft Setting (above).

Engines before No. 51099①

Intake Valves—Open 5° BTDC. Close 50° ALDC.

Exhaust Valves—Open 50° BLDC. Close 5° ATDC.

①—Also Engines No. 105, 010 Up.

Engines No. 51099 to 105010

Intake Valves—Open 5° BTDC. Close 50° ALDC.

Exhaust Valves—Open 32½° BLDC. Close 5° ATDC.

Valve Timing Check—See Camshaft setting for assembly of valve gear.

LUBRICATI N

Engine Oiling System: Pressure to main bearings, connecting rod bearings, camshaft bearings, and timing gear bearings (oil flow to camshaft bearings is through hollow towershaft and hollow camshaft). Oil pump in crankcase at forward end of engine.

Crankcase Capacity—2 qts. (refill), 2.8 qts. (when filter drained or filter element replaced). NOTE—Capacity 3 qts. on first 1946 cars.

Normal Oil Pressure—40-50 lbs. at 30 MPH (hot oil). 7 lbs. minimum with engine idling.

Oil Pressure Regulator—Located under plug on right front corner of engine. Not adjustable.

Oil Pump: Disassembly—Take out center capscrew on lower cover, remove cover, gasket, and screen. Take out four capscrews in pump cover, remove cover and gasket, lift out idler gear and shaft. To remove pump shaft and gear, file off end of pin in pump drive gear, drive pin out and remove gear.

Reassembly—Use new gaskets. Make certain that plain washer and lockwasher used on each cover screw and that lower cover (with oil inlet pipe) is tight. See Tightening Torque Wrench data for housing and mounting screw torques.

Oil Filter: Replace filter element at 8000-10000 mile intervals. NOTE——Add .8 qt. of oil in crankcase when oil filter drained or element replaced.

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe located at rear of valve chamber.

Servicing—Wash filter element in kerosene and re-oil at 2000 mile intervals or more often if required by operating conditions.

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COOLIN

Cooling System: Not pressurized (Pressure type Radiator Filler Cap available as accessory equipment).

Capacity—4 quarts (5 quarts with Heater).

NOTE—Capacity 5 qts. on first 1946 cars.

Water Pump (No. C-205175—Before Eng. No. 27637). Packless type. Mounted on right side of engine.

NOTE—This pump used with Generator GAS-4190. *See Water Pump Section for complete data.*

CAUTION—To prevent excessive pump bushing wear, generator mounting bracket must be aligned whenever alignment disturbed.

Water Pump (Generator Mounting Bracket) Alignment—*See "Cooling System" in Crosley Shop Notes.*

Removal—Disconnect drive coupling at water pump, drain cooling system by taking out plug in pump housing, disconnect two water hoses, take out two mounting bolts in flange at rear of pump, lift pump out.

Belt Adjustment—*See Generator Belt Adjustment.*

Water Pump (No. C-207187—After Eng. No. 27637). Adjustable packing type. Mounted on right side of engine.

NOTE—This pump used with Generator GDZ-4806B. *See Water Pump Section for complete data.*

Removal—Disconnect drive coupling at water pump, drain cooling system by taking out drain plug at bottom of radiator, disconnect two water hoses, take out two mounting bolts in flange in front of pump, lift pump out.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In engine outlet connection (blocker type). Opens at 170°F.

Temperature Gauge: Vapor pressure type (not electric).

CLUTCH

Rockford Model R-4608. Single plate, dry disc.
See Clutch Section for complete data.

Facings—Molded type. I. D. 4". O. D. 6" Thickness 7/64" (flywheel side), 9/64" (pressure plate side).

Pedal Adjustment: Pedal free travel should be 1". To adjust, turn clevis end in or out on cable.

Removal: Remove transmission (see Transmission Removal below). Working from below through the housing opening, remove two bolts in each of three release lever brackets, remove pressure plate and driven member through opening.

TRANSMISSION

Warner Model AS1-T92. Three-speed, sliding spur gear type with conventional shift lever mounted on transmission case cover.
See Transmission Section for complete data.

Removal: Raise rear of car until weight removed from rear springs, disconnect rear springs from axle. Disconnect brake cable and conduit at each rear wheel backing plate, disconnect speedometer cable, clutch release cable clamp from bottom of transmission case. Support rear end of engine on blocks remove rear engine mount (under transmission case at rear end). Remove transmission control housing and shift lever assembly. Take out capscrews mounting torque tube on rear face of transmission adapter, pull rear wheels, rear axle, and propeller shaft assembly to rear and clear of the transmission case (CAUTION—Do not lose spring and washer located between propeller shaft and speedometer gear). Remove four capscrews mounting transmission on flywheel housing, pull transmission straight back to clear clutch shaft and remove from car.

UNIVERSALS

Spicer Model 102 (First Cars), New England Products (Later Cars). One used. Plain bushing type. In ball housing at rear of transmission adapter.

REAR AXLE

Spicer Salisbury Model 11. Semi-floating, spiral bevel gear type with Torque Tube drive.
See Rear Axle Section for complete data.

Ratio—5.17-1 Std.

Backlash—.003-.008". Shim adjustment.

Removal: Disconnect brake cable clevis at brake cam lever and unfasten brake cable conduit at clamp on backing plate at each rear wheel. Raise rear of car until all weight removed from rear springs, disconnect rear springs from axle. Take out capscrews mounting torque tube on rear face of transmission adapter, pull rear wheels, rear axle, and torque tube assembly to rear until free from transmission. CAUTION—Do not lose spring and washer located between universal joint and speedometer gear in transmission.

Axle Shaft Removal: Remove rear wheel hub cap, rear wheel, and wheel hub (use Puller No. 202318). Disconnect brake cable from brake cam lever and free cable conduit from clamp on backing plate. Take out four capscrews mounting backing plate on axle housing, remove backing plate being careful not to lose bearing adjusting shims on housing flange. Pull axle shaft out of housing.

Wheel Bearing Adjustment: Check endplay at each wheel with dial indicator. Adjust by adding or removing shims located between backing plate and flange on axle housing (see Axle Shaft Removal for dismantling instructions).

Endplay—.002-.007" total for both wheels (between inner ends of shafts and thrust block in differential).

TORQUE TUBE & PROPELLER SHAFT ASSEMBLY:

Spicer No. 98-1182X. Torque tube assembly has flanged end at rear (bolted to rear axle housing flange) and thrust ball at forward end (cap assembly bolted on adapter on rear end of transmission). Propeller shaft is splined on pinion shaft (rear end) and in universal joint (forward end) and is positioned by spring located between universal joint and speedometer gear in transmission case. NOTE—A propeller shaft center bearing is located within the torque tube and is provided with a grease fitting on the tube at this point.

Propeller Shaft Removal: Remove Rear Axle and Torque Tube Assembly (see Rear Axle Removal above), withdraw propeller shaft through forward end of tube.

CAUTION—When installing assembly in car, make certain that spring and washer installed on transmission shaft ahead of universal joint. This spring takes up endplay in propeller shaft.

SHOCK ABSORBERS

Houde (Houdaille) Type—Before Serial No. 21135. Double acting, adjustable, hydraulic type.

Adjustment (Houde)—Handle on end of shaft (in center of lever) adjustable between end stops and should be turned clockwise for more control, or counter-clockwise for less control and softer ride. Do not change adjustment more than 1/32-1/16" from original factory setting.

NOTE—Original factory setting indicated by scribed line on end of shaft (pointer on adjusting handle aligned with this mark).

Refilling—Check fluid and fill to level of filler plug hole with Houdaille L-1404 fluid at 5000 miles intervals. CAUTION—Only L-1404 fluid should be used in this type shock absorber (may be identified by round-top filler plug).

Delco Model 1438-T,U (Front), 1438-V,W (rear)—After Serial No. 21135. Single acting, hydraulic type.

Adjustment—None (except by changing valves).

Refilling—Check fluid and fill to level of filler plug hole on cover plate (see Note) at 10000 mile intervals. NOTE—If cover plate does not have filler plug, this coverplate can be replaced by cover having filler hole and plug (for filling on car) or shock absorber can be removed and refilled on the bench.

FRONT SUSPENSION

Front Suspension: Conventional axle with semi-elliptic springs.

Kingpin Inclination—6½° crosswise.

Camber—2°. No adjustment (axle may be bent for minor adjustments).

Caster—7½°. Adjust by inserting wedge shims between spring and spring pad on axle.

NOTE—Caster 10° on first 1946 cars.

Toe In—3/64-1/16". Adjust in usual manner by changing length of tie rod.

STEERING GEAR

Ross Model S-12. Cam-and-Lever type.
See Steering Gear Section for complete data.

BRAKES

Service: Hawley. Four-Wheel, mechanical, two-shoe type. Hand lever applies all four service brakes.
See Brake Section for complete data.

Drums—Cast Iron. Diameter 6".

Clearance—.010" at both ends of each shoe (adjusting screw backed off approximately ¼ turn from point where wheels start to drag).

Lining—Molded type. Width 63/64". Thickness 5/32". Length per wheel 16".

NOTE—Bonded Lining used on some cars.

Hand Brake: See Service Brakes (above).

NOTE—Hand brake handle (on floor ahead of seat) is linked directly to hand brake lever on crossshaft.

Form 9B—1956-M

MODEL IDENTIFICATION

MODEL DESIGNATION: Regular "CD" and Sports "VC" models with model suffix letter as follows:

Model "CD-"		Model "VC-"	
Bus. Coupe	H	Hotshot	A
Super Sedan Del.	A	Super Sports	B
Super Conv't.	C		
Super Sta. Wgn.	D-4		
Std. Sta. Wgn.	D-3		
Panel Delivery	E		
Pick-up Trk.	B		

SERIAL NUMBER: Stamped on plate on front face of dash panel in engine compartment.

Beginning Serial Nos.

1949—100,000 Up.

1950—CD-200,000 (Deluxe & Super Deluxe CD), VC-20,000 (Hotshot & Super Sports VC).

1951—CD-300,000 (Deluxe & Super Deluxe CD), VC-30,000 (Hotshot & Super Sports VC).

ENGINE NUMBER: Stamped on pad on left side of crankcase.

TUNE-UP

COMPRESSION PRESSURE: 125-135 lbs. max. (110 lbs. min. hot) at cranking speed of 260 RPM. All cylinders must be equal within 10 lbs.

VACUUM READING: 18-20" Idling at 700 RPM.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAPS: .025".
Plugs—Auto-Lite Type AN-7E. 14 mm. Metric.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022"
Cam Angle—46° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 12° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—First flywheel mark (second mark is TDC) in inspection hole in right front face of flywheel housing.

CARBURETION: Tillotson Model DY-9C, ⅞" single barrel, plain tube, downdraft type with manual choke control.

Initial Setting (to warm up Engine)—Idle adjustment screw 1¼ turns open, Main (high speed) adjustment screw 2¾ turns open.

Main (High Speed) Adjustment—With engine warm and running at ½ throttle opening, turn screw in until engine begins to lose speed, then out until maximum speed and power secured (2-2⅛ turns open).

Idle Adjustment—After making Main Adjustment (above), close throttle and set stopscrew for slightly faster than normal idle speed, turn idle adjusting screw in until engine misses, then turn screw out until engine fires smoothly. Final setting 1 turn open.

Idle Speed—700 RPM or 7-8 MPH.

Float Level—Fuel level 23/32" below top edge of bowl or even with bottom of inspection plug hole on side of bowl.

►*CAUTION*—Remove idle adjusting screw, spring, and idle tube before removing air horn and float bowl cover assembly.

Accelerating Pump—None.

CARBURETION: Carter Model WO, No. 870S. 1", Single barrel, downdraft with manual choke control.
Idle Setting—¾-1¾ turns open (turn screw out for richer mixture).
Idle Speed—450-500 RPM.
Float Level—½" from top of float at free end to gasket seat on cover (invert assembly and allow float to hang freely). ***CAUTION—Do not compress spring in intake needle.***

Fast Idle: No adjustment required.

Choke: Manual type.

Fuel Pump Pressure: 3¼ lbs. maximum.

VALVE TAPPET CLEARANCE: (1949-51) .004-.005" Intake, .006-.007" Exhaust, (1952) .004-.006" Intake, .007-.009" Exhaust, COLD.

Tappet Clearance Adjustment Procedure—*See "Valve System" in Crosley Special Data.*

IGNITION

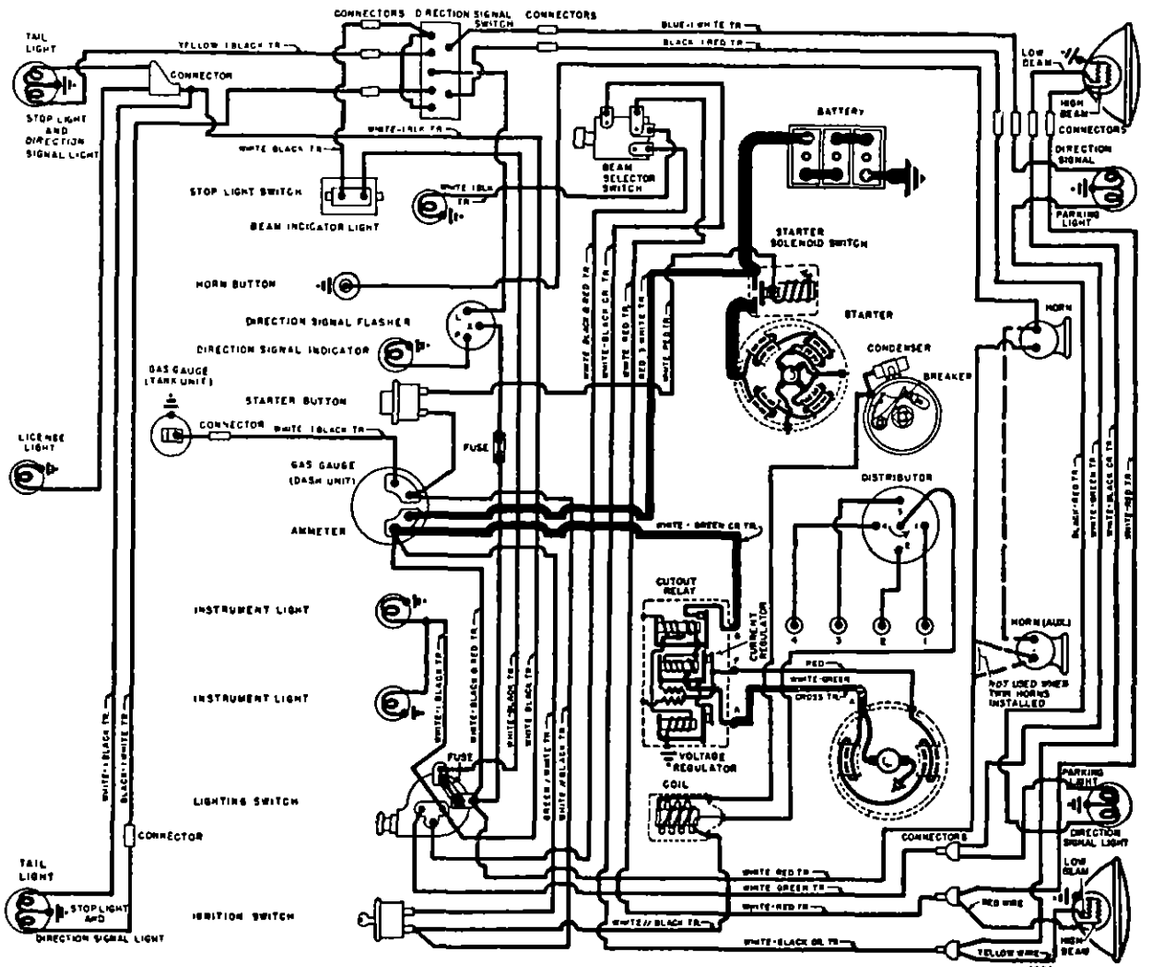
IGNITION SWITCH: Crosley No. 302199.

COIL: Auto-Lite Model IG-6001. On dash.
Service Coil—IG-4070 with IG-1944 Service Bracket.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IGB-1025.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGW-4181B or 4181C. Single breaker, four lobe cam, full automatic advance type (no vacuum control).
Breaker Gap—.020". Limits .018-.022".
Cam Angle—46° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

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Automatic Advance—IGW-4181B

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	400	0	800
1	490	2	980
6	890	12	1780
14	1550	28	3100
15	1625	30	3250

Automatic Advance—IGW-4181C

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	400	0	800
1	465	2	930
7	835	14	1670
16	1390	32	2780
17	1450	34	2900

Removal: Distributor mounted on crankcase at left front of engine. To remove distributor, drain engine oil, remove oil pan, remove distributor drive gear by removing palnut and regular nut on lower end of distributor shaft. (CAUTION—Do not lose Woodruff key in shaft). Then remove hold-down screw in advance arm, lift distributor out.

Distributor Installation Note—When installing distributor, first turn crankshaft to #1 cylinder firing position (#1 piston on compression, ignition timing mark on flywheel in center of inspection hole in right front face of housing), turn distributor shaft until rotor is at #1 segment in distributor cap (see diagram) with contacts just opening, install distributor on engine and tighten hold-down screw in advance arm. With oil pan removed, install drive gear on lower end of distributor shaft. (CAUTION—make certain that Woodruff key in place), being careful not to disturb relative position of distributor shaft and crankshaft when meshing gears, install regular nut and palnut on distributor shaft. Check Ignition Timing.

IGNITI N TIMING

Std. Setting.....12° BTDC.

To Set Timing—With #1 piston on compression, turn engine over until piston reaches firing position when first timing mark on flywheel is in center of inspection hole in right front face of housing. Loosen advance arm clamp bolt, rotate distributor housing until contacts begin to open, tighten clamp bolt. Check rotor and make certain it is at #1 segment in distributor cap, check spark plug connections.

To Check Timing (with Neon Timing Light)—Attach neon timing light to #1 spark plug, direct light on flywheel through inspection hole in right front face of housing. Start engine and allow it to idle (speed must not exceed 700 RPM. to avoid automatic advance action). Loosen distributor clamp bolt in advance arm, rotate distributor until timing mark (located 12° before TDC mark) appears to be in center of inspection hole, tighten clamp bolt.

CARBURETOR

TILLOTSON

Tillotson Model DY-9C—⅞", single barrel, plain tube, downdraft type with manual choke control.
See Carburetor Section for complete data.

NOTE—This carburetor has Main (High Speed) adjustment as well as conventional Idling (Low Speed) adjustment.

Adjustment & Float Level—*See Tune-up for data.*

Metering Jets—*See Tillotson DY-9C Carburetor article in Carburetor Section for complete data.*

CARTER

Carter Model WO, No. 870S. 1", single barrel, downdraft type with manual choke control.
See Carburetor Section for complete data.

Adjustment & Float Level—*See Tune-up for data.*

Metering Jets—*See Carter WO-870S Carburetor article in Carburetor Section for complete data.*

CARB. EQUIPMENT

Air Cleaner: Oil-bath type. Crosley No. 206894 (CD), 301631 (VC). *NOTE*—Dry felt type cleaner also used on 1952 cars.

Fuel Pump: AC No. 1538923 (Crosley No. 300042).
See Carburetion Equipment Section for data.

Pressure—1½-3¼ lbs.

Gasoline Gauge: Stewart (Stewart-Warner) Electric
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1MS-65—6 volt, 11 plate, 65 ampere hour (20 hour rate).
Grounded Terminal—Positive (+) terminal.
Location—On left hand side in engine compartment.
NOTE—Battery on **Hotshot** located under right front fender.

STARTER

Auto-Lite Model MZ-4147. Armature No. MZ-2053.
Drive—Bendix Drive No. A2920.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. with new brushes.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Starting Switch: Auto-Lite Model SS-4007 Magnetic Switch and Pushbutton Model XA-456 or XA-456E. Switch is mounted on dash and controlled by pushbutton on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GDZ-4806B. Armature GDZ-2079F.
Two brush type with current and voltage regulation.
Maximum Charging Rate—35 amperes at 8.0 volts.
Charging Rate Adjustment—None. See Regulator.

Cold Amperes	Volts	Performance Data R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	870-970	0	6.4	950-1050
35	8.0	1800-2000	35	8.0	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amperes at 6.0 volts.

Belt Adjustment: Loosen nuts on two bolts mounting fan shaft bracket on front of engine, move fan upward (right hand bolt hole slotted) until belt deflection is ½" (thumb pressure) midway between generator and fan pulleys, tighten nuts and recheck.

NOTE—Two holes provided in bracket for left hand fan mounting bolt. Additional range of adjustment can be secured by shifting bolt to upper hole.

REGULATOR

Auto-Lite Model VRP-4004F-2. Voltage-current type.
See Electrical Equipment Section for complete data.

NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toboard. Crosley No. 207371 (CD), 301351 (VC).
Adjustment—Aim upper beams straight ahead with top of "hot spot" 3" below lamp center height at 25 feet.

Direction Signal: Crosley No. 209355 used on "CD"—A, B, C, D, E, models. Crosley No. 301730 used on all "VC" models.
Direction Indicator—Single flasher light on lower edge of instrument panel to left of steering column.
See Electrical Equipment Section for complete data.

Switches

Lighting—Crosley No. 205936.
Beam Selector—Crosley No. 209446.
Directional—Crosley No. 209354.
Stop Light—Crosley No. 207800.

MISC. ELECTRICAL

FUSES: **Lighting**—20 ampere (1949-51), 25 ampere (1952). On lighting switch.
Direction Signal—14 ampere (1949-51), 10 ampere (1952). Located in lead wire back of instrument cluster to left of steering column.

HORN: Sparton or Auto-Lite No. HA-4037. Vibrator type. Single horn standard, dual horns optional.
Horn Current—7 amperes each.

ENGINE

ENGINE SPECIFICATIONS: "CIBA" cast-iron block engine. Four cylinder, Overhead Valve type with Overhead Camshaft. Cylinder block (with integral Head) is bolted on separate crankcase.
Bore—2.5". Stroke—2.25".
Displacement—44 cu. ins. **Rated H.P.**—10.
Developed Horsepower—(1949-50-51) 26.5 at 5400 RPM., (1952) 25.5 at 5200 RPM.
Compression Ratio—(1949-50-51) 7.8-1; (1952) 8.0-1 (Std.), 10-1 (Quicksilver engine used in Super Sports models).

ENGINE

CONTINUED FROM PRECEDING PAGE

Compression & Vacuum Reading—*See Tune-up data.*

►**ENGINE SERVICE NOTE:** Cylinder Heads are integral with cylinder barrels and cylinder block must be removed from crankcase for work on Valves, Pistons, Rings, etc.

ENGINE REMOVAL and Cylinder Block Removal: *See Crosley Special Data.*

TIGHTENING (TORQUE WRENCH) SPECIFICATIONS: *See Crosley Special Data.*

PISTONS: Aluminum alloy, four ring type, heat treated, cam ground, with aluminum oxide finish. **Weight**—6.5 ozs. stripped. **Length**—1 29/32". **Clearance**—.0025-.0035" (skirt). See Fitting New Pistons.

Removal—Pistons and rods removed through lower end of cylinder when cylinder block removed from crankcase (cylinder head integral with block). *See Crosley Special Data for Cylinder Block Removal.*

Fitting New Pistons: Use .002" feeler gauge, ½" wide, to check clearance. Place feeler gauge 90° from pin holes in piston on maximum thrust side. Pull required to withdraw feeler should be 4-6 lbs.

Replacement Pistons: Furnished Std. Size and .0025", .005", .010", .020", .030" Oversize.

NOTE—Std. piston furnished with pin and plugs.

PISTON RINGS: Two compression, one oil control ring above pin, additional oil control ring below pin.

Ring	Width	End Gap	Side Clearance
Compr. (#1,2)	.0620-.0625"	.007-.017"	.0025-.005"
Oil (#3,4)	.1545-.1550"	.007-.015"	.0015-.003"

Installing Rings—Inside bevel on compression rings upward. Top compression ring is chrome plated.

Replacement Rings: Furnished Std. Size and .010", .020", .030" Oversize.

PISTON PIN: Floating type with aluminum plug insert in each end of pin. Pin hole in rod has Cleveland Graphite Bronze #444 bushing.

Diameter—.6252". **Length**—2.260".

Pin Fit in Piston—.0004" Loose to .0003" Tight at room temperature or 70°F.

CAUTION—Heat piston to 160°F. when inserting pin to avoid distorting piston skirt.

Pin Fit in Rod Bushing—.0001-.0005" clearance or tight thumb push fit at room temperature (70°F.).

NOTE—Bushing is split leaded-bronze type and of size for press fit in connecting rod hole. Hone bushing for correct pin fit after installation.

Replacement Piston Pins: .001", .002", .003" Oversize.

CONNECTING ROD: Length—4.125-4.130". **Weight**—9.62 ozs. NOTE—Bearing cap bolts are forged integrally with the connecting rod.

Crankpin Journal Diameter—1.374-1.375".

Lower Bearing Type—Replaceable, precision type steel-backed, babbitt-lined. No shims.

►*NOTE*—Connecting rod bearings are interchangeable with the three intermediate lower main bearing halves (not interchangeable with crankshaft upper bearings).

Clearance—.0015-.003". **Sideplay**—.010-.025".

Bearing Adjustment: None (no shims). Replace bearings (precision type, no fitting required). Do not file bearing caps. NOTE—Palnuts used on connecting rod bolts. Always use new Palnuts.

Replacement Bearings: Furnished Std. Size and .001", .005", .010", .020" Undersize.

Installing Rods: Numerical marking on rod and bearing cap together and facing left side of engine.

CRANKSHAFT: Five main bearing type with individually counterweighted crankpins.

Journal Diameters—1.374-1.375" (except rear bearing), 1.499-1.500" (rear bearing only).

Bearing Type—Replaceable, precision type, steel-backed, babbitt-lined. Rear bearing is flanged (for end thrust).

►*NOTE*—The three intermediate main bearings are interchangeable and these lower bearing halves are interchangeable with connecting rod bearings. Upper and lower bearing halves are not interchangeable (upper halves may be identified by oil holes which must register with oil channels in crankcase).

Clearance—.0015-.003".

Bearing Adjustment: *None. See Crosley Special Data for Engine Removal and Crankshaft Removal.*

CAUTION—When installing bearings, make certain that oil holes in bearing upper halves register with oil channels in crankcase (see Bearing Note above). Bearing caps are numbered (1 to 5) on left side of engine and cannot be interchanged.

Crankshaft Oil Seals—Replace rear main bearing oil seal whenever rear main bearing is disturbed.

Oil Seal Replacement—*See "Crankshaft & Main Bearings" in Crosley Special Data.*

Replacement Bearings: Furnished Std. Size and .001", .005", .010", .020" Undersize.

End Thrust: Taken by flanges on #5 (rear bearing). Replace rear main bearing when endplay exceeds .008". **Endplay**—.003-.008".

CAMSHAFT: Five bearing type mounted on top of engine and driven through bevel gears by vertical tower shaft at front of engine.

Bearing Type—Consist of five split aluminum bearings bolted individually on pads on top of engine. Top of all bearing upper halves are machined flat and a separate bearing strap is assembled on top of bearing under bearing capscrews. These bearing straps have stud for camshaft cover retaining nuts (except rear #5 bearing strap which is plain type).

Bearing Interchangeability—All upper and lower bearing halves except front (#1) interchangeable on all engines. Bearing straps are interchangeable on intermediate bearings (#2, 3, 4). Rear bearing strap is plain type.

Clearance—.0015-.0027".

Endplay—Taken by thrust washer between camshaft gear and front camshaft bearing. With correct endplay, backlash between camshaft gear and upper towershaft gear will be .003-.005".

Endplay Adjustment—*See "Camshaft & Bearings" in Crosley Special Data.*

Camshaft Drive (Towershaft) Assembly: *See "Camshaft & Bearings" in Crosley Special Data.*

Camshaft Setting: For correct valve timing, with camshaft out of engine, proceed as follows:

1) Turn engine over slowly until the following three conditions occur simultaneously: a) Top dead center mark on flywheel is in center of inspection hole in right front face of housing, b) Distributor rotor points toward #1 cylinder segment in distributor cap, c) Punch-marked tooth of upper tower gear (see below) points toward rear of engine and is in line with center-line of camshaft bearings.

2) With engine positioned as above, assemble the camshaft, pushing the oil metering housing into upper tower shaft gear and meshing punch-marked tooth of upper tower shaft gear between two punch-marked teeth of camshaft gear. Complete camshaft assembly by installing bearing caps.

3) Check camshaft endplay (see data above).

4) Turn engine over slowly by hand for at least two revolutions.

VALVES: Engine must be dismantled (removed from chassis, cylinder block taken off) for valve work.

Valve Servicing—*See "Valve System" in Crosley Special Data.*

	Head Diameter	Stem Diameter	Length
Intake	1 11/64"	.3135-.3140"	3.934"
Exhaust	1 3/64"	.3125-.3130"	3.934"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.235"	.0015-.003"
Exhaust	45°	.235"	.0025-.0040"

►*VALVE INSTALLATION CAUTION*—Valve spring washer (intake valves), Thompson Roto Cap (exhaust valves) must be installed below valve springs with cupped side of washer and extruded lip on Roto Cap up toward camshaft.

Valve Springs (1949-50-51): Free Length (Inner) 2", (Outer) 2¾". Install with tightly wound coil down,

Outer "Booster" Springs
►(Engines No. 101374 to 101991)

	Springs Pressure	Length
Valve Closed	7.5 lbs. max.	1 23/32"
Valve Open	9 lbs. max.	1 7/16"

Inner Springs (All Engines)

	Springs Pressure	Length
Valve Closed	30 lbs.	1 1/2"
Valve Open (Intake)	46-51 lbs.	1 7/32"
Valve Open (Exhaust)	46-51 lbs.	①1 5/64"

①—With Thompson Roto-Cap.

Valve Springs (1952): Free length 2". Install with tightly wound coil down, using special spring compressor.

	Spring Pressure	Length
Valve Closed	44.5-44.8 lbs.	1.3125"
Valve Open	85-91 lbs.	①1.0781"

①—With Thompson Roto-Cap.

Valve Guides: Press old guide out from top to bottom. Press new guide in until top of guide protrudes ¾" above bottom of cam follower guide. Ream for .0015-.003" clearance (intake), .002-.004" (exhaust). Reface valve seats.

Valve Lifter (Cam Follower): Consists of an inverted cup operating in guide hole in cylinder block direcly above each valve assembly (cam follower spacer and tappet clearance adjusting shims located within cam follower above valve stem).

Cam Follower Clearance—.0005-.0015".

VALVE TIMING

Tappet Clearance: (1949-50-51) .004-.005" Intake, .006-.007" Exhaust; (1952) .004-.006" Intake, .007-.009" Exhaust. COLD.

►**Tappet Clearance Adjustment Procedure**—*See "Valve System" in Crosley Special Data.*

Valve Timing: See Camshaft Setting (above).

Engines before No. 105,010

Intake Valves—Open 5° BTDC. Close 59° ALDC.
Exhaust Valves—Open 32½° BLDC. Close 5° ATDC.

Engines after No. 105,010

Intake Valves—Open 5° BTDC. Close 50° ALDC.
Exhaust Valves—Open 50° BLDC. Close 5° ATDC.
Valve Timing Check—See Camshaft setting for assembly of valve gear.

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LUBRICATI N

Engine Oiling System: Pressure to main bearings, connecting rod bearings, camshaft bearings, and timing gear bearings (oil flow to camshaft bearings is through hollow towershaft and hollow camshaft).
Crankcase Capacity—2 qts. (refill), 2.8 qts. (when filter drained or filter element replaced).
Normal Oil Pressure—35-50 lbs. at 30 MPH. (hot oil). 7 lbs. minimum with engine idling.
Oil Pressure Regulator—Located under plug on right front corner of engine. Not adjustable.
Oil Pump: Gear type in front end of crankcase.
Oil Pump Overhaul: *See Crosley Special Data.*
Oil Filter: Replace filter element at 8000-10000 mile intervals. NOTE—Add .8 qt. of oil in crankcase when oil filter drained or element replaced.
Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe located at rear of valve chamber.

COOLING

Cooling System: Pressure type Radiator Filler Cap used on 1952 cars, can be installed on previous models.
Capacity—4 quarts (5 quarts with Heater).
Water Pump (No. C-207187): Adjustable Packing type. Mounted on right side of engine.
See Water Pump Section for complete data.
Removal—Disconnect drive coupling at water pump, drain cooling system by taking out drain plug at bottom of radiator, disconnect two water hoses, take out two mounting bolts in flange in front of pump, lift pump out.
Thermostat: In engine outlet connection (Choke type). Starts to open at 155°F.
Temperature Gauge: Vapor pressure type.

CLUTCH

Rockford Model No. 4608, Type 6TS (Before Serial No. CD-205500 & VC-20783). Model No. 165299, Type 6½TS (After Serial No. CD-205500 & VC-20783). Single plate dry disc type.
See Clutch Section for complete data.
Facings—(R4608) I.D. 4". O.D. 6". (165299) I.D. 4½" O.D. 6½". Thickness (both) ⅛"
Pedal Adjustment: Pedal free travel should be 1". To adjust, turn clevis end in or out on cable.
Removal: Remove transmission (see Transmission Removal below). Working from below through the housing opening, remove two bolts in each of three release lever brackets, remove pressure plate and driven member through opening.

TRANSMISSION

Warner Model AS1-T92. Three-speed, sliding spur gear type with conventional shift lever mounted on transmission case cover.
See Transmission Section for complete data.
Removal: Raise rear of car until weight removed from rear springs, disconnect rear springs and shock absorbers from axle. Disconnect brake cable and conduit at each rear wheel backing plate (mechanical brakes) or disconnect brake line and parking brake cable (hydraulic brakes). Disconnect speedometer cable and clutch release cable clamp from bottom of transmission case. Support rear end of engine on blocks, remove rear engine mount (under transmission case at rear end). Remove floor transmission cover. Take out capscrews mounting torque tube on rear face of transmission adapter, pull rear wheels, rear axle, and propeller shaft assembly to rear and clear of the transmission case (CAUTION—Do not lose spring and washer located between propeller shaft and speedometer gear). Remove four capscrews mounting transmission on flywheel housing, pull transmission straight back to clear clutch shaft and remove from car.

UNIVERSALS

New England Products. Crosley No. 207483. One used. Plain bushing type. In ball housing at rear of transmission adapter.

REAR AXLE

Spicer Salisbury Model 11. Semi-floating, spiral bevel gear type with Torque Tube drive.
See Rear Axle Section for complete data.
Ratio—5.17-1 Std.
Backlash—.003-.008". Shim adjustment.
Removal: "CD" Models—Disconnect hand brake cable at lever at the transmission adaptor. Disconnect hydraulic brake lines. Raise rear of car until all weight removed from rear springs, disconnect rear springs and shock absorbers from axle. Take out capscrews mounting torque tube on rear face of transmission adapter, pull rear wheels, rear axle and torque tube assembly to rear until free from transmission. CAUTION—Do not lose spring and washer located between universal joint and speedometer gear in transmission.
"VC" Models—Disconnect rear shocks and two radius springs at axle. Disconnect main hand brake rod at front and rear and rear brake hose at frame. Disconnect torque tube at rear axle and remove rear coil springs. Remove rear axle from car. Disconnect torque tube at universal joint and pull back until ball housing is as close as possible to front cross member. Turn torque tube to left to a point almost at right angle to the body. The ball housings will then come out of the tunnel over cross member.
Installation: Reverse removal procedure.
Axle Shaft Removal—Remove rear wheel hub cap, rear wheel, and wheel hub (use Puller M.T. 262). Disconnect brake hose from backing plate and free cable conduit from clamp on backing plate. Take out four capscrews mounting backing plate on axle housing, remove backing plate being careful not to lose bearing adjusting shims on housing flange. Pull axle shaft out of housing.
►*CAUTION*—On cars with Goodyear-Hawley Hydraulic Brakes, wheel brake unit must be disassembled before hub and brake disc can be removed. *See "Goodyear-Hawley Hydraulic" Brakes in Brake Section.*
Wheel Bearing Adjustment: Check endplay at each wheel with dial indicator. Adjust by adding or removing shims located between backing plate and flange on axle housing (see Axle Shaft Removal). Endplay—.002-.007" total for both wheels.
TORQUE TUBE & PROPELLER SHAFT ASSEMBLY: Spicer No. 98-1182X. Torque tube assembly has flanged end at rear (bolted to rear axle housing flange) and thrust ball at forward end (cap assembly bolted on adapter on rear end of transmission). Propeller shaft is splined on pinion shaft (rear end) and in universal joint (forward end) and is positioned by spring located between universal joint and speedometer gear in transmission case.
NOTE—A propeller shaft center bearing is located within the torque tube and is provided with a grease fitting on the tube at this point.
Propeller Shaft Removal: Remove Rear Axle and Torque Tube Assembly (see Rear Axle Removal above), withdraw propeller shaft through forward end of tube.
CAUTION—When installing assembly in car, make certain that spring and washer installed on transmission shaft ahead of universal joint. This spring takes up endplay in propeller shaft.

SHOCK ABSORBERS

Delco Model—Direct acting, hydraulic type.

	Crosley Numbers	
	Front	**Rear**
CD—301755		301754
VC—301166		301306

NOTE—Above shock absorbers used on 1949 "CD" model beginning Serial No. CD-201995.

FRONT SUSPENSION

Front Suspension: Conventional axle with semi-elliptic springs.
Kingpin Inclination—6½° crosswise.
Camber—2°. No adjustment (axle may be bent for minor adjustments).
Caster—7½°. Adjust by inserting wedge shims between spring and spring pad on axle.
Toe-In—(CD) 1/16". (VC) ⅛".
Toe-Out On Turns—Inner wheel turned 20°, outer wheel turned 18°.

STEERING GEAR

Ross Model S-12. Cam-and-Lever type.
See Steering Gear Section for complete data.

BRAKES

HAWLEY MECHANICAL

Before Serial No. 106,039

Service: Hawley. Four-wheel, mechanical two-shoe type, Hand lever applies all four service brakes.
See Brake Section for complete data.
Drums—Diameter 6". Cast iron.
Clearance—.006-.008" at both ends of each shoe (adjusting screws backed off approximately ¼ turn from point where wheel starts to drag).
Lining—Molded type. Width 31/32". Thickness 3/16" Length per wheel 14".

GOODYEAR-HAWLEY HYDRAULIC

Beginning Serial No. 106,039

Service: Goodyear-Hawley hydraulic four-wheel disc type. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Disc Diameter—7½".
►*CAUTION*—Disc integral with wheel hub. Wheel brake unit must be disassembled before wheel hub can be removed.
Clearance—Compensating screw backed off ¼ turn from point where wheel locked.
Lining—Molded circular discs (2 used).
Hand Brake: See Service Brakes (above).

LOCKHEED HYDRAULIC

Service Brakes: Lockheed Hydraulic, 4-wheel, double anchor. Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Cast-iron. Diameter 9".
Lining—Molded type. Width 1" Thickness 7/32".
Length—9 15/32" (fwd. shoe), 6 53/64" (rear shoe).
Clearance—Heel .005". Toe .008".
Hand Brake: See Service Brake data (above).

TIGHTENING SPECIFICATIONS

1946-54 6 CYL. MODELS

	Ft. Lbs.
Cylinder Head Nuts	57
Cylinder Head Capscrews	70
Manifold Stud Nuts	20
Oil Pan Screws	17
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	17
Crankshaft Pulley	(Min) 108
Con. Rod caps	50
Camshaft Sprocket	20
Fuel Pump Mounting	17
Oil Filter	27

1952-55 MODELS

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	125
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover (Double Rocker Shaft)	25
Engine Front Cover (Double Rocker Shaft)	30
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	30
Transmission Companion Flange	150

ENGINE

6 CYL. MODELS

ENGINE ASSEMBLY REMOVAL: Engine assembly, clutch, and transmission assembly can be removed from car as a unit as follows: Remove hood and radiator core. Remove propeller shaft (cars with two propeller shafts see Propeller Shaft Center Bearing Removal following). On cars with power shift remove the vacuum control unit. Disconnect the following: Fuel pump flexible line at pump, exhaust pipe at manifold, throttle controls, heat indicator tube and bulb at head, oil gauge line at flexible tube, generator wires, speedometer cable, hand brake, gear shift and selector rods at transmission, clutch pedal linkage and torque tube, windshield wiper vacuum hose (if so equipped). Remove crankcase ventilator breather tube and front and rear engine support bolts. Connect hoist to engine (remove air cleaner and horns) lift assembly out of chassis. When re-installing assembly, reverse procedure indicated above, check hood alignment and hood lock operation.

V8 MODELS

ENGINE ASSEMBLY REMOVAL: Drain cooling system (both cylinder bank drain cocks and radiator). Disconnect propeller shaft at transmission and disconnect wires and linkage at transmission and clutch. Remove exhaust pipes, hood, and battery. Disconnect the usual items under hood such as fuel lines, radiator hoses, wires, etc. If using engine lifting fixture C-3162, remove carburetor assembly after disconnecting integral choke tube, fuel lines as listed above.. Remove radiator shroud (if so equipped). Attach lifting fixture to carburetor flange studs on intake manifold, and hook chain hoist to eyebolt. Place a jack under transmission to relieve weight. Then remove engine rear support mounting bolts and cross-member. Then remove engine front support mounting bolts. Lower jack at transmission and remove from under car. Raise engine and at the same time, work engine out of chassis toward the left front fender.

OIL PAN

6 CYL. MODELS

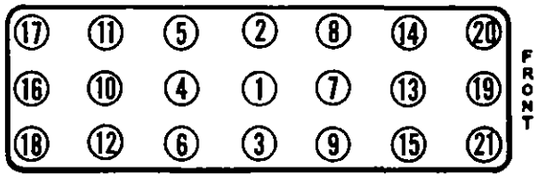
OIL PAN REMOVAL: Drain oil, replace oil pan drain plug. Remove clutch cover housing underpan to avoid damaging oil pan gaskets on underpan dust shield. Remove oil level indicator, drop oil pan on the tie rod. Pan can then be removed by reaching under crankcase and raising oil strainer to clear baffle while sliding pan out to rear.

CYLINDER HEAD & MANIFOLD

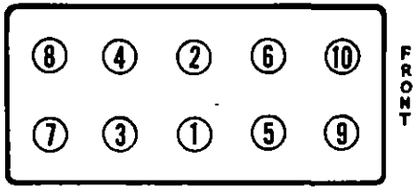
ALL MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

Tightening Torque—See Tightening (Torque Wrench) Specifications above.



6 CYL. CYLINDER HEAD



V8 CYLINDER HEAD

MANIFOLD HEAT CONTROL

V8 MODELS

MANIFOLD HEAT CONTROL VALVE: Attached to right cylinder block exhaust manifold, and can be removed and repaired without removing manifold.

Removal—Remove two exhaust manifold flange bolts and nuts and apply pressure to exhaust pipe to separate and remove the heat control valve. Remove counter-weight tightening bolt and nut and remove counter-weight. Remove thermostatic spring, spacer washer, then remove horseshoe lock and remove the anti-rattle spring.

►***CAUTION—Do not operate the engine without heat control valve in the manifold.***

Installation—Install anti-rattle spring and horseshoe lock, and secure lock to shaft by squeezing end of horseshoe lock together. Check valve and shaft for free movement. Install spacer washer and place inner tongue of coil spring in shaft slot with outer tongue of spring toward forward side of valve and in a down position. Install bumpers on each side of counter-weight, and insert the counter-weight shaft key into counter-weight, securing it in position with the lock bolt. Hold heat control valve in the open position, and move the outer end of thermostatic spring around and up ¾ of a turn, hooking end of spring under forward stop screw. Hold valve in closed position and install counter-weight assembly on shaft. Center butterfly valve in valve body and line up bumpers to clear stop pin, then press counter-weight all the way onto the shaft, with the anti-rattle spring adjusted so that when the valve shaft is pulled up against anti-rattle spring there will be about 1/16" tensional drag on the shaft. Install manifold heat control valve assembly on exhaust manifold. Check assembly for free operation.

ORIGINAL BORE & PISTONS

6 CYL. MODELS

ORIGINAL PISTON & CYLINDER BORE SIZES: Original production (new engine) piston and bore sizes indicated by letter located as follows:

Piston Size—Letter stamped on piston head.

Bore Size—Letter stamped on pad on distributor side of engine at top of block. Do not confuse this letter with "Special Standard" size letter indicating oversize bore.

"Special Standard" Size Bore—Letter "A" or "AB" following engine number indicates engine has .020" oversize standard cylinder bore.

NOTE—When measuring piston diameter take readings at right angles to the pin holes and ¾" from bottom of skirt.

PISTONS

ALL MODELS

REPLACEMENT PISTONS: Finished (Aluminum Alloy) Pistons—Furnished in standard size and .005", .020", .030", .040", .060" oversize, for all models.

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Semi-Finished (Aluminum Alloy) Pistons—These pistons furnished in two sizes (1) for cylinder bores from standard to .023" oversize. (2) For cylinder bores .025" to .060" oversize. Pistons are finished (head and ring grooves) except for skirt. Pistons must be finished on cam grinding equipment. Do not finish pistons circular. Skirt is elliptical (.010-.014"), with smaller diameter across pin bosses than across thrust faces, and piston is tapered (.0005-.0015"), with smaller diameter at top of piston.

IMPORTANT—Use same type pistons when replacing only a partial set. All pistons in engine must be of the same type.

PISTON RINGS

ALL MODELS

REPLACEMENT PISTON RINGS: Three types of piston ring sets furnished by car manufacturer for service replacement as follows:

Mopar Oil Master Ring Sets—These rings designed to be installed in cylinders with walls tapered .005" to .030" when cylinder walls are not to be reconditioned. No. 4 oil ring is special 4-piece type (upper and lower rails with stepped segment between rails and slotted expander). Mopar Oil Master Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Oil Saver Ring Sets—These ring sets are designed to be installed in cylinders with .005" or less taper, or where cylinder walls have been reconditioned. This set consists of the same size ring as used in Oil Master Set except that No. 3 & No. 4 rings are alike (slotted oil ring with slotted expander). Mopar Oil Saver Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Chrome Master Ring Sets—These ring sets are designed to be installed in cylinders with walls tapered .005" to .030" when cylinder walls are not to be reconditioned. Top and bottom rings are chromed.

Oil Ring Set Sizes—All piston ring sets are available in the following sizes: **Standard** (for standard to .009" oversize cylinders); **.010"** (for .010" to .019" oversize cylinders); **.020"** (for .020" to .029" oversize cylinders); **.030"** (for .030" to .039" oversize cylinders); **.040"** (for .040" to .049" oversize cylinders); **.050"** (for .050" to .060" oversize cylinders).

ORIGINAL BEARING SIZES

ALL MODELS

ENGINE NUMBER LETTERS ('SPECIAL STANDARD' BORE & BEARING SIZES): Letters used with engine number (not in circular pad) denote following 'special standard' sizes: **'A'**—.020" larger standard cylinder bore. **'B'**—.010" smaller standard main and connecting rod bearings. **'AB'**—Cylinder bore, main & connecting rod bearings 'special standard.'

CONNECTING ROD & BEARINGS

ALL MODELS

▷***CAUTION—See ORIGINAL BEARING SIZES for markings indicating engines equipped with bearings other than standard sizes.***

CONNECTING ROD BEARINGS: Removal & Installation. Bearing shells can be removed after taking off bearing caps. When installing bearing shells, oil hole in rod and bearing must be aligned and ear on bearing halves must be aligned and fitted in notch in rod and cap.

Fitting Bearings—To check bearing clearance, place oiled piece of feeler stock .0015" thick, ½" wide, ¾" long between bearing and crankshaft. Tighten bearing cap nuts. Bearing clearance is correct when slight drag is felt when turning crankshaft by hand. If no drag felt, and crankshaft out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshafts which show slight wear, .010" undersize for 'Special Standard' .010" crankshafts (see Engine Lettering 'Special Standard' Bore & Bearing Sizes Note above), .012" undersize bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

CRANKSHAFT & MAIN BEARINGS

ALL MODELS

▷***CAUTION—See ORIGINAL BEARING SIZES for markings indicating production engines equipped with bearings other than standard size.***

REPLACEMENT MAIN BEARING CAPS: Furnished for service where original cap damaged or broken. These replacement caps same as original caps except for stud holes being 1/64" larger, and bearing cap length which is 1/16" shorter.

Fitting—Replacement cap must be fitted to engine by filing or shimming to obtain proper bearing clearance. This is only necessary when replacement cap originally fitted to engine (cap should not be filed or shimmed to compensate for wear).

ALL MODELS

MAIN BEARINGS: Removal & Installation (with engine in car). Bearing shells can be removed and installed without removing crankshaft as follows: Remove oil pan, and oil suction pipe and screen assembly. Punch mark bearing caps and crankcase to insure re-installation of caps in same positions. Remove caps in pairs (2 front or 2 rear). Upper bearing halves can be removed by using tool C-584 inserted in oil hole in crankshaft and rotating crankshaft to turn bearing out.

▷***CAUTION***—When new bearings installed, always use complete bearing (do not use new bearing half with an old half). Upper and lower bearing halves for all bearings except rear are alike.

Fitting Bearings—To check bearing clearance, place an oiled piece of feeler stock, .0015" thick by ½" wide, and 1" long between bearing and crankshaft. Tighten bearing cap nuts or cap screws. Bearing clearance is correct when slight drag felt when turning crankshaft by hand. If no drag felt, and crankshaft journal out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshafts which show slight wear, .010" for 'Special Standard' .010" crankshafts (see Engine Lettering 'Special Standard' Bore & Bearing Sizes Note above), .012" bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

1946-54 MODELS (EXC. V8)

CRANKSHAFT OIL SEALS: Car manufacturer recommends that new oil seals be installed when chain cover or rear main bearing cap removed.

Front Oil Seal (6 Cyl.)—Oil seal located in timing chain cover. Consists of spring backed composition seal in a stamped steel housing pressed in chain case cover with composition gasket installed between seal and cover. To install proceed as follows: Insert new composition gasket in chain case cover, drive new seal in place with drift or similar tool slightly larger than seal (seal is press fit in cover). Center seal on crankshaft when installing chain case cover as follows: Install chain case cover on engine with cover screws tightened just enough to hold cover in place, install Centering Tool C-522 on end of crankshaft and hold it in place by tightening crankshaft starting jaw finger tight, tighten chain case cover screws and as cover is being compressed, tighten crankshaft starting jaw nut so as to maintain slight tension between centering tool and seal. Remove tool after chain case cover screws secured. Tighten starter jaw to 108 ft.lbs. torque.

Rear Oil Seal (1-Piece Type—6 Cyl.)—Seal is one-piece type with lip on forward edge engaging shoulder in crankcase and bearing cap to rear of crankcase oil slinger. This seal is split at top. To install new seal, remove oil pan, and back off all main bearing cap screws three turns. Remove rear main bearing cap, and pull out old seal with pliers. Coat one end of new seal with tire soap or cup grease (avoid getting any grease between seal ends). Insert one end of seal over shoulder in crankcase, work up until end approximately at top, then work other end in same manner on other side until ends come together at top. Coat lower lip of seal so that bearing cap will seat on seal easily. Check rear bearing cap for holes (either sand holes or tapped holes). If holes extend through oil slinger groove shoulder, weld up the sand holes, or plug the tapped holes by installing screws that have been coated with sealing compound. Re-install main bearing caps.

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Rear Oil Seal (2-Piece Type—6 Cyl.)—Located at rear main bearing. Consists of oil seal packing assembled on rear face of bearing cap and crankcase (upper half held by retainer assembled on rear face of crankcase, lower half by retainer assembled on rear face of bearing cap). Gaskets used on top face of bearing cap at each side, around oil slinger grooves and along shoulder across cap. Install new packing in retainer on crankcase and cap, place new gaskets on cap and install on engine without disturbing position of gaskets.

NOTE—Some models equipped with additional two-piece oil gasket. This gasket assembled between seal retainer and crankcase (upper half), between retainer and bearing cap (lower half).

1952-55 V8 MODELS

CRANKSHAFT OIL SEALS: Front Seal—Remove old seal with tool C-3050. Place new seal on chain cover with projecting flange facing inside the cover. Insert seal gasket and drive into place with tool C-3051.

Rear Oil Seal—Rope type seal of braided asbestos. With bearing cap, bearing, and seal removed, install a new seal into position in cap so that both ends of seal protrude above cap. Tap seal into position with tool C-3131 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, the long seal *will be on the oil filter side of engine.*

ENGINE FRONT COVER

V8 MODELS

ENGINE FRONT COVER (Double Rocker Shaft Engines): Proceed as follows:

Removal: Remove water pump. Remove vibration dampener retainer bolt and washer. Remove two of the vibration dampener pulley bolts and install puller Tool C-3033. Remove crankshaft pulley and vibration dampener as an assembly. Remove felt dust seal and vibration dampener hub key from crankshaft slot. Remove left cylinder bank exhaust pipe. Disconnect fuel lines at fuel pump. Remove fuel pump. Remove oil level indicator. Remove starter using Tool C-455. Drain engine oil and remove oil pan. Remove cover bolts and lockwashers. Drive chain case cover off the two dowel pins, using soft hammer.

Installation: Be sure mating surfaces of cylinder block and cover are clean. Apply moderate coat of sealing compound to block and cover faces, install new gasket. Make sure crankcase oil slinger is in proper position (flange end pointing toward seal). Position cover on two dowel pins and then gently tap cover in place. Install cover bolts and lockwashers and tighten to 30 ft. lbs. Install other items by reversing removal procedure.

FRONT OIL SEAL: Remove old seal by driving it out with Tool C-3050. Place new seal on the chain case cover with the projecting flange facing the inside of the cover. Insert seal gasket and drive new seal in place with Tool C-3051.

CAMSHAFT & BEARINGS

6 CYL. MODELS

CAMSHAFT REMOVAL: Remove Front End Assembly as a unit. Remove cylinder head, fuel pump, oil pump, valve tappet cover plates, crankshaft pulley, front motor support (with front of engine jacked up), timing chain cover, camshaft sprocket and timing chain. If valves and valve springs are not to be removed, prop valves up by inserting wooden wedges at opposite sides under valve head. Raise tappets and hold in this position (use spring type clothes pins or similar tool to hold tappets up). Withdraw camshaft (rotate shaft to clear any obstructions).

V8 MODELS

CAMSHAFT REMOVAL: Remove valve tappet cover, cylinder head cover and rocker arm assemblies and push-rods. Remove valve tappet assemblies, remove distributor. Remove timing chain case cover, timing chain and camshaft sprocket. Camshaft sprocket and timing chain can be removed by taking off the camshaft hub nut, fuel pump eccentric and dowel assembly. Chain and sprocket can then be removed. Remove four camshaft thrust plate screws, distributor and oil pump drive gear. Pull out the camshaft being careful not to damage camshaft bearings.

ALL MODELS

CAMSHAFT BEARINGS: Camshaft bearings are precision type and are a proper fit when installed. Bearings must be held in proper alignment when being pressed into block, otherwise they will be distorted resulting in a poor fit. Too much clearance in camshaft bearings will result in noise and excessive loss of oil pressure.

TIMING CHAIN

6 CYL. MODELS

TIMING CHAIN REMOVAL: Remove water pump, hoses, radiator core, belt and front crankshaft pulley. Support engine from underneath and remove front engine support. Remove chain cover. Remove 4 cap screws holding camshaft sprocket to camshaft, and pull off sprocket. Chain can now be removed. Cap screw holes in sprocket are offset and gear can be installed in one position only on camshaft.

V8 MODELS

TIMING CHAIN REMOVAL: Remove radiator (see Radiator Removal), remove fan and both belts, and water pump pulley. Remove the four water pump attaching capscrews and remove water pump. Remove bolts holding chain cover to cylinder block. Attach Puller C-3072 by hooking it under chain case cover and then installing two of the water pump mounting bolts. Pull cover off locating dowels by tightening up on puller bolt.

VALVE SYSTEM

1946-55 MODELS

EXHAUST VALVE SEAT INSERTS (Refacing): Exhaust valve seat inserts must be reground with special high speed regrinding tool MTH-JB-41, using the correct size valve guide pilot. Check concentricity of valve seat using a dial indicator. Total runout should not exceed .002". Check valve seat with prussian blue to get seat centralized on valve face. Use a 20° stone at the top or a 60° stone at the bottom, whichever is necessary to centralize the valve seat. Width of valve seats should be 3/64" to 1/16".

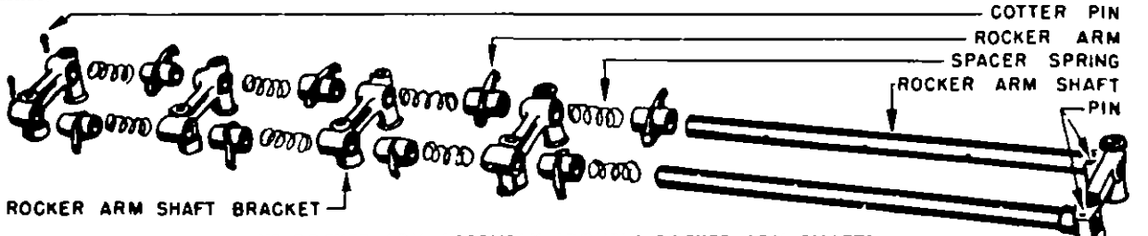
Replacement Inserts—Furnished .010" Oversize. Use special tool C-732 (Exc. V8); C-3140 (V8) to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be .002-.004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with tool MH-H-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly *and install a chilled insert with valve side up, and* drive it into place with installing tool C-767.

ROCKER ARMS

V8 MODELS

ROCKER ARM ASSEMBLY: Removal—Remove rocker arm covers. Place cotter pins in holes of first and last rocker arm brackets (if not already there) to prevent springs on rocker from pushing assembly apart when cylinder bolts removed. Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block. Grasp support bracket at each end of head, pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respec-

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V8 ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

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tive slots in holder C-3068. ***CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.***

Installation: Insert cylinder head bolts in brackets, with **short** bolts in intake side. Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes). Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms. Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above. ***When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.*** Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly.

HYDRAULIC VALVE LIFTER

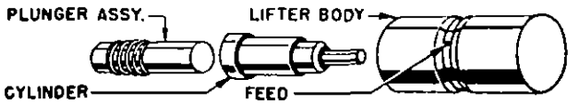
1952-53 V8 MODELS

HYDRAULIC VALVE LIFTERS (Two Piece Type): Consists of three separate units: tappet body, cylinder, and plunger. Oil is introduced from pressure system to lower part of tappet body, then through a ball check valve to cylinder below plunger. When lifter is raised by engine cam, the ball check valve closes, preventing escape of oil, and the cam action is transmitted to engine valve.

►*1952-53 VALVE LIFTER REPLACEMENT CAUTION: Valve lifters must be replaced with the same type lifter used originally ("Two-Piece" or "Integral Type"). Different length pushrods are required for each type lifter.*

Removal: To remove complete valve lifter assembly, remove cylinder head cover, rocker arm assembly, push rods and valve chamber cover. On early production engines the above procedure must also be followed to remove valve lifter plunger assembly from valve lifter body. On later engines the valve push rod hole has been enlarged, making it only necessary to remove the cylinder head cover, and then proceed as follows: Install valve spring compressing tool C-3024 over the rocker arm so heel of tool is resting on valve side. Make certain valve is seated on low part of cam lobe. (See following for camshaft position). Using a handle of tool for leverage, compress valve spring sufficiently to raise rocker arm above push rod. While holding in this position, slide rocker arm to one side. Remove push rod and insert tool C-3039 (standard spring jawed type holding tool) into push rod hole, positioning it over valve lifter plunger assembly. Pull the assembly from body, being careful not to pull body from lifter bore.

Disassembly: (Plunger and cylinder assembly removed from lifter body). ***NOTE—Disassemble one lifter at a time to avoid possibility of mixing the parts.*** Unlock plunger spring by twisting spring in a clockwise direction. Pull plunger and spring out of cylinder. It may be necessary to insert a thin wire through oil hole under ball check to raise ball and drain oil from cylinder. Wash all parts in clean solvent and dry with a clean dry cloth or blow dry with air. If plunger or cylinder unit scored, replace as a unit (old lifter body may be used providing clearance in block or guide bracket is not excessive). If there is evidence of scoring or foreign matter in oil, remove oil pan and thoroughly clean pan and inside of engine.



DE SOTO V8 TWO-PIECE VALVE LIFTER

Testing: Be sure there is no lubricating oil on lifter assembly and that it is completely dry. With cylinder held upright in one hand, start plunger into cylinder with the other. Depress plunger with the finger and release it quickly. The plunger should yield slightly to finger pressure. If no "kick-back" occurs, ball seat may be held open by dirt. Place finger over oil inlet and recheck. If "kick-back" occurs with oil inlet closed, clean plunger unit and retest. If there is still no "kick-back," it must be assumed that the ball check is scored or worn. Replace complete unit. If there is no "kick-back" when finger is held over oil inlet hole it is an indication that excessive wear exists between plunger and cylinder. Replace complete unit.

To Check Valve Tightness—Immerse lifter assembly in clean kerosene and pump plunger to fill cylinder, then note rate at which this leaks by ball check when unit is held in vertical position. Maximum allowable leakage is one drop per second. ***NOTE***—Car manufacturer provides tools for testing hydraulic valve lifters and these should be used whenever available.

Reassembly: ***(NOTE—Lifter will prime itself and air will be bled out more quickly if lifter is completely dry when installed).*** Insert plunger in cylinder, invert assembly so that ball check is off seat, or insert a small wire into oil inlet and raise ball check to allow plunger to move freely in cylinder. Lock plunger spring into cylinder by twisting spring clockwise direction. Insert lifter into tappet body.

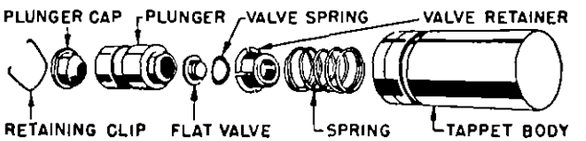
1952-55 V8 MODELS

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type) Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body.. Oil is introduced to this unit through hole in side of lifter plunger.

►*1952-53 VALVE LIFTER REPLACEMENT CAUTION: Valve lifters must be replaced with the same type lifter used originally ("Two-Piece" or "Integral Type"). Different length pushrods are required for each type lifter.*

Removal: Drain cooling system to a point below level of intake manifold, and remove intake manifold. (CAUTION—cover intake port in cylinder head to avoid the entry of dirt). Remove crankcase ventilator pipe and valve chamber cover. Install rocker arm and valve compressor tool C-3024 over rocker arm so heel of tool rests on the valve stem side. Make certain that valve is seated and that valve lifter is on low side of camshaft lobe. (See "Low Point of Camshaft Lobe," following). Using handle of tool C-3024 for leverage, compress valve spring sufficiently to raise rocker arm above push rod end. While holding rocker arm in this position, slide rocker arm to one side along tube and remove push rod. Insert hooked portion of tool C-3158 into hole in lifter body (this portion of tool can be used to remove lifter without varnish build-up on lower end of lifter). Remove lifter from bore. If lifter sticks in bore, proceed as follows: Slide puller portion of tool C-3158 through cylinder head push rod holes and seat firmly in cap in lifter. Insert puller pin through lifter body and tool shaft in holes provided. Grasp tool handle and pull lifter out of bore with a twisting motion. As lifter clears bore, withdraw puller pin and remove puller. Remove lifter from chamber.

Disassembly: ***(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)*** Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body. Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting. Check to see that valve exerts a slight pressure on valve spring to insure valve seating. Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.



DE SOTO V8 ONE-PIECE VALVE LIFTER

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene. ***(CAUTION***—Container and kerosene must be absolutely clean). Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing. This will prevent possible scoring of lifter plunger when engine is first started.

Reassembly: Reverse disassembly procedure as noted above.

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1952-55 V8 MODELS

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos. 1 and 6 cylinders. Set timing mark "DC" located on crankshaft pulley to pointer. With rotor at No. 1 firing position, the following lifters will be on the low side of the cam lobe: No. 2 intake and exhaust, No. 4 exhaust, No. 7 intake, No. 8 intake and exhaust *(NOTE*—To remove No. 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed). With rotor at No. 6 position, following lifters will be on low side of cam lobe: No. 3 intake and exhaust, No. 4 intake, No. 5 intake and exhaust, No. 7 exhaust *(NOTE*—To remove No. 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed).

OILING SYSTEM

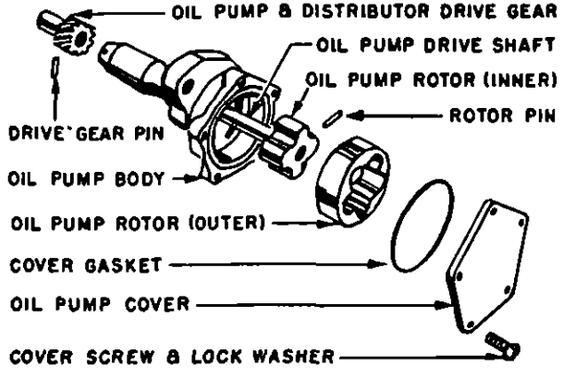
OIL PUMP

6 CYL. MODELS

ROTOR TYPE OIL PUMP: Removal—Take off distributor cap, turn engine over until No. 1 cylinder is at firing position (allow engine to remain in this position while pump is off engine). Remove two oil pump Allen type screws. Take pump off engine.

Pump Servicing—Disassemble pump by taking off cover and drive gear (drive out pin and press gear off shaft). Thoroughly clean parts and dry with compressed air. Check pump parts as follows: 1)—With rotors in pump body, turn shaft so that one lobe on inner rotor pushed into notch in outer rotor, check clearance between opposite lobe of inner rotor and inner face of outer rotor. If clearance greater than .010" replace both rotors. 2)—Height (or thickness) of both rotors should be at least .748". Diameter of outer rotor should be at least 2.245". Replace if measurements are less. 3)—With rotors in pump body, turn body up, place straightedge across face of body between screw holes. Clearance between straightedge and rotors should be .004" maximum. If greater replace pump body. 4)—With outer rotor pressed to one side of body, clearance at opposite side should be .008" maximum. If greater, replace pump body. 5)—Check cover by placing straightedge across inner face and .001" feeler can be inserted between cover and straightedge, or if face is scratched or marred, replace cover.

Pump Assembly—If new rotor installed on shaft, it must be installed with rotor square to shaft and pressed on until flush with end of shaft. Pin rotor to shaft after drilling 5/32" pin hole. Drive gear should be pressed on shaft to give .003-.010" clearance between underside of gear and pump body with rotor (on opposite end of shaft) seated in pump body. Install pin. If necessary, drill new 5/32" hole at right angles to old hole. With rotors in place, install new cover gasket on body and install cover.

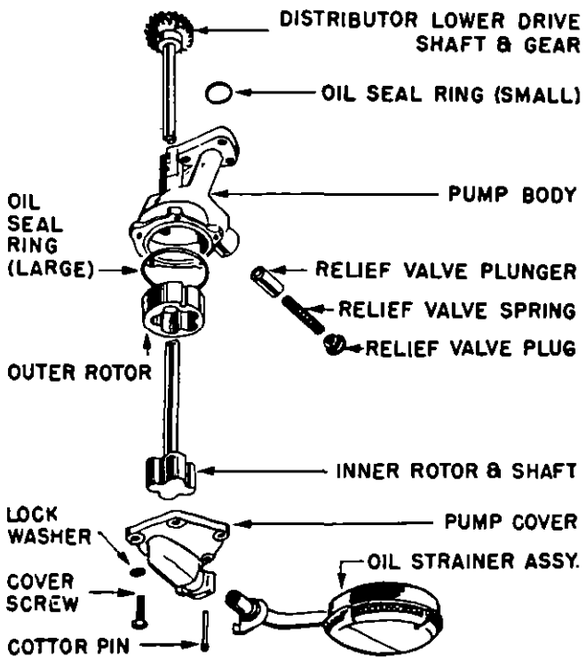


DE SOTO SIX OIL PUMP

Pump Installation—Oil pump must be installed on engine with No. 1 piston in firing position with rotor on distributor opposite No. 1 terminal in cap.

V8 MODELS

ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.



DE SOTO V8 OIL PUMP

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe. Remove cover bolts and cover. Discard oil seal ring. Remove pump rotor shaft and lift out pump outer rotor. Remove oil pressure relief valve *plug and lift out spring and plunger. Wash all parts* in a suitable solvent and inspect for damage or excessive wear. Check all pump parts as follows:

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers. If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors.

Inner Rotor—Measure thickness of inner rotor with micro-calipers. If thickness measures less than .998", replace both inner and outer rotors.

Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body. Use a feeler gauge and measure clearance between top of rotors and straightedge. If clearance in excess of .004", replace pump body.

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors. If clearance in excess of .010", replace both inner and outer rotors.

Reassembly: Use new oil seal ring between cover and body. Tighten cover bolts to 10-15 ft. lbs. Prime pump and then install new oil seal ring in pump mounting face.

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

COOLING SYSTEM

6 CYL. MODELS

WATER DISTRIBUTOR TUBE: Removable one-piece tube installed between cylinders and valve *ports, and which distributes water from pump to* exhaust valve ports through holes in tube.

Servicing—A new tube should be installed whenever engine overhauled or when tube rusted and corroded, in order to provide correct water circulation in engine block. To replace tube, proceed as follows: Remove front end assembly. Remove water pump which will expose front end of tube. Remove tube by using rod with hook formed on end and engage hook in slot in upper side of tube just inside block, pull tube out.

ALL MODELS

RADIATOR CORE REMOVAL: Raise hood, drain cooling system, disconnect hoses, free headlight wires from radiator shroud (if used), take out nuts and capscrews in support at each side, lift core out, tilting top toward rear. *NOTE*—Fan blades on some models must be removed if additional clearance required.

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IGNITION NOTES

V8 MODELS

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block.

Installation: Slide new bushing over burnishing end of Tool C-3053. Insert tool and bushing into bore of block. Drive bushing and tool down into position, using a soft hammer. As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. *DO NOT REAM THE BUSHING.*

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

CLUTCH NOTES

1946-48 MODELS

CLUTCH OVER-CENTER SPRING: Service only if linkage disturbed or bracket on frame bent. Original setting can be obtained by using Miller Gauge C-705 as follows: Check spring bracket on frame and straighten if necessary, install gauge over linkage pivot pins with lower end engaging coil spring bracket on frame (turn pedal rod turnbuckle until gauge fits properly). Then re-set pedal position and free travel as directed on car page.

1949-55 MODELS

CLUTCH OVER-CENTER SPRING: Use Miller Gauge C-853. Place gauge on pin at lower end of pedal and against spring hook. Raise or lower the vertical spring bracket until it just contacts gauge. Move pointer on gauge to setting for car model being worked. Adjust eyebolt until the inside edge is in line with the pointer where spring makes contact with eyebolt.

Adjusting Over-Center Spring Tension—Adjustment is made by turning the sleeve nut on the spring eyebolt. If pedal is soft and sluggish on return, back off the sleeve nut. If pedal requires excessive pressure to depress, tighten sleeve nut until desired action is obtained.

PROPELLER SHAFT

1946-54 MODELS

PROPELLER SHAFT CENTER BEARING: Used on all passenger car models with two propeller shafts. Consists of ball-bearing mounted on rear end of front propeller shaft with an oil seal assembled to front and to rear of bearing, and this assembly (bearing and oil seals) enclosed in a housing which is flange mounted on rear side of frame cross-member. An insulator is assembled on front end of housing. To remove assembly, remove nuts and lockwashers from differential and transmission companion flanges to free propeller shafts at front and rear, take out 4 center bearing housing-to-frame cross-member mounting bolts, remove propeller shaft and center bearing as an assembly.

REAR AXLE NOTES

1946-55 MODELS

REAR WHEEL BRAKE AXLE SHAFT SEAL: Leather seal mounted on brake support and bears on axle shaft (former design secured by brake support bolts and contacted hub).

Installation—With brake support removed and old seal driven out of support, new seal can be installed as follows: Soak new seal in thin oil for 30 minutes. Roll leather with smooth bar until pliable. Check seal bearing surface on axle shaft and make sure surface is smooth. Install seal on front side of support and stake to support at three points on outer edge. Install sleeve (Tool C-745) in seal (protects seal from damage while installing support.) Assemble brake support on housing. *CAUTION*—Lip of seal must not fold when installing in support.

BRAKE NOTES

1946-55 MODELS

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for .015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015-.020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut.

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed .005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1946 Detroit Numbers—S11S Deluxe 6,154,001 Up, Custom S11C 5,784,001 Up, S11 Taxicab 5,102,501 Up.

1947 Detroit Numbers—S11S Deluxe 6,172,863 Up, Custom S11C 5,825,875 Up, S11 Taxicab 5,105,414 Up.

1948 Detroit Numbers—S11S Deluxe 6,190,370 Up, Custom S11C 5,885,816 Up, S11 Taxicab 5,110,108 Up.

ENGINE NUMBER: Stamped on boss on left side of block between #1 and #2 cylinders.

TUNE-UP

COMPRESSION: Pressure—125-135 lbs. (100 lbs. min.) at cranking speed of 150 RPM. or 155-165 lbs. at 1000 RPM. (for Std. 6.6-1 Cast Iron Head).

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4

SPARK PLUGS: Auto-Lite Type A5. 14 mm. Metric. Gaps—.030" ± .002".

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.020" **Cam Angle**—38° (closed).

Breaker Arm Spring Tension—17-20 ozs.

Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.

Std. Setting—At Top Dead Center.

Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual (octane selector) adjustment as follows:

Manual (Octane Selector) Adjustment—Set for slight ping in 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Set idle adjusting screw for smooth idling with warm engine (Carter—¾-1¼ turns open), turn screw out for richer mixture. Idle speed 6 MPH. (450-475 Eng. RPM. with Hydraulic Trans.).

Float Level (Carter B&B)—Top of float (not seam) 5/64" (for EX1 carb. on cars with Std. Trans.), 1/16" (for EV1 carburetor on cars with Hydraulic Transmission), plus or minus 1/64" below top edge of bowl.

Float Level (Stromberg)—Fuel level ⅝" below top of bowl (even with bottom of inspection hole).

Accelerating Pump—Center Hole (med. stroke) Normal. Inner Hole—Summer, Outer Hole—Winter, for *extreme temperatures.*

Fuel Pump Pressure—3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up **approx. ¾ turn,** not over one turn or under ½ turn, hook end on stop stud.

VALVES: See Valve Timing.

Tappet Clearance—.008" Intake, .010" Exhaust, Hot. NOTE—Tappet adjusting screws are self-locking

IGNITION

IGNITION SWITCH: Briggs & Stratton or Mitchellock. NOTE—No armored cable used.
Briggs & Stratton—B & S Switch No. 85985.
Mitchellock Type 42-R—No. E-10182 (Yale & Towne lock), No. E-10663 (Hurd lock).
Lock Cylinder—Yale & Towne, Hurd, or Briggs & Stratton. B & S No. 85915 (Key Series CA1-CA800)

COIL: Auto-Lite No. IG-4806 or IG-4809. Mounted directly above distributor on ignition cable bracket.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-3927A.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IGS-4208-1. Full automatic advance type with auxiliary vacuum spark control and manual (octane selector) adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #6.
Breaker Gap—.020".
Cam Angle or Dwell—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

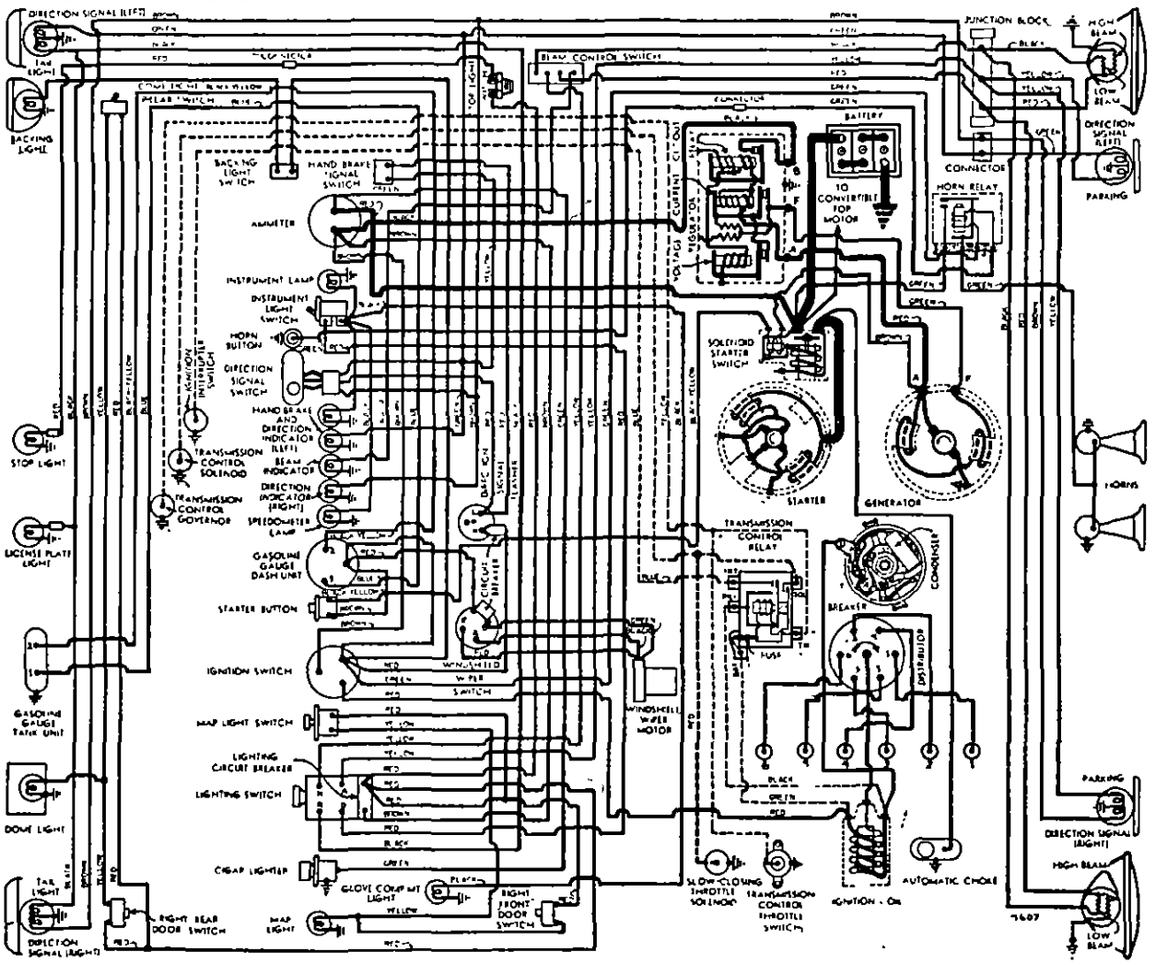
Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	350	0	700
3	400	6	800
6	770	12	1540
9	1150	18	2300
11	1400	22	2800

Vacuum Spark Control: Auto-Lite Unit. On distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring in unit).

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5½"
1°	2°	6½"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

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Distributor Removal:—Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position (at TDC) and rotor opposite #1 segment in cap.

IGNITION TIMING

S&S. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	0° at TDC	.000" TDC

NOTE—Impulse neutralizer marked 'DC' at TDC point with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following).

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor (as directed above).

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise to retard spark (if too severe).

CARBURETOR

CARTER (B&B)

Carter (B&B) EX1, 2, 3.....No Fluid Drive
Carter (B&B) EV1, 2.....Fluid Dr. & Tiptoe Shift
Carter (B&B) EL1.....Taxicab

1½" single barrel, downdraft type with Sisson automatic choke control. NOTE—EV1 has Slow-closing Throttle and Step-down Switch for Tiptoe Shift.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*

CARBURETOR

STROMBERG

Stromberg Model BXVD-3. Stromberg No. 380218. Code No. 3-82. 1½" single barrel, downdraft type.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Stromberg Jet Table in Carburetor Section for complete data.*

CARB. EQUIPMENT

Slow Closing Throttle (Fluid Drive Cars): Stromberg Adjustable Dashpot type or Carter (B&B) electromagnetic Dashpot type.
See Carburetion Equipment Section for complete data.
Setting (Carter B&B)—Not adjustable.
Setting (Stromberg)—With all slack removed from linkage, set adjusting screw on dash pot lever under float bowl so that piston travel is 5/16-11/32" (measured on dash pot rod on bowl cover). Turn screw out to lengthen stroke, in to shorten.

Automatic Choke:—Sisson Type AC-758B.
See Carburetion Equipment Section for complete data.
Setting—With throttle ⅓ open, adjust by inserting gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is closed tightly.

Air Cleaner: AC No. 1542284 Heavy-duty oil-bath type. Filter Element AC No. 1544091.
Servicing—Clean filter element in kerosene, clean out oil reservoir and fill to indicated level with SAE No. 50 oil (20W oil below 32°F., approx. 1 pint required). Service cleaner whenever sump is half filled with oil and dust sludge. NOTE—Crankcase ventilator air cleaner in oil filler cap should be cleaned in kerosene and re-oiled by dipping in SAE No. 50 engine oil at 1000 mile intervals.

Fuel Pump: AC No. 1539042 or Carter Type M594S or M639S. Diaphragm type fuel pumps.
Replacement Pump—AC No. 577 (for 1539042).
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: New Oillite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric. No. NG-10891D (dash unit), No. NG-10862T (tank unit).
See Carburetion Equipment Section for complete data.

BATTERY

Willard Type SW-2-110. 6 Volt, 17 Plate, 110 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) to engine.
Dimensions—Lgth. 10 3/16", W. 6 15/16", H. 9 5/16".
Location—Under hood in left fender shield.

STARTER

Auto-Lite Model MAW-4025. Armature MAW-2030.
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 175 amperes, 5.4 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
5.45 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
11.5 "	Lock	3.	505
18. "	Lock	4.	670

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).
Starting Switch: Auto-Lite Solenoid Type SS-4705 with pushbutton on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

STANDARD

Auto-Lite Model GDZ-4801A. Armature GDZ-2006F. Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—As given in table below reached at approx. 25 MPH. car speed and above with load or discharged battery (Current Regulator setting). Actual charging rate controlled by Voltage Regulator and dependent on battery condition.

Performance Data—GDZ-4801A

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.58	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current regulator setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Disconnect wires, take out adjusting strap bolt and mounting bracket bolts.
Belt Adjustment: Loosen adjusting strap bolt, pull generator out until belt just snug, tighten bolt.

GENERATOR

SPECIAL EQUIPMENT

Auto-Lite GEG-4823A or GEG-4823B. Armature No. GEG-2006F (both). Two brush (shunt) type with voltage and current regulation. Ventilated.
SEE CHRYSLER 8 C39 PAGE FOR ALL DATA.

REGULATOR

Std.—VRP-4401A, VRP-4501A, or VRP-4503A (VRP-4001A used on Canadian Cars).

Spec. Equip. (for GEG-4823A, B Gen.)—VRP-4001F or VRP-4401B. VRP-4005E used for negative ground. Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" Min. **Air Gap**—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70° F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting (VRP-4001A, 4401A)—34-36 amperes ("35").
Setting (VRP-4001F, 4005E, 4401B)—39-41 amperes, marked "40".
Setting (VRP-4501A, 4503A)—35 amperes (42 amperes at 70°F. after 15 minutes run, 33-37 amperes at 70° after additional 15 minutes run). CAUTION—These current regulators are temperature-compensated and setting decreases with temperature rise in service as above.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. *See Electrical Equipment Section for complete data.*
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—Red light on upper edge of panel above speedometer. Lighted with upper beams on.

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicators—In upper corners of speedometer face. Left for left turn, Right for right
Direction Signal Flasher—De Soto No. 1161586.

Switches

Lighting—De Soto No. 1149863.
Instrument—De Soto 976098 (early), 1154278 (late).
Beam Selector—DeSoto No. 859974.
Map Light—DeSoto No. 1149306.
Stop Light—DeSoto No. 920355.
Dome Lamp Pillar—DeSoto No. 317180.
Door Switches—DeSoto No. 882943.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	45-35 watts	Sealed Beam
Park & Tail (no Dir. Signal)	3	63
Front Dir. Sig. & Parking	21-3	1158
Rear Dir. Sig. & Tail	21-3	1158
Stop Light	21	1129
Rear License	3	63
Indicators, Ign. Sw., Glove	1	51
Instrument, Map Light	3	63
Dome①	15	87

①—Convertible (Quarter Lights) 6 cp. No. 81, 7 Pass. & Limo. (Pillar Lights) 3 cp. No. 63.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—On back of lighting switch. Vibrating type, protects lighting circuits.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects direction signal
Windshield Wiper—Vibrating, thermostatic type. Starts to operate with current of 12 amperes.

FUSES: Transmission Solenoid (Hydraulic Trans.)—30 ampere. Under transmission relay on left fender.
Clock—2 ampere. In clock lead wire.

Horns: Auto-Lite Model HT-4007 (Low Pitch), HT-4008 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite Model HRL-4101. Connected through ignition switch, operates only when "on".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" head.
Bore—3 7/16". **Stroke**—4¼".
Displacement—236.6 cu. ins. **Rated H.P.**—28.36.
Developed Horsepower—109 at 3600 RPM.
Compression Ratio—6.6-1 std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See De Soto Special Data.*

ENGINE REMOVAL: *See De Soto Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See De Soto Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type.
NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See De Soto Special Data.*
Length—3⅞". **Weight**—18.5 ozs. (stripped).
Clearance—.0008" on thrust face ¾" from bottom of skirt.
Removal—Pistons and rods removed from above.

Fitting New Pistons:—Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (inverted, pin removed) on side opposite slot. Feeler pull 5-7 lbs. (with piston and block at 70° F.).

Replacement Pistons: *See De Soto Special Data.*
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .005" require reboring and honing to limits listed above.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston ,all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	.5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down.

Replacement Piston Rings: *See De Soto Special Data.*

PISTON PIN: Diameter 55/64". Length 2⅞". Floating type. Pin hole in rod bronze bushed.
Pin Fit in Piston—Thumb push fit (piston at 160°).
Pin Fit in Rod Bushing—Thumb push fit at 70° F.

Replacement Pins: Std., .0006", .003", .008" oversize.

CONNECTING ROD: Length 8". Weight 34.1 ozs. with bolts less bearings.
Crankpin Journal Diameter—2.124-2.125". *See "Original Bearing Sizes" in De Soto Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel.
Clearance—.0005-.0015". **Sideplay**—.005-.012".

Bearing Adjustment:— None (no shims). Replace bearings. *See "Connecting Rod & Bearings" in De Soto Special Data.*

Replacement Bearings: *See "Connecting Rods & Bearings" in De Soto Special Data.*

Installing Rods:—Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearing, 7 integral counterweights with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in De Soto Special Data.*
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in De Soto Special Data.*

Replacement Bearings: *See "Crankshaft and Main Bearings" in De Soto Special Data.*

End Thrust:—Taken by flange faces on rear (#4) main bearing. **End Play**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in De Soto Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1¼".
Bearing Type—Removable, steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

End Thrust:—Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in De Soto Special Data.*

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Chain Removal & Installation—*See "Timing Chain" in De Soto Special Data.*

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 23/32"	.3405-.3415"	4 25/32"
Exhaust	1 17/32"	.3385-.3395"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.003-.005"

Exhaust Valve Seat Insert Servicing—*See "Valve System" in De Soto Special Data.*

Valve Guides:—Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (tool CM-83), finish ream to .3425-.3435".

Valve Springs:—Install with closely coiled end to top.

Free length 2".	Spring Pressure	Length
Valve Closed	40- 45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters:—Mushroom type (remove from below). Stem diam. ⅜". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030" & .060".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance:—.008" Intake, .010" Exh. (hot and idling), .002" additional exh. clearance desirable for sustained high speeds. NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.
Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance #6 intake valve should open with #6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to .008" Hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. New "Rotor" type oil pump mounted externally on right side of crankcase.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—45-55 lbs. above 30 MPH.
Oil Pressure Relief Valve Under plug below starter. Opens at 40-45 lbs. Spring painted red, green, or unmarked. If spring replaced, use same color spring.

Oil Pump: New "Rotor" type on right side of engine. Servicing—*See "Oil Pump" in De Soto Special Data.*

Oil Filter: On left side of engine above starter.

Oil Pressure Gauge: Auto-Lite No. G-10888 (not elec.)

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COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump. Capacity—17 quarts.

Radiator Core Removal: *See "Radiator" in De Soto Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in De Soto Special Data.*

Water Pump: Packless type with grease fitting. *See Water Pump Section for complete data.*
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite No. H-10890 (not elec.).

CLUTCH

Borg & Beck Model 10A7 (Std.), 9A7 (with Fluid Drive), 11A6 (Taxi). Single plate, dry disc type with "Borglite" driven member.
NOTE—Cover assembly marked 952 (9A7), 957 (10A7), 931 (11A6).
See Clutch Section for complete data.
Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) & have 1" free travel (adjusting nut on connector link at fork).
Clutch Over-Center Spring—*See "Clutch Notes" in De Soto Special Data.*

Removal:—Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

DeSoto—Fluid coupling at rear of engine. Optl.
See Transmission Section for complete data.

Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*

Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.

Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION

STANDARD

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
▷*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*

Transmission Control: Manual steering col. shift.
See Transmission Section for complete data.

Removal:—Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see De Soto Special Data for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods, vacuum and air hose (if Power Shift used). Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car.
NOTE—Use pilot studs when installing assembly.

TRANSMISSION

OPTIONAL EQUIPMENT

Tip-Toe Shift Type (with Fluid Drive). New design semi-automatic, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.

Transmission Control: See Transmission article for adjustment instructions.
See Transmission Section for complete data.

▷**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Kickdown Solenoid—Auto-Lite No. SSS-4002.
Kickdown Relay—Auto-Lite No. HRM-4102.
Governor—Auto-Lite No. TG-4202R, 3R, or 4R.
Kick-down Switch—Part of carburetor assembly. *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Fuse—30 ampere. On Kickdown Relay.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, replace drain plug. Disconnect transmission mounting bolts and lower assembly out of car.
INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 7200. Cross type with roller bearings.

Propeller Shaft Center Bearing: Used on 7 passenger
See "Propeller Shaft" in De Soto Special Data.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Axle Ratios	Std. Trans.	Tip-Toe Trans.
All exc. Sub. & 7 Pass.	3.9-1①	3.73-1②
Pass. Cars	4.3-1③	3.91-1
Sub. Sedan	4.3-1③	4.1-1④

①—Special Ratios 3.54-1, 3.73-1, 3.91-1, 4.1-1, 4.3-1, 4.56-1 & 4.78-1 (Export).
②—Special Ratios 3.54-1 and 3.9-1.
③—Special Ratios 4.1-1, 4.89-1 (Export).
④—3.91-1 on cars before Serial No. 5824769 except Serial Nos. 5821234 to 5821693.
Backlash—.006-.010". Screw adjustment.

Removal:—Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Outer Seal: New leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle" in DeSoto Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Delco—Model 1030-C (Front), 1030-T (Rear).
Monroe—Model K-11148 (Front), K-11149 (Rear).
Export—Delco Model 942D (front), 940W (rear). Direct acting, hydraulic types.

FRONT SUSPENSION

Front Suspension:—Independent linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6°.
Camber—Positive ¼°. Limits 0° to Pos. ¾°.
Caster—Negative 1° to Positive 1°. Not adjustable.
Toe In—0-1/16". Turn both tie rods equally.
Steering Geometry—Inner wheel 22½°, Outer 20°.

STEERING GEAR

Own Make. (Gemmer design) Model 305 (All except 7 Pass. & Suburban Sedan), Model 335 (7 Pass. & Suburban Sedan).
NOTE—See Gemmer 305 & 335 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: DeSoto "Safe-guard" Lockheed Hydraulic
See Brake Section for complete data.
▷*BRAKE SQUEAK OR SQUEAL CORRECTION: See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*
Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).
Drums—Cast-iron. Diameter 11" (12" on 7 pass.).
Lining—Molded Asbestos. 2" Wide. 13/64" thick. Length per shoe: 11" type—8⅞" (rear wheel rear shoe), 11½" (all others). 12" type—9⅝" (rear wheel rear shoe), 12 9/16" (all others).
Clearance—.006" at each end of all shoes.
Braking Power—60% front wheels, 40% rear.

Hand Brake:—On drum at rear of transmission.
Adjustment—*See "Hand Brake Notes" in De Soto Special Data.*
Drum—Cast-iron. 6" (7" Tip-Toe Shift & 7 Pass.).
Lining—Width 2" (2½" on 7" type). Thickness 5/32". Length 16 11/16" (20" on 7" type).
Clearance—.015-.020" around band.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWH-5001, EWH-5003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.
See Miscellaneous Section for complete data.
Circuit Breaker—Vibrating, thermostatic type. Starts to operate with current of 12 amperes.

CONVERTIBLE TOP CONTROL: Electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1949 Numbers	Detroit	Los Angeles
Custom	50,000,001 Up	62,004,001 Up
Deluxe	6,212,001 Up	60,002,001 Up

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 1 and 2 cylinders.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035". Limits plus or minus .001". **Plugs**—Auto-Lite Resistor Type AR5. 14 mm.

DISTRIBUTOR: Breaker Gap—.020".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC).
This setting supersedes previous data.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual (octane selector) adjustment.
Manual (Octane Selector) Adjustment—Set for slight ping with 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION:
Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ½-1½ turns open), turn screw out for richer mixture.
Idle Speed—6 MPH. (450-475 Eng. RPM. with Tip-toe Shift Trans.).
Float Level—Top of float (not soldered seam) 5/64", plus or minus 1/64", below top edge of bowl.
Accelerating Pump—Center Hole (med. stroke) Normal, Inner Hole—Summer, Outer Hole—Winter, for extreme temperatures.

Choke Setting: Adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up **approx. ¾ turn,** not over one turn or under ½ turn, hook end on stop stud.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust, Hot.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable through fire wall.

COIL: Auto-Lite No. CR-4001 (U.S.), IG-4809 (Early & Canada). Mounted directly above distributor on ignition cable bracket.

Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IG-3927G.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAP-4102C-1 (U.S.), IAP-4102A-1 (Canada). Automatic advance type with vacuum Spark Control.

►***DISTRIBUTOR CAP POPPING OFF CORRECTION*** *(Early IAP Distributors)—See "IAP" Distributors in Electrical Equipment Section.*

Breaker Plate Identification—Maximum vacuum advance limited by a slot in plate. Plate marked #6 (IAP-4102A-1), #9 (IAP-4102C-1).
Breaker Gap—.020".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

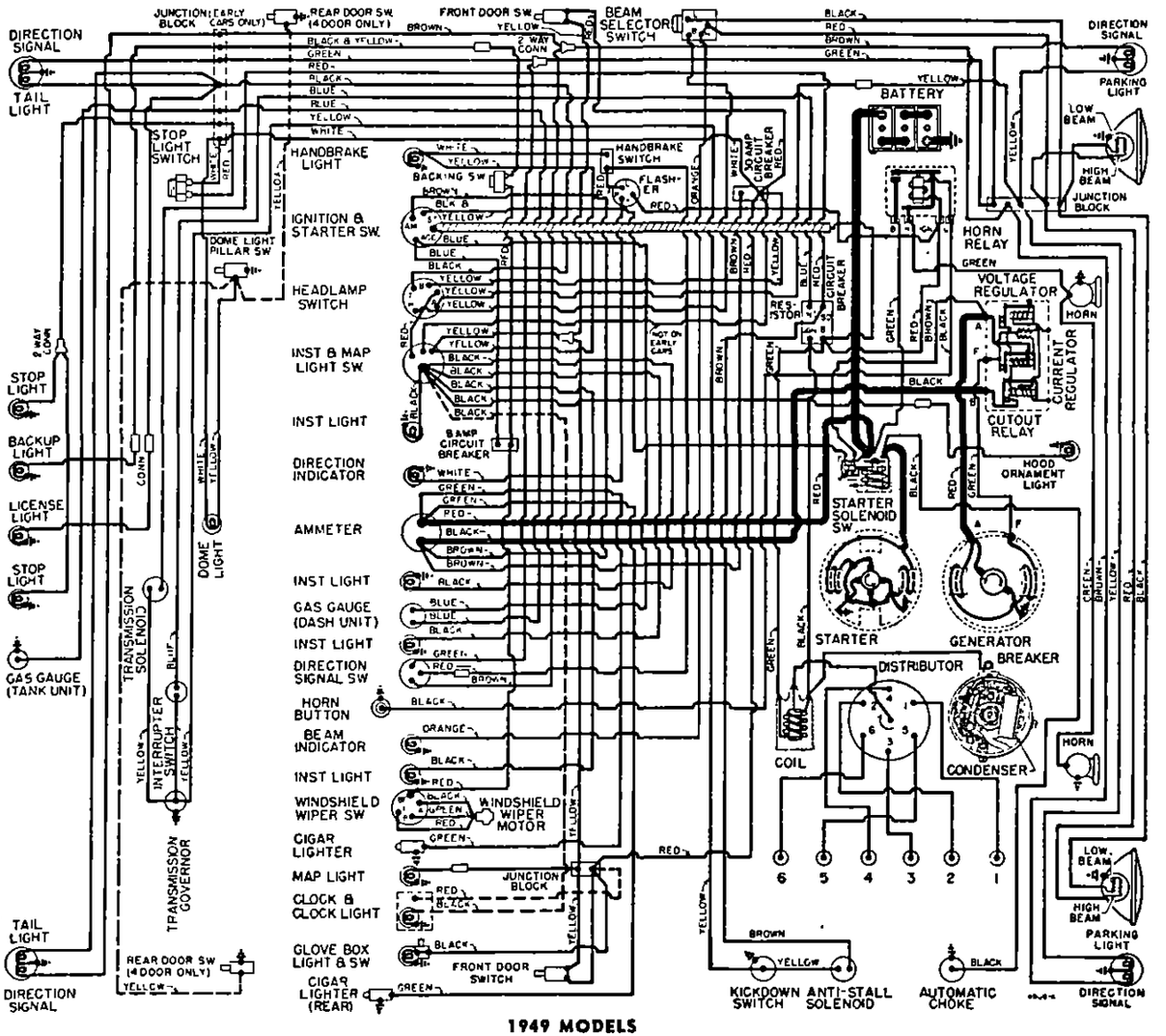
Automatic Advance—IAP-4102A-1

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
3	400	6	800
6	770	12	1540
9	1150	18	2300
11	1400	22	2800

Automatic Advance—IAP-4102C-1

Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

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1949 MODELS

CONTINUED FROM PRECEDING PAGE

Vacuum Spark Control: Auto-Lite Unit. Integral type (on distributor, linked directly to breaker plate).

Vacuum Advance—IAP-4102C-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7¼"
4°	8°	9¾"
6°	12°	11⅝"
9°	18°	15"

Vacuum Advance—IAP-4102A-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅛"
1°	2°	6⅝"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees—Piston Position
All Engines	At TDC.....000" TDC.

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt.

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor as directed above.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping noted), clockwise to retard spark (if ping too severe), tighten screw.

CARBURETOR

Carter (B&B) E7V1, W1 (City Traffic)..No Fluid Dr.
Carter (B&B) E7L1, L2, L3, L4.....Hydr. Trans.
Carter (B&B) EX3①.....Synchro-mesh
①—Not equipped with Slow-closing throttle and Step-down switch.

1½" Single barrel, downdraft type with Sisson automatic choke control, Slow-closing Throttle and Step-down Switch for hydraulically operated transmission.

See Carburetor Section for complete data.

▷***E7L1, L2, L3 Note—To bring these carburetors up to latest E7L4 carburetor, see Carter (B&B) Carburetors in Carburetor Section.***

▷***E7V1, W1 HAVE THROTTLE RESTRICTOR: See Carburetor Section for complete data.***

Settings (Idle① Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Jet—***See Carter (B&B) Jet Table in Carburetor Section for complete data.***

Slow-closing Throttle: Solenoid type. Non-adjustable. ***See Carburetion Equipment Section for complete data.***

Fast Idle: Throttle stopscrew stop dog linked to choke valve so that stop dog rotated and throttle opened to fast idle position when choke valve closed for starting. No adjustment required.

Automatic Choke: Sisson type.
See Carburetion Equipment Section for complete data.
Setting—With throttle 1/3 open, adjust by inserting gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is closed tightly.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544349 Heavy Duty Oil-bath type. Filter Element AC No. 21.
Servicing—Clean filter element in kerosene, clean out oil reservoir and fill to indicated level with SAE No. 50 oil (20W oil below 32°F., approx. 1 pint required). Service cleaner whenever sump is half filled with oil and dust sludge. NOTE—Crankcase ventilator air cleaner in oil filler cap should be cleaned in kerosene and re-oiled by dipping in SAE No. 50 engine oil at 1000 mile intervals.

Fuel Pump: AC No. 1539042 or Carter M639SL, M639SZ. Diaphragm type fuel pump.
Replacement Pump—AC No. 577 or 588.
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaner. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. 11607A.
Tank Unit—Auto-Lite No. 11538A.
See Carburetion Equipment Section for complete data.

BATTERY

Willard or Auto-Lite. 6 Volt, 17 Plate, 114 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

Auto-Lite Models MCH-6102 (U.S.), MAW-4055 (Canada after Eng. Nos. S13-1543C).
Armature—Auto-Lite Nos. MCH-2039 (MCH-6102), MAW-2213 (MAW-4055).
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
8.50 "	400	4.0	400
6.0 "	Lock	2.0	335

Starting Switch: Auto-Lite Solenoid Type SS-4707 controlled by turning ignition switch past "on" position.
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite. Two-brush with voltage-current regulation.

	Auto-Lite No.	Armature No.
Std. (Early)	GDZ-4801A	GDZ-2006F
Std. (Later)	GGW-6001B	GGW-2006F
Auto. Trans. (Early)	GDZ-4801R	GDZ-2006F
Auto. Trans. (Later)	GGW-6001A	GGW-2006F
State Police	GGJ-6001B	GGJ-2101F
	GGU-6001E	GGU-2006F
City Police & Taxi	GGJ-6001A	GGJ-2101F
	GGU-6001A	GGU-2006F

Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001A, B)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350

Performance Data (GDZ-4801A, R)

0	6.4	870-970 — 950-1050
35	8.0	1800-2000 — 2150-2350

Performance Data (GGJ-6001A, B)

0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750

Performance Data (GGU-6001A, E)

0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GDZ, GGU) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes).
Field Current—(GGW, GDZ) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes, (GGU) 1.7-1.8 amperes, all at 6.0 volts.
Motoring Current—(GGW) 4.6-5.2 amps., (GDZ) 4.2-4.6 amps., (GGJ) 4.3-4.8 amps., (GGU) 5.5-6.5 amps., all at 6.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs. tension accrued on scale attached to field frame) or ¼" belt deflection between generator and pump.

REGULATOR

Auto-Lite. Voltage-current type.

Auto-Lite Regulator No.	For Gen. No.
VRP-4503A	GDZ-4801A, R
VRP-4503B	GGW-6001A, B
VAV-4404A, VAV-4405A①	GGJ-6001A, B
VBA-4101A, VBA-4104A①	GGJ-6001A, B
VAV-4404B, VAV-4405B①	GGU-6001A, E
VBA-4101B, VBA-4104B①	GGU-6001A, E

①—For Negative Ground.

See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—(VRP & VBA) 6.3-6.8 volts, (VAV) 6.4-6.9 volts. Set all models to 6.4-6.6 volts.
Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—(VRP & VAV) 7.2-7.5 volts, (VBA) 7.0-7.2 volts at 70°F. while charging at 10 amperes (VRP & VBA), ½ maximum rate (VAV).
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section.***
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

►*CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VRP-4503A	42	33-37
VRP-4503B	46	38-42
VAV-4404A, 5A	55	48-52
VAV-4404B, 5B	50	43-47
VBA-4101A, 4A	56	48-52
VBA-4101B, 4B	51	43-47

Test A—After 15 minutes operation charging at 10 amperes (VRP & VBA), ½ maximum rate (VAV).
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage to 6.7-7.0 volts (VRP), 6.7-6.9 volts (VAV), 6.7 volts (VBA).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type *See Electrical Equipment Section for complete data.*
Beam Indicator—Lighted when Country (upper) beams in use. Located on lower right corner of speedometer face.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Flasher—DeSoto No. 1257223.

Switches

Lighting—DeSoto No. 1300601.
Beam Selector—DeSoto No. 1253460.
Map Light—DeSoto No. 1244605.
Direction Signal—DeSoto No. 1235606.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—30 ampere. Vibrating type, protects lighting circuit.
Aux. Circuit Breaker—8 ampere. Protects Windshield Wipers and Back-Up Light.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects direction signal circuit.

FUSES: Clock—3 ampere. In clock lead.

HORNS: Auto-Lite Models HT-4011 or HW-4201 (Low Pitch), HT-4012 or HW-4202 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite Models HRL-4103 or 4104. Connected through ignition switch, operates only when ignition "on."
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" head.
Bore—3 7/16". **Stroke**—4 1/4".
Displacement—236.6 cu. ins. **Rated H.P.**—28.36.
Developed Horsepower—112 at 3600 RPM.
Compression Ratio—7.0-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See De Soto Special Data.*

ENGINE REMOVAL: *See De Soto Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See De Soto Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type. *NOTE*—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0002-.0012" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See De Soto Special Data.*
Length—3⅞". **Weight**—18.5 ozs. (stripped).
Clearance—.0008" on thrust face ¾" from bottom of skirt.
Removal—Pistons and rods removed from above.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (inverted, pin removed) on side opposite slot. Feeler pull 5-7 lbs. (with piston and block at 70°F.).

Replacement Pistons: .005", .020", .030", .040", .060" OS. *See "Pistons" in De Soto Special Data.*

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS *See "Piston Rings" in De Soto Special Data.*

PISTON PIN: Diameter—55/64". Length 2 7/8". Floating type. Pin hole in rod bronze bushed.
Pin Fit in Piston—.0000" to .0005". Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at normal room temperature.

Replacement Pins: Standard size and .0006", .003", .008" oversize.

CONNECTING ROD: Length—8". **Weight**—34.1 ozs. with bolts less bearings.
Crankpin Journal Diameter—2.124-2.125".
Original Bearing Sizes—*See De Soto Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: *None (no shims). Replace bearings. Do not file rods or caps. See "Connecting Rods & Bearings" in De Soto Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Connecting Rod & Bearings" in De Soto Special Data.*

Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearing, 7 integral counterweights with vibration dampener on front end.
Journal Diameter—2.4995-2.5005".
Original Bearing Sizes—*See De Soto Special Data.*
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in De Soto Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Crankshaft & Main Bearings" in De Soto Special Data.*

End Thrust: Taken by flange faces on rear (#4) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft & Main Bearings in De Soto Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearing Type—Removable steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal: *See "Camshaft & Bearings" in De Soto Special Data.*

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Chain Removal & Installation—*See "Timing Chain" in De Soto Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 23/32"	.3405-.3415"	4 25/32"
Exhaust	1 17/32"	.3395-.3405"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.002-.004"

Exhaust Valve Seat Insert Servicing—*See "Valve System" in De Soto Special Data.*
Valve Seat Width (Max.) 7/64".

Valve Guides: Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (Tool CM-83), finish ream to .3425-.3435".

Valve Springs: Install with closely coiled end to top. Free Length 2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below). Stem diam. ⅝". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030" & .060".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exh. (hot and idling). *NOTE*—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance #6 intake valve should open with #6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump mounted externally on right side of crankcase.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—45-55 lbs. at 45 MPH.
Oil Pressure Relief Valve—Under plug below starter. Opens at 40-45 lbs. Spring painted red, green, or unmarked. If spring replaced, use same color spring.

Oil Pump: "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in De Soto Special Data.*

Oil Filter: On left side of engine above starter.

Oil Pressure Gauge: Auto-Lite No. 11609A (not elec.).

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COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump.
Capacity—17 quarts.
Radiator Core Removal: *See "Radiator" in De Soto Special Data.*
Water Distribution Tube Servicing: *See "Cooling System" in De Soto Special Data.*
Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183°F.
Temperature Gauge: Auto-Lite No. 11610A (not elec.).

CLUTCH

Borg & Beck Model 10A7 (Deluxe with Synchro-mesh Trans.), 9A7 (Deluxe & Custom with Tip-Toe Shift Trans.), 11A6 (Taxicab). Single plate, dry disc type.
Identification Note—Cover stamped 952 (9A7), 957 10A7), 994 (11A6).
See Clutch Section for complete data.
Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	125" (⅛")
10A7	7"	10"	125" (⅛")
11A6	6½"	11"	125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) and have 1" free travel (adjusting nut on connector link at fork).
Clutch Over-Center Spring—*See "Clutch Notes" in De Soto Special Data.*
Removal: Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

DeSoto—Fluid coupling at rear of engine. Optl.
See Transmission Section for complete data.
Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*
Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.
Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION
SYNCHRO-MESH

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
►*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*
Transmission Control: Manual steering column shift.
See Transmission Section for complete data.
Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see De Soto Special Data for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods. Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car. *NOTE*—Use pilot studs when installing assembly.

TRANSMISSION
AUTOMATIC

Tip-Toe Shift Type (with Fluid Drive)—Semi-automatic design, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
►**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Transmission Control: See Transmission article for adjustment instructions.
See Transmission Section for complete data.
Kick-down Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TG-4205R.
Kick-down Switch—Part of carburetor assembly.
See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.
►*INSTALLATION CAUTION*—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 7200—Cross type with roller bearings. Two used (3 on Long Wheelbase Cars).

Propeller Shaft Center Bearing: Used on 7 Passenger.
See "Propeller Shaft" in De Soto Special Data.

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Axle Ratio	Std. Trans.	Tip Toe Trans.
5-Passenger	3.9-1 (39:10) ①	②
Station Wagon	4.1-1 (41:10)	3.91-1 (43:11)
Long W.B. ('49)	4.3-1 (43:10)	③

①—4.1-1 (41:10) Optl.
②—3.73-1 (41:11) or 3.9-1 (39:10) Optl.
③—3.91-1 (43:11) or 4.1-1 (41:10) Optl.
Backlash—.006-.010". Screw adjustment.
Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). *NOTE*—Use puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.
Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle" in DeSoto Special Data.*
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Direct-acting, hydraulic, non-adjustable type.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6° crosswise.
Camber—0° to Pos. ¾°. (¼-½° higher on left).
Caster—Neg. 2° preferred. Limits Neg. 1° to Neg. 3°.
Toe In—0" preferred. Limits 0" to 1/16". Adjust both tie rods equally.
Steering Geometry—Inner wheel 21½° plus or minus 1°. Outer 20°.

STEERING GEAR

Own Make—3 tooth Worm-and-Roller. Similar to Gemmer Model 335.
NOTE—See Gemmer 305, 335 & 375 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: DeSoto "Safe-guard" Lockheed Hydraulic.
See Brake Section for complete data.
►*BRAKE SQUEAK OR SQUEAL CORRECTION: See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*
Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear).
Drums—Centrifuse. Diameter 11".
Lining—Molded asbestos. 2" wide, 13/64" thick. Length per wheel—(front) 23", (rear) 20 3/8".
Clearance—.006" at each end of all shoes.
Braking Power—60% (front), 40% (rear).
Hand Brake: On shaft at rear of transmission. External contracting type.
Adjustment—*See "Hand Brake Notes" in De Soto Special Data.*
Drum—Cast Iron. Diam. 6" (Deluxe), 7" (Custom).

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Ext. Type	2 1/2"	5/32"	20"

Clearance (External Type)—.015-.020" around band.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWJ-4001, EWJ-4003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.
See Miscellaneous Section for complete data.
CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1950 Numbers	Detroit	Los Angeles
Custom	50,062,001 Up	62,011,501 Up
Deluxe	6,233,501 Up	60,005,001 Up
1951 Numbers		
Custom	50,155,001 Up	62,024,001 Up
Deluxe	6,269,001 Up	60,011,001 Up

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 1 and 2 cylinders.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035". Limits plus or minus .001".
Plugs—Auto-Lite Resistor Type AR5 ('50), AR8 ('51)

DISTRIBUTOR: Breaker Gap—.020".
Cam Angle—34½° to 38°. **Do Not** exceed Breaker Gap limits (.018" to .022") to obtain cam dwell.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC).
Timing Procedure—*See Ignition Timing.*
Timing Mark—Vibration Dampener marked "DC" at top dead center position with 15-1° graduations before and after this point.
Manual (Octane Selector) Adjustment—Set for slight ping with 10-30 MPH. range when accelerating with wide open throttle. Do not vary initial timing more than 4° advance or retard.

CARBURETION:
Idle Setting—Set idle adjusting screw for smooth idling with warm engine (idle screw ½-1½ turns open), turn screw out for richer mixture.
Idle Speed—(Std. Trans.) Adjust to 6 MPH. (Tip-toe Shift Trans.). (1950) 450-475 RPM., (1951) 475-500 RPM.
Float Level—Top of float (not soldered seam) 5/64", plus or minus 1/64", below top edge of bowl.
Accelerating Pump—Center Hole (med. stroke) Normal. Inner Hole—Summer, Outer Hole—Winter, for extreme temperatures.

Choke Setting: (1950) Adjust by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjust carburetor choke valve lever so that choke valve is tightly closed.

Choke Setting: (1951) Cover "mark" centered at index.

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil, wind free end up **approx. ¾ turn,** not over one turn or under ½ turn, hook end on stop stud.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust, Hot.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable through fire wall.

COIL: Auto-Lite No. CR-4001. Mounted directly above distributor on ignition cable bracket.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IG-3927G.
Capacity—.25-.28 microfarad.

DISTRIBUTOR:

Year	U. S. Prod. Auto-Lite No.	Canada Auto-Lite No.
1950 Early	IAP-4102C-1	IAP-4102A-1
1950 Late	IAT-4004	IAT-4004B
1951	IAT-4012	IAT-4012B

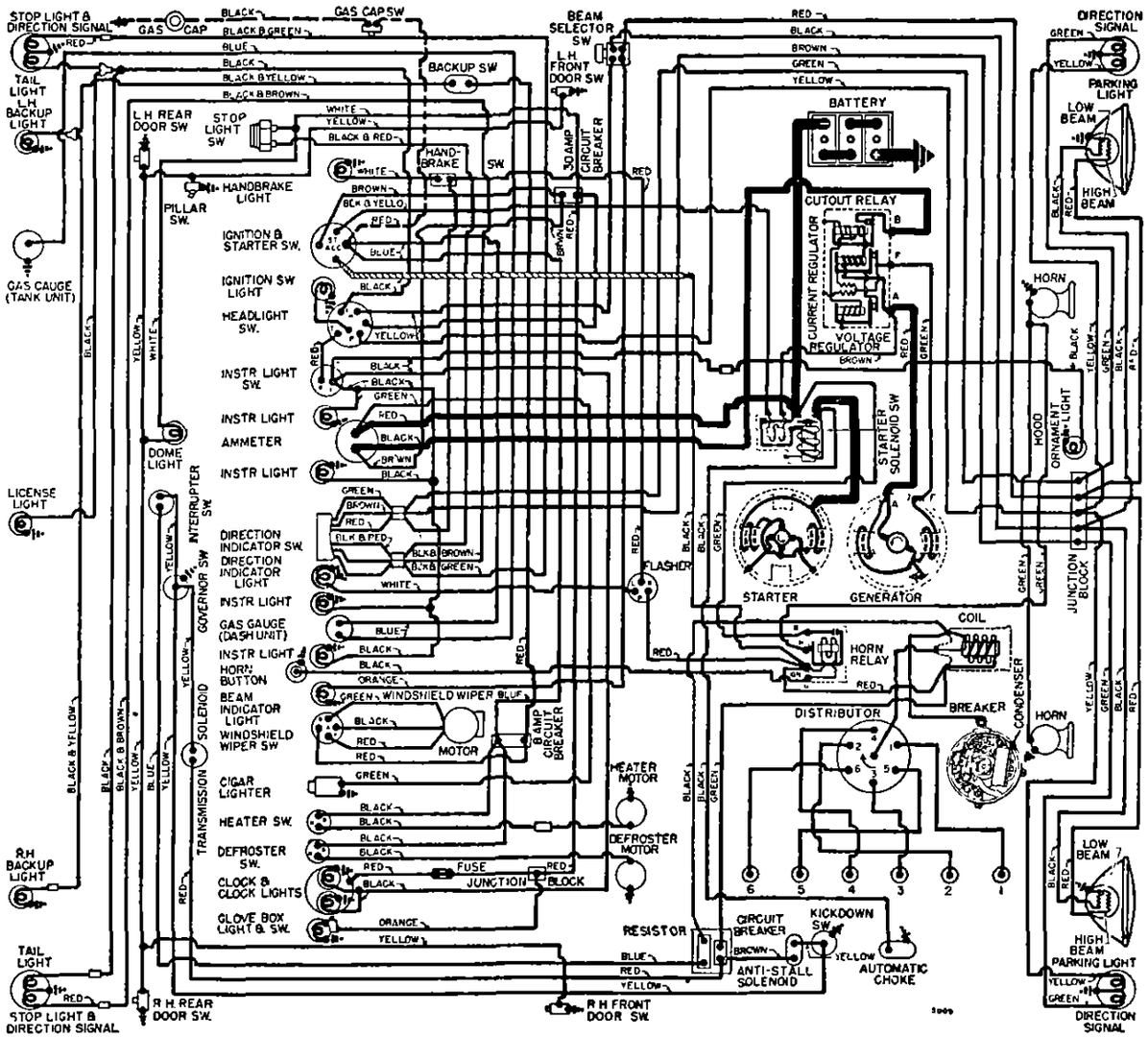
►***DISTRIBUTOR CAP POPPING OFF CORRECTION*** *Early "IAP" Distributors): See "Auto-Lite IAP Distributors" in Electrical Equipment Section.*

►**"IAT" Distributor Note**—New "Pivoted Breaker Plate" type. *See Electrical Equipment Section for data.*
Breaker Gap—.020".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAP-4102A-1, IAT-4004B

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	350	0	700
3	400	6	800
6	770	12	1540
9	1150	18	2300
11	1400	22	2800

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1950 MODELS

CONTINUED FROM PRECEDING PAGE

Automatic Advance—IAP-4102C-1, IAT-4004, IAT-4012, IAT-4012B

Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite Unit, Integral type

Vacuum Advance—IAP-4102A-1, IAT-4004B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅛"
1°	2°	6⅝"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

Vacuum Advance—IAP-4102C-1, IAT-4004, IAT-4012, IAT-4012B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7⅛"
4°	8°	9⅞"
6°	12°	11⅝"
9°	18°	15"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing.

IGNITION TIMING

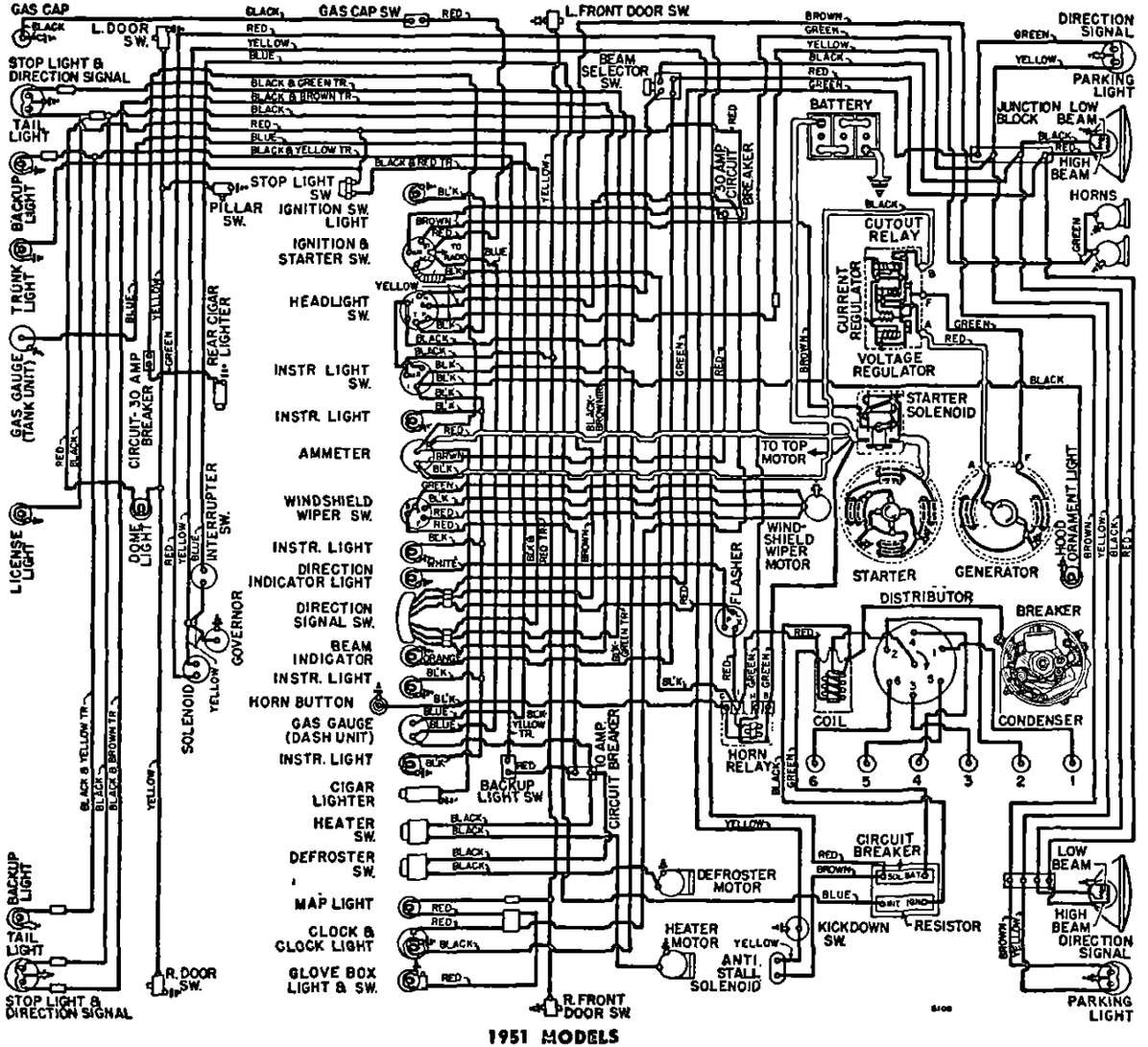
Std. Setting.....At TDC. Initial setting. See Manual Adjustment (below) for Final Setting.

NOTE—Impulse neutralizer marked "DC" at TDC. with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following).

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor as directed above.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping noted), clockwise to retard spark (if ping too severe), tighten screw.



1951 MODELS

CARBURETOR

Carter (Ball & Ball)—Used on all models. 1½" single barrel, downdraft type. Slow closing throttle and Kick-down switch used for hydraulic operated transmission.

Year	Application	Carb. No.
1950	Synchro-mesh Trans.	EX3①
1950	Automatic Trans.	E7L4
1950-51	City Traffic	E7W1②
1951	Synchro-mesh Trans.	E9C1
1951	Automatic Trans.	E9A1

①—Superseded by Carb. No. EX3R.
②—With Throttle Restrictor.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*
NOTE—If lean metering jet (High Altitude calibration) used at lower altitudes for increased economy, speed and power are reduced (not recommended).
Slow-closing Throttle: Solenoid type. Non-adjustable. *See Carburetion Equipment Section for complete data.*
Fast Idle: Setting—(EX3, E7L4, E7W1) Throttle stop dog linked to choke valve so that stop dog rotated and throttle opened to fast idle position when choke valve closed for starting. No adjustment required.
Fast Idle: Setting—(E9C1, E9A1) .018" throttle opening with choke valve held closed and throttle lever stop screw backed off.
Automatic Choke: Sisson Type (1950). Carter Climatic Control (1951).
Setting—Sisson Type. With throttle 1/3 open, insert gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft), adjust carburetor choke valve lever so that choke valve is closed tightly.
Setting—Carter Climatic Control. Centered (coil housing at index mark). *Do not change for hot or cold climate.*
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544349 Heavy Duty Oil-bath type. Filter Element AC No. 21.
Fuel Pump: AC No. 1539208 or Carter No. M639SL, SZ. Diaphragm type fuel pump.

Replacement Pump—AC No. 588.
Pressure—3½ to 5 lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oillite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaner. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. (1950) 12112A, (1951) 12341A, (1950 Sta. Wgn.) 12191A.
Tank Unit—Auto-Lite No. (1950-51) 11538A. (1950 Sta. Wgn.) 12157A (Early), 12195A (Late).
See Carburetion Equipment Section for complete data.

BATTERY

Willard or Auto-Lite. 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

Year	Auto-Lite Models U. S.	Canada
1950 (Early)	MCH-6102	MAW-4055
1950 (Late)	MCH-6105	MCH-6105
1951	MCL-6109	MCL-6109

Armature—Auto-Lite No. MCH-2039 (MCH-6102), **MAW-2213** (MAW-4055), **MCH-2070** (MCL-6109, MCH-6105).
Drive—Solenoid pinion shift & overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data—MCH-6102, MCH-6105, MAW-4055

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4300	5.0	65
6.0 "	Lock	2.0	335

Performance Data—MCL-6109

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4900	5.0	65
8.0 "	Lock	2.0	410

Starting Switch: Auto-Lite No. (Early 1950) SS-4707, (Late 1950 & 1951) SSX-4001. Solenoid type controlled by turning ignition switch past "on" position.
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite. Two-brush with voltage-current regulation.

Year	Auto-Lite No.
1950 (Early) Automatic Trans.	GGW-6001A
1950 (Late) Automatic Trans.	GGW-6001J①
1950 (Early) Synchro-mesh Trans.	GGW-6001B
1950 (Late) Synchro-mesh Trans.	GGW-6001K①
1950 (Early) Automatic Trans.②	GDZ-4801R
1951	GGW-6001J①
1951 Limosine & 8 Passenger	GGW-6001K①
1950 (Early) City Police & Taxi	GGJ-6001A
1950 (Early) City Police & Taxi	GGU-6001A
1950 (Early) State Police	GGJ-6001B
1950 (Early) State Police	GGU-6001E
1950-51 City Police & Taxi	GGU-6001G①
1950-51 City Police & Taxi	GGJ-6001F①
1950-51 State Police	GGU-6001H①
1950-51 State Police	GGJ-6001G①

①—Narrow Groove Pulley. ②—Canada.

Armature—GGW-2006F (GGW type generators), GDZ-2006F (GDZ type generators), GGJ-2101F (GGJ type generators), GGU-2006F (GGU type generators).
Two brush type current-voltage regulators.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001A, B, J, K)

Amperes	Volts	Cold—R.P.M.	Hot
0	6.4	870-970	950-1050
45	8.0	1925-2125	2350-2550

Performance Data (GDZ-4801R)

0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GGJ-6001A, B, F, G)

0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750

Performance Data (GGU-6001A, E, G, H)

0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GDZ, GGU) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes).
Field Current—(GGW, GDZ) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes, (GGU) 1.7-1.8 amperes, all at 6.0 volts.
Motoring Current—(GGW) 4.6-5.2 amps., (GDZ) 4.2-4.6 amps., (GGJ) 4.3-4.8 amps., (GGU) 5.5-6.5 amps., all at 6.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs. tension accrued on scale attached to field frame) or ¼" belt deflection between generator and pump.

REGULATOR

Auto-Lite. Voltage and current type.

Auto-Lite Regulator	Auto-Lite Generator
VRP-4503A	GDZ-4801R
VRP-6004A	GGW-6001A, B, J, K
VBE-6001A	GGW-6001J, K
VBA-4202A, 4204A①	GGJ-6001A, B, F, G
VAV-6001A, 6002A①	GGU-6001A, E, G, H
VAV-6001B, 6002B①	GGU-6001G

①—For Negative Ground.
See Electrical Equipment Section for complete data.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In (All)—6.3-6.8 volts. Set to 6.4-6.6 volts.
Cuts Out (All)—4.1-4.8 volts (Approx. 4-6 amps. disch.).
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—(VRP-4503A) 7.2-7.5 volts, (VRP-6004A) 7.1-7.4 volts, ((All VAV, VBA, VBE) 7.1-7.4 volts at 70°F. while charging at 10 amperes (VRA & VBA), ½-maximum rate (VAV & VBE).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

►*CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

Test A—Operating Amperes	Test B
VRP-4503A 42	33-37
VRP-6004A 46	38-42
VAV-6001A, 2A 50	43-47
VAV-6001B, 2B 55	48-52
VBA-4202A, 4A 56	48-52
VBE-6001A 52	43-47

Test A—After 15 minutes operation charging at 10 amperes (VRP & VBA, ½-maximum rate (VAV & VBE).
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage to 6.7-7.0 volts (VRP), 6.7-6.9 volts (VAV & VBE), 6.7 volts (VBA).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type with "Bull's-eye lens". Beam selector switch on toe-board controls upper and lower beams.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—Lighted when Country (upper) beams in use. Located on lower right corner of speedometer face.

Direction Signal: ***See Electrical Equipment Section.***
Direction Signal Indicator—In lower left corner of speedometer face.
Direction Signal Flasher—DeSoto No. 1257223.

Switches

Lighting—De Soto No. 1339720.
Beam Selector—DeSoto No. (1950) 1253460, (1951) 1253003.
Directional Signal—DeSoto No. (1950) 1257223, (1951) 1370454.
Map Light—DeSoto No. (1950) 1244605. (1951) 1253034.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—30 ampere. Vibrating type, protects lighting circuit.
Aux. Circuit Breaker—8 ampere. Protects Windshield Wipers and Back-Up Light.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects direction signal circuit.
Transmission Solenoid—Vibrating type mounted as an assembly with resistor unit.

FUSES: Clock—3 ampere. In clock lead.
Radio—14 ampere. In fuse connector at radio.

HORNS: Auto-Lite No. (1950) HW-4201 (Low Pitch), HW-4202 (High Pitch). (1951) HW-4107 (Low Pitch), HW-4108 (High Pitch). Dual horns operated by relay. Amp. Draw—15 amps. each.

Horn Relay: Auto-Lite No. HRL-4104. Connected through ignition switch, operates only when ignition "ON".
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

▷*LARGER ENGINE USED ON 1951 CARS.*

ENGINE SPECIFICATIONS: Six cylinder, "L" head.
Bore—3 7/16".
Stroke—(1950) 4¼", (1951) 4½".
Displacement—(1950) 236.6, (1951) 250.6 cu. ins.
Rated Horsepower—(1950-51) 28.36.
Developed Horsepower—At 3600 RPM. (1950) 112 HP. (1951) 116 HP.
Compression Ratio—7.0-1 Std. cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See De Soto Special Data.*

ENGINE REMOVAL: *See De Soto Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See De Soto Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type.
NOTE—Skirt cam ground (.010-.014" smaller diameter across pin bosses) and tapered (.0002-.0012" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See De Soto Special Data.*
Length—3⅞". **Weight**—18.5 ozs. (stripped).
Clearance—.0005" to .0015" on thrust face at center of skirt.
Removal—Pistons and rods removed from above.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (inverted, pin removed) on side opposite slot. Feeler pull 5-7 lbs. (with piston and block at 70°F.).

Replacement Pistons: .005", .020", .030", .040", .060" OS. *See "Pistons" in De Soto Special Data.*
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS. *See "Piston Rings" in De Soto Special Data.*

PISTON PIN: Diameter—55/64". Length 2 7/8". Floating type. Pin hole in rod bronze bushed.
Pin Fit in Piston—.0000" to .0005". Thumb push fit with piston heated to 160°F.
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at normal room temperature.

Replacement Pins: Standard size and .0006", .003", .008" oversize.

CONNECTING ROD: (1950) Length—8". Weight—34.1 ozs. (1951) Length—7 7/8". Weight—32.4 ozs., with bolts less bearing.
Crankpin Journal Diameter—2.124-2.125". *See "Original Bearing Sizes" in De Soto Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps. *See "Connecting Rods & Bearings" in De Soto Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S.

Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearing with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in De Soto Special Data.*
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in De Soto Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S.

End Thrust: Taken by flange faces on rear (#4) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in De Soto Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearing Type—Removable steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

Camshaft Removal: *See "Camshaft & Bearings" in De Soto Special Data.*

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Chain Removal & Installation—*See "Timing Chain" in De Soto Special Data.*

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 23/32"	.3405-.3415"	4 25/32"
Exhaust	1 17/32"	.3395-.3405"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.002-.004"

Exhaust Valve Seat Insert Servicing—*See "Valve System" in De Soto Special Data.*
Valve Seat Width (Max.) 7/64".

Valve Guides: Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (Tool CM-83), finish ream to .3425-.3435".

Valve Springs: Install with closely coiled end to top. Free Length 2".

	Spring Pressure 1950	1951	Length
Valve Closed	40-45 lbs.	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	110-120 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below). Stem diam. ⅝". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030" & .060".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exh. (hot and idling). *NOTE*—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance #6 intake valve should open with #6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump mounted externally on right side of crankcase.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—(1950) 45 to 55 lbs. at 30 MPH. (1951) 40 to 50 lbs. at 20 MPH.
Oil Pressure Relief Valve—Under plug below starter. Opens at (1950) 40-50 lbs. (1951) 45-55 lbs. Spring painted red, green or unmarked. If spring replaced, use spring of same color.

Oil Pump: "Rotor" type on right side of crankcase.
Servicing—*See "Oil Pump" in De Soto Special Data.*

Oil Filter: On left side of engine above starter.
Servicing—Replace element at 8000 mile intervals.
Oil Pressure Gauge—Auto-Lite No. 12340A (not electric).

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, pressure vent cap, and water distribution tube in cylinder block behind pump.
Capacity—(1950) 17 qts. (1951) 15 qts.

Radiator Core Removal: *See "Radiator" in De Soto Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in De Soto Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite No. 12343A (not elec.).

CLUTCH

Borg & Beck Model 10A7 (with Synchro-mesh Trans.), 9A7 (with Tip-Toe Shift Trans.), 11A6 (Taxicab). Single plate, dry disc type.
Identification Note—Cover stamped (1950) 952 (9A7), 957 (10A7), 994 (11A6). (1951) 953 (9A7), 930 (10A7), 994 (11A7).
See Clutch Section for complete data.
Facings—Woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) & have 1" free travel (adjusting nut on connector link at fork).
Clutch Over-center Spring—*See "Clutch Notes" in De Soto Special Data.*
Removal: Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

DeSoto—Fluid coupling at rear of engine. Optl.
See Transmission Section for complete data.
Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*
Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.
Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

SYNCHRO-MESH TRANSMISSION

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
►*HARD SHIFTING CORRECTION—See "Chrysler, De Soto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*
Transmission Control: Manual steering column shift.
See Transmission Section for complete data.
Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see De Soto Special Data for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods. Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car. *NOTE*—Use pilot studs when installing assembly.

AUTOMATIC TRANSMISSION

Tip-Toe Shift Type (with Fluid Drive)—Semi-automatic design, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
Transmission Oil—3 pints, 10-W engine oil.
►**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Transmission Control: See Transmission article for adjustment instructions.
See Transmission Section for complete data.
Kickdown Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TGG-4001.
Kick-down Switch—Part of carburetor assembly.
See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.
Ignition Interrupter Switch—On right side of transmission above Governor.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.
►*INSTALLATION CAUTION*—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 7200—Cross type with roller bearings. Two used (3 on Long Wheelbase Cars).

Propeller Shaft Center Bearing: Used on 7 Passenger.
See "Propeller Shaft" in De Soto Special Data.

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Axle Ratios—1950

Car Model	S-M Trans.①②	Auto Trans.②
5-Pass.	3.9-1 (39-10)③	3.73-1 (41-11)④
8-Pass.	4.1-1 (41-10)	3.91-1 (43-11)
Sta. Wgn.	4.1-1 (41-10)	3.91-1 (43-11)

Axle Ratios—1951

Car Model	S-M Trans.①②	Auto Trans.②
5-Pass.	3.9-1 (39-10)③	3.9-1 (39-10)
8-Pass.	4.3-1 (43-10)	4.1-1 (41-10)
Sta. Wgn.	4.1-1 (41-10)⑤	3.9-1 (39-10)

①—Synchro-mesh Transmission.
②—Standard Ratios.
③—4.1-1 (41-10) Optional.
④—3-9-1 (39-10), 4.1-1 (41-10) Optional.
⑤—3.9-1 (39-10) Optional.

Backlash—.006-.010". Screw adjustment.
Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.
Axle Shaft Removal—Remove wheel ,hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). *NOTE*—Use puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.
Axle Shaft Outer Oil Seal: New leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle" in DeSoto Special Data.*
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SH CK ABSORBERS

Own Make—New "Oriflow" type. Direct acting non-adjustable, non-refillable.

FR NT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6° crosswise.
Camber—Neg. ⅜° to Pos. ⅜° (¼-½° higher on left).
Caster—Neg. 2° preferred. Limits Neg. 1° to Neg. 3°.
Toe In—0" preferred. Limits 0" to 1/16". Adjust both tie rods equally.
Steering Geometry—Inner wheel 21½° plus or minus 1°. Outer 20°.

STEERING GEAR

Own Make—3 tooth Worm-and-Roller. Similar to Gemmer Model 335.
NOTE—See Gemmer 305, 335 & 375 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: DeSoto "Safe-guard" Lockheed Hydraulic.
Front Wheels—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top and actuated by lower cylinder).
Rear Wheels—Double anchor type with single double-acting wheel cylinder.
See Brake Section for complete data.
►*BRAKE SQUEAK OR SQUEAL CORRECTION—See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*
Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).
Drums—Centrifuse, 12" diameter.
Lining—Molded asbestos, 2" wide, 13/64" thick, Length per wheel—25 1/8". Bonded to shoe.
Clearance—.006" at each end of all shoes.
Braking Power—60% (front wheels), 40% (rear).
Hand Brake: On shaft at rear of transmission. 6" External contracting band used with Synchro-mesh Transmission. 7" Internal expanding used with Automatic Transmission.
Adjustment—*See "Hand Brake Notes" in De Soto Special Data.*
Drum—Cast Iron.

Lining—	Width	Thickness	Length
6" External	2"	5/32"	15 3/8"
7" Internal	2"	5/32"	13 1/8"

Clearance (External Type)—.015-.020" around band.
(Internal Type)—Adjusting nut on shoe link backed off one notch from point where shoes firm against drum.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWJ-4001, EWJ-4003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.
See Miscellaneous Section for complete data.
CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric type.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

First serial numbers are as follows:

	Detroit	Los Angeles
1952 Models:		
S15-1 Deluxe	6,283,601	60,013,001
S15-2 Custom	50,230,101	62,033,301
1953 Models:		
S18	50,266,001	62,039,001

ENGINE NUMBER: Stamped on boss on left side of cylinder block between Nos. 1 and 2 cylinders.

►***ENGINE NUMBER LETTERS & MARKS (Following Engine Number)—Identified as follows:***

"A"—ALL Cylinders .020" Oversize.

"B"—ALL Crankshaft Journals .010" Undersize.

"AB"—BOTH above conditions exist.

"MALTESE CROSS" (⅜" high—ONE OR MORE Crankshaft Journals .001" Undersize *(See "Connecting Rods" and "Crankshaft" under "ENGINE").*

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21", idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .035". Limits plus or minus .001". **Plugs**—Auto-Lite Resistor type AR8.

DISTRIBUTOR: Auto-Lite No. IAT-4012 (1952 U.S. & 1953 Canada), No. IAT-4102 (1953 U.S.), No. IAT-4012B (1952 Canada). Automatic & Vacuum advance type with "pivoted" breaker plate.
Breaker Gap—.018-.020".
Cam Angle—36°-42°. DO NOT exceed Breaker Gap Limits of .018-.020" to obtain dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite No. CR-4001 (U.S. Cars), CR-6007B (Canada). On bracket above distributor.
Ignition Current—2.25 amperes idling. 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA.
Capacity—.25-.28 microfarad.

IGNITION TIMING: 2° BTDC. *See Manual Adjustment*
Timing Mark—Vibration dampener marked "DC" at top dead center point with 15—1° graduations before and after this point.
Manual Adjustment—Set to give slight ping between 10-30 MPH when accelerating from 10 MPH with wide open throttle. Adjust distributor setting (not over 4° before or after this point).

CARBURETION: Carter (B&B) Model E9C1 (Synchro-mesh Trans. Cars), Model E9A1 (Auto. Trans. Cars), E7W1 (City Traffic). Downdraft type with automatic choke.
Idle Setting—Set idle adjusting screw for smooth idling with engine warm (idle screw ½ to 1½ turns open). Turn adjusting screw out for richer mixture.
Idle Speed (Std. Trans.)—Adjust to 6 MPH.
Idle Speed (Auto. Trans.)—475-500 RPM.
Float Level—Top of float (not soldered seam) 5/64" plus or minus 1/64", below top edge of bowl.
Accelerating Pump—Normal Setting, center hole. **Summer**, inner hole. **Winter**, outer hole.

Fast Idle: .018" throttle opening with choke valve held closed and throttle stop screw backed off.

Slow-Closing Throttle: Solenoid type. Non-adjustable.

Choke Adjustment: Cover "mark" centered on index. *Do not change setting for hot or cold weather.*

Fuel Pump Pressure: 3½-5½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely. When installing coil wind free end up **approximately ¾ turn**, not over one turn or under ½ turn, hook end on stop stud.

VALVE TAPPET CLEARANCE: .008" Intake. .010" Exhaust. Engine must be hot and idling. NOTE—Tappet screws self locking. Remove right front wheel and lower wheel housing panel for access to valves.

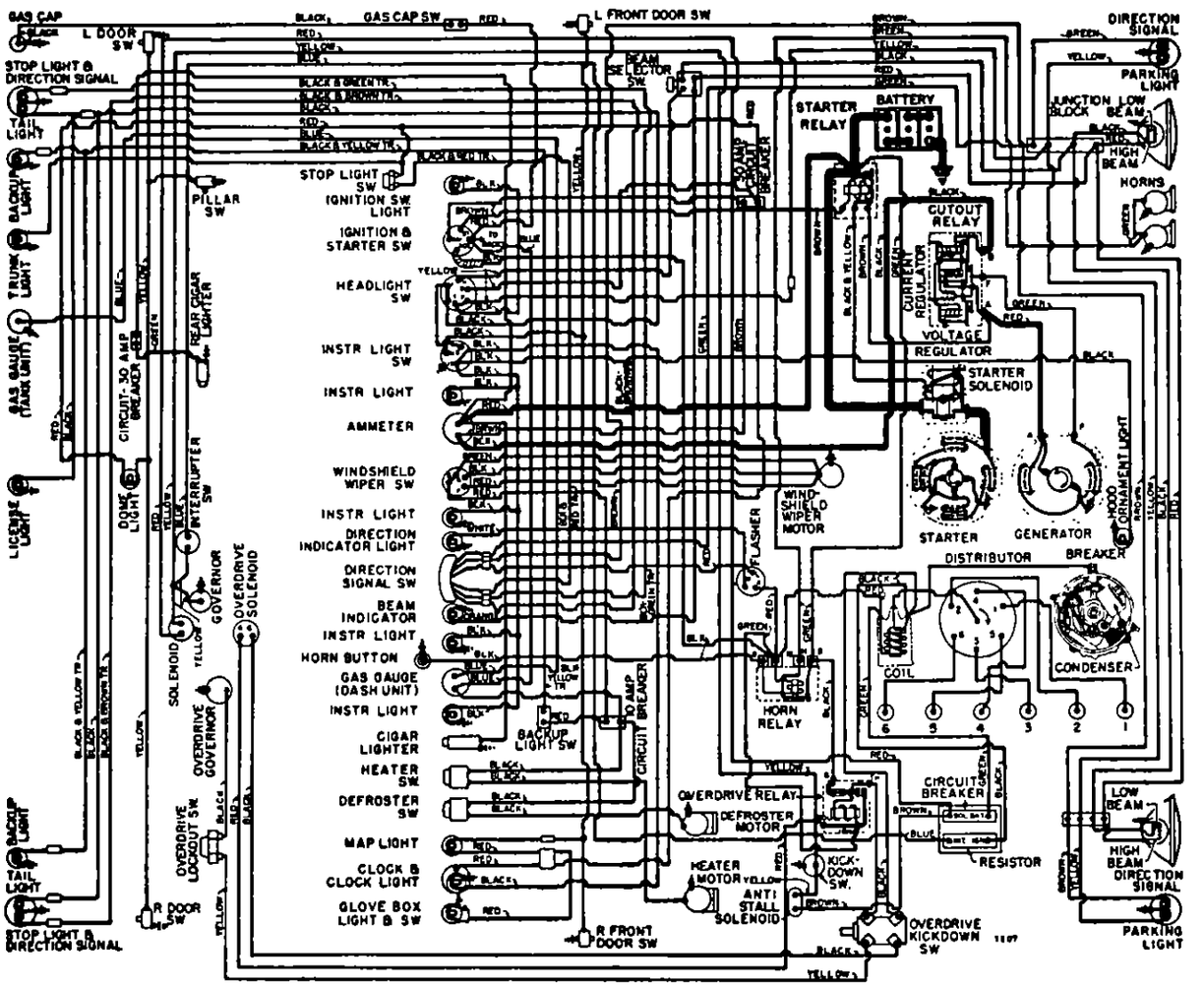
IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to right. Key automatically returns to "ON" position when released.

COIL: Auto-Lite No. CR-4001 (U.S. Cars), CR-6007B (Canada). On bracket above distributor.
Ignition Current—2.25 amperes idling. 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAT-4012 (1952 U.S. & 1953 Canada), No. IAT-4102 (1953 U.S.), No. IAT-4012B (1952 Canada). Automatic & Vacuum advance type with "pivoted" breaker plate.
Breaker Gap—.018-.020".
Cam Angle—36-42°. DO NOT exceed breaker gap limits of .018-.020" to obtain dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.



1952 MODELS

Automatic Advance—IAT-4012B

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
3	400	6	800
6	770	12	1540
9	1150	18	2300
11	1400	22	2800

Automatic Advance—IAT-4012 & 4102

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite. Integral type.

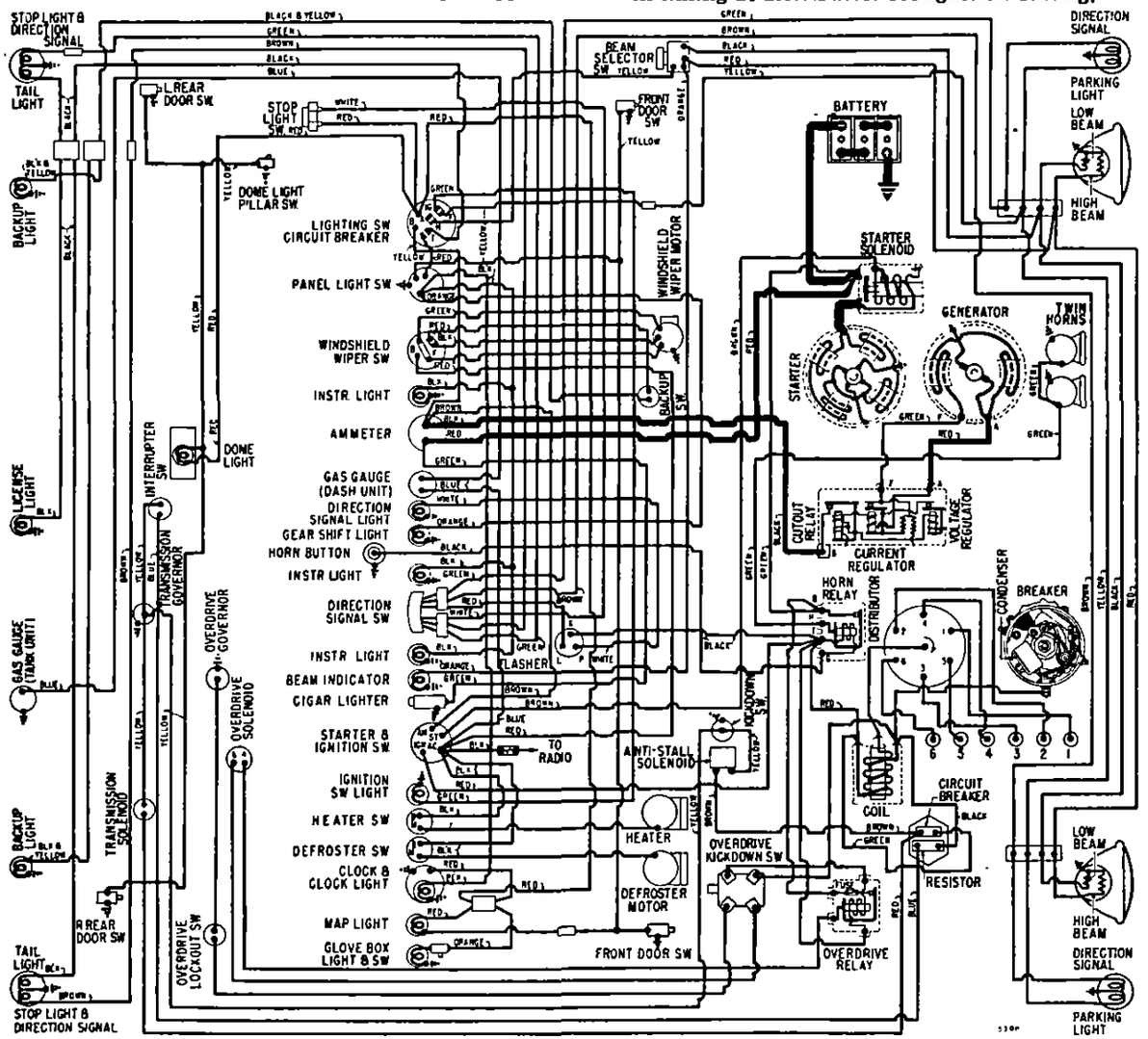
Vacuum Advance—IAT-4012B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5⅛
1	2	6⅝
3	6	9⅝
5	10	12½
6	12	14

Vacuum Advance—IAT-4012 & 4102

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7¼"
4°	8°	9⅜"
6°	12°	11⅝"
9°	18°	15"

Manual Adjustment—Provides for minor changes in timing at distributor. See Ignition Timing.



1953 MODELS

IGNITION TIMING

Setting ..... 2° BTDC
NOTE—This is standard setting for regular non-premium fuel at sea level. See Manual Adjustment
Timing Mark—Vibration dampener marked "DC" at top dead center point with I5—1° graduations before and after this point. Time engine with correct mark in line with pointer on chain case cover.
Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor by loosening lockplate hold-down screw and centering pointer on scale, tighten screw. Loosen lockplate clamp bolt, rotate distributor until correct timing secured.
Manual Adjustment—Set to give slight ping between 10-30 MPH when accelerating from 10 MPH with wide open throttle. Adjust distributor (not over 4° before or after initial setting).

CARBURET R

Carter (Ball & Ball)—Model E9C1 (Synchro-mesh Trans. Cars), Model E9A1 (Automatic Trans. Cars), E7W1 (City Traffic). 1½" single barrel downdraft with slow closing throttle and kick-down switch on E9A1. Throttle restrictor used on E7W1.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*
Slow-Closing Throttle: Solenoid type. Non-adjustable.
See Carburetion Equipment Section for complete data.
Fast Idle: Setting .018" throttle opening with choke valve held closed and throttle stop screw backed off.
Automatic Choke: Carter Climatic Control.
Setting—Centered (coil housing at index mark). *Do not change setting for hot or cold weather.*
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC. Heavy duty oil-bath type. Replacement Filter Element AC No. 21.
Fuel Pump: Carter No. M-639SL, SZ, SA. Vacuum diaphragm type.
Pressure—3½-5 lbs.
See Carburetion Equipment Section for complete data.
Fuel Tank Filter: Ollite metal filter in tank.
Servicing—If more than two pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.
Gasoline Gauge: Auto-Lite Electric type.
Auto-Lite Numbers:

Dash Unit	Early—1952—Late	1953
All exc. Est. Wgn.	12341A—12799A	13018A
Estate Wgn.	12529A—12800A	13019A
Tank Unit	**1952**	**1953**
All exc. Est. Wgn.	11538A	12617A
Estate Wagon	12195A	12195A
8 Pass. & Taxi	11539A	11538A

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite 2H-120-B. Willard HW-2-120 Optl. 6 volt, 17 plate, 120 ampere hour capacity (20 hr. rate).
Grounded Terminal—Positive to engine.
Location—Under hood, on left fender shield.

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STARTER

Auto-Lite No. (1952 Std.) MCL-6117, (1952 Power Steering) MCL-6117, (1953) MCL-6117, (1953 Taxicab Early) MCL-6116, (1953 Taxicab Later) MCL-6121A.

Armature—Auto-Lite No. MCH-2070.

Drive—Solenoid pinion shift & overrunning clutch.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid Switch No. SSX-4002 (MCL-6116 Starter), No. SSX-4003 (MCL-6117 Starter), No. SSX-4004 (MCL-6121A Starter). Combination solenoid pinion shift and starting switch controlled by ignition switch (by turning key past "on" position) with SEPARATE relay (on some Fluid Torque Drive cars only).

Starter Relay—Auto-Lite No. HRW-4001 (1952), No. HRW-4001A (1952-53). *See 1952 Wiring Diagram for relay connections.*

GENERATOR

Auto-Lite. Two brush type with voltage and current regulation.

Auto-Lite Gen. No. 1952	1953
Std. Equip. GGW-6001J,K	GGW-6001K
Power Steering GGW-6007B, 8B	GGW-6008B,D,G
GGJ-6004A	
Spec. Equip. GGU-6001V	GGU-6006C
City Pol. & Taxi GGJ-6001F	GGJ-6001F
GGU-6001G	GGU-6005A
State Police GGU-6001R	GG-6001R
GGJ-6001G	

Charging Rate Adjustment—None. See Regulator.

Performance Data—GGJ

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Performance Data—GGU

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850
50	8.0	1550-1750	1750-1950

Performance Data—GGW

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—(GGW, GGU) 35-53 ozs., (GGJ) 30-37 ozs., (with new brushes).

Field Current—(GGW) 1.4-1.5 amperes, (GGJ & GGU) 1.4-1.6 amperes, all at 5.0 volts.

Motoring Current—(GGW) 4.8-5.3 amperes, (GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, all at 5.0 volts.

Belt Adjustment: ¼" belt deflection or 40-50 lbs. tension with scale attached to field frame.

REGULATOR

Auto-Lite. Voltage and current type, "Temperature Compensated" Current regulator.

Auto-Lite Regulator No.	Generator
VBE-6001A	All "GGW" Gen.
VBF-6001A & VBF-6002A①	All "GGJ" Gen.
VAV-6001B & VAV-6002B①	All "GGU" Gen.

①—For Negative battery ground.

Cutout Relay

Cuts In—6.3-6.8 volts.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.1-7.4 volts (VBE & VAV), 7.15-7.45 volts (VBF), *after fifteen minutes operation charging at 10 amperes (VBF), ½ max. charging rate (VAV, VBE).*
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.

	Test A—Operating Amperes	Test B
VAV	55	50 (48-52)
VBE	52	45 (43-47)
VBF	66	55 (53-57)

Test A—After 15 minutes operation charging at 10 amperes (VBF), ½ maximum rate (VBE & VAV).

Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts).

Air Gap—.048-.052" with contacts opening.

Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type with "Bullseye" lens. *See Electrical Equipment Section for complete data.*
Beam Indicator—Lighted when upper beam in use. Located on lower right corner of speedometer face.

Directional Signal: *See Electrical Equipment Section.*
Directional Signal Indicator—In lower left corner of speedometer dial.

Switches

Lighting—DeSoto (1952) 1370138, (1953) 1495859.
Beam Selector—DeSoto No. 1253003.
Instrument—DeSoto No. 1369986.
Directional Signal—DeSoto No. (1952) 1440080, (1953) 1495297.

MISC. ELECTRICAL

CIRCUIT BREAKERS (1952): Lighting—30 amperes. Mounted on rear of instrument panel to left of ammeter. Protects Headlights, Tail & Stop Lights, and Instrument Panel Lights.
Accessory Circuit Breaker—8 amperes. Mounted on rear of instrument panel to right of fuel gauge. Protects Back-up Light, and Windshield Wiper Motor.

CIRCUIT BREAKERS (1953): In Headlight Switch assembly, protect headlight, tail & stop light, accessory and interior lighting circuits. Back-up lights protected by windshield wiper circuit breaker.

FUSES: Clock 2 amperes. In clock lead wire.
Radio—14 amperes. In fuse connector at radio.
Overdrive—20 ampere. On overdrive relay.

HORNS: Auto-Lite. Twin horns with relay.

Auto-Lite No.	Low Pitch	High Pitch
1952 Early	HW-4107	HW-4108
1952 Later	HW-4203	HW-4204
1953 Early	HAB-4617	HAB-4618
1953 Later	HAB-4659	HAB-4664

Horn Relay: Auto-Lite No. HRL-4104. Connected through ignition switch, operates only when ignition "ON."
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder "L" head type.
Bore—3 7/16". **Stroke**—4 1/2".
Displacement—250.6 cu. in. **Rated HP**—28.36.
Developed Horsepower—116 at 3600 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: *See DeSoto Special Data.*

OIL PAN REMOVAL: *See DeSoto Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See DeSoto Special Data.*

PISTONS: Aluminum alloy, U-slot, cam-ground type.
▷***CYLINDER BORE OVERSIZE CAUTION—Engines with letter "A" following engine number indicates that cylinder bores .020" oversize.***
Weight—18.5 ozs.
Clearance—.0002-.0012" measured ¾" from bottom of piston on thrust side.
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores with taper over .030" or out-of-round over .004" requires reboring and honing to above limits.
Removal—Pistons and rods removed from above.

Fitting New Pistons: With piston and cylinder clean and dry, piston should have a slight drag, but should travel through bore slowly of its own weight at 70°F.

Replacement Pistons: Furnished Standard, .005", .020", .030", .040", .060" Oversize. *See "Pistons" in De Soto Special Data.*

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compression, with step on inner edge up. #2 Compression with step on inner edge up or if step on outer edge, install with step down.

Replacement Rings: Std., .005", .020", .030", .040", .050", .060" Oversize. *See "Piston Rings" in DeSoto Special Data.*

PISTON PIN: Diameter—55/64". **Length**—2 7/8". Floating type with locking ring at each end.
Pin Fit in Piston—.0000-.0005". DOUBLE THUMB push fit at room temperature (70°F.).
Pin Fit in Rod Bushing—.0001-.0004". Tight thumb push fit at room temperature (70°F.).

ENGINE

CONTINUED FROM PRECEDING PAGE

Replacement Pins: Furnished Std., .003", .008" oversize.

CONNECTING ROD: Length—7⅞". Weight—32.4 ozs., with bolts, less bearings. NOTE—Piston pin hole is bronze bushed.
Crankpin Journal Diameter—2.124-2.125".

►*JOURNAL DIAMETER CAUTION—(ONE OR MORE journals machined UNDERSIZE)—See "Crankshaft" (below).*
Lower Bearing—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015" desired. Maximum—.0025".
Sideplay—.006-.011".

Bearing Adjustment: None. Replace bearings.
See "Connecting Rod & Bearings" in DeSoto Special Data.

Replacement Bearings: Standard, .001", .002", .010", .012", .020", .030", .040", undersize.
Installing Rods: Oil metering hole toward camshaft.

CRANKSHAFT: 4 bearing, with vibration damper.
Journal Diameters—2.4995-2.5005".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Engines with undersize journals identified as follows:*
.010" UNDERSIZE (ALL Main & Connecting Rod Journals)—Letter "B" stamped with engine number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (⅜" high) stamped on the machined surface at the upper right hand corner of the block (adjacent to front cylinder exhaust port) to signify that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the crankshaft center counterweight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None. Replace bearings.
See "Crankshaft & Main Bearings" in DeSoto Special Data.

Replacement Bearings: Standard, .001", .002", .010", .012", .020", .030", .040", undersize.
Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in DeSoto Special Data.*
End Thrust: Taken by flanged faces at rear (#4) main bearing. **Endplay**—.003-.007".

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—(1) 2"; (2) 1 31/32"; (3) 1 15/16"; (4) 1 1/4".
Bearing Type—Removable steel backed, babbitt lined bushings (except #4 machined in block).
Clearance—.0015-.0035". NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry cam toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.
Camshaft Removal—*See "Camshaft & Bearings" in DeSoto Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Timing Chain: Width 1". Pitch .500". Length 24" or 48 links.
Timing Chain Removal—*See "Timing Chain" in De Soto Special Data.*
Camshaft Setting: Sprockets marked. Mesh chain with sprockets so that '0' marks on sprockets are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.718"	.341"	4 27/32"
Exhaust	1.501"	.340"	4 27/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.365"	.002"
Exhaust	45°	.365"	.003"

Valve Seat Width—(Max.) 7/64".

Valve Seat Insert (Exhaust)—Removal & Installation.
See "Valve System" in DeSoto Special Data.
Valve Guides: Remove from above. Press new guides in (stepped end down) with upper end 7/8" below top of block (Tool CM-83), finish ream to give correct clearance (see Valve Stem Clearance).
Valve Springs: Install with closely coiled end up.
Free Length—2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1 3/4"
Valve Open	110-120 lbs.	1 3/8"

Valve Lifters: Mushroom type (remove from below).
Stem Diameter—.6235-.6240". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".
Lifter Clearance in Block—.0000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust (hot and idling). NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" (cold) tappet clearance, No. 6 intake valve should open with No. 6 piston within range of 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on timing chain cover case. Reset tappet clearance to standard.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump mounted externally on right side of crankcase.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—50 lbs. at 30 MPH.
Oil Pressure Relief Valve—Oil pressure relief valve opens at 40-60 lbs. Under plug on left side of crankcase ahead of oil line to provide additional oil at idling speeds. Adjustable by replacing spring (3 types. (1) Standard spring painted BLUE. (2) Lighter than Standard painted RED. (3) Heavier than Standard painted GREEN.

►*RELIEF VALVE SPRING CAUTION—Replace spring of same color as original spring.*

Oil Pan Removal: *See DeSoto Special Data.*
Oil Pump: Rotor type on right side of crankcase.
Oil Pump Overhaul—*See DeSoto Special Data.*
Removal—Remove distributor cap and turn engine over until #1 cylinder is in firing position (allow engine to remain in this position while pump off engine). Remove two oil pump Allen-head screws. Take pump off engine.
Installation—Oil pump must be installed on engine with #1 piston in firing position with rotor on distributor opposite #1 terminal in cap.
Oil Filter: Bypass type (full-flow cannot be used). Optl. On left side of engine above starter.
Servicing—Replace element at 8000 mile intervals.
Filter Cartridge—Mopar No. 861028.
Oil Pressure Gauge: Auto-Lite No. (1952 Early) 12340A, (1952 Later) 12801A, (1953) 13017A.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, pressure vent cap, and water distribution tube in cylinder block behind pump.
Pressure Valve—DeSoto No. 1346849. Radiator Filler Cap. Opens at 7 lbs.
Capacity—15 quarts (16 quarts with heater).
Water Distribution Tube Servicing: *See "Cooling System" in DeSoto Special Data.*
Radiator Removal: *See DeSoto Special Data.*
Water Pump: Packless type. Grease fitting for lubrication.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs. Remove pump.
Thermostat: By-pass type in cyl. head water outelt.
Setting—Starts to open at 157-162°. Fully open 183°.
Temperature Gauge: Auto-Lite. (1952 Early) 12715A, (1952 Later) 12797A, (1952 Taxi) 12885A, (1953) 13016A, (1953 Taxi) 13237A.

CLUTCH

Borg & Beck	Model	Assy. No.
Synchro-mesh Trans.	10A7	930
Fluid Drive	9A7	1329
Heavy Duty	11A6	929
Taxicab	11A6	1330

Single plate, dry disc type.
See Clutch Section for complete data.
Facings—Molded woven type, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125"
10A7	7"	10"	.125"
11A6	6½"	11"	.125"

Pedal Adjustment: Adjust stop screw on lower end of pedal and adjusting nut on connector link at fork.
Pedal Free Play (At outer end of clutch fork)—⅛" to 3/32". **(At Pedal Pad)**—1".
Over-Center Spring Adjustment: Tighten adjusting nut until within ¼" of end of adjusting screw (end of screw visible about half way through nut). Depress clutch pedal 1" and finish adjusting until over-center spring is on dead center.
See "Clutch Notes" in DeSoto Special Data.
Removal: Remove release fork pull-back spring. Remove Transmission (See Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

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FLUID DRIVE

DeSoto—Fluid coupling at rear of engine. Optl. *See Transmission Section for complete data.*

Slippage Test: Maximum engine RPM should be 1100 RPM in direct drive with car stationary and engine properly tuned up. If speed higher, check for leakage and low oil level. Use Mopar Fluid Drive Oil. *See "Chrysler Fluid Drive" in Transmission Section.*

Removal: Remove transmission and clutch (see Transmission and Clutch), take off driver flange studs (Tool C-589), lower fluid drive assembly out.

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). *See Transmission Section for complete data.*

Transmission Control: Manual steering column shift. *See Transmission Section for complete data.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see DeSoto Special Data for Propeller Shaft Center Bearing Removal on 8 Pass.). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove transmission-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car.

NOTE—Use pilot studs when installing assembly.

OVERDRIVE

Warner Type R10. Optl. with Synchro-mesh transmission. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down. *See Transmission Section for complete data.*

Solenoid—Delco-Remy No. 1118155.

Governor—Auto-Lite (1952-53) No. TGE-4008, (1953) TGE-4010.

Control Relay—Auto-Lite (1952) No. HRT-4001 or HRT-4001A, (1953) No. HRT-4001A.

Overdrive Fuse—20 ampere. On relay.

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

Tip-Toe Shift Type (with Fluid Drive)—Semi-automatic design, four-speed transmission with hydraulic actuation and electrical controls. *See Transmission Section for complete data.*

▷*TRANSMISSION SELECTOR LEVER ADJUSTMENT (To correct difficult shifting): See Transmission Section for complete data.*

▷*TESTING & TROUBLE SHOOTING: See Transmission Section.*

Transmission Control: *See Transmission Section for complete data.*

Kickdown Solenoid—Auto-Lite No. SSS-4003.

Governor—Auto-Lite No. TGG-4001.

Kickdown Switch—Part of carburetor assembly.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, REPLACE DRAIN PLUG. Disconnect transmission mounting bolts and lower assembly out of car.

▷*INSTALLATION CAUTION*—Rear face clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

▷*OTHER TRANSMISSION SERVICE DATA: See Transmission Section.*

UNIVERSALS

Detroit Universal. Ball and Trunnion type.

Propeller Shaft Center Bearing: Used on 8 Passenger. *See DeSoto Special Data.*

REAR AXLE

Own Make. Semi-floating hypoid gear type with Hotchkiss drive.

1952 Ratios:	Est. Wgn.	8 Pass.	Others
Synchro-mesh	3.91-1	4.3-1②	3.9-1①
Auto. Trans.	3.91-1	4.1-1	3.73-1③
1953 Ratios:			
Synchro-mesh	4.1-1⑤	4.3-1⑥	3.9-1④
Auto. Trans.	3.91-1⑦	4.1-1⑤	3.9-1④

①—Optl. 3.73-1. Spec. Equip. 3.54-1 & 4.1-1.
②—Optl. 4.56-1.
③—Optl. 3.9-1 & 4.1-1.
④—Optl. 3.73-1 & 4.1-1.
⑤—Optl. 3.91-1 & 4.3-1.
⑥—Optl. 4.1-1 & 4.89-1.
⑦—Optl. 4.1-1 & 4.3-1.

Ratio Identification—Ratio stamped on underside of carrier on pinion bearing end. *See Rear Axle Section for complete data.*

Removal: Disconnect rear universal, remove axle shafts (see below), and carrier assembly capscrews.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at brake cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (Use C-499 puller). NOTE—Use Puller C-293-C to remove bearing from shaft, Puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Outer Seal: Leather type mounted on brake support (backing plate).

Oil Seal Servicing—*See "Rear Axle Notes" in DeSoto Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow", direct acting hydraulic type. Non-adjustable. Serviced by replacement.

1952 Shock Absorbers

DeSoto Part No.	Front	Rear
Std.	1321127①	1321128
Heavy Duty	1450041	1450039

1953 Shock Absorbers

DeSoto Part No.	Front	Rear
Std. exc. 8 Pass. & Est. Wgn.	1326164	1326165
8 Pass. & Est. Wgn.	1450346	1326166
Heavy Duty	1450041	1450075

①—No. 1326164 on later cars.

FRONT SUSPENSION

Front Suspension: Independent linked parallelogram type with coil springs and direct acting shocks. *See Front Suspension Section for complete data.*

Kingpin Inclination—5° to 6½° with 0° camber.
Camber—Neg. ⅜° to Pos. ⅜° (¼-½° higher on left).
Caster—Neg. 1° to Neg. 3°, (Neg. 2° preferred).
Toe-In—0" to 1/16". (0" preferred). Adjust both tie rods equally.
Toe-Out on Turns—Inner wheel 21½° plus or minus 1°, with outer wheel at 20°.

STEERING GEAR

Own Make (same as Gemmer Model 335). Three-tooth Worm and Roller type. *See Steering Gear Section for complete data.*

Power Steering (Hydraguide): Gemmer. Optional equipment on all models. Gemmer hydraulic steering unit. Oil pump on generator operates piston connected to steering cross-shaft. Controlled through a valve block assembly actuated by steering gear shaft. *See Steering Gear Section for complete data.*

▷*POWER STEERING "HIGH SPOT" OR "LUMPY" FEELING AT OR NEAR STRAIGHT AHEAD POSITION—See "Gemmer Hydraguide" in Steering Gear Section for complete data.*

▷*FRONT WHEEL SHIMMY CORRECTION (Power Steering Cars): See "Chrysler, DeSoto, Dodge, Plymouth Front Suspension" in Front Suspension Section.*

▷*PRODUCTION & REPLACEMENT PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Gemmer Hydraguide" in Steering Section.*

BRAKES

Service: DeSoto "Safe-Guard" Lockheed hydraulic.
Front Wheels—Two cylinder type.
Rear Wheels—Double anchor type with single (double-acting) wheel cylinder. *See Brake Section for complete data.*
Wheel Cylinder Diameter—1⅛" (all).
Drums—Centrifuse. Diameter 12".
Lining—Molded asbestos. 2" wide, 13/64" thick.
Length per Shoe—12.57".
Clearance—.006" at each end of all shoes.
Braking Power—60% (Front), 40% (Rear).

Hand Brake: On shaft at rear of transmission. 6" external contracting type (with Std. Trans.), 7" internal expanding type (with Tip-Toe Shift).

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Int. Type	2"	5/32"	13 1/16"

Clearance (External Type)—.015-.020".
Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".
Adjustment—*See "Hand Brake Notes" in DeSoto Special Data.*

Brake Power Unit: Chrysler Vacu-ease Vacuum Power unit. *See Brake Section for complete data.*

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Electric type.
1952 Models—Auto-Lite No. EWJ-4001A (Early), No. EWJ-4007A (Later).
1953 Models—Auto-Lite No. EME-4001A, EMG-4001A, EMG-4101A, or EMG-4103A (Early), No. EMG-4102A (Later).

▷*1953 WINDSHIELD WIPER PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION ON EARLY TYPES: See "Auto-Lite Electric Windshield Wiper" in Miscellaneous Section.*

WINDOW REGULATORS: Auto-Lite Electric type. *See Miscellaneous Section for complete data.*

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1952 Serial Numbers:	Detroit	Los Angeles
S-17	55,000,001	64,001,001
1953 Serial Numbers:		
S-16	55,050,001	64,008,001

ENGINE NUMBER: Stamped on boss on the top front side of block just back of water pump.

ENGINE NUMBER LETTERS & MARKS (Following Engine Number)—Identified as follows:

"A"—All Cylinders .020" Oversize.

"B"—ALL Crankshaft Journals .010 Undersize.

"AB"—BOTH above conditions exist.

"MALTESE CROSS" (⅜" high)—**ONE OR MORE** Crankshaft Journals .001" Undersize *(See "Connecting Rods" & "Crankshaft" below.)*

"DIAMOND" (⅜" high)—**ALL** Tappet bodies are .008" Oversize.

TUNE-UP

►*1952 ACCELERATION HESITATION (EARLY CARS WITH CARTER WCD 884S & 884SA CARB.): See "Carter WCD" in Carburetor Section.*

►*1952 IMPROVED ACCELERATION & ROUGH IDLE CORRECTION (LATER CARS WITH CARTER BBD 901S, 905S, 906S CARB.): See "Carter Dual BBD" in Carburetor Section.*

COMPRESSION PRESSURE: 135 to 165 lbs. at 150 RPM cranking speed (min. pressure 90 lbs., maximum variation between cylinders 15 lbs.).

VACUUM READING: Steady 18-21" idling.

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinder Numbering—Left Bank 1-3-5-7. Right Bank—2-4-6-8.

SPARK PLUG GAPS: .035".

Plugs—Auto-Lite Resistor type 4S140. 14 mm.

DISTRIBUTOR: Auto-Lite No. IAZ-4002. Double breaker type with automatic advance and vacuum spark control.

Breaker Gap—.015-.018".

Cam Angle—26° to 28° (one set points). 32° to 36° (Total Dwell). Set both points alike.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite (1952) CR-6007B (1953) CR-6015.

Ignition Current—2.25 amperes idling. 5 stopped.

CONDENSER: Auto-Lite No. IAU-3076LA.

Capacity—.25-.28 microfarad.

IGNITION TIMING: 4° BTDC. See Man. Adjustment.

Timing Mark—Vibration dampener marked "DC" at top dead center point with 15—1° graduations before and after this point.

Manual Adjustment—Adjust distributor to give slight ping in 15-30 MPH range when accelerating from 15 MPH in fourth gear with wide open throttle. CAUTION— Do not set timing more than 4° early or 4° later than specified setting.

Timing Procedure—*See Ignition Timing.*

►***CARBURETOR REMOVAL CAUTION—Drain 3 to 4 gallons water from cooling system before removing carburetor from engine (throttle body water jacketed and water connecting tubes used).***

CARBURETION (EARLY 1952): CARTER WCD, No. 884S & 884SA Carburetors. Dual downdraft type.

Idle Setting—Both screws ¾-1¼ turns open (turn screws out for richer mixture).

Idle Speed—475-500 RPM. (shift lever in neutral).

Float Level—11/64" (Gauge T109-205) from top of floats to machined surface on bowl cover.

Accelerating Pump—Inner hole (short stroke) normal.

Fast Idle: .018" throttle valve opening (Gauge T109-44) with choke valve closed. Adjust fast idle screw.

Slow Closing Throttle: After adjustments completed, turn dashpot adjusting screw until dashpot plunger can be moved in approximately 1/16" from normal position against actuating arm. This will provide maximum dashpot action.

Automatic Choke Setting: Centered.

CARBURETION (LATE 1952 & 1953) CARTER BBD (see Carburetor for various models used). Dual downdraft.

Idle Setting—Set idle adjustment screws for smooth idling with engine warm (idle screw ¼ to 1¼ turns open), turn screws out for richer mixture. Adjust both screws alike.

Idle Speed—475-500 RPM. (shift lever in neutral).

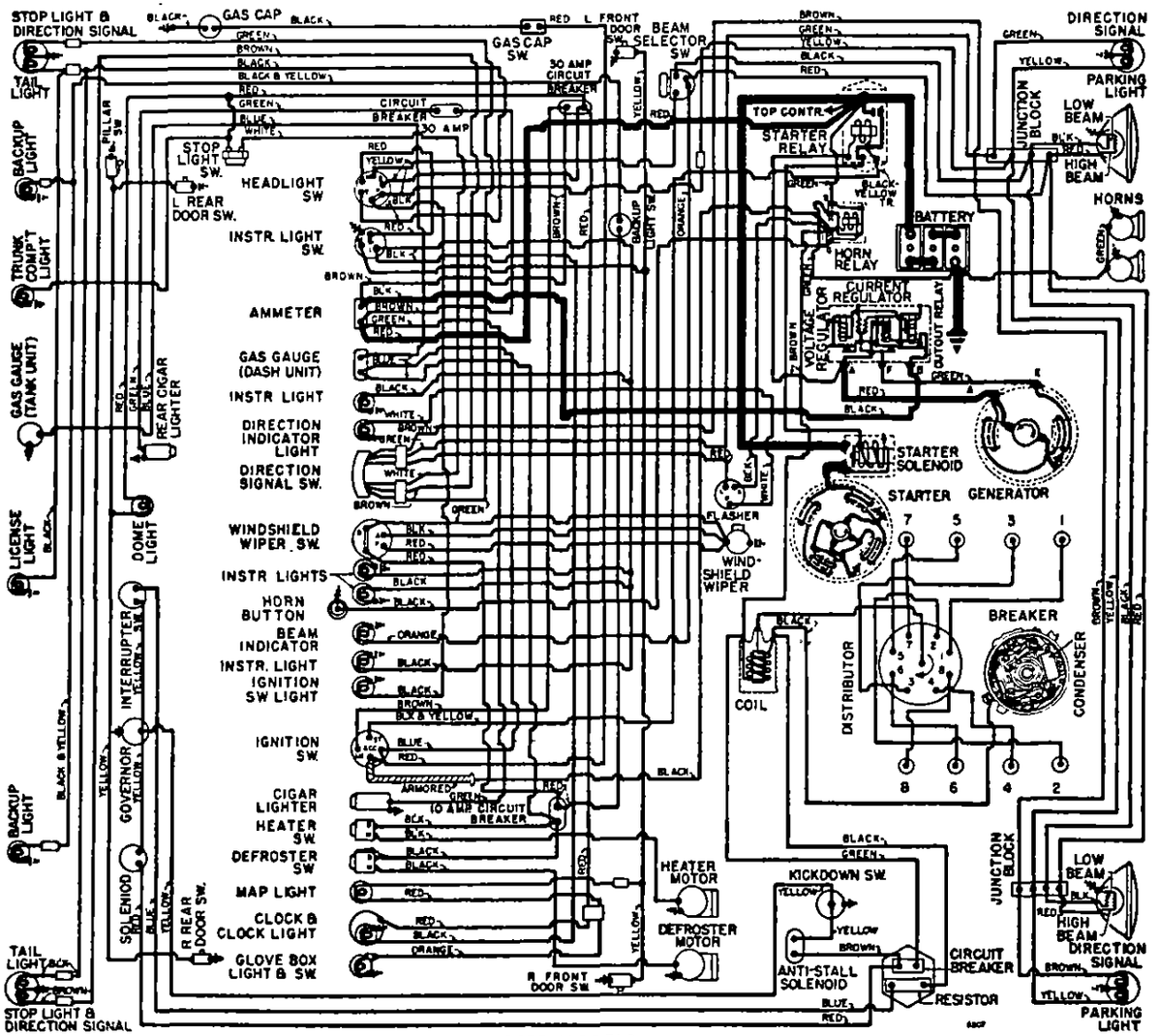
Float Level (901S, 905S, 906S)—5/16" (Gauge T109-230) plus 1/32" feeler thickness from top of floats to top edge of float bowl.

Float Level (908S, 909S, 910S)—9/32" (Gauge T109-230) from top of floats to top edge of float bowl.

►***FLOAT LEVEL SETTING CAUTION (Later 911S, 912S, 913S Carburetors)—TWO DIFFERENT types of floats (flat top and curved top) used on these models and DIFFERENT FLOAT SETTING used for each type***

Float Level (911S, 912S, 913S)—9/32" (flat top

CONTINUED ON NEXT PAGE



1952 MODELS

CONTINUED FROM PRECEDING PAGE

floats), 7/32" (curved top floats) from top of floats to top edge of float bowl with float pin at bottom of guide slots.

Accelerating Pump—Pump connector rod in outer hole—long stroke, pump arm pin in top hole of plunger shaft. Normal setting.

Fast Idle: .015-.019" throttle opening (Gauge T109-44) with choke valve tightly closed. With throttle adjusting screw backed out, adjust by bending choke connector rod at lower angle (Tool T109-213).

Dashpot Adjustment (901S, 8S, 11S): After carburetor adjustments completed, turn dashpot travel adjusting screw (on actuating arm on throttle shaft) until dashpot plunger can be moved in approximately 1/16" from normal position against actuating arm. This will provide maximum dashpot action.

Automatic Choke Setting: Centered (all models).

Fuel Pump Pressure: 3½-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. *NOTE*—Shaft must rotate freely in bushings without excessive free play. If clearance between shaft and bushings exceeds .002-.005", replace necessary parts.

See "Manifold Heat Control" in DeSoto Special Data.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully right. Key automatically returns to "on" position when released.

COIL: Auto-Lite (1952) CR-6007B (1953) CR-6015.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAU-3076LA.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAZ-4002. Double breaker type with automatic and vacuum advance.
Breaker Gap—.015-.018".
Cam Angle—26-28° (one set points), 32-36° (Total Dwell). Set both points alike.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Dist.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
1°	375	2°	750
2°	400	4°	800
13°	1775	26°	3550
14°	1900	28°	3800

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance

Dist. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5¼"
1°	2°	6"
5°	10°	9¼"
10°	20°	14⅞"
11.5°	23°	17"

Distributor Installation & Basic Timing: Rotate crankshaft until No. 1 cylinder is at TDC (firing position) and pointer on timing chain case cover over "DC" mark on vibration damper. Use Tool C-3027 and position oil pump shaft so that it lines up with the slot in the drive gear. Coat the drive gear shaft with engine oil and install so that after the gear spirals into place, it will index with the oil pump shaft, and the slot in the top of the drive gear will be parallel with crankshaft centerline.

Distributor Driveshaft Bushing Removal & Installation: *See "Oil Pump & Distributor Drive Gear" in DeSoto Special Data.*

IGNITION TIMING

Std. Setting ..... **4° BTDC Idling.** *See Distributor Installation (and Basic Timing) above.*

Timing Mark—Vibration dampener marked "DC" with 15-1° graduations before and after this point (timing mark is 4th graduation before DC mark).

Timing (Using Synchroscope)—Mark correct graduation on vibration damper with white chalk. Connect one lead of synchroscope to #1 spark plug wire at the distributor (Using Tool C-3066 adapter). Connect other lead to negative terminal of battery and direct the light on vibration damper. Idle engine and rotate distributor (clockwise to retard, counter-clockwise to advance) until pointer is aligned with chalk mark on vibration damper.

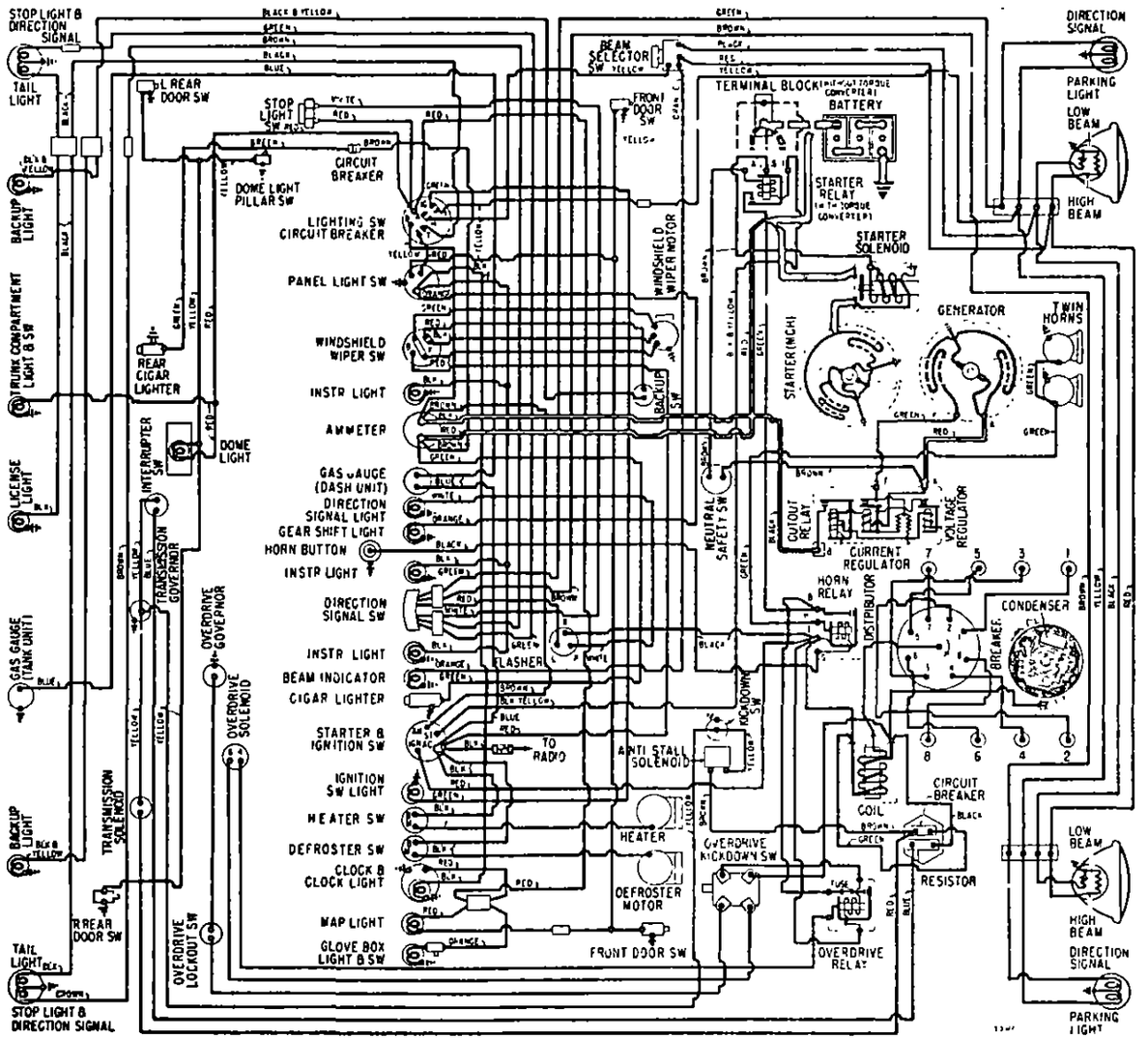
Manual Adjustment—Adjust distributor to give slight ping when accelerating from 15 MPH with wide open throttle, in fourth speed. NOTE—Do not set timing more than 4° early or 4° later than initial setting.

CARBURETOR

CARTER "WCD"

(EARLY 1952) Carter WCD, No. 884S & 884SA. Dual downdraft type with automatic choke.

▷ *ACCELERATION HESITATION (Between 10-20 MPH. in 3rd. Gear or 25-35 MPH. in 4th. Gear):* *See "Carter WCD" in Carburetor Section.*



1953 MODELS

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jet—*See Carburetor Section for "Carter Carburetor Jet Specification Table."*

Fast Idle: Carter Dual (WCD) type.
Setting—.018" throttle opening (Gauge T109-44) with choke valve closed. Adjust fast idle screw.
See Carburetion Equipment Section for complete data.

Slow-Closing Throttle: *See TUNE-UP data.*

Automatic Choke: Carter Climatic Control.
Setting—Centered with index mark on air horn.
See Carburetion Equipment Section for complete data.

CARTER "BBD"

(LATE 1952 & 53) Carter BBD. Dual downdraft types with automatic choke.

Carburetor No.	1952	1952-53	Late 1953
Synchro-mesh	905S	909S	912S
Overdrive	906S	910S	913S
Auto. Trans.	901S	908S	911S

►*IMPROVED ACCELERATION & ROUGH IDLE CORRECTION (Carb. No. 901S, 905S, 906S): See "Carter BBD" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*

Metering Jet—*See Carburetor Section for Carter (B&B) Downdraft Carburetor Jet Specifications.*

Fast Idle & Dashpot Adjustment: *See Tune-Up.*

Automatic Choke: Carter Climatic Control.
Setting—Centered (all models).
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Heavy Duty Oil Bath type.

Fuel Pump: Carter No. M-840S. Diaphragm type.
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oillte metal filter in tank.
Servicing—If more than two pints of water in tank, fuel will not pass filter. Remove filler cap and drain plug, drain tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit Nos.	1952	1953
All exc. Est. Wgn.	12799A	13018A
Estate Wagon	12800A	13019A
Tank Unit Nos.		
Exc. 8 Pass. & Est. Wgn.	11538A	12617A
8 Pass. Models	11538A	11538A
Estate Wagon	12195A	12195A

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite No. 2H-120-B. Optl. Willard HW-2-120-C. 6 volt, 17 plate, 120 ampere hour capacity (20 hr. rate).
Grounded Terminal—Positive to engine.
Location—On left side under engine hood.

STARTER

Auto-Lite (1952-53) No. MCL-6116 (Late 1953) MCH-6113 & MCH-6113A. Armature No. MCH-2070.
Drive—Solenoid pinion shift and overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data—MCL

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Performance Data—MCH

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Removal: *Special box wrench C-455 required.*

Starting Switch: Auto-Lite No. SSX-4002 (MCL), SSX-4004 (MCH). Solenoid pinion shift and starting switch controlled by combination starting-ignition switch through Neutral Safety Switch and Starter Relay (Fluid-Torque Drive Cars only).
Starter Relay—(Fluid Torque Drive Cars)—Auto-Lite .No. HRW-4001A. *NOTE*—Starter Terminal Block used on other cars.

GENERATOR

Auto-Lite. Two brush type with voltage & current regulation.

Auto-Lite Gen. No.	1952	1953
Std. Equip.	GGW-6001Q,K	GGW-6001K,L
Pwr. Steering	GGW-6007A,8C	GGW-6008B,C,D,E,G GGJ-6004A,C,D
Spec. Equip.	GGW-6001L	GGW-6001J
City Police	GGJ-6001F	GGJ-6001F
State Police	GGJ-6001G	GGJ-6001G
Taxicab	GGU-6005A	GGU-6005A

Maximum Charging Rate—See Regulator.
Charging Rate Adjustment—None. See Regulator.

Performance Data—GGJ

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	600-700	650 750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Performance Data—GGW

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Performance Data—GGU

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850
50	8.0	1550-1750	1750-1950

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GGU) 35-53 ozs., (GGJ) 30-37 ozs. (with new brushes).
Field Current—(GGW) 1.4-1.5 amperes, (GGJ & GGU) 1.4-1.6 amperes, all at 5.0 volts.
Motoring Current—(GGW) 4.8-5.3 amperes, (GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, all at 5.0 volts.

Belt Adjustment: Adjust generator belt so there is ¾" deflection midway between pulleys.

REGULATOR

Auto-Lite. Voltage & Current type. "Temperature Compensated" Current Regulator.

Auto-Lite Regulator No.	Generator
VBE-6001A	All "GGW" Gen.
VBF-6001A & VBF-6002A①	All "GGJ" Gen.
VAV-6001B & VAV-6002B①	All "GGU" Gen.

①—For Negative battery ground.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover is sealed. Serviced on exchange basis, if seal not broken (to remove cover).

Cutout Relay
Cuts In—6.3-6.8 volts (All).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.1-7.4 volts (VBE & VAV), 7.15-7.45 volts (VBF) after fifteen minutes operation charging at 10 amperes (VBF), at ½ maximum charging rate (VBE & VAV).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator
►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VAV	55	50 (48-52)
VBE	52	45 (43-47)
VBF	66	55 (53-57)

Test A—After 15 minutes operation charging at 10 amperes (VBF), ½ maximum rate (VAV & VBE).
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type with "Bulls-eye" lens. *See Electrical Equipment Section for data.*
Beam Indicator—Lighted when upper beam in use. Located on lower right corner of speedometer dial.

Directional Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—In lower left corner of speedometer dial.

Switches
Lighting—DeSoto (1952) 1370138, (1953) 1495859.
Beam Selector—DeSoto No. 1253003.
Instrument—DeSoto No. 1369986.
Directional Signal—DeSoto No. (1952) 1440080, (1953) 1495297.

MISC. ELECTRICAL

CIRCUIT BREAKERS (1952): Lighting—30 amperes. Mounted on rear of instrument panel to left of ammeter. Protects Headlights, Tail & Stop Lights, and Instrument Panel Lights.
Accessory Circuit Breaker—8 amperes. Mounted on rear of instrument panel to right of fuel gauge. Protects Back-up Light, and Windshield Wiper Motor.

CIRCUIT BREAKERS (1953): In Headlight Switch assembly. Consist of two 10 ampere and one 20 ampere circuit breakers protecting headlight, tail and stop light, accessory, and interior lighting circuits. Back-up lights protected by windshield wiper switch circuit breaker.

FUSES: Clock—2 amperes. In clock lead wire.
Overdrive—20 amperes. On overdrive relay.

HORNS: Auto-Lite. Twin horns with relay.

Auto-Lite No.	Low Pitch	High Pitch
1952 Early	HW-4107	HW-4108
1952 Later	HW-4203	HW-4204
1953 Early	HAB-4617	HAB-4618
1953 Later	HAB-4659	HAB-4664

Horn Relay—Auto-Lite No. HRL-4104. Connected through ignition switch.

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Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volts min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder "V" type, Valve-in-Head.
Bore—3⅝". **Stroke**—3 11/32".
Displacement—276.1 Cu. in. **Rated HP**—42.05.
Developed Horsepower—160 at 4400 RPM.
Compression Ratio—7.1-1.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: (Not necessary to remove transmission). Work engine out of frame toward left front fender (not necessary to remove heater).

OIL PAN REMOVAL: Remove oil level indicator, drain oil, and remove starter motor and exhaust crossover pipe. Remove oil pan attaching bolts and drop pan straight down and away from engine. To install, reverse removal procedure.

CYLINDER HEAD & TIGHTENING TORQUES: *See DeSoto Special Data.*

PISTONS: Aluminum alloy, T-slot, steel band, slipper type, cam ground, and tin-plated.

►*CYLINDER BORE OVERSIZE CAUTION—Engine with letter "A" following engine number indicates that cylinder bores are .020" oversize.*
Length—3 27/64". **Weight**—18.3 ozs.
Removal—Pistons and rods removed from above.
Clearance—.00075-.00125" at top of skirt.

►*NOTE*—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030", or out-of-round over .004" require reboring and honing to above limits.

Fitting New Pistons: Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x ½" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Feeler pull should be 5-12 lbs. at 70°F.

Replacement Pistons: Standard, .010", .020", .030", .040", .050", .060" Oversize. *See "Pistons" in DeSoto Special Data.*

Installing Pistons: Install with piston slot toward left side of engine (thrust side).

►*PISTON INSTALLATION CAUTION—Pistons must be assembled to the rods on the right hand cylinder bank (2-4-6-8) with the "V" slot in the rod aligned with the "T" slot in the piston. On left hand cylinder bank (1-3-5-7), assemble with "V" slot in rod opposite the "T" slot in piston.*

PISTON RINGS: Two compression, one slotted oil control, all above pin. Oil ring groove drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0775-.0780"	.010-.020"	.002-.0035"
Compr. #2	.0775-.0780"	.010-.020"	.0015-.003"
Oil #3	.1860-.1865"	.010-.020"	.001-.003"

Replacement Piston Rings: *See "Piston Rings" in DeSoto Special Data.*

PISTON PIN: Diameter—.9216-.9218". **Length**—3 1/16". Floating type with lock ring at each end.
NOTE—Piston pin is offset in piston toward right side of engine.
Pin Fit in Piston—.0000-.0005". Tight thumb press fit at normal room temperature (70°F).
Pin Fit in Connecting Rod—.0001-.0004". Tight thumb press fit at normal room temperature (70°F).
Replacement Pins: Std. and .003", .008" Oversize.

CONNECTING ROD: Length—6 1/16" (center to center). **Weight**—22.8 ozs.
Crankpin Journal Diameter—2.0615-2.0625".

►*JOURNAL DIAMETER CAUTION—(ONE OR MORE journals machined UNDERSIZE). See "CRANKSHAFT"*
Lower Bearing—Removable precision type, thin babbitt on steel, no shims.
Clearance—.0005-.0015".
Endplay—.006-.014". Total endplay for two rods.
Bearing Adjustment: None. *See "Connecting Rod & Bearings" in DeSoto Special Data.*
Replacement Bearings: Standard, .001", .002", .003", .010", .012" Undersize.
Installing Rods: Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet.

►*CAUTION*—Rods are **interchangeable,** however when rods are assembled to piston, the assemblies of one engine bank not interchangeable with other bank.

►*CONNECTING ROD BEARING CAP CAUTION*—The "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston pin. When installing the bearing cap make certain the "V" slot oil passage is toward the top of the engine.

CRANKSHAFT: Five bearing with vibration damper
Journal Diameter—2.3745-2.3755".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Engines with undersize journals identified as follows:*
.010 UNDERSIZE (ALL Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A Maltese Cross (⅜" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counterweight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).
Bearing Type—Removable, precision type, steel-backed, babbitt-lined. No shims.
Clearance—.0005-.0015".
End Thrust—Taken by No. 3 (center bearing).
Endplay—.002-.007".
Bearing Adjustment: None. *See "Crankshaft & Main Bearings" in DeSoto Special Data.*
Replacement Bearings: Furnished Std. and .001", .002", .003", .010", .012" Undersize.
NOTE—Nos. 1, 2, 4 bearings are interchangeable. No. 3 & 5 bearings not interchangeable.
Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in DeSoto Special Data.*

CAMSHAFT: Five bearing. Non-adjustable chain
Journal Diameters—(1) 1.998-1.999"; (2) 1.982-1.983"; (3) 1.967-1.968"; (4) 1.951-1.952"; (5) 1.4355-1.4365".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.003".
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Camshaft Removal: *See "Camshaft & Bearings" in DeSoto Special Data.*

Timing Chain: Width 1⅛". Pitch .375". Lgth. 68 links.
Timing Chain Removal—*See DeSoto Special Data.*

►*TIMING CASE COVER REMOVAL CAUTION—Remove water pump before removing timing case cover. (Cover attaching bolt behind water pump).*

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with the center of the camshaft. Temporarily install camshaft sprocket less chain, and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft "Zero" mark exactly in line with center of crankshaft. (Use straightedge to check accuracy of alignment). Remove camshaft sprocket and position it in timing chain and reinstall assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" mark should be in line with shaft centers. Install fuel pump eccentric and camshaft nut. Tighten to 120-130 ft.lbs.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 3/4"	.372-.373"	4 51/64"
Exhaust	1 13/32"	.371-.372"	4 3/4"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.361"	.001-.003"
Exhaust	45°	.361"	.002-.004"

Valve Seat Width—.060-.085" (In.). .040-.060" (Ex.).
Exhaust Valve Seat Inserts—*See DeSoto Special Data.*
Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

►*VALVE GRINDING CAUTION*—If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from valve spring seat in the head should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of hole *with oil hole facing toward intake guide.* Top of guides should be 1" (intake) 1 3/32" (exhaust) from valve seat. Finish ream guides to .374-.375" using tool C-741.
NOTE—If Valve Guide Tool C-3150 is not available, drive guide in, measuring from top of valve seat as follows: **Intake**—1". **Exhaust**—1 3/32".

Valve Springs: Two springs used per valve. Install with closed coil toward cylinder head.
Free Length—(Outer) 2 1/32". (Inner) 1 7/8".

Outer	Spring Pressure	Length
Valve Closed	38-43 lbs.	1 11/16"
Valve Open	100-110 lbs.	1 5/16"
Inner	**Spring Pressure**	**Length**
Valve Closed	12-14 lbs.	1 9/16"
Valve Open	35-40 lbs.	1 3/16"

CONTINUED FROM PRECEDING PAGE

ENGINE

►*CAUTION—Spring ends must be square within 1/16". (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION*—If valves or seats are reground, check installed height of spring. If height of spring is 1 23/32" or greater, install a 1/16" spacer (Part No. 1400482) in the head counterbore to reduce spring height to 1⅝-1 11/16".

►*VALVE SPRING LOAD CAUTION—Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.*

Valve Lifters: Hydraulic type. *TWO types used. See DeSoto Special Data for complete data.* **Diameter**—.9040-.9045". **Clearance**—.0005-.0015".

►*VALVE LIFTER OVERSIZE CAUTION—.008"OVERSIZE Valve lifters used in some engines.* A "DIAMOND" ⅜" high stamped on engine number pad following engine number indicates all lifters .008" O.S.

Rocker Arm Assembly Removal & Installation: *See "Valve System" in DeSoto Special Data.*

VALVE TIMING

Tappet Clearance: No adjustment required.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 52° ALDC.
Exhaust Valves—Open 50° BLDC. Close 14° ATDC.
Valve Timing Check—Turn crankshaft until #1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at Zero, turn crankshaft until dial indicator shows that valve has lifted .016". Pointer on chain cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft counter-clockwise until lifter backed down and valve closed, remove spacer from valve stem.

►*CAUTION—Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

►*TIMING CASE COVER REMOVAL CAUTION—One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing cover case.*

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, timing chain and hydraulic valve lifters (through Optl. "Full-flow" filter).

►*CRANKCASE CAPACITY CAUTION: Later 1952 & 1953 Fluid-Torque Drive Cars have COMBINED engine and torque converter oil system (see below).*
Capacity (exc. Later Fluid-Torque Cars with combined oil system)—5 qts. (1 qt. addtl, when filter changed).
Capacity (Later Fluid-Torque Cars with COMBINED oil system)—12 qts. (1 qt. addtl. when filter changed). *CHANGE OIL TWICE EACH YEAR. See "Chrysler-Fluid Torque Drive" in Transmission Section for Draining & Refilling.*
Normal Oil Pressure—40-65 lbs. at 40-50 MPH.
Oil Pressure Relief Valve—Mounted in oil pump.

►*CLOGGED OIL FILTER CAUTION ("Full-Flow" type)—An oil pressure drop of 15-20 lbs., below normal oil pressure indicates clogged filter. Replace element.*

Oil Filter: *CAUTION—TWO types used:*
Oil Filter ("Shunt-Flow" Type—Std. Equip.)—A portion of the oil from the oil pump is directed through this filter and the remainder flows directly into the engine lubricating system.
Oil Filter ("Full-Flow" Type—Optl. Equip.)—All oil enters lubrication system of engine through filter at full pump pressure. Safety valve in filter opens if filter element is clogged, allowing oil to pass into engine oil system at reduced pressure of 25-45 lbs.
Filter Element ("Shunt-Flow" & "Full-Flow" types)—Install a new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is replaced.

Oil Pump: Rotor type. Mounted on rear bearing cap.
Oil Pump Removal & Overhaul—*See DeSoto Special Data.*

Oil Pressure Gauge: Auto-Lite. (1952) No. 12801A, (1953) No. 13017A. Not electric.

COOLING

Cooling System: Non-pressure type, (under ordinary operating conditions). A pressure vent type radiator cap is used which pressurizes system (up to 7 lbs.) under abnormal conditions where overheating occurs.
Pressure Valve—DeSoto No. 1373136. Radiator Filler Cap. Operates at 7 lbs. (see above).
Capacity—22 qts. One quart additional for heater.

Radiator Removal: *See DeSoto Special Data.*

Water Pump: Packless type with lubricant fitting for bushing lubrication.
See Water Pump Section for complete data.
Fan Belt Adjustment—Adjust fan belt so there is ½" deflection midway between pulleys.

Removal: *Drain cooling system, remove belts and belt pulley.* Remove four bolts attaching pump to manifold and remove pump.
NOTE—Three drain cocks, one on radiator and one on each engine bank.

Thermostat: Bypass type. In cylinder water outlet elbow. Starts to open at 157-162°F. Fully open at 183°F.

Temperature Gauge: Auto-Lite. (1952) No. 12798A, (1953) No. 13016A. Not electric.

CLUTCH

Borg & Beck. Single plate, dry disc type.

Borg & Beck	Model	1952—Assy. No.—1953
Synchro-mesh	10A6	930 1335
Fluid Drive	9.5E	953 1215
Fluid-Torque	9.5E	1221① 1221

①—Model 10E No. 1222 with 1st (12½") Torque Converter.
See Clutch Section for complete data.
Facings—Molded woven asbestos.
10A6—I.D. 6", O.D. 10", Thickness .125".
9.5E—I.D. 6", O.D. 9½", Thickness .125".
10E—I.D. 6½", O.D. 10½", Thickness .125".

Pedal Adjustment: Adjust stopscrew on lower end of pedal, and adjusting nut on link at clutch fork.
Pedal Free Play (At outer end of clutch fork)—1/8" to 3/32". **(At Pedal Pad)**—1".

Over-center Spring Adjustment: Tighten adjusting nut until within ¼" of end of adjusting screw (end of screw visible about half way through nut). Depress clutch pedal 1", adjust until over-center spring on dead-center. *See "Clutch Notes" in DeSoto Special Data.*

Removal (with Tip-Toe Shift): Remove transmission (see TRANSMISSION) and unhook clutch release fork pull-back spring. Disconnect one end of clutch fork rod assembly from fork by removing cotter key, pin, and two washers. Disconnect other end from clutch release bearing torque shaft by removing cotter key, pin, and three washers. (CAUTION—As soon as rod assembly is removed, push clutch pedal until over-center spring brings it to toeboard. This will avoid injury should pedal be pushed in while linkage is disconnected). To remove release bearing from clutch fork, do not force bearing and pull-back springs straight off from fork prongs. Pivot the release bearing away from the fork. Assembly and springs will slide off easily. Remove two screws holding shaft pivot bracket assembly to clutch housing. Remove opposite end of pivot bracket assembly from torque shaft. Place jack under engine oil pan to support engine (block of wood between jack and pan). Remove clutch housing-to-cross member bolts, then cross member-to-frame bolts and drop cross member from frame. Jack engine down about three inches so clutch housing is far enough below floor boards to permit removal of housing capscrews and housing, and remove clutch assembly from clutch driven plate.

FLUID DRIVE

DeSoto—Fluid coupling at rear of engine.
See Transmission Section for complete data.
Slippage Test—*See "Fluid Drive" in Transmission Section for complete data.*

Removal: Remove transmission (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid assembly out of car.

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (second and high), sliding gear (low and reverse).
See Transmission Section for complete data.

Transmission Control: Manual steering column shift.
See Transmission Section for complete data.

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove transmission-to-clutch housing capscrews and nuts, pull unit to rear and down and out from under car. *NOTE*—Use pilot studs for installation.

OVERDRIVE

Warner Type R10. Optl. with Synchro-mesh transmission. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
See Transmission Section for complete data.
Solenoid—Delco-Remy No. 1118155.
Governor—Auto-Lite. (1952) No. TGE-4008, (1953) No. TGE-4008 or TGE-4010.
Control Relay—Auto-Lite No. HRT-4001A.
Overdrive Fuse—20 ampere. On relay.

Removal: Same as for Synchro-mesh transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

Hydraulically Operated Type (with Fluid-Drive or Fluid-Torque). Semi-automatic, four speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data.

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▷*TRANSMISSION SELECTOR LEVER ADJUSTMENT (To correct difficult shifting): See Transmission Section for complete data.*

▷*TESTING & TROUBLE SHOOTING: See Transmission Section.*

Transmission Control: *See Transmission Section for complete data.*
Governor—Auto-Lite No. TGG-4001.
Kickdown Solenoid—Auto-Lite No. SSS-4003.
Kickdown Switch—Part of carburetor assembly.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gear shift rods at transmission, **replace drain plug.** Disconnect transmission mounting bolts, remove from beneath car.

▷*INSTALLATION CAUTION*—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

▷*OTHER TRANSMISSION SERVICE DATA: See Transmission Section.*

FLUID-TORQUE DRIVE

1952-53 LATER TYPE

Own Make. Four element single stage Torque Converter with SEPARATE oil system (oil reservoir, oil pump, and oil cooler). Torque converter unit cannot be disassembled. Replace assembly if repairs necessary.

Lubrication: Maintain oil level at bottom of filler plug hole. Check every 1000 miles, drain and refill every 20,000 miles.
Capacity—10½ qts. Use Mopar Fluid Drive oil or good grade SAE 10W engine oil.
See Transmission Section for complete data.

Removal: *See "Chrysler Fluid Torque Drive" in Transmission Section for complete data.*

1952 EARLY TYPE

Own Make. Four element single stage Torque Converter with COMBINED oil system (combined with engine oil system—no separate oil reservoir or oil pump). *Torque converter unit cannot be disassembled. Replace assembly if repairs are necessary.*

Lubrication: Change engine and torque converter oil twice each year. *See Engine Lubrication (above) and "Chrysler Fluid-Torque Drive" in Transmission Section for complete data.*

Capacity—12 quarts (add one quart additional when filter element changed). Combined engine crankcase and torque converter capacity.

Removal: *See "Chrysler Fluid-Torque Drive" in Transmission Section for complete data.*

UNIVERSALS

Detroit. Cross-and-yoke type except front universal on Fluid-Torque Cars which is Ball-and-Trunnion.

Propeller Shaft Center Bearing: Used on 8 Pass. Cars. *See "Propeller Shaft" in DeSoto Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive. Barrel type differential with adjustable ring gear thrust pad used.
See Rear Axle Section for complete data.

1952 Ratios:	Est. Wgn.	8 Pass.	Others
Synchro-mesh	3.73-1①	3.73-1②	3.54-1③
Auto. Trans. & Fluid-Torque	4.3-1④	3.73-1①	3.73-1⑥
	3.73-1①	3.36-1⑦	3.36-1⑧
1953 Ratios:			
Synchro-mesh	4.1-1⑨	4.1-1⑨	3.73-1⑩
Auto. Trans. & Fluid-Torque	3.91-1⑪	4.1-1⑨	3.73-1⑩
	3.73-1⑩	3.73-1⑩	3.54-1⑫

Optional Ratios

①—3.91-1.
②—4.1-1 & 3.54-1.
③—3.73-1, 4.1-1, 4.3-1.
④—3.91-1 & 4.1-1.
⑥—3.91-1, 3.54-1, 4.1-1.
⑦—3.54-1 & 3.73-1.
⑧—3.36-1, 3.54-1, 3.73-1, 3.91-1, 4.1-1.
⑨—3.91-1 & 4.3-1.
⑩—3.54-1 & 3.91-1.
⑪—4.1-1 & 4.3-1.
⑫—3.36 & 3.73-1.

Ratio Identification—Ratio stamped on underside of carrier on pinion bearing end.
Backlash—.006-.010". Screw adjustment.

Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in brake support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.

Axle Shaft Outer Seal: Leather type mounted on brake support (backing plate).
Axle Shaft Oil Seal Servicing—*See "Rear Axle Notes" in DeSoto Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow" hydraulic, direct acting, non-adjustable type. Serviced by replacement.

DeSoto Part No.	Front	Rear
Std. exc. 8 Pass. & Est. Wgn.	1326164	1326165
8 Pass. & Est. Wgn.	1450346	1326166
Heavy Duty	1450041	1450075

FRONT SUSPENSION

Front Suspension: Independent linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5° to 6½° with 0° camber.
Camber—Neg. ⅜° to Pos. ⅜° (¼-½° higher on left).
Caster—Neg. 1° to Neg. 3° (Neg. 2° preferred).
Toe-In—0" to 1/16". (0" preferred). Adjust both tie rods equally.
Toe-Out on Turns—Inner wheel 21½° plus or minus 1° with outer wheel at 20°.

STEERING GEAR

Own Make (Standard)—3 tooth worm-and-roller.
See "Gemmer 335" steering gear in Steering Gear Section for complete data.

Power Steering (Hydraguide): Optional on all Models. Gemmer hydraulic steering unit. Oil pump on generator operates piston connected to steering cross-shaft. Controlled through a valve block assembly actuated by steering gear shaft.
See Steering Gear Section for complete data.

▷*POWER STEERING "HIGH SPOT" OR "LUMPY" FEELING AT OR NEAR STRAIGHT AHEAD POSITION—See "Gemmer Hydraguide" in Steering Gear Section for complete data.*

▷*FRONT WHEEL SHIMMY CORRECTION (Power Steering Cars): See "Chrysler, DeSoto, Dodge, Plymouth Front Suspension" in Front Suspension Section.*

▷*PRODUCTION & REPLACEMENT PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Gemmer Hydraguide" in Steering Section.*

BRAKES

Service: DeSoto "Safe-Guard" Lockheed hydraulic.
See Brake Section for complete data.
Wheel Cylinders—1⅛" bore. Single acting (front) double acting (rear).
Drums—Centrifuse. Diameter 12".
Lining—Molded asbestos. 2" wide, 13/64" thick.
Length per shoe—12.57".
Clearance—.006" at each end of shoes.
Braking Power—60% (front wheels), 40% (rear wheels).

Hand Brake: Independent type on propeller shaft at rear of transmission. 6" External contracting type (Synchro-mesh Trans. Cars), 7" Internal expanding type (Tip-Toe Shift Trans. Cars).
Drum Diameter—6" (external), 7" (internal).
Lining—Width 2". Thickness 5/32". Two shoes, total length (6" Drum) 15⅜", (7" Drum) 13 1/16".
Clearance (External Type)—.015-.020" around band.
Clearance (Internal Type)—Approximately .010" between shoes and drum.
Adjustment—*See "Hand Brake Notes" in DeSoto Special Data.*

Brake Power Unit: Chrysler Vacu-ease Vacuum Power unit. *See Brake Section for complete data.*

MISC. MECHANICAL

AIR CONDITIONING: Chrysler Airtemp type Optl.
See "Chrysler Air Conditioning" in Miscellaneous Section for complete data.

WINDSHIELD WIPER: Auto-Lite Electric type.
1952 Models—EWJ-4001A (Early), EWJ-4007A (Later).
1953 Models—EME-4001A, EMG-4001A, EMG-4101A, or EMG-4103A (Early), EMG-4102A (Later).

▷*WINDSHIELD WIPER PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION ON EARLY TYPES: See "Auto-Lite Electric Windshield Wiper" in Miscellaneous Section.*

WINDOW REGULATORS: Auto-Lite Electric type. Windows are individually powered.
See Miscellaneous Section for complete data.

CONVERTIBLE TOP CONTROL: Hydro-Lectric type.
See Miscellaneous Section for complete data.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Designation
1954 Firedome	S-19
1955 Fireflite	S-21
1955 Firedome	S-22

SERIAL NUMBER: On metal plate attached to left front door hinge pillar post.

Starting Serial Numbers	Detroit	Los Angeles
S-19	55130001	64017001
S-21	50330001	62045001
S-22	55185001	64022001

ENGINE NUMBER: Stamped on boss on top front side of cylinder block just back of water pump.

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A"–ALL Cylinders .020" oversize.

"B"–ALL Main & Connecting Rod Bearings .010" undersize.

"AB"–BOTH above conditions exist.

"MALTESE CROSS" (3/8" high)–ONE OR MORE Crankshaft Journals .001" undersize. *See "Connecting Rods & Crankshaft" (below).*

"DIAMOND" (3/8" high)–ALL tappet bodies are .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: 135-165 lbs. at cranking speed of 150 RPM. Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21" idling.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatically controlled valve in exhaust manifold of right cylinder block. Valve must operate freely. When installing coil, move outer (tongue) end around (clockwise) ¾ turn, hooking end of spring under right (toward front of engine) stop stud. See *"Manifold Heat Control" in DeSoto Special Data*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders–RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035"

Plugs–Auto-Lite 4S-140 (S-19 & S-22); 4S-165 (S-21). Resistor type, 14mm. Tighten to 30-32 ft. lbs.

COIL: Auto-Lite CR-6015 (1954), CR-6012C (1955). **Ignition Current**–2.25 amps. idling. 5.0 amps. stopped.

DISTRIBUTOR: Auto-Lite. As follows:

Model	Auto-Lite No.
S-19 (Early)	IAZ-4002A
S-19 (Late)	IAZ-4002B
S-21	IAZ-4002D
S-22	IAZ-4002C

Condenser–Auto-Lite IBB-2015R. **Capacity**–.25-.28 microfarad.

Contact Point Set–Auto-Lite IGP-3028ZS.

Breaker Gap–.015-.018". Set maximum gap to .017".

Cam Angle–34° ± 3° with both sets of contacts. Do not adjust contact gap outside limits to obtain specified cam dwell.

Breaker Arm Spring Tension–17-20 ozs.

Rotation–Clockwise viewed from above.

Automatic Advance–IAZ-4002A

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	500	2	1000
5	1075	10	2150
10	1775	20	3550
11	1925	22	3850

Automatic Advance–IAZ-4002B

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
3	400	6	800
6	950	12	1900
9	1500	18	3000
11	1850	22	3700

Automatic Advance–IAZ-4002C

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	370	2	740
2.5	400	5	800
7	725	14	1450
8	800	16	1600

Automatic Advance–IAZ-4002D

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	370	2	740
5	450	10	900
11	1615	22	3230
12	1800	24	3600

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance–IAZ-4002C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5.25
1	2	6.125
4	8	8.50
6	12	10.125
7	14	11.00

Vacuum Advance–IAZ-4002A, B, D

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5.25
1	2	6.00
5	10	9.25
10	20	14.875
11.5	23	17.00

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in DeSoto Special Data.*

IGNITION TIMING

Setting–(S19, S21) 4° BTDC. (S22) 10° BTDC.

Timing Mark–On crankshaft vibration damper.

Manual Adjustment–Timing may be advanced with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR

►*CARBURETOR APPLICATION: Carter 4-Barrel carburetor used on S21 Fireflite. Carter 2-Barrel used on other models.*

►*1954 V8 HESITATION OR STALLING ON ACCELERATION (WITH HOT ENGINE): May be noted on warm days when accelerating after prolonged idling or in heavy traffic. See "Carter BBD Dual" Carburetor in Carburetor Section.*

CARTER BBD 2-BARREL

Transmission	Carter Carburetor No.
S-19 Synchro-mesh (Early)	2067S
S-19 Overdrive (Early)	2068S
S-19 Powerflite (Early)	2070S
S-19 Synchro-mesh (Late)	2129S
S-19 Overdrive (Late)	2130S
S-19 Powerflite (Late)	2131S
S-22 Synchro-mesh	2176S, SA
S-22 Overdrive	2177S, SA
S-22 Powerflite	2178S, SA

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–1/4–1-1/4 turns open. Adjust both screws alike. Turn screw out for richer mixture.

Idle Speed–475-500 RPM (With selector lever in neutral).

Float Level–(1954) 9/32" (flat top floats), 7/32" (curved top floats). **(1955)** 7/32". Measure between top of each float and top surface of body casting. Use Gauge T109-239 for correct adjustment (gauge has both 9/32" & 7/32" dimensions). Equalize floats by bending lip on float arm.

Accelerating Pump–Install throttle connector rod in outer hole (medium stroke) of throttle lever and inner hole of pump arm.

Fast Idle: .022-.026" throttle opening (Gauge T109-44) with choke valve tightly closed. Adjust by bending choke connector rod at lower angle.

Unloader Adjustment: With throttle wide open there should be 1/4" clearance (Gauge T109-31) between upper edge of choke valve and inner wall of air horn. Adjust by bending arm on choke trip lever (use tool T109-214).

Automatic Choke Setting: Centered (at index).

Slow Closing Throttle (Dashpot): Loosen locknut and adjust dashpot unit so that dashpot plunger shaft can be moved inward approximately 1/16" with throttle valve tightly closed. Tighten locknut.

Overdrive Kick-down Switch Adjustment: With throttle valves in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kick-down lever and switch stem guide.

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See Carter "BBD" in Carburetor Section.*

Fuel Pump Pressure: 3½-5 lbs.

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CARTER 4-BARREL WCFB No. 2210S

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*
Idle Setting–1-2 turns open. Set both screws alike. Turn screws out for richer mixture.
Idle Speed–500 RPM. (With selector lever in neutral).
Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section*

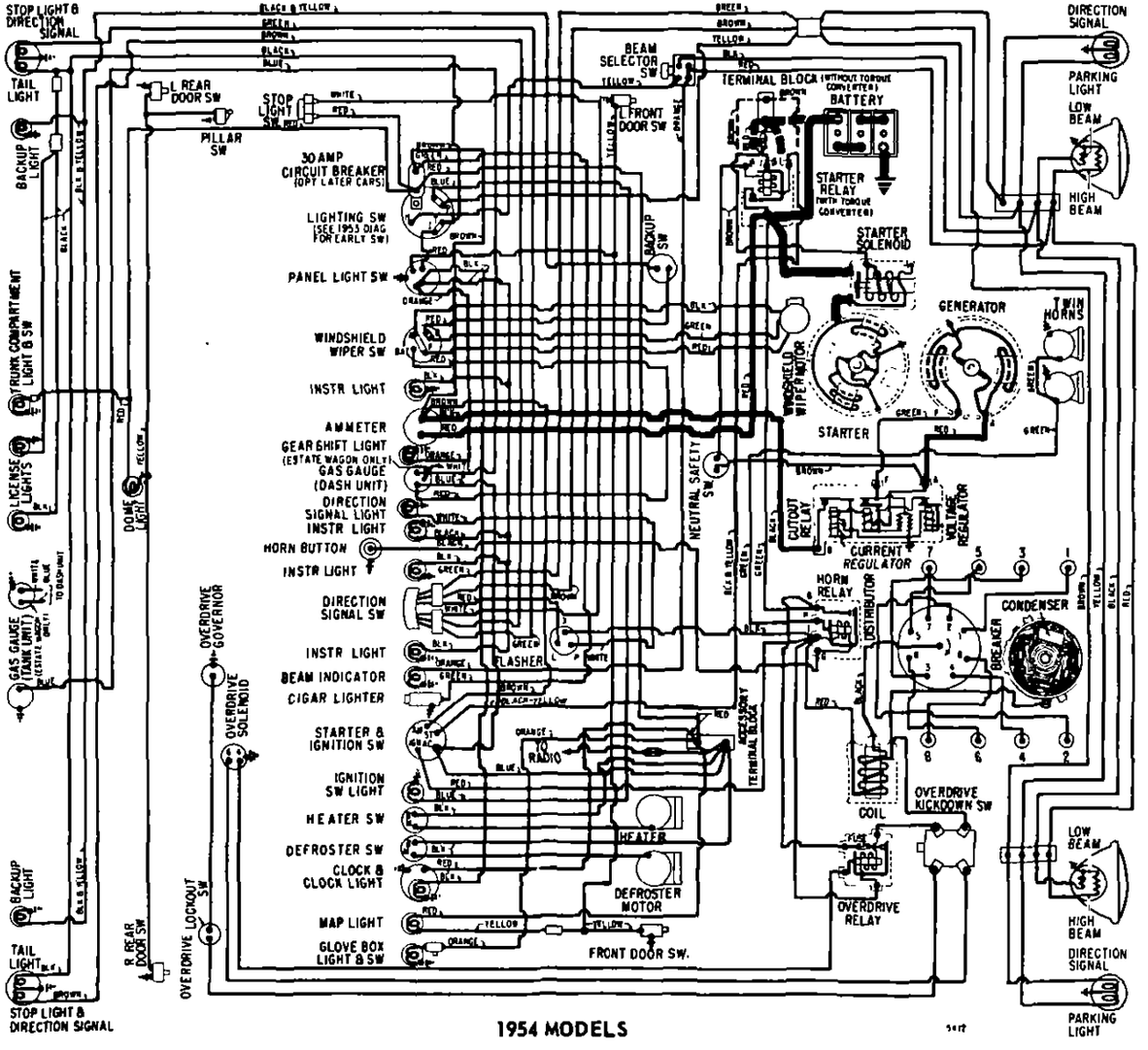
►*OTHER DATA: See "Carter WCFB 4-Barrel" in Carburetor Section.*
Fuel Pump Pressure: 3½-5 lbs.

CARB. EQUIPMENT

Fuel Pump: Carter M840S (1954 & Early 1955). M2241S (*Late 1955*). Vacuum diaphragm type.
Pressure–3½-5 lbs.
See "Fuel Pumps" in Carburetion Equipment Section.
Dash Unit–**(1954)** Auto-Lite 13392A (Exc. Estate Wagon), 13531A (Estate Wagon). **(1955)** Auto-Lite 13728A.
Tank Unit–**(1954)** Auto-Lite 12617A (Exc. 8-Pass. & Est. Wgn.) 11538A (8-Pass.), 13535A (Est. Wgn.). **(1955)** Auto-Lite 13795A.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 2H-120-B or Willard HW-2-120-C. 6 volt, 17 plate, 120 ampere hour rate.



1954 MODELS

Grounded Terminal–Positive.
Engine Ground–Left front of engine.

STARTER

Auto-Lite MCH-6113A (1954), MCL-6304 (1955).
Armature–Auto-Lite MCH-2110.
Drive–Solenoid pinion shift and overrunning clutch.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–42-53 ozs. (new brushes).

Performance Data–MCH-6113A

Torque	RPM	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 ft. lbs.	Lock	2.0	335

Performance Data–MCL-6304

Torque	RPM	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	410

Starting Switch: Auto-Lite SSX-4004. Solenoid pinion shift and starting switch combined. PowerFlite Cars have Neutral Safety Switch and SEPARATE starter relay Auto-Lite HRW-4001A. *See "Starter Controls" in Electrical Equip. Section.*

GENERATOR

1954 MODELS

Auto-Lite Generator No.	Armature No.
GGW-6001J, K (Std.)	GGW-2006F
GGW-6008F, G (Pow. St.)	GGW-2045S
GGU-6006G (Spec. Pow. St.)	GGU-2042F
GGU-6008D (*Air. Cond.*)	GGU-2063F
GGU-6006B (Air. Cond. & Pow. St.)	GGU-2042F
GGW-6008FA (Canada Pow. St.)	GGW-2045F
GGU-6006GA (Canada Pow. St.)	GGU-2042F
GGW-6001L, Q (Special)	GGW-2006F
GGU-6001G, H, R (Special)	GGU-2006F

1955 MODELS

GGW-6001J (Std.)	GGW-2006F
GGU-6001G (Spec. Equip.)	GGU-2006F
GGJ-6001-F (Spec. Equip.)	GGJ-2101AF
GGW-6016A (Pow. St.)	GGW-2090F
GGU-6013D (Pow. St.)	GGU-2071F
GGW-6016E (Can. Pow. St.)	GGW-2090F
GGW-6017A (*Air Cond.*)	GGW-2098F
GGU-6008C (Air Cond.)	GGU-2063F
GGJ-6001K (Air Cond.)	GGJ-2101AF
GGW-6016C (A C. & Pow St.)	GGW-2090F
GGU-6013C (A C & Pow St.)	GGU-2071F
GGW-6016F (Can. A C & P S)	GGW-2090F

►*SPECIAL GENERATOR NOTE:* GGJ, GGU, and GGW type generators used Performance specifications below apply equally to all generators, within any one of the three groups specified

Performance Data–GGJ

Amperes	Volts	Cold – RPM – Hot
0	6.4	600-700
50	*8.0*	*1400-1600*
55	8.0	1500-1700
		650-750
		1550-1750
		1650-1850

Performance Data–GGU

Amperes	Volts	Cold –R.P.M.– Hot
0	6.4	750-850 / 800-900
40	8.0	1450-1650 / 1650-1850
45	8.0	1550-1750 / 1750-1950

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Performance Data–GGW

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Brush Spring Tension–(GGJ) 34-41 ozs., (GGU, GGW) 35-53 ozs., with brushes

Field Current–(GGJ) 1 4-1 7 amperes, (GGU), 1 4-1 6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts.

Motoring Current–(GGJ) 4 1-4.6 amperes, (GGU) 5.0-6 0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts.

Rotation–Counter-clockwise at commutator end

Belt Adjustment: Approximately ½" slack (when pushed from a straight line midway between pulleys).

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VBE-6001A	GGW
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU

Cutout Relay

Cuts In–6.3-6.8 volts.

Cuts Out–4.1-4.8 volts.

Contact Gap–.015" minimum.

Air Gap–.031-.034" with contacts open (check at hinge end of core

Voltage Regulator

Setting (VAV, VBF)–7.1-7.4 volts (at 70°), *after 15 minutes operation charging at ½ maximum rate.*

Setting (VBE)–7.1-7.4 volts (at 70°). *Test with regulator in operation at 10 amperes output.*

Air Gap–.048-.052" with contacts just opening.

Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A – Operating Amperes –	Test B
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	66	55 (53-57)
VAV-6001B, 2B	55	50 (48-52)

Test A–After 15 minutes operation charging at 1/2 maximum rate.

Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF)

Air Gap–.048-.052" with contacts just opening.

Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

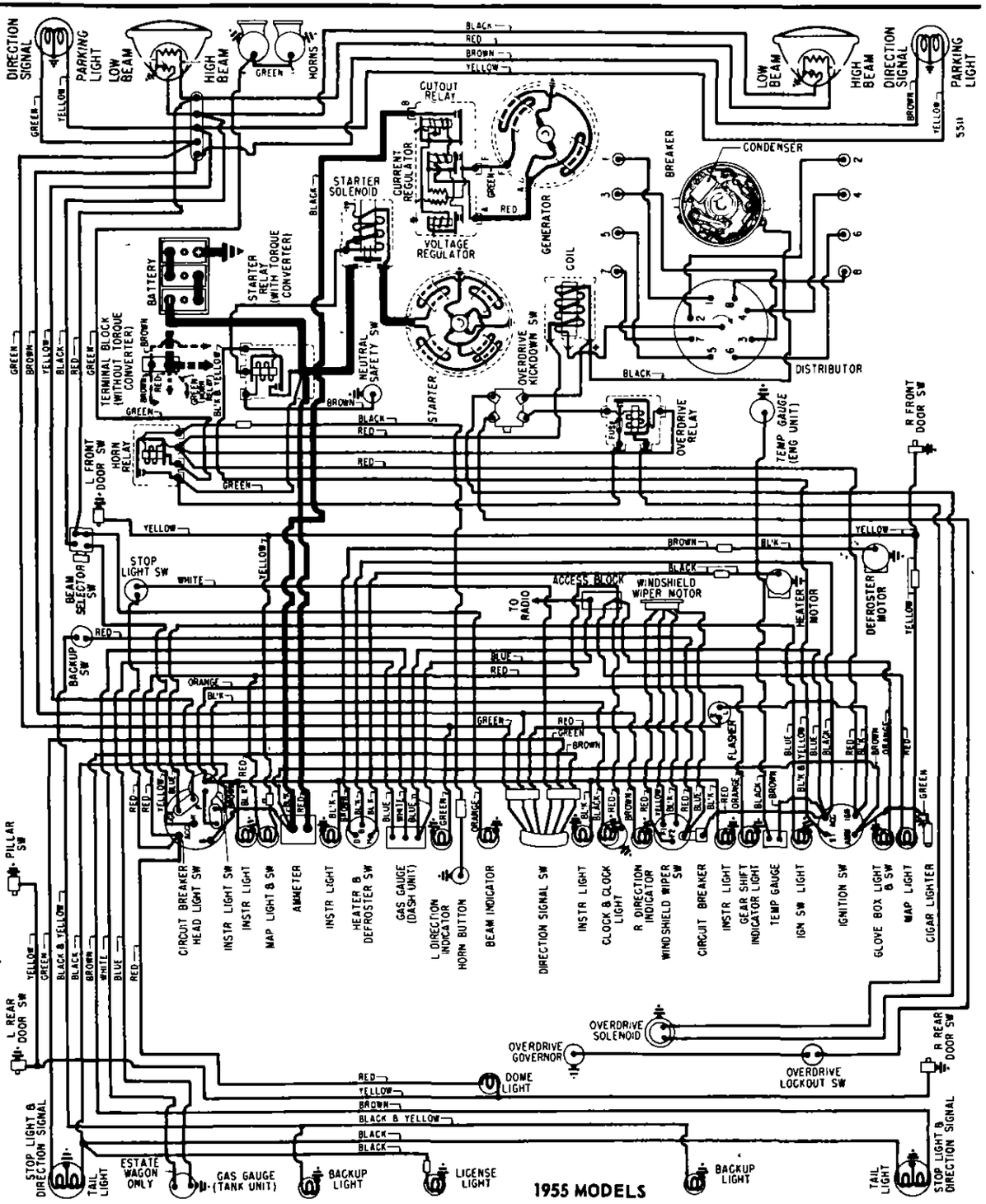
Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Direction Signal: *See Electrical Equip. Section.*

►*IGNITION-STARTER SWITCH CAUTION: When installing accessories, use accessory terminal* **only** *on ignition-starter switch and* **not** *the ammeter terminal*

Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut. Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft. Headlamp

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knob is held on its shaft by means of a recessed hex screw.

Stop Light Switch Location: On forward end of master cylinder.

CIRCUIT BREAKERS: (1954)—One 30 amps. circuit breaker located in headlight switch protects all lighting circuits. *NOTE—Some early 1954 models used the same headlight switch (with three circuit breakers) as 1953 models. See 1953 Wiring Diagram.*

CIRCUIT BREAKERS: (1955)—Three circuit breakers located in headlight switch as follows:

25 Amperes—Protects headlights

10 Amperes—Protects tail lights, license lights, parking, clock, and instrument panel lights.

10 Amperes—Protects stop, map, dome, glove box, courtesy and trunk compartment lights.

FUSES: Clock—3 amperes. In clock lead wire.

Radio—14 ampere. Behind instrument panel.

Overdrive—20 amperes. On overdrive relay.

HORNS: (1954)—Auto-Lite HAB-4659 (Low Pitch), HAB-4664 (High Pitch). **(1955)**—HAB-4704 (High Pitch), HAB-4703 (Low Pitch).

Horn Relay: HRL-4104 (1954), RAF-4001 (1955).

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Model	Bore	Stroke	Displacement
S19 (1954)	3 5/8"	3 11/32"	276.1 cu. ins.
S21, S22 (1955)	3.720"	3.344"	291 cu. ins.

Model	Compr. Ratio	Rated HP	Dev. HP
S19 (1954)	7.5-1	42.05	170 at 4400
S21 (1955)	7.5-1	44.3	200 at 4400
S22 (1955)	7.5-1	44.3	185 at 4400

Compression & Vacuum Reading—*See TUNE-UP.*

ENGINE REMOVAL: *See DeSoto Special Data.*

OIL PAN REMOVAL: Remove oil level indicator, drain engine oil. Remove starting motor and exhaust pipe cross-over. Remove oil pan attaching bolts, and drop pan straight down and away from engine.

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in DeSoto Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in DeSoto Special Data.*

PISTONS

Aluminum alloy, T-slot, steel band, slipper type, cam ground, and tin-plated.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" oversize.*

Weight—18.3 ozs. (stripped).

Removal—Pistons and rods removed from above.

Fitting New Pistons: .001" clearance at top desired. Check piston size with micrometer across large diameter at bottom of skirt. Insert .002" x 1/2" feeler between cylinder wall and piston (piston inverted, and pin removed) on side opposite slot. Pull to withdraw feeler should be 5-12 lbs. at 70° F.

►*NOTE*— Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .020" or out-of-round over .005" require reboring and honing to above limits.

Replacement Pistons: Std., .005", .020", .030", .040", .060" oversize.

Installing Pistons: Install with piston slot toward left side of engine (thrust side).

►*PISTON INSTALLATION CAUTION: Pistons must be assembled to the rods on the right hand cylinder bank (2-4-6-8) with the "V" slot in the rod aligned with the "T" slot in the piston. On left hand cylinder bank (1-3-5-7), assemble with "V" slot in rod opposite the "T" slot in piston.*

PISTON PINS

Floating type with lock ring at each end.

Diameter—.9216-.9218". **Length**—3-1/16".

NOTE—Piston pin is offset in piston toward right side of engine.

Clearance in Piston—.0000-.0005" or thumb press fit at 70° F.

Clearance in Rod—.0001-.0004". Selective fit.

Replacement Pins: Standard, .003", .008" oversize.

NOTE—Fitted pins are furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775-.0780"	.010-.020"	.002-.0035"
Compr. (#2)	.0775-.0780"	.010-.020"	.0015-.003"
Oil (#3)	.1860-.1865"	.010-.020"	.001-.003"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", 040", .060" oversize.

Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length (Center to Center)—6-1/16". **Weight**—22.8 ozs.

Crankpin Journal Diameter—2.0615-2.0625".

Maximum out-of-round and taper limits—.001".

Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*

Clearance—.0005-.0015" desired. Maximum—.0025".

Endplay—.006-.014".

Bearing Adjustment—None. Replace bearings.

Replacement Bearings: Std., .001", .002", .003", .010", .012" undersize.

Installing Rods: *See "Pistons (Installation)" above.* Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet. "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston pin. When installing bearing cap make certain "V" slot oil passage is toward top of engine.

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter—2.3745-2.3755". 5 bearings.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of the undersize journals are stamped on the machined surface of the center (#3) counterweight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).

Bearings—Removable, precision type, steel-backed, babbitt lined. No shims.

Clearance—.0005-.0015".

Replacement Bearings: Std., .001", .002", .003", .010", .012" undersize. Upper and lower halves of bearings Nos. 1, 2, and 4 are alike and interchangeable; Upper No. 3 is interchangeable with Lower No. 3; Upper & Lower No. 5 are **not interchangeable.**

End Thrust: Taken by center (#3) main Bearing.

Endplay—.002-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in DeSoto Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in DeSoto Special Data.*

CAMSHAFT

Journal Diameters—**(1)** 1.998-1.999", **(2)** 1.982-1.983", **(3)** 1.967-1.968", **(4)** 1.951-1.952", **(5)** 1.4355-1.4365".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001-.003"

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width—1-1/8". Pitch—.375". Length—68 links.

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Camshaft Setting: Place crankshaft "Zero" mark exactly in line with center of camshaft. Temporarily install camshaft sprocket less chain, and line up dowel pin hole in hub with sprocket dowel pin hole, while at the same time positioning the camshaft "Zero" mark exactly in line with center of crankshaft. (Use straightedge to check accuracy of alignment). Remove camshaft sprocket and position it in timing chain and reinstall assembly, positioning timing chain on crankshaft sprocket. When properly installed, "Zero" mark should be in line with shaft centers. Install fuel pump eccentric and camshaft nut. Tighten to 120-130 ft. lbs.

Camshaft Removal: *See "Camshaft & Bearings" in DeSoto Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in DeSoto Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in DeSoto Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diameter	Stem Diameter	Length
1954 Intake	1.75"	.372-.373"	4 55/64"
1955 Intake	1.84"	.372-.373"	4.81"
1954 Exhaust	1.407"	.371-.372"	4 13/16"
1955 Exhaust	1.50"	.371-.372"	4.80"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.361"	.001-.003"
Exhaust	45°	.361"	.002-.004"

Valve Seat Width—1/16-3/32" (In.), 3/64-1/16" (Ex.)

►*VALVE SEAT INSERT CAUTION: See "Valve System" in DeSoto Special Data.*

Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from valve spring seat in the head to valve tip should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: Two springs used for each valve. Install with closed coil toward cylinder head.

Valve Spring Specifications

1954 Models

Valve	Inner Spring Lbs. Press.	Inner Spring Length	Outer Spring Lbs. Press.	Outer Spring Length
Closed	13.	1.5625"	40.5	1.6875"
Open	37.5	1.875"	105	1.3125"

1955 Models

Valve	Lbs. Press.	Length	Lbs. Press	Length
Closed	22	1.56"	28	1.69"
Open	42	1.19"	92	1.31"

►*CAUTION: Spring ends must be square within 1/16". (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height of spring is 1-23/32" or greater, install a 1/16" spacer (Part No. 1400482) in the head counterbore to bring spring height back to normal 1-5/8—1-11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.*

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

►*CAUTION: Oil hole in top of exhaust guide must face up. Oil hole must face toward intake guide.*

►*VALVE GUIDE INSTALLATION NOTE:* If Valve Guide Tool C-3150 is not available, drive guide in, measuring from top of valve seat as follows: **Intake**—1". **Exhaust**—1 3/32".

Hydraulic Valve Lifters: Diameter—.9040-.9045". **Clearance**—.0005-0015".

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are .008" oversize.

Lifter Overhaul & Testing—*See "Valve System" in DeSoto Special Data.*

Rocker Arm Assembly: *See "Valve System" in DeSoto Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

S19 & S21 Valve Timing

Intake Valves—Open 12° BTDC. Close 52° ALDC.
Exhaust Valves—Open 50° BLDC. Close 14° ATDC.

S22 Valve Timing

Intake Valves—Open 4° BTDC. Close 76° ALDC.
Exhaust Valves—Open 54° BLDC. Close 10° ATDC.

Valve Timing Check—Turn crankshaft until #1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at Zero, turn crankshaft until dial indicator shows that valve has lifted .016". Pointer on chain cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft **counterclockwise** until lifter backed down and valve closed, remove spacer from valve stem.

►*CAUTION: Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add one additional quart if filter changed.

Normal Oil Pressure: 40-65 lbs. with warm oil operating at 40-50 MPH.

Oil Pressure Regulator—In pump. Not adjustable.

Oil Pressure Gauge—Auto-Lite 13389A (1954); 13727A (1955).

Oil Pump: Rotary type. In crankcase at rear end. Mounted on rear bearing cap.

Overhaul—*See "Oiling System" in DeSoto Special Data.*

Priming Oil Pump (After Overhaul)—Before installing oil pump and strainer to rear main bearing cap, prime pump.

Oil Filter: Shunt type. A portion of oil from oil pump is directed through this filter and the remainder flows directly into engine lubricating system.

Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is replaced.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 22 quarts (23 with heater).

Pressure Valve: DeSoto 1373136. Radiator filler cap. Opens at 7 lbs. 14 lb. type used with Air Cond.

Thermostat: By-pass type in cylinder head water outlet. Starts to open at 157-162° F.

Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for data.*

Pump Removal—Drain cooling system, remove fan belts and belt pulley. Remove four bolts attaching pump to water manifold and remove pump.

Temperature Gauge: Auto-Lite 13390A (1954); 13730A (1955).

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CLUTCH

Borg & Beck	Model	Assy.No.	Disc No.
Std. & O.D. (S19, S21)	10A6	361353	382349
Std. & O.D. (S22)	10A7	361368	382346
Heavy Duty (S22)	11A6	361330	381850

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Adjust fork rod to secure 1/16" free movement of clutch fork outer end This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: (*NOTE*—Over-center spring located above brake pedal and attached to pedal mounting bracket). Adjustment of over-center spring should not be disturbed.

Removal: Remove transmission (See Synchro-mesh Transmission). Remove clutch housing pan. Pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove cap screws, which hold clutch cover to flywheel, loosening each cap screw a few turns (in succession) until cover is free. Remove clutch assembly and clutch disc assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "DeSoto Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing Then remove transmission by pulling it back, down, and out of car.

►*1954 8 PASS. CAR NOTE: See DeSoto Special Data for propeller shaft center bearing removal.*

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down. *See "Warner R10" Overdrive in Transmission Section.*

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level—Apply hand brake, place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.

Oil Filler Tube (Location)—At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit. Ball & Trunnion type (Exc. S22 Est.Wgn.) Ball & Trunnion—front, Cross type—rear (S22 Est. Wgn.).

REAR AXLE

Own. Barrel Type. Semi-floating, Hypoid gear with Hotchkiss Drive.
See "DeSoto Hypoid" in Rear Axle Section.

Rear Axle Ratios

Model	①S.M.	② O.D.	PowerFlite
S19 Est. Wgn	③④3.73-1	④⑤4.1-1	⑥⑦3.54-1
S19 8 Pass.	③④3.73-1	④⑤4.1-1	⑥⑦3.54-1
S19 Exc. above	④⑤ 4.1-1	⑧4.3-1	③④3.73-1
S21 All Models	③④3.73-1	④⑤4.1-1	⑥⑦3.54-1
S22 Exc. Est. Wgn	⑥⑧3.9-1	⑧ 4.3-1	④⑧ 3.73-1
S22 Est. Wgn.	④⑤ 4.1-1	⑧ 4.3-1	⑥⑧3.91-1

①—Synchro-mesh. ②—Overdrive. ③—3.54-1 Optl. ④—3.91-1 Optl. ⑤—4.3-1 Optl. ⑥—3.73-1 Optl. ⑦—3.36-1 Optl. ⑧—4.1-1 Optl.

Backlash—.006-.010"

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in brake support), pull shaft and bearing (use C-499 puller). NOTE—Use puller C-293-C to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-241 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

Car Model	DeSoto Part No. Front	Rear
1954 4-Dr. & Cl. Cpe	1450630	1450633
1954 8-Pass. & Est. Wgn.	1450631	1450635
1954 Others	1450631	1450635
1954 Heavy Duty ①	1450041	1450075
1954 Heavy Duty ②	1450346	1450075
1955 Sp.Cl. & Conv.Cpe	1614406	1450919
1955 4-Door	1614405	1450918
1955 Estate Wagon	1614406	1450920
1955 Others	1614406	1450918
1955 Heavy Duty		1450920
1955 Heavy Duty (Special)		1450037

①—Except 8-Pass. & Estate Wagon.
②—8-Pass. & Estate Wagon.

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.
See "DeSoto" in Front Suspension Section.

Kingpin Inclination—5-6½°.
Caster (1954)—Neg. 1° to Neg. 3° (Neg. 2° preferred).
Caster (1955)—0° to Neg. 2° (0° preferred with Power Steering. 2° preferred with Manual Steering).
Camber (1954)—Pos. 3/8° to Neg. 3/8°. Left side ¼° to ½° higher than right side within these limits.
Camber (1955)—Pos. ¼°±3/8° (Pos. ½° left side, 0° right side preferred).
Toe-In—0" to 1/16" (0" preferred).
Toe-Out on Turns—Inner wheel 21½°±1° with outer wheel at 20°.

STEERING

Manual Steering Gear: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering (Early 1954): Gemmer Hydraguide (Internal Oil Passage Type). *See "Gemmer Hydraguide (Chrysler & DeSoto) Internal Passage Type" in Steering Section.*

Power Steering (Late 1954 & 1955): Co-axial type. *See "Chrysler, DeSoto, Dodge, Plymouth Co-axial" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

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BRAKES

Service: DeSoto "Safe-Guard" Lockheed hydraulic. *See "DeSoto Safe-Guard" in Brake Section.*

Drums–Centrifuse. Diameter 12".

Wheel Cylinder Diameter–1-1/8" bore. Single acting (front), double acting (rear wheels).

Replacement Linings & Shoes–Linings or shoes with linings are furnished Standard and .030" oversize.

Lining–Molded asbestos (bonded to shoe). Length–12.57" per shoe. Width–2". Thickness–13/64".

Braking Power–60% Front. 40% Rear.

Clearance–.006" at each end of all shoes.

Master Cylinder: *On engine* side of dash panel opposite base of brake pedal.

Checking Fluid–Filler plug at top of master cylinder (on dash panel in engine compartment)

Removal–Disconnect pushrod. Disconnect brake line tubes at master cylinder fittings. Remove four stud nuts from studs, remove master cylinder.

Power Brakes: Combination vacuum power unit and master cylinder. Unit mounted on engine side of firewall and replaces regular master cylinder. *See "DeSoto Power Unit" in Brake Section.*

Removal of Power Unit–Same as for standard master cylinder, after hydraulic lines and stop light wires removed

Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type used with PowerFlite.

Adjustment–*See "Hand Brake Notes" in DeSoto Special Data.*

Lining–	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15-3/8"
7" Int. Type	2"	5/32"	13-1/16"

Clearance (External Type)– .015-.020" around band. **Internal Type**–Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMG-4102A (1954), EMZ-4001 (1955). Electric type. *See "Auto-Lite Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: DeSoto "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: *Electric type. Reversible type* motor in each window. Controlled by door switch and master control switch. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjuster: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Electrical-hydraulic type. *See "Power Top Control" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-54 6 CYL. MODELS

	Ft.Lbs.
Spark Plugs	30-32
Cylinder Head Capscrews	65-70
Cylinder Head Nuts	52-57
Main Bearing Capscrew	80-85
Connecting Rod Nuts	45-50
Flywheel Nuts	55-60
Manifold Stud Nuts	15-20
Starting Crank Jaw	108 min.
Chain Case Cover Screw	30-35

1955 6 CYL. MODELS

	Ft. Lbs.
Cylinder Head	70
Manifolds	20
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Crankshaft Pulley	135
Con Rod Caps	45
Engine Front Cover	15
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	25
Oil Filter	25
Clutch Housing	30
Transmission Mounting	45
Transmission Companion Flange	150

V8 MODELS

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	125
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Single Shaft)	30
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover (Single Rocker Shaft)	4.2
Rocker Arm Cover (Double Rocker Shaft)	25
Engine Front Cover	15
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	30
Transmission Companion Flange	150

ENGINE

6 CYL. MODELS

ENGINE ASSEMBLY REMOVAL: Engine, clutch, and transmission assembly can be removed from car as an assembly, as follows: Remove hood and radiator core. Disconnect propeller shaft at transmission. Disconnect transmission controls at transmission (wires to overdrive controls), and speedometer cable. Disconnect clutch linkage at clutch housing. Disconnect fuel pump flexible line at pump, throttle and choke controls at carburetor, heat indicator tube at head. Disconnect wires from generator and starter, coil and distributor. Disconnect exhaust pipe at manifold. Disconnect oil gauge tube at flexible line. Remove crankcase breather pipe, and the front and rear engine support bolts. Disconnect hand brake linkage. Remove carburetor air cleaner. Connect hoist to engine and lift assembly out of chassis.

V8 MODELS

ENGINE ASSEMBLY REMOVAL: Drain cooling system (both cylinder bank drain cocks and radiator). Disconnect propeller shaft at transmission and disconnect wires and linkage at transmission and clutch. Remove exhaust pipes, hood, and battery. Disconnect the usual items under hood such as fuel lines, radiator hoses, wires, etc. If using engine lifting fixture C-3162, remove carburetor assembly after disconnecting integral choke tube, fuel lines as listed above.. Remove radiator shroud (if so equipped). Attach lifting fixture to carburetor flange studs on intake manifold, and hook chain hoist to eyebolt. Place a jack under transmission to relieve weight. Then remove engine rear support mounting bolts and cross-member. Then remove engine front support mounting bolts. Lower jack at transmission and remove from under car. Raise engine and at the same time, work engine out of chassis toward the left front fender.

OIL PAN

6 CYL. MODELS

OIL PAN REMOVAL: Drain oil, replace oil pan drain plug. Remove clutch cover housing underpan to avoid damaging oil pan gaskets or underpan dust shield. Remove oil level indicator, drop oil pan to tie rod. Pan can then be removed by reaching in under crankcase and raising oil strainer to clear baffle while sliding pan out to rear.

Installation—(6 Cylinder Engines)—When installing new gaskets, end gaskets should extend ¼" to ⅛" above level of oil pan (these ends must not be cut off). Side gaskets installed with ends resting on top of protruding end gaskets. Gaskets will be compressed into place when oil pan screws tightened.

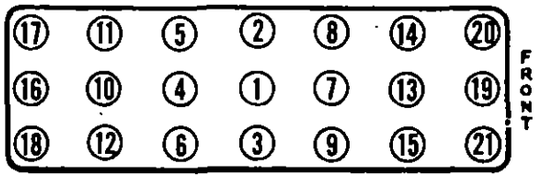
CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

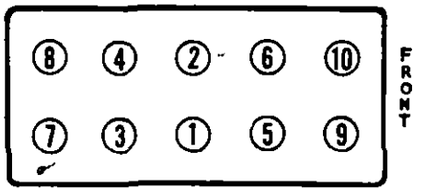
Tightening Torque—See Tightening (Torque Wrench) Specifications above

6 CYL. MODELS

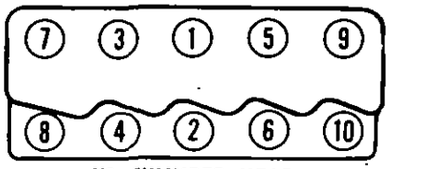
CYLINDER HEAD INSTALLATION: When installing cylinder head, use new gasket. Coat threads of capscrews with sealer except the three screws that lead into intake manifold ports. If sealer used on these capscrews, there is a possibility that it will be drawn into carburetor or valves. Use torque indicating wrench to tighten cylinder head bolt nuts and capscrews. Tighten in sequence shown in diagram.



6 CYL. ENGINE CYLINDER HEAD



V8 CYLINDER HEAD
(DOUBLE ROCKER ARM SHAFT ENGINE)



V8 CYLINDER HEAD
(SINGLE ROCKER ARM SHAFT ENGINE)

6 CYL. MODELS

INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN. Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install assembled manifolds. While holding manifold and gaskets evenly against engine block, install long center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer). Install remaining washer and nuts. *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 15-20 ft. lbs. torque. Tighten the four bolts holding exhaust manifold to intake manifold.

V8 MODELS

CYLINDER HEAD INSTALLATION (Single Rocker Shaft): Before cylinder head removed, remove rocker shaft assembly. Slide out push rods and place them in sequence in a suitable rack in order that each push rod can be reinstalled in its original position. When installing cylinder head, use new gaskets. Make sure all holes are punched out. Be certain cylinder head enters both dowel guide pins in cylinder block. Tighten cylinder head bolts in sequence shown in diagram. Slide push rods in position. Lower rocker shaft assembly down on two locating studs. Install all washers, nuts and bolts. *CAUTION*—Extreme caution must be exercised when tightening rocker shaft bolts and nuts so that hy-

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draulic tappets have time to bleed down to their operating length. If tappets are forced down too rapidly, damage to push rods, tappet bodies or rocker arms will result.

V8 MODELS

MANIFOLD HEAT CONTROL VALVE: Attached to right cylinder block exhaust manifold, and can be removed and repaired without removing manifold.

Removal: Remove the two exhaust manifold flange bolts and nuts and apply pressure to exhaust pipe to separate and remove the heat control valve. Remove counter-weight tightening bolt and nut and remove counter-weight. Remove thermostatic spring, spacer washer, then remove horseshoe lock and remove the anti-rattle spring.

►*CAUTION—Do not operate the engine without heat control valve in the manifold.*

Installation: Install the anti-rattle spring and horseshoe lock, and secure lock to shaft by squeezing end of horseshoe lock together. Check valve and shaft for free movement. Install spacer washer and place inner tongue of coil spring in shaft slot with outer tongue of spring toward forward side of valve and in a down position. Install bumpers on each side of counter-weight, and insert the counter-weight shaft key into counter-weight, securing it in position with the lock bolt. Hold heat control valve in the open position, and move the outer end of thermostatic spring around and up ¾ of a turn, hooking end of spring under forward stop screw. Hold valve in closed position and install counter-weight assembly on shaft. Center butterfly valve in valve body and line up bumpers to clear stop pin, then press counter-weight all the way onto the shaft, with the anti-rattle spring adjusted so that when the valve shaft is pulled up against anti-rattle spring there will be about 1/16" tensional drag on the shaft. Install manifold heat control valve assembly on exhaust manifold. Check assembly for free operation.

ORIGINAL BORE & PISTONS

ALL MODELS

ORIGINAL PISTON & CYLINDER BORE SIZES: Original production (new engine) piston and bore sizes indicated by letter located as follows:

Piston Size—Letter stamped on piston head.

Bore Size—Letter stamped on pad on distributor side of engine at top of block. Do not confuse this letter with "Special Standard" size letter indicating oversize bore.

"Special Standard" Size Bore—Letter "A" or "AB" following engine number indicates engine has .020" oversize standard cylinder bore.

NOTE—When measuring piston diameter take readings at right angles to the pin holes and ¾" from bottom of skirt.

PISTONS

ALL MODELS

REPLACEMENT PISTONS: Finished (Aluminum Alloy) Pistons—Furnished in standard sizes and .005", .020", .030", .040", .060" oversize, for all models.

Semi-Finished (Aluminum Alloy) Pistons—These pistons furnished in two sizes (1) For cylinder bores from standard to .023" oversize. (2) For cylinder bores .025" to .060" oversize. Pistons are finished (head and ring grooves) except for skirt. Pistons must be finished on cam grinding equipment. Do not finish pistons circular. Skirt is elliptical (.010-.014") with smaller diameter cross pin bosses than across thrust faces, and piston is tapered (.0005-.0015"), with smaller diameter at top of piston.

IMPORTANT—Use same type piston when replacing only a partial set. All pistons in engine must be of the same type.

PISTON RINGS

ALL MODELS

REPLACEMENT PISTON RINGS: Three types of piston ring sets furnished by car manufacturer for service replacement as follows:

Mopar Oil Master Ring Sets—These rings designed to be installed in cylinders with walls tapered .005" to .030" when cylinder walls not to be reconditioned. No. 4 oil ring is special 4-piece type (upper and lower rails with stepped segment between rails and slotted expander). Mopar Oil Master Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Oil Saver Ring Sets—These ring sets are designed to be installed in cylinders with .005" or less taper, or where cylinder walls have been reconditioned. This set consists of the same rings as used in Oil Master Set except that No. 3 and No. 4 rings are alike (slotted oil ring with slotted expander). Mopar Oil Saver Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Chrome Master Ring Sets—These ring sets are designed to be installed in cylinders with walls tapered .005-.030" when cylinder walls are not to be reconditioned. Top and bottom rings are chromed.

Oil Ring Set Sizes—All piston ring sets are available in the following sizes: **Standard** (for standard to .009" oversize cylinders); **.010"** (for .010" to .019" oversize cylinders); **.020"** (for .020" to .029" oversize cylinders); **.030"** (for .030" to .039" oversize cylinders); **.040"** (for .040" to .049" oversize cylinders); **.050"** (for .050" to .060" oversize cylinders).

ORIGINAL BEARING SIZES

ALL MODELS

ENGINE NUMBER LETTERS ('SPECIAL STANDARD' BORE & BEARING SIZES): Letters used with engine number (not in circular pad) denote following 'special standard' sizes: 'A'—.020" larger standard cylinder bore. 'B'—.010" smaller standard main and connecting rod bearings. 'AB'—Cylinder bore, main and connecting rod bearings 'special standard.'

CONNECTING ROD & BEARINGS

ALL MODELS

►*CAUTION—See ORIGINAL BEARING SIZES for markings indicating engines equipped with bearings other than standard sizes.*

CONNECTING ROD BEARINGS: Removal & Installation—Bearing shells can be removed after taking off bearing caps. When installing bearing shells, oil hole in rod and bearing must be aligned and ear on bearing halves must be aligned and fitted in notch in rod and cap.

Fitting Bearings—To check bearing clearance, place oiled piece of feeler stock .0015" thick, ½" wide, ¾" long between bearing and crankshaft. Tighten bearing cap nuts. Bearing clearance is correct when slight drag is felt when turning crankshaft by hand. If no drag felt, and crankshaft out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshaft which shows slight wear, .010" for 'Special Standard' .010" crankshafts (see Engine Lettering 'Special Standard' Bore & Bearing Size Notes above), .012" undersize bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

CRANKSHAFT & MAIN BEARINGS

ALL MODELS

►*CAUTION—See ORIGINAL BEARING SIZES for markings indicating production engines equipped with bearings other than standard size.*

REPLACEMENT MAIN BEARING CAPS: Furnished for service where original cap damaged or broken. These replacement caps same as original except for stud holes being 1/64" larger, and bearing cap length which is 1/16" shorter.

Fitting—Replacement caps must be fitted to engine by filing or shimming to obtain proper bearing clearance. This is only necessary when replacement cap originally fitted to engine (cap should not be filed or shimmed to compensate for bearing wear).

ALL MODELS

MAIN BEARINGS: Removal & Installation (with engine in car). Bearing shells can be removed and installed without removing crankshaft as follows: Remove oil pan, and oil suction pipe and screen assembly. Punch mark bearing caps and crankcase to insure re-installation of caps in same positions. Remove caps in pairs (2 front or 2 rear). Upper bearing halves can be removed by using tool C-584 inserted in oil hole in crankshaft and rotating crankshaft to turn bearing out.

►*CAUTION*—When new bearings installed, always use complete bearing (do not use new bearing half with an old half). Upper and lower bearing halves for all bearings except rear are alike.

Fitting Bearings—To check bearing clearance, place an oiled piece of feeler stock, .0015" thick by ½" wide, and 1" long between bearing and crankshaft. Tighten bearing cap nuts or cap screws. Bearing clearance is correct when slight drag felt when turning crankshaft by hand. If no drag felt, and crankshaft journal out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshafts which show slight wear, .010" for 'Special Standard' .010" crankshafts (see Engine Lettering 'Special Standard' Bore & Bearing Sizes Note above), .012" bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

6 CYL. MODELS

CRANKSHAFT OIL SEALS: Car manufacturer recommends that new oil seals be installed when chain cover or rear main bearing cap removed.

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Front Oil Seal (6 Cyl.)—Oil seal located in timing chain cover. Consists of spring backed composition seal in stamped steel housing pressed in chain case cover with composition gasket installed between seal and cover. To install proceed as follows: Insert new composition gasket in chain case cover, drive new seal in place with drift or similar tool slightly larger than seal (seal is press fit in cover). Center seal on crankshaft when installing chain case cover as follows: Install chain case cover on engine with cover screws tightened just enough to hold cover in place, install Centering Tool C-522 on end of crankshaft and hold it in place by tightening crankshaft starting jaw finger tight, tighten chain case cover screws and as cover is being compressed, tighten crankshaft starting jaw nut so as to maintain slight tension between centering tool and seal. Remove tool after chain case cover screws secured. Tighten starter jaw nut to 108 ft. lbs. torque.

Rear Oil Seal (1-Piece Type—6 Cyl.)—Seal is one-piece type with lip on forward edge engaging shoulder in crankcase and bearing cap to rear of crankcase oil slinger. This seal is split at top. To install new seal, remove oil pan, and back off all main bearing cap screws three turns. Remove rear main bearing cap and pull out old seal with pliers. Coat one end of new seal with tire soap or cup grease (avoid getting any grease between seal ends). Insert one end of seal over shoulder in crankcase, work up until end approximately at top, then work other end in same manner on other side until ends come together at top. Coat lower lip of seal so that bearing cap will seat on seal easily. Check rear bearing cap for holes (either sand holes or tapped holes). If holes extend through oil slinger groove shoulder, weld up the sand holes or plug the tapped holes by installing screws that have been coated with sealing compound. Re-install main bearing caps.

Rear Oil Seal (2-Piece Type—6 Cyl.)—Located at rear main bearing. Consists of oil seal packing assembled on rear face of bearing cap and crankcase (upper half held by retainer assembled on rear face of crankcase, lower half by retainer assembled on rear face of bearing cap). Gaskets used on top face of bearing cap at each side, around oil slinger grooves and along shoulder across cap install new packing in retainer on crankcase and cap, place new gaskets on cap and install on engine without disturbing position of gaskets.

NOTE—Some models equipped with two piece (additional) oil gasket. This gasket assembled between seal retainer and crankcase (upper half), between retainer and bearing cap (lower half).

V8 MODELS

CRANKSHAFT OIL SEALS: Front Seal—Remove old seal with tool C-3050. Place new seal on chain cover with projecting flange facing inside the cover. Insert seal gasket and drive into place with tool C-3051.

Rear Oil Seal—Rope type seal of braided asbestos. With bearing cap, bearing, and seal removed, install a new seal into position in cap so that both ends of seal protrude above cap. Tap seal into position with tool C-3131 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, the long seal will be on oil filter side of engine.

ENGINE FRONT COVER

6 CYL. MODELS

FRONT COVER INSTALLATION: Use new gasket and position cover in place. Install screws but do not tighten. Install pulley and hub on crankshaft far enough so that seal can be evenly positioned on crankshaft. Tighten two screws on right side lightly. Then tighten remainder of screws in like manner. Repeat tightening procedure and torque screws to 15 ft. lbs.

FRONT OIL SEAL: To replace, drive old seal out with suitable drift. When installing seal, make sure seal is driven into place evenly to insure a tight fit. Use a new gasket and position cover in place.

V8 MODELS

ENGINE FRONT COVER (All Engines):

Removal: Drain and remove radiator. Disengage fan belt and remove generator. Install Tool C-3033 over pulley and force pulley off end of crankshaft. Support engine with suitable chain hoist fastened to intake manifold. Remove motor support "U" bolts and nuts. Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads. Lift water pump housing, water pump, front motor support and insulator up and away from front of engine. Discard gaskets. Loosen bolts that hold oil pan to cylinder block. Drop pan slightly to clear chain case cover. Disconnect inlet and outlet fuel lines at fuel pump. Remove bolts that hold pump to chain case cover. Slide pump out and away from engine. Discard gasket. Remove bolts and washers from cover. Disengage cover from locating dowels, remove from engine. Discard gasket.

Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs. Install new gasket and position cover locating dowels. Coat screws with suitable sealer and tighten to 15 ft. lbs. *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil.

FRONT OIL SEAL: Remove old seal by driving it out with Tool C-3050. Place new seal on the chain case cover with the projecting flange facing the inside of the cover. Insert seal gasket and drive new seal in place with Tool C-3051.

CAMSHAFT & BEARINGS

6 CYL. MODELS

CAMSHAFT REMOVAL: Remove Front End Assembly as a unit. Remove cylinder head, fuel pump, oil pump, valve tappet cover plates, crankshaft pulley, front motor support (with front of engine jacked up), timing chain cover, camshaft sprocket and timing chain. If valves and valve springs are not to be removed, prop valves up by inserting wooden wedges at opposite sides under valve head. Raise tappets and hold in this position (use spring type clothes pins or similar tool to hold tappets up). Withdraw camshaft (rotate shaft to clear any obstructions).

V8 MODELS

CAMSHAFT REMOVAL: Drain radiator, remove radiator and crankshaft pulley. Support engine with chain hoist attached to intake manifold. Remove engine support U-bolts. Remove fan, water pump, and water pump housing assembly. Loosen oil pan bolts sufficiently in order that oil pan clears chain case cover, camshaft gear hub nut, fuel pump eccentric and dowel. Then remove camshaft gear and timing chain. Support engine at front of oil pan. Then remove intake manifold, distributor, distributor drive gear, tappet chamber cover, rocker cover, rocker shaft assemblies and push rods. Use Tool C-3158 to pull out hydraulic tappets. If varnish build-up is excessive, use puller part of Tool C-3158 and work tappet out of bore. Remove four camshaft thrust bolts, then remove camshaft.

TIMING CHAIN

6 CYL. MODELS

TIMING CHAIN REMOVAL: Remove water pump, hoses, radiator core, belt and front crankshaft pulley. Support engine from underneath and remove front engine support. Remove chain cover. Remove four capscrews holding camshaft sprocket to camshaft, and pull off sprocket. Chain can now be removed. Capscrew holes in sprocket are offset and gear can be installed in one position only on camshaft.

V8 MODELS

TIMING CHAIN REMOVAL: Remove generator and mounting bracket. Remove fan belt and radiator. Install tool C-3033 and pull crankshaft pulley off crankshaft. Fasten a chain hoist to intake manifold, slightly relieve engine weight on front motor support, and remove support bolts and nuts. Remove fan blades and hub, and take off water pump, housing, front motor support and insulator. Loosen bolts holding oil pan to cylinder block and drop oil pan slightly to clear chain case cover. Remove fuel pump. Remove bolts and washers holding chain case cover to cylinder block and pull cover out and away from block. Slide crankshaft pulley off end of shaft, then remove camshaft sprocket hub nut and fuel pump eccentric. Pull camshaft sprocket off shaft and at the same time disengage and remove timing chain.

VALVE SYSTEM

1946-55 MODELS

(EXC. SINGLE ROCKER SHAFT ENGINE)

EXHAUST VALVE SEAT INSERTS (Refacing): Exhaust valve seat inserts must be reground with special high speed grinding tool MTH-JB-41, using the correct size valve guide pilot. Check concentricity of valve seat using a dial indicator. Total runout should not exceed .002". Check valve seat with prussian blue to get seat centralized on valve face. Use a 20° stone at the top or a 60° stone at the bottom, whichever is necessary to centralize the valve seat. Width of valve seat should be 3/64" to 1/16".

Replacement Inserts—Furnished in .010" Oversize. Use special tool C-732 (Exc. V8); C-3140 (Double Rocker Shaft Engines) to remove inserts. After in-

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serts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be .002-.004" larger than counterbore. Enlarge counterbore with tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with installing tool C-767.

ROCKER ARMS
1953-55 V8 MODELS
(DOUBLE ROCKER SHAFT ENGINE)

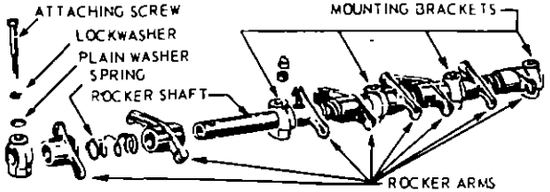
ROCKER ARM ASSEMBLY (Double Rocker Arm Shaft):

Removal: Remove rocker arm covers. Place cotter pins in holes of first and last rocker arm brackets to prevent springs on rocker from pushing assembly apart when cylinder bolts removed. Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block. Grasp support bracket at each end of head, pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068. ***CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.***

Installation: Insert cylinder head bolts in brackets, with **short** bolts in intake side. Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes). Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms. Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above. ***When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.*** Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly.

1955 V8 MODELS
(SINGLE ROCKER SHAFT ENGINE)

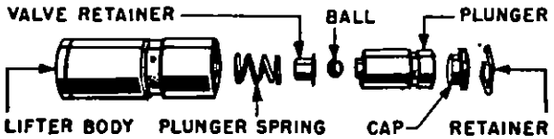
ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft): Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down. Slide an intake rocker arm over shaft and down against bracket, with diagonal slant of arm close to bracket. Then slide a spacer spring over shaft and down against intake rocker arm. Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket. Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed. Slide push rods into push rod holes. Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head. Install flatwashers and nuts.



V8 ROCKER ARM ASSEMBLY (SINGLE ROCKER ARM SHAFT)

HYDRAULIC VALVE LIFTER
V8 MODELS

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type) Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body.. Oil is introduced to this unit through hole in side of lifter plunger.



DODGE V8 HYDRAULIC VALVE LIFTER

Removal: Drain cooling system to a point below level of intake manifold, and remove intake manifold. (CAUTION—cover intake port in cylinder head to avoid the entry of dirt). Remove crankcase ventilator pipe and valve chamber cover. Install rocker arm and valve compressor tool C-3024 over rocker arm so heel of tool rests on the valve stem side. Make certain that valve is seated and that valve lifter is on low side of camshaft lobe. (See "Low Point of Camshaft Lobe," following). Using handle of tool C-3024 for leverage, compress valve spring sufficiently to raise rocker arm above push rod end. While holding rocker arm in this position, slide rocker arm to one side along tube and remove push rod. Insert hooked portion of tool C-3158 into hole in lifter body (this portion of tool can be used to remove lifter without varnish build-up on lower end of lifter). Remove lifter from bore. If lifter sticks in bore, proceed as follows: Slide puller portion of tool C-3158 through cylinder head push rod holes and seat firmly in cap in lifter. Insert puller pin through lifter body and tool shaft in holes provided. Grasp tool handle and pull lifter out of bore with a twisting motion. As lifter clears bore, withdraw puller pin and remove puller. Remove lifter from chamber.

Disassembly: ***(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)*** Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body. Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting. Check to see that valve exerts a slight pressure on valve spring to insure valve seating. Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene. ***(CAUTION***—Container and kerosene must be absolutely clean). Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing. This will prevent possible scoring of lifter plunger when engine is first started.

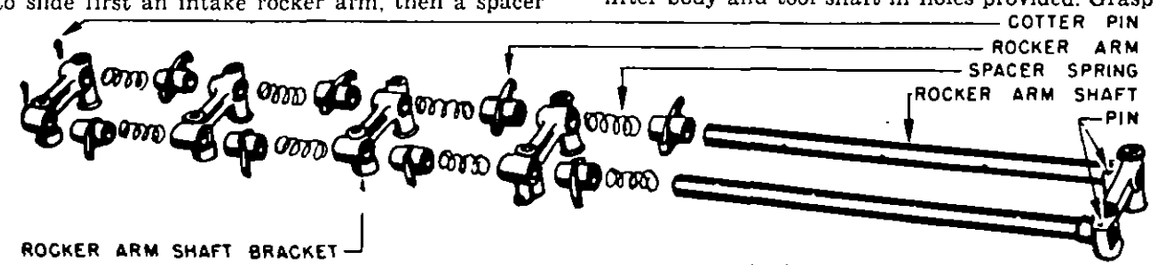
V8 MODELS

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos. 1 and 6 cylinders. Set timing mark "DC" located on crankshaft pulley to pointer. With rotor at No. 1 firing position, the following lifters will be on the low side of the cam lobe: No. 2 intake and exhaust, No. 4 exhaust, No. 7 intake, No. 8 intake and exhaust ***(NOTE***—To remove No. 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed). With rotor at No. 6 position, following lifters will be on low side of cam lobe: No. 3 intake and exhaust, No. 4 intake, No. 5 intake and exhaust, No. 7 exhaust ***(NOTE***—To remove No. 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed).

OILING SYSTEM
6 CYL. MODELS

ROTOR TYPE OIL PUMP: Removal—Before removing oil pump, rotate crankshaft and make sure "DC" mark on crankshaft pulley lines up with pointer on timing chain case cover. Do not rotate engine with oil pump removed. Remove the attaching screws and remove pump from engine ***NOTE***—On some models it will be necessary to remove the two upper cover capscrews to obtain sufficient clearance to remove oil pump.

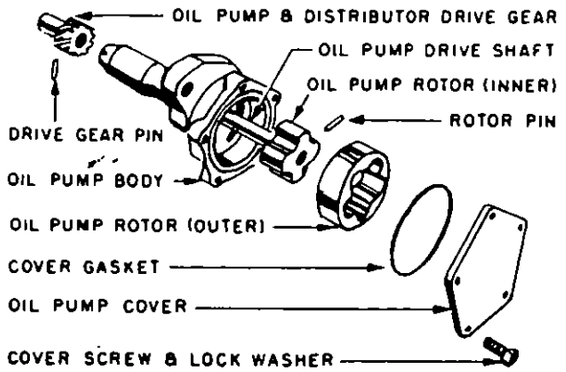
Disassembly & Inspection: Remove the oil pump cover and gasket. Hold hand over cover opening and with pump upside down, turn drive shaft until outer rotor slips out. Drive out the straight pin holding pump drive gear to shaft. Press the shaft



V8 ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

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6 CYL. OIL PUMP

out of drive gear and slide shaft and inner rotor assembly out of pump body. Wash all parts and dry with air. Inspect all parts and replace as necessary, then measure clearance between opposite lobe of inner rotor and outer rotor. Clearance should be .010" or less. If clearance is greater, replace both rotors. Measure thickness and diameter of outer rotor. If thickness is .748" or more and diameter is 2.245" or more, rotor is satisfactory. Thickness of inner rotor should be .748" or more. If either rotor is less than these dimensions, replace BOTH rotors. Insert both rotors into pump body and place a straight edge across pump body between bolt holes. Clearance between straight-edge and rotor should be .004" maximum. If greater, replace pump body. Press outer rotor to one side against pump body and measure clearance between rotor and body on opposite side. Maximum clearance should be .008". If greater, replace pump body. Cover should be smooth and flat. If it is scratched or grooved, replace cover. Check flatness by placing a straight-edge across inner surface of cover. If it is possible to insert a .001" feeler between cover and straight-edge, replace cover.

Reassembly: Slide the drive shaft and rotor assembly into pump body. Press drive gear on shaft until end play of shaft is from .003" to .010". Press rotor down in body with hand and measure clearance with feeler gauge. Install pin and peen over both ends. If pin holes do not line up, drill a new pin hole through gear and shaft, using a 5/32" drill. Slide outer rotor into place in pump body. Install new cover gasket and install cover and tighten screws evenly.

V8 MODELS

ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe. Remove cover bolts and cover. Discard oil seal ring. Remove pump rotor shaft and lift out pump outer rotor. Remove oil pressure relief valve plug and lift out spring and plunger. Wash all parts in a suitable solvent and inspect for damage or excessive wear. Check all pump parts as follows:

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers. If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors.

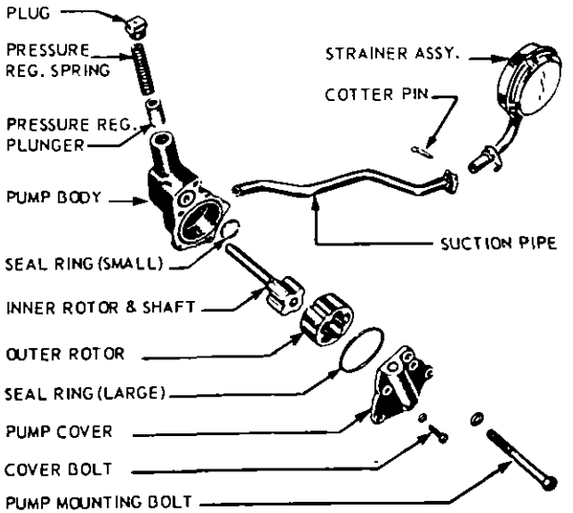
Inner Rotor—Measure thickness of inner rotor with micro-calipers. If thickness measures less than .998", replace both inner and outer rotors.

Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body. Use a feeler gauge and measure clearance between top of rotors and straightedge. If clearance in excess of .004", replace pump body.

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors. If clearance in excess of .010", replace both inner and outer rotors.

Reassembly: Use new oil seal ring between cover and body. Tighten cover bolts to 10-15 ft. lbs. Prime pump and then install new oil seal ring in pump mounting face.

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*



V8 OIL PUMP

COOLING SYSTEM

6 CYL. MODELS

WATER DISTRIBUTOR TUBE: Removable one-piece tube installed between cylinders and valve ports which distributes water from pump to exhaust valve ports through holes in tube.

Servicing—A new tube should be installed whenever engine overhauled or when tube rusted and corroded in order to provide correct water circulation in engine block. To replace tube, proceed as follows: Remove front end assembly. Remove water pump which will expose front end of tube. Remove tube by using rod with hook formed on end. Engage hook in slot in upper side of tube just inside block, pull tube out.

ALL MODELS

RADIATOR CORE REMOVAL: Raise hood, drain cooling system, disconnect hoses, free headlight wires from radiator shroud (if used), take out nuts and capscrews in support at each side, lift core out, tilting top toward rear. *NOTE*—Fan blades on some models must be removed if additional clearance required.

IGNITION NOTES

V8 MODELS

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block.

Installation: Slide new bushing over burnishing end of Tool C-3053. Insert tool and bushing into bore of block. Drive bushing and tool down into position, using a soft hammer. As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. *DO NOT REAM THE BUSHING.*

V8 MODELS

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

CLUTCH NOTES

1946-48 MODELS

CLUTCH OVER-CENTER SPRING: Service only if linkage disturbed or bracket on frame bent. Original setting can be obtained by using Miller Gauge C-705 as follows: Check spring bracket on frame and straighten if necessary, install gauge over linkage pivot pins with lower end engaging coil spring bracket on frame (turn pedal rod turnbuckle until gauge fits properly). Then reset pedal position and free travel as directed on car page.

1949-54 MODELS

CLUTCH OVER-CENTER SPRING: Use Miller Gauge C-853. Place gauge on pin at lower end of pedal and against spring hook. Raise or lower the vertical spring bracket until it just contacts gauge. Move pointer on gauge to setting for car model being worked. Adjust eyebolt until the inside edge is in line with the pointer where spring makes contact with eyebolt.

Adjusting Over-Center Spring Tension—Adjustment is made by turning sleeve nut on spring eyebolt. If pedal is soft and sluggish on return, back off sleeve nut. If pedal requires excessive pressure to depress, tighten sleeve nut until desired action is obtained.

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PROPELLER SHAFT

1946-54 MODELS

PROPELLER SHAFT CENTER BEARING: Used on all passenger car models with two propeller shafts. Consists of ball bearing mounted on rear end of front propeller shaft with an oil seal assembled to front and to rear of bearing, and this assembly bearing and seals) enclosed in a housing which is flange mounted on rear side of frame cross-member. An insulator is assembled on front end of housing. To remove assembly, remove nuts and lockwashers from differential and transmission companion flanges to free propeller shaft at front and rear, take out 4 center bearing housing-to-frame cross-member mounting bolts, remove propeller shaft and center bearing as an assembly.

REAR AXLE NOTES

ALL MODELS

REAR WHEEL BRAKE AXLE SHAFT SEAL: Leather seal mounted on brake support and bears on axle shaft (former design secured by brake support bolts and contacted hub).

Installation—With brake support removed and old seal driven out of support, new seal can be installed as follows: Soak new seal in thin oil for 30 minutes. Roll leather with smooth bar until pliable. Check seal bearing surface on axle shaft and make sure surface is smooth. Install seal on front side of support and stake to support at three points on outer edge. Install sleeve (Tool C-745) in seal (protects seal from damage while installing support). Assemble brake support on housing. *CAUTION*—Lip of seal must not fold when installing in support.

BRAKE NOTES

ALL MODELS

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for .015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015-.020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut.

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed .005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

M DEL IDENTIFICATION

SERIAL NUMBER: On right front door hinge post.
1946 Numbers—30,645,001 Up (Detroit).
1947 Numbers—30,799,738 Up (Detroit), 45,002,146 Up (Los Angeles).
1948 Numbers—31,011,766 Up (Detroit), 45,022,453 Up (Los Angeles).

ENGINE NUMBER: Stamped on boss on left side of engine between #1 and #2 cylinders.

TUNE-UP

COMPRESSION: Pressure—150-160 lbs. at 1000 RPM. or 125-135 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Auto-Lite Type A-5. 14 mm. Metric. Gaps—.030" ± .002".

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020" Cam Angle—38° Closed.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.
Std. Setting—2° After top dead center.
Timing Mark—Second graduation after "DC" mark on vibration dampener aligned with pointer on chain case cover. Vary as follows:
Octane Selector—Set for slight ping when accelerating with wide open throttle between 10-30 MPH.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—With engine warm, set throttle stop-screw for 6 MPH. idle speed. Adjust idle adjusting screw for smooth idle (½-1½ turns open for Carter).
Float Level (Stromberg)—Fuel level ⅝" below top of bowl (even with bottom of inspection hole).
Float Level (Carter B&B)—Top of float (not soldered seam) 5/64" ± 1/64" below top edge of bowl.
Accelerating Pump—Center hole (medium) Normal.
Inner Hole—Summer, Outer Hole—Winter.
Fuel Pump Pressure—3½-5½ lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type. See that valve operates freely. When installing coil, wind free end up approx. one turn.

VALVES: See Valve Timing.
Tappet Clearance—.008" Intake, .010" Exh., Hot.

IGNITION

IGNITION SWITCH: Briggs & Stratton or Mitchellock. NOTE—No armored cable used.
Briggs & Stratton—B & S Switch No. 85985.
Mitchellock Type 42-R—No. E-10182 (Yale & Towne lock), No. E-10663 (Hurd lock).
Lock Cylinder—Yale & Towne, Hurd, or Briggs & Stratton. B & S No. 85915 (Key Series CA1-CA800) or No. 80592 on Early cars (Key Series 1BP-1000BP).

COIL: Auto-Lite IG-4806 or IG-4809. Mounted directly above distributor on ignition cable bracket.
Ignition Current—2¼ amperes idling, 5½ stopped.

CONDENSER: Auto-Lite Part No. IG-3927A.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IGS-4207A-1 (U. S.) IGS-4208B-1 (Canada). Automatic advance type with Vacuum Spark Control and Octane Selector.

Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #8½ (for IGS-4207A-1 distr.), #7 (for IGS-4208B-1).
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance—IGS-4207A-1

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	350	0	700
3	400	6	800
5	620	10	1240
8	940	16	1880
10	1150	20	2300

Automatic Advance—IGS-4208B-1

Start	350	0	700
3	400	6	800
6	850	12	1700
9	1300	18	2600
12	1750	24	3500

Vacuum Spark Control: Auto-Lite Units. On distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring in unit).

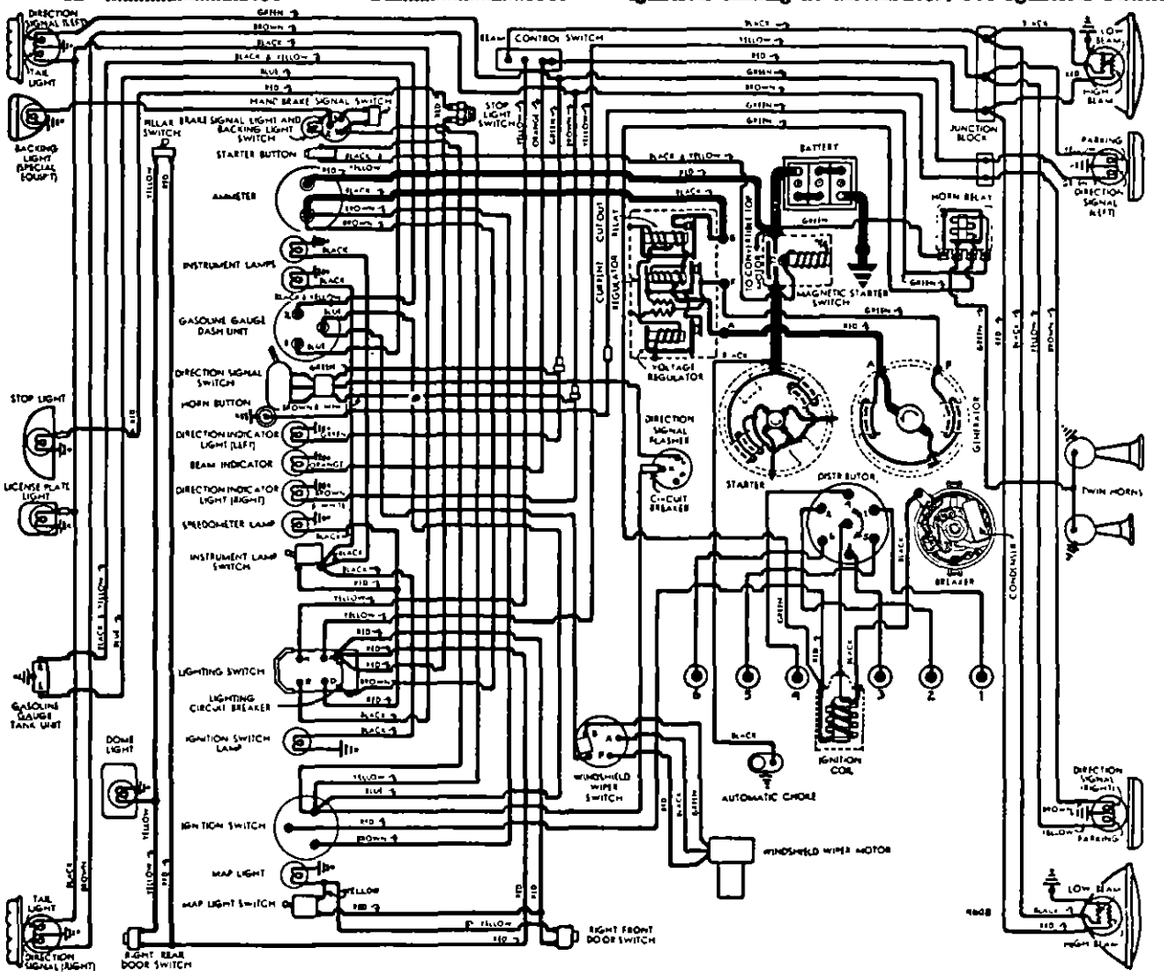
Vacuum Advance—IGS-4207A-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	7⅝"
4°	8°	10½"
6°	12°	12¾"
8.5°	17°	16"

Vacuum Advance—IGS-4208B-1

Start	0°	5"
1°	2°	6½"
3°	6°	9⅛"
5°	10°	12½"
7°	14°	15"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing



Distributor Removal:—Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position (at TDC) and rotor opposite #1 segment in cap.

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	2° ATDC	.002" ATDC

NOTE—Impulse neutralizer marked 'DC' at TDC point with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following).

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine and adjust distributor (as directed above).

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping noted), clockwise to retard spark (if ping too severe), tighten screw.

CARBURETOR

STROMBERG

Stromberg Model BXV-3 (Standard), BXVD-3 (with Fluid Drive). Stromberg No. 380158 (BXV-3), No. 380159 (BXVD-3) marked with Code No. 3-76 (BXV-3), 3-77 (BXVD-3). 1½" single barrel downdraft type with Sisson automatic choke.
NOTE—BXVD-3 type has Slow-closing Throttle.
See Carburetor Section for complete data.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for idle speed of 6 MPH min. Adjust idle adjusting screw for smooth idle (turn screw in for leaner mixture). Recheck idle speed. NOTE—If vacuum gauge used, adjust for maximum vacuum (see Vacuum Gauge data above).
Accelerating Pump Setting—Pump lever has three holes for pump link engagement. Set as follows:
Inner Hole (minimum stroke)—Extreme hot temperatures or altitudes above 3000 feet.
Center Hole (med. stroke)—Normal summer setting.
Outer Hole (max. stroke)—Winter temperatures.
Float Level—Fuel level 5/8" below top edge of bowl.
Metering Jet—*See Stromberg Jet Table in Carburetor Section for complete jet data.*

CARBURETOR

CARTER (B&B)

Carter (B&B) Model D6J1. 1½" single barrel, downdraft (with Slow-closing Throttle for Fluid Drive).
See Carburetor Section for complete data.
Idle Adjustment—Same as for Stromberg. Idle adjusting screw setting ½-1½ turns open.
Accelerating Pump Setting—Same as for Stromberg
Float Level—Top of float (not soldered seam) 5/64" ± 1/64" below top edge of bowl with valve seated.
Metering Jet—*See Carburetor Section for Carter (B&B) Downdraft Carburetor Jet Specification Table.*

CARB. EQUIPMENT

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment for Stromberg or Carter B&B.

Slow Closing Throttle (Fluid Drive Cars): Stromberg or Carter (B&B) Adjustable Dashpot types.
See Carburetion Equipment Section for complete data.
Setting (Stromberg)—With all slack removed from linkage, set adjusting screw on dash pot lever under float bowl so that piston travel is 5/16-11/32" (measured on dash pot rod on bowl cover). Turn screw out to lengthen stroke, in to shorten.
Setting (Carter B&B)—Adjusting screw on top of bowl cover open five (5) full terms from closed position.

Automatic Choke:—Sisson Type AC-758B.
See Carburetion Equipment Section for complete data.
Setting—The choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

Air Cleaner: AC No. 1542284 Heavy duty oil-bath type.
Filter element AC No. 1544091.
Servicing—Clean and refill to indicated oil level at 1000 mile or 30 day intervals. Use SAE 50 oil (above 32°F.), SAE 20-W (below 32°F.). Oil filler cap filter should be cleaned in kerosene and re-oiled by dipping in SAE 50 engine oil at the same time.

Fuel Pump: AC No. 1539042 or Carter Type M594S. Diaphragm type fuel pump.
Replacement Pump—AC No. 577 (for 1539042).
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: New Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—Auto-Lite No. NG-10884D or NG-11134D.
Tank Unit—Auto-Lite No. NG-10862T.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type CF-1-15R. 6 volt, 15 plate, 105 ampere hour capacity (20 hour rate).
Starting Capacity—133 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage 4.2 volts.
Dimensions—Length 9". Width 7 1/16". Hgt. 9 5/16".
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

Auto-Lite Model MAW-4041. Armature MAW-2030.
Drive—Outboard Barrel Type Bendix No. A2089.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 175 amperes, 6.4 volts.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4900	5.5	65
.60	"	3300	5.5	100
2.75	"	1480	5.0	200
5.45	"	820	4.5	300
8.50	"	400	4.0	400
11.55	"	110	3.5	500
11.5	"	Lock	3.0	505
18.	"	Lock	4.0	670

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).

Starting Switch: Auto-Lite Model SST-4001. Magnetic type mounted on left front fender shield and controlled by pushbutton on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

STANDARD

Auto-Lite Model GDZ-4801A. Armature GDZ-2006F. Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—No adjustment at generator. Charging rate controlled by Voltage Regulator and maximum output by Current Regulator.
Maximum Charging Rate—As given in tables below reached at approx. 25 MPH. car speed and above with load or discharged battery (Current Regulator *setting). Actual charging rate controlled by Voltage* Regulator and dependent on battery condition.

Cold Performance Data			Hot Performance Data		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator Setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts (all).
Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal:—Pivot mounted at left side of engine at front. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Loosen pivot and clamp bolts, pull out on generator until belt is snug or 40-50 lbs. tension secured on scale attached to field frame.

GENERAT R

SPECIAL EQUIPMENT

Auto-Lite GEG-4823A or GEG-4823B. Armature No. GEG-2006F (both). Two brush (shunt) types with voltage and current regulation. Ventilated.
SEE CHRYSLER 8 C39 PAGE FOR ALL DATA.

REGULAT R

Std.—VRP-4401A, VRP-4501A, or VRP-4503A (VRP-4001A used on Canadian Cars).

Spec. Equip. (for GEG-4823A, B Gen.)—VRP-4001F, VRP-4401B, or VRP-4501C (VRP-4005E for negative ground). Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

NOTE—Regulator case cover sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min. **Air Gap**—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70° F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting (VRP-4001A, 4401A)—34-36 amperes ("35").
Setting (VRP-4001F, 4005E, 4401B)—39-41 amperes, marked "40".
Setting (VRP-4501A, 4503A)—35 amperes (42 amperes at 70°F. after 15 minutes run, 33-37 amperes at 70° after additional 15 minutes run). CAUTION—These current regulators are temperature compensated and setting decreases with temperature rise in service.
Setting (VRP-4501C)—40 amperes (46 amperes at 70°F. after 15 minutes run, 38-42 amperes at 70° after additional 15 minutes run). CAUTION—This current regulator is temperature compensated and setting decreases with temperature rise in service.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown **"Sealed Beam" type.** *See Electrical Equipment Section for complete data.*
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—Red light on upper edge of panel above speedometer. Lighted with upper beams on.

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicator—On either side of Headlamp Beam Indicator (above speedometer).

Switches

Lighting—Dodge No. 990547.
Beam Selector—Dodge No. 859974.
Instrument—Dodge No. 947065.
Map Light—Dodge No. 947064.
Dome Lamp Pillar—Dodge No. 317180.
Door Switches—Dodge No. 882943.
Stop Light—Dodge No. 920355.
Direction Signal—Dodge No. 1163990, 980793 (RHD).

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	45-35 watts	Sealed Beam
Parking (no Dir. Signal)	3	63
Front Dir. Sig. & Park	21-3	1158
Instrument	1½	55
Speedometer (after 30653062)	6	81
Map Light	6	81
Beam & Dir. Sig. Ind., Ign. Sw.	1	51
Tail (no Dir. Sig.), License	3	63
Rear Dir. Sig. & Tail	21-3	1158
Stop, Back Up, Hand Brake	21	1129
Dome	10	07

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—On back of lighting switch. Vibrating type, protects lighting circuits.
Direction Signal—Dodge No. 1161568. On flasher behind instrument panel. 8 ampere, vibrating type.
Windshield Wiper—Dodge No. 898572. On switch. Vibrating type. Starts to operate with 12 ampere
Convertible Top—Mounted near control switch. Thermostatic type. Opens at 80 amperes in 1 minute
Hand Brake Signal—Dodge No. 1161568. 8 ampere, vibrating type. Protects Hand Brake Light circuit.

FUSES: Clock—2 ampere. In clock lead.
Radio—14 ampere. In fuse connector at radio.

HORNS: Auto-Lite Model HT-4007 (Low Pitch), HT-4008 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite HRL-4101. Connected through ignition switch, operates only with ignition on.
Contacts Close 1.5-3.0 volts (seal to core with 4 V).
Contacts Open— .5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type.
Bore—3¼". **Stroke**—4⅝".
Displacement—230.2 cu. ins. **Rated H.P.**—25.35.
Developed Horsepower—102 at 3600 RPM.
Compression Ratio—6.7-1 std. Cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Dodge Special Data.*

ENGINE REMOVAL: *See Dodge Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Dodge Special Data.*

PISTONS: Aluminum alloy, U-slot, cam ground type.
NOTE—Skirt cam ground (.010-.012" smaller diameter across pin bosses) and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See Dodge Special Data.*
Length—3 11/16". **Weight**—16 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—.0008" on thrust face ¾" from bottom of skirt.

Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses) ¾" from bottom of skirt. Fit piston in bore using .002" x ½" feeler, insert piston upside down in bore with feeler 90° from pin bosses on side opposite slot. Clearance correct when 5-7 lbs. pull required to withdraw feeler (bore & piston at 70°F). NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Replacement Pistons: *See Dodge Special Data.*

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage (lower groove slotted).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge install with step down.

Replacement Piston Rings: *See Dodge Special Data.*

PISTON PIN: Diameter 55/64". **Length** 2¾". Floating type. Pin hole in rod bronze bushed.
Pin Fit in Piston—Thumb push fit (piston at 160°F.).
Pin Fit in Rod Bushing—Tight thumb push fit at normal room temperature.

Replacement Pins: Std., .0006", .003", .008" oversize.

CONNECTING ROD: Weight 1.77 lbs. (with bolts less bearings). **Length** 7 13/16".
NOTE—Pin hole in rod bronze bushed.
Crankpin Journal Diameter—2.0615-2.0625". *See "Original Bearing Sizes" in Dodge Special Data.*
Lower Bearing—Removable, precision type, thin babbitt on steel.
Clearance—.001-.0015". **Sideplay**—.0055-.0115".

Bearing Adjustment:—None (no shims). Replace bearings. Do not file rods or caps. *See "Connecting Rods & Bearings" in Dodge Special Data.*

Replacement Bearings: *See Dodge Special Data.*

Replacement Bearings:—*See Chrysler Shop Notes.*

Installing Rods:—Wide portion of bearing to rear (#1, 3, 5) to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in Dodge Special Data.*
Bearings—Removable, precision type, thin babbitt on steel. No shims.
Clearance—.001-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in Dodge Special Data.*

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Dodge Special Data.*

End Thrust:—Taken by flange faces on rear (#4) main bearing. **Endplay**—.003-.007".

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1¼".
Bearing Type—Removable steel-backed, babbitt-lined bushings (except #4 machined in block).
Clearance—.001-.003" (#1), .0015-.0035" (all others).

Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*

End Thrust:—Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal—*See Dodge Special Data.*

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 25/32"
Exhaust	1 13/32"	.340-.341"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.003-.005"

Exhaust Valve Seat Inserts—*See "Valve System" in Dodge Special Data.*

Valve Guides:—Remove from above. Press new guides in (stepped end down) with upper end ⅞" below top of block (use Tool CM-83), then finish ream to .342-.343" Intake, .344-.349" Exhaust.

Valve Springs:—Install with closely coiled end to top.

	Free length 2". Spring Pressure	Length
Valve Closed	40- 45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters:—Mushroom type (remove from below). Stem diam. ⅝". Ream holes from above (pilot in valve guide). Oversizes .001", .008", .030".
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance:—.008" Intake, .010" Exh. (hot and idling), .002" additional exh. clearance desirable for sustained high speeds. NOTE—Tappet screws self-locking (no locknuts). Remove right front wheel and lower wheel housing panel for access to valves.

Valve Timing:—See Camshaft Setting above.

Intake Valves—Open 12° BTDC. Close 44° ALDC.

Exhaust Valves—Open 50° BLDC. Close 6° ATDC.

Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. New "Rotor" type oil pump.

Crankcase Capacity—5 quarts (refill).

Normal Oil Pressure—40-45 lbs. above 30 MPH.

Oil Pressure Relief Valve Under plug below starter. Opens at 40-45 lbs. Spring painted red, green, or unmarked. If spring replaced, use same color spring.

Oil Pump: New "Rotor" type on right side of engine.

Servicing—*See Dodge Special Data.*

Oil Filter: On left side side of engine above starter.

Servicing—Replace element at 8000 mile intervals.

Oil Pressure Gauge: Auto-Lite No. G-10881 (not elec.).

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump.

Capacity—15 quarts.

Radiator Core Removal: *See "Radiator" in Dodge Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Dodge Special Data.*

Water Pump: Packless type with grease fitting.

See Water Pump Section for complete data.

Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet.

INSTALLATION NOTE—Install thermostat with 2 ports facing front, and 2 ports facing rear.

Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite H-10883 or H-11133. Not electric.

CLUTCH

Borg & Beck Model 10A7 (Std.), 9A7 (with Fluid Drive), 11A6 (7 Passenger). Single plate, dry disc type with "Borglite" driven member.

NOTE—Cover No. 952 (9A7), 928 (10A7), 931 (11A6). *See Clutch Section for complete data.*

Facings—Woven type, 2 required.

	Inside Diameter	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Should just clear toeboard (adjust stopscrew on lower end of pedal) & have 1" free travel (adjusting nut on connector link at fork).

Clutch Over-Center Spring—*See "Clutch Notes" in Dodge Special Data.*

Removal:—Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

OPTIONAL EQUIPMENT

Dodge—Fluid coupling at rear of engine. Optl.

See Transmission Section for complete data.

Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*

Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.

Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*

►*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*

Transmission Control: Manual steering col. shift Std.

See Transmission Section for complete data.

Removal:—Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see Dodge Special Data for Propeller Shaft Center Bearing Removal on 7 pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods, vacuum and air hose (if Power Shift used). Remove trans.-to clutch housing capscrews and nuts. Pull unit to rear, down and out of car. NOTE—Use pilot studs when installing assembly.

UNIVERSALS

All exc. 7 Pass.—Detroit Universal Series 4200.

7 Pass. Models—Detroit Universal Series 7200.

Ball-and-Trunnion Type (4200), cross type (7200).

Propeller Shaft Center Bearing: Used on 7 pass. sedan.

See "Propeller Shaft" in Dodge Special Data.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive. *See Rear Axle Section for data.*

Ratio	Car Used On:
3.73-1	All 3 Passenger Coupe
3.9-1	Fluid Drive (exc. 3 & 7 Pass.)
4.1-1	No Fluid Drive (exc. 3 & 7 Pass.)
4.3-1	All 7 Passenger Sedan
4.56-1	Export (incl. 7 Passenger)
4.78-1	Export (except 7 Passenger)
4.89-1	Export (7 Passenger only)

Backlash—.006-.010". Screw adjustment.

Removal:—Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use Puller C-293-E to remove bearing from shaft, puller C-748 or C-358 for inner oil seal, drift C-201 to install.

Wheel Bearing Adjustment:—Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

Axle Shaft Outer Seal: New leather type mounted on brake support (backing plate).

Oil Seal Servicing—*See "Rear Axle" in Dodge Special Data.*

SHOCK ABS RBERS

Delco—Model 1030-C (Front), 1031-T (Rear).

Monroe—Model K-11148 (Front), K-11149 (Rear).

Export—Delco Model 942D (front), 940W (rear). Direct acting, hydraulic types.

Hydraulic Transverse Sway Absorber: Rear sway bar with built-in shock absorber used on 7 Pass. Sedan and Convertible Coupe.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—4¾° to 6°.

Camber—Positive ¼°. Limits 0° to Pos. ¾°.

Caster—Negative 1° to Positive 1°. Not adjustable.

Toe In—0-1/16". Turn both tie rods equally.

Steering Geometry—Inner wheel 22½°, Outer 20°.

STEERING EAR

Own Make. (Gemmer design) Model 305 (5 pass.), 335 "3-tooth" type (7 passenger).

NOTE—See Gemmer 305 & 335 articles for data.

See Steering Gear Section for complete data.

BRAKES

Service: Dodge "Safe-guard" Lockheed Hydraulic **Front Wheels**—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top and actuated by lower cylinder).

Rear Wheels—Double anchor type with single double-acting wheel cylinder.

See Brake Section for complete data.

►*BRAKE SQUEAK OR SQUEAL CORRECTION: See "Lockheed-ChryslerSafe-guard Hydraulic" Brakes in Brake Section.*

Wheel Cylinders—1⅛" bore. Single acting (front), double acting (rear wheels).

Drums—Cast-iron. Diameter 11" (12" on 7 pass.).

Lining—Molded Asbestos. 2" Wide. 13/64" Thick.

Length per shoe: 11" type—8⅞" (rear wheel rear shoe), 11½" (all others). 12" type—9⅝" (rear wheel rear shoe), 12 9/16". (all other shoes).

Clearance—.006" at each end of all shoes.

Braking Power—60% front wheels, 40% rear.

Hand Brake:—On drum at rear of transmission.

Adjustment—*See "Hand Brake Notes" in Dodge Special Data.*

Drum—Cast-iron. 6" (7" diameter on 7 Passenger).

Lining—Width 2" (2½" on 7" type). Thickness 5/32". Length 16 11/16" (20" on 7" type).

Clearance—.015-.020" around band.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWH-5001, EWH-5003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.

See Miscellaneous Section for complete data.

Circuit Breaker—Dodge No. 898572. On switch. Vibrating type. Starts to operate with 12 amperes.

CONVERTIBLE TOP CONTROL: Electric type.

See Miscellaneous Section for complete data.

Circuit Breaker—Near control switch. Thermostatic type. Opens at 80 amperes in 1 minute or less.

MODEL IDENTIFICATION

SERIAL NUMBER: Located on left front door hinge post.

1949 Numbers	Detroit	San Leandro
D-29	37,000,101 Up	48,000,101 Up
D-30	31,245,001 UP	45,050,001 Up

ENGINE NUMBER: Located on left side of cylinder block between #1 and #2 cylinders.

1949 Numbers—D-30-1001 Up.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

SPARK PLUG GAPS: .035". Limits plus or minus .001". *This setting supersedes previous data.*

Plugs—Auto-Lite Resistor Type AR5. 14 mm.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

DISTRIBUTOR: Breaker Gap—.020".

Cam Angle—34½° to 38° (closed).

Breaker Arm Spring Tension—17-20 ozs.

Automatic & Vacuum Advance—*See Ignition.*

Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC). *This setting supersedes previous data.*

Timing Procedure—*See Ignition Timing.*

Timing Mark—Fan pulley (Wayfarer), vibration dampener (Others) marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual (octane selector) adjustment.

Octane Selector—Set for slight ping when accelerating with wide open throttle between 10-30 MPH.

CARBURETION:

Idle Setting—With engine warm, set throttle stop-screw. Adjust idle adjusting screw for smooth idle (½-1½ turns open for Carter).
Idle Speed (Std. Trans.)—6 MPH.
Idle Speed (Gyro-Matic Drive)—450-475 RPM.
Float Level (Stromberg)—Fuel level ⅝" below top surface of float chamber.
Float Level (Carter)—Top of float (not soldered seam) 5/64" ± 1/64" below top edge of bowl.
Accelerating Pump—Center hole (medium) Normal. Inner Hole—Summer, Outer Hole—Winter.

Choke Setting: The choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

Fuel Pump Pressure: 3-5 lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type. See that valve operates freely. When installing coil, wind free end up approx. one turn.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exh. Hot.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position. Coil lead protected by armored cable through fire wall.

COIL: Auto-Lite CR-4001 (IG-4809 Early Cars). On ignition cable bracket above distributor.

Ignition Current—2¼ amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IG-3927G.

Capacity—.25-.28 mfd.

DISTRIBUTOR: Auto-Lite—Automatic advance type with Vacuum Spark Control as follows:

D29, D33 (Std.)	IGS-4207B-1
D30, D34 (Std.), D29, D33 (Spec.)	IAP-4103A-1
D30 (Canada)	IAP-4102-1

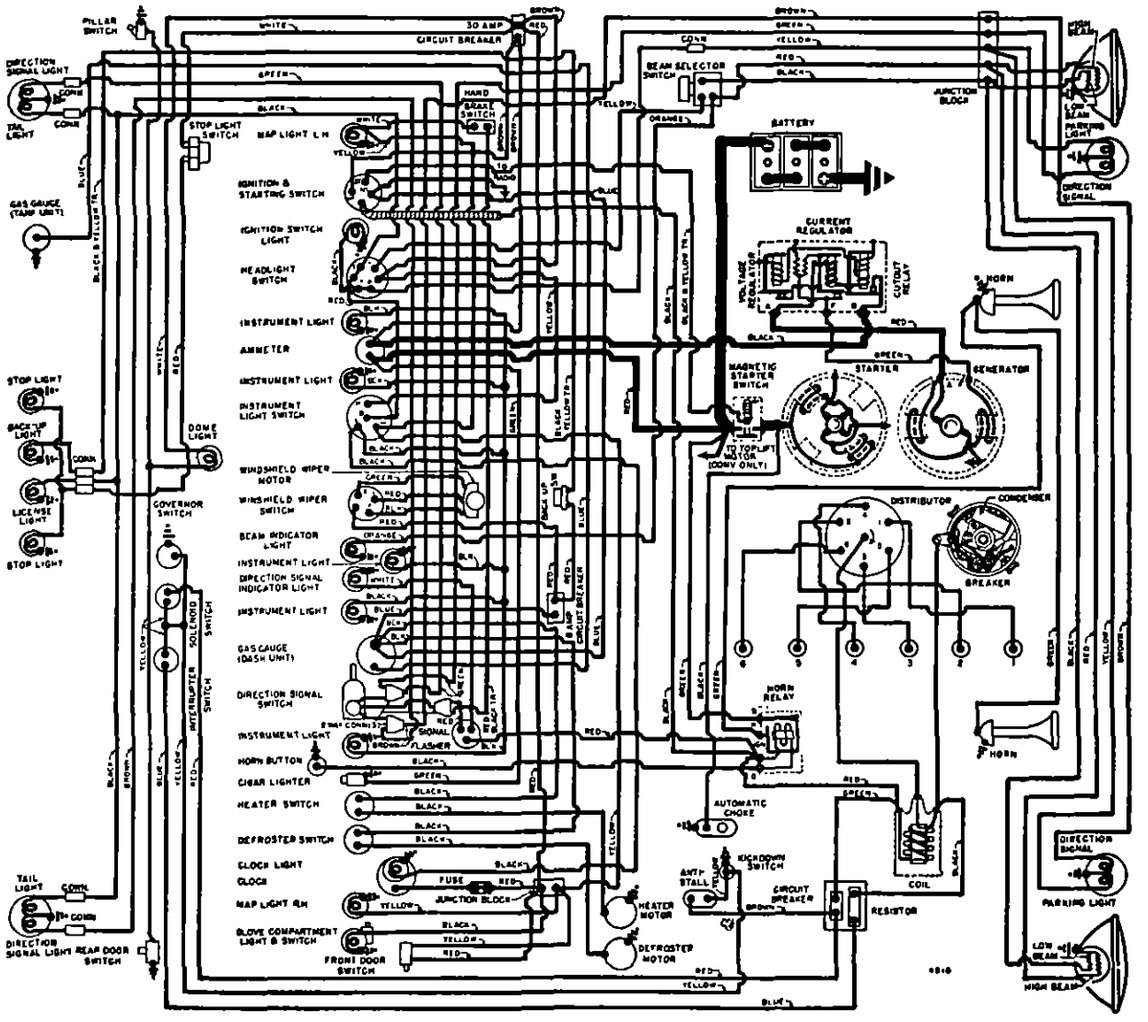
►*DISTRIBUTOR CAP POPPING OFF CORRECTION (Early IAP Distributors)—See "IAP" Distributors in Electrical Equipment Section.*

Breaker Plate Identification—Maximum vacuum advance limited by a slot in plate. Plate marked #7 (IAP-4201-1). #8 (IAP-4103A-1, IGS-4207B-1).
Breaker Gap—.020".
Cam Angle—34½° to 38° (closed).
Breaker Arm Spring Tension—17-20 ounces.

Rotation—Clockwise viewed from above.

Automatic Advance—IGS-4207B-1 & IAP-4103A-1

Degrees	Distr R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850



Automatic Advance—IAP-4102-1

Degrees Start	Distr	R.P.M.	Degrees	Eng.	R.P.M.
		350	0		700
3		400	6		800
6		850	12		1700
9		1300	18		2600
12		1750	24		3500

Vacuum Spark Control. Auto-Lite Units. Integral type (on distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring).

Vacuum Advance—IGS-4207B-1 & IAP-4103A-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4½"
1°	2°	5½"
4°	8°	9⅛"
7°	14°	12¾"
8°	16°	14"

Vacuum Advance—IAP-4102-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
1°	2°	6¾"
3°	6°	9¼"
5°	10°	12⅛"
7°	14°	15"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing.

Distributor Removal: Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position.

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	At TDC	.000" TDC.

This setting supersedes previous data.

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Timing Light)—*Connect timing light* between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see Setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following).

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (*mark correct graduation with paint*), idle engine, adjust distributor as directed above until mark aligned with pointer on chain case cover.
Manual Adjustment—Set to give slight ping from 10-30 MPH. accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise (if ping too severe), tighten screw.

CARBURETOR

STROMBERG

Stromberg Models BXVD-3 (with Fluid Drive). BXVES-3 (with Gyro-Matic Drive Transmission). Single barrel downdraft type with Sisson Automatic Choke.
NOTE—BXVES-3 type has Kick-down Switch for automatic transmission.
See Carburetor Section for complete data.

►**Carburetor Production Changes**—***Changes made in specifications indicated by carburetor Code No. (see Code Note). See "Stromberg BXVD-3 & BXVES-3" in Carburetor Section.***

►**Carburetor Code Note**—Stamped on carburetor:

Carburetor No.	Code No.①
BXVD-3 380249	3-93, 3-93A, 3-93B
BXVD-3 380253 (Can.)	3-97, 3-97A
BXVES-3 380251	3-95, 3-95A, B, C, D, E

①—See Carburetor Production Change note above.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Jet—***See Carburetor Section for Stromberg Downdraft Carburetor Jet Specification Table.***

Slow-Closing Throttle: Adjustable Dashpot type.
Setting—With all slack removed from linkage, set adjusting screw on dash pot lever under float bowl so that piston travel is 5/16-11/32" (measured on dash pot rod on bowl cover). Turn screw out to lengthen stroke, in to shorten.
See Carburetion Equipment Section for complete data.

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment required.
See Carburetion Equipment Section for complete data.

CARBURETOR

CARTER (B & B)

Carter (B&B) Models D6P1 (with Fluid Drive), D6M1 (with Gyro-Matic Drive). 1½" Single barrel, downdraft type with Sisson Automatic Choke.
NOTE—D6M1 type has Kick-down Switch for automatic transmission.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Jet—***See Carburetor Section for Carter (B&B) Downdraft Carburetor Jet Specification Table.***

Slow-Closing Throttle: (D6P1) Adjustable type, (D6M1) Non-adjustable Solenoid type.
Setting (D6P1)—Adjusting screw on top of bowl cover, open five (5) full turns from closed position.
See Carburetion Equipment Section for complete data.

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment required.
See Carburetion Equipment Section for complete data.

Automatic Choke: Sisson Type.
Setting—The choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544612 (Early), 1544714 (Late) Heavy duty oil-bath type. Filter element AC No. 21.
Servicing—Wash filter element in kerosene, drain and clean oil reservoir and refill to indicated level mark with 1 pint SAE No. 50 engine oil (SAE No. 20W for temperatures below freezing) at 1000 mile or 30 day intervals, or more often if required.
Oil Filler Cap (crankcase Ventilator) Air Cleaner: Wash filter element in cap in kerosene and re-oil by dipping in SAE No. 50 engine oil at 1000 mile or 30 day intervals or more often if required.

Fuel Pump: AC No. 1539042 or Auto-Lite No. FA-4001. Diaphragm type fuel pump.
Replacement Pump—AC No. 577 or 588 (for 1539042)
Pressure—3-5 lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—Auto-Lite No. 11728A.
Tank Unit—Auto-Lite No. 11538A.
See Carburetion Equipment Section for complete data.

BATTERY

Willard or Auto-Lite Type 1H-105D. 6 Volt, 15 Plate, 105 Ampere Hour Capacity (20 hour rate).
Dimensions—Length 9". Width 7 1/16". Hgt. 9 5/16".
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

U. S......**Auto-Lite MCH-6101.** Arm. MCH-2028
Canada.....**Auto-Lite MAW-4041.** Arm. MAW-2128
Drive—Outboard Barrel Type Bendix No. A-2991.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4900	5.5	65
2.75 "	1480	5.0	200
8.50 "	400	4.0	400
6.0 "	Lock	2.0	335

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).

Starting Switch: Auto-Lite Model SST-4001. Magnetic type mounted on left front fender shield and controlled by turning ignition switch past "on" position.
See Electrical Equipment Section for complete data.

GENERAT R

Auto-Lite. Two-brush with voltage and current regulation.

	Auto-Lite No.	Armature No.
All (Std.)	GGW-6001A	GGW-2006F
D-30 (Early)	GDZ-4801A	GDZ-2006F
D-30 (Early & Can.)	GDZ-4801R	GDZ-2006F
D30, D34 (Spec.)①	GGW-6001D	GGW-2006F
City Police & Taxi	GGJ-6001A	GGJ-2101F
	GGU-6001A	GGU-2006F
State Police	GGJ-6001B	GGJ-2101F
	GGU-6001E	GGU-2006F

①—Station Wagon & Long W.B. (7 Pass.) Cars.
Two brush type current-voltage regulators.

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Maximum Charging Rate—See table below.

Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001A, D)

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350

Performance Data (GDZ-4801A, R)

0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GGJ-6001A, B)

0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750

Performance Data (GGU-6001A, E)

0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GDZ, GGU) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes).
Field Current—(GGW, GDZ) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes, (GGU) 1.7-1.8 amperes, all at 6.0 volts.
Motoring Current—(GGW) 4.6-5.2 amps., (GDZ) 4.2-4.6 amps., (GGU) 5.5-6.5 amps., (GGJ) 4.3-4.8 amps., all at 6.0 volts.

Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs. tension secured on scale attached to field frame) or ¼" belt deflection between generator and pump.

REGULATOR

Auto-Lite. Voltage and current type.

Auto-Lite Regulator	Generator No.
VRP-4503A	GDZ-4801R
VRP-4503B	GGW-6001A, B, D
VBA-4101A, VBA-4104A①	GGJ-6001A, B
VBA-4101A, VBA-4104A①	GGJ-6001A, B
VAV-4404B	GGU-6001A, E
VBA-4101B, VBA-4104B①	GGU-6001A, E

①—For Negative Ground.

See Electrical Equipment Section for complete data.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—(VRP & VBA) 6.3-6.8 volts, (VAV) 6.4-6.9 volts. Set all models to 6.4 volts.
Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—(VRP & VAV) 7.2-7.5 volts, (VBA) 7.0-7.2 volts at 70°F. while charging at 10 amperes (VRP & VBA), ½-maximum rate (VAV).
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section.***
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

▷*CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes—Test B	
VRP-4503A	42	33-37
VRP-4503B	46	38-42
VAV-4404A, 5A	55	48-52
VAV-4404B	50	43-47
VBA-4101A, 4A	56	48-52
VBA-4101B, 4B	51	43-47

Test A—After 15 minutes operation charging at 10 amperes(VRP & VBA), ½-maximum rate (VAV).
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage to 6.7-7.0 volts (VRP), 6.7-6.9 volts (VAV), 6.7 volts (VBA).
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section.***
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type with new "Bull's-eye lens."
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Lighted when Country (upper beams in use. Located on lower face of speedometer.

Direction Signal: ***See Electrical Equipment Section.***
Direction Signal Indicator—Located on lower face of speedometer.

Switches

Lighting—Dodge No. 1300600.
Beam Selector—Dodge No. 1253460.
Instrument—Dodge No. 1308226.
Map Light—Dodge No. 1244600.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—30 ampere. Vibrating type, protects lighting circuits.
Aux. Circuit Breaker—8 ampere. Protects Windshield Wipers and Back-Up Light.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects dir. signal circuit.
Transmission Solenoid—Vibrating type mounted as an assembly with resistor unit.
Convertible Top—Mounted near control switch. Thermostatic type. Opens at 80 amperes in 1 minute or less.

FUSES: Clock—3 ampere. In clock lead.
Radio—14 ampere. In fuse connector at radio.

HORNS: Auto-Lite Model HW-4201 (Low Pitch), HW-4202 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite HRL-4103 or 4104. Connected through ignition switch, operates only with ignition on.
Contacts Close—1.5-3.0 volts (seal to core with 4 V.).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.018-.020" (armature air gap with contacts closed but not sealed, .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type.
Bore—3¼". **Stroke**—4⅝".
Displacement—230.2 cu. ins. **Rated H.P.**—25.35.
Developed Horsepower—103 at 3600 RPM.
Compression Ratio—7.0-1 Std. Cast-iron Head.
Compression & Vacuum Reading—***See Tune-up data.***

OIL PAN REMOVAL: ***See Dodge Special Data.***
ENGINE REMOVAL: ***See Dodge Special Data.***
CYLINDER HEAD & TIGHTENING TORQUES: ***See Dodge Special Data.***

PISTONS: Aluminum alloy, "U" slot, cam ground type.
NOTE—Piston skirt is elliptical (.010-.012" smaller diameter across pin bosses than across thrust faces), and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Length—3 11/16". **Weight**—16.0 ozs. (stripped).
Original Bore & Piston Sizes—***See Dodge Special Data.***
Removal—Pistons and rods removed from above.
Clearance—.0008" on thrust face ¾" from bottom of skirt.

Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses ¾" from bottom of skirt. Fit piston in bore using .002" x ½" feeler, insert piston upside down in bore with feeler 90° from pin bosses on side opposite slot. Clearance correct when 5-7 lbs. pull required to withdraw feeler (bore & piston at 70°F.).
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Replacement Pistons: .005", .020", .030", .040", .060" OS. ***See "Pistons" in Dodge Special Data.***

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression (top ring chrome-plated), two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	.5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS. ***See "Piston Rings" in Dodge Special Data.***

PISTON PIN: Diameter—55/64". Length—2 3/4". Pin floats in piston and rod, held by lock rings.
Pin Fit in Piston—.0000" to +.0005". Thumb push fit with piston at 70°F.
Pin Fit in Rod Bushing—+.0001" to +.0002". Thumb push fit at 70°F.

Replacement Pins: Std., .0006", .003", .008" Oversize.

CONNECTING ROD: Length—7 13/16". **Weight**—27.90 ozs. (with bolts less bearings).
NOTE—Pin hole in rod bronze bushed.
Crankpin Journal Diameter—2.0615-2.0625".

Original Bearing Sizes: ***Dodge Special Data.***
Lower Bearing—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps. ***See "Connecting Rods & Bearings" in Dodge Special Data.***

Replacement Bearings: .001", .002", .010", .012" U.S. ***See "Connecting Rods & Bearings" in Dodge Special Data.***

Installing Rods: Wide portion of bearing to rear (#1, 3, 5), to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.

ENGINE

CONTINUED FROM PRECEDING PAGE

Journal Diameters—2.4995-2.5005".
Original Bearing Sizes: *See Chrysler Special Data.*
Bearings—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015".
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Main Bearings" in Dodge Special Data.*
Replacement Bearings: .001", .002", .010", .012" U.S. *See "Crankshaft & Main Bearings" in Dodge Special Data.*
End Thrust: Taken by flanged faces of #4 (rear) main bearing. **Endplay**—.003-.007".
Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Dodge Special Data.*
CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #4—machined in crankcase).
Clearance—.001-.003".
Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal—*See Dodge Special Data.*
Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 25/32"
Exhaust	1 13/32"	.340-.341"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.001-.003"
Exhaust	45°	23/64"	.002-.004"

Exhaust Valve Seat Inserts—*See "Valve System" in Dodge Special Data.*
Valve Guides: Remove from above. Press new guides in with stepped end down and upper end ⅞" below top of block, ream guides to inside diameter of .342-.343" (Intake), .343-.344" (Exhaust).
Valve Springs: Install with close-coil end to top.

Free Length 2".	Spring Pressure	Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅝". Service by reaming lifter holes (work from above piloting reamer in valve guide) and installing oversize lifters furnished .001", .008", .030" Oversize.
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot.
NOTE—Tappet screws self-locking type.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 8° BTDC. Close 36° ALDC.
Exhaust Valves—Open 37° BLDC. Close 7° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 8° before top dead center with 8th graduation before "DC" mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to .008" Hot running clearance.

LUBRICATI N

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump.
Crankcase Capacity—5 qts. (refill).
Normal Oil Pressure—40-50 lbs. at 20 MPH.
Oil Pressure Relief Valve—Under plug below starter. Opens at 40-45 lbs. Spring painted red, green, or unmarked. If spring replaced, use same color spring.
Oil Pump: "Rotor" type on right side of engine.
Servicing—*See Dodge Special Data.*
Oil Filter: On left side of engine above starter.
Servicing—Replace filter at 8000 mile intervals.
Oil Pressure Gauge: Auto-Lite No. 11727A (not elec.).

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump.
Capacity—15 quarts.
Radiator Core Removal: *See "Radiator" in Dodge Special Data.*
Water Distribution Tube Servicing: *See "Cooling System" in Dodge Special Data.*
Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183-187°F.
Temperature Gauge: Auto-Lite 11729A. Not electric.

CLUTCH

Borg & Beck Model 9A7, 11A6 (Taxicab). Single plate, dry disc types.
BORG & BECK NOTE—Cover Assy. marked 952 (9A7), 931 (11A6).
See Clutch Section for complete data.
Facings (Borg & Beck)—Molded woven asbestos.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Set pedal to just clear toeboard (stopscrew on lower end of pedal) and set for 1" free travel (adjust nut on connector link at fork). NOTE—Do not disturb turnbuckle on pedal link.
Clutch Over-Center Spring—*See "Clutch Notes" in Dodge Special Data.*
Removal: Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

Fluid Coupling. Std. on all engines (with or without Gyromatic automatic transmission).
See Transmission Section for complete data.
Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.
Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*
Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSI N
STANDARD

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
►*HARD SHIFTING CORRECTION*—*See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*
Transmission Control: Manual steering col. shift Std.
See Transmission Section for complete data.
Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—see Chrysler Special Data for Propeller Shaft Center Bearing Removal on 7 Pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods, vacuum and air hose (if Power Shift used). Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car.
NOTE—Use pilot studs when installing assembly.

TRANSMISSI N
AUTOMATIC

Gyromatic—4-speed hydraulically operated type. New design semi-automatic, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
►**Kick-down Switch Change to Improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Transmission Control: See Transmission article for adjustment directions.
See Transmission Section for complete data.
Kick-down Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TG-4205R.
Kick-down Switch—Part of carburetor assembly.
See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.
Ignition Interrupter Switch—On right side of transmission above Governor.
Transmission Oil—3 pints, 10-W engine oil.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.
INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

All exc. 7 Pass.—Detroit Universal Series 4200.
7 Pass. Models—Detroit Universal Series 7200.

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Ball-and-Trunnion Type (4200), cross type (7200).

Propeller Shaft Center Bearing: Used on 7 pass. sedan. *See "Propeller Shaft" in Dodge Special Data.*

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive. *See Rear Axle Section for data.*

Axle Ratio—	Std.	Gyromatic Trans.
D29, Coupe & Rdstr	3.73-1	
D29, Sedans	3.9-1	
D30	3.9-1	3.9-1
Sta. Wgn & Long W.B.	4.3-1	4.1-1

Backlash—.008-.010". Screw adjustment.

Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws. **Axle Shaft Removal**—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use Puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Oil Seal: New leather type mounted on brake support (backing plate). **Oil Seal Servicing**—*See "Rear Axle" in Dodge Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Hydraulic, direct acting, non-adjustable.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.

See Front Suspension Section for complete data.

Kingpin Inclination—4¾° to 6° crosswise.

Camber—Pos. ¼°. Limits 0° to Pos. ¾° (¼-½° higher on left).

Caster—0° preferred. Limits Neg. 1° to Pos. 1°. No adjustment.

Toe In—0" (0-1/16"). Adjust by turning both tie rods equally.

Steering Geometry—Inner wheel 22½°. Outer 20°.

STEERING GEAR

Own Make—(Gemmer design) Model 305 (exc. 7 pass.), 335 "3-tooth" type (7 passenger).

NOTE—See Gemmer 305 & 335 articles for data.

See Steering Gear Section for complete data.

BRAKES

Service: Dodge "Safe-guard" Lockheed Hydraulic. *See Brake Section for complete data.*

►*BRAKE SQUEAK OR SQUEAL CORRECTION: See "Lockheed-ChryslerSafe-guard Hydraulic" Brakes in Brake Section.*

Wheel Cylinders—Single acting type (front), double acting type with straight (1⅛") bore (rear).

Drums—Cast iron. Diameter 10" (D29), 11" (D30), 12" (Station Wagons & Long W.B. cars).

Lining—Molded asbestos.

	Width	Thickness	Length per Wheel
D29	2"	13/64"	21" Frt., 18½" Rear
D30	2"	13/64"	23" Frt., 20⅜" Rear
Sta. Wgn. & Long W.B.	2"	13/64"	25⅛" Frt. & Rear

Clearance—.006" at each end of all shoes.

Braking Power—60% front wheels, 40% rear.

Hand Brake: On drum at rear of transmission.

Adjustment—*See "Hand Brake Notes" in Dodge Special Data.*

Drum—Cast iron. Diameter 6" (except Long W.B. cars), 7" (Long W.B. cars).

Lining—	Width	Thickness	Length
6" Type	2"	5/32"	15 3/8"
7" Type	2 1/2"	5/32"	20"

Clearance—.015-.020" around band.

MISC. MECHANICAL

WINDSHIELD WIPER: Auto-Lite Model EWJ-4001. EWJ-4003 (Conv. Coupe). Electric type with circuit breaker mounted on control switch.

See Miscellaneous Section for complete data.

CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: Located on left front door hinge post.

1950 Numbers

Plant	D33	D34
Detroit	37,060,001	31,420,001
Los Angeles	48,502,001	45,505,001
San Leandro	48,004,001	45,064,001

1951 Numbers

Plant	D41	D42
Detroit	37,135,001	31,663,001
Los Angeles	48,506,001	45,518,001
San Leandro	48,008,001	45,079,001

ENGINE NUMBER: Located on left side of cylinder block between #1 & #2 cylinders.
1950 Numbers—D34-1001 Up.
1951 Numbers—D42-1001 Up.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

SPARK PLUG GAPS: .035". Limits plus or minus .001"
Plugs—Auto-Lite Resistor Type (1950) AR5, (1951) AR8. 14 mm.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

DISTRIBUTOR: Breaker Gap—.020"
Cam Angle—34½° to 48° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC).
This setting supersedes previous data.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Fan Pulley (Wayfarer), vibration dampener (Others) marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual (octane selector) adjustment.
Octane Selector—Set for slight ping when accelerating with wide open throttle between 10-30 MPH.

CARBURETION:
Idle Setting—With engine warm, set throttle stop-screw. Adjust idle adjusting screw for smooth idle (½-1½ turns open for Carter).
Idle Speed (Std. Trans.)—6 MPH.
Idle Speed (Gyro-Matic Drive)—450-475 RPM.
Float Level (Stromberg)—Fuel level ⅝" below top surface of float chamber.
Float Level (Carter)—Top of float (not soldered seam) *5/64"±1/64" below top edge of bowl.*
Accelerating Pump—Center hole (medium) Normal. Inner Hole—Summer, Outer Hole—Winter.

Choke Setting: The choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

Fuel Pump Pressure: 3-5 lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type. See that valve operates freely. When installing coil, wind free end up **approx. one turn.**

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exh. Hot.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position.

COIL: Auto-Lite CR-4001 (IG-4809 Early Cars). On ignition cable bracket above distributor.
Ignition Current—2¼ amperes idling, 5 stopped.

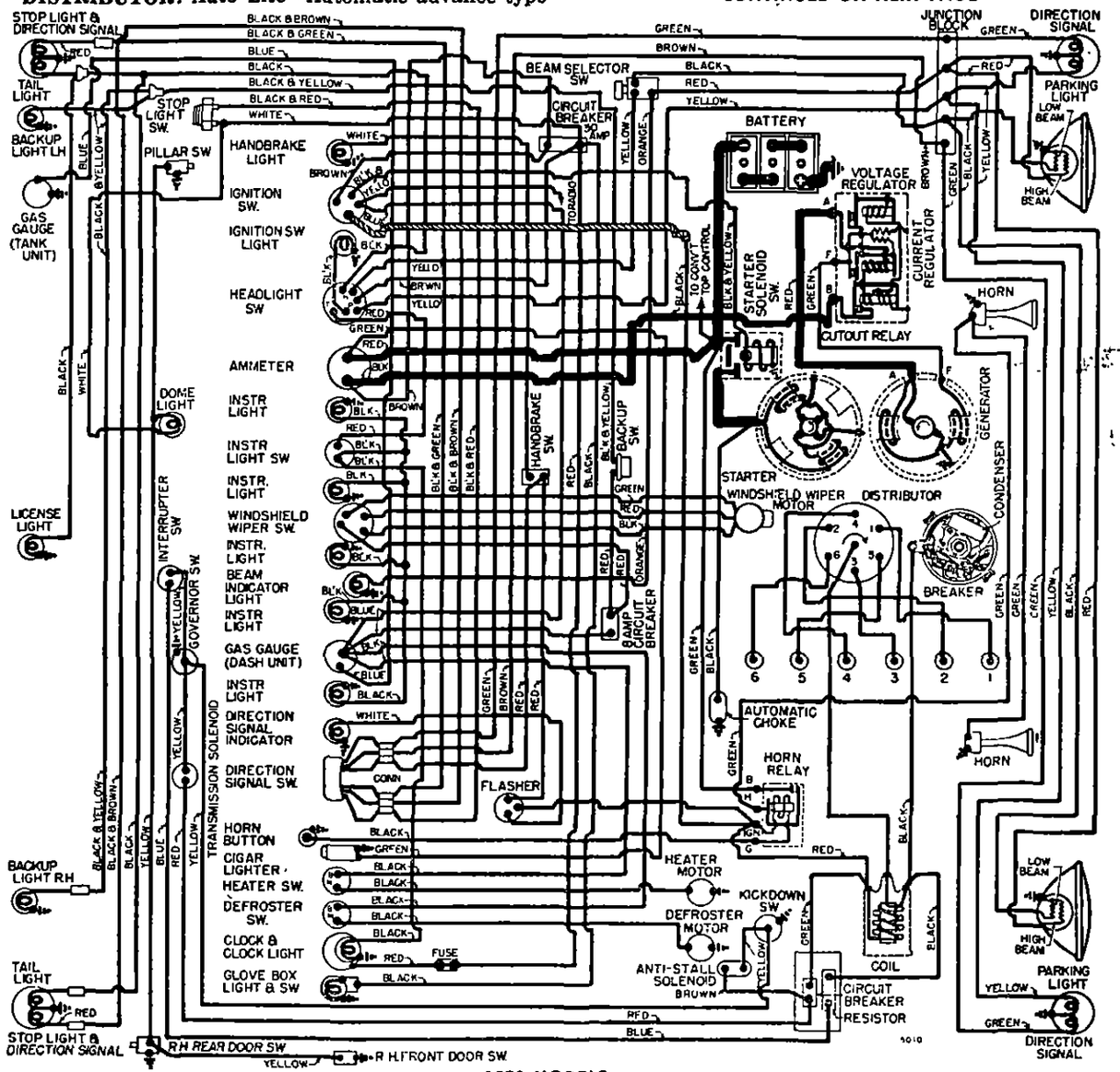
CONDENSER: Auto-Lite No. IG-3927G.
Capacity—.25-.28 mfd.

DISTRIBUTOR: Auto-Lite—Automatic advance type with Vacuum Spark Control as follows:

	Early	Late
D33 ('50) Std.	IGS-4207B-1	IAT-4003
D33 ('50) Spec.		IAP-4103A-1
D34 ('50) Std.	IAP-4103A-1	IAT-4003
D34 ('50) Canada	IAP-4102-1	IAT-4004A
D42 ('51) Canada	IAT-4012A	
D41, D42 ('51)	IAT-4011	

►***DISTRIBUTOR CAP POPPING OFF CORRECTION Early "IAP" Distributors): See "Auto-Lite IAP Distributors" in Electrical Equipment Section.***

CONTINUED ON NEXT PAGE



1950 MODELS

CONTINUED FROM PRECEDING PAGE

Breaker Gap—.020".
Cam Angle—34½° to 38° (closed).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance—IGS-4207B-1, IAP-4103A-1 IAT-4011, IAT-4003

Degrees	Distr. R.P.M.	Degrees Eng. R.P.M.
Start	350	0 — 700
1	450	2 — 900
5	800	10 — 1600
9	1300	18 — 2600
10	1425	20 — 2850

Automatic Advance—IAP-4102-1, IAT-4004A, IAT-4012A

Degrees	Distr. R.P.M.	Degrees Eng. R.P.M.
Start	350	0 — 700
3	400	6 — 800
6	850	12 — 1700
9	1300	18 — 2600
12	1750	24 — 3500

Vacuum Spark Control. Auto-Lite Units. Integral type (on distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring).

Vacuum Advance—IGS-4207B-1, IAP-4103A-1, IAT-4011, IAT-4003

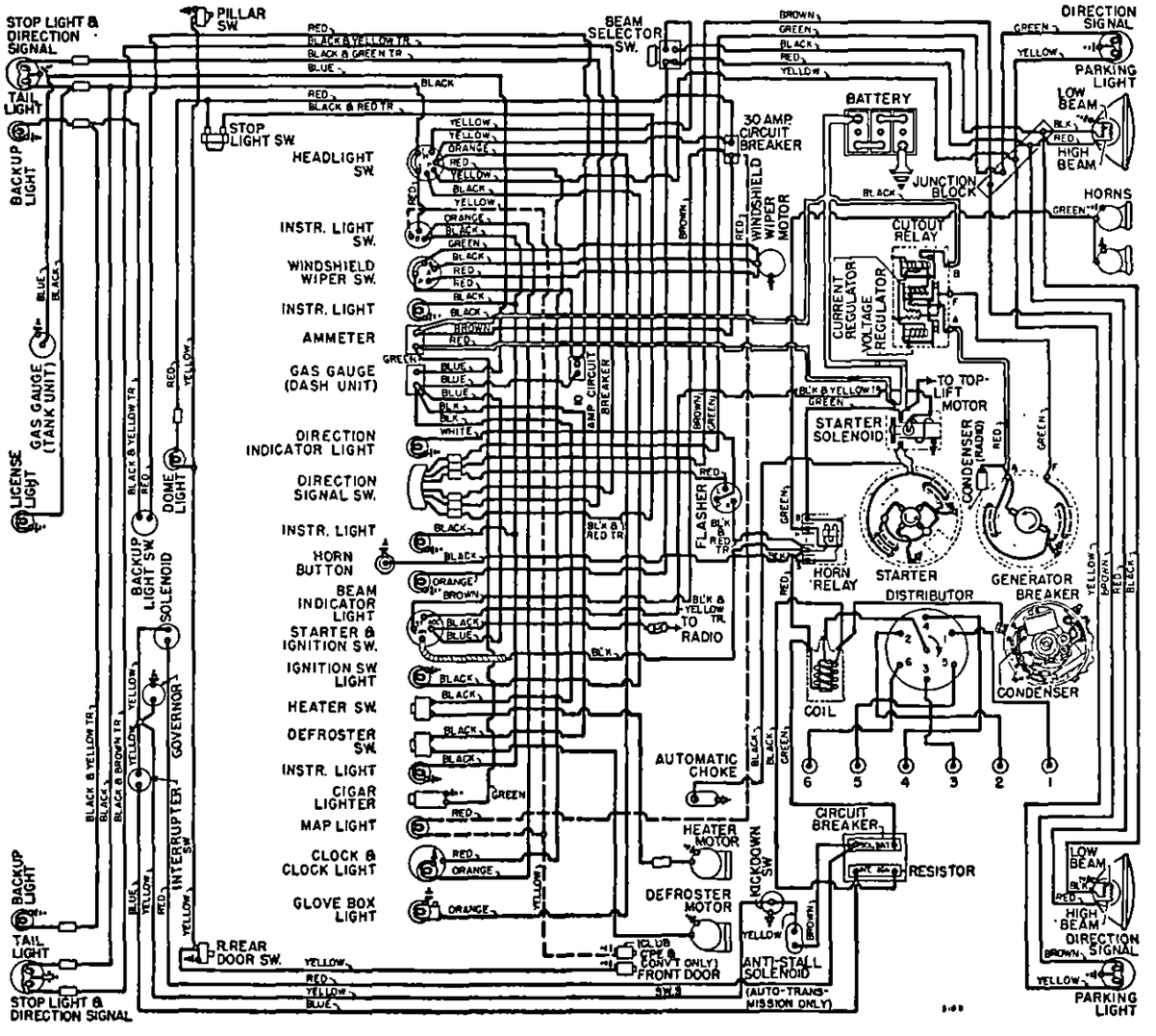
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4½"
1°	2°	5½"
4°	8°	9⅞"
7°	14°	12¾"
8°	16°	14"

Vacuum Advance—IAP-4102-1, IAT-4004A, IAT-4012A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
1°	2°	6¾"
3°	6°	9¼"
5°	10°	12⅛"
7°	14°	15"

Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing.

Distributor Removal: Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position.



1951 MODELS

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	At TDC	.000" TDC.

This setting supersedes previous data.

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see Setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following)

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine, adjust distributor as directed above until mark aligned with pointer on chain case cover.

Manual Adjustment—Set to give slight ping from 10-30 MPH. accelerating with wide open throttle from 10 MPH. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise (if ping too severe), tighten screw.

CARBURETOR

STROMBERG

Stromberg Models BXVD-3 (with Fluid Drive). BXVES-3 (with Gyro-Matic Drive Transmission). 1½" Single barrel downdraft type with Sisson Automatic Choke.

▷*NOTE*—BXVES-3 type has Kick-down Switch for automatic transmission.

See Carburetor Section for complete data.

▷**Carburetor Production Changes**—*Changes made in specifications indicated by carburetor Code No. (see Code Note). See "Stromberg BXVD-3 & BXVES-3" in Carburetor Section.*

►**Carburetor Code Note**—Stamped on carburetor:

Carburetor No.	Code No.①
BXVD-3 380249	3-93, A, etc.
BXVD-3 380253 (Can.)	3-97, A, etc.
BXVES-3 380251	3-95, A, etc.
BXVES-3 380268 (Can.)	3-103, A, etc.

①—See Carburetor Production Change note above.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Carburetor Section for Stromberg Downdraft Carburetor Jet Specification Table.*

Slow-Closing Throttle: Adjustable Dashpot type.
Setting—With all slack removed from linkage, set adjusting screw on dash pot lever under float bowl so that piston travel is 5/16-11/32" (BXVD3), 13/32-7/16" (BXVES3) measured on dashpot rod on bowl cover. Turn screw out to LENGTHEN stroke.
See Carburetion Equipment Section for complete data.

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment required.
See Carburetion Equipment Section for complete data.

Automatic Choke: See Carter (B&B) data below.

CARTER (B&B)

Carter (B&B) Models D6P1 (with Fluid Drive), D6M1 (with Gyro-Matic Drive). 1½" Single barrel, downdraft type with Sisson Automatic Choke.
NOTE—D6M1 type has Kick-down Switch for automatic transmission.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Carburetor Section for Carter (B&B) Downdraft Carburetor Jet Specification Table.*

Slow-Closing Throttle: (D6P1) Adjustable type, (D6M1) Non-adjustable Solenoid type.
Setting (D6P1)—Adjusting screw on top of bowl cover, open five (5) full turns from closed position.
See Carburetion Equipment Section for complete data.

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment required.
See Carburetion Equipment Section for complete data.

Automatic Choke: Sisson Type.
Setting—The choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544714 Heavy duty oil-bath type. Filter element AC No. 21.
Servicing—Wash filter element in kerosene, drain and clean oil reservoir and refill to indicated level mark with 1 pint SAE No. 50 engine oil (SAE No. 20W for temperatures below freezing) at 1000 mile or 30 day intervals, or more often if required.

Fuel Pump: AC No. 1539208 or Auto-Lite No. FA-4001 (1950). Auto-Lite No. FA-4001A (1951). Diaphragm type fuel pump.
Replacement Pump—AC No. 588 (for 1539208).
Pressure—3-5 lbs.
See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—Auto-Lite No. 12103A ('50), No. 12335A ('51).
Tank Unit—Auto-Lite No. 11538A (1950-51).
See Carburetion Equipment Section for complete data.

BATTERY

Willard HW-1-105C or Auto-Lite IH-105-D. 6 volt, 15 plate, 105 Ampere Hour Capacity (20 Hour rate).
Dimensions—Length 9". Width 7 1/16". Hgt. 9 5/16".
Grounded Terminal—Positive (+) to engine.
Location—Under hood in left fender shield.

STARTER

U.S.—**Auto-Lite MCH-6101.** Arm. MCH-2028
Canada—**Auto-Lite MAW-4041.** Arm. MAW-2128
Drive—Outboard Barrel Type Bendix No. A-2991.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).

Starting Switch: Auto-Lite Model SST-4001 ('50), SST-4006 ('51). Magnetic type mounted on left front fender shield and controlled by turning ignition switch past "On" position.
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite. Two-brush with voltage and current regulation.

	Auto-Lite No.	Armature No.
D33, D34 (Std.)	GGW-6001A (Early)	GGW-2006F
	①GGW-6001J (Late)	GGW-2006F
D33, D34 (Spec.)	GGW-6001B (Early)	GGW-2006F
	①GGW-6001K (Late)	GGW-2006F
D41 (Std.)	①GGW-6001L	GGW-2006F
D42 (Std.)	①GGW-6001K	GGW-2006F
City Police	GGU-6001A (Early)	GGU-2006F
	①GGU-6001G (Late)	GGU-2006F
	GGJ-6001A (Early)	GGJ-2101F
	①GGJ-6001F (Late)	GGJ-2101F
State Police	GGU-6001E (Early)	GGU-2006F
	①GGU-6001H (Late)	GGU-2006F
	GGJ-6001B (Early)	GGJ-2101F
	①GGJ-6001G (Late)	GGJ-2101F
Sta. Wg. & 7 Pass.	GGW-6001D (Early)	GGW-2006F
	①GGW-6001L (Late)	GGW-2006F

①—New Type Narrow Belt.

Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001A, B, D, J, K, L)

Amperes	Volts	Cold—R.P.M.	Hot
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350

Performance Data (GGJ-6001A, B, F, G)

0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750

Performance Data (GGU-6001A, E, G, H)

0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(GGW, GGU) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes).
Field Current—(GGW) 1.6-1.8 amperes, (GGJ) 1.7-1.9 amperes; (GGU) 1.7-1.8 amperes. All at 6.0 volts.
Motoring Current—(GGW) 4.6-5.2 amps., (GGU) 5.5-6.5 amps., (GGJ) 4.3-4.8 amps., all at 6.0 volts.
Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs. tension secured on scale attached to field frame) or ¼" belt deflection between generator and pump.

REGULAT R

Auto-Lite. Voltage and current type.

Auto-Lite Regulator No.	for Auto-Lite Generator
VRP-6004A	GGW-6001A, B, D, J, K, L
VBA-4202A, VBA-4204A①	GGJ-6001A, B, F, G
VAV-6001A, VAV-6002A①	GGU-6001A, E, G, H
VBE-6001A	GGW-6001L, K

①—VBA-4204A & VAV-6002A for negative ground.
See Electrical Equipment Section for complete data.

►*NOTE*—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In (All)—6.3-6.8 volts. Set to 6.4-6.6 volts.
Cuts Out (All)—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap (All)—.015" minimum.
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (All)—7.1-7.4 volts at 70°F. while charging at 10 amperes (VRP & VBA), ½-maximum rate (VAV & VBE).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

Current Regulator

►*CAUTION*—*"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VRP-6004A	46	38-42
VAV-6001A, 2A	50	43-47
VBA-4202A, 4A	56	48-52
VBE-6001A	52	43-47

Test A—After 15 minutes operation charging at 10 amperes (VRP & VBA), ½-maximum rate (VAV & VBE).
Test B—After additional 15 minutes operation with voltage regulator operating (load applied to hold voltage to 6.7-7.0 volts (VRP), 6.7-6.9 volts (VAV & VBE), 6.7 volts (VBA).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type with new "Bull's-eye lens."
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Lighted when Country (upper) beams in use. Located on lower face of speedometer.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—Located on lower face of speedometer.

Switches

Lighting—Dodge No. (1950) 1300600, (1951) 1370138.
Beam Selector—Dodge No. (1950) 1253460, (1951) 1253003.
Instrument—Dodge No. (1950) 1244997, (1951) 1370011.
Map Light—Dodge No. 1244600.

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MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting—30 ampere. Vibrating type, protects lighting circuits.
Aux. Circuit Breaker—8 ampere. Protects Windshield Wipers and Back-Up Light.
Direction Signal—On flasher behind instrument panel. Vibrating type. Protects dir. signal circuit.
Transmission Solenoid—Vibrating type mounted as an assembly with resistor unit.
Convertible Top—Mounted near control switch. Thermostatic type. Opens at 80 amperes in 1 minute or less.

FUSES: Clock—3 ampere. In clock lead.
Radio—14 ampere. In fuse connector at radio.

HORNS: Auto-Lite.
1950—HW-4201 (Low Pitch) & HW-4202 (High Pitch).
1951—HW-4108 (Low Pitch) & HW-4108 (High Pitch). Dual horns operated by relay.
Horn Current—15 amperes.

Horn Relay: Auto-Lite HRL-4104. Connected through ignition switch, operates only with ignition on.
Contacts Close—1.5-3.0 volts (seal to core with 4 V.).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type.
Bore—3¼". **Stroke**—4⅝".
Displacement—230.2 cu. ins. **Rated HP.**—25.35.
Developed Horsepower—103 at 3600 RPM.
Compression Ratio—7.0-1 Std. Cast-iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Dodge Special Data.*

ENGINE REMOVAL: *See Dodge Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Dodge Special Data.*

PISTONS: Aluminum alloy, "U" slot, cam ground type.
NOTE—Piston skirt is elliptical (.010-.012" smaller diameter across pin bosses than across thrust faces), and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Original Bore & Piston Sizes—*See Dodge Special Data.*
Length—3 11/16". **Weight**—16.0 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—.0008" on thrust face ¾" from bottom of skirt. Ring land diameter .0305" larger than skirt.

Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses) ¾" from bottom of skirt. Fit piston in bore using .002" x ½" feeler, insert piston upside down in bore with feeler 90° from pin bosses on side opposite slot. Clearance correct when 5-7 lbs. pull required to withdraw feeler (bore & piston at 70°F.).
NOTE—Cylinder recondition limits .0005" taper and .0005" out-of-round. Badly scored bores or with taper over .030" or out-of-round over .004" require reboring and honing to limits listed above.

Replacement Pistons: .005", .020", .030", .040", .060" OS. *See "Pistons" in Dodge Special Data.*

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression (top ring chrome-plated), two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down. NOTE—Ring expanders used with top oil ring.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS. *See "Piston Rings" in Dodge Special Data.*

Piston Pin: Diameter—55/64". **Length**—2 3/4". Pin floats in piston and rod, held by lock rings.
Pin Fit in Piston—.0000" to +.0005". Thumb push fit with piston at 70°F.
Pin Fit in Rod Bushing—+.0001" to +.0002". Thumb push fit at 70°F.

Replacement Pins: Std., .0006", .003", .008" Oversize.

CONNECTING ROD: Length—7 13/16". **Weight**—27.90 ozs. (with bolts less bearings).
NOTE—Pin hole in rod bronze bushed.
Crankpin Journal Diameter—2.0615-2.0625". *See "Original Bearing Sizes" in Dodge Special Data.*
Lower Bearing—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps. *See "Connecting Rods & Bearings" in Dodge Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Connecting Rods & Bearings" in Dodge Special Data.*

Installing Rods: Wide portion of bearing to rear (#1, 3, 5), to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in Dodge Special Data.*
Bearings—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See "Crankshaft and Bearing Sizes" in Dodge Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Crankshaft & Main Bearings" in Dodge Special Data.*

End Thrust: Taken by flanged faces of #4 (rear) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Dodge Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #4—machined in crankcase).
Clearance—.001-.003".

Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal—*See Dodge Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 25/32"
Exhaust	1 13/32"	.340-.341"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.001-.003"
Exhaust	45°	23/64"	.002-.004"

Exhaust Valve Seat Inserts—*See "Valve System" in Dodge Special Data.*

Valve Guides: Remove from above. Install new guides with the counterbore end UP for EXHAUST valves and with the counterbore end DOWN for INTAKE valves. Press new guides in with upper end 7/8" below top of block, ream guides to inside diameter of .342-.343" (Intake), .343-.344" (Exhaust).

Valve Springs: Install with close-coil end to top. Free Length 2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	110-120 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅝". Service by reaming lifter holes (work from above piloting reamer in valve guide) and installing oversize lifters furnished .001", .008", .030" Oversize.
Lifter Clearance in Block—.000-.001".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot.
NOTE—Tappet screws self-locking type.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 8° BTDC. Close 36° ALDC.
Exhaust Valves—Open 37° BLDC. Close 7° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 8° before top dead center (8th graduation before "DC" mark on vibration dampener or crankshaft fan pulley aligned with pointer on chain case cover). Reset tappet clearance to .008" HOT running clearance.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump.
Crankcase Capacity—5 qts. (refill).
Normal Oil Pressure—40-50 lbs. at 20 MPH.
Oil Pressure Relief Valve—Under plug below starter. Opens at 40-45 lbs. Spring painted red, green, or unmarked. If spring replaced, use same color spring.

Oil Pump: "Rotor" type on right side of engine.
Servicing—*See Dodge Special Data.*

Oil Filter: On left side of engine above starter.
Servicing—Replace filter at 8000 mile intervals.

Oil Pressure Gauge: Auto-Lite No. (1950) 12105A, (1951) 12332A. (Not electric).

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump.
Capacity—15 quarts.

Radiator Core Removal: *See "Radiator" in Dodge Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Dodge Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt,

disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183-187°F.
Temperature Gauge: Auto-Lite No. (1950) 12104A, (1951) 12333A. (Not electric).

CLUTCH

Borg & Beck Model No. 9A7, Auburn Model No. 9251-12 (Std.). Borg & Beck Model No. 10A7 (Heavy Duty), 11A6 (Taxicab). Single plate dry disc clutch.
BORG & BECK NOTE—Cover Assembly marked 952 (9A7), 931 (11A6).
See Clutch Section for complete data.
Facings (Borg & Beck)—Molded woven asbestos.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
11A7	6½"	11"	.125" (⅛")

Facings (Auburn)—Molded woven asbestos. I.D. 6⅛", O.D. 9⅛", Thickness .125".
Pedal Adjustment: Set pedal to just clear toeboard (stopscrew on lower end of pedal) and set for 1" free travel (adjust nut on connector link at fork). NOTE—Do not disturb turnbuckle on pedal link.
Clutch Over-Center Spring—*See "Clutch Notes" in Dodge Special Data.*
Removal: Remove release fork pull-back spring, Transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or driving plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

Fluid Coupling. Std. on all engines (with or without Gyromatic automatic transmission).
See Transmission Section for complete data.
Oil Level: Keep to level of filler hole. Check at first 1000 miles and every 10,000 miles. Manufacturer recommends MOPAR Fluid Drive Fluid.
Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*
Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

TRANSMISSION

STANDARD

Own Make—All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*
►*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*
Transmission Control: Manual steering col. shift Std.
See Transmission Section for complete data.
Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disabling transmission—see Dodge Special Data for for Propeller Shaft Center Bearing Removal on 7 Pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods, vacuum and air hose (if Power Shift used). Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car.
NOTE—Use pilot studs when installing assembly.

AUTOMATIC TRANSMISSION

Gyromatic—4-speed hydraulically operated type. New design semi-automatic, four-speed transmission with hydraulic actuation and electrical control.
See Transmission Section for complete data including Testing & Trouble Shooting.
►*SYNCHRONIZER PRODUCTION CHANGE NOTE*—New "Pin Type" synchronizer unit replaced former type during 1950 production.
►**Kick-down Switch Change to improve Transmission Operation**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*
Transmission Control: See Transmission article for adjustment directions.
See Transmission Section for complete data.
Kick-down Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TG-4205R ('50), No. TGG-4001 ('51).
Kick-down Switch—Part of carburetor assembly.
See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.
Ignition Interrupter Switch—On right side of transmission above Governor.
Transmission Oil—3 pints, 10-W engine oil.
Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gearshift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.
INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

All exc. 8 Pass.—Detroit Universal Series 4200.
8 Pass. Models—Detroit Universal Series 7200.
Ball-and-Trunnion Type (4200), cross type (7200).

Propeller Shaft Center Bearing: Used on 8 pass. sedan.
See "Propeller Shaft" in Dodge Special Data.

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive. *See Rear Axle Section for data.*

Axle Ratio—	Std.	Gyro-Matic
D33, D41 Coupe & Rdstr.	3.73-1	
All Others	3.9-1	3.9-1

Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use Puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.
Axle Shaft Oil Seal: New leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle" in Dodge Special Data.*
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay—.003-.008".**

SHOCK ABS RBERS

Hydraulic, direct acting, non-adjustable.
1951, New "Oriflow" type used.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram. Coil Springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—(1950) 4¾° to 6° crosswise, (1951) 5° to 6½° crosswise.
Camber—(1950) Pos. ¼°. Limits 0° to Pos. ¾° (¼-½° higher on left). (1951) Pos. ⅜° to Neg. ⅜° (0° preferred).
Caster—0° preferred. Limits Neg. 1° to Pos. 1°.
Toe-In—0" (0-1/16"). Adjust by turning both tie rods equally.
Toe-out on Turns—Inner wheel 22½°. Outer 20°.

STEERING GEAR

Own Make—(Gemmer design) Model 305 (exc. 8 pass.), 335 "3-tooth" type (8 passenger).
See Steering Gear Section for complete data.

BRAKES

Service: Dodge "Safe-guard" Lockheed Hydraulic.
See Brake Section for complete data.
►*BRAKE SQUEAK OR SQUEAL CORRECTION—See "Lockheed-Chrysler Safe-guard Hydraulic" Brake in Brake Section.*
Wheel Cylinders—Single acting type (front), double acting type with straight (1⅛") bore (rear).
Drum—Cast Iron. Diameter 10" (D33, D41), 11" (D34, D42), 12" (Station Wgns. & Long W.B. Cars).
Lining—Molded asbestos.

	Width	Thickness	Length
D33, D41	2"	13/64"	21" Frt., 18 1/2" Rear
D34, D42	2"	13/64"	23" Frt., 20 3/8" Rear
Sta. Wgn. & Long W.B.	2"	13/64"	25 1/8" Frt. & Rear

Clearance—.006" at each end of all shoes.
Braking Power—60% front wheels, 40% rear.
Hand Brake: On shaft at rear of transmission. External contracting type (Synchro-mesh Trans.). Internal expanding type (Gyro-Matic Trans.).
Adjustment—*See "Hand Brake Notes" in Dodge Special Data.*
Drum—Cast Iron. Diam. 7" (8 Pass.), 6" (others).
Lining—Molded asbestos. **Width 2", Thick. 5/32".**
Clearance—.015-.020" around drum.

MISC. MECHANICAL

WINDSHIELD WIPER:
Auto-Lite Model—Electric type with circuit breaker mounted on control switch.
EWJ-4001—D34 exc. Convt. ('50), D42 L.W.B. ('51).
EWJ-4003—Convt. ('50-51), D42 Coronet ('51).
EWR-5001C—D41 Sedan & Coupe (1951).
EWR-5001D—D42 Meadowbrook (1951).
EWR-5001E—D41 Roadster (1951).
Trico Vacuum Type: Model SSM-118, D33 (1950).
See Miscellaneous Section for complete data.
CONVERTIBLE TOP CONTROL: Auto-Lite Model EWM-4001. Electric Type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate on left front door hinge post. First Serial Numbers:

1952 Serial Nos.	Detroit	Los Angeles	San Leandro
D-41	31,663,001	48,507,601	48,009,901
D-42	31,867,801	45,527,501	45,090,601
1953 Serial Nos.			
D-46	32,042,001	45,536,001	45,102,001
D-47	37,213,001	48,511,001	48,013,001

ENGINE NUMBER: Stamped on boss on left side of cylinder block between #1 & #2 cylinders.

ENGINE NUMBER LETTERS: (Following Engine Number)—Identified as follows:

"A"—ALL Cylinders .020" oversize.

"B"—ALL Crankshaft Journals .010" undersize.

"AB"—BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-20" at idling speed.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .035".

Plugs—Auto-Lite AR8. 14 mm. Resistor type.

DISTRIBUTORS: Auto-Lite. (1952 U.S. Cars), IAT-4011, (1953 U.S. Cars) IAT-4101, (1952-53 Canada) IAT-4012. Automatic and vacuum advance type with "pivoted breaker plate."

Breaker Gap—.020" (.018-.022").

Cam Angle—39°±3°. DO NOT exceed breaker gap limits to obtain this dwell.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite No. CR-4001. Above distributor.

Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA.

Capacity—.25-.28 microfarad.

IGNITION TIMING: (1952) At TDC. (1953) 2° BTDC.

Timing Mark—Crankshaft pulley or vibration dampener marked "DC" at top dead center point with 15 1°-graduations before and after this point. Set timing with correct graduation in line with pointer on chain case cover.

Timing Procedure—*See Ignition Timing.*

CARBURETION (1953—CARTER): (B&B) No. D6H2 (Std. Trans. no Fluid Drive), D6P1 & D6P2 (Std. Trans. & Fluid Drive), D6U1 (Overdrive Trans., no Fluid Drive), D6V1 (Overdrive Trans. & Fluid Drive), D6M1 (Automatic Trans. & Fluid Drive). Single barrel downdraft types with separate Sisson Automatic Choke.

Idle Setting—½-1½ turns open. Adjust for smooth idle, (if vacuum gauge used, set for highest steady vacuum). Turn screw out for richer mixture.

Idle Speed—(Synchro-mesh Trans.) 450-500 RPM. **(Automatic Trans.)**—450-475 RPM.

Float Level—Top of float (not soldered seam) 5/64" plus or minus 1/64" below top edge of bowl.

Accelerating Pump—Center hole normal setting. Outer hole (max.) Winter, Inner hole (min.) Summer.

Fast Idle Setting: No adjustment required.

Choke Setting: Insert gauge pin through hole in automatic choke shaft and hole in base flange to position shaft, loosen choke valve screw and position choke so that valve is tightly closed.

Slow-Closing Throttle: Open adjusting screw **5 full turns** (D6P1), **4½ turns** (D6P2), **2½ turns** (D6V1), from closed position.

CARBURETION (1952-53 — STROMBERG): Model BXVD-3 (1952 Synchro-mesh Cars), BXVES-3 (1952 Synchro-mesh Cars), BXVES-3 (1952-53 Gyromatic Trans.). Single barrel downdraft with separate Sisson Automatic Choke.

Idle Setting—Adjust for smooth idle (if vacuum gauge used, set for highest steady reading). Turn screw out for richer mixture.

Idle Speed (Synchro-mesh Trans.) 450-500 RPM. **(Automatic Trans.)** 450-475 RPM.

Float Level—Fuel level in bowl 5/8" below top edge of bowl with needle valve seated.

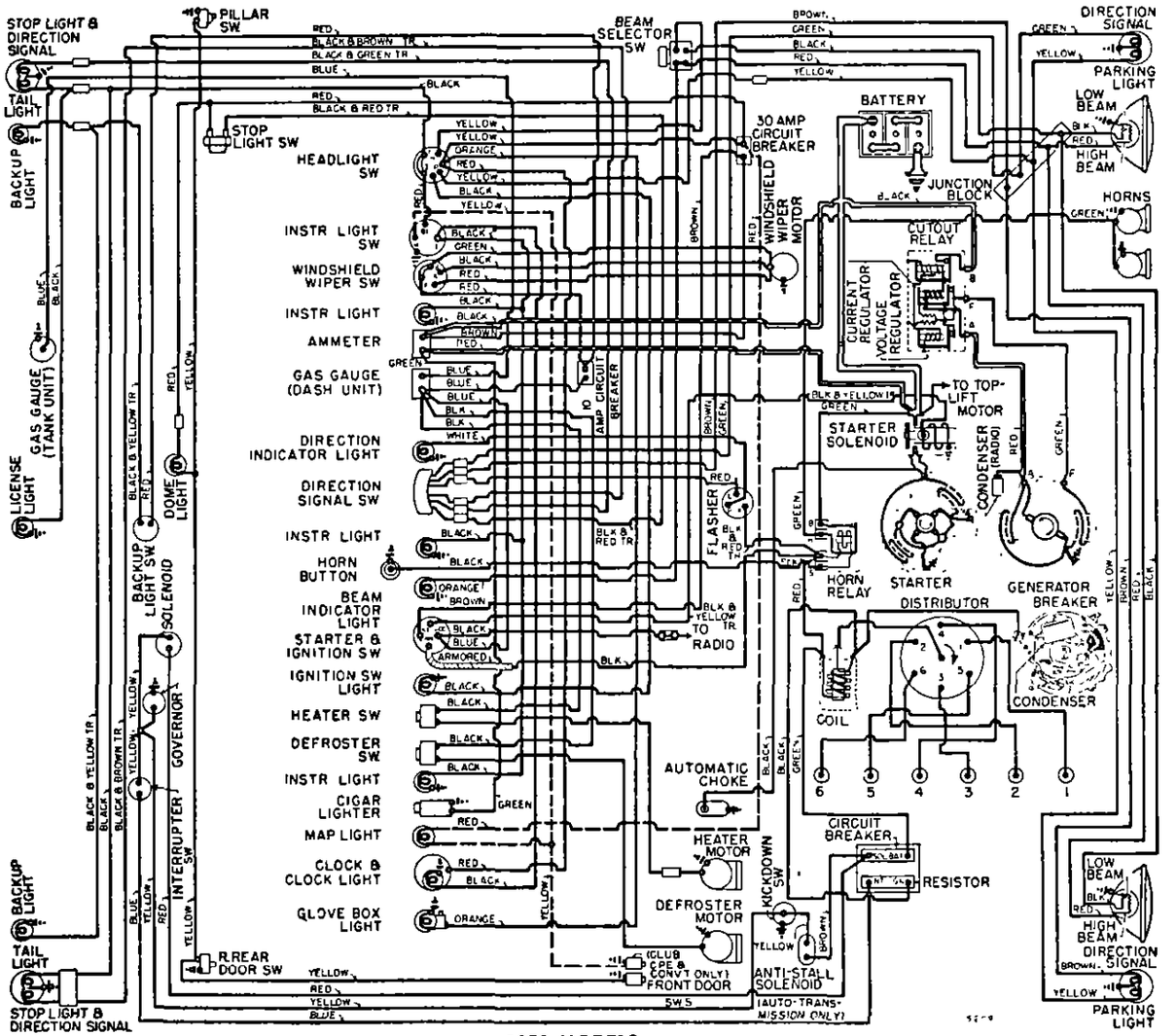
Accelerating Pump—Center Hole (medium stroke) Normal, Inner Hole (min. stroke) Summer, Outer Hole (max. stroke) Winter.

Fast Idle Setting: No adjustment required.

Choke Setting: See Carter (B&B) carburetor above.

Slow-closing Throttle Setting: Remove all slack from linkage, set adjusting screw on lever under float so that piston travel (measured on dashpot rod on bowl cover is 5/16-11/32" (BXVD-3), 13/32-7/16" (BXVES-3). Turn screw out to lengthen stroke.

Fuel Pump Pressure: 4 to 5½ lbs.



1952 MODELS

MANIFOLD HEAT CONTROL: Thermostatic coil type. See that valve operates freely. When installing coil, free end should have approx. ¾ turn wind-up (counter-clockwise) to hook over stop stud.

VALVE TAPPET CLEARANCE: With engine HOT:
(1952) .008" Intake, .010" Exhaust.
(1953) .010" Intake and Exhaust.
NOTE—Adjusting screws are self-locking type.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to the right. Key automatically returns to "on" position.

COIL: Auto-Lite CR-4001. On ignition cable bracket above distributor.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA.
Capacity—.25-.28 microfarad.

DISTRIBUTORS: Auto-Lite. (1952 U.S. Cars), IAT-4011, (1953 U.S. Cars) IAT-4101, (1952-53 Canada) IAT-4012. Automatic and vacuum advance type with "pivoted breaker plate."
Canada). Automatic and vacuum advance.
Breaker Gap—.020", (.018-.022").
Cam Angle—39°±3° closed. DO NOT exceed breaker gap limits to obtain this dwell.
Rotation—Clockwise viewed from above.

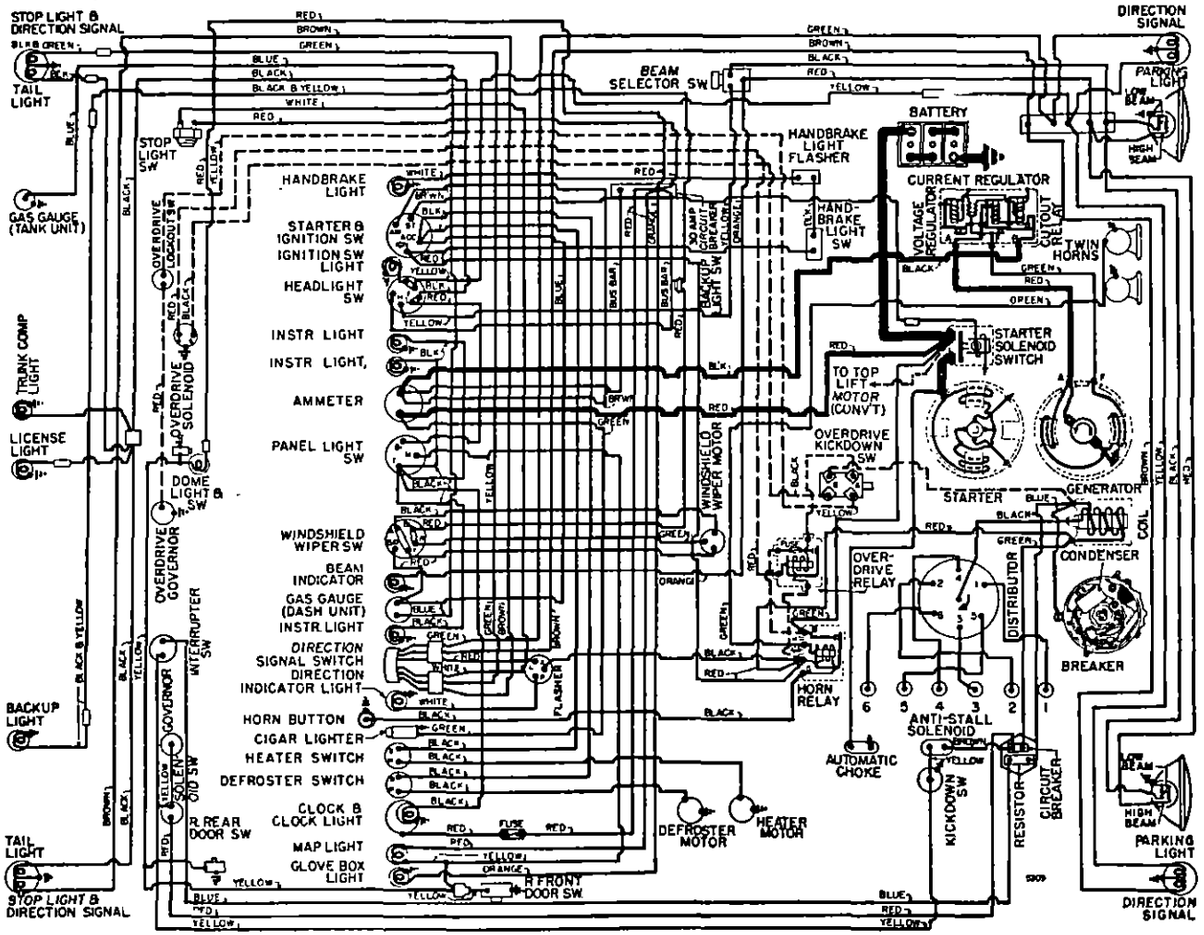
Automatic Advance—IAT-4011, 4012, 4101

Degrees Dist.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAT-4011, 4101

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4¼"
1°	2°	5½"
4°	8°	9⅛"
7°	14°	12¾"
8°	16°	14"



1953 MODELS

Vacuum Advance——IAT-4012

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5
2	4	7¼
4	8	9⅜
6	12	11⅝
9	18	15

Distributor Installation Note: Install distributor with #1 piston in firing position.

IGNITION TIMING

Model	Std. Setting
1952 D-41 & D-42	AT TDC.
1953 D-46 & D-47	2° BTDC

See Manual Adjustment below for Final Setting.

Timing Mark—Impulse neutralizer marked 'DC' at TDC with 15—1° graduations before and after this point.

Timing (Using Synchroscope)—Loosen distributor lockplate hold-down screw, center pointer on scale, tighten screw. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine, loosen lock-plate clamp bolt, rotate distributor until mark is aligned with pointer on chain case, tighten clamp bolt.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° before or after initial setting) counter-clockwise (if no ping), clockwise (if ping too severe). Tighten screw.

CARBURETOR

CARTER (B & B)

Carter (B&B)—1½" single barrel downdraft type with separate Sisson Automatic Choke.

Carter Carburetor No.	Application
D6H2	Std. Trans., no Fluid Drive
D6P1 & D6P2①	Std. Trans. & Fluid Drive
D6U1②	Overdrive Trans., no Fluid Drive
D6V1 ①②	Overdrive Trans. & Fluid Drive
D6M1 ①②	Automatic Trans. & Fluid Drive

①—With Slow-Closing Throttle.
②—With Kick-Down Switch.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jets—*See Carburetor Section for Carter Carburetor Jet Specification Table.*

Slow Closing Throttle: Adjustable dash-pot type.
Setting—Open adjusting screw in top of bowl cover 5 full turns (D6P1), 4½ turns (D6P2), 2½ turns (D6V1) from closed position.
See Carburetion Equipment Section for complete data.

Overdrive Kick-down Switch: With throttle valve in wide open position, adjust hex nuts on switch to have 1/64" to 3/64" clearance between kick-down lever and switch stem guide.

Fast Idle: No adjustment required.

Automatic Choke: Sisson type.
Setting—Insert gauge pin in automatic choke shaft and hole in base flange to position shaft, loosen choke valve lever screw and position choke so that valve is tightly closed.
See Carburetion Equipment Section for complete data.

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STROMBERG

Stromberg Model BXVD-3 (1952 Synchro-mesh), BXVES-3 (1952-53 Gyromatic Trans.). 1½" Single barrel downdraft type with Sisson Automatic Choke.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jet—*See Carburetor Section for Stromberg Downdraft Carburetor Jet Specification Table.*

Slow-Closing Throttle: Adjustable dashpot type.

Setting—With all slack removed from linkage, set adjusting screw on dashpot lever under float bowl so that piston travel is 5/16-11/32" (BXVD-3), 13/32-7/16" (BXVES-3). Turn screw out to lengthen stroke.

See Carburetion Equipment Section for complete data.

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment required.

Automatic Choke: Sisson type.

Setting—See Carter (B&B) carburetor above.

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Heavy duty oil-bath type.

Fuel Pump: Auto-Lite (1952) FA-4001, (1953) FA-4003. Diaphragm type fuel pump.

Pressure—3½-5½ lbs.

See Carburetion Equipment Section for complete data.

Fuel Tank Filter: Oillite metal filter in tank.

Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank. Blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with gasoline.

Gasoline Gauge: Auto-Lite electric type.

Dash Unit

Auto-Lite No.	1952	1953
All exc. Estate Wgn.	12821A	12964A
Estate Wgn.	12822A	13193A

Tank Unit

All exc. Estate Wgn.	11538A	12617A
Estate Wgn.	12195A	12904A

See Carburetion Equipment Section for complete data.

BATTERY

Willard HW-1-105C or Auto-Lite IH-105-D. 6 volt, 15 plate, 105 ampere hour capacity (20 hour rate).

Grounded Terminal—Positive (+) to engine.

Location—Under hood in left fender shield.

STARTER

Auto-Lite. (Early 1952 U.S. Cars) MCH-6201, (Late 1952 & 1953 U.S. Cars) MCH-6205, (Canada) MCH-6202 & MCH-6206. Armature No. MCH-2088.

Drive—Bendix "Folo-Thru" type.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ounces (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6 "	Lock	2.0	335

Starting Switch: Auto-Lite (1952) SST-4006, (1953) SST-4006A. Magnetic type controlled by ignition switch (by turning key past "on" position).

See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite. 2-brush with voltage-current regulation.

Model	Auto-Lite Generator
Std. Equip.	GGW-6001J, K, L, Q
Special	GGU-6001G, V, R GGJ-6001F, G

Maximum Charging Rate—See Table below.

Charging Rate Adjustment—None. See Regulator.

Performance Data—"GGJ" Gen.

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750
55	8.0	1500-1700 — 1650-1850

Performance Data—"GGW" Gen.

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350
45	8.0	1925-2125 — 2350-2550

Performance Data—"GGU" Gen.

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850
50	8.0	1550-1750 — 1750-1950

Rotation—Counterclockwise at commutator end.

Brush Spring Tension—(GGW & GGU) 35-53 ozs. (GGJ) 30-37 ozs. with new brushes.

Field Current—(GGW) 1.4-1.5 amperes, (GGJ & GGU) 1.4-1.6 amperes, all at 5.0 volts.

Motoring Current—(GGW) 4.8-5.3 amperes, (GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, all at 5.0 volts.

Belt Adjustment: ¼" belt deflection or 40-50 lbs. tension with scale attached to field frame.

REGULATOR

Auto-Lite. Voltage & Current type. "Temperature Compensated" Current Regulator.

Auto-Lite Regulator No.	for Auto-Lite Generator
VBE-6001A	All "GGW" Gen.
VBF-6001A or VBF-6002A①	All "GGJ" Gen.
VAV-600-B or VAV-6002B①	All "GGU" Gen.

①—For Negative battery ground.

Checking & Adjusting & Detailed Data—*See Electrical Equipment Section.*

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.3-6.8 volts.

Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.1-7.4 volts (VAV & VBE), 7.15-7.45 volts (VBF) after 15 minutes operation charging at 10 amperes (VBF), ½ maximum rate (VAV & VBE).

Air Gap—.048-.052" with contacts just opening.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

▷*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.:*

Test A—**Operating Amperes**—Test B

All "VAV" Reg. ... 50 ... 45 (43-47)

All "VBE" Reg. ... 52 ... 45 (43-47)

All "VBF" Reg. ... 66 ... 55 (53-57)

Test A—After 15 minutes operation charging at 10 amperes (VBF), ½ maximum rate (VAV & VBE).

Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts (VAV & VBE), 6.7-7.0 volts (VBF).

Air Gap—.048-.052" with contacts just opening.

Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Direction Signal: *See Electrical Equipment Section.*

Direction Signal Indicator—Located on lower face of speedometer.

Switches

Lighting—Dodge No. 1370138.

Beam Selector—Dodge No. 1253003.

Instrument—Dodge No. 1370011.

Direction Signal—Dodge No. 1440080.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting. 30 amperes, mounted on instrument panel between ammeter and headlamp switch.

Aux. Circuit Breaker—10 ampere. Protects Windshield Wiper and Back-Up Light.

FUSES: Clock—3 ampere. In clock lead.

Overdrive—20 ampere. On overdrive relay.

HORNS: Auto-Lite. Twin horns with relay.

Auto-Lite No.	Low Note	High Note
1952 (U.S. Cars)	HW-4203	HW-4204
1952 (Canada)	HW-4107	HW-4108
1953 (U.S. Early)	HAB-4619	HAB-4620
1953 (U.S. Later)	HAB-4655	HAB-4656
1953 (Canada Early)	HAB-4619	HAB-4620
1953 (Canada Later)	HAB-4659	HAB-4660

Horn Relay: Auto-Lite HRL-4104. Connected through ignition switch, operates only with ignition on.

Contacts Close—1.5-3.0 volts (seal to core with 4 V.).

Contacts Open—.5 volt min. (open from seal).

Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type.

Bore—3¼". **Stroke**—4⅝".

Displacement—230.2 cu. ins. **Rated HP**—25.35.

Developed Horsepower—103 at 3600 RPM.

Compression Ratio—7.0-1 Std. Cast-iron Head.

Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Dodge Special Data.*

OIL PAN REMOVAL: *See Dodge Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Dodge Special Data.*

PISTONS: Aluminum alloy, "U" slot, cam ground type.

▷*CYLINDER BORE OVERSIZE CAUTION—Engines with "A" following engine no. have .020" oversize bore.*

NOTE—Piston skirt is elliptical (.010-.012" smaller diameter across pin bosses than across thrust faces), and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).

Length—3 11/16". **Weight**—16 ozs. (stripped).

Removal—Pistons and rods removed from above.

Clearance—.0008" on thrust face ¾" from bottom of skirt.

Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses) ¾" from bottom of skirt. Fit piston in bore using .002" x ½" feeler, insert piston upside down in

ENGINE

CONTINUED FROM PRECEDING PAGE

bore with feeler 90° from pin bosses on side opposite slot. Pull required to withdraw feeler should be 6-10 lbs. with piston and cylinder bore at 70°F.

Replacement Pistons: .005", .020", .030", .040", .060" O.S. *See "Pistons" in Dodge Special Data.*

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression (tin-plated), two slotted oil control rings per piston, all above pin.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down. NOTE—Ring expanders used with top oil rings.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS. *See "Piston Rings" in Dodge Special Data.*

Piston Pin: Diameter—55/64". **Length**—2 3/4". Pin floats in piston and rod, held by lock rings.
Pin Fit in Piston—.0000" to +.0005". Thumb push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0001-.0002" clearance or Tight thumb press fit at 70°F.

Replacement Pins: Std., .003", .008" Oversize.

CONNECTING ROD: Length—7 13/16". **Weight**—27.90 ozs. (with bolts less bearings).
Crankpin Journal Diameter—2.0615-2.0625".

►*JOURNAL DIAMETER CAUTION—(ONE OR MORE journals machined UNDERSIZE). See Crankshaft data.*
Lower Bearing—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. *See "Connecting Rod & Bearings" in Dodge Special Data.*

Replacement Bearings: .001", .002", .010", .012", U.S. *See "Connecting Rod & Bearings" in Dodge Special Data.*

Installing Rods: Wide portion of bearing to rear (#1, 3, 5), to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.
Journal Diameters—2.4995-2.5005".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Engines with undersize journals identified as follows:* .010" **UNDERSIZE (ALL Main & Connecting Rod Journals)**—Letter "B" stamped with engine serial number indicates ALL Main & Connecting Rod Journals are .010" undersize.
Bearings—Removable, precision type, steel-backed, thin babbitt lined. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. *See "Crankshaft & Main Bearings" in Dodge Special Data.*

Replacement Bearings: .001", .002", .010", .012" U.S. *See "Crankshaft & Main Bearings" in Dodge Special Data.*

End Thrust: Taken by flanged faces of #4 (rear) main bearings. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Dodge Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #4—machined in crankcase).
Clearance—.001-.003".
Camshaft Removal: *See Dodge Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width 1". Pitch .500" (1/2"). Length 24" or 48 links.
Timing Chain Removal: *See Dodge Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 27/32"
Exhaust	1 13/32"	.340-.341"	4 27/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.001-.003"
Exhaust	45°	23/64"	.003-.005"

Exhaust Valve Seat Inserts—*See Dodge Special Data.*

Valve Guides: Remove from above. Install new guides with the counterbore end UP for EXHAUST valves and with the counterbore end DOWN for INTAKE valves. Press new guides in with upper end 7/8" below top of block, ream guides to inside diameter of .342-.343" (Intake), .343-.345" (Exhaust).

Valve Springs: Install with close-coil end to top. Free Length 2".

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1 3/4"
Valve Open	110-120 lbs.	1 3/8"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter 5/8". Service by reaming lifter holes (work from above piloting reamer in valve guide) and installing oversize lifters furnished .001", .008", .030" Oversize.
Lifter Clearance—.0002-.001".

VALVE TIMING

Tappet Clearance: With engine HOT:
(1952) .008" Intake, .010" Exhaust.
(1953) .010" Intake and Exhaust.
NOTE—Tappet screws are self-locking type.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 8° BTDC. Close 36° ALDC.
Exhaust Valves—Open 37° BLDC. Close 7° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 8° before top dead center (8th graduation before "DC" mark on vibration dampener or crankshaft fan pulley aligned with pointer on chain case cover). Reset tappet clearance at .008" (1952), .010" (1953) with engine HOT for running clearance.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, timing chain.
Crankcase Capacity—5 qts. (refill).
Normal Oil Pressure—40-50 lbs. at 30 MPH.
Oil Pressure Relief Valve—Under plug below starter. Opens at 45-55 lbs. Spring painted red, green, or unmarked. If spring replaced, use same color spring.

Oil Pan Removal: *See Dodge Special Data.*

Oil Pump: "Rotor" type on right side of engine.
Servicing—*See "Oil Pump" in Dodge Special Data.*

Oil Filter: On left side of engine above starter.
Servicing—Replace filter at 8000 mile intervals.
Replacement Filter Element—Mopar No. 1121694.

Oil Pressure Gauge: Auto-Lite. (1952 Early) No. 12682A, (1952 Late) No. 12820A, (1953) No. 12960A.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and water distribution tube in cylinder block behind pump. Pressure type with pressure valve in filler cap.
Capacity—13 1/2 qts.
Pressure Valve—(1952) Dodge No. 1346849 (4 lb. type, stamped "4"), (1952-53) Dodge No. 1373136 (7 lb. type, stamped "7").

Radiator Removal: *See Dodge Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Dodge Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front and two ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183-187°F.

Temperature Gauge: Auto-Lite. (Early 1952) No. 12716A, (Late 1952) No. 12818A, (1953) No. 12963A.

CLUTCH

Borg & Beck or Auburn (As Listed Below). Single plate dry disc type.

Borg & Beck Clutches

1952 Std.	9A7 (Assy. No. 952)
1953 Std.	10A7 (Assy. No. 957)
1952-53 Heavy Duty	11A6 (Assy. No. 931)

Auburn Clutch

1952-53	No. 9251-12

See Clutch Section for complete data.
Facings—Molded woven asbestos (all models).
Borg & Beck 9A7—I.D. 6", O.D. 9 1/4", Thickness .125".
Borg & Beck 10A7—I.D. 7", O.D. 10", Thickness .125".
Borg & Beck 11A6—I.D. 6 1/2", O.D. 11", Thickness .125".
Auburn 9251-12—I.D. 6", O.D. 9 1/4", Thickness .115".

Pedal Adjustment: Set pedal to just clear toeboard (stopscrew on lower end of pedal) and set for 1" free travel (adjust nut on connector link at fork). *NOTE*—Do not disturb turnbuckle at pedal spring.
Over-center Spring Adjustment—See "Clutch Notes" in Dodge Special Data.

Removal: Remove release fork pull-back spring, transmission (see Transmission) and housing underpan. Pull out clutch release bearing and sleeve. Mark cover and flywheel (or Driving Plate on Fluid Drive). Take out cover screws, remove assembly.

FLUID DRIVE

Fluid Coupling Optl. on all models with Std. and overdrive transmission, Std. with Automatic Trans.
See Transmission Section for complete data.

Slippage Test: *See "Fluid Drive" in Transmission Section for complete data.*

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Removal: Remove transmission and clutch (see TRANSMISSION and CLUTCH), take off driver flange stud nuts (Tool C-589), lower fluid drive assembly out.

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*

Transmission Control: Manual steering col. shift Std. *See Transmission Section for complete data.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if disassembling transmission—See Chrysler Special Data for Propeller Shaft Center Bearing Removal on 7 Pass.). Disconnect speedometer cable, hand brake cable, gear-shift rods, vacuum and air hose (If Power Shift used). Remove trans.-to-clutch housing capscrews and nuts. Pull unit to rear, down and out of car. *NOTE*—Use pilot studs for installation.

OVERDRIVE

Warner Type R10. Optional with Synchro-mesh Transmission. Planetary gear type with solenoid operation and accelerator pedal kick-down. *See Transmission Section for complete data.*

Control Relay—Auto-Lite (1952) No. HRT-4001, (1952-53) No. HRT-4001A.

Governor—Auto-Lite No. TGE-4008.

Solenoid—Delco-Remy No. 1118155.

Overdrive Control Fuse—20 ampere. In holder on control relay.

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

Gyromatic—4 speed hydraulically operated type. Semi-automatic, four-speed transmission with hydraulic actuation and electrical control.

▷*TESTING, TROUBLE SHOOTING & OVERHAUL: See "Chrysler, DeSoto, Dodge Automatic Transmission" in Transmission Section.*

Kick-down Solenoid—Auto-Lite No. SSS-4003.

Governor—Auto-Lite No. TGG-4001.

Kick-down Switch—Part of carburetor assembly.

Removal: Remove access cover on right rear side of floorboard under front floor mat, disconnect speedometer cable, and governor, solenoid and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gear-shift rods at transmission. Drain transmission, **replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.

INSTALLATION CAUTION—Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

UNIVERSALS

Detroit Universal Series 4200. Ball & Trunnion type.

Propeller Shaft Center Bearing: Used on 8 Pass. Cars. *See "Propeller Shaft" in Dodge Special Data.*

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive. *See Rear Axle Section for data.*

Ratios:	1952 Models
Coupe Models (Synchro-mesh)	3.73-1
Sedan Models exc. 8 Pass. (All Trans.)	3.9-1
8 Pass. Models	4.1-1
1953 Models	
All (Synchro-mesh Trans.)	3.9-1
All (Overdrive)	4.3-1
All (Gyromatic Trans.)	3.9-1

Removal: Disconnect rear universal, remove axle shafts (see below) and carrier assembly cap screws.

Axle Shaft Removal—Remove wheel, hub and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). *NOTE—Use puller C-293-E to remove* bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Oil Seal: Leather type mounted on brake support (backing plate).

Oil Seal Servicing—*See "Rear Axle" in Dodge Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008"

SHOCK ABSORBERS

"Oriflow." Direct-acting, hydraulic. Non-adjustable. Serviced by replacement.

Dodge Part Nos.	Front	Rear
1952 Early (Std)	1321127	1321128
1952 Later & 1953 (Std.)	1326164	1326165
1952 (Heavy Duty)	1540041	1450039
1953 (Heavy Duty)	1450041	1450075

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram. Coil springs and direct acting shock absorbers. *See Front Suspension Section for complete data*

Kingpin Inclination—5° to 6½° crosswise.

Camber—Pos. ⅜° to Neg. ⅜° (0° preferred).

Caster—0° preferred. Limits Pos. 1° to Neg. 1°.

Toe-In—0" (0-1/16") Adjust by turning both tie rods equally.

Toe-out on Turns—Inner wheel 21½° plus or minus 1° with outer wheel at 20°.

STEERING GEAR

Own Make—(Gemmer design) Model 305.

See "Gemmer Model 305 & 335" in Steering Gear Section for complete data.

BRAKES

Service: Dodge "Safe-Guard" Lockheed hydraulic.

▷*BRAKE SQUEAK OR SQUEAL CORRECTION—See "Lockheed-Chrysler Safe-guard Hydraulic Brake" in Brake Section.*

Drum Diameter—10" (D41, D47), 11" (D42, D46).

Lining—Molded asbestos bonded to shoe.

Length— Model	Front Wheel Primary	Front Wheel Secondary	Rear Wheel Primary	Rear Wheel Secondary
D42, 46	11.5"	11.5"	11.5"	8.8"
D41, 47	10.5"	10.5"	10.5"	8.0"

Width—2". Thickness—.200".

Clearance—.006" at each end of all shoes.

Braking Power—60% front wheels, 40% rear.

Hand Brake: On shaft at rear of transmission. External contracting type (Synchro-Mesh Trans.), Internal expanding type (Gyro-Matic Trans.).

Drum—6" (External Type), 7" (Internal Type).

Lining Molded asbestos. **Width 2", Thick. 5/32".**

Clearance (External Type)—.015-.020" between lining and drum.

Clearance (Internal Type)—Approximately .010" between lining and drum.

Adjustment—*See "Hand Brake Notes" in Dodge Special Data.*

Brake Power Unit: Chrysler Vacu-ease Vacuum Power unit.

See Brake Section for complete data.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydro-Lectric type *See Miscellaneous Section for complete data.*

WINDSHIELD WIPER: Auto-Lite or Redmond. Electric type with circuit breaker to protect wiper motor.

▷*1952-53 AUTO-LITE WIPER IMPROVED LINKAGE & MOTOR DRIVE PARTS: See "Auto-Lite Windshield Wiper" in Miscellaneous Section for complete data.*

▷*1952 REDMOND WIPER IMPROVED LINKAGE ASSEMBLIES: See "Redmond Electric Windshield Wiper" in Miscellaneous Section for complete data.*

Auto-Lite Wipers

1952 D41—Auto-Lite No. EWR-5001D & EWY-5001D.

1952 D42—Auto-Lite No. EWR-5001D or EWJ-4001 (Early), EWY-5001D or EWJ-4007 (Later).

1953 D46—Auto-Lite No. EMD-4001A.

1953 D47—Auto-Lite No. EMD-4001.

►*1954 AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

1953 MODELS

Series	Model
Coronet	D-44
Coronet Diplomat	D-48

1954 MODELS

Series	Model
Meadowbrook	D50-1, D50-1A
Coronet	D50-2
Royal	D50-3, D53-3
Sierra	D53-2

SERIAL NUMBER: On left front door hinge post.

1953 Starting Serial Numbers

Model	Detroit	Los Angeles	San Leandro
D-44	34500001	41500001	42500001
D-48	38500001	46500001	47001001

1954 Starting Serial Numbers

Model	Detroit	San Leandro
D-50-1A	32,152,901	45,105,801
D-50-1	34,642,001	42,510,001
D-50-2	34,642,001	42,510,001
D-50-3	34,642,001	42,510,001
D-53-2	38,525,001	47,003,001
D-53-3	38,525,001	47,003,001

ENGINE NUMBER: Stamped on boss on top front side of block just back of water pump
Starting Engine Number–D50-1001.

►*ENGINE NUMBER LETTERS: (Following Engine Number)–Identified as follows:*
"A"–All cylinders .020" Oversize.
"B"–All crankshaft journals .010" Undersize.
"AB"–BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 135-165 lbs., at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic coil type, located in exhaust manifold of right cylinder block. Valve must operate freely. When installing coil, position shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer (tongue) end of spring in upper left hand position. Press inner end of coil into slot and seat firmly. Now move outer end (tongue) of spring down, around, up and over stud. *See Dodge Special Data.*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2. See diagram.
SPARK PLUG GAP: .035".
Spark Plug–Auto-Lite 4S-140. Resistor type. 14mm.
COIL: Auto-Lite CR-6015.
Ignition Current–2.25 amperes idling, 5.0 amperes stopped.
DISTRIBUTOR: Auto-Lite IAZ-4003 (Early 1953); IAZ-4003A (Late 1953 & Early 1954); IAZ-4003B (Late 1954).
Condenser–Auto-Lite IBB-2015R. **Capacity**–.25-.285 microfarad.
Contact Point Set–IGP-3028ZS.
Breaker Gap–.015-.018". Set max. gap to .017".
Cam Angle–34° ± 3°. Total dwell both points. *Do not exceed breaker gap limits to obtain dwell.*
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Clockwise viewed from above.

Automatic Advance–IAZ-4003

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		375	2		750
2		400	4		800
14		1650	28		3300
15		1750	30		3500

Automatic Advance–IAZ-4003A

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
1	425	2	850
2	500	4	1000
10	1500	20	3000
11	1625	22	3250

Automatic Advance–IAZ-4003B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		375	2		750
3.5		450	7		900
14		1550	28		3100
15		1650	30		3300

Vacuum Spark Control: Auto-Lite. Integral type.

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0	5-1/4
1	2	6
5	10	9-1/4
10	20	14-7/8
11.5	23	17

IGNITION TIMING

Setting–4° BTDC. See Manual Adjustment.
Timing Mark–On fan drive pulley. Marks are 2° apart.
Manual Adjustment–Timing may be advanced to 8° BTDC with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

►*IGNITION TIMING CAUTION: For accurate reading, be sure engine is at operating temperature and carburetor is at slow idle.*

CARBURETOR

►*CARBURETOR APPLICATION: Stromberg 2-Barrel is standard on all models.*

STROMBERG

Stromberg WW. Dual downdraft type with automatic choke.

Model	Stromberg No.
1953 Synchro-mesh (Exc. Fl. Dr.)	3-108
1953 Synchro-mesh (Fluid Drive) ①	3-105
1953 Gyro-Matic & Gyro-Torque ① ②	3-105
1953 Overdrive ②	3-109
1954 Synchro-mesh	3-108A
1954 Overdrive ②	3-109A
1954 PowerFlite ①	3-105A

①–Slow closing throttle dashpot.
②–Kick-down Switch.

Idle Setting–Initial Setting 3/4–1-1/4 turns open, final setting midway between missing and rolling points. Adjust both screws alike, turn screws out for richer mixture.

Idle Speed–450-500 RPM.

Float Level–3/16" from top of main body to top of float measured at center of float with float lip held firmly against needle valve. Use depth gauge or Tool T-25569 to measure float level. To reset float level, bend float lever next to float (use Tool T-24733).

Accelerating Pump–Normal setting, center hole; for less fuel install rod in inner hole; for more fuel install rod in outer hole.

Fast Idle: To make fast idle adjustment, insert gauge T-25570 (1st Step) between short side of choke valve and air horn. Hold choke valve lightly against gauge and slowly close throttle. Top end of fast idle lever should just enter first step on fast idle cam. To adjust, place thumb on counterweight and bend fast idle cam lever ear as required.

Automatic Choke Setting: Centered (arrow on edge of cover aligned with boss on air cleaner end of housing).

Kickdown Switch Adjustment (3-106, 3-109, 3-109A): Adjust switch position on bracket by backing off one locknut on mounting stem and tightening opposite nut until "B" contacts (terminals on opposite end from plunger) are closed with throttle valves wide open (use test lamp connected to switch terminals to check operation).

Slow Closing Throttle (Dashpot) Adjustment (3-105, 3-105A, 3-106): For maximum action, turn screw out until overtravel of plunger (possible inward movement) is 1/32-1/16" with throttle valves closed.

PowerFlite Throttle Linkage Adjustment: *See "PowerFlite" in Transmission Section.*

►*OTHER DATA: See Stromberg "WW" in Carburetor Section.*

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Fuel Pump Pressure: 3-1/2–5-1/2 lbs.

CARTER 4-BARREL

Carter WCFB 2191S. Four-barrel downdraft type with automatic choke.
Idle Setting–1–2 turns open. For richer mixture, turn screws out.
Idle Speed–475–500 RPM.

►*OTHER DATA: See "Carter WCFB" Carburetor in Carburetor Section.*

PowerFlite Throttle Linkage Adjustment (1954 Models): *See "PowerFlite Transmission" in Transmission Section.*

Fuel Pump Pressure: 3-1/2–5-1/2 lbs.

CARB. EQUIPMENT

Fuel Pump: Auto-Lite FB-4002. Diaphragm type.
Pressure–3-1/2–5-1/2 lbs.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite. "One Wire" and "Two Wire (Thermostatic)" types used. Nos. 13529A and 13586A (Dash Units), 13514A (Tank Unit) comprise "Two Wire (Thermostatic)" type, others are "One Wire".

Dash Unit (1953)–Auto-Lite No. 12964A (Exc. Suburban); No. 13193A (Suburban).
Dash Unit (1954)–(Exc. Suburban) Auto-Lite No. 13454A (Early), 13584A (Later). (Suburban) 13457A & 13529A (Early), 13586A (Later).
Tank Unit–(Exc. Suburban) Auto-Lite 12617A. (Suburban) 12904A (Early), 13514A (Later).
See "Fuel Gauges" in Electrical Equip. Section.

BATTERY

Auto-Lite 1H-105-D or Willard HW-1-105-C. 6 volt, 15 plate, 105 ampere hour rate.
Grounded Terminal–Positive.
Engine Ground–Left front of engine.

STARTER

Auto-Lite MCH-6206. Armature–MCH-2088.
Drive–Bendix "Folo-thru" type.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–42-53 ozs. (with new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6 ft. lbs.	Lock	2.0	335

Starting Switch: Auto-Lite SST-4006A. Magnetic type switch controlled by ignition switch. Neutral Safety Switch mounted on Transmission on Automatic Transmission equipped cars. *See "Starter Controls" in Electrical Equip. Section.*

GENERATOR

Early 1953 Models

Auto-Lite Generator No.	Armature No.
GGW-6009 (Standard)	GGW-2006F
GGJ-6001F (City Pol. & Taxi)	GGJ-2101F
GGJ-6001G (State Police)	GGJ-2101F
GGW-6009A (Special)	GGW-2006F

Late 1953 & 1954 Models

Auto-Lite Generator No.	Armature No.
GGW-6012A, B (Standard)	GGW-2006F
GGW-6014A, B (Power Steering)	GGW-2045F
GGU-6008A, B (Special)	GGU-2063F
GGU-6006A, C (Special Power Steering)	GGU-2042F
GGU-6010B (Special Power Steering)	GGU-2042F
GGJ-6005A (Special)	GGJ-2101AF

Performance Data–GGJ

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	600-700 – 650-750
50	8.0	1400-1600 – 1550-1750
55	8.0	1500-1700 – 1650-1850

Performance Data–GGU

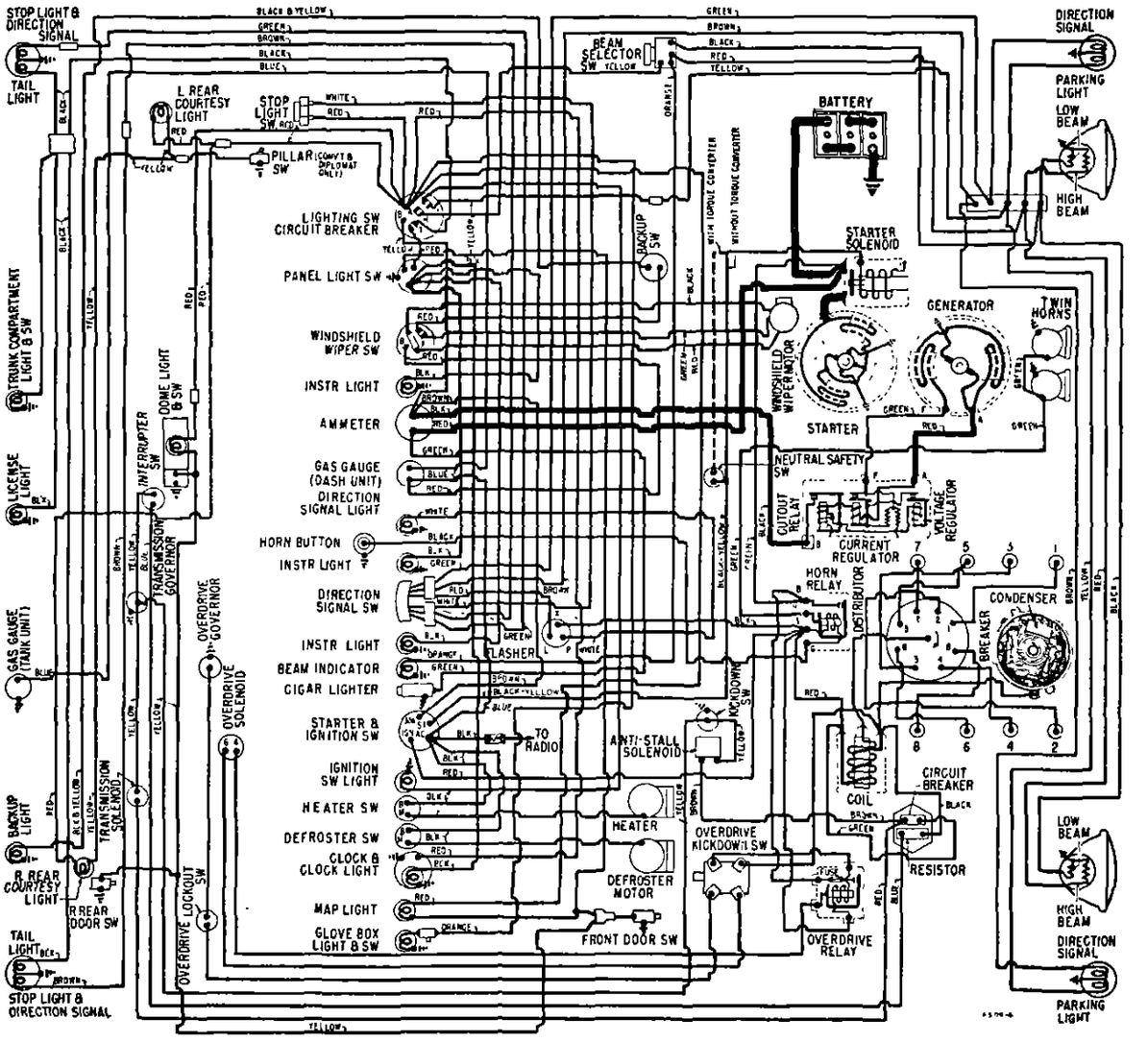
Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	750-850 – 800-900
45	8.0	1450-1650 – 1650-1850
50	8.0	1550-1750 – 1750-1950

Performance Data–GGW

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	870-970 – 950-1050
40	8.0	1800-2000 – 2150-2350
45	8.0	1925-2125 – 2350-2550

Brush Spring Tension–(GGJ) 30-37 ozs. (GGU, GGW) 35-53 ozs., with new brushes.

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1953 MODELS

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Field Current—(GGJ, GGU) 1.4—1.6 amperes, (GGW) 1.4—1.5 amperes, all at 5.0 volts.

Motoring Current—(GGJ) 4.1—4.6 amperes, (GGU) 5.0—6.0 amperes, (GGW) 4.8—5.3 amperes, all at 5.0 volts.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Approximately 1/2" slack (when pushed from a straight line midway between pulleys.

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW

Cutout Relay

Cuts In—6.3—6.8 volts.

Cuts Out—4.1—4.8 volts.

Contact Gap—.015" minimum.

Air Gap—.031—.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (VAV, VBF)—7.1-7.4 volts (at 70°), *after 15 minutes operation charging at ½ maximum rate.*

Setting (VBE)—7.1-7.4 volts (at 70°). *Test with regulator in operation at 10 amperes output.*

Air Gap—.048—.052" with contacts just opening.

Checking & Adjusting—See *Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

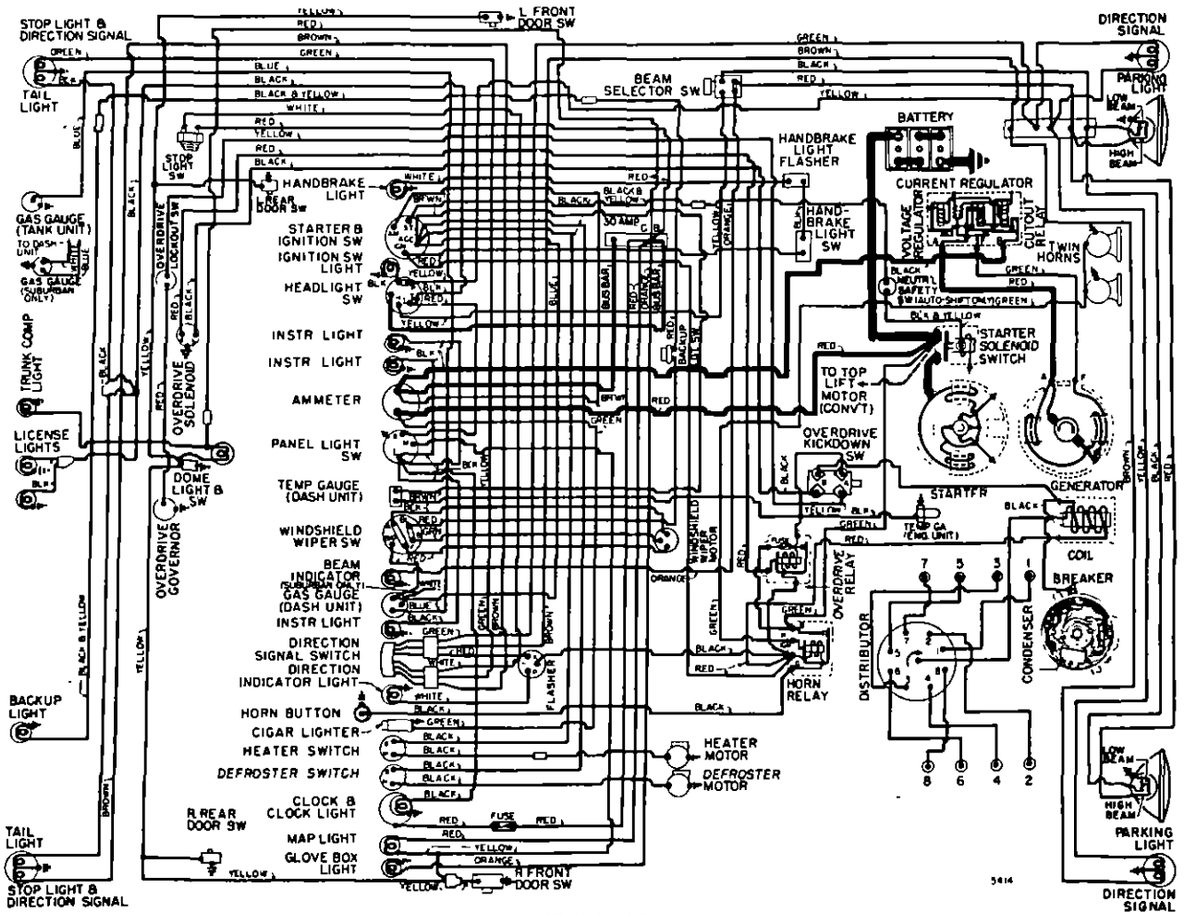
	Test A—Operating Amperes	Test B
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	55	55 (53-57)
VAV-6001B, 2B	50	50 (48-52)

Test A—After 15 minutes operation charging at 1/2 maximum rate.

Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7—6.9 volts (VAV, VBE). 6.7—7.0 volts (VBF).

Air Gap—.048—.052" with contacts just opening.

Checking & Adjusting—See *Electrical Equip. Section.*



1954 MODELS

MISC. ELECTRICAL

Headlamps: Sealed Beam. See *Electrical Equip. Section.*

Direction Signal: See *Electrical Equip. Section.*

►*IGNITION-STARTER SWITCH CAUTION: When installing accessories, use accessory terminal only on ignition-starter switch and not the ammeter terminal post.*

Lighting Switch Removal: Remove knob (use small screwdriver to raise up special slip in knob, or remove small cross-head screw, depending on method used to hold knob). Remove hex nut and collar that holds assembly in place. Pry out switch (switch has threaded sleeve with two flat sides. Sleeve fits snugly in switch hole in panel).

Stop Light Switch Location: In brake line fitting on frame left side rail.

FUSES: Clock—3 ampere. In clock lead wire.

Radio—14 amperes. At ignition terminal feed.

Overdrive—20 ampere. On overdrive relay.

CIRCUIT BREAKERS: Lighting—30 ampere circuit breaker, located to right of ammeter, protects lighting circuits

Windshield Wiper—10 ampere circuit breaker, located on wiper switch, protects windshield wiper and back-up lights.

HORNS: Auto-Lite. Twin horns with relay.

	High Pitch	Low Pitch
1953 U.S. (Early)	HAB-4620	HAB-4619
1953 U.S. (Late)	HAB-4156	HAB-4155
1953 Canada D-46 (Early)	HA-4042	
1953 Canada (Early)	HAB-4620	HAB-4619
1953 Canada (Late)	HAB-4660	HAB-4659
1954 U.S.	HAB-4656	HAB-4655
1954 Canada	HAB-4660	HAB-4659

Horn Relay: Auto-Lite HRL-4104.

Contacts Close—1.5—3.0 volts (seal to core with 4.0 volts maximum).

Contacts Open—.5 volt *minimum (open from seal).*

Contact Gap—.026". **Air Gap**—.016—.020" (armature air gap with contacts closed but not sealed), .015—.018" (gap between armature leg and yoke with armature sealed to core).

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ENGINE

►*AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Model	Bore	Stroke	Displacement
1953-54	3 7/16"	3 1/4"	241.3 cu. ins.

Model	Comp. Ratio	Rated HP	Dev. HP ①
1953 Coronet	7.1-1	37.8	140
1954 Meadowbrook	7.1-1	37.8	140
1954 Coronet, Royal	7.5-1	37.8	150

①—All at 4400 RPM.

Compression & Vacuum Reading—See *TUNE-UP.*

ENGINE REMOVAL: See *Dodge Special Data.*

OIL PAN REMOVAL: Remove oil level indicator, drain oil, disconnect steering linkage at idler arm support bracket, and allow linkage to drop. Remove bolts that hold oil pan to cylinder block and slide pan out, down, and away from engine.

CYLINDER HEAD & TIGHTENING TORQUES: See *Dodge Special Data.*

PISTONS

Aluminum alloy, T-slot, cam ground, with skirts relieved below piston pins, and tin coated.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" Oversize.*

Weight—16.4 ozs. (stripped).

Removal—Pistons and rods removed from above.

Fitting New Pistons: Clearance .00075—.00175" between thrust face of piston and cylinder wall. Coat bore with light engine oil (SAE 10W). Insert piston in bore upside down with feeler stock .0015" x 1/2" between thrust face of piston and cylinder wall. Pull to withdraw feeler should be 5—10 lbs. at 70° F.

Replacement Pistons: Std., .010", .020", .030", .040", .060" Oversize.

Installing Pistons: Arrow stamped on top of piston must point toward front of engine. NOTE—Assemble pistons to the rod on right hand cylinder bank with the "V" slot in connecting rod aligned with the "T" slot in piston. On left hand cylinder bank "V" slot in rod must be opposite "T" slot in piston.

PISTON PINS

Floating type with lock ring at each end.

Diameter—.8591—.8593". **Length**—2.880—2.890".

Pin Fit in Piston—.0000—.0005". Tight thumb press fit at 70° F.

Pin Fit in Rod Bushing—.0001—.0004". Tight thumb press fit at 70° F. Selective fit.

Replacement Pins: Std., .003", .008" Oversize.

NOTE—Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775—.0780"	.007—.015"	.0015—.0030"
Compr. (#2)	.0775—.0780"	.007—.015"	.0010—.0025"
Oil (#3)	.1860—.1865"	.007—.015"	.001—.003"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .040", .060" Oversize.

Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length (Center to Center)—5.9335—5.9375". **Weight**—21.14 ozs. (600 grams).

Crankpin Journal Diameter—1.9365—1.9375".

Maximum out-of-round and taper limits—.001".

Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)*—See *"CRANKSHAFT" below.*

Clearance—.0005—.0015". Maximum—.0025".

Endplay—.006—.014".

Bearing Adjustment—None. Replace bearings.

Replacement Bearings: Std., .001", .002", .003", .010", .012" Undersize.

Installing Rods: See *"Pistons (Installation)" above.* Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet. "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston. When installing bearing cap make certain "V" slot oil passage is toward top of engine.

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank **are not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter—2.3745—2.3755".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.

Bearings—Removable, precision type, steel-backed, babbitt lined. No shims.

Replacement Bearings: Std., .001", .002", .003", .010", .012" Undersize. Halves of Nos. 1, 2, and 4 bearings are interchangeable with one another (caps are not interchangeable); upper and lower halves of No. 3 bearing are interchangeable; No. 5 halves are NOT INTERCHANGEABLE.

End Thrust: Taken by center (#3) main Bearing.

Endplay—.002—.007". Maximum—.010".

Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Dodge Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.998—1.999", (2) 1.982—1.983", (3) 1.967—1.968", (4) 1.951—1.952", (5) 1.4355—1.4365".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001—.003". Maximum—.005".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002—.006". Maximum—.010".

Timing Chain: Width—1-1/8". **Pitch**—.375". **Length**—68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with center of camshaft. Temporarily install camshaft sprocket less chain, line up dowel pin holes in hub and gear, while at the same time positioning camshaft gear "Zero" mark exactly in line with center of crankshaft. (A straightedge should be used to check accuracy of this alignment). Remove camshaft gear and engage with timing chain. Place timing chain over crankshaft gear and at the same time, slide the camshaft gear over end of camshaft, keeping timing mark in position. With timing marks aligned, push gear on camshaft, install fuel pump eccentric. Install nut and tighten to 120-130 ft. lbs. torque.

Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*

►*TIMING CASE COVER REMOVAL CAUTION: Remove water pump before removing timing case cover. (Cover attaching bolt is behind water pump).*

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diameter	Stem Diameter	Length
Intake	1-21/32"	.372-.373"	4-13/16"
Exhaust	1-13/32"	.371-.372"	4-3/4"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.360"	.001-.003"
Exhaust	45°	.364"	.002-.004"

Valve Seat Width—.060-.085" (Intake), .040-.060" Exhaust).

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Dodge Special Data.*

Intake Valve Stem Oil Seal—Seal ring installed in bore of spring seat on all intake valves (install rings after assembling springs and seat but before installing valve locks).

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from valve spring seat in the

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head to valve tip should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: Two springs used for each valve. Install with closed coil toward cylinder head.
Free Length—(Outer) 2-1/32", (Inner) 2-1/64".

Valve Spring Specifications

	Inner Spring		Outer Spring	
Valve	Lbs. Press.	Length	Lbs. Press.	Length
Closed	20-23	1-9/16"	38-43	1-11/16"
Open	40-45	1-3/16"	100-110	1-5/16"

►*CAUTION: Spring ends must be square within 1/16". (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height of spring is 1-11/16" or greater, install a 1/16" spacer (Part No. 1400482) in the head counterbore to bring spring height back to nominal 1-5/8—1-11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.*

Valve Guides: Remove old guides by driving them out through top of head using tool C-3159. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3159 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

►*CAUTION: Oil hole in top of exhaust guide must face up.*

NOTE—If Valve Guide Tool C-3159 is not available, drive guide in, measuring from top of valve seat as follows: **Intake**—15/16". **Exhaust**—1-3/32".

Hydraulic Valve Lifters: Diameter—.9040-.9045". **Clearance**—.0005-.0015".
Lifter Overhaul & Testing—*See "Valve System" in Dodge Special Data.*

Rocker Arm Assembly: *See "Valve System" in Dodge Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 17° BTDC. Close 47° ALDC.
Exhaust Valves—Open 55° BLDC. Close 9° ATDC.
Valve Timing Check—Turn crankshaft until #1 intake valve is closed. Insert a .210" spacer between the rocker arm and stem of #1 intake valve. (This can be done by prying between rocker and valve spring seat with a large screwdriver). Install a dial indicator so that pointer contacts valve spring seat as nearly at a right angle as possible. Wait until seat stops moving. This indicates that oil has bled out of hydraulic tappet and plunger has bottomed, giving in effect a solid tappet. Set dial indicator on zero and then turn crankshaft clockwise (normal running direction) until dial indicator shows that valve has lifted .024". Timing on crankshaft pulley should now read from 5° BTDC to 7° ATDC. (If reading is over specified limits, check gear indexing marks and timing chain wear). After valve timing checked, turn crankshaft counter-clockwise until tappet is back down to valve closed position. Remove .210" spacer.

►*CAUTION: Do not turn crankshaft further than indicated above, as spacer might cause valve spring to bottom and damage valve operating mechanism.*

►*TIMING CASE COVER REMOVAL CAUTION: One cover attaching bolt located in case back of water pump. Remove water pump before attempting to remove timing case cover.*

OILING SYSTEM

Crankcase Capacity (Exc. Gyro-Torque Cars)—5 qts. (refill). Add one quart if filter changed.
Crankcase Capacity (Gyro-Torque Cars)—12 qts. Add one quart if filter changed.

►*OIL CHANGE NOTE (GYRO-TORQUE CARS): Change oil twice each year only. See "Gyro-Torque Drive" in Transmission Section.*

Normal Oil Pressure: 40-65 lbs. with warm oil operating at 40-50 MPH.
Oil Pressure Relief Valve—Mounted in oil pump. Adjustable by replacing springs (3 types). (1) Standard spring painted RED. (2) Lighter than standard spring painted GRAY. (3) Heavier than standard spring painted BROWN.

Oil Pressure Gauge: Auto-Lite No. 12960A (1953); No. 13451A (Early 1954), No. 13587A (Late 1954). Not electric.

Oil Pump: Rotary type. In crankcase at rear end. Mounted on rear bearing cap.
Oil Pump Overhaul—*See "Oil Pump" in Dodge Special Data.*
Priming Oil Pump (After Overhaul): Prime pump before installing oil pump and strainer to rear main bearing cap.

Oil Filter: Shunt type. A portion of oil from oil pump is directed through this filter and the remainder flows directly into engine lubrication system.
Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 19 quarts (20 with heater).
Pressure Valve: Dodge 1373136. Radiator filler cap. Opens at 7 lbs.
Thermostat: By-pass type in cylinder head water outlet. Starts to open at 159-165° F.

Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for data.*
Pump Removal—Drain cooling system, remove fan, belt, and pulley. Remove four water pump attaching bolts and remove water pump.

Temperature Gauge: Auto-Lite No. 12962A (1953); No. 13455A (Early 1954), No. 13589A (Late 1954).

CLUTCH

Borg & Beck. Single plate dry disc types as follows:

Car Model	Clutch Model	Assy.No.	Disc No.
Synchro-mesh	10A7	1331	382102
Gyro-Matic	9.5E	1214	382005
Gyro-Torque	9.5E	1220	382005
Hvy. Duty	11A6	929	381850

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Adjust fork rod to secure 1/8—5/32" free movement of clutch release fork at push rod contact point. This will provide 1" free pedal movement at pedal pad.

Over-Center Spring Adjustment: Adjust clutch pedal stop screw and rear mounting of over-center spring so as to locate the center-line of over-center spring at 5/16—11/32" above center-line of clutch pedal shaft when pedal stop screw is in contact with the stop. Adjust over-center spring so as to obtain 12-15 lbs. pedal pressure required to hold clutch in released position after approximately 1" return of the clutch pedal pad from a full clutch release pedal travel position.

Removal: Remove transmission or transmission and overdrive (See Synchro-mesh Transmission). Remove clutch housing pan, pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

FLUID DRIVE

1953 MODELS

Own Make. Fluid coupling at rear of engine. Optional. *See "Fluid Drive" in Transmission Section.*

Slippage Test: *See "Fluid Drive" in Transmission Section.*

Removal: Remove transmission and clutch (see Transmission Removal), take off drive flange and stud nuts (Tool 589), lower fluid coupling out.

GYRO-TORQUE DRIVE

1953 MODELS

Own Make. Four element single stage torque converter with combined oil system (engine oil circulates through torque converter). *Torque converter unit cannot be disassembled. Replace assembly if repairs are necessary.*

Lubrication: Change engine oil and torque converter oil twice each year and oil filter element every 5000 miles. *See "Fluid Torque Drive (Combined Oil System)" in Transmission Section.*

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Capacity—13 quarts (combined engine and torque converter capacity including one quart for filter).
Removal: *See "Fluid Torque Drive (Combined Oil System)" in Transmission Section.*

SYNCHRO-MESH TRANSMISSION

1953-54 MODELS

Own. *See "Dodge Synchro-mesh" Transmission in Transmission Section.*
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission is to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing. Then remove transmission by pulling it back, down, and out of car.

OVERDRIVE

1953-54 MODELS

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
See "Warner R10" Overdrive in Transmission Section.
Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

1953 MODELS

►**Own Make (Used with Fluid-Drive or Gyro-Torque Drive).** Semi-automatic, four speed transmission with hydraulic actuation and electric control.
►*DIFFICULT SHIFTING CORRECTION: Caused by incorrect selector lever adjustment. See "Chrysler, DeSoto, Dodge Automatic Transmission" in Transmission Section.*
►*TESTING, TROUBLE SHOOTING & OVERHAUL: See "Chrysler, DeSoto, Dodge Automatic Transmission" in Transmission Section.*
Transmission Control: *See "Chrysler, DeSoto, Dodge Automatic Transmission" in Transmission Section.*
Kickdown Solenoid—Auto-Lite No. SSS-4003.
Governor—Auto-Lite No. TGG-4001.
Kickdown Switch—Part of carburetor assembly.
Ignition Interrupter Switch—On right side of transmission above governor.
Transmission Oil Capacity—3 pints, 10W engine oil.
Removal: Remove access cover on right side of floor board under floor mat. Disconnect speedometer cable, governor, solenoid, and interrupter switch wires at transmission. Remove governor and solenoid. Disconnect hand brake cable at brake band, remove cable and cable anchor bracket. Remove brake support, band, adjusting bolt bracket and lever as an assembly. Disconnect front universal (push yoke back), and gear shift rods at transmission. Drain Transmission, **then replace drain plug.** Disconnect transmission mounting bolts and lower assembly out of car.
►*INSTALLATION CAUTION:* Rear face of clutch housing and lower pan must be in correct alignment. Misalignment can cause hard shifting when transmission installed.

POWERFLITE TRANSMISSION

1954 MODELS

Torque Converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmission Section.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).
Checking Fluid Level—Apply hand brake, place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.
Oil Filler Tube (Location)—(4-Dr. & Cl. Coupe) At right rear of engine compartment, (Conv. & Sp. Cl. Cpe.) Under floor mat at right hand side of driving compartment—Remove plug.
►*CAUTION:* To prevent dirt from entering transmission make sure oil level Indicator is properly seated in filler tube.
►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball and Trunnion Type.

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE*—"Barrel Type" differential assembly used on cars with Automatic Transmission.
See "Dodge Hypoid" in Rear Axle Section.

Transmission	Rear Axle Ratios
Standard	3.73-1, 3.91-1
Overdrive	4.1-1, 4.3-1
PowerFlite	3.54-1, 3.73-1
Automatic (1953)	3.9-1

Backlash—.006-.010".
Thrust Pad Clearance (Barrel Type)—.006-.008".
Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.
Axle Shaft Removal: Remove wheel, hub and drum assembly (Use puller C-845). *(CAUTION—Do not strike end of axle shaft to loosen hub; otherwise, possible damage to axle shaft bearings and thrust block might result).* Block brake pedal, disconnect brake line at wheel cylinders, remove axle shaft key, install sleeve C-757 in axle bearing outer oil seal before removing brake support plate from axle housing. Remove shims from each end of axle housing. (Each set should be kept separate so that at reassembly, central location of axle shafts, wheels and thrust block, will be assured). Remove axle shafts and bearings from housing (Use puller C-293-C to remove bearings from axle shafts, puller C-637 to remove inner oil seal, drift C-241 to install seal.
Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check end play with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

Standard Shock Absorbers

Car Model	Dodge Part No. Front	Rear
4-Dr., Club Coupe	1326164	1450633
Others	1450630	
8-Pass. Sed., Est. Wgn.		1450635

Heavy Duty Shock Absorbers

All (Exc. 8-Pass., Est. Wgn.)	1450041	1450635
All (Special)		1450075

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers.
See "Dodge" in Front Suspension Section.
Kingpin Inclination—5° to 6½° at 0° camber.
Camber—Pos. 3/8° to Neg. 3/8° (Left side 1/4—1/2° greater than right side within these limits).
Caster—Neg. 1° to Pos. 1° (0° preferred).
Toe-In—0" to 1/16" (0" preferred).
Toe-Out on Turns—With outer wheel turned 20°, inner wheel should be 21½°±1°.

STEERING

Manual Steering Gear: Gemmer. Worm and two-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: Ross "Full-Time". Linkage Type. Used with Standard Steering Gear.
See "Ross Power Steering (Linkage Type)" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

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BRAKES

Service: Dodge "Safe-Guard" Lockheed hydraulic.
See "Dodge Safe-Guard" in Brake Section.
Drums–Cast Iron. Diameter–11".
Wheel Cylinder Diameter–1-1/8". Single acting (front), double acting (rear wheels).
Replacement Linings & Shoes–Linings or shoes with linings are furnished Standard and .030" Oversize.
Lining–Molded asbestos (bonded to shoe).
Length–(Primary, Front & Rear) 11.5", (Secondary, Front) 11.5", (Secondary, Rear) 8.8".
Width–2". **Thickness**–.200".
Braking Power–60% Front, 40% Rear.
Clearance–.006" at end of all shoes.

Master Cylinder: On frame at base of brake pedal.
Checking Fluid–Access hole at left of front floor pan.
Removal–Remove floor mat and toe board. Disconnect push rod. Remove horse shoe clip and slide brake pedal off shaft. Disconnect brake line tubes at master cylinder fittings. Remove bolts from master cylinder body. Cylinder can then be lifted off frame bracket When reinstalling use new horse shoe clip.
Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type used with Automatic Transmissions.
Adjustment–*See "Hand Brake Notes" in Dodge Special Data.*

Lining–	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15-3/8"
7" Int. Type	2"	5/32"	13-1/16"

Clearance (External Type)–.015-.020" around band.
Internal Type–Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: (1953)–Auto-Lite EME-4001A (Early), EMG-4001A (Late). **(1954)**–Auto-Lite EMD-4003A (D50), EMD-4003 (D53), EMG-4102A (D50, D53 Two-speed). Electric type.

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.
Air Conditioning: Dodge "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*
Convertible Top Control: Electrical-Mechanical Type. *See "Dodge & Plymouth" Top Control in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Caution" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Designation
1954 Meadowbrook	D-51-1
1954 Meadowbrook	D-51-1A
1954 Coronet	D-51-2
1954 Coronet	D-52
1955 Coronet	D-56-1

SERIAL NUMBER: On left front door hinge post.

Starting Serial Nos.	Detroit	San Leandro
D-51-1	32,160,001	45,110,001
D-51-1A	34,635,801	42,508,001
D-51-2	32,160,001	45,110,001
D-52	37,227,001	48,015,001
D-56-1	32,192,001	①48,016,001

①—Los Angeles Assembly plant.

ENGINE NUMBER: Stamped on left side of engine block between No. 2 and 3 cylinders.
Starting Engine Numbers—D51-1001 (1954); D56-1001 (1955).

►*ENGINE NUMBER LETTERS: (Following Engine Number)—Identified as follows:*
"A"—ALL cylinders .020" oversize.
"B"—ALL Main & Connecting Rod Bearings .010" undersize.
"AB"—BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-20" at idling speed.

VALVE TAPPET CLEARANCE: .010" Intake. .010" Exhaust. Engine must be hot and idling. NOTE—Tappet screws are self-locking type.

►*CONTINUOUS HIGH SPEED TAPPET CLEARANCE:* An additional .002" clearance for **exhaust** tappets is desirable.

MANIFOLD HEAT CONTROL: Thermostatic coil type. See that valve operates freely. When installing coil, place new coil spring in position over shaft slot, with outer end (tongue) of spring in the upper left hand position (10 o'clock). Press inner end of coil into slot and seat firmly. Move outer end of spring down (counter-clockwise), around and up over stop stud.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .035".

Plugs—Auto-Lite Resistor Type 4S-140 14mm. Torque to 30-32 ft. lbs.

COIL: Auto-Lite CR-6012C.
Ignition Current—2.25 amperes idling, 5.0 stopped.

DISTRIBUTOR: Auto-Lite IAT-4101B (U.S.), IAT-4012A (Can. 1954), IAT-4012 (Can. 1955).
Condenser—IAT-3076RA. **Capacity**—.250-.285 mfd.
Contact Point Set—Auto-Lite IGW-3028BS.
Breaker Gap—.018-.022".
Cam Angle—36-42°. DO NOT exceed breaker gap limits to obtain dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAT-4101B

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	400	0	800
1	525	2	1050
4	875	8	1750
7	1225	14	2450
8	1350	16	2700

Automatic Advance—IAT-4012

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Automatic Advance-IAT-4012A

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	0	700
3	400	6	800
6	850	12	1700
9	1300	18	2600
12	1750	24	3500

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAT-4101B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-3/4
1	2	5-7/8
4	8	9-3/8
7	14	12-7/8
8	16	14

Vacuum Advance—IAT-4012

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-1/4
2	4	6-3/4
4	8	8-5/8
6	12	10-3/4
9	18	15

Vacuum Advance-IAT-4012A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5
1	2	6½
3	6	9¼
5	10	12 1/8
7	14	15

►*DISTRIBUTOR INSTALLATION CAUTION: Make sure that No. 1 piston is at TDC on compression stroke and that distributor rotor is in No. 1 firing position.*

IGNITION TIMING

Setting—2° BTDC.
Timing Mark—On crankshaft vibration damper.

Manual Adjustment—Timing may be advanced with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR

►*CARBURETOR APPLICATION: Carter "B&B" (Single Barrel) used in Early 1954. Carter "BBS" (Single Barrel) Late 1954. Stromberg "WW" (Dual) used in 1955.*

CARTER "B&B" (EARLY 1954)

Transmission	Carter No.
Synchro-mesh	E9T1
Overdrive	E9N1
Gyro-Matic	E9V1
PowerFlite	E9U1

Idle Setting—½-1½ turns open. For richer mixture turn screw out.
Idle Speed—450-500 RPM.
Float Level—**(E9U1)** 1/16", **(Others)** 5/64" from top surface of body casting to top of float.
Accelerating Pump—Long stroke for cold weather, short stroke for hot weather.
Fast Idle: No adjustment required.
Automatic Choke Setting: Insert gauge pin through hole in automatic choke shaft, and hole in base flange to position shaft, loosen choke valve screw and position choke so that valve is tightly closed.
Slow Closing Throttle (Dashpot) (E9U1): Tighten adjustment screw, then turn counter-clockwise 4½ turns. Further adjustment outward will increase action of dashpot and lengthen its retarding effect.
Overdrive Kick-down Switch Adjustment (E9N1): With throttle valve in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kick-down lever and switch stem guide.
Throttle Linkage Adjustment (E9U1): *See "PowerFlite" Transmission in Transmission Section.*
►*OTHER DATA: See "Carter BB" in Carburetor Section.*
Fuel Pump Pressure: 4-5½ lbs.

CARTER "BBS" (LATE 1954)

Transmission	Carter No.
Synchro-mesh	2063S, SA
Overdrive	2062S, SA
PowerFlite	2116S, SA

Idle Setting—½-1½ turns open. For richer mixture turn screw out.
Idle Speed—450-500 RPM.
Float Level—7/32" from top surface of body casting to top of each float.
Accelerating Pump—Center hole. Distance from top of bowl cover to top of plunger shaft should be 54/64". Adjust by bending throttle connector rod at lower angle.

Fast Idle: .022-.026" clearance between throttle valve and bore of carburetor (side opposite idle port), with choke valve held closed and throttle stop screw backed off.
Automatic Choke Setting: Set on index.

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Slow Closing Throttle Dashpot (2116S, SA): Maximum dashpot action is obtained by loosening locknut and *adjusting dashpot unit so that dashpot plunger shaft* can be moved inward approximately 3/32" with throttle valve tightly closed.

Overdrive Kickdown Switch Adjustment (2062S, SA): With throttle valve in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kickdown lever and switch stem guide.

Throttle Linkage Adjustment (2116S, SA): *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See "Carter BBS" in Carburetor Section.*

Fuel Pump Pressure: 4-5½ lbs.

STROMBERG "WW"
1955 MODELS

Transmission	Stromberg Carb. No.
Standard	WW3-124
Overdrive	WW3-125
PowerFlite	WW3-126

►*MANIFOLD FUEL DISTRIBUTION: Each barrel feeds all cylinders.*

Idle Setting—1 turn open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed—450-500 RPM.

Float Level—3/16" from top of main body to top of float measured at center of float, with float lip held firmly against needle valve. Use depth gauge or Tool T-25569 to measure float level. To reset float level, bend float lever next to float (use Tool T-24733).

Accelerating Pump—Normal setting, center hole; for less fuel install rod in inner hole; for more fuel install rod in outer hole.

Fast Idle: *With throttle valves in fully closed position,* turn throttle stop screw in until it just contacts throttle lever and then turn stop screw in 5-1/8 turns. When properly adjusted a #59 drill gauge should just pass between throttle valve and wall of throttle body. With choke valve closed and throttle lever held against throttle stop screw, a #48 drill gauge should just fit clearance between ear on contact lever and first step of fast idle cam. To adjust, bend cam contact ear.

Automatic Choke Setting: Centered (indicator mark on cover coincides with center mark on housing).

Unloader Adjustment: Apply light closing pressure to choke valve, then open throttle valve to wide open position. Choke valve should open just enough to insert a #19 drill gauge between choke valve and wall of air horn. To adjust, bend ear of cam contact lever with long nose pair of pliers.

Kickdown Switch Adjustment (3-125): With throttle valves in wide open position there should be 1/64-1/32" clearance between ear on throttle lever and threaded section of switch housing. To adjust, loosen adjusting nuts and adjust to correct position.

Slow Closing Throttle (Dashpot) Adjustment (3-126): With throttle stop screw set for normal idle speed, there should be a 1/16-1/32" clearance between end of dashpot plunger and ear of throttle lever when dashpot plunger is pushed into end of its stroke.

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See Stromberg "WW" in Carburetor Section.*

Fuel Pump Pressure: 4-6½ lbs.

CARB. EQUIPMENT

Fuel Pump: Auto-Lite FA-4003 (1954), FA-4005 (1955). Vacuum diaphragm type.
Pressure—4½-5½ lbs. (FA-4003), 5-6 lbs. (FA-4005).

Gasoline Gauge: Auto-Lite. Electric type.

►**1954 SUBURBAN GAS GAUGE NOTE:** *"One-Wire" and "Two-Wire" (Thermostatic) types used Dash units No. 13513A, 13529A, 13586A, and Tank unit No. 13514A are "Two-Wire". Others are "One-Wire".*

Dash Unit (1954)—(Except Suburban) Auto-Lite No. 13454A (Early), 13484 (Late). (Suburban) Auto-Lite No. 13457A & 13529A (Early), 13586A (Late).

Dash Unit (1955)—Auto-Lite No. 13792A (Exc. Suburban), 13816A (Suburban)

Tank Unit (1954)—(Except Suburban) Auto-Lite No. 12617A. (Suburban—"One-Wire") Auto-Lite No. 12904A. (Suburban—"Two-Wire") Auto-Lite No. 13514.

Tank Unit (1955)—(Except Suburban) Auto-Lite No. 13794A. (Suburban) Auto-Lite No. 13905A.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

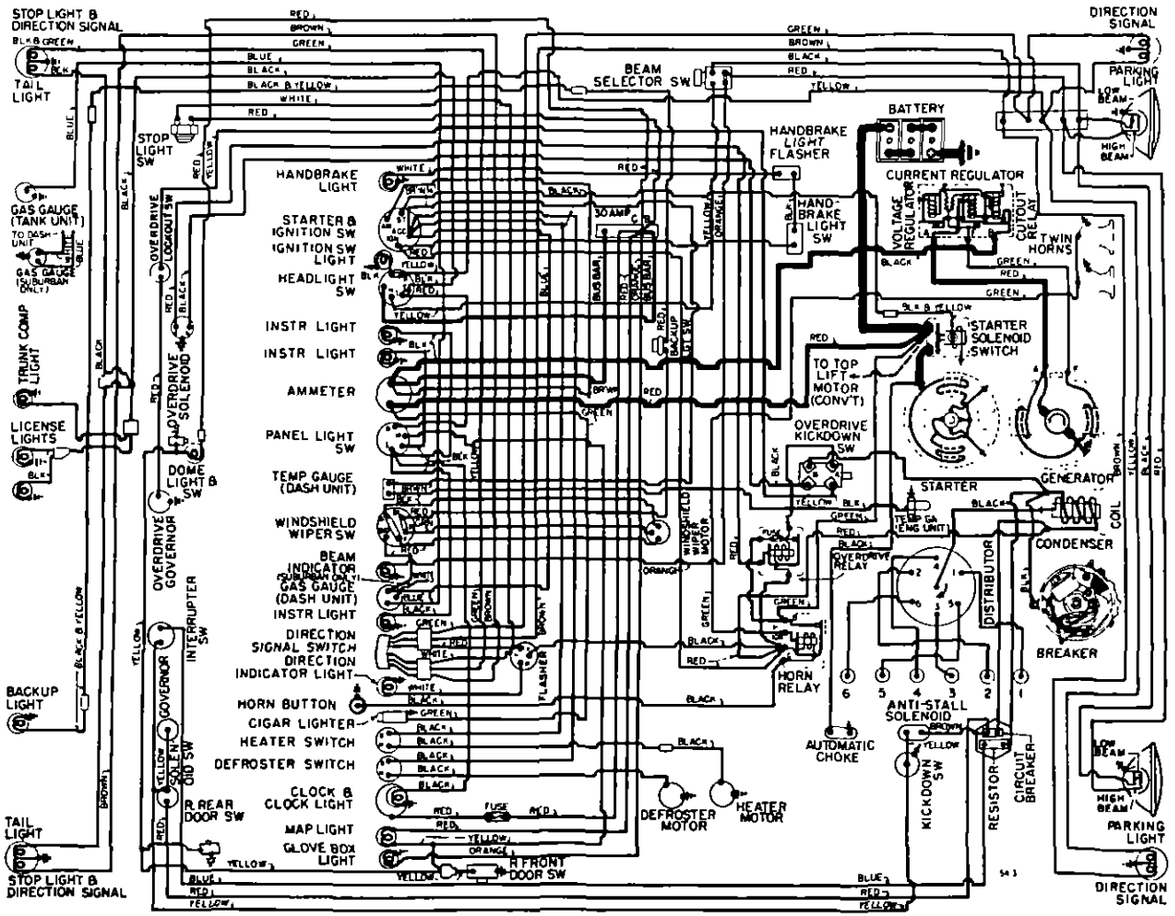
Auto-Lite 1H-105-D or Willard HW-1-105-C. 6 Volt, 15 plate, 105 ampere hour capacity.

With PowerFlite—Auto-Lite 2H-120-D. 6 volt, 120 ampere hour capacity

Grounded Terminal—Positive.

Engine Ground—Left front of engine.

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1954 MODELS

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STARTER

Model	Auto-Lite No.	Armature No.
1954 (U.S)	MCH-6205	MCH-2088
1954 (Can. Early)	MCH-6206	MCH-2088
1954 (Can. Late)	MCH-6305	MCH-2088
1955 (U S.)	MCH-6305	MCH-2088
1955 (Can Early)	MCL-6204	MCH-2088
1955 (Can Late)	MCL-6133	MCH-2088

Drive—Bendix A3274. "Folo-thru" type.
Rotation—Counterclockwise at commutator end.
Brush Spring Tension—42-53 ozs. (with new brushes)

Performance Data—MCH

Torque	RPM	Volts	Amperes
0 ft. lbs.	4300	5 0	65
6.0 ft. lbs.	Lock	2.0.	335

Performance Data—MCL

Torque	RPM	Volts	Amperes
0 ft. lbs.	4900.	5 0	65
8.0 ft. lbs.	Lock.	2.0.	410

Starting Switch: Auto-Lite SST-4006A (1954 All Models), SST-4006 (1955 Exc PowerFlite), SST-4013 (1955 PowerFlite) Magnetic type switch controlled by ignition switch (combination starter & ignition). Neutral Safety Switch mounted on transmission (PowerFlite cars).

See "Starter Controls" in Electrical Equipment Section.

GENERATOR

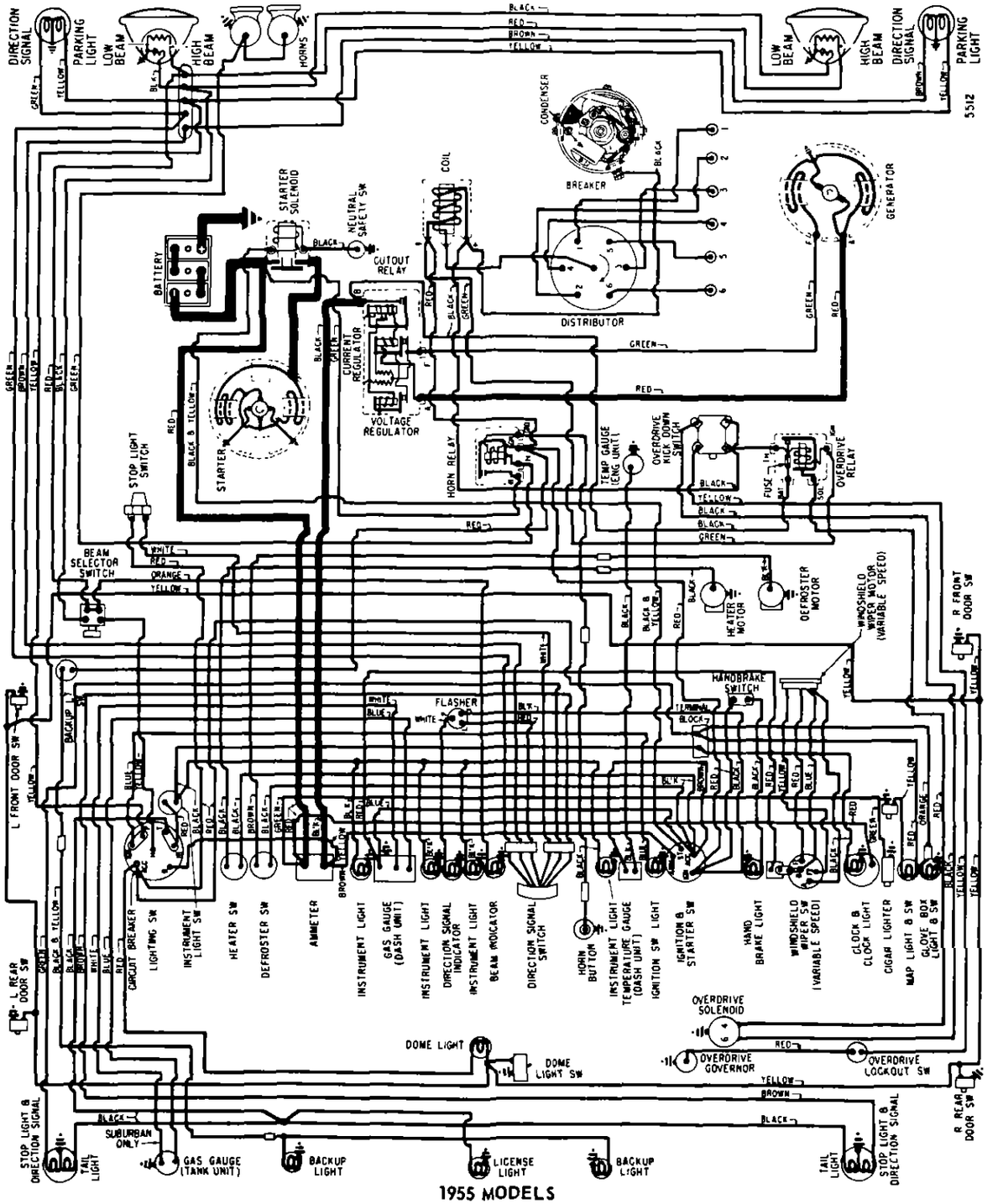
1954 MODELS

Auto-Lite Generator No.	Armature No.
GGW-6001J, K (Std.)	GGW-2006F
GGW-6001L, Q (Special)	GGW-2006F
GGW-6008F, G (Power Steering)	GGW-2045F
GGU-6001G (Special)	GGU-2006F
GGJ-6001F,G (Special)	GGJ-2101F
GGU-6001R (Canada Special)	GGU-2006F
GGU-6008A, B (Special)	GGU-2063F
GGU-6006A, C (Power Steering)	GGU-2042F
GGU-6006GA, BA (Canada Pow. St.)	GGU-2042F

1955 MODELS

Auto-Lite Generator No.	Armature No.
GGW-6001J (Std.)	GGW-2006F
GGU-6001G (Spec. Equip.)	GGU-2006F
GGJ-6001F (Spec. Equip.)	GGJ-2101AF
GGW-6016A (Pow. St.)	GGW-2090F
GGU-6013D (Pow. St.)	GGU-2071F
GGW-6016E (Can. Pow. St.)	GGW-2090F
GGW-6017A (Air Cond.)	GGW-2098F
GGU-6008C (Air Cond.)	GGU-2063F
GGJ-6001K (Air Cond.)	GGJ-2101AF
GGW-6016C (A.C. & Pow. St.)	GGW-2090F
GGU-6013C (A.C. & Pow. St.)	GGU-2071F
GGW-6016F (Can. A.C. & P.S.)	GGW-2090F

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1955 MODELS

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►*SPECIAL GENERATOR NOTE:* GGJ, GGU, and GGW type generators used. Performance specifications below apply equally to all generators, within any one of the three groups specified.

Performance Data–GGJ

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Performance Data–GGU

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850
50	8.0	1550-1750	1750-1950

Performance Data–GGW

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Brush Spring Tension–(GGJ) 34-41 ozs., (GGU, GGW) 35-53 ozs., with new brushes.
Field Current–(GGJ) 1.4-1.7 amperes, (GGU) 1.4-1.6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts.
Motoring Current–(GGJ) 4.1-4 6 amperes, (GGU) 5 0-6.0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts.
Rotation–Counter-clockwise at commutator end.

Belt Adjustment: Loosen generator adjusting strap and generator-to-generator bracket mounting bolts. With Tool C-3379 hooked over generator and a torque wrench attached to tool, apply torque of 45 ft. lbs. (new belt), 27 ft. lbs. (old belt), to pull generator outward While holding generator outward at required torque, securely tighten generator mounting bolts and adjusting strap.

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW
VBE-6201A (Late 1955)	GGW

Cutout Relay

Cuts In–6.3-6.8 volts.
Cuts Out–4.1-4.8 volts.
Contact Gap–.015" minimum.
Air Gap–.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (VAV, VBF)–7.1-7.4 volts (set at 70°F), *after 15 minutes operation charging at ½ maximum rate.*
Setting (VBE)–7.1-7.4 volts (at 70°F). Test with regulator in operation at 10 amperes output.
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F (VAV, VBE, VBF).*

Regulator	Test A-Operating Amperes-Test B
VAV-6001B, 2B	55 . . . 50 (48-52)
VBE-6001A, 6201A	52 . . . 45 (43-47)
VBF-6001A, 2A	66 . . . 55 (53-57)

Test A–After 15 minutes operation charging at 1/2 maximum rate.
Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF)).
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
►*IGNITION-STARTER SWITCH CAUTION: When installing accessories, use accessory terminal only on ignition-starter switch and not the ammeter terminal post.*
Lighting Switch Removal: Remove knob (use small screwdriver to raise up special clip in knob, or remove small cross-head screw, depending on method used to hold knob). Remove hex nut and collar that holds assembly in place. Pry out switch (switch has threaded sleeve with two flat sides. Sleeve fits snugly in switch hole in panel).
Stop Light Switch Location: On forward end of brake master cylinder.
FUSES: Clock–3 amperes. Located on clock.
Radio–14 amperes. At ignition terminal feed.
Overdrive–20 amperes. On overdrive relay.
CIRCUIT BREAKERS: (1954)–One 30 amp. circuit breaker located to right of ammeter, protects lighting circuits.
CIRCUIT BREAKERS: (1955)–Located in headlight switch assembly. Three in number as follows:

25 Ampere Circuit Breaker–Protects headlights, high beam indicator light, and parking lights.
10 Ampere Circuit Breaker–Protects tail lights, license plate lights, clock light, and instrument panel light.
10 Ampere Circuit Breaker–Protects stop lights, map light, dome light, glove box light, courtesy light, and trunk compartment light.

HORNS: (1954)–Auto-Lite HAB-4656 (High Pitch), HAB-4655 (Low Pitch). **(1955)**–HAB-4708 (High Pitch). HAB-4707 (Low Pitch).
Horn Relay: Auto-Lite HRL-4104 (1954). RAF-4001 (1955).

ENGINE

Model	Bore	Stroke	Displacement
1954-55	3¼".	3 5/8"	230.2 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
1954	7.25-1	25.35	110 at 3600 RPM
1955	7.40-1	25.35	123 at 3600 RPM

Compression & Vacuum Reading–*See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Dodge Special Data.*
►*MANIFOLD INSTALLATION CAUTION:* Two long capscrews extend into cylinder block water passage Before installing, apply sealer to these capscrews. It is important that conical washers at flange ends of exhaust manifold be installed to permit expansion and contraction without loosening.
OIL PAN REMOVAL: Drain engine oil. As soon as oil is drained, install drain plug and tighten securely. Remove clutch housing pan to prevent damaging oil pan gaskets on clutch housing pan dust seal. Remove oil level indicator and drop pan on tie rod. Lift up oil strainer so it clears baffle inside pan. With strainer lifted, slide pan to rear and remove. NOTE–New end gaskets should protrude 1/4" to 1/8" above oil pan. *Ends must not be cut off.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Dodge Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Dodge Special Data.*

PISTONS

Aluminum alloy, U-slot, cam ground type.
►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.*
Weight–16 ozs. (stripped).
Removal–Pistons and rods removed from above.

Fitting New Pistons: Clearance .0015-.002" between thrust face of piston and cylinder bore. With piston pin and rings removed, cylinder wall and piston dry and clean, insert piston, upside down, into cylinder bore, with feeler stock, .002" x 1/2", inserted between cylinder wall and piston, on high spot of piston contour. Pull to withdraw feeler should be 6-10 lbs.

Replacement Pistons: Std., .005", .020", .030", .040", .060" oversize.
Installing Pistons: "U" slot away from valves.

PISTON PINS

Full floating type.
Diameter–55/64". **Length**–2-3/4".
Pin Fit in Piston–.0000-.0005". DOUBLE THUMB push fit at room temperature (70° F.)
Pin Fit in Rod Bushing–.0001-.0002". Tight thumb push fit at room temperature (70° F.)
Replacement Pins: Std., .003", .008" oversize.
NOTE–Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.010-.020"	.0025-.004"
Compr. (#2)	3/32"	.010-.020"	.002-.0035"
Oil (#3)	5/32"	.010-.020"	.001-.0025"
Oil (#4)	5/32"	.010-.020"	.001-.003"

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Replacement Rings: Std., .010", .020", .030", .040", .050", .060" oversize.
Installing Rings: #1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down, if step on outer edge).

CONNECTING RODS

Length (Center to Center)–7-13/16". **Weight**–27.9 ozs.
Crankpin Journal Diameter–2.0625".
Maximum out-of-round and taper limits–.001"
Lower Bearings–Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)–See "CRANKSHAFT" below.*
Clearance–.0005-.0015".
Endplay–.006-.011".
Bearing Adjustment: None. Replace bearings.
Replacement Bearings: Std., .001", .002", .010", .012" undersize.
Installing Rods: Oil metering hole toward valve side of engine.

CRANKSHAFT

Journal Diameter–2.4995-2.5005". Four bearing.
Bearing Type–Removable, precision type, thin babbitt on steel. No shims.
►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows: **.010" UNDERSIZE (All Main & Connecting Rod Journals)**–Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
Clearance–.0005-.0015" desired.
Replacement Bearings: Std., .001", .002", .010", .012" undersize.
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Dodge Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Dodge Special Data.*
End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**–.003-.007".

CAMSHAFT

Journal Diameters–(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-1/4".
Bearings–Removable, steel-backed babbitt lined bushings (exc. #4–machined in crankcase).
Clearance–.001-.003". NOTE–If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**–.002-.006".
Timing Chain: Width–1". **Pitch**–.500". **Length**–24" or 48 links.
Camshaft Setting: Sprockets marked. Mesh chain with sprockets so that "O" marks on sprockets are adjacent and in line with a straightedge across shaft centers.

Engine Front Cover Installation: *See "Engine Front Cover" in Dodge Special Data.*
Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Dodge Special Data.*

VALVES

Tappet Clearance: .010" Intake, .010" Exhaust (engine hot and idling). NOTE–.002" additional clearance on exhaust tappets if car driven at continuous high speed.

Valves	Head Diam.	Stem Diam.	Length
Intake	1-17/32"	.340-.341"	4-27/32"
Exhaust	1-13/32"	.340-.341"	4-25/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.23/64"	.001-.003"
Exhaust	45°	.23/64"	.003-.005"

Valve Seat Width–1/16-3/32". Runout .0015" maximum.

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Dodge Special Data.*

Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, finish ream to give correct valve stem clearance (See Valve Stem Clearance above). CAUTION–*Guides must be installed with counterbore end UP on exhaust valves and counterbore end DOWN on intake valves.*

Valve Springs: Install with closely coiled end up.
Free Length–2".

Valve Spring Specifications

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1-3/4"
Valve Open	110-120 lbs.	1-3/8"

Valve Lifters: Mushroom type (remove from below).
Stem Diameter–5/8". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".
Lifter Clearance in Block–.000-.001".

VALVE TIMING

See *"Camshaft Setting" under CAMSHAFT above.*
Intake Valves–Open 12° BTDC. Close 44° ALDC.
Exhaust Valves–Open 50° BLDC. Close 6° ATDC.
Valve Timing Check–With .014" (Cold) tappet clearance, No. 6 intake valve should open with No. 6 piston 12-13° BTDC or .0766-.0770" BTDC. Reset tappet clearance to .010" HOT running clearance.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed.
Normal Oil Pressure: 40-50 lbs. at 25-30 MPH.
Oil Pressure Relief Valve–Oil pressure relief valve opens at 45-55 lbs. Under plug on left side of crankcase below starting motor. Provides additional oil at idling speeds. Adjustable by replacing springs (3 types). (1) Standard spring is not painted. (2) Lighter than standard painted RED. (3) Heavier than standard painted GREEN. When replacing springs, same color springs should be used.
Oil Pressure Gauge–Auto-Lite 13451A (Early 1954), 13587A (Late 1954), 13790A (1955). Not electric.

Oil Pump: Rotor type on right side of crankcase.
Overhaul–*See "Oiling System" in Dodge Special Data.*
Oil Filter: By-pass type. On left side of engine above starter.
Servicing–Install new filter element and cover gasket at 8000 mile intervals (more often in dusty areas). Change oil at same time filter is changed.
Crankcase Ventilation: Filter in oil filler tube and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 14 qts. (1954), 13 qts. (1955). Add one quart if equipped with heater.
Pressure Valve: Dodge No. 1373136. Radiator filler cap. Opens at 7 lbs.
Thermostat: By-pass type in cylinder head water outlet. Starts to open at 159-165° F.
Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for data.*
Pump Removal–Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs. Remove pump.
Water Distribution Tube: *See "Cooling System" in Dodge Special Data.*
Temperature Gauge–Auto-Lite 13452A & 13588A (Early 1954), 13591A. (Late 1954), 13791A (1955). *NOTE*–Early 1954 types are not electric. Late 1954 & 1955 are electric type.

CLUTCH

►*CLUTCH PEDAL CLICKING SOUND OR CLUTCH SLIPPAGE CORRECTION (When Due to Interference Between Rear End of Clutch Release Fork Rod & Clutch Release Fork):* To correct, rod end should be reworked to eliminate shoulders of rod end forward of attaching eyelet.

1954 Clutch Application

Borg & Beck	Model	Assy. No.	Disc No.
Standard	10A7	957	CD728
Overdrive	10A7	957	382139
Gyro-Matic	9A7	952	CD756
Heavy Duty	11A6	931	381850

1955 Clutch Application

Borg & Beck	Model	Assy. No.	Disc No.
Standard	9A7	361373	382237
Heavy Duty	10A7	361368	381758
Heavy Duty (Spl)	11A6	929	381850

See "Borg & Beck" & "Auburn" Clutches in Clutch Section.

Pedal Free Play Adjustment: Adjust fork rod to secure 1/8-5/32" free movement of clutch fork outer end. This adjustment will provide 1" free pedal movement at pedal pad.

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Over-Center Spring Adjustment (1954 Models): Adjust clutch pedal stop screw and rear mounting of over-center spring so as to locate the centerline of the over-center spring at 5/16-11/32" above centerline of clutch pedal shaft when pedal stop screw is in contact with the stop. Adjust over-center spring so as to obtain 12-15 lbs. pedal pressure required to hold clutch in released position after approximately 1" return of the clutch pedal pad from a full clutch release pedal travel position.

Over-Center Spring Adjustment (1955 Models): *(NOTE*—Over-Center spring located above brake pedal and attached to pedal mounting bracket). Disconnect clutch pedal pushrod. Remove over-center eyebolt adjusting nut. Reinstall adjusting nut, tighten finger tight then further tighten four complete turns. This adjustment will require 12-15 lbs. pressure to hold clutch pedal down when it is 1" from fully released position.

Removal: Remove transmission or transmission and overdrive (See Synchro-mesh Transmission). Remove clutch housing pan, pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "Dodge Synchro-mesh" Transmission in Transmission Section.*

ransmission Controls: *See "Transmission Controls" in Transmission Section.*

HARD SHIFTING CORRECTION: Check for interference between gear shift lever and transmission cover. If found, replace manual remote gearshift lever shaft screw, Part No. 853877. *(NOTE*—Before installing screw, it should be tested for proper hardness with a standard mill file. Only screws which are **not** file soft should be installed). If interference not found at point indicated above, check for interference between gearshift rod and lower edge of instrument panel. In most cases, condition can be corrected by realignment of steering column jacket. In some cases it may be necessary to provide adequate clearance by filing out lower edge of instrument panel.

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing. Then remove transmission by pulling it back, down, and out of car.

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
See "Warner R10" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

GYROMATIC TRANSMISSION

Own. Semi-automatic, 4-speed transmission with hydraulic actuation and electrical control.
See "Dodge Gyro-Matic" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dodge Gyro-Matic" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Dodge Gyro-Matic" Transmission in Transmission Section.*

Lubrication: Check oil level in transmission every 1000 miles or 30 days, drain and refill every 10,000 miles or once a year, maintain oil level even with bottom of filler plug hole. **Capacity**—3 pints.
Recommended Oil—SAE 10-W.

►*OTHER "DODGE GYRO-MATIC" SERVICE DATA: See "Dodge Gyro-Matic" Transmission in Transmission Section.*

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).
Checking Fluid Level—Apply hand brake, place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.
Oil Filler Tube (Location)—At right rear of engine compartment.
CAUTION: To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball and Trunnion Type.

►*UNIVERSAL JOINT BOOT NOTE:* A new, larger boot is used on the rear universal joint and can be identified by a daub of white paint on it. In service, larger boot can be used on both front and rear joints, but small boot should **never** be used on rear universal joint as boot failure is very likely to result.

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss drive.
See "Dodge Hypoid" in Rear Axle Section.

Transmission	Rear Axle Ratios
Standard	3.9-1 (39-10)
Overdrive	4.3-1 (43-10)
PowerFlite	3.73-1 (41-11)
Gyro-Matic	3.9-1 (39-10)

Backlash—.006-.010".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, drum, and hub assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 Puller). *NOTE*—Use Puller C-293-E to remove bearing from shaft, Puller C-748 or C-358 to remove inner oil seal, Drift C-201 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick (equally at both wheels). **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic type. Serviced by replacement.

Model	Front	Rear
1954 (Exc. D51-A)	1450630	1450633
1954 (D51-A)	1326164	1326166
1954 (Heavy Duty)	1450041	1450635
1954 (Sp. Hvy. Duty)		1450075
1955 (All Models)	1614404	1450918
1955 (Heavy Duty)	1617004	1450920
1955 (Sp. Hvy. Duty)		1450037

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.
See "Dodge" in Front Suspension Section.
Kingpin Inclination—5° to 6½° (1954). 5½° (1955), at 0° Camber.
Caster (1954)—Neg. 1° to Pos. 1° (0° preferred).
Caster (1955)—Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° preferred with Power Steering).
NOTE—On Power Steering Cars, left side should be 0° to ¾° more negative than right side.

Camber (1954)—Pos. 3/8° to Neg. 3/8° (Left side ¼° to ½° greater than right side within these limits).
Camber (1955)—Pos. ¼°±3/8° (Left side Pos. ½°, Right side 0° preferred).
Toe-In—0" to 1/16" (0" preferred).
Toe-out on Turns—With outer wheel at 20°, inner wheel should be 21½°±1°.

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STEERING

Manual: Gemmer. Worm & Roller.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering (1954): Linkage type, used with standard steering gear.
See "Monroe Power Steering (Linkage Type)" in Steering Section.

Power Steering (1955): "Co-axial" type with combined steering gear and power unit.
See "Dodge Co-Axial Power Steering" in Steering Section.

►*1955 JERKY OPERATION OF POWER STEERING GEAR CORRECTION:* Adjust generator drive belt (see Generator), then adjust fan drive belt so that a maximum of ¼" belt deflection is obtained when applying a 10 lb. pull with spring scale at middle of widest belt span.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

►*LOOSE OR SQUEAKY BRAKE PEDAL OR PAD CORRECTION:* Change location of attachment of brake pedal return spring from right side of pedal bracket to left side (Standard & Overdrive), left side to right side (PowerFlite), and attach in hole provided in bracket. On PowerFlite cars, if excessive movement or squeak is encountered in pedal pad, remove brake pedal and make several prick punch marks on pedal at pedal pad mounting bracket location to improve clamping action, re-install pad, tighten retaining bolt to 20 ft. lbs.

Service: Dodge "Safe-Guard" Lockheed Hydraulic.
See "Dodge Safe-Guard" in Brake Section.

Drums– Cast iron. (1954) Diameter 10"(Exc-D51-2). 11" (D51-2). (1955) 11" (All models).

Wheel Cylinder Diameter–1-1/8". Single acting (front), double acting (rear wheels).
Replacement Linings & Shoes–Lining or shoes with linings are furnished Standard and .030" Oversize.
Lining–Molded asbestos (bonded to shoe).

Lining Length

	Front Wheel		Rear Wheel	
Model	**Pri.**	**Sec.**	**Pri.**	**Sec.**
1954(Exc. D51-2)	10.5"	10.5"	10.5"	8.0"
1954 (D51-2)	11.5"	11.5"	11.5"	8.8"
1955 (All Models)	11.5"	11.5"	11.5"	8.8"

Width–2". Thickness–.200".
Braking Power–60% Front. 40% Rear.
Clearance–.006" at end of all shoes.

Master Cylinder: On frame at base of brake pedal (1954). On engine side of dash panel opposite base of brake pedal (1955).
Checking Fluid–Access hole at left of front floor pan (1954). At top of master cylinder on dash in engine compartment (1955).
Removal (1954)–Remove floor mat and toe board and disconnect pushrod. Remove horseshoe clip and slide brake pedal off shaft. Disconnect brake line tubes at master cylinder fittings. Remove bolts from master cylinder body. Cylinder can then be lifted off frame bracket.

Removal (1955)–Disconnect pushrod. Disconnect brake line tubes at master cylinder fittings. Remove four stud nuts and remove cylinder.

Power Brakes: Combination vacuum power unit and master cylinder. Unit mounted on engine side of firewall and replaces regular master cylinder. *See "Dodge Power Unit" in Brake Section.*

Removal of Power Unit–Same as for standard master cylinder, after hydraulic lines and stop light wires removed.

Parking Brake: On shaft at rear of transmission. 6" external-contracting type used with Synchro-mesh Trans. 7" internal expanding type used with PowerFlite Transmission.

Adjustment–*See "Hand Brake Notes" in Dodge Special Data.*

Lining–	**Width**	**Thickness**	**Length**
6" Ext. Type	2"	5/32"	15-3/8"
7" Int. Type	2"	5/32"	13-1/16"

Clearance (External Type)–.015-.020" around band.
Internal Type–Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite electric type as follows:

Model	**Auto-Lite No.**
1954 (D51)	①EMD-4003A
1954 (D51)	②EMG-4102A
1954 (D52)	①EMD-4003
1954 (D52)	②EMG-4102A
1955 (Early)	①EMU-4101
1955 (Early)	③EMZ-4001
1955 (Late)	①EMU-4101A
1955 (Late)	③EMZ-4001A

①–Single Speed. ②–Two Speed. ③–Variable Speed.
See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Dodge "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motors in each window. Controlled by door switch and master switch. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Series-	Model Identification
Coronet	D-55-1
Royal	D-55-2
Custom Royal	D-55-3

SERIAL NUMBER: On left front door hinge post.

Starting Serial Nos.	Detroit	Los Angeles
D-55-1, 2, 3	34740001	42518001

ENGINE NUMBER: Stamped on boss on top front side of block just back of water pump.

Starting Engine Number–(D-55-1, 2) D55-1-1001, (D-55-3) D55-3-1001.

►*ENGINE NUMBER LETTERS: (Following Engine Number)–Identified as follows:*

"A"–ALL cylinders .020" oversize.

"B"–ALL Main & Connecting Rod Bearings .010" undersize.

"AB"–BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 135-165 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic coil type, located in exhaust manifold of right cylinder block. Valve must operate freely. When installing coil, position shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot,. with outer (tongue) end of spring below shaft, horizontal and facing front of engine. Press inner end of coil into slot and seat firmly. Now move outer (tongue) end up, around (counter-clockwise) and hook under left stud (toward rear of engine).

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders–RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Plugs–Auto-Lite Resistor Type 4S-165, 14mm. Torque to 30 ft. lbs.

COIL: Auto-Lite CR-6012C.

Ignition Current–2.25 amperes idling, 5.0 amperes stopped.

DISTRIBUTOR: Auto-Lite (D-55-1, 2) IAZ-4003C, (D-55-3) IAZ-4003D.

Condenser–Auto-Lite IBB-2015R. **Capacity**–.25-.28 microfarad.

Contact Point Set–Auto-Lite IGP-3028ZS.

Breaker Gap–.015-.018". Set maximum gap to .017".

Cam Angle–34° ± 3° with both sets of contacts. Do not adjust contact gap outside limits to obtain specified cam dwell.

Breaker Arm Spring Tension–17-20 ozs.

Rotation–Clockwise viewed from above.

Automatic Advance–IAZ-4003C

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	370	2	740
5	450	10	900
17	1800	34	3600
18	1900	36	3800

Automatic Advance–IAZ-4003D

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	375	2	750
4	450	8	900
11	1475	22	2950
12	1625	24	3250

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance–IAZ-4003C, D

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-1/4
1	2	6
5	10	9-1/4
10	20	14-7/8
11.5	23	17

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in Dodge Special Data.*

IGNITION TIMING

Setting–4° BTDC. See Manual Adjustment below.

Timing Mark–On fan drive pulley. Marks are 2° apart.

Manual Adjustment–Timing may be advanced with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR

►*CARBURETOR APPLICATION: Stromberg 2-Barrel Carburetor is standard equipment. Carter 4-Barrel Carburetors used as special equipment.*

STROMBERG 2-BARREL WW

►*CARBURETOR PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: Later carburetors ("A", "B", "C" Coding) have different jet calibration and specifications. See "Stromberg WW (Dodge)" in Carburetor Section.*

D-55-1, 2	Stromberg Code No.
Synchro-mesh	WW-3-131, 131A
Overdrive	WW 3-132, 132A
PowerFlite	WW 3-133, 133A, 133B
D-55-3	
Synchro-mesh	WW 3-120, 120A, 120B
Overdrive	WW 3-121, 121A, 121B
PowerFlite	WW 3-122, 122A, 122B, 122C

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–1 turn open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–450-500 RPM. (Std. & O.D.) 475-500 RPM (PowerFlite) with selector lever in Neutral.

Float Level–3/16" from top of main body to top of float measured at center of float, with float lip held firmly against needle valve. Use depth gauge or tool T-25569 to measure float level. To reset float level, bend float lever next to float (use Tool T-24733).

Accelerating Pump–Normal setting, center hole, for less fuel install rod in inner hole; for more fuel install rod in outer hole.

Fast Idle: With throttle valves in fully closed position, turn throttle stop screw in until it just contacts throttle lever and then turn stop screw in 4-1/2 turns. When properly adjusted, a #59 drill gauge should just pass between throttle valve and wall of throttle body. With choke valve closed and throttle lever held against throttle stop screw, a #48 drill gauge should just fit clearance between ear on contact lever and first step of fast idle cam. To adjust, bend cam contact ear.

Automatic Choke Setting: 2 Points Lean.

Kickdown Switch Adjustment (3-121, 132): With throttle valves in wide open position, there should be 1/64-1/32" clearance between ear on throttle lever and threaded section of switch housing. To adjust, loosen adjusting nuts and adjust to correct position.

Slow Closing Throttle (Dashpot) Adjustment (3-122, 133): With throttle stop screw set for normal idle speed, clearance between end of dashpot plunger and ear on throttle lever should be 1/16-3/32" with dashpot plunger pushed in to the end of its stroke. Adjust by loosening locknut and turning dashpot assembly in or out of the bracket.

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See "Stromberg WW (Dodge)" in Carburetor Section.*

Fuel Pump Pressure: 5-6½ lbs.

CARTER 4-BARREL WCFB NOS. 2181S, 2253S

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting–1/2–1-1/2 turns open. For richer mixture, turn screws out.

Idle Speed–450-500 RPM (Std. & O.D.). 475-500 RPM (PowerFlite) with selector lever in Neutral

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See Carter "WCFB 4-Barrel" in Carburetor Section.*

Fuel Pump Pressure: 5-6½ lbs.

CARB. EQUIPMENT

Fuel Pump: AC or Auto-Lite. Diaphragm type. **Replacement Pump**–AC No 4280 or Auto-Lite FB-4006.

Pressure–5-6½ lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite. Electric type.

Dash Unit–Auto-Lite 13792A(U.S.), 13753A (Can.).

Tank Unit–Auto-Lite 13794A.

See "Fuel Gauges" in Electrical Equip. Section.

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BATTERY

Auto-Lite 1H-105-D or Willard HW-1-105-C. 6 volt, 15 plate, 105 ampere hour rate.
Grounded Terminal–Positive.
Engine Ground–Left front of engine.

STARTER

Auto-Lite MCH-6305. Armature MCH-2088.
Drive–Bendix "Folo-thru" type.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–42-53 ozs. (with new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6 ft. lbs.	Lock	2.0	335

Starting Switch: Auto-Lite SST-4006 (Std.), SST-4013 (PowerFlite). Magnetic type switch controlled by ignition switch. Neutral Safety Switch mounted on transmission of automatic transmission cars. *See "Starter Controls" in Electrical Equipment Section.*

Neutral Safety Switch Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

GENERATOR

Auto-Lite Generator No.	Armature No.
GGW-6012-B (D55-1, 2 Std.)	GGW-2006F
GGW-6001-J (D53 Std.)	GGW-2006F
GGJ-6005-A, D (D55-1, 2 Spec. Equip.)	GGJ-2101AF
GGU-6001-G (D53 Spec. Equip.)	GGU-2006F
GGJ-6001-F (D53 Spec. Equip.)	GGJ-2101AF
GGW-6016-A (Pow. St.)	GGW-2090F
GGU-6013-D (Pow. St.)	GGU-2071F
GGW-6016-E (Pow. St. Can.)	GGW-2090F
GGW-6017-A (Air Cond.)	GGW-2098F
GGU-6008-C (Air Cond.)	GGU-2063F
GGJ-6001-K (Air Cond.)	GGJ-2101AF
GGW-6016-C (A.C. & Pow. St.)	GGW-2090F
GGU-6013-C (A.C. & Pow. St.)	GGU-2071F
GGW-6016-F (A.C. & Pow. St. Can.)	GGW-2090F

►*SPECIAL GENERATOR NOTE:* GGJ, GGU, and GGW type generators used. Performance specifications below apply equally to all generators, within any one of these groups.

Performance Data–GGJ

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	600-700 – 650-750
50	8.0	1400-1600 – 1550-1750
55	8.0	1500-1700 – 1650-1850

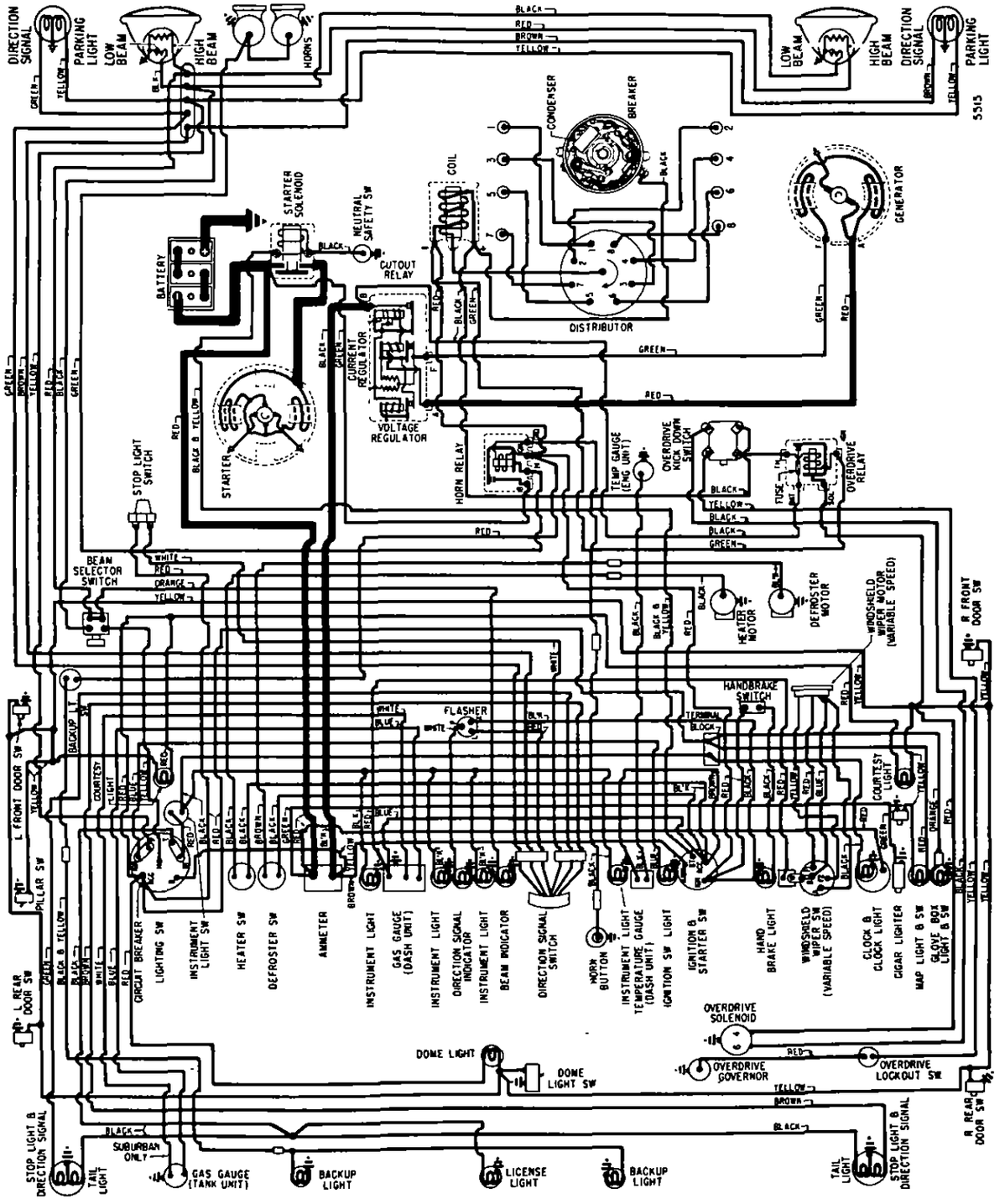
Performance Data–GGU

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	750-850 – 800-900
45	8.0	1450-1650 – 1650-1850
50	8.0	1550-1750 – 1750-1950

Performance Data–GGW

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	870-970 – 950-1050
40	8.0	1800-2000 – 2150-2350
45	8.0	1925-2125 – 2350-2550

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Brush Spring Tension–(GGJ) 34-41 ozs., (GGU, GGW) 35-53 ozs., with new brushes.
Field Current–(GGJ) 1.4-1.7 amperes, (GGU) 1.4-1.6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts.
Motoring Current–(GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts.
Rotation–Counter-clockwise at commutator end.

Belt Adjustment: Loosen generator adjusting strap and generator-to-generator bracket mounting bolts. With Tool C-3379 hooked over generator and a torque wrench attached to tool, apply torque of 45 ft. lbs. (new belt), 27 ft. lbs. (old belt), to pull generator outward. While holding generator outward at required torque, securely tighten generator mounting bolts and adjusting strap.

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW

Cutout Relay

Cuts In–6.3–6.8 volts.
Cuts Out–4.1–4.8 volts.
Contact Gap–.015" minimum.
Air Gap–.031–.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting–7.1–7.4 volts at 70° F. *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap–.048–.052" with contacts just opening.
Checking & Adjusting–See *Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A–Operating Amperes	Test B
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	66	55 (53-57)
VAV-6001B, 2B	50	50 (48-52)

Test A–After 15 minutes operation charging at 1/2 maximum rate.
Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7–6.9 volts (VAV, VBE), 6.7–7.0 volts (VBF).
Air Gap–.048–.052" with contacts just opening.
Checking & Adjusting–See *Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. See *Electrical Equip. Section.*
Direction Signal: See *Electrical Equip. Section.*

►*IGNITION-STARTER SWITCH CAUTION: When installing accessories, use accessory terminal* **only** *on ignition-starter switch and* **not** *the ammeter terminal post.*

Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut. Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft. Headlamp knob is held on its shaft by means of a recessed hex screw.

Stop Light Switch Location: On forward end of master cylinder.

FUSES: Clock–3 amperes. Located on clock.
Radio–14 amperes. At ignition terminal feed.
Overdrive–20 amperes. On overdrive relay.

LIGHTING CIRCUIT BREAKERS: Located in headlight switch assembly. Three in number as follows:
25 Ampere Circuit Breaker–Protects headlights, high beam indicator light, and parking lights.
10 Ampere Circuit Breaker–Protects tail lights, license plate lights, clock light, and instrument panel light.
10 Ampere Circuit Breaker–Protects stop lights, map light, dome light, glove box light, courtesy light, and trunk compartment light.

HORNS: Auto-Lite. Twin horns with relay.
High Pitch–HAB-4708.
Low Pitch–HAB-4707.
Horn Relay: Auto-Lite RAF-4001.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*TWO ENGINES USED AS FOLLOWS:* **D-55-1, 2 Red Ram**–Polyspherical combustion chamber with lateral valves (single rocker arm shaft)
D-55-3 Super Red Ram– Hemispherical combustion chamber with laterally inclined valves (double rocker arm shafts).

ENGINE SPECIFICATIONS: 90°V8 (All Models)

Model	Bore	Stroke	Displmnt	Rated HP
All Engines	3.63"	3.256"	270 cu. ins.	42.2

Model	Compr. Ratio	Developed HP
D-55-1, 2 Red Ram	7.6-1	175 at 4400 RPM
D-55-3 Super Red Ram	7.6-1	183 at 4400 RPM
D-55-3 Super Red Ram ①	7.6-1	193 at 4400 RPM

①–Special Power Pkg. (Carter 4-Barrel Carburetor and special Intake Manifold, and Dual Exhaust system).

Compression & Vacuum Reading– See *TUNE-UP.*

►*ENGINE PARTS INTERCHANGEABILITY NOTE:* All engine parts are interchangeable on both engines with exception of Cylinder Heads, Valve Train parts, Water Pump Housing, and Hydraulic Valve Lifters as explained below.

►*D-55-3 EXHAUST MANIFOLD INSTALLATION CAUTION (To Prevent Poor Gas Mileage, Carburetor Flooding or Difficulty in Restarting):* Check to see that the portion of the right bank exhaust manifold gasket that seals off the preheat chamber does NOT extend down below the exhaust manifold at choke heat tube cavity (on engine side of manifold at point opposite heat control valve).

ENGINE REMOVAL: See *"Engine" in Dodge Special Data.*

OIL PAN REMOVAL: Remove oil level indicator, drain oil, disconnect steering linkage at idler arm support bracket, and allow linkage to drop. Remove bolts that hold oil pan to cylinder block and slide pan out, down, and away from engine.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Dodge Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Dodge Special Data.*

PISTONS

Aluminum alloy, T-slot, cam ground, with skirts relieved below piston pins, and tin coated.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" Oversize.*

Weight–16.2 ozs. (stripped).
Removal–Pistons and rods removed from above.
Fitting New Pistons: Clearance .001" at top between thrust face of piston and cylinder wall. Coat bore with light engine oil (SAE 10W). Insert piston in bore upside down with feeler stock .0015" x 1/2" between thrust face of piston and cylinder wall. Pull to withdraw feeler should be 5–10 lbs. at 70° F.
Replacement Pistons: Std., .010", .020", .030", .040", .060" Oversize.
Installing Pistons: The notch on top of piston must point toward front of engine. NOTE–Assemble pistons to the rod on right hand cylinder bank with the "V" slot in connecting rod aligned with the "T" slot in piston. On left hand cylinder bank "V" slot in rod must be opposite "T" slot in piston.

PISTON PINS

Floating type with lock ring at each end.
Diameter–.8591–.8593". **Length**–2.880–2.890".
Pin Fit in Piston–.0000–.0005". Tight thumb press fit at 70° F.
Pin Fit in Rod Bushing–.0001–.0004". Tight thumb press fit at 70° F. Selective fit.
Replacement Pins: Std., .003", .008" Oversize.
NOTE–Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775–.0780"	.007–.015"	.0015–.0030"
Compr. (#2)	.0775–.0780"	.007–.015"	.0010–.0025"
Oil (#3)	.1860–.1865"	.007–.015"	.001–.003"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .040", .060" Oversize.
Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length (Center to Center)–5.9335–5.9375". **Weight**–21.14 ozs. (600 grams).
Crankpin Journal Diameter–1.9365–1.9375".
Maximum out-of-round and taper limits–.001".
Lower Bearings–Removable, precision type, thin babbitt on steel. No shims.

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►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)–See "CRANKSHAFT" below.*

Clearance–.0005–.0015". Maximum–.0025".

Endplay–.006–.014".

Bearing Adjustment–None. Replace bearings.

Replacement Bearings: Std., .001", .002", .003", .010", .012" Undersize.

Installing Rods: *See "Pistons (Installation)" above.* Rods are chamfered on one side at bearing insert and must be installed with chamfer toward crankshaft fillet. "V" slot across one bolt hole of each bearing cap is an oil passage for lubricating the opposite cylinder wall and piston. When installing bearing cap make certain "V" slot oil passage is toward top of engine.

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank **are not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter–2.3745–2.3755".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)–Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.

Bearings–Removable, precision type, steel-backed, babbitt lined. No shims.

Replacement Bearings: Std., .001", .002", .003", .010", .012" Undersize. Halves of Nos. 1, 2, and 4 bearings are interchangeable with one another (caps are not interchangeable); upper and lower halves of No. 3 bearing are interchangeable; No. 5 halves are NOT INTERCHANGEABLE.

End Thrust: Taken by center (#3) main Bearing.

Clearance–.0005-.0015".

Endplay–.002-.007". Maximum .010".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Dodge Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Dodge Special Data.*

CAMSHAFT

Journal Diameters–(1) 1.998–1.999", (2) 1.982–1.983", (3) 1.967–1.968", (4) 1.951–1.952", (5) 1.4355–1.4365".

Bearings–Removable, steel-backed, babbitt lined bushings.

Clearance–.001–.003". Maximum–.005".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay–.002–.006". Maximum–.010".

Timing Chain: Width–1-1/8". **Pitch**–.375". **Length**–68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with center of camshaft. Temporarily install camshaft sprocket less chain, line up dowel pin holes in hub and gear, while at the same time positioning camshaft gear "Zero" mark exactly in line with center of crankshaft. (A straightedge should be used to check accuracy of this alignment). Remove camshaft gear and engage with timing chain. Place timing chain over crankshaft gear and at the same time, slide the camshaft gear over end of camshaft, keeping timing mark in position. With timing marks aligned, push gear on camshaft, install fuel pump eccentric. Install nut and tighten to 120-130 ft. lbs. torque.

Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Dodge Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Dodge Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

►*CAUTION: Different Valves, Valve Seals, Springs, Valve Guides, Pushrods, and Lifters used on each engine.*

D-55-1, 2 Red Ram

Valve	Head Diameter	Stem Diameter	Length
Intake	1.72"	① .371-.372"	4.25"
Exhaust	1.47"	① .372-.373"	4.20"

①–Std. Valve. *See Valve Guides (below).*

D-55-3 Super Red Ram

Valve	Head Diameter	Stem Diameter	Length
Intake	1.75"	.371-.372"	4.83"
Exhaust	1.41"	.372-.373"	4.75"

All Engines

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.360"	.002"
Exhaust	45°	.360"	.003"

Valve Stem Seals–*New type seals used on D-55-1, 2 Red Ram Engine as follows:*

D-551, 2 Intake Valve Seals–"Umbrella" type rubber seal installed on valve stem inside valve spring (install seal with cup side down BEFORE installing spring retainer).

D-55-1, 2 Exhaust Valve Seals–On FIRST Cars (with two-bead locks), lubricate and install the "O" ring seal on valve stem AFTER valve retainer installed but BEFORE installing valve locks (position seal approximately 1/8" below lower valve stem lock groove). On LATER cars (with four-bead locks), seals will not be required.

D-55-3 Valve Seal Note–Seal ring used on Intake Valve stems only (same as 1954 Dodge V8).

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Dodge Special Data.*

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from valve spring seat in the head to valve tip should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: *SINGLE spring used on D-55-1, 2 Red Ram, DOUBLE springs used on D-55-3 Super Red Ram.*

Valve Spring Specifications

D-55-1, 2

Valve	Lbs. Press	Length
Closed	53 lbs.	1.69"
Open	140 lbs.	1.31"

D-55-3

	Inner Spring		Outer Spring	
Valve	Lbs. Press.	Length	Lbs. Press.	Length
Closed	20-23	1-9/16"	38-43	1-11/16"
Open	40-45	1-3/16"	100-110	1-5/16"

►*CAUTION: Spring ends must be square within 1/16". (Use steel square on surface plate–revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height of spring is 1-11/16" or greater, install a 1/16" spacer under valve spring.

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.*

Valve Guides: D-55-1, 2–Guides are integral with head. If valve stem clearance excessive, use tool set to ream hole to NEXT oversize and install valve with OVERSIZE stem. Valves are furnished Std. and .005", .015", .030" oversize.

D-55-3–Guides are separate pressed-in parts and are serviced by installing new guide and reaming to size for standard valve. Remove guides by driving out through top of head using tool C-3159. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3159 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

►*CAUTION: Oil hole in top of exhaust guide must face up.*

NOTE–If Valve Guide Tool C-3159 is not available, drive guide in, measuring from top of valve seat as follows: **Intake**–15/16". **Exhaust**–1-3/32".

Hydraulic Valve Lifters: *CAUTION–All valve lifters are hydraulic type but are not fully interchangeable on all engines.*

D-55-1, 2 Lifters–Three types used. Lifters identified by groove on body (groove is directly below large "V" groove at upper end of body or in land between this "V" groove and relieved section at upper end of body). *DO NOT use D-55-3 Lifters in this engine.*

D-55-3 Lifters–Two types used. Lifters do not have identifying grooves used on D-55-1, 2 types (above), *however, all D-55-1, 2 lifters can be used in this engine.*

Diameter–.9040-.9045". **Clearance**–.0005-.0015".

Lifter Overhaul & Testing–*See "Valve System" in Dodge Special Data.*

Rocker Arm Assembly: *See "Valve System" in Dodge Special Data.*

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VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 14° BTDC. Close 50° ALDC.
Exhaust Valves—Open 52° BLDC. Close 12° ATDC.
Valve Timing Check: *See "Camshaft Setting" under CAMSHAFT above.*

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add one additional quart if filter changed.

Normal Oil Pressure: 50-65 lbs. with warm oil and engine operating at 1500 RPM.

Oil Pressure Relief Valve—Mounted in oil pump. Adjustable by replacing springs (3 types). **(1)** Standard spring painted BLACK. **(2)** Lighter than standarc spring painted RED. **(3)** Heavier than standard spring painted GREEN.

►*OIL PRESSURE RELIEF VALVE NOTE:* Springs identified as follows:

Color	Free Height	Spring Press. & Checking Height
Red (Light)	1 13/16"	12.4-13.8 at 1¼"
Black (Standard)	1 13/16"	14.4-15.8 at 1¼"
Green (Heavy)	1 13/16"	16.2-17.8 at 1¼"

Oil Pressure Gauge: Auto-Lite 13790A. Not Electric.

Oil Pump: Rotary type. In crankcase at rear end. Mounted on rear bearing cap.

Overhaul—*See "Oiling System" in Dodge Special*

Priming Oil Pump (After Overhaul): Prime pump before installing oil pump and strainer to rear main bearing cap.

Oil Filter: Shunt type. A portion of oil from oil pump is directed through this filter and the remainder flows directly into engine lubrication system.

Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 19 quarts (20 with heater).

Pressure Valve: Dodge 1373136. Radiator filler cap. Opens at 7 lbs.

Thermostat: By-pass type in cylinder head water outlet. Starts to open at 159-165° F.

Water Pump: Packless type. Grease fitting for lubrication on early type only. *See Water Pump Note below. See Water Pump Section for data.*

Pump Removal—Drain cooling system, remove fan, belt, and pulley. Remove four water pump attaching bolts and remove water pump.

►*WATER PUMP NOTE:* Three types used. Early pump was bushing type with lubrication fitting. Two later types are ball-bearing, which are pre-lubricated and require no additional lubrication (have no lubrication fitting).

Temperature Gauge: Auto-Lite 13791A. Electric type.

CLUTCH

Borg & Beck	Model	Assy. No.	Disc No.
Standard	10A7	361368	382346
Heavy Duty	11A6	929	381850

See "Borg & Beck" Clutches in Clutch Section.

►*CLUTCH PEDAL CLICKING SOUND OR CLUTCH SLIPPAGE CORRECTION (When Due to Interference Between Rear End of Clutch Release Fork Rod & Clutch Release Fork):* To correct, rod end should be reworked to eliminate shoulders of rod end forward of attaching eyelet.

Pedal Adjustment: Adjust the fork rod to secure 1/16" free movement of clutch fork outer end. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: (*NOTE*—Over-center spring located above brake pedal and attached to pedal mounting bracket). Disconnect clutch pedal pushrod. Remove overcenter eyebolt adjusting nut. Reinstall adjusting nut, tighten finger tight, then further tighten four complete turns. This adjustment will require 12-15 lbs. pressure to hold clutch pedal down when it is 1" from fully released position.

Removal: Remove transmission or transmission and overdrive (See Synchro-mesh Transmission). Remove clutch housing pan, pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "Dodge Synchro-mesh" Transmission in Transmission Section.*

►*HARD SHIFTING CORRECTION:* Check for interference between gearshift lever and transmission cover. If found, replace manual remote gearshift lever shaft screw, Part No. 853877. (*NOTE*—Before installing screw, it should be tested for proper hardness with a standard mill file. Only screws which are **not** file soft should be installed). If interference not found at point indicated above, check for interference between gearshift rod and lower edge of instrument panel. In most cases, condition can be corrected by realignment of steering column jacket. In some cases it may be necessary to provide adequate clearance by filing out lower edge of instrument panel.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission is to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing. Then remove transmission by pulling it back, down, and out of car.

VERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down. *See "Warner R10" Overdrive in Transmission Section.*

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary transmission.

See "PowerFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level—Apply hand brake, place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.

Oil Filler Tube Location: At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball and Trunnion Type.

►*UNIVERSAL JOINT BOOT NOTE:* A new, larger boot is used on the rear universal joint and can be identified by a daub of white paint on it. In service, larger boot can be used on both front and rear joints, but small boot should **never** be used on rear universal joint as boot failure is very likely to result.

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE*—"Barrel Type" differential assembly used on cars with Automatic Transmission.

See "Dodge Hypoid" in Rear Axle Section.

Transmission	Rear Axle Ratios
Std., Exc. Suburban	3.73-1
Suburban Std.	3.9-1
Overdrive	4 1-1
PowerFlite	3 54-1

Backlash—.006-.010".
Thrust Pad Clearance (Barrel Type)—.006-.008".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

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Axle Shaft Removal: Remove wheel, hub and drum assembly (Use puller C-845). *(CAUTION—Do not strike end of axle shaft to loosen hub; otherwise, possible damage to axle shaft bearings and thrust block might result).* Block brake pedal, disconnect brake line at wheel cylinders, remove axle shaft key, install sleeve C-757 in axle bearing outer oil seal before removing brake support plate from axle housing. Remove shims from each end of axle housing. (Each set should be kept separate so that at reassembly, central location of axle shafts, wheels and thrust block, will be assured). Remove axle shafts and bearings from housing (Use puller C-293-C to remove bearings from axle shafts, puller C-637 to remove inner oil seal, drift C-241 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check end play with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

Type	Dodge Part No. Front	Rear
Standard	1614404	1450918
Heavy Duty	1617004	1450920
Heavy Duty (Spec.)		1450037

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers.
See "Dodge" in Front Suspension Section.
Kingpin Inclination—5-1/2° at 0° camber.
Caster—Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° preferred with Power Steering). Left side should be between 0° and ¼° more negative than right side.
Camber—Pos. 1/4°±3/8° (Left side Pos. ½°, Right side 0° preferred).
Toe-In—0" to 1/16" (0" preferred).

STEERING

Manual: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: Coaxial. Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.
See "Coaxial" Power Steering in Steering Section.
►*JERKY OPERATION OF POWER STEERING GEAR CORRECTION:* Adjust generator drive belt (See Generator), then adjust fan drive belt so that a maximum of ¼" deflection is obtained when applying a 10 lb. pull with spring scale at middle of widest belt span.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Dodge "Safe-Guard" Lockheed hydraulic.
See "Dodge Safe-Guard" in Brake Section.

►*LOOSE OF SQUEAKY BRAKE PEDAL OR PAD CORRECTION:* Change location of attachment of brake pedal return spring from right side of pedal bracket to left side (Standard & Overdrive), left side to right side (PowerFlite), and attach in hole provided in bracket. On PowerFlite cars, if excessive movement or squeak is encountered in pedal pad, remove brake pedal and make several prick punch marks on pedal at pedal pad mounting bracket location to improve clamping action, re-install pad, tighten retaining bolt to 20 ft. lbs.

Drums—Cast Iron. Diameter—11".
Wheel Cylinder Diameter—1-1/8". Single acting (front), double acting (rear wheels).
Replacement Linings & Shoes—Linings or shoes with linings are furnished Standard and .030" Oversize.
Lining—Molded asbestos (bonded to shoe).
Length—(Primary, Front & Rear) 11.5", (Secondary, Front) 11.5", (Secondary, Rear) 8.8".
Width—2". **Thickness**—.200".
Braking Power—60% Front, 40% Rear.
Clearance—.006" at each end of all shoes.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.
Checking Fluid—Filler plug at top of master cylinder (on dash panel in engine compartment).
Removal—Disconnect brake line tubes at master cylinder fittings. Remove four stud nuts from studs, remove master cylinder.

Power Brakes: Combination vacuum power unit and master cylinder. Unit mounted on engine side of firewall and replaces regular master cylinder. *See "Dodge Power Unit" in Brake Section.*
Removal of Power Unit—Same as for standard master cylinder, after hydraulic lines and stop light wires removed.
Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type used with Automatic Transmissions.
Adjustment—*See "Hand Brake Notes" in Dodge Special Data.*

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15-3/8"
7" Int. Type	2"	5/32"	13-1/16"

Clearance (External Type)—.015-.020" around band.
Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite. Electric.

Car Model	Auto-Lite No.
D-55-1 Std.	EMU-4101
D-55-1 Spec. (2-Speed)	EMZ-4001
D-55-2, 3 Std. (2-Speed)	EMZ-4001

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Dodge "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Electric Window Regulators" in Misc. Section.*

Power Seat Adjuster: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Electrical-hydraulic type. *See "Power Top Controls" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-48 MODELS

	Ft. Lbs.
Cyl. Head Nuts (Cast Iron Head)	50-60
Cyl. Head Nuts (Alum. Head)	35-40
Con. Rod Nuts (Castellated)	35-40
Con. Rod Nuts (Self-locking)	40-45
Main Bearing Nuts & Bolts	80-90
Flywheel Capscrew (self-locking)	80
Flywheel Capscrew (wired)	65-70
Spark Plugs	25-30

1949-54 MODELS

	Ft. Lbs.
Cylinder Head Nuts	50-55
Cylinder Head Bolts	65-70
Connecting Rod Nuts	45-50
Connecting Rod Locknuts	4-5
Main Bearing Bolts	95-105
Flywheel Bolts	75-80
Spark Plugs	25-30
Rocker Arm Shaft-to-Cyl. Hd.	45-55

1955 MODELS

	Ft. Lbs.
Cylinder Head (Hot) ①	75
Intake Manifold	23-28
Exhaust Manifold	23-28
Oil Pan	12-15
Main Bearing Caps	95-105
Flywheel	75-85
Vibration Dampener	85-95
Con Rod Caps	45-50
Camshaft Sprocket (6 Cyl.)	45-50
Camshaft Sprocket (V8)	35-45
Rocker Arm Support Bracket (6 Cyl.)	45-55
Rocker Arm Support Bracket (V8)	12-15
Rocker Arm Cover	2-2.5
Engine Front Cover (6 Cyl.)	6-9
Engine Front Cover (V8) 3/8" Bolt	23-28
Engine Front Cover (V8) 5/16" Bolt	12-15
Water Pump Mounting (6 Cyl.)	23-28
Water Pump Mounting (V8)	12-15
Oil Pump Mounting (6 Cyl.)	30-35
Oil Pump Mounting (V8)	12-15
Oil Filter	20-25

①–See Cylinder Head Installation (below) for head tightening procedure. Three different torque applications must be made.

ENGINE

1946-48 PASS. CARS & TRUCKS

ENGINE REMOVAL: For Engine Servicing (& Oil Pan Removal on Six)—Drain cooling system and crankcase. Remove engine as follows:

1. **Disconnect and remove radiator hoses and thermostats, remove radiator.**
2. Disconnect cables and remove battery.
3. Remove engine hood by taking out capscrews in hood hinges and bolts in support arm at each side.
4. Disconnect all electrical wires and cables at engine accessories (remove spark plug wires and conduits, disconnect ground cable at rear of engine).
5. Disconnect hand throttle and choke cables at carburetor (free hand throttle cable clamp at dash and loop cable out of the way by hooking it back of generator regulator, free choke cable clamp at dash and hook cable back of battery box), disconnect fuel line at fuel pump.
6. Remove all engine accessories (except water pumps and starter), remove oil filler pipe.
7. On V8, loosen clamp on exhaust cross-pipe, disconnect both exhaust pipes at exhaust manifold connections, remove cross-pipe (left bank pipe). On 6 Cylinder, disconnect exhaust pipe at manifold.
8. Remove two engine front support bolts.
9. Install sling on engine, attach hoist, take up slack in sling and hoist cables.
10. Remove front floor pan, take out capscrews mounting transmission on flywheel housing.
11. Move engine straight forward to disengage clutch shaft, then lift engine out of chassis.

Cab-over-Engine Model Note—On these models, radiator grille and radiator are removed from the forward end, and special engine cradle should be used to slide engine out toward front.

1949-51 PASSENGER CARS

ENGINE REMOVAL: Remove hood and battery. Drain crankcase and radiator. Disconnect upper radiator hose at engine and lower hose at radiator. Disconnect heater hoses and remove from engine. Disconnect all wires from engine, spread cable clips and fold cable out of the way. Disconnect fuel lines, throttle linkage, and accelerator pedal rod. Push cross shaft back against dash panel. Disconnect windshield wiper hose at engine. Disconnect muffler inlet pipe and clutch retracting spring. Remove the two top transmission to flywheel housing bolts. Remove engine front support nuts. Install engine lift brackets and take up the load with chain hoist. Support transmission and remove two lower transmission to flywheel housing bolts. Rock the engine and pull it away from transmission until the pilot and shaft separate from the clutch, then raise engine carefully. Be sure it clears all parts of engine compartment. Do not let engine strike grille.

Installation: Reverse the above procedure. NOTE—It may be necessary to adjust height of transmission with relation to engine until after pilot enters the clutch. If engine "hangs up" after pilot enters, turn crankshaft slowly until splines seat.

1952-53 PASSENGER CARS

1954 6 CYL. PASS. CARS

ENGINE REMOVAL (PASSENGER CAR): Disconnect driveshaft at rear axle and pull it out of transmission extension. Remove engine rear support-to-transmission extension bolts ***(on Fordomatic disconnect the manual control linkage at the transmission and disconnect the accelerator pedal shaft at the accelerator cross shaft and remove the screws retaining cross shaft to dash panel).*** Disconnect gearshift rods at transmission, disconnect clutch release rod and retracting spring. Remove the equalizer bar support-to-flywheel housing screws, remove support and bushing, and let the equalizer hang from frame. Disconnect speedometer cable. ***(On Overdrive transmission, disconnect manual control cable at overdrive lever, remove cable housing retainer clip and pull cable away from transmission. Disconnect the two wires at solenoid and one wire at governor).*** 1). Drain coolant. Remove hood and radiator and the heater blower motor. Disconnect heater hose at engine. Disconnect generator wires, ignition primary wire, engine temperature sending unit wires, and oil pressure sending unit wire.
2). Remove air cleaner and tape carburetor opening closed. Disconnect choke wire at carburetor and the windshield wiper hose at manifold. Disconnect starter wire at starter. Disconnect accelerator at manifold bellcrank (except Fordomatic). Disconnect fuel pump flexible line. Disconnect muffler inlet pipe at the exhaust manifold and pull pipe away from engine. Remove front support bolts.
3). Install engine lift bracket, using rear notch, and take up the load. Lift the engine and at the same time move it forward over the cross-member.

1954 V8 PASS. CARS

ENGINE REMOVAL: On standard and overdrive transmission cars remove capscrews retaining equalizer bar support to flywheel housing, then remove support and bushing. Remove transmission-to-flywheel housing capscrews. Place jack under transmission, and raise jack until it touches transmission. On Fordomatic Drive cars disconnect throttle linkage and remove it from unit. Remove converter housing lower access cover. Remove idler arm bracket and remove starter. Remove the six converter-to-flywheel assembly bolts, then remove three bolts from converter housing-to-engine block. To gain access to fourth bolt, roll back floor mat and remove floor pan plug. On all cars, drain coolant, remove hood, upper and lower radiator hoses. Drain oil from crankcase, remove battery ground cable, then remove radiator assembly. Remove fan and disconnect flexible fuel line. Remove air cleaner and disconnect wiper vacuum line and manual choke cable. Remove wires from oil pressure and temperature gauge sending units. Disconnect wires from coil and remove wires from generator. Jack up front end of car and position car on jack stands. Adjust transmission jack until it just touches transmission. Remove muffler inlet pipe and gasket from manifold. Remove transmission control linkage splash shield from cylinder block and remove oil filter. Remove front splash aprons from both sides of engine. Install an engine lifting sling on engine and position hoist so there is no slack in sling. Remove engine front support steady rest then remove engine support from left side of engine. Remove capscrews from right side engine support at engine. Raise engine slightly, then carefully pull engine away from transmission. Carefully lift engine out of engine compartment.

1955 PASS. CARS (EXC. THUNDERBIRD)

ENGINE REMOVAL: Disconnect transmission from engine.

1) **Cars with Standard or Overdrive Transmission:** Disconnect clutch release spring. Remove screws retaining equalizer bar support to flywheel housing, then remove support and bushing. Disconnect accelerator linkage at manifold bellcrank. Remove two upper flywheel housing bolts . Remove flywheel housing cover, support transmission with jack, then remove remaining flywheel housing bolts. Then following procedures under 3) below.

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2) Cars With Fordomatic Transmission: Disconnect transmission throttle linkage at cross shaft, tie linkage to dash panel. Remove idler arm bracket. Fold back floor mat, remove two rubber plugs, then two top converter housing-to-engine bolts. Jack up front of vehicle and position safety stands. Support transmission with jack, then remove remaining converter housing-to-engine bolts. Remove converter housing lower access cover, then remove six converter-to-flywheel assembly bolts. Remove dipstick tube assembly. Remove transmission control linkage splash shield from cylinder block, then remove oil filter. Then follow procedures under 3) below.

3) Engine Removal: Remove hood, drain cooling system and crankcase. Remove heater hoses. On 8 Cylinder engine, remove heater inlet duct. On 6 Cylinder engine, remove heater blower motor. Remove upper and lower radiator hoses, then remove radiator. Disconnect battery ground cable at cylinder block, and flex fuel line at fuel pump, remove pump. Disconnect windshield wiper vacuum hose, temperature sending unit wire, and oil pressure sending unit wire. Disconnect primary wire at coil. Remove starter cable at starter, then remove starter. Disconnect ground cable from rear of engine. Remove air cleaner, then tape air horn closed. Disconnect choke cable at carburetor and disconnect accelerator linkage. Disconnect muffler inlet pipes at exhaust manifold. Attach engine lift bracket or sling. Remove right and left front splash aprons. Loosen two engine front steady rest-to-frame bolts. Raise vehicle and position safety stands. On 8 Cylinder engine, remove left-hand engine support and capscrews from right-hand engine support at engine. On 6 Cylinder engine, remove left-hand mounting bolts at insulator, at right-hand mounting nuts at engine. Raise engine slightly, then carefully pull engine from transmission. Carefully lift engine out of engine compartment.

1955 THUNDERBIRD

ENGINE REMOVAL: Disconnect transmission from engine, follow steps 1) or 2) under "Engine Removal—All Passenger Cars (Except Thunderbird)" above, then remove engine as follows: Remove hood, drain cooling system and crankcase. Remove fan, then remove radiator and shroud as an assembly. Remove air cleaner. Disconnect engine ground wire at dash. Disconnect battery ground cable at engine and battery-to-starter relay cable at battery, Disconnect vacuum pump line, and fuel inlet line at fuel pump. Disconnect starter cable at starter solenoid, then remove cable clamp at dash panel. Disconnect ignition switch-to-coil wire at coil. Disconnect the two heater hoses. Remove generator wires, and wires from oil pressure and temperature sending units. Remove heater blower assembly. Disconnect tachometer cable. Disconnect accelerator rod, then disconnect link bracket at block (this bracket also serves as ignition cable bracket). Raise vehicle and position safety stands. Disconnect exhaust pipes at exhaust manifold. Remove engine front mount bolt and insulator. Remove engine right and left support bolts at engine, then turn insulator to one side so engine will clear them upon removal. Remove safety stands and lower vehicle. Install engine lifting sling. Raise engine slightly, then carefully pull engine from transmission. Carefully lift engine out of engine compartment.

1949-54 TRUCKS

ENGINE REMOVAL (CONVENTIONAL TRUCKS): 1). Drain engine coolant and remove the hood. Disconnect battery ground cable (at engine), engine temperature sending unit wire, oil pressure sending unit wire, and the ignition primary coil wire. Disconnect cable at starting motor.
2). Disconnect generator wires, windshield wiper hose, choke control cable, hand throttle, and accelerator rod and spring (at carburetor). Remove air cleaner and tape carburetor opening closed. Disconnect radiator upper hose at engine, and lower hose at radiator, and heater hose at engine.
3). Remove fan and bracket assembly, fan shroud and radiator. Disconnect muffler inlet pipe and pull away from manifold. Shut off fuel valve at tank and disconnect flexible hose at fuel pump.
NOTE—If engine and transmission are to be removed as an assembly, disconnect driveshaft at rear end and pull out of transmission extension. Remove transmission extension support bolts.
4). Remove transmission retaining bolts and disconnect clutch return spring. Support transmission with a jack. Remove engine front support bolts, and install engine lift bracket. Remove engine.

ENGINE REMOVAL (PARCEL DELIVERY): Remove engine compartment rear cover and latch open the front cover. (See Engine Removal—Conv. Trucks, and proceed through steps 1, 2, & 3), then install engine lift bracket. Project lift arm of crane through right hand door and take up load of engine. Remove engine front support nuts and remove the bolts securing the transmission to flywheel housing. Support the transmission with a jack. Move engine far enough forward to clear transmission main shaft, then lift engine enough to maneuver it through the door.

ENGINE REMOVAL (CAB-OVER-ENGINE MODELS): 1). Drain crankcase and cooling system. Remove hood, air cleaner and flexible tube, floor pan over the engine, and dash panel. Remove oil filter lines.
2). Remove either front wheel. Remove grille assembly, then disconnect radiator hoses and remove the radiator support assembly with the radiator.
3). Disconnect the generator wires, ignition switch to coil wire, temperature sending unit wire, oil pressure sending unit wire, and the vacuum hose at the intake manifold, starting motor cable at the starter, throttle linkage, choke wire, and heater hoses. Disconnect flexible fuel line, muffler inlet pipe, and clutch release bearing spring. Remove engine front support bolts.
4). **(To remove V8 Engine)**—Remove generator, carburetor, crankcase inlet pipe and fuel pump. Install the engine lift hook assembly and take up the slack in the cable with a portable floor crane. Remove the bolts securing transmission to flywheel housing. Move engine away from the transmission, and lift it high enough to clear chassis, then maneuver it from the engine compartment.
5). **(To remove 6 Cyl. Engines)**—Same as for V8 except that it is not necessary to remove generator, carburetor, crankcase inlet pipe and fuel pump.

ENGINE INSTALLATION: Reverse removal procedure.

1955 CONVENTIONAL TRUCKS

ENGINE REMOVAL: *For trucks equipped with Fordomatic, see Note below.* Drain cooling system and crankcase. Remove hood, fan assembly and fan belt. Disconnect heater hoses at engine. Remove radiator and shroud assembly. Remove air cleaner, then tape carburetor air horn closed. Disconnect windshield wiper hose at manifold. Disconnect hand throttle control, choke cable, accelerator rod, and accelerator retracting spring at carburetor. Disconnect engine temperature and oil pressure sending unit wires, and ignition coil primary wire. Disconnect generator wires. Disconnect flexible fuel line at fuel pump and muffler inlet pipe at exhaust manifold. Disconnect clutch release lever retracting spring, starter cable at starter, and battery ground strap at engine. Remove starter assembly. Install engine lifting sling. Remove flywheel housing-to-engine bolts, then flywheel housing lower cover. Remove bolts from engine front support. Take up weight of engine with hoist. Support transmission with jack, then move engine forward to separate clutch from transmission input shaft. Lift engine carefully from chassis.

►*FORDOMATIC ENGINE REMOVAL NOTE:* On Conventional & Cab Forward Trucks. In addition to procedures given, perform following: Disconnect transmission oil-to-water cooler inlet and outlet tubes. Remove upper and lower screws retaining converter housing to engine. Remove converter housing lower access cover, then using Tool T52L-7950-A, turn flywheel until flywheel drive plate is in position so that three bolts can be removed. Turn flywheel 180°, and remove other three bolts. Install engine lifting sling and remove engine in usual manner.

1955 CAB FORWARD TRUCKS

ENGINE REMOVAL: *For trucks with Fordomatic Transmission, see NOTE at end of "Conventional Truck Engine Removal" immediately above.* Drain cooling system and crankcase. Disconnect throttle return spring. Remove floor mat, then battery cover. Disconnect one of battery cables. Remove floor pan. Disconnect ignition coil primary wire and ground wire at coil mounting bracket. Remove screws securing loom clip, tail light wire clip, and speedometer cable, then move wires and speedometer cable out of way. Remove distributor cap and rotor. Remove fan assembly, belt, and air cleaner. Tape carburetor air horn closed. Disconnect radiator upper and lower hoses, and heater hoses at engine. Remove upper and center grille sheet metal. Remove radiator, shroud assembly, and radiator-to-front fender apron supports. Disconnect hand throttle control and choke control. Disconnect accelerator linkage. Remove windshield wiper hose from intake manifold (or vacuum pump inlet). Remove temperature sending unit wire and generator wires. Remove oil dipstick. Remove engine front support nuts and washers. Disconnect flexible fuel line at fuel pump. Close off main fuel line to prevent loss of fuel. Disconnect muffler inlet pipe, and pull it away from manifold flange. Remove flywheel housing lower cover. Remove flywheel

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housing-to-engine retaining screws. Disconnect starter cable and battery ground strap, remove starter. Install engine lifting sling. Position floor jack under engine, place wood block between jack and oil pan. Raise engine slightly, and remove engine front support bolts and rubber pad. Raise engine carefully with hoist, move it forward to clear transmission input shaft, and remove it from chassis.

1955 PARCEL DELIVERY TRUCKS

ENGINE REMOVAL: (*NOTE*–Engine & transmission removed as assembly). Remove driver's seat and support. Drain crankcase. Disconnect air cleaner tube and elbow from carburetor, then remove air cleaner from engine cover bracket. Tape carburetor air horn closed. Drain cooling system. Remove clutch pedal plate. Remove brake pedal pad, then remove pedal opening plate and slide it over brake pedal rod. Remove pedal opening rubber mat. Remove two screws retaining dimmer switch, and drop switch through floor board. Disconnect accelerator rod from pedal. Remove left floor plate (the accelerator pedal and engine front cover hoodlock are removed with floor plate). Remove brake master cylinder inspection cover. Remove ten screws from engine cover base plate. Remove nuts and bolts retaining center floor plate to engine cover base plate. Loosen three bolts securing crossmember reinforcing plate to left and right wheel housings (*NOTE*–Drive wedge between reinforcing plate and left and right wheel housings). Remove center floor plate, then remove one reinforcing plate-to-crossmember bolt from end of body crossmember. Remove engine cover and base plate assembly. Disconnect windshield wiper vacuum line at fuel pump, and the fuel flex line at tank fuel line-(*NOTE*–On Fordomatic equipped vehicles disconnect transmission selector rods at transmission). Disconnect radiator upper and lower hoses at radiator. Disconnect radiator-to-cylinder outlet tube and hose at water pump. Disconnect primary wire from coil and ground wire at coil bracket Disconnect heat and oil pressure indicator wires. Disconnect starter cable at solenoid and starter ground strap at starter. Disconnect exhaust inlet pipe at exhaust manifold. Remove emergency brake cable clevis pin, then remove emergency brake holding bracket. Remove emergency brake holding bracket. Remove emergency brake hold down bracket. Pull emergency brake cable out of way. Remove speedometer cable holding bracket, then remove speedometer cable from transmission speedometer gear, and move assembly out of way. Remove fan assembly and belt. Disconnect generator wires. Remove body crossmember. Disconnect choke cable at carburetor. Remove engine front support bolts, rear support mount bolts and lower right and left-hand pads. Remove universal joint "U" bolts and drop rear of drive shaft. Disconnect universal joint knuckle dust cap Remove drive shaft spline from universal joint knuckle and plug assembly. Remove carburetor inlet fitting and fuel line from carburetor. Remove valve rocker arm cover, then install the appropriate engine lifting bracket. Position hoist through right door and attach it to lifting bracket. Lift engine and remove engine and transmission through the front door.

ENGINE MOUNTINGS

1954-55 PASS. CARS & TRUCKS

ENGINE FRONT STEADY REST REMOVAL & INSTALLATION: Remove fan belt and the two clamp bolts at front steady rest bracket. Remove spacer bolt retaining insulators in bracket and remove insulators. Remove crankshaft pulley. Remove capscrews retaining steady rest bracket to cylinder front cover and remove bracket.

Installation—Install steady rest bracket on cylinder front cover and tighten capscrews to 23-28 ft. lbs. torque. Install crankshaft pulley. Install spacer bolt and clamp bolts. Do not tighten spacer bolts or clamp bolts. If necessary, center spacer bolt in frame bracket by shifting engine front mountings in their frame brackets. Tighten spacer bolt to 20-25 ft. lbs. Make sure no engine weight is being transferred to the steady rest insulators, then tighten clamp bolts to 25-30 ft. lbs. Install fan belt and adjust belt tension.

OIL PAN

1946-48 6 CYL. MODELS

OIL PAN REMOVAL: Remove the engine from the chassis (see Engine Removal above). Then remove starter, take out oil pan capscrews and lift pan off.

Oil Pan Installation Note—Use new packing at front and rear ends of pan. CAUTION—Soak new packing in engine oil for 2 hours before using.

1946-48 V8 MODELS

OIL PAN REMOVAL: Remove oil pan drain plug and drain the oil. Disconnect steering drag link at steering gear pitman arm. Loosen clamp on exhaust cross-pipe, disconnect exhaust pipe at left exhaust manifold and remove cross-pipe. Take out capscrews in ball joint at rear end of front radius rods, lower rear end of rods to provide clearance (rods can be held down by wooden block inserted between radius rod ball and frame). Take out engine splash pan mounting screws, move pans to the side and out of the way. Remove starter by disconnecting brace at commutator end and taking out two through bolts on commutator end plate. Disconnect oil filter return line at oil pan connection, remove oil level indicator stick and tube. Take out oil pan capscrews and remove pan from beneath car.

NOTE—Additional clearance can be secured by attaching hoist to front bumper bars (not axle) and raising front end of car slightly.

Oil Pan Installation Note—Use new gaskets and new packing at front end of pan. Soak new packing in engine oil for 2 hours before using.

1949-51 6 CYL. MODELS (EXCEPT "M" 254" ENGINE)

OIL PAN REMOVAL: Remove engine from chassis. Remove screws holding oil pan to engine rear plate, and screws holding pan to engine block and front cover plate. Remove pan from engine.

Installation—Soak new packing 2 hours in SAE 20 engine oil before installation. Install packing in retainer groove and roll it in place with a round bar, making sure the packing meets the pan gasket evenly. Mount pan on engine and install screws holding pan to engine block and front plate. Torque to 15-18 ft. lbs. (*NOTE*—Alignment of pan can be simplified by using two studs in opposite corners of block). Install screws holding oil pan to rear plate. Torque to 10-15 ft. lbs.

1949-53 V8 MODELS

OIL PAN REMOVAL: Drain oil, remove starter motor, clutch spring and the flywheel housing front cover. Remove the road air breather duct and the bolts retaining steering gear idler arm to frame. Remove steering gear arm and drop idler and connecting rod until it hangs from spindle. Remove oil pan retaining screws and drop the oil pan. The two front screws on the pan can be reached through holes in frame front cross member. *NOTE*—On some engines it will be necessary to disconnect the front engine supports and raise front of engine.

Installation—Clean gasket surface of block and file off any burrs around bolt holes. Tie each half of pan gasket to pan through two of the holes to hold gasket while installing. Hold pan in place on block and install two screws finger tight in each side. Remove strings and install remaining screws, tightening them to 15-18 ft. lbs. Install road breather duct and flywheel housing front cover. NOTE—Align flywheel housing front cover by installing the two shoulder bolts in the top holes. Install starter motor, clutch return spring, steering idler arm support bracket and the steering idler arm. Fill crankcase with oil and run engine to check for oil leaks.

1952-53 6 CYL. 215" ENGINE

OIL PAN REMOVAL: Drain radiator and crankcase. Disconnect upper and lower radiator hoses from the engine. Remove engine front support to frame attaching bolts, and raise the front of the engine about 2 inches. Remove oil dipstick, and remove the oil pan retaining screws. Remove pan.

Installation—Clean gasket surface of block thoroughly, and file off any burrs around threaded bolt holes. Install new gasket and oil pan, tighten one pan screw at each end of the pan finger-tight, tighten all screws from center outward, to 12-15 ft.lbs. torque, repeat tightening procedure to make certain all screws correctly torqued. Check pan for oil leakage after engine warmed up.

►*OIL PAN SCREW CAUTION*—Slotted head ¼" screws used to retain oil pan on first cars must be installed with lockwashers. Tighten screws securely with a large screwdriver.

1950-53 6 CYL. "M" ENGINE

OIL PAN REMOVAL: Raise and support front of truck. Drain crankcase and remove splash pan. Remove starter and disconnect ventilator pipe bracket. Remove oil pan-to-rear plate screws and oil pan-to-block and front cover screws. Remove oil pan.

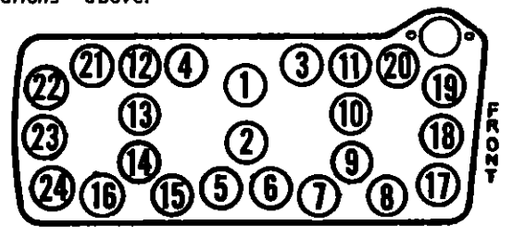
Installation–Remove old packing from front and rear of pan. Soak new packing in oil for two hours then install it in retainer grooves, rolling it in place with a round bar. Spread a thin coating of grease on oil pan gasket surface to hold gasket in place and install gasket. Install pan into place and secure with screws. Complete assembly by reversing removal instructions.

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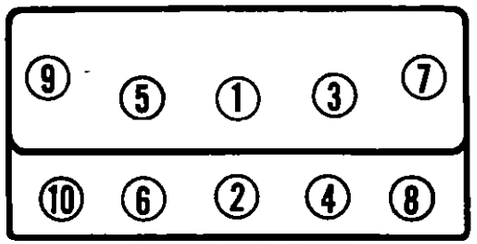
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CYLINDER HEAD & MANIFOLD

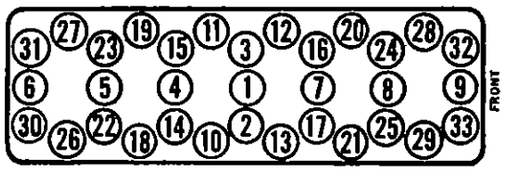
TIGHTENING TORQUES: *See "Tightening Specifications" above.*



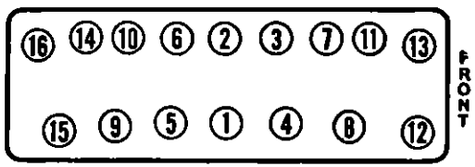
L-HEAD V8 ENGINE CYLINDER HEAD



OVERHEAD VALVE V8 CYLINDER HEAD



L-HEAD 6 CYL. ENG. CYLINDER HEAD



OVERHEAD VALVE 6 CYLINDER HEAD

1946-48 V8 MODELS

CYLINDER HEAD INSTALLATION: Right and left bank cylinder heads are interchangeable.

►*CAUTION: Do not use earlier type cylinder head gaskets with these heads.*

1949-53 V8 MODELS

CYLINDER HEAD INSTALLATION: ***CAUTION—Use latest type Cylinder Head gasket (see data below).*** Install guide studs (see note below) in two outer bolt holes in block. Coat NEW cylinder head gasket on both sides with special head gasket sealer No. 8A-19554, install gasket on block. Install cylinder head over guide studs. Coat threads of all cylinder head bolts lightly with water resistant sealer, install one bolt at each end of head and tighten finger-tight to hold head and gasket in position, remove guide studs, install remaining head bolts. Tighten all head bolts evenly to 65-70 ft. lbs. torque in correct sequence (see Cylinder Head Diagram). Recheck cylinder head bolts after engine has reached normal operating temperature (run for at least 10 minutes at fast idle) and again after 1000 miles of operation.

►**Cylinder Head Guide Stud Note**—Guide studs can be made up by cutting head off a 7/16-14 x 3½" bolt, tapering end, and cutting a screwdriver slot so that stud can be turned into cylinder block hole.

►***1949-53 REPLACEMENT CYLINDER HEAD AND GASKET CAUTION***—New heads and gaskets (heads .011" thicker at gasket surface, gaskets .010" thinner when compressed) are furnished to overcome coolant leakage due to loss of head bolt torque. LATER TYPE "THIN" GASKET MUST BE USED ONLY WITH LATER TYPE "THICKER" CYLINDER HEAD. Correct gasket and cylinder head combinations are as follows:

Gasket No.	EARLY TYPE	Cylinder Head No.
EAB-6051B	EAB-6049C, 8RT-6049A, 8BA-6049A	
EAB-6083B	EAB-6050C, 8RT-6050A, 8BA-6050A	

Gasket No.	LATER TYPE	Cylinder Head No.
EAB-6051C	EAB-6049D, 8RT-6049B	
EAB-6083C	EAB-6050D, 8RT-6050B	

1947-51 6 CYL. "H" ENGINES

6 CYLINDER HEAD GASKET: Gasket must be installed with large full flow passages at rear. Late type gaskets have left front corner cut off for identification. If this type gasket with cutoff corner installed backwards, water leaks at the rear corner between head and block will occur.

6 CYLINDER HEAD BOLTS & STUDS: Studs used on engines up to 7HA-61171, bolts used after this number. Both studs and bolts furnished for service but should not be mixed. Use all studs or bolts.

1954-55 V8 MODELS

CYLINDER HEAD: Removal– Drain cooling system. Clean outside of valve chamber cover. Remove cover, exhaust manifold, spark plugs, intake manifold, ignition harness bracket from right hand cylinder head (remove distributor cap when removing right hand head from Thunderbird). On cars, others than Thunderbird, disconnect battery ground cable, and oil dipstick tube bracket from cylinder head. Remove generator bracket-to-cylinder head bolt, remove generator from mounting bolt, and move generator out of way. Release spring tension on rocker arms by loosening adjusting screws, then remove rocker arm assembly and oil baffle plates. Remove valve pushrods in sequence. Identify pushrods so that they can be replaced in original positions. Disconnect wire from temperature sending unit (left-hand head). Remove cylinder head bolts. Install cylinder head holding fixtures. *(NOTE*– Distributor location on Thunderbird will not permit installation of rear holding fixture on right hand head in its normal position. Install fixture one hole forward). Lift cylinder head off block. Do not pry between head and block. Remove head gasket.

Installation: Using new gasket with sealer applied to both sides, position cylinder head on engine. Remove holding fixture brackets. Install cylinder head bolts, and tighten them to 55 ft. lbs. torque (cold) in proper sequence (see diagram). Repeat operation and tighten to 65 ft. lbs. (cold). (See Cylinder Head Torquing following for special tools required). Install pushrods in their proper locations. Position oil baffle plates on head. Place rocker arm assembly on plates, then install bracket retaining screws and nuts. Be sure to install the oil drain tube on same end bracket from which it was removed. The bracket end of the tube must enter locating hole in rocker shaft. *(CAUTION*–Be sure rocker shaft support brackets are not upside down when assembly installed. There is a .020" difference in bracket height when reversed. Tightening the screws with brackets reversed can result in a broken rocker shaft). Tighten bracket retaining screws and nuts to 12-15 ft. lbs. torque. Make a preliminary valve lash adjustment. Connect temperature sending unit (left hand head). After installing right hand head on all vehicles **except Thunderbird,** position generator, install the generator front mounting bolt, then fasten generator bracket to cylinder head. Connect battery ground cable and dipstick bracket. After installing right hand head on Thunderbird, install distributor cap. Install ignition harness bracket on right hand cylinder head. Install intake manifold. Install spark plugs, then install heat shields and exhaust manifold. Fill cooling system, and run engine until it has reached normal operating temperature. Then tighten head bolts to 75 ft. lbs. torque (hot). Check the valve lash and adjust the lash as necessary. Cement new gasket on rocker arm cover if necessary, then install cover. Tighten cover nuts to 2.0-2.5 ft lb. torque.

►*V8 CYLINDER HEAD TIGHTENING NOTE:* Due to position of rocker arm assemblies and exhaust manifolds, special tools are required to properly torque cylinder head. On both right and left hand bolts 1-2-3-4-5-6-7-8-9 use Wrench S-8663-A. On right hand bolt No. 10 use 11/16" socket, 1 5/16" long plus SX-5 Extension. On left hand bolt No. 10 use S-8663-A Wrench. *When using socket and extension on a Fordomatic equipped vehicle, work from the top of the manifold, and force the socket extension past the Fordomatic oil level indicator tube in order to get the socket on the bolt head.*

1952-55 6 CYL. MODELS

CYLINDER HEAD: Removal–Disconnect all lines and wires to distributor and carburetor. Remove coil from engine and let hang from distributor. Disconnect engine temperature unit sending wire. Remove capscrew and clip from No. 6 rocker arm support bracket and pull oil feed line out of bracket, then pull it out of block with with pliers (do not damage the line). Loosen all rocker arm adjusting screws to remove valve spring load from the rocker arms. Slide the rocker arms away from the pushrods and remove the rods. *NOTE–Leave the two end pushrods in place. Rocker arms at each end of*

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engine cannot be moved laterally). Identify the pushrods so they can be reinstalled in their original positions. Remove manifold bolts and pull manifold assembly away from head. Install cylinder head holding fixture Tool No. T52P-6085-DAD. Remove all cylinder head bolts, install guide studs (see notes below) in two diagonally opposite end bolt holes. Lift head up over pushrods and guide studs and remove from engine.

►**Cylinder Head Guide Stud Note:** Guide studs can be made up by cutting head off a 7/16-14x6" bolt, tapering end, and cutting a screwdriver slot so that it can be turned into cylinder block hole.

Installation: Coat NEW cylinder head gasket on both sides with special head gasket sealer No. 8A-19554, install gasket on block. Install the two end pushrods and install guide studs in two diagonally opposite end bolt holes. Lower the cylinder head over the guide studs and pushrods. *(CAUTION*—Slide head down carefully and guide pushrod through head). Coat threads of all cylinder head bolts lightly with water resistant sealer, install two bolts at opposite ends of head to hold head gasket in position, remove guide studs, install remaining head bolts. Tighten all head bolts evenly to 75 ft. lbs. torque in correct sequence (see Cylinder Head Diagram). Install all pushrods and assemble rocker arms (see Rocker Arm Data). Recheck cylinder head bolts after engine has reached normal operating temperature and again after 1000 miles of operation.

1954-55 V8 MODELS (256" ENGINE)

►*1954-55 "256" ENG. MANIFOLD HEAT CONTROL INSTALLATION (For Cold Weather Operation):* If poor engine operation encountered on 256 Eng. Trucks under stop and go conditions, an exhaust thermostat control valve may be installed on 1954-55 models as follows:

Engines Built Through September 2, 1954: Equipped with EBU-5267-B crossover pipe and B5T-5293-A spacer. Remove spacer and install B4A-9685-A exhaust thermostat control valve.

Engines Built From September 2, 1954 to December 1, 1954: Equipped with EBZ-5267-A crossover pipe and four attaching studs (353721-S). Remove pipe and studs, and replace with EBU-5267-B crossover pipe, 88413-S studs, 33816-S nuts. Install B4A-9685-A exhaust thermostat control valve.

Engines Built From December 1, 1954 Through 1955: Equipped with B5C-5267-A crossover pipe, four attaching studs (88448-S), and EBU-9450-B gaskets. Remove pipe, studs, and gaskets. Replace with B5A-5267-B crossover pipe, 88413-S studs, 33816-S nuts, B5A-9450-A gaskets. Install B5A-9685-C exhaust thermostat control valve. *NOTE*–B5A-9685-D exhaust thermostat control valve has been released to minimize engine stalling and improve fuel distribution. See Ford Truck Model pages.

CYLINDER SLEEVES

1946-53 V8 & 6 CYL. L-HEAD ENGINES

CYLINDER SLEEVES: Dry type Steel or Cast Iron cylinder sleeves used in production on some Ford engines. On V8 engines with sleeves, engine may be marked with letters 'HS' stamped on top of block beside inner front corner of left cylinder head.

Cylinder Sleeves

Model	Type	Part No.
6 Cyl. "M" Engine	Cast Iron	8MB-6055-B
6 Cyl. "G" Engine	Cast Iron	1GA-6055-D
6 Cyl. "H" Engine	Cast Iron	7HA-6055-B
8 Cyl. "V8" Engine	Cast Iron	①59A-6055-B
8 Cyl. "V8" Engine	Cast Iron	②59A-6055-C

①—Used with cylinder blocks with milled depression between valve port and cylinder.
②—Used with cylinder blocks without milled depression between valve port and cylinder.

Service Limits: Steel sleeves should be replaced if worn more than .003" or if ridged at top due to wear. Sleeves which have been buckled (visible waves or burned spots) must also be replaced.

Steel Sleeve Installation: Sleeves should be removed and installed with a puller which applies pressure evenly (do not use arbor press). Use Sleeve Replacer tool, No. 6055-A, to install new sleeves, check sleeves after installation for buckling using a plug gauge or new piston. If piston sticks any point, remove sleeve and install another new sleeve.

Cast Iron Sleeve Installation: These sleeves are thicker than steel type and cylinder must be bored out for sleeve installation. Rebore cylinder to size .0012" smaller than outside diameter of sleeve to provide correct press fit, counterbore top of cylinder to fit flange on upper end of sleeve, press sleeve in place. NOTE—These sleeves are furnished with finished cylinder bore to fit a standard size piston. No finishing operations are necessary.

Fitting Pistons on Sleeve Equipped Engines:—Special gauge thicknesses used (not same as for engines without sleeves). See Piston Fitting Instructions on each car model page for complete instructions.

PISTONS

1946-48 MODELS

REPLACEMENT PISTONS: Aluminum 4-Ring piston assemblies (with fitted pin and retainer) furnished for service in Std., .010", .020", .030", .040", .060" oversizes.

1949-53 MODELS

REPLACEMENT PISTONS: Aluminum 4-Ring piston assemblies (with fitted pin and retainer), pistons are either solid or split skirt type, furnished for service replacement in the following oversizes: Std., .0025", .005", .020", .030", .040", .060".

PISTON RINGS

1946-53 MODELS

REPLACEMENT PISTON RINGS: Three types of piston ring sets furnished for service as follows: **Standard** (Snap-type), designed for use in new engines or whenever the engine block is rebored and new pistons installed. **Expander Type,** designed for use after a light honing job and the cylinder taper does not exceed .006". **Steel Section Type,** designed for use in cylinders where taper of bore is between .006" and .015", or whenever excessive oil consumption is encountered, or when cylinder bore is not to be honed. NOTE—"Snap Type" piston rings not furnished for 254 cu. in. "M" engine.

Piston Ring Sets: Furnished Std., .020", .030", .040", .060" Oversize.

CONNECTING R D & BEARINGS

1946-48 V8 MODELS

REPLACEMENT CONNECTING ROD BEARINGS: Bearing floats between connecting rod and crankpin with inner bearing surface on connecting rod and outer bearing surface in connecting rod. Bearings are furnished Standard on outside diameter, and the following undersizes on inside diameter: .002", .010", .020", .030", .040".

1946-48 V8 MODELS

CONNECTING ROD BEARING SERVICING: If connecting rod bore worn more than .0015" over original size of 2.360" (2.3597-2.3603") rod should be replaced.

Connecting Rod Bearing: Measure bearing thickness with micrometer gauge by placing a piece of round stock on inner face of bearing and measuring total thickness of bearing and stock (measure stock separately and subtract from micrometer reading for bearing thickness figure). Replace bearing measuring less than .1085" thick.

Crankshaft Crankpins—Check crankpins for condition, replace crankshaft or re-machine crankpins if scored or grooved, tapered more than .001", or out-of-round more than .0015". Shafts should be re-machined as noted under "Crankshaft & Main Bearing" section below. NOTE—If crankpins worn evenly, and to less than maximum limits given above, crankshaft will be satisfactory for service providing that connecting rod bearings installed which provide bearing clearance of less than .005" (desired bearing clearance .0015-.0035").

1949-53 V8 MODELS

CONNECTING ROD INSTALLATION: Install connecting rods with oil squirt holes as follows—Left bank rods with oil squirt holes to front side and right bank rods with oil squirt holes on rear side. Left bank rod numbers must be towards the left side of engine and right bank rod numbers towards right side of engine.

CRANKSHAFT & MAIN BEARINGS

1946-47 6 CYL. "G" ENGINES

REPLACEMENT MAIN BEARINGS: Upper and lower bearing halves not interchangeable. Crankshaft end thrust taken by No. 4 (rear) bearing. Replacement bearings furnished in Standard and the following undersizes: .005", .010", .020", .030".

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1946-48 MODELS

SPECIAL MAIN BEARING NOTE (Some Engines)—Some cylinder blocks have been manufactured with main bearing bore .015" Oversize. These blocks can be identified by mark "ERP" stamped on oil pan gasket flange at left front corner of block. CAUTION—All bearings installed in these engines must be special "O.D. .015"" Oversize type

1946-48 V8 MODELS

REPLACEMENT MAIN BEARINGS: Main bearings furnished in Standard and the following undersizes (See Special Main Bearing Note above): .002", .010", .020", .030".

Rear Main Bearing Oversize (Length): Flanged rear main bearings are furnished .015" oversize (overall length) for adjustment of crankshaft endplay.

1949-55 V8 MODELS

1947-55 6 CYL. MODELS

REPLACEMENT MAIN BEARINGS: Bearings furnished Standard and in the following undersizes: .002", .010", .020", .030".

Selective Fit Standard Bearings: Engine block, crankshaft journals, and bearings marked with red or blue paint for selective fitting of bearings (Thinner wall section—RED; Thicker Wall Section—BLUE). If block and crankshaft journal marked with same color paint, then both bearing halves should be of same color. If block and crankshaft journals of different colors, then bearing halves should be of different colors. NOTE—Either color bearing half can be used optionally in combination with block and crankshaft journal markings for selective bearing fitting.

1954-55 V8 MODELS

CRANKSHAFT THRUST BEARING ALIGNMENT: After No. 1, No. 2, and No. 4 bearing caps and inserts have been installed and properly torqued, install No. 3 bearing cap and insert. Install capscrews snugly, then pry crankshaft toward rear of engine. Reverse this action by prying crankshaft forward (toward front of engine). This will align thrust surfaces of both halves of thrust bearing. RETAIN THIS FORWARD PRESSURE on the crankshaft, and tighten capscrews to 80-90 ft. lbs. torque. Check crankshaft endplay which should be .002-.006"

1952-55 6 CYL. MODELS
OVERHEAD VALVE ENGINES

REAR MAIN BEARING OIL SEALS: *NOTE*—Crankshaft seal is installed in groove in block and in seal retainer (directly behind rear main bearing).

Seal Installation: With crankshaft out, install new journal oil seal in cylinder block (Tool T52L-6701-AGD). Cylinder block journal seal and retaining cap journal seal must be cut flush without any frayed edges overlapping. Install a new journal oil seal in oil seal retainer cap (Tool T52L-6701-AGD) Install new retainer cap-to-cylinder block seals. Install main bearing caps and inserts. Lubricate seals with grease to reduce friction, then install retainer in cylinder block.

Testing Seal Installation: Check retainer-to-cylinder block seal for leaks. Squirt a few drops of oil into seal corners on outside of cylinder block. Blow compressed air into seal corners from inside block. If air bubbles appear in oil, remove seal retainer. Be sure all mating surfaces are clean. Install new seals and repeat air test.

1954-55 V8 MODELS

REAR MAIN BEARING OIL SEALS: *NOTE*—Crankshaft seal is installed in groove in block and in seal retainer (directly behind rear main bearing). Retainer is sealed in block by special sealing strips inserted in grooves in sides of retainer after it is installed in the block.

Seal Installation: With crankshaft out, install new journal oil seal in cylinder block (Tool T52L-6701-AGD). Cylinder block journal seal and retaining cap journal seal must be cut flush without any frayed edges overlapping Install a new journal oil seal in oil seal retainer cap (Tool T52L-6701-AGD). Install main bearing caps and inserts, then install rear main bearing oil seal retainer. Dip retainer-to-cylinder block oil seals in light engine oil, then immediately install them in grooves (seals will swell immediately on contact with with engine oil). It may be necessary to tap seals into place for last ½" of travel.

Testing Seal Installation: Same as for 6 Cylinder. See above.

ENGINE FRONT COVER

1954-55 V8 MODELS

FRONT COVER OIL SEAL: Drive out old seal with a pin punch, then clean out recess in cover. Coat new seal with grease, then install seal with Tool T52L-6700-BEE. Drive seal in until it is fully seated in recess. Check seal to be sure spring did not come out during installation.

CAMSHAFT & BEARINGS

1946-53 MODELS

CAMSHAFT BEARING SERVICING: Camshaft bearings should be replaced if scored or worn, or if bearing clearance is greater than indicated below.

Bearing Clearance—.001-.002" (new), .004" (worn).

Bushing Removal & Installation—Use Puller No. 6005-N to remove bearing so that bearing is drawn out evenly. Install new bearing with same tool, making certain that oil holes in bearing line up with oil channels in cylinder block. Replacement bearings are finished type and do not require reaming.

1947-51 6 CYL. "H" ENGINES

CAMSHAFT & TAPPET CLEARANCE CHANGES: Three different camshafts have been used on this engine. *NOTE—Tappet Clearances are different. See Tappet Clearance below..*

Early 1950 & Previous Engines—Camshaft No. *7HA-6350-C (stamped "C" or "CWC" on forward end)* used with Camshaft Gear 8HA-6256-A, B, C with 15° chamfer on inner diameter of hub. Later type gear 0HA-6256-A, B, C can also be used. *See Tappet Clearance Setting below.*

Late 1950 Engine—Camshaft No. OHA-6250-A (stamped "0" on forward end, and engine block stamped "0H" directly above #3 Intake valve port). Does not have undercut at gear post and is used with Camshaft Gear 0HA-6256-A, B, C. CAUTION—Previous type 8HA-6256-A, B, C can be used but chamfer on inner diameter must be increased from 15° to 45°. *See Tappet Clearance below.*

►*ENGINE MARKING CAUTION*—Engine marking (see above) must be added when "0H" camshaft installed in unmarked block, or removed if first type installed in marked block.

1951 Engines—Camshaft No. 0HA-6250-B (Stamped "B" on forward end), replaces previous type 0HA-6250-A. This camshaft is interchangeable with 0HA-6250-A. *See Tappet Clearance below.*

6 CYL. "H" ENGINE TAPPET CLEARANCE

(With 7HA-6250-C Camshaft—Marked "C" or "CWC") Intake—.009"-.011". Exhaust—.013"-.015".

(With 0HA-6250-A, 0HA-6250-B Camshaft) (Shaft Marked "0" or "B." Engine Marked "0H") Intake—.013"-.015". Exhaust—.017"-.019".

1950-53 6 CYL. "M" ENGINE

CAMSHAFT CHANGE: Two different camshafts used as follows:

Early 1950 & Previous Engines—Camshaft No. 7HT-6250-A, B, C same as used on Early 1950 "H" Engines. See "H" Engine Camshaft Change data above.

Late 1950 & 1951-53—Camshaft No. MTH-6250 (stamped "M" on forward end). This camshaft does not have undercut at gear post and is used with Camshaft Gear 7HT-6256-A, B, C (with 45° chamfer on inner diameter).

►*CAUTION*—Previous type gear 8HA-6256-A, B, C can be used but chamfer on inner diameter must be increased from 15° to 45°. Valve tappet clearance same for both. **Intake** .009"-.011", **Exhaust** .014"-.016".

1952-55 6 CYL. MODELS
OVERHEAD VALVE ENGINES

CAMSHAFT BEARING REMOVAL & INSTALLATION: Remove camshaft, drill a ½" hole in plug at rear camshaft bearing bore, remove plug with Tool 7600-E. Remove bearings from block with Tool T52L-6261-CEE. To install, position bearing at bearing bore and press it into place with Tool T52L-6261-CEE. No. 1 cam bearing must be pressed in .005-.025" below front face of bearing bore. Press remaining bearings in sufficiently to align oil supply holes. Clean out plug recess in camshaft rear bore. Coat outer rim of new plug lightly with Sealer 8A-19554-A, and install plug with Tool T52L-6266-BGD. Install camshaft. *NOTE*—No. 3 Bearing not interchangeable with other bearings.

1954-55 V8 MODELS

CAMSHAFT BEARING REMOVAL & INSTALLATION: Remove camshaft. Drill ½" hole through plug at camshaft rear bearing bore, then remove plug with Tool 7600-E. Pull bearings out of block with Tool T52L-

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6261-CEE. To install bearings use Tool T52L-6261-CEE (A bearing adapter with larger flange is used to install bearings in cylinder block). (*NOTE*—No. 1 camshaft bearing has *one oil hole, other four camshaft* bearings have five holes and are interchangeable) *Be sure to align holes in camshaft bearings with oil holes in cylinder block when bearings are installed.* Particular care should be taken with No. 3 cam bearing since it supplies oil to rocker arms. After all bearings are installed, coat a new camshaft rear bearing bore plug with oil resistant sealer and install plug with Tool T53L-200-A (Handle), T54L-6266-A (Adapter).

TIMING GEARS

1946-53 V8 ENGINES

1946-EARLY 1949 6 CYL. ENGINES

TIMING GEARS: Bolted on type camshaft used (fibre or aluminum) which can be replaced without removing camshaft from engine.

Replacement Gears: Crankshaft gears are Cast Alloy Steel and are furnished in one size only. Camshaft Gears are furnished in Standard size, and the following oversizes: .006", .010".

Camshaft Gear Removal and Installation:—Gear is bolted on camshaft hub flange by 4 offset capscrews. To remove gear, remove crankshaft pulley (and dampener on 6 Cyl. Engine)—use Puller 6312-A, and timing gear cover. Bend back lock plate tangs, take out four camshaft gear mounting capscrews, remove gear. When replacing gear, make certain that marks on camshaft and crankshaft gears are lined up and see that lockplate tangs are bent up against flats on mounting screws. NOTE—Camshaft gear mounting screw holes offset so gear can only be installed in correct position. Use 6312-B Pulley Replacer to install crankshaft pulley.

LATE 1949-51 6 CYL. "H" ENGINES

TIMING GEARS: Pressed on type camshaft gear used (fibre or aluminum) which can be replaced without removing camshaft from engine.

►*TIMING GEAR REPLACEMENT NOTE*—Later "Press-on" type timing gear can be used to replace earlier "Bolted-on" type by removing separate timing gear hub, then installing gear as indicated below.

Camshaft Gear Removal & Installation: *(NOTE—Three different camshafts used, and it is necessary that correct timing gear be used. See "Camshaft & Tappet Clearance Changes" above.* To remove timing gear, remove radiator, vibration dampener, and engine front cover. If gear has tapped holes in gear hub, use puller which fits the two 7/16-14 tapped holes in gear hub and pull gear off. If there are no tapped holes in hub, drill hub with Special Tool No. 6256-AA to relieve the press fit, then remove gear with puller No. 6256-AB. To install gear position thrust plate on camshaft with oil groove toward journal. Align gear with keyway in shaft, and marks on gear with marks on crankshaft gear. Press gear on camshaft with tool No. 6256-BB. Check backlash which should be .001-.002".

VALVE SYSTEM

1946-48 V8 MODELS

VALVE ASSEMBLY INTERCHANGEABILITY: 8BA type (1949-50) valve assembly (valve & guide) can be used in 1946-48 engines providing 8BA-6510-B Guide, 8BA-6514 Retainer and 7HA-6518 Valve Lock are also used. 8BA-6510 Valve Lifter must also be used with the later type assembly. Earlier type lifter will collapse if used with later type valve assembly.

OVERHEAD VALVE ENGINES

►*ALL 6 CYL. & V8 OVERHEAD VALVE ENGINE EXHAUST VALVE STEM GUIDE CLEARANCE CHANGE:* Stem diameter of Production & Service Exhaust Valves decreased .0005" for greater stem clearance. NEW stem diameters are:

Size	Stem Diameter
Std. (Marked Red)	.3400-.3405"
Std. (Marked Green)	.3405-.3410"
.003" Oversize	.3430-.3440"
.015" Oversize	.3550-.3560"
.030" Oversize	.3700-.3710"

1948-50 MODELS

ROTATABLE VALVES: Rotatable valves and parts can be installed in 1948-50 "R" Engines, 1949-50 Pass. Car Engines and 1948-50 "H" Engines by changing *the retainer valve spring, exhaust and intake valves.*

1950-53 6 CYL. "M" ENGINE

FREE TYPE VALVES: 6 Cyl. "M" Series Truck Engine **Exhaust Valves**—Consists of Valve Cap, Spring Retainer, Valve Lock and Valve. Free Type exhaust valve assemblies can be installed on 1948-51 6 Cyl. "H" engines by replacing the above parts.

VALVE TAPPET ADJUSTMENT

1946-53 V8 ENGINES

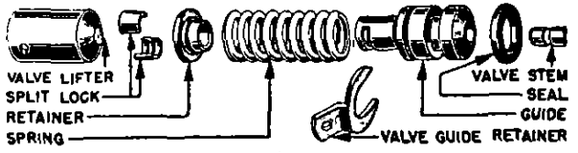
1946-47 6 CYL. "G" ENGINES

Valve Grinding and Tappet Clearance Note (for all V8 Models):—To perform these operations with minimum amount of hand cranking, note which valves are fully open (first column in table below), grind or check valves listed on same line of table—then turn shaft 'til next 'valve open' point reached.

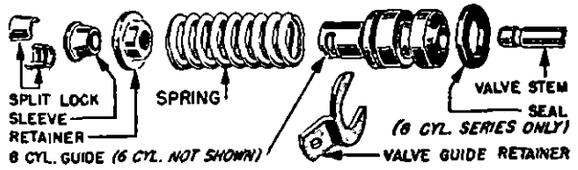
Valves Open	Valves to Grind
1. 4X & 1N	3X, 8N, 6N, 7X, 3N, 2X
2. 3X & 8N	1X, 7N, 5X, 2N, 4X, 1N
3. 1X & 7N	8X, 5N, 6X, 4N
OR	
1. 8X & 5N	1X, 7N, 6N, 7X, 3N, 2X
2. 6N & 7X	5X, 2N, 4X, 1N, 8X, 5N
3. 5X & 2N	6X, 4N, 3X, 8N

NOTE—'X' Exhaust Valve. 'N' Intake Valve.

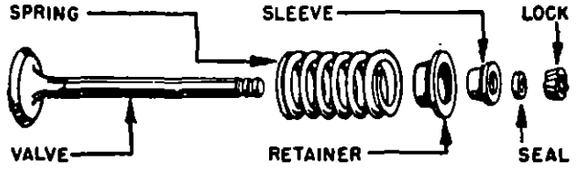
Tappet Clearance Checking (V-8 Engines & 6 Cyl. "G" Engines): Check tappet clearance when re-installing valves. Turn camshaft until lifter is on heel of cam, make certain that valve assembly is seated in engine block ("C" washer engaging valve guide), then check the tappet clearance between end of valve stem and top of lifter with a feeler gauge. If clearance less than minimum (see Car or Truck Model pages), install a shorter valve or grind off end of valve stem. If clearance greater than maximum, install longer valve, or reface valve seat to lower the valve in block.



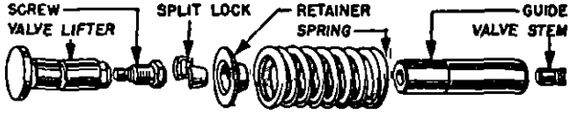
CONVENTIONAL TYPE V8 VALVE ASSEMBLY



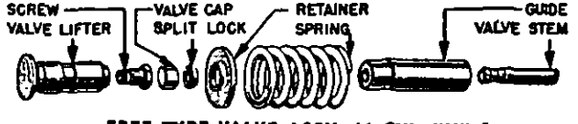
1946-53 V8 ROTATABLE VALVE ASSY.



TYPICAL 1952-55 ROTATABLE VALVE ASSY.
6 CYL. & V8 OVERHEAD VALVE ENGINES



CONVENTIONAL TYPE 6 CYL. "H" & "M" VALVE ASSEMBLY



FREE TYPE VALVE ASSY. (6 CYL. "H" & "M" ENGINE TYPE SHOWN)

1952-53 6 CYL. "215" ENGINES

Preliminary Valve Adjustment: Rotate crankshaft until No. 1 piston is at TDC on compression stroke. Adjust #1 Int. & Exh. valves to correct clearance. Make two chalk marks on damper 120° each way from timing mark (120° is equal to 1/3 turn of crankshaft). Turn crankshaft 1/3 turn in direction of rotation and adjust valve lash for No. 5 cylinder valves. Repeat this operation for No. 3, 6, 2, and 4 in that order (rotate crankshaft 1/3 turn for each set of valves).

Final Valve Adjustment: Run engine until it reaches normal operating temperature, then reset all valves to following tappet clearance:

Pass. Cars, All Valves	.015"
Truck Engine, Intake Valves	.013-.015"
Exhaust Valves	.015-.017"

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1949-51 SIX CYL. "H" ENGINE

VALVE TAPPET NOISE: Valve Tappet Clearance Springs, Ford Part No. 8HA-6550 can be used when valve tappets are noisy after they have been adjusted correctly. To install springs turn engine over to close valve and insert small end (bottom) of spring between tappet and tappet adjusting screw.

1946-47 6 CYL. "G" ENGINES
1946-53 V8 ENGINES

VALVE ASSEMBLY SERVICING: The complete valve assembly (valve, spring, and guide) should be removed and installed as a unit. Service these assemblies as follows:

Valve Assembly Removal: Compress valve spring down against valve locks and remove valve guide retainer. Pry up on tappet end of valve spring to remove assembly.

Valve Assembly Installation: Slide valve and spring assembly into valve chamber. Compress the valve spring and insert guide retainer in the groove provided in valve guide. Be sure retainer seats properly when spring is released.

►***INTAKE VALVE GUIDE RUBBER SEAL CAUTION—Be sure rubber seal around guide starts evenly in valve guide opening.***

6 CYL. "M" & "H" ENGINE

VALVE ASSEMBLY SERVICING: Valve assemblies are not removed and installed as a unit. Service as follows:

Removal—Compress valve springs using Tool J-6513-R and remove valve spring retainer locks. Remove valve spring using Tool 6513-S. *NOTE*—For "Free Type" exhaust valves use Tool 6518 to remove special thin valve locks.

Installation (Conventional Valves)—Install spring retainer and valve spring (with tightly wound coils in the up position against the block) using Tool 6513-S. Compress the spring using Tool 6513-R and install the valve spring locks.

Clearance (Free Type Valves)—.0002" to .004" between end of valve stem and inside of cap. This clearance can be measured after assembly in the engine by rotating crankshaft until valve is off the seat and free to rotate by hand. Locate a dial indicator on the head and note the reading when valve is moved vertically. If vertical movement exceeds .004", polish open end of cap on fine emery cloth until clearance is within limits. If clearance is less than .0002", grind off end of valve for proper clearance.

1952-55 6 CYL. & V8 MODELS
OVERHEAD VALVE ENGINES

VALVE SERVICING: Valves are "Rotatable" type operating directly in valve guide holes in cylinder head and are removed and installed as follows:

Valve Removal—Use Tool 6513-EE to compress valve springs, remove valve spring locks, retainer sleeve, retainer, spring, and "umbrella" type oil seal. Discard oil seal.

Valve Assembly Installation—Install valve in port from which it was removed. Install valve stem oil seal with cupped side toward valve guide boss. Install valve spring, spring retainer, retainer sleeve, and valve locks.

VALVE SEAT INSERTS
1946-53 V8 & 6 CYL. L-HEAD ENGINES

VALVE SEAT REMOVAL & INSTALLATION: (Removal)—Drill two small holes into insert approximately 180° apart. *(CAUTION*—Do not drill all the way through insert). Crack insert at drilled holes and pry the pieces out.

Installation—Counterbore recess to 1.6505"-1.6515" for oversize insert. Cut slightly below the old counterbore depth (.001-.002") to clean up this face. Remove all chips from recess. Chill the oversize insert and the installation tool in dry ice for ½ hour. Position insert on tool with the small radius on the outer edge facing outward. Pilot the driving tool in the valve guide, then drive insert into counterbore until it is fully seated. *DO NOT PEEN THE AREA AROUND INSERT.* Reface the new valve seat insert. *CAUTION—Installation of insert must be performed immediately after removal from dry ice.*

1954-55 V8 MODELS (256" ENGINE)

"256" ENGINE VALVE SEAT INSERT: Removal—Invert head and insert drift through valve port, drive seat out.

Installation: Counterbore insert recess to engine specifications. Cut slightly (.001-.002") below old counterbore depth to clean up this face Clean out chips and all oil from recess. Chill oversize insert and installation tool in dry ice for ½ hour. Position insert on tool with small radius on outer edge facing outward. Pilot the driving tool in valve guide, then drive the insert into counterbore until it is fully seated. Do not peen area around insert. Reface new valve seat insert. CAUTION-Installation of insert must be performed immediately on removal of tool and insert from dry ice.

VALVE GUIDES
1952-55 6 CYL. & V8 MODELS
OVERHEAD VALVE ENGINES

VALVE GUIDES (Oversize Valve Stem Installation): Use Tool T52L-6085-AEE Piloted Reamer to ream cylinder head valve guides for oversize stems. Reamers are furnished in .003", .015", .030' oversizes Pilots are furnished Standard, .003", .015".Use reamers with correct pilots in sequence when reaming from standard to oversize holes. Regrind valve seats AFTER reaming guides.

ROCKER ARMS
1952-55 6 CYL. & V8 MODELS
OVERHEAD VALVE ENGINES

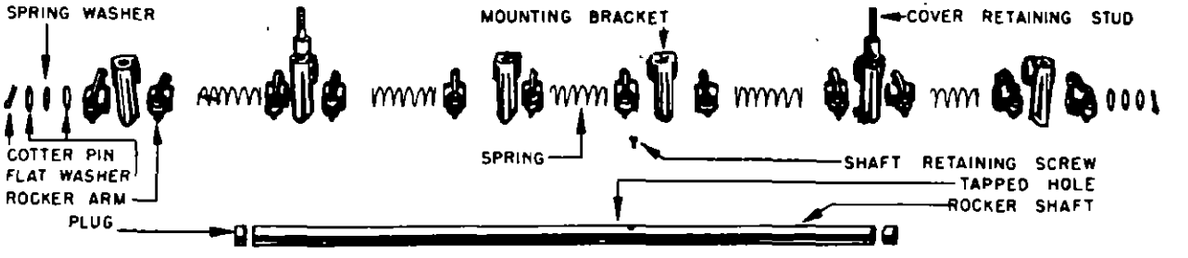
ROCKER ARMS: Disassembly—On 6 Cylinder Engines, remove capscrew and clip from No. 6 rocker arm support bracket. Pull oil feed line out of bracket (be careful not to damage line). Loosen all rocker arm adjusting screws to remove valve spring load from rocker arms, then remove rocker arm assembly. **On 8 Cylinder Engines,** release spring tension on rocker arms by loosening adjusting screws, then remove rocker arm assembly. **On all engines,** remove cotter pins at each end of rocker arm shaft, then remove flat washers, spring washers, and plugs. Slide rocker arms, springs, and brackets off shaft. Be sure to identify parts so they can be installed in their original positions.

Reassembly: Oil moving parts with engine oil. Install a plug at each end of shaft. **Do not peen plugs to make them tight.** Assemble rocker arm shaft parts in order shown in illustration. Install oil outlet tube in end rocker arm support and make certain end of tube enters hole in shaft. Tighten rocker arm shaft support-to-cylinder head bolts and tighten to 45-55 ft. lbs. torque. Install rocker arm covers and tighten hold down bolts finger tight after making a preliminary valve adjustment. Make final adjustment after engine warmed up to normal operating temperature. Install new gasket (cement to cover only), install cover and tighten hold down bolts to 8-10 ft. lbs. torque.

►*CAUTION:* Be sure rocker shaft support brackets are not upside down when assembly installed. There is .020" difference in bracket height when reversed, and tightening of screws with brackets reversed can result in a broken rocker shaft.

►*1954-55 ROCKER ARM COVER & GASKET PRODUCTION CHANGE & INSTALLATION CAUTION:* New rocker arm cover (B5A-6582-A) and cover gasket (B5A-6584-A) are now available for service. New gasket has greater resistance to shrinkage than those previously used. New cover does not have inner retaining flange for gasket New type rocker arm cover to be used on 1954 "239" and "256" Engines. Gasket can be used on 1954-55 "239" and "256" Engines. To install new gaskets (.040" thicker than old type) on 1954 "239" and "256" Engines with old type gasket, replace studs with new longer studs (ED-354052-S) to compensate for increased gasket thickness. If new studs not available, old studs (354052-S) should be backed out approximately two turns to allow for thread engagement of nuts. New type nuts (354526 °8) which are threaded completely through should be u: d to prevent bottoming of stud in nut and provide adequate pressure on gasket. Cement gasket to cover. Apply Sealing Compound (8A-19554-B) to gasket, and allow compound to become tacky before positioning gasket to cover.

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1952-55 6 CYL. OVERHEAD VALVE ROCKER ARM ASSEMBLY

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OILING SYSTEM

1952-53 6 CYL. 215" ENGINE

►*OIL LEAKAGE AT CAMSHAFT BEARING BORE HOLES IN CYLINDER BLOCK:* These holes located on outside right face of cylinder block and are sealed at inner end by camshaft bearings when installed. IF OIL LEAKAGE NOTED AT THESE HOLES, install tapered drive plugs (No. EAF-66025-A) in these holes. Coat outer surface of plug with Permatex No. 2, drive plugs in until outer end approximately ⅛" below outer surface of block.

OIL PUMP

1946-48 V8 MODELS

OIL PUMP: Removal & Disassembly—To remove pump from engine, remove locking wire and take out mounting screw in pump mounting flange, pull pump down and out (NOTE—Pump body fits in recess in cylinder block and it may be necessary to jar it slightly to loosen it). To dismantle pump, remove strainer screen retainer spring, remove screen, take out screen cover mounting screws, remove screen cover and gasket. Take out four capscrews in pump cover, remove cover, lift out pump driven gear. If pump shaft and driving gear are to be removed, drive out pin in drive gear, place pump in arbor press with support under drive gear, press shaft and driving gear out through lower end of pump housing.

Oil Pump Relief Valve (Pressure Regulator) Note—On pumps with relief valve located on side of pump housing, remove locking wire, take out relief valve nut, spring, and valve plunger.

Servicing—Clean out all oil passages in pump housing with compressed air. Replace all worn parts when clearances exceed following limits:

Pump Shaft & Bushings—Shaft clearance in bushings should be .001-.003" and bushings should be replaced if clearance exceeds .005". Replace shaft if pump gear worn or if bearing surface worn to diameter of less than .497". Replace bushings if worn to inside diameter greater than .502". Remove old bushings with driver, press new bushings in place, line ream bushings to inside diameter of .500".

Pump Driven Gear & Shaft—Clearance between driven gear and stub shaft in pump housing should be .002-.0035". Replace shaft if clearance exceeds .005". To replace shaft, drive old shaft out of housing, press new shaft in place making certain that end of shaft will clear pump cover when it is installed.

Oil Pressure Regulator (Relief Valve)—Check relief valve spring tension and replace spring if tension is less than 78 ozs. or more than 87 ozs. when compressed to length of 1.380".

Pump Assembly—Insert pump shaft in housing, press drive gear on shaft until clearance between gear hub and end of housing (endplay) is .017", drill new 5/32" hole hrough shaft in line with hole in gear, install 5/32" pin and peen both ends of the pin to prevent loosening in service. Complete assembly by reversing disassembly directions above.

CAUTION—Make certain that relief valve nut and pump mounting screw are locked with wire and that lockwashers used under screw heads on pump cover and oil screen cover.

1946-48 V8 MODELS

OIL PUMP DRIVE (Camshaft Gear): Pump drive gear is pressed on rear end of camshaft. Remove old gear with gear puller, No. 6254-A, drive new gear on shaft with a fibre block (support shaft in vise with brass jaws). NOTE—Late design camshafts have flat on oil pump drive gear hub and gears have a similar flat to prevent the gear turning in service. These gears and camshaft must be used together and flats must be lined up when installing gear. Drive gear on shaft until it is firmly seated against the shoulder on the shaft.

Oil Pump Idler Gear: This gear located in rear end of cylinder block between camshaft gear and oil pump drive gear on pump shaft.

Removal & Disassembly—Take out capscrews in cover on rear face of cylinder block, lift off cover and gear assembly, and gasket.

Servicing—Replace all worn parts when clearances exceed following limits:

Idler Gear & Bushing—Clearance on shaft should be .001-.003". Replace bushing if worn to inside diameter greater than .752" or if clearance exceeds .005". To replace bushing, drive old bushing out, press new bushing in gear, ream bushing to provide shaft clearance of .001-.003".

Idler Gear Shaft—Replace shaft if scored or worn to diameter less than .747". To replace shaft, press old shaft out, press new shaft in cover until end of shaft is flush with face of cover.

1946-48 V8 MODELS

OIL PRESSURE REGULATOR (Relief Valve): Relief valve located on side of pump housing. Check relief valve spring tension and replace springs which are not within limit of 78 ozs. to 87 ozs. when compressed to length of 1.380".

1946-48 V8 MODELS

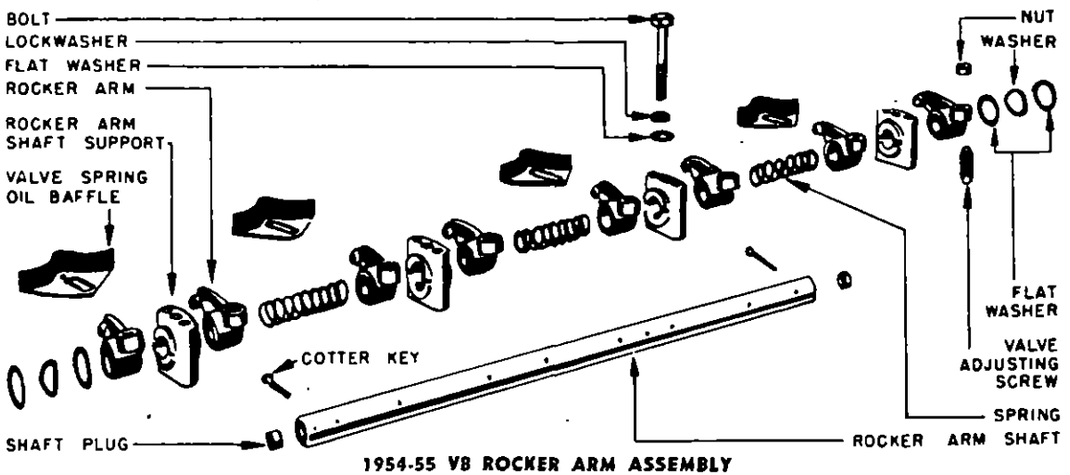
LOW OIL PRESSURE NOTE: Low oil pressure may be caused by fuel pump push rod bushing being worn through, permitting oil to escape from main oil channel. Replace bushing by driving old bushing out of cylinder block and driving new bushing in until top of bushing is flush with face of casting. New bushings need not be reamed.

1949-53 V8 MODELS

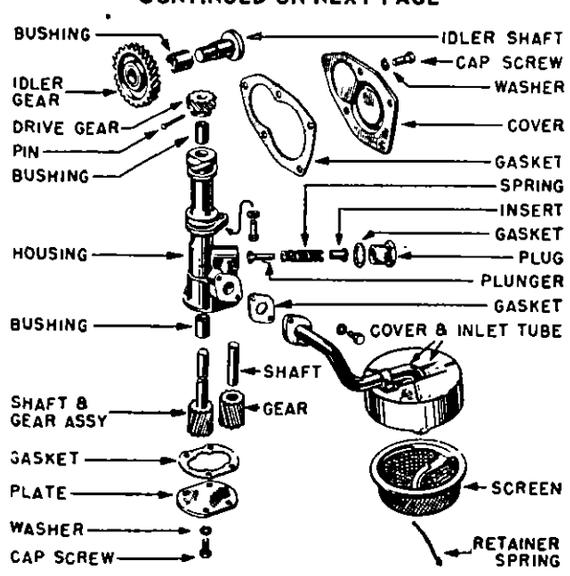
OIL PUMP: Gear type pump mounted on cylinder block inside oil pan at rear of engine. Pressure relief valve mounted in pump housing. NOTE—Early 1949 pumps have spur gear, and later type pumps have helical gears.

Removal: Drain oil, remove oil pan. Remove oil pump retaining screw and remove pump and strainer assembly.

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1954-55 V8 ROCKER ARM ASSEMBLY



1946-53 V8 OIL PUMP

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Disassembly: Remove strainer assembly retaining screw, strainer and gasket. Remove cover plate and pump driven gear. Remove lock wire and pressure relief valve (plug, gasket, spring, and valve). Drive out pin and remove upper driven gear. Slide shaft and drive gear assembly out of housing. Wash all parts in solvent and dry thoroughly, making sure that no dirt or metal particles remain in housing.

Inspection: Check pump housing for cracks or excessive wear. Pump shaft should have a free running fit without excessive endplay in bushings (.0005" to .0025" clearance). Check pump gear teeth for scratches and wear. Measure clearance between pump gears and pump body, which should be no greater than .005". Check compression relief valve spring which should be 12 lbs. ± 2 ozs., when compressed to 1.14". Clearance between oil pump driven gear and shaft should be .005" maximum.

Reassembly: Apply a thin coating of engine oil to all moving parts. Slide shaft and drive gear assembly into housing. Install upper drive gear, insert retaining pin, and rivet end of pin. ***(NOTE—When installing a new shaft and drive gear assembly, it will be necessary to drill a retaining pin hole in the shaft. Set the end clearance to .016" and use a No. 30 (.1285") drill for the retaining pin hole).*** Install pump driven gear, cover plate gasket and cover plate. Tighten cover plate screws to 7-10 ft. lbs. torque. Install pressure relief valve, spring, gasket, and plug. Insert a piece of lockwire through hole in plug and twist wire around extension housing. Install strainer and gasket and tighten screws securely.

Installation: Slide pump into cylinder block, making sure upper driven gear meshes properly, and install pump retaining screw with a lock washer. Tighten screw to 12-15 ft. lbs. Install oil pan and fill crankcase with engine oil.

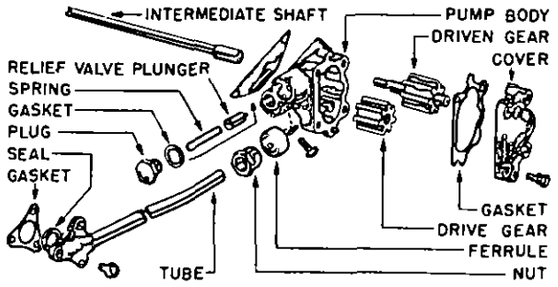
1954-55 V8 MODELS

OIL PUMP: Gear type pump mounted on left hand side of crankcase and driven by intermediate shaft from distributor shaft. Pressure relief valve in oil pump housing

Removal: Remove oil pump inlet pipe (NOTE—Early type inlet pipes were connected to oil pan with a flange connector. Later type pipes are one-piece, and are part of oil pump screen cover assembly and should be disconnected at oil pump). Remove capscrews and lockwashers securing pump to engine block. Remove pump and gasket, and the intermediate shaft (if shaft comes out with pump).

Disassembly: Remove capscrews retaining pump cover to body and remove cover plate and gasket. Do not tap pump drive shaft to drive cover off pump. Remove oil pump gear and shaft assembly and oil pump idler gear. Remove oil pressure relief valve plug, gasket, spring and plunger.

Inspection: Check oil pump housing for cracks or excessive wear. Pump shaft should have free running fit without excessive play in pump housing (clearance is .0001-.0024"). Check pump gear teeth for scratches and wear. Check compression of relief valve spring which should be 10.82-10.90 lbs. at 1.40". Replace any worn or defective parts.



1954-55 V8 OIL PUMP

Reassembly: Oil all parts thoroughly. Install oil pressure relief valve plunger, spring, cover plug, and gasket. Install idler gear and oil pump gear and shaft assembly. Install cover plate with new gasket, and tighten cover plate screws to 12-15 ft. lbs. torque. Check pump shaft endplay with a dial indicator which should be .0015-.0055".

Installation: Reverse removal procedure using a new gasket between pump mounting flange and engine.

1946-47 6 CYL. "G" ENGINES

OIL PUMP: Removal & Disassembly. To remove pump from engine, take off Oil Pump Screen Cover assembly by removing lock wire and capscrew at rear intermediate main bearing cap and lock wire and three capscrews in cover on front main bearing cap. Remove front main bearing cap with oil pump body. To disassemble pump, lift out driven (idler) gear from stub shaft in body, press drive gear and shaft out of driving gear and body, using an arbor press.

Servicing—Clean out all oil passages in pump body with compressed air. Replace all worn parts when clearances exceed following limits:

Pump Shaft and Bushings—Replace shaft if fibre drive gear worn or if bearing surface worn to diameter of less than .560". Replace bushing in pump body if worn to inside diameter greater than .566". Remove old bushing with driver, press new bushing in place until inner edge flush with pump body, line ream bushings to inside diameter of .5625".

Pump Driven (Idler) Gear & Shaft—Clearance between driven (idler) gear and stub shaft in pump body should be .002-.0035". Replace shaft if clearance exceeds .005". To replace shaft, press old shaft out of body, press new shaft in place until outer end flush with body (inner end of shaft must clear cover when it is installed).

Pump Assembly—Insert pump shaft in body, press driving gear on shaft. Install driven (idler) gear on stub shaft in pump body.

1947-51 6 CYL. "H" ENGINE

1950-53 6 CYL. "M" ENGINE

6 CYLINDER ROTOR TYPE OIL PUMP: Removal from Passenger Car. Remove the distributor cap turn engine over until #1 cylinder at firing position (rotor will point to oil hole in distributor), allow crankshaft to remain in this position while pump off engine. Remove front engine mounts-to-frame bolts. Loosen rear engine mounting. **Raise front of engine 2" and move ½" to left.** Remove distributor. Take out 3 pump mounting capscrews in pump cover, pull pump out.

Pump Disassembly—Remove cover and outer rotor (rotate drive gear to free rotor from pump body). Drive out pin in drive gear and press gear off shaft. Remove shaft and inner rotor. Clean all parts and check to specifications listed below.

Pump Specifications and Clearances—As follows:

Outer Rotor. Outside Diameter 2.249" (wear limit 2.245"). Clearance in Body .005-.010" (wear limit .012").

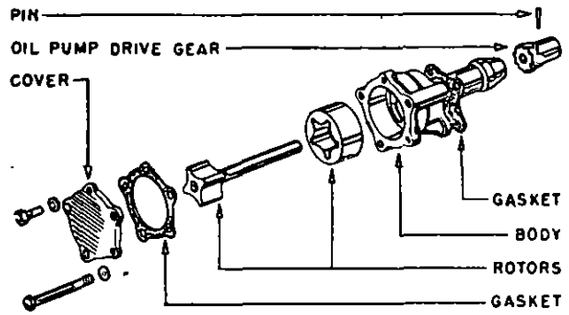
Pump Body. Inside Diameter 2.258" (wear limit 2.260").

Inner Rotor. Clearance in Outer Rotor .008" (wear limit .010").

Shaft. Outside Diameter .5175" (wear limit .5170"). Shaft Endplay .004-.008" (wear limit .010").

Pump Assembly—If new shaft installed, assemble shaft with inner rotor in pump. Press drive gear on end of shaft to obtain .004" clearance between gear and upper end of pump body. Drill pin hole in shaft. Install pin and peen both ends. Place outer rotor in body, install cover being sure to use new cover gasket.

Pump Installation—Reverse removal instructions listed above making certain distributor correctly positioned for proper ignition timing.



6 CYL. L-HEAD ENGINE OIL PUMP

1949-50 SIX CYL. "H" ENGINE

(before Pass. Car 8HA-107555, Truck 7H-219349)

OIL PUMP DRIVEN GEAR: After above nos. cast-iron gear (7HA-6652) used together with new flame-hardened camshaft (7HA-6250-C—this no. cast between second and fourth cam lobes from rear end of camshaft).

Replacement of Oil Pump Driven Gear on Engines before Pass. Car No. 8HA-107555 and Truck No. 7H-219349. Bronze gear used on these engines. If pump replaced or if gear failure encountered, manufacturer recommends installation of cast-iron gear no. 7HA-6652. If this cast-iron gear fails prematurely, new flame-hardened camshaft no. 7HA-6250-C and new cast-iron gear should be installed. ***CAUTION***—If oil pump being replaced, 8HA-6600 pump will require re-working by installation of cast-iron driven gear 7HA-6652.

Gear Installation Note. Must be .004-.008" shaft endplay. See Oil Pump Installation above.

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1952-55 6 CYL. MODELS
OVERHEAD VALVE ENGINES

►*OIL PUMP PRODUCTION CHANGE & PARTS INSTALLATION CAUTION (223 Eng.):* New oil pump assembly, oil pump body, intermediate shaft and body plate released for service. Intermediate shaft has been case hardened, body plate is now phosphate-coated, gear side and endplay have been increased to prevent binding. New oil pump assembly identified by a daub of green paint on pump body, body plate identified by the color black in addition to daub of green paint, intermediate shaft identified by daub of green paint (shaft should be tested to see that it is file-hard before installation). *Parts not interchangeable with those of previous type pump.*

Part	New Part No.	Old Part No.
Oil Pump Assembly	B5A-6621-B	B5A-6621-A
Intermediate Shaft	B5A-6609-B	B5A-6609-A
Oil Pump Body	B5A-6603-A	B4A-6603-A
Oil Pump Body Plate	B5A-6616-A	E4A-6616-A

OIL PUMP: Gear type oil pump mounted in crankcase in line with distributor. Pump driven by means of a hex drive shaft. Shaft is pinned in end of distributor drive shaft by a roll pin, and other end seats in end of oil pump drive shaft. Pressure relief valve is incorporated in oil pump housing.

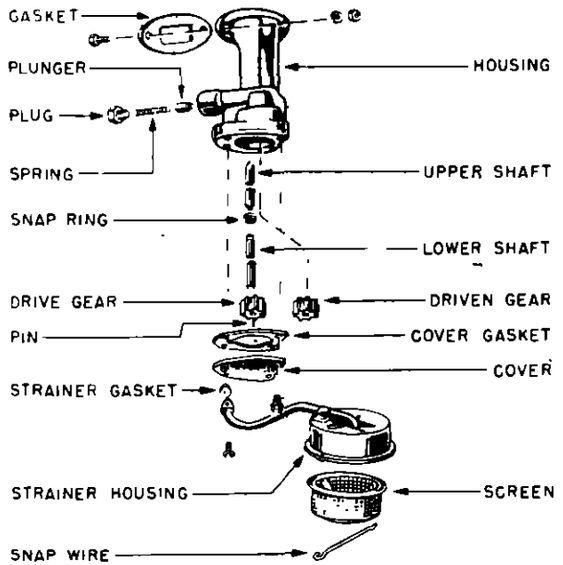
Removal: Drain oil and remove oil pan. Remove two nuts and lockwashers retaining pump to cylinder block. Remove pump and gasket.

Disassembly: Remove screen assembly retaining screws, screen assembly, and gaskets. Remove cover retaining screws, cover, and gasket. Push pump drive shaft and drive gear assembly from pump housing. Remove driven gear. Remove oil pressure relief valve plug, spring, and and plunger. Remove snap wire retaining pump screen, and remove screen from housing.

Inspection: Wash all parts in a solvent and dry them thoroughly. Use a brush to clean inside of pump housing and pressure relief valve bore. Be sure all dirt and chips are removed. Remove all old gasket material from pump body and cover. Check pump housing for damage or excessive wear. Check pump gear teeth for damage or wear. Check compression of relief valve spring (9.76-9.84 lbs. at 1.56"). Check relief valve clearance in relief valve bore. Check driven shaft clearance (.001-.002" maximum). Pump shaft should be free running fit without excessive play in pump housing. (.0015-.0029"). Replace any worn or defective parts.

Reassembly: Place snap ring on groove on upper end of lower drive shaft. Slide drive gear and shaft assembly into housing. Position gasket on housing, then lay a piece of Plastigage over face of gear and install cover. Remove cover and note reading on Plastigage. Gear endplay may be .0015-.0055" (Clearance of .0015-.003" preferred). An alternate method of checking gear endplay is as follows: Position gasket on housing, and lay a straightedge across gasket directly over gear. Check gear endplay by placing tip of dial indicator on gear and moving gear back and forth, between housing and straightedge. Subtract .005" from reading to allow for compression of gasket. Install pump drive gear, cover plate gasket, cover plate, and retaining screws. Tighten screws to 12-15 ft. lbs. Install pressure relief valve plunger, spring, and plug. Tighten plug to 33-38 ft. lbs. Install screen in screen cover and secure it with snap wire. Install gasket, screen and cover assembly, and retaining screws. Tighten screws to 10-12 ft. lbs. Rotate pump shaft by hand to make sure it turns freely.

Installation: Place new gasket on retaining bolts, slide pump mounting flange over retaining bolts, install lockwashers and nuts. Install oil pan, fill crankcase. Run engine, check pressure.



6 CYL. OVERHEAD VALVE ENGINE OIL PUMP

OIL FILTER
ALL OVERHEAD VALVE ENGINES

►*OIL FILTER LEAKAGE CORRECTION:* If leakage noted around filter sealing surfaces, first check center bolt tightness with a torque wrench and tighten this bolt to 20-25 ft. lbs. *(CAUTION*—DO NOT overtighten this bolt—will distort cover and cause leakage). If leakage continues, disassemble filter (see servicing data below), check cover for evidence of crushing or distortion and warping of center bolt-to-cover gasket surface, inspect flanged sealing surface on open end of cover for warping or distortion and mounting gasket surface on block for dirt or chips, clean all parts and reassemble filter.

OIL FILTER: Filter is full-flow type and should be replaced at 4000 mile intervals (or more often if required by operating conditions).

►*REPLACEMENT CAUTION: Use Replacement Kit, Part No. B2A-6731-A, which includes correct filter element and NEW GASKETS WHICH MUST BE USED. CAUTION—Use of by-pass filter element would restrict oil flow and might cause failure of engine.*

Filter Installation: Wash all parts in a solvent and dry them thoroughly. Make sure all openings in center bolt are clean. Install new fibre gasket on center bolt, then place bolt through filter housing. Install spring and spring assembly on bolt, making sure seat tangs are engaged in spring. Install a new neoprene gasket and new filter element over center bolt. *(NOTE*—Be sure two elongated holes in oil filter diaphragm are at top when positioned on block). Install new neoprene gasket in filter housing recess. Place filter assembly in position, and thread center bolt into adapter, finger tight. Rotate filter assembly slightly, in each direction, to make sure gasket is seated evenly. Tighten center bolt ¾-1 complete turn (20-25 ft. lbs.). With engine at normal operating temperature and operating at fast idle, check for oil leaks past housing gasket or around center bolt gasket. If oil leaks past housing gasket, check housing for proper seating. If oil leaks past center bolt gasket; check center bolt for proper torque or replace gasket. *NOTE*—Pressed paper type element does not use neoprene gasket.

FUEL SYSTEM

1952-53 6 CYL. 215" ENGINE

CAMSHAFT ECCENTRIC WEAR CHECK (6 CYL. "215" ENGINE): If fuel pump pressure below specifications with NEW pump, check for eccentric wear as follows: Remove pump, measure down 27/64" from center-line of two mounting bolt holes on pump mounting pad, scribe a line across the mounting pad at this point. Turn crankshaft until highest lift point of fuel pump eccentric on camshaft is directly opposite scribed line on pump pad. Use depth micrometer to measure from highest lift point on eccentric to face of machined surface of mounting pad. If this distance greater than 1.197", eccentric is worn and camshaft should be replaced.

1949-52 V8 ENGINES

FUEL PUMP PUSHROD WEAR (V8 "239" ENG.): On engines with combination fuel-and-vacuum pumps, if loss of power or engine cutting out at high speeds or during heavy operation complaints are encountered, check fuel pump pushrod for wear (resulting in lessened fuel pump stroke) and install LATEST type pushrod as follows:

Checking Pushrod Wear: First check fuel and vacuum pressures at inlet and outlet sides of fuel pump to make certain trouble not caused by clogged fuel lines, ignition trouble, etc. If pressure and vacuum are low, remove pump and pump mounting adapter and check pushrod stroke as follows: Remove pushrod and measure overall length, replace rod if length not 10 3/64-10 5/64" or if foot end of rod is scored or galled (check camshaft eccentric for scores or ridges if this condition noted). Install special master testing rod (see Note below), mount dial indicator on adapter mounting boss with indicating button contacting end of pushrod (CAUTION —Indicator must have range of .300"). Turn engine over until pushrod on highest point of eccentric. Set dial indicator at ZERO. Turn engine over until pushrod on lowest point of eccentric. Dial indicator reading should be within .185-.200". If reading less than .185", camshaft should be replaced.

Master Testing Pushrod Note—Use a pushrod which measures between 10 3/64" and 10 5/64" in length and modify lower end of the rod by reducing diameter to 7/32" for a length of ⅜".

►**ENGINE PRODUCTION CHANGE: New "H" Series Engine starting September 1947. New ignition system, valve system, oil pump, and cooling system.**

►***"H" SERIES ENGINE INFORMATION—For Tune-Up, Ignition, Ignition Timing, and Engine data, see 1949 FORD SIX car pages.***

OIL PAN REMOVAL: ***See Ford Shop Notes for Engine Removal Instructions (recommended for oil pan removal).***

M DEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing (visible through opening in floor) and on left frame side member near front engine support.

TUNE-UP

COMPRESSION: Pressure—105-125 lbs. at cranking speed of 100 RPM. (Std. 6.7-1 Cast Iron Head).

VACUUM READING: Approx. 18-20" at idling speed.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Champion H-10 (Pass. Cars), H-9 Comm'l (Trucks). 14 mm. Metric type.
Gaps—.025"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.014-.016". **Cam Angle 40° closed.**
Breaker Arm Spring Tension—20-24 ozs.
Automatic Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.
Std. Setting—1° BTDC.
Timing Marks—None. See Ignition Timing for directions on setting of distributor for correct timing when installed on engine.
Vacuum Brake Setting—Set to just eliminate pinging when engine operated under load (back off adjusting screw until engine pings, then turn screw in just enough to eliminate ping).

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Adjust idle screw for smooth idling and highest steady reading of vacuum gauge (when used). Idle speed 500 Engine RPM. (can be judged by marking fan belt and setting engine for 25 revolutions of the belt in 10 seconds).
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (Gauge 9550-A). Fuel level 11/16" plus or minus 1/32" below top edge of bowl.
Accelerating Pump—Center (#2) hole Normal. Inner (#1) hole—Summer, Outer (#3) hole—Winter for temperature extremes.

Fuel Pump Pressure: 3½ lbs. (2-3¼ lbs.).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely.

VALVES: See Valve Timing.
Tappet Clearance—.013-.015" Intake & Exhaust, Cold. No adjustment provided.

STARTING: See Battery, Starter, Generator, and Regulator.

I NITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock Assembly No. 302848, Ford No. 51A-3676-A (Deluxe Models), Oakes No. 302850, Ford No. 51A-3676-B (Super Deluxe Models). Ignition Switch Assembly Oakes No. 302494, Ford No. 11A-3680 (All).
Ignition Lock—Hurd or Briggs & Stratton No. 80935, Ford No. 91A-3686A (with key).
Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 1GA-12024. Mounted on engine.
Resistor Unit—Connected in coil primary circuit (part of Lighting Circuit Breaker Assembly).
Ignition Current—4½-6 amperes with engine stopped (primary resistance 1-1⅓ ohms).

CONDENSER: Ford Part No. 1GA-12300-B.
Capacity—.29-.32 microfarad.

DISTRIBUTOR: Ford No. 5GA-12127 (less Terminal Housing & Rotor). New "Sealed-dry" type. Single breaker, 6 lobe cam, full automatic advance type with Vacuum Brake adjustment.
Breaker Gap—.014-.016"
Cam Angle or Dwell—40° closed, 20° open (distr.).
Breaker Arm Spring Tension—20-24 ozs.
Rotation—Clockwise viewing driving end of unit.

Distributor Degrees	Automatic Advance R.P.M.	Engine Degrees	Engine R.P.M.
Start	200	0	400
9	600	18	1200

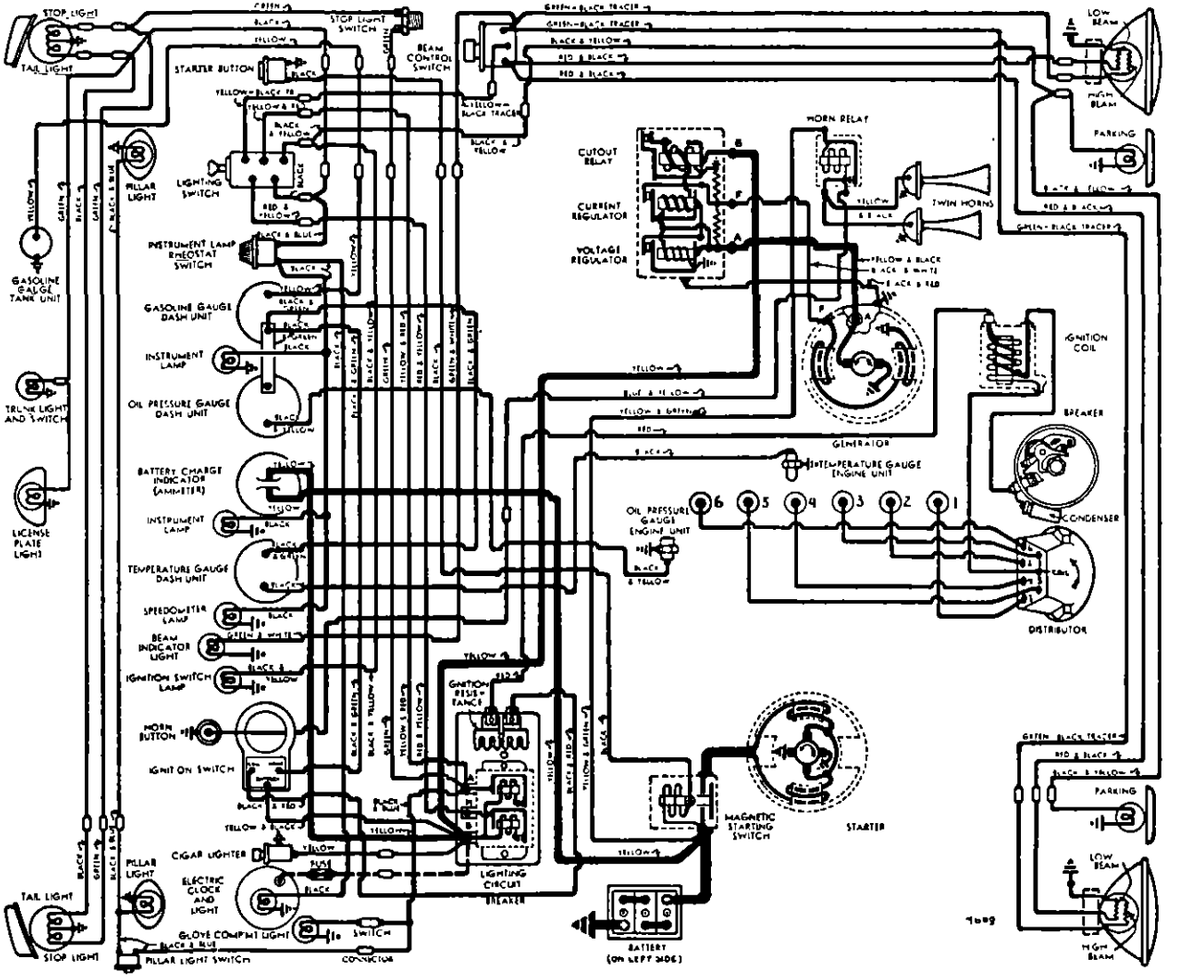
Vacuum Brake: Consists of a spring-loaded vacuum controlled brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.

Distributor Removal: Disconnect coil lead, unsnap two clips holding distributor cap in place, take out mounting capscrews. NOTE—Vacuum connection (for Vacuum Brake operation) is through hole in face of mounting flange.

IGNITION TIMING

Std. Setting	Flywheel Degrees
All Engines	1° BTDC

See Vacuum Brake Setting for service corrections.



Ignition Timing (Basic Setting)—Distributor can be timed for correct ignition timing when off engine as follows: Place small straightedge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate shaft in direction of rotation (clockwise) until leading edge of scale is exactly ⅝" before nearest edge of distributor mounting hole on vacuum piston side of mounting flange. If contacts do not begin to open at this point, loosen adjusting screw on side of distributor, move screw down (to advance spark), or up (to retard spark) in the slot until contacts begin to open, tighten adjusting screw. This will provide correct 1° BTDC ignition timing when distributor installed on engine.

Ignition Timing (On Engine)—No flywheel marks or other means provided to check timing on engine. If basic setting of distributor correct (above), all necessary adjustments for operating conditions and octane rating of fuel being used can be made through the Vacuum Brake adjustment.

Vacuum Brake Adjustment—Road test car. Back off vacuum brake adjusting screw until engine pings when operating under load, then turn adjusting screw in just enough to eliminate ping, tighten locknut.

CARBURETOR

Holley (Chandler-Groves) Ford No. 5GA-9510-A. Single barrel, downdraft type with manual choke control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm and choke valve wide open, set throttle stopscrew for idle speed of 500 engine RPM. Turn idle adjusting screw in until engine begins to miss, then turn screw out until engine begins to roll, finally turn screw in just enough so that engine idles smoothly. Recheck idle speed. NOTE—Idle speed can be noted by marking spot on fan belt and setting speed for 25 revolutions of the belt in 10 seconds.

Accelerating Pump Setting—Three holes in throttle lever for pump connection. Set as follows:

#1 (Inner)—Extremely Hot Weather.
#2 (Center)—Normal weather and fuel.
#3 (Outer)—Extremely Cold Weather.

Float Level—Use Ford No. 9550-A Gauge to check float. Invert air horn and float assembly, place gauge on face of bowl cover. Bottom of float should be 1.322-1.353" from face of cover (1.353" portion of gauge "GO", 1.322" portion "NO GO"). Adjust by bending lip on float lever. Fuel level in bowl 11/16" plus or minus 1/32" below top edge.

Metering Jets—*See Chandler-Groves (Ford) Jet Specification Table in Carburetor Section.*

Fast Idle: Consists of a "kicker" lever which opens throttle valve to fast idle position when choke valve closed for cold starting. Should not require adjustment.

CARB. EQUIPMENT

Air Cleaner: Ford No. 1GA-9600-C. Oil-bath type.

Servicing—Clean and refill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when draining crankcase), or more often if required.

NOTE—Clean and re-oil filter element in oil filler cap every 1000 miles.

Gasoline Gauge: King-Seeley Electric. Ford Nos.

Dash Unit—No. 51A-9280-A (1946 Deluxe & Sedan Del.), 51A-9280-B ('46 Sup. Del.), 6A-9280 (1947).

Tank Unit—No. 99A-9275-B (Deluxe & Super Deluxe Models), 21A-9275-A (Sedan Delivery).

See Carburetion Equipment Section for data.

Fuel Pump: AC. Type R, Ford No. 1GA-9350. Diaphragm type. **Pressure**—3½ lbs. max. (2-3¼ lbs.).

See Carburetion Equipment Section for data.

BATTERY

Ford Type No. 01A-10655-A. 6 volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).

Starting Capacity—150 amperes for 20 minutes.

Zero Capacity—300 amperes for 4.0 minutes.

Grounded Terminal—Positive (+) terminal grounded to dash. **Engine Ground**—Separate ground strap from rear of cylinder head to dash.

Location—On left side in engine compartment.

Dimensions—Length 10.56". Width 7.28". Height 8.25".

STARTER

Ford Model No. 18-11002. Armature No. 18-11005.

Drive—Inboard Bendix No. A1472. Ford No. B-11350.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—2 lbs. each.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on dash and controlled by pushbutton switch on instrument panel, Ford No. 19A-11500 (Pass. Cars).

Removal: Starter mounted on right front face of flywheel housing. To remove, disconnect cable, take out capscrews in right hand engine side pan and move pan to one side, loosen two through-bolts on commutator end plate and disconnect brace on commutator end of starter.

GENERATOR

Ford Model No. 2GA-10000A. Armature No. 2GA-10005. Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.

Charging Rate Adjustment—None (see Regulator).

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM
Start	565
32	1160
30	2500

Rotation—Counter-clockwise at commutator end.

Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F).

Brush Spring Tension—Approximately 28 ozs.

Removal: Generator mounted on adjustable bracket at left front of engine. To remove, take out bolt in mounting bracket, slip off drive belt and water pump belt, lift generator out.

Belt Adjustment: ½" deflection midway between generator and crankshaft pulley (generator belt), generator and pump pulley (pump belt). Adjust both belts by loosening two capscrews in mounting bracket beneath generator, move generator up and out (bolt holes slotted at this angle).

REGULATOR

Ford Model No. 01A-10505-C. Three-unit type Voltage & Current Regulator. In case with Cutout Relay on dash.

See Electrical Equipment Section for complete data.

NOTE—Regulator case grounded through 'pigtail' to dash or separate ground wire to generator. This ground connection must be in place when regulator being operated or tested (disturbed by cover removal).

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.

Cuts Out—8 amperes discharge current (maximum).

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Elec. Equip. Section for other temps.

Checking & Adjusting—*See Electrical Equipment Index for article on 'Ford Regulator—3 Unit Type' for complete instructions.*

Current Regulator

Setting—30-33 amperes Hot (after engine run for 5 minutes).

Checking & Adjusting—See Voltage Regulator.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot centers 3" below lamp center height at 25 ft.).

Beam Indicator—Red jewel on lower edge of speedometer dial. Lighted when upper beams in use.

Switches

Lighting—Ford No. 11A-11652 (Switch & Wiring—All Models), 51A-11661A (Knob & Insert—Deluxe Models), 51A-11661B (Knob & Insert—Super Deluxe with Blue-Gray Trim), 51A-11661C (Knob & Insert—Super Deluxe with Brown Trim).

Beam Selector—Ford No. 11A-13532 (Switch only), 5GA-11653 (Switch & Wiring).

Instrument—Ford No. 19A-13740.

Stop Light—Ford No. 11A-13480.

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MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Ford No. 11A-12250A Combined with the Ignition Resister on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlamp circuits, second unit protects other lighting circuits). Breakers are thermostatic and wound-coil type. Contacts open with current of 50 ampere and vibrate rapidly to control current.

HORNS: Ford No. 91A-13832 (High Note), 91A-13833 (Low Note). Air electric type dual horns operated by horn relay.
Horn Current—24-28 amperes (total).

Horn Relay: Ford No. 11A-13842D (Horns on Left Side), 5GA-13842 (Horns on Right Side).
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

►**ENGINE PRODUCTION CHANGE:** New "H" Series Engine starting September 1947. New ignition system, valve system, oil pump, and cooling system.

►*"H" SERIES ENGINE INFORMATION—For Tune-Up, Ignition, Ignition Timing, and Engine data, see 1949 FORD SIX car pages.*

ENGINE SPECIFICATIONS: 6GA 90 HP. Six cylinder, "L" head type.
Bore—3.30" **Stroke**—4.40"
Displacement—226 cu. ins. **Rated H.P.** 26.13
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.7-1. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL (For Oil Pan Removal & General Engine Service): *See Ford Shop Notes.*

OIL PAN REMOVAL: *See Ford Shop Notes.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening Torque—*See Ford Shop Notes.*

CYLINDER SLEEVES: Hardened, dry type cylinder sleeves used on some engines.
Sleeve Installation—*See Ford Shop Notes.*

PISTONS: New aluminum alloy, four-ring, Cam-ground, Dome Head type. Pistons have additional oil ring below piston pin.
Weight—414 grams (stripped), 576 grams (complete).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.

Fitting New Pistons: Use .50" wide feeler stock of correct thickness (as listed below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 5-8 lbs. (all types).
Feeler Thickness—.002" New Piston in New Plain Bore, .004" New Piston in Worn Plain Bore, .005" Worn Piston in Worn Plain Bore.

Replacement Pistons: *See Ford Shop Notes.*

PISTON RINGS: Two compression, one oil ring above pin, additional oil ring on piston skirt below pin. Upper oil ring groove slotted, lower oil ring groove drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.092-.0925"	.012-.017"	.0015-.003"
Compr. (#2)	.092-.0925"	.012-.017"	.001-.0025"
Oil (#3, 4)	.186-.1865"	.012-.017"	.001-.0025"

Replacement Rings: *See Ford Shop Notes.*

PISTON PIN: Diameter .8501-.8504". Length 2.91" Pin floats in piston and rod with locking ring at each end.
Pin Fit in Piston—.000-.0005" clearance or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" clearance (pin should fall through bushing slowly of own weight).

Replacement Pins: Furnished Standard size and .001", .002" Oversize.

CONNECTING ROD: Length 7.800" Weight 732 grams.
Crankpin Journal Diameter—2.235".
Lower Bearing—Removable, steel-backed, special alloy lined type. No shims.
Clearance—.0013-.0035". **Sideplay**—.003-.007".
NOTE—Replace bearing inserts worn .005" or more (.005" or more thinner than original insert).

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps. NOTE—Make certain that small tangs on bearing halves engage grooves in rod and cap.

Replacement Bearings: *See Ford Shop Notes.*

CRANKSHAFT: Four Bearings, Cast alloy steel with integral counterweights and Vibration Dampener on front end.
Journal Diameters—2.499" (all main bearings).
Bearing Type—Removable precision type, steel-backed, special alloy lined type. No shims.
Clearance—.001-.003".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

Replacement Bearings: *See Ford Shop Notes.*

End Thrust: Taken by rear main bearings. Adjust by replacing bearing (use bearing with thicker flange to reduce endplay).
Endplay—.002-.006"

CAMSHAFT: Four bearing with helical gear drive.
Bearing Diameters—1.797" all bearings. Replace the camshaft if worn to less than 1.7955" diameter. Replace bearings if inside diameter more than 1.802".
Bearing Type—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Timing Gears: Crankshaft Gear—cast alloy steel, Camshaft Gear—aluminum alloy, bolted-on type.
Timing Gear Replacement—*See Ford Shop Notes.*

Camshaft Setting: Mesh marked tooth of crankshaft gear in marked space between teeth of camshaft gear.

VALVES:	Head Diameter	Stem Diameter
Intake	1.620"	.3095-.3105"
Exhaust	1.484"	.3095-.3105"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0015-.0045"

NOTE—Service limit for valve stem diameter .3065".

Valve Seat Inserts—*See "Valve System" in Ford Special Data.*

Valve Assembly Removal & Servicing—*See Ford Shop Notes.*

Valve Guides: Split type retained by 'C' washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).

Valve Springs:	Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.85"

NOTE—Replace spring if the pressure is less than 30 lbs. when compressed to 2.125".

Valve Lifters: Barrel type in reamed holes in block. **Diameter**—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

VALVE TIMING

Tappet Clearance: .013-.015" All Valves Cold. No adjustment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 3° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
Valve Timing Check—No flywheel marks or other means provided to check timing. If top dead center position located on flywheel, intake valve for this cylinder should open approx. 1 tooth on flywheel before this top dead center point.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, and to valve lifters and timing gears. Oil pump mounted on #1 main bearing cap in crankcase (oil intake pipe extends to oil screen in sump at rear end of oil pan).

Oil Pan Removal: *See Ford Shop Notes.*
Crankcase Capacity—5 quarts.
Normal Oil Pressure—35 lbs. at 2000 RPM of engine.
Oil Pressure Regulator—Located under plug on right side of crankcase at front end. Not adjustable. NOTE—Replace oil relief valve spring if not within limits of 44-46 ounces with spring compressed to 1.40".

Oil Pump: Gear type. Mounted on front main bearing and driven from crankshaft timing gear (pump housing integral with main bearing cap).
Oil Pump Servicing—*See Ford Shop Notes.*

Oil Screen & Drain Plug: Screen mounted on inner end of drain plug and removed with plug when crankcase drained. Clean oil screen each time removed.

Oil Filter: Replace filter cartridge at 5000 mile intervals (Ford No. 01A-18662-A Unit).

Oil Pressure Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—No. 51A-9273-A (1946 Deluxe), No. 51A-9273-B (1946 Super Deluxe), No. 6A-9273 (All 1947).
Engine Unit—No. 41A-9278 (80 lb.) All Models.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with water distributing tube in block to direct cooling water on exhaust valve seats and ports. Re-circulation of water in engine with thermostat closed provided by by-pass channel in front end of head and block leading to pump inlet.
Capacity—14.5 quarts (Pass. Cars).
Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs.

Water Pump: Packless, centrifugal type with sealed ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet below. By-pass (dual valve) type. Starts to open at 150-155°F. Fully open at 175-180°F.

Temperature Gauge: King-Seeley Electric. Ford Nos. **Dash Unit**—No. 51A-10883-A (1946 Deluxe), No. 51A-10883-B (1946 Super Deluxe), No. 6A-10883 (All '47). **Engine Unit**—No. 99A-10884 (All models).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI, Ford No. 19A-7563. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.
Facings—Woven asbestos composition. I.D. 6¾". O.D. 10". Thickness ⅛".

Pedal Adjustment: Pedal free travel 1-1¼". To adjust, disconnect clevis at equalizer (throw-out) shaft end of pedal connector rod, turn clevis on rod.

Removal: Remove Transmission (see Transmission Removal below), install wooden wedges between each release lever and cover to hold the clutch in released position, take out six capscrews mounting cover assembly on flywheel, lift out cover assembly and driven member.

TRANSMISSION

Own Make. Three-speed, all-helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever on steering column.
See Transmission Section for complete data.

Removal: Remove Rear Axle (see Rear Axle Removal below), remove capscrews mounting front seat track on floor, move front seat back for necessary room. Take out mounting screws in front floor pan spacer, remove spacer. Disconnect gearshift connecting rods at transmission case, disconnect and remove equalizer (clutch release) shaft. Remove capscrew and washer on end of transmission shaft (in universal joint), remove universal joint. Remove nuts and washers on engine rear support bolts. Support engine by placing jack (use wood block on jack) under rear end and raise engine sufficiently so that rear support clears mounting bolts (NOTE—remove nuts holding lower half of engine rear support assembly and remove the assembly). Take out eight capscrews mounting transmission case on flywheel housing, pull transmission straight back and lift out.

UNIVERSALS

Spicer Model 202-6X, Ford No. B-7090. Steel bushing type. Single joint in torque ball at rear of transmission case.

REAR AXLE

Own Make. ¾ Floating, Spiral Bevel Gear type with Torque Tube Drive.
See Rear Axle Section for complete data.

Ratio—3.78-1 Std., 4.11-1 Optl.

Backlash—.012" maximum.

Removal: Raise rear end of car. Disconnect track bar. Disconnect rear spring (use spring spreader if available) by placing block under each rear spring eye and lowering car so that weight keeps spring extended and then removing spring shackle bolts and bars. Take out pin in hand brake equalizer and disconnect hand brake cable. Disconnect hydraulic brake line at torque tube and rear shock absorber links at each wheel. Disconnect accelerator pedal, remove pedal pads, floor mat, beam control switch (take out two mounting screws), and floor pan. Disconnect speedometer cable at torque tube. Remove nuts on four universal joint ball housing bolts and two bolts holding ball cap halves together, remove ball cap. Pull rear axle back to disconnect torque tube from transmission and remove from beneath car.

NOTE—Bleed brake line after rear axle re-installed and line connected.

SHOCK ABSORBERS

Houde (Houdaille). Double Acting, adjustable, hydraulic types (Front & Rear).
See Shock Absorber Section for complete data.

	Houde Model	Right — Ford No.	— Left
Front	BBCN-3	51A-18045	51A-18046
Rear①	BBCZ-3	51A-18080A	51A-18081A
Rear②	BBCZ-3	51A-18080B	51A-18081B

①—Except Sedan Delivery and Station Wagon.
②—Sedan Delivery & Station Wagon only.

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than 1 or 2 serrations at a time. NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check every 5000 miles, fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) required for these new shock absorbers which may be identified by round top filler plug.

FRONT SUSPENSION

Front Axle: Conventional "I" beam section type with Reverse-Elliott ends and transverse spring. Axle positioned by radius rods.

Kingpin Inclination—8° crosswise.

Caster—3°. Axle may be bent cold for minor corrections providing correct tools used to prevent crushing of axle flange.

Camber—¾°. Adjust as for Caster (above).

Toe In—1/16". Adjust in usual manner by changing length of tie rod.

STEERING GEAR

Gemmer design (Model 305), Ford Make. Worm-&-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed Hydraulic, self-centering, double anchor type. Hand lever applies rear wheel brakes.

►**These brakes do not have anchor pin adjustment.**
See Brake Section for complete data.

Drums—Composite cast iron and steel type. Diameter 12".

Clearance—Least possible amount without drag.

Lining—Width 1.75". Thickness .187". Length per shoe 13.12" (forward shoes), 10.08" (rear shoes).

Hand Brakes: See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Top: Two types as follows:
1—Convertible—Auto-lite electric type.
2—Sportsman Convertible—Hydro-Lectric type.
See Miscellaneous Section for complete data.

Power Window Regulators (Sportsman Convertible): Hydro-Lectric type.
See Miscellaneous Section for complete data.

HOOD LOCK: Hood is Alligator type hinged at cowl. To raise hood (Pass. Cars), pull out release knob under instrument panel, release safety catch under front edge of hood.

OIL PAN REMOVAL: *See Ford Shop Notes.*

M DEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing (visible through hole in floor) and on left frame side member near front eng. support.

TUNE-UP

COMPRESSION: Pressure—105-125 lbs. at cranking speed of 100 RPM. (Std. 6.75-1 Cast iron Head).

VACUUM READING: Steady 18-20" idling at 5-7 MPH.

FIRING ORDER: 1-5-4-8-6-3-7-2 (Cyl. Nos. 1-2-3-4 Right Bank, 5-6-7-8 Left Bank, front-to-rear).

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. Gaps—.025".

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.014-.016" (both sets).

Cam Angle—36° (both sets operating together).

Breaker Arm Spring Tension—20-24 ozs.

Automatic Advance—Starts at 200 RPM. Maximum 11° at 600 RPM (Distr. degrees & RPM).

IGNITION TIMING: See Ignition Timing.
Std. Setting—4° BTDC.

Timing Marks—None. See Ignition Timing for directions on setting of distributor for correct timing when installed on engine.

Vacuum Brake Setting—Set to just eliminate pinging when engine operated under load (back off screw until engine pings, then turn screw in until ping is eliminated).

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Both idle screws ⅜-¾ turn open and set for smooth idle and highest steady reading of vacuum gauge (when used). Idle speed 500 RPM or 5-7 MPH.

Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (Gauge 9550-A). Fuel level 11/16" plus or minus 1/32" below top edge of bowl.

Accelerating Pump—Center (#2) hole Normal. Inner (#1) hole—Summer, Outer (#3) hole—Winter for temperature extremes.

Fuel Pump Pressure: 3½ lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic control type (located in exhaust manifold outlet of left cylinder bank). See that valve operates freely.

VALVES: See Valve Timing.

Tappet Clearance—.010-.012" Intake, .014-.016" Exhaust. No adjustment provided.

STARTING: See Battery, Starter, Generator and Regulator.

I NITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock Assembly No. 302848, Ford No. 51A-3676-A (Deluxe Models), Oakes No. 302850, Ford No. 51A-3676-B (Super Deluxe Models). Ignition Switch Assembly Oakes No. 302494, Ford No. 11A-3680 (All Models).
Lock Cylinder—Hurd or Briggs & Stratton #80935 Ford No. 91A-3686-A (with Keys).
Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 1GA-12024. Mounted separately on left front corner of cylinder block.
Ignition Current—4½-6 amperes with engine stopped (primary resistance 1-1⅓ ohm).
Resistor Unit—Connected in coil primary circuit (part of Circuit Breaker Assembly 11A-12250A).

CONDENSER: Ford Part No. 1GA-12300-B.
Capacity—.29-.32 microfarad.

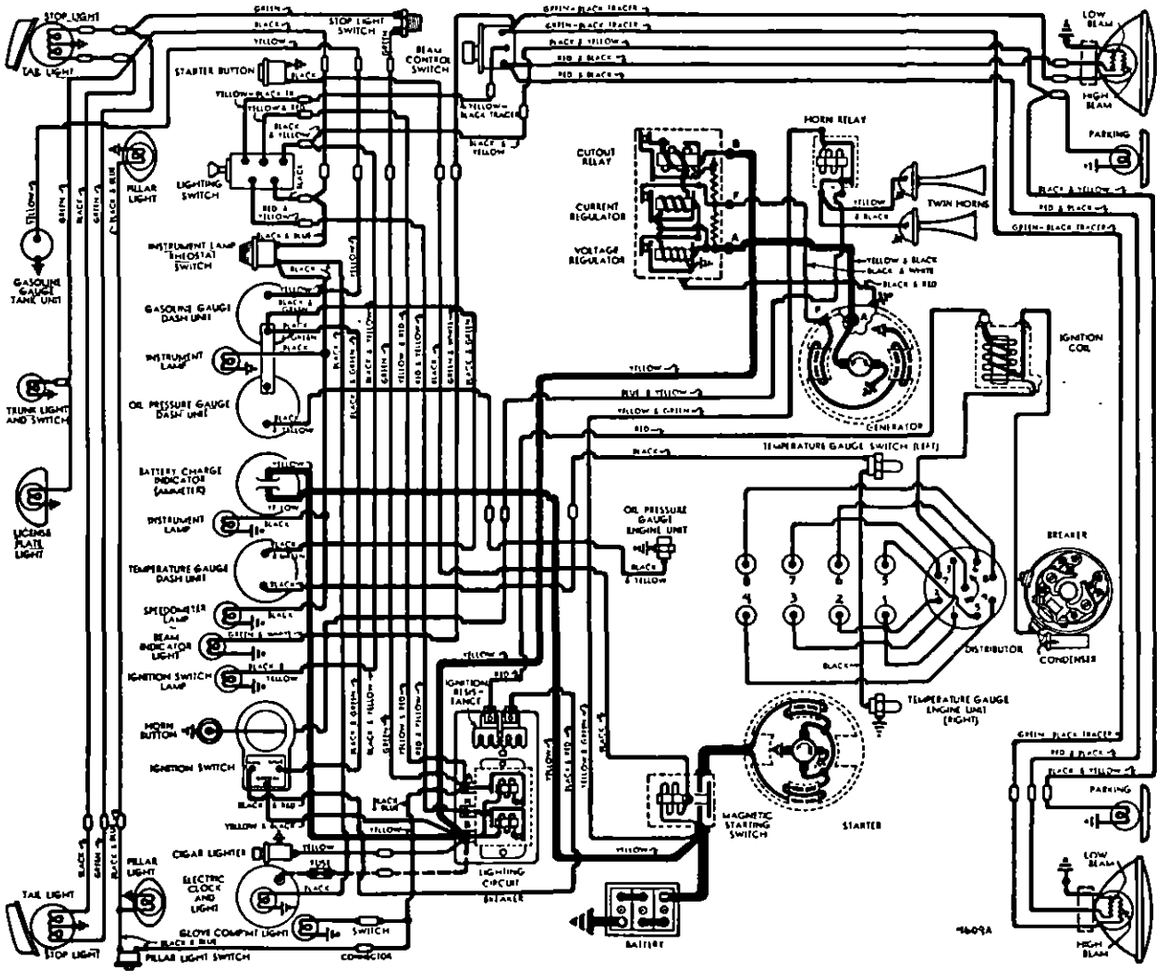
DISTRIBUTOR: Ford No. 59A-12127 (less Terminal Housing, Cap & Rotor). New "Single Cap" sealed-dry "V" outlet type. Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake adjustment. Breaker "loading" and "timing" contacts operate in same manner as on previous V8 models.
Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step 'go', .016" 'no go'.
Cam Angle or Dwell—Approx. 36° closed, 9° open. **Set dwell at 80% (78-80% at 2000 RPM) on Ford Test Set for both sets operating together with correct coil loading lead.**
NOTE—Cam Angle for each set operating singly approximately 22½° closed, 22½° open (50%).
Breaker Arm Spring Tension—20-24 ounces.
Rotation—Clockwise viewed from drive end (counter-clockwise viewed from front of car).

Automatic Advance
(Vacuum Brake Disconnected)

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	200	0	400
11	600	22	1200

NOTE—Limits are 10½-11½° (distributor degrees).

Vacuum Brake: Consists of a spring-loaded vacuum controlled brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.



Removal:—Distributor mounted on front of engine. To remove, disconnect primary lead, remove distributor cap, take out mounting screws in distributor flange, lift unit out.

IGNITION TIMING

Std. Setting—See Vacuum Brake Setting for service correction for operating conditions.

	Flywheel Degrees	Piston Position
All V8 Engines	4° BTDC	.0058" BTDC.

Ignition Timing (Basic Setting)—Distributor can be timed for correct ignition timing when off engine as follows: Place a small straight edge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate distributor in direction of rotation (clockwise) until trailing edge of scale is exactly ⅜" past the nearest edge of the small mounting hole (left hand hole—nearest vacuum brake) on the mounting flange. If left hand (timing) contacts do not begin to open at this point, loosen adjusting screw on side of distributor housing, move screw down (to advance spark), up (to retard spark), in slot until contacts begin to open, tighten adjusting screw. This setting will provide correct 4° BTDC. ignition timing when distributor installed on engine.

NOTE—Timing is controlled by opening of **left hand breaker contacts** only (right hand contacts "load" coil and open and close earlier than the left hand contacts).

Timing (On the Car)—No flywheel marks provided. With distributor adjusted as described above, this will give correct 4° BTDC. timing when installed on the engine and all necessary adjustments for operating conditions and octane rating of fuel being used can be made by means of the Vacuum Brake adjustment as follows:

Vacuum Brake Setting—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, then turn screw in just enough to eliminate ping, tighten locknut.

CARBURETOR

Holley (Chandler-Groves) Ford No. 59A-9510-A. Dual (double barrel), downdraft type with manual choke control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm, choke valve wide open, and Fast Idle inoperative, set throttle lever stopscrew for 500 RPM. idling speed, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then out until engine begins to roll, finally turn screw in until engine fires smoothly. Final setting should be approximately ⅝-¾ turn of screw from inner seated position. Readjust stopscrew for correct idling speed. NOTE—Idling speed can be estimated by marking spot on fan belt and setting speed for 25 revolutions of the belt in 10 seconds.

Accelerating Pump Setting—Three holes provided in the throttle lever for pump rod link connection. Adjust for seasonal requirements as follows:
#1 (Inner) Hole—Summer or Hot weather.
#2 (Center) Hole—Average fuel and weather.
#3 (Outer) Hole—Extremely Cold weather.

Float Level—Use 9550-A gauge to set the float level (1.353" end 'Go', 1.332" end 'No Go') measuring from underside of bowl cover to bottom of float (with cover and float assembly inverted). Fuel level in bowl should be 11/16" plus or minus 1/32".

Metering Jets—*See Chandler-Groves (Ford) Jet Table in Carburetor Section for complete data.*

Fast Idle:—Integral with carburetor. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: Ford No. 91A-9600-A. Oil-bath type.
Servicing—Clean and refill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when crankcase drained) or more often if required. Clean filter element by washing in cleaning fluid.
NOTE—Clean and re-oil filter element in oil filler cap (crankcase breather) every 1000 miles.

Fuel Pump: AC. Type R. Ford No. 11A-9350. Diaphragm type. Exchange Pump AC No. 541 ('46), 571 ('47).

See Carburetion Equipment Section for data.

Pressure—3½ lbs. max. (2-3¼ lbs.).

Gasoline Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—No. 51A-9280-A (1946 Deluxe & Sedan Del.), 51A-9280-B ('46 Sup. Del.), 6A-9280 (1947).
Tank Unit—No. 99A-9275B (Deluxe & Super Deluxe Models), 21A-9275A (Sedan Delivery).

See Carburetion Equipment Section for data.

BATTERY

Ford Type No. 01A-10655-A. 6 volt, 17 plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Grounded Terminal—Positive (+) grounded to dash.
Engine Ground—Strap connector between right rear cylinder head and dash.
Dimensions—Length 10.56". Width 7.28". Hgt. 8.25".
Location—On right side in engine compartment.

STARTER

Ford Model No. 18-11002. Armature No. 18-11005.
Drive—Inboard Bendix Drive No. A1472, Ford No. B-11350.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on dash and controlled by pushbutton switch on instrument panel, Ford No. 19A-11500 (Pass. Cars).

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR

Ford Model No. 21A-10000. Armature No. 01A-10005A. Two brush (shunt) type with vibrating voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM.
Start	520
30	1060
30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F).
Brush Spring Tension—Approximately 28 ozs.

Removal:—Generator mounted on bracket between cylinder banks at front of engine, driven in tandem with water pumps by Vee belt. To remove, loosen nut on bracket stud.

Belt Adjustment: ½" deflection midway between generator and water pump pulleys. NOTE—Generator mounting bracket also includes the fan mounting (fan driven by a separate belt). Both belts adjusted in same manner by loosening mounting bolt and raising mounting brackets.

REGULAT R

Ford Model No. 01A-10505-C. Three Unit Type. Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash.

See Electrical Equipment Section for complete data.

NOTE—Regulator case is grounded through separate ground wire extending from regulator to generator frame. This ground connection must be in place when regulator being operated or tested.

Cutout Relay
Cuts In—6.3-6.3 volts at operating temperature.
Cuts Out—8 ampere discharge current maximum.

Voltage Regulator
Setting—6.9-7.2 volts at 70-80° F.
Checking & Adjusting—*Refer to Electrical Equipment Index for article on 'Ford Regulator—3-unit Type' for complete instructions.*

Current Regulator
Setting—30-33 amperes (after 5 minutes run).
Checking & Adjusting See Voltage Regulator above.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—On lower edge of speedometer dial Lighted whenever upper beams in use.

Switches
Lighting—Ford No. 11A-11652 (Switch & Wiring—All Models), 51A-11661A (Knob & Insert—Deluxe Models), 51A-11661B (Knob & Insert—Super Deluxe Models with Blue-Grey Trim), 51A-11661C (Knob & Insert—Super Deluxe Models with Brown Trim).

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Beam Selector—Ford No. 11A-13532 (Switch only), 21A-11653 (Switch & Wiring).
Instrument—Ford No. 19A-13740.
Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	
Parking	3	63
Beam Indicator, Ign. Lock	1	51
Instrument, Clock	1½	55
Stop & Tail	21-3	1154
Dome (Pillar), Luggage Compt.	3	63
Rear License	3	63

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Ford 11A-12250A Combined with Ignition Resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlight circuits, second unit protects other lighting circuits) of the thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

HORNS: Ford No. 91A-13832 (High Note), 91A-13833 (Low Note). Air electric type dual horns operated by horn relay.

Horn Current—24-28 amperes total.

Horn Relay: Ford No. 11A-13842D.
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE SPECIFICATIONS: Own "100". Eight Cylinder, 90° Vee, "L" Head type. Cylinder banks and crankcase cast Enbloc.

Bore—3.187". **Stroke**—3.75".
Displacement—239 cu. ins. **Rated H.P.**—32.5.
Developed Horsepower—100 at 3800 RPM.
Compression Ratio—6.75-1 Cast Iron Heads.
Compression & Vacuum Readings—*See Tune-up data*

►**1946-47 ENGINE SERVICE NOTES: Cylinder Head.** 1946 Head, Part No. 59A-6050-B, is interchangeable right-and-left. May be identified by figures "59A" or "59A-B" on top. Heads have greater valve clearance for new cylinder block (below) and larger water holes for improved cooling (¾" hole at top center and ⅝" hole at center between #2 and #3 cylinders).

►**Cylinder Head Gasket**—New type, Part No. 59A-6051, may be identified by 5/16" round hole instead of blunt coneshaped opening at lower edge between #2 and #3 cylinder bores. ***This gasket must be used with new 1946 type Cylinder Head (above).***

►**Cylinder Block**—New type, Part No. 59A-6010-C with valve ports located .09" farther from center line of block. May be identified by number or by oblong water passages just above valves (round on previous types).

►***CAUTION—If the earlier type Cylinder Heads (81A-81T-, 99T-, 29A-) used with this block, heads must be machined out for valve clearance, and water passages in head should be enlarged for improved cooling.***

OIL PAN REMOVAL: *See Ford Shop Notes.*

ENGINE REMOVAL: *See Ford Shop Notes.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

CYLINDER HEAD: Tightening—*See Ford Shop Notes.*

CYLINDER SLEEVE: Cast iron, dry type cylinder sleeves may be used (engine may have mark "HS" on block beside inner front corner of left cyl. head).
Servicing—*See Ford Shop Notes.*

PISTONS: Steel Alloy, light weight, cam ground type or Aluminum Alloy, T slot type. Recondition engine to take finished replacement pistons (if sleeves used, replace sleeves, use new Std. size pistons).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.

Replacement Pistons: *See Ford Shop Notes.*

Fitting New Pistons: Use .50" wide feeler stock of correct thickness (see table below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 6-10 lbs. (all types).

Engines with Steel Sleeves	Steel Piston	Aluminum Piston
New Piston & Sleeve	.003"	.003"
New Piston—Worn Sleeve	.004"	.004"
Worn Piston & Sleeve	.005"	.005"
Engines without Sleeves		
New Piston & Bore	.0025"	.002"
New Piston—Worn Bore	.004"	.004"
Worn Piston & Bore	.005"	.005"

PISTON RINGS: Two compression, two slotted oil rings per piston (lower oil ring below pin). Oil ring grooves have oil drain holes.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0915-.0920"	.012-.017"	.0015-.003"
Compr. #2	.0915-.0920"	.012-.017"	.001-.0025"
Oil Contr.	.1545-.1550"	.012-.017"	.001-.0025"

Replacement Rings: *See Ford Shop Notes.*

PISTON PIN: Diameter .7501-.7504". Length 2.975" (with steel pistons), 2.850" (with aluminum pistons). Floating type with locking ring in piston at each end. Pin hole in connecting rod bronze bushed.
Pin Fit in Piston—.0001-.0002" (aluminum pistons), .0003-.0009" (steel pistons) or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" (pin should pass through bushing slowly of own weight).

Replacement Pins: Furnished Standard size and .001", .002" Oversize.

CONNECTING ROD: Length 7.000". Weight 492 grams. Crankpin Journal Diameter—2.1390" Connecting rod diameter on crankpin 2.360" (2.3597-2.3603").
Bearing Type—Steel-backed, special alloy lined with bearing surface on both inner and outer face. Bearing floats in both rods (side-by-side mounting)
Bearing Dimensions—Length 1.747". Thick .1095".
Clearance—.0015-.0035" (see Bearing Adjustment).
Sideplay—.003-.007" (bearing endplay), .006-.014" (side clearance for both rods).

Bearing Adjustment: None (no shims). Do not file bearing caps. Replace bearings if less than .1085" in thickness, replace or hone rod for oversize bearing if worn more than .0015" over original size (2.3597-2.3603"). CAUTION—Both rods must be same size.

Replacement Bearings: *See Ford Shop Notes.*

Installing Rods: Marks on rods and bearing caps (R1, L1 etc.) must be together and installed in same numbered cylinder with marks pointing down toward pan.

CRANKSHAFT: Three bearing type with integral counterweights. NOTE—New type crankshaft used with new wide land (four ring) pistons.
Journal Diameters—2.4990" (all bearings).
Bearing Type—Steel-backed, special alloy-lined.
Clearance—.001-.003".

Bearing Adjustment: None (no shims). Do not file bearing caps.

Replacement Bearings: *See Ford Shop Notes.*

End Thrust: Taken by rear main bearing. Adjust by replacing bearing. **Endplay**—.002-.006".

CAMSHAFT: Three bearing type. Helical gear drive.
Bearing Diameters—1.797" all bearings. Replace camshaft if worn to less than 1.7955" diameter.
Bearing Type—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

End Thrust: Taken by gear hub and thrust surface on inner face of cover plate. Adjusted by replacing coverplate. **Endplay**—.005-.015".

Timing Gears: Cast alloy iron (crankshaft), Aluminum or malleable iron bolted-on type (camshaft).
Backlash—.004" maximum.
Replacement Gears—*See Ford Shop Notes for Gear Oversizes and installation instructions.*

Camshaft Setting: Mesh marked tooth of crankshaft gear in similarly marked space between teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
All Valves	1.510"	.3105"	4.577"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0025-.0045"

NOTE—Service limit for valve stem diameter is .309" Intake, .3065" Exhaust. Valves interchangeable.

►*INSTALLATION OF LATER TYPE VALVE ASSEMBLIES See "Valve Assembly Interchangeability" under VALVE SYSTEM in Ford Special Data.*

Valve Seat Inserts—*See "Valve System" in Ford Special Data.*

Valve Assembly Removal & Installation—*See "Valve System" in Ford Special Data.*

Valve Guides: Split type retained by "C" washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).

Valve Lifters: Barrel type in reamed holes in block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).
Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs: Replace if pressure less than 30 lbs. when compressed to 2.125".

	Spring Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.84"

VALVE TIMING

Tappet Clearance: .010-.012" Intake, .014-.016" Exhaust, Cold. No adjustment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

Valve Timing Check—No flywheel marks or other means provided to check timing. No. 1 intake valve should open with No. 1 piston on top dead center entering intake stroke.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and timing gears. Oil pump mounted in crankcase at rear of engine.

Oil Pan Removal: *See Ford Shop Notes.*
Crankcase Capacity—5 quarts.
Normal Oil Pressure—50 lbs. at 2000 RPM.

Oil Pressure Regulator—Located under plug above front camshaft bearing (under manifold) and on oil pump housing (some models). Not adjustable.

NOTE—Check relief valve tension spring whenever engine overhauled. Replace the cylinder block relief valve spring if tension not within limits of 43-50 ozs. at 1.380" (engines without oil pump relief valve), or 78-80 ozs. at 1.380" (engines with oil pump relief valve). Replace oil pump relief valve spring if tension not within limits of 78-87 ozs. at 1.380".

Oil Pump: Gear type. In crankcase at rear of engine. NOTE—This new type pump, No. 41A-6600-A (for engines without oil pan baffles), has oil pressure regulator (relief valve) in pump body.

Oil Pump Servicing—*See Ford Shop Notes.*

Oil Pressure Gauge: King-Seeley Electric. Ford Nos. **Dash Unit**—No. 51A-9273-A (1946 Deluxe), No. 51A-9273-B (1946 Super Deluxe), No. 6A-9273 (All 1947).
Engine Unit—No. 41A-9278 (80 lb.) All Models.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with two water pumps at front of engine (pump for each bank). Capacity—22 quarts.

Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs.

Water Pump: Packless, centrifugal type (2 used). Mounted on front of engine (pump housing integral with front engine mounting).
See Water Pump Section for complete data.

Removal—Drain cooling system, place support jack under engine (use wood block on jack to avoid damaging pan), remove bolt from front engine support, raise engine until no weight rests on front support. Loosen generator mounting bolt, remove drive belt. Disconnect and remove hose at pump. Remove four capscrews mounting pump on engine, lift pump out. CAUTION—One mounting screw located within water pump inlet connection (accessible with hose removed).
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In each cylinder head water outlet (two used). Start to open at 150-155°F. Fully open at 175-180°F.

Temperature Gauge: King-Seeley Electric. Ford Nos. **Dash Unit**—No. 51A-10883-A (1946 Deluxe), No. 51A-10883-B (1946 Super Deluxe), No. 6A-10883 (All '47).
Engine Unit—No. 01A-10990 (Temperature Gauge Switch—in left hand cylinder head), No. 99A-10884 (regular Engine Unit—in right cylinder head).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI, Ford No. 19A-7563. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.

Facings—Woven asbestos composition. I.D. 6¾". O.D. 10". Thickness ⅛".

Pedal Adjustment: Pedal free travel 1-1¼". To adjust, disconnect clevis at equalizer (throw-out) shaft end of pedal connector rod, turn clevis on rod.

Removal: Remove Transmission (see Transmission Removal below), install wooden wedges between each release lever and cover to hold the clutch in released position, take out six capscrews mounting cover assembly on flywheel, lift out cover assembly and driven member.

TRANSMISSION

Own Make. Three-speed, all-helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever on steering column.
See Transmission Section for complete data.

Removal: Remove Rear Axle (see Rear Axle Removal below), remove capscrews mounting front seat track on floor, move front seat back for necessary room. Take out mounting screws in front floor pan spacer, remove spacer. Disconnect gearshift connecting rods at transmission case, disconnect and remove equalizer (clutch release) shaft. Remove capscrew and washer on end of transmission shaft (in universal joint), remove universal joint. Remove nuts and washers on engine rear support bolts. Support engine by placing jack (use wood block on jack) under rear end and raise engine sufficiently so that rear support clears mounting bolts (NOTE—remove nuts holding lower half of engine rear support assembly and remove the assembly). Take out eight capscrews mounting transmission case on flywheel housing, pull transmission straight back and lift out.

UNIVERSALS

Spicer Model 202-6X, Ford No. B-7090. Steel bushing type. Single joint in torque ball at transmission.

REAR AXLE

Own Make. ¾ Floating, Spiral Bevel Gear type with Torque Tube Drive.
See Rear Axle Section for complete data.

Ratio—3.54-1 Std., 3.78-1 & 4.11-1 Optl.

Backlash—.012" maximum.

Removal: Raise rear end of car. Disconnect track bar. Disconnect rear spring (use spring spreader if available) by placing block under each rear spring eye and lowering car so that weight keeps spring extended and then removing spring shackle bolts and bars. Take out pin in hand brake equalizer and disconnect hand brake cable. Disconnect hydraulic brake line at torque tube and rear shock absorber links at each wheel. Disconnect accelerator pedal, remove pedal pads, floor mat, beam control switch (take out two mounting screws), and floor pan. Disconnect speedometer cable at torque tube. Remove nuts on four universal joint ball housing bolts and two bolts holding ball cap halves together, remove ball cap. Pull rear axle back to disconnect torque tube from transmission.

SHOCK ABSORBERS

Houde (Houdaille). Double Acting, adjustable, hydraulic types (Front & Rear).

	Houde Model	Right — Ford No.	Left
Front	BBCN-3	51A-18045	51A-18046
Rear①	BBCZ-3	51A-18080A	51A-18081A
Rear②	BBCZ-3	51A-18080B	51A-18081B

①—Except Sedan Delivery and Station Wagon.
②—Sedan Delivery & Station Wagon only.

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than 1 or 2 serrations at a time. NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check every 5000 miles, fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) required for these new shock absorbers (identified by round top filler plug).

FRONT SUSPENSION

Front Axle: Conventional "I" beam section type with Reverse-Elliott ends and transverse spring. Axle positioned by radius rods.

Kingpin Inclination—8° crosswise.

Caster—3°. Axle may be bent cold for minor corrections providing correct tools used to prevent crushing of axle flange.

Camber—¾°. Adjust as for Caster (above).

Toe In—1/16". Adjust in usual manner by changing length of tie rod.

STEERING GEAR

Gemmer design (Model 305), Ford Make. Worm-&-Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed Hydraulic, self-centering, double anchor type. Hand lever applies rear wheel service brakes. NOTE—These brakes do not have anchor pin adjustment.
See Brake Section for complete data.

Drums—Composite iron and steel. Diameter 12".

Clearance—Least possible amount without drag.

Lining—Width 1.75". Thickness .187". Length per shoe 13.12" (forward shoes), 10.08" (rear shoes).

Hand Brakes: See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Top: Two types as follows:
1—Convertible—Auto-lite electric type.
2—Sportsman Convertible—Hydro-Lectric type.
See Miscellaneous Section for complete data.

Power Window Regulators (Sportsman Convertible): Hydro-Lectric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATI N

1946 MODELS

Series	V8④	6 Cyl.⑤	Whlbase.
Lgt. Duty Comm'l.	69C	6GC	114"
1 Ton	69Y	6GY	122"
1½ Ton	69T	6GT	134"
1½ Ton Dump Trk.	69U	6GU	134"
1½ Ton	698T	6G8T	158"
School Bus	694T		194"
C-O-E	691W		101"
C-O-E	69W		134"
C-O-E	698W		158"

1947 MODELS

Series	V8④	⑤—6 Cyl.—⑥	Whlbase.
Lgt. Duty Comm'l.	79C	7GC	7HC 114"
1 Ton	79Y	7GY	7HY 122"
1½ Ton	79T	7GT	7HT 134"
1½ Ton	798T	7G8T	7H8T 158"
School Bus	794T	7G4T	7H4T 194"
C-O-E	791W		101"
C-O-E	79W		134"
C-O-E	798W		158"

1948-50 MODELS

Series	"V8"①	"6 Cyl"②	WHB
F-1 ½ Ton	9RC	9HC	114"
F-2 ¾ Ton	9RD	9HD	122"
F-3 ¾ Heavy Duty	9RY	9HY	122"
F-3 Parcel Delivery	—	9HJ	104"
F-3 Parcel Delivery	—	9H2J	122"
F-4 1 Ton	9RTL	9HTL	134"
F-5 1½ Ton	9RT	9HT	134"
F-5 1½ Ton	9R8T	9H8T	158"
F-5 1½ Ton	9R6T	9H6T	176"
F-5 School Bus	9R8T	9H8T	158"
F-5 School Bus	9R4T	9H4T	194"
F-5 1½ C-O-E	9ROW	9HOW	110"
F-5 1½ C-O-E	9RW	9HW	134"
F-5 1½ C-O-E	9R8W	9H8W	158"
F-6 2 Ton	9RTH	9HTH	134"
F-6 2 Ton	9R8TH	9MTH③	158"
F-6 2 Ton	9R6TH	9H8TH	176"
F-6 2 C-O-E	9ROWH	9HOWH	110"
F-6 2 C-O-E	9RWH	9MOWH③	134"
F-6 2 C-O-E	9R8WH	9HWH	158"

①—Rouge 239 Truck V8 100 H.P. "R" Engine.
②—Rouge 226 Truck 6 Cyl. 95 H.P. "H" Engine.
③—Rouge 254 Truck 6 Cyl. 110 H.P. "M" Engine.
④—V8 100 HP. Truck Engine.
⑤—6 Cyl. "G" 90 HP. Engine.
⑥—6 Cyl. "H" 95 HP. Engine.

SERIAL & ENGINE NUMBER: (1946-47) Stamped on top of clutch housing. (visible when floor mat and transmission cover plate removed).

(1948-50) On Rating Plate on the dispatch compartment (glove box) door and on left side of frame near steering gear mounting bracket. NOTE—Engine Number is also Serial Number.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. at cranking spd.
VACUUM READING: Steady 18-21" idling at 500 RPM.
FIRING ORDER (V8): 1-5-4-8-6-3-7-2. See diagram.
FIRING ORDER (6 CYL.): 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: .025-.028".
Plug Type—Champion H-9 Comm. 14 mm.

DISTRIBUTOR: **Ford Part No.①**

1946-47 6 Cyl. "G" Engine	5GA-12127
1947-50 6 Cyl. "H" Engine	7HA-12127
1948-50 6 Cyl. "M" Engine	8MTH-12127
1946-47 V8 Engine	59A-12127
1948-50 V8 Engine	7RA-12127C
1950 (Late) V8 Engine	②8BA- or OBA-12127

①—Less Terminal Block or Cap and Rotor.
②—**8BA**—with cast iron front cover, **OBA**—with aluminum front cover.

Distr.	Breaker Gap	Cam-Angle
5GA-12127	.014-.016"	40°
7HA-12127, 8MTH-12127	.024-.026"	36°
59A-12127	.014-.016"	①36°
7RA-12127C	.014-.016"	27°
8BA- & OBA-12127	.014-.016"	27°

①—Both sets of points operating together (80% dwell), or 22½° (50% dwell) each set singly.

Breaker Arm Spring Tension—20-24 ozs. (5GA-12127 & 59A-12127), 17-20 ozs. (all others).

Rotation—*See wiring diagram.*
Automatic Advance—*See Ignition.*

IGNITION TIMING: **Std. Setting**

6 Cyl. "G" Engine	1° BTDC.
6 Cyl. "H" & "M" Engine	At TDC.
V8 1946-47 Engines	4° BTDC.
V8 1948-50 Engines	2° BTDC.

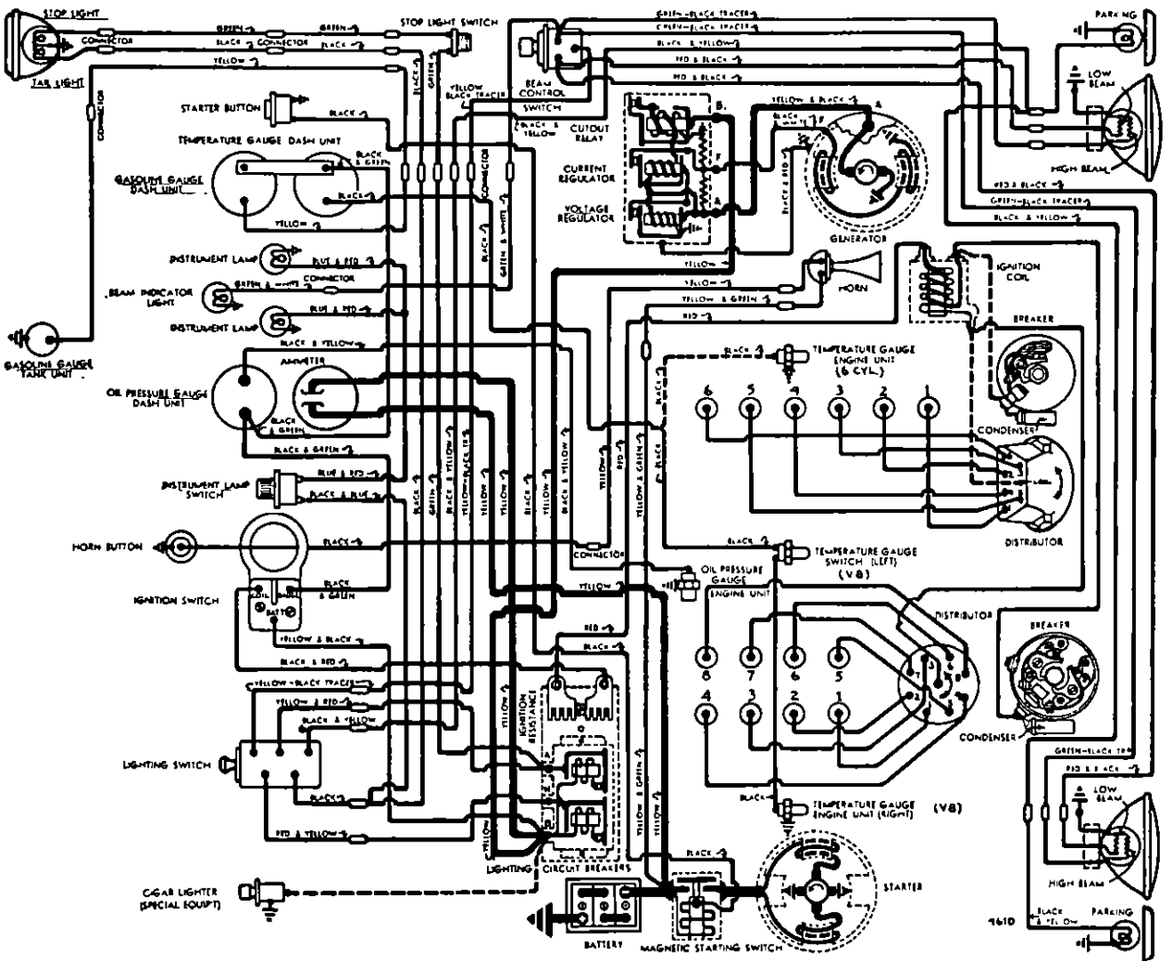
Timing Mark (6 Cyl. "G" & 1946-47 V8 Engines) No timing mark provided. See Ignition Timing for final ignition setting and Vacuum Brake setting.

Timing Mark (6 Cyl. "H" Engine)—Circular boss or groove in dampener (two types used) and two pointers on engine front cover. Use pointer nearest to outer circumference of dampener.

Timing Mark (6 Cyl. "M" Engine)—Groove on dampener and pointer on engine front cover.

Timing Mark (V8 1948-50 Engine)—Circular boss on crankshaft pulley and pointer on right side of engine front cover.

Timing Procedure—*See Ignition Timing.*



1946-47 6 CYL. & V8 TRUCKS

COIL: (6 Cyl. "G" & 1946-47 V8) Ford No. 1GA-12024, (6 Cyl. "H" & "M", 1948-50 V8) No. 8BA-12029.

Ignition Current—(1GA-12024 Coil) 4½-6 amperes with engine stopped (ignition primary resistance 1-1⅓ ohms—resistor mounted on circuit breaker and connected in series with coil primary).

(8BA-12029 Coil)—2.75-3 amperes at 6 volts idling, 5-5.5 amperes stopped (coil primary resistance 1.05-1.15 ohms at 75°F).

CONDENSER: (6 Cyl. "G" & 1946-47 V8) Ford No. 1GA-12300B, (6 Cyl. "H" & "M", 1948-50 V8) No. 7RA-12300C.

Capacity—.29-.32 mfd. (1GA-12300B), .21-.25 mfd. (7RA-12300C).

CARBURETION: Holly-Ford Downdraft (except C-O-E 6 Cyl. Engine Updraft). Single barrel (6 Cyl.), Dual (V8) types with manual choke control.

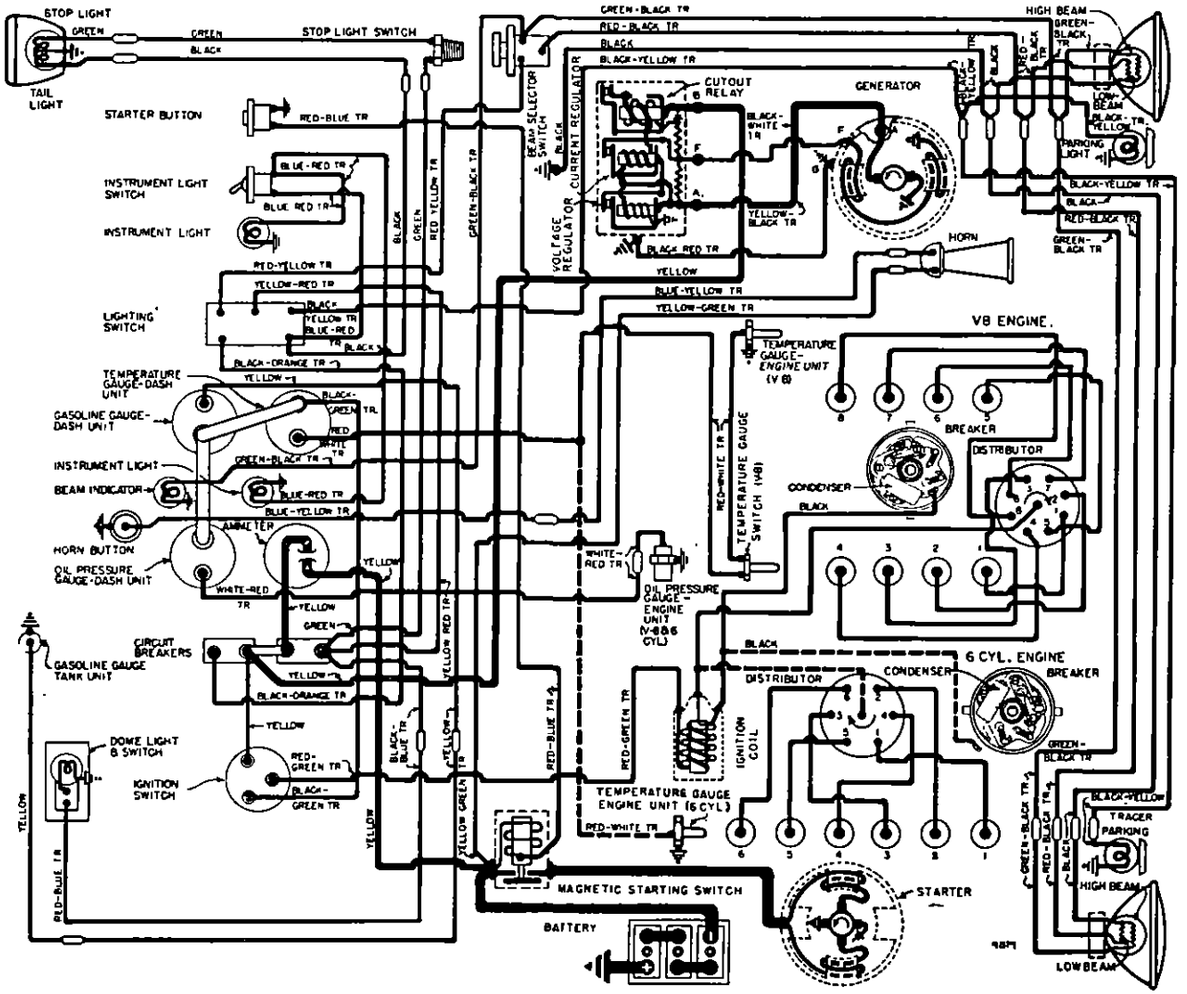
Engine	Ford Carburetor No.
6 Cyl. "G" Engine	5GA-9510A
6 Cyl. "H" Engine	7HT-9510A or ①7HW-9510A
6 Cyl. "M" Engine	8MTH-9510A or ①8MWH-9510A
V8 1946-47 Engine	59A-9510A
V8 1948-50 Engine	7RT-9510A

①—Updraft type carburetor.

Idle Setting—Approx. 1 turn open. 2 screws used on V8—turning screws out gives richer mixture.

Idle Speed—Approximately 500 RPM.

Float Level (6 Cyl. "G" & "H", All V8 Engines): 1.322-1.353" from bottom of float to machined surface of bowl cover with assembly inverted so that needle valve seated (use Gauge No. 9550-A).



1948-49 6 CYL. & V8 TRUCKS
►FOR 1950 TRUCKS, SEE 1951 TRUCK WIRING DIAGRAM

Float Level (6 Cyl. "M" Engine)—1.283" to 1.315" from bottom of float to machined surface of air horn with assembly held in inverted position.

Float Level (C-O-E 6 Cyl. "M" & "H" Engine)—1.180" to 1.200" from top of float to surface of bowl casting.

Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fuel Pump Pressure: (V8) 3½-4½ lbs., (6) 4-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type used on all engines. No adjustment.

V8 Engine—Valve located between right end of exhaust pipe cross over and right exhaust manifold.

6 Cylinder—At center of exhaust manifold just under intake manifold.

VALVE TAPPET CLEARANCE: ***CAUTION—SEVERAL CAMSHAFTS used on some engines require DIFFERENT TAPPET CLEARANCE as listed below.***

6 CYLINDER "G" ENGINE

Intake & Exhaust—.013-.015" COLD. *See "Tappet Clearance Adjustment" in Ford Special Data.*

V8 1946-47 ENGINE

Intake—.010-.012". **Exhaust**—.014-.016" COLD. *See "Tappet Clearance Adjustment" in Ford Special Data.*

6 CYLINDER "H" ENGINE

►First Type Camshaft No. 7HA-6250-C.
(Camshaft stamped "CWC" on forward end)

Intake—.009-.011", **Exhaust**—.013-.015", COLD. Self-locking adjusting screws located in lifters.

Later Type Camshaft No. 0HA-6250-A
(Engine marked "0H" above #3 Intake Port)
(Camshaft stamped "0" on forward end)

Intake—.013-.015". **Exhaust**—.017-.019" COLD. Self-locking adjusting screws located in lifter.

6 CYLINDER "M" ENGINE

Intake—.009-.011", **Exhaust**—.014-.016" COLD. Self-locking adjusting screws located in lifters. ***TWO CAMSHAFTS USED (Tappet Clearance same for both).***

NOTE—.002" additional exhaust valve clearance recommended for high speed operation.

V8 1948-50 ENGINE

►First Type Camshaft No. 8BA-6250-A
(No markings on Engine or Camshaft)

Intake—.010-.012", **Exhaust**—.014-.016" COLD. *See "Tappet Clearance Adjustment" in Ford Special Data.*

►Later Type Camshaft No. 8BA-6250-B
(Engine Marked—"*GAP, in- .014", ex- .018*")①
(Camshaft Marked—"*B*" *on front end*)

Intake Valves .....014" (.013-.015") COLD
Exhaust Valves .....018" (.017-.019") COLD

①—On top of block at center under valve cover.

See "Tappet Clearance Adjustment" in Ford Special Data.

IGNITION

IGNITION SWITCH: (1946-47) Oakes Steering Column & Ignition Lock Assembly. (1948-50) Ford No. 6A-11572B Ignition Lock & Switch assembly on instrument panel.

COIL: (6 Cyl. "G" & 1946-47 V8) Ford No. 1GA-12024, (6 Cyl. "H" & "M", 1948-50 V8) No. 8BA-12029.

Ignition Current—(1GA-12024 Coil) 4½-6 amperes with engine stopped (ignition primary resistance 1-1⅓ ohms—resistor mounted on circuit breaker and connected in series with coil primary).

(8BA-12029 Coil)—2.75-3 amperes at 6 volts idling,

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

5-5.5 amperes stopped (coil primary resistance 1.05-1.15 ohms at 75°F).

CONDENSER: (6 Cyl. "G" & 1946-47 V8) Ford No. 1GA-12300B, (6 Cyl. "H" & "M", 1948-50 V8) No. 7RA-12300C.

Capacity—.29-.32 mfd. (1GA-12300B), .21-.25 mfd. (7RA-12300C).

DISTRIBUTOR (1946-47 6 CYL. "G" & V8 ENGINE): Ford No. (6 Cyl.) 5GA-12127, (V8) 59A-12127 (Less Terminal Housing & Rotor). Single cap "sealed dry" type with automatic advance and Vacuum Brake Adjustment.

V8 DISTRIBUTOR NOTE—Two sets of breaker contacts used (one set for coil loading, one set for timing). No adjustment required other than breaker gap setting.

Breaker Gap—.014-.016" (all models).
Cam Angle (6 Cyl.)—40° closed.

Cam Angle (V8)—36° closed or 80% Dwell for both sets operating together. Each set operating singly should be 22½° closed or 50% Dwell (approximately).
Breaker Arm Spring Tension—20-24 ozs. (all).

Rotation—Clockwise viewed from **drive end** of unit.

Automatic Advance
▷With Vacuum Brake Disconnected

6 Cyl. Engine—No. 5GA-12127

Degrees	Distr.	RPM.	Degrees	Eng.	RPM.
Start		200	0		400
9		600	18		1200

V8 Engine—No. 59A-12127

Degrees	Distr.	RPM.	Degrees	Eng.	RPM.
Start		200	0		400
11		600	22		1200

Vacuum Brake: Consists of a spring-loaded, vacuum controlled, brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.

DISTRIBUTOR (1948-50 6 CYL. "H" & "M", & V8 ENGINES): "Pressure" distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs. Operating vacuum taken from 1 carburetor connection (2 passages inside carburetor, 1 at venturi, 1 at throttle valve). Full spark advance obtained at 18-35 MPH. with normal road load or for part throttle operation at any speed.

Car Model	①Distributor No.
1946-47 6 Cyl. "G" Engine	5GA-12127
1947-50 6 Cyl. "H" Engine	7HA-12127
1948-50 6 Cyl. "M" Engine	8MTH-12127
1946-47 V8 Engine	59A-12127
1948-50 V8 Engine	7RA-12127C
1950 (Late) V8 Engine	②8BA- or OBA-12127

①—Less Terminal Block or Cap and Rotor.
②—**8BA**—with cast iron front cover, **OBA**—with aluminum front cover.

See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.

Breaker Gap—(6 Cyl.) .024-.026" (V8) .014-.016".
Cam Angle—(6 Cyl.) 36° closed, (V8) 27° closed.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Advance Performance
▷With Distributor on Test Unit

7RA-12127C

Degrees	Vacuum	RPM
0-0°	0"	200
1½-2¼°	0.4"	500
4¼-5¼°	1.7"	1000
6¼-7¼°	2.8"	1500
7½-8½°	3.7"	2000

8BA- & 0BA-12127

Degrees	Vacuum	RPM
0-0°	0"	200
0-1°	0.30"	500
5.2-6.2°	1.32"	1000
8¾-10°	2.85"	1500
10-11¼°	3.7"	2000

7HA-12127

Degrees	Vacuum	RPM
0-0°	0"	200
1¾-3°	0.4"	500
5½-6¾°	1.4"	1000
11½-13°	5.5"	1000
8½-9¾°	2.9"	1500
10½-11½°	4.1"	2000

8MTH-12127

Degrees	Vacuum	RPM
0-0°	0"	200
2-3°	0.4"	500
6¼-7¼°	1.3"	1000
10½°-12°	3.6"	1500
9¼-10¼°	2.6"	1600

IGNITION TIMING

IGNITION TIMING:	Std. Setting
6 Cyl. "G" Engine	1° BTDC.
6 Cyl. "H" & "M" Engine	At TDC.
V8 1946-47 Engines	4° BTDC.
V8 1948-50 Engines	2° BTDC.

Timing Mark (6 Cyl. "G" & 1946-47 V8 Engines) No timing mark provided. See Ignition Timing for final ignition setting and Vacuum Brake setting.

Timing Mark (6 Cyl. "H" Engine)—Circular boss or groove in dampener (two types used) and two pointers on engine front cover. Use pointer nearest to outer circumference of dampener.

Timing Mark (6 Cyl. "M" Engine)—Groove on dampener and pointer on engine front cover.

Timing Mark (V8 1948-50 Engine)—Circular boss on crankshaft pulley and pointer on right side of engine front cover.

1946-47 TIMING PROCEDURE

Basic Timing (Distributor off Engine): Place a small straightedge or scale against tang on drive end of distributor shaft with scale on **widest side** of shaft, rotate distributor shaft in direction of rotation (clockwise) to the following position: **6 Cyl.—Leading** edge of scale exactly ⅝" **before** nearest edge of distributor mounting hole on vacuum piston mounting flange. **8 Cyl.—Trailing** edge of scale exactly ⅜" **past** nearest edge of small mounting hole (left hand hole—nearest vacuum brake) on mounting flange. If contacts do not begin to open at this point (left hand timing contacts on V8), loosen adjusting screw on side of distributor housing, move screw down to advance spark, or up to retard spark, until contacts begin to open, tighten adjusting screw. This setting will provide correct timing when distributor installed on engine.

Ignition Timing (On Engine)—No flywheel marks or other means provided to check timing on engine. If basic setting of distributor is correct (above), all necessary adjustments for operating conditions and octane rating of fuel being used can be made by means of the Vacuum Brake adjustment as follows: **Vacuum Brake Setting**—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, then turn screw in just enough to eliminate ping, tighten locknut. When adjusted on the stroboscope, vacuum brake should retard spark to peep sight with peep sight set at 2° when distributor is driven at 650 RPM with no vacuum to release brake.

1948-50 TIMING PROCEDURE

Timing—With #1 piston at firing position and timing mark aligned with pointer on front of engine, loosen distributor clamp screw, rotate distributor until contacts begin to open, tighten clamp screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.

Timing (with Neon Timing Light)—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark timing mark and pointer with white chalk (6 cylinder equipped with two pointers use pointer nearest to outer circumference of dampener). Connect timing light to #1 spark plug, idle engine, adjust distributor by loosening clamp screw and rotating distributor until mark and pointer are aligned, tighten clamp screw, connect vacuum line.

CARBURETOR

CARBURETION: Holly-Ford Downdraft (except C-O-E 6 Cyl. Engine Updraft). Single barrel (6 Cyl.), Dual (V8) types with manual choke control.

Engine	Ford Carburetor No.
6 Cyl. "G" Engine	5GA-9510A
6 Cyl. "H" Engine	7HT-9510A or ①7HW-9510A
6 Cyl. "M" Engine	8MTH-9510A or ①8MWH-9510A
V8 1946-47 Engine	59A-9510A
V8 1948-50 Engine	7RT-9510A

①—Updraft type carburetor.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Jets—***See Holley-Ford Jet Specification Table in Carburetor Section.***

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: Oil-bath type air cleaner used on all models.

Fuel Pump: Diaphragm type fuel pump or combination fuel-and-vacuum pumps used as follows:
6 Cyl. "G" Engine—Ford No. 1GA-9350.
6 Cyl. "H" & "M" Engines—Ford No. 7HA-9350B (first), replaced by 1HA-9350A (later).
V8 Engine—(Fuel Pump) Ford No. 59A-9350 (1946-47), No. 7RA-9350C (1948-50). (Combination fuel-and-vacuum Pump) No. 7RA-9350E (replaced by 1BA-9350H) or No. 8CM-9350A (replaced by 8CM-9350C).
Pressure—4-5 lbs. (6 Cyl.), 3½-4½ lbs. (V8).

See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley electric type.
Dash Unit—(1946-47) Ford No. 11C-9280A, (1948-50) No. 7RC-9280.

Tank Unit—	1946-47	1948-50
Comm'l	99A-9275B	①7RC-9275
Clsd. Cabs	21C-9275A	7RC-9275
Panels	21C-9275B	②
C-O-E	01W-9275.	7RC-9275
School Bus	594T-9275	7RT-9275

①—Or No. 21C-9275B.
②—(F1, 2, 3) 21C-9275B, (F4, 5, 6) 7RT-9275.

See Carburetion Equipment Section for complete data.

BATTERY

Std.—Ford 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Grounded Terminal—Positive (+) terminal.
Dimensions—L. 10½". W. 7⅛". H. 7¼".

Location—At rear of engine on right side (V8), left side (6 Cyl.). On right running board under separate cover on Cab-Over-Engine trucks.

School Bus (Spec. Equip. Other Models): Ford No. 01A-10655-A. 6 Volt, 17 Plate, 120 Ampere Hour Grounded Terminal & Location—As given above.

STARTER

Ford. Four-pole, two-coil type with Bendix Drive.

Engine Type	Ford Starter No.
6 Cyl. "G" & V8 (1946-47)	18-11002
6 Cyl. "G" (1946-47)	7HA-11002
V8 (1946-47)	7RA-11002
6 Cyl. "H" & "M", V8 (1948-50)	①FAD-11002A

①—See Drive Data below for two types of Drive.

Armature No.—Ford No. 18-11005.

Drive—10 Tooth Pinion Type (All V8, Early 6 Cyl.) Ford No. B-11350 (Bendix No. A1472) for use with 112 tooth flywheel ring gear.

Drive—9 Tooth Pinion Type (Late 6 Cyl.) Ford Part No. 8HA-11350 (with 114 tooth flywheel ring gear).

►***6 CYL. STARTER DRIVE CAUTION—Use proper type drive. Both 9 and 10 tooth pinions used as listed above.***

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—48-56 ozs. each.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on front of dash next to battery (left side on 6 Cyl. Conventional Truck, right side all others) controlled by pushbutton, Ford No. 11C-11500.

Removal: On right front face of flywheel housing cover. To remove, take off right engine splash pan (if used), free starter-to-oil pan bracket, take out 2 starter through bolts.

GENERATOR

Ford 2 brush type with voltage & current regulation.

Engine Type	Generator No.	Amps. Capacity
6 Cyl. "G" (1946-47)	5GA-10000	30
6 Cyl. "H" (1947)	7HA-10001B	30
V8 (1946-47)	21A-10000	30
All (1948-50)	①8BA-10002A, D	30
All (1948-50)	①8BA-10002B	40

①—Replaced by No. FAA-10002A or FAA-10002B.

Armature No.	Generator No.
8BA-10005A	5GA- & 21A-10000
8BA-10005A	7HA-10001B
0A-10005A	8BA-10002A & D
8EH-10005	8BA-10002B

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—Controlled by regulator dependent on load and battery condition.

Performance Data

	Maximum Rate Amperes	Eng. RPM
5GA-10000	30	1650
7HA-10001B	30	1650
21A-10000	35	935
8BA-10002-A	35	935
8BA-10002-B	40	1060
8BA-10002-D	35	900

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-36 ozs. each.

Removal (V8): On support secured to valve chamber cover by stud and nut, driven by belt in tandem with water pumps. To remove, loosen stud nut and disengage generator belt, take out capscrew in mounting strap, lift generator off support.

Removal (6 Cyl.): Separate generator mounting bracket mounted on engine bracket on left side of engine at front. To remove, slack off belt by loosening mounting bracket bolts, take out mounting strap bolt, lift generator off mounting bracket.

Belt Adjustment (V8): Loosen 2 bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulleys is ½" (thumb and finger pressure), tighten stud nut. Adjust fan belt in similar manner, tighten 2 fan bracket bolts.

Belt Adjustment (6 Cyl.): ½" deflection midway between generator and pump pulleys. To adjust, loosen 2 mounting bracket bolts under generator and capscrew in bracket slot behind generator.

REGULATOR

Ford. 3-unit, vibrating voltage and current regulators.

Ford Regulator No.	Rating & Application
51A-10505A①	(30-33) All 30 Amp. Gen.
51A-10505H①	(34-38) All 35 Amp. Gen.
5EH-10505C②	(38-42) All 40 Amp. Gen.
8L-10505②	(40-42) All 35 & 40 Amp. Gen.

①—Replaced by No. FAC-10505A.

②—Replaced by No. FAD-10505A.

See Electrical Equipment Section for complete data.

NOTE—Ground wire between generator and regulator must be in place.

Cutout Relay

Regulator	Cuts In
51A-10505-A,H, 5EH-10505-C	6.6-7.0 Volts
8M-10505-A, 8L-10505	6.0-6.6 Volts

Cuts Out (Discharge—0-8 Amperes.

Contact Gap—.010" (armature against upper stop).

Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting COLD①
All	7.2-7.6 Volts

①—Voltage settings will increase approx. .2 volts after 20 minutes running.

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

►***CAUTION—Make certain gauge contacts armature and not brass rivet on underside of voltage armature.***

Contact Spring Tension—5 ounces minimum with contacts just opening.

Current Regulator

Regulator	Current Setting COLD Amperes
51A-10505-A	30-34
51A-10505-H, 8M-10505-A	34-38
5EH-10505-C, 8L-10505	38-42

Checking & Adjustment—*see Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

Contact Spring Tension—5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).

Beam Indicator—Bulb between Fuel and Oil Gauges on panel. Lighted when Upper Beam in use.

Switches

Lighting—Ford. (1946-47 exc. "H" Eng.) 11A-11652, (1947 "H" & All 1948-50) No. 7RA-11654.

Beam Selector—Ford. (1946) No. 11A-13532, (1947-50) No. 8A-13532.

Instrument—Ford No. 21C-13740 (All Models).

Stop Light—Ford. (1946-47) No. 11A-13480, (1948-50) No. 0A-13480 (this switch has waterproof coating).

MISC. ELECTRICAL

CIRCUIT BREAKERS (1946-47): Ford No. 11A-12250C. Combined with ignition resistor on block on dash under cowl. Two separate circuit breakers (one protects Head Light circuits, second unit protects other units). Contacts open with current of 50 amperes and vibrate to limit current (thermostatic, wound-coil type).

CIRCUIT BREAKERS (1948-50): Ford No. 8C-12258B. Consists of two circuit breakers on block behind instrument panel (one 15-ampere unit, one 30-ampere unit). One unit protects Head Light circuit, other unit protects other circuits.

HORNS: Single horn Std., Dual Horns with relay optl.

ENGINE

►*VARIOUS ENGINES USED AS FOLLOWS:*

1946-47 6 CYL. "G" ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. "L" Head type.
Bore—3.30". **Stroke**—4.40".
Displacement 226 cu. ins. **Rated H.P.**—26.13.
Developed Horsepower—90 at 3300 RPM.
Compression Ratio—6.7-1 Cast Iron head.

►*FOR ALL ENGINE DATA, see Ford 1946-48 Six Cylinder Passenger Car data.*

1946-47 V8 "100" ENGINE

ENGINE SPECIFICATIONS: V8 "L" Head type.
Bore—3.187" **Stroke**—3.75".
Displacement—239 cu. ins. **Rated H.P.**—32.5.
Developed Horsepower—100 at 3800 RPM.
Compression Ratio—6.75-1 Cast Iron heads.

►*FOR ALL ENGINE DATA, See Ford 1946-48 V8 Passenger Car data.*

1947-50 6 CYL. "H" ENGINE

ENGINE SPECIFICATIONS: "H" 6 Cyl. "L" Head.
Bore—3.30" **Stroke**—4.40"
Displacement—226 cu.ins. **Rated H.P.** 26.1.
Developed Horsepower—95 at 3300 RPM.
Compression Ratio—6.8-1. Cast Iron head.

►*FOR ALL ENGINE DATA, see Ford Six Cylinder "H" Engine Passenger Car data and note also:*

►*"H" ENGINE CAMSHAFT PRODUCTION CHANGE & TAPPET CLEARANCE ADJUSTING CAUTION:* TWO different camshafts used with different Valve Timing and special Tappet Clearance settings. *See "Camshaft & Bearings" in Ford Special Data for Camshaft data, see Valve Timing (below) for Tappet Clearance & Valve Timing.*

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ENGINE

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1948-50 V8 "R" ENGINE

ENGINE SPECIFICATIONS: "R" V8 "L" Head type.
Bore—3.187" **Stroke**—3.75"
Displacement—239 cu.in. **Rated H.P.** 32.5
Developed Horsepower—100 at 3800 RPM.
Compression Ratio—6.8-1. Cast Iron head.

▷*FOR ALL ENGINE DATA, see Ford V8 Passenger Car Data and note also:*

▷*"R" ENGINE CAMSHAFT PRODUCTION CHANGE & TAPPET CLEARANCE ADJUSTING CAUTION:* TWO different camshafts used with different Valve Timing and special Tappet Clearance settings. *See Valve Timing (below) for Tappet Clearance and Valve Timing*

1950 6 CYL. "M" ENGINE

ENGINE SPECIFICATIONS: "M" 6 Cyl. "L" Head.
Bore—3.5" **Stroke**—4.40"
Displacement—254 cu.in. **Rated H.P.** 29.4
Developed Horsepower—110 at 3400 RPM.
Compression Ratio—6.8-1. Cast Iron head.

▷*"M" ENGINE DATA—Same as for Ford "H" Engine except as noted below. See Ford 6 Cyl. "H" Engine Passenger Car data and note the following:*

▷*PISTON PRODUCTION CHANGE: Split-skirt pistons used in early 1950 production, solid-skirt pistons in later 1950. Fit pistons as follows:*
Fitting Pistons—Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows: New piston in new bore .0015". New piston in used bore .002". Used piston in used bore .003". Pounds pull to withdraw: 5-10 lbs.

Piston Rings: Two compression, one oil ring.

Ring	End Gap	Side Clearance
Compr. (#1)	.007-.047"	.002-.0035"
Compr. (#2)	.007-.047"	.0015-.003"
Oil (#3)	.007-.047"	.0015-.003"

Connecting Rod: Special type marked "8MTH-D".
Weight—32 ozs.

▷*CAMSHAFT PRODUCTION CHANGE & REPLACEMENT CAUTION: TWO types used with special gears as indicated below. See "Camshaft & Bearings" in Ford Special Data for Camshaft data.*

Timing Gears: *CAUTION*—7HA-6256-A Camshaft gear used with early unmarked camshaft. 7HT-6256-A Camshaft gear used with marked camshaft in either "H" or "M" engines.

▷*NOTE*—7HA-6256-A Camshaft gear can be used with the unmarked camshaft by increasing the chamfer from 15° to 45°. 7HT-6256-A Camshaft gear can be used with either the marked or unmarked camshaft without interference. Same tappet clearance used for both camshafts.

Valves: Intake Valves are "Free Type", Exhaust Valves are "Rotatable Type." *See "Valve System" in Ford Special Data.*

▷*"M" ENGINE VALVE STICKING CORRECTION:* Correct complaints of sticking valves by modifying cylinder block and valve chamber oil baffles as follows:
Cylinder Block Modification—Drain crankcase and remove oil pan. Position crankshaft to provide access to bottom of valve chamber floor. Remove valve chamber covers and oil baffles. Locate centers for holes to be drilled in **front** and **rear** valve chamber (center chamber not affected) as follows: In line with EACH end (exhaust) cam in front and rear chamber, center-punch hole location exactly 1⅛" out toward crankcase wall from center-line of camshaft *(NOTE*—some engines may have cored hole at rear of rear valve chamber, if not, this hole must be drilled). Install a shield to keep chips and metal particles off crankshaft and camshaft, drill a ¼" pilot hole at each center-punched location (two in each end chamber), then drill vent holes out with a ⅝" drill. Carefully brush out all chips from valve chamber and flush valve chamber with solvent. Wash camshaft, crankshaft, and underside of valve chamber floor with solvent to remove all metal particles, wipe solvent off as completely as possible.
Valve Chamber Oil Baffle Modification—Install NEW TYPE BAFFLE No. 8MTH-6524-A in front and rear valve chambers, re-install original baffle in center valve chamber.

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—SEVERAL CAMSHAFTS used on some engines require DIFFERENT TAPPET CLEARANCE as listed below.*

6 CYLINDER "G" ENGINE

Intake & Exhaust—.013-.015" COLD. *See "Tappet Clearance Adjustment" in Ford Special Data.*

6 CYLINDER "H" ENGINE

▷First Type Camshaft No. 7HA-6250-C.
(Camshaft stamped "CWC" on forward end)
Intake .009-.011", **Exhaust** .013-.015" COLD. Self-locking adjusting screws located in lifters.

Later Type Camshaft No. 0HA-6250-A
(Camshaft stamped "0" on forward end)
(Engine marked "0H" above #3 Intake Port)
Intake .013-.015", **Exhaust** .017-.019" COLD. Self-locking adjusting screws located in lifters.

6 CYLINDER "M" ENGINE

Intake .009-.011", **Exhaust** .014-.016" COLD. Self-locking adjusting screws located in lifters. *TWO CAMSHAFTS USED (Tappet clearance same for both). NOTE*—.002" additional exhaust valve clearance recommended for high speed operation.

V8 1946-47 ENGINE

Intake—.010-.012". **Exhaust**—.014-.016" COLD. *See "Tappet Clearance Adjustment" in Ford Special Data.*

V8 1948-50 ENGINE

First Type Camshaft No. 8BA-6250-A
(No markings on Engine or Camshaft)
Intake .010-.012", **Exhaust** .014-.016" COLD. *See Tappet Clearance Adjustment in Ford Special Data.*

Later Type Camshaft No. 8BA-6250-B
(Engine marked "GAP, in-.014", ex-.018")①
(Camshaft marked "B" on front end)

Intake Valves	.014" (.013-.015") COLD
Exhaust Valves	.018" (.017-.019") COLD

①—On top of block at center under valve cover.

▷*CAUTION—"R" V8 Engines—Loss of Power will result if correct tappet clearance is not used with "B" (late type) camshaft. See Tune-Up for Camshaft Identification data.*

VALVE TIMING: *For Camshaft Settings, see Ford Passenger Car data pages.*

▷*VALVE TIMING CAUTION: Valve Timing is different for each type camshaft on some engines only as listed below:*

6 Cyl. "G" Engine
Intake Valves—Open 3° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

1946-47 V8 "100" Engine
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

6 Cyl. "H" & "M" Engines
Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.
NOTE—Valve Timing same for BOTH Camshafts.

V8 "R" Engine (First Type Camshaft)
(No markings on Engine or Camshaft)
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

V8 "R" Engine (2nd. Type Camshaft)
(Camshaft marked "B" on front end)
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 3° ATDC.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings. Timing gears and distributor drive gear lubricated through drilled hole in front end of camshaft on V8. Timing gears lubricated by spray past camshaft thrust plate on 6 cylinder engine.

▷***OIL PAN CLEAN-OUT PLATE—On underside of oil pan, attached by 7 nuts. Remove to clean oil pump intake and screen, and oil pan.***
Crankcase Capacity—5 qts. (All exc. "M" Eng.), 6 qts. ("M" Engine only).
Normal Oil Pressure—(6 Cyl. "G") 35 lbs. at 2000 RPM. (All Others) 50 lbs. at 2000 RPM.

Oil Pressure Relief Valve (6 Cyl.): In cylinder block just to rear of oil filter mounting. Not adjustable. Regulator Spring Tension—("G" Eng.) 44-56 ozs. compressed to 1.40", ("H" & "M" Eng.) 12.76 lbs. plus or minus 2 ozs. compressed to 1.14".

Oil Pressure Relief Valve (V8 Eng.): Located in oil pump body. *NOTE*—Some 1946-47 engines may also have relief valve located under plug above front camshaft bearing in cylinder block under manifold. **Regulator Spring Tension**—(1946-47) 78-87 ozs. compressed to 1.380", (1948-50) 12 lbs. plus or minus 2 ozs. compressed to 1.14". *NOTE*—If relief valve in cylinder block is used (with pump relief valve), spring tension should be 78-87 ozs. compressed to 1.380".

Oil Pump (6 Cyl. "G" Engine): Gear type. Mounted in crankcase on front main bearing cap and driven from crankshaft timing gear (pump body integral with bearing cap).
Oil Pump Servicing—*See Ford Special Data.*

Oil Pump (6 Cyl. "H" & "M" Engines): Rotor type. Mounted externally on right side of crankcase.

▷Oil Pump Driven Gear Replacement before 6 Cylinder Engine No. 7H-219349—*See Ford Shop Notes.*
Oil Pump Servicing—*See Ford Special Data.*

Oil Pump (V8 Engine): Gear type (two types: one equipped with spur gears, second helical gears). In crankcase at rear of engine.
Oil Pump Servicing—*See Ford Special Data.*

Oil Filter: On 6 cylinder, mounted directly on block (no external oil lines) on left side at rear. On V8, mounted on left cylinder head. Replace cartridge every 5000 miles or more often if required.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (1946-47) 41C-9273, (1948-50) 7RC-9273.
Engine Unit—Ford No. 41A-9278 (All Models).
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet) with outlet pipe in rear valve chamber extending down on right side of 6 cylinder engine, or from top of engine down behind fan and out along left side of V8 engine.
V8 NOTE—Outlet pipe may be equipped with filter element just below upper elbow.

C OLING

Cooling System: Pressure type with relief valve in filler cap, by-pass in block, and belt-driven water pump (two pumps used on V8 engines).
Capacity—(1946-47 6 Cyl. "G" & 1948-50 F1, F2, F3 with "H" Engine) 17 quarts, (Other 6 Cyl. "H" & "M" Engine models) 18 quarts, (All V8 Engine Models) 23 quarts.
Pressure Valve—In radiator filler cap. Ford Nos. 41A-8100-B (with knurled edge) or 41A-8100-A (flange type grip—use with 51A-8138 radiator cap gasket). Opens at 3½-4½ lbs.

Water Pump (6 Cylinder): Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing. No lubrication required.
See Water Pump Section for complete data.
Removal—Drain cooling system, disconnect hose connection at pump, remove fan blade assembly by taking out capscrews in shaft hub. Remove pump mounting capscrews and lift pump out.

Water Pumps (V8 Engine): Two used. Centrifugal, belt-driven, packless type. Shaft mounted on pre-packed ball-bearing at front, and a bushing next to seal. Oil cup provided for bushing lubrication.
See Water Pump Section for complete data.

►*8 1948-50 PUMP LUBRICATION CAUTION: Fill oil cup in pump with SAE #20 engine oil every 1000 miles. When oiling new pump insert piece of wire down alongside wick in oiler to permit air to escape from cavity.*
Removal—Drain cooling system. Place support jack under engine (use wood block to avoid damaging oil pan), remove engine front support bolts, raise engine just enough to remove weight from supports. Disconnect and remove water pump hose. Remove all water pump mounting capscrews. *(CAUTION*—one screw located within hose connector fitting—accessible with hose removed), lift pump out.

Thermostat: In cylinder head water outlet (2 on V8).

Model	Thermostat No.	Opening Temp.
1946-47 6 Cyl. "G"	1GA-8575A	158°F
1946-47 V8①	11A-8575B	148-153°F
1946-47 V8②	11A-8575C	158-162°F
1947 6 Cyl. "H"③	7HA-8575B3	148-153°F
1947 6 Cyl. "H"④	7HA-8575A3	157-162°F
1947 6 Cyl. "H"⑤	7HA-8575C	177-182°F
1948-50 6 "H" & "M"	7HT-8575B	157-162°F
1948-50 6 "H" & "M"	8HT-8575B	157-162°F
1950 6 Cyl. "M"	8HT-8575A	148-153°F
1948-50 V8	8RT-8575B	148-153°F

①—Use with Radiator Pressure Cap only.
②—DO NOT use with Radiator Pressure Cap.
③—Dole type (replaces 7HA-8575B1 Bellows type).
④—Dole type for use with Radiator Pressure Cap and Permanent Anti-freeze only.
⑤—Use with Permanent Anti-freeze only.

Temperature Gauge: King-Seeley electric. NOTE—V8 engines have regular sender (Engine Unit) in Right Hand cylinder head, additional Temperature Switch in Left Hand cylinder head (causes dash unit to read "hot" if this bank overheated).
Dash Unit—Ford No. (1946-47) 11C-10883A, (1948-50) 7R-10883.
Engine Unit ("Sender" located in R.H. cylinder head on V8 Engines)—Ford No. (1946-47) 99A-10884, (1948-50) 8A-10884.
Temperature Switch (V8 only—located in L.H. cylinder head)—Ford No. (1946-47) 01A-10990, (1948-50) 8A-10990.
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI (Com'l.), 11CF-CI (All others). *Semi-centrifugal, single plate, dry disc types.*
See Clutch Section for complete data.
Facings (10CF)—Moulded. 10" O.D. .125" thick.
Facings (11CF)—Woven (School Bus), Moulded (Others). Outside Diameter 11". Thickness .137".
Pedal Adjustment: 1-1¼" (F-1 with 3 spd. Trans.), 1½-1¾" (All Others) pedal free travel. Adjusting clevis provided at forward end of connector rod between pedal shaft and equalizer shaft.
Removal: Remove transmission (see TRANSMISSION Removal below). Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out. NOTE—Flywheel housing may have to be removed on some models.

TRANSMISSION

3-SPEED TYPE

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.
NOTE—Heavy Duty 3-Speed or 4-Speed Transmission optl. on models where this transmission used.
Removal: Remove propeller shaft by disconnecting rear universal and sliding shaft out of transmission. Disconnect clutch linkage and speedometer cable. Remove front floor plate. Remove nuts and washers from two engine rear support bolts. Raise rear end of engine (use block of wood on jack under engine) until rear support clears mounting bolts. Remove transmission mounting capscrews, pull transmission straight back until main drive gear shaft clears clutch, lift transmission out through floor opening.

HEAVY DUTY 3-SPEED TYPE

Own Make. Heavy duty, 3-speed, Helical gear, constant-mesh, synchro-mesh (Second & High). Sliding spur gear (Low & Reverse).
See Transmission Section for complete data.
Removal: Same as for 4-Speed type following.

4-SPEED

Own Make. 4-speed, sliding spur gear type.
See Transmission Section for complete data.
Removal: Remove seat cushion, floor mat, and transmission cover on floor. Support engine with jack under flywheel housing (use wood block on jack), raise jack until engine weight is off rear mounting. Free coupling shaft support bearing from crossmember by removing nuts on two bolts, disconnect front universal joint by taking out four bolts mounting universal joint flange at hand brake drum and disconnect intermediate universal joint at support bearing by removing nuts on "U" bolts (tape bearing caps in place to prevent losing needle bearings), remove front shaft. Remove clutch equalizer shaft by taking out pin in clutch shaft and clevis pin at lever and pulling equalizer shaft off the bracket (CAUTION—Do not lose spring and bushing halves). Remove two bolts in engine rear support. Disconnect speedometer shaft at transmission. Remove transmission capscrews from flywheel housing, pull transmission straight back until clutch (main drive gear) shaft clears, then lift transmission out through floor opening.

4-SPEED SYNCHR -MESH

Own Make. 4-speed constant-mesh type, Synchro-mesh (Second, Third & High). Helical gears used for second, third and fourth speed. Spur gears used low and reverse. *See Trans. Sect. for complete data.*
Removal: Same as for 4-Speed spur gear type (above).

UNIVERSALS

Spicer. Needle bearing type. Two used (114" WB. Light Duty and C-O-E 101" & 110" Trucks), Three used with slip joint at forward end of rear shaft behind coupling shaft support bearing at intermediate universal joint (Other Trucks).

	Spicer Model Nos.		
Wheelbase	Front	Center	Rear
114"①	1278-102X	None	1278-102X
114"②	1311-102X	None	1318-105X
122"	1318-103X	1311-102X	1318-103X
134" & 158"	1358-54X	1351-5107X	1358-5104X
101" & 110"	1351-517X	None	1358-5104X
194"	1358-514X	1351-5107X	1358-5107X

①—3-Speed Transmission. ②—4-Speed Trans.

Coupling Shaft Center Bearing: Consists of cushion mounted ball bearing bolted to underside of frame intermediate cross-member.

REAR AXLE

1946-47 ¾-FLOATING TYPE

Own Make. ¾ Floating, Spiral Bevel Gear type with straddle-mounted pinion and Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (6 Cyl.)—3.78-1 Std., 3.54-1, 4.11-1 Optl.
Ratio (V8)—3.54-1 Std., 3.78-1, 4.11-1 Optl.
Backlash—.012" Maximum.
Removal: Raise rear end of frame, disconnect propeller shaft by removing two "U" bolts and nuts in rear universal joint, lower propeller shaft. Disconnect hand brake cables and brake lines at rear axle (bleed brakes when line re-connected). Disconnect rear shock absorber links, disconnect rear springs, withdraw axle assembly from underneath.
Axle Shaft Removal—Axle assembly must be dismantled and axle shaft removed at inner end through differential housing. *See Ford Rear Axle article (in Rear Axle Section) for complete data.*

1948-50 SEMI-FLOATING HYPOID

Own Make. Semi-floating, Hypoid Gear type with Hotchkiss drive (separate carrier not used). Axle ends flanged (no separate hub).
►*NOTE—AXLE NOT SAME AS USED ON FORD CAR.*
See Rear Axle Section for complete data.
Ratio—3.73-1 Std., 4.27-1 Optl.
Backlash—.003-.006". Shim adjustment.
Removal: Raise rear of truck. Disconnect rear universal. Remove axle shafts (see instructions below). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Remove nuts on rear spring "U" bolts, drive bolts up free of housing, lower axle assembly and remove from underneath
Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer nuts (work through opening in axle shaft flange). Use Puller No. 4235 and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).
Wheel Bearing Adjustment: None. Pre-lubricated sealed ball-bearings.

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FULL-FLOATING TYPE

Own Make. Full-floating, Spiral Bevel Gear type with Hotchkiss drive. *See Rear Axle Sect. for data.*

Ratios:	Standard	Optional
¾ Ton	4.86-1 (34-7)	4.11-1 (37-9)
1 Ton	5.14-1 (36-7)	5.83-1 (35-6)
Others	6.66-1 (33-5)	5.83-1 (35-6) 5.14-1 (36-7)

Backlash—.004-.018".

Removal: Raise rear end of frame, remove axle shafts (see below), wheel and drum assemblies. Disconnect hydraulic brake line at each wheel and hose at bracket (bleed brake lines when re-connected). Remove backing plate assemblies. Disconnect rear universal. Remove nuts on rear spring "U" bolts, drive bolts up free of housing, lower axle assembly and remove from underneath truck.

Axle Shaft Removal: Remove hub cap, remove nuts on 8 hub studs holding axle shaft flange in place, turn 2 special screws (in tapped holes in flange) up evenly to break flange loose from hub, back these screws out, strike axle shaft flange at center to loosen centering cones on studs, remove cones, pull axle shaft out (wheel not disturbed).

Wheel Bearing Adjustment: Remove axle shaft (see above), use special bearing adjustment wrench and remove bearing locknut (outer nut), and lockwasher. Adjust bearings by turning bearing adjusting nut (inner nut) up until tight and then backing nut off ⅛ turn. Install bearing lockwasher making certain that it fits over dowel pin on adjusting nut, install bearing locknut and turn this nut up tight. NOTE—When installing axle shaft make certain that gasket in place under shaft flange, cones in place on studs and that two loosening screws backed off sufficiently so that stud nuts can be tightened securely. Turn two loosening screws in just enough to prevent loosening in service.

TWO-SPEED TYPE

Own Make. Vacuum Operated Shift, Two-speed, Full-floating, Spiral Bevel Gear (final drive), spur gear planetary unit (reduction gearing) with Hotchkiss drive. *See Rear Axle Section for data.*

Ratio—Std. 5.83-1 (Direct Spd.), 8.11-1 (2nd Spd.); **Optl.** 6.33-1 (Direct Spd.), 8.81-1 (2nd Spd.).

Backlash—.004-.018".

Removal: Same as for standard axle (above) after disconnecting vacuum line at hose connection.

SHOCK ABSORBERS

1946-47 MODELS

Houde (Houdaille). Double acting, hydraulic, adjustable type. Used at Front and Rear end (114" Light Duty Truck and 194" School Bus), Front end only (122" One Ton Truck).

Houde Model	Right—Ford No.—	Left
114", 122" Frt.	BBCN-3	51A-18045A 51A-18046A
114" Rear	BBCZ-3	51C-18080 51C-18081
194" Front	BBCHMS	
194" Rear	BBCLT	

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than 1 or 2 serrations at a time. NOTE—Stops limit adjustment.

Refilling: Check at 5000 mile intervals and fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404). Shock absorbers are identified by round top filler plug.

1948-50 MODELS

Houde (Houdaille). Direct acting, hydraulic type.

▷***Shocks are sealed (cannot be refilled or repaired).***

F-1, F-2, F-3—Ford No. 7RC-18045-B, Houde No. H-160 (Front). 7RC-18080-B, Houde H-170 (Rear). F-4, F-5, F-6 NOTE—Houde rotary type shocks optional equipment for front end only (Ford No. 8T-18045 Right, No. 8T-18046 Left). These shocks are adjustable and can be refilled. *See 1946-47 Shock Absorber data above.*

FRONT SUSPENSION

Front Axle—Conventional "I" beam section with Reverse Elliott ends and semi-elliptic springs.

Kingpin Inclination—(Comm'l., ¾ & 1 Ton incl. Par. Del., School Bus) 8° ± ¼°, (Others) 8¼° ± ¼° crosswise.

Caster—(1946-47 All Models) Pos. 1° to Pos. 3½°, (1948-50 Comm'l., ¾, 1 Ton exc. Par. Del.) Pos. 2½° to Pos. 4½°, (1948-50 Par. Del. & School Bus) Pos. 1° to Pos. 3°, (1948-50 Other Trucks) Pos. 1° to Pos. 3°. Maximum variation between wheels ½°.

NOTE—Caster angle controlled by wedge shims inserted between axle pads and springs. To increase caster, insert taper shims equally at both sides.

Camber—(All Models) Pos. ¼° to Pos. 1°.

NOTE—Maximum variation between wheels ¼°. Right wheel should not exceed left wheel.

Toe-In—(1946-47) 1/16" and set at 1-10 ratio to camber. (1948-50) 0-1/16" with truck empty.

STEERING GEAR

Ford (Gemmer design). Worm & Roller types with push-pull adjustments. *See "Gemmer 305, 335" in Steering Gear Section for complete data.*

Ford Part Nos.	1946-47	1948-50
Comm'l. ¾, 1 Ton	21C-3504A①	7RC-3504
Others (exc. C-O-E)	01T-3504	7RT-3504
C-O-E	01W-3504	7RW-3504B

①—No. 21C-3504B with steering column gearshift.

BRAKES

1946-47 MODELS

Service—Lockheed Hydraulic, double anchor type. *See Brake Section for complete data.*

Drums—Composite (Cast iron and steel).

	Front — Drum Diameter — Rear
Light Duty (114")	12" 12"
1 Ton (122")	12" 14"
Other Trucks	14" 15"

Lining—Molded type (all shoes).

	Width	Thickness	Length per Shoe①
Light Duty (114")	1.75"	.20"	13.5"—10.28"
1 Ton (Front)	1.75"	.20"	13.5"—10.28"
1 Ton (Rear)	2.00"	.27"	15.53"—10.78"
Others (Front)	2.00"	.27"	15.53"—10.78"
Others (Rear)	3.50"	.335"	16.67"—11.57"

①—Forward Shoe—Rear (reverse) Shoe.

Clearance—Least possible amount without drag.

Hand Brake (Light Duty & 1 Ton Truck): Hand lever applies rear wheel service brakes.

Hand Brake (Other Trucks): Independent external contracting band on drum at rear of transmission.

Adjustment—*See 1948-50 Brake data below.*

1948-50 F-1 SERIES

Service—F-1: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameter: Front wheel 1.0655" (hone limit 1.0675"), **Rear 1.003"** (hone limit 1.005").

Drums—11" composite (cast iron and steel).

NOTE—Drum boring limit 11.060" max. diameter.

Lining—Molded or woven type. **Width**—2" (Frt. Whls.), 1¾" (Rear Whls.), **Thickness** 3/16".

Length per Shoe—11 29/32" (all shoes).

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

1948-50 F-2, 3, 4, 5, 6 SERIES

Service—F-2 (All Wheels), F-3 (Front): Ford-Lockheed Hydraulic, self-centering, double anchor type. F-3 (Rear Wheels), F-4, 5, 6 (All Wheels)—Ford-Lockheed Hydraulic, double anchor type.

▷**Parcel Delivery Note—Ford-Lockheed Hydraulic, double anchor, with 13⅛" I.D. drums and independent shaft brake at transmission.**

See Brake Section for complete data.

Wheel Cylinder Diameters:	Frt. Wheel	Rear Wheel
F-2①	1⅜x1"	1⅜x1"
F-3	①1⅜x1"	1⅜"
F-3 Par. Del.	1⅜"	1¼"
F-4, F-5, F-6	1¼"	1½"

①—"Stepped" type (1⅜" prim. shoe, 1" secondary).

Drum Diameter:	Frt. Wheel	Rear Wheel
F-2	12"	12"
F-3	12"	14"
F-3 Parcel Del.	13⅛"	13⅛"
F-4, F-5, F-6	14"	15"

Drum Reboring Limits—.020" on diameter for all models except F-4, F-5, F-6 **Rear Drums**—.060".

Lining—Molded type (all models).

Shoe Lining	Width	Thick.	Lgth.	per Shoe①
F-2 (Front & Rear)	1.75"	.187"	13.5"	—10.375"
F-3 (Front)	1.75"	.187"	13.5"	—10.375"
(Rear)	2"	.25"	15.516"	—10.75"
Par. Del. (Fr.&Rr.)	2"	.25"②	14.563"	—12.25"
F-4, 5, 6 (Front)	2"	.25"	15.516"	—10.75"
(Rear)	3.5"	.313"	16.625"	—11.516"

①—Forward Shoe—Reverse (Rear) Shoe.

②—Primary shoe thickness .187" (3/16").

Clearance—Least possible amount without drag.

Hand Brake (F-2, F-3): Hand lever applies rear wheel service brakes. See Service Brakes above.

Hand Brake (F-3 Parcel Delivery, F-4, F-5, F-6): Independent external contracting band on drum at rear of transmission.

Brake Adjustment: Set hand lever in fully released position and make certain that flat portion of cam is resting on rear of brake band upper end (if cam not flat, remove clevis pin in upper end of cam, adjust clevis rod until cam is flat when rod re-connected). Remove locking wire from brake band anchor adjusting screw (left side), turn screw clockwise until clearance between band and drum is .010" at the anchor screw, install lock wire. Loosen locknut on adjusting screw for lower position of brake band (round screw on brake mounting bracket), turn screw until clearance between lower portion of brake band and drum is .010", tighten locknut. Tighten adjusting nut at lower end of main adjusting bolt (on which band positioning springs are located) until clearance between upper portion of band and drum is .010". **Drum Diameter**—7.81".

Lining—Woven. Lgth. 24.6". Width 2½". Thick. ¼".

Power Brakes: Midland Hy-Power Vacuum unit Optl. *See "Midland Hy-Power Unit" in Brake Section for complete data.*

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper control arm.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. at cranking spd.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Ford No. 7HA-12127.
Breaker Gap—.024-.026".
Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Distributor Line (Carburetor Connection) Vacuum at Carburetor—0.5-0.7" at 800 RPM., 1.2-1.6" at 1000 RPM., 4.8-6.6" at 2200 RPM., 4.9-6.7" at 2400 RPM. (In. of mercury at specified Engine RPM).

IGNITION TIMING: TDC.
Timing Procedure—*See Ignition Timing.*
Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper timing.***

CARBURETION: *Holley-Ford Carburetor 8HA-9510A.*
Idle Setting—Approx. 1 turn open. One screw—turning screw out gives richer mixture.
Idle Speed—Approximately 500 RPM.
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely).

VALVE TAPPET CLEARANCE: .009-.011" Intake, .013-.015" Exhaust, COLD. This setting correct for No. 7HA-6250-C Camshaft. *See "Camshaft & Bearings" in Ford Special Data for other camshaft settings.*

►*ADJUSTABLE SELF-LOCKING TAPPET SCREWS*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-A (Mitchell type), No. 6A-11572-B (Briggs & Stratton type).
Ignition Lock—Ford No. 1A-11582-A.

COIL: Ford No. 7RA-12029-A or 8BA-12029.
Location—On left side of engine above distributor.
Ignition Current—Idling 2.75-3.0 amperes at 6 volts, 5.0-5.5 stopped. Coil primary resistance 1.05-1.15 ohms, (75°F). Secondary resistance 4100 ohms, (75°F).

CONDENSER: Ford No. 7RA-12300-C.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Ford No. 7HA-12127 (Less Cap and Rotor). New "Pressure" distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs. Operating vacuum taken from 1 carburetor connection (2 passages inside carburetor, 1 at venturi, 1 at throttle valve). Full spark advance obtained at 18-35 MPH. with normal road load or for part throttle operation at any speed.
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.
►**Excessive Pinging Correction**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*
Breaker Gap—.024-.026".
Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Unit

Distr. Degrees	Vacuum	RPM.
0-0	0"	200
1¾-3	0.4"	500
5½-6¾	1.4"	1000
11½-13	5.5"	1000
8½-9¾	2.9"	1500
10½-11½	4.1"	2000

Distributor Line Vacuum Test—*See Tune-Up.*

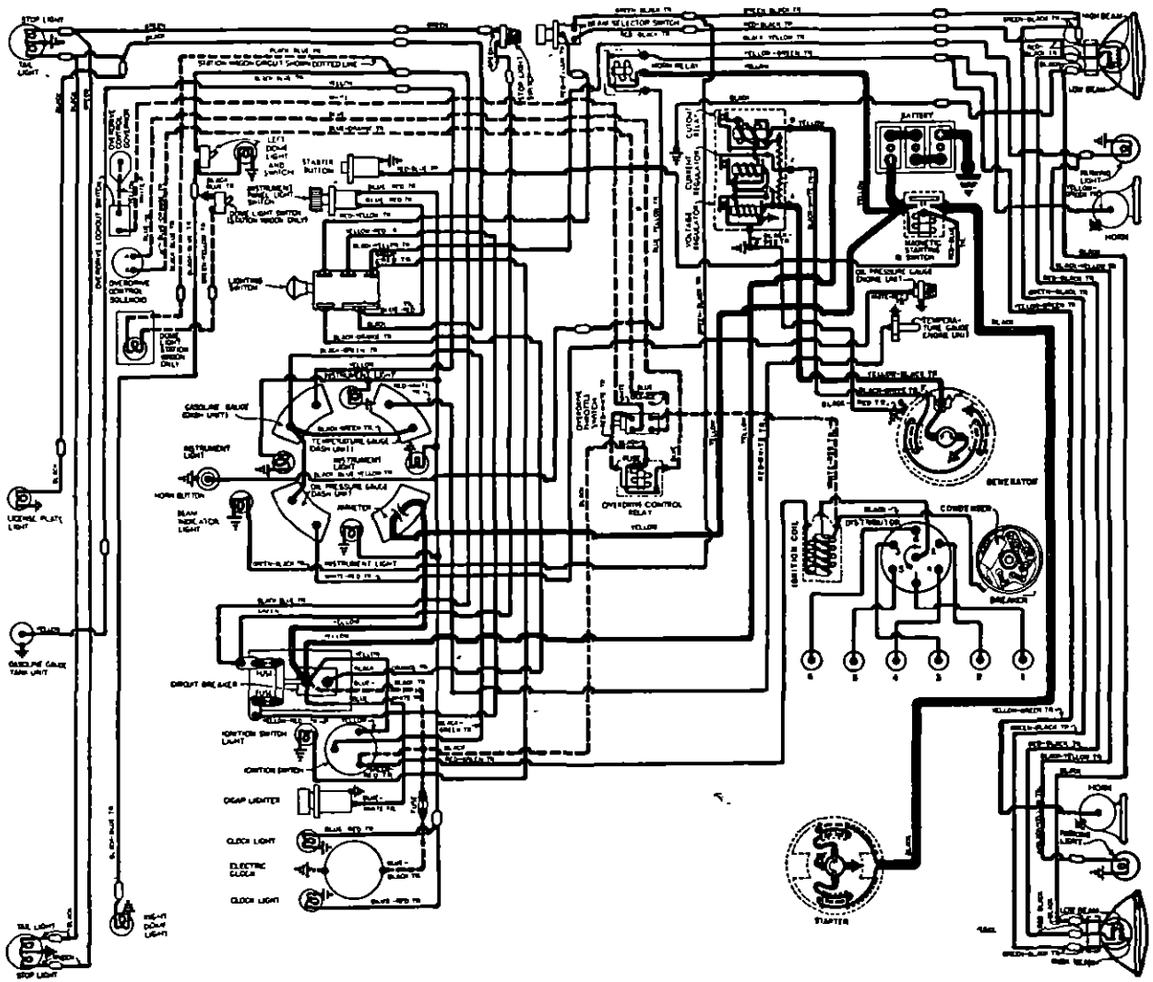
IGNITION TIMING

Std. Setting ..... **at TDC.**
Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. ***Use pointer nearest to outer circumference of dampener for proper timing.***
►**Timing (with Neon Timing Light)**—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark proper timing pointer (see Dampener Mark above) and dampener mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark aligned with pointer.

CARBURETOR

Holley-Ford No. 8HA-9510A (Repl. Carb. 8HA-9509A). Single barrel downdraft type with vacuum passages for distributor advance control.
See Carburetor Section for complete data.

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▷**Throttle Body Gasket Change & Installation Caution.** *See "Ford (Holley) Carburetor" in Carburetor Section.*

▷**Accelerator Assy. Interference Correction:** *See "Ford (Holley) Carburetor" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump: (Std.) Ford No. 7HA-9350-B (Replaced by No. 1HA-9350-A). Diaphragm type.
(Optl. Fuel & Vacuum)—Ford No. 8HA-9350 (Replaced by No. 1HA-9350-H).
Pressure—4-5 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-9280-A, (Red Ptr.) 8A-9280-B.
Tank Unit—No. 8A-9275 (Sta. Wg. 01A-9275A).
See Carburetion Equipment Section for complete data.

Air Cleaner (Std.—oil wetted): Ford No. OHA-9600-A. **Optl. (oil bath)**—Ford No. OHA-9600-B1 (1 pint cap.), OHA-9600-B4 (1 quart cap.).

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.

STARTER

Ford Model No. 7HA-11002. Armature No. 18-11005.
Service Replacement—Use No. 1A-11002A Starter with No. 1A-11140A Bracket.
Drive—Ford No. 8HA-11350 (9 tooth Pinion—use with 114 tooth Flywheel), or No. B-11350 (10 tooth Pinion—use with 112 tooth Flywheel).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on left front fender apron and controlled by panel pushbutton switch Ford No. 6H-11500.

GENERATOR

Ford. Two brush types with voltage and current regulation.

Generator No.	Type	Armature No.
8BA-10002-A①	35 Amp.	0A-10005-A
8BA-10002-B	40 Amp.	8EH-10005
8BA-10002-D	35 Amp.	0A-10005-A
8EL-10002-B	40 Amp.	8EH-10005

①—Replaced by 8BA-10002-D for service.
Maximum Charging Rate—See Performance.
Charging Rate Adjustment—See Regulator data.

Performance Data

Generator	Amperes	Eng. RPM.
8BA-10002-A	35	935
8BA-10002-B	40	
8BA-10002-D	35	900
8EL-10002-B	40	

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-36 ozs. each.
Belt Adjustment: ¼" deflection midway between generator and pump pulleys. To adjust, loosen 2 mounting bracket bolts under generator and capscrew in bracket slot behind generator.

REGULATOR

Ford. Vibrating, voltage and current type.

Ford Regulator No.	For Generator
51A-10505-A, C, H	8BA-10002-A, D
5EH-10505-C	8BA-10002-B
8L-10505	8BA-10002-B, 8EL-10002-B
8M-10505-A	*8BA-10002-D*

See Electrical Equipment Section for complete data.
NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Regulator	Cut-in (Volts)	Cut-out (Amps.)
51A-10505-A	6.6-7.0	0-8
51A-10505-C	6.4-6.9	0-8
51A-10505-H	6.6-7.0	0-8
5EH-10505-C	6.4-6.9	0-8
8L-10505	6.0-6.9	0-8
8M-10505	6.0-6.9	0-8

Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting①
51A-10505-A	7.2-7.6 volts
51A-10505-C	7.0-7.5 volts
51A-10505-H	7.2-7.6 volts
5EH-10505-C	7.2-7.6 volts
8L-10505, 8M-10505	7.2-7.6 volts

①—For regulator at normal operating temperature with room temperature of 70-80°F.

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.

Current Regulator

Regulator	Current Setting COLD	Amperes
51A-10505-A		30-34
51A-10505-C		30-33
51A-10505-H		34-38
5EH-10505-C		38-42
8L-10505		38-42
8M-10505		34-38

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Indicators—Right and Left indicators on lower edge of speedometer.
Direction Signal Flasher—Ford No. 8L-13350-B.

Switches
Lighting—Ford No. 7RA-11654.
Instrument—Ford No. 21C-13740.
Beam Selector—Ford No. 7RA-13532 or 8A-13532.
Dome Light (Exc. Sta. Wgn.)—Ford No. 8A-13752-B.
Dome Light (Sta. Wagon)—Ford 8M-13752-A.
Stop Light—Ford No. 11A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting (Headlights)—Ford No. 8A-12258-A. Behind instrument panel together with two lighting fuses (see wiring diagram).
Convertible Top—Ford No. 51A-12250-A. 30 ampere. On hydraulic pump motor or on front of dash near convertible top control switch.

FUSES: Auxiliary Lights (Parking, Tail & Instrument)—14 ampere. On circuit breaker bracket behind instrument panel (see wiring diagram).
Dome & Stop Lights—14 ampere. Next to fuse listed above.
Clock—2 ampere. In clock feed wire.
Overdrive—30 ampere. On relay on dash under hood.
Direction Signal—15 ampere. In feed from ignition switch to flasher.

HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), No. 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay. NOTE—"A" horns are 4.28" high, "B" horns are 4.14". Horns marked "HI" or "LO" on air columns.
Air Gap—.027-.029" for high pitch (right horn), .032-.034" for low pitch (left) for Sparks-Withington. NOTE—Air Gap for Auto-Lite type horns .040" HI, .050" LO.
Horn Current—13 amperes (high pitch), 14 (low).

Horn Relay: Ford No. 7RA-13853-B. On dash.

▷*CAUTION—Use only Ford type relay No. 7RA-13853-B with TAN plastic cover. If Mercury relay No. 7RA-13853-A with Black plastic cover installed, shock at button may result when blowing horn.*
Contact Gap—.015-.025".
Contact Closing Voltage—4 volts max.

ENGINE

ENGINE SPECIFICATIONS: Own 8HA. Six cylinder, "L" head type.
Bore—3.30". **Stroke**—4.40".
Displacement—226 cu. ins. **Rated HP**—26.13.
Developed Horsepower—95 at 3300 RPM.
Compression Ratio—6.8-1 cast iron head.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Ford Shop Notes.*

OIL PAN REMOVAL: *See Ford Special Data.*

ENGINE REMOVAL: *See Ford Special Data.*

CYLINDER HEAD AND GASKET INSTALLATION: *See "Cylinder Head" in Ford Shop Notes.*

▷**CYLINDER HEAD STUD CHANGE:** *See "Cylinder Head" in Ford Shop Notes.*

CYLINDER SLEEVE: Cast iron dry type cylinder sleeves furnished for replacement service.
See Ford Special Data.

PISTONS: 4-ring (all above pin), flat head, aluminum alloy, steel strut, U-slot, cam ground type.
Weight—17.35 ozs.
Removal—Pistons and rods removed from above.
Clearance—See Fitting Pistons

Fitting Pistons: Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin. Pull of 6-12 lbs. should be required to withdraw feeler of .003" thickness (New or Used Pistons in New or Used Bore).

Replacement Pistons: Standard size and .0025", .005", .020", .030", .040", .060" Oversize. *See Ford Special Data.*

PISTON RINGS: 2 compression, 2 slotted oil rings, all above pin. Upper oil ring groove drilled with oil drain holes, lower ring groove slotted.

ENGINE

CONTINUED FROM PRECEDING PAGE

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.047"	.0015-.003"
Compr. (#2)	3/32"	.007-.047"	.001-.0025"
Oil (#3, 4)	3/16"	.007-.047"	.001-.0025"

Replacement Rings: *See Ford Special Data.*

PISTON PIN: Diameter .8504" (maximum). Floating type (lock ring in piston at each end). Pin hole in connecting rod bronze-bushed.
Pin Fit in Piston—.0001-.0003" clearance (new), .0007" (worn limit).
Pin Fit in Rod—.0001-.0003" clearance.

Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" Oversize (yellow).

CONNECTING ROD: Length 8¼". Weight 29.0 ozs.
Crankpin Journal Diameter—2.2980-2.2988". Wear limits .0015" (out-of-round), .001" (taper).
Lower Bearing—Removable, steel-backed, copper-lead alloy lined, locked in type. No shims. Upper and lower halves interchangeable.
Clearance—.0004-.0027"
Sideplay—.006-.014" (new), .017" (worn limit).
►*BEARING ADJUSTMENT "M" ENGINES—CAUTION*—Connecting rods having shims must be serviced with the SHIMS IN PLACE. When assembling new rods and new crankshafts, if the bearing clearance is in excess of .0007" to .0013", the removal of one shim will reduce the clearance .00075". If both shims removed, bearing clearance will be reduced .0015".
Replacement Bearings: Standard and .002", .010", .020", .030", .040" Undersize. *See Ford Special Data.*

CRANKSHAFT: 4 bearing, integral counterweights.
Vibration Dampener—Viscous or rubber type.
Journal Diameters—2.8732-2.8740" (all bearings) wear limits—Out-of-round .0015". Taper .001".
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.0005-.0032".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in block and cap.

Replacement Bearings: Std., .002", .020", .030" U. S. *See Ford Special Data.*

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.004-.008".

CAMSHAFT: Four bearing with helical gear drive.
►*CAMSHAFT IDENTIFICATION:* Camshaft No. 7HA-6250-C (stamped "CWC") used on both "H" & "M" engines. *See Ford Special Data for later Camshafts (which may be used as replacement on these engines).*
►*NOTE*—Camshaft has phosphate coating (shows black oxide) beginning Eng. No. 8HA-2401 (Passenger Cars), 7HT-98891 (Trucks).
Bearing Diameter—1.9285" (replace bearing if diameter greater than worn limit 1.9315").
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.002".
Camshaft Bearing Servicing—*See "Camshaft & Bearings" in Ford Special Data.*

Replacement Bearings: Furnished Standard and .015" Undersize. *NOTE*—Std. bearing also furnished .080" Oversize on O.D.

End Thrust: Thrust plate bolted to front of block behind camshaft hub (hub keyed on front end of shaft). **Endplay**—.003-.006".

Timing Gears: *CAUTION—Two types camshaft gears used. See "Timing Gears" in Ford Special Data.*
Crankshaft Gear—Cast Alloy Iron.
Replacement Camshaft Gears—Std., .006", .012" OS.

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diameter	Stem Diameter
Intake	1.65"	.3410"
Exhaust	1.51"	.3410"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	①.350"	②.0010-.0031"

①—Replace camshaft if lift less than .3375" (Intake), .3335" (Exhaust).
②—Replace guides if clearance exceeds .0031".
Valve Seat Width—1/16" maximum.
►*ROTATABLE VALVES: If used, see "Valve System" in Ford Special Data.*
Sticking Valve Correction—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake valve guides.
Valve Seat Inserts—Used for exhaust valves. *See "Valve System" in Ford Special Data.*

Valve Guides: One-piece type pressed in block.
Removal: Use special tool 6510-0 to remove guides.
Installation—Upper end of guide 1.18" Intake, 1.08" Exhaust below top face of block. Install with stepped end down. Use tool 6510-N to drive guides in place.

Valve Lifters: Mushroom type with self-locking adjusting screws. Removable from below with camshaft out.
Diameter—.6240" (replace if worn to less than wear limit of .6225").
Clearance—.0005-.0015" (new) .003" (worn limit).

Valve Springs: Coated springs used. Install springs with closely spaced coils toward top (against block).
Spring Test—47-53 lbs. at 2.11". Free length 2.50".

VALVE TIMING

Tappet Clearance: .009-.011" Intake, .013-.015" Exhaust, COLD. This setting correct for No. 7HA-6250-C Camshaft. *See "Camshaft & Bearings" in Ford Special Data for other camshafts.*
►*ADJUSTABLE SELF-LOCKING TAPPET SCREWS*
►**VALVE TAPPET NOISE—Silencing springs available.** *See "Valve System" in Ford Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.
Valve Timing Check—Intake valve opens 11° BTDC. Valve timing mark location on vibration dampener.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings. Timing gears lubricated by spray past camshaft thrust plate. Rotor type oil pump mounted externally on right side of engine.
Crankcase Capacity—4 quarts (5 quarts when changing filter).
Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: In cylinder block just to rear of oil filter mounting. Not adjustable.
Spring Tension—12.64-12.88 lbs. at 1.14"

Oil Pump: Rotor type. Mounted externally on right side of engine with drive gear at center of camshaft.
►**Oil Pump Driven Gear Replacement before Eng. No. 8HA-107555**—*See Ford Shop Notes.*
Pump Removal & Overhaul—*See "Oil Pump" in Ford Special Data.*

Oil Filter: Mounted directly on block (no external oil lines) on left side. Replace cartridge each 5000 miles or more often if required.
Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr) 8A-9273-A, (Red Ptr.) 8A-9273-B.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet) with outlet pipe in rear valve chamber extending down on right side of engine.
Servicing—Wash screen in cleaning fluid and wet with engine oil when dry at oil change period (2500 miles).

COOLING

Cooling System: Pressure type with relief valve in filler cap, one belt-driven pump, and by-pass.
Capacity—16 quarts.
Pressure Valve—In radiator filler cap. Ford No. 26H-8100-B (AC #846740). Opens at 3½-4½ lbs.

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head water outlet. Various types used as follows:

Thermostat No.	Opening Temperature
7HT-8575-A	148-153°F.
7HT-8575-B	157-162°F.
7HT-8575-C	①177-182°F.
1HA-8575-A	177-182°F.

①—Use with Permanent Anti-freeze.

Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-10883-A, (Red Ptr.) 8A-10883-B.
Engine Unit—Ford No. 8A-10884 (Stamped "224"—use with 4 lb. type Pressure Cap).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½ CF-TS, Ford No. 8A-7563A. Single plate, semi-centrifugal, dry disc type.
►DISC NOTE—Softer damper springs used on cars with Overdrive (black colored springs). Cars without Overdrive have aluminum colored damper springs.
See Clutch Section for complete data.
Facings—Thickness .125". Outside diameter 9½".
Pedal Adjustment: 1" free travel. Lock nut and adjusting nut at release lever end of release rod.
Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

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▷**Transmission Locking in Reverse Correction**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

▷**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

▷*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

Transmission Control: Steering column mounted shift *See Transmission Section for complete data.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS1-R10E (exc. Conv. & Sta. Wagon). Warner Model AS3-R10E (Conv. & Sta. Wagon). Optl. equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated "kick-down."
See Transmission Section for complete data.

▷**Overdrive not engaging, and Prolonged shorting out of Ignition on Kick-down Corrections**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

▷**Overdrive Governor Production Change**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

▷**Overdrive Noise Correction on Early Cars**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

Solenoid—Ford No. 8M-6916A (8A-6916A or C, C is rubber-coated). (Sta. Wgn. & Convertible) Ford No. 8M-6916-A.
Control Relay—Ford No. 8M-6915. On dash.
Overdrive Fuse—30 ampere. On Control Relay.
Lock-out Switch—Ford No. 8M-6917A.
Throttle Kick-down Switch—Ford No. 8A-6918B.
Governor—Ford No. 8M-6943 (Assembly with gear).

Removal: Same as for Std. transmission (above) after disconnecting overdrive control cable and wiring.

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.

▷*REPLACEMENT UNIVERSAL JOINT NOTE: TWO types furnished for service (interchangeable):*
1) **Pre-lubricated** (8M-7042 Front & 8M-7039 Rear). Requires lubrication at 20,000 mile intervals (repack bearings and replace seals).
2) **Grease Fitting** (1M-7042A Front & 1M-7039 Rear). Must be lubricated at 1000 mile intervals using pressure gun.

▷*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive with separate carrier. Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required). *See Rear Axle Section for complete data.*

▷**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

▷**Ring & Pinion Gear Production Change**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Ratio—Standard: 3.73-1 (41-11). With overdrive: 4.10-1 (41-10). Optional: 3.54-1 (41-11).
Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

▷**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

▷*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.

Wheel Bearing Adjustment: None (sealed bearings).

STATION WAGON

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive (separate carrier not used). Axle ends flanged —(no separate hub). Wheel bearings are sealed (no lubrication required).

▷*NOTE—AXLE NOT SAME AS FORD PASSENGER CAR, similar to Mercury.*
See Rear Axle Section for complete data.
Ratio (Standard)—3.91-1 (43-11).
Ratio (with Overdrive)—4.27-1 (47-11).
Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as for Ford Pass. Car Rear Axle (above).

SHOCK ABSORBERS

Delco or Houdaille. Both types interchangeable. Direct acting hydraulic types. Service by replacement. Replacement types (Ford Nos.):

	Front	Rear
Pass. Cars	8A-18124-A	8A-18125-A
Station Wagon	8A-18124-B	8A-18125-B

▷*NOTE—Shock absorbers are permanently sealed and cannot be refilled or repaired.*

Rear Shock Absorber Installation—Lower tube has welded stone shield on lower end which must be installed toward front of car.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.
See Front Suspension Section for complete data.

▷**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

▷**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

▷**Front Spring Production Change & Installation Caution**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

▷**Pitman Arm and Idler Arm Bracket Change**—Requires 2 different Toe In Settings listed below. *For identification of parts, see "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

▷*CAUTION—Specifications listed below supersede earlier 1949 Ford Front End Specifications.*
Kingpin Inclination—5¼° crosswise.
Caster (Pass. Cars)—Pos. ½° to Neg. 1°.
(Station Wagon)—Neg. ¼° preferred, Limits Neg. ¼° to Neg. 1¾°.
NOTE—½° max. variation between wheels.
Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°.
NOTE—¼° max. variation between wheels.

▷**Toe In**—*CAUTION: Two settings as follows:*
1)—1/8" toe out to 3/16" toe out for cars built before March 1, 1949.
2)—1/16" toe in to 1/8" toe in for cars built after March 1, 1949.

Adjustment—Adjusting sleeve on outer end of each tie rod. Adjust equally.

STEERING GEAR

Ford. Worm-and-Roller type with eccentric adjustment. *See "1949-51 Ford Pass. Car Worm-&-Roller" in Steering Section for complete data.*

▷**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinder Diameters—Front 1⅛" (hone limit 1.132"), Rear ⅞" (hone limit .880").
Drums—Diameter 10" (11" Sta. Wagon rear drums).
Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:

	Front Wheel Pri.	Front Wheel Sec.	Rear Wheel Pri.	Rear Wheel Sec.
Pass. Cars	11"	11"	11"	11 15/16"
Sta. Wgn.	11 15/16"	11 15/16"	11"	11 15/16"

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

▷**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATI N

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper arm.

TUNE-UP

►*ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING: May be caused by excessive wear of fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*

COMPRESSION PRESSURE: 110 lbs. at cranking spd.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram.

SPARK PLUG GAPS: *.030". Limits .029-.032".*

Plug Type—Champion H-10, 14 mm.

DISTRIBUTOR: Ford No. 7RA-12127C or 8BA-12127 (Used with Cast Iron Front Cover) or 0BA-12127 (Used with Aluminum Front Cover).

Breaker Gap—.014-.016".

Cam Angle—27° closed, 18° open.

Breaker Arm Spring Tension—17-20 ounces.

Advance Performance—*See Ignition.*

Distributor Line (Carburetor Connection) Vacuum—2.0-2.9" at 800 RPM., 3.5-4.8" at 1000 RPM., 4.7-6.4" at 2200 RPM., 4.6-6.2" at 2400 RPM. (" of HG).

IGNITION TIMING: 2° BTDC.

Timing Procedure—*See Ignition Timing.*

Crankshaft Pulley Mark—Circular boss aligned with timing pointer on right side of engine front cover.

CARBURETION: Holley-Ford No. 8BA-9510-A. Dual downdraft type with manual choke control.

Idle Setting—Approx. 1 turn open. Two screws—turning screws out gives richer mixture.

Idle Speed—Approximately 500 RPM.

Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).

Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fuel Pump Pressure: 3½-4½ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross over and right exhaust manifold.

VALVE TAPPET CLEARANCE: *CAUTION—Different settings required for each type camshaft.*

►**First type Camshaft No. 8BA-6250①**
(no markings on Engine or Camshaft)

Intake—.010-.012", **Exhaust**—.014-.016", Cold.

①—Before Eng. No. 8BA-622468—Partial production after this number.

►**Later type Camshaft No. 8BA-6250-B②**
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)

Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.

②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.

③—On top of block at center under valve cover.

►*CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.*

Adjustment—*See "Valve System" in Ford Shop Notes*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-A (Mitchell type), No. 6A-11572-B (Briggs & Stratton type).

Ignition Lock—Ford No. 1A-11582-A.

COIL: Ford No. 7RA-12029-A or 8BA-12029.

Location—On front lower corner of right cyl. head.

Ignition Current—Idling 2.75-3 amperes at 6 volts. 5-5.5 amperes stopped. Coil primary resistance 1.05-1.15 ohms (75°F). Secondary resistance 4100 ohms (75°F).

CONDENSER: Ford No. 7RA-12300-C.

Capacity—.21-.25 microfarad.

DISTRIBUTOR: Ford No. 7RA-12127-C or 8BA-12127 (With Cast Iron Front Cover), 0BA-12127 (With Aluminum Front Cover). "Pressure" type distributor with spark advance controlled by vacuum diaphragm which moves breaker plate against tension of two breaker plate springs.

►*CAUTION—Correct distributor must be used with each type front cover.*

See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.

►**Excessive Pinging Correction**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*

Breaker Gap—.014-.016".

Cam Angle—27° closed, 18° open.

Breaker Arm Spring Tension—17-20 ounces.

Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Unit

7RA-12127-C		8BA & 0BA-12127	
Degrees①	Vacuum RPM	Degrees①	Vacuum RPM
0-0	0" 200	0-0	0" 200
1¼-2¼	0.4" 500	0-1	.0.3" 500
4¼-5¼	1.7" 1000	5.2-6.2	1.32" 1000
6¼-7¼	2.8" 1500	8¾-10	2.85" 1500
7½-8½	3.7" 2000	10-11¼	3.7" 2000

①—Distributor Degrees & RPM.

Distributor Line Vacuum Test—*See Tune-Up.*

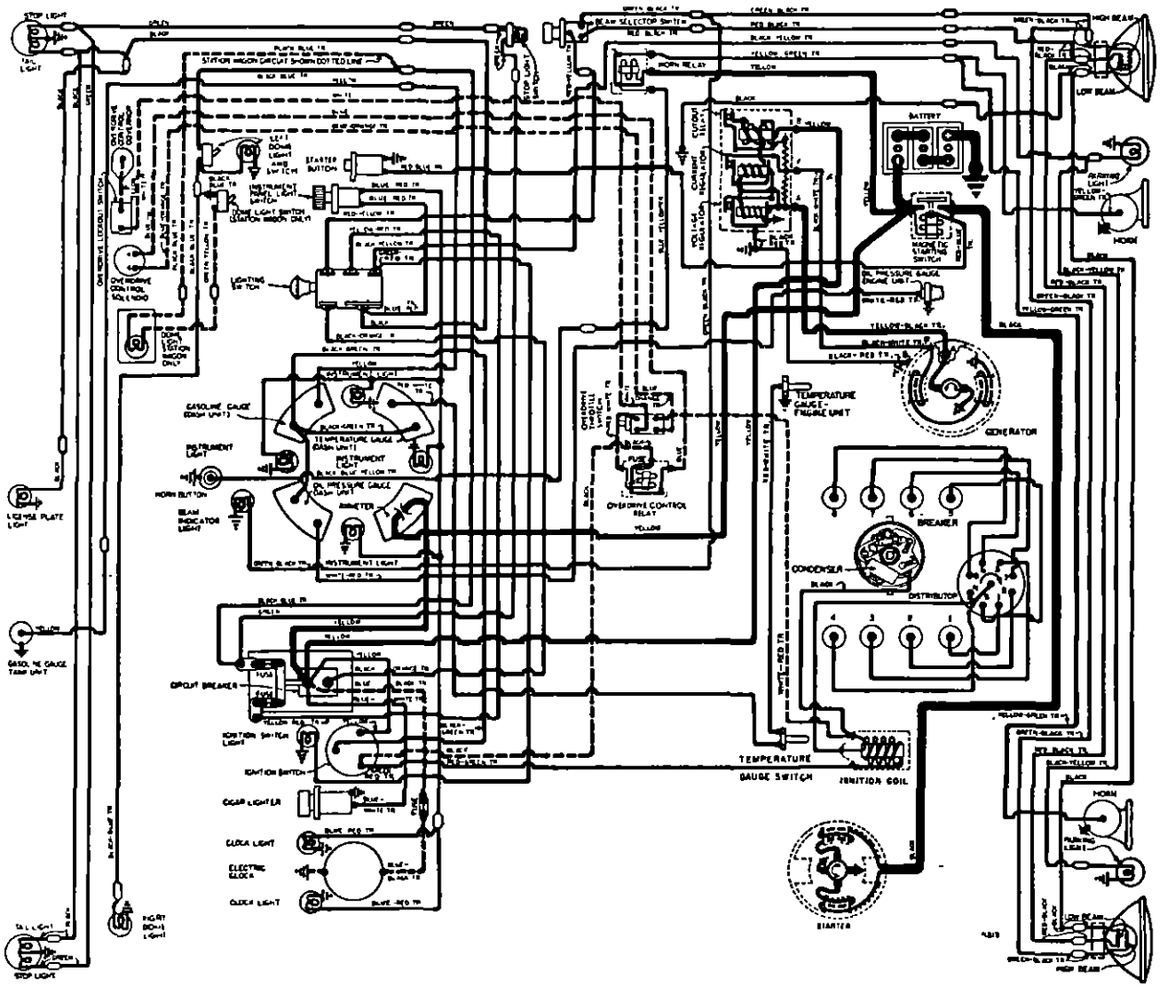
IGNITION TIMING

Std. Setting ..... **2° BTDC.**

Crankshaft Pulley Mark—Circular boss on rear edge of pulley (timing pin on right front side of engine).

Timing—With #1 piston at firing position and timing mark on pulley aligned with timing pin on front of engine, loosen hold-down screw on distributor, rotate distributor until contacts begin to open,

CONTINUED ON NEXT PAGE



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tighten hold-down screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.

▷**Timing (with Neon Timing Light)**—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark timing pin and pulley mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and timing pin aligned.

CARBURETOR

Holley-Ford No. 8BA-9510-A. Dual (double barrel) downdraft type with new vacuum passages for distributor operation.

▷**Throttle Body Gasket Change & Installation Caution.** *See "Ford (Holley) Carburetor" in Carburetor Section.*

▷**Accelerator Assy. Interference Correction:** *See "Ford (Holley) Carburetor" in Carburetor Section.*

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump (std.): Ford No. 7RA-9350-C.

Optl. (Fuel-&-Vacuum)—Ford No. 7RA-9350-E.

Pressure—3½-4½ lbs. (both types).

See Carburetion Equipment Section for complete data.

▷*FUEL PUMP PUSHROD WEAR (Causing Loss of Power or Engine Cutting out): See "Fuel System Notes" in Ford Special Data.*

Gasoline Gauge: King-Seeley Electric.

Dash Unit—Ford No. (Grn. Ptr.) 8A-9280-A, (Red Ptr.) 8A-9280-B.

Tank Unit—No. 8A-9275 (Sta. Wg. 01A-9275A).

See Carburetion Equipment Section for complete data.

Air Cleaner (Std.—Oil wetted): Ford No. OBA-9600-A.

Optl. (oil bath)—OBA-9600-B. Use OBA-9600-D with governor.

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.

Grounded Terminal—Positive (+).

Location—On left side in engine compartment.

STARTER

Ford Model No. 7RA-11002. Armature No. 18-11005.

Drive—Bendix No. A1472 (Ford No. B-11350).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—48-56 ozs. each.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on left front fender apron and controlled by panel pushbutton switch Ford No. 6H-11500.

GENERATOR

Ford. Two brush types with voltage and current regulation.

Generator No.	Type	Armature No.
8BA-10002-A①	35 Amp.	0A-10005-A
8BA-10002-B	40 Amp.	8EH-10005
8BA-10002-D	35 Amp.	0A-10005-A
8EL-10002-B	40 Amp.	8EH-10005

①—Replaced by 8BA-10002-D for service.

Maximum Charging Rate—See Performance.

Charging Rate Adjustment—See Regulator data.

Performance Data

Generator	Amperes	Eng. RPM.
8BA-10002-A	35	935
8BA-10002-B	40	
8BA-10002-D	35	900
8EL-10002-B	40	

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-36 ozs. each.

Generator Belt Adjustment: Loosen 2 bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulleys is ½" (thumb and finger pressure),

REGULATOR

Ford. Vibrating, voltage and current type.

Ford Regulator No.	For Generator
51A-10505-A, C, H	8BA-10002-A, D
5EH-10505-C	8BA-10002-B
8L-10505	8BA-10002-B, 8EL-10002-B
8M-10505-A	8BA-10002-D

See Electrical Equipment Section for complete data.

NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Regulator	Cut-in (Volts)	Cut-out (Amps.)
51A-10505-A	6.6-7.0	0-8
51A-10505-C	6.4-6.9	0-8
51A-10505-H	6.6-7.0	0-8
5EH-10505-C	6.4-6.9	0-8
8L-10505	6.0-6.9	0-8
8M-10505	6.0-6.9	0-8

Contact Gap—.010" (armature against upper stop).

Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting①
51A-10505-A	7.2-7.6 Volts
51A-10505-C	7.0-7.5 Volts
51A-10505-H	7.2-7.6 volts
5EH-10505-C	7.2-7.6 volts
8L-10505, 8M-10505	7.2-7.6 volts

①—For regulator at normal operating temperature with room temperature of 70-80°F.

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

Current Regulator

Regulator	Current Setting COLD	Amperes
51A-10505-A		30-34
51A-10505-C		30-33
51A-10505-H		34-38
5EH-10505-C		38-42
8L-10505		38-42
8M-10505		34-38

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*

Direction Signal Flasher—Ford No. 8L-13350-B.

Switches

Lighting—Ford No. 7RA-11654.

Instrument—Ford No. 21C-13740.

Beam Selector—Ford No. 7RA-13532 or 8A-13532.

Dome Light (Exc. Sta. Wgn.)—Ford No. 8A-13752-B.

Dome Light (Sta. Wagon)—Ford 8M-13752-A.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting (Headlights)—Ford No. 8A-12258-A. Behind instrument panel together with two lighting fuses (see wiring diagram).

FUSES: (Parking, Tail, Instr. Light) 14 ampere. On Circuit Breaker behind instrument panel. See Wiring Diagram.

Dome & Stop Lights—14 amp. On Circuit Breaker.

Clock—2 ampere. In clock feed wire.

Overdrive—30 ampere. On relay (on dash).

Direction Signal—15 ampere. In Flasher feed.

HORNS: *See 1949 Ford 6 Cyl. for complete data.*

ENGINE

ENGINE SPECIFICATIONS: Own 8BA. Eight cylinder, "L" head, 90° Vee type with both cylinder banks and crankcase cast Enbloc.

Bore—3.187". Stroke—3.75".

Displacement—239 cu. ins. Rated HP—32.5.

Developed Horsepower—100 at 3600 RPM.

Compression Ratio—6.8-1 cast-iron heads.

Compression & Vacuum Reading—*See Tune-Up.*

▷*ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING: May be caused by excessive wear of fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*

TIGHTENING TORQUES: *See Ford Special Data.*

OIL PAN REMOVAL: *See Ford Special Data.*

ENGINE REMOVAL: *See Ford Special Data.*

CYLINDER HEAD & GASKET INSTALLATION & PRODUCTION CHANGES: *See Ford Special Data.*

CYLINDER SLEEVE: Cast iron dry type cylinder sleeves furnished for replacement service.

PISTONS: *CAUTION—Two types used:*

"49T" U-Slot Pistons (Before Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, steel strut, cam ground, dome head type.

CAUTION—49T pistons must be used in ALL steel sleeve engines. Use "29A" piston rings with this piston.

"8BA" Solid Skirt Pistons, AUTOTHERMIC type (After Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy "Autothermic" type with offset pin.

CAUTION—8BA Autothermic pistons must not be used on steel sleeve engines. Can be used to replace 49T pistons in sets on other engines. Use "8BA-" piston rings with this piston (29T rings must not be used).

Removal—Pistons and rods removed from above.

Clearance—See Fitting Pistons.

Replacement Pistons ("49T-"): Std., .005", .020", .030", .040", .060" Oversize.

Replacement Pistons ("8BA-" Autothermic): Std. (4 grades with limits 3.1879-3.1891 in .0003" steps for selective fitting), .0025", .020", .030", .040", .060" OS.

Fitting New Pistons (All Types): Use ½" wide feeler stock of correct thickness (see table below) inserted between piston and cylinder wall at right angles to pin to check clearance (On 8BA pistons, feeler should be placed on thrust side of piston). Pull to withdraw feeler should be 6-12 lbs. (49T Pistons), 3-12 lbs. (8BA-Pistons).

Feeler Thickness:	49T Pistons	8BA Pistons
New Piston—New Bore	.003"	.0015"
New Piston—Used Bore	.003"	.0015"
Used Piston—Used Bore	.004"	.003"

EN INE

CONTINUED FROM PRECEDING PAGE

Installing Pistons ("8BA-" Autothermic): Locating mark (small indention) on head of piston above one piston pin hole, to front on all pistons.

PISTON RINGS: 2 compression, 2 slotted oil rings (lower oil ring below pin). Upper oil ring groove drilled with oil drain holes, lower groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0915-.0920"	.007-.047"	.0015-.003"
Compr. (#2)	.0915-.0920"	.007-.047"	.001-.0025"
Oil (#3, 4)	.1545-.1550"	.007-.047"	.001-.003"

Replacement Rings: *See Ford Special Data.*

PISTON PIN: Diameter .7504" (maximum). Floating type (lock ring in piston at each end).
Pin Fit in Piston—.0001-.0003" clearance (new), .0007" (worn limit).
Pin Fit in Rod—.0001-.0003" clearance (new).

Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" OS (yellow).

CONNECTING ROD: Length 7". Weight 18.7 ozs.

►**Connecting Rod CAUTION**—Beginning Engine No. 8BA-628866 through 8BA-629940 and all Engines after 8BA-641087, new type connecting rod used with 5/64" squirt hole drilled on an angle into the side of the bearing flange web meeting a 3/16" hole in connecting rod bearing flange.

►***CAUTION—These new connecting rods should be used only on engines with neoprene seals on intake valve guides and increased capacity oil pump.***

►**CONNECTING ROD INSTALLATION**—*See "Connecting Rod & Bearings" in Ford Special Data.*
Crankpin Journal Diameter—2.138-2.139". Wear limits .0015" (out-of-round), .001" (taper).

►**Lower Bearing**—***Locked in (not floating type as used on earlier engines).*** Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves interchangeable.
Clearance—.0005-.003" (new), .005" (worn limit).
Side Play—(Early type rod) .006-.014". Late type rod .006-.020".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in rod and cap.

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize. *See Ford Special Data.*
Installing Rods—Rods with squirt hole installed with squirt hole toward valve push rod assembly.

CRANKSHAFT: 3 bearing, integral counterweights.

►***SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning. Always use new plugs if old plugs disturbed and peen or stake crankshaft to hold plugs in place securely.***
Journal Diameters—2.498-2.4990" (all bearings) wear limits—Out-of-round .0015", Taper .001".
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.001-.0026".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in block and cap.

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.002-.006" (new), .008" (worn limit).

CAMSHAFT: ***CAUTION*—Two different types used, 8BA-6250**—All engines before No. 8BA-622468 and partial production after this number.
8BA-6250-B—Partial production beginning Eng. No. 8BA-622468 and service replacement of first type

►***CAMSHAFT IDENTIFICATION***—New 8BA-6250-B Camshaft stamped "B" on forward end (first type not marked), and engine marked "GAP, in- .014", ex- .018" on top of block under valve cover at center.

►***ENGINE MARKING CAUTION***—Gap mark (see above) must be added when "B" shaft installed on unmarked block, or removed if first type shaft installed on marked block.
Bearing Diameter—1.7985" (replace bearing if diameter greater than worn limit 1.8015").
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.002".

Replacement Bearings: Standard size and .010", .015" Undersize. Undersize bearings also furnished .080" overside on O.D.
Camshaft Bearing Servicing—*See "Camshaft & Bearings" in Ford Special Data.*

End Thrust: Taken by front end of camshaft and thrust surface on inner face of cylinder front cover.
Endplay—.007-.016".

Timing Gears: ***CAUTION—Two types camshaft gears used. See "Timing Gears" in Ford Special Data.***
Crankshaft Gear—Cast Alloy Iron.

►***CAUTION—Camshaft gear teeth REVERSE (L.H.) providing one-way thrust to camshaft for silencing backlash.***
Replacement Camshaft Gears—Std. .006", .012" OS.

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
All Valves	1.51"	.3410"①	4.750"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	①.292"	.0015-.0035"

①—Replace camshaft if valve lift less than .291" (Intake), .287" (Exhaust).
Valve Seat Width—1/16" maximum.
ROTATABLE VALVES: If used, see "Valve System" in Ford Special Data.
Valve Assembly Removal & Servicing—*See "Valve System" in Ford Special Data.*

►**Sticking Valve Correction**—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake guides.
Valve Seat Inserts—*See "Valve System" in Ford Special Data.*

Valve Guides: One-piece type positioned and retained by "C" washer. Inside diameter .344", Outside diameter 1.031". Length 2.20". NOTE—Rubber seal used on intake guide.

Valve Lifters: Barrel type in guide holes in block.
Diameter—.9992" (replace if worn to less than .9977"). Length limit after resurfacing 1.700".
Clearance—.0007-.0016" (new), .003" (worn limit).

Valve Springs: Coated springs used.
Spring Pressure—37-40 lbs. (closed), 78-80 (open).
Spring Test—40-43 lbs. at 2.13". Free Length 2.41".

VALVE TIMING

VALVE TAPPET CLEARANCE: ***CAUTION—Different settings required for each type camshaft.***

►**First type Camshaft No. 8BA-6250①**
(no markings on Engine or Camshaft)
Intake—.010-.012", **Exhaust**—.014-.016", Cold.
①—Before Eng. No. 8BA-622468—Partial production after this number.

►**Later type Camshaft No. 8BA-6250-B②**
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)
Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.
②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.
③—On top of block at center under valve cover.

►***CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.***
Adjustment—*See "Valve System" in Ford Shop Notes*

Valve Timing: See Camshaft Setting above.

Early Camshaft No. 8BA-6250
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

Late Camshaft No. 8RA-6250-B
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 3° ATDC.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear.
Crankcase Capacity—4 quarts (5 quarts when changing oil filter).
Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: In oil pump body. Not adjustable. **Spring Pressure** 12 lbs. at 1.14".

Oil Pump: Gear type (two types: one equipped with spur gears, later type helical gears).
Pump Removal & Overhaul—*See Ford Special Data.*

Oil Filter: On left cylinder head. Replace cartridge each 5000 miles or more often if required.
Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr) 8A-9273-A, (Red Ptr.) 8A-9273-B. **Engine Unit**—No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet) with outlet pipe extending from top of engine down behind fan and out along left side.

COOLIN

Cooling System: Pressure type with relief valve in filler cap and two belt-driven pumps (one for each bank) with re-circulating by-pass.
Capacity—21 quarts.
Pressure Valve—In radiator filler cap. Ford No. 26H-8100-B (AC #846740). Opens at 3½-4½ lbs.

Water Pump: Two used. Packless type.

►***CAUTION—WATER PUMP LUBRICATION: Oil cup provided on each pump which should be filled with SAE #20 engine oil when new and every 1000 miles.***

►**Water Pump Change**—Late 1949 models use later type water pump with longer ball bearings and no oil cup. Requires no service lubrication. Later type pumps can be used on earlier 1949 engines, providing later type pulleys are also used.
See Water Pump Section for complete data.
Fan Belt Adjustment—Loosen 2 fan mounting bracket bolts, raise fan up until side movement of belt midway between fan and crankshaft pulleys is ½".

Thermostats: Two used (one in each head water outlet). Various types used as follows:

Ford Part No.	Opening Temperature
8BA-8575-B, D, E	152-157°F
8BA-8575-C, F	①172-177°F

①—For use with permanent Anti-freeze.

Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. (Grn. Ptr.) 8A-10883-A, (Red Ptr.) 8A-10883-B.
Engine Unit—Ford No. 8A-10884 (stamped "224"—

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in left cylinder bank), No. 8A-1990 (stamped "217" —special excessive temperature switch in right bank). *NOTE*—Used with regular 4 lb. type pressure cap).

See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½ CF-TS, Ford No. 8A-7563A. Single plate, semi-centrifugal, dry disc type.

See Clutch Section for complete data.

Facings—Thickness .125". Outside diameter 9½".

Pedal Adjustment: 1" free travel. Lock nut and adjusting nut at release lever end of release rod.

Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

►*TRANSMISSION INOPERATIVE OR LOCKING IN REVERSE: See "Ford, Lincoln, Mercury" in Transmission Section.*

►*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

Transmission Control: Steering column mounted shift

See Transmission Section for complete data.

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS1-R10E (exc. Conv. & Sta. Wagon). Warner Model AS3-R10E (Conv. & Sta. Wagon). Optl. equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated "kick-down."

See Transmission Section for complete data.

►**Overdrive not engaging, and Prolonged shorting out of Ignition on Kick-down Corrections**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Trans. Sect.*

►**Overdrive Governor Production Change**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Trans. Sect.*

►**Overdrive Noise Correction on Early Cars**—*See "Ford, Lincoln, Mercury (Warner) Overdrive in Transmission Section.*

Solenoid—Ford No. 8M-6916A (8A-6916A or C, C is rubber-coated). (Sta. Wgn. & Convertible) Ford No. 8M-6916-A.

Control Relay—Ford No. 8M-6915. On dash.

Overdrive Fuse—30 ampere. On Control Relay.

Governor—Ford No. 8M-6943 (Assembly with gear).

Removal: Same as for Std. transmission (above) after disconnecting overdrive control cable and wiring.

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.

►*REPLACEMENT UNIVERSAL JOINT NOTE: TWO types furnished for service (interchangeable):*

1) **Pre-lubricated** (8M-7042 Front & 8M-7039 Rear). Requires lubrication at 20,000 mile intervals (repack bearings and replace seals).

2) **Grease Fitting** (1M-7042A Front & 1M-7039 Rear). Must be lubricated at 1000 mile intervals using pressure gun.

►***CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.***

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive with separate carrier. Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).

See Rear Axle Section for complete data.

►**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►**Ring & Pinion Gear Production Change**—*See "Ford Pass. Car (exc. Sta. Wgn.)" in Rear Axle Section.*

Ratio—Standard: 3.73-1 (41-11). With overdrive: 4.10-1 (41-10). Optional: 3.54-1 (41-11).

Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

►**Carrier Mounting Bolt Tightening Caution**—*See Ford Pass. Car (exc. Sta. Wgn.)" in Rear Axle Section.*

►*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).

Wheel Bearing Adjustment: None (sealed bearings).

STATION WAGON

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive (separate carrier not used). Axle ends flanged —(no separate hub). Wheel bearings are sealed (no lubrication required).

►***NOTE—AXLE NOT SAME AS FORD PASSENGER CAR, See Rear Axle Section for complete data.***

Ratio (Standard)—3.91-1 (43-11).

Ratio (with Overdrive)—4.27-1 (47-11).

Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

Delco or Houdaille. Both types interchangeable. Direct acting hydraulic types. Service by replacement. Replacement types (Ford Nos.):

	Front	Rear
Pass. Cars	8A-18124-A	8A-18125-A
Station Wagon	8A-18124-B	8A-18125-B

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shocks.

See Front Suspension Section for complete data.

►**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Front Spring Production Change & Installation Caution**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

►**Pitman Arm and Idler Arm Bracket Change**—Requires 2 different Toe In Settings listed below. *For parts identification, see Front Suspension Section.*

►*CAUTION—Specifications below supersede earlier data.*

Kingpin Inclination—5¼° crosswise.

Caster—(Pass. Cars) Pos. ½° to Neg. 1°. (Sta. Wgn). Neg. ¼° (Limits Neg. ¼° to Neg. 1¾°). Variation between wheels ½° maximum.

Camber—(All) Pos. ¼° to Pos. ¾° (Limits 0° to Pos. 1°). Variation between wheels ¼° maximum.

►**Toe In**—*CAUTION: Two settings as follows:*

1)—**1/8" toe out to 3/16" toe out for cars built before March 1, 1949.**

2)—**1/16" toe in to 1/8" toe in for cars built after March 1, 1949.**

STEERING GEAR

Ford. Worm-and-Roller type with eccentric adjustment. *See "1949-51 Ford Pass. Car Worm-&-Roller" in Steering Section for complete data.*

See Steering Gear Section for complete data.

►**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type. Hand lever applies rear wheel brakes.

See Brake Section for complete data.

Wheel Cylinder Diameters—Front 1⅛" (hone limit 1.132"), Rear ⅞" (hone limit .880").

Drums—Diameter 10" (11" Sta. Wagon rear drums).

Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:

	Front Wheel		Rear Wheel	
	Pri.	Sec.	Pri.	Sec.
Pass. Cars	11"	11"	11"	11 15/16"
Sta. Wgn.	11 15/16"	11 15/16"	11"	11 15/16"

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

►**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top: Hydro-Lectric type

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.

See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail to rear of front suspension control arm.

SERIAL NUMBERS: As follows:

Year	Engine Type	Model	Assembly Plant	Serial Number
1950	H	0	See below	100001 Up
1951	H	1	See below	100001 Up

Assembly Plant Designations

AT—Atlanta	**DA**—Dearborn	**MP**—Memphis
BF—Buffalo	**LU**—Louisville	**NR**—Norfolk
CS—Chester	**EG**—Edgewater	**RH**—Richmond
CH—Chicago	**KC**—Kansas City	**SR**—Somerville
DL—Dallas	**LB**—Long Beach	**SP**—Twin City
HM—Highland Park		(St. Paul)

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking speed.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".

Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Ford No. 7HA-12127.

Breaker Gap—.024-.026".

Cam Angle—36° closed, 24° open.

Breaker Arm Spring Tension—17-20 ounces.

Advance Performance—*See Ignition.*

Distributor Line (Carburetor Connection) Vacuum 0.5-0.7" at 800 RPM., 1.2-1.6" at 1000 RPM., 4.8-6.6" at 2200 RPM., 4.9-6.7" at 2400 RPM. (In. of mercury at specified engine RPM).

IGNITION TIMING: TDC.

Timing Procedure—*See Ignition Timing.*

Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. *Use pointer nearest to outer circumference of dampener for proper timing.*

CARBURETION: Holley-Ford No. 8HA-9510-A (1HA-9510-A on 1951 Fordomatic Cars). Carburetor on Fordomatic Cars has Anti-stall dashpot (see below).

Idle Setting—Approx. 1 turn open. One screw—turning screw out gives richer mixture.

Idle Speed—(Std. Trans.) Approx. 500 RPM.

Idle Speed—(Fordomatic Trans.) 425 RPM.

Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).

Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Anti-Stall Dashpot Adjustment (Fordomatic Cars): After idle speed correctly set, hold throttle valve closed, loosen dashpot adjusting screw locknut on throttle lever, turn adjusting screw out until screw causes dashpot plunger to bottom in dashpot, then turn adjusting screw in 1½-2 turns and tighten locknut. This will provide correct clearance of .045-.064" between dashpot plunger and adjusting screw.

Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve should be closed (counterweight arm against stop pin) with engine cold and should operate freely).

VALVE TAPPET CLEARANCE: *CAUTION—Different settings required for each type camshaft.*

►First type Camshaft No. 7HA-6250-C
(Camshaft stamped "CWC")

Tappet Clearance—.009-.011" Intake, .013-.015" Exhaust, COLD. Self-locking tappet adjusting screws located in valve lifters.

Later type Camshafts No. 0HA-6250-A, B
(Eng. marked "0H" above #3 Intake Port)
(Camshaft marked "0" or "B" on front end)

Tappet Clearance—.013-.015" Intake, .017-.019" Exhaust, COLD. Self-locking tappet adjusting screws located in valve lifters.

CAUTION—Loss of power will result if correct tappet clearance not used with "0" or "B" camshafts.

►VALVE TAPPET NOISE—Silencing springs available. *See "Valve System" in Ford Special Data.*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-A or B (All 1950 & 1951 Sta. Wgn.), No. 1A-11572-B (1951 exc. Sta. Wgn.).

Ignition Lock—Ford No. 8A-11582-A (1950), 1A-11582-A (1951).

COIL: Ford No. 8BA-12029.

Location—On left side of engine above distributor.

Ignition Current—Idling 2.75-3.0 amperes at 6 volts, 5.0-5.5 stopped. Coil primary resistance 1.05-1.15 ohms, (75°F). Secondary resistance 4100 ohms, (75°F).

CONDENSER: Ford No. 7RA-12300-C.

Capacity—.21-.25 microfarad.

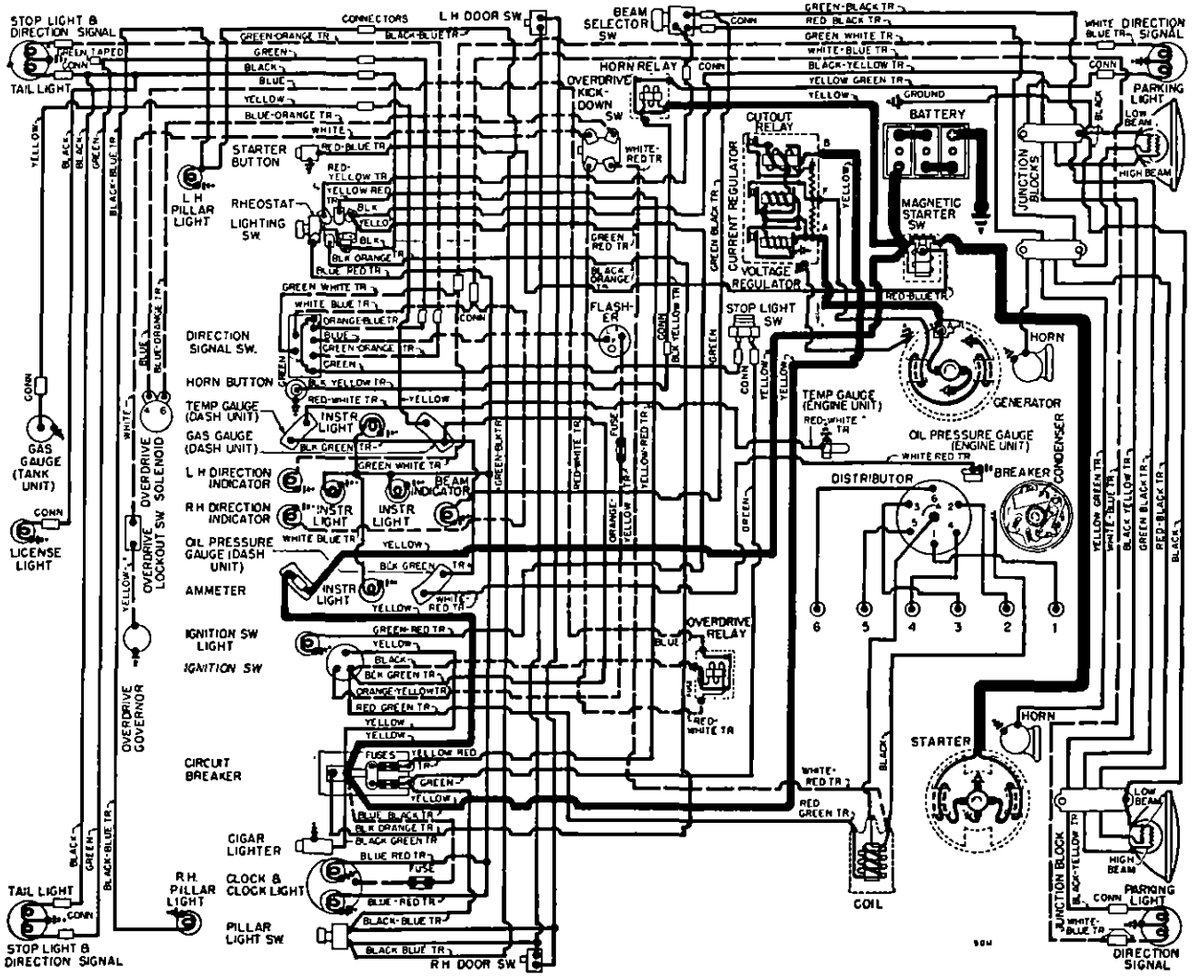
DISTRIBUTOR: Ford No. 7HA-12127 (Less Cap and Rotor), "Pressure" distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two springs.

See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.

►Excessive Pinging Correction—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*

Breaker Gap—.024-.026".

CONTINUED ON NEXT PAGE



1950 MODELS

CONTINUED FROM PRECEDING PAGE

Cam Angle—36° closed, 24° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Advance Performance
▷With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
1¾-3°	0.4"	500
5½-6¾°	1.4"	1000
11½-13°	5.5"	1000
8½-9¾°	2.9"	1500
10½-11½°	4.1"	2000

Distributor Line Vacuum Test—*See Tune-Up.*
Distributor Removal: Mounted on left side of engine at center. To remove, disconnect vacuum line, take out hold-down screw in timing arm, lift off.
▷*NOTE—Distributor angle-mounted on left side of engine and shaft splined to oil pump drive gear.*

IGNITION TIMING

Std. Setting.....**at TDC.**
Dampener Mark—Circular boss or groove (depending on type of dampener used). 2 pointers on front engine cover. *Use pointer nearest to outer circumference of dampener for proper timing.*
Timing—With #1 piston at firing position and timing mark aligned with pointer on front of engine, loosen clamp screw on timing arm, rotate distributor until contacts begin to open, tighten clamp screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap).
▷**Timing (with Neon Timing Light)**—*CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.* Mark proper timing pointer (see Dampener Mark above) and dampener mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and pointer aligned when light flashes.

CARBURETOR

1950-51 (Std. Trans.) Holley-Ford No. 8HA-9510-A. 1951 (with Fordomatic Trans.) Holley-Ford No. 1HA-9510-A. *NOTE*—Replacement Carburetor 8HA-9509A.
Single barrel downdraft type with vacuum passages for distributor operation.
See Carburetor Section for complete data.
Setting (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
▷*CARBURETOR JET CHANGE—See Carburetor Section for complete data.*
Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

CARB. EQUIPMENT

Fuel Pump: (Std.) Ford No. (1950) 7HA-9350-B, (1951) 1HA-9350-A. (Fuel & Vacuum) (1950) 8HA-9350, (1951) 1HA-9350-E or H.
Pressure—4-5 lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric.
Dash Unit—(All 1950 & 1951 Sta. Wgn.—Red Pointer) Ford No. 8A-9280-B, (1951 exc. Sta. Wgn.—Red Pointer) No. 1A-9280-A, (1951 exc. Sta. Wgn.—White Pointer) No. 1A-9280-B.
Tank Unit—Ford No. 8A-9275 (exc. Sta. Wgn.), No. 01A-9275-A (Sta. Wgn.).
See Carburetion Equipment Section for complete data.
Air Cleaner: Oil-wetted type Std., Oil-bath type Optl.

BATTERY

Ford No. 81A-10655-A. 6 Volt, 17 Plate, 100 Amp. Hr.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.

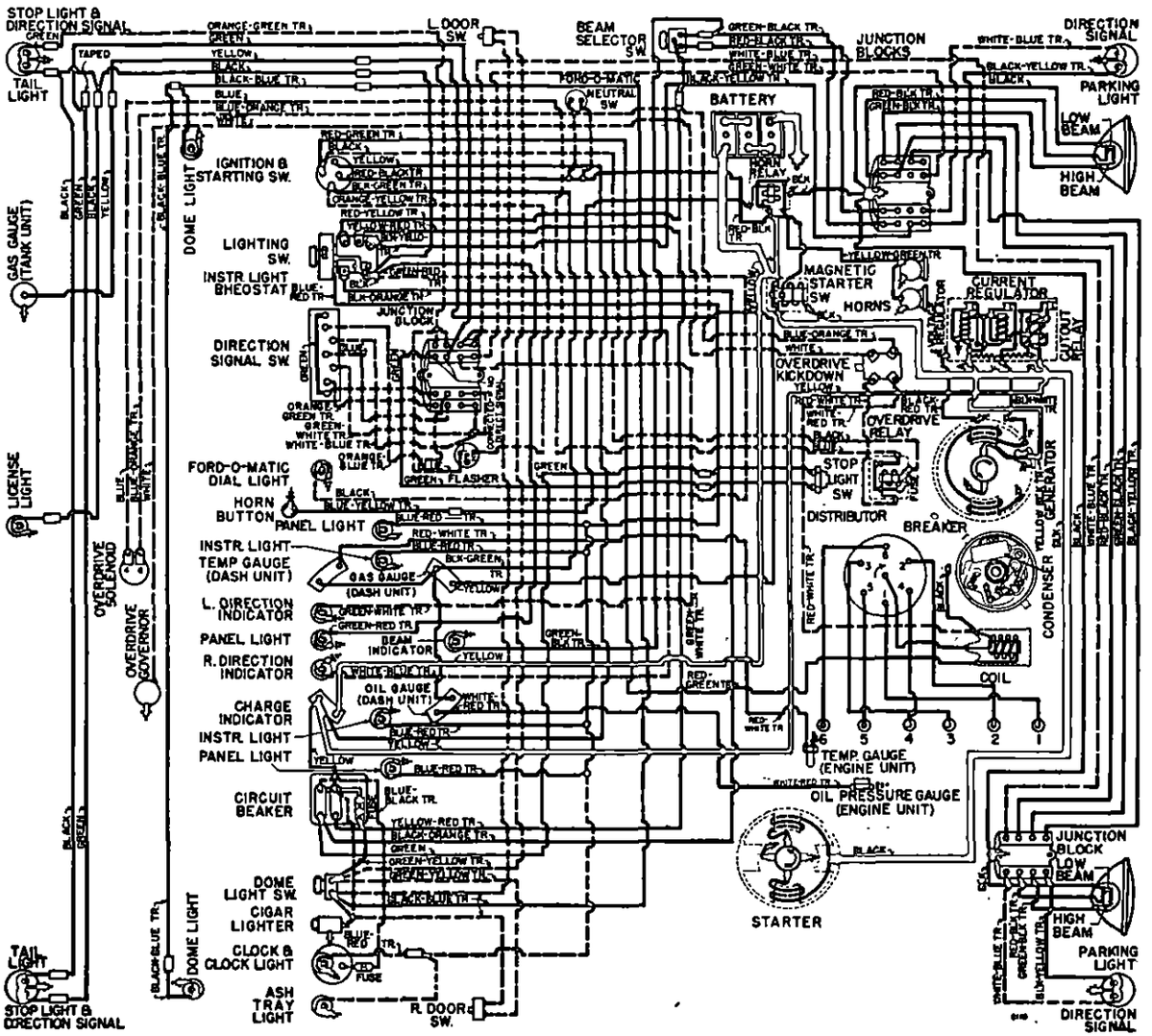
STARTER

1950 (All Models) Ford No. 7HA-11002.
1951 (Except Fordomatic) Ford No. 1A-11002-A.
1951 (With Fordomatic) Ford No. 1CM-11002-A.
NOTE—Starter No. 1A-11002-A with bracket 1A-11140-A used as replacement for 7HA-11002.
Armature—(Except Fordomatic) No. 18-11005. (With Fordomatic) No. 1CM-11005-A.
▷*STARTER DRIVE PRODUCTION CHANGE (LATE 1951)—Bendix "Folo-Thru" Starter Drive used on cars with FORDOMATIC TRANSMISSION. See Electrical Equipment Section for complete data.*
Drive—Ford No. 7HA-11350. New 9 tooth pinion type for use with 114 tooth flywheel ring gear.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: (1950 All Models & 1951 Sta. Wgn.) Ford No. 21A-11450. (1951 Except Sta. Wgn.) Ford



1951 MODELS

No. 1A-11450-A. Mounted on left front fender apron and controlled as follows:

►*1951 STARTER SWITCH CAUTION*—(Except Station Wagon). Starter switch grounded at switch bracket.

1950—Pushbutton Switch No. 6H-11500 mounted on instrument panel.

1951—Key operated ignition & starter switch, Ford No. 1A-11572-B. Turn switch full right to start.

►*FORDOMATIC DRIVE NOTE*—Neutral Safety Switch, Ford No. 1M-15812-B in circuit between ignition switch and starter relay. Selector lever must be in neutral to operate starter.

GENERATOR

Ford. Two-brush with voltage and current regulation.

Generator No.	Type	Armature No.
8BA-10002-A①	35 Amp.	0A-10005-A
8BA-10002-B	40 Amp.	8EH-10005
8BA-10002-D	35 Amp.	0A-10005-A
8EL-10002-B	40 Amp.	8EH-10005
0HA-10000-A	35 Amp.	0A-10005-A
0HA-10000-B	40 Amp.	8EH-10005

①—Replaced by 8BA-10002-D for service.

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—36 amperes, 7 volts, at approximately 20 MPH. Controlled by regulator and dependent on load and battery condition.

Performance Data

Generator	Amperes	Engine RPM.
8BA-10002-A	35	935
8BA-10002-B	40	
8BA-10002-D	35	900
8EL-10002-B	40	
0HA-10000-A	35	890
0HA-10000-B	40	1060

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-36 ozs. each.

REGULATOR

Ford. Vibrating voltage and current type.

Regulator No.	For Generator No.
51A-10505-A, H	8BA-10002-A, D
5EH-10505-C	8BA-10002-B
8L-10505	8BA-10002-B, 8EL-10002-B
8L-10505	0HA-10000-B
8M-10505, A	8BA-10002-D, 0HA-10000-A

See Electrical Equipment Section for complete data.

NOTE—Separate ground wire extending to cowl must be in place when generator is operated.

Cutout Relay

Regulator	Cuts In	Cuts Out (Disch.)
51A-10505-A	6.6-7.0 Volts	0-8 Amperes
51A-10505-H	6.6-7.0 Volts	0-8 Amperes
5EH-10505-C	6.6-7.0 Volts	0-8 Amperes
8M-10505A	6.0-6.6 Volts	0-8 Amperes
8L-10505	6.0-6.6 Volts	0-8 Amperes

Contact Gap—.010" (armature against upper stop).

Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting①
51A-1505-A, H	7.2-7.6 volts
5EH-10505-C	7.2-7.6 volts
8L-10505, 8M-10505, A	7.2-7.6 volts

①—For regulator at normal operating temperature with room temperature of 70-80°F.

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

Current Regulator

Regulator	Current Setting COLD	Amperes
51A-10505-A, H		30-34
5EH-10505-C		38-42
8L-10505		38-42
8M-10505, A		34-38

Checking & Adjustment—*See Elec. Equip. Section.*

Air Gap—.032-.035" between armature and core with contacts just closed.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*

Directional Signal Flasher—Ford No. ('50).. 8L-13350-B, ('51) 8L-13350-C.

Switches

Lighting—Ford No. 0A-11654 (All 1950, Sta. Wgn. 1951), No. 0L-11654 (1951 exc. Sta. Wgn.).

NOTE—Instrument switch is part of lighting switch (operated by rotating switch knob).

Beam Selector—Ford No. 8A-13532.

Dome Light—Ford No. ('50) 0A-13752, ('51) 1A-13752. (1950-51 Station Wagon) No. 0M-13752.

Stop Light—Ford No. 11A-13480 or 0A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKER (1950): Ford No. 0A-12258A. Consists of ONE thermostatic circuit breaker (for headlight circuits) and TWO fuses (see below) to protect other lighting circuits. Mounted behind instrument panel.

CIRCUIT BREAKER (1951): Ford No. 1A-12258A. Consists of TWO thermostatic circuit breakers (one for headlights, other for Parking, Tail & Instr. Lights), and ONE fuse to protect other lighting circuits. Mounted behind instrument panel.

FUSES: Auxiliary Lights (Parking, Tail & Instrument) (1950 only)—14 ampere. On circuit breaker bracket behind instrument panel (see wiring diagram).

Dome & Stop (1950 only)—14 ampere. Next to fuse listed above.

Dome (1951)—14 ampere. On circuit breaker bracket behind instrument panel.

Clock—2 ampere. In clock feed wire.

Overdrive—30 ampere. On relay on dash under hood.

Direction Signal—15 ampere. In feed from ignition switch to flasher.

HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), No. 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay. NOTE—"A" horns are 4.28" high, "B" horns are 4.14". Horns marked "HI" or "LO" on air columns.

Air Gap—.027-.029" for high pitch (right horn), .032-.034" for low pitch (left) for Sparks-Withington.

Horn Current—13 amperes (high pitch), 14 (low).

Horn Relay: Ford No. ('50) 7RA-13853-B, ('51) 7RA-13853-A.

►*CAUTION—Use only Ford type relay No. 7RA-13852-B with TAN plastic cover on 1950 cars. If 1951 relay No. 7RA-13853-A with BLACK plastic cover is used, shock at button may result when blowing horn.*

Contact Gap—.015-.025".

Contact Closing Voltage—4 volts max.

EN INE

ENGINE SPECIFICATIONS. Own 8HA. Six cylinder, "L" head type.

Bore—3.30". **Stroke**—4.40".

Displacement—226 cu. ins. **Rated HP**—26.13.

Developed Horsepower—95 at 3300 RPM.

Compression Ratio—6.8-1 cast iron head.

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: *See Ford Special Data.*

OIL PAN REMOVAL: *See Ford Special Data.*

NOTE—Engine must be removed to remove oil pan.

CYLINDER HEAD AND TIGHTENING TORQUE: *See Ford Special Data.*

►*CYLINDER HEAD PRODUCTION CHANGE NOTE—New type cylinder head used in production beginning early 1950. Interchangeable with previous head.*

CYLINDER SLEEVES: Cast iron dry type.

See Ford Special Data.

PISTONS: *CAUTION—Two types used.*

1950 (Early Production)—7HA piston, 4 ring (all above pin), flat head, aluminum alloy, steel strut, U-slot cam ground type.

1950-51 (Except early 1950 production) *New OHA AUTOTHERMIC TYPE used.* Solid skirt, 4 ring (all above pin), aluminum alloy.

►*CAUTION—When installing the OHA piston, make sure the small indentation at the top outer edge is towards the front of engine (pin offset 1/16" in piston).*

►*PISTON INTERCHANGE CAUTION*—The OHA piston should not be replaced with the earlier 7HA piston. However, the OHA piston can be used to replace the 7HA piston individually or in sets.

Replacement Pistons: Standard size and .0025", .005", .020", .030", .040", and .060" Oversize.

Fitting Pistons: Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin on thrust side. Use correct thickness feeler gauge (see table below). Pull required to withdraw feeler should be 6-12 lbs. (7HA), 3-12 lbs. (0HA pistons).

Feeler Thickness	7HA Pistons	0HA Pistons
New Piston—New Bore	.003"	.002"
New Piston—Old Bore	.003"	.002"
Old Piston—Old Bore	.003"	.003"

PISTON RINGS: 2 compression, 2 slotted oil rings, all above pin. Upper oil ring groove drilled with oil drain holes, lower ring groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.047"	.0015-.003"
Compr. (#2)	3/32"	.007-.047"	.001-.0025"
Oil (#3, 4)	3/16"	.007-.047"	.001-.0025"

►*PISTON RING PRODUCTION CHANGE 1950—New* 0HA rings (steel segment) used beginning early 1950.

►*CAUTION—When using the earlier type piston ring (7HA) on the OHA piston, install the oil ring expander in the 3rd groove rather than the 4th groove. OHA piston rings may be used on the 7HA piston.*

Replacement Rings: *See Ford Special Data.*

PISTON PIN: Diameter .8504". Floating type.

Pin Fit in Piston—.0001-.0003" clearance (new), .0007" (worn limit).

Pin Fit in Rod—.0001-.0003" clearance (new).

Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" Oversize (yellow).

CONNECTING ROD: Length 8¼". **Weight** 29.0 ozs.

Crankpin Journal Diameter—2.2980-2.2988". Wear limits .0015" (out-of-round), .001" (taper).

Lower Bearing—Removable, steel-backed, copper-

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

lead alloy lined, locked in type.
Clearance—.0004-.0027"
Sideplay—.006-.014" (new), .017" (worn limit).

Bearing Adjustment: None (except early 1950 "M" engine). Do not file caps. Replace bearings. Tang on bearing must engage groove in rod and cap.

▷*BEARING ADJUSTMENT FIRST "M" ENGINES*—Engines built prior to January 25, 1950 were equipped with connecting rods having shims. Engines built after this date did not have shims.
CAUTION—Connecting rods having shims must be serviced WITH THE SHIMS IN PLACE. When assembling new rods and new crankshafts if the bearing clearance is in exces of .0007" to .0013", the removal of one shim will reduce the clearance .00075". If both shims are removed the bearing clearance will be reduced .0015".

Replacement Bearings: Standard size and .002", .010", .020, .030", .040" Undersize. *See Ford Special Data.*

CRANKSHAFT: 4 bearing, integral counterweights.
Vibration Dampener—Viscous or rubber type.
Journal Diameters—2.8732-2.8740" (all bearings) wear limits—Out-of-round .0015". Taper .001".
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.0005-.0032" ("AHA" bearings), .0004-.0022" ("0HA" bearings).

Replacement Bearings: Standard and .002", .010", .020", .030" Undersize. *NOTE*—Standard bearings furnished in two sizes (stamped with Red "A" or Blue "B") for selective fitting. *See Ford Special Data.*

Bearing Adjustment: None. Replace bearings. Tang on bearing must engage groove in block and cap.

Replacement Bearings: Std., .002", .020", .030" U. S.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.004-.008".

CAMSHAFT: *CAUTION—THREE different types used in production. See "Camshaft & Bearings" in Ford Special Data for identification data.*

▷*CAUTION—Special Tappet Clearance required for each type camshaft. See Tappet Clearance data under VALVE TIMING.*
Camshaft Journal Diameter—1.924" (worn limit).
Bearing Diameter—1.9285" (replace bearing if diameter greater than worn limit 1.9315").
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.002" (new), .005" (worn limit).
Camshaft Bearing Servicing—*See "Camshaft & Bearings" in Ford Special Data.*

Replacement Bearings: Standard and .015" Undersize. *NOTE*—Standard bearings also furnished .080" oversize on O.D.

End Thrust: Taken by thrust plate bolted on front of block behind camshaft hub. **Endplay**—.003-.006".

Timing Gears: *CAUTION—TWO types used. See "Timing Gears" in Ford Special Data for interchangeability caution and reworking required.*
Camshaft Gear—Aluminum or Fibre. See Caution above.
Crankshaft Gear—Cast Alloy Iron.
Replacement Camshaft Gears—Std., .006", .012" OS. *See "Timing Gears" in Ford Special Data.*

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head. Diam.	Stem Diam.	Length
Intake	1.65"①	.3410"	5.36"
Exhaust	1.51"②	.3410"	5.36"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	③.350"	④.0010-.0031"

①1.652" (1951). ②—1.515" (1951).
③—Replace camshaft if lift less than .3375" Intake, .3335" Exhaust.
④—Replace guides if clearance exceeds .0031".

▷*ROTATABLE VALVES: Used in 1951 engines, can be installed in 1950 engines. See "Valve System" in Ford Special Data.*
Valve Seat Width—1/16" maximum.
Valve Seat Inserts—Used for exhaust valves.
See "Valve System" in Ford Special Data.
Sticking Valve Correction—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake valve guides.

Valve Guides: One-piece type pressed in block.
Removal: Use special tool 6510-O to remove guides.
Installation—Upper end of guide 1.18" Intake, 1.08" Exhaust below top face of block. Install with stepped end down. Use tool 6510-N to drive guides in place.

Valve Lifters: Mushroom type with self-locking adjusting screws. Removable from below with camshaft out.
Diameter—.6240" (replace if worn to less than wear limit of .6225").
Clearance—.0005-.0015" (new), .003" (worn limit).

Valve Springs: Coated springs used. Install springs with closely spaced coils toward top (against block).
Spring Test—47-53 lbs. at 2.11". Free length 2.50".

VALVE TIMING

▷**VALVE TAPPET NOISE**—Silencing springs available. *See "Valve System" in Ford Special Data.*

VALVE TAPPET CLEARANCE: *CAUTION—Different settings required for each type camshaft.*

▷First type Camshaft No. 7HA-6250-C
(Camshaft stamped "CWC")

Tappet Clearance—.009-.011" Intake, .013-.015" Exhaust, COLD. Self-locking tappet adjusting screws located in valve lifters.

Later type Camshafts No. 0HA-6250-A, B
(Eng. marked "0H" above #3 Intake Port)
(Camshaft marked "0" or "B" on front end)

Tappet Clearance—.013-.015" Intake, .017-.019" Exhaust, COLD. Self-locking tappet adjusting screws located in valve lifters.
CAUTION—Loss of power will result if correct tappet clearance not used with "0" or "B" camshafts.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings. Timing gears lubricated by spray past camshaft thrust plate. Rotor type oil pump mounted externally on right side of engine.
Crankcase Capacity—4 quarts (5 quarts when changing filter).
Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: Not adjustable.
Spring Tension—12.64-12.88 lbs. at 1.14".

Oil Pump: Rotor type. Mounted externally on right side of engine with drive gear at center of camshaft.

▷*OIL PUMP PRODUCTION CHANGE:* Pump No. 0HA-6600-A used with later 0HA-6250-A & 0HA-6250-B Camshafts. This pump has groove in bottom bearing surface in housing for increased lubrication of driving gears and copper-cadmium plate finish of driven gear. Interchangeable with previous type pump.

Pump Removal & Overhaul: *See Ford Special Data.*

Oil Filter: Mounted directly on block.
Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (All 1950 & 1951 Sta. Wgn.—Red Pointer) 8HA-9273-B, (1951 exc. Sta. Wgn.—Red Pointer) No. 1A-9273-A, (1951 exc. Sta. Wgn.—White Pointer) No. 1A-9373-B.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear valve chamber.

COOLING

Cooling System: Pressure type with relief valve in filler cap, one belt-driven pump, and by-pass.
Capacity—16 quarts.
Pressure Valve—In radiator filler cap. Ford No. (Except with Fordomatic) 26H-8100-B. Opens at 3½-4½ lbs.

Water Pump: Centrifugal, belt driven, packless type. *See Water Pump Section for complete data.*

Thermostat: In cylinder head water outlet.

Ford Thermostat No.	Opening Temperature
7HT-8575-A	148-153°F.
7HT-8575-B	157-162°F.
7HT-8575-C	①177-182°F.
1HA-8575-A	177-182°F.

①—For use with permanent anti-freeze.

Temperature Gauge: King-Seeley Electric type.
Dash Unit—Ford No. (All 1950 & 1951 Sta. Wgn.—Red Pointer) No. 8A-10883-B, (1951 exc. Sta. Wgn.—Red Pointer) No. 1A-10883-A, (1951 exc. Sta. Wgn.—White Pointer) No. 1A-10883-B.
Engine Unit—Ford No. 8A-10884 (stamped "224"—use with 4 lb. type pressure cap).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½CF-TS (Pass. Cars), 10CF-TI (Police & Taxicab). Semi-centrifugal, single plate types.

	Ford Clutch Nos.
Pass. Cars	①8A-7563-A, ②1A-7563-A
Police & Taxicab	③19A-7563-A

①—Identified by Orange marking and Green sprgs.
②—Identified by Black Paint mark (Cover), Yellow Paint mark (Pressure Plate) and silver springs.
③—Identified by White marking and Blue springs.

▷*CLUTCH PRODUCTION CHANGE:* 8BA-7563-A Clutch used on 1950 & early 1951 cars. 1A-7563-A Clutch used in production on late 1951 cars and can be used on earlier cars (has greater load capacity). Use this clutch with driven member having molded facing on flywheel side (previous type woven facings).
See Clutch Section for complete data.

Driven Member: *CAUTION—Different types used for Overdrive Cars as follows:*

	9½" Clutch	10" Clutch
Std. Trans.	8HA-7550-A ④	8HAS-7550-A
Overdrive Cars	8HA-7550-B ⑤	8HAS-7550-B

④—Aluminum Springs. ⑤—Black Springs.

Pedal Adjustment: Free travel 1-1¼" (Pass. Cars), 1⅛-1⅜" (Police & Taxicab). Adjust by loosening locknut and turning adjusting nut on release rod at clutch throw-out fork.

Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

►*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

►**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

Transmission Control: Steering column mounted shift *See Transmission Section for complete data.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model. (1950) AS1-R10E, (1951) AS4-R10E, (1950-51 Convt. & Sta. Wgn.) AS3-R10E. Solenoid operated type with governor control and throttle operated kickdown. *NOTE*—Overdrive used on Convt. & Sta. Wgn. has special solenoid mounting (pawl connected through linkage). Lock-out switch not used on 1951 models.

►*LOCK-OUT SWITCH ELIMINATION*—Not used on 1951 cars, can be removed from earlier cars if inoperative. *See "Ford, Lincoln, Mercury Overdrive" in Transmission Section.*

Solenoid—Ford No. (exc. Convt.) 8A-6916-A replaced by 8A-6916-C (rubber coated) or 8M-6916-B. (Convertible Models) No. 8M-6916-A.

Control Relay—Ford No. 8M-6915.

Overdrive Fuse—30 amperes. On relay.

Lockout Switch—Ford No. 6917-A, (1950).

Throttle Kickdown Switch—Ford No. 8A-6918-B.

Removal: Same as for Std. Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission with hydraulic control and parking lock.

►*LINKAGE PRODUCTION CHANGE*—Throttle Linkage changed on later cars for quieter and more efficient operation. Can be installed on earlier cars. *See Fordomatic Transmission in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Fordomatic & Mercomatic in Transmission Section.*

►*TROUBLE SHOOTING & TESTING: See Fordomatic & Mercomatic in Transmission Section.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15000 miles. **Use only Automatic Transmission Fluid, Type A.**

Capacity—Approx. 9 qts.

Checking Oil Level—With transmission selector lever in "Neutral," run engine approx. four minutes at idle speed. Clean floor mat and lift right side to expose plate in floor boards, remove plate. When engine and transmission are at normal operating temperature, move the selector lever through all ranges to distributor oil through transmission. Check fluid level on indicator in filler cap, add fluid to bring level to "full" mark on indicator. Make certain cap locked in place when replaced.

►*CAUTION—Do not fill above FULL mark.*

►*OTHER FORDOMATIC DATA: See Transmission Sect.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.

►*REPLACEMENT UNIVERSAL JOINT NOTE: TWO types furnished for service (interchangeable):*

1) Pre-lubricated (8M-7042 Front & 8M-7039 Rear). Requires lubrication at 20,000 mile intervals (repack bearings and replace seals).

2) Grease Fitting (1M-7042A Front & 1M-7039 Rear). Must be lubricated at 1000 mile intervals using a pressure gun.

►*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive with separate carrier. Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required). *See Rear Axle Section for complete data.*

►**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Gear Ratio:	Ratio & Marking①
Synchro-mesh Trans.	3.73-1 (11/41)
Overdrive	4.10-1 (10/41)
Fordomatic	3.31-1 (13/43) or 3.54-1 (11/39)

①—Ring and pinion gear tooth ratio (11/41 etc.) stamped on carrier.

Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

►**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

►*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.

Wheel Bearing Adjustment: None.

STATION WAGONS

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive (**separate carrier not used**). Axle ends flanged—(no separate hub). Wheel bearings are sealed (no lubrication required).

NOTE—AXLE NOT SAME AS PASSENGER CAR.

See Rear Axle Section for complete data.

Ratio (Standard)—3.91-1 (43-11).

Ratio (with Overdrive)—4.27-1 (47-11).

Ratio (with Fordomatic)—3.54-1 (39-11).

Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as Ford Pass. Cars.

SHOCK ABSORBERS

Direct acting hydraulic type. Two makes used which are interchangeable. Service by replacement.

Ford Part Nos.	Front	Rear
1950 Pass. Car Std.	8A-18124-A	8A-18125-A
1950 Pass. Car H.D.	8A-18124-C	8A-18080-C
1950 Station Wagon	8A-18124-B	8A-18125-B
1951 Pass. Car Std.	APA-18124-A	APA-18125-A
1951 Station Wagon①	APA-18124-B	APA-18125-B

①—Special Equipment on Passenger Cars.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.

See Front Suspension Section for complete data.

►**Riding Height & Car Leveling Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section).*

►**Front Suspension Noise (popping or chucking noise) Correction**—*See "Ford Passenger Cars, Lincoln, Mercury" in Front Suspension Section.*

Kingpin Inclination—5¼° crosswise.

Caster (Pass Cars)—Pos. ½° to Neg. 1°.

(Station Wagon)—Neg. ¼° preferred. Limits Neg. ¼° to Neg. 1¾°. Both wheels alike within ½°.

Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°. Both wheels alike within ¼°.

Toe In—1/16" to 1/8".

STEERING GEAR

Ford. Worm & Roller type with eccentric adjustment. *See "1949-51 Ford Pass. Car Worm-&-Roller" in Steering Section for complete data.*

►**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinder Diameter—Front 1⅛" (none limit 1.132"), Rear ⅞" (none limit .880").

Drums—Diameter 10" (11" Sta. Wagon rear drums).

Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:

	Front Wheels		Rear Wheels	
	Pri.	Sec.	Pri.	Sec.
Pass. Cars	11"	11"	11"	11"
Sta. Wgn.	11 15/16"	11 15/16"	11"	11"

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

►**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top Control: *TWO types*

1949-50 Hydro-Lectric with Non-reversible Motor. Motor control combined with hydraulic valve to reverse flow to cylinders for up-down movement.

1951 Hydro-Lectric with Reversible Motor. Reversing motor rotation directs fluid to correct end of cylinder for up or down movement.

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail just to rear of front suspension upper arm.

Year	Engine Type	Model	Assembly Plant	Serial Number
1950	B	0	See below	100001 Up
1951	B	1	See below	100001 Up

Assembly Plant Designations

AT—Atlanta	**DA**—Dearborn	**MP**—Memphis
BF—Buffalo	**LU**—Louisville	**NR**—Norfolk
CS—Chester	**EG**—Edgewater	**RH**—Richmond
CH—Chicago	**KC**—Kansas City	**SR**—Somerville
DL—Dallas	**LB**—Long Beach	**SP**—Twin City
HM—Highland Park		(St. Paul)

TUNE-UP

▷*ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING: May be caused by excessive wear of fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*

COMPRESSION PRESSURE: 120 lbs. at cranking spd.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Ford No. 7RA-12127-C or 8BA-12127 (Used with Cast Iron Front Cover) or 0BA-12127 (Used with Aluminum Front Cover).
Breaker Gap—.014-.016".
Cam Angle—27° closed, 18° open.
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Distributor Line (Carburetor Connection) Vacuum—2.0-2.9" at 800 RPM., 3.5-4.8" at 1000 RPM., 4.7-6.4" at 2200 RPM., 4.6-6.2" at 2400 RPM.

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Crankshaft Pulley Mark—Circular boss aligned with timing pointer on right side of engine front cover.

CARBURETION: Holley-Ford Carburetor No. 8BA-9510-A (1BA-9510-A on Fordomatic Cars). Carburetor used on Fordomatic Cars has Anti-stall Dashpot (below).
Idle Setting—Approx. 1 turn open. Two screws—turning screws out gives richer mixture.
Idle Speed—(Std. Trans.) 475-500 RPM, (Automatic Trans.) 425 RPM.
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (use Gauge No. 9550-A).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Anti-Stall Dashpot Adjustment (Fordomatic Cars): *After idle speed correctly set, hold throttle valve closed,* loosen dashpot adjusting screw locknut on throttle lever, turn adjusting screw out until screw causes dashpot plunger to bottom in dashpot, then turn adjusting screw in 1½-2 turns and tighten locknut. This will provide correct clearance of .045-.064" between dashpot plunger and adjusting screw.

Fuel Pump Pressure: 3½-4½ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross over and right exhaust manifold.

VALVE TAPPET CLEARANCE: ***CAUTION—Different settings required for each type camshaft.***

▷First Type Camshaft No. 8BA-6250-A①
(no markings on Engine or Camshaft)
Intake—.010-.012", **Exhaust**—.014-.016", Cold.
①—Before Eng. No. 8BA-622468—Partial production after this number.

▷Later type Camshaft No. 8BA-6250-B②
(Eng. marked—"GAP, in- .014", ex- .018")③.
(Camshaft marked "B" on front end)
Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.
②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.
③—On top of block at center under valve cover.

▷***CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.***
Adjustment—*See "Valve System" in Ford Special Data.*

IGNITION

IGNITION SWITCH: Ford No. 6A-11572-A or B (All 1950 & 1951 Sta. Wgn.), No. 1A-11572-B (1951 exc. Sta. Wgn.).

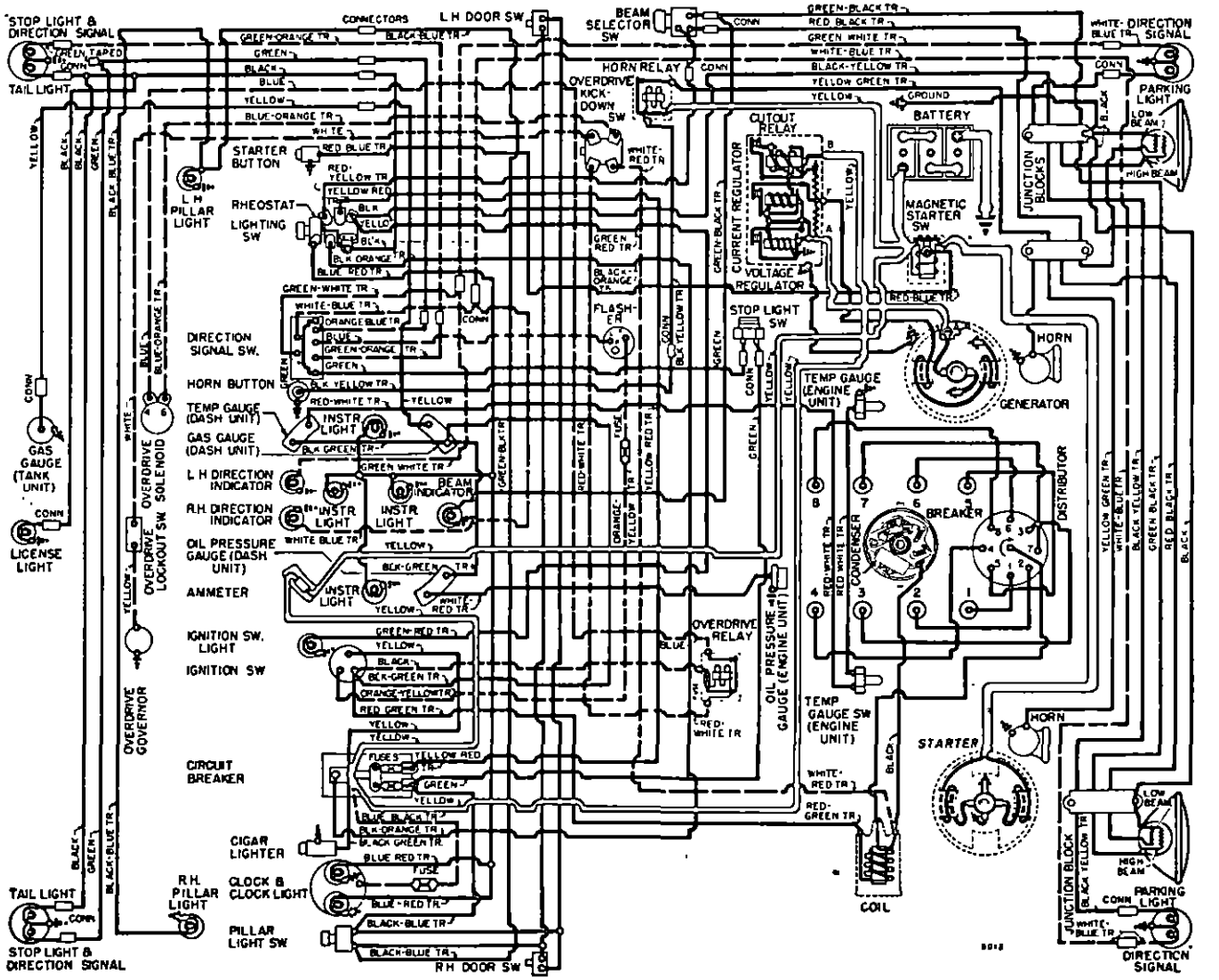
Ignition Lock—Ford No. 8A-11582-A (1950), 1A-11582-A (1951).

COIL: Ford No. 8BA-12029. On lower front corner of right hand cylinder head.
Ignition Current—Idling 2.75-3.0 Amperes at 6 volts. 5.0-5.5 amperes stopped. Coil primary resistance 1.05-1.15 ohms (75°F). Secondary resistance 4100 ohms (75°F).

CONDENSER: Ford No. 7RA-12300-C.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: (Early 1950) Ford No. 7RA-12127-C. Use with 8BA-6250-A Camshaft. (Late 1950-51) Ford No. 8BA-12127 (used with cast iron front cover), 0BA-12127 (used with aluminum front cover). Pressure type distributor with spark advance controlled by vacuum diaphragm moving plate to advance spark against two springs.

▷Excessive Pinging Correction—*See "Ford, Lincoln,*



1950 MODELS

Mercury Distributor" in Electrical Equipment Section.
Breaker Gap—.014-.016".
Cam Angle—27° closed, 18° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

8BA, OBA-12127 Advance Performance
►With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
0-1°	0.30"	500
5.2-6.2°	1.32"	1000
8¾-10°	2.85"	1500
10-11¼°	3.7"	2000

7RA-12127-C Advance Performance
►With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
1¼-2¼°	0.4"	500
4¼-5¼°	1.7"	1000
6¼-7¼°	2.8"	1500
7½-8½°	3.7"	2000

Distributor Line Vacuum Test—*See Tune-Up.*

IGNITION TIMING

Std. Setting ..... **2° BTDC.**
Crankshaft Pulley Mark—Circular boss on rear edge of pulley (timing pin on right front side of engine).
Timing—With #1 piston at firing position and timing mark on pulley aligned with timing pin on front of engine, loosen hold-down screw on distributor, rotate distributor until contacts begin to open, tighten hold-down screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.
►**Timing (with Neon Timing Light)**—*CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.* Mark timing pin and pulley mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and timing pin aligned.

CARBURETOR

1950-51 (Std. Trans.) Holley-Ford No. 8BA-9510-A.
1951 (With Fordomatic) Holley-Ford No. 1BA-9510-A.
Dual (double-barrel) downdraft type with new vacuum passages for distributor operation.
NOTE—Carburetors on Fordomatic Cars has Anti-stall Dashpot.
See Carburetor Section for complete data.
Setting (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.
Throttle Linkage Adjustment (Fordomatic Cars): *See "Fordomatic & Mercomatic" in Transmission Section.*

CARB. EQUIPMENT

Fuel Pump (std.): Ford No. (1950) 7RA-9350-C, (1951) 1BA-9350-A or 1BA-9350-G.
Optl. (Fuel & Vacuum)—Ford No. (1950) 7RA-9350-E, (1951) 1BA-9350-E or 1BA-9350-H.
►*FUEL PUMP PUSHROD WEAR (Causing Loss of Power or Engine Cutting Out): See "Fuel System Notes" in Ford Special Data.*
Pressure—3½-4½ lbs. (both types).
Gasoline Gauge: King-Seeley Electric.
Dash Unit—(All 1950 & 1951 Sta. Wgn.—Red Pointer) Ford No. 8A-9280-B, (1951 exc. Sta. Wgn.—Red Pointer) No. 1A-9280-A, (1951 exc. Sta. Wgn.—White Pointer) No. 1A-9280-B.
Tank Unit—Ford No. 8A-9275 (exc Sta Wgn), No. 01A-9275-A (Sta. Wgn.).
See Carburetion Equipment Section for complete data.
Air Cleaner: Oil-wetted type Std., Oil-bath type Optl.

BATTERY

Ford No. 81A-10655-A. 6-Volt, 17 Plate, 100 Amp. Hr.
Grounded Terminal—Positive (+).
Location—On left side in engine compartment.

STARTER

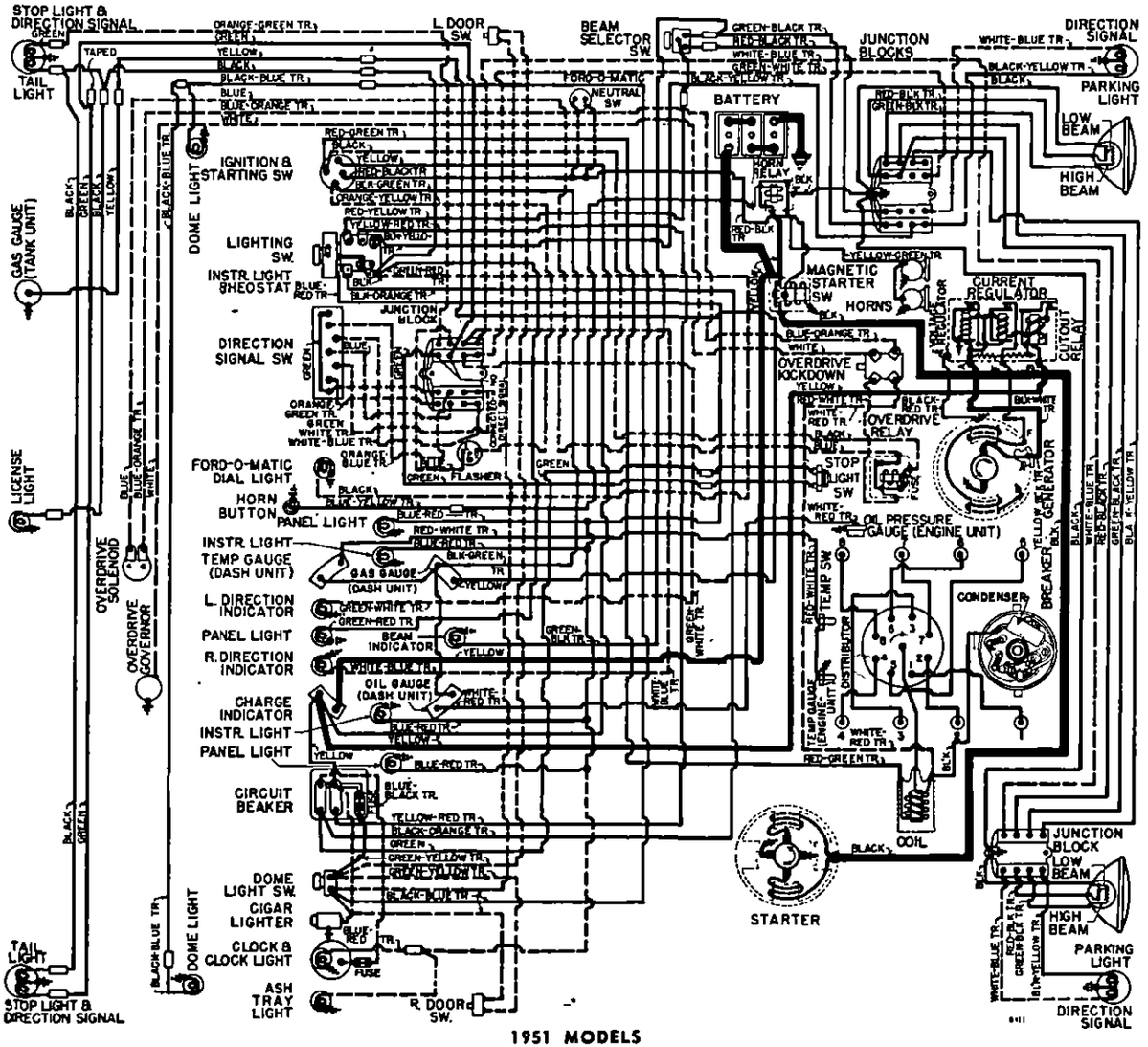
1950 (All Models) Ford No. 7RA-11002.
1951 (Except Fordomatic) Ford No. 1A-11002-A.
1951 (With Fordomatic) Ford No. 1CM-11002-A.
Armature—(Exc. Fordomatic) No. 18-11005. (With Fordomatic) No. 1CM-11005-A.
Drive—Bendix No. A1472 (Ford No. B-11350).
►*STARTER DRIVE PRODUCTION CHANGE (LATE 1951)—Bendix "Folo-Thru" Starter Drive used on cars with FORDOMATIC TRANSMISSION. See Electrical Equipment Section for complete data.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

Starting Switch: (1950 All Models & 1951 Sta. Wgn.)

CONTINUED ON NEXT PAGE



1951 MODELS

CONTINUED FROM PRECEDING PAGE

Ford No. 21A-11450. (1951 Except Sta. Wgn.) Ford No. 1A-11450-A. Mounted on left front fender apron and controlled as follows:
1950—Pushbutton Switch No. 6H-11500.
1951—Key operated ignition & starter switch, Ford No. 1A-11572-B. Turn switch full right to start.
►*FORDOMATIC DRIVE NOTE*—Neutral Safety Switch, Ford No. 1M-15812-B in circuit between ignition switch and starter switch.

ENERATOR

Ford. Two-brush (voltage & current regulation).

Generator No.	Type	Armature No.
8BA-10002-A①	35 Amp.	0A-10005-A
8BA-10002-B	40 Amp.	8EH-10005
8BA-10002-D	35 Amp.	0A-10005-A
8EL-10002-B	40 Amp.	8EH-10005

①—Replaced by 8BA-10002-D for service.

Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—36 amperes, 7 volts, reached at approximately 20 MPH. Controlled by regulator (dependent on load & battery condition).

Performance Data

Generator	Amperes	Engine RPM.
8BA-10002-A	35	935
8BA-10002-B	40	
8BA-10002-D	35	900
8EL-10002-B	40	

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-36 ozs. each.
Generator Belt Adjustment: Loosen hub and bracket assembly adjusting nut, raise generator until belt deflection midway between generator and left hand water pump pulleys is 3/8" (thumb and finger pressure), tighten adjusting nut.
Fan Belt Adjustment—*See COOLING.*

REGULATOR

Ford. Vibrating voltage and current type.

Regulator No.	For Generator No.
51A-10505-A	8BA-10002-A or D
51A-10505-H	8BA-10002-A or D
5EH-10505-C	8BA-10002-B
8L-10505	8BA-10002-B
8M-10505-A①	8BA-10002-A or D

①Service replacement regulator.

See Electrical Equipment Section for complete data.
NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Regulator	Cuts In	Cuts Out (Discharge)
51A-10505-A	6.6-7.0 Volts	0-8 Amperes
51A-10505-H	6.6-7.0 Volts	0-8 Amperes
5EH-10505-C	6.6-7.0 Volts	0-8 Amperes
8M-10505A	6.0-6.6 Volts	0-8 Amperes
8L-10505	6.0-6.6 Volts	0-8 Amperes

Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Regulator	Voltage Setting①
51A-1505-A, H	7.2-7.6 volts
5EH-10505-C	7.2-7.6 volts
8L-10505, 8M-10505, A	7.2-7.6 volts

①—For regulator at normal operating temperature
Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.

Current Regulator

Regulator	Cold Setting	Amperes
51A-10505-A, H		30-34
5EH-10505-C		38-42
8L-10505		38-42
8M-10505, A		34-38

Checking & Adjustment—*See Elec. Equip. Section.*
Air Gap—.032-.035" between armature and core with contacts just closed.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".
Direction Signal: Optl. *See Electrical Equipment Section.*
Directional Signal Flasher—Ford No. ('50).. 8L-13350-B, ('51) 8L-13350-C.

Switches

Lighting—Ford No. 0A-11654 (All 1950, Sta. Wgn. 1951), No. 0L-11654 (1951 exc. Sta. Wgn.).
Beam Selector—Ford No. 8A-13532.
Dome Light—Ford No. ('50) 0A-13752, ('51) 1A-13752. (1950-51 Station Wagon) No. 0M-13752.
Stop Light—Ford No. 11A-13480 or 0A-13480.

MISC. ELECTRICAL

CIRCUIT BREAKER (1950): Ford No. 0A-12258A. Consists of ONE thermostatic circuit breaker (for headlight circuits) and TWO fuses (see below) to protect other lighting circuits. Mounted behind instrument panel.
CIRCUIT BREAKER (1951): Ford No. 1A-12258A. Consists of TWO thermostatic circuit breakers (one for headlights, other for Parking, Tail & Instr. Lights), and ONE fuse to protect other lighting circuits. Mounted behind instrument panel.
FUSES: Auxiliary Lights (Parking, Tail & Instrument) (1950 only)—14 ampere. On circuit breaker.
Dome & Stop (1950), Dome only (1951)—14 ampere. On circuit breaker.
Clock—2 ampere. In clock feed wire.
Overdrive—30 ampere. On relay on dash under hood.
Direction Signal—15 ampere. In feed from ignition switch to flasher.
HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), No. 51A-13833-A or B (Low Pitch, Left Horn).
Horn Relay: Ford No. ('50) 7RA-13853-B, ('51) 7RA-13853-A.
►***CAUTION—Use only Ford type relay No. 7RA-13852-B with TAN plastic cover on 1950 cars. If 1951 relay No. 7RA-13853-A with BLACK plastic cover is used, shock at button may result when blowing horn.***

ENGINE

►*ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING: May be caused by excessive wear of fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*
ENGINE SPECIFICATIONS: Own 8BA. Eight cylinder "L-head," 90° V8 type.
Bore—3.187". **Stroke**—3.75".
Displacement—239 cu. ins. **Rated HP**—32.5.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.8-1 cast-iron heads.
Compression & Vacuum Reading—*See Tune-Up.*
ENGINE REMOVAL: *See Ford Special Data.*
OIL PAN REMOVAL: *See Ford Special Data.*
NOTE—1951 oil pan new non-interchangeable type.
CYLINDER HEAD & GASKET INSTALLATION & PRODUCTION CHANGES: *See Ford Special Data.*
CYLINDER SLEEVES: Cast iron dry type.
See Ford Special Data.
PISTON: *CAUTION*—**Two types used:**
"49T" U-Slot Pistons (Before Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, steel strut, cam ground, dome head type.
CAUTION—49T pistons must be used in ALL steel sleeve engines. Use "29A-" piston rings with this piston. Do not use 49T pistons to replace Autothermic pistons.
"8BA" Solid Skirt Pistons, AUTOTHERMIC type (After Pass. Car Eng. No. 8BA-641087, Truck 8R Eng. No. 195401)—4 ring (lower ring below pin) aluminum alloy, "Autothermic" type, 1/16" offset pin.
CAUTION—8BA Autothermic pistons must not be used on steel sleeve engines. Can be used to replace 49T pistons in sets on other engines. Use "8BA-" piston rings with this piston (29T rings must not be used).
Removal—Pistons and rods removed from above.
Clearance—See Fitting Pistons.
Replacement Pistons ("49T-"): Std., .005, .020", .030", .040", .060" Oversize.
Replacement Pistons ("8BA-" Autothermic): Std. (4 grades with limits 3.1879-3.1891 in .0003" steps for selective fitting), .0025", .020", .030", .040", .060" OS.
Fitting Pistons ("49T-"): Use .50" wide feeler stock of correct thickness (as listed below) inserted between piston and cylinder wall at right angles to pin to check clearance (on 8BA pistons, feeler should be placed on thrust side of piston). Pull to withdraw feeler 6-12 lbs. (49T), 3-12 lbs. (8BA pistons).

Feeler Thickness:	49T Pistons	8BA Pistons
New Piston—New Bore	.003"	.0015"
New Piston—Used Bore	.003"	.0015"
Used Piston—Used Bore	.004"	.003"

Installing Pistons ("8BA-" Autothermic): Locating mark (small indention) on head of piston above one pin hole to front on all pistons. *CAUTION*—This will place offset pin toward thrust side of piston.
PISTON RINGS: 2 compression, 2 slotted oil rings (lower oil ring below pin). Upper oil ring groove drilled with oil drain holes, lower groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0915-.0920"	.007-.047"	.0015-.003"
Compr. (#2)	.0915-.0920"	.007-.047"	.001-.0025"
Oil (#3, 4)	.1545-.1550"	.007-.047"	.001-.003"

Replacement Rings: *See Ford Special Data.*
►***CAUTION—Use "29A-" rings on first type 49T Pistons, "8BA-" rings on 8BA Autothermic Pistons.***
PISTON PIN: Diameter .7504". Floating type.
Pin Fit in Piston—.0001-.0003" clearance (new), .0007" (worn limit).
Pin Fit in Rod—.0001-.0003" clearance (new).
Replacement Pins: Sizes and paint marks: Std. (green), .001" Oversize (blue), .002" OS (yellow).
CONNECTING ROD: Length 7". Weight 18.7 ozs.
►*CONNECTING ROD PRODUCTION CHANGE*—Beginning Engine No. 8BA-628866 through 8BA-629940 and all Engines after 8BA-641087, new type connecting rod used with 5/64" squirt hole drilled on an angle into the side of the bearing flange web meeting 3/16" hole in rod bearing flange.
►***CAUTION—These new connecting rods should be used only on engines with neoprene seals on intake valve guides and increased capacity oil pump.***
Crankpin Journal Diameter—2.138-2.139". Wear limits .0015" (out-of-round), .001" (taper).
Lower Bearing—Steel-backed, copper-lead alloy lined, replaceable shells.

ENGINE

CONTINUED FROM PRECEDING PAGE

Clearance—.0005-.003" (new), .005" (worn limit).
Side Play—(Early type rod) .006-.014". Late type rod .006-.020".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings.

Replacement Bearings: Standard and .002", .010", .020", .030", .040" Undersize. *See Ford Special Data.*
Installing Rods—Rods with squirt hole installed with squirt hole toward valve push rod assembly.

CRANKSHAFT: 3 bearing. Integral counterweights.

►***SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning. Always use new plugs if old plugs disturbed and peen or stake crankshaft to hold plugs in place securely.***
Journal Diameters—2.498-2.4990" (all bearings) wear limits—Out-of-round .0015", Taper .001".
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.001-.0026".

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings.

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.002-.006" (new), .008" (worn limit).

CAMSHAFT: *CAUTION—Two different types used, each type requires different tappet clearance.*
8BA-6250-A—Engines before No. 8BA-622468.
8BA-6250-B—Partial production beginning Eng. No. 8BA-622468 and service replacement of first type.

►***CAMSHAFT IDENTIFICATION***—New 8BA-6250-B Camshaft stamped "B" on forward end (first type not marked), and engine marked "GAP, in- .014", ex- .018" on top of block under valve cover at center.

►***ENGINE MARKING CAUTION***—Gap mark (see above) must be added when "B" shaft installed on unmarked block, or removed if first type shaft installed on marked block.
Journal Diameters—1.794" (worn limit).
Bearing Diameter—1.7985" (replace bearing if diameter greater than worn limit 1.8015").
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.002".

Replacement Bearings: Standard size and .010", .015" Undersize. Undersize bearings also furnished .080" oversize on O.D.
Camshaft Bearing Servicing—*See "Camshaft & Bearings" in Ford Special Data.*

End Thrust: Taken by front end of camshaft. Adjust by replacing cover. **Endplay**—.007-.018".

Timing Gears: *CAUTION—Two types camshaft gears used. See "Timing Gears" in Ford Special Data.*
Crankshaft Gear—Cast Alloy Iron.

►***CAUTION—Camshaft gear teeth REVERSE (L.H.) providing one-way thrust to camshaft for silencing backlash.***
Replacement Camshaft Gears—Std. .006", .012" OS.

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
All (1950)	1.51"	.3410"	4.75"
All (1951)	1.515"	.3410"	4.54"

	Seat Angle	Lift	Stem Clearance
All	45°	①.292"	.0015-.0035"

①—Replace camshaft if lift less than .291" (Intake), .287" (Exhaust).

►***ROTATABLE VALVES—Used on 1951 cars, can be installed on earlier cars. See "Valve System" in Ford Special Data.***
Valve Seat Width—1/16" maximum.
Valve Assembly Removal & Servicing—*See "Valve System" in Ford Special Data.*
Valve Seat Inserts—*If used, see "Valve System" in Ford Special Data.*

►**Sticking Valve Correction**—If necessary to ream guides, use .001" oversize reamer for exhaust valve guides, .0005" oversize reamer for intake guides.

Valve Guides: One-piece type positioned and retained by "C" washer. Inside diameter .344", Outside diameter 1.031". Length 2.20". NOTE—Rubber seal used on intake guide.

Valve Lifters: Barrel type in guide holes in block.
Diameter—.9992" (replace if worn to less than .9977"). Length limit after resurfacing 1.700".
Clearance—.0007-.0016" (new), .003" (worn limit).

Valve Springs: Coated springs used.
Spring Test—40-43 lbs. at 2.13". Free length 2.41".

VALVE TIMING

VALVE TAPPET CLEARANCE: CAUTION—Different settings required for each type camshaft.

►**First Type Camshaft No. 8BA-6250-A①**
(no markings on Engine or Camshaft)
Intake—.010-.012", **Exhaust**—.014-.016", Cold.
①—Before Engine No. 8BA-622468.

►**Later type Camshaft No. 8BA-6250-B②**
(Eng. marked—"GAP, in- .014", ex- .018")③
(Camshaft marked "B" on front end)
Intake—.014" (.013-.015") **Exhaust**—.018" (.017-.019"), Cold.
②—Partial production after Eng. No. 8BA-622468, and service replacement on all engines.
③—On top of block at center under valve cover.

►***CAUTION—Loss of power will result if correct tappet clearance not used on engines with "B" CAMSHAFT.***
Adjustment—*See "Valve System" in Ford Special Data*

Valve Timing: See Camshaft Setting above.
First Type Camshaft No. 8BA-6250-A
Intake Valves—Open at TDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 6° ATDC.
Late Camshaft No. 8BA-6250-B
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 3° ATDC.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear.
Crankcase Capacity—4 quarts (5 quarts when changing oil filter).
Normal Oil Pressure—45 lbs. at 30 MPH.

Oil Pressure Relief Valve: In pump body. Not adj.
Spring Tension—12 lbs. compressed to 1.14".

Oil Pump: Gear type (two types: one equipped with spur gears, second with helical gears).
Pump Removal & Overhaul—*See Ford Special Data.*

Oil Filter: On left cylinder head.
Oil Filter Cartridge—Ford No. 7HA-6731A.

Oil Pan Removal: *See Ford Special Data.*

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. (All 1950 & 1951 Sta. Wgn.—Red Pointer) 8HA-9273-B, (1951 exc. Sta. Wgn.—Red Pointer) No. 1A-9273-A, (1951 exc. Sta. Wgn.—White Pointer) No. 1A-9373-B.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with relief valve in filler cap and two belt-driven pumps (one for each bank) with re-circulating by-pass.
Capacity—21 quarts.
Pressure Valve—In radiator filler cap. Ford No. (Except with Fordomatic) 26H-8100-B. Opens at 3½-4½ lbs. (With Fordomatic) 1M-8100-B. Opens at 6½-7½ lbs.

Water Pumps: Two used. Packless type.
See Water Pump Section for complete data.
Fan & Pump Belt Adjustment—Loosen adjusting screw, shift fan until belt deflection midway between right hand water pump and fan pulleys is ¼"
Generator (& Water Pump) Belt Adjustment—*See GENERATOR.*

Thermostats: Two Used (one in each head water outlet). Various types used as follows:

Thermostat Part No.	Opening Temperature
8BA-8575-B	157-162°F
8BA-8575-C①	167-172°F
8BA-8575-D, E	152-157°F
8BA-8575-F①	172-177°F
8RT-8575-A, B	148-153°F
1BA-8575-A (Dole)	157-162°F
1BA-8575-B (Dole)①	177-182°F

①For use with permanent anti-freeze.

Temperature Gauge: King-Seeley Electric type.
Dash Unit—Ford No. (All 1950 & 1951 Sta. Wgn.—Red Pointer) No. 8A-10883-B, (1951 exc. Sta. Wgn.—Red Pointer) No. 1A-10883-A, (1951 exc. Sta. Wgn.—White Pointer) No. 1A-10883-B.
Engine Unit—Consists of "Sender" (Temperature Indicator located in one cylinder head) and "Switch" (Excessive heat indicator) in other head.
Sender—Ford No. 8A-10884 (Stamped "224"—used with 4 lb. Pressure Cap) or No. 1A-10884-A (Stamped "233F"—used with 7 lb. Pressure Cap).
Switch—Ford No. 8A-10990 (Stamped "217"—used with 4 lb. Pressure Cap), or No. 1A-10990-A (Stamped "226F"—used with 7 lb. Pressure Cap).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½CF-TS (Pass. Cars), 10CF-TI (Police & Taxicab). Semi-centrifugal, single plate types.

Ford Clutch Nos.

Pass. Cars ①8A-7563-A, ②1A-7563-A
Police & Taxicab ③19A-7563-A
①—Identified by Orange marking and Green sprgs.
②—Identified by Black Paint mark (Cover), Yellow Paint mark (Pressure Plate) and silver springs.
③—Identified by White marking and Blue springs.

►***CLUTCH PRODUCTION CHANGE:*** 8BA-7563-A Clutch used on 1950 & early 1951 cars. 1A-7563-A Clutch used in production on late 1951 cars and can be used on earlier cars (has greater load capacity). Use this clutch with driven member having molded facing on flywheel side (previous type woven facings).
See Clutch Section for complete data.

Driven Member: *CAUTION—Different types used for Overdrive Cars*	9½" Clutch	10" Clutch
Std. Trans.	8HA-7550-A ④	8HAS-7550-A
Overdrive Cars	8HA-7550-B ⑤	8HAS-7550-B

④—Aluminum Springs. ⑤—Black Springs.

Pedal Adjustment: Free travel 1-1¼" (Pass. Cars), 1⅛-1⅜" (Police & Taxicab). Adjust by loosening locknut and turning adjusting nut on release rod.

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Removal: Remove transmission (see TRANSMISSION Removal below). Take off flywheel housing. Install wooden wedges between each release lever and cover to hold clutch in released position, take out 6 cover capscrews, lift assembly out.

TRANSMISSION

SYNCHRO-MESH

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for data.*

▷*TRANSMISSION NOISE CORRECTION—See Transmission Section for complete data.*

▷**Transmission Inoperative in Reverse (Overdrive Transmissions)**—*See "Ford, Lincoln, Mercury Transmission" in Transmission Section.*

Transmission Control: Steering column mounted shift *See Transmission Section for complete data.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame, Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model. (1950) AS1-R10E, (1951) AS4-R10E, (1950-51 Convt. & Sta. Wgn.) AS3-R10E. Solenoid operated type with governor control and throttle operated kickdown. *NOTE*—Overdrive used on Convt. & Sta. Wgn. has special solenoid mounting (pawl connected through linkage).

▷*LOCK-OUT SWITCH ELIMINATION*—Not used on 1951 cars, can be removed from earlier cars if inoperative. *See "Ford, Lincoln, Mercury Overdrive" in Transmission Section.*

Solenoid—Ford No. (exc. Convt.) 8A-6916-A replaced by 8A-6916-C (rubber coated) or 8M-6916-B. (Convertible Models) No. 8M-6916-A.

Control Relay—Ford No. 8M-6915.

Overdrive Fuse—30 amperes. On relay.

Throttle Kickdown Switch—Ford No. 8A-6918-B.

Removal: Same as for Std. Transmission (above).

▷**Overdrive not engaging, and Prolonged shorting out of Ignition on Kick-down Corrections**—*See "Ford, Lincoln, Mercury Overdrive in Transmission Section.*

FORDOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission, hydraulic control, mechanical parking lock.

▷*LINKAGE PRODUCTION CHANGE*—Throttle Linkage changed on later cars for quieter and more efficient operation. Can be installed on earlier cars.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Fordomatic & Mercomatic in Transmission Section.*

▷*TROUBLE SHOOTING & TESTING: See Fordomatic & Mercomatic in Transmission Section.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15000 miles. **Use only Automatic Transmission Fluid, Type A.**

Capacity—Approx. 9 qts.

Checking Oil Level—With transmission selector lever in "Neutral," run engine approx. four minutes at idle speed. Clean floor mat and lift right side to expose plate in floor boards, remove plate. When engine and transmission are at normal operating temperature, move the selector lever through all ranges to distributor oil through transmission. Check fluid level on indicator in filler cap, add fluid to bring level to "full" mark on indicator. Make certain cap locked in place when replaced.

▷*CAUTION—Do not fill above FULL mark.*

▷*OTHER FORDOMATIC DATA: See Transmission Sect.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used. *See Universals Section for complete data.*

▷*REPLACEMENT UNIVERSAL JOINT NOTE: TWO types furnished for service (interchangeable):*

1) **Pre-lubricated** (8M-7042 Front & 8M-7039 Rear). Requires lubrication at 20,000 mile intervals (repack bearings and replace seals).

2) **Grease Fitting** (1M-7042A Front & 1M-7039 Rear). Must be lubricated at 1000 mile intervals using a pressure gun.

▷*CAUTION (ALL CARS EXCEPT STATION WAGON)—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive with separate carrier. Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required). *See Rear Axle Section for complete data.*

▷**Excessive Axle Shaft Endplay (causing noise in service) Correction**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Gear Ratio:	Ratio & Marking①
Synchro-mesh Trans.	3.73-1 (11/41)
Overdrive	4.10-1 (10/41)
Fordomatic	3.31-1 (13/43) or 3.54-1 (11/39)

①—Ring and pinion gear tooth ratio (11/41 etc.) stamped on carrier.

Backlash—.005-.008". *Screw adjustment.*

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

▷**Carrier Mounting Bolt Tightening Caution**—*See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

▷*CAUTION—Pinion bearing pre-loading must be re-established whenever universal joint flange nut on pinion shaft is removed or disturbed. See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-P and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).

Wheel Bearing Adjustment: None.

STATION WAGONS

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive (separate carrier not used). Axle ends flanged—(no separate hub). Wheel bearings are sealed (no lubrication required).

NOTE—AXLE NOT SAME AS PASSENGER CAR.

See Rear Axle Section for complete data.

Ratio (Standard)—3.91-1 (43-11).

Ratio (with Overdrive)—4.27-1 (47-11).

Ratio (with Fordomatic)—3.54-1 (39-11).

Backlash—.003-.008". *Shim adjustment.*

Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as Ford Pass. Car.

SHOCK ABSORBERS

Direct acting hydraulic type. Two makes used which are interchangeable. Service by replacement. *See Ford 6 Cyl. data for replacement part numbers.*

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.

See Front Suspension Section for complete data.

▷**Riding Height & Car Leveling Correction:** *See Front Suspension Section for data.*

▷**Front Suspension Noise (popping or chucking noise) Correction:** *See Front Suspension Section for data.*

Kingpin Inclination—5¼° crosswise.

Caster (Pass Cars)—Pos. ½° to Neg. 1°.

(Station Wagon)—Neg. ¼° preferred, Limits Neg. ¼° to Neg. 1¾°. Both wheels alike within ½°.

Camber (All)—Pos. ¼° to Pos. ¾° preferred. Limits 0° to Pos. 1°. Both wheels alike within ¼°.

Toe In—1/16" to 1/8".

STEERING GEAR

Ford. Worm & Roller type with eccentric adjustment. *See "1949-51 Ford Pass. Car Worm-&-Roller" in Steering Section for complete data.*

▷**Steering Idler Arm Looseness Complaints**—*See "Ford (6 & V8 Pass. Car)" in Steering Gear Section.*

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinder Diameter—Front 1⅛" (hone limit 1.132"), Rear ⅞" (hone limit .880").

Drums—Diameter 10" (11" Sta. Wagon rear drums).

Lining—Molded or Woven. Width 2¼" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe:

	Front Wheels		Rear Wheels	
	Pri.	Sec.	Pri.	Sec.
Pass. Cars	11"	11"	11"	11" 15/16"
Sta. Wgn.	11 15/16"	11 15/16"	11"	11 15/16"

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Hand Brake: See Service Brakes (above).

▷**Hand Brake Linkage Change (for easier application) and Cable Interference Correction**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Top Control: *TWO types used as follows:*

1949-50 Hydro-Lectric with Non-reversible Motor. Motor control combined with hydraulic valve to reverse flow to cylinders for up-down movement.

1951 Hydro-Lectric with Reversible Motor. Reversing motor rotation directs fluid to correct end of cylinder for up or down movement.

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

►***ENGINE IDENTIFICATION NOTE: Engines are designated as follows for specifications and equipment:***
1951 "226" Engine—6 Cyl. 226 cu.In. L-head.
1952-53 "215" Engine—6 Cyl. 215 cu. in. Valve-in-head.
1951-53 "254" Engine—6 Cyl. "M" 254 cu. in. L-head.
1951-53 "239" Engine—V8, 239 cu. in. Valve-in-head.

VEHICLE NUMBER: Stamped in upper left hand corner of RATING PLATE on glove box door assembly (except Parcel Delivery) or on dash panel (Parcel Delivery only) and stamped on left side of frame near steering gear mounting bracket.

1951-52 VEHICLE NUMBER

Vehicle Number includes identification data in following sequence (example "F1D2KC1001"):

Truck Series①	Engine Type②	Model Year③	Assembly Plant	Serial Number
F1	D	2	See below	10001 Up

①Truck Series Note

Serial Code	Truck Series	Serial Code	Truck Series
F1	F-1 Conv.	F5	F-5 Conv.
F2	F-2 Conv.	C5	F-5 C-O-E
F3	F-3 Conv.	B5	F-5 Sch. Bus.
P3	F-3 Parcel Del.	F6	F-6 Conv.
F4	F-4 Conv.	C6	F-6 C-O-E
		B6	F-6 Sch. Bus.

②Engine Type Note

H—"226" Engine. M—"254" Engine.
D—"215" Engine. R—"239" Engine.
See Engine Identification Note above.

③Model Year Note

1—1951, 2—1952 (Last digit of model year).

1951-52 Assembly Plant Designation

AT—Atlanta	DA—Dearborn	MP—Memphis
BF—Buffalo	LU—Louisville	NR—Norfolk
CS—Chester	EG—Edgewater	RH—Richmond
CH—Chicago	KC—Kansas City	SR—Somerville
DL—Dallas	LB—Long Beach	SP—St. Paul
HM—Highland Park		

1953 VEHICLE NUMBER

Vehicle Number includes identification data in following sequence (example "F10D3K10001"):

Series① Truck	Engine Type②	Model Year③	Assembly Plant	Number Serial
F-10	D	3	See Below	10001 Up

①Truck Series Note

Serial Code	Truck Series	Serial Code	Truck Series
F-10	F-100 Conv.	P-59	P-500 Par.Del.
F-25	F-250 Conv.	F-60	F-600 Conv.
F-35	F-350 Conv.	B-60	B-600-Sch.Bus
P-35	P-350 Par.Del.	C-60	C-600 C-O-E
F-50	F-500 Conv.	F-70	F-700 Conv.
C-50	C-500 C-O-E	B-70	B-700 Sch.Bus
B-50	B-500 Sch.Bus		

②Engine Type Note

D—"215" Engine, M—"254" Engine, R—"239" Eng.
See Engine Identification Note above.

③Model Year Note

3—1953 (Last digit of model year).

1953 Assembly Plant Designation

A—Atlanta	F—Dearborn	U—Louisville
B—Buffalo	G—Chicago	N—Norfolk
C—Chester	H—Highland Park	P—St. Paul
D—Dallas	K—Kansas City	R—Richmond
E—Edgewater	L—Long Beach	S—Somerville
	M—Memphis	

TUNE-UP

►***1952 V8 ENGINE OVERHEATING CORRECTION & ENGINE COOLING IMPROVEMENTS: See COOLING data in 1952-53 Ford V8 Passenger Car data for production changes and recommended reworking of early 1952 engines.***

COMPRESSION PRESSURE: 215 Engine—130 lbs. at 110 RPM., 226 & 254 Engine—110 lbs. at 60 RPM., 239 Engine—110 lbs. at 90 RPM.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 6 Cyl. Engines—1-5-3-6-2-4. 8 Cyl. Engine—1-5-4-8-6-3-7-2. *See diagram for cylinder numbering order of all engines.*

SPARK PLUG GAPS: .025-.028".
Plug Type—Champion H-9 Std. *NOTE*—Type H-11 (hottest plug) can be used for slower-than-average driving. 14 mm. type.
CAUTION—Tighten plugs to 24-30 ft. lbs.

DISTRIBUTOR: "Loadomatic" type with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two springs.

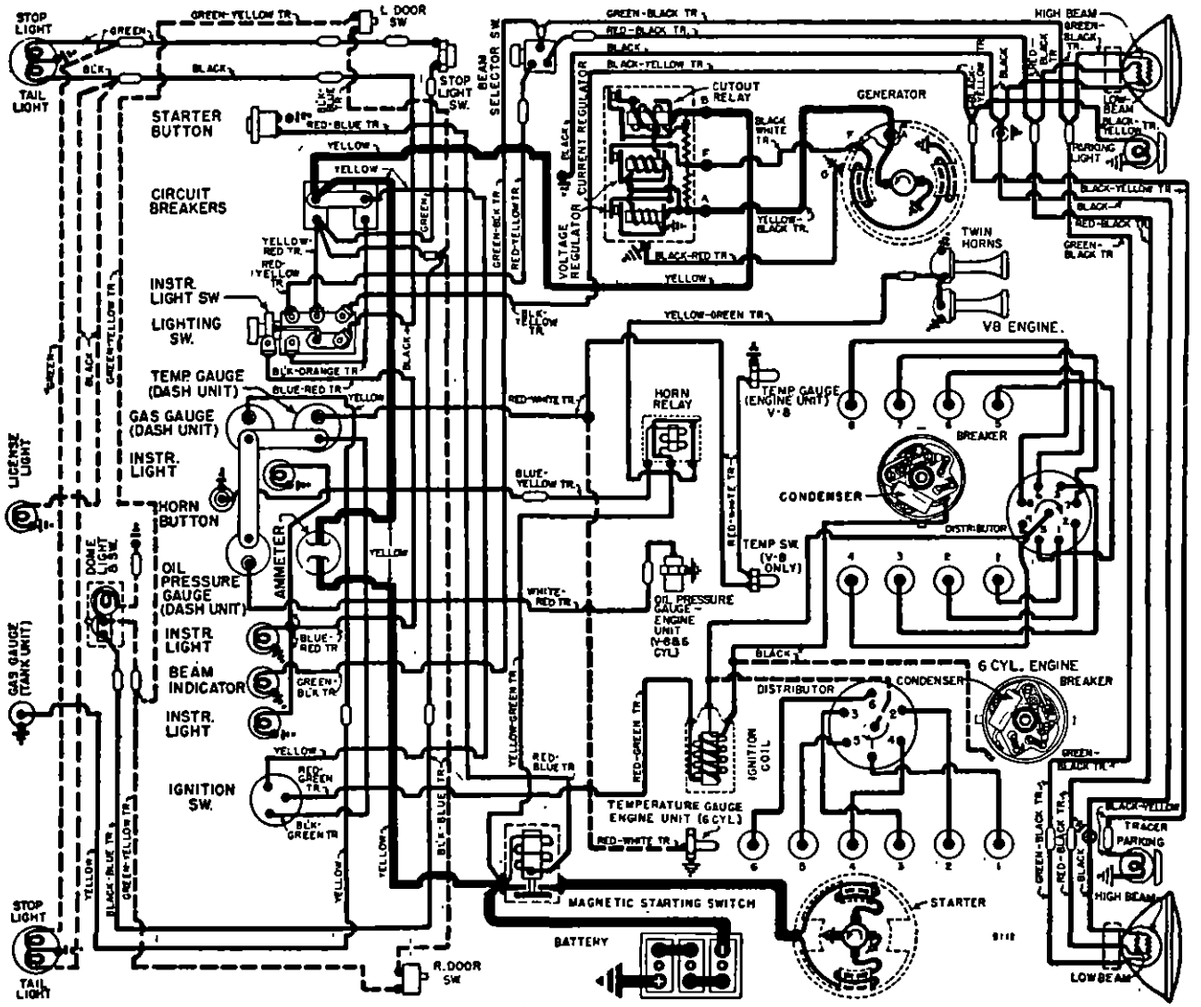
Engine Type	Ford Distributor No.
1951 226 Engine	7HA-12127
1952-53 215 Engine	①FAA-12127A
1953 215 Engine	FAA-12127C
1951-53 254 Engine	8MTH-12127
1951-53 239 Engine	②8BA-12127 or OBA-12127

①—See Conversion to FAA-12127C Note below.
②—See application Caution below.

►***"215" ENGINE DISTRIBUTOR PRODUCTION CHANGE CAUTION: Two distributors used have different advance and require different Ignition Timing settings.***

►***FAA-12127-A DISTRIBUTOR CONVERSION TO FAA-12127-C TYPE: See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.***

CONTINUED ON NEXT PAGE



1951-52 MODELS

CONTINUED FROM PRECEDING PAGE

▷*CAUTION—Use 8BA-12127 with CAST IRON FRONT COVER, use 0BA-12127 with ALUMINUM COVER.*

Breaker Gap—(6 Cyl. Engines) .024-.026" (8 Cyl. Engine) .014-.016".

Cam Angle—(6 Cyl. Engines) 36° closed. (8 Cyl. Engines) 27° closed. Dwell should be 58-63% idling.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic & Vacuum Advance—*See Ignition.*

▷*215 ENGINE DISTRIBUTOR INSTALLATION CAUTION—When installing distributor on engine, be sure oil pump tang engages slot in distributor shaft.*

COIL: Ford No. 8BA-12029.

Ignition Current—2.75-3.0 amperes (idling), 5.0-5.5 amperes (stopped).

CONDENSER: Ford No. 7RA-12300-C.

Capacity—.21-.25 microfarad at 70°F.

IGNITION TIMING: *CAUTION—Different timing required on "215" Engine for each type distributor.*

Engine & Distr.	Std. Ignition Setting
1951 226 Engine	At TDC.
1952-53 215 Eng. (FAA-12127A Distr.)	2° BTDC.
1953 215 Eng. (FAA-12127C Distr.)	5° BTDC.
1951-53 254 Engine	At TDC.
1951-53 239 Engine	2° BTDC.

215 Eng. Timing Mark—First type damper has one groove located 2° BTDC. (correct for first FAA-12127-A distr.). Later type damper has four marks (TDC or 0°, 3°, 7°, & 9° BTDC).

▷*REWORKING TIMING MARK ON FIRST 215 ENGINES:* If later FAA-12127-C distributor used on trucks with first type damper (2° BTDC mark only), make a new timing mark on the damper 3° or .165" to the right or clockwise from old mark for timing.

226 Engine Timing Mark—Circular boss or groove on dampener and two pointers on engine front cover. Use pointer nearest outer circumference of dampener.

254 Engine Timing Mark—Groove on damper aligned with pointer on engine front cover.

239 Engine Timing Mark—Mark on crankshaft pulley should be aligned with pointer on front cover.

Timing Procedure—*See Ignition Timing.*

CARBURETION (1952-53 "215" ENGINE): Holley-Ford. "Visi-flo" downdraft types. Carburetor used on 1953 Fordomatic Trucks has Anti-stall dashpot.

▷*1952 CARBURETOR LEAKAGE CORRECTION & FUEL BOWL CHANGE: See "Holley-Ford Visi-flo" in Carburetor Section.*

Idle Setting—Approximately 1 turn open. Set for highest steady vacuum reading with engine at normal operating temp., midway between rolling and missing points. Turn screw out for richer mixture.

Idle Speed—475-500 RPM.

CAUTION: Set idle speed only with engine warm and choke valve in wide open position.

Float Level: *See Ford "Visi-flow" Carburtor in Carburetor Section for complete data.*

Fuel Level—Flush to 1/16" below top edge of float hinge bracket in bowl. To adjust, remove bowl cover, bend float tab which contacts float needle spring. *NOTE—Fuel level can be checked through glass bowl cover without disturbing carburetor.*

Accelerating Pump: Inner hole for normal or hot weather, outer hole for cold weather (holes located in throttle lever). Shift pump link as required.

Throttle Linkage Adjustment (Fordomatic Trucks): *See "Fordomatic & Merco-Matic" in Transmission Section for complete data.*

Anti-Stall Dashpot (Fordomatic Trucks): First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes the dashpot rod up to the end of its travel. Turn dashpot screw in (clockwise) 1½ turns to 2 turns for .045-.064" clearance, tighten locknut.

Fuel Pump Pressure: 4-5 lbs.

CARBURETION (1951 "226" & 1951-53 "254" ENGINE): Holley-Ford. Single barrel downdraft (conventional trucks), updraft (Parcel Delivery & Cab-over-Engine trucks) with manual choke control.

Idle Setting—1 turn open. Turning screw out gives richer mixture.

Idle Speed—475-500 RPM.

Float Level (Downdraft Carburetors)—1.322-1.353" (226 Eng. 7HT-9510A Carb.), 1.283-1.315" (254 Eng. 8MTH-9510A Carb.) measured from bottom of float to machined surface of air horn (invert assembly and allow float to hang down in valve closed position).

Float Level (Updraft Carburetors)—1.180-1.200" (all carburetors) measured from bottom of float to face of bowl cover with valve seated (invert assembly).

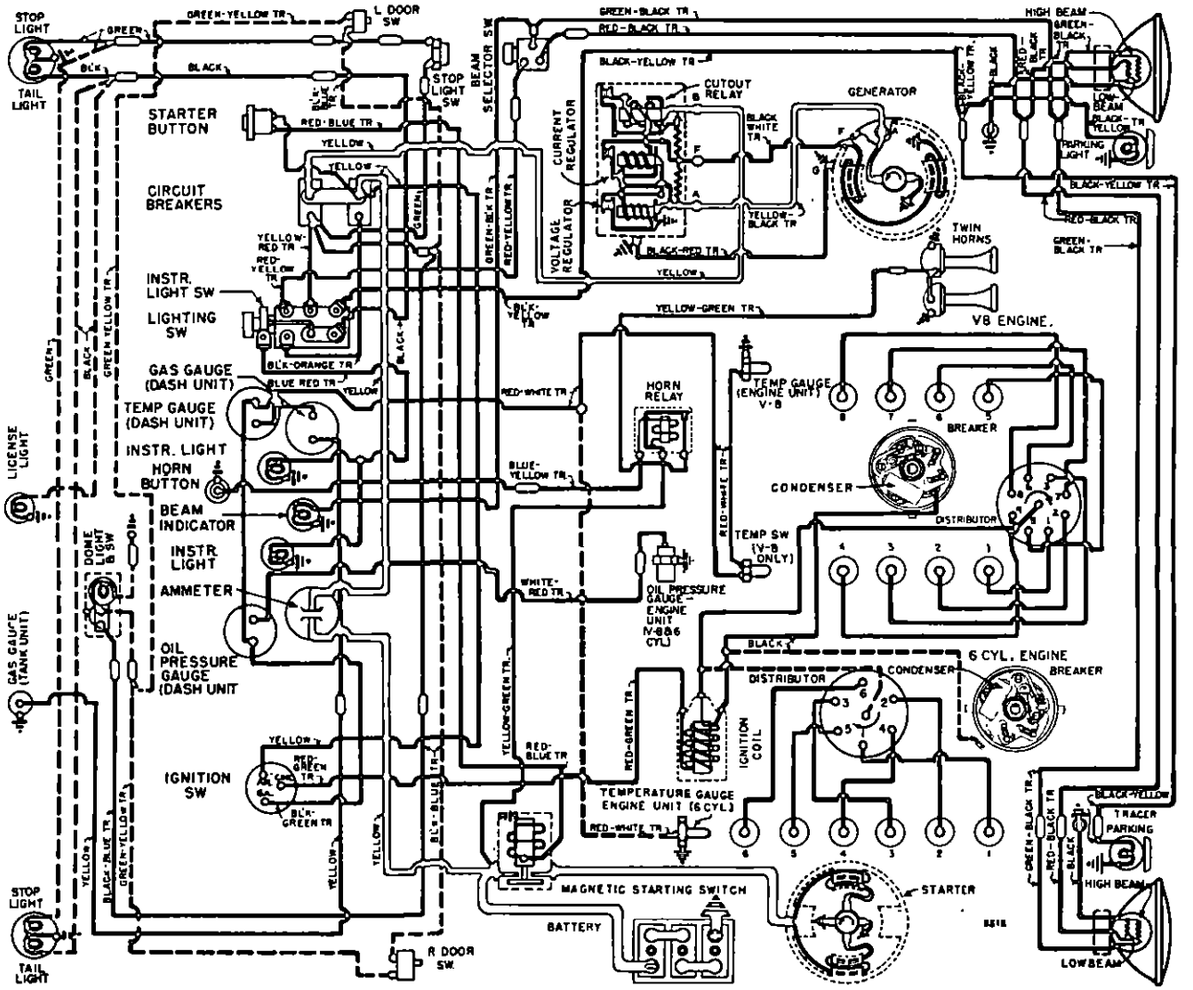
Accelerating Pump—Center hole average setting. Inner hole for hot weather, outer for cold.

Fast Idle: Integral type. Operated by choke lever. No adjustment required.

Fuel Pump Pressure: 4-5 lbs.

CARBURETION (1951-53 "239" V8 ENGINE): Holley-Ford. Dual downdraft type with manual choke control. Carburetor used on 1953 Fordomatic Trucks has Anti-stall dashpot.

Idle Setting—Approximately 1 turn open. Adjust both screws alike. Turn screws out for richer mixture.



1953 MODELS

Idle Speed—475-500 RPM.
Float Level—*CAUTION—DIFFERENT setting required for cars with "High-lift" Nozzle Bars as follows:* 1.322-1.353" (Std. Nozzle Bar Carburetors Nos. 7RT-9510A, 8RT-9510A). 1.275-1.305" (High-lift Nozzle Bar Carburetors Nos. 8RT-9510F, 8RT-9510G). Measure from bottom of float to underside of cover with needle valve seated (invert assembly).
Accelerating Pump—Center hole average setting. Inner hole for hot weather, Outer for cold.
Fast Idle: Integral type. Operated by choke lever. No adjustment required.
Throttle Linkage Adjustment (Fordomatic Trucks): *See "Fordomatic & Mercomatic" in Transmission Section for complete data.*
Anti-Stall Dashpot (Fordomatic Trucks): See 215 Engine Carburetor (above) for adjustment procedure.
Fuel Pump Pressure: 3½-4½ lbs.
MANIFOLD HEAT CONTROL: Automatic thermostatic type. **6 Cyl. Engines**—Located at center of exhaust manifold. **8 Cyl. Engine**—"Duck-Bill" type thermostatic valve located inside right side of crossover pipe near flange.
VALVE TAPPET CLEARANCE: *CAUTION—DIFFERENT setting required for each type engine as follows:*

"215" Engine

All Valves—.014-.016" HOT or cold setting of .013-.015" Intake, .015-.017" Exhaust. *NOTE*—Adjusting screws located in rocker arms on head.

"226" Engine

Intake—.013-.015", **Exhaust**—.017-.019". *NOTE*—Self-locking adjusting screws located in valve lifters in valve chamber.

"254" Engine

Intake—.009-.011", **Exhaust**—.014-.016" *NOTE*—Self-locking adjusting screws located in valve lifters in valve chamber.

"239" Engine

Intake—.014" (.013-.015"), **Exhaust**—.018" (.017-.019") COLD. *NOTE*—No tappet clearance adjustment provided. *See "Valve Tappet Clearance" in Ford Special Data.*

IGNITION

IGNITION SWITCH: Ford No. OL-11572-A (All Models 1951-52, Parcel Del 1953), **No. FAA-11572-A** (All Models exc. Parcel Del. 1953).
COIL: Ford No. 8BA-12029.
Ignition Current—Idling 2.75-3.0 amperes at 6 volts. 5-5.5 amperes stopped.
CONDENSER: Ford No. 7RA-12300-C.
Capacity—.21-.25 microfarad.
DISTRIBUTOR: Less distributor cap and rotor.
Type—"Loadomatic" type with spark advance controlled by diaphragm moving breaker plate to advance spark against two breaker plate springs.

Engine Type	Ford Distributor No.
1951 226 Engine	7HA-12127
1952-53 215 Engine	①FAA-12127A
1953 215 Engine	FAA-12127C
1951-53 254 Engine	8MTH-12127
1951-53 239 Engine	②8BA-12127 or OBA-12127

①—See Conversion to FAA-12127C Note below.
②—See application Caution below.

►*CAUTION—Use 8BA-12127 with CAST IRON FRONT COVER, use OBA-12127 with ALUMINUM COVER.*
►*"215" ENGINE DISTRIBUTOR PRODUCTION CHANGE CAUTION: Two distributors used have different advance and require different Ignition Timing settings.*
►*FAA-12127-A DISTRIBUTOR CONVERSION TO FAA-12127-C TYPE: See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*
Breaker Gap—(6 cyl.) .024-.026"; (V8) .014-.016".
Cam Angle—(6 Cyl.) 36° closed. (8 Cyl.) 27° closed. Dwell should be 58-63% idling.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Unit
Distributor No. 7HA-12127

Degrees①	Vacuum	RPM.
0-0	0"	200
1¾-3	0.4"	500
5½-6¾	1.4"	1000
11½-13	5.5"	1000
8½-9¾	2.9"	1500
10½-11½	4.1"	2000

8BA & OBA-12127

Degrees	Vacuum	RPM
0-0°	0"	200
0-1°	0.30"	500
5.2-6.2°	1.32"	1000
8¾-10°	2.85"	1500
10-11¼°	3.7"	2000

8MTH-12127

Degrees	Vacuum	RPM
0-0°	0"	200
2-3°	0.4"	500
6¼-7¼°	1.3"	1000
10½-12°	3.8"	1400
9¼-10¼°	2.6"	1600

FAA-12127A Distr.

Degrees①	Vacuum	RPM
0	0"	200
3½-4½	0.5"	500
8¼-9¼	1.8"	1000
14¾-16¼	6.5"	1000
11¾-13	3.8"	1500
14½-15¾	6.0"	2000

FAA-12127C Distr.

Degrees①	Vacuum	RPM
0-½	0"	200
3½-4½	0.5"	500
7-8	1.8"	1000
9¾-11	3.8"	1500
11½-13	6.0"	2000

①—Distributor degrees.

IGNITION TIMING

►*215 ENGINE TIMING CAUTION—Different timing required for each type distributor:*

Engine & Distr.	Std. Ignition Setting
1951 226 Engine	At TDC.
1952-53 215 Eng. (FAA-12127A Distr.)	2° BTDC.
1953 215 Eng. (FAA-12127C Distr.)	5° BTDC.
1951-53 254 Engine	At TDC.
1951-53 239 Engine	2° BTDC.

215 Eng. Timing Mark—First type damper has one groove located 2° BTDC. (correct for first FAA-12127-A distr.). Later type damper has four marks (TDC or 0°, 3°, 7°, & 9° BTDC). Set timing at 5° BTDC (midway between 3° and 7° marks) with later FAA-12127-C distributor.
►*REWORKING TIMING MARK ON FIRST 215 ENGINES:* If later FAA-12127-C distributor used on trucks with first type damper (2° BTDC mark only), make a new timing mark on the damper 3° or .165" to right or clockwise from old mark for ignition timing.
226 Engine Timing Mark—Circular boss or groove on dampener and two pointers on engine front cover. Use pointer nearest outer circumference of dampener.
254 Engine Timing Mark—Groove on damper aligned with pointer on engine front cover.
239 Engine Timing Mark—Mark on crankshaft pulley should be aligned with pointer on engine front cover.
Timing (with Neon Timing Light)—*CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.* Mark timing mark and pointer with white chalk. Connect timing light to No. 1 spark plug, idle engine, adjust distributor by loosening clamp screw, rotate distributor until mark and pointer aligned, tighten clamp screw, connect vacuum line.

CARBURET R

Holley-Ford Types (as listed below)—Dual (8 cyl.), single barrel (6 Cylinder), Downdraft types (Updraft on 6 Cyl. Parcel Delivery & Cab-over-Engine Models). All carburetors have vacuum passages for distributor advance control and manual choke. Anti-stall Dashpot used on Fordomatic truck models.

Engine	Ford Carburetor No.
1951 "226" Eng. (Downdraft)	7HT-9510A
1951 "226" Eng. (Updraft)	7HW-9510
1951-53 "254" Eng. (Downdraft)	8MTH-9510A
1951-53 "254" Eng. (Updraft)	8MWH-9510A
1951-52 "239" Engine	7RT-9501A & 8RT-9510A
1953 "239" Eng. (exc. Fordomatic)	8RT-9510G
1953 "239" Eng. (Fordomatic)	8RT-9510H
1952-53 "215" Eng. (exc. Fordomatic)	EAG-9510B
1953 "215" Eng. (Fordomatic)	EAA-9510H

►*1952 EAG-9510B CARBURETOR LEAKAGE CORRECTION & FUEL BOWL CHANGE: See "Holley-Ford Visi-flo" in Carburetor Section.*
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.
Throttle Linkage Adjustment (Fordomatic Trucks): *See "Fordomatic & Merco-Matic" in Transmission Section for complete data.*

CARB. EQUIPMENT

Air Cleaner: AC Oil Bath or Oil Wetted types.
Fuel Pump: AC. Diaphragm types as follows:

Engine	Ford Pump No.
1951 "226"	1HA-9350A & 1HA-9350G
1951 "254"	1HA-9350A
1951-53 "254"	1HA-9350G
1951 "239" (Fuel only)	1BA-9350A
1951 "239" (Fuel & Vacuum)	1BA-9350E
1951-53 "239" (Fuel only)	1BA-9350G
1951-52 "239" (Fuel & Vacuum)	1BA-9350H
1953 "239" (Fuel & Vacuum)	EAB-9350A
1952-53 "215" (Fuel only)	EAA-9350E
1952-53 "215" (Fuel & Vacuum)	EAA-9350F

►*6 CYL. "215" ENGINE LOW FUEL PUMP PRESSURE: Check for camshaft eccentric wear. See "Fuel System" in Ford Special Data.*
►*V8 "239" ENGINE LOSS OF POWER OR ENGINE CUTTING OUT DURING HEAVY OPERATION OR HIGH SPEED: May be caused by pushrod wear. See "Fuel System" in Ford Special Data.*
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric (Not Constant Voltage type).
Dash Unit—Ford No. 1C-9280-A (1951-52 All Models & 1953 Parcel Del.), No. FAD-9280-A (1953 All Models exc. Parcel Delivery).
Tank Unit—Ford Nos. as follows:

1951-52 Trucks

21C-9275-B—F-1, F-2, F-3 Panels.
7RC-9275—All models (Closed Cabs).
7RT-9275—F-5, F-6 Panels & School Bus.

1953 Trucks

Ford No. 9275-B—F-100, F-250, F-350 Panels & F-350 & F-500 Parcel Delivery.

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Ford No. 7RT-9275—F-500, F-600, F-700 Panels & School Bus (Exc. Parcel Delivery & C-O-E- Models).
Ford No. FAC-9275-B—F-500, F-600, F-700 Closed Cab (Except C-O-E- Models & Parcel Delivery).
Ford No. FAC-9275-A—All C-O-E Models.
See Carburetion Equipment Section for complete data.

BATTERY

F-100, *F-250, F-350 Series—Ford No. 81A-10655-L. 6 volt, 15 plate, 90 amp. hr. capacity (20 hr. rate).
F-500, F-600 Series—Ford No. 81A-10655-J. 6 volt 17 plate, 100 ampere hour capacity (20 hr. rate).
F-700 Series—Ford No. 01A-10655-J. 6 volt, 17 plate, 120 ampere hour capacity (20 hr. rate).
Grounded Terminal—Positive (+) terminal.
Location—(Except C-O-E) In engine compartment. (C-O-E)—On right running board.

STARTER

Engine	Ford Starter No.
1951 All Engines	1A-11002A
1952-53 254 Engine	FAD-11002A
1952 215 Engine	FAE-11002A
1953 215 Engine (exc. Fordomatic)	FAC-11002C
1953 215 Engine (Fordomatic)	FAE-11002A
1952-53 239 Eng. (exc. Fordomatic)	FAD-11002A
1953 239 Engine (Fordomatic)	FAE-11002A

Starter No.	Drive	Armature No.
1A-11002-A	④	18-11005
FAC-11002-A	①1CM-11350-C	52-11005
FAD-11002-A	②B-11350	18-11005
FAD-11002-A	③8HA-11350	18-11005
FAE-11002-A	①1CM-11350-C	1CM-11005-A

①—"Folo-thru" type drive.
②—239 Engine. ③—254 Engine.
④—B-11350 (10-tooth pinion), 8HA-11350 (9-tooth pinion).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs.
Normal Cranking Speed—100 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	①	6.5	70
16 ft. lbs.	Lock	3.5	700

①—With starter on engine and engine running.

Starting Switch: Ford No. 21A-11450 (1951), No. FAB-11450-B (1952-53) Magnetic type controlled by push-button on instrument panel. *NOTE*—Neutral Switch Ford No. FAC-15812-B used on trucks with Fordomatic Transmission.

GENERATOR

Own. Two-brush with voltage & current regulation.

Engine	Ford Generator No.	Armature
1951 (All)	8BA-10002A①	OA-10005A
1951 (All)	8BA-10002B	8EH-10005
1951 (All)	8BA-10002D	OA-10005A
1951-53 (All)	FAA-10002B	OA-10005A
1952-53 (239)	FAA-10002A	OA-10005A
1953 (239)	FAF-10002A②	
1953 (239)	8EL-10002B	8EH-10005
1953 (215)	FAF-10002B③	
1953 (All)	FAB-10002C	8EH-10005

①—Use 8BA-10002D for service replacement.
②—Use FAA-10002A for service replacement.
③—Use FAA-10002B for service replacement.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—Controlled by regulator and dependent on load and battery condition.

Performance Data

Generator	Amperes	Engine RPM.
8BA-10002-A	35	935
8BA-10002-B	40	
8BA-10002-D	35	900
FAA-10002-A	35	850
FAA-10002-B	35	1030
FAB-10002-C	①40	890
FAB-10002-C	②45	960
FAF-10002-A	32	
FAF-10002-B	32	
8EL-10000-B	①40	
8EL-10000-B	②45	

①—With FAD-10505-A Regulator.
②—With FAE-10505-A Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—26-34 ozs.

Belt Adjustment: (215 Engine)—½" belt deflection midway between fan and crankshaft pulleys, and ¼" deflection between generator and water pump pulleys.

Belt Adjustment (226 & 254 Engines): ¼" deflection midway between generator and water pump pulleys.

Belt Adjustment: (239 Engine)—Loosen two bolts on fan mounting bracket, loosen generator support mounting stud nut and raise generator up until side movement on belt midway between generator and water pump pulleys is ½" (thumb and finger pressure), tighten stud nut. Adjust fan belt in similar manner, tighten two fan bracket bolts.

REGULATOR

Ford Regulator No.	For Generator
51A-10505-A, H	8BA-1002-A, D
5EH-10505-A	8BA-10002-B
8L-10505	8BA-10002-B
8M-10505, A	8BA-10002-A, D; FAA-10002-B
FAC-10505-A	FAA-10002-A, B
FAD-10505-A	①FAB-10002-C, 8EL-10000-B
FAE-10505-A	②FAB-10002-C, 8EL-10000-B

①—With 40 ampere output.
②—With 45 ampere output.

Three-unit voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Settings below are for regulator at normal operating temperatures (after ½-hour operation) with room temperature of 75°F.

Cutout Relay

Cuts In—6.0-6.6 volts.

Voltage Regulator

Setting—7.4-7.8 volts.
Checking & Adjusting—*See Electrical Equipment Sec.*

Current Regulator

Setting (51A-10505-A)—30-34 amperes.
Setting (51A-10505-H)—34-38 amperes.
Setting (5EH-10505-A & 8L-10505)—38-42 amps.
Setting (8M-10505, A)—34-38 amperes.
Setting (FAC-10505-A)—34-38 amperes.
Setting (FAD-10505-A)—38-42 amperes.
Setting (FAE-10505-A)—43-47 amperes.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Light between fuel and oil gauges on panel. Lighted when upper beam in use.

Switches

Lighting—Ford. (1951-52) No. OL-11654-A, (1953) No. FAA-11654-A.
Beam Selector—Ford No. 8A-13532.
Instrument—Ford No. OL-13740.
Stop Light—Ford No. OA-13480.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Ford No. 8C-12258-B. Consists of a 15 ampere and a 30 ampere circuit breaker, located behind instrument panel.

HORNS: Dual horns with relay.

ENGINE

▷*ENGINE NOTE—Various engines used as follows:*

6 CYL. "226" ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. "H", L-head type.
Bore—3.30" **Stroke**—4.40"
Displacement—225.9 cu. ins. **Rated HP.**—26.1
Developed Horsepower—95 at 3300 RPM.
Compression Ratio—6.8-1.
CYLINDER SLEEVES: *See Ford Special Data.*
ENGINE & OIL PAN REMOVAL: *See Ford Special Data.*
CYLINDER HEAD & GASKET INSTALLATION: *See Ford Special Data.*
▷**ALL OTHER ENGINE DATA:** *See 1951 Ford 6 Cylinder Pass. Car engine data.*

6 CYL. "215" ENGINE

ENGINE SPECIFICATIONS: 6 Cylinder "D" Valve-in-head type.
Bore—3.65" **Stroke**—3.60"
Displacement—215 cu. ins. **Rated HP.**—30.4
Developed Horsepower—101 at 3500 RPM.
Compression Ratio—7.0-1.
▷*215 ENGINE VIBRATION NOTE—Vibration may be caused by incorrect installation of Rear Main Bearing Oil Seals. See "Crankshaft & Main Bearings" in Ford Special Data.*
ENGINE & OIL PAN REMOVAL: *See Ford Special Data.*
CYLINDER HEAD & GASKET INSTALLATION: *See Ford Special Data.*
▷**ALL OTHER ENGINE DATA:** *See 1952-53 Ford 6 Cylinder Pass. Car engine data.*

V8 "239" ENGINE

ENGINE SPECIFICATIONS: V8 "R" L-head type.
Bore—3.187" **Stroke**—3.75"
Displacement—239.4 cu. ins. **Rated HP.** 32.5
Developed Horsepower—106 at 3500 RPM.
Compression Ratio—6.8-1.
▷*239 ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING—May be caused by excessive wear or fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*
▷*1952 V8 ENGINE OVERHEATING CORRECTION & ENGINE COOLING IMPROVEMENTS: See COOLING data in 1952-53 Ford V8 Passenger Car data for production changes and recommended reworking of early 1952 engines.*
ENGINE & OIL PAN REMOVAL: *See Ford Special Data.*
CYLINDER SLEEVES: *See Ford Special Data.*
CYLINDER HEAD & GASKET INSTALLATION: *See Ford Special Data.*
▷*CYLINDER HEAD & GASKET PRODUCTION CHANGE: See Ford Special Data.*
▷**ALL OTHER ENGINE DATA:** *See 1951-1952-1953 Ford V8 Pass. Car engine data for all engine data EXCEPT THE FOLLOWING:*

CONTINUED ON NEXT PAGE

V8 "239" ENGINE (Cont.)

►**239 Engine Piston Fitting Note**—Use ½" wide feeler gauge inserted between piston and cylinder wall at right angle to pin on thrust side. Feeler thickness as follows: **New piston in new bore .0015". New piston in used bore .0015". Used piston in used bore .003".** Pull to withdraw feeler should be 3-12 lbs.

6 CYL. "254" ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. "M" L-head.
Bore—3.50" **Stroke**—4.40"
Displacement—254 cu. ins. **Rated HP.**—29.4
Developed Horsepower—112 at 3500 RPM.
Compression Ratio—6.8-1.

ENGINE & OIL PAN REMOVAL: *See Ford Special Data.*

CYLINDER SLEEVES: *See Ford Special Data.*

CYLINDER HEAD & GASKET INSTALLATION: *See Ford Special Data.*

►**ALL OTHER ENGINE DATA:** *See 1951 Ford 6 Cyl. Pass. Car "H" Engine data for all engine data EXCEPT THE FOLLOWING:*

PISTONS: Split skirt pistons used in early 1950, solid skirt pistons used beginning with later 1950 engines. Solid skirt piston data as follows:

►***CAUTION—Install piston with small indentation toward front of engine. Piston pin is offset 1/16".***
Removal—Pistons and rods removed from above.
Clearance—See Piston Fitting below.

Replacement Pistons: Std., .0025", .020", .030", .040", .060" Oversize.

Fitting Pistons: With piston inverted in cylinder bore so that end of piston is ⅝" below top of block and with piston pin bore parallel to crankshaft, use a ½" wide feeler gauge between piston and cylinder wall at right angle to pin on thrust side. Feeler thickness as follows: **New piston in new bore .0015". New piston in used bore .002". Used piston in used bore .003". 5-10 lbs.** pull should be required to withdraw feeler.

Installing Pistons: Locating mark (small indentation) on head of piston must be toward front of engine. Piston pin is offset 1/16" toward thrust side of piston.

PISTON RINGS: Two compression and one slotted oil control ring, all above piston pin.

Ring	End Gap	Side Clearance
Compr. #1	.007-.047"	.0020-.0035"
Compr. #2	.007-.047"	.0015-.0030"
Oil #3	.007-.047"	.0015-.0030"

►***NOTE—The minimum gap given above is for a new piston ring in a new (or rebored) bore. The maximum gap is for a new ring in a worn bore that is not to be resized.***

Replacement Rings: "Snap" type and "Expander" type rings available for service in the following sizes: Std., .020", .030", .040" .060" Oversize.

VALVE TIMING

VALVE TAPPET CLEARANCE: ***CAUTION—DIFFERENT setting required for each type engine as follows:***

"215" Engine

All Valves—.014-.016" HOT or cold setting of .013-.015" Intake, .015-.017" Exhaust. *NOTE*—Adjusting screws located in rocker arms on head.

"226" Engine

Intake—.013-.015". **Exhaust**—.017-.019". *NOTE*—Self-locking adjusting screws located in valve lifters in valve chamber on right side.

"254" Engine

Intake—.009-.011". **Exhaust**—.014-.016". *NOTE*—Self-locking adjusting screws located in valve lifters in valve chamber on right side.

"239" Engine

Intake—.014" (.013-.015"), **Exhaust**—.018" (.017" .019") COLD. *NOTE*—No tappet clearance adjustment provided. *See "Valve Tappet Clearance" in Ford Special Data.*

VALVE TIMING: *See "Camshaft Setting" in engine data for correct meshing of timing gears and chain.*

►***215"ENGINE CAUTION—Valve timing is different on Pass. Car and Truck engines.***

215 Engine①

Intake Valves—Open 13° BTDC. Close 68° ALDC.
Exhaust Valves—Open 55° BLDC. Close 22° ATDC.
①—With .015" Intake & Exhaust tappet clearance.

"226" & "254" Engine②

Intake Valves—Open 11° BTDC. Close 41° ALDC.
Exhaust Valves—Open 48° BLDC. Close 10° ATDC.
②—With .010" Int., .014" Exh. tappet clearance.

1951 "239" Engine③

Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 48° BLDC. Close 3° ATDC.
③—With No. 8BA-6250-B Camshaft (marked "B") and tappet clearance of .014" Intake, .018" Exhaust.

1952-53 "239" Engine④

Intake Valves—Open 21° BTDC. Close 68° ALDC.
Exhaust Valves—Open 56° BLDC. Close 11° ATDC.
④—With No. EAB-6250-B Camshaft (marked "E") and tappet clearance of .014" Intake, .018" Exhaust.

LUBRICATION

Crankcase Capacity: (215, 226, 239 Engines) 5 quarts. (254) Engine) 6 quarts. One quart additional required when filter being changed.

Oil Filter (215 Engine): "Full-Flow" type with pressure relief valve in filter center bolt. Replace element at 4000-5000 mile intervals, or whenever oil becomes dirty.
Replacement Filter Element—Ford No. CPA-6731A (Kit—includes gaskets).

►***CAUTION—This special Full-Flow filter element MUST BE USED (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication).***

►***215 ENGINE OIL FILTER INSTALLATION CAUTION & OIL LEAKAGE CORRECTION—See "Oiling System" in Ford Special Data.***

Oil Filter (226, 254, 239 Engines); By-pass (partial flow) type. Mounted on left side of crankcase (226 & 254), on left hand cylinder head (239). Replace element at 4000 mile intervals or more often if required.
Replacement Filter Element—Ford No. 7HA-6731A (Kit—with gaskets).

Normal Oil Pressure (at 2000 RPM): 215 & 226 Engine) 45 lbs., (239 Engine) 57 lbs., (254 Engine) 50 lbs. Not adjustable.

Oil Pump Relief Valve Spring Testing

Engine	Pressure	Length
215 Engine	9.82 lbs.①	1.56"
239 Engine	12.00 lbs.②	1.14"
226 & 254 Eng.	12.75 lbs.③	1.14"

①—Plus or minus 2 ozs. ②—Plus or minus .12 lbs.

Oil Pump (215 & 239 Engines): Gear type mounted in crankcase.
Pump Removal & Overhaul—See Ford Special Data.

Oil Pump (226 & 254 Engine): Rotor type. Mounted externally on right side of engine.
Pump Removal & Overhaul—See Ford Special Data.

Oil Pressure Gauge: King Seeley Electric (Not Constant Voltage Type).
Dash Unit—Ford No. 1C-9273-A (1951-52 All Models & 1953 Parcel Delivery), No. FAE-9273-A (1953 All Models exc. Parcel Delivery).

►***ENGINE SENDING UNIT INSTALLATION CAUTION:*** Unit must be installed so that "UP" marking on cover is at top vertical position.
Engine Unit—Ford No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap (inlet).

COOLING

Cooling System: Pressure type with relief valve in filler cap, by-pass in block, and belt driven water pump (two used on V8 "R" engine).
Capacity—For each engine as noted. 1 qt./addtl. when heater is installed.
(226 Eng.) 17 qts. (F1, 2, 3), 18 qts. (F4, 5, 6).
(254 Eng.) 18 qts. (1951), 19.3 (1952), 20 (1953).
(215 Eng.) 15 qts. (1952 F1, 2, 3), 16 qts. (1952 F4, 5, 6), 18½ qts. (All 1953).
(239 Eng.) 23 qts. (1951-52), 24½ qts. (1953).
Pressure Valve—Ford No. 1T-8100-A. Radiator filler cap. 4-lb. type (opens at 3½-4½ lbs.).

Water Pumps: Centrifugal, belt driven, packless type. Two pumps used on V8 239 Engine.
See Water Pump Section for complete data.

Thermostat: In cylinder head water outlet.
215 Engine—Dole type. Ford No. EAG-8575-A. Opens at 147-152°.
239 Engine—Bellows type. Ford No. 8RT-8575-B. Opens at 148-153°.
226 Engine—Dole type. Ford No. 7HT-8575-B or 8HT-8575-B (Std.—opens at 157-162°F). Spring & Cartridge type No. 7HT-8575-C (Permanent Anti-freeze—opens at 177-182°F).
254 Engine—Dole type. Ford No. 7HT-8575-B or 8HT-8575-B (Std.—opens at 157-162°F) or No. 8HT-8575-A (opens at 148-153° F). Spring & Cartridge type No. 7HT-8575-C (Permanent Anti-freeze—opens at 177-182°F).

Temperature Gauge: King-Seeley Electric (Not Constant Voltage Type).
Dash Unit—Ford No. 1C-10883-A (1951-52 All Models & 1953 Parcel Delivery), No. FAE-10883-A (1953 All Models except Parcel Delivery).
Engine Unit—Ford No. 8A-10884 (stamped "224"). This "sender" unit mounted in right hand cylinder head on V8 engines with additional switch mounted in left hand cylinder head.
Engine Temperature Switch (V8 Engine)—Ford No. 8A-10990 (stamped "217"). In left hand cyl. head.
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-T1, (F-1, F-100, F-250). Used with 3-speed transmission.
Long Model 11CF-C1 (All Other Models).
Semi-centrifugal, single plate dry disc type.
See Clutch Section for complete data.
Facings (10CF)—**Molded.** 10" O.D. .125" thick.
Facings (11CF)—**Woven.** (School Bus), **Molded**

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(others). Outside diameter 11". Thickness .137".

Pedal Adjustment: 1⅛-1⅜" pedal free travel. Adjusting clevis provided at forward end of connecting rod between pedal shaft and equalizer shaft.

Removal: Remove transmission (see TRANSMISSION removal below). Install wooden wedges between each release lever and cover to hold clutch in released position, take out cover capscrews, lift assembly out. NOTE—Flywheel housing bolts may have to be removed on some models.

TRANSMISSION

3-SPEED

Own Make. 3-speed, all helical gear type. Constant mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). Steering column shift lever standard on F-1 and F-100 Trucks.

See Transmission Section for complete data.

Removal: Remove propeller shaft by disconnecting rear universal and sliding yoke out of transmission. Disconnect clutch linkage and speedometer cable. Remove front floor plate. Remove nuts and washers from two engine rear support bolts. Raise rear end of engine (use block of wood on jack under engine) until rear support clears mounting bolts. Remove transmission mounting capscrews, pull transmission straight back until main drive gear shaft clears clutch, lift transmission out through floor opening.

3-SPD. HEAVY DUTY

Own Make. Heavy duty, 3-speed helical gear, constant mesh, synchro-mesh (Second & High). Sliding gear (Low & Reverse).

See Transmission Section for complete data.

NOTE—This transmission standard equipment on 1951-52 F-2 & F-3 and on 1953 F-250, F-350 Conventional Trucks, F-350 & F-500 Parcel Delivery. Optional on 1951-52 F-1, F-4, & F-5, and on 1953 F-100 & F-500 Conventional Trucks & School Bus.

Removal: Same as for 4-speed type following.

4-SPD. SYNCHRO-MESH

Own Make. 4-speed constant-mesh type. Synchro-mesh (Second, Third & High). Helical gears used for second, third and fourth speed. Spur gears used low and reverse.

▷*SHIFTER SHAFT LOCK PLUNGER SPRING CHANGE (To prevent transmission jumping out of gear):* Heavier spring (Part No. BB-7234) now used in production. This spring exerts pressure of 22-26 lbs. against plunger balls (8-9 lbs. with previous 8D-7234 spring).

See Transmission Section for complete data.

NOTE—This transmission standard equipment on 1951-52 F-6 (with "M" Engine) and 1953 F-500, F-600, F-700 Conventional Trucks and School Bus, and F-500, F-600 C-O-E. Optional on 1951-52 F-4, F-5, & F-6, and on 1953 F-100, F-250, F-350 Conventional Trucks and F-350 & F-500 Parcel Delivery.

Removal: Remove seat cushion, floor mat, and transmission cover on floor. Support engine with jack under flywheel housing (use wood block on jack), raise jack until engine weight is off rear mounting. Free coupling shaft support bearing from crossmember by removing nuts on two bolts, disconnect front universal joint by taking out four bolts mounting universal joint flange at hand brake drum and disconnect intermediate universal joint at support bearing by removing nuts on "U" bolts (tape bearing caps in place to prevent losing needle bearings), remove front shaft. Remove clutch equalizer shaft by taking out pin in clutch shaft and clevis pin at lever and pulling equalizer shaft off the bracket (CAUTION—Do not lose spring and bushing halves). Remove two bolts in engine rear support. Disconnect speedometer shaft at transmission. Remove transmission capscrews from flywheel housing, pull transmission straight back until clutch (main drive gear) shaft clears, then lift transmission out through floor opening.

NOTE—To remove brake assembly, take out 2 capscrews in hand brake lever sector on transmission case and two capscrews in brake adjusting screw bracket, disconnect hand brake link from transmission and anchor adjusting screw from brake band, remove brake band assembly and hand brake lever.

▷*TRANSMISSION INSTALLATION CAUTION—Make sure that all Universal Joint yokes are in the same plane when reinstalling to avoid drive-line unbalance.*

OVERDRIVE

Warner Model AS4-R10F. Overdrive is solenoid operated (no centrifugal pawls) with Governor control and throttle operated kick-down. There is no Lock-out switch on this unit.

See Transmission Section for complete data.

Overdrive Solenoid—Ford No. FAA-6916-A.
Control Relay—Ford No. 1M-6915-A.
Overdrive Governor—Ford No. 8M-6943.
Overdrive Fuse—30 amperes, on relay.
Throttle Kick-down Switch—Ford No. 8A-6918-B.

Removal: Same as for standard transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque Converter and three-speed automatic transmission with hydraulic control and mechanical parking lever. *NOTE*—This unit similar to Pass. Car model except that external Oil Cooler is used.

Lubrication (Capacity & Checking Oil Level)—*See 1953 Ford 6 Cyl. or V8 Pass. Car data.*

▷*OTHER FORDOMATIC SERVICE DATA—See "Fordomatic and Merc-O-Matic" in Transmission Section for complete data.*

UNIVERSALS

Spicer. Needle bearing type.

▷*UNIVERSAL JOINT INSTALLATION CAUTION—Make sure that all universal joint yokes in drive line are in the same plane, to avoid drive-line unbalance.*

Coupling Shaft Center Bearing: Consists of cushion mounted ball bearing bolted to underside of frame intermediate cross-member. Bearing is mounted on end of coupling shaft in a sleeve with felt retainer sleeve on each end and bearing baffle on front end.

REAR AXLE

SEMI-FLOATING (F-1 & F-100)

Own Make. Semi-floating, Hypoid gear type with Hotchkiss drive **(separate carrier not used).** Axle end flanged (no separate hub). Wheel bearings are sealed (pre-lubricated). No lubrication required.

▷*NOTE—AXLE NOT SAME AS FORD PASSENGER CAR (EXCEPT STATION WAGON & SEDAN DELIVERY).*

See Rear Axle Section for complete data.

Ratio (Standard)—3.92-1 (47-12).
Ratio (Optional)—4.27-1 (47-11).
Ratio (Overdrive)—4.09-1 (45-11).
Ratio (Fordomatic)—3.92-1 (47-12).
Backlash—.003-.008". Shim adjustment.

Removal: Raise rear of truck. Disconnect rear universal. Remove axle shafts (see instructions below). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Remove nuts on rear spring U-bolts, drive bolts up free of housing, lower axle assembly and remove from underneath.

Axle Shaft Removal: Remove wheel. Take off drum. Remove four axle retainer nuts (work through opening in axle shaft flange). Use puller No. 4235 and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).

Wheel Bearing Adjustment: None required in service.

FULL FLOATING

Own Make. Full-floating, Spiral Bevel or Hypoid Gear types as listed below. *DIFFERENT TYPES USED AS FOLLOWS:*

1951-52 Rear Axle Types

F-2, F-3, F-4, F-5 . . ..①Split Housing Spiral Bevel
F-4, F-5 (Later)..... ....②Split Housing Spiral Bevel
F-6 .... Split Housing Hypoid

1953 Rear Axle Types

F-250 Conv. .....③(Light) Split Housing Hypoid
F-350 Par. Del..... .③(Light) Split Housing Hypoid
F-350 Conv. .....④(Heavy) Split Housing Hypoid
F-500, F-600 . .....Banjo Housing Hypoid
F-700 ....④(Heavy) Split Housing Hypoid

①—With pinion bearings mounted directly in housing and pre-loaded by pinion shaft nut (tapered pinion shaft).
②—With pinion bearings in sleeve bolted in housing (bearings pre-loaded by spacer and universal yoke nut). Pinion shaft is splined.
③—Pinion bearings mounted directly in housing.
④—Pinion bearings mounted in sleeve bolted in axle housing.

See Rear Axle Section for complete data.

1951-52 Truck Models	Available Axle Ratios
F-2, F-3	4.86-1 (34-7), 4.11-1 (37-9)②
F-4	5.14-1 (36-7), 5.83-1 (35-6)②
F-5	6.66-1 (33-5), 5.83-1 (35-6), 5.14-1 (36-7)②
F-6	7.2-1 (36-5), 6.2-1 (31-5), 6.8-1 (34-5)②
F-6⑤	6.66-1 (40-6), 5.83-1 (35-6), 5.14-1 (36-7)②
1953 Truck Models	**Available Axle Ratios**
F-250 Conventional	4.86-1 (34-7), 5.83-1 (35-6)①
F-350 Parcel Delivery	4.86-1 (34-7), 5.83-1 (35-6)①
F-350 Conventional	5.14-1 (36-7), 5.83-1 (35-6)②
F-500	5.29-1, 6.2-1 (31-5), 6.8-1 (34-5)③
F-600	7.2-1 (36-5), 6.2-1 (31-5), 6.8-1 (34-5)④
F-700	7.2-1 (36-5), 6.8-1 (34-5)④

①—.008-.013" backlash. ②—.004-.018" backlash.
③—.006-.012" backlash. ④—.006-.016" backlash.
⑤—School Bus Models.

Removal: Loosen wheel and stud nuts, then raise rear of vehicle. Disconnect hydraulic brake hose from rear axle universal joint flange. Disconnect rear shock absorbers from spring seat clamps. Remove nuts and washers from spring clips (U-bolts), then remove spring clips. Roll axle out from under vehicle, remove wheels and rear axle hydraulic brake pipe from axle.

Axle Shaft Removal: Drain lubricant from axle housing, then remove axle shaft stud nuts and washers. Tap center of axle shaft flanges to loosen tapered dowels, then remove dowels. Remove axle shafts from housing, then remove hub and drum assemblies.

Wheel Bearing Adjustment: Remove axle shaft (see above), use special bearing adjusting wrench and remove bearing locknut (outer nut), and lockwasher. Adjust bearings by turning bearing adjusting nut (inner nut) up until tight and then backing off ⅛ turn. Install bearing lockwasher making certain that it fits over dowel pin on adjusting nut, install bearing locknut and turn up tight. NOTE—When installing axle shaft make certain that gasgasket in place under shaft flange, and that tapered dowels or cones are in place on studs, tighten stud nuts securely.

TWO-SPEED

Own Make. Two-speed, full-floating, spur gear planetary gear unit (reduction gearing), spiral bevel gear (final drive), Hotchkiss type drive. Shift control is vacuum operated (1951-52), electrically operated (1953).

See Rear Axle Section for complete data.

Ratio—(Standard) 5.83-1 (Direct), 8.11-1 (Second Speed). **(Optional)** 6.33-1 (Direct), 8.81-1 (Second Speed).

Backlash—.004-.018" (1951-52), .006-.016" (1953).

Removal: Same as for standard axle (above) after removal of wiring harness.

SHOCK ABSORBERS

Houde (Houdaile). Direct acting, hydraulic type. Shocks are sealed units and are not adjustable.

STEERING GEAR

Own Make (Gemmer 305 & 335 design). Worm-and-roller types with push-pull adjustments (See Gemmer Model 305 & 335 data).

See Steering Gear Section for complete data.

FRONT SUSPENSION

Front Axle—Conventional "I" beam section front axle with Reverse-Elliott ends and semi-elliptic springs.

Kingpin Inclination: As follows:

1951-52 F-1, F-2, F-3	8° ± ¼°
1951-52 Parcel Del. & School Bus.	8° ± ¼°
1951-52 F-4, F-5, F-6 (incl. C-O-E)	8¼° ± ¼°
1953 (All exc. F-700)	4° ± ½°
1953 F-700	8° ± ½°

Caster: As listed in table below. Maximum variation between wheels ½°.

	Caster (Min.-Max.)
1951-52 F-1, F-2, F-3.	①2½°-4½°
1951-52 F-4, F-5, F-6 incl. C-O-E.	1°-3½°
1951-52 Par. Del. & School Bus.	1°-3°
1953 F-100, F-250	3°-4°
1953 F-350 to F-700 incl.	3°-5°

①—Neg. ½° to Pos. ½° WITHOUT Caster Shims.

Camber (All Models): ¼° Minimum, 1° maximum. Maximum variation between wheels ¼°. Right wheel must not exceed left wheel.

Toe-In: 0" to 1/16" (All Models).

BRAKES

Service Brakes: Hydraulic types as listed below. Hand lever applies rear wheel service brakes (F-1 & F-100 only), independent shaft brake (All other models).

See Brake Section for complete data.

SERVICE BRAKE TYPES

Truck Model	Front	Rear
1951-52 F-1	Duo-Servo	Duo-Servo
1951 Early F-2, F-3	Double Anchor	Double Anchor
1951-52 F-2, F-3	Uni-Servo	Duo-Servo
1951 Early Pr. Del. F-3	Double Anchor	Double Anchor
1951-52 Par. Del. F-3	Double Anchor	Duo-Servo
1951-52 F-4, F-5, F-6	Double Anchor.	Double Anchor
1953 F-100	Duo-Servo	Duo-Servo
1953 F-250, F-350	Uni-Servo	Duo-Servo
1953 F-500, F-600	Uni-Servo.	①2 Cyl. Type.
1953 F-700	Double Anchor.	①2 Cyl. Type.

①—Two different types of 2 Cyl. rear brakes used. F-500 & F-600 has screw "Star Wheel" adjustment and F-700 has "Worm Type" requiring Allen wrench.

Duo-Servo Type—Ford-Bendix. Single anchor self-energizing. Wheel cylinder actuates both shoes. "Ratchet Type" adjusting screw.

Double-Anchor Type—Ford-Lockheed. Double anchor type. Wheel cylinder actuates both shoes.

NOTE—Some double anchor types are "self-centering" (do not require anchor pin adjustment).

2-Cylinder Type—Two types used. Two wheel cylinders in each brake assembly.

Brake Drum Diameter (& Lining Width)

Truck Model	Frt. Whl.	Rear Whl.
1951-52 F-1	11"x2"	11"x1¾"
1951 Early F-2	12"x1¾"	12"x1¾"
1951 Early F-3	12"x1¾"	12"x2"
1951-52 F-2, F-3	12"x2"	12"x2"
1951 Early Par. Del. F-3	13⅛"x2"	13⅛"x2"
1951-52 Par. Del. F-3	13⅛"x2"	12"x2"
1951-52 F-4, F-5, F-6	14"x2"	15"x3½"
1953 F-100	11"x2"	11"x1¾"
1953 F-250	12"x2"	12"x2"
1953 F-350 Conv.	12"x2"	13"x2½"
1953 F-350 Par. Del.	12"x2"	12"x2"
1953 F-500 (exc. 2-Spd.)	*13"x2¼"*	*14⅛"x3½"*
1953 F-500 (2-Spd.)	13"x2¼"	15"x4"
1953 F-600	13"x2¼"	15"x4"
1953 F-700	16"x2¼"	15"x5"

Lining Length & Thickness

Front Wheels

Truck Model	Length Primary	Length Secondary	Thick. (All)
1951-52 F-1	11 29/32"	11 29/32"	3/16"
1951 Early F-2, F-3.	13 1/2"	13 1/2"	3/16"
1951-52 F-2, F-3	11 1/2"	12 31/32"	3/16"
1951-52 Par. Del. F-3	14 9/16"	12 17/64"	1/4"
1951-52 F-4, F-5, F-6	15 33/64"	10 3/4"	1/4"
1953 F-100	11 29/32"	11 29/32"	3/16"
1953 F-250, F-350	11 33/64"	12 31/32"	3/16"
1953 Par. Del. F-350	11 33/64"	12 31/32"	3/16"
1953 F-500	12 45/64"	13 31/32"	1/4"
1953 F-600	12 45/64"	13 31/32"	1/4"
1953 F-700	16 13/32"	12 13/64"	1/4"

Rear Wheels

Truck Model	Length Primary	Length Secondary	Thick. (All)
1951-52 F-1	11 29/32"	11 29/32"	3/16"
1951 Early F-2.	13 1/2"	10 3/8"	3/16"
1951 Early F-3.	15 33/64".	10 3/4"	1/4"
1951-52 F-2, F-3	11 1/2"	12 31/32"	3/16"
1951 Early Pr. Dl. F-3.	14 9/16".	12 1/4"	1/4"
1951-52 Par. Del. F-3.	11 9/16"	12 31/32".	3/16"
1951-52 F-4, F-5, F-6	16 5/8"	11 33/64"	5/16"
1953 F-100	11 29/32".	11 29/32".	3/16"
1953 F-250	11 33/64".	12 31/32".	3/16"
1953 F-350	12 45/64"	13 31/32"	1/4"
1953 Par. Del. F-350	11 33/64".	12 31/32"	3/16"
1953 F-500 (ex. 2-Spd.)	14 29/64".	14 29/64"	3/8"
1953 F-500 (2-Spd.)	15 11/32".	15 11/32"	3/8"
1953 F-600	15 11/32"	15 11/32"	3/8"
1953 F-700	15 37/64"	15 37/64".	3/8"

Clearance—Brake lining to drum clearance is different for each type brake as follows:

Single Anchor Type—.010" clearance, measured 1½" from each end of secondary shoe or adjusting screw backed off 14 notches or "clicks" from point where shoes drag on drum.

Double Anchor Type—*.007" heel, .010" toe of each* shoe. In service, adjust for least possible amount of clearance without drag.

2 Cyl. Type (F-500, F-600)—.025" from brake shoe to gauge surface on brake plate.

2 Cyl. Type (F-700)—Reduce clearance until lining drags on drum, then loosen adjustment until drag is relieved. Turn adjusting screw one additional turn to loosen to provide working clearance.

Hand Brake (F-1 & F-100): See Service Brake above.

Hand Brake (All exc. F-1 & F-100): Independent, external contracting band on drum at rear of transmission.

Adjustment—On cable controlled parking brakes, move lever to full released position. On transmission mounted parking brake levers, set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, adjust clevis rod to allow flat portion to rest on brake band bracket. Install clevis and cotter pins. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until .010" clearance is established between brake lining and drum at anchor bracket. Loosen locknut on adjusting screw from lower half of brake band. Adjust for .010" clearance between lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting rod nut until .010" clearance is established between upper half of band and drum. Re-install adjusting screw lockwire.

Drum Diameters—(3-Speed Trans.) 8". (4-Speed Trans.) 7 13/16". (5-Speed Trans.) 9½".

Hand Brake Lining

Transmission	Length	Width	Thickness
3-Speed	24 5/8"	2"	5/32"
4-Speed	①24 5/8"	2 1/2"	1/4"
5-Speed	②29 11/16"	3"	5/16"

①—F-350, F-500 Parcel Delivery—Three pieces of lining used. Length 23 5/64".

②—Three pieces of lining used.

Power Brake Units: Midland Hy-power Unit or Hydrovac Vacuum power units. *See "Midland Hy-power Unit" and "Hydrovac Power Unit" in Brake Section.*

MODEL IDENTIFICATION

VEHICLE NUMBER (1952): Stamped on plate attached to right front body pillar below upper hinge opening, and stamped on the frame in the following places. 1. On top of right hand reinforcement (side member to No. 1 crossmember). 2. On top of No. 2 crossmember (part of "K" member) near right hand side member (except Convertible). 3. (**Convertible only**) on top of right rear "X" member near right hand side member. 4. (**All passenger models**) on top of rear "X" member near right hand end.

NOTE—Vehicle Number (example "A2KC100001") includes following identification data in sequence:

Eng. Type①	Model Yr.②	Assy. Plant	Serial No.
A	2	See below	100001 Up

①—A is 6 Cyl. 215 cu. in. Valve-in-head engine.
②—Last digit of model year (1952).

Assembly Plant Designation

AT—Atlanta	**DA**—Dearborn	**SR**—Somerville
BF—Buffalo	**LU**—Louisville	**SP**—St. Paul
CS—Chester	**EG**—Edgewater	**RH**—Richmond
CH—Chicago	**KC**—Kansas City	**MP**—Memphis
DL—Dallas	**LB**—Long Beach	**NR**—Norfolk
HM—Highland Park		

VEHICLE NUMBER (1953): Stamped on plate attached to left front pillar and stamped on top of frame right-hand front cross-member to side member reinforcement.

NOTE—Vehicle Number (Example "A3FG 100001") includes following identification data in sequence:

Eng.① Type	Mod.② Year	Assy. Plant	Body③ Style	Serial No.
A	3	See Below	See Below	100001 Up

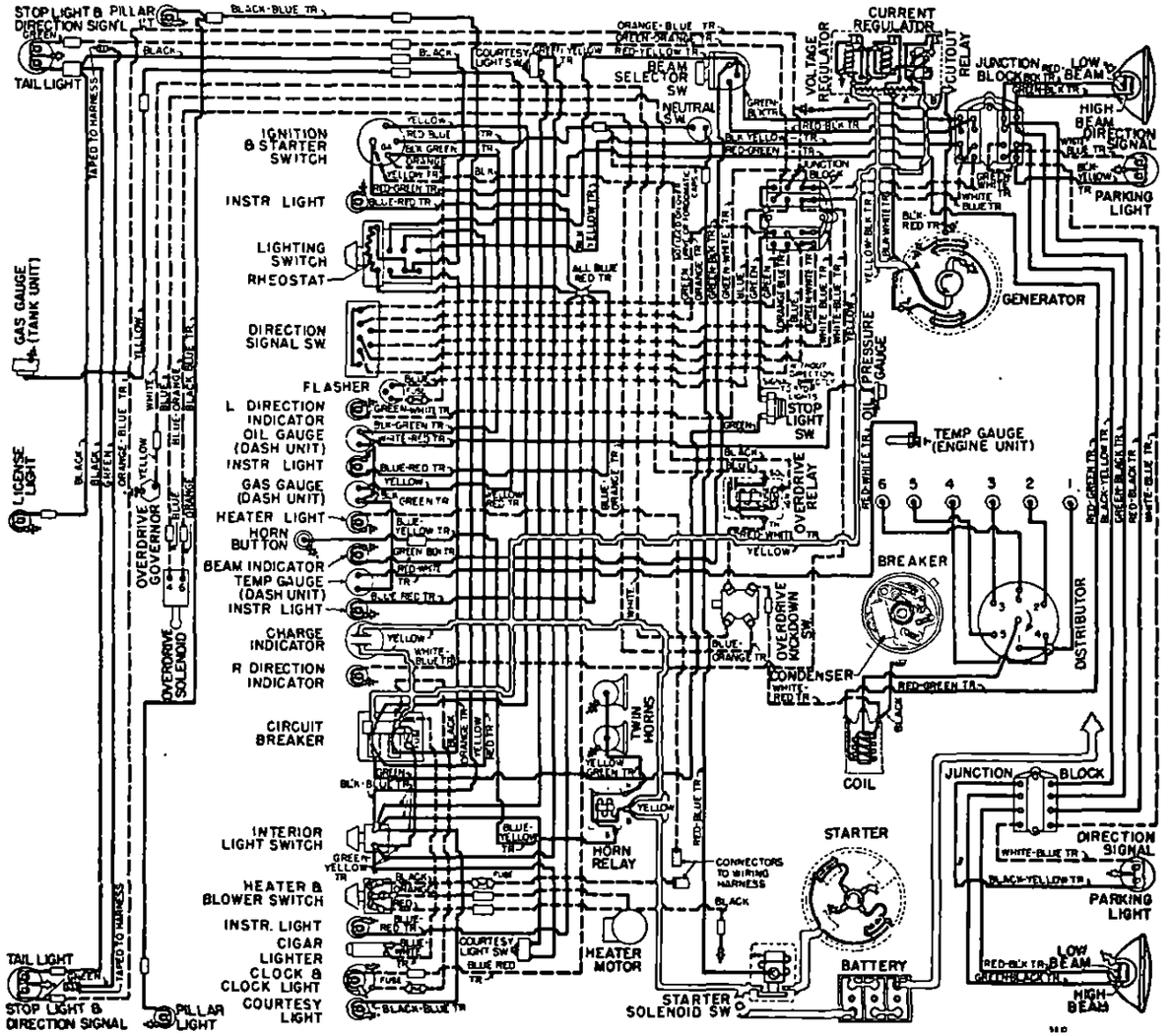
①—A—6 Cyl. 215 cu. in. engine; B—8 Cyl. 239 cu. in. engine; C—8 Cyl. Special Law Enforcement engine.
②—Last digit of model year (1953).
③—C—Convertible; S—Sedan Deliv.; V—Victoria; W—Ranch Wagon; X—Country Sedan; Y—Country Squire; G—All others (Tudor-Fordor-Coupe).

Assembly Plant Designation

A—Atlanta	**F**—Dearborn	**N**—Norfolk
B—Buffalo	**G**—Chicago	**P**—St. Paul
C—Chester	**H**—Highland Park	**R**—Richmond
D—Dallas	**K**—Kansas City	**S**—Somerville
E—Edgewater	**L**—Long Beach	**U**—Louisville
	M—Memphis	

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. at cranking spd.
VACUUM READING: Steady 18-20" idling at 500 RPM.
FIRING ORDER: 1-5-3-6-2-4.
SPARK PLUG GAPS: .034-.037".
Plug Type—Champion H-10, 14 mm.
CAUTION—Tighten plugs to 25-30 ft. lbs.
DISTRIBUTOR: Ford (1952 & Early 1953) No. FAA-12127A, (Late 1953) No. FAA-12127C. "Loadomatic" type with spark advance controlled by vacuum diaphragm unit moving breaker plate against two breaker plate springs.
▷***DISTRIBUTOR PRODUCTION CHANGE CAUTION:*** ***Two distributors used have different advance and require different Ignition Timing settings.***
Breaker Gap—.024-.026".
Cam Angle—36° closed (58-63% dwell idling).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
▷***CAUTION—When installing distributor on engine, be sure oil pump tang engages slot in distributor shaft.***
COIL: Ford No. 8BA-12029. Mounted on right side of engine to rear of distributor.
Ignition Current—2.75-3.0 amperes (idling), 5.0-5.5 amperes (stopped).
CONDENSER: Ford No. 7RA-12300-C.
Capacity—.21-.25 microfarad at 70°F.
IGNITION TIMING: ***CAUTION—Different timing required for each type distributor.***
1952-53 (FAA-12127A Distr.) . . .. At TDC.
1953 (FAA-12127C Distr.) ....3° BTDC.
Timing Mark—First type damper has one groove at TDC (correct for first FAA-12127A distributor). Later type damper has four marks (TDC or 0°, 3°, 7°, & 9° BTDC.). Use second 3° mark for timing with later FAA-12127C distributor.
▷***REWORKING TIMING MARK ON FIRST CARS:*** If later FAA-12127C distributor used on cars with first type damper (TDC mark only), make a new timing mark on the damper 3° or .165" to right or clockwise from old mark for ignition timing.
Timing Procedure—*See Ignition Timing.*
CARBURETION: Holley-Ford "Visi-flo." Single barrel downdraft type with manual choke control. Anti-stall dashpot used on Fordomatic Cars.
▷***1952 CARBURETOR LEAKAGE CORRECTION & FUEL BOWL CHANGE: See "Holley-Ford Visi-flo Carburetor" in Carburetor Section.***
Idle Setting—Approximately one turn open. Set for highest steady vacuum reading with engine at



1952 MODELS

normal operating temperature, or midway between rolling and missing point. Turn screw out for richer mixture.

Idle Speed—(Synchro-mesh Cars) 475-500 RPM., (Fordomatic Cars) 440-460 RPM.

Float Level: *See Ford "Visi-flow" Carburetor in Carburetor Section for complete data.*

Fuel Level—Flush to 1/16" below top edge of float hinge bracket in bowl. To adjust, remove bowl cover, bend float tab which contacts float needle spring. *NOTE—Fuel level can be checked through glass bowl cover without disturbing carburetor.*

Accelerating Pump: Inner hole for normal or hot weather, outer hole for cold weather operation (holes located in throttle lever. Shift pump link as required).

Anti-Stall Dashpot (Fordomatic Cars): First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes the dashpot rod up to the end of its travel. Turn dashpot screw in (clockwise) 1½ to 2 turns to obtain .045-.064" clearance. Tighten locknut.

Throttle Linkage Adjustment (Fordomatic Cars): *See "Fordomatic & Merco-Matic" in Transmission Section.*

Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL—Automatic thermostatic type with counter-weight. Valve is open at the top when engine cold. Thermostatic spring installed with ¾ turn and hooked over stop pin.

VALVE TAPPET CLEARANCE: .015" (.014-.016") with engine at normal operating temperature.

IGNITION

IGNITION SWITCH: Ford No. FAB-11572A. Combination ignition and starting switch.

COIL: Ford No. 8BA-12029. Mounted on right side of engine to rear of distributor.

Ignition Current—2.75-3.0 amperes (idling), 5.0-5.5 amperes (stopped).

CONDENSER: Ford No. 7RA-12300-C.

Capacity—.21-.25 microfarad at 70°F.

DISTRIBUTOR: Ford (1952 & Early 1953) No. FAA-12127A, (Late 1953) No. FAA-12127C. "Loadomatic" type with spark advance controlled by vacuum diaphragm unit moving breaker plate against two breaker plate springs.

►***DISTRIBUTOR PRODUCTION CHANGE CAUTION: Two distributors used have different advance and require different Ignition Timing settings.***

►***FAA-12127A DISTRIBUTOR CONVERSION TO FAA-12127C TYPE: See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.***

Breaker Gap—.024-.026".

Cam Angle—36° closed (58-63% dwell idling).

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Stand

FAA-12127A Distr.			FAA-12127C Distr.		
Degrees①	Vacuum	RPM	Degrees①	Vacuum	RPM
0	0"	200	0-½	0"	200
3½-4½	0.5"	500	3½-4½	0.5"	500
8¼-9¼	1.8"	1000	7-8	1.8"	1000
14¾-16¼	6.5"	1000	9¾-11	3.8"	1500
11¾-13	3.8"	1500	11½-13	6.0"	2000
14½-15¾	6.0"	2000			

①—Distributor degrees.

IGNITI N TIMING

►***TIMING CAUTION—Different timing required for each type distributor.***

1952-53 (FAA-12127A Distr.) ..... At TDC.
1953 (FAA-12127C Distr.) ..... 3° BTDC.

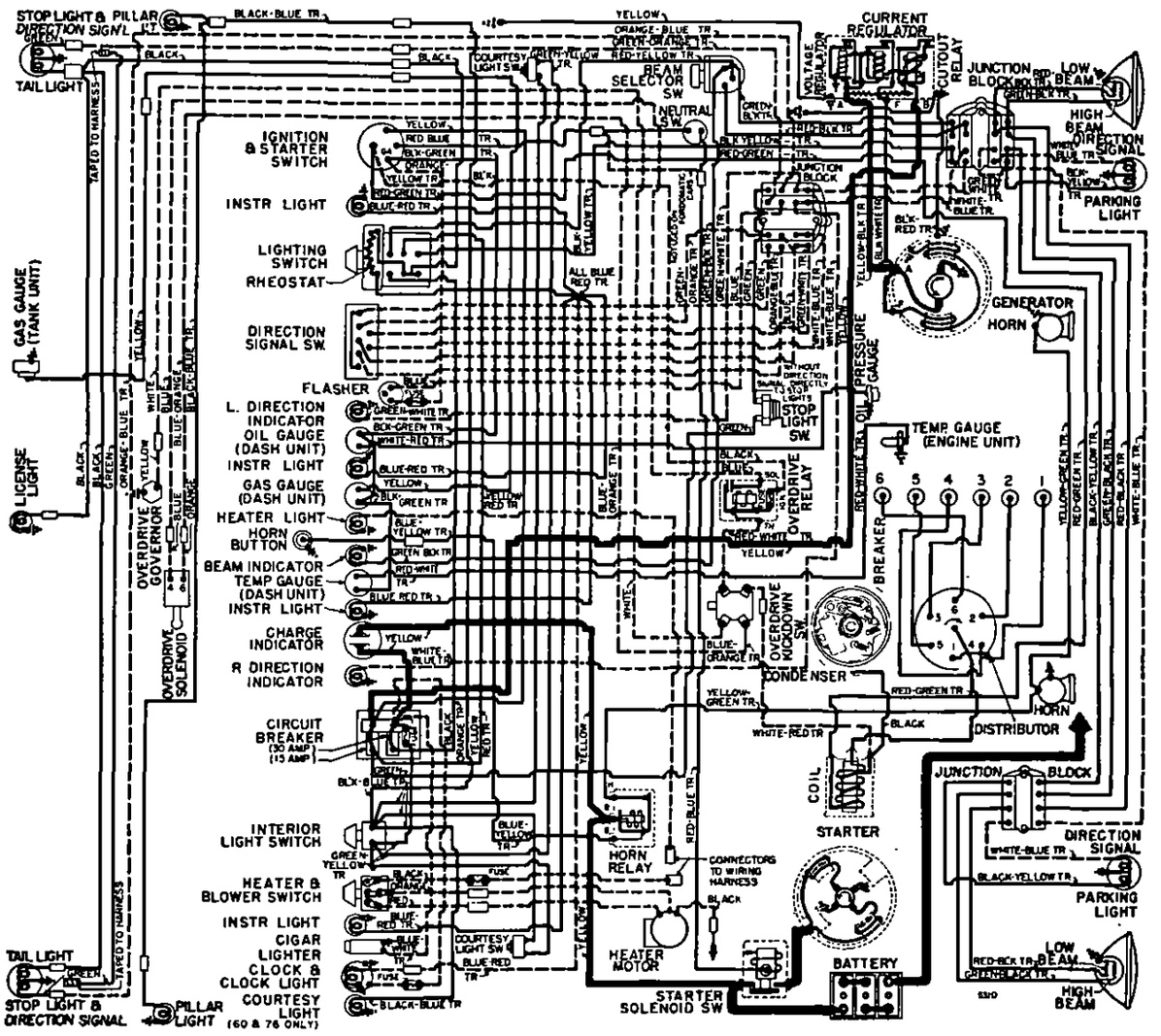
Timing Mark—First type damper has one groove at TDC (correct for first FAA-12127A distributor). Later type damper has **four** marks (TDC or 0°, 3°, 7°, & 9° BTDC.). Use second 3° mark for timing with later FAA-12127C distributor.

►***REWORKING TIMING MARK ON FIRST CARS:*** If later FAA-12127C distributor used on cars with first type damper (TDC mark only), make a new timing mark on the damper 3° or .165" to right or clockwise from old mark for ignition timing.

Timing—With #1 piston at firing position and timing mark on pulley aligned with timing pin on front of engine, loosen hold-down screw on distributor, rotate distributor until contacts begin to open, tighten hold-down screw. Check spark plug connections (see diagram), see that rotor is opposite #1 terminal in cap.

►**Timing (with Neon Timing Light)**—***CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.*** Mark timing pin and pulley mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and timing pin aligned.

CONTINUED ON NEXT PAGE



1953 MODELS

CONTINUED FROM PRECEDING PAGE

CARBURETOR

Holley-Ford "Visi-flo." Single barrel downdraft types with manual choke control. Anti-stall dashpot used on cars with Fordomatic Transmission.

Model	Ford Carburetor No.
1952 (Std. Trans.)	EAA-9510-D
1952 (Fordomatic)	EAA-9510-E
1953 (Std. Trans.)	EAA-9510-G
1953 (Fordomatic)	EAA-9510-H

▷*1952 CARBURETOR LEAKAGE CORRECTION & FUEL BOWL CHANGE: See "Holley-Ford Visi-flo Carburetor" in Carburetor Section.*

See Carburetor Section for complete data.

Setting (Idle Setting, Float Level, and Accelerating Pump:) ***See Tune Up.***

Throttle Linkage Adjustment (Fordomatic Cars): ***See "Fordomatic & Merco-Matic" in Transmission Section.***

Fast Idle: Integral type. Operated by choke valve. No adjustment required.

Choke Control: Manual type.

CARB. EQUIPMENT

Air Cleaner: Oil Wetted or Oil Bath types.

Fuel Pump: (Fuel Only) Ford No. EAA-9350E (1952-53).

(Fuel & Vacuum) Ford No. EAA19350D (1952), No. EAA-9350F (1952-53).

Pressure—4-5 lbs.

▷*LOW PUMP PRESSURE NOTE: If pressure with new pump is low, check for camshaft eccentric wear. See "Fuel System Notes" in Ford Special Data.*

Gasoline Gauge: King-Seeley Electric type.

Dash Unit—Ford No. FAB-9280-B.

Tank Unit—(Exc. Sta. Wgn. & Sed. Del.) Ford No. FAA-9275-A. (Sta. Wgn. & Sed. Del.)—Ford No. FAA-9275-B.

See Carburetion Equipment Section for complete data.

BATTERY

Ford No. 81A-10655-B. 6 volts, 15 plate, 90 ampere hour capacity at 20 hour rate.

Grounded Terminal—Positive (+) to engine.

Location—In engine compartment on right side.

STARTER

Ford No. FAE-11002A. Armature No. 1CM-11005A.

Drive—Ford No. 1CM-11350C. Bendix "Folo-Thru" type.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—48-56 ozs.

Cranking Speed—130 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	①	6.0	70
16 "	Lock		700

①—With starter on engine and engine running.

Starting Switch—Ford No. FAB-11450-B. Mounted on left front fender apron and controlled by ignition switch. Neutral switch, Ford No. FAC-15812A or B, used on Fordomatic cars.

GENERATOR

Ford No. FAA-10002-B. Two brush type with voltage and current regulation.

Armature—Ford No. OA-10005-A.

Charging Rate Adjustment—None. See Regulator.

Performance Data

Generator	Amperes	Eng. RPM.
FAA-10002-B	35	850

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—30 ozs.

Field Current—1½-2½ amperes at 6 volts.

Belt Adjustment: ¼" deflection midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Ford No. FAC-10505A. Voltage & current type.

See Electrical Equipment Section for complete data.

▷*NOTE*—Settings below are for regulator at NORMAL OPERATING TEMPERATURE (after ½-hour operation) with room temperature of 70-80°F.

Cutout Relay

Cuts In—6.0-6.6 volts.

Voltage Regulator

Setting—7.4-7.8 volts.

Checking & Adjusting—*See Electrical Equipment Sec.*

Current Regulator

Setting—34-38 amperes.

Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Ford "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Beam Indicator—Top center of instrument cluster above speedometer.

Directional Signal—Optl. ***See Electrical Equip. Section.***

Direction Indicators—Right and left indicators on lower edges of instrument cluster.

Directional Signal Flasher—Ford No. 8L-13350-C.

Switches

Lighting—Ford No. OL-11654.

Instrument—Part of lighting switch (controlled by turning knob).

Beam Selector—Ford No. 8A-13532.

Dome Light (Exc. Sta. Wgn. & Convertible)—Ford 1A-13752.

Dome Light (Sta. Wgn. & Convertible)—Ford No. 8M-13752.

Stop Light—Ford No. 11A-13480 & OA-13480.

MISC. ELECTRICAL

CIRCUIT BREAKER: 30 amperes (Headlights); 15 amperes (Park & Tail Lamps). Mounted behind instrument panel.

Convertible Top—40 amperes, mounted on right hand front fender apron.

FUSES: Interior lighting—14 amperes, on circuit breaker.

Turn Signal—20 amperes.

Overdrive—30 amperes. On overdrive relay.

Cigar Lighter—Special Fuse. In lighter base.

Clock—3 amperes. In clock lead.

Heater—14 amperes. In blower switch wire.

HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay.

Horn Current—13 amperes (high pitch), 14 (low).

Horn Relay: Ford No. FAA-13853-A.

ENGINE

ENGINE SPECIFICATIONS: Own. Six cylinder valve-in-head.

Bore—3.56". **Stroke**—3.60".

Displacement—215.3 cu. in. **Rated H.P.**—30.4.

Developed Horsepower—101 at 3500 RPM.

Compression Ratio—7.0-1.

Compression & Vacuum Readings—*See Tune-Up.*

▷*ENGINE VIBRATION CORRECTION: May be caused by incorrect installation of Rear Main Bearing Oil Seal. See "Crankshaft & Main Bearings" in Ford Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: ***See Ford Special Data.***

▷***HEAD GASKET INSTALLATION CAUTION:*** ***See Ford Special Data.***

ENGINE REMOVAL: ***See Ford Special Data.***

OIL PAN REMOVAL & INSTALLATION CAUTION: ***See Ford Special Data.***

PISTONS: Autothermic type. Solid skirt with three rings above pin.

Replacement Pistons: Furnished Std., .020", .030", .040", .060" oversize.

Fitting Pistons: Use ½" feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:

Feeler Gauge Thickness—New piston in new bore .0015". New piston in used bore .002". Used piston in used bore .003". Pull to withdraw feeler 5-10 lbs.

Installing Pistons: Small indentation on piston head toward FRONT of engine on all pistons.

PISTON RINGS: 2 compression, 1 oil ring, all above pin. Lower oil ring groove is slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.047"	.002-.0035"
Compr. (#2)	3/32"	.007-.047"	.0015-.003"
Oil Contr.	3/16"	.007-.047"	.001-.0025"

Replacement Rings: Furnished Std., .020", .030", .040", .060" oversize.

NOTE—Snap type, Expander type, or Steel Section type rings furnished for service.

PISTON PIN: Floating type with lock ring at each end.

Diameter—.9122". **Length**—3.025".

Pin Fit in Piston—Hand push fit at 70°F.

Pin Fit in Rod Bushing—.0001-.0003" clearance. New pins should not fall through bushing of own weight.

Replacement Pins: Furnished Std. .001", .002 oversize.

CONNECTING ROD: Length 6¼". **Weight** 29.37 ozs.

Crankpin Journal Diameters—2.2980-2.2988".

Lower Bearing—Steel-backed, copper-lead alloy lined type. Upper and lower halves interchangeable.

NOTE—Steel-backed, lead-base babbitt bearings used on first 1952 cars (both types interchangeable).

Clearance—.0005-.0021".

Side Clearance—.004-.010".

Replacement Bearings: Furnished Standard (two sizes marked Red and Blue for selective fitting) and .010", .020", .030" Undersize.

Installing Rods: Install rod in piston so that oil squirt hole is toward valve side of engine. Numbers on rods and bearing caps must be together and installed in same numbered cylinder.

CRANKSHAFT: 4 bearing, integral counterweights.

Journal Diameters—2.4980-2.4988". Max. wear limits .0015". Taper .001".

Bearing Type—Removable precision type, steel-backed, copper-lead alloy lined. *NOTE*—Steel-backed, tin-base babbitt bearings used on first 1952 cars (both types interchangeable).

Clearance—.0005-.0021".

Bearing Adjustment: None. Replace bearings. Tang must engage groove in block and cap.

Replacement Bearings: Furnished Standard (two sizes marked Red and Blue for selective fitting), and .010", .020", .030" Undersize.

End Thrust: Taken on Rear Intermediate main bearing (#3). **Endplay**—.004-.008".

Crankshaft Rear Oil Seal Installation: ***See "Crankshaft & Main Bearings" in Ford Special Data.***

ENGINE

CONTINUED FROM PRECEDING PAGE

►*1952 CRANKSHAFT REAR OIL SEAL PRODUCTION CHANGE CAUTION: See "Crankshaft & Main Bearings" in Ford Special Data for latest type oil seal.*

►***CRANKSHAFT REAR OIL SEAL CAUTION:** Incorrect installation may cause engine vibration (due to rear bearing cap not being fully seated). See Oil Seal Installation data in Ford Special Data.*

CAMSHAFT: Four bearing, chain drive type.
Journal Diameters—1.924" (worn limit).
Clearance—.001-.003" (new), .005" (worn limit).
Replacement Bearings: Finished bearings furnished Standard and .015" Undersize. *CAUTION—Rear Intermediate (#3) bearing not interchangeable with other camshaft bearings.*

Camshaft Bearing Servicing: *See Ford Special Data.*

End Thrust: Taken by plate on forward end of block (between camshaft sprocket and shoulder on shaft).
Endplay—.003-.006".

Timing Chain: Side-guide type. Length 56 links.

Timing Chain Replacement—Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure sideplay on opposite side). Remove and install chain "endless" as a unit with both sprockets.

Camshaft Setting: Sprockets marked by "O" at one tooth, chain guide links similarly marked. Mesh so that sprocket marks in line with chain marks.

VALVES	Head Diam.	Seat Angle
Intake	1.65"	45°
Exhaust	1.515"	45°

	Stem Diam. ①	Stem Clearance
Intake	.3415"	② .0025"
Exhaust	.3410"	② .0030"

①—.003", .015", .030" O.S. furnished. *See Valve Guides.*
②—Worn limits .004" Intake. .005" Exhaust.

►*ROTATABLE VALVES—All valves rotatable type. See "Valve System" in Ford Special Data.*
Valve Stem Seals (Intake & Exhaust Valves)—Rubber seals installed on valve stems (below locks) on all valves in production. *See Change following.*

►*"UMBRELLA" TYPE VALVE STEM LOWER SEALS TO ELIMINATE SPARK PLUG FOULING (Caused by excessive oil at valve stem guides):* These 1954 type seals, Part No. EAA-6571-C should be installed on intake valve stems IN PLACE OF regular valve stem seals under valve locks. It is recommended that this type seal be installed on all valves (Intake & Exhaust) when valves being serviced. *NOTE*—Install seals with cupped side down on valve stem at guide boss on head.

Oversize Valve Stem Installation—*See "Valve System" in Ford Special Data.*

Valve Seat Width: .060-.070" (Intake); .095-.105" (Exhaust). *NOTE*—Keep seat at center of valve face.

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum, install valves with oversize stems. *See "Valve System" in Ford Special Data.*

Valve Lifters: Mushroom type. Removable from below with camshaft removed.

Valve Springs: Install with closed coil next to head.
Valve Spring Specifications: 54-62 lbs. pressure when compressed to 1.821", or 124-140 lbs. at 1.505".

Rocker Arm Assembly Removal & Installation: *See "Valve System" in Ford Special Data.*

►*ROCKER ARM SHAFT PRODUCTION CHANGE (& Installation of new type assemblies on 1952 engines): See "Valve System" in Ford Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: .015" (.014-.016") with engine at normal operating temperature.

►**Preliminary Valve Adjustment Procedure**—*See "Valve System" in Ford Special Data.*

VALVE TIMING: See Camshaft Setting above.
Intake Valves—Open 23° BTDC. Close 79° ALDC.
Exhaust Valves—Open 65° BLDC. Close 33° ATDC.

LUBRICATION

►*OIL LEAKAGE AT CAMSHAFT BEARING BORE HOLES IN CYLINDER BLOCK: See "Oiling System" in Ford Special Data for installation of plugs in these holes.*

Engine Oiling System: Pressure to main, connecting rod and camshaft bearings. Rocker arm assemblies are pressure lubricated. "Full-flow" oil filter filters entire output of oil pump before the oil enters engine lubricating system.
NOTE—Diaphragm used in oil filter mounting pad on engine to retain oil in filter and shorten pressure build-up interval when engine started.
Crankcase Capacity—4 qts. (5 qts. if filter changed).
Normal Oil Pressure—45 lbs. at 2000 RPM.
NOTE—Oil pump relief valve spring should have 9.82±.12 lbs. compressed to 1.56".

Oil Pan Removal: *See Ford Special Data.*

Oil Pump: Gear type pump located in crankcase.
Pump Removal & Overhaul—See Ford Special Data.

Oil Filter (Std. Equip.)—Full-flow type oil filter with pressure relief valve in filter center bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.
Replacement Filter Element—Ford No. CPA-6731A (Kit—includes gaskets).

►*CAUTION—This special Full-flow filter element MUST BE USED (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication).*

►*FILTER INSTALLATION CAUTION & OIL LEAKAGE CORRECTION: See "Oiling System" in Ford Special Data.*

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Ford No. FAB-9273-B.
Engine Unit—Ford No. 41A-9278.

►*ENGINE SENDING UNIT INSTALLATION CAUTION: Unit must be installed so that "UP" marking on cover is at top vertical position.*
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

COOLING

Cooling System: Pressure system with relief valve in filler cap. One belt driven pump and by pass.
Capacity—16 qts. (1 qt. additional with heater).
Pressure Valve—Ford No. OL-8100-A. Radiator Filler Cap. 7 lb. type (opens at 6¼-7¾ lbs.). *Identification*—This cap measures approximately ⅝" from upper edge of flange on cap to lower edge of integral gasket (designed for use with AB-8005-A, B radiator which has short filler neck).

►*CAUTION—V8 Radiator Cap No. 1M-8100-B MUST NOT BE USED on 6 Cyl. cars (extra length of approx. ¼" will result in extra compression and excessive pressure. NOTE—Late 1953 V8 cars use same cap as 6 Cyl. cars (OL-8100-A).*

Water Pump: Centrifugal belt driven, packless type.
See Water Pump Section for complete data.

Thermostat: Mounted inside water outlet elbow in cylinder head. Ford No. EAA-8575-A (stamped 160 on operating cylinder) fully open at 180°F. *NOTE*—Use EAA-8575-B with permanent type anti-freeze.

Temperature Gauge: King-Seeley Electric type.
Dash Unit—Ford No. FAB-10883-C.
Engine Unit—Ford No. 1A-10884A (stamped 233F)
See Miscellaneous Section for complete data.

CLUTCH

Long Model 9½ CF-TS. Ford No. 1A-7563-A. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.

Facings—Thickness .125". Outside diameter 9½".

Pedal Adjustment: (Pedal Travel) If total pedal travel is less than 6⅜", or more than 6⅝", reposition pedal bumper until travel is within limits.
Pedal Free Travel—⅞-1⅛". Loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.

Removal: Remove transmission (See Transmission Removal below), and slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar bracket from flywheel housing and remove equalizer bar. Remove split bronze bushing from bracket and then remove flywheel housing. Install tool No. 7563 and remove clutch pressure plate assembly (if tool is not available clutch may be released by backing off the attaching bolts evenly). Remove the clutch release bearing from the hub with an arbor press.

SYNCHRO-MESH TRANSMISSION

Own Make. 3 speed, all helical gear type. Constant mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Steering column type shift.
See Transmission Section for complete data.

Removal: Disconnect gearshift linkage at transmission. Remove speedometer cable and gear. Disconnect drive shaft at transmission and remove the capscrews attaching transmission extension to rear engine support. Place a support under engine and remove the frame cross member and rear engine support. Remove transmission-to-flywheel housing capscrews and install two guide pins. Pull transmission back until main drive gear splines clear housing and lower transmission from car.

OVERDRIVE

Warner Model AS4-R10F. Optional. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated kick-down. There is no Lock-out-Switch on this unit.

►*OIL LEAKAGE AT SOLENOID BASE PLATE (Early 1952 Cars):* May be caused by insufficient clearance at lower rear corner of gearshift housing and solenoid housing. Correct by filing corner of gearshift housing to provide clearance.
See Transmission Section for complete data.
Overdrive Solenoid—Ford No. FAA-6916A.
Control Relay—Ford No. 1M-6915-A.
Overdrive Fuse—30 amperes. On relay.
Throttle Kick-Down Switch—Ford No. FAA-6918-A.

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Removal: Same as for Std. Transmission (above) after disconnecting control cable and wiring.

FORD-O-MATIC TRANSMISSION

Torque converter and three-speed automatic transmission with hydraulic control and mechanical parking lock.

▷*GEARSHIFT TUBE VIBRATION DAMPENER (Installation on early 1953 and previous cars): See "Fordomatic & Mercomatic Transmission" in Transmission Section.*

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic Transmission" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See Transmission Section.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15000 miles. **Use only Automatic Transmission Fluid, Type A.**

Capacity—Approx. 9 qts.

Checking Oil Level—Apply parking brakes, place transmission selector lever in "N" position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (Parking) position. When engine and transmission have reached normal operating temperature, move lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator. Wipe indicator clean and insert in tube (make sure indicator is pushed down all the way). Remove indicator and read level. Add sufficient fluid to raise fluid level to full mark on indicator. Replace indicator.

▷*TRANSMISSION VENT PRODUCTION CHANGE (& Installation of new vent on earlier cars to facilitate filling of transmission): See "Fordomatic & Mercomatic Transmission" in Transmission Section.*

▷*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Merc-O-Matic Transmission" in Transmission Section.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type, 2 used.

CAUTION—TWO types used interchangeably:

1) **Pre-lubricated** (8M-7042 Front & 8M-7039 Rear). Requires lubrication at 20,000 mile intervals (repack bearings and replace seals).

2) **Grease-fitting** (1M-7042A Front & 1M-7039 Rear). Must be lubricated with pressure grease gun at 1000 mile intervals.

▷*CAUTION (ALL CARS EXCEPT STATION WAGON & SEDAN DELIVERY)—Rear universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own Make. Semi-floating hypoid gear type with Hotchkiss drive **(separate carrier)**. Axle ends flanged (no separate hub). Wheel bearings are sealed ball-bearing pre-lubricated type.

▷*NOTE—AXLE NOT SAME AS STATION WAGON. See Rear Axle Section for complete data.*

Ratios

Standard Transmission—3.90-1 (39-10).
Overdrive Transmission—4.10-1 (41-10).
Fordomatic Transmission—3.31-1 (43-13)①.
①—3.54-1 (39-11) Optional.

▷*AXLE CARRIER & GEAR RATIO IDENTIFICATION:* **Gear Ratio**—Carrier stamped with pinion-and-ring gear ratio (10/39 for 3.90-1 ratio, etc.)
Backlash—.003-.008".

Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.

Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.

Wheel Bearing Adjustment: None.

SEDAN DEL. & STATION WGN.

Own Make: Semi-floating, hypoid gear type with Hotchkiss drive **(Integral Carrier)**. Axle ends flanged (no separate hub). Wheel bearings are sealed ball-bearing prelubricated type.

▷*NOTE—AXLE NOT SAME AS PASSENGER CAR. See Rear Axle Section for complete data.*

Ratios

Standard Transmission—4.09-1 (45-11).
Overdrive Transmission—4.27-1 (47-11).
Fordomatic Transmission—3.54-1 (39-11)①.
①—3.15-1 (35-9) Optional.

Removal: Raise rear of car. Disconnect rear universal Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

Axle Shaft Removal: Same as Ford Pass. cars.

SHOCK ABSORBERS

Direct acting type (front and rear). Not adjustable. Service by replacement.

▷*NOTE—Shock absorbers supplied for service in kit form only. Includes Shock Absorber and Bushing.*

▷*REPLACEMENT PARTS CAUTION: Ford numbers given below are 1953 production types and replace corresponding "CPA" parts used in 1952 production.*

	Front	Rear
Pass. Cars (Std.)	DPA-18124A	DPA-18125A
Pass. Cars (Heavy Duty)	DPA-18124C	DPA-18125C
Sta. Wgn. & Sedan Del.	DPA-18124B	DPA-18125C

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.

▷*TIRE & WHEEL BALANCING MARK CAUTION:* To maintain tire and wheel assembly balance, install tube with valve aligned with letter "V" stamped on tire, install wheel and tire assembly with "L" stamped on sidewall (light side of assy.) as nearly aligned as possible with "V" notch filed in brake drum (heavy side of drum and hub assy.).

▷*IDLER ARM INTERFERENCE-ON-LEFT TURN CORRECTION: See Front Suspension Section for complete data.*

Kingpin Inclination—4¾-5¾° crosswise.

Caster—(Pass. Cars & 1953 Sta. Wgn. & Sedan Delivery) Pos. ½° to Neg. 1° (1952 Sta. Wgn. & Sedan Delivery) Neg. ¼° to Neg. 1¾° (Neg. ¼° preferred). Maximum variation between wheels ½°.

Camber—Pos. ¼° to Pos. ¾° preferred with limits 0° to Pos. 1°. Maximum variation between wheels ¼°.

Toe-In—1/16-1/8". When adjusting toe-in, turn both connecting rod sleeves equally but in opposite directions (if steering wheel spokes in correct horizontal position), or lengthen one rod and shorten opposite rod, as necessary, to correct steering wheel spoke position while making toe-in adjustment.

STEERING GEAR

Std. Steering Gear: Own Make (Gemmer 305 design). Worm-and-roller type.
See Steering Gear Section for complete data.

Opti. Power Steering: Ford-Mercury Linkage type used in conjunction with standard type steering gear.
See "Ford & Mercury Power Steering" in Steering Section for complete data.

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

▷*BRAKE CABLE CONDUIT RUBBING ON REAR TIRE (First 1952 Cars): See Brake Section for complete data.*

Wheel Cylinder Diameter—Front Wheel 1⅛", Rear Wheel ⅞" (exc. 1953 Sta. Wgn. & Sedan Del. 15/16").

Drum Diameter—10" (Pass. Cars), 11" (Sta. Wgn. & Sedan Delivery). Maximum reboring limit .060" on diameter (to 10.060" and 11.060").

Lining—Molded type riveted to shoe. **Width**—2¼" (Front Pass. Cars). 2" (Front Sta. Wgn. & Sed. Del.), 1¾" (Rear—All).

Thickness—(1952—All Shoes) 3/16", (1953 Pass. Car Frt. Whl. Primary & All Rear Whl. Shoes) 3/16", (1953 Pass. Car Frt. Whl. Secondary Shoes) 7/32". (1953 Sta. Wgn. & Sedan Delivery—All Shoes) 7/32".

Length Per Shoe—10.85" (All shoes-Pass. Cars), 9.28" (Primary-Sta. Wgn. & Sed. Del.), 11.93" (Secondary-Sta. Wgn. & Sed. Del.).

Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw on each wheel backed off 14 notches or "clicks" from point where shoes drag on drum).

Brake Pedal Free Play Adjustment: ¼-7/16". If play not correct after brake adjustment, loosen locknut on the eccentric bolt that attaches brake pedal assembly to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Top: *TWO types used as follows:*

1952 & Early 1953 Top Control—Electric-mechanical type (reversible motor mounted under rear seat driving two screw type jacks through flexible cables).

▷*TOP FAILURE TO OPERATE (Due to disengagement of Drive Cables)—See Miscellaneous Section for recommended correction.*

Late 1953 Top Control—Hydro-Lectric type (motor driven hydraulic pump operating two hydraulic top lift cylinders).
See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER (1952): Stamped on plate attached to right front body pillar below upper hinge *opening, and stamped on the frame in the following* places. 1. On top of right hand reinforcement (side member to No. 1 crossmember). 2. On top of No. 2 crossmember (part of "K" member) near right hand side member (except Convertible). 3. **(Convertible only)** on top of right rear "X" member near right hand side member. 4. **(All passenger models)** on top of rear "X" member near right hand end. *NOTE—Vehicle Number (example "B2KC100001") includes following identification data in sequence:*

Eng. Type①	Model Yr.②	Assy. Plant	Serial No.
B	2	See below	100001 Up

①—B is 8 Cyl. 239 cu. in. engine.
②—Last digit of model year (1952).

Assembly Plant Designation

AT—Atlanta	**DA**—Dearborn	**SR**—Somerville
BF—Buffalo	**LU**—Louisville	**SP**—St. Paul
CS—Chester	**EG**—Edgewater	**RH**—Richmond
CH—Chicago	**KC**—Kansas City	**MP**—Memphis
DL—Dallas	**LB**—Long Beach	**NR**—Norfolk
HM—Highland Park		

VEHICLE NUMBER (1953): Stamped on plate attached to left front door pillar and stamped on top of frame right-hand front cross-member to side-member reinforcement.

NOTE—Vehicle Number (example "A3FG 100001") includes following identification data in sequence:

Eng.① Type	Mod.② Year	Assy. Plant	Body③ Style	Serial No.
B	3	See Below	See Below	100001 Up

①—A—6 Cyl. 215 cu. in. engine; B—8 Cyl. 239 cu. in. engine; C—8 Cyl. Special Law Enforcement engine.
②—Last digit of model year (1953).
③—C—Convertible; S—Sedan Delivery; V—Victoria; W—Ranch Wagon; X—Country Sedan; Y—Country Squire; G—All others (Tudor-Fordor-Cpe).

Assembly Plant Designation

A—Atlanta	**F**—Dearborn	**N**—Norfolk
B—Buffalo	**G**—Chicago	**P**—St. Paul
C—Chester	**H**—Highland Park	**R**—Richmond
D—Dallas	**K**—Kansas City	**S**—Somerville
E—Edgewater	**L**—Long Beach	**U**—Louisville
	M—Memphis	

TUNE-UP

►*ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING: May be caused by excessive wear of fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*

►*1952 OVERHEATING CORRECTION & ENGINE COOLING IMPROVEMENTS: See COOLING data for production changes and recommended reworking of early engines.*

COMPRESSION PRESSURE: 125 lbs. at cranking spd.

VACUUM READING: 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2.

Cylinder Numbering—Right Bank 1-2-3-4, Left Bank 5-6-7-8, numbered from FRONT of engine.

SPARK PLUG GAPS: .029-.032".

Plug Type—Champion H-10. 14 mm.

CAUTION—Tighten plugs to 25-30 ft. lbs.

DISTRIBUTOR: Ford No. 8BA-12127 or OBA-12127. Pressure type distributor with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs.

►*CAUTION—Use 8BA-12127 with CAST IRON FRONT COVER, use OBA-12127 with ALUMINUM COVER.*

Breaker Gap—.014-.016".

Cam Angle—27° closed (58-63% dwell idling).

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic & Vacuum Advance—*See Ignition.*

Distributor Line (Carburetor Connection) Vacuum—2.0-2.9" at 800 RPM., 3.5-4.8" at 1000 RPM., 4.7-6.4" at 2200 RPM., 4.6-6.2" at 2400 RPM.

COIL: Ford No. 8BA-12029.

Ignition Current—2.75-3.0 amperes (idling), 5.0-5.5 amperes (stopped).

CONDENSER: Ford No. 7RA-12300-C.

Capacity—.21-.25 microfarad at 70°F.

IGNITION TIMING: 2° BTDC.

Timing Mark—On crankshaft pulley and pointer on front engine cover. Align pointer and timing mark.

Timing Procedure—*See Ignition Timing.*

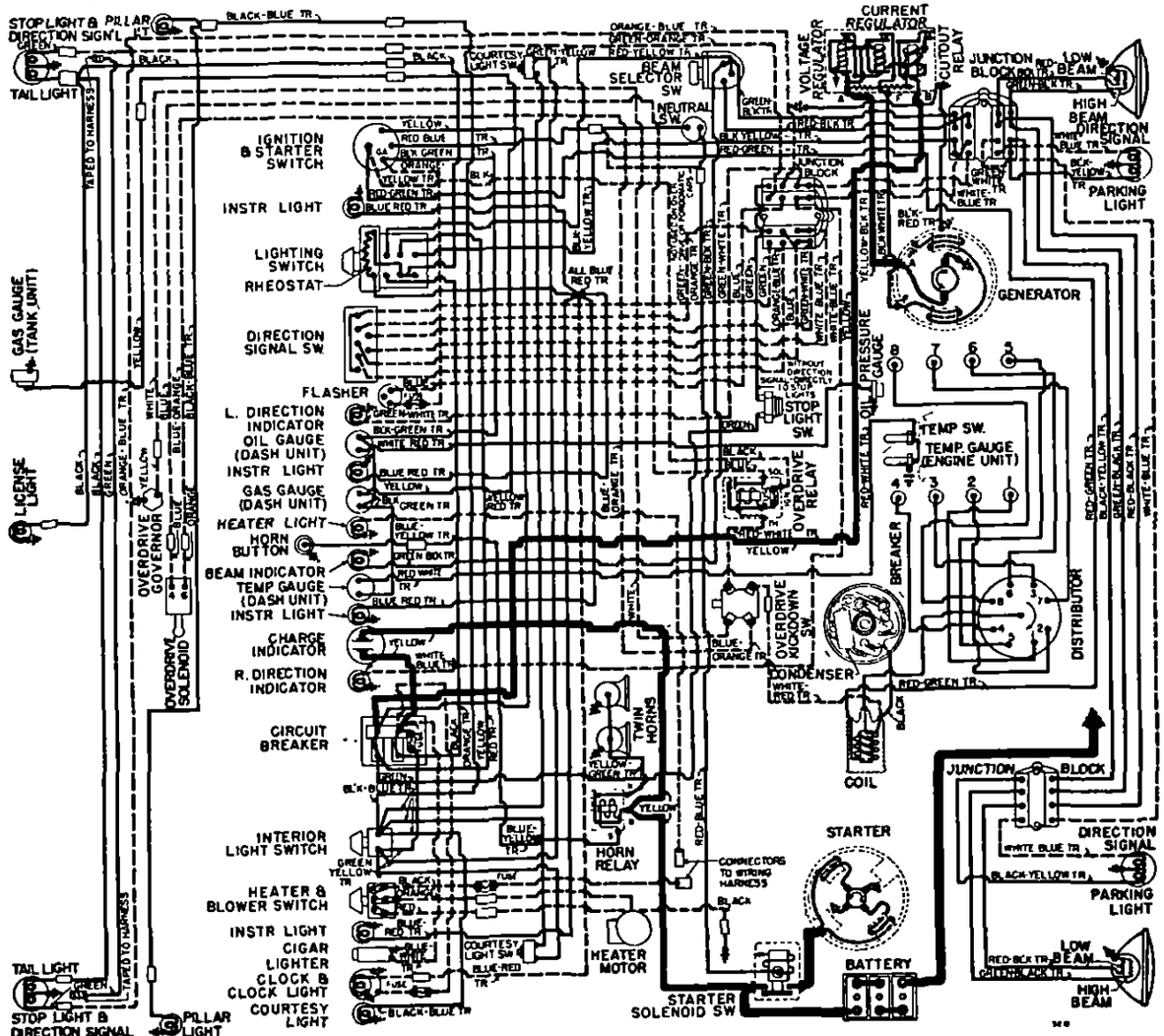
CARBURETION: Holley-Ford. Dual downdraft type with manual choke control. Anti-stall dashpot used on Fordomatic Cars.

Idle Setting—Approx. 1 turn open. Set both screws for highest steady vacuum reading and highest engine RPM.

Idle Speed—475-500 RPM. (Std. Trans.), 415-425 RPM. (Fordomatic Trans.)

Float Level—1.275-1.305". Measured from bottom of float to underside of bowl cover with needle valve seated. Use Gauge T52L-9510-AHD. *NOTE*—These carburetors have "High-lift" Nozzle Bars and require above float level setting.

CONTINUED ON NEXT PAGE



1952 MODELS

CONTINUED FROM PRECEDING PAGE

Accelerating Pump—Center hole average setting. Inner hole for hot weather. Outer for cold weather.
Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.
Throttle Linkage Adjustment (Fordomatic Cars): *See "Fordomatic & Merc-O-Matic" in Transmission Section for complete data.*
Anti-Stall Dashpot Adjustment (Fordomatic Cars): First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes the dashpot rod up to the end of its travel. Turn dashpot screw in (clockwise) 1½-2 turns to obtain .045-.064" dashpot clearance. Tighten locknut.
Fuel Pump Pressure—3½-4½ lbs.
MANIFOLD HEAT CONTROL: "Duck-bill" type thermostatic valve located inside right side of cross-over pipe near the flange.
VALVE TAPPET CLEARANCE: Adjust by grinding end of valve stem or valve face.
Intake—.014" (.013-.015"). **Exhaust**—.018" (.017-.019"), Cold.

IGNITION

IGNITION SWITCH: Ford No. FAB-11572A. Combination ignition and starting switch.
COIL: Ford No. 8BA-12029.
Ignition Current—2.75-3.0 amperes (idling), 5.0-5.5 amperes (stopped).
CONDENSER: Ford No. 7RA-12300-C.
Capacity—.21-.25 microfarad at 70°F.
DISTRIBUTOR: Ford No. 8BA-12127, or OBA-12127. "Loadomatic" type with spark advance controlled by vacuum diaphragm moving breaker plate to advance spark against two breaker plate springs. *See "Ford, Lincoln, Mercury Distributors" in Electrical Equipment Section.*
▷*CAUTION—Use 8BA-12127 with CAST IRON FRONT COVER, use OBA-12127 with ALUMINUM COVER.*
Breaker Gap—.014-.016".
Cam Angle—27° closed (58-63% dwell idling).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

8BA, OBA 12127 Advance Performance
▷With Distributor on Test Unit

Distr. Degrees	Vacuum	RPM.
0°	0"	200
0-1°	0.30"	500
5.2-6.2°	1.32"	1000
8.75-10°	2.85"	1500
10-11.25°	3.7"	2000

IGNITION TIMING

Std. Setting.....2° BTDC.
Crankshaft Pulley Mark—Circular boss on rear edge of pulley (timing pin on right front side of engine).
Timing—With #1 piston at firing position and timing mark on pulley aligned with timing pin on front of engine, loosen hold-down screw on distributor, rotate distributor until contacts begin to open, tighten hold-down screw. Check spark plug connections (see diagram), see that rotor opposite #1 terminal in cap.
▷**Timing (with Neon Timing Light)**—*CAUTION—Vacuum line must be disconnected to avoid vacuum advance operating.* Mark timing pin and pulley mark with white chalk. Connect timing light to #1 spark plug. Idle engine and adjust distributor (as directed above) until mark and timing pin aligned.

CARBURETOR

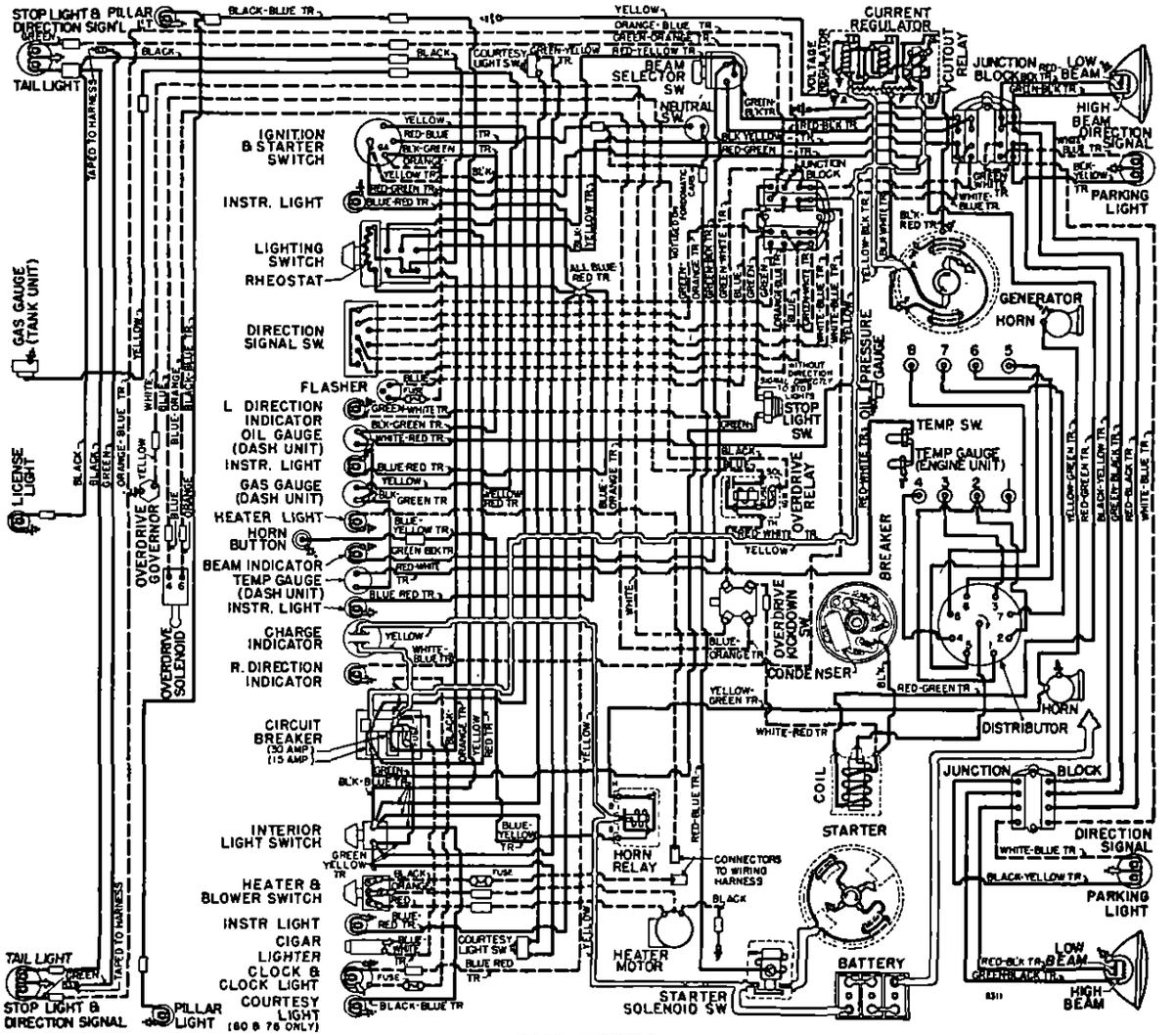
Holley-Ford. Dual downdraft types with manual choke control. Anti-stall dashpot used on cars with Fordomatic Transmission.

Model	Ford Carburetor No.
1952-53 (Std. Trans.)	EAB-9510-C
1952-53 (Fordomatic)	EAB-9510-D
1952-53 (Repl. Carb.)	EAB-9510-F

See Carburetor Section for compete data.
Setting (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
Fast Idle: Integral type. Operated by choke valve. No adjustment required.
Throttle Linkage Adjustment (Fordomatic Cars): *See "Fordomatic & Merc-O-Matic" in Transmission Section.*
Choke Control: Manual type.

CARB. EQUIPMENT

Air Cleaner: Oil Wetted or Oil Bath types.
Fuel Pump: (Fuel only) No. 1BA-9350G. Diaphragm type.
(Fuel & Vacuum) No. 1BA-9350H (1952), No. EAB-9350A (1952-53).
Pressure—3½-4½ lbs.
▷*FUEL PUMP PUSHROD WEAR: Check when replacing pump. See "Fuel System Notes" in Ford Special Data.*
Gasoline Gauge: King-Seeley Electric type.
Dash Unit—Ford No. FAB-9280-B.
Tank Unit—(Exc. Sta. Wgn. & Sed. Del.) Ford No. FAA-9275-A. (Sta. Wgn. & Sed. Del.)—Ford No.



1953 MODELS

FAA-9275-B. *See Carburetion Equipment Section for complete data.*

BATTERY

Ford No. 81A-10655-A2. 6 volt, 17 plate, 100 ampere *hour capacity (20 hour rate).*
Grounded Terminal—Positive (+) to engine.
Location—In engine compartment on right side.

STARTER

Ford No. FAD-11002-A (without Fordomatic). **FAE-11002-A** (with Fordomatic).
Armature—Ford No. 18-11005 (FAD-11002-A); **ICM-11005-A** (FAE-11002-A).
Drive (FAD-11002A Starter)—Ford No. B-11350, Bendix Drive ("standard" type).
Drive (FAE-11002A Starter)—Ford No. 1CM-11350C Bendix "Folo-Thru" Drive.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs.
Cranking Speed—130 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	①	6.0	70
16 "	Lock	3.5	700

①—With starter on engine and engine running.

Starting Switch: Ford No. FAB-11450-B. On left front fender apron and controlled by the ignition switch. Neutral Switch, Ford No. FAC-15812A or B, used on cars with Fordomatic Transmission.

GENERATOR

Ford No. FAA-10002-A. Two brush type with voltage and current regulation.
Armature—Ford No. OA-10005-A.
Charging Rate Adjustment—None. See Regulator.

Performance Data

Generator	Amperes	Eng. RPM.
FAA-10002-A	35	850

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—30 ozs.
Field Current—1½-2½ amperes at 6 volts.
Belt Adjustment: (Generator & Water Pump) ⅜" deflection between generator pulley and left hand water pump pulley with normal thumb pressure.
Fan & Water Pump Belt—Raise or lower fan bracket until a deflection of ¼" is obtained by normal thumb pressure between fan pulley and right hand pump pulley.

REGULATOR

Ford No. FAC-10505A. Voltage & current type. *See Electrical Equipment Section for complete data.*
NOTE—Settings below are for regulator at NORMAL OPERATING TEMPERATURE (after ½ hour operation) with room temperature at 70-80°F.

Cutout Relay

Cuts In—6.0-6.6 volts.

Voltage Regulator

Setting—7.4-7.8 volts.
Checking & Adjusting—*See Electrical Equipment Sec.*

Current Regulator

Setting—34-38 amperes.
Checking & Adjusting—*See Electrical Equipment Sec.*

LIGHTING

Headlamps: Ford "Sealed Beam" type. *See Electrical Equipment Section for complete data.*
Beam Indicator—Top center of instrument cluster above speedometer.
Directional Signal: *Optl. See Electrical Equipment Section.*
Direction Indicators—Right and left indicators on lower edges of instrument cluster.
Directional Signal Flasher—Ford No. 8L-13350-C.

Switches

Lighting—Ford No. OL-11654.
Instrument—Part of lighting switch (operated by turning knob).
Beam Selector—Ford No. 8A-13532.
Dome Light (Exc. Sta. Wgn. & Convertible)—Ford No. 1A-13752.
Dome Light (Sta. Wgn. & Convertible)—Ford No. 8M-13752.
Stop Light—Ford No. 11A-13480 & OA-13480.

MISC. ELECTRICAL

CIRCUIT BREAKER: 30 amperes (Headlights); 15 amperes (Park & Tail Lamps). Mounted behind instrument panel.
Convertible Top—40 amperes, mounted on right hand front fender apron.
FUSES: Interior lighting—14 amperes, on circuit breaker.
Turn Signal—20 amperes.
Overdrive—30 amperes. On overdrive relay.
Cigar Lighter—Special Fuse. In lighter base.
Clock—3 amperes. In clock lead.
Heater—14 amperes. In blower switch wire.
HORNS: Ford No. 51A-13832-A or B (High Pitch, Right Horn), 51A-13833-A or B (Low Pitch, Left Horn). Dual horns operated by relay.
Horn Current—13 amperes (high pitch), 14 (low).
Horn Relay: Ford No. FAA-13853-A.

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder "L" head "V" type with both cylinder banks and crankcase cast enbloc.
Bore—3.187", **Stroke**—3.75".
Displacement—239 cu. in. **Rated HP**—32.5.
Developed Horsepower—110 at 3800 RPM.
Compression Ratio—7.2-1.
Compression & Vacuum Reading—*See Tune-Up.*
►*ENGINE LOSS OF POWER OR CUTTING OUT AT HIGH SPEED OR WHEN PULLING: May be caused by excessive wear of fuel pump pushrod. See "Fuel System Notes" in Ford Special Data.*
►*1952 OVERHEATING CORRECTION & ENGINE COOLING IMPROVEMENTS: See COOLING data for production changes and recommended reworking of early engines.*
►*CYLINDER HEAD & GASKET PRODUCTION CHANGES & INSTALLATION CAUTION: See "Cylinder Head & Gasket" in Ford Special Data.*
CYLINDER HEAD & TIGHTENING TORQUES: *See Ford Special Data.*
ENGINE & OIL PAN REMOVAL: *See Ford Special Data.*
►*CYLINDER SLEEVES (When used): See Ford Special Data.*
PISTONS: Autothermic type, 4 ring (lower ring below pin), aluminum alloy with offset pin.
Removal—Pistons and rods removed from above.
Clearance—See Fitting Pistons.
Replacement Pistons: *Furnished Std., .0025", .020", .030", .040", .060" oversize.*
Fitting Pistons: Use ½" feeler inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:
New Piston in New Bore—.0015" feeler. 6-12 lbs. pull.
New Piston in Used Bore—.002" feeler. 6-12 lbs. pull.
Used Piston in Used Bore—.003" feeler. 6-12 lbs. pull.
Installing Pistons: *Locating mark (small indention)* on head of piston above one piston pin hole, to front on all pistons.
►*CAUTION—Piston pin offset 1/16". Must be installed toward thrust side.*
PISTON RINGS: 2 compression, 2 slotted oil rings (lower oil ring below pin). Upper oil ring groove drilled with oil drain holes, lower groove slotted.

Ring	Width	End Gap	Side Clearance
Compr. (1)	.0915-.0920"	.007-.047"	.0015-.0030"
Compr. (2)	.0915-.0920"	.007-.047"	.0010-.0025"
Oil (3, 4)	.1545-.1550"	.007-.047"	.001-.003"

Replacement Rings: Snap type, Expander type, or Steel Section type ring sets furnished in the following sizes: Std., .020", .030", .040", .060" oversize.
►*CAUTION—Use only rings designed for solid skirt pistons.*
PISTON PIN: Floating type (lock ring at each end). Pin hole in rod is bronze-bushed.
Diameter—.7501-.7504". **Length**—2.835".
Pin Fit in Piston—Hand push fit at 70°F.
Pin Fit in Rod Bushing—.0001-.0003" clearance. New pins should not fall through bushing of own weight.
Replacement Pins: Sizes and paint marks: Std. (Green); .001" Oversize (Blue) .002" Oversize (Yellow).
CONNECTING ROD: Length—7". **Weight**—18.7 ozs.
Crankpin Journal Diameter—2.1390". Maximum wear limits—out of round .002". Taper—.001".
Lower Bearing—Steel backed, copper lead alloy lined, replaceable shells. Upper and lower halves interchangeable. *NOTE*—Steel-backed, lead-base babbitt lined bearings used on first 1952 cars. Both types interchangeable.
Clearance—.0005-.0033" (copper-lead), .0008-.0029" (steel backed-babbitt).
Side Play—.006-.020".
Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.
Installing Rods: Numbers on rods and bearing caps together and installed in same numbered cylinder with oil squirt hole in all rods pointing toward valve side of cylinder bore.
CRANKSHAFT: 3 bearing. Integral counterweights.
►*SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning. Always use new plugs if old plugs disturbed and peen or stake crankshaft to hold plugs in place securely.*
Journal Diameters—2.498-2.499" (All bearings). Max. wear limits Out-of-round .0015", Taper .001".
Bearing Type—Precision steel-backed, copper lead alloy lined removable type. *NOTE*—Steel-backed, lead-base babbitt bearings used on first 1952 cars. Both types interchangeable.
Clearance—.0005-.0025", (selective fit).
Replacement Bearings: Furnished Standard (two sizes marked Red and Blue for selective fitting) and .002", .010", .020", .030", .040" Undersize.
End Thrust: Taken by rear main bearing. Replace bearing if endplay excessive.
Endplay—.002-.006".
CAMSHAFT: Three bearing type. Gear driven.
Identification—Camshaft No. EAB-6250-A (Letter "E" stamped on forward end of shaft).
Bearings—Babbitt lined, steel backed.
Journal Diameters—1.794" (worn limit).
Bearing Diameter (I.D.)—1.7985" (replace bearing if diameter greater than worn limit 1.8015").
Clearance—.001-.0025" (new), .005" (worn limit).
Replacement Bearings: Furnished Std., .010", .015" Undersize (Inside diameter). Bearings are finished (reaming not required). *NOTE—Special .010" & .015"*

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Undersize bearings also furnished .080" Oversize on OUTER diameter.

Camshaft Bearing Servicing—*See Ford Special Data.*

Timing Gears: Bolted-on type.

Camshaft Gear—Fibre (Pass.Car), Aluminum (Trk.).

Crankshaft Gear—Cast iron.

Replacement Camshaft Gears—Std., .006", .012" OS.

Timing Gear Removal & Installation—*See Ford Special Data.*

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
All Valves	1.51"	.3410"	4.54"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	.328"①	②

①—With ZERO valve lash (measure by inserting feeler gauge equal to valve lash between valve stem and lifter).

②—Max. .004" (In.), .005" (Ex.).

▷*ROTATABLE VALVES—All valves are rotatable type. See "Valve System" in Ford Special Data.*

Valve Seat Width—.060-.070" (all valves).

NOTE—Keep seat at center of valve face.

Valve Assembly Servicing—*See "Valve System" in Ford Special Data.*

Valve Seat Insert Removal & Installation: *See "Valve System" in Ford Special Data.*

Valve Guides: One piece type positioned and retained by "C" washer. Inside diameter .344", Outside diameter 1.031". Length 2.20". NOTE—Rubber seal used on intake guide.

Valve Lifters: Barrel type in guide holes in block.

▷*REPLACEMENT LIFTER CAUTION*—Lifters are Part No. EAB-6500-A and can be identified by over-all length of 1.742-1.749". DO NOT use 1949-51 type which is 1.715-1.722" long.

Diameter—.9992" (replace if worn to .9977").

Clearance—.0007-.0016" (new), .003" (worn).

Valve Springs: Free length 2.20" (9.12 coils). Install with closed-coil end up toward guide.

Spring Test—39-44 lbs. at 1.89".

VALVE TIMING

VALVE TAPPET CLEARANCE: Intake .014" (.013-.015"). **Exhaust** .018" (.017-.019").

ADJUSTMENT—Check tappet clearance with lifter on heel of cam. If clearance not within limits, grind end of valve stem (to increase clearance), install a new valve or grind valve in (to decrease clearance). *See "Tappet Clearance Adjustment" in Ford Special Data.*

VALVE TIMING: See Camshaft Setting above.

Intake Valves—Opens 21° BTDC. Close 68° ALDC.

Exhaust Valves—Opens 56° BLDC. Close 11° ATDC.

NOTE—Above specifications are for valve tappet clearance as given above.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear. Piston pins and valve lifters lubricated by splash. Oil pump mounted in crankcase at rear of engine.

Crankcase Capacity—4 qts. (5 qts. when changing oil filter).

Normal Oil Pressure—57 lbs. at 2000 RPM.

Oil Pressure Relief Valve: In pump. Not adjustable.

Spring Tension—12 lbs. at 1.14".

Oil Pump: Gear type (helical gears).

Pump Removal & Overhaul—*See Ford Special Data.*

Oil Filter: By-pass type. On left cylinder head.

Oil Filter Cartridge—Ford No. 7HA-6731-A.

Oil Pan Removal: *See Ford Special Data.*

Oil Pressure Gauge: King-Seeley Electric.

Dash Unit—Ford No. FAB-9273-B.

Engine Unit—Ford No. 41A-9278.

▷*ENGINE SENDING UNIT INSTALLATION CAUTION:* Unit must be installed so that "UP" marking on cover is at top vertical position.

See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter in oil filler cap.

COOLING

▷*1952 COOLING SYSTEM PRODUCTION CHANGES:* In 1952 production, following changes were made in the V8 engine to provide for a more uniform flow of coolant through the engine:

Cylinder Block Water By-pass Holes (Right and Left Banks)—These holes reduced in diameter from ½" to 11/32".

Water Pump Impeller Holes—Two 5/16" diameter holes added between impeller vanes.

Cylinder Head Gasket Change—Steam holes along inner side and center of head enlarged to ¼"

See New Gasket data under V8 CYLINDER HEAD.

▷*REWORKING OF EARLY 1952 ENGINES FOR IMPROVED COOLING:* Production changes listed above can be incorporated in earlier engines as follows:

Cylinder Block Water Bypass Hole (Right & Left Banks)—Make up reducer or adaptor tubes for installation in these holes as follows:

Adaptor Tubes—Use ½" O.D., 11/32" I.D. tubing. Cut one end off at 45° angle, cut angle end of tubing back .17" and chamfer resulting square end portion of tubing for .06" x 45° chamfer. Cut tubing off to overall length of 1.90" (for RIGHT HAND BANK), 1.54" (for LEFT HAND BANK). *CAUTION*—Measure depth of holes in each individual engine and vary overall length of adaptors as required so they are 1/32" shorter than measured depth.

Adaptor Tube Installation—Insert correct adaptor tube in cylinder block water bypass hole with taper end in and open portion upward to align with hole opening in upper face of block. Drive tube in until it bottoms in block. *CAUTION—Angle end opening MUST BE UPWARD (bypass flow from cylinder head will be cut off if angle end opening downward).*

Water Pump Impeller Holes—Locate hole centers 11/16" in from outer edge of impeller between vanes and at two points diametrically opposite each other. Drill completely through impeller using 5/16" diameter drill.

Cylinder Head Gaskets—Use only latest type gaskets which have enlarged steam holes.

Cooling System: Pressure type with relief valve in filler cap and two belt driven pumps (one for each bank) with re-circulating by-pass.

Capacity—21 qts.

Pressure Valve—Ford No. 1M-8100A (1952-53—Use with Radiators 1BA-8005-E & AC-8005-A), No. OL-8100-A (Late 1953—Use with Radiators AC-8005-F, G, H). Radiator filler cap, 7 lb. type (opens at 6¼-7¾ lbs).

▷*CAUTION—Correct type cap must be used with each type radiator. Use of wrong cap would result in EXCESSIVE PRESSURE (first type cap in later type radiator) or NO PRESSURE (later type cap in first type radiator).*

PRESSURE CAP IDENTIFICATION—First 1M-8100-A cap is 13/16" from upper edge of flange on cap to lower edge of integral gasket. Later OL-8100-A cap is approximately ¼" shorter than first type.

Water Pumps: Two used (packless type).

See Water Pump Section for complete data.

Fan Belt Adjustment—Raise or lower fan bracket until a deflection of ¼" is obtained by normal thumb pressure between fan pulley and right hand pump pulley.

Generator & Water Pump Belt Adjustment—See Generator.

Thermostat: In water outlet elbows on cylinder heads (two used).

Part No.	Identification①	Starts to Open
1BA-8575-A	160	157-162°
1BA-8575-B②	180	177-182°

①—Stamped on operating cylinder circumference.

②—Use with permanent type anti-freeze.

Temperature Gauge: King-Seeley Electric type.

Dash Unit—Ford No. FAB-10883-C.

Engine Unit—Consists of **Sender** (in right bank cyl. head), and **Switch** (left bank cyl. head).

Sender—Ford No. 1A-10884A. Stamped "233F."

Switch—Ford No. 1A-10990A. Stamped "226F."

See Miscellaneous Section for compete data.

CLUTCH

Long Model 9½ CF-TS. Ford No. 1A-7563-A. Single plate, semi-centrifugal, dry disc type.

See Clutch Section for complete data.

Facings—Thickness .125". Outside Diameter 9½".

Pedal Adjustment: (Pedal Travel). If total pedal travel is less than 6⅜" or more than 6⅝", reposition pedal bumper until pedal travel is within limits.

Pedal Free Travel—⅞-1⅛". Loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.

Removal: Remove transmission (See Transmission Removal below), and slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar bracket from flywheel housing and remove equalizer bar. Remove split bronze bushing from bracket and then remove flywheel housing. Install tool No. 7563 and remove clutch pressure plate assembly (if tool is not available clutch may be released by backing off the attaching bolts evenly). Remove the clutch release bearing from the hub with an arbor press.

SYNCHRO-MESH TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Steering column mounted shift.

See Transmission Section for complete data.

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame. Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS4-R10F. Optional equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated kick-down. There is no Lock-out switch on this unit.

▷*OIL LEAKAGE AT SOLENOID BASE PLATE (Early 1952 Cars):* May be caused by insufficient clearance

at lower rear corner of gearshift housing and solenoid housing. Correct by filing corner of gearshift housing to provide clearance.
See Transmission Section for complete data.
Overdrive Solenoid—Ford No. FAA-6916A.
Control Relay—Ford No. 1M-6915-A.
Overdrive Fuse—30 amperes. On relay.
Throttle Kick-Down Switch—Ford No. 8A-6818-B.
Removal: Same as for standard transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque Converter and three speed automatic transmission with hydraulic control and mechanical parking lock.
►*GEARSHIFT TUBE VIBRATION DAMPENER (Installation on early 1953 and previous cars): See "Fordomatic & Mercomatic Transmission" in Transmission Section.*
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic Transmission" in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See Transmission Section.*
Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15000 miles. Use only Automatic Transmission Fluid, Type A.
Capacity—Approximately 9 qts.
Checking Oil Level—Apply parking brake, place transmission selector lever in "N" position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (Parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt from fluid level cap, remove indicator. Wipe indicator clean and insert in tube (make sure indicator is pushed down all the way). Remove indicator and read level. Add sufficient fluid to raise fluid level to full mark on indicator. Replace indicator.
►*TRANSMISSION VENT PRODUCTION CHANGE (& Installation of new vent on earlier cars to facilitate filling of transmission): See "Fordomatic & Mercomatic Transmission" in Transmission Section.*
►*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Merc-O-Matic Transmission" in Transmission Section.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type, 2 used.
CAUTION—TWO types used interchangeably:
1) **Pre-lubricated** (8M-7042 Front & 8M-7039 Rear). Requires lubrication at 20,000 mile intervals (repack bearings and replace seals).
2) **Grease-fitting** (1M-7042A Front & 1M-7039 Rear). Must be lubricated with pressure grease gun at 1000 mile intervals.

CAUTION (ALL CARS EXCEPT STATION WAGON & SEDAN DELIVERY)—Rear universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). See "Ford Passenger Cars (except Station Wagon)" in Rear Axle Section.

REAR AXLE

PASSEN ER CARS

Own Make. Semi-floating, hypoid type with Hotchkiss drive (separate carrier). Axle ends flanged (no separate hub). Wheel bearings are sealed ball-bearing pre-lubricated type.
►*NOTE—AXLE NOT SAME AS STATION WAGON.*
See Rear Axle Section for complete data.
Ratios
Standard Transmission—3.90-1 (39-10).
Overdrive Transmission—4.10-1 (41-10).
Fordomatic Transmission—3.31-1 (43-13)①.
①—3.54-1 (39-11) Optional.
►*AXLE CARRIER & GEAR RATIO IDENTIFICATION:*
Gear Ratio—Carrier stamped with pinion-and-ring gear ratio (10/39 for 3.90-1 ratio, etc.)
Backlash—.003-.008".
Removal: Disconnect rear universal. Remove axle shafts (see instructions below). Remove carrier from housing.
Axle Shaft Removal: Remove wheel. Take off drum. Remove 4 axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure backing plate.
Wheel Bearing Adjustment: None.

SEDAN DEL. & STATION WGN.

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive **(Integral carrier).** Axle ends flanged (no separate hub). Wheel bearings are sealed ball-bearing pre-lubricated type.
NOTE—AXLE NOT SAME AS PASSENGER CAR.
See Rear Axle Section for complete data.
Ratios
Standard Transmission—4.09-1 (45-11).
Overdrive Transmission—4.27-1 (47-11).
Fordomatic Transmission—3.54-1 (39-11)①.
①—3.15-1 (35-9) Optional.
Removal: Raise rear of car. Disconnect rear universal. Remove axle shafts (see instructions above). Disconnect brake line at "T" on left side of axle housing, and hand brake cable. Disconnect shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.
Axle Shaft Removal: Same as Ford Pass. Cars.

SHOCK ABSORBERS

Direct acting type (front and rear). Not adjustable. Service by replacement.
►*NOTE—Shock absorbers supplied for service in kit form only. Includes Shock Absorber and Bushing.*
►*REPLACEMENT PARTS CAUTION: Ford numbers given below are 1953 production types and replace corresponding "CPA" parts used in 1952 production.*

	Front	Rear
Pass. Cars (Std.)	DPA-18124A	DPA-18125A
Pass. Cars (Heavy Duty)	DPA-18124C	DPA-18125C
Sta. Wgn. & Sedan Del.	DPA-18124B	DPA-18125C

FRONT SUSPENSION

Front Suspension: Independent linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.
►*TIRE & WHEEL BALANCING MARK CAUTION:* To maintain tire and wheel assembly balance, install tube with valve aligned with letter "V" stamped on tire, install wheel and tire assembly with "L" stamped on sidewall (light side of assy.) as nearly aligned as possible with "V" notch filed in brake drum (heavy side of drum and hub assy.).
►*IDLER ARM INTERFERENCE-ON-LEFT TURN CORRECTION: See Front Suspension Section for complete data.*
Kingpin Inclination—4¾-5¾° crosswise.
Caster—(Pass. Cars & 1953 Sta. Wgn. & Sedan Delivery) Pos. ½° to Neg. 1° (1952 Sta. Wgn. & Sedan Delivery) Neg. ¼° to Neg. 1¾° (Neg. ¼° prefefred). Maximum variation between wheels ½°.
Camber—Pos. ¼° to Pos. ¾° preferred with limits 0° to Pos. 1°. Maximum variation between wheels ¼°.
Toe-In—1/16-1/8". When adjusting toe-in, turn both connecting rod sleeves equally but in opposite directions (if steering wheel spokes in correct horizontal position), or lengthen one rod and shorten opposite rod, as necessary, to correct steering wheel spoke position while making toe-in adjustment.

STEERING GEAR

Std. Steering Gear: Own Make (Gemmer 305 design). Worm-and-roller type.
See Steering Gear Section for complete data.
Optl. Power Steering: Ford-Mercury Linkage type used in conjunction with standard type steering gear.
See "Ford & Mercury Power Steering" in Steering Section for complete data.

BRAKES

Service: Ford-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
►*BRAKE CABLE CONDUIT RUBBING ON REAR TIRE (First 1952 Cars): See Brake Section for complete data.*
Wheel Cylinder Diameter—Front Wheel 1⅛", Rear Wheel ⅞" (exc. 1953 Sta. Wgn. & Sedan Del. 15/16").
Drum Diameter—10" (Pass. Cars), 11" (Sta. Wgn. & Sedan Delivery). Maximum reboring limit .060" on diameter (to 10.060" and 11.060").
Lining—Molded type riveted to shoe. **Width**—2¼" (Front Pass. Cars); 2" (Front Sta. Wgn. & Sed. Del.), 1¾" (Rear-All).
Thickness—(1952—All Shoes) 3/16", (1953 Pass. Car Frt. Whl. Primary & All Rear Whl. Shoes) 3/16", (1953 Pass. Car Frt. Whl. Secondary Shoes) 7/32". (1953 Sta. Wgn. & Sedan Delivery—All Shoes) 7/32".
Length Per Shoe—10.85" (All shoes—Pass. Cars), 9.28" (Primary—Sta. Wgn. & Sed. Del.), 11.93" (Secondary—Sta. Wgn. & Sed. Del.).
Clearance—.010" at each end of secondary shoe with primary shoe forced out against drum (adjusting screw on each wheel backed off 14 notches or "clicks" from point where shoe drags on drum).
Brake Pedal Free Play Adjustment: 1/4-7/16". If play not correct after brake adjustment, loosen locknut on the eccentric bolt that attaches brake pedal assembly to master cylinder pushrod, rotate eccentric bolt for desired clearance.
Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Top: *TWO types used as follows:*
1952 & Early 1953 Top Control—Electric-mechanical type (reversible motor mounted under rear seat driving two screw type jacks through flexible cables).
►*TOP FAILURE TO OPERATE (Due to disengagement of Drive Cables)—See Miscellaneous Section for recommended correction.*
Late 1953 Top Control—Hydro-Lectric type (motor driven hydraulic pump operating two hydraulic top lift cylinders).
See Miscellaneous Section for complete data.
Windshield Wipers: Vacuum Link & Crank Arm type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate attached to left front body pillar below upper hinge opening.

First Number—100001 up, for each year.

►*VEHICLE NUMBER NOTE:* Vehicle number (example "A5FS100001") includes following identification data in sequence.

Engine Type ①	Year ②	Assembly Plant ③	Body Style ④	Serial No.
A	5	F	S	100001 up

①—See Engine Type Code below.
②—4(1954), 5(1955).
③—See Assembly Plant Code below.
④—See Body Style Code below.

Engine Type Code

Code	1954 Engine	1955 Engine
A (6 Cyl.)	223 cu. in.	223 cu. in.
U (V8)	239 cu. in.	272 cu. in.
P (V8)	256 cu. in.	292 cu. in.

Body Style Code

Code	1954 Models	1955 Models
C	Sunliner	Sunliner
F	Skyliner	Skyliner
H		Thunderbird
R	Ranch Wagon ⑤	Ranch Wagon
S	Sedan Delivery	Sedan Delivery
T	Fordor ⑥	Fordor & Tudor
V	Victoria	Victoria
W	Ranch Wagon ⑦	Special Body
X	Country Sedan	Country Sedan
Y	Country Squire	Country Squire
G	All Others ⑧	All Others ⑦

⑤—Customline. ⑥—Crestline ⑦—Mainliner
⑧—Mainliner & Customliner.

Assembly Plant Designation

A—Atlanta	F-Dearborn	N—Norfolk
B—Buffalo	G-Chicago	P—St. Paul
C—Chester	K—Kansas City	R—Richmond
D—Dallas	L—Long Beach	S—Somerville
E—Edgewater	M—Memphis	U—Louisville

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. (1954), 125 lbs. (1955), at cranking speed. Maximum variation between cylinders is 10 lbs.

VACUUM READING: Steady 18-20" idling at 500 RPM.

VALVE TAPPET CLEARANCE: .015" (Intake), .019" (Exhaust) with engine at operating temperature.

MANIFOLD HEAT CONTROL: Automatic thermostatic type with counterweight. Valve is open at top when engine cold. Thermostat spring installed with ¾ turn wind-up and hooked over stop pin.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .034-.037" (Champion H-10). .032-.036" (Champion 870).

Spark Plugs (1954)—Champion H-10. 14mm. Use Champion H-11 for slow or stop-and-go driving. Tighten to 25-30 ft. lbs.

Spark Plugs (1955)—Champion 870. 18mm. Special.

►*1955 SPARK PLUG CAUTION: Spark plug is new type with tapered seat and does not require a sealing gasket. It is important that plugs be torqued to 15-20 ft. lbs.*

COIL: Ford 8BA-12029.

Ignition Current—3.0 amperes idling, 5.0 amperes stopped.

DISTRIBUTOR: FAA-12127-C (1954); B5A-12127-C (1955).

Condenser—Ford 7RA-12300-C. **Capacity** .21-.25 mfd.
Contact Point Set—Ford 7RA-12171.
Breaker Gap—.024-.026".
Cam Angle—35-38°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
3½-4½	5	500
7-8	1.8	1000
9¾-11	3.8	1500
11½-13	6.0	2000

►*DISTRIBUTOR INSTALLATION CAUTION: Be sure oil pump intermediate shaft engages seat in oil pump.*

IGNITION TIMING

Setting—3° BTDC.
Timing Mark—5 marks—0°, 3°, 5°, 7°, 9°, on vibration damper. Align correct mark with pointer on engine front cover.

CARBURETOR

Ford No. EBP-9510-A (Except Fordomatic), EBP-9510-B (With Fordomatic). "Visi-flo", single barrel.

►*1955 ACCELERATOR LINKAGE CORRECTION (To Permit Full Accelerator Travel):* Bend upper arm of accelerator assembly so that it moves on a 6" radius (distance between center of accelerator shaft-carburetor rod pivot point hole and center line of straight portion of accelerator should be 2 9/64").

►*1955 STANDARD & OVERDRIVE TRANSMISSION ACCELERATOR BELL CRANK-TO-CARBURETOR ROD ASSEMBLY PRODUCTION CHANGE (To Correct Difficult Idle Adjustment):* If difficulty encountered in adjusting idle, check to see if car equipped with new rod assembly, Part No. TRAA-9772-A (has phosphate-dark-finish). Old rod assembly, Part No. AB-9772-A, had cadmium plated finish.

Idle Setting—Initial setting 1½ turns open. Set for highest steady vacuum reading with engine at normal operating temperature, or midway between missing and rolling points. Turn screw out for richer mixture.

Idle Speed (1954)—475-500 RPM (Std. & O.D.), 440-460 RPM (Fordomatic) with selector lever in "N".

Idle Speed (1955)—475-500 RPM (Std. & O.D.), 450-475 RPM (Fordomatic) with selector lever in "N".

Fuel Level—11/16" ±1/32" below power valve mounting surface (Tool T52L-9550-AEE). *See "Ford Visi-flo" in Carburetor Section of Manual.*

Accelerating Pump: Inner hole for normal or hot weather, outer hole for cold weather operation (holes located in throttle lever. Shift pump link as required).

Fast Idle: Integral type operated by choke valve. No adjustment required.

Throttle Linkage Adjustment (Fordomatic Cars): With selector lever in "N" position and engine at normal operating temperature, set engine idle speed at 440-460 RPM (1954 Models), 450-475 RPM (1955 Models). Adjust Anti-stall Dashpot, then turn engine off. Remove clevis pin from upper end of transmission control rod (at cross shaft). Pull gently upward on throttle control rod to hold transmission lever against its internal stop. Rotate rod clevis for free entry of clevis pin into holes in clevis and cross shaft lever. Lengthen control rod by rotating clevis 2½ turns counterclockwise. Connect control rod to cross shaft lever. Road Test car and if band or clutch slippage evident, **increase rod length to 3 turns of clevis but do not exceed 3½ turns.** Check transmission for kick-down action and if found to be incorrect, disconnect accelerator connecting link from cross shaft lever and adjust pedal height by turning the threaded trunnion on connecting link until top surface of accelerator pedal is 4 5/16" (1954), 4 9/16" (1955) from floor.

Anti-Stall Dashpot (Fordomatic Cars): First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counterclockwise) until head of adjusting screw pushes the dashpot rod up to the end of its travel. Turn dashpot screw in (clockwise) 1½-2 turns to obtain .045-.064" clearance. Tighten locknut.

►*OTHER DATA: See Ford "Visi-flo" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. at 900 RPM

CARB. EQUIPMENT

►*FUEL TANK FILTER CAUTION:* If particles of foreign material found in fuel pump or carburetor on units built prior to February 1, 1955, particles should be examined very closely (with magnifying glass and strong light). If particles clear or cream colored, short, and thread-like pieces, they are probably from a damaged fuel tank filter. To correct, replace fuel tank.

Fuel Pump (1954): Ford No. EAA-9250-E, Fuel only Except Fordomatic & Overdrive Cars); **EBP-9250-A,** Fuel & Vacuum (Fordomatic & Overdrive Cars).

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Fuel Pump (1955): **Ford No. B5A-9350-A,** Fuel only (Except Fordomatic & Overdrive Cars); **B5A-9350-B,** Fuel & Vacuum (Fordomatic & Overdrive Cars).

Fuel Pump Pressure–4-5 lbs. at 900 RPM.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric.

Dash Unit (1954)–Ford No. FAG-9280-A.
Dash Unit (1955)–Ford No. B5A-9280-A.
Tank Unit (1954)–Ford No. FAA-9275-A (Except Sta. Wgn. & Sedan Delivery). No. FAA-9275-B (Sta. Wgn. & Sedan Delivery).
Tank Unit (1955)–Ford No. B5A-9275-A (Exc. Sta. Wgn. & Sedan Delivery). B5A-9275-B (Sta. Wgn. & Sedan Delivery).

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Ford No. FDA-10655-A. 6 volt, 17 plate, 90 ampere hour capacity (20 hr. rate).
Battery Ground–Positive (+) to engine.
Engine Ground–Cylinder head to dash.

STARTER

Ford No. FAC-11002-B (1954); FAC-11002-G (1955).
Armature–Ford No. 52-11005 (FAC-11002-B); **FAC-11005-B** (FAC-11002-G).

Drive–Ford No. 1CM-11350-C. Bendix "Folo-Thru" type.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–48-56 ozs.
Cranking Speed–115-125 RPM.

Performance Data–FAC-11002-B

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
16 ft. lbs.	Lock		700

Performance Data–FAC-11002-G

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
14 ft. lbs.	Lock		700

①–With starter on engine and engine running.

Starting Switch: Ford No. FAB-11450-B. Mounted on left front fender apron and controlled by Ignition Switch. *NOTE*–A Neutral Safety Switch is used on all models with Fordomatic.

Fordomatic Neutral Safety Switch: Ford No. FAC-15812-C (1954); B5A-15812-A (1955).
Adjustment–*See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Ford No. FAA-10002-B. Armature–0A-10005-A.

►*GENERATOR BELT WEAR & IMPROPER CHARGING RATE CAUTION:* If either of these two conditions are encountered, check to make sure an 8-Cyl. generator is not being used.

►*GENERATOR BELT NOISE CORRECTION:* To make sure noise is coming from belt, squirt a few drops of hydraulic fluid on belt driving surface. If noise or whine disappears, belt is at fault and should be replaced with plain type belt, Part No. B5A-8620-B. In some cases, removal of paint in generator pulley groove has stopped noise without belt replacement.

Performance Data

Generator	Amperes	Eng. RPM
FAA-10002-B	35 ①	850

①–See Regulator for maximum charging rate.

Brush Spring Tension–30 ozs.
Field Current–1½-2½ amperes at 6.0 volts.
Rotation–Counter-clockwise at commutator end.

Belt Adjustment: ¼" belt deflection midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

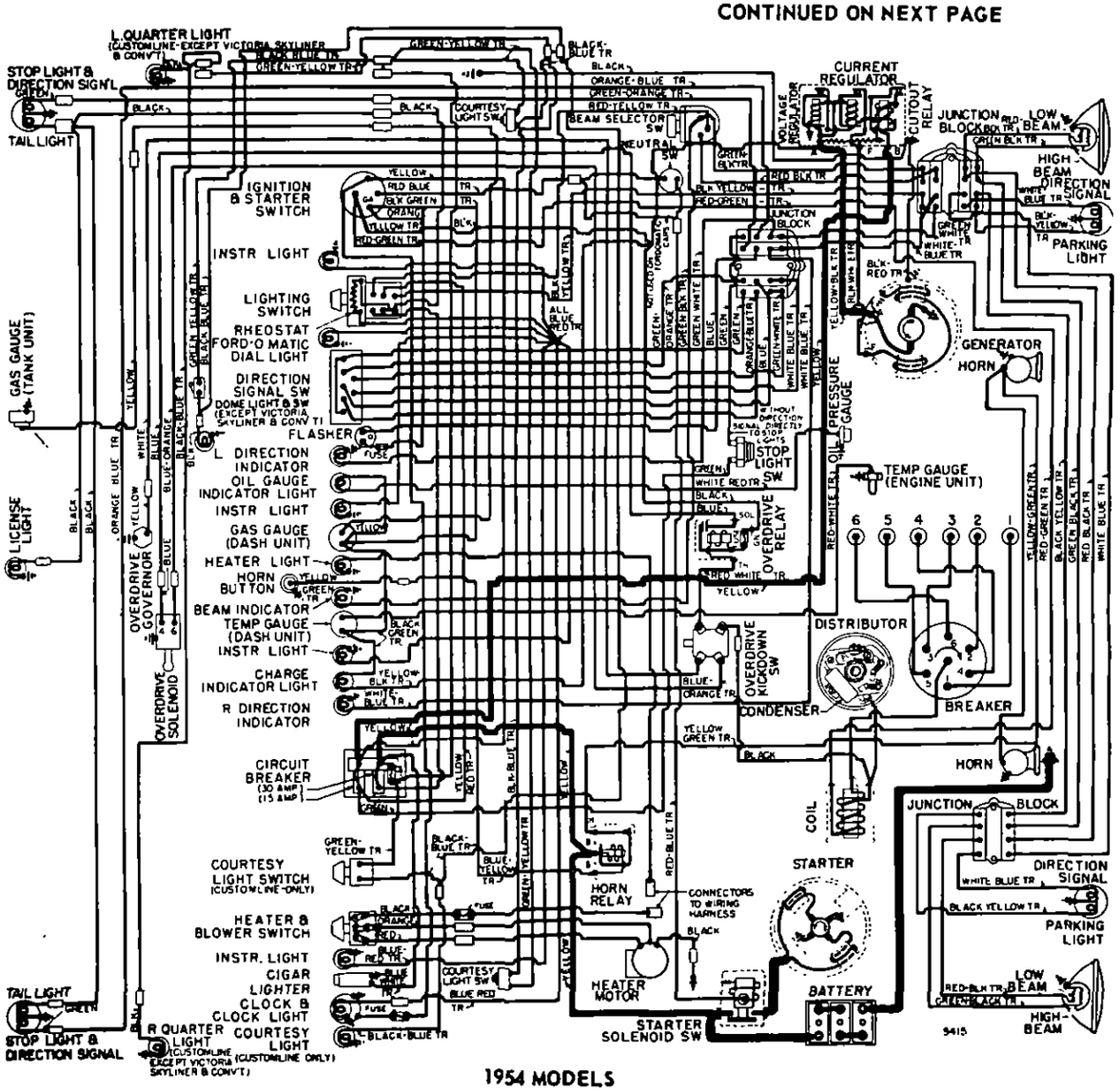
Ford No. FAC-10505-A

►*SETTING NOTE:* Settings below are for regulator at NORMAL OPERATING TEMPERATURE (after ½ hour operation) with room temperature at 70°-80 ° F.

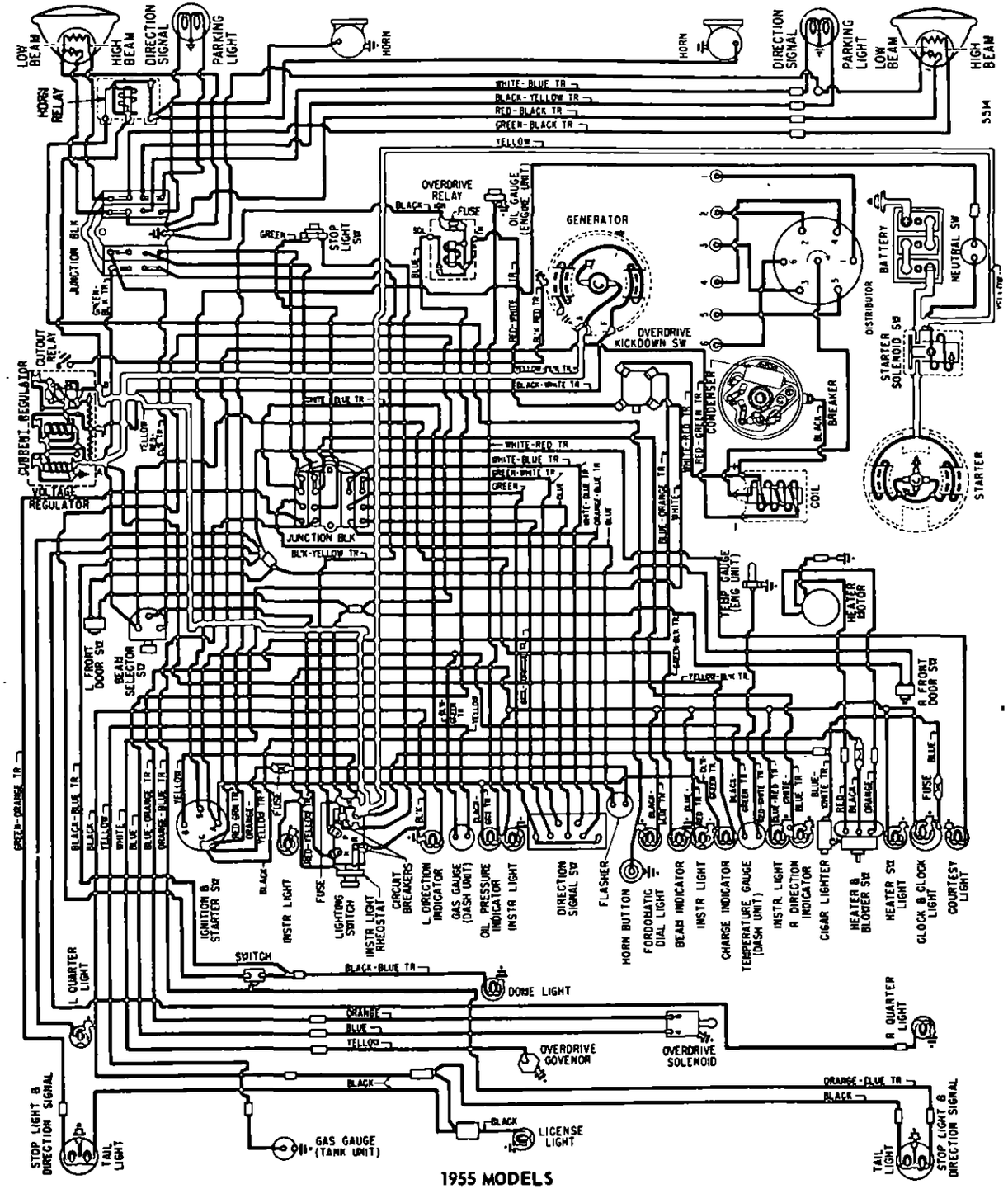
Cutout Relay

Cuts In–6.0-6.6 volts.

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1954 MODELS



1955 MODELS

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▷*CUTOUT RELAY AIR GAP CHECK:* With cover off regulator, manually close cutout contacts. Measure air gap between armature and core. This dimension should be .009-.013". Air gap with contacts open should be .012-.020". If either or both of these dimensions are not up to specifications, regulator is defective and should be replaced.

Voltage Regulator

Setting—7.4-7.8 volts.
Checking & Adjusting—See *Electrical Equip. Section.*

Current Regulator

Setting—34-38 amperes.
Checking & Adjusting—See *Electrical Equip. Section.*

MISC. ELECTRICAL

▷*1955 BACK-UP LIGHT SWITCH BRACKET INSTALLATION CAUTION:* Change in steering gear shift rod on late production cars affects installation of back-up light switch bracket, Part B5A-15517-A. To install this bracket, bend upward to prevent switch from bottoming when gear shift lever in reverse position. New bracket, Part No. B5A-15517-B, is included in new kit, Part No. B5A-15517-B, however, some kits will be released with old bracket.

▷*1954 DIRECTIONAL SIGNAL BURNING OUT CORRECTION:* Replace 14 amp. fuse with a 9 amp. fuse by making a 3/16" long spacer from ¼" copper tubing. Cut spacer lengthwise and place on wire so that it will be between bottom of fuse holder and spring. Press sides of spacer together with pliers.

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Direction Signal: *See Electrical Equipment Section.*

Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N. Remove switch and disconnect all wires.

Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), and on top of booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment.

FUSES: Located as indicated below:

Direction Signal—14 amp. (1954); 15 amp. (1955). In fuse holder between ignition switch and flasher. *1954 NOTE—See "Directional Signal Flasher Burning Out CORRECTION" above.*

Interior Lights—14 ampere. On lighting switch.
Overdrive—30 amps., on overdrive relay.
Cigar Lighter—Special fuse in lighter base.
Clock—3 amps., in clock lead.
Heater—14 amps., in blower switch wire.

LIGHTING CIRCUIT BREAKERS: On headlight switch. Combination headlight switch, circuit breaker, and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument, parking, stop and tail light circuits. The 14 ampere fuse protects interior lighting circuit.

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HORNS: (1954)—Ford No. FAC-13832-E or F (High pitch), FAB-13833-F or G (Low pitch). Dual horns operated by relay.

HORNS: (1955)—Ford No. B5A-13832-C (High pitch), B5A-13833-C (Low pitch). Dual horns operated by relay.

Horn Current—12-14 amps at 6.2-7.2 volts.

Horn Relay: Ford No. FAA-13853-A.

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. Valve-in-head.

Bore—3.62". **Stroke**—3.60".

Displacement—223 cu. in. **Rated H.P.**—31.5.

Developed Horsepower—115 at 3900 RPM (1954). 120 at 4000 RPM (1955).

Compression Ratio—7.2-1 (1954). 7.5-1 (1955).

Compression & Vacuum Reading—*See TUNE-UP.*

►*1955 CAMSHAFT OR VALVE SPRING REPLACEMENT CAUTION:* Approximately 2000 1955 models were released with 1956 type camshafts installed. If valve springs or camshaft to be replaced, correct parts must be installed. *See "Camshaft" (below) for identification and parts replacement.*

►*1955 OIL BATH AIR CLEANER INTERFERENCE WITH HOOD CORRECTION: On early production cars* Oil Bath Air Cleaner interfered with hood. To correct, cut out 2½" long x 7/16" deep section out of top of air cleaner at point of interference with hood. Cars after November 13, 1954 have hoods corrected. If replacement cleaner B5A-9600-F installed on unrevised hood cars, correction will have to be made since service cleaners have not been reworked.

►*1955 DRIVE SHAFT-TO-FRAME INTERFERENCE NOTE & CORRECTION (Conv.):* On early production units, drive shaft may strike bottom of clearance hole in frame "X" member after vehicle passes over a severe bump. Current production is installing three shims and longer bolts (7/16"—20 x 1½") between engine rear support and "X" member to prevent interference, and can be installed on early units. *NOTE—If shims removed during repair operation, make sure they are reinstalled.*

►*1955 FUEL LINE (TOO LONG) CORRECTION:* All early production units should be checked for too long a fuel line causing sharp bend in flexible line installed at forward end of fuel line. To correct, bend forward end of fuel line outward, and increase radius of bend in flexible line. Drill a 7/32" hole in No. 2 crossmember. Install a clip, Part No. 8A-14588 and screw, Part No. 31498-58, to secure fuel line to No. 2 crossmember.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Ford Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Ford Special Data.*

ENGINE REMOVAL: *See "Engine" in Ford Special Data.*

ENGINE FRONT MOUNTING: *See "Engine Mountings" in Ford Special Data.*

OIL PAN REMOVAL: Drain crankcase, remove oil dipstick. Drain coolant from engine and radiator. Disconnect upper radiator hose at engine. Remove engine front support bolts. Remove engine steady rest. Raise front end of engine about 2". Remove left and right engine splash aprons. Block engine and lower engine on block. Remove flywheel housing inspection cover. Remove oil pan retaining screws, remove pan and gasket.

PISTONS

Autothermic type. Solid skirt with three rings above pin.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Use ½" feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:

New Piston in New Bore—.0015" feeler. 5-10 lbs. pull.

New Piston in Used Bore—.002" feeler. 5-10 lbs. pull.

Used Piston in Used Bore—.0025" feeler. 5-10 lbs. pull.

Replacement Pistons: Standard size, .020", .030", .040", .060" Oversize. Pistons furnished only with fitted pins.

Installing Pistons: Install with small indentation in head toward FRONT of engine.

PISTON PINS

Floating type with lock rings at each end.

Diameter—.9120-.9123". **Length**—3.016-3.030".

Pin Fit in Piston—.0001-.0003". Hand push fit at 70°F.

Pin Fit in Rod Bushing—.0001-.0003" clearance. New pin should not fall through bushing of own weight.

Replacement Pins: Standard size, .001", .002" Oversize.

PISTON RINGS

►*SPECIAL SERVICE PISTON RING SET (To reduce Possibility of Excessive Oil Consumption): Special Piston Ring Set, Ford Part No. B4A-6148-AAA furnished as service replacement in addition to standard "Expander and "Snap Ring" type sets.*

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.010-.027"	.002-.0035"
Compr. #2	3/32"	.010-.027"	.002-.0035"
Oil	3/16"	.010-.027"	.0015-.003"

Replacement Rings: Standard size, .020", .030", .040", .060" Oversize.

►*REPLACEMENT PISTON RING NOTE:* "Snap-Type" rings furnished in Std. size only. "Expander" type furnished in all above oversizes. *See "Special Service Piston Ring Set" above.*

CONNECTING RODS

Crankpin Journal Diameter—2.2980-2.2988".

Lower Bearings—Steel backed, copper lead alloy lined type. Upper and lower halves interchangeable.

Clearance—.0005-.0023" (1954). .0004-.0023" (1955).

Side Clearance—.005-.007".

Replacement Bearings: Standard size, (4 sizes marked **red** & **blue** for selective fitting) and .010", .020", .030", Undersize.

Installing Rods: Install rod in piston so that squirt hole is to right when indentation on top of piston is toward front of engine.

CRANKSHAFT

►*1954 CRANKSHAFT & FLYWHEEL PRODUCTION CHANGE:* Later type parts are interchangeable with previous parts except that later crankshaft cannot be used with early flywheel unless inner edge of flywheel bore is chamfered 1/16" x 45° to eliminate flywheel-to-crankshaft interference. Use a bearing scraper to chamfer.

Journal Diameter—2.4980-2.4988". Max. wear limits .0015", taper .001".

Bearings—Steel backed, copper lead alloy lined.

Clearance—.0005-.0025" (No. 1, 2, 3), .001-.0029" (No. 4).

Replacement Bearings: Standard size, (4 sizes marked **red** & **blue** for selective fitting) and .010", .020", .030" Undersize.

End Thrust: Taken on rear intermediate bearing (#3).

Thrust Bearing Alignment—*See "Crankshaft & Main Bearings" in Ford Special Data.*

Endplay—.004-.008".

Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Ford Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Ford Special Data.*

CAMSHAFT

►*1955 CAMSHAFT & VALVE SPRING REPLACEMENT CAUTION:* When replacing either camshaft or valve springs on Late 1955 models, replacement parts must match the original parts exactly. Approximately 2000 Late 1955 models were equipped with 1956 type camshafts and valve springs. THESE PARTS ARE NOT INTERCHANGEABLE WITH STANDARD PRODUCTION 1955 PARTS. If replacement parts are not available, install 1955 camshaft, Part No. B5A-6250-B and valve springs, Part No. EAA-6513A. 1955 camshafts can be identified by a cam lobe lift of .242" (.273" on 1956 type). 1955 valve springs have 7½ coils with lower coil closely spaced. 1956 valve springs have 7 equally spaced coils. Use of mismatched camshafts and springs may result in early failure of camshaft and/or valve flutter at high speeds.

Journal Diameter—1.9255-1.9265".

Clearance—.001-.003" (new). .005" (worn limit).

End Thrust—Taken by plate on forward end of block (between camshaft sprocket and shoulder on shaft).

Endplay—.003-.007".

Replacement Camshaft Bearings: Finished bearings furnished Standard, and .015" Undersize. *CAUTION—Rear intermediate (#3) bearing not interchangeable with other bearings.*

Camshaft Bearing Removal & Installation: *See "Camshaft & Bearings" in Ford Special Data.*

Timing Chain: Side-guide type. Length 56 links.

►*REPLACEMENT NOTE:* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure slack on opposite side).

Camshaft Setting: Sprockets marked by "O" at one tooth. Mesh chain so that there are 12 pins between "O" marks.

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►*CAMSHAFT SPROCKET SPACER INSTALLATION CAUTION:* If spacer, Part No. EBE-6265-A, installed backwards, it will allow an excessive amount of end-play. Chamfer on inside diameter of spacer must be toward No. 1 camshaft bearing journal.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Ford Special Data.*

VALVES

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves): Stem diameter decreased. 0005" for greater stem clearance in guide. See "Valve System" in Ford Special Data.*

Tappet Clearance: .015" (Intake). .019" (Exhaust) with engine at operating temperature.

Valve	Head Diam.	① Stem Diam.	Length
Intake	1.785"	.3415"	5.02"
Exhaust	1.515"	.3405"	5.02"

Valve	Seat Angle	② Lift	Stem Clearance
Intake	45°	.340"	.002" max.
Exhaust	45°	.340"	.003" max.

①—Valves furnished with .003", .015", .030" Oversize stems for service replacement. *See "Valve Guides" in Ford Special Data.*

②—Minimum lift for checking camshaft lobe wear.

Valve Seat Width—.066-.084" (Intake). .087-.109" (Exhaust).

►*ROTATABLE VALVE NOTE: All valves are rotatable type. See "Valve System" in Ford Special Data.*

Valve Stem Oil Seals—"Umbrella" type oil seals used on intake and exhaust valve stems. Seals are installed with cupped side down on valve stem at at guide boss on cylinder head. *Install new seals whenever valves removed or when seals become loose on stem.*

►*VALVE STEM OIL SEAL INSTALLATION CAUTION:* New valve stem oil seal, Part No. B5A-6571-A, has been released and **should be used to service V8 engines only.** Old seal, Part No. EAA-6571-C, should be used to service only 6-cylinder engines.

Valve Springs: Install with closed coil end toward cylinder head.

►*1955 VALVE SPRING REPLACEMENT CAUTION: See "1955 Camshaft & Valve Spring Replacement Caution" under "Camshaft" above.*

Valve Spring Specifications

	Pressure	Length
Valve Closed	54-62 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.002" Intake, .003" Exhaust), ream guides and install oversize valves. *See "Valve System" in Ford Special Data.*

Valve Lifters: Mushroom type. Removed from below with camshaft removed.

Rocker Arm Assembly: *See "Valve System" in Ford Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE:* The following valve opening and closing points are with camlift as indicated.

Intake Valves— Open 13° ①BTDC. Close 68° ①ALDC.
Exhaust Valves—Open 55° ②BLDC. Close 22° ②ATDC.
①—Camlift .013". ②—Camlift .016".

Valve Timing Check: *See "Camshaft Setting" under CAMSHAFT above.* Remove rocker chamber cover. Turn engine over until No. 1 intake tappet is on heel of No. 1 intake cam lobe. Back off No. 1 intake valve adjusting screw, push rocker arm to one side, then install dial indicator. Zero dial indicator, then rotate engine slowly until desired lift (.013") obtained. Compare degrees on pulley with specifications (13°). If not within specifications, check for bent timing pointer by bringing No. 1 piston to TDC and see if timing pointer aligned with TDC mark on vibration damper. If pointer not at fault, check timing chain, camshaft sprocket, camshaft, vibration damper, and crankshaft in order of accessibility.

OILING SYSTEM

Crankcase Capacity: 4 qts. (refill), 5 qts. (when new filter installed).

Normal Oil Pressure: 45 lbs. at 2000 RPM.

Pressure Regulator Valve—In pump body, not adjustable.

Oil Pressure Indicator—Indicator light on instrument panel, operated by Engine Unit—Ford No. FDA-9278-A (Stamped #7 on Hex.). Lights when ignition switch turned on, goes out when engine starts and pump operates.

Oil Pump: Gear type pump located in crankcase.

►*1955 OIL PUMP PRODUCTION CHANGE & PARTS INSTALLATION CAUTION:* New oil pump assembly, intermediate shaft and body plate released for service. Parts not interchangeable with those of previous type pump. *See "Oiling System" in Ford Special Data.*

Pump Overhaul—*See "Oil Pump" in Ford Special Data.*

Oil Filter: Full-flow type (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.

Replacement Filter Element—Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION—This special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication.*

►*FILTER INSTALLATION CAUTION & OIL LEAKAGE CORRECTION: See "Oiling System" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

COOLING

Water Capacity: 15 qts. (without heater). 16 qts. (with heater).

Pressure Valve: Ford LA-8100-A (marked "13" or "14"). Radiator filler cap. Opens at 12-15 lbs. *CAUTION*—If replacement required use 12-15 lb. type.

Thermostat: Ford No. EAA-8575-A. Mounted inside water outlet elbow in cylinder head. (Stamped 160 on operating cylinder) 160° type. Part No. EAA-8575-B (180°) can be used for permanent anti-freeze.

Water Pump: Packless, sealed ball bearing type.
See "Ford 6" in Water Pump Section.

Temperature Gauge: King-Seeley Electric.

Dash Unit—Ford No. FDA-10883-A (1954). B5A-10883-A (1955).

Engine Unit—Ford No. 1A-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 9½ CF-TS. Ford No. 1A-7563-A.
See "Long Clutches" in Clutch Section.

►*1954 CLUTCH RELEASE BEARING NOISE CORRECTION:* Check release bearing hub shoulder for a second "step" that prevents bearing from seating properly. Correct by replacing hub.

►*1954 CLUTCH GRATING NOISE CORRECTION:* Retracting spring reversed and rubbing on steering housing. Long end of spring should be toward front of car.

Clutch Disc No.—Ford No. 8HA-7550-B.

Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper until until travel is within limits.

Pedal Free Travel—1 1/8-1 3/8". Loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.

►*PEDAL FREE TRAVEL ADJUSTMENT CAUTION:* Normal action of pressure plate centrifugal weights at high engine speed will take up approximately ¼" of specified free travel. Check free travel when engine is operated at high speed and see if approximately ½" of free travel is left. Insufficient free travel will cause release bearing to rotate at all times and will result in early bearing failure.

Removal: Remove transmission (see Transmission Removal below), and slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar bracket from flywheel housing and remove equalizer bar. Remove split bronze bushing from bracket and then remove flywheel housing. Install Tool 7563 and remove clutch pressure plate assembly (if tool not available, clutch may be released by backing off the attaching bolts evenly). Remove clutch release bearing from hub with an arbor press.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See "Ford Synchro-mesh" in Transmission Section

►*INTERMEDIATE & HIGH GEAR JUMP-OUT CORRECTION: See "Ford Synchro-mesh" in Transmission Section.*

►*LOW GEAR JUMP-OUT CORRECTION (Due to Insufficient Clearance):* To correct, remove side cover, grind corner of detent boss to provide sufficient clearance between shift cam and detent boss.

►*GEAR CLASHING CORRECTION (Shifting from Neutral-to-Low or Reverse):* Check operation by depressing clutch pedal and allowing sufficient time for input shaft to stop rotating. If clashing still occurs,

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check fit of clutch disc hub on input shaft. If it binds on shaft, apply lapping compound to input shaft and lap hub to shaft. If condition continues to exist, it will be necessary to select-fit clutch disc and input shaft. *CAUTION–Reducing clutch free-play below specified limit will not correct condition.*

Transmission Control: *See "Transmission Control" in Transmission Section.*

Removal: Disconnect gearshift linkage at transmission. Remove speedometer cable and gear. Disconnect drive shaft at transmission and remove the capscrews attaching transmission extension to rear engine support. Place a support under engine and remove the frame cross member and rear engine support. Remove transmission-to-flywheel housing capscrews and install two guide pins. Pull transmission back until main drive gear splines clear housing, and lower transmission from car.

OVERDRIVE

Warner Model AS4-R10F. Solenoid operated type, with governor control and throttle operated kick-down. No Lock-Out Switch used.

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.

See "Fordomatic & Mercomatic" in Transmission Section.

►*FORDOMATIC "WHISTLING NOISE" CORRECTION: This condition may occur during normal engine operation. See "Fordomatic & Mercomatic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication–Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain & refill every 15,000 miles. **Use only Automatic Transmission Fluid, Type A.**

Checking Fluid Level–Apply parking brakes, place transmission selector lever in "N" position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (Parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator. Wipe indicator clean and insert in tube (make sure indicator is pushed down all the way). Remove indicator and read level. Add sufficient fluid to raise level to full mark on indicator. Replace indicator.

►*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type.

►*CAUTION (All Cars Except Station Wagon & Sedan Delivery): Rear universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). See "Ford & Mercury (Separate Carrier Type) Hypoid" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own. Separate Carrier, semi-floating hypoid, with Hotchkiss drive.

►*NOTE: Axle not same as Station Wagon & Sedan Delivery.*

See "Ford & Mercury (Separate Carrier Type) Hypoid" in Rear Axle Section.

1954 Ratios

Standard Transmission–3.90-1 (39-10).
Overdrive Transmission–4.10-1 (41-10).
Fordomatic Transmission–3.31-1 (43-13). ①

①–3.54-1 (39-11) Optional.

1955 Ratios

Standard Transmission–3.89-1 (35-9).
Overdrive Transmission–4.11-1 (37-9).
Fordomatic Transmission–3.30-1 (33-10). ①

①–3.55-1 (32-9) Optional.

Backlash–.003-.008".

Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: Disconnect rear universal. Remove axle shafts (see above). Remove carrier from housing.

Wheel Bearing Adjustment: None required.

SEDAN DEL. & STATION WGN.

Own. Integral Carrier, semi-floating hypoid, with Hotchkiss drive.

►*NOTE: Axle not same as passenger cars.*

See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.

Ratios

Standard Transmission–4.09-1 (45-11).
Overdrive Transmission–4.27-1 (47-11).
Fordomatic Transmission–3.54-1 (39-11).

Axle Shaft Removal: Same as Pass. Cars (above).

Rear Axle Assembly Removal: Raise rear of car and disconnect rear universal. Remove axle shafts. Disconnect brake lines at "T" on left side of axle housing. Disconnect hand brake cable, shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

1954 Models

Model	Front	Rear
Pass. Cars (Std.)	B4A-18124-D	B4A-18125-A
Pass. Cars (Hvy. Duty)	B4A-18124-F	B4A-18125-C
Sta. Wgn. & Sed. Del.	B4A-18124-E	B4A-18125-B

1955 Models

Model	Front ①	① Rear
Pass. Cars (Std.)	B5A-18124-A	B5A-18125-A
Pass. Cars (Hvy. Duty)	B5A-18124-C	B5A-18125-C
Sta. Wgn. & Sed. Del.	B5A-18124-C	B5A-18125-D

①–Furnished in kits which include shock absorber mounting bushings.

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs.

See "Lincoln, Mercury, Ford (Ball-Joint)" in Front Suspension Section.

►*LOWER ARM BUMPER INSTALLATION:* Right and left hand bumpers are different and must be installed in the correct position. Damage to suspension system will result if installed incorrectly. **Bumpers when installed should point slightly inboard.**

Kingpin Inclination–0° minimum, 7° maximum, crosswise.

Caster–0° to Pos. 1° (1954). Pos. ¼° to Pos. 1¼° (1955). Maximum variation between wheels ½°.

Camber–Pos. ¼° to Pos. 1¼°. Maximum variation between wheels ¼°.

Toe-In–1/16" to 1/8".

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type. *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Power Steering: Ford-Mercury Linkage type. Used in conjunction with standard type steering gear.

See "Ford & Mercury Bendix" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

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BRAKES

Ford-Bendix Hydraulic (Single Anchor-with eccentric on front wheels, without eccentric on rear wheels). Hand lever applies rear wheel service brakes.
See "Ford, Lincoln, Mercury Bendix" in Brake Section.

►*1955 FRONT WHEEL ADJUSTMENT NOTE: Eccentric has been moved from secondary shoe to primary shoe. Adjustment procedures are different for 1954 and 1955 models. See "Ford, Lincoln, Mercury Bendix" in Brake Section.*

►*1955 PARKING BRAKE "FIX" CORRECTION:* A new parking brake cable equalizer, Part No. B5A-2111-A, is available to correct permanent set of early brake cable equalizer. Before installing on a convertible, cut 1 5/8" from each end of equalizer.

►*1954 BRAKE DRUM INTERFERENCE CORRECTION (Sta. Wgn. & Sed. Del.):* Interference occurs between drum lugs and hand hole flange on wheel and does not allow wheel to seat flat against face of drum. Correct by grinding off outer edge of lugs (3) on an angle of 60° to braking surface of drum. *CAUTION–Do not grind corner of drum.*

Drum Diameter–10" (1954 Pass. Cars, Exc. Sta. Wgn. & Sed Del.) .11" (1954 Sta. Wgn. & Sed. Del. 1955 Pass. Cars, Sta. Wgn. & Sed. Del.).
Wheel Cylinder Diameter–1 1/8" (Front–All); 7/8" (Rear–Pass. Cars). 15/16" (Rear–Sta. Wgn.).

Lining Specifications

Car Model	Width	Thickness	Length
Pass. Car (Fr. Pri.)	2¼"	3/16"	10.84"
Pass. Car (Fr.Sec.)	2¼"	15/64"	10.84"
Pass. Car (Rear-All)	1¾"	3/16"	10.84"
Sta.Wgn.,Sed.Del. (Fr.Pri.)	①	7/32"	9.28"
Sta.Wgn.,Sed.Del. (Fr.Sec.)	①	7/32"	11.94"
Sta.Wgn.,Sed.Del. (Rr.Pri.)	②	7/32"	9.28"
Sta.Wgn.,Sed.Del. (Rr. Sec.)	②	7/32"	11.94"

①–2" (1954). 2¼" (1955). ②–1¾" (1954). 2" (1955).

Clearance–.010" at each end of both primary and secondary shoes. Maximum variation .003". *See Adjustment Change above.*

Brake Pedal Free Play Adjustment: ¼-7/16". If play not correct after brake adjustment, loosen locknut on the eccentric bolt that attaches brake pedal assembly to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder: Located on engine side of firewall.
Checking Fluid–Maintain fluid level to within ½" of top of reservoir.

Removal–Disconnect brake line from master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove cap screws and lock washers attaching master cylinder to firewall.

Power Brakes: Midland Hy-Power Unit mounted on left side of car in engine compartment and connected in hydraulic brake line between master cylinder and wheel cylinders. There are no mechanical connections and adjustments are required.
See "Midland Power Unit" in Brake Section.

Checking Fluid–Same as for manual brakes (above).
Removal of Power Unit–Depress brake pedal a few times to remove all vacuum from system. Disconnect hydraulic lines at the power unit and remove wires from brake stop light switch. Remove power unit to mounting bracket bolts and lockwashers and remove the power unit.

MISC. MECHANICAL

Windshield Wipers: Vacuum link and crank arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Reversible motor in each window. *See "Electric Window Regulators" in Miscellaneous Section.*

►*POWER WINDOW REGULATOR RELAY FLUTTER CORRECTION: See "Power Window Regulators" in Miscellaneous Section.*

Power Top Control: Electric-Hydraulic with reversible pump motor. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric screw and jack type with individual motors and transmissions for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate attached to left front door pillar and stamped on top of frame right-hand front cross member-to-side member reinforcement. **First Number**—100001 up.

►*VEHICLE NUMBER NOTE:* Vehicle number (example "U4FG100001") includes following identification data

Eng. Type ①	Year ②	Assy. Plant	Body Style ③	Serial No.
U	4	See Below	See Below	100001 up

①—**A**—6 Cyl. 223 cu. in. engine; **U**—8 Cyl. 239 cu. in. engine; **P**—8 Cyl. 256 cu. in. engine (Special Law Enforcement).

②—Last digit of model year.

③—**C**—Sunliner; **F**—Skyliner; **R**—Ranch Wagon (Customline); **S**—Sedan Delivery; **T**—Fordor (Crestline); **V**—Victoria; **W**—Ranch Wagon (Mainliner); **X**—Country Sedan; **Y**—Country Squire; **G**—All Others (Tudor, Fordor, Coupe—Mainline & Customline).

Assembly Plant Designation

A—Atlanta	**F**—Dearborn	**M**—Memphis
B—Buffalo	**G**—Chicago	**N**—Norfolk
C—Chester	**H**—Highland Park	**P**—St. Paul
D—Dallas	**K**—Kansas City	**R**—Richmond
E—Edgewater	**L**—Long Beach	**S**—Somerville
	U—Louisville	

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. at cranking speed.

VACUUM READING: 18-21" idling at 500 RPM.

VALVE TAPPET CLEARANCE: .019" (intake & exhaust), with engine at normal operating temperature.

MANIFOLD HEAT CONTROL: Automatic thermostatic type with counterweight. Valve on cars with single exhaust system is located on front end of right hand exhaust manifold. Cars with dual exhaust system, the valve is located in rear end of left hand exhaust manifold. Thermostat spring installed with ¾ turn-windup and hooked over stop pin. NOTE—When valve installed, stop pin should be at top.

►*MANIFOLD HEAT CONTROL VALVE CHANGE (To improve fuel distribution and minimize stalling due to icing):* New 1955 Manifold Heat Control Valve, No. B5A-9685-D, can be installed. Valve has increased spring tension and will provide more exhaust gas heat.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.

Cylinders—RIGHT BANK 1-2-3-4, LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .033-.037".

Spark Plugs—Champion H-10 14mm. Use Champion H-11 for slow or stop-and-go driving.

COIL: Ford No. 8BA-12029.

Ignition Current—2.75-3.0 amperes (idling), 5.0-5.5 amperes (stopped).

DISTRIBUTOR: Ford No. FAE-12127-A.

Condenser—FAB-12300-A. **Capacity**—.21-.25 mfd.

Contact Point Set—Ford No. FAB-12171-A (Std.). FAB-12171-B (Heavy Duty).

Breaker Gap—.014-.016".

Cam Angle—26-28° (58-63% dwell idling).

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Advance Performance
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Dist. RPM
0	0	200
3¾-4¾	0.72	500
10-11	2.20	1000
12½-13½	3.46	1500
14-15½	4.40	2000

►*DISTRIBUTOR INSTALLATION CAUTION: Be sure oil pump tang engages slot in distributor shaft.*

IGNITION TIMING

►*TIMING CAUTION: Timing is different on Synchro-mesh and Fordomatic Drive Cars.*

Setting (Fordomatic Cars)—6° BTDC.

Setting (Synchro-mesh Trans. Cars)—3° BTDC. NOTE—Timing on synchro-mesh cars can be set up to 6° providing higher octane rating gasoline is used.

Timing Mark—On crankshaft pulley and pointer on front engine cover. Align pointer and timing mark. NOTE—Six timing marks (0°-2°-4°-6°-8°-10° BTDC) on dampener. Wide mark represents TDC.

CARBURETOR

Ford No. EBU-9510-E. Dual down-draft type. NOTE—Anti-stall dashpot used on Fordomatic Cars.

►*CARBURETOR INSTALLATION CAUTION:* Tighten carburetor hold-down bolts evenly to 12-15 ft. lbs. torque. Tightening one bolt completely would result in compressing spacer and cracking carburetor throttle body.

►*ACCELERATOR PEDAL ALIGNMENT NOTE: Clearance between brake pedal and accelerator pedal should be 1¾". If not correct, install one or two flat washers on left hand accelerator pedal bracket-to-floor pan bolt.*

►*ENGINE STALLING AT IDLE SPEED CORRECTION:* If engine stalls at idle speed when idle mixture setting is known to be correct, deviate from the specifications as follows:

Turn each idle mixture screw **out** 1/8th turn at a time until engine speed is reduced 25 RPM., then turn screw **in** until specified idle speed is obtained.

Idle Setting—Approximately one turn open. Set both screws for highest steady vacuum reading and highest engine RPM.

Idle Speed—475-500 RPM., (Std. Trans.). 445-455 RPM., (Fordomatic Trans.) with selector lever in "N" position.

Float Level: 1.275-1.305". Measured from bottom of float to underside of bowl cover with needle valve seated. Use Gauge No. T52L—9510AHD.

Accelerating Pump: Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fast Idle: Integral type. Operated by choke valve lever. No adjustment required.

Anti-Stall Dashpot (Fordomatic Cars): First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes the dashpot rod up to the end of its travel. Turn dashpot screw in (clockwise) 1½-2 turns to obtain .045-.064" clearance. Tighten locknut.

Throttle Linkage Adjustment (Fordomatic Cars): *See "Fordomatic & Mercomatic" in Transmission Section.*

►*OTHER DATA: See "Holley-Ford Carburetors" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs.

CARB. EQUIPMENT

Fuel Pump: Ford No. EAN-9350-A, Fuel only (Except Fordomatic & Overdrive Cars). EBY-9350-A, Fuel & Vacuum (Fordomatic & Overdrive Cars.)

Pressure—4-5 lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric.

Dash Unit—Ford No. FAG-9280-A.

Tank Unit—Ford No. FAA-9275-A (Exc. Sta. Wgn. & Sedan Delivery). No. FAA-9275-B (Sta. Wgn. & Sedan Delivery).

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Ford No. FDA-10655-A. 6 volt, 17 plate, 90 ampere hour capacity (20 hr. rate).

Battery Ground—Positive (+) to cylinder head.

Engine Ground—Cylinder head to dash.

STARTER

Ford No. FAC-11002-B. Armature—No. 52-11005.

►*STARTER DRIVE INTERFERENCE WITH FLYWHEEL RING GEAR (FORDOMATIC CARS):* Identified by coarse grinding noise when starting, and a wear pattern at bottom lands of drive gear. To correct, install starter, leaving mounting bolts loose. Insert edge of pry bar between starter flange and engine block, and pry starter away from block. Hold in this position and tighten bolts securely. If not corrected in this manner, it may be necessary to replace converter housing.

►*STARTER SEAL INTERFERENCE WITH FLYWHEEL CORRECTION (FORDOMATIC CARS):* Identified by coarse grinding sound or a "ticking" noise (similar to a loose tappet) when engine is running. Correct by installing a new starter seal.

Drive—Ford No. 1CM-11350-C. Bendix "Folo-Thru".

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—48-56 ozs.

Cranking Speed—100 RPM.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
16 ft. lbs.	Lock		700

①—With starter on engine and engine running.

►*STARTER INSTALLATION CAUTION:* Tighten top and bottom flange bolts first, then tighten the center or outer flange bolt. This will avoid misalignment and prevent noisy starter operation.

Starting Switch: Ford No. FAB-11450-B. Mounted on left front fender apron and controlled by Ignition Switch. NOTE—A Neutral Safety Switch is used on all models with Fordomatic.

Fordomatic Neutral Safety Switch: Ford No. FAC-15812-C

Adjustment—*See "Fordomatic & Mercomatic" in Transmission Section.*

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GENERATOR

Ford No. FBC-10002-A. Armature—FBC-10005-A.

►*GENERATOR BELT WEAR & IMPROPER CHARGING RATE CAUTION:* If either of these two conditions are encountered, check to make sure a 6 Cyl. generator is not being used.

Performance Data

Generator	Amperes	Eng. RPM.
FBC-10002-A	35①	900

①—See Regulator for maximum charging rate.

Brush Spring Tension—30 ozs.
Field Current—1½-2½ amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: ¼" belt deflection midway between generator and pump pulleys with normal thumb pressure.

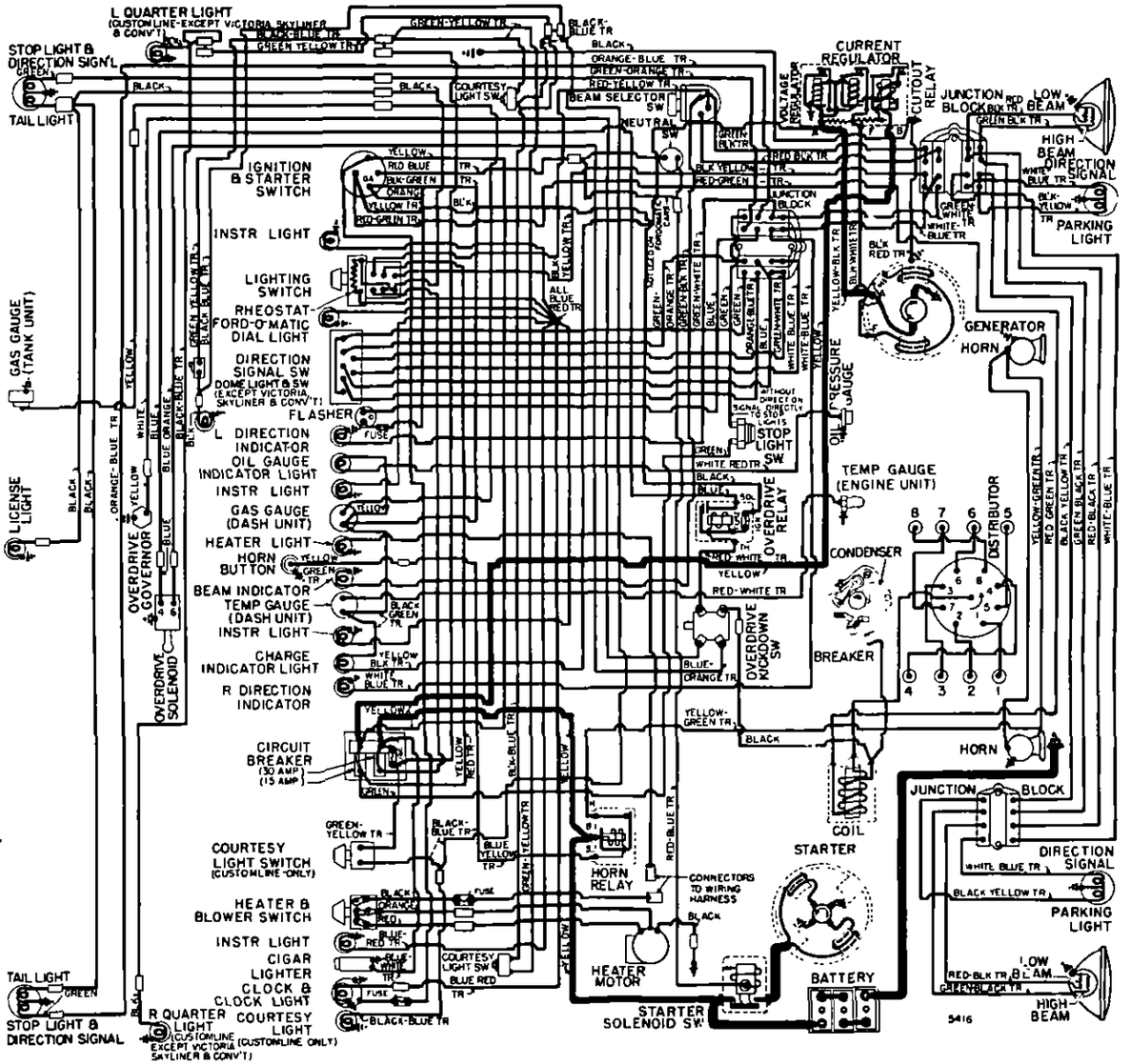
REGULATOR

Ford No. FAC-10505-A.

►*SETTING NOTE:* Settings below are for regulator at NORMAL OPERATING TEMPERATURE (after ½ hour operation) with room temperature at 70-80°.

Cutout Relay

Cuts In—6.0-6.6 volts.



Voltage Regulator

Setting—7.5-7.8 volts.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—34-38 amperes.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equipment Section.*

►*DIRECTION SIGNAL FLASHER BURNING OUT CORRECTION:* Replace 14 amp. fuse with a 9 amp. fuse by making a 3/16" long spacer from ¼" copper tubing. Cut spacer lengthwise and place on wire so it will be between bottom of fuse holder and spring. Press sides of spacer together with pliers.

Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N. Remove switch and disconnect all wires.

Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), and on top of brake booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment.

FUSES: Located as indicated below:
Interior Lights—14 amps., on main circuit breaker.
Direction Signal—14 amps., in fuse holder between ignition switch and flasher. *NOTE—See "Direction Signal Flasher Burning Out Correction" above.*
Overdrive—30 amps., on overdrive relay.
Cigar Lighter—Special fuse in lighter base.
Clock—3 amps., in clock lead.
Heater—14 amps., in blower switch wire.

CIRCUIT BREAKERS: Two circuit breakers on a single panel located behind instrument panel. Upper circuit breaker protects tail & stop light circuits, and lower circuit breaker protects headlamp circuit.

HORNS: Ford No. FAC-13832-E or F (High Pitch), FAB-13833-F or G (Low Pitch). Dual horns operated by relay.
Horn Current—13 amps. (high pitch), 14 amps. (low pitch).
Horn Relay: Ford No. FAA-13853-A.

ENGINE

►*ENGINE FRONT COVER OIL LEAK CORRECTION:* Install gasket Part No. B4A-6020-A (.020" thicker than previous gasket), to correct oil leaks or whenever front cover is removed. Coat both sides of gasket with sealing compound.

►*CYLINDER HEAD PRODUCTION CHANGE:* A new cylinder head, Part No. B4A-6049-A or EBU-6090-B, identified by EBU-6090-B cast in side and top of head, used in later production cars. *CAUTION—LATER TYPE GASKET MUST BE USED WITH THIS HEAD. See "Cylinder Head Gasket Caution" below.*

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ENGINE SPECIFICATIONS: Own 90° V8.
Bore—3.50". **Stroke**—3.10"
Displacement—239 cu. in. **Rated H.P.**—39.2.
Developed Horsepower—130 at 4200 RPM.
Compression Ratio—7.2-1.
Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD: *See Ford Special Data.*

►*CYLINDER HEAD GASKET CAUTION:* Later type gasket Part No. B4A-6051-A (identified by **elongated core hole** sealing area on outer edge of gasket on piston side between center piston holes), can be used with either early or late type heads. Early gasket Part No. EBU-6051-E (identified by **round hole** sealing area in same location as above), must NOT be used with later type head.

►*CYLINDER HEAD GASKET INSTALLATION CAUTION:* Gaskets are stamped on one side with the words "RIGHT FRONT". When installing gasket on **right hand** side of cylinder block, wording should be **upward** and toward front of engine. When installing on **left hand** side, wording should be **downward** and toward front of engine.

TIGHTENING TORQUES: *See Ford Special Data.*

ENGINE REMOVAL: *See Ford Special Data.*

ENGINE FRONT MOUNTING: *See Ford Special Data.*

OIL PAN REMOVAL: *NOTE—Later type oil pan has single piece oil pump screen cover and inlet tube assembly.* To remove oil pan rotate engine to place #1 piston on TDC. Drain oil and remove engine front splash pans and oil pan-to-oil pump pipe (early type pans), disconnect oil pipe at oil pump (later type pans). On Fordomatic Transmission cars, remove converter housing dust cover. Remove oil pan.

PISTONS

Autothermic type. Solid skirt with three rings above pin.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Use ½" feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:
New Piston in New Bore—.0015" feeler. 5-10 lbs. pull.
New Piston in Used Bore—.002" feeler. 5-10 lbs. pull.
Used Piston in Used Bore—.0025" feeler. 5-10 lbs. pull.

Replacement Pistons: Standard size, .020", .030", .040", .060" Oversize. Pistons furnished only with fitted pins.

Installing Pistons: Install with small indentation in head toward FRONT of engine.

PISTON PINS

Floating type with lock rings at each end.
Diameter—.9120-.9123". **Length**—2.9820".
Pin Fit in Piston—Hand push fit at 70° F.
Pin Fit in Rod Bushing—.0001-.0003" clearance. New pin should not fall through of own weight.

Replacement Pins: Standard size, .001", .002" Oversize.

PISTON RINGS

►*SPECIAL SERVICE PISTON RING SETS (To Reduce Possibility of Excessive Oil Consumption):* The following "Special Service" piston ring sets are available in addition to the "Expander" & "Snap Ring" type service replacement rings: B4A-6149-ABA (Pass. Cars only), has "Unitized" oil ring. B4A-6149-ACA (Pass. Cars & Trucks) has "Steel Section" oil ring. B4A-6149-ADA (Pass. Car & Truck) has "Steel Rail" oil ring.

Ring	Width	End Gap	Side Clearance
Compr. #1	.3/32"	.010-.027"	.002-.0035"
Compr. #2	.3/32"	.010-.027"	.002-.0035"
Oil	.3/16"	.010-.027"	.0015-.003"

Replacement Rings: Standard size, .020", .030", .040", .060" Oversize.

►*REPLACEMENT PISTON RING NOTE:* "Snap-Type" rings furnished in Std. size only. "Expander" type furnished in all above oversizes. *See "Special Service Piston Ring Sets" above.*

CONNECTING RODS

►*1954 V8 CONNECTING ROD & BEARING PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Late production connecting rods have an oil hole (for cylinder lubrication) located on the same side as the bearing notch. Early type bearings, with one oil hole MUST NOT BE USED with the later type rod. Later type bearings may be used with either the old or new rod as they have two oil holes and will fit either rod.
Length—6 21/64". **Weight**—24.06 ozs.
Crankpin Journal Diameter—2.1880-2.1888".
Lower Bearing—Steel backed, copper lead alloy lined type. Upper and lower halves interchangeable.
Clearance—.0005-.0021".
Side Clearance—.006-.016" (two rods).

Replacement Bearings: Standard size (4 sizes marked **red & blue** for selective fitting) and .010", .020", .030" Undersize.

Installing Rods: Oil squirt hole in rod toward camshaft side of bore on all rods. Numbers on rods and bearing cap should be together and installed in same numbered cylinder.

CRANKSHAFT

►*CRANKSHAFT & FLYWHEEL PRODUCTION CHANGE:* Later type parts are interchangeable with previous parts except that later crankshaft cannot be used with early flywheel unless inner edge of bore in flywheel is chamfered 1/16" x 45° to eliminate crankshaft-to-flywheel interference. This operation can be accomplished with a bearing scraper.
Journal Diameter—2.4980-2.4988". Max. wear limits .0015", taper .001".
Bearings—Steel backed, copper lead alloy lined.

Replacement Bearings: Standard size, (4 sizes marked **red & blue** for selective fitting) and .010", .020", .030" Undersize.

End Thrust: Taken by No. 3 main bearing. Replace bearing if endplay excessive.
Thrust Bearing Alignment—*See "Crankshaft & Main Bearings" in Ford Special Data.*
Endplay—.002-.006".

Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Ford Special Data.*

►*CRANKSHAFT REAR BEARING OIL SEAL PRODUCTION CHANGE: New type oil seal and oil seal retainer used in later production and is not interchangeable with early engines. See Ford Special Data.*

CAMSHAFT

►*1954 239" & 256" ENGINE CAMSHAFT BEARING CHANGE (To prevent oil starvation due to improperly installed front bearing):* On engines equipped with the "ECE" camshaft, new front camshaft bearings have been released for service replacement (Part No. B4C-6261-A, Standard. B4C-6261-B, .015" undersize). The later bearings have a slot instead of a 1/8" diameter oil hole. When installing the new bearing make sure that the slot is aligned with hole in cylinder block bore and that the bearing is pressed .005-.020" into cylinder block camshaft bearing bore to eliminate interference with camshaft thrust plate.
Journal Diameter—1.9255-1.9265" (new), 1.924" (worn limit).
Clearance—.001-.003" (new), .005" (worn limit).

End Thrust: Taken by plate on forward end of block (between camshaft sprocket and shoulder on block).
Endplay—.003-.006".

Replacement Camshaft Bearings: Finished bearings furnished Standard, .015" Undersize. CAUTION—Oil holes *in bearings must be lined up correctly. See Ford Special Data.*

Camshaft Bearing Removal & Installation: *See Ford Special Data.*

Timing Chain: Side-guide type. Length 56 links.

►*REPLACEMENT NOTE:* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure slack on opposite side).

Camshaft Setting: *(NOTE—Two types of timing chains used which have different index marks).* **"Brass disc"** type has a brass link pin washer which should be placed next to marked camshaft sprocket tooth (away from opposite sprocket). **"Punched link"** type has a hole punched in center of link which should index with marked tooth on camshaft sprocket. Place #1 piston on TDC (firing position). Place timing chain over camshaft and crankshaft sprockets, making sure that timing marks on sprockets are lined up adjacent to marks on timing chain. Align camshaft and crankshaft keys so that both timing chain sprockets and timing chain can be installed simultaneously.

VALVES

►*1954 VALVE PUSHROD BENDING & ROCKER ARM BREAKAGE CORRECTION:* If this condition is encountered at sustained speed over 40-50 MPH, check the guide clearance on the valve in question. The clearance should be .001"-.002" (intake), and .002"-.003" (exhaust). The above condition is usually encountered when less than minimum clearance is provided. Ream valve guides as necessary to provide proper clearance.

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves): Stem diameter decreased .0005" for greater stem clearance in guide. See "Valve System" in Ford Special Data.*

Tappet Clearance: .019" (Intake & Exhaust), with engine at normal operating temperature. *NOTE—Valve tappet clearance on truck engines is different.*

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Valve	Head Diam.	①Stem Diam.	Length
Intake	1.652"	.3415"	5.02"
Exhaust	1.515"	.3405"	5.02"

Valve	Seat Angle	②Lift	Stem Clearance
Intake	45°	.345"	.004" max.
Exhaust	45°	.345"	.005" max.

①—Valves furnished with .003", .015", .030" Oversize stems for service replacement. *See "Valve System" in Ford Special Data.*

②—Minimum lift for checking camshaft lobe wear.

Valve Seat Width—.060-.070" (Intake). .070-.080" (Exhaust).

►*ROTATABLE VALVE NOTE: All valves are rotatable type. See "Valve System" in Ford Special Data.*

Valve Stem Oil Seals—"Umbrella" type oil seals used on intake & exhaust valve stems. Seals are installed with cupped side down on valve stem at guide boss on cylinder head. *Install new seals whenever valves removed or when seals become loose on valve stems.*

Valve Springs: Install with closed coil end toward cylinder head.

Valve Spring Specifications

	Pressure	Length
Valve Closed	54-62 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" Intake, .005" Exhaust), ream guides and install oversize valves. *See "Valve System" in Ford Special Data.*

Valve Lifters: Mushroom type. Removed from below with camshaft removed.

►*1954 V8 ENGINE TAPPET REPLACEMENT CAUTION:* The cast iron tappet, Part No. EAA-6500-C should no longer be used as service replacement on V8 engines as these tappets may contribute to camshaft lobe wear. Install tappet, Part No. EAA-6500-D (steel forging) which can be identified by forging marks on outer edge of tappet foot. The tappet foot is .140" thick as compared to .220" thickness of the cast iron tappet foot.

Rocker Arm Assembly: *See "Valve System" in Ford Special Data.*

►*ROCKER ARM COVER OIL LEAKAGE CORRECTION:* Cover may be slightly shallow requiring the use of an additional washer under the acorn nut to firmly seat cover on cylinder head.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 8° BTDC. Close 44° ALDC.
Exhaust Valves—Open 47° BLDC. Close 5° ATDC.

OILING SYSTEM

►*1954 239" & 256" ENGINE SERVICE REPLACEMENT OIL PUMP CHANGE & INSTALLATION CAUTION:* A new pump, Part No. EAM-6600-A, with steel gears is available for service replacement. The pump is furnished in Kit No. B5A-6600-C which includes a pump and spring. When installing pump on these engines, remove the Relief Valve Spring from the pump and replace it with the spring, Part No. EBU-6670-A, found in the box.

►*1954 V8 ENGINE OIL PUMP FAILURE CORRECTION (Due to oil pan-to-oil pump tube seal breaking off):* In some cases the tube is too short and when the retaining nut is tightened excessively, the seal is squeezed over the edge of the tube which cuts to seal. Always lubricate the seal with engine oil prior to installation, and tighten the retaining nut just enough to ensure against leakage.

Crankcase Capacity: 5 qts. (refill).

Normal Oil Pressure: 45-55 lbs. at 30-40 MPH.

Pressure Regulator Valve—In pump body, not adjustable.

Oil Pressure Indicator—Indicator light on instrument panel, operated by Engine Unit—Ford No. FDA-9278-A (Stamped #7 on Hex.). Lights when ignition switch turned on, goes out when engine starts and pump operates.

Oil Pump: Gear type pump located on left side of engine crankcase, driven by distributor drive gear.

Pump Overhaul—*See "Oil Pump" in Ford Special Data.*

Oil Filter: Full-flow type (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.

Replacement Filter Element—Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION: This special Full-flow filter element must be used for replacement(use of by-pass type element would restrict oil flow and result in insufficient engine lubrication.*

►*FILTER INSTALLATION CAUTION & OIL LEAKAGE CORRECTION: See "Oiling System" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

►*CRANKCASE VENTILATOR OIL LEAKAGE CORRECTION:* Install gasket, Part No. B4A-6872-A, which is a firmer type neoprene gasket and will not distort when tightened.

COOLING

►*TEMPERATURE GAUGE FALSE READING CORRECTION:* In cases where heat indicator shows a reading higher than actual water temperature, check water temperature gauge bulb on engine to see that it is not contacting a casting flash inside cylinder head. Remove flashing with a rat tail file.

►*RESTRICTED WATER PUMP BY-PASS CAUTION:* A restricted or blocked passage caused by casting flash will retard or decrease the flow of water in engine when thermostat is closed. Check for this condition by listening for a gurgling sound when engine is stopped after a short period of operation. If noise is heard, remove water by-pass tube and inspect for a restricted opening in water pump housing. If necessary, remove pump and drill opening with a 19/32" drill.

Water Capacity: *20 qts. (without heater), 21 qts. (with heater).*

Pressure Valve: Ford No. 1M-8100-A. Radiator filler cap cap (7# type), opens at 6¼-7¾ lbs.

Thermostat: *Ford No. B4A-8575-A (160°), No. B4A-8575-B (180° used with permanent anti-freeze).* Mounted inside water outlet elbow on forward end of intake manifold. *NOTE—The above thermostat replaces type formerly used.*

Water Pump: Packless, sealed ball bearing type. *See "Ford V8" in Water Pump Section.*

Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. FDA-10883-A.
Engine Unit—Ford No. 1A-10884-A.

Temperature Bulb Sleeve Removal—Thread adapter handle of tool T50T-100-A into sleeve. Tighten locknut against sleeve, then pull sleeve with sliding hammer.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 9½ CF-TS, Ford No. 1A-7563-A.
See "Long Clutches" in Clutch Section.

►*CLUTCH RELEASE BEARING NOISE CORRECTION: Check release bearing hub shoulder for a second "step" that prevents bearing from seating properly. Correct by replacing hub.*

►*CLUTCH GRATING NOISE CORRECTION:* Retracting spring reversed and rubbing on steering housing. Long end of spring should be toward front of car.
Clutch Disc No.—Ford No. 8HA-7550-B.

Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper until travel is within limits.
Pedal Free Travel—7/8-1 1/8". Loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.

Removal: Remove transmission (see Transmission Removal below), and slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar bracket from flywheel housing and remove equalizer bar. Remove split bronze bushing from bracket and then remove flywheel housing. Install Tool 7563 and remove clutch pressure plate assembly (if tool not available, clutch may be released by backing off the attaching bolts evenly). Remove clutch release bearing from hub with an arbor press.

SYNCHRO-MESH TRANSMISSION

Own. *Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).*
See "Ford Synchro-mesh" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

►*GEAR CLASHING CORRECTION (Shifting from Neutral-to-Low or Reverse):* Check operation by depressing clutch pedal and allowing sufficient time for input shaft to stop rotating. If clash still occurs, check fit of clutch disc hub on input shaft. If it binds on shaft, apply lapping compound to input shaft and lap hub to shaft. If condition continues to exist, it will be necessary to select-fit clutch disc and input shaft. *CAUTION—Reducing clutch free-play below specified limits will not correct condition.*

Transmission Control: *See "Transmission Control" in Transmission Section.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission

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and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame. Take out 4 transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS4-R10F. Solenoid operated type, with governor control and throttle operated kick-down. Lock-out Switch not used on this model.

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.

►*FORDOMATIC "WHISTLING" NOISE CORRECTION: This condition may occur during normal engine operation. See "Fordomatic & Mercomatic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain & refill every 15,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level—Apply parking brakes, place transmission selector lever in "N" (Neutral) position, run engine at idle speed for approximately four minutes. With engine and transmission at normal operating temperature and idling, move selector lever through all positions to distribute fluid through transmission. Return selector lever to "P", check fluid level on dipstick in filler cap in engine compartment. Maintain level at "Full" mark on dipstick.

►*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Roller bearing type.

►*CAUTION (All Cars Except Station Wagon & Sedan Delivery): Rear universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own. Separate Carrier, semi-floating hypoid, with Hotchkiss drive.

See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.

Ratios

Standard Transmission—3.90-1 (39-10).
Overdrive Transmission—4.10-1 (41-10).
Fordomatic Transmission—3.31-1 (43-13). ①

①—3.54-1 (39-11) Optional.

►*AXLE CARRIER & GEAR RATIO IDENTIFICATION: Carrier housing stamped with ring gear & pinion gear ratio (10/39 for 3.90-1 ratio, etc.).*

Backlash—.003-.008".

Axle Shaft Removal: Remove wheel, take off drum, Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: Disconnect rear universal. Remove axle shaft (see above). Remove carrier from housing.

Wheel Bearing Adjustment: None required.

SEDAN DEL. & STATION WGN.

Own. Integral Carrier. Semi-floating hypoid, with Hotchkiss drive.

See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.

Ratios

Standard Transmission—4.09-1(45-11).
Overdrive Transmission—4.27-1 (47-11).
Fordomatic Transmission—3.54-1 (39-11).

Axle Shaft Removal: Same as Pass. Cars (above).

Rear Axle Assembly Removal: Raise rear end of car and disconnect rear universal. Remove axle shafts. Disconnect brake lines at "T" on left side of axle housing. Disconnect hand brake cable, shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

Model	Front	Rear
Pass. Cars (Std.)	B4A-18124-D	B4A-18125-A
Pass. Cars (Hvy. Duty)	B4A-18124-F	B4A-18125-C
Sta. Wgn. & Sed. Del.	B4A-18124-E	B4A-18125-B

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs.

See "Lincoln, Mercury, Ford (Ball-Joint)" in Front Suspension Section.

►*LOWER ARM BUMPER INSTALLATION CAUTION:* Right and left hand bumpers are different and must be installed in the correct position.

Kingpin Inclination—6° minimum, 7° maximum, crosswise.

Caster—0° to Pos. 1°. Maximum variation between wheels ½°

Camber—Pos. ¼° to Pos. 1¼°. Maximum variation between wheels ¼°.

Toe-In—1/16" to 1/8".

STEERING

MANUAL: Own (Gemmer 305 Design). Worm & Roller type.

See "Gemmer Worm & Roller (Type 305)" in Steering Section.

Power Steering: Ford-Mercury Linkage type. Used in conjunction with standard type steering gear.

See "Ford & Mercury Power Unit" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

BRAKES

Ford-Bendix Hydraulic (Single anchor—with eccentric on front wheels, without eccentric on rear wheels). Hand lever applies rear wheel service brakes. *See "Ford, Lincoln, Mercury Bendix" in Brake Section.*

►*BRAKE DRUM INTERFERENCE (Sta. Wgn. & Sed. Del.):* Interference occurs between drum lugs and hand hold flange on wheel and does not allow wheel to seat flat against face of drum. Correct by grinding off outer edge of lugs (3) at an angle of 60° to braking surface of drum. *CAUTION—Do not grind corner of drum.*

Drums—Diameter 10" (Pass. Cars). 11" (Sta. Wgn. & Sed. Del.).

Wheel Cyl. Diameter—1 1/8" (Front). 7/8" (Rear).

Lining— Molded type riveted to shoe.

Width—2¼" (Front, Pass Cars.). 2" (Front, Sta. Wgn. & Sed. Del.). 1¾" (Rear, All Models).

Thickness—(Pass. Cars) 3/16" (Exc. Front Whl. Secondary). 15/64" (Front Whl. Secondary). **Sta. Wgn. & Sed. Del. 7/32"** (All Shoes).

Length—10.84" (Pass. Cars—All Shoes). 9.28" (All Primary Shoes—Sta. Wgn. & Sed. Del.). 11.94" (All Secondary Shoes—Sta. Wgn. & Sed. Del.).

Clearance—.010" at each end of both primary and secondary shoes. Maximum variation .003".

Brake Pedal Free Play Adjustment: 1/4-7/16". If play not correct after brake adjustment, loosen lock nut on the eccentric bolt attaching brake pedal to master cylinder pushrod, rotate eccentric bolt.

Standard Master Cylinder: On engine side of firewall.

Checking Fluid—Maintain fluid level to within ½" of top of reservoir.

Removal—Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to firewall.

Power Brakes: Midland Hy-Power Unit mounted on left side of car in engine compartment and connected in hydraulic brake line.

See "Midland Power Unit" in Brake Section.

Removal of Power Unit—Depress brake pedal a few times to remove all vacuum from system. Disconnect hydraulic lines at the power unit and remove wires from brake stop light switch. Remove power unit to mounting bracket bolts and lockwashers.

MISC. MECHANICAL

Windshield Wipers: Vacuum link and crank arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Window Regulators: Reversible motor in each window. Two types used. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Top Control: Electric Hydraulic with reversible pump motor. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric screw and jack type *See Miscellaneous Section for complete data.*

MODEL IDENTIFICATION

VEHICLE NUMBER: On Rating Plate attached to glove box door, Vehicle Number is also Engine Number. **First Number**—10001 up.

►*ENGINE IDENTIFICATION NOTE: Three engines used, and for identification purposes in the following Ford Truck pages, reference is made to each engine by piston displacement, "223", "239", "256". See "Vehicle Number Note" following.*

►*VEHICLE NUMBER NOTE: Vehicle number (example "F10D5A 10001") includes identification in the following sequence.*

Serial Code①	Engine Symbol②	Model Year③	Assy. Plant	Serial Number
F-10	D	5	See below	10001 Up

①—See Model & Serial Code Table below.

②—**D**—6 Cyl. 223 cu. in. O.H.V. engine. **V**—8 Cyl. 239 cu. in. O.H.V. engine **Z**—8 Cyl. 256 cu. in. O.H.V. engine.

③—Last digit of model year.

Models & Serial Codes

Model	Serial Code	Model	Serial Code
F-100 Conv.	F-10	F-600 Conv.	F-60
F-250 Conv	F-25	F-600 Conv	①F-61
F-350 Conv	F-35	B-600 Sch. Bus	B-60
P-350 Par. Del.	P-35	C-600 C.O.E.	C-60
F-500 Conv.	F-50	C-600 C.O.E.	①C-61
B-500 Sch. Bus	B-50	P-600 Par. Del.	P-60
C-500 C.O.E.	C-50	P-600 Par. Del.	①P-61
P-500 Par. Del.	P-50		

①—Light Duty models.

Assembly Plant Designation

A—Atlanta	**F**—Dearborn	**N**—Norfolk
B—Buffalo	**G**—Chicago	**P**—St. Paul
C—Chester	**H**—Detroit Truck	**R**—Richmond
D—Dallas	**K**—Kansas City	**S**—Somerville
E—Edgewater	**L**—Long Beach	**U**—Louisville
	M—Memphis	

TUNE-UP

COMPRESSION PRESSURE: At cranking speed.

Engine	1954	1955
223"	120 lbs.	125 lbs.
239"	130 lbs.	130 lbs.
256"	115 lbs. ①	125 lbs.

①—With early type camshaft. 120 lbs. with later type camshaft. *See "Camshaft" below for identification.*

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: 223" Engine—.015" (Intake), .019" (Exhaust). **239" & 256" Engines**—.016" (Intake), .018" (Exhaust). With engine at normal operating temperature.

MANIFOLD HEAT CONTROL (239 Eng.): Automatic thermostatic type with counterweight. Valve is open at top when engine cold. Install thermostat spring with ¾ turn wind-up and hook over stop pin.

►*256 ENG. MANIFOLD HEAT CONTROL INSTALLATION (For Cold Weather Operation): See "Manifold Heat Control" in Ford Special Data.*

►*MANIFOLD HEAT CONTROL PRODUCTION CHANGE (239 & 256 Engs. with Single Exhaust):* To minimize engine stalling (due to carburetor icing) and to improve fuel distribution by directing more exhaust gases through crossover passage in intake manifolds, a new manifold heat control valve, Part No. B5A-9685-D, has been released for V8 engines with single exhaust. New valve has bi-metal thermostat spring that holds valve closed for a longer period of time

IGNITION

FIRING ORDER: 6 Cyl. Engines—1-5-3-6-2-4. **8 Cyl. Engines**—1-5-4-8-6-3-7-2.

Cylinders—RIGHT BANK 1-2-3-4. LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .025-.029" (Champion H-9 or H-10). .028-.032" (Champion 860)

Spark Plugs (1954)—Champion H-9. 14mm. Use Champion H-10 for slow or stop-and-go driving. Tighten to 25-30 ft. lbs.

Spark Plugs (1955)—Champion 860. 18mm. Special. Tighten to 15-20 ft. lbs.

►*1955 SPARK PLUG CAUTION: Spark plug is new type with tapered seat and does not require a sealing gasket. It is important that plug be torqued to 15-20 ft. lbs.*

COIL: Ford No. 8BA-12029.

Ignition Current—2.75-3.0 amperes (idling). 5.0-5.5 amperes (stopped).

DISTRIBUTOR: Ford Part Numbers as listed below.

Engine	1954	1955
223"	FAA-12127-C	B5A-12127-C
239"	FAE-12127-A①	B5C-12127-B
239"	B4A-12127-A②	B5C-12127-B
256"	FAD-12127-B	FAD-12127-B

①—13 tooth distributor gear, used with EBU-6250-B camshaft. ②—14 tooth distributor gear, used with B4T-6250-A camshaft.

Contact Point Set—Ford No. FAB-12171-A (Std.). FAB-12171-B (Heavy Duty).

Breaker Gap—.014-.016".

Cam Angle—36-38° (223" Engine). 26-28½° (239" & 256" Engines). 58-63% idling.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise (223" Engine). Counter-clockwise 239" & 256" Engines).

FAA-12127-C Advance Performance
►(With Distributor on Test Stand)

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0-½	0	200
3½-4½	0.5	500
7-8	1.8	1000
9¾-11	3.8	1500
11½-13	6.0	2000

FAE-12127-B & B4A-12127-A Advance Performance
►(With Distributor on Test Stand)

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0-½	0	200
3¾-4¾	0.72	500
10-11	2.20	1000
12½-13½	3.46	1500
14-15½	4.40	2000

B5A-12127-C Advance Performance
►(With Distributor on Test Stand)

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
⅜-1¾	0.32	400
3½-4½	0.5	500
7-8	1.8	1000
9¾-11	3.8	1500
11½-13	6.0	2000

B5C-12127-B Advance Performance
►(With Distributor on Test Stand)

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
3¾-5	0.72	500
10-11	2.20	1000
12½-13½	3.46	1500
14-15½	4.40	2000

FAD-12127-B Advance Performance
►(With Distributor on Test Stand)

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0-½	0	200
2½-3¾	0.51	500
9-10	2.18	1000
11¾-13	3.68	1500
13¾-15	5.30	2000

►*DISTRIBUTOR INSTALLATION CAUTION: Be sure oil pump shaft engages distributor intermediate shaft.*

IGNITION TIMING

Setting—5° BTDC (223" Engine). 10° BTDC (239" & 256" Engines).

223" Engine Timing Mark—Rubber type dampener has 5 marks. The long mark represents TDC, and each succeeding mark 3°, 5°, 7°, 9° BTDC. Pointer located on front cover.

239" & 256" Engine Timing Mark—Crankshaft pulley grooved at 10° point. Pointer bolted to water pump cover.

CARBURETOR

ANTI-STALL DASHPOT ADJUSTMENT: First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes dashpot up to the end of its travel. Turn dashpot screw in (clockwise) 1½-2 turns to obtain .045-.064" clearance. Tighten locknut.

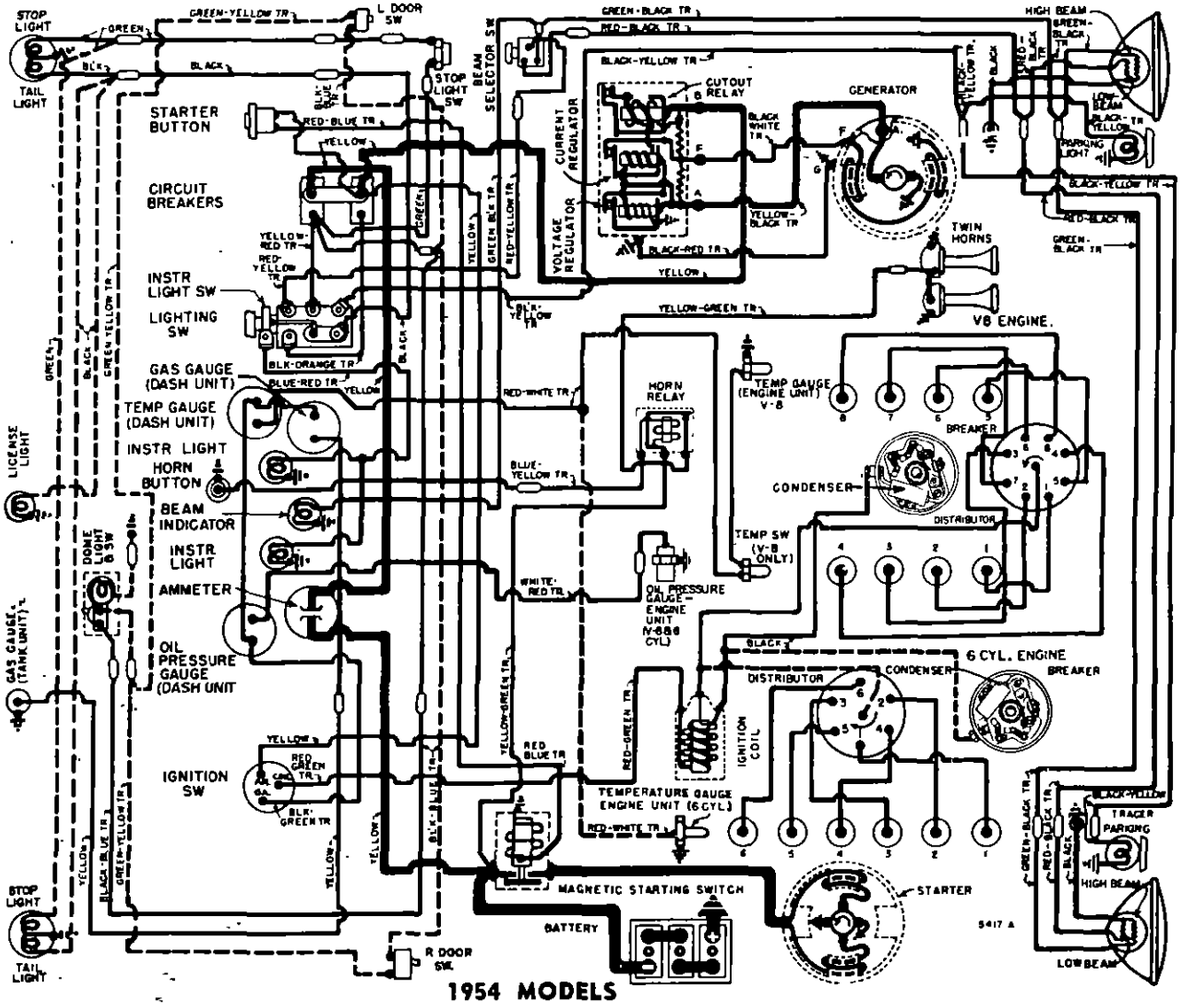
THROTTLE LINKAGE ADJUSTMENT (1954-55 6 CYL. FORDOMATIC TRUCKS): With selector lever in "N" position and engine at normal operating temperature, set engine idle speed at 440-460 RPM (1954 Models), 450-475 RPM. (1955 Models). Adjust Anti-stall Dashpot, (for Adjustment, see above) then turn engine off. Remove clevis pin from upper end of transmission control rod (at cross shaft). Pull gently upward on throttle control rod to hold transmission lever against its internal stop. Rotate rod clevis for free entry of clevis pin into holes in clevis and cross shaft lever. Length-

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en control rod by rotating clevis 2½ turns counter-clockwise. Connect control rod to cross shaft lever. *Road test truck and if band or clutch slippage evident,* **increase rod length to 3 turns of clevis but do not exceed 3½ turns.** Check transmission for kickdown action. If there is no action, loosen the accelerator stop bolts lock nut located under the accelerator pedal and adjust the stop bolt height until kickdown action is obtained.

THROTTLE LINKAGE ADJUSTMENT (1954-55 FORDOMATIC TRUCKS): Adjust idle speed and Anti-stall dashpot same as for 6 Cylinder models (above). Position Throttle Linkage Adjustment Tool T54L-77230-A on clean surface of accelerator mounting bracket. Lower pin of tool should freely enter hole in accelerator assembly lever. If pin does not enter hole in lever, loosen carburetor connecting link barrel locknut and rotate barrel until pin enters hole freely (with carburetor throttle valve lever against its stop). Tighten link barrel locknuts. Remove clevis pin from upper end of transmission throttle control rod at cross shaft. Pull upward gently on throttle control rod to hold transmission lever against its internal stop. Rotate rod clevis for free entry of clevis pin into holes in clevis and cross shaft lever. **Lengthen control rod by rotating clevis 3 turns counter-clockwise.** Connect control rod to cross shaft. Road test car and if band or clutch slippage is evident, ***increase rod length to 3½ turns of clevis but do not exceed 4 turns.*** *NOTE*—Connecting link between cross shaft and lever must be parallel to centerline of engine. Adjust as necessary by rotating adjusting screw lever. If height of accelerator pedal stop bolt prevents obtaining kickdown, loosen the accelerator pedal stop bolt jam nut and adjust stop bolt height sufficiently to provide kickdown.



1954 MODELS

CARBURETOR (223" ENGINE)

Ford No. EBR-9510-A (Except Fordomatic), EBP-9510-B (With Fordomatic).

Idle Setting—Approximately one turn open. Set for highest steady vacuum reading with engine at normal operating temperature, or midway between missing and rolling point. Turn screw out for richer mixture.

Idle Speed—475-500 RPM (Exc. Fordomatic), 450-475 (Fordomatic) with selector lever in Neutral "N".

Float Level: *See "Ford Visi-flo" in Carburetor Section.*

Fuel Level—Flush to 1/16" below top edge of float hinge bracket in bowl. To adjust, remove bowl cover, bend float tab which contacts float needle spring.

►*NOTE: Fuel level can be checked through glass bowl cover without disturbing carburetor.*

Accelerating Pump: Inner hole for normal or hot weather, outer hole for cold weather operation (holes located in throttle lever. Shift pump link as required).

Fast Idle: Integral type. Operated by choke valve. No adjustment required.

Anti-Stall Dashpot Adjustment: *See "Carburetor" above.*

Throttle Linkage Adjustment (Fordomatic Trucks): *See "Carburetor" above.*

►*OTHER DATA: See "Ford Visi-flo" Carburetor in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs.

CARBURETOR (239" ENGINE)

Ford No. **EBV-9510-H.** *Dual down-draft type with* manual choke.

►*FORDOMATIC NOTE: Anti-stall dashpot used on trucks with Fordomatic Transmission.*

Idle Setting—Approximately 1½ turns open from lightly seated position. Set both screws for highest steady vacuum reading and highest engine RPM.

Idle Speed—475-500 RPM (Exc. Fordomatic), 450-475 RPM (Fordomatic) with selector lever in Neutral.

Float Level: With throttle body inverted, distance between bottom of float and flanged surface of air horn should be 1.275-1.305". Use Float Level Gauge T52L-9510-AHD.

Accelerating Pump: Center hole average setting. Inner hole for hot weather, outer hole for cold weather.

Fast Idle: No adjustment required.

Anti-Stall Dashpot Adjustment: *See "Carburetor" above.*

Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Holley-Ford Carburetors" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs.

CARBURETOR (256" ENGINE)

Ford No. EBZ-9510-C (1954); B4T-9410-A (Early 1955), B4T-9510-A (Late 1955). Dual "Concentric" downdraft type with manual choke control, governor actuating assembly, and "depopper" valve.

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Idle Setting—Approximately 1½ turns open from lightly seated position. Set both screws for highest steady vacuum reading and highest engine RPM.

Idle Speed—450-500 RPM. *See "Depopper Valve" Adjustment below.*

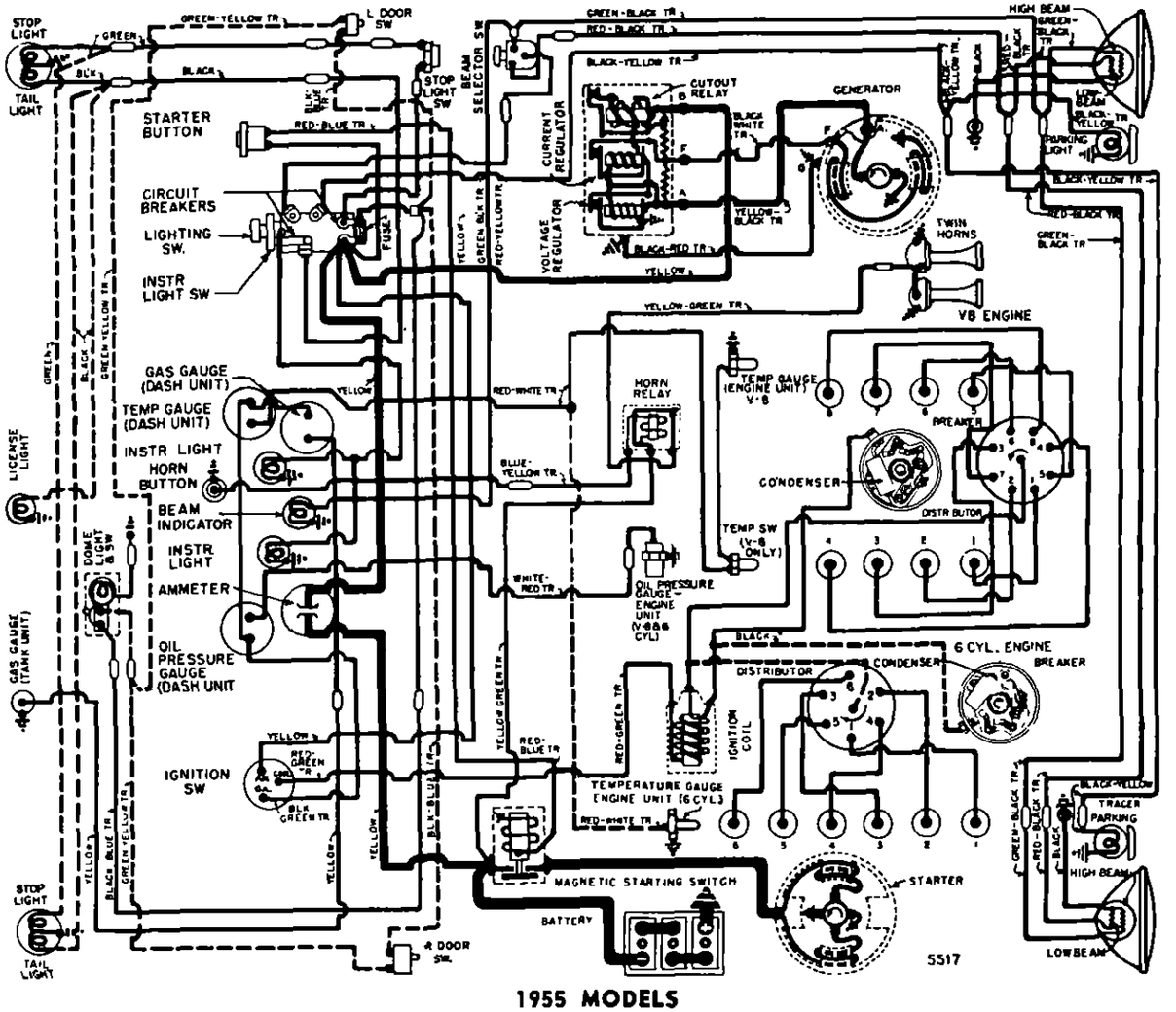
Fuel Level: ½"±1/32" below top edge of bowl with fuel pump pressure at 4-5 lbs. Use Fuel Level Gauge 9550-B to check fuel level, placing gauge squarely on top of main body so that gauge pins extend down into bowl. Fuel should be at least as high as longer GO pin but must not touch shorter NO GO pin. Adjust by bending tab on float lever which contacts intake needle.

Accelerating Pump: Center hole average setting. Inner hole for hot weather, outer hole for cold weather.

Fast Idle: No adjustment required.

Depopper Valve Adjustment: Turn depopper valve adjusting screw until it is lightly seated *(CAUTION—Do not force adjusting screw).* With depopper valve seated, adjust engine idle speed, with the stop screw, to 450-500 RPM. Adjust idle mixture screws (see above), then decrease engine idle speed to 300 RPM (do not disturb idle mixture screws). Turn depopper valve adjusting screw out until engine idle speed comes up to 450-500 RPM. If engine will not maintain a steady idle speed and has a tendency to roll, turn spring tension setscrews (directly opposite valve adjusting screw) "in" against piston spring until a steady idle is obtained *(CAUTION—Do not turn spring tension screw in more than is necessary to attain a smooth idle).* Readjust idle mixture with idle adjusting screw. If engine RPM increased, reset idle speed to 450-500 RPM with depopper valve adjusting screws. *NOTE*—If satisfactory adjustment cannot be made, disassemble and clean.

►**OTHER DATA:** *See "Ford Truck Dual Concentric Type" in Carburetor Section.*



1955 MODELS

CARB. EQUIPMENT

Fuel Pump Application

Truck Model	Fuel Only	Fuel & Vacuum
223" (1954)	B4A-9350-B	B4A-9350-C
223" (1955)	B5A-9350-A	
239" & 256" (1954)	B4A-9350-D	Ⓒ EBY-9350-A
239" & 256" (1955)	B5C-9350-A	

Ⓒ—B4A-9350-E also used.

Pressure—4-5 lbs. at 900 RPM.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric.

Dash Unit—Ford No. FAD-9280-A (All Models Exc. Parcel Delivery). No. 1C-9280-A (Parcel Delivery).

Tank Unit (Ford 21C-9275-B)—F-100, F-250, F,P-350, P-500 Panels. Not used with 30 gal. tank on P-500 (see below).

Ford FAC-9275-A—C-500, 600 Cab Forward.

Ford FAC-9275-B—F-500, 600. Closed Cab.

Ford FAC-9275-C—F-100, 250, 350 Closed Cab, B-500, School Bus, P-500 (with 30 gal. tank).

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Ford No. 01A-10655-J. 6 volt, 17 plate, 120 ampere hour capacity (20 hr. rate.).

Battery Ground—Positive(+) to cylinder head.

Engine Ground—Cylinder head to dash.

STARTER

Ford No. FAC-11002-B (1954); FAC-11002-G (1955).

Armature—Ford No. 52-11005 (1954); FAC-11005-B (1955).

►*STARTER INSTALLATION CAUTION:* Make certain that rubber seal is properly positioned before mounting starter. If trouble encountered in keeping seal in position, apply rubber cement to both seal and engine block to hold seal in position while mounting starter.

Drive—ICM-11350-C. Bendix "Folo-Thru".

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—48-56 ozs.

Cranking Speed—100 RPM.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs	Ⓓ	6.0	70
16 ft. lbs	Lock		700

Ⓓ-With Starter on engine and engine running.

Starting Switch: Magnetic type. Ford No. B5A-11450-A. Starter switch is controlled by push button switch on instrument panel. *NOTE—Neutral safety switch used on Fordomatic Transmission Trucks.*

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Fordomatic Neutrol Safety Switch: Ford No. FAC-15812-C. **Adjustment**—*See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Model	Generator No.	Armature No.
223"Engine	FAA-10002-B	OA-10005-A
239" & 256"Engines	FBC-10002-A	FBC-10005-A
All Engines (Optl.)	FBB-10002-A	FAB-10005-A

Performance Data

Generator	Amperes Ⓒ	Engine RPM.
FAA-10002-B	35	1000
FBC-10002-A	35	1000
FBB-10002-A	50	1200

Ⓒ—See Regulator for maximum charging rate.

Brush Spring Tension—30 ozs.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: 223" *ENGINE NOTE—When this engine used on F-500, F-600 Trucks and Buses, a separate belt is used to drive the fan.*
223" Engine (Generator Belt)—¼" deflection between water pump and crankshaft pulleys with normal thumb pressure.
223" Engine (Separate Fan Belt)—½"deflection between fan and crankshaft pulleys with normal thumb pressure.
239" & 256" Engine (Both Belts): ½" deflection midway between pulleys with normal thumb pressure.

REGULATOR

Regulator No.	For Generator No.
FAC-10505-A	FAA-10002-A & FBC-10002-A
FAJ-10505-A	FBB-10002-A

►*SETTING NOTE:* Settings below are for regulator at NORMAL OPERATING TEMPERATURE (After ½ hour operation with room temperature at 70-80°F).

Cutout Relay

Cuts In—6.0-6.6 volts.

►*CUTOUT RELAY AIR GAP CHECK:* With cover off regulator, manually close cut-out contacts. Measure air gap between armature and core. The dimension should be .009-.013". Air gap with contacts open should be .012-.020". If either or both of these dimensions are not up to specifications, regulator is defective and should be replaced.

Voltage Regulator

Setting—7.4-7.8 volts.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—33-37 amps (FAC—10505-A). 48-52 amps (FAJ-10505-A).
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N. Remove switch and disconnect all wires.

Stop Light Switch Location: On brake master cylinder, or on brake power unit assembly. Master cylinder located on engine side of firewall (F-100), and on bracket attached to left frame member below brake pedal (Other Trucks).

FUSES: Located as indicated below:
Overdrive—30 amps., on overdrive relay.
Cigar Lighter—Special fuse in lighter base.
Clock—3 amps. in clock lead.
Heater—14 amps. in blower switch wire.
Interior Lights—14 ampere. On lighting switch.

LIGHTING CIRCUIT BREAKERS: On headlight switch. Combination headlight switch, circuit breaker, and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument lights, parking lights and stop and tail light circuits. Fuse protects interior lighting circuit (14 amps.).

HORNS: Ford B5A-13832-C (High Pitch), B5A-13833-C (Low Pitch). Dual horns operated by relay
Horn Current—12-14 amperes.
Horn Relay: Ford No. FAA-13853-A.

ENGINE

ENGINE SPECIFICATIONS: (223" Engine)—6 Cyl. O.H.V. **(239" Engine & 256" Engine)**—V8 O.H.V.

Engine	Bore	Stroke	Displacement
223"	3.62"	3.60"	223 cu. ins.
239"	3.50"	3.10"	239 cu. ins.
256"	3.62"	3.10"	256 cu. ins.

Engine	Comp. Ratio	Rated HP	Developed HP
1954 223"	7.2-1	31.5	115 at 3900 RPM
1955 223" (F-100-250)	7.5-1	31.5	118 At 3900 RPM
1955 223" (Others)	7.5-1	31.5	116 at 3900 RPM
1954 239"	7.2-1	39.0	130 at 4200 RPM
1955 239"	7.5-1	39.0	132 at 4200 RPM
1954 256"	7.2-1	42.0	138 at 3900 RPM
1955 256"	7.5-1	42.0	140 at 3900 RPM

CYLINDER HEAD: *See Ford Special Data.*
TIGHTENING TORQUES: *See Ford Special Data.*
ENGINE REMOVAL: *See Ford Special Data.*
OIL PAN REMOVAL (223" Engine): Drain crankcase. Pull dipstick out of tube. Remove oil pan retaining screws, remove pan and gasket.
OIL PAN REMOVAL (239" & 256" Engines): *CAUTION—Place #1 piston on top dead center before removing oil pan.* Drain crankcase and remove engine front splash pans, then remove oil pump-to-oil pan tube. On Fordomatic equipped trucks, remove converter housing dust cover. Remove oil pan.

223" 6 CYL. ENGINE
(See Engine Specifications Above)

See 1954-55 Ford 6 Passenger Car Pages. Engine is similar to those used in 1954-55 Pass. Cars and all passenger cars engine data applies to truck engines.

►*1955 OIL PUMP PRODUCTION CHANGE & PARTS INSTALLATION CAUTION (223" Engine):* New oil pump assembly, intermediate shaft, and body plate released for service. Parts not interchangeable with those of previous type pump. *See "Oiling System" in Ford Special Data.*

239" & 256" ENGINES
(See Engine Specifications Above)

See 1954 Ford V8 Passenger Car Pages. Engine is similar to those used in 1954 Pass. Cars, and all passenger car engine data applies to truck engines EXCEPT AS NOTED BELOW.

►*1954 239" ENG. CAMSHAFT PRODUCTION CHANGES:* First type camshaft, Part No. EBU-6250-A (13 tooth distributor drive gear, and 2.0500-2.0510" diameter bearing journals), replaced by camshaft, Part No. B4A-6250-A (with 14 tooth distributor drive gear, and 1.9255-1.9265" diameter bearing journals). The B4A-6250-A camshaft was replaced in later production with camshaft, Part No. B4T-6250-A (with 14 tooth distributor drive gear, and 1.9255-1.9265" diameter bearing journals). The B4T-6250-A camshaft is identified by "14" stamped on front end, or "ECE" cast into shaft.

►*1954 256" ENG. CAMSHAFT PRODUCTION CHANGE:* Early type camshaft, Part No. EBY-6250-A replaced in production with Part No. B4T-6250-A. Later type camshaft is identified by "14" stamped on front end of shaft, or "ECE" cast into shaft. 256" Engines with later type camshaft have a blue or white daub of paint on right or left side of block. Engines with early camshafts have a daub of orange paint on right or left side of block. *CAUTION—Valve Timing, Valve Lift, and Compression Pressures are different with early and late type camshafts. See data below for differences.*

►*1954 V8 ENGINE CONNECTING ROD & BEARING PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Late 1954 production connecting rods have an oil hole (for cylinder lubrication) located on same side as the bearing notch. Early type bearings, with one oil hole, MUST NOT BE USED with the later type rod. Later type bearings may be used with either the old or new rod as they have two oil holes and will fit either rod.

►*1954 239" & 256" ENGINE CAMSHAFT BEARING CHANGE (To prevent oil starvation due to improperly installed front bearing):* On engines equipped with camshafts (marked "14" on end, or "ECE" cast into shaft), new front bearings have been released for service replacement, Part No. B4C-6261-A Standard, B4C-6261-B (.015" undersize). The later type bearings have a slot instead of a 1/8" diameter oil hole. When installing the new bearing, make sure that the slot is aligned with hole in cylinder bore and that bearing is pressed .005-.020" into cylinder block camshaft bearing bore to eliminate interference with camshaft thrust plate.

►*1954 239" & 256" ENGINE ROCKER ARM ADJUSTING NOTE:* On engines equipped with B4T-6250-A camshaft, (marked "14" on end of shaft, or "ECE" cast into shaft), it may be found in some cases that the rocker arm adjusting screws are too short to provide proper tappet adjustment and still maintain the neces-

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sary amount of thread contact. If necessary new adjusting screws, Part No. EAA-6549-B should be installed. The new screws are .060" longer when measured from end to center of the socket, than the old screw.

►*1954 239" & 256" ENGINE OIL PUMP SERVICE REPLACEMENT CHANGE & INSTALLATION CAUTION:* A new oil pump, Part No. EAM-6600-A, with steel gears is available for service replacement. The pump is furnished in Kit No. B5A-6600-C which includes a pump and spring. When installing pump on these engines, remove the Relief Valve Spring from the pump and install spring, Part No. EBU-6670-A.

►*1954 V8 ENGINE TAPPET REPLACEMENT CAUTION:* The cast iron tappet, Part No. EAA-6500-C should no longer be used as a service replacement on V8 engines as these tappets may contribute to camshaft lobe wear. Install tappet, Part No. EAA-6500-D (Steel forging) which can be identified by forging marks on outer edge of tappet foot. The tappet foot is .140" (steel forging), .220" (cast iron).

►*239" & 256" TRUCK ENGINE OIL PAN BAFFLE INSTALLATION (To Prevent Loss of Oil Pressure on Sudden Brake Stops):* Fabricate a baffle plate from hot rolled, low carbon, oil hardened steel (.042" thick) to fit the inside of the oil pan at a point 7 11/16" (239" engine), 9 7/8" (256" engine), from rear of pan. The baffle should be 3 9/16" high with the lower corners trimmed off on a 27/32" radius (this will allow oil to flow between both sides of the baffle). Allow 11/16" of material at side and bottom which must be turned at right angles on a 3/16" radius. Tack weld baffle to oil pan securely at sides and bottom.

VALVES:	Head Diam.	Stem Diam①	Length
Intake	②	③	5.02"
Exhaust	1.515"	④	5.02"

Valve	Seat Angle	Lift⑤	Stem Clearance
Intake	45°	.345"	.002" max.
Exhaust	45°	.345"	.003" max.

①—Valves furnished with .003", .015", .030" oversize stems for service replacement.

②—1.652" (239" engine), 1.785" (256" engine).

③—Two standard sizes for selective fitting (Red-.3415-.3420" & Green-.3420-.3425").

④—Two standard sizes for selective fitting (Red-.3405-.3410" & Green-.3410-.3415").

⑤—All models except 1954 256" Engine with EBY-6250-A camshaft. Valve lift for models with the EBY-6250-A camshaft is: .345-.350" (Intake), .339-.343" (Exhaust). *See "1954 256" Engine Camshaft Production Change" above.*

►*256" ENGINE VALVE SEAT INSERT NOTE:* Valve seat inserts used on exhaust valves in production and furnished for service replacement in Std. size, and .020" oversize. *See "Valve System" in Ford Special Data.*

VALVE LIFTERS: *INSTALLATION CAUTION*—Cast iron tappet, Part No. EAA-6500-C, should no longer be used as service replacement on V8 engines as these tappets may contribute to camshaft wear. Use steel tappet, Part No. EAA-6500-D. Cast iron tappet has smooth molded appearance on unmachined portion of tappet foot. Tappet foot is .220" thick. Steel tappet has forging marks on outer edge of tappet foot and is .140" thick.

VALVE TIMING: *NOTE*—The following valve opening and closing points are with camlift as indicated in following table.

Valve Timing
(EBY-6250-A Camshaft)①

Intake Valves—Open 15°②BTDC. Close 67°③ALDC.
Exhaust Valves—Open 57°④BLDC. Close 19°⑤ATDC.

Valve Timing
(Except Trucks with EBY-6250-A Camshaft)①

Intake Valves—Open 8°④BTDC. Close 44°⑥ALDC.
Exhaust Valves—Open 47°④BLDC. Close 5°⑥ATDC.

①—See 1954 256" Engine Camshaft Production Change above.

Camlift—②—.016". ③—.018". ④—.015".⑤—.017".⑥—.019".

Valve Timing Check: Remove right hand rocker chamber cover. Turn engine over until No. 1 intake tappet is on heel of No. 1 intake cam lobe. Back off No. 1 intake valve adjusting screw, push rocker arm to one side, then install dial indicator. Zero dial indicator, then rotate engine slowly until desired lift (.015") obtained. Compare degrees on pulley with specifications (8°). If not within specifications check for bent timing pointer by bringing No. 1 piston to TDC and see if timing pointer is aligned with TDC mark on crankshaft pulley. *If pointer not at fault, check timing* chain, camshaft sprocket, crankshaft pulley and crankshaft in order of accessibility.

►*CAMSHAFT SPROCKET SPACER INSTALLATION CAUTION (V8 Eng.):* If spacer, Part No. EBE-6265-A, is installed backwards, it will allow an excessive amount of endplay. Inside diameter of spacer has a chamfer on one side and this chamfered side should be installed toward No. 1 camshaft bearing journal.

VALVE TAPPET CLEARANCE: .016" (Intake), .018" (Exhaust). With engine at normal operating temperature.

OILING SYSTEM

►*F-100 TRUCK OIL PRESSURE INDICATOR:* Indicator light on instrument panel operated by engine unit. Lights when ignition switch turned on, goes out when engine starts and oil pump operates. *All other truck models have an oil pressure indicator gauge on instrument panel.*

►*1955 223" ENGINE OIL PUMP PRODUCTION CHANGE & PARTS INSTALLATION CAUTION:* New oil pump assembly, intermediate shaft, and body plate released for service. Parts not interchangeable with those of previous type pumps. *See "Oiling System" in Ford Special Data.*

►*CRANKCASE VENTILATION GASKET INSTALLATION CAUTION (V8 Eng.):* On some units gasket, Part No. B4A-6872-A, may have been installed upside down causing leak at gasket location. Bolt center line is 5/64" below center line of gasket.

Crankcase Capacity: 5 qts. (223 & 239 Eng.), 6 qts. (256 Eng.). 1 qt. addtl. when filter element changed.

Normal Oil Pressure: 45 lbs. at 2000 RPM. (223 Eng.), 45-55 lbs. at 30-40 MPH. (239 & 256 Eng.).

Pressure Regulator Valve: In oil pump body. Not adjustable. *NOTE*—Valve spring pressure should be 9.82 lbs. at 1.56" (223 Eng.), 10.86 lbs. at 1.40" (239 & 256 Eng.).

Oil Pressure Indicator: *See Note above for F100 Trucks.* King-Seeley Electric type.
Dash Unit—Ford No. FAE-9273A (Exc. Par. Del.), 1C-9273A (Parcel Delivery).
Engine Unit—Ford No. 41A-9278 (All).
See "King-Seeley Gauges" in Miscellaneous Section.

Oil Pump: Gear type pump mounted in crankcase (223 Eng.), on left side of crankcase (239 & 256" Eng.).
Pump Overhaul—*See "Oil Pump" in Ford Special Data.*

Oil Filter: Full-flow (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.
Replacement Filter Element—Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION:* This special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication.

►*FILTER INSTALLATION CAUTION & OIL LEAKAGE CORRECTION: See "Oiling System" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

COOLING

►*TEMPERATURE GAUGE FALSE READING CORRECTION (8 CYL. ENGINES):* In cases where heat indicator shows a reading higher than actual water temperature, check water temperature gauge bulb on engine to see that it is not contacting a casting flash inside cylinder head. Remove flashing with a rat tail file.

►*RESTRICTED WATER BY-PASS CAUTION (8 CYL. ENGINES):* A restricted or blocked passage caused by casting flash will decrease flow of water in engine when thermostat is closed. Check for this condition by listening for a gurgling sound when engine is stopped after a short period of operation. If noise is heard, remove water by-pass tube and inspect for a restricted opening in water pump housing. If necessary, remove pump and drill opening with a 19/32" drill.

Water Capacity (Without Heater): 18½ qts. (223" Engine), 22 qts. (239" Engine), 22½ qts. (256" Engine).

Pressure Valve: Ford No. 1T-8100-A. Radiator filler cap (opens at 4 lbs.).

Thermostat: Ford No. EAG-8575-A (147-152°). No. EBR-8575-A (167-173°). Mounted inside water outlet elbow.

►*THERMOSTAT INSTALLATION (V8 Engines): Install thermostat with word "TOP" in uppermost position.*

Water Pump: Packless, sealed ball bearing type.
See "Ford 6" or "Ford V8" in Water Pump Section.

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Temperature Gauge: King-Seeley Electric type.
Dash Unit—Ford No. FAE-10883-A.
Engine Unit—Ford No. 8A-10884.
Temperature Bulb Sleeve Removal (V8 Engines)—Thread adapter handle of tool T50T-100-A into sleeve. Tighten locknut against sleeve, then pull sleeve with sliding hammer.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 10CF, No. L5222 (F-100, F-250)—Ford No. AE-7563-A. Models with 3-Speed Transmission.
Long Model 11CF, No. L1440 (Std. All Other Models and F-100, F-250 with 4-Speed Transmission)—Ford No. 51-7563-A.
Long Model 11CF, No. L1478 (Heavy Duty All Models Except F-100, F-250)—Ford No. 8MTH-7563-A.
See "Long" in Clutch Section.

Clutch Disc—Use with cover assembly as follows:

Long No.	Ford No.	Cover Assembly
CD870	59T-7550-A①	Ford No. 51-7563-A
CD606	51A-7550-A	Ford No. AE-7563-A
CD887	TDAA-7550-A	Ford No. 8MTH-7563-A
CD607	TDAA-7550-A	Ford No. 51-7563-A

①—Replaced by Ford No. 81T-7550.

Pedal Adjustment: 1 1/8-1 3/8" free travel. Adjusting clevis provided, at forward end of connecting rod between pedal shaft and equalizer shaft.

►*PEDAL FREE TRAVEL ADJUSTMENT CAUTION:* Normal action of pressure plate centrifugal weights at high engine speed will take up approximately ¾" of specified free travel. Check free travel when engine is operated at high speed and see if approximately ½" of free travel is left. Insufficient free travel will cause release bearing to rotate at all times and will result in early bearing failure.

Removal: Disconnect clutch pedal retracting spring from clutch release lever. Remove lock nut and adjusting nut from release lever rod, then remove rod. Remove transmission assembly from clutch housing (see below). Remove clutch release bearing and hub from release lever. Mark pressure plate and cover assembly and flywheel so that parts may be reinstalled in same relative positions. Loosen pressure plate and cover assembly-to-flywheel bolts until pressure plate springs are expanded, then remove bolts. Remove pressure plate and cover assembly and clutch disc assembly through opening in bottom of clutch housing. Remove pilot bearing from flywheel with Tool 7600-E.

TRANSMISSION

►*239" ENGINE HARD SHIFTING CORRECTION (ALL TRANSMISSIONS):* If hard shifting occurs with truck standing and clutch completely disengaged, pilot bearing bore in crankshaft may not be deep enough. This locks transmission input shaft to crankshaft and makes it almost impossible to shift transmission. To correct, grind approximately 1/8" off pilot bearing end of input shaft to provide clearance between end of shaft and counterbore in crankshaft.

3-SPEED (LIGHT DUTY)

Own. 3-Speed, all helical gear. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). *Steering column shift standard.*
See "Ford Truck 3-Speed (Light Duty)" in Transmission Section.

►*INTERMEDIATE & HIGH GEAR JUMP-OUT CORRECTION:* *See "Ford Synchro-mesh" in Transmission Section.*

Removal: Remove floor mat and floor plate. Loosen two nuts that secure top of transmission to clutch housing studs. Raise truck, then drain lubricant from transmission. Disconnect the drive shaft from the transmission. If truck equipped with band-type parking brake, disconnect brake cable at brake and at gear shift housing. Disconnect gear shift linkage at transmission, then disconnect clutch pedal retracting spring from clutch release lever. Remove bolts and lockwashers which attach clutch release equalizer bar anchor bracket to transmission. Disconnect speedometer cable from transmission. Remove dust cover from bottom of clutch housing. Position transmission jack under transmission. Remove two top nuts, two bottom bolts, and lockwashers that secure transmission to clutch housing. Move transmission to rear until input shaft splines clear clutch housing. Be careful not to allow clutch release bearing and hub to drop out of release lever fork. Lower transmission to floor.

3-SPEED (HEAVY DUTY)

Own. 3-Speed, helical gear (second & high), spur gear (low & reverse). Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Steering column shift standard.
See "Ford Truck 3-Speed (Heavy Duty)" in Transmission Section.

Removal: Same as for 3-Speed (Light Duty) above.

4-SPEED

Own. 4-Speed, Constant mesh, synchro-mesh (second, third & high). Helical gears used for second, third & high. Spur gears used for low & reverse. Center, floor mounted gear shift lever standard.
See "Ford Truck 4-Speed (Synchro-mesh)" in Transmission Section.

Removal: Same as for 3-Speed (Light Duty) above and note following: *If hoist not used, it may be necessary to remove gear shift lever assembly and lever housing before transmission can be removed from truck.* Disconnect drive shaft, or coupling shaft, at parking brake drum. If truck equipped with coupling shaft support, disconnect support bracket from support plate, then remove coupling shaft.

OVERDRIVE

Warner Model AS4-R10F. Overdrive with solenoid operated (no centrifugal pawls) with governor control and throttle operated kick-down. There is no lockout switch on this unit.
See "Warner R10 Overdrive" in Transmission Section.
Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for 3-Speed Synchro-mesh Transmission (above), after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.
See "Fordomatic & Mercomatic" in Transmission Section.

►*1955 F-100 TRUCK FORDOMATIC OIL COOLER PRODUCTION CHANGE:* The Fordomatic oil cooler discontinued in production after May 1955. A by-pass tube assembly is being used in place of the oil cooler.

►*FORDOMATIC WHISTLING NOISE CORRECTION: This condition may occur during normal engine operation. See "Fordomatic & Mercomatic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication—Check transmission oil every 1000 miles and maintain fluid level at "Full" mark on dipstick. Drain & refill every 15,000 miles. Use only Automatic Transmission Fluid Type A.

Checking Fluid Level—Apply parking brakes, place transmission selector lever in "N" (neutral) position, *run engine at idle speed for approximately four minutes.* With parking brake applied and engine running at slow idle, move selector lever to "P" (parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator. Wipe clean and insert in tube (make sure indicator is pushed all the way down). Remove indicator and read level. Add sufficient fluid to raise level to full mark on indicator. Replace indicator.

►*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

►*UNIVERSAL JOINT INSTALLATION CAUTION: Make sure that all universal joint yokes in drive line are in the same plane to avoid drive line unbalance.*

Coupling Shaft Center Bearing: Consists of cushion mounted ball bearing bolted to underside of frame intermediate cross member. Bearing is mounted on end of coupling shaft in a sleeve with felt retainer on each end and bearing baffle on front end.

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REAR AXLE
SEMI-FLOATING

Own. Semi-floating, hypoid gear with Hotchkiss drive. *NOTE*—Same axle as used in Station Wagon & Sedan Delivery.

See "Ford & Mercury (Separate Carrier Type) Hypoid" in Rear Axle Section.

Ratios—As follows:
Standard—3.92-1 (47-12).
Optional—4.27-1 (47-11).
Overdrive—4.09-1 (45-11).
Fordomatic—3.92-1 (47-12).

Backlash—.003-.008". Shim adjustment.

Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer nuts (work through opening in axle shaft flange). Use Puller No. 4235 and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal).

Axle Assembly Removal: Raise rear of truck, then disconnect hydraulic brake hose from hydraulic brake line at rear axle. Disconnect parking brake cable from equalizer rod, then remove screws which attach brake cable brackets to frame crossmember. Disconnect drive shaft at rear axle universal joint flange. Remove nuts from rear spring clips (U-bolts), then remove spring clips. Loosen shock absorber stud nuts and move shock absorbers out of way. Roll axle assembly away from truck, remove wheels.

Wheel Bearing Adjustment: None required in service.

FULL-FLOATING

Own. Full floating hypoid gear with Hotchkiss drive.

Model	Rear Axle Type
F-250 Conventional (Early)	① Split Housing
P-350 Parcel Del. (Early)	① Split Housing
F-250 Conventional (Later)	Integral Housing
P-350 Parcel Del. (Later)	Integral Housing
F-350 Conventional	② (Heavy Duty) Split Housing
F-500, F-600 (All Models)	Banjo Housing

①—Drive pinion bearings pressed in axle housing.
②—Drive pinion bearings pressed in sleeve and bolted to axle housing.

See Various Types of Ford Rear Axles in Rear Axle Section.

Axle Ratios

Model	Ratio
F-250 Conv.	4.86-1 (34-7), 5.83-1 (35-6) ①
P-350 Par. Del.	4.86-1 (34-7), 5.83-1 (35-6) ①
F-350 Conv.	5.14-1 (36-7), 5.83-1 (35-6) ②
F-500 (All)	5.29-1 (27-7), 6.2-1 (31-5), 6.8-1 (34-5) ③
F-600 (All)	7.2-1 (36-5), 6.2-1 (31-5), 6.8-1 (34-5) ③

①—.008-.013" backlash. ②—.004-.018" backlash.
③—.006-.012" backlash. ③—.006- .016" backlash.

Axle Shaft Removal: Drain lubricant from axle housing, then remove axle shaft stud nuts and washers. Tap center of axle shaft flanges to loosen tapered dowels, then remove dowels. Remove axle shafts from housing, remove hub and drum assemblies.

Axle Assembly Removal: Loosen wheel and stud nuts, then raise rear of vehicle. Disconnect hydraulic brake hose from rear axle universal joint flange. Disconnect rear shock absorbers from spring seat clamps. Remove nuts and washers from spring clips (U-bolts), then remove spring clips. Roll axle out from under vehicle, remove wheels and rear axle hydraulic brake pipe from housing.

Wheel Bearing Adjustment: Remove axle shafts (see above), use special bearing adjusting wrench and remove bearing locknut (outer nut), and lockwasher. Adjust bearings by turning bearing adjusting nut (inner nut) up until tight then backing off 1/8 turn. Install bearing lockwasher. (*NOTE*—If adjusting nut equipped with dowel, make sure lockwasher fits over dowel). Install bearing locknut and draw nut up tight. If flange type lockwasher is used, bend one flange over adjusting nut and one flange over locknut. Install axle shaft and lower vehicle.

TWO-SPEED

Own. Electrically operated shift, Two-speed, Full-floating spur gear planetary unit (reduction gearing). Spiral bevel gear final drive.

See "Ford Truck Two-Speed" in Rear Axle Section.

Ratio—5.83-1 (Direct Speed), 8.11-1 (Second Speed). 6.33-1 (Direct Speed), 8.81-1 (Second Speed).

Backlash—.006-.016".

Removal: Same as for standard axle (above) after removal of wiring harness.

SHOCK ABSORBERS

Direct acting hydraulic. Shock absorbers are sealed units and are not adjustable or refillable.

►*REPLACEMENT SHOCK ABSORBER NOTE: Shocks are supplied for service replacement in kits consisting of shock absorber and necessary bushings.*

►*SHOCK ABSORBER APPLICATION NOTE:* Front and rear shocks are standard equipment on all F-100, F-250, & P-350 (Parcel Delivery). Front shocks only are standard on F-350. Front and rear shocks are optional on all other models.

1954 Replacement Shock Absorbers

Model	Front - Ford Nos. - Rear
F-100, F-250	B3C-18124-A B3C-18125-A
F-100, F-250	① B3C-18124-B ..... ① B3C-18125-B
F-350	B3C-18124-A B3Y-18125-A
F-350	① B3C-18124-B
P-350 (Par. Del.)	A8C-18124-A B3C-18125-A
P-350 (Par. Del.)	① B3C-18125-B
F-500, F-600 (All Models)	B3T-18124-A B3T-18125-A

①—Heavy duty shock absorbers.

1955 Replacement Shock Absorbers

Model	Front - Ford Nos. - Rear
F-100	B5C-18124-A B5C-18125-A
F-100 H.D.	B5C-18124-B B5C-18125-B
F-250, 350	B3C-18124-A
F-250 350 H.D.	B3C-18124-B
P-350	A8C-18124-A B5C-18125-B
F-250, P-350	B3C-18125-A
F-250, P-350 H.D.	B3C-18125-B
F-350	B3Y-18125-A
B, F-500, 600	B3T-18124-A
B, C, F-500, 600	B3T-18125-A

FRONT SUSPENSION

Conventional "I" beam section front axle with Reverse-Elliott ends and semi-elliptic springs.

Kingpin Inclination—4°±½°.

Caster—(F-100, F-250) 3° to 4°, (Others) 3° to 5°. ½° maximum variation between wheels.

Camber—¼° to 1°. ½° maximum variation between wheels.

Toe-In—0-1/16".

STEERING

Own. (Gemmer 305 & 335 Design). Worm-and-roller types with push-pull adjustment.

►*F-100, 250 DRAG LINK INSTALLATION CAUTION:* Due to design of drag link (THAA-3305-A) it is possible to install link in a reverse position causing steering interference. When properly installed, offset end of drag link is attached to sector shaft arm, and lubrication fittings will be at bottom side of link.

See "Gemmer Worm-and-Roller Types" in Steering Gear Section.

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305 & 335)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305 & 335)" in Steering Section.*

BRAKES

Brake types are as listed in application table below. Hand lever applies rear wheel service brakes on F-100 only (independent shaft brake on other models).

►*1954 F-100 TRUCK REAR WHEEL SKIDDING CORRECTION:* If rear wheel skidding on severe brake application (no load) is encountered, replace both rear wheel cylinders with Ford No. 8A-2261 and 8A-2262. These are passenger car type cylinders and are smaller than original truck cylinders. *CAUTION—Right and left wheel cylinders must be replaced.*

►*1955 F-500 BRAKE PRODUCTION CHANGE:* Effective approximately April 13, 1955 all F-500 Series trucks will be equipped with larger rear wheel brakes previously used on these models with 2-Speed Rear Axles. See tables below.

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►*1955 F-500 & F-600 REAR WHEEL BRAKE CYLINDER LEAK CORRECTION (Due to Excessive Depth of Counterbore):* To correct, install two 91A-2152 gaskets between brake pipe and wheel cylinder body.

Brake Type Application

Truck Model	Front	Rear
F-100	Duo-Servo	Duo-Servo
F-250, F-350	Uni-Servo	Duo-Servo
F-500, F-600	Uni-Servo	2 Cyl. Type

Uni-Servo - Ford Bendix. Single anchor. Wheel cylinder actuates primary shoe. Ratchet adjusting screw.

See "Ford-Bendix Uni-Servo Hydraulic" in Brake Section.

Duo-Servo - Ford-Bendix. Single anchor, self energizing. Wheel cylinders actuates both shoes. Ratchet adjusting screw.

See "Ford-Bendix Hydraulic" in Brake Section.

Two-Cylinder Type—Two wheel cylinders in each brake assembly.

See "Ford Truck Two Cylinder" in Brake Section.

Brake Drum Diameter

Model	Front	Rear
F-100 All Models	11"	11"
F-250 All Models	12"	12"
F-350 Conventional	12"	13"
P-350 Parcel Delivery	12"	12"
F-500 (1954 & Early 1955) Ⓒ	13"	14 1/8"
F-500 (Late 1955) Ⓒ	13"	15"
F-500 (2-Speed Axle)	13"	15"
F-600 All Models	13"	15"

Lining Width & Thickness

Model	Front	Rear
F-100 All Models	② 2"	⑤ 1 3/4"
F-250 All Models	② 2"	⑤ 2"
F-350 Conventional	③ 2"	③ 2 1/2"
P-350 Parcel Delivery	② 2"	⑤ 2"
F-500 (1954 & Early 1955) Ⓒ	③ 2 1/4"	⑤ 3 1/2"
F-500 (Late 1955) Ⓒ	③ 2 1/4"	⑤ 4"
F-500 (2-Speed Axle)	③ 2 1/4"	⑤ 4"
F-600 All Models	③ 2 1/4"	⑤ 4"

Ⓒ—Single Speed Axle. ②—3/16" thick. ③—¼" thick. ⑤—3/16" thick. ⑤—3/8" thick.

Lining Length (Primary Shoe)

Model	Front Whl.	Rear Whl.
F-100 All Models	11 29/32"	11 29/32"
F-250 All Models	11 33/64"	11 33/64"
F-350 *Conventional*	11 33/64".	12 45/64"
P-350 Parcel Delivery	11 33/64"	11 33/64"
F-500 (1954 & Early 1955) Ⓒ	12 45/64"	14 29/64"
F-500 (Late 1955) Ⓒ	12 45/64"	15 11/32"
F-500 (2-Speed Axle)	12 45/64"	15 11/32"
F-600 (All Models)	12 45/64"	15 11/32"

Lining Length (Secondary Shoe)

Models	Front Whl.	Rear Whl.
F-100 All Models	11 29/32"	11 29/32"
F-250 All Models	12 31/32"	12 31/32"
F-350 Conventional	12 31/32"	13 61/64"
P-350 Parcel Delivery	12 31/32"	12 31/32"
F-500 (1954 & Late 1955) Ⓒ	13 61/64"	14 29/64"
F-500 (Late 1955) Ⓒ	13 61/64"	15 11/32"
F-500 (2-Speed Axle)	13 61/64"	15 11/32"
F-600 All Models	13 61/64"	15 11/32"

Ⓒ—Single Speed Axle.

Clearance—Brake lining to drum clearance different as follows:

Uni-Servo & Duo-Servo—*.010" clearance measured* 1½" from each end of secondary shoe.

Two-Cylinder Type—.025" from brake shoe to gauge surface on brake plate.

Hand Brake (Except F-100): External contracting type consisting of a brake drum bolted to transmission main shaft companion flange, and an external contracting band mounted on rear of transmission.

Adjustment—On cable controlled parking brakes, move lever to full released position. On transmission mounted parking brake levers, set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, adjust clevis rod to allow flat portion to rest on brake band bracket. Install clevis and cotter pins. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until .010" clearance is established between brake lining and drum at anchor bracket. Loosen locknut on adjusting screw from lower half of brake band. Adjust for .010" clearance between lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting rod nut until .010" clearance is established between upper half of band and drum. Re-install lockwire in anchor adjusting screw.

Hand Brake Drum Diameter—(F-250, 350) 8". (Others) 7 13/16"

Hand Brake Lining

Series	Length	Width	Thickness
F-250, 350	24 5/8"	2"	5/32"
P-350, 500 Ⓓ	23 5/64"	2½"	1/4"
B, C, F-500, 600	24 5/8"	2½"	1/4"

Ⓓ—Three-piece lining used.

Brake Pedal Free Play Adjustment: 3/16-3/8". Adjust free play by loosening brake pedal-to-master cylinder push rod and rotating rod to obtain correct free play. Tighten lock nut while holding push rod securely.

Standard Master Cylinder: Located on bracket attached to left frame side member below brake pedal.

Checking Fluid—Maintain fluid level to within ½" of top of reservoir.

Removal—Disconnect brake lines from master cylinder and depress brake pedal a few times to empty master cylinder. Remove brake pedal return spring from brake pedal clevis pin and remove clevis pin. Disconnect stop light switch wires at switch. Remove assembly from bracket.

Power Brakes: Midland or Hydrovac unit mounted in various positions depending on truck model and connected in hydraulic brake line between master cylinder and wheel cylinders. There are no mechanical connections and adjustments are not required.

See "Midland" or "Hydrovac" Power Units in Brake Section.

Checking Brake Fluid—Same as for manual brakes (above).

Removal of Power Unit—Depress brake pedal several times to remove all vacuum from system. Loosen brake power unit air inlet tube clamp and remove tube. Disconnect master cylinder to power unit hydraulic line at power unit. Disconnect vacuum tube at power unit. If stop light switch located on brake power unit, disconnect wires. Remove mounting bracket bolts and power unit.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate attached to left front body pillar below upper hinge opening.
First Number–100001.

►*VEHICLE NUMBER NOTE:* Vehicle number (example "P5FV100001") includes following identification data

Eng. Type①	Year②	Assy. Plant	Body Style③	Serial No.
P	5	See below	See below	100001 up.

①–**A**–6 Cyl. 223 cu. in. engine; **U**–8 Cyl. 272 cu. in. engine; **P**–8 Cyl. 292 cu. in. engine (Special Law Enforcement & Thunderbird).
②–Last digit of model year.
③–**C**–Sunliner; **F**–Skyliner; **H**–Thunderbird; **R**–Ranch Wagon; **S**–Sedan Delivery; **T**–Fordor & Tudor (Fair lane); **V**–Victoria; **W**–Special Body (Solid top); **X**–Country Sedan; **Y**–Country Squire; **G**–All Other (Fordor, Tudor, Mainline & Customline).

Assembly Plant Designation

A–Atlanta	**F**–Dearborn	**N**–Norfolk
B–Buffalo	**G**–Chicago	**P**–St. Paul
C–Chester	**K**–Kansas City	**R**–Richmond
D–Dallas	**L**–Long Beach	**S**–Somerville
E–Edgewater	**M**–Memphis	**U**–Louisville

TUNE-UP

►*FORD & THUNDERBIRD V8 ENGINE ROUGH IDLE: Can usually be corrected by this procedure:*
1) Tappet Clearance Adjustment–Adjust using "GO" and "NO GO" gauges (below).
2) High Tension Coil & Spark Plug Cable Installation–If wires loosen at coil and plug connections, check location of pressure relief hole in boot. If hole too low, pierce new .062" hole in side of boot 1/2-3/4" above lower edge of boot.
3) Carburetor Fuel Level–Check for fluctuations caused by burrs or rough spots on float hinge or pin, worn or ridged fuel inlet needle or seat and leakage, or incorrect float setting. *See "Holley (Ford) Dual" and "Holley (Ford, Lincoln, Mercury) 4-Barrel" in Carburetion Section for checking procedure and float and fuel level specifications.*

COMPRESSION PRESSURE: 130 lbs. (Except Special), 140 lbs. (Special).

VACUUM READING: 18-21" idling at 500 RPM.

VALVE TAPPET CLEARANCE: .019" (intake & exhaust), with engine at normal operating temperature. *NOTE*–Adjust with engine hot and idling, use .018" feeler as "GO", .020" feeler as "NO GO" gauge. This will insure tappet clearance being .019"±.001".

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Located at front end of right exhaust manifold (Single Exhaust), rear end of left exhaust manifold (Dual Exhaust). Install spring with ¾ turn windup. *NOTE*–Stop pin should be at top with valve installed.

►*MANIFOLD HEAT CONTROL PRODUCTION CHANGE* **(272 Engine with Single Exhaust):** New Manifold Heat Control Valve, No. B5A-9658-D can be installed. Valve has increased spring tension and will improve fuel distribution and minimize stalling (due to icing) by providing more exhaust gas heat.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders– RIGHT BANK 1-2-3-4, LEFT BANK 5-6-7-8.
SPARK PLUG GAP: .032-.036"
Spark Plug–Champion 870. 18mm. Special.

►*SPARK PLUG CAUTION: Spark plug is new type with tapered seat and does not require a sealing gasket. It is important that plugs tightened to 15-20 ft. lbs.*

COIL: Ford 8BA-12029. On engine at distributor.
Ignition Current–3.0 amps. idling, 5.0 stopped.

DISTRIBUTOR: Ford. Used as follows:

	Distributor No.
272 (Std.-2-barrel Carb.)	B5A-12127-B
272 (Special–4-Barrel Carb.)①	③ FEC-12127-A
272 (Special–4-Barrel Carb.)②	⑨ B5A-12127-F
292 (Interceptor)①	③ B5S-12127-D
292 (Interceptor)②	⑨ B5S-12127-E

①–Early Cars. ②–Later Cars. ③–See Distributor Modification (below). ⑨–Modified Distributors (with new spring combination for the Distributor Modification.

►*DISTRIBUTOR MODIFICATION & PRODUCTION CHANGE (Distr. Nos. FEC-12127-A & B5S-12127-D on Early 272 Special & Interceptor 292 Engines):* To minimize detonation, particularly in areas where fuel octane rating is below average, above distributors can be modified by replacing secondary spring (nearest vacuum chamber) with new spring No. 8EQ-12225, and recalibrating distributor advance as indicated in MODIFIED Advance Performance Table below. *NOTE*–Later B5A-12127-F & B5S-12127-E Distributors have this new spring and MODIFIED advance performance

►*CAUTION:* Above modification must NOT be made on 272 Std. Engine Distr. B5A-12127-B (will result in excessive spark advance and cause detonation).
Condenser–Ford FAB-12300-A. **Capacity** .21-.25 mfd.
Contact Point Set–Ford FAB-12171-A (B5A-12127-B Distr.), FAB-12171-B (All Others).
Breaker Gap–.014-.016".
Cam Angle–26-28½°.
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Counter-clockwise viewed from above.

Advance Performance
Distributor No. B5A-12127-B
►**With Distributor on Test Stand**

Distr. Degrees	Vacuum ("of HG)	Distr. RPM
0	.15	300
1½-2½	.40	500
9½-10½	1.58	1000
12¾-14	3.13	1500
15¼-16½	4.60	2000

Distr. FEC-12127-A & B5S-12127-D (Orig.)
►**With Distributor on Test Stand**

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
½-1½	19	300
11-12½	1.36	1000
12¾-13¾	1.59	1400
14¼-15½	1.95	2000

Modified Distr. FEC-12127-A & B5S-12127-D, All B5A-12127-F & B5S-12127-E
►**With Distributor on Test Stand**

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
¼-1¼	16	300
6½-7½	75	700
9½-10½	1.27	1200
11¼-12¼	1.59	1500
14-15¼	2.19	2000

►*DISTRIBUTOR INSTALLATION CAUTION: Make sure oil pump intermediate shaft properly engages distributor shaft. It may be necessary to turn over the engine with starter, after distributor drive gear is partially engaged, to engage distributor intermediate shaft.*

IGNITION TIMING

►*TIMING CAUTION: Timing is different on Synchro-mesh and Fordomatic Drive Cars.*
Setting (Fordomatic Cars)–6° BTDC.
Setting (Synchro-mesh Trans. Cars)–3° BTDC. NOTE–Timing on synchro-mesh cars can be set up to 6° providing higher octane rating gasoline is used.
Timing Mark–On crankshaft pulley and pointer on front engine cover. Align pointer and timing mark. NOTE–six timing marks (0°-2°-4°-6°-8°-10°-BTDC) on dampener. Wide mark represents TDC.

CARBURETOR

►*CARBURETOR APPLICATION: Two-barrel and four-barrel carburetors used on 272 Cu. In. Engine. Four-barrel carburetors used on 292 Cu. In. Engine.*

►*ACCELERATOR ROD-TO-BELL CRANK CONNECTING LINK CORRECTION (To Prevent Linkage Disconnection):* Install a No. 10 lockwasher, Part No. 34803-S7, between lock nut and accelerator rod. New rods which incorporate this change and which have improved design ball end sockets are available.

Anti-Stall Dashpot (Fordomatic Cars): First adjust engine idle speed then turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes the dashpot rod up to the end of its travel. Turn dashpot screw in (clockwise) 1½-2 turns to obtain .045-.064" clearance.

Throttle Linkage Adjustment (Fordomatic Cars): With selector lever in "N" position and engine at normal operating temperature, set idle speed to 450-475 RPM. Adjust Anti-Stall Dashpot, then turn engine off. Disconnect transmission throttle control rod from accelerator assembly lever on engine and insert a locking pin (¼" drill rod) through adjusting holes in lever and assembly. Adjust length of link between assembly and carburetor throttle valve lever to close lever against its stop. Adjust accelerator assembly connecting link (assembly-to-cross shaft link) to obtain a pedal height of 3 11/16" (Exc. Interceptor & Special), 3 9/16" (Interceptor & Special), Remove locking pin and pull up gently on transmission throttle control rod to hold transmission lever against its internal stop. Rotate clevis on upper end of rod until clevis fits freely on pin on accelerator assembly lever, **then lengthen rod by turning clevis 3 turns counter-clockwise.** Install throttle control rod on lever. Hold lever in alignment

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to prevent binding, and tighten locknut. Road test car and if band or clutch slippage evident, **increase rod length to 3½ turns of clevis but do not exceed 4 turns.** *NOTE*–Connecting link between cross shaft and lever must be parallel to center line of engine. Adjust as necessary by rotating adjusting screw in lever.

FORD TWO-BARREL

Transmission	Ford Carb. No.
Std. & Overdrive	B5A-9510-J
Fordomatic	B5A-9510-K

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–Initial setting 1½ turns open. Set both screws alike. Set for highest steady vacuum reading with engine at normal operating temperature, or midway between rolling and missing points. Turn screws out for richer mixture.

Idle Speed–475-500 RPM. (Std. & O.D.), 450-475 RPM. (Fordomatic) with selector lever in Neutral "N".

Float Level–1.275-1.305" measured from flange surface of air horn (near each end), to bottom side of float (not soldered seam). To correct float setting, bend float lever arm up or down.

Accelerating Pump: Center hole average setting. Inner hole for hot weather, Outer for cold weather.

Fast Idle: *Integral type. Operated by choke valve lever.* No adjustment required.

Throttle Linkage & Anti-Stall Dashpot Adjustment: See CARBURETOR above.

►*OTHER DATA: See "Holley-Ford Carburetors" in Carburetor Section*

Fuel Pump Pressure: 4-5 lbs. at 900 RPM.

FORD FOUR-BARREL

Transmission	Ford Carb. No.
Std. & Overdrive (Early)	B5A-9510-G
Fordomatic (Early)	B5A-9510-H
Std. & Overdrive (Later) ①	B5A-9510-M
Fordomatic (Later) ①	B5A-9510-N
All Transmissions (Latest) ②	B5A-9510-B

①–When used on 292 Eng. use air cleaner screw, Part No. B5S-9813-A (same as installed on old carburetor).

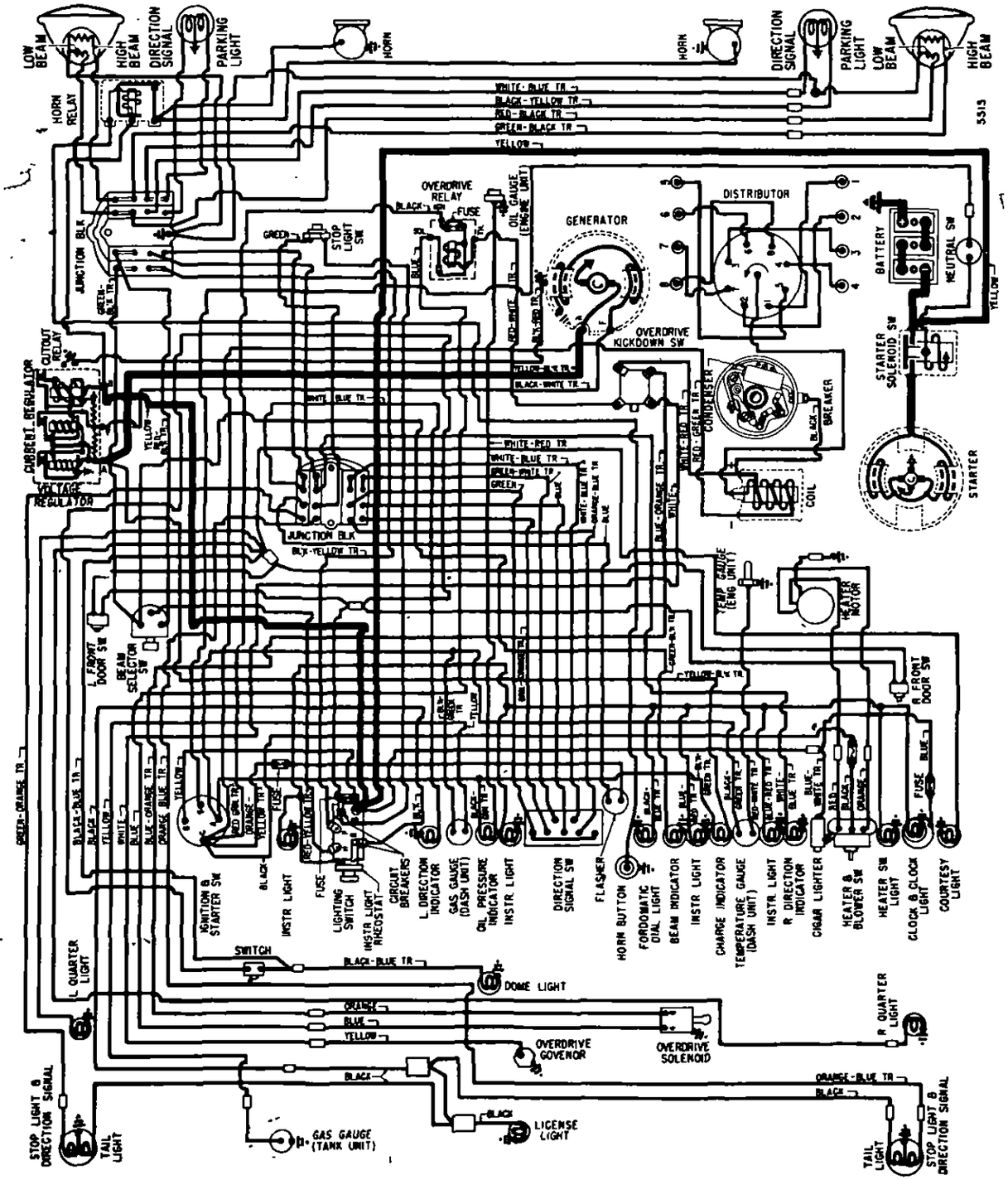
②–Have leaner setting, accomplished by redesigned idle tube assemblies, nozzle bar air bleeds, main jets, some main body drillings, and changed accelerator nozzles. New carburetor units identified by suffix "-5" either stamped or cast in side of main body following ECG model identification. *See "Ford, Lincoln, Mercury Centri-Quad 4-Barrel" in Carburetor Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*ROUGH ENGINE IDLE CORRECTION: See Tune-Up above.*

►*CARBURETOR ICING CORRECTION:* On early cars, Radiator Upper Air Deflector, No. B5A-8327-A, can be installed to restrict cold air entering engine compartment (this deflector installed in production beginning May, 1955). *CAUTION*–Deflector should be removed during summer months in extremely hot temperatures to avoid possibility of engine overheating.

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►*CHOKE VALVE BIND CORRECTION (First Cars): See "Ford Lincoln, Mercury Centri-Quad" Carburetor in Carburetor Section.*

►*CARBURETOR INSTALLATION CAUTION (First Cars):* Care must be taken not to dislodge choke air inlet tube washer in carburetor throttle body which may be carried into engine combustion chamber. *See "Ford, Lincoln, Mercury Centri-Quad 4-Barrel" in Carburetor Section.*

Idle Setting–1¼ turns open (B5A-9510-G, H), 1/2-5/8 turn open (B5A-9510-M, N). Set both screws alike. Set for highest steady vacuum reading with engine at normal operating temperature, or midway between missing and rolling points. Turn screws out for richer mixture.
Idle Speed–475-500 RPM (Std. & O.D.), 450-475 RPM. (Fordomatic Pass. Car), 475-500 RPM (Fordomatic Interceptor) with selector lever in Neutral "N".
Throttle Linkage & Anti-Stall Dashpot Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Ford, Lincoln, Mercury Centri-Quad 4-Barrel" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. at 900 RPM.

CARB. EQUIPMENT

►*FUEL TANK FILTER CAUTION:* If particles of foreign material found in fuel pump or carburetor on units built prior to February 1, 1955 are clear or cream colored, short, and thread like; they are probably from damaged fuel tank filter. Replace tank.

Fuel Pump: Ford B5A-9350-C, Fuel only (Except Fordomatic & Overdrive Cars). B5A-9350-D, Fuel & Vacuum (Fordomatic & Overdrive Cars).
Pressure–4-5 lbs. at 900 RPM.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric.
Dash Unit–Ford B5A-9280-A.
Tank Unit–Ford B5A-9275-A (Exc. Sta. Wgn. & Sedan Del.). B5A-9275-B (Sta. Wgn. & Sedan Del.).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Ford No. FDA-10655-A. 6 volt, 17 plate, 90 ampere hour capacity (20 hr. rate).
Battery Ground–Positive (+) to cylinder head.
Engine Ground–Cylinder head to dash.

STARTER

Ford FAC-11002-G. Armature–FAC-11005-B.
Drive–Ford 1CM-11350-C, Bendix "Folo-thru" type.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–48-56 ozs.
Cranking Speed– 115-125 RPM.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
14 ft. lbs.	Lock		700

①–With starter on engine and engine running.

►*STARTER INSTALLATION CAUTION:* Make certain that rubber seal properly positioned (can be held in place with rubber cement).

Starting Switch: Ford No. FAB-11450-B. Mounted on left front fender apron and controlled by Ignition Switch.

Fordomatic Neutral Safety Switch: Ford B5A-15812-A. **Adjustment**–*See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Ford FBC-10002-A (272 Eng.), **B5S-10002-A** (292 Eng.). **Armature**–FBC-10005-A.

►*GENERATOR BELT NOISE CORRECTION:* To make sure noise is coming from belt, squirt a few drops of hydraulic fluid on belt driving surface. If noise or whine disappears, replace belt with plain type No. B5A-8620-B belt.

Performance Data

Generator	Amperes ①	Eng. RPM
FBC-10002-A	35	850
B5S-10002-A	40	850

①–See Regulator for maximum charging rate.

Brush Spring Tension–30 ozs.
Field Current–1.5-2.5 amperes at 6.0 volts.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: ¼" belt deflection midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Ford FAC-10505-A (FBC-10002-A Gen.), **FAD-10505-A** (B5S-10002-A Gen.).

Cutout Relay

Cuts In–6.0-6.6 volts.

►*CUTOUT RELAY AIR GAP CHECK:* With cover off regulator, manually close cut-out contacts. Measure air gap between armature and core. The dimension should be .009-.013". Air gap with contacts open should be .012-.020". If either or both of these dimensions are not up to specifications, regulator is defective.

Voltage Regulator

Setting–7.4-7.8 volts.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–33-37 amperes (FAC-10505-A Reg.), 38-42 amperes (FAD-10505-A Reg.).
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equipment Section.*
Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N.
Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), and on top of brake booster assembly (Power Brakes).

FUSES: Located as indicated below:
Interior Lights–14 amps. on lighting switch.
Direction Signal–14 amps., in fuse holder between ignition switch and flasher.
Overdrive–30 amps., on overdrive relay.
Cigar Lighter–Special fuse in lighter base.
Clock–3 amps., in clock lead.
Heater–14 amps., in blower switch wire.

LIGHTING CIRCUIT BREAKERS: On Lighting Switch. Combination headlight switch circuit breaker and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument lights, parking lights and stop and tail light circuits.

HORNS: Ford B5A-13832-C (High Pitch), B5A-13833-C (Low Pitch). Dual horns operated by relay.
Horn Relay–Ford FAA-13853-A.

►*BACK-UP LIGHT SWITCH BRACKET INSTALLATION CAUTION:* Change in steering gear shift rod on late production cars affects installation of back-up light switch bracket, Part No. B5A-15517-A. To install this bracket, bend upward to prevent switch from bottoming when gear shift lever in reverse position. New bracket, Part No. B5A-15517-B, is included in new kit, Part No. B5A-18276-B. However, some new kits will be released with old bracket.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8.

Engine	Bore	Stroke	Displmnt.	Rated HP
272 Eng.	3.62"	3.30"	272 cu. ins.	42.0
292 Eng.	3.75"	3.30"	292 cu. ins.	45.0

Engine	Compr. Ratio	Developed HP
272 Exc. Special	7.6-1	162 at 4400 RPM
272 Special	8.5-1	182 at 4400 RPM
292 Interceptor	7.6-1	188 at 4400 RPM

Compression & Vacuum Reading–*See TUNE-UP.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Ford Special Data.*

►*CYLINDER HEAD IDENTIFICATION:* Identified by number cast in top of head. In addition, 292 Eng. Interceptor has ECK cast in recess in head gasket surface. Identification as follows:

Engine	Compr. Ratio	Casting No.
272 Standard	7.6-1	ECL-6090-A
292 Thunderbird Std.	8.1-1	ECL-6090-A
272 Special (Early)	8.5-1	① ECL-6090-B
272 Special (Later)	8.5-1	ECG-6090-A
292 Thunderbird Fordomatic	8.5-1	① ECL-6090-B
292 Interceptor (Early)	7.6-1	ECL-6090-B
292 Interceptor (Later)	7.6-1	ECK-6090-B

①–These two heads identified from each other by measuring thickness of either of two center machine locating pads (directly beneath No. 2 & No. 3 spark plug holes on right bank, below No. 6 & No. 7 holes on left bank). Thicknesses are: .964-.966" on 272 Special, .999-1.001" 292 Thunderbird.

►*DRIVE SHAFT-TO-FRAME INTERFERENCE CAUTION & CORRECTION (CONVERTIBLE):* On early production units, drive shaft may strike bottom of clearance hole in frame "X" member after vehicle passes over severe bump. Current production is installing three shims and longer bolts (7/16"-20" x 1½") between engine rear support and "X" member to prevent interference, and can be installed on early units. *NOTE*– If shims removed during repair operation, make sure they are reinstalled.

TIGHTENING TORQUES: *See "Tightening Specifications" in Ford Special Data.*
ENGINE REMOVAL: *See "Engine" in Ford Special Data.*
ENGINE FRONT MOUNTING: *See "Engine Mountings" in Ford Special Data.*

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OIL PAN REMOVAL: Drain crankcase. Remove engine front splash pans. Disconnect oil pump inlet tube at oil pump. Remove oil pan retaining screws and remove oil pan. *(NOTE*—No. 1 cylinder must be on TDC before oil pan can be removed). Remove nut securing oil pump inlet tube to oil pan, then remove oil pump screen and inlet tube assembly from oil pan.

PISTONS

Autothermic type. Solid skirt with three rings above pin.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Use ½" feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:
New Piston in New Bore—.0015" feeler. 5-10 lbs. pull.
New Piston in Used Bore—.002" feeler. 5-10 lbs. pull.
Used Piston in Used Bore—.0025" feeler. 5-10 lbs. pull.
Replacement Pistons: Standard size, .020", .030", .040", .060" Oversize. Pistons furnished only with fitted pins.
Installing Pistons: Install with small indentation in head toward FRONT of engine.

PISTON PINS

Floating type with lock rings at each end.
Diameter—.9120-.9123". **Length**—3.016-3.030".
Pin Fit in Piston—Hand push fit at 70°F.
Pin Fit in Rod Bushing—.0001-.0003" clearance. New pin should not fall through of own weight.
Replacement Pins: Standard size, .001", .002" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.010-.027"	.002-.0035"
Compr. #2	3/32"	.010-.027"	.002-.0035"
Oil	3/16"	.010-.027"	.0015-.003"

Replacement Rings: Standard size, .020", .030", .040", .060" Oversize.
►*REPLACEMENT PISTON RING NOTE:* "Snap type" rings furnished in standard size only, "Steel section type" in all above oversizes.

CONNECTING RODS

Crankpin Journal Diameter—2.1880-2.1888".
Lower Bearing—Steel backed, copper lead alloy lined type. Upper and lower halves interchangeable.
Clearance—.0008-.0027".
Side Clearance—.006-.016" (two rods).
Replacement Bearings: Standard size (4 sizes marked **red & blue** for selective fitting) and .010", .020", .030" Undersize.
Installing Rods: Rod bearing lock slot in rod should be toward outside of engine "V". When installing rod and piston assembly in engine indentation on top of piston head should be to front of engine, and numbers on rod and cap should be to left (left bank) and to right (right bank).

CRANKSHAFT

Journal Diameter—2.4980-2.4988". Max. wear limits .0015", taper .001".
Bearings—Steel backed, copper lead alloy lined.
Replacement Bearings: Standard size, (4 sizes marked **red & blue** for selective fitting) and .010", .020", .030" Undersize.
End Thrust: Taken by No. 3 main bearing. Replace bearing if endplay excessive.
Thrust Bearing Alignment—*See "Crankshaft & Main Bearings" in Ford Special Data.*
Endplay—.002-.006".
Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Ford Special Data.*
Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Ford Special Data.*

CAMSHAFT

Journal Diameter—1.9255"-1.9265" (new). 1.924" (worn limit).
Clearance—.001-.003" (new). .005" (worn limit).
End Thrust: Taken by plate on forward end of block (between camshaft sprocket and shoulder on block).
Endplay—.003-.007".
Replacement Camshaft Bearings: Finished bearings furnished Standard, .015" Undersize. *CAUTION—Oil holes in bearings must be lined up correctly. See Ford Special Data.*
Camshaft Bearing Removal & Installation: *See "Camshaft & Bearings" in Ford Special Data.*
Timing Chain: Side-guide type. Length 56 links.
►*REPLACEMENT NOTE:* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure slack on opposite side).
►*CAMSHAFT SPROCKET SPACER INSTALLATION CAUTION:* If spacer, Part No. EBE-6265-A, installed backwards, it will allow an excessive amount of endplay. Inside diameter of spacer has a chamfer on one side and this chamfered side should be installed toward No. 1 camshaft bearing journal.
Camshaft Setting: Sprockets marked by "O" at one tooth. Mesh chain so that there are 12 pins betweeh "O" mark s.
Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Ford Special Data.*

VALVES

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves): Stem diameter decreased .0005" for greater stem clearance in guide. See "Valve System" in Ford Special Data.*
Tappet Clearance: .019" (Intake & Exhaust), with engine at normal operating temperature. *NOTE—Valve tappet clearance on truck engines is different.*

Valve	Head Diam.	Stem Diam. ①	Length
Intake	1.785"	.3415"	5.02"
Exhaust	1.515"	.3405"	5.02"

Valve	Seat Angle	Lift ②	Stem Clearance
Intake	45°	.345"	.002" max.
Exhaust	45°	.345"	.003" max.

①—Valves furnished with .003", .015", .030" oversize stems for service replacement. *See "Valve Guides" in Ford Special Data.*
②—Minimum lift for checking camshaft lobe wear.
Valve Seat Width—.060-.070" (Intake). .070-.080" (Exhaust).
►*ROTATABLE VALVE NOTE: All valves are rotatable type. See "Valve System" in Ford Special Data.*
Valve Stem Oil Seals—"Umbrella" type oil seals used on intake & exhaust valve stems. Seals are installed with cupped side down on valve stem at guide boss on cylinder head. *Install new seals whenever valves removed or when seals become loose on valve stems.*
►*VALVE STEM OIL SEAL PRODUCTION CHANGE & INSTALLATION CAUTION:* New valve stem oil seal (Part No. B5A-6571-A) is being installed in production and is available for service. Skirt length has been increased .001" to seal a greater area of valve stem from oil splash. Also, seal will minimize amount of oil permitted to enter combustion chamber via stem-to-valve guide clearance. *When servicing engines with old type seal, new seal should be used.*
Valve Springs: Install with closed coil end toward cylinder head. **Free Length**—2.11-2.13".

Valve Spring Specifications

	Pressure	Length
Valve Closed	54-62 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (See table above), ream guides and install oversize valve. *See "Valve Guides" in Ford Special Data.*
Valve Lifters: Mushroom type. Removed from below with camshaft removed.
►*VALVE LIFTER INSTALLATION CAUTION:* Cast iron tappet, Part No. EAA-6500-C, should no longer be used as service replacement on 8-cylinder engines as these tappets may contribute to cam lobe wear. Use steel tappet, Part No. EAA-6500-D. Cast iron tappet has smooth molded appearance on unmachined portion of tappet foot. Tappet foot is .220" thick. Steel tappet has forging marks on outer edge of tappet foot and is .140" thick.
Rocker Arm Assembly: *See "Valve System" in Ford Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
►*VALVE TIMING NOTE:* The following valve opening and closing points are with camlift as indicated.
Intake Valves—Open 12° ① BTDC. Close 54° ① ALDC.
Exhaust Valves—Open 58° ③ BLDC. Close 8° ③ ATDC.
①—Camlift .016". ②—Camlift .019". ③—Camlift .014". ④—Camlift .018".
Valve Timing Check: *See "Camshaft Setting" under CAMSHAFT above.* Remove right-hand rocker chamber cover. Turn engine over until No. 1 intake tappet is on heel of No. 1 intake cam lobe. Back off No. 1 intake valve adjusting screw push rocker arm to one side, then install dial indicator. Zero dial indicator, then rotate engine slowly until desired lift (.016") obtained. Compare degrees on pulley with specifications (12°). If not within specifications check for bent timing pointer by bringing No. 1 piston to TDC and see if timing pointer aligned with TDC mark on crankshaft pulley. If pointer not at fault, check timing chain, camshaft sprocket, camshaft, crankshaft pulley, and crankshaft in order of accessibility.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add 1 qt. when filter changed.
Normal Oil Pressure: 45-55 lbs. at 30-40 MPH.
Pressure Regulator Valve—In pump body, not adjustable.
Oil Pressure Indicator—Indicator light on instrument panel, operated by Engine Unit—Ford No. FDA-9278-A (Stamped No. 7 on Hex.). Lights when ignition switch turned on, goes out when engine starts.

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Oil Pump: Gear type pump located on left side of engine crankcase, driven by distributor drive gear.
Pump Overhaul—*See "Oiling System" in Ford Special Data.*

►*OIL PUMP LEAK CORRECTION:* On some oil pumps, oil pump cover bolt holes may be tapped into gear cavity of pump causing oil leak past threads and out between bolt and pump cover. To correct, remove cover bolts. Coat threads of bolts with Sealing Compound, Part No. 8A-19554-B. Install bolts.

►*OIL PAN-TO-PUMP TUBE SEAL INSTALLATION CAUTION:* Pump failures have been encountered due to pieces of oil pan-to-oil pump seal (Part No. B4A-6698-A) breaking off and lodging between oil pump gears. In some cases, oil inlet tube is too short. As a result, when retaining nut is tightened excessively, seal is squeezed over edge of tube which cuts seal. *Always lubricate seal with engine oil prior to installation, and tighten retaining nut just enough to insure against leakage.*

Oil Filter: Full-flow type (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil dirty or polluted.
Filter Element Installation—*See "Oiling System" in Ford Special Data.*
Replacement Filter Element—Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION: This special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication.*

►*BRAKE LINE INTERFERENCE WITH OIL FILTER CORRECTION:* Clip, Part No. B4A-2244-A, and attaching screw, Part No. 39883-S7, now available to secure brake line to rear side of No. 2 crossmember. On vehicles not equipped with additional clip (now used in production), and on which interference is encountered proceed with installation of additional clip as follows: Locate and mark spot on No. 2 crossmember 4½" to left, and 4 15/16" up from center of existing clip at left hand rear side of crossmember. Drill 9/32" hole at this spot. Position brake line on crossmember, and secure line with clip and screw. *NOTE*—Brake line will move far enough to permit installation without bending or crimping line.

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

►*CRANKCASE VENTILATION GASKET INSTALLATION CAUTION:* On some units gasket (B4A-6872-A) may have been installed upside down causing leak at gasket location. Bolt center line is 5/64" below center line of gasket.

COOLING

Water Capacity: 20 qts. (without heater), 21 qts. (with heater).
Pressure Valve: Ford LA-8100-A, 12-15 lbs. (marked "13" or "14"). *CAUTION*—If replacement required use 12-15 lb. type, Radiator filler cap.
Thermostat: Ford No. B4A-8575-A (160°), No. B4A-8575-B (180° used with permanent anti-freeze). Mounted inside water outlet elbow on forward end of intake manifold. *NOTE—The above thermostat replaces type formerly used.*
Water Pump: Packless, sealed ball bearing type.
See "Ford V8" in Water Pump Section.
Temperature Gauge: King-Seeley Electric.
Dash Unit—Ford No. B5A-10883-A.
Engine Unit—Ford No. 1A-10884-A.
Temperature Bulb Sleeve Removal: Thread adapter handle of tool T50T-100-A. into sleeve. Tighten locknut against sleeve, then pull sleeve with sliding hammer.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 10NC. Ford B5A-7563-A. (Heavy Duty) **B5S-7563-A (11").**
See "Long Clutches" in Clutch Section.

►*ENGINE VIBRATION CORRECTION (Due to Improper Clutch Disc Friction-Lag):* Vibration noted on some cars equipped with Standard and Overdrive Transmissions. To help this condition, install service clutch disc, Part No. B5A-7550-A, which has proper friction-lag characteristics. *NOTE*—Only disc should be replaced. Repairs to transmission or replacement of clutch pressure plate have proven of little value in correcting condition.

Clutch Disc No.—(B5A-7563-A Clutch) B5A-7550-A, (B5S-7563-A Clutch) B5S-7550-A.
Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper until travel is within limits.
Pedal Free Travel—1 1/8-1 3/8". Loosen lock nut on clutch pedal release rod, turn adjusting nut until correct travel is reached.
Removal: Remove transmission (see Transmission Removal below), and slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar bracket from flywheel housing and remove equalizer bar. Remove split bronze bushing from bracket and then remove flywheel housing. Install Tool 7563 and remove clutch pressure plate assembly (if tool not available, clutch may be released by backing off the attaching bolts evenly). Remove clutch release bearing from hub with an arbor press.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See "Ford Synchro-mesh" in Transmission Section.
Transmission Control: *See "Transmission Controls" in Transmission Section.*

►*INTERMEDIATE & HIGH GEAR JUMP-OUT CORRECTION: See "Ford Synchro-mesh" in Transmission Section.*

►*STANDARD & OVERDRIVE TRANSMISSION INSTALLATION CAUTION:* 292 Eng. Police Interceptor uses Lincoln-Mercury Transmissions which are not interchangeable with Ford Transmissions.

►*TRANSMISSION GEARSHIFT ROD BIND CORRECTION (Interceptor):* To correct, weld 5/16" flat washer (Part No. 44722-S8) on each rod 5/8" from end.

►*SYNCHRO-MESH LOW GEAR JUMP-OUT CORRECTION (Due to Insufficient Clearance):* To correct, remove side cover, and grind corner of detent boss to provide sufficient clearance between shift cam and detent boss.

Removal: Drain transmission, disconnect gear shift linkage at transmission. Remove speedometer cable and gear, remove drive shaft. Remove bolts which hold transmission extension to engine rear support. Remove frame cross-member and engine rear support. Remove bolts and lock washers which attach transmission to clutch housing, then install two guide pins. Move transmission assembly to rear until input shaft splines clear clutch housing, then lower transmission and pull forward to remove from car.

OVERDRIVE

Warner Model AS4-R10F. Solenoid operated type, with governor control and throttle operated kick-down. Lock-out Switch not used on this model.
See "Warner R10 Overdrive" in Transmission Section.
Overdrive Control: *See "Overdrive Control" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.
See "Fordomatic & Mercomatic" in Transmission Section.

►*FORDOMATIC "WHISTLING" NOISE CORRECTION: This condition may occur during normal engine operation. See "Fordomatic & Mercomatic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*
Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain & refill every 15,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level: With selector lever in "N" (Neutral) and emergency brake applied, run engine approximately four minutes at idle speed. Check to see that emergency brake is applied and that engine is on slow idle, move selector lever to the "P" (Park) position. (*NOTE*—When engine and transmission are at normal operating temperature, move selector lever through all ranges to assure fluid distribution throughout transmission). Raise hood and wipe top of oil level indicator. Remove indicator and read fluid level. Add Automatic Transmission Fluid "Type A" if necessary to bring fluid level to "Full" mark on indicator. Replace fluid level indicator.

THROTTLE LINKAGE ADJUSTMENT: *See Carburetor above.*

►*OTHER "FORDOMATIC" SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

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UNIVERSALS

Mechanics. Needle bearing type.

►*CAUTION: (All Cars Except Station Wagon & Sedan Del. & Interceptor): Rear Universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own. Separate Carrier, semi-floating hypoid, with Hotchkiss drive.

►*NOTE: Axle not same as Station Wagon & Sedan Delivery. See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.*

Ratios	Standard	Overdrive	Fordomatic
V8 Cars	3.78-1	3.89-1	3.55-1, 3.30-1

►*RATIO, DRIVE GEAR & DIFFERENTIAL CASE IDENTIFICATION:*

Gear Ratio	Differential Case Color	Drive Gear No. (on Edge of Gear)
3.89-1	Black	AD-4210-B
3.78-1	Black	AG-4210-A
3.55-1	Red	AF-4210-B
3.30-1	Gray	AF-4210-A

Backlash—.003-.008".

Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: Drain lubricant from rear axle housing. Remove carrier-to-housing nuts, then remove identification tag (ratio) and set it aside for reference during assembly of axle. Remove carrier assembly from axle housing.

EXCEPT PASSENGER CARS

Own. Integral Carrier, semi-floating hypoid, with Hotchkiss drive.

►*NOTE: Axle assembly not same as passenger cars. See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.*

Ratios:	Standard	Overdrive	Fordomatic
Sta. Wgn.	4.09-1	4.27-1	3.54-1
Sedan Del.	4.09-1	4.27-1	3.54-1
Interceptor	3.92-1		3.31-1

Axle Shaft Removal: Same as Pass. Cars (above).

Rear Axle Assembly Removal: Raise rear end of car and disconnect rear universal. Remove axle shafts. Disconnect brake lines at "T" on left side of axle housing. Disconnect hand brake cable, shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

Model	① Front	① Rear
Pass. Cars (Std.)	B5A-18124-A	B5A-18125-A
Pass. Cars (H. Dty)	B5A-18124-C	B5A-18125-C
Sta. Wgn. & Sed. Del.	B5A-18124-C	B5A-18125-D

①—Furnished in kits which include shock absorber mounting bushings.

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs.

See "Lincoln, Mercury, Ford (Ball-Joint)" in Front Suspension Section.

►*LOWER ARM BUMPER INSTALLATION CAUTION:* Right and left hand bumpers are different and must be installed in the correct position. Damage to suspension will result if installed incorrectly. **Bumpers when installed should point slightly inboard.**

Kingpin Inclination—6° minimum, 7° maximum, crosswise.

Caster—Pos. ½° to Pos. 1½°. Maximum variations between wheels ½°.

Camber—Pos. ¼° to Pos. 1¼°. Maximum variation between wheels ¼°.

Toe-In—1/16" to 1/8".

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type.
See "Gemmer Worm & Roller (Type 305)" in Steering Section.

Power Steering: Ford-Mercury Linkage type. Used in junction with standard steering gear.
See "Ford & Mercury Bendix" in Steering Section.

Pump Belt Adjustment: Install torque wrench on pump pulley bolt. Check torque required to slip pulley against belt friction. If torque is not 14-16 ft. lbs. adjustment is required. To adjust, position a heavy duty 1½" "C" clamp with bottom against lower side of pump support bracket and top of clamp resting on pump bracket at its center. Loosen four pump attaching bolts until pump body may be repositioned by tightening "C" clamp. Tighten "C" clamp until torque of 14-16 ft. lbs. is required to slide pump pulley. (*NOTE*—Hold final torque as close as possible to upper limit). Tighten pump attaching bolts, remove "C" clamp, and make a final check of pulley sliding torque.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

BRAKES

Ford-Bendix Hydraulic (Single Anchor—with eccentric on front wheels, without eccentric on rear wheels). Hand lever applies rear wheel service brakes.

See "Ford, Lincoln, Mercury Bendix" in Brake Section. and note following change:

►*FRONT WHEEL ADJUSTMENT CHANGE:* Eccentric has been moved from secondary shoe to primary shoe. Initial adjustments made on primary instead of secondary shoe.

►*PARKING BRAKE "FIX" CORRECTION:* New parking brake equalizer, Part No. B5A-2119-A, available to correct permanent set of early cable equalizer, Part No. 8A-2119-A. Before installing on a convertible, cut 1 5/8" from each end of equalizer.

►*BRAKE LINE INTERFERENCE WITH OIL FILTER CORRECTION: See "Oil Filter" under CILING SYSTEM above.*

Drum Diameter—11" front and rear. Maximum boring limit 11.06".

Wheel Cyl. Diameter—1 1/8" (Front—All), 7/8" (Rear—Pass. Car), 15/16" (Rear—Sta. Wgn. & Sed. Del.).

Lining—Molded type riveted to shoe.
Lining Width—2¼" (Front-All), 1¾" (Rear—Pass. Car), 2" (Rear—Sta. Wgn. & Sed. Del.).

Lining Thickness—3/16" (Exc. Front Whl. Secondary—Pass. Car), 15/64" (Front Whl. Secondary—Pass. Car), 7/32" (All Shoes—Sta. Wgn. & Sed. Del.).

Lining Length—10.84" (All Shoes—Pass. Car), 9.28" (Primary Shoes—Sta. Wgn. & Sed. Del.), 11.94' (Secondary Shoes—Sta. Wgn. & Sed. Del.).

Clearance—.010" at each end of both primary and secondary shoes. Maximum variation .003" (Adjusting screws backed off 10-12 notches from point where shoes drag on drum. *See Adjustment Change above.*

Brake Pedal Free Play Adjustment: 1/4-7/16". If play not correct after brake adjustment, loosen lock nut on the eccentric bolt attaching brake pedal to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder: Located on engine side of firewall.

Checking Fluid—Maintain fluid level to within ½" of top of reservoir.
Removal—Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to firewall.

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Power Brakes: Midland Hy-Power Unit mounted on left side of car in engine compartment and connected in hydraulic brake line between master cylinder and wheel cylinder. There are no mechanical connections and no adjustments are required.
See "Midland Power Unit" in Brake Section.

Checking Brake Fluid—Same as for manual brakes (above).

Removal of Power Unit—Depress brake pedal a few times to remove all vacuum from system. Disconnect hydraulic lines at the power unit and remove wires from brake stop light switch. Remove power unit to mounting bracket bolts and lockwashers and remove the power unit.

MISC. MECHANICAL

Windshield Wipers: Vacuum link and crank arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Reversible motor in each window. *See "Electric Window Regulators" in Miscellaneous Section.*

►*POWER WINDOW REGULATOR RELAY "FLUTTER" CORRECTION: See "Power Window Regulators" in Miscellaneous Section.*

Power Top Control: Electric Hydraulic with reversible pump motor. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric screw and jack type with individual motors and transmissions for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

Air Conditioning: *See Ford "SelectAire" in Miscellaneous Section.*

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate installed on dash panel in engine compartment.

First Number—100001.

►*VEHICLE NUMBER NOTE:* Vehicle number (example "P5FV100001") includes following identification data

Eng. Type①	Year②	Assy. Plant	Body Style③	Serial No.
P	5	See below	H	100001 up.

①—**A**—6 Cyl. 223 cu. in. engine; **U**—8 Cyl. 272 cu. in. engine; **P**—8 Cyl. 292 cu. in. engine (Special Law Enforcement & Thunderbird).

②—Last digit of model year.

③— **H**—Thunderbird.

Assembly Plant Designation

A—Atlanta	**F**—Dearborn	**N**—Norfolk
B—Buffalo	**G**—Chicago	**P**—St. Paul
C—Chester	**K**—Kansas City	**R**—Richmond
D—Dallas	**L**—Long Beach	**S**—Somerville
E—Edgewater	**M**—Memphis	**U**—Louisville

TUNE-UP

►*THUNDERBIRD V8 ENGINE ROUGH IDLE: See TUNE-UP on Ford V8 Passenger Car page for complete corrective procedure.*

COMPRESSION PRESSURE: 135 lbs. (Std. & O.D.), 140 lbs. (Fordomatic), at cranking speed.

VACUUM READING: 18-21" idling at 500 RPM.

VALVE TAPPET CLEARANCE: .019" (intake & exhaust), with engine at normal operating temperature. *NOTE*—Adjust with engine hot and idling, use .018" feeler as "GO", .020" feeler as "NO GO" gauge. This will insure tappet clearance being .019"±.001".

MANIFOLD HEAT CONTROL: Automatic thermostatic type with counterweight. Valve on cars with single exhaust system is located on front end of right hand exhaust manifold. Cars with dual exhaust system, the valve is located in rear end of left hand exhaust manifold. Thermostat spring installed with ¾ turn windup and hooked over stop pin. NOTE—When valve installed, stop pin should be at top.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.

Cylinders—RIGHT BANK 1-2-3-4. LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .032-.036"

Spark Plug—Champion 870. 18mm. Special.

►*SPARK PLUG CAUTION: Spark plug is new type with tapered seat and does not require a sealing gasket. It is important that plugs be tightened to 15-20 ft. lbs.*

COIL: *Ford 8BA-12029. On engine at distributor.*

Ignition Current—3.0 amps. idling, 5.0 stopped.

DISTRIBUTOR: Ford	**Distributor No.**
Early Cars	① B5S-12127-D
Later Cars	② B5S-12127-E

①—See Distributor Modification (below).

②—Modified Distributor (with new spring combination indicated in Distributor Modification).

►*DISTRIBUTOR MODIFICATION & PRODUCTION CHANGE: (Distr. No. B5S-12127-D on early cars):* To minimize detonation, particularly in areas where fuel octane rating is below average, distributor can be modified by replacing secondary spring (nearest vacuum chamber) with new spring, No. 8EQ-12225, and recalibrating distributor advance as indicated in MODIFIED Advance Performance Table below. *NOTE*—Later Distr. B5S-12127-E has this new spring and MODIFIED advance performance.

Condenser—Ford FAB-12300-A **Capacity** ..21-.25 mfd.

Contact Point Set—FAB-12171-B.

Breaker Gap—.014-.016".

Cam Angle—26-28½°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Advance Performance

Original Distributor B5S-12127-D

►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
½-1½	19	300
11-12½	1.36	1000
12¾-13¾	1.59	1400
14¼-15½	1.95	2000

Modified B5S-12127-D, & B5S-12127-E

►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
¼-1¼	16	300
6½-7½	75	700
9½-10½	1.27	1200
11¼-12¼	1.59	1500
14-15¼	2.19	2000

►*DISTRIBUTOR INSTALLATION CAUTION: Make sure oil pump intermediate shaft properly engages distributor shaft. It may be necessary to turn over the engine with starter, after distributor drive gear is partially engaged, in order to engage distributor intermediate shaft.*

IGNITION TIMING

►*TIMING CAUTION: Timing is different on Synchro-mesh and Fordomatic Drive Cars.*

Setting (Fordomatic Cars)—6° BTDC.

Setting (Synchro-mesh Trans. Cars)—3° BTDC. NOTE—Timing on synchro-mesh cars can be set up to 6° providing higher octane rating gasoline is used.

Timing Mark—On crankshaft pulley and pointer on front engine cover. Align pointer and timing mark. NOTE—six timing marks (0°-2°-4°-6°-8°-10°-BTDC) on dampener. Wide mark represents TDC.

CARBURETOR

FORD FOUR-BARREL

Transmission	Ford Carb. No.
Std. & Overdrive (Early)	B5A-9510-G
Fordomatic (Early)	B5A-9510-H
Std. & Overdrive (Later) ①	B5A-9510-M
Fordomatic (Later) ①	B5A-9510-N

①—When used on 292 Eng. use air cleaner screw, Part No. B5S-9813-A (same as installed on old carburetor).

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*ROUGH ENGINE IDLE CORRECTION: See TUNE-UP on Ford V8 Passenger Car page for complete corrective procedure.*

►*FORDOMATIC THROTTLE LINKAGE PRODUCTION CHANGE & NO DOWNSHIFT CORRECTION (Early Cars):* To correct "No Downshift" condition on cars built prior to January 12, 1955, a new transmission control shaft-to-accelerator rod, Part No. B5A-9784-F, and a new control shaft, Part No. B5S-77230-F, are available. New parts eliminate bend or twist in bellcrank portion of transmission control shaft and bracket assembly. Cars built after January 12, 1955 have new parts installed.

►*THUNDERBIRD ACCELERATOR ASSEMBLY PRODUCTION CHANGE (To Correct Permanent Set):* New accelerator assembly, Part No. B5S-9725-B, available to replace assembly, Part No. B5S-9725-A, which was found to take a permanent set under operating load conditions.

►*CHOKE VALVE BIND CORRECTION (First Cars): See "Ford Lincoln, Mercury Centri-Quad" Carburetor in Carburetor Section.*

►*CARBURETOR INSTALLATION CAUTION (First Cars):* Care must be taken not to dislodge choke air inlet tube washer in carburetor throttle body which may be carried into engine combustion chamber. *See "Ford, Lincoln, Mercury Centri-Quad" in Carburetor Section.*

Idle Setting—1¼ turns open (B5A-9510-G, H), 1/2-5/8 turn open (B5A-9510-M, N). Set both screws alike. Set for highest steady vacuum reading with engine at normal operating temperature, or midway between missing and rolling points. Turn screws out for richer mixture.

Idle Speed—475-500 RPM (Std. & O. D.), 475-500 RPM (Fordomatic) with selector lever in Neutral.

Anti-Stall Dashpot Adjustment (Fordomatic Cars): First adjust engine idle speed, then turn engine off. Loosen dashpot adjusting screw locknut, hold throttle inclosed position and turn adjusting screw out (counter-clockwise) until screw pushes dashpot rod in to the end of its travel, then turn adjusting screw in (clockwise) 1½-2 turns to provide correct clearance of .045-.064", tighten locknut.

Throttle Linkage Adjustment (Fordomatic Cars): With selector lever in "N" position and engine at normal operating temperature, set engine idle speed to 450-475 RPM. Adjust Anti-Stall Dashpot, then turn engine off. Disconnect transmission throttle control rod from accelerator assembly lever on engine and insert a locking pin (¼" drill rod) through adjusting holes in lever and assembly. Adjust length of link between assembly and carburetor throttle valve lever to close lever against its stop. Adjust accelerator assembly connecting link (assembly-to-cross shaft link) to obtain a pedal height of 4¼". Remove locking pin and pull up gently on transmission throttle control rod to hold transmission lever against its internal stop. Rotate clevis on upper end of rod until clevis fits freely on pin on accelerator assembly lever, **then lengthen rod by turning clevis 3 turns counter-clockwise.** Install throttle control rod on lever. Hold lever in alignment to prevent binding, and tighten locknut. Road test car and if band or clutch slippage evident, **increase rod length to 3½ turns of clevis but do not exceed 4 turns.** *NOTE*—Connecting link between cross shaft and lever must be parallel to center line of engine. Adjust as necessary by rotating adjusting screw in lever.

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▷*OTHER DATA: See "Ford, Lincoln, Mercury Centri-Quad" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. at 900 RPM.

CARB. EQUIPMENT

▷*FUEL TANK FILTER CAUTION:* If particles of foreign material found in fuel pump or carburetor on units built prior to February 1, 1955 particles should be examined very closely (with magnifying glass and strong light). If particles clear or cream colored, short, and thread-like pieces, they are probably from a damaged fuel tank filter. To correct, replace fuel tank.

Fuel Pump: Ford B5S-9350-A, Fuel only (Except Ford-omatic & Overdrive Cars). B5S-9350-B, Fuel & Vacuum (Fordomatic & Overdrive Cars).
Pressure–4-5 lbs. at 900 RPM.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric.
Dash Unit–Ford B5A-9280-A.
Tank Unit–Ford B5A-9275-A.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Ford 01A-10655-A. 6 volt, 17 plate, 120 ampere hour capacity (20 hr. rate).
Battery Ground–Positive to engine.
Engine Ground–Cylinder head to dash.

STARTER

Ford FAC-11002-G. Armature FAC-11005-B.
Drive–Ford 1CM-11350-C, Bendix "Folo-thru" type.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–48-56 ozs.
Cranking Speed–115-125 RPM.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
14 ft. lbs.	Lock		700

①–With starter on engine and engine running.

▷*STARTER INSTALLATION CAUTION:* Make certain that rubber seal is properly positioned before mounting starter. If trouble encountered in keeping seal in position, apply rubber cement to both seal and engine block to hold seal in position while mounting starter.

Starting Switch: Ford FAB-11450-B. Mounted on left front fender apron and controlled by Ignition Switch. *NOTE*–Neutral Safety Switch is used on all cars with Fordomatic.

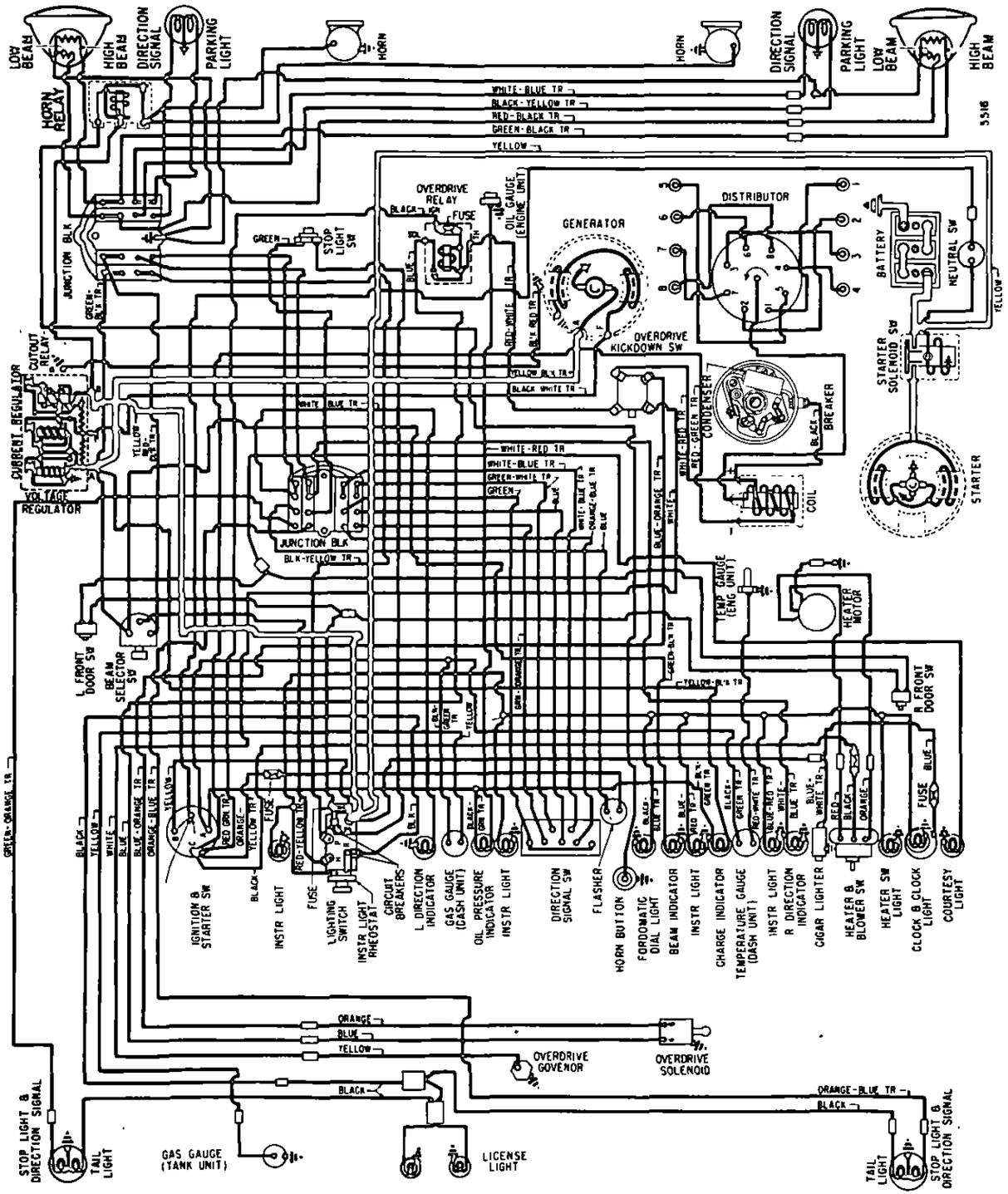
Fordomatic Neutral Safety Switch: Ford B5S-15812-B.
Adjustment–*See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Ford B5S-10002-A. Armature FBC-10005-A.

▷*GENERATOR BELT NOISE CORRECTION:* To make sure noise is coming from belt, squirt a few drops of hydraulic fluid on belt driving surface. If noise or whine disappears, belt is at fault and should be replaced with plain type belt, Part No. B5A-8620-B. In some cases, removal of paint in generator pulley groove has stopped noise without belt replacement.

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Performance Data

Generator	Amperes ①	Eng. RPM
FBC-10002-A	35	850
B5S-10002-A	40	850

①—See Regulator for maximum charging rate.

Brush Spring Tension—30 ozs.
Field Current—1.5-2.5 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.

►*THUNDERBIRD GENERATOR REMOVAL PROCEDURE (To Prevent Loss of Coolant):* Disconnect generator leads, remove two nuts from generator mounting bolts and capscrew from adjusting bracket. Remove fan belt. Remove capscrew attaching support bracket to front of generator mounting bracket. Remove top capscrew attaching main generator mounting bracket to engine front cover, and loosen lower capscrew about two full turns. Remove capscrew attaching front of generator to main generator mounting. *(NOTE*—Do not remove lower capscrew as it is tapped into water jacket and coolant will be lost). Swing generator up to let bracket pivot outboard on its lower mounting capscrew enough to permit removal of rear generator mounting bolt. Remove generator. *CAUTION*—If generator not immediately installed, tighten lower capscrew to prevent possible loss of coolant.

Belt Adjustment: ¼" belt deflection midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Ford FAD-10505-A.

Cutout Relay

Cuts In—6.0-6.6 volts.

►*CUTOUT RELAY AIR GAP CHECK:* With cover off regulator, manually close cut-out contacts. Measure air gap between armature and core. The dimension should be .009-.013". Air gap with contacts open should be .012-.020". If either or both of these dimensions are not up to specifications, regulator is defective and should be replaced.

Voltage Regulator

Setting—7.4-7.8 volts.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—38-42 amperes.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out to switch. Unscrew mounting nut with Tool 17470-N. Remove switch and disconnect all wires.
Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), and on top of brake booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment.

►*BACK-UP LIGHT SWITCH BRACKET INSTALLATION CAUTION:* Change in steering gear shift rod on late production cars affects installation of back-up light switch bracket, Part No. B5A-15517-A. To install this bracket, bend upward to prevent switch from bottoming when gear shift lever in reverse position. New bracket, Part No. B5A-15517-B, is included in new kit, Part No. B5A-18276-B. However, some new kits will be released with old bracket.

FUSES: Located as indicated below:
Interior Lights—14 amps., on lighting switch.
Direction Signal—14 amps., in fuse holder between ignition switch and flasher.
Overdrive—30 amps., on overdrive relay.
Cigar Lighter—Special fuse in lighter base.
Clock—3 amps., in clock lead.
Heater—14 amps., in blower switch wire.

LIGHTING CIRCUIT BREAKERS: On lighting switch. Combination headlight switch circuit breaker and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument lights, parking lights and stop and tail light circuits. Fuse protects interior lighting circuit (14 amps.).

HORNS: Ford B5A-13832-C (High Pitch), B5A-13833-C (Low Pitch). Dual Horns operated by relay.
Horn Current—12-14 amperes.
Horn Relay—Ford FAA-13853-A.

ENGINE

ENGINE SPECIFICATIONS: 90° V8.

Engine	Bore	Stroke	Displmnt	Rated HP
292 Eng.	3.75"	3.30"	292 cu. ins.	45.0

Transmission	Compr. Ratio	Developed HP
Std. & Overdrive	8.1-1	193 at 4400 RPM
Fordomatic	8.5-1	198 at 4400 RPM

Compression & Vacuum Reading—*See TUNE-UP.*

►*OTHER ENGINE DATA:* *See Ford V8 Passenger Car.*

VALVE TIMING

See "Camshaft Setting" under Ford V8 Passenger Cars.

►*VALVE TIMING NOTE:* The following valve opening and closing points are with camlift as indicated.
Intake Valves—Open 12° ① BTDC. Close 54° ② ALDC.
Exhaust Valves—Open 58° ③ BLDC. Close 8° ④ ATDC.
①—Camlift .016". ②—Camlift .019". ③—Camlift .014" ④—Camlift .018".

Valve Timing Check: *See "Camshaft Setting" under Ford V8 Pass. Cars.* Remove right-hand rocker chamber cover. Turn engine over until No. 1 intake tappet is on heel of No. 1 intake cam lobe. Back off No. 1 intake valve adjusting screw, push rocker arm to one side, then install dial indicator. Zero dial indicator, then rotate engine slowly until desired lift (.016") obtained. Compare degrees on pulley with specifications (12°). If not within specifications check for bent timing pointer by bringing No. 1 piston to TDC and see if timing pointer aligned with TDC mark on crankshaft pulley. If pointer not at fault, check timing chain, camshaft sprocket, camshaft, crankshaft pulley, and crankshaft in order of accessibility.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add 1 qt. when filter changed.
Normal Oil Pressure: 45-55 lbs. at 30-40 MPH.
Pressure Regulator Valve—In pump body, not adjustable.
Oil Pressure Indicator—Indicator light on instrument panel, operated by Engine Unit—Ford No. FDA-9278-A (Stamped No. 7 on Hex.). Lights when ignition switch turned on, goes out when engine starts and pump operates.

Oil Pump: Gear type pump located on left side of engine crankcase, driven by distributor drive gear.
Pump Overhaul—*See "Oiling System" in Ford Special Data.*

►*OIL PUMP LEAK CORRECTION:* On some oil pumps, oil pump cover bolt holes may be tapped into gear cavity of pump causing oil leak past threads and out between bolt and pump cover. To correct, remove cover bolts. Coat threads of bolts with Seal Sealing Compound, Part No. 8A-19554-B. Install bolts.

►*OIL PAN-TO-PUMP TUBE SEAL INSTALLATION CAUTION:* Pump failures have been encountered due to pieces of oil pan-to-oil pump seal (Part No. B4A-6698-A) breaking off and lodging between oil pump gears. In some cases, oil inlet tube is too short. As a result, when retaining nut is tightened excessively, seal is squeezed over edge of tube which cuts seal. *Always lubricate seal with engine oil prior to installation, and tighten retaining nut just enough to insure against leakage.*

Oil Filter: Full-flow type (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.

►*BRAKE LINE INTERFERENCE WITH OIL FILTER CORRECTION:* Clip, Part No. B4A-2244-A, and attaching screw, Part No. 39883-S7, now available to secure brake line to rear side of No. 2 crossmember. On vehicles not equipped with additional clip (now used in production), and on which interference is encountered proceed with installation of additional clip as follows: Locate and mark spot on No. 2 crossmember 4½" to left, and 4 15/16" up from center of existing clip at left hand rear side of crossmember. Drill 9/32" hole at this spot. Position brake line on crossmember, and secure line with clip and screw. *NOTE*—Brake line will move far enough to permit installation without bending or crimping line.

Replacement Filter Element—Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION: This special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication.*

Filter Element Installation—*See "Oiling System" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

►*CRANKCASE VENTILATION GASKET INSTALLATION CAUTION:* On some units gasket (B4A-6872-A) may have been installed upside down causing leak at gasket location. Bolt center line is 5/64" below center line of gasket.

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COOLING

Water Capacity: 20 qts. (without heater), 21 qts. (with heater).

Pressure Valve: Ford LA-8100-A, 12-15 lbs. (marked "13" or "14"). *CAUTION–If replacement required use 12-15 lb. type. Radiator filler cap.*

Thermostat: Ford No. B4A-8575-A (160°), No. B4A-8575-B (180° used with permanent anti-freeze). Mounted inside water outlet elbow on forward end of intake manifold. *NOTE–The above thermostat replaces type formerly used.*

Water Pump: Packless, sealed ball bearing type. *See "Ford V8" in Water Pump Section.*

Temperature Gauge: King-Seeley Electric.
Dash Unit–Ford No. B5A-10883-A.
Engine Unit–Ford No. 1A-10884-A.

Temperature Bulb Sleeve Removal: Thread adapter handle of tool T50T-100-A into sleeve. Tighten locknut against sleeve, then pull sleeve with sliding hammer. *See "Temperature Gauges" in Miscellaneous Section.*

CLUTCH

Long Model 11CF. Ford B5S-7563-A (11"). *See "Long Clutches" in Clutch Section.*
Clutch Disc No.–Ford B5S-7550-A.

Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper until travel is within limits.

Pedal Free Travel–1 1/8-1 3/8". Loosen locknut on clutch pedal release rod, turn adjusting nut until correct travel is reached.

Removal: Drain transmission, remove drive shaft, and disconnect shift rods at transmission. Place jack under transmission. Disconnect transmission from clutch housing, and move transmission toward rear of car so that clutch parts can be removed from clutch housing. Slide clutch release bearing and hub assembly off end of release lever assembly. Remove pressure plate and cover assembly and clutch disc from engine flywheel. Remove bolts that attach clutch housing to engine, then lower clutch housing (*NOTE–*Clutch housing must be pivoted downward and forward to remove it from car). Press clutch release bearing off bearing hub assembly.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second and high), sliding gear (low and reverse). *See "Ford Synchro-mesh" in Transmission Section.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

►*INTERMEDIATE & HIGH GEAR JUMP-OUT CORRECTION:* Before attempting to correct gear jump-out by overhaul of transmission, check as follows: Check high and intermediate shift rod for interference with low and reverse shift rod, and if interference caused by bent rod it will be necessary to compare old shift rods with new rods to determine which rod is at fault. Defective rod must be bent to contour of new rod or replaced. Check for interference between floor panel and shift rod. If interference due to excess wear, rod must be replaced. If interference exists between clutch release rod and high and intermediate shift rod, remove enough stock from threaded end of clutch rod to provide necessary clearance between rods when clutch is released.

►*LOW GEAR JUMP-OUT CORRECTION (Due to Insufficient Clearance):* To correct, remove side cover, and grind corner of detent boss to provide sufficient clearance between shift cam and detent boss.

Removal: Drain transmission, then disconnect the gear shift linkage at transmission. Remove speedometer cable and gear. Remove drive shaft. Remove cover from bottom of clutch housing, then remove starter from clutch housing. Disconnect clutch pedal linkage from clutch release lever. Raise rear of engine slightly, then disconnect engine rear mount and remove frame crossmember. Place transmission jack under transmission, remove bolts that secure transmission to clutch housing. Move transmission toward rear of car so that clutch parts can be removed from clutch housing. Slide clutch release bearing and hub assembly off end of release lever assembly. Remove pressure plate and cover assembly and clutch disc from engine flywheel. Remove bolts that attach clutch housing to engine, lower clutch housing, then remove transmission.

*NOTE–*Clutch housing must be pivoted downward and forward to remove it from car.

OVERDRIVE

Warner Model AS4-R10F. Solenoid operated type, with governor control and throttle operated kick-down. Lock-out Switch not used on this model. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *See "Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.

See "Fordomatic & Mercomatic" in Transmission Section.

►*FORDOMATIC "WHISTLING" NOISE CORRECTION: This condition may occur during normal engine operation. See "Fordomatic & Mercomatic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication–Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain & refill every 15,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level: With selector lever in "N" (Neutral) and emergency brake applied, run engine approximately four minutes at idle speed. Check to see that emergency brake is applied and that engine is on slow idle, move selector lever to the "P" (Park) position. (*NOTE–*When engine and transmission are at normal operating temperature, move selector lever through all ranges to assure fluid distribution throughout transmission). Raise hood and wipe top of oil level indicator. Remove indicator and read fluid level. Add Automatic Transmission Fluid "Type A" if necessary to bring fluid level to "Full" mark on indicator. Replace fluid level indicator.

THROTTLE LINKAGE ADJUSTMENT: *See CARBURETOR above.*

►*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type.

REAR AXLE

Own. Integral Carrier, semi-floating hypoid, with Hotchkiss drive. *See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.*
Ratios–3.92-1 (Std.), 3.31-1, 3.73-1 (Fordomatic).

Axle Shaft Removal: Remove wheel and tire assembly, then remove Tinnerman nut that secures brake drum to axle flange. Remove brake drum. Working through hole provided in axle shaft flange, remove nuts that secure brake carrier plate to axle housing. Pull axle shaft assembly out of housing with Tool 7600-C. Be careful not to dislodge brake carrier plate or damage oil seal in housing. Install one nut to hold brake carrier plate in place.

Rear Axle Assembly Removal: Raise rear end of car and disconnect rear universal. Remove axle shafts. Disconnect brake lines at "T" on left side of axle housing. Disconnect hand brake cable, shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

Direct acting, non-adjustable. Serviced by replacement.
Shock Absorber Nos.–Ford B5S-18124-B (Front), B5S-18125-A (Rear) *NOTE–*Furnished in kits which include shock absorber mounting bushings.

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs. *See "Lincoln, Mercury, Ford (Ball-Joint)" in Front Suspension Section.*

►*LOWER ARM BUMPER INSTALLATION CAUTION:* Right and left hand bumpers are different and must be installed in the correct position. Damage to suspension will result if installed incorrectly. **Bumpers when installed should point slightly inboard.**

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Kingpin Inclination–6° minimum, 7° maximum, crosswise.
Caster–Pos. ½° to Pos. 1½°. Maximum variation between wheels ½°.
Camber–Pos. ¼° to Pos. 1¼°. Maximum variation between wheels ¼°.
Toe-In–1/16" to 1/8".

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type. *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Power Steering: Ford-Mercury Linkage type. Used in conjunction with standard type steering gear.
See "Ford & Mercury Bendix" in Steering Section.
Pump Belt Adjustment–Install torque wrench on pump pulley bolt. Check torque required to slip pulley against belt friction. If torque is not 14-16 ft. lbs., adjustment is required. To adjust, position a heavy duty 1½" "C" clamp with bottom against lower side of pump support bracket and top of clamp resting on pump bracket at its center. Loosen four pump attaching bolts until pump body may be repositioned by tightening "C" clamp. Tighten "C" clamp until torque of 14-16 ft. lbs. is required to slide pump pulley. (*NOTE*–Hold final torque as close as possible to upper limit). Tighten pump attaching bolts, remove "C" clamp, and make a final check of pulley sliding torque.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

BRAKES

Ford-Bendix Hydraulic (Single Anchor–with eccentric on front wheels, without eccentric on rear wheels). Hand lever applies rear wheel service brakes.
See "Ford, Lincoln, Mercury Bendix" in Brake Section and note the following change:
►*FRONT WHEEL ADJUSTMENT CHANGE:* Eccentric is located on primary shoe. Initial adjustments made on primary instead of secondary shoe.
►*BRAKE LINE INTERFERENCE WITH OIL FILTER CORRECTION: See "Oil Filter" under OILING SYSTEM above.*
Drum Diameter–11" front and rear. Rebore limit 11.06".
Wheel Cylinder Diameter–1 1/8" (front), 7/8" (rear).
Lining–Molded type riveted to shoe.
Lining Width–1¾" (Front-Primary), 2¼" (Front-Secondary), 1¾" (Rear-Primary & Secondary).
Clearance–.010" at each end of both primary and secondary shoes. Maximum variation .003" (Adjusting screws backed off 10-12 notches from point where shoes drag on drum). *See Adjustment Change above.*

Brake Pedal Free Play Adjustment: 1/4-7/16". If play not correct after brake adjustment, loosen lock nut on the eccentric bolt attaching brake pedal to master cylinder pushrod, rotate eccentric bolt for desired clearance.
►*BRAKE PEDAL PRODUCTION CHANGE:* New brake pedal (Part No. B5S-2455-B) is being installed in production to provide greater clearance between brake and accelerator pedals. Clearance with new pedal is 1¾" as compared with 1¼" with old pedal. If greater clearance desired, new pedal should be installed.

Standard Master Cylinder: Located on engine side of firewall.
Checking Fluid–Maintain fluid level to within ½" of top of reservoir.
Removal–Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to firewall.

Power Brakes: Midland Hy-Power Unit mounted on left side of car in engine compartment and connected in hydraulic brake line between master cylinder and wheel cylinder. There are no mechanical connections and no adjustments are required.
See "Midland Power Unit" in Brake Section.
Checking Brake Fluid–Same as for manual brakes (above).
Removal of Power Unit–Depress brake pedal a few times to remove all vacuum from system. Disconnect hydraulic lines at the power unit and remove wires from brake stop light switch. Remove power unit to mounting bracket bolts and lockwashers and remove the power unit.
►*PARKING BRAKE "FIX" CORRECTION:* New parking brake cable equalizer, Part No. B5A-2119-A, available to correct permanent set of early cable equalizer, Part No. 8A-3119-A.

MISC. MECHANICAL

Windshield Wipers: Vacuum link and crank arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Reversible motor in each window. *See "Electric Window Regulators" in Miscellaneous Section.*

►*POWER WINDOW REGULATOR RELAY "FLUTTER" CORRECTION: See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Electric screw and jack type with individual motors and transmissions for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

►*POWER SEAT "JAMMING" CORRECTION: See "Power Seat Adjusters" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1947-48 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts①	40-50	480-600
Spark Plugs	5-10	60-120
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mtg. Bolts	36-40	432-480
Camshaft Sprocket Bolts	35-40	420-480
Camshaft Retaining Nut	30-35	360-420
Timing Gear Cover Bolts	14-20	168-240
Filler Block Screws	14-16	168-192
Int. & Exh. Manifolds	31-35	372-420
Oil Pan Screws	10-14	120-168
Vibration Dampener Bolt	100-130	1200-1560
Engine Mountings		See Note

①—Tighten cold and recheck with engine at 150°.

1949-51 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	30-35	360-420
Spark Plugs	30	360
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mounting Bolts	35-40	420-480
Camshaft Sprocket Nut	35-40	420-480
Camshaft Thrust Plate	12-15	144-180
Timing Gear Cover	12-15	144-180
Eng. Front End Plate 5/16"	12-15	144-180
Eng. Front End Plate 7/16"	40-50	480-600
Oil Pan Screws	12-15	144-180
Vibration Dampener Bolt	100-130	1200-1560

CAUTION—Torque figures given are for clean and dry threads. If threads oiled, reduce torque approx. 10%.

CYLINDER HEAD

CYLINDER HEAD INSTALLATION: Following procedure is recommended:

1) Blow out all blind tapped holes in head to insure full tightening of bolts without bottoming.

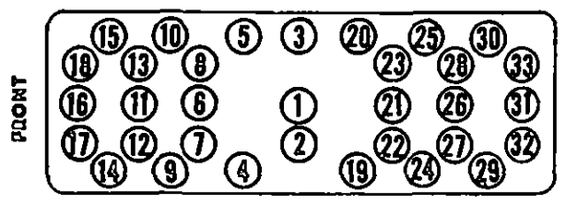
2) Install guide pins in head bolt holes #14 and #30 (see diagram). These holes are smaller diameter in gasket and head for piloting. *NOTE*—Guide pins can be made from #207354 Head Bolts by cutting heads off and slotting end so that they can be installed and removed with a screwdriver.

3) Install head gasket and cylinder head.

4) Coat head bolts with Perfect Seal Gasket Paste, K-F No. 200047, tighten bolts snugly in sequence shown in head diagram, then torque bolts to 30-35 ft. lbs. in same sequence.

5) Warm engine up to normal operating temperature and retorque bolts to 30-35 ft. lbs. Check head bolts and gasket for leaks. *NOTE*—Recheck head bolts after 500-600 miles of operation.

Tightening Torque: See Tightening Specifications.



ENGINE REMOVAL

ENGINE REMOVAL: Proceed as follows:

1. Remove Hood (see Hood Assembly above).
2. Drain cooling system.
3. Disconnect windshield wiper hose at manifold (or at vacuum pump), disconnect fuel line at point where fuel pump flexible line connected to tubing at frame, disconnect exhaust pipe at manifold.
4. Remove Radiator (see Radiator removal below).
5. Remove Battery. Disconnect cables, lift out.
6. Disconnect Wiring. Disconnect ground cable near left front engine mounting, disconnect wiring at starter, generator, and distributor.
7. Remove Air Cleaner.
8. Disconnect Temperature Gauge by removing bulb from cylinder head (Frazer), disconnecting lead (Kaiser). Disconnect oil gauge by disconnecting line at flexible hose connection on left side of engine (Frazer), disconnecting lead at engine unit (Kaiser).
9. Disconnect throttle linkage at carburetor.
10. Disconnect heater inlet and outlet hoses.
11. Remove transmission (and overdrive if used).
12. Disconnect clutch throw-out linkage.
13. Install lifting bracket at #7 and #28 cylinder head bolts—see cylinder head diagram (remove distributor if required). Raise engine slightly with hoist.
14. Disconnect front engine mountings.
15. Hoist engine from car with engine turned at slight angle to frame with front end of engine raised to clear shroud. *CAUTION*—Do not damage engine accessories when lifting engine from car.

ORIGINAL BORE & PISTONS

BORE & PISTON SIZES: Engines originally equipped at factory with special oversize pistons may be identified by code letter following engine number:
"N"—Pistons are .020" Oversize.
"AN"—Pistons .020" Oversize. Main and connecting rod bearings Undersize (See Original Bearing Sizes).
"NX"—Pistons .020" Oversize. Main bearings are Undersize (see Original Bearing Sizes following).

PISTONS

PISTON IDENTIFICATION: Two types of aluminum alloy pistons used which can be identified as follows:

▷*CAUTION—Piston weight different on each type.*

Strut Type Piston—Has wide strut embedded within skirt at each piston pin boss and drilled oil drain holes in both #3 and #4 ring grooves.

T-Slot Type Piston—Has horizontal slot in lower (#4) ring groove and short vertical slot on one side of piston skirt. #3 oil ring groove has drilled oil drain holes.

REPLACEMENT PISTONS: See "Piston Identification" for types used. Each type furnished in following sizes: *CAUTION—Piston weight different for each type.*

Strut Type Pistons: Standard and .005", .010", .020", .025", .030" Oversize.

T-Slot Type Pistons: Standard and .005", .010", .020", .025", .030", .040", .050", .060" Oversize.

PISTON RINGS

REPLACEMENT RINGS: Rings furnished as single rings (12 Compression, 12 Oil Rings required), or in complete sets (1 Set per car) as follows:

Single Rings: Standard and .010, .020", .030" Oversize.

Ring Sets: Use for cylinder sizes indicated: Standard (Std. to .009" OS), .020" Oversize (.010" to .029" OS), .040" Oversize (.030" to .049" OS), .060" Oversize (.050" to .069" OS).

ORIGINAL BEARING SIZES

MAIN & CONNECTING ROD BEARING SIZES: Engines originally equipped with special undersize main and connecting rod bearings may be identified by code letter following engine number:
"A"—Main & Connecting Rod Bearings .010" Undersize.
"X"—Main Bearings .002" Undersize.
"AN"—Main & Connecting Rod Bearings .010" Undersize and Pistons Oversize (see Original Bore and Pistons).
"NX"—Main Bearings .002" Undersize and Pistons Oversize (see Original Bore and Pistons).

CRANKSHAFT & MAIN BEARINGS

1947-48 MODELS

FRONT MAIN BEARING CHANGE: Two types of front main bearing used (flanged & unflanged). This bearing takes end thrust (see Endplay Adjustment).
1)—Front Main Bearing (Flanged Type). End thrust taken by flange on bearing.
2)—Front Main Bearing (Not Flanged). End thrust taken by thrust washer installed in front of bearing.

Replacement Note—Both types of front main bearings are interchangeable. Flanged type can be used to replace unflanged type by removing thrust-washer and dowel pins.

1947-50 MODELS

CRANKSHAFT ENDPLAY ADJUSTMENT: Requires removal of radiator, vibration dampener, timing gear cover, timing gears and chain (remove as an assembly), thrustplate, and shims.

Endplay Adjustment: *CAUTION*—Two thrust washers (1 at each side of front bearing) must be in place when checking endplay. With front end of crankshaft disassembled as described above, re-install thrust plate (do not install shims at this time), install checking sleeve No. KF-28 on end of shaft, secure sleeve on shaft with vibration dampener bolt and lockwasher. Mount dial indicator at front of engine with button against front end of shaft. Pry shaft to rear, set indicator at zero and then pry shaft forward, reading will be endplay. Select shim pack (shims furnished .002" and .008" thick) so that when installed, endplay will be .004-.006".

▷*CAUTION—Make certain that clearance exists between slinger on rear end of crankshaft and upper and lower filler blocks in rear end of crankcase.*

1947-51 MODELS

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket). Rear filler blocks (additional upper filler block guard in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger.

Front Filler Block (Lower) Servicing: Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block. When installing filler block, first install oil pan side gaskets (No. 200266), install filler block (use Perma-tex), install new end gasket (No. 200267) on block.

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal). Remove and discard old gasket or seal. Install new seal (no. 204654) in same manner as described below for Rear Filler Block (Upper) Guard. Install lower filler block after upper filler block guard has been installed.

Rear Filler Block (Upper) Guard Servicing: Guard is seated in groove in crankcase and can be "rotated" out without disturbing crankshaft after lower filler block removed. Remove and discard old gasket or seal, clean out seal groove. Install new graphite impregnated seal (no. 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard). **Do not use shellac or sealing compound in groove.**

►*CAUTION*—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft. If necessary, seal can be built up using 1/32" thick gasket material, 3/16" wide, as shims shellacked to groove in block or guard behind seal.

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Camshaft can be removed with radiator off and engine in car as follows:

1. Remove timing gears (remove both gears and chain as an assembly). This requires removal of vibration dampener and pulley, timing gear cover.
2. Remove cylinder head.
3. Remove fuel pump.
4. Remove oil pan, oil pan return tube & oil pump.
5. Lift valves, using valve spring lifter tool C-482 (see Note below), block valves up by inserting a clothespin or block of wood under each valve head. NOTE—Remove right front tire and wheel and take off splash shield under fender for access to valves.
6. Block up Valve Lifters (lift each lifter up by hand and fasten in upper position with a wire).
7. Remove Camshaft Thrustplate by taking out two screws retaining thrustplate on crankcase.
8. Pull camshaft out through front of engine.

Camshaft Bearing Replacement Note—Requires removal of engine from car for access to plug at rear of block which must be removed.

1951 MODELS

CAMSHAFT & REPLACEMENT PARTS CAUTION: ***TWO DIFFERENT CAMSHAFTS used in production and special VALVE LIFTERS and OIL PUMP DRIVE GEAR must be used with each camshaft as listed below.***

1951 Camshaft

Type & Identification①	Part No.
Cast Iron (Circle O & #733340)	207218
Steel Forging (#700599)	203017

①—Identification number and marks are cast or stamped on shaft.

VALVE LIFTERS: Steel lifters must be used ONLY with Cast Iron camshaft. Cast Iron lifters can be used with Cast Iron or steel camshaft.

OIL PUMP DRIVE GEAR: Oil pump drive gear must be SAME material as camshaft (use Cast Iron gear with cast iron camshaft, steel gear with steel camshaft).

1951 Valve Lifters

Type & Identification	Part No.
Steel (Stamped with "diamond")	②207171
Cast Iron (no mark)	②207219

②—Std. Size. Also furnished .001", .002", .005" Oversize.

1951 Oil Pump Drive Gear

Type & Identification	Gear	Gear & Shaft
Cast Iron (Stamped "O")	207222	207221
Steel (no mark)	200248	203185

TAPPET CLEARANCE ADJUSTMENT

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below). Remove right front wheel and access cover in fender splash shield for access to valve compartment. Remove spark plugs so that engine can be turned over by moving fan or fan belt. By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment.**

Valve Tappet Adjustment Order (numbered from FRONT of engine)

Fully Raise Valve	Then ADJUST Valve:
Nos. 1 and 3	Nos. 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos. 2 and 6	Nos. 7 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 5	Nos. 8 and 9
Nos. 7 and 11	Nos. 2 and 6

OIL PAN REMOVAL

OIL PAN REMOVAL: Raise front end of car and support it securely on stands. Disconnect steering drag link at idler arm on frame, turn wheels to right and work drag link clear of oil pan. Drain oil, remove oil pan capscrews and lockwashers, slide pan to rear.

►INSTALLATION NOTE—Lower Filler Blocks (front and rear) must be removed to install new oil pan side gaskets. See "Front & Rear Filler Blocks" under Crankshaft & Main Bearings (above) for data.

OIL PUMP

OIL PUMP SERVICING: Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling. Service pump as follows:

Disassembly—Take out cotter pin and remove screen float assembly. Remove cover and gasket. Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear. Remove idler gear (remove idler shaft if required). Take off lower drive gear (press fit and keyed to shaft).

Oil Pump Clearances—Check as follows:

1)—Pump Body Bushing: If over .005" clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to .500-.501".

2)—Pump Shaft: shaft diameter .4990-.4985".

3)—Lower Drive Gear: end of gear should be .001-.006" beyond gasket seat on pump body.

4)—Upper Drive Gear: .002-.004" clearance between underside of gear and upper end of pump body. Controlled by pressing lower drive gear on shaft until this clearance obtained.

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose). Replace by using drift inserted in distributor drive shaft bore from top of block. Install new bushing from below (must be flush with bottom of block).

Reassembly—Press upper drive gear on shaft with pin hole at right angles to tongue on shaft. Insert new pin and peen ends flush with gear. Install shaft and gear in pump body. Press lower drive gear on shaft (with key in place) until .002-.004" clearance obtained between upper drive gear and upper end of pump body. Press idler gear shaft in body, install idler gear. Install cover using new gasket and pin oil screen float assembly on cover.

Oil Pump Installation—Set #1 piston at top dead center. Insert distributor main drive shaft from top of block. Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx. parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut. Remove distributor shaft for cyl. head installation.

►***CAUTION—Check Ign. Timing after pump installed.***

RADIAT R

RADIATOR REMOVAL (1947-48): Disconnect hose connections. Disconnect two tie rods at top of radiator. Remove nuts on mounting studs underneath radiator, lift radiator up and out.

RADIATOR REMOVAL (1949-51): Disconnect hose connections. Take out radiator-to-shroud screws, 6 total (3 each side). Lift core out, tilting upper end to rear as core being raised.

PROPELLER SHAFT

CENTER SUPPORT BEARING: Consists of a ball bearing on rear end of front propeller shaft mounted in rubber in steel plate mounted on frame.

Removal & Disassembly—Disconnect front and intermediate universal joints, take off nuts on center support frame mounting bolts, remove front shaft and support bearing assembly. Clamp front shaft in a vise, remove bolt, lockwasher, and plain washer on rear end of shaft (in universal joint companion flange), pull companion flange using Puller C-452. Remove rear dust shield. Pull support plate off bearing insulator, remove bearing insulator. Use jaw type puller (KF-56) and pull bearing off shaft, remove front dust shield.

►***CAUTION—Do not wash bearing in gasoline or solvent.***

Reassembly—Install front dust shield and bearing (use driver KF-11) on splined end of front propeller shaft (bearing must support shield firmly). Place rubber insulator over bearing (small diameter to rear). Coat outer surface of insulator with liquid soap and slip support plate in place over insulator (flanged end of sleeve to front, insulator bottomed against bead on inside of sleeve). Install rear dust shield, companion flange, flat washer, lock washer, and bolt. Tighten bolt until flange and dust shield bottom against shaft shoulder (25-30 ft.lbs. torque).

Bearing Support Installation: When installing front propeller shaft and support bearing assembly in car, install washers and insulators on each support stud on frame cross-member in the following order: Spacer, Bushing, Front Support Insulator (fluted end to rear), Front Support Washer (has large hole), Support Bearing Plate, Rear Support Insulator (fluted end forward), Rear Support Washer (has small hole), and nut (tighten to 15-20 ft. lbs.).

►***CAUTION—Install center bearing support on frame studs so that sleeve in which bearing seated slopes downward toward the rear to provide correct propeller shaft angularity.***

M DEL IDENTIFICATI N

STARTING SERIAL NUMBERS

	Model	Serial Numbers
1947 Frazer	F-47	F-47-001001 Up
1947 Frazer Manhattan	F-47C	F-47C-1000001 Up
1948 Frazer	F-485	F-485-001001 Up
1948 Frazer Manhattan	F-486	F-486-001001 Up

SERIAL NUMBER: On left front door hinge post.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Nameplate on left side of crankcase. NOTE—Numeral following Engine Model Designation (first part of Engine Number) indicates Engine Plant as follows: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes)** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Fraser Shop Notes.* NOTE—Symbol consists of 1 or 2 letters following engine number

TUNE-UP

COMPRESSION PRESSURE: 115-125 lbs. (6.86-1 Heads). 120-130 lbs. (7.3-1 Heads) at cranking speed of 140 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.

►*NOTE—7.3-1 Heads marked by "73" stamped on Head directly above engine number pad on block.*

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .032"
Plug Type—Auto-Lite A-5 (normal driving), A-7 (for short runs or to correct hard-starting in cold climates). 14 mm. metric type.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle or Dwell—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: TDC. (at Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—Mark "DC" on flywheel (first cars), on vibration dampener (beginning Eng. No. 17160).
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—¾-1¼ turn open—one screw (WA1 Carb.), 1¼-2¼ turns open—one screw (W1 Carb.), 1-1¾ turns open—2 screws (WCD Carb.). Turn screws out for richer mixture.
Idle Speed—550 RPM.
Float Level (WA1 Carb.)—5/16" (610S), ⅜" (622S with first Float and Inlet Valve), ½" (622SA, SB & 622S with late type Float and Inlet Valve). Measure from top of projection on bowl cover to top of soldered seam on free end of float with bowl cover assembly inverted.
Float Level (W1)—½" from top of float at free end to gasket seat on cover.
Float Level (WCD Carb.)—9/64" (685S with first type Inlet Valve), 1/16" (685S & 685SA with later type Inlet Valve) from top of each float to gasket seat on cover with valve closed (assembly inverted).
Accelerating Pump—Lower hole (medium) Normal. NOTE—Pump on 574S has no seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. (for pump mounted at rear of engine), 3-4¼ lbs. (pump mounted at

►*CAUTION—Pump pressure must not exceed 4½ lbs.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

►**VALVE TAPPET CLEARANCE:** *CAUTION—Two settings used.*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.

►**Adjustment Procedure**—*See Frazer Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Douglas or Mitchellock. Frazer No. 201354 (Before Frazer No. F47-36877, Manhattan No. F47C-1033604), No. 203186 (After Above Nos.).
Lock Cylinder—Kaiser-Frazer No. 201898 (with key).

COIL: Auto-Lite Model IG-4093. On left side of engine opposite distributor.
Ignition Current—3 amperes idling, 5 amperes at 6.4 volts (stopped).

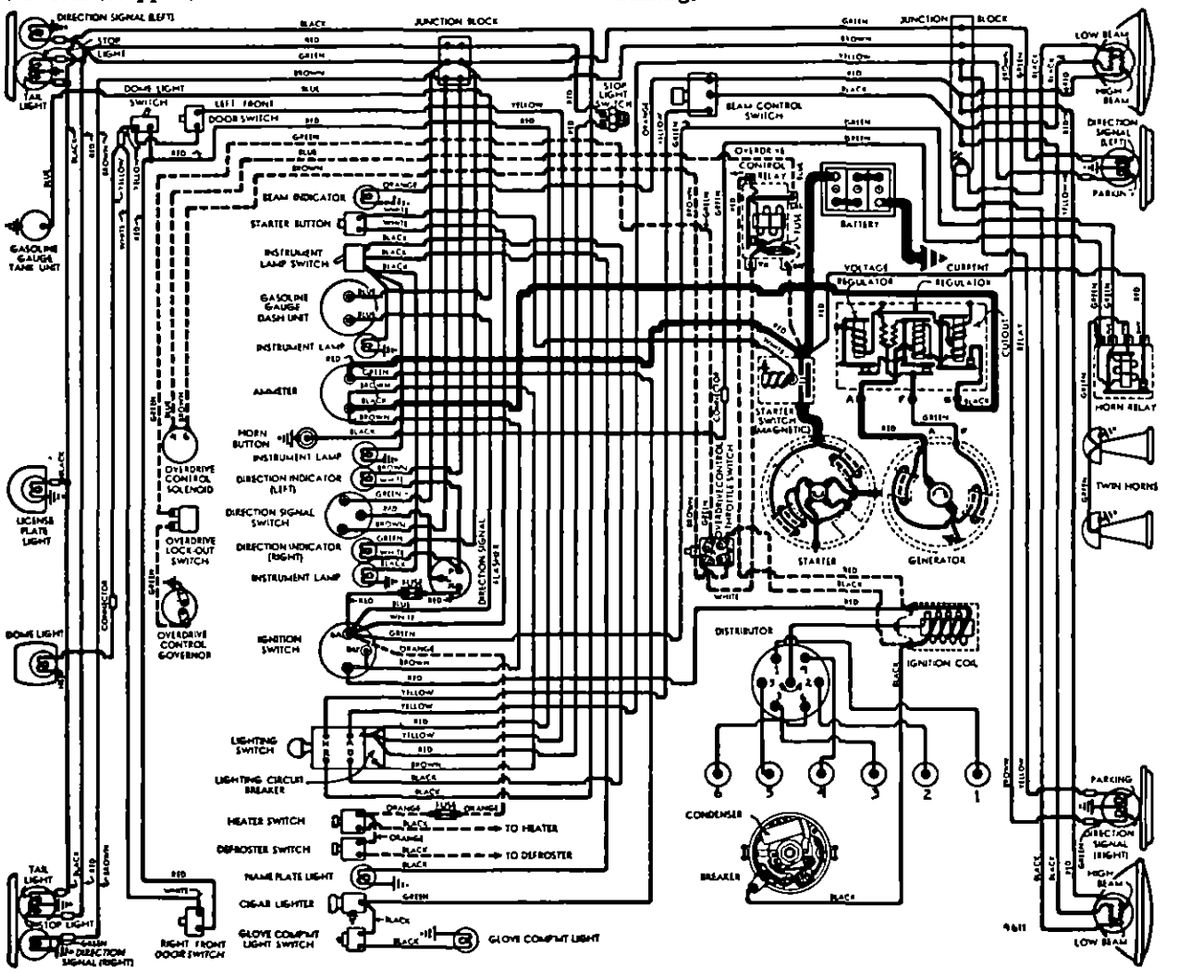
CONDENSER: Auto-Lite No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4211. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
IGS-4214 (Used on late '48 Cars)—*See "1949-50 Fraser" for data on this Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IGS-4211

Distributor Degrees	RPM.	Engine Degrees	R.P.M.
Start	350	0	700
1	365	2	730
3	400	6	800
7	1150	14	2300
10	1700	20	3400

Octane Selector—Manual adjustment at distributor providing 10° advance and retard. See Ignition Timing.



Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGS-4211

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	8"
4°	8°	11¼"
7.5°	15°	14"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting ..... At TDC.

TIMING MARK NOTE—Timing mark located on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 up). Consists of "DC" mark or "0" mark at top dead center with 1° graduations

Timing (with Timing Light C-693)—Mark "DC" or "0" top dead center mark on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 Up) with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at 400 RPM. (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen clampscrew in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten clampscrew. Check octane selector setting.

►*CAUTION—Reset engine idling speed at 550 RPM.*

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

CARTER WA-1

Carter WA1 Type 622SB superseding 622S & 622SA *(All Models).* 1¼" Single Barrel, Downdraft type

►NOTE—622S carburetor can be converted to 622SA by installing new Float and Inlet Valve assembly and changing float level.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle (WA1 Carburetors): Carter Single Barrel type.

See Carburetion Equipment Section for data.

Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

Automatic Choke (WA1 Carburetors): Carter Climatic Control (Single Carburetor Type).

See Carburetion Equipment Section for complete data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER WCD

Carter WCD Type 685S superseded by 685SA (Opt. on Manhattan F-486). 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.

►NOTE—685S carburetor can be converted to 685SA by installing new intake Needle & Valve Assembly and resetting float level to 685SA specifications.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle (WCD Carburetors): Carter Dual (WCD) type.

See Carburetion Equipment Section for complete data.

Setting—.016" throttle opening with choke valve held closed and throttle lever stopscrew backed off

Automatic Choke (WCD Carburetors): Carter Climatic Control (Dual Carburetor Type).

See Carburetion Equipment Section for data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER W1

Carter W1 Type 574S. 1¼" **Single Barrel, downdraft type with manual choke.**

NOTE—This carburetor used for part production starting with following numbers: **F-47 30,770; F-47C 1021118.**

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

CARB. EQUIPMENT

Air Cleaner: AC. Oil-bath type. Kaiser-Frazer No. 200618 (All models with WA1 or W1 Carbs.), No. 203372 (F-486 Manhattan with WCD Carb.).

Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with approx. 1 pint SAE No. 50 engine oil (No. 20 for below freezing tem.) at 1000 mile intervals or when engine tuned

Fuel Pump (Early type—mounted at rear of engine): AC No. 1539057, K-F No. 200281. Diaphragm type.

►*CAUTION—Install this pump with rocker arm OVER camshaft eccentric.*

See Carburetion Equipment Section for data.

Pressure—3½-4½ lbs. maximum.

Fuel Pump (Later type—mounted at front of engine): AC No. 1539073 (K-F No. 201509) Diaphragm type fuel pump or AC No. 1539074 (K-F No. 202319) combination Fuel-and-Vacuum Pump.

Replacement Pump—AC No. 574 (for 1539073), No. 582 (for 1539074 fuel-and-vacuum pump).

►*CAUTION—Install these pumps with rocker arms UNDER camshaft eccentric.*

See Carburetion Equipment Section for data.

Pressure—3-4¼ lbs.

Gasoline Gauge: Auto-Lite electric type.

Dash Unit—A-L No. NG-11104D, Frazer No. 200471.

Tank Unit—A-L No. NG-10987T, Frazer No. 200468.

See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).

Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.

Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4043. Armature MAW-2128.

Drive—Barrel type Bendix Drive No. A1792.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
5.75 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
18.0 "	Lock	4.0	670

Starting Switch: Auto-Lite Model SS-4001 magnetic switch. Mounted on starter and controlled by push-button on instrument panel.

See Electrical Equipment Section for complete data.

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cables, take out flange mounting screws.

GENERATOR

Auto-Lite Model GDZ-4818A. Armature GDZ-2006F. Two brush type with voltage and current regulation.

Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM. or approximately 20 MPH.

Charging Rate Adjustment—None (see Regulator).

Performance Data					
Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.

Belt Adjustment: ⅛" belt deflection midway between generator and fan pulleys (adjust by pulling generator out with 15 lb. force with all mounting bolts loose).

REGULATOR

Auto-Lite Model VRP-4004F-2. Vibrating type Voltage and current regulators with Cutout Relay.

See Electrical Equipment Section for complete data.

NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).

Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.

Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*

Contact Gap—.012" min. (armature against stop pin).

Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).

Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*

Contact Gap & Air Gap—Same as Voltage Regulator.

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LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch. *See Electrical Equipment Section for complete data.*
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel on left side of instrument panel (above starter button). Lighted when upper (country beams) in use.

Direction Signal: Mitchell (United Specialties) type. *See Electrical Equipment Section for complete data.*
Direction Indicators—Right and Left indicator lights above instrument dials. Lighted when direction signal on same side of car in operation.

Switches

Lighting—Kaiser-Frazer No. 200819.
Beam Selector—Kaiser-Frazer No. 200863 (Frazer before No. F485-1838), No. 201605 (Frazer after above Nos. & All Manhattans).
Direction Signal—Kaiser-Frazer No. 201467 (Frazer before No. F485-1838), No. 202692 (Frazer after above Nos. & All Manhattans).
Instrument (Rheostat Type)—K-F No. 200821.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Park & Direc. Signal	21-3	1154
Beam Ind., Ign. Switch	1	51
Dir. Sig. Ind. & Clock	1	51
Instrument & Nameplate	1½	55
Rear Direc. Signal	21	1129
Stop & Tail	21-3	1154
License Plate, Rear Compt.	3	63
Dome, Glove Compt.	21	1129
Courtesy	6	81

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type. On back of lighting switch.

FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On relay on dash.
Direction Signal—9 ampere. In flasher lead under instrument panel to left of steering column.

HORNS: Auto-Lite. Model HT-4021 or HT-4023 (Low Note), HT-4022 or HT-4024 (High Note). Twin horns.

Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16". **Stroke**—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.86-1 (First Cars), 7.3-1 (All Cars after Eng. No. 304305—Detroit, 66125—Muskegon).
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune Up data.*

TIGHTENING TORQUES: *See Fraser Shop Notes.*
CYLINDER HEAD INSTALLATION: *See Fraser Shop Notes.*
ENGINE REMOVAL: *See Fraser Shop Notes.*
PISTONS: Two types used. Aluminum alloy, Cam-ground, Tin-plated, strut type with split skirt, or T-slot type. Length 3 9/16" (both types).
NOTE—Pistons can be identified by drilled oil drain holes in fourth ring groove and strut within skirt at each pin boss (Strut Type), or by horizontal slot in fourth ring groove and short vertical slot on one side of skirt (T-slot Type).
▷*CAUTION—Piston weight different on each type.*
Original Bore & Piston Sizes—*See Fraser Special Data.*
Weight—15.58 ozs. (strut type), 14.28 ozs. (T-slot).
Clearance—.0255-.0315" (Top Land). See Fitting new pistons.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.
Replacement Pistons: *See Fraser Shop Notes.*
Installing Pistons: Slot in skirt toward left or away from camshaft (all types). NOTE—On pistons marked by arrow on head, arrow toward front of car.
PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled for oil drainage (all types), fourth groove drilled (strut type pistons), slotted (T-slot pistons).

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Compr. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3, 4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.
Replacement Rings: *See Fraser Shop Notes.*
PISTON PIN: Diameter—.55/64". **Length**—2 13/16". Floating type, with lock ring at each end.
Pin Fit in Piston—Tight fit (—.0003" clearance), or push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing: +.0003" clearance. When installing oversize pins or new bushings, ream bushings for this clearance with DD-82-2 Reamer (used also to ream piston pin bore in piston).
Replacement Pins: Std. size and .003", .005" Oversize.
CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
▷*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Fraser Shop Notes.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0023". **Sideplay**—.006-.010".
Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.
Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.
Installing Rods: Rods and bearing caps marked. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).
CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". All bearings.
▷*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Fraser Shop Notes.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0015-.002".
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation *See "Crankshaft & Main Bearings" in Fraser Shop Notes.*
Replacement Bearings: Furnished Std. size and .002", .004", .010" Undersize. NOTE—Two types of #1 bearings (flanged & unflanged). See Endplay data.
End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between bearing journal and thrustwasher. **Endplay**—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Fraser Shop Notes.*
CAMSHAFT: Four bearing. Two-sprocket chain drive. NOTE—Two different camshafts used due to relocation of fuel pump. Camshaft No. 200113 (first cars—pump at rear), No. 203017 (later cars—pump at front).
Journal Diameters—#1, 1 7/8"; #2, 1 13/16"; #3, 1 3/4"; #4, 1 1/4".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".
Bearing Adjustment: None. Replace bushings with camshaft removed.
End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket). **Endplay**—.003-.007".
Camshaft Removal: *See "Camshaft & Bearings" in Fraser Shop Notes.*
Timing Chain: Non-adjustable type. **Width** 1". **Pitch** .500", **Length** 23" or 46 links.
Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3395-.3387"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width—5/64-3/32" (Intake), 3/32-7/64" (Exhaust). Use KF-58 Relief Counterboring Set to remove high shoulder in block above valve head.
Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Use Driver DD-849. Drive old guide down and out, drive new guide down into place (same height as old guide with mark on driver stem in line with top face of block). NOTE—Tapered end of guide must be upward.
Valve Springs: Check spring with tester C-647. Pressure should be 101±3 lbs. at 1⅜". Spring free length 1 15/16".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. NOTE—Lifters can be removed (some engines only) without disturbing cylinder head.
Clearance—.0005-.0018". With correct clearance, lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and .0005" .001", .0015", .002" Oversize.

VALVE TIMING

►**Tappet Clearance:** *CAUTION—Two settings used:* **Before Eng. No. 10769**—.010" Int., .014" Exh. Cold. **After Eng. No. 10769**—.014" All Valves, Cold.

►**Adjustment Procedure**—*See Fraser Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With tappet clearance set at .014" (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with the ten-degree mark after the dead center mark "DC" at indicator in flywheel housing inspection hole (before Eng. No. 17160). Beginning with Eng. No. 17160, marks located on dampener.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Under plug on right side of crankcase between #4 & #5 cylinders. Opens at 35 lbs. Adjustable by adding or removing washer, No. 200272, between end of spring and plug.

Oil Pan Removal: *See Fraser Shop Notes.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine.

Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Fraser Shop Notes.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostat.
Capacity (First 22" Radiator)—15 qts. (14 qts. at driving level). **(Later 17" Radiator)** 13½ qts. (13 qts. at driving level).
Pressure Valve—AC. No. 846740 (Radiator Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).

Radiator: Two types used as follows:
First Cars—No. 200445 (22" wide). Service by installing later type (No. 202906) and installing Radiator Shroud Side Panel Extension No. 203100 (two required), using No. 576 screws (10 required).
Later Cars—Radiator No. 202906 (17" wide).
Radiator Removal—*See Fraser Shop Notes.*

Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only).
Setting (Std. type)—Begins to open at 148-155°F. Fully open at 173°F.

Temperature Gauge: Auto-Lite No. H-11103, Frazer No. 200453. Not electric.

CLUTCH

Borg & Beck.....**Model 9A7**
Auburn (Some Cars).....**Model 9251-15**
Clutch Identification—Types can be identified by number of pressure plate springs—3 (Auburn), 9 (Borg & Beck—cover also marked "951").
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven asbestos, 2 required. I.D. 6". O.D. 9¼". Thickness ⅛".
Facings (Auburn)—Moulded metallic or Raybestos, 2 required. I.D. 6". O.D. 9¼. Thickness .135".

Pedal Adjustment: Pedal free travel ¾-1". To adjust, position nut on pedal assist spring link (at rear end of spring) so that it is lined up with spring adjusting gauge, KF-10, installed on spring.

Removal: Remove transmission (see Transmission Removal below), remove clutch housing underpan, disconnect clutch pedal cross-shaft from pedal linkage. Install Clutch Plate Aligning Arbor, C-360, to hold clutch parts in alignment, take out mounting screws in clutch cover flange (rotate flywheel so that all screws accessible through pan opening). Remove aligning arbor, remove clutch cover assembly and driven member through underpan opening.

TRANSMISSION

Warner Model AS11-T86E (Std.), Model AS12-T86E with new Type R10B Overdrive (Optl.). Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Disconnect front propeller shaft at front universal joint (take out bolts in transmission companion flange), move shaft out of the way. Disconnect speedometer drive cable and transmission control levers at transmission case, free parking brake cable support bracket from frame cross-member. Remove four bolts mounting engine support on frame cross-member (support comes out with transmission). Loosen all four bolts mounting transmission on clutch housing, remove two lower bolts only (CAUTION—two upper bolts must support transmission until ready for removal). Remove flywheel housing underpan, raise rear end of engine (place jack under flywheel, use wood block between jack and flywheel) for sufficient clearance for transmission removal. Remove the two upper transmission mounting bolts, move transmission back until clear of clutch, slide tranmission clear of cross-member and remove from beneath car.

OVERDRIVE

Warner Type R10B (with special AS12-T86E Transmission). Optl Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down".
See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy 1118132, Warner No. 3AR10B-62 Kaiser-Frazer No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001, Kaiser-Frazer No. 201636. On left side of dash.
Kick-down Switch—Kaiser-Frazer No. 201638. Adjust switch by means of nuts on threaded sleeve so switch actuating cam on accelerator lever just contacts plunger on switch at wide open throttle
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Disconnect all wiring at control units on overdrive case, disconnect control cable and speedometer cable. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

UNIVERSALS

Detroit Series 4200. Ball-and-trunnion type or Mechanics. Roller bearing type. Three used with intermediate universal at propeller shaft support

Propeller Shaft & Support Bearing: Two shafts used: **Propeller Shaft & Support Bearing Servicing**—*See "Propeller Shaft" in Fraser Shop Notes.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (Without Overdrive)—4.09-1 Std., 3.73-1 Optl.
Ratio (With Overdrive)—4.27-1.
Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABSORBERS

Monroe. Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

	Front	Rear
Kaiser-Frazer No. (Std.)	201490	201493
Kaiser-Frazer No. (Exp.)	202864	202866

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾—5¾° crosswise.
Caster—0° preferred (—1° to +1°).
Camber—¼° preferred (0° to ¾°).
Toe-In—1/16". Adjust by turning both tie rods
Steering Geometry (Toe-out): Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 11"
Clearance—.008" at heel and toe of each shoe.
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).

Hand Brake: See Service brake data (above).

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1949 Numbers—Frazer F-495—F-495-001000 and up, Frazer Manhattan F-496—F-496-001000 and up.
1950 Numbers—Prefixed by F-505 (Frazer), F-506 (Manhattan).
Body Number Note—Stamped on plate on right front face of dash in engine compartment.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.
NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

▷**Engine Number Symbol (Special Bore & Bearing Sizes)** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Fraser Special Data.* NOTE—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. (7.3-1 Heads) at cranking speed of 70 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.
NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plug Type—Auto-Lite A-5 or AR5.

DISTRIBUTOR: Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.

▷*CAUTION—Engine must be idling below 450 RPM when setting timing.*
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:
Idle Setting—1-1½ turns open—2 screws. Turn screws out for richer mixture.
Idle Speed—550 RPM.
Float Level—Flush to 1/32" from top of each float to gasket seat on cover with valve closed (bowl cover assembly inverted).
Accelerating Pump—Lower Hole (min.) Normal.

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4¼ lbs.

▷*CAUTION—Pump pressure must not exceed 4½ lbs.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.

▷**Adjustment Procedure**—*See Fraser Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Kaiser&Frazer No. 204485.
Lock Cylinder—Kaiser-Frazer No. 203885 (with key).

COIL: Auto-Lite IG-4093, IG-6001 or 9A. On left side of engine opposite distributor.
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

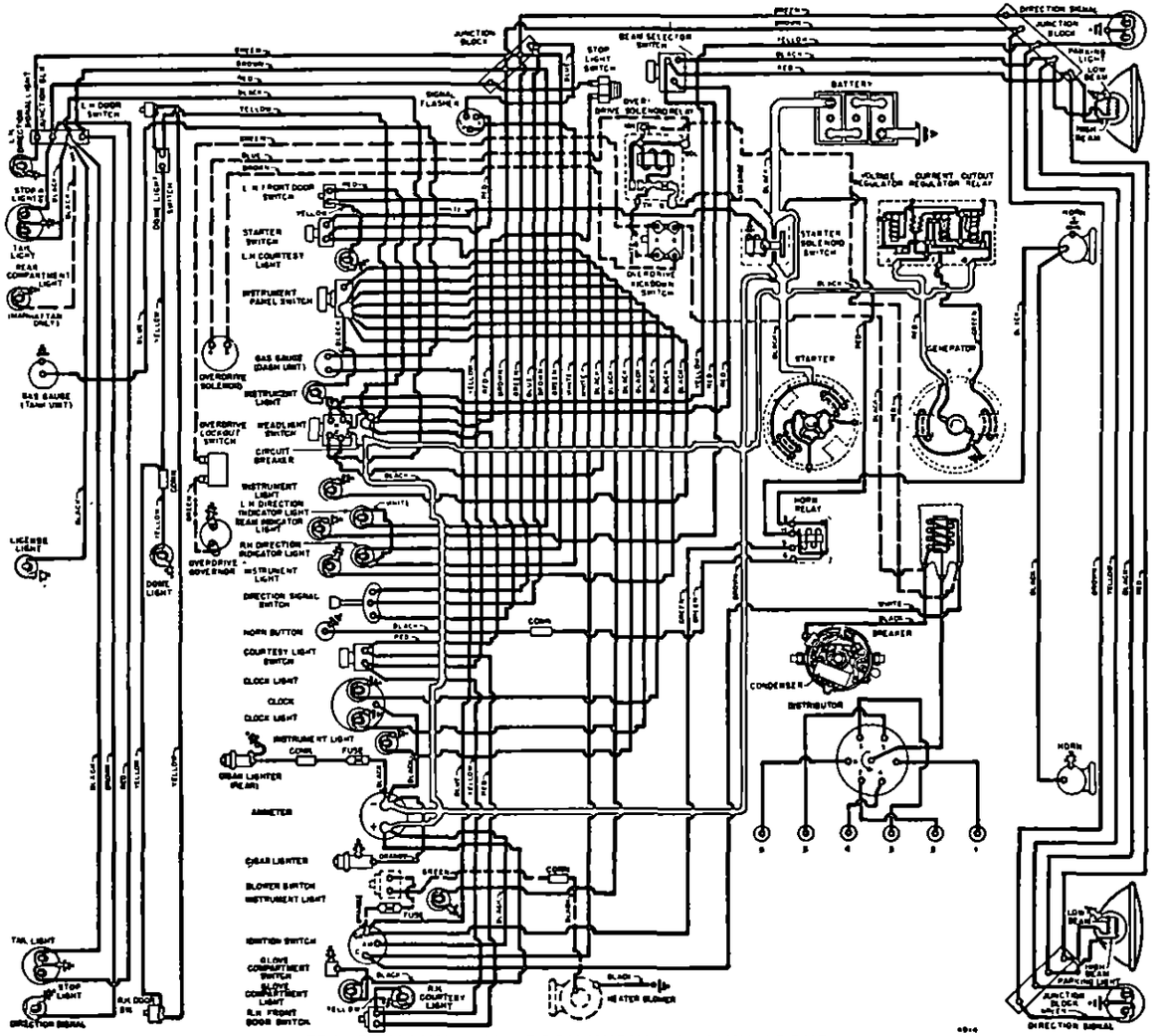
Distr. Degrees	Automatic Advance Eng. R.P.M.	Eng. Degrees	R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.



FRAZER MANHATTAN BODY WIRING SHOWN ABOVE

IGNITION TIMING

Std .Setting .....4° BTDC.

Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.

Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine below 450 RPM. (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten cap screw. Check octane selector setting.

►*CAUTION—Reset engine idling speed at 550 RPM.*

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

Carter WCD Type 723S. 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.
Casting No. on Flange—550.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

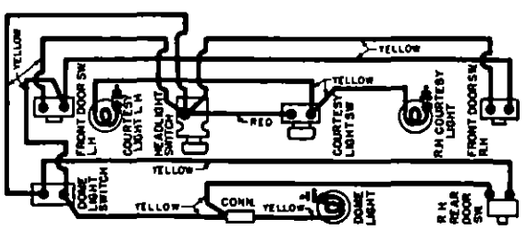
Fast Idle: Carter Dual (WCD) type.
See Carburetion Equipment Section for complete data.
Setting—.018" throttle opening with choke valve held closed and throttle lever stopscrew backed off.

Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
See Carburetion Equipment Section for data.
Setting—Centered (coil housing at index mark).

CARB. EQUIPMENT

Air Cleaner: AC No. 1544539 Oil-bath type.
Element—AC No. 22.
Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with SAE No. 50 engine oil (No. 20 for below freezing temp.) at 2000 mile intervals or when engine tuned.

Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.



FRAZER BODY WIRING

►*CAUTION—Install pump with rocker arms UNDER camshaft eccentric.*
See Carburetion Equipment Section for data.
Pressure—3-4¼ lbs.

Gasoline Gauge: Auto-Lite electric type.
Dash Unit—A-L No. 11586A.
Tank Unit—A-L No. 11571A.
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4054. Armature MAW-2128.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
8.50 "	400	4.0	400
6.0 "	Lock	2.0	335

Starting Switch: Magnetic switch K-F Part No. 204752 on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws.

GENERATOR

35 Amp.....Auto-Lite GDZ-4818A. Arm. GDZ-2006F.
45 Amp.....Auto-Lite GGU-6001B. Arm. GGU-2006F.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance Data (GDZ-4818A)

Amperes	Volts	Cold—R.P.M.	Hot
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GGU-6001B)

45	8.0	1550 Max.	

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.60-1.78 amperes at 6.0 volts, (GGU) 1.6-1.8 —amperes at 6.0 volts.
Motoring Current—(GDZ) 4.16-4.60 amps. at 6.0 volts, (GGU) 5.5-6.5 amperes at 6.0 volts.

Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.

Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

REGULATOR

35 Amp.—Auto-Lite VRP-4004F-2.....for GDZ Gen.
45 Amp.—Auto-Lite VAV-4002C.....for GGU Gen.
Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—As follows:
VAV-4002C 44-46 amperes (marked '45' on cover).
VRP-4004F-2 34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at bottom of speedometer dial. Lighted when upper (country beams) in use.

Direction Signal: Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on face of speedometer. Lighted when direction signal on same side of car in operation.

Switches
Lighting—Kaiser-Frazer No. 203830.
Beam Selector—Kaiser-Frazer No. 204545.
Instrument Panel—Kaiser-Frazer No. 203833.
Courtesy (on Instrument Panel)—K-F No. 200821.
Door—Kaiser-Frazer No. 204229.
Dome Lamp—Kaiser-Frazer No. 204779.
Stop Lamp—Kaiser-Frazer No. 201466.
Direction Signal—Kaiser-Frazer No. 204552.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.

FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Cigar Lighter—30 amperes. In lead back of instrument panel.

HORNS: Auto-Lite or Sparton. A-L HW-4017 (Low Note), HW-4018 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.

Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core.

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ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145"). *See "Original Bore & Pistons" in Fraser Special Data.*
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—112 at 3600 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

TIGHTENING TORQUES: *See Fraser Special Data.*

CYLINDER HEAD INSTALLATION: *See Fraser Special Data.*

ENGINE REMOVAL: *See Fraser Special Data.*

PISTONS: Aluminum alloy, Cam-ground. Tin-plated, T-slot type. Length 3 9/16".
Original Bore & Piston Sizes—*See Fraser Special Data.*
Clearance—See Fitting new pistons.
Removal—Pistons and rods removed from above.

▷*CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.*

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.

Replacement Pistons: *See Fraser Special Data.*

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.

Replacement Rings: *See Fraser Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-.8595" for new std. pins.

▷**CAUTION**—Pin bushing must protrude 1/64" on each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".

▷*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Fraser Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.

CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".

▷*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Fraser Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation—*See "Crankshaft & Main Bearings" in Fraser Special Data.*

Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.

End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between front crankshaft thrust washer (ahead of #1 bearing) and crankshaft thrust plate (behind crankshaft sprocket).
Endplay—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Fraser Special Data.*

CAMSHAFT: Four bearing. Two-sprocket chain drive.
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I.D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".

Camshaft Removal: *See "Camshaft & Bearings" in Fraser Special Data.*

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set (furnished finished line-bored and do not require reaming after installation). Use KF-4 Camshaft Bearing Remover & Replacer.

▷*CAUTION—Align oil hole in bushings and block.*

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket **Endplay**—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.

▷*Timing Chain Caution—Morse and Link Belt chains used. Interchangeable only as complete sets with both sprockets.*

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:

	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width—5/64-3/32" (Intake), 3/32-7/64" (Exhaust). Use KF-58 Relief Counterboring Set to remove high shoulder in block above valve head.

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.

Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. Two types used and are interchangeable. One type using tappet adjusting screw with locknut, other type is self-locking.
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize. Oversize identified as follows: "A", .0005", "B", .001", "C", .0015", "D", .002", "K", .005", "S", .008".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.

▷**Adjustment Procedure**—*See Fraser Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .014" tappet clearance (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Located in right side of cylinder block below the valve chamber and toward the rear of engine. Adjustable by replacing spring or install washers No. 200272 between end of spring and plug.

Oil Pan Removal: *See Fraser Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine. NOTE—Two types of valve cover and outlet pipe assemblies used—can be identified by angle of cut-off at lower end of tube: (Early 1949 Cars) angular cut-off faces **forward**, (Later 1949 Cars) angular cut-off faces **toward rear.**

▷*CAUTION—Do not install later valve cover & outlet pipe assembly on early cars (may cause loss of oil through tube).*

Oil Pump: Gear Type. In crankcase.

Oil Pump Servicing—*See Fraser Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

Oil Gauge—Auto-Lite No. 11585A.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostatic control.

Capacity—13½ qts. (13 qts. at driving level).

Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Radiator: No. 202906 (17" wide). Side mounted to shroud with six bolts.

Radiator Removal—*See Fraser Special Data.*

Water Pump: Centrifugal type with ball bearing shaft. *See Water Pump Section for complete data.*

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.

Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: Auto-Lite No. 11587A or 11775A. Not electric.

CLUTCH

Auburn Model 9251-15 or Borg & Beck Model 9A7.

►**Clutch Identification**—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (for Borg & Beck—cover marked "951").

See Clutch Section for complete data.

Facings (Borg & Beck)—Woven asbestos, 2 required. Inside Diam. 6". Outside Diam. 9¼". Thickness ⅛".

Facings (Auburn)—Moulded metallic or Raybestos. 2 required. I. D. 6". O. D. 9¼". Thickness .135".

Pedal Adjustment: Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bellcrank. Turn clevis end in or out to obtain correct pedal free movement. Install adjusting link clevis on bellcrank, insert clevis pin, cotter pin, and return spring.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, using Flywheel Turning Tool C-771 and loosen six bolts equally before removing. Remove clutch pressure plate and cover assembly and clutch disc.

TRANSMISSION

Warner Model AS23-T86E (Std.), Model AS24-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low and Reverse).

See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.

See Transmission Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, disconnect propeller shaft at front companion flange. Free engine rear support from cross-member by taking out two insulator bolts at transmission. Disconnect and remove master cylinder operating rod. Disconnect hand brake cable at equalizer and engine rear crossmember. Remove eight bolts at frame side rails and remove crossmember. Remove four bolts holding transmission to clutch housing and pull out the transmission. (If overdrive is installed it will be removed with transmission).

OVERDRIVE

Warner Type R10B (with special AS24-T86E Transmission). Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."

See Transmission Section for complete data.

Overdrive Solenoid—D-R 1118132, K-F No. 200911.

Governor—Kaiser-Frazer No. 200908.

Control Relay—Auto-Lite HRT-4001 or 1A. Has 20-ampere fuse on BAT terminal.

Kick-down Switch—Kaiser-Frazer No. 203451.

Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Disconnect front propeller shaft at front companion flange and move shaft away from housing. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

UNIVERSALS

Detroit Series 4200. Ball-and-Trunnion. 3 used with intermediate universal at propeller shaft support.

Propeller Shaft & Support Bearing: Two shafts used with support bearing on frame crossmember at intermediate universal.

Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Fraser Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio (Without Overdrive)—3.91-1 Std., 3.73-1 or 4.09-1 Optl.

Ratio (With Overdrive)—4.27-1 or 4.55-1.

Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.

Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.

Endplay—.001-.006".

SHOCK ABS RBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—5½° preferred (4¾-5¾° crosswise).

Caster—0° preferred (—1° to +1°).

Camber—¼° preferred (0° to ¾°).

Toe In—1/16". Adjust by turning both tie rods.

Steering Geometry (Toe-out)—Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes. *See Brake Section for complete data.*

►*SELF ADJUSTING BRAKE NOTE*—Used on a limited number of cars during 1949-50 production. *See "Wagner Lockheed" Brakes in Brake Section for complete data.*

Drums—Composite (cast-iron & steel). Diameter 11"

Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).

Clearance—.008" at heel and toe of each shoe.

Braking Power—56% Front wheels, 44% Rear.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.

See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

SERIAL NUMBER: On plate located on left front pillar post.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.

NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes)** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Fraser Special Data.* NOTE—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. (7.3-1 Heads) at cranking speed of 70 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.

NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030".

Plugs—Auto-Lite Type A-5 (Early 1951), A-7 (Late 1951). *CAUTION*—Type A-7 is used for new car break-in. Type A-5 can be used for replacement if A-7 too hot for sustained high speed driving. Do not use A-7 for A-5 replacement unless required.

DISTRIBUTOR: Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.
►***CAUTION—Engine must be idling below 450 RPM when setting timing.***
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:
►*CARBURETOR CHANGE (to Correct Hard Starting & Flooding)—See Carburetor Section for complete data.*
Idle Setting—½ to 1 turn open—2 screws. Turn screws out for richer mixture.
Idle Speed—550-600 RPM (Std.), 425-450 RPM (Hydra-Matic).
Float Level—(Early Production, Spring Loaded Needle & Seat assembly)—7/64". (Later Production, Solid Needle & Seat assembly)—¼", measured from machined surface of bowl cover to top of float with bowl cover inverted.
►***CAUTION—When measuring float level do not depress float lip against spring in needle, but let float rest of its own weight. Adjust by bending lip of float, not float arm.***
Accelerating Pump—No seasonal adjustment. *See Carburetor Section for complete data.*

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4½ lbs.

►***CAUTION—Pump pressure must not exceed 4½ lbs.***

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.
►**Adjustment Procedure**—*See Fraser Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.

IGNITION

IGNITION SWITCH: Kaiser & Frazer No. 204485.
Lock Cylinder—Kaiser-Frazer No. 203885 (with key).

COIL: Auto-Lite IG-6009A (Early), CR-6009 (Late). On left side of engine opposite distributor.
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

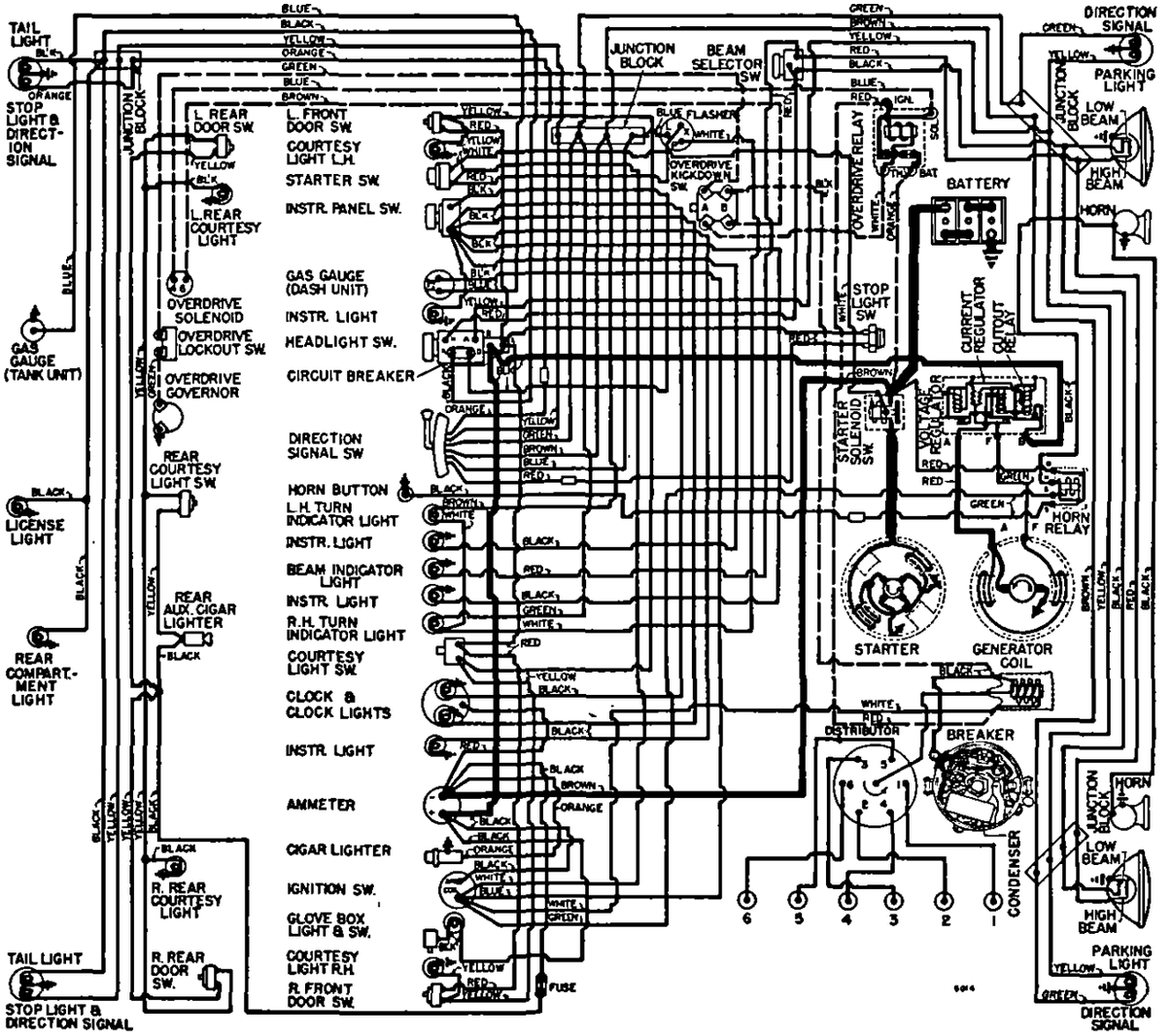
DISTRIBUTOR: Auto-Lite Model IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.

Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type).



Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting ..... **4° BTDC.**
Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.
Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine below 450 RPM, (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten capscrew. Check octane selector setting.
►*CAUTION*—Reset engine idling speed to 550 RPM on cars with synchro-mesh transmission.
Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

Carter WGD Type 813S. 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.
►*CARBURETOR CHANGE (to Correct Hard Starting & Flooding)—See Carburetor Section for complete data.*
Casting No. on Flange—774.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Dual (WGD) type.
Setting—With thermostatic coil housing gasket and baffle plate removed, crack throttle valve and hold choke valve closed. There should now be .018" to .023" clearance (gauge T109-29) between throttle valve and bore of carburetor (side opposite idle port). Adjust by bending the choke connector rod at lower angle bend.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
Setting—Centered (coil housing at index mark).
See Carburetion Equipment Section for data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544539 Oil-bath type.
Element—AC No. 22.
Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with SAE No. 50 engine oil (No. 20 for below freezing temp.) at 2000 mile intervals or when engine tuned.
Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.
►*CAUTION—Install pump with rocker arm UNDER camshaft eccentric.*
Pressure—3-4¼ lbs.
See Carburetion Equipment Section for data.
Gasoline Gauge: Auto-Lite electric type.
Dash Unit—A-L No. 11586A.
Tank Unit—A-L No. 11571A.
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4054 (Std.), MAW-4057 (Hydra-Matic). Armature MAW-2138.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
12.0 "	Lock	3.0	505
6.0 "	Lock	2.0	335

Starting Switch: Magnetic switch K-F Part No. 204752 on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

35 Amp.....Auto-Lite GDZ-4818A. Arm. GDZ-2006F.
45 Amp.....Auto-Lite GGU-6001B. Arm. GGU-2006F.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance Data (GDZ-4818A)

Amperes	Volts	Cold—R.P.M.	Hot
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GGU-6001B)

Amperes	Volts	Cold—R.P.M.	Hot
45	8.0	1550 Max.	

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.60-1.78 amperes at 6.0 volts, (GGU) 1.7-1.8 amperes at 6.0 volts.
Motoring Current—(GDZ) 4.16-4.60 amperes at 6.0 volts, (GGU) 5.5-6.2 amperes at 6.0 volts.
Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

REGULATOR

Auto-Lite Regulator No.	For Generator No.
VRP-4004F-2 (Early)	GDZ-4818A
VRP-6001A (Late)	GDZ-4818A
VAV-4002C (Taxi)	GGU-6001B

Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—As follows:
VAV-4002C 44-46 amperes (marked '45' on cover).
VRP-4004F-2 34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at bottom of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on face of speedometer. Lighted when direction signal on same side of car in operation.

Switches
Lighting—Kaiser-Frazer No. 203830.
Beam Selector—Kaiser-Frazer No. 204545.
Instrument Panel—Kaiser-Frazer No. 203833.
Courtesy (on Instrument Panel)—K-F No. 200821.
Door—Kaiser-Frazer No. 204229.
Dome Lamp—Kaiser-Frazer No. 204779.
Stop Lamp—Kaiser-Frazer No. 201466.
Direction Signal—Kaiser-Frazer No. 204552.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.
FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Rear Seat Cigar Lighter & Body Lights—30 ampere in lead back of instrument panel.
HORNS: Auto-Lite or Sparton. A-L HW-4017 (Low Note), HW-4018 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.
Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core.

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ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145"). *See "Original Bore & Pistons" in Frazer Special Data.*
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3
Developed Horsepower—115 at 3650 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

ENGINE REMOVAL: *See Frazer Special Data.*

CYLINDER HEAD AND TIGHTENING TORQUES: *See Frazer Special Data.*

PISTONS: Aluminum alloy, Cam-ground. Tin-plated, T-slot type. Length 3 17/32".
Original Bore & Piston Sizes—*See Frazer Special Data.*
Clearance—See Fitting new pistons.
Removal—Pistons and rods removed from above.
▷*CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.*

Fitting New Pistons: Use .0015" feeler stock (new pistons only—use .004" feeler for used pistons), ½" wide, insert feeler between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 5-10 lbs. as 70°F.

Replacement Pistons: *See Frazer Special Data.*

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.002-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.0025-.004"

Installing Rings: Side marked "TOP" (compression rings) upward. Chrome plated ring must be installed in top (#1) ring groove.

Replacement Rings: *See Frazer Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 160°F. (heat piston in hot water to install pin).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-8595" for new std. pins.
▷*CAUTION*—Pin bushing must protrude 1/64" on each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
▷*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0018". **Side Play**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.
CAUTION—Install bearings with tang, engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".
▷*CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Frazer Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0007-.002".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation—*See "Crankshaft & Main Bearings" in Frazer Special Data.*

Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.

End Thrust: Taken by #4 (rear) bearing which is flanged type.
Endplay—.003-.006".

CAMSHAFT: Four bearing. Two-sprocket chain drive.
▷*CAUTION—TWO different camshafts used in production (steel & Cast Iron). See Frazer Special Data for identification and Oil Pump Drive Gear and Valve Lifter type used with each shaft.*
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I.D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbited bushings.
Clearance—.002-.004".

Camshaft Removal: *See "Camshaft & Bearings" in Frazer Special Data.*

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set (furnished finished line-bored and do not require reaming after installation). Use KF-4 Camshaft Bearing Remover & Replacer.
▷*CAUTION—Align oil hole in bushings and block.*

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket. **Endplay**—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.
▷*Timing Chain Caution—Morse and Link Belt chains used. Interchangeable only as complete sets with both sprockets.*

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3520"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width—5/64-3/32" (Intake), 3/32-7/64" (Exhaust). Use KF-58 Relief Counterboring Set to remove high shoulder in block above valve head.

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides to inside diameter of .3432-.3422" using Reamer C-249. This will provide correct stem clearance.
Replacement Guides—Guides furnished .0005" Oversize (marked "A") and .0055" Oversize (marked "L") to insure correct .0005-.003" press fit.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.

Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32". Free length 1 31/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Mushroom type with self-locking tappet adjusting screws. **Diameter**—.6855-.6860".
▷*CAUTION—TWO types used in conjunction with different camshafts.* STEEL lifters used only with Cast Iron Camshaft, CAST IRON lifters can be used with both Steel and Cast Iron Camshafts. *See "Camshaft & Bearings" in Frazer Special Data.*
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Standard size and in following oversizes (marked as indicated): "B" .001", "D" .002", "K" .005".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.
▷**Adjustment Procedure**—*See Frazer Special Data.*
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .020" tappet clearance, #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Located in right side of cylinder block below the valve chamber and toward the rear of engine. Adjustable by replacing spring or install washers No. 200272 between end of spring and plug.

Oil Pressure Gauge: Auto-Lite No. 11585A (Not elec.).

Oil Pan Removal: *See Frazer Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine.

Oil Pump: Gear Type. In crankcase.
▷*OIL PUMP DRIVE GEAR CAUTION—Gear must be same material as camshaft (Cast Iron or steel). See "Camshaft & Bearings" in Frazer Special Data.*
Oil Pump Servicing—*See Frazer Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostatic control.
Capacity—13½ qts. (13 qts. at driving level).
Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Form 158—1956-M

Radiator Removal: *See "Radiator" in Frazer Special Data.*

►*REPLACEMENT RADIATOR CAUTION: Both Harrison & Fedders Radiators furnished. If Harrison Radiator installed, ALL SIX MOUNTING HOLES MUST BE RELOCATED ¾" BELOW ORIGINAL HOLES. This will raise radiator and prevent fan striking underside of upper tank.*

Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: Auto-Lite No. 11775A (Not elec.).

CLUTCH

Auburn Model 9251-18 or Borg & Beck 9A7 No. 951. Single plate, dry disc type.

►**Clutch Identification**—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (for Borg & Beck). Borg & Beck cover marked 951.
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven asbestos, 2 required. Inside Diam. 6". Outside Diam. 9¼". Thickness ⅛".
Facings (Auburn)—Molded metallic or Raybestos. 2 required. I. D. 6". O. D. 9¼". Thickness .135".

Pedal Adjustment: Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bellcrank. Turn clevis end in or out to obtain correct pedal free movement. Install adjusting link clevis on bellcrank, insert clevis pin, cotter pin, and return spring.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, using Flywheel Turning Tool C-771 and loosen six bolts equally before removing. Remove clutch pressure plate and cover assembly and clutch disc.

TRANSMISSION

Warner Model AS49-T86E (Std.), Model AS50-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low and Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit.) Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, disconnect propeller shaft at front companion flange. Free engine rear support from cross-member by taking out two insulator bolts at transmission. Disconnect and remove master cylinder operating rod. Disconnect hand brake cable at equalizer and engine rear crossmember. Remove eight bolts at frame side rails and remove crossmember. Remove four bolts holding transmission to clutch housing and pull out the transmission. (If overdrive is installed it will be removed with transmission).

VERDRIVE

Warner Type R10B (with special AS50-T86E Transmission). Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."
See Transmission Section for complete data.
Overdrive Solenoid—D-R 1118132, K-F No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001A, K-F Part No. 201636. Has 20-ampere fuse on BAT terminal.
Kick-down Switch—Kaiser-Frazer No. 203451.
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Disconnect front propeller shaft at front companion flange and move shaft away from housing. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

HYDRA-MATIC DRIVE TRANSMISSION

Four-speed planetary type automatic transmission and fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles. Add fluid as required, to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Automatic Transmission Fluid Type "A").

Capacity—Approx. 11 qts. (refilling after draining). 12 qts. (when transmission disassembled).

Checking Fluid Level—Check only with transmission warm (set hand brake, run engine with selector in "N"). With transmission oil hot, idle engine for at least two minutes, then check with engine running and selector in "N". Dip stick located under inspection hole cover in floor pan under front floor mat. Add fluid as required to bring level up to "F" mark on stick.
CAUTION—Do not fill above "F" mark on dip stick.

Linkage Adjustment: *See "Hydra-Matic Drive Linkage Adjustment" in Transmission Section.*
Neutral Safety Switch Adjustment—(Hydra-Matic) No adjustment required.

►*OTHER HYDRA-MATIC DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit Series 4200. Ball-and-Trunnion. 3 used with intermediate universal at propeller shaft support.

Propeller Shaft & Support Bearing: Two shafts used with support bearing on frame crossmember at intermediate universal.
Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Frazer Special Data.*

REAR AXLE

Spicer Model 41-2 (Early 1951), Model 44 (Late 1951). Semi-floating, Hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Ratio—(Std. & Overdrive Cars) 4.55-1, (Hydra-Matic Cars) 3.54-1.
Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABS RBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5° crosswise desired (limits 4¾-5½°).
Caster—0° preferred (limits Neg. 1° to Pos. 1°).
Camber—Pos. ½° preferred (limits 0° to Pos. ¾°).
Toe-In—1/8" preferred (1/16-1/8"). Adjust by turning both tie rods.
Toe-out on Turns—Inner wheel 20°, outer wheel 17½°. No adjustment.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter11"
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Clearance—.010" between lining and drum at adjusting cam. *CAUTION*—Brake shoes should be "centered" by several brake applications before adjusting brakes and before checking for drag after adjustment.
Braking Power—55.5% Front wheels, 44.5% Rear.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

HOOD ASSEMBLY

HOOD ALIGNMENT: Adjust hood by means of slotted holes provided for hood attaching bolts. Install shims between hood and hinge to raise hood. Install or remove shims between hinge and body to move hood sideways. The height and fit at front end is controlled by adjustment of hood latch and rubber bumper. See "Hood Latch Adjustment" following.

HOOD LATCH ADJUSTMENT: Hood latch bolts have slotted holes in both hood latch and radiator shroud to align latch with lock bolt. Lock bolt is also adjustable by turning bolt in plate to obtain proper height of closed hood.

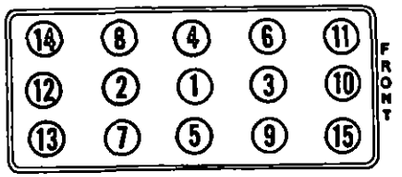
FRONT END SHEET METAL

FRONT END SHEET METAL ASSEMBLY REMOVAL: Entire front assembly with exception of hood (front fenders, splash shields, radiator shroud, grille, radiator, and radiator support) can be removed as an assembly for work on front of engine. To remove assembly, take out six bolts at body front cowl and one bolt and insulator at radiator support, disconnect fender-to-cowl brace on each side.

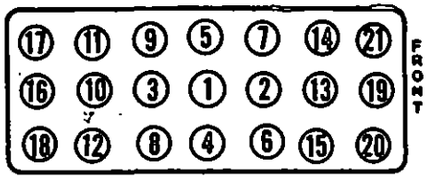
CYLINDER HEAD

CYLINDER HEAD INSTALLATION: Use a Torque Indicating Wrench to tighten cylinder head nuts. Heads should be tightened cold and rechecked after engine reaches temperature of 150°F.

Tightening Torque—See Tightening Specifications.



4 CYLINDER



6 CYLINDER

TIGHTENING SPECIFICATIONS

	Ft.Lbs.	In.Lbs.
Cylinder Head Stud Nuts	60-65	780-792
Main Bearing Capscrews	65-70	780-840
Con. Rod Bolts (4 Cyl.)	50-55	600-660
Con. Rod Bolts (6 Cyl.)	25-30	300-360
Spark Plugs	30	360
Manifold Nuts	20-25	240-300

ENGINE REMOVAL

ENGINE REMOVAL: Disconnect hood-to-hinge bolts on each side and remove hood. Remove front bumper and supports from frame. Drain cooling system and disconnect radiator hoses at engine. Disconnect headlamps at junction block near hood latch. Remove battery and if car is equipped with air ducts, disconnect these at cowl. Remove front end sheet metal (see Front End Sheet Metal above) then proceed as follows:

1)—Raise car on hoist and disconnect the following: Propeller shaft from transmission companion flange. Transmission shift rods at transmission. Exhaust pipe support bracket, and hand brake cable from clutch housing. Overdrive control cable and wiring, and speedometer cable. Clutch cross shaft and bell-crank. Remove cross shaft to avoid damage. Remove rear engine mount (at transmission) to frame crossmember bolts.

2)—Lower car and disconnect heater hoses, electrical wiring at ignition coil, starter and generator, oil pressure gauge and temperature gauge engine units. Disconnect exhaust pipe from manifold, and throttle linkage at carburetor and remove bell-crank.

3)—Remove nuts and washers at forward engine mountings. Attach a sling or lifting hook approximately in center of block so front of engine is tilted up when lifting assembly out of car.

CRANKSHAFT & MAIN BEARINGS

CRANKSHAFT SERVICING: Bearing Replacement—
▷*CAUTION*—4 Cyl. engine must be removed from car for bearing replacement (bearings "doweled" in case and crankshaft must be taken out to remove and install bearings). 6 Cyl. bearings not doweled in this manner.
Make certain that oil holes in bearings line up with oil holes in crankcase. On 4 cylinder, see that bearings fit snugly on dowel pins in crankcase and bearing caps.

Rear Bearing Oil Seal—Consists of a wick type packing installed in grooves in bearing cap and crankcase. To install new packing, insert packing in groove, use round piece of wood or steel to "roll" packing into groove, working from both ends toward center. With packing firmly seated in groove, cut off ends flush with surface. NOTE—Crankshaft must be removed to install packing in upper (crankcase) half of bearing.

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case. When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. CAUTION—Do not cut off this protruding portion of the packing.

Front (Timing Cover) Oil Seal—On all models, timing case cover (with double baffle and spring loaded leather seal) and crankshaft pulley (with polished surface for seal contact) used.

CHECKING CRANKSHAFT ALIGNMENT: Mount crankshaft in crankcase with all bearings in place except one. Mount dial indicator on crankcase with indicator button resting on bearing journal which has bearing removed. Slowly rotate crankshaft and note dial indicator reading. Install bearing and remove another bearing. Repeat operation with dial indicator until all journals are checked. The maximum allowable run-out is .002".

CAMSHAFT & BEARINGS

▷***1953 HENRY J 6 CYL. TIMING GEAR PRODUCTION CHANGE & 1951-53 REPLACEMENT PARTS CAUTION:*** Beginning 1953 Engine No. 3060100, new parts used as listed below and these parts can be used in previous engines with limitations noted.

	1st Part No.	Later Part No.
Camshaft	208798②	③214387
Camshaft Gear	208807④	⑤214388
Crankshaft Gear	208804⑥	⑦214389
Crankshaft Oil Slinger	208739⑧	⑨214390
Crankshaft Thrust Shim	208741	①214391

①—This new shim is .003" thick and when used with std. .002" shim (No. 208741) will make it possible to secure more precise adjustment of crankshaft endplay.
②—Gear mtg. trunnion length ⅞".
③—Gear mtg. trunnion length 1 7/32".
④—Tooth Width ⅞". ⑤—Tooth Width 1 1/16".
⑥—Tooth Width 29/32". ⑦—Tooth Width 1 5/32".
⑧—Diameter of flat face at center 2".
⑨—Diameter of flat face at center 1 13/16".

WHENEVER POSSIBLE, REPLACEMENT PARTS SHOULD MATCH ORIGINAL TYPE PARTS. Parts can be interchanged providing following combinations are maintained:

1) Old Camshaft and old Camshaft Gear.
2) New Camshaft and new Camshaft Gear.
3) Old Crankshaft Gear and old Slinger.
4) New Crankshaft Gear and new Slinger.
5) Any combination of new and old gears.

CAMSHAFT REMOVAL: Drain radiator and cylinder block, remove entire Front End Sheet Metal, or remove grille and radiator. Remove cylinder head, manifold, valves, and valve springs. Remove oil pump, fuel pump, fan blade assembly, and oil pan. Remove drive belt from water pump and crankshaft pulleys. Use puller W-175 to remove crankshaft pulley. Remove timing gear cover. Rotate camshaft gear until two thrust plate screws are visible through holes in timing gear. Remove screws from thrust plate. Retain all tappets in a raised position with wedges or wooden clothes pins and carefully remove camshaft.

Camshaft Front Bearing—Consists of a steel-backed, babbitt-lined bushing which takes thrust. When installing this bushing, make certain oil hole lines up with drilled oil hole in crankcase, stake bearing in place to prevent turning in service.

Camshaft Thrust Plate—Thrust plate is assembled on shaft behind camshaft gear with spacer between plate and camshaft front bearing journal. If required, thin shim can be installed behind spacer to increase clearance, or spacer can be dressed off to reduce clearance.

CAUTION—Install spacer with beveled inner edge toward rear.

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT PROCEDURE: The following is the recommended order for adjusting tappets at room temperature. (Valves are counted from front of engine).

4-CYL. MODELS

Fully Raise Valve	Then ADJUST Valve
Nos. 1 and 3	Nos. 6 and 8
Nos. 2 and 5	Nos. 4 and 7
Nos. 6 and 8	Nos. 1 and 3
Nos. 4 and 7	Nos. 2 and 5

6-CYL. MODELS

Nos. 1 and 3	Nos. 10 and 12
Nos. 7 and 9	Nos. 4 and 6
Nos. 2 and 5	Nos. 8 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 6	Nos. 7 and 9
Nos. 8 and 11	Nos. 2 and 5

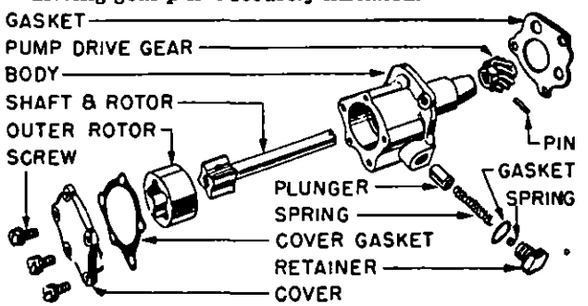
OIL PUMP

ROTOR TYPE OIL PUMP: Pump mounted externally on left hand side of crankcase.

Pump Removal—Remove mounting screws in pump body flange, slide pump assembly out. To disassemble pump, remove cover screws and lockwashers, lift off cover, remove pump outer rotor. To remove shaft and rotor assembly, file off end of pin in drive gear hub, drive pin through shaft using a small drift, remove gear, withdraw shaft and rotor from housing. To remove oil regulator, remove hexagonal-headed plug on side of housing, withdraw regulator spring and plunger.

CAUTION—Do not lose adjusting shims located in plug above spring.

Pump Servicing & Assembly—Replace rotors if clearance between inner and outer rotor excessive, or if rotor clearance in housing excessive. Replace cover if rotor bearing surface is worn or scratched. Use new body and cover gaskets. Make certain that driving gear pin is securely installed.



HENRY J OIL PUMP

OIL PUMP INSTALLATION: Turn flywheel to #1 piston firing position with flywheel mark "IGN" centered in inspection hole in right front face of flywheel housing below starter. Turn distributor shaft to #1 firing position with distributor rotor finger opposite #1 terminal in distributor cap. Hold oil pump in same relative position as when installed on engine, turn pump shaft until tongue offset is upward (widest part of shaft down) and line up gear retaining pin with right hand side of slot in pump body. Slide pump into place on mounting studs, recheck rotor position. NOTE—If distributor rotor not at #1 terminal with pump installed, remove pump, turn shaft as required, and re-install.

OIL PAN REMOVAL

6 CYL. MODELS

OIL PAN REMOVAL: Drain radiator and remove upper and lower hoses. Remove nuts and washers securing engine front end plate to right and left front engine support insulators. Raise front of car, drain engine oil and remove tie rod from pitman arm. Loosen rear engine support insulator-to-crossmember bolts enough to prevent distortion of rear insulators when engine is raised. Attach hoist and raise front of engine until sufficient clearance is obtained between bottom of pan and front crossmember to remove pan. Remove right front engine support bracket and then remove oil pan.

OIL PAN INSTALLATION: Reverse removal procedure.

RADIATOR

RADIATOR REPLACEMENT: Drain cooling system and remove hoses. Take out three bolts at each side attaching radiator to cradle. On 4-Cyl. models, move fan shroud back out of way or remove this shroud. Lift radiator out.

►*ELECTRICAL EQUIPMENT CHANGE*—Delco-Remy used in place of Auto-Lite units beginning with Corsair Serial No. K-523-1203957. Inspect 1952 Vagabond models to identify equipment used. **Delco-Remy and Auto-Lite units are NOT interchangeable, even as complete sets.**

►*See Henry J 4 1952-53 following for data on Delco-Remy equipped cars. The following data pertains only to Auto-Lite equipped cars.*

HOOD ALIGNMENT: *See Henry J Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Henry J Special Data.*

MODEL IDENTIFICATION

	First Serial No.
1951 Models:	
All	1001 Up
1952 Models:	
K-523 Vagabond	K-523-1000001 Up
K-523 Corsair	K-523-1200001 Up

SERIAL NUMBER: On left front door hinge post. **Body Number Note**—Stamped on plate on right front upper firewall in engine compartment.

ENGINE NUMBER: Stamped on top of water pump boss at front of engine and on Engine Name Plate on right side of crankcase.

►*ENGINE NUMBER NOTE—Letters used with engine number are identified as follows:*

"A"—Denotes .010" Undersize main and connecting rod bearings.

"W"—.020" Oversize cylinder bore and pistons.

NOTE—Oversize bore engines were marked "N".

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. at cranking speed (Std. 7.0-1 Hd.). 10 lbs. max. variation between cylinders.

VACUUM READING: Steady 17-21" idling at 550 RPM.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAP: .030".
Plug Type—Auto-Lite AN-7 (Std.). 14 mm. Tighten to 30 ft. lbs. torque.

DISTRIBUTOR: Auto-Lite No. IAT-4008 & 4008-A.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—41°±1° closed.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

COIL: Auto-Lite No. CR-4009 & 4009A.
Ignition Current—2.5 amperes (idling), 4.8 amps. (stopped) at 6.3 volts.

CONDENSER: Auto-Lite No. IAT-3076L.
Capacity—.20-.25 microfarad.

IGNITION TIMING: 5° BTDC.
Timing Mark—(Early cars with Auto-Lite units). 5° mark before top dead center "TC" mark on flywheel.
(Later cars with Delco-Remy units). Notch on crankshaft pulley and two marks (TDC and 5° BTDC) on timing chain cover.

►*CAUTION*—Single timing chain cover mark on first Delco-Remy-equipped cars is TDC and is not used for timing. *See Ignition Timing for reworking of timing mark.*
Timing Procedure—*See Ignition Timing.*
CAUTION—Engine must be idling below 550 RPM. when setting timing.

CARBURETION: Carter YF-820S, SA, SB. 1¼" Single Barrel, Downdraft types. Identical in appearance with YF-814 & 833S (6 cyl.) but not interchangeable.
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" from top of float at free end to bowl cover when needle is seated (assembly inverted).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. fast idle.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control Valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type.
See that valve operates freely.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.

►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*
NOTE—Tappet adjusting screws self-locking. Remove left front wheel and access hole cover in splash shield for access when adjusting valves.

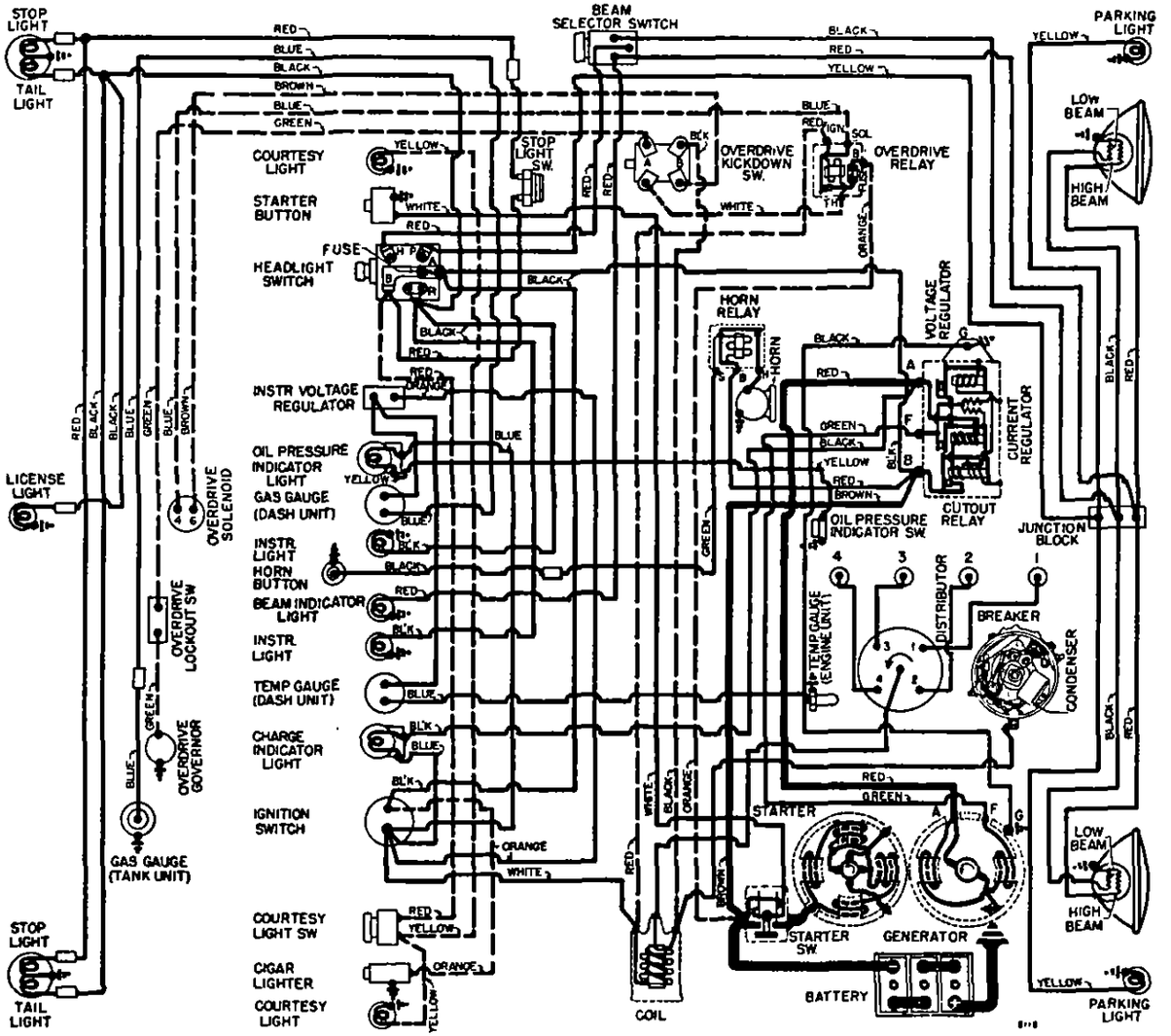
IGNITION

IGNITION SWITCH: K-F No. 212063

COIL: Auto-Lite CR-4009 & 4009A. On right side of engine to rear of distributor.
Ignition Current—2.5 amperes (idling). 4.8 amps. (stopped) at 6.3 volts.

CONDENSER: Auto-Lite Part No. IAT-3076L.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite IAT-4008 or IAT-4008A.
New "Pivoted Breaker Plate" type. Full automatic



advance with auxiliary vacuum spark control.
See Electrical Equipment Section for complete data.

Breaker Gap—.020". Limits .018-.022".
Cam Angle—41°±1° closed.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IAT-4008

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	400	2	800
4	650	8	1300
10	1800	20	3600
11	2000	22	4000

Automatic Advance—IAT-4008-A

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
2°	560	4°	1120
5°	875	10°	1750
8°	1190	16°	2380
11°	1500	22°	3000

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IAT-4008

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4¾
1	2	5⅜
3	6	6¾
4	8	7⅜
5	10	8

Vacuum Advance—IAT-4008-A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
2°	4°	5¾"
5°	10°	9¼"
8°	16°	12¾"
10°	20°	15"

Distributor Removal: Distributor located on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

►*CAUTION—If Oil Pump removed, refer to Oil Pump Installation directions in Henry J Special Data.*

IGNITION TIMING

Std. Setting ..... **5° BTDC.**
Timing Mark—(Early cars with Auto-Lite units)—Timing mark on flywheel. Consists of "TC" mark at top dead center with a 5° mark before this point.
Timing (Timing Light C-693): Connect light to #1 spark plug terminal and direct light at timing mark. Idle engine at lowest possible smooth idle speed (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw extending upward through 45° slot in arm under distributor. Advance or retard distributor until timing mark appears in line with index mark on edge of flash hole, tighten cap screw.

►*CAUTION—Reset engine idling speed at 550 RPM.*

CARBURETOR

Carter YF-820S, SA, SB—1¼" Single Barrel, Downdraft types. Identical in appearance with YF-814 & 833S (6 cyl.) but not interchangeable.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Single Barrel.
See Carburetion Equipment Section for complete data.
Setting—With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.

CARB. EQUIPMENT

Air Cleaner: United Specialties. K-F No. 212749 Oil-wetted type Std., Oil-bath type Optl.

Fuel Pump (Std.): Carter M807S. Diaphragm type.
Optl.—Carter No. M809S combination Fuel-and-Vacuum Pump.
See Carburetion Equipment Section for complete data.
Pressure—3½-4½ lbs. fast idle. At 1000 RPM should be 3-4¼ lbs. If more than 4½ lbs., adjust by adding gaskets between pump and cylinder block.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 45574.
Tank Unit—K-S No. 45567.
See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air Intake Pipe (from air cleaner to **oil filler pipe**) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve **must close at idling speed** for satisfactory engine idling performance.

Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. When vacuum control valve is clogged, pressure will build up in crankcase. When not seating, idle will be unsatisfactory. Remove and clean vacuum control valve and air outlet pipe when tuning engine or if system operating incorrectly.

Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type IM-109D or Willard HW-1-100—6 volt, 15 plate, 100 ampere hour capacity (20 Hour Rate).
Grounded Terminal—Positive (+) terminal grounded at right front engine support. Engine ground cable connected at same point.
Location—In engine compt. on right side.

STARTER

Auto-Lite Model MZ-4163. Armature No. MZ-2237. Four field, 4 brush type with magnetic switch on starter.
Drive—Barrel type Bendix Drive No. A2089.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Starting Switch: Auto-Lite No. SS-4014 solenoid operated, mounted on motor near starter and controlled by push-button on instrument panel.
Removal: Flange mounted on right front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws and bracket screw.

GENERATOR

Auto-Lite No. GDZ-6001-E. Armature No. GGY-2006F. Two-brush type with voltage and current regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, cold, at 8.0 volts, 1800-2000 RPM.

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 amperes at 5.0 volts.
Motoring Current—*3.9-4.4 amperes at 5.0 volts.*

Removal: Pivot mounting at right front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts.

Belt Adjustment: Loosen clamp and pivot bolts, swing generator out away from engine to 15 lbs. pull on scale in line with adjusting bracket.

Generator Indicator: Warning light (under RED plastic) burns red when ignition switch turned on and goes out when cutout relay closes.

REGULAT R

Auto-Lite Model VRP-6001-A. Vibrating type voltage and current regulator.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-6.9 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with arm against stop.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.

Direction Signal: (Optl.)—Guide Light Division make.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

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Switches

Lighting—K-F No. 212091
Beam Selector—K-F No. 204545
Courtesy Light (Optl.)—K-F No. 200821

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. On back of switch.
Overdrive—20 amperes. On control relay.
Heater—14 amperes.
Radio—14 amperes.

HORNS: Delco-Remy No. 1999639 (Low Note), 1999640 (High Note). Matched tone twin horns with relay.
Horn Relay—K-F No. 212080.

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is connected in gauge feed circuit.

ENGINE

▷***ENGINE PARTS CHANGE*—(Models equipped with Delco-Remy units).** Cylinder block, rear end plate, flywheel and ring gear, clutch housing and fan were changed to adapt to new electrical units, and are NOT interchangeable with corresponding parts on Auto-Lite-equipped engines.

ENGINE SPECIFICATIONS: K-F Model 4L-134. Four cylinder Supersonic "L" head type.
Bore—3⅛" or 3.125".
Stroke—4⅜".
Displacement—134.2 cu. ins. **Rated HP**—15.63.
Developed Horsepower—68 at 4000 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Henry J Special Data.*

ENGINE REMOVAL: *See Henry J Special Data.*

OIL PAN REMOVAL: *See Henry J Special Data.*

CYLINDER HEAD INSTALLATION: *See Henry J Special Data.*

PISTONS: Aluminum alloy, "T" slot, Cam ground, tin- or brass-plated type with heat insulation groove above top ring groove.
Length—3¾".
Weight—12.7 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top land .017-.019". Skirt .003".
CAUTION—Pistons must not be "lapped" in (will destroy tin-plated surface).

Replacement Pistons: Std. & .010", .020", .030", .040" oversize.

Fitting New Pistons: Use .0015" x ½" feeler gauge inserted between piston and cylinder wall on opposite side to "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70° F.

Fitting Used Pistons: Use .003" x ¾" feeler gauge inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Upper Comp.	3/32"	.007-.020"	.002-.004"
Lower Comp.	3/32"	.007-.020"	.003-.007"
Oil	3/16"	.007-.020"	.006-.010"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: Furnished in sets for following oversize ranges: Std.-to-.009", .010"-to-.029", .030"-to-.039", .040"-to-.049", .050"-to-.069".

PISTON PIN: Pin is locked in rod by clampscrew.
Diameter—.8118-.8120". **Length**—2.7813".
Pin Fit In Piston—.0002-.0006" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: No oversizes are available.

CONNECTING ROD: Length—9.1845-9.1905". **Weight**—39.41 ozs. NOTE—Rods are offset and are not interchangeable.

▷***CRANKSHAFT JOURNAL UNDERSIZE CAUTION*—*Letter "A" in Engine Number indicates that main & connecting rod journals are .010" UNDERSIZE.***
Crankpin Journal Diameter—1.9375-1.9385".
Lower Bearing—Steel-backed, babbitt-lined, replaceable precision type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.
Clearance—.0005-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: None. (No shims.) Replace bearings. Do not file connecting rods or bearing caps.
NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: .001", .002", .010", .012" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in lower end of rod toward right of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type with removable counterweights.

▷***CRANKSHAFT JOURNAL UNDERSIZE CAUTION*—*Letter "A" in Engine Number indicates that main & connecting rod journals are .010" UNDERSIZE.***
Journal Diameters—2.3331-2.3341" (all bearings).
Bearings—Steel-backed, babbitt-lined, replaceable precision type. Bearing shells are dowelled in bearing caps and crankcase.
Clearance—.0009-.0029".
NOTE—Replace bearings when clearance exceeds .008" or when endplay exceeds .018".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instructions in Henry J Special Data.*
NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing.

Replacement Bearings: .001", .002", .010" Undersize.

Oil Seals: Rear main bearing oil seal is wick type packing in groove in crankcase and rear main bearing cap.
Oil Seal Installation—*See Henry J Special Data.*

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft gear thrustwasher and shoulder on crankshaft at front of flanged front bearing.
NOTE—Crankshaft gear must be removed with a gear puller in order to make endplay adjustments.
Endplay—.004-.008".

CAMSHAFT: Four bearing, helical gear drive. Pressed-on type fibre gear.
Journal Diameters—(1) 2.1855-2.1860"; (2) 2.1215-2.1225"; (3) 2.0590-2.0600"; (4) 1.6225-1.6230".
Bearings—Removable steel-backed, babbitt-lined bushing (front), all others machined in block.
Clearance—.001-.0025" (front bearing).
Camshaft Removal—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.
Endplay—.003-.0055".

Timing Gears: Crankshaft gear cast iron. Camshaft gear fibre with steel hub.
Timing Gear Backlash—.000-.002".

Camshaft Setting: Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1 17/32"	.373"	5 57/64"
Exhaust	1 15/32"	.3725"	5 13/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.0015-.00325"
Exhaust	45°	23/64"	.0025-.0045"

Valve Seat Width—1/16" to 5/64" (Intake). 3/32" to 7/64" (Exhaust).

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place to following dimensions:
Intake Guide—Top of guide 1 5/16" below top face of block. The shorter smaller-diameter section end of guide should be up. Ream to .3745-.3755" I.D.
Exhaust Guide—Top of guide 1" below top face of block. Taper end (counter-bored end) of guide should be up. Ream guide to .3745-.3755" I.D.

Valve Springs: Two close-wound coils toward top of block. Install springs with closed-coil end up toward cylinder block. Spring free length 2½".

	Spring Pressure	Length
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

Valve Lifters: Mushroom type with self-locking screws, operating in reamed holes in block. Access hole in cover in left front splash shield. Serviced by installing oversize lifters.
Lifter Diameter—.6240-.6245".
Lifter Clearance—Select Fit with slight drag.
NOTE—Camshaft must be removed for lifter removal. *See Camshaft Removal instructions in Henry J Special Data.*

VALVE TIMING

Tappet Clearance: .016" All Valves, Cold.

▷**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—With .020" tappet clearance on #1 intake valve. This valve should open with #1 piston at 9° or .039" BTDC. with flywheel mark "I.O." centered in inspection hole in right front face of flywheel housing. Reset tappet clearance at .016"

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to timing gears.
Crankcase Capacity—4 qts. refill.
Normal Oil Pressure—35 lbs. at 30 MPH.
Oil Pressure Regulator—Opens at 28-40 lbs. Located on oil pump cover. Adjustable by removing or adding shims between valve retainer and spring.

Oil Pan Removal: *See Henry J Special Data.*

Oil Pump: External Rotor type with floating oil intake. Mounted externally on left side of crankcase.
Oil Pump Servicing—*See Henry J Special Data.*

Oil Pressure Gauge: Indicator light on instrument panel. Controlled by King-Seeley Engine Unit. Light glows RED until oil pressure rises above 13 lbs.
Engine Unit—King-Seeley No. 47100. Pressure Switch. Contacts open at 13 lbs. (remain closed with lower oil pressure).

COOLING

Cooling System: Pressure type. Relief valve in cap optl. equipment.
Capacity—10½ qts. (11½ qts. with heater).
Pressure Cap (Optl.)—For high altitudes or extremely hot temperatures.

Radiator Removal: *See "Radiator" in Henry J Special Data.*

Water Pump: Centrifugal, belt-driven, packless type with sealed ball bearing shaft.
See Water Pump Section for complete data.
Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.

Thermostat: Harrison. In outlet elbow on cylinder head. No by-pass.
Std.—Stamped '151'. Starts to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) Electric type with voltage regulator.
Dash Unit—King-Seeley No. 45577.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-37 or Rockford Model 8½ RM with Borg & Beck Driven Member. Single plate dry disc type.
Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 6 (Rockford).
See Clutch Section for complete data.
Facings (Auburn)—Molded metallic or Raybestos. 2 required" I.D. 5⅜". O.D. 8½". Thickness .305".
Facings (B&B on Rockford Clutch)—Woven Asbestos. 2 required. I.D. 5⅜". O.D. 8½". Thickness .132-138".

Pedal Adjustment: Free travel 1" measured at pedal rod. Adjust as follows: (1) Clearance between rounded forward end of release fork adjusting rod and clutch housing when release bearing just contacting clutch levers should be ⅝". If less than ½", adjust to ⅝" by changing release fork adjusting rod length (more accessible by removing bellcrank from pivot with rod attached—grease bellcrank pivot before re-installing). (2) Connect and adjust length of pedal rod at trunnion end on bellcrank for required 1" free pedal travel.

Removal: Remove transmission (see Transmission Removal). Free clutch pedal adjusting rod at trunnion end of bellcrank. Remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws to clutch cover flange (turn all screws out evenly). remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS40-T96. Model AS41-T96 with new Type R10B Overdrive (Optl.). Constant-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.

Removal: Support car on stands, drain transmission case (and overdrive case). Disconnect both shift rods at levers on transmission case (on overdrive cars, disconnect control cable from lever on overdrive case and electrical wiring at solenoid and lockout switch). Remove two capscrews and washers attaching clutch cross-shaft support bracket to transmission and remove bracket. Disconnect speedometer cable. Disconnect propeller shaft by taking off four nuts attaching front universal joint to yoke (CAUTION—tape needle bearing retainers in place to prevent entry of dirt or loss of bearings), tie propeller shaft up out of the way. Remove two capscrews attaching rear mounting insulator to cross-member, support rear end of engine (Support Tool KF-104) and raise engine just enough to remove weight from cross-member. Disconnect clutch realease bearing return spring from transmission (accessible through opening in right side of clutch housing). Remove four nuts attaching transmission to clutch housing, pull transmission straight back and remove from beneath car.

OVERDRIVE

Warner Type R10B (with special AS41-T96 Transmission)—Optl. equipment. New solenoid operated, governor controlled with throttle "kick-down."
NOTE—Overdrive is new "centered ring gear" type with one rear bearing only.
Control Relay—K-F No. 207923
Overdrive Governor—K-F No. 212385
Kick-down Switch—K-F No. 207924
Overdrive Solenoid—Warner 4AR10B-62.
See Transmission Section for complete data.

Removal: Overdrive and transmission are removed as a unit. See Transmission Removal above.

UNIVERSALS

Spicer Model with needle bearing.
Spicer No. 10275-1SF. Needle bearing type.

REAR AXLE

Spicer (Salisbury) Model 23-6, Part No. 2125-1; or Model 23-6, Part No. 2125-2 with O.D.—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratios—4.55 (Early Std.), 4.27-1 (Later Std.), 4.55-1 (Overdrive).
Backlash—.001-.005".

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers at spring seat, disconnect parking brake cables. Take out "U" spring bolts, disconnect both springs at rear shackle, remove axle from beneath car.

Axle Shaft Removal: Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out, using Axle Shaft Puller KF-15 (with Adapter SP-341 required).

SHOCK ABSORBERS

Monroe—Direct Acting, hydraulic two-way type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4½° preferred. Limits 4-4¾°.
Caster—0° preferred (±1°). Adjust by adding half shim under upper control arm at frame mounting bolt (rear bolt for Pos., front bolt for Neg. caster).
Camber—½° preferred (¼°-1° Pos. limits). Adjust by adding or removing whole shim under upper control arm at frame mounting bolts.
Toe-In—¼" (3/16-1/4" limits). Adjust by turning sleeve at outer end of each tie rod equally.
Steering Geometry (Toe-out)—Inner wheel 20°. Outer wheel 17°31'. No adjustment.

STEERING GEAR

Own Make (Gemmer 305 Type)—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 9".
Lining—Molded type. Width 2". Thickness 3/16". Length per Shoe—9.87" (Forward Shoe—all wheels), 7.62" (Rear Shoe—all wheels).
Clearance—Shoe eccentric backed off to point where wheel turns freely.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type.
See Miscellaneous Section for complete data.

▷*ELECTRICAL EQUIPMENT CHANGE*—Delco-Remy units used in place of Auto-Lite units beginning with Corsair deLuxe Serial No. K-524-1205339. Inspect 1952 Vagabond deLuxe models to identify equipment used. **Delco-Remy and Auto-Lite units are NOT interchangeable, even as complete sets.**

▷*See Henry J 6 1952-53 following for data on Delco-Remy equipped cars. The following data pertains only to Auto-Lite equipped cars.*

HOOD ALIGNMENT: *See Henry J Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Henry J Special Data.*

MODEL IDENTIFICATION

1951 Models:	First Serial No.
All	1001 Up
1952 Models:	
K-524 Vagabond deLuxe	K-524-1000001 Up
K-524 Corsair deLuxe	K-524-1200001 Up

SERIAL NUMBER: On left front door hinge post.
Body Number Note—Stamped on plate on right front firewall in engine compartment.

ENGINE NUMBER: Stamped on pad on right front upper corner of cylinder block and on Engine Name Plate on right side of crankcase.

▷*ENGINE NUMBER NOTE—Letters used with engine number are identified as follows:*
"A"—Denotes .010" Undersize main and connecting rod bearings.
"W"—.020" Oversize cylinder bore and pistons.
NOTE—Oversize bore engines were marked "N".

TUNE-UP

COMPRESSION PRESSURE: 130-140 lbs. at cranking speed (Std. 7.0-1 Hd.). 10 lbs. max. variation between cylinders.

VACUUM READING: Steady 18-21" idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .030".
Plug Type—Auto-Lite AN-7 (Std.). 14 mm. Tighten to 30 ft. lbs. torque.

DISTRIBUTOR: Auto-Lite No. IAT-4007.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° ± 1° closed.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite No. CR-4009 & 4009A.
Ignition Current (Auto-Lite)—2.5 amperes (idling), 4.8 amperes (stopped) at 6.3 volts.

CONDENSER: Auto-Lite IAT-3076L.
Capacity—.020-.25 microfarad.

IGNITION TIMING: 5° BTDC. *This setting supersedes former TDC setting. See FINAL SETTING below.*
Timing Mark—Crankshaft dampener marked with "0" at TDC. and there are 20—1° graduations BTDC, and 5—1° graduations ATDC.

▷*CAUTION—Disconnect distributor vacuum advance tube when checking timing.*

Timing Procedure—*See Ignition Timing.*

Final Setting—After setting timing at 5° BTDC., road test car and check for excessive ping under low speed, full throttle conditions. If ping excessive, retard ignition timing to point where only faint ping noted under these conditions.

CARBURETION: Carter YF No. 814S (First Cars), No. 833S, SA, SB (Late Cars). 1¼" Single Barrel, Downdraft types. Identical in appearance with YF-820S, SA, SB (4 cyl.) but not interchangeable.
Idle Setting—1-2 turns open. Turn screw out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" from top of float at free end to bowl cover when needle is seated (assembly inverted).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. fast idle.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.

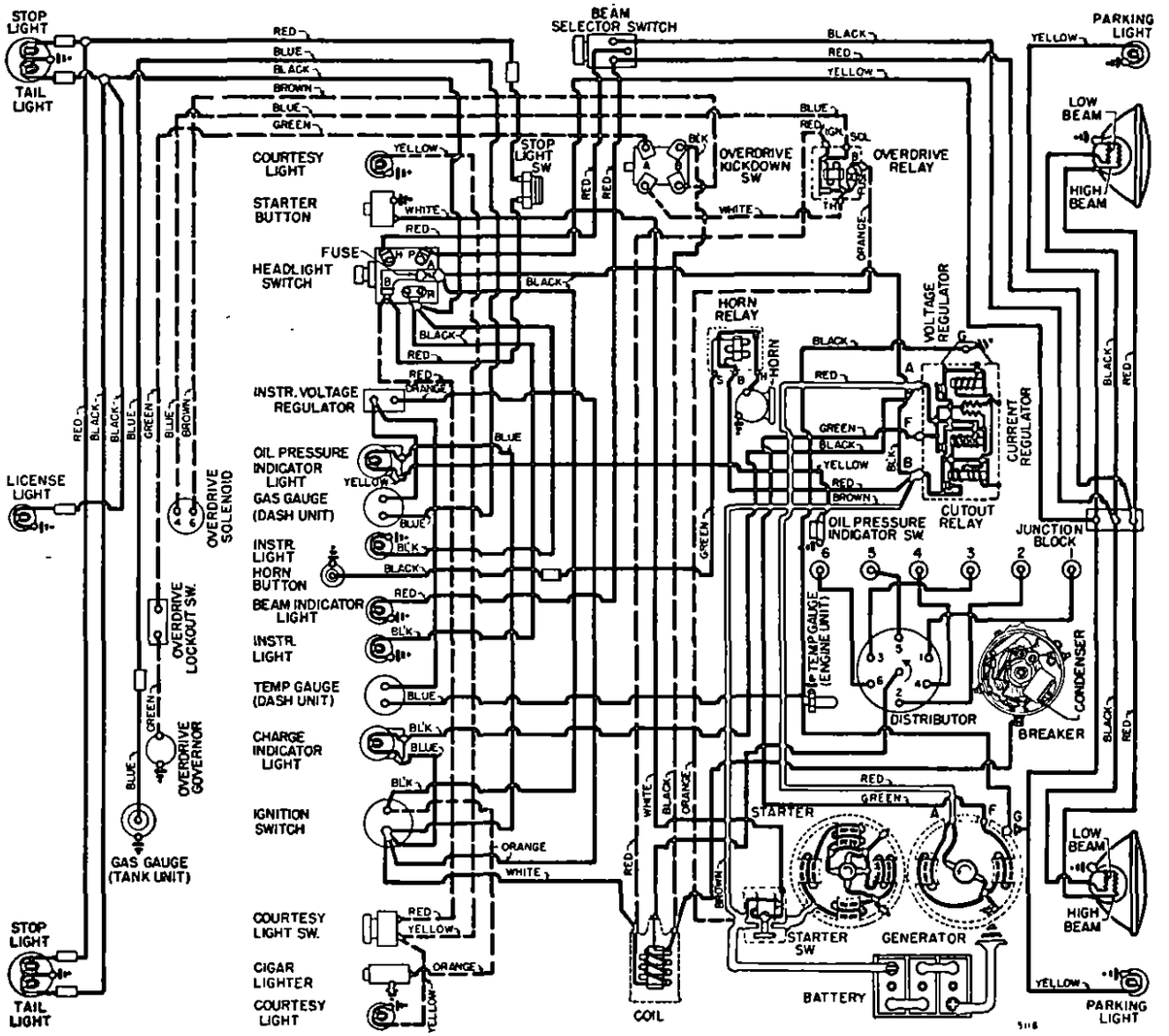
▷**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*
NOTE—Tappet adjusting screws self-locking. Remove left front wheel and access hole cover in splash shield for access when adjusting valves.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: K-F No. 212063

COIL: Auto-Lite No. CR-4009, 4009A. On right side of engine to rear of distributor.
Ignition Current—2.5 amperes (idling). 4.8 amps. (stopped) at 6.3 volts.

CONDENSER: Auto-Lite No. IAT-3076L.
Capacity—.20-.25 microfarad.



DISTRIBUTOR: Auto-Lite No. IAT-4007. New "Pivoted Breaker Plate" type. Full automatic advance with auxiliary vacuum spark control.
See Electrical Equipment Section for data.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° ± 1° closed (at 300 RPM).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0°	700
1°	380	2°	760
7°	550	14°	1100
11°	1300	22°	2600
12°	1500	24°	3000

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
1°	2°	5½"
3°	6°	9¼"
5°	10°	13"
6°	12°	15"

Distributor Removal: Distributor located on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.
►*CAUTION—If Oil Pump removed, refer to Oil Pump Installation directions in Henry J Special Data.*

IGNITION TIMING

Std. Setting (See Change Note).....5° BTDC.
►*IGNITION TIMING CHANGE—Setting above (5°BTDC) supersedes former setting (TDC) and should be checked by road-testing car. See FINAL SETTING.*
Timing Mark—Crankshaft dampener marked with "O" at TDC. and there are 20—1° graduations BTDC and 5—1° graduations ATDC.
Timing with Timing Light (C-693)—Mark correct graduation on vibration dampener with chalk or paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at lowest possible smooth idle speed (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw extending upward through 45° slot in arm under distributor. Advance or retard distributor until timing mark appears in line with pointer at front of engine. Tighten cap screw and recheck timing.
Final Setting—After setting timing at 5° BTDC., road test car and check for excessive ping under low speed, full throttle conditions. If ping excessive, retard ignition itiming to point where only faint ping noted under these conditions.
►*CAUTION—Reset engine idling speed at 550 RPM.*

CARBURETOR

Carter YF No. 814S (First Cars), No. 833S, SA, SB (Late Cars). 1¼" Single barrel. Downdraft types. Identical in appearance with YF-820S, SA, SB (4 Cyl.) but not interchangeable.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Single Barrel.
See Carburetion Equipment Section for complete data.
Setting—With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.

CARB. EQUIPMENT

Air Cleaner: United Specialties. K-F No. 212749 Oil-wetted type Std., Oil-bath type Optl.
Fuel Pump (Std.): Carter No. M807S Diaphragm type.
Optl.—Carter No. M809S combination Fuel-and-Vacuum Pump.
See Carburetion Equipment Section for complete data.
Pressure—3½-4½ lbs. fast idle. At 1000 RPM should be 3-4½ lbs. If more than 4½ lbs., adjust by adding gaskets between pump and cylinder block.
Vacuum—Not less than 6" at fuel pump inlet while cranking engine. 8" at 120 fuel pump RPM or 10½" at 1800 RPM.
Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 45574.
Tank Unit—K-S No. 45567.
See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air Intake Pipe (from air cleaner to oil filler pipe) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve must close at idling speed for satisfactory engine idling performance.
Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. When vacuum control valve is clogged, pressure will build up in crankcase. When not seating, idle will be unsatisfactory. Remove and clean vacuum control valve and air outlet pipe when tuning engine or if system operating incorrectly.
Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type IM-100D & Willard HW-1-100—6 volt, 15 plate, 100 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at right front engine support. Engine ground cable connected at same point.
Location—In engine compt. on right side.

STARTER

Auto-Lite Model MZ-4163. Armature No. MZ-2237. Four-field, 4-brush type with magnetic switch in starter.
Drive—Barrel type Bendix Drive No. A2089.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Starting Switch: Auto-Lite No. SS-4014 solenoid operated, mounted on motor near starter and controlled by push-button on instrument panel.
Removal: Flange mounted on right front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws and bracket screw.

GENERAT R

Auto-Lite No. GDZ-6001-E. Armature No. GGY-2006F. Two-brush type with voltage and current regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, cold, at 8.0 volts, 1800-2000 RPM.

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 950-1050
35	8.0	1800-2000 2150-2350

Rotation—Counter-clockwise at commutator end.
***Brush Spring Tension**—35-53 ozs. (new brushes).*
Field Current—1.3-1.5 amperes at 5.0 volts.
Motoring Current—3.9-4.4 amperes at 5.0 volts.
Removal: Pivot mounting at right front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts.
Belt Adjustment: Loosen clamp and pivot bolts, swing generator out away from engine to 15 lbs. pull on scale in line with adjusting bracket.
Generator Indicator: Warning light (under RED plastic) burns red when ignition switch turned on and goes out when cutout relay closes.

REGULAT R

Auto-Lite Model VRP-6001-A. Vibrating type voltage and current regulator.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cut In—6.4-6.9 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015"minimum.
Air Gap—.031-.034" with arm against stop.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch. **Adjustment**—Aim upper beam straigh ahead (hot spot center 3" below lamp center height at 25 ft.). **Beam Indicator**—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: (Optl.)—Guide Light Division make.
See Electrical Equipment Section for complete data.

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Direction Indicators—Right and left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Lighting—K-F No. 212091
Beam Selector—K-F No. 204545
Courtesy Light (Optl.)—K-F No. 200821

MISC. ELECTRICAL

FUSES: Lighting—30 ampere on back of switch.
Overdrive—20 amperes. On control relay.
Heater—14 amperes.
Radio—14 amperes.

HORNS: Delco-Remy No. 1999639 (Low Note), 1999640 (High Note). Matched tone twin horns with relay.
Horn Relay—K-F No. 212080.

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is connected in gauge feed circuit. See wiring diagram.

ENGINE

▷*ENGINE PARTS CHANGE*—**(Models equipped with Delco-Remy units).** Cylinder block rear end plate, flywheel, ring gear and clutch housing were changed to adapt to new electrical units, and are NOT interchangeable with corresponding parts on Auto-Lite-equipped engines.

ENGINE SPECIFICATIONS: K-F Model 6L-161. Six cylinder Supersonic "L" head type.
Bore—3⅛" or 3.125".
Stroke—3½".
Displacement—161.0 cu. ins. **Rated HP.**—23.44.
Developed Horsepower—80 at 3800 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Henry J Special Data.*

CYLINDER HEAD INSTALLATION: *See Henry J Special Data.*

ENGINE REMOVAL: *See Henry J Special Data.*

OIL PAN REMOVAL: *See Henry J Special data.*

PISTONS: Aluminum alloy, "T" slot, cam ground, tin-plated type with heat insulation groove above top ring groove.

▷*PISTON OVERSIZE NOTE—The letter "W" included with engine number indicates that all pistons are .020" OVERSIZE. See "Engine Number Note."*
Length—3".
Weight—10.8 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top land .018-.021". Skirt .0021".
CAUTION—Pistons must not be "lapped" in (will destroy tin-plated surface).

Replacement Pistons: Std. & .010", .020", .030", .040" oversize.

Fitting New Pistons: Use .0015" feeler stock, ½" wide, inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Fitting Used Pistons: Use .004" x ½" feeler gauge inserted between piston and cylinder wall on opposite side of "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Upper Comp.	3/32"	.007-.020"	.002-.004"
Lower Comp.	3/32"	.007-.020"	.003-.007"
Oil	3/16"	.007-.020"	.006-.010"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: Furnished in sets for following oversize ranges: Std.-to-.009", .010"-to-.029", .030"-to-.039", .040"-to-.049", .050"-to-.069".

PISTON PIN: Pin clamped in rod by clampscrew.
Diameter—.7494-.7496". **Length**—2.6563".
Pin Fit in Piston—.0002-.006". clearance, or light thumb press fit with piston and pin at 70°F.

Replacement Pins: No Oversizes are available.

CONNECTING ROD Length—6.345". **Weight** 22.5 ozs.
NOTE—Rods are not offset and are interchangeable.

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Letter "A" in Engine Number indicates that main and connecting rod journals are .010" UNDERSIZE.*
Crankpin Journal Diameter—1.874-1.875".
Lower Bearing—Steel-backed, babbit-lined, replaceable precision type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.
Clearance—.0005-.0025". **Sideplay**—.002-.008".

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps. NOTE—Replace Bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: .001", .002", .010", .012" Undersize.

Installing Rods: Rods not offset. Install with oil spray hole in lower end toward right (away from camshaft) on all rods.

CRANKSHAFT: Four-bearing type with integral counter-weights. Vibration dampener on forward end.

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Letter "A" in Engine Number indicates that main and connecting rod journals are .010" UNDERSIZE.*
Journal Diameters—2.249-2.250" (all bearings).
Bearings—Steel-backed, babbit-lined, replaceable precision type.
NOTE—Bearing shells are NOT dowelled on 6 cylinder engine. They can be removed and replaced without removing crankshaft.
Clearance—.0009-.0030".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instruction in Henry J Special Data.*

Replacement Bearings: .001", .002", .010" Undersize.

Oil Seals: Rear main bearing oil seal is wick type packing in groove in crankcase and rear main bearing cap.
Oil Seal Installation—*See Henry J Special Data.*

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft gear thrust washer and shoulder on crankshaft at front of flanged front bearing.

▷*ENDPLAY ADJUSTMENT CAUTION: See "Camshaft & Bearings" in Henry J Special Data for new timing gear, oil slinger, and adjusting shims used with new type camshaft and gear used for replacement.*
Endplay—.004-.008".

CAMSHAFT: Four-bearing, helical gear drive. Pressed-on type fibre gear.

▷*CAMSHAFT REPLACEMENT PARTS CAUTION—See "Camshafts & Bearings" in Henry J Special Data for new type camshaft and timing gear and non-interchangeability of parts.*
Journal Diameters—#1, 1.8755-1.8760"; #2, 1.8425-1.8435", #3, 1.8110-1.8120"; #4, 1.6245-1.6250".
Bearings—Removable steel-backed, babbit-lined bushing (front), machined in crankcase (all others).
Clearance—.001-.0025".
Camshaft Removal—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.
Endplay—.003-.0055".

Timing Gears: Crankshaft gear cast iron. Camshaft gear fibre with steel hub.

▷*TIMING GEAR REPLACEMENT PARTS CAUTION*—**See "Camshaft & Bearings" in HenryJ SpecialData for new gears used with later type camshaft and interchangeability of parts.**
Timing Gear Backlash—.000-.002".

Camshaft Setting: Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1 3/8"	.3410"	4 9/16"
Exhaust	1 9/32"	.3400"	4 9/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.284"	.0015-.00325"
Exhaust	45°	.300"	.0025-.0045"

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place. Upper end 7/8" below upper edge of valve seat (taper end up).

Valve Springs: Springs can be installed with either end up. Free length 1 57/64".

	Spring Pressure	Length
Valve Closed	50 lbs.	1 5/8"
Valve Open	105 lbs.	1 21/64"

Valve Lifters: Mushroom type with self-locking screws, operating in reamed holes in block. Serviced by installing oversize lifters.
NOTE—Camshaft must be removed for lifter removal. *See Camshaft Removal instructions in Henry J Special Data.*
Lifter Diameter—.597-.605". **Length**—2".
Clearance in Block—.0005-.002".

VALVE TIMING

Tappet Clearance: .016" All Valves, Cold.

▷**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—With .020" tappet clearance on #1 intake valve, this valve should open with piston 5° before top dead center with five-degree mark before dead center "0" mark on dampener aligned with pointer at front of engine. Reset tappet clearance at .016".

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to timing gears.

Crankcase Capacity—5 qts. refill.

Normal Oil Pressure—30-40 lbs. at 30 MPH.

Oil Pressure Regulator—Opens at 40 lbs. Located on oil pump cover. Adjustable by removing or adding shims between valve retainer and spring.

Oil Pan Removal: *See Henry J Special Data.*

Oil Pump: External Rotor type with floating oil intake. Mounted externally on left side of crankcase.

Oil Pump Servicing—*See Henry J Special Data.*

Oil Pressure Gauge: Indicator light on instrument panel. Controlled by King-Seeley Engine Unit. Light glows RED until oil pressure rises above 13 lbs.
Engine Unit—King-Seeley No. 47100. Pressure Switch. Contacts open at 13 lbs. (remain closed with lower oil pressure).

COOLING

Cooling System: Pressure type. Relief valve in cap optl. equipment.

Capacity—9 qts. (10 qts. with heater).
Pressure Cap (Optl.)—For high altitudes or extremely hot temperatures.

Radiator Removal: *See "Radiator" in Henry J Special Data.*

Water Pump: Centrifugal, belt-drive, packless type with sealed ball bearing shaft. NOTE—Seal not same as that on 4 cylinder.

Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.
See Water Pump Section for complete data.

Thermostat: Harrison. In outlet elbow on cylinder head. No by-pass.
Std.—Stamped '151'. Starts to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) Electric type with voltage regulator.
Dash Unit—King-Seeley No. 45577.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-37 or Rockford Model 8½ RM with Borg & Beck Driven Member. Single plate dry disc type.

Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 6 (Rockford).

See Clutch Section for complete data.

Facings (Auburn)—Molded metallic or Raybestos. 2 required. I.D. 5⅜". O.D. 8½". Thickness .305".
Facings (B&B on Rockford Clutch)—Woven Asbestos, 2 required. I.D. 5⅜". O.D. 8½". Thickness .132-.138".

Pedal Adjustment: Free travel 1" measured at pedal rod. Adjust as follows: (1) Clearance between the rounded forward end of release fork adjusting rod and clutch housing when release bearing just contacting clutch levers should be ⅝". If less than ½", adjust to ⅝" by changing release fork adjusting rod length (more accessible by removing bellcrank from pivot with rod attached—grease bellcrank pivot before re-installing). (2) Connect and adjust length of pedal rod at trunnion end on bellcrank for required 1" free pedal travel.

Removal: Remove transmission (see Transmission Removal). Free clutch pedal adjusting rod at trunnion end of bellcrank. Remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws to clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS40-T96. Model AS41-T96 with Type R10B Overdrive (Optl.). Constant-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.

Removal: Support car on stands, drain transmission case (and overdrive case). Disconnect both shift rods at levers on transmission case (on overdrive cars, disconnect control cable from lever on overdrive case and electrical wiring at solenoid and lockout switch). Remove two capscrews and washers attaching clutch cross-shaft support bracket to transmission and remove bracket. Disconnect speedometer cable. Disconnect propeller shaft by taking off four nuts attaching front universal joint to yoke (CAUTION—tape needle bearing retainers in place to prevent entry of dirt or loss of bearings), tie propeller shaft up out of the way. Remove two capscrews attaching rear mounting insulator to cross-member, support rear end of engine (Support Tool KF-104) and raise engine just enough to remove weight from cross-member. Disconnect clutch realease bearing return spring from transmission (accessible through opening in right side of clutch housing). Remove four nuts attaching transmission to clutch housing, pull transmission straight back and remove from beneath car.

OVERDRIVE

Warner R10B (with special AS41-T96 Transmission)—Optl. equipment. New solenoid operated, governor controlled with throttle "kick-down."

NOTE—Overdrive is new "centered ring gear" type with one rear bearing only.

Control Relay—K-F No. 207923
Overdrive Governor—K-F No. 212385
Kick-down Switch—K-F No. 207924
Overdrive Solenoid—Warner 4AR10B-62.
See Transmission Section for complete data.

Removal: Overdrive and transmission are removed as a unit. See Transmission Removal above.

UNIVERSALS

Spicer No. 10275-1SF. Needle bearing type.

REAR AXLE

Spicer (Salisbury) Model 23-6, Part No. 2125-1; or Model 23-6, Part No. 2125-2 with O.D.—Semi-floating, Hypoid Gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—4.10-1 (Std.), 4.55-1 (with O.D.).

Backlash—.001-.005".

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers at spring seat, disconnect parking brake cables. Take out "U" spring bolts, disconnect both springs at rear shackle, remove axle from beneath car.

Axle Shaft Removal—Remove rear wheel and drum using Puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out, using Axle Shaft Puller KF-15 (with Adapter SP-341 required).

SHOCK ABSORBERS

Monroe—Direct Acting, hydraulic two-way type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—4½° preferred. Limits 4-4¾°
Caster—0° preferred (±1°). Adjust by adding half shim under upper control arm at frame mounting bolt (rear bolt for Pos., front bolt for Neg. caster).

Camber—½° preferred (¼-1° Pos. limits). Adjust by adding or removing whole shim under upper control arm at frame mounting bolts.

Toe-In—¼" (3/16-1/4" limits). Adjust by turning sleeve at outer end of each tie rod equally.

Steering Geometry (Toe-out)—Inner wheel 20°. Outer wheel 17°31'. No adjustment.

STEERING GEAR

Own Make (Gemmer 305 Type). Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Drums—Composite (cast iron & steel). Diameter 9".

Lining—Molded type. Width 2". Thickness 3/16". Length per Shoe—9.87" (Forward Shoe—all wheels), 7.62" (Rear Shoe—all wheels).

Clearance—Shoe eccentric backed off to point where wheel just turns freely.

Hand Brake: See Service Brakes (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type.

See Miscellaneous Section for complete data.

HOOD ALIGNMENT: *See Henry J Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Henry J Special Data.*

►*1952 ELECTRICAL EQUIPMENT CHANGE:* Delco-Remy units used in place of Auto-Lite units beginning with Corsair Serial No. K-523-1203957. Inspect 1952 Vagabond models to identify equipment used. Delco-Remy and Auto-Lite units are NOT interchangeable, even as complete sets.

►*See Henry J 4 1951-52 preceding for data on Auto-Lite equipped cars. The following data pertains only to Delco-Remy equipped cars.*

M DEL IDENTIFICATION

1952 Models:	First Serial No.
K-523 Vagabond	K-523-1000001
K-523 Corsair	K-523-1200001
1953 Models:	
K-533 Corsair	K-533-001001
1954 Models:	
K-543 Corsair	①

①—1954 Serial numbers are a continuation of 1953 numbers.

SERIAL NUMBER: On left front door hinge post.
Body Number Note—Stamped on plate on right front upper firewall in engine compartment.

ENGINE NUMBER: Stamped on top of water pump boss on front of engine and on Engine Name Plate on right side of crankcase.

►*ENGINE NUMBER NOTE—Letters used with engine number are identified as follows:*
"A"—Denotes .010" Undersize main and connecting rod bearings.
"W"—.020" Oversize cylinder bore and pistons.
NOTE—Oversize bore engines were marked "N".

TUNE-UP

COMPRESSION PRESSURE: 115-120 lbs. at 185 RPM. cranking speed. Maximum variation between cylinders 10 lbs.

VACUUM READING: Steady 17-21" idling at 550 RPM.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAP: .030".
Plugs—Auto-Lite A-7. 14 mm. Tighten to 30 ft.lbs.

DISTRIBUTOR: Delco-Remy No. 1110230.
Breaker Gaps—.022". Limits .018-.024".
Cam Angle Range—Test limits with .022" gap, 31-37°
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115328. Mounted on right side of engine.
Ignition Current—1.3 amps. idling. 5 amps. stopped at 6.3 volts.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: 5° BTDC.
Timing Mark—Notch in crankshaft pulley aligned with 5° mark on timing gear cover.

►*CAUTION*—Single timing chain cover mark on first Delco-Remy-equipped cars is TDC and is not used for timing. *See Ignition Timing for reworking of timing mark.*
Timing Procedure—*See Ignition Timing.*

►*CAUTION—Disconnect distributor vacuum advance tube when checking timing.*

CARBURETION: Carter YF, No. 820SB. Single barrel downdraft carburetor with manual choke control.
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" from top of float at free end to bowl cover when needle is seated (assembly inverted).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. fast idle.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control Valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.

►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

NOTE—Tappet adjusting screws self-locking. Remove left front wheel and access hole cover in splash shield for access when adjusting valves.

IGNITION

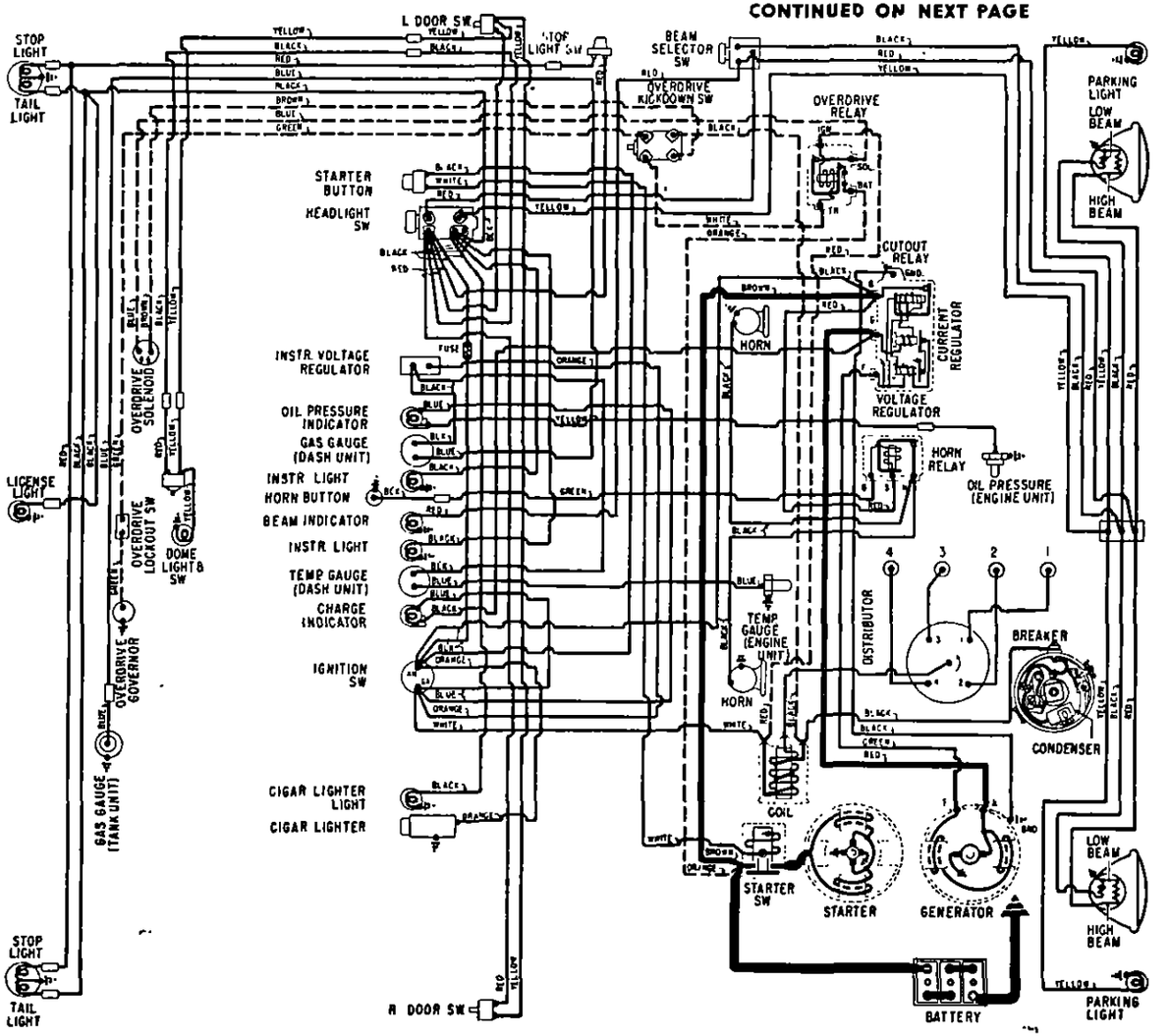
IGNITION SWITCH: K-F No. 212083.

COIL: Delco-Remy No. 1115328. On right side of engine directly above starter.
Ignition Current—1.3 amperes (idling), 5 amperes (stopped) at 6.3 volts.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110230. Full automatic advance type with auxiliary vacuum spark control.
Breaker Gap—.022". Limits .018-.024".
Cam Angle—Test limits with .022" gap, 31-37° closed.
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.

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Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	450	0-4	900
5-7	975	10-14	1950
10-12	1500	20-24	3000

Vacuum Spark Control: Delco-Remy No. 1116066. Integral type linked directly to breaker plate.
Plunger Travel—11/64-13/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	2.5-4.5
9-11	18-22	14-16

Distributor Removal: Distributor located on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

►*CAUTION—If oil pump removed, refer to Oil Pump Installation directions in Henry J Special data.*

IGNITION TIMING

Std. Setting.....5° BTDC
Timing Mark—V notch on crankshaft pulley and TDC and 5° BTDC marks on timing chain cover.

CAUTION—Do not use TDC mark on Delco-Remy-equipped engines for timing. Timing cover on first Delco-Remy-equipped engines have only TDC mark and must be reworked. See method of reworking timing mark below.

►**Reworking TDC mark on first Delco-Remy-equipped engines.** Single timing chain cover mark on first Delco-Remy-equipped engines is TDC and is not used for timing. To permit timing engine 5° BTDC, the TDC mark must be reworked as follows: Scribe line along center-line of TDC mark. Measure 7/32" to the left of the scribed line (viewed from front of engine) and scribe second line parallel to the first. The second line locates No. 1 piston at 5° BTDC when V notch on crankshaft pulley is lined up with it.

Timing (Timing Light C-693): Connect light to #1 spark plug terminal and direct light at timing mark. Idle engine at lowest possible smooth idle speed (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw extending upward through 45° slot in arm under distributor. Advance or retard distributor until notch on crankshaft pulley appears in line with correct (5°) mark on timing gear cover.

►*CAUTION—Reset engine idling speed at 550 RPM.*

CARBURETOR

Carter YF, No. 820SB. 1¼" Single barrel, downdraft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Single Barrel.
See Carburetion Equipment Section for complete data.
Setting—With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.

CARB. EQUIPMENT

Air Cleaner: United Specialties, K-F No. 212749 Oil-wetted type Std., Oil-bath type Optl.
Fuel Pump (Std.): Carter M807S. Diaphragm type. **Optl.**—Carter No. M809S combination Fuel-and-Vacuum Pump.
See Carburetion Equipment Section for complete data.
Pressure—3½-4½ lbs. fast idle. At 1000 RPM should be 3-4½ lbs. If more than 4½ lbs., adjust by adding gaskets between pump and cylinder block.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. (1952) 45574, (1953-54) 46037.
Tank Unit—K-S No. 45567.
See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air Intake Pipe (from air cleaner to oil filler pipe) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve **must close at idling speed** for satisfactory engine idling performance.

Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. When vacuum control valve is clogged, pressure will build up in crankcase. When not seating, idle will be unsatisfactory. Remove and clean vacuum control valve and air outlet pipe when tuning engine or if system operating incorrectly.

Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type IM-100D or Willard HW-1-100—6 volt, 15 plate, 100 ampere hour capacity (20 Hour Rate).
Grounded Terminal—Positive (+) terminal grounded at right front engine support. Engine ground cable connected at same point.
Location—In engine compt. on right side.

STARTER

Delco-Remy No. 1107131. Armature No. 1917855.
Drive—Solenoid pinion shift with overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Starting Switch—Solenoid switch (without relay) mounted on starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy No. 1102789. Armature No. 1921235. Two-brush type with current and voltage regulation.
Charging Rate Adjustment—None. *See Regulator.*
Maximum Charging Rate—38 amperes.

Performance Data

	Amperes	Volts	R.P.M.
Cold	30①	8.0	2050

①—Not maximum output. *See Current Regulator.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ounces (new brushes).
Field Current—1.75-1.95 amperes at 6 volts.
Belt Adjustment: Move generator out for ½" deflection with thumb pressure midway between generator and water pump pulleys.
Generator Charge Indicator: Red warning light on instrument panel. Lights when switch turned on, goes out when generator begins to charge.

REGULATOR

1952-53 MODELS

Delco-Remy No. 1118731. Vibrating type voltage and current regulator.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads, check regulator ground before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Elec. Equip. Section.*

Current Regulator
Setting—34-42 amperes hot (set at 38 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Elec. Equip. Section.*

1954 MODELS

Delco-Remy No. 1118841. New "1118825 Series" regulator.
►*REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. All Specifications below are for "Normal" settings.*

Cutout Relay
Cuts In—6.4 volts.
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.3 volts (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator
Setting—38 amperes (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.

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Direction Signal: (Optl.)—Guide Light Division make. *See Electrical Equipment Section for complete data.*

Direction Indicators—Right and left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Lighting—K-F No. 212091.
Beam Selector—K-F No. 204545.

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. In lighting switch lead behind instrument panel.
Overdrive—20 amperes. On control relay.
Heater—14 amperes.
Radio—14 amperes.

HORNS: Delco-Remy No. 1999639 (Low Note), 1999640 (High Note). Matched tone twin horns wth relay.
Horn Relay—K-F No. 212080.

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is connected in gauge feed circuit.

ENGINE

▷*1952 ENGINE PARTS PRODUCTION CHANGE (To adapt engines to Delco-Remy Electrical Units): Cylinder block, rear end plate, flywheel and ring gear, clutch housing, and fan were changed and are NOT INTERCHANGEABLE with corresponding parts on earlier Auto-Lite equipped engines.*

ENGINE SPECIFICATIONS: K-F Model 4L-134. Four cylinder Supersonic "L" head type.
Bore—3⅛" or 3.125".
Stroke—4⅜".
Displacement—134.2 cu. ins. **Rated HP**—15.63.
Developed Horsepower—68 at 4000 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Henry J Special Data.*

CYLINDER HEAD INSTALLATION: *See Henry J Special Data.*

FRONT END SHEET METAL REMOVAL (For Engine Work): *See Henry J Special Data.*

ENGINE REMOVAL: *See Henry J Special Data.*

OIL PAN REMOVAL: *See Henry J Special Data.*

PISTONS: Aluminum alloy, "T" slot, Cam ground, tin-plated type with heat insulation groove above top ring.

▷*PISTON OVERSIZE NOTE—The letter "W" included with engine number indicates that all pistons are .020" OVERSIZE. See "Engine Number Note."*
Length—3¾".
Weight—12.7 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top land .017-.019". Skirt .003".
CAUTION—Pistons must not be "lapped" in (will destroy tin-plated surface).

Replacement Pistons: Std. & .010", .020", .030", .040" oversize.

Fitting New Pistons: Use .0015" x ½" feeler gauge inserted between piston and cylinder wall on opposite side to "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Fitting Used Pistons: Use .004" x ½" feeler gauge inserted between piston and cylinder wall on opposite side to "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Upper Comp.	3/32"	.007-.020"	.002-.004"
Lower Comp.	3/32"	.007-.020"	.003-.007"
Oil	3/16"	.007-.020"	.006-.010"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: Furnished in sets for following oversize ranges: Std.-to-.009", .010"-to-.029", .030"-to.039", .040"-to-.049", .050"-to-.069".

PISTON PIN: Pin is locked in rod by clampscrew.
Diameter—.8118-.8120". **Length**—2.7813".
Pin Fit In Piston—.0002-.0006" clearance or light thumb push fit with piston and pin at 70°F.

CONNECTING ROD: Length—9.1845-9.1905". **Weight**—39.41 ozs. NOTE—Rods are offset and are **not** interchangeable.

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Letter "A" in Engine Number indicates that main & connecting rod journals are .010" UNDERSIZE.*
Crankpin Journal Diameter—1.9375-1.9385".
Lower Bearing—Steel-backed, babbitt-lined, replaceable precision type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.
Clearance—.0005-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: *None. (No shims.)* Replace bearings. Do not file connecting rods or bearing caps. NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: .001", .002", .010", .012" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in lower end of rod toward right of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type with removable counter-weights.

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Letter "A" in Engine Number indicates that main & connecting rod journals are .010" UNDERSIZE.*
Journal Diameters—2.3331-2.3341" (all bearings).
Bearings—Steel-backed, babbitt-lined, replaceable precision type. Bearing shells are dowelled in bearing caps and crankcase.
Clearance—.0009-.0029".
NOTE—Replace bearing when clearance exceeds .006" or when endplay exceeds .018"

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instruction in Henry J Special Data.*
NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing.

Replacement Bearings: .001", .002", .010" Undersize.

Oil Seals: Rear main bearing oil seal is wick type packing in groove in crankcase and rear main bearing cap.
Oil Seal Installation—*See Henry J Special Data.*

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft gear thrustwasher and shoulder on crankshaft at front of flanged front bearing. NOTE—Crankshaft gear must be removed with a gear puller in order to make endplay adjustments.
Endplay—.004-.008".

CAMSHAFT: Four bearing, helical gear drive. Pressed on type fibre gear.
Journal Diameters—(1) 2.1855-2.1860"; (2) 2.1215-2.1225"; (3) 2.0590-2.0600"; (4) 1.6225-1.6230".
Bearings—Removable steel-backed, babbitt-lined bushing (front), all others machined in block.
Clearance—.001-.0025" (front bearing).
Camshaft Removal—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.
Endplay—.003-.0055".

Timing Gears: Crankshaft gear cast iron. Camshaft gear fibre with steel hub.
Timing Gear Backlash—.000-.002".

Camshaft Setting: Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 17/32"	.373"	5 57/64"
Exhaust	1 15/32"	.3725"	5 13/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.351"	.0015-.00325"
Exhaust	45°	.351"	.0025-.0045"

Valve Seat Width—1/16" to 5/64" (Intake). 3/32" to 7/64" (Exhaust).

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place to following dimensions:
Intake Guide—Top of guide 1 5/16" below top face of block. The shorter smaller-diameter section end of guide should be up. Ream to .3545-.3755" I.D.
Exhaust Guide—Top of guide 1" below top face of block. Taper end (counter-bored end) of guide should be up. Ream guide to .3745-.3755" I.D.

Valve Springs: Two close-wound coils toward top of block. Install springs with closed-coil end up toward cylinder block. Spring free length 2½".

	Spring Pressure	Length
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

Valve Lifters: Mushroom type with self-locking screws, operating in reamed holes in block. Access hole in cover in left front splash shield. Serviced by installing oversize lifters.
Lifter Diameter—.6240-.6245".
Lifter Clearance—Select fit with slight drag.
NOTE—Camshaft must be removed for lifter removal. *See Camshaft Removal instructions in Henry J Special Data.*

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VALVE TIMING

Tappet Clearance: .016" All Valves, Cold.

►**Adjustment Procedure**—*See "Valve System" in Henry J Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to timing gears.
Crankshaft Capacity—4 qts. refill.
Normal Oil Pressure—30-40 lbs. at 30 MPH.
Oil Pressure Regulator—Opens at 35 lbs. Located on oil pump cover. Adjustable by removing or adding shims between valve retainer and spring.

Oil Pan Removal: *See Henry J Special Data.*

Oil Pump: External Rotor type with floating oil intake. Mounted externally on left side of crankcase.
Oil Pump Servicing—*See Henry J Special Data.*

Oil Pressure Gauge: Indicator light on instrument panel. Controlled by King-Seeley Engine Unit. Light glows RED until oil pressure rises above 13 lbs.
Engine Unit—*King-Seeley No. 47100.* Pressure Switch Contacts open at 13 lbs. (remain closed with lower oil pressure).

COOLING

Cooling System: Pressure type. Relief valve in cap optl. equipment.
Capacity—10½ qts. (11½ qts. with heater).
Pressure Cap (Optl.)—For high altitudes or extremely hot temperatures. Opens at 3½-4½ lbs.

Radiator Removal: *See "Radiator" in Henry J Special Data.*

Water Pump: Centrifugal, belt-driven, packless type with sealed ball bearing shaft.
See Water Pump Section for complete data.

Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.

Thermostat: Harrison. In outlet elbow on cylinder head. No by-pass.
Std.—Stamped '151'. Starts to open at 149-156°F. Fully open at 176°F.
Optl. (for permanent Anti-freeze)—Starts to open at 166-174°F., fully open at 194°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) Electric type with voltage regulator.
Dash Unit—King-Seeley No. 45577.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-37 or Rockford Model 8½ RM with Borg & Beck Driven Member. Single plate dry disc type.

Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 6 (Rockford).
See Clutch Section for complete data.

Pedal Adjustment: Free travel 1" measured at pedal rod. Adjust as follows: (1) Clearance between rounded forward end of release fork adjusting rod and clutch housing when release bearing just contacting clutch levers should be ⅝". If less than ½", adjust to ⅝" by changing release fork adjusting rod length (more accessible by removing bellcrank from pivot with rod attached—grease bellcrank pivot before re-installing). (2) Connect and adjust length of pedal rod at trunnion end of bellcrank for required 1" free pedal travel.

Removal: Remove transmission (see Transmission Removal). Free clutch pedal adjusting rod at trunnion end of bellcrank. Remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws to clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS40-T96. Model AS41-T96 with new Type R10B Overdrive (Optl.). Constant-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.

Removal: Support car on stands, drain transmission case (and overdrive case). Disconnect both shift rods at levers on transmission case (on overdrive cars, disconnect control cable from lever on overdrive case and electrical wiring at solenoid and lockout switch). Remove two capscrews and washers attaching clutch cross-shaft support bracket to transmission and remove bracket. Disconnect speedometer cable. Disconnect propeller shaft by taking off four nuts attaching front universal joint to yoke (CAUTION—tape needle bearing retainers in place to prevent entry of dirt or loss of bearings), tie propeller shaft up out of the way. Remove two capscrews attaching rear mounting insulator to cross-member, support rear end of engine (Support Tool KF-104) and raise engine just enough to remove weight from cross-member. Disconnect clutch release bearing return spring from transmission (accessible through opening in right side of clutch housing). Remove four nuts attaching transmission to clutch housing, pull transmission straight back and remove from beneath car.

OVERDRIVE

Warner Type R10B (with special AS41-T96 Transmission)—Optl. equipment. New solenoid operated, governor controlled with throttle "kick-down."

NOTE—Overdrive is new "centered ring gear" type with one rear bearing only.
See Transmission Section for complete data.

Removal: Overdrive and transmission are removed as a unit. See Transmission Removal above.

UNIVERSALS

Std.—Spicer. Needle bearing type.
Overdrive Cars. Detroit. Ball-and-trunnion type.

REAR AXLE

Spicer (Salisbury) Model 23-6, Part No. 2125-1; or Model 23-6, Part No. 2125-2 with O.D.—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Ratios—4.55-1 (Early Std.), 4.27-1 (Later St.), 4.55-1 (Overdrive).
Backlash—.003-.006".

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers at spring seat, disconnect parking brake cables. Take out "U" spring bolts, disconnect both springs at rear shackle, remove axle from beneath car.

Axle Shaft Removal: Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out, using Axle Shaft Puller KF-15 (with Adapter SP-341 required)

SHOCK ABS RBERS

Monroe—Direct Acting, hydraulic two-way type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—4½° preferred. Limits 4-4¾°.

Caster—0° preferred (±1°). Adjust by adding half shim under upper control arm at frame mounting bolt (rear bolt for Pos., front bolt for Neg. caster).

Camber—½° preferred (¼°-1° Pos. limits). Adjust by adding or removing whole shim under upper control arm at frame mounting bolts.

Toe-In—¼" (3/16-1/4" limits). Adjust by turning sleeve at outer end of each tie rod equally.

Toe-Out on Turns—Inner wheel 20°. Outer wheel 17½°. No adjustment.

STEERING GEAR

Own Make (Gemmer 305 Type)—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.

Drums—Composite (cast-iron & steel). Diameter 9".

Lining—Molded type as follows:

	Width	Thickness	Length per Shoe
Primary	2"	3/16"	9.87"
Secondary	1¾"	3/16"	7.62"

Clearance—Shoe eccentric backed off to point where wheel turns freely.

Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type.
See Miscellaneous Section for complete data.

HOOD ALIGNMENT: *See Henry J Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Henry J Special Data.*

►*1952 ELECTRICAL EQUIPMENT CHANGE:* Delco-Remy units used in place of Auto-Lite units beginning with Corsair Serial No. K-524-1205339. Inspect 1952 Vagabond models to identify equipment used. Delco-Remy and Auto-Lite units are NOT interchangeable, even as complete sets.

►*See Henry J 6 1951-52 preceding for data on Auto-Lite equipped cars. The following data pertains only to Delco-Remy equipped cars.*

MODEL IDENTIFICATION

1952 Models:	First Serial No.
K-524 Vagabond deLuxe	K-524-1000001
K-524 Corsair deLuxe	K-524-1200001
1953 Models:	
K-534	K-534-001001
1954 Models:	
K-544 Corsair DeLuxe	①

①—1954 Serial numbers are a continuation of 1953 numbers.

SERIAL NUMBER: On left front door hinge post.
Body Number Note—Stamped on plate on right front firewall in engine compartment.

ENGINE NUMBER: Stamped on pad on right front upper corner of cylinder block and on Engine Name Plate on right side of crankcase.

►*ENGINE NUMBER NOTE—Letters used with engine number are identified as follows:*
"A"—Denotes .010" Undersize main and connecting rod bearings.
"W"—.020" Oversize cylinder bore and pistons.
NOTE—Oversize bore engines were marked "N".

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. at 185 RPM. cranking speed. Maximum variation between cylinders 10 lbs.

VACUUM READING: Steady 18-21" idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .030".
Plugs—Auto-Lite A-7. 14 mm. Tighten to 30 ft.lbs. torque.

DISTRIBUTOR: Delco-Remy No. 1110231.
Breaker Gap—.022". Limits .018-.024".
Cam Angle Range—Test limits with .022" gap, 31-37°
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115328. Mounted on right side of engine.
Ignition Current—1.3 amps. idling. 5 amps. stopped at 6.3 volts.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: 5° BTDC. *This setting supersedes former TDC setting. See FINAL SETTING below.*
Timing Mark—Crankshaft dampener marked with "0" at TDC. and there are 20—1° graduations BTDC, and 5—1° graduations ATDC.

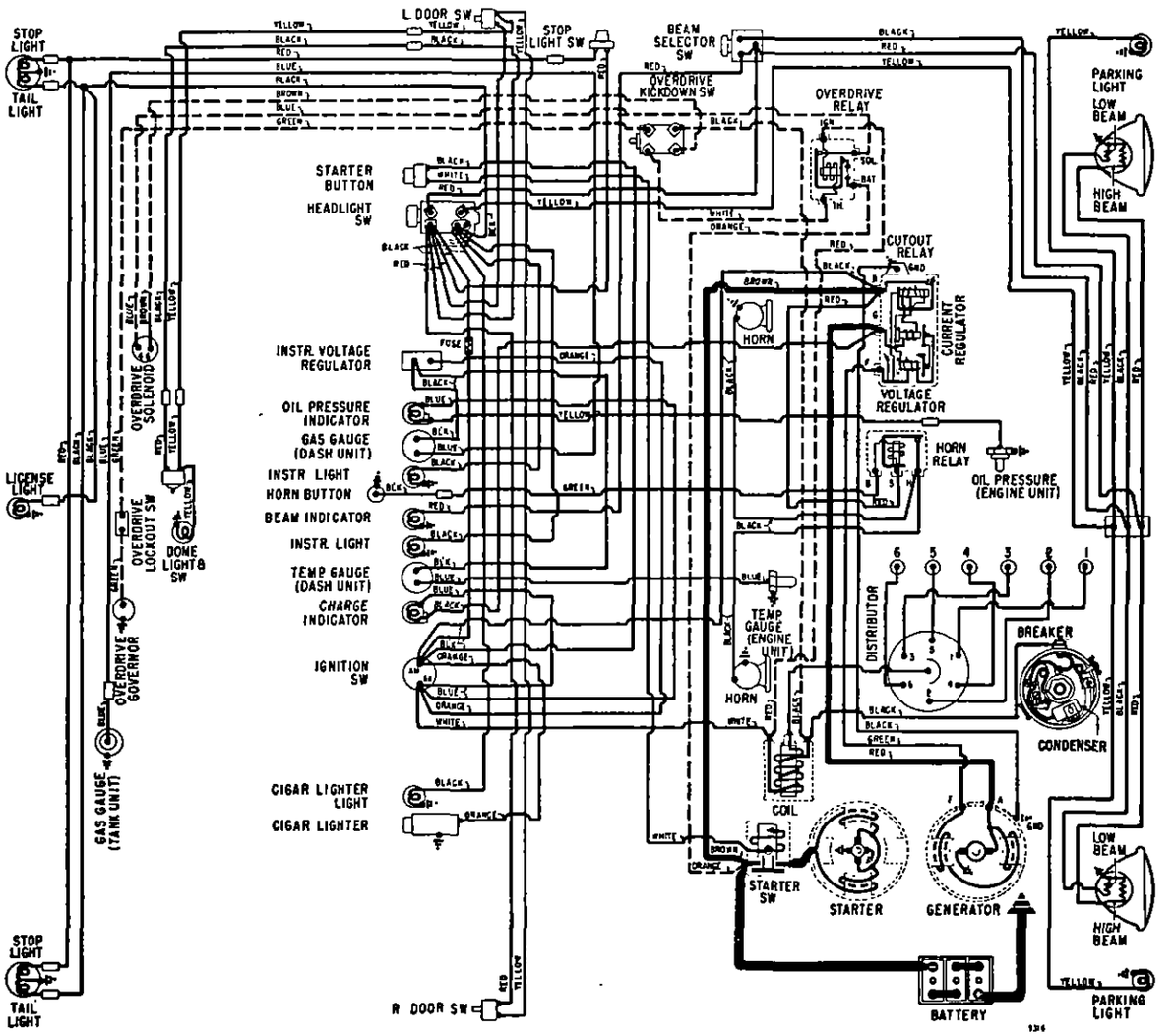
►*CAUTION—Disconnect distributor vacuum advance tube when checking timing.*

Timing Procedure—*See Ignition Timing.*
Final Setting—After setting timing at 5° BTDC., road test car and check for excessive ping under low speed, full throttle conditions. If ping excessive, retard ignition timing to point where only faint ping noted under these conditions.

CARBURETION: Carter YF, No. 833SB. Single barrel, downdraft type with manual choke control.
Idle Setting—1-2 turns open. Turn screw out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" from top of float at free end to bowl cover when needle is seated (assembly inverted).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 3½-4½ lbs. fast idle.

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CRANKCASE VENTILATOR: Remove and clean Vacuum Control valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .016" All valves, Cold.

►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

NOTE—Tappet adjusting screws self-locking. Remove left front wheel and access hole cover in splash shield for access when adjusting valves.

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IGNITION

IGNITION SWITCH: K-F No. 212063.

COIL: Delco-Remy No. 1115328. On right side of engine directly above starter.
Ignition Current—1.3 amperes (idling), 5 amperes (stopped) at 6.3 volts.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110231. Full automatic advance type with auxiliary vacuum spark control.
Breaker Gap—.022". Limits .018-.024".
Cam Angle—Test limits with .022" gap, 31-37° closed.
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	375	0-4	750
5-7	500	10-14	1000
8-10	1000	16-20	2000
11-13	1500	22-26	3000

Vacuum Spark Control: Delco-Remy No. 1116067. Integral type. **Plunger Travel**—7/64-1/8".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
4¼-7	8½-14	14-16

Distributor Removal: Distributor located on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

►*CAUTION—If Oil Pump removed, refer to Oil Pump Installation directions in Henry J Special Data.*

IGNITION TIMING

Std. Setting (See Change Note).....5° **BTDC.**

►*IGNITION TIMING CHANGE—Setting above (5°BTDC) supersedes former setting (TDC) and should be checked by road-testing car. See FINAL SETTING.*

Timing Mark—Crankshaft dampener marked with "O" at TDC. and there are 20—1° graduations BTDC and 5—1° graduations ATDC.

Timing with Timing Light (C-693)—Mark correct graduation on vibration dampener with chalk or paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at lowest possible smooth idle speed (back off throttle stopscrew to decrease normal idle speed of 550 RPM). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw extending upward through 45° slot in arm under distributor. Advance or retard distributor until timing mark appears in line with pointer at front of engine. Tighten cap screw and recheck timing.

Final Setting—After setting timing at 5° BTDC., road test car and check for excessive ping under low speed, full throttle conditions. If ping excessive, retard ignition timing to point where only faint ping noted under these conditions.

►*CAUTION—Reset engine idling speed at 550 RPM.*

CARBURETOR

Carter YF No. 833SB. 1¼" Single barrel. Down-draft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Single Barrel.
Setting—With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Fuel Pump (Std.): Carter No. M807S Diaphragm type.
Optl.—Carter No. M809S combination Fuel-and-Vacuum Pump.
See Carburetion Equipment Section for complete data.
Pressure—3½-4½ lbs. fast idle. At 1000 RPM should be 3-4½ lbs. If more than 4½ lbs., adjust by adding gaskets between pump and cylinder block.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 46037.
Tank Unit—K-S No. 45567.
See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air Intake Pipe (from air cleaner to **oil filler pipe**) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve **must close at idling speed** for satisfactory engine idling performance.

Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. When vacuum control valve is clogged, pressure will build up in crankcase. When not seating, idle will be unsatisfactory. Remove and clean vacuum control valve and air outlet pipe when tuning engine or if system operating incorrectly.

Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite Type IM-100D & Willard HW-1-100—6 volt, 15 plate, 100 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal is grounded at right front engine support. Engine cable connected at same point.
Location—In engine compartment on right side.

STARTER

Delco-Remy No. 1107131. Armature No. 1917855.
Drive—Solenoid pinion shift with overrunning clutch.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load	5500	5.65	70
12 ft. lbs.	Lock	3.25	550

Starting Switch—Solenoid switch (without relay)
See Electrical Equipment Section for complete data.

GENERATOR

Delco-Remy No. 1102789. Armature No. 1921235.
Charging Rate Adjustment—None. *See Regulator.*
Maximum Charging Rate—38 amperes.

Performance Data

	Amperes	Volts	R.P.M.
Cold	30①	8.0	2050

①—Not maximum output. *See Current Regulator.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ounces (new brushes).
Field Current—1.75-1.95 amperes at 6 volts.

Belt Adjustment: Move generator out for ½" deflection with thumb pressure midway between generator and water pump pulleys.

Generator Charge Indicator: Red warning light on instrument panel. Lights when switch turned on, goes out when generator begins to charge.

REGULATOR

1952-53 MODELS

Delco-Remy No. 1118731. Vibrating type voltage and current regulator.
See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads, check regulator ground before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cut In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator should be checked with cover in place.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Elec. Equip. Section.*

Current Regulator

Setting—34-42 amperes hot (set at 38 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Elec. Equip. Section.*

1954 MODELS

Delco-Remy No. 1118841. New "1118825 Series" regulator.

►*REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. All Specifications below are for "Normal" settings.*

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Cutout Relay

Cuts In—6.4 volts.
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.3 volts (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—38 amperes (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
Direction Signal: (Opti.)—Guide Light Division make.
See Electrical Equipment Section for complete data.

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. In lighting switch lead behind instrument panel.
Overdrive—20 amperes. On control relay.
Heater—14 amperes.
Radio—14 amperes.

HORNS: Delco-Remy No. 1999639 (Low Note), 1999640 (High Note). Matched tone twin horns with relay.
Horn Relay—K-F No. 212080.

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctation) on gauge feed circuit. Unit is connected in gauge feed circuit. See wiring diagram.

ENGINE

▷*1952 ENGINE PARTS PRODUCTION CHANGE (To adapt engines to Delco-Remy Electrical Units): Cylinder block, rear end plate, flywheel and ring gear, clutch housing, and fan were changed and are NOT INTERCHANGEABLE with corresponding parts on earlier Auto-Lite equipped engines.*

ENGINE SPECIFICATIONS: K-F Model 6L-161. Six cylinder Supersonic "L" head type.
Bore—3⅛" (3.125"). **Stroke**—3½".
Displacement—161.0 cu. ins. **Rated HP.**—23.44.
Developed Horsepower—80 at 3800 RPM.
Compression Ratio—7.0-1.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Henry J Special Data.*

CYLINDER HEAD INSTALLATION: *See Henry J Special Data.*

FRONT END SHEET METAL REMOVAL (For Engine Work): *See Henry J Special Data.*

ENGINE REMOVAL: *See Henry J Special Data.*

OIL PAN REMOVAL: *See Henry J Special Data.*

PISTONS: Aluminum alloy, "T" slot, cam ground, tin-plated type with heat insulation groove above top ring groove.

▷*PISTON OVERSIZE NOTE—The letter "W" included with engine number indicates that all pistons are .020" OVERSIZE. See "Engine Number Note."*
Length—3".
Weight—10.8 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top land .018-.021". Skirt .0021".

▷CAUTION—Pistons must not be "lapped" in (will destroy tin-plated surface).

Replacement Pistons: Std. & .010", .020", .030", .040" oversize.

Fitting New Pistons: Use .0015" x ½" feeler gauge inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Fitting Used Pistons: Use .004" x ½" feeler gauge inserted between piston and cylinder wall on opposite side to "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Upper Comp.	3/32"	.007-.020"	.002-.004"
Lower Comp.	3/32"	.007-.020"	.003-.007"
Oil	3/16"	.007-.020"	.006-.010"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: Furnished in sets for following oversize ranges: Std.-to-.009", .010"-to-.029", .030"-to.039", .040"-to-.049", .050"-to-.069".

PISTON PIN: Pin clamped in rod by clampscrew.
Diameter—.7494-.7496". **Length**—2.6563".
Pin Fit in Piston—.0002-.0006" clearance or light thumb press fit with piston and pin at 70°F.

CONNECTING ROD: Length—6.345". **Weight** 22.5 ozs.
NOTE—Rods are not offset and are interchangeable.

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Letter "A" in Engine Number indicates that main & connecting rod journals are .010" UNDERSIZE.*
Crankpin Journal Diameter—1.874-1.875".
Lower Bearing—Steel-backed, babbit-lined, replaceable precision type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.
Clearance—.0005-.0025". **Sideplay**—.002-.008".

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps.
NOTE—Replace Bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: .001", .002", .010", .012" Undersize.

Installing Rods: Rods not offset. Install with oil spray hole in lower end toward right (away from camshaft) on all rods.

CRANKSHAFT: Four-bearing type with integral counterweights and vibration dampener.

▷*CRANKSHAFT JOURNAL UNDERSIZE CAUTION—Letter "A" in Engine Number indicates that main & connecting rod journals are .010" UNDERSIZE.*
Journal Diameters—2.249-2.250" (all bearings).
Bearings—Steel-backed, babbit-lined, replaceable precision type.
NOTE—Bearing shells are NOT dowelled on 6 cylinder engine. They can be removed and replaced without removing crankshaft.
Clearance—.0014-.0030".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instruction in Henry J Special Data.*

Replacement Bearings: .001", .002", .010" Undersize.

Oil Seals: Rear main bearing oil seal is wick type packing in groove in crankcase and rear main bearing cap.
Oil Seal Installation—*See Henry J Special Data.*

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft gear thrust washer and shoulder on crankshaft at front of flanged front bearing.

▷*ENDPLAY ADJUSTMENT CAUTION: See "Camshaft & Bearings" in Henry J Special Data for new timing gear, oil slinger, and adjusting shims used with new type camshaft and gear used on later cars.*
Endplay—.004-.008".

CAMSHAFT: Four-bearing, helical gear drive. Pressed-on type fibre gear.

▷*CAMSHAFT PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION: See "Camshaft & Bearings" in Henry J Special Data for new type camshaft and timing gear and non-interchangeability of parts.*
Journal Diameters—#1, 1.8755-1.8760"; #2, 1.8425-1.8435", #3, 1.8110-1.8120"; #4, 1.6245-1.6250".
Bearings—Removable steel-backed, babbit-lined bushing (front), machined in crankcase (all others).
Clearance—.001-.0025".
Camshaft Removal—*See Henry J Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled between plate and camshaft journal.
Endplay—.003-.0055".

Timing Gears: Crankshaft gear cast iron. Camshaft gear fibre with steel hub.

▷*TIMING GEAR PRODUCTION CHANGE: See "Camshaft & Bearings" in Henry J Special Data for new gears used with later type camshaft and interchangeability of parts.*
Timing Gear Backlash—.000-.002".

Camshaft Setting: Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1 3/8"	.3410"	4 9/16"
Exhaust	1 9/32"	.3400"	4 9/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.284"	.0015-.00325"
Exhaust	45°	.300"	.0025-.0045"

Valve Seat Width—1/16" to 5/64" (Intake), 3/32" to 7/64" (Exhaust).

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place. Upper end 7/8" below upper edge of valve seat (taper end up). Ream new guides to inside diameter of .343-.344".

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Valve Springs: Spring can be installed with either end up. Free length 1 57/64".

	Spring Pressure	Length
Valve Closed	50 lbs.	1 5/8"
Valve Open	105 lbs.	1 21/64"

Valve Lifters: Mushroom type with self-locking screws, operating in reamed holes in block. Serviced by installing oversize lifters.

NOTE—Camshaft must be removed for lifter removal. *See Henry J Special Data.*

Lifter Body Diameter—.6240-.6245".

Lifter Clearance—Select fit with slight drag.

VALVE TIMING

Tappet Clearance: .016" All Valves, Cold.

►**Adjustment Procedure**—*See "Valve System" in Henry J Special data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—With .020" tappet clearance on #1 intake valve, this valve should open with piston 5° before top dead center with five-degree mark **before** dead center "0" mark on dampener aligned with pointer at front of engine. Reset tappet clearance at .016".

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to timing gears.
Crankcase Capacity—5 qts. refill.
Normal Oil Pressure—30-40 lbs. at 30 MPH.
Oil Pressure Regulator—Opens at 35 lbs. Located on oil pump cover. Adjustable by removing or adding shims between valve retainer and spring.

Oil Pan Removal: *See Henry J Special Data.*

Oil Pump: External Rotor type with floating oil intake. Mounted externally on left side of crankcase.
Oil Pump Servicing—*See Henry J Special Data.*

Oil Pressure Gauge: Indicator light on instrument panel. Controlled by King-Seeley Engine Unit. Light glows RED until oil pressure rises above 13 lbs.
Engine Unit—King-Seeley No. (1952) 47100, (1953) 47130. Pressure Switch. Contacts open at 13 lbs. (remain closed with lower oil pressure).

COOLING

Cooling System: Pressure type.
Capacity—9½ quarts (10½ quarts with heater).
Pressure Cap (Optl.)—For high altitudes or extremely hot temperatures. Opens at 3½-4½ lbs.

Radiator Removal: *See Henry J Special Data.*

Water Pump: Centrifugal, belt-drive, packless type with sealed ball bearing shaft. NOTE—Seal not same as that on 4 cylinder.
Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.
See Water Pump Section for complete data.

Thermostat: Harrison. In outlet elbow on cylinder head. No by-pass.
Std.—Stamped '151'. Starts to open at 149-156°F. Fully open at 176°F.
Optl.. (for permanent Anti-freeze)—Starts to open at 166-174°F.. fully open at 194°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) Electric type with voltage regulator.
Dash Unit—King-Seeley No. (1952) 45577, (1953) 46041.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-37 or Rockford Model 8½ RM with Borg & Beck Driven Member. Single plate
Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 6 (Rockford).
See Clutch Section for complete data.

Pedal Adjustment: Free travel 1" measured at pedal rod. Adjust as follows: (1) Clearance between the rounded forward end of release fork adjusting rod and clutch housing when release bearing just contacting clutch levers should be ⅝". If less than ½", adjust to ⅝" by changing release fork adjusting rod length (more accessible by removing bellcrank from pivot with rod attached—grease bellcrank pivot before re-installing). (2) Connect and adjust length of pedal rod at trunnion end on bellcrank for required 1" free pedal travel.

Removal: Remove transmission (see Transmission Removal). Free clutch pedal adjusting rod at trunnion end of bellcrank. Remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws to clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS40-T96. Model AS41-T96 with Type R10B Overdrive (Optl.). Constant-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.

Removal: Support car on stands, drain transmission case (and overdrive case). Disconnect both shift rods at levers on transmission case (on overdrive cars, disconnect control cable from lever on overdrive case and electrical wiring at solenoid and lockout switch). Remove two capscrews and washers attaching clutch cross-shaft support bracket to transmission and remove bracket. Disconnect speedometer cable. Disconnect propeller shaft by taking off four nuts attaching front universal joint to yoke (CAUTION—tape needle bearing retainers in place to prevent entry of dirt or loss of bearings), tie propeller shaft up out of the way. Remove two capscrews attaching rear mounting insulator to cross-member, support rear end of engine (Support Tool KF-104) and raise engine just enough to remove weight from cross-member. Disconnect clutch release bearing return spring from transmission (accessible through opening in right side of clutch housing). Remove four nuts attaching transmission to clutch housing, pull transmission straight back and remove from beneath car.

OVERDRIVE

Warner R10B (with special AS41-T96 Transmission)—Optl. equipment. New solenoid operated, governor controlled with throttle "kick-down."

NOTE—Overdrive is new "centered ring gear" type
See Transmission Section for complete data.

Removal: Overdrive and transmission are removed as a unit. See Transmission Removal above.

UNIVERSALS

Std.—Spicer. Needle bearing type.
Overdrive Cars—Detroit. Ball-and-trunnion type.

REAR AXLE

Spicer (Salisbury) Model 23-6, Part No. 2125-1; or Model 23-6, Part No. 2125-2 with O.D.—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Ratios—4.10-1 (Std.), 4.55-1 (Overdrive).

Backlash—.003-.006".

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers at spring seat, disconnect parking brake cables. Take out "U" spring bolts, disconnect both springs at rear shackle, remove axle from beneath car.
Axle Shaft Removal—Remove rear wheel and drum using Puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out, using Axle Shaft Puller KF-15 (with Adapter SP-341 required).

SHOCK ABSORBERS

Monroe—Direct Acting, hydraulic two-way type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—4½° preferred. Limits 4-4¾°
Caster—0° preferred (±1°).
Camber—½° preferred (¼-1° Pos. limits).
Toe-In—¼" (3/16-1/4" limits).
Toe-out on Turns—Inner wheel 20°. Outer wheel 17½°. No adjustment.

STEERING GEAR

Own Make (Gemmer 305 Type). Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Composite (cast iron & steel). Diameter 9".

Lining-	Width	Thickness	Length per Shoe
Primary	2"	3/16"	9.87"
Secondary	1¾"	3/16"	7.62"

Clearance—Shoe eccentric backed off to point where wheel just turns freely.

MISC. MECHANICAL

Windshield Wiper: Vacuum type.
See Miscellaneous Section for complete data.

TIGHTENING SPECIFICATIONS

1946-47 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Stud Nuts (6)	40	480
Cylinder Head Stud Nuts (8)	50	600
Spark Plugs (14 MM. Type)	28	336
Main Bearing Bolts	75	920
Connecting Rod Bolt Nuts	40	480
Flywheel to Crankshaft	45	540
Water Jacket Cover Bolt	15	180
Front Engine Support Bolt	45	540
Clutch Cover Mounting Bolts	22	264
Differential Carrier Nuts	37	444
Axle Shaft Nut	95	1140

1948-52 MODELS

Cylinder Head Capscrews (6)	70-75	840-900
Cylinder Head Stud Nuts (8)	45-50	540-600
Main Bearing Capscrews (6)	75-80	900-960
Main Bearing Capscrews (8)	70-80	840-960
Connecting Rod Bolts	40-45	480-540
Camshaft Gear Bolt	20-30	240-360
Intake Manifold Stud Nuts	12-15	144-180
Exhaust Manifold Stud Nuts	20-30	240-360
Engine Mounting Bolts	40-45	480-540
Vibration Dampener Screw	100-120	1200-1440
Clutch Cover Bolts	20-25	240-360
Differential Carrier Bolts	35-40	420-480
Rear Axle Shaft Nut	125-200	1500-2400

1953-55 6 CYL. MODELS

	Hornet Foot Lbs.	Wasp
Cylinder Head	①75-80	①60-65
Intake Manifold	12-15	12-15
Exhaust Manifold	20-35	20-30
Oil Pan	15-20	15-20
Main Bearing Caps	75-80	75-80
Flywheel	40-45	40-45
Vibration Dampener	100-120	80-90
Con Rod Caps	40-45	40-45
Camshaft Sprocket	20-30	20-30
Engine Front Cover	15-20	15-20

①—Aluminum heads tightened at room temperature. Cast Iron heads at operating temperature.

1955 V8 MODELS

	Ft. lbs.
Cylinder Head	55-60
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan	15-18
Main Bearing Caps	90-95
Flywheel	55-60
Vibration Dampener	130-150
Con Rod Caps	40-45
Camshaft Sprocket ①	25-30
Rocker Arm Support Bracket	55-60
Upper Valve Tappet Cover	15-18
Rocker Arm Cover	15-18
Water Pump Manifold	25-30
Water Pump Mounting	15-18
Oil Pump Mounting	25-30

①—Fuel pump eccentric retaining screw.

ENGINE

1946-47 MODELS

ENGINE ASSEMBLY REMOVAL: All engines can be removed as follows: Remove bonnet (see Hood Removal), front seat cushion, accelerator pedal, front floor mat, transmission hole cover, clutch housing to engine bolts, engine ground strap, radiator core (see Radiator Core Removal), radiator stay rods and horns. Disconnect generator, starter, temperature gauge, and oil check valve wires and remove wiring harness from clips on left side of engine. Disconnect flexible fuel pump feed line and remove fuel line to carburetor. Disconnect throttle linkage leading from accelerator cross shaft and remove cross shaft (pull shaft toward spring and slip shaft out of opposite bracket). Disconnect windshield wiper hose at manifold. Remove spark plug wires and bracket, distributor cap, carburetor and air cleaner. Disconnect exhaust pipe at manifold. Remove front engine support bolts and nuts. Hoist engine out of car (use Tool J-917 attached to engine) move engine forward carefully to disconnect from transmission mainshaft. Finally, remove distributor, generator, fuel pump and clutch.

Installation—Reverse procedure listed above and note following point. Wrap a piece of soft wire around clutch throwout bearing oil seal with ends of wire extending up through clutch housing, lower engine in place (use care not to damage clutch driving plate assembly when engaging transmission mainshaft), pull wire out (this will prevent edge of seal from curling over).

1948-53 MODELS

ENGINE REMOVAL: ***(NOTE—Engine and transmission are removed as one unit with electrical units and carburetor attached to engine).*** Remove the two hood-to-hood hinge attaching, hood prop bolts. Lift and remove hood. Drain cooling system, removing plug at left rear of engine to drain block. Disconnect throttle linkage. Disconnect fuel line flex hose at main gas line. Disconnect exhaust pipe from manifold. Remove radiator hoses. Disconnect remote shift cable by removing hairpin lock at steering column. Leave cable attached to transmission. Disconnect wires from starter, starter solenoid, battery, water temperature cylinder block unit, oil gauge check light, generator and coil. Disconnect windshield wiper tube. Remove crankcase breather, and remove radiator. Remove two front engine mounting bolts. Drain transmission and leave drain plug out. Drain engine oil. Remove propeller shaft center bearing support bolts and disconnect front propeller shaft at transmission companion flange. Remove bolt and bracket attaching exhaust pipe to engine rear plate. Remove two bolts from clutch cross shaft bracket, and remove cross shaft. Remove remote control shifter rod from transmission. Remove engine rear mounts. Attach motor lift bracket J-2782 and raise engine up and out fo chassis.

▷*ENGINE REMOVAL (CARS WITH HYDRA-MATIC DRIVE): Remove Hydra-Matic Transmission before removing engine, then proceed as indicated above.*

1954 MODELS

ENGINE REMOVAL: Remove the two hood hinge bolts (each side). Raise and support hood then remove hood prop bolts, and fuel line at flexible tube. Disconnect exhaust pipe from manifold and remove radiator hoses. Disconnect transmission controls at transmission. Disconnect battery, starter solenoid, starter, temperature gauge and oil gauge wires at engine. Disconnect windshield wiper hoses, generator and coil wires. On all models except Hornet, remove fan and water pump assembly. Disconnect hood lock wire, then remove radiator (see Radiator Removal), and remove the two front engine mounting bolts. Drain transmission (torus cover on Hydra-Matic also), and engine oil.. Remove propeller shaft. Remove bracket attaching exhaust pipe to engine rear plate. Remove clutch cross shaft and bracket. Disconnect engine rear mounting bolts. Attach motor lift bracket J-2782, then remove engine rear mounting bolts (on Hydra-Matic cars, remove the No. 3 cross-member). Carefully remove engine.

ENGINE MOUNTINGS

1946-54 MODELS

ENGINE FRONT SUPPORT REMOVAL: Drain cooling system. Remove generator, fan belt, radiator outlet hose and raise front end of car. Remove radiator lower tank shield, vibration dampener (see Vibration Dampener Removal) and timing gears (see Timing Gear Removal). Block up front end of engine and remove front engine mounting bolts and nuts. Take out engine support bolt and locks and remove plate.

Installation—Reverse procedure listed above, note the following points: Clean front face of cylinder block thoroughly and use new gaskets. When replacing engine mounting bolts, tighten nuts until upper and lower plates are against spacer.

1946-54 MODELS

ENGINE FRONT INSULATOR REMOVAL: Can be removed without removing support plate (above) by taking off self-locking nuts on insulator bolts and raising engine sufficiently to clear bolt threads from insulators. When installing insulators, tighten bolt nuts to 40-45 ft. lbs.

1946-54 MODELS

ENGINE REAR MOUNTING ADJUSTMENT & REMOVAL:

▷***CAUTION—Mounting must be kept properly tightened or engine roughness and noise will result.***

Adjustment—Remove nuts, lockwashers, and bolts attaching rear mount to cross-member, jack up engine using block of wood between jack and oil pan (to avoid damage to pan) for one-inch clearance between base of mount and cross-member, insert box wrench or short socket through this clearance space and engage head of screw attaching mount to clutch housing (in hole in center of mount). Tighten screw, then lower engine re-install mount bolts in cross-member, tighten bolt nuts to 40-50 ft. lbs.

Removal—Proceed as for adjustment (above), use box wrench or short socket to remove attaching screw from center hole in mount, remove mount from clutch housing.

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OIL PAN

1946-54 6 CYL. MODELS

OIL PAN REMOVAL: Raise front end of car and place jack stands under #2 cross-member. Take out three bolts attaching center steering arm support bracket to #2 cross-member and drop center steering arm and tie rods. Take out two bolts attaching flywheel dust cover, remove cover. Drain oil pan. Take out oil pan attaching screws and lockwashers, lower pan and slide it out to rear.

►***CAUTION—Do not lose round rubber gasket at oil outlet tube.***

1948-52 8 CYL. MODELS

OIL PAN REMOVAL: Raise front of car and place jacks under each side of #3 crossmember. Drain oil and re-install plug. Place jack under center of #2 crossmember and raise jack until pressure is exerted against #2 crossmember enough to hold member in place against coil spring expansion pressure when attaching studs are removed. Remove one bolt (and loosen the second bolt) in each shock absorber anchor plate, which will allow the shock absorbers to slide out of the anchor plates. Remove the outer bolt (each side) of #2 crossmember at front of coil springs and insert ½"-20x6" studs. Remove two bolts (each side) from #2 crossmember at rear of coil springs and insert ½"-20x6" studs. Remove four bolts holding crossmember at front of coil springs. Release pressure of jack slowly and allow cross-member to settle on the heads of the six special studs. Remove two bolts from flywheel dust cover and remove cover. Remove bolts from oil pan and remove pan.

CYLINDER HEAD & MANIFOLD

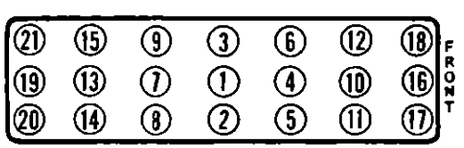
1946-54 MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head stud nuts, tighten in the sequence shown in the diagram.

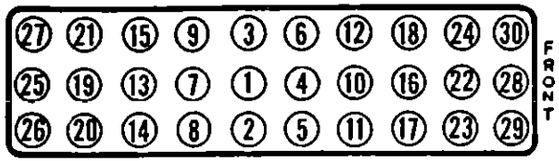
Cast Iron Heads—With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all nuts.

Aluminum Heads—With the engine cold, tighten all nuts to correct tension. Run engine until thoroughly warm, allow engine to cool off, and then recheck all nuts. Do not tighten aluminum heads when warm.

Tightening Torque—See Tightening (Torque Wrench) Specifications.



6 CYL. ENGINE CYLINDER HEAD



8 CYLINDER IN-LINE CYLINDER HEAD

1946-54 MODELS

CYLINDER HEAD GASKET INSTALLATION: Observe following precautions when installing gaskets:
1) With straight edge, check top surface of cylinder block for bulge or slightly raised metal around stud holes. Dress off raised points with fine mill file. A cylinder head that is warped in excess of .010" should be milled or planed off just enough to clean up over entire surface.
2) Examine gasket for broken spots, check water hole alignment. Wipe both cylinder head and block face with clean cloth. Cap screw threads must be clean and turn freely in threaded block openings. Use two J-2969 Locating Studs to properly position gasket and cylinder head.
3) Though cylinder head gasket has been treated by manufacturer with effective sealing agent, Hudson Perfect Seal Gasket Paste, Part No. 164848 may be used without detrimental effect on this sealer.

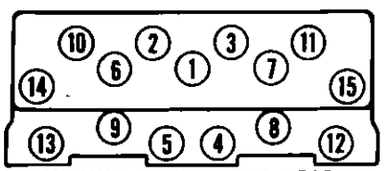
1955 6 CYL. MODELS

CYLINDER HEAD INSTALLATION: Use torque indicating wrench to tighten cylinder head capscrews in sequence shown in diagram.

CYLINDER HEAD GASKET INSTALLATION: Inspect the mating surfaces of cylinder head and block for cleanliness and squareness with a straight edge. Use guide pins 3" x ½"-13 (Hornet) 3" x 7/16"-14 (Wasp) to properly locate gasket on cylinder block. Use non-hardening gasket paste on gasket and a sealing compound on all cylinder head capscrews.

1955 V8 MODELS

CYLINDER HEAD INSTALLATION: Cylinder block has two sleeve locating dowels to assist in lining up and holding position of cylinder head and gasket during installation. Coat gasket with a non-hardening gasket compound. Install Cylinder Head Lifter J-4159 in the front and rear spark plug holes and install head over dowels (dowels are drilled for oil return from rocker arm chamber). Install pushrods, rocker arm assembly, and the cylinder head capscrews. Tighten all head bolts in the sequence indicated in diagram.



HORNET V8 CYLINDER HEAD

INTAKE & EXHAUST MANIFOLD ASSEMBLY REMOVAL (Wasp, With Twin H-Power, and Hornet 6 Cyl. Models): Remove nut from top of front engine supports and loosen rear engine supports. Disconnect fuel and vacuum lines to carburetors and intake manifold. Disconnect throttle linkage (leave carburetors mounted). Remove exhaust pipe at attaching point to manifold. Remove all manifold-to-engine attaching nuts and clamps. Place a porto-power or suitable jack between front and right hand corner of block or on water pump casting and just below upper wheelhouse-to wheelhouse crossmember and wheelhouse panel. Move engine upward and to the left to provide clearance to remove manifold assembly.

ORIGINAL BORE & PISTONS

1946-55 MODELS (EXC. V8)

ORIGINAL BORE & REPLACEMENT PISTON SIZES: Original production (new engines) bore size indicated by code mark (see below) stamped on lower edge of valve chamber opposite cylinder. A code letter (see below) and the piston weight is stamped on the head of each piston (weight is indicated in ounces and quarter ounces; top figure ounces, lower figure quarters).

►*NOTE: See Replacement Pistons (following) for code marks and oversizes.*

1955 6 CYL. MODELS

ORIGINAL BORE LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter ..... Size of Bore
Second letter ..... Size of Main Bearings
Third letter .....Size of Con Rod Bearings

Letter Size Code

Letter "A" ..... Standard
Letter "B" ..... .010" Undersize.
Letter "C" ..... .010"Oversize.
Letter "D" ..... .001" Undersize

► *ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.*

PISTONS

1946-55 MODELS (EXC. V8)

►**1949 SIX CYL. REPLACEMENT PISTON CAUTION (Piston Production Change beginning Car No. 491-95958):** Different pistons (see Identification Note below) must be used on engines after this number. These engines have new block with recess in top face between valve seat chamfer and cylinder bore. **Piston Identification**—Pistons used with new block (above) marked by number 302562 cast inside skirt near piston pin boss and have piston ring locating pin 20° from center-line of pin boss (44° on previous type pistons).

►***PISTON NON-INTERCHANGEABILITY CAUTION—Pistons are not interchangeable between engines due to difference of piston height between pin center and top of piston. See Car Model pages for dimensions.***

REPLACEMENT PISTONS: Standard and oversize pistons furnished for service replacement in the following finished sizes (see table below).

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Code	Oversize	Code	Oversize	Code	Oversize
(B)	Std.	(P)	.007"	(BB)	.020"
(D)	.001"	(BO)	.010"	(DD)	.021"
(F)	.002"	(DO)	.011"	(FF)	.022"
(J)	.004"	(FO) ①	.0115"	(B000)	.030"
(L)	.005"	(LO) ②	.0145"	(E000)	.0315"

①—(Wasp). Hornet .012" ②—(Wasp). Hornet .015"

Piston Markings: Code marks stamped on head of piston indicate the following: **Letter** indicates piston size (see table below). **Number** Indicates piston weight in ounces (if two numbers used—one over the other—top number indicates weight in ounces, bottom number indicates additional weight in ¼ ounces). All pistons in one engine should be of same weight (carry same weight marks on head). NOTE—Original factory installed pistons have two additional numbers indicating which cylinder piston installed. and cylinder block number.

▷**Piston Measuring Note**—Piston size given above is the major diameter at top of skirt just below chamfer under No. 3 ring, at right angles to pin.

PISTON PINS

1946-55 MODELS (EXC. V8)

PISTON PIN REPLACEMENT: When replacing pins, manufacturer recommends that oversize piston pins be fitted to the piston boss and new piston pin bushings be installed in rod. Piston pin bosses are diamond-bored and should not be reamed.

Replacement Piston Pins—Furnished in standard size and .002", .005", .010" oversize.

Fitting Pins—Piston pins should be a hand press when piston heated to 200°F. Heat piston in boiling water (DO NOT HEAT PISTON WITH TORCH). After pins fitted in piston, check piston pin in connecting rod bushing. Ream bushing to .0003" larger than pin diameter. Check fit by holding piston with rod in horizontal position. Rod should just turn on pin under its own weight. See Connecting Rod Bushing Replacement (below).

1955 V8 MODELS

PISTON PIN BUSHING (IN CONNECTING ROD) INSTALLATION: After pressing old bushing out with an arbor press, install new bushing so that it is flush with both sides of rod. Position Burnisher Tool J-6055 in bushing, then applying plate of tool under rod, push burnisher through bushing with an arbor press. Make sure oil hole in bushing lines up with oil hole in rod. *NOTE*—If bushing not drilled for an oil hole, drill a 3/16" hole before reaming bushing.

PISTON RINGS

1946-55 MODELS (EXC. V8)

REPLACEMENT PISTON RINGS: Piston rings for service replacement are furnished in Standard size, and the following Oversizes: .003", .005", .010", .015", .020".

Piston Ring Sets—Cast-iron, Steel Segment, or Kromex piston ring sets furnished in Standard size, and .020" oversize.

ORIGINAL BEARING SIZES

1946-54 M DELS

CRANKSHAFT SIZE CODE: Engines built with undersize parts are identified by following marks stamped on crankshaft or engine block (see Location data below).
PU—.010" undersize connecting rod crank pins.
MU—.010" undersize main bearing journals.
PMU—.010" undersize main and connecting rod pins.

Location of Marks

Crankshaft Mark (Six Cyl. Engines through 1947, All Eight Cyl. Engines)—On left front corner of cylinder block on bottom face beside oil pan gasket (visible from below without removing oil pan).

Crankshaft Mark (Six Cyl. Engine 1948 on)—Stamped on front face of crankshaft #1 counterweight.

Bearing Marks—Undersize Main Bearings marked by green paint and part number stamped on back for Eight Cylinder engines, stamped on back of bearing shells only on Six Cylinder engines.

1955 6 CYL. MODELS

ORIGINAL BEARING LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code	
First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code	
Letter "A"	Standard
Letter "B"	.010" Undersize
Letter "C"	.010" Oversize
Letter "D"	.001" Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

CONNECTING ROD & BEARINGS

1946-54 MODELS

▷**1948 SIX CYL. CONNECTING ROD PRODUCTION CHANGE:** Three different type connecting rods used in production as listed below.

CAUTION—See Rod interchangeability Caution below.

(1) No. 300044 (Drilled Type)—Used on all engines before Car No. 482-108180 (Oct. 1948) except for 563 engines on which type (2) rods used. These rods have drilled hole in rod web extending up to pin bushing for pressure lubrication of pin from crankshaft in addition to oil-spray hole in lower end for cylinder wall lubrication.

(2) No. 302293 (Non-drilled Type)—Used on all engines beginning Car No. 482-108180 and on 563 engines before this number. These rods are same forging as type (1) rods above but do not have drilled hole for pressure lubrication of pin. Pin lubrication is provided by a drilled hole in upper end of rod through pin bushing and rod has oil-spray hole in lower end for cylinder wall lubrication.

(3) No. 302601 (Non-drilled Type)—Used on later engines. These rods same as type (2) above except that forging changed (different design I-beam section).

▷**CONNECTING ROD INTERCHANGEABILITY CAUTION:** All three types of six cyl. connecting rods (see Production Change Note above) are interchangeable but **must be matched for weight with rod being replaced.** All rods installed in engine must be uniform in weight.

NOTE—Where undrilled rod (type 2 or 3) used to replace drilled rod (type 1), the undrilled rod may be slightly heavier (fraction of an ounce) than the drilled rod it replaces. This difference will be compensated for by weight of oil in drilled rod.

Rod Installation—All types of rods should be installed with oil spray hole in lower end toward valve side of engine.

1946-55 MODELS (EXC. V8)

CONNECTING ROD BUSHING REPLACEMENT: Press out old bushing by supporting bushing end of connecting rod on Burnisher Block J-2950 (Cars with 31/32" Piston Pin), J-2951 (Cars with ¾" Piston Pin) and press bushing out using J-2790 (Use with J-2950); J-2948 (use with J-2951). Press new bushing in connecting rod using same tools as for removal. Burnish bushing in place with Burnisher J-2791 (Cars with 31/32" Piston Pin) and Burnisher Block J-2950; Burnisher J -2949 (Cars with ¾" Piston Pin) and Burnisher Block J-2951. This burnishing operation swages bushing into eye of rod and prevents bushing working out of Rod. Ream bushing for .0003" clearance. Check pin fit by holding piston and rod assembly with connecting rod horizontal. Rod should just turn on piston pin under its own weight.

CRANKSHAFT & MAIN BEARINGS

1946-47 MODELS

CRANKSHAFT REMOVAL: Crankshaft can be removed with engine in chassis as follows: Remove bonnet (see Hood (Bonnet) Removal above), radiator (see Radiator Core Removal following), vibration dampener (see Vibration Dampener Removal following), timing gears (see Removal instructions following), transmission and clutch (see Hudson 6 and 8 Car articles for data). Remove flywheel and engine oil pan and tray. Remove connecting rod bearing caps and push rods up clear of crankshaft. Remove front and rear main bearing caps with Puller Tool J-377. Remove center main bearing cap with care and take out crankshaft.

Installation—Reverse removal procedure listed above. Install new oil seals at front and rear main bearing cap (see Front and Rear Main Bearing Cap Installation following) and new palnuts on main and connecting rod bolts (see Connecting Rod and Main Bearing Palnut Installation above).

1948-54 MODELS

CRANKSHAFT REMOVAL: ***Can be removed with engine in car but manufacturer recommends that engine be removed first. Then proceed as follows:***
Remove transmission and clutch assembly, remove flywheel, crankshaft oil thrower, oil pan, and oil pan baffle. Remove vibration dampener (use puller J-676-C). Remove gear case cover, lift out camshaft thrust plunger (8 cyl. only). On six cyl. engines,

CONTINUED ON NEXT PAGE

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remove camshaft gear and timing chain. On all engines, use puller J-471 to remove crankshaft gear. Remove all piston and connecting rod assemblies. Use puller J-2955 to remove front & rear main bearing caps, remove other bearing caps and remove crankshaft with a rope sling.

Installation Note (8 Cyl.)—Before installing flywheel, make certain that lower half of oil retainer fits squarely on upper half and that gaskets are in good condition. If contacting faces nicked, install new retainer. NOTE—Screw holes in oil retainer half mounted on bearing cap are slotted to permit adjustment for good contact with upper half.

►***CAUTION—Oil leaks may result if oil retainer joint not tight.***

ALL 1946-47 MODELS
1948-52 8 CYL. MODELS

MAIN BEARINGS: Removal and Installation (with engine in car). Bearing halves are retained in crankcase and caps by a machine screw in each half, requiring removal of crankshaft for access to screw in upper half. Remove crankshaft (see Crankshaft Removal above), take out machine screw in each bearing half in crankcase and caps, remove bearings. Install by reversing this procedure.

Replacement Bearings—Hudson replacement bearings furnished reamed (standard size or .010" undersize) and not reamed (see Line-Reaming data below). Reamed bearings carry punch marks on one side and when installed these marks should be together and on the same side for all bearings so that they will be in the same position as when reamed.

IMPORTANT—Lower half of bearing shell extends .002" above surface of cap (allows bearing to seat in cap and crankcase when stud nuts tightened).

Fitting Bearings—See Replacement Bearings above. Bearings can be fitted with shims (do not file caps) as follows: Install bearing shells in caps and case and oil bearing surface. Fit each bearing separately. Install crankshaft and bearing cap (on front and rear bearings, caps should be centralized on studs by inserting ¼" drill rod in vertical packing holes on each side of cap), tighten stud nuts to 75 ft. lbs. Test bearing fit by using two hand pull on crankshaft, shaft should start hard but be able to be turned over. If shaft cannot be moved, insert .005" shim between cap and case (trim shim flush with bearing shell). Repeat test until shaft turns easily. Shims are furnished .003" and .005" thick.

Line-Reaming Bearings—See Replacement Bearings above. Semi-finished bearings available for service which must be line-reamed on engine as follows: Place bearing shells in place in caps and crankcase, and secure with machine screws (see that screws are seated in countersink hole in shells), bearing shell in cap should project .002" above cap while shell in case should be flush, tighten caps to 75 ft. lbs. (front and rear caps should be centralized on studs by inserting ¼" drill rod in vertical packing holes on each side of cap). Line-ream bearings for .001" maximum clearance on crankshaft and face flange on center bearing for .006" shaft endplay.

Front and Rear Main Bearing Cap Removal and Installation—These caps fit in machined openings in crankcase. Front cap has vertical and horizontal grooves, rear cap vertical grooves only, with packing installed in these grooves to seal caps in place. When removing these caps a special removing Tool J-377 must be used to pull caps out of engine. After caps removed, grooves in caps and crankcase must be cleaned of all old packing. If old packing not removed from crankcase, oil passages may be clogged. When installing main bearing caps, insert new cotton wicking (use Crankshaft Bearing Packing Tool J-392) in vertical grooves on each side of front and rear caps, then install packing in horizontal grooves in upper end of front cap (horizontal grooves not used on rear cap). Lower half of oil retainer on rear cap should be a tight fit against upper half to prevent oil leaks at this point.

1946-54 6 CYL. MODELS
(EXCEPT JET)

CRANKSHAFT OIL SEAL REPLACEMENT (Except Jet Models): If replacement of oil seal in bearing cap required, carefully clean out old packing material, crowd new material into outer groove of bearing cap by hand, then use Installer Tool J-2779 to drive seal tightly into groove (large diameter of tool should be toward front of bearing with smaller diameter compressing seal), tap tool handle with soft hammer to compress seal. After seal properly seated and before removing tool, cut seal end off flush with top of cap (*CAUTION*—DO NOT cut seal off too short and do not leave frayed ends which may prevent cap seating). Seal must entirely fill groove to prevent oil leaks.

Front & Rear Bearing Cap Seals: (1946-47)—***NOTE—See Production Change for 1948 & Later models below.*** Seal consists of vertical grooves on each side of cap, and additional horizontal grooves on each side of front bearing cap only, for installation of special wood seals. Install seals in following order:

Vertical Seals No. BM300093—Now furnished with 1/32" saw slot approximately 2/3 length of seal. Dip seal in engine oil, start sawed end in bearing cap groove, drive seal in until bottomed securely.

Horizontal Seals No. 300093 (Front Cap only)—Install only after vertical seals have been installed. Dip seals in engine oil, drive in grooves in bearing cap until bottomed against vertical seals.

Front & Rear Bearing Cap Seals: (1948 & Later Models)—***NOTE—This method of sealing front and rear bearing caps supersedes previous wooden seals.***

Front Bearing Cap—After bearing cap installed and bearing cap bolts tightened, install wick packing in vertical holes using a blunt punch with a diameter slightly smaller than the packing groove and at least 4" long, to pack wicking solidly into grooves. (CAUTION—packing must be compressed so that it bottoms in groove and forms a solid seal flush with face of bearing cap.) After vertical grooves packed, install packing similarly in horizontal holes in bearing cap.

Rear Bearing Cap—Pack vertical grooves in bearing cap in same manner as on front bearing cap (above). Horizontal grooves are not used in the rear bearing cap.

1953-54 JET MODELS

CRANKSHAFT REAR OIL SEAL REPLACEMENT (Jet Models): A "Brummer" type oil seal is used. Clean main bearing cap and channel at crankcase rear flange. Apply a liberal amount of liquid soap to both ends and along groove of "Brummer" type oil seal. Insert the end of seal in crankcase and work the seal carefully around crankshaft until end appears on opposite side. (*CAUTION*—Take extreme care not to scuff the soft center sealing cushion at bottom of seal groove). Install the new seal in the bearing cap being careful that flange on cap fits groove in seal. Apply oil liberally between seal flange and crankshaft journal and install rear bearing cap. Tighten bolts to 75-80 ft.lbs. torque.

1948-49 6 CYL. M DELS

FRONT BEARING CAP LOCK PLATE INSTALLATION: New lock plates, BM303799, furnished for installation on front bearing cap screws to replace split lockwashers formerly used. NOTE—These lockplates will prevent oil leakage or seepage which might occur when regular lockwashers used.

Lockplate Installation—Install lockplate under screw head with lock tabs pointing straight forward. After screws properly tightened to 75-80 ft. lbs., use pointed punch to bend center tab up, then use V-shaped drift to secure tab firmly against cap screw head.

1955 6 CYL. M DELS

CRANKSHAFT FRONT & REAR MAIN BEARING SEALS: Metal backed neoprene lined seal (two identical halves), plus cotton waste for vertical and horizontal packing holes in cap.

Removal—Upper half can be removed without removing crankshaft by using ¼" brass rod to drive old seal from around shaft while rotating shaft.

Installation—Coat groove of seal with non-hardening sealer. Use 4" punch with diameter smaller than vertical holes to force cotton waste into vertical holes, leaving enough waste protruding to seal between pan gasket and bearing cap.

1955 V8 M DELS

►*CRANKSHAFT REAR MAIN BEARING OIL LEAK CORRECTION (Cars before Engine No. P-15629):* If seepage of oil exists between milled surface of rear main bearing cap and crankcase, file a notch approximately 3/32" deep, with a three cornered file, on the top outer edge of each side of the bearing cap approximately 1/8" forward of the oil pan gasket seal groove. Install a new oil seal as indicated below.

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CRANKSHAFT REAR MAIN BEARING OIL SEAL: Apply Lubriplate to groove in bearing cap and install oil seal, using Oil Seal Installer J-3048-A and a hammer, drive seal into place. With seal installed and tool still in place, trim ends of seal flush with surface of cap. To install upper half of seal in crankcase, remove crankshaft and install seal in same manner as for bearing cap. **NOTE**—At time of pan installation, place a generous bead of non-hardening Permatex along edge of bearing cap and crankcase to insure a perfect seal.

VIBRATION DAMPENER

1946-54 MODELS (EXC. JET)

VIBRATION DAMPENER REMOVAL: Dampener can be removed from beneath car without removing radiator louvre panel or radiator (radiator must be removed on Eight only) as follows: Remove radiator louvre panel center moulding, front bumper bracket bolts permitting bumper to drop down, and fan belt. On Eight only, remove radiator (see Radiator Core removal data above). Unscrew crankshaft starting jaw from end of crankshaft. Install jaw of special vibration dampener removal tool over dampener and place screw of tool through starting crank hole. Withdraw dampener by turning screw of dampener tool and remove from beneath car (6), or above (8).

1948-49 MODELS

▷**VIBRATION DAMPENER PRODUCTION CHANGE:** Dampener No. 300098 used on first cars, superseded by No. 301934 which has front face machined at angle for balance drilling in production. **These dampeners are interchangeable** (see replacement caution below).

Dampener Alignment Marks—Center-punch marks on front end of hub and adjacent mark on pulley indicate relative position of parts when dampener assembled and balanced. If dampener disassembled, **assemble dampener with these two marks together.**

▷**Six Cylinder Balanced Crankshaft & Dampener Replacement Caution**—On special balanced engines, where crankshaft and dampener matched for proper balance, engine is marked by "B" stamped on front machined face of block beside water pump housing. When replacing crankshaft on these engines, install new No. 301934 Dampener.

▷***CAUTION—Do not re-install dampener used with original specially balanced crankshaft.***

▷**INOPERATIVE VIBRATION DAMPENER (Causing Engine Roughness & Vibration at 24-26 MPH.):** May be caused by inner and outer members being locked together by mounting capscrew in crankshaft. Inspect capscrew and locking washer for contact with outer member. If clearance not noted at this point, remove screw, chamfer outer corners of hexagonal head of screw at 45° angle, re-install screw and tighten to 100-120 ft. lbs. torque, bend **all lips** of locking washer over capscrew flats.

1955 6 CYL. MODELS

VIBRATION DAMPENER: **Removal**—Remove radiator core for puller clearance, remove retaining capscrew. **Hornet** vibration dampener has two punch marks for alignment to maintain proper balance when dampener is disassembled for replacement of rubber discs. **Wasp** vibration dampener has an offset screw location to insure proper reassembly for balance. Use pulley Remover J-676-C and Replacer J-483 for **Hornet** and Remover J-5371 and Replacer J-5369 for **Wasp**. Tighten retaining screw to specifications shown in table above.

1955 V8 MODELS

VIBRATION DAMPENER: **Removal**—Drain cooling system. Remove radiator core and fan assembly. Remove vibration dampener retainer screw and lockwasher and if car is equipped with Power Steering or Air Conditioning, remove the drive pulleys by prying them off dampener assembly. Install center adapter J-5992-2 in threads of crankshaft. Install screw assembly J-5992-3 in remover body J-5992-1 and remove dampener.

Installation: Lubricate oil seal in engine front cover and position dampener over crankshaft and tap it into place with a rawhide hammer. Assemble Vibration Dampener Installer J-5992 by placing the ⅜" nut on screw assembly J-5992-3 and slide spacer J-5992-4 over screw assembly. Start screw in end of crankshaft and tighten until it bottoms in the threads. With one end of spacer against dampener, turn nut on screw until dampener hub bottoms the crankshaft oil slinger against a shoulder on crankshaft. Install Power Steering and/or Air Conditioning pulleys, retainer washer, and screw. Tighten retainer screw to 130-150 ft. lbs.

ENGINE FRONT COVER

1955 6 CYL. MODELS

ENGINE FRONT COVER: **Removal**—Remove Vibration Dampener (see above), remove retaining screws attaching cover to block and remove cover.

Installation: Reverse removal procedure, cover alignment is automatically made during assembly.

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION: Remove engine front cover (see above). Use Tool J-2776 to remove and install seal. Insert collar so that slot in collar engages depression in cover. Support cover when driving out seal with straight side of driver. Use tapered side of driver for installing seal. *NOTE*—Apply coating of white or red lead in well in timing cover and recheck to make sure that lip of leather is in good condition and not curled over.

1955 V8 MODELS

ENGINE FRONT COVER: **Removal**—Remove vibration dampener (see above), and water pump manifold assembly. Disconnect and remove fuel pump. Remove screws attaching front cover to block and remove cover.

Installation: Using a new gasket, install engine front *cover in place and start capscrews in threads,* **but do not tighten.** Lubricate oil seal in cover and install vibration dampener assembly, using hub on dampener as a pilot to align front cover. Complete installation by reversing removal procedure.

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION: Remove engine front cover (see above), drive out old seal with a hammer and punch, being careful not to damage cover. Install a new seal using tool J-5983, pressing seal into place with an arbor press.

CAMSHAFT & BEARINGS

1946-47 MODELS

CAMSHAFT SERVICING: Camshaft Remov'l. Remove bonnet (see Hood (Bonnet) Removal above), radiator (see Radiator Core Removal following), radiator louvre panel, vibration dampener (see Vibration Dampener Removal above), fan blades, fan belt, timing gear cover and gasket, vibration dampener spacer, camshaft gear (3 bolts and lockwire), valve chamber cover, valves, tappets, oil pump, fuel pump, and distributor. Camshaft with thrust button and spring can then be withdrawn from engine by pressing down on radiator lower tank shield.

Camshaft Installation—See Timing Gear data below (note CAUTION on cover bolt installation).

Camshaft Bearings—New thin type steel-backed, babbitt-lined bushings used (cannot be used for service on earlier cars). Factory reamed bearings available for replacement which require no reaming or scraping. Standard bearings with extra wall thickness permitting line-reaming on engine also available (line-ream for .001" bearing clearance).

Camshaft Bearing Removal & Installation—Bearings can be removed as follows: Remove camshaft (see Camshaft Removal above), remove oil pan and tray, press old bearings out. New bearings can be installed as follows: Press new bearings in place with locating notch on front edge at top (back of bearing has 1/16" chamfer so that bearings can be readily installed in crankcase, bearing material on front of bearing has light chamfer at front). Coat bearings with light engine oil, install camshaft.

1948-54 MODELS

CAMSHAFT REMOVAL: Remove radiator, cylinder head, right front wheel, fender side shield. Disconnect vacuum pump line, windshield wiper, hose and fuel pump. Remove distributor and oil pump. Remove grille center support cover, upper baffle and right hand moulding, remove grille intermediate baffle and moulding. Place block of wood between oil pan and head of jack, raise engine 1½". Remove vibration dampener, screw lock and dampener, dampener key and gear case cover. Remove coil and valve covers. Remove valve and valve springs (use Tool KMO-484). On Six Cyl. raise and secure tappets enough to permit camshaft removal. On Eight Cyl. remove tappet retainer screws, plates, washers, and lockwashers, tappets and guides. Align sprocket or gear markings and remove camshaft sprocket or gear. Remove camshaft and thrust washer.

1955 6 CYL. MODELS

CAMSHAFT REMOVAL: Remove radiator, radiator grille, fan assembly, intake and exhaust manifolds. Remove vibration dampener, (see above). Remove engine front cover, (see above). Cut sprocket mounting bolt safety wire, rotate engine to bring timing marks on chain to

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marks on sprockets, remove camshaft sprocket and chain assembly (Puller J-471). Remove valve side covers, raise valves and install tools J-1612-3-A to hold lifters out of way. Remove oil spout on Wasp, spout and chain silencer on Hornet. Remove thrust plate and camshaft.

1955 V8 MODELS

CAMSHAFT: Removal—Remove cylinder head covers, ignition wires, rocker arm assemblies, intake manifold, and carburetor. Remove water pump and manifold assembly. Remove upper oil breather and tappet assembly cover. Remove inner oil baffle cover. Remove pushrods, keeping them in their relative operational positions. Remove hydraulic tappets and keep in their relative operational positions. Remove fuel pump, vibration dampener, and engine front cover. Crank engine until timing marks on camshaft and crankshaft sprockets line up with shaft centers. Remove oil shedder from crankshaft and fuel pump eccentric from camshaft. Timing chain, camshaft, and crankshaft sprockets can be pried off. Remove camshaft retainer and thrust plate and end plate thrust spacer. Remove camshaft.

Installation: Reverse removal procedure and note the following: Install camshaft gear about 1/16" beyond a position flush with camshaft end to allow mounting of fuel pump eccentric.

TIMING GEARS

1946 MODELS

REPLACEMENT TIMING GEARS: Aluminum Type. A new aluminum Camshaft Gear has been used on all models beginning with 1946 engines (later cars only—first cars have laminated fibre type gear). This gear (and cast iron crankshaft gear used with it) have 20° pressure angle teeth and in addition, teeth have slight crown or curvature to improve quietness. These gears furnished for service in Matched Sets only. See Installation data below for changes necessary when aluminum camshaft gear used to replace the laminated fibre type.

Identification Marking—Both gears marked by figure "20" on front face of gear. Crankshaft gear has additional marking "FRONT" to insure correct installation.

Camshaft Gear Installation (Aluminum Type): When using aluminum gear to replace laminated fibre type, additional clearance must be provided for this gear as follows:

Support Plate Screws—With camshaft gear out, remove front support plate (see Engine Front Support Removal), countersink the two screw holes in the plate behind the camshaft gear, and the corresponding holes in the cylinder block, to take special countersunk head screws and lockwashers furnished for use at this point.

Support Plate Cutout—The cutout in the plate adjacent to the camshaft flange should be increased in size or chamfered to provide adequate clearance when aluminum gear installed.

1946-47 MODELS

1948-52 8 CYL. MODELS

TIMING GEAR REMOVAL: Drain cooling system. Remove fan belt, radiator outlet hose, vibration dampener (see Vibration Dampener Removal), timing gear cover bolts, cover, cover gasket and vibration dampener spacer. Turn engine over until timing marks (2 teeth mark on camshaft gear, 1 tooth mark on crankshaft gear) coincide. Remove camshaft gear (retained by 3 capscrews and lock wire). Remove crankshaft gear using Puller Tool J-471. Gear Installation—Reverse removal procedure above (use Tool J-483 to replace camshaft gear). Use new timing cover gasket and check leather oil seal in timing gear cover. If new seal to be installed, coat seal seat in cover with red or white lead and press seal securely in place. Do not curl edge of seal over when cover installed.

Replacement Camshaft Gear:—A special .008" oversize camshaft gear (marked with daub of yellow paint on front face of gear) available for service.

TIMING CHAIN

1948-55 MODELS (EXC. V8)

TIMING CHAIN: Removal—Drain cooling system, disconnect hoses and remove radiator. Remove fan blade, pulley and fan belt. Remove dampener screw, lock and dampener (Use Puller J-676-C for Hornet Models, and J-5371 for Jet and other models to pull dampener from crankshaft). Remove timing gear cover and gasket. Crank engine until timing marks on sprocket line up with marks on timing chain then remove camshaft sprocket and chain.

Installation: If engine has not been rotated with chain removed, line up timing chain marks and sprocket marks and install camshaft gear and chain, at the same time engaging chain with crankshaft gear. Complete installation by reversing removal procedure outlined above.

►*TIMING CAUTION:* If engine rotated with camshaft and chain removed, place No. 1 piston on TDC., with marks on sprocket 14 pitches apart, and install chain and camshaft gear.

1955 V8 MODELS

TIMING CHAIN: Removal—Remove engine front cover (see above). Pry off oil slinger from end of crankshaft and remove fuel pump eccentric. Rotate engine to line up marks on sprockets with marks adjacent and in line across shaft centers. Remove sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts.

Installation: Install camshaft and crankshaft sprocket keys being sure that they are properly seated in keyways. Rotate engine or crankshaft to bring No. 1 cylinder to firing position. Slide crankshaft sprocket part way on the crankshaft and assemble camshaft sprocket in chain, locating and lining up the "O" marks on the sprockets in line with camshaft and crankshaft centers. Position chain on crankshaft sprocket and start camshaft sprocket on camshaft. Using a rawhide hammer, alternately tap both sprockets into proper position. Camshaft gear must be installed about 1/16" beyond a position flush with end of camshaft for installation of fuel pump eccentric. Complete installation by reversing removal procedure.

VALVE SYSTEM

1946-47 MODELS

1948-52 8 CYL. MODELS

VALVE LIFTER REMOVAL: Valve lifters may be removed without removing cylinder head, although it is recommended that if two or more lifters are to be removed, the cylinder head should be removed. Remove right front fender shield and valve cover, and crankcase breather pipe. Use KMO-484 valve lifter and remove keepers, valves and springs. Remove tappet guide clamp bolts, washers, clamps, and remove tappet and guide assemblies.

Installation—Reverse removal procedure and note the following: Tappet guides must be accurately aligned with cams on camshaft. Position of guides is controlled by guide clamps, the inner side of which should be in full contact with matching flat surface on front face of each pair of tappet guides within .0015". To obtain this alignment, tighten clamp nuts just less than snug, then bump outer face of clamps sharply inward using a brass drift punch and hammer. This will jar tappets into alignment with clamps. When clamps are tightened, it should not be possible to insert a .002" feeler gauge at any point between inner edge of clamp and mating face of tappet guide.

VALVE TAPPET ADJUSTMENT

1955 V8 MODELS

VALVE TAPPET ADJUSTMENT: *(NOTE—Checking must be done with no oil in compression chamber of tappet and plunger completely bottomed, with tappet on base circle of cam).* With piston on compression stroke and both valves closed, press downward on the pushrod end of rocker arm to compress plunger spring and force plunger to bottom position. While still holding down on rocker arm, measure the lash. The clearance between valve stem end and rocker arm tip should be .050" to .210".

VALVE GUIDES

1955 V8 MODELS

CHECKING VALVE STEM CLEARANCE: After valves have been removed from head, and with valve stems and guides clean, install valve in respective guide bore and measure side-to-side play crosswise to the cylinder head using a dial indicator or thin strips of feeler gauge material placed between stem and guide bore. If clearance is excessive, guides should be reamed and valves with oversize stems installed.

VALVE GUIDE REAMING: Four oversize reamers are available in Valve Guide Set J-6042 which will provide the desired clearance of .001-.002" (Intake), and .002-.003" (Exhaust) between stem and guide. After checking clearance, select the proper oversize reamer and pilot for the oversize valve to be installed.

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ROCKER ARMS

1955 V8 MODELS

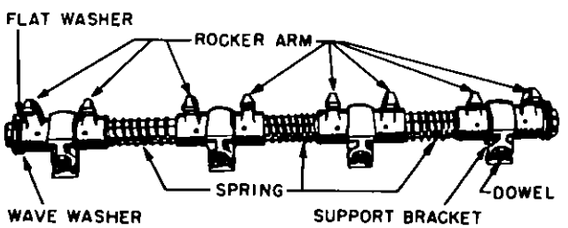
►*IMPROVED OIL CONTROL ROCKER ARM SHAFT PRODUCTION CHANGE & CORRECTION ON EARLY CARS:* For improved oil control at the intake valve stems, THREE types of rocker arm shafts have been used in production with different number and size of rocker arm oil holes as follows:

1) **First Cars before Engine No. P-9038**–All oil holes in shafts were .094" diameter. On some cars, the eight holes in each shaft **toward the pushrod** were plugged in the field with 3/32" x 9/16" pins made from brass welding rod and swedged in place. If trouble experienced on these cars, install third type rocker shaft (below).

2) **Cars from Engine No. P-9038 to P-17288**–Rocker arm shafts did not have the eight holes **toward the pushrod** (holes omitted in production). If trouble experienced on these cars, install third type rocker shaft (following).

3) **Cars beginning Engine No. P-17288**–Rocker arm shafts have the eight holes **toward the pushrod** but these holes are .062" diameter (reduced from .094" diameter size used on first type shaft). All other holes in shaft were .094" prior to Engine No. P-17830 when ALL holes in shaft were changed to .062" diameter. *This latest type shaft is furnished for service on all cars and should be installed if trouble experienced with either previous type shaft.*

►ROCKER ARM SQUEAK CORRECTION *(Caused by insufficient oil reaching rocker arm shafts):* Determine if sufficient oil is getting to the rocker arm shaft by removing rocker arm covers and examining shaft for presence of oil while engine is running. If no oil is found it will be necessary to remove the cylinder head and drill out the oil passages as follows: Remove the 1/8" pipe plug at rear end of right hand cylinder head (or oil filter connection at front of left hand cylinder head). Using a 21/64" drill, drill out the oil passage to intersect the rocker shaft support bracket **rear** attaching bolt hole **(right hand head)**, or the rocker shaft support bracket **front** attaching bolt hole **(left hand head)**. Make sure that all chips are removed from holes and passages.



HORNET V8 ROCKER ARM ASSEMBLY

ROCKER ARM AND SHAFT DISASSEMBLY: Remove rocker arm and shaft assembly from cylinder head. Remove pins and wave washers from end of shaft. Remove rocker arms, springs and supports, keeping all parts in order so they can be reassembled in original position.

Inspection: Clean and inspect all parts for wear. Inspect rocker arm radius at valve stem ends, and if worn replace the rocker arm. Inspect plugs at each end of shaft for tightness.

Reassembly: Reverse disassembly procedure and note the following: Rocker arm shaft must be assembled with the grooved oil hole in the downward position, or facing the cylinder head.

►*CAUTION: There is a right and left rocker arm and if reversed in assembly they will not contact the valve stem properly.*

HYDRAULIC LIFTERS

1955 V8 MODELS

HYDRAULIC VALVE LIFTERS: Removal–Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm assembly. Remove upper valve tappet cover and breather tube and then remove lower tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in same relative position.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. *(CAUTION–Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove all varnish and gum deposits.

Inspection: Inspect the plunger and wall of body for scratches (if plunger or body is scratched, replace complete unit). Try the plunger for fit in body. If check valve removed from plunger, inspect flat disc valve, spring and seat.

Reassembly: Reverse disassembly procedure. See illustration for correct sequence.

Testing: Use a clean container deep enough to cover the lifter assembly (in an upright position). Fill container with clean kerosene. Remove the pushrod socket and place lifter in kerosene in an upright position, allowing it to fill up. Remove lifter and replace pushrod socket. Place lifter assembly between jaws of checking tool J-5978. Check leakdown by depressing the tool. A decided resistance should be felt. If plunger collapses immediately, the lifter should be checked again. Replace if no resistance felt.

OILING SYSTEM

1948-53 MODELS

►**OIL LEAKAGE AT MACHINING LOCATING HOLE IN CRANKCASE FLANGE CORRECTION**—Locating hole in crankcase flange at left rear of engine behind starter opens into oil pan and is sealed by a special cup shaped plug. If this plug loose or dislodged, oil may be thrown out or dirt and water allowed to enter oil pan. Check this plug, and similar plugged opening at right front of engine and install new plugs as follows:

Plug Installation—Plug can be installed from above (after starter removed) or from below (if oil pan off). Use plug No. 171091 (cup shaped plug 9/16" in diameter), coat outer rim with white lead or sealer, drive plug into hole, entering closed end of plug first (handle of J-483 vibration dampener installer tool can be used as a driver).

OIL PUMP

1948-55 6 CYL. MODELS

OIL PUMP: Removal– Lift off distributor cap, rotate engine crankshaft until distributor is in firing position for No. 6 cylinder. **Do not** disturb this position of engine while oil pump is removed. Remove oil pump to block attaching screws, remove oil pump.

Overhaul: Remove pump cover and mark one lobe of inner rotor and corresponding point on outer rotor to insure reassembling in same relative position. With rotors meshed in this position, measure clearance between inner and outer rotors at point diametrically opposite marks. Replace rotors and shaft if clearance exceeds .010". Rotor end clearance (measure between rotors and straightedge laid across cover flange on body) must not exceed .004" Outer rotor clearance in body (press rotor against body and measure clearance on opposite side) must not exceed .008". Inner surface of cover must not be worn more than .002".

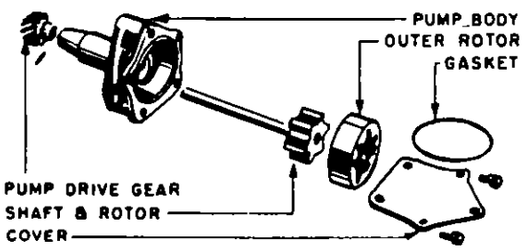
Installation: If crankshaft inadvertently turned while pump removed, install pump as follows to insure correct timing:

1) **Hornet**–Crank engine to TDC position (exhaust stroke No. 1 Cyl., firing position No. 6 Cyl.). **Other Models**–Crank engine to TDC position (firing position No. 1 Cyl.).

2) Install Aligning Tool J-2794 in distributor mounting hole so that guide pin indexes with distributor mounting screw hole.

3) Install oil pump, turn pump shaft so that slot in shaft indexes with tang on aligning tool (tool will be pushed out as pump installed).

4) Install distributor with rotor turned to No. 6 cylinder terminal in cap (Hornet), No. 1 cylinder terminal (Wasp).



6 CYL. ENGINE OIL PUMP

1948-52 8 CYL. MODELS

OIL PUMP: Oscillating plunger type oil pump driven by an integral gear on camshaft. Reciprocating motion of plunger allows slots to line up with inlet and outlet openings of pump, performing the function of a double acting piston.

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Removal: Disconnect inlet and outlet lines from pump and remove the two attaching bolts and remove oil pump.

Disassembly: Remove hex plug and gaskets from either end of pump. Remove oil pump shaft and bushing retaining screw, and remove shaft and plunger. Wash all parts and blow dry with air.

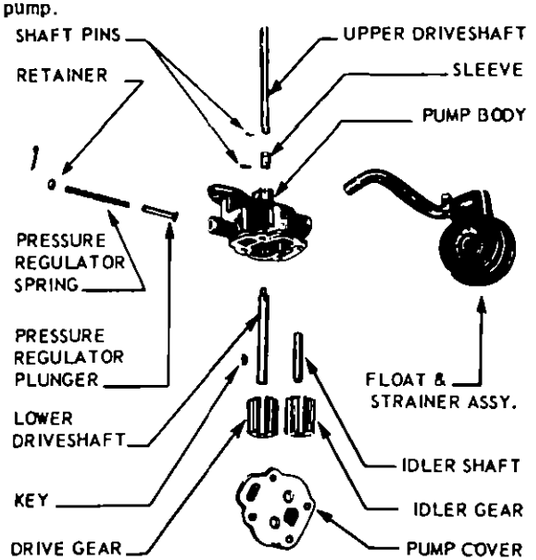
Reassembly: Dip pump shaft and plunger in engine oil, install shaft and bushing and align hole of bushing with hole in pump body and ball of shaft in hole in plunger. Make sure that all connections are leakproof.

Installation: Reverse removal procedure.

1955 V8 MODELS

OIL PUMP: Removal—Remove engine oil pan and remove the two screws attaching oil pump to rear main bearing cap and remove oil pump and strainer assembly.

Disassembly: Remove screws attaching pump cover to pump and remove the cover. Remove idler gear. Remove pin from shaft and drive off sleeve. Remove upper and lower oil pump driving shafts and gear. If necessary, press shaft out of gear. If necessary to remove the float assembly, the tube can be unscrewed from pump.



HORNET V8 OIL PUMP

Inspection: Wash all parts in clean solvent and blow dry with air. Inspect float for leaks. Inspect strainer. Inspect pump shaft for wear, scores or pits. Check clearance between pump housing and gears (opposite point of gear mesh). This clearance should not be greater than .008". Check gear endplay using a straightedge across gears and housing. Endplay should not exceed .004". Inspect relief valve piston for scores.

Reassembly & Installation: Reverse disassembly and removal procedure indicated above.

COOLING SYSTEM

1946-53 MODELS

RADIATOR CORE REMOVAL: Drain cooling system, remove upper and lower hoses. Disconnect hood lock conduit and pull wire at lower hood lock support. Remove nine capscrews from fender tie panel and hook lock support panel, remove panel. Remove four bolts attaching radiator core to channel (NOTE—remove nuts located inside radiator channel). Lift radiator core up and forward out of channel.

1954 MODELS

RADIATOR REMOVAL: On Hornet Model 7D, disconnect hood lock pull wire and remove Phillips head screw at top of front ornament. Remove eight hexhead screws attaching grille upper louvre to front fender tie panel (located under louvre), and two screws attaching front fender tie panel feeler to tie panel. Remove eight screws from fender tie panel and hood lock support panel and remove tie panel (NOTE—On other models disconnect hood support prop). Remove four bolts attaching radiator to channel (remove the nuts located inside radiator channel), remove radiator.

CLUTCH NOTES

1946-54 MODELS (EXC. JET)

►***CLUTCH STICKING CORRECTION: Flushing instructions below will correct clutch sticking due to gum and oxidation deposits in clutch.***

FLUSHING OF CLUTCH: Engine must be run for sufficient length of time to warm up clutch to approximately 100° before flushing. Then proceed as follows:

1) Remove flywheel dust pan, turn flywheel until one drain plug in front face of flywheel is downward, remove plug and drain out old clutch compound.

2) Turn flywheel until filler hole visible in timing opening in left side of rear engine plate, inject one pint of solvent (20% carbon tetrachloride plus 80% commercial acetone), replace plug.

3) Use pedal depressor or stick to hold pedal down and clutch disengaged. Allow car to stand for about 10 minutes.

4) After 10 minute interval, turn flywheel 90° or ¼ turn and again allow car to stand for 10 minutes.

5) Repeat step (4) at 10 minute intervals until flywheel has been turned through entire revolution so that entire clutch mechanism has been exposed to solvent action.

6) Drain solvent, making certain that drain plug hole at extreme lower position so that all solvent is removed.

7) Install ⅓ pint Hudson Compound. See Refilling data below.

DRAINING & REFILLING CLUTCH: At 5000 mile intervals, proceed as follows:

Draining: Turn flywheel until drain plug on front face of flywheel visible through timing inspection hole on left side of rear engine plate, remove plug. Turn flywheel until star on flywheel is aligned with pointer in timing inspection hole. This will place drain hole at bottom of flywheel and allow old compound to drain out.

Refilling: After draining completed, turn flywheel until drain hole is again visible in timing inspection plate in engine rear plate, inject ⅓ pint of Hudsonite Clutch Compound using J-485 Clutch Filler gun (fluid can be measured with J-486 Measuring Cup or "one shot" ⅓ pint can used). Replace drain plug.

PROPELLER SHAFT NOTES

1948-54 MODELS

PROPELLER SHAFT CENTER BEARING REPLACEMENT: Remove nuts, lock plates, and "U" bolts from universal joint at front end of rear shaft and lower shaft support. Remove nut and washer attaching flange to rear of front propeller shaft. Use puller J-820 to pull companion flange from splined shaft. Remove bolt attaching center bearing and housing assembly to cushion frame support, remove center bearing and housing assembly from shaft. Remove lock rings from either side of bearing and press bearing from housing.

Installation—Reverse procedure above.

SUSPENSION NOTES

1952 PACEMAKER M DELS

►*1952 PACEMAKER "OFFSET" REAR SPRING SHACKLES (To minimize possibility of shackle noise):* Shackles with threaded ends offset ⅛" (instead of being parallel) were used on later cars and can be used as replacement on earlier cars as follows:

Shackle No.	First Type	Later "Offset" Type
Right	161005①	②307501
Left	161006①	③307502

①—Marked by two ribs at top.

②—Has left-hand thread on lower shank.

③—Marked by single rib on back.

BRAKE NOTES

1955 MODELS

►*SPONGY BRAKE PEDAL CORRECTION (EXCEPT POWER BRAKES):* The small hole of the keyhole slot in master cylinder-to-pedal shaft brace may not fully engage groove at outer end of pedal shaft allowing the pedal shaft to flex within the keyhole. Correct as follows: Remove master cylinder-to-pedal shaft brace and elongate the master cylinder attaching hole as necessary to provide a full engagement of small hole of keyhole slot to groove in outer end of pedal shaft. Replace brace using two "bite" washers in place of the regular lockwashers on the master cylinder attaching screws.

HOOD LOCK: Hood is Reverse Alligator type hinged at radiator. To raise hood, press in on lock handle to left of steering column, raise rear end of hood.

MODEL IDENTIFICATION

	Super 6 Model	Ser.No.	Commodore 6 Model	Ser.No.	Bus. Cars Model	Ser.No.
1946	51	31-101	52	32-101	58	38-101
1947	171	171-101	172	172-101	178	178-101

SERIAL & ENGINE NUMBER: See model notation above for First No. and prefix (first two figures indicate model thus: 31-101). Stamped on plate on right front door hinge pillar post and on top of engine block between #1 and #2 exhaust flanges.

TUNE-UP

COMPRESSION: Pressure—120 lbs. at 125 RPM.

VACUUM READING: Steady 18-21" idling 7½-8 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Champion Special J-9 Hudson. 14 mm. **Gaps**—.032"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap .020". **Cam Angle** 35° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance See tables following.

IGNITION TIMING: See Ignition Timing.
Std. Setting—½" on flywheel before TDC.
Timing Mark—Flywheel marked "UDC.1-6/" with four graduations ¼" apart ahead of this mark. Set timing with the 3rd white line aligned with pointer in inspection hole in motor support above starter, then adjust Fuel Compensator as follows:
Fuel Compensator Setting—Advance spark (loosen *vacuum unit link screw on distributor quadrant*) until slight ping noted accelerating with wide open throttle between 10-15 MPH. **Final setting must not be more than 1" before "UDC.1-6/".**

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set both idle adjusting screws for smooth running and highest steady vacuum gauge reading (each screw ½-1½ turns open—turn screws in for leaner mixture). Idle speed 7½-8 MPH.
Float Level—⅛" from top of float to gasket seat on cover with valve seated (invert to check).
Accelerating Pump—Outer hole (max.) Normal.

Fuel Pump Pressure: 3-4 lbs. (AC. mechanical type), 2½-3 lbs. (Autopulse electrical type).

MANIFOLD HEAT CONTROL: Automatic thermostatic type (no adj.). Valve must operate freely.

VALVES: See Valve Timing.
Tappet Clearance—*.008" Int., .010" Exh. Hot.*
NOTE—This supersedes earlier data.

IGNITION

IGNITION SWITCH: Mitchellock 24-B, No. E8996.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—H601 to H1100. **Groove**—No. 1.

COIL: Auto-Lite Model IG-4098. Service Coil IG-4098S. Mounted on dash. NOTE—Coil connections are reversed (breaker connection at base of coil).
Ignition Current—2½ amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IGW-3075C.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGW-4203-A with *separate* VC-3060ES Vacuum unit. Full automatic advance type with auxiliary vacuum spark control and Fuel Compensator adjustment.

Breaker Gap—.020". Limits .020-.024".

Cam Angle or Dwell—35° closed, 25° open.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

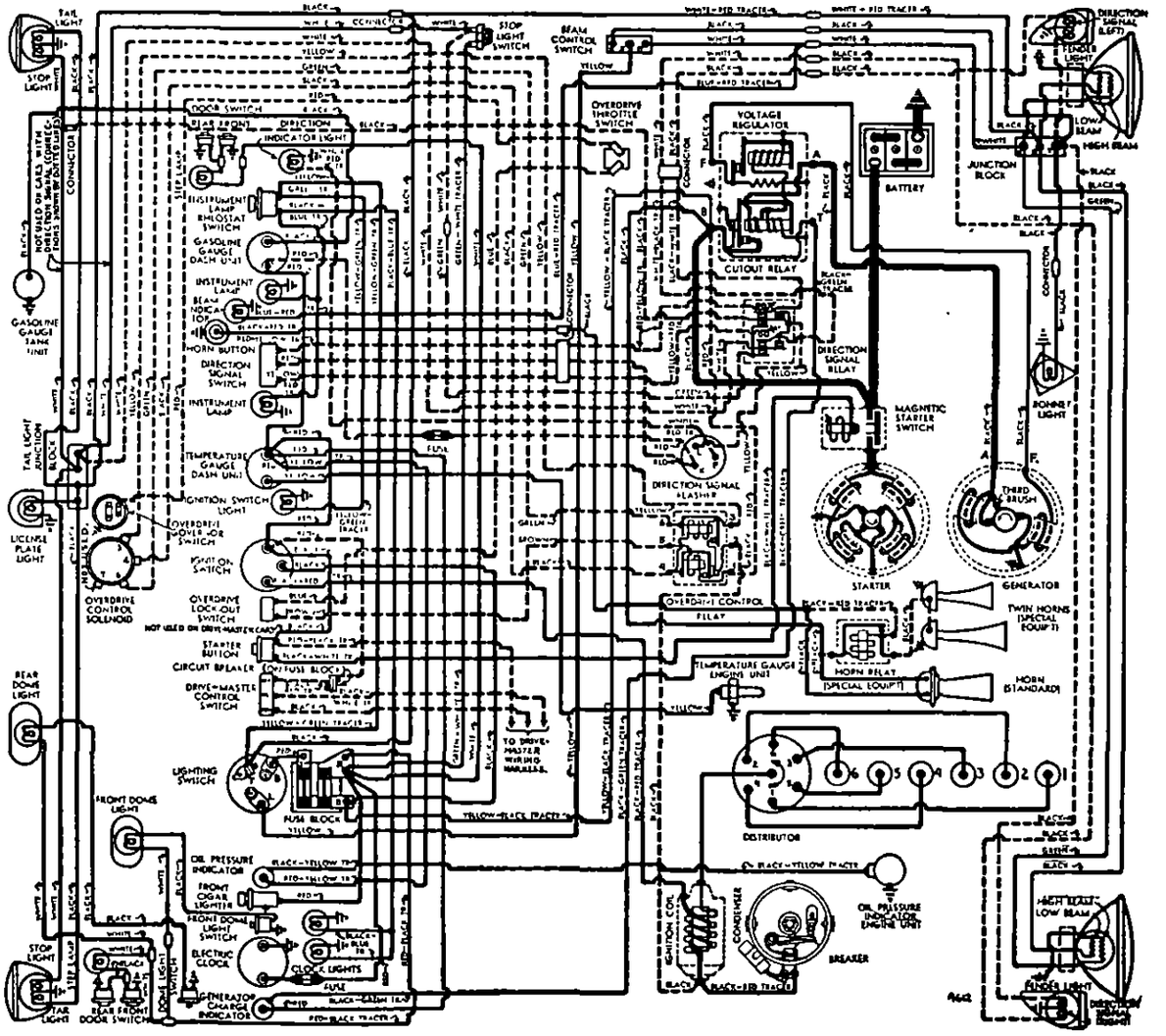
Distributor Degrees	R.P.M.	Automatic Advance Degrees	Engine R.P.M.
Start	400	0	800
3	700	6	1400
6	1000	12	2000
9	1300	18	2600
11.75	1570	23.5	3140

Fuel Compensator—Manual adjustment for octane *rating of fuel used. See Ignition Timing for setting.*

Vacuum Spark Control: Auto-Lite No. VC-3060ES Unit. Separate unit mounted on distrib. hold-down plate, linked to quadrant scale on distributor. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring within unit).

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅞"
4°	8°	9¼"
7.5°	15°	11¼"

Distributor Removal:—Mounted at top rear of cylinder head. To remove, disconnect vacuum line, take out cyl. head stud nuts on hold-down plate.



IGNITION TIMING

Std. Setting .....⅛" On Flywheel BTDC This setting correct for fuel of approximately 72 Octane Rating. See Fuel Compensator Setting for fuel and operating condition correction.

Flywheel Marks—'UDC.1-6/' at TDC with 4 white graduations (¼" apart) ahead of this mark.

Timing—With #1 piston on compression, turn engine over until second graduation before flywheel mark 'UDC.1-6/' lines up with pointer on left front face of rear motor support above starter. Loosen vacuum advance diaphragm screw on quadrant scale, rotate distributor counter-clockwise to limit of slot, then slowly rotate clockwise until contacts begin to open, tighten diaphragm screw securely. Check Fuel Compensator Setting below.

Timing (Using Synchroscope)—Recommended by car manufacturer. Mark flywheel with white chalk or paint. Idle engine, adjust distributor (above).

Fuel Compensator Setting—Road test car (engine warm). When running at 8 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen vacuum unit link screw on distributor quadrant, rotate distributor one graduation on quadrant scale clockwise (if no ping), counter-clockwise (if ping too severe).

Final setting must not be more than 1" (4th graduation) before 'UDC.1-6/' flywheel mark.

CARBURETOR

Carter Model WDO, Type 501S. 1" Dual (double barrel) downdraft type with Carter Climatic Control.
See Carburetor Section for complete data.
Idle Adjustment—With engine warm (Fast Idle and Automatic Choke inoperative), set throttle stop-screw for idle speed of 7½-8 MPH. Adjust both idle adjusting screws (two used—one for each barrel), in succession until engine fires smoothly. Final setting of each screw should be ½-1½ turns open from inner seated position (turn screws in for leaner mixture). Recheck idle speed.
Accelerating Pump Setting—Pump lever (under dust cover at top of bowl cover) has two holes for pump link engagement. Set as follows:
Outer Hole (Max. stroke)—Normal setting.
Inner Hole (Min. stroke)—If less charge required.
Float Level—⅛" from top of float to bowl cover with valve seated (remove gasket, invert to check).
Metering Rods & Jets—*Refer to Carburetor Index for Carter Downdraft Carburetor Jet Specification Table.*

Fast Idle:—Integral type (part of carburetor).
See Carburetion Equipment Section for data.
Setting—With choke valve closed and fast idle screw on high lobe of fast idle cam, turn fast idle screw in until throttle opening is .045".

Automatic Choke: Carter Climatic Control.
See Carburetion Equipment Section for data.
Setting—1 Point Lean.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., United Oil-bath type Optl.
Servicing (Oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.
Servicing (Oil-bath type)—Remove filter element, clean sump with kerosene (clean filter element with kerosene also if necessary), refill with 1 Pint engine oil (service same as for Oil-wetted type).

Fuel Pump: AC. Type AK Diaphragm type mechanical pump or Autopulse electric pump Std., AC. Type AJ combination fuel and vacuum pump Optl.
See Carburetion Equipment Section for data.
Pressure—3-4 lbs. (Type AK), 2½-3 (Autopulse).

Gasoline Gauge: King-Seeley Electric type. K-S Nos. 41050 (dash unit), 7550 (tank unit).
See Carburetion Equipment Section for data.

BATTERY

National Type HT-17. 6 Volt, 17 Plate, 96 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage—4.24 volts.
Grounded Terminal—Positive (+) to frame. **Engine Ground**—Strap (rear motor support to frame).
Dimensions—Lgth. 10 9/16". W. 7¼". Hght. 7 13/16".
Location—On left side under engine hood.

STARTER

Auto-Lite Model MZ-4092. Armature MZ-2138.
Drive—Inboard Bendix type Bendix No. A-1684.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 125 amperes, 5.4 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.5	70
2.55 "	1325	5.0	200
4.95 "	750	4.5	300
7.65 "	220	4.0	400
7.8 "	Lock	3.0	420
11.8 "	Lock	4.0	560

Removal:—On left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch:—A-L Model SS-4001. Magnetic type. Mounted on starter, controlled by switch on instrument panel. Operative only with ignition on (and clutch disengaged on cars with Vacumotive Drive or Drive-Master).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature GDZ-2006F.
SEE 1946-47 HUDSON 8 CAR PAGES FOR DATA

REGULATOR

Auto-Lite Model VRR-4001A. Voltage Regulator.
SEE 1946-47 HUDSON 8 CAR PAGES FOR DATA

LIGHTING

Headlamps: Hall "Sealed Beam" type with upper lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb on speedometer dial. Lighted with Country (upper) beam in use.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—At extreme left hand side of instrument panel. Flashes whenever Right or Left Direction Signal is operating.

Switches
Lighting—Hudson No. 200417.
Beam Selector—Hudson No. 164439.
Instrument—Hudson No. 160092.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	35-45 watts	Sealed Beam
Front Bonnet (Park)	1½	55
Fender (no Dir. Sig.)	3	63
Fender (with Dir. Sig.)	21-3	1158
Beam & Dir. Sig. Indicator	1	51
Gen. & Oil Indicators	1	51
Spdmtr. (51, 58)	1	51
Spdmtr. (54), Clock	1½	55
Courtesy, Dome	15	88
Ignition Lock	1½	55
Stop & Tail	21-3	1154
Rear License	3	63
Fog Lamp	50	1211S
Spot Lamp	32	1209S

MISC. ELECTRICAL

GENERATOR CHARGE SIGNAL: Red indicator on right hand side of instrument panel (to right of clock). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on right hand side of instrument panel (to left of clock). Should light when ignition turned on and go out as soon as engine is started.
See Electrical Equipment Section for complete data.

FUSES: Lighting—30 ampere. Bottom fuse on fuse block to right of steering column behind instrument panel. **Accessory**—30 ampere. Top fuse on fuse block. NOTE—Silver-plated fuses used.
Direction Indicator—10 ampere. Near flasher.
Electric Clock—3 ampere. In lead behind clock.
Weathermaster—14 ampere.
Radio—20 ampere.

CIRCUIT BREAKER: Drive-Master Cars only. Thermostatic type. Mounted on fuse block. Protects Drive-Master circuits only.

HORNS: Sparton. Twin type air electric horns operated by horn relay.
Air Gap—.026-.030" high pitch (short horn), .032-.035" low pitch (long horn).

Horn Relay:—R-B-M Model 6004. On dash. **Contacts Close 3-4 volts** (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. Six Cylinder, "L" Head type.
Bore—3". **Stroke**—5".
Displacement—212 cubic inches.
Rated Horsepower—21.6.
Developed Horsepower—102 at 4000 RPM.
Compression Ratio—6.5-1 Std. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Hudson Shop Notes.*

ENGINE FRONT SUPPORT REMOVAL & INSTALLATION: *See Hudson Shop Notes.*

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Hudson Shop Notes.*

PISTONS: Aluminum alloy, Cam ground, T-slot type. Use finished replacement pistons.
Original Bore & Pistons—*See Hudson Special Data.*
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above.
Clearance—Top .016". Skirt .0005-.001". See Fitting New Pistons below.

Replacement Pistons: *See Hudson Shop Notes.*

Fitting New Pistons:—Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888-A Piston Feeler Scale to measure pull.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap).

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil (upper)	3/16"	.009-.011"	.001"
Oil (lower)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN: Diameter—¾". **Length**—2 7/16".
Floating type with diamond-drilled pin holes in piston and bronze bushing in connecting rod. Pin retained by lock ring at each end.
Piston Pin Servicing—*See Hudson Shop Notes.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD: Weight 29.75 ozs. **Length** 8 3/16"
Crankpin Journal Diameter—1.936" (1.935-1.936").
See Crankshaft Size Code Note in the Hudson Shop Notes for Original Connecting Rod Bearing sizes.
Lower Bearing—Babbitt lined, spun type.
Clearance—.001". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or bearing caps. Palnuts used on bolt nuts.

Replacement Rods: Exchange rods furnished Std. size and .010" Undersize.

Installing Rods:—Lower end of rods offset. Install rods with widest half of bearing toward the rear (#1,2,4), toward front (#3,5,6). Oil scoop on lower end of rod toward camshaft.

CRANKSHAFT: Three bearing type with integral counterweights and vibration dampener on forward end.
Vibration Dampener Removal—*See Hudson Shop Notes.*
Crankshaft & Main Bearing Removal & Installation—*See Hudson Shop Notes.*
Journal Diameters—#1, 2.342" (2.341-2.342"), #2, 2.374" (2.373-2.374"), #3, 2.405" (2.404-2.405").
See Crankshaft Size Code Note in the Hudson Shop Notes for original Main Bearing Sizes.
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Bearing Adjustment:—None (no shims). Do not file bearing caps. Palnuts used on bearing cap bolt nuts.

▷*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. NOTE—If new unfinished bearings installed, thrust face for center bearing must be faced for proper endplay.
Endplay—.006-.012".

CAMSHAFT: Three bearing type. Helical gear drive. New design camshaft used. *See Hudson Shop Notes for Replacement Camshaft data.*
CAUTION—Special tappet clearance required for this camshaft. *See Tappet Clearance in "Tune-up" and "Valve Timing".*
Camshaft Removal—*See Hudson Shop Notes.*
Bearing Diameters—#1, 2"; #2, 1 31/32":, #3 1 9/16".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Bearing Removal & Installation: *See Hudson Shop Notes.*

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover. NOTE—Service thrust washer available which can be split and installed without removing camshaft.

Timing Gears:—Crankshaft gear cast-iron, camshaft gear Laminated Fibre (first cars), Aluminum (Later Cars). All gears have 20° pressure angle teeth. Aluminum gears (and crankshaft gear used with them) have teeth slightly crowned to improve quietness.
NOTE—Gears have figure 20 on front face (crankshaft gear carries additional FRONT mark to insure correct installation). NOTE—Camshaft gear available in .008" oversize and can be distinguished from std. size by spot of yellow paint on front face.
Replacement Gear Caution—Aluminum Camshaft Gear furnished in Matched Sets only with crankshaft gear (aluminum gear has slight crown or curvature of teeth for quietness and must be used with similarly crowned teeth type crankshaft gear).
Backlash—.002-.004".
Timing Gear Removal & Installation—*See Hudson Shop Notes.*

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:

	Head Diameter	Stem Diameter	Length
All Valves	1⅜"	11/32"	5 11/32"
	Seat Angle	**Lift**	**Stem Clearance**
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: Removable type pressed in block.
Servicing—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 1 1/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-2 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122

Valve Springs:—Cadmium plated springs are used. Use tool J-587-A to install valve spring and seat
Spring Free Length—2 17/64".

	Spring Pressure	Spring Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1 21/32"

NOTE—When springs removed, test for pressure (Tool U-15). Replace if pressure below 34 lbs. at 2".

Valve Lifters:—Roller shoe type, fitted in removable guides in cylinder block.
Valve Lifter Removal—*See Hudson Shop Notes.*

VALVE TIMING

Tappet Clearance—.008" Int., .010" Exh. Hot.
NOTE—This supersedes earlier data.
CAUTION—This tappet clearance required by new camshaft. See Camshaft data above.

Valve Timing:—See Camshaft Setting above.
Intake Valves Open 27°30'BTDC. Close 68°10' ALDC.
Exhaust Valves—Open 51°50' BLDC. Close 32°10' ATDC. *These figures correct with .010" tappet clear.*
Valve Timing Check—With .010" tappet clearance No. 1 intake valve opens 27°30' BTDC. with point on flywheel approximately 10½ teeth before top dead center mark "UDC. 1-6/" in line with indicator in inspection hole in flywheel housing above starter.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.
NOTE—Lower end of oil reservoir suction pipe (from oil pan to crankcase wall) now extends to center of oil reservoir to insure constant oil supply to pump.
Crankcase Capacity—5½ qts. (dry), 4½ (refill).
Servicing Note—When changing oil without removing oil pan, refill with 4½ quarts. If oil pan removed, place 1½ quarts in upper tray before oil pan installed, then 4 quarts through filler with pan in place.
Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure Indicator below).

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Filter: Special Hudson type. Optl. equipment.
Servicing—Replace filter cartridge at 5000 mile intervals.

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. Consists of signal light on instrument panel operated by switch mounted on oil check valve.
See Electrical Equipment Section for complete data.

COOLING

Cooling System: *Positive circulation type with the water pump at water inlet on front of engine.*
Capacity—13 quarts.

Water Pump:—Centrifugal, belt-driven, packless type with single outlet (no by-pass). Grease fitting provided for front and rear bearing lubrication.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Fulton Choke type. In cyl. head outlet. **Setting**—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge:—King-Seeley Electric. K-S Nos. 41053 (dash unit), No. 41085 (engine unit).

See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in oil). 9" Type Std. on Passenger Cars, 10" Type Std. on Commercial (Business) Cars and all Passenger Cars with Vacumotive Drive, Overdrive, or Drive-Master.

See Clutch Section for complete data.

Facings—Cork Insert type as follows:

	No. Corks	Inside Diam.	Outside Diam.
9" Type	90	5¼"	9"
10" Type	108	6⅜"	10"

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin in throw-out lever at lower end of connector link, turn clevis in or out of link, tighten locknut after re-connecting clevis. CAUTION—Make certain that clevis pin inserted in same hole in lever.

Clutch Oil Servicing:—See Hudson Shop Notes.

►*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Clutch Flushing data.*

Removal:—Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate above starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive:—Automatic clutch control. Optl.

See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

See Transmission Section for complete data.

NOTE—External shift rail lock accessory kits available for installation on cars operated in mountainous regions where long 2nd gear operation required.

Transmission Control: Handy-Shift remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal:—Transmission can be removed from inside car as follows: Take off accelerator pedal by removing cotter pins in anchor bracket and bell crank link clevis pins. Move steering column rubber hole cover up out of way. Remove floor mat by taking out screws at kick pads on dash and mat trim clips. Remove front seat cushion and transmission floor opening cover (CAUTION—Accelerator pedal operating rod should be secured so as not to drop on starter switch). Disconnect front universal by taking out four nuts and lock plates on U-bolts. Release clutch pedal return spring. Remove two cross shaft bracket bolts, clutch control link clevis pin and clutch pedal assisting spring. Remove Handy Shift control tube-to-transmission shift rod cotter pin, washer and grommet; transmission casing lower anchor bracket screws and bracket, shift shaft outer lever nut, washer and lever. Remove two flywheel guard-to-clutch housing screws and two rear engine mounting bolts (CAUTION—Do not remove rear engine mounting-to-clutch housing bolt). Jack rear of engine up ½" off frame. Remove clutch housing to transmission bolts. Disconnect speedometer cable from transmission. Pull transmission back and lift out.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed (twist wire with end extending up through clutch housing so it will come off after transmission installed).

OVERDRIVE

Warner Model AS2-R9B. Optl. equipment, used with Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down".

See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy. Hudson #163305.

Throttle Switch—R-B-M. Hudson No. 164438. On toeboard under accelerator pedal. Not adjustable.

Governor Switch—Auto-Lite Model TGA-4002 (two terminal type), Model TGB-4002 (five terminal type used on cars with Hudson Drive-Master transmsn.).

Removal: Same as standard transmission removal (above) except that overdrive control and wiring connections must be disconnected. Special Tool J-1502-H (hoist and dolly) should be used to lift transmission and lower onto dolly for removal.

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

See Transmission Section for complete data.

UNIVERSALS

Spicer. Needle bearing type. Two used.

	Front — Spicer Model — Rear	
Standard	1261-101X	1268-101X
With Overdrive	1261-101X	1278-101X
Commercial	1281-101X	1278-101X
" with OD.	1261-101X	1268-101X

REAR AXLE

Own Make. Semi-floating type with Spiral Bevel Gears and Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratios	Pass. Cars	Comm'l.
Standard	4 1/9-1	4 5/9-1
Optl.	4 5/9-1	
Std. with Overdrive	4 5/9-1	4 5/9-1
Optl. with Overdrive	4 1/9-1	
Std. with Drive-Master	4 5/9-1	4 5/9-1
Optl. with Drive-Master	4 1/9-1	

Backlash—.0005-.003". Screw adjustment.

Removal:—Disconnect rear universal by taking out four nuts and lock plates on U-bolts, drop rear end of propeller shaft. Remove axle shafts (see instructions below). Remove bolt nuts on carrier flange, pull carrier assembly out of axle housing.

Axle Shaft Removal:—Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer (use Tool J-351). Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, push bolts out of backing plate, remove bearing cap and shims (without disturbing hand brake link). Take out rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal aseembly in housing.

Wheel Bearing Adjustment:—Controlled by shims under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft). **Endplay**—.004-.010".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic type.
Delco Model 1037-C (front), 1041-S (rear).
Monroe Model 18076 (front), 18077 (rear).

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs and Autopoise Control.

See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Positive ¾°. Adjustable.

Toe In—0-1/16". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry (Toe-out on Turns)—With outer wheel turned 25°, inner wheel turn should be 30°.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, 4-wheel, Duo-servo, Single anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.

See Brake Section for complete data.

Drums—Centrifuse type. Diameter 10" (Std. on Pass. Cars), 11" (Comm'l Cars & Optl. for Police Car & Taxicab).

Lining—Multibestos molded (primary), Ferodo woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 22⅛" (10" type), 23 15/16" (11" type).

Clearance—.0075" at each end of each shoe. (.015" at each end of secondary or rear shoe with primary shoe forced out against drum).

Mechanical Follow-up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which causes rear wheel brakes to be applied mechanically by pedal if hydraulic system not operating.

See Brake Section for complete data.

Setting—1¼" clearance between face of pedal pushrod and end of actuating tube with brakes released.

Hand Brake: See Service Brakes above..

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydraulic (hydro-electric) type with hydraulic power cylinders actuated by motor driven hydraulic pump.

See Miscellaneous Section for complete data.

HOOD LOCK: Hood is Reverse Alligator type hinged at radiator. To raise hood, press in on lock handle to left of steering column, raise rear end of hood.

MODEL IDENTIFICATION

	Super Eight Model	Ser. No.	Commodore Eight Model	Ser. No.
1946	53	33-101	54	34-101
1947	173	173-101	174	174-101

SERIAL & ENGINE NUMBER: See model notation above for first No. and prefix (first two figures indicate model thus: 33-101). Stamped on plate on right front door hinge pillar post and on top of engine block between #1 and #2 exhaust flanges.

TUNE-UP

COMPRESSION: Pressure—120 lbs. at cranking speed of 125 RPM.

VACUUM READING: Steady 18-21" idling 7½-8 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUGS: Champion Special J-9 Hudson. 14 mm.. **Gaps**—.032"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.017" **Cam Angle** 31° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic Advance—Starts at 300 RPM., 3° at 400 RPM., Maximum 17.5° at 1700 RPM (Distr. ° & RPM)

IGNITION TIMING: See Ignition Timing.
Std. Setting—At Top Dead Center.
Timing Mark—Flywheel marked "UDC.1-8" with four graduations ¼" apart ahead of this mark. Set timing with first white line aligned with pointer in inspection hole in motor support above starter, then adjust Fuel Compensator as follows:
Fuel Compensator Setting—Advance spark (loosen hold-down screw and rotate distributor) until slight ping noted when accelerating with wide open throttle between 10-15 MPH. **Final setting must not be more than ¾" before "UDC.1-8/".**

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set both idle adjusting screws for smooth running and highest steady vacuum gauge reading (each screw ½-1½ turns open—turn screws in for leaner mixture). Idle speed 7½-8 MPH.
Float Level—⅛" from top of float to gasket seat on cover with valve seated (invert to check).
Accelerating Pump—Outer hole (max.) Normal.

Fuel Pump Pressure: 3-4 lbs. (AC. mechanical type), 2½-3 lbs. (Autopulse electrical type).

MANIFOLD HEAT CONTROL: Automatic thermostatic type (no adj.). Valve must operate freely.

VALVES: See Valve Timing.
Tappet Clearance—.008" Intake, .010" Exhaust, engine idling at normal operating temperatures.
NOTE—This supersedes earlier data.

IGNITION

IGNITION SWITCH: Mitchellock 24-B, No. E8996.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—H601 to H1100. **Groove**—No. 1.

COIL: Auto-Lite Model CE-4029. Service Coil CE-3224JS. Mounted on the dash.
Ignition Current—2½ amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4008-A or IGP-4008-B. Full automatic advance type (no vacuum control) with Fuel Compensator adjustment.
Breaker Gap—.017".
Cam Angle or Dwell—31° closed, 14° open.
Breaker Arm Spring Tension—18-20 ozs.
Rotation—Clockwise viewed from above.

Distributor Degrees	Automatic Advance R.P.M.	Engine Degrees	Engine R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

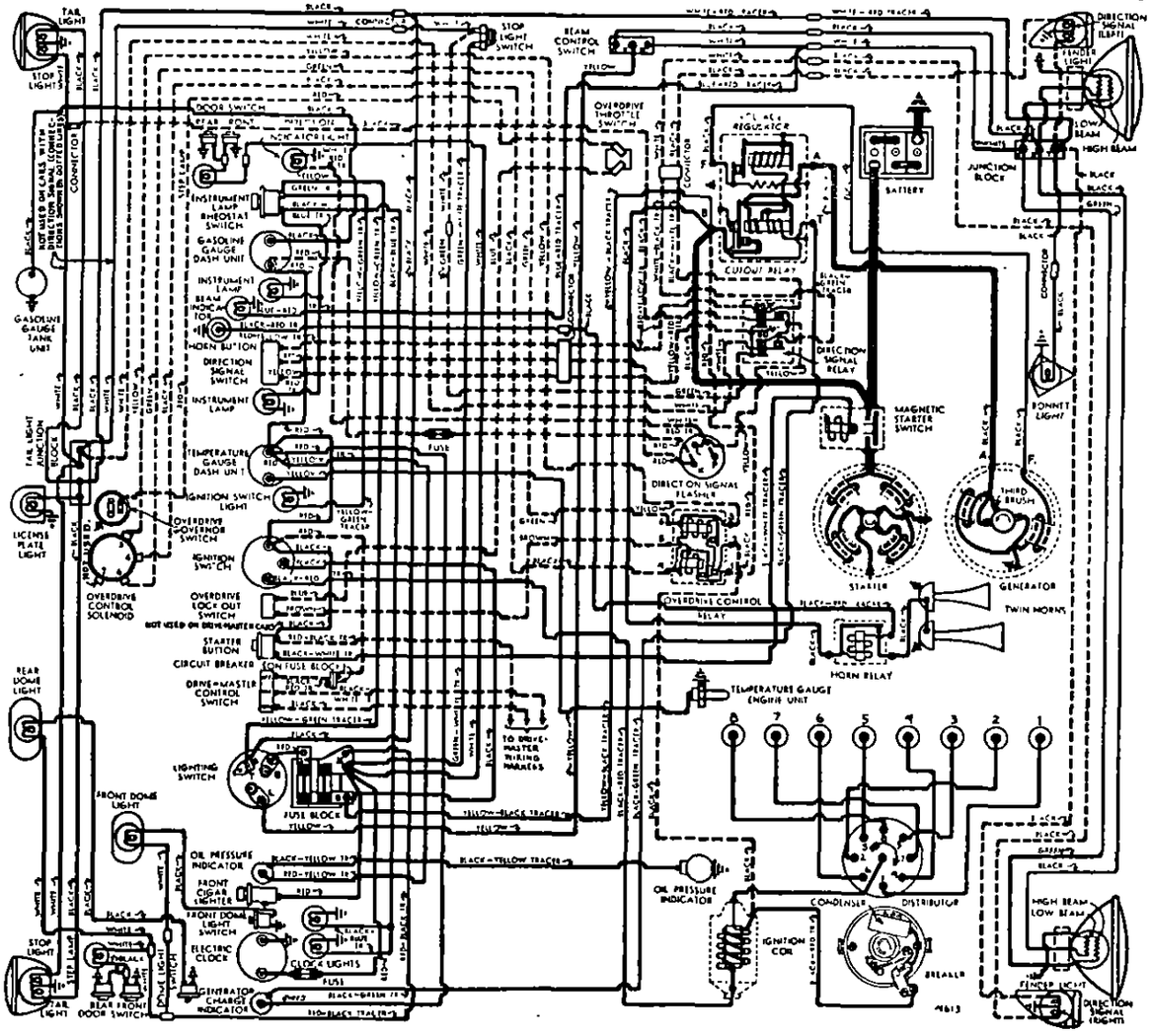
Fuel Compensator—Manual adjustment for octane rating of fuel used. See Ignition Timing for setting.
Removal:—Mounted on right side of crankcase. To remove take out hold-down screws in advance arm.

IGNITION TIMING

Std. Setting.....At Top Dead Center
This setting correct for fuel of approximately 72 Octane Rating. See Fuel Compensator Setting for fuel and operating condition correction.

Flywheel Marks—'UDC.1-8/' at TDC with 4 graduations (¼" apart) ahead of this mark.

Timing—With #1 piston on compression, turn engine over until piston reaches top dead center when flywheel mark 'UDC.1-8/' lines up with pointer in left front face of rear motor support. Loosen hold-down screw in advance arm, rotate distributor clockwise to limit of advance arm slot, then slowly rotate distributor counter-clockwise until contacts begin to open, tighten hold-down screw. Check Fuel Compensator setting.
Timing (Using Synchroscope)—Recommended by



manufacturer. Mark flywheel with white chalk or paint, connect at #1 spark plug. Idle engine and adjust distributor as directed above.

Fuel Compensator Setting—Road test car (engine warm). When running at 8 MPH slight ping should occur between 10-15 MPH when accelerating with wide open throttle. To adjust, loosen hold-down screw, rotate distributor one graduation on scale counter-clockwise (if no ping), clockwise (if ping too severe). **Final setting must not be more than ¾" (3rd graduation) before 'UDC.1-8/' mark.**

CARBURETOR

Carter Model WDO, Type 502S. 1¼" Dual (double barrel), downdraft type with Carter Climatic Control.
See Carburetor Section for complete data.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for 7½-8 MPH. idling speed. Adjust both idle adjusting screws (2 used, one for each barrel) in succession until engine fires smoothly. Final setting should be ½-1½ turns open for each screw (turning screws in gives leaner mixture) to give highest reading on vacuum gauge. Recheck idle speed.

Accelerating Pump Setting—Pump lever (under dust cover at top of carburetor) has two holes for pump link engagement. Set as follows:
Outer Hole (Max. stroke)—Normal setting.
Inner Hole (Min. stroke)—If less charge required.

Float Level—⅛" from top of float to bowl cover with valve seated (remove gasket, invert to check).

Metering Rods & Jets—*Refer to Carburetor Index for Carter Downdraft Carburetor Jet Specification Table.*

Fast Idle:—Integral (built-in each carburetor).
See Carburetion Equipment Section for complete data.

Fast Idle Setting—With choke valve closed and fast idle screw on high lobe of fast idle cam, turn fast idle screw in until throttle valve opening is .053".

Automatic Choke:—Carter Climatic Control.
See Carburetion Equipment Section for complete data.

Setting—Set coil housing 1 Notch Lean.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., United Oil-bath type Optl.

Servicing (Oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.

Servicing (Oil-bath type)—Remove filter element, clean sump with kerosene (clean filter element with kerosene also if necessary), refill with 1 Pint engine oil of same grade used in crankcase at 2000 mile intervals or more often if required by operating conditions.

Fuel Pump: AC. Type AK Diaphragm type mechanical pump or Autopulse electric pump Std., AC. Type AJ combination fuel and vacuum pump Optl.
See Carburetion Equipment Section for data.

Pressure—3-4 lbs. (AC. Type AK), 2½-3 lbs. (Autopulse type).

Gasoline Gauge: King-Seeley Electric type. K-S Nos. 41050 (dash unit), 7550 (tank unit).
See Carburetion Equipment Section for complete data.

BATTERY

National Type HT-19. 6 Volt, 19 Plate, 108 Ampere Hour Capacity (20 hour rate).
Starting Capacity—135 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes. Five second voltage—4.43 volts.
Grounded Terminal—Positive (+) to frame. **Engine Ground**—Strap (rear motor support to frame).
Dimensions—Lgth. 11¾". Width 7¼". Hght. 7 13/16".
Location—On left side under engine hood.

STARTER

Auto-Lite Model MAB-4100. Armature MAB-2113.
Drive—Inboard Barrel type Bendix No. A-1684.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 RPM, 120-125 amperes, 5 v.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	3700	5.5	60
0.6	"	1910	5.5	100
3.4	"	1100	5.0	200
6.6	"	695	4.5	300
10.15	"	420	4.0	400
15.2	"	Lock	3.0	575
21.5	"	Lock	4.0	750

NOTE—Lock torque figures correct with switch.

Removal:—On left front face of rear motor support. To remove, take out flange mounting screws.

Starting Switch:—A-L Model SS-4001. Magnetic type. Mounted on starter, controlled by switch on instrument panel. Operative only with ignition on (and clutch disengaged on cars with Vacumotive Drive or Hudson Drive-Master).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature No. GDZ-2006F. Third brush control with voltage regulation. Ventilated by fan on drive pulley.
Maximum Charging Rate—44 amperes (Cold), 38 amperes (hot), 35 MPH. Actual charging rate controlled by Voltage Regulator and dependent on battery condition. See Regulator data. When checking generator output, ground "F" terminal.
Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Setting adjustable

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amperes at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Swing generator out until possible belt deflection midway between generator and fan pulley is ¾" (use straightedge across pulleys).

REGULATOR

Auto-Lite Model VRR-4001A. Voltage Type. Cutout Relay and Voltage Regulator in case on dash.
NOTE—Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In—6.4-6.6 volts, 825 RPM. 9.4 MPH.
Cuts Out—4.2-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min. ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Setting—7.1-7.4 volts at 70°F.
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal, voltmeter between this terminal and ground. Warm up generator by running engine at speed of 20 MPH for 15 minutes. Then increase speed to 30 MPH charging battery until voltage is constant. Voltmeter reading should be within limits of 7.1-7.4 volts at 70°F. See Electrical Equipment Section for voltages at other temperatures.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.043-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type with upper lower beams controlled by Beam Selector Switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at upper center of speedometer dial. Lights with Upper Beam "on".

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—At extreme left hand side of instrument panel. Flashes whenever Right or Left Direction Signal is operating.

Switches

Lighting—Hudson No. 2004[illegible].
Beam Selector—Hudson No. 164439.
Instrument—Hudson No. 160092.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	35-45watts	Sealed Beam
Front Bonnet (Park)	1½	55
Fender (no Dir. Sig.)	3	63
Fender (with Dir. Sig.)	21-3	1158
Beam & Dir. Sig. Indicator	1	51
Gen. & Oil Indicators	1	51
Spdmtr. (53)	1	51
Spdmtr. (52), Clock	1½	55
Courtesy, Dome	15	88
Ignition Lock	1½	55
Stop & Tail	21-3	1154
Rear License	3	63
Fog Lamp	50	1211S
Spot Lamp	32	1209S

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MISC. ELECTRICAL

GENERATOR CHARGE SIGNAL: Red indicator on right hand side of instrument panel (to right of clock). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on right hand side of instrument panel (to left of clock). Should light when ignition turned on and go out as soon as engine is started.
See Electrical Equipment Section for complete data.

FUSES: Lighting—30 ampere. Bottom fuse on fuse block to right of steering column behind instrument panel. **Accessory**—30 ampere. Top fuse on fuse block. NOTE—Silver-plated fuses used.
Direction Indicator—10 ampere. Near flasher.
Electric Clock—3 ampere. In lead behind clock.

CIRCUIT BREAKER: Drive-Master Cars only. Thermostatic type. Mounted on fuse block. Protects Drive-Master circuits only.

HORNS: Sparton. Twin type air electric horns operated by horn relay.
Air Gap—.026-.030" high pitch (short horn), .032-.035" low pitch (long horn).

Horn Relay:—R-B-M Model 6004. On engine dash.
Contacts Close—3 volts min., 4 volts, max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. Eight Cylinder "L" Head type.
Bore—3". **Stroke**—4½".
Displacement—254 cubic inches. **Rated HP**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio—6.50-1 cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Hudson Shop Notes.*

ENGINE FRONT SUPPORT REMOVAL & INSTALLATION: *See Hudson Shop Notes.*

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Hudson Shop Notes.*

PISTONS: Aluminum alloy, Cam ground, T-slot type. Use finished replacement pistons.
Original Bore & Pistons—*See Hudson Special Data.*
Weight—10.5 ozs. (stripped). **Length**—3 3/16".
Removal—Piston & rod removed from above or below. **Clearance**—Top .016". Skirt .0005-.001".

Replacement Pistons: *See Hudson Shop Notes.*

Fitting New Pistons:—Use .0015" feeler ½" wide (Piston Feeler Scale Tool J-888-A) inserted between piston and cylinder wall on side opposite slot 90° from pin. Pull to withdraw feeler 3-4 lbs.

Installing Pistons:—Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one oil ring above piston, second ring on skirt below pin). All rings are positioned by pin in ring groove.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.009-.011"	.001"
Oil (upper)	3/16"	.009-.011"	.001"
Oil (lower)	5/32"	.009-.011"	.001"

Replacement Rings:—*See Hudson Shop Notes for data.*

PISTON PIN: Diameter—⅞". **Length**—3 7/16". Floating type with diamond-drilled pin holes in piston and bronze bushing in connecting rod. Pin retained by lock ring at each end.
Piston Pin Servicing—*See Hudson Shop Notes.*
Pin Fit in Piston—.0003" clearance (hand push fit) with piston heated to 200°F.
Pin Fit in Rod Bushing—.0003" clearance.

Replacement Pins:—Std., .002", .005", .010" oversize.

CONNECTING ROD: Weight 29.75 oz. **Length** 8 3/16".
Crankpin Journal Diameter—1.935-1.936".
See Crankshaft Size Code Note in Hudson Shop Notes for Original Connecting Rod Bearing sizes.
Lower Bearing—Babbitt lined, spun type.
Clearance—.001". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or bearing caps. Palnuts used on bolt nuts.

Replacement Rods: Exchange rods furnished Std. size and .010" Undersize.

Installing Rods:—Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.
Vibration Dampener Removal—*See Hudson Shop Notes.*
Crankshaft & Main Bearing Removal & Installation—*See Hudson Shop Notes.*
Journal Diameters—#1, 2.279-2.280", #2, 2.311-2.312", #3, 2.341-2.342", #4, 2.373-2.374", #5, 2.404-2.405".
See Crankshaft Size Code Note in Hudson Special Data for original bearing size.
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Bearing Adjustment:—None (no shims). Do not file bearing caps. Palnuts used on bolt nuts.

▷*CAUTION—Replacement of main bearings requires removal of crankshaft. Bearings retained by brass screws.*

Replacement Bearings: *See Hudson Shop Notes.*

End Thrust:—Taken by center bearing. Replace bearing if endplay excessive. **Endplay**—.006-.012".

CAMSHAFT: Five bearing type. Helical gear drive.
Camshaft Removal—*See Hudson Shop Notes.*
Bearing Diameters—#1, 2 1/32"; #2, 2"; #3 1 31/32"; #4, 1 15/16"; #5, 1½".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.002".

Bearing Removal & Installation—*See Hudson Shop Notes.*

End Thrust:—Thrust washer between camshaft flange and crankcase. Spring loaded button in camshaft hub bears against thrust plate on gear cover.

Timing Gears: Crankshaft gear Cast Iron, camshaft gear Laminated Fibre (first cars), Aluminum (later cars). All gears have 20° pressure angle teeth. Aluminum gears (and crankshaft gears used with them) have teeth slightly crowned to improve quietness. NOTE—Gears have figure "20" on front face for identification (crankshaft gear also marked "FRONT" to insure correct installation).
Replacement Gear Caution—Aluminum Camshaft Gear furnished in Matched Sets only with crankshaft gear (aluminum gear has slight crown or curvature of teeth for quietness and must be used with similarly crowned teeth type crankshaft gear).
Backlash—.002-.004".
Timing Gear Removal & Installation—*See Hudson Shop Notes.*

Camshaft Setting:—Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1½"	11/32"	5 3/32"
Exhaust	1⅜"	11/32"	5 3/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0025"
Exhaust	45°	11/32"	.004"

Valve Guides: Removable type pressed in block.
Servicing—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-2 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122

Valve Springs: Cadmium plated springs are used. Use tool J-587-A to install valve spring and seat assembly. **Spring Free Length**—2 17/64".

	Spring Pressure	Spring Length
Valve Closed	40 lbs	2"
Valve Open	80 lbs	1 21/32"

NOTE—When springs removed, test for pressure (Tool U-15). Replace if pressure below 34 lbs. at 2".

Valve Lifters: Roller shoe type, fitted in removable guides in cylinder block.
Valve Lifter Removal—*See Hudson Shop Notes.*

VALVE TIMING

Tappet Clearance—.008" Int., .010" Exh., Hot.
NOTE—This supersedes earlier data.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44'ATDC.
Above figures correct with .010" tappet clearance.
Valve Timing Check—With .010" tappet clearance #1 intake valve should open with piston 10°40' or .0494" BTDC when a point on the flywheel approximately 3.97 teeth before 'UDC.1-8/' mark lines up with indicator in inspection hole above starter. Reset tappet clearance at .008" hot and idling.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.
NOTE—Lower end of oil reservoir suction pipe (from oil pan to crankcase wall) now extends to center of oil reservoir to insure constant oil supply
Crankcase Capacity—9 qts. (dry), 7 (refill).
Servicing Note—Whenever pan removed, install 2 qts. in upper tray before pan installed, then 7 qts. through oil filler after pan in place on engine.

Oil Filter: Special Hudson type. Optl. equipment.
Servicing—Replace filter cartridge at 5000 mile intervals.
Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure Indicator below).

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. *For data, refer to Elec. Equip. Index.*

COOLING

Cooling System: Positive circulation type with water pump at water inlet on front of engine. On Commodore Eight only, by-pass passage between outlet elbow on head and water pump inlet provides recirculation of water through block with thermostat closed.

Capacity—18 quarts.

Water Pump: Centrifugal, belt driven, packless type.

NOTE—Pump used on Commodore Eight has double inlet (for by-pass).

See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Fulton. Choke type (Super Eight), By-pass type (Commodore Eight). In cylinder head water outlet elbow.

Setting—Starts to open 150-155°F. Fully open 185°F.

Temperature Gauge:—King-Seeley Electric. K-S Nos. 41053 (dash unit), No. 41085 (engine unit).

See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in oil). 10" type used on all models.

See Clutch Section for complete data.

Driven Member—Cork insert type. Inside Diam. 6⅜". Outside Diam. 10". Facing 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin in throw-out lever at lower end of connector link, turn clevis in or out of link, tighten locknut after re-connecting clevis. CAUTION—Make certain that clevis pin inserted in same hole in throw-out lever from which removed.

Clutch Oil Servicing:—*See Hudson Shop Notes.*

►*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Clutch Flushing data.*

Removal:—Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate above starter, remove plug, turn engine over ½ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

NOTE—See Installation Note following Transmission Removal for Clutch Throwout Bearing Oil Seal.

VACUMOTIVE DRIVE

Vacumotive Drive:—Automatic clutch control. Optl.

See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

See Transmission Section for complete data.

Transmission Control: Handy-Shift remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal:—Transmission can be removed from inside car as follows: Take off accelerator pedal by removing cotter pins in anchor bracket and bell crank link clevis pins. Move steering column rubber hole cover up out of way. Remove floor mat by taking out screws at kick pads on dash and mat trim clips. Remove front seat cushion and transmission floor opening cover (CAUTION—Accelerator pedal operating rod should be secured so as not to drop on starter switch). Disconnect front universal by taking out four nuts and lock plates on U-bolts. Release clutch pedal return spring. Remove two cross shaft bracket bolts, clutch control link clevis pin and clutch pedal assisting spring. Remove Handy Shift control tube-to-transmission shift rod cotter pin, washer and grommet; transmission casing lower anchor bracket screws and bracket, shift shaft outer lever nut, washer and lever. Remove two flywheel guard-to-clutch housing screws and two rear engine mounting bolts (CAUTION—Do not remove rear engine mounting-to-clutch housing bolt). Jack rear of engine up ½" off frame. Remove clutch housing to transmission bolts. Disconnect speedometer cable from transmission. Pull transmission back and lift out.

Installation Note—Wrap one strand of soft wire around throw-out bearing oil seal to prevent leather curling over when transmission installed (twist wire with end extending up through clutch housing so that it will come off the seal after transmission installed).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

See Transmission Section for complete data.

OVERDRIVE

Warner Model AS2-R9B. Optl. equipment, used with Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down".

See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy. Hudson #163305.

Throttle Switch—R-B-M. Hudson No. 164438. On toeboard under accelerator pedal. Not adjustable.

Governor Switch—Auto-Lite Model TGA-4002 (two terminal type), Model TGB-4002 (five terminal type used on cars with Hudson Drive-Master transmsn.).

Removal: Same as standard transmission removal (above) except that overdrive control and wiring connections must be disconnected. Special Tool J-1502-H (hoist and dolly) should be used to lift transmission and lower onto dolly. Transmission and overdrive assembly can then be rolled out from beneath car.

UNIVERSALS

Spicer. Needle bearing type. Two used.

	Front—Spicer Model—Rear
Std.	1261-101X—1268-101X
With Overdrive	1261-101X—1278-101X

REAR AXLE

Own Make. Semi-floating, Spiral Bevel gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—	Standard	Optional
Std. Transmission	4 1/9-1	4 5/9-1
With Overdrive	4 5/9-1	4 1/9-1
With Drive-Master	4 1/9-1	4 5/9-1

FOR OTHER REAR AXLE DATA SEE 1946-47 HUDSON SIX CAR PAGES

SHOCK ABS RBERS

Delco Model 1037-C (front), Model 1041-S (rear). Direct acting, hydraulic types.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs and Autopoise Control.

See Front Suspension Section for complete data.

Kingpin Inclination—4°36' crosswise.

Caster—0° (Neg. ¼° to Pos. ¼°). Adjustable.

Camber—Positive ¼° to Positive ¾°. Adjustable.

Toe In—0-1/16". Loosen clamps at ends of each tie rod (adjust rods equally with steering arm centered).

Steering Geometry—Inner wheel 30°, Outer 25°.

STEERING GEAR

Gemmer Model 335. Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, 4-wheel, Duo-servo, Single anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.

See Brake Section for complete data.

Drums—Centrifuse. Diameter 11".

Lining—*Multibestos molded (primary), Ferodo* woven (secondary). Width 1¾". Thickness 7/32". Length per wheel 23 15/16".

Clearance—.0075" at each end of each shoe. (.015" at each end of secondary or rear shoe with primary shoe forced out against drum).

Mechanical Follow-up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which causes rear wheel brakes to be applied mechanically by pedal if hydraulic system not operating.

See Brake Section for complete data.

Setting—1¼" clearance between face of pedal pushrod & end of actuating tube with brakes off.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydraulic (hydro-electric) type with hydraulic power cylinders actuated by motor driven hydraulic pump.

See Miscellaneous Section for complete data

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door hinge pillar post and stamped vertically on upper right front corner of block.

	Super 6 Serial No.	Commodore 6 Serial No.
1948	481101 Up	482101 Up
1949	491101 Up	492101 Up

Identification—First three figures of number indicate model.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs., min. at 125 RPM. but not less than 100 lbs. min., and not over 10 lbs. max. variation between cylinders.

VACUUM READING: 17-18" idling at 540-560 RPM. (Std.), 580-600 RPM (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs for Cast-iron Head—Champion J-7. 14 mm.
Plugs for Aluminum Head—Champion H-10. 14 mm.

DISTRIBUTOR: **Breaker Gap**—.020". Limits .018-.022".
Cam Angle—38° Closed. 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC-1-6/" (1948-49) aligned with pointer in rear engine support plate opening behind starter.
plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting (647S, SA)—1¼-1¾ turns open, (776S) ½-1 turn open. Turn screws out for richer mixture.
Idle Speed (Std.)—540-560 RPM. or 7½-8 MPH. (Vacumotive or Drive-Master)—580-600 RPM.
Float Level—3/16". Measured from top of float to gasket seat (machined surface) on bowl cover with needle valve seated. 776S NOTE—Measured from center highest point of float.
Accelerating Pump—Outer hole, max. (Normal).
776S Note—No seasonal pump adjustment.

Choke Setting: Coil housing one mark lean.

Fuel Pump Pressure: (Carter)—4-5 lbs. at carburetor, (AC)—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Int., .010" Exh. Hot.

►*CAUTION—This figure supersedes earlier data.*
NOTE—Self-locking tappet adjusting screws used. Remove apron in right front fender for access.
Valve Timing Check—*See Valve Timing.*

IGNITION

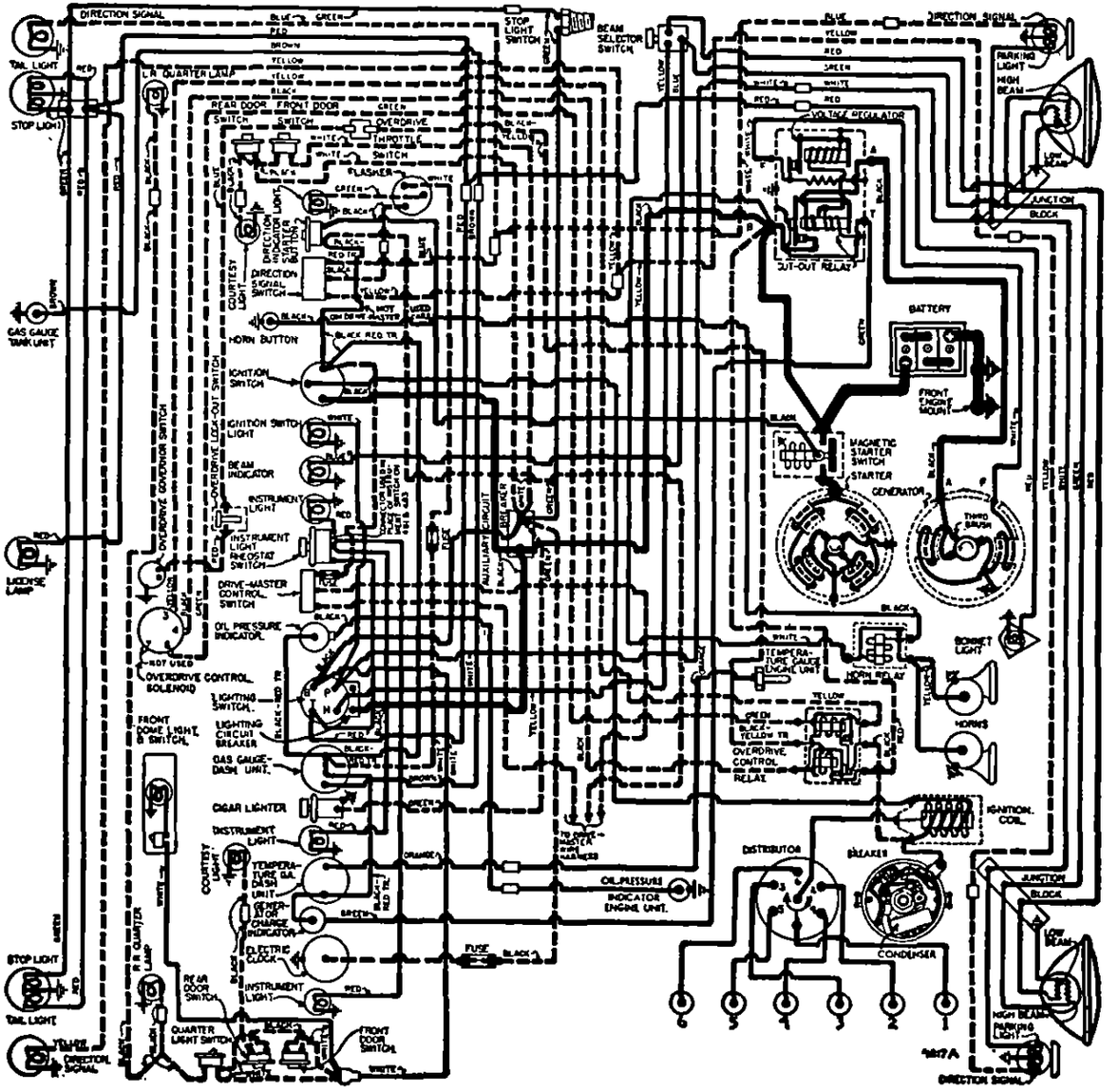
IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite No. CE-6006A (Early), CR-6012A (Late).
Location—Left side of engine above distributor.
Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Auto-Lite IG-3927G.
Capacity—.25-.28 microfarad.

►**1949 DISTRIBUTOR PRODUCTION CHANGES:** Vacuum advance changed on first (IGS-4213-1) distributor, and new (IGS-4213A-1) distributor with different advance used on later cars.
IGS-4213-1 (8.5° Vacuum Adv.)....Up to No. 49133913
IGS-4213-1 (3.5 or 4° Vac. Adv.) ①After No. 49133913
IGS-4213A-1 .....Beginning No. 49176984
①—May be found on cars before this no. (identify these distributors by number on breaker plate.

DISTRIBUTOR: *See Production Change Note above.*
Auto-Lite IGS-4213-1 (1948-49 to Car No. 49176984).
IGS-4213A-1 ('49) (beginning with Car #49176984).
Automatic advance type with Vacuum Spark Control and Fuel Compensator adjustment.
Breaker Plate Identification—No. stamped on plate (at breaker arm pivot pin) indicates max. vacuum advance:
8.5°.....①First IGS-4213-1 Distributors
3.5° or 4°.....①Later IGS-4213-1 Distributors
4°..... IGS-4213A-1 Distributors
①—See Distributor Production Change Note above.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° Closed, 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.



Automatic Advance—IGS-4213-1

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	400	0	800
3	800	6	1600
6	1200	12	2400
9	1600	18	3200
12	2000	24	4000

Automatic Advance—IGS-4213A-1

Start	500	0	1000
1	670	2	1340
4	1150	8	2300
8	1825	16	3650
9	2000	18	4000

Fuel Compensator: 10° advance or retard adjustment at distrbutor. See Ignition Timing.

Vacuum Spark Control: Auto-Lite. Integral type.
►***PRODUCTION CHANGE CAUTION***—Vacuum advance changed on IGS-4213-1 distributor, and different advance also used on IGS-4213A-1 distributors:

IGS-4213-1 Vacuum Advance
►Marked "8.5"—Up to Car No. 49133913

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
2°	4°	10½"
4°	8°	11⅝"
6°	12°	12⅝"
8.5°	17°	14"

IGS-4213-1 Vacuum Advance
►Marked "3.5" or "4"—After Car No. 49133913

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	12½"
1°	2°	13¼"
2°	4°	14"
3°	6°	14¾"
4°	8°	15¾"

Vacuum Advance—IGS-4213A-1
►Beginning Car No. 49176984

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	13⅜"
1°	2°	14"
2°	4°	14¾"
3°	6°	15⅜"
3.75°	7.50°	16"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.
►***INSTALLATION CAUTION—If oil pump removed, refer to Oil Pump Installation in Hudson Special Data.***

IGNITION TIMING

Std. Setting.....At Top Dead Center
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Flywheel Mark—"UDC-1/" (#1 and #6 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark (opening behind starter).
NOTE—Early flywheels marked "UDC-1-6/", later flywheels marked "UDC-1/".
Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.
Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 800 RPM., adjust distributor (as directed above) until mark lines up with lower edge of opening.
Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**

CARBURETOR

Carter WDO No. 647S, 647SA. 1¼" dual downdraft with Carter Climatic Control.
Casting No. on Flange (647S, SA)—542.
See Carburetor Section for complete data.
►**Difficult Starting & Carburetor loading and stalling Correction on 1948 & Early 1949 Cars**—***See Carter "WDO" Carburetor in Carburetor Section for installation of new Intake Manifold (with angle mounting flange) and other necessary carburetor parts.***
►**1949 Intake Manifold & Carburetor Production Changes**—***See Carter "WDO" Carburetor in Carburetor Section for new manifold and new 647SA carburetor used on later 1949 cars.***
►**Lean Condition at 20 MPH. correction on 647S carburetors**—***See Carter WDO carburetors in Carburetor Section.***
►**ACCELERATION "STUMBLE" CORRECTION**—***See "Carter WDO" in Carburetion Section.***
Settings (Idle Setting, Float Level, and Accelerating Pump: ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***
Fast Idle: Carter Dual (WDO) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Automatic Choke: Carter Climatic Control (Dual Carbs.).
See Carburetion Equipment Section for complete data.
Setting—Set coil housing 1 point lean.

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Optl. oil bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.
Fuel Pump (Std.): (1948-49) AC Type AH #1539109.
Optl. (Fuel-&-Vacuum)—AC Type AJ No. 1539108.
Replacement Pump—No. 584.
Pressure—4-5 lbs. at carburetor.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 42120 ('48-49 Super), 42135 ('48-49 Commander).
Tank Unit—K-S No. 41765.
See Carburetion Equipment Section for complete data.

BATTERY

National S17-2HF, 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

STARTER

Auto-Lite Model MCL-6006.
Armature—Auto-Lite MCH-2023.
Drive—Bendix No. A-1806. Inboard Barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data (MCL-6006)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4900	5.0	65
8.0 "	Lock	2.0	410

Removal: On left front face of rear motor support. To remove, take off Drivemaster mounting bracket bolts (on cars equipped with Drivemaster), disconnect linkage, and pull bracket out and forward, disconnect cables from solenoid switch, remove two starter mounting stud nuts and remove starter
Starting Switch: Auto-Lite No. SS-4001. On starter with pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Vacumotive Drive, Drive-Master or Super-Matic).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature GDZ-2006F. Third brush control with voltage regulation.
Maximum Charging Rate—43 amperes (Cold), 37 amperes (Hot), at approx. 35 MPH. Ground "F" terminal when checking generator output.
Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Adjust 3rd brush.

Cold Amperes	Cold Volts	Performance Data R.P.M.	Hot Amperes	Hot Volts	Hot R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
41	8.0	3350	34	8.0	3800

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amps. at 6.0 volts.
Belt Adjustment: ¾" belt deflection between generator and pump. Loosen clamp, swing generator out.

REGULAT R

Auto-Lite Model VRR-4001A. Voltage type.
NOTE—Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-6.6 volts.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

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Voltage Regulator

Voltage Setting—7.1-7.4 volts at 70°F.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".

Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Door Switch—Hudson No. 300796.
Front Dome Light—Hudson No. 211312.
Rear Quarter Pillar—Hudson No. 160091.
Direction Signal—Hudson No. 300875 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.

FUSES: **Electric Clock**—3 ampere. Behind clock.
Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.
Weather Control—14 ampere. On heater.
Drive-Master—15 ampere (supersedes 10 ampere type used on 1948 & early 1949 cars). On back of Drive-Master Control Switch.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on instrument panel (to left of gas gauge). Should light with ignition on, go out as soon as engine started.
Oil Pressure Warning Switch—Carter No. A658S. Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. Not adjustable. *See Electrical Equip. Section for data.*

HORNS: *See 1948-49 Hudson Eight car pages for data.*

ENGINE

ENGINE SPECIFICATIONS: **Own Make.** Six cylinder, "L" head type.
Bore—3 9/16". *See "Original Bore & Pistons" in Hudson Special Data.*
Stroke—4⅜".
Displacement—262 cu. ins. **Rated HP**—30.4.
Developed Horsepower—121 at 4000 RPM.
Compression Ratio (Std.)—6.50-1, cast iron head.
Compression Ratio (Optl.)—7.00-1, aluminum head.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*

▷**1949 CYLINDER BLOCK & PISTON PRODUCTION CHANGE**—Beginning Car No. 491-95958 (April, 1949), blocks have tapered depresssion ⅛" deep extending from valve seat chamfers to cylinder bores. **Special pistons (with cast 302562 identification number must be used in these blocks.**
See "Pistons" in Hudson Special Data.

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CYLINDER HEAD DIAGRAM: *See Hudson Shop Notes.*

ENGINE REMOVAL: *See Hudson Special Data.*

OIL PAN REMOVAL: *See Hudson Shop Notes.*

PISTONS: Aluminum alloy, Cam ground, T-slot type.
▷*CAUTION*—DIFFERENT PISTONS used starting car no. 491-95958. Change required due to change in finishing cylinder top face.
Weight—18 ± ⅛ ozs. (stripped). **Length**—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0015 to .002" (skirt).
Original Bore & Pistons—*See Hudson Special Data.*
Piston Fitting—Insert piston in cylinder with .0015" feeler gauge. Pull to withdraw feeler 3 to 4 lbs.

Replacement Pistons: *CAUTION*—Two different types required. *See Hudson Special Data.*

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap.

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.007-.012"	.001"
Oil (upper)	3/16"	.007-.012"	.001"
Oil (lower)	5/32"	.007-.012"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.

Replacement Rings: *See Hudson Shop Notes.*

PISTON PIN: Dia.—.9684-.9687". **Length**—2.9375".
Floating type with diamond-drilled pin holes in piston and rolled steel babbitt faced bearing in connecting rod. Pin retained by lock ring at each end.
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.
Piston Pin Servicing—*See Hudson Special Data.*

Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8⅛".

▷**1948 CONNECTING ROD PRODUCTION CHANGE:** New non-drilled rods used beginning Car No. 482-108180 (and some cars before this no.). *See "Connecting Rod & Bearings" in Hudson Special Data.*
Weight—34.23 ozs. (without bearings).
Crankpin Journal Diameter—2.1244-2.1254".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—Steel-backed, babbitt-lined type with upper and lower halves alike. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Bearings: Furnished Std. ("Large" & "Small"), & .001", .002", .010", .012" Undersize.

Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.

▷**INOPERATIVE VIBRATION DAMPENER (Causing Engine Roughness at 24-26 MPH.)**—*See "Vibration Dampener" in Hudson Special Data.*
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Bearings—Removable steel-backed, babbitt-lined Upper and lower halves of each bearing alike.
Clearance—.0005-.0015".
Front & Rear Oil Seals—*See "Crankshaft & Main Bearings" in Hudson Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft with Tool KMO-734.
Palnuts—Tighten finger tight, plus 1/3 turn.

▷**Front Main Bearing Lock Plates:** Used beginning 1950, can be installed 1948-49 cars (instead of lockwashers) to eliminate oil leakage or seepage. *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Crankshaft & Main Bearing Removal: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Replacement Bearings: Furnished Std. & .001", .002", .010", .012" Undersize.

End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive. **Endplay**—.003-.009".

CAMSHAFT: 4 bearing type. Non-adjustable chain
▷**Oil Pump & Camshaft Gear Change**—Camshaft driving gear & mating oil pump gear have "Granoseal" finish to reduce wear (may be identified by black velvety appearance).
Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-1.4975".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than individual camshaft journals.
▷*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks.

Timing Chain: Morse. 60 links, ⅜" pitch. Width—1¼".
Chain Tension Shoe—Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC). NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

ENGINE

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VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 53/64"	.3402-.3412"	5.730"
Exhaust	1 9/16"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides as follows:
Intake Guide—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-3442".
Exhaust Guides—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442". Counterbored 9/16" deep to diameter of 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	77 lbs.	2 3/16"

NOTE—Reject springs if pressure less than 60 lbs. Free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out. Service by installing oversize lifter.
Clearance—.00075-.00175".
Replacement Lifters—.002", .004", .010" Oversize.

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust. Hot.
►*CAUTION—This figure supersedes earlier data.*
Self-locking tappet screws are used. Remove right front fender apron for access to valve compartment.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exhaust Valves—Open 53°18' BLDC. Close 7°42' ATDC. These figures correct with .010" tappet clear.
Valve Timing Check—Adjust #1 intake tappet to .010" hot. Insert .002" feeler gauge between valve and tappet and turn engine in direction of rotation until exhaust valve begins to close, then continue to turn engine until a slight drag is felt on feeler gauge. The first of the five timing marks on flywheel (the one furthest from UDC mark) will be 5/8" above lower edge of opening in engine plate. One tooth out of time is equivalent to approximately 1½" on flywheel. Reset valve tappet clearance to .008" hot.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, piston pins (Cars before No. 482-108180—see Connecting Rod production change note), valve lifters & timing chain.
►**Oil Leakage (through machining locating hole in crankcase flange) Correction**—*See "Oiling System" in Hudson Special Data.*

Crankcase Capacity—7 qts. (refill), 7½ qts. (dry).
Normal Oil Pressure—40 lbs. at 30 MPH. No gauge used. See Oil Pressure Indicator below.
Oil Pressure Relief Valve—Non-adjustable release valve and spring under plug on left side of engine ahead of starter
Oil Pan Removal: *See Hudson Shop Notes.*
Oil Pump: Rotor type consisting of inner and outer rotor, shaft, body, and cover. Angle mounted on right side of crankcase and driven from camshaft.
►*CAUTION*—New granoseal type oil pump gear must be installed on cars with previous type steel gear or when installing new camshaft.
Removal & Overhaul—*See "Oil Pump" in Hudson Special Data.*
Oil Pressure Indicator: Hudson Signal Light with new Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—Carter No. A658S. Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. No adjustment. *See Electrical Equip. Section for data.*
Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.
Servicing—Wash filter element in gasoline and re-oil when changing oil.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and brass water distribution tube in cylinder block.
Capacity—17 quarts.
Radiator Removal: *See "Radiator" in Hudson Special Data.*
Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.
Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S 42125 ('48-49 Super), 42140 ('48-49 Commander).
Engine Unit—K-S No. 41085.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil. 10" type used on all models.
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.
Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.
Clutch Oil Servicing: *See Hudson Shop Notes.*
►*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Clutch Flushing data.*
Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSI N

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
See Transmission Section for complete data.
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.65:1 (Std.) 1948-49, 1.82-1 (cars with Drive-Master). NOTE—1.65 ratio discontinued in production and only 1.82 ratio gears furnished.
►**Transmission Main Drive Gear Stop Ring Production Change**—New Main Drive Gear with Stop Ring used on 1.65-1 Ratio Transmissions beginning Dec. 29, 1948 (after first 22645 "490 Series" cars) and on other transmissions after Jan. 18, 1949, to correct overshift in high gear position resulting in premature wear of Shift Sleeve & Fork.
See "Hudson Transmission" in Transmission Section for Stop Ring installation.
►**High Gear Overshift Correction (1948 & Early 1949 Cars)**—See Main Drive Gear Stop Ring Production Change above for correction of overshift in high gear resulting in wear of Shift Sleeve & Fork.
Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.
Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross-member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening (NOTE—Hoist J-1502 can be used to lift transmission out).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).
See Transmission Section for complete data.
Identification—Metal tag attached by a cover bol' screw carries second speed ratio 1.82:1.

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►**Drive-Master Fuse Change**—15 ampere fuse, No. 71406, used on late 1949 & 1950 cars. **Replace previous type 10 ampere fuse with new 15 ampere fuse on earlier cars.**

Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.
See Transmission Section for complete data.

OVERDRIVE

Warner Model AS2-R9B (1948), AS1-R10D (1949)—Optl. equip. used with the Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down."
See Transmission Section for complete data.

►**OVERDRIVE FUSE INSTALLATION**—On 1948 & early 1949 cars without overdrive fuse, 30 ampere fuse (in Holder Assy. 302566) should be connected in overdrive circuit at regulator "B" terminal. **Install this fuse in all instances where short-circuits have caused damage to relay or solenoid.**

Overdrive Fuse—30 ampere. In lead from regulator "B" terminal on left front side of dash. NOTE—See fuse installation note above for first cars where fuse not used.

Overdrive Solenoid—Hudson No. 301757.

Lock-Out Switch—Hudson No. 301755.

Throttle Switch—Hudson No. 164438.

Governor—Hudson No. 165829 (standard), Hudson No. 165831 (cars with Drive-Master).

Relay—Hudson No. 165826. On left fender shield.

Removal: Same as standard transmission removal (above) except that overdrive control cable and wiring must also be disconnected.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Ratios	Std.	Optl.
1948-49 Std. & Drive-Master	4.1-1	4.59-1
1948-49 With Overdrive	4.95-1	4.1-1

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets, on cross-member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear spring at axle housing, and at rear shackle, lower rear end of springs, slide axle out toward rear.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	Front	Rear
Light Scale		
Monroe	300350	300351
Delco	301240	301241
Heavy Scale		
Monroe	301767	301768
Delco	301769	301770
Extra Heavy Scale		
Delco	301637	301638

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.
See Front Suspension Section for complete data.

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe In—1/32" ± 1/32". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Wheel Cylinders—Diameters: Front wheel 1⅛", Rear wheel 15/16".

Drums—11" centrifuse type.

Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).

Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.
See Brake Section for complete data.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door hinge pillar post and stamped on top of cylinder block between No. 1 and No. 2 exhaust manifold flanges.

	Super 8 Serial No.	Commodore 8 Serial No.
1948	483101 Up	484101 Up
1949	493101 Up	494101 Up

Identification—First three figures of number indicate model.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs. min. at 125 RPM. Minimum 100 lbs. with not more than 10 lbs. variation between cylinders.

VACUUM READING: 18-21" idling at 540-560 RPM. (Std.), 580-600 RPM (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs for Cast-Iron Head—Champion J-7, 14 mm.
Plugs for Aluminum Head—Champion H-10, 14 mm.

DISTRIBUTOR: Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° closed with .017" gap.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC-1-6/" (1948-49) aligned with pointer in rear engine support plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting—(648S) 1-1½ turns open. Turn screws out for richer mixture.
Idle Speed (Standard)—540-560 RPM., 7½-8 MPH.
(Vacumotive or Drive-Master)—580-600 RPM.
Float Level—(648S) 13/64" measured from top of float gasket seat (machined surface) on bowl cover with needle valve seated (invert to check).
Accelerating Pump—(648S) Outer hole—Normal, Inner hole if less charge required.

Choke Setting: Center at index.

Fuel Pump Pressure: (Carter)—4-5 lbs., (AC)—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust at normal operating temperature.

►*CAUTION—This setting supersedes earlier data.*

NOTE—Remove apron in right front fender for access to valve compartment.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite CE-6006A (Early), CR-6012A (late).
Location—Right side of engine above distributor.
Ignition Current—2½ amperes idling, 4½ stopped.

CONDENSER: Auto-Lite No. IG-2671G.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGT-4204A-1 (1948-49 to car No. 494114018), IGT-4204B-1 (1949 Beginning car No. 494114018), Automatic advance type with Vacuum Spark Control & Fuel Compensator adjustment.

Breaker Plate Identification—No. stamped on plate (opposite vacuum control unit) indicates maximum vacuum advance: 8.5 (IGT-4204A-1), 4 (IGT-4204B-1).

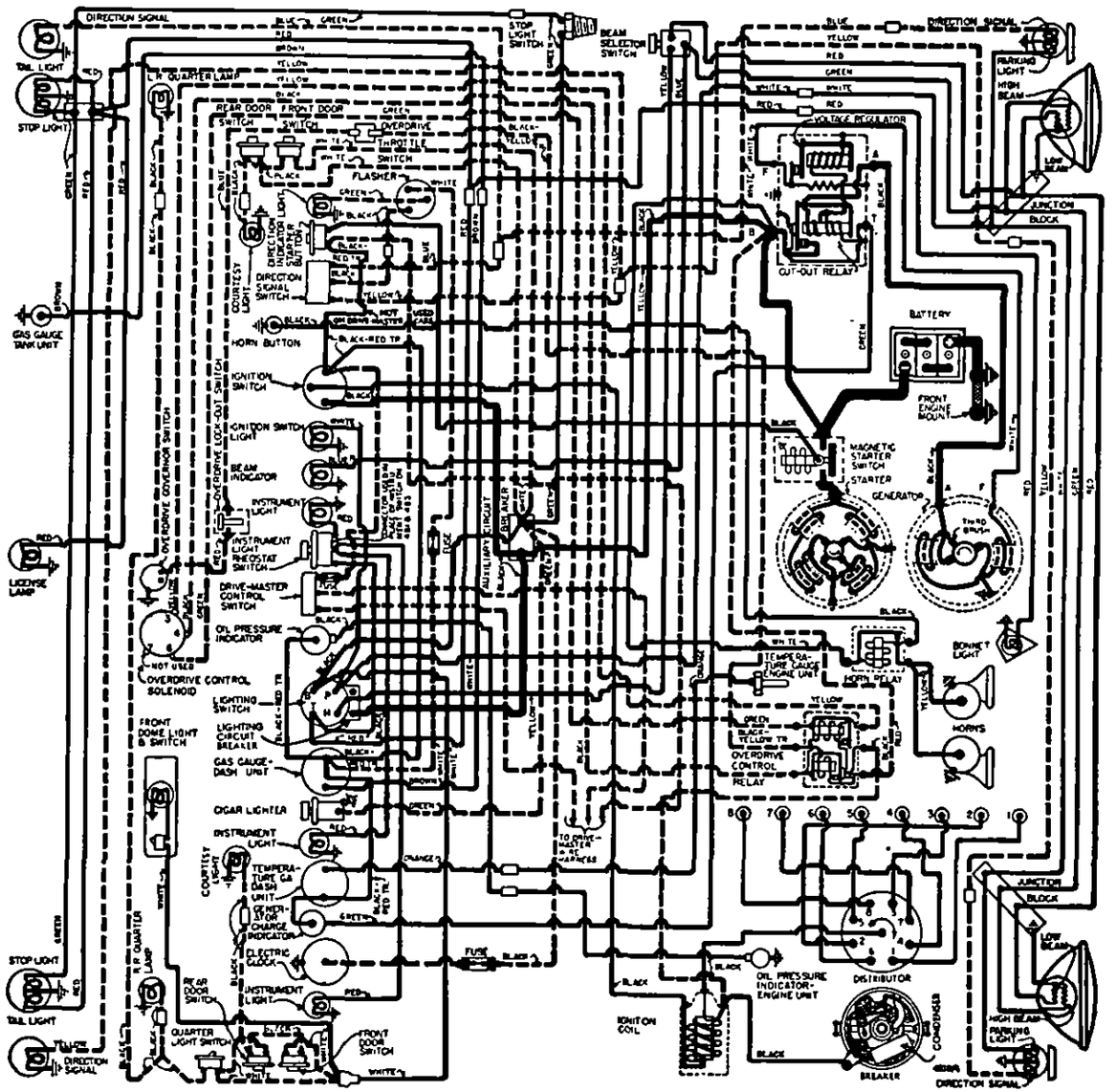
Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° closed with .017" gap.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance
(IGT-4204A-1 & IGT-4204B-1)

Degrees Start	Distr. R.P.M.	Degrees Eng.	R.P.M.
0	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

Fuel Compensator: 10° adjustment at distributor. See Ignition Timing for adjustment and setting.
Vacuum Spark Control: Auto-Lite. Integral type. Linked directly to breaker plate. Provides additional

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advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGT-4204A-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
2°	4°	10½"
4°	8°	11⅝"
6°	12°	12⅝"
8.5°	17°	14"

Vacuum Advance—IGT-4204B-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	12½"
1°	2°	13¼"
2°	4°	14"
3°	6°	14¾"
4°	8°	15¾"

Distributor Removal: On right side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

IGNITION TIMING

Std. Setting.....At Top Dead Center
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Flywheel Mark—"UDC-1/" (#1 and #8 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark (opening behind starter). *NOTE*—Early flywheels marked "UDC-1-8/", later flywheels marked "UDC-1/".
Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.
Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 600 RPM., adjust distributor (as directed above) until mark lines up with lower edge of opening.
Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**

CARBURETOR

(1948-49) Carter WDO, No. 648S. (Casting No. 542). 1¼" dual barrel downdraft type with Carter Climatic Control.
See Carburetor Section for complete data.
►**ACCELERATION "STUMBLE" CORRECTION**—*See "Carter WDO" in Carburetion Section.*
Settings (Idle Setting, Float Level, and Accelerating Pump: *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Dual (WDO) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Automatic Choke: Carter Climatic Control (Dual).
See Carburetion Equipment Section for complete data.
Setting—Coil housing centered (at index).

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Opti. oil bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.
Fuel Pump (std.): AC Type AH No. 1539109.
Opti. (Fuel-&-Vacuum)—AC Type AJ No. 1539108.
Replacement Pump—No. 584 (for AH), 583 (AJ).
Pressure—(Carter) 4-5 lbs., (AC)—3-4 lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 42120 ('48-49 Super), 42135 ('48-49 Commander).
Tank Unit—K-S No. 41765 ('48-49).
See Carburetion Equipment Section for complete data.

BATTERY

National S17-2HF, 6 volt, 17 plate, 120 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

STARTER

Auto-Lite Model MCL-6006. Armature MCH-2023.
Drive—Bendix No. A-1806. Inboard Barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Removal: On left front face of rear motor support. To remove, take out flange mounting bolts.
Starting Switch: Auto-Lite Magnetic type SS-4001 on starter with pushbutton (Hudson No. 300646) on instrument panel. Operative only with ignition "on" (clutch disengaged on Vacumotive or Drive-Mstr).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GEC-4801A. Armature GDZ-2006F. Third brush control with voltage regulation.
Maximum Charging Rate—43 amperes (Cold), 37 amperes (Hot), at approx. 35 MPH. Ground "F" terminal when checking generator output.
Charging Rate Adjustment—See Regulator data. Third brush setting 1 commutator bar minimum, 1 commutator bar plus 1 mica strip maximum, from nearest (insulated) main brush. Adjust 3rd brush.

Cold Performance Data			Hot Performance Data		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	960	0	6.4	1040
4	6.55	1060	4	6.6	1140
8	6.7	1160	8	6.8	1280
12	6.85	1280	12	6.95	1440
16	7.0	1400	16	7.15	1600
20	7.15	1550	20	7.35	1820
24	7.25	1700	24	7.55	2090
28	7.5	1890	28	7.75	2440
32	7.65	2100	32	7.9	3000
36	7.8	2375	34	8.0	3800
41	8.0	3350			

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.85-5.4 amps. at 6.0 volts.
Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp screws and nuts.
Belt Adjustment: ¾" belt deflection between generator and pump. Loosen clamp, swing generator out

REGULATOR

Auto-Lite Model VRR-4001A. Voltage type.
NOTE—Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-6.6 volts.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.)
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close)
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.1-7.4 volts at 70°F.
Contact Gap—.012" Min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

Current Regulator

Setting—34-36 amperes (marked '35' on the cover)
Contact Gap—.012" min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.)
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".
Direction Signal: Opti. *See Electrical Equipment Section*
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Door Switch—Hudson No. 300796.
Front Dome Light—Hudson No. 211312.
Rear Quarter Pillar—Hudson No. 160091.
Stop Light—Auto-Lite 100810K.
Direction Signal—Hudson No. 300875 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.

FUSES: Electric Clock—3 ampere. Behind clock.

Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.

Weather Control—14 ampere. On heater.

Drive-Master—15 ampere (supersedes 10 ampere type used on 1948 & early 1949 cars). On back of Drive-Master Control Switch.

Overdrive—30 ampere. In insulated fuse holder in overdrive relay feed wire on left front side of dash.

►*OVERDRIVE FUSE INSTALLATION NOTE*—This fuse not used on 1948 & early 1949 cars but should be installed if damage caused by short-circuits.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator on instrument panel (to left of gas gauge). Should light with ignition on, go out as soon as engine started.
See Electrical Equipment Section for complete data.

HORNS: Sparton or Auto-Lite Model HW-4021 (Low HW-4022 (High). Dual horns operated by relay.
Air Gap—.027-.029" for high pitch (short horn), .032-.034" low pitch (long horn).

Horn Relay: Hudson No. 164401. On engine dash.
Contacts Close—3 volts min., 4 volts max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own Make. 8 cylinder, "L" head type.
Bore—3". *See "Original Bore & Pistons" in Hudson Special Data.*
Stroke—4½".
Displacement—254 cubic inches. **Rated HP**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio (Std.)—6.50-1, cast iron head.
Compression Ratio (Optl.)—7.00-1, aluminum head.
Compression & Vacuum Reading—*See Tune-Up.*

TIGHTENING TORQUES: *See Hudson Shop Notes.*

CYLINDER HEAD DIAGRAM: *See Hudson Shop Notes.*

ENGINE REMOVAL: *See Hudson Special Data.*

OIL PAN REMOVAL: *See Hudson Shop Notes.*

ENGINE REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*

PISTONS: Aluminum alloy, Cam ground, T-slot type.
Weight—10¼ ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above or below.
Clearance—.002-.0025" (skirt).
Original Bore & Pistons—*See Hudson Special Data.*

Replacement Pistons: *See Hudson Shop Notes.*

Fitting New Pistons: Use .0015" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888-A Piston Feeler Scale to measure pull.

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.004-.009"	.001"
Oil (upper)	3/16"	.004-.009"	.001"
Oil (lower)	5/32"	.004-.009"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.

Replacement Rings: *See Hudson Shop Notes.*

PISTON PIN: Dia.—.7497-.750". **Lgth.**—2.4375". Floating type with diamond-drilled pin holes in piston and bronze bushing (with oil grooves at sides) in connecting rod. Lock ring used at each end of pin.
Pin Fit in Piston—.0000-.0003" at 70°F., or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.
Piston Pin Servicing—*See Hudson Special Data.*

Replacement Pins: *Std., .002", .005", .010" oversize.* Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8 3/16".
Weight—31.36 ozs. (with bearings).
Crankpin Journal Diameter—1.935-1.936".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—Babbitt-lined, spun type.
Clearance—.0003-.0006". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or caps. Palnuts used on bolt nuts.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Rods: Std. size and .010" undersize.

Installing Rods: Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.

►**INOPERATIVE VIBRATION DAMPENER (Causing Engine Roughness at 24-26 MPH.)**—*See "Vibration Dampener" in Hudson Special Data.*

►*CAUTION—Crankshaft not interchangeable with earlier 8 cylinder shaft. 1948-49 shaft longer at rear end between oil slinger and flywheel flange.*
Journal Diameter—#1, 2.279-2.280"; #2, 2.311-2.312"; #3, 2.341-2.342"; #4, 2.373-2.374"; #5, 2.404-2.405".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Bearing Diameter—#1, 2.2805-2.2815"; #2, 2.3125-2.3135"; #3, 2.3425-2.3435"; #4, 2.3745-2.3755"; #5, 2.4055-2.4065".
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

►*CAUTION—Replacement of main bearings requires removal of crankshaft (bearings retained by screws).*

Crankshaft & Main Bearing Removal: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Replacement Bearings: Reamed bearings furnished standard size and .010" Undersize. Unfinished bearings also supplied. *For Line-Reaming of Unfinished Replacement Bearings, see "Crankshaft & Main Bearings" in Hudson Shop Notes.*

End Thrust: Taken by center (#3) bearing. Replace bearing if endplay excessive.
Endplay—.006-.012".

CAMSHAFT: Five bearing type. Helical gear drive.
Bearing Diameter—#1, 2.028-2.030"; #2, 1.997-1.999"; #3, 1.965-1.967"; #4, 1.9345-1.9365"; #5, 1.497-1.499".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit and line ream to .001" larger than individual camshaft journals.

►*CAUTION*—Install all bearings with notch at top.

End Thrust: Bakelite thrust washer between gear and crankcase. Spring loaded button in front end of camshaft bears against hardened plate on gear cover.

Timing Gears: Crankshaft gear Cast-iron, camshaft gear Aluminum. Teeth have 20° pressure angle and are slightly crowned for quiet operation.
Identification of Gears—Figure "20" on front face of gears (crankshaft gear also marked "FRONT").
Replacement Gear Caution—Camshaft gear not furnished singly (set only). Crankshaft gear furnished singly or in matched set.
Backlash—.002-.004".
Timing Gear Removal & Installation—*See Hudson Special Data.*

Camshaft Setting: Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 1/2"	.3402-.3412"	5.094"
Exhaust	1.380"	.3402-.3412"	5.094"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.003-.005"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable type pressed in block.
Guide Removal & Installation—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-3 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122 to remove carbon and scale out of guides (pay particular attention to carbon in counterbore at top of exhaust guide).

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	46 lbs.	2"
Valve Open	80 lbs.	1.656"

NOTE—Reject springs if pressure less than 34 pounds. Free length 2.343".

Valve Lifters: Roller-shoe type, fitted in removable guides in cylinder block.
Lifter Removal & Installation—*See "Valve System" in Hudson Special Data.*

VALVE TIMING

Tappet Clearance: .008" Int., .010" Exh. at normal operating temperature. *This setting supersedes earlier data.*
NOTE—Removable apron in right front fender.

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Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC.
Above figures correct with .010" tappet clearance.
Valve Timing Check—Adjust #1 intake tappet to .010" hot. Insert .002" feeler gauge between valve and tappet and turn engine in direction of rotation until exhaust valve begins to close, then continue to turn engine until a slight drag is felt on feeler gauge. The first of the five timing marks on flywheel (the one furthest from UDC mark) will be 9/16" above lower edge of opening in engine plate. One tooth out of time is equivalent to approximately 1½" on flywheel. Reset valve tappet clearance to .008" hot.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.

▷**Oil Leakage (through machining locating hole in crankcase flange) Correction**—*See "Oiling System" in Hudson Special Data.*

Crankcase Capacity—9 quarts.
Oil Filling Note—Whenever pan removed, install 2 quarts in upper tray before pan installed, then 7 quarts through oil filler after pan in place on engine.

Oil Pan Removal: *See Hudson Shop Notes.*
Normal Oil Pressure—4-12 lbs. with hot oil. No gauge used (see Oil Pressure indicator below).

Oil Check Valve:—Located on right side of crankcase at rear. Opens at 4-12 lbs. with hot oil. Operates dash signal to indicate oil flow.

Oil Pump:—Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Pressure Indicator:—Hudson Teleflash Oil Pressure Indicator. *See Electrical Equipment Section for complete data.*

Checking Oiling System:—*See Hudson Shop Notes.*

Crankcase Ventilation: Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Cooling System: Positive circulation with pump on front of engine and by-pass type thermostat.
Capacity—18 quarts.

Radiator Removal: *See "Radiator" in Hudson Special Data.*

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S 42125 ('48-49 Super), 42140 ('48-49 Com'dre), 42918 (All 1950).
Engine Unit—K-S No. 41085.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil. 10" type used on all models.
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Clutch Oil Servicing: *See Hudson Special Data.*

▷*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Clutch Flushing data.*

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.65:1 (Std.) 1948-49, 1.82:1 (cars with Drive-Master 1948-49) and all 1950 cars. NOTE—1.65 ratio discontinued in production and only 1.82 ratio gears furnished.

▷**Transmission Main Drive Gear Stop Ring Production Change**—New Main Drive Gear with Stop Ring used on 1.65-1 Ratio Transmissions beginning Dec. 29, 1948 (after first 22645 "490 Series" cars) and on other transmissions after Jan. 18, 1949, to correct overshift in high gear position resulting in premature wear of Shift Sleeve & Fork.
See "Hudson Transmission" in Transmission Section for Stop Ring installation.

▷**High Gear Overshift Correction (1948 & Early 1949 Cars)**—See Main Drive Gear Stop Ring Production Change above for correction of overshift in high gear resulting in wear of Shift Sleeve & Fork.
See Transmission Section for complete data.

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.
See Transmission Section for complete data.

▷**Drive-Master Fuse Change**—15 ampere fuse, No. 71406, used on late 1949 & 1950 cars. **Replace previous type 10 ampere fuse with new 15 ampere fuse on earlier cars.**

Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.
See Transmission Section for complete data.

OVERDRIVE

Warner Model AS2-R9B (1948), Model AS1-R10D (1949)—Optl. equip. used with the Hudson Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down."
See Transmission Section for complete data.

▷**OVERDRIVE FUSE INSTALLATION**—On 1948 & early 1949 cars without overdrive fuse, 30 ampere fuse (in Holder Assy. 302566) should be connected in overdrive circuit at regulator "B" terminal. **Install this fuse in all instances where short-circuits have caused damage to relay or solenoid.**

Overdrive Fuse—30 ampere. In lead from regulator "B" terminal on left front side of dash. NOTE—See fuse installation note above for first cars where fuse not used.

Overdrive Solenoid—Hudson No. 301757.
Lock-Out Switch—Hudson No. 301755.
Throttle Switch—Hudson No. 164438.
Governor—Hudson No. 165829 (standard), Hudson No. 165831 (cars with Drive-Master).
Relay—Hudson No. 165826. On left fender shield.

Removal: Same as standard transmission removal (above) except that overdrive control cable and wiring must also be disconnected.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.
Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.
Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Ratios	Std.	Optl.
1948-49 Std. & Drive-Master	4.1-1	4.59-1
1948-49 With Overdrive	4.95-1	4.1-1

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets on cross member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear end of springs, slide axle assembly out toward rear of car.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	Front	Rear
Light Scale		
Monroe	300350	300351
Delco	301240	301241
Heavy Scale		
Monroe	301767	301768
Delco	301769	301770
Extra Heavy Scale		
Delco	301637	301638

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.
See Front Suspension Section for complete data.

Kingpin Inclination—3°36' crosswise.
Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.
Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.
Toe In—1/32" ± 1/32". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).
Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Wheel Cylinders Diam. front wh'l. 1⅛", rear 15/16".

Drums—11" centrifuse type.

Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).

Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.
See Brake Section for complete data.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door hinge pillar post and stamped vertically on upper right front end of block. 1951 model designation (4A) appears only in the separate space above the serial number.

1950 Numbers—500101 Up.

Identification—First three figures of number indicate Series and Model: 500101 Pacemaker Six.

1951 Numbers—1001 Start. Cars will be consecutively numbered regardless of model or body type.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. min. Compression between cylinders should not vary more than 10 lbs.

VACUUM READING: 17-18" idling at 540-560 RPM. (Std.), 580-600 RPM. (Vacumotive, Drive-Master or Super-Matic).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs (Early 1950)—Champion J-7 (Cast-iron Head), H-10 (Aluminum Head), 14 mm.
Plugs (1950-51)—Champion H8 14 mm. (All heads).

DISTRIBUTOR: Breaker Gap—.020".
Cam Angle—38° Closed, 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: TDC (top dead center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—"UDC.1/" aligned with lower edge of rear engine support plate opening behind starter.
Fuel Compensator Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed (Std.)—540-560 RPM., or 7½-8 MPH.
Idle Speed (with Vacumotive, Drive-Master or Super-Matic Drive)—580-600 RPM.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
Accelerating Pump—Outer hole (Normal). Inner hole if less charge required.

Choke Setting: Centered at index.

Fuel Pump Pressure: (Carter)—3½-4½ lbs. at carburetor, **(AC)**—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type.

VALVE TAPPET CLEARANCE: .008" Int., .010" Exh., Hot.
NOTE—Self-locking tappet adjusting screws used. Remove apron in right front fender for access.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite No. CR-6012-A. Located on left side of engine above distributor.

Ignition Current—1.5-2.0 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076R.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: (1950) Auto-Lite Model IAT-4002. (1951) Auto-Lite Model IAT-4009. New "Pivoted Breaker Plate" type with automatic advance, Vacuum Spark Control and Fuel Compensator adjustment.
See Electrical Equipment Section for data.

▷**Breaker Plate Binding Correction on First Cars**—*See Electrical Equipment Section for data.*

Breaker Gap—.020".

Cam Angle—38° Closed, 22° Open.

Breaker Arm Spring Tension—17-20 ounces.

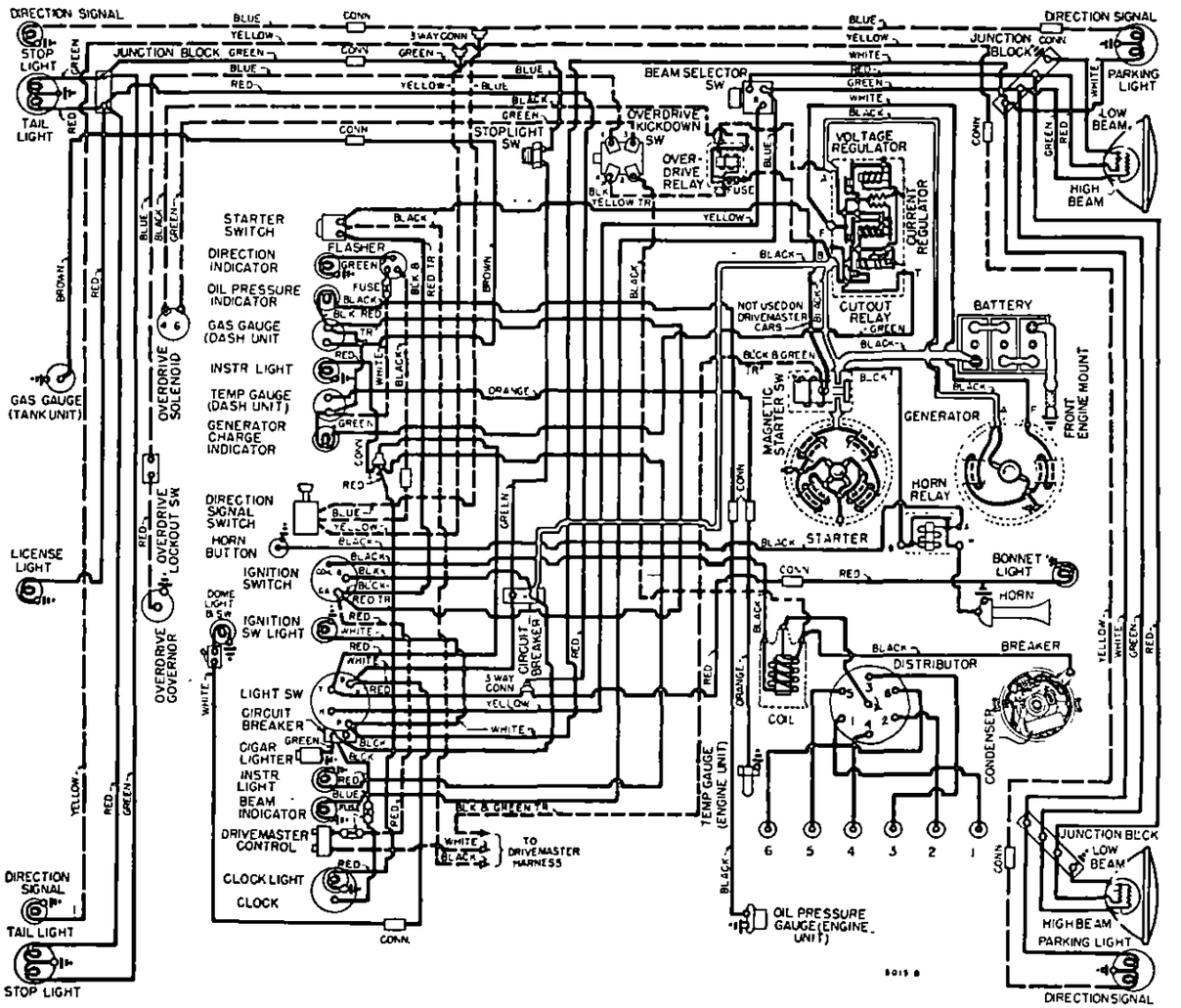
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	300	0	600
1	365	2	730
3	400	6	800
9	1090	18	2180
10	1200	20	2400

Fuel Compensator: 10° advance or retard adjustment at distributor. See Ignition Timing.

Vacuum Spark Control: Auto-Lite. Integral type. Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.



1950 MODELS

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
1°	2°	10"
3°	6°	11"
4°	8°	11½"
5°	10°	12"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

►***INSTALLATION CAUTION—If oil pump removed, refer to Oil Pump installation directions in Hudson Special Data.***

IGNITION TIMING

Std. Setting ..... **At Top Dead Center**

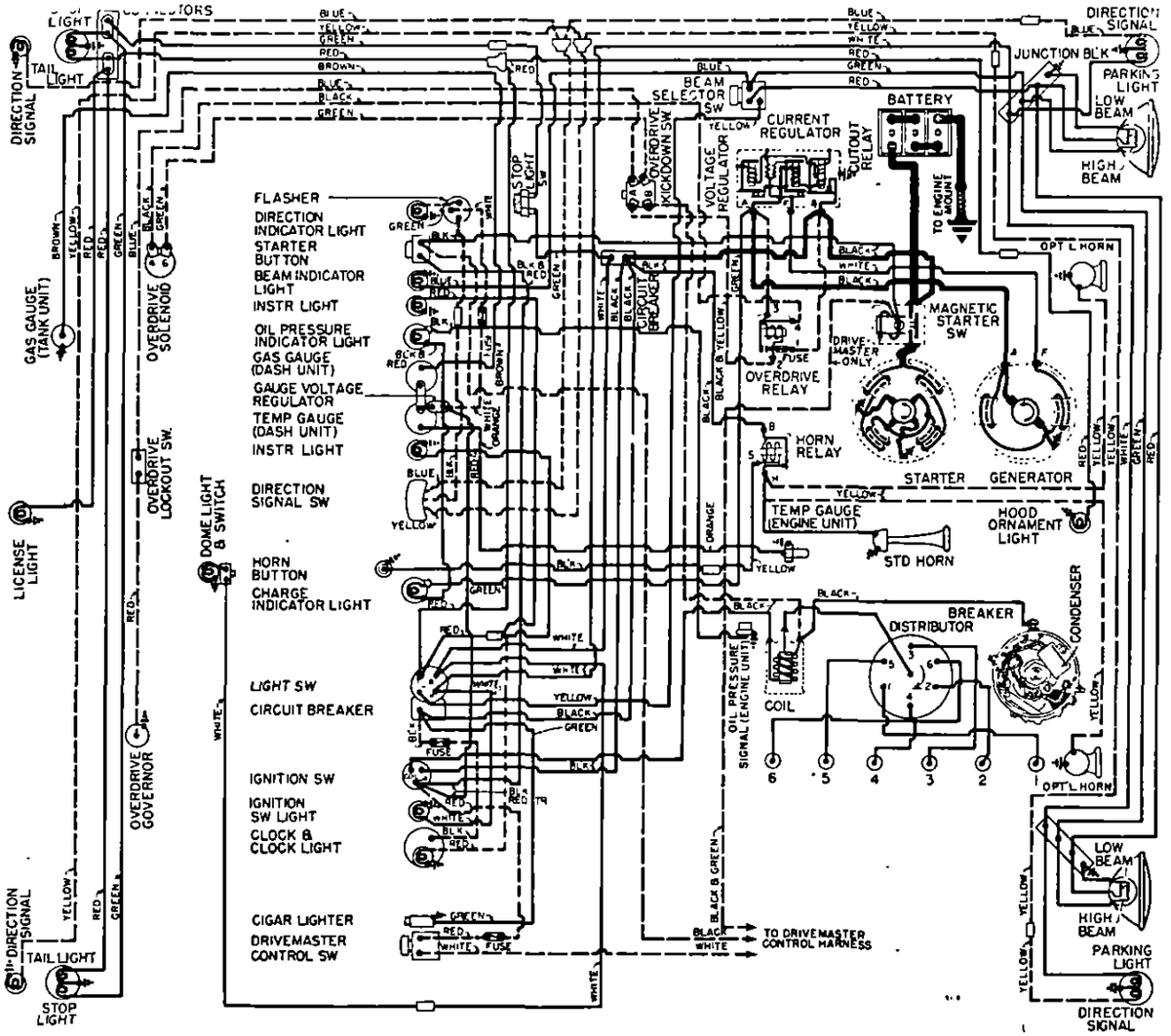
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

Flywheel Mark—"UDC.1/" (#1 and #6 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark. Visible in opening behind starter.

Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.

Timing (with Neon Timing Light)—Mark long line on flywheel with white chalk and loosen hold-down screw in distributor quadrant. Operate the engine at idle speed with timing light aimed at flywheel opening and rotate distributor until chalk mark lines up with pointer. Tighten quadrant screw.

Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (1st short line) ahead of "UDC-1/" flywheel mark.**



1951 MODELS

CARBURET R

Carter WA1-749S. 1¼" single barrel downdraft type with Carter Climatic Control.
Casting No. on Flange—682.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—Center at index.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted Std., Oil-bath Optl.
Servicing (oil-wetted type)—Clean and re-oil filter element (use same grade engine oil used in crankcase) at 2000 mile intervals or more often if required by operating conditions.
Servicing (oil-bath type)—Service same as oil-wetted type except that filter element not oiled and refill to level with engine oil.

Fuel Pump (Std.): Carter Model M729SZ.
Optl. (Fuel & Vacuum)—AC type "AJ".
Pressure—(Carter) 3½-4½ lbs. at carb. **(AC)** 3-4 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42916.
Tank Unit—K-S No. 42696.

Gasoline Gauge (1951): King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—K-S No. 45675.
Tank Unit—K-S No. 44513.
See Carburetion Equipment Section for complete data.

BATTERY

National Type OE-2L-100. 6 volt, 17 Plate, 100 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

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STARTER

Auto-Lite. (1950) MZ-4159, (1951) MZ-4164.
Drive—Bendix No. A-1806. Inboard Barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 160 amperes at 150 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.5	70
4.4 "	Lock	2.0	280

Removal: On left front face of rear motor support. To remove, take off Drivemaster mounting bracket bolts (on cars equipped with Drivemaster), disconnect linkage, pull bracket out and forward.
Starting Switch: Auto-Lite No. SS-4001 ('50). SS-4030 ('51). On starter with pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Vacumotive Drive, Drive-Master or Super-Matic).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GDZ-6001B. Armature GGY-2006F.
Two brush (shunt) type with voltage and current regulation. Ventilated.
Maximum Charging Rate—35 amperes at 8 volts.
Charging Rate Adjustment—None (see Regulator).

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amps. at 6.0 volts.
Belt Adjustment: ¾" belt deflection between generator and pump pulleys. Loosen bolts, swing generator out.

REGULATOR

Auto-Lite Model (1950) VRP-6002A, (1951) VRP-6101A. Voltage and Current regulators.
NOTE—VRP-6002A Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control. VRP-6101A Cutout Relay does **not** have extra set of points. "Teleflash" Indicator light is operated from the "A" terminal on the regulator.
NOTE—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Contact Gap—.012" Min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Contact Gap—.012" min. (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on."
Direction Signal: *Optl. See Electrical Equipment Section.*
Direction Signal Indicator—At left end of instrument panel. Flashes when Signal in use.

MISC. ELECTRICAL

See 1950-51 Hudson Six Pages for Circuit Breakers, Generator Charge & Oil Presure Signals, and Horns.

ENGINE

ENGINE SPECIFICATIONS: Own Make. Six cylinder, "L" head type.
Bore—3 9/16". *See "Original Bore & Pistons" in Hudson Special Data.*
Stroke—3 7/8".
Displacement—232 cu. ins. **Rated HP**—30.4.
Developed Horsepower—112 at 4200 RPM.
Compression Ratio (Std.)—6.70-1 cast-iron head.
Compression Ratio (Optl.)—7.20-1 aluminum head.
Compression & Vacuum Reading—*See Tune-Up.*
ENGINE REMOVAL: *See Hudson Special Data.*
OIL PAN REMOVAL: *See Hudson Special Data.*
▷*LOCATING HOLE PLUG CAUTION: Plug in locating hole in pan flange at left rear of block (behind starter) must be tight to prevent oil leakage through hole or contamination of oil by dirt and water.*
TIGHTENING TORQUES: *See Hudson Special Data.*
ENGINE FRONT SUPPORT & REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*
CYLINDER HEAD: *CAUTION—NOT INTERCHANGEABLE with other engines.*
▷**Head Diagram & Tightening Torques**—*See Hudson Special Data.*
PISTONS: Aluminum alloy, Cam ground, T-slot type.
▷*CAUTION—Pistons NOT INTERCHANGEABLE with other engines* (greater height from pin hole to top—2.310-2.314" on Pacemaker, 2.060-2.064" other Sixes).
▷*1950 PISTON PRODUCTION CHANGE: "Solid Skirt" type pistons used intermittently prior to car Serial No. 50A-85955 (these engines identified by letter "P" on upper right corner of front engine face) and on all engines after above number.*
Weight—18⅛ ozs. (stripped). **Length**—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0025" to .002" (skirt).
Original Bore & Pistons—*See Hudson Special Data.*
Piston Fitting—Insert piston in cylinder with .002" feeler gauge. Using Piston Feeler Scale (Tool J-888), pull to withdraw feeler, 3 to 4 lbs.
Replacement Pistons: *See Hudson Special Data.*
Installing Pistons: Slot away from camshaft.
PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap.

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.006-.014"	.001"
Oil (upper)	3/16"	.006-.014"	.001"
Oil (lower)	5/32"	.006-.014"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.
Replacement Rings: *See Hudson Special Data.*
PISTON PIN: Diameter—.9684-.9687". **Lgth.**—2.9375". Floating type with diamond-drilled pin holes in piston and rolled steel babbitt faced bearing in connecting rod. Pin retained by lock ring at each end.
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—Hand push fit at 70°F.
Piston Pin Servicing—*See Hudson Special Data.*
Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**
CONNECTING ROD: Length—8⅛".
NOTE—Connecting Rods are interchangeable with other Six Cylinder engines.
Weight—34.24 ozs. (without bearings).
Crankpin Journal Diameter—2.1244-2.1254".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—steel-backed, babbitt-lined type with upper and lower halves interchangeable. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.
Replacement Bearings: Large std., small std., .010" US.
Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.
CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
NOTE—Crankshaft not interchangeable with other Six Cylinder engines.
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Bearings—Removable steel-backed, babbitt-lined type. Upper and lower halves of each bearing are interchangeable.
Clearance—.0005-.0015".
Front & Rear Oil Seals—*See "Crankshaft & Main Bearings" in Hudson Special Data.*
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft by using Tool KMO-734.
Palnuts—Tighten finger tight, plus 1/3 turn.
Crankshaft & Main Bearing Removal: *See "Crankshaft & Main Bearings" in Hudson Special Data.*
Replacement Bearings: Std., optl. std., .010" US.
End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive.
Endplay: .003-.009".

ENGINE

CONTINUED FROM PRECEDING PAGE

CAMSHAFT: 4 bearing type. Non-adjustable chain.
Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-1.4975".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Finished-reamed or unfinished.
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than individual camshaft journals.
►*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks.

Timing Chain: Morse. 60 links. ⅜" pitch. Width 1¼".
Chain Tension Shoe—Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC.) NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 53/64"	.3412-.3422"	5.730"
Exhaust	1 9/16"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides as follows:
Intake Guide—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-.3442".
Exhaust Guides—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442". Counterbored 9/16" deep to diameter of 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	77 lbs.	2 3/16"

NOTE—Reject springs if pressure less than 60 lbs. Free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out.
NOTE—Inner sides of guide clamps should be in full contact at all points with matching flat surfaces of front face of each pair of tappet guides within .0015".
Clearance—.00075-.0015".
Replacement Lifters—.002", .004", .010" Oversize.

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot. Self-locking tappet screws are used. Remove right front fender apron for access to valve compartment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exhaust Valves—Open 53°18' BLDC. Close 7°42' ATDC. These figures correct with .010" tappet clearance, Hot or .012" Cold.
Valve Timing Check—Remove front tappet cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately ⅝" above index of timing hole in rear engine support plate. Reset tappet clearance to .008" Hot, or .010" Cold.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, piston pins, valve lifters, and timing chain.
Crankcase Capacity—7 qts. (refill), 7½ qts. (dry).
Normal Oil Pressure—40 lbs. at 30 MPH. No gauge used. See Oil Pressure Indicator below.
Oil Pressure Relief Valve—Non-adjustable release valve and spring under plug on left side of engine ahead of starter.

Oil Pan Removal: *See Hudson Special Data.*

Oil Pump: Rotor type consisting of inner and outer rotor, shaft, body, and cover. Angle mounted on right side of crankcase and driven from camshaft.
Pump Removal & Overhaul—*See "Oil Pump" in Hudson Special Data.*

Oil Pressure Indicator: Hudson Signal Light with Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—Carter No. A815S or *King-Seeley No. 47100 (Hudson No. 300828).* On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed (no adjustment).
See Electrical Equipment Section for complete data.

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.
Servicing—Wash filter element in gasoline and re-oil when changing oil.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and brass water distribution tube in cylinder block.
Capacity (1950)—18 qts. 19 qts. with heater.
Capacity (1951)—18½ qts. 19½ qts. with heater.
Pressure Cap—Optl. AC #850005 or Stant #AAX-0417.

Radiator Removal: *See "Radiator" in Hudson Special Data.*

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42918.
Engine Unit—K-S No. 41085.

Temperature Gauge (1951): King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—K-S No. 45675.
Engine Unit—K-S No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Own Make—Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil. 9" type used on standard models, 10" type used with Drive-Master.
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 9" (Std.), 10" (With Drive-Master), 90 corks (9"), 108 corks (10"), .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Clutch Oil Servicing: *See Hudson Special Data.*
►*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Clutch Flushing data.*

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over 1/3 revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

STANDARD

Own Make—All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
Second Speed Ratio—1.82:1.
See Transmission Section for complete data.

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.
►*SLIPPING OUT OF HIGH & SECOND GEAR CORRECTION—See Transmission Section for complete data.*

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross-member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Re-

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move breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening (NOTE—Hoist J-1502 can be used to lift transmission out).

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).

Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.

See Transmission Section for complete data.

Drive-Master Fuse—15 ampere, Part No. 71406. Located in wiring circuit 6" from control switch.

Power Cylinder Lubrication—Must be lubricated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

OVERDRIVE

Warner Type AS2-R10D (Early '50), AS3-R10D (Late '50), AS4-R10D (Late '50 & '51). (Models AS3,4 have centered ring gear). Optl. with Hudson Transmission. Part of Super-Matic Drive. Has simplified control (2-terminal solenoid, Relay & Throttle Kick-down Switch).

Removal: Same as standard transmission removal (above) except that overdrive control cable and wiring must also be disconnected.

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.

See Transmission Section for complete data.

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**

Spicer No. 1268-102X.....**Intermediate**

Needle bearing type. Three used with intermediate universal to rear of propeller shaft center bearing.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross-members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

Own Make—Semi-floating, hypoid gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratios	Std.	Optl.
Std. Transmission	4.1-1	4.55 or 3.82-1
With Drive-Master	4.1-1	4.55 or 3.82-1
With Overdrive	4.55-1	4.1-1
With Super-Matic	4.1-1	4.55-1

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets, on cross-member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear spring at axle housing, and at rear shackle, lower rear end of springs, slide axle out toward rear.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used. If knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly.

Wheel Bearing Adjustment: Controlled by shims (.003", .005",. or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Light Scale

Make	Front	Rear
Monroe	303060	300351
Delco	303062	301241

Heavy Scale

Monroe	303061	301768
Delco	303063	301770

Extra Heavy Scale

Monroe	302431	302431
Delco	303063	301770

APPLICATION NOTE—**Light Scale** front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.

See Front Suspension Section for complete data.

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. *Eccentric adjustment. Both wheels* alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe In—1/32" ± 1/32". Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tubes equally (to increase toe-in turn rods in direction of wheel travel, to decrease, turn in opposite direction).

Steering Geometry—Inner wheel 30° .Outer 25°.

STEERING GEAR

Gemmer Model 335—"3-tooth" Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameters: Front wheel 1 1/16", Rear wheel 15/16".

Drums—11" centrifuse type.

Lining—Molded. Width 1¾" (front & rear) Length per shoe 11" (except rear secondary 11 1/16")

Clearance—.010" at both ends of secondary (rear) shoe with primary shoe forced out against drum

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand brake) linkage which causes rear wheel brakes to be applied mechanically by pedal if hydraulic system not operating.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

See Brake Section for complete data.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders. *See Miscellaneous Section for complete data.*

Windshield Wipers: Cable operated—Vacuum type *See Miscellaneous Section for complete data.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on plate on right front door pillar post and stamped vertically on upper right front corner of block. Model designation (5A, 6A, etc.) on 1951 models appears only in the separate space above the serial number.
1950 Serial Number—Super 6, 501101 Up. Commodore 6, 502101 Up. First three figures of number indicate model.
1951 Serial Number—All Models, 1001 Up. Cars will be consecutively numbered regardless of model or body type.

TUNE-UP

COMPRESSION PRESSURE: 119 lbs. min. at 125 RPM. but not less than 100 lbs. min. and not over 10 lbs. max. variation between cylinders.

VACUUM READING: 17-18" idling at 540-560 RPM. (Std.), 580-600 RPM. (Vacumotive or Drive-Mstr.).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032".
Plugs (Early 1950)—Champion J-7 (Cast-iron Head), H-10 (Aluminum Head), 14 mm.
Plugs (1950-51)—Champion H-8 14 mm. (all Heads).

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° ('50), 39° ('51) Closed.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.25-.28 microfarads ('50), .20-.25 microfarads ('51).

IGNITION TIMING: TDC (top dead center).
Timing Procedure—See Ignition Timing.
Flywheel Mark—"UDC-1/" aligned with pointer in rear engine support plate opening behind starter.
Octane Selector Setting—Slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.

CARBURETION:
Idle Setting: (WDO-647SA—Early 1950)—1¼-1¾ turns open, **(WGD-776S—1950-51)**—1-1½ turns open. Turn screws out for richer mixture.
Idle Speed: (Std.)—540-560 RPM. or 7½-8 MPH.
Vacumotive or Drive-Master—580-600 RPM.
Hydra-Matic Drive—490-510 RPM.
Float Level—3/16". Measured from top of float to gasket seat (machined surface) on bowl cover with needle valve seated. **776S NOTE**—Measured from center highest point of float.
Accelerating Pump—Outer hole, max. (Normal). **776S Note**—No seasonal pump adjustment.
Choke Setting: Coil housing 1 point lean (WDO), 2 points lean (WGD).
►*CAUTION*—2 point setting on WGD Carb. supersedes original setting of 1 point lean.

Fuel Pump Pressure: (Carter)—3½-4½ lbs. at carburetor. **(AC)**—3-4 lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: .008" Int., .010" Exh. Hot. NOTE—Self-locking tappet adjusting screws used. Remove apron in right front fender for access.

IGNITION

IGNITION SWITCH: Mitchellock.

COIL: Auto-Lite No. CE-6006A (Early), CR-6012A (Late '50 & '51).
Location—Left side of engine above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite (1950 "IGS") No. IG-3927G, (1951 "IAT") No. IAT-3076R.
Capacity—.25-.28 microfarads ('50). .20-.25 microfarads ('51).

DISTRIBUTOR: (1950) Auto-Lite Model No. IGS-4213A-1. (1951) Auto-Lite Model No. IAT-4009A. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.
NOTE—IAT-4009A new "Pivoted Breaker Plate" type.
See Electrical Equipment Section for complete data.
Breaker Plate Identification—Number stamped on plate (at pivot arm pin) indicates maximum vacuum advance.
Breaker Gap—.020". Limits .019-.022".
Cam Angle—38° ('50), 39° ('51) Closed. 22° Open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance IGS-4213A-1, IAT-4009A

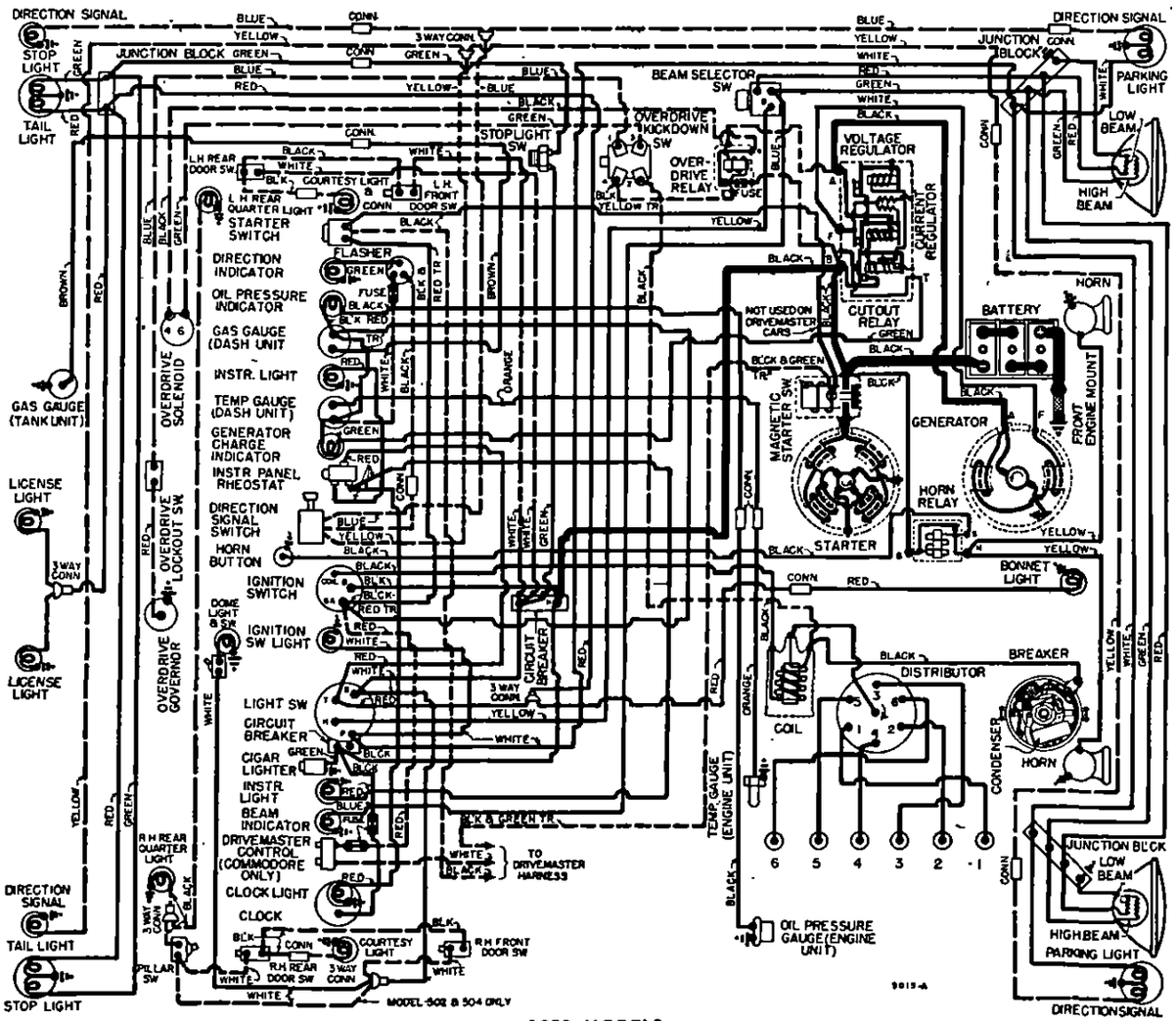
Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	500	0	1000
1	670	2	1340
4	1150	8	2300
8	1825	16	3650
9	2000	18	4000

Fuel Compensator: 10° advance or retard adjustment at distributor. *See Ignition Timing.*
Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IGS-4213A-1, IAT-4009A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	13⅜"
1°	2°	14"
2°	4°	14¾"
3°	6°	15⅜"
3.75°	7.50°	16"

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Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw in advance arm. Lift off.

▷*INSTALLATION CAUTION—If oil pump removed, refer to Oil Pump Installation in Hudson Special Data.*

IGNITION TIMING

Std. Setting*.....*At Top Dead Center

NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

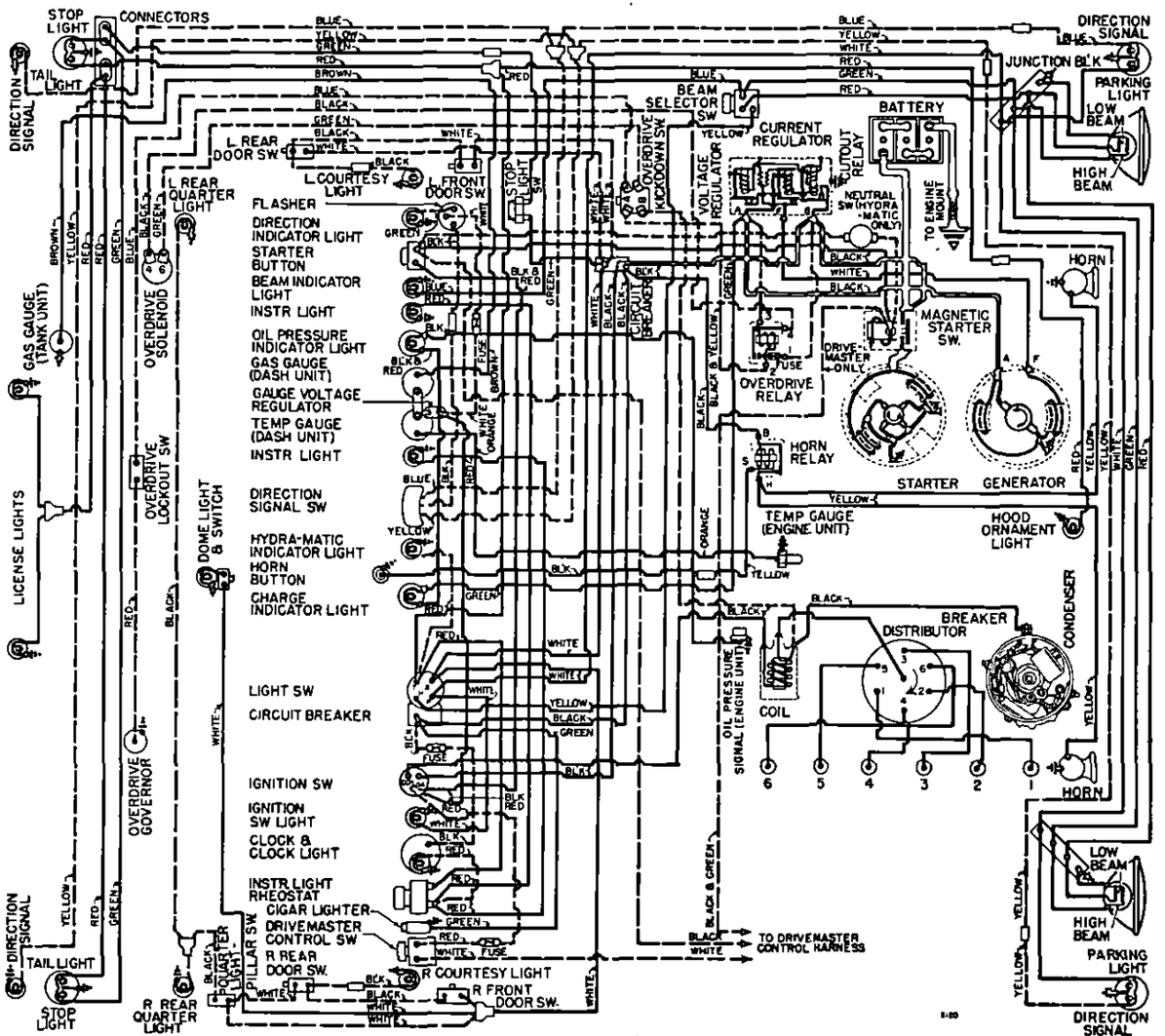
Flywheel Mark—"UDC-1/" (#1 and #6 piston top dead center position) with 4 short marks (1¼" apart) ahead of this mark (opening behind starter).

NOTE—Early flywheels marked "UDC-1-6/", later flywheels marked "UDC-1/".

Timing—With #1 piston on compression stroke, crank engine until long line of flywheel mark "UDC-1/" lines up with pointer in rear engine support plate behind starter. Loosen hold-down screw in quadrant, rotate distributor clockwise to limit of quadrant slot, then rotate distributor counter-clockwise until contacts open, tighten quadrant screw. Check Fuel Compensator setting.

Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 800 RPM., adjust distributor (as directed above) until mark lines up with lower edge of opening.

Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**



1951 MODELS

CARBURETOR

(1950 Early) Carter WDO-647SA.
(1950 Late and 1951) Carter WGD-776-S. 1¼" dual downdraft with Carter Climatic Control.
Casting No. on Flange (647SA)—542.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

▷*776S METERING ROD & FLOAT VALVE PRODUCTION CHANGE—See Carburetor Section for complete data.*

Fast Idle: Carter Dual (WDO) or (WGD) Carburetor type.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Setting (WGD Carb.)—.026" throttle opening with choke valve closed. Check with thermostatic coil housing, gasket, and baffle plate removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" adjust by bending connector rod at lower angle.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.
Setting—Set coil housing 1 point lean (WDO), 2 points lean (WGD).

▷*WGD CAUTION*—2 point lean setting supersedes original setting of 1 point lean.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner (std.): AC 1544265 (1544297 for Dr.-Mstr.).
(Optl. oil bath)—1544266 (1544298 Drive-Master).
Filter Element—(std.) #5, (oil bath) #7-S.
Fuel Pump (Std.): Carter Model M729SL or SZ.
Optional (Fuel & Vacuum)—AC Type AJ-1539108.
Replacement Pumps—No. 583 (AJ).
Pressure—(Carter) 3½-4½ lbs., (AC) 3-4 lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge (1950): King-Seeley Electric.
Dash Unit—K-S No. 42916, **Tank Unit No. 42696.**
Gasoline Gauge (1951): King-Seeley "CV" (Constant Voltage).
Dash Unit—K-S No. 45675, **Tank Unit No. 44513.**
See Carburetion Equipment Section for complete data.

BATTERY

National OE-2L-100. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by a single strap.
Location—On left side under engine hood.

STARTER

1950—Auto-Lite MZ-4159. Armature MZ-2312.
1951—(Except Hydra-Matic) Auto-Lite No. MCH-6109. Armature No. MCH-2023.
1951—(Hydra-Matic) Auto-Lite No. MCH-6107. Armature No. MCH-2028.
Drive—Bendix No. A-1808 (on MZ-4159, MCH-6109 Starters). Bendix No. A-1792 (on MCH-6107 Starter). A-1808 is Inboard Barrel type. A-1792 Outboard Barrel type.
Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—Approx. 140-160 amperes at 120 RPM. (warm engine).

Performance Data—MZ-4159

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Performance Data—MCH-6107, 9

0 ft. lbs.	4300	5.0	65
4.0 "	Lock	2.0	335

Starting Switch—Auto-Lite No. SS-4001. On left front fender splash apron, with pushbutton on instrument panel. Operative only with ignition "on" (and clutch disengaged on cars with Vacumotive Drive, Drive-Master or Super-Matic). Hydra-Matic selector lever must be in neutral to operate starter. *See Electrical Equipment Section for complete data.*
Removal: On left front face of rear motor support. To remove, take off Drivemaster mounting bracket bolts (on cars equipped with Drivemaster), disconnect linkage, and pull bracket out and forward, disconnect cables from solenoid switch, remove two starter mounting stud nuts and remove starter.

GENERATOR

Auto-Lite GDZ-6001B. Armature GGY-2006F.
Two brush (shunt) type with voltage and current regulation. Ventilated.
Maximum Charging Rate—35 amperes at 8 volts.
Charging Rate Adjustment—None (see Regulator).

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amps. at 6.0 volts.
Belt Adjustment: ¾" deflection between generator and pump. Loosen clamp, swing generator out.

REGULATOR

Auto-Lite Model VRP-6002A ('50), VRP-6101A ('51). Vibrating Voltage and current regulators.
►*NOTE*—VRP-6002A Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control. VRP-6101A Cutout Relay does **not** have extra set of points. "Teleflash" indicator light is operated from the "A" terminal on the regulator.
►*NOTE*—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" min., ground contacts closed (ground contacts open when main contacts close).
Air Gap—.031-.034" at hinge end of core with contacts open (ground contacts closed).

Voltage Regulator

Voltage Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for other temperatures.
Contact Gap—.012" Min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Contact Gap—.048-.052" contacts just opening.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when Upper Beam "on".
Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with Circuit Breaker), No. 300642 (switch only).
Beam Selector—Hudson No. 300799.
Instrument (Commodore)—Hudson No. 160092.
Direction Signal—Hudson No. 305081 (with wires).

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting—Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
FUSES: Electric Clock—3 ampere. Behind clock.
Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.
Drive-Master—15 ampere. In Drive-Master control switch lead on instrument panel.
Overdrive—30 ampere. In insulated fuse holder in overdrive relay feed wire on left front side of dash.
GAUGE VOLTAGE REGULATOR: King-Seeley—Consists of a thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ignition switch, and the gauge circuits. See Wiring Diagram.
GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). *See Electrical Equipment Section for complete data.*
OIL PRESSURE SIGNAL: Red indicator on instrument panel (to left of gas gauge). If pressure drops below approximately 13 lbs., red dash signal lights.
Oil Pressure Warning Switch—Carter No. A815S or King-Seeley No. 47100, Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. Not adjustable.
HORNS: Sparton or Auto-Lite Model HW-4021 (Low Pitch), HW-4022 (High Pitch). Dual horns.

ENGINE

ENGINE SPECIFICATIONS: Own make. 6 cylinder,

Model	Bore	Stroke	Displacement
5A, Super	3 9/16"	4⅜"	262 Cu. In.
6A, Commodore	3 9/16"	4⅜"	262 Cu. In.
7A, Hornet	3 13/16"	4½"	308 Cu. In.

Rated Horsepower—(5A Super & 6A Commodore) 30.4. (7A Hornet) 34.9.
Developed Horsepower—(5A Super & 6A Commodore) 123 at 4000 RPM., (7A) 145 at 3800 RPM.

Compression Ratio	Standard	Optional
5A, 6A	6.7-1	7.2-1
7A	7.2-1	6.7-1

NOTE—6.7-1 ratio is for cast-iron head. 7.2-1 ratio is for aluminum head.
Compression and Vacuum Reading—*See Tune-Up.*
ENGINE REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*
CYLINDER HEAD & TIGHTENING TORQUE: *See Hudson Special Data.*
►*1951 CYLINDER HEAD & GASKET CHANGE*—New cylinder head and/or gasket not interchangeable with earlier 6 cyl. engines. Impaired cooling will result if incorrect head or gasket used.
ENGINE REMOVAL: *See Hudson Special Data.*
OIL PAN REMOVAL: *See Hudson Special Data*
►*LOCATING HOLE PLUG CAUTION: Plug in locating hole in pan flange at left rear of block (behind starter) must be tight to prevent oil leakage through hole or contamination of oil by dirt and water.*
PISTONS: Aluminum Alloy. Cam Ground. "T" Slot.
►*1950 PISTON PRODUCTION CHANGE: "Solid Skirt" pistons used in production on 501 & 502 cars beginning car Serial No. 501-63216.*
Original Bore & Pistons—*See Hudson Special Data.*
Weight—(5A, 6A) 18½ ozs., (7A) 18⅝ ozs. (stripped.)
Length—3¾".
Removal—Pistons and rods removed from above.
Clearance—.0025 "to .002" (skirt).
Piston Fitting—Insert piston in cylinder with .002" feeler gauge. Pull to withdraw feeler 3 to 4 lbs. using Tool J-888 Piston Feeler Scale to measure pull.
Replacement Pistons: *CAUTION*—Two different types required. *See Hudson Special Data.*
Installing Pistons: Slot away from camshaft.
PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation. Rings cut and notched to fit pin (clearance on pin equal to ring end gap).

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.007-.012"	.001"
Oil (upper)	3/16"	.007-.012"	.001"
Oil (lower)	5/32"	.007-.012"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.
NOTE—7A top compression ring chrome-plated.
Replacement Rings: *See Hudson Special Data.*
PISTON PIN: Dia.—.9684-.9687". **Length**—2.9375".
Floating type with diamond-drilled pin holes in piston and rolled steel babbitt faced bearing in connecting rod. Pin retained by lock ring at each end.
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.
Piston Pin Servicing—*See Hudson Special Data.*
Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**
CONNECTING ROD: Length—8⅛".
Weight—34.24 ozs. (without bearings).
Crankpin Journal Diameter—2.1244-2.1254".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—Steel-backed, babbitt-lined type with upper and lower halves alike. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus ¼-⅓ turn.
Replacement Bearings: Furnished Std. ("Large" & "Small"), & .0005", .002", .010", .012" Undersize.
Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.
CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".
Original Journal & Bearing Sizes—*See "Crankshaft Size Code" in Hudson Special Data.*
Bearings—Removable steel-backed, babbitt-lined

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

upper and lower halves of each bearing alike.
Clearance—.0005-.0015".

Crankshaft & Main Bearing Removal: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft with Tool KMO-734.
Palnuts—Tighten finger tight, plus ⅓ turn.

Replacement Bearings: Furnished Std. & .001", .002", .010", .012" Undersize.

End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive. **Endplay**—.003-.009".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

CAMSHAFT: 4 bearing type. Non-adjustable chain.
Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-1.4975".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit).
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than journals.

▷*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks.

Timing Chain: Morse. 60 links, ⅜" pitch. Width—1¼".
Chain Tension Shoe—Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC). NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 53/64"	.3412-.3422"	5.730"
Exhaust	1 9/16"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—No valve inserts used. Stem clearance worn limit .005" max.

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides as follows:
Intake Guide—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-.3442" (.3437" preferred).
Exhaust Guides—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442" (.3437" preferred). Counterbored 9/16" deep to 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	77 lbs.	2 3/16".

NOTE—Reject springs if pressure less than 60 lbs. Free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out. Service by installing oversize lifter.
NOTE—Inner sides of guide clamps should be in full contact at all points with matching flat surfaces of front face of each pair of guides within .0015".
Clearance—.00075-.0015".
Replacement Lifters—.002", .004", .010" Oversize.

VALVE TIMING

Tappet Clearance: Intake—.008" (Hot), .010" (Cold). **Exhaust**—.010" (Hot), .012" (Cold).
Self-locking tappet screws are used. Remove right front fender apron for access to valve compartment.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exhaust Valves—Open 53°18' BLDC. Close 7°42' ATDC. These figures correct with .010" tappet clearance Hot or .012" Cold.

Valve Timing Check—Remove front tappet cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately ⅝" above index of timing hole in rear engine support plate. Reset tappet clearance to .008" Hot, or .010" Cold.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, valve lifters and timing chain.

▷**Oil Pump & Camshaft Gear Change**—Camshaft driving gear & mating oil pump gear have "Granoseal" finish to reduce wear (may be identified by black velvety appearance).
Crankcase Capacity—7 qts. (refill), 7½ qts. (dry).
Normal Oil Pressure—40 lbs. at 30 MPH. No gauge used. See Oil Pressure Indicator below.
Oil Pressure Relief Valve—Non-adjustable release valve and spring under plug on left side of engine ahead of starter.

Oil Pan Removal: *See Hudson Special Data.*

Oil Pump: Rotor type consisting of inner and outer rotor, shaft, body, and cover. Angle mounted on right side of crankcase and driven from camshaft.

▷*CAUTION*—New granoseal type oil pump gear must be installed when installing new camshaft.
Pump Removal & Overhaul—*See "Oil Pump" in Hudson Special Data.*

Oil Pressure Indicator: Hudson "Teleflash" with Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—Carter No. A815S or King-Seeley No. 47100. Hudson No. 300828. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch sealed. No adjustment. *See Electrical Equipment Section for data.*

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.
Servicing—Wash filter element in gasoline and re-oil when changing oil.

COOLING

▷*1951 CYLINDER HEAD AND GASKET CAUTION*—Impaired cooling will result if incorrect head or gasket used. 1951 cylinder head and gasket not interchangeable with earlier 6 cyl. engines.

Cooling System: Positive circulation with pump on front of engine, by-pass type thermostat, and brass water distribution tube in cylinder block.
Pressure Cap (1950)—AC No. 85005 or Stant No. AAX-0417.
Capacity—(1950) 19 qts. without heater, 20 qts. with heater. (1951) 18½ qts. without heater, 19½ qts. with heater.

Radiator Removal: *See "Radiator" in Hudson Special Data.*

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°.

Temperature Gauge (1950): King-Seeley electric type.
Dash Unit—K-S No. 42918. Engine Unit No. 41085.

Temperature Gauge (1951)—King-Seeley "CV" (Constant Voltage).
Dash Unit—K-S No. 45675, Engine Unit No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member) operating in Hudsonite oil. 10" type used on all models.
See Clutch Section for complete data.
Facings—Cork insert type. Inside diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Clutch Oil Servicing: *See Hudson Special Data.*

▷*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Clutch Flushing data.*

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over ⅓ revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. Optl.
See Clutch Section for complete data.

TRANSMISSION

STANDARD

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.
See Transmission Section for complete data.

▷*SLIPPING OUT OF HIGH & SECOND GEAR CORRECTION—See Transmission Section for complete data.*

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake

pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross-member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedometer cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening.

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic shifting between 2d & High gears. Used with Vacumotive Drive.
See Transmission Section for complete data.

Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.

►**Drive-Master Fuse**—15 ampere, Part No. 71406. Located in wiring circuit 6" from control switch.

Power Cylinder Lubrication—Lubricate every 10,000 miles. *See "Hudson Drive-Master" in Trans. Section.*

SUPER-MATIC TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.
See Transmission Section for complete data.

OVERDRIVE

Warner Type AS2-R10D (Early '50), AS3-R10D (Late '50), AS4-R10D (Late '50 & '51). (Models AS3, 4 have centered ring gear). Optl. Part of Super-Matic Drive. Governor controlled with solenoid operation and throttle operated kick-down switch.
See Transmission Section for complete data.

Overdrive Relay—Hudson No. BT303107.

Throttle Switch—Hudson No. BT303254.

Overdrive Fuse—30 amps. On overdrive relay.

Removal: Same as standard transmission removal, except that overdrive control cable and wiring must be disconnected.

HYDRA-MATIC TRANSMISSION

Four speed planetary type automatic transmission and fluid coupling. *1951 MODELS*—Modulated pressure and hydraulically operated reverse mechanism.
See Transmission Section for complete data.

Lubrication—Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type "A".

Capacity—11 qts. 12 qts. (after overhaul).

Checking Fluid Level—Operate engine at normal operating temperature. Manual control lever in "N" position. Hand brake on. Dipstick located under inspection cover placed on right side under floor mat. Oil level must be just to the full mark on the dip stick. *DO NOT OVERFILL.*

CAUTION—Do not check oil level when transmission temperature is excessively high and do not fill above "F" on dip stick (will cause foaming when hot).

Hydra-Matic Linkage Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See Trans. Section.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint). 2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

Center Bearing Removal & Installation—*See "Propeller Shaft" in Hudson Special Data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Axle Ratios:	Std.	Optional
Std. Trans.	4.1-1	①4.55-1
With Overdrive	4.55-1	4.1-1
With Super-Matic Drive	4.55-1	4.1-1
With Hydra-Matic Drive	3.58-1	———

①—3.58-1 also on 7A Hornet model.

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets, on cross-member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear spring at axle housing, and at rear shackle, lower rear end of springs, slide axle out toward rear.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736—CAUTION—Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly.

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft).

Endplay—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting, hydraulic types.

Make	Front	Rear
Light Scale		
Monroe	303060	300351
Delco	303062	301241
Heavy Scale		
Monroe	303061	301768
Delco	303063	301770
Extra Heavy Scale		
Monroe	302431	302431
Delco	301637	301638

APPLICATION NOTE—Light Scale front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.
See Front Suspension Section for complete data.

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe In—1/32" ± 1/32" measured at wheel rim. Center steering arm on frame must be at center of car. To adjust loosen clamps at ends of each tie rod and adjust tubes equally.

Steering Geometry—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Wheel Cylinders—Diameters: Front wheel 1⅛", Rear wheel 15/16".

Drums—11" centrifuse type.

Lining Molded. Width 2¼" (front whl.), 1¾" (rear). Length per shoe 11" (exc. 11 1/16" rear secondary).

Clearance—.010" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake)
See Brake Section for complete data.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric. *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

1950 Super Eight 503
1950 Commodore Eight 504
1951 Commodore Eight 8A
1952 Commodore Eight 8B

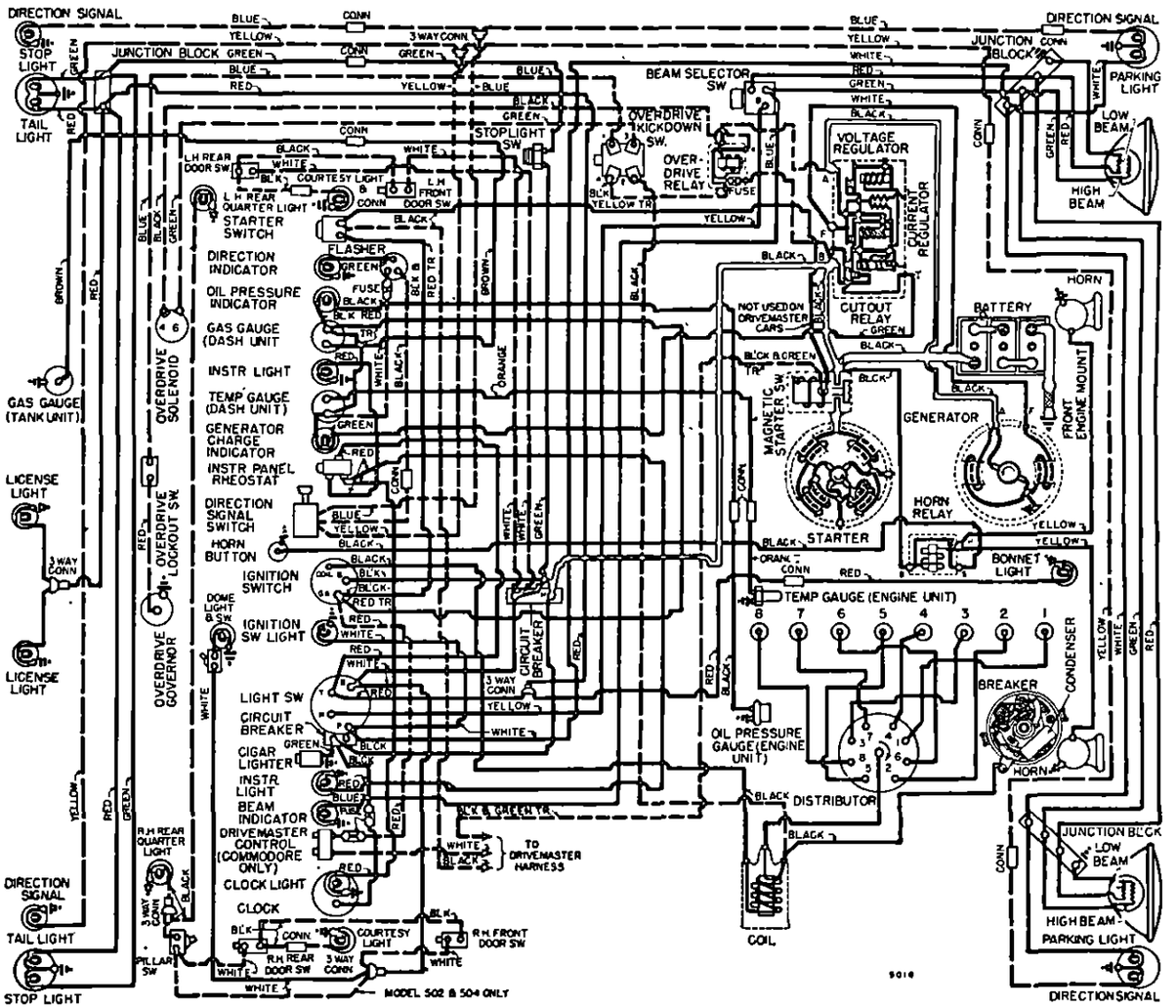
SERIAL & ENGINE NUMBERS: Serial Number stamped on plate on right front door hinge pillar post. (1950 & 1952) Engine Number stamped on top of cylinder block between No. 1 and No. 2 exhaust manifold flanges, and (1951) vertically on upper right front of block.
1950 Numbers—Super 8, 503101 Up. Commodore 8, 504101 Up. First three figures of number indicate model.
1951 Numbers—1001 Up.
1952 Numbers—132916 Up (same for all models—cars numbered consecutively regardless of model).

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. minimum with not more than 10 lbs. variation between cylinders at cranking speed of 125 RPM.
VACUUM READING: Steady 17-18" at idling speed.
FIRING ORDER: 1-6-2-5-8-3-7-4.
SPARK PLUG GAPS: .032".
Plugs—(Early 1950) Champion J7 (Cast Iron Head), H-10(Aluminum Head), (1950-52) Champion H-8. 14 mm.
DISTRIBUTOR: Auto-Lite IGT-4204B-1. Full automatic advance with vacuum spark control and Fuel Compensator adjustment.
Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° plus or minus 3°. ***Do not set breaker gap outside limits to secure this cam angle.***
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
COIL: Auto-Lite CE-6006A (Early), CR-6012A (Late). On right side of engine above distributor.
Ignition Current—2.5 amperes idling, 4.5 stopped.
CONDENSER: Auto-Lite No. IG-2671G.
Capacity—.20-.25 microfarad.
IGNITION TIMING: At TDC.
CAUTION—When setting timing with timing light, disconnect vacuum control line at distributor and plug line to prevent disturbing engine performance.
Timing Mark—Long line at "UDC-1" mark on flywheel aligned with pointer in inspection hole in rear engine support plate on left side of engine.
Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.
Timing Procedure—*See Ignition Timing.*
CARBURETION: (Early 1950) Carter WDO No. 648S, (Late 1950, 1951-52) Carter WGD No. 773S. Dual downdraft types with automatic choke control.
Idle Setting—(648S) 1-1½ turns open. (773S) ½-1 turn open. Turn screw out for richer mixture.
Idle Speed—(Std. Trans.) 550 RPM (With Overdrive) 575 RPM. (Hydra-Matic Drive Cars) 500 RPM. (Vacumotive or Drive-Master) 590 RPM.
Float Level—(648S) 13/64", (773S) 3/16" measured from top of float to gasket seat (machined surface) on bowl cover with needle valve seated (invert to check). 773S Note—measured from center highest point of float.
Accelerating Pump—(648S) Outer hole Normal, Inner hole if less charge required. (773S) No seasonal adjustment.
Fast Idle Setting (648S): .054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Fast Idle Setting (773S): .026" throttle opening with choke valve closed. Check with thermostatic coil housing, gasket, and baffle removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" at this point, adjust by bending connector rod at lower angle.
Choke Setting: Centered (at index).
Fuel Pump Pressure: 3-4 lbs. (AC), 3½-4½ lbs. (Carter).
MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment. See that valve operates freely.
VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust HOT. NOTE—Remove right front wheel and fender side shield for accessibility.

IGNITION

IGNITION SWITCH (1950-51) Ignition switch only, (1952) Combination ignition starting switch (starter operates when key held fully to right—key returns to ignition on position when released).
COIL: Auto-Lite CE-6006A (Early), CR-6012A (Late). On right side of engine above distributor.
Idling Current—2½ amperes idling, 4½ stopped.
CONDENSER: Auto-Lite No. IG-2671G.
Capacity—.21-.25 microfarad.
DISTRIBUTOR: Auto-Lite No. IGT-4204B-1. Full automatic advance with vacuum spark control, and Fuel Compensator.
See Electrical Equipment Section for complete data.



1950 MODELS

Breaker Plate Identification—Number stamped on plate (opposite vacuum control unit), indicates maximum advance.
Breaker Gap—.017". Limits .015-.019".
Cam Angle—27° ± 3°. *Do not set breaker gap outside limits to secure this cam angle.*
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Engine Degrees	R.P.M.
Start	300	0	600
3	400	6	800
8	850	16	1700
13	1300	26	2600
17.5	1700	35	3400

Fuel Compensator: 10° adjustment at distributor. See Ignition Timing for adjustment and setting.

Vacuum Spark Control: Auto-Lite, Integral type.

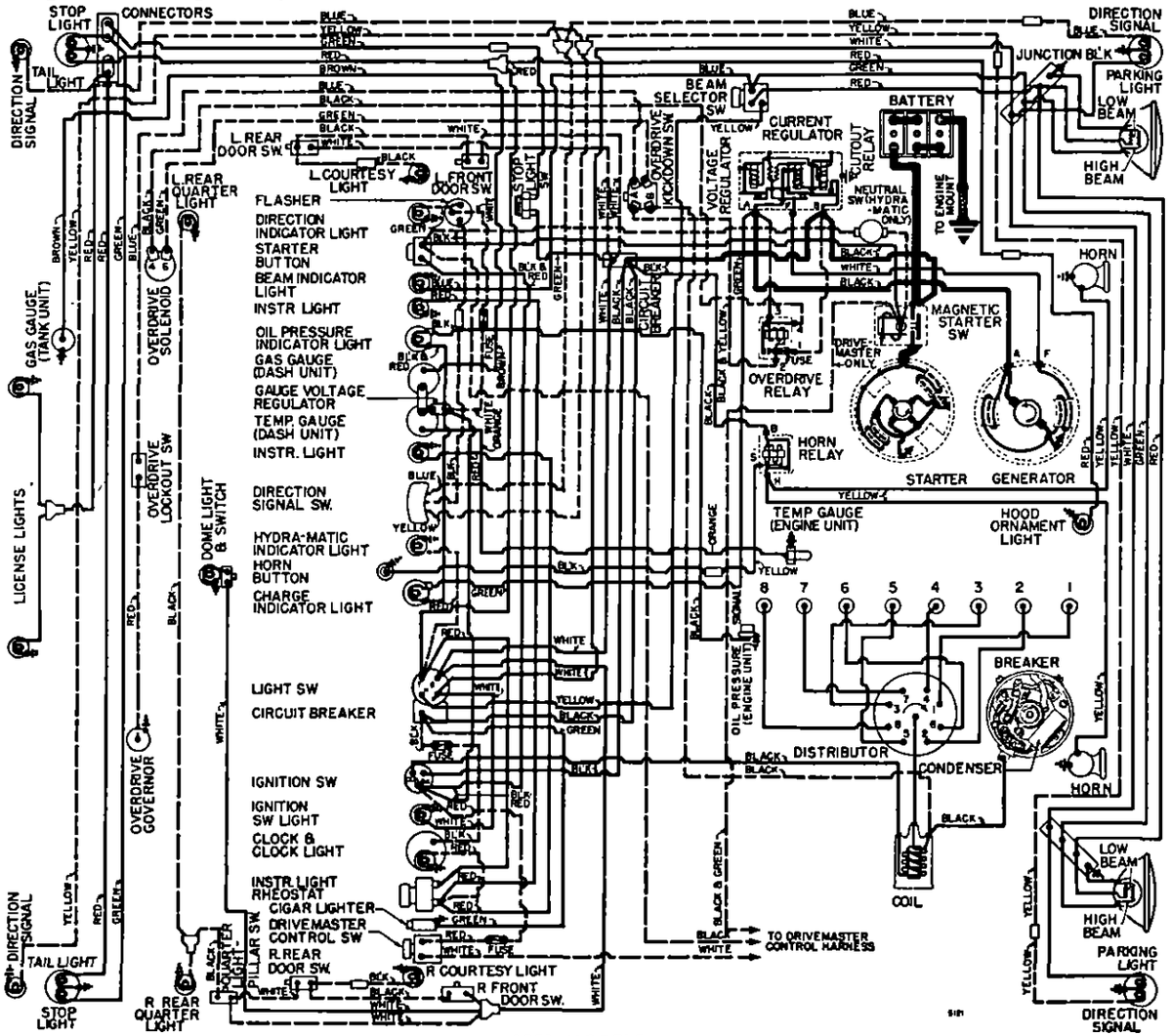
Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	13⅜"
1°	2°	14"
2°	4°	14¾"
3°	6°	15⅜"
3.75°	7.5°	16"

IGNITION TIMING

Standard Setting ..... **TDC**

NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

Flywheel Mark—"UDC-1/" (#1 and #8 piston top dead center position) with four short marks (¼" apart) ahead of this mark (opening behind starter).



1951 MODELS

Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to #1 spark plug. Idle engine below 600 RPM., adjust distributor as directed above, until timing mark lines up with pointer.

CARBURETOR

(Early 1950) Carter WDO 648S, (1950-51-52) Carter WGD 773S, 1¼" dual barrel downdraft types with Carter Climatic Control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level and Accelerating Pump): *See Tune-Up Data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Dual (WDO) or (WGD) Carburetor type.
Setting (WDO Carb.)—.054" throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of cam.
Setting (WGD Carb.)—.026" throttle opening with choke valve closed. Check with thermostatic coil housing, gasket, and baffle plate removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" adjust by bending connector rod at lower angle.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (dual).
Setting—Coil housing centered at index.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Oil Wetted type (Standard). Oil Bath type (Optional).

Fuel Pump: AC or Carter No. M729-SL-SZ-SA Diaphragm type fuel pump, or AC Combination fuel-and-vacuum pump.
Replacement Pump (AC)—No. 5484 (Fuel), No. 584 (Fuel & Vacuum).
Pressure—3½-4½ lbs., (Carter). 3 to 4 lbs. (AC).
See Carburetion Equipment Section for complete data.

Gasoline Gauge (1950): King-Seeley Electric type.
Dash Unit—K-S No. 42916.
Tank Unit—K-S No. 42696.

Gasoline Gauge (1951-52): King-Seeley "CV" (Constant Voltage) Electric type.
Dash Unit—K-S No. 45675.
Tank Unit—K-S No. 44513.
See Carburetion Equipment Section for complete data.

BATTERY

National OE-2L-100, 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to engine and frame with a single strap.
Location—On left side under hood.

STARTER

Model	Auto-Lite No.
1950 Synchro-mesh Trans.	MCL-6006
1951-52 Synchro-mesh Trans.	MCH-6109
1951-Early 1952 Hydra-Matic	MCH-6107
1952 Late Hydra-Matic	MCH-6204

Armature—Auto-Lite No. MCH-2023 (for MCL-6006); **MCH-2084** (for MCH-6109); **MCH-2028** (for MCH-6107); **MCH-2088** (for MCH-6204).

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Drive—(Std. Trans. Cars) Bendix No. 1806. Inboard barrel type.
Drive—(Hydra-Matic Cars) Bendix No. 1792. Outboard barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (with new brushes).
Cranking Engine—Approx. 160 amperes at 120 RPM., (warm engine).

Performance Data—MCL-6006

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

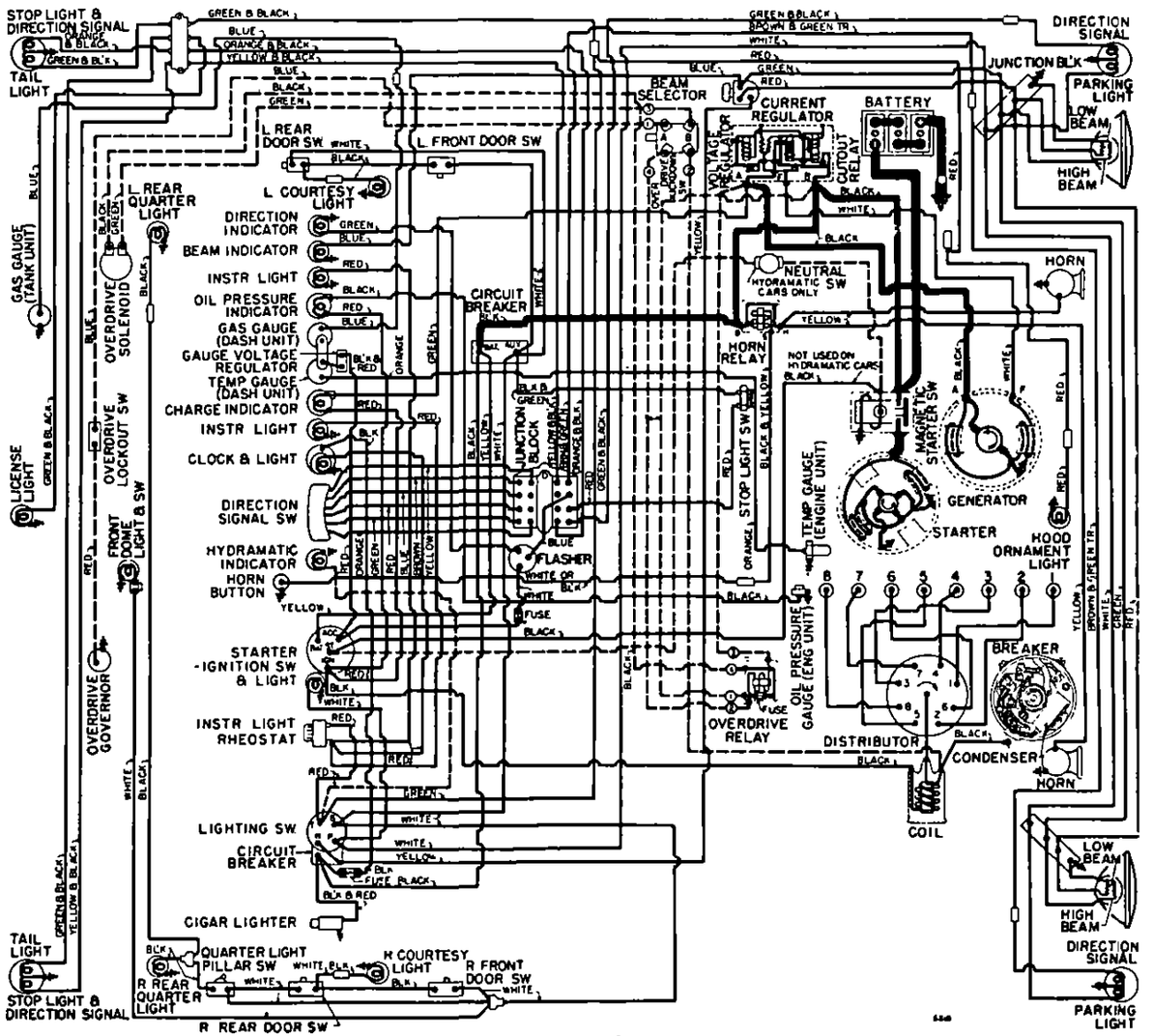
Performance Data—MCH-6107, 6109, 6204

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Starting Switch: Auto-Lite Magnetic type SS-4001 (1950), SS-4030 (1951-52), controlled by combination ignition-starter switch.

GENERATOR

Auto-Lite No. GDZ-6001B. Two brush type with voltage and current regulation.
Armature—Auto-Lite No. GGY-2006F.
Maximum Charging Rate—35 amperes at 8 volts.
Charging Rate Adjustment—None (see Regulator).



1952 MODELS

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
35①	8.0	1800-2000 — 2150-2350

①—Maximum output 40 amperes with 1952 type VRP-6101B regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amps. at 6.0 volts.
Belt Adjustment: ¾" belt deflection midway between generator and water pump pulleys.

REGULATOR

Auto-Lite No. (1950) VRP-6002A, (1951) VRP-6101A, (1952) VRP-6101B. Voltage & Current type.
►*NOTE*—VRP-6002A Cutout Relay has extra set of contacts for Generator "Teleflash" Indicator control. Indicator light is operated from "A" terminal on regulator.
NOTE—Regulator cover sealed. Serviced on replacement basis if seals not broken (to remove cover).
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" at hinge end of core with contacts open.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F.
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting (VRP-6002A, 6101A)—34-36 amps (marked "35" on cover).
Setting (VRP-6101B)—39-41 amperes (marked "40" on cover).
Contacts Gap—.012" min., (armature against stop).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when upper beam "on."
Direction Signal: Optl. *See Electrical Equipment Section.*
Direction Indicator— At left end of instrument panel. Flashes when signal in use.
Direction Signal Flasher—Hudson No. 300877.

Switches

Lighting—Hudson No. 300641 (with circuit breaker), No. 300642 (switch only).
Beam Selector—Hudson No. (1950-51) 300799, (1952) 303035.
Instrument—Hudson No. (1950-51) 160092, (1952) 304706.
Direction Signal—Hudson No. (1950-51) 305081, (1952) 307052.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting—Hudson 300643. 30 amp. On light switch.
Misc. Lighting—Hudson No. 301853. 20 ampere. On steering support bracket behind instrument panel.
Convertible Top & Hydraulic Window Regulators—Hudson No. 300626. 30 ampere. On steering support bracket behind instrument panel.
FUSES: Electric Clock—3 ampere. Behind clock.
Direction Signal—10 ampere. On Direction Signal Harness behind instrument panel.

Weather Control—14 ampere. On heater.
Overdrive—30 ampere. In insulated fuse holder in overdrive relay feed wire on left front side of dash.
Drive-Master—15 ampere. In Drive-Master control switch on instrument panel.

GAUGE VOLTAGE REGULATOR: King-Seeley—Consists of a thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ignition switch, and the gauge circuits. See Wiring Diagram.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). Should light when ignition turned on and should go out when generator begins to charge.
See Electrical Equipment Section for complete data.

OIL PRESSURE SIGNAL: Red indicator in instrument panel (to left of gas gauge). If pressure drops below approximately 13 lbs. red dash signal lights.
See Electrical Equipment Section for complete data.

HORNS: Sparton or Auto-Lite Model HW-4021 (Low), HW-4022 (High). Dual horns operated by relay.
Air Gap—.027-.029" for high pitch (short horn). .032-.034" low pitch (long horn).

Horn Relay: Hudson No. 164401. On engine dash.
Contacts Close—3 volts min., 4 volts max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: Own make. 8 cylinder. "L" head type.
Bore—3". **Stroke**—4½".
Displacement—254 cubic inches. **Rated HP**—28.8.
Developed Horsepower—128 at 4200 RPM.
Compression Ratio: (Std.)—Cast-iron head 6.7-1.
Compression Ratio: (Optl.)—Aluminum head 7.2-1.
Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Hudson Special Data.*

►***HEAD GASKET IDENTIFICATION & INSTALLATION:*** *See Hudson Special Data.*

OIL PAN REMOVAL: *See Hudson Special Data.*

ENGINE FRONT SUPPORT & REAR MOUNTING ADJUSTMENT: *See Hudson Special Data.*

►***LOCATING HOLE PLUG CAUTION:*** Plug in locating hole in pan flange at left rear of block (behind starter) must be tight to prevent oil leakage through hole or contamination of oil by dirt or water.

PISTONS: Aluminum alloy, Cam ground, T-slot type.
Weight—10¾ ozs. (stripped). **Length**—3 3/16".
Removal—Pistons and rods removed from above or below.
Clearance—.0015-.002" (skirt).
Original Bore & Piston Sizes & Markings—*See Hudson Special Data.*

Replacement Pistons: *See Hudson Special Data.*

Fitting New Pistons: Use .002" feeler ½" wide inserted between piston and cylinder wall on side opposite slot at right angles to pin. Pull to withdraw feeler must be within 3-4 lbs. Use Tool J-888 Piston Feeler Scale to measure pull.

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one above pin, one below pin) per piston. Rings are square end type. Rings pinned to prevent rotation.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.004-.009"	.001"
Oil (upper)	3/16"	.004-.009"	.001"
Oil (lower)	5/32"	.004-.009"	.001"

Installing Rings—Three top rings have offset pin notch (in relation to gap). Install rings so that alternate gaps offset.

Replacement Rings: *See Hudson Special Data.*

PISTON PIN: Dia.—.7497-.750". **Lgth.**—2.4375". Floating type with diamond-drilled pin holes in piston and bronze bushing (with oil grooves at sides) in connecting rod. Lock ring used at each end of pin.
Pin Fit in Piston—.0000-.0003" at 70°F., or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.
Piston Pin Servicing—*See Hudson Special Data.*

Replacement Pins: Std.. .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length—8 3/16".
Weight—31.36 ozs. (with bearings).
Crankpin Journal Diameter—1.935-1.936".

Original Journal & Bearing Sizes: *See "Crankshaft Size Code" in Hudson Special Data.*
Lower Bearing—Babbitt-lined, spun type.
Clearance—.0003-.0006". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Install replacement rods furnished on exchange basis. Do not file rods or caps. Palnuts used on bolt nuts.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.
Palnuts—Tighten finger tight, plus 1/3 turn.

Replacement Rods: Std. size and .010" undersize.

Installing Rods: Offset. Install rods with widest half of bearing toward rear (#1, 3, 5, 7), toward front (#2, 4, 6, 8). Oil scoop on all rods toward camshaft.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.
Journal Diameter—#1, 2.279-2.280"; #2, 2.311-2.312"; #3, 2.341-2.342"; #4, 2.373-2.374"; #5, 2.404-2.405".
Bearing Diameter—#1, 2.2805-2.2815"; #2, 2.3125-2.3135"; #3, 2.3425-2.3435"; #4, 2.3745-2.3755"; #5, 2.4055-2.4065".

Original Journal & Bearing Sizes: *See "Crankshaft Size Code" in Hudson Special Data.*
Bearings—Bronze backed, babbitt lined type. Bearings secured in cap and crankcase by brass screws.
Clearance—.001".

Crankshaft & Main Bearing Removal: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Crankcase Front & Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

►***BEARING INSTALLLATION CAUTION***—Tighten bearing retaining screws just snug to allow bearing to center itself on the screw. SCREW HEADS MUST BE BELOW SURFACE OF BABBITT. Bearing edges should be flush in case but should project .002" above edge of bearing cap.

►***CAUTION—Replacement of main bearings requires removal of crankshaft. Bearing shells retained by brass screws.***

Replacement Bearings: Reamed bearings furnished standard size and .010" Undersize. Unfinished bearings also supplied.

End Thrust: Taken by center (#3) bearing. Replace bearing if endplay excessive.
Endplay—.006-.012".

CAMSHAFT: Five bearing type. Helical gear drive.
Bearing Diameter—#1, 2.028-2.030"; #2, 1.997-1.999"; #3, 1.965-1.967"; #4, 1.9345-1.9365"; #5, 1.497-1.499".
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.0015-.002".
Camshaft Removal—*See Hudson Special Data.*

Replacement Bearings: Furnished as follows:
Finished Reamed—Will be proper dimension when pressed in place (.0026-.0055" press fit) and no reaming required.
Unfinished—Press in place (.0026-.0055" press fit) and line ream to .001" larger than individual camshaft journals.

►***CAUTION***—Install all bearings with notch at top.

End Thrust: Bakelite thrust washer between gear and crankcase. Spring loaded button in front end of camshaft bears against hardened plate on gear cover.

Timing Gears: Crankshaft gear Cast-Iron, camshaft gear Aluminum. Teeth have 20° pressure angle and are slightly crowned for quiet operation.
Identification of Gears—Figure "20" on front face of gears (crankshaft gear also marked "FRONT").
Replacement Gear Caution—Camshaft gear not furnished singly (set only). Crankshaft gear furnished singly or in matched set.
Backlash—.002-.004".
Timing Gear Removal & Installation—*See Hudson Special Data.*

Camshaft Setting: Mesh marked crankshaft gear tooth between two marked teeth on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 1/2"	.3407-.3417"	5.094"
Exhaust	1.380"	.3392-.3402"	5.094"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	.346"	.003-.005"

NOTE—Stem clearance worn limit .005" max.

Valve Guides: Removable type pressed in block.
Guide Removal & Installation—Use Tool J-1188 to drive guides out. Install guides with Tool J-883-A with top of guide 15/16" below top of cylinder block. With guides installed, ream guides with Tool J-129-3 to .3437" (11/32") which will provide proper valve stem-to-guide clearance. NOTE—Car manufacturer recommends that guides be cleaned with Tool KMO-122 to remove carbon and scale out of guides (pay particular attention to carbon in counterbore at top of exhaust guide).

Valve Springs: Cadmium plated springs are used. Install springs with closed coil end up.

	Spring Pressure	Length
Valve Closed	40 lbs.	2"
Valve Open	80 lbs.	1.656"

NOTE—Reject springs if pressure less than 34 pounds. Free length 2.343".

Valve Lifters: Roller shoe type, fitted in removable guides in cylinder block.
Lifter Removal & Installation—*See "Valve System" in Hudson Special Data.*
NOTE—Inner sides of guide clamps should be in full contact at all points with matching flat surfaces of front face of each pair of tappet guides within .0015".

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VALVE TIMING

Tappet Clearance: .008" Int., .010" Exh. at normal operating temperature.
NOTE—Removable apron in right front fender.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10°40' BTDC. Close 60° ALDC.
Exhaust Valves—Open 50° BLDC. Close 18°44' ATDC.
Above figures correct with .010" tappet clearance, Hot or .012" Cold.
Valve Timing Check—Remove front tappet cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately 9/16" above pointer in timing hole in rear engine support plate. Reset tappet clearance at .008" HOT or .010" COLD.

LUBRICATION

Engine Oiling System: Duo-flow (pressure and positive splash) system. Pump delivers oil to front and rear ends of upper tray in oil reservoir. Connecting rod bearings are lubricated by dippers on caps which dip into troughs in this upper tray and also splash oil inside crankcase. Part of this oil is caught in channels inside crankcase and fed into reservoirs directly over each camshaft and crankshaft bearing from which it flows into the bearings.
Crankcase Capacity—(Dry) 8 qts. (Refill) 7 qts.

►*NOTE*—Whenever pan removed, install 1 qt. in upper tray before pan installed, then 7 qts. through oil filler after pan in place on engine.
Normal Oil Pressure—Approximately 13 lbs. at normal operating temperature. No gauge used (see Oil Pressure Indicator below).

Oil Check Valve: Located on right side of crankcase at rear. Opens at 11-15 lbs. Operates dash signal to indicate oil flow.

Oil Pump: Oscillating plunger type, gear driven by camshaft. Mounted on right side of crankcase.

Oil Pressure Indicator: Hudson Teleflash Oil Pressure Indicator. *See Electrical Equipment Section for complete data.*

Crankcase Ventilation: Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Cooling System: Positive circulation with pump on *front of engine and by-pass type thermostat.*
Capacity—18½ quarts. 19½ quarts with heater.

Radiator Removal: *See Hudson Special Data.*

Water Pump: Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.
See Water Pump Section for complete data.
Belt Adjustment—*See Genertor Belt Adjustment.*

Thermostat: Hudson No. 166272. By-pass type in water outlet on cylinder head.
Setting—Starts to open 150-155°F. Fully open 185°

Temperature Gauge (1950): King-Seeley electric type.
Dash Unit—King-Seeley No. 42918.
Engine Unit—King-Seeley No. 41085.

Temperature Gauge (1951-52): King-Seeley Electric "CV" (constant voltage) with gauge voltage regulator.
Dash Unit—King-Seeley No. 45675.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert type driven member operating in Hudsonite oil). 10" type used on all models.

►*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Flushing instructions.*
See Clutch Section for complete data.
Facings—Cork insert type. Inside Diameter 6⅜". Outside Diam. 10". 108 corks, .203" thick.

Clutch Lubrication: *See "Clutch Notes" in Hudson Special Data.*

Pedal Adjustment: Clearance between underside of toeboard and top face of pedal shank must be 1½". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over 1/3 revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to be drained. Loosen mounting bolts in clutch cover rim to release spring tension, remove bolts and lift clutch assembly off car.

VACUMOTIVE DRIVE

Vacumotive Drive: Automatic clutch control. 1950-51 Optional.
See Clutch Section for complete data.

SYNCHRO-MESH TRANSMISSION

1950-52 (OWN MAKE)

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

►*SLIPPING OUT OF HIGH & SECOND GEAR: See Transmission Section for recommended correction.*

Transmission Control: Handy-shift remote control type with shift lever mounted on steering column.
See Transmission Section for complete data.

Transmission Removal: Remove front seat cushion, disconnect front seat from track, disconnect seat adjusting lever and remove seat back from car. Disconnect accelerator pedal at accelerator rod, brake pedal rod at lever. Remove floor mat, remove Weather Control blower unit (2 screws each side), disconnect bowden wire at control valve at cylinder head. Remove floor opening cover over transmission. Disconnect front universal joint at transmission (wire bearings on universal joint spider). Remove bolts attaching center bearing support bracket, move propeller shaft to rear to clear companion flange at transmission. Disconnect clutch pedal lever return spring, remove clutch cross-shaft and bracket, disconnect clutch control link clevis. Disconnect Handy Shift by removing shifter shaft outer lever, nut, and washer. Remove flywheel guard from bottom of clutch housing. Remove two engine rear mounting bolts and nuts, jack up rear end of engine about ½" off frame cross member (CAUTION—use block of wood on jack to prevent damage to oil pan). Disconnect speedomter cable at transmission case, plug hole with wood plug. Remove two top screws attaching clutch housing to engine, install guide studs (headless screws) in these holes to support transmission, remove remaining screws. Remove breather pipe bracket from clutch housing and bolt attaching breather pipe and rear valve cover. Pull transmission straight back on guide studs, lift transmission out through floor opening.

1952 (WARNER)

Warner Model AS63-T86E (Without Overdrive). AS64-T86E (With Overdrive). All helical gear type. Constant mesh (second & high), sliding gear (low & reverse), with remote (steering column) shift.
See Transmission Section for complete data.

Transmission Control: Steering column shift.
See Transmission Section for complete data.

Transmission Removal: *(NOTE—This transmission removed from underneath car. Not necessary to remove floor mat and cover).* Drain lubricant and disconnect front universal joint (retain universal joint bearing cups with tape to hold bearings in place). Disconnect transmission shift rods, speedometer cable (if car equipped with overdrive, disconnect control cable and wiring from overdrive) at transmission, and remove speedometer pinion. Remove nuts from front end of brake pivot brace at No. 3 cross member and remove clevis pin at rear end of brace and move linkage to left side of car. With universal socket on a 10" extension, remove two top bolts attaching transmission-to-clutch housing. Insert in their place, guide studs J-2969 to guide transmission during removal. Remove the two lower transmission-to-clutch housing bolts and lower transmission out of car.

DRIVE-MASTER TRANSMISSION

Drive-Master Transmission: Optl. Conventional 3-speed transmission with automatic gear shifting between Second & High Gears. Used in conjunction with Vacumotive Drive (automatic clutch control).
Identification—Metal tag attached by a cover bolt screw carries second speed ratio 1.82:1.
See Transmission Section for complete data.

►**Drive-Master Fuse**—15 ampere, Part No. 71406. Located in wiring circuit 6" from control switch.
Power Cylinder Lubrication—Must be lubrfcated at 10,000 mile intervals. *See "Hudson Drive-Master" in Transmission Section.*

SUPER-MATIC DRIVE TRANSMISSION

Own Make—Four-speed automatic transmission (3-speed automatic shift plus ultra-low). Optl.
See Transmission Section for complete data.

OVERDRIVE

Year	Warner No.
1950, Early	AS2-R10D
1950, Late	①AS3-R10D
1951-52, 1950 Late	①AS4-R10D

①—Have "centered ring gear."

Warner Type. Optional. Used with Hudson (First Type) Transmission. Governor controlled type with solenoid operation and kick-down switch.
See Transmission Section for complete data.
Overdrive Relay—Hudson No. BT303107.
Overdrive Governor—Auto-Lite No. TGA-4005.
Overdrive Solenoid—Delco-Remy No. 1118164.
Kickdown Switch—Hudson No. BT303254.
Overdrive Fuse—30 amperes. On fuse block on side of overdrive relay.

Removal: Same as for standard transmission, except that overdrive control cable and wiring must be disconnected.

HYDRA-MATIC TRANSMISSION

Four speed planetary type automatic transmission and fluid coupling. *1951-52 MODELS*—Modulated pressure and hydraulically operated reverse mechanism.

See Transmission Section for complete data.

►***PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Hydra-Matic Drive" in Transmission Section.***

►***TESTING & TROUBLE SHOOTING—See "Hydra-Matic Drive" in Transmission Section.***

Lubrication: Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type "A."

Capacity—11 quarts (approx.). 12 quarts (after reassembly).

Checking Fluid Level (1950-51)—Operate engine at normal operating temperature. Manual control lever in "N" position. Hand brake on. Dipstick located under inspection cover placed on right side under floor mat. Oil level must be just to the full mark on the dipstick. *DO NOT OVERFILL.*

Checking Fluid Level (1952)—Set hand brake. Allow engine to idle with Hydra-Matic Selector lever in "Dr4" position for 2 minutes. Place selector lever in "N' position. Roll back floor mat and remove oil level indicator (after cleaning all dirt and lint from around indicator). Wipe indicator dry and check fluid level. Fluid level must be to "F" mark. DO NOT OVERFILL.

►***CAUTION—Do not check oil level when transmission is excessively hot and do not fill above "F" mark on dipstick.***

►***OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.***

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint).

2) Rear shaft with slip joint at forward end.

Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

Center Bearing Removal & Installation—*See Hudson Special Data.*

REAR AXLE

1950-52 (OWN MAKE)

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

►***IDENTIFICATION NOTE—Housing rear cover is welded in place. Bolts not used.***

Model	Ratios Standard	Optional
Synchro-mesh Tr.	4.1-1 (41-11)	4.55-1 (41-9)
Overdrive Trans.	4.55-1 (41-9)	4.1-1 (41-10)
Super-Matic Tr.	4.1-1 (41-11)	4.55-1 (41-9)
Drive-Master Tr.	4.1-1 (41-11)	4.55-1 (41-9)
Hydra-Matic Tr.	3.58-1 (43-12)	

Backlash—.004-.006". Screw adjustment.

Removal: Support car on stands under body frame just forward of rear springs, remove fender shields and rear wheels. Disconnect brake line at tee on axle housing, remove tee. Disconnect brake cables at equalizer bar clevis and unscrew end fittings, loosen nuts on cable conduit brackets on cross member and free conduits from brackets, disconnect cable conduit clips on rear springs, pull cables and conduits out through guides and clamps. Disconnect rear universal joint and lower propeller shaft. Disconnect lower end of shock absorbers, disconnect and remove rear stabilizer. Disconnect each rear end of springs, slide axle assembly out toward rear of car.

Axle Shaft Removal: Hoist rear of car. Remove rear wheels. Remove axle shaft nut and washer. Remove hub and drum assembly using screw type wheel puller (Tool J-736). *CAUTION* Car manufacturer recommends that screw type puller be used, if knock-out type puller is used serious damage to differential parts may result). Remove 4 nuts on bearing cap bolts, remove bearing cap and shims (without disturbing brake backing plate). Pull rear wheel bearing and axle shaft, using puller Tool J-352. Do not drag axle shaft on oil seal assembly.

Wheel Bearing Adjustment: Controlled by shims (.003", .005", or .015" thick) under bearing cap. To adjust, remove bearing cap (see directions above under Axle Shaft Removal), add or remove shims equally at both wheels (necessary to keep thrust spacer centered on differential pinion shaft). **Endplay**—.001-.004".

1952 (SPICER)

Spicer Type. Semi-floating, hypoid gear type, with Hotchkiss Drive.

See Rear Axle Section for complete data.

►***IDENTIFICATION NOTE—Housing rear cover attached with capscrews.***

►***NOTE—This axle used on "Second Series" cars with "Dual Range" Hydra-Matic Transmission.***

Ratio—3.07-1 (43-14).

Removal: Same as "First Series" (See above).

Axle Shaft Removal: Raise and support rear end of car with jacks placed under frame. Remove wheel, hub (using Puller J-736A), and remove brake cable conduit caps from backing plate and disconnect cable at operating lever. Disconnect brake line at rear wheel cylinder. Remove backing plate, gasket, and grease seal retainer, and shim pack (right side only). Tie shim pack together to insure correct replacement. Withdraw axle shaft using Puller J-352, do not drag on inner seal.

Wheel Bearing Adjustment: Controlled by shims (.003", .005", .010" and .030") between backing plate and end of housing (right side only). To adjust, remove wheel and backing plate (above), add or remove shims for endplay. **Endplay**—.001-.004".

SHOCK ABSORBERS

Delco or Monroe. Direct acting hydraulic types. Furnished—Light, Heavy, and Extra Heavy scales, see application below.

►**APPLICATION NOTE—Light Scale** front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.

►***FRONT SPRING PRODUCTION CHANGE: See Front Suspension Section.***

Kingpin Inclination—3°36' crosswise.

Caster—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Camber—½-1½°. Eccentric adjustment. Both wheels alike within ½°.

Toe-In—0" to 1/16" measured at wheel rim. Center steering arm on frame must be at center of car. To adjust, loosen clamps at ends of each tie rod and adjust tube equally.

Toe-Out on Turns—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Front—1 1/8". **Rear**—15/16".

Drums—11" centrifuse type.

Lining—Molded type. Width—Front 2¼". Rear 1¾".

Thickness—.177".

Length Per Wheel—Front—*21.32*". **Rear**—*20.108*".

Clearance—(1950-51) .010", (1952) .015" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.

See Brake Section for complete data.

Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders). *See Miscellaneous Section for complete data.*

Windshield Wiper: Cable Operated—Vacuum type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

1952 Models	Model No.	Engine Displacement
Pacemaker	4B	232 cu. in.
Wasp	5B	262 cu. in.
Commodore Six	6B	262 cu. in.
Hornet	7B	308 cu. in.
1953 Models		
Wasp	4C	232 cu. in.
Super Wasp	5C	262 cu. in.
Hornet	7C	308 cu. in.

SERIAL & ENGINE NUMBERS: Both numbers same. Stamped on plate attached to right front door hinge pillar post and stamped vertically on upper right front corner of cylinder block.

1952 Starting Nos.—132916. Same for all models. Cars are numbered consecutively regardless of model.

1953 Starting Nos.—(Wasp) 4C-202928. (Super Wasp) 5C-202919, (Hornet) 7C-202917. *NOTE*—First two digits indicate model, remaining digits are serial number which is consecutive regardless of model designation.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. minimum (all models) with not more than 10 lbs. variation between cylinders at cranking speed of 125 RPM.

VACUUM READING: Steady 18-21" at idling speed.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .032"
Plugs—Champion (4C, 5C) H-10, (Others) H-11. 14 mm.
NOTE—Tighten plugs to 25-30 ft. lbs. torque.

DISTRIBUTOR: Auto-Lite (4B, 4C) IAT-4009, (Early 5B, 6B, 7B) IAT-4009A, (Late 5B, 6B, 7B & 5C, 7C) IAT-4009B. Full automatic advance with vacuum spark control and Fuel Compensator adjustment.
Breaker Gap—.020" Limits .018-.022".
Cam Angle—39° plus or minus 3°. *Do not set breaker gap outside limits to secure this cam angle.*
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

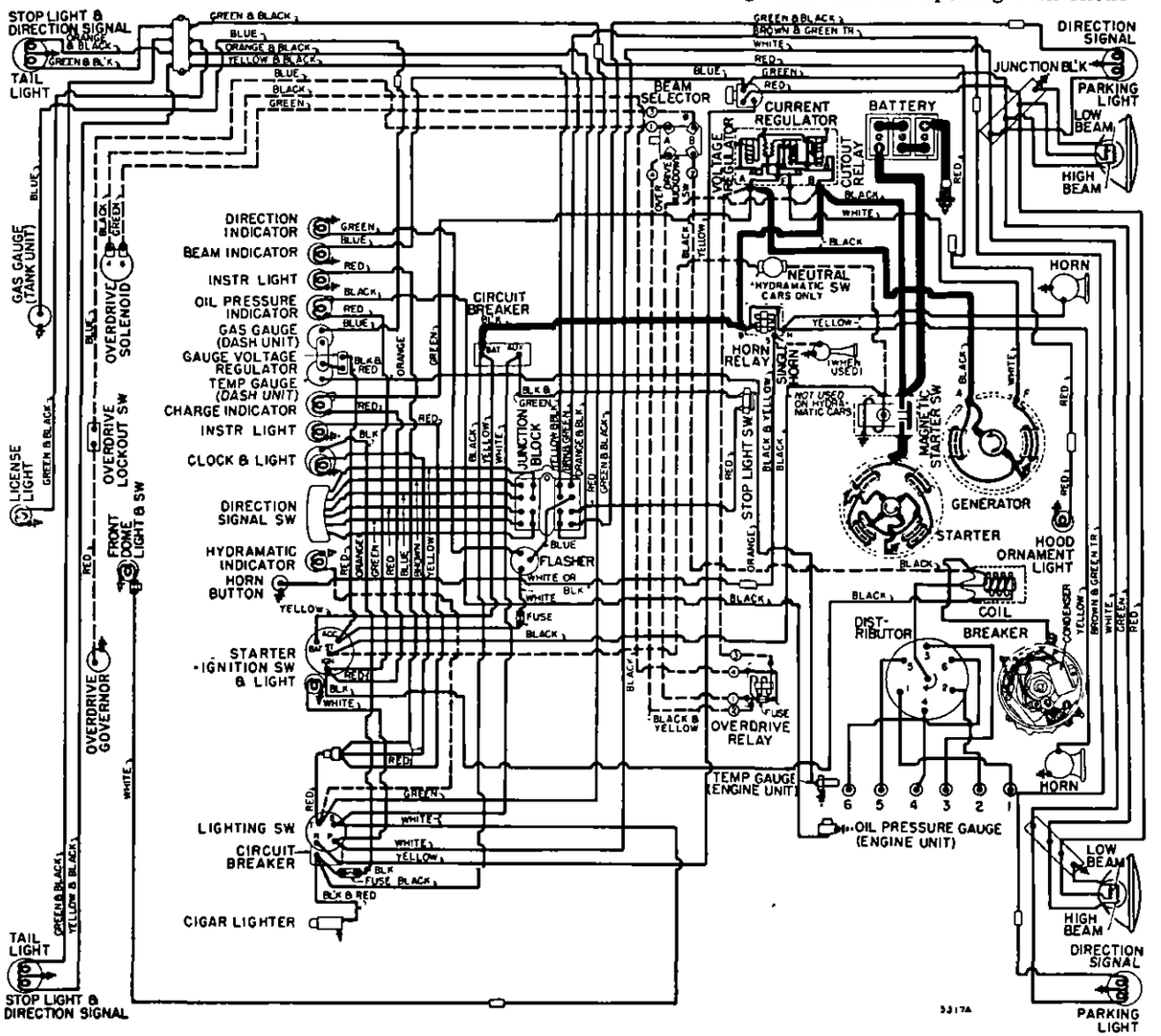
COIL: Auto-Lite CR-6012A. On right of engine.
Ignition Current—2.5 amperes idling, 4.5 amperes stopped, at 6.3 volts.

CONDENSER: Auto-Lite No. IAT-3076R.
Capacity—.21-.25 microfarad.

IGNITION TIMING: At TDC.
CAUTION—When setting timing with timing light, disconnect vacuum control line at distributor and plug line to prevent disturbing engine performance.
Timing Mark—Long line at "UDC-1" mark on flywheel aligned with pointer in inspection hole in rear engine support plate behind starter.
Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. in high gear.
Timing Procedure—*See Ignition Timing.*

CARBURETION (Standard 4B, 4C): Carter WA1, No. 749S. Singe barrel down-draft type with automatic choke.
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed—(Std. Trans.) 540-560 RPM; (Overdrive) 575 RPM; (Hydra-Matic) 490-510 RPM.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert cover and float assembly to check level).
Accelerating Pump—Center hole Normal, Inner hole if less charge required
Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section for complete data.*
Fast Idle Setting: ⅝" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset.
Choke Setting: Centered (at index).
Fuel Pump Pressure: 3-4 lbs. (AC), 3½-4½ lbs. (Carter).

CARBURETION (Standard 5B, 6B, 7B, 5C, 7C): Carter WGD-776S. Dual down-draft type with automatic choke.
Idle Setting—1-1½ turns open (two screws—set alike). Turn screws out for richer mixture.
Idle Speed—(Std. Trans.) 540-560 RPM; (Overdrive) 575 RPM; (Hydra-Matic) 490-510 RPM.
Float Level—3/16" measured from top of float at center to machined underside of bowl cover with needle valve seated (remove gasket and invert cover and float assembly to check level).
Accelerating Pump—No seasonal adjustment
Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section for complete data.*
Fast Idle Setting: .026" throttle opening with choke



PACEMAKER 4B & WASP 4C MODELS

valve closed. Check with thermostatic coil housing, gasket, and baffle removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" at this point, adjust by bending connector rod at lower angle.

Choke Setting: 2 Points Lean.

Fuel Pump Pressure: 3-4 lbs. (AC), 3½-4½ lbs. (Carter).

CARBURETION (Optional "Twin H-Power"): ***Two Carburetors of same type used per engine.*** **Carter WA1 No. 968S (7B, 7C), No. 990S (5B, 6B, 4C, 5C).** Single barrel downdraft type with automatic choke.

Idle Setting—(968S) 1¼ to 2¼ turns open. **(990S)** ¾ to 1¾ turns open. Turn screw out for richer mixture.

Idle Speed—(Std. Trans.) 540-560 RPM; (Overdrive) 575 RPM; (Hydra-Matic) 490-510 RPM.

►***TWIN CARBURETOR ADJUSTMENT CAUTION***—Adjust as follows for correct equalization of both carburetors: Remove air cleaners, install adjusting pin J-2544-1 through accelerator pedal link bellcrank lever and in hole in cylinder block to lock the lever. On 5B & 5C, adjust throttle shaft rod trunnion to 1 25/32" from top face of bracket to center of clevis pin hole in cross shaft lever. Connect tachometer, but before warming up engine, remove clevis pin from ends of both throttle shaft to carburetor rods, position fast idle cam on each carburetor in "off" position and turn each throttle stopscrew in until it just touches the cam. Set idle mixture screws exactly 2 turns open (7B, 7C), 1¼ turns open (5B, 6B, 4C, 5C). Warm engine, then adjust for correct idle speed (see above). Adjust each idle mixture adjusting screw for maximum increase in idling speed and readjust throttle stopscrews for correct idling speed (CAUTION—turn stopscrew on each carburetor an equal amount). Adjust front and rear throttle shaft-to-carbureor rod clevises so that clevis pins can be installed freely, connect rods. On Hydra-Matic cars adjust throttle linkage (see Hydra-Matic Drive in Transmission Section). Remove linkage adjusting pin, adjust accelerator pedal to bellcrank rod to get 1/64-1/16" clearance between pedal and pedal stop at wide open throttle, re-install air cleaners.

Float Level—½" from top projection on underside of bowl cover to top of seam on free end of float (invert cover and float assembly to check level).

Accelerating Pump—Center hole normal. Inner hole if less charge required.

Hydra-Matic Throttle Linkage Adjustment: ***See "Hydra-Matic Drive" in Transmission Section for complete data.***

Fast Idle Setting: 5/64" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset.

Choke Setting: One point lean.

Fuel Pump Pressure: 3-4 lbs., (AC), 3½-4½ lbs., (Carter).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment. See that valve operates freely.

VALVE TAPPET CLEARANCE: ***CAUTION—Different setting used for each type camshaft:***

Before Car (1952) No. 147662 (Camshaft No. 304078)—.008" Intake, .010" Exhaust.

Beginning Car (1952) No. 147662 (Camshaft No. 306344 with Tappet Clearance decal on Valve Cover Plate)—.010" Intake, .012" Exhaust HOT.

NOTE—Adjusting screws are self-locking. Remove apron in right front fender for accessibility.

IGNITION

IGNITION SWITCH: Hudson No. BO-306354. Combination ignition-starter switch. Starter operates when key held fully to right (automatically returns to ignition "on" position when released).

Lock Cylinder—Hudson No. BO-47630 (with keys), No. BO-152043 (cylinder only—uncoded).

COIL: Auto-Lite CR-6012A. On right of engine.

Ignition Current—2.5 amperes idling, 4.5 amperes stopped, at 6.3 volts.

CONDENSER: Auto-Lite No. IAT-3076R.

Capacity—.21- 25 microfarad.

DISTRIBUTOR: Auto-Lite (4B, 4C) IAT-4009, (Early 5B, 6B, 7B) IAT-4009A, (Late 5B, 6B, 7B & 5C, 7C) IAT-4009B. Full automatic advance with vacuum spark control and Fuel Compensator adjustment. ***These distributors are "pivoted Breaker Plate" type.***

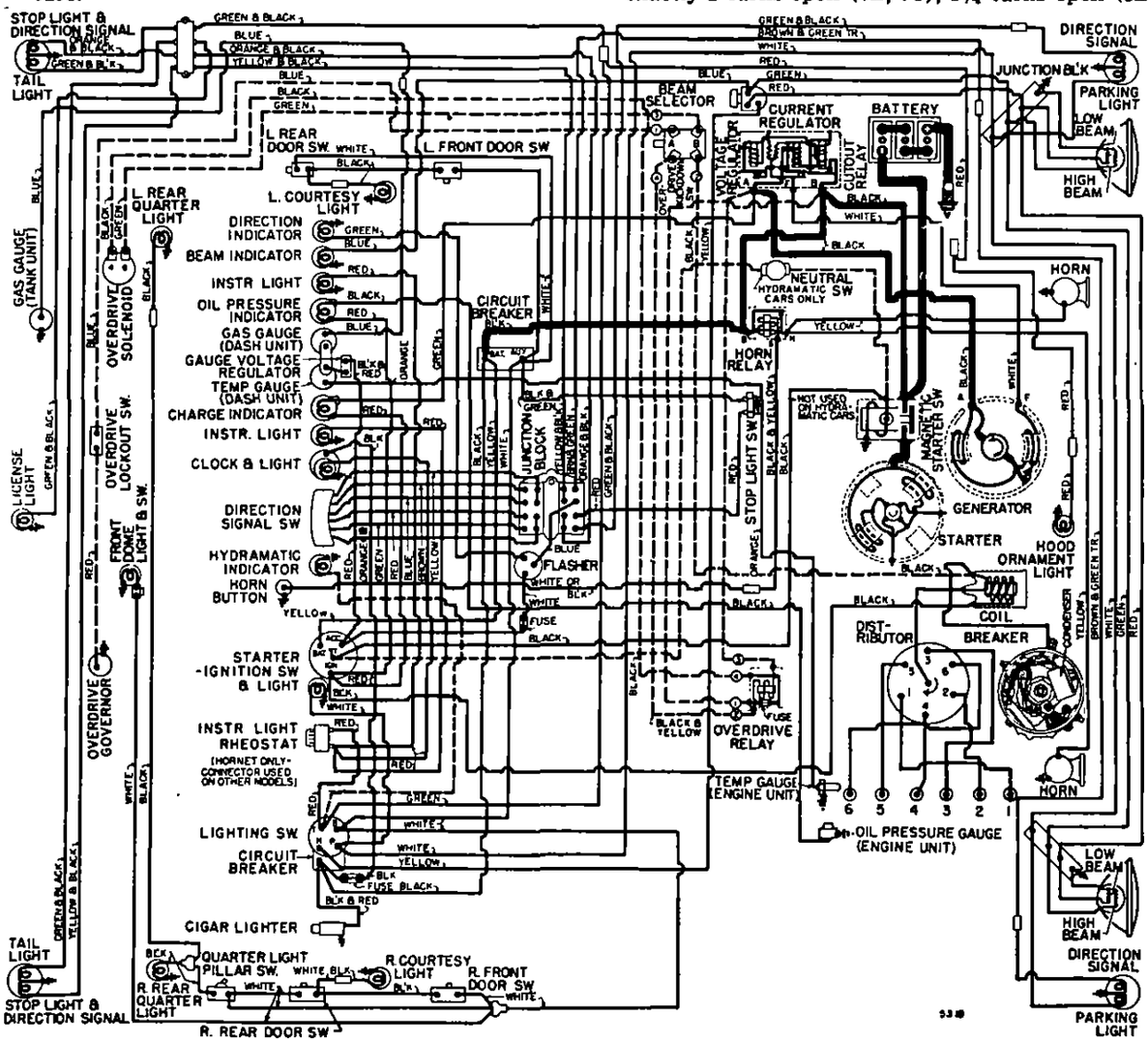
Breaker Plate Identification—Number stamped on plate (at pivot arm pin) indicates maximum vacuum advance.

Breaker Gap—.020". Limits .018- 022".

Cam Angle—39°+3°. ***Do not set breaker gap outside limits to secure this cam angle.***

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.



COMMODORE, WASP 5B, SUPER WASP, & HORNET MODELS

CONTINUED ON NEXT PAGE

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Automatic Advance—IAT-4009

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	300	0	600
1	335	2	670
3	400	6	800
9	1090	18	2180
10	1200	20	2400

Automatic Advance—IAT-4009A, B

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	500	0	1000
1	670	2	1340
4	1150	8	2300
8	1825	16	3650
9	2000	18	4000

Fuel Compensator: 10° advance or retard adjustment at distributor. *See Ignition Timing.*

Vacuum Spark Control: Auto-Lite integral type.

Vacuum Advance—IAT-4009

Dist. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
1°	2°	10"
3°	6°	11"
4°	8°	11½"
5°	10°	12"

Vacuum Advance—IAT-4009A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	13⅜"
1	2	14"
2	4	14¾"
3	6	15⅜"
3.75	7.5	16"

Vacuum Advance—IAT-4009B

Dist. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9½"
1°	2°	10"
2°	4°	10⅜"
3°	6°	10⅞"
3.75°	7½°	11¼"

IGNITION TIMING

Std. Setting ..... ***At Top Dead Center***

NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

Flywheel Mark—"UDC-1/" (#1 and #6 piston top dead center position) with 4 short marks (¼" apart) ahead of this mark (opening behind starter).

CAUTION—When setting timing with timing light, disconnect vacuum control line at distributor and plug line to prevent disturbing engine performance.

Timing (with Neon Timing Light)—Mark long line of "UDC-1/" flywheel mark with white paint, connect timing light to No. 1 spark plug, idle engine and adjust distributor until mark appears in line with pointer.

Fuel Compensator Setting—Set for slight ping at 15 MPH. when accelerating from 10 MPH. with wide open throttle. To adjust, loosen hold-down screw, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping). **Final setting must not be more than 1" (4th short line) ahead of "UDC-1/" flywheel mark.**

CARBURETOR

CARTER WA1

Carter WA1. Single barrel downdraft type with automatic choke.

Car Model	Carter Model No.
4B, 4C	749S
5B, 6B, 4C, 5C Optl.	Two 990S
7B, 7C Optl.	Two 968S

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section for complete data.*

Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—Centered on index (749S). One point lean 968S, 990S).
See Carburetion Equipment Section for complete data.

CARTER DUAL WGD

Carter WGD, No. 776S (Std. 5B, 6B, 5C, 7C). Dual downdraft type with automatic choke.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up Data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section for complete data.*

Fast Idle: Carter Dual (WGD) Carburetor type.
Setting—.026" throttle opening with choke valve closed. Check with thermostatic coil housing gasket, and baffle removed. Crack throttle valve, hold choke valve closed, move throttle valve toward closed position as far as possible. If throttle opening not .026" adjust by bending connector rod at lower angle.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.
Setting—Set coil housing 2 points lean.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type (Std.), Oil-bath type (Optl.). **Filter Element**—AC No. 5 (Std.), No. 7S (Optl. oil-bath type).

Fuel Pump: (**Std. 4B, 5B, 6B, 7B, 4C**) Carter M729SZ (fuel only); (**Optl. 4B, 5B, 7B**) AC No. 538 (fuel & vacuum); (**4C Optl., 5C, 7C**) AC No. 583 (first), No. 4057 (later) fuel & vacuum.
Pressure—3½ to 4½ lbs., (Carter). 3 to 4 lbs., (AC).
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric "CV" type (Constant Voltage) with voltage regulator.
Dash Unit—K-S No. 45674 (1952); No. 46193 (1953).
Tank Unit—No. 44513.
See Carburetion Equipment Section for complete data.

BATTERY

National (1952) OE-2L-100, (1953) 2L-S-100. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive (+) to frame and engine by single strap.
Location—On left side under hood.

STARTER

Model	Auto-Lite No.
4B, 4C (Std.)	MZ-4167
5B, 6B, 7B, 5C, 7C (Std.)	MCH-6109
5B, 6B, 7B (Early Hydra-Matic)	MCH-6107
5B, 6B, 7B (Late Hydra-Matic)	MCH-6204
4C, 5C, 7C (Hydra-Matic)	MCH-6204

Armature—Auto-Lite No. MZ-2312 (for MZ-4167); MCH-2084 (for MCH-6109); MCH-2088 (for MCH-6107 & MCH-6204).
Drive—(Std. Trans. Cars) Bendix No. 1806. Inboard barrel type.
Drive—(Hydra-Matic Cars) Bendix No. 1792. Outboard barrel type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (with new brushes).
Cranking Engine—Approx. 160 amperes at 120 RPM. (warm engine).

Performance Data—MZ-4167

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Performance Data—MCH-6107, 6109, 6204

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Starting Switch: Auto-Lite Magnetic type, No. SS-4030 or RBM No. 2201-15. Controlled by combination starting and ignition switch. *NOTE*—Hudson No. BT-304524 Neutral Safety Switch used on Hydra-Matic Cars (starter cranks only with selector lever in Neutral "N" position).

GENERATOR

Auto-Lite No. GDZ-6001B (Early), GGW-4801B (Late). Two-brush type with current & voltage regulation.

▷***GENERATOR CAUTION—Two different generators used. Identified by a BLUE name plate or a BLACK name plate. DO NOT USE A BLACK NAME PLATE GENERATOR WITH A BLUE NAME PLATE REGULATOR.***

Armature—Auto-Lite No. GGY-2006F (for GDZ-6001B). **GGW-2006F** (for GGW-4801B).
Maximum Charging Rate—See Current Regulator.

Performance Data—GGW-4801B

Amperes	Volt	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Performance Data—GDZ-6001B

Amperes	Volt	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
17	8.0	1350-1500	1550-1700
35	8.0	1800-2000	2150-2350

Rotation—Counter-Clockwise at commutator end.
Brush Spring Tension—35-53 ozs. new brushes.
Field Current—1.3-1.5 (GDZ-6001B); 1.4-1.5 (GGW-4801B) amperes at 5.0 volts.
Motoring Current—3.9-4.4 (GDZ-6001B); 4.1-4.6 (GGW-4801B) amperes at 5.0 volts.
Belt Adjustment: ¾" belt deflection midway between generator and water pump pulleys.

Form 178—1956-M

REGULATOR

Auto-Lite No. VRP-6101B (GDZ-6001B Gen.), VBE-6104A (GGW-4801B Gen.). Voltage-current type.

►***VOLTAGE REGULATOR CAUTION—Two different regulators used. Identified by a BLUE name plate or BLACK name plate. DO NOT USE A BLUE NAME PLATE REGULATOR WITH A BLACK NAME PLATE GENERATOR.***

NOTE—Regulator cover sealed. Serviced on replacement basis if seals not broken (to remove cover). ***See Electrical Equipment Section for complete data.***

Cutout Relay

Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amperes disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" at hinge end of core with contacts open.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. ***in normal operation charging at 10 amperes (VRP), at ½ maximum (VBE).***
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—***See Electrical Equip. Section.***

Current Regulator (VRP)

Setting—39-41 amperes (marked "40" on cover).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—***See Electrical Equip. Section.***

Current Regulator (VBE)

►***SETTING CAUTION—"Temperature Compensated" type, Set to following specifications at 70°F.***

Test A	Operating Amperes	Test B
52 max		45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum output.

Test B—After additional 15 minutes operation with current regulator operating (with load applied to hold voltage down to 6.7-6.9 volts).

LIGHTING

Headlamps: "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red pilot bulb at lower center of speedometer dial. Lights when upper beam "on."

Direction Signal: Optl. ***See Electrical Equipment Section.***

Switches

Lighting—Hudson No. (1952) 300641, (1953) 307191,
Beam Selector—Hudson No. 303035.
Instrument Rheostat (Hornet)—Hudson No. 304706.
Direction Signal—Hudson No. (1952) 307050 for 4B, 5B, No. 307052 for 6B, 7B. (1953) No. 306361.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Headlight—Hudson No. (1952) 300643—30 amps., (1953) 307192—25 amps. On light switch.
Misc. Lighting—Hudson No. (1952) 301853, (1953) 306362. 20 ampere type. On steering support bracket behind instrument panel.

FUSES: Electric Clock—3 ampere. Behind clock.
Direction Signal—14 ampere. In flasher lead behind instrument panel.
Overdrive—30 ampere. In holder on relay.
Heater—14 ampere. In holder on left side of Weather Control Housing or on cross brace.

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45677 (1952); King-Seeley No. 46283 (1953). Regulator is thermal bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on on gauge feed circuit. See Wiring Diagram.

GENERATOR CHARGE SIGNAL: Red indicator on instrument panel (to right of temperature gauge). ***See Electrical Equipment Section for complete data.***

OIL PRESSURE SIGNAL: Red indicator on instrument panel. **Warning Switch:** (1952) Carter No. A815S or King-Seeley No. 47100. (1953) Carter No. A658S or King-Seeley No. 47130. On right side of engine above oil pump. Opens at 11-15 lbs.
See Electrical Equipment Section for complete data.

HORNS (1952): Sparton or Auto-Lite Model HW-4021 (Low Pitch), HW-4022 (High Pitch). Twin horns

HORNS (1953): Sparton or Auto-Lite Model HAB-4611 (Low Pitch), HAB-4612 (High Pitch). Twin horns

Horn Relay: Hudson No. 164401. On engine dash.
Contacts Close—3 volts min. 4 volts max.
Open—2 volts min. (relay upright, terminals down).

ENGINE

ENGINE SPECIFICATIONS: All engines 6 Cyl. "L" head type.

Model	Bore	Stroke	Displacement
4B, 4C	3 9/16"	3 7/8"	232 cu. in.
5B, 6B, 5C	3 9/16"	4 3/8"	262 cu. in.
7B, 7C	3 13/16"	4 1/2"	308 cu. in.

Model	Comp. Ratio	Rated H.P.	Developed H.P.
4B, 4C	6.7-1①	30.4	112 at 4200 RPM
5B, 6B	6.7-1①	30.4	123 at 4000 RPM
5C	6.7-1①	30.4	127 at 4000 RPM
7B, 7C	7.2-1②	34.9	145 at 3800 RPM

①—7.2-1 Optl. ②—6.7-1 Optl.

NOTE—6.7-1 ratio is for cast iron head. 7.2-1 ratio is for aluminum head.

Compression & Vacuum Reading—***See Tune-Up.***

CYLINDER HEAD & TIGHTENING TORQUE: ***See Hudson Special Data.***

►***HEAD GASKET IDENTIFICATION & INSTALLATION: See Hudson Special Data.***

ENGINE REMOVAL: ***See Hudson Special Data.***

OIL PAN REMOVAL: Support car on jack stands placed under #2 cross-member. Take out three bolts attaching center steering arm support bracket on this cross-member and drop steering arm and tie rods. Remove flywheel dust cover. Remove pan.

►***LOCATING HOLE PLUG CAUTION***—Plug in locating hole in pan flange at left rear of block (behind starter) must be tight to prevent oil leakage through hole or contamination of oil by dirt and water entering pan through hole.

PISTONS: Aluminum alloy, cam ground type.

►***CAUTION—Pistons NOT INTERCHANGEABLE between engines (except 5B, 5C, 6B) due to different height from pin hole to top as follows:*** **(4B, 4C)**—2.310-2.314"; **(5B, 5C, 6B)**—2.060-2.064"; **(7B, 7C)**—1.967-1.971".
Weight—(4B, 4C) 18⅜ ozs., (5B, 6B, 5C) 18 ozs., (7B, 7C) 18⅝ ozs.
Removal—Pistons and rods removed from above.
Clearance—.0015-.0025" (skirt).
Piston Fitting—Insert piston in cylinder with .002" feeler gauge. Pull to withdraw should be 3 to 4 lbs., using tool J-888 Piston Feeler Scale to measure pull.

Replacement Piston Sizes: ***See "Pistons" in Hudson Special Data.***

Installing Pistons: Slot away from camshaft.

PISTON RINGS: Two compression, two oil rings (one oil ring above and one below), per piston. Rings are square end type and pinned to prevent rotation. Ends are cut and notched to fit pin (clearance on pin must be equal to end gap).

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.006-.014"	.001"
Oil Upper	3/16"	.006-.014"	.001"
Oil Lower	5/32"	.006-.014"	.001"

Installing Rings—Rings have pin notch offset in relation to end gap. Install rings so that short side of notch is installed on alternate sides of pin.

Replacement Rings: Furnished Standard, .002", .005", .010", .015", .020", .030" oversize.

PISTON PIN: Floating type with locking ring at each end. Holes in piston are diamond bored and bearing in rod is steel-backed, bronze bushing. See Rod Bushing Installation below.
Diameter—.9684-.9687". **Length**—2.9375".
Pin Fit in Piston—.0000-.0003" at 70°F. or hand push fit with piston at 200°F.
Pin Fit in Rod Bushing—.0003" clearance. Hand push fit at 70°F.

Rod Bushing Installation: Press old bushing out and press new bushing in with Tool J-2948 (support rod on Burnisher Block J-2950 in press). Then BURNISH bushing in place, using Burnishing Tool J-2791 (rest rod on burnisher block J-29506 in press, press burnishing tool through rod bushing). Ream bushing to diameter of .9685-.9688".

Replacement Pins: Std., .002", .005", .010" oversize. Select pin to fit piston. **Do not ream pin hole in piston.**

CONNECTING ROD: Length 8⅛". **Wgt.** 32⅜ ozs.
Crankpin Journal Diameter—2.1244-2.1254".

►***See "Crankshaft Size Code" in Hudson Special Data.***

Lower Bearing—Steel-backed, babbitt-lined type with upper and lower halves alike. No shims.
Clearance—.0005-.0015". **Sideplay**—.007-.013".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Identifying notches on side of cap and rod must be together when cap installed on rod.

Replacement Bearings: Furnished Std. ("Large" & "Small"), & .0005", .002", .010", .012" Undersize.

Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward valve side of engine.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
Journal Diameter—2.4988-2.4998".
Bearing Diameter—2.4993-2.5013".

►***See "Crankshaft Size Code" in Hudson Special Data.***

Bearings—Removable steel-backed, babbitt-lined upper and lower halves of each bearing alike.
Clearance—.0005-.0015".
Crankcase Front & Rear Oil Seal Installation: ***See "Crankshaft & Main Bearings" in Hudson Special Data.***

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Bearing shells positioned in cap and crankcase by tang on edge of shell. Can be rotated out without removing crankshaft with Tool KMO-734.
Palnuts—Tighten finger tight, plus ⅓ turn.

Replacement Bearings: Furnished Std. & .001", .002", .010", .012" Undersize.

End Thrust: Taken by #3 bearing. Replace bearing if endplay excessive. **Endplay**—.003-.009".

CAMSHAFT: 4 bearing type. Non-adjustable chain.

►***CAMSHAFT PRODUCTION CHANGE—Camshaft No. 306344, replaces No. 304078 at Car Serial No. 147662 (1952 Model). DIFFERENT TAPPET SETTINGS REQUIRED. See Valve Timing following.***
Bearing Diameter—#1, 2.375-2.3755"; #2, 1.997-1.9975"; #3, 1.965-1.9655"; #4, 1.497-14975".

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Bearings—Steel-backed, babbitt-lined bushings. **Clearance**—.0015-.002".

Replacement Bearings: Furnished as follows: **Finished Reamed**—Will be proper dimension when pressed in place (.0026-.0055" press fit). **Unfinished**—Press in place (.0026-.0055" press fit) and line ream to .001" larger than journals.

▷*CAUTION*—Install all bearings with notch at top.

End Thrust: Steel thrust plate fitted between front end of camshaft and sprocket. Plate attached to crankcase by two capscrews and locks. **Endplay**—.003-.005".

Timing Chain: Morse. 60 links, ⅜" pitch. Width—1¼". ***Chain Tension Shoe***—*Fibre shoe backed by synthetic rubber plunger mounted inside timing chain cover at top. Holds chain in close mesh with sprockets and prevents whip.*

Camshaft Setting: Sprockets marked. Two chain guide links marked with center holes. Mesh chain with center hole in each link opposite "O" mark on each sprocket with #1 piston at top dead center (crankshaft sprocket keyway at top with #1 piston at TDC.) NOTE—With this setting, there should be 6 full links plus two half-links between marks on sprockets (half-links opposite sprocket marks).

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.831"	.3412-.3422"	5.730"
Exhaust	1.556"	.3402-.3412"	5.730"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.346"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

Valve Guides: Removable, one-piece, cast-iron Exhaust guides counterbored at upper end. Install guides using installer handle part of tool J-883-A and installer pilots J-883-8 and J-883-9 (pilots have stop collars which position guides). **Intake Guide**—Upper end 1 7/16" below top of valve seat. Finish ream to .3432-.3442" (.3437" preferred). **Exhaust Guides**—Upper end 1 3/32" below top of valve seat. Finish ream to .3432-.3442" (.3437" preferred). Counterbored 9/16" deep to 25/64".

Valve Springs: Cadmium plated springs are used. Install springs with closely coiled end up.

	Spring Pressure	Length
Valve Closed	73-81 lbs.	2.188"
Valve Open	153-165 lbs.	1.842"

NOTE—Reject springs if pressure less than 60 lbs. at 2 3/16". Spring free length 2.500".

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out. Service by installing oversize lifter. **Clearance**—.00075-.0015". **Replacement Lifters**—.002", .004", .010" Oversize.

VALVE TIMING

TAPPET CLEARANCE: CAUTION—***Different setting used for each type camshaft.***

▷**First 1952 Cars before No. 147662 (Camshaft No. 304078):** .008" Intake, .010" Exhaust, HOT.

▷**Beginning with 1952 Car No. 147662 and all 1953 Cars (*Camshaft No. 306344 with tappet clearance decal* on valve cover plate):** .010" Intake, .012" Exhaust, HOT. Self-locking tappet screws used. Remove right front fender apron for access to valve compartment.

VALVE TIMING: See Camshaft Setting above.

Camshaft No. 304078

Intake Valves—Open 7°18' BTDC. Close 53°42' ALDC.
Exh. Valves—Open 53°18' BLDC. Close 7°42' ATDC.

Camshaft No. 306344

Intake Valves—Open 26.8° BTDC. Close 99.7° ALDC.
Exhaust Valves—Open 64.9° BLDC. Close 45.7° ATDC.

Valve Tappet Timing Check: Remove front cover and adjust tappet clearance of No. 1 intake valve to .010" Hot, or .012" Cold. Insert .002" feeler gauge in No. 1 intake tappet and rotate engine in direction of rotation until exhaust valve begins to close, and light drag is felt on feeler gauge. Engine is correctly timed when first of four long timing marks is approximately ⅝" above pointer on timing hole in rear engine support plate. Reset tappet clearance to correct clearance (see Tappet Clearance).

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, valve lifters and timing chain. **Crankcase Capacity**—7 qts. (refill), 7½ qts. (dry). **Normal Oil Pressure**—40 lbs. at 30 MPH. No gauge **Oil Pressure Relief Valve**—Non-adjustable relief valve and spring under plug on left side of engine

Oil Pump: Rotor type consisting of inner and outer *rotor, shaft, body, and cover. Angle mounted on* right side of crankcase and driven from camshaft. **Oil Pump Overhaul**—***See "Oil Pump" in Hudson Special Data.***

▷***OIL PUMP INSTALLATION CAUTION—See "Oil Pump" in Hudson Special Data.***

Oil Filter: Optl. Fram or Hudson. Replace filter cartridge at 5000 mile intervals.

Oil Pressure Indicator: Hudson "Teleflash" with Oil Pressure Warning Switch. ***See Misc. Electrical.***

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Cooling System: Positive circulation with pump on front of engine, by-pass thermostat, and brass water distribution tube in cylinder block. **Pressure Cap**—AC No. 846713. Opens at 7 lbs., pressure. **Capacity**—18½ quarts without heater. 19½ quarts with heater. **Radiator Removal**—***See Hudson Special Data.***

Water Pump: Centrifugal, belt driven, packless type. Shaft mounted on sealed duplex ball bearing. ***See Water Pump Section for complete data.***

Thermostat: Hudson No. F-166272 (Std.), No. SP-161664 (High Type for permanent anti-freeze). *By-pass located in water outlet in cylinder head.* **Setting**—(Std). Starts to open at 150-155°F., fully open at 175°F. (High Type) Starts to open at 165-170°F., fully open at 195°F.

Temperature Gauge—King-Seeley Electric "CV" type. (Constant Voltage) with voltage regulator. **Dash Unit**—K-S No. 45675 (1952); No. 46197 (1953). **Engine Unit**—King-Seeley No. 44200. ***See Miscellaneous Section for complete data.***

CLUTCH

Own Make. Single plate, fluid cushioned type (cork insert driven member) operating in Hudsonite oil. *NOTE*—Two sizes used: 9" (4B, 4C Std.), 10" (4B & 4C with Overdrive, 5B, 6B, 7B, 5C, 7C).

▷***CLUTCH STICKING CORRECTION:*** ***See "Clutch Notes" in Hudson Special Data for Flushing instructions. See Clutch Section for complete data.***

Driven Member:	I.D.	O.D.	Cork Inserts
9" Clutch	5.25"	8.687"	90
10" Clutch	6.375"	9.8125"	108

Clutch Lubrication: ***See "Clutch Notes" in Hudson Special Data.***

Pedal Adjustment: Clearance between underside of toeboard and top face of clutch shank must be 1¼" to 1¾". To adjust, loosen locknut above clevis, remove clevis pin, turn clevis in or out of link, tighten locknut after re-connecting clevis.

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over 1/3 revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to drain. Unhook clutch pedal lever return spring, remove two clutch cross shaft bracket bolts and remove the bracket. Remove clutch control link clevis pin and disconnect the clevis. Install engine holding fixture J-4651 (position "U" shaped *section around oil pan and engage adjusting hooks* in holes provided on each side of frame). Remove flywheel dust pan by taking out two attaching screws. Take out two engine rear mounting bolts and nuts at No. 3 cross member. Raise engine rear support approximately ½" off cross member by adjusting the holding fixture hooks (*NOTE*—If holding fixture not available, use hydraulic jack with block of wood to prevent damage to pan to raise engine). Take out two top screws attaching *clutch housing to engine rear end plate (use universal* socket and extension). Remove breather pipe bracket, remove bolt attaching breather pipe and rear valve chamber cover, remove breather pipe. Remove flywheel pointer, remove starter. Take out two lower attaching screws and remove clutch housing assembly (*CAUTION*—Take care that throw-out collar and bearing does not drop out of clutch cover bore). Loosen all clutch cover-to-flywheel screws evenly to relieve spring pressure, take out screws and remove clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

1952 (OWN MAKE)

Own Make. All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse) with remote (steering column) shift.

Transmission Control: Handy-shift remote control type with *shift lever mounted on steering column.* ***See Transmission Section for complete data.***

Transmission Removal: ***See 1951 Hudson Six data.***

1952-53 (WARNER)

Warner Model AS63-T86E (4B, 5B, 6B, 4C, 5C—Without Overdrive). AS65-T86E (7B, 7C—Without Overdrive). AS64-T86E (4B, 5B, 6B, 4C, 5C—With Overdrive). All helical gear type. Constant-mesh (second & high), sliding gear (low & reverse) with remote (steering column) shift. ***See Transmission Section for complete data.***

Transmission Control: Steering column shift. ***See Transmission Section for complete data.***

Transmission Removal: *(NOTE—This transmission removed from underneath car. Not necessary to remove floor mat and cover).* Drain lubricant and disconnect front universal joint (retain universal joint bearing cups with tape to hold bearings in place). Loosen nut on propeller shaft center bearing support nut, disconnect propeller shaft by sliding shaft rearward, disconnect shift rods, speedometer cable (if car is equipped with overdrive, disconnect control cable and wiring from overdrive at transmission), and remove speedometer pinion. Remove nut from front end of brake pivot brace at No. 3 cross-member and remove clevis pin at rear end of brace and move linkage to left side of car. With universal socket on a 10" extension, remove two top bolts attaching transmission-to-clutch housing. Insert in their place, guide studs J-2969 to guide transmission during removal. Remove the two lower transmission-to-housing bolts, lower transmission out.

OVERDRIVE

Warner Type AS4-R10D (part of AS64-T86E Transmission). Optional equipment.
See Transmission Section for complete data.
Overdrive Relay—Hudson No. BT303107.
Overdrive Governor—Auto-Lite No. TGA-4005.
Overdrive Solenoid—Delco-Remy No. 1118164.
Kick-down Switch—Hudson No. BT-306763.
Overdrive Fuse—30 amperes. On fuse block on side of overdrive relay.

Removal: Same as for standard transmission, except that overdrive control cable and wiring must be disconnected.

HYDRA-MATIC TRANSMISSION

"Dual Range," Four-Speed Planetary type automatic transmission with Modulated Throttle Pressure and Hydraulically Operated Reverse.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING—See "Hydra-Matic Drive" in Transmission Section.*

Lubrication: Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type "A."
Capacity—11 quarts (approx.). 12 quarts (after reassembly).
Checking Fluid Level—Set hand brake and allow engine to idle with Hydra-Matic Selector lever in "Dr4" position for 2 minutes. Place selector lever in "N" position. Roll back floor mat and remove oil level indicator (after cleaning all dirt and lint from around cap). Fluid level must be at "F" mark on dipstick. *CAUTION—Do not fill above "F" mark.*

►***OTHER HYDRA-MATIC SERVICE DATA**—See Transmission Section.*

UNIVERSALS

Spicer No. 1268-111X.....**Front & Rear**
Spicer No. 1268-102X.....**Intermediate**
Needle bearing types.

Propeller Shaft & Center Bearing: Two shafts used: 1) Front shaft supported by sealed ball-bearing just ahead of rear coupling flange (no slip joint).
2) Rear shaft with slip joint at forward end.
Center Bearing—Prelubricated sealed annular ball bearing fitted in cast steel housing bolted to support mounting which is secured to underside of frame cross members. Housing cradle mounted on two rubber supports and forward end of support mounting fitted with rubber cushion.

REAR AXLE

1952 (OWN MAKE)

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.

►*IDENTIFICATION NOTE: Housing rear cover welded. See Rear Axle Section for complete data.*

Axle Ratios:	Standard	Optional
Synchro-mesh Tr.	4.1-1 (41-11)	①4.55-1 (41-9)
Overdrive Trans.	4.55-1 (41-9)	4.1-1 (41-10)
Hydra-Matic Tr.	3.58-1 (43-12)	

①—3.58-1 (43-12) also Optl. on Model 7B Hornet.

Rear Axle Removal & Wheel Bearing Adjustment: *See 1951 Hudson Six data.*

1952-53 (SPICER)

Spicer Type. Semi-floating, hypoid gear type, with Hotchkiss Drive.
See Rear Axle Section for complete data.

►*IDENTIFICATION NOTE—Housing rear cover attached with capscrews.*

Ratios:	(Standard)	Optional
Std. (Synchro-mesh)	4.09-1	4.55-1
With Overdrive	4.55-1	4.09-1
Hydra-Matic	3.07-1	
Optl.①	3.31-1, 3.53-1, 3.92-1, 4.27-1	

①—"Severe Usage."

Axle Ratio Marking—Ratios can be identified by marking (no. of teeth in gear set) stamped on tag attached to inspection cover by one bolt: 43-14 (3.07-1), 43-11 (3.31-1), 46-13 (3.53-1), 47-12 (3.92-1), 45-11 (4.09-1), 47-11 (4.27-1), 50-11 (4.55-1).

Backlash—.003-.006". Shim adjustment.

Removal: Support rear end of car on jack stands placed under frame. Drain rear axle housing. Remove rear fender shields, remove rear wheels, remove wheel hubs using Puller J-736A. Remove brake cable conduit caps from backing plates, disconnect cables at operating levers. Disconnect brake hose at frame connection and brake lines at rear wheel cylinders. Remove backing plates, gaskets, grease seal retainers and shim pack (right side only, tie shims together to insure correct replacement). Remove axle shaft using puller J-352, remove oil seals using puller J-943. Disconnect rear stabilizer at axle bracket. Disconnect propeller shaft at rear universal (tape bearing cups in place). Remove rear axle "U" bolts, mounting plates, cushions, and retainers. Disconnect rear shock absorbers at lower end. Remove axle assembly from beneath car.

Axle Shaft Removal: Raise and support rear end of car with jacks placed under frame. Remove wheel, rear hub (using Puller J-736-A), and remove brake cable conduit caps from backing plates and disconnect cables at operating levers. Disconnect brake line at rear wheel cylinders. Remove backing plate, gasket, and grease seal retainers, and shim pack (right side only). Tie shims together to insure correct replacement. Withdraw axle shaft using Puller J-352, do not drag on inner seal.

Wheel Bearing Adjustment: Controlled by shims (.003", .005", .010" and .030") between backing plate and end of housing (right side only). To adjust, remove wheel and backing plate (above), add or remove shims for endplay. **Endplay**—.001-.004".

SHOCK ABSORBERS

►*1952 PACEMAKER REAR SPRING PRODUCTION CHANGE—Rear spring shackles offset on later cars. See "Spring Shackles" in Hudson Special Data.*

Delco or Monroe. Direct acting hydraulic types. Furnished Light, Heavy, and Extra Heavy scales.

Hudson Part Nos.	Front	Rear
Light Control (4B,5B,6B,4C,5C)	F-304700	F-304701
Light Control (7B, 7C)	F-303060	①
Heavy Control (All)	F-303601	②
Extra Heavy Control (All)	F-302430	③

①—No. F-300351 or F-301241.
②—No. F-301768 or F-301770.
③—No. F-308999 or F-302431.

APPLICATION NOTE—**Light Scale** front and rear shocks used with light scale springs and with front only heavy scale springs. **Heavy Scale** front and rear shocks used with heavy scale springs and with rear only heavy scale springs. **Extra Heavy Scale** front and rear shocks optional on all models. **Part Number** stamped on outside of shock absorber body.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and lateral stabilizer.

►*1952 FRONT SPRING PRODUCTION CHANGE: See Front Suspension Section.*

Kingpin Inclination—3°36' crosswise.
Caster—½-1½°. Both wheels alike within ½°.
Camber—½-1½". Both wheels alike within ½°.
Toe-In—0" to 1/16" measured at wheel rim. Center steering arm on frame must be at center of car.
Toe-Out on Turns—Inner wheel 30°. Outer 25°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinders—Front—(4B, 4C) 1 1/16", (5B, 6B, 7B, 5C, 7C) 1 1/8". **Rear**—15/16" (All Models).
Drums—11" centrifuse type.
Lining—Molded type. **Width**—Front (4B, 4C) 1¾", (5B, 6B, 7B, 5C, 7C) 2¼". Rear (All Models) 1¾".
Thickness—.177".
Length Per Wheel—(4B, 4C) 20.108" front and rear. (5B, 6B, 7B, 5C, 7C) 21.32" front, 20.108" rear.
Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Mechanical Follow-Up (Reserve): Over-running linkage between brake pedal and parking (hand-brake) linkage which applies rear wheel brakes by pedal mechanically if hydraulic system not operating.
Setting—1¼" clearance between clevis pin and rear end of slot in pedal rod rear clevis.

Hand Brake—See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top & Windows: Hydro-Lectric type.
See Miscellaneous Section for complete data.

Windshield Wiper: Cable operated—Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

Model	Starting Serial & Engine Nos.
1953 1C Jet	203865
1953 2C Super Jet	203543
1954 1D Jet	1269062
1954 2D Super Jet	2269060
1954 3D Jet Liner	3269070

SERIAL & ENGINE NUMBERS: Stamped on plate on right front door body hinge post and also on top flange of right frame side rail near dash panel. Engine number which is the same as serial number is read downward, and located on the front face of the cylinder block at top right corner.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. minimum at idle speed. All cylinders should be equal to within 10 lbs.

VACUUM READING: 17-20" Hg. at idling speed.

VALVE TAPPET CLEARANCE: Intake .010", Exhaust .012" Hot.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adj. Valve must operate freely.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .032".

Spark Plug—Champion H-10. 14 mm.

COIL: Auto-Lite CR-6012A.

Ignition Current—2.5 amps. idling, 4.5 amps. stopped.

DISTRIBUTOR: Auto-Lite IAT-4016.

Condenser—Auto-Lite IAT-3076R. **Capacity** .21-.25 mfd.
Contact Point Set—Auto-Lite IGW-3028BS.
Breaker Gap—.020".
Cam Angle—39°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

►*DISTRIBUTOR INSTALLATION NOTE:* Engine rotation while oil pump removed affects timing. *See "Oil Pump Removal" under Oil Pump in Hudson Special Data.*

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
1	350	2	700
4.5	500	9	1000
12	1325	24	2650
13.5	1500	27	3000

Vacuum Spark Control—Auto-Lite integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	5-1/4
1	2	5-3/4
4	8	7-1/2
6	12	8-3/4
7.5	15	9-1/2

IGNITION TIMING

Setting—TDC (Long line before "1UDC" on vibration damper).

►*IGNITION TIMING CAUTION:* When setting timing with timing light, disconnect vacuum line from distributor and plug line to prevent disturbing engine performance.

Timing Mark—Long line before "1UDC" on Vibration Damper. Timing is correct when this mark is in line with pointer on timing chain cover, with engine at idling speed.

CARBURETOR

►*CARBURETOR APPLICATION: Carter carburetors are standard equipment on all models. On "Twin H-Power" (optional), two Carter carburetors are used.*

►*1953 JET ENGINE CUTTING OUT ON TURNS CORRECTION (First Cars):* Set carburetor float level to new setting of 7/16" (was ½"). See Float Setting below.

►*CARTER WA1-2009S CARBURETOR PRODUCTION & RECOMMENDED CHANGES: See "Carter WA1" in Carburetor Section.*

THROTTLE LINKAGE ADJUSTMENT (HYDRA-MATIC CARS): With engine at normal operating temperature and idle speed adjusted to 490-510 RPM, and selector lever in "N" position, proceed as follows:

Models With Single Carburetor: Install throttle gauge pin J-2544 in lower bellcrank and adjust throttle bellcrank operating rod (rod from lower bellcrank to upper bellcrank) to 2 9/32", measured from centerline of throttle control bellcrank-to-carburetor rod clevis pin, and the top of the machined surface of cylinder head. Tighten jam nut securely. With throttle return spring attached and idle adjusting screw against its stop, and the gauge pin J-2544 still in place in lower bellcrank, adjust throttle control bellcrank-to-carburetor rod until clevis pin slides freely into holes in clevis and hole in bellcrank. Tighten jam nut. With gauge pin in lower bellcrank, and transmission throttle lever (on transmission case) back against its rear stop, adjust length of transmission throttle rod (rod from transmission lever to lower bellcrank) so that it is 3/32" **shorter** than the actual distance between the holes. Tighten jam nut. Remove gauge pin from lower bellcrank and adjust length of accelerator pedal-to-bellcrank rod to give full throttle with 1/64" to 1/16" clearance between accelerator pedal and pedal stop.

Models With "Twin H-Power": Install gauge pin J-2544 in lower bellcrank and in upper bellcrank holes, then adjust length of throttle bellcrank operating rod (rod from lower bellcrank to upper bellcrank) so that operating rod trunnion pin enters bellcrank. Tighten jam nut. With gauge pins still in place, and both carburetors off fast idle (choke open) and with throttle return spring attached, adjust both bellcrank-to-carburetor rods so clevis pin slides freely through clevis and lever. *Complete adjustment as indicated for models with single carburetor.*

STANDARD

Carter WA1-2009S (Early 1953), 2009SA (Late 1953 & 1954). Single barrel downdraft type with automatic choke.

Idle Setting—1/2—1-1/2 turns open. Turn screw out for richer mixture.

Idle Speed—Standard transmission 540-560 RPM, Hydra-Matic transmission 490-510 RPM. Overdrive 575 RPM.

Float Level—7/16" from top edge of bowl cover to soldered edge of seam on float with cover inverted.

Accelerating Pump—Outer hole normal, inner hole if less charge required.

Fast Idle Setting: 5/8" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending link at lower offset.

Automatic Choke Setting: Set at Index.

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Carter WA1" in Carburetor Section.*

Fuel Pump Pressure: Std. 3-1/2—4-1/2 lbs. Combination 4-5 lbs.

TWIN H-POWER

Carter WA1-2013S (2 carburetors per engine). Single barrel downdraft with automatic choke.

►*TWIN H-POWER CARBURETOR ADJUSTMENT CAUTION:* Proceed as follows:

Idle Setting—For correct equalization of both carburetors: Remove air cleaners, install adjusting pin J-2544-1 through accelerator pedal link bellcrank lever and in hole in cylinder block to lock lever. Connect tachometer, but before warming up engine, remove clevis pin from ends of both throttle shaft to carburetor rods, position fast idle cam on each carburetor in "off" position and turn each throttle stop screw in until it touches cam. Set idle mixture screws exactly 1-1/4 turns open. Warm up engine and adjust for correct idle speed (see below). Adjust each idle mixture adjusting screw for maximum increase in idling speed and readjust throttle stop screws for correct idling speed. *(CAUTION*—Turn stop screws on each carburetor an equal amount). Adjust front and rear throttle shaft to carburetor rod clevises so that clevis pins can be installed freely, connect rods. On Hydra-Matic cars, adjust throttle linkage *(see Hydra-Matic Linkage Adjustment in Transmission Section).* Remove linkage adjusting pin, adjust accelerator pedal to bellcrank rod to get 1/64-1/16" clearance between pedal and pedal stop at wide open throttle, reinstall air cleaners.

Idle Speed—Std. Trans. 540-560 RPM, Hydra-Matic 490-510 RPM, Overdrive 575 RPM.

Float Level—1/4" from top edge of bowl cover to soldered edge of seam on float with cover inverted.

Accelerating Pump—Outer hole normal, inner hole if less charge is desired.

Fast Idle Setting: 1/2" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending link at offset portion.

Automatic Choke Setting: Set at Index.

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Carter WA1" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. at 1800 RPM.

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CARB. EQUIPMENT

Fuel Pump: Carter M-729-SZ (Standard. Fuel only). AC No. 4057 (Optional, Fuel & vacuum).
Pressure—4-5 lbs. at 1800 RPM. (Combination) 3-1/2—4-1/2 lbs. (Std).
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: King-Seeley Electric "CV" (constant voltage) type with voltage regulator.
Dash Unit—King-Seeley 46193.
Tank Unit—King-Seeley 44554.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

National 1-W-90. 6 Volt, 15 plate, 90 Ampere hours *capacity (20 hour rate).*
Battery Ground—Positive (+) terminal to frame.
Engine Ground—Engine to frame.

STARTER

Auto-Lite MZ-4167 (Std. Trans.), **MZ-4172** (Hydra-Matic).
Armature—Auto-Lite MZ-2312 (MZ-4167), MZ-2211 (MZ-4172).
Drive—(Std. Trans.) Bendix No. A 1806 Inboard type. (Hydra-Matic Drive) Bendix No. A 1792 Outboard type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 ft. lbs.	Lock	2.0	280

Starting Switch: Auto-Lite Magnetic type, No. SS-4030 or RBM No. 2201-15. Controlled by combination starting and ignition switch.
Neutral Safety Switch: Hudson No. 304524 located at lower end of steering column. Connected in starter control circuit so that starter operates only when selector lever in "N" Neutral.
Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Auto-Lite GGW-4802A. Armature—Auto-Lite GGW-2006F.

Performance Data

Amperes	*Volts*	*Cold* —R.P.M.— *Hot*	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Brush Spring Tension—35-53 ozs.
Field Current—1.4-1.5 amperes at 5.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: 10.5 foot lbs. with torque wrench applied in vertical position on generator adjusting bracket bolt and all generator and attaching bracket bolts loose.

REGULATOR

Auto-Lite VBE-6104A. Voltage and current type with "Temperature Compensated" current regulation.

Cutout Relay

Cuts in—6.3-6.8 volts. (set to 6.4-6.6 volts).
Contact Gap—.015" minimum.
Air Gap—.031-.034" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.5 volts at 70° F.
Air Gap—.048-.052" with contacts just opening.
Checking and Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

Test A	Operating Amperes	Test B
52 Max.		45 (43-47)

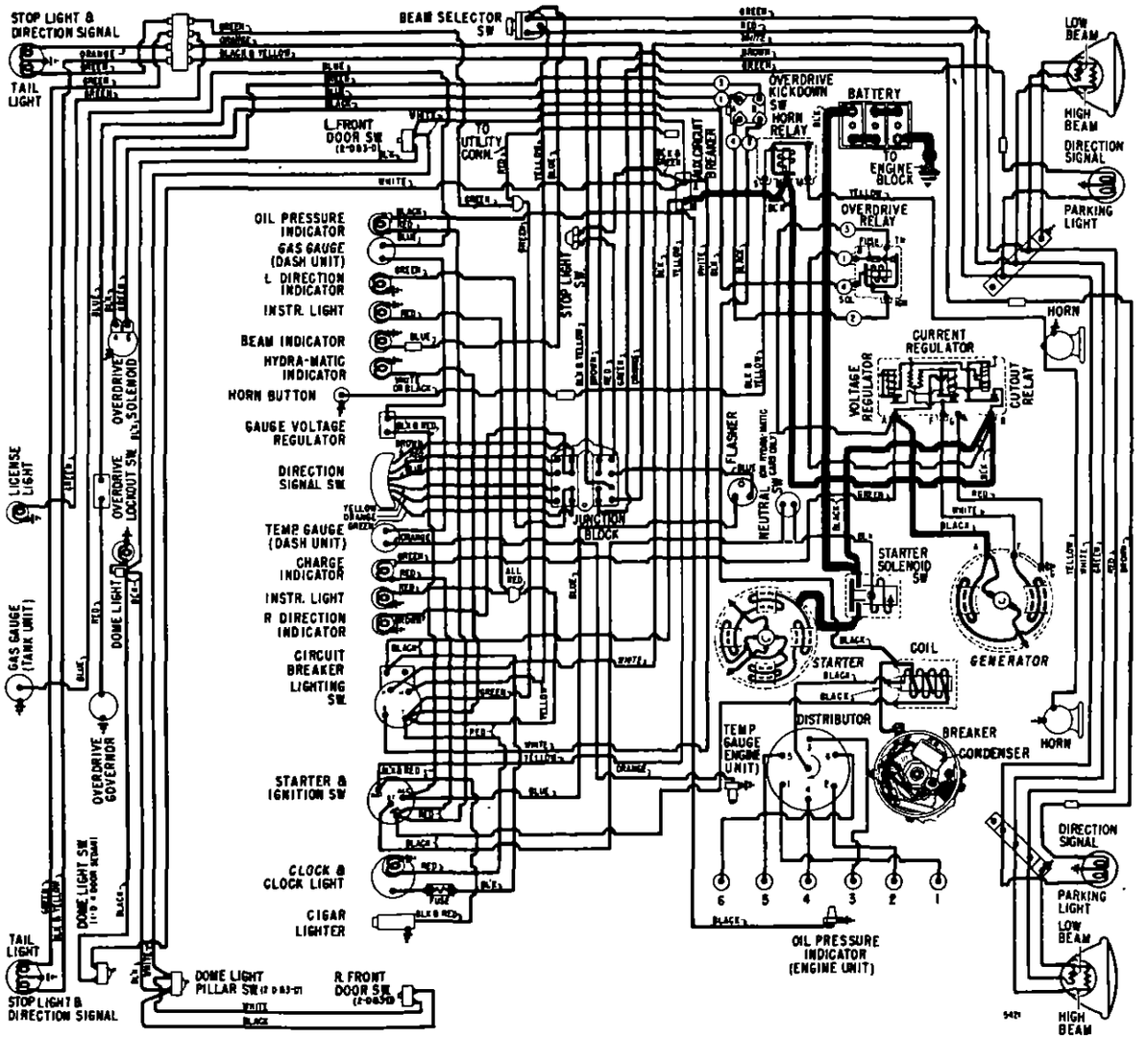
Test A—After 15 minutes operation charging at one-half maximum output.
Test B—After additional 15 minutes operation with current regulator operating (with load applied to hold voltage down to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

►*IMPROVED FLASHER SWITCH OPERATION:* Flasher Switch Hudson No. 309813 replaces 308893 and requires use of Flasher Switch Clamp No. 301775. Place clamp around Flasher and insert base of clamp between base of circuit breaker and cross brace using circuit breaker screw to hold it in place.

►*INSTRUMENT CLUSTER LAMP BULB REPLACEMENT PROCEDURE:* Remove six 1/4" stud nuts and

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lay back instrument cluster. To remove high beam indicator lamp bulb it is now necessary to remove speedometer cover and two screws holding cover to speedometer. **Note**–Use Mazda 44 when replacing for longer life bulb. Instrument lenses may be replaced in same manner.

Headlamps–Sealed Beam. *See Electrical Equipment Section.*

Directional Signal: *See Electrical Equip. Section.*

Lighting Switch Removal: Remove six 1/4" stud nuts, lay back Instrument Cluster. With battery disconnected remove control knob screw and knob, Escutcheon nut and Escutcheon, remove switch and switch wires.

Stop Light Switch Location: At rear of Master Cylinder attached to brake line fitting.

FUSES: Located as follows:

Clock–SFE-3 ampere in fuse case at back of clock.

Weather Control–SFE-14 ampere in fuse case at left side of heater blower.

Radio–SFE-14 ampere in fuse case at left side of radio.

Overdrive–SFE-30 ampere mounted on overdrive relay.

CIRCUIT BREAKERS: Main Circuit Breaker (25 ampere) mounted on lighting switch. **Auxiliary Circuit Breaker** (30 ampere) mounted on instrument structural brace.

HORNS: Auto-Lite (High Pitch) HAB-4626A, (Low Pitch) HAB-4625A.

ENGINE

ENGINE SPECIFICATIONS: 6 cyl. "L" head type.

Model	Bore	Stroke	Displmnt.	Rated HP
1D, 2D, 3D..	3"	4-3/4"	202 cu. ins.	21.6

Model	Comp. Ratio	Developed HP
1D, 2D, 3D	① 7.5-1	104 at 4000 RPM
1D, 2D, 3D	② 8.0-1	114 at 4000 RPM

①Cast Iron Head. ②Aluminum Head with Twin Carburetors.

Compression & Vacuum Reading–*See Tune Up.*

ENGINE REMOVAL: *See Hudson Special Data.*

OIL PAN REMOVAL: Support car on jack stands placed under #2 crossmember. Take out three bolts attaching center steering arm support bracket on this crossmember and drop steering arm and tie rods. Remove flywheel dust cover. Remove oil pan.

►*LOCATING HOLE PLUG CAUTION:* Plug in locating hole in pan flange at left rear of block (behind starter) must be tight fit to prevent oil leakage or contamination of oil by dirt or water.

CYLINDER HEAD & GASKET: Standard cyl. head (Cast Iron) uses gasket Hudson No. 308017 while Aluminum head used with Twin carburetors uses gasket Hudson No. 308019.

Cylinder Head & Gasket Installation–*See Hudson Special Data.*

TIGHTENING TORQUES: *See Hudson Special Data.*

PISTONS

Aluminum alloy, cam ground, four ring type.

►*CAUTION: Pistons are not interchangeable with other Hudson models due to different height from pin to top of piston.*

Weight–10-1/4 ozs.

Removal–Pistons and rods removed from above.

►*PISTON WEIGHT CAUTION:* Piston weight stamped on head. 10 over 1 indicates 10-1/4 oz. piston. Use same weight piston when making replacement.

Fitting New Pistons: Use ribbon feeler 1/2" wide .002" thick between thrust side of piston (opposite valve mechanism) and cylinder wall. Pull required to remove feeler 3-4 lbs.

Original Bore & Piston Sizes & Markings–*See "Original Bore" in Hudson Special Data.*

Replacement Pistons: *See "Pistons" in Hudson Special Data.*

Installing Pistons: Slot away from camshaft.

PISTON PINS

Floating type with locking ring on each end.

Diameter–.7497-.750". **Length**–2.4375".

Clearance in Piston–.0000-.0003" at 70° F or hand push fit, with piston at 200° F.

Clearance in Rod–.0003". Hand push fit at 70° F.

Replacement Pins: Available in the following oversizes, and are identified by a spot of paint on end of pin. Color denotes oversize. Std. (not painted), .001" (yellow), .002"(orange), .005"(white),.010"(blue).

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Comp. (#1,2)	.0775"	.004-.009"	.001"
Oil (#3)	.186"	.004-.009"	.001"
Oil (#4)	.1514"	.004-.009"	.001"

Replacement Rings: Supplied in Standard & .010" oversize.

CONNECTING RODS

Length–Center to center 8.183" to 8.193". **Weight**–26 ozs.

Crankpin Journal Diameter–1.937-1.938". Out-of-round limit .0015" and taper not more than .001".

►*CRANKSHAFT SIZE CODE: See Hudson Special Data.*

Bearings–Steel-backed, babbitt-lined type (upper and lower halves interchangeable), no shims.

Clearance–.0005-.0015".

Side Play–.007-.013".

Replacement Bearings: Standard & .001", .002", .010", .012" undersize.

Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward camshaft side of engine.

CRANKSHAFT

Journal Diameter–2.4988-2.4998". Four bearings. Out-of-round limit .0015".

►*CRANKSHAFT SIZE CODE: See Hudson Special Data.*

Bearings–Steel-backed babbitt-lined. Upper and lower halves of bearings alike.

Clearance–.0005-.0015".

Replacement Bearings: Standard & .001", .002", .010", .012" Undersize.

End Thrust: On No. 3 bearing.

End Play–.003-.009".

Rear Bearing Oil Seal Installation: *See Hudson Special Data.*

CAMSHAFT

Journal Diameters–(1) 2.375", (2) 1.997", (3) 1.965", (4) 1.497".

Bearings–Steel-backed babbitt-lined bushings.

Clearance–.0005-.0015".

End Thrust: Controlled by thrust plate behind camshaft sprocket.

End Play–.003-.005".

Timing Chain: Link Belt. **Width** 1.000". **Pitch** .375". **Links** 60.

Camshaft Setting: Timing chain has two marked links six full links apart. Both crankshaft and camshaft sprockets have a marked tooth. With crankshaft sprocket installed and turned to TDC position, install one marked link over crankshaft sprocket marked tooth, insert sprocket into chain with marked link over marked tooth, rotate camshaft until screw holes line up and install screws.

VALVES

Tappet Clearance: Intake .010", Exhaust .012". Hot.

Valve	Head Diameter	Stem Diameter	Length
Intake	1.500"	.3417"	5.045"
Exhaust	1.395"	.3407"	5.043"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.346"	.001-.003"
Exhaust	45°	.346"	.003-.004"

Valve Seat Width–Intake .054", Exhaust .075".

Valve Springs: Install valve springs with closely coiled end of spring up.

Free Length–2.1875".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	40-48	1.953"
Open	116-124	1.607"

Valve Guides: Remove Tappet adjusting screws and drive out with tool J-267. Use tool J-883-A installer and tool J-883-10 pilot to replace guide. Insert guide to a depth of 1-9/32" from top of guide to top of valve seat.

Valve Lifters: Mushroom type self-locking adjusting screws. Remove from below with camshaft out. Serviced by installing oversize lifters.

Diameter–.62325-.62375". **Length**–2.310".

Clearance–.00075-.0015".

Replacement Lifters–Std., .002", .004", .010" Oversize.

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VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 26.8° BTDC. Close 99.7° ALDC.
Exhaust Valves—Open 64.9° BLDC. Close 45.7° ATDC.
Valve Timing Check—Set No. 1 Intake Valve Tappet at .010" clearance hot and insert .002" feeler between tappet and valve stem. Rotate engine clockwise until a slight drag is felt on feeler gauge. The engine is properly timed if the long mark (1UDC) is 1" from pointer. The first small mark should be 1/4" before the pointer.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 5-1/2 qts. (dry engine).
Note—1 qt. additional for dry filter.
Normal Oil Pressure: 40 lbs. at 30 MPH.
Pressure Regulator Valve—Non-adjustable relief valve and spring under plug on left side of engine.
Oil Pressure Indicator—Hudson "Teleflash" with Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:
Oil Pressure Warning Switch—King-Seeley No. 47170. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch is sealed (Not adjustable).
Oil Pump: Rotor type. Angle mounted on right side of engine and driven by camshaft.

Pump Overhaul—*See Hudson Special Data.*
►*OIL PUMP REMOVAL CAUTION: See "Oil Pump Removal" under Oil Pump in Hudson Special Data.*
Oil Filter: Fram or Hudson. Replace filter cartridge at 5000 mile intervals.
Replacement Filter Element—Hudson No. SP-302496.
Crankcase Ventilator: Oil-wetted type filter element in oil filler cap, (air intake). Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Water Capacity: 16 qts. with heater. 15 qts. without heater.

Pressure Valve: AC No. 850549 Radiator filler cap. 7 lbs. pressure.
Thermostat: Hudson No. F-308042 (Std.) No. SP-307952 (High type for permanent anti-freeze). Std. opens at 150-155° F. High type opens at 165-170° F.
Water Pump: Centrifugal, belt driven, packless type. Shaft mounted on sealed duplex ball bearing. *See "Hudson" in Water Pump Section.*

Pump Removal—Remove Generator adjusting bracket, remove fan blade assembly and pump mounting bolts. Remove pump from engine.

Temperature Gauge: King-Seeley Electric "CV" (constant voltage) with voltage regulation.
Dash Unit—King-Seeley 46197.
Engine Unit—King-Seeley 44200.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck Model 9A7. Assembly No. 361361. Single plate dry disc.
See "Borg & Beck" in Clutch Section.
Clutch Disc. No. B & B No. 382118 (Std. Trans.), **B & B No. 382191** (Overdrive).
Pedal Adjustment: Tighten or release adjusting nut on clutch adjusting link to obtain 3/4—1-1/4" distance from under surface of floor board to top face of clutch shank.
Removal: Place car on jack stands. Remove propeller shaft, speedometer cable and disconnect selector levers. (Disconnect wiring on Overdrive equipped cars) Remove screws holding cross shaft support assembly. With transmission supported on jack, disconnect throw-out lever rod. Remove screws holding throw-out lever boot and retainer. Remove transmission support screws and slide transmission back and lower to floor. Remove retaining pin and spring from clutch bell housing and throw-out lever pivot. Remove throw-out release assembly from housing. Punch mark cover pressure plate lug and flywheel for reassembly. Remove assembly to flywheel cap screws uniformly to reduce spring tension and lower clutch assembly.

SYNCHRO-MESH TRANSMISSION

Warner—With and without Overdrive. *See "Warner Transmissions" in Transmission Section.*
Transmission Control: *See "Transmission Controls" in Transmission Section.*
Removal: Disconnect universal joint at rear axle companion flange, and remove propeller shaft as an assembly. Tape around bearing cups to retain cups and rollers. Disconnect transmission shift control rods at transmission shift levers. Disconnect speedometer cable and remove speedometer gear. Remove clutch cross shaft support screws and support. Disconnect adjusting rod at outer end of throw-out lever and remove retainer and boot from lever. Remove the two top transmission to bell housing bolts (use universal socket on 10" extension). Install two guide pins Tool J-2969 in these bolt holes. Remove remaining two bolts, slide transmission back and lower to floor.

OVERDRIVE

Warner R10—*See "Warner R10 Overdrive" in Transmission Section.*
Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with fluid coupling.
See "Hydra-Matic Drive" in Transmission Section.
►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*
Lubrication—Check fluid level every 1000 miles of operation. Drain and refill every 25000 miles, Use only "Hydra-Matic Drive Fluid" type A.
Capacity—8-1/2 qts. (refill).
Checking Fluid Level—Set hand brake and allow engine to idle with Hydra-Matic Selector lever in "Dr4" position for two minutes. Place selector lever in "N" position. Roll back floor mat and remove oil level indicator (after cleaning all lint and dirt from around indicator). Wipe indicator dry and check fluid level. Fluid level must be to "F" mark.

►*CAUTION: Do not check oil level when transmission is excessively hot and do not fill above "F" mark on dip stick.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer. One at each end of propeller shaft.

REAR AXLE

Spicer 44-2. Semi-floating, hypoid gear type with Hotchkiss drive.
See "Spicer Hypoid" in Rear Axle Section.

	Axle Ratio	
Synchro-mesh	Overdrive	Hydra-Matic
4.1-1 (Std.)	4.27-1 (Std.)	3.54-1 (Std.)
4.27-1 (Opt.)	4.1-1 (Opt.)	3.31-1 (Opt.)
3.31-1 (Opt.)	3.31-1 (Opt.)	
	3.54-1 (Opt.)	

Gear & Pinion Teeth. 4.10 (41-10); **4.27** (47-11); **3.31** (43-13); **3.54** (46-13).
Severe Usage Ratios—4.89-1, 4.27-1, 4.09-1, 3.92-1, 3.54-1, 3.31-1.
Rear Axle Ratio Note—*Ratio is marked on metal tag attached to rear axle by rear axle cover bolt. A tag marked 43 over 13 would mean the axle ratio was 3.31 to 1.*
Back Lash—.002-.006" desired.

Axle Shaft Removal: Raise rear end of car off floor and place jack stands under axle assembly. Disconnect brake cables at toggle and unhook brake cables from parking brake levers. Disconnect brake hose at frame connection and brake lines from wheel cylinders. Remove wheel & hub. Remove backing plate bolts and backing plate, wheel bearing oil seal caps and axle shims (shims only on right side). Tie shims together for reinstallation. Use Puller J-352-B to remove axle shaft and Puller J-943 to remove seal.

Rear Axle Assembly Removal: Place jack stands under frame just ahead of rear springs. Disconnect brake cables at toggles and unhook from parking brake levers, brake hose from frame connection, brake line from wheel cylinders. Remove wheels, brake cylinders, backing plates and pull axle shafts. Disconnect propeller shaft at rear companion flange (tape rollers and caps to prevent falling off). Remove nuts from spring "U" bolts and the lower shock absorber studs. Disconnect stabilizer. Lower assembly and roll from beneath car.

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Wheel Bearing Adjustment: Controlled by shims (.003", .005", .010", & .030") between backing plate (on the right side only) and end of axle housing. To adjust remove wheel and backing plate (above), add or remove shims for end play.
End Play–.001" to .004".

SHOCK ABSORBERS

Monroe–Direct acting hydraulic type. Units are sealed (serviced by replacement).

Hudson Shock Absorber Nos.

1953 Models

Control	Front	Rear
Light	308394	308395
Heavy	308996	308997
Extra Heavy	308998	308999

1954 Models

Control	Front	Rear
Light	308996	308997
Heavy	311326	311327
Ex. Heavy	311328	311329
Severe Usage	309862	309863

FRONT SUSPENSION

Independent linked parallelogram type with coil springs and lateral stabilizer.
See "Hudson" in Front Suspension Section.
King Pin Inclination–3°58' crosswise.
Caster–0° ± 1/2° (Neg. 1/2° desired with empty car).
Camber–1/4°–1 1/4° Pos.
Maximum variation between right and left wheel Caster or Camber 1/2°.
Toe-in–0"-1/16" measured at wheel rim.
Toe-out on Turns–Inner wheel 30°, Outer wheel 25°. Maximum allowable variation between wheels 1/2°.

STEERING

Gemmer–Worm and 2 tooth roller, with push-pull adjustment.
See "Gemmer Steering Gears" in Steering Gear Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix (Lockheed) Hydraulic–Self centering (floating shoe) type. Parking lever applies rear service brakes.
NOTE–No anchor pin adjustment.
See "Bendix (Lockheed) Self-Centering" in Brake Section.
Drums–Diameter 9" Centrifuse cast iron. 11" Severe Usage 1D, 2D.
Wheel Cylinder Diameter–Front 1-1/8", Rear 15/16".
Replacement Lining and Shoes–Linings or shoes with linings come in Std. or .030" oversize.

Lining Width & Thickness

Service	Front	Rear
Standard	2" x .175"	2" x .175"
Severe Usage 1D, 2D	1-3/4" x .175"	

Clearance–Eccentric adjustment for each shoe (2 per wheel). Tighten adjustment until wheel drag is heavy and back off eccentric until wheel is free. *NOTE*–Locknuts used on eccentrics.
Standard Master Cylinder: On frame to left of transmission.
Checking Fluid–Access hole in floor pan. Roll back floor covering, remove access hole cover, clean lint and dirt from filler plug, remove plug. Fluid should be 1/2 to 1" below top of filler opening.
Removal–Remove from beneath car. Not necessary to disturb other parts.

MISC. MECHANICAL

Windshield Wipers: Vacuum operated type. *See "Windshield Wipers" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model

4D ..... Wasp
5D ..... Super Wasp
7D ..... Hornet

SERIAL & ENGINE NUMBERS: Stamped on plate on right front door body hinge post and also on top of right frame side rail near dash panel: Engine number which is the same as serial number is read downward and located on the front face of the cylinder block at top right corner.

Starting Serial Number—269069 for all models and runs consecutively. A digit preceeding this number designates the model: **4**—Wasp, **5**—Super Wasp, **7**—Hornet.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. min. at cranking speed. Allowable variation between cylinders 10 lbs.

VACUUM READING: Steady 17-20" at idling speed.

VALVE TAPPET CLEARANCE: Intake .008", Exhaust .010" hot.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No Adj. Valve must operate freely.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .032".

Spark Plug—(4D, 5D) Champion H10, (7D) Champion H11. 14 mm.

COIL: Auto-Lite 6012-A.

Ignition Current—2.5 amps. idling, 4.5 amps. stopped.

DISTRIBUTOR: Auto-Lite IAT-4009 (4D with 232" engine), **Auto-Lite IAT-4009-B** 4D, 5D, 7D (with 262" & 308" engine).

Condenser—Auto-Lite IAT-3076R. **Capacity** .21-.25 mfd.

Contact Point Set—Auto-Lite IAT-3028BS.

Breaker Gap—.020".

Cam Angle—39°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

►*DISTRIBUTOR INSTALLATION NOTE:* Engine rotation while oil pump removed affects timing. *See "Oil Pump Removal" under Oil Pump in Hudson Special Data.*

Automatic Advance (IAT-4009)

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
1	333	2	666
3	400	6	800
9	1100	18	2200
10	1200	20	2400

(IAT-4009-B)

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	500	0	1000
1	675	2	1350
4	1150	8	2300
8	1825	16	3650
9	2000	18	4000

Vacuum Spark Control: Auto-Lite integral type.

Vacuum Advance (IAT-4009)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	9½
1	2	10
3	6	11
5	10	12

(IAT-4009-B)

Start	0	9-1/4
1	2	10
2	4	10-1/2
3	6	11
3.75	7.5	11-1/2

IGNITION TIMING

Setting—TDC (Long line before "1UDC" on flywheel).

►*IGNITION TIMING CAUTION:* When setting timing with timing light, disconnect vacuum line from distributor and plug line to prevent disturbing engine performance.

Timing Mark—Long line before "UDC1" on flywheel. Timing is correct when the long line ahead of "UDC1" appears in line with pointer at opening of rear engine support plate.

CARBURETOR

►*CARBURETOR APPLICATION:* Single carburetors used on all models or two carburetors used with Twin-H Power, all models.

WASP

Carter WA1 7495—Single barrel downdraft with automatic choke.

Idle Setting—1/2—1-1/2 turns open. Turn screw out for richer mixture.

Idle Speed—550 RPM (Std. & O.D. Trans.), 500 RPM (Hydra-Matic or Automatic Trans. in "DR" range).

Float Level—1/2" distance from top of seam on float to tip on lower edge of float chamber, when needle is seated.

Accelerating Pump—Outer hole normal, inner hole if less charge required.

Fast Idle: 5/8" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending link at lower offset.

Automatic Choke Setting: Set at index.

Hydra-Matic & Automatic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" and "Studebaker Automatic Transmission" in Transmission Section.*

►*OTHER DATA: See "Carter WA1 Carburetor" in Carburetor Section.*

Fuel Pump Pressure: 3-1/2—5-1/2 lbs. (Std.), 4-5 lbs. (Combination).

SUPER WASP & HORNET

Carter WGD 2115S—Dual downdraft type with automatic choke.

Idle Setting—3/4—1-3/4 turns open. Turn screws out for richer mixture.

Idle Speed—550 RPM (Std. & O.D. Trans.), 500 RPM (Hydra-Matic & Automatic Trans. in "DR" range).

Float Level—3/16" between top of float and bowl cover with cover inverted and gasket removed.

Accelerating Pump—No seasonal adjustment required.

Fast Idle: .026" throttle opening with choke valve closed. Check with thermostatic coil housing, gasket and baffle removed. Crack throttle valve, hold choke valve closed, move throttle toward closed position as far as possible. If throttle opening not exactly .026" bend connector link at lower angle.

Automatic Choke Setting: Set 2 points lean.

Hydra-Matic & Automatic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" & "Studebaker Automatic Transmission" in Transmission Section.*

►*OTHER DATA: See "Carter WGD Carburetors" in Carburetor Section.*

Fuel Pump Pressure: 3-1/2—5-1/2 lbs. (Std.), 4-5 lbs. (Combination).

TWIN H-POWER (ALL)

Carter WA1 2114S (4D, 5D), Carter WA1 2113S (7D). Two used. Single barrel downdraft with automatic choke.

►*TWIN-H POWER CARBURETOR ADJUSTMENT CAUTION:* Proceed as follows:

Idle Setting—For correct equalization of both carburetors: Remove air cleaners, install adjusting pin J-2544-1 through accelerator pedal link bellcrank lever and in hole in cylinder block to lock lever. On 5D, adjust throttle shaft rod trunnion to 1-25/32" from top face of bracket to center of clevis pin hole in cross shaft lever. Connect tachometer, but before warming up engine, remove clevis pin from ends of both throttle shaft to carburetor rods, position fast idle cam on each carburetor "off" position and turn each throttle stopscrew in until it just touches the cam. Set idle mixture screws exactly 2 turns open (7D), 1-1/4 turns open (4D, 5D). Warm engine, then adjust for correct idle speed (see below). Adjust each idle mixture adjusting screw for maximum increase in *idling speed and readjust throttle stop screws for* correct idling speed (*CAUTION*—turn stopscrew on each carburetor an equal amount). Adjust front and rear throttle shaft-to-carburetor rod clevises so that clevis pins can be installed freely, connect rods. On Hydra-Matic cars adjust throttle linkage (see Hydra-Matic Drive & Studebaker Automatic Trans. Linkage adjustment in Transmission Section). Remove linkage adjusting pin, adjust accelerator pedal to bellcrank rod to get 1/64-1/16" clearance between pedal and pedal stop at wide open throttle, reinstall air cleaners.

Idle Speed—540-560 RPM (Std.), 490-510 RPM (Hydra-Matic & Automatic), 575 RPM (Overdrive).

Float Level—1/2" from top of float seam to tip on lower edge of float chamber cover.

Accelerating Pump—Outer hole normal, inner hole if less charge required.

Fast Idle—1/2" (2114S), 5/8" (2113S) clearance between choke valve and air horn with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending at lower offset.

Automatic Choke—Set 1 point lean.

Hydra-Matic & Automatic Trans. Throttle Linkage Adjustment: *See "Hydra-Matic Drive" & "Studebaker Automatic Trans." in Transmission Section.*

►*OTHER DATA: See "Carter WA1 Carburetors" in Carburetor Section.*

Fuel Pump Pressure: 3-1/2—5-1/2 lbs. (Std.), 4-5 lbs. (Combination).

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CARB. EQUIPMENT

Fuel Pump: Carter M-729SZ Std., AC No. 4057 (Optl. Fuel & Vacuum).
Pressure–3-1/2–5-1/2 lbs. (Carter), 4-5 lbs. (AC).
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: King-Seeley Electric CV (constant voltage) type with voltage regulator.
Dash Unit–King-Seeley 46379.
Tank Unit–King-Seeley 44513.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

National 2LS-100–6 volt, 17 plate, 100 ampere hour (20 hr. rate).
Battery Ground–Positive (+) terminal.
Engine Ground–Left front engine mount and frame.

STARTER

Auto-Lite Starter	Armature
4D, Synchro-mesh MZ-4167	MZ-2312
5D, 7D Synchro-mesh MCH-6109	MCH-2084
4D, 5D, 7D Auto. Trns.. MCH-6204	MCH-2088

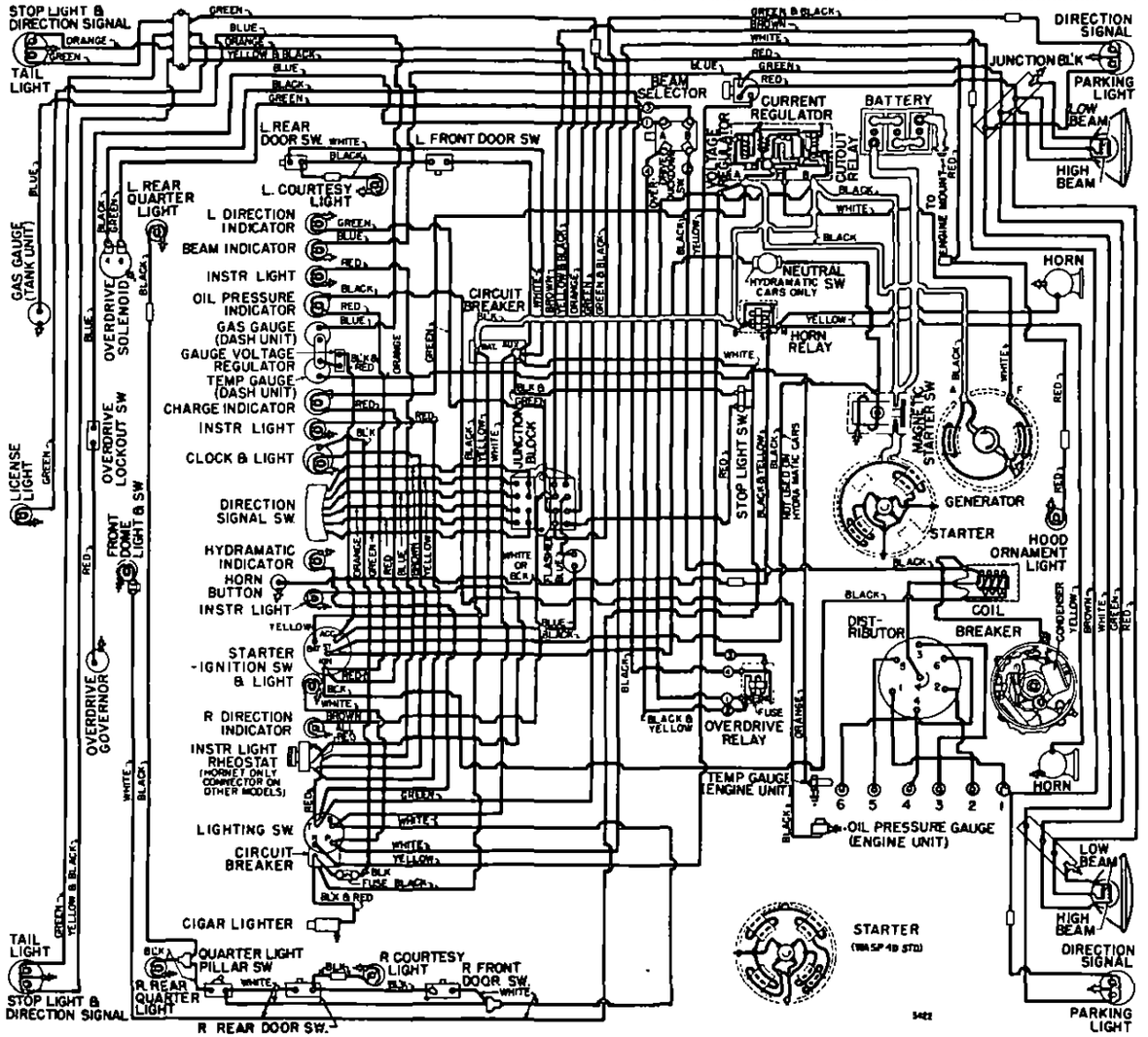
Drive–Bendix A1806 (Std. Trans.), A1792 (Auto. Trans.).
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–42-53 ozs.

Performance Data
MZ-4167

Torque	RPM	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 ft. lbs.	Lock	2.0	280

MCH-6109 & 6204

0 ft. lbs.	4300	5.0	65
6.0 ft. lbs.	Lock	2.0	335



Starting Switch: Auto-Lite Magnetic type **SS-4030** or **RBM-2201-15.** Controlled by combination starting and ignition switch.
Neutral Safety Switch: Hudson No. 304524 located at lower end of steering column. Connected in starter control circuit so that starter operates only when selector lever is in "N" Neutral.
Adjustment–*See "Hydra-Matic Drive" or "Automatic Transmission" in Transmission Section.*

GENERATOR

Auto-Lite GGW-4801B (Std.), GGJ-6101E (Optl.).
Armature Number–GGW-2006F (GGW-4801-B).

Performance Data
(GGW-4801-B)

Amperes	Volts	Cold – RPM –	Hot
0	6.4	870-900	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

(GGJ-6101-E)

0	6.0	600-700	650-750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Brush Spring Tension–35-53 ozs.
Field Current–1.4-1.5 Amperes at 5.0 volts. (GGW-4801-B), 1.4-1.6 Amperes at 5.0 volts (GGJ-6101-E).
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: 3/4" belt deflection midway between generator and water pump pulleys.

REGULATOR

Auto-Lite VBE-6104A (GGW-4801-B Gen.) VBF-6003A (GGJ-6101-E Gen.). Voltage and Current type with "Temperature Compensated" current regulation.

Cutout Relay
Cuts In–6.3-6.8 volts (set to 6 4-6.6 volts).
Cuts Out–4.1-4.8 volts.
Contact Gap–.015" Minimum.
Air Gap–.031-.034" at hinge end of core with contacts just closed.

Voltage Regulator
Setting–7.2-7.5 volts (VBE-6104A), 7.1-7.4 volts (VBF-6003A) in normal operation charging at 1/2 maximum rate.
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator
▷*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°.*

	Test A Operating Amperes	Test B
VBE-6104A	52 Max.	45 (43-47)
VBF-6003A	66 Max.	55 (53-57)

Test A–After 15 minutes operation charging at one-half maximum output.
Test B–After additional 15 minutes operation with current regulator operating (with load applied to hold voltage down to 6.7-6.9 volts on "VBE" or 6.7-7.0 volts on "VBF").
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Head Lamps: Sealed Beam. *See Electrical Equipment Section.*
Directional Signals: *See Electrical Equip. Section.*

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Lighting Switch Removal: Disconnect Negative battery cable, loosen screw and remove control knob, remove escutcheon nut and escutcheon, remove switch and wires from switch.

Stop Light Switch Location: At rear of Master Cylinder (Std. Brakes) ahead of Master Cylinder (Power Brakes).

FUSES: Located as follows:

Clock–SFE-3 ampere in fuse case at back of clock.

Weather Control–SFE-14 ampere in fuse case at left side.

Radio–SFE-14 ampere in fuse case at left side of radio.

Overdrive–SFE-30 ampere mounted on overdrive relay.

CIRCUIT BREAKERS: Main Circuit Breaker (25 ampere) mounted on lighting switch. **Auxiliary Circuit Breaker** (30 ampere) mounted on instrument structural brace.

HORNS: Auto-Lite (High Pitch) HAB-4626A, (Low Pitch) HAB-4625A.

ENGINE

ENGINE SPECIFICATIONS: 6 cyl. "L" head type.

Model	Bore	Stroke	Displmnt.	Rated HP
4D	3-9/16"	3-7/8"	232 cu. ins.	30.4
5D	3-9/16"	4-3/8"	262 cu. ins.	30.4
7D	3-13/16"	4-1/2"	308 cu. ins.	34.9

Model	Comp. Ratio	Developed HP
4D	① 7.0-1	126 at 4400 RPM
4D	② 7.5-1	129 at 4400 RPM
5D	① 7.0-1	140 at 4000 RPM
5D	② 7.5-1	143 at 4000 RPM
5D	② 7.5-1 ③	149 at 4000 RPM
7D	① 7.0-1	156 at 3800 RPM
7D	② 7.5-1	160 at 3800 RPM
7D	② 7.5-1 ③	170 at 4000 RPM

① Cast Iron Head.
② Aluminum Head.
③ Twin-H Power.

Compression & Vacuum Reading–*See Tune Up.*

ENGINE REMOVAL: *See Hudson Special Data.*

OIL PAN REMOVAL: Support car on jack stands placed under #2 cross-member. Take out three bolts attaching center steering arm support bracket on this cross-member and drop steering arm and tie rods. Remove flywheel dust cover. Remove pan.

►*LOCATING HOLE PLUG CAUTION: Plug in locating hole in pan flange at left rear of block (behind starter) must be tight fit to prevent oil leakage or contamination of oil by dirt or water.*

CYLINDER HEAD GASKET: Used as follows:

Model	Cast Iron Hd.	Aluminum Hd.
4D	309112	309114
5D	309116	309118
7D	309120	309122
7D (Exc. 6.8-1)		307408
7D (7X Eng.) Severe Usage		309390

Cylinder Head & Gasket Installation–*See Hudson Special Data.*

TIGHTENING TORQUES: *See Hudson Special Data.*

PISTONS

►*CAUTION:* Pistons NOT INTERCHANGEABLE between engines due to different height from pin hole to top as follows: 4D–2.310-2.314", 5D–2.060-2.064", 7D–1.967-1.971".

Aluminum alloy, cam ground, four ring type.

Original Bore & Piston Sizes & Markings–*See "Original Bore" in Hudson Special Data.*

Weight–18-1/8 ozs. (4D, 5D), 18-5/8 ozs. (7D).

Removal–Pistons & Rods removed from above.

►*PISTON WEIGHT CAUTION:* Piston weight stamped on head of piston. Use same weight piston when replacing pistons.

Fitting New Pistons: Use ribbon feeler 1/2" wide .002" thick and scale with cylinder and piston both at 70° F. Piston is properly fitted when 3-4 lbs. pull required to remove feeler.

Replacement Pistons: *See "Pistons" in Hudson Special Data.*

Installing Pistons: Slot away from camshaft.

PISTON PINS

Floating type with locking ring at each end.

Diameter–.968". **Length**–2.937".

Clearance in Piston–From .000 to .0003" at 70° F.

Clearance in Rod–Hand push fit at 70° F.

Replacement Pins: Available in the following oversizes and identified by a spot of paint on end of pin. Color denotes oversize. Std. not painted, .001" yellow, .002" orange, .005" white, .010" blue.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Comp.	.0775"	.006-.014"	.001"
Oil (#3)	.186"	.006-.014"	.001"
Oil (#4)	.1545"	.006-.014"	.001"

Replacement Rings: Supplied in Standard & .010" Oversize.

CONNECTING RODS

Length–Center to center 8-1/8". **Weight**–34.24 ozs.

Crankpin Journal Diameters–2.125". Out of round limit .0015".

►*CRANKSHAFT SIZE CODE: See Hudson Special Data.*

Bearings–Steel-backed Babbitt. (Upper & lower halves interchangeable). No shims.

Clearance–.0005-.0015".

Side Play–.007-.013".

Replacement Bearings: Standard, .001", .002", .010", .012" Undersize.

Installing Rods: Not offset. Oil spit hole in lower end of rod must be toward camshaft side of engine.

CRANKSHAFT

Journal Diameter–2.4988-2.4998".

►*CRANKSHAFT SIZE CODE: See Hudson Special Data.*

Bearings–Steel-backed, Babbitt-lined. Upper and Lower halves of bearings alike. No shims.

Clearance–.0005-.0015".

Replacement Bearings: Standard, .001", .002", .010", .012" Undersize.

End Thrust: On No. 3 bearing.

End Play–.003-.009".

Rear Bearing Oil Seal Installation: *See Hudson Special Data.*

CAMSHAFT

Journal Diameters–(1) 2.375", (2) 1.997", (3) 1.965", (4) 1.497".

Bearings–Steel-backed, Babbitt-lined bushings.

Clearance–.0015-.002".

End Thrust: Controlled by thrust plate behind camshaft sprocket.

End Play–.003-.005".

Timing Chain: Link Belt. Width 1.250". Pitch .375". Length 60 Links.

Camshaft Setting: Timing chain has two marked links, six full links apart. Both crankshaft and camshaft sprockets have a marked tooth. With crankshaft sprocket installed and turned to TDC position, install one marked link over crankshaft sprocket marked tooth, insert camshaft into chain with marked link over marked tooth, rotate camshaft until screw holes line up and install screws.

VALVES

Tappet Clearance: Intake .008", Exhaust .010" hot.

Valve	Head Diameter	Stem Diameter	Length
Intake	1.831"	.3417"	5.815"
Exhaust	1.561"	.3407"	5.815"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.346"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

Valve Seat Width–Intake .054", Exhaust .075".

►*VALVE GRINDING CAUTION:* Replace valve when grinding reduces distance from upper edge of valve seat to top of valve to less than 1/16".

Valve Springs: Install valve springs with closely coiled end of spring up.

Free Length–2.500".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	77	2 3/16"
Open	160	1 27/32"

Valve Guides: Remove Tappet adjusting screws and drive out guides with tool J-267. Use tool J-883-A Installer and tool J-883-10 Pilot to replace guide. Insert guide to a depth of 1 9/32" from top of guide to top of valve seat.

Valve Lifters: Mushroom type fitted directly in crankcase. Removed from below with camshaft out. Serviced by installing oversize lifter.

Clearance–.00075-.0015".

Replacement Lifters–.002", .004", .010" Oversize.

►*VALVE LIFTER NOTE*–Replace tappet (excessive oil consumption) when oil is expelled in squirts from around tappet. Check for out of round bore in block. Oversize available .002", .004" & .010".

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 33.7° BTDC. Close 80.1° ALDC.

Exhaust Valves–Open 73.9° BLDC. Close 28.4° ATDC.

Valve Timing Check–Set No. 1 Intake Valve Tappet at .010" clearance (hot) and insert .002" feeler between tappet and valve stem. Rotate engine clockwise until a slight drag is felt on feeler gauge. The engine is *properly timed when the first of the five timing marks* on the flywheel is 5/8" above the pointer in timing hole. Reset valve tappet to specifications.

OILING SYSTEM

Crankcase Capacity: 7 qts. refill, 7-1/2 qts. dry.

Normal Oil Pressure: 40 lbs. at 30 MPH.

Pressure Regulator Valve–Non-adjustable relief valve and spring under plug in left side of engine.

Oil Pressure Indicator–Hudson "Teleflash" with Oil Pressure Warning Switch. Consists of light on instrument panel operated by switch as follows:

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Oil Pressure Warning Switch–King-Seeley No. 47170. On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch is sealed (not adjustable).

Oil Pump: Rotor type. Angle mounted on right side of engine and driven from camshaft.

Pump Overhaul–*See "Oil Pump" in Hudson Special Data.*

Oil Filter: Fram or Hudson. Replace filter cartridge at 5000 mile intervals.

Replacement Filter Element–Hudson No. SP-302496.

Crankcase Ventilator: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

Water Capacity: 19-1/2 qts. *NOTE*–Capacity without heater 18-1/2 qts.

Pressure Valve: Hudson No. 302265. Radiator filler cap pressure type.

Thermostat: Hudson No. 166272 (Std.), 161664 (High type for permanent Anti-Freeze). Standard type opens 150-155° F, High type opens 165-170° F.

Water Pump: Centrifugal, belt driven, packless type. Shaft mounted on sealed duplex ball bearing. *See "Hudson" in Water Pump Section.*

Pump Removal–Remove generator adjusting bracket, remove fan blade as assembly and pump mounting bolts. Remove pump from engine.

Temperature Gauge: King-Seeley Electric "CV" type (constant voltage) with gauge voltage regulator.
See "Temperature Gauges" in Miscellaneous Section.

Dash Unit–King-Seeley 46372.

Engine Unit–King-Seeley 44200.

Gauge Voltage Regulator–King-Seeley 46377.

CLUTCH

Own. Single plate fluid cushioned type (cork insert driven member) operating in Hudsonite oil. 9" on 4D (less Overdrive), 10" 4D (with Overdrive), 5D, 7D.

►*CLUTCH STICKING CORRECTION: See "Clutch Notes" in Hudson Special Data for Flushing instructions.*

See "Hudson Clutches" in Clutch Section.

Clutch Lubrication: *See "CLUTCH SERVICING" in Hudson Special Data.*

Clutch Disc No.–Hudson 303342 (9"), 304885 (10").

Pedal Adjustment: 1-1/2" between floor board and rear face of pedal. Adjust by loosening locknut above clevis and turn clevis in or out as required.

Removal: Remove transmission (see Transmission Removal following). Drain clutch oil by turning engine over until plug on flywheel is accessible through timing inspection hole in rear engine support plate behind starter, remove plug, turn engine over 1/3 revolution until star on flywheel visible through timing hole (drain hole then at bottom), allow lubricant to drain. Unhook clutch pedal lever return spring, remove two clutch cross shaft bracket bolts and remove the bracket. Remove clutch control link clevis pin and disconnect the clevis. Install engine holding fixture J-4651 (position "U" shaped section around oil pan and engage adjusting hooks in holes provided on each side of frame). Remove flywheel dust pan by taking out two attaching screws. Take out two engine rear mounting bolts and nuts at No. 3 cross member. Raise engine rear support approximately 1/2" off cross member by adjusting the holding fixture hooks *(NOTE*–If holding fixture not available, use hydraulic jack with block of wood to prevent damage to pan to raise engine). Take out two top screws attaching clutch housing to engine rear end plate (use universal socket and extension). Remove breather pipe bracket, remove bolt attaching breather pipe and rear valve chamber cover, remove breather pipe. Remove flywheel pointer, remove starter. Take out two lower attaching screws and remove clutch housing assembly *(CAUTION*–Take care that throw-out collar and bearing does not drop out of clutch cover bore). Loosen all clutch cover-to-flywheel screws evenly to relieve spring pressure, take out screws and remove clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model AS63-T86E (4D, 5D) Without Overdrive. AS65-T86E (7D) Without Overdrive. AS64-T86E (4D, 5D, 7D) With Overdrive. Three speed, all helical gear type.

See "Warner Transmission" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: *(NOTE–This transmission removed from underneath car. Not necessary to remove floor mat and cover).* Drain lubricant and disconnect front universal joint (retain universal joint bearing cups with tape to hold bearings in place). Loosen nut on propeller shaft center bearing support nut, disconnect propeller shaft by sliding shaft rearward, disconnect shift rods, speedometer cable (if car is equipped with overdrive, disconnect control cable and wiring from overdrive at transmission), and remove speedometer pinion. Remove nut from front end of brake pivot brace at No. 3 cross-member and remove clevis pin at rear end of brace and move linkage to left side of car. With universal socket on a 10" extension, remove two top bolts attaching transmission-to-clutch housing. Insert in their place, guide studs J-2969 to guide transmission during removal. Remove the two lower transmission-to-clutch housing bolts and lower transmission out of car.

OVERDRIVE

Warner R10. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *See "Warner R10 & R11 Overdrive Controls" in Transmission Section*

HYDRA-MATIC DRIVE

Dual Range. Four-Speed Planetary type automatic transmission with Modulated Throttle Pressure and Hydraulically operated reverse.

See "Hydra-Matic Drive" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication–Check fluid level every 1000 miles of operation, drain and refill every 25,000 miles. Use only Hydra-Matic Drive fluid.

Capacity–8-1/2 qts.

Checking Fluid Level–Set hand brake and allow engine to idle with selector lever in "DR4" position for two minutes. Place selector lever in "N" position. Roll back floor mat and remove oil level indicator (after cleaning all lint and dirt from around indicator). Wipe indicator dry and check fluid level. Fluid level must be to "F" mark.

►*CAUTION: Do not check fluid level when transmission is excessively hot and do not fill above "F" mark on dip stick.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

AUTOMATIC TRANSMISSION

Detroit–Torque Converter and 3 speed automatic planetary transmission with hydraulic control.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmissions" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Studebaker Automatic Transmissions" in Transmission Section.*

Lubrication: Check fluid level every 1,000 miles, drain and refill every 25,000 miles. Use "Hydra-Matic Drive" or "Automatic Trans." fluid type A.

Checking Fluid Level–Apply Parking Brake, place Selector Lever in "L" position, operate engine at idling speed to obtain normal operating temperature. Roll back left floor mat, remove access hole cover, clean area around gauge cap and withdraw gauge. Oil level should be tested with engine idling and Selector Lever in "L" position. Add oil to bring level to full mark.

Capacity–11 qts. (Place 6 qts. in transmission, operate at idle with Selector lever in "L" position and add fluid to bring level to full mark).

►*OTHER AUTOMATIC TRANS. SERVICE DATA: See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer. One at each end of propeller shaft.
See Universals Section for complete data.

►*ASSEMBLY CAUTION:* The tack welded tie-bar or the welded spots where the bar was attached must be located in the relief of the companion flanges when assembling the universal.

REAR AXLE

Spicer 44-2. Semi-floating, hypoid gear type with Hotchkiss drive.
See "Spicer Hypoid" in Rear Axle Section.

	Axle Ratio	
Synchro-mesh	**Overdrive**	**Automatic**
4.09-1 (Std.)	4.55-1 (Std.)	3.07-1 (Std.)
4.55-1 (Opt.)	4.09-1 (Std.)	

Severe Usage Ratios–4.55-1, 4.27-1, 3.92-1, 3.54-1, 3.31-1, 3.07-1.

Gear & Pinion Teeth–4.09 (45-11), 4.55 (50-11), 3.07 (43-14).

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Rear Axle Ratio Note–Ratio is marked on metal tag attached to rear axle by rear axle cover bolt. A tag marked 43 over 14 would mean an axle ratio of 3.07 to 1.

Back Lash–.003-.006".

Axle Shaft Removal: Raise rear end of car off floor and place jack stands under axle assembly. Disconnect brake cables at toggle and unhook brake cables from parking brake levers. Disconnect brake hose at frame connection and brake lines from wheel cylinder. Remove wheel & hub. Remove backing plate bolts and backing plate, wheel bearing oil seal caps and axle shims (shims only on right side). Tie shims together for reinstallation. Use Puller J-352-B to remove axle shaft and Puller J-943 to remove seal.

Rear Axle Assembly Removal: Place jack stands under frame just ahead of rear springs. Disconnect brake cables at toggles and unhook from parking brake levers, brake hose from frame connection, brake line from wheel cylinders. Remove wheels, brake cylinders, backing plate and pull axle shafts. Disconnect propeller shaft at rear companion flange (tape rollers and caps to prevent falling off). Remove nuts from spring clip "U" bolts and lower shock absorber studs. Disconnect stabilizer. Lower assembly and roll from beneath car.

Wheel Bearing Adjustment: Controlled by shims (.003", .005" & .015") between backing plate (right side only) and end of axle housing. To adjust, remove wheel and backing plate (see Axle Shaft Removal), add or remove shims for endplay adjustment.

End Play–.001-.004".

SHOCK ABSORBERS

Monroe & Delco–Direct acting hydraulic type. Units are sealed (serviced by replacement).

Hudson Shock Absorber Nos.

Control	Front	Rear
Light 4D, 5D	① 304700	① 304701
Light 7D	① 303060	① 300351
Light 7D		② 301241
Heavy All	① 303061	① 301768
Heavy All		② 301770
Ex. Hvy. All	① 302430	① 302341
Severe Usage All	① 306707	① 309683

① Monroe. ② Delco.

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs and lateral stabilizer.

See "Hudson" in Front Suspension Section.

King Pin Inclination–3° 36" crosswise.

Caster–1/2° to 1-1/2°. Pos.

Camber–1/2° to 1-1/2°. Pos.

Maximum variation between right and left wheel caster or camber 1/2°.

Toe-In–0" to 1/16".

Toe-out on Turns–Inner wheel 30°, outer wheel 25°. Variation between wheels 1/2°.

STEERING

Manual: Gemmer Model 335. Three-tooth Worm & Roller with "push-pull" adjustments.

See "Gemmer Steering Gears" in Steering Section.

Power Steering: Two types used as follows:

(4D, 5D)–Monroe Linkage Type. *See "Monroe Power Steering" in Steering Section.*

(7D)–Saginaw Linkage Type. *See "Saginaw Linkage Type Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix Hydraulic, Duo-Servo, Single Anchor. Without eccentric adjustment. Parking lever applies rear service brakes.

See "Bendix Hydraulic" in Brake Section.

Drums–Diameter 11".

Wheel Cyl. Diameter–Front 4D, 1 1/16", 5D, 7D 1 1/8". Rear All 15/16".

Replacement Lining & Shoes–Linings & shoes with linings come in Std. & .030" Oversize.

Lining Width & Thickness

Model	Front	Rear
4D	1-3/4" x .177"	1-3/4" x .177"
5D, 7D	2-1/4" x .177"	1-3/4" x .177"

Clearance–.015" at each end of secondary shoe with primary shoe out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

Mechanical Follow-up (Pedal Pushrod) Adjustment–Adjust pedal pushrod (linking pedal to lever on frame cross-member) for clearance of 1 1/4" between rear side of retaining pin in lever and rear end of slot in slide link.

Standard Master Cylinder: On frame to left of transmission.

Checking Fluid–Access hole in floor pan. Roll back floor covering, remove access hole cover, clean lint and dirt from filler plug, remove plug. Fluid should be 1/2 to 1" below the top of filler opening.

Removal–Remove from beneath car. Not necessary to disturb other parts.

Power Brakes: Bendix Power Unit–Combination vacuum power unit and hydraulic master cylinder. Replaces conventional master cylinder.

See "Bendix Power Unit" in Brake Section.

Checking Fluid–Raise hood, clean surface around filler plug and remove plug. Maintain fluid level not lower than 1/4" below the bottom of reservoir filler opening.

Removal–Remove key lock washer and pin from pedal bell crank under instrument panel and remove rod from pedal. Raise hood and disconnect hose assembly by removing outlet fitting bolt to the master cylinder.

NOTE–Do not remove stop light switch, wires, or hose assembly from outlet fitting. Loosen clamp and remove manifold vacuum hose at the check valve on the power unit. Loosen the reserve tank hose from the fitting on the check valve. Remove the four cap screws securing the assembly to the dash bracket.

MISC. MECHANICAL

Windshield Wipers: Vacuum operated type. *See "Windshield Wipers" in Miscellaneous Section.*

Window Regulators: Hydro-Lectric, with single action hydraulic window cylinders. *See "Hydro-Lectric Power Window Regulators" in Miscellaneous Section.*

Power Top Control: Hydro-Lectric, with double acting hydraulic top operating cylinders. *See "Hydro-Lectric Power Tops" in Miscellaneous Section.*

►*AIR CONDITIONING CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Wasp 35540
Hornet 35560

SERIAL NUMBER: Stamped on plate attached to cowl.
Starting Serial Number—(Wasp)—Kenosha W-1001, El Segundo WC-1001, Unassembled Export WKD-1001.
Starting Serial Number—(Hornet)—Kenosha X-1001, El Segundo XC-1001, Unassembled Export XKD-1001.

ENGINE NUMBER: Stamped on machined surface (left side) of cylinder block at side of No. 2 cylinder.
Starting Engine No.—(Wasp) M-1001, (Hornet) F-1001.

TUNE-UP

COMPRESSION PRESSURE: At cranking speed 100 lbs. min , allowable variation limit 10 lbs.

VACUUM READING: 17-20" at idling speed.

VALVE TAPPET CLEARANCE: Intake .010" (GO), .011" (NO GO), Exhaust .015" (GO), .016" (NO GO).

►*VALVE TAPPET ADJUSTMENT NOTE:* Manifold and carburetor assembly must be removed for access to valve compartment. On Wasp Twin H-Power & Hornet (All Cars), engine must be jacked over to permit manifold removal as follows:

1) Disconnect fuel and vacuum lines at carburetors and manifold, disconnect exhaust pipe at manifold, disconnect throttle linkage.

2) Remove top nut on front engine supports and loosen rear engine supports.

3) Place jack between front right hand corner of cylinder block and point just below upper wheelhouse-to-wheelhouse crossmember and wheelhouse panel, move engine up and to left for clearance to remove manifold (not necessary to drain cooling system—hoses will permit this movement).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No. adj. Valve must operate freely.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .032".

Spark Plug—Champion H10 (Wasp), H11 (Hornet). Tighten to 30 ft. lbs. (Cast Iron Head), 25 ft. lbs. (Aluminum Head).

COIL: Auto-Lite CR-6012A.

Ignition Current—2.5 Amps. idling, 4.5 Amps. stopped.

DISTRIBUTOR: Auto-Lite IAT-4202 (Wasp), IAT-4203A (Hornet).

Condenser—Auto-Lite IAT-2015R. **Capacity**—.21-.25 mfd.

Contact Point Set—Auto-Lite IGW-3028 BS (All).

Breaker Gap—.018-.022". **Cam Angle**—39°±3°.

Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAT-4202

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		350	2		700
4.5		500	9		1000
12		1325	24		2650
13.5		1500	27		3000

Automatic Advance—IAT-4203A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		500	0		1000
1		670	2		1340
4		1150	8		2300
8		1825	16		3650
9		2000	18		4000

Vacuum Spark Control—Auto-Lite integral type.

Vacuum Advance—IAT-4202

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	5 1/4
1	2	5 3/4
4	8	7 1/2
6	12	8 3/4
7.5	15	9 1/2

Vacuum Advance—IAT-4203A

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	9 1/2
1	2	10
2	4	10 3/8
3	6	10 7/8
3.75	7.5	11 1/4

IGNITION TIMING

Setting—TDC.

Timing Mark—(Wasp)—Long line before "1UDC" on damper. (Hornet)—Long line before "UDC1" on flywheel.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: One or two (Twin-H-Power) Carburetors used as follows:*

Model	Carter No.
Wasp (HI-TORQUE)	WA1 2009SA
Wasp (TWIN-H-POWER)	WA 1 2013S
Hornet (CHAMPIONSHIP 6)	WGD 2252S
Hornet (TWIN-H-POWER)	WA1 2113S

Throttle Linkage Adjustment (Hydra-Matic): Adjust idle speed to 490-510 RPM (compressor running on Air Conditioned cars), engine at normal idling speed, transmission warm and selector lever in neutral position.

Wasp—Adjust carburetor rods and install aligning pins J-2544 so that both pins index at the rear upper throttle lever and lower bell crank and hole in boss on cylinder block.

Hornet—Aligning pin J-2544 should fit freely in bell crank lever and hole in boss of cylinder block. If aligning ping does not index, remove carburetor to throttle rod lever clevis pins and readjust rods.

All Models—Then recheck and adjust carburetor idle adjusting screws. Disconnect throttle rod at left side of transmission case, clean machined surface of case and check lever using Tool J-2915 flush against surface with edge of gauge against transmission side cover. Gauge should fit freely in hole of throttle valve lever. Adjust trunnion so throttle rod fits freely in hole in trunnion. Shorten throttle valve rod 1/16" or approximately two turns by backing off front nut and tightening rear nut.

CARTER WA1 (Wasp HI-TORQUE) (2009SA Single Carb.)

Idle Setting—½-1½ turns open. Turn screw out for richer mixture.

Idle Speed (Without Air Conditioning)—540-560 RPM (Standard Trans.), 575 RPM (Overdrive), 490-510 RPM (Hydra-Matic in Neutral).

Idle Speed (With Air Conditioning)—Same as above with compressor running.

Float Level—7/16" from tip of cover projection to soldered edge of seam on float with cover inverted.

Accelerating Pump—Outer hole normal, inner hole if less charge is required.

Fast Idle: 5/8" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) fast idle cam. Adjust by bending link at lower offset.

Unloader Adjustment: Use Gauge T109-84 (9/16") to check choke valve opening or clearance between lower edge of valve and air horn wall. Adjust by bending cam on throttle using Tool T109-41.

Automatic Choke Setting: Set at Index.

►*OTHER DATA: See "Carter WA1" carburetors in Carburetor Section.*

Fuel Pump Pressure: 3½-4½ lbs. (Single Action), 3½-5 lbs. (Fuel & Vacuum), at 500 RPM.

CARTER WGD (Hornet Championship 6) 2252S (Single Carb.)

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-2-3, LEFT barrel 4-5-6.*

Idle Setting—1¾-2¾ turns open. Turn screw out for richer mixture.

Idle Speed (Without Air Conditioning)—540-560 RPM (Standard Trans.), 575 RPM (Overdrive), 490-510 RPM (Hydra-Matic in Neutral).

Idle Speed (With Air Conditioning)—Same as above with compressor running.

Float Level—¼" between top of float and bowl cover (gasket removed) and cover inverted.

Accelerating Pump—No seasonal adjustment.

Fast Idle: .030" clearance between throttle valve and bore of carburetor (side opposite idle port) with choke valve closed.

Unloader Adjustment: Use Gauge T109-106 (7/32") to check choke valve opening or clearance between lower edge of valve and air horn wall. Adjust by bending choke shaft unloader arm with Tool 109-105.

Automatic Choke Setting: Set at Index.

►*OTHER DATA: See "Carter WGD" carburetors in Carburetor Section.*

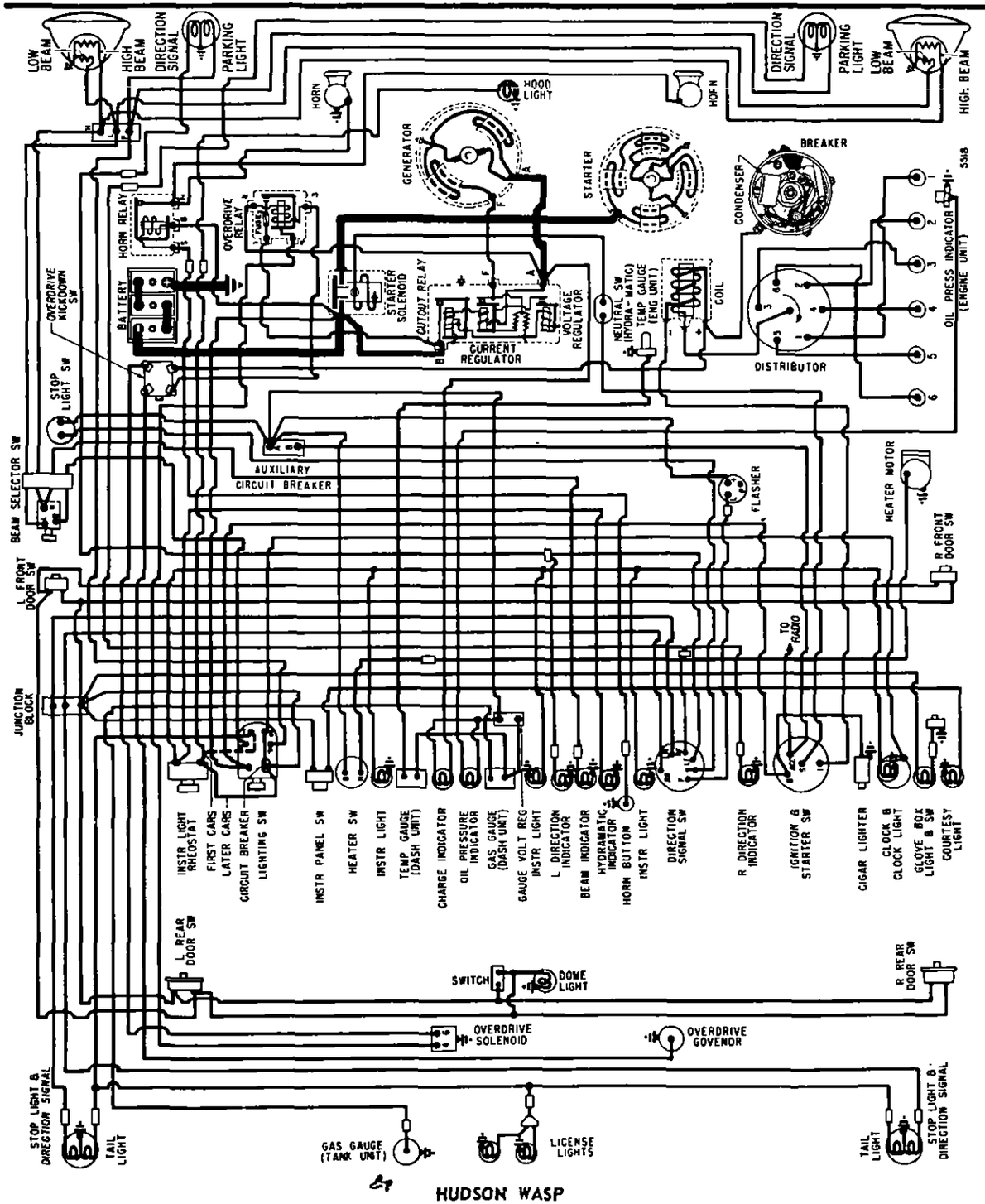
Fuel Pump Pressure: 3½-4½ lbs. (Single Action), 3½-5 lbs. (Fuel & Vacuum), at 500 RPM.

CARTER WA1 (Twin-H-POWER) (2013S & 2113S)

►*MANIFOLD FUEL DISTRIBUTION: An internal manifold compensator port is incorporated in twin carburetor manifolds.*

Idle Setting—For correct synchronization of both carburetors: Remove clevis pins from throttle shaft to carburetor rod clevis. Connect vacuum gauge and tachometer. Hold fast idle cam in normal idle position and adjust idle speed screws until throttle valves just seated in closed position. Adjust idle mixture screws (½-1½ turns out (Wasp), 1¼-2¼ turns out (Hornet). Run engine until temperature normalized. Hold front carburetor throttle valve closed and adjust rear carburetor

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HUDSON WASP

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idle speed 25-40 RPM less than specified. Adjust rear carburetor mixture for best operation. Adjust front carburetor idle speed to where an increase of 10-15 RPM is noted (Idle mixtures). Readjust the rear carburetor until the specified RPM is obtained and then adjust the front carburetor until a slight increase in RPM is noted. Readjust idle mixture to obtain best *mixture and manifold vacuum. Adjust throttle shaft to* carburetor rod clevis, retaining the throttle valves in idle position and accelerator linkage in released position. Reinstall clevis pins.

Idle Speed (Without Air Conditioning)—540-560 RPM Standard Trans.), 575-RPM (Overdrive), 490-510 RPM (Hydra-Matic in Neutral).

Idle Speed (With Air Conditioning)—Same as above with compressor running.

Float Level—¼" (2013S), ½" (2113S) from tip on lower edge of cover to seam on float with cover inverted.

Accelerating Pump—Outer hole normal, inner hole if less charge is desired.

Fast Idle: *½" (2013S), 5/8" (2113S) clearance between* choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending link at offset portion.

Unloader Adjustment: Use Gauge T109-84 (9/16") to check valve opening or clearance between lower edge of valve and air horn wall. Adjust by bending cam on throttle lever using Tool 109-41.

Automatic Choke Setting: Set one point lean.

►*OTHER DATA: See "Carter WA1" carburetors in Carburetor Section.*

Fuel Pump Pressure: 3½-4½ lbs. (Single action), 3½-5 lbs. (Fuel & Vacuum) at 500 RPM.

CARB. EQUIPMENT

Air Cleaner: *DRY TYPE—DO NOT WASH.* Clean at 1000 mile intervals by removing cartridge and shaking thoroughly to remove dirt. Replace cartridge every 10,000 miles or six months.

Fuel Pump: Carter M729SZ (Std. Trans.) Single action. **AC No. 4057** (O.D. & Automatic Trans.) Combination fuel and vacuum.
Pressure—3½-4½ lbs. (Single action), 3½-5 lbs. (Fuel & Vacuum), at 500 engine RPM.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric "CV" (constant voltage) type with voltage regulator.
Dash Unit—King-Seeley 46375.
Tank Unit—King-Seeley 44558.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 1-M-100 (Wasp), 1H-105-D (Hornet). 6 volt, 15 plate, 100 ampere hour (Wasp), 105 ampere hour (Hornet) capacity (20 hr. rate).
Battery Ground—Positive, to cylinder head.
Engine Ground—Rear engine mount crossmember to transmission.

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STARTER

Auto-Lite No.	Starter	Armature
Wasp (Std. Trans.)	MZ-4167	MZ-2312
Wasp (Hydra-Matic)	MZ-4172	MZ-2211
Hornet (Std. Trans.)	MCH-6109	MCH-2084
Hornet (Hydra-Matic)	MCH-6306	MCH-2088

Drive—Bendix No. A1806 (Std. Trans.), A1792 (Hydra-Matic).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs.

Performance Data

(MZ-4167 & 4172)

Torque	RPM	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 ft. lbs.	Lock	2.0	280

(MCH-6109 & 6306)

0 ft. lbs.	4300	5.0	65
6.0 ft. lbs.	Lock	2.0	335

Starter Switch: Magnetic type, controlled by combination Ignition and Starting Switch. Turn key full right against spring tension to start.

Neutral Safety Switch (Hydra-Matic Cars): Hudson No. 3143998. Permits starter operation only with selector lever in Neutral "N" position.

GENERATOR

Auto-Lite GGW-4802B. Armature—GGW-2006F.

Performance Data

Amperes	Volts	Cold — RPM — Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350
45	8.0	1925-2125 — 2350-2550

Brush Spring Tension—35-53 ozs.

Field Current—1.6-1.7 amperes at 5.0 volts at 70°F.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: ¾" deflection midway between water pump & generator pulleys.

REGULATOR

Auto-Lite VBE-6101-A, Voltage & Current type with "Temperature Compensated" current regulation.

Cutout Relay

Cuts In—6.3-6.8 volts. (Set to 6.4-6 6 volts).

Contact Gap—.015" minimum.

Air Gap—.031-.034" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F.

Air Gap—.048-.052" with contacts just opening.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

▷*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
52 Max.		45(43-47)

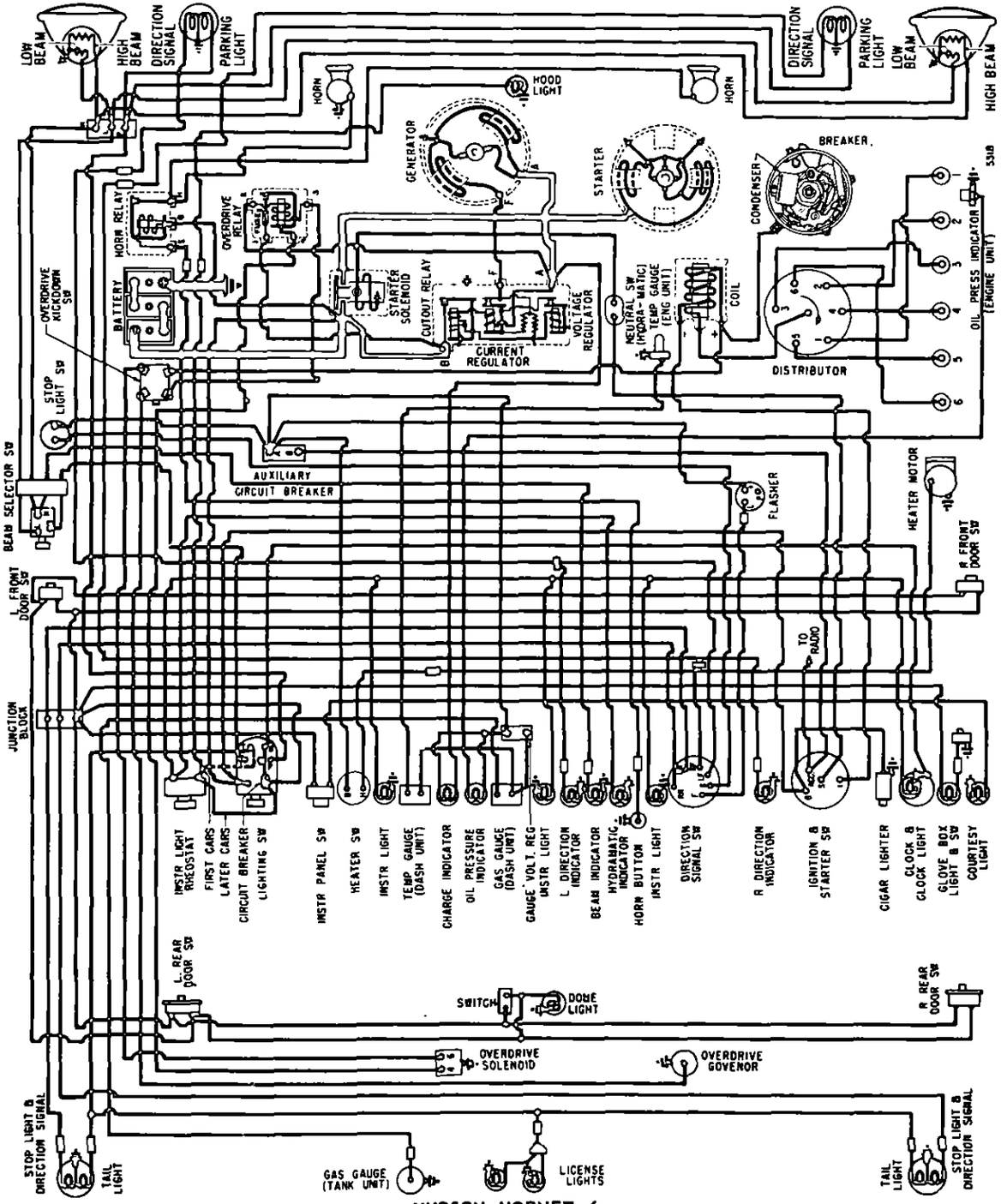
Test A—After 15 minutes operation charging at one-half maximum output.

Test B—After additional 15 minutes operation with current regulator operating (with load applied to hold voltage down to 6.7-6.9 volts).

Air Gap—.048-.052" with contacts just opening.

Checking & Adjusting—*See Electrical Equip. Section.*

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HUDSON HORNET 6

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MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equipment Section.*

Direction Signal: *See Electrical Equipment Section.*

Lighting Switch Removal: Remove knob (Allen wrench) and retaining nut. Lower assembly and remove wires.

Stop Light Switch Location: At tee fitting in line to front brakes.

FUSES: Overdrive—30 ampere. On overdrive relay.

CIRCUIT BREAKER: Two used as follows:

30 ampere (Main light circuit) attached to headlight switch.

20 ampere (Ignition switch, heater motors and stop light switch), located behind dash panel on left side of cowl.

HORNS: Sparton. Twin horns. Hudson No. 3141323 (Low Note), No. 3141324 (High Note).

Current Draw—13-17 amperes (Low Note), 12-16 amperes (High Note), at 5-7 volts.

Horn Relay: Hudson No. 3141308.

ENGINE

►*AIR CONDITIONING CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 6 cyl. "L" head.

Model	Bore	Stroke	Displacement
Wasp	3"	4¾"	202 Cu. Ins.
Hornet	3-13/16"	4½"	308 Cu. Ins.

	Compr. Ratio	Rated HP	Developed HP
Wasp	7.5-1①	21.6	115 at 4000
Wasp (Twin HP)	8.0-1②	21.6	126 at 4000
Hornet	7.5-1②	34.88	160 at 4000
Hornet (Twin HP)	7.5-1②	34.88	170 at 4000

①—Cast Iron Head ②—Aluminum Head.

CYLINDER HEAD & MANIFOLDS: *See "Cylinder Head & Manifolds" in Hudson Special Data.*

►*MANIFOLD REMOVAL (WITH ENGINE IN CAR): Required for valve tappet adjustment. See VALVE TAPPET ADJUSTMENT NOTE under Tune-Up.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Hudson Special Data.*

PISTONS

Aluminum alloy, cam ground, with taper ground skirt.

Original Bore & Pistons—*See "Original Bore & Pistons" in Hudson Special Data.*

Weight—10.4 ozs. (Wasp), 18.5 ozs. (Hornet).

Removal—Pistons & rods removed from above.

Fitting New Pistons: Use ribbon feeler .002" thick and scale with both piston and cylinder bore at 70°F. Pull required to remove feeler 3-4 lbs.

Replacement Pistons: *See "Original Bore & Pistons" in Hudson Special Data.*

Installing Pistons: Notch in top of piston must be toward front of engine.

PISTON PINS

Floating type with locking ring at each end.

	Length	Diameter
Wasp	2.4375" ±.005"	.7499" +.000" - .00025"
Hornet	2.942-2.932"	.9687-.96845"

Clearance in Piston—Hand push fit with piston heated to 200°F.

Clearance in Rod—.0003". Rod should turn in piston under its own weight.

Replacement Pins: (Wasp) Std. & .002", .005", .010", .015", .020" Oversize. (Hornet) Std. & .002", .005", .010" Oversize.

PISTON RINGS

	Width	End Gap	Side Clearance
Compr.	.0775"	.004-.009"①	.002-.004"
Oil #3	.186"	.004-.009"①	.001-.003"
Oil #4	.1514"	.004-.009"①	.001-.003"

①—Wasp, (Hornet .006-.014").

Replacement Rings: Sets of Std. and .020" Oversize.

Installing Rings: Rings are pinned in piston to prevent rotation. Ring clearance on pin must be same as end gap.

CONNECTING RODS

Crankpin Journal Diameter—1.937-1.938" (Wasp), 2.1244-2.1254" (Hornet).

Original Bearing Sizes—*See "Original Bearing Sizes" in Hudson Special Data.*

Bearings—Steel backed babbitt. No shims.

Clearance—.0005-.0015". **Side Play**—.007-.013".

Replacement Bearings: Std. .001", .002", .010", .012" Undersize.

Installing Rods: Notch in top of piston toward front of engine. Spit hole in rod to thrust or camshaft side of engine.

CRANKSHAFT

Journal Diameter—2.4988-2.4998". Four bearings.

Original Bearing Sizes—*See "Original Bearing Sizes" in Hudson Special Data.*

Bearings—Steel-backed babbitt. No Shims.

Clearance—.0005-.0015".

Replacement Bearings: Std., .001", .002", .010", .012" Undersize.

End Thrust: Taken by No. 3 main bearing.

End Play—.003-.009".

Crankshaft Front & Rear Bearing Oil Seals: *See "Crankshaft & Main Bearings" in Hudson Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Hudson Special Data.*

VIBRATION DAMPENER: *See "Vibration Dampener" in Hudson Special Data.*

CAMSHAFT

Bearings—Steel-backed babbitt-lined bushings.

Clearance—.0005-.0015" (Wasp), .0015-.002" (Hornet).

Camshaft Removal—*See "Camshaft & Bearings" in Hudson Special Data.*

End Thrust: Controlled by thrust plate behind camshaft sprocket. **End Play**—.003-.005".

Timing Chain: Link Belt. **Width** 1.000" (Wasp), 1.250" (Hornet). **Pitch** .375". **Length** 60 links.

Camshaft Setting: Timing chain has two marked links, six full links apart. Both crankshaft and camshaft have a marked tooth. With crankshaft sprocket installed and turned to TDC position, install one marked link of chain over crankshaft marked tooth, insert camshaft sprocket into chain with marked link over marked tooth, rotate camshaft until screw holes line up and install screws.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Hudson Special Data.*

VALVES

Tappet Clearance: Intake .010" (Go), .011" (No Go). **Exhaust** .015" (Go), .016" (No Go). COLD.

►*TAPPET CLEARANCE ADJUSTMENT NOTE: Manifold assembly must be removed for access to valve compartment. See VALVE TAPPET ADJUSTMENT NOTE under Tune-Up.*

Wasp Valves

Valve	Head Diam.	Stem Diam.	Length
Intake	1.495-1.505"	.3412-.3422"	5.045"
Exhaust	1.390-1.400"	.3412-.3422"	5.043"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.346"	.001-.003"
Exhaust	46°	.346"	.002-.004"

Hornet Valves

Valve	Head Diam.	Stem Diam.	Length
Intake	1.831"	.3412-.3422"	5.815"
Exhaust	1.556"	.3402-.3412"	5.815"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.346"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE—Valve face and valve seat angle are the same.

►*VALVE GRINDING CAUTION:* Replace valve when grinding reduces distance from upper edge of valve seat to top of valve to less than 1/16".

Valve Springs: Install springs with closed coils toward valve.

Valve Spring Specifications

Wasp	Pressure	Length
Open	116-124 lbs.	1 19/32"
Closed	40-48 lbs.	1 61/64"

Free Length—2 3/16" approximately.

Hornet	Pressure	Length
Open	153-165 lbs.	1 27/32"
Closed	73-81 lbs.	2 3/16"

Free Length—2½" approximately.

Valve Guides: Remove old guides through valve seat opening using Tool J-2814. Install new guides as follows: **Wasp**—Use Tool J-883-A with Pilot J-883-10 to install guides to depth of 1 9/32" from top of guide to top face of block. **Hornet**—Use Tool J-883-A with Pilot J-883-8 or 9 and install guides to depth of 1 7/16" (Intake), 1 3/32" (Exhaust) from top of guide to top face of block.

Valve Lifters: Mushroom type fitted directly in crankcase. Remove from below with camshaft out.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Wasp①	Open	Close
Intake	26.8° BTDC	99.7° ALDC
Exhaust	64.9° BLDC	45.7° ATDC

Hornet①	Open	Close
Intake	33.7° BTDC	80.1° ALDC
Exhaust	73.9° BLDC	28.4° ATDC

①—Valve lash .008" Intake, .010" Exhaust

Valve Timing Check—(Wasp & Hornet)—Set No. 1 Intake Valve Tappet at .010" clearance (Hot) and insert .002" feeler between tappet and valve stem. Rotate engine until a slight drag is felt on feeler gauge. **(Wasp)**—The engine is properly timed if the long mark on damper (1UDC) is 1" from pointer. The first small mark should be ¼" before the pointer. **(Hornet)**—The

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engine is properly timed when the first of the five timing marks on the flywheel is 5/8" above the pointer in timing hole.

OILING SYSTEM

Crankcase Capacity: 5 qts. (Wasp), 7 qts. (Hornet). Add ½ qt. for dry engine.

Normal Oil Pressure: 40 lbs. at 30 MPH.

Pressure Regulator Valve—Non-adjustable spring loaded, located on left side of cylinder block.

Oil Pressure Indicator Switch: King-Seeley 47185 (Wasp), 47170 (Hornet). On right side of engine above oil pump. Contacts open at 11-15 lbs. Switch is sealed (not adjustable).

Oil Pump: Rotor type. Angle mounted on right side of engine and driven by camshaft.

Pump Overhaul, Removal & Installation—*See "Oiling System" in Hudson Special Data.*

Oil Filter: Fram or Hudson. Replace filter cartridge at 5000 mile intervals.

Replacement Filter Element—Hudson No. 8990183.

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake). Outlet pipe in rear valve compartment cover on right side of engine.

COOLING

►*RADIATOR TO FAN BLADE CLEARANCE CAUTION (Wasp):* There should be ½" clearance between radiator core and fan blades on cars equipped with standard or overdrive transmissions. Starting with Serial No. W-5886, all cars with standard and overdrive transmissions are equipped with Rear Engine Support Plate Hudson No. 3146059 to provide this ½" clearance.

Water Capacity: 14 qts. (Wasp), 19½ qts. (Hornet).

Pressure Valve: 7 lb. radiator filler cap (standard), 13 lb. cap with air conditioning.

Thermostat: Hudson No. 5325067 (157°-162°). Located in cylinder head water outlet housing.

Water Pump: Centrifugal type with non-adjustable packless type seal. *NOTE*—Water pump discharges into brass water distributing tube to provide uniform circulation around valves.

See "Hudson" in Water Pump Section.

Pump Removal—Remove generator adjusting bracket, remove fan blade as assembly and pump mounting bolts. Remove pump from engine.

Temperature Gauge: King-Seeley Electric "CV" type (constant voltage) with gauge voltage regulator.

See "Temperature Gauges" in Miscellaneous Section.

Dash Unit—King-Seeley 46372.

Engine Unit—King-Seeley 44200.

CLUTCH

Borg & Beck. (Wasp) 9A7, (Hornet) 10A6.

Assembly No.—(Wasp) 1361, (Hornet) 1385.

Clutch Disc. No.—(Wasp) 382118 Std., 382191 Overdrive.

Clutch Disc. No.—(Hornet) 382372 Std., 382215 Overdrive.

Pedal Adjustment: Pedal free travel ½-¾". Adjust length of beam to throw-out lever rod. Lengthening rod reduces free play. NOTE—Do not disturb clutch pedal to beam rod adjustment.

►*CAUTION:* Pedal-to-beam rod should not be disturbed in service. This rod can be checked (with pedal against floor board) as follows: **Wasp**—Clearance between flat surface of beam lever and rear edge of bracket should be 7/8". **Hornet**—Outer end of beam lever should project 5/16" from beam toward the rear.

►*WASP CLUTCH BEAM INSULATOR DISTORTION CORRECTION:* To correct this condition, reinforce the new insulator with .015" shim made up to same dimensions as insulator.

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove housing and pan, punch-mark flywheel, clutch cover, and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange. Remove clutch and driven disc.

SYNCHRO-MESH TRANSMISSION

Warner. 3 Speed Std. Transmission & Overdrive Optl. *See "Warner Transmissions" in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect brake tube bracket on underside of body. Disconnect torque tube (see Rear Axle Removal below). Disconnect hand brake cable at bellcrank and brake cable housing at bellcrank bracket. Move rear axle to rear to disconnect front universal joint from transmission mainshaft. Disconnect speedometer cable and shift rods (On Overdrive Cars, disconnect overdrive control and wiring). Remove two upper transmission mounting screws, install guide pins (Tool J-1434) in these holes, remove two lower mounting screws, slide transmission straight back to clear clutch pilot bearing, remove transmission from beneath car.

OVERDRIVE

Warner R10. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *See "Warner R10 Overdrive Controls" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range four speed automatic transmission with fluid coupling.

See "Hydra-Matic Drive" in Transmission Section.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid every 1000 miles, drain and refill at 25,000 mile intervals.

Capacity—8½ qts. (9½ qts. after overhaul).

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located under right front floor plate). Add "AQ-ATF" Hydra-Matic fluid to bring level to "F" mark.

►*CAUTION:* Do not check fluid level when transmission is excessively hot and do not fill above "F" mark on dipstick.

►*OTHER HYDRA-MATIC DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit, Mechanics and Saginaw. One used at front end of propeller shaft.

See Universals Section for complete data.

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive.

See "Hudson Rear Axles" in Rear Axle Section.

Axle Ratio—Used as follows:

	Standard	Overdrive	Hydra-Matic
Wasp	4.1-1 (9-37)	4.4-1(8-35)	3.6-1(12-43).
Hornet	4.1-1(10-41)	4.4-1(9-40)	3.2-1(13-41).

Backlash—.002-.006". Shim adjustment.

Axle Shaft Removal: Remove wheel. Pull drum (use hub puller J-736-B). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims. Withdraw axle shaft with puller J-2498. Do not drag shaft splines on inner oil seal.

Rear Axle Assembly Removal: Raise and support rear of body. Disconnect hand brake cable at bell crank and cable housing at bracket. Disconnect torque tube at transmission, rear brake hose at bracket on body floor pan, rear springs and shock absorbers from axle tube, and stabilizer bar at tube. Roll assembly from beneath car.

Wheel Bearing Adjustment: Shims behind brake backing plate.

SHOCK ABSORBERS

Direct acting hydraulic type. Serviced by replacement.

Front—Hudson No. 3118500. **Rear**—3117364. Set of two.

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs located between upper end of steering knuckle pin and seat in outer wheel house panel.

See "Hudson" in Front Suspension Section.

►*CASTER & CAMBER LOSS OF ADJUSTMENT CORRECTION:* Beginning engine No. X-1152 (Hornet), W-1200 (Wasp), improved eccentric bolt nut (deeper counter-bore) provides more positive locking of eccentric adjusting bolt. If necessary, 5/8" I.D. washer may be installed to insure locking of the bolt and eccentric washers.

►*FRONT CROSSMEMBER INSTALLATION CAUTION:* When installing front crossmember the distance between centers of either front or rear mounting bracket bolt holes must be 19½" to insure maintaining front wheel alignment.

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King Pin Inclination–3°36'.
Caster–(Without Power Steering) Pos. ½° desired, limits 0° to Pos. ½°. (With Power Steering) 1° desired, limits Pos. ½° to Pos. 1°.
Camber–0° desired, limits Neg. ¼° to Pos. ¼°.
Toe-In–1/16-3/16".
Toe-Out on Turns–Outer wheel 20°, Inner wheel 24° (Wasp), 26° (Hornet).

STEERING

Gemmer. Worm & Roller with push-pull adjustments. *See "Gemmer Worm & Roller" in Steering Section.*
Power Steering: Monroe Linkage type. *See "Monroe Linkage Power Steering" in Steering Section.*
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" Steering Gear in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" Steering Gear in Steering Section.*

BRAKES

Bendix Hydraulic, Single Anchor (without Eccentric). Service brake system has "Mechanical Follow-up" linkage (between pedal and parking brake linkage). Hand lever applies rear wheel service brakes.

See "Bendix Hydraulic, Single Anchor" in Brake Section.

►*WASP BRAKE CHATTER CORRECTION (Caused by Uneven Wheel to Hub Contact Ledges): See "Bendix Hydraulic, Single Anchor" in Brake Section.*

►*SOFT OR SPONGY BRAKE PEDAL CORRECTION:* When correct bleeding of brake system does not eliminate soft or spongy brake pedal, check master cylinder to pedal shaft brace. When pedal shaft flexes at this point (due to poor engagement of slot in pedal shaft with elongated hole in brace), it is advisable to elongate the two mounting bolt holes at rear of brace, move brace back so slot in shaft engages small hole in keyhole slot in brace. Use Bite Washer Hudson No. 3138264 in place of lockwashers to retain brace in proper location. Late production cars have above correction completed.
Drum Diameter–10" (Wasp), 11" (Hornet).
Wheel Cylinder Diameter–1 1/8" (Front), 15/16" (Rear).
Replacement Lining & Shoes–Shoes with lining, or linings only furnished in Std. size only.

Lining Width & Length

Wasp	Front	Rear
Primary	2¼ x 8½"	1¾" x 8½'
Secondary	2¼" x 11"	1¾" x 11"
Hornet	**Front**	**Rear**
Primary	2½" x 9 3/8"	2" x 9 3/8"
Secondary	2½" x 12"	2" x 12"

Clearance–.015" heel and toe of secondary shoe with primary shoe out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

Mechanical Follow-up Cable Adjustment–Depress brake pedal against 3½" spacer block on floor (with pedal cable and pushrod disconnected), adjust mechanical follow-up cable length at clevis end so that clevis pin can be installed freely with no slack in cable.

Standard Master Cylinder: Under front floor at left of transmission.
Checking Fluid–Roll back floor mat, remove access hole cover in floor pan, maintain fluid ½-1" below filler opening.
Removal–Remove from beneath car. Not necessary to disturb other parts.

Power Brakes: Bendix Power Unit. *See "Bendix Power Unit" in Brake Section.*
Checking Fluid–Check every 1,000 miles. Maintain fluid to within ½" of filler opening.

MISC. MECHANICAL

Windshield Wipers: Vacuum operated type. *See "Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Miscellaneous Section.
Power Window Regulators: Electric. Reversible motor in each door.
See "Power Window Regulators" in Miscellaneous Section.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.

Starting Serial Number– Kenosha Y-1001, El Segundo YC-1001, Unassembled Export YKD-1001.

ENGINE NUMBER: Below right exhaust manifold.

Starting Engine Number–P-1001.

TUNE-UP

►*HARD STARTING CORRECTION (CARS BEFORE ENGINE NO. P-14763) & CARBURETOR PRODUCTION CHANGE: See "Carter WGD" in Carburetion Section for installation of Atmospheric Vent.*

►*POOR WARM-UP CORRECTION & CARBURETOR PRODUCTION CHANGE: See "Carter WGD" in Carburetion Section for recommended changes on carburetors date-coded before tag date "M-5" or Engine No. P-24900.*

►*SLOW COLD STARTING CORRECTION:* Check spark plugs, breaker points, all electrical connections, and ignition timing. See that carburetor choke valve has .005" clearance in all positions and that choke valve and shaft operate freely. Choke vacuum piston must operate freely in cylinder and there must be no bind between unloader arm on choke lever and fast idle link. *NOTE–*Automatic choke may be set one point rich or lean from standard setting to improve starting and warming up performance.

COMPRESSION PRESSURE: 140 lbs., at cranking speed (150 RPM), with wide open throttle.

VACUUM READING: 19" at 1500 RPM. 17.25" at 425 RPM.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic type. Located at left manifold outlet.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders–RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plug–(Before Engine No. P-6001) Champion H-10 or Auto-Lite AL-7. (After Engine No. P-6001) Champion N-8 or Auto-Lite AG-5. Tighten plugs to 30 ft. lbs.

COIL: Auto-Lite CR-6001.

Ignition Current–2.30 amps. (idling).

DISTRIBUTOR: (Before Engine No. P-6001) Auto-Lite IBK-4001. (After Engine No. P-6001) Auto-Lite IBK-4001-B.

Condenser–Auto-Lite IBB-2015L. **Capacity** .25-.28 mfd.

Contact Point Set–Auto-Lite IGW-3028JS.

Breaker Gap–.017"±.002".

Cam Angle–33°-39°.

Breaker Arm Spring Tension–17-20 ozs.

Rotation–Counter-clockwise viewed from above.

Automatic Advance–IBK-4001

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		325	2		650
11		600	22		1200
19		1135	38		2270
20		1200	40		2400

Automatic Advance–IBK-4001-B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		375	2		750
8		850	16		1700
15		1650	30		3300
16		1750	32		3500

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance–IBK-4001

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6"
1	2	6 3/4"
3	6	8 1/4"
4	8	8 7/8"
5.5	11	10"

Vacuum Advance–IBK-4001-B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6 1/4"
1	2	6 5/8"
6	12	9"
11	22	12 1/8"
12	24	13"

IGNITION TIMING

Setting–5° BTDC.

Timing Mark–Timing indicator on chain cover marked 0 - 5 - 10 - 15. Align groove in vibration dampener with correct mark on indicator.

CARBURETOR

Carter WGD, No. 2231S (Early), 2231SA (Later). Dual downdraft type with automatic choke.

►*HARD STARTING CORRECTION (CARS BEFORE ENGINE NO. P-14763) & CARBURETOR PRODUCTION CHANGE:* An atmospheric vent has been incorporated in later carburetors and can be installed on early cars to correct a hard starting condition. *See "Carter WGD Carburetor" in Carburetor Section.*

►*POOR WARM-UP CORRECTION & CARBURETOR PRODUCTION CHANGE: See "Carter WGD" in Carburetion Section for recommended changes on carburetors date-coded before tag date "M-5" or Engine No. P-24900.*

►*SLOW COLD STARTING CORRECTION: See TUNE-UP (above).*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–½-1½ turns open. Turn screws out for richer mixture.

Idle Speed–425 RPM with transmission in "N". (Air Conditioning turned on).

Float Level–¼" from underside of bowl cover to top of float at center with needle valve seated. Measure with bowl cover and float assembly inverted. *NOTE–This ¼" setting supersedes original specification of 3/16". See also "Hard Starting Correction" above.*

Fast Idle: .030" throttle opening or clearance between valve and wall on side opposite idle ports with choke valve tightly closed. Adjust by bending choke rod at lower angle.

Unloader Adjustment–With fast idle adjustment completed, hold throttle valve wide open and close choke valve as far as possible. **Do not force choke valve closed.** Clearance between upper edge of choke valve and inner wall of air horn should be 3/16" (Gauge T109-28). Adjust by bending choke shaft unloader arm.

Automatic Choke: 1 point rich.

►*OTHER DATA: See "Carter WGD Carburetor" in Carburetor Section.*

THROTTLE LINKAGE ADJUSTMENT: *CAUTION–Control rod dimensions should be checked and length adjusted before linkage adjustment is made.*

Control Rod Dimensions: Check and adjust each rod as follows:

Carburetor Throttle Rod (from carburetor throttle lever to accelerator pedal lever)–Over-all length of rod from center of ball pivot at carburetor end to "L" bend at rear end of rod must be 15½". Adjust by loosening locknut near forward end and turning end fitting in or out of rod.

Adjuster Rod (Upper throttle rod from carburetor throttle rod to cross-shaft lever)–Over-all length between centers of rod ends must be 6 9/16". Adjust by bending rod at existing bend near center.

Throttle Valve Rod (Lower throttle rod from cross-shaft to control lever on transmission case)–Length between center of pins at ends of rod must be 26 1/8" (measured in straight line). Adjust by bending rod.

Throttle Linkage Adjustment: Adjust engine idle speed to 400 RPM with engine at normal operating temperature. Block carburetor choke valve in the wide open position and disconnect throttle rod at throttle valve shaft outer lever at transmission. Move transmission throttle lever to the rear against its stop and hold a straight edge across milled surface at rear of transmission case. The taper on end of lever should just contact straight edge. If necessary to adjust, loosen lever clamp screw nut and turn shaft counter-clockwise until valve has reached its stop. Hold shaft in this position and rotate lever on shaft so that taper on lever lines up with milled surface on rear of case. Reconnect rod to lever. Remove carburetor air cleaner and disconnect the upper throttle rod from center hole of throttle cross shaft. Lightly hold cross shaft lever forward so that throttle valve in transmission is against its stop (*CAUTION–*Do not spring linkage). Loosen locknut at each end of adjuster (rod connector) on carburetor throttle rod so that upper throttle rod can be connected in center hole of cross-shaft lever without disturbing linkage, tighten locknuts against adjuster and make certain that rod fits freely in lever. Reset engine idle speed (see Idle Speed Setting above).

Fuel Pump Pressure: 3½-5 lbs. max. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter M2256S (Fuel & Vacuum).

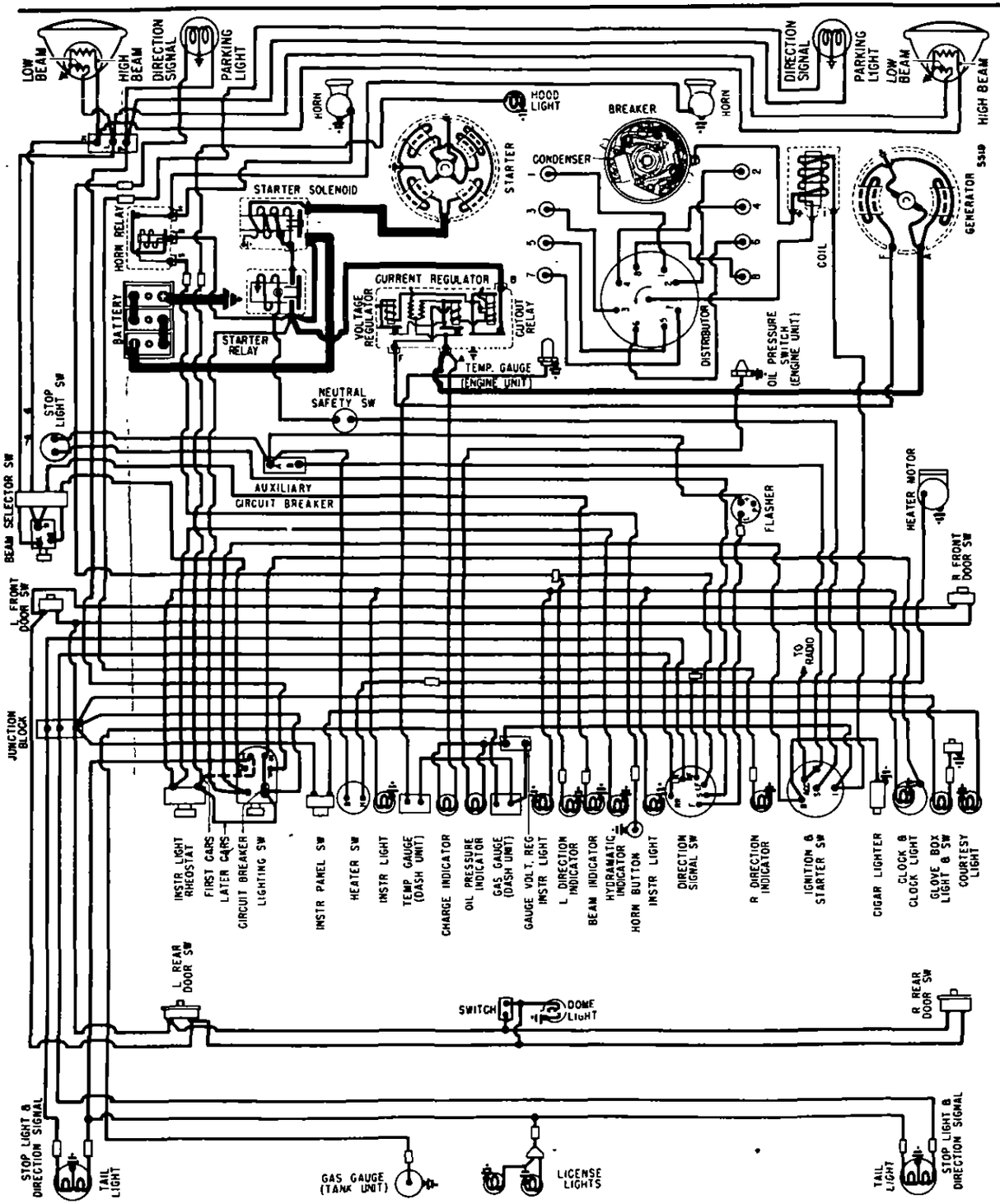
Pressure–3½-5 lbs. at 500 RPM.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit–Auto-Lite 13380A.

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Tank Unit—Auto-Lite 12642A.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 1H-105D. 6 volt, 105 ampere hour capacity (20 amp. rate).

Battery Ground—Positive.

Engine Ground—Battery to engine with body ground from transmission to rear crossmember.

STARTER

Auto-Lite MCL-6132. Armature—MCH-2122.

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid SSX-4003 mounted on starter with SEPARATE relay (Magnetic Switch), Hudson No. 3118899 on left fender apron. Controlled by combination Ignition & Starter Switch Hudson No. 308595. Turn key full right to start engine.

See "Auto-Lite Solenoid Starter Switch (No Relay)" in Electrical Section.

Neutral Safety Switch: Hudson No. 3143999. On steering column. Permits starter operation with selector lever in "P" or "N" only.

GENERATOR

Auto-Lite GGW-4801F. Armature—GGW-2006F.

Maximum Charging Rate—*See Voltage Regulator.*

Performance Data

Amperes	Volts	Cold — RPM — Hot
0	6.4	870-970 — 950-1050
45	8.0	1925-2125 — 2350-2550

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs.

Field Current—1.6-1.7 amps at 5.0 volts.

Belt Adjustment: ½" belt deflection midway between water pump and generator pulleys.

REGULATOR

Auto-Lite VBE-6101-A

Cutout Relay

Cuts In—6.3-6.8 volts.

Cuts Out—4.1-4.8 volts.

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contact open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. After 15 minutes operation charging at one-half maximum rate.

Air Gap—.048-.052" with contacts opening.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
52		45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.

Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage

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down to 6.7-6.9 volts).
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–See *Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. See *Electrical Equip. Section.*
Direction Signals: See *Electrical Equipment Section.*
Light Switch Removal: Loosen Allen screw and remove retaining nut. Push switch back and remove from dash.
Stop Light Switch: Located at tee fitting in line to front brakes.

FUSES: Radio–SFE-14 (14 amp.) in lead wire to radio.

CIRCUIT BREAKERS: Two used. 30 amp. in main light switch protects headlights, tail, instrument and interior lights. 20 amp. located on rear side of dash just forward of steering column protects stoplights, direction signal, Weather Eye blowers and accessory lights.

HORNS: Sparton. Hudson No. 3141323 (Low Note). 3141324 (High Note).
Horn Relay: Hudson No. 3141308.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*IMPROVED OIL CONTROL PRODUCTION CHANGES & CORRECTION ON EARLY CARS:* For improved oil control at the intake valve stems, THREE types of rocker arm shafts have been used in production and latest type should be installed whenever trouble experienced on cars with previous type shafts (before Engine No. P-17288). See *Rocker Arms under "Valve System" in Hudson Special Data for complete details.*

►*INTAKE VALVE STEM OIL DEFLECTOR PRODUCTION CHANGE: See VALVES below.*

ENGINE SPECIFICATIONS: V8 valve-in-head.

Bore	Stroke	Displacement
3 13/16"	3½"	320 cu. ins.

Compression Ratio	Developed HP	Rated HP
8.25-1①	208 at 4200 RPM	46.5

①–After Engine No. P-6001. 7.8-1, before Engine No. P-6001

Compression & Vacuum Reading: See *TUNE-UP.*

OIL PAN REMOVAL: Remove steering idler arm attaching bolts and drop steering linkage. Remove exhaust crossover pipe.

CYLINDER HEAD INSTALLATION: See *"Cylinder Head & Manifolds" in Hudson Special Data.*

TIGHTENING TORQUES: See *"Tightening Specifications" in Hudson Special Data.*

PISTONS

Aluminum alloy, slipper type, tapered skirt, cam ground with steel reinforcement. Piston pin offset toward thrust side of piston.
Removal–Pistons and rods removed from above.
Clearance–.001-.0015" (top of skirt), .000-.0015" (bottom of skirt).
Replacement Pistons: Furnished Std. size, .010", .020", .030" oversize.
Installing Pistons: Install with "F" cast in piston strut and notch in piston head toward front of engine.

PISTON PINS

Full floating type. Retained in piston by lock rings at each end. **Diameter**–.9803".
Pin Fit in Piston–Palm press fit with piston heated in water to 200°F.
Pin Fit in Connecting Rod–Palm press fit at room temperature.
Replacement Pins: Std. size, .003", .006" oversize.
Piston Pin Bushing (In Connecting Rod) Installation: See *"Piston Pins" in Hudson Special Data.*

PISTON RINGS

Three rings (two compression & one oil) used. Upper compression ring is chrome plated.

Ring	Width	End Gap	Side Clearance
Compr.	.078"	.010-.018"	.0015-.005"
Oil	.186"	.010-.018"	.0015-.005"

Installing Rings: Install upper compression ring and oil ring with gap toward camshaft side of engine. Install lower compression ring with gap toward opposite side from camshaft. All gaps should be midway between piston pin bosses.

CONNECTING RODS

Length–6 25/32" (center-to-center).
Crankpin Journal Diameter–2.250".
Lower Bearing–Replaceable precision type.
Clearance–.0005-.0025". **Sideplay** .003-.011".
Replacement Bearings: Std. size, .001", .002", .020" undersize.
Installing Rods: Install odd numbered rods in left bank and even numbered rods in right bank, with numbers on rods facing down and away from block and milled oil groove in connecting rod cap upward and toward crankshaft.

CRANKSHAFT

Journal Diameter–2.500". Five bearings.
Bearings–Precision type. The four front crankshaft bearings are interchangeable.
Clearance–.0005-.0025".
Replacement Bearings: Std. size, .001", .002", .020" undersize.
End Thrust: Taken by No. 5 (rear) main bearing.
Endplay–.0035-.0085".
Crankshaft Rear Main Bearing Oil Seal: See *"Crankshaft & Main Bearings" in Hudson Special Data.*
►*CRANKSHAFT REAR MAIN BEARING OIL LEAK CORRECTION: See "Crankshaft & Main Bearings" in Hudson Special Data.*
Crankshaft Front Oil Seal: See *"Engine Front Cover" in Hudson Special Data.*
Vibration Dampener: See *"Vibration Dampener" in Hudson Special Data.*

CAMSHAFT

Bearings–Five, steel-backed babbitt lined precision bearings.
Clearance–.0005-.0045".
End Thrust: Taken by thrust plate behind camshaft sprocket. **Endplay**–.004-.006".
Camshaft Removal & Installation: See *"Camshaft & Bearings" in Hudson Special Data.*
Timing Chain & Sprocket Removal–See *"Timing Chain" in Hudson Special Data.*
Engine Front Cover Removal: See *"Engine Front Cover" in Hudson Special Data.*
Engine Front Cover Oil Seal (Crankshaft Front Seal): See *"Engine Front Cover" in Hudson Special Data.*
Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers.

VALVES

►*INTAKE VALVE STEM OIL DEFLECTOR PRODUCTION CHANGE:* Starting with Engine No. P-13644, Intake Valve Stem Oil Deflector, Part No. 6476056, entered production. The deflector, a rubber cap, is located over valve stem and installed on top section of cast valve guide. This deflector can be installed on all earlier engines for improved oil control.
Tappet Clearance: Hydraulic lifters. Adjustment not required unless cylinder head removed or valve lifters replaced. See *"Valve Tappet Adjustment" in Hudson Special Data.*

Valve	Head Diam.	Stem Diam.	Length
Intake	1.937"	.3725"	5.712"
Exhaust	1.687"	.3715"	5.690"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.374"	.001-.002"
Exhaust	45°	.374"	.002-.003"

Valve Seat Width–3/64" (Intake), 5/64" (Exhaust).
Valve Springs: Single springs used. Install springs with two closely wound coils against cylinder head.

Valve Spring Specifications

Valves	Spring Pressure	Spring Length
Closed	78-86 lbs.	1¾"
Open	158-172 lbs.	1 3/8"

Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance excessive. Valves are furnished with .003", .010", .020", .030" oversize stems.
Checking Valve Stem Clearance and Reaming Guides for Oversize Valve Stems: See *"Valve System" in Hudson Special Data.*
Valve Lifters: Hydraulic type.
Hydraulic Valve Lifter Removal, Overhaul & Testing–See *"Valve System" in Hudson Special Data.*
Rocker Arm Assembly: See *"Valve System" in Hudson Special Data.*
►*ROCKER ARM SHAFT PRODUCTION CHANGES (For Improved Oil Control): See "Valve System" in Hudson Special Data.*
►*ROCKER ARM SQUEAK CORRECTION (Caused by insufficient oil reaching rocker arm shafts): See "Valve System" in Hudson Special Data.*

VALVE TIMING

See *"Camshaft Setting" under* CAMSHAFT above.
Intake Valves–Open 14° BTDC. Close 56° ALDC.
Exhaust Valves–Open 52° BLDC. Close 18° ATDC.
Valve Timing Check: Remove cylinder head cover and spark plugs. Crank engine until No. 6 piston in right bank is on TDC (on compression stroke). This places No. 1 piston on TDC on the exhaust stroke overlap position. Rotate crankshaft 90°. Install a dial indicator on No. 1 intake rocker arm pushrod end. Crank engine slowly in direction of rotation (clockwise) until dial indicator indicates pushrod movement, (the hydraulic lifter should be fully charged for this check). At the time dial indicator moves, the ignition timing

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mark on vibration dampener should align with the 14° (approximately) position on the degree quadrant section of the timing assembly cover. *NOTE–If more than ½" variance in either direction is evident, remove engine front cover and inspect timing chain installation.*

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill).

Normal Oil Pressure: 45 lbs. at 40 MPH. 10 lbs. at idle speed.

Pressure Regulator–In oil pump. Not adjustable.

Oil Pressure Indicator: Red light on instrument panel. Lighted when engine oil pressure low.

Oil Pressure Switch–King-Seeley 47195.

Oil Pump: Gear type. On rear main bearing cap, driven through distributor drive and camshaft gear.

Oil Pump Removal, Overhaul & Installation–*See "Oiling System" in Hudson Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve tappet cover.

COOLING

Water Capacity: 21 qts. (with heater), 20 qts. (without heater).

Pressure Valve: Radiator filler cap. 7 lbs. (Std.) 14 lbs. (With Air Conditioning).

Thermostat: 170°. Starts to open at 167°-173° F.

Water Pump: Packless type with sealed ball bearing.

See "Hudson V8" in Water Pump Section.

Temperature Gauge: King-Seeley Electric type.

Dash Unit–K-S No. 46372.

Engine Unit–K-S No. 44215.

See "Temperature Gauges" in Miscellaneous Section.

ULTRAMATIC DRIVE

Packard "Twin-Ultramatic". Torque converter (with hydraulic operated direct speed clutch) and hydraulic operated planetary unit.

►*ULTRAMATIC HIGH RANGE CLUTCH AND LOW RANGE BAND FAILURE CORRECTION: See "Twin-Ultramatic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Twin-Ultramatic Transmission" in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level–*(CAUTION–Fluid level must be checked at normal operating temperature and after engine has been idling at 800 RPM for at least one minute to completely fill system).* Run engine at low idle speed while fluid level is being checked, using dipstick located in engine compartment. Add fluid as required to bring level to "Full" mark on dipstick.

Capacity–22 pints. Use only Automatic Transmission Fluid Type A having an AQ-ATF number on can.

Linkage Adjustment: See *CARBURETOR* above.

►*OTHER TWIN-ULTRAMATIC DATA: See "Twin-Ultramatic" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw. One universal joint used at front end of propeller shaft.

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive.

See "Hudson Hypoid" in Rear Axle Section.

►*PROPELLER DRIVE SHAFT NOISE CORRECTION & PRODUCTION CHANGE:* A noise developing at 58-62 MPH under light throttle pressure, either pull or coast (similar to rear axle gear noise) may be caused by drive shaft and can be corrected by installing a two-piece shaft Part No. 3145400. The later two-piece shaft replaced the former one-piece shaft in production at Car Serial Y-5887.

►*REAR AXLE RATIO PRODUCTION CHANGE:* Beginning with Car Serial No. Y-5887, the rear axle ratio has been changed from 3.54-1 (11-39), to 3.2-1 (13-41). When installing a new service axle having the 3.2-1 ratio, speedometer gear, Part No. 6450318 (18 teeth), and adaptor, Part No. 6450518 is required.

Axle Ratio–3.54-1 (11-39) before Car Serial V-8235. 3.2-1 (13-41) after Car Serial V8235. **Backlash**–.002-.006"

Rear Axle Assembly Removal: Raise rear of body. Disconnect hand brake cable at bellcrank and the housing at bracket. Disconnect torque tube from transmission, rear brake hose at bracket on body floor pan, rear springs, shock absorbers and rear axle stabilizer bar at axle tube. Roll axle from under car and remove truss rods, torque tube and propeller shaft from rear axle.

Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644-B). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims and replace same amount when reassembling). Withdraw shaft using Puller J-2498, do not drag on inner seal.

Wheel Bearing Adjustment: Shims behind brake backing plate.

Rear Suspension: *See "Hudson Rear Suspension" in Rear Axle Section.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.

Front Shocks–Hudson Part No. 3118500 (Set of 2).

Rear Shocks–Hudson Part No. 3117364 (Set of 2).

FRONT SUSPENSION

Independent. With coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.

See "Hudson" in Front Suspension Section.

►*CAMBER & CASTER ECCENTRIC BOLT NUT BOTTOMING ON SHOULDER OF ECCENTRIC BOLT CORRECTION & PARTS PRODUCTION CHANGE:* (Eccentric bolt nut will not tighten sufficiently to prevent bolt from turning). On early cars install a 5/8" I.D. washer between nut and eccentric washer. At Car Serial No. Y-1292 the counter-bore of the eccentric nut has been increased to 3/16".

Kingpin Inclination–6½°.

Caster (Manual Steering)–½° Pos. desired, with 0-½° Pos. limit **(Power Steering)** 1° Pos. desired with ½-1° Pos. limits.

Camber–0° desired with ¼° Neg to ¼° Pos. limit.

Toe-In–1/16-3/16".

Toe-Out on Turns (Manual Steering)– Inner wheel 25°, Outer wheel 20¼° **(Power Steering)** Inner wheel 25°, Outer wheel 21¼°.

STEERING

►*POWER STEERING PUMP VIBRATION CORRECTION & PUMP BRACE PRODUCTION CHANGE (AIR CONDITIONED CARS):* Install Power Steering Pump Brace Part No. 3146406, between cover capscrew and engine cylinder head. Cars after Serial No. Y-6374 have the brace installed in production.

Manual: Gemmer Model 305. Worm & Roller with "push-pull" adjustments.

See "Gemmer Steering Gears" in Steering Section.

Power Steering: Monroe "Linkage Type". *See "Monroe Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix. Hydraulic duo-servo single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See "Bendix Hydraulic" in Brake Section.

►*SPONGY BRAKE PEDAL CORRECTION (EXCEPT POWER BRAKES): See "Brake Notes" in Hudson Special Data.*

Drum Diameter–11".

Wheel Cyl. Diameter–1 1/8" (Front), 15/16" (Rear).

Lining Width–2½" (Front Wheels), 2" (Rear Wheels).

Lining Length–9 3/8" (Primary Shoes), 12" (Secondary Shoes).

Clearance–Back off adjusting screw 14 notches from point where wheel can just be turned by hand.

Standard Master Cylinder: Mounted on support under floor pan to left of transmission.

Checking Fluid–Remove access cover under floor mat on left side. Maintain level ½-1" below filler top.

Removal–Remove from below without disturbing other parts.

Power Brakes: Bendix Power Unit. Replaces standard cylinder.

See "Bendix Power Unit" in Brake Section.

Removal of Power Unit–Remove vacuum and air cleaner hoses at inlet tubes. Remove hydraulic line. Disconnect pushrod from brake pedal linkage. Remove unit from mounting brackets.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Own. Compressor clutch controlled magnetically. Inoperative unless control knob turned "ON". *See "Hudson Air Conditioning" in Miscellaneous Section.*

►*AIR CONDITIONER COMPRESSOR VIBRATION CORRECTION & COMPRESSOR BRACE PRODUCTION CHANGE (Cars before Serial No. Y-6448): See "Hudson Air Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electric. Individual motors in each window. *See "Power Window Regulators" in Miscellaneous Section.*

HOOD ASSEMBLY
ALL MODELS (EXC. DARRIN)

HOOD ADJUSTMENT: Loosen bolts attaching hinge to cowl bracket, and hood to hinge arm enough to permit movement at these points, but still tight enough to retain adjustment until final tightening. Close hood and check for fit, using cowl contour and fender lines as guides. A telescoping joint is provided at the center of hood crossbar for hood adjustment at cowl and at hood edge and fenders (spread hood using a suitable spreader to lower hood line at cowl, and extend edges of hood at fenders. To raise hood at cowl, and provide clearance at edge of hood and fender, reverse spreading operation). Adjust hood for snug fit at anti-squeak molding by adjusting hinges at vertical slots in cowl bracket. Hood can be moved to one side or the other by pressure at nose of hood, for movement of hood mounting bolts in hinge arm. Fenders may also be moved vertically a slight distance to align fender line and hood line.

TIGHTENING SPECIFICATIONS
1946-48 "L" HEAD ENGINE

	Ft.Lbs.	In.Lbs.
Cylinder Head Bolts①	40-50	480-600
Spark Plugs	5-10	60-120
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mtg. Bolts	36-40	432-480
Camshaft Sprocket Bolts	35-40	420-480
Camshaft Retaining Nut	30-35	360-420
Filler Block Screws	14-16	168-192
Int. & Exh. Manifolds	31-35	372-420
Oil Pan Screws	10-14	120-168

①—Tighten cold and recheck with engine at 150°.

1949-55 "L" HEAD ENGINE

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	30-35	360-420
Spark Plugs	30	360
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mounting Bolts	35-40	420-480
Camshaft Sprocket Nut	35-40	420-480
Int. & Exh. Manifolds	30-35	360-420
Vibration Dampener Bolt	100-130	1200-1560

CAUTION—Torque figures given are for clean and dry threads. If threads oiled, reduce torque approx. 10%.

"F" HEAD ENGINE

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	60-70	720-840
Spark Plugs	25-35	300-420
Con. Rod Bearing Bolts	50-55	600-660
Main Bearing Cap Bolts	65-75	780-900
Flywheel Mtg. Molts	35-41	420-492
Camshaft Thrust Plate	20-26	240-312
Int. & Exh. Manifolds	29-35	348-420

ENGINE
"L" HEAD ENGINE

ENGINE REMOVAL: Drain cooling system and proceed as follows:

1)—Remove hood and radiator assemblies. Disconnect and remove battery. Remove distributor, air cleaner and carburetor. Disconnect throttle lever from linkage and shaft on cylinder head.

2)—Disconnect fuel pump inlet line at frame, and disconnect wiper hose from tubing at pump.

3)—Remove the two nuts attaching engine front endplate to engine front mounts. Disconnect exhaust pipe at manifold flange and at hanger clamp on clutch housing.

4)—Disconnect solenoid to starting motor cable, water temperature gauge engine unit, wiring at engine oil gauge unit, cable coil negative terminal and the wiring at generator.

5)—Disconnect engine rear mount from #2 crossmember, gearshift rods at transmission, overdrive control cable, and wiring to overdrive electrical controls. If car is equipped with Hydra-Matic, remove throttle rear rod and throttle lever from transmission. Disconnect speedometer cable, and remove or disconnect propeller shaft as necessary.

6)—Disconnect clutch linkage (if Synchro-mesh Trans.).

7)—Attach suitable engine lifting bracket to cylinder head (#7 and #28 cylinder head bolts—see Head Diagram). Raise hoist and turn engine at a slight angle to frame with front of engine higher than rear, then remove engine from car. Be extremely careful while removing to prevent damage to car and accessories.

OIL PAN
"L" HEAD ENGINE

OIL PAN REMOVAL: Raise front end of car and support it securely on stands. Disconnect steering drag link at idler arm on frame, turn wheels to right and work drag link clear of oil pan. Drain oil, remove oil pan capscrews and lockwashers, slide pan to rear.

▷INSTALLATION NOTE—Lower Filler Blocks (front and rear) must be removed to install new oil pan side gaskets. See "Front & Rear Filler Blocks" under Crankshaft & Main Bearings (above) for data.

CYLINDER HEAD & MANIFOLD
"L" HEAD ENGINE

CYLINDER HEAD INSTALLATION: Following procedure is recommended:

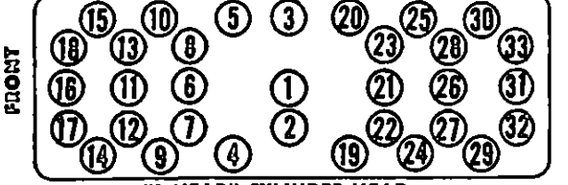
1) Blow out all blind tapped holes in head to insure full tightening of bolts without bottoming.

2) Install guide pins in head bolt holes #14 and #30 (see diagram). These holes are smaller diameter in gasket and head for piloting. *NOTE*—Guide pins can be made from #207354 Head Bolts by cutting heads off and slotting end so that they can be installed and removed with a screwdriver.

3) Install head gasket and cylinder head.

4) Coat head bolts with Perfect Seal Gasket Paste, K-F No. 200047, tighten bolts snugly in sequence shown in head diagram, then torque bolts to 30-35 ft. lbs. in same sequence.

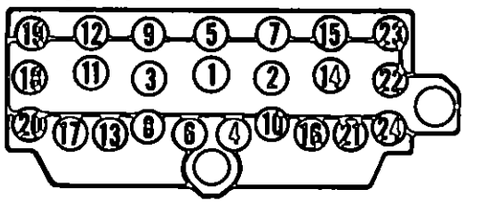
5) Warm engine up to normal operating temperature and retorque bolts to 30-35 ft. lbs. Check head bolts and gasket for leaks. *NOTE*—Recheck head bolts after 500-600 miles of operation.



"L-HEAD" CYLINDER HEAD

"F" HEAD ENGINE

CYLINDER HEAD INSTALLATION: Use a torque indicating wrench to tighten cylinder head stud nuts and cap screws, tighten in correct sequence as shown in diagram and to correct torque as shown in tightening specifications. Recheck with engine warmed up to operating temperature of 150°F.



"F-HEAD" CYLINDER HEAD

ORIGINAL BORE & PISTONS
"L" HEAD ENGINE

BORE & PISTON SIZES: Engines originally equipped at factory with special oversize pistons may be identified by code letter following engine number: "N"—Pistons are .020" Oversize.

"AN"—Pistons .020" Oversize. Main and connecting rod bearings Undersize (See Original Bearing Sizes).

"NX"—Pistons .020" Oversize. Main bearings are Undersize (see Original Bearing Sizes following).

"F" HEAD ENGINE

BORE & PISTON SIZES: Engines originally equipped at factory with special oversize pistons may be identified by code letter following engine number: "B" or "AB"—Pistons and cylinder bores .010" Oversize.

PISTONS
"L" HEAD ENGINE

PISTON IDENTIFICATION: Two types of aluminum alloy pistons used which can be identified as follows:

▷*CAUTION—Piston weight different on each type.*

Strut Type Piston—Has wide strut embedded within skirt at each piston pin boss and drilled oil drain holes in both #3 and #4 ring grooves.

T-Slot Type Piston—Has horizontal slot in lower (#4) ring groove and short vertical slot on one side of piston skirt. #3 oil ring groove has drilled oil drain holes.

REPLACEMENT PISTONS: See "Piston Identification" for types used. Each type piston furnished in following sizes: Standard, .005", .010", .020", .025", .030", .040", .050", .060" Oversize.

▷*CAUTION—Piston weight different on each type.*

PISTON RINGS
"L" HEAD ENGINE

REPLACEMENT RINGS: Standard type cast iron rings, or Chrome type Oil Control Rings furnished in Standard size and the following oversizes (below). Chrome type rings are recommended for engines being overhauled after high mileage and especially where cylinder bore out-of-round and taper are near the "high limit."

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Replacement Ring Oversizes—Cast iron type or Chrome type, furnished either singly or in complete sets. Standard size, .010, .030", .040", .050" Oversize.

ORIGINAL BEARING SIZES

"L" HEAD ENGINE

MAIN & CONNECTING ROD BEARING SIZES: Engines originally equipped with special undersize main and connecting rod bearings may be identified by code letter following engine number:

"A"—Main & Connecting Rod Bearings .010" Undersize.
"X"—Main Bearings .002" Undersize.
"AN"—Main & Connecting Rod Bearings .010" Undersize and Pistons Oversize (see Original Bore and Pistons).
"NX"—Main Bearings .002" Undersize and Pistons Oversize (see Original Bore and Pistons).

"F" HEAD ENGINE

MAIN & CONNECTING ROD BEARING SIZES: Engines originally equipped with special undersize main and connecting rod bearings may be identified by code letter following engine number:
"A" or "AB"—Main and Connecting Rod Bearings .010" Undersize.

CRANKSHAFT & MAIN BEARINGS

"L" HEAD ENGINE

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket). Rear filler blocks (additional **upper filler block guard** in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger. Filler blocks can be removed and replaced without disturbing crankshaft as follows:

Front Filler Block (Lower) Servicing: Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block. When installing filler block, first install oil pan side gaskets (No. 200266), install filler block (use Perma-tex), install new end gasket (No. 200267) on block.

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal). Remove and discard old gasket or seal. Install new seal (no. 204654) in same manner as described below for Rear Filler Block (Upper) Guard. Install lower filler block **after** upper filler block guard has been installed.

Rear Filler Block (Upper) Guard Servicing: Guard is seated in groove in crankcase and can be "rotated" out without disturbing crankshaft after lower filler block removed. Remove and discard old gasket or seal, clean out seal groove. Install new graphite impregnated seal (no. 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard). **Do not use shellac or sealing compound in groove.**

►***CAUTION***—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft. If necessary, seal can be built up using 1/32" thick gasket material, 3/16" wide, as shims shellacked to groove in block or guard behind seal.

"F-HEAD" ENGINE

REAR BEARING OIL SEAL: Consists of a wick type packing installed in grooves in bearing cap and crankcase. To install new packing, insert packing in groove, working both ends toward center with round piece of wood or steel. With packing firmly seated in groove, cut off ends flush with surface. *NOTE*—Crankshaft must be removed to install packing in upper (crankcase) half of bearing.

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case. When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. *CAUTION*—Do not cut off this protruding portion of the packing.

FLYWHEEL

1951-53 "L" HEAD ENGINE

►***CRANKSHAFT OR FLYWHEEL REPLACEMENT (HYDRA-MATIC DRIVE CARS)—If it is necessary to replace crankshaft or flywheel, determine if ⅜" spacer is located between crankshaft flange and flywheel. If so, proceed as follows for correct replacement:***

Crankshaft Replacement—Replace original parts with the following: Crankshaft—No. 209227; Hydra-Matic Flywheel—No. 209001; Flywheel Bolts—No. 209005; Flywheel to Crankshaft Dowel (Oversize)—No. 209002. DISCARD THE ⅜" SPACER WHEN THESE PARTS ARE INSTALLED.

Flywheel Replacement—To install a new flywheel on the original crankshaft, use a service replacement flywheel and the ORIGINAL ⅜" SPACER AND FLYWHEEL BOLTS. ***NOTE—One Dowel only used in new flywheel, (Part No. 209002). See "Flywheel" (below) for installation data.***

FLYWHEEL REPLACEMENT (HYDRA-MATIC DRIVE CARS): Remove flywheel to crankshaft dowel using Tool KF-115-1 (Dowel must be tapped 5/16"-24 to use Tool KF-115-1). Remove flywheel bolts, plates and flywheel (CAUTION—Do not hammer on flywheel or damage torus cover gasket surface). ***IF ⅜"SPACER FOUND BETWEEN FLYWHEEL AND CRANKSHAFT, see "Crankshaft Replacement Note" above.***

Installation—Clean crankcase flange and mating surface on flywheel being careful not to scratch or nick surfaces. Use Acetone to remove Pliobond 30 sealing compound. Apply a thin coating of Pliobond sealing compound, about ½" wide on crankshaft flange surface at bolt circle diameter, smoothing compound toward outer edge. Allow to dry about one minute. Install flywheel on crankshaft flange and enter all flywheel bolts through plates. Replace bolts and hardened plates and tighten bolts. (CAUTION—Diametrically opposite bolts should be tightened to 105 ft. lbs., uniformly or leakage may result). Mount dial indicator so stem or button rests on torus cover gasket sealing area and check flywheel runout which should not exceed .005" total indicator reading. Ream dowel hole using Tool KF-115-3, 115-4, 115-5, 115-6. (CAUTION—Bolts used for holding guide are not heat treated alloy steel and should be tightened only enough to hold block firmly to flywheel). Install dowel using Tool KF-115-7, making sure that dowel does not extend beyond face of crankshaft flange.

►**Flywheel Replacement Note**—Service crankshaft and crankshaft in partial engine service assembly have a dowel hole 15/32" in diameter. When installing either of these parts, enlarge the dowel hole using a sharp ½" drill and Tools KF-115-2, 115-3, 115-4, before reaming for oversize dowel (Part No. 209002).

CAMSHAFT & BEARINGS

1947 "L" HEAD EN INE

CAMSHAFT CHANGE (1947): Two different camshafts are used (camshaft changed when fuel pump mounting location changed) and can be identified as follows:

Early Cars—Fuel pump mounted at rear of engine.
Later Cars—Fuel pump mounted at front of engine.

Replacement Camshafts for All Engines

K-F Part No. 200113.....Fuel Pump at Rear
K-F Part No. 203017.....Fuel Pump at Front

"L" HEAD ENGINE

CAMSHAFT REMOVAL: Camshaft can be removed with radiator off and engine in car as follows:

1. Remove timing gears (remove both gears and chain as an assembly). This requires removal of vibration dampener and pulley, timing gear cover.
2. Remove cylinder head.
3. Remove fuel pump.
4. Remove oil pan, oil pan return tube & oil pump.
5. Lift valves, using valve spring lifter tool C-482 (see Note below), block valves up by inserting a clothespin or block of wood under each valve head. NOTE—Remove right front tire and wheel and take off splash shield under fender for access to valves.
6. Block up valve Lifters (lift each lifter up by hand and fasten in upper position with a wire).
7. Remove Camshaft Thrustplate by taking out two screws retaining thrustplate on crankcase.
8. Pull camshaft out through front of engine.

Camshaft Bearing Replacement Note—Requires removal of engine from car for access to plug at rear of block which must be removed.

1951-55 "L" HEAD ENGINE

CAMSHAFT & REPLACEMENT PARTS CAUTION: ***TWO DIFFERENT CAMSHAFTS used in production and special VALVE LIFTERS and OIL PUMP DRIVE GEAR must be used with each camshaft as listed below.***

Camshaft

Type & Identification①	Part No.
Cast Iron (Circle O & #733340)	207218
Steel Forging (#700599)	203017

①—Identification number and marks are cast or stamped on shaft.

VALVE LIFTERS: Steel lifters must be used ONLY with Cast Iron camshaft. Cast Iron lifters can be used with Cast Iron or steel camshaft.

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Valve Lifters

Type & Identification	Part No.
Steel (Stamped with "diamond")	②207171
Cast Iron (no mark)	②207219

②—Std. Size. Also furnished .001", .002", .005" Oversize.

OIL PUMP DRIVE GEAR: Oil pump drive gear must be SAME material as camshaft (use Cast Iron gear with cast iron camshaft, steel gear with steel camshaft).

Oil Pump Drive Gear

Type & Identification	Gear	Gear & Shaft
Cast Iron (Stamped "O")	207222	207221
Steel (no mark)	200248	203185

VALVE SYSTEM

1947-50 "L" HEAD ENGINE

VALVE LIFTER REMOVAL: Lifters can be removed **on some cars,** without disturbing head, as follows: Remove splash shield under right front fender for access to valve compartment. Remove valve spring seat lock (retaining pin on early cars, split type locks on later cars). Turn tappet clearance adjusting screw down as far as possible, remove valve spring. Working through spark plug hole, lift valve up with a wire to provide clearance. Turn tappet clearance adjusting screw up free of the lifter barrel, tilt adjusting screw and locknut to clear valve stem and lift these parts out of the lifter barrel. Raise lifter barrel up until lower end clears hole in block, then tilt barrel and remove.

►***NOTE—If lifter barrel cannot be emoved in this manner, remove cylinder head and remove valve.***

VALVE TAPPET ADJUSTMENT

"L-HEAD" ENGINE

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below). Remove right front wheel and access cover in fender splash shield for access to valve compartment. Remove spark plugs so that engine can be turned over by moving fan or fan belt. By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment.**

Valve Tappet Adjustment Order (numbered from FRONT of engine)

Fully Raise Valve	Then ADJUST Valve:
Nos. 1 and 3	Nos. 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos. 2 and 6	Nos. 7 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 5	Nos. 8 and 9
Nos. 7 and 11	Nos. 2 and 6

ROCKER ARMS

"F-HEAD" ENGINE

ROCKER ARM ASSEMBLY REMOVAL: Lock the rocker arms, shaft, brackets, and springs together as a unit by removing the cover studs in front and rear rocker arm shaft brackets and installing four 5/16"-24 thread set screws in the two front and two rear brackets in the same way the set screws are installed in center brackets. Remove the nuts on the six bracket studs and lift entire assembly off studs as a unit.

INSTALLATION: Check push rods, straighten or replace any that are bent. Place push rods in holes in head and block, being sure that they are properly seated in intake valve tappets. Place rocker arm assembly on its studs, seat intake valve adjusting screws in tops of push rods before installing nuts on bracket studs. Torque nuts to 30-36 ft. lbs. Remove four extra set screws from two front and two rear rocker arm shaft brackets, install cover studs in front and rear brackets with short end of stud down.

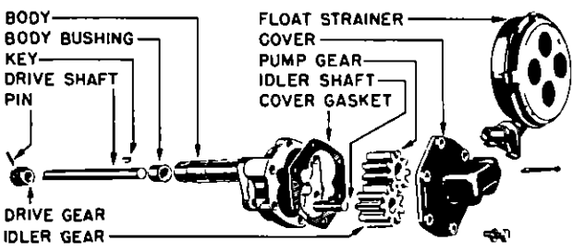
OILING SYSTEM

OIL PUMP

"L" HEAD ENGINE

OIL PUMP SERVICING: Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling. Service pump as follows:

Disassembly—Take out cotter pin and remove screen float assembly. Remove cover and gasket. Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear. remove idler gear (remove idler shaft if required). Take off lower drive gear (press fit and keyed to shaft).



"L-HEAD" ENGINE OIL PUMP

Oil Pump Clearances—Check as follows:

1)—Pump Body Bushing: if over .005" clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to .500-.501".

2)—Pump Shaft: shaft diameter .4990-.4985".

3)—Lower Drive Gear: end of gear should be .001-.006" beyond gasket seat on pump body.

4)—Upper Drive Gear: .002-.004" clearance between underside of gear and upper end of pump body. Controlled by pressing lower drive gear on shaft until this clearance obtained.

NOTE—Cover plate should be replaced if worn from contact with gears, or if cracked.

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose). Replace by using drift inserted in distributor drive shaft bore from top of block. Install new bushing from below (must be flush with bottom of block).

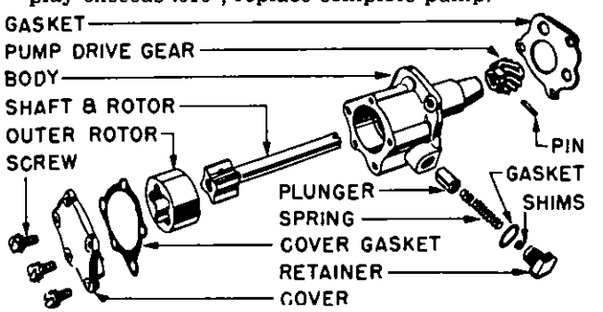
Reassembly—Press upper drive gear on shaft with pin hole at right angles to tongue on shaft. Insert new pin and peen ends flush with gear. Install shaft and gear in pump body. Press lower drive gear on shaft (with key in place) until .002-.004" clearance obtained between upper drive gear and upper end of pump body. Press idler gear shaft in body, install idler gear. Install cover using new gasket and pin oil screen float assembly on cover. Check shaft and gears—must rotate freely when turned by hand.

Oil Pump Installation—Set #1 piston at top dead center. Insert distributor main drive shaft from top of block. Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx. parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut. Remove distributor shaft for cyl. head installation.

►***CAUTION—Check Ign. Timing after pump installed.***

"F" HEAD ENGINE

OIL PUMP REMOVAL & OVERHAUL: (Removal)—Rotate engine until distributor rotor points to No. 1 firing position and timing mark on flywheel or vibration dampener is directly under pointer. On 4 Cyl. Models do not remove distributor (pump must be installed so gears mesh without moving rotor for correct engine timing). On 6 Cyl. Models, remove distributor. (CAUTION—Engine must not be rotated with oil pump removed). Remove pump mounting bolts and pull pump out as far as possible. Place a short jack between front suspension support and front lower edge of block and push engine to right until pump is free (Note—It may be necessary to loosen engine support bolts for more movement). Check pump shaft for wear before disassembling pump by mounting it in a vise with a dial indicator bearing against shoulder on gear, at right angles to relief valve housing. Move gear toward, then away from indicator and note total reading. If this play exceeds .010", replace complete pump.



"F-HEAD" ENGINE OIL PUMP

Disassembly: Remove cover screws, cover and gasket and shake outer rotor from housing. Remove relief valve retainer, gasket, shims, spring, and plunger. If rotor is to be replaced, file off one end of gear retaining pin, pull gear off shaft and remove shaft and inner rotor from housing. Clean all parts in solvent and check for wear, pits and scoring.

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Checking Rotor Clearance: Position inner rotor with one lobe engaged between two lobes of outer rotor, then measure clearance of opposite inner rotor lobe and lobe of outer rotor. This clearance should not exceed .010". To check end clearance, place a small piece of .010" shim stock on inner rotor so that it does not overhang edge of rotor at any point. Install cover and gasket and tighten screws. If shaft can be turned by hand, end clearance is excessive. Install new cover and repeat test. If rotors still not tight, replace rotors.

Reassembly: Install relief valve, spring, gasket and retainer. If shims were removed, install them between spring and retainer. If new rotors installed, slide gear on shaft after installing shaft and rotor in housing. Position gear so there is not over .010" clearance between gear and pump housing and drill a 5/32" hole through pump shaft for retaining pin. Install pin and peen ends. Install cover and gasket and tighten screws.

Installation (6 Cyl. Models): Make certain that No. 1 piston is on top dead center and that timing mark on flywheel or vibration dampener is directly under pointer. Install new gasket between pump and block and be sure that gasket matches pump intake and discharge ports. Start pump into mounting hole but do not engage gears. Insert a long screw driver through distributor hole and engage slot in pump drive gear. Rotate pump gear so that when meshed with camshaft gear, slot will be practically vertical with off-set to rear, as it enters camshaft gear. As pump is pushed in and gears are fully meshed, slot will be about 45° from vertical position. (NOTE—If gear is meshed one tooth away from the correct position, slot will be 36° off, which is readily noticeable). Install distributor and check ignition timing.

COOLING SYSTEM

1947-50 "L" HEAD ENGINE

RADIATOR REMOVAL: Drain water, disconnect hose connections. Disconnect two tie rods at top of radiator. Remove nuts on mounting studs underneath radiator, lift radiator up and out.

1951-55 "L" HEAD ENGINE

RADIATOR REMOVAL: Drain water, disconnect hose connections. Take out radiator-to-shroud screws, 6 total (3 each side). Lift core out, tilting upper end to rear as core being raised.

PROPELLER SHAFT NOTES

1947-50 MODELS

CENTER SUPPORT BEARING: Consists of a ball bearing on rear end of front propeller shaft mounted in rubber in steel plate mounted on frame.

Removal & Disassembly—Disconnect front and intermediate universal joints, take off nuts on center support frame mounting bolts, remove front shaft and support bearing assembly. Clamp front shaft in a vise, remove bolt, lockwasher, and plain washer on rear end of shaft (in universal joint companion flange), pull companion flange using Puller C-452. Remove rear dust shield. Pull support plate off bearing insulator, remove bearing insulator. Use jaw type puller (KF-56) and pull bearing off shaft, remove front dust shield.

►***CAUTION—Do not wash bearing in gasoline or solvent.***

Reassembly—Install front dust shield and bearing (use driver KF-11) on splined end of front propeller shaft (bearing must support shield firmly). Place rubber insulator over bearing (small diameter to rear). Coat outer surface of insulator with liquid soap and slip support plate in place over insulator (flanged end of sleeve to front, insulator bottomed against bead on inside of sleeve). Install rear dust shield, companion flange, flat washer, lock washer, and bolt. Tighten bolt until flange and dust shield bottom against shaft shoulder (25-30 ft.lbs. torque).

Bearing Support Installation: When installing front propeller shaft and support bearing assembly in car, install washers and insulators on each support stud on frame cross-member in the following order: Spacer, Bushing, Front Support Insulator (fluted end to rear), Front Support Washer (has large hole), Support Bearing Plate, Rear Support Insulator (fluted end forward), Rear Support Washer (has small hole), and nut (tighten to 15-20 ft. lbs.).

►***CAUTION—Install center bearing support on frame studs so that sleeve in which bearing seated slopes downward toward the rear to provide correct propeller shaft angularity.***

HOOD ADJUSTMENT: *See Kaiser Special Data.*

MODEL IDENTIFICATION

STARTING SERIAL NUMBERS

	Model	Serial Numbers
1947 Kaiser	K-100	K-100-001001 Up
1947 Kaiser Custom	K-101	K-101-2000001 Up
1948 Kaiser	K-481	K-481-001001 Up
1948 Kaiser Custom	K-482	K-482-001001 Up

SERIAL NUMBER: On left front door hinge post.
Body Number Note—Stamped on plate on left side of cowl or on right front face of dash.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Nameplate on left side of crankcase. NOTE—Numeral following Engine Model Designation (first part of Engine Number) indicates Engine Plant as follows: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes).** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Kaiser Special Data.* Note—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 115-125 lbs. (for 6.86-1 Heads), 120-130 lbs. (7.3-1 Heads) at cranking speed of 140 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.

►*NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.*

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .032"
Plug Type—Auto-Lite A-5 (normal driving), A-7 (for short runs or to correct hard-starting in cold climates). 14 mm. metric type.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle or Dwell—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: TDC. (at Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—Mark "DC" on flywheel (first cars), on vibration dampener (beginning Eng. No. 17160).
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—¾-1¼ turn open—one screw (WA1 Carb.), 1¼-2¼ turns open—one screw (W1 Carb.), 1-1¾ turns open—2 screws (WCD Carb.). Turn screws out for richer mixture.
Idle Speed—550 RPM.
Float Level (WA1 Carb.)—5/16" (610S), ⅜" (622S with first Float and Inlet Valve), ½" (622SA, SB & 622S with late type Float and Inlet Valve). Measure from top of projection on bowl cover to top of soldered seam on free end of float with bowl cover assembly inverted.
Float Level (W1)—½" from top of float at free end to gasket seat on cover.
Float Level (WCD Carb.)—9/64" (685S with first type Inlet Valve); 1/16" (685S & 685SA with later type Inlet Valve) from top of each float to gasket seat on cover with valve closed (bowl cover assembly inverted).
Accelerating Pump—Lower Hole (med.) Normal.
NOTE—Pump on 574S has no seasonal adjustment.
Fuel Pump Pressure: 3½-4½ lbs. (for pump mounted at rear of engine), 3-4¼ lbs. (pump mounted at front of engine).
►*CAUTION—Pump pressure must not exceed 4½ lbs.*

►**VALVE TAPPET CLEARANCE:** *CAUTION—Two settings used.*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.

►**Adjustment Procedure**—*See Kaiser Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

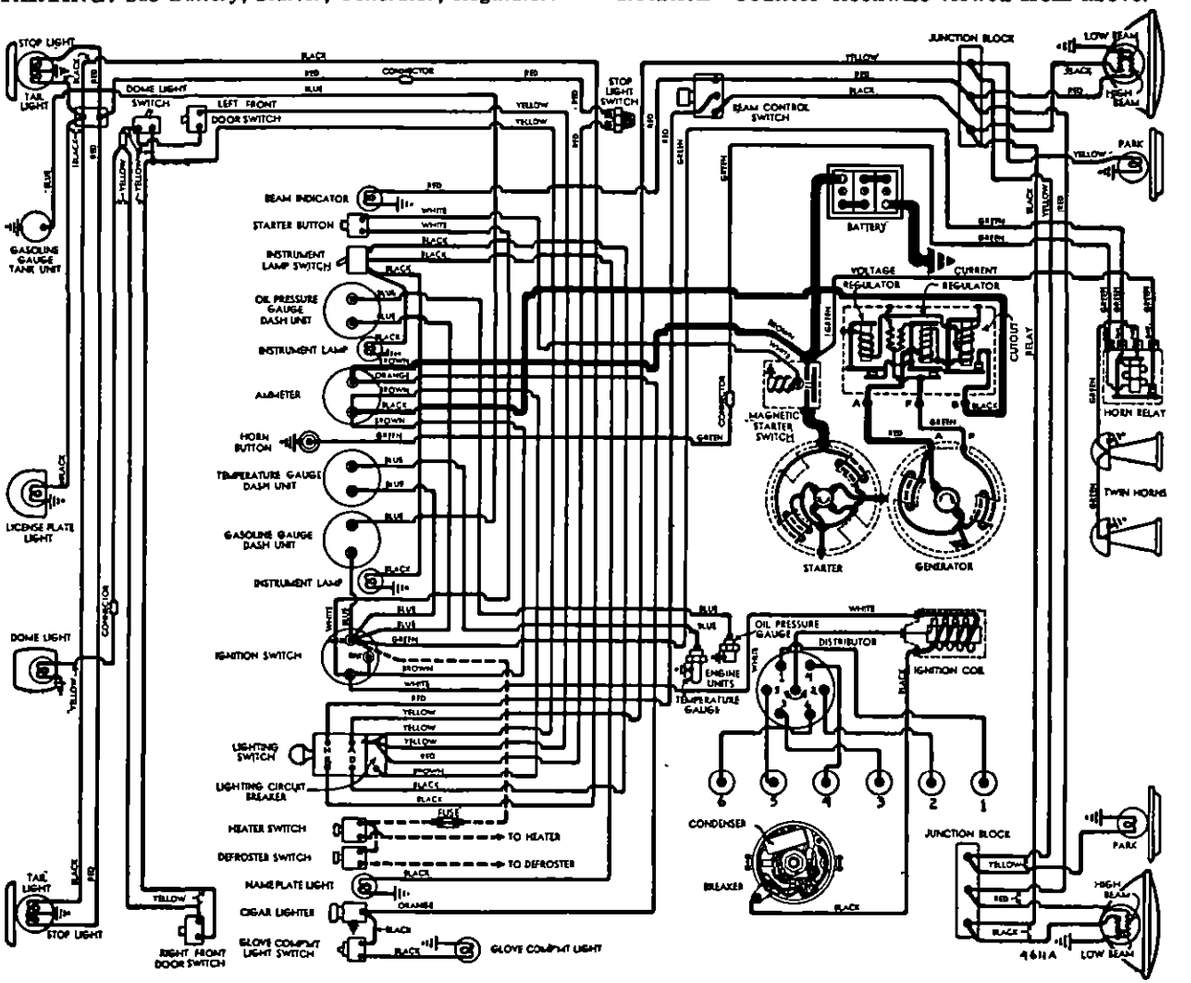
IGNITION

IGNITION SWITCH: Douglas or Mitchellock. Kaiser Frazer No. 201354 (Before Kaiser No. K-100-65372 & Kaiser Custom No. K-101-2005405), No. 203186 (After above numbers).
Lock Cylinder—K-F No. 201898 (with key).

COIL: Auto-Lite Model IG-4093. Mounted on left side of cylinder head opposite distributor.
Ignition Current—3 amperes idling, 5 amperes at 6.4 volts (stopped).

CONDENSER: Auto-Lite No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4211. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
IGS-4214 (Used on later '48 Cars)—*See "1949-50 Kaiser" for data on this Distributor.*
Breaker Gap—.020" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.



Automatic Advance—IGS-4211

Distributor Degrees	RPM.	Engine Degrees	R.P.M.
Start	350	0	700
1	365	2	730
3	400	6	800
7	1150	14	2300
10	1700	20	3400

Octane Selector—Manual adjustment at distributor providing 10° advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance—IGS-4211

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	8"
2°	4°	9½"
4°	8°	11¼"
6°	12°	12¾"
7.5°	15°	14"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting ..... At TDC.

TIMING MARK NOTE—Timing mark located on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 up). Consists of "DC" mark or "0" mark at top dead center with 1° graduations before and after this point.

Timing (with Timing Light C-693)—Mark "DC" or "0" top dead center mark on flywheel (before Eng. No. 17160), on vibration dampener (Eng. No. 17160 Up) with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine at 400 RPM. (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen clampscrew in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten clampscrew. Check octane selector setting.

►CAUTION—Reset engine idling speed at 550 RPM.

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

CARTER WA-1

Carter WA1 Type 622SB superseding 622S & 622SA (All Models). 1¼" Single Barrel, Downdraft type with Fast Idle and Climatic Control.

►NOTE—622S carburetor can be converted to 622SA by installing new Float and Inlet Valve assembly and changing float level.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle (WA1 Carburetors): Carter Single Barrel

See Carburetion Equipment Section for data.

Setting—5/8" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

Automatic Choke (WA1 Carburetors): Carter Climatic Control (Single Carburetor Type).

See Carburetion Equipment Section for complete data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER WCD

Carter WCD Type 685S superseded by 685SA (Optl. on Custom K-482). 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.

►NOTE—685S carburetor can be converted to 685SA by installing new intake Needle & Valve Assembly and resetting float level to 685SA specifications.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle (WCD Carburetors): Carter Dual (WCD)

See Carburetion Equipment Section for complete data.

Setting—.016" throttle opening with choke valve held closed and throttle lever stopscrew backed off (adjust by turning fast idle screw in or out).

Automatic Choke (WCD Carburetors): Carter Climatic Control (Dual Carburetor Type).

See Carburetion Equipment Section for data.

Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER W1

Carter W1 Type 574S. 1¼" Single Barrel, downdraft type with manual choke.

NOTE—This carburetor used for part production starting with following numbers: **K-100 51361, K-101 2000001.**

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

CARB. EQUIPMENT

Air Cleaner: AC Oil-bath type. Kaiser-Frazer No. 200618 (All Models with WA1 or W1 Carburetors), No. 203372 (K-482 Custom with WCD Carburetor).

Servicing—Empty and clean reservoir, wash cleaner in kerosene, refill to indicator line with approx. 1 pint SAE No. 50 engine oil (No. 20 for below freezing tem.) at 1000 mile intervals or when engine tuned up (more often if required by operating conditions).

Fuel Pump (Early type—mounted at rear of engine): AC No. 1539057, K-F No. 200281. Diaphragm type.

►*CAUTION—Install this pump with rocker arm OVER camshaft eccentric.*

See Carburetion Equipment Section for data.

Pressure—3½-4½ lbs. maximum.

Fuel Pump (Later type—mounted at front of engine): AC No. 1539073 (K-F No. 201509) Diaphragm type fuel pump or AC No. 1539074 (K-F No. 202319) combination Fuel-and-Vacuum Pump.

Replacement Pump—AC No. 574 (for 1539073), No. 582 (for 1539074 fuel-and-vacuum pump).

►*CAUTION—Install these pumps with rocker arms UNDER camshaft eccentric.*

See Carburetion Equipment Section for data.

Pressure—3-4¼ lbs.

Gasoline Gauge: King-Seeley electric type.

Dash Unit—K-S No. 41405, Kaiser-Frazer No. 201545 (First Type—Ivory on Green), K-S No. 42015, Kaiser-Frazer No. 202786 (Later Type—White on Beige).

Tank Unit—K-S No. 7916, Kaiser-Frazer No. 201546

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100D. 6 Volt, 15 Plate, 105 Ampere Hour capacity (20 hour rate).

Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.

Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4043, Armature MAW-2128.

Drive—Barrel type Bendix Drive No. A1792.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
5.75 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
18.0 "	Lock	4.0	670

Starting Switch: Auto-Lite Model SS-4001 magnetic switch. Mounted on starter and controlled by push-button on instrument panel.

See Electrical Equipment Section for complete data.

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cables, take out flange mounting screws.

GENERATOR

Auto-Lite Model GDZ-4818A. Armature GDZ-2006F. Two brush type with voltage and current regulation.

Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM. or approximately 20 MPH.

Charging Rate Adjustment—None (see Regulator).

Cold Performance Data Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.

Belt Adjustment: ½" belt deflection midway between generator and fan pulleys (adjust by pulling generator out with 15 lb. force with all bolts loose).

REGULAT R

Auto-Lite Model VRP-4004F-2. Vibrating type Voltage and current regulators (with Cutout Relay) in case on left fender shield.

See Electrical Equipment Section for complete data.

NOTE—Regulator cover sealed. Warranty void if seals broken.

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Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel on left side of instrument panel (above starter button). Lighted when upper (country beams) in use.
Direction Signal (Custom Models): Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights above instrument dials. Lighted when direction signal on same side of car is operating.

Switches

Lighting—Kaiser-Frazer No. 200819.
Beam Selector—Kaiser-Frazer No. 201605.
Direction Signal—Kaiser-Frazer No. 202692.
Instrument—Kaiser-Frazer No. 200821 (Before Kaiser No. K100-46044), No. 202715 (Kaiser after No. K100-46044 & all Custom cars).

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Parking	3	63
Beam Ind., Clock	1	51
Instrument, Nameplate	1½	55
Stop & Tail	21-3	1154
Rear License	3	63
Dome, Glove Compt.	21	1129

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type. On back of lighting switch.
FUSES: Clock—2 ampere. In clock lead.
Direction Signal—9 ampere. In flasher lead under instrument panel to left of steering column.
HORNS: Auto-Lite. Model HT-4021 or HT-4023 (Low Note), HT-4022 or HT-4024 (High Note). Twin horns.
Horn Relay: Auto-Lite Model HRL-4101. Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16". **Stroke**—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—100 at 3600 RPM.
Compression Ratio—6.86-1 (First Cars), 7.3-1 (All Cars after Eng. No. 304305—Detroit, 66125—Muskegon).
▷*NOTE—7.3 Heads marked by "73" stamped on left front directly above engine number on block.*
Compression & Vacuum Reading—*See Tune Up data.*
TIGHTENING TORQUES: *See Kaiser Special Data.*
CYLINDER HEAD INSTALLATION: *See Kaiser Special Data.*
ENGINE REMOVAL: *See Kaiser Special Data.*
OIL PAN REMOVAL: *See Kaiser Special Data.*
PISTONS: Two types used. Aluminum alloy, Cam-ground, Tin-plated, strut type with split skirt, or T-slot type. Length 3 9/16" (both types).
Original Bore & Piston Sizes—*See Kaiser Special Data.*
NOTE—Pistons can be identified by drilled oil drain holes in fourth ring groove and strut within skirt at each pin boss (Strut Type), or by horizontal slot in fourth ring groove and short vertical slot on one side of skirt (T-slot Type).
Weight—15.58 ozs. (strut type), 14.28 ozs. (T-slot).
Clearance—.0255-.0315" (Top Land). See Fitting new pistons.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.
Replacement Pistons—*See Kaiser Special Data.*
Installing Pistons: Slot in skirt toward left or away from camshaft (all types). NOTE—On pistons marked by arrow on head, arrow toward front of car.
PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled for oil drainage (all types), fourth groove drilled (strut type pistons), slotted (T-slot pistons).

Ring	Width	End Gap	Side Clearanec
Compr. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Compr. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3, 4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.
Replacement Rings—*See Kaiser Special Data.*
PISTON PIN: Diameter—55/64". **Length**—2 13/16". Floating type, with lock ring at each end.
Pin Fit in Piston—Tight fit (—.0003" clearance), or push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing: +.0003" clearance. When installing oversize pins or new bushings, ream bushings for this clearance with DD-82-2 Reamer (used also to ream piston pin bore in piston).
Replacement Pins: Std. size and .003", .005" Oversize.
CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".
▷*CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0023". **Sideplay**—.006-.010".
Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.
Replacement Bearings: Furnished Std. Size and .001", 002". .010". .012" Undersize.
Installing Rods: Rods and bearing caps marked. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).
CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752".
▷*CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0015-.002".
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation *See "Crankshaft & Main Bearings" in Kaiser Special Data.*
Replacement Bearings: Furnished Std. size and .002", .004", 010" Undersize. NOTE—Two types of #1 bearings (flanged & unflanged). See Endplay data.
End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between bearing journal and thrustwasher. **Endplay**—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*
CAMSHAFT: Four bearing. Two-sprocket chain drive. NOTE—Two different camshafts used due to relocation of fuel pump. Camshaft No. 200113 (first cars—pump at rear), No. 203017 (later cars—pump at front).
Journal Diameters—#1, 1 7/8"; #2, 1 13/16"; #3, 1 3/4"; #4, 1 1/4".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".
Bearing Adjustment: None. Replace bushings with camshaft removed.
End Thrust: Taken by thrust plate on front of engine Between front bearing journal and sprocket.
Camshaft Removal: *See "Camshaft & Bearings" in Kaiser Special Data.*
Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.
Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3395-.3387"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width—5/64-3/32" (intake), 3/32-7/64" (Exhaust). Use KF-58 Relief Counterboring Set to remove any high shoulder in block above valve head.
Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Use Driver DD-849. Drive old guide down and out, drive new guide down into place (same height as old guide with mark on driver stem in line with top face of block). NOTE—Tapered end of guide must be upward.
Valve Springs: Check spring with tester C-647. Pressure should be 101±3 lbs. at 1⅜". Spring free length 1 15/16".

ENGINE

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	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. NOTE—Lifters can be removed (some engines only) without disturbing cylinder head. *See "Valve System" in Kaiser Special Data.*
Clearance—.0005-.0018". With correct clearance, lifter should rotate in bore with a slight drag.
Replacement Lifters—Furnished Std. size and .0005", .001", .0015", .002" Oversize.

VALVE TIMING

►**Tappet Clearance:** *CAUTION—Two settings used:*
Before Eng. No. 10769—.010" Int., .014" Exh. Cold.
After Eng. No. 10769—.014" All Valves, Cold.
►**Adjustment Procedure**—*See Kaiser Special Data.*
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With tappet clearance set at .014" (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with the ten-degree mark after the dead center mark "DC" at indicator in flywheel housing inspection hole (before Eng. No. 17160). Beginning with Eng. No. 17160, marks located on dampener.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Under plug on right side of crankcase between #4 & #5 cylinders. Opens at 35 lbs. Adjustable by adding or removing washer, No. 200272, between end of spring and plug.
Oil Pan Removal: *See Kaiser Special Data.*
Crankcase Ventilation: Filter element in oil filler cap Outlet pipe located on front valve cover plate.
Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Kaiser Special Data.*
Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.
Oil Pressure Gauge: King-Seeley electric type.
Dash Unit—K-S No. 41410, Kaiser-Frazer No. 201539 (First Type—Ivory on Green), K-S No. 42020, Kaiser-Frazer 202787 (Later—White on Beige).
Engine Unit—K-S No. 40767, K-F No. 201540.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostat.
Capacity (First 22" Radiator)—15 qts. (14 qts. at driving level). **(Later 17" Radiator)** 13½ qts. (13 qts. at driving level).
Pressure Valve—AC. No. 846740 (Radiator Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).
Radiator: Two types used as follows:
First Cars—No. 200445 (22" wide). Service by installing later type (No. 202906) and installing Radiator Shroud Side Panel Extension No. 203100 (two required), using No. 576 screws (10 required).
Later Cars—Radiator No. 202906 (17" wide).
Radiator Removal—*See Kaiser Special Data.*
Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 148-155°F.
Temperature Gauge: King-Seeley electric type.
Dash Unit—K-S No. 41415, Kaiser-Frazer No. 201543 (First Type—Ivory on Green), K-S No. 42025, Kaiser-Frazer 42025 (Later—White on Beige).
Engine Unit—K-S 40380, Kaiser-Frazer 201550.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck.....**Model 9A7**
Auburn (Some Cars).....**Model 9251-15**
Clutch Identification—Types can be identified by number of pressure plate springs—3 (Auburn), 9 (Borg & Beck—cover also stamped "951").
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven asbestos, 2 required. I.D. 6". O.D. 9¼". Thickness ⅛".
Facings (Auburn)—Moulded metallic or Raybestos, 2 required. I.D. 6". O.D. 9¼. Thickness .135".
Pedal Adjustment: Pedal free travel ¾-1". To adjust, position nut on pedal assist spring link (at rear end of spring) so that it is lined up with spring adjusting gauge, KF-10, installed on spring.
Removal: Remove transmission (see Transmission Removal below), remove clutch housing underpan, disconnect clutch pedal cross-shaft from pedal linkage. Install Clutch Plate Aligning Arbor, C-360, to hold clutch parts in alignment, take out mounting screws in clutch cover flange (rotate flywheel so that all screws accessible through pan opening). Remove aligning arbor, remove clutch cover assembly and driven member through underpan opening.

TRANSMISSION

Warner Model AS11-T86E. All helical gear type. Constant-mesh, synchro-mesh (Second and High), sliding gear (Low and Reverse).
See Transmission Section for complete data.
Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.
Removal: Disconnect front propeller shaft at front universal joint (take out bolts in transmission companion flange), move shaft out of the way. Disconnect speedometer drive cable and transmission control levers at transmission case, free parking brake cable support bracket from frame cross-member. Remove four bolts mounting engine support on frame cross-member (support comes out with transmission). Loosen all four bolts mounting transmission on clutch housing, remove two lower bolts only (CAUTION—two upper bolts must support transmission until ready for removal). Remove flywheel housing underpan, raise rear end of engine (place jack under flywheel, use wood block between jack and flywheel) for sufficient clearance for transmission removal. Remove the two upper transmission mounting bolts, move transmission back until clear of clutch, slide tranmission clear of cross-member and remove from beneath car.

UNIVERSALS

Detroit Series 4200. Ball-and-trunnion type or Mechanics. Roller bearing type. Three used with intermediate universal at propeller shaft support

Propeller Shaft & Support Bearing: Two shafts used:
Propeller Shaft & Support Bearing Servicing—*See "Propeller Shaft" in Kaiser Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.09-1 Std., 3.73-1 Special.
Backlash—.003-.006". Shim adjustment.
Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange. disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out using Puller KF-15.
Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential pinion), then adjust endplay at left wheel. **Endplay**—.001-.006".

SHOCK ABSORBERS

Monroe. Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

	Front	Rear
Kaiser-Frazer No. (Std.)	201490	201493
Kaiser-Frazer No. (Exp.)	202864	202866

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾—5¾° crosswise.
Caster—0° preferred (—1° to +1°).
Camber—¼° preferred (0° to ¾°).
Toe-In—1/16". Adjust by turning both tie rods
Steering Geometry (Toe-out): Inner wheel 23°. Outer wheel 20°. No adjustment. Check for bent steering arms.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
NOTE—Both "2-tooth Roller" and "3-tooth Roller" types used. Both gears are similar design.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 11"
Clearance—.008" at heel and toe of each shoe.
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Hand Brake: See Service brake data (above).

HOOD ADJUSTMENT: *See Kaiser Special Data.*

M_DEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1949 Numbers—Model K-1491—K-491-001000 and up, Deluxe K-492—K-492-001000 and up.
1950 Numbers—Prefixed by K-501 (Special and Traveler), K-502 (Deluxe).
Body Number Note—Stamped on plate on right front face of dash in engine compartment.

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase.
NOTE—Numeral following Engine Model Designation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

►**Engine Number Symbol (Special Bore & Bearing Sizes).** *See "Original Bore & Pistons" & "Original Bearing Sizes" in Kaiser Special Data.* Note—Symbol consists of 1 or 2 letters following engine number.

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. (7.3-1 Heads) at cranking speed of 70 RPM. (engine hot, all plugs out, throttle wide open). All cylinders must be equal within 10 lbs.
NOTE—7.3-1 Heads marked by "73" stamped on head directly above engine number pad on block.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4 .See diagram.

SPARK PLUG GAPS: .032".
Plug Type—Auto-Lite A-5 or AR5.

DISTRIBUTOR: Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.

►***CAUTION—Engine must be idling below 450 RPM. when setting timing.***
Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION:
Idle Setting—(WA1) ¾-1¾ turns open—one screw. (WCD) 1-1½ turns open—two screws. Turning screws out gives richer mixture.
Idle Speed—550 RPM.
Float Level (WA1 Carb.)—½" from top of projection on bowl cover to top of soldered seam on free end of float (bowl cover inverted).
Float Level (WCD Carb.)—Flush to 1/32" from top of each float to gasket seat on cover with valve closed (floats must hang free on inverted cover).
Accelerating Pump—(WA1) Lower Hole, med., Normal. (WCD) Lower Hole, short stroke, Normal.

Choke Setting: Centered (coil housing at index mark).

Fuel Pump Pressure: 3-4½ lbs. (pump mounted at front of engine).

►***CAUTION—Pump pressure must not exceed 4½ lbs.***

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.

►**Adjustment Procedure**—*See Kaiser Special Data.*
NOTE—Remove splash shield under right front fender for convenience in adjusting valves.

IGNITION

IGNITION SWITCH: Kaiser&Frazer No. 204485.
Lock Cylinder—Kaiser-Frazer No. 203885 (with key).

COIL: Auto-Lite IG-4093, IG-6001 or 9A. On left side of engine opposite distributor.
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

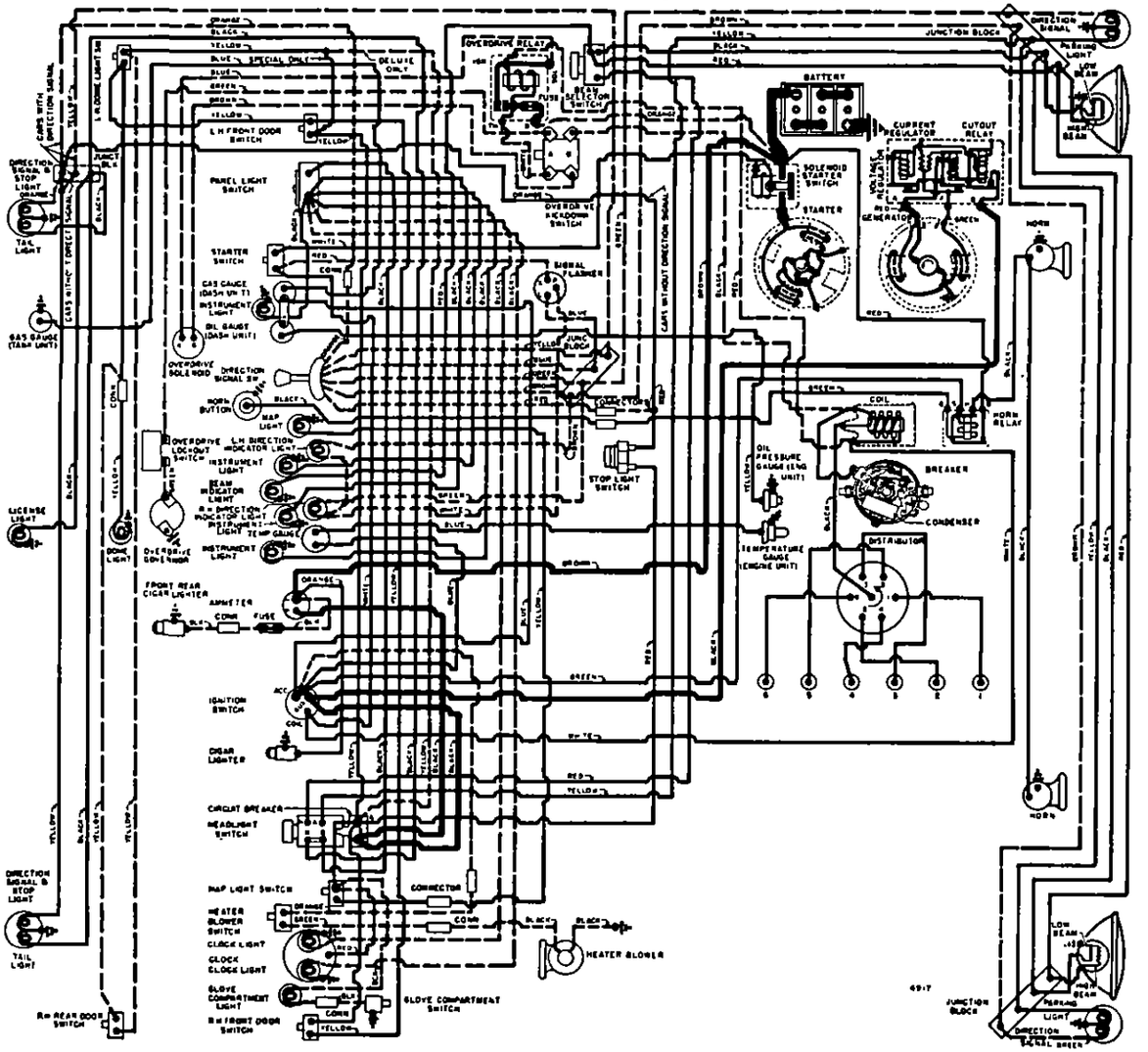
DISTRIBUTOR: Auto-Lite Model IGS-4214. Full automatic advance type with auxiliary vacuum spark control and octane selector adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.
Breaker Gap—.022" (.018-.022").
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Octane Selector—Manual adjustment at distributor providing advance and retard. See Ignition Timing.

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.



Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
3	6°	13"
5	10°	15"

Distributor Removal: On cylinder head between #4 and #5 cylinders. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting.....4° BTDC.
Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.
Timing (with Timing Light C-693)—Mark fourth degree mark before "0" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine **below 450 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor *until timing* mark appears in line with pointer, tighten cap screw. Check octane selector setting.
►*CAUTION—Reset engine idling speed at 550 RPM.*
Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

CARTER WA-1

Carter WA1 Type 622SB. (Special). 1¼" Single Barrel, Downdraft with Carter Climatic Control.
Casting No. on Flange—309.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle (WA1 Carburetors): Carter Single Barrel.
See Carburetion Equipment Section for data.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).
Automatic Choke (WA1 Carburetors): Carter Climatic Control (Single Carburetor Type).
See Carburetion Equipment Section for data.
Setting—Centered (coil housing at index mark).

CARBURETOR

CARTER WCD

Carter WCD Type 723S (Deluxe)—1¼ Dual (Double barrel), Downdraft type with Fast Idle and Climatic Control.
Casting No. on Flange—550.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Fast Idle: Carter Dual (WCD) type.
See Carburetion Equipment Section for complete data.
Setting—.018" throttle opening with choke valve held closed and throttle lever stopscrew backed off.
Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
See Carburetion Equipment Section for data.
Setting—Centered (coil housing at index mark).

CARB. EQUIPMENT

Air Cleaner: (Special). AC #1544029 Oil-bath type.
Element—AC No. 7-S.
Servicing—*Empty and clean reservoir, wash cleaner* in kerosene, refill to indicator line with SAE No. 50 engine oil (No. 20 for below freezing temp.) at 2000 mile intervals or when engine tuned.
Fuel Pump: AC No. 1539074 combination Fuel-and-Vacuum Pump.
Replacement Pump—AC No. 582.
►*CAUTION—Install pump with rocker arms UNDER camshaft eccentric.*
See Carburetion Equipment Section for data.
Pressure—3-4¼ lbs.
Gasoline Gauge: King-Seeley electric type.
Dash Unit—K-S No. 42455.
Tank Unit—K-S No. 7916.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100D—6 Volt, 15 Plate, 105 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

Auto-Lite Model MAW-4054. Armature MAW-2128.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4900	5.5	65
2.75 "	1480	5.0	200
8.50 "	400	4.0	400
6.0 "	Lock	2.0	335

Starting Switch: Magnetic switch K-F Part No. 204752 on splash shield near starter and controlled by push-button on instrument panel.
See Electrical Equipment Section for complete data.
Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws.

GENERATOR

35 Amp.....Auto-Lite GDZ-4818A. Arm. GDZ-2006F.
45 Amp.....Auto-Lite GGU-6001B. Arm. GGU-2006F.
Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).
Maximum Charging Rate—As given below.

Performance Data (GDZ-4818A)

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 950-1050
35	8.0	1800-2000 2150-2350

Performance Data (GGU-6001B)

45	8.0	1550 Max. .....

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.60-1.78 amperes at 6.0 volts, (GGU) 1.6-1.8 —amperes at 6.0 volts.
Motoring Current—(GDZ) 4.16-4.60 amps. at 6.0 volts, (GGU) 5.5-6.5 amperes at 6.0 volts.
Removal: Pivot mounting at left front of engine. To remove, disconnect leads, take out clamp bolt and pivot bolts. NOTE—Remove battery for access.
Belt Adjustment: Adjust by pulling generator out with 15 lb. force in line with adjuster link with all mounting bolts loose. A 6 lb. adjustment for new belt is recommended.

REGULATOR

35 Amp.—Auto-Lite VRP-4004F-2.....for GDZ Gen.
45 Amp.—Auto-Lite VAV-4002C.....for GGU Gen.
Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—As follows:
VAV-4002C 44-46 amperes (marked '45' on cover).
VRP-4004F-2 34-36 amperes (marked '35' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.
Direction Signal: (Deluxe) Mitchell (United Specialties) type.
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches

Lighting—Kaiser-Frazer No. 203830.
Beam Selector—Kaiser-Frazer No. 204545.
Instrument Panel—Kaiser-Frazer No. 203833.
Courtesy (on Instrument Panel)—K-F No. 203662.
Door—Kaiser-Frazer No. 204229.
Dome Lamp—Kaiser-Frazer No. 204779.
Stop Lamp—Kaiser-Frazer No. 201466.
Direction Signal—Kaiser-Frazer No. 204551.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.
FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Cigar Lighter—30 amperes. In lead back of instrument panel.
HORNS: Auto-Lite or Sparton—A-L HW-4017 (Low Note), HW-4018 (High Note). Twin horns.
Horn Current—Approximately 15 amperes each at 6.2 volts.

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Horn Relay: Auto-Lite Model HRL-4101—Relay connected through ignition switch (horns operative only with ignition switch "on").
Contacts Close—1.5-3.0 volts (seal to core with 4.0 volts maximum).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (between armature leg and yoke with armature sealed to core.

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145"). *See "Original Bore & Pistons" in Kaiser Special Data.*
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower (with Single Carb.)—100 at 3600 RPM. **(With Dual Carb.)** 112 at 3600 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—*See Tune-Up data.*

TIGHTENING TORQUES: *See Kaiser Special Data.*

CYLINDER HEAD INSTALLATION: *See Kaiser Special Data.*

ENGINE REMOVAL: *See Kaiser Special Data.*

OIL PAN REMOVAL: *See Kaiser Special Data.*

PISTONS: Aluminum alloy. Cam-ground. Tin-plated, T-slot type. Length 3 9/16".
Clearance—See Fitting new pistons.

▷***CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.***
Original Bore & Piston Sizes—*See Kaiser Special Data.*

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.
Replacement Pistons—*See Kaiser Special Data.*

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.008-.016"	.0025-.004"
Comp. (#2)	.0925-.0935"	.008-.016"	.0015-.0035"
Oil (#3,4)	.1550-.1545"	.008-.016"	.001-.0025"

Installing Rings: Side marked "TOP" (compression rings) upward.
Replacement Rings—*See Kaiser Special Data.*

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 212°F. (heat piston in water at 212°F. to install new pins).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to inside diameter of .8593-.8595" for new std. pins.

▷**CAUTION**—Pin bushing must protrude 1/64" in each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".

▷***CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.***
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.010".

Bearing Adjustment: None. Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Furnished Std .Size and .001", .002", .010", .012" Undersize.
CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener on forward end.
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".

▷***CAUTION—Special bearing size used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.***
Bearings—Removable, steel-backed, babbitt-lined.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. Upper main bearing shells can be "rotated" out by installing tool KF-8 in crankshaft journal hole (lug on tool engages edge of bearing when crankshaft rotated).
Filler Block (Front & Rear) Removal & Installation—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*

Replacement Bearings: Furnished Std. size and .001", .002", .010", .012" Undersize.

End Thrust: Taken by front (#1) bearing (special thrustwasher used with unflanged bearings). Controlled by shims installed between front crankshaft thrust washer (ahead of #1 bearing) and crankshaft thrust plate (behind crankshaft sprocket).
Endplay—.004-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*

CAMSHAFT: Four bearing. Two-sprocket chain drive.
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I. D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbitted bushings.
Clearance—.002-.004".

Camshaft Removal: *See "Camshaft & Bearings" in Kaiser Special Data.*

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set (furnished finished line-bored and do not require reaming after installation). Use KF-4 Camshaft Bearing Remover & Replacer.

▷***CAUTION—Align oil hole in bushings and block.***

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket **Endplay**—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.

▷***Timing Chain Caution—Morse and Link Belt chains used. Interchangeable only as complete sets with both sprockets.***

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3481"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width—5/64-3/32" (intake), 3/32-7/64" (Exhaust). Use KF-58 Relief Counterboring Set to remove any high shoulder in block above valve head.

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides for correct clearance using Reamer C-249.
Valve Guide Installation—Place guide (tapered end of guide toward top) in position in bore. Use Tool KF-27 when installing guides to correct position of 1 7/32" below top face of cylinder block.

Valve Springs: Check spring with tester C-647. Pressure should be 45 ± 2½ lbs. at 1 21/32".

	Spring Pressure	Length
Valve Closed	51 lbs.	1 43/64"
Valve Open	113 lbs.	1 5/16"

Valve Lifters: Barrel type. Two types used and are interchangeable. One type using tappet adjusting screw with locknut, other type is self-locking.
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize. Oversize identified as follows: "A" .0005", "B", .001", "C", .0015", "D", .002", "K" .005", "S", .008".
Lifter Removal—*See Kaiser Special Data.*

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.

▷**Adjustment Procedure**—*See Kaiser Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .014" tappet clearance (running clearance), #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after dead center "0" mark on dampener aligned with pointer at front of engine.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, exhaust valve lifters, timing chain. Oil pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Located in right side of cylinder block below the valve chamber and toward the rear of engine. Adjustable by replacing spring or installing washers between spring and plug.

Oil Pan Removal: *See Kaiser Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine. NOTE—Two types of valve cover and outlet pipe assemblies used—can be identified by angle of cut-off at lower end of tube: (Early 1949 Cars) angular cut-off faces forward. (Later 1949 Cars) angular cut-off faces toward rear.

▷***CAUTION—Do not install later valve cover & outlet pipe assembly on early cars (may cause loss of oil through tube).***

Oil Pump: Gear type. In crankcase.
Oil Pump Servicing—*See Kaiser Special Data.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

Oil Pressure Gauge: King-Seeley electric type.
Dash Unit—K-S No. 42460.
Engine Unit—K-S 40767 (1949), 40790 (1950).
See Miscellaneous Section for complete data.

COOLING

Cooling System: Sealed system (relief valve in filler cap) with positive circulation and thermostatic control.
Capacity—13½ qts. (13 qts. at driving level).
Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Radiator: No. 202906 (17" wide). Side mounted to shroud with six bolts.
Radiator Removal—*See Kaiser Special Data.*

Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.

Temperature Gauge: King-Seeley electric type.
Dash Unit—K-S No. 42465.
Engine Unit—K-S 40380 (212°), 42553 (224°).
See Miscellaneous Section for complete data.

CLUTCH

Pass. Cars.....**Auburn 9251-15 or Borg & Beck 9A7**
Taxi.....**Borg & Beck 10A7**

►**Clutch Identification**—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (Borg & Beck—cover marked 951 (9A7), 948 (10A7).
See Clutch Section for complete data.
Facings (Auburn)—Moulded metallic or Raybestos. 2 required. I. D. 6". O. D. 9¼". Thickness .135".
Facings (Borg & Beck)—Woven asbestos, 2 required. I. D. 6" (7" 10A7), O. D. 9¼" (10" 10A7). ⅛" thick.

Pedal Adjustment: Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bellcrank. Turn clevis end in or out to obtain correct pedal free movement. Install adjusting link clevis on bellcrank, insert clevis pin, cotter pin, and return spring.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, using Flywheel Turning Tool C-771 and loosen six bolts equally before removing. Remove clutch pressure plate and cover assembly and clutch disc.

TRANSMISSION

Warner Model AS23-T86E (Std.), Model AS24-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, disconnect propeller shaft at front companion flange. Free engine rear support from crossmember by taking out two insulator bolts at transmission. Disconnect and remove master cylinder operating rod. Disconnect hand brake cable at equalizer and engine rear crossmember. Remove eight bolts at frame side rails and remove crossmember. Remove four bolts holding transmission to clutch housing and pull out the transmission. (If overdrive is installed it will be removed with transmission).

OVERDRIVE

Warner Type R10B (with special AS24-T86E Transmission)—Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."
See Transmission Section for complete data.
Overdrive Solenoid—D-R 1118132, K-F No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001 or 1A. Has 20-ampere fuse on BAT terminal.
Kick-down Switch—Kaiser-Frazer No. 203451.
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Disconnect front propeller shaft at front companion flange and move shaft away from housing. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

UNIVERSALS

Detroit Series 4200. Ball-and-Trunnion. 3 used with intermediate universal at propeller shaft support.

Propeller Shaft & Support Bearing: Two shafts used with support bearing on frame cross member at intermediate universal. *See "Propeller Shaft" in Kaiser Special Data.*

REAR AXLE

Spicer (Salisbury) Model 41-2—Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (491)—4.09-1 Std., 3.73-1 or 3.91-1 Optl.
Ratio (492)—3.91-1 Std., 4.27-1 or 4.55-1 with O. D., 3.73-1 or 4.09-1 Optl.
Backlash—.003-.006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft at rear universal flange, disconnect hydraulic brake line at connector on axle housing, disconnect rear shock absorbers and sway eliminator links (when used) at spring seat, disconnect parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABS RBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5½° preferred (4¾-5¾° crosswise).
Caster—0° preferred (—1° to +1°).
Camber—¼° preferred (0° to ¾°).
Toe-In—1/16". Adjust by turning both tie rods.
Steering Geometry (Toe-out)—Inner wheel 23°. Outer wheel 20°. No adjustment.

STEERING EAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
►*SELF ADJUSTING BRAKE NOTE*—Used on a limited number of cars during 1949-50 production. *See "Wagner Lockheed" Brakes in Brake Section for complete data.*
Drums—Composite (cast-iron & steel). Diameter 11"
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Clearance—.008" at heel and toe of each shoe.
Braking Power—56% Front wheels, 44% Rear.

Hand Brake: See Service brake data (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

HOOD ADJUSTMENT: *See Kaiser Special Data.*
OIL PAN REMOVAL: *See Kaiser Special Data.*

MODEL IDENTIFICATION

1951 Models	First Serial No.
K-511 Special	K511-001000
K-512 Deluxe	K512-001000
1952 Models	
K-521 Virginian Special	K521-1000001
K-521 Deluxe	K521-1200001
K-522 Virginian Deluxe	K522-1000001
K-522 Manhattan	K522-1200001

SERIAL NUMBER: Stamped on plate on left front door pillar post.

First Numbers (1951 & 1952)—*See Model Identification table above.*

ENGINE NUMBER: Stamped on pad on left front upper corner of engine block and on Engine Name Plate on left side of crankcase. *NOTE*—Numeral following Engine Model Desigation (first part of Engine Number on Engine Name Plate) indicates Engine Plant: 4—Detroit, 8—Muskegon.

▷*ENGINE NUMBER SYMBOL (Special Bore & Bearing Sizes):* Consists of one or two letters following engine number. *See "Original Bore & Pistons" in Kaiser Special Data.*

TUNE-UP

COMPRESSION PRESSURE: 120-130 lbs. at cranking speed.

VACUUM READING: 17½" steady idling at 550 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030".
Plugs: Auto-Lite A5 (Early 1951), A7 (Later). Type A7 used for new car break-in. Type A5 can be used for replacement if A7 too hot for sustained high speed driving.

DISTRIBUTOR (DELCO-REMY): No. 1110224. Automatic advance with auxiliary vacuum spark control and octane selector adjustment.
Breaker Gap—.022".
Cam Angle—31-37° with .022" gap.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

DISTRIBUTOR (AUTO-LITE): No. IGS-4214. Automatic advance with auxiliary vacuum spark control and octane selector adjustment.
Breaker Gap—.020" (.018-.022").
Cam Angle—38°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115328 (1951), No. 1115380 (1952), Auto-Lite No. CR-6009A (1951-52).
Ignition Current—4.8 amperes at 6.3 volts (stopped).

CONDENSER: Delco-Remy 1869704 or Auto-Lite IG-2671K.
Capacity—(Delco-Remy) .18-.23 mfd. (Auto-Lite) .20-.25 mfd.

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—4th. graduation before top dead center "0" mark on vibration dampener.

▷***CAUTION—Engine must be idling below 450 RPM. when setting timing.***

Octane Selector Setting—Set for slight ping when accelerating with wide open throttle.

CARBURETION: Carter WGD, No. 781S. Dual downdraft type with automatic choke.

▷*EARLY 1951 CARBURETOR CHANGE (To correct Hard Starting & Stalling due to flooding): See "Carter WGD" in Carburetor Section.*

Idle Setting—Both screws ½-1 turn open. Turn screws out for richer mixture.

Idle Speed—(Synchro-mesh Cars) 550-600 RPM., (Hydra-Matic Cars) 425-450 RPM.

Float Level—***CAUTION—First cars with spring-loaded intake needle require different setting.*** 7/64" (first cars with spring-loaded intake needle), ¼" (later cars with solid intake needle) measured from machined surface of bowl cover to top of float with assembly inverted.

▷***CAUTION—When checking first carburetors with spring-loaded needle, float should rest of own weight on needle (pressure will compress spring and cause false setting).***

Accelerating Pump—No seasonal adjustment.

Choke Setting: Centered (coil housing at index mark).

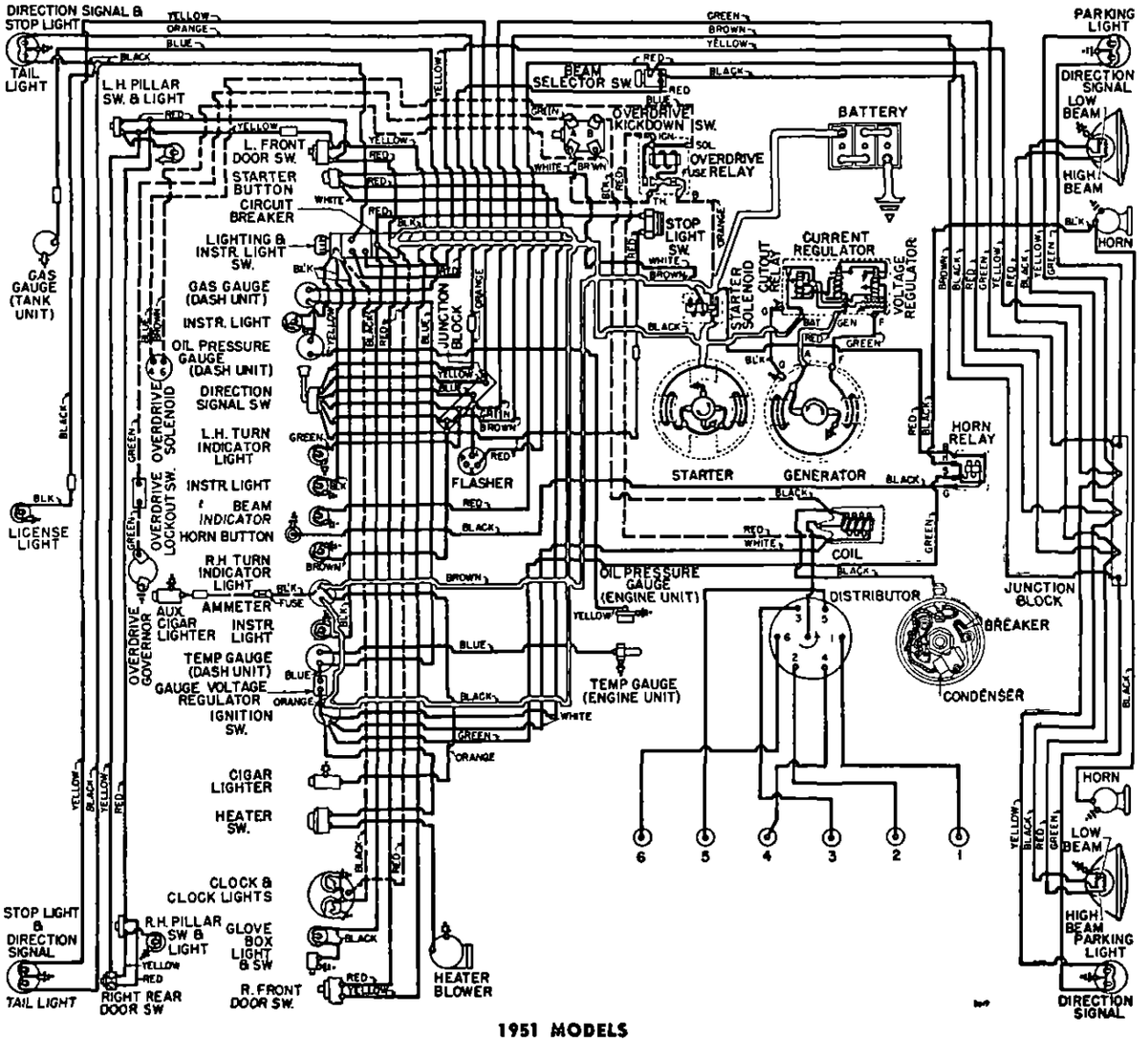
Fuel Pump Pressure: 3-4½ lbs. (pump mounted at front of engine).

▷***CAUTION—Pump pressure must not exceed 4½ lbs.***

MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely.

VALVE TAPPET CLEARANCE: .014" All Valves, Cold.

▷**Adjustment Procedure**—*See Kaiser Special Data.*



1951 MODELS

IGNITI N
DELC -REMY

IGNITION SWITCH: K-F No. 207760.

COIL: Delco-Remy No. (1951) 1115328, (1952) 1115380. Ignition Current—4.8 amperes at 6.3 volts (stopped).

DISTRIBUTOR: Delco-Remy No. 1110224. Automatic advance type with auxiliary vacuum spark control and octane selector adjustment. "Center Bearing" breaker plate.

Breaker Gap—.022".

Cam Angle—31-37° with .022" gap.

Breaker Arm Spring Tension—17-21 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM.	Degrees Eng.	RPM.
Start	450	0-4	900
5-7	1175	10-14	2350
8-10	1600	16-20	3200

Vacuum Spark Control: Delco-Remy No. 1116054. Integral type linked directly to breaker plate.

Plunger Travel—3/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	9-11
5	10	14-18

AUTO-LITE

IGNITION SWITCH: K-F No. 207760.

COIL: Auto-Lite No. CR-6009A.

Ignition Current—4.8 amperes at 6.3 volts (stopped).

DISTRIBUTOR: Auto-Lite No. IGS-4214. Automatic advance type with auxiliary vacuum spark control and octane selector adjustment.

Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Plate marked #5.

Breaker Gap—.020" (limits .018-.022").

Cam Angle—38°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

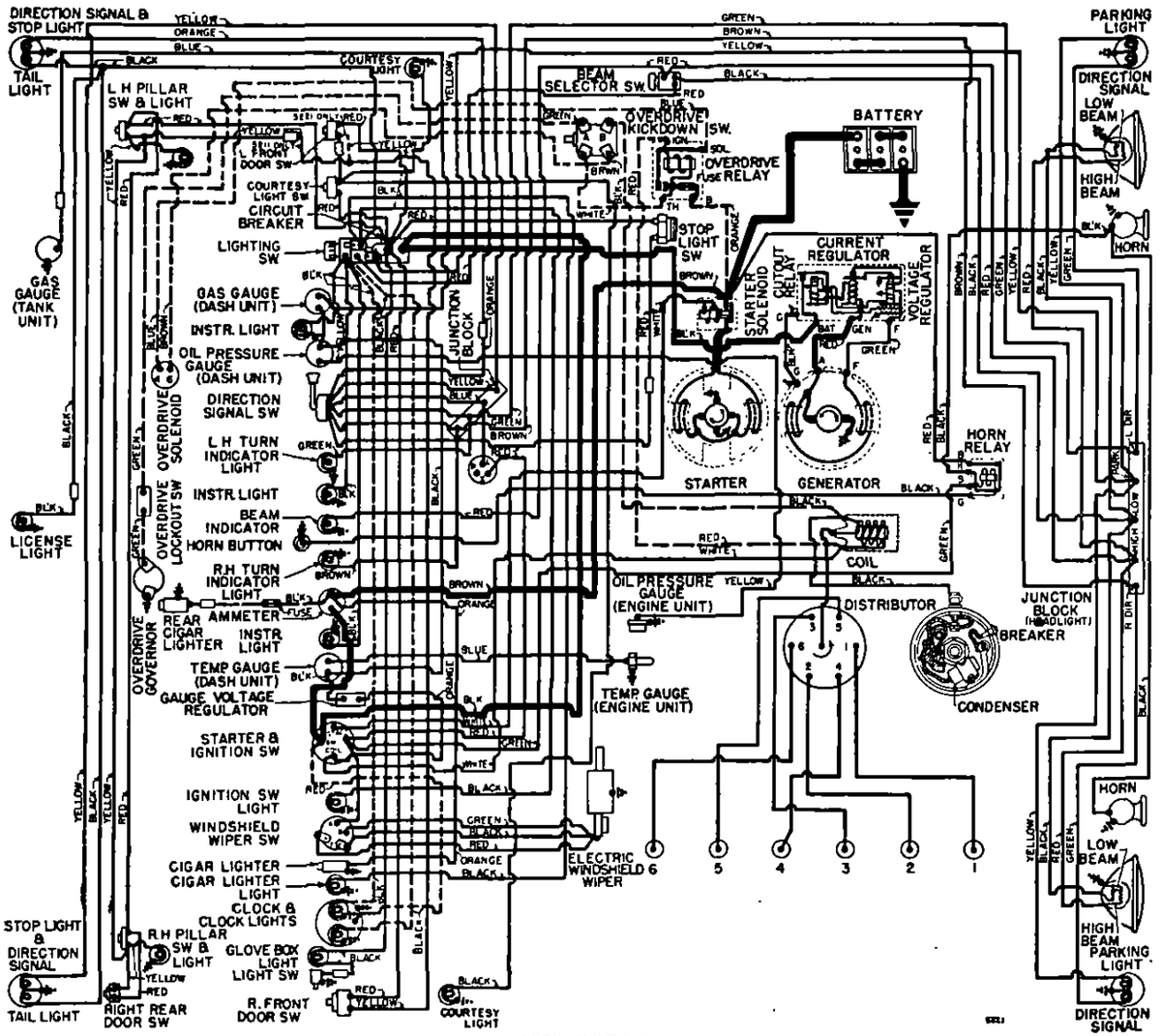
Automatic Advance

Degrees Distr.	RPM.	Degrees Eng.	RPM.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1400	16	2800
9	1675	18	3350

Vacuum Spark Control: Auto-Lite integral type, linked directly to breaker plate.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	10
3	6	13
5	10	15



1952 MODELS

IGNITION TIMING

Std. Setting.....**4° BTDC.**

Timing Mark—Timing mark located on vibration dampener. Consists of "0" mark at top dead center with 1° graduations before and after this point.

Timing (with Timing Light C-693)—Mark fourth degree mark before "O" top dead center mark on vibration dampener with chalk or white paint. Connect timing light to #1 spark plug terminal and direct light at timing mark. Idle engine **below 450 RPM.** (back off throttle stopscrew to decrease normal idle speed of 550 RPM.). Loosen hold-down screw in advance arm, center screw in slot, tighten hold-down screw. Loosen cap screw in end of arm under distributor, rotate distributor until timing mark appears in line with pointer, tighten cap screw. Check octane selector setting.

►***CAUTION***—Reset engine idling speed to 550 RPM on cars with Synchro-mesh transmission.

Octane Selector Setting—Set for slight ping when accelerating with wide-open throttle. To adjust, loosen hold-down screw in advance arm, rotate distributor clockwise (if no ping noted), counter-clockwise (if ping too severe).

CARBURETOR

Carter WGD Type 781S. 1¼" Dual (double barrel), Downdraft type with Fast Idle and Climatic Control.

►***EARLY 1951 CARBURETOR CHANGE (To correct Hard Starting & Stalling due to Flooding): See "Carter WGD" in Carburetor Section.***

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Dual (WGD) type.

Setting—With thermostatic coil housing gasket and baffle plate removed, crack throttle valve and hold choke valve closed. There should now be .018" to .023" clearance (gauge T109-29) between throttle valve and bore of carburetor (side opposite idle port). Adjust by bending the choke connector rod at lower angle bend.

See Carburetion Equipment Section for complete data.

CONTINUED ON NEXT PAGE

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Automatic Choke: Carter Climatic Control (Dual Carburetor Type).
Setting—Centered (coil housing at index mark).
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-bath type.
Filter Element—AC No. 23.

Fuel Pump: AC. Combination fuel-and-vacuum pump.
Replacement Pump: AC No. 9549 or 9616.

►***CAUTION—Install pump with rocker arm UNDER camshaft eccentric.***
Pressure—3-4½ lbs. ***CAUTION—Pressure must not exceed 4½ lbs.***
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley electric "CV" (Constant Voltage) type with Voltage Regulator.
Dash Unit—King-Seeley No. 45507.
Tank Unit—King-Seeley No. 44504.
Voltage Regulator—***See Misc. Electrical.***
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100D—6 Volt, 15 Plate, 105 Ampere Hour Capacity (20 hour rate).
Grounded Terminal—Positive (+) terminal grounded at left front engine support. Engine ground cable connected at same point.
Location—In engine compt. on left side.

STARTER

DELCO-REMY

Delco-Remy (Std) No. 1107087 or 1107125, (Hydra-Matic Drive) No. 1107088 or 1107126.
Armature—Delco-Remy No. 1878077 (all models).
Drive—Barrel type Bendix Drive No. A3281.
Roation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. (new brushes).

Performance Data—1107087, 88

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	5000	5.67	65
12	"	Lock	3.37	525

Performance Data—1107125, 26

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	5500	5.65	70
11	"	Lock	3.25	550

Starting Switch: Magnetic switch on splash shield near starter controlled by pushbutton (1951) ignition key (1952). ***HYDRA-MATIC CARS***—Neutral Safety switch used so that starter operative only with selector lever in Neutral.

AUTO-LITE

Auto-Lite Model MAW-4054. Armature MAW-2138.
Drive—Barrel type Bendix Drive A3281.
Roation—Counter-clockwise at commuator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4300	5.5	65
6	"	Lock	2.0	335

Starting Switch: Same as Delco-Remy (above).

GENERATOR

DELCO-REMY

Delco-Remy. (1951) No. 1102733, (1952) No. 1102782. Two brush shunt type with voltage and current regulation.
Armature—Delco-Remy No. 1879002 (1951 1102733 Gen.), No. 1912599 (1952 1102782 Gen.).
Charging Rate Adjustment—None. See Regulator.

Performance Data—Cold

	①Amperes	Volts	R.P.M.
1102733	30	8.0	2050
1102782	40	8.0	2150

①—Not maximum. See Current Regulator.
Roation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs. each.
Field Current—1.75-1.95 amperes (1102733), 1.87-2.0 amperes (1102782) at 6.0 volts.

Belt Adjustment: Loosen all mounting bolts, pull generator out in line with adjuster link with force of 15 lbs. (use spring scale hooked to generator bolt lug), tighten mounting bolts before slacking off on scale pull.

AUTO-LITE

Auto-Lite Model GDZ-6001F. Armature No. GGY-2006F. Two brush type with voltage and current regulation.
Charging Rate Adjustment—None (see Regulator).

Performance (GDZ-6001F)

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
17	8.0	1350-1500 — 1550-1700
35	8.0	1800-2000 — 2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 amperes at 5.0 volts.
Motoring Current—3.9-4.4 amperes at 5.0 volts.

Belt Adjustment: Same as Delco-Remy generator (above).

REGULATOR

DELCO-REMY

Delco-Remy No. (1951—1102733 Gen.) No. 1118302, (1952—1102782 Gen.) No. 1118392. Voltage and current type. ***CAUTION—Each regulator must be used with correct type generator.***

►***"1118300" SERIES REGULATORS—Have screw adjustment for settings and single regulator springs.***
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—(1118302) 7.0-7.7 volts, (1118392) 7.2-7.6 volts. Set both models to 7.4 volts hot. Check with regulator hot and with cover in place.
Air Gap—(1118302) .075", (1118392) .068" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

Current Regulator
Setting—(1118302) 32-40 amperes (set to 36 hot).
Setting—(1118392) 40-46 amperes (set to 42 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

AUTO-LITE

Auto-Lite No. VRP-6001A (for GDZ-6001F Gen.). Vibrating type voltage and current regulators.
See Electrical Equipment Section for complete data.

Cutout Relay
Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts, approx. 4-6 amps. disch.).
Contcat Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (Without Breaking Seal) & Adjustment—***See Electrical Equipment Section.***
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—34-36 amperes (marked '35' on cover).
Checking (Without Breaking Seal) & Adjustment—***See Electrical Equipment Section.***
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel at top of speedometer dial. Lighted when upper (country beams) in use.

Direction Signal: Mitchell (United Specialties).
See Electrical Equipment Section for complete data.
Direction Indicators—Right and Left indicator lights on lower face of speedometer. Lighted when direction signal on same side of car in operation.

Switches
Headlight & Instrument—Kaiser-Frazer No. 207782.
Beam Selector—Kaiser-Frazer No. 204545.
Dome Lamp—Kaiser-Frazer No. 204779.
Direction Signal—Kaiser-Frazer No. 207789 (Std.), No. 209294 (Hydra-Matic Cars).

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Thermostatic type, 30 amperes. On back of lighting switch.

FUSES: Clock—2 ampere. In clock lead.
Overdrive—20 amperes. On control relay.
Rear Seat Cigar Lighter—30 ampere. In lead back of instrument panel.

HORNS: Delco-Remy No. 1999649 (Low Note), **D-R No. 1999650** (High Note).

Horn Relay: Relay connected through ignition switch (horns operative only with ignition switch "on").

GAUGE VOLTAGE REGULATOR: King-Seeley—No. 45550. Thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ignition switch, and the gauge circuits. See Wiring Diagram.

ENGINE

ENGINE SPECIFICATIONS: Own (Continental). Six Cylinder, "L" head type.
Bore—3 5/16" (3.3125-3.3145").
Stroke—4⅜".
Displacement—226.2 cu. ins. **Rated HP.**—26.3.
Developed Horsepower—115 at 3650 RPM.
Compression Ratio—7.3-1.
NOTE—7.3-1 Heads marked by "73" stamped on left front directly above engine number on block.
Compression & Vacuum Reading—***See Tune-Up data.***

ENGINE & OIL PAN REMOVAL: ***See Kaiser Special Data.***

CYLINDER HEAD & TIGHTENING TORQUES: ***See Kaiser Special Data.***

ENGINE

CONTINUED FROM PRECEDING PAGE

PISTONS: Aluminum alloy, Cam-ground, Tin-plated, T-slot type. Length 3 17/32".

►*CAUTION—Some engines have oversize cylinder bores and pistons. See "Original Bore & Pistons" in Kaiser Special Data.*

Clearance—See Fitting new pistons.

►*CAUTION—Mark piston and rod assemblies before removal to insure re-installation in same cylinder.*

Fitting New Pistons: Use .0015" feeler stock ½" wide inserted on side opposite slot. Pull to withdraw feeler must be 5-10 lbs. *NOTE*—Used pistons should be 5-10 lbs. pull on .004" feeler.

Replacement Pistons: Furnished Std. and .010", .020", .025", .030", .040", .050", .060" Oversize.

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON RINGS: Two compression, two slotted oil rings, all above pin. Third ring groove drilled, fourth groove slotted for oil drainage.

Ring	End Gap	Side Clearance
Compr. (upper)	.008-.016"	.002-.004"
Compr. (lower)	.008-.016"	.0015-.0035"
Oil (all)	.008-.016"	.0025-.004"

Installing Rings: Side marked "TOP" (compression rings) upward.

Replacement Rings: Ring sets and single rings furnished in following sizes for oversize ranges indicated: Std. (Std.-to-.009"), .020" (.010"-to-.029"), .030" (.030-to-.039"), .040" (.040"-to-.049"), .060" (.050"-to-.069").

PISTON PIN: Diameter—.8591-.8593". **Lgth.**—2 13/16". Floating type with lock ring at each end.
Pin Fit in Piston—Push fit with piston heated to 160°F. (heat piston in water at 160°F.).
Pin Fit in Rod Bushing—Light press fit. When installing new bushings, ream bushings with DD-82-2 Reamer to .8593-.8595" for new standard pins.

►*CAUTION*—Pin bushing must protrude 1/64" on each side of rod.

Replacement Pins: Std. size and .003", .005" Oversize.

CONNECTING ROD: Length—7". **Weight**—29.6 ozs.
Crankpin Journal Diameter—2.0619-2.0627".

►*CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Lower Bearing—Removable steel-backed, babbitt-lined type. No shims.
Clearance—.0005-.0015". **Side Play**—.006-.010".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Furnished Std. Size and .001", .002", .010", .012" Undersize.
CAUTION—Install bearings with tang engaging notch in rod and cap and oil hole aligned with oil spurt hole in rod.

Installing Rods: Mark rods and bearing caps. Install wth marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. NOTE—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 toward front; #2, 4, 6 toward rear of engine).

CRANKSHAFT: Four bearing counterweighted type with vibration dampener on forward end.

►*CRANKSHAFT OR FLYWHEEL REPLACEMENT (HYDRA-MATIC DRIVE CARS) CAUTION—See "Crankshaft & Main Bearings" in Kaiser Special Data.*
Journal Diameters—2.3744-2.3752". NOTE—Allowable taper or out-of-round .001".

►*CAUTION—Special bearing sizes used in some engines. See "Original Bearing Sizes" in Kaiser Special Data.*
Bearings—Removable, steel-backed babbitt-lined.
Clearance—.0005-.0015".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

Replacement Bearings: Furnished Std. size and .001", .002". .010", .012" Undersize.

End Thrust: Taken by flanges on #4 (rear) bearing. If endplay not within limits, install new bearing.
End Play—.003-.006".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Kaiser Special Data.*

Flywheel Replacement: *See "Flywheel" in Kaiser Special Data.*

CAMSHAFT: Four bearing. Two-sprocket chain drive.

►*CAMSHAFT CHANGE CAUTION—Two types used in production (steel and cast iron). See Kaiser Special Data for identification and Oil Pump Drive Gear and Valve Lifter type used with each camshaft.*
Journal Diameters—#1, 1.8725-1.8735"; #2, 1.8095-1.8105"; #3, 1.7472-1.7485"; #4, 1.2475-1.2485".
Bearing Diameters (I.D.)—#1, 1.8745-1.8755"; #2, 1.8115-1.8125"; #3, 1.7495-1.7502"; #4, 1.2495-1.2505".
Bearings—Steel-backed, babbitted bushings.
Clearance—.001-.003", running clearance.

Camshaft Removal: *See Kaiser Special Data.*

Bearing Adjustment: None. Replace bushings with camshaft removed.

Replacement Bushings: Replace as set. Use KF-4 camshaft bearing remover and replacer.

►*CAUTION—Align oil hole in bushings and block.*

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and camshaft sprocket). **Endplay**—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500", Length 23" or 46 links.

►**Timing Chain Caution**—Both Morse and Link Belt Chains used. Chains and sprockets interchangeable only in COMPLETE SETS.

Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 33/64"	.3414-.3406"	5 3/16"
Exhaust	1 21/64"	.3382-.3390"	5 3/16"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.3520"	.0008-.0026"
Exhaust	45°	.3315"	.0032-.0050"

Valve Seat Width: 5/64-3/32" (Int.), 3/32-7/64" (Ex.). Use KF-58 Relief Counterboring Set to remove any high shoulder in block above valve head.

Valve Guides: Replace when stem clearance exceeds maximum (above). Use tool KF-27 to remove old guides and to install new guides (tool will position guides properly with upper end 1 7/32" below top face of cylinder block). Install guides with tapered end toward top of block and use Valve Guide Reamer C-249 to ream guides to inside diameter of .3432-.3422" for correct stem clearance.

►*GUIDE REPLACEMENT CAUTION*—Guides must be .0005-.003" press fit in block. If guides loose, ream block, using tool KF-57, and install oversize guides furnished .0005" O.S. (marked "A"), and .0055" O.S. (marked "L").

Valve Springs: Free length 1 31/32".

	Spring Pressure	Length
Valve Open	118 lbs.	1 5/16"
Valve Open	118 lbs.	1 5/16"

Valve Lifters: Mushroom type with self-locking tappet adjusting screws. **Diameter** .6855-.6860".

►*CAUTION*—Two types used (different type for each camshaft). STEEL lifters used only with Cast Iron Camshaft, CAST IRON lifters can be used for both Steel and Cast Iron camshafts. *See "Camshaft & Bearings" in Kaiser Special Data.*
Clearance—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters—Furnished Std. size and oversize as follows: "B" .001", "D" .002", "K" .005".

VALVE TIMING

Tappet Clearance: .014" All Valves, Cold.

►**Adjustment Procedure**—*See Kaiser Special Data.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 60° ALDC.
Exhaust Valves—Open 55° BLDC. Close 10° ATDC.
Valve Timing Check—With .020" tappet clearance, #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark **after** dead center "0" mark on dampener aligned with pointer at front of engine. Reset tappet to .014" clearance, COLD.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, camshaft bearings, valve lifters and timing chain. Oil Pump located in oil pan.
Crankcase Capacity—5 qts. (refill), 5½ (dry).
Normal Oil Pressure—35-40 lbs., 2000 RPM., 30 MPH.
Oil Pressure Regulator—Adjust by replacing spring or install washers between end of spring and plug.

Oil Pan Removal: *See Kaiser Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe located on front valve cover plate on right side of engine.

Oil Pump: Gear Type. In crankcase.
Oil Pump Servicing—*See Kaiser Special Data.*

►*OIL PUMP DRIVE GEAR CAUTION—See CAMSHAFT data for correct type gear to be used with each type camshaft.*

Oil Filter: Replace cartridge at 10,000 mile intervals or more often if required by operating conditions.

Oil Pressure Gauge—King-Seeley "CV" (Constant Voltage) type, with voltage regulator.
Dash Unit—King-Seeley No. 45511.
Engine Unit—King-Seeley No. 44030.
Gauge Voltage Regulator—See Misc. Electrical.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure system (relief valve in filler cap) with thermostat control.

Capacity—(1951) 13½ qts. without heater, 14½ qts. with heater; (1952) 13½ qts. with heater.
Pressure Valve—AC No. 850501 (Radiator Filler Cap). 3¼-4¼ lbs.

Radiator Removal: *See Kaiser Special Data.*

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Water Pump: Centrifugal type with ball bearing shaft.
See Water Pump Section for complete data.

Thermostat: Kaiser-Frazer No. 200160 (Std.), No. 202349 (for Permanent Anti-freeze only). In water outlet elbow on cylinder head.
Setting (Std. type)—Begins to open at 149-156°F. Fully open at 176°F.
Setting (High Temp.)—Starts to open 166-174°F., fully open at 194°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) type, with voltage regulator.
Dash Unit—K-S No. 45514.
Engine Unit—K-S No. 44200.
Gauge Voltage Regulator—See Misc. Electrical.
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 9251-18 or Borg & Beck 9A7 No. 951. Single plate dry disc type.
Clutch Identification—Types can be identified by number of pressure plate springs—3 (for Auburn), 9 (Borg & Beck). Borg & Beck cover marked 951.
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven Asbestos, 2 required. Inside Diam. 6". Outside Diam. 9¼". Thickness ⅛".
Facings (Auburn)—Molded metallic or Raybestos. 2 required. I.D. 6". O.D. 9¼". Thickness .135"

Pedal Adjustment—Pedal free travel ⅝-¾". To adjust remove return spring, clevis pin and release clevis end of adjusting link from clutch pedal shaft bell-crank. Turn clevis end in or out to obtain correct pedal free movement.

Removal: Remove transmission (see Transmission Removal below), remove housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, and loosen six bolts equally before removing.

SYNCRO-MESH TRANSMISSION

Warner Model AS49-T86E (Std.), Model AS50-T86E with new Type R10B Overdrive (Optl.)—Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever mounted on steering column.
See Transmisiun Section for complete data.

Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers. (If overdrive is installed disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, and disconnect propeller shaft. Free engine rear support from crossmember by removing insulator bolts at transmission. Disconnect master cylinder. Disconnect hand brake cable to clear crossmember. Remove bolts from side rails holding crossmember and remove crossmember. Remove transmission to clutch housing mounting bolts and pull out transmission.

OVERDRIVE

Warner Type R10B (with special AS50-T86E Transmission)—Optl. Equipment. New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle "kickdown."
See Transmission Section for complete data.
Overdrive Solenoid—D-R 1118132, K-F No. 200911.
Governor—Kaiser-Frazer No. 200908.
Control Relay—Auto-Lite HRT-4001A, K-F Part No. 201636. Has 20-ampere fuse on BAT terminal.
Kick-down Switch—Kaiser-Frazer No. 203451.
Lock-out Switch—Kaiser-Frazer No. 200915.

Removal: Remove drain plug in overdrive housing and drain lubricant. Disconnect wiring at shift fork rail switch terminals. Disconnect speedometer cable at overdrive housing, control wire at control shaft lever on overdrive housing and the tie-down clips. Remove Overdrive and Transmission as a unit (see Transmission Removal above).

HYDRA-MATIC TRANSMISSION

Four-speed planetary type automatic transmission and fluid coupling.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles. Add fluid as required to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Automatic Transmission Fluid Type "A").

Capacity—Approx. 11 qts. (refilling and draining). 12 qts. (when transmission disassembled).

Checking Fluid Level—Check only with transmission warm (set hand brake, run engine with selector in "N"). With transmission oil hot, idle engine for at least two minutes, then check with engine running and selector in "N". Dip stick located under inspection hole cover in floor pan under front floor mat. Add fluid as required to bring level up to "F" mark on stick.

▷*CAUTION—Do not fill above "F" mark on dip stick.*

Linkage Adjustment: *See "Hydra-Matic Drive Linkage Adjustment" in Transmission Section.*
Hydra-Matic Neutral Switch—Delco-Remy No. 1997846. At lower end of steering column.
Neutral Switch Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

▷*OTHER HYDRA-MATIC DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer—Two used. Needle bearing cross type. Front yoke slides on transmission mainshaft.

REAR AXLE

Spicer (Salisbury) Model 41-2 (Early), Model 44-2 (Later). Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratios—As listed below. *RATIO NOTE*—Ratios indicated by tag on differential cover. Tag numbers indicate number of teeth on ring gear and pinion as listed with ratios following:

Model	Ratio & Gear Combination
Std.	3.91-1 (43-11 or 51-13) & 4.09-1 (45-11)
Overdrive	4.55-1 (50-11)
Hydra-Matic	3.54-1 (46-13) or 3.31-1 (43-13)

Backlash—.003-006". Shim adjustment.

Removal: Hoist rear end of car and place supports under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propeller shaft, hydraulic brake line at axle housing, rear shock absorbers, and parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.
Axle Shaft Removal—Remove rear wheel and drum using puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Wheel Bearing Adjustment: Adjust endplay by adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block on differential shaft), adjust endplay at left wheel.
Endplay—.001-.006".

SHOCK ABSORBERS

Monroe—Direct acting, hydraulic type. Serviced by replacement (mountings serviced separately).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5° crosswise preferred (limits 4¾ to 5½°).
Caster—0° preferred (limits Neg. 1° to Pos. 1°).
Camber—Pos. ½° preferred (limits 0° to Pos. ¾°).
Toe-In—⅛" preferred (limits 1/16" to ⅛"). Adjust by turning both tie rods equally.
Toe-out on Turns—Inner wheel 20°, outer wheel 17½°. No adjustment.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See Brake Section for complete data.
Drums—Composite (cast-iron & steel). Diameter 11".
Lining—Molded type. Width 2". Thickness 13/64". Length 12¼" (forward shoe—all wheels), 10 1/32" (rear shoe—all wheels).
Clearance—.010" between lining and drum at adjusting cam. *CAUTION*—Center brake shoes by several brake applications before adjusting brakes and before checking for drag after adjustment.
Braking Power—55.5% Front wheels, 44.5% Rear.
Hand Brake: See Service Brake data (above).

MISC. MECHANICAL

WINDSHIELD WIPER: (Deluxe Models)—Auto-Lite No EWJ-4004. Electric type. **(Standard Models)**—Vacuum type, cable operated.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

Model	Model Designation
1953 Dragon	K-530
1953 DeLuxe	K-531
1953 Manhattan	K-532
1953 Carolina	K-538
1954 Manhattan (supercharged)	K-542
1954 Special	K-545
1955 Manhattan (2-Door)	51367
1955 Manhattan (4-Door)	51347

SERIAL NUMBER: On plate located on left front door hinge pillar post.

Starting Serial Number: 001001 (1953-54). 10001 (1955).

ENGINE NUMBER: Stamped on left side at upper front of cylinder block and plate on left side of cylinder block.

►*ENGINE NUMBER NOTE (Special Bore & Bearing sizes): See "Original Bore & Piston Sizes" in Kaiser Special Data.*

TUNE-UP

►*1954-55 SUPERCHARGED ENGINE HARD STARTING CORRECTION: See "Carter WCD Carburetor" in Carburetion Section.*

COMPRESSION PRESSURE: 120 lbs. at cranking speed (70 RPM).

VACUUM READING: 17½" steady at idling speed (500 RPM).

VALVE TAPPET CLEARANCE: Intake & Exhaust .014" cold.

Adjustment Procedure–*See Kaiser Special Data.*

MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .030".

Spark Plug–Auto-Lite A-7 or equivalent. 14mm.

COIL: Delco-Remy 1115380.

Ignition Current–1.3 amps. idling, 5 amps. at 6.3 volts, stopped.

DISTRIBUTOR: Delco-Remy 1110224 (Without Supercharger), 1110237 (With Supercharger).

Condenser–Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set–Delco-Remy 1871862.
Breaker Gap–.022".
Cam Angle–31-37°.
Breaker Arm Spring Tension–17-21 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance–1110224

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	450	0-4	900
5-7	1175	10-14	2350
8-10	1600	16-20	3200

Automatic Advance–1110237

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	475	0-4	950
1-3	600	2-6	1200
4-6	1000	8-12	2000

Vacuum Spark Control: Delco-Remy 1116054.
Plunger Travel–3/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	.9-11
5	10	.14-18

IGNITION TIMING

Setting–4° BTDC. at 450 RPM.
Timing Mark–4th. graduation before "0" TDC mark on vibration dampener in line with pointer on left side of engine. *NOTE*–Dampener marked "0" at TDC with 1° graduations on each side.

►*TIMING CAUTION:* Idle engine **below 450 RPM.** when *setting timing. Reset engine to normal idling speed* after timing completed.

CARBURETOR

CARTER WGD

Carter WGD 999S (Early 1953), 2052S (Late 1953 & Early 1954), 2052SA (Late 1954 & 1955). Models without Supercharger.

►*1953 HYDRA-MATIC CARS FULL THROTTLE SETTING:* If wide open throttle at carburetor cannot be secured AFTER Hydra-Matic throttle linkage adjusted, bend lower end of bellcrank on left side of cylinder head (to which transmission rod attached) away from engine just far enough to permit full throttle opening (*CAUTION*–Do not bend offset portion of bellcrank and prevent throttle control extension shaft from bending by wedging screwdriver under shaft).

Idle Setting–½-1½ turns open. Turn screws out for richer mixture.
Idle Speed (Synchro-mesh & Overdrive)–500 RPM.
Idle Speed (Hydra-Matic)–450 RPM. with selector lever in Neutral "N" position.
Float Level–9/32" from top of float at center of machined underside of bowl cover with needle valve seated (remove gasket and invert float and cover assembly).
Accelerating Pump–No seasonal adjustment.

Fast Idle: With thermostatic cover and coil assembly removed, crack throttle, hold choke valve closed, release throttle. Throttle valve opening measured between edge of valve and bore on side opposite idle ports should be .018-.023". Adjust by bending choke *connector rod at lower angle.*

Unloader Adjustment: With throttle valve wide open and choke valve closed as far as possible without forcing, there should be 9/64" (Gauge T109-34) clearance between upper edge of choke valve and inner wall of *air horn. Adjust by bending arm on choke trip lever.*

Automatic Choke Setting: One point Lean (9995), Two points Lean (2052S), Centered at index (2052SA).

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section.*

►*OTHER DATA: See "Carter WGD" in Carburetion Section.*

Fuel Pump Pressure: 5 lbs. maximum at 1800 RPM.

CARTER WCD

Carter WCD 2146S. Dual downdraft type with automatic choke. *NOTE*–This carburetor used with Supercharger Kaiser Model VS-57A.

►*CARBURETOR ADJUSTMENT NOTE:* Carburetor is completely shrouded by supercharger air pipe but three Access Plugs are provided for carburetor adjustment (idle mixture screws and idle speed screw). Shroud must be removed for other adjustments.

***Idle Setting**–½-1½ turns open. Turn screws out for* richer mixture.
Idle Speed (Synchro-mesh & Overdrive)–500 RPM.
Idle Speed (Hydra-Matic)–450 RPM. with selector lever in Neutral "N" position.
Float Level–3/16" from top of each float to machined surface of bowl cover (Gauge T109-162). Invert cover assembly with gasket removed, place gauge on cover under floats, adjust floats vertically and laterally to barely touch gauge legs.
Accelerating Pump–Two holes in pump arm under dust cover: Lower hole–short stroke, Upper hole–long stroke.

Fast Idle: .026" throttle valve opening (Gauge T109-189) with choke valve tightly closed. Adjust by turning fast idle screw.

Unloader Adjustment: With throttle valve wide open there should be 7/32" (Gauge T109-106) clearance between upper edge of choke valve and inner wall of air horn. Adjust by bending unloader lip on throttle shaft lever.

Automatic Choke Setting: Centered (on index).

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section.*

►*OTHER DATA: See "Carter WCD" in Carburetion Section.*

Fuel Pump Pressure: 9 lbs. maximum at 1800 RPM. (models with supercharger).

CARB. EQUIPMENT

Fuel Pump (1953): AC No. 9616 or Carter M-808SA (Fuel & Vacuum). AC No. 9617 or Carter M-998S (Fuel only).

Fuel Pump (1954-55): Carter M957S (models without supercharger). Carter M2145S (models with supercharger). *NOTE–Special high pressure pump used on models with supercharger.*
Pressure–5 lbs. max. (without supercharger); 9 lbs. max. (with supercharger), both at 1800 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with Gauge Voltage Regulator.
Dash Unit–*King-Seeley 45980 (1953); 46424 (1954-55).*
Tank Unit–King-Seeley 44504.
See "Fuel Gauges" in Carburetion Equipment Section.

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BATTERY

Auto-Lite 1M-100D. 6 Volt, 15 Plate, 100 Ampere Hour (20 hour rate).
Grounded Terminal—Positive (+) terminal.
Engine Ground—At left front of engine.

STARTER

Delco-Remy 1107125 (Synchro-mesh & Overdrive), 1107126 (Hydra-Matic). Armature No. 1878077.
Drive—Bendix "Folo-thru" No. A3281.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: R.B.M. No. 5686-2 Magnetic Switch controlled by ignition switch for "key starting" (turn key to extreme right hand position for starting).

Hydra-Matic Neutral Safety & Back-up Light Switch: Delco-Remy 1997846 (1953), 1998065 (1954-55) located at lower end of steering column. Starter operative only with selector lever in "N" (neutral) position.

GENERATOR

Delco-Remy 1102782. Armature—1912599.

Performance Data—Cold

Amperes	Volts	RPM
40①	8.0	2150

①—Not maximum. See Regulator data.

Brush Spring Tension—28 ozs. each.
Field Current—1.87-2.0 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Adjust to 15 lbs. pull on generator in line with adjusting link with all mounting bolts loose.

REGULATOR

Delco-Remy 1118392 (1953); 1118842 (1954-55). *See notes below.*

►*1953 1118392 REGULATOR NOTE: See "1118300 Series Regulators" in Electrical Equipment Section. Specifications below are "Normal" settings.*

►*1954-55 1118842 REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. Specifications below are "Normal" settings.*

Cutout Relay

Cuts In—6.4 volts hot.
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.3 volts hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

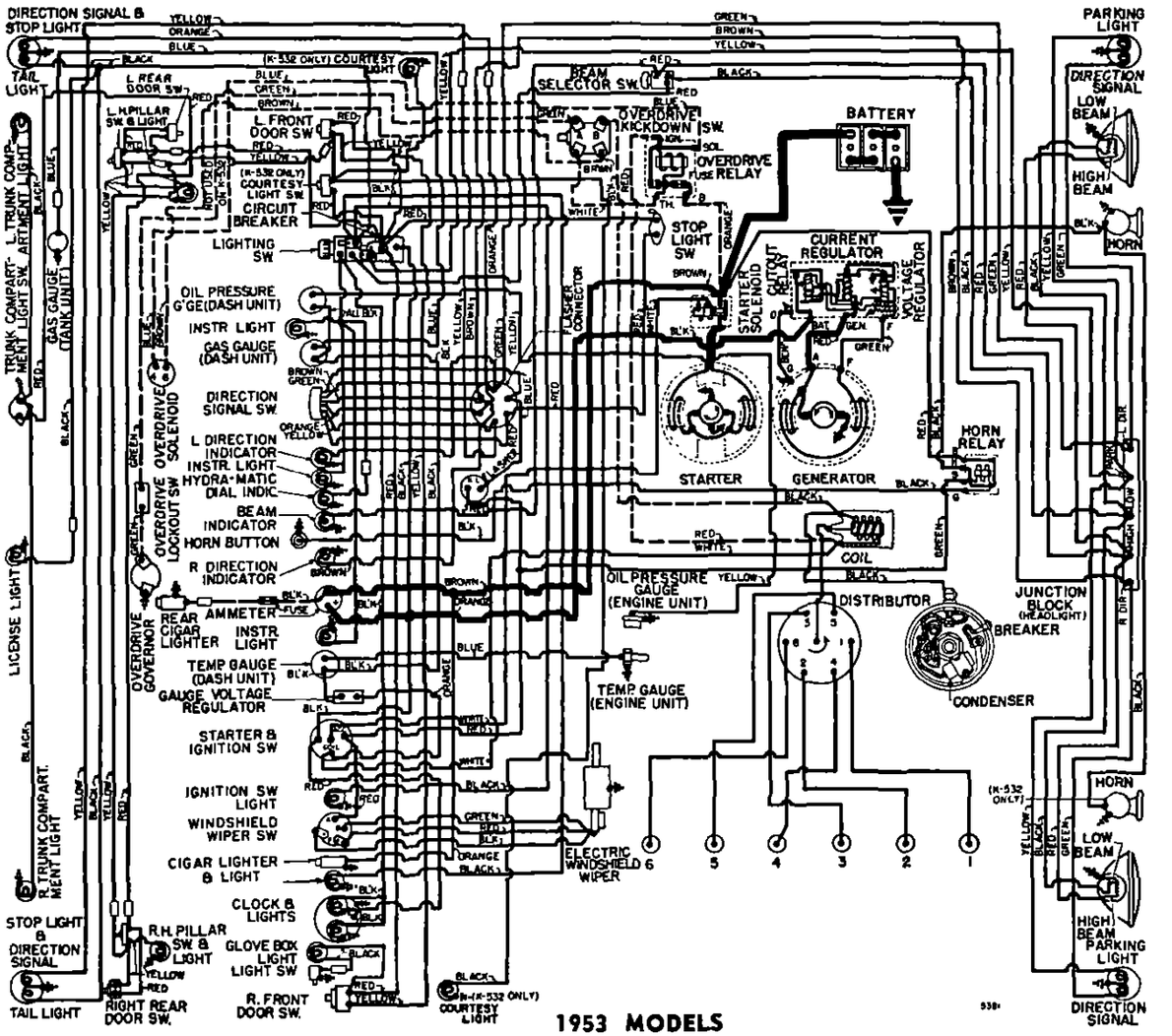
Setting—42 Amperes.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Head Lamps: *Sealed Beam. See Electrical Equip. Section.*
Directional Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: Disconnect battery cable. Remove knob. Remove set screw or move clamp spring toward the head of knob. Remove nut that holds assembly to instrument panel. Detach cables noting color code for reinstallation.

Stop Light Switch Location: In "Tee" at junction of brake lines to front brake cylinders.
CIRCUIT BREAKER: 30 ampere. On lighting switch.
FUSES: Located in line at point noted.
Overdrive—20 Ampere. On Control Relay on left front of dash.
Heater—14 Ampere. Under instrument panel near ignition switch.
Rear Seat Cigar Lighter—30 Ampere. Near ammeter.
HORNS: Delco-Remy 1999649 (Low Note), **1999650** (High Note).
Horn Relay—Connected through Ignition Switch (operative only with ignition "on".

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1953 MODELS

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GAUGE VOLTAGE REGULATOR: King-Seeley 45550 (1953), 46439 (1954-55). Thermo-bi-metal interrupter unit which maintains constant voltage of 5 volts in gauge feed circuits (regardless of charging voltage fluctuations). Mounted on back of instrument panel and connected between ignition switch and gauge circuits. See diagram.

ENGINE

►*ENGINE NOTE: Engine with Supercharger used on some 1954 & 1955 Models. See Supercharger Data below.*

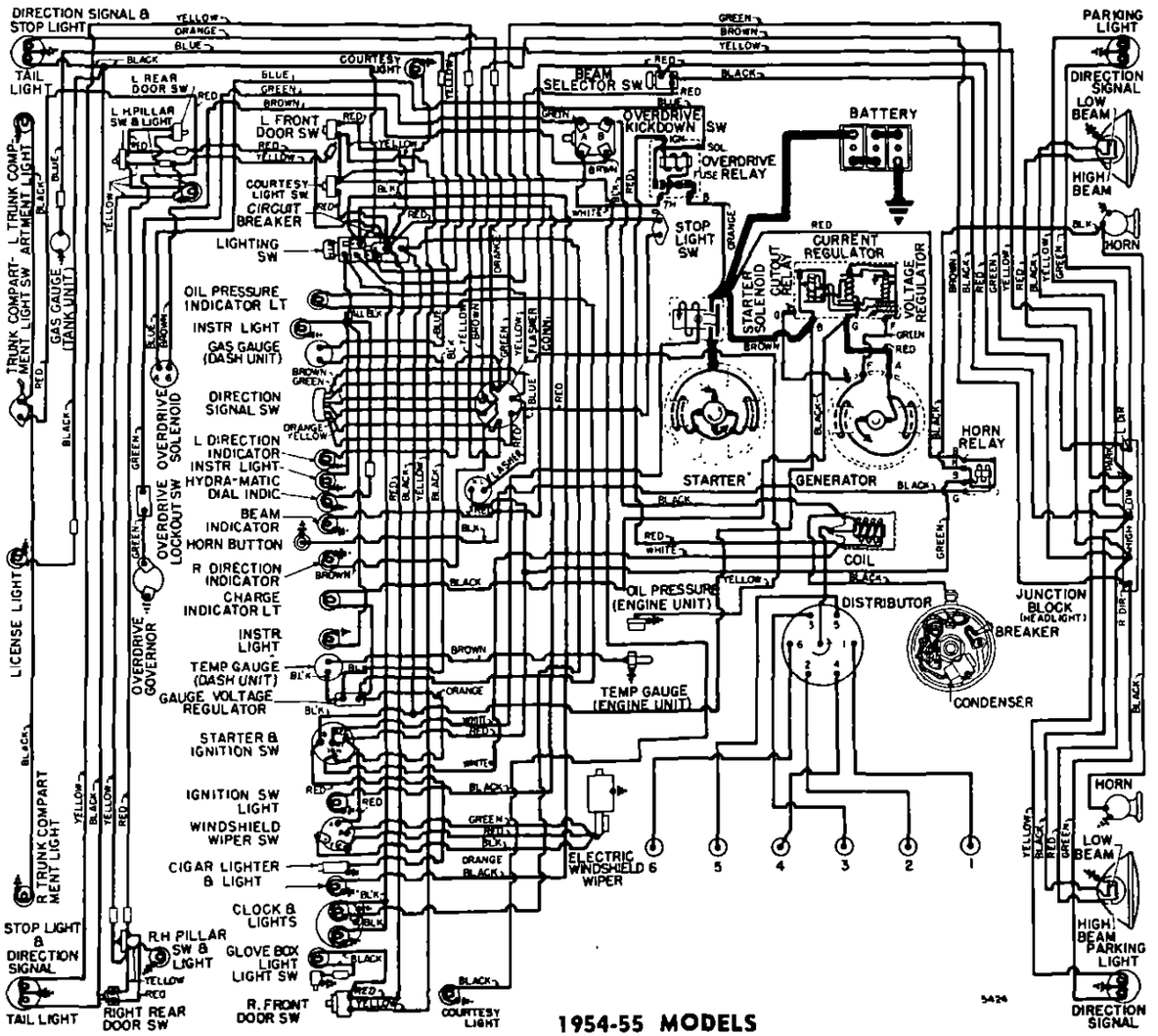
ENGINE SPECIFICATIONS: 6 Cyl. "L" Head.

Series	Bore	Stroke	Displacement
All	3 5/16"	4 3/8"	226.2 cu. ins.

Series	Compr. Ratio	Rated HP	Developed HP
All	7.3-1	26.3 ①	118 at 3650 RPM

①—140 at 3800 RPM (Engines with Supercharger).

SUPERCHARGER (1954-55): Centrifugal type with automatic variable speed drive (variable drive pulley operated by air piston in housing with manifold vacuum control). Operation is completely automatic and supercharger idles except when throttle opened for acceleration or high speed performance. At this point, the variable drive shifts to high ratio and supercharger provides 4 lbs. maximum boost.



1954-55 MODELS

Lubrication—Maintain oil level in case at mark on dipstick. Use only recommended oil.

Supercharger Overhaul—*See "Kaiser Supercharger" in Carburetion Equipment Section.*

ENGINE REMOVAL: *See Kaiser Special Data.*

OIL PAN REMOVAL: *See Kaiser Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Kaiser Special Data.*

PISTONS

Aluminum alloy "T" slot, cam ground, tinplated type.

►*ORIGINAL BORE & PISTONS: See Kaiser Special Data.*

Weight—15.187-15.437 ozs. *NOTE*—All pistons to be within .25 ozs. of equal weight.

Removal—Pistons & rods removed from above.

Fitting New Pistons: Fit new pistons to 5-10 lbs. pull on .0015"x½" ribbon feeler. *NOTE*—Used pistons should have same 5-10 lbs. pull on .004" feeler.

Replacement Pistons: Standard, .010", .020", .025", .030", .040", .050" and .060" Oversize.

Installing Pistons: Pistons marked with cylinder number. Install pistons with "T" slot toward left or away from camshaft (opposite from rod oil hole).

PISTON PINS

Floating type with snap ring at each end.

Diameter—.8591-.8593". **Length**—2.780".

Clearance in Piston—Light push fit at 150-160°F, piston temperature.

Clearance in Rod—Light push fit at room temperature.

Replacement Pins: Standard, .003" & .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (Upper)	.0925-.0935"	.007-.020" ①	.002-.004"
Compr. (Lower)	.0925-.0935"	.007-.020" ①	.003-.007"
Oil (Upper)	.1545-.1550"	.007-.020" ①	.006-.010"
Oil (Lower)	.1545-.1550"	.007-.020" ①	.0025-.004"

①—In new or rebored cylinders, .045" in evenly worn cylinders.

Replacement Rings: Ring sets and single rings furnished in following sizes for Oversize ranges indicated: Std. (Std.-.009"), .020" (.010-.029"), .030" (.030-.039"), .040" (.040-.049"), .060" (.050-.069").

Installing Rings: Side marked "Top" (compression rings) upward. Chrome-plated ring must be installed in top (#1) ring groove.

CONNECTING RODS

Length—6.998-7.002" (Center to center). **Weight**—29.6 ozs.

Crankpin Journal Diameter—2.0619-2.0627".

►*ORIGINAL BEARING SIZES: See Kaiser Special Data.*

Bearings—Steel backed babbitt. No shims.

Clearance—.0005-.0015".

Side Play—.006-.011".

Replacement Bearings: Furnished Std. .001", .002", .010" and .012" Undersize.

Installing Rods: Numbers on rods and bearing caps together and installed in same numbered cylinder with marks toward camshaft (oil spray hole also toward camshaft). Rod lower bearings are offset with narrow side toward nearest main bearing.

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CRANKSHAFT

Journal Diameter–2.3744-2.3752".
ORIGINAL BEARING SIZES: See Kaiser Special Data.
Bearings–Steel backed babbitt.
Clearance–.0005-.0015".
Replacement Bearings: Furnished in Std., .001", .002", .010" and .012" Undersize.
End Thrust: Taken by #4 main bearing which is flanged type.
End Play–.002-.006".
Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Kaiser Special Data.*

CRANKSHAFT OR FLYWHEEL REPLACEMENT (HYDRA-MATIC DRIVE CARS): *See "Flywheel" in Kaiser Special Data.*

CAMSHAFT

Journal Diameters– (1) 1.8725-1.8735", (2) 1.8095-1.8105", (3) 1.7472-1.7485", (4) 1.2475-1.2485".
Bearings–Steel-backed babbitt.
Clearance–.001-.003".
End Thrust–Taken by thrust plate behind camshaft sprocket.
Endplay–.003-.006".

Camshaft Removal–*See "Camshaft & Bearings" in Kaiser Special Data.*

►*1953-55 CAMSHAFT REPLACEMENT PARTS CAUTION: TWO* different camshafts used in production (steel and cast iron). Correct type oil pump drive gear and valve lifter must be used with each type camshaft. For identification, *see "Camshaft & Bearings" in Kaiser Special Data.*

Timing Chain: Morse & Link Belt. *CAUTION–Chains and sprockets interchangeable only as units.* **Width** 1", **Pitch** ½", **Length** 46 links.
Camshaft Setting: Mesh chain with 9 links (or 10 link pins) between marks on sprockets with #6 piston on TDC of compression stroke.

VALVES

Tappet Clearance: .014" All Valves, Cold.
Adjustment Procedure–*See "Tappet Clearance Adjustment" in Kaiser Special Data.*

Valve	Head Diameter	Stem Diameter	Length
Intake	1.520"	.3402-.3412"	5.190"
Exhaust	1.328"	.3382-.3390"	5.200"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.3520"	.0010-.0030"
Exhaust	45°	.3315"	.0032-.0052"

Valve Seat Width–Intake .078-.093". Exhaust .093-.109".
Valve Springs: Free length 1.969".

Valve Spring Specifications

Valve	Lbs. Pressure	Length
Closed	51	1.672"
Open	118	1.312"

Valve Guides: Guides are .001-.003" press fit in cylinder block. Press new guides in (taper end upward) until top of guide is 1 7/32" below top face of block. Ream guides to I.D. of .3422-.3432".

Valve Lifters: Mushroom type with self-locking adjusting screws.
►*CAUTION: Two different camshafts used requiring different type lifters. For identification and correct lifter application, see "Camshaft & Bearings" in Kaiser Special Data.*
Diameter–.6855-.6860".
Clearance–Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.
Replacement Lifters–Standard and following Oversizes: "B" .001", "D" .002", "K" .005".

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves–Open 10° BTDC. Close 60° ALDC.
Exhaust Valves–Open 55° BLDC. Close 10° ATDC.

►*VALVE TIMING NOTE: Tappet clearance for timing is different than standard clearance, .018" (Intake), .020" (Exhaust).*

Valve Timing Check–With .020" tappet clearance, #1 exhaust valve should close with piston 10° ATDC. when 10th. graduation after top dead center mark "O" in line with pointer on timing chain cover. Reset tappet clearance to .014" Cold running clearance.

OILING SYSTEM

Crankcase Capacity: 5 quarts (refill).
Normal Oil Pressure: 35 Lbs. at 30 MPH (2000 RPM).
Pressure Regulator Valve: Spring & plunger behind plug on left side of crankcase. Replace spring or add washers between spring and plug.
Oil Pressure Gauge (1953): King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit–King-Seeley 45984.
Engine Unit–King-Seeley 44030.
See "King-Seeley "CV" Gauges" in Miscellaneous Section.
Oil Pressure Indicator (1954-55): King-Seeley Electric Switch No. 47180 and Instrument panel light. Light goes on when ignition switch turned in, goes out as oil pressure reaches minimum.
Oil Pump: Gear Type with floating screen intake.
Pump Overhaul–*See Kaiser Special Data.*
►*CAUTION: Two different camshafts used requiring different type oil pump drive gears. For identification and correct oil pump drive gear application, see "Camshaft & Bearings" in Kaiser Special Data.*
Oil Filter: Partial flow. Located on left side engine to rear of filler.
Replacement Filter Element–Kaiser No. 200136 (for use with 209985 filter).

Crankcase Ventilation: Breather cap on oil filler and tube in valve tappet cover.

COOLING

Water Capacity: 12½ quarts. Add 1 quart for heater.
Pressure Valve: Radiator filler cap (3½-4½ lbs.).
Thermostat: In water outlet on cylinder head. Std. type opens 157-162°F. Permanent Anti-freeze Type opens at 177-182°F.
Water Pump: Packless, seal ball bearing type.
See "Kaiser" in Water Pump Section.

Pump Removal–Disconnect hose at pump inlet. Detach generator adjusting link (fan belt tensioner). Remove belt and pump mounting bolts.

Temperature Gauge: King Seeley Electric "CV" (constant voltage) with Voltage Regulator.

Dash Unit–King-Seeley 45987 (Early 1953); No. 46346 (Late 1953); No. 46428 (1954-55).
Engine Unit–King-Seeley No. 44200 (Early 1953); No. 44214 (Late 1953-55).
See "King-Seeley Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 9A7 or Auburn 9251-18. Single plate.
NOTE–Borg & Beck clutch Assembly No. 951.
See "Borg & Beck" and "Auburn" in Clutch Section.
Clutch Disc No. Kaiser No. 208629 (Std. Trans.), 213068 (Overdrive).
Pedal Adjustment: Pedal free travel should be 1" (¾-1"). Adjust trunnion at rear end of connector link (between pedal intermediate lever and clutch shaft lever).
Removal: Remove Transmission (see Transmission below), remove clutch housing pan. Position of clutch on the flywheel must be marked before removal. Rotate flywheel, and loosen six bolts equally before removing.

SYNCHRO-MESH TRANSMISSION

Warner Model AS49-T86E (Std.) **Model AS50-T86E** (With R10 Overdrive).
See "Warner Transmissions" in Transmission Section.
Transmission Control: *See "Transmission Controls" in Transmission Section.*
Removal: Remove clutch pedal return spring, clevis pins at cross shaft coupling and slide coupling onto cross shaft. Disconnect gear shift rods at transmission levers (If overdrive is installed, disconnect overdrive shift rod at overdrive unit). Disconnect speedometer cable at transmission (plug hole in transmission to prevent loss of lubricant). Disconnect wiring to overdrive. Support rear of engine using Tool KF-47 or suitable jack under clutch housing, and disconnect propellor shaft. Free engine rear support from crossmember by removing insulator bolts at transmission. Disconnect Master Cylinder. Disconnect hand brake cable to clear crossmember. Remove bolts from side rails holding crossmember and remove crossmember. Remove transmission to clutch housing mounting bolts and pull out transmission.

OVERDRIVE

Warner R10–*See "Warner R10" in Transmission Section.*
Overdrive Control:*See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

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HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with fluid coupling.
See "Hydra-Matic Drive" in Transmission Section.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles of operation. Drain & refill every 25,000 miles.

Capacity—Approximately 11 quarts.

Checking Fluid—To check fluid level, engine must be idling, transmission warm, parking brake set and selector lever in "DR" position. Dipstick located under hood on right side of engine. Add oil if level below "L" mark on dipstick to bring level to full mark.

►*CAUTION: Do not fill above "F" mark on dipstick.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer—Two used. Needle bearing cross type. Front yoke slides on transmission mainshaft splined extension.

REAR AXLE

Spicer (Salisbury) Model 44. Semi-floating with Hypoid gear.
See "Spicer Hypoid Semi-floating" in Rear Axle Section.

Axle Ratio: Varies with type of transmission used as follows:

Synchro-mesh Trans.—3.91-1, 4.09-1, 4.27-1.
Overdrive Trans.—4.55-1.
Hydra-Matic Drive—3.31-1, 3.54-1.

Rear Axle Ratio Note—Numbers stamped in tag attached to differential cover.

Tag Numbers	Ratio
43/13	3.31-1
47/12	3.91-1
45/11	4.09-1
47/11	4.27-1
41/9 or 50/11	4.55-1
46/13	3.54-1

Backlash—.003-.006".

Axle Shaft Removal: Remove rear wheel & drum using Puller C-319. Disconnect hydraulic brake line at backing plate and brake cable. Remove outer oil seal and backing plate (CAUTION—do not lose adjusting shims between backing plate and housing flange). Pull axle shaft and bearing assembly out.

Rear Axle Assembly Removal: Hoist rear end of car and place support under frame. Remove rear wheels and drums (use Puller C-319). Disconnect propellor shaft, hydraulic lines at axle housing, rear shock absorbers and parking brake cables. Disconnect both springs at front hanger and rear shackle, remove axle and spring assembly from beneath car. NOTE—Axle can be removed without disturbing springs by taking out spring "U" bolts.

Wheel Bearing Adjustment: Adjust end play by adding or removing shims located between backing plate and axle housing (shims .003", .005", .010" and .030" thick). Make certain that shim thickness at right wheel is .060" (to center thrust block of differential shaft), adjust endplay at left wheel.

End Play—.001-.006".

SHOCK ABSORBERS

Monroe. Direct-acting hydraulic. Serviced by replacement.

FRONT SUSPENSION

Independent. Linked parralelogram type with coil springs.
See "Kaiser" in Front Suspension Section.

Kingpin Inclination—5° (4¾-5½°) with 0° Camber.

Caster—(Manual Steering) 0° preferred (limits Pos. 1° to Neg. 1°) **(Power Steering)** Pos. ½° preferred (Limits 0° to Pos. 1°).

Camber—Pos. ½° preferred (limits 0° to Pos. ¾°).

Toe-In—1/8" preferred (1/16" to 1/8").

Toe-out on Turns—Inner wheel 20°, outer wheel 17½° (right turn), 18½° (left turn).

STEERING

Manual: Gemmer Model 305 Worm & Roller. With push pull adjustments.
See "Gemmer Steering Gears" in Steering Section.

Power Steering: Kaiser (Monroe) Power Steering. Linkage type.
See "Kaiser (Monroe) Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix (Lockheed) Hydraulic Self-Centering. Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear service brakes.
See "Bendix (Lockheed) Hydraulic Self-Centering" in Brake Section.

Drums—Diameter 10.995-11.005".

Wheel Cyl. Diameter	Front Bore	Rear Bore
Front wheel	1 1/8"	1"
Rear wheel	1"	1"

Replacement Lining & Shoes—Std. & .030" Oversize (in sets of 4 shoes & linings).

Lining—Width—2", **Length**—12.25" (primary Shoes), 10" (secondary shoes). **Thickness**—3/16" (Std.), 15/64" (Oversize).

Braking Power—Front 55.5%, Rear 44.5%.

Clearance—.010" between lining and drum at adjusting cam.

►*CAUTION:* Brake shoes should be "centered" by several brake applications before adjusting brakes and before checking for drag after adjustment.

Standard Master Cylinder: Located on left side of transmission. Attached to frame side rail.

Checking Fluid. Roll back floor mat, remove access plate. Check every 2000 miles, maintain level to ¼" of filler hole.

Removal—Remove from beneath car. Not necessary to disturb other parts.

MISC. MECHANICAL

Windshield Wipers: (1953 Models & 1954 Special)—Cable operated vacuum type.

1954-55 Manhattan Models—Auto-Lite EWJ-4012. Electric type with "Double-End" motor.
See "Windshield Wipers" in Miscellaneous Section.

MODEL IDENTIFICATION

Type	Model
Darrin 161 Sports Car	547

SERIAL NUMBER: Stamped on plate on front side of firewall in engine compartment.
Starting Serial Number–161-1001.

ENGINE NUMBER: Stamped on boss on top right front corner of cylinder block.

►*ENGINE NUMBER NOTE:* Letters following number denote the following:
A–Crankshaft journals (main & connecting rod) are .010" Undersize.
B–Cylinder bore & Pistons .010" Oversize.
AB–Both above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 115 lbs. minimum with all cylinders equal within 10 lbs.
VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: Intake .018". Exhaust .016" (hot or cold).
MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAP: .028-.032".
Spark Plug–Champion type J-8. 14 MM.
COIL: Delco-Remy 1115385.
Ignition Current–1.3 amperes idling, 5 amperes at 6.3 volts stopped.

DISTRIBUTOR: Delco-Remy 1112316.
Condenser–Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set–Delco-Remy 1871362.
Breaker Gap–.022" (limits .018-.024").
Cam Angle–31-37° with .022" breaker gap.
Breaker Arm Spring Tension–17-21 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	400	0-4	800
5-7	925	10-14	1850
9-11	1350	18-22	2700

Vacuum Spark Control: Delco-Remy 1116084.
Plunger Travel–7/64-1/8".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	4-6
6-7	12-14	14

IGNITION TIMING

Setting–5° BTDC at 500 RPM.
Timing Mark–Fifth graduation before top dead center mark "0" on vibration dampener in line with pointer on timing gear cover. Dampener marked with 15–1° graduations before top dead center mark "0" and 5–1° graduations after this point.

CARBURETOR

Carter YF 2094S. Single barrel downdraft type with manual choke control.
Idle Setting–1–2 turns open. Turn screw out for richer mixture.
Idle Speed–500 RPM.
Float Level–*9/32" (Gauge T109-126) from top of float* at free end to cover with assembly inverted and float hanging free. *CAUTION*–do not compress spring in intake needle (will give false setting).
Accelerating Pump–Not adjustable.

Fast Idle–With choke wide open, bend choke connector rod so that lip on fast idle arm contacts boss on body casting.
►*OTHER DATA: See "Carter YF Carburetors" in Carburetor Section.*
Fuel Pump Pressure: 5-1/4 lbs. maximum at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Mechanical diaphragm type.
Pressure–5-1/4 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: Auto-Lite Electric Type.
Dash Unit–Auto-Lite 13420A.
Tank Unit–Auto-Lite 13487A.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 1M-100D. 6 Volt, 15 Plate, 100 Ampere Hour (20 hour rate).
Battery Ground–Positive (+) terminal.
Engine Ground–Strap at right front engine mounting.

STARTER

Delco-Remy 1107131. Armature–1917855.
Drive–Solenoid pinion shift & overrunning clutch.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: Delco-Remy Solenoid 1118135 (No Relay). Controlled by ignition switch "key starting" (turn key to right beyond "Ignition On" point).
See "Delco-Remy Starter Controls" in Electrical Equipment Section.

GENERATOR

Delco-Remy 1102789. Armature–1921235.

Performance Data–Cold

Amperes	Volts	RPM
30 ①	8.0	2050

①Not maximum output. See Current Regulator.
***Brush Spring Tension**–28 ozs.*
Field Current–1.75–1.95 amperes at 6.0 volts.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: 1/2" deflection with thumb pressure midway between generator and pump pulleys.

REGULATOR

Delco-Remy 1118841. "1118825 Series" Regulator.
►*REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulators" in Electrical Equipment Section. All specifications are for "Normal" settings.*

Cutout Relay

Cuts In–6.4 volts hot.
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–7.3 volts hot.
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–38 amperes (hot).
Air Gap–.075" with armature pressed down to point where contact points just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Directional Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: Disconnect battery cable. Remove knob. Remove set screw or move clamp spring toward the head of knob. Remove nut that holds assembly to instrument panel. Detach cables noting color code for reinstallation.
Stop Light Switch Location: Adjacent to Master Cylinder.
FUSES: Located in line to item.
Heater–10 ampere. Near Ignition switch.
Overdrive–20 ampere. At Overdrive relay.
CIRCUIT BREAKER: On lighting switch. 30 ampere. Protects all lighting circuits except Map, Dome, Clock, and Glove Compartment Lights.
HORNS: Delco-Remy 1999649 (Low Note), 1999650 (High Note).

ENGINE

ENGINE SPECIFICATIONS: 6 cyl. in line, "F" head.
Bore–3.125". **Stroke**–3.500".
Displacement–121 cu. ins. **Rated HP**–23.4.
Compression Ratio–7.6 to 1.
Developed HP–90 at 4200 RPM.
Compression & Vacuum Reading–*See TUNE-UP.*
►*ENGINE IDENTIFICATION NOTE:* Letters following number denote the following: **"A"** Crankshaft journals (main & connecting rod) are .010" Undersize. **"B"** Cylinder bore and Pistons .010" Oversize. **"AB"** Both above conditions exist.
CYLINDER HEAD & TIGHTENING TORQUES: *See Kaiser Special Data.*

PISTONS

Aluminum alloy, T slot, cam ground, tin or brass plated.
►*PISTON SIZE NOTE:* Letters "A" or "AB" following engine number indicate .010" Oversize cylinder bore.
Weight–10.9 ozs.
Piston Removal–Pistons and rods removed from above.

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Fitting New Pistons: Use .003" feeler gauge 1/2" wide between piston and cylinder wall on side opposite slot. Pull required to remove feeler should be 5-10 lbs.
Replacement Pistons: Std., .010", .020", .030" and .040" Oversize.
Installing Pistons: T-slot toward left (valve side) of engine (opposite side from oil spray hole in rod). *See Rod Installation.*

PISTON PINS

Locked in rod by clamp screw.
Diameter–.7496-.7498". **Length**–2-21/32".
Clearance in Piston–.0002-.0006" or light thumb push at room temperature.
Replacement Pins: Fitted pins furnished with pistons.

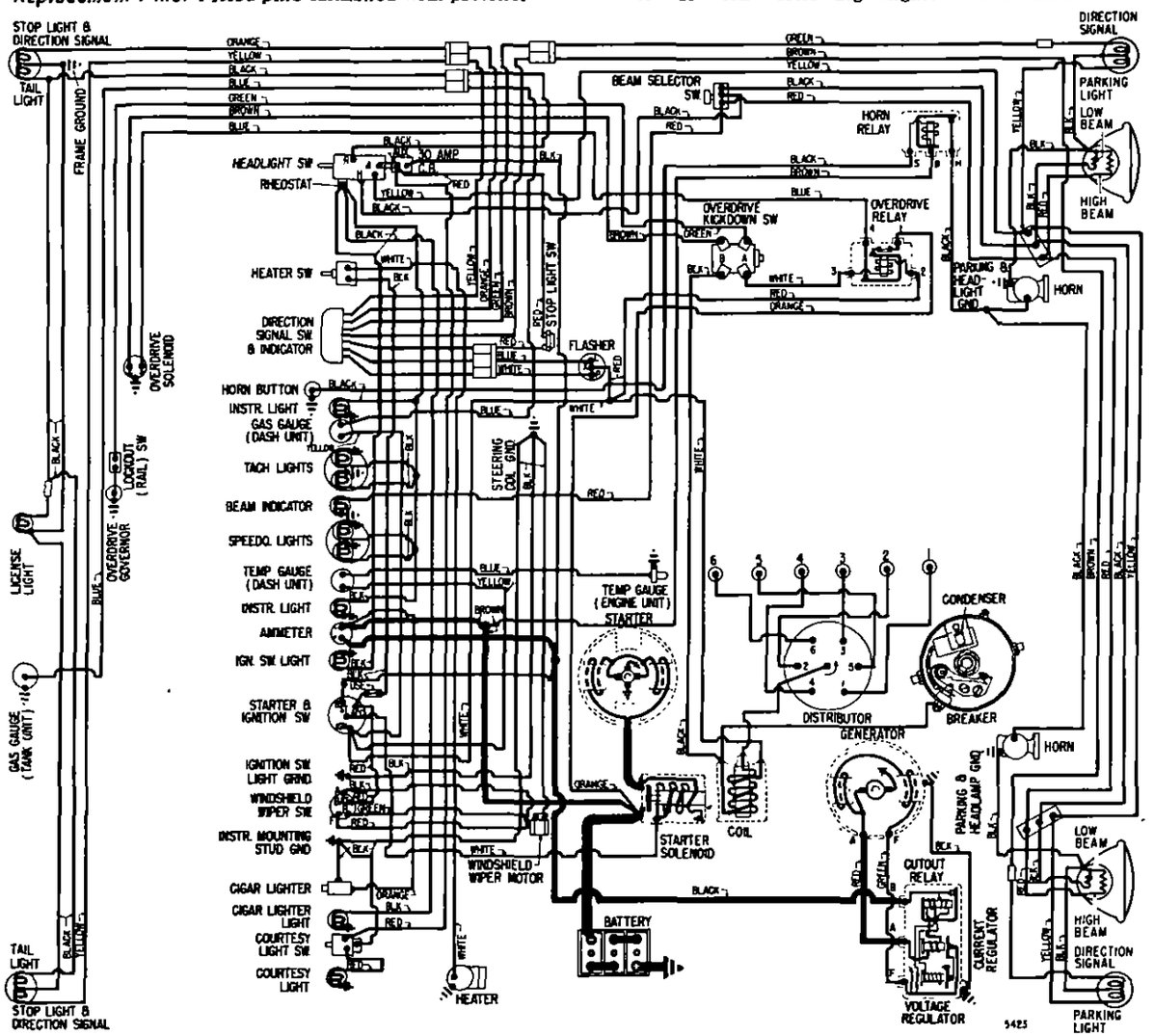
PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.002-.004"
Compr. (#2)	3/32"	.007-.015"	.0015-.0035"
Oil (#3)	3/16"	.007-.015"	.001-.0025"

Replacement Rings: Ring sets furnished in following sizes for oversize range noted: Std. (0-.010"), .020" (.011-.024"), .030" (.025-.034"), .040" (.035-.049").
Installing Rings: Compression ring mark "Top" (on side of ring) and bevel on inner edge must be up.

CONNECTING RODS

Length–6.345". **Weight**–22.5 ozs.
Crankpin Journal Diameter–1.874-1.875".
►*JOURNAL DIAMETER UNDERSIZE NOTE:* Letters "A" or "AB" following Engine Number denote .010" Undersize journals.
Bearings–Steel-backed, babbitt-lined.
Clearance–.001-.0025".
Side Play–.002-.008".
Replacement Bearings: Std., .001", .002", .010", .011", .012", .020" and .030" Undersize.
Installing Rods: Rods not offset. Install with spray hole in lower end toward right side (away from camshaft), on all rods.



CRANKSHAFT

Journal Diameter–2.25" Four bearings.
►*JOURNAL DIAMETER UNDERSIZE NOTE:* Letters "A" or "AB" following Engine Number denote .010" Undersize journals.
Bearings–Steel-backed babbitt.
Clearance–.0009-.003".
Replacement Bearings: Std., .001", .002", .010", .020" and .030" Undersize.
End Thrust: Taken by No. 1 (front) bearing, and thrust washer in back of crankshaft gear. Adjusted by adding or removing shims behind thrust washer. Shims .002" thick.
Endplay–.004-.006".
Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Kaiser Special Data.*

CAMSHAFT

Journal Diameter–(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-3/4".
Bearings–Steel-backed babbitt.
Clearance–.001-.0025".
End Thrust: Taken by thrust plate behind camshaft gear and space behind plate. **End Play**–.004-.006".
Timing Gears: Crankshaft gear Cast Iron, camshaft gear Fibre with steel hub.
Gear Backlash–.000-.002".
Camshaft Setting: Mesh marked tooth of camshaft gear with mark of crankshaft gear.

VALVES

Tappet Clearance: Intake .018", Exhaust .016" (Hot or Cold).

Valve	Head Diameter	Stem Diameter	Length
Intake	1.750"	.3733-.3738"	4.531"
Exhaust	1.281"	.3395-.3405"	4.625"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.260"	.0007-.0022"
Exhaust	45°	.300"	.0025-.0045"

Valve Seat Width–3/64" (all valves).
Valve Springs: *DIFFERENT springs used for Intake and Exhaust Valves.*

Valve Spring Specifications

Intake Valve	Lbs. Press.	Length
Closed	73	1.66"
Open	153	1.40"
Exhaust Valve	**Lbs. Press.**	**Length**
Closed	50	1.625"
Open	105	1.328"

Valve Guides: Drive guides out with tool W-240. To install, use tool W-240 with correct adapters, drive guides into head and cylinder block (taper end toward seat) until top of guide is 7/8" from top of valve seat.

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Rocker Arm Assembly: *See "Valve System" in Kaiser Special Data.*

VALVE TIMING

See "Camshaft Setting" under Camshaft above.
Intake Valves—Open 9° BTDC. Close 44° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC
Valve Timing Check—Set tappet clearance No. 1 intake valve at .027". Rotate crankshaft until No. 1 piston approaching top dead center on exhaust stroke, stop when 9° mark on vibration dampener (9th graduation before TDC mark "0") is at pointer. No. 1 intake valve should be just about to open at this point. Reset tappet clearance at .018" running clearance.

OILING SYSTEM

Crankcase Capacity: 5 quarts refill.
Normal Oil Pressure: 30-40 lbs. at 30 MPH.
Pressure Regulator—Located on oil pump housing. Adjustable by removing or adding shims from above spring within plug.
Oil Pressure Indicator—Auto-Lite 13419A. Not electrical.
Oil Pump: Internal rotor type. Mounted externally on left side of crankcase.
Oil Pump Overhaul—*See Kaiser Special Data.*

COOLING

Water Capacity: 12 quarts. Add 1 qt. for heater.
Pressure Valve: 7 lb. filler cap.
Thermostat: Choke type. Starts to open at 148-156°.
Water Pump: Centrifugal, packless type with special sealed ball bearing shaft (no lubrication required).
See "Kaiser Darrin" in Water Pump Section.
Temperature Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite 13421A.
Engine Unit—Auto-Lite 11528A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Auburn. Single plate, dry disc type.
See "Auburn Clutches" in Clutch Section.

Pedal Adjustment: Pedal free travel should be 1-1/2". To adjust, loosen locknut and turn adjusting nut on connector link at clutch fork.

Removal—Remove transmission, remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation. Take out mounting screws in clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner. 3-speed synchro-mesh with optional Overdrive.
See "Warner Transmissions" in Transmission Section.
Transmission Control: *See "Transmission Controls" in Transmission Section.*

OVERDRIVE

Warner R10. *See "Warner R10" in Transmission Section.*
Overdrive Controls: *See "Warner R10 & R11 Overdrive Controls" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with fluid coupling.
See "Hydra-Matic Drive" in Transmission Section.

PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.

TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.

Lubrication—Check fluid level every 1000 miles and drain & refill every 25,000 miles. Use only "Hydra-Matic Drive" fluid.
Capacity—8-1/2 quarts (9-1/2 quarts after overhaul).
Checking Fluid Level—Check only with engine and transmission at normal operating temperatures, engine running at idling speed, and selector lever in "N" position. Add fluid as necessary to bring level to the "F" mark on dipstick.

►*CAUTION:* Do not check fluid level when transmission is excessively hot and do not fill above "F" mark on dipstick.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing "cross" type.

REAR AXLE

Spicer. Semi-floating, Hypoid gear type with Hotchkiss drive.
See "Spicer Hypoid Semi-floating" in Rear Axle Section.

Axle Ratio		
Standard	Overdrive	Hydra-Matic
4.10—1	4.55—1	3.54—1
(41-10)	(41-9)	(39-11)

NOTE—Axle ratio stamped on plate attached to cover.
Backlash—.004-.008".
Axle Shaft Removal: *See "Spicer Hypoid Semi-floating" in Rear Axle Section.*
Wheel Bearing Adjustment—.002-.007". Remove or add shims between backing plate and flange of housing. Use the same amount of shims on each side.

SHOCK ABSORBERS

Monroe. Direct acting hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs. *NOTE*—Springs mounted above upper end of knuckle support.
Kingpin Inclination—4.5° (4—4.75°) with 0° Camber.
Caster—0° preferred (Limits Pos. 1° to Neg. 1°).
Camber—Pos. 1/2° preferred (Limits Pos. 1/4° to Pos. 1°).
Toe-In—1/4" preferred (Limits 3/16" to 1/4").
Toe-out on Turns—Outer wheel 17.5°, Inner wheel 20°.

STEERING

Gemmer. Worm and Roller, with push-pull adjustments.
See "Gemmer Worm & Roller" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (with push-pull adjustments)" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller (with push-pull adjustments)" in Steering Section.*

BRAKES

Bendix (Lockheed) Hydraulic. Self-centering type. Parking lever applies rear wheel service brakes.
See "Bendix (Lockheed) Hydraulic Self-centering" in Brake Section.
Drums—Diameter 11".
Wheel Cylinder Diameter—Front Wheel 1.125" (Fwd. Shoe), 1.00" (Rear Shoe); **Rear Wheel** 1.00" (Both).
Replacement Lining & Shoes—Molded asbestos lining. **Width** 2". **Length** 12.25" (Primary Shoes), 10" (Secondary Shoes). **Thickness** .188".
Braking Power—55.5% (Front), 44.5% (Rear).
Clearance—.010" for each shoe.

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMG-4104. Electric double end motor.
See "Windshield Wipers" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

1946-48 MODELS

	Ft. Lbs.	In. Lbs.
All Aluminum Heads	40	480
All Cast Iron Heads	50	600
Spark Plugs:		
7/8-18 Cast Iron Head	34-38	408-456
14 MM. Cast Iron Head	24-28	288-336
14 MM. Aluminum Head	20-24	240-288
18 MM. Aluminum Head	24-28	288-336

1949-51 MODELS

	Ft Lbs.	In. Lbs.
Cylinder Head Stud Nuts	50-55	600-660
Cylinder Head Capscrews	65-70	780-840
Main Bearing "Place Bolts"	120-130	1440-1560
Connecting Rod Nuts	52-60	624-720
Flywheel to Crankshaft	75-85	900-1020
Vib. Damper to Crankshaft	120-130	1440-1560

1952-55 MODELS

	Ft. Lbs.
Cylinder Head	①80-90
Intake Manifold	23-28
Exhaust Crossover Pipe	12-15
Oil Pan	12-15
Main Bearing Caps	120-130
Flywheel	75-85
Crankshaft Pulley	85-95
Con Rod Cap Nuts	45-50
Con Rod Cap Locknuts	3-3½
Camshaft Sprocket	15-18
Rocker Arm Support Bracket	12-15
Rocker Arm Cover	2-2½
Engine Front Cover (3/8")	23-28
Engine Front Cover (5/16")	12-15
Oil Filter	20-25
Flywheel Housing	45-50
Transmission Mounting	55-60

①—See Cylinder Head Installation (below) for tightening procedure. Three different torque applications must be made.

ENGINE

►*1955 SPECIAL ENGINE OVERHAUL CAUTION (Engines identified by yellow paint at water outlet connection housing):* Approximately 600 engines at close of 1955 production have special parts listed below which are not identical with regular engine parts. *Observe the following cautions when working on these engines:*

Special Engine Parts

Part	Part No.
Crankshaft	EAM-6303-B
Main Bearing (Rear)	① EAM-6331-J, ② EAM-6331-K
(Frt. & Int.)	① EAM-6333-J, ② EAM-6333-K
(Center)	① EAM-6337-J, ② EAM-6337-K
Rear Oil Seal	EAM-6701-A
Piston Pin	EAM-6135-A or D

①—Marked RED. ②—Marked BLUE.

Crankshaft & Main Bearings—Crankshaft main bearing journal diameters are .0005" smaller (increasing clearance from .0007-.0029" to .0015-.0033") and the main bearings listed below must be used with this crankshaft.

Piston Pin—Pins are heavier but they can be intermixed and used in any engine.

Crankshaft Rear Oil Seal—This seal is approximately .012" less in thickness than regular engine seal but can be used with either crankshaft.

1946-48 MODELS

ENGINE REMOVAL (For Servicing or Exchange): To remove engine from chassis, drain cooling system and crankcase, then proceed as follows:

1. Disconnect and remove battery.

2. Remove hood (disconnect horn lead at relay, mark hood hinge location on dash, remove hinges).

3. Disconnect all radiator hoses, remove hoses and thermostats, remove radiator.

4. Disconnect all electrical wires and cables at engine accessories (remove spark plug wires and conduits, disconnect ground strap at rear of engine).

5. Disconnect control cables (hand throttle and choke cables—free hand throttle cable clamp at dash and loop cable out of the way by hooking it back of generator regulator, dispose of choke cable similarly by hooking it back of battery box), disconnect fuel line at fuel pump.

6. Remove all engine accessories (except water pumps and starter), remove oil filler pipe.

7. Remove two engine front support bolts.

8. Loosen clamp on exhaust cross-pipe, disconnect both exhaust pipes at exhaust manifolds.

9. Attach hoist to engine sling, take up slack in sling and hoist cables.

10. Remove front floor pan, place support under front end of transmission case, take out capscrews mounting transmission on flywheel housing.

11. Move engine straight forward to disengage clutch shaft, then lift engine out of car.

1949-51 MODELS

ENGINE REMOVAL: Engine and transmission are removed as a unit as follows:

1. Drain oil and water.

2. Remove hood, battery, generator, air cleaner.

3. Remove air deflector top panel, radiator and hoses.

4. Remove carburetor fuel line, throttle rods, vacuum lines, engine to dash bonding strap.

5. Disconnect coil wire to distributor, temp. gauge wiring and starter cable.

6. Disconnect universal joint (rear) and remove drive line, (slip yoke at front end slides out of transmission).

7. Disconnect transmission shift rods, exhaust pipe at manifold, and remove front and rear engine mounting bolts.

8. Lift engine out, guiding the rear at the same time.

Hydra-Matic Cars—Follow steps 1 to 6 above and proceed as follows:

1. Remove transmission levers, bell crank rods, accelerator bell crank and accelerator cross shaft.

2. Support rear of engine on jack.

3. Remove cross member and rear mount supporting transmission.

4. Lift engine out with man beneath guiding the transmission.

1952-55 MODELS

ENGINE REMOVAL (With Transmission):

1.) Disconnect battery, drain radiator, remove hood assembly, and carburetor air cleaner. Remove top radiator air deflector, hood latch support brackets, horns, radiator hoses, and radiator assembly.

2.) Disconnect defroster blower motor wires, heater delivery chamber clips, and turn blower motor clockwise and remove entire assembly. Disconnect heater hoses, generator field and ground wires, windshield wiper hoses, flexible ground strap, throttle and accelerator linkage, and remove "Z" bar from dash. Remove wires from water temperature gauge and "BAT" terminal of coil.

3.) Place car on jack or hoist. Drain engine oil and transmission oil, remove flywheel cover and drain torus cover. Remove torus cover bolts, leaving a few to hold cover in place.

4.) Disconnect rear universal joint, remove drive shaft. Remove transmission throttle and manual lever rods and throttle lever from transmission. Disconnect speedometer cable, wire from oil pressure gauge sender unit, generator armature wire, starter cable, and battery ground strap.

5.) Disconnect flexible fuel line, disconnect exhaust pipe from exhaust manifold. Remove oil filter. Remove front and rear engine mounts allowing transmission to rest on detachable frame cross-member.

6.) Install engine hoisting sling Tool 6000-AA under exhaust manifolds, and raise engine enough to clear engine mounts. Remove detachable frame cross-member.

7.) While lifting engine out of car, rear of engine should be guided by forcing engine toward right side to clear oil pump.

OIL PAN

1946-48 MODELS

OIL PAN REMOVAL: Drain crankcase. Disconnect drag link at steering gear pitman arm. Loosen clamp on exhaust cross pipe, disconnect cross pipe at left cylinder bank exhaust manifold, remove cross-pipe. Remove capscrews in ball cap at rear end of front radius rods, lower radius rods to provide additional clearance at pan (rods can be held down by inserting wooden block between ball connection at rear end and frame). Remove right and left splash pan mounting screws and move pans out of the way. Remove starter motor. Disconnect oil filter return line at oil pan. Take out oil pan capscrews and remove pan from beneath car. NOTE—Front end of car can be raised by means of hoist attached to bumper bars (not axle) for additional pan clearance at front end.

Installation Caution—Install new packing in groove at front end of oil pan and use new pan gasket. Packing should be soaked in engine oil for two hours before it is used.

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1949-51 LINCOLN

OIL PAN REMOVAL (LINCOLN): ***CAUTION—For access to oil pump and screen or for clean out, oil sump only can be removed. Oil sump secured by 4 lower capscrews on bell housing and 18 nuts to oil pan.***

Oil Pan Removal—Car manufacturer recommends following method be used:

1)—Drain oil, set #2 piston at top dead center (2nd cylinder right hand bank), turn wheels to extreme right, take off exhaust cross-over pipe (secure manifold heat valve with one nut).

2)—Remove steering idler arm bracket from right frame rail and pull down. Take off starter and oil dip stick tube.

3)—Remove oil sump (4 lower capscrews on bell housing and 18 nuts to oil pan). Take off oil pan baffle (clipped to oil pan). Disconnect filter return line on left side of pan.

4)—Remove 20 oil pan-to-block capscrews using 3/8" drive tools. Move outlet pipe to left after freeing bracket for access to front oil pan screws. Lower rear end of pan and slide out to rear.

1949-51 COSMOPOLITAN

OIL PAN REMOVAL (LINCOLN COSMOPOLITAN): Same as given for LINCOLN above except that front end of engine must be raised as follows:

1)—Drain radiator and remove lower radiator hoses.

2)—Turn fan so that wide angle between blades up.

3)—Remove fuel & vacuum pump from adapter.

4)—Take off 2 nuts from front engine mounts, raise front of engine 2¼-2⅜", block engine up by inserting blocks between brackets and engine mounts.

5)—When removing oil pan, pan should be turned so front oil seal will pass over left capscrew of front main bearing cap.

1952-53 MODELS

OIL PAN REMOVAL: Turn crankshaft so that rear counterweights on crankshaft are upwards, then remove oil pan from front of engine.

CYLINDER HEAD & MANIFOLD

1946-51 MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten head stud nuts. Tighten in sequence from center of head outwards.

Cast Iron Heads—With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all nuts.

Aluminum Heads—With the engine cold, tighten all nuts to correct tension. Run engine until thoroughly warm, allow engine to cool off, and then recheck all nuts. Do not tighten aluminum heads when warm.

1952-55 MODELS

CYLINDER HEAD REMOVAL: Loosen all pushrod adjusting nuts and screws to relieve tension on pushrods. Remove all rocker arm bracket attaching screws and nuts, remove oil overflow pipe from end support (front end on right bank, rear end on left bank), lift rocker arm assembly up over studs and remove as an assembly (see Rocker Arm data under "Valve System" below). Remove all pushrods, remove oil baffle plates from rocker arm pads. Remove the two end cylinder head capscrews and install Pilot Studs, Part No. 6051-A, in these two holes. Install cylinder head holding fixture 6085-A (CAUTION—this fixture recommended to protect machined surfaces of head while it is off the engine AND SHOULD NOT BE REMOVED FROM HEAD UNTIL IT IS RE-INSTALLED ON ENGINE). Remove remaining cylinder head capscrews, lift head up and off the locating dowels and pilot studs. Remove gasket. ***CAUTION—Never pry between cylinder head and block.***

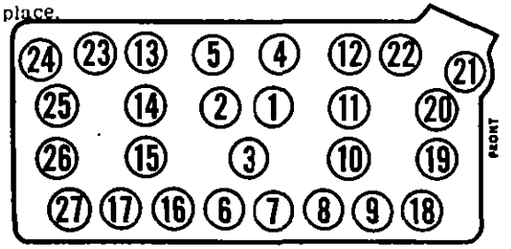
►***CYLINDER HEAD INTERCHANGEABILITY:*** Heads can be changed from one bank to the other if the rocker arm shafts and supports are changed to properly line up oil feed and drain passages. Water jacket plugs must be installed in hole at rear of the cylinder head. Use Tool 6085-C to install new plugs.

1952-55 MODELS

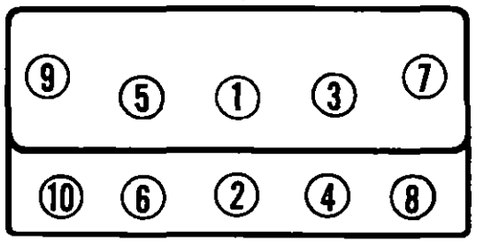
CYLINDER HEAD INSTALLATION: Install pilot studs, Tool 6051-A in two end capscrew holes in block, Coat NEW steel head gasket lightly with 8M-19554 gasket sealer and install gasket over pilot studs and dowels. Install cylinder head assembly over pilot studs and dowels **with plugged water jacket hole to rear of engine.** Install 8 cylinder head capscrews, then remove pilot studs and install remaining two capscrews in these holes. Tighten all capscrews evenly as follows: ***(CAUTION—Three torque applications must be made as indicated below).*** **Initial** COLD torque should be 75 ft. lbs., **Second** COLD torque to 80 ft. lbs.; **Third** HOT torque to 85 ft. lbs. should be made after 20-minute fast idle warm up. NOTE—After the above procedure has been completed the cylinder head capscrews require no additional torquing and should not be disturbed for installation of engine lifting hooks, etc.

►***CYLINDER HEAD GASKET INSTALLATION CAUTION:*** Gaskets are interchangeable from one cylinder bank to the other but MUST BE INSTALLED WITH MARK "FRONT" TOWARD FRONT OF ENGINE. Make certain that water passage holes in gasket and block line up.

►*1953-54 SERVICE REPLACEMENT CYLINDER HEAD NOTE:* Cylinder Head, Part No. EAD-6049-G is adaptable to either the 14mm or 18mm spark plugs. Spark plug holes are drilled and tapped for 18mm spark plugs and a special adapter, Part No. B5A-6060-A, is provided so that 14mm spark plugs may be used. Adapter can be installed by threading plug into adapter, then installing assembly in cylinder head and torquing to to 25-30 ft. lbs., which is sufficient to seal adapter in place.



1949-51 CYLINDER HEAD



1952-55 CYLINDER HEAD

CRANKSHAFT & MAIN BEARINGS

1949-51 MODELS

CRANKSHAFT REPLACEMENT: Use 8EL-6303-A or B for replacement engines with standard clutch and transmission, and 8EL-6303-B or C crankshaft in engines with Hydra-Matic drive. "C" shaft is same as "B" shaft except pilot bushing and retainer for the Hydra-Matic have been installed.

1949-51 MODELS

FLYWHEEL REPLACEMENT: If new crankshaft is installed with an old flywheel or a new flywheel used with an old crankshaft on Hydra-Matic cars, new oversize dowels must be installed. A special reaming tool is made for this purpose. Oversize dowels (.005" O.S., Part No. 8EL-6387-D, .015" O.S., Part No. 8EL-6387-E) are furnished for service.

1949-51 MODELS

REAR MAIN BEARING OIL SEAL: (Upper Seal)—Place upper rear main bearing seal retainer in Tool 6007-A and install packing, forming it in place with upper half of Tool 6007-A. Cut off ends of packing at cut-off point provided in Tool 6007-A (CAUTION—Do not soak packing in engine oil). Remove seal retainer from tool and install it in cylinder block, with a gasket between retainer and cylinder block. Coat gasket sparingly with Permatex No. 2. Secure retainer with capscrews and lockwashers. Torque capscrews to 5-8 ft. lbs. torque.

Lower Seal (In Oil Pan)—Install packing in oil pan using Tool 6007. Seat packing firmly in pan groove and then cut off ends of packing at cut-off slots in tool. Packing should extend approximately 1/16" from pan gasket surface. CAUTION—Do not soak packing in engine oil.

1952-55 MODELS

REAR MAIN BEARING OIL SEAL: Install new packing in crankcase and bearing cap using Tool 6701 to seat packing. Before removing tool cut off edges flush with surface. Make certain there are no ragged edges protruding. Install outer "L" shaped neoprene seal on bearing cap and coat with lubricant. Install Pilot Studs Tool 6336-A1, and place unit over pilot studs. Push bearing cap through tool and into position in block. Remove bearing replacing tool and trim vertical seals, leaving approximately 5/64" of seal above cap. Remove pilot studs and install the self locking main bearing cap bolts. Tighten to 120-130 ft. lbs. torque.

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1952-55 MODELS

CRANKSHAFT THRUST BEARING ALIGNMENT: After #1, #2, and #4 bearing caps and inserts have been installed and properly torqued, install #3 bearing cap and insert. Install capscrews snug, then pry crankshaft toward rear of engine. Reverse this action by prying crankshaft forward (toward front of engine). This will align thrust surfaces of both halves of thrust bearing. RETAIN THIS FORWARD PRESSURE on the crankshaft, and tighten capscrews to 120-130 ft. lbs. torque. Check crankshaft endplay which should be .004-.008"

1952-55 MODELS

ENGINE FRONT COVER INSTALLATION: Coat new cover gasket with sealer, install gasket and front cover on engine. Align cover and oil seal on crankshaft, BEFORE installing capscrews by positioning Tool 6059 on crankshaft. Tighten cover capscrews to correct torque (see Tightening Specifications).

1952-55 MODELS

CRANKSHAFT FRONT OIL SEAL (In Timing Chain Cover): Coat new seal with engine oil and install on Tool 6700. Center seal and tool over front cover boss and drive in until seated. Make sure spring on inside of seal is properly seated.

CAMSHAFT & BEARINGS

1949-51 MODELS

►*1949-50-51 CAMSHAFT REMOVAL CAUTION*—Camshaft **cannot** be removed with engine in car. Fuel pump cam ring at rear end of camshaft will drop off cam and fall into pan.

Oversize Camshaft Bearings: Some engines in production have .080" oversize outside diameter camshaft bearings installed. Can be identified by the fact they are not the split type. Engines with these bearings are stamped on the valve cover gasket surface near the left water pump with an "F," "G," or "H" indicating front, center, or rear bearing is oversize. Part Nos. are #1 & #2, 8EL-6262-D, #3, 8EL-6263-D.

1952-55 MODELS

CAMSHAFT REMOVAL: Remove cylinder head covers and rocker arm asemblies from cylinder heads (see Cylinder Head Removal). Remove valve pushrods and hydraulic valve lifters. Remove timing chain and sprockets (see Timing Chain). Remove fuel pump drive sleeve from camshaft eccentric and remove timing chain oil deflection plate. With Tool 9400-B remove snap ring retainer from fuel pump push rod and remove rod. Carefully withdraw camshaft to avoid damaging camshaft bearings.

►*1952-55 SERVICE REPLACEMENT CAMSHAFT CHANGE (To provide better wear characteristics):* New camshafts, Part Nos. EAD-6250-G (1952-54), EBJ-6250-B identified by the letter "C" followed by two dimples between the first two cam lobes (from front of shaft).

TIMING GEARS

1946-48 MODELS

TIMING GEARS: Camshaft Gear. New type aluminum alloy camshaft gear is bolted on camshaft hub flange by four offset capscrews and can be replaced without removing camshaft from engine. To remove gear, remove screw in front end of crankshaft, pull fan and dampener assembly (use Puller 6360-A), remove timing gear cover. Bend back lockplate tangs and take out four camshaft gear mounting screws, remove gear. When replacing gear, make certain that marks on camshaft gear and crankshaft gear are lined up and see that lockplate tangs are bent up against flats on mounting screws. Use 6360-B Dampener Replacer tool to install dampener.

NOTE—Camshaft gear mounting screw holes are offset so that gear can only be installed in correct position.

Crankshaft Gear—To replace crankshaft gear, pull fan and dampener assembly (see Camshaft Gear Removal above), use 6306-C puller to remove crankshaft gear, 6306-D Gear Replacer to install gear.

Timing Gears: Camshaft Gear (Aluminum Alloy) furnished in .006" Oversize (1GA-6256-B), and .012" Oversize (1GA-6256-C).

1949-51 MODELS

TIMING GEARS: Removal & Installation—Follow same procedure as for 1946-48 models.

TIMING CHAIN

1952-55 MODELS

TIMING CHAIN REMOVAL & INSTALLATION: Remove radiator and then remove water pump assembly from engine front cover. Remove hex head capscrews from front of crankshaft, and using Tool 6313-FF, remove crankshaft dampener and woodruff key. Remove front cover and engine timing pointer. Remove thrust plunger and spring from front end of camshaft. Take out the three capscrews in camshaft sprocket. Remove lock plate, and then remove sprocket and timing chain together.

VALVE SYSTEM

1952-55 MODELS

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves):* Stem diameter has been decreased .0005" to provide greater stem clearance in guide. NEW stem diameters are:

Size	Stem Diameter
Std. (Marked Red)	.3400-.3405"
Std. (Marked Green)	.3405-.3410"
.003" Oversize	.3430-.3440"
.015" Oversize	.3550-.3560"
.030" Oversize	.3700-.3710"

1949-51 MODELS

VALVE TIMING CHECK: Remove the intake manifold and the right hand cylinder head. With intake valve (#1 cyl.) just opening, line up timing mark on dampener with pointer. Raise #1 exhaust valve and insert a piece of ⅛" stock between lifter plunger and valve stem, release the valve and allow the lifter to collapse completely. Crank engine backwards about 45° and place contact point of dial indicator on head of #1 exhaust valve and set indicator to ZERO. Crank engine forward until timing mark and pointer again line up. If the valve timing is correct the indicator will read .020" to .040". If the reading falls back it indicates the lifter is not completely collapsed and it will be necessary to repeat the procedure. If the camshaft is one or more teeth out of time the dial reading will be considerably outside the limits given.

1946-48 MODELS

VALVE SERVICING: Complete valve assembly (valve, spring, guide) should be removed from the engine and dismantled on the bench as follows:

Valve Assembly Removal—Use special bar type lifter, VZ-185, inserting end of lifter through spring coils to engage flanged lower end of guide, pull guide down slightly to release retaining 'C' washer, pull 'C' washer out, lift valve assembly out through top of block.

CAUTION—Mark valve assembly with cylinder number to insure re-installation in same position.

CAUTION—Mark valve guide halves to insure each assembly being kept together and re-installed in same cylinder.

Valve Installation Note—Intake valve guides have relief groove cut on one edge of each guide half. Install guides with this relief groove up.

1949-51 MODELS

VALVE ASSEMBLY REMOVAL: Compress valve spring with Tool 6513 and remove retainer keys. (NOTE—Crank engine until tappet is at lowest point before compressing spring). Hold spring up and remove lower spring retainer, then drop spring over tappet and while holding upper retainer up, remove spring, then remove upper retainer. Install by reversing above procedure.

1952-55 MODELS

VALVE ASSEMBLY REMOVAL: Loosen push rod adjusting nuts and take off rocker arm assemblies by removing support bolts. Use Tool 6513-A or any suitable valve compressor and remove valve keepers, retainers, sleeves, neoprene seals and valve springs. ***Identify each part to insure return to original position.***

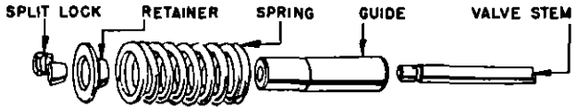
LATE 1951 & 1952-55 MODELS

ROTATABLE VALVES: *(NOTE—Rotatable Valves are standard on Late 1951 and Later Models. See Note below for installation on previous cars).* Consists of a two piece type retainer and sleeve which allows valve to rotate freely.

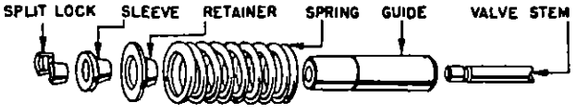
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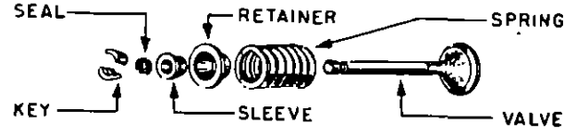
1949-50 & Early 1951 Rotatable Valve Installation (Cars not originally equipped with rotatable valves) —Install new type retainer and sleeve. Valve gap setting is not changed when rotatable valves installed.



1949-51 CONVENTIONAL VALVE ASSY.



1949-51 ROTATABLE VALVE ASSY.



1952-55 ROTATABLE VALVE ASSY.

1949-55 MODELS

VALVE SEAT WIDTH: Valve seat width should be held to 1/16-5/64". If wider than this they should be narrowed down by grinding the seat at bottom 30° and top 60°. Center valve head face contact is desired. Seat contact on valve can be raised by grinding block seat with 30° grinder and lowered with a 60° grinder. Check valve face using prussian blue to determine if seat is centered.

►**1949-50-51 Valve Replacement Note**—If the original seat has been ground to a point where contact with valve face is too near the outer edge of valve, a .070" intake valve should be installed. To install the oversize valve, grind the seat down with a 45° grinder until valve does not protrude more than .030" above block (for head clearance).

VALVE TAPPET ADJUSTMENT
1952-55 MODELS

INITIAL VALVE CLEARANCE: To insure valve being on the low side of the cam, make all adjustments in the following sequence, and with No. 1 & No. 6 pistons in the indicated position.

No. 1 Piston at TDC (Compression Stroke)—Adjust No. 1 In. & Ex., No. 2 In. & Ex., No. 5 In. & Ex., No. 7 In., No. 4 Ex.

No. 6 Piston at TDC (Compression Stroke)—Adjust No. 6 In. & Ex., No. 3 In. & Ex., No. 7 Ex., No. 8 In. & Ex., No. 4 In.

Turn valve adjusting screw clockwise while moving push rod up and down until **all slack is removed.** ***(CAUTION—Plunger unit of hydraulic lifter should not be forced down into body during this operation).*** With all slack removed, turn adjusting screw an **additional 2½ turns.** Hold adjusting screw, tighten locknut to 30-35 ft.lbs. torque. *NOTE*—If lifter is noisy in operation, adjustment can be varied by turning adjusting screw ±¼ turn from original 2½ turn setting. Repeat operation on all valves.

VALVE STEM SEALS
1952-55 MODELS

►*VALVE STEM SEAL REPLACEMENT NOTE:* On early type heads with tapered shoulder on valve guide boss, use Valve Stem Seal, Part No. B4Q-6571-A on intake and exhaust valves. On later type heads with square shoulder approximately ¼" below top of valve guide, use Valve Stem Seal, Part No. EAA-6571-C on intake and exhaust valves.

VALVE STEM SEAL INSTALLATION: Install valve stem seals on valve stem so seal is seated in position on valve guide boss. *See "Replacement Note" above for correct seal application.*

VALVE SEAT INSERTS
1946-50 MODELS

VALVE SEAT INSERT (Removal & Installation)—Valve seat inserts used only on 1949-50 model exhaust valves. To remove valve seat, drill two holes directly opposite each other at right angles to face of valve seat using a No. 30 drill. Drill as deeply as possible without breaking through insert. With a sharp chisel, cut into holes and use a screwdriver to pry upward to break insert. To install a new seat, first chill it in dry ice then quickly drive it into the counterbore

VALVE GUIDES
1952-55 MODELS

OVERSIZE VALVE STEM INSTALLATION: Use Tool 6085 Piloted Reamer to ream cylinder head valve guides for oversize valve stems. Reamers are furnished in .003", .015", & .030" oversizes. Pilots are furnished Std., .003", & .015". Use reamers in sequence with correct pilots when reaming from standard to oversize. Regrind valve seats AFTER reaming guides.

ROCKER ARMS
1952-55 MODELS

ROCKER ARM ASSEMBLY: *After assembly removed* from cylinder head (see Cylinder Head Removal above), disassemble and reassemble the assembly as follows:

Rocker Arm Disassembly: Remove cotter keys, washers, rocker arms, springs, supports and plugs from shaft. ***Keep all parts in order as removed so they may be reinstalled in same position.*** Inspect all parts for wear and replace worn parts. If rocker arm radius is scored, replace arm, do not try to regrind radius.

Rocker Arm Reassembly: Reverse disassembly procedure. Two types of rocker arms are used. These should be installed so valve ends of arms point outward away from support, see illustration.

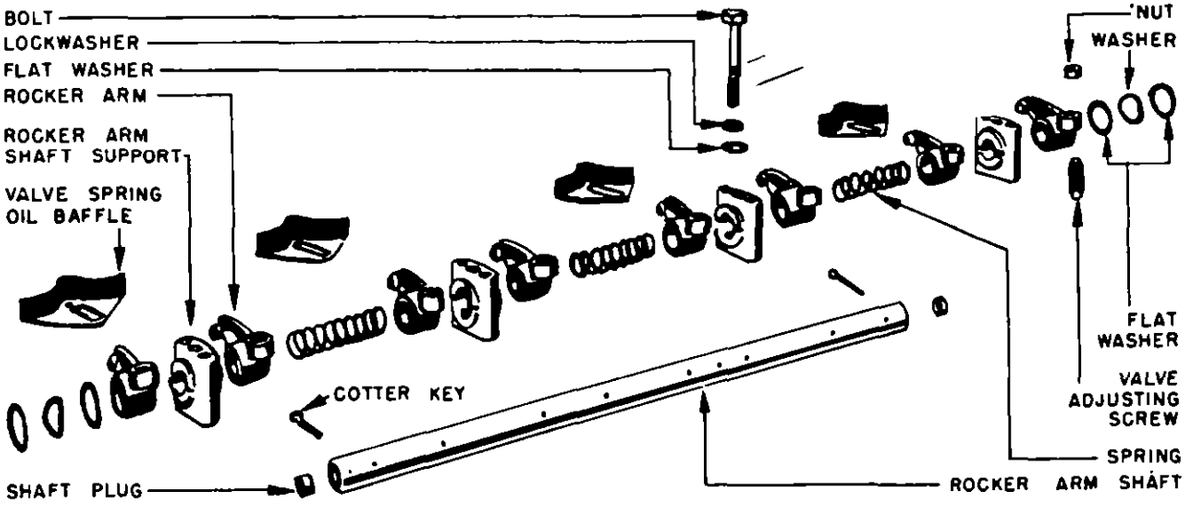
HYDRAULIC LIFTERS
1946-48 MODELS

HYDRAULIC VALVE LIFTERS: ***(NOTE—Two types used: "One-Piece" type and "Two-Piece" type. For disassembly & Reassembly of "Two-Piece" type, see 1949-51 Hydraulic Valve Lifters below).***

Removal: Both type lifters are "Barrel Type" and can be lifted out of bore after valve and spring have been removed.

Disassembly: Force piston down slightly with a blunt instrument and pry out the retaining ring. If piston does not come out easily, soak in solvent, and if necessary, pry it out with a screwdriver. Remove return spring and valve assembly from body. Clean *thoroughly with solvent and dry with compressed*

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LINCOLN 1952-55 ROCKER ARM ASSEMBLY

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air. *CAUTION—It is important that lifter parts do not become mixed. Disassemble and clean one lifter at a time.*

Reassembly: Position valve assembly in place in lifter body with spring installed on top. Insert piston and depress sufficiently to install retainer ring.

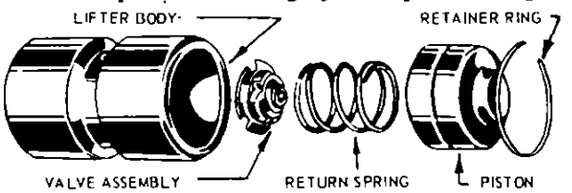
Adjustment: No adjustment required. Clearance should be zero with lifter filled with oil, and .030" to .070" clearance with lifter dry and compressed.

1949-51 MODELS

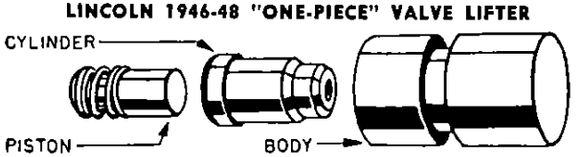
HYDRAULIC VALVE LIFTERS: "Two-Piece" type lifter consisting of a cylinder and plunger assembly and a "mushroom" type lifter body.

Removal: Cylinder and plunger assembly can be withdrawn from lifter body (mushroom type) after valves and springs have been removed. *Camshaft must be removed if lifter body is to be removed from engine.*

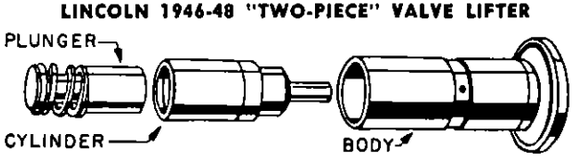
Disassembly: (Plunger and cylinder assembly removed from lifter body). *(NOTE—Disassemble one unit at a time to avoid the possibility of mixing the parts).* Unlock plunger spring by twisting in a clockwise direction. Pull plunger and spring out of cylinder. It may be necessary to insert a thin wire through oil hole under ball check to raise ball and drain oil from cylinder. Wash all parts in clean solvent and dry with a clean dry cloth or blow dry with air. If plunger or cylinder scored, replace as a unit (old lifter body may be used if clearance in block or guide bracket is not excessive). If there is evidence of scoring, or foreign matter in the oil, remove oil pan and thoroughly clean pan and engine.



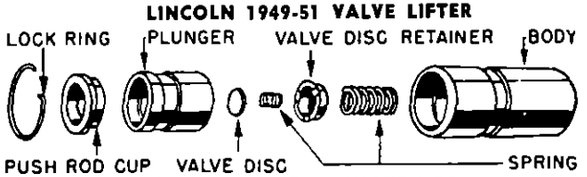
LINCOLN 1946-48 "ONE-PIECE" VALVE LIFTER



LINCOLN 1946-48 "TWO-PIECE" VALVE LIFTER



LINCOLN 1949-51 VALVE LIFTER



LINCOLN 1952-55 VALVE LIFTER

1952-55 MODELS

HYDRAULIC VALVE LIFTERS: Lifters are "barrel type," integral units with a flat, disc type check valve.

Removal: Remove cylinder head covers. Take out rocker arm assembly support bolts and remove rocker arm assemblies, and valve push rods. Valve lifters can then be removed from lifter bores in block.

Disassembly: Immerse all lifters in solvent to remove all varnish and carbon deposits. DO NOT CUT OR SCRAPE CARBON FROM LIFTER. With needle nose pliers, remove lock ring from top of body. Remove push rod seat, plunger, valve disc assembly and spring from body. *(CAUTION—Disassemble one lifter at a time to avoid inter-mixing lifter parts).*

Reassembly: Place push rod seat upside down on bench. Install plunger on push rod seat and place valve disc assembly on plunger and set spring on valve disc retainer. Place body over assemblies and push body down over plunger. Lift assembly and push plunger and push rod seat up into body. Install lock ring using tool 6500-C.

OILING SYSTEM

1946-48 MODELS

LOW OIL PRESSURE NOTE: Low oil pressure may be caused by fuel pump push rod bushing being worn through, permitting oil to escape from main oil channel. Replace bushing by driving old bushing out of cylinder block and driving new bushing in until top of bushing is 7/8" above face of casting. New bushings need not be reamed.

OIL PUMP

1946-48 MODELS

OIL PUMP: Removal & Disassembly—To remove pump from engine, remove locking wire and take out mounting screw in pump mounting flange, pull pump down and out (NOTE—Pump body fits in recess in cylinder block and it may be necessary to jar it slightly to loosen it). To dismantle pump, remove 4 screen cover capscrews, take out screen cover, pump cover plate, screen, and screen cover gasket. Lift out pump driven gear. Remove relief valve plug, spring, and plunger (on side of pump housing). If pump shaft and driving gear are to be removed, drive out pin in drive (upper) gear, place pump in arbor press with support under oil screen cover gasket seat (below relief valve), press shaft and driving gear out through lower end of housing.

Servicing—Clean out all oil passages in pump housing with compressed air. Replace all worn parts when clearances exceed following limits:

Pump Shaft & Bushings—Shaft clearance in bushing should be .001-.003" and bushings should be replaced if clearance exceeds .005". Replace shaft if pump gear worn or if bearing surface worn to diameter of less than .497". Replace bushings if worn to inside diameter greater than .502" (check by pushing shaft gear from side-to-side in pump housing, replace bushings if play greater than .005". Remove old bushings with driver, press new bushings in place, line ream to inside diameter of .499".

Pump Driven Gear & Shaft—*Clearance between* driven gear and stub shaft in pump housing should be .002-.0035". Replace shaft if clearance exceeds .005" or shaft diameter under .434". To replace shaft, drive old shaft out of housing, press new shaft in place (make certain end of shaft will clear cover when installed).

Oil Pump Relief Valve—Check relief valve spring tension. Replace if not within limits as follows:

Spring Number	Pressure & Length
H-6670 ("H" & "86H" pumps)	134-144 ozs. @ 1.06"
06H-6670 (for "06H" pumps)	*95-101 ozs. @ 1.195"*
41A-6654 (for "56H" pumps)	78-87 ozs. @ 1.38"

Pump Assembly—Insert pump shaft in housing, press drive gear on shaft until clearance between gear hub and end of housing (endplay) is .017", drill new 5/32" hole through shaft in line with hole in gear, install 5/32" pin and peen both ends of pin. Complete assembly by reversing disassembly (above).

CAUTION—Make certain that pump mounting screw is locked with wire and lockwashers used under screen cover capscrews. Stake oil relief valve plug in place with punch.

1946-48 MODELS

OIL PUMP DRIVE (Camshaft Gear): Pump drive gear is pressed on rear end of camshaft. Remove old gear with gear puller, No. 6254-A, drive new gear on shaft with a fibre block (support shaft in vise with brass jaws). NOTE—Late design camshafts have flat on oil pump drive gear hub and gears have similar flat to prevent the gear turning in service. These gears and camshaft must be used together and flats must be lined up when installing gear. Drive gear on shaft until it is firmly seated against the shoulder on the shaft.

Oil Pump Idler Gear: This gear located in rear end of cylinder block between camshaft gear and oil pump drive gear on pump shaft.

Removal & Disassembly—Take out capscrews in cover on rear face of cylinder block, lift off cover and gear assembly, and gasket.

Servicing—Replace all worn parts when clearances exceed following limits:

Idler Gear & Bushing—Clearance on shaft should be .0005-.002". Replace bushing if worn to inside diameter greater than .752" or if clearance exceeds .005". To replace bushing, drive old bushing out, press new bushing in gear, ream bushing to provide shaft clearance of .0005-.002".

Idler Gear Shaft—Replace shaft if scored or worn to diameter less than .747". To replace shaft, press old shaft out of cover, press new shaft in until end of shaft is flush with face of cover.

1946-48 MODELS

OIL-PRESSURE REGULATOR (Relief Valve): Relief valve located under plug directly above **front** camshaft bearing (under valve cover) on all engines. Oil pump relief valve located on side of oil pump. Additional hydraulic lifter by-pass valve located above **rear** camshaft bearing (under valve cover) on cars with hydraulic valve lifters starting with 1939. Check relief valve spring tension and replace all springs which are not within limits listed below.

CAUTION—Correct type spring must be used.

Front Cylinder Block Relief Valve (Engines without Hydraulic Valve Lifters)—Replace valve spring if not within limits of 36-43 ozs. compressed to 1.38".

Front Cylinder Block Relief Valve (Engines equipped with Hydraulic Valve Lifters)—Replace valve spring if not within 33-36 ozs. compressed to .53".

Rear Cylinder Block Hydraulic Lifter By-Pass Valve—Replace by-pass valve if spring broken or if valve

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does not seat properly

Oil Pump Relief Valve—Three different spring used. See Oil Pump Removal & Disassembly data above.

1949-51 MODELS

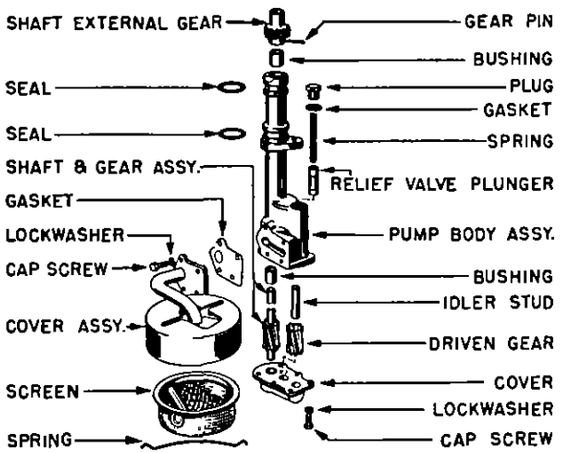
OIL PUMP: Located in engine crankcase, and driven by gear on end of camshaft, through an intermediate idler gear.

►***OIL PUMP DRIVE GEAR AND IDLER GEAR NOTE***—*Engine must be removed from car to replace pump drive gear (on end of camshaft), and idler gear assembly.*

Removal: Remove oil pan and remove pump attaching bolts. Withdraw complete pump assembly from engine recess.

Disassembly: Remove screen and cover assembly, then remove pump cover from pump body. Remove pump driven gear. Remove relief plug, gasket, valve spring and plunger. If external drive gear is worn or defective, file retaining pin flush with gear shoulder and drive pin out. Press gear from pump shaft. Remove rubber oil seal rings from body.

Inspection: Wash all parts in solvent. Examine oil pump gears and shaft for wear and scoring. Install shaft in bushing and check for sideplay. Check bushings for score marks. If bushings are worn, drive out old bushings and install new ones. Ream new bushings for a slip fit with shaft. Replace all other parts of pump found to be worn or defective. Check relief valve plunger for wear or scores, and check tension of relief valve spring which should be 12.4 lbs. at 2.175".

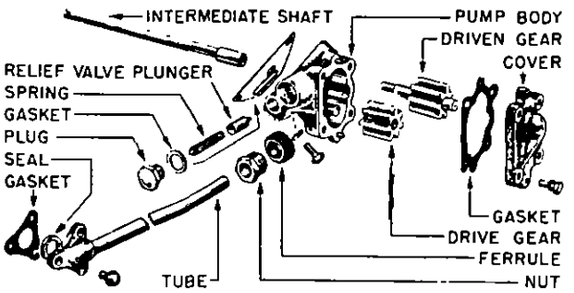


LINCOLN 1949-51 OIL PUMP

1952-55 MODELS

OIL PUMP: Externally mounted on lower left rear side of engine block. Pump is driven by distributor shaft.

►***OIL PUMP PRODUCTION CHANGE:*** Later type oil pump and driving gear assembly has been changed to a press fit. Early assemblies were keyed.



LINCOLN 1952-55 OIL PUMP

Removal: Disconnect external oil line. Remove attaching capscrews and remove pump and intermediate shaft.

Disassembly: Remove capscrews retaining bottom cover to pump body. Tap cover gently with a soft hammer if stuck. (CAUTION—Do not tap end of drive gear shaft). Remove gears from pump body, relief valve plug gasket, spring and relief valve. Pull oil inlet pipe ferrule assembly from large hole of pump body.

Inspection: Wash all parts in solvent. Check all parts for signs of wear, or grooves that might cause an oil leak. Check upper drive shaft clearance (.0015"-.0030"), and lower drive shaft clearance (.0010"-.0030"). If clearance is greater than above, replace pump body. Check oil pump relief valve spring tension which should be 9.82 lbs., at 1.71". Check gears, and if worn or scored, replace as necessary.

Reassembly: Install gears in pump body and install cover using a new gasket. Install new oil inlet tube ferrule assembly in large hole of pump body. Position relief valve in bore and install spring and plug with new gasket.

OIL FILTER

1952-55 MODELS

OIL FILTER SERVICING: Filter is full-flow type and should be replaced at 4000 mile intervals (or more often if required by operating conditions).

►***REPLACEMENT CAUTION***—Use Replacement Kit, Part No. HCK-6731-A, which includes correct Filter Element and NEW GASKETS WHICH MUST BE USED.

►***OIL FILTER OIL ANTI-DRAIN BACK PRODUCTION CHANGE:*** Beginning with serial number 54WA-19137-H and 54LA-7558-H an oil anti-drain back and filter mounting bolt insert has been installed in the filter to replace the anti-drain back valve formerly installed in oil inlet passage of the block. NOTE—some cars may have both types installed and it is not necessary to remove the former type. To install later type assemblies on earlier cars proceed as follows: Remove oil assembly and discard mounting gasket and mounting bolt insert *(CAUTION—The new type insert must be used with the diaphragm assembly).* Thread the new insert, Part No. EAA-6890-C into diaphragm until it contacts flange. Clean cylinder block oil filter recess and assemble insert and diaphragm into block recess with the two slots and the word "top" toward the up position. Tighten insert firmly to insure diaphragm being clamped tightly between insert and block. *(CAUTION—Make sure that slots in diaphragm are in the uppermost horizontal position and that top edge of insert has no burrs which would prevent bottom of oil filter element from sealing against it).* Install filter assembly using a new gasket between diaphragm and filter container. *NOTE*—Removal of oil filter for normal service operations does not disturb diaphragm after it has once been properly installed.

Filter Removal: Take out center bolt in filter cover, remove filter assembly. Remove and discard cover mounting gasket from filter mounting pad, remove and discard filter element. Remove and discard neoprene gasket from center bolt, remove spring and seat assembly from center bolt, then remove center bolt from cover, remove and discard fiber center bolt-to-cover gasket. Wash all parts and filter pad on block with solvent and make certain they are clean.

Filter Installation: Install NEW fiber gasket on center bolt, install bolt in cover, install spring and seat assembly on bolt with open end of seat toward cover *(CAUTION*—seat must be attached to spring by tangs). Install NEW neoprene gasket on center bolt next to spring seat, install new filter element. Install NEW filter mounting gasket in block recess *(CAUTION*—DO NOT use sealing compound on this gasket). Install filter assembly on engine making certain that filter is seated in recess and not "cocked" over shoulder of recess. Tighten center bolt just enough to bring case up against gasket, rotate housing slightly to assure even seating, then tighten center bolt to 20-25 ft.lbs. torque. *CAUTION*—DO NOT overtighten the bolt which may strip threads, distort cover, or cause leaks. After engine started up, allow it to idle until lubrication established and normal oil pressure secured, then speed up engine and check for oil leaks.

COOLING SYSTEM

1949-51 LINCOLN & LINCOLN COSMOPOLITAN

PRODUCTION CHANGE FOR IMPROVED COOLING: New Cylinder Head Gasket No. 8EL-6051-D. This gasket required for new water holes added during production, 4 holes in block (1 in upper corners of each bank) with matching holes in each cylinder head. This gasket furnished for service on all engines (can be used on early engines without the additional holes).

Drilling of Additional Water Passage Holes on Early Cylinder Blocks and Heads for Improved Circulation—Allowed by car manufacturer where overheating conditions cannot be corrected by regular methods. Use new gasket No. 8EL-6051-D as template, drill 5/16" additional holes as follows: 4 in cylinder block (1 in upper corner front and rear of each bank), 2 in each cylinder head (1 in upper corner front and rear).

►***CAUTION—Holes in cylinder block should not be drilled deeper than ⅝".***

HOOD LOCK: Hood is Alligator type. To raise hood, pull out lock button on left side of instrument panel, press in on safety catch under front edge of hood.

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing (visible through opening in floor) and on left side of frame front cross-member near left front engine support.

TUNE-UP

COMPRESSION: Pressure—105-125 lbs. at cranking speed.

VACUUM READING: Steady 18-20" idling at 6 MPH.

FIRING ORDER: 1-4-9-8-5-2-11-10-3-6-7-12 with cylinders numbered 1-3-5-7-9-11—Left Bank, 2-4-6-8-10-12—Right Bank (front-to-rear).

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. Gaps—.025"

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.014-.016" (both sets equal).
Cam Angle or Dwell—36.5° closed, 23.5° open (each set—contacts operate independently).
Breaker Arm Spring Tension—20-24 ozs.
Automatic Advance—Starts at 200 RPM. Max. advance 11-12° at 650 RPM (Distr. ° and RPM).

IGNITION TIMING: See Ignition Timing.
Std. Setting—2° BTDC.
Timing Marks—None. See Ignition Timing for *directions on setting and synchronizing of distributor* for correct timing when installed on engine.
Vacuum Brake Setting—Set to just eliminate ping with engine pulling load (back off adjusting screw until engine pings, then turn screw in just enough to eliminate pinging).

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—With engine warm, set throttle stop-screw for 500 RPM idle speed. Set idle adjusting screws (1 for each barrel—adjust in succession) for smooth idle (turn screws in for leaner mixture).
Float Level—1.322-1.353" bottom of float to underside of bowl cover with needle valve seated (Gauge 9550-A). Fuel level 11/16" plus or minus 1/32" below top edge of bowl.
Accelerating Pump—Inner (#1) Hole—Summer, Center (#2) Hole—Winter, Outer (#3) Hole—extremely cold temperatures.

Fuel Pump Pressure: 1½-3½ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Located at exhaust pipe connection to exhaust manifold for left hand cylinder bank. See that valve operates freely.

VALVES: See Valve Timing.
Tappet Clearance—None in service. Zero-lash type hydraulic lifter used.

STARTING: See Battery, Starter, Generator, and Regulator.

IGNITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock.

Assembly	Oakes No.	Ford No.
Lincoln	302945	5EH-3675-A
Continental	303000	5EH-3675-B
Lincoln RHD.	302964	5EHF-3675

Ignition Switch Assembly—Oakes No. 302440, Ford No. 16H-3680.
Lock Cylinder—Hurd.

COIL: Ford No. H-12024 (Part of Ignition Unit Assy.). Two-coil unit mounted on distributor.
Primary Resistor—One resistor connected in series with each coil primary (two used). Resistors are part of Lighting Circuit Breaker Assy. 16H-11624.
Ignition Current—*Approx. 3.2 amperes idling, 4.2* amperes stopped, for each coil. Primary circuit resistance 1.0-1.33 ohms.

CONDENSER: Ford Part No. H-12300 (two used).
Capacity—.30-.34 microfarad.

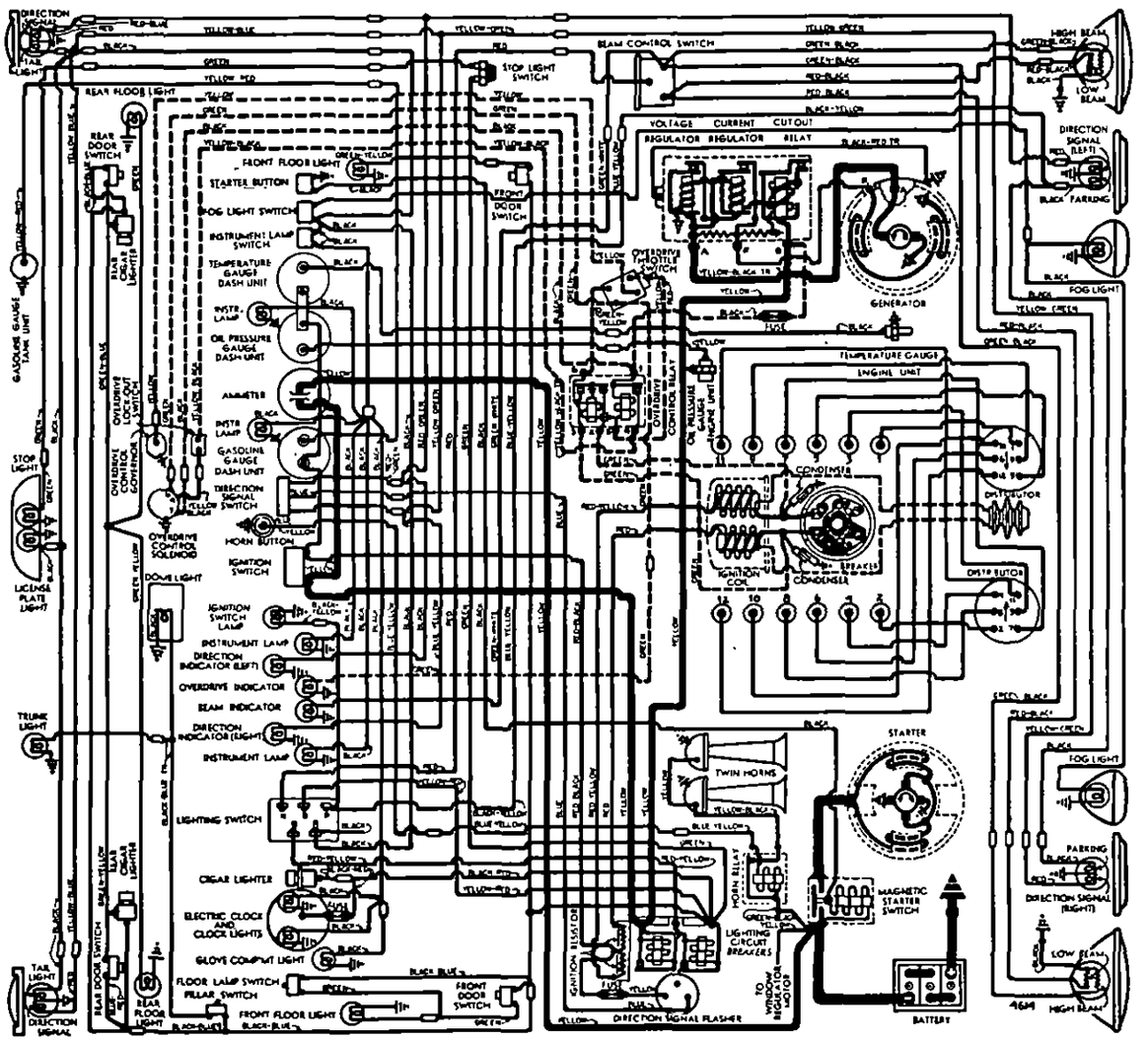
DISTRIBUTOR: Ford No. 16H-12127 (Less Coil, Distributor Caps, and Plates). Double breaker, 6 lobe cam, full automatic advance type with Vacuum Brake adjustment. Contacts open alternately at 37½° and 22½° intervals corresponding to unequal 75° & 45° firing intervals (must be synchronized).
Firing Interval—Movable contacts open 37½° after fixed set with unequal intervals of 37½° and 22½° (75° & 45° crankshaft rotation) caused by 75° included angle between cylinder banks.
Breaker Gap—.014-.016" (both sets set alike).
Cam Angle or Dwell—36.5° closed, 23.5° open (each set—operate independently).
Breaker Arm Spring Tension—20-24 ozs.
Rotation—Clockwise viewed from drive end.

Distributor Automatic Advance Engine

Degrees	R.P.M.	Degrees	R.P.M
Start	200	0	400
11-12	650	22-24	1300

Distributor Removal:—Mounted on front of engine To remove, remove generator, disconnect vacuum line and primary leads, remove distributor caps, take out 3 capscrews in mounting flange.

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Vacuum Brake: Consists of a spring-loaded, vacuum controlled brake piston which bears on edge of retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.

IGNITION TIMING

Std. Setting—All Engines.....2° BTDC. See Vacuum Brake Setting for service correction for operating conditions and octane rating of fuel used.

Ignition Timing (Basic Setting)—Distributor can be set for correct ignition timing when off engine as follows: Place a small straight edge or scale against the tang on the drive end of the shaft (scale must be on wide side of shaft), rotate distributor in direction of rotation (clockwise) until the trailing edge of the scale is exactly 11/32" past the nearest edge of the mounting hole in the flange which is nearest the vacuum brake. If left hand (fixed) breaker contacts do not open at this point, loosen adjusting screw on side of distributor housing, move screw up (to advance timing), down (to retard timing) until contacts begin to open, tighten adjusting screw. Then check synchronization of movable contacts as follows:

Synchronization (Basic Setting)—Remove timing adjusting screw and plate on side of distributor for access to synchronizing screw (visible in adjusting screw slot). Place a scale on the wide side of the shaft and against the tang (as for timing above), rotate distributor shaft in direction of rotation (clockwise) until leading edge of scale is exactly 27/32" before the nearest edge of the mounting hole in the flange which is nearest the vacuum brake. If right hand (movable) contacts do not open at this point, turn synchronizing adjusting screw until contacts begin to open. Replace adjusting screw and plate, recheck timing of left hand (fixed) contacts as directed above.

Timing (On Engine)—No flywheel marks or other means provided to check or adjust ignition timing on the engine. If basic setting (timing & synchronizing of contacts) is correct as directed above, all necessary adjustments for operating conditions and octane rating of fuel being used can be made by means of Vacuum Brake Setting as follows:

Vacuum Brake Setting:—Should be set for best performance with particular fuel and operating conditions. To adjust, loosen locknut and back off adjusting screw until engine pings when accelerated, then turn screw in just enough to eliminate this ping, tighten the locknut.

CARBURETOR

Holley (Chandler-Groves) Ford No. 26H-9510-C. Dual (double barrel) downdraft with manual choke. *See Carburetor Section for complete data.*

Idle Adjustment—With engine warm, choke valve wide open and Fast Idle inoperative, set throttle lever stopscrew for 6 M.P.H. idle speed. Turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then out until engine begins to roll, finally turn screw in until engine fires smoothly. Recheck idle speed.

NOTE—Set for highest reading on Vacuum Gauge.

Float Level—Use Gauge 9550-A to check float level. Invert air horn and float assembly, place gauge on face of bowl cover. Bottom of float should be 1.322-1.353" from face of cover (1.353" part of gauge "Go", 1.322" part of gauge "No Go"). Adjust by bending lip of float lever. Fuel level in bowl should be 11/16" plus or minus 1/32" below top edge of bowl.

Accelerating Pump Adjustment—Three holes provided in throttle lever for pump link connection. Inner (#1)—Min. stroke, Summer temperatures. Center (#2)—Medium stroke, Normal Temperature. Outer (#3)—Max. stroke, Extreme cold weather. NOTE—Pump link locked in pump rod by snap lock. Pull link shaft out of pump rod to disengage lock.

Metering Jets—*See Chandler-Groves (Ford) Jet Specification Table in Carburetor Section.*

Fast Idle:—Integral with carburetor. Operated by choke lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: Ford No. 26H-9625-A (Lincoln), 26H-9625-B (Cont'l) Heavy duty Oil-bath type.

Servicing—Clean and re-fill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when crankcase drained) or more often if required. Wash filter element. NOTE—Clean and re-oil filter element in oil filler cap (crankcase breather) every 1000 miles.

Gasoline Gauge: King-Seeley Electric. Ford Nos. **Dash Unit:** 5EH-9280A ('46 Lincoln), 5EH-9280B ('46 Continental), 5EH-9280C ('47 All). **Tank:** 21C-9275A.

Fuel Pump: AC Type R, No. 1537709, Ford No. 26H-9350A. Diaphragm type. *See Carburetion Equipment Section for data.*

Pressure—3½ lbs. maximum (1½-3½ lbs.).

BATTERY

Ford Type 06H-10655-A. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).

Starting Capacity—150 amperes for 20 minutes.

Zero Capacity—300 amperes for 4.0 minutes.

Grounded Terminal—Positive (+) grounded to cylinder head stud of right hand bank.

Location—On right side in engine compartment.

Dimensions—Length 10.6". Width 7.3". Height 9.2".

STARTER

Ford Model No. 18-11002 or Ford No. 5EH-11001.

Armature No.—Ford No. 18-11005 (for 18-11001).

Drive—Bendix No. A1472 (Ford No. B-11350) or Bendix No. A-2100 (June 1947, starting Ser. No. 7H-165897).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—2 lbs. each.

Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450. Magnetic switch mounted on the dash and is controlled by panel pushbutton switch Ford No. 5EH-11500.

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, remove bolts on commutator endplate

GENERATOR

Ford Model No. 21A-10000. Armature No. 01A-10005A. Two brush (shunt) type with vibrating voltage and current regulation. Ventilated by fan

Charging Rate Adjustment.—None. See Regulator.

Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine, check output at 2 speeds given in performance table below. Restore original connections after completing test.

Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.

Amperes	Engine RPM.
Start	520
30	1060
30	2500

Rotation—Counter-clockwise at commutator end.

Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F.).

Brush Spring Tension—Approximately 28 ozs.

Removal:—Generator mounted on bracket between cylinder banks at front of engine driven in tandem with water pumps by Vee belt. To remove, loosen nut on bracket stud.

Belt Adjustment:—Loosen nut on bracket mounting stud, raise generator up until side movement on belt midway between generator and water pump pulley is ½" (thumb and finger pressure).

REGULATOR

Ford Model No. 01A-10505-C. Three Unit Type. Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash. *See Electrical Equipment Section for complete data.*

NOTE—Regulator case is grounded through braided wire 'pigtail' or separate ground wire extending from regulator to generator frame. Ground wire must be in place when generator operated.

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—8 ampere discharge current (maximum).

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Electrical Equipment Section for voltages at other temperatures.

Checking & Adjusting—*Refer to Electrical Equipment Index for article on 'Ford Regulator—3-unit Type'*

Current Regulator

Setting—30-33 amperes hot (after 5 minutes run).

Checking&Adjusting—See Voltage Regulator above.

LIGHTING

Headlamps: Ford "Sealed Beam" type.

Controlled by Lighting Switch on instrument panel and Beam Selector Switch on toeboard.

See Electrical Equipment Section for complete data.

Beam Indicator—In upper center of speedometer dial. Lighted whenever upper beams in use.
Direction Signal: *See Electrical Equipment Section.*
Direction Indicators—Right and Left hand arrows on face of speedometer dial.
Direction Signal Flasher—Ford No. 16H-13350.

Switches

Lighting—R-B-M Model 2445, Ford No. 11A-11654 (switch only). Light Switch Knob No. 5EH-11666-A (Lincoln), 5EH-11666-B (Continental).
Beam Selector (Switch Only)—Ford No. 16H-13532-A (Lincoln), 16H-13532-B (Continental).
Beam Selector (With Headlamp & Horn Wiring)—Ford 26H-11653-A (Lincoln), 26H-11653-B (Contl.).
Instrument—Ford No. 5EH-13740-B.
Stop Light—Ford No. 11A-13480.
Direction Signal—Ford No. 16H-13335 (switch).

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	
Park & Frt. Direc. Signal	21-3	1154
Instrument, Clock	1.5	55
Beam & Direc. Sig. Indicators	1	51
Tail & Rear Direc. Signal	21-3	1154
Stop	21	1129
Dome & Quarter	6	81
Rear License	3	63
Trunk (Luggage Comp't.)	6	81

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: RBM Model 6740, Ford No. 16H-11624. Combined with Ignition Resistor (twin unit) on block on dash under cowl (Direction Signal Flasher also mounted on same block). Consists of two separate circuit breaker units (one unit protects headlight circuits, second unit protects other lighting circuits) of the thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

WINDOW REGULATOR CIRCUIT BREAKER: Ford No. 51A-12250-A. 30 ampere capacity.

FUSES: Overdrive—20 ampere. In control relay lead. **Direction Signal**—10 ampere. In flasher lead.

HORNS: Ford No. 26H-13832 (High Note), 26H-13833 (Low Note). Air electric type twin horns operated by horn relay. **Horn Current**—24-28 amperes total.

Horn Relay: Ford No. 96H-13842.
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

►*ENGINE PRODUCTION CHANGE: See Engine Specifications below for TWO different engines used.*

►**ENGINE SPECIFICATIONS (To Eng. No. 138051):** Twelve Cylinder, "L" Head, 75° Vee type with both cylinder banks and crankcase cast Enbloc.
Bore—2.937" **Stroke**—3.75"
Displacement—305 cu. ins. **Rated H. P. 41.4.**
Developed Horsepower—130 at 3600 RPM.
Compression Ratio—7.2-1. Cast Iron Heads.

►**ENGINE SPECIFICATIONS (Beginning Engine No. 138052):** Twelve Cylinder, "L" Head, 75° Vee type with both cylinder banks and crankcase cast Enbloc.
Bore—2.875" **Stroke**—3.75"
Displacement—292 cu. ins. **Rated H. P.**—39.6
Developed Horsepower—120 at 3600 RPM.
Compression Ratio—7.2-1. Cast Iron Heads.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Lincoln Shop Notes.*
ENGINE REMOVAL: *See Lincoln Shop Notes.*
TIGHTENING TORQUES: *See Lincoln Shop Notes.*
CYLINDER HEAD: Tightening. *See Lincoln Shop Notes.*
CYLINDER SLEEVE: *Cast iron, dry type cylinder* sleeves available for replacement where bore size worn beyond Oversize Piston limit.
Servicing—Press sleeve in cylinder rebored to .0012" smaller diameter than outside diameter of sleeve and counterbored at top for sleeve flange. Sleeve finished for std. pistons without honing.
PISTONS: Steel alloy, light weight, cam ground, with slipper type skirt. Recondition cylinders for finished replacement pistons (or sleeves if required).
Weight—442 grams (without rings or pin).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.
Replacement Pistons: Furnished Standard size and .015", .030" Oversize.
Fitting New Pistons:—Use .002" feeler, .50" wide, inserted between piston and cylinder wall at right angle to pin. Pull to withdraw feeler must be within 5-8 lbs. NOTE—For New Pistons installed in Worn Bore use .004" feeler, or .005" for Worn Pistons in Worn Bore (all within 5-8 lbs. pull).
PISTON RINGS: Two compression, one oil ring, all above pin. Oil ring groove drilled with drain holes. NOTE—Expander used with #2 Compr. and oil ring. Install this #2 Compr. ring with mark 'TOP' up.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.093-.0935"	.008-.013"	.0015-.0035"
Compr. (#2)	.093-.0935"	.008-.013"	.001-.004"
Oil Cont. (#3)	.1845-.185"	.008-.013"	.001-.004"

Replacement Rings: Furnished Standard and .020", .030", .040" Oversize.
PISTON PIN: Diameter .7501-.7504". Length 2.607". Floating type (locking ring in piston at each end). Pin hole in connecting rod bronze-bushed.
Pin Fit in Piston—.0003-.0009" clearance or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" clearance (pin should pass through bushing slowly of own weight).
Replacement Pins: Std., .001", .002" Oversize.
CONNECTING ROD: Length 7.40". Weight 711 grams.
Crankpin Journal Diameter—2.250"
Bearing Type—Steel-backed, copper-lead lined bearing halves clamped in each rod.
Clearance—.001-.0025". **Sideplay** .014" (both rods).
Bearing Adjustment: None (no shims). Do not file bearing caps. Replace bearings if less than .08375" thick. NOTE—Rods and caps carry cylinder number. Engage tang on bearing in groove in rod and cap. Install long and short bearing cap bolts correctly.
Replacement Bearings: *Furnished Standard and* .0015", .003", .020", .040" Undersize.
CRANKSHAFT: Four bearing with integral counterweights. NOTE—Crankshafts furnished Std. and .020", .040" undersize.
Journal Diameters—2.401" (all bearings).
Bearing Type—Steel-backed, copper-lead lined.
Clearance—.001-.003".
Bearing Adjustment:—None (no shims). Replace bearings. Do not file bearing caps. NOTE—See that tang on bearing engages groove in block and cap.
Replacement Bearings: Furnished Standard and .0015", .003", .020", .040" Undersize.
End Thrust:—Taken by rear main bearing. To adjust, replace bearing. **Endplay**—.002-.006".

CAMSHAFT: Four bearing with helical gear drive.
Bearing Diameters—1.797" (replace bearings if diameter more than 1.802", replace camshaft if journal diameter less than 1.7955".
Bearing Type—Steel-backed, babbitt-lined bushings pressed in block. **Clearance**—.001-.002".
End Thrust:—Taken by gear hub and coverplate. Adjusted by replacing coverplate. **Endplay**—.005-.015".
Timing Gears:—Cast alloy iron (Crankshaft), New Aluminum Alloy—bolted on shaft (Camshaft).
Backlash—.004" Maximum.
Timing Gear Replacement—*See Lincoln Shop Notes.*
Camshaft Setting:—Mesh marked tooth of crankshaft gear with space marked by line on camshaft gear (this line must be in line with mark on hub).

VALVES:—

	Head Diameter	Stem Diameter	Length
All Valves	1.537"	3115"	4.750-4.751"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0025-.0045"

NOTE—Service limit for valve stem diameter is .309" Intake, .3065" Exhaust. Valves interchangeable.
Valve Seat Inserts—Used for exhaust valves.
For Valve Servicing data, see Lincoln Shop Notes.
Valve Guides: Split type retained by "C" washer and valve spring. NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide half).
For Valve Servicing data, See Lincoln Shop Notes.
Valve Lifters: Barrel type hydraulic tappet take-up (Wilcox-Rich Zero-Lash type or Johnson type).
Diameter—.9995".
See Lincoln Special Data for complete data.

Valve Springs:	Pressure	Length
Valve Closed	51-57 lbs.	2.13"
Valve Open	111-121 lbs.	1.84"

NOTE—Replace springs which do not test to 47-57 lbs. at 2⅛" or if paint coating has been removed.

VALVE TIMING

Tappet Clearance:—None in service (hydraulic lifter). *See Valve Lifter Servicing in Lincoln Shop Notes.*
Valve Timing:—See Camshaft Setting above.
Int. Valves—Open 10.42° BTDC. Close 35.58° ALDC.
Exh. Valves—Open 50.92° BLDC. Close 8.08° ATDC.
To Check Timing—No flywheel marks provided. If dead center position for any cylinder established on flywheel, intake valve for this cylinder should open approx. 3.24 teeth before this point with piston .0389" before top dead center.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, valve lifters (hydraulic type) and timing gears. Oil pump mounted in crankcase at rear of engine.
Oil Pan Removal: *See Lincoln Shop Notes.*
Crankcase Capacity—5 qts.
Normal Oil Pressure—40-45 lbs. at 2000 RPM.
Oil Pressure Regulator—Located under plug above front camshaft bearing (under manifold) and on oil pump body (in crankcase).
NOTE—Check relief valve tension spring whenever engine overhauled. Replace cylinder block relief valve spring if tension not within limits of 33-36 ozs. at .53". Replace oil pump relief spring if tension not within limits of 78-87 ozs. at 1.38".

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Oil Pump: Gear type. In crankcase at rear of engine.
Oil Pump Servicing—*See Lincoln Shop Notes.*

Oil Filter: Replace cartridge at 5000 mile intervals (Ford No. 01A-18662-A1).

Oil Pressure Gauge: King-Seeley Electric. Ford Nos.
Dash Unit: 5EH-9273A ('46 Lincoln), 5EH-9273B ('46 Continental), 5EH-9273C (All 1947).
Engine Unit—No. 48-9278 (All Models).
See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with two water pumps at front of engine (pump for each bank), pressure system with relief valve in radiator cap.
Capacity—27 quarts.
Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs. Radiator Cap No. 26H-8100-B.

Water Pump: Packless type with ball bearing at pulley end (plain bushing at impeller). Two used.
See Water Pump Section for complete data.
Removal—Drain cooling system, loosen generator belt adjustment, remove belt. Disconnect and remove hose at water pump. Take out four capscrews mounting pump on cylinder block, lift pump out.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In outlet hose for each bank (2 used).
Setting—Start to open at 150-155°F. Fully open at 175-180°F.

Temperature Gauge: King-Seeley Electric. Ford Nos.
Dash Unit: 5EH-10883A ('46 Lincoln), 5EH-10883B ('46 Continental), 5EH-10883C (All 1947).
Engine Unit—No. 99A-10884 (All Models).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI, Ford No. 26H-7563. Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven asbestos composition. I. D. 6¾". O. D. 10". Thickness .125" (⅛").

Pedal Adjustment: Pedal free travel 1¼-2". To adjust, loosen locknuts and turn adjusting turnbuckle on connector rod between clutch throw-out lever and equalizer shaft lever. CAUTION—Opening in turnbuckle must be horizontal to prevent it binding on transmission case.

Removal: Remove transmission (see Transmission Removal below), block clutch release levers in disengaged position by inserting wedge between each lever and clutch cover. Take out six capscrews mounting clutch on flywheel, lift out assembly.

TRANSMISSION

Own Make No. 01A-7005 (Std.), 26H-7005-A (With Overdrive). All helical gear type, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control: Mechanical steering col. shift.
See Transmission Section for complete data.

Removal: Remove rear axle assembly (see Rear Axle Removal below). Disconnect Overdrive control and wires at solenoid, lockout switch and governor, remove solenoid as directed under Overdrive (cars with Overdrive Transmission only). Disconnect gearshift rods at transmission case levers, take out capscrew and washer mounting universal joint on transmission shaft, slide universal to rear and remove. Disconnect and remove clutch throw-out equalizer shaft. Remove nuts and flat washers on engine rear support bolts. Place support jack under rear end of engine (use wood block on jack), raise rear end of engine so that rear support clears mounting bolts. Take out eight capscrews mounting transmission on flywheel housing, pull transmission straight back and remove from car.

OVERDRIVE

Warner Model AS2-R10 (before Mar. 1, 1947), AS3-R10 (After Mar. 1, 1947). Optl. equipment, used with special Lincoln Transmission. Overdrive is solenoid operated with governor control and throttle operated "kick-down".
See Transmission Section for complete data.

Solenoid—Ford No. 16H-6916.

Control Relay—Ford No. 26H-6915-A.

Control Governor—Ford No. 16H-6919.

Throttle Kick-down Switch—Ford No. 16H-6918-A (Lincoln), 16H-6918-B (Continental).

Lock-out Switch—Ford No. 16H-6917.

Removal: Same as for Std. transmission (above) except for removal and installation of the solenoid.

►IMPORTANT SERVICE NOTE—Solenoid should be removed before transmission or overdrive removed from car (and installed after these units installed) and must be removed exactly as follows to avoid damage to unit: Disconnect wires at solenoid terminals, take out two mounting screws in base flange, **rotate solenoid approximately 60° to right** to disengage pawl rod from pawl (this will line up flats on end of rod with slot in pawl), withdraw solenoid and pawl rod assembly. To install solenoid, insert pawl rod in adapter with flats horizontal, make certain that short pilot on end of solenoid body enters counterbore in adapter casting, **rotate solenoid approximately 60° to left** to engage pawl rod in pawl and to line up solenoid flange mounting holes. Check engagement of pawl by attempting to pull solenoid out (solenoid should not come out and resistance of solenoid spring should be felt). Install solenoid mounting screws and connect wires.

UNIVERSALS

Spicer Model 2102-1X. Needle bearing type. Single universal in torque ball at rear of transmission.

REAR AXLE

Own Make. ¾ Floating, Hypoid Gear type with Torque Tube drive.
See Rear Axle Section for complete data.
Ratio—4.22-1 Std.
Backlash—.002-.004"

Removal: Raise rear end of car. Disconnect track bar. Disconnect rear spring (use spring spreader if available) by placing block under each rear spring eye and lowering car so that weight keeps spring extended, then remove spring shackle bolts and bars. Take out pin in hand brake equalizer and disconnect hand brake cable. Disconnect hand brake conduit retainer and hydraulic brake line at torque tube, disconnect shock absorber links. Remove front floor pan. Disconnect speedometer cable at torque tube. Take off nuts on four universal housing ball cap bolts, remove two bolts holding ball cap halves together, remove ball cap. Pull rear axle assembly straight back to disconnect torque tube from transmission, remove axle assembly from beneath car.
Axle Shaft Removal—*See Lincoln Rear Axle article in Rear Axle Section for complete data.*

SHOCK ABSORBERS

Houde (Houdaille). Double acting, hydraulic type.

	Houde Model	Right—Ford No.—	Left
Front	BBCHO-6	5EH-18045	5EH-18046
Rear	BBCLY-6	5EH-18080	5EH-18081

Adjustment—Std. setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control), or counter-clockwise (for less control) not more than 1 or 2 serrations at a time. NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check at 5000 mile intervals and fill to level of filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) which is required for these new shock absorbers with **round top filler plug.**

FRONT SUSPENSION

Front Suspension:—Conventional I-beam section axle with Reverse-Elliott ends and transverse spring. Axle held by radius rods and anti-sway strut rod.
Kingpin Inclination—4° crosswise.
Caster—3° Min., 5° Max. Must be equal for both wheels within ½°. No adjustment.
Camber—¼° Min., ¾° Max. Must be equal for both wheels within ¼°, right wheel must not exceed left.
Toe In—1/16". Set at 1-10 ratio to Camber. To adjust, loosen clamp bolts, turn tie rod.
Steering Geometry—Outer wheel 20°, Inner 23° ± ½°

STEERING GEAR

Gemmer Model 330. Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-servo, Single Anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Wheel Cylinders—Diameter 1.125" (front), 1.00" (rear). Not interchangeable between wheels.

Drums—Composite Cast Iron type. Diameter 12".

Lining—Molded (primary or forward shoe), Woven (secondary shoe). Width 1.75". Thickness .21". Length per shoe 11.95".

Clearance—.010" at each end of each shoe (adjusting screw in each wheel backed off 14 notches or "clicks" from point where shoes drag on drum.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Top: Auto-Lite Electric type.
See Miscellaneous Section for complete data.

Window Regulators: Hydro-Electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail to rear of front suspension upper control arm.

TUNE-UP

COMPRESSION PRESSURE: 110 lbs. at cranking speed.

VACUUM READING: *Steady 18-21" Idling at 500 RPM.*

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram.

SPARK PLUG GAPS: .030". Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: (1949) Auto-Lite Model No. IGT-4302-1.
Breaker Gap—.015-.018".
Cam Angle—28-30° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

DISTRIBUTOR: (1950-51) Lincoln No. OEL-12127.
Breaker Gap—.014-.016".
Cam Angle—26-28½°.
Breaker Arm Spring Tension 17-20 ounces.
Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad

IGNITION TIMING: 4° BTDC.
Timing Procedure—*See Ignition Timing.*
Dampener Mark—"/" mark aligned with timing pin on front engine cover above top of dampener.

CARBURETION:
Idle Setting—Set for highest steady vacuum reading. 2 screws (turning out gives richer mixture).
Idle Speed (Std.)—400-500 RPM.
Idle Speed (Hydra-Matic)—375 RPM.
Float Level—Fuel level ½" ± 1/32" below top edge of bowl. Use Fuel Level Gauge No. 9550-B.
►*NEW "CLIP TYPE" FLOAT NEEDLE & SEAT ASSEMBLY*—Furnished for replacement.
Accelerating Pump—Center hole average setting. Inner hole for Hot weather, outer for cold weather.

Fuel Pump Pressure: 3½-4½ lbs.

Choke Setting: Index mark on coil cover aligned with center mark on housing (maximum variation one division either side).

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross over and right exhaust manifold.

VALVE TAPPET CLEARANCE: None in service (Hydraulic type lifters).
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Lincoln No. OL-11572-A.
Ignition Lock—Lincoln No. 8H-11582-A or B.

COIL: Lincoln No. 7RA-12029-A. Can type.
Ignition Current—5 amperes stopped, 3 amperes idling.

CONDENSER: (1949) Lincoln No. 8EL-12300-A. (1950-51) Lincoln No. 7RA-12300-B (use with Breaker Plate No. OBA-12150-A), 7RA-12300-C (use with Breaker Plate No. OBA-12150-B).
Capacity—.20-.25 microfarad.

DISTRIBUTOR 1949 MODELS: Auto-Lite Model No. IGT-4302-1 (Lincoln No. 8EL-12127) Automatic advance type with Vacuum Spark Control.
Breaker Plate Identification—No. 7 stamped on plate (vacuum advance limiting slot size).
Breaker Gap—.015-.018".
Cam Angle—28-30° (closed).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	275	0	550
1	340	2	680
2	400	4	800
7	1000	14	2000
12	1600	24	3200

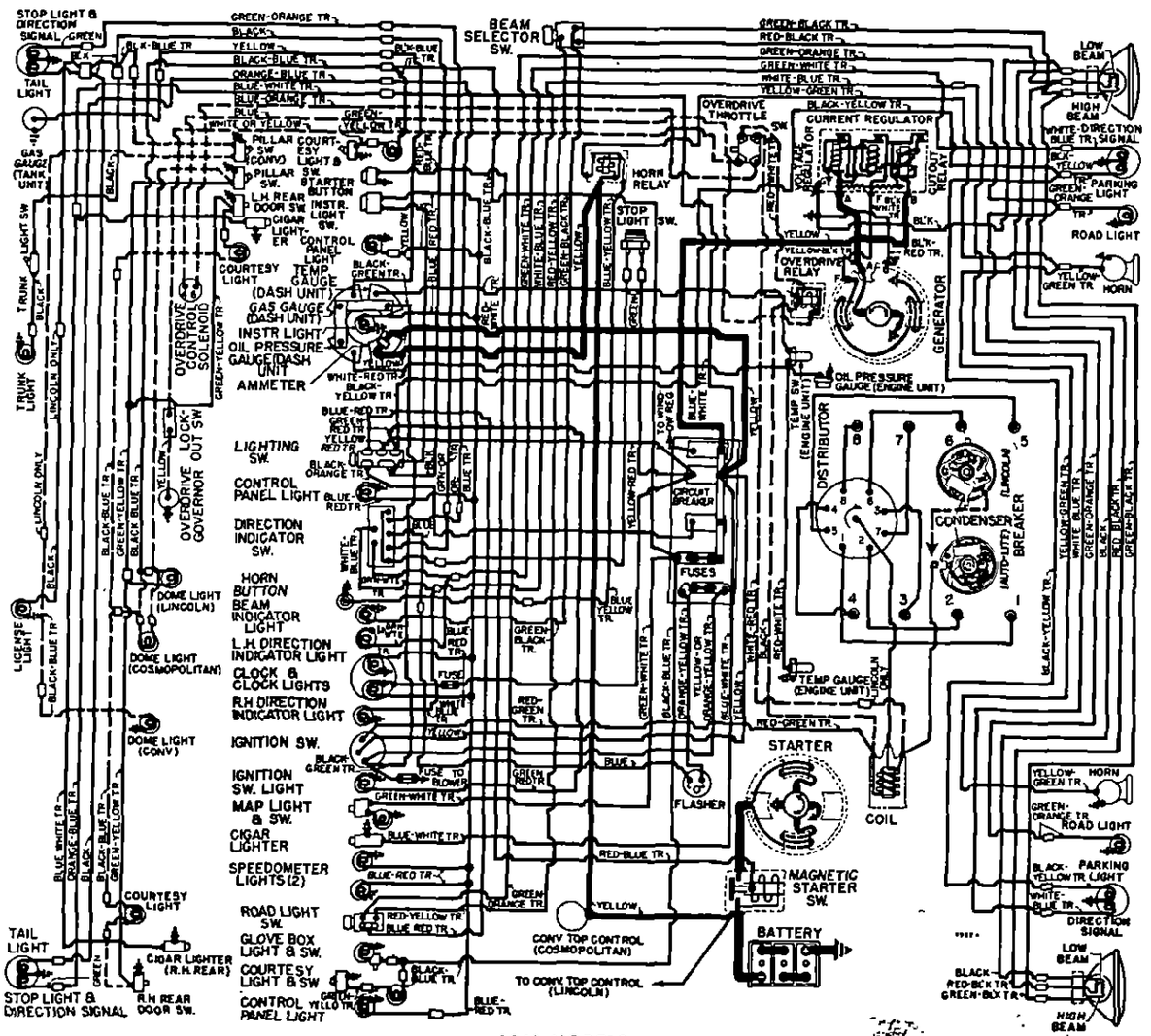
Vacuum Spark Control: Integral type (advances breaker plate).

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	9"
2°	4°	10⅜"
4°	8°	11⅞"
6°	12°	13¼"
7°	14°	14"

DISTRIBUTOR 1950-51 MODELS: Lincoln No. OEL-12127. "Pressure Type" Distributor, fully vacuum controlled (no centrifugal advance). Diaphragm unit connected to breaker plate governs entire advance range in relation to engine vacuum.
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.
Breaker Gap—.014-.016".

CONTINUED ON NEXT PAGE



1949 MODELS

CONTINUED FROM PRECEDING PAGE

Cam Angle—26-28½°.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise, viewed from above.

Advance Performance
▷With Distributor on Test Unit

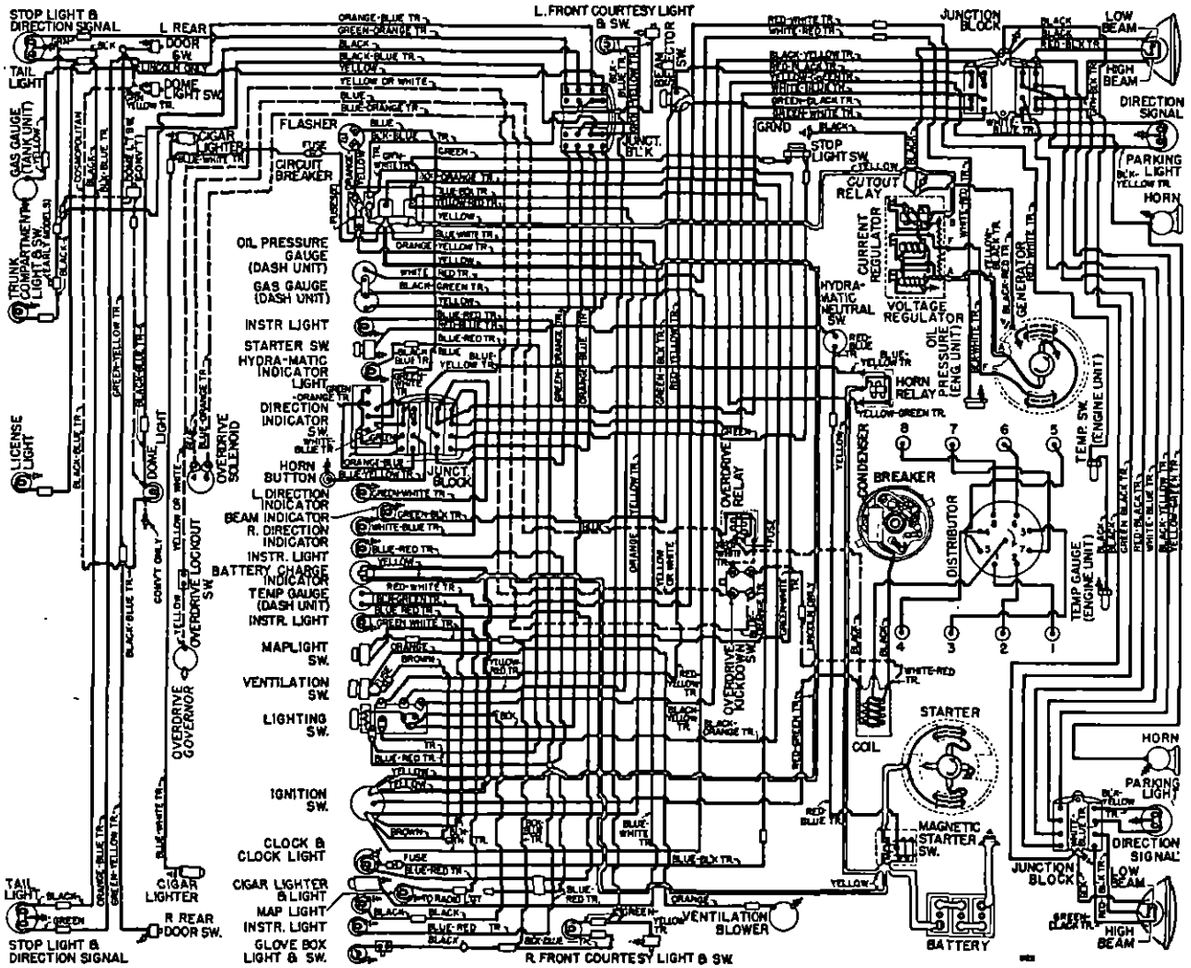
Distributor Degrees	Vacuum	R.P.M.
0°	0"	200
1½-2½°	0.8"	600
5-6°	2.0"	1000
9½-10½°	5.8"	2000

IGNITION TIMING

Std. Setting.....4° BTDC.
Dampener Mark—"/" groove mark on edge of dampener with timing pin on front of engine.
Timing—With #1 piston at firing position and "/" groove mark on dampener aligned with timing pin on front of engine, loosen clamp screw in timing arm, rotate distributor until contacts begin to open, tighten clamp screw. Check spark plug connections (see diagram), see that rotor at #1 cap terminal.
Timing (with Neon Timing Light)—Mark timing pin and "/" groove mark on dampener with white chalk. Connect timing light to #1 spark plug. Idle engine below 550 RPM., adjust distributor (as directed above) until mark and timing pin aligned when light flashes.

CARBURETOR
1949 MODELS

Holley-Ford 8EL-9510—Dual downdraft with integral automatic choke.
See Carburetor Section for complete data.
▷New Float and Float Spring Change for Stabilizing Float Level—*See 1949 Lincoln in Carburetor Section.*
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
Hydra-Matic Throttle Adjustment: *See "Lincoln Hydra-Matic Drive" in Transmission Section.*



1950-51 MODELS

Fast Idle: Holley-Ford Carburetor type.
See Carburetion Equipment Section for complete data.
Automatic Choke: Holley-Ford Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—Index mark on coil spring cover aligned with center mark on housing (maximum variation one division either side).

1950-51 MODELS

Holley-Ford 0EL-9510—Dual downdraft with separate automatic choke. Automatic choke unit located on intake manifold.
See Carburetor Section for complete data.
▷*NEW "CLIP TYPE" FLOAT NEEDLE & SEAT ASSEMBLY*—Furnished for replacement.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*
Hydra-Matic Throttle Adjustment: *See "Lincoln Hydra-Matic Drive" in Transmission Section.*
Fast Idle: Holley-Ford Carburetor type.
See Carburetion Equipment Section for complete data.
Automatic Choke: Holley-Ford Carburetor type.
Setting—Index mark on coil cover aligned with center mark on housing (maximum variation one division either side).
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner (Oil Bath): Lincoln No. 8EL-9600.
Fuel Pump (Fuel-&-Vacuum): Lincoln 8EL-9350-A.
Pressure—3½-4½ lbs.
▷Fuel Pump Filter Change—Copper screen type changed to "Edge" type. Use "Edge" type when servicing pumps, Part No. 8EL-99360 Kit.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric.
Dash Unit—Lincoln No. (1949) 8EL-9280, (1950-51) OL-9280.
Tank Unit (Lincoln)—No. 99A-9275-B.
Tank Unit (Cosmopolitan)—Lincoln No. 21C-9275A.
See Carburetion Equipment Section for complete data.

BATTERY

Lincoln No. 06H-10655-A. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Grounded Terminal—Positive (+) terminal.
Location—On right side in engine compartment.

STARTER

Standard.....Lincoln 7EH-11002-B. Arm. 18-11005
Hydra-Matic.....Lincoln 8EL-11002. Arm. 52-11005
Drive—(7EH) B-11350, (8EL) 29B-11350.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ounces.
Cranking Engine—100-180 RPM., 190-215 Amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load①	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

①—Manufacturer recommends taking "No Load" readings by inserting 0-600 range ammeter in battery circuit at battery and operating starter while engine is idling.

Starting Switch: Lincoln No. 21A-11450 Magnetic Switch mounted on right front fender apron and controlled by panel pushbutton switch Lincoln No. 6H-11500 (and 8L-15812 Neutral Safety Switch on Hydra-Matic Drive cars).
Hydra-Matic Neutral Safety Switch Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

Removal: On right front face of engine rear plate. To remove, take off right engine splash pan (if used), free starter-to-oil pan bracket, take out 2 starter through bolts.

GENERATOR

Lincoln No. 8EL-10002 (less pulley & bracket).
Armature No.—Lincoln No. 8EH-10005. Two brush type with current and voltage regulation.
Maximum Charging Rate—42 amperes, 7 volts, reached at approximately 19.5 MPH. Controlled by regulator and dependent on load and battery condition.
To Check Generator Output—Connect ammeter in series with charging line at regulator "ARM" terminal, connect short insulated jumper between generator "A" and "F" terminals (to short out regulator). Run engine at approximately 1500 RPM. and note ammeter reading. If generator output equals or exceeds rate output (below) generator performance is satisfactory. Remove jumper.

►***CAUTION—Do not operate generator at higher speeds or in service with jumper connected between generator armature and field terminals. This jumper eliminates all regulator action.***

Performance Data

Amperes	Engine R.P.M.
40	1500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.

Generator Belt Adjustment: Loosen nut on support mounting stud, raise generator up until side movement on belt midway between generator and water pump pulley is ¾" (thumb and finger pressure).

Fan Belt Adjustment: *See COOLING.*

REGULATOR

Lincoln No. 8L-10505. Voltage-current, 3 unit type. *See Electrical Equipment Section for complete data.*
NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Cutout Relay

Cuts In——6.0-6.4 volts COLD (will be slightly higher when warm).
Cuts Out—8 ampere discharge current (maximum).
Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.

Voltage Regulator

Voltage Setting (8L-10505)—7.2-7.6 volts COLD. (7.4-7.8 volts after 20 minutes run).
Air Gap—.032-.035" between armature and core with contacts just closed.

►***CAUTION—Make certain gauge contacts armature and not brass rivet on underside of armature.***

Contact Spring Tension—5 ounces minimum with contacts just opening.
Checking & Adjustment—*See Electrical Equip. Section.*

Current Regulator

Current Setting—38-42 amperes COLD.
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ounces minimum with contacts just opening.
Checking & Adjustment—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.

Direction Signal: Std. *See Electrical Equipment Section.*
Direction Signal Flasher—Lincoln No. 8L-13350-B.

Switches

Lighting—Lincoln No. (1949) 7RA-11654, (1950-51) OL-11654.
Beam Selector—Lincoln No. 8A-13532.
Instrument—Lincoln No. (1949) 8L-13740, (1950-51) OL-13740.
Map Light—Lincoln No. (1949) 8L-13764, (1950-51) OL-13764.
Dome Light (exc. Conv.)—Lincoln No. (1949) 8M-13752-A, (1950-51) OM-13752.
Dome (Convertible)—Lincoln No. 8H-13754.
Stop Light—Lincoln No. 91A-13480.
Directional Signal—Lincoln No. (1949) 8L-14486, (1950) OL-14486, (1951) 1M-14486-A.
Back-Up Light—(1949-50) 51A-15520-A, (1951) 1H-15520-A.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lincoln No. 8L-12258-A (Lincoln), No. 8H-12258-A (Lincoln Cosmopolitan, Lincoln Convertible). Three used on one mounting, located on dash behind instrument panel together with two fuses (see wiring diagram for positions on bracket).
30 Ampere CB. Protects main lighting system.
15 Ampere CB. Protects speedometer light, control panel light, instrument cluster light, electric clock and clock light.
15 Ampere CB. Protects hydraulic equipment.

FUSES: Courtesy, Dome, Glove Box and Map Lights—14 ampere. Located on circuit breaker behind instrument panel (see wiring diagram).
Direction Signal—14 Ampere. Located on circuit breaker behind instrument panel (see wiring diagram).
Overdrive—30 ampere. On "IGN" terminal of overdrive relay (on dash under hood).
Clock—3 ampere. In clock feed wire.

HORNS: Lincoln No. (1949) 51A-13832-A or B, (1950-51) OL-13801-A (High Pitch, Right Horn). Lincoln No. (1949) 51A-13833-A or B, (1950-51) O1-13802-A (Low Pitch, Left Horn)—Dual horns with relay.
Horn Current—13 amperes (High Pitch), 14 (Low).

Horn Relay: Lincoln No. 7RA-13853-A. On dash.

ENGINE

ENGINE SPECIFICATIONS: Own Make. Eight cylinder, "L" head, 90° Vee type with both cylinder banks and crankcase cast Enbloc.
Bore—3½". **Stroke**—4⅜".
Displacement—336.7 cu. ins. **Rated HP**—39.2.
Developed Horsepower—152 (1949-50), 154 (1951) at 3600 RPM.
Compression Ratio—7.0-1 cast-iron head.
Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Lincoln Special Data.*

►***1949-50 CYLINDER HEAD GASKET PRODUCTION CHANGE: For improved cooling. See "Cooling System" in Lincoln Special Data.***

OIL PAN & ENGINE REMOVAL: *See Lincoln Special Data.*

PISTONS: Aluminum alloy, steel strut, flat head, split skirt, cam ground, tin-plated type.

►***PISTON PRODUCTION CHANGE:*** Early 1949 pistons were 4-ring type, 3-ring pistons used beginning late 1949.
Weight—548 grams. **Length**—3.84".
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting Pistons.

Replacement Pistons: Std. .0025", .020", .030", .040" OS.

Fitting Pistons: Use ½" wide feeler inserted between piston (on side opposite slot) and cylinder wall at right angles to pin. Feeler thickness .0015" (for new piston in new bore), .002" (for new piston in old bore), .003" for old piston in old bore). Pull to withdraw feeler should be 5-10 lbs. (all pistons).

Cyl. Bore Wear Limit—Out-of-round .003", Taper .006".

PISTON RINGS: Early 1949 engines used 2 Compr. and 2 Oil rings. Late 1949 & 1950 engines used 2 Compr. and one Oil ring. Compr. rings coated and Oil rings slotted.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	④.007-.015"	①.002-.0035"
Compr. (#2)	3/32"	④.007-.015"	②.0015-.003"
Oil (All)	3/16"	④.007-.015"	③.001-.003"

Worn Limit—① .0035", ② .0045", ③ .004".
④—End Gap .008-.016" for 1949-50 cars.
Replacement Rings—Std. and .020", .030", .040", .050", .060" Oversize.

PISTON PIN: Diameter .8501-.8504", **Length** 3.118". Floating type. Bronze bushing in rod.

►***PIN REMOVAL & INSTALLATION CAUTION:*** Heat piston in hot water (210°F) when removing or installing pin to avoid distorting piston. DO NOT drive pin in or out of piston.
Pin Fit in Piston—.0001-.00005" clearance (new), .001" (worn limit).
Pin Fit in Rod Bushing—.0001-.0003" clearance. Light thumb push fit. Worn limit .0012".

Replacement Pins: Std. size & .001", .002" Oversize.

CONNECTING ROD: Length—8.062".
Weight—773 grams (less bearings).
Crankpin Journal Diameter—(1949-50) 2.3995-2.400", (1951) 2.3991-2.400". Maximum Wear Limits—Out-of-round .0015". Taper .001".
Lower Bearing—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves are interchangeable.
Clearance—(1949-50) .0004-.0024" (1951) .0003-.0019". Worn limit .005".
Sideplay—.007-.013" (new), .022" (worn limit).

►***NOTE—Replace rod bearings less than .0745" thick.***

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in rod and cap.

Replacement Bearings: Standard size and .002", .010" .020", .030", .040" Undersize.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Connecting Rod Installation: The numbered side of the connecting rods must be towards the outside of the engine. Left bank rod numbers must be towards the left side of engine and right bank rod numbers to the right side.

CRANKSHAFT: 3 bearing with 6 integral counterweights and vibration dampener on front end.

▷**Crankshaft Interchangeability:** *See "Crankshaft & Main Bearings" in Lincoln Special Data.*

▷*SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning.*

Main Journal Diameter—(1949-50) All bearings, 2.8735-2.8740", (1951) #1 & #2 2.8729-2.8740", #3 2.8724-2.8735". **Maximum Wear Limits**—Out-of-round .0015". Taper .001".

Clearance—#1 & #2 (1949-50) .0004-.0029", (1951) .0004-.0019". #3 (1949-50) .0009-.0034", (1951) .0009-.0024".

Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.

▷*NOTE—Replace main bearings less than .0938" thick.*

Bearing Adjustment: None (no shims). Do not file caps. Replace bearings. Tang on bearing must engage groove in block and cap.

▷*NOTE—Self-locking bearing cap bolts used.*

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

End Thrust: Taken by rear main bearings. Adjust by replacing bearings if clearance excessive.

End Play—.004-.008". Worn limit .010".

Crankshaft Rear Main Bearing Oil Seals: *See "Crankshaft & Main Bearings" in Lincoln Special Data.*

FLYWHEEL REPLACEMENT: Special Dowels required. *See "Crankshaft & Main Bearings" in Lincoln Special Data.*

CAMSHAFT: *CAUTION—Two types used and have different valve timing (see Valve Timing).*

1) **To 1949 Eng. No. 9EL-43603**—Camshaft not marked. Use second type for replacement.

2) **Beginning 1949 Eng. No. 9EL-43603**—Camshaft No. 8EL-6251-B marked "P" on gear attaching flange at forward end.

Camshaft Journal Diameter—(1949-50) 1.9265-1.9270", (1951) 1.9262-1.9267". Out-of-round limit .001". Undersize bearings available for reground shafts.

Bearing Diameter—1.9285" (replace bearing if diameter greater than worn limit of 1.9315").

▷*OVERSIZE DIAMETER CAMSHAFT BEARINGS (Used in some production engines): Bearing O.D. .080" Oversize. See "Camshaft & Bearings" in Lincoln Special Data and Replacement Bearings below.*

▷*CAMSHAFT REMOVAL CAUTION: Camshaft can not be removed with engine in car (fuel pump drive cam ring will drop off end of shaft).*

Replacement Bearings: Three sizes as follows:

1—Std. size on both inside and outside diameter.

2—Std. on I. D., .080" Oversize on O. D.

3—.015" Undersize on I. D., Std. on O. D. (must be finished reamed in assembly).

End Thrust: Thrust plate bolted on front of block.

Camshaft End Play—.004-.0065".

Timing Gears: Helical cast aluminum camshaft gear bolted on camshaft, cast alloy iron crankshaft gear.

Back Lash—(1949-50) .002-.003", (1951) .002-004".

Timing Gear Removal & Installation—*See "Timing Gears" in Lincoln Special Data.*

Oversize Timing Gears—Furnished in the following sizes: .006" & .012" oversize.

Camshaft Setting: Mesh marked tooth of crankshaft gear with space marked by line on camshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1.800"	.3412-.3422"	5.7145"
Exhaust	1.484"	.340-.341"	5.7145"

	Seat Angle	Lift	Stem Clearance
Intake	45°	①.350"	③.0009-.0024"
Exhaust	45°	②.350"	④.0021-.0036"

①—Lift .357" with first type 1949 camshaft.

②—Lift .340" with first type 1949 camshaft.

③—1951 only. .0015-.003" for 1949-50 cars.

④—1951 only. .002-.003" for 1949-50 cars.

Valve Disassembly & Removal—*See "Valve System" in Lincoln Special Data.*

Valve Seat Insert Servicing—*See "Valve System" in Lincoln Special Data.*

Valve Seat Width—1/16-5/64". NOTE—If valve seat bearing line is at extreme outer edge of valve head or if seat width is under above specifications install oversize valve. *See "Valve System" in Lincoln Special Data.*

▷*CAUTION—Top of valve must not be more than .030" above top face of block for head clearance.*

▷*ROTATABLE VALVE NOTE:* Used in Late 1951 engines, can be installed in earlier engines. *See "Valve System" in Lincoln Special Data.*

Valve Guides: One piece type pressed in block. Inside diameter .3431-.3436". Length 2.66".

Guide Installation—Press in block from above with small diameter end down. Distance from top of valve seat to upper end of valve guide 1.30".

Valve Lifters: Mushroom type, hydraulic tappet take-up (Wilcox-Rich Zero-Lash type).

Body Diameter—.7177" (new), .7167" (wear limit).

Clearance in Block—.0003-.0018" (new), .003" (worn). *See Lincoln Special Data for complete data.*

Initial Valve Clearance—*See "Valve System" in Lincoln Special Data.*

Valve Springs: Coated springs used.

Spring Pressure—62-68 lbs. (closed), 140-152 (open).

Spring Test—63-69 lbs. at 1.680". Free length 2.08".

VALVE TIMING

Tappet Clearance: None in service (Hydraulic lifters).

▷**Valve Timing**—*CAUTION—Two Camshafts used and have different valve timing.*

▷**Before Engine No. 9EL-43603**
(Camshaft not Marked)

Intake Valves—Open 14° BTDC. Close 60° ALDC.

Exhaust Valves—Open 62° BLDC. Close 16° ATDC.

▷**After Engine No. 9EL-43603**
(Camshaft Stamped "P" on front end)

Intake Valves—Open 5° BTDC. Close 49° ALDC.

Exhaust Valves—Open 49° BLDC. Close 8° ATDC.

Valve Timing Check—*See "Valve System" in Lincoln Special Data.*

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, valve lifters (hydraulic type) and timing gears. Oil pump mounted in crankcase at rear of engine.

Crankcase Capacity—6 quarts.

Normal Oil Pressure—45-65 lbs. at 2000 RPM.

Oil Pressure Relief Valves: Two used as follows:

1—Oil Pump Relief Valve—In oil pump body and regulates pressure to 50 lbs. for engine lubrication. Spring Tension 12.4 lbs. at 2.175".

2—Cylinder Block Oil Relief Valve—At front end of valve chamber and regulates pressure to 15 lbs. for hydraulic valve lifters.

Oil Pump: Gear type. In crankcase at rear of engine.

Oil Pump Servicing—*See Lincoln Special Data.*

▷*NOTE—Removable sump attached to oil pan for access to oil pump and screen.*

Oil Filter: On left cylinder head. Replace cartridge every 5000 miles or more often if required.

Oil Filter Cartridge—Lincoln No. 8CM-6731A Kit.

Oil Pressure Gauge: King-Seeley Electric.

Dash Unit—Lincoln No. (1949) 8L-9273, (1950-51) OL-9273.

Engine Unit—Lincoln No. 41A-9278.

See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler breather cap (inlet), and in upper end of outlet pipe at elbow connection just below generator on left side.

Servicing—Wash screen in cleaning fluid and wet with engine oil when dry at oil change period (2500 miles).

Outlet Pipe Air Filter Cartridge—Lincoln No. 8EL-6841.

COOLING

▷**New Cylinder Head Gasket for improved cooling:** *See "Cooling System" in Lincoln Special Data.*

Cooling System: Pressure type with relief valve in filler cap and two belt-driven pumps (one for each bank) with re-circulating by-pass.

Capacity—34½ quarts.

Pressure Valve—In radiator filler cap. Lincoln No. 26H-8100-B (AC #846740). Opens at 3½-4 lbs.

Water Pumps: Two used. Centrifugal, belt-driven, packless type. Shaft mounted on sealed duplex ball bearing.

NOTE—Bottom bolt must be installed prior to installing water pump pulley.

See Water Pump Section for complete data.

Fan Belt Adjustment—Loosen fan mounting bracket bolts, raise fan up until side movement on belt midway between fan and crankshaft pulleys is ½".

Generator (& Water Pump) Belt Adjustment—*See GENERATOR.*

Thermostats: Two used (one in each cylinder head water outlet). Lincoln No. 8EL-8575-A (std.), B & C (optl.).

Setting (std.)—148-170° maximum.

Settings (Optl.)—158-180° (B), 178-200° (C), max.

Temperature Gauge: King-Seeley Electric

Dash Unit—Lincoln No. (1949) 8L-10883, (1950-51) OL-10883.

Engine Unit—Lincoln No. 8A-10884 in left head.

Engine Switch—No. 8A-10990 in right hand head.

See Miscellaneous Section for complete data.

CLUTCH

Long Model 11CF-10½TI, Lincoln No. 8EL-7563. Semi-centrifugal, single plate, dry disc type.

See Clutch Section for complete data.

Facings—Moulded or Woven. Inside Diameter 7". Outside Diameter 10½". Thickness .125".

Pedal Adjustment: 1-1¼" free travel. Adjust by loosening locknut and turning adjusting screw on adjusting rod.

Removal: Remove transmission (see TRANSMISSION Removal below). Remove flywheel housing inspection cover. Remove transmission from flywheel housing, detach clutch release spring first, remove flywheel housing from engine plate and cylinder block. Take off clutch release bearing and hub. Prick punch flywheel and pressure plate so that these parts may be placed in original positions when reassembling. Use Tool 7563 to compress pressure plate. Take off 6 capscrews holding pressure plate assembly to flywheel.

TRANSMISSION

STANDARD

Warner Model AS1-T85B (Std.), AS2-T85B (with Overdrive). All helical gear type, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Steering column mounted shift.

See Transmission Section for complete data.

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame. Take out four transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model AS2-T85B (Transmission & Overdrive). Optl. equipment. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated "kick-down".

See Transmission Section for complete data.

►**Prolonged shorting-out of Ignition on Kick-down Correction**—*See "Ford, Lincoln, Mercury (Warner) Overdrive" in Transmission Section.*

Solenoid—Lincoln No. 8M-6916.

Control Relay—Lincoln No. 8M-6915. On engine side of dash. 30 ampere fuse at IGN terminal of relay.

Lock-Out Switch—Lincoln No. 8M-6917-A.

Throttle Kick-down Switch—Lincoln No. 8A-6918.

Governor Switch—Lincoln No. 8M-6919.

Removal: Same as for Std. transmission (above) after disconnecting overdrive control cable and wiring.

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Description—Four-speed planetary type automatic transmission and fluid coupling. Similar to other Hydra-Matic Drive installations, with Modulated Line Pressure.

►*HYDRA-MATIC DRIVE PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles. Add fluid, as required, to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type "A", furnished under Lincoln Part No. 8L-19582.

Capacity—11 qts. (approx.).

Checking Fluid Level—To check fluid level engine must be idling, transmission warm, parking brake set, and selector lever in "DR" position. Dipstick located under inspection cover placed on right side under floor mat. Add oil if below "L" mark on dipstick to bring level to "F" mark.

►***CAUTION—Do not check oil level when transmission temperature excessively high and do not fill above "F" on dip stick (will cause foaming when warm).***

Draining & Refilling—*See "Hydra-Matic Drive" in Transmission Section.*

Linkage Adjustment—*See "Hydra-Matic Drive Linkage Adjustment" in Transmission Section.*

►*OTHER HYDRA-MATIC DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer 1310. Needle bearing type. Two used.

REAR AXLE

• **Own Make.** Semi-floating, hypoid gear type with Hotchkiss drive (separate carrier not used). Axle ends flanged (no separate hub). Wheel bearings are sealed ball, pre-lubricated (no lubrication required).

See Rear Axle Section for complete data.

Ratio—3.9-1 (43:11—Std.), 4.27-1 (47:11—with O.D.).

Ratio (Hydra-Matic)—3.31-1.

Backlash—.005-.008". Shim adjustment.

Removal: Raise rear of car. Remove axle shafts, and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers, spring U-bolts. Remove axle housing assembly from car.

Axle Shaft Removal: Remove rear wheels. Take out 3 capscrews holding brake drum to axle shaft flange. Remove hydraulic lines from brake backing plate. Take out 4 axle retainer nuts (work through opening in axle shaft flange). Use Tool 4235-A to remove axle shaft and bearing assembly from housing. Take off gasket and backing plate. Do not damage oil seal when removing axle shaft.

SHOCK ABSORBERS

Front—Lincoln No. 8L-18045-C (Monroe).

Rear—Lincoln No. 8L-18080 (Monroe).

Direct acting, hydraulic types. Two makes are used and are interchangeable.

►***NOTE—Shock absorbers are permanently sealed and cannot be refilled or repaired.***

►**Rear Shock Absorber Installation**—Lower tube has welded stone shield on lower end which must be installed toward front of car.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.

See Front Suspension Section for complete data.

►*CAUTION—Specifications listed below supersede earlier 1949 Lincoln Front End Specifications.*

Kingpin Inclination—5° crosswise with ¾° Camber.

Caster—0° to Neg. 1½°. Threaded bushing adjustment at lower pivot pin.

Camber—0° to Pos. ¾°. Eccentric adjustment at upper pivot pin.

Toe In—3/32-5/32". Adjusting sleeve on outer end of each tie rod. Adjust equally.

Steering Geometry (toe out on turns)—Inner wheel turned 23½° ± ½°, outer wheel 20°.

STEERING GEAR

Gemmer Model 335. "3-tooth" Worm-and-Roller type with "push-pull" adjustment.

See Steering Gear Section for complete data.

BRAKES

Service: Lincoln-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameter: Front wheel 1.128" (hone limit 1.132"). Rear wheel .940" (hone limit .942").

Drums—Diameter 12".

Lining—Molded. Width 2¼" (front wheel), 2" (rear wheel). Thickness (1949) 3/16", (1950-51) 7/32". Length per wheel 23 7/64".

Clearance—.010" at each end of each shoe.

Braking Power—59% front wheels, 41% rear.

Hand Brake: See Service Brakes above.

Hand Brake Linkage Change 1949 Models (for easier application)—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Tops, Windows & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

Windshield Wipers: Two types used:

Lincoln 9EL—Vacuum Link and Crank Arm type.

Cosmopolitan 9EH—Vacuum Cable Operated type.

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on Patent Plate riveted to right front body pillar just below upper hinge opening. **Serial number includes identification in the following sequence:** *NOTE—Model year indicated on plate will be either 52 (1952), or 53 (1953).*

Year	Assembly Plant	Serial Number	Engine Type
53	See Below	5001①	H

①—Starting Serial Number (All Plants).

Assembly Plants (Indicated in serial number by the following code): **"LA"**—Los Angeles. **"LP"**—Lincoln Plant. **"SL"**—St. Louis.

TUNE-UP

COMPRESSION PRESSURE: (1952) 110-120 lbs., (1953) 135 lbs., at cranking speed.

VACUUM READING: Steady 16-19" idling at 400-425 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2.

Cylinder Numbering—Right Bank 1-2-3-4, Left Bank 5-6-7-8. Numbered from FRONT of engine.

SPARK PLUG GAP: (1952) .029-.032". (1953) .033-.037".

Plugs—Champion H-10.

CAUTION—Tighten plugs to 24-30 ft. lbs. torque.

DISTRIBUTOR: (1952)—**Lincoln No. FAB-12127.** Single breaker type with vacuum control (no centrifugal advance). Diaphragm unit linked to breaker plate governs entire advance in accordance with engine requirements.

Breaker Gap—.014-.016". **Cam Angle**—26-28½°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic & Vacuum Advance—*See Ignition.*

Removal: *See Ignition.*

DISTRIBUTOR: (1953)—**Lincoln No. FAF-12127-A (Distr. less Cap & Rotor).** Single breaker plate with NEW double unit vacuum spark control and mechanical advance.

Vacuum Advance—Double diaphragm mounted on distributor with two vacuum lines from carburetor

Mechanical Advance—Distributor advance is operated by a cable between carburetor throttle linkage and distributor breaker plate.

Breaker Gap—.014-.016". **Cam Angle**—26-28½°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic & Vacuum Advance—*See Ignition.*

Removal: *See Ignition.*

COIL: Lincoln No. 8BA-12029.

Ignition Current—2 amperes idling. 5 stopped.

▷***COIL HIGH TENSION LEAD CAUTION (Radio Equipped Cars):*** This coil-to-distributor lead is SPECIAL SUPPRESSOR LEAD (non-metallic type with carbon impregnated nylon or rayon core) and the special length (approx. 14½") is required for proper radio reception. ***THIS LEAD MUST NOT BE SHORTENED AND OTHER TYPE IGNITION CABLES MUST NOT BE SUBSTITUTED FOR IT.***

CONDENSER: Lincoln No. FAB-12300-A.

Capacity—.21-.25 microfarad.

IGNITION TIMING: 3° BTDC.

Timing Mark—Dampener marked "TDC" with 10-2° graduations before this mark. Align 3° point with pointer on chain case cover.

Timing Procedure—*See Ignition Timing.*

CARBURETION: (1952)—**Lincoln No. EAD-9510-B, D.** Dual downdraft "Centriflo" type with fast idle and separate automatic choke mechanism. All carburetors have vacuum passages for distributor control and EAD-9510-D has additional "Spark Control Valve."

▷***HARD STARTING CORRECTION (External Vent Conversion)—See "Lincoln-Mercury Centri-flo Carburetor" in Carburetor Section for complete data.***

▷***EXTERNAL VENT SEASONAL SETTING***—Spring type adjustable clip, Part No. EAD-99608-A provided for installation on accelerator pump rod (external vent hollow type). **Setting**—(Winter) Vent hole closed. (Summer) Vent hole open. *See "Lincoln-Mercury Centri-flow Carburetor" in Carburetor Section for complete data.*

▷***NEW CHOKE ASSEMBLY (To improve cold starting on cars with new type external vent—see Hard Starting Correction, above)—See Carburetor Section for complete data.***

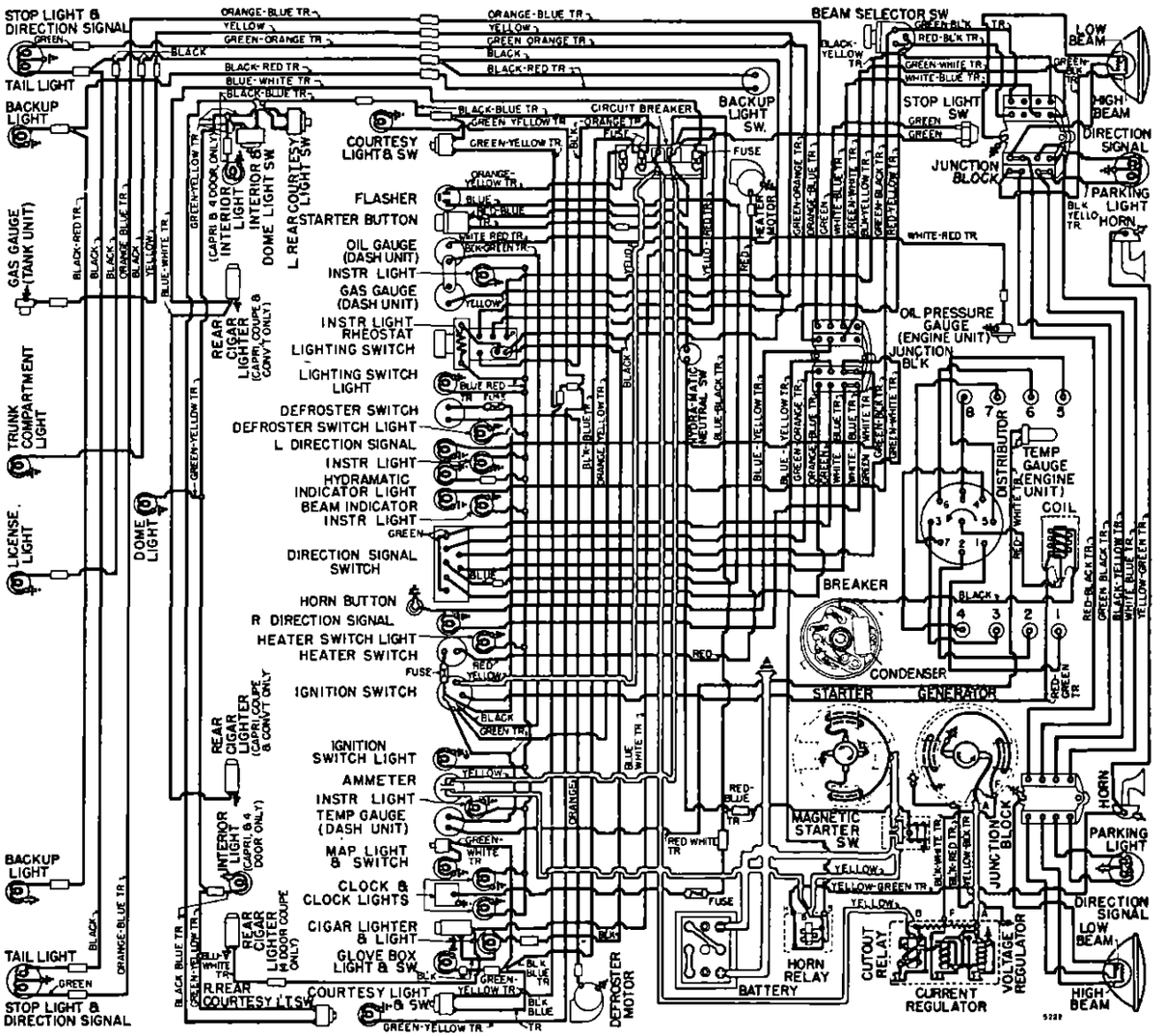
▷***THROTTLE STICKING CORRECTION: See Carburetor Section.***

▷***ENGINE SURGE AT 20-25 MPH. CORRECTION (Idle Jet Change): See Carburetor Section.***

▷***ENGINE HESITATION OR LOSS OF POWER AT 30-35 MPH. CORRECTION: See Carburetor Section.***

▷***AUTOMATIC CHOKE CORRECTION (Exhaust Gas Leakage Correction): See Carburetor Section.***

Idle Setting—With engine at normal operating temperature (oil pressure and coolant temperature stabilized) so that choke valve wide open and fast idle inoperative, adjust throttle stopscrew for cor-



1952 MODELS

rect idling speed, then adjust both idle mixture screws for highest steady manifold vacuum. Recheck engine idle speed.

Idle Speed—400-425 RPM.

Float (Fuel) Level—1/2" ±1/32" below top edge of bowl with fuel pump pressure at 3½-4½ lbs. Use Fuel Level Gauge 9550-B to check fuel level, placing gauge squarely on top of main body so that gauge pins extend down into bowl. Fuel should be at least as high as longer GO pin but must not touch shorter NO GO pin. Adjust by bending tab on float lever which contacts intake needle.

CAUTION—Both floats must be at same height and floats must not contact float bowl walls.

Accelerating Pump—Seasonal adjustment provided by three holes in throttle shaft lever for pump link engagement. **Center Hole**—Normal operating. **Outer Hole**—Extreme cold. **Inner Hole**—Extreme hot.

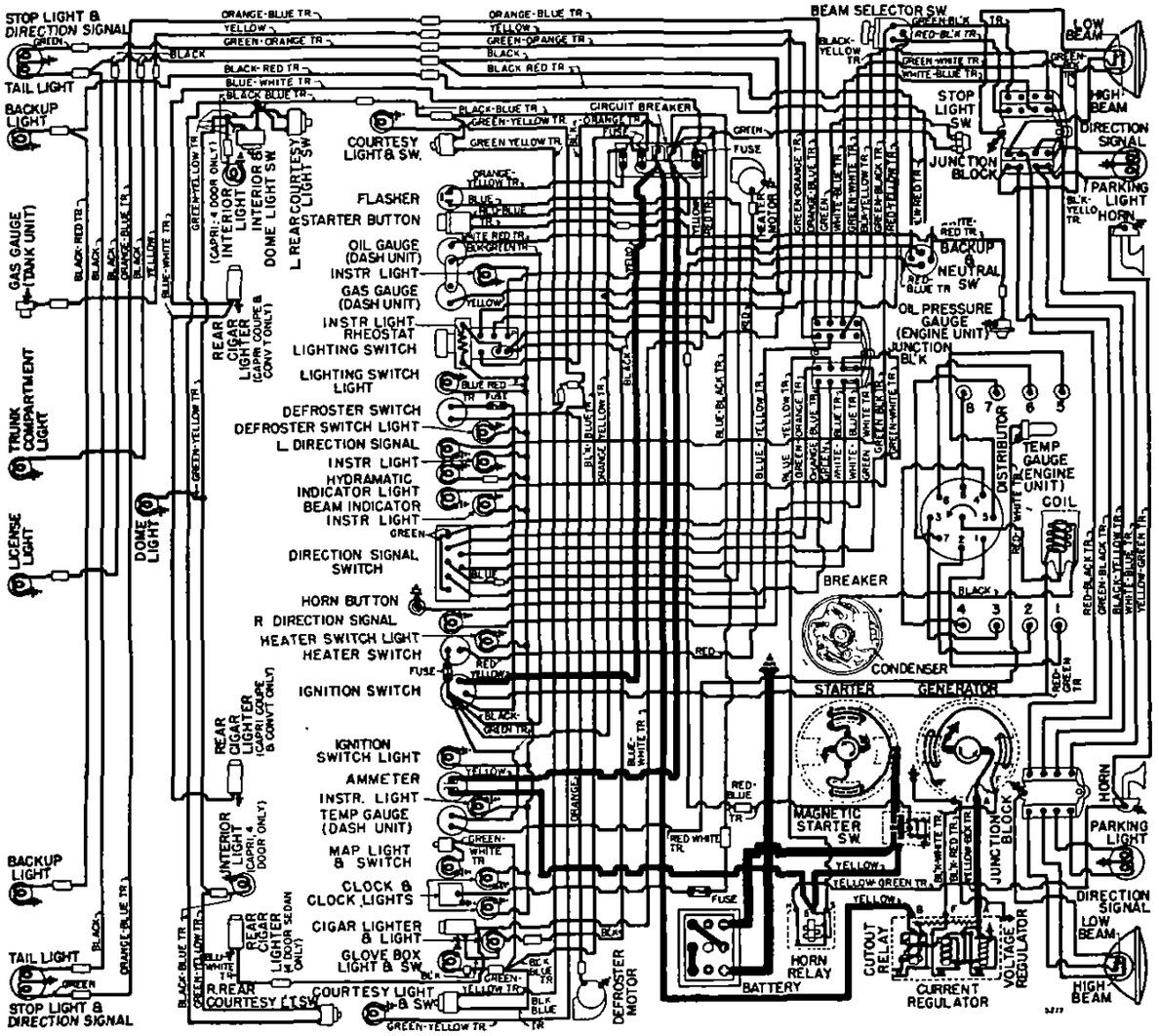
Fast Idle Setting: No adjustment required.

Choke Setting: Mark on cover aligned with center mark of scale on choke housing.

Fuel Pump Pressure: 3½-4½ lbs.

CARBURETION: (1953)—Lincoln No. EAD-9510-H, M. Four barrel "Centri-Quad" carburetor with fast idle and separate automatic choke mechanism. *NOTE—EAD-9510-M carburetor has the External Vent modification noted below.*

►*HARD STARTING CORRECTION (External Vent Conversion)—See "Lincoln Centri-Quad Carburetor" in Carburetor Section for complete data.*



1953 MODELS

►*EXTERNAL VENT SEASONAL SETTING*—Spring type adjustable clip, Part No. EAD-99608-A provided for installation on accelerator pump rod (external vent hollow type). **Setting**—(Winter) Vent hole closed. (Summer) Vent hole open. *See "Lincoln Centri-Quad Carburetor" in Carburetor Section for complete data.*

►*NEW CHOKE ASSEMBLY (To improve cold starting on cars with new type external vent—see Hard Starting Correction, above)—See Carburetor Section for complete data.*

►*THROTTLE LOCKING IN PARTIALLY OPEN POSITION: May be caused by interference between carburetor choke lock-out lever and air cleaner. See "Air Cleaner Installation" in Lincoln Special Data.*

►*CARBURETOR COVER & PLUG ASSY. CHANGE (To correct faulty Power Valve Action due to air leakage): See "Lincoln Centri-Quad Carburetor" in Carburetor Section.*

Idle Setting—First set BOTH primary idle mixture adjusting screws EXACTLY 1¼ turns open (no screws used for secondary stage). Start engine and operate it until normal operating temperature secured with choke valve wide open and fast idle cam in slow idle position. Back off fast idle adjusting screw (inner screw on throttle lever) so that it clears the fast idle cam. Set engine speed to correct hot or slow idle speed (see below) by turning slow idle speed adjusting screw (outer screw on fast idle cam). Turn both idle mixture adjusting screws equally ⅛ turn at a time in or out until smoothest idle performance obtained with highest steady vacuum reading. If engine speed changes during this operation, reset speed and repeat idle mixture adjustment. Then adjust Fast Idle.

Idle Speed—400-425 RPM. With Selector lever in "Dr" position.

Float (Fuel) Level: To check fuel level with carburetor on car, remove air cleaner and main body cover from carburetor, crank engine with starter to fill bowl to operating level. Install Gauge 9550-B squarely on top edge of main body so that gauging pins extend down into bowl. Fuel should be at least as high as longer GO pin but must not touch shorter NO GO pin. Adjust by bending float tab.

►*CAUTION—Both floats must be same height and floats must not contact side walls of float bowl.*

Fuel Level—1/2" ± 1/32" with fuel pump pressure at 3½-4½ lbs.

Fast Idle Setting: After completing slow idle setting (above) and with engine at normal operating temperature, so that fast idle cam in slow idle position, turn fast idle adjusting screw (inner screw on throttle lever) in until screw just contacts lowest step on fast idle cam. This will provide correct fast idle speed. NOTE—If fast idle speed is unnecessarily high with above setting, fast idle screw may be backed off *not to exceed one full turn.*

Choke Setting: Mark on cover aligned with center mark of scale on choke housing.

Fuel Pump Pressure: 3½-4½ lbs.

MANIFOLD HEAT CONTROL: "Duck-bill" type thermostatic valve located inside right end of cross-over pipe near the flange.

VALVE TAPPET CLEARANCE: No adjustment required in service. See Initial Adjustment if engine disassembled or rocker arms removed.

Initial Valve Clearance—*See "Valve System" in Lincoln Special Data.*

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IGNITION

IGNITION SWITCH: Lincoln No. FAA-11572-A.

COIL: Lincoln No. 8BA-12029.

▷***COIL HIGH TENSION LEAD CAUTION (Radio Equipped Cars):*** This coil-to-distributor lead is SPECIAL SUPPRESSOR LEAD (non-metallic type with carbon impregnated nylon or rayon core) and the special length (approx. 14½") is required for proper radio reception. ***THIS LEAD CABLE MUST NOT BE SHORTENED AND OTHER TYPE IGNITION CABLES MUST NOT BE SUBSTITUTED FOR IT.***

Ignition Current—5 amperes stopped, 3 amperes idling.

CONDENSER: Lincoln No. FAB-12300-A.

Capacity—.20-.25 microfarad.

DISTRIBUTOR: (1952)—Lincoln No. FAB-12127. Single breaker type with vacuum control (no centrifugal advance). Diaphragm unit linked to breaker plate governs entire advance in accordance with engine requirements.

Breaker Gap—.014-.016". **Cam Angle**—26-28½°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Advance Performance—FAB-12127
▷With Distributor on Test Unit

Distributor Degrees	Vacuum	R.P.M.
0°	0"	200
2-3°	.38"	400
9½-10½°	1.80"	1000
16¼-17½°	5.70"	1500
14¾-16°	4.85"	2000

Removal: *NOTE*—As distributor is removed, note the amount rotor turns. This will be helpful when installing.

Installation: Position No. 1 piston on TDC (firing position). Set distributor to fire No. 1 cylinder with points just breaking. Mark position of rotor on housing. Turn rotor counter-clockwise approximately ⅛ turn (or amount noted when distributor removed). As distributor is installed rotor should line up with mark on housing. If not repeat the operation.

DISTRIBUTOR: (1953)—Lincoln No. FAF-12127-A. Single breaker type with NEW double vacuum unit vacuum spark control and cable operated mechanical advance.

Breaker Gap—.014-.016". **Cam Angle**—26-28½°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Advance Performance—FAF-12127-A
▷With Distributor on Test Unit

Distr. Degrees	Vacuum	Distr. RPM.
0°	0"	200
3° to 4°	.38"	400
9½° to 10½°	1.80"	1000
12¼° to 13¼°	3.05"	1500
14¼° to 15¼°	4.85"	2000

Removal: Remove spark advance cable assembly from cable clamp and spark control arm on carburetor. Disconnect the two lines leading to vacuum diaphragm. Unsnap two ball clips and remove distributor cap. Scribe a line on distributor housing to indicate position of rotor and scribe a line on distributor housing in relation to position on engine. This will eliminate initial timing of distributor (see below) to engine providing engine is not rotated with distributor removed. To install distributor, reverse removal procedure and check distributor timing.

IGNITION TIMING

Std. Setting ..... **3° BTDC**

▷***1953 TIMING CAUTION***—Distributor has advance cable connected to carburetor throttle lever which must be adjusted when setting ignition timing. See Positioning of Advance Cable Conduit below.

Timing Mark—Dampener marked TDC with 5—2° (1952); 10—2° (1953) graduations ahead of this point. Set timing with 3° point in line with pointer on timing chain cover.

Initial Distributor Timing—Turn engine until timing mark on crankshaft damper is lined up with pointer and No. 1 piston is in firing position. Install the distributor with the points just breaking and the rotor in position to fire No. 1 cyl. (The vacuum connection boss should be at approximately right angles to crankshaft and pointing toward left side of engine). Installation must be done carefully in order that tang end of distributor shaft will engage slot in intermediate shaft at the same time the distributor gear begins to mesh with camshaft gear (intermediate shaft can be aligned by inserting long screwdriver in shaft slot to rotate shaft.

Timing (on Engine)—Disconnect vacuum line at vacuum advance unit on distributor, loosen distributor hold-down bolt just enough to permit distributor to be rotated, connect Power Timing Light to No. 1 cylinder spark plug. Run engine at idle speed (400-425 RPM), rotate distributor until timing mark on dampener appears in line with pointer on timing chain cover. Tighten distributor hold-down bolt and reconnect vacuum line.

Correct Positioning of Advance Cable Conduit (1953 Models—FAF-12127-A Distributor)—Hook end of spark control cable assembly on pin of spark control cable arm and place cable conduit loosely in clamp on carburetor flange. Place a .105" spacer between spark control arm and stop on carburetor. With a timing light connected, adjust cable conduit in the clamp in a direction to obtain a reading of 15° advance on crankshaft dampener. Tighten conduit clamp on carburetor. Recheck engine timing and adjust if necessary. Timing should have returned to initial setting of 3° advance.

CARBURETOR

1952 "CENTRI-FLO"

Lincoln No. EAD-9510-B, D. Dual downdraft "Centri-flo" type with fast idle and separate automatic choke mechanism. All carburetors have vacuum passages for distributor control and EAD-9510-D has additional "Spark Control Valve."

▷***HARD STARTING CORRECTION (External Vent Conversion)—See "Lincoln-Mercury Centri-flo Carburetor" in Carburetor Section for complete data.***

▷***EXTERNAL VENT SEASONAL SETTING:*** Spring type adjustable clip, Part No. EAD-99608-A provided for installation on accelerator pump rod (external vent hollow type).

Setting—(Winter) Vent hole closed. (Summer) Vent hole open. ***See "Lincoln-Mercury Centri-flo Carburetor" in Carburetor Section for complete data.***

▷***NEW CHOKE ASSEMBLY (To improve cold starting on cars with new type external vent—see Hard Starting Correction, above.)—See Caburetor Section for complete data.***

▷***THROTTLE STICKING CORRECTION: See Carburetor Section.***

▷***ENGINE SURGE AT 20-25 MPH. CORRECTION (Idle Set change): See Carburetor Section.***

▷***ENGINE HESITATION OR LOSS OF POWER AT 30-35 MPH. CORRECTION: See Carburetor Section.***

▷***AUTOMATIC CHOKE CORRECTION (Exhaust Gas Leakage Correction): See Carburetor Section.***

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Jets—***See "Holley-Ford Jet Specification Table" in Carburetor Section.***

Hydra-Matic Throttle Linkage Adjustment: ***See "Hydra-Matic Drive" in Transmission Section for data.***

Fast Idle: Holley-Ford Carburetor Type.

See Carburetion Equipment Section for complete data.

Setting—No adjustment required.

Automatic Choke: ***See "Lincoln-Mercury Choke" in Carburetion Equipment Section for complete data.***

Setting—Mark on cover should be aligned with center mark on scale on choke housing. Adjust by loosening cover screws and rotating cover assy.

1953 "CENTRI-QUAD"

Lincoln No. EAD-9510-H, M. Four barrel "Centri-Quad" Carburetor with fast idle and separte automatic choke mechanism. ***NOTE—EAD-9510-M carburetor has the External Vent modification noted below.***

▷***HARD STARTING CORRECTION (External Vent Conversion)—See "Lincoln Centri-Quad Carburetor" in Carburetor Section for complete data.***

▷***EXTERNAL VENT SEASONAL SETTING***—Spring type adjustable clip, Part No. EAD-99608-A provided for installation on accelerator pump rod (external vent hollow type).

Setting—(Winter) Vent hole closed. (Summer) Vent hole open. ***See "Lincoln Centri-Quad Carburetor" in Carburetor Section for complete data.***

▷***NEW CHOKE ASSEMBLY (To improve cold starting on cars with new type external vent—see Hard Starting Correction above) See Carburetor Section for data.***

▷***THROTTLE LOCKING IN PARTIALLY OPEN POSITION: May be caused by interference between carburetor choke lock-out lever and air cleaner.***

▷***CARBURETOR COVER & PLUG ASSY. CHANGE (To correct faulty Power Valve Action due to air leakage): See "Lincoln Centri-Quad Carburetor" in Carburetor Section.***

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Jets—***See "Holley-Ford Jet Specification Table" in Carburetor Section.***

Hydra-Matic Throttle Adjustment: ***See "Hydra-Matic Drive" in Transmission Section.***

Fast Idle: Holley-Lincoln type.

Setting—After completing slow idle setting and with engine at normal operating temperature, so that fast idle cam in slow idle position, turn fast idle adjusting screw (inner screw on throttle lever) in until screw just contacts lowest step on fast idle cam. This will provide correct fast idle speed. NOTE If fast idle speed too high, back off fast idle screw ***not to exceed one full turn.***

See Carburetion Equipment Section for complete data.

Automatic Choke: Separate unit on manifold.

Setting—Mark on cover should be aligned with center mark of scale on choke housing. Adjust by loosening cover screws and rotating cover assembly.

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Oil bath type.
Installation—*See "Air Cleaner" in Lincoln Special Data.*

►***THROTTLE STICKING CORRECTION (Due to Air Cleaner interference)—See "Air Cleaner".***

Fuel Pump: Lincoln No. (1952) EAD-9350-A & D, (1953) EAD-9350-E. Combination fuel and vacuum pump.

►**Fuel Pump Rod Removal Note**—Timing chain cover must be removed to gain access to snap ring at lower end of push rod, for push rod removal.

►***CAUTION—Pump has laminated paper filter (in metal sediment bowl) and bowl must be removed and cleaned at each chassis lubrication period.***
Pressure—3½-4½ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric type.
Dash Unit—Lincoln No. FAA-9280-B.
Tank Unit—Lincoln No. FAB-9275-A.
See Carburetion Equipment Section for complete data.

BATTERY

Lincoln No. FAA-10655-A. 21 plate, 6 volt, 110 ampere hour capacity (20 hour rate).
Grounded Terminal—Positive.
Location—Under toeboard on right hand side.

STARTER

Lincoln No. FAC-11002-B. Armature No. 52-11005.
Drive—Bendix "Folo-thru" type.
See Electrical Equipment Section for complete data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ozs.
Cranking Speed—100-180 RPM, 210 amps. max.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	①	5.0	40-60
16	ft. lbs.	Lock	3.5	700

①—With starter mounted on engine and engine running.

Starting Switch: Lincoln No. FAB-11450-B. Magnetic switch mounted on right fender apron. Controlled by pushbutton switch Lincoln No. FAA-11500-A, and Hydra-Matic Neutral Safety Switch, No. FAB-15812-A.
Hydra-Matic Neutral Safety Switch Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Lincoln No. FAB-10002-A (Less pulley and bracket). Two brush type with voltage and current regulation.
Armature—Lincoln No. 8EH-10005.
Maximum Charging Rate—42 amperes, 7 volts reached at approximately 21.3 MPH. Controlled by regulator and dependent on load and battery condition.
To Check Generator Output—Connect ammeter in series with charging line at regulator "ARM" terminal, connect short insulated jumper between generator "A" and "F" terminals (to short out regulator). Run engine at 1675 RPM and note ammeter reading. If generator ouput equals or exceeds rated output (below), generator performance is satisfactory.

►***CAUTION—Do not operate generator at higher speeds or in service with jumper connected between generator armature and field terminals. This jumper eliminates all regulator action.***

Performance Data

Amperes	*Engine RPM.*
40	1675

Rotation—Counter-clockwise at commutator end.
Field Current—1.7-2.0 amperes
Brush Spring Tension—26-34 ozs.
Belt Adjustment: ½" deflection midway between generator and fan pulley.

REGULATOR

Lincoln No. FAD-10505-A. Voltage-current 3 unit type.
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.0-6.6 volts.
Cuts Out—8 amperes discharge current (max.).
Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts just closed.

Voltage Regulator

Setting—7.2-7.6 volts.
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ozs. minimum with contacts just opening.
Checking & Adjusting—*See Electrical Equipment Sec.*

Current Regulator

Setting—38-42 amperes.
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ozs. minimum with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.

Directional Signal: Std. See Electrical Equip. Section.
Direction Signal Flasher—Lincoln No. (1952) 8L-13350-B, (1953) FAA-13350-A.

Switches

Lighting—Lincoln No. (1952) OL-11654, (1953) FAA-11654-A.
Beam Selector—Lincoln No. 8A-13532-B.
Instrument—Lincoln No. (1952) OL-13740, (1953) FAA-13740-A.
Map Light—Lincoln No. 21C-13740.
Glove Box—Lincoln No. OM-14413-A.
Door Switches—Lincoln No. OA-12713.
Stop Light—Lincoln No. 11A-13480-A.
Road Light—Lincoln No. 1C-15224-A.
Direction Signal—Lincoln No. FAB-14486-A.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lincoln No. FAB-12258-A (30 amp. & 15 amp.) Headlights (30 amp.); Stop & Tail Lights (15 amp.). Assembly is mounted back of instrument panel.
Convertible Top Control—40 ampere circuit breaker.
Window Regulators—Lincoln No. FAA-12258-B. Assembly consists of four 30 ampere circuit breakers.

FUSES: Courtesy & Interior Lights—14 amperes. Located on circuit breaker behind instrument panel.
Direction Signal—14 amperes. Located on circuit breaker behind instrument panel.
Overdrive—30 amperes. Mounted on overdrive relay.
Heater—20 amperes. In lead wire.
Blower—20 amperes. In lead wire.
Clock—3 amperes. In clock wire lead.
Cigar Lighters—30 amperes.

HORNS: Lincoln No. FAA-13832-A (Low Note, Left Horn); **FAA-15833-A** (High Note, Right Horn). Dual horns operated by relay.
Horn Relay: Lincoln No. FAA-13853-A. On right fender apron.

ENGINE

ENGINE SPECIFICATIONS: 90° V8, Valve-in-head.
Bore—3.8". **Stroke**—3.5".
Displacement—317.5 cu. in.
Rated Horsepower—48.2.
Developed Horsepower—(1952) 160 at 3900 RPM. (1953) 205 at 4200 RPM.
Compression Ratio—(1952) 7.5-1. (1953) 8.0-1.
Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Lincoln Special Data.*

►***1953 CYLINDER HEADS ARE NOT INTERCHANGEABLE WITH PREVIOUS MODELS.***

HEAD GASKET INSTALLATION CAUTION—See Lincoln Special Data.

►***CYLINDER HEAD INTERCHANGEABILITY—See Lincoln Special Data.***

ENGINE & OIL PAN REMOVAL: *See Lincoln Spec. Data.*

PISTONS: Aluminum alloy, Auto-thermic, slipper type skirt, with three rings (all above pin).
NOTE—Pin hole in piston offset.
Weight—22.9 ozs. **Length**—4.15".
Original Bore & Piston Sizes—*See Lincoln Special Data.*
Removal—Pistons and rods removed from above.
Clearance—.0007-.0013". See Fitting Pistons.
Cyl. Bore Wear Limit: Out-of-round .003". Taper .006".

Fitting Pistons: Use ½" wide feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Pull to withdraw should be 6-12 lbs. with following feeler thickness:
New Piston in New Bore—.0015" feeler.
New Piston in Used Bore—.002" feeler.
Used Piston in Used Bore—.003" feeler.
Piston Installation: *Install piston with "F" (embossed on piston) and dimple on head toward front of engine.*
Replacement Pistons: Furnished Standard (3 sizes) and .005", .020", .030", .040" Oversize.

PISTON RINGS: 2 compression rings and one oil ring.

Ring	Width	End Gap	Side Clearance
#1 Comp.	.0775-.0780"	.010-.020"	.0015-.003"
#2 Comp.	.0775-.0780"	.010-.020"	.001-.0025"
#3 Oil	.186-.1865"	.010-.020"	.0015-.003"

Replacement Rings: Standard, (no oversizes).
PISTON PIN: *Floating type (lock ring each end).*
Diameter—.912-.9123".
Pin Fit in Piston—.0001-.0003" loose (tight fit at 70°F).
Pin Fit in Rod—.0003-.0004" loose. (Light thumb press fit).
Replacement Pins: *Std., .001", .002" oversize.*

CONNECTING ROD: Length—7.066-7.064".
Crankpin Journal Diameter—2.2482-2.2490".
Clearance—.0004-.0020".
Side Clearance—.006-.014" (two rods).

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ENGINE

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Connecting Rod Installation: The numbered side of the connecting rod must be toward the outside of the engine. Left bank rod numbers must be toward the left side of the engine and the right bank rod numbers toward the right side.

Replacement Bearings: Std., .010", .020", .030".

CRANKSHAFT: 5 bearing, with integral counterweights and vibration damper.
Main Journal Diameter—2.6235-2.6243".
Bearings—Steel-backed babbitt lined.
Clearance—.0008-.0026".
Adjustment—None. Replace bearings.

►*MAIN BEARING CAP CAUTION*—Bearing caps numbered #1 through #5 from FRONT of engine and must be installed with ARROW ON CAP TOWARD FRONT OF ENGINE.
NOTE—Main bearing cap bolts are self-locking type.
Rear Bearing Oil Seal Installation—*See Lincoln Special Data.*

Replacement Bearings: Std., .010", .020", .030", .040" undersize.

Endthrust: Taken by No. 3 (center main bearing). Adjust by replacing bearing.
End Play—.004-.008".

CAMSHAFT: 5 bearing. Chain driven.
Camshaft Journal Diameter—2.1240-2.1250".
Clearance—.0013-.0028". Wear limit .005".

Replacement Bearings: Furnished Std. & .015" Undersize.

►*BEARING INSTALLATION CAUTION*—Use Tool 6261-C to install bearings with notch on edge facing front of engine and at bottom of bore. See that oil holes in bearing line up with oil holes in block.

Camshaft Removal: *See "Camshaft & Bearings" in Lincoln Special Data.*

Endthrust: Taken by hydraulic plunger in forward end of camshaft. Excess oil lubricates timing chain, sprockets and front cover thrust boss.
End Play—Zero.

►**Eccentric Sleeve (Fuel Pump)**—Inspect and replace if clearance exceeds .006".

Timing Chain: Width 1.25". Pitch .5". Length 25".

Timing Chain Removal: *See "Timing Gears" in Lincoln Special Data.*

Camshaft Setting: Timing marks on camshaft and crankshaft gears adjacent and in line with straightedge across shaft centers.

VALVES (1952):	Head Diameter	Stem Diameter
Intake	1.80"	.3415-.3425"
Exhaust	1.505-1.515"	.3405-.3415"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.354"①	.0010-.0020"②
Exhaust	45°	.354"①	.0015-.0025"②

①—Replace camshaft if lift less than .333".
②—See Valve Stem Clearance Note below.

VALVES (1953): *CAUTION—1953 valves not interchangeable with previous type (intake valves larger, all vaves longer).*

	Head Diameter	Stem Diameter	Length
Intake	2.000-2.010"	.3415-.3425"	5.18"
Exhaust	1.505-1.515"	.3405-.3415"	5.18"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.354"①	.0010-.0020"②
Exhaust	45°	.354"①	.0020-.0030"②

①—Replace camshaft if less than .333".
②—See Valve Stem Clearance Note following.

Valve Stem Clearance Note—Install valves with oversize stems if clearance exceeds .004" (Intake), .005" (Exhaust). *See Valve Guides (below).*
Replacement Valves—Furnished with stems Std. and .003", .015", .030" Oversize.
Valve Seat Width—.060-.070" (1/16-5/64"). *See "Valve System" in Lincoln Special Data.*

►*1952-53 LINCOLN REPLACEMENT VALVE STEM CHANGE:* New "Umbrella" type valve stem seals, Part No. EAD-66571-B, should be installed on BOTH INTAKE & EXHAUST VALVES. These seals supersede previous type neoprene seal ring installed in valve stem groove.

Oversize Valve Stem Installation: *See "Valve System" in Lincoln Special Data.*

Valve Assembly Removal & Installation: *See "Valve System" in Lincoln Special Data.*

Valve Guides: Integral with cylinder head. For Installing oversize valves, *see "Valve System" in Lincoln Special Data.*

Valve Lifters: Hydraulic type. Removable from above. *See "Hydraulic Valve Lifters" in Lincoln Special Data.*

►*HYDRAULIC VALVE LIFTER PRODUCTION CHANCE (1953)*—New lifter, Part No. EAB-6800-D is interchangeable with previous 1952-53 lifters, either singly or in complete sets. *CAUTION—Do not interchange hydraulic valve lifter parts.*
Body Diameter—.8740-.8745".
Clearance in Block—.0005-.0020". Selective fit.
Initial Valve Clearance—*See "Valve System" in Lincoln Special Data.*

Valve Springs: Free Length—2.21".

	Spring Length	①Pressure
Valve Open	1.47"	133-147 lbs.
Valve Closed	1.80"	64-70 lbs.

①—A 10% pressure loss allowable in service.

Rocker Arm Assembly: *See "Valve System" in Lincoln Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: None in service. Hydraulic lifters. *See "Valve System" in Lincoln Special Data.*

VALVE TIMING: See Camshaft Setting above.
Intake Valves—Open 18° BTDC. Close 58° ALDC.
Exhaust Valves—Open 56° BLDC. Close 20° ATDC.

LUBRICATION

Engine Oiling System: Pressure through a "Full-flow" type oil filter to main bearings, connecting rod bearings, camshaft bearings, hydraulic valve lifters, rocker arms, and timing gears.

Crankcase Capacity—5 qts. (refill), 6 qts. (when new filter installed).
Normal Oil Pressure—40 lbs. at 40 MPH.

Oil Pump: Gear type. Mounted externally on left rear side of crankcase. Driven by distributor shaft. Oil screen assembly in front of crankcase and connected by an external pipe to oil pump.

Oil Pump Overhaul: *See "Oil Pump" in Lincoln Special Data.*

Oil Filter (Std. Equip.): "Full-flow" type mounted on crankcase adjacent to oil pump. Filter has pressure relief valve in filter center bolt which by-passes the oil to main oil gallery when filter becomes dirty. Replace filter element every 4000-5000 miles or more often if required.
Oil Filter Cartridge—Lincoln No. HCK-6731-A.
Oil Filter Installation—*See "Oiling System" in Lincoln Special Data.*

Oil Pressure Gauge: King-Seeley Electric (not CV).
Dash Unit—Lincoln No. FAA-9273-B.
Engine Unit—Lincoln No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler cap and in upper end of breather outlet pipe at elbow.
Servicing—Wash with solvent and saturate with engine oil every 2000 miles.
Outlet Pipe Air Filter Cartridge—Lincoln No. EAD-6841-A.

COOLING

Cooling System: Pressure type with single water pump mounted on engine front cover and thermostat in water outlet manifold on head. External bypass between water outlet manifold and pump recirculates water in engine when thermostat closed.
Capacity—22.5 qts. (total), 21.5 qts. (recommended water level). 2 qts. addtl. with heater.
Pressure Valve—Lincoln No. LA-8100-A3 (stamped 14). Radiator Filler Cap. Opens at 12-15 lbs.

Water Pump: Packless, sealed ball-bearing shaft. Pump mounted on front engine cover.
See Water Pump Section for complete data.

Belt Adjustment: ½" belt deflection midway between generator and water pump pulley.

Thermostat: Lincoln No. EAD-8575-B in cylinder head water manifold.
Setting—Starts to open at 148-153°F., fully open at 169-174°F.

Temperature Gauge: King-Seeley Electric (Not "CV").
Dash Unit—Lincoln No. FAA-10883-B.
Engine Unit—Lincoln No. FAA-10884-A.
See Miscellaneous Section for complete data.

HYDRA-MATIC TRANSMISSION

"Dual Range" (1952)—Type L-52 *(After first 2700 cars. See Note below for first 2700 cars).* **(1953)—Type L-53.** Four speed planetary type automatic transmission and fluid coupling. Modulated throttle pressure and hydraulic type reverse.

►*1952 NOTE—1951 Type L-51 transmission (not "Dual-Range") used on first 2700 cars.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles. Add fluid as required to maintain level at full mark on dipstick. Drain and refill every 25000 miles. Use Automatic Transmission Fluid Type "A," furnished under Lincoln Part No. 8L-19582.

Checking Fluid Level—To check fluid level, engine must be idling, transmission warm, parking brake set and selector lever in "DR" position. Dipstick located under hood on right side of engine (1952 NOTE—First 2700 cars same as 1951 Models). Add oil if below "L" mark on dipstick to bring level to full mark.

►*CAUTION—Do not check oil level when transmission temperature excessively high and do not fill above "F" on dipstick (will cause foaming).*

►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer 1310. Needle bearing type. Two used.

REAR AXLE

Own Make. Semi-floating hypoid gear type with Hotchkiss drive (**separate carrier not used**). Axle end flanged (no separate hub). Wheel bearings are sealed ball-bearing, pre-lubricated.

See Rear Axle Section for complete data.

Rear Axle Ratios

L-51 Hydra-Matic Cars	3.15-1 (41-13)
L-52 Hydra-Matic Cars	3.07-1 (43-14)
L-53 Hydra-Matic Cars	3.31-1 (43-13)

Backlash—.005-.008". Shim adjustment.

Removal: Raise rear of car. Remove axle shafts, and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers, and spring U-bolt. Remove axle housing assembly from car.

Axle Shaft Removal: Remove rear wheels. Take out 3 capscrews holding brake drum to axle shaft flange. Remove hydraulic brake lines from brake backing plate. Take out 4 axle retainer nuts (working through opening in axle shaft flange). Use Tool 4235-A to remove axle shaft and bearing assembly from axle housing. Take off backing plate and gasket. Do not damage oil seal when removing axle.

SHOCK ABSORBERS

Direct acting Hydraulic type. Shock absorbers are permanently sealed and require no servicing.

Front—Lincoln No. LA-18045-A (Standard); LA-18045-B (for heavy duty springs).

Rear—Lincoln No. LA-18080-A or LA-18080-C (Std.), LA-18080-B (Heavy Duty Springs).

REPLACEMENT CAUTION—Manufacturer recommends that replacement shock absorber of **same suffix letter** as original type be used.

FRONT SUSPENSION

Independent linked parallelogram type with coil springs, direct acting shock absorbers and front stabilizer.

See Front Suspension Section for complete data.

Kingpin Inclination—7°10' with Pos. ¾° camber.
Caster—0° to Neg. 1½°. Caster must not vary more than ½° from one side to the other.
Camber—0° to Pos. ¾°. Camber must not vary more than ¼° from one side to the other.
Toe-In—3/32" to 5/32".

STEERING GEAR

Standard: Gemmer Model 335. "3-Tooth" Worm & Roller type with "push-pull"adjustment.

See Steering Gear Section for complete data.

Power Steering (Optl. 1953): *See "Saginaw (G.M.) Power Steering" in Steering Gear Section for complete data.*

Lubrication (Power Steering Reservoir)—Maintain level to "Full" line on dipstick using Automatic Transmission Fluid Type "A".

Steering Gear Housing—Use only Ford Motor Co. specification M-4748 lubricant. *NOTE—This lubricant is "Alemite Special Steering Gear Lubricant No. 7".*

Belt Adjustment—Check each 10,000 miles. Correct tension is ¼" belt deflection with 5-7 lbs. pull on belt midway between pulleys.

BRAKES

Service: Lincoln-Bendix Hydraulic, Duo-Servo, Single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinders—Diameter: Front Wheel 1 1/8". Rear Wheel 15/16".

Drums—Diameter 11".

Lining—Molded type. **Width**—2½" (front wheels). 2" (rear wheels). **Thickness**—7/32". **Length Per Wheel**—23 7/64".

Clearance—.010" at each end of each shoe.

Braking Power—59% Front wheels, 41% Rear wheels.

Brake Pedal Free Play—.220-.440". Master cylinder rod is connected to brake pedal with an eccentric bolt. Rotate bolt for desired clearance.

Hand Brake: See Service Brakes above.

Power Brakes (Optl. 1953): Special vacuum power cylinder combined with hydraulic master cylinder Mounted on engine side of dash and directly connected to brake pedal.

See "Power Brakes" in Brake Section for complete data.

►*POWER BRAKE UNIT PRODUCTION CHANGE (& Installation of Later Type on first cars): See "Power Brakes" in Brake Section for complete data.*

MISC. MECHANICAL

Air-Conditioning: Optl. *See "Lincoln Air-conditioning" in Miscellaneous Section for complete data.*

Four-Way Seat Control: Electric type (separate motors for up-and-down and fore-and-aft movement).

See Miscellaneous Section for complete data.

Power Operated Top: Reversible type motor (mounted under seat) drives two screw type jacks (one on each side) through flexible cables. Controlled by relay and two-way switch.

See Miscellaneous Section for complete data.

Power Operated Window Regulators: Electric type. Individual motor and relay mounted in each door. Controlled by door switch and master control switch.

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum, Link & Crank arm type.

See Miscellaneous Section for complete data.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on patent plate attached to right front body pillar between door hinges.

First Number—5001 up (each year). At both plants.

►*SERIAL NUMBER NOTE: Serial number (example #55LA5001H#) includes following identification data in sequence.*

Year①	Assy. Plant②	Serial No.	Eng. Type
55	LA	5001	H

①—Last two digits of model year.

②—Assembly Plant Code: **LA** (Los Angeles), **WA** (Wayne).

TUNE-UP

COMPRESSION PRESSURE: 135 lbs. ± 10 lbs. at cranking speed.

VACUUM READING: (1954) 18-21" at 450 RPM in neutral. (1955) 19-20" at 500 RPM in neutral.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: (Early 1954)—"Duckbill" type thermostatic valve located inside right end of cross-over pipe near flange.

Late 1954 & 1955 (Single Exhaust)—"Butterfly" type valve located at right end of cross-over pipe at flange.

1955 Dual Exhaust—"Butterfly" type located at rear flange on right manifold.

►*BUTTERFLY TYPE MANIFOLD VALVE INSTALLATION CAUTION:* When installing valve assembly, make sure counterweight portion is toward right front of engine.

►*BUTTERFLY TYPE MANIFOLD VALVE INSTALLATION ON EARLY CARS:* Crossover pipe, Lincoln Part No. EAD-5267-F; Right hand exhaust manifold, Part No. EAD-9430-D; and longer studs, Part No. 354055-S must be used when installing later type heat control valve, Part No. EAD-9685-C.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.

Cylinders—RIGHT BANK 1-2-3-4. LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .033-.037" (Champion H-10). .032-.036" (Champion 870).

Spark Plugs (1954)—Champion H-10. 14mm., or equivalent. Tighten plugs to 24-30 ft. lbs.

Spark Plugs (1955)—Champion 870. 18mm. special.

►*1955 SPARK PLUG CAUTION: Spark plug is new type with a tapered seat and does not require a sealing gasket. It is important that plugs be tightened to 15 ft. lbs. exactly.*

COIL: Lincoln No. 8BA-12029.

Ignition Current—3 amps. idling, 5 amps. stopped.

►*COIL HIGH TENSION LEAD CAUTION (Radio Equipped Cars):* Coil-to-Distributor lead is SPECIAL SUPPRESSOR LEAD (non-metalic with carbon impregnated nylon or rayon core) and the special length (approx. 14-1/2") is required for proper radio reception. *DO NOT SHORTEN LEAD OR USE ANOTHER TYPE FOR REPLACEMENT.*

DISTRIBUTOR: (Early 1954)—Lincoln No. FAF-12127-B; (Late 1954)—FDD-12127-A; (1955)—FDL-12127-B.

►*1954 DISTRIBUTOR (FAF-12127-B) OVER-ADVANCING WHEN ENGINE STARTED AT LOWER TEMPERATURE CORRECTION:* This condition noted when engine detonates excessively after starting under low temperature conditions. Install Pin and Post Assembly, Lincoln Part No. FDC-12357-A which limits distributor advance to 15° to 15½°. FAF-12127-B distributors that have been reworked in production are identified by the part number prefix "ED". *CAUTION—When calibrating a corrected distributor refer to Automatic Advance Table for FDD-12127-A distributor. See "Ford, Lincoln, Mercury Distributor" in Electrical Section.*

Condenser—Lincoln No. FAB-12300-A. **Capacity** .21-.25 microfarad.

Contact Point Set—Lincoln No. FAB-12171-B.

Breaker Gap—.014-.016"

Cam Angle—26-28.5°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Advance Performance—FAF-12127-B①

►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
2-3	0-19	300
5½-6¾	0-51	500
10¼-11¼	1-32	1000
11¼-12¾	1-63	1400
15¼-16¼	2-65	2000

①—Distributors **without** correction for "Over-Advance" See Distributor Correction (above).

Advance Performance—FDD-12127-A②

►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
2-3	0-19	300
5½-6¾	0-51	500
10¼-11¼	1-32	1000
11¼-12¾	1-63	1400
15-15¼	2-65	2000

②—Use this table for FAF-12127-B distributors that have been corrected for "Over-Advance". See Distributor Correction (above).

Advance Performance—FDL-12127-B

►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
4-1/2—5-1/2	.62	500
10-11	1.76	1000
11-1/2—12-3/4	2.17	1500
12-1/4—13-1/2	2.35	2000

►*DISTRIBUTOR INSTALLATION NOTE:* It may be necessary to crank engine slightly to engage oil pump hex shaft with distributor shaft. Procedure will not disturb timing because distributor engages camshaft gear before distributor shaft starts to engage with oil pump drive.

Initial Distributor Timing: Rotate engine until timing mark on crankshaft dampener is lined up with pointer and #1 piston is in firing position. Install distributor with points just breaking and the rotor in position to fire #1 cylinder (vacuum advance connection boss should be at approximately right angles to crankshaft and pointing toward left side of engine).

IGNITION TIMING

Setting—3° BTDC (1954); 5° BTDC (1955).

Timing Mark—Crankshaft pulley marked TDC with ten lines (each line representing 2°) before this point. Align correct timing mark (see Setting above) with pointer on engine front cover.

CARBURETOR
1954 MODELS

Lincoln EAD-9510-N "Centri-Quad" four-barrel downdraft type with automatic choke.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*CARBURETOR SERVICE REPLACEMENT NOTE:* Carburetor Assembly, Lincoln Part No. ED-EAD-9510-S (with new type bowl cover to prevent fuel spill-over on sharp right turns) available for service replacement.

►*EXTERNAL VENT PRODUCTION CHANGE:* An adjustable spring clip, Lincoln Part No. EAD-99608-A used in production, and available for service on earlier carburetors to provide a means of closing off lower vent holes in accelerator pump rod for better starting in cold weather. *See "Lincoln-Mercury Centri-Quad" in Carburetor Section.*

►*CARBURETOR "SPILL-OVER" ON SHARP RIGHT TURN CORRECTION:* To prevent spill-over on cars with external vent, replace carburetor bowl cover assembly with Lincoln No. ED-EAD-99983-F. *See "Lincoln-Mercury Centri-Quad" in Carburetor Section.*

►*CHOKE HEAT TUBE ASSEMBLY & INTAKE MANIFOLD PRODUCTION CHANGE:* New assemblies entered production in early June to prevent exhaust gas leakage into choke control heat tube assembly. Previous type heat tube assemblies are retained for service replacement on early cars, and later type heat tubes and manifold assemblies can be installed if desired.

Idle Setting—Exactly 1¼ turns open (set both screws alike).

Idle Speed—400-425 RPM with selector lever in "Drive".

External Vent Seasonal Adjustment: (See "External Vent Production Change" above). On carburetors where spring clip is provided on hollow accelerator pump rod to control vent opening, adjust clip to open or close vent hole for best operation as follows:

Winter Operation (Temperatures below 50°F)—Slide clip down on pump rod so that vent hole is CLOSED.

Summer Operation (Temperatures above 50°F)—Slide clip upward on pump rod so that full diameter of vent hole is OPEN.

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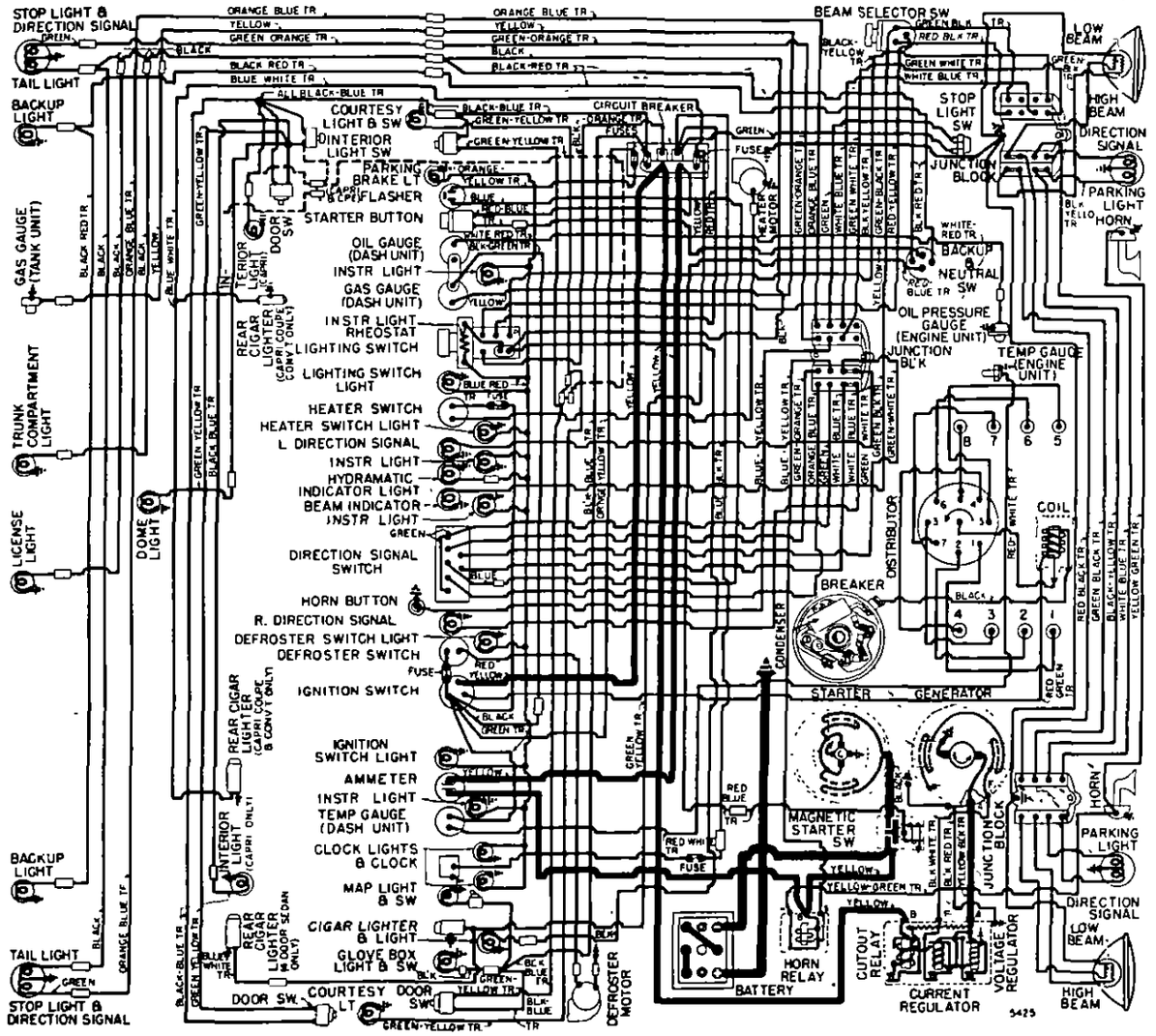
Hydra-Matic Throttle Linkage Adjustment: With engine at normal operating temperature (choke valve wide *open and fast idle inoperative*) adjust engine idle speed to 400-425 RPM with transmission selector lever in "N" (Neutral) and turn off engine. Disconnect transmission throttle rod at forward end by taking out clevis pin. Adjust carburetor throttle rod by loosening locknut and turning adjusting clevis on rod so that carburetor throttle lever stop screw is against stop, and control shaft assembly is against its stop. Tighten locknut against adjusting clevis. *(CAUTION—Throttle rod ends must be in alignment to prevent binding).* Hold throttle lever in slow idle position (stop screw against its stop), and push down firmly on transmission throttle rod so that lever is in its stop position, adjust clevis on forward end of rod so that clevis pin enters freely, then remove pin and **shorten the rod three full turns of clevis.** Connect rod and tighten clevis locknut. Check shift points by road testing car.

►*OTHER DATA: See "Lincoln & Mercury Centri-Quad" in Carburetion Section.*

Fuel Pump Pressure: 3.5-4.5 lbs. at 900 RPM.

1955 MODELS

Lincoln EBJ-9510-D (Early); EBJ-9510-F, H (Late).



1954 MODELS

"Centri-Quad" four-barrel downdraft type with automatic choke.

►*CARBURETOR INSTALLATION CAUTION (First cars with Choke Inlet Air Tube Washer in Throttle Body): See "Lincoln & Mercury Centri-Quad" in Carburetor Section.*

►*AUTOMATIC CHOKE ROD ADJUSTMENT: Must be correct for proper starting and automatic choke operation. See "Lincoln & Mercury Centri-Quad" in Carburetor Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting—1-1/2 turns open (set both screws alike).
Idle Speed—425-450 RPM with selector lever in "Drive"

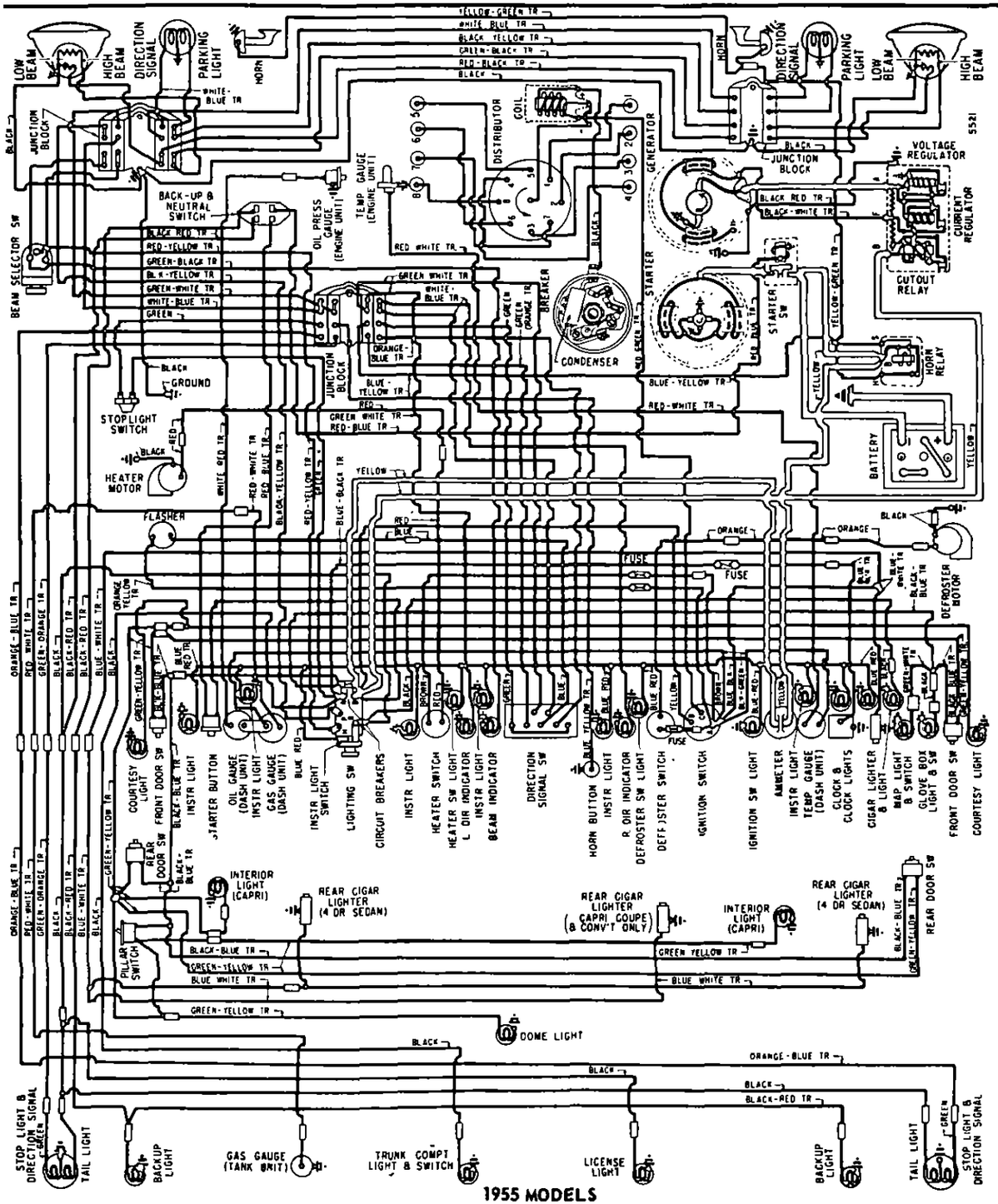
Dashpot Adjustment: Hold dashpot piston in to limit of travel, turn adjusting screw in or out until clearance between screw and dashpot piston rod is .045-.064".

Automatic Throttle Control Adjustment (Air-Conditioned Cars): With engine adjusted to normal idle speed (425-450 RPM., selector lever in "D"), and engine at normal operating temperature, turn air-conditioner "ON" and place transmission selector lever in "N" (Neutral) position. Loosen adjusting screw locknut on end of operating rod and adjust knurled adjusting nut to provide an idle speed of 800 RPM. Tighten locknut. Check operation of Automatic Throttle Control to make sure idle speed return to normal idle when transmission is shifted out of "N" (Neutral), or air-conditioner is turned off.

Turbo-Drive Throttle Linkage Adjustment: Adjust the engine idle speed to 425-450 RPM with fast idle cam in low idle position and transmission in "Dr" range. Disconnect clevis pin from transmission control-to-accelerator shaft assembly and transmission control shaft-to-transmission rod assembly. Disconnect carburetor-to-transmission control shaft rod assembly. Insert gauge pin through bracket and bellcrank tab. Adjust carburetor-to-transmission control shaft rod assembly so that it fits freely. Reassemble rod assembly and remove gauge pin. Pull upward on transmission control shaft-to-transmission rod assembly to position throttle lever against its internal stop. Adjust transmission control shaft-to-transmission rod clevis so that clevis pin enters clevis and lever on transmission control-to-accelerator shaft assembly freely. Lengthen rod by turning clevis 2-1/2 turns and reassemble. With ignition off and accelerator pedal depressed to full kickdown position, adjust length of toggle rod assembly so that nylon bushing fits in the slot in the transmission control-to-accelerator shaft lever assembly within .25" clearance (approximately). Adjust toggle rod assembly so that it is in a vertical plane when viewed from front of vehicle. This is done by loosening jam nut and turning stud with a screwdriver in desired direction. Retighten jam nut after making adjustment.

Turbo-Drive Throttle Linkage Adjustment (Optional Method): *See "Turbo-Drive" in Transmission Section.*

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1955 MODELS

CONTINUED FROM PRECEDING PAGE

▷*OTHER DATA: See "Lincoln & Mercury Centri-Quad" in Carburetor Section.*

Fuel Pump Pressure: 3.5-4.5 lbs. at 900 RPM.

CARB. EQUIPMENT

▷*CARBURETOR AIR CLEANER INSTALLATION CAUTION: The indentation at bottom of air cleaner and the words "Front" on side of cleaner must face front of engine.*

▷*1954 AIR CLEANER GASKET & HOLD-DOWN WING SCREW PRODUCTION CHANGE (To Correct Air Cleaner "Flexing" and Wing Screw Breakage):* The paper gasket has been replaced in production and for service by a neoprene gasket, Part No. EAD-99654-B, and the previous wing screw has been replaced by a longer screw. Part No. 354535-S8B. When installing the neoprene gasket, apply a coat of cement to both surfaces before inserting in air cleaner.

Fuel Pump: Lincoln No. EAD-9350-E (1954); EAD-9350-F (1955). Fuel & Vacuum type with magnetic type filter.
Pressure—3.5-4.5 lbs., at 900 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley Electric type.
Dash Unit—Lincoln No. FAF-9280-A (1954); FDL-9280-A (1955).
Tank Unit—Lincoln No. FAB-9275-A.
See "Fuel Gauges" in Carburetion Section.

BATTERY

▷*LINCOLN BATTERY REPLACEMENT CAUTION: Use only a replacement battery with terminal posts on same side. Damage to battery will result if battery with diagonal terminal posts used.*

Lincoln No. FAA-10655-E. 6 volt, 21 plate, 110 ampere hour capacity (20 hr. rate).
Location—Under front compartment toe-boards on right side of car.
Battery Ground—Positive, to frame side rail.
Engine Ground—Engine cylinder head to dash.

STARTER

Lincoln No. FAC-11002-B (1954); FAC-11002-G (1955).
Armature—Lincoln No. 52-11005 (FAC-11002-B); FAC-11005-B (FAC-11002-G).
Drive—Lincoln No. 1CM-11350-C. Bendix "Folo-Thru".
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs.
Cranking Speed—115-125 RPM.

Performance Data—FAC-11002-B

Torque	RPM	Volts	Amperes
0 ft. lbs.	Ⓒ	6.0	70
14 ft. lbs.	Lock	3.5	700

Performance Data—FAC-11002-G

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
14 ft. lbs.	Lock	3.5	700

① —With starter on engine and engine running.

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Removal: Remove battery-to-starter cable. Remove attaching bolts holding steering idler arm support to frame lower support and remove idler arm assembly. Remove capscrews holding endplate to converter housing and remove starter by pulling out and down until starter drive clears housing.

Starting Switch: Lincoln No. B5A-11450-A *(NOTE—This relay is a sealed type and replaces the relay formerly used).* Mounted on frame side rail adjacent to starter, and controlled by Ignition Switch and Automatic Transmission Neutral Safety Switch.

Neutral Safety & Back-up Light Switch (1954): Lincoln No. FAB-15812-A (Without Power Steering); FAD-15812-A (With Power Steering). Located at lower end of steering column.
Adjustment—See *"Hydra-Matic Drive" in Transmission Section.*

Neutral Safety & Back-up Light Switch (1955): Lincoln No. FDK-15825-B (Switch Terminal). Located on steering column inside passenger compartment. Supersedes previous switch location.
Adjustment—See *"Turbo-Drive" in Transmission Section.*

GENERATOR

Lincoln No. FBB-10002-A. Armature—FAB-10005-A.

Performance Data

Generator	Amperes	Gen. RPM.
FBB-10002-A	50 ①	1850

① —See Regulator for maximum charging rate.

Brush Spring Tension—26-34 ozs.
Field Current—2.25-2.50 amps. at 6.0 volts.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Approximately ½" deflection midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Lincoln No. FAJ-10505-A.

►*SETTING NOTE:* Settings below are for regulator at *NORMAL OPERATING TEMPERATURE* (after 1/2 hour operation) with room temperature at 70-80° F.

Cutout Relay

Cuts In—6.0-6.6 volts.

Voltage Regulator

Setting—7.4-7.8 volts.
Checking & Adjusting—See *Electrical Equip. Section.*

Current Regulator

Setting—48-52 amperes.
Checking & Adjusting—See *Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. See *Electrical Equip. Section.*
Direction Signal: See *Electrical Equipment Section.*

Automatic Headlight Dimmer: See *"Lincoln-Mercury" Headlight Control" in Electrical Equipment Section.*

Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut, remove switch and disconnect all wires.

Stop Light Switch Location: On forward end of brake master cylinder (Conventional or Power Brakes). Master cylinder located on firewall in engine compartment.

FUSES: Turn Signal—14 amps. (1954); 9 amps. (1955).
Dome & Courtesy Lights—14 amps. (1954); 9 amps. (1955).
Glove Box—14 amps.
Cigar Lighter (Front & Rear)—Special fuse in lighter base.
Clock—3 amps. (in clock lead) (1954); None (1955).
Heater—20 amps.
Spotlight—14 amps.
Windshield Washer (1955)—14 amps. (or special 3 amps.).

CIRCUIT BREAKERS (1954): Two circuit breakers (30 amps. for headlights, 15 amps. for auxiliary) mounted on signal panel located behind instrument panel.

CIRCUIT BREAKERS (1955): On headlight switch. One circuit breaker protects headlight circuit and second circuit breaker protects instrument panel lights, parking lights, and stop and tail light circuits.

HORNS: Dual Horns operated by relay.

Lincoln Nos.	Without Air Cond.	With Air Cond.
High Pitch	FAE-13832-B	B5A-13832-A
Low Pitch	FAE-13833-B	B5A-13833-A

Horn Relay—Lincoln No. FAA-13853-A.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION:* Before disconnecting any part of air conditioning equipment or lines for access to engine, see *"Air Conditioning Service Cautions" in Miscellaneous Section.*

►*1954 CYLINDER HEAD & VALVE STEM SEAL PRODUCTION CHANGE:* Beginning with April 1954 production, a new cylinder head, Part No. EAD-6049-F (identified by a square shoulder ¼" below top of valve guide), and a new valve stem seal, Part No. EAA-6571-C, replaced earlier cylinder head, Part No. EAD-6049-D (identified by tapered shoulder on valve guide boss), and valve stem oil seal, Part No. EAD-6571-A. Early and late cylinder heads are interchangeable. *CAUTION*—Use later type valve stem seal with late type head, and early type seals with early head.

►*1955 SPECIAL ENGINE OVERHAUL CAUTION (Engines identified by yellow paint at water outlet connection housing):* Approximately 600 engines at close of 1955 production have special parts listed below which are not identical with regular engine parts. Special instructions must be followed when working on these engines. See *"Engine" in Lincoln Special Data.*

ENGINE SPECIFICATIONS: 90° V8 Valve-in-head.

Model	Bore	Stroke	Displacement
1954	3.8"	3.5"	317.5 cu. ins.
1955	3.94"	3.5"	341 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
1954	8.0-1	46.2	205 at 4200 RPM
1955	8.5-1	49.6	225 at 4400 RPM

Compression & Vacuum Reading—See *TUNE-UP.*

CYLINDER HEAD: See *"Cylinder Head & Manifold" in Lincoln Special Data.*

TIGHTENING TORQUES: See *"Tightening Specifications" in Lincoln Special Data.*

ENGINE REMOVAL: See *"Engine" in Lincoln Special Data.*

OIL PAN REMOVAL: Turn crankshaft so that rear counterweights on crankshaft are upwards, then remove oil pan from front of car.

PISTONS

Aluminum alloy, autothermic slipper type with three rings above pin.
Removal—Rod and piston assembly removed from above.
Fitting New Pistons: Use 1/2" wide feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:
New Piston in New Bore—.0015" feeler, 6-12 lbs. pull.
New Piston in Used Bore—.002" feeler, 6-12 lbs. pull.
Used Piston in Used Bore—.0025" feeler, 6-12 lbs. pull.

Replacement Pistons: Standard size (see note following), .005", .020", .030", .040" Oversize. Pistons furnished only with fitted pins.

STANDARD SIZE PISTON NOTE: Standard size pistons furnished in eight different sizes ranging from 3.7990" to 3.8014" for selective fitting.

Installing Pistons: Install piston with "F" (embossed on piston) and dimple on head toward front of engine.

PISTON PINS

Floating type with lock rings at each end.
Diameter—.9120-.9123".
Pin Fit in Piston—.0001-.0003".
Pin Fit in Rod—.0002-.0004" loose, (Light thumb press fit).

Replacement Pins: Standard size, .001", .002" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	.0775-.0780"	.010-.027"	.0015-.0030"
Compr. #2	.0775-.0780"	.010-.027"	.0010-.0025"
Oil	.1860-.1865"	.010-.027"	.0015-.0030"

Replacement Rings: Standard size, .020", .030", .040" Oversize.

►*PISTON RING REPLACEMENT NOTE: Install Compression Rings with groove on inner edge of ring UPWARD.*

CONNECTING RODS

Length—7.064-7.066". **Weight**—28.36 ozs.
Crankpin Journal Diameter—2.2482-2.2490".
Lower Bearing—Steel backed, copper lead alloy lined type. Upper and lower halves interchangeable.
Clearance—.0005-.0025".
Side Clearance—.006-.014" (two rods).

Replacement Bearings: Standard (2 sizes marked red & blue for selective fitting) and .010", .020", .030", .040" Undersize.

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Installing Rods: Oil squirt hole in rod toward camshaft side of bore on all rods. Numbers on rods and bearing caps should be together and installed in same numbered cylinder.

CRANKSHAFT

Journal Diameters—2.6235-2.6243".
Out-of-Round Limits—.00025". **Taper Limits**—.0005".
Bearings—Steel backed copper lead alloy lined.
Replacement Bearings: Standard size (2 sizes marked red and blue for selective fitting) and .010", .020", .030", .040" Undersize.
End Thrust: Taken by #3 main bearing. Replace bearing if end play excessive.
Thrust Bearing Alignment—*See "Crankshaft & Main Bearings" in Lincoln Special Data.*
Endplay—.004-.008" (service maximum .012").
Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bedrings" in Lincoln Special Data.*
Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Lincoln Special Data.*

CAMSHAFT

►*CAMSHAFT IDENTIFICATION NOTE: Camshafts used in 1954-55 production and for service replacement are as follows:*

1954 (Std. Camshaft)—EAD-6250-F. "EAD" cast between No. 12 cam lobe and No. 4 cam bearing; also letter "L" stamped on front face of camshaft fuel pump eccentric.

1954 (Heavy Duty Camshaft)—EAD-6250-E. "EAD" cast in same location as for Std. Camshaft (above). Letter "L" not stamped on shaft.

1955 (Early)—EBJ-6250-A. "EBJ" cast between No. 5 cam bearing and distributor drive gear; also letter "J" stamped on front face of camshaft fuel pump eccentric. Specifications are same as for later camshaft.

1955 (Late)—EBJ-6250-B. "EBJ-B" cast between No. 5 cam bearing and distributor drive gear; also letter "J" stamped on front face of camshaft fuel pump eccentric, and the letter "C", with two dimples cast between No. 4 cam lobe and No. 2 cam bearing. Specifications are same as for early camshaft.

►*1954-55 SERVICE REPLACEMENT CAMSHAFT CHANGE (To provide better wear characteristics):* Camshafts, Part Nos. EAD-6250-G (1954 Models), and EBJ-6250-B (1955 Models) are furnished for service replacement. These camshafts are identified by the letter "C", with two dimples, cast between the first two cam lobes, counting from front of engine.

Journal Diameter—2.1263-2.1268".

Bearings—Steel-backed babbitt-lined bushings.
Clearance—.0011-.0028". Wear limit .005".
End Thrust: Taken by hydraulic plunger in front end of camshaft. Excessive oil lubricates timing chain, sprockets, and front cover thrust boss. **Endplay**—.000".
Replacement Bearings: Standard size, and .015" Undersize.
Camshaft Removal: *See "Camshaft & Bearings" in Lincoln Special Data.*
Timing Chain: Width 1.25". Pitch .5". Length 25".
Camshaft Setting: Timing marks on camshaft and crankshaft sprockets adjacent and in line with straight edge across shaft centers.
Timing Chain Cover Seal Installation (Crankshaft Front Seal): *See "Engine Front Cover" in Lincoln Special Data.*

VALVES

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves): Stem diameter decreased .0005" for greater stem clearance in guide. See "Valve System" in Lincoln Special Data.*

Tappet Clearance: None in service (hydraulic).

Valve	Head Diam.	①② Stem Diam.	Length
Intake	2.000-2.010"	.3415-.3425"	5.18"
Exhaust	1.505-1.515"	.3405-.3410"	5.18"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	③	④ .0010-.0020"
Exhaust	45°	③	⑤ .0020-.0030"

①—Exhaust valve stems (service replacement) decreased .0005" in diameter. See Exhaust Valve Change above.
②—Valves furnished with .003", .015", .030" oversize stems for service replacement.
③—.354" (1954); .384" (1955).
④—.004" service maximum.
⑤—.005" service maximum.

Valve Seat Width: 1/16" to 5/64".
Oversize Valve Stem Installation: *See "Valve System" in Lincoln Special Data.*

►*ROTATABLE VALVE NOTE: All valves are rotatable type.*

►**Valve Stem Oil Seals:** For Replacement Notes and Installation, *see "Valve System" in Lincoln Special Data.*

Valve Springs: (1954)—Free Length 2.21". Spring pressure, with spring compressed to 1.80", pressure should be 64-67 lbs. Compressed to 1.47", pressure should be 133-147 lbs.
1955—Free Length 2.11-2.13". Spring pressure with spring compressed to 1.80", pressure should be 67-74 lbs. Compressed to 1.42", pressure should be 165-183 lbs.

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" intake, .005" exhaust), ream guides and install oversize valves. *See "Valve System" in Lincoln Special Data.*

Valve Lifters: Hydraulic, Barrel type. Lifters can be removed from above with camshaft in engine.

►*1954 MODEL NOISY VALVE LIFTER CORRECTION:* On cars built before Serial Nos. 54WA-19137-H & 54LA-7558-H, install an anti-drain back diaphragm B4A-6751-A and oil filter mounting bolt insert, EAA-6890-C in oil filter assembly. *See "Oil Filter" in Lincoln Special Data.*

►*1954 HYDRAULIC VALVE LIFTER PRODUCTION CHANGE:* Beginning with Sept. 1954 production a new lifter EBJ-6500-A replaced former lifter EAD-6500-D. Later lifter has three oil holes in outside diameter groove and four holes in plunger, compared to one hole at each point on former lifter. Later type lifters are furnished in unit packs of eight.

►*1954 VALVE PUSH ROD PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* A new pushrod, Part No. EBJ-6565-A has been released for service replacement for use with later type lifters (see Valve Lifter Production Change above). The new type pushrod can be identified by a spherical tappet end (early type had a flat end). *Later type pushrod must not be used with early type hydraulic lifter.*

►*1954 ROCKER ARM COVER SEAL NOTE:* A new seal, Part No. EBU-6570-A and a longer stud, Part No. 354053-S has been released for service to minimize engine noises.

Diameter—.8740-8745". **Clearance in Block**—.0005-.0020".
Initial Valve Clearance—*See "Valve System" in Lincoln Special Data.*
Lifter Overhaul—*See "Valve System" in Lincoln Special Data.*
Rocker Arm Assembly: *See "Valve System" in Lincoln Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE: The following valve opening and closing points are with a camlift as indicated.*

1954 Models

Intake Valves—Open 18° ① BTDC. Close 58° ② ALDC.
Exhaust Valves—Open 56° ① BLDC. Close 20° ② ATDC.

1955 Models

Intake Valves—Open 8° ① BTDC. Close 56° ② ALDC.
Exhaust Valves—Open 52° ① BLDC. Close 12° ② ATDC.
①—Camlift .002". ②—Camlift .005".

Valve Timing Check—Slide rocker arm to one side and install dial indicator so reading can be taken from end of valve push rod (use an indicator that will read .300" or more). Install a quadrant (reading in degrees) on crankshaft pulley to check amount of crankshaft rotation. Rotate engine slowly until dial indicator reading for valve being checked is same as indicated in table above. Amount of crankshaft rotation should be the same as shown in valve timing table. As an example, check intake valve opening by rotating engine until dial indicator reads .002" camlift. Quadrant on crankshaft should indicate 18° (1954); 8° (1955). Continue to rotate engine to check valve closing degrees. Dial indicator should read .005" and quadrant should indicate 58° (1954); 56° (1955).

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 6 qts. (when filter changed).
Normal Oil Pressure: 35-45 lbs. at 40 MPH.
Pressure Regulator Valve—In pump body, not adjustable.

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Oil Pressure Indicator–King-Seeley Electric.
Dash Unit (1954)–Lincoln No. FAG-9273-A.
Dash Unit (1955)–Lincoln No. FDL-9273-A.
Engine Unit (1954-55)–Lincoln No. 41A-9278. (Use FAA-13785-A Clip).
See "Oil Gauges" in Miscellaneous Section.

Oil Pump: Gear type pump located on left side of engine crankcase and driven by distributor drive gear.

Pump Overhaul–*See "Oiling System" in Lincoln Special Data.*

Oil Filter: Full-flow type with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.

►*1954 OIL FILTER PRODUCTION CHANGE (New anti-drain back diaphragm): See "Oiling System" in Lincoln Special Data.*

Replacement Filter Element–HCK-6731-A (Kit includes new gaskets).

See "Oiling System" in Lincoln Special Data.

CAUTION–Special "full-flow" filter element must be used for replacement (use of by-pass type filter element will restrict engine oil flow and result in insufficient engine lubrication).

Crankcase Ventilation: Filter element in oil filler cap and in road draft tube. Clean and oil filters every 2000 miles or more often in dusty areas.

►*1954 CRANKCASE VENTILATOR OIL LEAKAGE CORRECTION:* Install gasket, Part No. B4A-6872-A, which is a firmer type gasket and will not distort when tightened.

COOLING

Water Capacity: 22.5 qts. (1954); 23 qts. (1955), without heater (21.5 qts. recommended).
Pressure Valve: Lincoln No. LA-8100-A3 (14 lbs.); LA-8100-A4 (13 lbs.). Radiator filler cap, stamped with figure "13" or "14".
Thermostat: **(1954)**–EAD-8575-B (157-162°). EAD-8575-C (168-173°). **(1955)**–EAD-8575-D (157-162°). B4Q-8575-B (168-173°). *NOTE–When installing 1955 thermostats on 1954 cars, use gasket, Part No. EAD-8590-B.*
Water Pump: Packless type with sealed ball bearing. *See "Lincoln" in Water Pump Section.*

Temperature Gauge: King-Seeley Electric.
Dash Unit (1954)–Lincoln No. FAG-10883-A.
Dash Unit (1955)–Lincoln No. FDL-10883-A.
Engine Unit–FAB-10884-A (Early 1954); 1A-10884-A (Late 1954 & 1955).
See "Temperature Gauges" in Miscellaneous Section.

HYDRA-MATIC DRIVE

"Dual-Range" four speed automatic transmission with fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication–Check fluid level every 1000 miles. Drain & refill every 25,000 miles. Use only Automatic Transmission Fluid Type A, furnished under Lincoln Part No. 8L19582.

Checking Fluid Level–Check fluid level with engine idling, transmission at normal operating temperature, and selector lever in "Dr" range. Dipstick located under hood on right side of engine. Add fluid to bring level to "Full" mark on dipstick.

►*CAUTION–Do not check fluid level when transmission excessively hot, and do not fill above "Full" mark on dipstick.*

THROTTLE LINKAGE ADJUSTMENT: *See CARBURETOR above.*

►*OTHER DATA: See "Hydra-Matic Drive" in Transmission Section.*

TURBO-DRIVE TRANSMISSION

Torque converter and three-speed automatic transmission with hydraulic control and mechanical parking lock.
See "Turbo-Drive" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Turbo-Drive" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Turbo-Drive" Transmission in Transmission Section.*

Lubrication–Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level–With selector lever in "N" (Neutral) and emergency brake applied, run engine approximately four minutes at idle speed. Check to see that emergency brake is applied and that engine is on slow idle, move selector lever to the "P" (Park) position. *(NOTE*–When engine and transmission are at normal operating temperature, move selector lever through all ranges to assure fluid distribution throughout transmission). Raise hood and wipe top of oil level indicator. Remove indicator and read fluid level. Add Automatic Transmission Fluid "Type A" if necessary to bring fluid level to "Full" mark on indicator. Replace fluid level indicator.

THROTTLE LINKAGE ADJUSTMENT: *See CARBURETOR above.*

►*OTHER "TURBO-DRIVE" SERVICE DATA: See "Turbo-Drive" Transmission in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

REAR AXLE

Own. Semi-floating hypoid gear, with Hotchkiss drive.
See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.

Ratios–3.31-1 (1954); 3.07-1 (Std. 1955); 3.31-1 (Optl. 1955).

Backlash–.003-.008" with .002" maximum variation per gear set.

Axle Shaft Removal: Remove rear wheels and take out screws holding brake drum to axle shaft flange. Remove hydraulic brake lines from brake backing plate. Take out axle retainer nuts (working through opening in axle shaft flange). Use Tool 4235-A to remove axle shaft and bearing assembly from axle housing. Take off backing plate and gasket and remove axle being careful not to damage oil seal.

Axle Assembly Removal: Raise rear of car and remove axle shafts and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers and spring U-bolts. Remove axle housing assembly from car.

Wheel Bearing Adjustment: None required.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

►*1954 SHOCK ABSORBER REPLACEMENT CAUTION:* Both Gabriel and Monroe shock absorbers used. Valve action is different in each make and it is recommended that single shock be replaced with the same make removed. Either make may be installed in pairs on front or rear.

Model	Front	Rear
Standard (1954)	LA-18045-F	LA-18080-F
Standard (1954)	LA-18045-G	LA-18080-G
Standard (1955)	LE-18045-A	LE-18080-E
Heavy Duty (1954)	LA-18045-H	LA-18080-H
Heavy Duty (1954)	LA-18045-J	LA-18080-J
Maximum Hvy. Duty (1954)	LA-18045-E	LA-18080-E
Special (1954) Ⓒ		LA-18080-B

Ⓒ–Use with Hvy. Duty Springs.

FRONT SUSPENSI N

Independent. "Ball-Joint" suspension with direct acting shock absorbers mounted within front coil springs.
See "Lincoln, Mercury, Ford (Ball Joint)" in Front Suspension Section.

Kingpin Inclination–7°10' with Pos. 3/4° camber.

Caster–0° to Neg. 1-1/2°. Caster must not vary more than 1/2° from one side to the other.

Camber–0° to Pos. 3/4°. Camber must not vary more than 1/4° from one side to the other.

Toe-In–3/32" to 5/32".

Toe-Out on Turns–With outer wheels at 20°, inner wheel should be 23½°.

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STEERING

Manual: Gemmer Model 335. "3-Tooth" Worm & Roller type with "push-pull" adjustment.
See "Gemmer Worm & Roller (Type 335)" in Steering Section.

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder.
See "Saginaw (GM) Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 335)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 335)" in Steering Section.*

BRAKES

►*1955 FRONT BRAKE PRODUCTION CHANGE: Front brake eccentric adjustment has been eliminated on Late 1955 cars.*

Bendix Hydraulic (Single Anchor). With Eccentric (Front Wheels—See 1955 Production Change above). **Without Eccentric (Rear Wheels).** Parking lever applies rear wheel service brakes.
See "Ford-Bendix (Ford, Lincoln, Mercury)" in Brake Section.
Drums—Diameter 12".
Wheel Cyl. Diameter—1-1/8" (front), 15/16" (rear).
Lining—Molded type riveted to shoe
Width—2-1/2" (front whls.), 2" (rear whls.).
Thickness—7/32" (all whls.).
Length—11-33/64" (primary shoes, front & rear whls.), 12-15/16" (secondary shoes, front & rear wheels.).
Braking Power—59% (front whls.), 41% (rear whls.).
Clearance—.010" at each end of both primary and secondary shoes (.003" maximum variation).

Brake Pedal Free Play Adjustment: .240" to .440". If play not correct after brake adjustment, loosen lock nut on the eccentric bolt attaching brake pedal to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder: Located on engine side of fire wall.
Checking Fluid—Maintain fluid level to within 1/2" of top of reservoir.
Removal—Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to fire wall.

Power Brakes: Bendix Vacuum Power Unit (combination vacuum power unit and master cylinder). Unit mounted on engine side of fire wall and replaces regular master cylinder.
See "Bendix Power Unit" in Brake Section.
Checking Fluid—Same as for regular master cylinder.
Removal of Power Unit—Disconnect valve pushrod from brake pedal assembly in drivers compartment. Remove master cylinder outlet fitting bolt from master cylinder. (NOTE—It is not necessary to remove stop light switch, wires or hose assembly from outlet fitting. Do not disturb outlet fitting in master cylinder). Loosen clamp securing manifold vacuum hose to check valve on power unit. Remove hose from valve. Loosen clamp securing vacuum reserve tank hose to fitting on check valve. Remove four capscrews securing power brake assembly to bracket on dash panel and remove power brake assembly.

MISC. MECHANICAL

Windshield Wipers: Cable operated vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Own. *See "Lincoln Air-Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Power Window Regulators" in Miscellaneous Section.*

Power Top Control: Reversible type motor (mounted under seat) drives two screw type jacks (one on each side) through flexible cables. Controlled by relay and two-way switch. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric type. Individual motor for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

HO D ASSEMBLY

1949-51 MODELS

HOOD ALIGNMENT: Fore-and-Aft Adjustment—3 hood hinge bracket-to-hood screws at each hinge. Loosen screws just enough to allow hinge to hold hood in place when raised. Lower hood, shift hood fore and aft until correctly positioned. Raise hood without disturbing alignment, tighten screws. Check hood safety catch action (bend catch if necessary).

Up-and-Down Adjustment—Loosen locknut on top of latch dowel. Turn dowel with screwdriver **down** if hood fits too tight, **up** if hood loose on dowel or too much clearance at lower edge of hood. Tighten locknut.

RADIATOR GRILLE REMOVAL: (1949-50)—Remove center grille ornament by taking out four bolts holding right and left hand grilles to center ornament. Remove capscrew holding center grille ornament to grille opening panel and take out sheet metal screws holding ornament to stone deflector. Disconnect parking lamp wire. Remove four sheet metal screws holding radiator grille extension (1950) to fender and opening panel. (Accessible from inside front wheel opening). Remove extension including lamp assembly. Remove sheet metal screw securing grille to grille opening and take out bolts securing grille to bracket. Remove bolts holding grille to center ornament.

(1951)—Center Grille Section Removal—Remove 8 bolts holding right and left hand grilles to center section and remove bolt holding center section to stone deflector. Push center grille backward and remove through opening between opening panel and radiator.

(1951) Right or Left Hand Grille Removal—Working from inside fender, remove two bolts holding grille to opening panel, and take out bolt holding grille to stone deflector bracket. Remove the lower bolts holding grille to center section.

1952-53 MODELS

HOOD ALIGNMENT: For "fore & aft" adjustment of hood, loosen capscrews securing rear hood reinforcement to hood and shift hood as necessary. Hood may be raised or lowered at front end by adjusting front hood bumpers. To adjust guide plate, loosen three bolts securing guide plate to latch support. Lower hood carefully and center the lock dowel in guide plates. Raise hood and tighten the bolts. Locking tension of hood lock dowel can be adjusted by loosening locknut on dowel and turning dowel in either direction.

TIGHTENING SPECIFICATIONS

1946-48 MODELS

	Ft.Lbs.	In.Lbs
Cyl. Hd. Nuts (All C.I. Hds.)	50-60	600-720
Cyl. Hd. Nuts (Al. Hds.)	35-40	420-480
Con. Rod Nuts (castellated)	35-40	420-480
Con. Rod Nuts (self-locking)	40-45	480-540
Main Bearing Nuts	75-80	900-960
Flywheel Capscrews	65-70	780-840

1949-53 MODELS

Cylinder Head Capscrews	65-70	780-840
Main Bearing Capscrews	80-90	960-1080
Connecting Rod Nuts	45-50	540-600
Flywheel to Crankshaft	75-85	900-1020
Engine Front Support	65-70	780-840
Eng. Rear Support to Trans.	55-60	660-720
Clutch Cover Mounting Screws	22-26	264-312
Flywheel Housing:		
To Cylinder Block	40-45	480-540
To lower Front Cover	15-18	180-216
Trans. to Flywheel Housing	30-35	360-420
Exten. (or OvDr.) to Trans.	40-45	480-540

1954-55 MODELS

	Ft. Lbs.
Cylinder Head	①65-75
Intake & Exhaust Manifold	23-28
Exhaust Crossover Pipe	35-40
Oil Pan	12-15
Main Bearing Caps	80-90
Con Rod Cap Nuts	45-50
Con Rod Cap Locknuts	3-3½
Crankshaft Pulley	85-95
Camshaft Sprocket	35-45
Camshaft Thrust Plate	12-15
Rocker Arm Support Bracket	12-15
Rocker Arm Cover	2-2½
Engine Front Cover (⅜")	23-28
Engine Front Cover (5/16").	12-15
Water Outlet	12-15
Water Pump Mounting	12-15
Oil Pump Mounting	12-15
Oil Filter	20-25

①—See Cylinder Head Installation (below) for tightening procedure. Three different torque applications must be made.

ENGINE REMOVAL

1946-51 MODELS

ENGINE REMOVAL: For Engine Servicing—Drain cooling system and crankcase. Remove engine as follows:

1. Disconnect and remove radiator hoses and thermostats, remove radiator.
2. Disconnect cables and remove battery.
3. Remove engine hood by taking out capscrews in hood hinges and bolts in support arms at each side.
4. Disconnect all wires and cables at engine accessories (remove spark plug wires and conduits), disconnect ground cable at rear of engine.
5. Disconnect hand throttle and choke cables at carburetor (free hand throttle cable clamp at dash and loop cable out of way by hooking it back of regulator, free choke cable clamp at dash and hook cable back of battery box), disconnect fuel line at fuel pump.
6. Remove all engine accessories (except water pumps and starter), remove oil filler pipe.
7. Loosen clamp on exhaust crosspipe, disconnect both exhaust pipes at exhaust manifold connections, remove crosspipe.
8. Remove two engine front support bolts.
9. Install sling on engine, attach hoist and take up slack in cables.
10. Remove front floor pan, take out capscrews mounting transmission on flywheel housing.
11. Remove engine straight forward to disengage clutch shaft, then lift engine out of chassis.

1952-53 MODELS

ENGINE REMOVAL: Drain radiator and engine oil pan, then proceed as follows:

1) Mask edge of hood, fender, and cowl to protect the paint. Take out hinge assembly-to-hood capscrews and remove hood.

2) Disconnect battery cables and remove battery.

3) Remove heater blower motor by disconnecting clips attaching delivery chamber to dash and turning entire assembly clockwise. Remove air cleaner.

4) Remove heater hose from water pump and cylinder head. Disconnect fuel pipe at flexible hose, and windshield wiper hose at vacuum booster pump. Disconnect throttle rod from throttle lever and remove "Z" bar from dash.

5) Disconnect the following wires: battery and overdrive wires from coil, wire from temperature gauge sender unit on left cylinder head, all generator wires, wire from oil pressure gauge sender unit.

6) Free wiring cable from clip at crankcase ventilator pipe and from retainer on cylinder head. Remove overdrive cable from clip at rear of left cylinder head.

7) Remove both upper radiator hoses. Remove generator and fan assemblies from engine.

8) Loosen lower radiator hose clamps and slide hose toward water pump as far as possible.

9) Take out three bolts at each side of radiator attaching radiator to support, remove horns and place them behind grille, remove upper radiator air deflector, remove radiator.

10) Disconnect battery cable at starter, remove kick-down switch (overdrive cars only).

11) Raise car on hoist for following operations: Drain transmission. Remove speedometer drive cable. Disconnect shift rods at transmission case levers, disconnect clutch pedal retracting spring and release rod from clutch release lever, disengage equalizer bar tension spring and remove equalizer bracket assembly. Remove overdrive solenoid, governor, and control cable (overdrive cars only).

12) Disconnect propeller shaft at rear universal joint (detach joint from companion flange).

13) Remove front and rear engine mounting bolts.

14) Detach exhaust pipe from right hand bank exhaust manifold.

15) Lower car to floor for following operations: Remove oil filter. Install engine lifting hooks, lift engine out of car (*CAUTION*—guide rear of engine assembly out carefully).

ENGINE INSTALLATION: Reverse removal procedure

1954-55 MODELS

ENGINE REMOVAL (LESS TRANSMISSION): 1) Mask edge of hood, fender and cowl, place fender covers on fenders. Remove capscrews that retain hinge assembly to hood, remove hood.

2) Remove carburetor air cleaner, disconnect and remove battery.

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3) Drain cooling system and oil pan. (Drain cocks in engine assembly are located on each side and to front of cylinder block).
4) Disconnect both upper and lower radiator hoses, then remove radiator. (Radiator is retained by three bolts, nuts and lockwashers at each side). Remove fan assembly.
5) Disconnect heater hoses at water control valve and water pump. Disconnect and remove heater blower and duct assembly.
6) Disconnect starter cable at starter motor (On Merc-O-Matic disconnect transmission fill tube bracket at exhaust manifold). Disconnect primary ignition wire to coil, water temperature gauge sending unit and oil pressure sender unit wires.
7) Disconnect flexible fuel line at fuel pump and windshield wiper vacuum hose from vacuum booster pump. If car equipped with windshield washer, disconnect and remove windshield washer.
8) **On Standard or Overdrive Transmissions,** disconnect clutch pedal retracting spring and release rod from clutch release lever. Disengage equalizer bar tension spring and remove equalizer bracket assembly from flywheel housing. Let equalizer bar and clutch release rod hang from frame.
9) **On Merc-O-Matic Transmissions,** disconnect accelerator linkage (Z-bar) at firewall and throttle valve rod at clevis (linkage remains on engine).
10) Disconnect engine ground strap at firewall. *NOTE*—If vehicle equipped with power brake or power steering, remove these units at this time.
11) From underneath car, remove splash shield in front of linkage and the end and lower converter access covers from transmission bell housing.
12) Disconnect accelerator pedal linkage at accelerator shaft.
13) Remove starter assembly. To remove starter, turn wheels to extreme left turn position and pull starter down between tie rods and tubular engine support crossmember.
14) Disconnect generator field and ground wires from generator.
15) Disconnect exhaust manifold-to-muffler inlet pipe.
16) Remove hex bolts (6) and nuts securing flex plate to converter (Merc-O-Matic only).
17) Remove capscrews (2) securing engine assembly to flywheel housing.
18) Position transmission lift under transmission to support transmission while engine is out of vehicle.
19) Remove capscrews (2), each side, securing engine to front engine mounts, and loosen self-locking nuts retaining engine mounts to engine front cover support.
20) Inside of vehicle, pull front carpet and insulation away from floor pan and remove rubber grommets (2) covering openings to two upper capscrews securing engine assembly to flywheel housing and remove capscrews.
21) Attach hoisting sling to engine, positioning sling to properly lift engine without transmission, and take up load of engine with hoist. Adjust transmission lift and gently pull engine away from transmission. Raise engine, carefully pull it forward and lift out of engine compartment. *CAUTION*—When removing engine, be sure oil pump pickup tube and oil filter are clear of engine mount.

Installation: Reverse removal procedure above.

OIL PAN REMOVAL

1946-48 MODELS

OIL PAN REMOVAL: Drain oil. Disconnect steering drag link at steering gear pitman arm. Loosen clamp on exhaust pipe at left manifold and remove cross-pipe. Take out capscrews in ball joint at rear end of front radius rods, lower rear end of rods and block down. Take out engine splash pan mounting screws and move pan to side out of way. Remove starter. Disconnect oil filter return line at oil pan connection, remove oil level indicator stick and tube. Take out oil pan screws and lower pan.

NOTE—Additional clearance can be secured by attaching hoist to front bumper bars and raising front end of car slightly.

1949-51 MODELS

OIL PAN REMOVAL: Car manufacturer recommends following method be used (pan can be removed without draining oil).

1)—Take off exhaust pipe cross-over (secure manifold heat valve with one nut).

2)—Remove steering idler arm bracket from right frame rail and pull down.

3)—Remove starter.

4)—Take off flywheel housing lower front cover (cover drops straight down after removing nuts and bolts). Remove oil dip stick tube from pan.

5)—Remove 16 oil pan-to-block capscrews using ⅜" drive tools. Lower rear end of pan and slide out to rear.

NOTE—Front end of engine does not have to be raised to remove pan.

1952-53 MODELS

OIL PAN REMOVAL (With Engine in Car): Take out two bolts attaching steering idler arm support to frame, pull steering linkage down. Remove starter. Remove front and bottom flywheel housing cover (pull straight down after removing attaching nuts and bolts). Remove oil level indicator tube. Take out all pan-to-block capscrews, lower rear end of pan and slide pan out to rear. NOTE—Lower section of crankcase ventilator tube should be removed if work being performed on engine.

CYLINDER HEAD & MANIFOLD

1946-48 MODELS

CYLINDER HEADS: Heads are new design as listed below. These heads are interchangeable (Right & Left) and have larger water passages and increased valve clearance required for use with the new "41A" and "59A" Cylinder blocks.

CAUTION—New design head gaskets must be used with these new type heads.

Part No.	Cylinder Heads	Used on
59A-6050-B	(2 used—Stmpd. 59A-B)	90 & 100 HP.

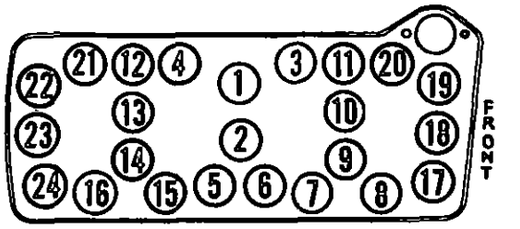
NOTE—Head may be identified by part number prefix "59A" cast on top surface.

1946-53 MODELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews in correct sequence as shown in diagram. Tighten all screws to correct tension and recheck after engine has been run and thoroughly warmed up.

▷*CAUTION—Coat cylinder head capscrew threads with sealer before installing.*

Tightening Torques—See Tightening (Torque Wrench) specifications.



1946-53 CYLINDER HEAD

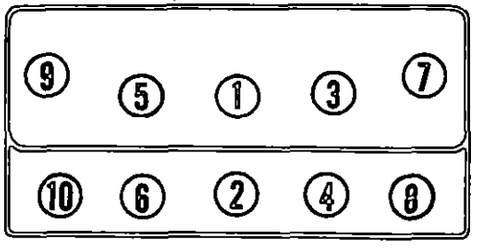
1954 MODELS

▷*1954 SERVICE REPLACEMENT CYLINDER HEAD*

NOTE: Cylinder Head, Part No. B4A-6049-E is adaptable to either the 14mm or 18mm spark plugs. Spark plug holes are drilled and tapped for 18mm spark plugs and a special adapter, Part No. B4A-6060-A, is provided so that 14mm plugs may be used. Adapter can be installed by threading plug into adapter, then installing assembly in cylinder head and torquing to 25-30 ft. lbs. which is sufficient to seal adapter in place.

1954-55 MODELS

CYLINDER HEAD INSTALLATION: Install pilot studs (made from cylinder head bolts with head cut off) in two end capscrew holes in block, coat NEW steel head gasket lightly with 8M-19554-A Sealer and install gasket over studs and dowels. Install cylinder head assembly over studs and dowels with plugged water jacket hole to rear of engine. Install cylinder head capscrews and tighten screws as follows: Tighten all screws to 55 ft. lbs. torque, engine cold, then retighten to 65 ft. lbs., with engine cold. After engine assembly has been completed, run engine for a minimum of 20 minutes at fast idle and retighten all head screws to 75 ft. lbs. torque. Use Tool S-8663-A to tighten all screws on right bank and lower screws on left bank. Use Tool P-8675 to tighten screws under rocker arm on left bank.



1954-55 CYLINDER HEAD

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CYLINDER SLEEVES

1946-48 MODELS

CYLINDER SLEEVES: Dry type steel or cast iron cylinder sleeves used in production on some engines. On engines with sleeves, engine may be marked with letters 'HS' stamped on top of block beside inner front corner of left cylinder head.

Service Limits: Steel sleeves should be replaced if worn more than .003" or if ridged at top due to wear. Sleeves which have been buckled (visible waves or burned spots) must also be replaced.

Steel Sleeve Installation: Sleeves should be removed and installed with a puller which applies pressure evenly (do not use arbor press). Use Sleeve Replacer tool, No. 6055-A, to install new sleeves, check sleeves after installation for buckling using a plug gauge or new piston. If piston sticks at any point, remove sleeve and install another new sleeve.

Cast Iron Sleeve Installation: These sleeves are thicker than steel type and cylinder must be bored out for sleeve installation. Rebore cylinder to size .0012" smaller than outside diameter of sleeve to provide correct press fit, counterbore top of cylinder to fit flange on upper end of sleeve, press sleeve in place.

NOTE—These sleeves are furnished with finished cylinder bore to fit a standard size piston. No finishing operations are necessary.

Fitting Pistons on Sleeve Equipped Engines:—Special gauge thicknesses used (not same as for engine without sleeves). See Piston Fitting Instructions on each car model page for complete instructions.

CONNECTING ROD & BEARINGS

1946-48 MODELS

CONNECTING ROD BEARING SERVICING: Bearings float between connecting rod and crankpin and have bearing surface on both sides. Running clearance for oil film must be provided at inner face (on crankpin) and outer face (in connecting rod bore) and replacement bearings are furnished both Undersize (on crankpin) and Oversize (in connecting rod) as indicated in Replacement Bearing data (following). Check crankpin diameter, connecting rod bore diameter, and bearing thickness with micrometer and select replacement bearings to give correct clearances as follows:

Connecting Rod—If bore worn more than .0015" over original size of 2.220" (2.2195-2.2220"), rod should be replaced (or honed for oversize replacement bearing).

CAUTION—Both rods used on each connecting rod bearing **must be same size.** Replace or hone both rods to same size (one bearing used for two rods).

Connecting Rod Bearing—Measure bearing thickness with micrometer gauge by placing a piece of round stock on inner face of bearing and measuring total thickness of bearing and stock (measure stock separately and subtract from micrometer reading for bearing thickness figure). Replace bearings measuring less than .1085" thick. New bearing thicknesses are .1095".

Crankshaft Crankpins—Check crankpins for condition, replace crankshaft or re-machine crankpins if scored or grooved, tapered more than .001", or out-of-round more than .0015". Shafts should be re-machined as noted under "Crankshaft & Main Bearing" section below. NOTE—If crankpins worn evenly, and to less than maximum limits given above, crankshaft will be satisfactory for service providing that connecting rod bearings installed which provide bearing clearance of less than .005" (desired bearing clearance .0015-.0035").

1949-51 MODELS

CONNECTING ROD INSTALLATION: Install connecting rods with oil squirt holes as follows—Left bank rods with oil squirt holes to front side and right bank rods with oil squirt holes on rear side. Left bank rod numbers must be towards the left side of engine and right bank rod numbers towards right side of engine.

1949-51 MODELS

CONNECTING ROD BEARINGS: Two types used, early 1949 bearing has no oil squirt hole. Late 1949 and later bearings have squirt hole and carry different part numbers.

CRANKSHAFT & MAIN BEARINGS

1954 MODELS

REAR MAIN BEARING OIL SEALS: ***(NOTE—Two different type seals have been used in production, and they are not interchangeable.)***

Early Cars—Remove old seal material from cylinder block and from retainer cap. Remove oil seal retainer to block seals. Install new journal seal in cylinder block and in oil seal retainer cap with Tool 6701-A. Seals must be cut flush with block and retaining cap with no frayed edges overlapping. Install new retainer cap to cylinder block seals in retainer and install retainer with seals in position in Tool 6335. Place assembly over pilot studs of tool and push into position in block. After assembly has been in position a few minutes, trim vertical seals so approximately 5/64" of seal remains above retainer. Install retainer bolts and oil pan.

Later Cars—Remove oil seal material from cylinder block and seal retainer cap. Remove oil seal retainer to block seals. Install new journal seal in cylinder block and in oil seal retainer cap with Tool 6701-A. Cut seals flush with block and retaining cap with no frayed edges overlapping. Install new retainer to block seals after installing retainer cap in cylinder block by dipping seals in oil and slipping them up between block and retainer in the holes provided. It may be necessary to tap them into place for the last ½". Allow .050" to .070" of retainer to block seals to protrude past oil pan to retainer mating surface. This portion will embed itself into oil pan gasket. Install oil pan.

1955 MODELS

REAR MAIN BEARING OIL SEALS: *NOTE*—Crankshaft seal is installed in groove in block and in Seal Retainer (directly behind rear main bearing). Retainer is sealed in block by special sealing strips inserted in grooves in sides of retainer after it is installed in the block.

►***SEAL RETAINER PRODUCTION CHANGE:*** Aluminum retainer used on later engines (previous type was zinc). When installing this aluminum retainer, a ⅜" flat washer must be used under the head of each retaining bolt.

Seal Installation: With crankshaft out, install new packing in groove in block and in groove in retainer using Tool 6701-A to seat packing. Cut packing off flush with surface before removing tool ***(CAUTION*** —do not leave frayed edges which may prevent proper seating of retainer in block). After crankshaft installed, coat retainer-to-block mating surface lightly with oil resisting sealing compound, install retainer **without** side seals, tighten retainer screws securely (see Seal Retainer Production Change above). Dip side seal strips in engine oil and install immediately (seals are special graphite coated rubber asbestos composition and will swell immediately on contact with engine oil). Side seals may be tapped in place with a mallet but should project approximately .050-.070" below oil pan gasket surface after installation. DO NOT cut off this excess length.

Testing Seal Installation—Squirt engine oil along seal retainer-to-block parting line, direct compressed air nozzle at inner upper corners of retainer. If air bubbles noted, remove and clean retainer thoroughly, install new side seals.

1954-55 MODELS

CRANKSHAFT THRUST BEARING ALIGNMENT: After #1, #2, and #4 bearing caps and inserts have been installed and properly torqued, install #3 bearing cap and insert. Install capscrews snug, then pry crankshaft toward rear of engine. Reverse this action by prying crankshaft forward (toward front of engine). This will align thrust surfaces of both halves of thrust bearing. RETAIN THIS FORWARD PRESSURE on the crankshaft, and tighten capscrews to 80-90 ft. lbs. torque. Check crankshaft endplay which should be .002-.006".

ENGINE FRONT COVER

1954-55 M DELS

CRANKSHAFT FRONT OIL SEAL INSTALLATION: Coat seal with engine oil, place seal on Tool 6700-B. Center tool and seal over inner end of bore in front cover, drive seal in until it is seated.

1954-55 MODELS

ENGINE FRONT COVER INSTALLATION: Use new gasket and position Tool 6059 on crankshaft to align cover with block before installing cover capscrews. Tighten screws to correct torque (see Tightening Specifications).

CAMSHAFT & BEARINGS

1946-48 MODELS

CAMSHAFT BEARING SERVICING: Camshaft bushings should be replaced if scored or worn to inside diameter greater than 1.7985". Replace bushings as follows:

Bushing Removal & Installation—Use puller, No. 6261-A, to remove bushings so that bushing is drawn out evenly. Install new bushings with same tool making certain that oil holes in bushing line up with oil channels in cylinder block. New bushings are finished type and need not be reamed.

Bearing Clearance—.001-.002" (new), .004" (worn limit).

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1949 MODELS

CAMSHAFT PRODUCTION CHANGE (1949 MERCURY VEHICLE NO. 9CM-826 UP): Change to REVERSE helix timing gears giving forward thrust at front end of camshaft for silencing backlash (was toward rear on early engines with normal gears). Oiling at front end modified with a change in front camshaft bearing position (same bearing used). Parts for both types are as follows:

CAMSHAFT PRODUCTION PARTS CHANGES

	Early Type	9CM-826 UP Type
Camshaft	8CM-6250	8CM-6250-B
Camshaft Gear	7RA-6256	8BA-6256-A
Crankshaft Gear	48-6306	8BA-6306
Oil Line Plug	8BA-6026	7HA-6026

NOTE—Beginning Vehicle #145,832 new fiber camshaft timing gears used. Part No. 8BA-6256-D (Std.), E (.006" oversize), F (.012" oversize).

Following modifications made for use of new REVERSE helix timing gears:

1)—**Timing Gears.** Reverse helical gears (L.H. teeth on camshaft gear, R.H. teeth on crankshaft gear).

2)—**Camshaft.** Oil hole in front bearing journal moved 1/16" (center of hole .440-.450" to rear of flange on shaft, was .507-.512" on early shafts). Inside diameter increased to 3/16" (was ⅛" on early shafts). Outer end of hole is at front of shaft on both types of camshafts.

NOTE—Beginning vehicle #145832 new fiber camshaft timing gear is used. Mercury Part No. 8BA-6256-D (Std.), E (.006" oversize), F (.012" oversize).

►3)—**Camshaft Front Bearing Position**—***CAUTION—Same bearing used but position in block different for each type camshaft. This is important to provide correct lubrication for front end of camshaft (alignment of upper oil hole in bearing with oil hole in camshaft front bearing journal). Bearing positioned as follows:***

Bearing Position for Late (8CM-6250-B) Camshaft—Installed with front edge **flush** with front face of block to align upper oil hole in bearing with relocated hole in camshaft front bearing journal (see No. 2 above).

Bearing Position for Early (8CM-6250) Camshaft—Installed with front edge **1/16" back** from face of block for oil hole alignment.

4)—**Cylinder Block Front Oil Line Plug.** Solid plug in oil line (above camshaft). Early type plug equipped with oil hole for front end gear lubrication. With this new plug front end gears and thrust surfaces lubricated from front end of camshaft (oil fed from main oil line lead at front camshaft bearing into oil lead in shaft and out through front end of shaft).

1949-53 MODELS

CAMSHAFT BEARING SERVICING: Replace camshaft bearings if scored or worn beyond limits.
Removal—With Tool 6261-B, drive front bearing inward. Slide tool pilot into front bearing hole and drive out center and rear bearings.

Installation—With Tool 6261-B, install rear bearing so that the larger of the two oil holes is at the top. Install center bearing so the two equal size oil holes will be in a vertical position. Install front bearing with the larger of the two oil holes at bottom and front face of bearing flush to .010" below face of block.

1949-53 MODELS

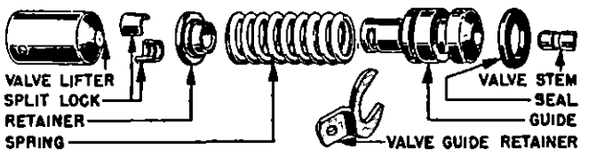
CAMSHAFT OIL PUMP & DISTRIBUTOR DRIVE GEAR (Removal & Installation): Remove camshaft (see Camshaft Removal following). Using Tool 6254-C (gear puller) remove oil pump drive gear and distributor drive gear.

Installation—Install both gears with Tool 6354-B (Installer). CAUTION—Make sure that both gears are seated against shoulder on camshaft, and that marks on front end of shaft line up with mark on distributor drive gear.

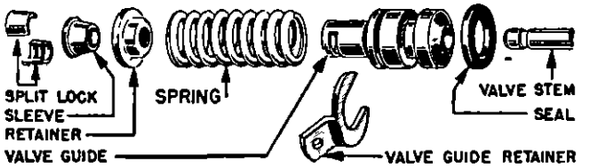
1949-53 MODELS

CAMSHAFT REMOVAL & INSTALLATION: Camshaft can be removed with engine in car, as follows: Remove radiator, cylinder heads, and intake manifold. Remove valves, guides, and spring assemblies. Remove valve lifters. Remove fan assembly, crankshaft pulley and front engine cover. Withdraw camshaft being careful not to damage camshaft bearings. Install camshaft by reversing removal procedure.

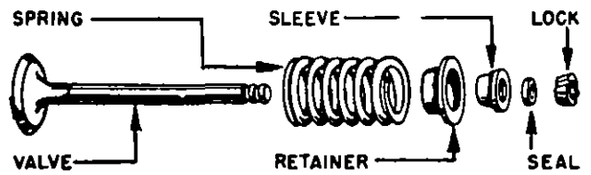
►***REMOVAL NOTE—If new camshaft is not to be installed, or if valves are not to be ground, wedge valves open with a wooden wedge placed under valve head. Raise valve lifters and insert a cotter pin in lifter oil hole to hold lifters up. Camshaft can then be removed by rotating cam to clear lifters.***



1946-50 CONVENTIONAL VALVE ASSY.



1951-53 ROTATABLE VALVE ASSY.



1954-55 ROTATABLE VALVE ASSY.

1954-55 MODELS

CAMSHAFT BEARING REMOVAL & INSTALLATION:
Removal—Remove camshaft and drill a ½" hole through plug at rear bearing bore and remove plug. Remove bearings from block with Camshaft Bearing Remover & Installer 6261-C and adapter pilots 6261-F.

Installation—Install bearings with same tool used for removal making sure that oil holes in bearings are in line with holes in cylinder block web. Notch on edge of bearing should face front of engine at bottom of bore. *(CAUTION—*#1 camshaft bearing must be flush with front face of block or not more than .010" below surface of face). After all bearings have been installed, coat a new camshaft rear bearing plug with sealer and install in block.

TIMING GEARS

1946-53 MODELS

TIMING GEARS: Bolted-on type gear used, which can be removed without removing camshaft from engine as follows:

Camshaft Gear Removal and Installation:—Gear is bolted on camshaft hub flange by 4 offset capscrews. To remove gear, remove crankshaft pulley —use Puller 6312-N, and timing gear cover. Bend back lock plate tangs, take out four camshaft gear mounting capscrews, remove gear. When replacing gear, make certain that marks on camshaft and crankshaft gears are lined up and see that lockplate tangs are bent up against flats on mounting screws. NOTE—Camshaft gear mounting screw holes offset so gear can only be installed in correct position. Use 6312-B Pulley Replacer to install crankshaft pulley.

Replacement Gears: Crankshaft gears are Cast Alloy Steel and are furnished in one size only. Camshaft gears are Fibre or Aluminum and are furnished Standard, .006", .010" Oversize.

VALVE SYSTEM

1951-55 MODELS

ROTATABLE VALVES: Standard equipment on 1951 and later engines. A two-piece type retainer (retainer and sleeve) and shorter valve spring used. Valve locks are same as previous type.

►***ROTATABLE VALVE INSTALLATION ON 1949-50 MODELS—Rotatable valves and parts can be installed in engine equipped with conventional valves by changing the valve spring, spring retainer, exhaust & intake valves, and installing new retainer sleeve. VALVE GAP SPECIFICATIONS ARE NOT CHANGED WHEN ROTATABLE VALVES INSTALLED.***

1954-55 MODELS

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves):* Stem diameter has been decreased .0005" to provide greater stem clearance in guide. NEW stem diameters are:

Size	Stem Diameter
Std. (Marked Red)	.3400-.3405"
Std. (Marked Green)	.3405-.3410"
.003" Oversize	.3430-.3440"
.015" Oversize	.3550-.3560"
.030" Oversize	.3700-.3710"

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1946-53 MODELS

VALVE ASSEMBLY SERVICING: Complete valve assembly (valve, spring, and guide) should be removed and installed as a unit.

Disassembly: Install the valve assembly in Tool 6505-C, compress spring, remove valve spring retainer locks, release spring tension, remove valve spring retainer, sleeve, spring, guide, and valve.

►*ROTATABLE VALVE NOTE—Rotatable type valves used on all 1951 and later engines.*

Reassembly (Rotatable Valves): Place valve, guide, spring, and spring retainer in compressing tool. Assembly valve locks in valve retainer sleeve, hold locks in sleeve and start sleeve over end of valve stem. Compress valve spring and work sleeve and locks up into place with fingers until locks engage groove in valve stem

Valve Assembly Installation: Turn crankshaft so that valve lifter is at lowest position (on heel of cam). Lubricate intake guides and seals and all valve stems. Insert valve assembly in cylinder block, use compressor bar engaged in groove in lower end of guide to pry guide downward, install retainer. Make certain that retainer engages groove in guide and that it seats properly when guide released.

1954-55 MODELS

VALVE SERVICING: Valves are "Rotatable" type operating directly in valve guide holes in cylinder head and are removed and installed as follows:

Valve Removal—Use Tool 6513-EE to compress valve springs, remove valve spring locks, retainer sleeve, retainer, spring, and "umbrella" type oil seal. Discard oil seal.

Valve Assembly Installation—Install valve in port from which it was removed. Install valve stem oil seal with cupped side toward valve guide boss. Install valve spring, spring retainer, retainer sleeve, and valve locks.

VALVE GUIDES

1949-53 MODELS

►**VALVE GUIDE OIL SEALS:** Late type engines are equipped with rubber seals on intake valve guides. Use late type guides for replacement on all 1949 engines. Mercury Part numbers 8BA-6510-B (Guide) and 8BA-6571 (Seal).

1954-55 MODELS

OVERSIZE VALVE STEM INSTALLATION: Use Tool 6085 Piloted Reamer to ream cylinder head valve guides for oversize valve stems. Reamers are furnished in .003", .015", .030" oversizes. Pilots are Std., .003", .015". Use reamers in sequence with correct pilot when reaming from standard to oversize. Regrind valve seats after reaming guides.

VALVE TAPPET ADJUSTMENT

1946-53 MODELS

TAPPET CLEARANCE ADJUSTMENT: After installing valve assembly (above), check tappet clearance with lifter on heel of cam. If clearance not within limits, grind end of valve stem (to increase clearance), install a new valve or grind valve in (to decrease clearance).

Valve Grinding and Tappet Clearance Note:—To perform these operations with minimum amount of hand cranking, note which valves are fully open (first column in table below), grind or check valves listed on same line of table—then turn shaft until next 'valve open' point reached.

Valves Open	Valves to Grind
1. 4X & 1N	3X, 8N, 6N, 7X, 3N, 2X
2. 3X & 8N	1X, 7N, 5X, 2N, 4X, 1N
3. 1X & 7N	8X, 5N, 6X, 4N
OR	
1. 8X & 5N	1X, 7N, 6N, 7X, 3N, 2X
2. 6N & 7X	5X, 2N, 4X, 1N, 8X, 5N
3. 5X & 2N	6X, 4N, 3X, 8N

NOTE—'X' Exhaust Valve. 'N' Intake Valve.

1954-55 MODELS

INITIAL VALVE CLEARANCE: To insure valve being on low side of the cam, make all adjustments in the following sequence and with No. 1, 3, & 4 pistons in the indicated position:

No. 1 Piston at TDC (Compression Stroke)—Adjust No. 1 Intake & Exhaust, No. 2 Intake, No. 4 Exhaust, No. 5 Exhaust, and No. 7 Intake.

No. 4 Piston at TDC (Compression Stroke)—*(NOTE—Rotate engine 180° from the point where No. 1 piston is at TDC).* Adjust No. 6 Exhaust, No. 4 Intake, No. 8 Exhaust, No. 5 Intake.

No. 3 Piston at TDC (Compression Stroke)—*(NOTE—Rotate engine 270° from the point where No. 4 piston is at TDC).* Adjust No. 2 Exhaust, No. 3 Intake & Exhaust, No. 6 Intake, No. 7 Intake, No. 8 Intake.

►*CAUTION*—Final tappet adjustment is made after engine assembly is completed and with engine at normal operating temperature. The final setting is .019".

VALVE TIMING

1949-53 MODELS

VALVE TIMING CHECK: Remove valve cover (intake manifold) and right cylinder head. Crank engine over until intake valve #1 cylinder is opening. Line up pointer with timing mark on front dampener. Insert a piece of .020" stock between the exhaust valve (#1) stem and lifter. Crank the engine forward about 45°. Place contact point of dial indicator on head of #1 exhaust valve, and set dial to ZERO. Crank engine backward until timing marks are again lined up. If the valve timing is correct indicator will read .033" to .050" (1949-50), .026" to .044" (1951-53). If camshaft is one or more teeth out of time the dial readings will be considerably outside the limits given.

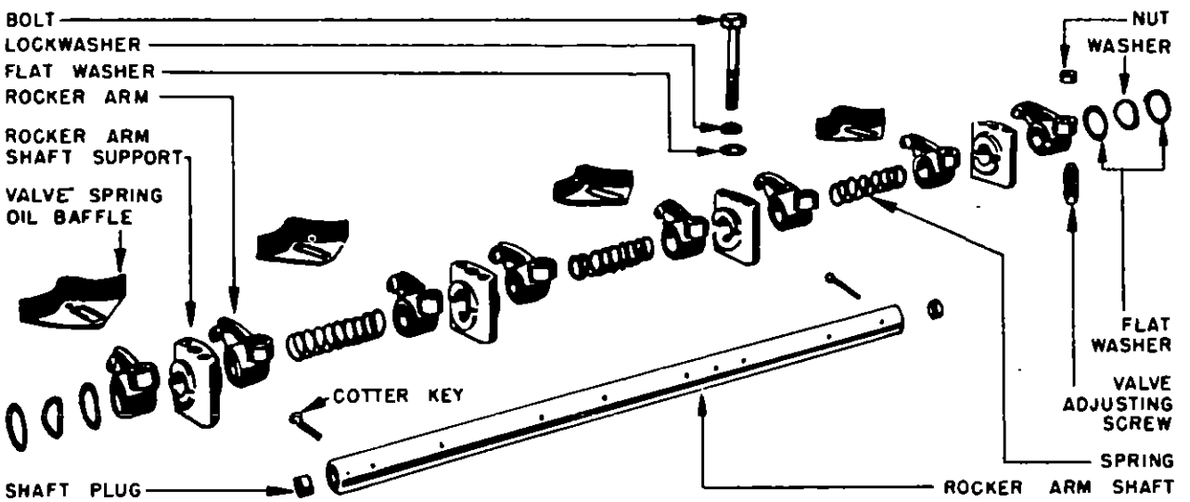
ROCKER ARMS

1954-55 MODELS

ROCKER ARM SERVICING: Disassembly—Remove assembly from head by taking out rocker arm shaft bracket retaining screws. Remove cotter pins at each end of rocker arm shaft and remove flat washers and spring washers. Slide rocker arms, springs, and washers off shaft *(Be sure to identify each part for assembly in same position).* Pull oil tube out of end rocker arm support to remove shaft from support.

Rocker Arm Shaft Assembly—Oil moving parts with engine oil. Install a plug at each end of shaft. **Do not peen plugs to make them tight.** Assemble rocker arm shaft parts in order shown in illustration. Install oil outlet tube in end of rocker arm support and make certain end of tube enters hole in shaft. Tighten rocker arm shaft support-to-cylinder head bolts to 45-55 ft. lbs. torque. Install rocker arm covers and tighten hold down bolts finger tight after making preliminary valve adjustment. Make final adjustment after engine warmed up to normal operating temperature. Install new gaskets (cement to cover only), install cover, and tighten hold down bolts to 2-2½ ft. lbs. torque.

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1954-55 ROCKER ARM ASSEMBLY

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OILING SYSTEM

OIL PUMP

1946-48 MODELS

OIL PUMP: Removal & Disassembly—To remove pump from engine, remove locking wire and take out mounting screw in pump mounting flange, pull pump down and out (NOTE—Pump body fits in recess in cylinder block and it may be necessary to jar it slightly to loosen it). To dismantle pump, remove strainer screen retainer spring, remove screen cover and gasket. Take out four capscrews in pump cover, remove cover, lift out pump driven gear. If pump shaft and pump driving gear are to be removed, drive out pin in drive gear, place pump in arbor press with support under drive gear, press shaft and driving gear out through lower end of housing.

Oil Pump Relief Valve—(Pressure Regulator) Note—On pumps with relief valve located on side of pump housing, remove locking wire, take out relief valve nut, spring and valve plunger.

Pump Shaft and Bushings—Shaft clearance in bushing should be .001-.003" and bushings should be replaced if clearance exceeds .005". Replace pump shaft if gear worn or if bearing surface worn to diameter of less than .097". Replace bushings if worn to inside diameter greater than .502". Remove old bushing with driver, press new bushing in place, line ream bushings to inside diameter of .500".

Pump Driven Gear & Shaft—Clearance between driven gear and stub shaft in pump housing should be .002-.0035". Replace shaft if clearance exceeds .005". To replace shaft, drive old shaft out of housing, press new shaft in place making certain that end of shaft will clear pump cover when it is installed.

Oil Pressure Regulator (Relief Valve)—Check relief valve spring tension and replace spring if tension less than 78 ozs., or more than 87 ozs. when compressed to length of 1.380".

Pump Assembly—Insert pump shaft on housing, press drive gear on shaft until clearance between gear hub and end of housing (endplay) is .017", drill new 5/32" hole through shaft in line with hole in gear, install 5/32" pin and peen both ends of pin to prevent loosening in service. Complete assembly by reversing disassembly instructions above.

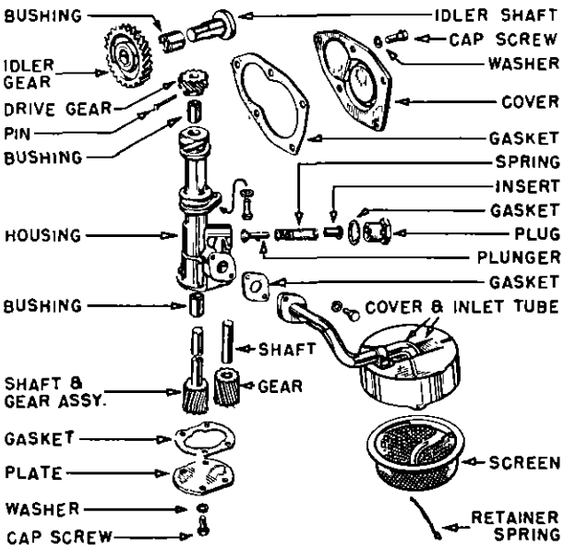
1949-53 MODELS

OIL PUMP: Gear type pump mounted on cylinder block inside oil pan at rear of engine. Pressure relief valve mounted in pump housing. NOTE—Early 1949 pumps have spur gears, and later type has helical gears.

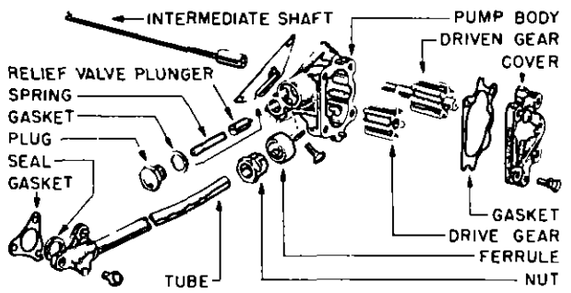
Removal: Drain oil, remove oil pan (see Oil Pan Removal), remove oil pump retaining screw and remove pump and strainer assembly.

Disassembly: Remove strainer assembly retaining screw, strainer and gasket. Remove cover plate and pump driven gear. Remove lock wire and pressure relief valve (plug, gasket, spring and valve). Drive out pin and remove upper driven gear. Slide shaft and drive gear assembly out of housing. Wash all parts in solvent and dry thoroughly, making sure that no dirt or metal particles remain in housing.

Inspection: Check pump housing for cracks or excessive wear. Pump shaft should have a free running fit without excessive endplay in bushings (.0005" to .0025" clearance). Check pump gear teeth for scratches and wear. Measure clearance between pump gears and pump body, which should be no greater than .005". Check compression relief valve spring which should be 12 lbs. ±2 ozs., when compressed to 1.14". Clearance between oil pump driven gear and shaft should be .005" maximum.



1946-53 MERCURY OIL PUMP



1954-55 MERCURY OIL PUMP

Reassembly: Apply a thin coating of engine oil to all moving parts. Slide shaft and drive gear assembly into housing. Install upper drive gear, insert retaining pin, and rivet end of pin (NOTE—When installing new shaft and drive gear assembly, it will be necessary to drill a retaining pin hole in the shaft. Set the end clearance to .016" and use a No. 30 drill for the retaining pin hole). Install pump driven gear, cover plate and gasket. Tighten cover plate screws to 7-10 ft. lbs. torque. Install pressure relief valve, spring, gasket, and plug. Insert a piece of lockwire through hole in plug and twist wire around extension housing. Install strainer and gasket and tighten screws securely.

Installation: Slide pump into cylinder block, making sure upper drive gear meshes properly, and install retaining screw with a lockwasher. Tighten screw to 12-15 ft. lbs. torque. Install oil pan and fill crankcase with engine oil.

1954-55 MODELS

OIL PUMP: Gear type pump mounted on left hand side of engine crankcase and driven by intermediate shaft from distributor shaft. Pressure relief valve in oil pump housing.

Removal: Remove oil pump inlet pipe. Remove capscrews and lockwashers securing pump to engine block. Remove pump and gasket, and the intermediate shaft (if shaft comes out with pump).

Disassembly: Remove capscrews retaining pump cover to body and remove cover plate and gasket. Do not tap pump drive shaft to drive cover off pump. Remove oil pump gear and shaft assembly and oil pump idler gear. Remove oil pressure relief valve plug, gasket, spring and plunger.

Inspection: Check oil pump housing for cracks or wear. Pump shaft should have a free running fit without excessive play in pump housing (clearance is .0015-.0029" upper end, and .001-.002" lower end). Check pump gear teeth for scratches and wear. Check compression of relief valve spring which should be 10.86 lbs., at 1.40". Replace any worn or defective parts. Short end of drive gear shaft should be .500" ± 030". If longer than .530" replace drive gear assembly.

Reassembly: Oil all parts thoroughly. Install oil pressure relief valve plunger, spring, and cover plug and gasket. Install idler gear and oil pump gear and shaft assembly. Install cover plate with new gasket, and tighten cover plate screws to 12-15 ft. lbs. torque.

Installation: Reverse removal procedure using a new gasket between pump mounting flange and engine.

OIL FILTER

1954-55 MODELS

OIL FILTER SERVICING: Filter is full-flow type and should be replaced at 4000-5000 mile intervals (or more often if required by operating conditions).

▷*REPLACEMENT CAUTION:* Use Replacement Kit, Part No. HCK-6731-A, which includes correct Filter Element and NEW GASKETS WHICH MUST BE USED.

Filter Removal: Take out center bolt in filter cover, remove filter assembly. Remove and discard cover mounting gasket from filter mounting pad, remove and discard filter element. Remove and discard neoprene gasket from center bolt, remove center bolt from cover, remove and discard fibre center bolt-to-cover gasket. Wash all parts and filter pad on block with solvent and make certain they are clean.

Filter Installation: Install NEW fibre gasket on center bolt, install bolt in cover, install spring and seat assembly on bolt with open end of seat toward cover (*CAUTION*—Seat must be attached to spring by tangs). Install NEW neoprene gasket on center bolt next to spring seat, install filter element. Install NEW filter mounting gasket in block recess (*CAU-*

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TION—DO NOT use sealing compound on this gasket). Install filter element on engine, making sure that filter is seated in recess and not "cocked" over recess of shoulder. Tighten center bolt just enough to bring case up against gasket, rotate housing slightly to seat evenly, then tighten center bolt to 20-25 ft. lbs. torque. *CAUTION*—DO NOT overtighten the bolt which may strip threads, distort cover, or cause leaks. After engine started up allow it to idle until lubrication established and normal oil pressure secured, then speed up engine and check for oil leaks.

NOTE—An adapter is provided in cylinder block which can be easily replaced in case of stripped threads.

COOLING SYSTEM

1949-51 MODELS

WATER PUMP LUBRICATION: 1949 Models, with oil cup. Use a length of wire inserted in oil cup when oiling with oil can. Ordinary oil cans will not reach properly, and the wire allows air trapped in the reservoir to escape by the oil wick. No oil cup used on late 1949 and later models.

1949-52 MODELS

►*1949-52 MERCURY CYLINDER HEAD LEAKS (Caused by distributor hold-down bolt preventing proper seating of cylinder head):* If leaks noted near distributor, or if correct ignition timing not maintained, check hold-down bolt for bottoming on face of cylinder block and preventing head from seating. Replace original 1¼" long bolt with new type 1" bolt. NOTE —This 1" bolt used in later 1952 production.

1952-53 MODELS

►*COOLING SYSTEM PRODUCTION CHANGES:* During 1952 production, following changes were made in the cylinder block for a more constant coolant flow at high speeds and high temperatures:

Cylinder Block Water Bypass Holes (Right and Left Banks): Reduced from ½" to 11/32" diameter.

Water Pump Impeller Holes: Two 5/16" diameter holes have been added between impeller vanes.

►*REWORKING OF EARLY 1952 ENGINES FOR IMPROVED COOLING:* Production changes listed above can be incorporated in earlier engines as follows:

Cylinder Block Water Bypass Hole (Right & Left Banks): Make up reducer or adapter tubes:
Adaptor Tubes—Use ½" O.D., 11/32" I.D. tubing. Cut one end off at 45° angle, cut angle end of tubing back .17" and chamfer resulting square end portion of tubing for .06" x 45° chamfer. Cut tubing off to overall length of 1.90" (for RIGHT HAND BANK), 1.54" (for LEFT HAND BANK).

Adaptor Tube Installation—Insert correct adaptor tube in cylinder block water bypass hole with taper end in and open portion upward to align with hole opening in upper face of block. Drive tube in until it bottoms in block. *CAUTION—Angle end opening MUST BE UPWARD (bypass flow from cylinder head will be cut off if angle end opening downward).*

Water Pump Impeller Holes—Locate hole centers 43/64" in from outer edge of impeller between vanes and at two points diametrically opposite, drill completely through impeller using 5/16" drill.

FUEL SYSTEM NOTES

1949-50 MODELS

►*1949-50 MERCURY FUEL PUMP PUSHROD BUSHING INSTALLATION (To correct wear and excessive looseness of pushrod):* On cars **without pushrod bushing,** correct looseness of rod by installing bushing as follows: Remove ⅛" pipe plug on rear of cylinder block in line with main oil gallery. Drill through this opening to enlarge original .125" diameter oil hole leading from pushrod hole into end of main oil line to new size of .312" *(CAUTION*—use extreme care not to damage pipe plug threads in block). Bore or ream original pushrod bore hole in block to .593-.594", remove all chips and foreign material from hole, press new bushing No. 8BA-6025 in flush with upper boss. Replace ⅛" pipe plug using a suitable sealer to prevent oil leaks. *NOTE*—This bushing used in production beginning with later 1950 cars (can be identified by engine not having pipe plug at rear of block).

ENGINE HOOD NOTE: Hood is alligator type with release knob under instrument panel to left of steering column. To raise hood, pull out on release knob (hood will raise slightly), press in on safety catch under front edge of hood, lift hood up.

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBER: Stamped on top of clutch housing and on left frame side member near generator.

TUNE-UP

COMPRESSION: Pressure—105-125 lbs. at cranking speed of 100 RPM (Std. 6.75-1 Cast Iron Head).

VACUUM READING: Steady 18-20" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2 (Cyl. Nos. 1-2-3-4 Right Bank, 5-6-7-8 Left Bank, front-to-rear). See diagram.

SPARK PLUGS: Champion Type H-10. 14 mm. Metric. **Gaps**—.025"

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap—.014-.016" (both sets).

Cam Angle—36° (both sets operating together).

Breaker Arm Spring Tension—20-24 ozs.

Rotation—Clockwise viewed from drive end (distributor off engine).

Automatic Advance—Starts at 200 RPM. Maximum 11° at 600 RPM (distr. degrees & RPM).

IGNITION TIMING: See Ignition Timing.

Std. Setting—4° BTDC.

Timing Marks—None. See Ignition Timing for directions on setting of distributor for correct timing when installed on engine.

Vacuum Brake Setting—Set to just eliminate pinging when engine operated under load (back off screw until engine pings, then turn screw in until ping is eliminated).

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting—Both idle screws ⅝-¾ turn open and set for smooth idle and highest steady reading of vacuum gauge (when used). Idle speed 500 RPM. (can be judged by marking fan belt and setting speed for 25 revolutions of the belt in 10 seconds).

Float Level—Fuel level 11/16" (21/32 - 23/32") below top edge of bowl.

Accelerating Pump—Center (#2) hole Normal. Inner (#1) hole—Summer, Outer (#3) hole—Winter, for temperature extremes.

Fuel Pump Pressure: 3½ lbs. maximum (1½-3½ lbs.).

MANIFOLD HEAT CONTROL: Automatic thermostatic control type. Located in exhaust manifold outlet connection of left hand cylinder bank, diverts exhaust gases through by-pass in intake manifold to right cylinder bank when valve closed. See that valve operates freely.

VALVES: See Valve Timing.

Tappet Clearance—.010-.012" Intake, .014-.016" Exhaust, Cold. No adjustment.

STARTING: See Battery, Starter, Generator, and Regulator.

IGNITION

IGNITION SWITCH: Oakes Steering Column & Ignition Lock Assembly No. as follows:

	Steering Col. & Ign. Lock Oakes No.	Ignition Switch Ford No.	Oakes No.	Ford No.
LHD. Cars①	302995	59A-3676A	302494	11A-3680
LHD. Cars②	302960	59A-3676B	302494	11A-3680
RHD. Cars①	302998	59AF-3676D	302494	11A-3680
Sportsman	302992	*59A-3676C*	*302494*	*11A-3680*
Canadian Cars	302970	C59A-3676	302494	11A-3680

①—With Brown Trim. ②—With Grey-Green Trim.

Lock Cylinder—Hurd or Briggs & Stratton No. 80935. Ford No. 91A-3686A (with Keys).

Key Series—FK000 to FK999. **Groove**—No. 17.

COIL: Ford No. 1GA-12024. Mounted separately on left front corner of cylinder block.

Resistor Unit—Connected in coil primary circuit. Mounted on Circuit Breaker Assembly No. 11A-12250.

Ignition Current—4½-6 amperes (engine stopped). Ignition primary circuit resistance 1-1⅓ ohms.

CONDENSER: Ford Part No. 1GA-12300-B. Capacity—.29-.32 microfarad.

DISTRIBUTOR: Ford No. 59A-12127 (Less Terminal Housing, Cap, and Rotor). New flat type, single cap, "Sealed Dry" type with "V" outlet. Double breaker, 8 lobe cam, full automatic advance type with Vacuum Brake adjustment. Breaker "loading" and "timing" contacts operation unchanged.

Breaker Gap—.014-.016" (both sets). Use special two step feeler—.014" step "Go", .016" "No Go".

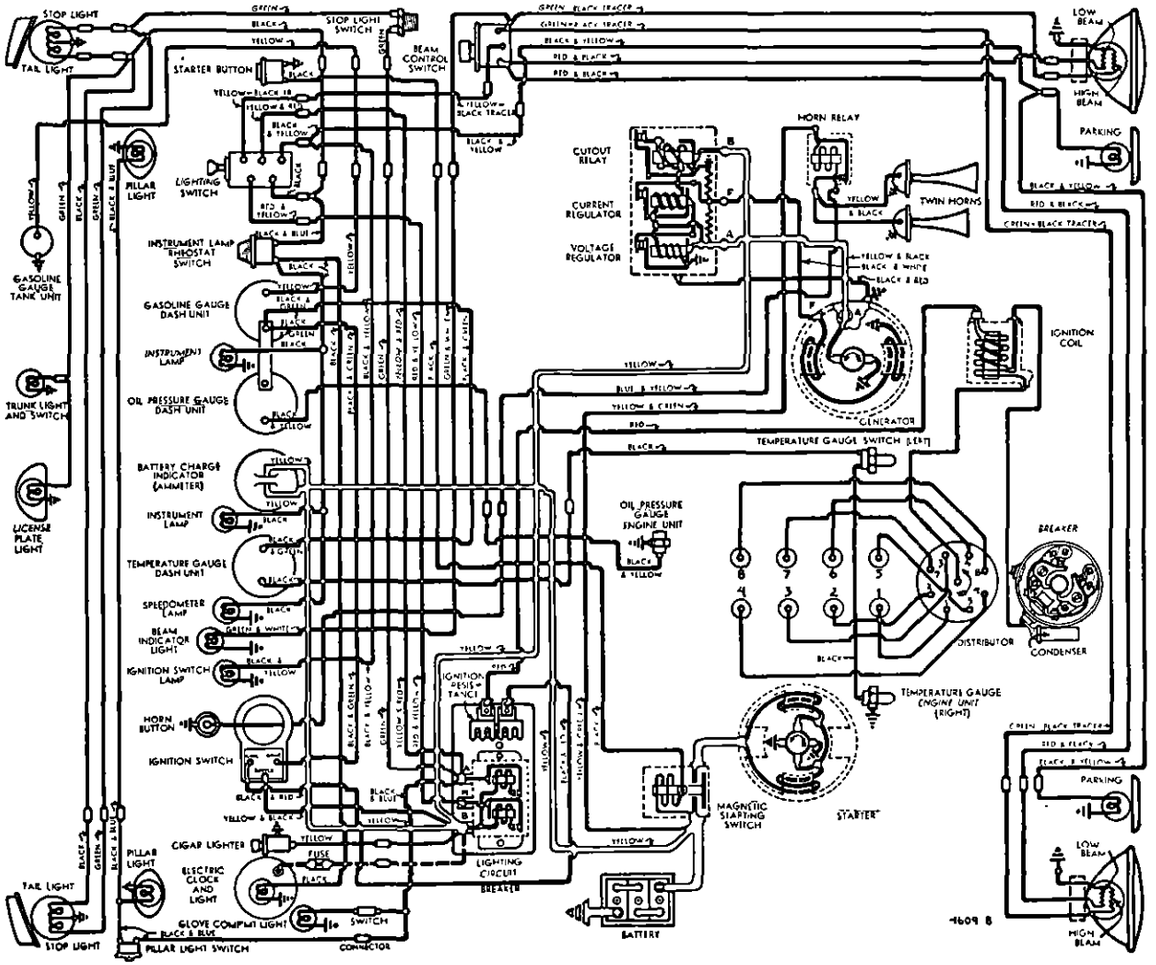
Cam Angle or Dwell—36° closed, 9° open. For both sets operating together with correct coil-loading lead. NOTE—Cam Angle for each set operating singly approximately 22½° closed, 22½° open (50%).

Breaker Arm Spring Tension—20-24 ounces.

Rotation—Clockwise viewed from drive end of unit.

Distributor Degrees	R.P.M.	Automatic Advance Degrees	Engine R.P.M.
Start	200	0	400
11	600	22	1200

Vacuum Brake: Consists of a spring-loaded, vacuum controlled, brake piston which bears on edge of



retard disc of breaker advance mechanism and acts as a "drag" to retard normal advance when engine is accelerated or operated under load. Piston is normally held out of engagement by manifold vacuum.

Removal: Distributor mounted on front of engine. To remove, disconnect coil primary lead, unsnap bail clip and remove terminal housing and conduit assembly, remove distributor rotor. Take out two capscrews mounting distributor on engine, remove distributor and gasket. NOTE—Vacuum connection (for Vacuum Brake operation) is through hole in face of mounting flange.

IGNITION TIMING

Std. Setting—See Vacuum Brake Setting for service correction for operating conditions.

	Flywheel Degrees	Piston Position
All Engines	4° BTDC	.0058" BTDC.

Ignition Timing (Basic Setting)—Distributor can be timed for correct ignition timing when off engine as follows: Place a small straight edge or scale against tang on drive end of distributor shaft (scale must be on wide side of shaft), rotate distributor in direction of rotation (clockwise) until trailing edge of scale is exactly ⅜" past the nearest edge of the small mounting hole (left hand hole—nearest vacuum brake) on the mounting flange. If left hand (timing) contacts do not begin to open at this point, loosen adjusting screw on side of distributor housing, move screw down (to advance spark), up (to retard spark), in slot until contacts begin to open, tighten adjusting screw. This setting will provide correct 4° BTDC. ignition timing when distributor installed on engine.

NOTE—Timing is controlled by opening of **left hand breaker contacts only** (right hand contacts "load" coil and open and close earlier than the left hand contacts).

Timing (On the Engine)—No flywheel marks provided. With basic timing of distributor properly set (above), ignition timing will be correct when distributor installed on engine and all necessary adjustments for operating conditions and octane rating of fuel being used can be made by means of the Vacuum Brake adjustment as follows:

Vacuum Brake Setting:—Should be adjusted to eliminate pinging when engine operated with load. To adjust, loosen locknut, back off adjusting screw until engine pings with load, turn screw in just enough to eliminate ping.

CARBURETOR

Holley (Chandler-Groves) Ford No. 59A-9510-A. Dual (double barrel), downdraft type with manual choke control.

See Carburetor Section for complete data.

Idle Adjustment—With engine warm, choke valve wide open, and Fast Idle inoperative, set throttle lever stopscrew for 500 RPM. idling speed, turn each idle adjusting screw (one for each barrel, adjust in succession) in until engine begins to miss, then out until engine begins to roll, finally turn screw in until engine fires smoothly. Final setting should be approximately ⅝-¾ turn of screw from inner seated position. Readjust stopscrew for correct idling speed. NOTE—Idling speed can be estimated by marking spot on fan belt and setting speed for 25 revolutions of the belt in 10 seconds.

NOTE—Vacuum gauge recommended for idling adjustment. Set for highest steady gauge reading.

Float Level—Use 9550-A gauge to set float level (1.353" end "Go", 1.322" end "No Go") measuring from underside of bowl cover to bottom of float with cover and float assembly inverted. Fuel level in bowl should be 11/16" plus or minus 1/32".

Accelerating Pump Setting—Three holes provided for pump link connection as follows:
Inner (#1)—Min. stroke, Summer Temperatures.
Center (#2)—Medium Stroke, Normal temperature.
Outer (#3)—Max. stroke, Extreme Cold Weather.
NOTE—Link locked in pump rod by snap-lock. Pull link shaft out of pump rod to disengage this lock.

Metering Jets—*Refer to Carburetor Index for Chandler-Groves (Ford) Carburetor Jet Specification Table.*

Fast Idle: Integral with carburetor. Operated by Choke Valve lever. No adjustment required.

CARB. EQUIPMENT

Air Cleaner: Ford No. 91A-9600-A. Oil-bath type.
Servicing—Clean and refill (to level mark on case) with same grade engine oil used in crankcase at 3500 mile intervals (when crankcase drained) or more often if required. Clean filter element by washing in cleaning fluid.
NOTE—Clean and re-oil filter element in oil filler cap (crankcase breather) every 1000 miles.

Fuel Pump: AC. Type R, Ford No. 11A-9350. Diaphragm type. Exchange Pump AC No. 541 ('46), 571 ('47).
See Carburetion Equipment Section for data.
Pressure—3½ lbs. maximum (1½-3½ lbs.).

Gasoline Gauge: King-Seeley Electric. Ford Nos.
Dash Unit—No. 59A-9280 ('46), No. 6M-9280 ('47).
Tank Unit—No. 99A-9275-B.
See Carburetion Equipment Section for data.

BATTERY

Ford Type No. 01A-10655-A. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.0 minutes.
Grounded Terminal—Positive (+) grounded to dash.
Engine Ground—Strap connector between right rear cylinder head and dash.
Dimensions—Length 10.56". Width 7.28". Height 8.25".
Location—On right side in engine compartment.

STARTER

Ford Model No. 18-11002. Armature No. 18-11005
Drive—Inboard Bendix Drive No. A1472, Ford No. B-11350.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—2 lbs. each.
Cranking Engine—100 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
4 ft. lbs.	1070	4.6	200
8 "	660	4.3	340
12 "	300	3.65	465
14 "	Lock	3.5	500

Starting Switch: Ford No. 21A-11450 Magnetic Switch mounted on the dash and controlled by pushbutton switch on instrument panel, Ford No. 19A-11500.

Removal:—Starter mounted on right front face of flywheel housing. To remove, take off pan at right of engine, free starter-to-oil pan support bracket, take out through-bolts on commutator end plate.

GENERATOR

Ford Model No. 21A-10000. Armature No. 01A-10005A. Two brush (shunt) type with vibrating type voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—No adjustment. See Regulator data below.
Maximum Charging Rate—Controlled by regulator and dependent on battery condition and load. To check generator output, disconnect generator field lead at generator, connect both generator terminals together (use short insulated wire). Use 'BRS' set or rheostat connected across battery terminals and apply load until voltage is exactly 6 volts. Connect ammeter in charging line, run engine, check output at 2 speeds given in performance table below. Restore original connections after completing test. **Do not operate generator in service with both terminals connected together. This eliminates all regulator action and will damage generator.**

Performance Data

Amperes	Engine RPM.
Start	520
30	1060
30	2500

Rotation—Counter-clockwise at commutator end.
Field Current—2.1 amperes at 6.0 volts (field resistance 2.88 ohms at 70°F.).
Brush Spring Tension—Approximately 28 ozs.

Removal:—Generator mounted on bracket between cylinder banks at front of engine, driven in tandem with water pumps by Vee belt. To remove, loosen nut on bracket stud.

Belt Adjustment:—Loosen nut on bracket mounting stud, raise generator up until side movement on belt midway between generator and water pump pulley is ½" (thumb and finger pressure).

REGULATOR

Ford Model No. 01A-10505-C. Three-Unit Type. Consists of Cutout Relay, vibrating Voltage Regulator and vibrating Current Regulator (separate units) in single case on engine side of dash.
See Electrical Equipment Section for complete data.
NOTE—Regulator case is grounded through braided wire 'pigtail' or separate ground wire extending from regulator to generator frame. This ground connection must be in place when regulator being operated or tested (disturbed by removal of regulator cover).

Cutout Relay

Cuts In—5.8-6.3 volts at operating temperature.
Cuts Out—8 ampere discharge current (maximum).

Voltage Regulator

Setting—6.9-7.2 volts at 70-80° F. See Ford Regulator article in Electrical Equipment Section for voltages at other temperatures.
Checking and Adjusting—*Refer to Electrical Equipment Index for article on 'Ford Regulator—3-unit Type' for complete instructions.*

Current Regulator

Setting—30-33 amperes hot (after generator has been operating for 5 minutes).
Checking & Adjusting—See Voltage Regulator (above).

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LIGHTING

Headlamps: Ford "Sealed Beam" type.
Controlled by Lighting Switch on instrument panel and Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam of each headlamp straight ahead with hot spot centered on horizontal line 3" below lamp center height at 25 ft.
Beam Indicator—Red Jewel on lower edge of speedometer dial. Lighted whenever upper beam in use.

Switches

Lighting—Ford No. 11A-11652 (Switch & Wiring), Light Switch Knob & Insert Ford No. 59A-11661.
Beam Selector—Ford No. 11A-13532 (Switch only), No. 29A-11653 (Switch & Wiring).
Instrument—Ford No. 19A-13740.
Stop Light—Ford No. 11A-13480.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Parking	3	63
Instrument, Clock	1.5	55
Beam Indicator	1	51
Dome, Luggage Comp't.	3	63
Stop & Tail	21-3	1154
Rear License	3	63

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Ford No. 11A-12250A Combined with Ignition Resistor on block on dash under cowl. Consists of two separate circuit breaker units (one unit protects headlight circuits, second unit protects other lighting circuits) of the thermostatic and wound-coil type. Contacts open with current of 50 amperes and vibrate rapidly to control current.

HORNS: Ford No. 91A-13832 (High Note), 91A-13833 (Low Note). Air electric type dual horns operated by horn relay.
Horn Current—24-28 amperes total.

Horn Relay: Ford No. 11A-13842D.
Contact Closing Voltage—3.5-4.5 volts.
Current Draw—Approximately ¾ ampere.

ENGINE

ENGINE SPECIFICATIONS: Own "100". Eight Cylinder, 90° Vee, "L" Head type. Cylinder banks and crankcase cast Enbloc.
Bore—3.187". **Stroke**—3.75".
Displacement—239 cu. ins. **Rated H. P. 32.5.**
Developed Horsepower—100 at 3800 RPM.
Compression Ratio—6.75-1 Cast Iron Heads.
Compression Pressure & Vacuum Reading—*See Tune-up data.*

▷**1946-47 ENGINE SERVICE NOTES: Cylinder Head.** New type, Part No. 59A-6050-A or -B, is interchangeable right-and-left. May be identified by figures "59A" or "59A-B" on top. Heads have greater valve clearance for new cylinder block (below) and larger water holes for improved cooling (¾" hole at top center and ⅝" hole at center between #2 and #3 cylinders).

▷**Cylinder Head Gasket**—New type, Part No. 59A-6051, may be identified by 5/16" round hole instead of blunt cone shaped opening at lower edge between #2 and #3 cylinder bores. ***This gasket must be used with new 1946 type Cylinder Head (above).***

▷**Cylinder Block**—New type, Part No. 59A-6010-C with valve ports located .09" farther from center line of block. May be identified by number or by oblong water passages just above valves (round on previous types).

OIL PAN & ENGINE REMOVAL—*See Mercury Special Data.*

TIGHTENING TORQUES & CYLINDER HEAD: *See Mercury Special Data.*

CYLINDER SLEEVE: Cast iron, dry type cylinder sleeves may be used (engine may have mark "HS" on block beside inner front corner of left cyl. head). *See Mercury Special Data.*

PISTONS: Steel or aluminum alloy, light weight, cam ground, dome head type. Pistons are new four-ring type. Recondition engines to take finished replacement pistons (if sleeves used, replace sleeves, install new std. size pistons).
Removal—Pistons and rods removed from above.
Clearance—See Fitting New Pistons.

Replacement Pistons: Std., .0025", .005", .015", .020", .030", .040".

Fitting New Pistons: Use .50" wide feeler stock of correct thickness (see Table below) inserted between piston and cylinder wall at right angles to pin to check clearance. Pull required to withdraw feeler should be 6-10 lbs. (all types).

Engine With Sleeves	Feeler Thickness Steel Piston	Aluminum Piston
New Piston & Sleeve	.003"	.003"
New Piston—Worn Sleeve	.004"	.004"
Worn Piston & Sleeve	.005"	.005"
Engines Without Sleeves		
New Piston & Bore	.0025"	.002"
New Piston—Worn Bore	.004"	.004"
Worn Piston & Bore	.005"	.005"

PISTON RINGS: Two compression, two slotted oil rings per piston (lower oil ring below pin). Upper oil ring groove slotted, lower ring groove drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0915-.0920"	.012-.017"	.0015-.003"
Compr. (#2)	.0915-.0920"	.012-.017"	.001-.0025"
Oil (#3, 4)	.1540-.1550"	.012-.017"	.001-.0025"

Replacement Rings: Std., .020", .030", .040", .060".

PISTON PIN: Diameter .7501-.7504" Length 2.975" (with steel pistons), 2.850" (aluminum pistons). Floating type with locking ring in piston at each end. Pin hole in rod is bronze-bushed.
Pin Fit in Piston—.0001-.0002" clearance (aluminum pistons), .0003-.0009" clearance (steel pistons) or light hand push fit with piston at 70°F.
Pin Fit in Rod Bushing—.0002-.0005" clearance (pin should pass through bushing slowly of own weight).

Replacement Pins: Std., .002" Oversize, .002" Undersize, .001" Undersize.

CONNECTING ROD: Length 7.000". Weight 492 grams.
Crankpin Journal Diameter—2.1390". Connecting rod bore diameter 2.360" (2.3597-2.3603").
Lower Bearing Type—Steel-backed, special alloy lined with bearing surface on both inner and outer face. Bearing floats in both rods (side-by-side mounting). Bearing Dimensions—Length 1.747", Thickness .1095".
Clearance—.0015-.0035" (see Bearing Adjustment).
Sideplay—.003-.007" (bearing endplay), .006-.014" (side clearance for both rods).
Bearing Adjustment: None (no shims). Do not file bearing caps. Replace bearings if less than .1085" thick, replace or hone rods for oversize bearings if worn more than .0015" over original size of 2.3597-2.3603". CAUTION—Both rods must be same size.

Connecting Rod Bearing Servicing: *See Mercury Special Data.*

Replacement Bearings: Std., .003", .010", .015", .020". Also furnished Oversize on O.D. for oversize rods.

Installing Rods: Marks on rods and bearing caps (R1, L1, etc.) must be together and installed in same numbered cylinder with marks pointing down toward oil pan.

CRANKSHAFT: Three bearing type with integral counter-weights.

Replacement Bearings: Std., .005", .010", .015", .022", .030".
Journal Diameters—2.4990" (all main bearings).
Bearing Type—Steel-backed, special alloy lined.
Clearance—.001-.003"

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
MAIN BEARING NOTE—Some cylinder blocks have been manufactured with main bearing bore .015" Oversize. These blocks can be identified by mark 'ERP' stamped on oil pan gasket flange at left front corner of block.
CAUTION—All bearings installed in these engines must be special "O.D. .015"" Oversize type.

End Thrust: Taken by rear main bearing flanges. Adjust by replacing bearing. **Endplay .002-.006".**

CAMSHAFT: Three bearing type. Helical gear drive.
Bearing Diameters—1.797" (all bearings).
Bearing Type—Steel-backed, babbitted bushings.
Clearance—.001-.002"
End Thrust: Taken by gear hub and thrust surface on inner face of cover plate. Adjusted by replacing cover plate. **Endplay**—.005-.015"

Camshaft Bearing Removal & Installation: *See Mercury Special Data.*

Camshaft Oil Pump & Distributor Drive Gear Removal & Installation: *See Mercury Special Data.*

Camshaft Removal & Installation: *See Mercury Special Data.*

Timing Gears: Crankshaft Gear—Cast alloy iron. *Camshaft Gear—Aluminum alloy bolted-on type.*
Backlash—.004" maximum.

Replacement Gears: *See Mercury Special Data.*

Camshaft Setting: Mesh marked tooth of crankshaft gear in similarly marked space between teeth on camshaft gear.

VALVES:

	Head Diameter	Stem Diameter	Length
All Valves	1.510"	.3095-.3105"	4.577"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.292"	.0015-.0035"
Exhaust	45°	.292"	.0025-.0045"

NOTE—Service limit for valve stem diameter is .309" Intake, .3065" Exhaust. Valves interchangeable.

Valve Guides: Split type retained by "C" washer and valve spring. *NOTE—Replace both halves of all guides measuring less than .6665" (thickness of guide half and valve stem at top of guide with valve of .311" stem diameter in place in guide).*
See Mercury Special Data.

Valve Lifters: Barrel type operating in guide holes in cylinder block.
Diameter—.9995". Replace if worn to less than .998" in diameter or length less than 1.710" after any necessary resurfacing of ends (cast type can be resurfaced on both ends, pressed steel type on bottom end only).

ENGINE

CONTINUED FROM PRECEDING PAGE

Clearance—.0005-.0015". Lifter should slip into hole in block of own weight.

Valve Springs: Replace springs if pressure less than 30 lbs. when compressed to 2.125".

	Spring Pressure	Length
Valve Closed	37-40 lbs.	2.13"
Valve Open	76-80 lbs.	1.84"

VALVE TIMING

Tappet Clearance: 010-.012" Intake, .014-.016" Exhaust, Cold. No adjustment.

Valve Timing: See Camshaft Setting above.

Intake Valves—Open AT TDC. Close 44° ALDC.

Exhaust Valves—Open 48° BLDC. Close 6° ATDC.

Valve Timing Check—No flywheel marks or other means provided to check timing. #1 intake valve should open with #1 piston on top dead center entering the intake stroke.

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, and timing gears. Oil pump mounted in crankcase at rear of engine.

Crankcase Capacity—5 quarts.

Normal Oil Pressure—30 lbs. at 2000 RPM.

Oil Pressure Regulator—Located under plug above front camshaft bearing (under manifold) and on oil pump housing (some models). Not adjustable. NOTE—Check relief valve tension spring whenever engine overhauled. Replace the cylinder block relief valve spring if tension not within limits of 43-50 ozs. at 1.380" (engines without oil pump relief valve), or 78-80 ozs. at 1.380" (engines with oil pump relief valve). Replace oil pump relief valve spring tension not within 78-87 ozs. at 1.380".

Oil Pump: Gear type. In crankcase at rear of engine.

►NOTE—This new type pump, No. 41A-6600-A (for engines without oil pan baffles), has oil pressure regulator (relief valve) in pump body.

See Mercury Special Data.

Oil Filter: Replace cartridge at 5000 mile intervals (Ford No. 01A-18662-A Unit).

Oil Pressure Gauge: King-Seeley Electric. Ford Nos.

Dash Unit—No. 59A-9273 ('46), No. 6M-9273 ('47).

Engine Unit—No. 41A-9278 (80 lbs. type).

See Miscellaneous Section for complete data.

COOLING

Cooling System: Positive circulation with two water pumps at front of engine (pump for each bank).

Capacity—22 quarts.

Pressure Valve—In radiator filler cap. Opens at 3½-4½ lbs.

Water Pump: Packless, centrifugal type (2 used). Mounted on front of engine (pump housing integral with front engine mounting).

See Water Pump Section for complete data.

Removal—Drain cooling system, place support jack under engine (use wood block on jack to avoid damaging pan), remove bolt from front engine support, raise engine until no weight rests on front support. Loosen generator mounting bolt, remove drive belt. Disconnect and remove hose at pump. Remove four capscrews mounting pump on engine, lift pump out. CAUTION—One mounting screw located within water pump inlet connection (accessible with hose removed).

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In each cylinder head water outlet (two used). Start to open at 150-155°F. Fully open at 175-180°F.

Temperature Gauge: King-Seeley Electric Ford Nos.

Dash Unit—No. 59A-10883 ('46), No. 6M-10883 ('47).

Engine Unit—No. 01A-10990 (Temperature Gauge Switch—in left hand cylinder head), No. 99A-10884 (regular Engine Unit—in right cylinder head).

See Miscellaneous Section for complete data.

CLUTCH

Long Model 10CF-TI, Ford No. 19A-7563. Single plate, semi-centrifugal, dry disc type.

See Clutch Section for complete data.

Facings—Woven asbestos composition. I. D. 6¾". O D 10". Thickness ⅛".

Pedal Adjustment: Pedal free travel 1-1¼". To adjust, disconnect clevis at equalizer (throw-out) shaft end of pedal connector rod, turn clevis on rod.

Removal: Remove Transmission (see Transmission Removal below). Install wooden wedges between each release lever and cover to hold the clutch in released position, take out six capscrews mounting cover assembly on flywheel, lift out cover assembly

TRANSMISSION

Own Make. Three-speed, all-helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever on steering column.

See Transmission Section for complete data.

Removal: Remove Rear Axle (see Rear Axle Removal below), remove capscrews mounting front seat track on floor move front seat back for necessary room. Take out mounting screws in front floor pan spacer, remove spacer. Disconnect gearshift connecting rods at transmission case, disconnect and remove equalizer (clutch release) shaft. Remove capscrew and washer on end of transmission shaft (in universal joint), remove universal joint. Remove nuts and washers on engine rear support bolts. Support engine by placing jack (use wood block on jack) under rear end and raise engine sufficiently so that rear support clears mounting bolts (NOTE—remove nuts holding lower half of engine rear support assembly and remove the assembly). Take out eight capscrews mounting transmission case on flywheel housing, pull transmission straight back

UNIVERSALS

Spicer Model 202-6X, Ford No. B-7090. Steel bushing type. Single joint in torque ball at transmission.

REAR AXLE

Own Make. ¾ Floating. Spiral Bevel Gear type with Torque Tube Drive.

See Rear Axle Section for complete data.

Ratio—3.54-1 Std. 3.78-1 & 4.11-1 Opti.

Backlash—.012" maximum.

Removal: Raise rear end of car. Disconnect track bar Disconnect rear spring (use spring spreader if available) by placing block under each rear spring eye and lowering car so that weight keeps spring extended and then removing spring shackle bolts and bars Take out pin in hand brake equalizer and disconnect hand brake cable. Disconnect hydraulic brake line at torque tube and rear shock absorber links at each wheel Disconnect accelerator pedal, remove pedal pads, floor mat, beam control switch (take out two mounting screws), and floor pan. Disconnect speedometer cable at torque tube. Remove nuts on four universal joint ball housing bolts and two bolts holding ball cap halves together, remove ball cap. Pull rear axle back to disconnect torque tube from transmission and remove from beneath car.

SHOCK ABSORBERS

Houde. Double acting, hydraulic, adjustable type.

Houde Model	Right — Ford No.	— Left
Front BBCN-3	51A-18045	51A-18046
Rear① BBCZ-3	51A-18080A	51A-18081A
Rear② BBCZ-3	51A-18080B	51A-18081B

①—Except Sedan Delivery and Station Wagon.

②—Sedan Delivery & Station Wagon only.

Adjustment: Standard setting marked by line on face of lever hub (pointer should be aligned with this mark). Adjustment can be varied by turning pointer clockwise (for more control) or counter-clockwise (for less control) not more than 1 or 2 serrations at a time. NOTE—Stops are provided to limit adjustment in either direction.

Refilling: Check every 5000 miles, fill to level of the filler plug hole. Use Ford No. M-4633-B fluid only (Houde L-1404) required for these new shock absorbers (identified by round top filler plug).

FRONT SUSPENSION

Front Axle: Conventional "I" beam section type with Reverse-Elliott ends and transverse spring. Axle positioned by radius rods.

Kingpin Inclination—8° crosswise.

Caster—3°. Axle may be bent cold for minor corrections providing correct tools used to prevent crushing of axle flange.

Camber—¾° Adjust as for Caster (above).

Toe In—1/16" Adjust in usual manner by changing length of tie rod.

STEERING GEAR

Gemmer design (Model 305), Ford Make. Worm-&-Roller type with push-pull adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Lockheed Hydraulic, self-centering, double anchor type. Hand lever applies rear wheel brakes.

►These brakes do not have anchor pin adjustments.

See Brake Section for complete data.

Drums—Composite iron and steel. Diameter 12".

Clearance—Least possible amount without drag.

Lining—Width 1.75". Thickness .187". Length per shoe 13.12" (forward shoes), 10.08" (rear shoes).

Hand Brakes: See Service Brakes (above).

MISC. MECHANICAL

Power Operated Convertible Top: 2 types as follows:

1—Convertible—Auto-Lite electric type.

2—Sportsman Convertible—Hydro-Lectric type.

See Miscellaneous Section for complete data.

Power Window Regulators (Sportsman Convertible): Hydro-Lectric type.

See Miscellaneous Section for complete data.

HOOD ALIGNMENT & RADIATOR GRILLE REMOVAL: *See Mercury Special Data.*

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on plate attached to engine side of dash and on top of right frame side rail to rear of front suspension upper control arm.

TUNE-UP

▷**Fuel Pump Pushrod Bushing Installation (To correct wear and excessive looseness)**—*See Mercury Special Data.*

COMPRESSION PRESSURE: 115 lbs. at cranking speed.

VACUUM READING: Steady 18-21" idling at 500 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2. See diagram.

SPARK PLUG GAPS: .030" Limits .029-.032".
Plug Type—Champion H-10. 14 mm.

DISTRIBUTOR: Breaker Gap—.014-.016".
Cam Angle—28-30° (closed).
Breaker Arm Spring Tension—17-20 ounces.
Advance Performance—*See Ignition.*
Condenser Capacity—.21-.25 microfarad.
Distributor Line (Carburetor Connection) Vacuum—.25" at 800 RPM., .8" at 1000 RPM., 1.7" at 1200 RPM., 2.4" at 1400 RPM., 2.8" at 1600 RPM.

▷**NOTE**—Cars with "1CM" carburetors will have a higher distributor line vacuum at high speed or full open throttle than cars with "OCM" carburetor. *See "Lincoln & Mercury Dual Concentric Carburetor" in Carburetor Section.*

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Crankshaft Pulley Mark—Small circular button on rim of pulley.

CARBURETION: Dual-concentric carburetor.
Idle Setting—Approx. 1 turn open. Two screws—turning screws out gives richer mixture.
Idle Speed—(Std. Trans.) 400-450 R.P.M. (Merc-o-matic) 425 R.P.M. Max.
Float Level—Fuel level ½" ± 1/32" below top edge of bowl. Use Fuel Level Gauge No. 9550-B.

▷***NEW "CLIP TYPE" FLOAT NEEDLE & SEAT ASSEMBLY***—furnished for replacement.
Accelerating Pump—Center Hole average setting. Inner Hole for hot weather, Outer for cold weather.

Choke Setting: Index mark on coil cover aligned with center mark on housing (maximum variation one division either side).

Fuel Pump Pressure: 3½-4½ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross over and right exhaust manifold.

VALVE TAPPET CLEARANCE: ***CAUTION—Different camshafts used in 1950 & 1951. Valve tappet clearances are different.***
1949-50—Intake .010"-.012". **Exhaust** .014"-.016"
1951—Intake .013"-.015". **Exhaust** .017"-.019".
Valve Timing Check—***See Valve Timing.***

STARTING: ***See Battery, Starter, Generator, Regulator.***

IGNITION

IGNITION SWITCH: Mercury No. (1949) 6A-11572-A, (1950-51) OL-11572-A.
Ignition Lock—Mercury No. (1949 Early 1950) **8H-11582-A,** (1950-51) **8H-11582-B.**

COIL: Mercury No. (1949) 7RA-12029-A, (1950-51) 8BA-12029. Primary resistance 1.05 ohms (75°). Secondary resistance 4100 ohms (75°).

Location—On front lower corner of right cyl. hd.
Ignition Current—***2.75-3.0 amperes idling. 5.0-5.5*** amperes stopped.

CONDENSER: Mercury No. 7RA-12300-B.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Mercury No. (1949-Early 1950) 7RA-12127-C (less Cap and Rotor). (1950-51) OCM-12127. "Pressure Type" distributor with spark controlled by diaphragm.

▷***DISTRIBUTOR REPLACEMENT CAUTION—When replacing Distributor No. 7RA-12127C with Distributor OCM-12127, the new front cylinder cover, Part No. OBA-6059A MUST BE INSTALLED.***
See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.

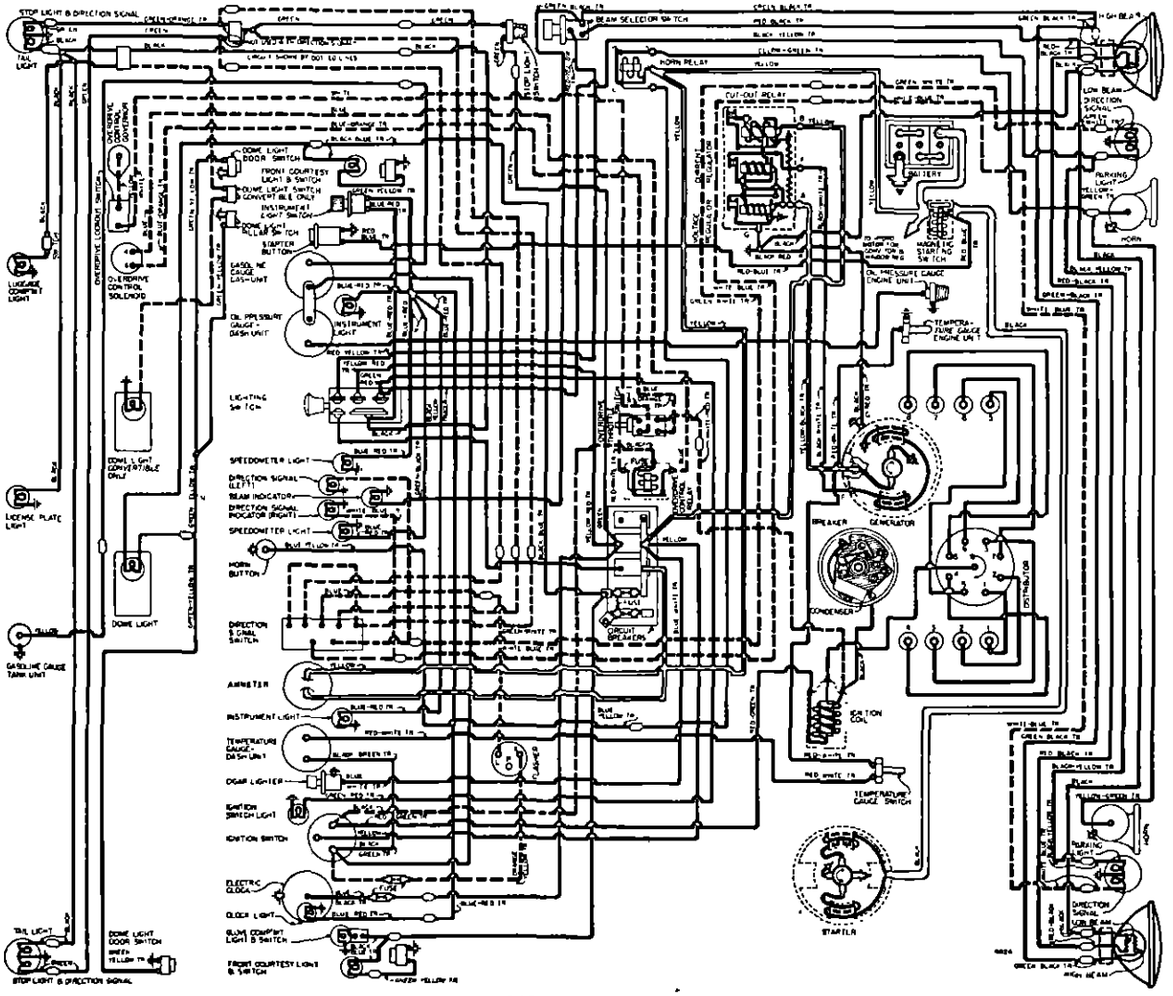
▷**Excessive Pinging Correction & Retarded Spark Complaints on first cars**—*See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section.*

Breaker Gap—.014-.016".
Cam Angle—28-30° (closed).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Advance Performance
▷With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
1¼-2¼°	0.4"	500
4¼-5¼°	1.7"	1000
6¼-7¼°	2.8"	1500
7½-8½°	3.7"	2000

Distributor Removal: Mounted at front of engine on right side. To remove, disconnect vacuum line, take out hold down screw, lift off.



1949 MODELS

IGNITION TIMING

Std. Setting ..... **2° BTDC.**

►*IGNITION TIMING NOTE*—Improved performance can be obtained by advancing timing 4° (total advance will be 6° indicated on dampener). Paint ¼" wide stripe on ADVANCE side of timing mark to indicate new setting. (Edge of line indicates 6° point).

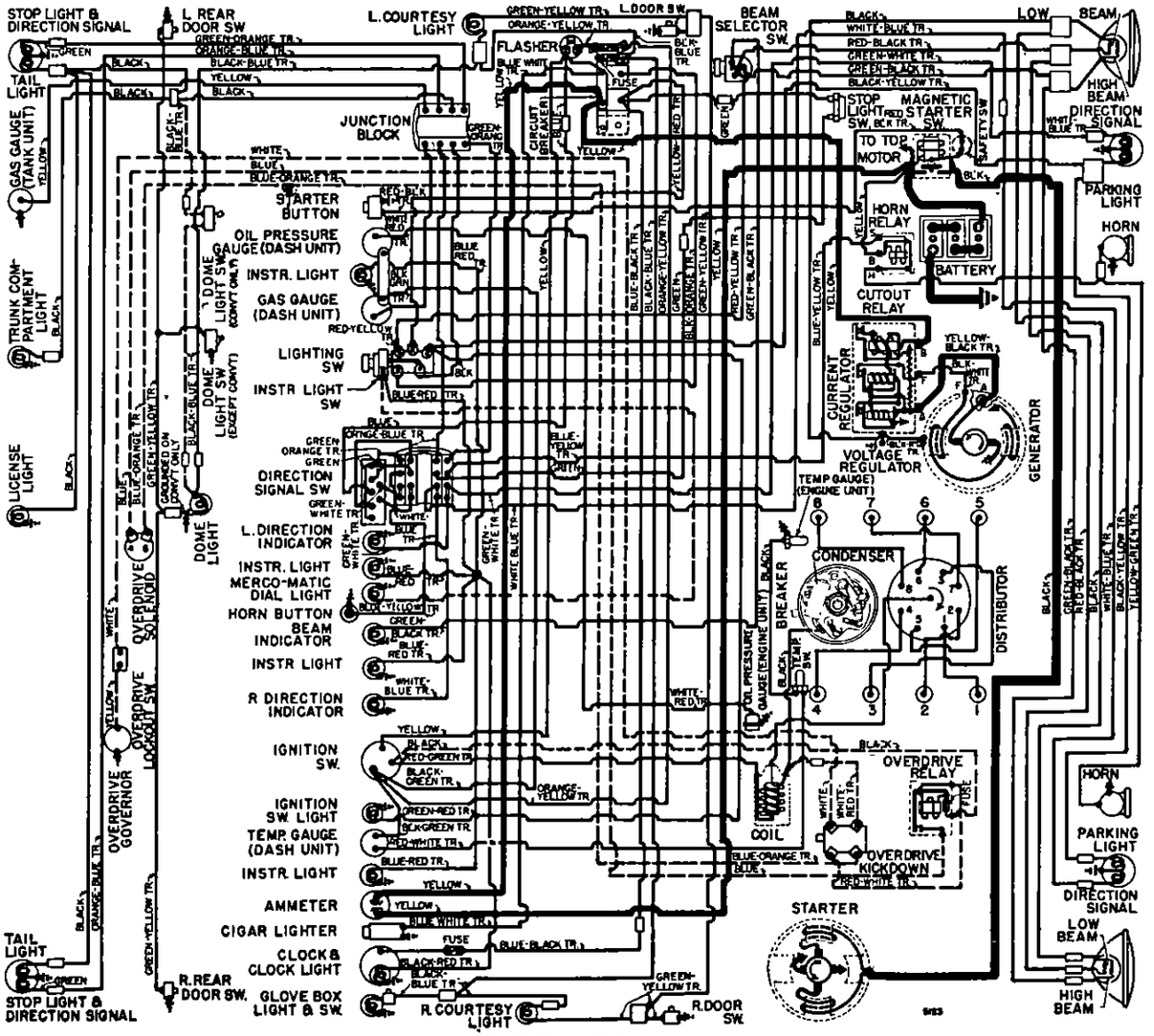
Crankshaft Pulley Mark—Small circular button on rim of pulley. Timing pin above pulley on right side.

►*DISTRIBUTOR TIMING INDICATOR PLATE PRODUCTION CHANGE—(Used beginning June 1951, and can be installed on 1949 & later cars)*—Indicator plate, Part No. 1CM-12182-A can be installed on right front water outlet support capscrew under wire clip. Time engine as outlined under "Initial Timing" (below). Note position of end of distributor clamping flange in relation to timing marks on indicator plate. Then proceed as indicated in "Final Timing" (below).

Initial Timing—With #1 piston in firing position, timing mark on pulley aligned with timing pin on front of engine, loosen hold down screw on distributor, rotate distributor until contacts begin to open, tighten hold-down screw. Check spark plug connections (see diagram), see that rotor at #1 position in distributor cap. Then make "Final Ignition Timing" as directed below.

Initial Timing (With Neon Timing Light)—Disconnect vacuum line to prevent automatic advance operating, idle engine and adjust as above so that timing mark appears to be at pointer on front of engine. Then make "Final Ignition Timing":

Final Ignition Timing—After Initial Timing (above), note position of end of distributor clamping flange with relation to scale on Indicator Plate on cylinder head water outlet. ADVANCE timing by moving distributor in direction of arrow (counter-clockwise) one graduation on scale. Road test car for objectionable or engine roughness under load. Repeat until ping or roughness noted, then RETARD distributor until pinging and roughness eliminated.



1950-51 MODELS

CARBURETOR

Holley-Ford dual concentric (double barrel) downdraft with automatic choke.

1949-Early 1950 Std. Trans..... **8CM-9510-G, H, J**
1950-1951 Std. Trans..... **1CM-9510-G,H,J**
1950 (Early) Merc-O-Matic..... **1CM-9510-K,L,M**
1950-1951 Merc-O-Matic ①**1CM-9510-N,P,R**
①Automatic choke mounted on intake manifold.
See Carburetor Section for complete data.

►*ADAPTING LATE TYPE (Stamped 8-49 & Later) CARBURETOR TO EARLIER MODELS—See Carburetor Section for complete data.*

►*NEW "CLIP TYPE" FLOAT NEEDLE & SEAT ASSEMBLY*—furnished for replacement.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jets—*See Holley-Ford Jet Specification Table in Carburetor Section.*

Fast Idle: Holley-Ford Carburetor type.
See Carburetion Equipment Section for complete data.

Automatic Choke: Holley-Ford Carburetor type.

►*AUTOMATIC CHOKE PRODUCTION CHANGE*—Automatic choke moved to position on intake manifold on late 1950 & 1951 Merc-O-Matic cars.
See Carburetion Equipment Section for complete data.

Setting—Index mark on coil cover aligned with center mark on housing (maximum variation one division either side).

CARB. EQUIPMENT

Air Cleaner (Oil Bath): Mercury No. (1949) 8CM-9600-A1, (1950-51) 8CM-9600-A5.

►*CAUTION: Oil Bath Air Cleaners stamped "HH" on underside should be serviced with ½ pint of engine oil only. Disregard level mark or 1 pint specifications.*

Fuel Pump (std.): Mercury No. 7RA-9350-C.

►**Fuel Filter Change to "Edge" type**—*See Lincoln Mercury Dual Concentric" in Carburetor Section.*

Optl. (Fuel-&-Vacuum)—Mercury 8CM-9350-A, C.
Pressure—3½-4½ lbs. (both types).
See Carburetion Equipment Section for complete data.

►**Fuel Pump Pushrod Bushing Installation (To correct Wear and Excessive Looseness):** *See Mercury Special Data.*

Gasoline Gauge: King-Seeley Electric.
Dash Unit—Mercury No. (1949) 8M-9280, (1950-51) OM-9280.
Tank Unit (exc. Sta. Wgn.)—Mercury 99A-9275-B.
Tank Unit (Sta. Wagon)—Mercury No. 01A-9275-A.
See Carburetion Equipment Section for complete data.

BATTERY

Mercury No. 8M-10655-A. 6 volt, 17 plate, 100 A. H. Zero Capacity—300 amperes for 3.3 minutes. Five Second Voltage—4.2 volts.

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Grounded Terminal—Positive (+) terminal.
Location—On left side in engine compartment.
Dimensions—L. 10 9/16". W. 7¼". H. 8 1/16".

STARTER

Mercury No. (Std. Trans.) 7RA-11002. Armature No 18-11005. **(Merc-O-Matic Trans.) 1CM-11002.** Armature No. 1CM-11005-A.
Drive—Mercury No. (Std. Trans.) B-11350. (Merc-O-Matic) 1CM-11350-B.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-22 ounces.
Cranking Engine—100-180 RPM., 190-215 amperes.

Performance Data

Torque	R.P.M.	Volts	Amperes
No Load①	4000-6000	5.8	45-60
15 ft. lbs.	Lock	3.5	600

①—Manufacturer recommends taking "No Load" reading by inserting 0-600 range ammeter in battery circuit at battery and operating starter while engine is idling.

Starting Switch: Mercury No. 21A-11450 Magnetic Switch mounted on left front fender apron and controlled by panel pushbutton switch 6H-11500.

Removal: On right front face of flywheel housing cover. To remove, take off right engine splash pan (if used), free starter-to-oil pan bracket, take out 2 starter through bolts.

GENERATOR

Mercury No.	Armature No.
8BA-10002-D	OA-10005-A
OM-10002	8HJ-10005
8EL-10002-B	8EH-10005
8BA-10002-C	8BA-10005-B

2 Brush type with current and voltage regulation.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—Controlled by regulator (dependent on battery condition).
To Check Generator Output—Connect ammeter in series with charging line at regulator "ARM" terminal, connect short insulated jumper between generator "A" and "F" terminals (to short out regulator). Run engine at approximately 1500 RPM. and note ammeter reading. If generator output equals or exceeds rate output (below) generator performance is satisfactory. Remove jumper.

▷***CAUTION—Do not operate generator at higher speeds or in service with jumper connected between generator armature and field terminals. This jumper eliminates all regulator action.***

Performance Data

Generator	Amperes	Engine R.P.M.
8BA-10002-D	30	1500
OM-10002	32	1500
8EL-10002-B	40	1500
8BA-10002-C	60	1500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.

Generator Belt Adjustment: Loosen 2 bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulley is ¾" (thumb and finger pressure), tighten stud nut.

Fan Belt Adjustment: *See COOLING.*

REGULATOR

Mercury Numbers

Regulator No.	Generator No.
51A-10505-A	8BA-10002-D
8A-10505-A	OM-10002
8L-10505	8EL-10002-B
8BA-10505-A	8BA-10002-C

Voltage-current 3-Unit types.
See Electrical Equipment Section for complete data.

NOTE—Separate ground wire extending to cowl must be in place when generator operated.

Regulator Settings (Cold)

	①Cut-in Volts	Voltage Regulator Volts	Current Regulator Amperes
51A-10505-A	6.6-7.0	7.2-7.6	30-34
8A-10505-A	6.0-6.4	7.2-7.6	30-34
8L-10505	6.0-6.4	7.2-7.6	38-42
8BA-10505-A	5.9-6.2	7.1-7.3	55-60

①—Cuts Out at 0-8 amperes discharge (all).
Checking & Adjustment—*See Electrical Equip. Section*
Cut Out Relay Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts open.
Voltage Regulator Air Gap—.032-.035"①.
Current Regulator Air Gap—.032"-.035"①.
①—Between armature and core with contacts just closed.

▷***CAUTION—Make certain gauge contacts armature and not brass rivet on underside of armature.***

Contact Spring Tension (voltage & current regulators) 5 ounces minimum with contacts just opening.

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot centers 3" below lamp center height at 25 ft.).
Beam Indicator—Bulb between 50 and 60 on speedometer. Lighted with Upper Beam "on".

Direction Signal: Std. *See Electrical Equipment Section.*
Direction Indicators—Right and Left indicators on lower edge of speedometer.
Direction Signal Flasher—Mercury No. 8L-13350-B.

Switches

Lighting—Mercury No. (1949) 7RA-11654. (1950-51) OL-11654.

Beam Selector—Mercury No. (1949) 7RA-13532. (1950-51) 8A-13532.

Instrument—Mercury No. (1949) 5EH-13740-B. (1950-51) OL-13740.

Glove Box—Mercury No. (1949) 8L-14413. (1950-51) OM-14413-A.

Dome Light—Mercury No. (1949) 8M-13752-A. (1950-51) OM-13752.

Dome Light (Convertible)—Mercury No. (1949) 8H-13752-A. (1950-51) OH-13752.

Door Switches—Mercury No. 8M-13713.

Stop Light—Mercury No. 11A-13480.

Trunk Light—Mercury No. (1949) 8M-13546. (1950-51) OM-13546.

Directional Signal—Mercury No. (1949) 8L-14486. (1950) OL-14486. (1951) 1M-14486.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Mercury No. 8L-12258-A, No. 8H-12258-A (Convertible). Three used on one mounting, located on dash behind instrument panel together with two fuses (see wiring diagram for positions on bracket).
30 Ampere CB—Protects main lighting system.
15 Ampere CB—Protects speedometer light, control panel light, instrument cluster light, electric clock and clock light.
15 Ampere CB—Protects hydraulic equipment.

FUSES: Courtesy, Dome, Glove Box and Map Lights—14 ampere. Located on circuit breaker behind instrument panel (see wiring diagram).
Direction Signal—14 ampere. Located on circuit breaker behind instrument panel (see wiring diagram).
Clock—3 ampere. In clock feed wire.
Overdrive—30 ampere. On IGN terminal of overdrive relay (on dash under hood).
Heater—20 ampere. In lead to heater switch.

HORNS: Mercury No. 51A-13832-A, B (High Pitch, Right Horn). 51A-13833-A, B (Low Pitch, Left Horn). Dual horns operated by relay.
Air Gap—.027-.029" for high pitch (right horn), .032-.034" for low pitch (left horn).
Horn Current—13 amperes (high pitch), 14 (low).

Horn Relay: Mercury No. 7RA-13853-A. On dash.
Contact Gap—.015-.025".
Contact Closing Voltage—4 volts max.

ENGINE

ENGINE SPECIFICATIONS: Own Make. Eight cylinder "L" head, 90° Vee type with both cylinder banks and crankcase cast Enbloc.
Bore—3 3/16". **Stroke**—4".
Displacement—255.4 cu. ins. **Rated HP**—32.5.
Developed Horsepower—110 at 3600 RPM.
Compression Ratio—6.8-1 cast-iron head.
Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Mercury Special Data.*

▷***CYLINDER HEAD LEAKS (Caused by Distributor Hold-down bolt)—See Mercury Special Data.***

OIL PAN & ENGINE REMOVAL: *See Mercury Special Data.*

PISTONS: Aluminum alloy, steel strut, dome head, U-slot, cam ground type.

▷***CAUTION—Mercury and Ford Pistons or Rings are not interchangeable.***

Weight—370 grams. **Length**—2.89" (exclud. dome).
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting Pistons.
Cyl. Bore Wear Limits—Out-of-round .003", Taper .006".

Replacement Pistons: Furnished Standard, .0025", .020", .030" & .040" Oversize.

Fitting Pistons: Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin. Feeler thickness .0015" for New Piston in New Bore, Pull to withdraw feeler 6 to 12 lbs.

PISTON RINGS: Two compression, two slotted oil rings per piston (lower oil ring below pin). Rings are taper faced. Upper oil ring groove slotted, lower ring groove drilled for oil drainage.
NOTE—Top compression ring Chrome plated.

▷***CAUTION—Mercury and Ford Piston Rings are not interchangeable (heavier rings used on Mercury).***

ENGINE

CONTINUED FROM PRECEDING PAGE

Ring	Width	End Gap①	Side Clearance
Compr. #1	3/32"	.010-.017"	.0015-.003"⑧
Compr. #2	3/32"	.010-.017"	.001-.0025"③
Oil #3 & #4	3/16"	.010-.017"	.0015-.003"⑧

Worn Limit—① .035", ⑧ .004", ③ .0035".
Ring Thickness—Compr. .154", Oil .142".

Installing Rings: Top compression ring assembled with counterbore to top. Lower compression ring assembled with side marked "TOP" to face top of piston.

Replacement Rings: Ring sets furnished standard size and .020", .030", .040" Oversize.
NOTE—Service Rings have expander behind top oil ring, not the bottom.

PISTON PIN: Diameter—.7501-.7504". **Length**—2.847". Floating type. Pin hole in connecting rod bronze bushed.
Pin Fit in Rod—.0002-.0004" clearance. Light thumb push fit. Worn Limit .0015".

Replacement Pins: Std. size & .001", .002" Oversize.

CONNECTING ROD: Length—7".
Weight—524 grams (less bearings).
Crankpin Journal Diameter—2.138-2.139". Maximum wear limit out of round .0015", Taper .001".

►**Lower Bearing**—*Locked in (not floating type as used on earlier engines)*, steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves interchangeable.
Clearance—.0005-.003" (new), .005" (worn limit).
Side Play—(2 rods) .006-.020". Worn Limit .022".

►*NOTE—Replace bearing shells less than .0745" thick.*
Bearing Adjustment—None. Replace bearings.

►**CONNECTING ROD INSTALLATION**—*See "Connecting Rod & Bearings" in Mercury Special Data.*

Replacement Bearings: Standard size and .002", .010", .020", .030", .040" Undersize.

CRANKSHAFT: 3 bearing, 6 integral counterweights.

►*SLUDGE TRAPS—Crankpin throws equipped with sludge traps having removable plugs for cleaning.*
Journal Diameters—2.498-2.499" (all main journals).
Wear Limits: .0015" Out-of-round, .001" Taper.
Bearings—Steel-backed, copper-lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.001-.0026".

►*NOTE—Replace main bearing shells when less than .0835" thick.*
Bearing Adjustment—None. Replace bearings.

Replacement Bearings: Standard size and .002", .010", .020", .030" Undersize. Rear mains also furnished .015" longer for taking up excessive endplay.

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.002-.006" (new), .008" (worn).

CAMSHAFT: *CAUTION—Different Camshafts used in 1950 & 1951.* Three bearing. Helical gear drive. Distributor drive gear pressed on front end of shaft, oil pump drive gear on rear end.

►*CAMSHAFT PRODUCTION CHANGE VEHICLE NO. 9CM-826 UP (1949)—Change to REVERSE helix timing gears. See Mercury Special Data.*
Camshaft Journal Diameter—1.7965-1.797".
Bearing Diameter—1.7985" (replace bearing if diameter greater than worn limit of 1.8015").

Replacement Bearings: Standard size and .010", .015" Undersize. Undersize bearings require finish reaming.

End Thrust: Taken by front end of camshaft and thrust surface on inner face of front cover. Adjust by replacing front cover. **End Play**—.007-.016".

Camshaft Bearing Removal & Installation: *See Mercury Special Data.*

Camshaft Oil Pump & Distributor Drive Gear Removal & Installation: *See Mercury Special Data.*

Camshaft Removal & Installation: *See Mercury Special Data.*

Timing Gears: L.H. helical. Fiber camshaft gear.
Replacement Camshaft Gears—Standard, .006" & .012" Oversize. *See "Timing Gears" in Mercury Special Data.*

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.515"	.342"	4.8175"
Exhaust	1.515"	.3405-.3415"	4.8175"

	Seat Angle	Lift	Stem Clearance
Intake	45°	①	.0006-.0026"
Exhaust	45°	①	.0011-.0031"

①—(1949-50) .338", (1951) .333".

►*ROTATABLE VALVES USED IN 1951 ENGINES (Can be Installed in 1949 & 1950 Engines)—See "Valve System" in Mercury Special Data.*

►*REPLACEMENT VALVES—Exhaust valves furnished for replacement to be used for ALL VALVES.*
Valve Seat Inserts—Used on all valves.
Valve Seat Width—1/16-5/64".

Valve Guides: One piece type positioned and retained by "C" washer. Inside diameter .344". Outside diameter 1.031". Distance from top of valve seat to upper end of guide 1.116".
Valve Guide Bushing—Rubber seal used around outer diameter of intake valve guide bushings.

Valve Lifters: Barrel type operating in guide holes in cylinder block.
Diameter—.9992" (replace if worn to less than .9977"). Length limit after resurfacing end 1.728".
Clearance—.0007-.0016" (new), .003" (worn limit).

Valve Springs: Coated springs used.
Spring Test—37-40 lbs. at 2.125". Free length 2.41".

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—Different camshafts used in 1950 & 1951. Valve tappet clearances are different.*
1949-50—Intake .010"-.012". Exhaust .014"-.016".
1951—Intake .013"-.015". Exhaust .017"-.019".

Valve Timing: See Camshaft Setting above.

1949-50

Intake Valves—Open 10° BTDC. Close 50° ALDC.
Exhaust Valves—Open 50° BLDC. Close 10° ATDC.

1951

Intake Valves—Open 5° BTDC. Close 51° ALDC.
Exhaust Valves—Open 47° BLDC. Close 9° ATDC.
Valve Timing Check—*See "Valve System" in Mercury Special Data.*

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear. Piston pins and valve lifters lubricated by splash. Oil pump mounted in crankcase at rear of engine.
Crankcase Capacity—5 quarts (refill).
Normal Oil Pressure—55 lbs. at 2000 RPM.

Oil Pressure Relief Valve: In oil pump body. Not adjustable.
Spring Tension—12 lbs. at 1.14".
NOTE—Cylinder block oil relief valve not used.

Oil Pump: Gear type. In rear of crankcase.

Oil Filter: On left cylinder head. Replace cartridge each 5000 miles or more often if required.
Oil Filter Cartridge—Mercury No. 8CM-18662.

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—Mercury No. (1949) 8M-9273. (1950-51) OM-9273.
Engine Unit—Mercury No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler breather cap (inlet), and in outlet pipe below fan.
Servicing—Wash screen in cleaning fluid and wet with engine oil when dry at oil change period (2500 miles).
Outlet Pipe Air Filter Cartridge—Mercury No. 8CM-6841.

COOLING

Cooling System: Pressure type with relief valve in filler cap and two belt-driven pumps (one for each bank) with re-circulating by-pass.
Capacity—22.25 quarts.
Pressure Valve—In radiator filler cap. Mercury No. 26H-8100-B (AC #846740). Opens at 3½-4 lbs.

Water Pumps: Two used. Centrifugal, belt driven packless type. Shaft mounted on pre-packed ball bearings. Require no lubrication service.

►*WATER PUMP REMOVAL CAUTION*—One pump attaching bolt located within water inlet.
NOTE—Bottom bolt must be installed prior to installing water pump pulley.
See Water Pump Section for complete data.
Fan Belt Adjustment—*Loosen 2 fan mounting bracket bolt nuts, raise fan up until side movement of belt midway between fan and crankshaft pulleys is ½".*
Generator (& Water Pump) Belt Adjustment—*See GENERATOR.*

Thermostats: Two used (one in each cylinder head water outlet). Mercury No. 8RT-8575-A.
Setting—Starts to open 148-153°F. Fully open 168-173°F.

Temperature Gauge: King-Seeley Electric.
Dash Unit—Mercury No. (1949) 8M-10883. (1950-51) OM-10883.
Engine Unit—Mercury No. 8A-10990 (switch in right bank), No. 8A-10884 (reg. unit left bank).
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 10A7 Mercury No. (1949) 8CM-7563-A. (1951) 8CM-7563-B, C. Single plate. Dry disc type with Borglite driven member.
Cover Number—988 stamped on cover.
See Clutch Section for complete data.

►*IMPROPER CLUTCH DISENGAGEMENT CORRECTION (1949 & 1950 Cars)*—New ball type clutch pilot bearing Part No. B-7600-A used in production beginning Aug. 1950, and can be used to replace previous solid bronze type bearing.
Facings—Moulded. Inside diameter 6¾". Outside diameter 10". Thickness .125".

Pedal Adjustment: 1-1¼" free travel. Adjust by loosening locknut and turning adjusting screw on adjusting rod.

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Removal: Remove transmission (see TRANSMISSION Removal below). Remove flywheel housing. Prick punch flywheel and pressure plate so that these parts may be placed in original positions when reassembling. Compress pressure plate assembly with Tool 7563 and remove capscrews. Take off clutch assembly.

TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

▷*TRANSMISSION GEAR SHIFT INTER-LOCK PIN PRODUCTION CHANGE (To reduce possibility of shifting into two gears at once)—See "Ford, Lincoln, Mercury Transmission" in Transmission Section for complete data.*

Transmission Control: Steering column mounted shift.

See Transmission Section for complete data.

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame. Take out eight transmission-to-flywheel housing capscrews and remove transmission.

OVERDRIVE

Warner Model (1949-50) AS1-R10C, (Early 1951) AS1-R10E, (Late 1951) AS4-R10E. (NOTE—AS4-R10E is not equipped with "Lock-out Switch"). Overdrive is solenoid operated type (no centrifugal pawls) with governor control and throttle operated Kick-down Switch.

See Transmission Section for complete data.

▷*LOCKOUT SWITCH NOTE—In the event of lockout switch faulure, it is only necessary to by-pass switch by connecting the two wires together. Leave switch in place or install a plate over transmission opening.*

▷**Prolonged shorting-out of Ignition on Kick-down Correction**—*See "Ford, Lincoln, Mercury (Warner) Overdrive" in Transmission Section.*

Solenoid—Mercury No. 8M-6916-A.

Control Relay—Mercury No. 8M-6915. On engine of dash. 30 ampere fuse at IGN terminal of relay.

Lock-out Switch—Mercury No. 8M-6917-A (Not used on AS4-R10E Overdrive).

Throttle Kick-down Switch—Mercury No. 8A-6918.

Governor Switch—Mercury No. 8M-6919.

Removal: Same as for Std. transmission (above) after disconnecting overdrive control cable and wiring.

MERC-O-MATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dip stick. Drain and refill every 15000 miles. Use only Automatic Transmission Fluid, Type A.

Capacity—Approx. 9 qts.

Checking Oil Level—With transmission selector lever in "Neutral," run engine approximately four minutes at idle speed. Clean floor mat and lift right side to expose plate in floor boards, remove plate. When engine and transmission are at normal operating temperature, move selector lever through all ranges to assure distribution of oil throughout the transmission. Clean all dirt away from fluid indicator cap and remove indicator. Wipe indicator and insert in transmission making sure that it is seated and locked. Remove indicator and check level. Add fluid to bring level to "Full" mark on the indicator. Replace indicator and tighten properly. Replace plate and floor mat.

CAUTION—Do not fill above "FULL" mark.

Linkage Adjustment—*See "Mercury Merc-O-Matic" in Transmission Section.*

▷*OTHER MERCOMATIC DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.

▷***NOTE—Slip joint formed by splined yoke of front universal engaging transmission mainshaft (or overdrive shaft). One-piece propeller shaft used.***

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive **(separate carrier not used).** Axle ends flanged (no separate hub). Wheel bearings are sealed-ball pre-lubricated (no lubrication required).

See Rear Axle Section for complete data.

Ratio—Standard: 3.9-1 (43-11). With Overdrive: 4.27-1 (47-11). Station Wagon: 4.55-1 (50-11).

Backlash—.003-.008". Shim adjustment.

Removal: Raise rear of car. Remove axle shafts, and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers, spring U-bolts. Remove axle housing assembly from car.

Axle Shaft Removal: Remove rear wheels. Take out 3 capscrews holding brake drum to axle shaft flange. Remove hydraulic lines from brake backing plate. Take out 4 axle retainer nuts (work through opening in axle shaft flange). Use Tool 4235-A to remove axle shaft and bearing assembly from housing. Take off gasket and backing plate. Do not damage oil seal when removing axle shaft.

SHOCK ABSORBERS

Std.—Mercury 8M-18045-A1, A2 (front), 8M-18080-A1, A2 (rear).

Heavy Duty (special equip.)—Mercury 8M-18045-C1, C2, D (front), 8M-18080-C1, C2, D (rear). Direct acting, hydraulic types. Two makes are used and are interchangeable except station wagon.

▷***NOTE—Shock absorbers are permanently sealed and cannot be refilled or repaired.***

Rear Shock Absorber Installation—Lower tube has welded stone shield on lower end which must be installed toward front of car.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs, direct acting shocks, and front stabilizer.

See Front Suspension Section for complete data.

▷**FRONT SPRING PRODUCTION CHANGE:** *See "Ford Pass. Cars, Lincoln, Mercury" in Front Suspension Section.*

Kingpin Inclination—5° crosswise with ¾° Camber.

Caster—Pos. ½° to Neg. 1°. Threaded bushing adjustment at lower pivot pin.

Camber—0° to +¾°. Eccentric adjustment at upper pivot pin.

Toe In—3/32-5/32". Adjusting sleeve on outer end of each tie rod. Adjust equally.

Steering Geometry (toe out on turns)—Inner wheel turned 23½° ± ½°, outer wheel 20°.

STEERING GEAR

Gemmer Model 305—"3-tooth" Worm-and-roller type with "push-pull" adjustment.

See Steering Gear Section for complete data.

BRAKES

Service: Mercury-Bendix Hydraulic, Duo-Servo, Single Anchor type without ecentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

▷*BRAKE DRUM SILENCER SPRING INSTALLATION (To correct Brake Squeal): See "Ford-Lincoln-Mercury Bendix Hydraulic" in Brake Section.*

Wheel Cylinders—Diameter: Front wheel 1.128" (hone limit 1.132"). Rear wheel 1.003" (hone limit 1.005").

Drums—Diameter 11".

Lining—Molded or woven. Width 2" (front wheel), 1¾" (rear wheel). Thickness 3/16". Length per shoe 11 15/16".

Clearance—.010" at each end of each shoe.

Braking Power—56% front wheels, 44% rear.

Hand Brake: See Service Brakes above.

▷**HAND BRAKE LINKAGE CHANGE: For easier application**—*See "Ford-Bendix Hydraulic" in Brake Section.*

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Link & Crank Arm Type.

See Miscellaneous Section for complete data.

HOOD ALIGNMENT: *See Mercury Special Data.*

M DEL IDENTIFICATI N

SERIAL NUMBER: Stamped on Patent Plate riveted to right front body pillar just below upper hinge opening. Serial number includes identification in the following sequence: *NOTE—Model year indicated on plate will be either 52 (1952), or 53 (1953).*

Year	Plant Assembly	Number Serial	Type Engine
53	See below	10001①	M

①—Starting Serial Number (All Plants).

Assembly Plants—(Indicated in serial number by the following code): "LA"—Los Angeles. "LP"—Lincoln Plant. "ME"—Metuchen. "SL"—St. Louis.

TUNE-UP

COMPRESSION PRESSURE: 105-125 lbs. at 120 RPM.

VACUUM READING: 21" at 425 RPM.

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinder Numbering—Right Bank 1-2-3-4, Left Bank 5-6-7-8. Numbered from FRONT of engine.

SPARK PLUG GAP: .029-.032".
Plugs—Champion H-10.
CAUTION—Tighten plugs to 24-30 ft.lbs. torque.

DISTRIBUTOR: (1952)—Mercury No. 7RA-12127-C or OCM-12127. (1953)—Mercury No. 7RA-12127-D or OCM-12127-B. *(CAUTION—Use "7RA" type with Cast Iron Cylinder Front Cover, "OCM" with Aluminum Cylinder Front Cover).* "Loadomatic" type with spark advance controlled by vacuum diaphragm which moves breaker plate.
Breaker Gap—.014-.016".
Cam Angle—26-28½° closed.
Rotation—Clockwise viewed from above.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Mercury No. 8BA-12029. At distributor.

►***COIL HIGH TENSION LEAD CAUTION (Radio Equipped Cars):*** This coil-to-distributor lead is SPECIAL SUPPRESSOR LEAD (non-metallic type with carbon impregnated nylon or rayon core) and the special length (approx. 14½") is required for proper radio reception. ***THIS LEAD CABLE MUST NOT BE SHORTENED AND OTHER TYPE IGNITION CABLES MUST NOT BE SUBSTITUTED FOR IT.***
Ignition Current—3 amperes idling, 5 stopped.

CONDENSER: Mercury No. 7RA-12300-C.
Capacity—.21-.25 microfarad.

IGNITION TIMING: 2° BTDC.
Timing Mark—Small circular button on rim of pulley. Timing pin above pulley on right side. With No. 1 piston in firing position, align timing mark with timing pin (Initial Timing), adjust distributor for best engine performance without objectionable ping (Final Ignition Timing).

►***IGNITION TIMING CAUTION—If neon timing light used,*** disconnect vacuum line to prevent automatic advance operating.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Mercury No. EAC-9510-E, F (Synchro-mesh Trans.), EAC-9510-G, H, J (Merco-matic Trans.) "Centri-flo" dual down-draft carburetor with fast idle and separte automatic choke control.

►***CARBURETOR-TO-INTAKE MANIFOLD AIR LEAK CORRECTION—See Carburetor Section for complete data.***

►***RECOMMENDED REMOVAL OF AIR CLEANER HOLD-DOWN BOLT NUT (First 1953 Cars): See "Mercury Centri-flo Carburetor" in Carburetor Section.***

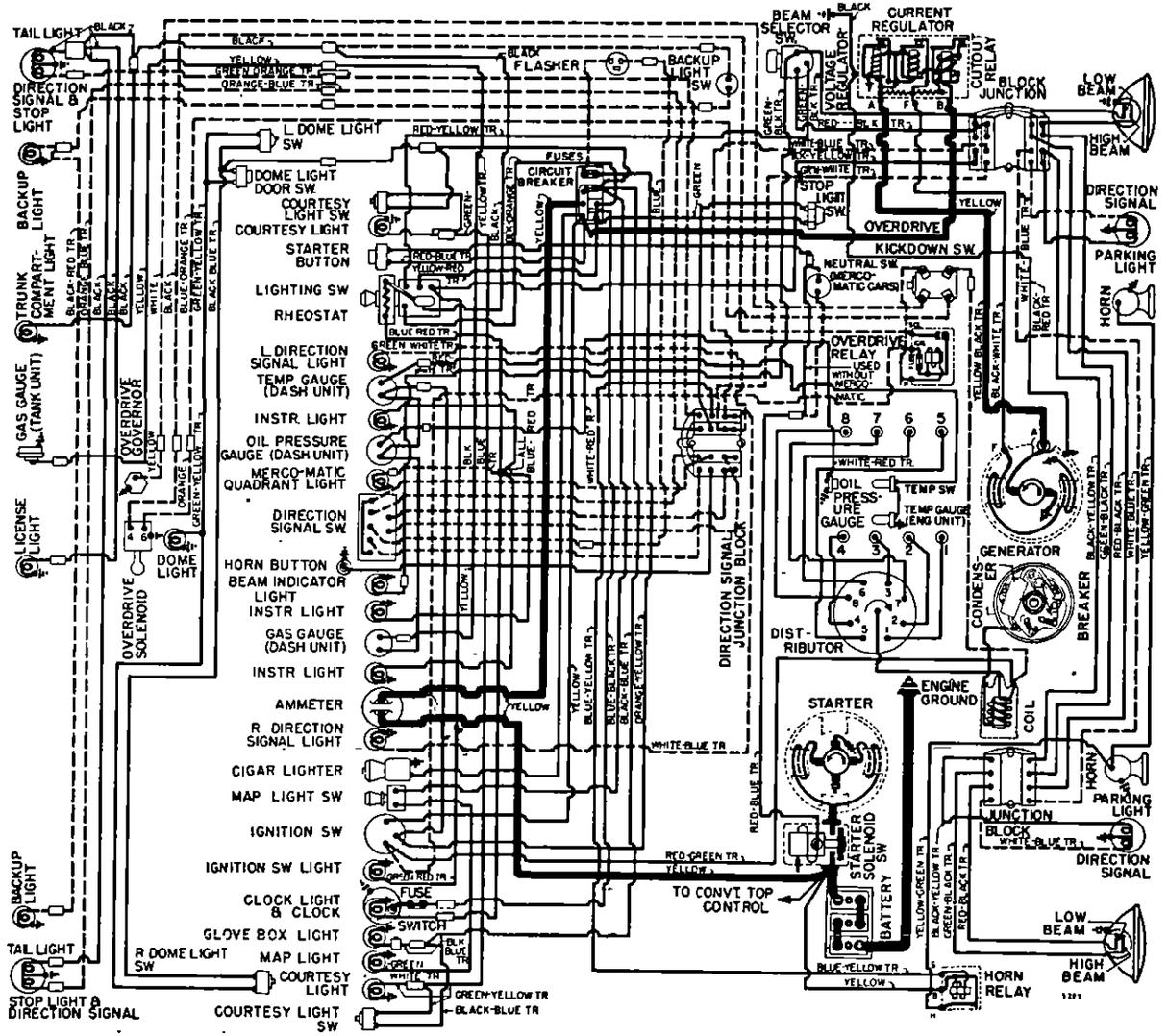
►***THROTTLE STICKING CORRECTION: See Carburetor Section.***

►***ENGINE HESITATION OR LOSS OF POWER AT 30-35 MPH CORRECTION: See Carburetor Section.***

►***1952 DASHPOT REPLACEMENT CAUTION***—Dashpot assembly No. EAC-99560-B used on late 1952 cars has nylon check ball and spring located in dashpot body (instead of carburetor). ***If this EAC-99560-B dashpot installed on earlier cars, CHECK BALL, SPRING, AND RETAINER MUST BE REMOVED FROM CARBURETOR AND DISCARDED.*** *See Carburetor Section for complete data.*

►***CARBURETOR COVER & PLUG ASSY. CHANGE (To prevent Lean Mixture at off-idle or transfer point): See "Mercury Centri-flo Carburetor" in Carburetor Section.***
Idle Setting—With engine at normal operating temperature (oil pressure and coolant temperature stabilized) so that choke valve wide open and fast rect idling speed, then adjust both idle mixture idle inoperative, adjust throttle stopscrew for corscrews for highest steady manifold vacuum. Recheck engine idle speed.
Idle Speed—400-450 RPM (Synchro-mesh Trans.), 425 RPM maximum (Merc-O-Matic), in "N".
Float (Fuel) Level—1/2" ±1/32" below top edge of bowl with fuel pump pressure at 3½-4½ lbs. Use Fuel Level Gauge 9550-B to check fuel level, placing

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1952 MODELS

CONTINUED FROM PRECEDING PAGE

gauge squarely on top of main body so that gauge pins extend down into bowl. Fuel should be at least as high as longer GO pin but must not touch shorter NO GO pin. Adjust by bending tab on float lever which contacts intake needle.

CAUTION—Both floats must be at same height and floats must not contact float bowl walls.

Accelerating Pump—Seasonal adjustment provided by three holes in throttle shaft lever for pump link engagement. **Center Hole**—Normal operating. **Outer Hole**—Extreme cold. **Inner Hole**—Extreme hot.

Fast Idle Setting: No adjustment required.

Choke Setting: Mark on cover aligned with center mark of scale on housing.

Fuel Pump Pressure: 3½-4½ lbs.

VALVE TAPPET CLEARANCE: Intake .013-.015". Exhaust .017-.019. *See Mercury Special Data.*

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve located between right end of exhaust pipe cross-over and right exhaust manifold.

IGNITION

IGNITION SWITCH: Mercury No. FAA-11572-A.

COIL: Mercury No. 8BA-12029.

▷***COIL HIGH TENSION LEAD CAUTION (Radio Equipped Cars):*** This coil-to-distributor lead is SPECIAL SUPPRESSOR LEAD (non-metallic type with carbon impregnated nylon or rayon core) and the special length (approx. 14½") is required for proper radio reception. ***THIS LEAD CABLE MUST NOT BE SHORTENED AND OTHER TYPE IGNITION CABLES MUST NOT BE SUBSTITUTED FOR IT.***

Ignition Current—5 amperes stopped, 3 amperes idling.

CONDENSER: Mercury No. 7RA-12300-C.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Mercury No. 7RA-12127-C, or D (use with Cast Iron Cylinder Front Cover), OCM-12127 or OCM-12127-B (use with Aluminum Cylinder Front Cover). "Loadomatic" full advance type with single breaker. *See "Ford, Lincoln, Mercury Distributor" in Electrical Equipment Section for complete data.*

▷***DISTRIBUTOR REPLACEMENT CAUTION—When replacing distributor, use 7RA-12127-C or D with CAST IRON cover, OCM-12127 or OCM-12127-B with ALUMINUM cover.***

Breaker Gap—.014-.016".
Cam Angle—26-28½° closed.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Advance Performance
▷With Distributor on Test Unit

Distr. Degrees	Vacuum	R.P.M.
0°	0"	200
2-3°	0.57"	600
4½-5¼°	1.70"	1000
7½-8½°	3.70"	2000

IGNITION TIMING

Initial Setting① ..... **2° BTDC**

①—See "Final Ignition Timing" below.

Crankshaft Pulley Mark—Small circular button on rim of pulley. Timing pin above pulley on right side.

Initial Timing—With #1 piston in firing position, timing mark on pulley aligned with timing pin on front of engine, loosen hold down screw on distributor, rotate distributor until contacts begin to open, tighten hold down screw. Check spark plug connections (see diagram), see that rotor at #1 position in distributor cap. Then make "Final Ignition Timing" adjustment as directed below.

Initial Timing (With Neon Timing Light)—Disconnect vacuum line to prevent automatic advance operating, idle engine and adjust distributor as above so that timing mark appears to be at pointer on chain case cover. Then make "Final Ignition Timing" as follows:

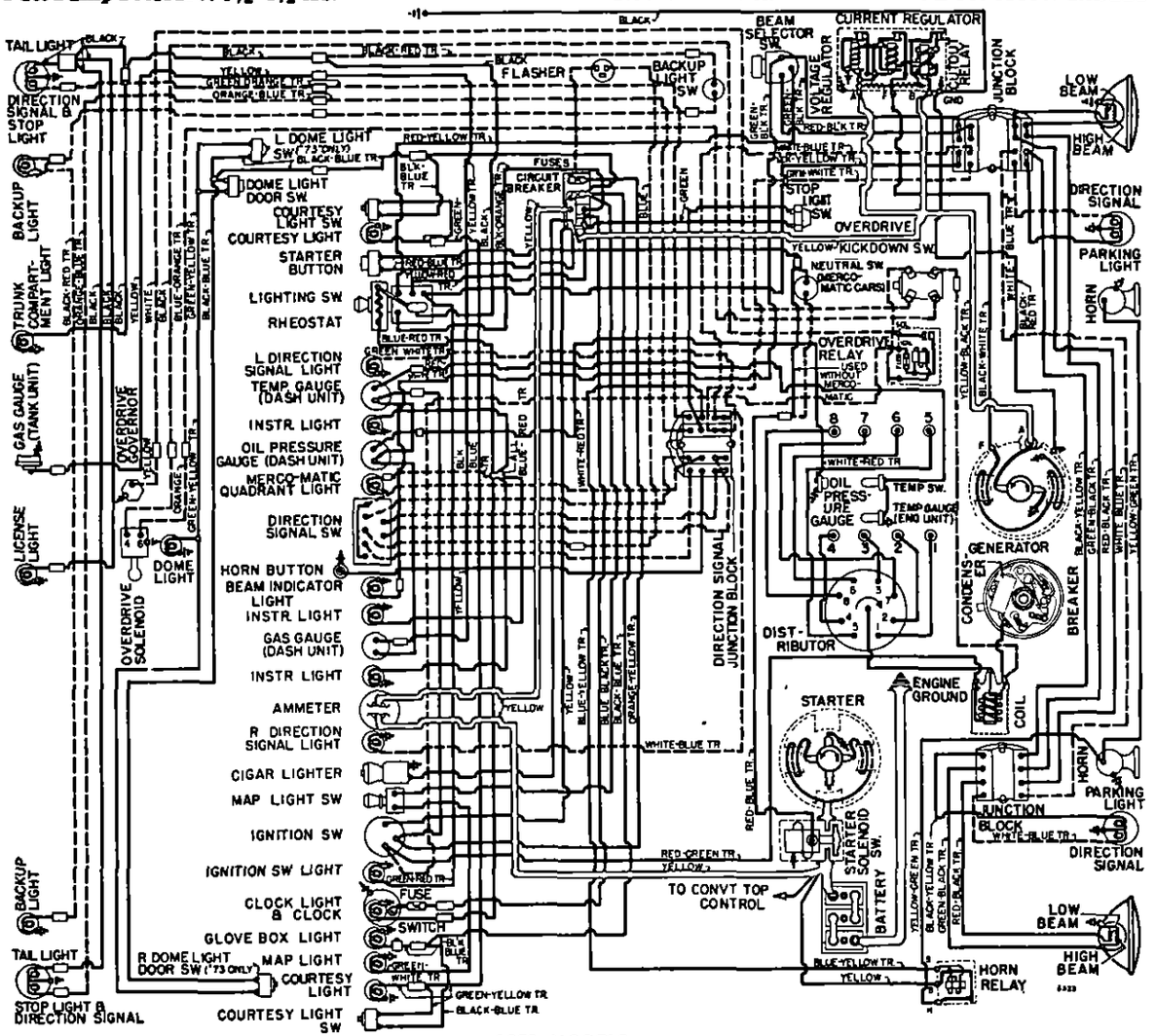
Final Ignition Timing—After initial timing (above), note position of end of distributor clamping flange with relation to scale on Indicator Plate on cylinder head (mounted on right front water outlet support capscrew), ADVANCE timing by moving distributor counter-clockwise one graduation on the scale. Road test car for objectionable pinging under load and for engine roughness. Repeat this procedure (advancing distributor one graduation at a time) until pinging or roughness noted, then RETARD distributor slightly until pinging and roughness eliminated.

CARBURETOR

Mercury No. EAC-9510-E, F (Synchro-mesh Trans.), EAC-9510-G, H, J (Mercomatic Trans.) "Centri-flo" dual downdraft type carburetor with fast idle and separate automatic choke.

See "Lincoln-Mercury Centri-flo Carburetor" in Carburetor Section for complete data.

▷***CARBURETOR-TO-INTAKE MANIFOLD AIR LEAK CORRECTION—See Carburetor Section for complete data.***



1953 MODELS

►*RECOMMENDED REMOVAL OF AIR CLEANER HOLD-DOWN BOLT NUT (First 1953 Cars): See "Mercury Centri-flo Carburetor" in Carburetor Section.*

►*THROTTLE STICKING CORRECTION: See Carburetor Section.*

►*ENGINE HESITATION OR LOSS OF POWER AT 30-35 MPH CORRECTION: See Carburetor Section.*

►*1952 DASHPOT REPLACEMENT CAUTION*—Dashpot assembly No. EAC-99560-B used on late 1952 cars has nylon check ball and spring located in dashpot body (instead of carbureor). *If this EAC-99560-B dashpot installed on earlier cars, CHECK BALL, SPRING, AND RETAINER MUST BE REMOVED FROM CARBURETOR AND DISCARDED. See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See "Holley-Ford Jet Specification Table" in Carburetor Section.*

Merc-O-Matic Throttle Adjustment: *See "Fordomatic & Merc-O-Matic Transmission" in Transmission Section.*

Fast Idle: Holley-Ford Carburetor type.
Setting—No adjustment required.
See Carburetion Equipment Section for complete data.

Automatic Choke: *See "Lincoln-Mercury Choke" in Carburetion Equipment Section for complete data.*
Setting—Mark on cover should be aligned with center mark of scale on choke housing. Adjust by loosening three cover screws and rotating cover assembly.

CARB. EQUIPMENT

Air Cleaner: Oil bath type.

Fuel Pump: (1952) Mercury No. 1CM-9350-A; (1953) EAB-9350-A. Fuel and vacuum type.
Pressure—3½-4½ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge—King-Seeley Electric (not "CV").
Dash Unit—Mercury No. FAC-9280-B.
Tank Unit—Mercury No. FAA-9275-A (Exc. Sta. Wgn.). No. FAA-9275-B (Sta. Wgn.).
See Carburetion Equipment Section for complete data.

BATTERY

Mercury No. 8M-10655-A. 6 volt, 17 plate, 100 ampere hour capacity (20 hour rate).
Zero Capacity—300 amperes for 3.3 minutes. Five second voltage—4.2 volts.
Grounded Terminal—Positive (+) terminal.
Location—Right side of engine under hood.

STARTER

Mercury No. FAD-11002-A (Synchro-mesh Trans.), FAE-11002-A (Merc-O-Matic Trans.).
Armature—Mercury No. 18-11005 (for FAD-11002-A), 1CM-11005 (for FAE-11002-A).
Drive—Mercury No. B-11350 (Synchro-mesh Trans.); 1CM-11350-C Bendix "Folo-Thru" Drive (Merco-matic Trans. Cars).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—48-56 ozs.
Cranking Speed—100-180 RPM. 210 amps. max.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	①	5.0	40-60
16 "	Lock	3.5	700

①—With starter on engine and engine running.

Starting Switch: Mercury No. FAB-11450-B. Magnetic Switch mounted on right front fender apron and controlled by Pushbutton Switch No. FAA-11500-A. Neutral Switch, Mercury No. 1M-15812-B, used on Merc-O-Matic cars.

Removal: To remove, take off right engine splash pan, free starter to oil pan bracket, take out two starter through bolts.

GENERATOR

Mercury No. FAA-10002-A. Two brush type with current & voltage regulation.
Armature—Mercury No. OA-10005-A.
Maximum Charging Rate—Controlled by regulator (dependent on battery condition).
Charging Rate Adjustment—None. See Regulator.
To Check Generator Output—Connect ammeter in series with charging line at regulator "ARM" terminal, connect short insulated jumper between generator "A" & "F" terminals (to short out regulator). Run engine at approximately 1500 RPM and note ammeter reading. If generator output equals or exceeds rated output of 35 amperes, generator performance is satisfactory.

►*CAUTION—Do not operate generator at higher speeds or in service with jumper connected between generator armature and field terminals. This jumper eliminates regulator action.*

Performance Data

Amperes	Engine RPM.
35	1500

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—20-24 ozs.

Generator Belt Adjustment: Loosen two bolts on fan mounting bracket, loosen generator support mounting stud nut, raise generator up until side movement on belt midway between generator and water pump pulley is ¾" (thumb and finger pressure), tighten stud nut.

Fan Belt Adjustment: *See COOLING.*

REGULATOR

Mercury No. FAC-10505-A. Voltage current, 3 unit type.
See Electrical Equipment Section for complete data.

Cutout Relay
Cuts In—6.0-6.6 volts.
Cuts Out—8 amperes discharge current (max.)
Contact Gap—.010" (armature against upper stop).
Air Gap—.014" between armature and core with contacts just closed.
Checking & Adjusting—*See Electrical Equip. Section.*

Voltage Regulator
Setting—7.4-7.8 volts.
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ozs. minimum with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator
Setting—34-38 amperes.
Air Gap—.032-.035" between armature and core with contacts just closed.
Contact Spring Tension—5 ozs. minimum with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Ford "Sealed Beam" type.
See Electrical Equipment Section for complete data.

Direction Signal: Std. *See Electrical Equipment Section.*
Direction Signal Flasher—Mercury No. 8L-13350-B.

Switches
Lighting—(1952) Mercury No. OL-11654; (1953) FAA-11654-A.
Beam Selector—Mercury No. 8A-13532.
Instrument—(1952) Mercury No. OL-13740; (1953) FAA-13740-A.
Glove Box—OM-14413-A.
Map Light—OA-13752.
Stop Light—11A-13480.
Direction Signal—1M-14486-A.

MISC. ELECTRICAL

CIRCUIT BREAKERS: (Lighting) Mercury No. FAA-12258-C (30 amp. & 15 amp.). Headlights (30 amp.); Stop & Tail Lights (15 amp.). Assembly mounted on back of instrument panel.
Convertible Top Control—40 ampere circuit breaker.

FUSES: Courtesy & Interior Lights—14 amperes. Located on circuit breaker assembly behind instrument panel.
Direction Signal—14 amperes. Located on circuit breaker assembly behind instrument panel.
Overdrive—30 amperes. Mounted on overdrive relay.
Heater—20 amperes. In lead wire.
Clock—3 amperes. In clock lead wire.

HORNS: Mercury No. 51A-13832-A,B High Pitch, Right Horn). **51A-13833-A,B** (Low Pitch, Left Horn). Dual horns operated by relay.

►*HORN NOT BLOWING OR CONTINUED BLOWING CORRECTION—See "Mercury Steering Gear" in Steering Gear Section.*
Horn Relay—Mercury No. FAA-13853-A. On engine side of dash panel.

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder "L" head 90° "V" type with both cylinder blocks and crankcase cast enbloc.
Bore—3 3/16". **Stroke**—4".
Displacement—255.4 cu. ins. **Rated HP**—32.5.
Developed Horsepower—125 at 3700 RPM.
Compression Ratio—7.2-1.

►*1952 COOLING SYSTEM IMPROVEMENTS & PRODUCTION CHANGE: See "Cooling System" in Mercury Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Mercury Special Data.*

►*CYLINDER HEAD LEAKS (Caused by Distributor Hold-down bolt)—See "Cooling System" in Mercury Special Data.*

OIL PAN & ENGINE REMOVAL: *See Mercury Special Data.*

PISTONS: (First Cars) Aluminum alloy, steel strut, dome head, U-slot, cam ground type.
(Later Cars)—Aluminum alloy, solid skirt type with offset piston pin.

►*PISTON & PIN ASSEMBLY PRODUCTION CHANGE—New SOLID SKIRT pistons with OFFSET PINS used in production on later cars, and can be used as service replacement on 1949-53 engines in either full sets or intermixed with "split-skirt" pistons. CAUTION—Piston fit is different. See Piston Clearance following.*

►*CAUTION—Mercury and Ford Pistons or Rings are not interchangeable.*
Weight—13.1 ozs. **Length**—2.89" (exclud. dome).
Removal—Pistons and rods removed from above.
Clearance—(Split-Skirt Type) .0000-.0006" loose.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

(Solid-Skirt Type) .0005-.0011" loose. See Fitting Pistons.
Cyl. Bore Wear Limits—Out-of-round .003", Taper .006".

Replacement Pistons: Furnished Std., .0025", .020," .030", .040" Oversize.

Fitting Pistons: Use ½" wide feeler inserted between piston and cylinder wall at right angles to pin. Use feeler thickness listed below. Pull to withdraw feeler should be 6-12 lbs. (all pistons).
New Piston in New Bore—.0015".
New Piston in Old Bore—.002".
Old Piston in Old Bore—.003".

▷*NOTE*—Pounds pull to withdraw feeler should be 6-12 lbs.

Installing Pistons: **(First—Split Skirt)**—Split in skirt toward left side of engine (viewed from rear). **(Later—Solid Skirt)** Small indentation in piston head toward front of engine on all pistons.

PISTON RINGS: Two compression, two slotted oil rings per piston (lower oil ring below pin). Rings are taper faced. Upper oil ring groove slotted, lower oil ring groove drilled for oil drainage.
NOTE—Top compression ring is chrome plated.

▷***CAUTION—Mercury and Ford Piston Rings are not interchangeable (heavier rings on Mercury).***

Ring	Width	End Gap①	Side Clearance
Comp. No. 1	3/32"	.007-.017"	.0015-.003"②
Comp. No. 2	3/32"	.010-.017"	.001-.0025"③
Oil Nos. 3 & 4	3/16"	.010-.017"	.0015-.003"②

Worn Limit—①.035", ②.004", ③.0035".

Installing Rings: Top compression ring assembled with counterbore to top. Lower compression ring mark "TOP" should be up toward head of piston.

Replacement Rings: Ring sets furnished Standard size and .020", .030", .040" oversize.
NOTE—Service rings have expander behind top oil ring, none on bottom ring.

PISTON PIN: Diameter—.7501-.7504". Length—2.839-2.845". Floating type. Pin hole in connecting rod bronze bushed.
Pin Fit in Rod—.0002-.0004" (Select for light thumb push fit). Worn Limit .0015".
Pin Fit in Piston—.0001-.0003" loose.

Replacement Pins: Standard size, .001", .002" oversize.

CONNECTING ROD: Length 7".
Weight—18.5 ozs. (less bearings).
Crankpin Journal Diameter—2.138-2.139". Maximum wear limit out-of-round .0015". Taper .001".
Lower Bearing—Locked in (not floating type), steel backed, copper lead alloy lined, replaceable shells. Upper and Lower halves interchangeable.
Clearance—.0005-.003" (new), .005" (worn limit).
Side Play—(2 rods) .006-.020". (Worn limit .022").

Replacement Bearings: Standard size, .002", .010", .020", .030" & .040" undersize.

Installing Rods: Numbers on rods must be toward right side of engine (Right Hand bank), toward left side (Left Hand Bank). Assemble rods to pistons so that oil squirt hole in lower end of rod is on rear side (Right Hand Bank), front side (Left Hand Bank).

CRANKSHAFT: 3 bearing, integral counterweights. ***CRANKSHAFT SLUDGE TRAPS—Crankpin throws have sludge traps with removable plugs for cleaning.***
Main Bearing Journal Diameter—2.498-2.499".
Wear Limits—.0015" Out-of-round. .001" Taper.
Bearings—Steel backed, copper lead alloy lined, replaceable shells. Upper and lower halves alike.
Clearance—.001-.0026".
Bearing Adjustment—None. Replace bearings.

Replacement Bearings: Standard size, .002", .010", .020", .030" undersize.

▷***MAIN BEARING CAUTION—Main bearing caps marked with BLUE paint indicate that the engine block main bearing bore is .0005" oversize and A SPECIAL MAIN BEARING IS REQUIRED.***

End Thrust: Taken by rear main bearing. Adjust by replacing bearing if endplay excessive.
Endplay—.002-.006" (new), .008" (worn).

CAMSHAFT: Three bearing. Helical gear drive. Distributor drive gear pressed on front end of shaft, oil pump drive gear on rear end.
Camshaft Journal Diameter—1.7965-1.797".
Bearing Diameter—1.7985" (replace bearing if diameter greater than worn limit of 1.8015").

Replacement Bearings: Standard size, .010", .015" undersize. Undersize service bearings do not require finish reaming.

End Thrust: Taken by front end of camshaft and thrust surface on inner face of front cover. Adjust by replacing front cover. **Endplay**—.007-.016".

Camshaft Oil Pump & Distributor Drive Gear Removal & Installation: *See Mercury Special Data.*

Timing Gears: L.H. helical, fibre camshaft gear. Cast iron crankshaft gear.

Replacement Camshaft Gears: Furnished Standard size, .006", .012" oversize. *See Mercury Special Data.*

Camshaft Removal & Installation: *See Mercury Special Data.*

Camshaft Setting: Mesh marked tooth of crankshaft gear with marked space on camshaft gear.

VALVES:	Head Diam.	Stem. Diam.	Length
Intake	1.505-1.515"	.341-.342"	4.8175"
Exhaust	1.505-1.515"	.3405-.3415	4.8175"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.319"	.0014-.0034"
Exhaust	45°	.315"	.0019-.0039"

Seat Width—.065-.080" (1/16-5/64") and centered on valve face.

▷***ROTATABLE (FREE TYPE) VALVES USED—See "Valve System" in Mercury Special Data.***

▷***REPLACEMENT VALVES—Exhaust valves furnished for service replacement of ALL VALVES.***

Valve Guides: One piece type positioned and retained by "C" washer. Inside diameter .344". Outside diameter 1.031". Distance from top of valve seat to upper end of valve guide 1.116".
Intake Valve Guide Seal—Rubber seal installed in groove on outer diameter of intake guide bushing.

Valve Lifters: Barrel type operating in guide holes in block.
Diameter—.9992" (replace if worn to less than .9977"). Length limit after resurfacing end 1.728".
Clearance—.0007-.0016" (new), .003" (worn limit).

Valve Springs: Free length 2 13/64" (2.20"). 9⅛ coil type. Install closed-coil end up toward valve.

Valve Spring Specifications

Valve	Lbs. Pressure	Length
Open	85-89	1.57"
Closed	40-43	1.89"

VALVE TIMING

VALVE TAPPET CLEARANCE: Intake .013-.015". Exhaust .017-.019. *See Mercury Special Data.*

VALVE TIMING: See Camshaft Setting above.
Intake Valves—Open 5° BTDC. Close 51° ALDC.
Exhaust Valves—Open 47° BLDC. Close 9° ATDC.
Valve Timing Check—*See "Valve System" in Mercury Special Data.*

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings, camshaft bearings, timing gears and distributor drive gear. Piston pins and valve lifters lubricated by splash. Oil pump mounted in crankcase at rear of engine.
Crankcase Capacity—4 qts. (refill); 5 qts. (dry).
Normal Oil Pressure—57 lbs. at 40 MPH.

Oil Pressure Relief Valve: In pump. No adjustment.
Spring Tension—12 lbs. at 1.14".
NOTE—Cylinder block oil relief valve not used.

Oil Pump: Gear type in rear of crankcase.
Oil Pump Overhaul—*See Mercury Special Data.*

Oil Filter: By-pass type. On left cylinder head. Replace filter element each 4000 miles or more often as required.
Oil Filter Cartridge—Mercury No. 8CM-6731-A (Kit includes element and gaskets).

Oil Pressure Gauge: King-Seeley Electric (not CV).
Dash Unit—Mercury No. FAC-9273-B.
Engine Unit—Mercury No. 41A-9278.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Filter element in oil filler breather cap. Outlet pipe (below fan) does not have a filter element.

COOLING

▷*1952 COOLING SYSTEM IMPROVEMENTS & PRODUCTION CHANGE: See "Cooling System" in Mercury Special Data.*

Cooling System: Pressure type with relief valve in filler cap and two belt driven pumps (one for each bank) with re-circulating by-pass.
Capacity—21.5 qts. (No heater). Recommended operating capacity—20.5 qts.
Pressure Valve—Mercury No. OL-8100-A. Radiator Filler Cap opens at 6-8 lbs.

Water Pumps: 2 used. Centrifugal belt driven packless type. Shaft mounted on pre-lubricated ball bearings. Requires no lubrication service.

▷*WATER PUMP REMOVAL CAUTION*—One pump attaching bolt located inside water outlet.
NOTE—Bottom bolt must be installed before installing water pump pulley.
See Water Pump Section for complete data.

Fan Belt Adjustment: Loosen two fan mounting bracket bolt nuts, raise fan up for ½" side movement of belt midway between fan and crankshaft pulley.
Generator & Pump Belt Adjustment: *See Generator.*

Thermostats: Mercury No. 1BA-8575-B (157°-162°), 1BA-8575-B (177°-182°). Two thermostats are used (one in each cylinder head water outlet).

Temperature Gauge: King-Seeley Electric (not CV).
Dash Unit—Mercury No. FAC-10883-B.
Engine Unit—Consists of **Sender** (in right bank cyl. head), and **Switch** (in left bank cyl. head).
Sender—Mercury No. 1A-10884A (stamped 233F).
Switch—Mercury No. 1A-10990 (stamped 226F).
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 10A7. Mercury No. MA-7563-A. Single plate, dry disc, Borglite Driven Member.
See Clutch Section for complete data.
Facings—Molded. Inside diameter 6¾". Outside diameter 10". Thickness .125".

Pedal Adjustment: 1-1¼" Free travel. Adjust by turning pedal-to-equalizer shaft link adjusting screw. **Toe-Board Clearance**—Move clutch pedal bumper bracket as required to bring clutch pedal pad same distance from floor as the brake pedal pad.

Removal: Remove transmission (see Transmission Removal below). Remove flywheel housing. Prick punch flywheel and pressure plate so that these parts may be placed in original positions when reassembling. Compress pressure plate assembly with Tool 7563, take out capscrews, remove clutch.

SYNCHRO-MESH TRANSMISSION

Own Make. 3-speed, all helical gear type. Constant mesh synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.

Transmission Control: Mounted on steering column.
See Transmission Section for complete data.

►*TRANSMISSION GEAR SHIFT INTER-LOCK PIN PRODUCTION CHANGE (To reduce possibility of shifting into two gears at once)—See "Ford, Lincoln, Mercury Transmission" in Transmission Section for complete data.*

Removal: Disconnect rear universal, slide propeller shaft out of transmission. Disconnect clutch, transmission and speedometer linkage. Support rear of engine and disconnect rear engine mounting from frame. Take out transmission-to-flywheel housing capscrews (remove two rubber plugs under floor mat for access to two top capscrews).

OVERDRIVE

Warner Model AS1-R10F. Overdrive is solenoid operated type (no centrifugal pawls) with governor control and throttle operated kick-down switch.
See Transmission Section for complete data.
Solenoid—Mercury No. FAA-6916-A.
Control Relay—Mercury No. 1M-6915-A.
Kick-down Switch—Mercury No. FAA-6918-A.
Governor Switch—Mercury No. 8M-6943.

Removal: Same as for Standard transmission after disconnecting overdrive control cable and wiring.

MERC-O-MATIC TRANSMISSION

Torque converter combined with a hydraulically operated transmission (3 speed forward, 1 reverse).

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING—See Transmission Section.*

Lubrication—*Note—Oil level dipstick and oil filler tube located under engine hood on right side near dash panel. Check transmission oil level every 1000 miles and maintain oil level at full mark on dipstick. Drain and refill every 15000 miles. Use only Automatic Transmission Fluid Type "A."*

►*TRANSMISSION CASE VENT ASSEMBLY PRODUCTION CHANGE: New vent (identified by mushroom shaped cap) used for faster filling of case. May be installed on all previous transmissions.*

Capacity—Approximately 9 qts.

Checking Oil Level—Run engine with transmission selector lever in 'N' (Neutral) until both engine and transmission are at normal operating temperature (approx. 4 minutes), then move selector lever through all ranges to assure distribution of oil. Remove oil filler dipstick, wipe clean and insert in filler tube, making sure that it is seated securely. Remove dipstick and check fluid level. Add necessary amount of fluid to bring level to "Full" mark on indicator. Replace oil level dipstick.

►*CAUTION—Do not fill above 'Full' mark.*

►*OTHER MERC-O-MATIC SERVICE DATA: See "Fordomatic & Merc-O-Matic" in Transmission Section.*

UNIVERSALS

Mechanics Type 2CR. Needle bearing type. 2 used.

REAR AXLE

Own. *TWO different types used as follows:*

1) All Models except Station Wagon—Semi-floating, hypoid gear type **with separate carrier.** Axle shaft ends flanged (no separate hub). Wheel bearings are sealed, pre-lubricated (no lubrication required).

2) Station Wagon—Semi-floating, hypoid gear type **(no separate carrier used).** Axle shaft design same as other cars (above).

See Rear Axle Section for complete data.

Rear Axle Ratios

	Standard	Optional
All (Exc. Sta. Wgn. & Convt.)		
Std. Trans	3.73-1 (41-11)	①
Overdrive	4.10-1 (41-10)	②
Merc-O-Matic	3.54-1 (39-11)	3.31-1 (43-13)
Station Wagon:		
Std. Trans.	4.27-1 (47-11)	4.55-1 (50-11)
Overdrive	4.55-1 (50-11)	4.27-1 (47-11)
Merc-O-Matic	3.54-1 (46-13)	
Convertible:		
Std. Trans.	3.90-1 (39-10)	4.10-1 (41-10)
Overdrive	4.10-1 (41-10)	3.90-1 (39-10)
Merc-O-Matic	3.54-1 (39-11)	3.31-1 (43-13)

①—4.10-1 (41-10) or 3.54-1 (46-13)
②—3.73-1 (41-11) or 3.54-1 (46-13)

Removal: Raise rear of car. Remove axle shafts, and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers, spring U-bolts. Remove axle housing assembly from car.

Axle Shaft Removal: Remove rear wheels. Take out three capscrews holding drum to axle shaft flange. Remove hydraulic brake line from brake backing plate. Take out four axle retainer nuts (work through opening in axle shaft flange). Use Tool 4235-A to remove axle shaft and bearing assembly from housing. Take off gasket and backing plate. Do not damage oil seal when removing axle shaft.

SHOCK ABSORBERS

Direct acting hydraulic. Service by replacement.

All (exc. Sta. Wgn.)	Front	Rear
Std.	MA-18045-B	MA-18080-B
Heavy Duty	MA-18045-G	MA-18080-G
Station Wagon:		
Std.	MA-18045-D	MA-18080-D
Heavy Duty	MA-18045-H	MA-18080-H

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5° with ¾° Camber.
Caster—0° to Neg. 1½°. Threaded bushing adjustment at lower pivot pin. Must not vary more than ½° from side to side.
Camber—0° to Pos. ¾°. Eccentric adjustment at upper pivot pin. Must not vary more than ½° from side to side.
Toe-In—3/32"-5/32". Adjusting sleeve at outer end of each tie rod. Adjust equally.

STEERING GEAR

Std. Steering Gear: Gemmer Model 305. 3-Tooth, Worm and Roller type with push-pull adjustments.
See Steering Gear Section for complete data.

POWER STEERING (Optional 1953)—Bendix hydraulic "Linkage Type" with power cylinder and control valve incorporated in steering linkage.
See "Ford & Mercury Power Steering" in Steering Gear Section for complete data.

BRAKES

Service: Mercury-Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

►*BRAKE DRUM SILENCER SPRING INSTALLATION (To correct Brake Squeal): See "Ford-Lincoln-Mercury Bendix Hydraulic" in Brake Section.*

Wheel Cylinders—Diameter: Front Wheel 1⅛". Rear Wheel—⅞".
Drums—Diameter 11" (Front & Rear).
NOTE—Drum grinding limit .060" (on diameter).
Lining—Molded. **Width** 2" (front wheels), 1¾" (rear wheels). **Thickness** 3.16". **Length per Shoe** 11 5/16".
Clearance—.010" at each end of each shoe.

Hand Brake: See Service Brakes above.

►**POWER BRAKES: (Optional 1953)**—Special vacuum power cylinder combined with hydraulic master cylinder. Unit is mounted on toe-board in place of conventional master cylinder.
See "Power Brakes" in Brake Section for complete data.

MISC. MECHANICAL

Four-Way Seat Control (1953): Electric type. Separate motors for up-and-down and fore-and-aft movement.
See Miscellaneous Section for complete data.

Power Operated Top: Reversible type motor (mounted under seat) drives two screw type jacks (one on each side) through flexible cables.
See Miscellaneous Section for complete data.

Power Operated Window Regulators: Electric type.
See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum, Link & Crank Arm type.
See Miscellaneous Section for complete data.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on patent plate attached to left front body pillar extension.

First Number–10001 up (each year). At both plants.

►*SERIAL NUMBER NOTE: Serial number (example #55LA10001M#) includes following identification data in sequence.*

Year①	Assy. Plant②	Serial No.	Eng. Type
55	LA	10001	M

①–Last two digits of model year.

②–See Assembly Plants following.

Assembly Plants–Indicated in serial number by following codes: **LA**–Los Angeles. **ME**–Metuchen. **SL**–St. Louis. **WA**–Wayne.

ENGINE IDENTIFICATION: One compression ratio used in 1954 engines (no specific identification). In 1955, two compression ratios were used (controlled by cylinder head design). Engine with 7.6-1 head is designated "ECK". Engine with 8.5-1 head is designated "ECL". 1955 Car model engine application is as follows:

1955 Car Model	Engine Designation
Custom	ECK
Monterey	ECK
Montclair	ECL

1955 Engine Identification Mark Location–"ECK" or "ECL" indicated on head between center rocker arm supports and in depression on lower surface. Effective Jan. 3, 1955 (ECK-B or C; or ECL-B), mark included between 1 & 2 and 7 & 8 exhaust ports toward top of head above spark plug shield (visible with mirror). All early engines had tan rocker arm covers. Beginning production Oct. 18, 1954, "ECL" engines have yellow covers, and "ECK" engines continue with tan covers.

TUNE-UP

COMPRESSION PRESSURE: (1954)–120 lbs. **(1955)**–130 lbs. (ECK); 135 lbs. (ECL). At cranking speed on all engines.

VACUUM READING: (1954)–19" at 450 RPM. **(1955)**–19-20" at 500 RPM.

VALVE TAPPET CLEARANCE: .019" (Intake & Exhaust), with engine hot. *This setting supersedes previous 1955 setting of .018" for all valves.* Preliminary cold setting .020" (Intake & Exhaust).

►*1954 VALVE TAPPET ADJUSTING SCREW LOCKNUT CAUTION:* If adjusting screw is found **not** to extend up through rocker arm sufficiently to provide full thread engagement with locknut replace pushrods with Part No. EBU-6565-A and locknuts, Part No. EAA-6549-B.

MANIFOLD HEAT CONTROL: "Butterfly" type valve. Located at right end of crossover pipe at flange (single exhaust system), at flange joining right exhaust manifold to muffler inlet pipe (dual exhaust system). *CAUTION*–When installing, make sure counterweight portion is toward right front of engine.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders–RIGHT BANK 1-2-3-4, LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .029-.033" (Champion H-10). .032-.036" (Champion 870).
Spark Plugs (1954)–Champion H-10. 14mm., or equivalent. Tighten plugs to 24-30 ft. lbs.
Spark Plugs (1955)–Champion 870. 18mm., special.

►*1955 SPARK PLUG CAUTION: Plug is new type with tapered seat and does not require a sealing gasket. It is important that plugs be tightened to torque of 15-20 ft. lbs.*

COIL: Mercury No. 8BA-12029.
Ignition Current–3 amps. idling, 5 amps. stopped.

►*COIL HIGH TENSION LEAD CAUTION (Radio Equipped Cars):* Coil-to-Distributor lead is SPECIAL SUPPRESSOR LEAD (non-metalic with carbon impregnated nylon or rayon core) and the special length (approx. 14-1/2") is required for proper radio reception.

DO NOT SHORTEN LEAD OR USE ANOTHER TYPE FOR REPLACEMENT.

DISTRIBUTOR: Mercury No. FAE-12127-C (Early 1954); FDC-12127-A (Late 1954). FDK;12127-C (1955 "ECK" Engine); FEC-12127-A (1955 ECL Engine).

►*1954 FAE-12127-C DISTRIBUTOR OVER-ADVANCE WHEN ENGINE STARTED AT LOWER TEMPERATURE CORRECTION:* This condition noted when engine detonates excessively after starting under low temperature conditions. Install Pin & Post Assembly, Mercury Part No. FDC-12357-A which limits distributor advance to 15°-15½°. FAE-12127-C distributors that have been reworked in production are identified by the part number prefix "ED". *CAUTION*–When calibrating a corrected distributor refer to Automatic Advance Table for FDC-12127-A distributor. *See "Ford, Lincoln, Mercury Distributor" in Electrical Section for installation of Pin & Post Assembly.*

Condenser–Mercury No. FAB-12300-A. **Capacity** .21-.25 microfarad.
Contact Point Set–Mercury No. FAB-12171-B.
Breaker Gap–.014-.016".
Cam Angle–26-28.5°.
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Counter-clockwise viewed from above.

Advance Performance–FAE-12127-C①
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
1½-2½	0.24	500
4¼-5¼	0.43	700
7¼-8¼	0.64	1000
11¾-12¾	1.13	1500
15¼-16½	1.52	2000

①–Distributors **without** correction for "Over-Advance". See Distributor Correction (above).

Advance Performance–FDC-12127-A②
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
1½-2½	0.24	500
4¼-5¼	0.43	700
7¼-8¼	0.64	1000
11¾-12¾	1.13	1500
15-15½	1.52	2000

②–Use this table for FAE-12127-C distributors that have been corrected for "Over-Advance". See Distributor Correction above.

Advance Performance–FDK-12127C, FEC-12127A
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
1/2–1-1/2	0.19	300
11-1/4–12-1/4	1.36	1000
12-1/2–13-3/4	1.59	1400
14-1/4–15-1/2	1.95	2000

►*DISTRIBUTOR ADVANCE NOTE:* Advance data above is for distributor on TEST STAND. On the engine, advance is dependent on the carburetor used (number and location of vacuum takeoff ports and Spark Control Valve vary).

►*DISTRIBUTOR INSTALLATION NOTE:* It may be necessary to crank engine slightly to engage oil pump hex shaft with distributor shaft. This will not disturb timing because distributor engages camshaft gear before distributor shaft starts to engage the oil pump drive.

Initial Distributor Timing: Rotate engine until timing mark on crankshaft dampener is lined up with pointer and #1 piston is in firing position. Install distributor with point just breaking and the rotor in position to fire #1 cylinder (vacuum advance connection boss should be at approximately right angles to crankshaft and pointing toward left side of engine).

IGNITION TIMING

Setting (1954)–3° BTDC (normal).
Setting (1955)–3° BTDC (Std. & Overdrive Trans.). 6° BTDC (Merc-o-Matic).

Timing Mark–On crankshaft dampener and pointer on engine front cover. *See Initial Distributor Timing under DISTRIBUTOR above.*

CARBURETOR

1954 MODELS

Mercury No. EBY-9510-A (Std. & O.D. Trans.). EBY-9510-H (Merc-o-Matic). "Centri-Quad" four barrel downdraft type with vacuum controlled secondary throttle valve and separate automatic choke.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels 1-4-6-7.*

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►*CARBURETOR SERVICE REPLACEMENT NOTE:* Carburetor Assembly, Mercury Part No. ED-EBY-9510-K (with new type bowl cover to prevent fuel spill-over on sharp right turns) available for service replacement.

►*CARBURETOR "SPILL-OVER" ON SHARP RIGHT TURN CORRECTION:* To prevent spill over on cars with external vent, replace carburetor bowl cover assembly with Mercury No. ED-EBY-99983-C. *See "Lincoln-Mercury Centri-Quad" in Carburetor Section.*

►*EXTERNAL VENT PRODUCTION CHANGE:* An adjustable spring clip, Mercury Part No. EAD-99608-A used in production, and available for service on earlier carburetors to provide a means of closing off lower vent holes in accelerator pump rod for better starting in cold weather. *See "Lincoln-Mercury Centri-Quad" in Carburetor Section.*

►*CHOKE HEAT TUBE ASSEMBLY & INTAKE MANIFOLD PRODUCTION CHANGE:* New assemblies entered production in early June to prevent exhaust gas leakage into choke control heat tube assembly. Previous type heat tube assemblies are retained for service replacement on early cars, and later type heat tubes and manifold assemblies can be installed if desired. *See "Lincoln-Mercury Centri-Quad" in Carburetor Section.*

►*FAILURE TO GET FULL THROTTLE (MERC-O-MATIC CARS) CORRECTION: Remove necessary number of seals on accelerator pedal rod to obtain full throttle. NOTE—One seal must be retained to properly seal opening in toe-board.*

►*ENGINE NOT RETURNING TO IDLE SPEED (MERC-O-MATIC CARS) CORRECTION:* Check the following points and correct as necessary. (1) Ignition cable bracket assembly at left rear side of engine near engine ground strap may be interfering with "Z" bar spring support. Correct by bending bracket assembly away from "Z" bar. (2) Adjust carburetor dashpot (see Dashpot following). (3) Change location of accelerator Shaft Retracting Spring by attaching upper end of spring to ball joint and lower end of spring to lowest hole in bracket.

Idle Setting—Exactly 1¼ turns open (set both screws alike).

Idle Speed—With engine at normal operating temperature. 475-500 RPM (Std. & O.D. Trans.). 425-440 RPM (Merc-o-matic) with transmission selector lever in "D" (drive) position.

External Vent Seasonal Adjustment: (See "External Vent Production Change" above). On carburetors *where spring clip is provided on hollow accelerator* pump rod to control vent opening, adjust clip to open or close vent for best operation as follows:

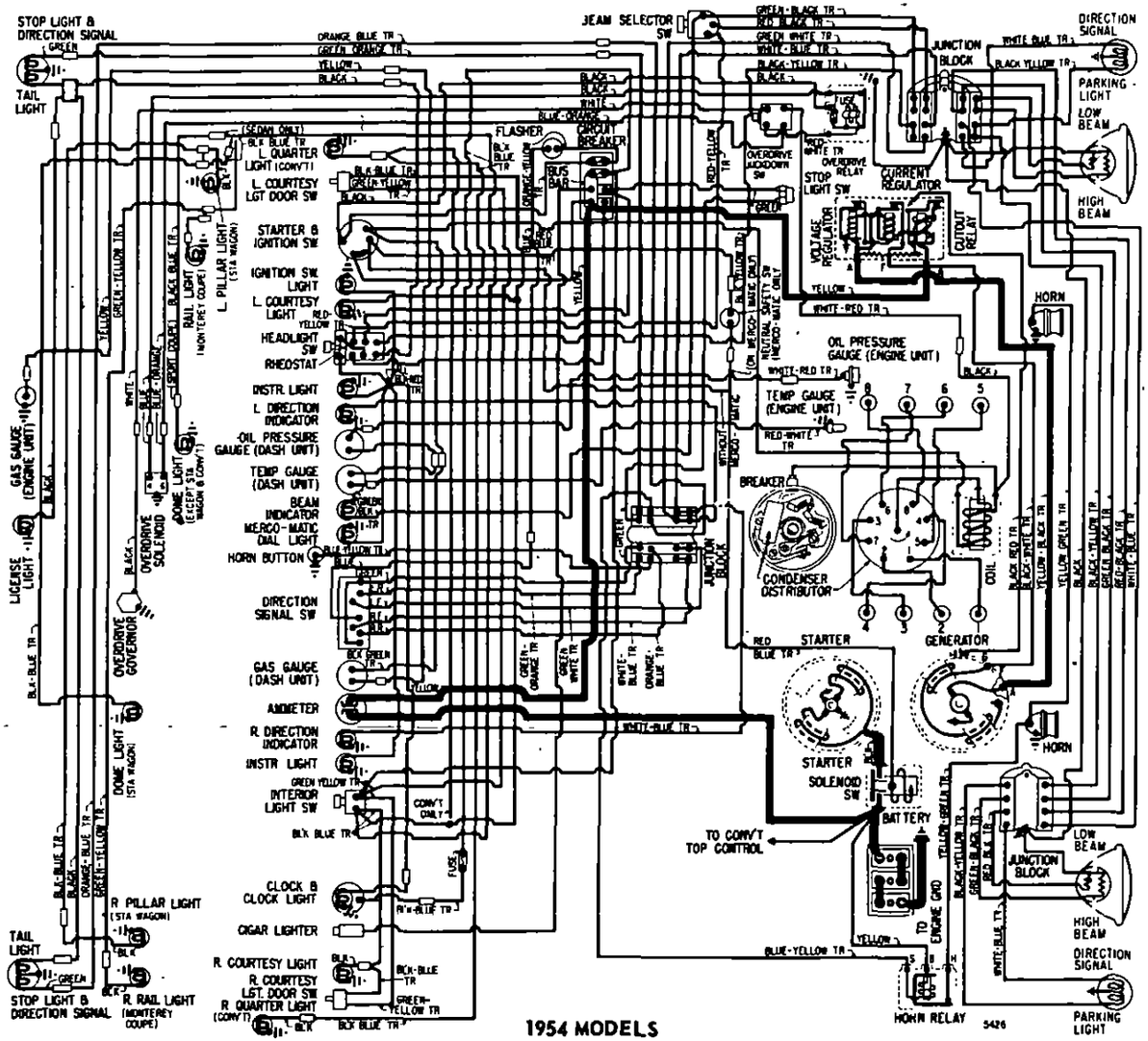
Winter Operation (Temperature below 50°F)—Slide clip down on pump rod so vent is CLOSED.

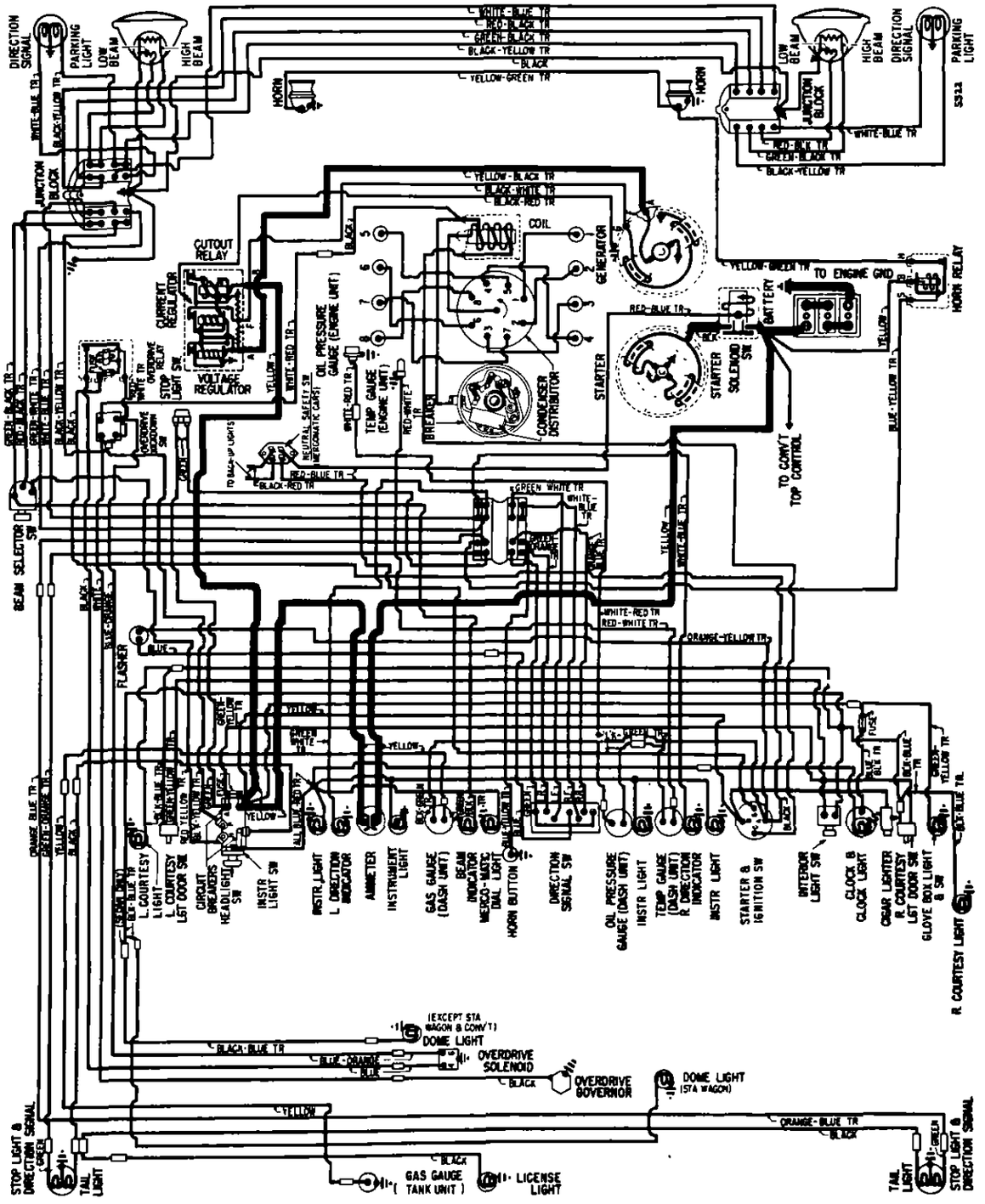
Summer Operation (Temperature above 50°F)—Slide clip upward on pump rod so that full diameter of vent hole is OPEN.

Dashpot Adjustment (Merc-O-Matic Cars): Adjust engine idle speed to correct setting and turn engine off. Loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counter-clockwise) until head of adjusting screw pushes dashpot up to the end of its travel. Turn dashpot screw in 1½2 turns to obtain .045-.064" clearance. Tighten locknut.

Throttle Linkage Adjustment (Merc-O-Matic Cars): Adjust engine idle speed to 425-440 RPM, with engine at normal operating temperature and selector lever in *"Dr" position. Adjust anti-stall dashpot (see above),* then turn ignition off. Disconnect carburetor-to-control shaft rod at carburetor. Remove clevis pin securing transmission control rod to transmission control shaft. Insert Gauge Pin 77230-MB through control rod and bracket (on left side of bracket). With carburetor throttle at slow idle position, adjust carburetor-to-control shaft rod so that it enters hole in carburetor throttle lever freely, and remove gauge pin. While holding carburetor throttle in slow idle position, hold transmission throttle control rod up against its stop and adjust length of rod to allow free entry of clevis pin in hole in shaft and hole in clevis at upper end of rod, **then lengthen rod by turning clevis three full** *turns counter-clockwise. Install clevis pin and secure* with cotter pin. Tighten clevis locknut. *NOTE—If band or clutch slippage is evident, the rod can be*

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1955 MODELS

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lengthened another complete turn. Total lengthening of rod must not exceed 4 turns from STOP position.

►*OTHER DATA: See "Ford, Lincoln, Mercury Centri-Quad" in Carburetion Section.*

Fuel Pump Pressure: 4-5 lbs.

1955 MODELS

►*CARBURETOR PRODUCTION CHANGES: Different carburetors used as follows:*

Transmission	Mercury Carb. No.
1954 (Std. & O.D.)	EBY-9510-A
1954 (Merc-o-matic)	EBY-9510-H
1955 Early (Std. & O.D.)	① ECK-9510-C
1955 Late (Std. & O.D.)	ECK-9510-G
1955 Early (Merc-o-matic)	② ECL-9510-B
1955 Early (Merc-o-matic)	③ ECK-9510-D
1955 Late (Merc-o-matic)	ECK-9510-H
1955 Late	ECK-9510-S,T

① —Use Serv. Part No. B5A-9510-G for replacement.
② —Identical with ECK 9510-D (Part No. Change only).
③ —Use Serv. Part No. B5A-9510-H for replacement.

►*CARBURETOR INSTALLATION CAUTION (First Cars with Choke Inlet Air Tube Washer in Throttle Body): See "Lincoln & Mercury Centri-Quad" in Carburetor Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*ACCELERATOR ROD CLIP STICKING IN WIDE OPEN POSITION CORRECTION:* On some early 1955 Merc-O-Matic equipped cars accelerator rod clip will not freely clear transmission splash pan when accelerator fully depressed. To correct, bend top corner of splash pan forward approximately 3/4" or remove approximately 3/8" of top edge of pan. Be sure to provide adequate clearance for spark plug wires running to left bank and for the lead wire to oil pressure gauge.

►*AUTOMATIC CHOKE ROD ADJUSTMENT: Must be correct for proper starting and automatic choke operation. See "Ford-Lincoln-Mercury Centri-Quad" Carburetor in Carburetor Section.*

Idle Setting—Preliminary setting 1-1/2 turns open (set both screws alike). With engine at normal operating temperature, turn one screw at a time out until engine begins to roll from richness, then turn screw in just enough to provide smoothest idle performance.

Idle Speed—(Std. & O.D.) 475-500 RPM, (Merc-O-Matic Cars) 425-500 RPM in "Drive" range.

Dashpot Adjustment (Merc-O-Matic Cars): Hold dashpot piston in to limit of travel, turn adjusting screw in or out until clearance between screw and dashpot piston rod is .045-.064".

Automatic Throttle Control Adjustment (Air-Conditioned Cars): With engine adjusted to normal idle speed (see above), and engine at normal operating temperature,

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turn air-conditioner "ON" and place transmission selector lever in "N" (Neutral) position. Loosen adjusting screw locknut on end of operating rod and adjust knurled adjusting nut to provide an idle speed of 800 RPM. Tighten locknut. Check operation of Automatic Throttle Control to make sure idle speed returns to normal idle when transmission is shifted out of "N" (Neutral), or air-conditioner is turned off.

Throttle Linkage Adjustment (Merc-O-Matic Cars): Disconnect carburetor-to-control shaft rod at carburetor. Adjust engine idle speed to 425-450 RPM in "Dr" position, turn ignition off. Adjust dashpot (see above). Remove clevis pin that secures transmission control rod to transmission control shaft. Insert gauge pin, Tool 77230-MB, through control rod and shaft bracket. With engine at operating temperature and on slow idle, adjust carburetor-to-control shaft rod so that it enters hole in carburetor freely, **then lengthen two full turns.** Remove positioning gauge pin. While holding carburetor throttle in the slow idle position, hold control shaft-to-transmission rod up against its stop and adjust length of rod to allow free entry of clevis pin in hole in shaft of transmission control shaft. **Lengthen rod by turning clevis three complete turns in a counter-clockwise direction.** If it is not possible to obtain a forced downshift with this adjustment, control shaft-to-transmission rod assembly should be lengthened an additional 1½ turns. Install clevis pin and secure with cotter pin. Tighten clevis locknut.

►*OTHER DATA: See "Lincoln & Mercury Centri-Quad" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. at 900 RPM.

CARB. EQUIPMENT

►*1954 CARBURETOR AIR CLEANER INSTALLATION CAUTION:* Two types of air cleaners being used in production and should be installed as follows: "Oval" type installed with overhang portion of cleaner facing rear of engine. "Round" type installed with indentation at bottom edge and word "Front" stamped on side of cleaner facing front of engine.

►*1954 AIR CLEANER GASKET & HOLD-DOWN WING SCREW PRODUCTION-CHANGE (To correct air cleaner "flexing" and wing screw breakage):* The paper gasket and wing screw have been replaced in production and for service by a neoprene gasket, Part No. 354534-S8B (oval type air cleaner). Gasket, Part No. EAD-99654-B, wing screw, Part No. 354535-S8B (round type air cleaner). When installing the neoprene gasket, apply a coat of cement to both surfaces before inserting in air cleaner.

►*FUEL GAUGE PRODUCTION CHANGE (1955) & REPLACEMENT PARTS CAUTION (1954-55):* New tank units used on late 1955 cars as listed below will minimize inaccuracies in gauge readings and can be used for service replacement on 1954 and early 1955 cars.

NOTE–Later type tank units must not be used on cars prior to 1954.

Fuel Pump: Mercury No. EBY-9350-A (1954); B5A-9350-A (1955). Fuel & vacuum.
Pressure–4-5 lbs. at 1000 RPM (1954), at 900 RPM (1955).
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauges: King-Seeley Electric type.
Dash Unit–Mercury No. FDC-9280-A (1954); FDK-9280-B (1955).
Tank Unit–*See Production Change Note (above) for replacement of 1954 and early 1955 units.*

Model	First Type ①	Second Type
Exc. Sta. Wgn.	FAA-9275-A	B5A-9275-A
Station Wagon	FAA-9275-B	B5A-9275-B

①–1954 & Early 1955 Models.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Mercury No. FAD-10655-C. 6 volt, 19 plate, 120 ampere hour capacity (20 hr. rate).
Location–In engine compartment on right side.
Battery Ground–Positive, to cylinder head bolt.
Engine Ground–Engine left cylinder head to dash panel.

STARTER

Mercury No. FAC-11002-G. Armature FAC-11005-B.
Drive–Mercury No. 1CM-11350-C. Bendix "Folo-Thru".
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–48-56 ozs.
Cranking Speed–115-125 RPM.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	6.0	70
14 ft. lbs.	Lock	3.5	700

①–With starter on engine and engine running.

Removal: Remove battery-to-starter cable. Remove attaching bolts holding steering idler arm support to frame lower support and remove idler arm assembly. Remove capscrews holding endplate to converter housing and remove starter by pulling out and down until starter drive clears housing.

Starting Switch: Mercury No. B5A-11450-A. *(NOTE–This relay is a sealed type and replaces the relay formerly used).* Mounted on frame side rail adjacent to starter and controlled by Ignition Switch and Automatic Transmission Switch.

Neutral Safety & Back-up Light Switch (1954): Mercury No. 1M-15812-B. Mounted on lower end of steering column.

Neutral Safety & Back-up Light Switch (1955): Mercury No. FDK-15825-B (Switch Terminal). Located on steering column inside passenger compartment. Supersedes previous switch location.
Adjustment–*See "Fordomatic & Merc-O-Matic" in Transmission Section.*

GENERATOR

Mercury B5C-10002-A. Armature FBC-10005-A.

Performance Data

Generator	Amperes	RPM
B5C-10002-A	40 ①	1750

①–See Regulator for maximum charging rate.
Brush Spring Tension–30 ozs.
Field Current–2.50-2.80 amps. at 6.0 volts.
Rotation–Counter-clockwise at commutator end.
Removal: Remove front splash pan to rear of front frame cross member and remove generator from below car.
Belt Adjustment: 1/2" belt deflection midway between generator and water pump pulleys with normal thumb pressure.

REGULATOR

Mercury No. FAD-10505-A.

►*SETTING NOTE:* Settings below are for regulator at NORMAL OPERATING TEMPERATURE (after 1/2 hour operation) with room temperature at 70-80°.

Cutout Relay

Cuts In–6.0-6.6 volts.

Voltage Regulator

Setting–7.4-7.8 volts.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–38-42 amperes.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equipment Section.*
Automatic Headlight Dimmer: *See "Lincoln-Mercury Headlight Control" in Electrical Equipment Section.*
Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch.
Stop Light Switch Location: Forward end of brake master cylinder (Conventional & Power Brakes). Master cylinder located on firewall in engine compartment.

FUSES: Turn Signal–14 amps. (1954); 9 amps. (1955).
Dome & Courtesy Lights–14 amps. (1954); 9 amps. (1955).
Glove Box–14 amps.
Cigar Lighter–Special fuse-in lighter base.
Clock–3 amps. (in clock lead), except 1955 Montclair.
Heater–20 amps.
Spotlight–14 amps.
Windshield Washer–14 amps. (or special 3 amps.).

CIRCUIT BREAKERS (1954): Two circuit breakers (30 amps. for headlights, 15 amps. for auxiliary) mounted on single panel located behind instrument panel.

CIRCUIT BREAKERS (1955): On headlight switch. One circuit breaker protects headlight circuit and second

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circuit breaker protects instrument panel lights, parking lights, and stop and tail light circuits.

HORNS: Mercury No. B5A-13832-C (High Pitch), B5A-13833-C (Low Pitch). Dual horns operated by relay.

Horn Relay—Mercury No. FAA-13853-A.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 Valve-in head.

Engine	Bore	Stroke	Displacement
1954	3.62"	3.10"	256 cu. ins.
1955 (All)	3.75"	3.30"	292 cu. ins.

Engine	Compr. Ratio	Rated HP	Developed HP
1954	7.5-1	42.05	161 at 4400 RPM
1955 (ECK)	7.6-1	45.00	188 at 4400 RPM
1955 (ECL)	8.5-1	45.00	198 at 4400 RPM

Compression & Vacuum Reading—See *TUNE-UP.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Mercury Special Data.*

►*1954 REPLACEMENT CYLINDER HEAD NOTE:* One head, Part No. EBY-6049-D is used for replacement on on both engine banks. Install plug, EAN-6052-A in rear water passage hole if used for right bank, or *adapter, B4A-10911-A for heat indicator bulb in rear* passage hole if used for left bank.

►*1954 EXHAUST MANIFOLD PRODUCTION CHANGE:* Later type exhaust manifolds, Part Nos. EBY-9430-B (right hand), and EBY-9431-A (left hand), used in production and for service replacement. Bolt holes are larger and flanges are heavier to prevent breakage in service.

►*INTAKE MANIFOLD-TO-CYLINDER HEAD BOLT CAUTION:* The two bolt holes located at No. 2 and No. 10 valve push rod holes are not tapped deep enough to permit tightening the 3" bolts to correct torque specification without mutilating the two bottom threads. For this reason, only the 3/8"-16 x 2-3/4" bolts, Part No. 45528-S8, should be used at the No. 2 and No. 10 push-rod hole positions.

►*CYLINDER HEAD GASKET INSTALLATION CAUTION:* Gaskets are stamped on one side with the work "FRONT". When installing gasket on **right hand** side of cylinder block wording should be **upward** and toward front of engine. When installing on **left hand** side, wording should be **downward** and toward front of engine.

TIGHTENING TORQUES: *See "Tightening Specifications" in Mercury Special Data.*

ENGINE REMOVAL: *See "Engine" in Mercury Special Data.*

OIL PAN REMOVAL: Turn crankshaft so that rear counterweights on crankshaft are upward, remove necessary splash pans and remove oil pan.

PISTONS

Aluminum alloy, autothermic solid skirt type with three rings above pin.

Removal—Rod and piston assemblies removed from above.

Fitting New Pistons: Use 1/2" wide feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:

New Piston in New Bore—.0015" feeler. 5-10 los. pull.

New Piston in Used Bore—.002" feeler. 5-10 lbs. pull.

Used Piston in Used Bore—.0025" feeler. 5-10 lbs. pull.

Replacement Pistons: Standard size, .020", .030", .040" Oversize. Pistons furnished only with fitted pins.

Installing Pistons: Install piston with "F" (embossed on piston) and dimple on head toward front of engine.

PISTON PINS

Floating type with lock ring at each end.

Diameter—.9120-.9123".

Pin Fit in Piston—.0001-.0003" loose.

Pin Fit in Rod—.0001-.0003" loose.

Replacement Pins: Standard size, .001", .002" Oversize.

PISTON RINGS

1954 Models

Ring	Width	End Gap	Side Clearance
Compr. #1	.0930-.0935"	.010-.027"	.0025-.0030"
Compr. #2	.0930-.0935"	.010-.027"	.0015-.0030"
Oil ①	.1860-.1865"	.010-.027"	.0015-.0030"

①—Expander type ring.

1955 Models

Ring	Width	End Gap	Side Clearance
Compr. #1	.0775-.0780"	.010-.027"	.002-.0035"
Compr. #2	.0775-.0780"	.010-.027"	.002-.0035"
Oil	.1860-.1865"	.010-.027"	②

②—Side sealing type ring, and side clearance is not evident.

Replacement Rings: Standard size, .020", .030", .040" Oversize.

►*1955 OIL RING INSTALLATION NOTE:* Install spring spacer in oil ring groove directly above pin hole. Butt ends together and hold in this position while installing top steel rail and bottom steel rail. Make sure top ring ends are at least 1" to **left** of spring spacer gap, and bottom rail ends at least 1" to **right.**

CONNECTING RODS

►*1955 CONNECTING ROD & BEARING PRODUCTION CHANGE:* Squirt hole in crankshaft end of rod has been moved to opposite side of rod. New service bearings have two holes drilled in them (may be used with either old or new rod hole location). *CAUTION—Bearings with one hole in them should not be used to service 1955 type rods.*

Length—6.320-6.324". **Weight**—24.05 ozs.

Crankpin Journal Diameter—2.1880-2.1888".

Lower Bearing—Steel backed, babbitt lead alloy lined type. Upper and lower halves interchangeable.

Clearance—.0005-.0025" (1954); .0008-.0027" (1955).

Side Clearance—.006-.016" (two rods).

Replacement Bearings: *Standard (two sizes marked* **red** and **blue** for selective fitting) and .010", .020", .030" Undersize.

Installing Rods: Oil squirt hole in rod **away from** camshaft side of bore on all rods. Numbers on rods and bearing caps should be together and installed in same *numbered cylinder.*

CRANKSHAFT

Journal Diameters—2.4980-2.4988".

Maximum Wear Limits—.0005". **Taper**—.0005".

Bearings—Steel backed copper lead alloy lined.

Replacement Bearings: Standard size (2 sizes marked **red** and **blue** for selective fitting) and .010", .020", .030" Undersize.

End Thrust: Taken by #3 main bearing. Replace bearing if endplay excessive.

Thrust Bearing Alignment—See *"Crankshaft & Main Bearings" in Mercury Special Data.*

Endplay—.002-.006".

Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Mercury Special Data.*

Crankshaft Rear Oil Seal Installation: See *"Crankshaft & Main Bearings" in Mercury Special Data.*

►*1954 CRANKSHAFT REAR MAIN BEARING OIL SEAL PRODUCTION CHANGE:* New type seal and oil seal retainer used in later production and is not interchangeable with early type seal. See *"Crankshaft & Main Bearings" in Mercury Special Data.*

CAMSHAFT

►*CAMSHAFT IDENTIFICATION NOTE: Camshafts used in 1954-55 production and for service replacement are as follows:*

1954 (All)—B4T-6250-A (ECE-6250-A). "ECE" cast between No. 1 cam bearing and No. cam lobe.

1955 (Early)—B5A-6250-A (ECB-6250-A). "ECB" cast between No. 1 cam bearing and No. 1 cam lobe.

1955 (Late)—ECK-6250-A. "ECK" cast between No. 1 cam bearing and No. 1 cam lobe. Also, a letter "C" with one dimple on each side is cast between No. 15 & 16 cam lobes.

►*1955 SERVICE REPLACEMENT CAMSHAFT CHANGE* (To provide better wear characteristics): Type of material has been changed in later type camshaft, Part No. ECK-6250-A. Other dimensions and specifications remain the same.

Journal Diameter—1.9255-1.9265".

Clearance—.001-.003".

End Thrust: Taken by thrust plate on forward end block (between camshaft sprocket and shoulder on block).

Endplay—.003-.007".

Replacement Camshaft Bearings: Finished bearings furnished Standard size, .015" Undersize. *CAUTION—Oil holes in bearings must be lined up correctly.* See *"Camshaft & Bearings" in Mercury Special Data.*

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Camshaft Bearing Removal & Installation: See *"Camshaft & Bearings" in Mercury Special Data.*

Timing Chain: Side-guide type. Length 56 links.

►*REPLACEMENT NOTE:* Replace timing chain and sprockets when deflection on shaft side exceeds 1/2" (take up all slack on driving side, measure slack on opposite side). Remove and install chain "endless" as a unit with both sprockets.

Camshaft Setting: Timing marks on camshaft and crankshaft sprockets adjacent to timing marks on timing chain, when installed toward left side of engine as *viewed from drivers seat.*

Timing Chain Cover Seal Installation (Crankshaft Front Seal): *See "Engine Front Cover" in Mercury Special Data.*

VALVES

►*EXHAUST VALVE STEM DIAMETER CHANGE (Production & Service Replacement Valves): Stem diameter decreased .0005" for greater stem clearance in guide. See "Valve System" in Mercury Special Data.*

►*1954 VALVE TAPPET ADJUSTING SCREW LOCKNUT CAUTION:* If adjusting screw is found not to extend up through rocker arm sufficiently to provide full thread engagement with locknut, replace pushrods with Part No. EBU-9565-A and locknuts, Part No. EAA-6549-B.

Tappet Clearance: .019" (Intake & Exhaust), with engine at normal operating temperature.
Initial Valve Tappet Clearance—*See "Valve System" in Mercury Special Data.*

Valve	Head Diam.	①②Stem Diam.	Length
Intake	1.775-1.785"	.3415-.3425"	5.02"
Exhaust	1.505-1.515"	.3405-.3415"	5.02"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	③	⑤.001-.002"
Exhaust	45°	④	⑥.002-.003"

①—Exhaust valve stems (service replacement) decreased .0005" in diameter. See Exhaust Valve Change above.
②—Valves furnished with .003", .015", .030" oversize stems for service replacement.
③—.350" (1954). .377" (1955).
④—.350" (1954). .375" (1955).
⑤—.004" service maximum. ⑥—.004" service maximum.

Valve Seat Width—(1954) .060-.070" (Intake), .070-.080" (Exhaust). **(1955)** .070-.090" (Intake), .060-.080" (Exhaust).

►*ROTATABLE VALVE NOTE: All valves are rotatable type. See "Valve System" in Mercury Special Data.*

Valve Stem Oil Seals—"Umbrella" type oil seals used on all valves. Seals are installed with cupped side down on valve stem at guide boss on cylinder head. *Install new seals whenever valves removed or when seals become loose on valve stems.*

►*1955 VALVE STEM OIL SEAL PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE:* Valve Stem Oil Seal, Part No. B5A-6571-A, with a .100" longer skirt than used previously, has been released for production and service replacement.

►*1954 VALVE STEM OIL SEAL REPLACEMENT NOTE:* Valve Stem Oil Seal, Part No. B5A-6571-A must be used when servicing 1954 models having service cylinder head, Part No. B4A-6049-F.

Valve Springs: Free Length—2.12".

Valve Spring Specifications

	Pressure	Length
Valve Closed	54-62 lbs.	1.821"
Valve Open	124-140 lbs.	1.505"

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" Intake, .005" Exhaust), ream guides and install oversize valves. *See "Valve System" in Mercury Special Data.*

Valve Lifters: Mushroom type. Removed from below with camshaft removed.

Rocker Arm Assembly: *See "Valve System" in Mercury Special Data.*

►*ROCKER ARM COVER INSTALLATION CAUTION:* Covers manufactured prior to February 1, 1955 were manufactured without an inner retainer for holding cover gasket in place. When replacing gasket it will be necessary to seat gasket firmly against outside flange and secure in place with fast drying cement.

►*1954 ROCKER ARM SHAFT OIL OUTLET TUBE NOTE:* A new oil outlet tube, Part No. B4A-6588-B has *been released for service. The new tube directs overflow oil from rocker arm shaft to No .1 pushrod hole in right cylinder head, and to No. 16 hole in left cylinder head.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE: The following valve opening and closing points are with a camlift as indicated.*

1954 Models

Intake Valves—Open 8° ① BTDC. Close 44° ② ALDC.
Exhaust Valves—Open 47° ① BLDC. Close 5°② ATDC.

1955 Models

Intake Valves—Open 12° ① BTDC. Close 54° ② ALDC.
Exhaust Valves—Open 58° ③ BLDC. Close 8° ④ ATDC.
Camlift—①—.016". ②—.019". ③—.015". ④—.017".

Valve Timing Check—Slide rocker arm to one side and install a dial indicator so reading can be taken from end of valve push rod (use an indicator that will read .300" or more). Install a quadrant (reading in degrees) on crankshaft pulley to check amount of crankshaft rotation. Rotate engine slowly until dial indicator reading for valve being checked is same as indicated in table above. Amount of crankshaft rotation should be the same as shown in valve timing table. As an example, check intake valve opening by rotating engine *until dial indicator reads .026" cam lift. Quadrant on crankshaft should read 8° (1954). 12° (1955).* Continue to rotate engine to check valve closing in degrees. Dial indicator should read .019", and quadrant 44° (1954), 54° (1955).

OILING SYSTEM

►*1954-55 HIGH ENGINE OIL LEVEL CORRECTION:* Install Oil Level Indicator (bayonet), Part No. B5A-6750-A. The new oil level indicator has the markings raised 5/32" to correct complaints of high engine oil level readings.

Crankcase Capacity: 5 qts. (refill). 6 qts. (when filter changed).

Normal Oil Pressure: 45-55 lbs., at 30-40 MPH.
Pressure Regulator Valve—In pump body, not adjustable.
Oil Pressure Indicator—King-Seeley Electric.

Dash Unit (1954)—Mercury No. FDC-9273-A.
Dash Unit (1955)—Mercury No. FDK-9273-B.
***Engine Unit (1954-55)**—Mercury No. 41A-9278 (Use with FAA-13875-A Clip).*
See "Oil Pressure Gauges" in Miscellaneous Section.

Oil Pump: Gear type pump located on left side of engine crankcase and driven by distributor drive gear.

Pump Overhaul—*See "Oiling System" in Mercury Special Data.*

Oil Filter: Full-flow type with pressure relief valve in center filler bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted. *See "Oiling System" in Mercury Special Data.*

Replacement Filter Element—Mercury No. HCK-6731-A (Kit includes new gaskets).

►*CAUTION: Special "full-flow" filter element must be used for service replacement (use of by-pass type filter element will restrict engine oil flow and result in insufficient engine lubrication).*

Crankcase Ventilation: Filter in oil filler cap (inlet) and road draft tube. Clean and oil every 2,000 miles or more often in dusty areas.

COOLING

Water Capacity: 19 qts. (without heater). 20 qts. (with heater).

Pressure Valve: Mercury No. LA-8100-A3 (14 lbs.), LA-8100-A4 (13 lbs.). Radiator filler cap, stamped with figure "14" or "13".

Thermostat: Mercury No. B4A-8575-A (157-162°F.), B4A-8575-B (177-182°F.—used with permanent anti-freeze). Mounted in water outlet housing at front of intake manifold.

►*THERMOSTAT INSTALLATION NOTE: When installing the later type thermostat, be sure that the word "Top" is in the uppermost position to avoid foreign material settling under valve.*

Water Pump: Packless, sealed ball bearing type.
See "Mercury" in Water Pump Section.

Temperature Gauge: King-Seeley Electric.

Dash Unit (1954)—Mercury No. FDC-10883-A.
Dash Unit (1955)—Mercury No. FDK-10883-B.
Engine Unit (1954-55)—Mercury No. 1A-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

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CLUTCH

Borg & Beck Model 10A6. Mercury No. MB-7563-A (1954). MC-7563-B (1955).
See "Borg & Beck" in Clutch Section.
Clutch Disc No.—Mercury No. MB-7550-B (1954). MC-7550-A (1955).

►*1955 CLUTCH RELEASE RETRACTING SPRING & BRACKET PRODUCTION CHANGE:* **Retracting spring bracket has been eliminated. A longer spring, Part No. MB-7523-B replaces the spring formerly used (later spring is 1" longer). Use bolt, Part No. 354390-S8 when using the later type spring.**

Pedal Adjustment: If pedal free travle is not 1 to 1-1/4", loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.

Removal: Remove transmission (see Transmission Removal below), and disengage clutch pedal retracting spring and release rod from clutch release lever. Disengage equalizer bar tension spring and remove two capscrews retaining equalizer bracket assembly to flywheel housing. Remove flywheel housing. Mark position of flywheel and pressure plate so parts may be installed in original position. Compress clutch pressure plate assembly with Tool 17563. Remove capscrews and remove pressure plate.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh synchro-mesh (second & high), sliding gear (low & reverse).
See "Mercury Synchro-mesh" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: If equipped with overdrive, remove kickdown switch retainer nut and push switch through floor. Raise car and drain transmission. On overdrive cars remove governor, solenoid, and control cable. Disconnect speedometer cable and remove speedometer drive gear. Remove transmission shift rods at transmission. Remove bolts retaining rear universal joint to companion flange and remove drive shaft. Support rear of engine and remove the detachable cross-member of the frame. Remove two top capscrews retaining transmission to flywheel housing and install a couple of studs to act as guide pins. Remove lower capscrews and slide transmission to rear as far as possible and lower front end. Remove from below car.

OVERDRIVE

Warner Model AS1-R10F. Solenoid operated type, with governor control and throttle operated kickdown. Lock-out Switch not used on this model.
See "Warner R10 Overdrive" in Transmission Section.

►*1955 OVERDRIVE SOLENOID FAILURE CORRECTION: If necessary to replace original solenoid, additional wires required. See "Warner R10 Overdrive" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

MERC-O-MATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.
See "Fordomatic & Mercomatic" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication—Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain & refill every 15,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level—Apply parking brakes, place transmission selector lever in "N" (Neutral) position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (Parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator, wipe clean and insert in tube (make sure indicator is pushed all the way down). Remove indicator and read level. Add sufficient fluid to raise level to "Full" mark on indicator. Replace indicator.

THROTTLE LINKAGE ADJUSTMENT: *See CARBURETOR above.*

►*OTHER MERCOMATIC SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Roller bearing type.

REAR AXLE

1954 (EXC. STATION WAGON)

►***REAR AXLE "CLINK" CORRECTION: See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.***

►*INTERFERENCE BETWEEN REAR WHEEL & FENDER CORRECTION:* If difficulty is encountered in removing rear wheel, with tire inflated, the cause may be due to incorrect combination of rear springs and shock absorbers. See "Shock Absorbers" below.
Own. Separate Carrier, semi-floating hypoid, with Hotchkiss drive.

NOTE: Different type rear axle used on Station Wagon. See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.

Ratios
Standard Transmission—3.90-1 (39-10) Std. ①.
Overdrive Transmission—4.10-1 (41-10) Std. ②.
Mercomatic Transmission—3.54-1 (39-11) Std. ③.
①—4.10-1 (41-10) Optional.
②—3.90-1 (39-10) Optional.
③—3.31-1 (43-13) Optional.

►*AXLE CARRIER & GEAR RATIO IDENTIFICATION: Carrier housing stamped with ring gear & pinion gear ratio (10/39 for 3.90-1 ratio, etc.).*
Backlash—.003-.008".

Axle Shaft Removal: Remove wheel and brake drum. Remove axle shaft retainer locking type nuts (work through opening in axle shaft flange). Use Puller and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: Disconnect rear universal. Remove axle shaft (see above). Remove carrier from housing.

Wheel Bearing Adjustment: None required.

1954 STATION WAGON
1955 ALL MODELS

Own. Integral Carrier. Semi-floating hypoid with Hotchkiss drive.

Model	Ratio
1954 Sta. Wgn. (Conventional)	①3.91-1
1954 Sta. Wgn. (Overdrive)	②4.09-1
1954 Sta. Wgn. (Merc-O-Matic)	③3.54-1
1955 Exc. Sta. Wgn. (Conventional)	①3.73-1
1955 Exc. Sta. Wgn. (Overdrive)	②4.09-1
1955 Exc. Sta. Wgn. (Merc-O-Matic)	⑤3.15-1
1955 Sta. Wgn. (Exc. Merc-O-Matic)	②4.09-1
1955 Sta. Wgn. (Merc-O-Matic)	⑥3.54-1

①—4.09-1 Optl. ②—3.91-1 Optl. ③—3.31-1 Optl. ②—3.73-1 Optl. ⑤—3.54-1 Optl. ⑥—3.15-1 Optl.

Axle Shaft Removal: Remove wheel and brake drum. Remove axle shaft retainer locking type nuts (work through opening in axle shaft flange). Use Puller and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Rear Axle Assembly Removal: Raise rear end of car and disconnect rear universal. Remove axle shafts. Disconnect brake lines at "T" on left side of axle housing. Disconnect hand brake cable, shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

►*INTERFERENCE BETWEEN REAR WHEEL & FENDER CORRECTION: If difficulty is encountered in removing rear wheel, with tire inflated, the cause may be due to incorrect combination of rear springs and shock absorbers. See table below for correct application.*

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Shock Absorbers: Direct acting, non-adjustable. Service by replacement.

1954 Front Shock Absorbers

Model	Std.	Hvy. Duty
All (Exc. Sta. Wgn.)	MB-18045-B	MB-18045-K
Station Wagon	MB-18045-D	MB-18045-K

1955 Front Shock Absorbers

Model	Std ①	Hvy. Duty
All (Exc. Sta. Wgn.)	MC-18045-F	MC-18045-B
Station Wagon	MC-18045-E	MC-18045-C

①—Use MC-18045-G with Air Conditioning.

►*REAR SHOCK ABSORBER APPLICATION CAUTION: To avoid interference between rear wheels and fenders, springs and shock absorbers must be used in following combinations.*

1954 Rear Shock Absorbers & Springs

Model	①Shock No.	②Spring No.
All (Exc. Following)	MB-18080-A,B,E	MA-5560-F③
Convertible	MB-18080-A,B,E	MA-5560-A④
Station Wagon	MB-18080-C,D,F	MA-5560-B⑤

①—Use MB-18080-G,H (Hvy. Duty), when heavy duty springs used.
②—Spring number stamped on lower spring leaf.
③—Heavy Duty Spring No. MA-5560-H.
④—Heavy Duty Spring No. MA-5560-J
⑤—No Heavy Duty Spring supplied.

1955 Rear Shock Absorbers & Springs

Model	①②Shock No.	③Spring No.
All (Exc. Following)	MC-18080-F	MC-5560-G⑤
Convertible	MC-18080-F	MC-5560-F⑥
Station Wagon	MC-18080-E④	MC-5560-J

①—Use MC-18080-G (Exc. Sta. Wgn.) when heavy duty springs used.
②—Use MC-18080-H on Air Conditioned Cars.
③—Use MC-18080-C for heavy duty use. Heavy duty springs not furnished.
④—Spring number stamped on lower leaf.
⑤—Heavy Duty Spring No. MC-5560-H,K.
⑥—Heavy Duty Spring No. MC-5560-L.

FRONT SUSPENSION

Independent. "Ball-Joint" suspension with direct acting shock absorbers mounted within front coil springs.

See "Lincoln, Mercury, Ford (Ball-Joint)" in Front Suspension Section.

Kingpin Inclination—7° with Pos. 3/4° camber.
Caster—0° to Neg. 1-1/2°. Maximum variation between wheels is 1/2°.
Camber—0° to Pos. 3/4°. Maximum variation between wheels is 1/4°.
Toe-In—3/32" to 5/32".
Toe-Out on Turns—With outer wheel at 20°, inner wheel should be 24° (1954), 24°9' (1955).

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type.
See "Gemmer Worm & Roller (Type 305)" in Steering Section.

Power Steering: Ford-Mercury Linkage type. Used in conjunction with standard type steering gear.
See "Ford & Mercury Power Unit" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

BRAKES

►*1955 FRONT BRAKE PRODUCTION CHANGE: Front brake eccentric adjustment has been eliminated on Late 1955 cars.*

Bendix Hydraulic (Single Anchor). With Eccentric (Front Wheels—See 1955 Production Change above). **Without Eccentric (Rear Wheels).** Parking lever applies rear wheel service brakes.
See "Ford-Bendix (Ford, Lincoln, Mercury)" in Brake Section.
Drums—11"
Wheel Cylinder Diameter—1 1/8" (Front), 15/16" (Rear).
Lining—Molded type riveted to shoe.
Width (Front Wheels)—2" (1954); 2½" (1955). **Rear Wheels**—1¾" (1954); 2" (1955).
Length—9.28" (All Primary Shoes), 11.94" (All Secdary Shoes).
Clearance—.010" at each end of both primary and secondary shoes (.003" maximum variation).

►*1955 BRAKE ADJUSTMENT CHANGE:* Adjustment procedure on 1955 Models are affected in that eccentric cam is now spring loaded which eliminates need for locknut to retain it in position. See Production Change above also.

Braking Power—62% (Front Whls.), 38% (Rear Whls.).

Brake Pedal Free Play Adjustment: 1/4—7/16". If play not correct after brake adjustment, loosen lock nut on the eccentric bolt attaching brake pedal to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder: Located on engine side of firewall.
Checking Fluid—Maintain fluid level to within ¼" of top of reservoir.
Removal—Disconnect brake line from master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to firewall.

Power Brakes: Bendix Vacuum Power Unit (combination vacuum power unit and master cylinder). Unit mounted on engine side of firewall and replaces regular master cylinder.
See "Bendix Power Unit" in Brake Section.

Checking Fluid Level—Same as for regular master cylinder.

Removal of Power Unit—Disconnect valve pushrod from brake pedal assembly in drivers compartment. Remove master cylinder outlet fitting bolt from master cylinder. (*NOTE*—It is not necessary to remove stop light switch, wires or hose assembly from outlet fitting. Do not disturb outlet fitting in master cylinder). Loosen clamp securing manifold vacuum hose to check valve on power unit. Remove hose from valve. Loosen clamp securing vacuum reserve tank hose to fitting on check valve. Remove four capscrews securing power brake assembly to bracket on dash panel and remove power brake assembly.

MISC. MECHANICAL

Air Conditioning: Own. *See "Mercury Air-Conditioning" in Miscellaneous Section.*

Windshield Wipers: Vacuum, Link & Crank Arm type.
See "Windshield Wipers" in Miscellaneous Section.

Power Window Regulators: Electric. Reversible motor in each window. Controlled by door switch and master control switch. *See "Window Regulators" in Miscellaneous Section.*

Power Top Control: Reversible type motor (mounted under seat) drives two screw type jacks (one on each side) through flexible cables. Controlled by relay and two-way switch. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric type. Individual motor for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs. (Dry Thds.)
Spark Plugs	30
Cylinder Head Nuts	40
Main Bearing Cap Nuts	70
Con. Rod Bearing Capscrews	33
Flywheel Stud Nuts	32

ENGINE

►*ENGINE REMOVAL NOTE:* Engine assembly (with clutch and transmission) *can be removed from* below, or engine only (less transmission) can be removed from above. This latter method is recommended for engine replacement.

ENGINE ASSEMBLY REMOVAL (From below): Drain engine oil pan, transmission case, and radiator and block. Then proceed as follows:

(1) Remove hood top, radiator, air cleaner and cylinder head cover.

(2) Disconnect all lines, hoses, and electrical connections at engine, and cables and controls at transmission.

(3) Disconnect exhaust pipe at engine and muffler, remove pipe, wire muffler to left side of underbody.

(4) Disconnect and remove propeller shaft (disconnect shaft at rear universal companion flange, pull shaft out and off transmission shaft splines).

(5) Attach Engine Lifting Fixture (see Note below), support engine weight, remove all Front and Rear Cross-member attaching bolts at body side sills.

(6) Lower engine assembly and remove from beneath car.

ENGINE REMOVAL (From above): Drain engine oil pan, radiator, and block. Then proceed as follows:

(1) Remove top hood, radiator, air cleaner, and cylinder head cover.

(2) Disconnect all lines, hoses, and electrical connections at engine, disconnect exhaust pipe at exhaust manifold.

(3) Remove starter from right side of engine.

(4) Attach Engine Lifting Fixture (see Note below), remove engine support bracket-to-front cross-member bolts (4 on each side), support engine weight with lifting fixture.

(5) Remove all clutch housing-to-engine rear plate attaching bolts. Move engine forward to disengage transmission drive shaft from pilot bearing, then lift engine up and maneuver it out of engine compartment.

► **Engine Lifting Fixture Note**—Fixture can be made up from two pieces of channel with hole in each end of each piece to fit the end cylinder head studs on each side of head. Lifting holes in channel should be centered between the cylinder head stud holes (for engine removal only), 3 3/8" to rear of center point (for engine and transmission assembly removal).

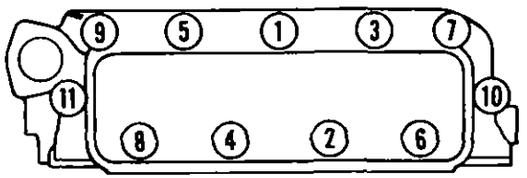
CYLINDER HEAD & MANIFOLD

REMOVAL: Remove head as complete assembly with rocker arms and shaft after loosening tappet adjusting screws and removing pushrods. *See Pushrod Removal under VALVES below.* Inspect cylinder head studs for tightness in block. If studs removed, use sealing compound on studs when replacing.

INSTALLATION: Install head (see Gasket Note below), tighten all stud nuts finger-tight, install Pushrods, tighten cylinder head nuts, adjust valve clearance. *NOTE*—Recheck cylinder head nut torque and recheck valve tappet clearance after approximately 100 miles of operation.

Tightening Cylinder Head Nuts—Tighten nuts in order as shown in cylinder head diagram to recommended torque of 40 ft. lbs. with dry threads.

Cylinder Head Gasket Note—Use non-hardening gasket paste and install gasket with "Top" mark upward.



CYLINDER HEAD

CRANKSHAFT & MAIN BEARINGS

FRONT & REAR MAIN BEARING CAPS: Removal—Remove front and rear end plates, then use tool J-5559 to pull bearing caps from recesses in block. *NOTE*—This tool is combination Main Bearing Cap and Pinion Bearing Remover.

Installation—Install caps with punchmark toward camshaft side of engine. Transverse groove for oil seal should be on outer edge of bearing cap.

Oil Seal Installation: Install cork strip in transverse groove in front and rear main bearing caps.

FLYWHEEL

FLYWHEEL REPLACEMENT: With engine removed, flywheel can be removed by taking off nuts on flywheel mounting studs. When installing flywheel, tighten mounting stud nuts to 32 ft. lbs. torque.

CAMSHAFT & BEARINGS

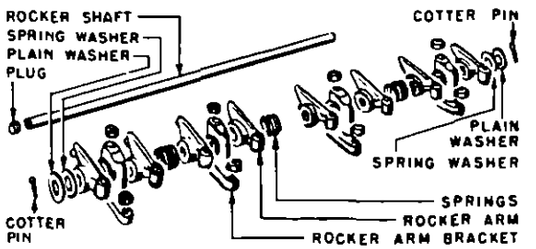
CAMSHAFT REMOVAL: With engine removed from car, remove pushrods, remove valve side covers, remove all valve lifters through side openings. Pull crankshaft pulley, remove timing cover and oil shedder, remove camshaft sprocket capscrews, pull both sprockets and timing chain as a unit. Remove camshaft retaining and thrust plate (*CAUTION*—note location of oil hole for timing chain lubrication). Remove oil pump and distributor drive gear shaft. Slide camshaft out through front of engine.

CAMSHAFT BEARING REPLACEMENT: Punch old bearings out, tap new bearings into position (*CAUTION*—line up oil holes in bearings and block). Line-ream new bearings for correct clearance of .001-.002".

VALVE SYSTEM

PUSHROD REMOVAL: Loosen tappet clearance adjusting screws in rocker arms completely, depress valve spring until pushrod socket end is free from ball end of adjusting screw, push rocker arm to one side. Remove pushrod (*CAUTION*—maintain side pressure on pushrod to insure lower end snapping out of lifter without pulling lifter up and out of its bore in the block). When removing end pushrods (front and rear), take out cotter pin in end of rocker shaft and slide rocker arm off shaft.

ROCKER ARM ASSEMBLY: Removal—Remove nuts from all rocker arm support brackets (left hand nuts are on cylinder head studs), lift entire unit off as an assembly. To disassemble unit, remove cotter pins from ends of shaft, slide rocker arms, spacing springs, and support brackets off shaft. *NOTE*—Remove plug from end of rocker arm shaft and clean sludge accumulations from hollow shaft.



TYPICAL ROCKER ARM ASSEMBLY

Rocker Arm Specifications

Rocker Arm Shaft Diameter	.624-.625"
Rocker Arm Bushing Inside Diameter	.6255-.626"
Shaft Clearance	.0005-.004"

►*SERIES "B" ROCKER ARM ASSEMBLY NOTE: Rocker arm center spring spacer not used (see illustration).*

Installation—All rocker arms are the same. Install arm on each side of each support bracket with spacing spring between adjacent rocker arms (no spring for end rocker arms which are assembled on each end of shaft and retained by cotter pin). When installing assembly, make certain that oil lead in FRONT support bracket lines up with oil lead in cylinder head at support bracket mounting pad. *CAUTION*—This oil lead in front bracket supplies oil for rocker arm assembly (feeds into hollow rocker arm shaft through front support bracket).

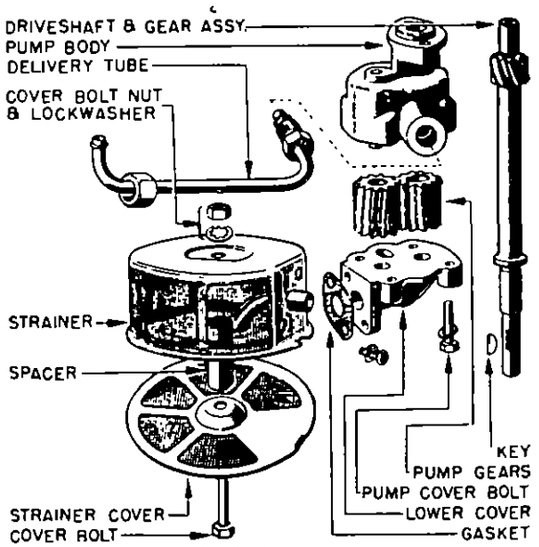
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OIL PUMP

OIL PUMP REMOVAL & INSTALLATION: With oil pan off, remove nuts from oil pump mounting studs, slide pump down off mounting studs (*CAUTION*–Pump drive shaft and gear assembly may remain in engine and can be removed by pulling it down to disengage drive gear). Install pump by reversing this procedure. Make certain that holes in pump mounting gasket line up with holes in block (*CAUTION*–Pump delivery is through oil channel in pump body and block), and that drive gear tang engages slot in upper end of pump shaft.

PUMP OVERHAUL: Disassembly (Series "A" Engine)– Remove oil strainer assembly from side of pump lower cover. Take out pump cover attaching screws, lift off cover and remove pump gears (driving gear is keyed to pump shaft and may have to be tapped off), remove key from shaft, withdraw shaft through top of pump body.



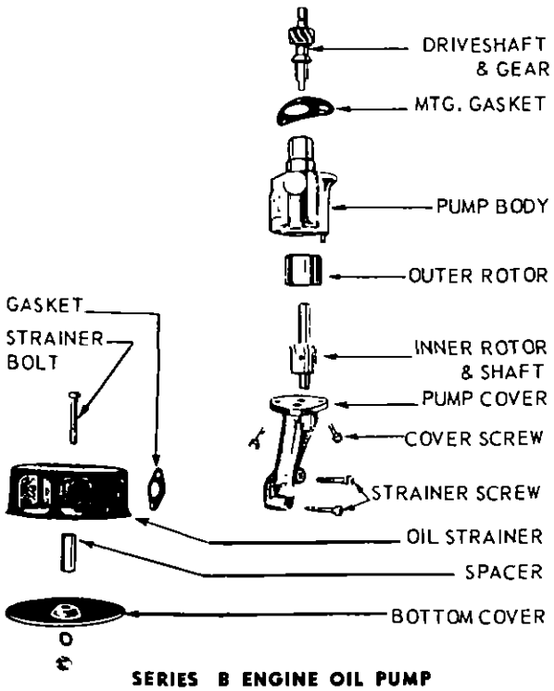
SERIES A ENGINE OIL PUMP

Disassembly (Series "B" Engine)–Remove oil strainer assembly from side of pump lower cover. Take out two pump cover attaching screws, lift off cover and remove inner and outer pump rotors and pump shaft. Inner rotor is pinned to shaft.

Reassembly–Reverse disassembly procedure above. After assembly completed and with lower cover tight, make certain that shaft can be turned freely by hand without binding.

IGNITION NOTES

DRIVESHAFT NOTE: This shaft and gear assembly is installed in the cylinder block and has a slot in the flanged upper end for distributor shaft drive. The assembly need not be disturbed unless replacement is required or camshaft is being removed. *CAUTION–Remove and install assembly exactly as detailed below to insure correct ignition timing.*



SERIES B ENGINE OIL PUMP

Removal–Use a tool made up from a piece of rod with threaded end (5/16" - 24 N.F. THD.) as a remover and installer tool. With distributor and drive bushing removed, insert threaded end of rod into upper end of the driveshaft and remove the shaft with a turning motion which will prevent the shaft disengaging from the rod and dropping into the crankcase while it is being removed.

Installation–Turn crankshaft until #1 piston is on TDC. of compression stroke. Install driveshaft in engine (using threaded rod in upper end of shaft) so that offset slot is slightly off the vertical (approximately equal to 12:30 - 6:30 of a clock face) and large portion of offset is toward REAR of engine with drive gear fully meshed with camshaft gear and driveshaft assembly fully seated in cylinder block.

RESONANCE CORRECTION

1954 MODELS

►*NOTE:* If resonance noise noted in front compartment under certain driving conditions, following procedure will correct this resonance:

Accelerator Pedal–May be noted as a buzz when foot pressure removed. Remove pedal roller and apply light coating of heavy fibrous wheel bearing lubricant to pedal arm before replacing roller.

Air Cleaner–May be noted at 45-50 MPH. or on deceleration. Remove top gasket from element section and replace with correct length piece of 3/8" clothes line OR make up an insulator (use waffle pad insulation or equivalent of 1/8" thickness) to conform to top flat section of air cleaner with a circular opening for air intake, install this insulator with Part No. 4340429 cement.

Choke Cable–May be noted as cable oscillation under same conditions as air cleaner noise. Install 12" section of windshield wiper hose (3/16" I.D.) over choke control cable so that 2/3" of tubing is over the cable conduit.

MODEL IDENTIFICATION

NOTE: Electrical system is 12 volt type.

Convertible Model.....541 Hardtop Model 542

SERIAL NUMBER: Stamped on plate on right side of dash panel in engine compartment and on upper flange of right dash-to-front wheelhouse panel brace near top corner of brace (below serial number plate).

Starting Serial Number

Series	Serial Number
"A"	E-1001
"B"	B-11001

ENGINE NUMBER: Stamped on plate on upper edge of cylinder block on right side at center.

Starting Engine Number—IG-881459 (Start of 1954 production).

►*SERIES "A" & "B" ENGINE NOTE: These engines are different. Specifications and service procedures are the same except where noted.*

TUNE-UP

►*1954 RESONANCE CORRECTION (When caused by Accelerator Pedal, Choke Control, or Air Cleaner): See "Resonance Correction" in Metropolitan Special Data.*

COMPRESSION PRESSURE: 120-135 lbs. at cranking speed of 300-350 RPM.

VALVE TAPPET CLEARANCE: .015" All Valves. At room temperature.

MANIFOLD HEAT CONTROL: "Hot Spot" plate located between intake manifold and exhaust manifold with baffle to direct exhaust gas to center of plate. No moving parts or external controls.

IGNITION

FIRING ORDER: 1-3-4-2.

SPARK PLUG GAP: .023-.025".

Spark Plug—Champion N-8. 14mm. (Long Reach). *Tighten plugs to 30 ft. lbs. torque.*

COIL: Lucas Q-12. *12 Volt.* On generator.

DISTRIBUTOR: Lucas DM-2, No. 40427E ("A" Series). DM-2 P4, No. 40284D ("B" Series). Distributor has "micrometer" adjuster for fine timing adjustments.

Condenser-Lucas. Metropolitan No. 8111099.
Capacity—.2 microfarad.
Contact Point Set—Metropolitan No. 8111098.
Breaker Gap—.014-.016"
Cam Angle—60°±3° (closed).
Breaker Arm Spring Tension—20-24 ozs. (at contacts).
Rotation—Counter-clockwise viewed from above.

Automatic Advance—No. 40427E

Degrees Distr.	RPM	Degrees Eng.	RPM
0-1	500	0-2	1000
14-16	1900	28-32	3800

Automatic Advance—No. 40284D

Degrees Distr.	RPM	Degrees Eng.	RPM
0-1	380	0-2	760
8-10	1500	16-20	3000

Vacuum Spark Control—Part of distributor assembly.

Vacuum Advance—No. 40427E

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
1-3	2-6	6.5
9-11	18-22	17

Vacuum Advance—40284D

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
1-3	2-6	6.04
10-12	20-24	20.8

Distributor Removal & Installation: Distributor assembly (including mounting clamp) can be lifted out after hold-down screw removed from drive bushing flange (under mounting clamp plate). Drive tang in lower end of shaft is offset and distributor can only be installed in correct position.

Distributor Drive Shaft & Gear Removal & Installation—*See "Ignition Notes" in Metropolitan Special Data.*

IGNITION TIMING

Setting (Series "A" Engine)—7° BTDC.

Setting (Series "B" Engine)—11° BTDC.

Timing Mark—Series "A" & Early Series "B" Engines (Before Serial No. 14668)—Pointer on timing chain cover and notch in crankshaft pulley. Indicates TDC when pointer and notch aligned.

Timing Mark—Later Series "B" Engines (After Serial No. 14668)—Three pointers on lower part of timing chain cover and notch in crankshaft pulley. Pointers indicate 0°, 5°, 10° when aligned with notch in pulley.

Timing (Series "A" Engine)—7° BTDC point is 5/16" before TDC notch in pulley (measured on outside diameter).

Timing (Series "B" Engine before Serial No. 14668)—11° BTDC point is ½" before TDC notch in pulley (measured on outside diameter).

Timing (Series "B" Engine after Serial No. 14668)—11° BTDC point is slightly to right of 10° pointer on timing chain cover when viewed from below.

TIMING ADJUSTMENT NOTE—Timing should be set by loosening mounting clamp bolt and rotating distributor within mounting clamp. The "micrometer" adjuster nut (knurled nut on opposite side of distributor housing from vacuum spark control mounting stud) can be used for fine timing adjustments to compensate for operating conditions and fuel.

CARBURETOR

Zenith Model 30. VIG-8 (Series "A" Engine). VIG-10 (Series "B" Engine). Single barrel downdraft type with manual choke control.

Idle Setting—0-1 turn open. Turn screw in for richer mixture. Adjusting screw controls idle air bleed.

Idle Speed—500 RPM. at normal operating temperature.

Float Level—No adjustment (float is free in bowl and bears directly against intake needle in cover).

Accelerating Pump—Two holes in throttle lever. Upper Hole—long stroke. Lower Hole—short stroke

Fast Idle—1/32" throttle valve opening with choke valve closed. Adjust by loosening setscrew and changing connector rod position in choke shaft swivel.

Choke Control: Manual (cable) control.

►*OTHER DATA: See "Zenith Model 30" in Carburetion Section.*

Fuel Pump Pressure: 1.5-2.5 lbs. at carburetor inlet.

►*NOTE: Fuel pump has priming handle at side of sediment bowl for manual operation.*

CARB. EQUIPMENT

Fuel Pump: AC. Type T. Pump has "Priming Handle" at side of sediment bowl for manual operation.
Replacement Pump—Metropolitan No. 8110897.
Pressure—1.5-2.5 lbs. at carburetor inlet.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Electric.
Dash Unit—Metropolitan No. 8110706.
Tank Unit—Metropolitan No. 8110398.
See "Gasoline Gauges" in Carburetion Equipment Section.

BATTERY

Lucas GTW-9A. *12 Volt.* 9 plate, 58 ampere hour (20 hour rate). Local battery may be installed. (Delco or Auto-Lite).
Grounded Terminal—Positive (+) terminal.
Engine Ground—Cable from flywheel housing to frame on right side.
Location—Under rear seat on right side (lift seat pad for access to battery box cover).

STARTER

Lucas M-35-G-1. *12 Volt.*
Armature—Metropolitan No. 8111090.
Drive—Bendix Barrel Type.
Brush Spring Tension—15-25 ozs.
Rotation—Counter-clockwise at commutator end.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5800	12.0	45
4.9 "	1000	8.9-9.3	250-270
9.3 "	Lock	7.3-7.7	370-390

Starting Switch: ST-19/1. On dash in engine compartment with cable actuation by button on instrument panel.

GENERATOR

Lucas C-39-PV-2. *12 Volt.* Two brush type.
Armature—Metropolitan No. 8111074.

Performance Data

Amperes	Volts	RPM.
0	13.0	1050-1200
19	13.5	2000-2150

Brush Spring Tension—22-25 ozs. (new brushes).
Field Current—Field resistance 6.2 ohms.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: 1" deflection with light finger pressure midway between generator and crankshaft pulleys.

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REGULATOR

Lucas RB-106-1. *12 Volt.* Two unit type with combined voltage-current regulator. Compensated.
See "Lucas Regulator" in Electrical Equipment Section.

Cutout Relay

Cuts In—12.7-13.3 volts (1050-1200 Gen. RPM.).
Cuts Out—9-10 volts with 3-5 amperes discharge current.
Contact Gap—.002-.006" (with .025" air gap).
Air Gap-.011-.015" with .008" feeler between armature bar and regulator frame. *NOTE*—Clearance between stop arm and armature should be .030-.034" with above gauges in place.

Voltage & Current Regulator

Voltage Setting—15.8 volts at 68°F. (Generator RPM. 1000 RPM. minimum).
Current Setting—19 amperes at 13.5 volts (At 2000-2150 Generator RPM.).
Air Gap—.012-.020" (adjust with .018" feeler between armature and regulator frame).
Contact Gap—.006-.017" (armature against core).

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section*
Lighting & Ignition Switch: Combination switch (ignition lock cylinder located in light switch knob).
Removal—Remove spring clamp screw and clamp behind instrument panel, pull switch assembly out. *NOTE*—Ignition lock cylinder can be removed by rotating light switch knob until cylinder retaining pin lines up with access hole in side of switch case, insert key, use rod to depress retaining pin, withdraw lock cylinder.
Stop Light Switch: In front brake line fitting on inside of left front wheelhouse panel.

Lamp Bulbs: *12 Volt.*	**Bulb No.**
Head lamps	4430
Park & Dir. Sig., Tail & Stop	1016
Rear Dir. Sig.	1141
Ind.(High Beam, Oil, Gen. Chg.)	ℂ Lucas 987
Instrument	ℂ Lucas 987
Dir. Sig. Indicator	Lucas 970
License, Courtesy	57

ℂ—Mazda-No.-1446 (Toy Train-Headlight) bulb can be used in emergency.

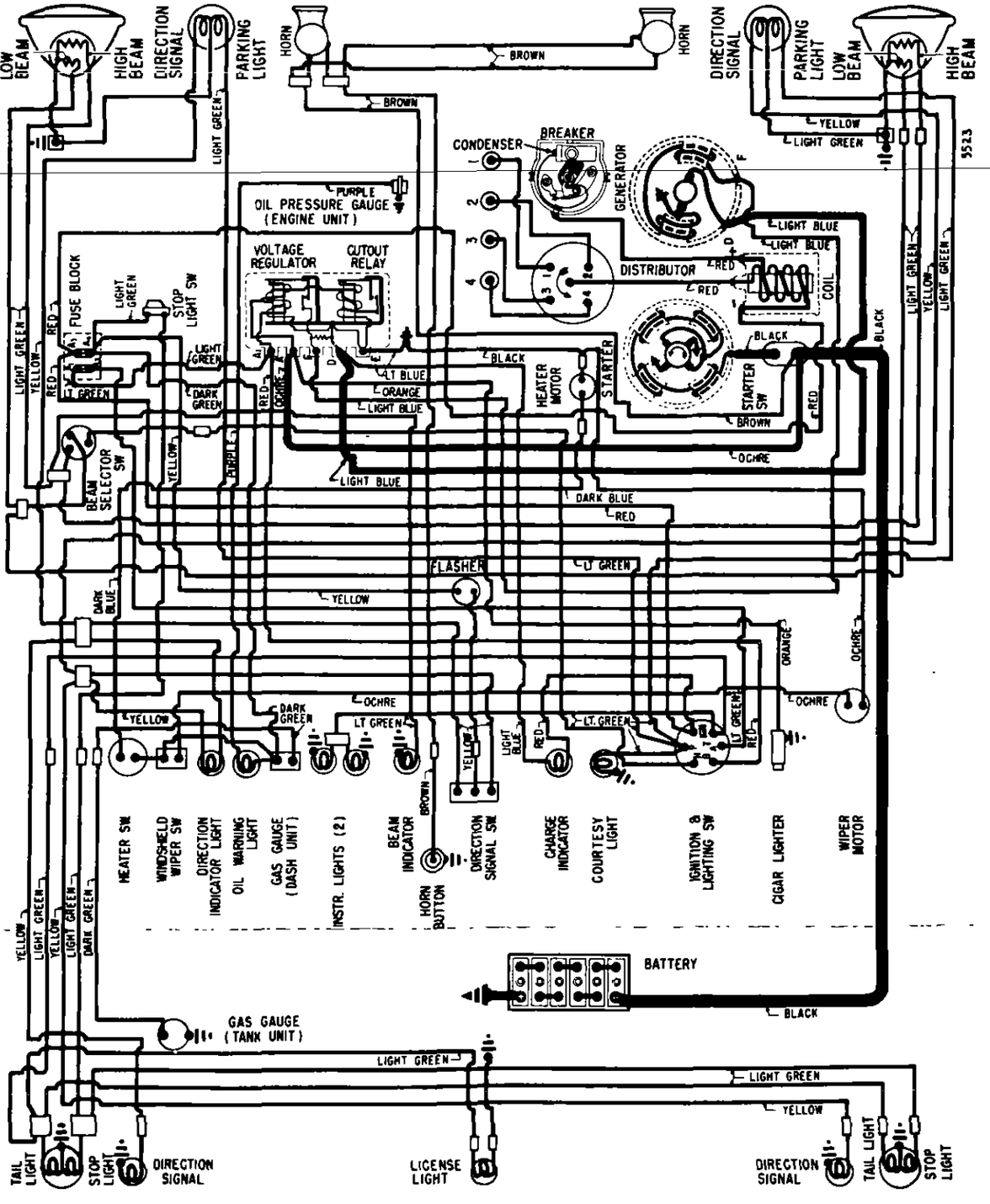
FUSES: Two fuses on fuse block on firewall adjacent to Regulator. Spare fuse provided for each circuit. **Lighting**—30 amperes. **Ignition**—30 amperes.

HORNS: Lucas WT-614. *12 Volt.* Twin horns (no relay). **Horn Current**—6.5 amperes at 12 volts (each horn).

ENGINE

►*SERIES "A" & "B" ENGINE NOTE: These engines are different. Specifications and service procedures are the same except where noted.*

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ENGINE SPECIFICATIONS: Austin A40. 4 Cylinder, Valve in head.
Bore—2 37/64". **Stroke**—3 1/2".
Displacement—73.17 cu. ins. **Rated HP.**—10.63
Developed Horsepower—42 at 4500 RPM.
Compression Ratio—7.2-1.
Compression & Vacuum Reading—*See TUNE-UP.*

OIL PAN REMOVAL: No obstructions.

ENGINE REMOVAL: *See "Engine" in Metropolitan Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Metropolitan Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Metropolitan Special Data.*

PISTONS

Aluminum alloy, cam ground, split skirt, 4-ring.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Clearance .0009-.0015" measured at bottom of skirt at right angles to piston pin. Check fit by inverting piston in clean dry bore. Piston should just support its own weight.
Replacement Pistons: Furnished with pins in Standard size and .010", .020" Oversize.

PISTON PINS

Pin is locked in rod by a clampscrew.
Diameter—.6425". **Length**—2.276"
Clearance in Piston—.0003" maximum Fit pin to palm push fit in piston bosses at 70°F.
Replacement Pins: Standard & .001", .003" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.(#1,2,3)	.077-.078"	.008-.012"	.001-.003"
Oil (#4)	.1552-.1562"	.008-.012"	.0025-.003"

Replacement Rings: Standard and .020" Oversize.
Installing Rings: Plain compression ring in top groove, taper-faced rings in #2 & #3 grooves, oil ring in bottom groove. All rings are oxidized-coated.

CONNECTING RODS

Rods have lower end split at an angle (to permit removal through cylinder bore), lower bearing is offset toward camshaft side of engine, and bearing has "narrow side" toward main bearing journal.

Crankpin Journal Diameter—1.7499-1.7504" (Series "A" Engine). 1.8759-1.8764" (Series "B" Engine).

Bearings—Steel backed, babbitt-lined, precision type.

Clearance—.00025-.0015".

Sideplay—.0085-.0125".

Replacement Bearings: Standard & .002", .010" Undersize.

Installing Rods: Rods are stamped for cylinder location. Install rods in numbered cylinder with bearing offset and shorter side of rod toward left or camshaft side (oil spray hole in lower end of rod will be toward right side of engine). *NOTE*—"Narrow" side of lower bearing must be toward nearest main bearing (#1 & #3 forward, #2 & #4 toward rear).

CRANKSHAFT

Journal Diameter—1.8749-1.8754" (Series "A" Engine). 2.0005-2.001" (Series "B" Engine).

Bearings—Steel-backed, babbitt precision type.

►*BEARING NOTE: Upper bearing halves can be rotated in and out.*

Clearance—.00075-.002".
Replacement Bearings: Standard & .002", .010" Undersize.
End Thrust: Taken by split thrustwashers at center main bearing (upper washers retained in recesses in bearing support in crankcase, lower washers retained by tabs fitting in recesses in bearing cap).
Endplay—.003-.007".
Front & Rear Bearing Caps & Oil Seal Installation: *See Metropolitan Special Data.*

►*MAIN BEARING REMOVAL NOTE:* Engine assembly, engine end plates, oil pump and strainer assembly must be removed to remove main bearing caps.

FLYWHEEL REPLACEMENT: *See "Flywheel" in Metropolitan Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.78875-1.78925", (2) 1.72875-1.72925", (3) 1.62275-1.62325".
Bearings—Steel-backed, babbitt bushings.
Clearance—.001-.002".
End Thrust: Taken by thrust plate on front end plate behind camshaft sprocket. **Endplay**—.002-.008".
Camshaft Removal & Bearing Replacement: *See "Camshaft" in Metropolitan Special Data.*

Timing Chain—Double Roller. Metropolitan No. 8110131.
NOTE—Camshaft sprocket has rubber Tensioner Ring (installed in groove in outer rim) for quiet operation.

Camshaft Setting: Mesh sprockets in chain (on the bench) with marks on sprockets adjacent and line with a straightedge across shaft centers. Turn crankshaft until #1 & #4 pistons are at TDC., turn camshaft so that #1 & #2 valves are in overlap position (exhaust valve closing, intake valve opening), install chain and sprockets as an assembly.

VALVES

Tappet Clearance: .015" All Valves. At room temperature.

Valve	Head Diameter	Stem Diameter
Intake	1 3/8"	.3089-.3094"
Exhaust	1 3/16"	.3089-.3094"

Seat Angle	Lift	Stem Clearance
45°	.312"	©.001-.003"

©—Replace guides if I.D. greater than .314".
Valve Seat Width—1/16" (3/32" maximum).
Valve Stem Seals: Used on all valves. Seal washer installed between Seal Retainer and Spring Retainer on upper end of valve stem. Use NEW seals when installing valves.
Valve Springs: Free length 1 13/16".

Valve Spring Specifications

	Lbs. Pressure	Length
Valve Closed	53-57	1 15/32"
Valve Open	103-107	1 5/32"

►*VALVE LOCK INSTALLATION CAUTION*—Safety pin (hairpin spring) must be installed in groove in locks.

Valve Guides: Drive old guides out from top of head. Use Driver J-5564 to install new guides from combustion chamber side, drive guides in until they extend 11/16" beyond machined spring seat surface on head.
Valve Lifters: Two-piece barrel type (pushrod cup is pressed in main body). Remove from above (through side opening of block) after side covers and pushrods removed. *CAUTION*—Re-install lifters in same bore.
Rocker Arm Assembly: *See "Valve System" in Metropolitan Special Data for removal and assembly.*
Rocker Arm Clearance—.0005-.004"

VALVE TIMING

See CAMSHAFT SETTING above.
Intake Valves—Open 5° BTDC. Close 45° ALDC.
Exhaust Valves—Open 40° BLDC. Close 10° ATDC.
NOTE—These specifications apply with .020" tappet clearance.
Valve Timing Check—Turn crankshaft so that #1 & #4 piston on top dead center with #4 piston entering power stroke. At this point, #1 & #2 valves should be in "overlap" position (exhaust valve closing and intake valve opening).

OILING SYSTEM

Crankcase Capacity: 4 quarts (refill).
Normal Oil Pressure: 40-45 lbs. at 30 MPH.
Pressure Regulator Valve—Located under plug on left side at the rear of engine.
Oil Pressure Indicator—Warning light on lower left face of speedometer controlled by Pressure Switch on right side of engine block. Lamp should light when ignition turned on and should go out when engine oil pressure exceeds 7 lbs.
Oil Pressure Switch—Metropolitan No. 3134704.
Oil Pump: Rotor type. In crankcase on left side.
Pump Removal & Installation—*See "Oil Pump" in in Metropolitan Special Data.*

Oil Filter: Accessory.
Replacement Filter Element—Metropolitan No. 8990183.
Crankcase Ventilation: Air intake in rocker arm cover (hose connection to air cleaner), outlet pipe on left side of engine at rear.

COOLING

Water Capacity: 8 qts. (with heater).
Pressure Valve: Metropolitan No. 8111524 Radiator Filler Cap 3.5-4.5 lbs.
Thermostat: In water outlet elbow on cylinder head. **(Std.)** Metropolitan No. 8110247. Opens at 158-167°F. **(Permanent Anti-freeze)** Metropolitan No. 8111202. Opens at 180°F.
Water Pump: Packless. *NOTE*—Pump has oil plug on top of body (lubricate with light engine oil at 10,000 mile intervals).
See "Metropolitan" in Water Pump Section.
Pump Removal—Remove radiator core first, then remove pump from block.

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CLUTCH

Borg & Beck Type A–Single plate.

See "Borg & Beck Type A" in Clutch Section.

Clutch Disc–Metropolitan No. 8110511 (Series "A" Engine). No. 8111732 (Series "B" Engine).

Pedal Adjustment: Freeplay ½-¾". Adjust length of rod between clutch pedal and clutch master cylinder.

Hydraulic Clutch Control: Consists of standard master cylinder located adjacent to brake master cylinder, attached to clutch cover. Adjusting link between clutch pedal and master cylinder, connecting rod only between clutch operating cylinder and clutch throwout lever.

Filling Master Cylinder: Filler cap accessible through hole in floor pan. Maintain level to mark on cylinder. Bleed hole in clutch operating cylinder permits bleeding procedure the same as for brake system.

►*MASTER CYLINDER VENT CAUTION:* Floor pan hole cover gasket may block off air vent hole. Cut 2" diameter holes in gasket directly over both clutch and brake master cylinder.

Removal: Remove transmission and integral bell housing (see below), mark clutch cover, pressure plate, and flywheel (to insure re-installation in same position), relieve spring pressure by turning out all cover screws evenly.

SYNCHRO-MESH TRANSMISSION

Own. Three-speed, helical gear, constant mesh gears.
See Transmission Section for complete data.

Transmission Control: See "Transmission Controls" in *Transmission Section.*

Removal: Remove four top transmission to engine mounting bolts (from engine compartment). Raise & support car securely. Drain transmission. Install engine support fixture Tool J-5565. Disconnect propellor shaft at the rear axle companion flange and pull the shaft from the transmission main shaft splines. Remove rear crossmember from rear transmission supports and side sill members. Disconnect speedometer cable and shift rods from transmission levers. Disconnect clutch operating cylinder rod from clutch throwout lever, remove two capscrews holding cylinder to transmission but DO NOT disturb hydraulic lines. Remove four remaining lower transmission to engine bolts and remove starter. Lower the engine support fixture approximately 1¼" and lift transmission toward the rear, while supporting weight to eliminate possible damage to clutch drive plate.

UNIVERSALS

Cross type. Two used.

REAR AXLE

Own. 3/4-Floating, Hypoid Gear, Hotchkiss Drive, with separate differential gear carrier.
See Rear Axle Section for complete data.

Ratio–4.55-1 (9-41), standard after Serial No. E-11944. Prior to this Serial No, some 4.625 to 1 (8-37) ratios were installed.

Backlash–.005-.008". Shim adjustment.

Axle Shaft Removal: Remove rear wheel, drain axle housing. Remove drum locating screw, tap brake drum off hub. Remove axle shaft retaining screw (in shaft flange–exposed when drum removed), pull axle shaft straight out (if flange tight, pry flange loose from studs).

►*INSTALLATION CAUTION–Always use NEW gasket between axle shaft flange and hub when installing shaft.*

Rear Axle Removal: *Carrier Assembly can be removed separately, or complete Axle Assembly can be removed as follows:*

Carrier Removal–Raise rear end of car, drain axle housing, remove axle shafts (see above). Disconnect propeller shaft at rear universal companion flange and remove shaft. Remove nuts on differential carrier studs and lift assembly out of housing.

Axle Assembly Removal– Disconnect brake cable at balance lever and brake hose at "Tee" fitting. Disconnect propeller shaft at rear universal companion flange and remove shaft. Disconnect rear springs by removing "U" bolts at spring seats. Remove axle assembly from beneath car.

Wheel Bearing Adjustment: None. Bearing nuts on outer end of axle housing should be kept tight.

SHOCK ABSORBERS

Direct acting, hydraulic (front & rear). Service by replacement.
Front–Metropolitan No. 8111425.
Rear–Metropolitan No. 8111426.

FRONT SUSPENSION

Independent. Parallelogram type with coil springs mounted above knuckle pin and independent direct acting shock absorbers.
See Front Suspension Section for complete data.

Kingpin Inclination–6½° crosswise.
Caster–Pos. 2° to Pos. 3°. No adjustment.
Camber–Pos. ½° to Pos. 1½°. No adjustment.
Toe-In–0-1/16". Adjust center tie-rod (between steering gear pitman arm and idler arm).
Toe-Out on Turns–With outer wheel turned 20°, inner wheel should be 24½°+½°-0°.

STEERING

Ross. Cam-and-Lever type.
See "Ross Cam-and-Lever" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam-and-Lever" in Steering Section.*

Steering Gear Removal: *See "Ross Cam-and-Lever" in Steering Section.*

BRAKES

Girling Hydraulic. Front Wheels–Twin Cylinder, floating shoes (single acting cylinder actuating one shoe and serving as anchor for other shoe). Rear Wheels–Single cylinder, floating, non-servo lever (shoes anchored at adjuster bracket, piston actuates one shoe, lateral movement of cylinder actuates opposite shoe). Parking lever applies rear wheel service brakes.
See "Girling Hydraulic" in Brake Section.

►*MASTER CYLINDER VENT CAUTION:* Floor pan hole cover gasket may block off air vent hole. Cut 2" diameter holes in gasket directly over both clutch and brake master cylinder.

Drums–Diameter 8".
Wheel Cylinders– ¾" diameter (all whls.).
Replacement Lined Shoes–Shoes with bonded or riveted lining furnished for replacement as follows:

Metropolitan No.	Front Whl.	Rear Whl.
Shoe & Lining Set	8110986	8111002

Lining Width–1.25". **Length**–7.68".

Clearance–Shoes just free of drag (eccentric adjuster for each front wheel shoe, single wedge adjuster on backing plate for both rear wheel shoes).

Master Cylinder: Under front compartment floor on left side.
Checking Fluid–Filler access hole in front floor pan on left side. Check fluid level at 1000 mile intervals.
Removal–Remove from beneath car after disconnecting brake line fitting, pedal pushrod, and return spring.

MISC. MECHANICAL

Windshield Wiper: Lucas Model CRT-14. Electric.
See "Lucas Electric Windshield Wiper" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

1946-55 6 CYL. MODELS

	Foot Lbs. Stsm.	Amb. 6
Cylinder Head	57-60	65-70
Main Bearing Caps	66-70	①66-70
Flywheel	100-110	100-110
Vibration Dampener	65-70	90-100
Con Rod Caps	27-30	52-56
Piston Pin Clamp Bolts	18-22	22-26
Camshaft Sprocket	50-55	35-40

①—Special hollow center main bearing capscrew (oil pump screw) 70-75 ft lbs.

AMBASSADOR V8

	Ft. lbs.
Cylinder Head	55-60
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan	15-18
Main Bearing Caps	90-95
Flywheel	55-60
Vibration Dampener	130-150
Con Rod Caps	40-45
Camshaft Sprocket ①	25-30
Rocker Arm Support Bracket	55-60
Upper Valve Tappet Cover	15-18
Rocker Arm Cover	15-18
Water Pump Manifold	25-30
Water Pump Mounting	15-18
Oil Pump Mounting	25-30

①—Fuel pump eccentric retaining screw.

ENGINE

1946-48 MODELS

ENGINE REMOVAL: Remove hood. Drain cooling system, remove radiator and hose connections from engine. Disconnect fuel line at fuel pump, and exhaust pipe at manifold flange. Disconnect throttle controls and remove linkage from engine. Disconnect oil pressure and temperature gauge lines at engine units. Disconnect wiring at ignition coil and generator. Remove crankcase ventilator. Take out front and rear engine mounting bolts. Disconnect clutch linkage (under car), disconnect transmission (see Transmission Removal on car model page for complete instructions). Lift engine out of car using care not to damage engine accessories.

1952-53 STATESMAN & AMBASSADOR

ENGINE REMOVAL: Remove front bumper assembly and remove front end sheet metal (see Front End Sheet Metal Removal), including radiator. Engine assembly, with or without transmission attached, can be removed from its mountings after removing "K" brace assembly.

ENGINE MOUNTINGS

1946-48 "600" MODELS

Front Engine Mounting: Consist of shackles insulated with rubber bushings (upper end attached to engine support plate by bushing welded to support, lower end attached to bracket bolted to front frame cross-member) with rubber bumper between frame bracket and bushing to limit movement of shackle mounting.

Installation & Adjustment—Tighten retaining nuts on shackle studs securely. NOTE—Studs provided with shoulders to limit compression of rubber bushings.

Rear Engine Mounting: Consists of rubber and steel support cushion (upper and lower channel sections with live rubber cushion vulcanized to both parts) bolted to transmission case (upper channel), and to body frame cross-member (lower channel). Oil shield is installed on top of support to protect support cushion. Clutch housing is also insulated from engine block (see Clutch Housing Insulator).

Installation—See that oil seal installed with depressed edge forward (to clear transmission case), tighten mounting bolts securely.

Clutch Housing Insulator: Consists of a live rubber pad installed between clutch housing and engine block (upper) and additional pad between engine block and adapter plate (lower). Upper mounting studs (3) provided with limiting sleeves to prevent excessive compression of the rubber pad. Tighten stud nuts securely and lock with palnuts. NOTE—No bolt used in hole on right hand side of housing just above dowel bolt (omitted to permit proper functioning of insulators).

1946-47 AMBASSADOR MODELS

REPLACEMENT (1948 TYPE) ENGINE NOTE: ***When installing 1948 engines in these models, see Replacement Engine Mounting data (following original mounting data).***

Front Engine Mounting (Original Type): Consists of rubber cushion in retainer mounted on frame cross-member by four studs and nuts. Cushion has steel insert (for engine support capscrew) and loose rubber insert plug in lower face of cushion to stabilize cushion action. Cushion block has rectangular projection to control engine torque which must be installed toward left side and square projection of steel insert must register with locating washer welded on front engine support.

Installation & Adjustment—See that loose rubber insert in place in cushion and that torque reaction projection on cushion toward left side, align square projection on steel insert with locating washer on engine support, install capscrew and lockwasher, shift retainer until it just contacts torque projection on cushion, tighten retainer stud nuts securely.

Rear Engine Mounting (Original Type): Consists of upper and lower rubber cushions assembled on stud welded to frame cross-member and support bracket bolted to flywheel housing at each side. Mounting stud has shoulder to limit compression of rubber cushions.

Installation & Adjustment—Install lower (larger) cushion on stud under engine support bracket with steel face down and upper end piloted in steel retainer on lower face of bracket, install upper cushion on stud above bracket with steel face up and small end seated in counterbore in bracket, install lockwasher and nut on stud, tighten nut securely (shoulder on stud limits compression of cushions).

1946-47 AMBASSADOR MODELS

REPLACEMENT ENGINE MOUNTINGS: When installing 1948 Series Engines in these cars, 1948 type engine mountings must be used (see 1948 Mounting data), and front support must be modified as follows:

Installing 1948 Mountings on 1946-47 Cars—Cut off two front original retainer mounting studs to height of 7/32" (to serve as alignment dowels) or install two No. 3125208 dowel studs in these holes. Install new Support Brackets (No. 3124614 L.H. & 3124615 R.H.), piloting bracket on dowel studs, using original rear mounting studs, or two No. SC-3430 capscrews in bracket rear holes. Weld bracket to front of frame cross-member across entire 2" front width (CAUTION—Rubber cushions must be removed from bracket to avoid damage from heat of welding). Lower engine until cushion studs project through slots in chain cover spacer, tighten cushion-to-bracket stud nuts securely, install reinforcing plates No. 3124598 on cushion studs, install lockwasher and nut, tighten nut securely.

1948 AMBASSADOR MODELS

Front Engine Mounting: New type cushion assembly consisting of outer "U" shaped steel section with integral stud (bolts to engine support plate), and inner plate with separate stud (bolts to bracket on cross-member) with rubber insulator bonded to both parts.

Installation & Adjustment—With cushion assembled on frame bracket, lower engine until cushion studs project through slots in engine support plate, tighten cushion-to-bracket stud nuts, then install reinforcing plates on cushion studs and tighten stud nuts.

Rear Engine Mounting: Consist of similar rubber cushions on angular brackets welded to frame cross-member and attached to clutch housing by bolts. NOTE—1948 type engine has new clutch housing and frame cross-member for this new mounting.

OIL PAN

1949-51 MODELS

OIL PAN REMOVAL: Oil pan is removed in a conventional manner except as indicated below:

Statesman—Lift front of engine sufficiently so pan bolts under generator can be removed without difficulty.

Ambassador—Engine must be lifted approximately 4" so oil pan will clear #1 & #2 crank throws.

1952-53 MODELS

OIL PAN REMOVAL: Remove steering linkage cross tie rod and front suspension pivot bar brace to permit removal of engine oil pan.

CYLINDER HEAD & MANIFOLD

1946-55 6 CYL. MODELS

INSTALLING CYLINDER HEAD: Use torque indicating wrench to tighten cylinder head stud nuts in sequence shown in cylinder head diagram.

Cast Iron Heads—Torque to specifications with engine at normal operating temperature.

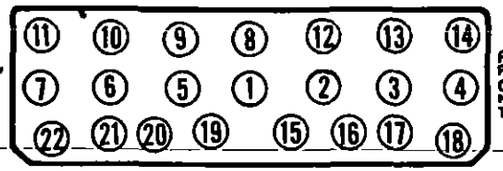
Aluminum Heads—Torque to specifications with engine cold or at room temperature.

Cylinder Head Gasket—Always use new gasket. Coat gasket with non-hardening gasket paste.

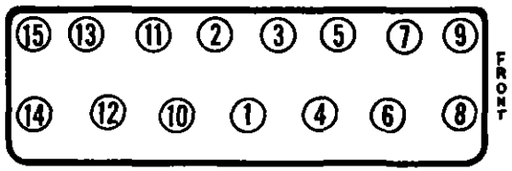
Tightening Torque—See Tightening (Torque Wrench) Specifications above.

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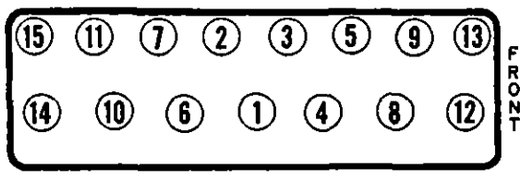
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"600" & STATESMAN



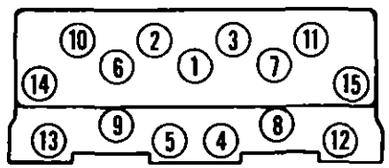
AMBASSADOR 6 (1949 & EARLIER)



AMBASSADOR 6 (1950 & LATER)

AMBASSADOR V8

CYLINDER HEAD INSTALLATION: Cylinder block has two sleeve locating dowels to assist in lining up and holding position of cylinder head and gasket during installation. Coat gasket with a non-hardening gasket compound. Install Cylinder Head Lifter J-4159 in the front and rear spark plug holes and install head over dowels (dowels are drilled for oil return from rocker arm chamber). Install pushrods, rocker arm assembly, and the cylinder head capscrews. Tighten all head bolts in the sequence indicated in diagram.



AMBASSADOR V8 CYLINDER HEAD

ORIGINAL BORE & PISTONS

1946-55 6 CYL. MODELS

ORIGINAL BEARING LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter ..... Size of Bore
Second letter ..... Size of Main Bearings
Third letter ..... Size of Con Rod Bearings

Letter Size Code

Letter "A" ..... Standard
Letter "B" ..... .010" Undersize
Letter "C" ..... .010" Oversize
Letter "D" ..... .001" Undersize

► *ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.*

PISTON PINS

AMBASSADOR V8

PISTON PIN BUSHING (IN CONNECTING ROD) INSTALLATION: After pressing old bushing out with an arbor press, install new bushing so that it is flush with both sides of rod. Position Burnisher Tool J-6055 *in bushing, then applying plate of tool under rod,* push burnisher through bushing with an arbor press. Make sure oil hole in bushing lines up with oil hole in rod. *NOTE*—If bushing not drilled for an oil hole, drill a 3/16" hole before reaming bushing.

ORIGINAL BEARING SIZES

1946-55 6 CYL. MODELS

ORIGINAL BEARING LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter ..... Size of Bore
Second letter ..... Size of Main Bearings
Third letter ..... Size of Con Rod Bearings

Letter Size Code

Letter "A" ..... Standard
Letter "B" ..... .010" Undersize
Letter "C" ..... .010" Oversize
Letter "D" ..... .001" Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

CRANKSHAFT & MAIN BEARINGS

1946-55 6 CYL. MODELS

MAIN BEARING REMOVAL & INSTALLING: Upper bearing halve may be 'rotated' out by inserting pin in oil hole in crankshaft and turning shaft in the direction of locating tongue on bearing. Bearings can be installed by reversing removal procedure.

Replacement Bearings—Finished bearings which require no reaming or scraping are furnished standard size and .002", .010" undersize.

Fitting Bearings—To check bearing clearance, insert short piece of .002" feeler stock, ½" wide, lengthwise to crank pin between bearing and crankshaft, tighten cap. Bearing fit correct when a definite drag is felt when rotating crankshaft (CAUTION—Do not rotate crankshaft more than 1" in either direction). If no drag felt, replace bearings with proper undersize (as listed above) until bearing fit correct. Do not shim bearings or file caps. NOTE—If filing of caps necessary, car manufacturer recommends that this be done carefully without removing too much metal.

1946-48 MODELS

REPLACEMENT MAIN BEARING CAPS: In extreme emergencies, replacement main bearing caps can be installed if fitted as directed below. Bearing caps are line-bored in production and original bearing caps should be retained if possible.

Replacement Main Bearing Caps—On 6 cyl. engines replace caps as follows: Align bore in cap with bore in crankcase by filing sides of cap (caps fit in recess in block). To assure correct alignment, cap retaining screws should be tightened, then backed off slightly and crankshaft rotated allowing cap to be properly positioned, tighten retaining screws to 66-70 ft. lbs. tension with tension wrench.

1946-48 "600" MODELS

1949-55 STATESMAN

CRANKSHAFT END THRUST PLATE: Crankshaft end thrust taken by flanged edges of front bearing. A steel thrust plate is assembled between rear face of timing chain sprocket and flanged face of front bearing. Plate keyed to shaft by Woodruff key which also secures sprocket on shaft. When plate installed, chamfered edge on inner diameter should face toward the rear for tight fit against bearing journal.

1946-48 "600" MODELS

1949-55 STATESMAN

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Packing in groove in block and cap behind oil slinger on crankshaft. Cap sealed with rubber plugs in groove on each side where cap fitted in recess in block. Use Tool J-1610 to install packing in groove in block and cap. Place packing in groove (with bearing shell removed), place small diameter of tool over packing, hit end of tool with lead hammer to seat packing, cut ends of packing flush with bearing cap seat, remove tool. Repeat *operation for groove in block. Install rubber seal* plugs on each side of bearing cap (where angle seal used, make certain that seal also seated in horizontal groove in block).

1946-47 AMBASSAD R

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Reverse threaded oil slinger formed on crankshaft rotates in line with cored groove in block and cap. No seal installed in this groove. Groove in cap provided with two 13/32" diameter oil return holes. Cap sealed *with wood seals installed in groove on each* side of cap where cap fitted in recess in block. With bearing cap off, check clearance between oil slinger threads and bore in block and cap. Clearance must be .006-.008" uniformly around shaft to provide eccentric oil thread. If clearance too small, file crankshaft thread *(CAUTION—Do* not alter bore in block and cap for clearance adjustment). Clean plug grooves in cap to provide flat and smooth surfaces. After bearing cap installed, place gasket compound on inner end of plug, tap plug carefully in place in groove *on each side of cap, cut off ends of plug flush.*

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1948-55 AMBASSADOR (EXC. V8)

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Steel backed synthetic rubber seal. Install upper half in block, lower half in bearing cap, make certain that seal fits snugly over edge of rear bearing oil return groove. See that surface on crankshaft to rear of oil slinger (on which seal rides) is rough. **NOTE**–Manufacturer now recommends roughing seal position on crankshaft with No. 240 grit emery cloth. **DO NOT** create spiral scratches which may conduct oil against and under seal lip. Check depth of bearing cap seal groove (.050-.055"). Insufficient depth will prevent crankshaft seal from contacting crankshaft. Install rubber seal strips on either side of bearing cap (three strips overlap bearing cap and seal sides and end surfaces of bearing cap in crankcase).

AMBASSADOR V8

►*CRANKSHAFT REAR MAIN BEARING OIL LEAK CORRECTION (Cars before Engine No. P-15629):* If seepage of oil exists between milled surface of rear main bearing cap and crankcase, file a notch approximately 3/32" deep, with a three cornered file, on the top outer edge of each side of the bearing cap approximately 1/8" forward of the oil pan gasket seal groove. Install a new oil seal as indicated below.

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Apply Lubriplate to groove in bearing cap and install oil seal, using Oil Seal Installer J-3048-A and a hammer, drive seal into place. With seal installed and tool still in place, trim ends of seal flush with surface of cap. To install upper half of seal in crankcase, remove crankshaft and install seal in same manner as for bearing cap. **NOTE**–At time of pan installation, place a generous bead of non-hardening Permatex along edge of bearing cap and crankcase to insure a perfect seal.

1946-55 6 CYL. MODELS

CRANKSHAFT FRONT OIL SEAL: A felt seal is fitted in the timing chain cover which bears against vibration dampener hub. Seal seat in hub has inner edge turned up to form a shedder on inside of cover. An oil slinger is assembled behind vibration dampener hub which extends over outer edge of oil shedder. Use Tool J-1430 installed on end of crankshaft when tightening timing chain cover screws to align seal properly. NOTE—On Statesman, "600", & Rambler Models, a cork seal and rubber seal ring is assembled behind vibration dampener to seal front end of crankshaft. See Vibration Dampener below for data

VIBRATION DAMPENER

1946-55 6 CYL. MODELS

INSTALLATION: Non-adjustable, rubber cushioned type. To install hub assembly, install large lockwasher with notches on inner edge, cork seal ring, rubber seal ring and hub retainer in recess in hub, install hex head lock screw with helical lockwasher under it, in screw hole in end of crankshaft and tighten screw securely. On Ambassador 6 models, dampener hub retained by a special nut shake-proof lockwasher (no seal installed behind hub). On both models, rubber block retaining bolt nuts on front face of dampener hub must be drawn up tight. *CAUTION*–When installing vibration dampener on hub, timing marks must be aligned with hub key-way and on same side.

AMBASSADOR V8

VIBRATION DAMPENER: Removal–Drain cooling system. Remove radiator core and fan assembly. Remove vibration dampener retainer screw and lockwasher and if car is equipped with Power Steering or Air Conditioning, remove the drive pulleys by prying them off dampener assembly. Install center adapter J-5992-2 in threads of crankshaft. Install screw assembly J-5992-3 in remover body J-5992-1 and remove dampener.

Installation: Lubricate oil seal in engine front cover and position dampener over crankshaft and tap it into place with a rawhide hammer. Assemble Vibration Dampener Installer J-5992 by placing the ¾" nut on screw assembly J-5992-3 and slide spacer J-5992-4 over screw assembly. Start screw in end of crankshaft and tighten until it bottoms in the threads. With one end of spacer against dampener, turn nut on screw until dampener hub bottoms the crankshaft oil slinger against a shoulder on crankshaft. Install Power Steering and/or Air Conditioning pulleys, retainer washer, and screw. Tighten retainer screw to 130-150 ft. lbs.

ENGINE FRONT COVER

1946-55 6 CYL. MODELS

CRANKSHAFT FRONT OIL SEAL: A felt oil seal is fitted in the timing chain cover which bears against vibration dampener hub. Seal seat in hub has inner edge turned up to form a shedder on inside of cover. An oil slinger is assembled behind vibration dampener hub which extends over outer edge of oil shedder. Use Tool J-1430 installed on end of crankshaft when tightening timing chain cover screws to align seal properly. **NOTE**–On Statesman a cork seal and rubber seal is assembled behind vibration dampener to seal front end of crankshaft. See Vibration Dampener above.

AMBASSADOR V8

ENGINE FRONT COVER: Removal–Remove vibration dampener (see above), and water pump manifold assembly. Disconnect and remove fuel pump. Remove screws attaching front cover to block and remove cover.

Installation: Using a new gasket, install engine front cover in place and start capscrews in threads, **but do not tighten.** Lubricate oil seal in cover and install vibration dampener assembly, using hub on dampener as a pilot to align front cover. Complete installation by reversing removal procedure.

AMBASSADOR V8

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION: Remove engine front cover (see above), drive out old seal with a hammer and punch, being careful not to damage cover. Install a new seal using tool J-5983, pressing seal into place with an arbor press.

FLYWHEEL

1946-55 6 CYL. MODELS

►*FLYWHEEL REPLACEMENT CAUTION (Std. & Overdrive Trans.):* Flywheel on which starter ring gear is installed is balanced as an assembly with crankshaft and vibration dampener. When flywheel is replaced, it is important that balance holes be duplicated as to size, depth, and angular location. After replacing flywheel, tighten crankshaft to flywheel stud nuts with torque wrench.

CAMSHAFT & BEARINGS

1946-48 "600" MODELS
1949-55 STATESMAN

CAMSHAFT REMOVAL NOTE: Special valve tappet retaining clips supplied in sets of 16 (Tool No. J-1612). Clips should be installed on upper ends of valve lifters to hold lifters up out of the way while the camshaft is being removed.

1946-55 AMBASSADOR (EXC. V8)

CAMSHAFT REMOVAL: Remove pushrods. Remove valve cover on side of engine, lift up each valve lifter and use rubber bands to hold lifters up out of the way while camshaft is being withdrawn.

AMBASSADOR V8

CAMSHAFT: Removal–Remove cylinder head covers, ignition wires, rocker arm assemblies, intake manifold, and carburetor. Remove water pump and manifold assembly. Remove upper oil breather and tappet assembly cover. Remove inner oil baffle cover. Remove pushrods, keeping them in their relative operational positions. Remove hydraulic tappets and keep in their relative operational positions. Remove fuel pump, vibration dampener, and engine front cover. Crank engine until timing marks on camshaft and crankshaft sprockets line up with shaft centers. Remove oil shedder from crankshaft and fuel pump eccentric from camshaft. Timing chain, camshaft, and crankshaft sprockets can be pried off. Remove camshaft retainer and thrust plate and end plate thrust spacer. Remove camshaft.

Installation: Reverse removal procedure and note the following: Install camshaft gear about 1/16" beyond a position flush with camshaft end to allow mounting of fuel pump eccentric.

TIMING CHAIN

AMBASSADOR V8

TIMING CHAIN: Removal–Remove engine front cover (see above). Pry off oil slinger from end of crankshaft and remove fuel pump eccentric. Rotate engine to line up marks on sprockets with marks adjacent and in line across shaft centers. Remove sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts.

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Installation: Install camshaft and crankshaft sprocket keys being sure that they are properly seated in keyways. Rotate engine or crankshaft to bring No. 1 cylinder to firing position. Slide crankshaft sprocket part way on the crankshaft and assemble camshaft sprocket in chain, locating and lining up the "O" marks on the sprockets in line with camshaft and crankshaft centers. Position chain on crankshaft sprocket and start camshaft sprocket on camshaft. Using a rawhide hammer, alternately tap both sprockets into proper position. Camshaft gear must be installed about 1/16" beyond a position flush with end of camshaft for installation of fuel pump eccentric. Complete installation by reversing removal procedure.

VALVE SYSTEM

1946-48 "600" MODELS
1949-55 STATESMAN

SELF-LOCKING TAPPET SCREWS: No locknuts are used on tappet adjusting screw. Threaded bushing welded to top of tappet with threads out of index with threads in tappet which locks tappet screw in position. Screw tension should be 50 inch lbs. minimum to retain tappet adjustment. Check with tension wrench. Tappet screws supplied separately, however car manufacturer recommends replacement of complete tappet assembly.

VALVE TAPPET ADJUSTMENT
AMBASSADOR V8

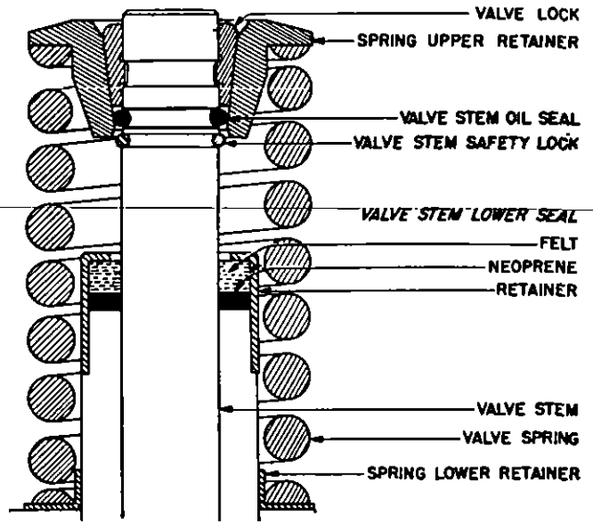
VALVE TAPPET ADJUSTMENT: *(NOTE–Checking must be done with no oil in compression chamber of tappet and plunger completely bottomed, with tappet on base circle of cam).* With piston on compression stroke and both valves closed, press downward on the push-rod end of rocker arm to compress plunger spring and force plunger to bottom position. While still holding down on rocker arm, measure the lash. The clearance between valve stem end and rocker arm tip should be .050" to .210".

VALVE STEM SEALS
1950-55 AMBASSADOR (EXC. V8)

►*1955 AMBASSADOR 6 INTAKE & EXHAUST VALVE PRODUCTION CHANGE:* Starting with Engine No. R-744962, the safety lock-ring has been eliminated as the rubber "O" ring seal prevents the valve from dropping into the cylinder bore. When using the later type valve, the "O" ring seal must be used.

VALVE STEM OIL SEAL: Consists of a neoprene valve stem seal and a felt seal under metal retainer, which is mounted over top of valve guide. The neoprene seal prevents excessive oil passage past valve stem while felt seal provides initial starting lubrication. An upper seal is also provided in the form of a neoprene ring installed below valve locks.

NOTE–A safety lock is mounted below upper seal on valve stem to prevent valve from dropping below top of valve guide during assembly.



AMBASSADOR 6 VALVE SEAL ASSEMBLY

VALVE SEAT INSERTS
1952-54 AMBASSADOR

VALVE SEAT REMOVAL & INSTALLATION (ALUMINUM CYLINDER HEAD): To remove the valve seat inserts, file or grind away peened metal from seat, then drill two holes 180° apart, using a drill slightly smaller than valve seat width. Cut through balance of insert with a chisel and remove insert in two pieces.

Installation—Heat cylinder head uniformly to approximately 350° F., and cool valve seat inserts in dry ice for approximately 15 minutes. Install cooled insert in cylinder head and peen metal of head adjacent to insert, over edge of insert, as a means to prevent dislodging of seat. Grind seat concentric with valve guide.

VALVE GUIDES
AMBASSADOR V8

CHECKING VALVE STEM CLEARANCE: After valves have been removed from head, and with valve stems and guides clean, install valve in respective guide bore and measure side-to-side play crosswise to the cylinder head using a dial indicator or thin strips of feeler gauge material placed between stem and guide bore. If clearance is excessive, guides should be reamed and valves with oversize stems installed.

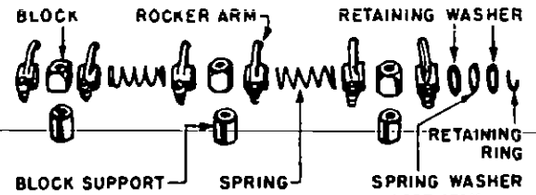
AMBASSADOR V8

VALVE GUIDE REAMING: Four oversize reamers are available in Valve Guide Set J-6042 which will provide the desired clearance of .001-.002" (Intake), and .002-.003" (Exhaust) between stem and guide. After checking clearance, select the proper oversize reamer and pilot for the oversize valve to be installed.

ROCKER ARMS
1946-55 AMBASSAD R 6

ROCKER ARM ASSEMBLY: See illustration for sequence of assembly.

►*ROCKER ARM & LUBRICATION CAUTION:* Hollow bolt must be in front mounting bolt hole of rocker arm assembly for proper lubrication.



AMBASSADOR 6 ROCKER ARM ASSEMBLY

AMBASSAD R V8

►*IMPROVED OIL CONTROL ROCKER ARM SHAFT PRODUCTION CHANGE & CORRECTION ON EARLY CARS:* For improved oil control at the intake valve stems, THREE types of rocker arm shafts have been used in production with different number and size of rocker arm oil holes as follows:

1) First Cars before Engine No. P-9038–All oil holes in shafts were .094" diameter. On some cars, the eight holes in each shaft **toward the pushrod** were plugged in the field with 3/32" x 9/16" pins made from brass welding rod and swedged in place. If trouble experienced on these cars, install third type rocker shaft (below).

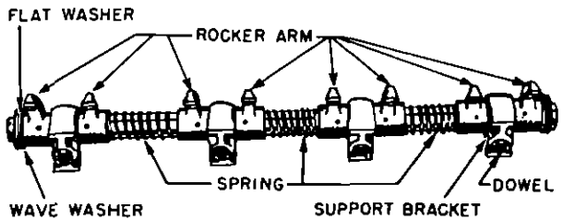
2) Cars from Engine No. P-9038 to P-17288–Rocker arm shafts did not have the eight holes **toward the pushrod** (holes omitted in production). If trouble experienced on these cars, *install third type rocker shaft* (following).

3) Cars beginning Engine No. P-17288–Rocker arm shafts have the eight holes **toward the pushrod** but these holes are .062" diameter (reduced from .094" diameter size used on first type shaft). All other holes in shaft were .094" prior to Engine No. P-17830 when ALL holes in shaft were changed to .062" diameter. *This latest type shaft is furnished for service on all cars and should be installed if trouble experienced with either previous type shaft.*

►*ROCKER ARM SQUEAK CORRECTION (Caused by insufficient oil reaching rocker arm shafts):* Determine if sufficient oil is getting to the rocker arm shaft by removing rocker arm covers and examining shaft for presence of oil while engine is running. If no oil is found it will be necessary to remove the cylinder head and drill out the oil passages as follows: Remove the 1/8" pipe plug at rear end of right hand cylinder head (or oil filter connection at front of left hand cylinder head). Using a 21/64" drill, drill out the oil passage to intersect the rocker shaft support bracket **rear** attaching bolt hole **(right hand head)**, or the rocker shaft support bracket **front** attaching bolt hole **(left hand head)**. Make sure that all chips are removed from holes and passages.

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AMBASSADOR V8 ROCKER ARM ASSEMBLY

ROCKER ARM AND SHAFT DISASSEMBLY: Remove rocker arm and shaft assembly from cylinder head. Remove pins and wave washers from end of shaft. Remove rocker arms, springs and supports, keeping all parts in order so they can be reassembled in original position.

Inspection: Clean and inspect all parts for wear. Inspect rocker arm radius at valve stem ends, and if worn replace the rocker arm. Inspect plugs at each end of shaft for tightness.

Reassembly: Reverse disassembly procedure and note the following: Rocker arm shaft must be assembled with the grooved oil hole in the downward position, or facing the cylinder head.

►*CAUTION: There is a right and left rocker arm and if reversed in assembly they will not contact the valve stem properly.*

HYDRAULIC LIFTERS

AMBASSADOR V8

HYDRAULIC VALVE LIFTERS: Removal—Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm assembly. Remove upper valve tappet cover and breather tube and then remove lower tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in same relative position.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. *(CAUTION—Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove all varnish and gum deposits.

Inspection: Inspect the plunger and wall of body for scratches (if plunger or body is scratched, replace complete unit). Try the plunger for fit in body. If check valve removed from plunger, inspect flat disc valve, spring and seat.

Reassembly: Reverse disassembly procedure. See illustration for correct sequence.

Testing: Use a clean container deep enough to cover the lifter assembly (in an upright position). Fill container with clean kerosene. Remove the pushrod socket and place lifter in kerosene in an upright position, allowing it to fill up. Remove lifter and replace pushrod socket. Place lifter assembly between jaws of checking tool J-5978. Check leakdown by depressing the tool. A decided resistance should be felt. If plunger collapses immediately, the lifter should be checked again. Replace if no resistance felt.

OILING SYSTEM

OIL PUMP

LATE 1947 MODELS

►**OIL PUMP PRODUCTION CHANGE:** A larger capacity, higher-pressure pumps used beginning with late 1947 cars as follows: "600" Series 40—Serial No. K-182791, Eng. No. KE-34134 Up; Amb. Series 60—Serial No. R-457798, Eng. No. RE-20512 Up.

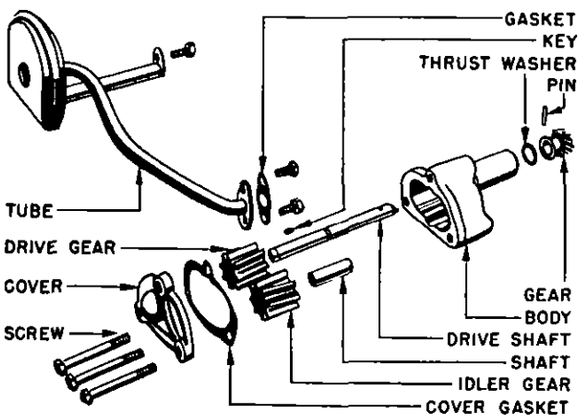
►***CAUTION—Pump parts not interchangeable (parts furnished for both early and later type pumps).***

Pump Identification—Pumps can be distinguished by length of pump gears as follows: First Type—1¼", Later Type—1⅜". Later type pump also has shaft undercut to provide for the greater oil delivery flow.

1946-48 "600" & 1949-55 STATESMAN

REMOVAL: Note position of pump drive gear keyway before removing oil pump and install in same position to retain distributor timing. Engine is properly timed when No. 1 cylinder is at TDC in firing position and the oil pump drive gear keyway is approximately at three-thirty o'clock position when viewed from lower section of pump body.

OVERHAUL: Remove capscrews, cover and gasket, then drive gear (in pump) and idler gear and their shafts. Remove key from keyway on drive shaft. Remove drive shaft and drive gear (camshaft end) assembly from pump body. (NOTE—Drive gear (camshaft end) is held on drive shaft by a pin). Remove thrust washer from drive shaft. To assemble, reverse disassembly procedures.



NASH "600," STATESMAN OIL PUMP

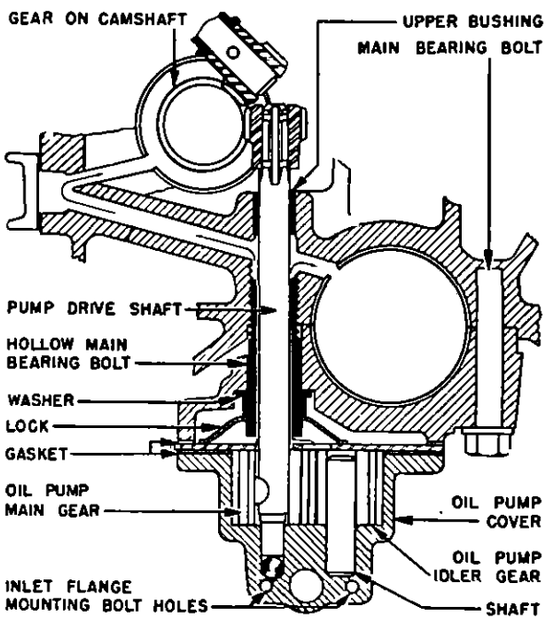
1946-55 AMBASSADOR 6

OIL PUMP: Removal—Pump is mounted on center main bearing cap and must be dismantled for removal as follows: Take out pump mounting screws, withdraw pump body and idler gear assembly (shaft will remain in engine) Withdraw shaft from below disengaging drive gear from splines on upper end of shaft as shaft is withdrawn. Gear is free fit on shaft splines and can be lifted out after it is freed from the shaft. Pump shaft operates in thin wall bushing pressed in block (upper), in pump body (lower). Remove and replace bushing from beneath with pump and shaft out of engine. Ream bushing to diameter of .500" after installation.

►*CAUTION: Excessive clearance of shaft in bushing will result in low oil pressure (pump oil delivery is up along shaft to oil channel in block—upper bushing prevents oil leakage from channel).*

Installation: Make certain that loose thrust ball is installed in pump body at lower end of pump shaft. Install pump in reverse order of disassembly and removal above

CAUTION—Maintain a tight connection between inlet flange and pump body.



AMBASSADOR 6 OIL PUMP

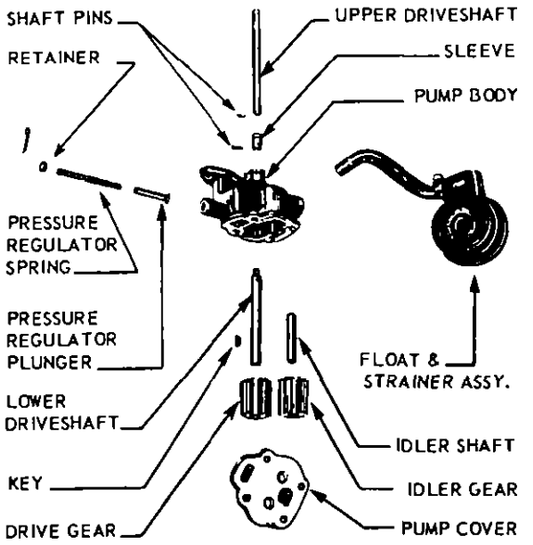
AMBASSADOR V8

OIL PUMP: Removal—Remove engine oil pan and remove the two screws attaching oil pump to rear main bearing cap and remove oil pump and strainer assembly.

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Disassembly: Remove screws attaching pump cover to pump and remove the cover. Remove idler gear. Remove pin from shaft and drive off sleeve. Remove upper and lower oil pump driving shafts and gear. If necessary, press shaft out of gear. If necessary to remove the float assembly, the tube can be unscrewed from pump.



AMBASSADOR V8 OIL PUMP

Inspection: Wash all parts in clean solvent and blow dry with air. Inspect float for leaks. Inspect strainer. Inspect pump shaft for wear, scores or pits. Check clearance between pump housing and gears (opposite point of gear mesh). This clearance should not be greater than .008". Check gear endplay using a straightedge across gears and housing. Endplay should not exceed .004". Inspect relief valve piston for scores.

Reassembly & Installation: Reverse disassembly and removal procedure indicated above.

FUEL SYSTEM NOTES

1953 STATESMAN

AIR CLEANER NOISE (STATESMAN): The standard "dry" type air cleaner may amplify engine noises that may be diagnosed as loose pistons. Check this condition by idling engine and grasping air cleaner with both hands, which will eliminate the noise. To correct this condition, apply a deadening material (Underseal) over the entire bottom surface of the air cleaner.

1953-55 STATESMAN

OIL BATH AIR CLEANER INSTALLATION (STATESMAN): ***Install air cleaner as follows to prevent distortion or breakage of the carburetor.***

1) Make certain that carburetor air horn and mounting surface of air cleaner are clean and dry to insure firm mounting.

2) Align threaded hole in air cleaner with hole in support bracket. Install spacing washers, as necessary if bracket contacts flange on cleaner.

3) Make certain that support bracket firmly attached to coil bracket so that no movement of bracket is possible.

4) Tighten air cleaner clamp by hand only.

CLUTCH NOTES

1946-48 "600" MODELS

1949-55 STATESMAN

1949-55 AMBASSADOR (EXC. V8)

CLUTCH LINKAGE: Linkage consists of a beam lever, with a support mounted at one end in a hook plate on engine (later models use a flexible link) and the other end held in position by a fulcrum plate and guide fastened to a steering gear housing boss bolt which also bolts steering gear to frame. The outer end of the beam lever connects to the clutch pedal with a rod, and the inner end connected by rod to the release bearing fork arm. Both rods are adjustable. Only the latter rod must be used when making clutch pedal free play adjustments. The fulcrum plate guide centers the beam support. If the beam support is not centered it will climb out of the hook and cause chattering. The beam is held in position by the beam anchor spring, and the pedal return spring.

►***CAUTION—Do not disturb the length of the pedal to beam rod (All Models).***

Beam Fulcrum Plate Adjustment (to centralize beam) 1946-48 Models—Install spacing washers as required, between the steering gear boss and the fulcrum plate on bolt so that the beam support is centered on the support points. See that pull of beam anchor spring is parallel to beam anchor plate.

Clutch Linkage Adjustment (1949-53 Models—Pedal free play adjustment is made by lengthening or shortening the beam to release bearing fork arm rod. Do not disturb the pedal to beam rod setting. In the event it is necessary to adjust the pedal to beam rod the adjustment is made so that the outer end of the beam lever projects (1/2" on "Statesman" and 5/16" on "Ambassador") from the beam, toward the rear, with the clutch pedal against the floorboard. No provision is made for adjustment of this rod on "Rambler" (solid rod used).

BRAKE NOTES

1955 ALL M DELS

►*SPONGY BRAKE PEDAL CORRECTION (EXCEPT POWER BRAKES):* The small hole of the keyhole slot in master cylinder-to-pedal shaft brace may not fully engage groove at outer end of pedal shaft allowing the pedal shaft to flex within the keyhole. Correct as follows: Remove master cylinder-to-pedal shaft brace and elongate the master cylinder attaching hole as necessary to provide a full engagement of small hole of keyhole slot to groove in outer end of pedal shaft. Replace brace using two "bite" washers in place of the regular lockwashers on the master cylinder attaching screws.

▷**1948 ELECTRICAL EQUIPMENT NOTE:** Both Auto-Lite and Delco-Remy electrical units are used.

HOOD LOCK: Alligator hood. Release instrument panel button and safety catch under hood nose.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate on right body sill brace under engine hood.
1946 Numbers—K-77701 Up.
1947 Numbers—K-136001 Up.
1948 Numbers—K-196901 Up.

Service Serial Number (4640 only): N4-78001 Up. On plate on left front door hinge pillar post.

ENGINE NUMBER: Stamped on left side of engine block at front end.
1947 Numbers—KE-136001 Up.
1948 Numbers—KE-55001 Up.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at 350 RPM.

VACUUM READING: Steady 18-21" idling at 7 to 9 MPH. or 400-500 RPM.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .025".
Plug Type—Auto-Lite Type A5. 14 mm. Metric.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" Limits .018-.022" (Auto-Lite), .018-.024" (Delco-Remy).
Cam Angle or Dwell—35° Closed, 25° Open (Auto-Lite & Delco-Remy).
Breaker Arm Spring Tension—17-20 ozs. (Auto-Lite), 17-21 ozs. (Delco-Remy).
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: TDC. (At top dead center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—"IGN/DC" mark on vibration dampener in line with pointer screw on timing case cover.
Octane Selector—Set to give slight ping when accelerating with wide open throttle at 10-15 MPH.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—Idle screw ('46-47) 1¼-2¼, ('48) ¾-1¾ turns open. One screw—turning screw out gives richer mixture.
Idle Speed—7-10 MPH.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
Accelerating Pump—('46-47) No seasonal adjus'mt. ('48) Medium stroke (lower, outer hole) Normal.
Fuel Pump Pressure—3½ lbs. maximum.

VALVE TAPPET CLEARANCE: .015" All Valves, Hot. NOTE—Tappet adjusting screws self-locking type.
Valve Timing Check—See Valve Timing.

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION
DELCO-REMY

IGNITION SWITCH: Delco-Remy No. 1116460. No armored cable.
Ignition Lock—Briggs & Stratton No. 85853.
Key Series—5 digits. Groove—No. 1.

COIL: Delco-Remy No. 1115328. Mounted on engine.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: *Delco-Remy Part No. 1869704.*
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112351. Full automatic advance type with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.020". Limits .018-.024".
Cam Angle—35° closed, 25° open.
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Delco-Remy)

Degress	Distr. R.P.M.	Degress	Eng. R.P.M.
Start	300	2	600
5½	400	11	800
12	1400	24	2800

Vacuum Spark Control: Delco-Remy No. 1116045. Separate unit mounted on hold-down plate and linked to advance arm. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. Plunger Travel 23/64".

Vacuum Advance (Delco-Remy)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3-5"
8½°	17°	13-17"

Distributor Removal: *See Auto-Lite Distr. (following).*

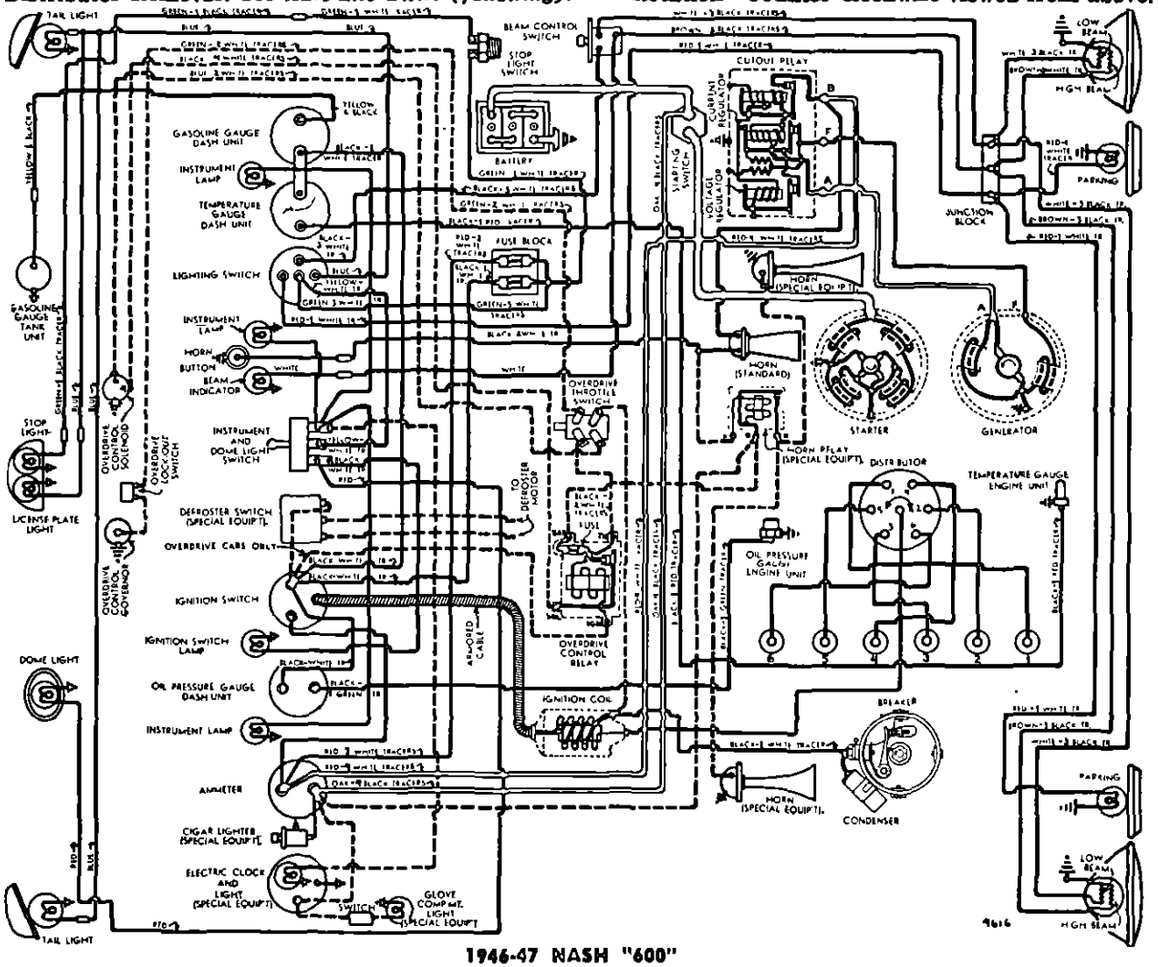
IGNITION
AUTO-LITE

IGNITION SWITCH: Mitchellock Type 24-B, No. E-10230. Connected to coil by armored cable.

COIL: 1946-47 Auto-Lite No. IG-4677. Service Coil (less switch & cable) IG-3224JS. On dash.
1948—Auto-Lite No. CE-6001. Mounted on engine.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: Auto-Lite (1946-47) IGB-1025J (IGW distr.). (1948) IG-2671 (IGC distributor).
Capacity—.20-.25 microfarad.

DISTRIBUTOR: 1946-47 Auto-Lite IGW-4184 or 4184A, 1948 Auto-Lite IGC-4512. Full automatic advance type with vacuum spark control and octane selector adjustment.
Breaker Gap—.020". Limits .018-.022".
Cam Angle or Dwell—35° closed, 25° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.



1946-47 NASH "600"

Automatic Advance (Auto-Lite IGW-4184, A)

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	275	0	550
2	330	4	660
4.5	400	9	800
8	940	16	1880
11	1400	22	2800

Automatic Advance (Auto-Lite IGC-4512)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	325	2	650
4	410	8	820
10	1290	20	2580
11	1450	22	2900

Octane Selector—Hold-down plate marked with scale for timing variation dependent on fuel regularly used.

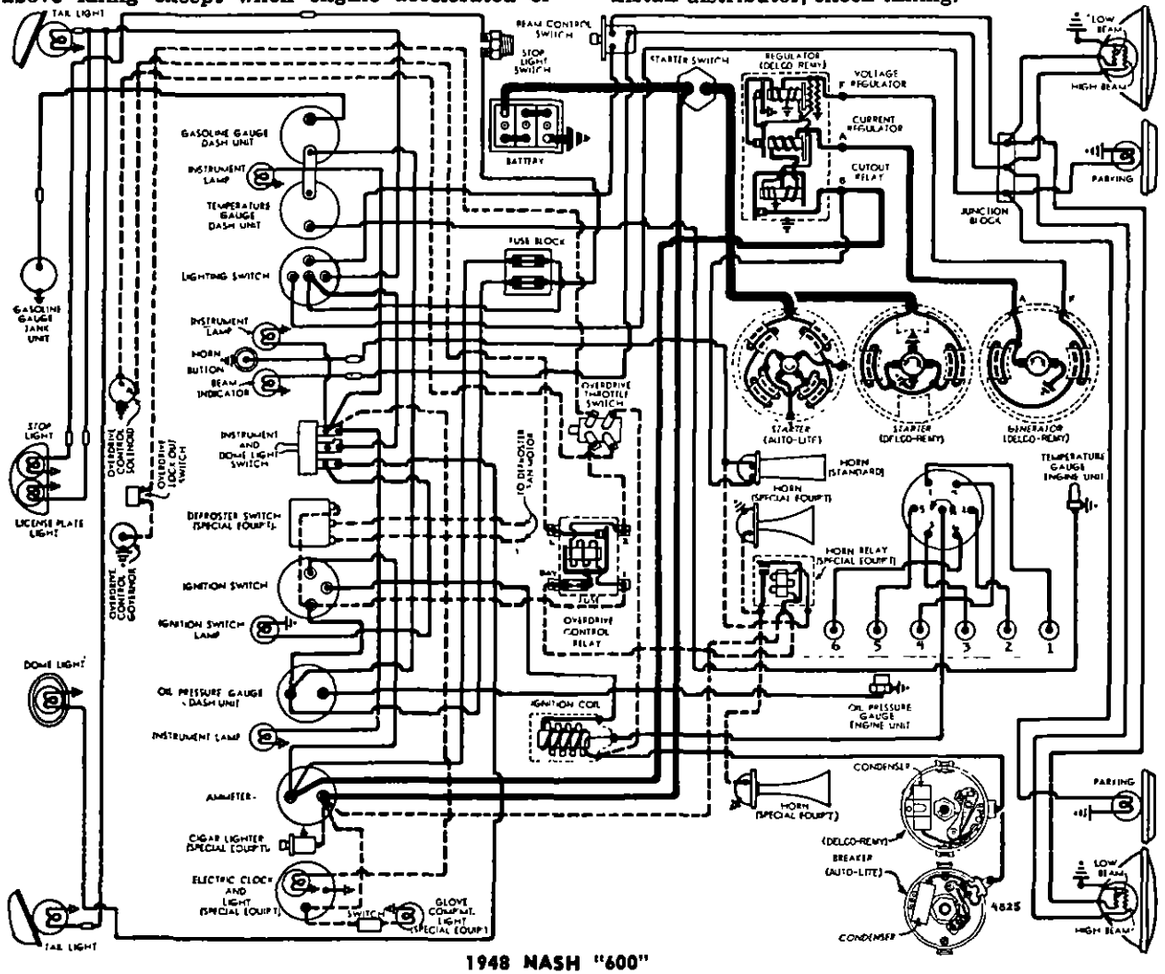
Vacuum Spark Control: A-L No. VC-4015. Separate unit mounted on hold-down plate and linked to advance arm. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by spring within unit.

Vacuum Advance (Auto-Lite)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4"
2°	4°	6⅛"
4.5°	9°	9"
6°	12°	12"
7.5°	15°	15"

Distributor Removal: On left side of engine. To remove, disconnect vacuum line, take out hold-down screw, lift distributor off.

Installation Note—When installing distributor, crank engine to firing position for #1 cylinder (piston at TDC), see that oil pump drive gear meshed with shaft tongue on 1946-47 in vertical or straight-across-engine position, or on 1948 two teeth forward of vertical position, and on all engines wide half of shaft should be toward rear (offset shaft), turn distributor to #1 segment in distributor cap, install distributor, check timing.



1948 NASH "600"

IGNITI N TIMING

Std. Setting ..... At TDC.

NOTE—Car manufacturer recommends using Synchroscope or Timing Light to set Ignition Timing.

Timing (Using Synchroscope)—Loosen distributor hold-down screw, center octane selector scale, tighten screw. Fill in "IGN/DC" mark on vibration dampener with chalk. Clip synchroscope to #1 spark plug, direct light on vibration dampener at timing-case-cover-pointer. Idle engine at 400-500 RPM., loosen advance arm clamp bolt, rotate distributor until "IGN/DC" vibration dampener mark aligned with pointer, tighten clamp bolt, check Octane Selector Setting given below.

Timing (Using Timing Light)—Connect timing light, adjust distributor as directed above. Crank engine by placing in high gear and moving car ahead slowly.

Octane Selector Setting—Loosen hold-down screw in distributor, adjust scale so that slight ping secured when accelerating with wide open throttle at 10-15 MPH.

CARBURET R

Carter WA1, No. 611S (1946-47), 662S (Early 1948), 662SA (Late 1948). 1¼" Single Barrel downdraft type with Carter Climatic Control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump Setting): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in the Carburetor Section.*

Fast Idle: Carter Single Barrel Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
See Carburetion Equipment Section for complete data.
►**Setting**—*CAUTION—Two settings used.*
(611S, 662S) 2 points Lean, (662SA) Centered.

CARB. EQUIPMENT

Air Cleaner: AC No. 1542037 Oil-wetted type (Std.), Filter Element AC #1. Oil-bath Cleaner Optl.
Servicing Oil-wetted type)—Wash filter element and re-oil with heavy engine oil every 2000 miles.
Servicing (Oil-bath type)—Wash filter element, clean out and refill oil reservoir with 1 pint SAE No. 50 engine oil (summer), No. 20 (winter) every 5000 miles.

Fuel Pump (Std.): AC Type W, No. 1537398.
(Optl. & Overdrive Cars)—AC Type AJ, No. 1537406 combination fuel-and-vacuum pump.
Replacement Pumps—AC 532 (for W), 7406 (for AJ).
►*CAUTION—Install pumps with rocker arm ABOVE (W), or UNDER (AJ) eccentric on camshaft.*
See Carburetion Equipment Section for complete data.
Pressure—3½ lbs. max. ("W"), 4 lbs. ("AJ").

Gasoline Gauge: King-Seeley electric type. K-S Nos. 40152 (dash unit), 40170 (tank unit).
See Carburetion Equipment Section for complete data.

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BATTERY

Auto-Lite Type 1H-90 (old CT-1-13). 6 volt, 13 plate, 90 Ampere Hour capacity (20 hour rate).
Starting Capacity—114 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.0 minutes. Five second voltage—4.10 volts.
Dimensions—Lght. 9 1/16". W. 7 1/16". Hght. 9".
Grounded Terminal—Positive (+) to body floor to rear of battery. Engine ground from right rear side of engine flywheel housing to rear engine support.
Location—Left side under front seat.

STARTER
DELCO-REMY

Delco-Remy Model 1109451. Armature No. 1882547.
Drive—Barrel type Bendix Drive No. A-2033.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	6000	5.7	60
11.5	"	Lock	3.3	540

Starting Switch: Delco-Remy No. 1996478. Mounted on toeboard, actuated by fully depressing clutch pedal.
Removal: *See Auto-Lite Starter (following).*

STARTER
AUTO-LITE

Auto-Lite Model MZ-4103. Armature No. MZ-2154.
Drive—Barrel type Bendix No. A-2033.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150-175 amperes, 5 volts min.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4300	5.5	70
.65	"	2500	5.5	100
2.55	"	1325	5.0	200
4.95	"	750	4.5	300
7.65	"	220	4.0	400
7.8	"	Lock	3.0	420
11.8	"	Lock	4.0	560

Starting Switch: Auto-Lite No. SW-4012. Mounted on toeboard and operated by fully depressing clutch pedal.
Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cable take out flange mounting screws.

GENERATOR
DELCO-REMY

Delco-Remy Model 1102702. Armature No. 1911454. Two-brush with voltage and current regulation.
Maximum Charging Rate—30 amperes, 8.0 volts.
Charging Rate Adjustment—None (see Regulator).

Performance Data

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ounces.
Field Current—1.75-1.9 amperes at 6.0 volts.
Removal & Belt Adjustment: *See Auto-Lite Generator (following).*

GENERATOR
AUTO-LITE

Auto-Lite Model GDZ-4806A. Armature GDZ-2079F. Two brush (shunt) type with voltage and current regulation. Ventilated.
Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM.
Charging Rate Adjustment—None (see Regulator).

Performance Data

Cold Amperes	Volts	R.P.M.	Hot Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current regulator setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.
Removal: Generator cradle mounted at left side of engine with fan belt drive (water pump driven by flexible coupling from generator). To remove, disconnect water pump, loosen fan belt, remove generator clamp band, lift out generator.
Belt Adjustment: Adjust whenever belt deflection exceeds ½" either way between the fan and generator shaft pulleys. To adjust, loosen fan mounting bracket screws (pivots on one screw, other screw hole slotted), raise fan, tighten screws. Belt misalignment can be corrected by installing shims behind fan bracket.

REGULATOR
DELCO-REMY

Delco-Remy Model 1118202. Single Core Type. Voltage and current regulator on left sill brace under hood.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—6.2-6.7 volts hot (operating temperature).
Cuts Out—0-4.0 amperes discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.2-7.4 volts Hot (operating temperature). Regulator over-compensated for temperature. Check with cover in place and at operating temp.
Checking & Adjustment—*See Electrical Equipment Section.*
Air Gap—.070" between center of core and armature with contacts just closing.

Current Regulator
Setting—34-36 amps hot (operating temperature).
Checking & Adjustment—*See Electrical Equipment Section.*
Air Gap—.080" between center of core and armature with contacts just closing.

REGULATOR
AUTO-LITE

Auto-Lite Model VRP-4004-F. Vibrating type voltage and current regulators (with cutout relay) in case on left body sill brace under hood.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—34-36 amperes (marked '35' on the cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel above speedometer dial. Lighted when upper (country beam) in use.

Switches
Lighting—Douglas.
Beam Selector—Douglas.
Instrument—Douglas.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Parking, Speedometer	1½	55
Dash Instruments	1	51
Stop	21	1129
Rear License, Tail	3	63
Dome	6	81

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. On fuse block on left body sill brace under hood.
Accessory—30 ampere. On fuse block.
Overdrive (Warner R10B)—20 amp. On overdrive relay.
HORNS: Auto-Lite. Model HT-4009 (low note), HT-4010 (high note). Twin horns.
Horn Current—14-16 amperes (each).
Horn Relay: Auto-Lite Model HRC-4001.
Contact Gap—.026".
Air Gap—.016-.020" with contacts closed but not sealed. .015-.018" air gap between armature leg and yoke with armature sealed to core.
Contacts Close—1.5-3.0 volts. Armature seals to core at 4.0 volts maximum.
Contacts Open—.5 volt minimum (open from seal).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" head type. Cylinders cast Enbloc with intake manifold cast in block (Iso-thermal fuel intake system).

Bore—3⅛". Stroke—3¾".

Displacement—172.6 cu. ins. Rated H.P.—23.44.

Developed Horsepower—82 at 3800 RPM.

Compression Ratio—7.0-1 Std. cast iron head. 7.5-1 ratio optional.

Compression & Vacuum Reading—*See Tune-up data.*

ORIGINAL BORE & BEARING SIZES: ***See "Original Bore & Pistons" and "Original Bearing Sizes" in Nash Shop Notes.***

TIGHTENING TORQUES: ***See Nash Shop Notes.***

CYLINDER HEAD INSTALLATION: ***See Nash Shop Notes***

ENGINE REMOVAL (For Servicing): ***See Nash Shop Notes.***

ENGINE MOUNTINGS: ***See Nash Special Data.***

PISTONS: Aluminum alloy, split skirt, strut, oval, tin-plated type. **Length—3⅜".**

NOTE—Cylinder out-of-round limits .003" (in service), .0005" (when reconditioned). Taper limits .009" (in service).

Clearance—.001-.002". See Fitting New Pistons.

NOTE—Piston out-of-round and taper limits .004" in service.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Do not use feeler gauge. New pistons should hold own weight approximately ⅓ down from top of bore but must be free enough to work up and down by hand (bore clean and free from oil).

Replacement Pistons: Furnished std. and .001", .002". .003", .005", .010", .012", .015", .020", .040" oversize.

Installing Pistons: Piston slot toward left side (opposite side from oil squirt hole in rod).

PISTON RINGS: 2 compression, 1 oil ring per piston, all above pin. Drilled oil drain holes in oil ring groove.

Ring	Width	End Gap	Side Clearance
Compression	.0932"	.010-.015"	.002-.004"
Oil Control	.1862"	.010-.015"	.002-.004"

PISTON PIN: Diameter .812". Length 2.632". Floating type with lock ring at each end.

Pin Fit in Piston—Palm push fit with piston heated (heat piston in boiling water).

Pin Fit in Rod Bushing—Light thumb push fit at room temperature.

Replacement Pins: Standard, .001", .003" oversize.

CONNECTING ROD: Length—6¾". Weight—24 ozs.

NOTE—Pin hole in rod bronze bushed.

Crankpin Journal Diameter—1.875". ***See "Original Bearing Sizes" in Nash Shop Notes.***

Lower Bearing—Removable steel-backed, babbitt lined type. No shims.

Clearance—.0015-.002". Sideplay—.006-012".

Bearing Adjustment: None. Replace bearings. ***See "Connecting Rods & Bearings" in Nash Shop Notes.***

NOTE—Tangs on bearing shells must engage slots in rod and cap. Palnuts used on rod bolt nuts.

Replacement Bearings: Std., .002", .010" Undersize.

Installing Rods: Oil squirt hole in lower end of rod toward right (camshaft side) of engine.

NOTE—Rods and bearing caps should be marked before removal and replaced in same cylinder and in same relative positions.

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener mounted on front end.

Vibration Dampener Servicing—*See Nash Shop Notes.*

Journal Diameters—2.479" (2 31/64"). ***See Engine Code Note in Nash Special Data for original sizes.***

►**Bearings—*CAUTION—Bearings changed, two types used as follows:***

Before Serial No. K-196901, Eng. No. KE-55001. Replaceable precision, steel-backed, thin babbitt lined. No shims. Used with first type oil pump.

Beginning Serial No. K-196901, Eng. No. KE-55001. Bearings have 360° oil groove. Used with later type larger-capacity, higher-pressure oil pump.

CAUTION—These 360° oil groove bearings used only when new larger capacity oil pump used. See Oil Pump.

Clearance—.002".

Bearing Adjustment: None (no shims). Replace bearings. ***See "Crankshaft & Main Bearings" in Nash Shop Notes.***

Replacement Main Bearing Caps: ***See "Crankshaft & Main Bearings" in Nash Special Data.***

Replacement Bearings: Standard, .002", .010" undersize.

Crankshaft Oil Seal: ***See "Crankshaft & Main Bearings" in Nash Shop Notes.***

End Thrust: Taken by front (#1) bearing (thrust plate on shaft ahead of flanged bearing).

Endplay Adjustment—*See "Crankshaft & Main Bearings" in Nash Shop Notes.*

Endplay—.006-.008".

CAMSHAFT: 4 bearing. Non-adjustable chain drive.

Camshaft Removal—*See Nash Shop Notes.*

Bearings—Steel-backed, babbitted bushings.

Clearance—.002".

End Thrust: Thrust plate assembled on front face of engine between #1 bearing and camshaft sprocket. Endplay controlled by position of timing chain sprocket (press fit on shaft).

Endplay—.004-.006".

CAUTION—Thrust plate has long oil groove on rear face which provides valve tappet lubrication from #1 camshaft bearing. Short groove on front face of plate lubricates timing chain and sprockets.

Timing Chain: Non-adjustable type. **Width 9/16". Pitch ⅜". Length 22½"** or 60 links.

Camshaft Setting: Mesh chain with camshaft and crankshaft sprockets turned so that marked tooth on each gear is 45° past (to right—as viewed facing front of engine) top vertical position. With sprockets in this position there should be 9½ links or 19 pins between tooth marks.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 15/32"	.3412"	4 25/32"
Exhaust	1 9/32"	.3412"	4 25/32"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	5/16"	.002-.003"

NOTE—Valve face angle 44°.

Valve Guides: Top of guides 27/32" below top face of block. Press guides in place and ream for correct stem clearance.

Valve Springs: Install springs with closed-coil end up against cylinder block and seated in counterbore in block. Spring free length 2 3/32".

►***CAUTION—Excessive wear of valve stems and guides will result if springs not properly seated in counterbore.***

	Spring Pressure	Length
Valve Closed	37-41 lbs.	1 3/4"
Valve Open	80-88 lbs.	1 7/16"

Valve Lifters: Mushroom type operating in reamed holes in block. Lifters removed from below with camshaft out of engine. ***See "Camshaft & Bearings" in Nash Shop Notes for Camshaft Removal.***

VALVE TIMIN

Tappet Clearance: .015" Hot, running clearance. Tappet adjusting screws self-locking (no locknuts). NOTE—Replace lifter and adjusting screw assembly if torque required to turn screw less than 50 in. lbs.

Valve Timing: See Camshaft Setting above.

Intake Valves—Open 6° BTDC. Close 50° ALDC.

Exhaust Valves—Open 46° BLDC. Close 10° ATDC.

Valve Timing Check—With tappet clearance set at .019", #1 exhaust valve should close with piston 10° after top dead center and "DC" mark on vibration dampener ⅝" past pointer on timing chain cover. Reset tappet clearance at .015" Hot.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins, valve tappets, and timing chain. Oil pump mounted on right side of crankcase.

Crankcase Capacity—5 quarts.

Normal Oil Pressure—30 lbs. at 20 MPH.

Oil Pressure Regulator—Spring-loaded release valve under plug to rear of oil pump on lower edge of crankcase. Non-adjustable. Opens at 30 lbs. (first type spring—before Eng. No. KE-18015), 50-58 lbs. (later type spring—after Eng. No. KE-18015).

►**Oil Pump:** ***CAUTION—Pump changed, two types used:***

Oil Pump (Before Serial No. K-182791, Eng. No. KE-34134)—Gear type with gears 1¼" long. Pump parts not interchangeable with later type.

Oil Pump (Beginning Serial No. K-182791, Eng. No. KE-34134)—Gear type with longer 1⅜" gears. Has increased volume and pressure. Parts not interchangeable with first type pump.

►***CAUTION—This larger capacity pump must be used when new 360° oil groove main bearings used (see Crankshaft Bearings).***

Oil Pump Installation—See Distributor Removal Installation Note for correct meshing of oil pump gears.

Oil Filter: Optional. Replace cartridge at 8000 mile intervals or more often if necessary.

Oil Pressure Gauge: King-Seeley Electric. K-8 Nos. 40161 (dash unit), No. 40790 (engine unit).

See Miscellaneous Section for complete data.

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C LING

Cooling System: Pressure type with pressure valve in filler cap, and positive circulation with water pump

Capacity—14 quarts (15 with heater).

Pressure Valve—AC #850501 Filler Cap. Opens 4 lbs.

Water Pump: Centrifugal, adjustable packing type with oiler for bearing lubrication. Driven by flexible coupling from generator.
See Water Pump Section for complete data.

Belt Adjustment—*See Generator Belt Adjustment.*

Removal—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove two pump mounting capscrews.

Thermostat: Fulton. In cylinder head water outlet.

Setting—Starts to open 157-162°F. and should be fully open 20° above starting point.

Temperature Gauge: King-Seeley Electric. K-8 Nos. 40154 (dash unit), No. 41085 (engine unit).
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 8A7. Single plate, dry disc type.

►**Clutch Assembly Change**—No. 975 through July 1947, No. 360987 starting August 1947.

►*CAUTION—Driven members are NOT INTERCHANGEABLE.*
See Clutch Section for complete data.

Facings—Woven (flywheel side). Moulded (pressure plate side). I.D. 5⅜". O.D. 8". Thickness ⅛".

Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.

►*CAUTION—Do not disturb adjustment of clutch beam lever-to-pedal rod.*

►**Clutch Linkage Change**—Beam type linkage used starting 1946 Service Serial No. N4-125727. *For linkage adjustment, see "Clutch Notes" in Nash Shop Notes.*

Removal:—Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punchmark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange. Remove clutch assembly.

TRANSMISSION

Own Make. Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear.
See Transmission Section for complete data.

►**1946-47 Transmission Shifter Shaft & Fork Change to correct Gear Disengagement**—*See 1946-47 Nash "600" in Transmission Section.*

Transmission Control: Mech. steering column shift.
See Transmission Section for complete data.

Removal: Remove Rear Axle (see REAR AXLE below), disconnect transmission shift rods at levers on left side of case and speedometer cable. Support engine at rear, free rear engine mounting, take out transmission upper mounting bolts, install special guide bolts, J-1434, in these holes, remove lower mounting bolts, slide transmission back on guide bolts, remove from below.

VERDRIVE

Warner Type AS1-R10B. Optional. New governor controlled type with electrical solenoid operation and throttle operated "kick-down" switch.
See Transmission Section for complete data.

Overdrive Solenoid—Nash No. 3123433. Warner Part No. 3AR-10B-62.

Control Governor—Auto-Lite Model TGE-4005.

Control Relay—Auto-Lite Model HRT-4101.

Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal (above).

UNIVERSALS

Mechanics 1½CR. Needle bearing, 1 used (in torque tube adapter at rear of transmission). Tapered coil spring is installed ahead of joint to properly locate joint on driveshaft. NOTE—Universal is slip fit on transmission end, slight press fit on driveshaft.

Propeller Shaft: One piece. Universal joint is light press fit on forward end, pinion coupling tight press fit on rear end.

►*CAUTION—Propeller Shaft Center Bearing Lubrication. Do not turn propeller shaft or rear wheels with bearing locating screw out (Bearing will move out of place).*
See Nash "600" Rear Axle data in Rear Axle Section for complete data.

►*PROPELLER SHAFT COUPLING SERVICE REPLACEMENT: New "Slip Type" coupling replaces former coupling & nut. See "Nash Hypoid Rear Axle" in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube Drive.
See Rear Axle Section for complete data.

Ratio (No Overdrive)—Std. ('46-47) 4.1-1, ('48) 4.4-1. Optional ('46-47) 4.4-1, ('48) 4.9-1.
(With Overdrive)—Std. ('48) 4.9-1.
NOTE—Tag stamped with ratio attached by cover bolt.

Backlash—.004-.006". Shim adjustment.

Removal:—Raise rear end of car and support car at body frame (not frame flange) or at bumper brackets. Disconnect brake cables at equalizer and remove brake tube connections. Disconnect stabilizer bar and rear springs and shock absorber mounting brackets from axle (allow springs and shock absorber to hang from body—do not bend shock absorber rod or bayonet). Disconnect torque tube by removing nuts on forward ends of trunnion bracket mounting studs, move tube and axle back to clear studs, pry universal joint off drive shaft, pull axle assembly out of car. *See "Nash '600' Rear Axle Article" in Rear Axle Section for Trunnion Bracket installation and adjustment, and shaft bearing data.*

Axle Shaft Removal—Remove wheel & drum, disconnect brake line and cable, remove backing plate mounting bolt nuts, oil seal retainer, backing plate, and bearing adjusting shims. Withdraw shaft and bearing, using care not to drag shaft on oil seal.

Wheel Bearing Adjustment—Shims located between backing plate and flanged end of housing. To adjust, remove wheel and backing plate (above), add or remove shims for endplay. **Endplay .002-.004".**

Rear Suspension: Coil spring type with conventional rear axle.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco. Model 1018-E (Front), 1029-CC (Rear).
Direct acting, hydraulic type.

FRONT SUSPENSION

Front Suspension: New design, parallelogram type with coil springs and direct acting shock absorbers.
NOTE—Entire assembly mounted on box-section pressed steel cross-member attached to frame and body through 4 rubber-bushed bolts.
See Front Suspension Section for complete data.

Kingpin Inclination—7½° crosswise.

Caster—¼° to ¾°. Shims as for Camber.

Camber—¼° to ¾°. Shim adjustment at upper control arm shaft mounting.

Toe In—1/8-3/16". Adjust tubes at inner end of each tie rod. Clamp bolts must be on front end of rod and vertical to ground when tightened.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

1946-47 "600" 4640, 4740 SERIES

Service Brakes: Lockheed hydraulic, double anchor type. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Cast-iron. Diameter 9".

Lining—Moulded type. Width 1¾". Thickness 3/16". Length per wheel 20½".

Clearance—.010" toe, .004" heel, for each shoe.

Hand Brake: See Service Brake data (above).
Adjustment—Same as for 1948 given below.

BRAKES

1948 "600" 4840 SERIES

Service Brakes: Lockheed Hydraulic "Floating Shoe" (self-centralizing) type. Hand lever applies rear wheel service brakes. NOTE—No anchor pin adjustment required.
See Brake Section for complete data.

Drums—Cast iron. Diameter 9".

►**Lining**—*CAUTION—Different width and length used on each shoe in each wheel as follows:*

1948 Brake Lining Specifications

Brake Shoe	Width	Length	Thickness
Forward (Primary)	2"	10"	3/16"
Rear (Secondary)	1¾"	7½"	3/16"

Lining is moulded type.

Clearance—.010" at toe & heel of each shoe.

Hand Brake: See Service Brakes (above).

Adjustment—Pull hand lever "on" two notches. Loosen locknut at wheel cable equalizer under car, remove all slack from cables, tighten locknut. Release hand lever, check rear brakes for drag.

►**1948 ELECTRICAL EQUIPMENT NOTE:** Both Auto-Lite and Delco-Remy electrical units are used.

HOOD LOCK: Alligator hood. To raise hood, pull out on lock button under left side of instrument panel, reach under front edge of hood and release safety catch, raise hood.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate attached to top right frame side rail to rear of front shock absorber.
1946 Numbers—R-393101 Up.
1947 Numbers—R-429201 Up.
1948 Numbers—R-468501 Up.

Service Serial Number (4660 only): N6-86001 Up. On plate on left front door hinge pillar post.

ENGINE NUMBER: Stamped on pad on right side of engine block at upper front corner.

TUNE-UP

COMPRESSION PRESSURE: 125 lbs. at 350 RPM. for Std. 7.02-1 Head.

VACUUM READING: Steady 18-20" idling at 7 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .025".
Plug Type—AC No. 45. 14 mm. Metric type.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" Limits .018-.022" (Auto-Lite), .018-.024" (Delco-Remy).
Cam Angle or Dwell (A-L)—38° Closed, 22° Open.
Cam Angle or Dwell (D-R)—35° Closed, 25° Open.
Breaker Arm Spring Tension—17-20 ozs. (Auto-Lite), 17-21 ozs. (Delco-Remy).
***Automatic & Vacuum Advance**—See Distributor.*

IGNITION TIMING: 4° BTDC ('46), TDC ('47-48).
Timing Procedure—*See Ignition Timing.*
Timing Mark—"IGN" ('46), "IGN/DC" ('47-48) dampener mark in line with pointer on timing chain cover.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—Set idle adjusting screw ½-1½ turns open. Adjust for smooth idle. Idle speed 7 MPH.
Float Level—⅜" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
***Accelerating Pump**—Inner Hole (med. stroke) Normal, Lower hole (max.) winter, Upper (min.) Summer.*
Fuel Pump Pressure: 3½ lbs. maximum.

VALVE TAPPET CLEARANCE: .015" Int., .018" Exh. Hot.
Valve Timing Check—*See Valve Timing.*
►*CAUTION—Valve timing changed during 1946 production. See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION
DELCO-REMY

IGNITION SWITCH: Delco-Remy No. 1116460. No armored cable.
Ignition Lock—Briggs & Stratton No. 85853.
Key Series—5 digits. **Groove**—No. 1.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110216. Full automatic advance type with auxiliary vacuum spark control.
Breaker Gap—.020". Limits .018-.024".
Cam Angle—35° Closed, 25° Open.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance (Delco-Remy)

Degress Start	Distr. R.P.M.	Degress	Eng. R.P.M.
	300	2	600
8	650	16	1300
15	1350	30	2700

Vacuum Spark Control: Delco-Remy (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. Total plunger travel 7/64".

Vacuum Advance (Delco-Remy)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4-8"
6°	12°	14-16"

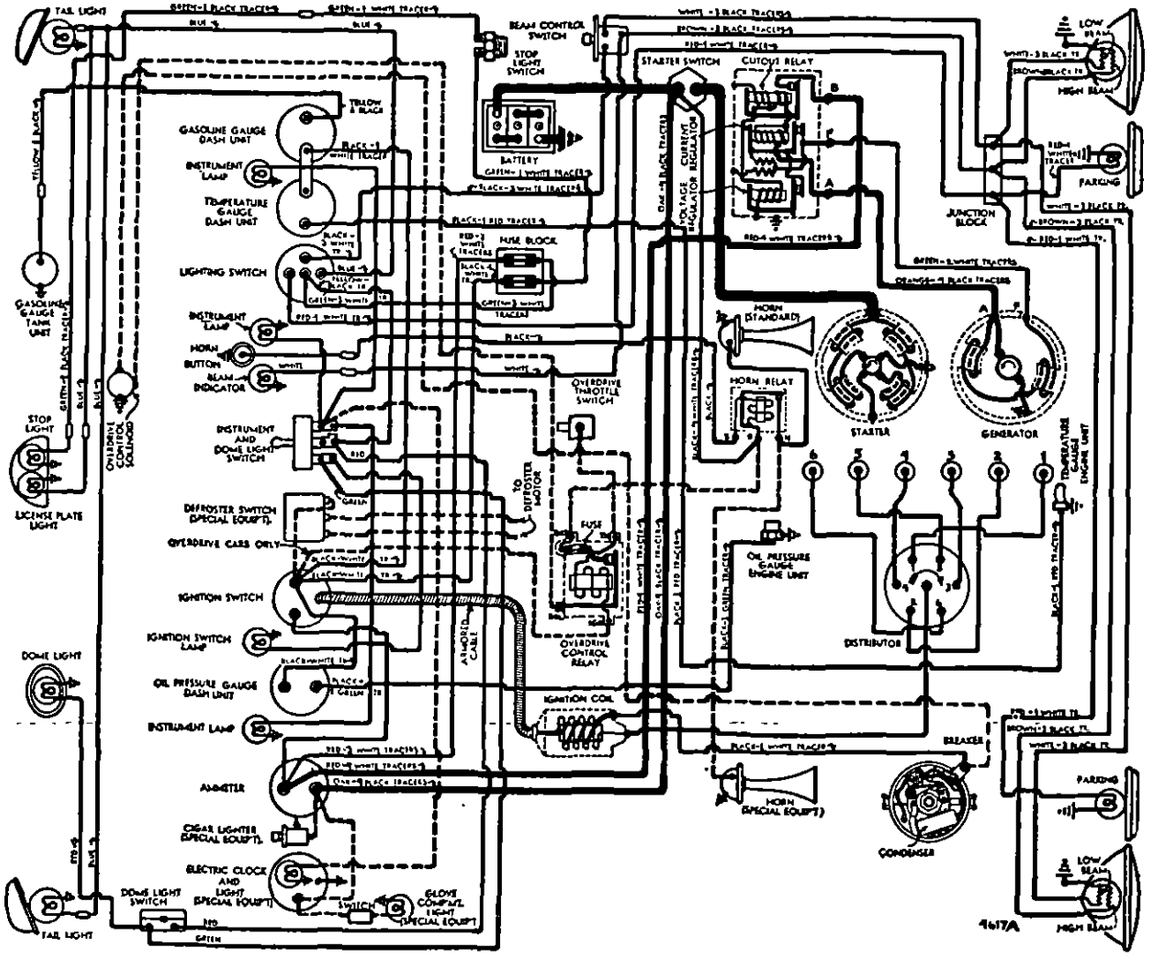
Distributor Removal: *See Auto-Lite Distr. (following).*

IGNITION
AUTO-LITE

IGNITION SWITCH: Mitchellock Type 24-B, No. E-10231. Connected to coil by armored cable.

COIL: 1946-47 Auto-Lite CE-4662. Service Coil (less switch & cable) *CE-3224JS.* On dash.

CONTINUED ON NEXT PAGE



1946-47 NASH AMBASSADOR SIX

►**R7 OVERDRIVE CIRCUIT WITH AUTO-LITE CONTROLS SHOWN ABOVE**

►***FOR R10 GOVERNOR CONTROLLED OVERDRIVE, SEE 1948 DIAGRAM***

CONTINUED FROM PRECEDING PAGE

1948—Auto-Lite IG-6001. Mounted on engine.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671F.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: 4660 below Service Serial No. N6-115-794 Auto-Lite IGS-4205A. 4660 starting Service Serial No. N6-115794 and 4760, 4860—Auto-Lite IGS-4502B. Full automatic advance types with auxiliary vacuum spark control.

Breaker Plate Identification—Maximum vacuum advance limited by slot. Plate marked #6.

Breaker Gap—.020" (.018-.022").

Cam Angle or Dwell—38° Closed, 22° Open.

Breaker Arm Spring Tension—17-20 ounces.

Rotation—Clockwise viewed from above.

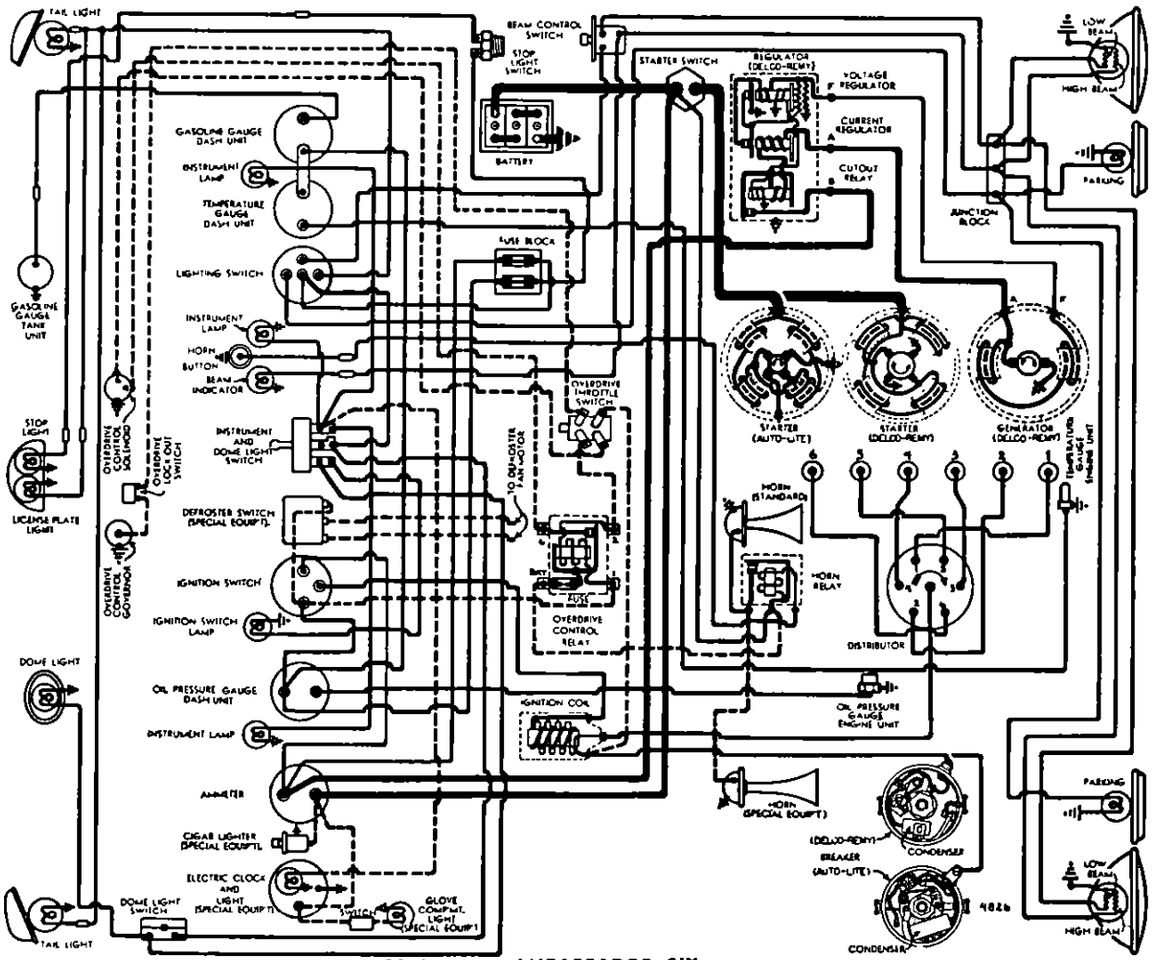
Automatic Advance (Auto-Lite IGS-4205A)

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	350	0	700
1	385	2	770
3	450	6	900
7	850	14	1700
12	1350	24	2700

Automatic Advance (Auto-Lite IGS-4205B)

Start	300	0	600
3	450	6	900
7	650	14	1300
10	950	20	1900
14	1350	28	2700

Vacuum Spark Control: Auto-Lite (integral type). Linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.



1948 NASH AMBASSADOR SIX

►FOR AUTO-LITE GENERATOR & REGULATOR CIRCUITS, SEE 1946-47 DIAGRAM

Vacuum Advance (Auto-Lite)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
1°	2°	6⅝"
3°	6°	10"
5°	10°	13⅜"
6°	12°	15"

Distributor Removal: On right side of engine. To remove, disconnect vacuum line, take out hold-down screw, lift distributor off engine.

IGNITION TIMING

4660.....4° BTDC.
4760, 4860.....At TDC.
NOTE—Car manufacturer recommends using Synchroscope or Timing Light to set Ignition Timing.
Timing (Using Synchroscope)—Clip synchroscope to #1 spark plug, fill in vibration dampener "IGN" mark with white chalk, direct light on vibration dampener at timing case cover pointer. Idle engine at 400-500 RPM., loosen advance arm clamp bolt, rotate distributor until "IGN" vibration dampener mark aligned with pointer, tighten clamp bolt.
Timing (Using Timing Light)—Connect timing light, adjust distributor as directed above. Crank engine by placing in high gear and moving car ahead slowly.

CARBURETOR

Carter Type WA-1, Model 464-S. 1¼" Single Barrel, downdraft type with Fast Idle and Climatic Control.
NOTE—Carries Casting No. 290 on face of flange.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in the Carburetor Section.*

Fast Idle: Carter Single Barrel Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
See Carburetion Equipment Section for complete data.
Setting—Centered (coil housing at index).

CARB. EQUIPMENT

Air Cleaner: AC No. 1529112 Oil-wetted type (Std.), Filter Element AC 1528179. Oil-bath Cleaner Optl.
Servicing (Oil-wetted type)—Wash filter element and re-oil with heavy engine oil every 2000 miles.
Servicing (Oil-bath type)—Wash filter element, clean out and refill oil reservoir with 1 pint SAE No. 50 engine oil (summer), No. 20 (winter) every 5000 miles.

Fuel Pump (Std.): AC Type W, No. 1537389.
(Optl. & Overdrive Cars)—AC Type AD, No. 1538780 (1946), AJ, No. 1539216 (1948-49) combination fuel-and-vacuum pump.
Replacement Pump—AC No. 533 (for W), 585 (for AD).
See Carburetion Equipment Section for complete data.
Pressure—3½ lbs. max. ("W"), 4 lbs. (No. 8780).

Gasoline Gauge: King-Seeley electric type. K-S Nos. 40152 (dash unit), No. 40170 (tank unit).
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1H-105 (old CT-1-15). 6 volt, 15 Plate, 105 Ampere Hour Capacity (20 hour rate).
Starting Capacity—133 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage—4.2 volts.
Dimensions—L. 9 1/16". W. 7 1/16". H. 9 1/16".
Grounded Terminal—Positive (+) to body floor to rear of battery. Separate engine to frame ground.
Location—Right side under front seat.

STARTER

DELCO-REMY

Delco-Remy No. 1107949. Armature No. 1911763.
Drive—Inboard Bendix No. A-1584.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data (Delco-Remy)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	6000	5.0	60
16 "	Lock	3.0	600

Starting Switch: Delco-Remy No. 1998478. Mounted on toeboard, actuated by fully depressing clutch pedal.
Removal: *See Auto-Lite Starter (following).*

STARTER

AUTO-LITE

4660, 4760.....Auto-Lite MAB-4076. Arm. MAB-2057
4860.....Auto-Lite MCL-6008. Arm. MCH-2038
Drive—Inboard Bendix No. A-1660.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—160 RPM, 150-160 amps., 5.2 v.

Performance Data (Auto-Lite MAB-4076)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	3700	5.5	60
0.6 "	1910	5.5	100
3.4 "	1100	5.0	200
6.6 "	695	4.5	300
10.15 "	420	4.0	400
15.8 "	Lock	3.0	582
22.5 "	Lock	4.0	775

Performance Data (Auto-Lite MCL-6008)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5300	5.5	65
8 "	Lock	2.0	410

Removal: Flange mounted on left front face of flywheel housing. To remove, disconnect cable, take out flange mounting screws.
Starting Switch: Auto-Lite No. SW-4012. Mounted on toeboard and operated by fully depressing clutch pedal.

GENERATOR

DELCO-REMY

Delco-Remy Model 1102702. Armature No. 1911454.
Two-brush with voltage and current regulation.
Maximum Charging Rate—30 amperes, 8.0 volts.
Charging Rate Adjustment—None (see Regulator).

Performance Data (Delco-Remy)

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ounces.
Field Current—1.75-1.9 amperes at 6.0 volts.
Removal & Belt Adjustment: *See Auto-Lite Generator (following).*

ENERATOR

AUTO-LITE

Auto-Lite Model GDZ-4806A. Armature GDZ-2079F. Two brush (shunt) type with voltage and current regulation. Ventilated.
Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM.
Charging Rate Adjustment—None (see Regulator).

Performance Data (Auto-Lite)

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current regulator setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.
Removal: Generator cradle mounted at left side of engine with fan belt drive (water pump driven by flexible coupling from generator). To remove, disconnect water pump, loosen fan belt, remove generator clamp band, lift out generator.
Belt Adjustment: Adjust whenever belt deflection exceeds ½" either way between the fan and generator shaft pulleys. To adjust, loosen fan mounting bracket screws (pivots on one screw, other screw hole slotted), raise fan, tighten screws. Belt misalignment can be corrected by installing shims behind fan bracket.

REGULATOR

DELCO-REMY

Delco-Remy Model 1118202. Single Core Type. Voltage and current regulator on left sill brace under hood.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—6.2-6.7 volts hot (operating temperature).
Cuts Out—0-4.0 amperes discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.2-7.4 volts Hot (operating temperature). Regulator over-compensated for temperature. Check with cover in place and at operating temp.
Checking & Adjustment—*See Electrical Equipment Section.*
Air Gap—.070" between center of core and armature with contacts just closing.

Current Regulator
Setting—34-36 amps hot (operating temperature).
Checking & Adjustment—*See Electrical Equipment Section.*
Air Gap—.080" between center of core and armature with contacts just closing.

REGULATOR

AUTO-LITE

Auto-Lite Model VRP-4004-F. Vibrating type voltage and current regulators (with cutout relay) in case on left body sill brace under hood.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—34-36 amperes (marked '35' on the cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by beam selector switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red jewel above speedometer dial. Lighted when upper (country beam) in use.

Switches
Lighting—Douglas.
Beam Selector—Douglas.
Instrument—Douglas.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Parking, Speedometer	1½	55
Dash Instruments	1	51
Stop	21	1129
Rear License, Tail	3	63
Dome	6	81

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. On fuse block on left body sill brace under hood.
Accessory—30 ampere. On fuse block.
Overdrive (Auto-Lite Relays only)—20 ampere.
HORNS: Auto-Lite. Model HT-4009 (low note), HT-4010 (high note). Twin horns operated by relay
NOTE—Single horn with relay standard.
Horn Current—14-16 amperes (each).

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

Horn Relay: Auto-Lite Model HRC-4001.

Contact Gap—.026".

Air Gap—.016-.020" with contacts closed but not sealed. .015-.018" air gap between armature leg and yoke with armature sealed to core.

Contacts Close—1.5-3.0 volts. Armature seals to core at 4.0 volts maximum.

Contacts Open—.5 volt minimum (open from seal).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, valve-in-head type. Cylinders cast Enbloc with intake manifold cast in block. (Iso-thermal fuel intake system).

Bore—3⅜". **Stroke**—4⅜".

Displacement—234.8 cu. ins. **Rated H.P.**—27.34.

Developed Horsepower—112 at 3400 RPM.

Compression Ratio—7.02-1 Std. cast-iron head. 7.52-1 ratio optional.

Compression & Vacuum Reading—*See Tune-up data.*

▷**1948 ENGINE NEW PARTS:** *New Cylinder Block, Crankshaft, & Rear Bearing used—not interchangeable with previous parts except as complete assembly due to new type Rear Oil Seal—See Crankshaft Oil Seals.*

ENGINE MOUNTS (1948 Type Installation on Previous Car Models): *See Nash Shop Notes.*

ORIGINAL BORE & BEARING SIZES: *See "Original Bore & Pistons" and "Original Bearing Sizes" in Nash Shop Notes.*

TIGHTENING TORQUES: *See Nash Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Nash Shop Notes*

ENGINE REMOVAL (For Servicing): *See Nash Shop Notes.*

PISTONS: Aluminum alloy, split skirt, strut, oval, tin-plated type. **Length**—3⅞".

NOTE—Cylinder out-of-round limits .003" (in service), .0005" (when reconditioned). Taper limits .009" (in service).

Clearance—.001-.002". See Fitting New Pistons.

NOTE—Piston out-of-round and taper limits .004" in service.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Do not use feeler gauge. New pistons should hold own weight approximately ⅓ down from top of bore but must be free enough to work up and down by hand (bore clean and free from oil).

Replacement Pistons: Furnished std. and .001", .002", .003", .005", .010", .012", .015", .020", .040" oversize.

Installing Pistons: Piston slot toward left side (opposite side from oil squirt hole in rod).

PISTON RINGS: 2 compression, 2 oil rings per piston, all above pin. Drilled oil drain holes in oil ring grooves.

Ring	Width	End Gap	Side Clearance
Compression	.0932"	.010-.015"	.002-.004"
Oil Control	.1547"	.010-.015"	.002-.004"

PISTON PIN: Diameter—.8746". **Length**—2.824". Floating type, with lock ring at each end.

NOTE—Pin hole in piston offset toward camshaft.

Pin Fit in Piston—Palm push fit with piston heated (heat piston in boiling water).

Pin Fit in Rod Bushing—Light thumb push fit at room temperature.

Replacement Pins: Standard, .001", .003" oversize.

CONNECTING ROD: Length—8¾". **Weight**—36¼ ozs.

NOTE—Pin hole in rod bronze-bushed.

Crankpin Journal Diameters—2.000". *See Engine Code Note in Nash Special Data for original sizes.*

Lower Bearing—Removable steel-backed, babbitt lined type. No shims.

Clearance—.0015-.0025". **Sideplay**—.006-.014".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Nash Shop Notes.*

Installing Rods: Oil spray hole in lower end of rod must be toward camshaft (right) side of engine.

NOTE—Rods and bearing caps should be marked before removal and replaced in same cylinder and in same relative position.

CRANKSHAFT: Seven bearing, counterweighted type with vibration dampener mounted on front end.

Vibration Dampener Servicing—*See Nash Shop Notes.*

Journal Diameters—2.479" (2 31/64"). *See Engine Code Note in Nash Special Data for original sizes.*

▷**Bearings**—*CAUTION—Bearings changed, two types used as follows:*

Before Serial No. R-459542, Eng. No. RE-022227. Replaceable precision, steel-backed, thin babbitt lined. No shims. Used with first type oil pump.

Beginning Serial No. R-459542, Eng. No. RE-022227. Bearings have 360° oil groove. Used with later type larger-capacity, higher-pressure oil pump.

▷*CAUTION—These 360° oil groove bearings used only when new larger capacity oil pump used. See Oil Pump.*

Clearance—.0015-.0025".

Replacement Main Bearing Caps: *See "Crankshaft & Main Bearings" in Nash Special Data.*

Bearing Adjustment: None (no shims). Replace bearings.
See "Crankshaft & Main Bearings" in Nash Shop Notes.

Replacement Bearings: Standard .002", .010" undersize.

Crankshaft Oil Seal: Rear oil seal new type steel-backed synthetic rubber seal fitted in crankcase and rear bearing cap. Bears directly on crankshaft.

▷*CAUTION—This type oil seal used only with 1948 Cylinder Block and Crankshaft (no oil return threads).*

Oil Seal Servicing—*See "Crankshaft & Main Bearings" in Nash Shop Notes.*

End Thrust: Taken by Center (#4) bearing.

Endplay—.006-.008".

CAMSHAFT: Non-adjustable 2 sprocket chain drive.

Camshaft Removal—*See Nash Shop Notes.*

Bearings—Steel-backed, babbitted bushings.

Clearance—.002".

End Thrust: Taken by front bearing, controlled by position of timing chain sprocket (press fit on shaft).

Endplay—.004-.006".

Timing Chain: Non-adjustable type. Width 9/16". Pitch ⅜". Length 22½" or 60 links.

Camshaft Setting: Mesh chain with camshaft and crankshaft sprockets turned so that marked tooth on each gear is at 45° past (to right—as viewed facing front of engine) top vertical position. With sprockets in this position there should be 9½ links or 19 pins between tooth marks.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 3/4"	.3725"	5 17/32"
Exhaust	1 15/32"	.3725"	5 17/32"

	Seat Angle	Lift	Side Clearance
All Valves	45°	11/32"	.002-.004"

NOTE—Valve face angle 44°.

Valve Guides: Press fit in head (positioned by shoulder on guide). Tops of guides should be ⅛" from face of cylinder head. Ream new guides for correct stem clearance.

Valve Springs: Free length 2 3/32". NOTE—Single spring now used (double springs formerly used).

	Spring Pressure	Length
Valve Closed	53 lbs.	1 11/16"
Valve Open	146 lbs.	1 11/32"

Valve Lifters: Mushroom type. Lifter guide holes in block. Remove from below with camshaft out.

VALVE TIMING

Tappet Clearance: .015" Int., .018" Exh., Hot.

Valve Timing: See Camshaft Setting above.

▷*CAUTION—Valve Timing changed during 1946.*

Exhaust Valve Closing Point

Early 4660—6° ATDC.

Late 4660, 4760 & 4860—16° ATDC.

Valve Timing Check—With .0225" tappet clearance, #1 exhaust valve should close with piston on Early 4660 6° after top dead center, or on Late 4660 and 4760, 4860 16° after top dead center, and "DC" mark on vibration dampener 3/8" (Early 4660), 1" (Late 4660, 4760 & 4860) past pointer on timing chain cover. Reset tappet clearance at .015" Hot.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins, valve tappets, and timing chain. Oil pump mounted on center (#4) main bearing cap in crankcase.

Crankcase Capacity—6 quarts.

Normal Oil Pressure—30 lbs. at 20 MPH.

Oil Pressure Regulator—On oil pump cover. Opens at 30 lbs. (first type spring—before Eng. No. 11514), 50-58 lbs. (later type spring—Beginning Eng. No. RE-11514). Not adjustable.

►**Oil Pump:** *CAUTION—Pump changed—two types used.*

Oil Pump (Before Serial No. R-457798, Eng. No. RE-20512)—Gear type with gears 1¼" long. Pump parts not interchangeable with later type.

Oil Pump (Beginning Serial No. R-457798, Eng. No. RE-20512)—Gear type with longer 1⅜" gears and undercut shaft to provide additional oil flow. Parts not interchangeable with first type pump.

►*CAUTION—This larger capacity pump must be used when new 360° oil groove main bearings used (see Crankshaft Bearings).*

Oil Pump Servicing—*See Nash Shop Notes.*

Cylinder Cover Vent: Vent located on front of cover just behind water outlet elbow to allow escape of vapors inside cover. Turn to open position at all times, especially winter, except for hot dusty driving.

Oil Filter: Replace cartridge at 8000 mile intervals or more often if necessary.

Oil Pressure Gauge: King-Seeley Electric. K-S Nos. 40161 (dash unit), No. 40790 (engine unit).

See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with pressure valve in filler cap, and positive circulation with water pump on left side of engine with thermostat control.

Capacity—17 quarts (18 with heater).

Pressure Valve—AC 850501 (Filler Cap). Opens at 4 lbs.

Water Pump: Centrifugal, adjustable packing type with oiler for bearing lubrication. Driven by flexible coupling from generator.

See Water Pump Section for complete data.

Removal—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting capscrews.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Fulton. In water outlet on cylinder head.

Setting—Starts to open at 157-162°F. and should be fully open 20° above starting point.

Temperature Gauge: King-Seeley Electric. K-S Nos. 40154 (dash unit), No. 41085 (engine unit).

See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 10A7. Assembly No. 950 stamped on cover. Single plate, dry disc type.

See Clutch Section for complete data.

Facings—Woven type, 2 used. Inside Diameter 7". Outside Diameter 10". Thickness ⅛".

Adjustment: Pedal free travel setting must be ½". To adjust, install Aligning Pin J-1390 in end of helper spring lever (right end of clutch release shaft), loosen helper spring lever screw on end of clutch release shaft. Loosen locknut and adjust nut on clutch release shaft end of pedal connector link for correct ½" pedal free travel. Use pipe wrench or pliers to turn clutch release shaft to rear to take up all play, see that aligning pin in helper spring lever is against pivot bracket at rear of engine, tighten helper spring lever screw securely.

CAUTION—Pedal adjustment must be made exactly as outlined above to insure correct pedal travel and helper spring operation.

Removal:—Remove transmission (see below). Disconnect clutch pedal linkage, support engine at rear and free rear engine mounting, remove clutch housing and pan. Punchmark flywheel, clutch cover and pressure plate (reassemble to same marks), remove clutch mounting screws, take out clutch.

TRANSMISSION

Own Make. Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear.

See Transmission Section for complete data.

►**1947 Transmission Shifter Shaft & Fork Change and 1946-47 Replacement Shifter Shaft & Fork Assemblies**—*See 1946-47 Nash Ambassador Six in Transmission Section.*

Transmission Control: Mechanical steering col. shift.

See Transmission Section for complete data.

Removal:—Disconnect shift rods, speedometer cable, and front universal. Remove 2 upper transmission mounting screws and install pilot studs (to support transmission during removal), remove remaining mounting screws, pull transmission straight back and remove.

OVERDRIVE

►**4660 TO SERVICE SERIAL NO. N6-95333 "R7" WITH DELCO-REMY RELAY & SOLENOID**

Warner Type R7C (Warner No. AS1-R7C) with Delco-Remy Relay and Solenoid. Centrifugal pawl type with throttle controlled "kick-down". Optl. equipment.

►**Delco-Remy Solenoid has one-terminal only.**

See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy No. 1118004.

Overdrive Relay—Delco-Remy No. 1116798.

Removal: Same as for R10 type below.

►**4660 SERVICE SER. NO. N6-95333 TO 120026 "R7" WITH AUTO-LITE RELAY & SOLENOID**

Warner Type R7C (Warner No. AS1-R7C) with Auto-Lite Relay and Solenoid. Centrifugal pawl type with throttle controlled "kick-down". Optl. equip.

►**Auto-Lite Solenoid has two terminals.**

See Transmission Section for complete data.

Overdrive Solenoid—Auto-Lite No. SSB-4002.

Overdrive Relay—Auto-Lite No. HRT-4001.

Fuse—20 ampere. On O. D. Relay under hood.

Removal: Same as for R10 type below.

►**STARTING 4660 SERVICE SERIAL NO. N6-120026 "R10" GOVERNOR CONTROLLED OVERDRIVE**

Warner Type R10B (Warner Number AS2-R10B) Governor controlled. Electric solenoid operation and throttle controlled "kick-down". Optl. equipment.

See Transmission Section for complete data.

Overdrive Solenoid—Nash No. 3123433, Warner Part No. 3AR10B-62.

Control Governor—Auto-Lite Model TGE-4001.

Control Relay—Auto-Lite Model HRT-4101.

Throttle Kickdown Switch—Nash No. 3122959.

Lockout Switch—Nash No. 3123432.

Fuse—20 ampere. On Control Relay under hood.

Removal: Same as for Std. Transmission (above) except that overdrive control cable and wires must first be removed. Then remove overdrive as a unit with transmission.

UNIVERSALS

Mechanics Type 2CR. Roller bearing type, 2 used.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratio—4.1-1 Standard. 4.4-1 with Overdrive.

Backlash—.004-.006". Shim adjustment.

Removal:—Hoist rear end of car, disconnect brake cables at rear clevises. Remove brake tubes. Disconnect rear universal. Remove rear spring U-bolts and withdraw axle from car.

Axle Shaft Removal—Remove wheel & drum, disconnect brake line and cable, remove backing plate mounting bolt nuts, oil seal retainer, backing plate, and bearing adjusting shims. Withdraw shaft and bearing, using care not to drag shaft on oil seal.

Wheel Bearing Adjustment—Shims located between backing plate and flanged end of housing. To adjust, remove wheel and backing plate (above), add or remove shims for endplay. **Endplay** .002-.004".

SHOCK ABSORBERS

Monroe Model K-11431 (Front), K-11432 (Rear). Direct acting, hydraulic type.

NOTE—Shock absorbers are sealed (non-refillable).

FRONT SUSPENSI N

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.

See Front Suspension Section for complete data.

Kingpin Inclination—4½°.

Caster—0° to Negative ½°. "C" washer adjustment.

Camber—Pos. ¼° to ¾°. "C" washer adjustment.

Toe In—1/16-3/16".

STEERIN EAR

Gemmer Model 305. Worm-and-roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix hydraulic, duo-servo, single anchor type without Eccentric Adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Drums—Cast-iron. Diameter 10".

Lining—Moulded type. Width 2". Thickness 3/16". Length 22" per wheel.

Clearance—.015" at each end of secondary (rear) shoes with primary shoes forced out against drum.

Hand Brakes: See Service Brake data above.

Adjustment—With hand lever set two notches 'on', loosen two clamp bolts at wheel cable equalizer under car, remove all cable slack, tighten clamp bolts. See that wheels free of drag with lever 'off'.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate on right side of dash under engine hood.

Starting Serial Numbers

Model	Kenosha	El Segundo
1949	K-26051	KC-1001
1950	K-340001	KC-9501
1951	K-438001	KC-23501

ENGINE NUMBER: Stamped on right side of engine block above exhaust pipe. Starting numbers as follows:
1949 Numbers—S-1001.
1950 Numbers—S-92001.
1951 Numbers—S-207001.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking spd.
VACUUM READING: Steady 18-21", 450-500 RPM idle.
FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: .030" ± .002".
Plugs—Auto-Lite A-5 (1949), A-7 (1950-51). 14 mm.
DISTRIBUTOR: Breaker Gap—.018-.024".
Cam Angle—35°. Test limits with .022" gap 31-37°.
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.
IGNITION TIMING: TDC. (At Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—"/" mark on dampener aligned with pointer on chain cover above dampener.
Octane Selector—Set to give slight ping when accelerating with wide open throttle at 10-15 MPH.
CARBURETION: Carter 694S (1949 & Early 1950); 780S (Late 1950).
Idle Setting—Idle screw ¾-1¾ turns open. One screw—turning screw out gives richer mixture.
Idle Speed—450-500 RPM.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
Accelerating Pump—Medium stroke (lower, outer hole) Normal. Inner hole (min.). Upper (max.).
Choke Setting—(694S) 2 points rich; (780S) Centered.
▷*780S NOTE—"Centered" Choke Setting supersedes previous setting of 2 points rich.*
Fuel Pump Pressure: 3-4½ lbs. (5 lbs. maximum).
CARBURETION: (Early 1951) Carter 824S, SA, SB. (Late 1951) Carter 877S, SA.
▷*CARBURETOR RECOMMENDED CHANGE FOR SMOOTHER ENGINE PERFORMANCE—See Carburetor Section for complete data.*
Idle Setting—(824S, SA, SB) 1 to 2 turns open. (877S, SA) ½ to 1½ turns open. For richer mixture, turn screws out.
Idle Speed—(Std. Trans.) 500 RPM. (Hydra-Matic) 375 RPM. with Selector Lever in "N" position.
Float Level—(824S, SA, SB) 1/2", (877S) 5/16". (877SA) ½". Measure from under side of bowl cover to top of float with bowl cover inverted and weight of float on needle valve.
▷*FLOAT NEEDLE & SEAT ASSEMBLY CHANGE—Solid type needle valve (877SA), Spring type needle valve (877S).*
Accelerating Pump—No seasonal adjustment provided and no pump stroke setting required.
Choke Setting—(824S, SA, SB) Center on index. (877S, SA) Set 1 point lean.
Fuel Pump Pressure—3-4½ lbs. (5 lbs. maximum).
VALVE TAPPET CLEARANCE: .015" All Valves, Hot.
NOTE—Tappet adjusting screws self-locking type.
STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Nash No. 3125645 (1949); 3128822 (1950); 3131343 (1951).
COIL: Delco-Remy 1115328 (1949-50); 1115380 (1951). Mounted on engine.
Ignition Current—2 amperes idling, 5 stopped.
CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.
DISTRIBUTOR: Delco-Remy No. 1112351, Full automatic advance type with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.018-.024".
Cam Angle—35°. Test limits with .022" gap 31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	2	600
5½	400	11	800
12	1400	24	2800

Vacuum Spark Control: Delco-Remy No. 1116045. Plunger Travel 23/64".

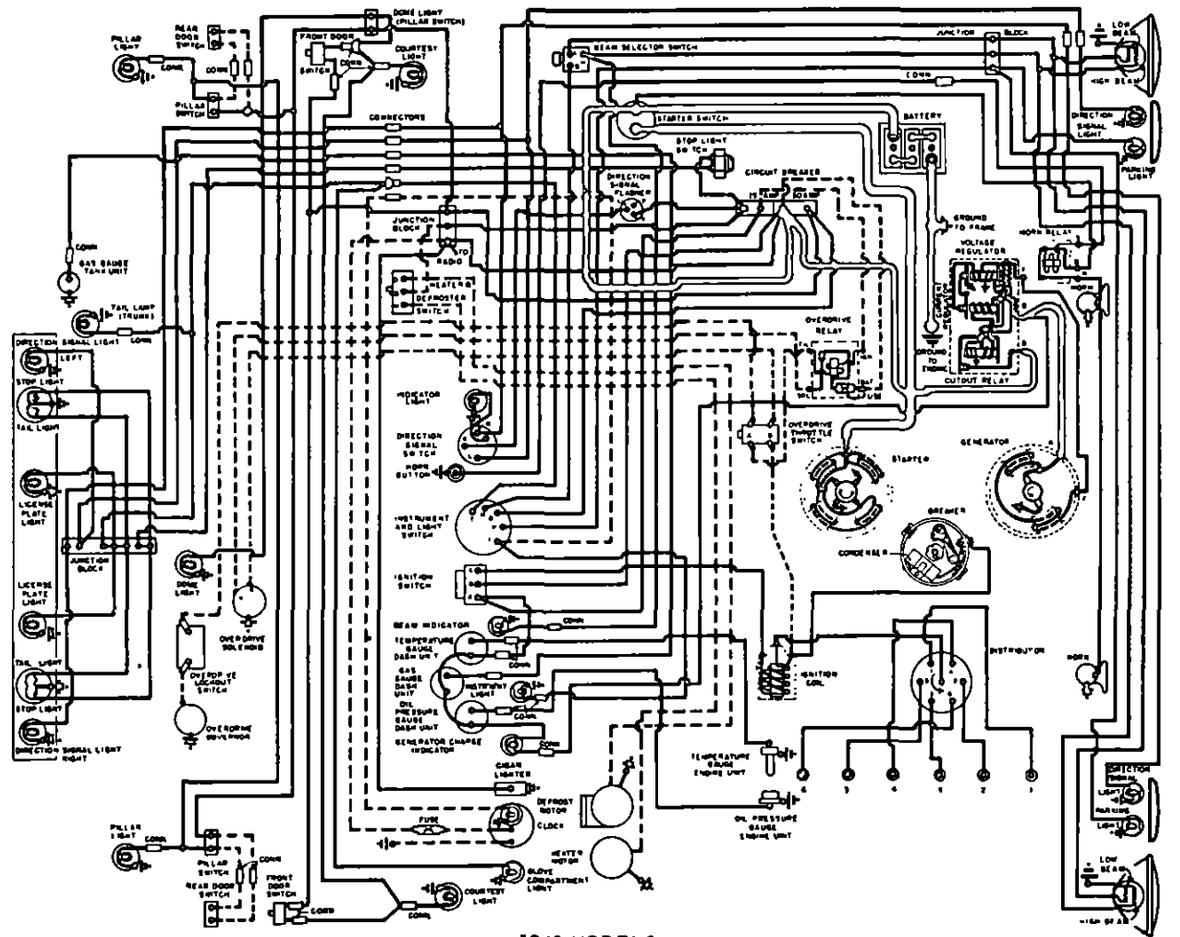
Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3.5"
8½°	17°	13-17"

IGNITION TIMING

Std. Setting ..... At TDC.
Timing (Using Neon Timing Light)—Align ⅛" holes in clamp arm and distributor support and insert pin. *Loosen distributor hold-down screw and center octane selector scale, tighten screw. Clip Neon Timing*

CONTINUED ON NEXT PAGE



1949 MODELS

CONTINUED FROM PRECEDING PAGE

Light to #1 spark plug, direct light at vibration dampener at timing chain cover pointer. Idle engine at 450-500 RPM., loosen clamp arm bolt, rotate distributor until "/" mark on dampener aligned with pointer, tighten clamp bolt, remove ⅛" pin in support. Check Octane Selector Setting.

Octane Selector Setting—Loosen hold-down screw in distributor, adjust scale so that slight ping secured at 10-15 MPH. with wide open throttle.

CARBURETOR

1949-50 CARTER WA1.

Carter No. 694S (1949 & Early 1950); 780S (Late 1950). Downdraft type with Climatic Control.
Casting No. on Flange (694S)—298, (780S)—779.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
►**694S Accelerating Pump Setting Change**—To improve acceleration performance. *See "Carter WA-1" in Carburetor Section.*
Metering Rods & Jets—*See Carter Jet Table in the Carburetor Section.*
Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
See Carburetion Equipment Section for complete data.
Setting—(694S) 2 points rich; (780S) Centered *(This setting supersedes previous setting of 2 points rich.)*

1951 CARTER YF

Carter No. (Early 1951) 824S, SA, SB. (Late 1951) 877S, SA. 1¼" Single barrel downdraft type with Climatic Control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up Data.*
►*CARBURETOR RECOMMENDED CHANGE FOR SMOOTHER ENGINE PERFORMANCE—See Carburetor Section for complete data.*
Metering Rods & Jets—*See Carter Jet Table in the Carburetor Section.*
Fast Idle: .054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate, adjust by bending connector link at lower bend.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—(824S, SA, SB) Centered on index. (877S, SA) Set 1 point lean.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Oil Wetted type (std.), Oil Bath type (optional).
Fuel Pump: Carter No. M797S or AC Type W, No. 1537398 or 1539413 fuel only. AC Type AJ, No. 1537406 combination fuel & vacuum.
Replacement Pumps—AC 532 (for W), 7406 (for AJ).
►*CAUTION: Install pumps with rocker arm ABOVE (W), or UNDER (AJ) eccentric on camshaft.*
Pressure—3-4½ lbs. (5 lbs. maximum).
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: Auto-Lite Electric.
Dash Unit—Auto-Lite No. 11578A (1949); 11982A (1950); 12268A (1951).
Tank Unit—Auto-Lite No. 11529A (1949-50); 12203A (1951).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Auto-Lite Type CT-1-13—6 volt, 13 plate, 90 Ampere Hour capacity (20 hour rate).
Grounded Terminal—Positive (+) grounded to wheelhouse (engine grounded at same point).
Location—Under hood at left side of engine.

STARTER

Delco-Remy Models—As follows:

Model	Starter No.	Armature No.
1949 (All)	1109451	1882547
1950 (Early)	1109451	1882547
1950 (Late)	1109459	1915056
1951 (Std. & O.D.)	1109463	1917887
1951 (Hydra-Matic)	1109465	1917946

Drive—(1949-50) Barrel type, Bendix No. A2033.
Drive—(1951) Delco-Remy Automatic type. No. 1917888 (Std. Trans.), No. 1917948 (Hydra-Matic).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

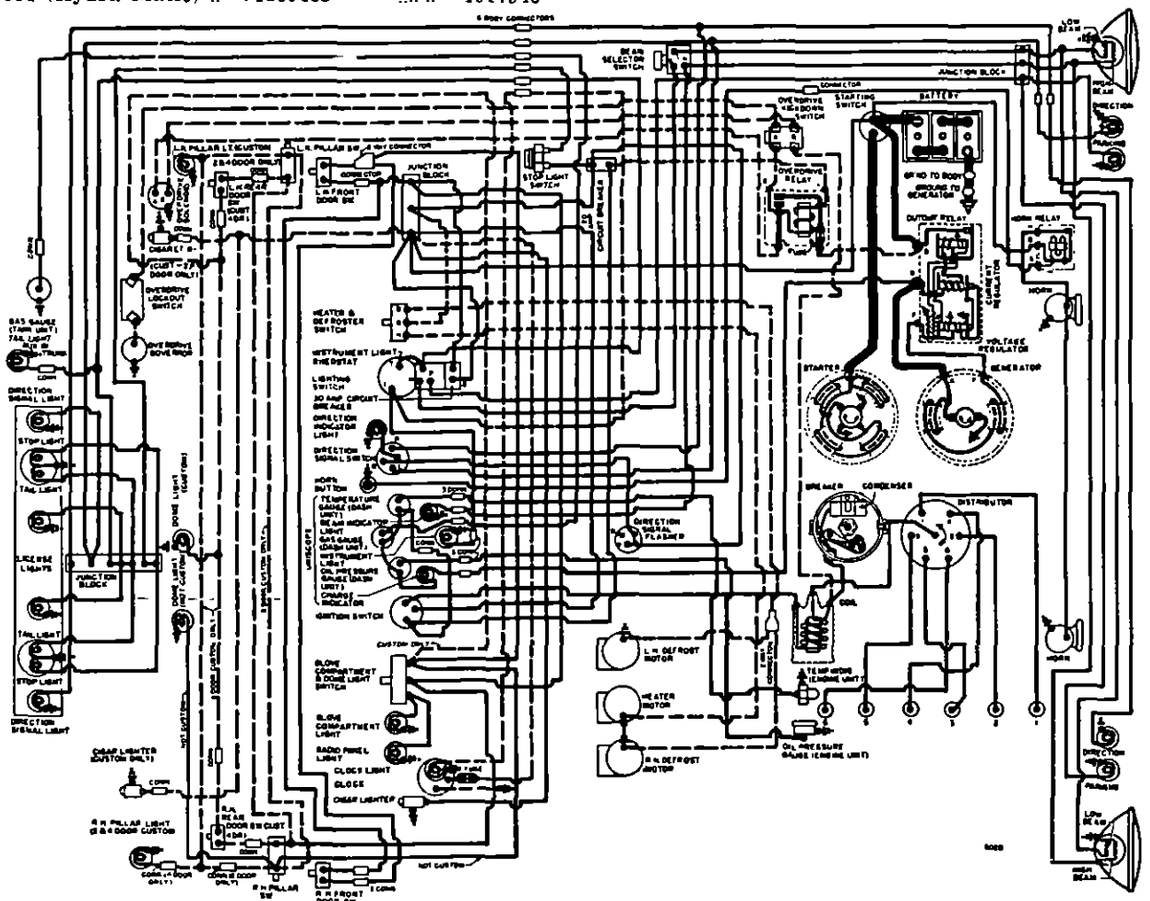
Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	6000	5.7	60
11.5 "	Lock	3.3	540

Starting Switch: (Std. Trans.) Delco-Remy No. 1996478. Mounted on toeboard, actuated by fully depressing clutch pedal.

Starting Switch: (Hydra-Matic Trans.) Delco-Remy No. 1465. Magnetic type. Control switch (Delco-Remy No. 1996044) mounted on steering column and controlled by Hydra-Matic selector lever. Operative by lifting the lever in "N" position.

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1950 MODELS

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GENERATOR

Delco-Remy Models—As follows:

Model	Generator No.	Armature No.
1949 (Std.)	1102702	1911454
1949 (Std.)	1102712	1913597
1950 (Std.)	1102712 & 1102730	1913597
1951 (Std.)	1102730	1913597
1951 (Optl.)	1102748	1917175

Maximum Charging Rate—See Regulator (below).

Performance Data
(Exc. Gen. No. 1102748)

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

Performance Data
(Gen. No. 1102748)

Cold	40	8.0	1950

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—28 ozs.

Field Current—1.75-1.9 amps. (Exc. 1102748); 1.90-2.05 amps. (1102748). All at 6.0 volts.

Belt Adjustment: Adjust belt so that 25 lbs. pressure midway between fan and generator shaft pulley will deflect belt ½". To adjust, loosen fan mounting bracket screws, raise fan, tighten screws. Belt misalignment corrected by shims back of fan bracket.

REGULATOR

Delco-Remy No. 1118302 (Use with Gen. Nos. 1102702, 712, 730). No. 1118382 (Use with Gen. No. 1102748). Voltage & Current type.

"1118300 SERIES" regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

Current Regulator

Setting—(1118302) 32-40 amperes hot (set to 36).
Setting—(1118382) 40-46 amperes hot (set to 42).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

LIGHTING

Headlamps: Hall "Sealed Beam". Upper and lower beams controlled by selector switch on toeboard.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel located on right side of instrument cluster face.

Switches

Lighting—Rotary type (1949). Push-pull type, Nash Part No. 3128824 (1950-51).

Beam Selector—Nash No. 3104105.

MISC. ELECTRICAL

GENERATOR CHARGE INDICATOR: Indicator light in instrument cluster. Lights when ignition turned on, should go out when generator begins to charge.

CIRCUIT BREAKERS: Two used;
20 ampere Circuit Breaker protects Stop Light Switch, Heater and Defroster Switch, and Directional Signal Flasher. On left body sill brace.
30 ampere Circuit Breaker protects Dome Light, Pillar Light, Courtesy Light, and Main Lighting Switches. Mounted on switch.

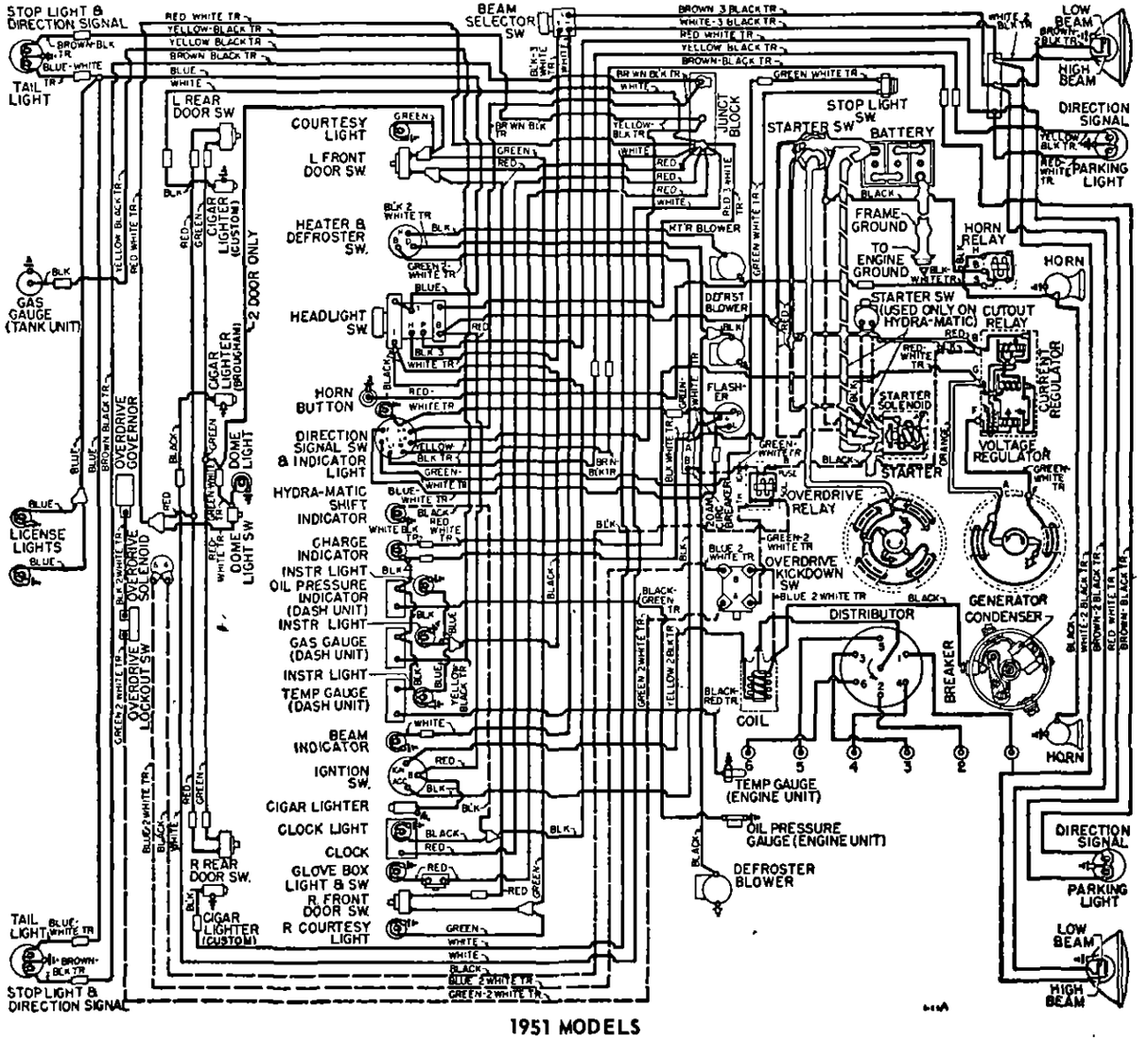
FUSES: Electric Clock. 3 ampere in clock feed. Overdrive—30 ampere. On Overdrive Relay.

HORNS (1949): Auto-Lite No. HW-4013 or HW-4025 (Low Pitch). HW-4014 or HW-4026 (High Pitch).

HORNS (1950): Auto-Lite No. HW-4025 (Low Pitch), HW-4026 (High Pitch).

HORNS (1951): Delco-Remy No. 1999657 (Low Pitch), No. 1999658 (High Pitch).
Horn Current—15 amps. at 6.2 volts.
Horn Relay: Nash No. 3125879.

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1951 MODELS

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ENGINE

ENGINE SPECIFICATIONS: 6 cyl. "L" head type.

Model	Bore	Stroke	Displacement
1949	3 1/8"	3 3/4"	172.6 cu. ins.
1950-51	3 1/8"	4"	184 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
1949	7.0-1	23.44	82 at 3800 RPM
1950-51	7.0-1①	23.44	②85 at 3800 RPM

①—7.35-1 with Optional head.
②—With 7.0-1 compression ratio.

Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Nash Special Data.*

OIL PAN REMOVAL—*See Nash Special Data.*

PISTONS: Aluminum alloy, Cam Ground, Tin plated, strut type with solid skirt. **Length—3 3/8".**
Original Bore and Pistons—*See Nash Special Data.*
Weight—13½ ozs. stripped.
Removal—Pistons and rods removed from above.
Clearance—.001-.002". See Fitting New Pistons.
NOTE—Cylinder out-of-round and taper limits .004"

Fitting New Pistons: With all parts clean and dry, fit pistons so that piston will support its own weight in any portion of cylinder. If feeler gauge used, insert .002" x ½" feeler at right angles to pin bosses, pull to withdraw feeler must be 12-18 lbs.

Replacement Pistons: Furnished Std., and .002", .005", .010", .020" and Semi-finished.

Piston Installation: Pin hole in piston offset 1/16" from center-line. Install piston with heavy side away from camshaft (pin offset toward camshaft).

PISTON RINGS: 2 compression, 1 slotted oil and 1 Thompson U-Flex oil ring, (U-Flex ring in #4 groove), per piston. All rings above pin. Oil grooves drilled with oil drain holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"①	.015 ± .005"	.002-.004"
Oil Control	5/32"②	.015 ± .005"③	.002-.004"

①—.0930" ± .0005". ②—.15475" ± .00025".
③—No end gap on Thompson U-Flex ring.
Installing Rings—Stepped inner edge of both compression rings must be UP.

PISTON PIN: Diameter—.8593-.8595". **Length**—2¾". Locked in rod.
Pin Fit in Piston—Thumb press fit or .0003" max. loose fit at room temperature (70°F.).
Replacement Pins: Standard & .001", .003" oversize.

CONNECTING ROD: Length—6⅝" (6.623-6.627").
Weight—25 ozs.
Original Bearing Sizes—*See Nash Special Data.*
Crankpin Journal Diameter—2 3/32" (2.094-2.095").
Lower Bearing—Removable steel-backed, babbitt lined type. No shims.
Clearance—.001-.0025". **Sideplay**—.006-.014".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Nash Special Data.*
Replacement Bearings: Std. & .002", .010" Undersize.
Installing Rods: Oil squirt hole in lower end of rod toward right (camshaft side) of engine.
NOTE—Rods and bearing caps should be marked before removal and replaced in same cylinder and in same relative positions.

CRANKSHAFT: Four bearing, counterweighted type with vibration dampener mounted on front end.
Vibration Dampener—*See Nash Special Data.*
Original Bearing Sizes—*See Nash Special Data.*
Journal Diameters—2 31/64" (2.479").
Bearings—Removable, steel-backed, micro-babbitt.
Clearance—.002".

Bearing Adjustment: None. Replace bearings. *See "Crankshaft & Main Bearings" in Nash Special Data.*
Replacement Bearings: Std. & .002", .010" Undersize.
Crankshaft Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

End Thrust: Taken by front (#1) bearing (thrust plate on shaft ahead of flanged bearing).
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Nash Special Data.*
Endplay—.006-.008".
►*FLYWHEEL REPLACEMENT CAUTION (Std. & Overdrive Cars)*—*See "Flywheel" in Nash Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Camshaft Removal—*See Nash Special Data.*
Bearings—Steel-backed, babbitted bushings.
Clearance—.002".

End Thrust: Thrust plate assembled on front face of engine between #1 bearing and camshaft sprocket.
Endplay—.004-.006".
CAUTION—Thrust plate has long oil groove on rear face which provides valve tappet lubrication from #1 camshaft bearing. Short groove on front face of plate lubricates timing chain and sprockets.

Timing Chain: Morse. Non-adjustable type. Width 1". Pitch ⅜". Length 22½" or 60 links.

Camshaft Setting: Install chain with punch mark on camshaft sprocket and inverted "V" mark on crankshaft sprocket adjacent and in line with straight-edge across shaft centers. Check setting as follows: turn engine over until punch mark on camshaft sprocket at one o'clock position with crankshaft sprocket mark just beginning to mesh with chain—there should be 9½ links or 19 pins (2 pins to each link) between marks.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 15/32"	.3407-.3412"	4 25/32"
Exhaust	1 9/32"	.3407-.3412"	4 25/32"

	Seat Angle	Lift	Stem Clearance
All Valves	①	5/16"	.002-.003"

①—Valve face angle 44°. Valve angle in block 45°.

Valve Guides: Pressed in block. Remove guides using Tool J-2814. Install guides using Tool J-1429-A with adapter J-1429-4.

Valve Springs: Install springs with closed-coil end up against cylinder block and **seated in counterbore** in block. Spring free length 2 3/32".
►***CAUTION*—Excessive wear of valve stems and guides will result if springs not properly seated in counterbore.**

	Spring Pressure	Length
Valve Closed	37-41 lbs.	1 3/4"
Valve Open	①	1 7/16"

①—(1949-50) 80-86 lbs. (1951) 75-82 lbs.

Valve Lifters: Mushroom type operating in reamed holes in block. Lifters removed from below with camshaft out of engine. *See "Camshaft & Bearing" in Nash Special Data for Camshaft Removal.*

VALVE TIMING

Tappet Clearance: .015" Hot, running clearance.
NOTE—Tappet adjusting screws are self-locking.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 6° BTDC. Close 50° ALDC.
Exhaust Valves—Open 46° BLDC. Close 10° ATDC.
Valve Timing Check—With tappet clearance set at .019", #1 exhaust valve should close with piston 10° after top dead center and "DC" mark on vibration dampener ⅝" past pointer on timing chain cover. Reset tappet clearance at .015" Hot.

LUBRICATI N

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, valve tappets, and timing chain.
Crankcase Capacity—5 quarts.
Normal Oil Pressure—50 lbs. at 30 MPH.
Oil Pressure Regulator—Spring-loaded release valve under plug to rear of oil pump on lower edge of crankcase. Non-adjustable. Opens at 50-58 lbs.

OIL PAN REMOVAL—*See Nash Special Data.*

Oil Pump: Gear type pump mounted on right side of engine, driven by inclined shaft.

Oil Filter: Optional. Replace cartridge at 8000 mile intervals or more often if necessary.

Oil Pressure Gauge: Auto-Lite Electric.
Dash Unit—Auto-Lite No. 11577A (1949); 11981A (1950); 12267A (1951).
Engine Unit—Auto-Lite No. 11527A.
See "Oil Gauges" in Miscellaneous Section.

COOLIN

Cooling System: Pressure type with pressure valve and vacuum valve (relief valves) in filler cap, and positive circulation with water pump.
Capacity—14 quarts (15 quarts with heater).
Pressure Valve—AC #850501 Filler Cap. Opens 4 lbs.
►*PRESSURE VALVE CHANGE NOTE*—Effective at car serial No. K-48207, a 7 lb. pressure radiator cap entered production.

Water Pump: New sealed-in, non-adjustable seal assembly. Grease fitting for bushing lubrication. Centrifugal pump driven by flexible coupling from generator.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Removal—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove two pump mounting capscrews.

Thermostat: Dole. In cylinder head water outlet.
Setting—Starts to open 162-168°F. and should be fully open 20° above opening point.

Temperature Gauge: Auto-Lite Electric.
Dash Unit—Auto-Lite No. 11579A (1949); 11983A (1950); 12269A (1951).
Engine Unit—Auto-Lite No. 11528A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck Model 8A7—(Std. & O.D. Trans. Cars). Single plate dry disc type.
Identification Note—Cover stamped "987".
See Clutch Section for complete data.
Facings—Woven. 2 used. I.D. 5⅜". O.D. 8". Thickness ⅛".

Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.
►***CAUTION*—Do not disturb adjustment of clutch beam lever-to-pedal rod.**

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punchmark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange. Remove clutch assembly.

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TRANSMISSION

Own Make. Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear.
See Transmission Section for complete data.
Transmission Control: Mech. steering column shift.
See Transmission Section for complete data.
Removal: Remove Rear Axle (see REAR AXLE below), disconnect transmission shift rods at levers on left side of case and speedometer cable. Support engine at rear, free rear engine mounting, take out transmission upper mounting bolts, install special guide bolts in these holes, remove lower mounting bolts, slide transmission back on guide bolts, remove from below.

VERDRIVE

Warner Type AS6-R10B (1949); AS8-R10B (1950-51). *(NOTE*—1950-51 Overdrive unit has "Centered Ring Gear). Optional (with Nash Transmission). Governor controlled type with electric solenoid operation and throttle operated kick-down switch.

See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy No. 1118132.
Governor—Warner No. AR10B-72E.
Control Relay—Auto-Lite No. HRT-4101.
Overdrive Fuse—30 ampere. On BAT terminal of overdrive relay (on left body sill under hood).
Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal (above).

HYDRA-MATIC TRANSMISSION

See Nash Ambassador for Nash Hydra-Matic Data.

UNIVERSALS

Mechanics 1½CR or Saginaw. One used (in torque tube adapter at rear of transmission). Tapered coil spring is installed ahead of joint to properly locate joint on driveshaft. NOTE—Universal is slip fit on transmission end, slight press fit on driveshaft.

►*PROPELLER SHAFT COUPLING SERVICE REPLACEMENT: New "Slip Type" coupling replaces former type coupling & nut. See "Nash Hypoid Rear Axle" in Rear Axle Section for complete data.*
Propeller Shaft (Std. & Overdrive Cars): Steel shaft with pre-lubricated, rubber mounted center bearing installed in torque tube. Shaft splined at both ends, universal light press fit on forward end, coupling at rear end is a tight press fit.
►*PROPELLER SHAFT CENTER BEARING PRODUCTION CHANGE (1951)—Two center bearings used on cars equipped with 4.4-1 ratio rear axle assembly. Installation of second bearing is same as for single bearing type.*
Propeller Shaft (Hydra-Matic Drive): One piece tubular steel shaft with one universal at forward end and companion flange at rear. No center bearing.
See Nash Rear Axle in the Rear Axle Section for Propellor Shaft Data.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Torque Tube Drive.
See Rear Axle Section for complete data.

Ratio—(Std.) 4.4-1 (8-35). **(Overdrive)** 4.9-1 (8-39). **(Hydra-Matic)** 3.8-1 (9-34).
Backlash—.004-.006". Shim adjustment.
Removal: Jack up and support rear end of body. Disconnect rear brake cable at equalizer, torque tube at rear of transmission, brake hose and shock absorbers at axle end (allow shocks and brake hose to hang from body). Roll axle assembly out from under car. *For Torque Tube Trunnion Bracket Adjustment, see Nash Rear Axle in Rear Axle Section.*
Axle Shaft Removal—Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolts nuts, take off oil seal retainer, backing plate, and wheel bearing adjusting shims. Withdraw axle shaft using Puller J-2498, do not drag shaft on inner oil seal.
Wheel Bearing Adjustment—Shims located between backing plate and flanged end of housing. To adjust, remove wheel and backing plate (above), add or remove shims for endplay. **Endplay**—.002-.004".
Rear Suspension: Coil spring type with conventional rear axle. *See Rear Axle Section for complete data.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting, Hydraulic.

FRONT SUSPENSION

Front Suspension: Independent, parallelogram type. with coil springs and direct acting shock absorbers. NOTE—Entire assembly mounted on box-section pressed steel cross-member attached to frame and body through 4 rubber-bushed bolts.
See Front Suspension Section for complete data.
Kingpin Inclination—8½° crosswise.
Caster—0° desired. Limits 0° to Pos. ½°. Shim adjustment ("C" washers) between upper control arm inner pivot and frame bracket.
Camber—0° desired. Limits Neg. ¼° to Pos. ¼°. Shim adjustment as for Caster (above).
Toe-In—1/16" to 3/16". Loosen clamp at both ends of adjustable tubes in each tie rod. Turn tubes
Steering Geometry—Inner wheel 23½° + ½° — 0°. Outer wheel 20°.

STEERING GEAR

Gemmer Model 305. Worm-and-roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering (floating shoe) type. Hand lever applies rear wheel service brakes.
NOTE—No anchor pin adjustment on these brakes.
See Brake Section for complete data.
Wheel Cylinders—Diam.: Front wheels 1", Rear ⅞".
Drums—Cast-iron. Diameter 9".
►*Lining—CAUTION—Different width and length used on each shoe in each wheel as follows:*

Brake Shoe	Width	Length	Thickness
Forward (Primary)	2"	10"	3/16"
Rear (Secondary)	1 3/4"	7½"	3/16"

Lining is moulded type.
Clearance—.015" heel and toe. Eccentric adjustment for each shoe.
Braking Power—57.6% front wheels, 43.4% rear.
Hand Brake: See Service Brakes (above).

MISC. MECHANICAL

Windshield Wiper: Cable Operated—vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate on right side of dash under engine hood.

Starting Serial Numbers

Model	Kenosha	El Segundo
1949	R-515501	RC-1001
1950	R-556001	RC-3501
1951	R-600501	RC-8701

ENGINE NUMBER: Stamped on pad on right side of engine block at upper front corner. Starting numbers as follows:

1949 Numbers—A-1001 Up (All plants).
1950 Numbers—A-46001 Up (All plants).
1951 Numbers—A-97001 Up (All plants).

TUNE-UP

COMPRESSION PRESSURE: 125 lbs. (1949), 130 lbs. (1950-51), at cranking speed.

VACUUM READING: Steady 18-21", 450-500 RPM. Idle. (375 RPM. on Hydra-Matic Drive cars).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .030" ± .002".
Plugs—Auto-Lite A-5 (1949); A-7 (1950-51). 14 mm.

DISTRIBUTOR: Breaker Gap—.018-.024".
Cam Angle—35°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: TDC. (At Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Timing Mark—"/" mark on dampener aligned with pointer on chain cover above dampener.

CARBURETION:
Idle Setting—Set idle adjusting screw ½-1½ turns open. Turn out for richer mixture.
Idle Speed (standard)—450-500 RPM.
Idle Speed—(Hydra-Matic) 375 RPM. with Selector Lever in "N" position.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
Accelerating Pump—Inner Hole (med. stroke) Normal, Lower Hole (max.) winter, Upper (min.) Summer.

Choke Setting: Centered (coil housing at index).

Fuel Pump Pressure: 3-4½ lbs. 5 lbs. Maximum.

VALVE TAPPET CLEARANCE: (1949)—.015" (Intake), .018" (Exhaust). (1950-51)—.012" (Intake), .018" (Exhaust).

►*1950-51 NOTE: This clearance supersedes previous setting on 1950-51 cars only.*

IGNITION

IGNITION SWITCH: Nash No. 3125645 (1949); 3128822 (1950); 3131343 (1951).

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2 amperes idling, 5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy 1110216 (1949); 1110216 or 1110223 (1951); 1110223, 1110225, 1110227 (1951). Full automatic advance type with separate vacuum spark control.

Breaker Gap—.018-.024".
Cam Angle—35°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	2	600
8	650	16	1300
15	1350	30	2700

Vacuum Spark Control: Delco-Remy No. 1116044.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4-6"
6°	12°	14-16"

IGNITION TIMING

Std. Setting ..... **At TDC.**
NOTE—Car manufacturer recommends using Neon Timing Light to set Ignition Timing.
Timing—Clip Neon Timing Light to #1 spark plug, direct light at vibration dampener at timing chain cover pointer. Idle engine at 450-500 RPM., loosen clamp arm bolt, rotate distributor until "/" mark on dampener aligned with pointer, tighten clamp bolt.

CARBURETOR

Carter No. 683S (1949 & Early 1950): 746S (Late 1950 & 1951). 1¼" single barrel downdraft type with Climatic Control.

Casting No. on Flange—(683S) 290, (764S) 679.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

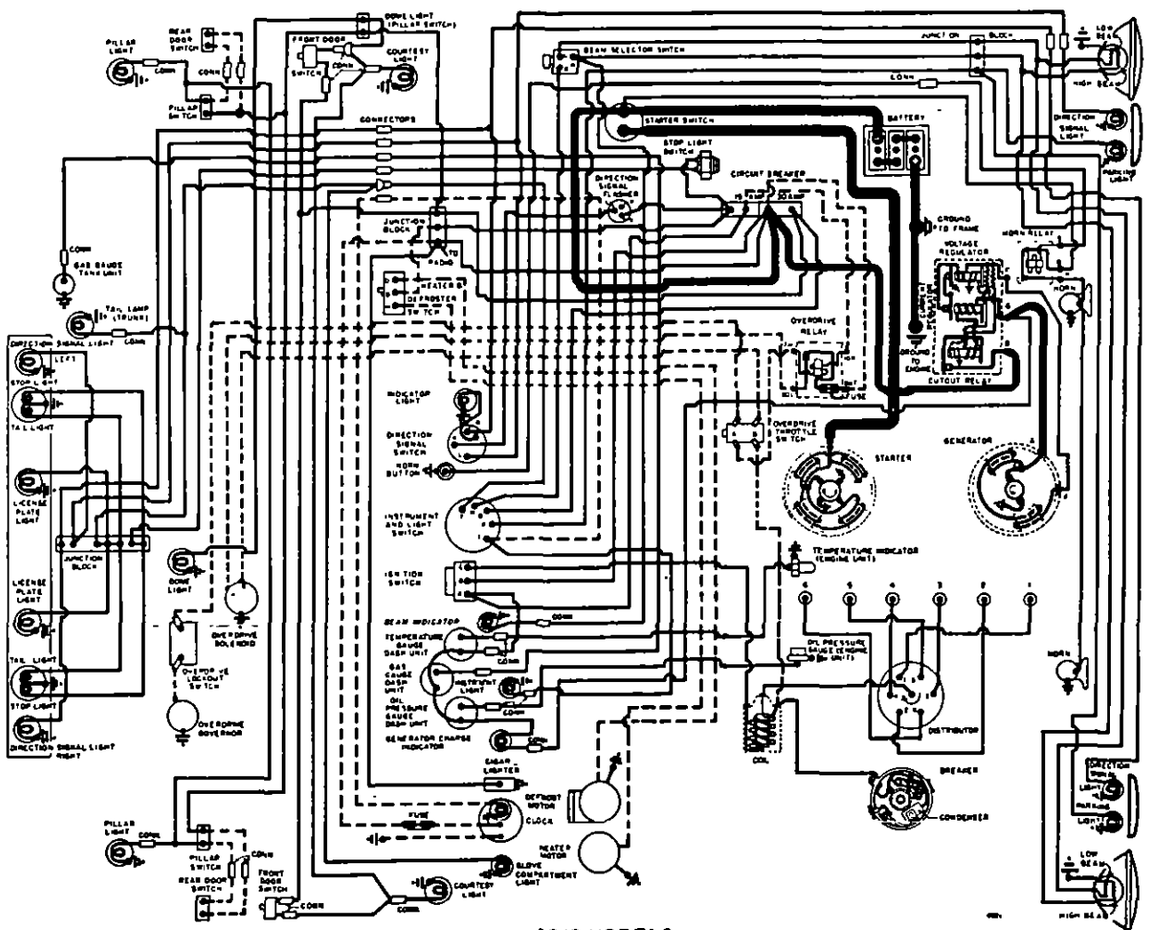
Metering Rods & Jets—*See Carter Jet Table in the Carburetor Section.*

►**683S Metering Rod Production Change**—*See "Carter WA-1" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See Nash Hydra-Matic Drive in Transmission Section.*

Fast Idle: Carter Single Barrel Carburetor type.

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1949 MODELS

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Setting—5/8" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (Tool T109-41).

See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).

Setting—Centered (coil housing at index).

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544443 Oil-wetted type (Std.), Filter Element #3. Oil-bath Cleaner AC No. 1544393, Element #7-S.

Fuel Pump: (Std.) AC Type W, No. 1537389 or 1539412, Carter No. M-816-S.
(Optional, Overdrive & Hydra-Matic Cars) AC Type AJ, No. 1539216 or Carter No. M-798-S.

▷*CAUTION—Install pumps with rocker arm ABOVE (W), or UNDER (AJ) eccentric on camshaft.*

See Carburetion Equipment Section for complete data.

Pressure—3-4½ lbs. (5 lbs. maximum).

Gasoline Gauge: Auto-Lite electric type.

Dash Unit—Auto-Lite No. 11578A (1949); 11982A (1950); 12268A (1951).

Tank Unit—Auto-Lite No. 11529A (1949-50); 12203A (1951).

See "Fuel Gauges" in Carburetion Section.

BATTERY

Auto-Lite Type CT-1-15—6 volt, 15 plate, 105 Ampere Hour Capacity (20 hour rate).

Starting Capacity—133 amperes for 20 minutes.

Zero Capacity—300 amperes for 3.5 minutes. Five second voltage—4.2 volts.

Grounded Terminal—Positive (+) grounded to wheelhouse (engine grounded at same point).

Location—Left side of engine compartment under hood.

STARTER

Delco-Remy Models. As follows:

Model	Starter No.	Armature No.
Synchro-mesh & O.D.	1107950	1911832
Hydra-Matic	1107965	1911832
R.H.D. Cars	1107959	1867897

Drive (1107950 & 959)—Bendix No. A-2033.
Drive (1107965)—Delco-Remy No. 1873789. Overrunning clutch with solenoid pinion shift.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data—1107950 & 959

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	5500	5.7	65
16	"	Lock	3.0	600

Performance Data—1107965

0	ft. lbs.	5500	5.7	80①
14	"	Lock	3.0	600

①—Includes current draw of starter switch.

Starting Switch (Std.): Delco-Remy No. 1996478. On toeboard, actuated by fully depressing clutch pedal.

Starting Switch (Hydra-Matic): Delco-Remy Solenoid No. 1118136 (no relay) used mounted on starter. Control Switch (Delco-Remy No. 1996044) mounted on steering column and controlled by Hydra-Matic selector lever. Operative only with lever in "N."

▷*CAUTION*—Overrunning clutch pinion clearance must be adjusted whenever solenoid removed from starter.

See Electrical Equipment Section for complete data.

Starter Switch Adjustment—*See Nash Hydra-Matic Drive in Transmission Section.*

GENERATOR

Delco-Remy Models. As follows:

Model	Generator No.	Armature No.
1949 (Std.)	1102702	1911454
1949 (Std.)	1102712	1913597
1950 (Std.)	1102712 & 1102730	1913597
1951 (Std.)	1102730	1913597
1951 (Optl.)	1102748	1917175

Maximum Charging Rate—See Regulator (below).

Performance Data
(Exc. Gen. No. 1102748)

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

Performance Data
(Gen. No. 1102748)

	Amperes	Volts	R.P.M.
Cold	40	8.0	1950

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—28 ozs.

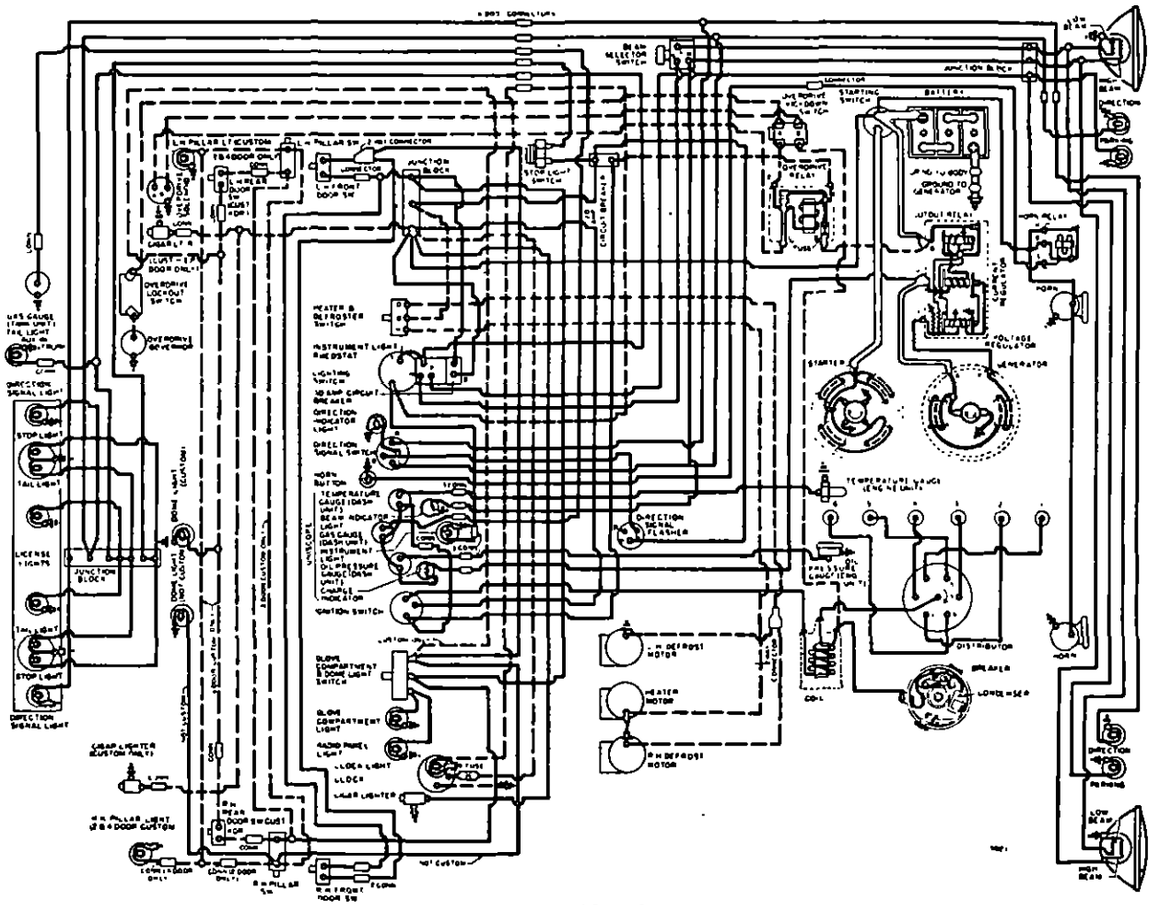
Field Current—1.75-1.9 amps. (Exc. 1102748); 1.90-2.05 amps. (1102748). All at 6.0 volts.

Belt Adjustment: Adjust belt so that 25 lbs. pressure midway between fan and generator shaft pulley will deflect belt ½". To adjust, loosen fan mounting bracket screws, raise fan, tighten screws. Belt misalignment corrected by shims back of fan bracket.

REGULATOR

Delco-Remy No. 1118302 (Use with Gen. Nos. 1102702, 712, 730). No. 1118382 (Use with Gen. No. 1102748). Voltage & Current type.

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1950 MODELS

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►*"1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs. ***See Electrical Equipment Section for complete data.***

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

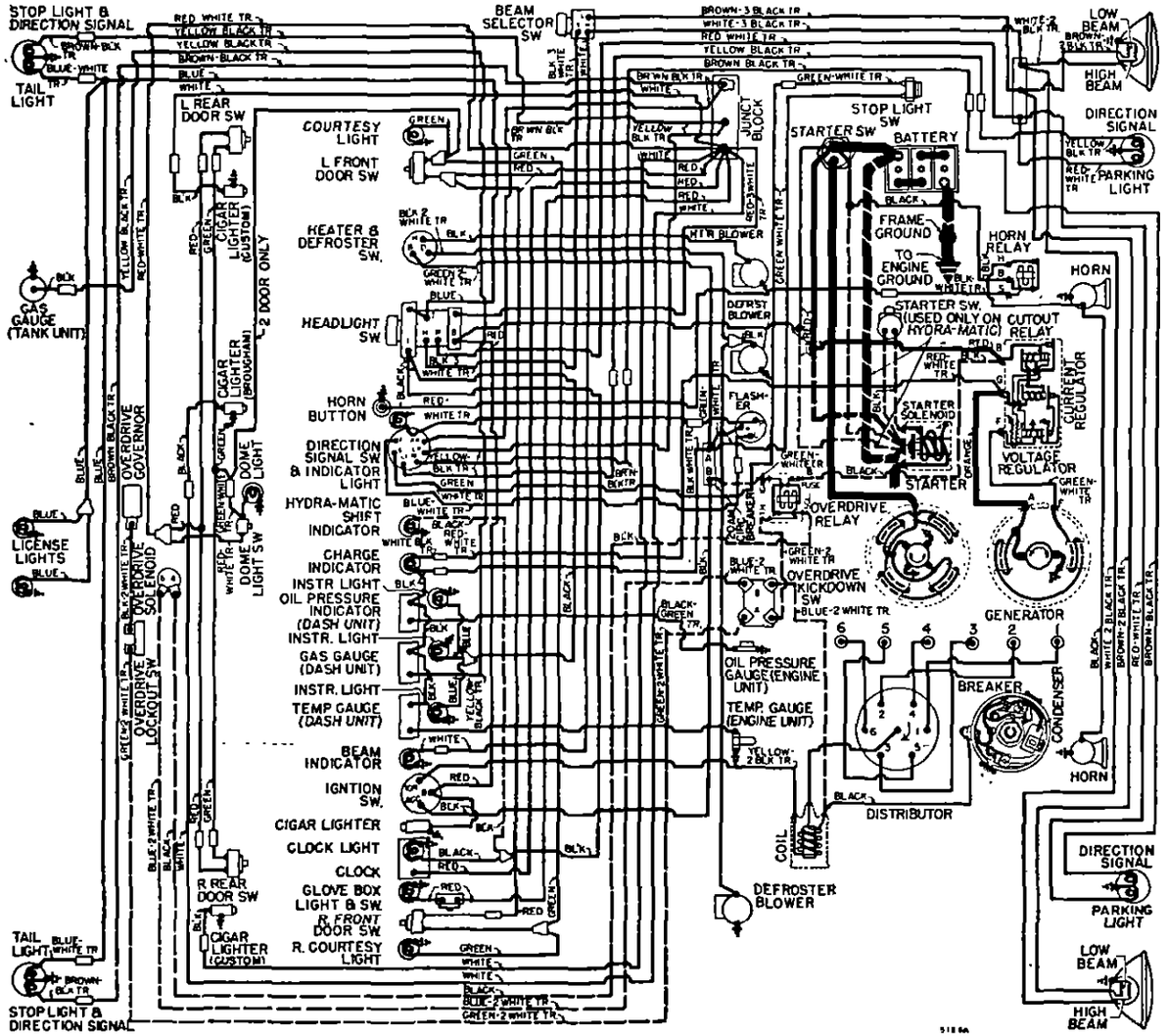
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator

Setting (1118302)—32-40 amperes hot (set to 36).
Setting (1118382)—40-46 amperes hot (set to 42).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel located on right side of instrument cluster face.



1951 MODELS

Switches

Lighting—Rotary type (1949). Push-pull type, Nash *Part No. 3128824* (1950-51).

Beam Selector—Nash No. 3104105.

MISC. ELECTRICAL

GENERATOR CHARGE INDICATOR: Indicator light in instrument cluster. Lights when ignition turned on should go out when generator begins to charge.

CIRCUIT BREAKERS: Two used, one mounted on Lighting Switch (30 amp.), and one mounted on left body sill brace under hood (20 amp.).

20 ampere Circuit Breaker protects Stop Light Switch, Heater and Defroster Switch, and Directional Signal Flasher.

30 ampere Circuit Breaker protects Dome Light, Pillar Light, Courtesy Light, and Main Lighting Switches.

FUSES: Electric Clock. 3 ampere in clock feed.

Overdrive—30 ampere. On overdrive Relay on left body sill brace under hood.

HORNS (1949): *Auto-Lite No. HW-4013 or HW-4025* (Low Pitch). HW-4014 or HW-4026 (High Pitch).

HORNS (1950): Auto-Lite No. HW-4025 (Low Pitch), HW-4026 (High Pitch).

HORNS (1951): Delco-Remy No. 1999657 (Low Pitch), No. *1999658* (High Pitch).

Horn Relay: Nash No. 3125879.
Contact Gap—.028".
Air Gap—.016-.020" with contacts closed.
Contacts Close—1.5-3.0 volts.
***Contacts Open**—.5 volts minimum (open from seal).*

ENGINE

ENGINE SPECIFICATIONS: 6 cyl. Valve-in-head.

Model	Bore	Stroke	Displacement
All	3⅜"	4⅜"	234.8 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
1949	7.02-1	27.34	112 at 3400 RPM
1950-51	7.3-1①	27.34	②115 at 3400 RPM

①—7.5-1 ratio with optional head.
②—With 7.3-1 ratio head.

Compression & Vacuum Reading—*See Tune-up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Nash Special Data.*

OIL PAN REMOVAL—*See Nash Special Data.*

PISTONS: Aluminum alloy, Cam Ground, Tin plated, strut type with split skirt. **Length**—3⅞".

Weight—12½ ozs. (stripped).
Clearance—.001-.002". See Fitting New Pistons.
NOTE—Cylinder out-of-round and taper limits .004".
Removal—Pistons and rods removed from above.

Original Piston & Bore Sizes: *See Nash Special Data.*

Fitting New Pistons: With all parts clean and dry, fit pistons so that piston will support its own weight in any portion of cylinder. If feeler gauge used, insert .002" x ½" feeler at right angles to pin bosses on side opposite slot, 12-18 lbs. pull to withdraw.

Replacement Pistons: Furnished Std., and .002", .005", .010", .020" and Semi-finished.

Installing Pistons: Piston slot toward left side (opposite side from oil squirt hole in rod).

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PISTON RINGS: 2 compression, 1 slotted oil and 1 Thompson U-Flex oil ring, (U-Flex ring in #4 groove), per piston. All rings above pin. Oil ring grooves drilled with oil drain holes.

Ring	Width	End Gap	Side Clearance
Comp.	.0930 ± .0005"	.015 ± .005"	.002-.004"
Oil Control	.15475"	.015 ± .005"①	.002-.004"

①—No end gap on Thompson U-Flex oil rings.

Replacement Piston Rings: Furnished Std., .020", .030" oversize.

Installing Rings—Top compression ring inner groove up, lower compr. ring outer groove down.

PISTON PIN: Diameter—.8746". Length—2.824". Floating type, with lock ring at each end.

NOTE—Pin hole in piston offset toward camshaft.

Pin Fit in Piston—Palm push fit with piston heated (heat piston in boiling water).

Pin Fit in Rod Bushing—Light thumb push fit at room temperature.

Replacement Pins: Standard & .001", .003" oversize.

CONNECTING ROD: Length—8¾". Weight—36¼ ozs.

Crankpin Journal Diameter—2.000-2.001". *See "Original Bearing Sizes" in Nash Special Data.*

Lower Bearing—Removable steel-backed, babbitt lined type. No shims.

Clearance—.001-.002". **Sideplay**—.008-.014".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Nash Special Data.*

Replacement Bearings: Std. & .002", .010" Undersize.

Installing Rods: Oil spray hole in lower end of rod must be toward camshaft (right) side of engine.

CRANKSHAFT: Seven bearing, counterweighted type with vibration dampener mounted on front end.

Vibration Dampener—*See Nash Special Data.*

Journal Diameters—2 31/64" (2.479"). *See "Original Bearing Sizes" in Nash Special Data.*

Bearings—Removable, steel-backed, micro-babbitt.

Clearance—.0018".

▷*CENTER MAIN BEARING REMOVAL NOTE*—Oil pump must be removed before removing center bearing cap. *See "Oil Pump" in Nash Special Data.*

Bearing Adjustment: None. Replace bearings. *See "Crankshaft & Main Bearings" in Nash Special Data.*

Replacement Bearings: Std. & .002", .010" Undersize.

Crankshaft Rear Oil Seal: *See Nash Special Data.*

End Thrust: Taken by Center (#4) bearing.

Endplay—.0055 ± .002".

▷*FLYWHEEL REPLACEMENT CAUTION (Std. & Overdrive Cars)*—*See "Flywheel" in Nash Special Data.*

CAMSHAFT: Non-adjustable 2 sprocket chain drive.

▷*1951 CAMSHAFT PRODUCTION CHANGE*—Cast iron replaces forged steel shaft in production and for service replacement. (CAUTION—*Cast iron type oil pump drive gear and steel or chilled cast iron tappets must be used with cast iron type camshaft).* Camshaft identified by machined area between cams (steel camshaft), not machined between cams (cast iron type).

Camshaft Removal—*See Nash Special Data.*

Bearings—Steel-backed, babbitted bushings.

Clearance—.002".

End Thrust: Taken by front bearing, controlled by position of chain sprocket (press fit on shaft).

Endplay—.004-.006".

Timing Chain: Morse. Non-adjustable type. Width 1". Pitch ⅜". Length 22½" or 60 links.

Camshaft Setting: Install chain with punch mark on camshaft sprocket and inverted "V" mark on crankshaft sprocket adjacent and in line with straightedge across shaft centers. Check setting as follows: turn engine over until punch mark on camshaft sprocket at one o'clock position with crankshaft sprocket mark just beginning to mesh with chain—there should be 9½ links or 19 pins (2 pins to each link) between marks.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	①.	.3725-.3740"	②
Exhaust	1 15/32"	.3725-.3740"	②
1949-50—	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	③.	11/32"	⑤
Exhaust	③.	④	⑥
1951—	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	⑦.	.365"	.002-.004"
Exhaust	③.	.3635"	.002-.004"

①—1¾" (1949-50); 1 25/32" (1951).
②—5 17/32" (1949); 5 31/32" (1950-51).
③—Valve face angle 44°. Valve seat angle 45°.
④—11/32" (1949); 3/8" (1950).
⑤—.0015-.003" (1949); .002-.004" (1950).
⑥—.002-.0035" (1949); .002-.004" (1950).
⑦—Valve face angle 29°. Valve seat angle 30°.

ROCKER ARM & VALVE LUBRICATION: *CAUTION*—Hollow bolt must be used in front mounting bolt hole of rocker arm assembly for proper lubrication.

▷*1951 VALVE STEM OIL SEAL ASSEMBLY CAUTION*—*See "Valve Stem Oil Seal Assembly" in Nash Special Data.*

Valve Guides: *1950 PRODUCTION CHANGE—Two different settings used.* Early 1950 cars, install valve guides to a height of 11/16" above boss. Late 1950 & 1951, install guides to a height of 25/32". *CAUTION—Check height of original guide and install new guide to same height.*

Valve Springs: Single springs used.

Free Length—2 3/32" (1949); 2 1/16" (1950-51).

1949 Valve Spring Specifications

Valve	Spring Pressure	Spring Length
Closed	.53 ± 5 lbs.	1 11/16"
Open	146 ± 5 lbs.	1 11/32"

1950-51 Valve Spring Specifications

Valve	Spring Pressure	Spring Length
Closed	53-58 lbs.	1 13/16"
Open	①.	1 7/16"

①—141-151 lbs. (1950); 144-154 lbs. (1951).

Installing Springs—Closely coiled end of springs should be installed toward the valve seat.

Valve Lifters: Mushroom type. Lifter guide holes in block. Remove from below with camshaft out.

VALVE TIMING

Tappet Clearance: (1949)—.015" (Intake), .018" (Exhaust). (1950-51)—.012" (Intake), .016" (Exhaust). *(NOTE—1950-51 Tappet Setting supersedes previous setting on 1950-51 cars only).*

Valve Timing: *See Camshaft Setting above.*

1949 Valve Timing

Intake Valves—Open 4°32' BTDC. Close 61°28' ALDC.

Exhaust Valves—Open 49°28' BLDC. Close 16°32' ATDC.

1950-51 Valve Timing

Intake Valves—Open 8°30' BTDC. Close 55°30' ALDC.

Exhaust Valves—Open 53°30' BLDC. Close 10°30' ATDC.

Valve Timing Check (1949)—With tappet clearance set at .0225", #1 exhaust valve should close with #1 piston 16½° after top dead center and "DC" mark on vibration dampener slightly past pointer on timing chain cover. Reset tappet clearance to correct setting.

Valve Timing Check (1950-51—Set #6 piston on TDC in firing position, then set valves on #1 cylinder to .003" clearance. Slowly rock crankshaft back and forth. If timing is set correctly, the exhaust valve should open before the "DC" mark on vibration dampener lines up with pointer. **Note the amount of opening.** Now the intake valve should open an equal distance after the "DC" mark passes the pointer.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins, and timing chain.

Crankcase Capacity—6 quarts.

Normal Oil Pressure—50 lbs. at 30 MPH.

Oil Pressure Regulator—Located in body of pump. Not adjustable. Opens at 50-58 lbs.

Oil Pump: Gear type in crankcase mounted on center main bearing cap.
See "Oil Pump" in Nash Special Data.

Cylinder Cover Vent: Vent located on front of cover just behind water outlet elbow to allow escape of vapors inside cover. Turn to open position at all times, especially winter, except for hot dusty driving.

Oil Filter: Replace cartridge at 8000 mile intervals or more often if necessary.

Oil Pressure Gauge: Auto-Lite Electric.

Dash Unit—Auto-Lite No. 11577A (1949); 11981A (1950); 12267A (1951).

Engine Unit—Auto-Lite No. 11527A.
See "Oil Gauges" in Miscellaneous Section.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valves) in filler cap, and positive circulation with water pump.

Capacity—17 quarts (18 quarts heater).

Pressure Valve—AC 850501 (Filler Cap). Opens at 4 lbs.

▷*PRESSURE VALVE CHANGE NOTE*—Effective at car serial No. R-633937, a 7 lb. pressure radiator cap entered production.

Water Pump: New sealed-in, non-adjustable type.
See Water Pump Section for complete data.

Removal—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting capscrews.

Belt Adjustment: *See Generator Belt Adjustment.*

Thermostat: Dole. In water outlet on cylinder head.

Setting—Starts to open at 162-168°F. and should be fully open 20° above starting point.

Temperature Gauge: Auto-Lite Electric.

Dash Unit—Auto-Lite No. 11579A (1949); 11983A (1950); 12269A (1951).

Engine Unit—Auto-Lite No. 11528A.
See "Temperature Gauges" in Miscellaneous Section.

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CLUTCH

Borg & Beck Model 10A7—Assembly No. 950 stamped on cover. Single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven type, 2 used. Inside Diameter 7". Outside Diameter 10". Thickness 1/8".
Adjustment: Pedal free travel 1/2-3/4". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.
►*CAUTION—Do not disturb adjustment of clutch beam lever-to-pedal rod.*
Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punchmark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

TRANSMISSION

Warner Model AS25-T86E (Std. Trans. without Overdrive). AS26-T86E (1949 & Early 1950 with Overdrive). AS46-T86E (Late 1950 & 1951 with Overdrive). Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.
Transmission Control: Mechanical steering col. shift.
See Transmission Section for complete data.
Removal: Remove Rear Axle (see REAR AXLE below), disconnect transmission shift rods at levers on left side of case and speedometer cable. Support engine at rear, free rear engine mounting, take out transmission upper mounting bolts, install special guide bolts in these holes, remove lower mounting bolts, slide transmission back, remove from below.

OVERDRIVE

Warner Type R10 (part of AS26-T86E & AS46-T86E Transmission). Optl. Governor controlled type with electrical solenoid operation and throttle operated kick-down switch. Overdrive in AS46-T86E assembly is new "centered ring gear" type.
See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy No. 1118132.
Governor—Auto-Lite No. TGE-4005.
Control Relay—Auto-Lite No. HRT-4101.
Overdrive Fuse—30 amperes. On BAT terminal of overdrive relay (on left body sill under hood).
Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal (above).

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Description—Four-speed planetary type automatic transmission and fluid coupling. *NOTE*—1951 Type has hydraulically operated "Cone Type Clutch" Reverse mechanism.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*
Lubrication—Check fluid level every 1000 miles. Add fluid, as required, to maintain level at "F" mark on dip stick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Automatic Transmission Fluid Type "A") as furnished in containers marked with approval symbol "AQ-ATF".
Capacity—Approx. 11 qts. (refilling after draining). **12 qts.** (when transmission disassembled).
Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes after transmission has reached operating temperature. Roll back front floor mat on right side, remove inspection cover in floor pan, clean all dirt and lint from floor and around oil level indicator on right side of transmission case. Place selector lever in "N" position and idle engine with lever in this position while checking fluid level. Fluid level should be at "F" mark on dip stick, add fluid to bring level up to "F" mark.
►*OTHER HYDRA-MATIC DRIVE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw—Roller bearing type, 1 used.

Propeller Shaft: (Synchro-mesh Trans.) One piece steel shaft with pre-lubricated, rubber mounted center bearing installed in torque tube.
(1950 Hydra-Matic Drive) Two shafts used. Front shaft is tubular and is splined to rear solid steel shaft which is supported in the center with a pre-lubricated, rubber mounted bearing installed in the torque tube.
(1951 Hydra-Matic Drive) One piece shaft.
See Nash Rear Axle in the Rear Axle Section for Propeller Shaft Data.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with torque tube drive.
See Rear Axle Section for complete data.
Ratio—(Std.) 4.1-1 (10-41). **(Overdrive)** 4.4-1 (9-40). **(Hydra-Matic)** 3.5-1 (11-39).
Backlash—.004-.006". Shim adjustment.
Removal: Raise and support rear end of car. Disconnect rear brake cable at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at the axle end, (will hang from the body). Roll axle free from car.
Axle Shaft Removal—Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolts nuts, take off oil seal retainer, backing plate, and wheel bearing adjusting shims (check thickness of shims, replace same amount when re-assembling). Withdraw axle shaft using Puller J-2498, do not drag on inner seal.
Wheel Bearing Adjustment—Shims located between backing plate and flanged end of housing. To adjust, remove wheel and backing plate (above), add or remove shims for endplay. **Endplay**—.002-.004".

SHOCK ABSORBERS

Delco or Monroe—Direct acting, hydraulic type.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shocks.
See Front Suspension for complete data.
Kingpin Inclination—8 1/2° crosswise.
Caster—0° desired. Limits 0° to Pos. 1/2°. Shim adjustment ("C" washers) at upper control arms.
Camber—0° desired. Limits Neg. 1/4° to Pos. 1/4°. Shim adjustment as for Caster (above).
Toe-In—1/16" to 3/16". Loosen clamp at both ends of adjustable tubes in each tie rod. Turn tubes equally.
Steering Geometry—Inner wheel 23° plus 1/2°, minus 0°. Outer wheel 20°.

STEERING GEAR

Gemmer Model 305—Worm-and-roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix hydraulic, duo-servo, single anchor type without Eccentric Adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Cast-iron. Diameter 10".
Lining—Moulded type. Width 2". Thickness 3/16". Length 22" per wheel.
Clearance—.015" heel and toe.
Braking Power—53% front wheels, 47% rear.
Hand Brakes: See Service Brake data (above).

MISC. MECHANICAL

Windshield Wiper: Cable Operated—vacuum type.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

SERIAL NUMBER: On plate on right side of dash under hood.

Starting Serial Number—	1952	1953
Kenosha	K-519001	K-563501
El Segundo	KC-37001	KC-43001
Toronto	KT-6101	KT-6901

ENGINE NUMBER: Stamped on right side of engine block above exhaust pipe.

Starting Engine Number—	1952	1953
All	S-308001	S-365001

TUNE-UP

►*1953 CARS STALLING AT ABRUPT STOP (HOT WEATHER): Split type floats can be installed to correct this condition. See "Carter WCD Carburetor" in Carburetor Section for complete data.*

►*1953 STUMBLE ON LIGHT ACCELERATION CARBURETOR CHANGE*—To correct condition on cars before Engine No. S-378530 (Carburetors prior to B3), install parts furnished in Carter Unitized Pkg. 75-900U, Nash No. 3116455. *NOTE*—Cars after above engine number (Carburetors dated "B3" and later) have this change. *See "Carter WCD" in Carburetor Section for complete data.*

►*1953 ENGINE CUTTING OUT ON EXTREME RIGHT TURN*—If engine cuts out on extreme right turn, install 5° angular spacer plate, Nash No. 3138063, under carburetor so that it is inclined 5° toward right side of engine. NOTE—This spacer installed in production beginning Engine No. K-568401 (Kenosha), No. KC-43798 (El Segundo).

COMPRESSION PRESSURE: 120 lbs. at cranking spd.

VACUUM READING: Steady 18-21", 500-550 RPM idle.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .030".
Plugs—Auto-Lite A-7 or AN-7. 14mm. Tighten to 30 ft. lbs.

DISTRIBUTOR: Delco-Remy No. 1112382. Full automatic advance type with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.018-.024". (Set to .022").
Cam Angle—31-37°. DO NOT exceed Breaker Gap limits of .018-.024" to obtain dwell.
Breaker Arm Spring Tension—17-21 ozs. *NOTE*—Tension for high speed points 19-23 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

►*DISTRIBUTOR REMOVAL CAUTION (STATESMAN)*—Align Timing Mark on crankshaft vibration damper with indicator on timing chain cover before removing distributor. Damage to No. 3 & 4 piston may result if this is not done.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2.3 amperes idling. 5 amperes stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: (1952) TDC. (1953) 4° ATDC.
Timing Mark—Groove on damper aligned with pointer on chain cover above damper.

►*EARLY 1952 TIMING MARK CHANGE*—On all cars before Engine No. S-310696, change original timing mark on vibration dampener to ¼" to the left (viewed from front of engine). Mark new location with white lead or file a new mark in dampener. *CAUTION—Make sure that this correction has not already been made.* Engines after above number were changed in production.

Timing Procedure—*See Ignition Timing.*

CARBURETION (1952): Carter 877SA. 1¼" single barrel downdraft type with Climatic Control.
Idle Setting—½ to 1½ turns open. For richer mixture, turn screws out.
Idle Speed—500-550 RPM. (Std. & O.D. Trans. Cars), 375 RPM. with selector lever in Neutral "N" position (Hydra-Matic Cars).
Float Level—½". Measure from under side of bowl cover to top of float with bowl cover inverted and weight of float on needle valve.

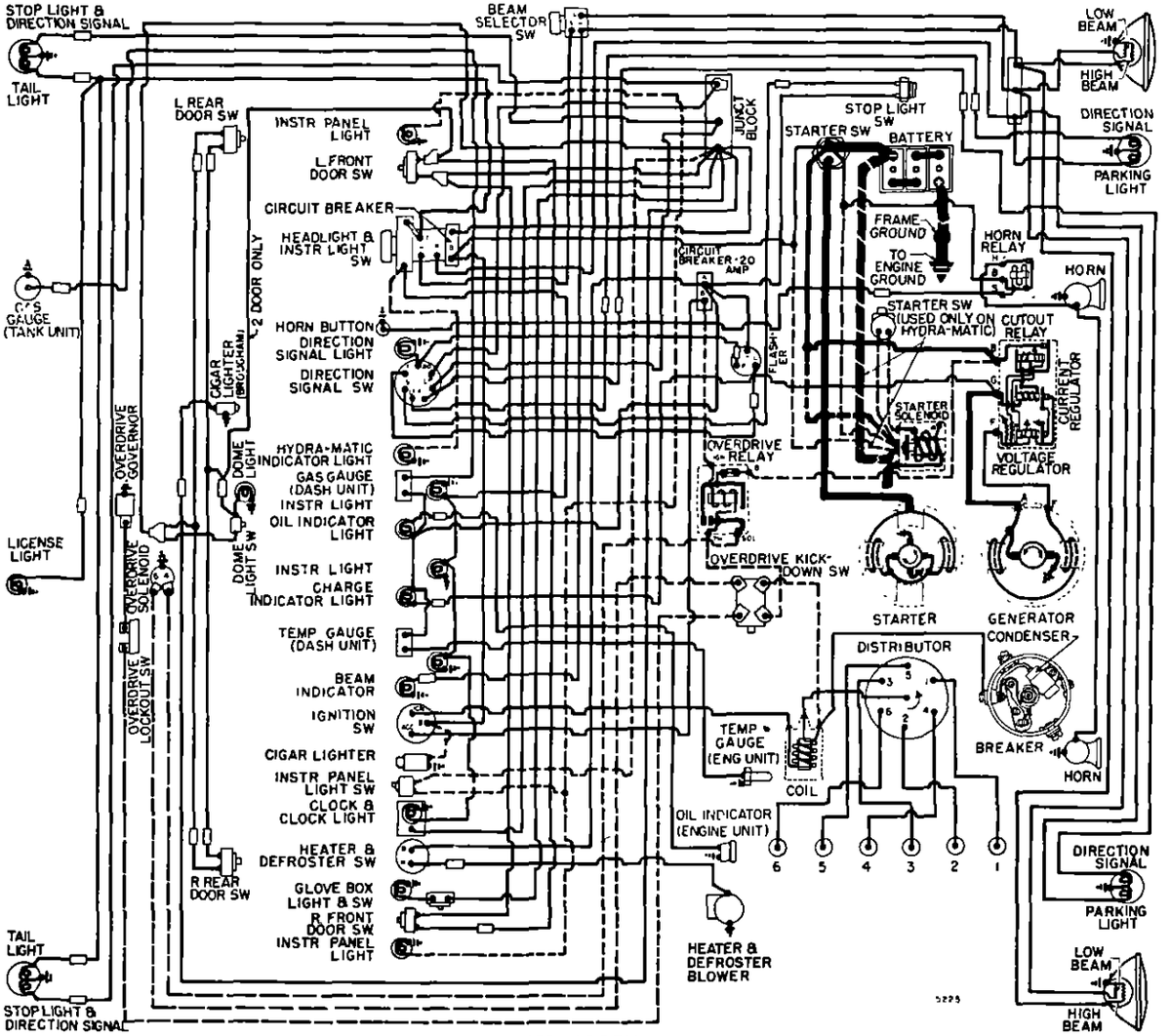
Fast Idle: .054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate. Adjust by bending connector link at lower end.

Choke Adjustment: Set one point lean.

Fuel Pump Pressure: 3-4½ lbs.

CARBURETION (1953): Carter WCD 2034S. Dual downdraft type with Climatic Control.
Idle Setting—1/2 to 1 1/8 turns open. For richer mixture turn screws out.
Idle Speed—(Std. & O.D. Trans. Cars) 550 RPM. (Hydra-Matic Cars) 375 RPM. with selector lever in Neutral "N" position.
Float Level—5/32". With bowl cover inverted and

CONTINUED ON NEXT PAGE



1952 MODELS

CONTINUED FROM PRECEDING PAGE

weight of float on needle valve, measure from top of float to machined surface of casting.

►*SPLIT TYPE FLOAT CAUTION—Both floats must be set EXACTLY alike. See "Carter WCD Carburetor" in Carburetor Section for complete data.*

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section for complete data.*

Fast Idle: .026" between throttle valve and bore of carburetor (side opposite idle port). With choke valve tightly closed, and fast idle adjusting screw on high step of cam, tighten screw until proper throttle valve opening secured.

Choke Adjustment: Set on index.

Fuel Pump Pressure: 3-4½ lbs.

VALVE TAPPET CLEARANCE: Hot Setting—.015" All valves. **Cold Setting**—.016" Intake, .018" Exhaust. NOTE—Tappet screws are self-locking type.

IGNITION

IGNITION SWITCH: Nash No. 3131343.

COIL: Delco-Remy No. 1115380. Mounted on engine. **Ignition Current**—2.3 amperes idling. 5 amperes stopped.

CONDENSER: Delco-Remy No. 1869704. Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112382. Full automatic advance type, with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.018-.024" (*set to .022"*).
Cam Angle—31-37°. DO NOT exceed Breaker Gap limits of .018-.024" to obtain dwell.
Breaker Arm Spring Tension—17-21 ozs. *NOTE*—Tension for high speed points 19-23 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	325	0-4	650
3.5-5.5	400	7-11	800
7-9	950	14-18	1900
10-12	1400	20-24	2800

Vacuum Spark Control: *(CAUTION—Two different Vacuum Spark Control Units used on 1952 Cars. Vacuum Advance Specifications are different)*—**Delco-Remy No. 1116045 (1952); Delco-Remy No. 1116072** (1952-53). Separate unit mounted on hold-down plate and linked to advance arm.
Plunger Travel—(1116045) 11/32-⅜". (1116072) 13/64-¼".

Vacuum Advance—1116045

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3-5"
8.5°	17°	13-17"

Vacuum Advance—1116072

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4-6"
5.5°	11°	11"

►*DISTRIBUTOR REMOVAL CAUTION*—Allgn Timing Mark on crankcase vibration damper with indicator on timing chain cover before removing distributor. Damage to No. 3 & 4 pistons may result if this is not done.

IGNITION TIMING

Standard Setting (1952) . . . . . **TDC**
Standard Setting (1953) . . . . . 4° **ATDC**
Timing Mark—Groove on damper aligned with pointer on chain cover above damper.

►*EARLY 1952 TIMING MARK CHANGE*—On all cars before Engine No. S-310696, change original timing mark on vibration dampener to ¼" to the left (viewed from front of engine). Mark new location with white lead or file a new mark in dampener.

CAUTION—Make sure that this correction has not already been made. Engines after above number were changed in production.

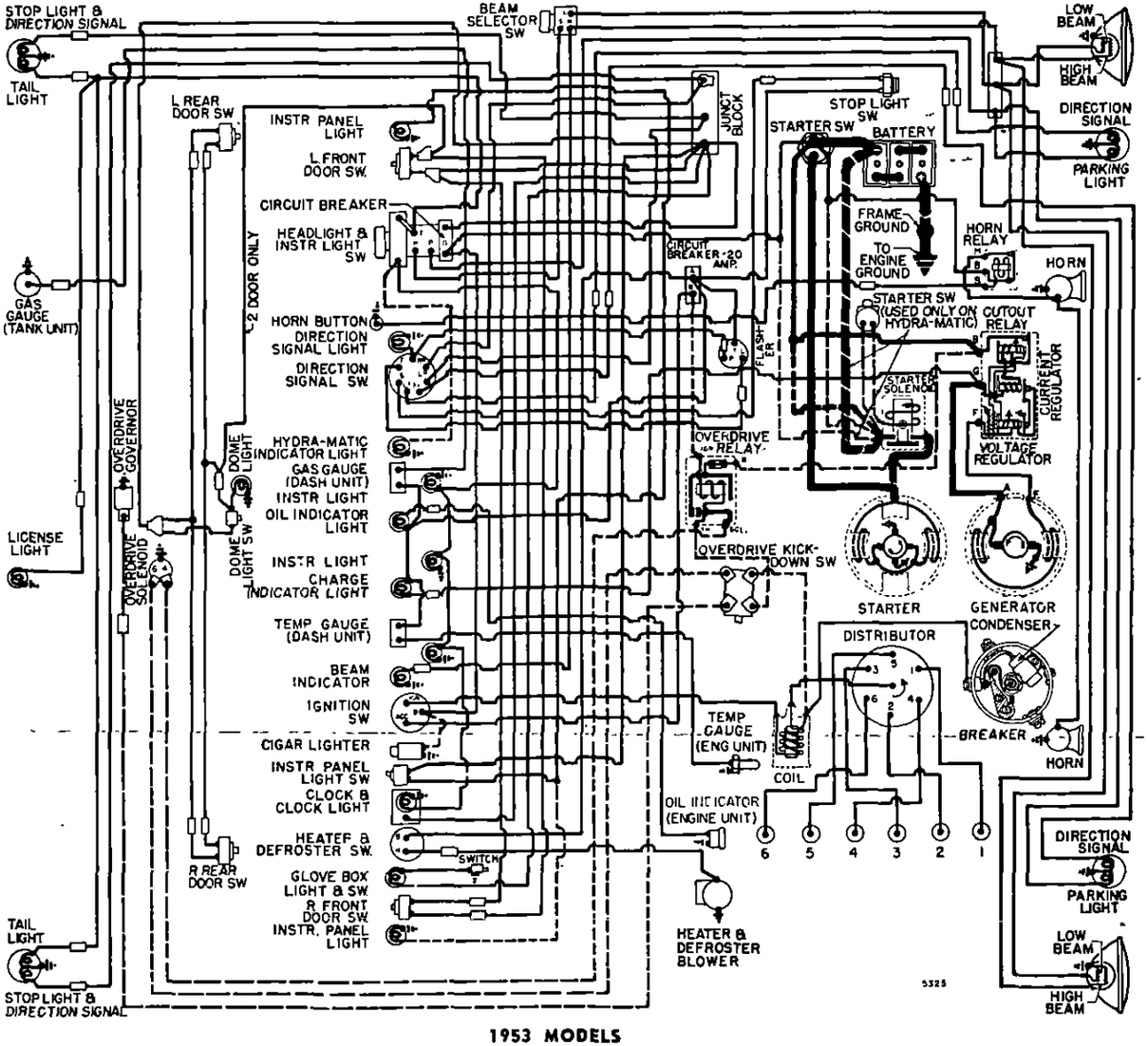
Timing (Using Timing Light)—Align ⅛" holes in clamp arm and distributor support and insert pin. Loosen distributor hold-down screw and center octane selector scale, tighten screw. Clip neon timing light to #1 spark plug, direct light at vibration damper at timing chain cover pointer. Idle engine at 450-500 RPM, loosen clamp arm bolt, rotate distributor until "/" mark on damper aligned with pointer, tighten clamp arm bolt, remove ⅛" pin in support. Check Octane Selector Setting.
Octane Selector Setting—Loosen hold-down screw in distributor, adjust scale so that slight ping secured at 10-15 MPH, with wide open throttle.

CARBURETOR

1952 MODELS

Carter YF, No. 877SA. 1¼" single barrel down-draft type with Climatic Control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*



1953 MODELS

Metering Rods & Jets—*See Carter Jet Tables in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See Nash Hydra-Matic Drive in Transmission Section.*

Fast Idle—.054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate, adjust by bending connector link at lower end.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—Set 1 point lean.
See Carburetion Equipment Section for complete data.

1953 MODELS

Carter WCD No. 2034S. Dual (2-barrel) downdraft type with Climatic Control.

▷*1953 CARS STALLING ON ABRUPT STOP (HOT WEATHER): Split type floats can be installed to correct this condition. See "Carter WCD Carburetor" in Carburetor Section for complete data.*
STUMBLE ON LIGHT ACCELERATION (First Cars): See "Carter WCD" in Carburetor Section for installation of parts furnished in Unitized Pkg. Carter No. 75-900U, Nash No. S-378530.
ENGINE CUTTING OUT ON EXTREME RIGHT TURNS (First Cars): See Tune-Up data for installation of wedge spacer plate under carburetor.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rods & Jets—*See Carter Jet Tables in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See Nash Hydra-Matic Drive in Transmission Section.*

Fast Idle: .026" between throttle valve and bore of carburetor (side opposite idle port). With choke valve tightly closed, and fast idle adjusting screw on high step of fast idle cam, tighten screw until proper throttle valve opening secured.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.
Setting—Set on index.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC Oil-wetted type Std., Oil-bath type Optl. Filter Element—AC No. 6 (oil-wetted type).

▷*OIL BATH AIR CLEANER CAUTION—To avoid carburetor damage, care must be taken when installing Oil Bath Air Cleaner. See "Air Cleaner" in Nash Special Data.*

Fuel Pump: Carter & AC types used as follows:
Carter Type—No. M-797S (All except Std. Trans. Cars). Combination fuel & vacuum.
AC Type—Fuel Pump No. 532 (with glass sediment bowl), No. 9801 (without bowl). Combination Fuel and Vacuum Pump No. 9800.
See Carburetion Equipment Section for complete data.
Pressure—3-4½ lbs.

Gasoline Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. 12710-A.
Tank Unit—Auto-Lite No. 12642-A.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100. 6 volt, 15 plate, 100 amp. hr. capacity.
Grounded Terminal—Positive (+) terminal.

▷*1953 BATTERY GROUND CABLE PRODUCTION CHANGE: See "Late 1953 Cars" following:*

1952 & Early 1953 Cars—Battery grounded to cylinder head with small ground strap extending from this point to body at wheel housing.

Late 1953 Cars—Body ground strap (above) discontinued and SEPARATE ground strap connected between transmission and rear engine cross-member.

▷*CAUTION—Whenever new type battery ground cable installed on first cars, ground strap at transmission (Nash No. 3137307) MUST ALSO BE INSTALLED.*
Location—Under hood on left side of engine.

STARTER

▷*STARTER PRODUCTION CHANGE CAUTION—Two different starters used on Hydra-Matic Drive Cars.*

Delco-Remy Numbers—	Starter	Armature
Std. Trans. (LHD)	1107119	1923018
Std. Trans. (RHD)	1107120	1923018
Hydra-Matic Trans.①	1107121	1923040
Hydra-Matic Trans.②	1107136	1925939

①—Early Hydra-Matic Transmission with 12" Torus, Trans. Serial No. E-52-1 or higher, or EA-53-1 or higher.
②—Later Hydra-Matic Transmission with 11" Torus, Trans. Serial E-53-1 or higher.

Drive (Standard)—Delco-Remy Automatic type. Delco-Remy No. 1923008.
Drive (Hydra-Matic)—Delco-Remy Automatic type. Delco-Remy No. 1925942 (1107121 Starter), No. 1923043 (1107136 Starter).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 "	Lock	3.25	550

Starting Switch: (Std. Trans.) Delco-Remy No. 1996478. Mounted on toe-board, actuated by fully depressing clutch.

Starting Switch (Hydra-Matic Cars): Switch, Nash No. 3134517 (Early cars with 12" torus), No. 3137292 (Later cars with 11" torus), mounted on left fender apron controlled by Control Switch mounted on steering column and operated by Hydra-Matic selector lever (operative in "N" by lifting lever).
Control Switch—Two types used (See Starter Change above). Early Cars—Delco-Remy No. 1996074 (with Vacuum Unit). Later Cars—Delco-Remy No. 1996077 (without Vacuum Unit).
Starter Switch Removal—Disconnect battery and remove vacuum hose from switch. Raise front end of car and disconnect both wires from starter switch and place gear shift operating lever in reverse position. Remove switch from bracket using a 1/4" drive ratchet handle and socket on threaded bushing retaining switch to bracket.

GENERATOR

Delco-Remy No. 1102777. Two brush type with voltage and current regulation.
Armature—Delco-Remy No. 1921981.
Maximum Charging Rate—45 amperes, 8.0 volts.
Charging-Rate Adjustment—None. See Regulator.

Performance Data

	Amperes	Volts	R.P.M.
Cold	45①	8.0	2450

①—Max. output controlled by current regulator.
①—Maximum output controlled by current regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.90-2.05 amps., at 6 volts.
Belt Adjustment: ½" deflection in belt midway between fan and generator pulley with an application of 25 lbs. pressure.

REGULATOR

Delco-Remy No. 1118732. Voltage and current regulator.
See Electrical Equipment Section for complete data.

▷*TEST NOTE—To obtain operating temperature, run regulator at least 15 min. charging at 8-10 amps.*
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct high charging rate or high voltage.

Cutout Relay
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 6.4 volts hot). Regulator is overcompensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator
Setting—45-51 amperes hot (set to 47 hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type. Upper and lower beam controlled by selector switch on floor.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel located on speedometer face below the numeral "5."

Direction Signal: Optl. *See Electrical Equip. Section.*
Direction Indicator—Bulb in direction signal switch handle, lights when signals flashing.

Switches
Lighting—Nash No. 3128824.
Beam Selector—Nash No. 3130120.
Instrument Lights—Controlled by turning lighting switch.
Directional Signal—Nash No. 3131527.
Heater & Defroster—Nash No. 3134340.
Stop Light—Nash No. 99469.

MISC. ELECTRICAL

GENERATOR CHARGE INDICATOR: Indicator light in instrument cluster. Lights when ignition turned on, should go out when generator begins to charge.

Low Oil Pressure Indicator: *See "Oil Pressure Gauge" under "Lubrication" below.*

CIRCUIT BREAKERS: Thermostatic type. Contacts remain closed under normal conditions, and open the circuit under an excessive load. Not adjustable.
30 Ampere—Located on main lighting switch. Protects headlights, tail, instrument panel, and interior lights. See Wiring diagram.
20 Ampere—Located on rear side of dash just forward of steering column. Protects stoplights, Oil Level Indicator, Temp. Indicator, Gas Gauge, Charge Indicator, Heater & Defroster, and Directional Signal Flasher. See Wiring diagram.

FUSES: Electric Clock. 3 amp., in clock lead.
Radio—14 amperes (located under control panel to right of steering column).

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Overdrive—30 amperes (located in engine compartment at left side on overdrive relay).

HORNS: Delco-Remy No. 1999641 (Low Note). No. 1999642 (High Note).

Horn Relay: Nash No. 3127787.
Contact Gap—*.026".*
Air Gap—.016-.020" with contacts closed.
Contacts Close—1.5-3.0 volts.
Contacts Open—.5 volts minimum (open from seal).

ENGINE

►*ENGINE NOISE CAUTION—An engine sound similar to a loose piston may be caused by the standard dry type air cleaner. See "Air Cleaner Noise Correction" in Nash Special Data.*

►*RAMBLER (HYDRA-MATIC DRIVE) ENGINE CAUTION—The Statesman Engine (With Different Cylinder Head) used on Rambler Cars with Hydra-Matic Drive. See Rambler Car Pages for Developed Horsepower and Compression Ratio.*

ENGINE SPECIFICATIONS: 6 cylinder "L" head type. Intake manifold cast in block, (Iso-thermal fuel intake system).
Bore—3⅛". **Stroke**—4¼".
Displacement—195.6 cu. ins.

Model	Comp. Ratio	Rated HP.	①Dev. HP.
1952	7.1-1	123.44	88
1953	7.35-1	123.44	100

①—At 3800 RPM.
Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Nash Special Data.*

ENGINE & OIL PAN REMOVAL: *See Nash Special Data.*

PISTONS: Cam ground aluminum alloy, tin plated with steel strut and solid skirt.

►*PISTON NOTE*—Piston pin is offset in piston and piston is marked with a notch that should be toward front of engine when installed.

Original Piston & Bore Sizes: *See Nash Special Data.*
Removal—Pistons and rods removed from above.
Clearance—.001-.002". See Fitting Pistons.
Cylinder Out-of-Round & Taper Limits—.004". Rebore cylinder if taper exceeds .009".

Fitting New Pistons: With all parts clean and dry, fit pistons so that piston will support its own weight in any portion of cylinder. If feeler gauge used, insert .002" x ½" feeler at right angles to pin bosses, pull to withdraw feeler must be 12-18 lbs.

Replacement Pistons: Furnished Standard, .002", .005", .010", .020" and Semi-finished.

Installing Pistons: Notch in top edge of piston must be toward front of engine. *See Connecting Rod Installation.*

PISTON RINGS: 2 compression, 1 slotted oil ring and 1 Thompson U-Flex ring, (U-Flex ring in No. 4 groove), per piston. All rings above pin. Oil ring grooves drilled with oil drain holes.

Ring	Width	End Gap
Top Compression	.0930-.0935"	.010-.020"
Lower Compression	.0930-.0935"	.010-.020"
Upper Oil	.1545-.1550"	.010-.020"
Lower Oil	.154-.155"	①

①—No end gap with U-Flex rings.
Ring Side Clearance—.002-.004" (all rings).

Replacement Rings: Furnished Std. & .020" oversize.

Installing Rings: Stepped inner edge of both compression rings must be UP.

PISTON PINS: Diameter—.8593-.8595". **Length**—2¾". Locked in rod.
Pin Fit in Piston—Thumb press fit or .0003" maximum loose fit at room temperature (70°F.).

Replacement Pins: Standard, .001", .003" oversize.

CONNECTING ROD: Length—6⅝" (6.623-6.627").
Weight—25 ozs.
Crankpin Journal Diameter—2 3/32" (2.094-2.095"). *See "Original Bearing Sizes" in Nash Special Data.*
Lower Bearing—Steel backed babbitt lined type. No shims.
Clearance—.001-.002". **Sideplay**—.005-.015".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Nash Special Data.*
NOTE—Tangs on bearing shells must engage slots in rods and caps. Palnuts used on rod bolt nuts. Replace with new Palnuts each time nuts are removed.

Replacement Bearings: Furnished Standard, .002", .010", .012" undersize.

Installing Rods: Numbers on rod and bearing cap should be together and rod installed in same numbered cylinder with numbers toward camshaft side of engine. *See Piston Installation above.*

CRANKSHAFT: Four bearing counter-weighted type with vibration damper mounted on front end.
Vibration Dampener Removal & Installation—*See Nash Special Data.*

►*CRANKSHAFT REPLACEMENT NOTE—Replacement crankshaft furnished complete with vibration damper and flywheel. Assembly is balanced as a unit.*
Journal Diameters—2 31/64" (2.479").
See "Original Bearing Sizes" in Nash Special Data.
Bearings—Removable steel backed, micro-babbitt.
Clearance—.0007-.0029".

Bearing Adjustment: None. Replace bearings. *See "Crankshaft & Main Bearings" in Nash Special Data.*
NOTE—Upper bearing halves can be rotated in and out without removing crankshaft.

Replacement Bearings: Furnished Standard, .002", .010", .012" undersize.

Crankshaft Oil Seal: *See "Crankshaft & Main Bearing" in Nash Special Data.*

End Thrust: Taken by front (No. 1) bearing. (Thrust plate ahead of bearing). **Endplay**—.006-.008".
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Nash Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Camshaft Removal—*See Nash Special Data.*
Bearings—Steel backed babbitted bushing.
Clearance—.002".

End Thrust: Thrust plate assembled on front face of engine between No. 1 bearing and camshaft sprocket. **Endplay**—.004-.006".
CAUTION—Thrust plate has long groove on rear face which provides valve tappet lubrication from No. 1 crankshaft bearing. Short groove on front face of plate lubricates timing chain and sprockets.

Timing Chain: Morse. Non-adjustable type. Width 1", Pitch ⅜". Length 22½" or 60 links.

Camshaft Setting: Install chain with the marked teeth of camshaft and crankshaft sprockets adjacent and in line with a straightedge across shaft centers. Check setting as follows: Turn engine over until punch mark on camshaft at 1 o'clock position, with mark on crankshaft sprocket just beginning to mesh with chain. There should be 9½ links or 19 pins (2 pins to each link) between marks.

VALVES:

	Head Diam. 1952	Head Diam. 1953	Stem. Diam. 1952-53	Seat Angle 1952-53
Intake	1.469"	1.594"	3.407-3.412"	①
Exhaust	1.281"	1.343"	3.407-3.412"	①

	Lift 1952	Lift 1953	Stem Clearance 1952	Stem Clearance 1953
Intake	.300"	.340"	.0013-.0047".	.002-.003"
Exhaust	.300"	.300"	.0013-.0047"	.002-.003"

①—Valve Face Angle 44°. Seat Angle in Block 45°.

Valve Guides: Pressed in block. Remove guides using Tool J-2814. Install guides using Tool J-1429-A

Valve Springs: Install springs with closed coil end up against cylinder block and seated in counter-bore in block. **Spring Free Length**—2 5/32".

►*CAUTION—Excessive wear of valve stem and guide will result if springs not properly seated in counter-bore.*

	Spring Pressure	Length
Valve Closed	37-41 lbs.	1 3/4"
Valve Open	75-82 lbs.	1 7/16"

Valve Lifters: Mushroom type operating in reamed holes in block. Lifters removed from below with camshaft out of engine. *See "Camshaft & Bearings" in Nash Special Data, for camshaft removal.*

VALVE TIMING

Tappet Clearance: Hot Setting—.015" All Valves.
Cold Setting—*.016" Intake, .018" Exhaust.*
NOTE—Tappet adjusting screws are self locking.

Valve Timing: See Camshaft Setting above.

1952 Models
Intake Valves—Open 6° BTDC. Close 50° ALDC
Exhaust Valves—Open 46° BLDC. Close 10° ATDC.

1953 Models
Intake Valves—Open 10° BTDC. Close 58° ALDC.
Exhaust Valves—Open 46° BLDC. Close 10° ATDC.
Valve Timing Check—Set No. 6 piston on TDC in firing position, then set valves on No. 1 cylinder to .003" clearance. Slowly rock crankshaft back and forth. If timing is set correctly, the exhaust valve should open before the "DC" mark on vibration damper lines up with the pointer. Note this distance. Intake valve should open an equal distance after the "DC" mark passes the pointer.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, valve tappets, and timing chain.
Crankcase Capacity—4 qts.

►*1952 CRANKCASE CAPACITY PRODUCTION CHANGE—Cars before Engine No. S-318073 require 5 quarts of oil to bring level to "F" mark on dipstick. See "Oiling System" in Nash Special Data.*
Normal Oil Pressure—50 lbs. at 30 MPH.
Oil Pressure Regulator—Spring loaded release valve under plug to rear of oil pump on lower edge of crankcase. Non-adjustable, opens at 50-58 lbs.

Oil Pump: Gear type pump mounted on right side of engine, driven by inclined shaft.

Oil Filter: Optional. Replace cartridge at 8000 miles or more often if necessary.

Oil Pressure Gauge: Carter pressure switch on engine controlling warning light on instrument panel.
Dash Unit—Warning light on instrument panel. Lights when ignition on, goes out when oil pressure sufficient to open engine unit contacts.
Engine Unit—Carter Pressure Switch No. A-954S. Nash No. 3134704.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve located in filler cap, and positive circulation with water pump.
Capacity—14 qts. (15 qts. with heater).
Pressure Valve—Nash No. (1952) 3112649, (1953) 3136627. In filler cap, opens at 7 lbs.

Water Pump: Sealed packing and bushing type.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove distributor, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove mounting screws.

Belt Adjustment: *See Generator Belt Adjustment.*

Thermostat: Dole. In water outlet on cylinder head.
Setting—Starts to open at 167-173°, and should be fully open 20° above starting point.

Temperature Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. 12711-A.
Engine Unit—Auto-Lite No. 11528-A.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 8A7—(Std. & O.D. Cars). Single plate dry disc type. Cover Assy. No. 987.
See Clutch Section for complete data.
Facings—Inside Diameter—5⅜". Outside Diameter —8". Thickness—⅛".

Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.
►*CAUTION—Do not disturb adjustment of clutch beam lever-to-pedal rod.*

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punchmark flywheel, clutch cover, and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange. Remove clutch assembly.

SYNCHRO-MESH TRANSMISSION

Own Make. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Warner Transmission" in Transmission Section.*

Transmission Control: Steering column shift.
See Transmission Section for complete data.

Removal: Remove rear axle (see REAR AXLE below), disconnect transmission shift rods at levers on left side of case, and speedometer cable. Support engine at rear, free rear engine mounting, take out transmission upper mounting bolts, install special guide bolts in these holes, remove lower mounting bolts, slide transmission back on guide bolts, remove from below.

OVERDRIVE

Warner Type AS8-R10B—With centered ring gear. Optional (with Nash Transmission). Governor controlled type with electric solenoid operation and throttle operated kick-down switch.
►*LOCKOUT SWITCH ELIMINATION:* Switch not used on later cars (switch mounting hole on transmission closed by plate, and two switch leads connected together). *NOTE*—If switch inoperative on early cars, cut switch out of circuit by connecting both switch leads to same terminal.
See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy No. 1118155.
Governor—Auto-Lite No. TGE-4004.
Control Relay—Nash No. 3123721.
Overdrive Fuse—30 amp. On BAT terminal of overdrive relay.

Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal above.

HYDRA-MATIC TRANSMISSION

"Dual Range", Four-Speed Planetary type automatic transmission and fluid coupling, Modulated Throttle Pressure, and hydraulically operated reverse mechanism.
►*HYDRA-MATIC PRODUCTION CHANGE CAUTION—The following Hydra-Matic Transmissions were used in 1952-1953 production. TRANSMISSIONS AND TRANSMISSION PARTS NOT INTERCHANGEABLE.*
Series E-52—Used prior to ENGINE NO. S-375274.
Series E-53-1 to E-53-50 & EA-53-1000 and Higher—Used prior to SERIAL NO. K-582900 (Kenosha), KC-46185 (El Segundo). This transmission has a 12" torus and front & rear flywheel housing.
Series E-53-1000 and Higher—Used beginning SERIAL NO. K-582900 (Kenosha), KC-46185 (El Segundo). This transmission has an 11" torus and one piece flywheel housing.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Hydra-Matic Drive" in Trans. Sect.*
►*TESTING & TROUBLE SHOOTING: See Trans. Sect.*
Lubrication—Check fluid every 1000 miles. Add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Auto. Trans. Fluid type "A").
Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes after transmission has reached normal operating temperature. With selector lever in "N," remove dipstick and check fluid level (dipstick located under right front floor plate). Add the necessary amount of fluid to bring fluid level to "F" mark. *CAUTION—Use care not to allow dirt or lint to enter transmission.*
►*CAUTION—Do not fill above "F" mark on dipstick.*

Capacity	(Drain-&-Refill)	(After Overhaul)
First (12" Torus)	11 qts.	12 qts.
Later (11" Torus)	8½ qts.	9½ qts.

OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.

UNIVERSALS

Mechanics 1½ CR or Saginaw. One used (in torque tube adapter at rear of transmission). Tapered coil spring is installed ahead of joint to properly locate joint on driveshaft. NOTE—Universal is slip fit on transmission end and slight press fit on driveshaft.

Propeller Shaft (Std. & Overdrive Cars): Steel shaft with pre-lubricated rubber mounted center bearing, **(1 bearing used with 4.4-1 rear axle); (2 bearings used with 4.9-1 rear axle),** installed in torque tube. Propeller shaft is machined .003" undersize on front end to facilitate installation and removal.

Propeller Shaft (Hydra-Matic Drive): One piece tubular steel shaft with one universal at forward end and companion flange at rear. No center bearing.
►*PROPELLER SHAFT COUPLING PRODUCTION CHANGE:* New "slip type" coupling (replacing former type coupling and nut) used on cars beginning Serial No. K-604703 (Kenosha). *See "Nash Hypoid Rear Axle" in Rear Axle Section for installation of both types of couplings and use of later type to replace former coupling-and-nut type.*
►*CAUTION:* When connecting first type shaft coupling to pinion shaft, coupling must be tightened to 300 ft.lbs. to prevent loosening in service.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with torque tube drive.
See Rear Axle Section for complete data.

Transmission	Axle Ratios	Ratio
Std. Trans.	4.4-1 (8-35)	Std. 4.1-1 (9-37) Optl.
Overdrive	4.9-1 (8-39)	Std. 4.4-1 (8-35) Optl.
Hydra-Matic		3.3-1 (13-43)

Backlash—.002-.006". Shim adjustment.

Removal: Jack up and support rear end of body. Disconnect rear brake cable at equalizer, torque tube at rear of transmission, brake hose and shock absorbers at rear axle end (allow shocks and brake hose to hang from body). Roll axle assembly out from under car. *See Nash Rear Axle in Rear Axle Section for Torque Tube Bracket Adjustment.*
Axle Shaft Removal—Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate, and wheel bearing adjusting shims. Withdraw axle shaft using puller J-2498, do not drag shaft on inner oil seal.
Endplay—.002-.004".

Rear Suspension: Coil spring type with conventional rear axle. *See Rear Axle Section for complete data.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting hydraulic type. Serviced by replacement.
Front—Nash No. 3133914. **Rear**—Nash No. 3135354.

FRONT SUSPENSION

Front Suspension: Independent type with coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.
►*1952 PRODUCTION CHANGES & ADJUSTMENT CAUTIONS—See Front Suspension Section.*
Kingpin Inclination—6½°.
Caster—0° to Pos. ½° (Pos. ½° preferred).
Camber—¼° Neg. to ¼° Pos. (0° preferred).
Toe-In—1/16" to 3/16".
Toe-Out on Turns—Outer wheel turned 20°, inner wheel should be turned 23½°.

STEERING GEAR

Gemmer Model 305—Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering (floating shoe) type. Hand lever applies rear wheel service brakes.
NOTE—No anchor pin adjustment on these brakes.
See Brake Section for complete data.
Wheel Cylinders—(Diameter) Front 1". Rear ⅞".
Drums—Cast-Iron. Diameter 9".
Lining—Molded type. *CAUTION*—Different width and length used on each shoe, as follows:

Brake Shoe	Width	Length	Thickness
Primary	2"	9⅞"	.214"
Secondary	1¾"	7⅝"	.214"

Clearance—Eccentric adjustment for each shoe. Shoes should just be free of drag *(CAUTION*—make hard brake application to centralize shoes and release brakes before making adjustments).

Hand Brake: See Service Brakes (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum, Link-and-Arm type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATI N

SERIAL NUMBER: On plate attached to center of cowl under engine hood.

Starting Serial Number—	1952	1953
Kenosha	R-656001	RC-14501
El Segundo	R-692101	RC-19001

ENGINE NUMBER: On upper right hand corner of the engine block.

Starting Engine Number—	1952	1953
All	A-165001	A-210001

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. (Jetfire); 130 lbs. (Dual Jetfire) at cranking speed.

VACUUM READING: 18-21" idling at 500-550 RPM.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .030".
Plugs—Auto-Lite A-7 or AN-7. 14mm. Tighten to 30 ft. lbs.

►*DUAL JETFIRE SPARK PLUG NOTE—"Heli-Coil" thread inserts used in spark plug holes on engines with aluminum cylinder heads beginning with Engine No. LMA-221152.*

DISTRIBUTOR: Delco-Remy No. 1110227. Full automatic advance type with auxiliary vacuum spark control.
Breaker Gap—.018-.024" (Set to .022").
Cam Angle—31-37°. DO NOT exceed Breaker Gap limits of .018-.024" to obtain dwell.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115380. Mounted on right front fender apron.
Ignition Current—2.3 amperes idling, 5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: TDC.
Timing Mark—Groove on damper aligned with pointer on chain cover above damper.
Timing Procedure—*See Ignition Timing.*

CARBURETION (Jetfire): Carter YH, No. (1952) 895S, SA, (1953) 895SA. "Horizontal" type with Climatic Control.
Idle Setting—1-1½ turns open. For richer mixture, turn screw out.
Idle Speed—(Std. Trans. & Overdrive) 500-550 RPM. (Hydra-Matic Cars) 375 RPM. with selector lever in Neutral "N" position.
Float Level—3/8" from bowl cover to top of float with bowl cover assembly inverted and float resting on pin in needle seat.

►*CAUTION—Do not compress spring in intake needle which would cause incorrect setting.*

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section for data.*

Fast Idle: .030" between throttle valve and bore of carburetor (side opposite idle port) with choke valve closed. Remove thermostatic coil housing and baffle plate. Adjust by bending connector arm.

Choke Adjustment: With one-piece choke piston (Carter No. 160-35), **set one point lean.** With two-piece choke piston (Carter No. 160-116S), **set one point rich.**

Fuel Pump Pressure: 3-4½ lbs.

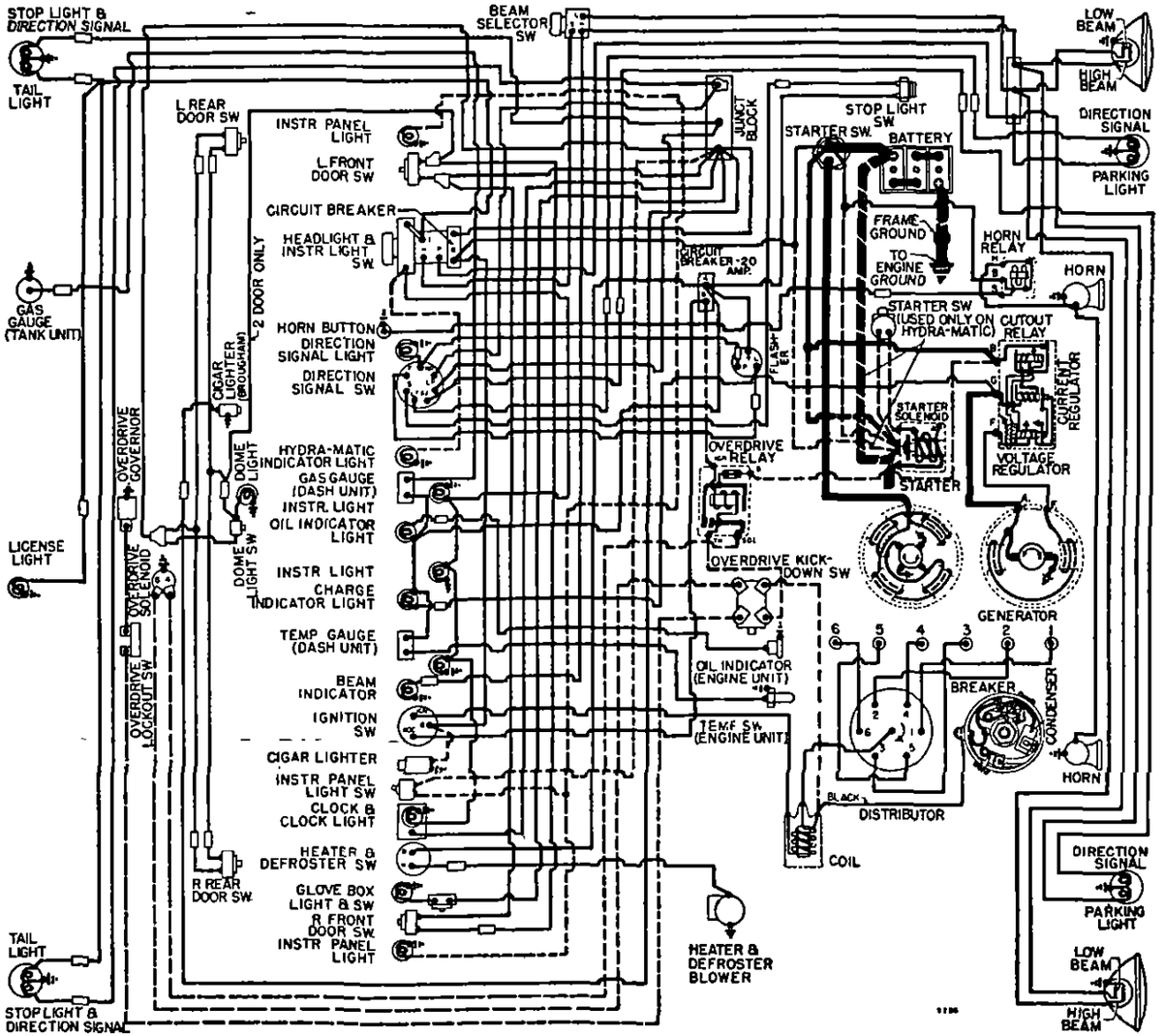
CARBURETION (Dual Jetfire): Carter YH, No. 973S (front), No. 974S (rear). "Horizontal" type with Climatic Control.

►*AUTOMATIC CHOKE THERMOSTATIC COIL ASSY. & SETTING CHANGES FOR IMPROVED HOT STARTING PERFORMANCE: See Automatic Choke and Fast Ide Settings below and "Carter YH Horizontal Carburetor" In Carburetor Section for complete data.*

Idle Setting—See Adjustment Procedure below.

Idle Speed—(Std. Trans. & Overdrive) 550-650 RPM. (Hydra-Matic Cars) 375 RPM. with selector lever in Neutral "N" position.

Dual Jetfire Idle Adjustment Procedure—
1) Remove air cleaner boots and "Tee" from carburetor air horns.
2) Adjust throttle stopscrew on rear carburetor as follows: Hold choke valve open, back off throttle stopscrew until throttle valve is just closed, then turn stopscrew in approximately 2 turns to crack throttle valve slightly. Adjust **front** carburetor similarly.
3) Start engine and allow it to idle until normal temperature reached. Attach Tachometer.
4) Adjust rear carburetor stopscrew for minimum idle speed of 550 RPM.
5) While noting idle speed, synchronize front carburetor by adjusting connecting throttle linkage between carburetors, opening front carburetor throttle just to the joint where a further opening begins to increase engine speed. At this point, air suction noises in both carburetors should be identical.
6) Replace air cleaner boots and "Tee" connections.



1952 MODELS

7) Adjust idle mixture on rear carburetor by turning adjusting screw in (to lean mixture) until engine begins to be rough, then turn screw out ¼ turn. Adjust idle mixture for front carburetor similarly. 8) Recheck idle speed. If not within limits of 550-650 RPM., repeat throttle synchronization (1 thru 5)
Float Level—7/16" from bowl cover to top of float with bowl cover assembly inverted and float resting on pin in seated needle.

►***CAUTION—Do not compress spring in intake needle which would cause incorrect setting.***

Hydra-Matic Throttle Linkage Adjustment: ***See "Hydra-Matic Drive" in Transmission Section for data.***

Fast Idle: .015" (Gauge T109-44) between throttle valve and bore of carburetor (side opposite idle port) with choke valve closed. Remove thermostatic coil housing and baffle plate, adjust by bending connector arm. ***CAUTION—Above setting supersedes .030" setting originally specified.***

Choke Setting: CAUTION—Different setting required for each type Thermostatic Coil Assembly:
First "N" Type—No. 170N-250S—1 Point Lean.
Later "P" Type—No. 170P-250S—2 Points Lean.

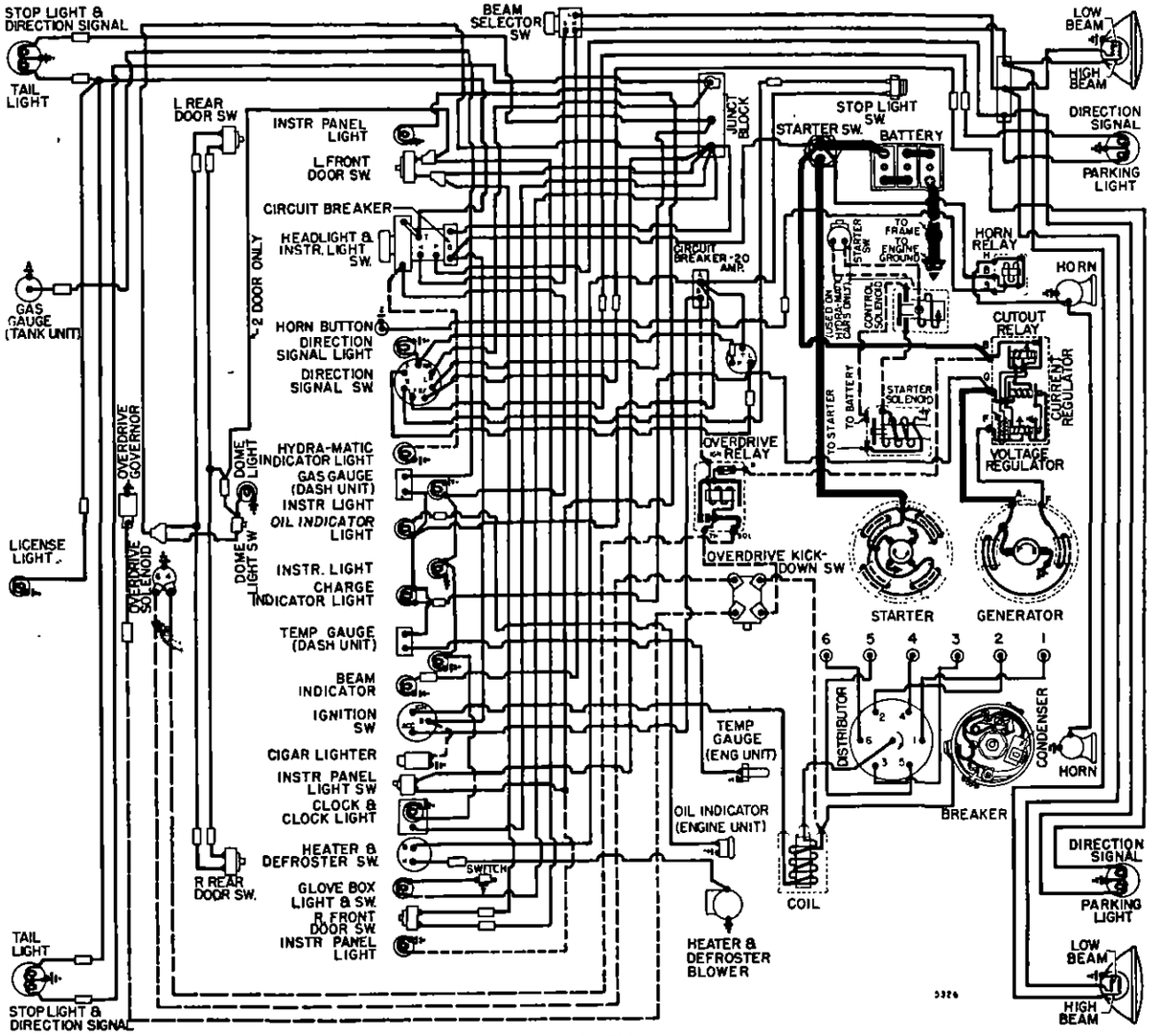
Fuel Pump Pressure: 3-4½ lbs.

VALVE TAPPET CLEARANCE: .012" **Intake**, .016" **Exhaust** (Engine at normal operating temperature).

IGNITION

IGNITION SWITCH: Nash No. 3131343.

COIL: Delco-Remy No. 1115380. Mounted on right front fender apron.



1953 MODELS

Ignition Current—2.3 amperes idling, 5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110227. Full automatic advance type with auxiliary vacuum control.
Breaker Gap—.018-.024" (set to .022").
Cam Angle—35°. Test limits with .022" gap 31-37°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	350	0-4	700
6-8	650	12-16	1300
10-12	1050	20-24	2100
13-15	1350	26-30	2700

Vacuum Spark Control: Delco-Remy No. 1116044. Separate unit mounted on hold down plate and linked to advance arm. **Plunger Travel**—7/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4-6"
6°	12°	14-16"

IGNITION TIMING

Standard Setting ..... **TDC**
Timing Mark—Groove on damper at front of engine aligned with pointer on chain case cover.
NOTE—Car manufacturer recommends that Neon Timing Light be used to set timing.
Timing (with Neon Timing Light)—Connect timing light to #1 spark plug, direct light at vibration damper, idle engine, loosen clamp bolt and adjust distributor until groove on damper appears in line with pointer on chain case cover, tighten clamp bolt.

CARBURETOR

Carter YH (Jetfire) No. 895S, SA. (Dual-Jetfire) No. 973S (front), 974S (rear). "Horizontal" type with Climatic Control.

►***DUAL JETFIRE (973S, 974S) CARBURETOR AUTOMATIC CHOKE THERMOSTATIC COIL ASSY. & SETTING CHANGES FOR IMPROVED HOT STARTING PERFORMANCE: See Automatic Choke and Fast Idle Settings below and "Carter YH Horizontal Carburetor" in Carburetor Section for complete data.***

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Hydra-Matic Throttle Linkage Adjustment: ***See "Hydra-Matic Drive" in Transmission Section for data.***

Fast Idle: (895S, SA) .030" (Gauge T109-29), (973S, 974S) .015" (Gauge T109-44) throttle valve opening or clearance between valve and bore of carburetor (side opposite idle port) with choke valve closed. Remove thermostatic coil and baffle plate, adjust by bending connector arm.

►***CAUTION—Above setting on 973S & 974S supersedes .030" setting originally specified.***
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.

►***CAUTION—DIFFERENT SETTINGS used as follows:*** **895S, SA** (With one-piece Choke Piston)—**1 point lean.** (With two-piece Choke Piston)—**1 point rich.** **973S & 974S**—(with First "N" type No. 170N-250S Coil) 1 Point Lean, (With Later "P" type No. 170P-250S Coil) 2 Points Lean.
See Carburetion Equipment Section for complete data.

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CARB. EQUIPMENT

Air Cleaner: AC Oil-wetted type Std., Oil-bath type Optl. Filter Element AC No. 6 (Std.), No. 22 (Optl. Oil-bath).

Fuel Pump: Carter & AC type used as follows:
Carter Type—No. M-798S (All except Std. Trans. Cars). Combination fuel & vacuum.
AC Type—Fuel pump only. Replacement Pump No. 533 (with glass bowl) or 9802 (without bowl). No. 9799 is replacement combination fuel and vacuum.
See Carburetion Equipment Section for complete data.
Pressure—3-4½ lbs.

Gasoline Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. 12710-A.
Tank Unit—Auto-Lite No. 12642-A.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite CT-1-15. 6 volt, 15 plate, 105 amp. hr.
Grounded Terminal—Positive (+) terminal.

►***1953 BATTERY GROUND CABLE PRODUCTION CHANGE: See "Late 1953 Cars" following:***

1952 & Early 1953 Cars—Battery ground to cylinder head with small ground strap extending from this point to body at wheel housing.

Late 1953 Cars—Body ground strap (above) discontinued and SEPARATE ground strap connected between transmission and rear engine cross-member.

►***CAUTION—Whenever new type battery ground cable installed on first cars, ground strap at transmission (Nash No. 3137307) MUST ALSO BE INSTALLED.***
Location—Under hood, left side of engine.

STARTER

Delco-Remy No.—	Starter	Armature
Std. Trans. (LHD)	1107950	1911832
Std. Trans. (RHD)	1107959	1911832
Hydra-Matic Cars (Early)	1107965	1867897
Hydra-Matic Cars (Later)	1108007	1917855

►***STARTING SWITCH CONTROL PRODUCTION CHANGE (Hydra-Matic Cars): See Starting Switch***
Drive (Std.)—Delco-Remy 1882549 automatic type.
Drive (Hydra-Matic)—Delco-Remy No. 1873789. Overrunning clutch with solenoid pinion shift.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data—1107950

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
14 ft. lbs.	Lock	3.15	570

Performance Data—1107959

Torque	R.P.M.	Volts	Amperes
0 ft.lbs.	5500	5.0	65
16 "	Lock	3.0	600

Performance Data—1107965

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 ft. lbs.	Lock	3.0	600

Performance Data—1108007

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch (Standard): Delco-Remy No. 1996478. On toe-board, actuated by fully depressing clutch.

Starting Switch (Hydra-Matic Cars): Delco-Remy No. 1118136 Solenoid (pinion shift and starting switch solenoid) on starter and controlled as follows:
Control Switch (First Cars)—D-R No. 1996074 on steering column, operated by Hydra-Matic selector lever (operative in "N" position by lifting lever).
Control Switch (Later Cars)—Starter solenoid (on starter) controlled by second solenoid, Nash No. 3137326, which is controlled by regular control Switch, D-R No. 1996074 (same as on first cars).
Starter Switch Removal—Disconnect battery and remove vacuum hose from switch. Raise front end of car and disconnect both wires from starter switch and place gear shift operating lever in reverse position. Remove switch from bracket, using a ¼" drive ratchet handle and socket on threaded bushing that retains switch to bracket.
Starter Switch Adjustment—***See "Hydra-Matic Drive" (Nash Linkage Adjustment) in Transmission Section.***

GENERATOR

Delco-Remy No. 1102777. Two brush type with current & voltage regulation.
Armature—Delco-Remy No. 1921981.
Maximum Charging Rate—45 amperes, 8.0 volts.
Charging Rate Adjustment—None. See Regulator.

Performance Data

	Amperes	Volts	R.P.M.
Cold	45①	8.0	2450

①—Max. output controlled by current regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.90-2.05 amps. at 6 volts.

Belt Adjustment: ½" deflection in belt midway between fan and generator pulleys with an application of 25 lbs. pressure.

REGULATOR

Delco-Remy No. 1118732. Voltage and current regulator. Test units at full operating temperature.
See Electrical Equipment Section for complete data.

►***TEST NOTE—To obtain operating temperature, run regulator at least 15 min. charging at 8-10 amps.***

►***CAUTION***—Check generator for grounded field coils and leads before changing regulator settings to correct for high voltage or high charging rate.

Cutout Relay
Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—***See Electrical Equip. Section.***

Current Regulator
Setting—45-51 amperes hot (set to 47 hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—***See Electrical Equip. Section.***

LIGHTING

Headlamps: "Sealed Beam" type. Upper and lower beam controlled by selector switch on floor.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel located on speedometer face below the numeral "5".

Switches
Lighting—Nash No. 3128824.
Beam Selector—Nash No. 3130120.
Instrument Lights—Controlled by turning lighting switch.
Directional Signal—Nash No. 3131527.
Heater & Defroster—Nash No. 3134340.
Stop Light—Nash No. 99469.

MISC. ELECTRICAL

GENERATOR CHARGE INDICATOR: Indicator light in instrument cluster. Lights when ignition turned on, should go out when generator begins to charge.

LOW OIL PRESSURE INDICATOR: ***See "Oil Pressure Warning Light" under LUBRICATION.***

CIRCUIT BREAKERS: Thermostatic type. Contacts remain closed under normal conditions, and open the circuit under an excessive load. Not adjustable.
30 Ampere—Located on main lighting switch. Protects headlights, tail, instrument panel, and interior lights. See Wiring diagram.
20 Ampere—Located on rear side of dash just forward of steering column. Protects stoplights, Oil Level Indicator, Temp. Indicator, Gas Gauge, Charge Indicator, Heater & Defroster, and Direction Signal Flasher.

FUSES: Electric Clock. 3 amp. in clock feed.
Overdrive—30 amp. On Overdrive Relay.
Radio—14 amperes (located under control panel to right of steering column).

HORNS: Delco-Remy No. 1999641 (Low Note). No. 1999642 (High Note).

Horn Relay: Nash No. 3127787.
Contact Gap—.026".
Air Gap—.016-.020" with contacts closed.
Contacts Close—1.5-3.0 volts.
Contacts Open—.5 volts minimum (open from seal).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder valve-in-head type. Cylinders cast enbloc, with intake manifold cast in block, (Iso-thermal intake system).
Bore—3½". **Stroke**—4⅜".
Displacement—252.6 cu. in.
Rated Horsepower—29.4.
Developed Horsepower—(Jetfire) 120 at 3700 RPM. (Dual Jetfire) 140 at 4000 RPM.
Compression Ratio—(Jetfire) 7.3-1, (Dual Jetfire) 8.0-1. *NOTE*—Dual Jetfire head is Aluminum.
Compression & Vacuum Reading—***See Tune-Up.***

CYLINDER HEAD & TIGHTENING TORQUES: ***See Nash Special Data.***

►***CYLINDER HEAD NOTE—Aluminum Cylinder Head used on Dual Jetfire and Cast Iron Cylinder Head used on Jetfire engines. Heads are interchangeable.***

ENGINE & OIL PAN REMOVAL: ***See Nash Special Data.***

PISTONS: Aluminum alloy, cam ground, tin plated, strut type with split skirt.

►***1953 PISTON PRODUCTION CHANGE—Three different type pistons used in production. CAUTION—it is important that when replacing less than complete sets that the same type pistons be used.***

Original Piston & Bore Sizes: ***See Nash Special Data.***
Removal—Pistons and rods removed from above.
Clearance—.002". See Fitting Pistons.
Fitting Piston—With all parts clean and dry, fit pistons so that piston will support its own weight

ENGINE

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in any portion of cylinder. If feeler gauge used, insert .002" x ½" feeler at right angles to pin bosses, pull to withdraw feeler must be 12-18 lbs.
NOTE—Cylinder out-of-round & taper limits .004".

Replacement Pistons: Furnished Standard, .002", .005", .010", .020" and Semi finished.

Installing Pistons: Notch in top edge of piston must be toward front of engine. See Connecting Rod Installation.

PISTON RINGS: 2 compression, 1 slotted oil and 1 Thompson U-Flex ring, (U-Flex ring in No. 4 groove), per piston. All rings above pin. Oil ring grooves drilled with oil drain holes.

Ring	Width	End Gap
Top Compression	.0930-.0935"	.007-.015"
Lower Compression	.0930-.0935"	.007-.014"
Upper Oil	.1545-.1550"	.007-.017"
Lower Oil	.154-.155"	①

①—No end gap with U-Flex Ring.
Ring Side Clearance—.002-.004" (all rings).

Replacement Piston Rings: Furnished Std., .020" oversize.

Installing Rings: Inner groove on compression rings must be installed toward top of piston.

PISTON PINS: Floating type with lock rings.

▷*1953 PISTON PIN PRODUCTION CHANGE—Two types used as follows:*
First—Diameter—⅞". Length—2.824".
Later (Beginning with 2nd type Piston). Diameter 15/16". Length—3.000".
NOTE—Pin hole in piston offset toward camshaft.
Pin Fit in Piston—Palm push fit with piston heated (in water).
Pin Fit in Rod Bushing—Light thumb push fit at room temperature.

Replacement Pins: Standard & .001", .003" oversize.

CONNECTING ROD: Length—8¾". **Weight**—36¼ ozs.
Crankpin Journal Diameter—2.000"-2.001".
See "Original Bearing Sizes" in Nash Special Data.
Lower Bearings—Removable steel backed, babbitt lined type. No shims required.
Clearance—.001-.002". **Sideplay**—.005-.015".

▷*CENTER MAIN BEARING REMOVAL NOTE—Oil pump must be removed before removing center main bearing cap. See "Oil Pump" in Nash Special Data.*

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Nash Special Data.*
NOTE—Tangs on bearing shells must engage slots in rods and caps. Palnuts used on connecting rod bolt nuts. Replace with new Palnuts each time nuts are removed.

Replacement Bearings: Furnished Standard, .002", .010", .012" undersize.

Installing Rods: Oil spray hole in lower end of rod and identification marks on rod must be toward camshaft side of engine. See Installing Pistons (above). *NOTE*—Rod and bearing cap should be marked before removal to insure replacement in same cylinder and in same relative position.

CRANKSHAFT: Seven bearing, counterweighted type
CRANKSHAFT REPLACEMENT NOTE—Replacement crankshaft furnished complete with vibration damper and flywheel. Assembly is balanced as a unit.
Vibration Dampener Removal & Installation: *See Nash Special Data.*
Journal Diameters—2 31/64" (2.479").
See "Original Bearing Sizes" in Nash Special Data.
Bearings—Removable, steel backed babbitt lined.
Clearance—.001-.002".

Bearing Adjustment: None. Replace bearings. See *"Crankshaft & Main Bearings" in Nash Special Data.*

Replacement Bearings: Furnished Standard, .002", .010", .012" undersize.

Crankshaft Rear Main Oil Seal: *See Nash Special Data.*

End Thrust: Taken by center (No. 4) main bearing.
Endplay—.006-.008".

CAMSHAFT: Cast-iron. Non-adjustable chain drive.
Camshaft Removal—*See Nash Special Data.*
Bearings—Steel backed babbitted bushings, (except No. 1 which is cast iron).
Clearance—.002".

End Thrust: Taken by front bearing, controlled by position of chain sprocket (press fit on shaft).
Endplay—.004-.006" clearance between camshaft front bearing and camshaft sprocket.

Timing Chain: Morse. Non-adjustable type. Width 1", Pitch ⅜". Length 22½" or 60 links.

Camshaft Setting: Install chain with the marked teeth of camshaft and crankshaft sprockets adjacent and in line with a straightedge across shaft centers. Check setting as follows: Turn engine over until punch mark on camshaft at one o'clock position, with crankshaft sprocket mark just beginning to mesh with chain. There should be 9½ links or 19 pins (2 pins to each link) between marks.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1.787"	.3720-.3730"	5 31/64"
Exhaust	1.468"	.3725-.3735"	5 31/64"

	Seat Angle	Lift	Stem Clearance
Intake	30°①	.393"	.002-.004"
Exhaust	45°②	.3945"	.0025-.0035"

①—Valve Face Angle 29°. ②—Valve Face Angle 44°.

▷*ROCKER ARM & VALVE LUBRICATION CAUTION—Hollow bolt must be used in front mounting bolt hole of rocker arm assembly for proper lubrication.*

▷*VALVE STEM OIL SEAL ASSEMBLY NOTE—See "Valve System" in Nash Special Data.*

▷*VALVE SEAT (ALUMINUM CYLINDER HEAD) REMOVAL & INSTALLATION—See "Valve System" in Nash Special Data.*

Valve Guides: Pressed in cylinder head. Valve stem seal on upper end. *See "Valve System" in Nash Special Data.*

▷*VALVE GUIDE CAUTION—Guides used for Cast Iron & Aluminum Cylinder heads are different. Aluminum cylinder head valve guides have lock ring which seats in a counterbore in cylinder head.*
Valve Guide Removal (Aluminum Cylinder Head)—Drive guide upward from combustion chamber to release valve guide lock rings seated in cylinder head counterbore.
Valve Guide Installation—Replace guide with Tool J-4687. IF TOOL NOT AVAILABLE INSTALL TO A DEPTH WHICH PERMITS 25/32" PROTRUSION ABOVE BLOCK. *CAUTION—Install valve guide locks on all guides installed in ALUMINUM cylinder heads.*

Valve Springs: Single springs on all valves.
Free Length—2 1/16".

Valve Spring Specifications

	Pressure	Length
Valve Closed	53-58 lbs.	1 13/16"
Valve Open	144-154 lbs.	1 7/16"

Installing Springs—Closely coiled end of spring should be installed toward valve seat.

Valve Lifters: Mushroom type. Camshaft must be removed to remove lifters.

▷*REPLACEMENT VALVE LIFTER CAUTION*—Original type lifters No. 3133042 (used with Cast Iron Camshaft) were superseded by No. 3136395 CHILLED FACE CAST IRON LIFTERS beginning with Engine No. A-196646. These special Chilled Face cast iron lifters are satisfactory for use with Cast Iron Camshaft and complete set of 12 should be installed when replacement camshaft installed (this recommendation supersedes former recommendation that cast iron lifters should not be used with cast iron camshaft).

VALVE TIMING

Tappet Clearance: .012" Intake, .016" Exhaust, HOT.
Valve Timing: *See Camshaft Setting above.*
Intake Valves—Open 12½° BTDC. Close 51½° ALDC.
Exh. Valves—Open 53½° BLDC. Close 10½° ATDC.
Valve Timing Check—Set No. 6 piston on TDC in firing position, then set valves on No. 1 cylinder to .003" clearance. Slowly rock crankshaft back and forth. If timing set correctly, the exhaust valve should open before the D.C. mark on vibration damper lines up with the pointer. **Note this distance.** Intake valve should open an equal distance after the DC mark passes the pointer.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins and timing chain.
Crankcase Capacity—6 quarts.
Normal Oil Pressure—50 lbs. at 30 MPH.
Oil Pressure Regulator—Located in body of pump. Not adjustable. Opens at 50-58 lbs.

Oil Pump: Gear type. Mounted on center main bearing cap in crankcase.
See "Oil Pump" in Nash Special Data.

▷*OIL PUMP DRIVE GEAR CAUTION*—Steel type oil pump drive gear should not be used with CAST IRON Camshaft. To replace, use No. 3105452 Gear.

Cylinder Cover Vent: Vent located on cover just behind water outlet elbow. Turn to open at all times, except for hot dusty driving.

Oil Filter: Replace cartridge at 8000 miles, or more often if necessary.

Oil Pressure Warning Light: Carter type pressure switch controlling light on instrument panel.
Dash Unit—Warning light on instrument panel. Lights when ignition on, goes out when oil pressure sufficient to open engine unit contacts.
Engine Unit—Carter Pressure Switch No. A-954-S. Nash No. 3134704. Open at 5-8 lbs. No adjustment.

COOLING

Cooling System: Pressure type with pressure and vacuum valves in filler cap. Positive circulation
Capacity—18 qts. with heater.
Pressure Valve—Nash No. (1952) 3112649, (1953) 3136627. In filler cap, opens at 7 lbs.

Water Pump: Sealed packing and bushing type.
See Water Pump Section for complete data.
Removal—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting screws.

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Belt Adjustment: *See Generator Belt Adjustment.*

Thermostat: Dole. In water outlet on cylinder head.
Setting—Starts to open at 167-173°, and should be fully open 20° above starting point.

Temperature Gauge: Auto-Lite Electric type.
Dash Unit—Auto-Lite No. 12711-A.
Engine Unit—Auto-Lite No. 11528-A.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 10A7—Assembly No. 950 stamped on cover. Single plate. dry disc type.
See Clutch Section for complete data.

Facings—I.D.—7". O.D.—10". Thickness—⅛".

Adjustment—Pedal free travel ½-¾". To adjust, turn adjusting nut on connector link at clutch fork.

►*CAUTION—Do not disturb adjustment of clutch beam lever-to-pedal rod.*

Removal: Remove transmission (see below), disconnect clutch linkage, remove clutch housing and pan. Punch mark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner Model (Std. without Overdrive) AS25-T86E. (Optional with Overdrive) AS46-T86E. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.

Transmission Control: Steering column shift.
See Transmission Section for complete data.

Removal: Remove Rear Axle (See REAR AXLE below), disconnect transmission shift rods at levers on left side of case, and speedometer cable. Support engine at rear engine mounting, take out transmission upper mounting bolts, install special guide bolts in these holes, remove lower mounting bolts, slide transmission back, remove from below.

OVERDRIVE

Warner Type R10 (part of AS46-T86E Transmission). Optional equipment. Governor controlled type with electric solenoid operation and throttle operated kick-down switch (Jetfire); pushbutton kick-down switch (Dual Jetfire). Overdrive is "centered ring gear" type.

►*LOCKOUT SWITCH ELIMINATION:* Switch not used on later cars (switch mounting hole on transmission closed by plate, and two switch leads connected together). *NOTE*—If switch inoperative on early cars, cut switch out of circuit by connecting both switch leads to same terminal.
See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy No. 1118155.
Governor—Auto-Lite No. TGE-4005.
Control Relay—Nash No. 3123721.
Overdrive Fuse—30 amp. On overdrive relay.

Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal above.

HYDRA-MATIC TRANSMISSION

"Dual Range," Four-Speed Planetary type automatic transmission and fluid coupling, Modulated Throttle Pressure, and hydraulically operated reverse mechanism.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Hydra-Matic Drive" in Trans. Sect.*

►*TESTING & TROUBLE SHOOTING: See Trans. Sect.*

Lubrication—Check fluid every 1000 miles. Add fluid as required, to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Auto. Trans. Fluid type "A").
Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes after transmission has reached normal operating temperature. With selector lever in "N," remove dipstick and check fluid level (dipstick located under right front floor plate). Add fluid to bring level to "F" mark.

►*CAUTION—Do not fill above "F" mark on dipstick.*

Capacity—Approximately 11 qts. (refill), 12 qts. (after transmission disassembled).

►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw—Roller bearing type. 1 used.

Propeller Shaft: One piece steel shaft with pre-lubricated rubber mounted center bearing.
See Nash Rear Axle in Rear Axle Section for data.

REAR AXLE

Own Make. Semi-floating hypoid gear type with torque tube drive.
See Rear Axle Section for complete data.

Axle Ratios

Std. Trans.	4.1-1 (41-10)
Overdrive	4.4-1 (40-9)
Hydra-Matic	3.2-1 (41-13)

Backlash—.002-.006". Shim adjustment.

Removal: Raise and support rear of car. Disconnect rear brake cables at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at the axle end, (let hang from body). Roll axle free from car.
Axle Shaft Removal—Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims, and replace same amount when reassembling). Withdraw shaft using puller J-2498, do not drag on inner seal.
Wheel Bearing Adjustment—Shims located between backing plate and flanged end of housing. To adjust, remove wheel and backing plate (see above), add or remove shims. **Endplay**—.002-.004".

SHOCK ABSORBERS

Delco or Monroe—Direct acting, hydraulic type. Serviced by replacement.
Front—Nash No. 3134914. **Rear**—No. 3135354.

FRONT SUSPENSI N

Front Suspension: Independent type with coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.
See Front Suspension Section for complete data.

Kingpin Inclination—6½°.
Caster—0° to ½° Pos. (½° Pos. preferred).
Camber—¼° Neg. to ¼° Pos. (0° preferred).
Toe-In—1/16" to 3/16".
Toe-Out on Turns—Outer wheel turned 20°, inner wheel should be turned 23°.

STEERING GEAR

Standard: Gemmer Model 305. Worm & Roller type with "push-pull" adjustment.
See Steering Gear Section for complete data.

Power Steering (1953 Optl.): Bendix hydraulic "Linkage Type" used with standard steering gear.
See "Bendix Power Steering" in Steering Gear Section

BRAKES

Service Brakes: Bendix hydraulic, duo-servo, single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Drums—Diameter 10".

Wheel Cyl. Diameter—(Frt.) 1 1/16", (Rear) 15/16".

Lining—Molded type. Riveted to shoe.

Shoe	Width	Length	Thickness
Primary (Front & Rear)	2"	9"	.214"
Secondary (Front)	2½"	11 3/32"	.214"
Secondary (Rear)	2"	11 3/32"	.214"

Clearance—.015" heel and toe of secondary shoe with primary shoe out against drum.

Hand Brake: See Service Brakes (above).

MISC. MECHANICAL

Windshield Wiper: Vacuum, Link-and-Arm type.
See Miscellaneous Section for complete data.

►*AIR CONDITICNED CAR SERVICE CAUTICN: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate located under hood, right side, body cowl.

ENGINE NUMBER: Stamped on machined surface on right side, at center of block.

►*MODEL IDENTIFICATION NOTE: Powerflyte Models have one carburetor. Dual Powerflyte Models have two carburetors.*

SERIAL NUMBER: Stamped on plate located under hood on cowl panel.

Starting Serial Number

Model	Kenosha	El Segundo
1954	K-615501	KC-47201
1955	K-635001	KC-48101

ENGINE NUMBER: Stamped on machined surface on right side of cylinder block above exhaust pipe.

Starting Engine Numbers

Model	Powerflyte	Dual Powerflyte
1954	©S-430001	J-1001
1955	S-440001	②J-30001

©—Canadian cars with single carburetor.
②—"JJ" prefix used on later cars.

►*ENGINE NUMBER SUFFIX CODE NOTE: A three letter code stamped adjacent to engine number indicates as follows:*

Letter Sequence Code

First Letter	Size of Bore
Second Letter	Size of Main Bearings
Third Letter	Size of Con Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	.010" Undersize
Letter "C"	.010" Oversize
Letter "D"	.001" Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

TUNE-UP

COMPRESSION PRESSURE: At cranking speed, as follows:

Model	Powerflyte	Dual Powerflyte
1954	150 lbs.	
1955	120 lbs.	130 lbs.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: All, .015" hot.

MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .030".

Spark Plug—Auto-Lite. A-7 (1954-55 Powerflyte); AL-5 (1954 Dual Powerflyte); AL-7 (1955 Dual Powerflyte). Tighten to 30 ft. lbs. (Powerflyte); 25 ft. lbs. (Dual Powerflyte).

COIL: Delco-Remy 1115380.
Ignition Current—2.3 amps. idling, 5 amps. stopped.

DISTRIBUTOR: Delco-Remy 1112401 (1954 Dual Powerflyte); 1112382 (1955 Powerflyte); 1112409 (Dual Powerflyte).
Condenser—Delco-Remy 1869704 (Distr. 1112401 & 1112382); No. 1928111 (Distr. 1112409).
Capacity—.18-.23 mfd.
Contact Point Set—1855720 (Distr. 1112401 & 1112382); No. 1924571 (Distr. 1112409).
Breaker Gap—.018-.024".
Cam Angle—31-37° at .022" gap.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—1112382

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	325	0-4	650
3.5-5.5	400	7-11	800
7-9	950	14-18	1900
10-12	1400	20-24	2800

Automatic Advance—1112401 & 1112409

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	375	0-4	750
1-3	400	2-6	800
5.5-7.5	1100	11-15	2200
10-12	1800	20-24	3600

Vacuum Spark Control: Delco-Remy 1116072 (All).
Plunger Travel—13/64-¼".

Vacuum Advance—All

Distr. Degrees	Engine Degrees	Vacuum (" of Hg.)
Start	0	4-6
5.5	11	11

IGNITION TIMING

Setting—4° ATDC at idling speed.
Timing Mark—Groove on damper aligned with pointer on timing chain cover above damper.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: One carburetor used on Powerflyte models, two carburetors used on Dual Powerflyte models.*

►*1955 CARBURETOR FLOODING CORRECTION & PRODUCTION CHANGE: Changes were made in production and can be incorporated in earlier production cars to eliminate flooding. See "Carter YF" in Carburetion Section.*

Hydra-Matic Throttle Linkage Adjustment: Adjust engine to correct idle speed (see Idle Speed Settings below) with engine at normal operating temperature. Disconnect throttle rod at transmission throttle lever. Clean machined surface at back of transmission case and place Throttle Lever Checking Gauge J-2545-C flush with surface with edge of gauge against side cover. The throttle lever stud should fit freely in notch in gauge. If gauge does not pass over throttle lever stud freely, use bending tool J-3310 and bend to proper location. Gauge notch must slide freely on stud pin. Adjust transmission throttle rod (which is threaded into upper throttle rod yoke) to fit freely on throttle lever stud; **then shorten rod approximately 2 turns.** Install rod on stud and replace wave washer, flat washer and cotter pin.

CARTER WCD
(1955 Powerflyte)

Carter No. 2061S. Dual downdraft type with automatic choke control.
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed (Without Air Conditioning)—500-550 RPM (standard & overdrive transmissions). 450 RPM (Hydra-Matic in neutral).
Idle Speed (With Air Conditioning)—500 RPM with compressor operating. (All transmissions, Hydra-Matic in neutral).
Float Level—5/32". With bowl cover inverted and weight of float on needle valve, measure from top of float to machined surface of casting.
Accelerating Pump—No seasonal adjustment.

Fast Idle: .026" between throttle valve and bore of carburetor (side opposite idle port). With choke valve tightly closed and fast idle adjusting screw on high step of cam, tighten screw until proper throttle valve opening secured.

Automatic Choke Setting: Set at index.

Hydra-Matic Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter WCD Carburetors" in Carburetion Section.*

Fuel Pump Pressure: 3½-5¼ lbs. at 500 RPM.

CARTER YF (Two Carbs.)
(1954-55 Dual Powerflyte)

Carter No.	Starting Engine No.
2098S (1954)	J-1001
2137S (1954)	J-4697
2137SA (1954)	J-7511
2163S (1954)	J-11186
2258S (1955)	J-30001

►*CARBURETOR INSTALLATION CAUTION: Both carburetors must be same part number to eliminate any differences in specifications.*

Idle Setting—½-1¾ turns open. Turn screw out for richer mixture.
Idle Speed (1954 Without Air Conditioning)—550 RPM (Synchro-mesh); 475 RPM (Hydra-Matic—In "N"). *See "Throttle Synchronization" below.*
Idle Speed (1955 Without Air Conditioning)—500-550 RPM (Synchro-mesh); 450 RPM (Hydra-Matic—In "N"). *See "Throttle Synchronization" below.*
Idle Speed (Air Conditioned Cars)—500 RPM with compressor operating (All Models). *See "Throttle Synchronization" below.*
Float Level (1954)—*CAUTION—Different setting required for each type Needle Valve (See "Flooding Correction" above).* 3/8" (Solid needle). 1/4" (spring loaded needle). Measured from bowl cover to top of float at free end with gasket removed and bowl cover inverted. Use Gauge T109-80 (3/8"); T109-31 (1/4").
Float Level (1955)—5/16" measured from bowl cover to top of float at free end with gasket removed and bowl cover inverted. Use Gauge T109-220.
Accelerating Pump—No seasonal adjustment.

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Fast Idle: .024" throttle opening with choke valve closed and fast idle screw on high step of fast idle cam. Adjust by turning fast idle screw.

Automatic Choke Setting: Two points lean.

Throttle Synchronization (Dual Powerflyte Models): To insure correct synchronization, make idle adjustments in following sequence:

1)-Remove-air-cleaner-assemblies-from-carburetor air horns.

2) Start with rear carburetor and adjust throttle stop screw until valve is seated in closed position. While doing this, the choke valve must be held in the open position to insure throttle stop screw contacting low speed stop in the fast idle cam mechanism. Turn throttle stop screws about two turns to crack valves slightly.

3) Start engine and run to obtain operating temperature. Attach tachometer to engine and observe RPM. Adjust rear carburetor to maintain correct idle speed. See above.

4) By means of the connecting throttle linkage between carburetors adjust front carburetor to synchronize with rear, maintaining rear carburetor throttle on idle stop position while checking.

5) During adjustment, reference must be made to the tachometer because it will indicate when front carburetor throttle is opened beyond rear throttle. Point at which further opening of the front carburetor throttle would cause an increase in RPM is the point of throttle synchronization. At this time, the air inlet noise of each carburetor will be identical.

6) To make idle mixture adjustment, replace air cleaner. Turn rear carburetor mixture adjustment screw in (lean) until engine operation becomes rough, then open ¼ turn out (rich). Repeat this on front carburetor.

7) Another idle speed throttle synchronization adjustment may be required because of improved idle mixture. Adjust to correct idle speed. See above.

Hydra-Matic Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter YF Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 3½-5¼ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Fuel only (Std.) Fuel & Vacuum (OD. & Hydra-Matic).

Replacement Pump-(Fuel) AC No. 532 (with glass bowl) or No. 9801 (without glass bowl). **(Fuel & Vacuum)** AC No. 9800 or Carter M-797SA.

Pressure-3-1/2-5-1/4 lbs. at 500 RPM.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit-Auto-Lite 13520A (1954); No. 13380A (1955).

Tank Unit-Auto-Lite 12642A.

See "Fuel Gauges" in Carburetion Section.

BATTERY

Auto-Lite 1M-100. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).

Grounded Terminal-Positive (+) grounded to engine.

Engine Ground-From transmission to rear cross-member.

STARTER

Delco-Remy Numbers:	Starter	Armature
Synchro-mesh & O.D. (LHD)..	1107119	1923018
Hydra-Matic Drive.	1107136	1925939
RHD. Cars	1107120	1923018

Drive-Delco-Remy Automatic Drive or Bendix "Folo-thru" type. **Synchro-mesh & OD. Cars**-Delco-Remy 1923008 or Bendix A3283. **Hydra-Matic Cars**-Delco-Remy 1923043 or Bendix A3338.

Rotation-Counter-clockwise at commutator end.

Brush Spring Tension-24-28 ozs.

Performance Data

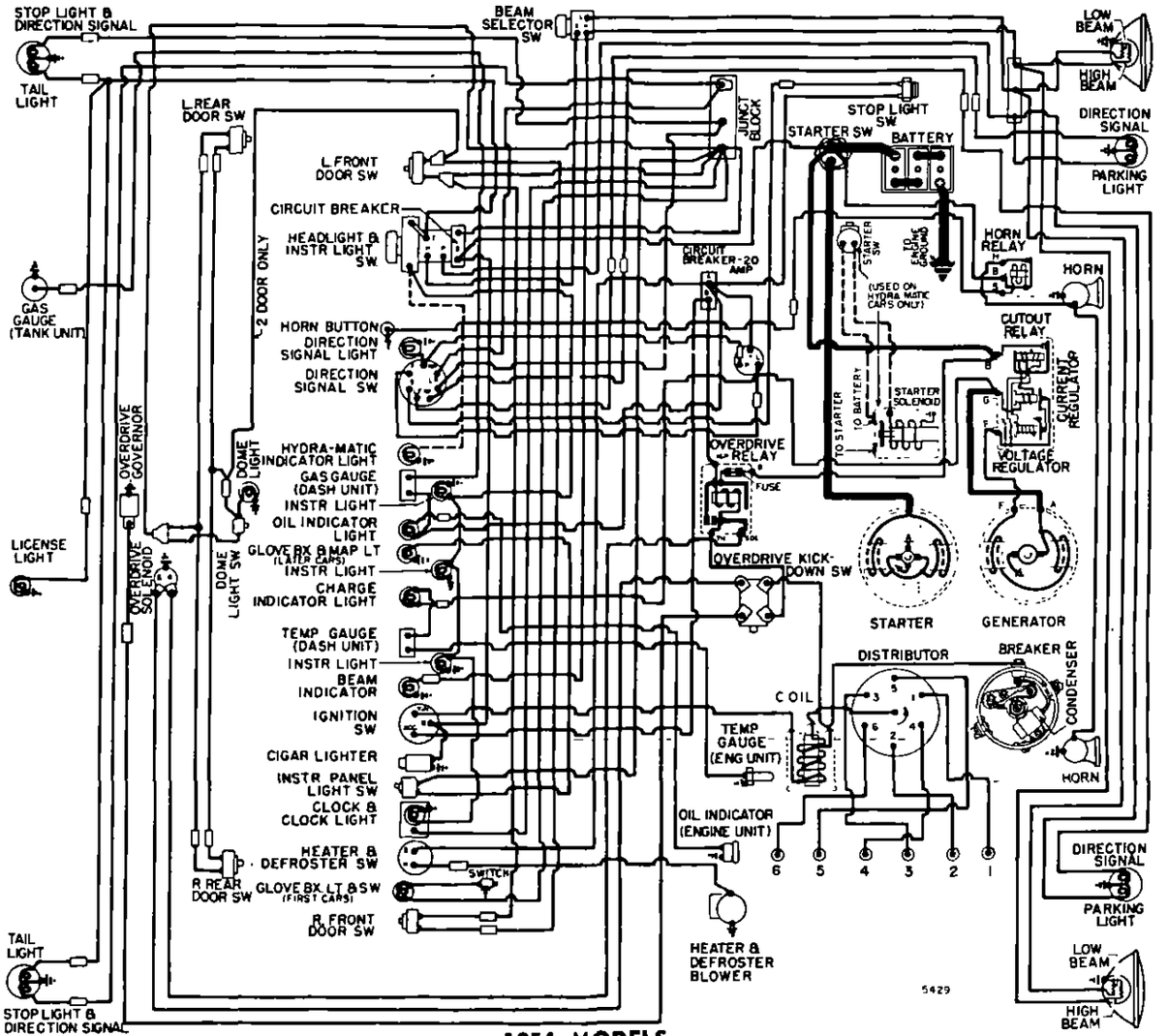
Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11.0 ft. lbs.	Lock	3.25	550

Starting Switch: Two types used.

Synchro-mesh & Overdrive Cars-Delco-Remy 1996478. Mounted on toeboard, actuated by fully depressing clutch pedal.

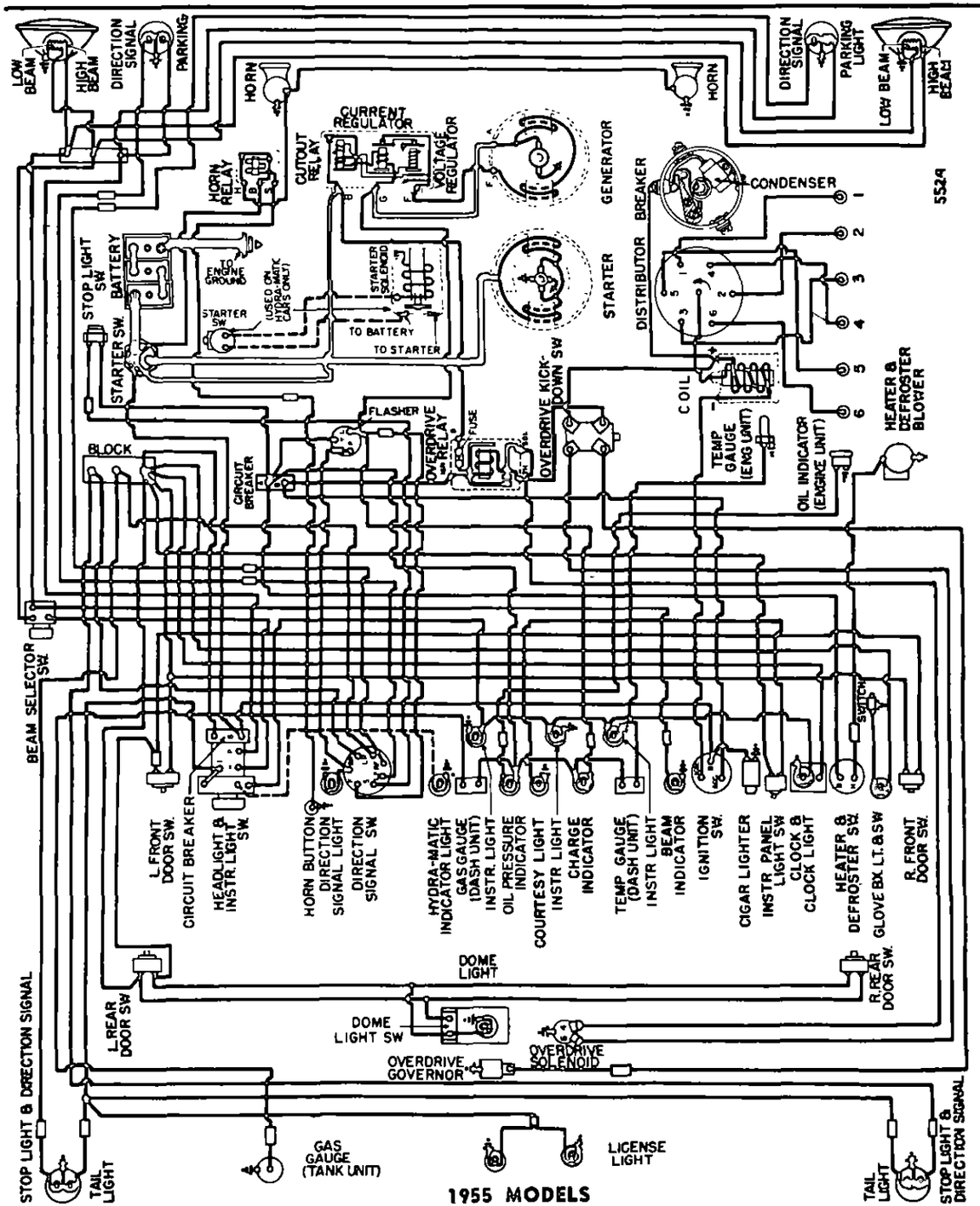
Hydra-Matic Drive Cars-Nash 3137292 Magnetic Switch on left front fender apron and Delco-Remy 1996077 Control Switch mounted on steering column. Actuated by lifting Hydra-Matic selector lever in Neutral "N" position.

Control Switch Adjustment: *See "Hydra-Matic Linkage Adjustment" in Transmission Section.*



1954 MODELS

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1955 MODELS

SEE NASH AMBASSADOR FOR "PUSHBUTTON" OVERDRIVE CONTROL (STD. TYPE SHOWN)

CONTINUED FROM PRECEDING PAGE

GENERATOR

Delco-Remy No.	Generator	Armature
Without Air Cond.	1102777	1921981
With Air Cond.	1102815	1921981

Performance Data Cold (1102777 & 1102815)

Amperes	Volts	R.P.M.
45 ①	8.0	2450

①—Not maximum. See Regulator Data.

Brush Spring Tension—28 ozs.

Field Current—1.87-2.0 Amperes at 6 volts.

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: 1/2" deflection in belt midway between fan and generator pulleys with an application of 25 lbs. pressure.

REGULATOR

Delco-Remy 1118828. *NOTE—Regulator is "1118825 Series". Specifications below are "Normal" Settings.*

Cutout Relay

Cuts In—6.4 volts (hot).

Contact Gap—.020".

Air Gap—.020" (With contacts just closed).

Voltage Regulator

Setting—7.3 volts (hot).

Air Gap—.075" (With armature pressed down to point where contacts just touching).

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—47 Amperes.

Air Gap—.075" (with armature pressed down to point where contacts just touching).

Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section*

Directional Signals: *See Electrical Equip. Section.*

Light Switch Removal: Loosen Allen screw and remove knob. Remove retaining nut. Push switch back and lower to remove wires.

Stop Light Switch: Located at tee fitting in line to front brakes.

FUSES: Located as follows:

Radio—SFE-14 in line.

Overdrive Relay—AGC-30 on Overdrive Relay.

CIRCUIT BREAKERS: Two used as follows:

30 ampere on light switch (main lighting).

20 ampere behind dash panel on left side of cowl (Ignition, heater motors and stop light).

HORNS (1954): Delco-Remy 1999641 (low note), 1999642 (high note).

HORNS (1955): Nash No. 3141323 (low note), 3141324 (high note).

Horn Relay: Nash No. 3135335 (1954), 3141308 (1955).

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ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 6 cyl. "L" Head.

Bore	Stroke	Displ.	Rated HP
3-1/8"	4-1/4"	195.6 cu. ins.	23.44

Engine	Compr. Ratio	Dev. HP
Powerflyte	7.45-1 ①	100 at 3800
Dual Powerflyte (1954)	8.5-1 ②	110 at 4000
Dual Powerflyte (1955)	8.0-1 ②	110 at 4000

①—Cast Iron head. ②—Aluminum head.

Compression & Vacuum Reading—*See TUNE-UP.*

OIL PAN REMOVAL: Remove steering linkage cross tie-rod before removing pan.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Cam ground, aluminum alloy, tin plated with steel strut and solid skirt.

►*CYLINDER BORE OVERSIZE CAUTION: Code letter adjacent to engine number indicates cylinders bored .010" oversize. See "Original Bore & Pistons" in Nash Special Data.*

Weight—13.59 ozs.

Removal—Remove from above.

Fitting New Pistons: Clearance .0006-.0012". Pistons should just support own weight at any point in cylinder bore (piston and bore dry and clean).

Replacement Pistons: Standard, .002", .005", .010", .020", .030", .040" Oversize.

Installing Pistons: Piston pin is offset in piston. Piston is marked with notch that should face front of engine when installed. *See Rod Installation.*

PISTON PINS

Locked in rod by means of a locking bolt.

Diameter—55/64". **Length**—2.750".

Clearance in Piston—.0003" Maximum loose at 70°F. Thumb push fit.

Replacement Pins: Standard, .001" & .003" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr	.0930-.0935" ①	.010-.020"	.002-.004"
Oil #3	.1545-.1550"	.010-.020"	.002-.004"
Oil #4	.1545-.1550"	②	.002-.004"

①—1955 Dual Powerflyte..07750-.07800", ②—U-flex.

Replacement Rings: Standard & .020" Oversize in sets.

Installing Rings: Stepped inner edge of both compression rings must be UP.

CONNECTING RODS

►*1954 OIL CLEARANCE PRODUCTION CHANGE:* Crankpin journal diameter changed on later engines to decrease clearance. See Journal Diameter below.

►*CONNECTING ROD JOURNAL UNDERSIZE CAUTION: Code letter adjacent to engine number indicates journals are undersize. See "Original Bearing Sizes" in Nash Special Data.*

Length—6.625" center-to-center. **Weight**—25 ozs.

Crankpin Journal Diameter—*NOTE—Journal diameter increased during 1954 production.* 2.0943-2.095" (Before 1954 Engine No. J-10765). 2.0948-2.0955" (After 1954 Engine No. J-10765, and 1955 models).

Original Bearing Sizes—*See "Original Bearing Sizes" in Nash Special Data.*

Bearings—Steel-backed babbitt. No shims.

Clearance—.0010-.0015". **Sideplay**—.005-.015".

Replacement Bearings: Std. & .001", .002", .010" and .012" Undersize.

Installing Rods: Identification marks (raised section on center of rod and bearing cap) toward front of engine.

CRANKSHAFT

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Code letter adjacent to engine number indicates main and connecting journals undersize. See "Original Bearing Sizes" in Nash Special Data.*

►*1954 CRANKSHAFT PRODUCTION CHANGE:* Crankpin journal diameter increased .0005" on later engines to reduce connecting rod oil clearance. See CONNECTING RODS above.

Journal Diameter—2.4791-2.4798". Four bearing.

Original Bearing Sizes—*See "Original Bearing Sizes" in Nash Special Data.*

Bearings—Steel-backed babbitt. No shims.

Clearance—.001-.0015".

Replacement Bearings: Std. & .002", .010", .012" Undersize.

End Thrust: Taken by front main bearing. *See "Crankshaft & Main Bearings" in Nash Special Data.*

Endplay—.003-.008".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Nash Special Data.*

VIBRATION DAMPENER REMOVAL: *See "Vibration Dampener" in Nash Special Data.*

CAMSHAFT

Bearings—Steel backed babbitt bushings.

Clearance—.002".

Camshaft Removal—*See "Camshaft & Bearings" in Nash Special Data.*

End Thrust: Thrust plate on front of engine between No. 1 bearing and camshaft sprocket. End play controlled by position of sprocket on shaft (press fit on shaft).

Endplay—.004-.006".

Timing Chain: Morse. **Width** 1". **Pitch** 3/8". **Length** 22-1/2" or 60 links.

Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across center line of sprockets.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

VALVES

Tappet Clearance: .015" All Valves Hot (with engine running) or .016" Intake, .018" Exhaust Cold.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.594"	.3407-.3412"	4 25/32"
Exhaust	1.343"	.3407-.3412"	4 25/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45° ①	.340"	.0018-.0033"
Exhaust	45° ①	.340"	.0018-.0033"

① Valve Face Angle 44° (Intake & Exhaust).

►*VALVE GRINDING CAUTION:* Replace valve when refacing reduces distance from top of valve face to top of valve to 1/32".

Valve Springs: Install springs with closed coil end up against cylinder block and seated in counter-bore in block.

Free Length—2-5/32".

Valve Spring Specifications

Valve	Lbs. Pressure	Length
Closed	37-41	1-3/4"
Open	75-82	1-7/16"

Valve Guides: Use Tool J-2814 to remove guides and Tool J-1429-A to replace guides. Drive guides flush with the guide bore opening in the block.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 10° BTDC, Close 58° ALDC.

Exhaust Valves—Open 49° BLDC, Close 19° ATDC.

NOTE—Above readings with .019" valve lash.

Valve Timing Check—Set valves on No. 1 cylinder at .003" lash. With No. 6 piston at TDC in firing position, timing will be correct if exhaust valve opens the same abount before DC on vibration dampener as intake valve opens after DC as engine is rocked back and forth over DC.

OILING SYSTEM

Crankcase Capacity: 4 qts. refill.

Normal Oil Pressure: 30 lbs. at 20 MPH. 12 lbs. minimum at 600 RPM.

Pressure Regulator Valve—Non-adjustable spring loaded valve located under plug near oil pump.

Oil Pressure Indicator—Light goes on when Ignition switch is turned on, goes out as oil pressure reaches 5-8 lbs. Carter Switch A-954S, Nash 3134704, located on right side of crankcase.

Oil Pump: Gear type mounted on right side of engine, driven by inclined shaft.

Oil Filter: Partial Flow type. Replace element every 8000 miles or less as needed.

Replacement Filter Unit—Nash No. 3113312.

Crankcase Ventilation: Breather pipe in Valve Cover and filter in crankcase filler cap.

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C OLING

Water Capacity: 15 qts. (with heater).
Pressure Valve: (Exc. Air Conditioned Cars)—Radiator cap, Nash No. 3136627, 7 lb. (1954). No. 3142965, 7 lb. (1955). **Air Conditioned Cars**—Nash No. 3141371, 14 lb. (1954-55).

Thermostat: Choke type, Nash No. 3131817 (167-173°). Use 3131985 (177-182°) for permanent anti-freeze.
Water Pump: Sealed packing and bushing type. *See "Nash" in Water Pump Section.*

Pump Removal—Drain cooling system, remove distributor, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting screws.

►*1955 WATER PUMP LUBRICATION CHANGE:* Starting with Engine No. S-440115, the water pump lubrication fitting was eliminated and a prelubricated water seal cartridge used.
Temperature Gauge: Auto-Lite. Electric type.
Dash Unit—Auto-Lite No. 13521A (1954); No. 13881A (1955).
Engine Unit—Auto-Lite No. 11528A (1954-55).
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 8A7. Assy. No. 987. Single plate.
See "Borg & Beck" in Clutch Section.
Pedal Adjustment: Pedal free play 1/2-3/4". Adjust by loosening locknut and turning adjusting nut on connector link **at clutch fork.**
►*CAUTION: The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project 1/2" from beam toward the rear.
Clutch Linkage—*See "Clutch Notes" in Nash Special Data.*
Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punch mark flywheel, clutch cover and pressure plate. (Reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Own. 3 speed, all helical gear type.
See "Nash Transmission" in Transmission Section.
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
Removal: Disconnect brake tube bracket at body, and torque tube at rear of transmission. Disconnect brake cable at bell crank and cable housing at bell crank bracket. Move rear axle assembly to rear off transmission main shaft splines. Disconnect speedometer cable and shifter rods, (if overdrive equipped, disconnect wires at solenoid and overdrive cable at lever). Use guide pins, Tool J-1434, in two upper cap screw positions and slide transmission free of pilot bearing and clutch disc.

OVERDRIVE

Warner R10. Used with Nash transmission.
See "Warner R10 Overdrive" in Transmission Section.
Overdrive Control: *Two types used.*
Super (With Accelerator Pedal Kickdown)—*See "Warner R10 & R11 Overdrive Control" in Transmission Section.*
Custom (With Steering Wheel Button Kickdown)—*See "Warner Pushbutton Type Overdrive Control" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with fluid coupling.

►*1955 HYDRA-MATIC ROUGH 2-3 UPSHIFT CORRECTION:* If rough 2-3 upshift cannot be eliminated by proper linkage and internal band adjustment, install Service Spring, Part No. 3119206 in front servo body 4-3 downshift valve. *See "Hydra-Matic Drive" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*
Lubrication—Check fluid every 1,000 miles, drain and refill at 25,000 mile intervals.
Capacity—8-1/2 qts. (9-1/2 qts. after overhaul).
Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located under right front floor plate). Add fluid to bring level up to "F" mark.
▲*CAUTION:* Do not check oil level when transmission is excessively hot and do not fill above the "F" mark on dipstick.
►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit—Cross type. One used at forward end of propeller shaft.

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive.
See "Nash Rear Axles" in Rear Axle Section.

Rear Axle Ratios

Model	Standard	Optional
1954-55 Synchro-mesh	4.4-1 (8-25)	4.1-1 (9-37)
1954-55 Overdrive	4.9-1 (8-39)	4.4-1 (8-35)
1954-55 Hydra-Matic ℂ	3.58-1 (12-43)	

ℂ—Rear axle ratio used in 1954 production for a short period.

Backlash—.002-.006". Shim adjustment.
Axle Shaft Removal: Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate, and wheel bearing adjusting shims. Withdraw axle shaft using puller J-2498. Do not drag shaft on inner oil seal.
Rear Axle Assembly Removal: Jack up and support rear end of body. Disconnect rear brake cable at equalizer, torque tube at rear of transmission, brake hose and shock absorbers at rear axle end (allow shocks and brake hose to hang from body). Roll axle assembly out from under car.
Wheel Bearing Adjustment: Shims behind brake backing plate.
Rear Suspension: *See "Nash Rear Suspension" in Rear Axle Section.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.

Shock Absorber Application

Model	Front	Rear
1954 (Std.)	3117363	3117371
1954 (Heavy Duty)	ℂ 3117364	
1955	3118500	3117364

ℂ—Use with Continental Kit, and Heavy Duty rear spring Part No. 3140400.

FRONT SUSPENSION

►*FRONT SUSPENSION ADJUSTMENT NOTE: Camber & Caster adjusted by shims between lower control pivot arm and support (1954 Models), and by lower control arm eccentric bolts (1955 Models).*

►*1955 FRONT CROSSMEMBER INSTALLATION CAUTION:* When installing front crossmember, distance between centers of either front or rear mounting bracket bolt holes must be 19½" to insure maintaining front wheel alignment.
►*1955 CASTER & CAMBER LOSS OF ADJUSTMENT CORRECTION:* Beginning with Engine No. 635286, improved eccentric bolt nut (deeper counter-bore) provides more positive locking of eccentric adjusting bolt. If necessary a 5/8" L.D. washer may be installed between nut and eccentric washer to insure locking of bolt and eccentric washer.

Independent. Linked parallelogram type with coil springs located between upper ends of steering knuckle pin and seat in outer wheel house panel.
See "Nash" in Front Suspension Section.
King Pin Inclination—6-1/2°.
Caster (Manual Steering)—Pos. 1/2° desired (limits 0° to Pos. 1/2°). **(Power Steering)** Pos. 1° desired (limits Pos. 1/2° to Pos. 1°).

Camber—0° desired (limits Neg. 1/4° to Pos. 1/4°).
Toe-In—1/16"-3/16".
Toe-Out on Turns—Outer wheel 20-3/4°, Inner wheel 25°.

STEERING

Manual: Gemmer. Worm & Roller with "push-pull" adjustments.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: Monroe "Power Guide". Linkage type.
See "Monroe Power Guide" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*

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Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*
Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

1954 MODELS

Bendix (Lockheed) Self-Centering. Hydraulic type with floating self-centering shoes (no anchor pin adjustment). Hand lever applies rear wheel service brakes.
See "Bendix (Lockheed) Self-Centering" in Brake Section.
Drums—Diameter 9" (front & rear).
Wheel Cylinder Diameter—1 1/16" (front), 7/8" (rear).

Lining Width & Length

Brake Shoe	Front Wheel	Rear Wheel
Primary	2¼" x 9 7/8"	2" x 9 7/8"
Secondary	2" x 7 11/16"	1¾" x 7 11/16"

Thickness—.314" (All Shoes).
Braking Power—55.5% (front), 44.5% (rear).
Clearance—All shoes free of drag with brakes centralized (by hard application and releasing pedal). Eccentric adjustment for each shoe.

1955 MODELS

►*BRAKE CHATTER CORRECTION (Caused by Uneven Wheel to Hub Contact Ledges): See "Bendix Hydraulic Single Anchor" in Brake Section.*
Bendix Hydraulic, Single Anchor. Hand lever applies rear wheel service brakes.
See "Bendix Hydraulic, Single Anchor" in Brake Section.
Drums—Diameter 10" (front & rear).
Wheel Cylinder Diameter—1-1/8" (Front), 15/16" (Rear).

Lining Width & Thickness

	Front Wheel	Rear Wheel
Primary Shoes	2-1/4" x 8-1/2"	1-3/4" x 8-1/2"
Secondary Shoes	2-1/4" x 11"	1-3/4" x 11"

Clearance—.015" heel & toe of secondary shoe with primary out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

1954-55 MODELS

Power Brakes: Bendix Power Unit. Replaces standard master cylinder.
See "Bendix Power Unit" in Brake Section.
Checking Fluid—Same as for standard master cylinder.
Removal—Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: *Nash-Hudson Air Conditioning.* Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Miscellaneous Section.
Window Regulators: Electric with reversible motor. *See "Nash Window Regulators" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

►*MODEL IDENTIFICATION NOTE: Super Jetfire Models have one carburetor. LeMans Dual Jetfire Models have two carburetors.*

SERIAL NUMBER: Stamped on plate located under hood on cowl panel.

Starting Serial Number

Model	Kenosha	El Segundo
1954	R-722501	RC-22001
1955	R-742901	RC-23001

ENGINE NUMBER: Stamped on machined surface on right side at front of block.

Starting Engine Number

Model	Super Jetfire	LeMans Dual Jetfire
1954	A-246001	LMA-246001
1955	A-270001	LMA-270001

►*ENGINE NUMBER SUFFIX CODE NOTE: A three letter code stamped adjacent to engine number indicates as follows:*

Letter Sequence Code

First Letter ..... Size of Bore
Second Letter ..... Size of Main Bearings
Third Letter ..... Size of Con Rod Bearings

Letter Size Code

Letter "A" ..... Standard
Letter "B" ..... .010" Undersize
Letter "C" ..... .010" Oversize
Letter "D" ..... .001" Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. (Exc. 1954 Dual Jetfire). 130 lbs. (1954 Dual Jetfire). All at cranking speed.

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE: Intake .012" hot, Exhaust .016" hot.

MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .030".

Spark Plug–Auto-Lite A-7 (Exc. 1954 Dual Jetfire). Auto-Lite AL-5 (1954 Dual Jetfire). Tighten to 30 ft. lbs. (Cast Iron Head); 25 ft. lbs. (Aluminum Head).

COIL: Delco-Remy 1115380.

Ignition Current–2.5 amps. idling, 4.5 amps. stopped.

DISTRIBUTOR: Delco-Remy 1110227 (1954); No. 1110241 (1955).

Condenser–Delco-Remy 1869704. **Capacity**–. 18-.23 mfd.

Contact Point Set–Delco-Remy 1916636 (Distr. 1110227); No. 1924499 (Distr. 1110241).

Breaker Gap–.018-.024".

Cam Angle (Distr. 1110227)–31-37° (with .022" Gap).

Cam Angle (Distr. 1110241)–38-45° (with .016" Gap).

Breaker Arm Spring Tension–17-21 ozs. (1110227); 19-23 ozs. (1110241).

Rotation–Clockwise viewed from above.

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		350	0-4		700
6-8		650	12-16		1300
10-12		1050	20-24		2100
13-15		1350	26-30		2700

Vacuum Spark Control: Delco-Remy 1116044 (1954); 1116092 (1955).

Plunger Travel–7/64".

Vacuum Advance

Distr. Degrees	Engine Degrees	Vacuum (" of HG)
Start	0	4-6
5-7	10-14	15

IGNITION TIMING

Setting–TDC (1954); 4° ATDC (1955).

Timing Mark–Groove on dampener aligns with pointer on timing chain cover.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: One carburetor used on Super Jetfire, two carburetors used on LeMans Dual Jetfire.*

►*1954 HARD STARTING OR PERCOLATION CORRECTION:* Heat Deflector, Insulated Fuel Line, and Drain Tube & Hole provided in production. These parts may be installed on earlier cars. *See "Carter YH Carburetor" in Carburetion Section.*

Throttle Linkage Adjustment (Hydra-Matic): Adjust engine idle speed at 450 RPM (with air conditioning, 500 RPM compressor running) with engine temperature at 150-160° F., transmission warm and selector lever in neutral. Disconnect throttle rod, at throttle lever at side of transmission. Clean machined surface at back of transmission case and place throttle lever checking gauge J-2545-C flush against surface with edge of gauge against transmission side cover. The throttle lever stud should fit freely in notch of gauge. If gauge does not pass over throttle lever stud freely, use bending Tool J-3310 and bend to proper location. Gauge notch must slide freely on stud pin. Adjust transmission throttle rod (which is threaded into upper throttle rod yoke) to fit freely on throttle lever stud; **then shorten rod approximately two turns (Exc. 1954 Dual Jetfire); 3 turns (1954 Dual Jetfire).** Install rod on stud and replace wave washer, flat washer and cotter pin.

CARTER YH (Super Jetfire)
(895SA)

Idle Setting–½-1½ turns open. Turn screw out for richer mixture.

Idle Speed (Without Air Conditioning)–550 RPM (1954 Std. & O.D. Trans.). 500-550 RPM (1955 Std. & O.D.). 450 RPM (1954-55 Hydra-Matic, in "N").

Idle Speed (With Air Conditioning)– 500 RPM with compressor operating. (All transmissions, Hydra-Matic in neutral).

Float Level–3/8". With bowl cover inverted and weight of float on needle valve, measure distance from bowl cover (gasket removed) to top of float.

Accelerating Pump–No seasonal adjustment.

Fast Idle: .030" clearance between throttle valve and bore of carburetor (side opposite idle port) with choke valve closed and fast idle adjusting screw on high step of cam.

Unloader Adjustment: After fast idle adjusted, hold throttle valve wide open, close choke valve as far as possible. Clearance between lower edge of choke valve and air horn wall should be 5/8" (Gauge T109-85).

Automatic Choke Setting: 1 point rich. *NOTE–On Early 1954 Models with one-piece choke piston, set choke 1 point lean.*

Hydra-Matic Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter YH Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 3½-5¼ lbs. at 500 RPM.

CARTER YH (LeMans Dual Jetfire)
(973S Front, 974S Rear)

Idle Setting– ¾-1¾ turns open. Turn screw out for richer mixture.

Idle Speed (1954 All Models)–550-650 RPM. *(NOTE–* Selector lever in "N" on Hydra-Matic Models). *See "Throttle Synchronization" below.*

Idle Speed (1955 Models Without Air Conditioning)– 500-550 RPM (Std. & O.D.); 450 RPM (Hydra-Matic, in "N"). *See "Throttle Synchronization" below.*

Idle Speed (1955 Models With Air Conditioning)– 500 RPM with compressor operating (All transmissions. Selector lever in "N" on Hydra-Matic). *See "Throttle Synchronization" below.*

Float Level–7/16". Distance from bowl cover (gasket removed) and top of float at free end. Use Gauge T-109-81.

Accelerating Pump–No seasonal adjustment.

Fast Idle: .015" clearance between throttle valve and bore of carburetor (side opposite idle ports) with choke valve closed and idle screw on high step of fast idle cam.

Unloader Adjustment: After fast idle adjusted, hold throttle valve wide open, close choke valve as far as possible. Clearance between lower edge of choke valve and air horn should be 5/8" (Gauge T-109-85). Adjust by bending shaft unloader arm using tool T109-105.

Automatic Choke Setting: Set two points lean.

Throttle Synchronization (LeMans Dual Jetfire Models)..

To insure correct synchronization, make idle adjustments in following sequence:

1) Remove air cleaner boots and "Tee" from carburetor airhorns.

2) Adjust throttle stop screw on rear carburetor as follows: Hold choke valve open, back off throttle stop screw until throttle valve is just closed, then turn screw in approximately 2 turns to crack throttle valve slightly. Adjust front carburetor similarly.

3) Start engine and allow it to idle until normal temperature reached. Attach Tachometer.

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4) Adjust rear carburetor stop screw for minimum idle speed (See above).
5) While noting idle speed, synchronize front carburetor by adjusting connecting throttle linkage between carburetors, opening front carburetor throttle just to the point where further opening begins to increase engine speed. At this point, air suction noise in both carburetors should be identical.
6) Replace air cleaner boots and "Tee" connections.
7) Adjust idle mixture on rear carburetor by turning adjusting screw in (to lean mixture) until engine begins to be rough, then turn screw out ¼ turn. Adjust idle mixture for front carburetor similarly.
8) Recheck idle speed. If not within limits (see above) repeat synchronization (1 thru 5).

Hydra-Matic Throttle Linkage Adjustment: See *CARBURETOR above.*

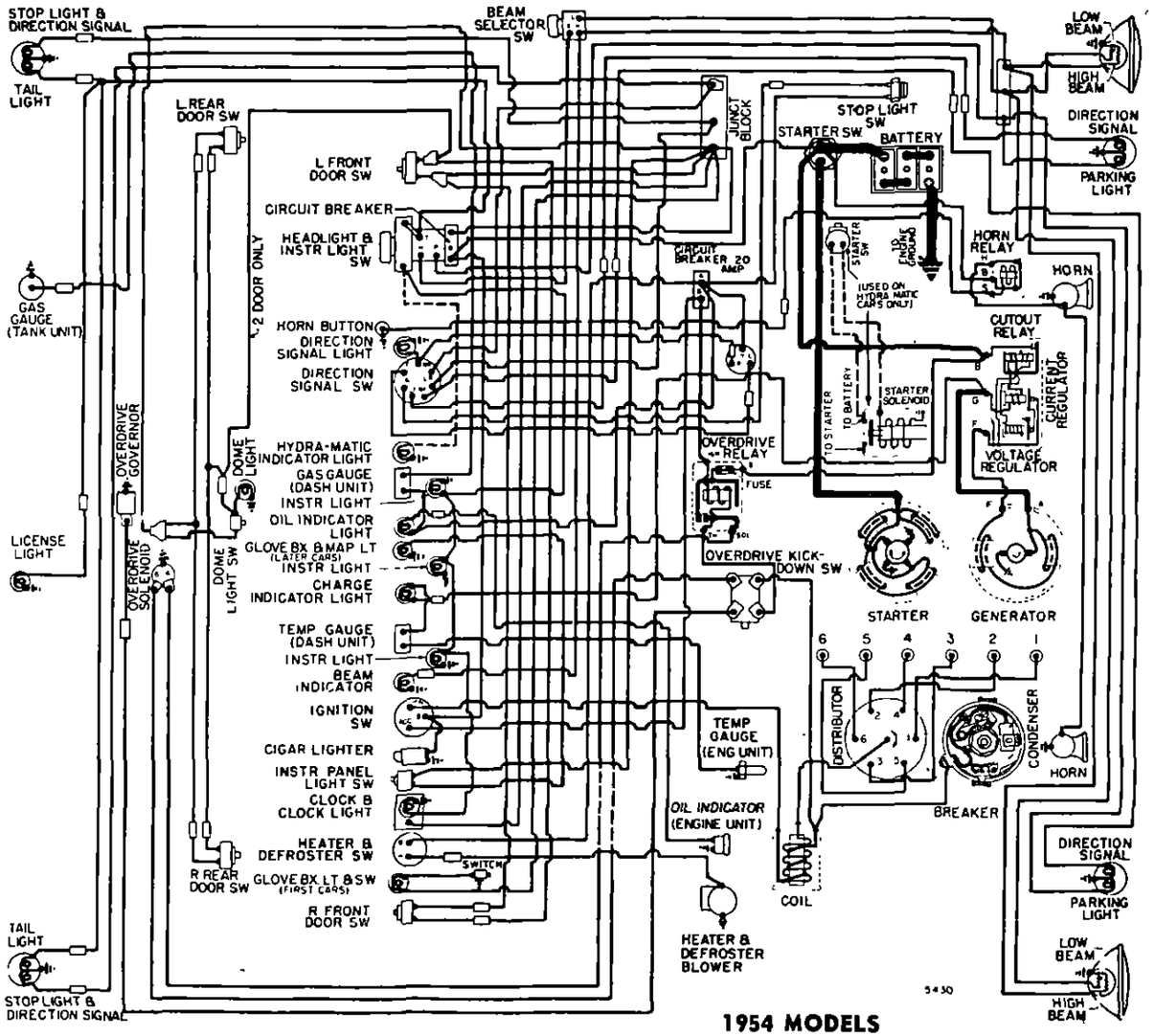
►*OTHER DATA:* See *"Carter YH Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 3½-5¼ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Fuel only (Std.), Fuel & Vacuum (OD. & Hydra-Matic).
Replacement Pump (Fuel)—*AC No. 533 (with glass bowl) or 9802 (without bowl).*
Fuel & Vacuum—AC No. 9799 or Carter M798S.
Pressure—3-1/2—5-1/4 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Equip. Section.

Gasoline Gauge: Auto-Lite Electric Type.
Dash Unit—Auto-Lite 13520A (1954); No. 13380A (1955).
Tank Unit—Auto-Lite 12642A.
See "Fuel Gauges" in Carburetion Section.



1954 MODELS

BATTERY

Auto-Lite 1H-105D. 6 volt, 15 plate, 105 Ampere hour capacity (20 hr. rate).
Grounded Terminal—Positive (+).
Engine Ground—Battery to engine with body ground from transmission to rear cross member.

STARTER

Delco-Remy No.	Starter	Armature
Std. Trans. LHD	1107950	1911832
Std. Trans. RHD	1107959	1911832
Hydra-Matic	1108029	1878077

Drive—Delco-Remy Automatic Drive or Bendix "Folo-thru" type. **Synchro-mesh & OD. Cars**—Delco-Remy 1882549 or Bendix A2033. **Hydra-Matic Cars**—Delco-Remy 1922266 or Bendix A3281.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

(1107950)

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
13.5 ft. lbs.	Lock	3.15	570

(1107959)

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.67	80
15 ft. lbs.	Lock	3.0	600

(1108029)

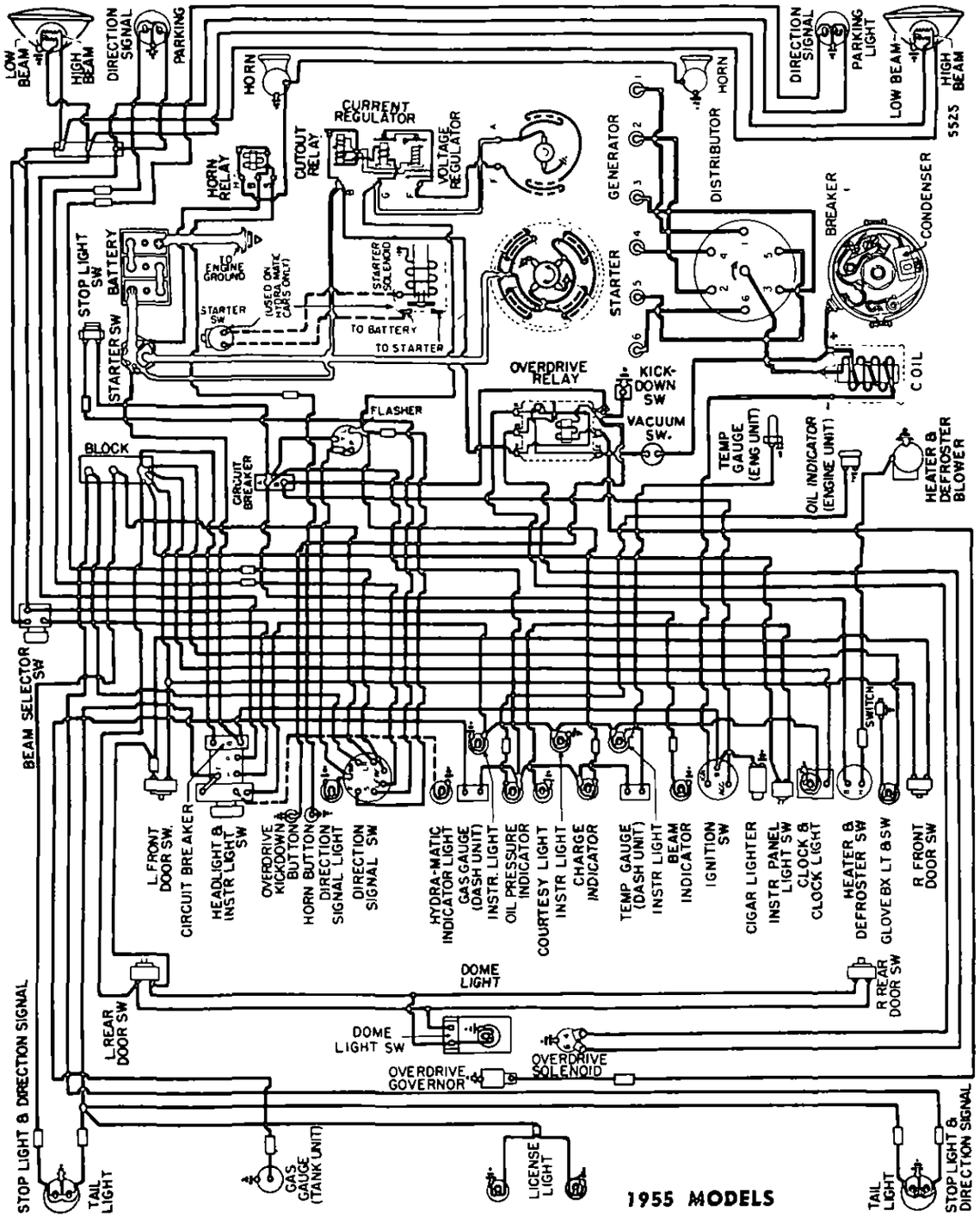
Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.67	80
14 ft. lbs.	Lock	3.0	600

Starting Switch: Two types used.
Std. & Overdrive Transmissions—Delco-Remy 1996478. Mounted on floor board, actuated by fully depressing clutch pedal.
Hydra-Matic Transmission—Nash No. 3137292. Mounted on left front fender apron, controlled by Control Switch Delco-Remy 1996074. Control switch mounted on steering column and operated by Hydra-Matic selector lever (operative in "N" by lifting lever).
Control Switch Adjustment—*See "Hydra-Matic Linkage Adjustment" in Transmission Section.*

GENERATOR

Delco-Remy No.	Generator	Armature
Without Air Cond.	1102777	1921981
With Air Cond.	1102815	1921981

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1955 MODELS

SEE NASH STATESMAN FOR STD. OVERDRIVE CONTROL ("PUSHBUTTON" TYPE SHOWN)

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Performance Data Cold (1102777 & 1102815)

Amperes	Volts	RPM
45 ①	8.0	2450

① Not maximum. See Regulator data.

Brush Spring Tension–28 ozs.
Field Current–1.87-2.00 amperes (at 80°F) at 6 volts.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: 1/2" deflection in belt halfway between fan and generator pulleys with an application of 25 lbs.

REGULATOR

Delco-Remy 1118828. *NOTE–Regulator is "1118825 Series". Specifications are for "Normal" settings.*

Cutout Relay

Cuts In–6.4 volts, hot.
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–7.3 volts, hot.
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–47 Amperes.
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Directional Signals: *See Electrical Equip. Section.*
Light Switch Removal: Loosen Allen screw and remove knob. Remove retaining nut. Push switch back and lower to remove wires.
Stop Light Switch Location: At tee fitting in line to front brakes.
FUSES: Located as follows:
Radio–14 ampere. Located under cowl to right of steering column. Remove storage bin for access.
Overdrive–30 ampere. Under hood on left side on relay.
CIRCUIT BREAKERS: Two used as follows:
30 ampere on light switch (main lighting).
20 ampere behind dash panel on left side of cowl (Ignition, heater motors and stop light).
HORNS (1954): Delco-Remy 1999641 (low note), 1999642 (high note).
HORNS (1955): *Nash No. 3141323 (low note), 3141324* (high note).
Horn Relay– Nash No. 3135335 (1954), 3141308 (1955).

ENGINE

▷*AIR CONDITIONING CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 6 cyl. valve in head.

	Bore	Stroke	Displacement
All engines	3-1/2"	4-3/8"	252.6 cu. ins.

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	Comp. Ratio	Rated HP	Developed HP
Super Jetfire	7.6-1	29.4	130 at 3700 RPM
Lemans Dual Jetfire	7.6-1	29.4	140 at 4000 RPM

Compression & Vacuum Reading–*See TUNE-UP.*

OIL PAN REMOVAL: Remove steering linkage cross tie-rod before removing pan.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Cam ground, aluminum alloy, tin plated with steel strut and solid skirt.

►*CYLINDER BORE OVERSIZE CAUTION: Code letter adjacent to engine number indicates cylinders bored .010" oversize. See "Original Bore & Pistons" in Nash Special Data.*

Weight–19.57 ozs.
Removal–Remove from above.

Fitting New Pistons: Clearance .0009-.0015". Fit piston so that it will support itself in any part of cylinder bore (dry piston & bore).

Replacement Pistons: Std., .002", .005", .010", .020", .030" & .040" Oversize.

Installing Pistons: Notch on front edge of piston must be toward front of engine. *See Rod Installation.*

PISTON PINS

1954 Models–Floating type pin used before Engine No. A-254478. Locked in rod after above engine number.

1955 Models–Locked in rod (same as Late 1954 Models).

Diameter–15/16". **Length**–3.000".
Clearance in Piston–.0002" max.
Clearance in Rod (Floating Type Pin)–.0002".

Replacement Pins: (Floating Type)–Std., .001", .003", .005" Oversize. (Locked-in-Rod Type)–Std., .001", .003" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.	.0930-.0935"	.007"	.002-.004"
Oil #3	.1545-.1550"	.007"	.002-.004"
Oil #4	.1545-.1550"	②	.002-.004"

② No end gap with U-flex ring.

Replacement Rings: Std. & .020" Oversize. In sets.
Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

►*CONNECTING ROD JOURNAL UNDERSIZE CAUTION: Code letter adjacent to engine number indicates journals are undersize. See "Original Bearing Sizes" in Nash Special Data.*

Length–8.750" center to center. **Weight**–29 ozs.
Crankpin Journal Diameter–2.0010-2.0003".
Original Bearing Sizes–*See "Original Bearing Sizes" in Nash Special Data.*
Bearings–Steel backed babbitt. No shims.
Clearance–.001-.015". **Side Play**–.005-.015".
Replacement Bearings: Std., .001", .002", .010", .012" Undersize.
Installing Rods: The identification boss on center of rod is installed to front of engine.

CRANKSHAFT

►*CRANKSHAFT JOURNAL DIAMETER CAUTION: Code letter adjacent to engine number indicates main and connecting rod journals undersize. See "Original Bearing Sizes" in Nash Special Data.*

Journal Diameter–2.4791-2.4798". Seven main bearings.
Original Bearing Sizes–*See "Original Bearing Sizes" in Nash Special Data.*
Bearings–Steel backed babbitt.
Clearance–.001-.0015".
Replacement Bearings: Std., .002", .010", .012" Undersize.
End Thrust: Taken on center No. 4 main bearing.
End Play–.003-.008".
Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Nash Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Nash Special Data.*

VIBRATION DAMPENER REMOVAL & INSTALLATION: *See "Vibration Dampener" in Nash Special Data.*

CAMSHAFT

Bearings–Steel-backed babbitt bushings (except #1 Cast Iron with babbitt lining).
Clearance–.002".
Camshaft Removal–*See "Camshaft & Bearings" in Nash Special Data.*
End Thrust: Controlled by position of chain sprocket & No. 1 bearing.
End Play–.004-.006".
Timing Chain: Morse. **Width**–1". **Pitch**–3/8". **Length**–22-1/2" or 60 links.
Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across center line of sprockets.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

VALVES

►*1955 INTAKE & EXHAUST VALVE PRODUCTION CHANGE:* Starting with Serial No. R-744962, the safety lock ring has been eliminated as the rubber "O" ring seal prevents the valve from dropping into cylinder bore. When using the later type valve, the "O" ring seal must be used.

Tappet Clearance: Intake .012" Hot. Exhaust .016" Hot.

Valve	Head Diameter	Stem Diameter	Length
Intake	1.787"	.3720-.3730"	5-31/64"
Exhaust	1.468"	.3725-.3735"	5-31/64"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30° ①	.393"	.002-.004"
Exhaust	45° ②	.3945"	.002-.004"

① –Valve face 29°. ② –Valve face 44°.

►*VALVE GRINDING CAUTION:* Replace valve when refacing reduces distance from top of valve face to top of valve to 1/32".

Valve Stem Oil Seal: *See "Valve System" in Nash Special Data.*

Valve Springs: Install springs with closed-coil end toward valve seat. **Free Length**–2-1/16".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	53-58	1-13/16"
Open	144-154	1-7/16"

Valve Guides: Pressed in. Use Tool J-4687 to replace guides. *NOTE*–Before removing guides, check height of guide and install guide to same height.
Rocker Arm Assembly: *See "Valve System" in Nash Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves–Open 12-1/2° BTDC. Close 51-1/2° ALDC.
Exhaust Valves–Open 53-1/2° BLDC. Close 10-1/2° ATDC.
Valve Timing Check–With No. 6 piston on TDC in firing position, set tappet clearance on No. 1 Intake & Exhaust at .003". Rock engine back and forth over TDC. Timing is correct if the Exhaust valve opens before TDC same amount that the Intake opens after the TDC mark.

OILING SYSTEM

Crankcase Capacity: 6 qts.
Normal Oil Pressure: 30 lbs. at 20 MPH, 12 lbs. minimum at 600 RPM.
Pressure Regulator Valve–Non adjustable, located in pump body. Opens at 50-58 lbs.
Oil Pressure Indicator–Light goes on when Ignition Switch is turned on, goes out as oil pressure reaches 5-8 lbs. Carter Switch A 954S, Nash No. 3134704 located on right side of crankcase.
Oil Pump: Gear type, driven off camshaft, mounted on center main bearing cap.
Oil Pump Removal Note–Pump must be dismantled for removal.
Pump Overhaul–*See "Oiling System" in Nash Special Data.*
Oil Filter–Partial Flow type. Replace element every 8000 miles or less as needed.
Replacement Filter Element–Nash No. 3113750.
Crankcase Ventilation: Breather pipe in valve cover and filter in crankcase filler cap.

COOLING

Water Capacity: 17 qts. Add 1 qt. for heater.
Pressure Valve: 7 lb. Radiator Filler Cap Nash No. 3142965 (less Air Conditioning), 14 lb. No. 3141371 (with Air Conditioning).
Thermostat: Choke type, Nash No. 3131817 (167-173°), Use 3131985 (177-182°) for permanent anti-freeze.
Water Pump: Sealed packing and bushing type.
See "Nash" in Water Pump Section.
Pump Removal–Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting screws.
►*1955 WATER PUMP LUBRICATION CHANGE:* Starting with Engine Number A-270049, water pump lubrication

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fitting was eliminated and a prelubricated pump seal cartridge was used.

Temperature Gauge: Auto-Lite Electric.

Dash Unit—Auto-Lite No. 13521A (1954); No. 13881A (1955).

Engine Unit—Auto-Lite No. 11528A (1954-55).

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 10A7 Assy. No. 950. Single plate.

See "Borg & Beck" in Clutch Section.

Clutch Disc No.—Borg & Beck CD 752. Nash No. 3125822.

Pedal Adjustment: Pedal free travel 1/2-3/4". Adjust by loosening locknut and turning adjusting nut on control link at clutch fork.

►*CAUTION: The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project 5/16" from beam toward the rear, to provide proper leverage.

Clutch Linkage—*See "Clutch Notes" in Nash Special Data.*

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan. Punch mark flywheel-clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner AS25-T86E (Standard), AS46-T86E (With Overdrive). Three speed, helical gear type.

See "Warner Transmissions" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Move rear axle back (see Universals for procedure) to slip front universal joint off transmission. Disconnect shift levers and speedometer cable, remove two upper transmission to bell housing bolts, and install special guide bolts in their place. Remove lower bolts slide transmission out.

OVERDRIVE

Warner R10. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *Two types used.*

Super (With Accelerator Pedal Kickdown)—*See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

Custom (With Steering Wheel Button Kickdown)—*See "Warner Pushbutton Type Overdrive Control" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with fluid coupling.

►*1955 HYDRA-MATIC ROUGH 2-3 UPSHIFT CORRECTION:* If rough 2-3 upshift cannot be eliminated by proper linkage and internal band adjustment, install Service Spring, Part No. 3119206 in front servo body 4-3 downshift valve. *See "Hydra-Matic Drive" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid every 1,000 miles, drain and refill at 25,000 mile intervals.

Capacity—11 qts. 12 qts. after disassembly.

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position remove dipstick and check fluid level (dipstick located under right front floor plate). Add fluid to bring level up to "F" mark.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit—Cross type. One used at rear of transmission.

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive.

See "Nash Hypoid" in Transmission Section.

Axle Ratio—4.1-1 (10-41) Std., 4.4-1 (9-40) with Overdrive, 3.2-1 (13-41) with Hydra-Matic.

Backlash—.002-.006" shim adjusted.

Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims, and replace same amount when reassembling). Withdraw shaft using puller J-2498, do not drag on inner seal.

Rear Axle Assembly Removal: Raise and support rear end of car. Disconnect rear brake cables at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at axle end (let hang from body). Roll axle free.

Wheel Bearing Adjustment: Shims behind brake backing plate.

Rear Suspension: *See "Nash Rear Suspension" in Rear Axle Section.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.

Shock Absorber Application

Model	Front	Rear
1954 (Std.)	3117363	3117371
1954 (Heavy Duty)	©3117364	
1955	3118500	3117364

©—Use with Continental Kit, and Heavy Duty Rear Spring, Part No. 3140400.

FRONT SUSPENSION

►*FRONT SUSPENSION ADJUSTMENT NOTE: Camber & Caster adjusted by shims between lower control pivot arm and support (1954 Models), and by lower control arm eccentric bolts (1955 Models).*

►*1955 FRONT CROSSMEMBER INSTALLATION CAUTION:* When installing front crossmember, distance between centers of either front or rear mounting bracket holes must be 19½" to insure maintaining front wheel alignment.

►*1955 CASTER & CAMBER LOSS OF ADJUSTMENT CORRECTION:* Beginning with Engine No. R-743047, improved eccentric bolt (deeper bore) provides more positive locking of eccentric adjusting bolt. If necessary, a 5/8" I.D. washer may be installed between nut and eccentric washer to insure locking of bolt.

Independent. With coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.

See "Nash" in Front Suspension Section.

King Pin Inclination—6-1/2°.

Caster—**(Std.)** Pos. ½° desired (limits 0° to Pos. ½°). **(Power Steering)** Pos. 1° desired (limits Pos. ½° to Pos 1°).

Camber—0° desired with 1/4° Neg. to 1/4° Pos. Limit.

Toe-In—1/16-3/16".

Toe-Out on Turns—Outer wheel 20-1/4°. Inner 25°.

STEERING

Manual: Gemmer Model 305. Worm & Roller with "push-pull" adjustments.

See "Gemmer Steering Gears" in Steering Section.

Power Steering: Bendix Linkage type.

See "Bendix Linkage Type" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix Hydraulic Single Anchor. Hand lever applies rear wheel service brakes.

See "Bendix Hydraulic, Single Anchor" in Brake Section.

Drums—10" (1954); 11" (1955). Front & Rear.

Wheel Cylinder Diameter—Front 1 1/8". Rear 15/16".

1954 Lining Width & Length

Shoe	Front	Rear
Primary	2" x 9"	2" x 9"
Secondary	2½" x 11 3/32"	2" x 11 3/32"

1955 Lining Width & Length

Shoe	Front	Rear
Primary	2½" x 9 3/8"	2" x 9 3/8"
Secondary	2½" x 12"	2" x 12"

Thickness—7/32" (1954-55).

Braking Power—52.8% Front, 47.2% Rear (1954). 56% Front, 44% Rear (1955).

Clearance—.015" heel & toe of secondary shoe with primary out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

Standard Master Cylinder: Mounted on support under floor pan to left of transmission.

Checking Fluid—Roll back floor mat, remove access hole cover, maintain fluid 1/2-1" below filler opening.

Removal—Remove from below without disturbing other parts.

Power Brakes: Bendix Power Unit. Replaces standard master cylinder.

See "Bendix Power Unit" in Brake Section.

Checking Fluid—Same as for standard master cylinder.

Removal—Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning.

See "Nash-Hudson Air Conditioning" in Miscellaneous Section.

Power Window Regulators: Electric with reversible motor. *See "Nash Window Regulators" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.

Starting Serial Number—(Kenosha) V-1001, El Segundo VC-1001, (Unassembled Export) 8KD-1001.

ENGINE NUMBER: Below right exhaust manifold.

Starting Engine Number—P-1001.

TUNE-UP

►*HARD STARTING CORRECTION (CARS BEFORE ENGINE NO. P-14763) & CARBURETOR PRODUCTION CHANGE: See "Carter WGD" in Carburetion Section for installation of Atmospheric Vent.*

►*POOR WARM-UP CORRECTION & CARBURETOR PRODUCTION CHANGE: See "Carter WGD" in Carburetion Section for recommended changes on carburetors date-coded before tag date "M-5" or Engine No. P-24900.*

►*SLOW COLD STARTING CORRECTION:* Check spark plugs, breaker points, all electrical connections, and ignition timing. See that carburetor choke valve has .005" clearance in all positions and that choke valve and shaft operate freely. Choke vacuum piston must operate freely in cylinder and there must be no bind between unloader arm on choke lever and fast idle link. *NOTE*—Automatic choke may be set one point rich or lean from standard setting to improve starting and warming up performance.

COMPRESSION PRESSURE: 140 lbs., at cranking speed (150 RPM), with wide open throttle.

VACUUM READING: 19" at 1500 RPM. 17.25" at 425 RPM.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic type. Located at left manifold outlet.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plug—(Before Engine No. P-6001) Champion H-10 or Auto-Lite AL-7. (After Engine No. P-6001) Champion N-8 or Auto-Lite AG-5. Tighten plugs to 30 ft. lbs.

COIL: Auto-Lite CR-6001.

Ignition Current—2.30 amps. (idling).

DISTRIBUTOR: (Before Engine No. P-6001) Auto-Lite IBK-4001. (After Engine No. P-6001) Auto-Lite IBK-4001-B.

Condenser—Auto-Lite IBB-2015L. **Capacity** .25-.28 mfd.

Contact Point Set—Auto-Lite IGW-3028JS.

Breaker Gap—.017"±.002".

Cam Angle—33°-39°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance—IBK-4001

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
1	325	2	650
11	600	22	1200
19	1135	38	2270
20	1200	40	2400

Automatic Advance-IBK-4001-B

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
1	375	2	750
8	850	16	1700
15	1650	30	3300
16	1750	32	3500

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IBK-4001

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6"
1	2	6 3/4"
3	6	8 1/4"
4	8	8 7/8"
5.5	11	10

Vacuum Advance—IBK-4001-B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6 1/4"
1	2	6 5/8"
6	12	9"
11	22	12 1/8"
12	24	13"

IGNITION TIMING

Setting—5° BTDC.

Timing Mark—Timing indicator on chain cover marked 0 - 5 - 10 - 15. Align groove in vibration dampener with correct mark on indicator.

CARBURETOR

Carter WGD, No. 2231S (Early), 2231SA (Later). Dual downdraft type with automatic choke.

►*HARD STARTING CORRECTION (CARS BEFORE ENGINE NO. P-14763) & CARBURETOR PRODUCTION CHANGE:* An atmospheric vent has been incorporated in later carburetors and can be installed on early cars to correct a hard starting condition. *See "Carter WGD Carburetor" in Carburetor Section.*

►*POOR WARM-UP CORRECTION & CARBURETOR PRODUCTION CHANGE: See "Carter WGD" in Carburetion Section for recommended changes on carburetors date-coded before tag date "M-5" or Engine No. P-24900.*

►*SLOW COLD STARTING CORRECTION: See TUNE-UP (above).*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting—½-1½ turns open. Turn screws out for richer mixture.

Idle Speed—425 RPM with transmission in "N". (Air Conditioning turned on).

Float Level—¼" from underside of bowl cover to top of float at center with needle valve seated. Measure with bowl cover and float assembly inverted. *NOTE—This ¼" setting supersedes original specification of 3/16". See also "Hard Starting Correction" above.*

Fast Idle: .030" throttle opening or clearance between valve and wall on side opposite idle ports with choke valve tightly closed. Adjust by bending choke rod at lower angle.

Unloader Adjustment—With fast idle adjustment completed, hold throttle valve wide open and close choke valve as far as possible. **Do not force choke valve closed.** Clearance between upper edge of choke valve and inner wall of air horn should be 3/16" (Gauge T109-28). Adjust by bending choke shaft unloader arm.

Automatic Choke: 1 point rich.

►*OTHER DATA: See "Carter WGD Carburetor" in Carburetor Section.*

THROTTLE LINKAGE ADJUSTMENT: *CAUTION—Control rod dimensions should be checked and length adjusted before linkage adjustment is made.*

Control Rod Dimensions: Check and adjust each rod as follows:

Carburetor Throttle Rod (from carburetor throttle lever to accelerator pedal lever)—Over-all length of rod from center of ball pivot at carburetor end to "L" bend at rear end of rod must be 15½". Adjust by loosening locknut near forward end and turning end fitting in or out of rod.

Adjuster Rod (Upper throttle rod from carburetor throttle rod to cross-shaft lever)—Over-all length between centers of rod ends must be 6 9/16". Adjust by bending rod at existing bend near center.

Throttle Valve Rod (Lower throttle rod from cross-shaft to control lever on transmission case)—Length between center of pins at ends of rod must be 26 1/8" (measured in straight line). Adjust by bending rod.

Throttle Linkage Adjustment: Adjust engine idle speed to 400 RPM with engine at normal operating temperature. Block carburetor choke valve in the wide open position and disconnect throttle rod at throttle valve shaft outer lever at transmission. Move transmission throttle lever to the rear against its stop and hold a straight edge across milled surface at rear of transmission case. The taper on end of lever should just contact straight edge. If necessary to adjust, loosen lever clamp screw nut and turn shaft counter-clockwise until valve has reached its stop. Hold shaft in this position and rotate lever on shaft so that taper on lever lines up with milled surface on rear of case. Reconnect rod to lever. Remove carburetor air cleaner and disconnect the upper throttle rod from center hole of throttle cross shaft. Lightly hold cross shaft lever forward so that throttle valve in transmission is against its stop (*CAUTION*—Do not spring linkage). Loosen locknut at each end of adjuster (rod connector) on carburetor throttle rod so that upper throttle rod can be connected in center hole of cross-shaft lever without disturbing linkage, tighten locknuts against adjuster and make certain that rod fits freely in lever. Reset engine idle speed (see Idle Speed Setting above).

Fuel Pump Pressure: 3½-5 lbs. max. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter M2256S (Fuel & Vacuum).

Pressure—3½-5 lbs. at 500 RPM.

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See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite Electric type.

Dash Unit—Auto-Lite 13380A.

Tank Unit—Auto-Lite 12642A

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 1H-105D. 6 volt, 105 ampere hour capacity (20 amp. rate).

Battery Ground—Positive.

Engine Ground—Battery to engine with body ground from transmission to rear crossmember.

STARTER

Auto-Lite MCL-6132. Armature—MCH-2122.

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	410

Starting Switch: Auto-Lite Solenoid SSX-4003 mounted on starter with SEPARATE relay (Magnetic Switch). Nash No. 3118899, of left fender apron. Controlled by selector lever operated switch, No. 3143978, located on steering column. Starter operative only with selector lever in "P" or "N" position.

See "Auto-Lite Solenoid Starter Switch (No Relay)" in Electrical Section.

GENERATOR

Auto-Lite GGW-4801F. Armature—GGW-2006F.

Maximum Charging Rate—*See Voltage Regulator.*

Performance Data

Amperes	Volts	Cold — RPM — Hot
0	6.4	870-970 . . 950-1050
45	8.0	1925-2125 . . 2350-2550

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs.

Field Current—1.6-1.7 amps at 5.0 volts.

Belt Adjustment: ½" belt deflection midway between water pump and generator pulleys.

REGULATOR

Auto-Lite VBE-6101-A

Cutout Relay

Cuts In—6.3-6.8 volts.

Cuts Out—4.1-4.8 volts.

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contact open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. After 15 minutes operation charging at one-half maximum rate.

Air Gap—.048-.052" with contacts opening.

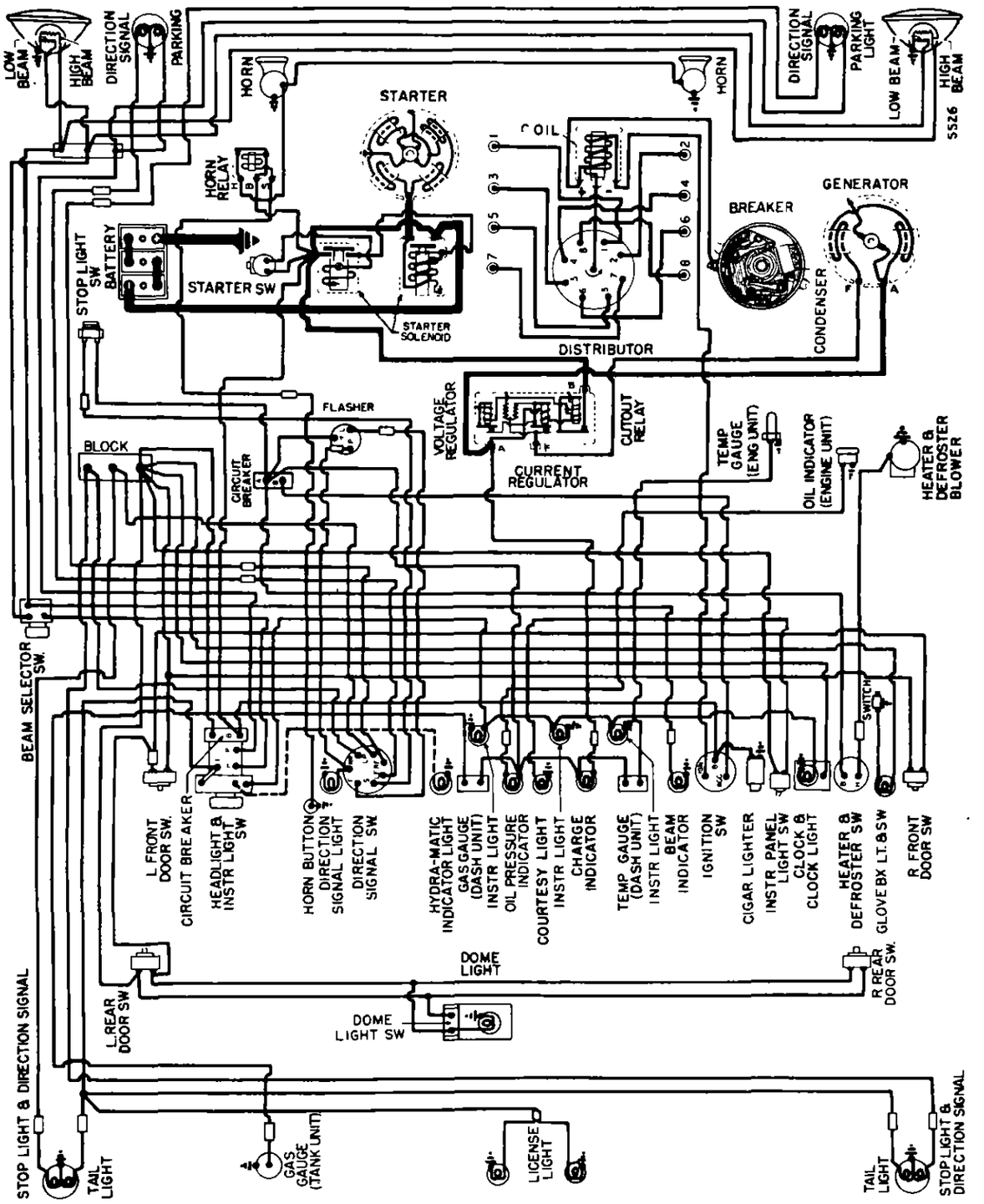
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
52		45 (43-47)

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Test A–After 15 minutes operation charging at ½ maximum rate.

Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts).

Air Gap–.048-.052" with contacts just opening.

Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Direction Signals: *See Electrical Equipment Section.*

Light Switch Removal: Loosen Allen screw and remove retaining nut. Push switch back and remove from dash.

Stop Light Switch: Located at tee fitting in line to front brakes.

FUSES: **Radio**–SFE-14 (14 amp.) in lead wire to radio.

CIRCUIT BREAKERS: Two used. 30 amp. in main light switch protects headlights, tail, instrument and interior lights. 20 amp. located on rear side of dash just forward of steering column protects stoplights, direction signal, Weather Eye blowers and accessory lights.

HORNS: Sparton. Nash No. 3141323 (Low Note). 3141324 (High Note).

Horn Relay: Nash No. 3141308.

Current Draw–13-17 amps. (low note), 12-16 amps. (high note), at 5-7 volts.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*IMPROVED OIL CONTROL PRODUCTION CHANGES & CORRECTION ON EARLY CARS:* For improved oil control at the intake valve stems, THREE types of rocker arm shafts have been used in production and latest type should be installed whenever trouble experienced on cars with previous type shafts (before Engine No. P-17288). *See Rocker Arms under "Valve System" in Nash Special Data for complete details.*

►*INTAKE VALVE STEM OIL DEFLECTOR PRODUCTION CHANGE: See VALVES below.*

ENGINE SPECIFICATIONS: V8 valve-in-head.

Bore	Stroke	Displacement
3 13/16"	3½"	320 cu. ins.

Compression Ratio	Developed HP	Rated HP
8.25-1①	208 at 4200 RPM	46.5

①–After Engine No. P-6001. 7.8-1, before Engine No. P-6001.

Compression & Vacuum Reading: *See TUNE-UP.*

OIL PAN REMOVAL: Remove steering idler arm attaching bolts and drop steering linkage. Remove exhaust crossover pipe.

CYLINDER HEAD INSTALLATION: *See "Cylinder Head & Manifolds" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Aluminum alloy, slipper type, tapered skirt, cam ground with steel reinforcement. Piston pin offset toward thrust side of piston.

Removal–Pistons and rods removed from above.

Clearance–.001-.0015" (top of skirt), .000-.0015" (bottom of skirt).

Replacement Pistons: Furnished Std. size, .010", .020", .030" oversize.

Installing Pistons: Install with "F" cast in piston strut and notch in piston head toward front of engine.

PISTON PINS

Full floating type. Retained in piston by lock rings at each end. **Diameter**–.9803".

Pin Fit in Piston–Palm press fit with piston heated in water to 200°F.

Pin Fit in Connecting Rod–Palm press fit at room temperature.

Replacement Pins: Std. size, .003", .006" oversize.

Piston Pin Bushing (In Connecting Rod) Installation: *See "Piston Pins" in Nash Special Data.*

PISTON RINGS

Three rings (two compression & one oil) used. Upper compression ring is chrome plated.

Ring	Width	End Gap	Side Clearance
Compr.	.078"	.010-.018"	.0015-.005"
Oil	.186"	.010-.018"	.0015-.005"

Installing Rings: Install upper compression ring and oil ring with gap toward camshaft side of engine. Install lower compression ring with gap toward opposite side from camshaft. All gaps should be midway between piston pin bosses.

CONNECTING RODS

Length–6 25/32" (center-to-center).

Crankpin Journal Diameter–2.250".

Lower Bearing–Replaceable precision type.

Clearance–.0005-.0025". **Sideplay** .003-.011".

Replacement Bearings: Std. size, .001", .002", .020" undersize.

Installing Rods: Install odd numbered rods in left bank and even numbered rods in right bank, with numbers on rods facing down and away from block and milled oil groove in connecting rod cap upward and toward crankshaft.

CRANKSHAFT

Journal Diameter–2.500". Five bearings.

Bearings–Precision type. The four front crankshaft bearings are interchangeable.

Clearance–.0005-.0025".

Replacement Bearings: Std. size, .001", .002", .020" undersize.

End Thrust: Taken by No. 5 (rear) main bearing.

Endplay–.0035-.0085".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

►*CRANKSHAFT REAR MAIN BEARING OIL LEAK CORRECTION: See "Crankshaft & Main Bearings" in Nash Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

Vibration Dampener: *See "Vibration Dampener" in Nash Special Data.*

CAMSHAFT

Bearings–Five, steel-backed babbitt lined precision bearings.

Clearance–.0005-.0045".

End Thrust: Taken by thrust plate behind camshaft sprocket.

Endplay–.004-.006".

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Nash Special Data.*

Timing Chain: Morse. **Width**–1". **Pitch**–.375". **Length**–64 links.

Timing Chain & Sprocket Removal–*See "Timing Chain" in Nash Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Nash Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers.

VALVES

►*INTAKE VALVE STEM OIL DEFLECTOR PRODUCTION CHANGE:* Starting with Engine No. P-13644, Intake Valve Stem Oil Deflector, Part No. 6476056, entered production. The deflector, a rubber cap, is located over valve stem and installed on top section of cast valve guide. This deflector can be installed on all earlier engines for improved oil control.

Tappet Clearance: Hydraulic lifters. Adjustment not required unless cylinder head removed or valve lifters replaced. *See "Valve Tappet Adjustment" in Nash Special Data.*

Valve	Head Diam.	Stem Diam.	Length
Intake	1.937"	.3725"	5.712"
Exhaust	1.687"	.3715"	5.690"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.374"	.001-.002"
Exhaust	45°	.374"	.002-.003"

Valve Seat Width–3/64" (Intake), 5/64" (Exhaust).

Valve Springs: Single springs used. Install springs with two closely wound coils against cylinder head.

Valve Spring Specifications

Valves	Spring Pressure	Spring Length
Closed	78-86 lbs.	1¾"
Open	158-172 lbs.	1 3/8"

Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance excessive. Valves are furnished with .003", .010", .020", .030" oversize stems.

Checking Valve Stem Clearance and Reaming Guides for Oversize Valve Stems: *See "Valve System" in Nash Special Data.*

Valve Lifters: Hydraulic type.

Hydraulic Valve Lifter Removal, Overhaul & Testing–*See "Valve System" in Nash Special Data.*

Rocker Arm Assembly: *See "Valve System" in Nash Special Data.*

►*ROCKER ARM SHAFT PRODUCTION CHANGES (For Improved Oil Control): See "Valve System" in Nash Special Data.*

►*ROCKER ARM SQUEAK CORRECTION (Caused by insufficient oil reaching rocker arm shafts): See "Valve System" in Nash Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 14° BTDC. Close 56° ALDC.

Exhaust Valves–Open 52° BLDC. Close 18° ATDC.

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Valve Timing Check: Remove cylinder head cover and spark plugs. Crank engine until No. 6 piston in right bank is on TDC (on compression stroke). This places No. 1 piston on TDC on the exhaust stroke overlap position. Rotate crankshaft 90°. Install a dial indicator on No. 1 intake rocker arm pushrod end. Crank engine slowly in direction of rotation (clockwise) until dial indicator indicates pushrod movement, (the hydraulic lifter should be fully charged for this check). At the time dial indicator moves, the ignition timing mark on vibration dampener should align with the 14° (approximately) position on the degree quadrant section of the timing assembly cover. *NOTE–If more than ½" variance in either direction is evident, remove engine front cover and inspect timing chain installation.*

• OILING SYSTEM

Crankcase Capacity: 5 qts. (refill).

Normal Oil Pressure: 45 lbs. at 40 MPH. 10 lbs. at idle speed.

Pressure Regulator–In oil pump. Not adjustable.

Oil Pressure Indicator: Red light on instrument panel. Lighted when engine oil pressure low.

Oil Pressure Switch–King-Seeley 47195.

Oil Pump: Gear type. On rear main bearing cap, driven through distributor drive and camshaft gear.

Oil Pump Removal, Overhaul and Installation–*See "Oiling System" in Nash Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve tappet cover.

COOLING

Water Capacity: 21 qts. (with heater), 20 qts. (without heater).

Pressure Valve: Radiator filler cap. 7 lbs. (Std.) 14 lbs. (With Air Conditioning).

Thermostat: 170°. Starts to open at 167°-173°F.

Water Pump: Packless type with sealed ball bearing. *See "Nash V8" in Water Pump Section.*

Temperature Gauge: Dash Unit is Auto-Lite, Engine Unit is King-Seeley as indicated below.

Dash Unit–Auto-Lite 13881A.

Engine Unit–King-Seeley 44215.

See "Temperature Gauges" in Miscellaneous Section.

ULTRAMATIC DRIVE

Packard "Twin-Ultramatic". Torque converter (with hydraulic operated direct speed clutch) and hydraulic operated planetary unit.

►*ULTRAMATIC HIGH RANGE CLUTCH AND LOW RANGE BAND FAILURE CORRECTION: See "Twin-Ultramatic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Twin-Ultramatic Transmission" in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level–*(CAUTION–Fluid level must be checked at normal operating temperature and after engine has been idling at 800 RPM for at least one minute to completely fill system).* Run engine at low idle speed while fluid level is being checked, using dipstick located in engine compartment. Add fluid as required to bring level to "Full" mark on dipstick.

Capacity–22 pints. Use only Automatic Transmission Fluid Type A having an AQ-ATF number on can.

Linkage Adjustment: *See CARBURETOR above.*

►*OTHER TWIN-ULTRAMATIC DATA: See "Twin-Ultramatic" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw. One universal joint used at front end of propeller shaft.

REAR AXLE

►*PROPELLER DRIVE SHAFT NOISE CORRECTION & PRODUCTION CHANGE:* A noise developing at 58-62 MPH under light throttle pressure, either pull or coast (similar to rear axle gear noise) may be caused by drive shaft and can be corrected by installing a two-piece shaft, Part No. 3145400. The later two-piece shaft replaced the former one-piece shaft in production at Car Serial V-8235.

►*REAR AXLE RATIO PRODUCTION CHANGE:* Beginning with Car Serial No. V-8235, the rear axle ratio has been changed from 3.54-1 (11-39), to 3.2-1 (13-41). When installing a new service axle having the 3.2-1 ratio, speedometer gear, Part No. 6450318 (18 teeth), and adaptor, Part No. 6450518 is required.

Own. Semi-floating, Hypoid Gear with Torque Tube drive. *See "Nash Hypoid" in Rear Axle Section.*

Axle Ratio–3.54-1 (11-39) before Car Serial V-8235. 3.2-1(13-41)after Car Serial V8235.**Backlash**–.002-.006"

Rear Axle Assembly Removal: Raise rear of body. Disconnect hand brake cable at bellcrank and the housing at bracket. Disconnect torque tube from transmission, rear brake hose at bracket on body floor pan, rear springs, shock absorbers and rear axle stabilizer bar at axle tube. Roll axle from under car and remove truss rods, torque tube and propeller shaft

Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644-B). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims and replace same amount when reassembling). Withdraw shaft using Puller J-2498, do not drag on inner seal.

Rear Suspension: *See "Nash Rear Suspension" in Rear Axle Section.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.

Front Shocks–Nash Part No. 3118500 (Set of 2).

Rear Shocks–Nash Part No. 3117364 (Set of 2).

FRONT SUSPENSION

►*CAMBER & CASTER ECCENTRIC BOLT NUT BOTTOMING ON SHOULDER OF ECCENTRIC BOLT CORRECTION & PARTS PRODUCTION CHANGE:* (Eccentric bolt nut will not tighten sufficiently to prevent eccentric bolt from turning). On early cars install a 5/8" I.D. washer between nut and eccentric washer. At Car Serial V-1511 the counter-bore of the eccentric nut has been increased to 3/16".

Independent. With coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.

See "Nash" in Front Suspension Section.

Kingpin Inclination–6½°.

Caster (Manual Steering)–½° Pos. desired, with 0-½° Pos. limit **(Power Steering)** 1° Pos. desired with ½-1° Pos. limits.

Camber–0° desired with ¼° Neg to ¼° Pos. limit.

Toe-In–1/16-3/16".

Toe-Out on Turns (Manual Steering)– Inner wheel 25°, Outer wheel 20¼° **(Power Steering)** Inner wheel 25°, Outer wheel 21¾°.

STEERING

►*POWER STEERING PUMP VIBRATION CORRECTION & PUMP BRACE PRODUCTION CHANGE (AIR CONDITIONED CARS):* Install Power Steering Pump Brace, Part No. 3146406, between cover cap screw and engine cylinder head. Cars after Serial No. V-9917 have the brace installed in production.

Manual: Gemmer Model 305. Worm & Roller with "push-pull" adjustments.

See "Gemmer Steering Gears" in Steering Section.

Power Steering: Monroe "Linkage Type". *See "Monroe Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

►*SPONGY BRAKE PEDAL CORRECTION (EXCEPT POWER BRAKES): See "Brake Notes" in Nash Special Data.*

Bendix. Hydraulic duo-servo single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes *See "Bendix Hydraulic" in Brake Section.*

Drum Diameter–11".

Wheel Cyl. Diameter–1 1/8" (Front), 15/16" (Rear).

Lining Width–2½" (Front Wheels), 2" (Rear Wheels).

Lining Length–9 3/8" (Primary Shoes), 12" (Secondary Shoes).

Clearance–Back off adjusting screw 14 notches from point where wheel can just be turned by hand.

Standard Master Cylinder: Mounted on support under floor pan to left of transmission.

Checking Fluid–Remove access cover under floor mat on left side. Maintain level ½-1" below filler top.

Removal–Remove from below without disturbing other parts.

Power Brakes: Bendix Power Unit. Replaces standard cylinder.

See "Bendix Power Unit" in Brake Section.

Removal of Power Unit–Remove vacuum and air cleaner hoses at inlet tubes. Remove hydraulic line. Disconnect pushrod from brake pedal linkage. Remove unit from mounting brackets.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Own. Compressor clutch controlled magnetically. Inoperative unless control knob turned "ON". *See "Nash Air Conditioning" in Miscellaneous Section.*

►*AIR CONDITIONER COMPRESSOR VIBRATION CORRECTION & COMPRESSOR BRACE PRODUCTION CHANGE (Cars before Serial No. V-10150): See "Nash Air Conditioning" in Miscellaneous Section,*

Power Window Regulators: Electric. Individual motors in each window. *See "Power Window Regulators" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-48 MODELS

	Ft. Lbs.	In. Lbs.
Spark Plugs (14 MM. Type)	28-35	336-420
Cylinder Head Capscrews	60-70	720-840
Main Bearing Bolts:		
All (except Rear)	100	1200
Rear Only	140	1680
Connect. Rod Nuts (slotted lock)	50-55	600-660
Piston Pin Lockscrews	9-11	108-132
Flywheel to Crankshaft Bolts	55-60	660-720
" " " (Hydra-Matic)	60	720
Front Engine Mounting to Frame	25-30	300-360
Rear Eng. Mtg. to Clutch Hous'g	45-50	540-600
Exh. to Int. Manifold Bolts	22-26	264-312
Manifold to Block Nuts	11-14	132-168
Crankshaft Front End Bolt	130-140	1560-1680
Clutch Cover Mounting Bolts	22-26	264-312
Transmission to Housing	60-70	720-840

1949-55 MODELS

	Ft. Lbs.
Cylinder Head	60-70
Intake Manifold (Bolts & Nuts)	22-26
Exhaust Manifold (Bolts & Nuts)	22-26
Oil Pan	9-11
Main Bearing Caps (except Rear)	100
Main Bearing Caps (Rear)	140
Flywheel	85-95
Crankshaft Pulley	45-50
Con Rod Caps	40-50
Camshaft Sprocket & Pump Eccentric	14-17
Rocker Arm Support Brackets	14-17
Engine Front Cover (3/8 & 7/16" Bolts)	30-35
Water Manifold	22-26
Oil Pump Mounting	11-14
Oil Filter to Cylinder Block	30-35
Oil Filter Housing to Base	40-45
Oil Filter Pad Cover	30-35
Flywheel Lower Housing	50-55
Transmission Mounting	60-70

ENGINE MOUNTING

1949-55 MODELS

FRONT ENGINE MOUNT INSTALLATION: Cap screws fastening mounting to frame or bracket should first be screwed finger tight, then tightened alternately, one turn at a time. DO NOT TIGHTEN ONE CAP SCREW IN POSITION INDEPENDENTLY OF THE OTHER, since lower portion of asssembly would not seat evenly in upper portion. Front mounting must be properly positioned and tightened, otherwise mounting will not function properly as an insulator.

OIL PAN

1946-47 MODELS
1948 DYNAMIC MODELS

OIL PAN REMOVAL: Oil pan can be removed as follows: Disconnect idler arm support from frame dropping steering relay rod assembly. On 8 cylinder only, remove flywheel lower pan. For access to bolts at front end of pan, unhook splash guard fasteners and work through openings in front frame cross-member. Third bolt from front on each side requires use of end wrench to clear front suspension cross-member. Remove right and left filler plates (rotate left plate out). With all pan bolts removed, turn crankshaft to place counterweights up out of the way, take off pan.

Installation—Use new gaskets and allow them to dry before installing so as to prevent gasket moving when pan installed on engine.

1949-50 SIX CYLINDER

OIL PAN REMOVAL: Disconnect steering idler arm from frame and drop steering relay assembly. Drain radiator, disconnect radiator hoses. Remove two front engine mounting-to-frame bolts, raise engine approx. 3/4". For access to pan bolts at front end, unhook fasteners on splash guard between cross-member and radiator baffle and work through openings in cross-member. Front bolts on each side of pan must be removed with an end wrench. With pan bolts removed, rotate crankshaft to place counterweights up for clearance, remove oil pan.

Installation—Use new gasket coated with cement. Allow cement to dry for easier installation.

1949-55 V8 MODELS

OIL PAN REMOVAL: Remove starter and exhaust cross-over pipe. Disconnect idler arm from frame and drop steering relay rod. Remove oil pan cap-screws and withdraw pan.

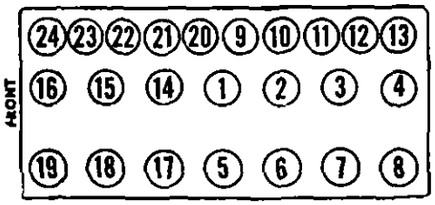
Installation: Cement new cork gaskets to pan, assemble front and rear synthetic seals to pan. Place coat of graphite grease on exposed surface of seals to insure that seal maintain their proper position in pan and do not hang up on front cover and main bearing sealing surfaces during oil pan installation.

CYLINDER HEAD & MANIFOLD

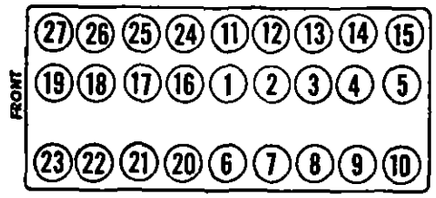
1946-50 MODELS (EXC. V8)

CYLINDER HEAD SERVICING: Steel-asbestos cylinder head gasket used. This gasket cannot be reused. When installing new gasket, coat both sides with thin coat of P.O.B. Perfect Gasket Seal at room temperature (approx. 70°F.). Edges at cylinder bore holes must be wiped clean of all sealer. To prevent leakage, a plain washer is used under bolt heads.
1941-47 Note. Install gasket with 3/16" flange next to cyl. block (flange on upper side 3/32" wide).
1939-41 8 cyl. Engine Note—Install new neoprene grommet in pump by-pass hole on front of head.

INSTALLING CYLINDER HEAD: Use a Torque Indicating Wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in the diagram. Cast Iron heads should be tightened cold and rechecked after engine has been run sufficiently to bring all parts to normal operating temperature.



OLDSMOBILE SIX CYLINDER HEAD



OLDSMOBILE EIGHT (1946-48)
CYLINDER HEAD

Tightening Torque—See Tightening (Torque Wrench) Specifications.

1949-55 V8 MODELS

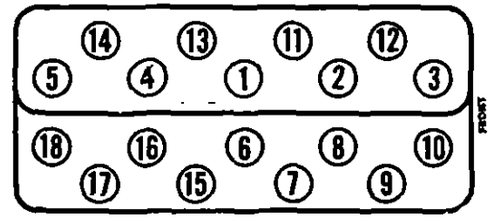
CYLINDER HEAD REMOVAL: Drain cooling system, disconnect upper radiator hose from water outlet. Remove air cleaner, generator, and spark plug wire retainers (name plates on valve covers). Disconnect wires at spark plugs, throttle linkage, and spark plug wire and air cleaner supports from cyl. heads. Take off distributor cap, lift off cap, high tension wire assembly and supports off engine as an assembly. Remove carburetor fuel and vacuum lines, external water by-pass (tube around lower end of oil filler pipe), valve covers, intake manifold with coil and carburetor attached. Disconnect exhaust pipe from exhaust manifold. Remove rocker arm shaft assembly, push rods. Remove cylinder head with exhaust manifold by taking out 14 cylinder head bolts.

1949-55 V8 M DELS

CYLINDER HEAD INSTALLATION: Reverse removal instructions given above and note following:

Gaskets. Use all new gaskets. Use POB No. 3 sealer and coat both sides of head and intake gaskets. Cement cover gaskets to valve covers. ***Install head gaskets with crimped side UP.***

Cylinder Head Bolts. 7/16" bolts used as follows: Four 6" bolts at rocker arm supports. Ten 4½" bolts through center of head. Four 2½" bolts at bottom. Use a Torque Wrench (see Tightening Specifications) and tighten in order shown in head diagram.



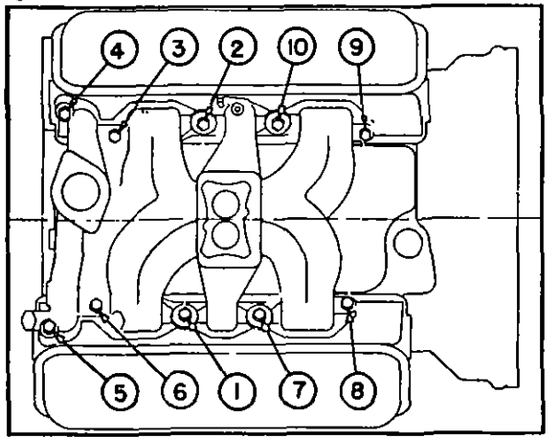
OLDSMOBILE V8 CYLINDER HEAD

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1949-55 V8 MODELS

Intake Manifold. ***CAUTION—Manifold must be centered between cylinder heads.*** Dip threads of six manifold bolts (two 3/8" x 1 7/8" at front, and four 3/8" x 1½" at sides) in POB No. 3 sealer. Use large flat washers under manifold nuts, small flat washers on bolts. Use a Torque Wrench (see Tightening Specifications) and tighten in order shown below.



ROCKET V8 INTAKE MANIFOLD

PISTON PINS

1946-48 MODELS (WITH ALUMINUM PISTONS)

PISTON PINS: Only standard size pins furnished for service. Pin bosses in pistons are electrolite and must not be reamed. Replacement pistons (standard and oversize) furnished with pins fitted.

Removal: To remove pin, take out lock screw, place assembly in boiling water one minute. With Tool HM-535 push pin out through plain boss end.

Fitting:—Pin fit in piston .0001" loose to .0002" tight (plain boss), .0002-.0005" tight (lock screw boss). Pin fit in rod bushing .0003-.0006". If rod bushing worn, press new bushing in place (align oil hole in bushing and rod), burnish with Tool HM-587E and line ream with Reamer HM-586 to .8558-.8562".

Installing:—To install pin, heat piston and pin (as for Removal above), dip pin in hot light engine oil, start pin through plain boss end of piston and through rod (make sure lock screw hole in pin and boss will be aligned), then with Tool HM-535 lightly push pin in place until hole in pin and boss aligned (use punch in hole to correct slight mis-alignment).

IMPORTANT—Pin must not be forced (if heavy push required, indicates piston has cooled, disassemble and reheat piston and pin). After pin in place, coat lock screw with graphite and tighten to 9-11 lbs. ft. tension with a torque wrench.

1949-50 SIX CYLINDER

PISTON PIN: Removal. Take out lockscrew, use Tool HM-535 and tap pin out (hold piston in hand). **Replacement Pins**—Std. and .001", .003" oversize. **Installing Pins.** Fit pins to specifications listed on car page. If reaming required to fit oversize pins, use Reamer HM-536 for piston bosses and rod bushing. Rod bushing can be removed and replaced with Tool J-1674 and Support Tool J-1649. **To install piston pin,** heat piston (not pin) in boiling water, coat inside of pin boss with graphite, insert split end of pin in piston boss (mark "V-S" on piston head and oil spit hole in lower end of rod must be on same side), use Tool HM-535 and tap pin in place, install lockscrew and tighten to 9-11 ft. lbs.

CRANKSHAFT & MAIN BEARINGS

1946-50 SIX CYLINDER

MAIN BEARING REMOVAL: With bearing cap removed upper half of bearing can be removed by inserting Tool HM-J-173 in oil hole in shaft, and with tang on tool engaging plain edge of bearing, rotate crankshaft in usual direction and turn bearing out. Crankshaft will not have to be removed.

Installation—Remove sharp edge from plain end of bearing, insert this end at indented side of support and rotate in place using pin in oil hole in shaft.

1946-48 8 CYL. MODELS

MAIN BEARING CAPS (8 CYL.): "Snap-In" type on all bearings except No. 1 which is doweled type. "Snap-In" caps are ¼" heavier and have machined edges which must not be filed, and must be pressed in block with slight pressure. Caps bored 1/16" offset and must be installed with notch in cap (for bearing tongue) on the same side and next to notch in block.

1946-50 MODELS (EXC. V8)

CRANKSHAFT END THRUST: Taken through front (#1) main bearing. Bronze thrust plate assembled on each end of bearing with a steel thrust collar between front bronze thrust plate and sprocket. **Endplay Note**—Rear bronze thrust plate .124" thick. Front bronze thrust plate (behind steel collar) is a selective fit to obtain proper endplay (.124" thick or one of two other thicknesses).

Hydra-Matic Cars—Steel thrust collar (Part No. 414229) has a more highly polished finish than that used on synchro-mesh transmission equipped cars. Can be identified by finish and part no. which is etched on collar. This collar only furnished for service (can be used to service synchro-mesh transmission equipped cars also). Front bronze thrust washer has eight grooves in face of plate and must be assembled with these grooves next to steel thrust collar. A plain bronze thrust washer is used at rear.

1946-55 MODELS

REAR MAIN BEARING OIL SEAL: Asbestos covered wiper seal installed in rear groove in bearing cap and block (oil slinger operates in front groove). **Note**—Cork strips used to seal vertical joints between bearing cap and block on "L" head engines.

Oil Seal Installation—With crankshaft out of engine and bearing cap off, use new seal coated with graphite grease, crowd seal by hand into rear groove in cap and block. Use Compressor Tool No. J-955 (for "L" Hd. Engines), No. BT-12 (for Rocket V8 Engine), and drive seal into place. With tool resting on seal, cut ends flush at each end (for both cap and block). ***Seal must entirely fill groove and be trimmed flush to prevent oil leaks.*** When installing cap on all but Rocket V8 Engines, seal vertical joints with new cork seals.

1949-55 V8 MODELS

CRANKSHAFT FRONT OIL SEAL REMOVAL AND INSTALLATION: (Without removal of engine front cover).

Removal—Remove crankshaft pulley and replace large capscrew in crankshaft end. Place fingers of Tool J-4176 over end of crankshaft and turn tool fingers so that hooks will pass through clearance between crankshaft end and inner diameter of front oil seal (a few light taps on tool center screw will force fingers behind rubber ring of oil seal). Use an end wrench on fixed nuts below puller plate and rotate each finger outward 90° to engage the finger hooks with ring of oil seal, then tighten nuts on upper plate fo puller to hold fingers in position. Rotate puller center screw against crankshaft screw and remove seal.

Installation—Use Tool J-4177 to replace seal in cover by first positioning seal in cover and then assembling adapter ring and driver so slot in driver will clear crankshaft key. Drive seal into place until adapter bottoms on cover face.

ENGINE FRONT COVER

1949-55 V8 MODELS

ENGINE FRONT COVER (Removal): Disconnect lower radiator hose and heater hose from front cover and disconnect generator link at generator. Remove oil pan and remove the two bolts attaching front engine mount to frame. Support engine with Special Tool BT-29 (engine must clear front cross member). Remove radiator assembly, fan blades and pulley and crankshaft pulley. Remove fuel and vacuum pump assembly. Remove front cover attaching bolts and front cover. Reverse removal sequence to install cover, using a new gasket coated on one side with gasket cement. Lubricate sealing surface of front oil seal and fuel pump operating arm. Dip attaching cover bolts in POB No. 3 sealer.

Engine Front Cover Oil Seal (Crankshaft Front Oil Seal) Replacement: ***(NOTE—Front cover oil seal can be replaced without removing front cover by using Tool J-4176).*** Remove crankshaft pulley and replace large capscrew in crankshaft end. Place fingers of Tool J-4176 over end of crankshaft and turn tool

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fingers so that hooks will pass through clearance between crankshaft end and inner diameter of front oil seal, (some light taps on tool center screw will force fingers behind rubber ring of oil seal). Use an end wrench on fixed nuts below puller plate and rotate each finger outward 90° to engage the finger hooks with ring of oil seal, then tighten nuts on upper plate for puller to hold fingers in position. Rotate puller center screw against crankshaft screw and remove seal.

Installation—Use Tool J-4177 to replace seal in cover by first placing seal in cover and then assembling adapter ring and driver so slot in driver will clear crankshaft key. Drive seal into place until adapter bottoms on cover face.

FLYWHEEL

1949-50 SIX CYLINDER

FLYWHEEL INSTALLATION: Cast-iron flywheel used on cars with synchro-mesh transmission, pressed steel flywheel on Hydra-Matic. Ring gear shrunk on both flywheels. Replacement flywheels supplied with only two mounting holes requiring reaming of four additional holes (7/16") after flywheel attached to crankshaft.

FLYWHEEL HOUSING

1949-55 V8 MODELS

LOWER FLYWHEEL HOUSING ALIGNMENT: It will always be necessary to carefully check alignment of block and lower bell housing whenever original housing is replaced. Misalignment will be evident in one or both of two conditions; step between rear surfaces of block and lower housing resulting from location of housing too far forward or rearward on block, or a non-parallel condition resulting from either block or lower housing being slightly out-of-square. To insure proper alignment on replacement, proceed as follows:

1) Remove two dowels which serve to align original lower housing with block, install and tighten clutch (flywheel bell) housing to block, place lower flywheel housing in its proper position so that it is flat against clutch housing and contacting cylinder block; then tighten bolts securing lower flywheel housing to clutch housing.

2) Using feeler gauge, check to see if lower housing and block are square with each other, and if not, install proper thickness shims (as near bolts as possible) to properly align parts. If more than .010" of shims required, use different flywheel housing. Tighten lower flywheel housing-to-cylinder block bolts. If all bolts properly tightened it will not be necessary to re-dowel between block and lower housing

3) If dowels not used to maintain alignment, foregoing procedure will have to be followed when lower housing is removed and replaced.

4) Lower housing to cylinder block alignment can be checked after assembly by removing clutch (flywheel) housing and laying straight-edge along rear surface of block and lower housing. NOTE—Use care not to disturb lower housing when clutch housing removed and replaced.

1949-55 V8 M DELS

CLUTCH (FLYWHEEL BELL) HOUSING ALIGNMENT: Mark flywheel and crankshaft for identification during assembly. Proceed as follows:

1) Support engine by oil pan flanges for alignment of flywheel housing. NOTE—When using engine stand, engine can be supported at front and rear of block. **Do not support on flywheel housing.**

2) With flywheel and crankshaft assembled in place, assemble clutch (flywheel bell) housing onto engine block and tighten housing attaching bolts sufficiently so housing can be shifted by tapping with lead hammer.

3) Install lower flywheel housing and tighten in place CAUTION—Lower flywheel housing **must be in place when aligning clutch housing.** Install dial indicator pilot shaft and strap.

4) With dial indicator stem positioned against rear face of clutch housing at approximately 2¼" radius from center line of crankshaft, revolve flywheel 360°. If reading exceeds limits, shim as necessary between housing and engine block to bring within limits. CAUTION—Be sure indicator button is kept clear of oil groove in housing.

5) Assemble dial indicator to pilot shaft using attachment, check radial runout of housing bore, attach flywheel turning tool J-4772 to lower housing to turn flywheel.

6) Shift housing as necessary with lead hammer to bring within limits. Tighten housing to block bolts to 50-55 ft. lbs. torque. recheck limits.

7) Using reamer J-4832-3 and ratchet wrench J-808-6 ream two engine block-to-clutch housing dowel pins, Part No. 557754 After dowel pins installed check to see that dowel pins do not protrude inside housing and interfere with flywheel. Clean all cutting from housing.

CAMSHAFT & BEARINGS

1949-55 V8 MODELS

CAMSHAFT REMOVAL: Drain radiator. Remove radiator hoses, heater hoses, air cleaner, fuel and vacuum lines, distributor, throttle linkage from carburetor, fan, fan pulleys, fan belts, generator, generator belt, generator bracket, spark plug wire support, external water by-pass tube, valve covers, rocker arm assembly, push rods, intake manifold, cylinder block cover, valve lifters (keep clean and in order for re-installation in same position), upper radiator baffle, radiator core, harmonic balancer and pulley as an assembly, fuel pump, exhaust pipe cross-over, steering idler arm, oil pan, front engine mounting (use Tool Set BT-29 to support engine), engine front cover, fuel pump eccentric, timing chain and sprocket, thrust plate, and camshaft.

►*CAUTION*—Withdraw camshaft carefully to prevent bearing damage as follows: Slide camshaft through each bearing while slowly rotating shaft, hold shaft at front end and guide it from the rear.

VALVE SYSTEM

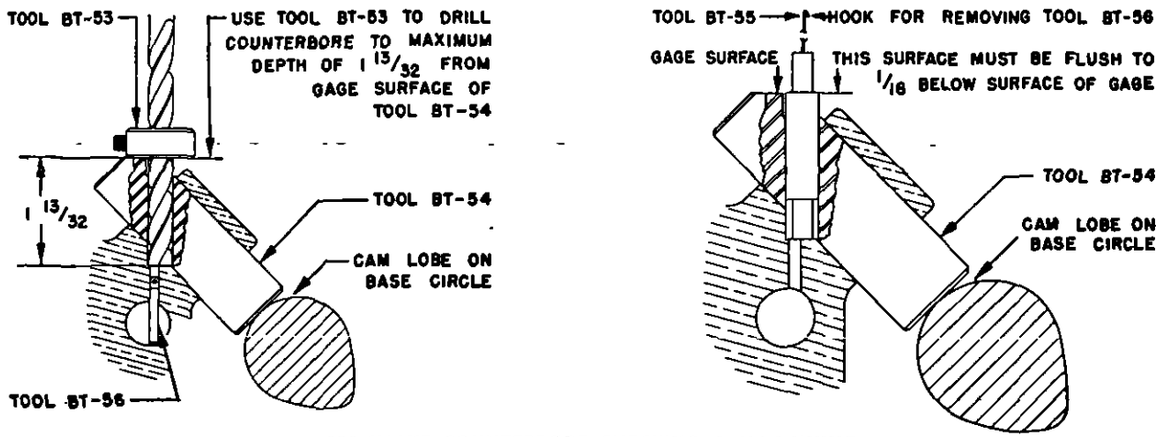
1952 V8 M DELS

VALVE LIFTER COUNTERBORE (CHECKING AND DEEPENING): ***CAUTION—Do not attempt to check or correct counterbores without the following tools: BT-53, 54, 55, 56, and special flat end magnetized drill.***

Checking Counterbore: Rotate camshaft so drill guide Tool BT-54 rests on low side of cam lobe. Place handle of Tool BT-55 through hole of Tool BT-54 to rest on base of counterbore. Shoulder of Tool BT-55 must be flush to 1/16" below gauge surface of Tool BT-54. If shoulder of tool is **higher,** counterbore must be deepened as follows.

Deepening Counterbore: Remove Tool BT-54, and apply hard oil to Tool BT-56 (⅛" plug), and drop it into oil hole in lifter boss so it rests on bottom of oil gallery. Replace BT-54 (drill guide). Set collar on BT-53 on special magnetized drill to 1 13/32", and apply hard oil to flutes, drill counterbore as shown in illustration, (take out a small amount at a time, removing the drill frequently and wiping clean. Apply hard oil each time drill is removed). Proceed in this manner until specified depth is reached. Remove tools (except plug) and clean area around lifter with a magnetized rod to pick up all bits of metal. Remove Tool BT-56 with hook on end of tool BT-55.

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1952 VALVE COUNTERBORE CHECKING & MACHINING

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R CKER ARMS

1949-55 V8 MODELS

ROCKER ARM SHAFT ASSEMBLIES: Identical hollow steel tube shafts (ends plugged) are used. Four removable supports for each shaft, one support doweled to shaft for oil feed (at oil line from #2 camshaft bearing on left side, from #4 camshaft bearing on right side). Three springs used to position center rocker arms against supports. End rocker arms retained by wave washer, flat washer, and cotter key.

Rocker Arm Shaft Disassembly: With assembly off engine, remove cotter key and washers from end of shaft. Remove rocker arms, supports (except doweled support which should not be removed from shaft), and springs.

►*CAUTION—Rocker arms should be stored so that they can be reassembled in their original position.*

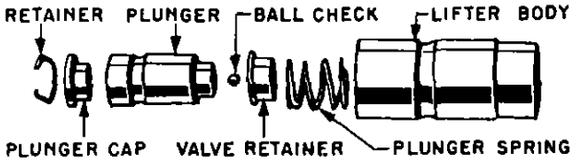
Rocker Arm Shaft Reassembly: Assemble supports in proper position as to doweled support (oil supply). Push rod end of rocker arms must be on same side as large cylinder head bolt hole in each support.

HYDRAULIC LIFTERS

1949-55 V8 MODELS

VALVE LIFTERS: Hydraulic, Barrel Type. Consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet body (See illustration). Oil is introduced to this unit from main oil gallery through hole in side of lifter plunger and body.

Removal: Remove intake manifold, cylinder block cover, valve covers, rocker arm shaft assemblies, push rods and valve lifters.



OLDSMOBILE HYDRAULIC VALVE LIFTER

►*CAUTION*—Valve lifters must be installed in same bores from which they were removed.

Disassembly: Remove plunger retainer with Lock Spring Tool, BT-31. Remove push rod seat, plunger, ball check valve, ball retainer and spring. If plunger is stuck in lifter body, remove plunger by engaging Remover Tool BT-38, in plunger oil hole, and while holding tool lug in vise, turn "T" handle counterclockwise until plunger in drawn from lifter body. NOTE—Soak heavily varnished lifters in solvent before disassembling.

Cleaning & Inspection: Wash all parts in a suitable cargon solvent and remove all trace of carbon and varnish. Inspect plunger and lifter body for scoring or other damage that would prevent free movement. Inspect lower end of lifter body for nicks or indentations. If any exist, replace complete lifter assembly. Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement. Plunger should drop of own weight into body bore .

Reassembly: *(NOTE—Body and plunger are selectively fit and must not be interchanged, or replaced individually).* Place plunger over push rod seat and then turn plunger over holding push rod seat in place, and install ball on its seat in plunger. Place ball check valve retainer over ball and then place valve retainer spring over retainer. Carefully assemble valve lifter body over complete assembly. Turn assembly over and while holding push rod seat down, install retaining lock spring, using Tool BT-31.

Identification Note—It is important when replacing lifters that the correct oversize lifter be used. An identification number is etched on all lifter bodies except standard. Lifters are furnished in Std., size and the following oversizes: .001", .002", .003", .005". The cylinder block is marked 1, 2, 3, or 5 for lifter size on rail under engine top cover.

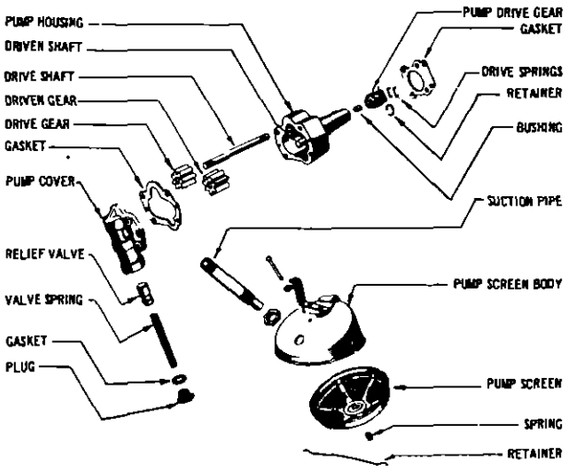
OILING SYSTEM

OIL PUMP

1946-48 MODELS

OIL PUMP: Gear type pump. Six and Eight pump identical except for gear faces which are ¼" wider on Eight. When assembling pump gear on shaft, press shaft on gear flush with outer end of gear (Six), with gear extending ¼" beyond end of shaft (Eight—Use Tool J-954 which properly positions gear on shaft). Pump drive gear must be assembled with Feeler Gauge J-954-1 between inner face of gear hub and pump body to give proper end clearance for pump shaft. Use new pump body gasket.

Installation—Set engine in firing position for #1 cylinder with rotor opposite #1 segment in distributor cap. Note position of distributor shaft tongue for proper oil pump drive gear mesh, then raise distributor and mesh pump drive gear with camshaft gear. Replace distributor in position and reset ignition timing.



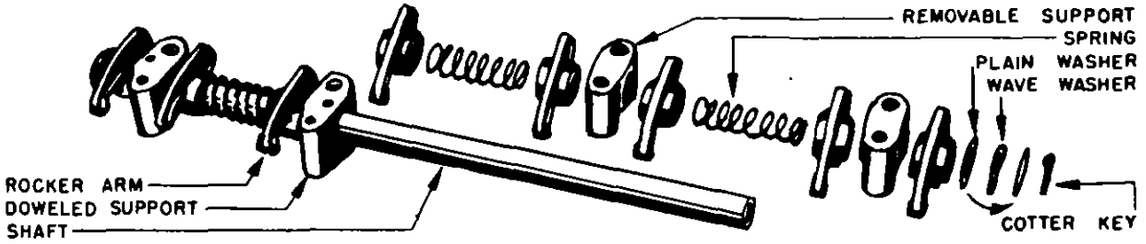
OLDSMOBILE 6 CYL. OIL PUMP

1949-50 SIX CYLINDER

OIL PUMP: Disassembly. With pump off engine, use an arbor press and Tool J-959 and press drive gear off shaft and take out woodruff key. Disassemble pump, take off cover, oil pump gears and shaft.

Assembling Pump. With pump gear on flat surface and woodruff key in place on shaft, press shaft through gear until flush with outer end of gear. Put idler gear on stub shaft in pump body, slide pump shaft and gear assembly into place in pump housing. Place woodruff key on upper end of shaft and press pump drive gear on shaft with Tool J-954-1 between inner face of gear hub and pump body (gives proper end clearance of pump shaft assembly). Install piston, relief spring and nut in pump cover, bolt cover to body. Use new gaskets between pump cover and body, and between pump body and cylinder block.

Installation. Set engine in firing position for #1 cylinder with rotor opposite #1 segment in distributor cap. Note position of distributor shaft tongue for proper oil pump drive gear mesh, then raise distributor and mesh pump drive gear with camshaft gear. Replace distributor in position and reset ignition timing.



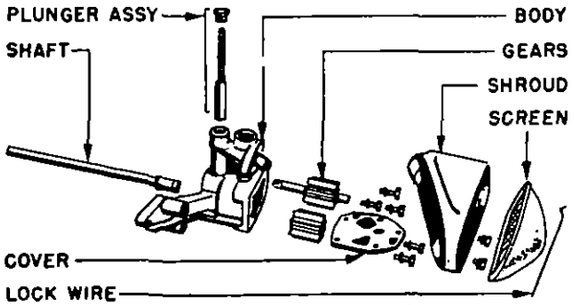
OLDSMOBILE V8 ROCKER ARM ASSEMBLY

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1949-55 V8 MODELS

OIL PUMP: Removal & Disassembly—Remove oil pan, then remove pump. Remove oil screen lock wire and screen, and oil screen shroud. Remove extension shaft and coupling by removing lower snap ring from coupling. Remove oil pump cover, oil pump gears and pressure regulator nut, spring and valve.



OLDSMOBILE V8 OIL PUMP

Reassembly & Installation: Reverse removal & disassembly procedures outlined above.

COOLING SYSTEM

1946-47 EIGHT CYL. MODELS

RADIATOR SHROUD #555107 FOR 1946-47 EIGHT CYLINDER: This assembly used on 1948 Eight Cylinder Series 68 and 78 to maintain proper water temperatures for high altitude and extremely high outside temperatures. This shroud can be installed on 1946-47 Eight Cylinder Series 68, 78, and 98.

Radiator Shroud Installation on 1946-47 Eight Cylinder Series 68, 78, and 98—Drain radiator just enough to permit disconnecting upper end of top hose. Remove radiator baffle cover and take off hood latch as an assembly. Remove radiator baffle. Disconnect radiator support from radiator by taking out 1 bolt and 3 screws on each side. Free wiring harness from clips at upper radiator tank. Loosen upper end of top radiator hose. Pull radiator forward just enough to slide shroud in place between core and support. Re-assemble all parts and fill radiator.

1946-48 MODELS

RADIATOR CORE REMOVAL: To remove radiator core, raise hood, drain cooling system, detach upper and lower radiator hoses, take out four radiator core-to-core support bolts at each side, lift out core (rotate fan as required).

1949-50 6 CYL. M DELS

RADIATOR CORE REMOVAL: Drain radiator, disconnect radiator hoses and hood latch cable. Take off upper radiator baffle. At each side, remove one shroud-to-core self-tapping screw and four core-to-core support self-tapping screws. Lift core out (rotate fan as required).

1949-53 V8 M DELS

RADIATOR CORE REMOVAL: Drain radiator, disconnect radiator hoses. Remove radiator upper baffle, radiator shroud and lift core out.

FRONT END SHEET METAL REMOVAL: *See Oldsmobile Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: On plate ('46-47) on upper left front corner of dash under hood, (1948) on left front door hinge post.
1946-47-48 Numbers—First numbers as follows:

Series	Lansing Mich.	Linden N. J.	South Gate, Cal.	Wilmington, Del.
66 ('46)	66-112001	66L-14001	66C-12001	
66 ('47)	66-132001	66L-19001	66C-15001	66W-1001
66 ('48)	66-165001	66L31001	66C21001	66W3001
76 ('46)	76- 92001	76L-13001	76C- 9001	
76 ('47)	76-134001	76L-20001	76C-13001	76W-1001
76 ('48)	76-164001	76L31001	76C18001	76W3001

Series	Atlanta, Ga.	Framingham, Mass.	Kansas City, Kans.
66 ('47)	66A-1001	66B-1001	66K-1001
66 ('48)	66A2001	66B1001	66K9001
76 ('47)	76A-1001	76B-1001	76K-1001
76 ('48)	76A2001	76B1001	76K9001

ENGINE NUMBER: Stamped on pad on front left top corner of cylinder block above generator.
1946 Numbers—6-1001 Up (LHD), 6R-1001 (RHD).
1948 Numbers—6-18801 Up (LHD), 6R7001 (RHD).
Hydra-Matic Cars—Engine Number marked with letter "H" following number: 6-1001H.

TUNE-UP

COMPRESSION: Pressure—112 lbs. at cranking speed of 100 RPM.

VACUUM READING: Steady 17" min. at idling speed.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .040".
Plug Type—AC No. 45. 14 mm.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020".
Cam Angle or Dwell—35° Closed, 25° Open.
Breaker Arm Spring Tension—17-21 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: Synchro-Mesh Trans.....TDC.
Hydra-Matic Drive Cars..... .001" BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Steel ball insert in flywheel lined up with pointer in inspection hole in left front face of flywheel housing beside starter.
Octane Selector—Set to give slight ping accelerating with wide open throttle below 15 MPH.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—½-1½ turns open. One screw—turn screw out for richer mixture.
Idle Speed (Standard)—425 RPM. or 6 MPH.
Idle Speed (Hydra-Matic)—375 RPM.
Float Level—½" from machined projection on cover to top of soldered seam at free end (invert to check).
Accelerating Pump—Lower hole Normal setting. Upper hole (max.) winter. Inner hole (min.) summer.

Fuel Pump Pressure: 5 lbs. maximum.

MANIFOLD HEAT CONTROL: Thermostatic coil type. Setting—Coil wind-up should be 125° (approx. ½ turn) at room temperature. NOTE—To check valve for correct position on shaft, use feeler gauge in slot on rear end of valve shaft. With valve closed, gauge should contact stop pin (slot 6° to left or toward engine from up-and-down position) with ⅛" clearance between valve tip and manifold. Valve welded to shaft in this position.

VALVE TAPPET CLEARANCE: .008" Int., .011" Exh. Hot.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCHES: Delco-Remy Nos. as follows: 1946-47—1116353 (66), 1116351 (76), 1116331 (76 RHD). These are used with armored cable. 1948—1116458 (66, 76), 1116459 (76 RHD). Armored cable not used.

Ignition Lock Cylinder: Briggs and Stratton Numbers ('46-47) 45792, ('48) 85373.
Key Series—8000 to 9499. Groove—No. 15.

COIL: Delco-Remy ('46-47) 1115126 or 1115129, (1948) 1115380. ('46-47) on dash, ('48) on engine.
Ignition Current—2.0 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy 1869704.
Capacity—.18-.25 microfarad.

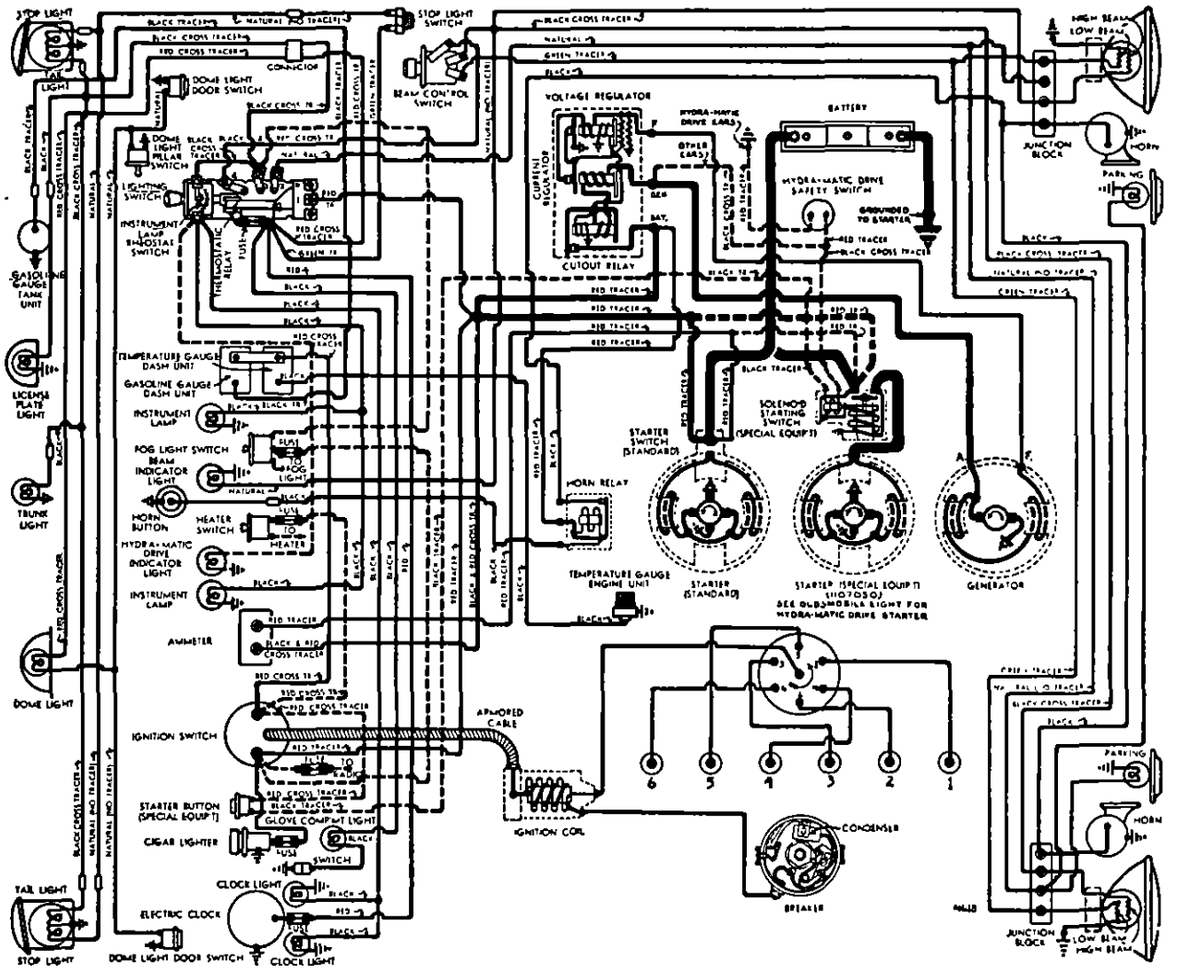
DISTRIBUTOR: Delco-Remy Model No. ('46) 1110213, ('47-48) 1110214. Automatic advance with Vacuum Spark Control and Octane Selector.
Breaker Gap—.020". Limits .018-.024".
Cam Angle or Dwell—35° closed, 25° open.
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110213

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	250	3.0	500
3.0	450	6.0	900
12.0	1600	24.0	3200

Automatic Advance—1110214

Start	250	3.25	500
13.0	1300	26.0	2600



1946-47 OLDSMOBILE SIX

Vacuum Spark Control: Delco-Remy No. 1116035—Integral type linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. **Plunger Travel—7/64".**

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7.5-9.5"
6°	12°	14.6-16.6"①

①—At .103" travel.

Octane Selector—Adjustment permits 10° advance or retard from center '0' position. See Ign. Timing.

Removal:—Distributor mounted on left side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

IGNITION TIMING

Std. Setting — **Piston Position**

Synchro-Mesh Transmission ..... **TDC.**

Hydra-Matic Drive ..... **.001" BTDC.**

NOTE—Modify this setting for special fuel and altitude conditions. See Octane Selector Setting.

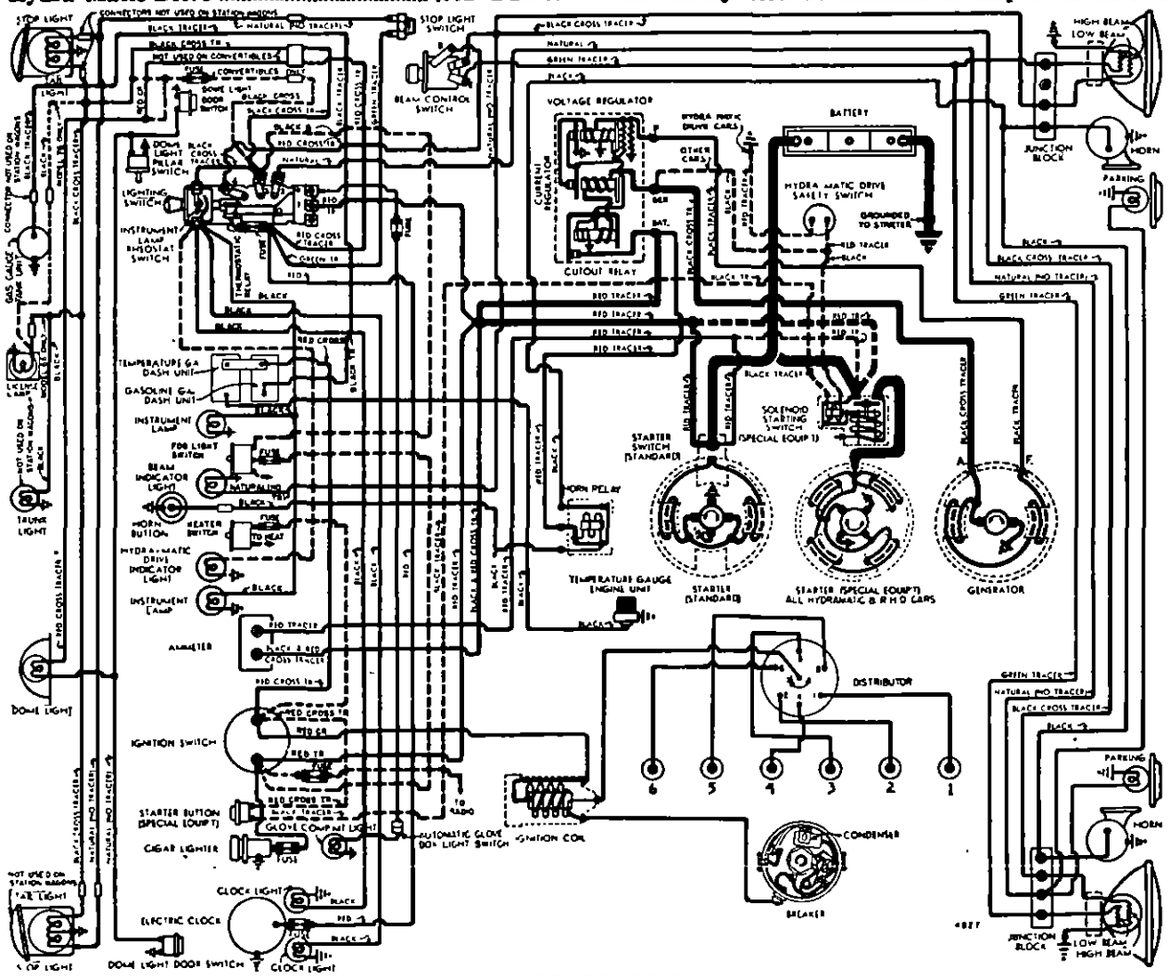
Flywheel Mark—Steel ball on flywheel (#1 and #6 piston top dead center position). Inspection hole in left front face of flywheel housing above starter.

Timing (With Synchroscope)—Recommended method. Loosen hold-down screw in advance arm, center Octane Selector scale ('0' at indicator line), tighten hold-down screw. Clip synchroscope lead to #1 spark plug, direct synchroscope light on flywheel through inspection hole in left front face of housing above starter. Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert) on flywheel lines up with indicator on housing, tighten clamp bolt, check Octane Selector setting (below).

Hydra-Matic Drive Car Note—Set distributor so contacts open with piston .001" before top dead center.

Timing (Without Synchroscope)—Turn engine over to firing position for #1 piston with steel ball insert in flywheel at indicator in inspection hole in left front face of flywheel housing (or with piston .001" BTDC. on cars with Hydra-Matic drive). Loosen hold-down screw in advance arm, center pointer on scale ('0' mark at indicator), tighten hold-down screw. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt and check Octane Selector setting.

Octane Selector Setting: Set for a slight ping when accelerating engine with wide open throttle at speeds below 15 MPH. To adjust, loosen distributor hold-down screw, rotate distributor clockwise toward 'Adv' end of scale (if no ping noted), counter-clockwise toward 'Ret' end of scale (if ping too severe) by steps until performance correct.



1948 OLDSMOBILE SIX

CARBURET R

1946-47-48 Synchro-Mesh Tr.. Carter WA-1, No. 504S
1946-47 Hydra-Matic..... Carter WA-1, No. 481S
1948 Hydra-Matic..... Carter WA-1, No. 651S
1½" single barrel downdraft with Carter Climatic Control.

Casting No. on Flange—(481S, 504S) 340, (651S) 538. *See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Downdraft Jet Specification Table in Carburetor Section.*

Hydra-Matic Throttle Adjustment: *See Hydra-Matic Drive article in Transmission Section.*

Throttle Cracker Adjustment: .0625" to .0851" (1/16") clearance between throttle stopscrew and highest step of fast idle cam with starting pedal fully depressed (starter pinion fully meshed). Adjust by loosening locknut and turning adjusting screw on accelerator bellcrank (screw contacts lug on lever linked to starter pinion shift lever).
CAUTION—Engine will not start properly if this adjustment not correctly made.

Fast Idle: Carter Single Barrel Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (T109-41).

Automatic Choke: Carter Climatic Control (single carbs.).
See Carburetion Equipment Section for complete data.
Setting—Centered (coil housing at index mark).

CARB. EQUIPMENT

Air Cleaner: AC No. 1529861 Oil-wetted type Std. Filter Element AC 1528064. Oil-bath Cleaner Opt'l.
Servicing—Wash and re-oil oil-wetted type every 2000 miles (500 to 1000 miles for dusty conditions) For Oil bath types, wash element and re-fill with 1 pint S.A.E. 50 oil (S.A.E. 40 for winter temperatures) every 5000 miles (2500 miles or oftener as required by local conditions in dusty areas).

Fuel Pump: AC Type "AJ" No. 1537358. AC Replacement Exchange No. 536. Fuel-and-vacuum type.
See Carburetion Equipment Section for complete data.
Pressure—5 lbs. maximum.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. ('46-47) 1516809, ('48) 1517091.
Tank Unit—AC No. ('46-47) 1516285, ('48) 1517068.
See Carburetion Equipment Section for complete data.

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BATTERY

Delco Type 15E-2. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).

Starting Capacity—120 amperes for 20 minutes.

Zero Capacity—300 amperes for 3.5 minutes. Five second voltage 4.25 volts.

Grounded Terminal—Negative (—) to Starter.

Location—On left side in engine compartment.

Police Battery Delco Model 19E-1. 6 volt, 19 plate, 130 Ampere Hour Capacity (20 hour rate).
Grounded Terminal and Location—Same as above.

STARTER

Delco-Remy Nos.	Type
1107034 ('46), 1107066 ('47-48)	Foot Operated
1107930 (Hydra-Matic & RHD Cars)	Pushbutton
1107050 ('46-47 Optional)	Pushbutton

Armature No.—Delco-Remy No. 1867897 (all mod.).

Drive—Overrunning clutch type, with pinion shift, manual (1107034, 66), solenoid (1107050, 930).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ounces each.

Cranking Engine—100 RPM., 125-135 amperes, 5 volts (for Summer Temperatures).

Performance Data—1107034, 50, 66

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.0	65
12 "	Lock	3.37	525

Performance Data—1107930

0	ft. lbs.	6000	5.0	60
15	"	Lock	3.0	600

Removal:—Flange mounted on left front face of flywheel housing. To remove, take out mounting screws.

Starting Switch (1107034, 66): Delco-Remy No. 820052. On starter. Operated by pedal pionion shift lever. (1107050, 1107930)—Delco-Remy Solenoid Switch No. 1118021. On starter. Controlled by Pushbutton Switch No. 1996009 on instrument panel (and Neutral Safety Switch No. 1997761 on Hydra-Matic Cars).
See Electrical Equipment Section for complete data.
Safety Switch Adjustment—Place Selector Lever in "N" (neutral) position, loosen safety switch bracket locking screw, adjust switch so clearance between lever and stop is 1/16-3/32".

GENERATOR

Delco-Remy 1102664 (Std.), 1102680 (Hydra-Matic). Armature No. 1879002. Two brush (shunt) types with voltage and current regulation. Ventilated by fan.

Pulley Note—Cars with Std. Trans. (1102664 Gen.) have regular 3 9/16" pulley. Hydra-Matic Drive cars (1102680 Gen.) have smaller 3 1/16" pulley to compensate for lower engine speed (max. output reached at approx. 110 Eng. RPM. less). NOTE—This pulley can be installed on cars with 3.9-1 Axle ratio

Charging Rate Adjustment—None. Charging rate controlled by Voltage Regulator, maximum output by Current Regulator. See Regulator data below.

Maximum Charging Rate—33 amperes, 7¾ volts, 2400 RPM (hot operating tem.) at 21 MPH car speed and above (Current Regulator setting) with load or discharged battery. Actual charging rate controlled by Voltage Regulator (dependent on battery).

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102664, 80	30	8.0	1750

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. each.
Field Current—1.75-1.9 amperes at 6.0 volts.

Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Check with straightedge across pulleys. Belt deflection should be ¾" inward.

REGULATOR

Delco-Remy Model 1118242. Single Core Type. Vibrating type Voltage and Current Regulators in a single case with Cutout Relay.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings

Cutout Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts hot (at operating temp.). Regulator over-compensated for temperature. Should be checked with cover in place and hot.
Checking & Adjusting—*See Electrical Equip. Section.*
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).

Current Regulator

Setting—34-36 amperes hot (at operating temp.).
Checking & Adjusting—*See Electrical Equip. Section.*
Air Gap—.080" (check same as Voltage Regulator).

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).
Beam Indicator—Small red indicator in upper edge of speedometer. Lighted when Upper Beams in use.

Direction Signal: *See Electrical Equipment Section.*

Switches

Lighting—(1946—66, 1946-47—76) Delco-Remy Nos. 1995026 (1995027 for RHD cars).
(1947—66) Delco-Remy 1995033 (1995034 for RHD).
(1948—66) Delco-Remy 1995036 (1995037 for RHD).
(1948—76) Delco-Remy 1995038 (1995039 for RHD).
Instrument—Part of Lighting Switch. Rheostat operated by turning lighting switch knob.
Beam Selector—Delco-Remy No. 1997008.
Stop Light—Delco-Remy No. 1997725.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Parking, Rear License	3	63
Dir. Signal & Parking	21-3	1154
All Indicators	1	51
Instrument, Glove C., Clock	1½	55
Stop & Tail	21-3	1154
Dome (exc. Sta. Wg. & Conv.)	15	88
Dome (Station Wagon)	6	81
Dome (Convertible)	1½	55
Trunk & Under-hood	6	81
Back-up	32	1133L

MISC. ELECTRICAL

THERMOSTATIC RELAY: On lighting switch. Contacts remain closed with 30 ampere current, open in 3 minutes with 42 amps. current@70°F. Limits current to 18 amps. with dead short-circuit. Not adj

FUSES: Dome & Stop Lights—On lighting switch. ('46-47) SFE 9 ampere. ('48) SFE 14 ampere.
Dome & Tail (1948 Convertible)—3AG 20 ampere. In body feed wire to tail and dome lights.
Glove Box & Under-hood light—1AG 5 ampere.
Direction Signal—SFE 9 ampere. In Flasher to Ignition Switch wire.
Electric Clock—1AG 2 ampere. In feed wire.
Cigar Lighter—1AG 30 and 3AG 30 ampere.
Radio—3AG 15 ampere.
Back Up Light—SFE 9 ampere.

HORNS: Delco-Remy No. Low Note: (1946-47) 1999607, (1948) 1999617, High Note: (1946-47) 1999608, (1948) 1999618. Vibrator type operated by relay.

Type	Current (at 6 volts)	Air Gap
1999607, 617 (Low)	19-21 amperes	.047-.052"
1999608, 618 (High)	18-20 amperes	.039-.044"

Horn Relay:—Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" head type.
Bore—3½". **Stroke**—4⅛".
Displacement—238.1 cubic ins. **Rated HP**—29.4.
Developed Horsepower—100 at 3400 RPM.
Compression Ratio—6.5-1 cast-iron head.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Oldsmobile Shop Notes.*

TIGHTENING TORQUES (Torque Indicating Wrench Data)—*See Oldsmobile Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Oldsmobile Shop Notes.*

PISTONS: Aluminum alloy, T-slot, cam ground, electro-plated type.
Weight—17.37 ozs. **Length**—4 1/32".
Removal—Pistons and rods removed from above.
Clearance—Top land .023-.028". Skirt clearance Top .0025", Bottom .00075". Fitted for .0005-.0010" clearance on thrust surface. See Fitting New Pistons.

Replacement Pistons: Finished pistons (pins fitted) .003", .005", .010", .015", .030" oversize.

Fitting New Pistons: Check piston for size with micrometer (pin removed) 90° from pin bosses ⅜" below lower ring groove and ⅜" from bottom of skirt. Insert .002" x ½" feeler between piston (pin removed) and cylinder wall on valve side with piston inverted and T-slot on opposite side from feeler. Pull to withdraw, feeler must be 4 to 11 lbs. (piston and block at 70°—low limit below 70°, high above).

Installing Pistons: Mark "V-S" on head toward valves (slot away from valves). Pin hole offset 3/32" to left.

PISTON RINGS: 2 coated compression (install with mark TOP up), 2 oil control rings, all above pin.

Ring	Width	End Gap	Side Clearance
Compr.	.0925-.0935"	.008-.018"	.001-.003"
Oil Contr.	.1860-.1865"	.007-.015"	.001-.0025"

Replacement Rings: .010", .020", .030" oversize.

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ENGINE

PISTON PIN: Diameter—.8554-.8557". **Lgth.**—3 5/32". Pin locked in one piston boss by lockscrew (opposite end slotted). Pin bosses are plated and must not be reamed. Standard size pins only serviced.
Pin Fit in Piston—.0001" tight to .0002" loose (plain boss end), .0003-.0006" tight (lock boss end).
Pin Fit in Rod Bushing—.0003-.0006" clearance.
Pin Fitting, Removal, and Installation—*See "Piston Pins" in Oldsmobile Shop Notes.*

CONNECTING ROD: Length 7 13/16". Weight 29 ozs.
Crankpin Journal Diameter—2.123-2.124".
Lower Bearing Diameter—2.1245-2.1255".
Lower Bearing—Removable steel-backed, Durex-babbitt overlay bearing shells.
Clearance—.0005-.0025". **Sideplay**—.0055-.0105".

Bearing Adjustment: None (no shims). Replace bearings.

Installing Rods: Oil spit hole at lower end toward valves and grooves on rod and cap bolt boss (part number side) matched. Special ground cap bolts with self-locking nuts used. Tighten to 45-50 ft. lbs.

CRANKSHAFT: 4 bearing, 7 integral counterweights.
Journal Diameters—#1, 2.478-2.479"; #2, 2.5405-2.5415"; #3, 2.6655-2.6665"; #4, 2.6855-2.6865".
Bearings—Removable steel-backed, Durex-babbitt overlay bearing shells. Front bearing has oil groove (to front) for thrust plate lubrication.
Clearance—.0005-.002" (rear), .001-.003" (all others).

Bearing Adjustment:—None (no shims). Replace bearings. Do not file caps. NOTE—9/16" cap bolts used on rear bearing, ½" on others (heads alike).
Bearing Removal—*See "Crankshaft & Main Bearings" in Oldsmobile Shop Notes.*

End Thrust:—At #1 bearing. **Endplay**—.004-.008". *See "Crankshaft & Main Bearings" in Oldsmobile Shop Notes.*

Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Shop Notes.*

Flywheel Installation: *See "Flywheel" in Oldsmobile Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Journal Diameters—#1, 1.9975-1.9980"; #2, 1.9350-1.9355"; #3, 1.8725-1.8730"; #4, 1.8100-1.8105".
Reamed Bushing Diameters—#1, 1.9995-2.001", #2, 1.937-1.9385"; #3, 1.8745-1.876"; #4, 1.812-1.8135".
Bearings—Bronze bushings. **Clearance** .0015-.0035".

End Thrust:—Forward thrust taken by flange on front engine support plate, rear thrust by flange on shaft bearing against front of engine block.

Timing Chain: Link-Belt. Width 1". Pitch .500". Length 47 links or 23½".

Camshaft Setting—Mesh chain with sprocket marks adjacent and in line with a straightedge across the shaft centers (or use Tool HM-408-0).

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 9/16"	.3415-.3425"	5 51/64"
Exhaust	1 27/64"	.3410-.3418"	5 51/64"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.303"	.00175-.00375"
Exhaust	45°	.298"	.00245-.00425"

Valve Guides:—Intake and exhaust guides same. Press guides in so top end ⅞" below top of block. (Tool J-1042 positions guide correctly in block). Ream to .34425-.34525" inside diam. (not tapered). **Length**—3 7/32".

Valve Springs:—Same spring used on both valves and on 6&8 engines. Damper on top of each spring. Free length 2⅜".

	Spring Pressure	Spring Length
Valve Closed	55 lbs.	2¼"
Valve Open	100 lbs.	1 15/16"

Valve Lifters:—Mushroom type. Diam. .6235-.6240". Lifter holes in block have bearing-ized finish (if worn, fit oversize lifter without reaming hole when possible, to preserve finish). Furn. .001", .002", .005", .010" OS. Clearance .0005-.0008". NOTE—Use only 1⅛" diam. face lifter (to clear fuel pump eccentric).

VALVE TIMING

Tappet Clearance:—.008" Int., .011" Exh. Hot & idling. NOTE—Self-locking tappet screws used.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 5° BTDC. Close 45° ALDC.
Exhaust Valves—Open 45° BLDC. Close 5° ATDC.
Valve Timing Check—With .0124" tappet clearance, #1 intake valve should open with piston 5° (.0163") BTDC with flywheel TDC mark (steel ball insert) approx. 2 teeth before indicator (hole on left front face of housing). Reset tappet clearance at .008" hot.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins, and timing chain. Oil pump mounted externally on right side of engine.
Crankcase Capacity—5 quarts.
Normal Oil Pressure—30 lbs.
Oil Pressure Regulator—On oil pump. Opens at 30 lbs. Non-adjustable type.

Oil Pump: Gear type on right side of crankcase.
Oil Pump Assembly & Installation—*See "Oil Pump" in Oldsmobile Shop Notes.*

Oil Pressure Gauge: AC No. ('46-47) 1506797, ('48) 1507034.

Crankcase Ventilation: Filter element in oil filler cap (inlet breather). Outlet pipe on right side of engine. Servicing—Wash and re-oil filter element every 2000 miles or oftener as required in dusty areas.

COOLING

Cooling System: Positive circulation with water pump on front of engine and water distributing tube in cylinder block. Pressure valve (relief valve) used in filler cap on 1947-48.
Capacity—18½ quarts.
Pressure Valve—AC No. 850501. Filler Cap Opens at 4 lbs. (3¼-4¼ lbs.).

Radiator Core Removal: *See Oldsmobile Shop Notes.*

Water Pump: Packless, sealed ball-bearing shaft. *See Water Pump Section for complete data.*

Thermostat:—Harrison. In cylinder head outlet.
Setting—Starts to open 152°F. Fully open 173°F.

Temperature Gauge: AC Electric type.
Dash Unit—('46-47) 1511652, ('48) 1512059.
Engine Unit—('46-47) 1510772, ('48) 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 9A7 with Borglite driven member. Single plate, dry disc type with steel and asbestos composition pressure plate oil baffle and clutch release bearing lubrication fitting. Cover No. 924. *See Clutch Section for complete data.*

Release Bearing Lubrication:—*See Oldsmobile Special Data.*
Facings—Spiral wound (spirally grooved) molded woven, 2 used. Inside Diam. 6", O.D. 9¼". ⅛" thick.
Pedal Adjustment:—Free travel 1-1¼". Turn link at fork in or out of clevis on auxiliary shaft.
Removal:—Remove transmission (see data below), clutch underpan and take out 6 mounting screws in clutch cover (when installing, use 2 long shank mounting screws in 2nd hole on each side of locating dowel), lower clutch assembly out.

TRANSMISSION

STANDARD

Own Make. All helical gear. Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.

Transmission Control:—Oldsmobile 'Handi-shift' type.
See Transmission Section for complete data.

Removal:—Disconnect shift and selector rods from levers at transmission, speedometer cable, rear universal and slide slip yoke and propeller shaft to rear. Remove four transmission mounting capscrews, pull transmission straight back and remove.

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Own Make. Consists of fluid coupling and 4 speed automatic transmission.
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check fluid level in transmission at each 1000 mile lubrication period or every 2000 miles. Drain and refill every 25,000 miles. Use only Oldsmobile Hydra-Matic Drive Fluid.
Capacity—11 qts. (when drained and refilled with unit in car). **Approximately 12 qts.** (when refilling after the unit has been removed and completely rebuilt).
Checking Fluid Level—Engine must be running at slow idle. Raise floor mat, take off cover in floor above transmission, lift out combination filler cap and dip stick. Add fluid until level is at "FULL" mark with engine idling.
►*CAUTION—Engine must be running at slow idle speed when checking Hydra-Matic Drive Fluid Level.*
Hydra-Matic Linkage Adjustment—*See Hydra-Matic Drive article in Transmission Section.*
Removal: *See Hydra-Matic Drive article in Transmission Section.*

UNIVERSALS

Mechanics 2C or 2CR types. Roller bearing types.

NOTE—Slip joint formed at rear of transmission ahead of front U-joint (driveshaft 1 piece type).
►**1947-48 CAUTION**—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See 1947-48 Oldsmobile in Rear Axle Section.*

REAR AXLE

1946 Type—Same as 1942. Hypoid gear, semi-floating type. This type axle has three setscrews equally spaced around pinion housing.
See Rear Axle Section for complete data.
1947-48—New hypoid gear, semi-floating type. Design similar to 1946 type except that pinion is mounted on two taper roller bearings and com-

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panion flange nut controls pinion bearing "pre-load." No setscrews are used.
See Rear Axle Section for complete data.

1946-47 Rear Axle Ratios

Std.: (66) 4.1-1, (76 '46) 4.3-1, (76 '47) 4.55-1.
Hydra-Matic— (66) 3.42-1, (Std. 76, Optl. 66) 3.9-1.
Optional: 3.9-1 or 4.55-1.

1948 Standard Ratios

66—43:10 (4.3).
76 (& 66 Station Wagon)—41:9 (4.55).
66 Convertible (Optl. Hilly Ratio)—41:9 (4.55).

1948 Hydra-Matic Ratios

66—40:11 (3.64).
76 (& 66 Sta. Wag. & Convertible)—39:10 (3.9).
66 (Optional Hilly Ratio)—39:10 (3.9).
All Export (Optl. Ratio)—41:10 (4.1).

►**Rear Axle Ratio Marking**—Ring and pinion gear ratio (43:10, etc.) and date, stamped on underside of carrier casting, right horizontal rib.
Backlash—('46) .004-.008", ('47-48) .004-.006". Screw adjustment.

Removal:—Disconnect drive shaft at rear universal (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews.

►**1947-48 CAUTION**—Rear universal companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal: Hoist rear end, remove wheel, brake drum, backing plate mounting nuts, static collector and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with puller J-942 (do not allow shaft to drag on oil seal), replace 1 backing plate nut.
Wheel Bearing Adjustment—None.

Rear Suspension: Coil spring type with support arms.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco. Two types are used. FRONT—Model 1947-C (right), D (left). RIGHT REAR—2105-E (76), G (66). LEFT REAR—2105-F (76), H (66). Double acting (parallel cylinder type rear), hydraulic.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4° 51' 10".
Caster—0-¾° Negative. Adjustable.
Camber—Negative ¼° to Positive ¾°. Adjustable.
Toe In—1/16-⅛". Adjust each tie rod equally.
Steering Geometry—Inner wh'l 23° ± ½°. Outer 20°.

STEERING GEAR

Steering Gear—Saginaw Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinder Bore—Front wheel 1⅛". Rear 1".
Drums—Cast-iron lined steel. Diameter 11".
Lining—Moulded. Width 2" (front wheels), 1¾" (rear). Thickness 3/16". Length per shoe: 9 11/32" (primary), 11 31/32" (secondary).
Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.
Braking Power—56% front wheels, 44% rear.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On plate ('46-47) on upper left front corner of dash under hood, (1948) on left front door hinge post.

1946-47-48 Numbers—First numbers as follows:

Series	Lansing Mich.	Linden N. J.	South Gate, Cal.	Wilmington, Del.
68 ('47)	68-13001	68L- 4001	68C-4001	68W-1001
68 ('48)	68-25001	68L8001	68C6001	68W2001
78 ('46)	78-33001	78L- 5001	78C-5001	
78 ('47)	78-50001	78L- 8001	78C-7001	78W-1001
78 ('48)	78-72001	78L16001	78C11001	78W2001
98 ('46)	98-32001	98L- 7001	98C-5001	
98 ('47)	98-43001	98L-10001	98C-7001	98W-1001
98 ('48)	98-65001	98L20001	98C11001	98W1001

	Atlanta Ga.	Framingham Mass.	Kansas City Kans.
68 ('47)	68A-1001	68B-1001	68K-1001
68 ('48)	68A2001	68B1001	68K3001
78 ('47)	78A-1001	78B-1001	78K-3001
78 ('48)	78A2001	78B1001	78K7001
98 ('47)	98A-1001	98B-1001	98K-2001
98 ('48)	98A1001	98B1001	98K6001

ENGINE NUMBER: Stamped on pad on front left top corner of cylinder block above generator.
1946 Numbers—8-1001 Up.
1948 Numbers—Models 68 & 78, 8-127001 Up.
1948 Numbers—Model 98 First No. 9-1001 (LHD).
Hydra-Matic Cars—Engine Number marked with letter "H" following number: 8-1001H.

TUNE-UP

COMPRESSION: Pressure—115 lbs. at cranking speed of 100 RPM. (All Exc. Futuramic), 182 lbs. at 1000 RPM. (Futuramic 98 1948).

VACUUM READING: Steady 17" min. at idling speed.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .030".
Plug Type—AC No. 45, 14 mm.

IGNITION—*See Coil, Condenser, and Distributor.*
Breaker Gap—.015".
Cam Angle or Dwell—31° Closed, 14° Open.
Breaker Arm Spring Tension—19-23 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: Synchro-Mesh Trans.....2° BTDC
Hydra-Matic Drive Cars .....001" BTDC
Timing Procedure—*See Ignition Timing.*
Timing Mark—Steel ball insert (2° BTDC.) in flywheel lined up with pointer in inspection hole in left front face of flywheel housing beside starter.
Octane Selector—Set to give slight ping accelerating wide open throttle, high gear, below 15 MPH.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—(480S, SA; 503S, SA) ½-2¼, (665S) ¾-1¾, (650S, SA) ½-1½ turns open. Two screws—turning screws out gives richer mixture.
Idle Speed (Standard)—425 RPM. or 6 MPH.
Idle Speed (Hydra-Matic)—375 RPM.
Float Level (WDO Carburetors)—3/16" ("S" carburetors with 25-100S Needle & Seat Assembly), 15/64" ("SA" carburetors with later 25-164S Needle & Seat Assembly) from top of float to machined surface of cover (remove gasket and invert to check).
Float Level (WCD 665S carburetor)—3/16" from top of float to gasket seat on bowl cover (Gauge T109-162). Sides of floats should barely touch vertical uprights on gauge (to prevent floats binding on sides of bowl).
Accelerating Pump—Seasonal adjustment on WCD 665S only: Top hole (max.) normal, Lower hole if less charge required.

Fuel Pump Pressure: 5 lbs. maximum.

MANIFOLD HEAT CONTROL: Thermostatic coil type. **Setting**—Coil wind-up should be 160° (approx. ½ turn) at room temperature. NOTE—To check valve for correct position on shaft, use feeler gauge in slot on rear end of valve shaft. With valve closed, gauge should contact stop pin (slot 6° to left or toward engine from up-and-down position) with ⅛" clearance between valve tip and manifold.

VALVE TAPPET CLEARANCE: .008" Int., .011" Exh. hot. Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCHES: Delco-Remy Nos. as follows:
1946-47—1116351 (78), 1116353 (98). These are used with armored cable.
1948—1116458 (68, 78), 1116453 (98). Armored cable not used.

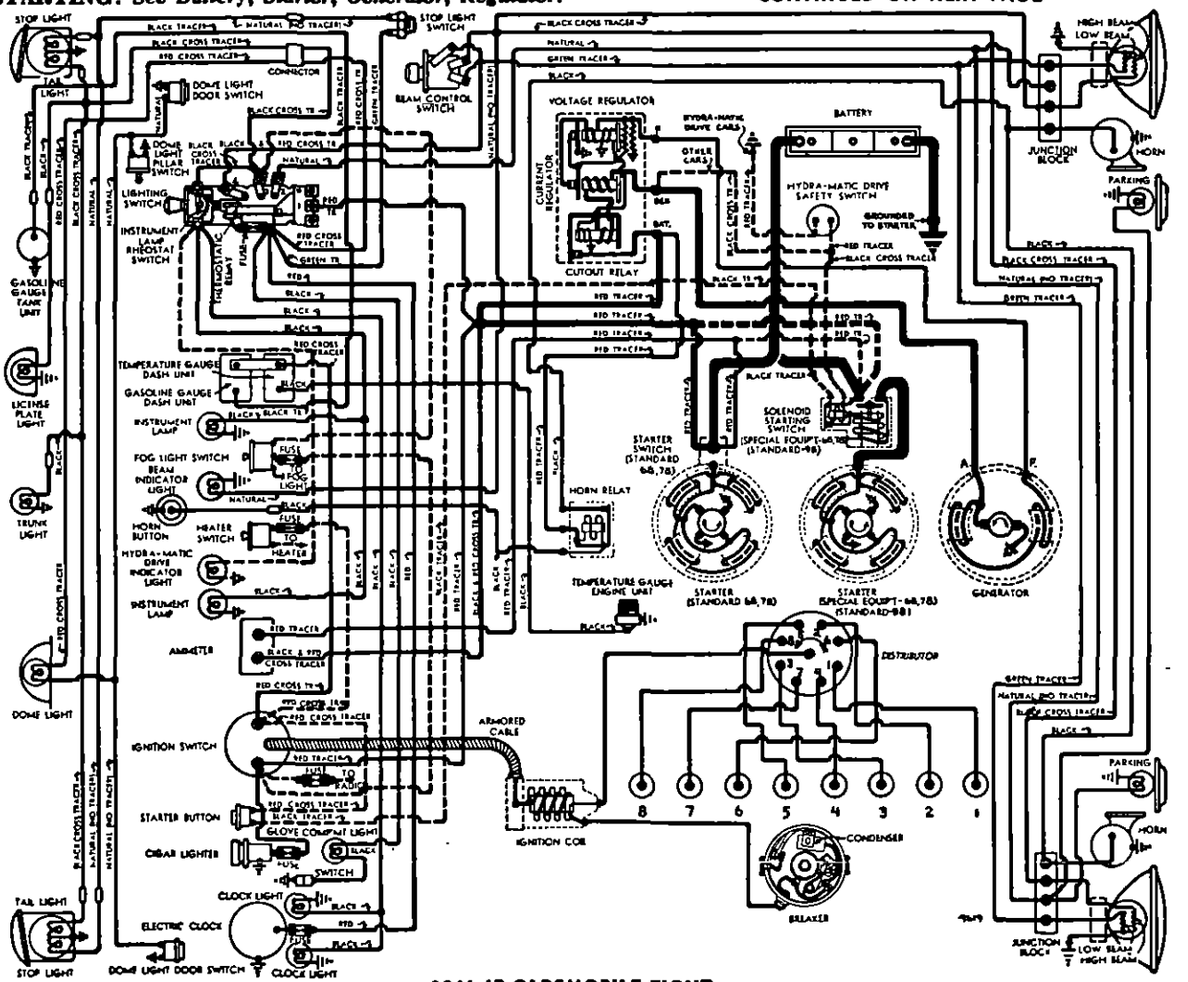
Ignition Lock Cylinder: Briggs and Stratton Numbers ('46-47) 45792, ('48) 85373.
Key Series—8000 to 9499. Groove—No. 15.

COIL: Delco-Remy ('46-47) 1115126 or 1115129, (1948) 1115380. ('46-47) on dash, ('48) on engine.
Ignition Current—2.0 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1968704.
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy 1110808 with Vacuum Control 1116036. Single breaker, 8 lobe cam, full automatic advance type with Octane Selector.
Breaker Gap—.015". Limits .0125-.0175".
Cam Angle or Dwell—31° closed, 14° open.
Breaker Arm Spring Tension—19-23 ounces.

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1946-47 OLDSMOBILE EIGHT

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Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	250	3.0	500
3.5	500	7.0	1000
12.0	1600	24.0	3200

Vacuum Spark Control: Delco-Remy No. 1116036—Integral type linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. **Plunger Travel**—9/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	6.5-8.5"
6°	12°	14.0-16"①

①—At .125" travel.

Octane Selector—Adjustment permits 10° advance or retard from center '0' position. See Ign. Timing.

Removal:—Distributor mounted on left side of engine. To remove, disconnect vacuum line, take out hold-down screw in advance arm.

I NITI N TIMING

Std. Setting	Flywheel Degrees	Piston Position
Std. Trans. Cars	2° BTDC	.002" BTDC.
Hydra-Matic Trans.		.001" BTDC.

NOTE—Modify this setting for special fuel and altitude conditions. See Octane Selector Setting.

Timing (With Synchroscope)—Recommended method. Loosen hold-down screw in advance arm, center Octane Selector scale ('0' at indicator line), tighten hold-down screw. Clip synchroscope lead to #1 spark plug, direct synschroscope light on flywheel through inspection hole in left front face of housing above starter. Idle engine, loosen advance arm clamp bolt, rotate distributor until ignition mark (steel ball insert) on flywheel lines up with indicator on housing, tighten clamp bolt, check Octane Selector setting (below).

NOTE—On cars with Hydra-Matic drive, use dial indicator and set distributor so contacts open with piston .001" before top dead center.

Timing (Without Synchroscope)—Turn engine over to firing position for #1 piston with steel ball insert in flywheel at indicator in inspection hole in left front face of flywheel housing (or with piston .001" BTDC. on cars with Hydra-Matic drive). Loosen hold-down screw in advance arm, center pointer on scale ('0' mark at indicator), tighten hold-down screw. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt and check Octane Selector setting.

Octane Selector Setting: Set for a slight ping when accelerating engine with wide open throttle at speeds below 15 MPH. To adjust, loosen distributor hold-down screw, rotate distributor clockwise toward 'Adv' end of scale (if no ping noted), counter-clockwise toward 'Ret' end of scale (if ping too severe) by steps until performance correct.

CARBURETOR

CARTER WDO

Car Model	Carter WDO No.
'46-48 Synchro-Mesh Tr.	503S, SA
'46-Part '47 Hydra-Matic	480S, SA
'48 Hydra-Matic	650S, SA

1⅛" Dual barrel downdraft type with Carter Climatic Control.

Casting No. on Flange—(480S, SA; 503S, SA) 342, (650S, SA) 540.

See Carburetor Section for complete data.

►480S, 503S, 650S **Carburetor Change to improve Warm Engine Starting**—*See 1946-47-48 Oldsmobile Eight (Carter WDO carburetors) in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Downdraft Jet Specification Table in Carburetor Section.*

Hydra-Matic Throttle Adjustment: *See Hydra-Matic Drive article in Transmission Section.*

Throttle Cracker Adjustment: Must be set for correct throttle opening for starting. To adjust, disconnect starter cable at starter switch (for foot operated starters), disconnect coil lead to distributor (for solenoid operated starters), depress starter pedal or pushbutton to full down position (engine will be turning over on solenoid starter cars) to fully mesh starter pinion, loosen locknut and turn adjusting screw on accelerator bell-crank (screw contacts lug on lever linked to starter pinion shift lever) so that clearance between throttle stopscrew and highest step of fast idle cam is .105-.125" (⅛").

Fast Idle: Carter Dual (WDO) Carburetor type.

See Carburetion Equipment Section for complete data.

Setting—.015" opening between edge of throttle valve and bore of carburetor (side opposite port) with choke valve tightly closed.

Automatic Choke: Carter Climatic Control (Dual carbs.).

See Carburetion Equipment Section for complete data.

Setting—Mark on thermostat case centered on housing scale (503S, SA), 2 Notches Rich (480S, SA; 650S, SA).

CARBURETOR

CARTER WCD

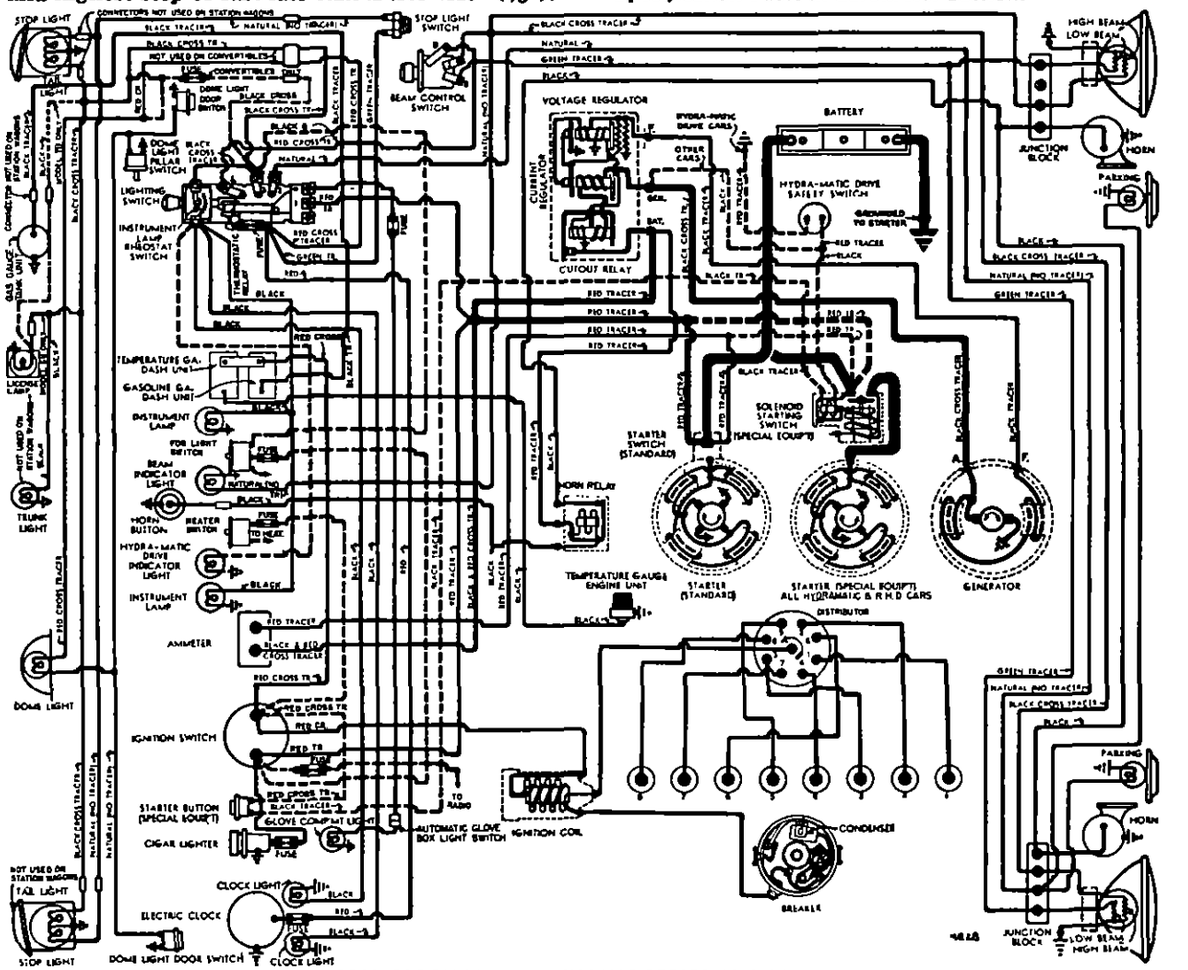
►PART PRODUCTION 1947 HYDRA-MATIC

Carter WCD, No. 665S. 1¼" dual barrel downdraft type with Carter Climatic Control.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Downdraft Jet Specification Table in Carburetor Section.*



1948 OLDSMOBILE 8 DYNAMIC SERIES 68 & 78

Hydra-Matic Throttle Adjustment: *See Hydra-Matic Drive article in Transmission Section.*

Fast Idle: Carter Dual (WCD) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—With choke valve tightly closed, and fast idle adjusting screw on highest step of fast idle cam, adjust fast idle screw for .018" throttle opening (use Gauge T109-44 between edge of throttle valve and carburetor wall on side opposite idle ports).

Automatic Choke: Carter Climatic Control (dual carburetor type).
See Carburetion Equipment Section for complete data.
Setting—One point Rich.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544128 Oil-wetted type Std. Filter Element AC #6. Oil-bath Cleaner Optl.
Servicing—Wash and re-oil oil-wetted type every 2000 miles (500 to 1000 miles for dusty conditions). For Oil bath types, wash element and re-fill with 1 pint S.A.E. 50 oil (S.A.E. 40 for winter temperatures every 5000 miles (more often if necessary).

Fuel Pump: AC Type "AJ" No. 1537330. AC Replacement Exchange No. 535. Fuel-and-vacuum type.
See Carburetion Equipment Section for complete data.
Pressure—5 lbs. maximum.

Gasoline Gauge: AC Electric type.
Dash Unit (1946-47)—AC No. 1516809.
Dash Unit ('48)—AC (68, 78) 1517091, (98) 1517011.
Tank Unit—AC No. ('46-47) 1516285, ('48) 1517068.
See Carburetion Equipment Section for complete data.

BATTERY

***1946-47: Delco 17E-2.** 6 Volt, 17 Plate, 100 Ampere Hr. Capacity (20 hour rate).*
Starting Capacity—140 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.5 minutes. Five second voltage 4.4 volts.
Grounded Terminal & Location—Same as for 1948.

1948: Delco 15E-2. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes.
Five second voltage—4.25 volts.
Grounded Terminal—Negative (—) to Starter.
Location—On left side in engine compartment.

Police Battery Delco Model 19E-1. 6 volt, 19 plate, 130 Ampere Hour Capacity (20 hour rate).
Grounded Terminal and Location—Same as above.

STARTER

Delco-Remy Nos.	Type
1107922 ('46), 1107941 ('46-48)	Foot Operated
1107930 (Hydra-Matic & RHD)	Push button

Armature No.—Delco-Remy No. 1867897 (all mods.).
Drive—Overrunning clutch type with pinion shift, manual (1107922, 41), solenoid (1107930).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces each.
Cranking Engine—100 RPM. 140-150 amperes, 5 volts (for Summer Temperatures).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 "	Lock	3.0	600

Removal:—Flange mounted on left front face of flywheel housing. To remove, take out mounting screws.
Starting Switch (1107922, 41): Delco-Remy No. 820052. On starter. Operated by pedal shift lever. (1107930)—Solenoid Switch D-R No. 1118021. On starter. Controlled by Pushbutton Switch No. 1996033 (Futuramic), 1996009 (Others) on the instr. panel (and Neutral Safety Switch No. 1997761 on Hydra-Matic Drive Cars).
See Electrical Equipment Section for complete data.
Safety Switch Adjustment—Place Selector Lever in "N" (neutral) position, loosen safety switch bracket locking screw, adjust switch so clearance between lever and stop is 1/16-3/32", tighten lock screw.

GENERAT R

Delco-Remy 1102664 (Std.), 1102680 (Hydra-Matic). Armature No. 1879002. Two brush (shunt) types with voltage and current regulation. Ventilated by fan.
Pulley Note—*See Oldsmobile 6 page for standard and optional pulley data.*
Charging Rate Adjustment—None. Charging rate controlled by Voltage Regulator, maximum output by Current Regulator. See Regulator data below.
Maximum Charging Rate—33 amperes, 7¾ volts, 2400 RPM (hot operating tem.) at 21 MPH car speed

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102664, 80	30	8.0	1750

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. each.
Field Current—1.75-1.9 amperes at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment:—Check with straightedge across pulleys. Belt deflection should be ¾" inward.

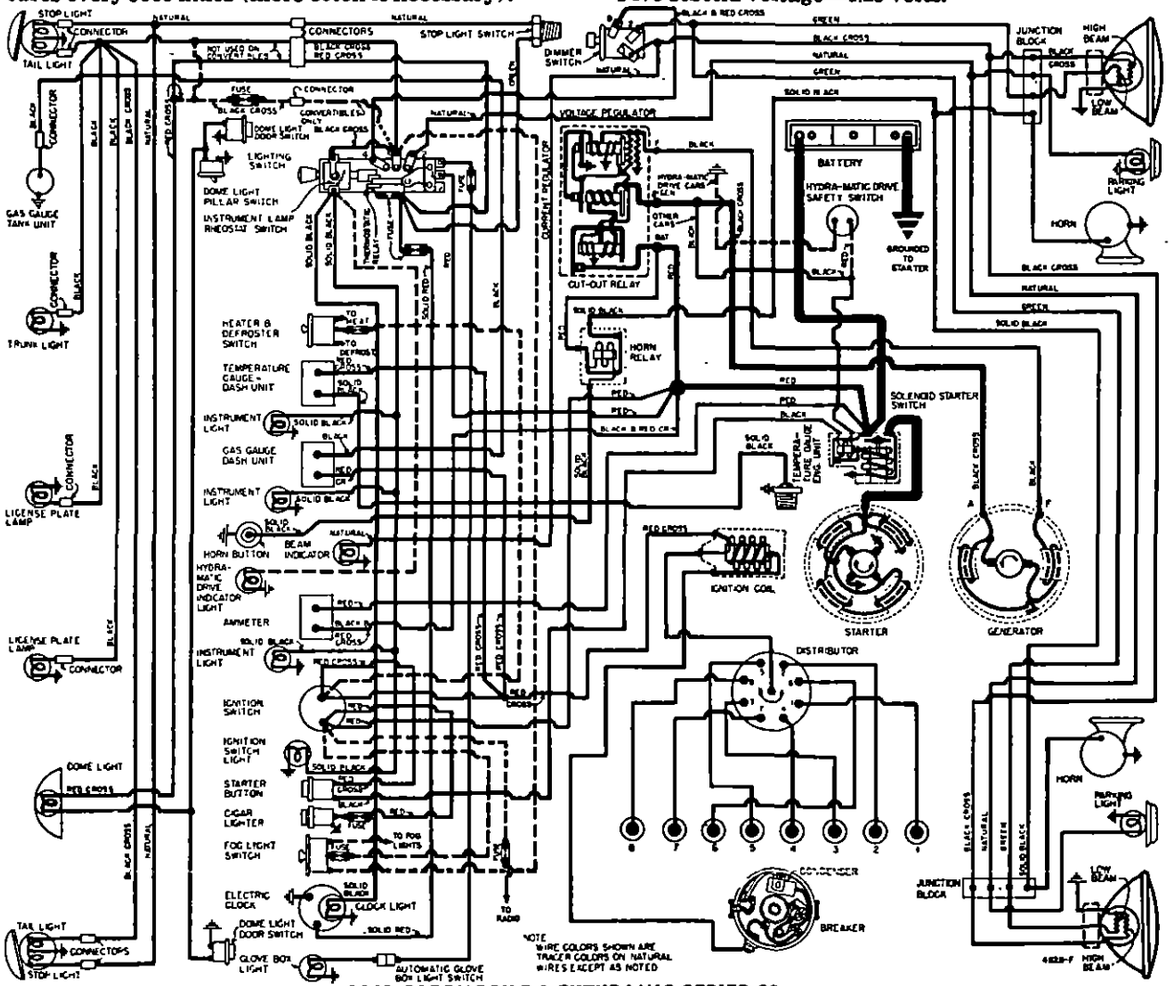
REGULAT R

Delco-Remy Model 1118242. Single Core Type. Vibrating type Voltage and Current Regulators in a single case with Cutout Relay.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings

Cutout Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

CONTINUED ON NEXT PAGE



1948 OLDSMOBILE 8 FUTURAMIC SERIES 98

CONTINUED FROM PRECEDING PAGE

Voltage Regulator

Setting—7.2-7.4 volts hot (at operating temp.). Regulator over-compensated for temperature. Should be checked with cover in place and hot.

Checking & Adjustment—*See Electrical Equipment Section.*

Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).

Current Regulator

Setting—34-36 amperes hot (at operating temp.).

Checking & Adjustment—*See Electrical Equipment Section.*

Air Gap—.030" (check same as Voltage Regulator).

LIGHTING

Headlamps: Guide "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).

Beam Indicator—Small red indicator in upper edge of speedometer. Lighted when Upper Beams in use.

Direction Signal: *See Electrical Equipment Section.*

Switches

Lighting—(1946-47—68, 78) D-R No. 1995026.
(1946-47—98) Delco-Remy No. 1995025.
(1948—68, 78) Delco-Remy No. 1995036.
(1948—98) Delco-Remy No. 1995030.

Instrument—Part of Lighting Switch. Rheostat operated by turning Lighting Switch Knob.

Beam Selector—Delco-Remy No. 1997008.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	4030
Parking, Rear License	3	63
Dir. Signal & Parking	21-3	1154
All Indicators	1	51
Instrument (Dynamic)	1½	55
Instrument (Futuramic)	1	51
Ign. Key (Futuramic Conv.)	1	51
Glove Compt., Clock	1½	55
Stop & Tail	21-3	1154
Dome (exc. Sta. Wg. & Conv.)	15	88
Dome (Station Wagon)	6	81
Dome (Convertible)	1½	55
Trunk & Under-hood	6	81
Back-Up	32	1133L

MISC. ELECTRICAL

THERMOSTATIC RELAY: On lighting switch. Contacts remain closed with 30 ampere current, open in 3 minutes with 42 amps. current@70°F. Limits current to 18 amps. with dead short-circuit. Not adj

FUSES: Dome & Stop Lights—On lighting switch. ('46-47) SFE 9 ampere. ('48) SFE 14 ampere.
Dome & Tail (1948 Convertible)—3AG 20 ampere. In body feed wire to tail and dome lights.
Glove Box & Under-hood Light—1AG 5 ampere.
Direction Signal—SFE 9 ampere. In Flasher to Ignition Switch wire.
Electric Clock—1AG 2 ampere. In feed wire.
Cigar Lighter—1AG 30 and 3AG 30 ampere.

HORNS: Delco-Remy No. Low Note: (1946-47) 1999607, (1948) 1999617, High Note: (1946-47) 1999608, (1948) 1999618. Vibrator type operated by relay.

Type	Current (at 6 volts)	Air Gap
1999607, 617 (Low)	19-21 amperes	.047-.052"
1999608, 618 (High)	18-20 amperes	.039-.044"

Horn Relay:—Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.
Bore—3¼". **Stroke**—3⅞".
Displacement—257.1 cubic ins. **Rated HP**—33.8.
Developed Horsepower—(Dynamic) 110 at 3600 RPM. (Futuramic)—115 at 3600 RPM.
Compression Ratio—(Dynamic) 6.5-1, (Futuramic) 7.0-1. Std. Cast iron heads.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Oldsmobile Shop Notes.*

TIGHTENING TORQUES: *See Oldsmobile Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Oldsmobile Shop Notes.*

PISTONS: Aluminum alloy, T-slot, cam ground, electro-plated type.
Weight—16 ozs. (stripped). **Length**—3 15/16".
Removal—Pistons and rods removed from above.
Clearance—Top land .023-.028". Skirt clearance Top .00205", Bottom .00155". Fitted for .0013-.0018" clearance on thrust surface. See Fitting New Pistons.

Replacement Pistons: Finished pistons (pins fitted) .003", .005", .010", .015", .030" oversize.

Fitting New Pistons: Check piston for size with micrometer (pin removed) 90° from pin bosses ⅜" below lower ring groove and ⅜" from bottom of skirt. Insert .002" x ½" feeler between piston (pin removed) and cylinder wall on valve side with piston inverted and T-slot on opposite side from feeler. Pull to withdraw feeler must be 4 to 11 lbs. (piston and block at 70°—low limit below 70°, high above).

Installing Pistons: Mark "V-8" on head toward valves (slot away from valves). Pin hole offset 3/32" to left.

PISTON RINGS: 2 compression (coated type—install with mark TOP up), 2 oil control, all above pin.

Ring	Width	End Gap	Side Clearance
Compr.	.0925-.0935"	.009-.014"	.001-.0025"
Oil Contr.	.1860-.1865"	.009-.014"	.001-.0025"

Replacement Rings:—.010", .020", .030" oversize.

PISTON PIN: Diameter—.8554-.8557". **Lgth.**—2 31/32". Pin locked in one piston boss by lockscrew (opposite end slotted). Pin bosses are plated and must not be reamed. Standard size pins only serviced.
Pin Fit in Piston—.0001" tight to .0002" loose (plain boss end), .0003-.0006" tight (lock boss end).
Pin Fit in Rod Bushing—.0003-.0006" clearance.
Pin Fitting, Removal and Installation—*See "Piston Pins" in Oldsmobile Shop Notes.*

CONNECTING ROD: Length 7 13/16". Weight 28 ozs.
Crankpin Journal Diameter—2.123-2.124".
Lower Bearing Diameter—2.1245-2.1255".
Lower Bearing—Removable steel-backed, Durex-babbitt overlay bearing shells.
Clearance—.0005-.0025". **Sideplay**—.0055-.0105".

Bearing Adjustment: None (no shims). Replace bearings.

Installing Rods: Oil spit hole at lower end toward valves and grooves on rod and cap bolt boss (part number side) matched. Special ground cap bolts with self-locking nuts used. Tighten to 45-50 ft. lbs.

CRANKSHAFT: 5 bearing, 8 integral counterweights.
Journal Diameters—#1, 2.478-2.479"; #2, 2.5405-2.5415"; #3, 2.603-2.604"; #4, 2.6655-2.6665"; #5, 2.6855-2.6865".
Bearings—Removable steel-backed, Durex-babbitt overlay bearing shells. Front bearing has oil groove (to front) for thrust plate lubrication.
Clearance—.0005-.002" (rear), .001-.003" (all others).

Bearing Adjustment:—None (no shims). Replace bearings. Do not file caps. NOTE—9/16" cap bolts used on rear bearing, ½" on others (heads alike).

End Thrust:—At #1 bearing. **Endplay**—.004-.008". *See "Crankshaft & Main Bearings" in Oldsmobile Shop Notes.*

Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Shop Notes.*

CAMSHAFT: 5 bearing. Non-adjustable chain drive.
Journal Diameters—#1, 2.0600-2.0605"; #2, 1.9975-1.9980"; #3, 1.9350-1.9355"; #4, 1.8725-1.8730"; #5, 1.8100-1.8105".
Reamed Bushing Diameters—#1, 2.0620-2.0635"; #2, 1.9995-2.001"; #3, 1.9370-1.9385; #4, 1.8745-1.876"; #5, 1.812-1.8135".
Bearings—Bronze bushings. **Clearance** .0015-.0035".

End Thrust:—Forward thrust taken by flange on front engine support plate, rear thrust by flange on shaft bearing against front of engine block.

Timing Chain:—Link-Belt. Width 11/16". Pitch .500". Length 47 links or 23½".

Camshaft Setting—Mesh chain with sprocket marks adjacent and in line with a straightedge across the shaft centers (or use Tool HM-408-0).

VALVES:

	Head Diameter	Stem Diameter	Length
Intake	1 9/16"	.3415-.3425"	.5 51/64"
Exhaust	1 27/64"	.3410-.3418"	.5 51/64"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.286"	.00175-.00375"
Exhaust	45°	.314"	.00245-.00425"

Valve Guides:—Intake and exhaust guides same. Press guides in so top end ⅞" below top of block. (Tool J-1042 positions guide correctly in block). Ream to .34425-.34525" inside diam. (not tapered).

Valve Springs:—Same spring used on both valves and on 6&8 engines. Damper on top of each spring. Free length 2⅝".

	Spring Pressure	Spring Length
Valve Closed	55 lbs.	2¼"
Valve Open	100 lbs.	1 15/16"

Valve Lifters:—Mushroom type. Diam. .6235-.6240". Lifter holes in block have bearing-ized finish (if worn, fit oversize lifter without reaming hole when possible, to preserve finish). Furn. .001", .002", .005", .010" OS. Clearance .0005-.0008". NOTE—Use only 1⅛" diam. face lifter (to clear fuel pump eccentric).

VALVE TIMING

Tappet Clearance:—.008" Int., .011" Exh. Hot & idling. NOTE—Self-locking tappet screws used.

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open at TDC. Close 35° ALDC.
Exhaust Valves—Open 45° BLDC. Close 10° ATDC.
Valve Timing Check—With .0124" tappet clearance #1 intake valve should open with piston at top dead center (flywheel mark "TDC/"—NOT STEEL BALL INSERT) aligned with pointer in housing above starter. Reset tappet cl. at .008" hot & idling.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins, and timing chain. Oil pump mounted externally on right side
Crankcase Capacity—6 quarts.
Normal Oil Pressure—30 lbs.
Oil Pressure Regulator—On oil pump. Opens at 30 lbs. Non-adjustable type.

Oil Pump: Gear type on right side of crankcase.
Oil Pump Assembly & Installation—*See "Oil Pump" in Oldsmobile Shop Notes.*

Oil Pressure Gauge: (1946-47) AC No. 1506797.
(1948)—AC No. 1507304 (68, 78), 1507124 (98).

Crankcase Ventilation: Filter element in oil filler cap (inlet breather). Outlet pipe on right side of engine.

COOLING

Cooling System: Positive circulation with water pump on front of engine and water distributing tube in cylinder block and ('47-48) pressure valve in filler cap.

►**1948 Radiator Shroud**—Used on all Eight cylinder models to maintain proper water temperature for high altitude and extreme hot weather driving.

►**Radiator Shroud #555107 for Installation on the 1946-47 Eights**—This 1948 68 & 78 type shroud can be installed. *See "Cooling System" in Oldsmobile Shop Notes.*

Capacity—20½ quarts.
Pressure Valve—AC No. 850501. Radiator filler cap. Opens at 4 lbs. (3¼-4¼ lbs.).

Radiator Core Removal: *See Oldsmobile Shop Notes.*

Water Pump: Packless, sealed ball-bearing shaft.
See Water Pump Section for complete data.
Futuramic Note—Water pump on these engines has been lowered.

Thermostat:—Harrison. In cylinder head outlet.
Setting—Starts to open 152°F. Fully open 173°F.

Temperature Gauge: AC Electric type.
Dash Unit—(1946-47) AC No. 1511652.
(1948) AC No. 1512059 (68, 78), 1511943 (98).
Engine Unit—AC ('46-47) 1510772, ('48) 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 10A7 with Borglite driven member. Cover marked #927. Single plate, dry disc type
See Clutch Section for complete data.

Release Bearing Lubrication:—*See Oldsmobile Special Data.*
Facings—Spiral wound (spirally grooved) molded woven, 2 used. Inside Diam. 7". O.D. 10". ⅛" thick.

Pedal Adjustment:—Free travel 1-1¼". Turn link at fork in or out of clevis on auxiliary shaft.

Removal:—Remove transmission (see below), clutch underpan and reinforcing plate. Take out 6 mounting screws in clutch cover (when installing, use 2 long shank mounting screws in 2nd hole on each side of locating dowel), remove clutch. *For Clutch Housing Re-inforcing Plate data refer Olds Shop Notes.*

TRANSMISSION

STANDARD

Own Make. All helical gear. Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.

Transmission Control:—Oldsmobile 'Handi-shift' type.
See Transmission Section for complete data.

Removal: Disconnect shift and selector rods from levers at transmission, speedometer cable, rear universal and slide slip yoke and propeller shaft to rear. Remove four transmission mounting capscrews, pull transmission straight back and remove.

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Own Make. Consists of fluid coupling and 4 speed automatic transmission.
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check fluid level in transmission at each 1000 mile lubrication period or every 2000 miles. Drain and refill every 25,000 miles. Use only Oldsmobile Hydra-Matic Drive Fluid.
Capacity—11qts. (when drained and refilled with unit in car). **Approximately 12 qts.** (when refilling after unit removed and completely rebuilt.
Checking Fluid Level—Engine must be running at slow idle. Raise floor mat, take off cover in floor above transmission, lift out combination filler cap & stick, fill to "FULL" mark (engine idling).
►*CAUTION—Engine must be running at slow idle speed when checking Hydra-Matic Drive Fluid Level.*
Hydra-Matic Linkage Adjustment—*See Hydra-Matic Drive article in Transmission Section.*

Removal: *See Hydra-Matic Drive article in Transmission Section.*

UNIVERSALS

Mechanics 2C or 2CR types. Roller bearing types.

NOTE—Slip joint formed at rear of transmission ahead of front U-joint (driveshaft 1 piece type).

►**1947-48 CAUTION**—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See 1947-48 Oldsmobile in Rear Axle Section.*

REAR AXLE

1946 Type—Same as 1942. Hypoid gear, semi-floating type. This type axle has three setscrews equally spaced around pinion housing.
See Rear Axle Section for complete data.
1947-48—New hypoid gear, semi-floating type. Design similar to 1946 type except that pinion is mounted on two taper roller bearings and companion flange nut controls pinion bearing "pre-load." No setscrews are used.
See Rear Axle Section for complete data.

1946-47 Rear Axle Ratios
Ratio—Std.: 4.55-1 (98), 4.3-1 (for 68 and 78).
Hydra-Matic: 3.42-1 (68), 3.63-1 (78), 3.9-1 (98).
Optional: 3.9-1 or 4.55-1.

1948 Rear Axle Ratios
Ratios (Std. Trans.)—(68, 78, 98) 43:10 (4.3-1), (68 Sta. Wgn & Optl. on 68 Conv.) 41:9 (4.55-1).
Ratios (With Hydra-Matic Drive)—(68, 78) 40:11 (3.64-1), (98) 39:10 (3.9-1), (68 Sta. Wgn & Conv. & Optl. on 68, 78) 39:10 (3.9-1).

►**Rear Axle Ratio Marking**—Ratio (43:10 etc.) and date stamped on right lower side of carrier.
Backlash—('46) .004-.008", ('47-48) .004-.006". Screw adjustment.

Removal: Disconnect drive shaft at rear universal (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews.

►**1947-48 CAUTION**—Rear universal companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal: Hoist rear end, remove wheel, brake drum, backing plate mounting nuts, static collector and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with puller J-942 (do not allow shaft to drag on oil seal), replace 1 backing plate nut.
Wheel Bearing Adjustment—None.

Rear Suspension: Coil spring type with support arms.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco. Two types are used. FRONT—Model 1947-C (right), D (left). RIGHT REAR—2105-E (78, 98), G (68). LEFT REAR—2105-F (78, 98), H (68). Double acting (parallel cylinder type rear), hydraulic.

FRONT SUSPENSION

Front Suspension:—Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—4° 51' 10".
Caster—0-¾° Negative. Adjustable.
Camber—Negative ¼° to Positive ¾°. Adjustable.
Toe In—1/16-⅛". Adjust each tie rod equally.
Steering Geometry—Inner wh'l 23°±½°. Outer 20°.

STEERING GEAR

Steering Gear—Saginaw Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinder Bore—Front wheel 1⅛". Rear 1".
Drums—Cast-iron lined steel. Diameter 11".
Lining—Molded. Width: Front wheel 2" (68), 2¼" (78, 98). Rear 1¾" (68), 2" (78, 98). Thick. 3/16". Length 9 11/32" (primary), 11 31/32" (secondary).
Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Hand Brake:—See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (motor driven pump).
Futuramic Note—Power operated windows and front seat adjustment optional on 2-Door & 4-Door
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.
1949 Numbers—First number 1001 with prefix 496M, A, etc. as follows:
1950 Numbers—First number 1001 with prefix 506M, A, etc. as follows:
Serial No. Prefix Identification. First two numbers 49 (1949), 50 (1950) —indicate year, third number 6 indicates 76 Series, letter indicates assembly plant: **M**—Lansing, **A**—Atlanta, **B**—Framingham, **K**—Kansas City, **L**—Linden, **C**—South Gate, **W**—Wilmington.

ENGINE NUMBER: On left front top corner of block.
1949 Numbers—6A1001 up.
1950 Numbers—6A97001 up.
Hydra-Matic Cars. Engine number marked with letter "H" following number: **6A1001H.**

TUNE-UP

COMPRESSION PRESSURE: 125 lbs. at cranking speed.

VACUUM READING: Steady 17" min. at idling speed.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .040".
Plugs—AC No. 45, 14 mm.

DISTRIBUTOR: Breaker Gap—.021-.026" (new). .018-.024" or .020" preferred (used points).

▷*CAUTION—Set new points at .021-.026" to allow for wearing in of rubbing block.*
Cam Angle—35°. Test limits with .022" gap 31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: TDC (At Top Dead Center).
Timing Procedure—*See Ignition Timing.*
Flywheel Mark—Steel ball insert aligned with pointer in inspection hole in housing beside starter.
Octane Selector—Set to give slight ping accelerating with wide open throttle below 15 MPH.

CARBURETION:
Idle Setting—(1949) ½-2 turns open. (1950) ½-1½ turns open. Turning screw out gives richer mixture.
Idle Speed (Standard)—425 RPM, or 6 MPH.
Idle Speed (Hydra-Matic)—375 RPM (3-Speed Hydra-Matic); 400 RPM (4-Speed Hydra-Matic) with selector lever in "Dr" position.
Float Level—½" from machined projection on cover to top of soldered seam at free end (invert to check).
Accelerating Pump—No seasonal adjustment.

Choke Setting: Centered (housing centered on scale).

Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type.
Setting—Coil wind-up should be 125° (approx. 1/3 turn) at room temperature. NOTE—To check valve for correct position on shaft, use feeler gauge in slot on rear end of shaft. With valve closed, gauge should contact stop pin (slot 6° to left or toward engine from up-and-down position) with 1/8" clearance between valve tip and manifold. Valve welded to shaft in this position.

VALVE TAPPET CLEARANCE: Intake Valves .008", Exhaust Valves .011", HOT.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Delco-Remy No. 1116453.
Ignition Lock—Briggs & Stratton or Delco.

COIL: Delco-Remy 1115380. On side of engine.
Ignition Current—2.0 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy 1110214 or 1110221. Automatic and vacuum advance with Octane Selector.
1110221 Note—Has new "center-bearing" breaker plate.

▷**Breaker Plate Bearing Assembly**—Plate rotates on 3 bakelite buttons on support plate with spring tension adjustment (shim washers) on underside of support plate. Pull required to move plate should be 8 oz. min., 16 oz. max. with breaker plate assembly out of housing.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

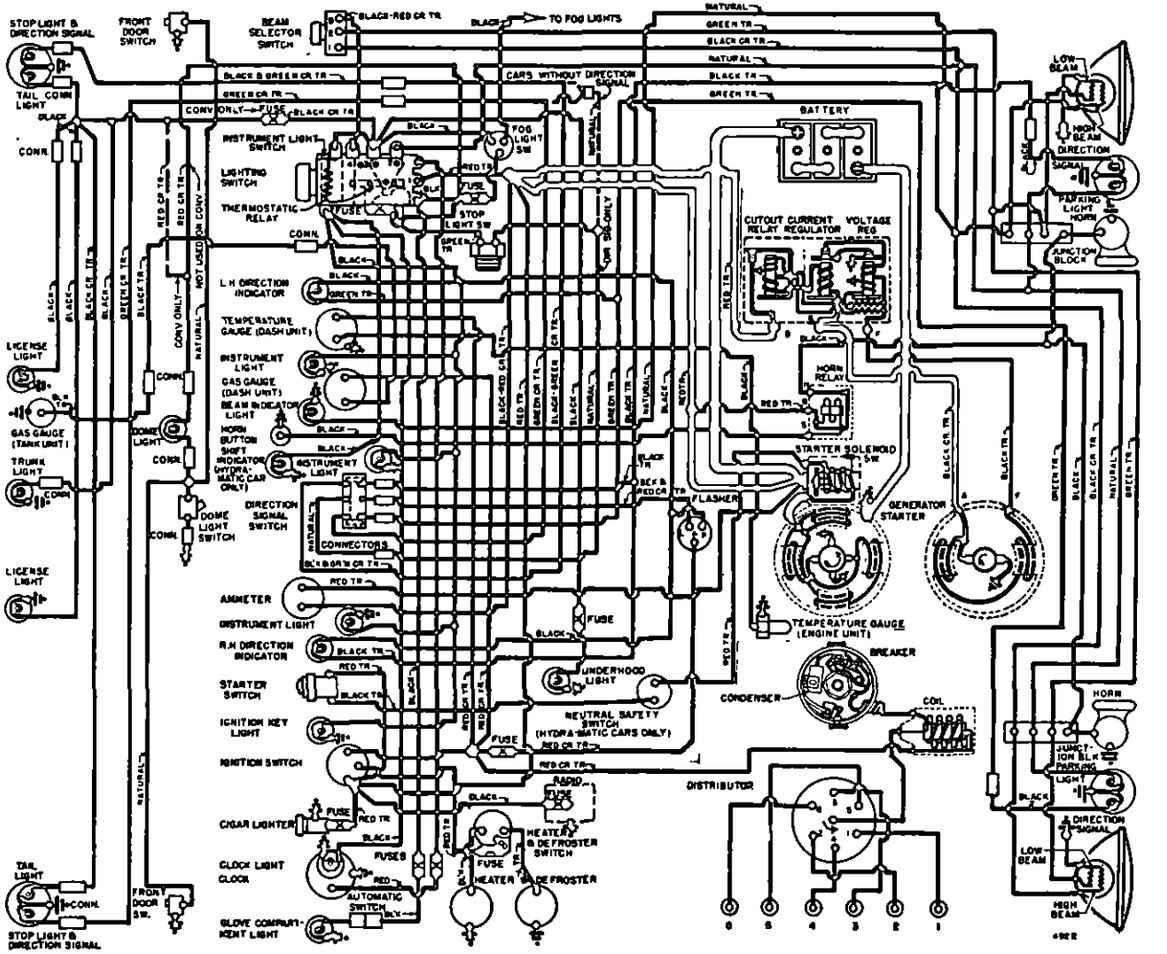
Breaker Gap—.021-.026" (new points), .018-.024" or .020" preferred (used points).

▷*CAUTION—Set new points at .021-.026" to allow for wearing in of rubbing block.*
Cam Angle—35°. Test limits with .022" gap 31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Distributor Automatic Advance		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	250	2.0	500
12.0	1600	24.0	3200

Vacuum Spark Control: Delco-Remy No. 1116039 (for 1110214 distributor), **1116053** (for 1110221). Integral type linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring.

Plunger Travel—5/32".



1949 MODELS

Vacuum Advance		
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
8°	16°	(1116039) 16½-18½"
8°	16°	(1116053) 16-20"

Octane Selector—Hold-down plate permits 10° advance or retard. See Ignition Timing.

IGNITION TIMING

Std. Setting — Piston Position

Standard Setting ..... **TDC**

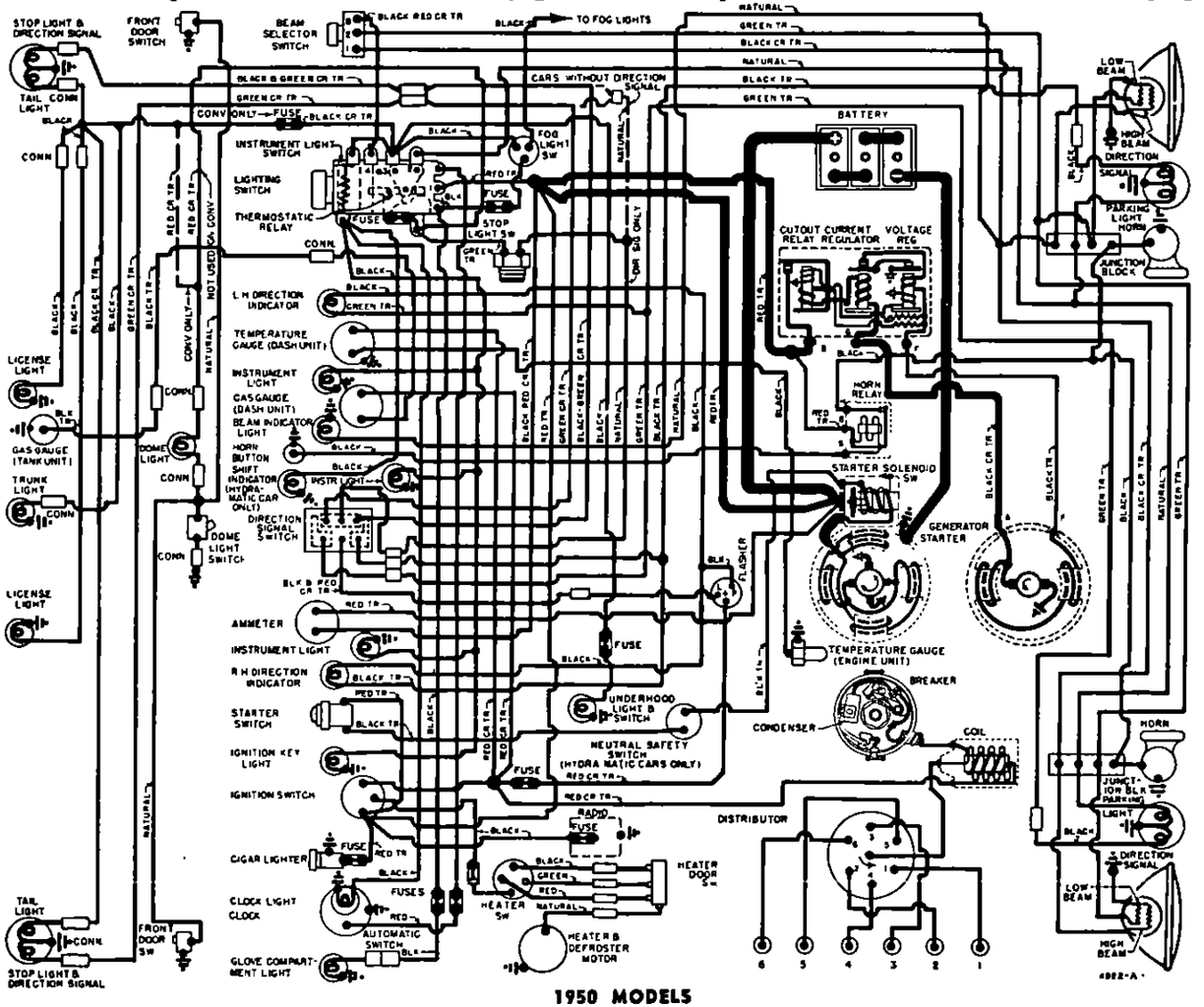
NOTE—Modify this setting for special fuel and altitude conditions. See Octane Selector Setting.

Flywheel Mark—Steel ball on flywheel (#1 and #6 piston top dead center position). Inspection hole in left front face of flywheel housing above starter.

Timing (with Synchroscope)—Use Tool HMO-161. Loosen distributor hold-down plate bolt, center hold-down plate scale ("0" at indicator line), tighten hold-down bolt. Clip synchroscope lead to #1 spark plug, direct light on flywheel through inspection hole in housing above starter. With engine idling, loosen hold-down plate clamp screw, rotate distributor until ignition mark (steel ball insert) lines up with pointer, tighten clamp screw, check Octane selector setting (below).

Timing (without Synchroscope)—Turn engine over to firing position for #1 cylinder (steel ball on flywheel aligned with pointer in inspection hole in housing above starter). Loosen distributor hold-down plate bolt, center hold-down plate scale ("0" at indicator line), tighten hold-down bolt. Loosen hold-down plate clamp screw, rotate distributor until contacts begin to open, tighten clamp screw, check Octane Selector Setting below.

Octane Selector Setting: Set for slight ping when accelerating with wide open throttle in high gear below 15 MPH. To adjust, loosen hold-down plate bolt, move plate toward RET end of scale if no ping noted, toward ADV end if ping too severe, tighten bolt.



1950 MODELS

CARBURETOR

Carter WA-1.
(1949) 709S, (1950) 763S sup. by 763SA.....H-M Drive
(1949) 710S, (1950) 764S.....S-M Trans.
1½" single barrel downdraft, Carter Climatic Contr.
Casting No. on Flange—538.
See Carburetor Section for complete data.

►**763S, SA Production Changes—*See "Carter WA-1" in Carburetor Section.***

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Rods & Jets—*See Carter Downdraft Jet Specification Table in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: ***See Oldsmobile Hydra-Matic Drive in Transmission Section.***

Throttle Cracker Adjustment (S-M cars only): .0625 to .0825" clearance between throttle stop screw and highest step of fast idle cam with starter button fully depressed. Adjusting screw on accelerator bellcrank.

Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (use Tool T109-41).
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (single barrel carbs).
Setting—Centered (coil housing at index mark).
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544458 oil wetted type (std.), No. 1544459 heavy duty oil-bath type (optl.).
Filter Element—AC #6 (std.), #21 (hvy. duty).
Servicing—Clean and re-oil std. cleaner every 2000 miles. On heavy duty types clean and refill reservoir with 1 pint SAE 50 (40 in winter) oil every 2500-5000 miles.

Fuel Pump: AC No. 1539516 fuel & vacuum pump.
Replacement Pump—AC No. 9297.
Pressure—4-5 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517011.
Tank Unit—AC No. 1517299.
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15AA-4. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.6 minutes. Five second voltage—4.2 volts.
Grounded Terminal—Negative (—) to Starter.
Location—In engine compartment on left side.

STARTER

Delco-Remy Model 1107955. Armature No. 1867897.

►***CAUTION—Starter operates whenever pushbutton depressed (and shift lever in neutral on Hydra-Matic) regardless of ignition switch position.***

Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

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Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	5500	5.7	80①
14	"	Lock	3.0	600

①—Includes current draw of starter switch.

Starting Switch: Delco-Remy Solenoid Switch No. 1118136 (no relay used) mounted on starter and controlled by Pushbutton Switch No. 1996038 (1949), 1996046 (1950), (and Neutral Switch No. 1997849 on Hydra-Matic cars).

▷*CAUTION*—Overrunning clutch pinion clearance must be adjusted whenever solenoid removed.

See Electrical Equipment Section for complete data.

Neutral Safety Switch Adjustment—***See Oldsmobile Hydra-Matic Drive in Transmission Section.***

GENERATOR

Delco-Remy 1102706 (Std.), 1102707 (Hydra-Matic). Armature No. 1880550. Two brush (shunt) types with voltage and current regulation. Ventilated by fan.

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—40 amperes min. reached at car speed of 22 MPH. Actual charging rate controlled by regulator.

Performance Data

	Amperes	Volts	R.P.M.
Cold	40①	8.0	1900

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—25 ozs. each.

Field Current—1.9-2.05 amperes at 6.0 volts.

Belt Adjustment: Check with straightedge across pulleys. Belt deflection should be ⅜".

REGULATOR

Delco-Remy 1118300. Voltage & Current Regulator.

▷*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs. ***See Electrical Equipment Section for complete data.***

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).

Contact Gap—.020" (same for both sets).

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.

Air Gap—.075" with armature pressed down to point where contacts are just touching.

Checking & Adjustment—***See Elec. Equip. Section.***

Current Regulator

Setting—40-46 amperes hot (set to 42 amps. hot).

Air Gap—.075" with armature pressed down to point where contacts are just touching.

Checking & Adjustment—***See Elec. Equip. Section.***

LIGHTING

Headlamps: Guide "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Headlamp Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height).

Beam Indicator—Small red indicator in upper edge of speedometer. Lighted when Upper Beams in use.

Direction Signal: ***See Electrical Equipment Section.***

Direction Signal Indicators—Left & Right Turn Indicator located at either end of instrument cluster. Lights when direction signal on same side of car operating (Stop Light flashes at rear).

Switches

Lighting—Delco-Remy No. 1995030.

Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).

Beam Selector—Delco-Remy No. 1997008.

Directional Signal—Delco-Remy No. (1949) 1995542, (1950) 1995554.

Stop Light—Delco-Remy No. 1997725.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

FUSES: Dome & Stop—SFE 14 amp. On light switch.

Dome & Tail (Convertible only)—AGC 20 ampere. In body feed wire to dome and tail lights.

Glove Box & Under-hood Light—AGA 5 amp. each.

Direction Signal—SFE 9 ampere. In Flasher to Ignition Switch wire behind instrument panel.

Electric Clock—AGA 2 ampere. In feed wire.

Cigar Lighter—AGC 30 ampere.

HORNS: Delco-Remy No. (1949) 1999617, (1949-50) 1999647 (welded type) **Low Note. Delco-Remy No. (1949) 1999618, (1949-50) 1999648** (welded type) **High Note.** Vibrator type operated by relay.

Horn Relay: Delco-Remy No. 1116775.

Contact Gap—.027". **Air Gap**—.014" (closed).

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: Big Six. 6 cylinder, "L" head.

Bore—3 17/32". **Stroke**—4 3/8".

Displacement—257 cubic ins. **Rated HP.**—29.9.

Developed Horsepower—105 at 3400 RPM.

Compression Ratio—6.5-1 cast-iron head.

Compression & Vacuum Reading—***See Tune-Up.***

TIGHTENING TORQUES: ***See Oldsmobile Special Data.***

CYLINDER HEAD INSTALLATION: ***See Oldsmobile Special Data.***

OIL PAN REMOVAL: ***See Oldsmobile Special Data.***

PISTONS: Aluminum alloy, T-slot, cam ground, oxalic sulphuric acid coated type.

Weight—('49) 18.24 ozs., ('50) 18.05 ozs. (stripped).

Length—4 1/32".

Removal—Pistons and rods removed from above.

Clearance—Top Land .023-.028". Skirt clearance Top .0025", Bottom .00075". See Fitting New Pistons following.

Replacement Pistons: Finished pistons (pins fitted) .003", .005", .010", .015", .030" oversize.

Fitting New Pistons: Check piston for size with micrometer (pin removed) 90° from pin bosses ⅜" below lower ring groove and also ⅜" from bottom of skirt. Taper should be .0004" max. (larger diameter at the bottom). Then check clearance by inserting .0015 x ½" feeler between piston (pin removed) and cylinder wall on valve side with piston inverted and T-slot on opposite side from feeler. Pull to withdraw feeler should be 7 to 20 lbs.

Installing Pistons: Mark "V-S" on piston head toward valves.

PISTON RINGS: 2 coated compression (install with mark TOP up), 2 oil control rings, all above pin.

Ring	Width	End Gap	Side Clearance
Comp. (#1,2)	.0925-.0935"	①	.001-.003"
Oil (#3,4)	.1860-.1865"	.007-.016"	.001-.0025"

①—(1949) .007-.017". (1950) .008-.018".

Replacement Rings: .010", .020", .030" oversize.

PISTON PIN: Diameter .8554-.8557". Length 3 5/32". Pin locked in one piston boss by lockscrew (opposite end slotted). Piston bosses may be reamed for installation of oversize pins.

Pin Fit in Piston—.0001" tight to .0002" loose (plain boss end), .0003-.0006" tight (lock boss end), or a tight wring fit (with solid end of pin in boss, pin should just be able to be turned with 6" drift in pin lock screw hole—test each boss).

Pin Fit in Rod Bushing—.0003-.0006" clearance, or suck fit (pin holds on own weight but can be pushed through with slight thumb pressure).

Replacement Pins: Std., .001", .003" oversize.

Piston Pin Removal and Installation—***See "Piston Pins" in Oldsmobile Special Data.***

CONNECTING ROD: Length 7 13/16". **Wgt.** 30.72 oz.

Crankpin Journal Diameter—2.353-2.354".

Lower Bearing Diameter—2.3570-2.3575".

Lower Bearing—Removable steel-backed, Durex-babbitt overlay. No shims.

Clearance—.0005-.0025". **Sideplay**—.0055-.0105".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

Installing Rods: Oil spit hole at lower end toward valves and grooves on rod and cap bolt boss (part number side) matched. Special ground cap bolts with self-locking nuts used. Tighten to 45-50 ft. lbs.

CRANKSHAFT: 4 bearing, 7 integral counterweights.

Journal Diameters—#1, 2.478-2.479"; #2, 2.5405-2.5415"; #3, 2.6655-2.6665"; #4, 2.6855-2.6865".

Bearings—Removable, steel-backed, Durex-babbitt overlay bearing shells. Front bearing has oil groove (to front) for thrust plate lubrication.

Clearance—.0005-.002" (rear), .001-.003" (others).

Bearing Adjustment: None (no shims). Replace bearings. Do not file caps. *NOTE*—9/16" cap bolts used on rear bearing, ½" on others (heads are alike).

Bearing Removal—***See "Crankshaft & Main Bearings" in Oldsmobile Special Data.***

End Thrust: At No. 1 bearing. **Endplay**—.004-.008".

See "Crankshaft & Main Bearings" in Oldsmobile Special Data for thrust collar and plate data.

Rear Main Bearing Oil Seal Installation: ***See "Crankshaft & Main Bearings" in Oldsmobile Special Data.***

Flywheel Installation: *See "Flywheel" in Oldsmobile Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.

Journal Diameters (1949)—No. 1, 1.9974-1.9981"; No. 2, 1.9349-1.9351"; No. 3, 1.8724-1.8731"; No. 4, 1.8099-1.8106".

Journal Diameters (1950)—No. 1, 1.9974-1.9979"; No. 2, 1.9349-1.9354"; No. 3, 1.8724-1.8729"; No. 4, 1.8099-1.8104".

Reamed Bushing Diameters—#1, 1.9995-2.001"; #2, 1.937-1.9385"; #3, 1.8745-1.876"; #4, 1.812-1.8135".

Bearings—Steel backed copper lead bronze bushings.

ENGINE

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Clearance—.0014-.0036" (1949), .0016-.0036" (1950).

End Thrust: Forward thrust taken by flange on front engine support plate, rear thrust by flange on shaft bearing against front of engine block.

Timing Chain: Link-Belt. Width 15/16". Pitch .500". Length 47 links or 23½".

Camshaft Setting: Mesh chain with sprocket marks adjacent and in line with a straightedge across the shaft centers (or use Tool HM-408-0).

VALVES	Head Diam.	Stem Diam.	Length
Intake	1.745-1.755"	.3415-.3425"	5.7695-5.8095"
Exhaust	1 27/64"	.3410-.3418"	5 51/64"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.310"	.0022-.0042"
Exhaust	45°	.308"	.0029-.0047"

Valve Guides: Intake and exhaust guides same. Press guides in until top end ⅞" below top of block, Tool J-952 positions guide correctly in block. Ream to .34425-.34525" inside diameter (not tapered).

Length—3 7/32".

Valve Springs: Intake and exhaust springs the same. Damper installed on top of each spring. Free length 2⅝".

	Spring Pressure	Spring Length
Valve Closed	55 ± 3 lbs.	2 1/4"
Valve Open	100 ± 3 lbs.	1 15/16"

Valve Lifters: Mushroom type with self-locking screws. Body Diameter .6235-.6240". Head Diam. 1.125-1.140".

Clearance—.0005-.0008".

Replacement Lifters—.001", .002", .005", .010" O. S.

NOTE—Lifter holes in block have "Bearingized" finish. If holes worn, fit oversize lifter without reaming hole when possible to preserve finish.

VALVE TIMING

Tappet Clearance: .008" INT., .011" EXH. Hot & idling.

NOTE—Self-locking tappet screws used.

Valve Timing: See camshaft setting above.

Intake Valves—Open 5° BTDC. Close 45° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Valve Timing Check—With .0125" tappet clearance #1 intake valve should open with piston 5° (.010") BTDC. with flywheel steel ball insert (TDC mark) approx. 2 teeth before indicator (hole on left front face of housing). Reset tappet clearance at .008" hot.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, piston pins and chain.

Crankcase Capacity—5 quarts.

Normal Oil Pressure—28-33 lbs. (1949), 40 lbs. (1950) at 30 MPH.

Oil Pressure Regulator—On oil pump. Opens at 30 lbs. (1949), 40 lbs. (1950). Non-adjustable.

Oil Pump: Gear type on right side of crankcase.

Oil Pump Assembly & Installation—*See "Oil Pump" in Oldsmobile Special Data.*

Oil Pressure Gauge: AC No. 1507124. Not electric.

Crankcase Ventilation: Filter element in oil filler cap (inlet breather). Outlet pipe on right side of engine.

CO LING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap. Water distribution tube installed in block. Re-circulation of water through engine (with thermostat closed) permitted by fixed by-pass from cylinder head through block to pump inlet.

Capacity—18½ quarts.

Pressure Valve—AC No. 850501 Filler Cap. Opens at 4 lbs. (3¼-4¼ lbs.).

Radiator Core Removal: *See Oldsmobile Special Data.*

Water Pump: Packless, sealed ball-bearing shaft. *See Water Pump Section for complete data.*

Thermostat: Harrison. In cylinder head water outlet. **Setting**—Starts to open 152°F. Fully open 173°F.

Temperature Gauge: AC Electric.
Dash Unit—AC No. 1512168.
Engine Unit—AC No. 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 10A7 (Borglite driven member). Single plate, dry disc type with pressure plate oil baffle and release bearing lubrication fitting.

Clutch Cover No.—927 stamped on cover.

See Clutch Section for complete data.

Clutch Release Bearing Lubrication—*See Oldsmobile Special Data.*

Facings—Spiral wound (spirally grooved) molded woven, 2 used. Inside Diam. 7". O. D. 10". ⅛" thick.

Pedal Adjustment: Free travel (1949) ⅞-1¼", (1950) 1-1¼". Turn link at fork in or out of clevis on auxiliary shaft.

Removal: Remove transmission (see data below), clutch underpan and take out 6 mounting screws in clutch cover (when installing, use 2 long shank mounting screws in 2nd hole on each side of locating dowel), lower clutch assembly out.

TRANSMISSION

STANDARD

Own Make. All helical gear, constant-mesh, synchro-mesh (2nd & high), sliding gear (low & reverse).

See Transmission Section for complete data.

Transmission Control: Oldsmobile "Handi-shift". *See Transmission Section for complete data.*

Removal: Disconnect shift and selector rods from levers at transmission, speedometer cable, rear universal and slide slip yoke and propeller shaft to rear. Remove 4 transmission mounting capscrews, pull transmission straight back and remove.

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Own Make. Consists of Fluid Coupling and automatic self-shifting four-speed transmission.

►*1950-51 "WHIRLAWAY" TYPE HYDRA-MATIC CONVERSION TO STANDARD 4-SPEED HYDRA-MATIC*—*See "Hydra-Matic Drive" in Transmission Section for complete data.*

►*HYDRA-MATIC PRODUCTION CHANGE*—Late production cars have modulated throttle pressure.

See Transmission Section for complete data including Testing & Trouble Shooting.

►*NOTE—Different Hydra-Matic Transmissions used and can be distinguished by Serial No. Plate Color and Prefix as follows:*

Car Model	Prefix (& Plate Color)
1949 Six	08-(Black)
1950 Six (First Cars)	8- (Aluminum)
1950 Six (Later "Whirlaway")①	B- (Orange)

①—Beginning No. 6A108158H.

►*CAUTION*—"Whirlaway" transmissions not interchangeable with earlier transmissions.

Lubrication—Check fluid level in transmission every 2000 miles. Drain and refill after first 15000 miles and every 25,000 miles thereafter. Use only "Oldsmobile Hydra-Matic Drive Fluid."

Draining & Refilling—*See "Hydra-Matic Drive" in Transmission Section.*

Capacity—Approx. 11 qts. (1949), Approx. 10½ qts. (1950).

Checking Fluid Level—Raise front floor mat at right side, remove sheet metal cover in floor, clean opening of lint, sand, etc. Set hand brake, start engine and let engine idle, move control lever to "DR" (1949-50), or "LO" (1950 Whirlaway) position. Remove dipstick, wipe dry, and replace. Remove dipstick quickly and check fluid level. Add fluid as necessary to bring level up to "FULL" mark on stick with engine idling.

Linkage Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics 2C or 2CR. Roller bearing types.

NOTE—Slip joint formed at rear of transmission ahead of front U-joint (one-piece driveshaft used).

►*CAUTION*—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Oldsmobile Rear Axle in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with pinion mounted on two taper roller bearings.

►*CAUTION*—Do not use "76" series carrier and axle housing on "88" and "98" series cars. New support used on "88" and "98" series rear axles.

►*NOTE*—Rear universal companion nut controls pinion bearing "pre-load."

See Rear Axle Section for complete data.

Standard Ratios

41:10 (4.1)—Std. exc. Convertible & Sta. Wagon.

43:10 (4.3)—Std. on Convertible & Station Wagon. Optional Hilly Ratio Domestic Cars, & Export Cars.

39:10 (3.9)—Optional on Export Cars.

Hydra-Matic Ratios

40:11 (3.64)—Std. exc. Convertible & Station Wagon. Optional on Export Cars.

39:10 (3.9)—Std. on Convertible and Station Wagon. Optional Hilly Ratio Domestic Cars and Export Cars.

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41:12 (3.42)—Optional on Export Cars.

Rear Axle Ratio Marking (1949)—Ring and pinion ratio (39:10, etc.) and date stamped on underside of carrier right horizontal rib.

Rear Axle Ratio Marking (1950)—Coded ring and gear marking stamped on upper side of carrier housing as follows: 4=39:10, 6=40:11, 8=41:12.

NOTE—Early 1950 housings were stamped with three figures, last two of which indicated date of manufacture.

Backlash—.004-.008". Screw adjustment.

Removal: Disconnect driveshaft at rear universal (wire trunnions to avoid losing rollers), mark joint (reassemble to mark when reassembling). Remove axle shafts (see data below) and carrier capscrews.

►*CAUTION*—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal: Remove wheel. Take off brake drum by removing two Tinnerman nuts from wheel studs (if nuts removed by turning off threads they can be re-used, if nuts damaged new nuts must be used). Remove backing plate mounting nuts, and static collector. Loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with Puller J-942 (do not allow shaft to drag on oil seal); replace one backing plate nut.

Wheel Bearing Adjustment—None.

Rear Suspension: Coil spring type with support arms.
See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco. Double acting (parallel cyl. rear), hydraulic.
FRONT—Model 1947-J (right), 1947-K (left).
REAR (1949) Model 2105-N (right), 2105-P (left).
REAR (1950) Model 2105-T (right), 2105-P (left).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—4°29'47".

Caster—0° to Neg. ¾°. Adjustable.

Camber—Neg. ¾° to Pos. ¾° (Service Limits), Neg. ¼° to Pos. ¾° (New Car Specification).

Toe-In—1/16-1/8". Adjust each tie rod equally.

Steering Geometry Inner wheel 23° ± ½°. Outer 20°.

STEERING GEAR

Steering Gear—Saginaw Model 420. Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

Wheel Cylinder Bore—Front wheels 1⅛", Rear 1".

Drums—Cast-iron. Diameter 11". Max. rebore .060". (or .030" cut).

Lining (1949)—Molded. **Width** 2" (front wheels), 1¾" (rear wheels). **Thickness** 3/16". **Length per shoe** 9 11/16" (front primary); 11 31/32" (front secondary); 12" (all shoes, rear wheels).

Lining (1950)—Molded. **Width** 2" (front wheels). 1¾" (rear wheels). **Thickness** 3/16". **Length per shoe** (front and rear wheels) 9 11/16" (primary); 11 31/32" (secondary).

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Braking Power—56% front wheels, 44% rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATI N

SERIAL NUMBER: On left front door hinge post.

►*SERIAL NUMBER NOTE: Complete serial number (example 499M 1001) includes following identification data in sequence.*

Year①	Series②	Assy. Plant③	④Serial No.
49	9	M	1001

①—Last two digits of year.
②—7 (88 Series 1951). 8 (88 Series 1949-50; Super 88 Series 1951; Deluxe 88 & Super 99 1952). 9 (98 Series).
③—See Assembly Plant Designation below.
④—1001 Starting Serial Number at all plants.

Assembly Plant Designation

M—Lansing	**L**—Linden
A—Atlanta	**C**—South Gate
B—Framingham	**W**—Wilmington
K—Kansas City	**T**—Arlington

ENGINE NUMBER (1949): Stamped on front face of left cylinder block just below cylinder head and is prefixed by the digit "8", indicating number of cylinders, and a letter indicating compression ratio. ('A' for 7.25-1 & 'C' for 7.5-1).

Starting Engine Number (1949): 1001.

ENGINE NUMBER (1950-51): Stamped on machined pad on left side of block between #5 & #7 exhaust port, and is prefixed by the digit "8", indicating number of cylinders, and a letter indicating compression ratio. ('A' for 7.25-1 & 'C' for 7.5-1).

Starting Engine Number: 194001 (1950); 1001 (1951). *NOTE*—Suffix letters indicate as follows: **H**—Hydra-Matic. **B**—Synchro-mesh.

ENGINE NUMBER (1952): Stamped on machined pad located on top of left hand cylinder block between center and rear exhaust manifold ports.

Starting Engine Number (1952): R-1001.

TUNE-UP

COMPRESSION PRESSURE: 136 lbs. at cranking spd.

VACUUM READING: Steady 17" min. at idling speed.

FIRING ORDER: 1-8-7-3-6-5-4-2 (Cyl. Nos. 1-3-5-7 Left Bank, 2-4-6-8 Right Bank, front-to-rear). See wiring diagram.

SPARK PLUG GAPS: .030".
Plugs—AC No. 46-5

DISTRIBUTOR: **Delco-Remy 1110814 (Early 1949); 1110817 (Late 1949 & 1950); 1110824 (1951 & 1952).**
Breaker Gap—.012-.0175". Set new points to .016-.021" to allow for initial wear on rubbing block.
Cam Angle—21-30° (1110814 & 1110817); 26-33° (1110824). All with .016" gap.
See "Delco-Remy Cam Angle" in Electrical Equip. Section.
Breaker Arm Spring Tension—19-23 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING (1949-51): 2½° BTDC. *CAUTION*—Ignition timing is very sensitive and must be set exactly between steel balls, brass pins, or edges of slot on vibration dampener.

IGNITION TIMING (1952): 5° BTDC with engine idling at 850 RPM and vacuum line to distributor disconnected at carburetor, and carburetor opening taped closed.
Timing Mark (1949)—Pointer on left front side of engine and two steel balls (early cars had two brass pins) on outer surface of vibration dampener. *NOTE—First ball or pin indicates TDC. Adjust timing so pointer is midway between the two points.*
Timing Mark (1950-52)—Slot in rim of vibration dampener (or pulley) and pointer on front cover. Leading edge of slot is at 5° BTDC. Trailing edge is at TDC.

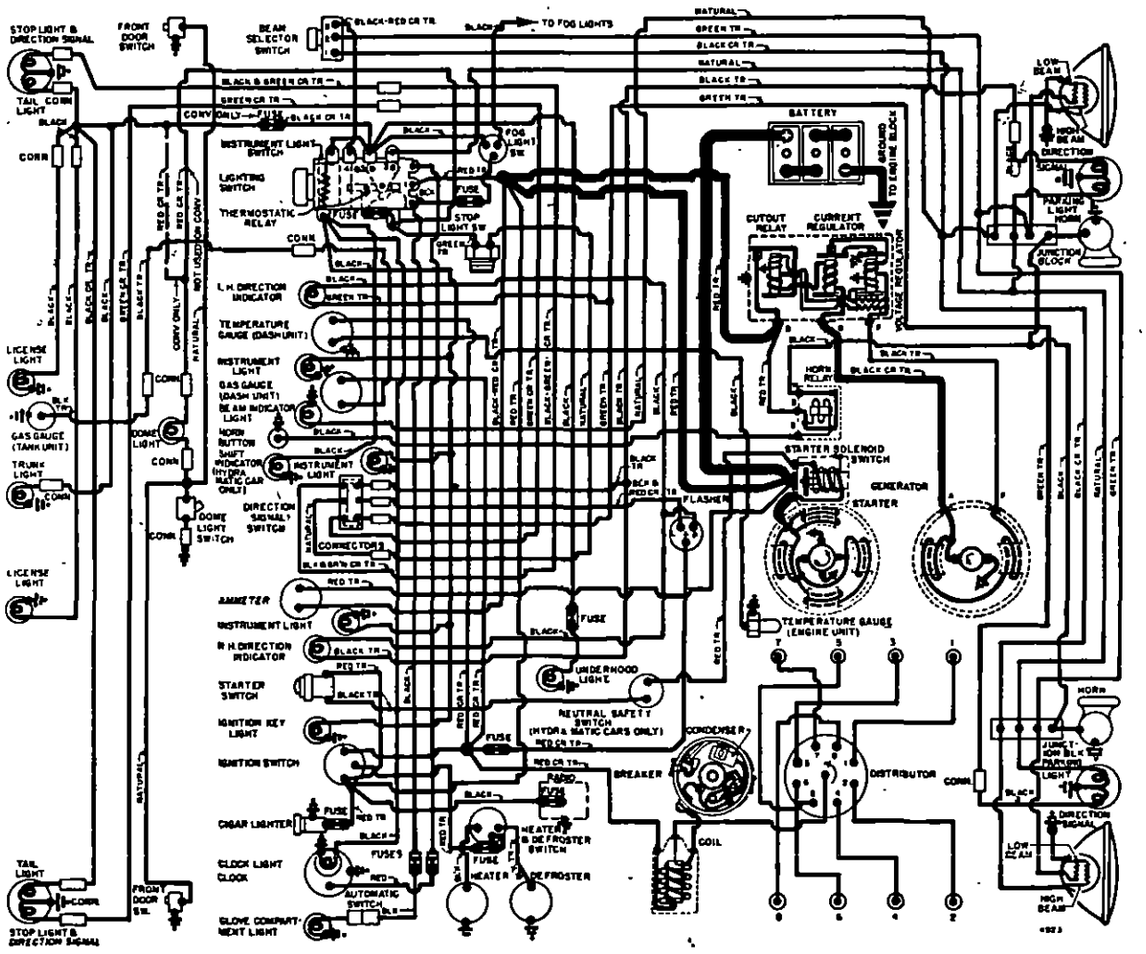
►*1952 ENGINE TIMING CAUTION:* The "Slow Idle" setting method recommended for earlier models should not be used to time 1952 models.

►*1952 MODEL DETONATION CORRECTION: If engine detonates (due to low octane fuel or carbon build-up) set timing to 2½° BTDC. For high-altitude operation, timing can be advanced to 7½° BTDC, if detonation does not occur.*

CARBURETION: (1949 Series 88 & 98)—**Carter WGD-714S, SA.** *NOTE—Rochester Carburetor also used. See below.*
Idle Setting—Both screws ½-1 turn open. Turning screws out gives richer mixture.
Idle Speed—(Standard) 425 RPM.
Idle Speed (Hydra-Matic)—375 RPM (3-Speed Hydra-Matic); 400 RPM (4-Speed Hydra-Matic) with selected lever in "Dr." position.
Float Level—¼" from top of float to lower face of bowl cover with needle valve seated.
Accelerating Pump—No seasonal adjustment.
Choke Setting—Centered.

CARBURETION: (1949-50 Series 88 & 98)—**Rochester Model AA.** *NOTE—Carter Carburetor also used. See above.*
Idle Setting—Approximately 1 turn open. Turning screws out gives richer mixture.
Idle Speed—(Synchro-mesh) 425 RPM. or 6 MPH.
Idle Speed—(Hydra-Matic) 350 RPM. with selector lever in "Dr" position.
Float Level—23/32" from top of seam on free end to gasket seat on cover with cover assembly inverted and needle seated.

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1949 MODELS

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Float Tension—Bend float tang against spring to decrease amount of drop; bend away from spring to increase drop. Tension is correct when the bottom edge of float is suspended freely from cover and is 1/8" above the power stem.

Accelerating Pump Adjustment—3 holes in pump shaft lever. Outer hole (minimum stroke), Center **Recommended Setting**—(1949) Outer hole (minimum stroke); (1950) Middle hole (medium stroke).

Choke Setting—Centered on index.

CARBURETION: (1951 Series 88 & 98; 1952 Deluxe 88) —Rochester Model BB. *NOTE—Carter Carburetor also used. See below.*

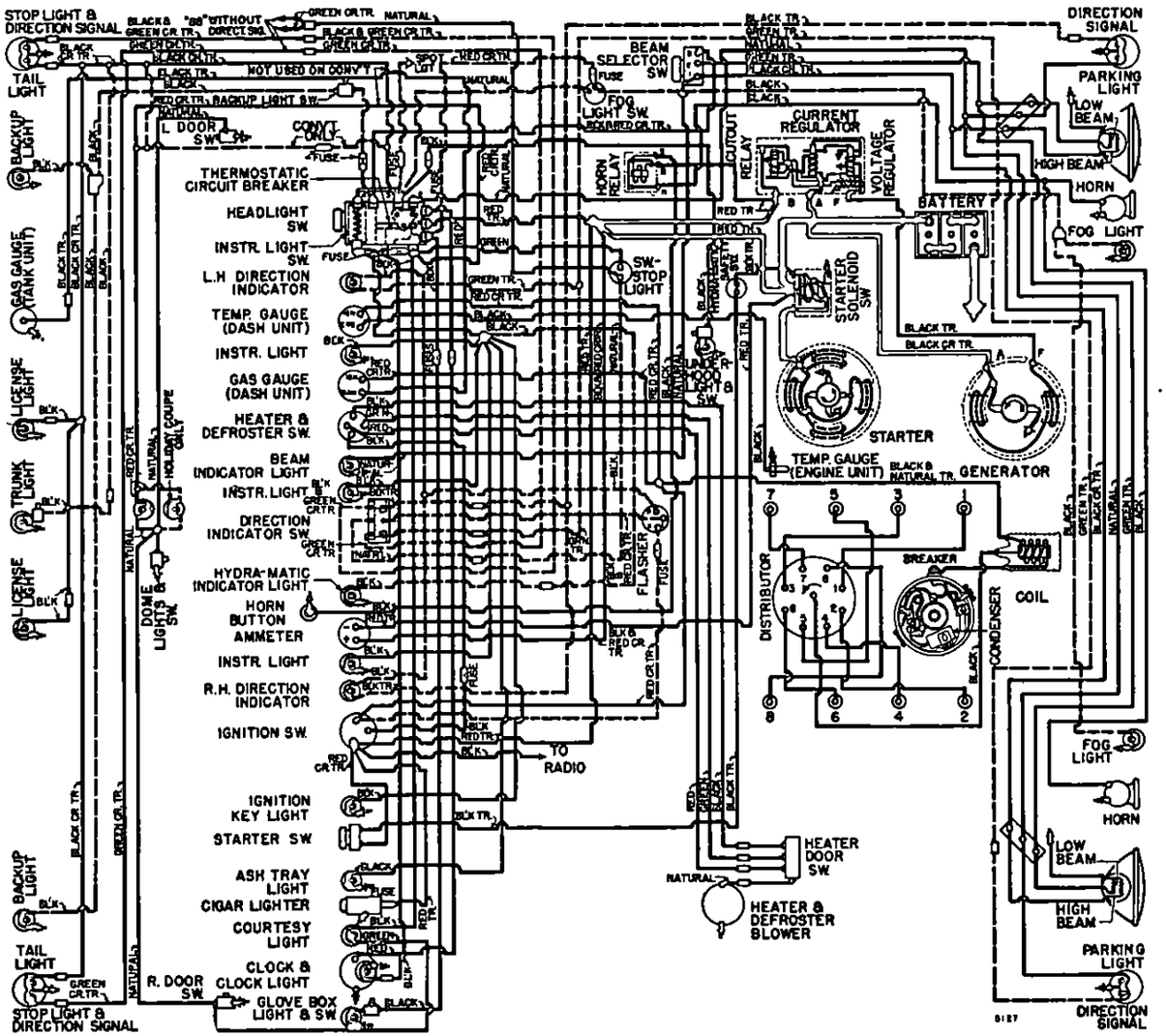
Idle Setting—Approximately 1½ turns open. Turning screw out gives richer mixture.

Idle Speed—(Synchro-mesh) 425 RPM. or 6 MPH.

Idle Speed—(Hydra-Matic) 350 RPM (1951); 400 RPM (1952), with selector lever in "Dr" position.

Float Level—Set float position with Float Gauge BT-51.

Float Tension—Bend float tang against balance spring to decrease drop; bend away from spring to increase drop. Tension is correct when the distance from bottom of air horn gasket to bottom of float is 1⅝", which is equivalent to the distance from scribed line on Gauge BT-51 to end of gauge.



1950-51 MODELS

Accelerating Pump—No seasonal adjustment.

Choke Setting—Centered.

CARBURETION: (1951 Series 88 & 98; 1952 Deluxe 88) —Carter WGD-851S. *NOTE—Rochester Carburetor also used. See above.*

Idle Setting—Both screws ¾-1¼ turns open. Turning screws out gives richer mixture.

Idle Speed—(Standard) 425 RPM. or 6 MPH.

Idle Speed—(Hydra-Matic) 350 RPM (1951); 400 RPM (1952), with selector lever in "Dr" position.

Float Level—¼" between top of float and bowl cover with bowl inverted.

Accelerating Pump—No seasonal adjustment.

Choke Setting—Centered on index.

CARBURETION: (1952 Series 88 Super, & 98)—Carter WCFB-932S. *NOTE—Rochester Carburetor also used. See below.*

▷*CARBURETOR PRODUCTION CHANGE NOTE: See "Carter WCFB" in Carburetor Section.*

Idle Speed—(Synchro-mesh) 425 RPM.

Idle Speed—(Hydra-Matic) 400 RPM with selector lever in "Dr" position.

▷*OTHER DATA: See "Carter WCFB" in Carburetor Section.*

CARBURETION: (1952 Series 88 Super, & 98)—Rochester Model 4GC. *NOTE—Carter Carburetor also used. See above.*

Idle Speed—(Synchro-mesh) 425 RPM.

Idle Speed—(Hydra-Matic) 400 RPM with selector lever in "Dr" position.

▷*OTHER DATA: See "Rochester 4GC" in Carburetor Section.*

MANIFOLD HEAT CONTROL: Thermostatic coil type. Valve located on left side between exhaust manifold and exhaust pipe. Stop spring should strike stop before counter-weight touches pin to prevent valve rattles when closed.

VALVE TAPPET CLEARANCE: None in service (automatic hydraulic type tappet take-up).

Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Delco-Remy 1116453 (1949-51); 1116476 (1952). *NOTE—1952 Switch is combination ignition & starter switch, others are ignition switch only.*

COIL: Delco-Remy 1115380. Mounted on manifold just ahead of distributor.

Ignition Current—2.0 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.

Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy 1110814 (Early 1949); 1110817 (Late 1949 & 1950); 1110824 (1951-52). "Center-Bearing" type (Except No. 1110814), with automatic and vacuum advance.

See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

Breaker Gap—.012-.017". Set new points to .016-.021" to allow for initial wear on rubbing block.

Cam Angle—21-30° (1110814, 1110817); 26-33° (1110824).

See "Delco-Remy Cam Angle" in Electrical Equipment Section.

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Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Distr. Degrees	Automatic Advance RPM	Eng. Degrees	RPM
0-2	400	0-4	800
9-11	1350	18-22	2700
14-16	1850	28-32	3700

Vacuum Spark Control: Delco-Remy 1116048 (1949-50); 1116059 (1951-52). Integral type linked directly to breaker plate.

Plunger Travel—7/32-15/64".

Vacuum Advance - 1116048

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	6.5-8.5"
10°	20°	19-21"

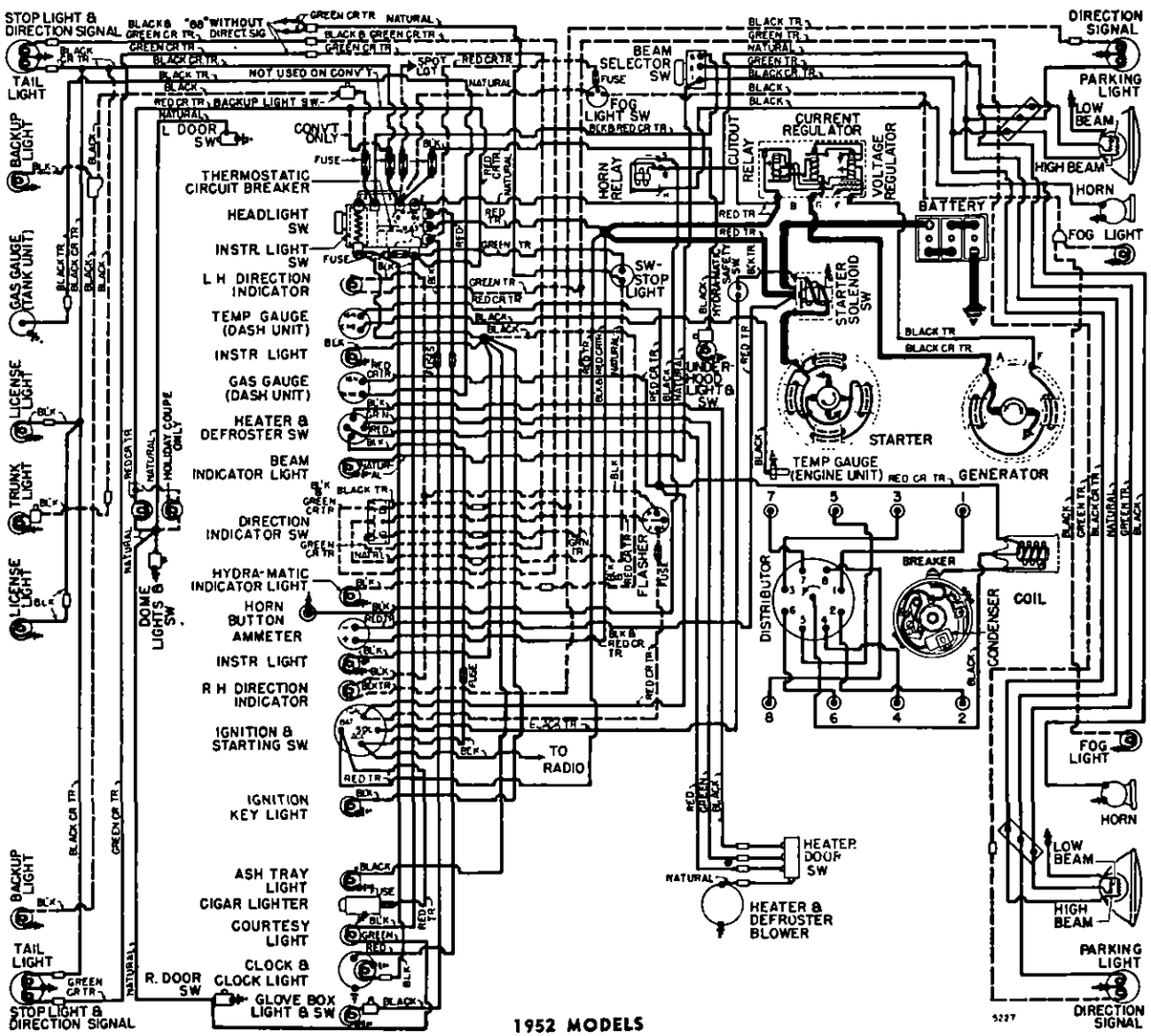
Vacuum Advance - 1116059.

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4.5-6.5"
10°	20°	15-16

Octane Selector—Hold-down plate permits 15° advance or retard. See Ignition Timing.

Removal: Remove distributor cap, disconnect breaker lead and vacuum line, take out 2 distributor clamp-to-block capscrews, lift distributor straight up.

►**Installation**—Place #1 piston in firing position and Timing pointer centered midway between timing marks on dampener (see Pulley Marks above). Install distributor with flat in distributor drive gear aligned with flat on oil pump shaft, push distributor down just enough to engage oil pump shaft—drive gear must not engage camshaft gear. Align distributor clamp with holes in engine (1949 engines). Turn rotor and align with breaker terminal (low tension connection). Push distributor down to engage camshaft gear (rotor will turn to #1 terminal). Install hold-down plate. Connect low tension terminal lead and vacuum line, install cap



1952 MODELS

IGNITION TIMING

Std. Setting—2½° BTDC (1949-51); 5° BTDC (1952).

Dampener Mark—*See Tune-Up.*

Timing (with Synchroscope)—Use Tool KMO-161. Loosen hold-down plate and center scale "0" mark on center line, tighten hold-down plate. Clip synchroscope lead to #1 spark plug, direct light on dampener at timing pointer on left side of engine. With engine idling, loosen clamp bolt, rotate distributor until point on dampener midway between edges of slot line up with pointer, tighten bolts.

Octane Selector Setting: Normal setting, "0" mark on scale at center line. Timing should not be retarded more than to eliminate spark ping if required.

CARBURETOR

CARTER 2-BARREL

Carter 714S, SA, (1949). 1¼" downdraft horizontal air intake type.

Carter 851S, (1951). 1¼" downdraft, vertical air intake type. Used partial production.

Casting No. 604 (714S, SA), 836 (851S). On face of flange.

Carter Installation Unit No. 195-43U—Required when installing 714S, SA, 849S carburetors on 1949 Oldsmobile 8 engine not originally equipped with Carter.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See "Carter Downdraft Carburetor Jet Specifications" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Oldsmobile Hydra-Matic Drive" in Transmission Section.*

Fast Idle: Carter Dual (WGD) Carburetor type. *See Carburetion Equipment Section for complete data.*

Setting (714S, SA)—*CAUTION*—Two separate adjustments:

1) **Fast Idle Linkage.** Back off fast idle screw until fast idle cam can be revolved freely. Loosen choke lever clampscrew. Insert .018" flat feeler (Gauge T109-72) between lip of fast idle cam and boss on carburetor casting, hold choke valve tightly closed, remove all slack from linkage by pressing choke lever toward closed position, tighten clampscrew in this position.

2) **Fast Idle Screw.** Back off throttle lever set screw closing throttle valves. Turn fast idle cam until ear on cam opposite fast idle screw (choke valve wide open). Adjust fast idle screw until it just touches ear on cam.

Setting (851S). Remove thermostatic coil housing, gasket and baffle plate. Crack throttle valve and

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hold choke valve tightly closed, then close throttle. This will allow fast idle cam to revolve to fast idle position. With choke valve held tightly closed and slight tension on throttle lever, loosen lock nut on choke connector rod assembly and turn sleeve until there is .020" clearance between throttle valve and bore of carburetor, side opposite port. Hold sleeve in position, lock nut.

▷*THROTTLE STICKING CORRECTION (851S)—Fast idle link change. See Carburetor Section for complete data.*

Automatic Choke: Carter Climatic Control (Dual Carburetor).
See Carburetion Equipment Section for complete data.
Setting—Centered (housing centered on scale).

CARTER 4-BARREL

Carter WCFB-932S. Four-barrel downdraft type with automatic choke.

▷*OTHER DATA: See "Carter WCFB" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Oldsmobile Hydra-Matic Drive" in Transmission Section.*

ROCHESTER 2-BARREL

1949—Rochester Model AA—Oldsmobile No. 7001570.
1950—Rochester Model AA—Oldsmobile No. 7002570 Dual downdraft concentric bowl, horizontal air intake type with diaphragm accelerating pump.
1951—Rochester Model BB—Oldsmobile No. 7002900. Dual downdraft, vertical air intake type with lever operated accelerating pump and automatic choke. Used partial production 1951.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up Data.*

Hydra-Matic Throttle Linkage Adjustment: *See "Oldsmobile Hydra-Matic Drive" in Transmission Section .*

Fast Idle: Rochester GM Dual Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—500 RPM. engine idling speed with engine and transmission warm. Adjusted by opening throttle slightly, rotating fast idle cam by hand until fast idle screw rests on first (low) step of fast idle cam and turning fast idle screw for 500 RPM. idle speed with transmission selector lever in "N" position.

Automatic Choke: Rochester GM Automatic Choke.
See Carburetion Equipment Section for complete data.
Setting—Centered (index marks aligned).

ROCHESTER 4-BARREL

Rochester 4GC, No. 7004300 (Hydra-Matic); 7004800 (Synchro-mesh). Four barrel downdraft type with automatic choke.

▷*OTHER DATA: See "Rochester 4GC" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Oldsmobile Hydra-Matic Drive" in Transmission Section.*

CARB. EQUIPMENT

Fuel Pump: AC No. 1539294 fuel-&-vacuum pump.
Replacement Pump—AC No. 9294.
Pressure—4-5 lbs.

▷*CAUTION—*When installing fuel pump, tip pump up to place arm under fuel pump eccentric.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517011 (1949-50); 1517358 (1951-52).
Tank Unit—AC No. 1517299 (1949-50 exc. Sta. Wgn.); 1516342 (1949-50 Sta. Wgn.); 1517420 (1951); 1517716 (1952).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Delco 17K4W. 6 volt, 17 plate, 115 ampere hour capacity (20 hr. rate).
Grounded Terminal—Negative. To cylinder block.
Location—In engine compartment on left side.

STARTER

Delco-Remy 1107956 (1949-50); 1107982 (1951); 1107997 (1952).
Armature—Delco-Remy 1867897 (1949-51); 1919267 (1952).
Drive—Overrunning clutch (solenoid pinion shift).

▷***CAUTION—Overrunning clutch pinion clearance must be adjusted whenever solenoid removed from starter.***

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data—1107956 & 1107982

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5500	5.67	80
14 "	Lock	3.0	600

Performance Data—1107997

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5500	5.67	80
15 "	Lock	3.0	600

Starting Switch: Delco-Remy Solenoid Switch No. 1118136 (1949-51); No. 1118156 (1952), (no relay used) mounted on starter and controlled by Push-button Switch No. 1996038 (1949); No. 1996046 (1950-51). Combination Starter & Ignition Switch No. 1116476 (1952). See "Hydra-Matic Neutral Safety Switch" below.

Hydra-Matic Neutral Safety Switch: Delco-Remy No. 1997849 (1949-50); 1997887 (1951); 1998011 (1952). Connected in starter circuit. Starter operative only when selector lever in "N" (neutral) position.
Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy. Two brush type.

Model	Generator	Armature
1949-50 & Early 1951	1102704	1880550
1951 (Late)	1102771	1921621
1952	1102780	1921621

Maximum Charging Rate—See Regulator.

Performance Data—Cold

Generator No.	Amperes	Volts	R.P.M.
1102704	40	8.0	2150
1102711 & 780	45	8.0	2350

▷***GENERATOR CAUTION: Use correct voltage regulator as indicated. See REGULATOR (below).***
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.87-2.0 amperes at 6.0 volts.

Generator Belt Adjustment: Loosen generator attaching bolts and place tool J-4170 against generator between bracket and generator. Attach torque wrench to tool and pull generator against belt to a tension of: (1949-50). 12-13 ft. lbs., (1951) 4 ft. lbs. Tighten generator attaching bolts.

▷*1951 NOTE—*Cut ¾" from end of Tool J-4170 so tool will clear valve cover.

Fan Belt Adjustment: *See COOLING.*

REGULATOR

Delco-Remy No. 1118300 (for Gen. No. 1102704); 1118725 (for Gen. Nos. 1102771 & 1102780).

▷*IDENTIFICATION NOTE—*Red daub of paint around lower mounting screw hole on Regulator No. 1118300; None on Regulator No. 1118725.

▷***REGULATOR CAUTION—Use only regulator specified for generator. In an emergency, Regulator No. 1118300 can be used with Gen. 1102771 or 1102780. DO NOT USE REGULATOR 1118725 WITH GEN. 1102704.***
See Electrical Equipment Section for complete data.

▷*CAUTION—*Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.7 volts (hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—6.9-7.4 volts (hot). Regulator is over-compensated for temperature. Check with cover in place and regulator hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator
Setting—(1118300) 37-42 amperes (hot).
Setting—(1118725) 42-47 amperes (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Directional Signal: *See Electrical Equipment Section.*

Directional Signal Indicators—Left & Right Turn Indicator located at either end of instrument cluster. Lights when directional signal on same side of car operating (Stop Lights flash at rear).

Switches
Lighting—Delco-Remy No. 1995030.
Instrument—Part of Lighting Switch (Rheostat operated by turning light switch knob).
Beam Selector—Delco-Remy No. 1997008.

Direction Signal—Delco-Remy 1995542 (1949); 1995554 (1950); 1995559 (1951); 1995563 (1952).
Stop Light—Delco-Remy 1997725 (1949-50), pressure type in brake line. Delco-Remy 1997901 (1951); 1997915 (1952), mechanical type mounted on floor board.

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Back-up Light—(1951-52 Synchro-mesh) Delco-Remy 1997893.

Back-up Light—(1951 Hydra-Matic) Delco-Remy 1997875. (1952 Hydra-Matic) 1998011. Combined with Neutral Safety Switch.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assembly). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

FUSES: Located as indicated below.

1949-52 Dome & Tail Light (Conv. Only)—20 amps. In line near light switch.

1949-52 Stop & Dome Light (Exc. 1952 Series 98 & Conv.)—14 amps. On light switch.

1952 Dome Light & Rear Cigar Lighter (98 4-Door Only)—30 amps. Near light switch in fuse holder.

1949-52 Electric Clock—2 amps. In lead from clock to light switch.

1949-51 Glove Box—5 amps. In lead near glove box.

1952 Glove Box—4 amps. In lead near glove box.

1949-52 Heater—20 amps. (1949); **30 amps.** (1950-52). In lead to heater.

1949-52 Underhood Light—5 amps. (1949-51); **4 amps.** (1952). In lead near main light switch.

1949-52 Back-up Light—14 amps. (Exc. Bumper Mounting); **9 amps.** (Bumper Mounting). In line near light switch.

1952 Stop Light (1952 98 4-Dr. & Conv.)—**14 amps.** In Headlight switch.

HORNS: Delco-Remy models as follows:

Delco-Remy No.—	Low Note	High Note
1949	1999617	1999618
1949-51 (Welded Type)	1999647	1999648
1951-52①	1999665	1999666

①—Delco-Remy 1999671 (Low Note, 1999672 (High Note) also used on 1952 Super 88 & 98.

ENGINE

ENGINE SPECIFICATIONS: Rocket Engine. New 90° V8 with Overhead Valves. Both cylinder blocks and crankcase cast Enbloc.

Model	Bore	Stroke	Displacement
All	3¾"	3 7/16"	303 cu. ins.

Model	Compr. Ratio	Rated HP	①Dev. HP
1949-50	7.25-1	45	135
1951	7.5-1	45	135
1952 (Deluxe 88)	7.5-1	45	145
1952 (Super 88 & 98)	7.5-1	45	165

①—All at 3600 RPM

Compression & Vacuum Reading—*See Tune-Up.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Oldsmobile Special Data.*

OIL PAN REMOVAL: *See Oldsmobile Special Data.*

FRONT ENGINE MOUNT INSTALLATION: *See "Engine Mountings" in Oldsmobile Special Data.*

PISTONS: Aluminum alloy, three-ring, auto-thermic steel-strut, slipper skirt, cam ground, tin plated.

Length—4". Weight—19.88 ozs. (stripped).

Removal—Pistons and rods removed from above.

►*CAUTION*—When removing more than one piston assembly, stamp cylinder number on piston, connecting rod, and cap, before loosening assembly.

Clearance—Top land .032-.036". Skirt clearance .0005-.001" measured ⅛" from bottom of skirt with piston pin removed.

Fitting New Pistons: Insert .0015" x ½" x 12" feeler between piston (pin removed) and cylinder wall at right angles to pin hole. Pull to withdraw feeler should be 5-12 lbs. *NOTE—This specification supersedes previous setting of 10-18 lbs.*

►*CAUTION*—Allow rebored cylinders to cool to normal room temperature before fitting pistons.

Installing Pistons: Mark "F" cast on each side of pin hole on front side of piston. Install pistons 1, 3, 5, 7 in left bank, 2, 4, 6, 8 in right bank with letter "F" toward front on all pistons.

PISTON RINGS: Two coated (Top ring chrome plated on 1951 engines) compression rings, one slotted oil ring, all above pin. Oil ring groove drilled.

Ring	Width	Gap	Side Clearance
Comp. (#1, #2)	.077-.078"	①	.001-.003"
Oil (#3)	.1860-.1865"	①	.0018-.0033"

①—Perfect Circle .010-.020". Sealed Power .008-.016"

Installing Rings—Compression rings installed with step on inner edge UP. Oil rings marked TOP installed with mark UP.

PISTON PIN: Diameter—.9803-.9807". **Length**—3" (1949); 3 1/64" (1950-52). Floating type with lock ring at each end. *NOTE*—1949 rods are rifle drilled for pin lubrication. Rods in later engines are NOT drilled.

►*CAUTION*—Discard old lock rings and install new service type lock rings when installing pins.

Pin Fit in Piston—.0000-.0002" loose. Pin should NOT fall through piston of own weight. Pin can be tapped in place using brass drift. Pin hole out-of-round .0005" max. Hone pin hole and install oversize pin.

Pin Fit in Rod Bushing—.0003-.0005" loose.

►*1949 CONNECTING ROD BUSHING REPLACEMENT CAUTION:* Align oil hole in bushing and rod for pin lubrication. Finish to size with Piston Pin Bushing Hone KMO-754.

Replacement Pins: Std. size, and .001", .003", oversize.

CONNECTING ROD: Length 6.625", Weight 29.54 ozs. Rifle drilled in 1949 engines for piston pin lubrication. Not drilled in later engines.

►*CAUTION*—Use Guide Tool No. BT-22 over rod bolts to prevent damaging crankpin journals when removing and installing piston and rod assemblies.

Crankpin Journal Diameter—2.2488-2.2498.

Lower Bearing—Removable, steel-backed, Durex-babbitt overlay. No shims.

Clearance—.0009-.0029". **Sideplay**—.002-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

NOTE—Tang on bearing insert must seat in notches in cap and rod.

►**Installing Rods:** *CAUTION*—Rods have plain side and boss side (two machined bosses at lower end). Install **rods #1, 3, 5, 7, with plain side to front, and #2, 4, 6, 8, with boss side to front** (NOTE—Pistons marked "F" on front side). Caps offset and cannot be installed incorrectly. Groove on rod and cap and pads for numbering caps and rods are on same side.

►*CAUTION*—Misaligned rods must be replaced, straightening rods in field not recommended.

NOTE—Oil spit hole for lubrication of opposite cylinder wall provided in rod above cap joint.

CRANKSHAFT: 5 bearing, 6 integral counterweights.

Journal Diamters #1, 2, 3, 4, 2.498-2.499"; #5, 2.623-2.624".

Bearings—Removable, steel-backed, Durex-babbitt overlay bearing shells. Rear bearing flanged.

Clearance—.002-.0035" (rear), .0005-.003" (others).

►*REAR BEARING SHELLS*—Marked with letter on backside of bearing tang. **Use same size bearing (indicated by letter on tang) when replacing bearing.** Rear bearings are selective fit during manufacture, 3 sizes used: "M" Medium, "T" Thin, "H" Heavy.

Bearing Adjustment: None (no shims). Replace bearings. Do not file caps.

NOTE—#1, 2, 3, 4, bearing caps numbered. Install with numbers toward right hand cylinder bank.

Bearing Removal—Bearing shells can be removed and installed without removing crankshaft.

End Thrust: Taken by flanges on rear main bearing.

Endplay—.004-.008".

Crankshaft Front Oil Seal and Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Special Data.*

CAMSHAFT: 5 bearing, coated (Parco-Lubrited) shaft

Camshaft Removal & Installation—*See Oldsmobile Special Data.*

Journal Diameter—1.8724-1.8731" (1949); 1.8724-1.8729" (1950-52).

Reamed Bushing Diameters—1.8745-1.8760" (all).

Bearings—Steel-backed, babbitt bushings.

Clearance—.0014-.0036".

End Thrust (1949): Forward thrust taken by thrust plate on front of engine, rear thrust at front of cylinder block.

►*CAUTION*—Thrust plate seals off two oil galleys and must be installed flat to prevent low oil pressure at idling speeds. 1/16" hole in plate at right galley provides lubrication for chain, sprockets, fuel pump

End Thrust (1950-52): Forward thrust taken by plunger and spring on front of engine, rear thrust at front of block.

►*CAUTION*—Two main galley oil holes in block sealed by hex head bolt. A small hole in bolt for right hand galley provides lubrication to timing chain sprocket, fuel pump eccentric and lever.

Engine Front Cover Removal: *See Oldsmobile Special Data.*

Timing Chain	Link-Belt	Morse
Width	①	7/8"
Pitch	.500"	.375"
Length (Links)	48	64

①—11/16" (1949-51); 27/32" (1952).

►*NOTE—Link-Belt and Morse chains not interchangeable unless sprockets also changed.*

Camshaft Setting: Mesh chain with sprocket marks adjacent and in line with a straightedge across the shaft centers (or use Tool BT-11).

NOTE—Fuel pump eccentric bolted to front end of camshaft ahead of sprocket. Assemble with "0" mark to front, machined step against sprocket.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 3/4"	.3417-.3425"	4.907-4.927"
Exhaust	1.432-1.442"	.3930-.3938"	4.931-4.951"

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1949 Models

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.330"	.0017-.0035"
Exhaust	45°	.330"	.0022-.0040"

1950-51 Models

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.333"	.0022-.0042"
Exhaust	45°	.333"	.0027-.0045"

1952 Models

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.366"	.0022-.0042"
Exhaust	45°	.366"	.0027-.0045"

Intake Valve Rubber Seals—Installed in second groove from end of valve stem between lock retainer and valve stem. Always use new seals.

Valve Seat Width: .042-.071" (Intake); .070-.098" (Exhaust).

Valve Guides: Intake valve guides tapered at lower end. Press guides into head until top end is 27/32" (1949-51); .740" (1952), above face of valve spring seat. Use Tool BT-13 (1949-51); Tool J-5158 to correctly position guides in head. Ream inside diameter of guides as follows: .34425-.34525" (1949 Intake); .3447-.3457" (1950-52 Intake); .39605-.39705" (1949 Exhaust); .3965-3975" (1950-52 Exhaust).

Valve Springs: Intake and exhaust springs are alike. Dampeners used on lower end of all springs.
Free Length—2 3/32" (1949-51); 2.33" (1952).

1949-51 Spring Specifications

Valve	Spring Pressure	Spring Length
Closed	62-68 lbs.	1.777"
Open	136-146 lbs.	1.477"

1952 Spring Specifications

Valve	Spring Pressure	Spring Length
Closed	85-95 lbs.	1.829"
Open	149-163 lbs.	1.463"

▷***CAUTION*—Lower end of damper and spring must seat in recess in head.**

Valve Lifters: Barrel type hydraulic lifters.
▷***HYDRAULIC LIFTER INSTALLATION CAUTION:*** FIVE different sizes used in production as follows (marked as indicated): Standard (unmarked), .001" O.S. (marked "1"), .002" O.S. (marked "2"), .003" O.S. (marked "3"), .005" O.S. (marked "5"). **Lifters** marked by etched number on lifter body, **Cylinder Block** marked by number on rail under engine top cover. Re-install lifter in same hole or replace with proper size.
Diameter—.8424-.8427". **Length**—2" (overall).
Clearance in Block—.0005-.0018" (selective).
Replacement Lifters—Std. and .001", .002", .003", .005" Oversize.
Hydraulic Valve Lifter Removal & Overhaul—*See "Hydraulic Valve Lifters" in Oldsmobile Special Data.*
▷***1952 NOISY VALVE LIFTER (AT HIGH SPEED) CORRECTION:** If valve lifters become noisy at continuous high speed, then quiet down as speed is reduced, one or more valve lifter counterbores may not be to maximum depth. See "Valve System" in Oldsmobile Special Data.*

Rocker Arms: New rocker arm and shaft assemblies mounted on each cylinder head. Intake rocker arms identified by brass pin in oil lead.
Rocker Arm Shaft Disassembly and Reassembly—*See Oldsmobile Special Data.*
▷***CAUTION*—Steel plain finish push rods (alike for all valves) used on domestic engines. Longer copper finish push rods (for thicker head gaskets) used on export engines only.**

VALVE TIMING

Tappet Clearance: None in service (hydraulic type lifters which maintain zero clearance).
Valve Timing: *See Camshaft Setting above.*
Intake Valves—Open 14° BTDC. Close 50° ALDC.
Exhaust Valves—Open 50° BLDC. Close 14° ATDC.
Valve Timing Check—#1 intake valve opens 14° before top dead center (#1 piston .060" before top dead center) with zero tappet clearance.

LUBRICATION

Crankcase Capacity—5 quarts.
Normal Oil Pressure—35-45 lbs. at 50 MPH.
Oil Pressure Regulator—Located on oil pump. Opens at 35-45 lbs. Non-adjustable.
Oil Pump: Gear type. Located in crankcase and attached to rear main bearing cap by three bolts.
NOTE—Pump can be removed and installed without disturbing distributor drive (flat on upper end of oil pump shaft engages flat on distributor drive gear).
Removal & Overhaul: *See "Oil Pump" in Oldsmobile Special Data.*
Oil Filter: AC PF-122 full-flow type optional. On lower right side of crankcase at rear.
▷***CAUTION*—If oil filter (or pad cover if filter not used) replaced, use a new gasket (coat both sides with POB No. 5 Sealer) and tighten bolts to 35-40 ft. lbs. Oil filter (or pad) mounted externally on lower right side of crankcase at rear. Oil filter is full flow type (all oil from pump delivered to oil filter) requires pad when filter not used to return oil to main oil galley.**
Oil Pressure Gauge: AC No. 1507124 (1949-51 Exc. 1951 Super 88); AC No. 1507522 (1951 Super 88 & All 1952). Not Electric.
Crankcase Ventilation: Air intake in oil filler cap (oil-wetted type cleaner) with outlet connection to a ventilating baffle at rear of block above right bank. Outlet pipe push fit at ventilator and extends down below right rear corner of engine.
Servicing—Wash and re-oil filter element in cap every 2000 miles (oftener in dusty areas).

COOLING

Capacity—21½ qts.
Pressure Valve—AC No. 850549 Radiator Cap. Opens at 7 lbs.
Radiator Core Removal: *See Oldsmobile Special Data.*
Water Pump: Packless, sealed ball-bearing shaft. Pump mounted in front engine cover casting.
See Water Pump Section for complete data.
Removal—Take off fan and two fan pulleys. Remove six pump mounting bolts (4 to engine cover, 2 to block). Remove pump. NOTE—When installing pump, coat one side of pump housing gasket with gasket cement, dip four bolts in CP No. 9 Sealer.
Fan Belt Adjustment—Loosen idler pulley attaching screws and place tool J-4139 over idler pulley attaching bolt and under bracket. Attach torque wrench to tool J-4139 and tighten belt to 25 ft. lbs.
Generator Belt Adjustment—*See GENERATOR.*
Thermostat: Harrison. In water outlet (integral with intake manifold casting).
Setting—Starts to open 152°F. Fully open 173°F.
Temperature Gauge: AC Electric.
Dash Unit—AC No. 1512168 (1949-50); 1512275 (1951-52).
Engine Unit—AC No. 1512015.
See "Temperature Gauges" in Miscellaneous Section.

FLYWHEEL HOUSING

FLYWHEEL HOUSING ALIGNMENT & INSTALLATION: *See "Flywheel" in Oldsmobile Special Data.*

CLUTCH

Long 11CF-10½ TI—Semi-centrifugal, single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven type. I.D. 7", O.D. 10½", Thick. .137".
Pedal Adjustment: Pedal free travel ⅞-1¼" (1949); 1-1¼" (1950-51). Adjust by turning nut on connector rod at clutch fork.
Removal: Remove transmission (see Transmission), remove right and left splash pans, engine breather pipe, and right and left lower flywheel housing bolts. Install Engine Rear Support Tool BT-28, entering pilot supports into lower housing bolt holes. Remove engine rear mount bolts at clutch housing, and remove frame cross-member by removing three bolts at each end. Remove clutch housing by removing eight bolts holding housing to flywheel housing. Remove clutch assembly from flywheel.

TRANSMISSION

SYNCHRO-MESH

Own Make. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse), all helical gear type with remote shift control.
▷***1951 NOTE*—Different shifting arrangement used on this transmission. Not interchangeable with previous models.**
See Transmission Section for complete data.
Transmission Control: Oldsmobile "Handi-shift."
See Transmission Section for complete data.
Removal: Drain transmission and disconnect manual control rods and speedometer cable at transmission. Remove clutch return spring and disconnect clutch linkage at yoke connecting link. Detach drive shaft at rear universal joint, and slide shaft from transmission. Remove transmission.

HYDRA-MATIC TRANSMISSION

Own Make. Consists of fluid coupling and automatic transmission. NOTE—*Three different transmissions used as follows:*
▷***1950-51 "WHIRLAWAY" TYPE HYDRA-MATIC CONVERSION TO STANDARD 4-SPEED HYDRA-MATIC*—*See "Hydra-Matic Drive" in Transmission Section for complete data.***
1949—Standard type transmission as used in previous models.
1950—"Whirlaway" type with Modulated Throttle pressure.
1951—"Whirlaway" type with Modulated Throttle Pressure and Hydraulically operated "Cone Type Clutch" Reverse mechanism.
1952—Standard type with Modulated Throttle Pressure and hydraulically operated "Cone Type Clutch" Reverse mechanism.
See Transmission Section for complete data including Testing & Trouble Shooting.
▷***CAUTION—Eight Cylinder model transmissions not interchangeable with Six Cylinder models.***

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Lubrication—Check fluid level in transmission every 2000 miles. Drain and refill after first 25000 miles and every 25000 miles thereafter. Use only "Oldsmobile Hydra-Matic Drive Fluid."

Draining & Refilling—*See "Hydra-Matic Drive" in Transmission Section.*

Capacity—10½ qts.

►*1951 NOTE*—Fluid level can be checked from under hood with bayonet gauge now being used.

Checking Fluid Level—Raise front floor mat at right side, remove sheet metal cover in floor, clean opening thoroughly. Set hand brake, start engine and let engine idle, move selector lever to "Dr" (1949); "Lo" (1950-52) position. Remove dipstick, wipe dry and replace. Remove stick quickly and check level. Level should be at "FULL" mark. Add fluid to bring up to "FULL" mark if required, with engine idling.

Linkage Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

Removal: *See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics 2C or 2CR, & Saginaw. Roller bearing types.

►*CAUTION*—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Oldsmobile Rear Axle in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with pinion mounted on two tapered roller bearings.

►*CAUTION*—New carriers (with machined surfaces on differential side bearing caps) and axle housings (with 2 welded support plates—supports bearing caps to take care of increased torque of new Rocket engine) are used. *Not interchangeable with "76" Series carrier and axle housing.* Use only carriers and axle housings described above on "88" and "98" Cars.

►*NOTE*—Rear universal companion nut controls pinion bearing "pre-load."

See Rear Axle Section for complete data.

1949 Axle Ratios

Synchro-mesh—4.10-1 (41-10); 4.30-1 (43-10).
Hydra-Matic—3.63-1 (40-11); 3.90-1 (39-10); 3.23-1 (42-13).

1950 Axle Ratios

Synchro-mesh—4.10-1 (41-10); 4.30-1 (43-10); 3.63-1 (40-11); 3.90-1 (39-10).
Hydra-Matic—3.63-1 (40-11); 3.90-1 (39-10); 3.42-1 41-12).

1951 Axle Ratios

Synchro-mesh—3.63-1 (40-11); 3.90-1 (39-10).
Hydra-Matic—3.42-1 (41-12); 3.63-1 (40-11); 3.90-1 (39-10).

1952 Axle Ratios

Synchro-mesh—3.63-1 (40-11); 3.90-1 (39-10).
Hydra-Matic—3.23-1 (42-12); 3.42-1 (41-12); 3.63-1 (40-11).

Rear Axle Ratio Markings (1949)—Ring and pinion gear ratio and date stamped on underside of carrier right horizontal rib.

Rear Axle Pinion Marking (1950-52)—Coded ring and pinion gear marking stamped on lower side of carrier housing as follows: 4 (39-10); 6 (40-11); 8 (41-12); 9 (42-13); 0 (40-13).

NOTE—Early 1950 housings were stamped with three figures, last two of which indicate date of manufacture.

Backlash—.004-.008". Screw adjustment.

Removal: Disconnect driveshaft at rear universal (wire trunnions to avoid losing rollers), mark joint (reassemble to mark when reassembling). Remove axle shafts (see data below) and carrier capscrews.

►*CARRIER INSTALLATION CAUTION*—Due to close fit between carrier pedestal caps and support plates in housing, special carrier installation procedure used. *See Oldsmobile Rear Axle in Rear Axle Section.*

►*CAUTION*—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal: Remove wheel. Take off brake drum by removing two Tinnerman nuts from wheel studs (if nuts removed by turning off threads they can be re-used, if nuts damaged new nuts must be used). Remove backing plate mounting nuts, and static collector. Loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with Puller J-942 (do not allow shaft to drag on oil seal), replace one nut.

Wheel Bearing Adjustment—None.

Rear Suspension (1949-50 All Models & 1951 Deluxe 88): Coil spring type with support arms.

Rear Suspension (1951 Super 88 & 98. 1952 All Models): Semi-eliptical springs and direct acting shock absorbers.

See Rear Axle Section for complete data.

SHOCK ABSORBERS

Delco. Double acting front and rear on 1949-50 & 1951 Deluxe 88. Double acting front and direct acting rear on 1951 Super 88 & 98, 1952 all models.

Shock Absorber Application

	Front		Rear	
Model	**RH**	**LH**	**RH**	**LH**
1949 "88"	1947-J	1947-K	2105-N	2105-P
1950-51 "98"	1947-J	1947-K	2105-T	2105-U
1951 Super "88"	1947-J	1947-K	801-T	801-T
1952 "88"	1947-J	1947-K	①851-T	①851-T
1949 "98"	1947-C	1947-D	2105-E	2105-F
1950 "98"	1947-C	1947-D	2105-R	2105-S
1951 "98"	1947-C	1947-D	801-T	801-T
1952 "98"	1947-J	1947-K	801-T	801-T

①Use No. 801-T for convertible models.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—4° 29' 47" crosswise.

Caster—0° to Neg. ¾°. Adjustable.

Camber—Neg. ¾° to Pos. ¾° (Service Limits), Neg. ¼° to Pos. ¾° (New Car Specification).

Toe-In—1/16-1/8". Adjust each tie rod equally.

Steering Geometry Inner wheel 23° ± ½°. Outer 20°.

STEERING GEAR

1949 Series "98" & 1949-51 Series "88". Saginaw Worm & Roller type.

1950-52 Series "98" & 1952 Series "88". Saginaw Recirculating Ball Worm & Nut type.

See Steering Gear Section for complete data.

Power Steering (1952): Saginaw GM. Recirculating Ball Worm & Nut type to which hydraulic power had been added.

See "Saginaw (GM) Power Steering" in Steering Section.

Steering Wheel & Horn Button Removal: *See "Saginaw Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Saginaw Steering Gears" in Steering Section.*

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinder Bore (Series 88)—1 3/32" (Front Whl.); 15/16" (Rear Whl.).

Wheel Cylinder Bore (Series 98)—1949—1 1/8" (Front Whl.); 1" (Rear Whl.). **1950-52**—1 3/32" (Front Whl.); 15/16" (Rear Whl.).

Drums—Diameter 11". Max. rebore .060".

Lining Length

Model	Primary	Secondary
1949	9 11/32"	11 31/32"
1950-52	9 3/8"	12 1/32"

Width—2½" (Front Whls.); 2" (Rear Whls.).

Thickness—3/16".

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Braking Power (Exc. 1949 Series 98)—58% (Front); 42% (Rear. 1949 Series 98—56% (Front); 44% (Rear).

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows, & Front Seat: Hydro-Lectric type (motor driven pump).

►*1952 NOTE:* Two different systems used. **Reversible Motor** Series 88 Convertible without window regulators. **Non-Reversible Motor** (With Hydraulic Flow Control Valve) on all other models.

See Miscellaneous Section for complete data.

Windshield Wiper: (1949-51 Series 98) Vacuum, Cable operated. (Other Models) Vacuum, Link & Arm type.

See Miscellaneous Section for complete data.

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBERS: On left body pillar post.
Starting Serial Number—1001.

►*SERIAL NUMBER NOTE: Complete Serial Number (example 547M1001) includes following identification data in sequence.*

Year	Series ①	Assy. Plant②	Serial No.
54	7	M	1001

①—Series Designation: 7 (88 Series). 8 (Super 88 Series) 9 (98 Series)

②—See Assembly Plant Designation following:

Assembly Plant Designation

M—Lansing	L—Linden
A—Atlanta	C—South Gate
B—Framingham	W—Wilmington
K—Kansas City	T—Arlington

ENGINE NUMBER: Stamped on machined pad located on top of left hand cylinder bank of block in either of the following two positions: Between center and rear, or center and front, exhaust manifold ports.

Starting Engine No.—R-215001 (1953). V-1001 (1954).

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. minimum at cranking speed. Reading on low cylinders should not be less than 80% of high cylinder.

VACUUM READING: Steady 17" minimum at idle speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic coil type located on left side between exhaust manifold and exhaust pipe. Stop spring should strike stop before counter-weight touches pin to prevent valve rattle when cold.

►*MANIFOLD HEAT CONTROL VALVE NOTE*—Check for broken valve welds or frozen bearings by allowing manifold to cool, then start engine and with transmission in neutral, "flash" throttle quickly. The valve should open and return to close position immediately. If welds are broken or bearings frozen, valve weight will not move. Replace the valve assembly.

IGNITION

►*1954 IGNITION SECONDARY WIRING PRODUCTION CHANGE: New resistance type wires used. Center conductor is graphite impregnated nylon making it necessary to use only pre-cut assemblies for replacement. A new distributor rotor without a resistance unit is also used with this type wiring. (See Distributor below).*

FIRING ORDER: 1-8-7-3-6-5-4-2. See Diagram.

SPARK PLUG GAP: .030".
Spark Plugs—AC 46-5. 14mm.

COIL: Delco-Remy 1115082. *12 Volt.*
Ignition Current—2.0 amperes idling. 4.5 stopped.
Resistor—Delco-Remy 1928016. On bracket adjacent to ignition coil.

►*COIL RESISTOR NOTE*—Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from starter solenoid-to-coil.

DISTRIBUTOR: Delco-Remy 1110824 (1953). 1110843 (Early 1954). 1110850 (Late 1954). *12 Volt.*

►*1954 DISTRIBUTOR ROTOR CAUTION: Resistance type distributor rotor replaced in production by a non-resistance type for use with new secondary wiring (see Secondary Ignition Wiring Production Change above). Distributor Rotor, Part No. 1927393 must always be used with later type resistance wiring.*

Condenser—Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set—Delco-Remy 1918140
Breaker Gap—.016" (.012-.0175").
Cam Angle—26-33° (with .016" gap).

►*BREAKER GAP CAUTION:* Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set gap.
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110824

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	400	0-4	800
9-11	1350	18-22	2700
14-16	1850	28-32	3700

Automatic Advance—1110843, 1110850

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	400	0-4	800
7.5-9.5	1000	15-19	2000
11-13	1450	22-26	2900
13-15	1725	26-30	3450

Vacuum Spark Control: Delco-Remy 1116059.
Plunger Travel—7/32-15/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4.5-6.5
10	20	16-17

►*DISTRIBUTOR INSTALLATION CAUTION:* Before installing distributor, make certain that crankshaft turned to #1 firing position (see Ignition Timing following), install distributor with flat on the distributor gear in line with flat on oil pump shaft, push distributor down just enough to engage gear with shaft but do not push distributor all the way down. Turn rotor so that it is in line with #8 terminal in distributor cap (in line with breaker terminal on housing), push distributor all the way down. NOTE—Rotor will turn to #1 spark plug terminal position as gears are meshed. Install and tighten distributor hold-down clamp.

IGNITION TIMING

Setting—5° BTDC. with engine idling at 850 RPM. and vacuum line to distributor disconnected and carburetor opening taped closed.

►*ENGINE TIMING CAUTION: The "Slow Idle" setting method formerly recommended should not be used.*

►*DETONATION CAUTION: If engine detonates (due to low octane fuel or carbon build-up) set timing to 2½° BTDC. For high altitude operation, timing can be advanced to 7½° BTDC, if detonation does not occur.*

Timing Mark—Slot in rim of crankshaft pulley and pointer on front cover. Leading edge of slot is 5° BTDC. Trailing edge is TDC. Midway between these two points is 2½° BTDC.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: Carter 2-Barrel used on DeLuxe 88. Carter WCFB or Rochester 4GC 4-Barrel used on Super 88 & 98.*

►*1953 CARBURETOR METERING JETS & VENTURI CLUSTER PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: Different combinations used in production. See "Rochester 4GC 4-Barrel" in Carburetor Section for data.*

►*1954 THROTTLE RETURN SPRING BRACKET CAUTION (Synchro-mesh Cars):* Connect throttle spring to TOP holes for 2-Barrel carburetors, and to BOTTOM holes for 4-Barrel carburetors.

1953 Synchro-mesh Throttle Linkage Adjustment: Adjust engine idle speed to 425 RPM, then adjust throttle rod (rod from bellcrank on dash panel to bellcrank on engine) to allow 5/16" to 3/8" clearance between depression in dash panel and bellcrank assembly. Remove return spring on dash panel bellcrank and advance carburetor throttle to wide open position. Adjust rod between upper and lower bellcranks on dash to allow ¼" clearance between accelerator pedal and floor mat. Assemble return spring and tighten locknuts on rod.

Hydra-Matic Throttle Control Linkage Adjustment (1953 Series 88-With 2-Barrel Carburetors): Apply hand brake firmly, warm up engine so that it idles at hot or slow idle speed.

1) With engine warm, disconnect upper throttle rod from bellcrank on engine (*CAUTION*—do not disconnect intermediate throttle rod to which upper throttle rod is connected at the bellcrank). Adjust engine idle speed to 400 RPM with selector lever in "Dr" range, then turn off engine.

2) After setting idle speed, adjust length of intermediate throttle rod (free clevis from bellcrank on engine, turn rod in or out of clevis) until clearance between rear face of lever to which rod is connected and depression in dash is 5/16-3/8", tighten clevis locknut and connect the rod.

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3) Disconnect throttle return spring from bellcrank on dash, open carburetor throttle valves to wide open position, adjust clevis at bellcrank end of accelerator pedal linkage so that clearance between lower face of boss on underside of pedal and top of floor mat is ¼", tighten clevis locknut and connect rod (*CAUTION*—open side of clevis must be facing AWAY from engine).

4) Disconnect lower throttle rod from lever on left side of transmission case. Hold carburetor throttle lever in slow idle position against its stop, adjust length of upper throttle rod so that Pin Gauge BT-25 freely enters holes in bellcrank and hole in bracket on engine. Tighten clevis locknut and connect rod at bellcrank. *CAUTION*—open side of clevis must be AWAY from engine.

5) With lower throttle rod disconnected from transmission lever, check position of lever as follows: Install checking tool J-2195 on machined surface on rear face of transmission case with gauging rod extending forward toward lever. Hold throttle lever back against stop. If small end of tool does not enter hole in lever freely in this position, bend lever as required using tool J-2029. Do not connect rod to lever at this point.

6) After adjusting lever position, see that carburetor is in slow idle position (throttle lever against stop), hold transmission lever fully back against its stop, adjust length of the rod by loosening locknut and turning clevis until clevis pin enters hole in lever freely, then **shorten rod by one full turn of the clevis,** tighten locknut and connect rod.

Hydra-Matic Throttle Control Linkage Adjustment (1953 Super 88 & 98-With 4-Barrel Carburetors): Disconnect accelerator pedal from accelerator rod (in front compartment), disconnect lower throttle rod (between bellcrank on engine and transmission case lever) at bellcrank, disconnect intermediate throttle rod at bellcrank on dash. Then proceed as follows:

1) Hold carburetor throttle valves in slow idle position, adjust intermediate throttle rod (turn clevis on rear end of rod) until clearance between rear face of bellcrank and depression in dash is 5/16-3/8" when rod connected. Tighten clevis locknut and connect rod (*CAUTION*—open side of clevis must face AWAY from center of engine).

2) Start engine and allow it to warm up (*CAUTION*—apply hand brake firmly to hold car). Adjust engine idle speed to 400 RPM with selector lever in "Dr" range, then turn off engine.

3) Hold carburetor throttle valves in slow idle position, check alignment of two holes in bellcrank at rear of engine with hole in bellcrank bracket. If Gauge Pin BT-25 does not enter all three holes freely, adjust as follows: Disconnect upper throttle rod from bellcrank, adjust rod length (turn rod in or out of clevis at forward end) as necessary to line up bellcrank and bracket holes, tighten clevis locknut and connect rod.

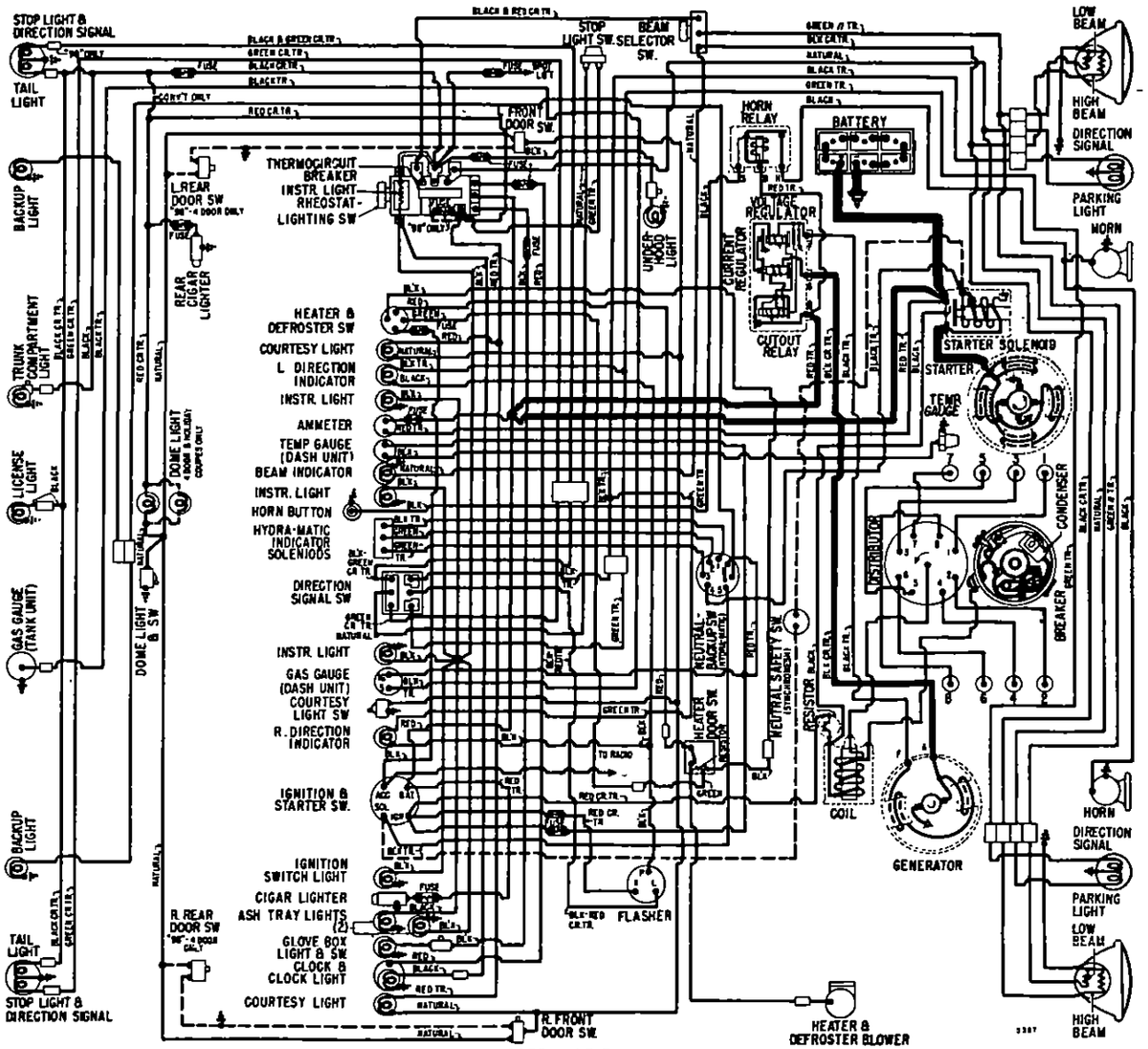
4) Connect lower throttle rod to this bellcrank at rear of engine, disconnect lower end of rod from lever on left side of transmission.

5) Check and adjust transmission lever (see step 5 in Series 88 2-barrel carburetor adjustment above).

6) After adjusting lever position, see that carburetor is in slow idle position (throttle lever against stop), hold transmission lever fully back against the stop, adjust length of lower throttle rod by loosening locknut and turning clevis on rear end of rod until clevis pin enters hole in lever freely, then **shorten rod by three full turns of the clevis,** tighten locknut and connect rod.

7) Hold carburetor choke valve completely open, move intermediate throttle rod (from bellcrank on dash to bellcrank on engine to rear of carburetor) forward until carburetor throttle valves are in wide open position and throttle linkage has moved transmission lever fully forward and against its stop (through detent positions). Hold linkage in this position and turn stopscrew (on bellcrank just to rear of carburetor) down until it just contacts the downshift lever assembly (to which transmission throttle rod connected). Release linkage, then **back stopscrew off one complete turn** and tighten locknut. This will provide 1/32" clearance—between stopscrew—and downshift—lever with transmission lever against its forward stop.

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1953 MODELS

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8) Connect accelerator pedal to accelerator rod inside car. Adjust clevis at upper end of accelerator pedal linkage (at bellcrank on dash) so that clearance between boss on underside of pedal and floor mat is ¼" with carburetor throttle valves in wide open position.

CAUTION–Open side of clevis at bellcrank end of accelerator pedal linkage must face AWAY from center of engine.

Hydra-Matic Throttle Control Linkage Adjustment (1954 All Series-With 2-Barrel & 4-Barrel Carburetors):

1) Remove throttle rod from transmission throttle lever and move throttle lever to rear against its stop. Place Throttle Lever Gauge J-5605 flat against rear face of transmission case, rod on gauge should just enter hole in throttle lever. The distance from rear face of transmission case to hole in throttle lever should be 6¾". Adjust by bending lever with tool J-2029. Attach throttle rod to transmission lever.

2) Apply hand brake and allow engine to warm up. Place throttle lever in "Dr" position and adjust engine idle speed to 400 RPM. Turn off engine. Disconnect upper throttle rod from engine bellcrank. Check clearance between end of intermediate throttle rod assembly and dash. This distance should be 5/16" to 3/8" with carburetor on slow idle. Adjust intermediate throttle rod assembly as necessary to obtain the specified clearance. *(NOTE*–On 4-Barrel carburetors, open side of rod end should face away from center of engine, and toward center of engine on 2-Barrel carburetors).

3) Loosen jam nut and remove pin from lower throttle rod at throttle bellcrank, and with bellcrank against stop and intermediate throttle rod against its stop, the clevis pin should enter holes in clevis of lower throttle rod and hole in throttle bellcrank freely. Adjust clevis on end of lower throttle rod so pin enters hole freely. *CAUTION–Do not shorten or lengthen rod after this setting is obtained.*

4) With upper throttle rod assembly held rearward with light pressure to remove lash, the clevis pin should just touch gauge point on throttle bellcrank (gauge point is a curved projection above clevis pin hole in bellcrank). Adjust by rotating clevis so clevis pin just touches, or is within ½ turn short of gauge point. Replace clevis pin and tighten jam nut.

5) Hold choke completely open and move upper throttle rod assembly forward until throttle is wide open. Continue pushing upper throttle rod until transmission throttle lever just stops at its forward position (Repeat this procedure several times until the exact forward position is distinctly felt). Do not force linkage beyond this point. With linkage in this position there should be zero clearance between throttle bellcrank stopscrew and downshift lever. With linkage held forward as outlined, loosen locknut on setscrew and adjust setscrew until it just contacts the downshift lever. Release lever and tighten jam nut.

6) Place a wood block 3 7/8" long on top center of floor mat retainer and bring bottom of accelerator pedal down to rest on block. With carburetor in slow idle position (choke completely off) pedal should just touch gauge block. If necessary adjust accelerator position by disconnecting accelerator pedal rod from accelerator bellcrank on dash, and adjust accelerator pedal rod so that clevis just slides over pin with wood block in position and carburetor on slow idle. Reassemble rod, making sure open side of rod end is facing away from center of engine. Remove wood gauge block.

CARTER 2-BARREL

Carter WGD, No. 851SA (Early 1953); No. 2015S (Late 1953); No. 2058S (1954). Dual downdraft type with automatic choke.

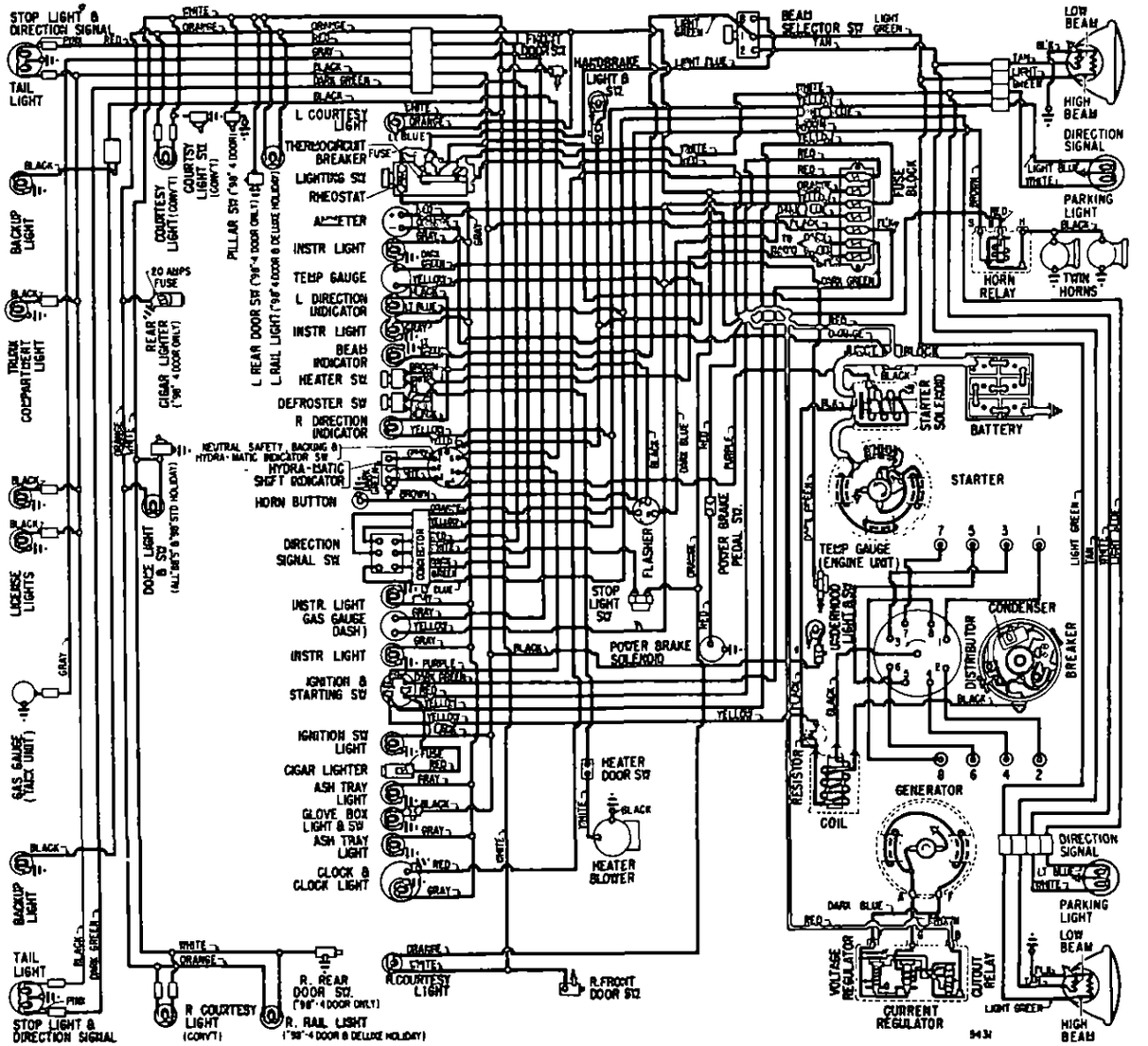
Idle Setting–¾-1¼ (1953); 1½-2½ (1954), turns open. Turn screws out for richer mixture.

Idle Speed (Synchro-mesh)–425 RPM.

Idle Speed (Hydra-Matic)–400 RPM with selector lever in "Dr" position.

Idle Speed (Dynaflow)–400 RPM with selector lever in "P" position.

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1954 MODELS

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Float Level: ¼" between top of float and bowl cover with float assembly inverted.
Accelerating Pump—No seasonal adjustment.
Fast Idle: .020" throttle opening or clearance between valve and wall on side opposite idle ports with choke valve tightly closed. Adjust by turning sleeve on connector rod.
Automatic Choke Setting: Centered (at index).

1953 Synchro-mesh Throttle Linkage Adjustment: *See "Carburetor" above.*
1953-54 Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Carter WGD Carburetor" in Carburetor Section.*
Fuel Pump Pressure: 4-5 lbs. at 16" above outlet at 1800 RPM.

CARTER 4-BARREL

Carter WCFB, No. 2016S (Early 1953); No. 2080S (Late 1953); No. 2059S (1954). 4-Barrel downdraft type with automatic choke.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 1-4-6-7. LEFT barrels 2-3-5-8.*
Idle Setting (2016S, 2080S)—1¾-2¾ turns open (both screws). Turn screws out for richer mixture.
Idle Setting (2059S)—1-2 turns open (both screws). Turn screws out for richer mixture.
Idle Speed (Synchro-mesh)—425 RPM.
Idle Speed (Hydra-Matic)—400 RPM with selector lever in "Dr" position.
Idle Speed (Dynaflow)—400 RPM with selector lever in "P" position.

1953 Synchro-mesh Throttle Linkage Adjustment: *See "Carburetor" above.*
1953-54 Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA—See "Carter WCFB Carburetor" in Carburetor Section.*
Fuel Pump Pressure: 4-5 lbs. at 16" above outlet at 1800 RPM.

ROCHESTER 4-BARREL

Rochester Model 4GC. 4-Barrel downdraft type with automatic choke.

Rochester Carburetor Application

Model	Rochester No.
1953 (Synchro-mesh)	7005700
1953 (Hydra-Matic)	7005600
1953 (Dynaflow)	7006250
1954 (Synchro-mesh)	7005600
1954 (Hydra-Matic)	7005900

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 1-4-6-7. LEFT barrels 2-3-5-8.*
Idle Setting—Adjust with engine at normal operating temperature, automatic choke not operating and engine idling at hot or slow idle speed. Adjust idle speed(see below) to correct RPM, then adjust each idle mixture screw (one screw for each primary throttle valve) until engine idles smoothly and RPM is at maximum. Then turn each screw out ½ turn additional for slightly richer mixture (both idle speed and vacuum will drop off slightly). Check setting by slowly opening throttle until speed increases to 1000 RPM, then close throttle rapidly. If slight rich roll is noted as engine returns to idle speed, *turn each idle screw in not more than 1/8 turn.*
Idle Speed (Synchro-mesh)—425 RPM.
Idle Speed (Hydra-Matic)—400 RPM with selector lever in "Dr" position.
Idle Speed (Dynaflow)—400 RPM with selector lever in "P" position.

1953 Synchro-mesh Throttle Linkage Adjustment: *See "Carburetor" above.*
1953-54 Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Rochester 4GC Carburetor" in Carburetor Section.*
Fuel Pump Pressure: 4-5 lbs. at 16" above outlet at 1800 RPM.

CARB. EQUIPMENT

Fuel Pump: AC. Fuel & Vacuum.
Replacement Pump—AC No. 9775 (1953 & Early 1954); No. 4140 (Late 1954).
Pressure—4-5 lbs. at 16" above outlet at 1800 RPM. *See "Fuel Pumps" in Carburetion Equipment Section.*

Gasoline Gauge: AC Electric type.
►*1954 GASOLINE GAUGE NOTE: Gasoline tank outlet tube is part of gauge tank unit and is equipped with a saran filter. Some early cars did not have filter installed in production.*
Dash Unit—AC No. 1517783 (1953); 1517999 (1954).
Tank Unit—AC No. 1517716 (1953); 1518134 (Early 1954-without filter); 1518022 (Late 1954-with saran filter).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

1953-Delco 3EE70W. *12 Volt.* 11 plate,70 ampere hour capacity (20 hr. rate).
1954-Delco 8KM60. *12 Volt.* 9 plate, 60 ampere hour capacity (20 hr. rate).
Battery Ground—Negative. To cylinder head.
Engine Ground—Connected between engine and forward side of firewall.

STARTER

Delco-Remy 1107603 (1953); 1107623 (1954). *12 Volt.*
Armature—Delco-Remy 1919267 (1107603), No. 1927343 (1107623).
►*1953-54 STARTER & ENGINE CONTINUING TO RUN (With ignition key on or off):* May be caused by shorting of ignition switch lead or broken return spring in starter solenoid allowing contact disc to float forward and complete circuit through ignition "by-pass" circuit. Correct by repairing or replacing solenoid.
Drive—Overrunning clutch (solenoid pinion shift).
►*CAUTION: Overrunning clutch pinion clearance must be adjusted whenever solenoid removed from starter.*
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24 ozs. minimum (1107603); 35 ozs. minimum (1107623).

Performance Data (1107603)

Torque	RPM	Volts	Amperes
0 ft. lbs.	6500	10.3	75
11.0 ft. lbs.	Lock	4.9	520

Performance Data (1107623)

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
10.5 ft. lbs.	Lock	5.4	470

Starting Switch: Delco-Remy 1118188 (1953); No. 1119761 (1954) no relay used. Mounted on starter and controlled by combination Starter & Ignition Switch. *NOTE—A Neutral Safety Switch is used on all models.*

See "Starter-Controls" in Electrical Equipment Section.
Synchro-Mesh Neutral Safety Switch: Delco-Remy 1998031. Switch is controlled by transmission shift linkage, and allows the starter to be operated only when transmission gear shift lever in "Neutral" position.
Adjustment—Place transmission in 2nd gear and adjust the Neutral Safety Switch so there is 1/16" clearance between switch arm and stop. Check to see that engine will not start with gear shift lever in any position except neutral.
Hydra-Matic Neutral Safety Switch: Delco-Remy 1998026. Combination Neutral Safety Switch, Back-up Light Switch, and Hydra-Matic Indicator Switch.
Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*
Hydra-Matic Indicator Switch: *See "Hydra-Matic Transmission" following for description of indicator unit.*

GENERATOR

Delco-Remy 1102003 (1953-54 Std.); No. 1102021 (1954 Air Conditioned Cars).
Armature—Delco-Remy No. 1923535.

Performance Data—Cold

Amperes	Volts	RPM
30①	14	2150

①—Not maximum. See Regulator.
Brush Spring Tension—24-32 ozs.
Field Current—1.48-1.62 amperes at 12 volts.
Rotation—Counter-clockwise at commutator end.

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Belt Adjustment: Loosen generator attaching bolt and place tool J-4170 against generator between bracket and generator housing. Attach torque wrench to tool and apply a torque of 16 ft. lbs. Tighten generator attaching bolts while holding tension on belt.

REGULATOR

1953 Models—Delco-Remy 1118750. Current & voltage regulator.
See "Delco-Remy 1118700 Series Regulator" in Electrical Equipment Section.
1954 Models—Delco-Remy 1118826. Current & voltage regulator.

►*1954 REGULATOR NOTE: Checking procedure is different than for 1953 regulators. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. Specifications below are "Normal" settings for this regulator.*

Cutout Relay

Cuts In—12.8 volts (hot).
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—14.5 volts (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—30 amperes (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See Electrical Equipment Section.*

Lighting Switch Removal: Disconnect battery cable and disconnect wires from lighting switch. Pull switch knob out to last notch, then depress spring loaded latch button on switch body while pulling rod and knob assembly out of switch. Remove switch mounting nut and remove switch and escutcheon from instrument panel.

Stop Light Switch Location (Std. Brakes): Mechanical type on underside of toe board near brake pedal.
Stop Light Switch Location (Power Brakes): Directly above brake pedal on firewall. Adjust so lights come on within free travel of brake pedal.

1953 MODELS

FUSES: Following circuits are fused as indicated.
1) Dome & Rear Seat Cigar Lighter ("98" 4-Door)—AGC-30. Near light switch in fuse holder.
2) Stop & Dome (Exc. "98" 4-Door & Conv.)—SFE-14. On light switch.
3) Stop Light ("98" 4-Door & Conv.)—SFE-14. On headlight switch.
4) Tail Light (Exc. Conv.)—SFE-20. Near light switch in lead.
5) Dome & Tail Light (Conv.)—SFE-20. In lead.
6) Directional Signal—SFE-9. Near flasher on brace.
7) Cigar Lighter—On back of lighter.
8) Glove Box—SFE-4. In lead.
9) Clock—AGA-1. In lead.
10) Heater—SFE-14. In lead.
11) Back-Up-Light—SFE-9 in lead near light switch.

1954 MODELS

FUSES: All fuses (exc. Instrument Panel fuses) are located on a combination fuse and junction block under the instrument panel. A color code is used on the fuse panel corresponding to the color code of circuits protected by each fuse. The following fuses will be found on this panel:
(1) Clock (Std. on 98 Series only). 1 ampere.
(2) Courtesy Lights, Dome & Stop Lights, and Rear Cigar Lighter. 20 amps. (Exc. 98), 25 amps. (98 Series).
(3) Fuel & Temp. Gauges, Hand Brake Signal Light, Hydra-Matic Shift Indicator, and Back-up Lights. 9 amperes.
(4) Glove Box, Underhood, Keyhole, Tail, Trunk, & Spot Lights. 9 amperes.
(5) Turn Signal. 9 amperes.
(6) Radio. 7.5 amperes.
(7) Heater & Air Conditioner. 20 amps. (without Air-Conditioner). 25 amps. (with Air-Conditioner).
Window & Seat Regulators—20 amps. Located on separate fuse block attached to main fuse block.
Instrument Panel Lights—2 amps. located on headlamp switch.
Cigar Lighter—20 amps. Located behind cigar lighter.
Air-Conditioner Solenoid Valve—2 amps. Located in lead near Solenoid Valve.

CIRCUIT BREAKER: 22 amps. Located in headlamp switch.

HORNS: Delco-Remy 1999753 (Low Note), 1999754 (High Note). *12 Volt.*

Horn Relay: Delco-Remy 1116781. *12 Volt.*
Contacts Close—2.75-4.0 volts.
Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

►*AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air-conditioning system. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*1954 OLDSMOBILE FRONT MAIN BEARING PRODUCTION CHANGE: Beginning with Car Serial V52229 a selective fit front main bearing entered production. There are two bearings available in addition to the regular Std. size, .002", .010", & .020" Undersize bearings. See "Crankshaft" below.*

ENGINE SPECIFICATIONS: 90° V8 with overhead valves.

Model	Bore	Stroke	Displacement
1953	3 3/4"	3 7/16"	303.73 cu. ins.
1954	3 7/8"	3 7/16"	324.31 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
1953 ①	8.0-1	45	105 at 3600 RPM
1953 ②	8.0-1	45	165 at 3600 RPM
1954 ①	8.25-1	48	170 at 4000 RPM
1954 ②	8.25-1	48	185 at 4000 RPM

①—DeLuxe 88.
②—Super 88 & 98.

Compression & Vacuum Reading—*See TUNE-UP.*

CYLINDER HEAD: *See Oldsmobile Special Data.*

TIGHTENING TORQUES: *See Oldsmobile Special Data.*

OIL PAN REMOVAL: *See Oldsmobile Special Data.*

ENGINE FRONT MOUNT INSTALLATION: *See Oldsmobile Special Data.*

PISTONS

Aluminum alloy, three ring, autothermic, steel strut, slipper skirt, cam ground, tin plated.
Length—4". **Weight**—20.46 ozs. (1953); 21.7 ozs. (1954).
Removal—Pistons and rods removed from above.

►*CAUTION:* Mark pistons, rods, and bearing caps with cylinder number before removal to insure correct reinstallation.

Fitting New Pistons: .0005-.0010" skirt clearance, measured 1/8" from bottom of skirt with piston pin removed. Use a .0015" x 1/2" x 12" feeler between piston (pin removed) and cylinder wall at right angles to pin. Pull to withdraw feeler should be 10-18 lbs.

►*CAUTION: Allow rebored cylinders to cool to normal room temperature before fitting pistons.*

Replacement Pistons: Standard & .020", .030" Oversize. Pistons furnished only with fitted pins.

Installing Pistons: Mark "F" cast on each side of piston pin hole on front side of piston. Install pistons 1, 3, 5, 7 in left bank, 2, 4, 6, 8 in right bank with letter "F" toward front on all pistons.

PISTON PINS

Floating type with lock rings at each end.

►*CAUTION: Discard old lock rings and install new service type lock rings when installing pins.*

Diameter—.9803-.9807". **Length**—3.016" (1953); 3 9/64" (1954).
Clearance in Piston—.0000-.0002".
Pin Fit in Piston—Pin should not fall through piston of own weight. Pin can be tapped in place using brass drift.
Pin Fit in Rod Bushing—.0003-.0005" loose.
Replacement Pins: Standard size, and .001", .003" Oversize.

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PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1 & 2)	.077-.078"	Ⓒ	.001-.003"
Oil (#3)	1.860-1.865"	Ⓒ	.0018-.0033"

Ⓒ—Perfect Circle .010-.020". Sealed Power .008-.016".

Replacement Rings: Standard size, .020", .030"Oversize.

Installing Rings: Compression rings with step on inner edge UP. Oil rings marked TOP, installed with mark up.

CONNECTING RODS

Length—6 5/8" (Center to center). **Weight**—29.54 ozs.
Crankpin Journal Diameter—2.2488-2.2498".
Out of Round Limit—.0015".

Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.
Clearance—.0009-.0029".

Sideplay—.002-.011" (total for both rods).

Replacement Bearings: Standard size, .002", .010", .020" Undersize.

Installing Rods: *CAUTION*—Rods have plain side and boss side (two machined bosses at lower end). Install rods **1, 3, 5, 7 with plain side to front, and 2, 4, 6, 8 with boss side to front** (*NOTE*—Pistons marked "F" on front side). Caps offset and cannot be installed incorrectly. Groove on rod and cap, and pads for numbering caps and rods are on same side.

►*CAUTION—Use Guide tool BT-22 over rod bolts to prevent damaging crankpin journals when removing and installing piston and rod assemblies.*

NOTE—Oil spit hole for lubrication of opposite cylinder wall provided in rod above cap joint.

CRANKSHAFT

Journal Diameter—#1, 2, 3, 4 2.498-2.499"; #5 2.623-2.624".
Bearings—Durex 100A, steel backed, full precision type. Rear bearing flanged.
Clearance—.0005-.002" (Front—See Note below), .002-.0035" (Rear - See Note below), .0005-.003" (Others).

►*FRONT BEARING NOTE:* Beginning with Car Serial V52229 a selective fit front bearing entered production. **On Cars with Power Steering or Air-conditioning it is very important that front bearing fit be held as close to minimum as possible because of the increased pump drive and compressor drive belt load.** Bearing Part No. 565770 (Marked "M" on tang) will reduce bearing clearance .0005". Bearing Part No. 565771 (marked "H" on tang) will reduce bearing clearance .001". These bearings are in addition to regular replacement bearings.

►*REAR BEARING NOTE:* Rear bearings are selective fit during manufacture, 3 sizes used: "M" Medium, "T" Thin, "H" heavy. **Use same size bearing (indicated by letter on tang) when replacing bearing.**

Replacement Bearings: Standard size, .002", .010", .020" Undersize. In addition to lettered bearings used at front and rear. *See Front & Rear Bearing Notes above.*

End Thrust: Taken by rear (#5) flanged bearing.
Endplay—.004-.008"

Crankshaft Front Oil Seal & Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Special Data.*

Flywheel & Clutch Housing Alignment: *See "Flywheel Housing" in Oldsmobile Special Data.*

CAMSHAFT

Journal Diameters—1.8724-1.8729".
Bearings—Steel backed babbitt.
Clearance—.0014-.0036".

End Thrust: Forward thrust taken by plunger and spring on front of engine, rear thrust at front of cylinder block.

►*CAUTION:* Two main oil gallery holes in block sealed by hex head bolt. A small hole in bolt for right hand gallery provides lubrication to timing chain, fuel pump eccentric and lever.

Camshaft Removal & Installation: *See "Camshaft" in Oldsmobile Special Data.*

Timing Chain:	Link-Belt (Std.)	Morse (Optl.)
Width	.27/32"	7/8"
Pitch	.500"	.375"
Length (Links)	48	64

►*NOTE—Morse and Link-Belt chains not interchangeable unless sprockets also changed.*

Engine Front Cover—*See "Engine Front Cover" in Oldsmobile Special Data.*

Camshaft Setting: Mesh chain with sprocket marks adjacent and in line with a straight edge across shaft centers (or use Tool BT-11).

NOTE—Fuel pump eccentric bolted to front of camshaft ahead of sprocket. Assemble with "O" mark to front, machined step against sprocket.

VALVES

Tappet Clearance: None in service (hydraulic).

Valve	Head Diam.	Stem Diam.	Length
Intake	1¾"	.3417-.3425"	4.907-4.927"
Exhaust	1.432-1.442"	.3930-.3938"	4.931-4.951"

Valve	Angle	Lift	Clearance
Intake	45°	.366"	.0022-.0040"
Exhaust	45°	.366"	.0027-.0045"

Valve Seat Width—.042-.071" (Intake), .070-.098" (Exhaust).

Intake & Exhaust Valve Stem Seals—Installed in second groove from end of valve stem between lock retainer and valve stem. When servicing valves always use new seals.

Valve Springs: Intake and exhaust valve springs are alike. Dampeners used on lower end of all valve springs.
Valve Spring Free Length—2.33".

Valve Spring Specifications

Valve	Pressure	Length
Closed	85-95 lbs.	1.829"
Open	149-163 lbs.	1.463"

►*CAUTION—Lower end of dampener and spring must seat in recess in head.*

Valve Guides: Intake guides tapered on lower end. Press guides in head until top of guide is 47/64" (.7344") above face of valve spring seat (Tool J-5158 positions guides correctly in head). Ream inside diameter of guide after installation to .3447-.3457 (Intake), .3965-.3975" (Exhaust).

Hydraulic Valve Lifters: Barrel type.

►*HYDRAULIC LIFTER INSTALLATION CAUTION:* FIVE different sizes used in production as follows (marked as indicated): Standard (unmarked), .001" O.S. (marked "1"), .002" O.S. (marked "2"), .003" O.S. (marked "3"), .005" O.S. (marked "5"). **Lifters** marked by etched number on lifter body, **Cylinder Block** marked by number on rail under engine top cover. *Reinstall lifter in same hole or replace with proper size.*

Diameter—.8424-.8427". **Length**—2" (Overall).
Clearance in Block—.0005-.0018" (Selective).

Replacement Lifters: Standard size, .001", .002", .003", .005" Oversize.

Lifter Overhaul & Testing—*See "Hydraulic Lifters" in Oldsmobile Special Data.*

Rocker Arm Assembly: *See "Valve System" in Oldsmobile Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 13½° BTDC. Close 50½° ALDC.
Exhaust Valves—Open 49½° BLDC. Close 14½° ATDC.

Valve Timing Check—Remove left hand cylinder head rocker arm assembly and rotate engine so that #1 piston is on top dead center (firing stroke). Trailing edge of notch in vibration dampener will be aligned with pointer on timing chain cover. Install tool J-5374 in place of rear rocker shaft bracket with step plunger over #7 cylinder exhaust push rod. The 7/16" diameter pilot at bottom of tool will fit into cylinder head bolt hole. Screw main body of gauge down so step plunger contacts push rod and small diameter of step plunger is flush with top of main body. Tighten clamp bolt. Rotate engine one complete revolution so that #1 piston is again at TDC (intake stroke). Distributor rotor should now be pointing toward rear of engine. If timing chain is installed properly, top of tool plunger will rise so top of main body of tool is between second and third step. If camshaft is retarded one tooth, the third step will rise above top of main body, and if advanced one tooth, second step will be below main body.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). 6 qts. (dry).
NOTE—1 qt. additional for dry filter.

Normal Oil Pressure: 35-45 lbs. at 50 MPH.
Pressure Regulator Valve—In pump body. Not adjustable.

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Oil Pressure Gauge—AC No. 1507940 (1953); No. 1508118 (1954). Not electrical.

Oil Pump: Gear type. In crankcase at rear end.
Pump Overhaul—*See "Oil Pump" in Oldsmobile Special Data.*

Oil Filter: AC No. PM-90-3 full flow type (optional). On lower right side of crankcase at rear.
Replacement Filter Element—AC No. PF-122.

►*CAUTION*—If filter (or pad cover if filter not used) is replaced, used a new gasket (coat both sides with POB No. 5 Sealer) and tighten bolts to 35-40 ft. lbs. Oil filter or pad mounted externally on lower right side of crankcase at rear. Oil filter is full flow type (all oil from pump delivered to oil filter) requires pad when filter not used to return oil to main oil gallery.

Crankcase Ventilation: Air intake in oil filler cap has oil-wetted cleaner, AC No. 1551091 (Std.), No. 1551509 (Heavy Duty). Outlet is connected to ventilating baffle at rear of block above right bank. Outlet pipe is push fit at ventilator and extends down below right rear corner of engine.
NOTE—Tail pipe breather, AC No. 1551075 used on cars with oil bath air cleaner and heavy duty inlet breather in oil filler cap.

COOLING

Water Capacity: (With Heater)—22½ qts. (1953); 21½ qts. (1954). **(Without Heater)**—21½ qts. (1953); 20½ qts. (1954)

Pressure Valve: AC No. 850549 Radiator Filler Cap (stamped 549/7#).

Thermostat: Oldsmobile No. 563219 (160°). NOTE—use No. 563311 (180°) with permanent type anti-freeze.

Water Pump: Packless, sealed ball bearing type.
See "Oldsmobile" in Water Pump Section.
Pump Removal—Remove fan and fan pulley. Remove six mounting bolts (4 to engine cover, 2 to engine block). Remove pump. *NOTE*—When installing pump, coat one side of pump housing gasket with gasket cement, dip bolts in CP No. 9 Sealer.

Temperature Gauge: *12 Volt.* AC Electric. *CAUTION*—Use only 12 Volt type units which are stamped "12 Volt" on threaded side of block unit below nut hex. Later type 12 volt block units also have a copper colored terminal. 6 volt units have a natural brass terminal.
Dash Unit—AC No. 1512598 (1953); 1512810 (1954).
Engine Unit—AC No. 1512678.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long 11CF-11 TJ. Single plate dry disc type.
See "Long Clutches" in Clutch Section.

Clutch Disc No.—Oldsmobile No. 562395 (1953); 565059 (1954).

Pedal Adjustment: Pedal free travel 1 1/8-1 3/8". Adjust by turning adjusting nut on clutch connector link at throw-out yoke.

Removal: Remove transmission (see Transmission), remove right and left splash pans, engine breather pipe, and right and left lower flywheel housing bolts. Install Engine Rear Support Tool BT-28, entering pilot supports into lower housing bolt holes. Remove engine rear mount bolts at clutch housing, and remove frame cross member by removing three bolts at each end. Remove clutch housing by removing eight bolts holding housing to flywheel housing. Remove clutch assembly from flywheel.

Clutch Housing Alignment: *See "Flywheel Housing" in Oldsmobile Special Data.*

SYNCHRO-MESH TRANSMISSION

Own. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse) all helical gear type. *See "Oldsmobile Synchro-mesh" in Transmission Section.*

►*TRANSMISSION LEAKAGE CORRECTION: See "Oldsmobile Synchro-mesh" in Transmission Section.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission and disconnect manual control rods and speedometer cable at transmission. Remove clutch return spring and disconnect clutch linkage at yoke connecting link. Detach drive shaft at rear universal joint, and slide shaft from transmission. Remove transmission.

DYNAFLOW DRIVE

►*FOR 1953 CARS WITH "TWIN-TURBINE DYNAFLOW DRIVE": See "Buick Dynaflow Drive" in Transmission Section.*

HYDRA-MATIC DRIVE

"Dual-Range" four speed automatic transmission and fluid coupling.

►*NOISE IN LIGHT THROTTLE REVERSE OPERATION CORRECTION: See "Hydra-Matic Drive" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles. Drain & Refill every 25,000 miles. Use only GM Hydra-Matic Drive Fluid.

Checking Fluid Level—Set hand brake, let engine idle and move selector lever to "Lo" position. Raise engine Raise engine hood and remove dipstick located at right rear side of engine, wipe dry. With engine idling, replace dipstick, and remove quickly to check fluid level. Add GM Hydra-Matic Drive Fluid to bring level to "FULL" mark.

►*CAUTION—DO NOT FILL ABOVE "FULL" MARK.*

Hydra-Matic Indicator: Lights on instrument panel indicate position of Hydra-Matic selector lever. Unit consists of three coils in sealed unit operating five lights on instrument panel. Coils are energized by by movement of Hydra-Matic Neutral Safety and Indicator Switch which is connected to Hydra-Matic linkage.

Checking Indicator Unit—Disconnect all three leads from unit. Connect jumper wire from hot side of ignition switch to #1 terminal on unit; "N" should light. Connected to #2 terminal; "S" should light. Connected to to #3 terminal; "R" should light. If indicator does not indicate correctly, replace unit.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics. Roller bearing type.

►*CAUTION*—Rear universal companion flange nut controls rear axle pinion bearing pre-load (must be adjusted whenever nut loosened) *See "Oldsmobile Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Hypoid gear, semi-floating with Hotchkiss drive. *See "Oldsmobile Hypoid" in Rear Axle Section.*

Axle Ratios

Ratio	①Code
3.07-1 (40:13)	0
3.9-1 (39:10)	4
3.64-1 (40:11)	6
3.42-1 (41:12)	8
3.23-1 (42:13)	9

①—Rear axle ratio code number stamped on lower locating boss on forward side of carrier.

Backlash—.004-.006". Screw adjustment.

Axle Shaft Removal: Remove wheel and take off brake drum by removing two Tinnerman nuts from wheel studs (if nuts removed by turning off threads they can be reused, if nuts damaged, new nuts must be used). Remove backing plate mounting nuts and static collector. Loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with Puller J-942 (do not allow shaft to drag on oil seal), replace one nut to hold backing plate in position.

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Differential Carrier Assembly Removal: Remove axle shafts (see above). Clean differential carrier and axle housing around carrier to prevent dirt entering housing. Disconnect propeller shaft at rear universal joint after having wired trunnion blocks together to avoid loss of rollers. Mark universal joint so it can be replaced in the same position. Drain oil by removing nuts from carrier mounting studs and moving carrier away from housing.

CAUTION– Do not wash exterior of carrier until differential has been disassembled.

Wheel Bearing Adjustment: None required. Bearings are built with .012-.015" endplay between balls. Check endplay before removing axle shaft and if endplay greater than .020", replace bearings. *CAUTION–* If bearings removed from shaft, they cannot be reused.

SHOCK ABSORBERS

Delco. Double Acting used on front. **Direct Acting** used on rear.

Front Shock Absorbers ①

Model	Right	Left
1953 Series 88	5518436	5518437
1953 Series 98②	5513733	5513734
1953 Series 98 Hol. Cpe.	5519053	5519054
1953 Series 98 Fiesta	5513987	5513988
1954 Series 88③	5511190	5511191
1954 Series 98	5513733	5513734

①—Oldsmobile Part Numbers.
②—Except Holiday Coupe & Fiesta.
③—Except Air Conditioned Cars.

Rear Shock Absorbers

Model	Oldsmobile Part No.
1953 Series 88 (Exc. Conv)	5518438
1953 Super 88 Conv.	5518439
1953 Series 98 (Exc. Conv. &.Air. Cond.)	5518439
1953 Series 98 Conv. (Exc. Fiesta)	5325689
1953 Series 98 Fiesta (Early)	5383754
1953 Series 98 Fiesta (Late)	5325689
1953 Series 98 (with Air Cond.)	5518438
1954 Series 88	5511192
1954 Series 98 (Exc. Conv.)	5519693

►*SHOCK ABSORBER LUBRICATION NOTE–*(Front) Check fluid level every 10,000 miles and replenish with Delco Shock Absorber Fluid. (Rear) Not serviced.

FRONT SUSPENSION

Independent. Double acting shock absorber directly connected to steering knuckle support and forms upper control arm.
See "Oldsmobile" in Front Suspension Section.

►*STEERING TIE-ROD STRIKING OIL PAN CORRECTION:* To prevent tie-rod from striking oil pan on extreme turns, place a 7/16" flat washer under head of wheel stop bolt on steering knuckle support so that stop bolt protrudes a minimum of 1". If this does not provide at least 1/8" clearance between tie-rod and pan, reform the pan slightly as necessary. *CAUTION– Be very careful not to puncture oil pan.*

Kingpin Inclination–4°55'13" (1953); 5°51'10" (1954).

Caster– 0° to Neg. ¾°. Variation between both sides should not exceed ½°.

Camber–Neg. ¾° to Pos. ¾°. Variation between both sides should not exceed ½°.

Toe-In–1/16" to 1/8".
Toe-Out on Turns–23°±½°-on-inner-wheel-with-outer wheel turned 20°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm & nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder.
See "Saginaw (GM) Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

►*1954 PARKING BRAKE CABLE PRODUCTION CHANGE & ADJUSTMENT CAUTION:* Early 1954 type parking brake rear cables are longer, and front cables are shorter. It is necessary when adjusting the first types that threaded part of rear cables do not protrude into clevis more than ¾". Front cable threaded part should be installed all the way through the clevis. Later type cables have been adjusted for length and do not require the above precautions.

►*1953 POWER BRAKE SOLENOID CHECK VALVE ADJUSTMENT:* This solenoid valve used to conserve the reserve tank vacuum supply is controlled by the brake pedal (consolidated with stop light switch) and requires adjustment. *See "Bendix Power Unit" in Brake Section.*

Bendix Hydraulic (Single Anchor). Conventional two shoe with short molded lining front (Primary), and long molded lining rear (Secondary). Parking brake applies rear wheel service brakes.
See "Bendix Hydraulic" in Brake Section.
Drums–Diameter 11". Rebore limits .060".

Wheel Cylinder Diameter–Front 1 1/32" (1953-54); Rear 15/16" (1953), 31/32" (1954).
Lining–Molded. **Width**–2½" (front wheels). 2" (rear wheels). **Thickness**–3/16" (1953); 7/32" (1954).
Braking Power–**(1953)**–58% (front), 42% (rear). **(1954)** –56% (front), 44% (rear).

Clearance–Heavy drag and back off 16 notches.

Standard Master Cylinder: On left chassis frame front extension under hood.

Checking Fluid–Fluid reservoir is part of master cylinder. Maintain fluid level to top of reservoir.
Removal–Remove from above. Not necessary to disturb other parts.

Power Brakes: Bendix Vacuum Power Unit (combination vacuum power unit and hydraulic master cylinder). Unit mounted on underside of toe-board and replaces regular master cylinder.
See "Bendix Power Unit" in Brake Section.
Checking Fluid–Same as for standard master cylinder.

Removal of Power Unit–Disconnect hydraulic line at master cylinder and secure hose so that end is above level of junction assembly. Disconnect vacuum hoses hoses at power cylinder, and remove dipstick. Disconnect leads from stop light switch and fold back floor mat. Remove three brake pedal bracket attaching bolts and remove pedal and bracket. Remove mast jacket grommet retainer and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws, cover plate and power cylinder assembly. Remove two cover plate-to-power cylinder bolts and remove cover plate.

MISC. MECHANICAL

Windshield Wipers: Cable operated Vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Frigidaire type with solenoid controlled compressor clutch (compressor) operates only with air-conditioning switch turned on. *See "Frigidaire Air-Conditioning" in Miscellaneous Section.*

Window Regulators: Two systems used:
(1) Electric–Reversible motor in each window.
(2) Hydro-Lectric–Window raised hydraulically, lowered by return spring. *See Miscellaneous Section for types and Model application.*

Power Top Control: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Two systems used:
(1) Electric–Individual reversible motor for vertical and horizontal adjustment.
(2) Hydro-Lectric–Individual cylinder for vertical and horizontal adjustment. *See Miscellaneous Section for types and Model application.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBERS: On left body pillar post.
Starting Serial Number–1001.

►*SERIAL NUMBER NOTE: Complete serial number (example 557M 1001) includes following identification data in sequence.*

Year	Series①	Assy. Plant②	Serial No.
55	7	M	1001

①–Series Designation: 7(88 Series), 8(Super 88 Series), 9 (98 Series).

②–See Assembly Plant Designation following.

Assembly Plant Designation

M–Lansing	L–Linden
A–Atlanta	C–South Gate
B–Framingham	W–Wilmington
K–Kansas City	T–Arlington

ENGINE NUMBER: Stamped on machined pad located on top of left hand cylinder bank of block. The number can be observed between the front and center exhaust manifold ports.
Starting Engine Number–V400001.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs., minimum at cranking speed. Reading on low cylinders should not be less than 80% of high cylinder.

VACUUM READING: Steady 17" minimum at idling speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic coil type located on left side between exhaust manifold and exhaust pipe. Stop spring should strike stop before counter-weight touches pin to prevent valve rattle when cold.

IGNITION

►*IGNITION SECONDARY WIRING NOTE: Resistance type wires used. Center conductor is graphite impregnated nylon making it necessary to use only pre-cut assemblies for replacement. Distributor rotor does not have a resistance unit.*

FIRING ORDER: 1-8-7-3-6-5-4-2.
Cylinders–RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .030".
Spark Plugs–AC No.44-5.14mm. Torque to 23-28 ft. lbs.

COIL: Delco-Remy 1115082. *12 Volt.*
Ignition Current–2.0 amperes idling. 4.5 stopped.
Resistor–Delco-Remy 1928016. On bracket adjacent to ignition coil.

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110850.
Condenser–Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set–Delco-Remy 1918148.
Breaker Gap–.016" (.012-.0175").
Cam Angle–26-33° (with .016" gap).

►*BREAKER GAP CAUTION:* Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set gap.
Breaker Arm Spring Tension–19-23 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
7.5-9.5	1000	15-19	2000
11-13	1450	22-26	2900
13-15	1725	26-30	3450

Vacuum Spark Control: Delco-Remy 1116059.
Plunger Travel–7/32-15/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4.5-6-5
10	20	16-17

►*DISTRIBUTOR INSTALLATION CAUTION:* Before installing distributor, make certain that crankshaft is turned to No. 1 firing position (see Ignition Timing following). Install distributor with flat on distributor gear in line with flat on oil pump shaft, push distributor down just enough to engage gear with shaft but do not push distributor all the way down. Turn rotor so that it is in line with No. 8 terminal in distributor cap (in line with breaker terminal on housing), push distributor all the way down. *NOTE*–Rotor will turn to No. 1 spark plug terminal position as gears are meshed. Install and tighten distributor hold-down clamp.

IGNITION TIMING

Setting–5° BTDC, with engine idling at 850 RPM and vacuum line to distributor disconnected and carburetor opening taped closed.

►*DETONATION CAUTION: If engine detonates (due to low octane fuel or carbon build-up) set timing to 2½° BTDC. For high altitude operation, timing can be adjusted to 7½° BTDC, if detonation does not occur.*
Timing Mark–Slot in rim of crankshaft pulley and pointer on front cover. Leading edge of slot is 5° BTDC. Trailing edge is TDC. Midway between these points is 2½° BTDC.

CARBURETOR

►*CARBURETOR APPLICATION: Rochester 2GC 2-Barrel used on 88 Series, Carter WCFB or Rochester 4GC 4-Barrel used on Super 88 & 98 Series.*

►*IDLE ADJUSTMENT NOTE:* A new "Split Throttle" lever permits idle speed adjustment after Hydra-Matic Throttle Linkage adjustment made (without affecting that adjustment).

►*AIR-CONDITIONED CAR IDLE ADJUSTMENT CAUTION: For Summer operation, set idle speed with Air Conditioner turned "ON". For Winter operation, set idle speed with Air Conditioner turned "OFF".*

THROTTLE LINKAGE ADJUSTMENT (2 & 4-BARREL CARBURETORS): 1) Remove throttle rod from transmission throttle lever and move throttle lever to rear against its stop, and with Throttle Lever Gauge J-5605 placed flat against rear face of transmission case, rod on gauge should just enter hole in throttle lever. The distance from rear face of transmission case to hole in throttle lever should be 6¾". Adjust by bending lever with tool J-2029. Attach throttle rod to transmission lever.

►*THROTTLE LEVER PRODUCTION CHANGE (Requiring the reworking of Throttle Lever Bending Tool J-2029):* The present forged type throttle and manual levers on transmission are being replaced with pressed steel levers. The new pressed steel manual lever can be used for 1954 & 1955 models. The new pressed steel throttle lever can be used only on 1955 models after transmission Serial No. R55-76159.

►*THROTTLE LEVER BENDING TOOL REWORK (For use with Later Type Pressed Steel Levers):* With movable lever of tool held upward, grind off 1/8" from lower side of top support pin (flush with side of tool).
2) Apply hand brake and allow engine to warm up. Place throttle lever in "Dr" position and adjust engine idle speed to 400 RPM. Turn engine off. Disconnect upper throttle rod from engine bell crank. Check clearance between end of intermediate throttle rod assembly and dash. This distance should be 5/16" to 3/8" with carburetor on slow idle. Adjust intermediate throttle rod assembly as necessary to obtain specified clearance (NOTE–on 4-Barrel carburetors, open side of rod should face away from center of engine, and toward center of engine on 2-Barrel carburetors).
3) Loosen jam nut and remove pin from lower throttle rod at throttle bellcrank, and with bellcrank against its stop and intermediate throttle rod against its stop, the clevis pin should enter holes in clevis of lower throttle rod and hole in throttle bellcrank freely. Adjust clevis on end of lower throttle rod so pin enters hole freely. *CAUTION–Do not shorten or lengthen rod after this setting obtained.*
4) With upper throttle rod assembly held rearward with light pressure to remove lash, the clevis pin should just touch gauge point on throttle bellcrank (gauge point is curved projection above clevis pin hole in bellcrank). Adjust by rotating clevis so clevis pin just touches, or is within ½ turn short of gauge point. Replace clevis pin and tighten jam nut.
5) Hold choke completely open and move upper throttle rod assembly forward until throttle is wide open. Continue pushing upper throttle rod until transmission throttle lever just stops at its forward position (repeat this operation several times until the exact forward position is distinctly felt). Do not force linkage beyond this point. With linkage in this position there should be zero clearance between throttle bellcrank stopscrew and downshift lever. With linkage held forward as outlined, loosen locknut on setscrew and adjust setscrew until it just contacts downshift lever. Release lever and tighten jam nut.
6) Place a wood block 3 7/8" long on top center of floor mat retainer and bring bottom of accelerator pedal down to rest on block. With carburetor in slow idle position (choke completely off) pedal should just touch gauge block. If necessary adjust accelerator position by disconnecting accelerator pedal rod from accelerator bellcrank on dash, and adjust accelerator pedal rod so that clevis just slides over pin with wood block in position and carburetor on slow idle. Reassemble rod, making sure open side of rod end is facing away from center of engine. Remove wood block.

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ROCHESTER 2GC

Rochester No. 7006970 (Synchro-mesh & Hydra-Matic).

►*MANIFOLD FUEL DISTRIBUTION:* Carburetor RIGHT barrel feeds Cyl. 1-4-6-7, LEFT barrel 2-3-5-8.

Idle Setting—Initial setting for both screws 1½ turns open. With engine at operating temperature, turn each adjusting screw in or out for smoothest possible idle (highest vacuum and RPM), then turn each screw out (rich) ¼ turn. *NOTE*—If engine rolls from richness when throttle snapped closed, turn each screw in 1/8 turn.

Idle Speed—(Synchro-mesh)—425 RPM. (Hydra-Matic)—400 RPM, with selector lever in "Dr" range. *For "Idle Speed Setting" on Air Conditioned Cars, see "Carburetor" above.*

Float Level—1 9/32" from air-horn gasket to top of float with assembly inverted. Use Gauge J-5917 so it rests against power piston shaft with outer leg in line with center of float. Adjust by bending float arm between pivot and float.

Float Drop—1 29/32" between air-horn gasket and lowest point on bottom of float. Adjust by bending float tang toward float needle seat to lessen drop and away from seat to increase drop.

Fast Idle: 1400-1500 RPM with fast idle screw on high step of fast idle cam. Adjust screw as necessary to obtain the correct engine RPM.

Automatic Choke Setting: Centered (at index).

►*OTHER DATA: See "Rochester 2GC Carburetor" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 4-5 lbs. (16" above outlet at 1800 RPM).

CARTER WCFB

Carter No. 2246S. Downdraft type with automatic choke.

►*MANIFOLD FUEL DISTRIBUTION:* Carburetor RIGHT barrels feed Cyl. 1-4-6-7, LEFT barrels 2-3-5-8.

Idle Setting—With engine at operating temperature, set idle speed (see below), turn each screw in or out for smoothest possible idle (highest vacuum and RPM), then turn each screw out (rich) ¼ turn. NOTE—If engine rolls from richness when throttle snapped closed, turn each screw in (lean) 1/8 turn.

Idle Speed—(Synchro-mesh) 425 RPM, (Hydra-Matic) 400 RPM with selector lever in either "Dr" position. *For "Idle Speed Setting" on Air Conditioned Cars, see "Carburetor" above.*

►*OTHER DATA: See "Carter WCFB Carburetor" in in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 4-5 lbs. (16" above outlet at 1800 RPM).

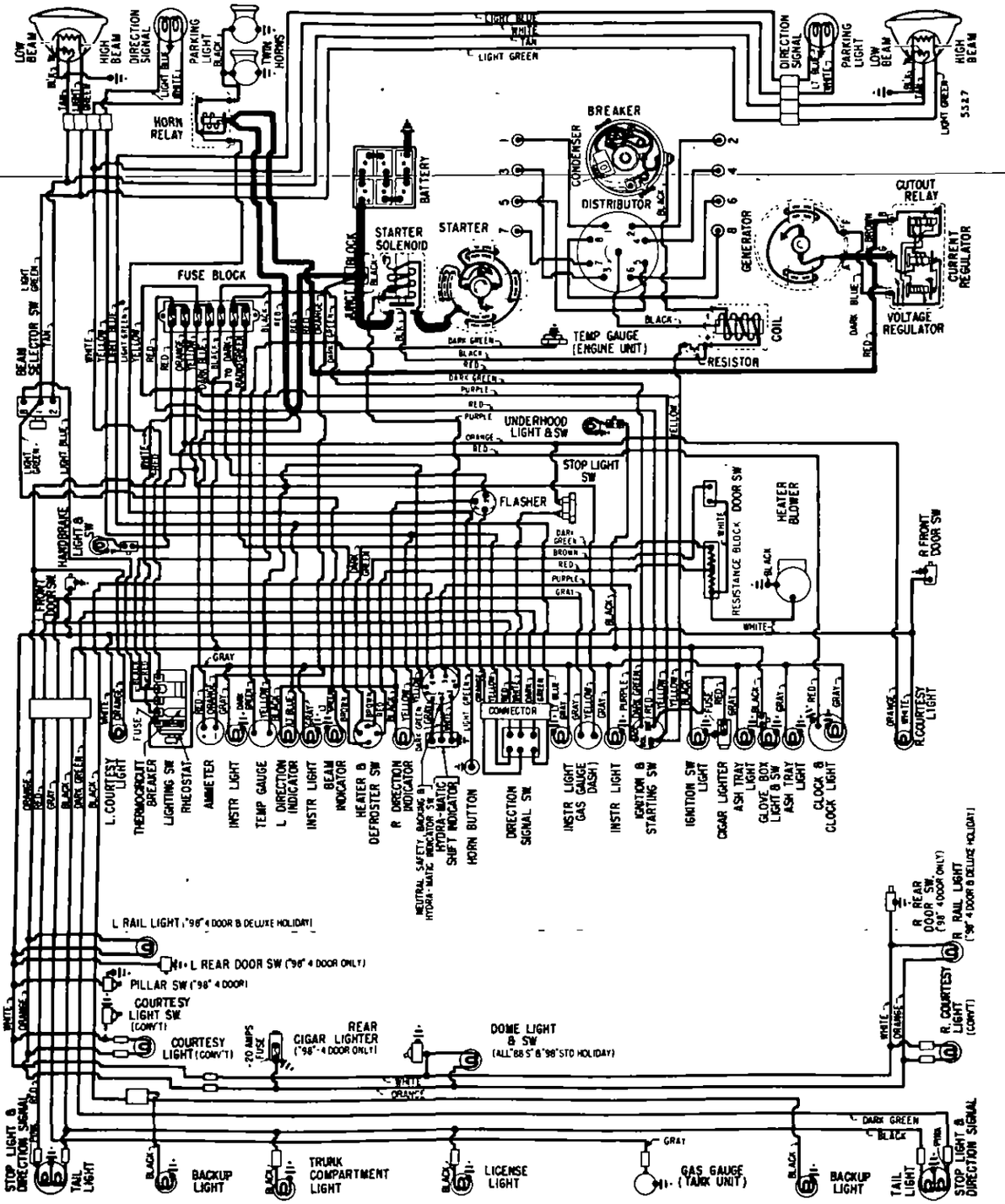
ROCHESTER 4GC

Rochester No. 7006000 (Synchro-mesh Cars), 7007000 (Hydra-Matic Drive Cars).

►*MANIFOLD FUEL DISTRIBUTION:* Carburetor RIGHT barrels feed Cyl. 1-4-6-7, LEFT barrels 2-3-5-8.

Idle Setting—With engine at operating temperature, set idle speed (see below), turn each screw in or out for smoothest possible idle (highest vacuum and RPM),

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then turn each screw out (rich) ¼ turn. *NOTE*–If engine rolls from richness when throttle snapped closed, turn each screw in (lean) 1/8 turn.

Idle Speed–(Synchro-mesh) 425 RPM, (Hydra-Matic) 400 RPM with selector lever in either "Dr" range. *For "Idle Speed Setting" on Air Conditioned Cars, see "Carburetor" above.*

▷*OTHER DATA: See "Rochester 4GC Carburetor" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 4-5 lbs. (16" above outlet at 1800 RPM).

CARB. EQUIPMENT

Fuel Pump: AC Replacement No. 4148. Fuel & Vacuum. **Pressure**–4-5 lbs. at 16" above outlet at 1800 RPM. *See "Fuel Pumps" in Carburetion Equipment Section.*

Gasoline Gauge: AC Electric Type. *NOTE–Gasoline Gauge tank outlet tube is part of gauge tank unit and is equipped with a saran filter.*

Dash Unit–AC No. 1517999.

Tank Unit–AC No. 1518134.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco 3KM60. *12 volt,* 9 plate, 60 ampere hour capacity (20 hr. rate).

Battery Ground–Negative.

Engine Ground–Connected between engine and forward side of firewall.

STARTER

Delco-Remy 1107623. *12 Volt.* **Armature–1927343.**

Drive–Overrunning clutch (solenoid pinion shift).

Rotation–Counter-clockwise at commutator end.

Brush Spring Tension–30-40 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
11 ft. lbs.	Lock	5.2	460

Starting Switch: Delco-Remy Solenoid 1119761 (no relay used) mounted on starter and controlled by combination Starter & Ignition Switch and Neutral Safety Switch. *NOTE–A Neutral Safety Switch is used on all models.*

See "Starter Controls" in Electrical Equipment Section.

▷*NEUTRAL SAFETY SWITCH REPLACEMENT CAUTION:* When replacing Neutral Safety Switch, Part No. 1998026 on 1955 model cars make sure that the replacement switch terminals are in the same location as the switch being replaced. The plastic plug used in 1955 carries the switch leads and is designed to fit the second type switch only. *NOTE*–The first type switch can be used providing the leads are removed from the plug and connected individually to the switch.

Synchro-Mesh Neutral Safety Switch: Delco-Remy 1998031 (Without Air Conditioning), Delco-Remy 1998094 (With Air Conditioning). Switch is controlled by transmission shift linkage, and allows starter to be operated only when transmission gear shift lever in "Neutral" position.

Adjustment–Place transmission in 2nd gear and adjust the Neutral Safety Switch so there is 1/16" clearance between switch arm and stop. Check to see that engine will not start with gearshift lever in any position except neutral.

Hydra-Matic Neutral Safety Switch: Delco-Remy 1998026 (Without Air Conditioning), Delco-Remy 1998093 (With Air Conditioning). Combination Neutral Safety Switch, Back-up Light Switch, and Hydra-Matic Indicator Switch.

Adjustment–*See "Hydra-Matic Drive" in Transmission Section.*

Hydra-Matic Indicator Switch: *See "Hydra-Matic Transmission" following for description of indicator unit.*

GENERATOR

Delco-Remy 1102003 (Std.), 1102021 (Air-Conditioned Cars). *12 Volt.*

Armature–Delco-Remy 1923535 (All Models).

Maximum Charging Rate–*See Voltage Regulator.*

Performance Data–Cold

Amperes	Volts	RPM
30①	14	2150

①–Not maximum. See Regulator.

Brush Spring Tension–24-32 ozs.

Field Current–1.48-1.62 amps at 12 volts.

Rotation–Counter-clockwise at commutator end.

Bolt Adjustment: Loosen generator attaching bolt and place Tool J-4170 against generator between bracket and generator housing. Attach torque wrench to tool to apply torque of 16 ft. lbs. Tighten generator attaching bolts while holding tension on wrench.

REGULATOR

Delco-Remy 1118826. *12 Volt. NOTE–Regulators are "1118825 Series". Specifications below are "Normal" settings.*

Cutout Relay

Cuts In–12.8 volts (hot).

Contact Gap–.020".

Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–14.5 volts (hot).

Air Gap–.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–30 amperes (hot).

Air Gap–.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Autronic Eye: See "Autronic Eye" in Electrical Equipment Section.

▷*AUTRONIC EYE PRODUCTION CHANGE: See "Autronic Eye" in Electrical Equipment Section.*

Direction Signal: *See Electrical Equipment Section.*

Lighting Switch Removal: Disconnect battery cable and disconnect wires from lighting switch. Pull switch knob out to last notch then depress spring loaded latch button on switch body while pulling rod and knob assembly out of switch. Remove switch mounting nut and remove switch and escutcheon from instrument panel.

Stop Light Switch Location (Std. Brakes): Mechanical type on toe board near brake pedal.

Stop Light Switch Location (Power Brakes): Directly above brake pedal on firewall. Adjust so lights come on within free travel of brake pedal.

FUSES: All fuses (exc. Instrument Panel fuses) are located on a combination fuse and junction block under the instrument panel. A color code is used on the fuse panel corresponding to the color code of circuits protected by each fuse. The following fuses will be found on this panel:

(1) Clock (Std. on 98 Series only). 1 ampere.
(2) Courtesy Lights, Dome & Stop Lights, and Rear Cigar Lighter. 25 amperes.
(3) Fuel & Temp. Gauges, Hand Brake Signal Light, Hydra-Matic Shift Indicator, and Back-up Lights. 9 amperes.
(4) Turn Signal. 9 amperes.
(5) Glove Box, Underhood, Keyhole, Tail, Trunk, & Spot Lights. 9 amperes.
(6) Radio. 7.5 amperes.
(7) Heater & Air Conditioner. 20 amperes (without Air Conditioner), 25 amperes (with Air Conditioner).
(8) Electric Windows & Antenna. 20 amperes.
Instrument Panel Lights–2 amperes located on headlight switch.
Cigar Lighter–20 amperes located behind lighter.

CIRCUIT BREAKER: 22 amps. Located in headlamp switch.

HORNS: Delco-Remy 1999753 (Low Note). **1999754** (High Note). *12 Volt.*

Horn Relay: Delco-Remy 1116781. *12 Volt.*

Contacts Close–2.75-4.0 volts.

Contact Gap–.025". **Air Gap**–.015" (closed).

ENGINE

▷*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 with overhead valves.

Bore	Stroke	Displacement	Rated HP
3 7/8"	3 7/16"	324 cu. ins.	48

Engine	Compr. Ratio	Developed HP
Deluxe 88	8.5-1	185 at 4000 RPM
Super 88 & 98	8.5-1	202 at 4000 RPM

Compression & Vacuum Reading–*See Tune-Up.*

CYLINDER HEAD: *See Oldsmobile Special Data.*

INTAKE MANIFOLD INSTALLATION: *See "Cylinder Head & Manifolds" in Oldsmobile Special Data.*

TIGHTENING TORQUES: See *Oldsmobile Special Data.*

OIL PAN REMOVAL: *See Oldsmobile Special Data.*

ENGINE FRONT MOUNT INSTALLATION: *See Oldsmobile Special Data.*

PISTONS

Aluminum alloy, three ring, autothermic, steel strut, slipper skirt, cam ground, tin plated.

Length–4 1/32". **Weight**–21.7 ozs. (less rings & pin).

Removal–Pistons and rods removed from above.

▷*CAUTION:* Mark pistons, rods, and bearing caps with cylinder number before removal to insure correct reinstallation.

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Fitting New Pistons: .0005-.0010" skirt clearance measured 1/8" from bottom of skirt with piston pin removed. Use a .0015" x 1/2" x 12" feeler between piston (pin removed) and cylinder wall at right angles to pin. Pull to withdraw feeler should be 5-12 lbs.

►*CAUTION: Allow rebored cylinders to cool to normal room temperature before fitting pistons.*

Replacement Pistons: Standard & .020", .030" Oversize. Pistons furnished only with fitted pins.

Installing Pistons: Mark "F" cast on each side of piston pin hole on front side of piston. Install pistons 1, 3, 5, 7 in left bank, 2, 4, 6, 8 in right bank with letter "F" toward front on all pistons.

PISTON PINS

Floating type with lock rings at each end.

►*CAUTION: Discard old lock rings and install new service type lock rings when installing pins.*

Diameter—.9803-.9807". **Length**—3 9/64".

Clearance in Piston—.0000-.0002" loose.

Pin Fit in Piston—Pin should not fall through piston of own weight when using the low limit (.0000" fit). Piston pin can be tapped in place using a brass drift.

Pin Fit in Rod Bushing—.0003-.0005" loose.

Replacement Pins: Standard size, and .001", .003" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1 & 2)	.077-.078"	Ⓒ	.001-.003"
Oil (#3)	1.860-1.865"	Ⓒ	.0018-.0033"

Ⓒ—Perfect Circle .010-.020". Sealed Power .008-.016".

Replacement Rings: Standard size, .020"; .030" Oversize.

Installing Rings: Compression rings with step on inner edge UP. Oil rings marked TOP, installed with mark up.

CONNECTING RODS

Length—6 5/8" (Center to center). **Weight**—29.54 ozs.
Crankpin Journal Diameter—2.2488-2.2498".
Out of Round Limit—.0015".

Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.
Clearance—.0009-.0029".

Sideplay—.002-.011" (total for both rods).

Replacement Bearings: Standard size, .002", .010", .020" Undersize.

Installing Rods: *CAUTION*—Rods have plain side and boss side (two machined bosses at lower end). Install rods **1, 3, 5, 7 with plain side to front, and 2, 4, 6, 8 with boss side to front** (*NOTE*—Pistons marked "F" on front side). Caps offset and cannot be installed incorrectly. Groove on rod and cap, and pads for numbering caps and rods are on same side.

►*CAUTION—Use Guide tool BT-22 over rod bolts to prevent damaging crankpin journals when removing and installing piston and rod assemblies.*

NOTE—Oil spit hole for lubrication of opposite cylinder wall provided in rod above cap joint.

CRANKSHAFT

Journal Diameter—#1, 2, 3, 4 2.498-2.499"; #5 2.623-2.624".

Bearings—Durex 100A, steel backed, full precision type. Rear bearing flanged.

Clearance—.0005-.002" (Front—See Note below), .002-.0035" (Rear - See Note below), .0005-.003" (Others).

►*FRONT MAIN BEARING NOTE: Selective fit bearing used. On cars with Power Steering or Air Conditioning* **it is very important that front bearing fit be held as close as possible because of the increased pump drive and compressor drive belt load.** Bearing Part No. 565770 (Marked "M" on tang) will reduce bearing clearance .0005". Bearing Part No. 564771 (marked *"H" on tang) will reduce bearing clearance .001".* These bearings are in addition to regular replacement bearings.

►*REAR BEARING NOTE:* Rear bearings are selective fit during manufacture, 3 sizes used: "M" Medium, "T" Thin, "H" heavy. **Use same size bearing (indicated by letter on tang) when replacing bearing.**

Replacement Bearings: Standard size, .002", .010", .020" Undersize. In addition to lettered bearings used at front and rear. *See Front & Rear Bearing Notes above.*

End Thrust: Taken by rear (#5) flanged bearing.

Endplay—.004-.008"

Crankshaft Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Oldsmobile Special Data.*

Flywheel & Clutch Housing Alignment: *See "Flywheel Housing" in Oldsmobile Special Data.*

CAMSHAFT

Journal Diameters—1.8724-1.8729".
Bearings—Steel backed babbitt.
Clearance—.0014-.0036".

End Thrust: Forward thrust taken by plunger and spring on front of engine, rear thrust at front of cylinder block.

►*CAUTION:* Two main oil gallery holes in block sealed by hex head bolt. A small hole in bolt for right hand gallery provides lubrication to timing chain, fuel pump eccentric and lever.

Camshaft Removal & Installation: *See "Camshaft" in Oldsmobile Special Data.*

Timing Chain:	Link-Belt (Std.)	Morse (Optl.)
Width	.27/32"	7/8"
Pitch	.500"	.375"
Length (Links)	48	C4

►*NOTE—Morse and Link-Belt chains not interchangeable unless sprockets also changed.*

Engine Front Cover Removal & Installation: *See "Engine Front Cover" in Oldsmobile Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Oldsmobile Special Data.*

Camshaft Setting: Mesh chain with sprocket marks adjacent and in line with a straight edge across shaft centers (or use Tool BT-11).

►*NOTE—Fuel pump eccentric bolted to front of camshaft ahead of sprocket. Assemble with "0" mark to front, machined step against sprocket.*

VALVES

►*INTAKE & EXHAUST VALVE AND SEAL PRODUCTION CHANGE: New valves used in production and for service replacement do not have the oil seal grooves, and valve stem is relieved below the head and at end of stem. A "Top Hat" type oil seal is used with this valve.*

Tappet Clearance: None in service (hydraulic).

Valve	Head Diam.	Stem Diam.	Length
Intake	1¾"	.3417-.3425"	4.965-4.985"
Exhaust	1.432-1.442"	.3930-.3938"	4.989-5.009"

Valve	Angle	Lift	Clearance
Intake	45°	.403"	.0022-.0040"
Exhaust	45°	.403"	.0027-.0045"

Valve Seat Width—.042-.071" (Intake), .070-.098" (Exhaust).

Intake & Exhaust Valve Stem Seals: First type seals are "O" ring type installed in second groove of valve. Later type valves (see Production Change Above) are a "Top Hat" type seal installed above valve spring. *NOTE*—"Top Hat" type seals can be used as service replacement on all 1953 and later engines.

Valve Springs: Intake and exhaust valve springs are alike. Dampeners used on lower end of all valve springs.
Valve Spring Free Length—2.33".

Valve Spring Specifications

Valve	Pressure	Length
Closed	85-95 lbs.	1.829"
Open	149-163 lbs.	1.463"

►*CAUTION—Lower end of dampener and spring must seat in recess in head.*

Valve Guides: Intake guides tapered on lower end. Press guides in head until top of guide is 47/64" (.7344") above face of valve spring seat (Tool J-5158 positions guides correctly in head). Ream inside diameter of guide after installation to .3447-.3457 (Intake), .3965-.3975" (Exhaust).

Hydraulic Valve Lifters: Barrel type.

►*HYDRAULIC LIFTER INSTALLATION CAUTION:* FIVE different sizes used in production as follows (marked as indicated): Standard (unmarked), .001" O.S. (marked "1"), .002" O.S. (marked "2"), .003" O.S. (marked "3"), .005" O.S. (marked "5"). **Lifters** marked by etched number on lifter body, **Cylinder Block** marked by number on rail under engine top cover. *Reinstall lifter in same hole or replace with proper size.*

Diameter—.8424-.8427". **Length**—2" (Overall).
Clearance in Block—.0005-.0018" (Selective).

Replacement Lifters: Standard size, .001", .002", .003", .005" Oversize.

Hydraulic Lifter Overhaul & Testing—*See "Valve System" in Oldsmobile Special Data.*

Rocker Arm Assembly: *See "Valve System" in Oldsmobile Special Data.*

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VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 13½° BTDC. Close 50½° ALDC.
Exhaust Valves—Open 49½° BLDC. Close 14½° ATDC.

Valve Timing Check—Remove left hand cylinder head rocker arm assembly and rotate engine so that #1 piston is on top dead center (firing stroke). Trailing edge of notch in vibration dampener will be aligned with pointer on timing chain cover. Install tool J-5374 in place of rear rocker shaft bracket with step plunger over #7 cylinder exhaust push rod. The 7/16" diameter pilot at bottom of tool will fit into cylinder head bolt hole. Screw main body of gauge down so step plunger contacts push rod and small diameter of step plunger is flush with top of main body. Tighten clamp bolt. Rotate engine one complete revolution so that #1 piston is again at TDC (intake stroke). Distributor rotor should now be pointing toward rear of engine. If timing chain is installed properly, top of tool plunger will rise so top of main body of tool is between second and third step. If camshaft is retarded one tooth, the third step will rise above top of main body, and if advanced one tooth, second step will be below main body.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). 6 qts. (dry).
NOTE– 1 qt. additional for dry filter.

Normal Oil Pressure: 35-45 lbs. at 50 MPH.
Pressure Regulator Valve—In pump body. Not adjustable.

Oil Pressure Indicator—AC No. 1508118. Not electrical.

Oil Pump: Gear type. In crankcase at rear end.
Pump Overhaul—*See "Oil Pump" in Oldsmobile Special Data.*

Oil Filter: AC No. PM-90-3 full flow type (optional). On lower right side of crankcase at rear.
Replacement Filter Element—AC No. PF-122.

►*CAUTION*—If filter (or pad cover if filter not used) is replaced, used a new gasket (coat both sides with POB No. 5 Sealer) and tighten bolts to 35-40 ft. lbs. Oil filter or pad mounted externally on lower right side of crankcase at rear. Oil filter is full flow type (all oil from pump delivered to oil filter) requires pad when filter not used to return oil to main oil gallery.

Crankcase Ventilation: Air intake in oil filler cap has oil-wetted cleaner, AC No. 1551091 (Std.), No. 1551509 (Heavy Duty). Outlet is connected to ventilating baffle at rear of block above right bank. Outlet pipe is push fit at ventilator and extends down below right rear corner of engine.

►*NOTE:* Air cleaner also used in lower section of ventilator outlet tube on cars with heavy duty inlet breather in filler cap and oil bath air cleaner.

COOLING

Water Capacity: 20½ qts. (without heater), 21½ qts. (with heater).

Pressure Valve: AC Type RC-1, No. 850549. Radiator Filler Cap (stamped 549/7#).

Thermostat: Oldsmobile No. 563219 (160°). NOTE—use No. 563311 (180°) with permanent type anti-freeze.

Water Pump: Packless, sealed ball bearing type.
See "Oldsmobile" in Water Pump Section.
Pump Removal—Remove fan and fan pulley. Remove six mounting bolts (4 to engine cover, 2 to engine block). Remove pump. *NOTE*—When installing pump, coat one side of pump housing gasket with gasket cement, dip bolts in CP No. 9 Sealer.

Temperature Gauge: *12 Volt.* AC Electric. *CAUTION*—Use only 12 Volt type units which are stamped "12 Volt" on threaded side of block unit below nut hex. Later type 12 volt block units also have a copper colored terminal. 6 volt units have a natural brass terminal.
Dash Unit—AC No. 1512810.
Engine Unit—AC No. 1512078.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long 11CF-11 TI. Single plate dry disc type.
See "Long Clutches" in Clutch Section.
Clutch Disc No.—Oldsmobile No. 565059.
Pedal Adjustment: Pedal free travel 1 1/8-1 3/8". Adjust by turning adjusting nut on clutch connector link at throw-out yoke.

Removal: Remove transmission (see Transmission), remove right and left splash pans, engine breather pipe, and right and left lower flywheel housing bolts. Install Engine Rear Support Tool BT-28, entering pilot supports into lower housing bolt holes. Remove engine rear mount bolts at clutch housing, and remove frame cross member by removing three bolts at each end. Remove clutch housing by removing eight bolts holding housing to flywheel housing. Remove clutch assembly from flywheel.

Clutch Housing Alignment: *See "Flywheel Housing" in Oldsmobile Special Data.*

SYNCHRO-MESH TRANSMISSION

Own. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse) all helical gear type.
See "Oldsmobile Synchro-mesh" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission and disconnect manual control rods and speedometer cable at transmission. Remove clutch return spring and disconnect clutch linkage at yoke connecting link. Detach drive shaft at rear universal joint, and slide shaft from transmission. Remove transmission.

HYDRA-MATIC DRIVE

"**Dual-Range**" four speed automatic transmission and fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles. Drain & Refill every 25,000 miles. Use only GM Hydra-Matic Drive Fluid.

Checking Fluid Level—Set hand brake, let engine idle and move selector lever to "Lo" position. Raise engine Raise engine hood and remove dipstick located at right rear side of engine, wipe dry. With engine idling, replace dipstick, and remove quickly to check fluid level. Add GM Hydra-Matic Drive Fluid to bring level to "FULL" mark.

►*CAUTION—DO NOT FILL ABOVE "FULL" MARK.*

Hydra-Matic Indicator: Lights on instrument panel indicate position of Hydra-Matic selector lever. Unit consists of three coils in sealed unit operating five lights on instrument panel. Coils are energized by by movement of Hydra-Matic Neutral Safety and Indicator Switch which is connected to Hydra-Matic linkage.

Checking Indicator Unit—Disconnect all three leads from unit. Connect jumper wire from hot side of ignition switch to #1 terminal on unit; "N" should light. Connected to #2 terminal; "S" should light. Connected to to #3 terminal; "R" should light. If indicator does not indicate correctly, replace unit.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics. Roller bearing type.

►*PROPELLER SHAFT YOKE LUBRICATION CAUTION:* Remove plug, install fitting and lubricate with hand pressure gun using high melting point, low viscosity lubricant, Oldsmobile Part No. 567196. Remove fitting and replace plug. **Do not use chassis grease at this point.**

►*CAUTION*—Rear universal companion flange nut controls rear axle pinion bearing pre-load (must be adjusted whenever nut loosened) *See "Oldsmobile Hypoid" in Rear Axle Section.*

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REAR AXLE

Own. Hypoid gear, semi-floating with Hotchkiss drive. *See "Oldsmobile Hypoid" in Rear Axle Section.*

►*PINION SHAFT COMPRESSIBLE SPACER PRODUCTION CHANGE: New type spacer not interchangeable with those on previous rear axle assemblies. See "Oldsmobile-Hypoid" in Rear Axle Section.*

Axle Ratios

Ratio	①Code
3.07-1 (40:13)	0
3.9-1 (39:10)	4
3.64-1 (40:11)	6
3.42-1 (41:12)	8
3.23-1 (42:13)	9

①—Rear axle ratio code number stamped on lower locating boss on forward side of carrier.

Backlash—.004-.006". Screw adjustment.

Axle Shaft Removal: Remove wheel and take off brake drum by removing two Tinnerman nuts from wheel studs (if nuts removed by turning off threads they can be reused, if nuts damaged, new nuts must be used). *Remove backing plate mounting nuts and static collector.* Loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with Puller J-942 (do not allow shaft to drag on oil seal), replace one nut to hold backing plate in position.

Differential Carrier Assembly Removal: Remove axle shafts (see above). Clean differential carrier and axle housing around carrier to prevent dirt entering housing. Disconnect propeller shaft at rear universal joint after having wired trunnion blocks together to avoid loss of rollers. Mark universal joint so it can be replaced in the same position. Drain oil by removing nuts from carrier mounting studs and moving carrier away from housing.

CAUTION—Do not wash exterior of carrier until differential has been disassembled.

Wheel Bearing Adjustment: None required. Bearings are built with .012-.015" endplay between balls. Check endplay before removing axle shaft and if endplay greater than .020", replace bearings. *CAUTION*—If bearings removed from shaft, they cannot be reused.

SHOCK ABSORBERS

Delco. Double Acting used on front. **Direct Acting** used on rear.

Front Shock Absorbers

Model	Right	Delco No.	Left
88 & Super 88①	5511190		5511191
98	5513733		5513734

①—Except Air-Conditioned Cars.

Rear Shock Absorbers

Model	Right	Delco No.	Left
88 & Super 88	5511192		5511192
98	5519693		5519693

►*SHOCK ABSORBER LUBRICATION NOTE*—(Front) Check fluid level every 10,000 miles and replenish with Delco Shock Absorber Fluid. (Rear) Not serviced.

FRONT SUSPENSION

Independent. Double acting shock absorber directly connected to steering knuckle support and forms upper control arm.
See "Oldsmobile" in Front Suspension Section.

►*STEERING TIE-ROD STRIKING OIL PAN CORRECTION:* To prevent tie-rod from striking oil pan on extreme turns, place a 7/16" flat washer under head of wheel stop bolt on steering knuckle support so that stop bolt protrudes a minimum of 1". If this does not provide at least 1/8" clearance between tie-rod and pan, reform the pan slightly as necessary. *CAUTION—Be very careful not to puncture oil pan.*

Kingpin Inclination—5° 51' 10" crosswise.
Caster— 0° to Neg. ¾°. Variation between both sides should not exceed ½°.
Camber—Neg. ¾° to Pos. ¾°. Variation between both sides should not exceed ½°.
Toe-In—1/16" to 1/8".
Toe-Out on Turns—23°±½° on inner wheel with outer wheel turned 20°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm & nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic power cylinder.
See "Saginaw (GM) Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic (Single Anchor). Conventional two shoe with short molded lining front (Primary), and long molded lining rear (Secondary). Parking brake applies rear wheel service brakes.
See "Bendix Hydraulic" in Brake Section.

►*BRAKE ASSEMBLY PRODUCTION CHANGE:* Beginning May 15, the brake assembly has been revised to include a larger retracting spring and parking lever assembly. *See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.*
Drums—Diameter 11". Rebore limits .060".

Wheel Cylinder Diameter—Front 1 1/32". Rear 31/32".
Lining—Molded. **Width**—2½" (front wheels), 2" (rear wheels). **Thickness**—7/32".

Length—(Primary)—9-3/8", (Secondary)-12-1/32".

Clearance—Adjusting screw backed off 16 notches from point where wheels can just be turned by hand.

Braking Power—56% Front. 44% Rear.

Standard Master Cylinder: On left chassis frame front extension under hood.

Checking Fluid—Fluid reservoir is part of master cylinder. Maintain fluid level to top of reservoir.

Removal—Remove from above. Not necessary to disturb other parts.

Power Brakes: Bendix or Moraine Power Unit (combination vacuum power unit and hydraulic master cylinder). Unit is mounted on under side of toe board and replaces regular master cylinder. *See "Bendix Power Unit" or "Moraine Power Unit" in Brake Section.*

Checking Fluid—Same as for standard master cylinder.

Removal of Power Unit—Disconnect hydraulic line at master cylinder and secure hose so that end is above level of junction assembly. Disconnect vacuum hoses hoses at power cylinder, and remove dipstick. Disconnect leads from stop light switch and fold back floor mat. Remove three brake pedal bracket attaching bolts and remove pedal and bracket. Remove mast jacket grommet retainer and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws, cover plate and power cylinder assembly. Remove two cover plate-to-power cylinder bolts and remove cover plate.

MISC. MECHANICAL

Windshield Wipers: Cable operated Vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: *See "Oldsmobile Air Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electric type with individual motors in each window.

See "Power Window Regulators" in Miscellaneous Section.

Power Top Control: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric type with separate reversible motors for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-48 MODELS

	Ft. Lbs.	In. Lbs.
Spark Plugs (10 MM. Type)	4	50 Max.
Cylinder Head	60-62	720-744
Main Bearing Caps	90-95	1080-1140
Connecting Rod Caps	60-65	720-780
Connecting Rod Palnuts		1/3 turn tight
Flywheel to Crankshaft	65-70	780-840
Intake & Exhaust Manifold	25-30	300-360
Timing Chain Cover	11-14	132-168
Oil Pan Drain Plug	20-25	240-300
Oil Pan to Crankcase	9-11	108-132

1949-54 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Stud Nuts	60-62	720-744
Main Bearing Capscrews	90-95	1080-1680
Connecting Rod Nuts (7/16)	60-65	720-780
Connecting Rod Nuts (3/8)	45-46	540-552
Camshaft Sprocket Nut	140-160	1680-1920
Timing Chain Cover	15-18	180-216
Intake & Exhaust Manifold	25-30	300-360
Vibration Dampener Screw	130-150	1560-1800
Flywheel to Crankshaft		
Screws (1/2)	70-80	840-960
Screws (7/16)	55-60	660-720
Oil Pan	15-18	180-216
Spark Plugs (10 mm.)	10-14	120-168

1955 V8 MODELS

	Ft. Lbs.
Cylinder Head	55-60
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan	15-18
Main Bearing Caps	90-95
Flywheel	55-60
Vibration Dampener	130-150
Con Rod Caps	40-45
Camshaft Sprocket ①	25-30
Rocker Arm Support Bracket	55-60
Upper Valve Tappet Cover	15-18
Rocker Arm Cover	15-18
Engine Front Cover	15-18
Water Pump Manifold	25-30
Water Pump Mounting	15-18
Oil Pump Mounting	25-30

① —Fuel Pump eccentric retaining screw.

ENGINE

1951-54 MODELS

ENGINE REMOVAL: Remove hood assembly. Disconnect and remove battery. Drain cooling system and remove radiator core. (NOTE—Radiator core, cradle, grille and front fenders may be removed as an assembly). Disconnect propeller shaft and remove transmission (see Transmission Removal). Use a jack or auxiliary support beam to support rear end of engine while transmission is being removed. Remove carburetor air cleaner, and crankcase ventilator tube. Disconnect heat indicator sending unit lead wire. Disconnect wire at oil pressure indicator sending unit. Disconnect electrical leads at generator, starter and ignition coil. Disconnect clutch linkage and remove clutch torsion shaft bearing bracket from upper flywheel housing. Remove engine front support insulator-to-upper bracket attaching nuts. Using an engine lifting bracket and a chain hoist, raise engine off support insulators. Remove auxiliary support beam from frame and remove engine.

Installation—Reverse removal instructions and note the following: Lower and locate engine in its approximate position by allowing the pilots in the support insulators (front) to protrude through the center hole in engine front support bracket.

1955 V8 MODELS

ENGINE REMOVAL: *(NOTE—On Synchro-mesh cars, Engine and transmission can be removed as an assembly providing front fenders and grille are first removed).*

1) Drain engine oil pan. Remove hood assembly and drain cooling system. Remove radiator core. Disconnect heater hose at cylinder head and remove water pump and manifold assembly. Remove battery and carburetor air cleaner.

2) Remove coil, bracket, distributor cap and ignition wiring as an assembly. Remove carburetor assembly. Disconnect power brake vacuum line at power cylinder (if car so equipped). Disconnect vacuum hose at windshield wiper motor. Disconnect flexible fuel pump line.

3) Remove generator assembly. Disconnect wire leads to water temperature and oil pressure indicator sending units. Disconnect engine ground wire at dash. If car equipped with Power Steering, remove screws at pump bracket and place pump pressure lines and hose assembly out of way.

4) Remove valve tappet cover vent tube. Remove starting motor and flywheel housing lower cover. Disconnect exhaust pipe from exhaust manifold. Drain transmission oil pan and remove transmission filler tube assembly. Disconnect oil cooler lines at transmission. Loosen transmission rear support bracket, *but do not remove bolts.* Support transmission using a block of wood and a jack. Disconnect throttle control valve linkage at transmission.

5) Remove converter clutch housing to flywheel retaining nuts, and bell housing to flywheel housing capscrews. Disconnect front motor supports at frame. Install a flexible lifting cable or rope around intake manifold and attach a chain fall or hoist. Clamp or wire converter to transmission case to keep converter from sliding out of transmission. Raise engine and slide forward to clear transmission and slide out of chassis.

OIL PAN

1948-54 MODELS

OIL PAN REMOVAL: Place car to position hoist over engine. Disconnect steering idler lever support from frame side rail and lower steering linkage. Remove flywheel housing lower cover and take out oil pan screws. Lower oil pan and if necessary, rotate crankshaft to place counterweights up for clearance (use pry bar at flywheel housing engaging teeth on flywheel). If pan requires additional clearance, attach hoist to front of engine (do not disturb front engine support bolts), raise engine just enough to relieve load on support, pan should then come out.

1955 V8 MODELS

OIL PAN REMOVAL: Drain engine oil and remove screws attaching steering idler lever to frame and lower steering linkage. Remove engine oil level indicator. On cars not equipped with the dual exhaust system the crossover pipe from left to right banks must be removed, on cars with dual exhaust, remove left exhaust pipe. Remove starting motor and flywheel lower housing. Remove attaching screws and washers and remove oil pan.

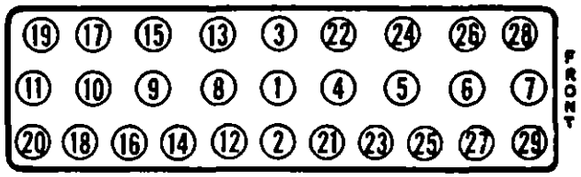
CYLINDER HEAD & MANIFOLD

1946-54 MODELS

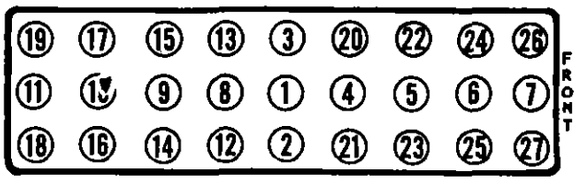
CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head stud nuts, tighten in correct sequence as shown in the diagrams. Procedure for tightening Cast Iron and Aluminum heads is as follows:

Cast Iron Heads—With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all nuts (additional tightening may be necessary for correct tension).

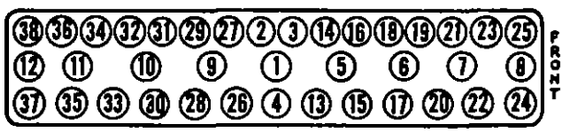
Aluminum Heads—With the engine cold, tighten all nuts to correct tension. Run engine until thoroughly warm, allow engine to cool off, and then recheck all nuts. Do not tighten aluminum heads when warm.



1946-47 PACKARD 8 (EXCEPT SUPER 8)



1946-47 PACKARD SUPER 8 CYL. HEAD



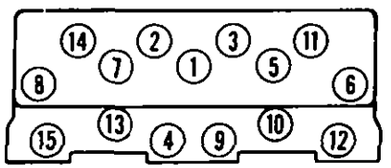
1948-54 PACKARD 8 CYLINDER HEAD

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1955 V8 MODELS

CYLINDER HEAD: Removal—Drain cooling system. Remove generator (if removing right bank head), or fan belt (if removing left bank head). Remove fan, water pump, and manifold assembly. Remove air cleaner. Remove ignition coil and bracket, disconnect ignition cables and place the coil and wiring out of way. Remove carburetor and intake manifold assembly. Remove valve cover and remove bolts attaching rocker lever shaft to cylinder head, and lift off the rocker lever shaft assembly. Disconnect exhaust manifold from exhaust pipe. Remove cylinder head bolts. Install Cylinder Head Lifter J-4159 in the front and rear spark plug holes and lift off cylinder head. *NOTE*—To remove right bank head it will be necessary to remove heater and oil level indicator. On cars equipped with Twin Ultramatic Transmission the filler tube assembly will have to be removed. On removing the left bank head, the oil filter and bracket will have to be loosened from cylinder head, On cars equipped with Power Steering the bracket bolts will have to be removed and pump and hose assembly will have to be moved out of way.



PACKARD V8 CYLINDER HEAD

Installation: Clean gasket surfaces of cylinder head and engine block. Coat gasket with Perfect Seal No. 5 and install on block. Install cylinder head over dowels (dowels are drilled for oil return from rocker arm chamber). Install flat washers on head bolts and start the five medium length bolts in center holes of head. Install valve pushrods making sure they engage in sockets in valve lifters, and carefully install rocker shaft lever assembly. The two end rocker shaft mounting brackets are doweled to line up with bosses on cylinder head. Use the four longest cylinder head bolts and tighten them equally, and at the same time place pushrods in their respective sockets in the rocker levers. Install the short cylinder head bolts along lower edge of cylinder head and tighten all bolts in sequence shown in diagram to 55-60 ft. lbs.

ORIGINAL BORE & PISTONS

1946-54 MODELS

ORIGINAL BORE & PISTON SIZES: Mark stamped on piston head and cylinder block indicate size variation in relation to nominal size. (See below).

Piston Mark Location—Stamped in piston head.

Cylinder Bore Mark Location—Stamped on top left face of cylinder block.

NOTE—Piston and Bore marks should correspond on engines that have neither been bored nor honed.

PISTON & BORE MARKING (FOR SIZE VARIATION)

AA—.00025" Under Nominal Size.
A—Nominal Size
BB—.00025" Over Nominal Size.
B—.0005" Over Nominal Size.
CC—.00075" Over Nominal Size.
C—.001" Over Nominal Size.
DD—.00125" Over Nominal Size.
D—.0015" Over Nominal Size.

NOMINAL SIZE

Bore	Piston	Bore
3 3/16"	3.18575-3.18600"	3.18725-3.18750"
3 1/4"	3.24850-3.24875"	3.24975-3.25000"
3 1/2"	3.49875-3.49900"	3.49975-3.50000"

►**.020" Oversize Bore Engines—Marked by ★ following engine serial number.**

PISTONS

1946-54 MODELS

REPLACEMENT ALUMINUM ALLOY & CAST IRON PISTONS:—Finished aluminum alloy or cast-iron replacement pistons are stamped on head with decimal figure (.005, .010, etc.) indicating nominal oversize and one or two letters (AA, A, BB, B, CC, C, DD, D) which indicates the actual size variation (in .00025" steps) of the piston from indicated nominal oversize. See oversizes listed below and size variations for each letter (in table).

NOTE—This system of marking makes it possible to order a finished piston (using number and letter) for any particular bore size within these limits.

Piston Oversizes (Figures Stamped on Piston Head)—Furnished in Standard size and the following oversizes: .003", .005", .010", .015", .020", .030", .040".

PISTON MARKING (FOR SIZE VARIATION)

(Letters Stamped on Piston Head)

For All Models and Piston Oversizes

AA—.00025" Under marked size.
A—Same as marked size.
BB—.00025" Over marked size.
B—.0005" Over marked size.
CC—.00075" Over marked size.
C—.001" Over marked size.
D—.00125" Over marked size.
DD—.0015" Over marked size.

PISTON PINS

1946-54 MODELS

PISTON PIN BUSHING INSTALLATION: Two-piece bushing used in rod. Use Piston Pin Bushing Replacement Set J-2555 (consists of: Remover, Replacer, Plate, Burnisher), and Piston Pin Bushing Reamer J-874-18. Press old bushings out with Remover and arbor press. *(CAUTION*—Each half of bushing must be installed and burnished separately so that oil channel formed between inner ends of bushing halves will not close up). Install one half of bushing flush with outer end of rod, then using Plate of tool under end of rod, push Burnisher through from inner end of bushing. Install second half of bushing and burnish in place from inner end working through bushing half already in place. Ream bushing for size-to-size fit with piston pin using Reamer J-874-18. Check pin fit as follows:

Piston Pin Fit in Rod Bushing—With lower bearing inserts and cap installed on rod, insert piston pin in rod, clamp pin in vise with lead jaws placing rod in horizontal position. Rod should hold in this position, but should fall down of own weight when tapped down by hand.

1955 V8 MODELS

PISTON PIN BUSHING (IN CONNECTING ROD) INSTALLATION: After pressing old bushing out with an arbor press, install new bushing so that it is flush with both sides of rod. Position Burnisher Tool J-6055 in bushing, then applying plate of the tool under the rod, push burnisher through bushing with an arbor press. After bushing has been burnished, and before reaming bushing, the oil hole in bushing should be drilled using a 3/16" drill.

PISTON RINGS

1946-54 MODELS

TRIPLE ACTION PISTON RING SETS: Service Sets.—These rings furnished in packaged sets for all models and should be installed on **aluminum pistons only** as directed below. CAUTION—Do not use these rings with Cast Iron pistons.

Oil Ring—Spring expander type oil ring used consisting of top and bottom rails with a spring assembled between two rails. Two tabs in each rail engage a loop in spring expander when assembly installed in ring groove. Install ring on piston as follows: Place lower rail with locking tabs up (45° to right of thrust face or left side of piston) on piston slightly below lower ring groove. Insert spring expander in oil ring groove with end gap centered on thrust or left side of piston. Install upper rail in ring groove with locking tabs down so as to engage first loop in spring to left of spring end gap. Move lower rail up into ring groove with tabs in rail engaging first loop in spring expander to right of spring end gap. Press upper and lower rails down firmly on spring so that rails are properly seated on spring and are free in groove.

#2 Compression Ring—Assemble ring in #2 ring groove with groove on outer edge down.

Top Compression Ring—Assemble ring in top ring groove with groove on inner edge up.

CRANKSHAFT & MAIN BEARINGS

1946-54 MODELS

CRANKSHAFT FRONT SEAL: Installed on front end behind timing chain cover. To replace seal remove radiator core, vibration dampener (puller J-2636 for fluid type dampener), and timing chain cover. Remove old seal and install new seal over end of shaft. Place cover aligning arbor over end of shaft, install cover and tighten cover screws. Insert feeler gauge between arbor and hole in cover, run gauge around arbor, if clearance not uniform, loosen cover screws and shift cover until clearance uniform.

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1946-54 MODELS

REAR MAIN BEARING OIL SEAL REPLACEMENT (Engine in Car): Raise car on stands at all four corners, keeping engine in its normal position and on a level plane. Remove transmission and oil pan. Remove rear main bearing cap. ***Do not remove other main bearing caps.*** Loosen each main bearing cap attaching screw just enough to "break loose" each screw from its tightened position. Alternately back off each main bearing cap screw ½ turn at a time until crankshaft has been lowered evenly ½". Remove rear main bearing seal (upper) from its groove in crankcase, using a pointed tool. Remove seal from rear main bearing cap, and remove the wooden side seals. To install upper seal, first form it to shape using the lower bearing cap. With a round wood block, 2¾" diameter, press seal into bearing cap with an arbor press. After seal has been shaped, feed it up into upper groove around crankshaft. When seal has been positioned, tighten each bearing cap attaching screw alternately ½ turn to raise crankshaft evenly to its normal position. Rotate crankshaft to burnish seal into position. Continue tightening bearing cap screws until torque of 90-95 ft. lbs. is obtained. Cut off ends of seal flush with split line of bearing. Form seal into lower bearing groove in same manner as with upper seal. While holding seal in position with round wood block and arbor press, trim end of seal so that 1/16" of seal extends above bearing split line at each end. Install bearing cap and torque to 90-95 ft. lbs. Install wood side seals in bearing cap by driving them into grooves in cap, then trim them off flush with bearing cap. Install oil pan and transmission.

1955 V8 MODELS

CRANKSHAFT: Removal (With Engine in Car)—Remove transmission. Drain cooling system and remove radiator core. Drain and remove engine oil pan. Remove water pump and manifold assembly. Remove fuel pump. Remove engine vibration dampener, engine front cover, timing chain and sprockets. Remove oil and vacuum pump assembly. Remove spark plugs. Disconnect connecting rods and push piston assemblies up into cylinder bores so that crankshaft can be removed without interfering with connecting rods. Remove front and rear main bearing caps. Support crankshaft at front and rear journals and remove the three intermediate bearing caps. Carefully lower crankshaft and flywheel assembly.

Installation: Install new rear main bearing seals in upper crankcase and in bearing cap (See Rear Main Bearing Oil Seal Installation below). Install new front crankshaft seal in engine front cover. Reverse removal procedure indicated above.

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Apply Lubriplate to groove in bearing cap and install oil seal. Using Oil Seal Installer J-3048-A and a hammer, drive seal into place. With seal still in place, trim ends of seal flush with surface of cap. To install upper half of seal in crankcase, remove crankshaft and install in same manner as for bearing cap.

VIBRATION DAMPENER

1955 V8 MODELS

VIBRATION DAMPENER: Removal—Drain cooling system, remove radiator core and top splasher. Remove fan assembly. Remove vibration dampener retainer screw and washer and if car is equipped with Power Steering or Air Conditioning, remove the drive pulleys by prying them off dampener assembly. Install center adapter J-5992-2 in threads of crankshaft. Install screw assembly J-5995-3 in remover body J-5992-1 and remove dampener.

Installation: Lubricate oil seal in engine front cover, and position dampener over crankshaft and tap it into place by tapping it with a rawhide hammer. Assemble Vibration Dampener Installer J-5992 by placing the 3/4" nut on screw assembly J-5992-3 and slide spacer J-5992-4 over screw assembly. Start screw in end of crankshaft and tighten until it bottoms in the threads. With one end of the spacer against dampener, turn nut on screw until dampener hub bottoms the crankshaft oil slinger against a shoulder on the crankshaft. Install Power Steering and/or Air Conditioning Pulleys, retainer washer and screw. Tighten retainer screw to 130-150 ft. lbs.

ENGINE FRONT COVER

1955 V8 MODELS

ENGINE FRONT COVER: Removal—Remove vibration dampener (see above), and water pump manifold assembly. Disconnect and remove fuel pump. Remove screws *attaching front cover to block and remove cover.*

Installation: Using a new gasket, install engine front cover in place and start capscrews in threads, *but do not tighten.* Lubricate oil seal in cover, and install vibration dampener assembly, using hub on dampener as a pilot to align front cover. Complete installation by reversing removal procedure.

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION: Remove engine front cover (see above), drive out old seal with a hammer and punch, being careful not to damage cover. Install a new seal using tool J-5983, pressing seal into place with an arbor press.

CAMSHAFT & BEARINGS

1946-54 MODELS

CAMSHAFT REMOVAL: Remove cylinder head, raise front end of car and place stands under front suspension. Remove right front wheel from hub and drum, and right front fender splash apron cover plate. Disconnect and remove fuel pump and oil pump. Remove valve spring chamber cover. Raise valve with lifter HM-536. DO NOT REMOVE VALVE LOCKS. Insert two blocks of wood between valve head and block to hold valves open (wood block should be approximately ⅜" thick, ⅛" wide, 1" long). Raise all valves and block them up with similar blocks of wood. Lift valve tappets up by hand, retaining them with spring-loaded type clothespins. Remove camshaft thrust plate from front end of engine block. Carefully remove camshaft, rotating it as it is withdrawn, to prevent scoring or damaging bearings.

Camshaft Bearing Removal & Replacement: Remove oil pan and camshaft (see Camshaft Removal above). Drive out old camshaft bearing using a smooth faced drift of smaller diameter than outside diameter of bearings. Replace new bearings by using similar drift with larger outside diameter than outside of bearings. CAUTION—Be sure oil holes in bearings line up with passages in block.

Cleaning & Inspection—Clean camshaft, and inspect cams and bearing surfaces for wear, scores, or pits. Inspect oil pump drive gear for nicks, scores, pits or wear. Camshaft to bearing clearance should be .001-.003". If tappets removed (see Hydraulic Valve Lifters, below).

Camshaft Installation: Reverse removal procedure, and check camshaft endplay (see Car Pages for Camshaft Endplay specifications). If endplay not within limits, replace camshaft thrust plate.

1955 V8 MODELS

CAMSHAFT: Removal (With Engine in Car)—Drain and remove radiator. Remove fan, water pump and manifold assembly. Remove air cleaner, ignition coil, carburetor and intake manifold. Remove vacuum line to distributor, disconnect ignition cables and place out of way. Remove distributor. Remove valve rocker covers, the four rocker lever shaft capscrews (both banks), and lift off shaft assemblies. Remove upper valve tappet cover and breather tube, and remove the lower cover. Remove pushrods and hydraulic lifters (keeping them in sequence so they will be installed in the same location). Remove vibration dampener (see above). Drain engine oil and remove oil pan. Remove engine front cover (see above). Pry off oil slinger from end of crankshaft. Remove fuel pump drive eccentric. Rotate engine to line up marks on camshaft and crankshaft sprockets so marks are adjacent and in line across shaft centers. Remove the sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts. Remove the three camshaft retainer plate screws and remove plate and camshaft spacer. Carefully pull camshaft forward into the radiator grille far enough to clear engine block, taking care not to damage camshaft or bearings.

Installation: Reverse removal procedure and note the following: Install camshaft gear about 1/16" beyond a position flush with camshaft end, to allow mounting of fuel pump eccentric.

TIMING CHAIN

1955 V8 MODELS

TIMING CHAIN: Removal—Remove engine front cover (see above). Pry off oil slinger from end of crankshaft and remove fuel pump eccentric. Rotate engine to line up marks on sprockets so marks are adjacent and in line across shaft centers. Remove sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts.

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Installation: Install camshaft and crankshaft sprocket keys being sure they are properly seated in keyways. Rotate engine crankshaft to bring No. 1 cylinder to firing position. Slide crankshaft sprocket part way on the crankshaft and assemble camshaft sprocket in chain, locating and lining up the "O" marks on the sprockets in line with camshaft and crankshaft centers. Position chain on crankshaft sprocket and start camshaft sprocket on camshaft. Using a rawhide hammer, alternately tap both sprockets into proper position. Camshaft gear must be installed about 1/16" beyond a position flush with end of camshaft for installation of fuel pump eccentric. Complete installation by reversing removal procedure.

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT

1955 V8 MODELS

VALVE TAPPET ADJUSTMENT: *NOTE—Checking must be done with no oil in compression chamber of tappet and the plunger completely bottomed, with tappet on base circle of cam.* With piston on compression stroke and both valves closed, press downward on the push-rod end of rocker arm to compress plunger spring and force plunger to its bottom position. While still holding down on rocker arm, measure the lash. The clearance between valve stem end and rocker arm tip should be .050" to .210".

VALVE GUIDES

1955 V8 MODELS

CHECKING VALVE STEM CLEARANCE: After valves have been removed from head, and with valve stems and guides clean, install valve in respective guide bore and measure side-to-side play crosswise to the cylinder head using a dial indicator or thin strips of feeler gauge material placed between stem and guide bore. If clearance is greater than .004" (intake), or .005" (exhaust) guides should be reamed and oversize valves installed.

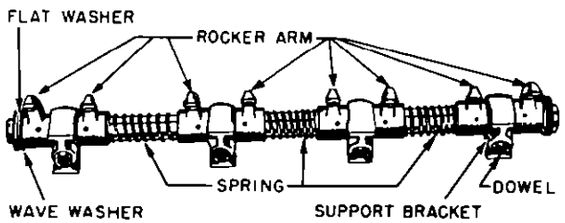
VALVE GUIDE REAMING: Four oversize reamers are available in Valve Guide Set J-6042 which will provide the desired clearance of .001-.002" (Intake), and .002-.003" (Exhaust) between stem and guide. After checking clearance, select the proper oversize reamer and pilot for the oversize valve to be installed.

R CKER ARMS

1955 V8 MODELS

►*IMPROVED OIL CONTROL ROCKER ARM SHAFT PRODUCTION CHANGE & CORRECTION ON EARLY CARS:* Three types of rocker arm shafts have been used in production with different number and size of rocker arm oil holes. For all replacement use, use LATEST type shaft, Part No. 440466, which may be identified by ALL oil holes being of the same size (.062").

ROCKER ARM AND SHAFT: Disassembly—Remove rocker arm and shaft assembly from cylinder head. Remove cotter pins, and flat and wave washers from end of shaft. Remove rocker arms, springs and supports, keeping all parts in order so they can be replaced in original position.



PACKARD V8 ROCKER ARM ASSEMBLY

Inspection: Clean and inspect all parts, making sure that all oil holes are open. Inspect shaft and arms for wear. Inspect rocker arm radius at valve stem end, and if worn replace the rocker arm. Inspect plugs at each end of shaft for tightness.

Reassembly: *Reverse disassembly procedure and note* the following: Rocker arm shaft must be assembled with the grooved oil hole in the downward position, or facing the cylinder head.

►*CAUTION: There is a right and left rocker arm and if reversed in assembly they will not properly contact the valve stem.*

HYDRAULIC VALVE LIFTER

1946-54 MODELS

HYDRAULIC VALVE LIFTERS ("Wilcox-Rich"): Mushroom type lifters, removed from below with camshaft out of engine. Lifter is composed of three major units: tappet body, cylinder, and plunger. Oil is introduced to lower part of lifter body from main oil pressure system, and then through a ball check valve to cylinder below plunger.

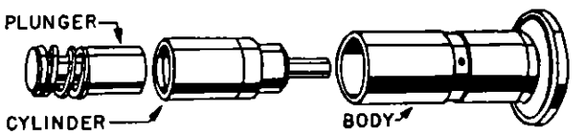
Removal: Remove camshaft (see Camshaft Removal above), and oil pan. Lifters can then be removed from below.

Disassembly: ***(CAUTION—Plungers and cylinders are selectively fit at the factory and must not be interchanged. Disassemble one unit at a time to avoid mixing parts).*** To remove plunger from cylinder, twist plunger in a direction that would "wind-up" the spring and pull outward at the same time. If plunger is stuck in cylinder, clean all carbon and varnish from lifter and then insert a match in oil inlet hole at bottom of lifter and raise check valve ball, allowing oil to drain out. If lifter remains stuck, soak in a carbon solvent.

Cleaning & Inspection: Clean all lifter parts in clean solvent and check for scoring, burrs, wear or foreign matter *Blow parts dry with compressed air.*

Testing:—Make sure there is no oil on lifter parts, then with cylinder held upright in one hand, start plunger into cylinder with the other. Depress plunger and release it quickly. Plunger should yield slightly to finger pressure but should "kick-back" immediately upon release of pressure. If it does not, place finger over oil inlet hole and repeat the test. If "kick-back" does not occur on second test, thoroughly re-clean lifter to eliminate the possibility of dirt causing check valve to leak. Again check lifter, and if "kick-back" is not felt, it must be assumed that lifter check valve is damaged. Replace entire hydraulic unit.

Reassembly: Clean plunger and cylinder, and blow completely dry with air. Avoid touching plunger with fingers to prevent oil film, and place plunger in cylinder, pushing it down until air escapes, then place unit in lifter body. CAUTION—It is important to keep plunger and cylinder assembly free of oil, as a dry assembly will bleed quicker and prime quicker, eliminating excessive noise when engine first started.



1946-54 PACKARD HYDRAULIC VALVE LIFTER

Initial Adjustment (after Valves Ground or New Parts Installed): Check the take-up reserve of each hydraulic valve lifter after valves and valve seats have been refaced or new lifter parts installed. Remove hydraulic plunger and cylinder from lifter body (valve springs and retainers removed from valve stems). Bring piston of cylinder to top of its compression stroke (this must be done on each cylinder when checking the respective valves) which will place lifters on heel of cam lobe. Check valve clearance by inserting Plug Gauge of Hydraulic Gauge Set J-4540 or J-2553 (which ever required) in lifter body. Check clearance between gauge plug and valve stem (with valve held down on seat) using feeler gauge supplied with gauge set. **Clearance should be .030" to .070".** If under .030", grind off end of valve stem with valve refacer. NOTE—Feeler gauge marked "GO" and "NO GO."

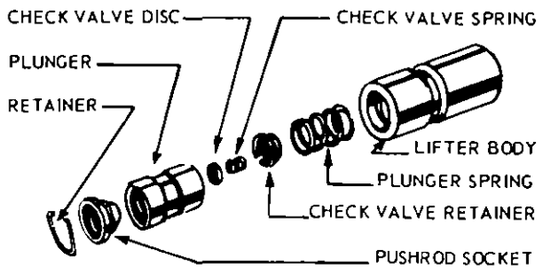
►*CAUTION*—When checking other valves, make certain piston for that cylinder is at top of compression stroke.

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1955 V8 MODELS

HYDRAULIC VALVE LIFTERS: Removal–Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm shaft assembly. Remove



PACKARD V8 HYDRAULIC VALVE LIFTER

upper valve tappet cover and breather tube and then remove lower valve tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in the same relative position. *NOTE*–Lifters can be removed from block with Valve Lifter Remover J-5962 or a wire hook.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. *(CAUTION–Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove any varnish or gum deposits.

Inspection: Inspect plunger and walls of body for scratches (if plunger or body are scratched, replace complete unit). Try the plunger for fit in body. If check valve assembly removed from plunger, inspect flat disc valve, spring and seat.

Reassembly: Reverse disassembly procedure. See illustration for correct sequence.

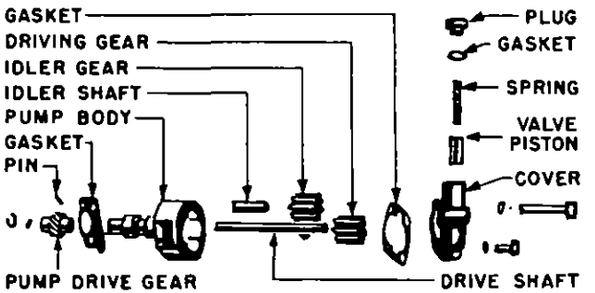
Testing: Use a clean container deep enough to cover the lifter assembly (in an upright position). Fill container with clean kerosene. Remove the pushrod socket and place lifter in kerosene in an upright position, allowing it to fill up. Remove lifter and replace pushrod socket. Place lifter assembly between jaws of checking tool J-5978. Check leakdown by depressing the tool. A decided resistance should be felt. If plunger collapses immediately, the lifter should be checked again. Replace if no resistance felt.

OILING SYSTEM

OIL PUMP

1946-54 MODELS

OIL PUMP: Removal—Set engine in firing position for #1 cylinder (6° BTDC.), remove distributor cap and mark rotor position on distributor housing. With pump cover off, mark pump driving gear position on pump body (check to this mark when re-assembling since pump must be rotated 180° on some cars to clear frame when removing pump from engine).



1946-54 PACKARD OIL PUMP

Disassembly: Remove pump cover and gasket. Place a straight-edge across pump body, and with a feeler gauge, measure clearance between pump gears and straight-edge. Clearance should be .002" or less. Clearance between gears and pump body should be .005" or less. Holding hand under pump body, rotate drive shaft until driven gear falls out. Drive out driving gear retaining pin and press out drive gear. Driving gear may be pressed from shaft if necessary.

Reassembly: Assemble shaft and drive pump gear and install in oil pump body. Press drive gear on shaft until endplay of shaft measures .003-.010". Measure this clearance between drive gear and pump body, using a feeler gauge. If a new pump drive shaft installed, drill a ⅛" hole through drive gear and shaft, install pin and peen it over on both ends. Install oil pump idler gear. Lubricate pump with clean engine oil and install pump cover, using a new gasket. Torque attaching screws to 25-30 ft. lbs. Clean and inspect relief valve by removing valve piston, spring, and plug from pump cover. Check piston for scores and for improper seating. Check pump cover for dirt or foreign material and clean thoroughly. If necessary crocus cloth can be used to polish relief valve piston.

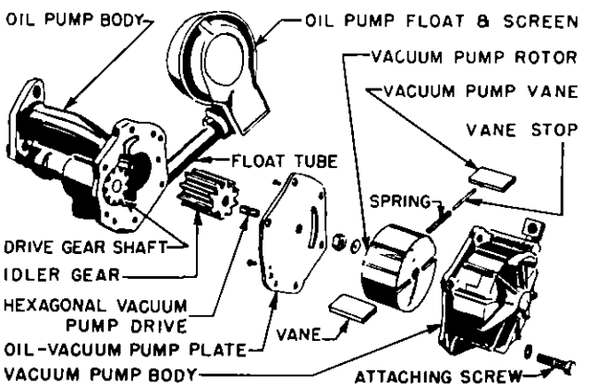
Installation: Correct engaging position of pump drive is with driving blade in pump drive gear parallel with camshaft, and punch mark on end of drive gear at **top.** Reassemble to marks made at time pump removed, and with engine in firing position for No. 1 cylinder. If pump does not engage slot in distributor shaft, remove pump and turn pump drive one tooth and reinstall, making certain that distributor is at No. 1 firing position.

1955 V8 MODELS

OIL PUMP: Removal–Remove engine oil pan. Disconnect vacuum pump line to crankcase. Remove the two screws attaching oil pump to rear main bearing cap and remove oil pump, vacuum pump and strainer assembly.

Disassembly: Remove screws attaching vacuum pump to oil pump body and remove vacuum pump. Do not lose the small hexagonal drive. Remove idler gear. Remove pin from shaft and drive off sleeve. Remove upper and lower oil pump driving shaft and gear. If necessary, press shaft out of gear. If necessary to to remove the float assembly, the tube can be unscrewed from pump.

Inspection: Wash all parts in clean solvent and blow dry with air. Inspect float for leaks. Inspect strainer. Inspect pump shaft and gears for wear, scores or pits. Check clearance between gears and pump housing using a feeler gauge. This clearance should not exceed .005". Check gear endplay using a straightedge across gears and housing. Endplay should not exceed .003". Check clearance between shaft and body. Clearance should not exceed .003". Inspect pressure relief valve piston for scores. Inspect relief valve spring. Free length of spring should be approximately 3-19/64". When compressed to 1-3/8", pressure should be 9–9-1/2 lbs. Inspect pump cover for wear. Dress down on a surface plate if necessary.



V8 OIL & VACUUM PUMP ASSEMBLY

Reassembly: If float and suction tube removed from pump body, special care should be taken when installing to see that suction tube is tight in threads of pump body, and that float is properly positioned. To position float and tube (vacuum pump must be removed), measure the distance between machined face of pump housing and top edge of float. This distance must be 3/4" *(CAUTION–When positioning float, do not unscrew*

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tube to position float, but continue one more turn). Install key in pump shaft keyway and press driving gear on shaft until flush with bottom of gear. Install upper and lower shafts and gear in pump body. Install sleeve on shaft. Install pin in sleeve and stake both ends of pin. Install idler gear and hexagonal drive in end of gear. Position vacuum pump on oil pump body to line up with dowel pins and install attaching screws.

Installation: Start oil pump driving shaft in hole in rear main bearing cap and turn shaft to engage mating end on distributor shaft. Start the two screws and lockwashers and tighten screws to 25-30 ft. lbs. Connect vacuum pump line to crankcase. Install engine oil pan.

COOLING SYSTEM

1946-47 CLIPPER MODELS

RADIATOR CORE REMOVAL: The radiator core can be removed without removal of Front End Assembly as follows: Remove pan from between Radiator Core and Radiator Grille, loosen radiator core mounting bolts, lift core out of car. CAUTION—Do not damage fan blades when lifting core out of car.

CLUTCH NOTES

1946-54 MODELS

CLUTCH PEDAL OVER-CENTER SPRING: New adjustable type over-center (booster) spring. Adjustment provided at spring eye-bolt nut (front end of spring) and by turn buckle type pedal-to-relay lever link (controls over-center point). To adjust, proceed as follows:

Clutch Pedal Linkage Adjustment: Check over-center *eye bolt (should be 1 5/8" from end of bolt to head* of nut—adjust if necessary). Back off locknut and adjusting nut on rod at throwout lever and unhook pedal retracting spring from throwout lever. Adjust pedal-to-relay lever link turnbuckle so that over-center spring will pull pedal down after pedal moved down one inch from toeboard (make certain throwout lever does not contact adjusting nut and locknut backed off above). Hook pedal retracting spring to throwout lever. Adjust pedal for 1¼-1⅜" free play at pedal pad. Check over-center spring hold-in position by pulling pedal to floor and hooking spring at bend in pedal arm. Adjust eye bolt nut to hold pedal down with seven lbs. pull on scale.

ELECTRICAL EQUIPMENT NOTE: If Delco-Remy units are used (Starter, Generator, Regulator), refer to preceding article on Packard Clipper Six for complete data on these units.

HOOD LOCK: One piece side hinge hood. To raise hood, release lever under instrument panel on side to be raised, lift hood slightly, release safety catch (approx. 2 feet from rear edge of hood), raise hood, engage prop on dash to hold hood open.

MODEL IDENTIFICATION

SERIAL NUMBER: On left side of cowl (use Eng. No.)

ENGINE NUMBER: First No. F-300001 (1946), F-320001 (1947). On upper left side of cylinder block between #3 and #4 cylinders.

TUNE-UP

COMPRESSION: Pressure—118 lbs. at cranking speed.

VACUUM READING: Steady 18-20" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUGS: AC No. 104 or Champion Y4-A. 10 mm. or Auto-Lite No. P-4. 10 mm.
Gaps—.028" (.0255-.0305").
NOTE—Tighten plugs to 50 inch lbs. only.

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.017". Cam Angle—27° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Automatic Advance—Starts 325 RPM., 5.3° at 800 RPM., Max. 10.75° at 1500 RPM. Distr. ° & RPM.
Vacuum Advance—Starts with 10" of vacuum, Max. 6° with 17" vacuum. Distributor degrees.

IGNITION TIMING: See Ignition Timing.
Std. Setting—5° BTDC.
Timing Mark—Vibration dampener at front of engine marked "#1UP.DC" with fifteen 1° graduations before this point. Set ignition contacts to open at 5th graduation before "DC" mark.
Fuel Compensator—Set for slight ping accelerating with wide open throttle (shift link on quadrant).

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set both idle adjusting screws ½-1½ turns open. Adjust for smooth 6 MPH. idle speed.
Float Level—5/32" from top of float to cover with valve seated (remove gasket and invert to check).
Accelerating Pump—Inner Hole (minimum) Normal, outer hole (max. stroke) if greater charge required.

Fuel Pump Pressure: 4¾ lbs. maximum.

MANIFOLD HEAT CONTROL: Thermostatic coil type. Make certain that valve operates freely and does not bind or stick. Do not oil control.

VALVES: See Valve Timing.
Tappet Clearance—.007" Intake, .010" Exh., Hot.

STARTING: See Battery, Starter, Generator and Regulator.

IGNITION

IGNITION SWITCH: Mitchellock Switch Model 24-B. Auto-Lite No. CE-2260BCS Lock Switch and cable.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—P1250 to P1500. Groove—No. 2.

COIL: Auto-Lite Model CE-4659. Service coil (less switch & cable) CE-3224US. On left side of engine.
Ignition Current—2.4 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4502A. Single breaker, 8 lobe cam, full automatic advance type with vacuum spark control and Fuel Compensator.
Breaker Gap—.017" Limits .0125-.0175".
Cam Angle or Dwell—27° clsd., 18° open (.017" gap).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	325	0	650
3	600	6	1200
5.3	800	10.6	1600
8	1175	16	2350
10.75	1550	21.5	3100

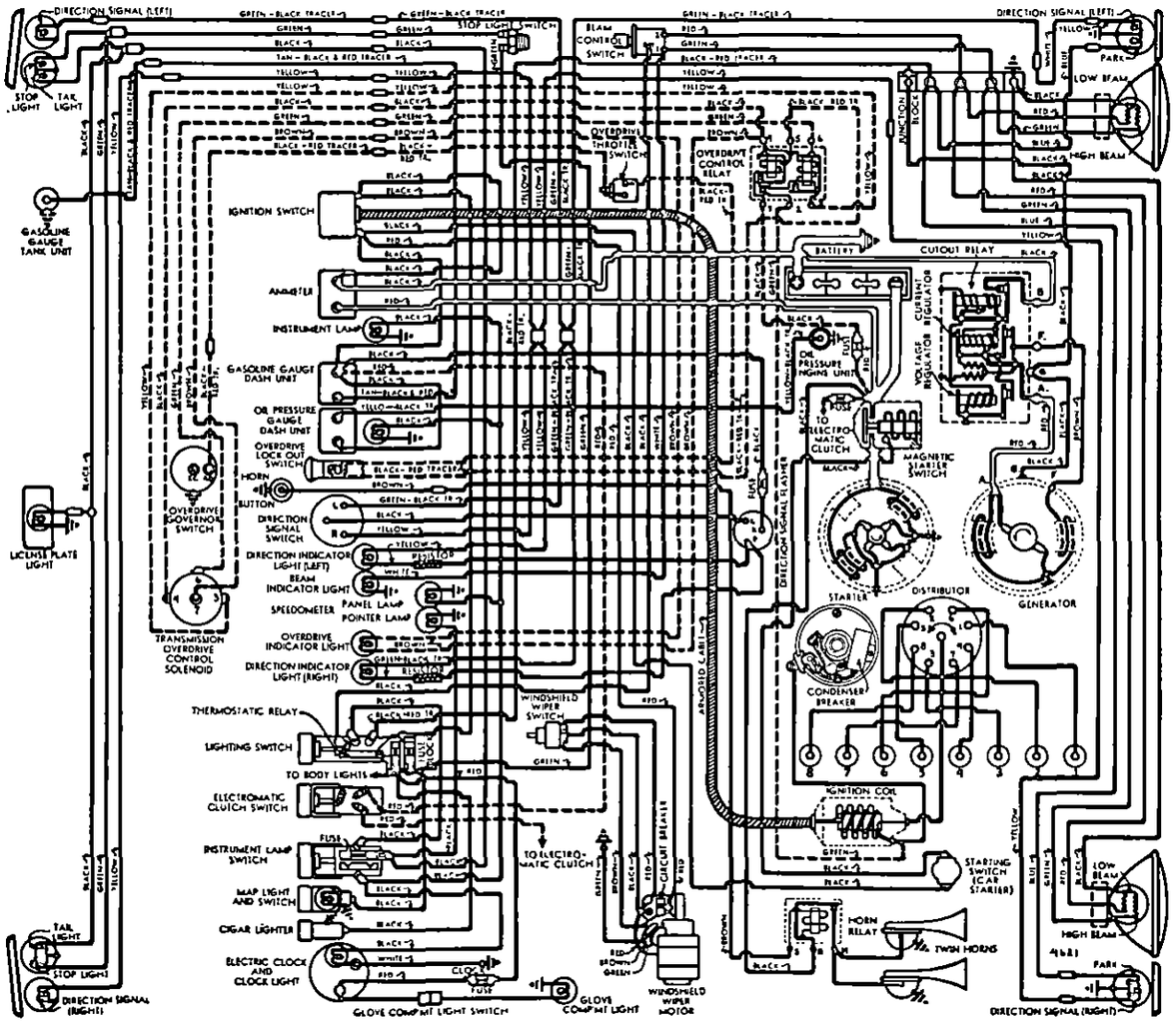
Fuel Compensator Adjustment—Permits 40° range of adjustment by loosening vacuum unit link screw at distributor quadrant. See Ignition Timing below.

Vacuum Spark Control: Auto-Lite Unit. Mounted on hold-down plate and linked to adjusting quadrant on distributor. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	10"
1°	2°	11⅛"
3°	6°	13⅛"
5°	10°	15⅞"
6°	12°	17"

Removal:—Distributor mounted on left side of crankcase. To remove, disconnect vacuum line, take out screw in hold-down plate, lift entire unit out.



IGNITION TIMING

Std. Setting—As given below. See Fuel Compensator Setting for service and fuel corrections.

	Flywheel Degrees	Piston Position
All Engines	5° BTDC	.0103" BTDC

Timing Mark Note—Marks on vibration dampener at front of engine. Dampener marked '#1 UP.DC' with fifteen 1° graduations before this point.

Timing—With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampener in line with pointer on chain case cover (see table above). Loosen vacuum unit link screw in distributor quadrant, rotate distributor until contacts begin to open, tighten screw. Check Fuel Compensator Setting (below).

Timing (Neon Timing Light)—Mark correct graduation on vibration dampener, clip neon timing light to #1 spark plug and direct light on vibration dampener, idle engine and adjust distributor as directed above.

Fuel Compensator Setting—Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant, rotate one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping), until correct performance secured.

CARBURETOR

Carter Type WDO, Model 512S. 1" Dual (double barrel), Downdraft type with Carter Climatic Control. *See Carburetor Section for complete data.*

NOTE—Carburetor Casting No. 371 on flange.

Idle Adjustment—With engine warm and running at slow idle speed (choke valve wide open, fast idle inoperative), set throttle stopscrew for idle speed of 6 MPH. (8-10 MPH. for cars with Electromatic Clutch). Turn idle adjusting screw for each barrel (in succession) until engine fires smoothly (½-1½ turns open for each screw—turn screws in for leaner mixture). Readjust idle speed.

Accelerating Pump—Pump arm under dust cover at top of carburetor has two holes for pump link engagement. Set as follows:

Inner (min. stroke)—Normal weather & fuel.
Outer (max. stroke)—Cold weather or low-test fuel.

Float Level—5/32" from top of float to bowl cover with valve seated (remove gasket & invert to check).

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Fast Idle:—Integral type (built-in carburetor). *See Carburetion Equipment Section for data.*

Setting—Adjust fast idle screw for .020" throttle opening with choke valve closed.

Automatic Choke:—Carter Climatic Control. *See Carburetion Equipment Section for data.*

Setting—Set thermostat coil housing at Index mark.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., Heavy duty Oil-bath type Optl.

Servicing (Oil-wetted type)—Wash and re-oil filter element whenever crankcase oil changed (1000-2000 mile intervals for normal service).

Servicing (Oil-bath type)—Clean filter element, clean and refill oil reservoir with SAE No. 50 engine oil (Summer), SAE No. 30 (Winter) to level of indicator line on case (approx. 1 pint) whenever crankcase oil changed (1000-2000 mile intervals).

Oil Filler Cap (Crankcase Ventilator Filter)—Wash filter element in filler cap and re-oil when servicing air cleaner.

Fuel Pump: AC. Type AH (Std.), Type AJ (Optl.). Diaphragm type fuel pump (AH), combination fuel-and-vacuum pump (AJ). Pump Exchange AC. No. 525 (AH), 508 (AJ).

Pressure—4-4¾ lbs. (AH), 3-3¾ lbs. (AJ).

Gasoline Gauge:—Stewart (Stewart-Warner) Electric. *See Carburetion Equipment Section for data.*

BATTERY

Auto-Lite Type PN-15ZR or Willard Type SW-1D-100. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate). End-to-end type.

Starting Capacity—120 amperes (Auto-Lite), 122 amperes (Willard) for 20 minutes.

Zero Capacity—300 amperes for 3.2 minutes. Five second voltage 4.15 volts (Auto-Lite), 4.2 volts (Willard).

Grounded Terminal—Positive (+) to frame.

Dimensions—Length 19⅜". Width 4". Height 9 3/16" (Auto-Lite), 8 15/16" (Willard).

Location—On left side in engine compartment.

STARTER

Auto-Lite Model MAW-4024 or MAW-4027. Armature No. MAW-2128.

Drive—Outboard Barrel Type Bendix No. A1792.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Cranking Engine—125 RPM., 175 amperes, 5.1 volts.

Performance Data—Auto-Lite

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
0.60 "	3300	5.5	100
2.75 "	1480	5.0	200
5.45 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
11.5 "	Lock	3.0	505
18.0 "	*Lock*	4.0	*670*

Removal: Flange mounted on left front face of flywheel housing. To remove, take out flange mounting screws, lift out starter and switch assembly.

Starting Switch: Auto-Lite Model SS-4017 Magnetic Switch mounted on starter and controlled by Carter Car Starter Model 192-11U on carburetor. *See Electrical Equipment Section for complete data on Magnetic Switch & Carter Car Starter.*

GENERATOR

Auto-Lite Model GDZ-4801F (Std.), GEB-4802C-2 (Taxicab). Armature No. GDZ-2006F (GDZ Gen.), GEB-2006F (GEB Gen.). Two brush (shunt) type with voltage and current regulation. Ventilated.

Charging Rate Adjustment—No adjustment at generator. Charging rate controlled by Voltage Regulator, maximum output by Current Regulator.

Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM and above with load or discharged battery. Actual charging rate controlled by voltage regulator and dependent on battery condition.

Performance Data—GDZ-4801F

Cold Amperes	Volts	RPM.	Hot Amperes	Volts	RPM.
0	6.4	925	0	6.4	1000
5	6.65	1080	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
*35	8.0	1900	35	8.0	2250

Performance Data—GEB-4802C-2

0	6.4	560	0	6.4	620
5	6.6	640	5	6.6	700
10	6.8	720	10	6.8	800
15	7.1	800	15	7.1	910
20	7.3	880	20	7.3	1040
25	7.5	980	25	7.5	1170
30	7.8	1080	30	7.8	1340
*35	8.0	1200	35	8.0	1520

*—Current Regulator Setting.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (GDZGen.), 64-68 ozs. (GEB Gen.) for new brushes.

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.16-4.60 amperes (GDZ Gen.), 4.0-4.5 amperes (GEB Gen.) at 6.0 volts.

Removal: Pivot mounted at left side of engine at front. To remove, take out pivot and clamp bolts.

Belt Adjustment: 50 lbs. tension on spring scale hooked to generator frame, or ½" thumb-pressure deflection midway between generator and pump pulleys.

REGULATOR

Auto-Lite Model VRP-4002C (GDZ-4801F Gen.), Model VRP-4002D (GEB-4802C-2 Gen.). Voltage-Current Type. Vibrating type Voltage and Current Regulators in case with Cutout Relay. *See Electrical Equipment Section for complete data.*

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts. 920 RPM (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.

To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal (use short heavy leads), voltmeter between 'B' terminal and ground. Operate generator at speed equivalent to 30 MPH, charging fully charged battery, until voltage is steady. Voltage reading should agree with setting given above.

To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. *See Electrical Equipment Section.*

Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).

To Check (without breaking seals)—Connect test meters as for voltage check (above). Operate gen-

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erator at speed equivalent to 30 MPH. charging battery, turn on car lights and accessories or connect load (bank of headlamp bulbs, etc.) between ammeter and battery so that generator charges at peak rate and Current Regulator operates. Current reading should agree with setting given above. If more than slight excess noted, regulator is defective.

To Adjust (with cover removed)—Same as for Voltage Regulator (above).

Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).

Beam Indicator—Red light on left side of speedometer dial. Lighted with upper beam "on".

Direction Signal: *See Electrical Equipment Section.*

Direction Signal Indicator—Illuminated arrows on face of speedometer dial. Right or Left arrow lighted when direction signal on same side operating.

Switches

Lighting—Delco-Remy No. 1995021.

Beam Selector—Delco-Remy No. 1997008.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	40-30 watts	Sealed Beam
Parking & Frt. Direc. Sig.	21-3	1154
Rear Direc. Sig.	21	1129
Direc. Sig. Indicator	1½	55
Beam Ind., Glove Compt.	1	51
Instrument, Map Light	1½	55
Clock & Speedometer ('46)	1	51
Clock & Speedometer ('47)	1½	55
Overdrive Indicator	1½	55
Courtesy, Dome	6	82
Stop & Tail	21-3	1154
Rear License	3	63

MISC. ELECTRICAL

THERMOSTATIC RELAY: Delco-Remy. On lighting switch. Contacts remain closed with 30 amperes, open in 3 minutes with 42 amps. at 70° F. Not adj.

FUSES: Auxiliary (Stop Light, Cigar Lighter, Body Lights, Accessories)—SFE 20 ampere. Two fuses on lighting switch.

Instrument & Tail Light—SFE 20 ampere. On Panel Light Switch.

Clock—SFE 4 ampere. In clock lead near clock.

Overdrive—SFE 30 ampere. In relay lead.

Direction Signal—9 ampere. In flasher lead.

HORNS: Sparton. Vibrator type, air tone, twin horns operated by relay.

Horn Current—22-25 amperes.

Horn Relay: Delco-Remy No. 1116775.

Contact Gap—.025". **Air Gap**—.015" (closed).

Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder "L" head type. **Bore**—3¼". **Stroke**—4¼".

Displacement—282 cubic ins. **Rated HP.**—33.8.

Developed Horsepower—125 at 3600 RPM.

Compression Ratio—6.85-1 Std. cast iron head.

Compression & Vacuum Reading—*See Tune-up data.*

ORIGINAL BORE & PISTONS: *See Packard Shop Notes*

TIGHTENING TORQUES: *See Packard Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Packard Shop Notes.*

PISTONS: Aluminum alloy, autothermic strut type.

Length 3⅞".

Weight—17¼ ozs. (stripped), 23⅛ (with rings&pin).

Removal—Pistons and rods removed from above.

Clearance—.0005"-.001". See Fitting New Pistons.

Replacement Pistons: *See Packard Shop Notes.*

Fitting New Pistons:—Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 12-18 lbs.

Installing Pistons:—Slot toward valves.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 70 second groove), one oil control ring (No. 86) per piston, all above pin. Oil ring groove has twelve 5/32" oil drain holes.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0925-.0935"	.007-.017"	.0025-.003"
Comp. (#2)	.1240-.1235"	.007-.017"	.0025-.003"
Oil Control	.1865-.186"	.007-.015"	.0025-.003"

NOTE—Oil Ring (Perfect Circle No. 86) has coil spring type expander spring.

Replacement Rings:—.005, .010", .020", .030", .040" O.S. Triple Action (packaged sets) std. & .020" oversize. *See Packard Shop Notes for Piston Ring data.*

PISTON PIN: Diameter .875". Length 2 51/64". Pin floats in piston and rod, held by locking rings.

Pin Fit in Piston—Palm push fit with piston at 160°F. (heat in water).

Pin Fit in Rod Bushing—Finger push fit at 70°F.

Piston Pin & Connecting Rod Bushing Servicing—*See Packard Shop Notes.*

Replacement Pins:—Std. and .003", .006" oversize.

CONNECTING ROD: Length 7 11/16". Weight 31.6 oz.

Upper Bearing (Piston Pin Bushing)—Split type. *See Packard Shop Notes for servicing data.*

Crankpin Journal Diameter—2.094".

Lower Bearing—Shimless, precision, steel backed, Moraine Durex "300" (copper nickel matrix with babbitt overlay) lined type.

Clearance—.0005-.0025". **Endplay**—.004-.010".

Bearing Adjustment:—None (no shims). Replace bearings. Do not file rods or caps

Replacement Bearings: Furnished Std. size and .001", .002", .003", .015" Undersize.

Installing Rods:—Oil squirt hole toward camshaft.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.

Journal Diameter—2.7465".

Bearings—Interchangeable, shimless, precision type steel-backed, Moraine Durex "300" (copper nickel matrix with babbitt overlay) lined type.

Clearance—.0005-.0025".

Bearing Adjustment:—None (no shims). Replace bearings (upper halves can be 'rotated' in and out).

Replacement Bearings: Furnished Std. size and .001", .002" Undersize.

End Thrust:—By #3 bearing. **Endplay**—.003-.008".

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*

CAMSHAFT: Five bearing type. Non-adjustable (two sprocket) chain drive.

Bearings—Shimless, precision, steel backed, babbitt lined type. **Clearance**—.001-.003".

End Thrust:—Taken by thrust plate in back of camshaft sprocket. **Endplay**—.0025-.006".

Timing Chain: Morse or Ramsey. Width 1¼". Pitch .375". Length 21¾" or 58 links.

Camshaft Setting:—Install chain and sprockets together with '0' marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 31/64"	.33975"	5.619"
Exhaust	1⅜"	.33975"	5.619"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.318"	.0015-.0035"
Exhaust	45°	.3175"	.0035-.0055"

Valve Guides:—Pressed in block from above with upper end 31/32" below valve seat. Exhaust guides counter-bored on upper inner diameter to ⅜" diameter and ⅜" deep.

Valve Springs:—Intake and exhaust springs interchangeable. Anti-rotation serrated washer installed on top of springs.

	Spring Pressure	Spring Length
Valve Closed	52-57 lbs.	1 5/8"
Valve Open	119-129 lbs.	1 5/16"

Valve Lifters:—Mushroom type. Remove from below with camshaft out. Lifters furnished .001", .002", .005" oversize. Use Tool S.T. 5144 (piloted in valve guide) and ream for .005" oversize lifters.

Diameter—.6235-.6240". **Clearance**—.0003-.0012".

VALVE TIMING

Tappet Clearance:—.007" Intake, .010" Exh. (warm & idling). NOTE—Self-locking tappet screw used.

Valve Timing:—See Camshaft Setting above.

Intake Valves—Open 1° BTDC. Close 39° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Above figures correct with .0125" Intake, .015" Exhaust tappet clearance.

Valve Timing Check—With .0125" tappet clearance #1 intake valve should open with #1 piston 1° or .0004" BTDC with 1st graduation before top dead center mark '#1 UP DC' on vibration damper lined up with pointer (permissible variation 4° either way). Reset tappet clearance .007" (hot & idling).

LUBRICATION

Engine Oiling System: Full pressure system (pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters, and timing chain). Oil pump mounted externally on right side of crankcase.

Crankcase Capacity—5½ quarts.

Normal Oil Pressure—40 lbs. at driving speeds.

Oil Pressure Regulator—On oil pump cover. Not adjustable. Pressure regulator spring tension should be 14 lbs. ± 2 oz. at 1⅞".

Oil Pump: Gear type. On right side of crankcase.

Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*

Oil Filter: Special equipment.

Servicing—Renew filter cartridge at 8000-10000 mile intervals.

C LING

Cooling System: Pressure type with pressure valve (relief valve) in radiator filler cap. Water pump mounted on front of engine with generator & fan belt drive.

Capacity—17 quarts.

Radiator Core Removal—*See Packard Shop Notes.*

Pressure Valve—In filler cap. Opens at 4½ lbs.

Water Pump:—Packless, sealed ball-bearing type.

See Water Pump Section for complete data.

Removal—Remove fan belt, disconnect pump hose, take out pump mounting screws, lift out pump.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Harrison. In cylinder head outlet.

Setting—Starts to open at 145-150°F. (Std. Type), 160-165°F. (Optl. High Reading Type).

CLUTCH

Long Model 10CF-CI. Single plate, semi-centrifugal, dry disc type.

See Clutch Section for complete data.

Facings—Woven (US Asbestos) type, 2 required. I.D. 6". O.D. 10". Thickness .125" (⅛").

Adjustment:—Adjust nut on pedal rod (at clutch fork) for 1½-1¾" free travel (2" on cars with Electromatic Clutch).

Removal:—Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect and remove pedal rod, clutch throw-out bearing. Remove clutch cover screws (release tension evenly) and lower assembly out.

ELECTROMATIC CLUTCH

Electromatic Clutch—Vacuum type actuation with electrical control. Optl. on all models.

See Clutch Section for complete data.

TRANSMISSION

Own Make. Helical gear, constant-mesh, synchro-mesh (Second & High), constant-mesh (Low). Sliding spur gear (Reverse). Low & Second speed gears are ball bearing mounted.

See Transmission Section for complete data.

Transmission Control: Remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal:—Disconnect shifter rods, speedometer cable, hand brake cable at equalizer, engine ground strap, overdrive cable and solenoid wires (if used); front universal (block drive shaft up against floor pan) and rubber bearing at rear of overdrive. Support rear of engine with jack and unbolt cross member (at frame ends and transmission case), disconnect clutch retractor spring and fore-and-aft restraint rod. Take out transmission-to-housing mounting screws, remove transmission assembly.

OVERDRIVE

►*INSTALLATION OF R11 OVERDRIVE (To replace original R9 Assembly)—See "Warner R11 Overdrive" in Transmission Section for complete data.*

Warner Model AS2-R9 ("Econo-drive" used with Packard Transmission). Electric solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down."

See Transmission Section for complete data.

►**Overdrive Lock-up in Reverse Correction for Clipper:** Install 1948 Safety Switch (Kit No. 394484). *See 1948 Packard Car Pages for Overdrive Safety Switch description and Car Wiring Diagram showing Overdrive Circuit with Safety Switch installed.*

Overdrive Indicator Light—Green light on right side of speedometer dial. Lights when overdrive is ready to engage (at car speed of 22 MPH), goes out when accelerator pedal released momentarily to engage overdrive.

Overdrive Relay—Delco-Remy No. 1116823.

Removal: Disconnect control cable and all leads to solenoid, governor, and lockout switch. Free mounting at rear of overdrive case. Then remove overdrive and transmission assembly as directed in Transmission removal (above).

UNIVERSALS

Mechanics Type 3CR. Needle bearing type, 2 used.

►CAUTION—Rear universal flange nut controls rear axle pinion bearing pre-load which **must be adjusted whenever nut is loosened.** *See Packard Rear Axle article in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

►*REAR AXLE OIL SEAL LEAKAGE CORRECTION—See "Packard Rear Axle" in Rear Axle Section for complete data.*

Ratio—4.1-1 (Std.), 4.3-1 (With Overdrive).

Backlash—.003-.005". Screw adjustment.

Removal:—Remove wheel, hub, and brake backing plate assembly. Withdraw axle shafts. Disconnect rear universal joint and drop drive shaft. Remove carrier-to-housing bolt nuts, withdraw carrier.

Wheel Bearing Adjustment—Endplay controlled by shims between flanged end of housing and brake backing plate. Unbolt backing plate and clips holding brake tube to housing. Add or remove shims (endplay up to .050" can be adjusted to desired .006" at one wheel). **Endplay**—.004-.007".

SHOCK ABSORBERS

Delco Model 1946-J,K (front), Model 1040-V (rear). Hydraulic, double acting (front), direct (rear).

Fifth Shock Absorber (Stabilizer):—Monroe 373935. Direct acting, hydraulic (built-in rear stabilizer).

FRONT SUSPENSI N

Front Suspension: Clipper Type Packard Safe-T-Flex, independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—5°35' crosswise.

Camber—0° plus or minus ¼°.

Caster—Neg. 1° plus or minus ½°. Adjustable.

Toe In—0" (plus 1/16", minus 0") at hub height. Adjust by turning adjuster at outer end of each tie rod equally.

Steering Geometry—Inner wheel 23° ± ½°. Outer 20°.

STEERING GEAR

Steering Gear: Own Make (same design as Gemmer Model 335) Worm & Roller with "push-pull" adjustment.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, 4-wheel, Duo-Servo, Single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Drums—Centrifuse. Diameter 12".

Lining—Marshall 2201H-8 (primary shoe), Marshall B-50 (secondary). Width 1¾". Thickness 3/16". Length per shoe 11½" (primary), 13" (secondary).

Clearance—.015" at both end of secondary shoe with primary shoe forced out against drum.

Hand Brake:—See Service Brake (above).

MISC. MECHANICAL

WINDSHIELD WIPER: Stewart-Warner Type 645-H. Electric-type. NOTE—'Klixon' type circuit-breaker mounted on unit (no fuse used).

See Miscellaneous Section for complete data.

HOOD LOCK: One piece design, side hinge type hood with remote control levers at each side of front compartment under instrument panel. To raise hood, push remote control lever in to unlocked position on side to be raised, raise hood about 1", release safety catch under hood (approx. 2" ahead of rear edge of hood), raise hood up and prop in open position with lever pivoted on dash.

MODEL IDENTIFICATION

SERIAL NUMBER: On left side of cowl (use Eng. No.).

ENGINE NUMBER: First No. F-500001 (1946), F-506001 (1947). On upper left side of cylinder block between #3 and #4 cylinders.

TUNE-UP

COMPRESSION: Pressure—133 lbs. at 300 RPM.

VACUUM READING: Steady 18½" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUGS: AC No. 104 or Champion Y4-A. 10mm. or Auto-Lite No. P-4. 10 mm.
Gaps—.028" (.0255-.0305").
NOTE—Tighten spark plugs to 50 inch lbs. only.

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.017". **Cam Angle**—27° Closed.
Breaker Arm Spring Tension—17-20 ozs.
Automatic Advance—Starts 250 RPM, 6° at 700 RPM, Max. 11½° at 1800 RPM. Distributor degrees & RPM.
Vacuum Advance—Starts with 7" of vacuum, Max. 5½° with 16" of vacuum. Distributor degrees.

IGNITION TIMING: See Ignition Timing.
Std. Setting—4° BTDC.
Timing Mark—Vibration dampener at front of engine marked "#1 UP.DC" with fifteen 1° graduations before this point. Set ignition contacts to open at 4th graduation before "DC" mark.
Fuel Compensator—Set for slight ping accelerating with wide open throttle.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—Set both idle adjusting screws 1 to 2 turns open. Adjust for smooth idle. Idle speed 6 MPH.
Float Level—5/32" from top of float to cover with valve seated (remove gasket and invert to check).
Accelerating Pump—Inner Hole (minimum) Normal, outer hole (max. stroke) if greater charge required.

Choke Setting: Coil Housing Centered at index.

Fuel Pump Pressure: 4¾ lbs. maximum.

MANIFOLD HEAT CONTROL: Thermostatic coil type. Make certain that valve operates freely and does not bind or stick.

VALVES: See Valve Timing.
Tappet Clearance—None in service (automatic hydraulic type tappet take-up).

STARTING: See Battery, Starter, Generator, and Regulator.

IGNITION

IGNITION SWITCH: Mitchellock Switch Model 24-B. Auto-Lite No. CE-2260BCS Lock Switch and cable.
Ignition Lock Cylinder—Briggs & Stratton 50184.
Key Series—P1251 to P1500. **Groove**—No. 2.

COIL: Auto-Lite No. CE-4659. Service Coil (less switch & cable) CE-3224US. On dash.
Ignition Current—2.4 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671J.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite No. IGT-4203 (or IGT-4102). Automatic advance type with Vacuum Spark Control and Fuel Compensator adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot and marked by number (#5½) on plate.
Breaker Gap—Set at .017".
Cam Angle—27° closed, 18° open (with .017" gap).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	250	0	500
3	475	6	950
6	700	12	1400
9	1300	18	2600
11½	1800	23	3600

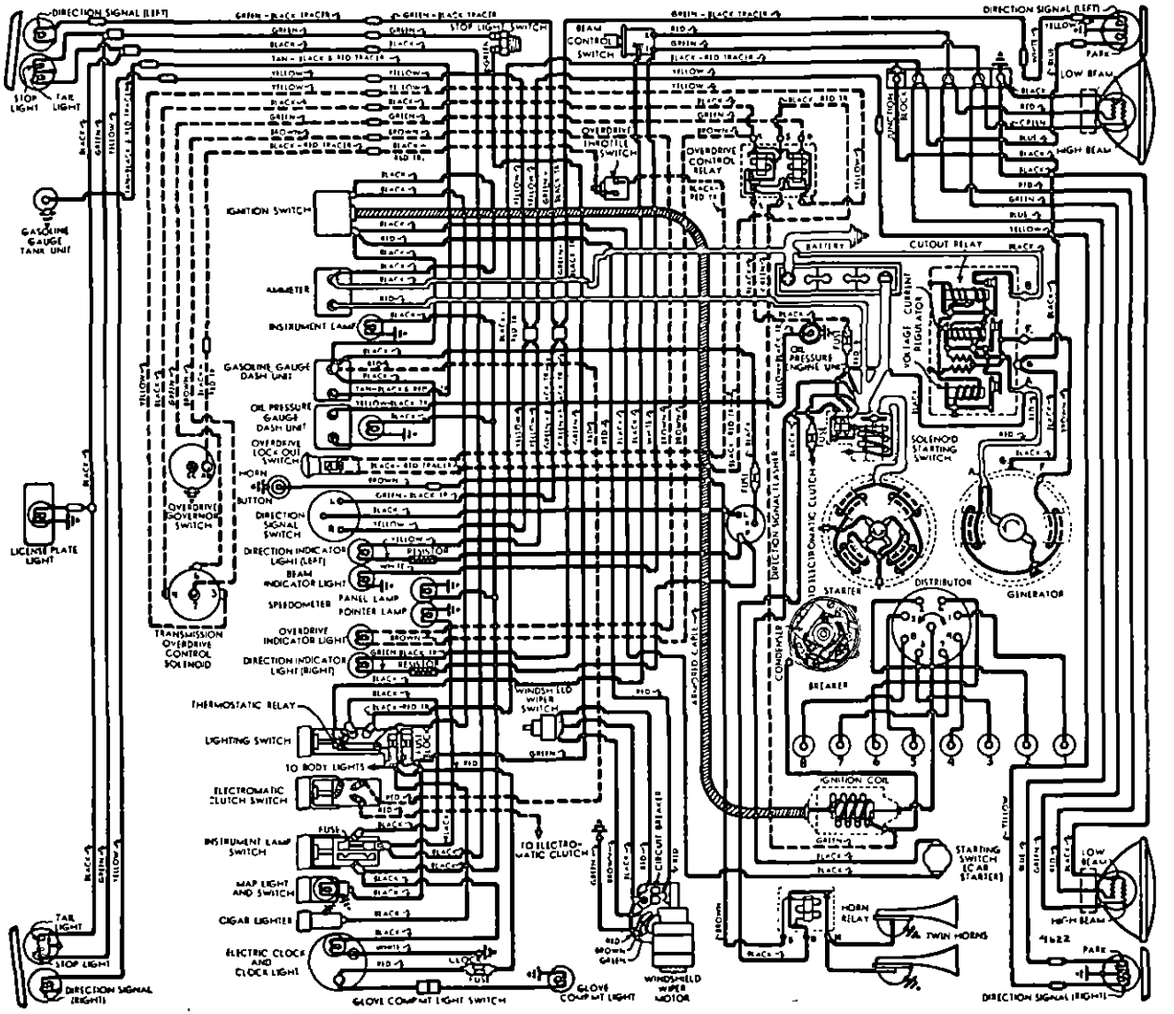
Fuel Compensator—Manual adjustment at distributor providing 10° advance or retard from center '0' position. See Ignition Timing for setting.

Vacuum Spark Control: Auto-Lite Unit. On distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring in unit).

Vacuum Advance

Distr. Degrees	Engine Degrees	Vacuum (" of HG)
Start	0°	7"
1°	2°	8⅝"
3°	6°	12"
4°	8°	13½"
5½°	11°	16"

Distributor Removal:—Mounted on left side of crankcase. To remove, disconnect vacuum line and take out hold-down screw in advance arm.



IGNITI N TIMING

Std. Setting—As given below. See Fuel Compensator Setting for service and fuel corrections.

	Flywheel Degrees	Piston Position
All Engines	4° BTDC	.0070" BTDC.

Timing Mark—Vibration dampener at front of engine marked '#1 UP.DC' at top dead center for #1 piston with 15 (1°) graduations before this mark.
Timing—Loosen thumbnut, set Fuel Compensator pointer at '0', tighten thumbnut. With #1 piston on compression, turn engine over until piston reaches firing position (see table above) with 4th graduation ahead of #1UP.DC mark in line with pointer on chain case cover. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt, see that rotor opposite #1 segment in distributor cap, check Fuel Compensator setting (following).
Timing (Neon Timing Light)—Mark 4th graduation ahead of #1UP.DC mark on vibration dampener with white paint, clip neon timing light at #1 spark plug and direct light on vibration dampener, idle engine below 500 RPM and adjust distributor as directed above until mark in line with pointer on chain case cover.
Fuel Compensator Setting—Should be set for slight ping when accelerating with wide open throttle. To adjust, loosen thumbnut, rotate distributor counter-clockwise (if ping too severe), clockwise (if no ping noted), tighten thumbnut and recheck performance.

CARBURETOR

Carter Type WDO, Model 531S, SA. 1¼" Dual downdraft type with Carter Climatic Control.
See Carburetor Section for complete data.
Casting Numbers—377 (531S), 564 (531SA).
►*CARBURETOR RECOMMENDED CHANGES (for better Low Speed Performance and Increased Gas Mileage)—See "Carter WDO" in Carburetor Section for complete data.*
Idle Setting—With engine warm (fast idle inoperative), set throttle stopscrew for 6 MPH idle speed. (Std.), 8-10 MPH. (Cars with Electromatic Clutch) Adjust both idle screws (1 for each barrel, adjust alike) for smooth idling performance (turn screws in for leaner mixture, correct setting 1 to 2 turns open for each screw. Recheck idle speed.
Accelerating Pump—Pump arm under dust cover at top of carburetor has two holes for pump link engagement. Set as follows:
Inner Hole (min. stroke)—Normal setting.
Outer (max. stroke)—If greater charge required.
Float Level—5/32" from top of float to bowl cover with valve seated (remove gasket & invert to check).
Metering Rods & Jets—*Refer to Carburetor Index for Carter Downdraft Carburetor Jet Specification Table.*
Fast Idle:—Integral type (built-in carburetor).
See Carburetion Equipment Section for data.
Setting—Adjust fast idle screw for .023-.028" throttle opening (Gauge T109-189) with choke closed.
Automatic Choke:—Carter Climatic Control.
See Carburetion Equipment Section for data.
Setting—Set thermostat coil housing at index.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., Heavy duty Oil-bath type Optl.
Servicing (Oil-wetted type)—Wash and re-oil filter element whenever crankcase oil changed (1000-2000 mile intervals for normal service).
Servicing (Oil-bath type)—Clean filter element, clean and refill oil reservoir with SAE No. 50 engine oil (Summer), SAE No. 30 (Winter) to level of indicator line on case (approx. 1 pint) whenever crankcase oil changed (1000-2000 mile intervals).
Oil Filler Cap (Crankcase Ventilator Filter)—Wash filter element in filler cap and re-oil when servicing air cleaner.
Fuel Pump: AC. Type AH. Diaphragm type fuel pump. Exchange Pump AC No. 545.
See Carburetion Equipment Section for data.
Pressure—4-4¾ lbs. max.
Gasoline Gauge:—Stewart (Stewart-Warner) electric.
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type PN-17ZR. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—138 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.1 minutes. Five second voltage 4.35 volts.
Grounded Terminal—Positive (+) to frame.
Dimensions—Length 19⅜". Width 4". Hght. 9 3/16".
Location—On left side in engine compartment.

STARTER

Auto-Lite Model MAX-4052. Armature MAW-2069.
Drive—Overrunning clutch (solenoid pinion shift) through reduction gears.
Rotation—Clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	RPM①	Volts	Amperes
0 ft. lbs.	2700	5.5	77
33.5 "	Lock	3.0	650
45.9 "	Lock	4.0	900

①—Pinion shaft RPM. (reduction gear drive).
Removal:—Flange mounted on left front face of flywheel housing. To remove, take out flange mounting screws, lift out starter and switch assembly.
Starting Switch: Auto-Lite Model SS-4205 Solenoid type. Mounted on starter and controlled by Carter Car Starter Model 192-11U mounted on carburetor (accelerator pedal starting). *See Electrical Equipment Section for Auto-Lite Solenoid Switches and Carter Car Starter.*

GENERATOR

Auto-Lite Model No. GEA-4802A-1. Armature No. GDZ-2006F. Two brush type with Current and Voltage control. Air cooled by fan on pulley.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes (hot or cold), 8.0 volts, 1700 RPM and above with load or discharged battery (Current Regulator setting). Actual charging rate controlled by Voltage Regulator and dependent on battery condition.

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	850	0	6.4	865
4	6.6	950	4	6.6	975
8	6.75	1050	8	6.75	1075
12	6.95	1150	12	6.95	1180
16	7.1	1250	16	7.1	1300
20	7.3	1345	20	7.3	1425
24	7.5	1440	24	7.5	1560
28	7.7	1540	28	7.7	1695
32	7.85	1635	32	7.85	1850
35	8.0	1700	35	8.0	1970

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—53 ozs. max. (new brushes).
Field Current—1.57-1.75 amperes at 6.0 volts.
Motoring Current—4.45-4.9 amperes at 6.0 volts.
Removal:—*Pivot mounted at left front of engine.* To remove, take out pivot and clamp bolts.
Belt Adjustment:—Swing generator out until 50 lb. reading secured on scale hooked to clamp bolt lug parallel to clamp link or until belt deflection midway between generator and water pump pulley is ½" with thumb pressure.

REGULAT R

Auto-Lite Model VRP-4002C. Voltage-Current Type. Vibrating type Voltage and Current Regulators in case with Cutout Relay.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts, 780 RPM (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
To Check (without breaking seals)—Connect ammeter in charging line at regulator 'B' terminal (use short heavy leads), voltmeter between 'B' terminal and ground. Operate generator at speed equivalent to 30 MPH., charging fully charged battery, until voltage is steady. Voltage reading should agree with setting given above.
To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. See Electrical Equipment Section.
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
To Check (without breaking seals)—Connect test meters as for voltage check (above). Operate generator at speed equivalent to 30 MPH. charging battery, turn on car lights and accessories or connect load (bank of headlamp bulbs, etc.) between ammeter and battery so that generator charges at peak rate and Current Regulator operates. Current reading should agree with setting given above. If more than slight excess noted, regulator is defective.
To Adjust (with cover removed)—Same as for Voltage Regulator (above).
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTIN

Headlamps: Hall "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red light on left side of speedometer. Lighted when Upper beams in use.

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Direction Signal: *See Electrical Equipment Section.*

Direction Signal Indicator—Illuminated arrows on face of speedometer dial. Right or Left arrow lighted when direction signal on same side operating.

Switches

Lighting—Delco-Remy No. 1995021.

Beam Selector—Delco-Remy No. 1997008.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	40-30 watts	Sealed Beam
Parking & Frt. Direc. Sig.	21-3	1154
Rear Direc. Sig.	21	1129
Direc. Sig. Indicator	1½	55
Beam Ind., Glove Compt.	1	51
Instrument, Map Light	1½	55
Clock & Speedometer ('46)	1	51
Clock & Speedometer ('47)	1½	55
Overdrive Indicator	1½	55
Courtesy, Dome	6	82
Stop & Tail	21-3	1154
Rear License	3	63

MISC. ELECTRICAL

THERMOSTATIC RELAY: Delco-Remy. On lighting switch. Contacts remain closed with 30 amperes, open in 3 minutes with 42 amps. at 70° F. Not adj.

FUSES: Auxiliary (Stop Light, Cigar Lighter, Body Lights, Accessories)—SFE 20 ampere. Two fuses on lighting switch.

Instrument & Tail Light—SFE 20 ampere. On Panel Light Switch.

Clock—SFE 4 ampere. In clock lead near clock.

Overdrive—SFE 30 ampere. In relay lead.

Direction Signal—9 ampere. In flasher lead.

HORNS: Sparton. Vibrator type, air tone, twin horns operated by relay.

Horn Current—22-25 amperes.

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: Eight cylinder, "L" head type.
Bore—3½". **Stroke**—4⅝".

Displacement—356 cubic inches. **Rated HP**—39.2.

Developed Horsepower—165 at 3600 RPM.

Compression Ratio—6.85-1 cast-iron head. No Optl.
Compression & Vacuum Reading—*See Tune-up data.*

ORIGINAL BORE & PISTONS: *See Packard Shop Notes*

TIGHTENING TORQUES: *See Packard Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Packard Shop Notes.*

PISTONS: Aluminum alloy, autothermic strut type.
Length—3⅞".

Weight 20¼ oz. (stripped), 26¾ (with rings & pin).

Removal—Pistons and rods removed from above.

Clearance—.0005-.001". See Fitting New Pistons.

Replacement Pistons: *See Packard Shop Notes.*

Fitting New Pistons:—Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 12-18 lbs.

Installing Pistons:—Slot toward valves.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 70 second groove), one oil control ring (No. 86) per piston, all above pin. Oil ring groove has twelve 5/32" oil drain holes.

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0930-.0935"	.007-.017"	.0025-.003"
Comp. (#2)	.1240-.1235"	.007-.017"	.0025-.003"
Oil Control	.1865-.186"	.007-.015"	.0025-.003"

NOTE—Oil Ring (Perfect Circle No. 86) has coil spring type expander spring.

Replacement Rings:—.005", .010", .020", .030", .040" O.S. Triple Action (packaged sets) std. & .020" oversize.
See Packard Shop Notes for Piston Ring data.

PISTON PIN: Diameter ⅞". Length 3 1/64".
Pin floats in piston and rod. Held by locking rings.

Pin Fit in Piston—Palm push fit with piston at 160°F (heat in water).

Pin Fit in Rod Bushing—Finger push fit at 70°F.

Piston Pin & Connecting Rod Bushing Servicing—*See Packard Shop Notes.*

Replacement Pins: Std. and .003", .006", oversize.

CONNECTING ROD: Length—9¼". **Weight**—39 ozs.
Upper Bearing (Piston Pin Bushing)—Split type.
See Packard Shop Notes for Piston Pin servicing data.

Crankpin Journal Diameter—2.250".

Lower Bearing—Shimless, precision, steel backed, Moraine Durex "300" (copper nickel matrix with babbitt overlay) lined type.

Clearance—.0005-.0025". **Endplay**—.004-.010".

Bearing Adjustment:—None (no shims). Replace bearings. Do not file rods or caps.

Replacement Bearings: Furnished Std. size and .001", .002", .003", .015" Undersize.

Installing Rods:—Oil squirt hole toward camshaft.

CRANKSHAFT: Nine bearing type with bolted-on counterweights and vibration dampener at forward end.

Journal Diameter—2.7465".

Bearings—Interchangeable, shimless, precision, steel-backed, Moraine Durex "300" (copper nickel matrix with babbitt overlay) lined type.

Clearance—.0005-.0025".

Bearing Adjustment:—None (no shims). Replace bearings (upper halves can be 'rotated' in and out).

Replacement Bearings: Furnished Std. size and .001", .002" Undersize.

End Thrust:—By #5 bearing. **Endplay**—.003-.008".

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*

CAMSHAFT: Eight bearing type. Non-adjustable (two-sprocket) chain drive.

Bearings—Shimless, precision, steel-backed, babbitt lined type. **Clearance**—.001-.003".

End Thrust:—Taken by thrust plate in back of camshaft sprocket. **Endplay**—.0025-.006".

Timing Chain: Morse. Width 1¼". Pitch .375" (⅜"). Length 23¼" or 62 links.

Camshaft Setting:—Install chain and sprockets together with '0' marks on sprockets adjacent and in line with a straightedge across the shaft centers.

VALVES:

	Head Diameter	Stem Diameter	Length
Intake	1.670"	.34025"	6.224"
Exhaust	1 7/16"	.34025"	6.224"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.340"	.001-.003"
Exhaust	45°	.340"	.003-.005"

Valve Guides:—Pressed in block from above with upper end 31/32" below valve seat. Exhaust guide upper end counterbored to ⅜" diameter, ⅜" deep.

Valve Springs:—Washer used on top of each spring.

	Spring Pressure	Spring Length
Valve Closed	60-66 lbs.	1¾"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters:—Wilcox-Rich 'Zero-lash' type hydraulic lifters (mushroom type). Remove from below with camshaft out. Lifters furnished .001", .002", .005" oversize. Use Tool S.T. 5101 (piloted in valve guide) and ream for .005" oversize lifters.
Refer to Packard Shop Notes for checking Valve Lifter Clearance when grinding valves.

Diameter .7177-.7182". **Clearance** .0002" selective.

Hydraulic Valve Lifter Removal & Overhaul: *See "Hydraulic Valve Lifters" in Packard Special Data.*

VALVE TIMING

Tappet Clearance:—None in service (hydraulic type lifter). *See Valve Servicing in Packard Shop Notes.*

Valve Timing:—See Camshaft Setting above.
Intake Valves—Open 4° BTDC. Close 51° ALDC.
Exhaust Valves—Open 49° BLDC. Close 10° ATDC.
Valve Timing Check—#1 exhaust valve close 10° after top dead center (#1 piston .0438" ATDC) with hydraulic lifter dry (all oil drained out) and built up with feeler stock for zero tappet clearance.

LUBRICATION

Engine Oiling System: Full pressure system (pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters, and timing chain). Oil pump mounted externally on right side of crankcase.

Crankcase Capacity—7 quarts.

Normal Oil Pressure—50 lbs. at driving speeds.

Oil Pressure Regulator—On oil pump cover. Not adjustable. Pressure regulator spring tension should be 17½-18½ lbs. at 1⅞".

Oil Pump: Gear type. on right side of crankcase.
Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*

Oil Filter: Std. equipment. On left side of engine.
Servicing—Replace filter cartridge at 8000-10000 mile intervals.

Oil Pressure Gauge: Stewart-Warner Electric type.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in radiator filler cap. Water pump mounted on front of engine (belt driven with generator and fan).

Capacity—20 quarts.

Pressure Valve—In filler cap. Opens at 7 lbs. (Std.), 12 lbs. (with Air Conditioning equipment).

Water Pump:—Packless, sealed ball-bearing type.
See Water Pump Section for complete data.

Thermostat: Harrison. In water outlet elbow on cylinder head.

Setting—Starts to open at 145-150°F. (Std. Type), 160-165°F. (Optl. High Reading Type).

CLUTCH

Long Model 11CF-CI. Single plate, semi-centrifugal, dry disc type.

See Clutch Section for complete data.

Facings—Woven type (US Asbestos), 2 required. I.D. 6". O.D. 11". Thickness .125" (⅛").

Pedal Adjustment: 1¾-2¼" (Std.); 2" (with Electromatic Clutch) pedal free travel. Adjusting nut (with locknut) located on clutch fork end of connecting link.

Removal: Remove Transmission (see Transmission Removal below), disconnect pedal linkage, remove throw-out bearing. Remove clutch cover mounting screws evenly to relieve spring pressure, remove clutch and driven member.

ELECTROMATIC CLUTCH

Electromatic Clutch—Vacuum type actuation with electrical control. Optl. on all models.

See Clutch Section for complete data.

TRANSMISSION

Own Make. Helical gear, constant-mesh, synchromesh (Second & High), constant-mesh (Low), sliding spur gear (Reverse). Constant-mesh gears (Low & Second) are ball-bearing mounted.

See Transmission Section for complete data.

Transmission Control: Remote control type with shift lever mounted on steering column.

See Transmission Section for complete data.

Removal: Disconnect shifter rods, speedometer cable, hand brake cable at equalizer, and ground strap at transmission. Disconnect front universal joint, block drive shaft up for clearance. Support engine with jack, unbolt frame cross-member carrying rear engine mountings and remove cross-member. Remove flywheel housing lower cover, disconnect stabilizer rod (from transmission to X-member). Take out transmission-to-housing mounting screws, pull transmission straight back and remove from car.

OVERDRIVE

►*INSTALLATION OF R11 OVERDRIVE (To replace original R9 Assembly)—See "Warner R11 Overdrive" in Transmission Section for complete data.*

Warner Model AS1-R9A ("Econo-drive" used with Packard Transmission). Electric solenoid operated type (no centrifugal pawls) with Governor control and throttle operated "kick-down."

See Transmission Section for complete data.

►**Overdrive Lock-up In Reverse Correction for Clipper:** Install 1948 Safety Switch (Kit No. 394484). *See 1948 Packard Car Pages for Overdrive Safety Switch description and Car Wiring Diagram showing Overdrive Circuit with Safety Switch installed.*

Overdrive Indicator Light—Green light on right side of speedometer dial. Lights when overdrive is ready to engage (at car speed of 22 MPH), goes out when accelerator pedal released momentarily to engage overdrive.

Overdrive Relay—Delco-Remy No. 1116823.

Removal: Disconnect control cable and all leads to solenoid, governor, and lockout switch. Free mounting at rear of overdrive case. Then remove overdrive and transmission assembly as directed in Transmission removal (above).

UNIVERSALS

Mechanics Type 3CR. Needle bearing type, 2 used.

►*CAUTION*—Rear universal flange nut controls rear axle pinion bearing pre-load which **must be adjusted whenever nut is loosened.** *See Packard Rear Axle article in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive. NOTE—Ring gear has special Support Roller. Housing cover is welded in place.

See Rear Axle Section for complete data.

►*REAR AXLE OIL SEAL LEAKAGE CORRECTION—See "Packard Rear Axle" in Rear Axle Section for complete data.*

►**Pinion Bearing Spacer**—*CAUTION*—1/16" spacer used on some 2103, 2106, 2126 cars. *See 1946-47 Packard in Rear Axle Section.*

Ratio—3.92-1 (Std.), 4.09-1 (With Overdrive).

Backlash—.003-.005". Screw adjustment.

Removal: Remove wheel, hub, and brake backing plate assembly, withdraw axle shafts. Disconnect rear universal joint and drop drive shaft. Remove axle carrier mounting bolt nuts, withdraw carrier assembly.

Wheel Bearing Adjustment—Endplay controlled by shims between flanged end of housing and brake backing plate. To adjust endplay, unbolt backing plate and clips holding brake tube to housing, add or remove shims.

Endplay—.004-.007"

SHOCK ABSORBERS

Delco No. 1946-J,K (front), Monroe No. 18096 (rear), Hydraulic, double acting (front), direct (rear).

EXPORT CARS—Used Delco 1040-V (direct) rear.

Fifth Shock Absorber (Stabilizer): Monroe Model 373935 Direct acting type (built-in one end of stabilizer bar).

FRONT SUSPENSION

Front Suspension (Clipper):—New type Packard Safe-T-fleX (parallelogram type with upper & lower support arms and coil springs—no torque arms)

See Front Suspension Section for complete data.

Kingpin Inclination—5°35' crosswise.

Caster—Negative 1° plus or minus ½°.

Camber—0° plus or minus ¼°.

Toe In—0-1/16" measured 10" up from floor.

Steering Geometry Inner wheel 23° ± ½°. Outer 20°.

STEERING GEAR

Steering Gear: Own Make (same design as Gemmer Model 335) Worm & Roller with "push-pull" adjustment.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, 4-wheel, Duo-Servo, Single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Drums—Centrifuse type. Diameter 12".

Lining—Marshall 2201H-8 (primary),) B-50 (secondary). Width 2¼" (front wheels), 2" (rear wheels). Thickness 3/16". Length per shoe 11½" (primary), 13" (secondary).

Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

WINDSHIELD WIPER: Stewart-Warner Type 645-H. Electric type. NOTE—"KLIXON" type circuit breaker mounted near wiper motor.

See Miscellaneous Section for complete data.

ELECTRICAL EQUIPMENT NOTE: Both Auto-Lite and Delco-Remy electrical equipment are used.

M DEL IDENTIFICATION

►**1949 MODEL DESIGNATION**—These models are continuation of 1948 "2200" Series with "—9" following Model No. and Body No. Engine Nos. are continuation of 1948 Nos.

SERIAL NUMBER: On left side of cowl (use Eng. No.).

ENGINE NUMBER: Stamped on upper left side of cylinder block between #3 and #4 cylinders.

1948 Numbers—G-200001 Up (8), G-400001 Up (Super 8).

►***ENGINE NUMBER CODE: Marks following engine number indicate changes or differences over unmarked engines as follows:***

★—Engine Bore, .020" Oversize.
"A"—Oversize Valve Guides used.
"C"—Late type Pistons and Rings used.
"CD"—Same as "C" and "D".
"CE"—Same as "C" and "E".
"D"—7 qt. oil pan—"7 qt." mark on dip stick.
"E"—7 qt. oil pan and Late type Camshaft used.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. cranking speed.

VACUUM READING: Steady 18-20" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAP: .028", Limits .025-.030".

Plug Types—Auto-Lite P-4, AC No. 104, or Champion Y4A. 10 mm. Metric.

CAUTION—Avoid overtightening plugs. Tighten snugly with fingers using plug wrench.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.017". Limits .013-.018".
Cam Angle—Closed 27° Auto-Lite, 31° Delco-Remy.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 6° BTDC.
Timing Procedure—*See Ignition Timing.*
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of this point. Set ignition contacts to open at 6th graduation before "DC"
Fuel Compensator Setting—Slight ping accelerating with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—⅝-1⅛ turns open (Eight), ¾-1¼ turns open (Super 8). Two screws—turn out for richer mixture.
Idle Speed (standard)—6 MPH.
Float Level—5/32" from top of float to cover with valve seated (remove gasket and invert to check).
Accelerating Pump—Not adjustable on 643S, SA. Inner Hole (Normal 644S, SA). Outer hole if more charge needed.
Fuel Pump Pressure—4-4¾ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: *CAUTION—Special setting for early & late camshafts:*

►**ENGINES WITH EARLY CAMSHAFT**
.006" Intake, .008" Exhaust, Hot. (Supersedes original setting of .007" Int. & .010" Exh. to reduce tappet noise).

►**ENGINES WITH LATER CAMSHAFT**
►**With Code "CE" or "E" following Engine No.**
.007" Intake, .010" Exhaust, Hot.

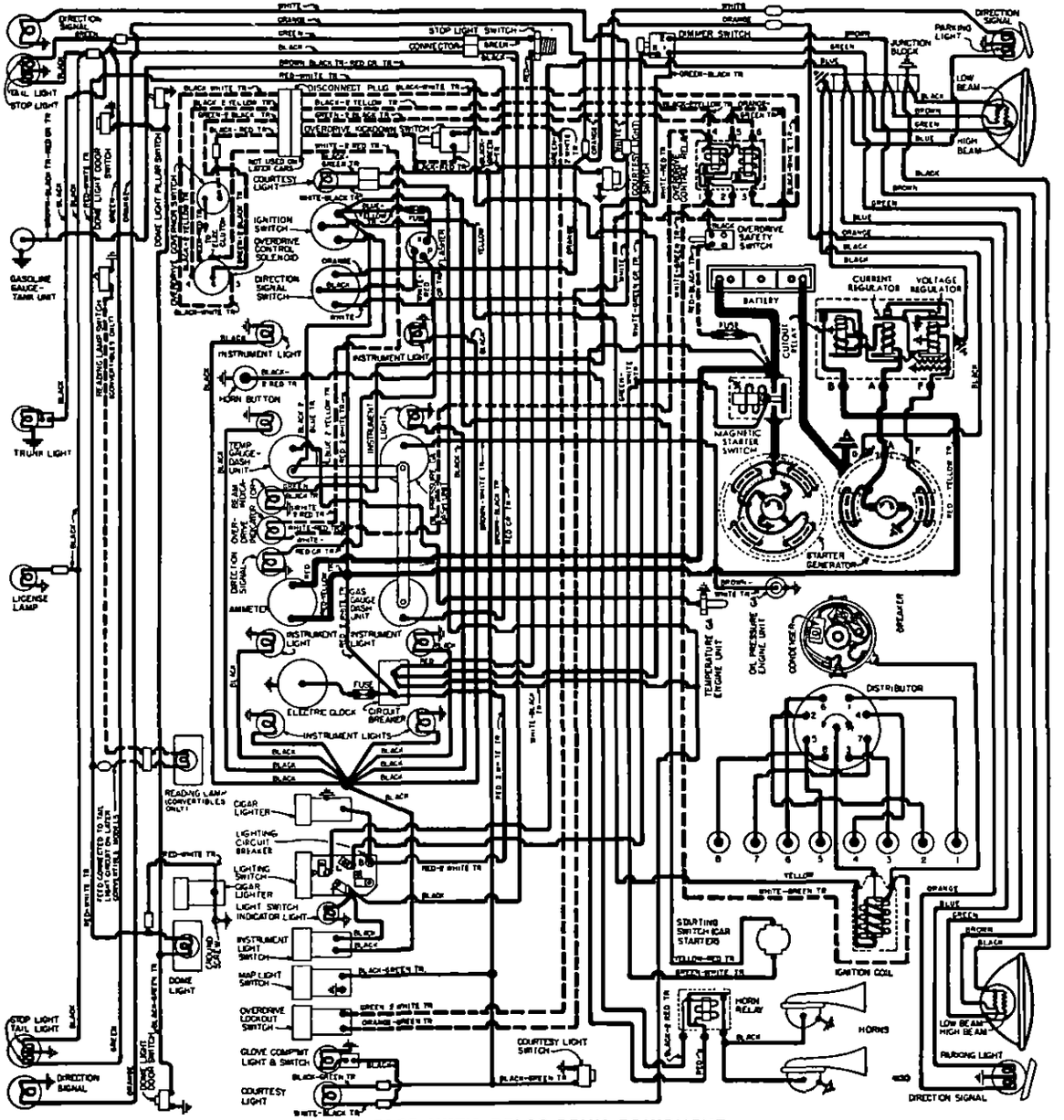
STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

AUTO-LITE

IGNITION SWITCH: Mitchellock Type 42-B.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—P1251 to P1500. **Groove**—No. 2.

COIL: Auto-Lite Model CE-4033.



CARS WITH DELCO-REMY EQUIPMENT
SEE "2300" SERIES FOR 1949 R11 OVERDRIVE WIRING (1948 R9 SHOWN ABOVE)

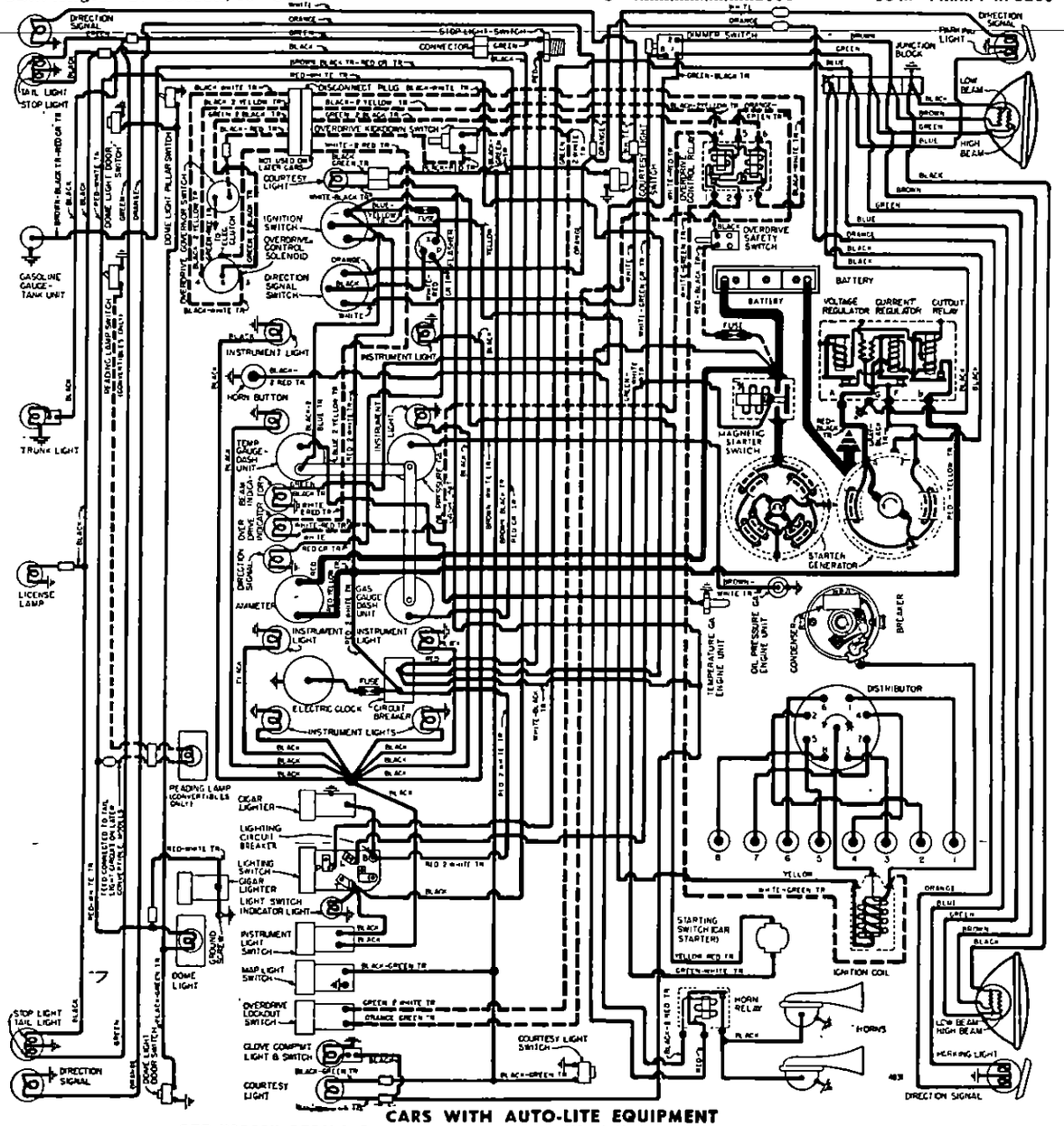
Location—Left side of engine above distributor.
Ignition Current—2.75 amps. idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4502B. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.
Breaker Gap—.017". Limits .013-.018".
Cam Angle—27° Closed, 18° Open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Auto-Lite)

Degrees Start	Distr. R.P.M.	Degrees	Eng. R.P.M.
	300	0	600
1	400	2	800
3	600	6	1200
6	1200	12	2400
8	1600	16	3200



CARS WITH AUTO-LITE EQUIPMENT
SEE "2300" SERIES FOR 1949 R11 OVERDRIVE WIRING (1948 R9 SHOWN ABOVE)

Fuel Compensator: 40° range of adjustment on quadrant at vacuum link connection. See Ign. Timing.

Vacuum Spark Control: Auto-Lite. Mounted on hold-down plate and linked to adjusting quadrant on distributor. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring.

Vacuum Advance (Auto-Lite)

Distr. Degrees Start	Eng. Degrees	Vacuum (" of HG)
	0°	6"
2°	4°	9⅜"
4°	8°	10½"
6°	12°	12⅞"
7°	14°	14"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down plate screw,

IGNITI N

DELCO-REMY

IGNITION SWITCH: Mitchellock Type 42-B.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—P1251 to P1500. Groove No. 2.

COIL: Delco-Remy No. 1115380.
Location—Left side of engine above distributor.
Ignition Current—2.4 amperes idling, 5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy Model 1110811. Automatic advance type with Vacuum Spark Control and Fuel Compensator.
Breaker Gap—.017". Limits .013-.018".
Cam Angle—31° Closed, 14° Open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Delco-Remy)

Degrees Start	Distr. R.P.M.	Degrees	Eng. R.P.M.
	300	0	600
4	600	8	1200
9	1600	18	3200

Fuel Compensator: 10° advance or retard adjustment at distributor. See Ignition Timing.

Vacuum Spark Control: Delco-Remy 1116041. Integral type mounted on distributor and linked directly to breaker plate. Plunger Travel—5/32" max.

Vacuum Advance (Delco-Remy)

Distr. Degrees Start	Eng. Degrees	Vacuum (" of HG)
	0°	5-7"
7°	14°	13.0-15.0"

Distributor Removal: Same as for Auto-Lite (above)

IGNITION TIMING

Std. Setting ..... **6° BTDC.**

NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.
Timing—With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampener in line with pointer on chain case cover (see table above). Loosen vacuum unit link screw in distributor quadrant (Auto-Lite distributors), or hold-down screw in advance arm (Delco-Remy distributors), rotate distributor until contacts begin to open, tighten screw.
Timing (with Neon Timing Light)—Mark 6th line ahead of "#1UP.DC" mark on vibration dampener with white paint, clip timing light to #1 spark plug.

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

Idle engine below 600 RPM., adjust distributor (as directed above) until mark lines up with pointer.
Fuel Compensator Setting—Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite Distributors), advance arm hold-down screw (Delco-Remy Distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping), until correct performance secured.

CARBURETOR

Eight.....**Carter WDO, No. 644S or SA.**
Super Eight.....**Carter WDO, No. 643S or SA.**
1¼" dual barrel downdraft types with Carter Climatic Control.
Casting No.—377 (643S), 561 (643SA, 644S, SA).
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Dual (WDO) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—.026" (643S, SA), .020" (644S, SA) throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of fast idle cam.

Automatic Choke: Carter Climatic Control (Dual Carburetors).
See Carburetion Equipment Section for complete data.
Setting—Centered (at index).

CARB. EQUIPMENT

Fuel Pump (Fuel-&-Vacuum): AC Type AJ. No. 1523867 or 1523629.

Replacement Pump—AC No. 508.

Pressure—4-4¾ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41635.
Tank Unit—K-S No. 41676 (Eight), 41678 (Super 8).
See Carburetion Equipment Section for complete data.

Air Cleaner (std.—oil wetted): AC No. 1544180 (Type #6 element).
Optl. (oil-bath)—AC. Element #14.
Servicing (oil-wetted type)—Wash and re-oil filter element every 1000 to 2000 miles whenever crankcase oil is changed.
Servicing (oil bath type)—Clean filter element, clean and refill oil reservoir with SAE No. 50 engine oil (Summer), No. 30 (Winter) to level of indicator line on case (approx. 1 pint) every 5000 miles or oftener if required.

BATTERY

Auto-Lite Type PN-15ZR or Willard SW-1D-100.
6 volt, 15 plate, 100 amp. hr. capacity (20 hr. rate).
Starting Capacity—120 amperes (Auto-Lite), 122 amperes (Willard) for 20 minutes.

Grounded Terminal—Positive (+) to frame.

Location—Left side in engine compartment.

STARTER
AUTO-LITE

Auto-Lite Model MCL-6003. Armature No. MCH-2021
Drive—Outboard Barrel Type Bendix No. A-1915.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data (Auto-Lite)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	4.0

Removal: On left front face of flywheel housing. To remove, take out flange mounting screws.

Starting Switch: Auto-Lite Model SS-4017 Magnetic Switch on starter controlled by Carter Car Starter No. 192-11U on carburetor (accelerator control).
See Electrical Equipment Section for complete data.

STARTER
DELCO-REMY

Delco-Remy Model 1107943. Armature No. 1910938.
Drive—Outboard Barrel Type Bendix No. A-1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.
Cranking Engine—175-225 amperes.

Performance Data (Delco-Remy)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 "	Lock	3.0	600

Removal: Same as Auto-Lite data (above).

Starting Switch: Delco-Remy Model 1452 Magnetic Switch on starter controlled by Carter Car Starter No. 192-11U on carburetor (accelerator control).
See Electrical Equipment Section for complete data.

GENERATOR
AUTO-LITE

Auto-Lite Model GDZ-4801F or GDZ-4801T. Arm. GDZ-2006F. 2 brush with voltage & current regulation.

Maximum Charging Rate—35 amperes, 8.0 volts.
Charging Rate Adjustment—None. See Regulator.

Performance Data (Auto-Lite)

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
10	6.85	1200	10	6.85	1290
20	7.3	1480	20	7.3	1590
30	7.8	1760	30	7.8	1980
*35	8.0	1900	35	8.0	2250

*—Current Regulator Setting.

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounted at left front of engine. To remove, take out strap screw and mounting bolts.

Belt Adjustment: ¼" belt deflection between fan and generator. Loosen adjusting strap screw, pry generator out for ¼" setting, tighten screw.

GENERATOR
DELCO-REMY

Delco-Remy Models 1102699 or 1102705.
Armature No.—Delco-Remy No. 1879002.
2 brush with voltage and current regulation.
Maximum Charging Rate—35 amperes at 8.0 volts.
Charging Rate Adjustment—None. See Regulator.

Performance Data (Delco-Remy)

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ounces each.
Field Current—1.75-1.9 amperes at 6.0 volts.

Removal & Belt Adjustment: See Auto-Lite (above).

REGULATOR
AUTO-LITE

Auto-Lite Model VRP-4402A. Voltage-current type.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts, 920 RPM. (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

REGULATOR
DELCO-REMY (FIRST CARS)

Delco-Remy 1118278 Single Core Voltage & Current type.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutouf Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts hot (operating temperature). Regulator over-compensated for temperature. Should be checked with cover in place and hot.
Checking & Adjustment—*See Electrical Equip. Section.*
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).

Current Regulator

Setting—34-36 amperes hot (operating temp.).
Checking & Adjustment—*See Electrical Equip. Section.*
Air Gap—.080" (check same as Voltage Regulator).

REGULATOR
DELCO-REMY (LATER CARS)

Delco-Remy Model 1118331. (For 1102705 Generator).
See "1949-50 Packard Eight" for complete data.

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—Left hand indicator below speedometer. Lighted when Upper Beam "on".
Direction Signal: Std. *See Electrical Equipment Section.*
Direction Signal Indicator—Below speedometer.

Switches

Lighting—Packard No. 393563:
Beam Selector—Delco-Remy No. 1997008.
Instrument—Packard No. 393565.
Map Light—Packard No. 396675.
Courtesy Light (Door Switch)—Packard 393517.
Dome Light—Packard No. 399289.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating, thermostatic types. Packard No. 410047 (Lighting), 393746 (Accy.).
Lighting—On lighting switch. 30 ampere.
Accessory (Stop & Body Lights)—Behind instrument panel above Clock. 30 ampere.

FUSES: Clock—SFE 2 ampere in lead near Clock.
Direction Signal—SFE 9 ampere. In Flasher feed wire above speedometer.
Overdrive—SFE 30 ampere. In lead from Starter to Overdrive Safety Switch.
Electromatic Clutch—9 ampere. In lead from Ignition Switch to Electromatic Switch.
Heater—SFE 30 ampere. In cable under clock.

HORNS: Sparton. Dual horns operated by relay.
Horn Current—22-25 amperes.

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.

	Eight	Super 8
Bore	3½"①	3½"①
Stroke	3¾"	4¼"
Displacement	288 cu. ins.	327 cu. ins.
Rated HP	39.2	39.2
Developed HP	130 at 3600	145 at 3600

①—*For Original Bore Sizes, see Packard Shop Notes.*
Compression Ratio—7.0-1 std. cast iron head.
Compression & Vacuum Reading—*See Tune-Up data.*
►*.020" OVERSIZE BORE ENGINES: Marked by star following engine number.*

OIL PAN REMOVAL: *See Packard Special Data.*

TIGHTENING TORQUES: *See Packard Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Packard Shop Notes.*

PISTONS: Aluminum alloy, autothermic strut type. *Original Piston Sizes & Markings, see Packard Shop Notes.*
►*LATE TYPE PISTONS AND RINGS: Used on engines marked with letters "C", "CD", or "CE" following engine number.*
Length—3⅞".
Weight—19½ ozs. (stripped), 25⅞ (with rings & pin)
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting New Pistons.

Replacement Pistons: *See Packard Shop Notes.*

Fitting New Pistons: Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 12-18 lbs.

Install Pistons: Slot toward valves.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 70 second groove), one oil control ring (No. 86) per piston, all above pin. Oil ring groove has twelve 5/32" oil drain holes.
►*LATE TYPE PISTONS AND RINGS: Used on engines marked C, CD, or CE following engine number.*

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0930-.0935"	.0054-.0233"	.0025-.003"
Comp. (#2)	.1235-.124"	.0054-.0233"	.0025-.003"
Oil Control	.186-.1865"	.0054-.0213"	.0025-.003"

Oil Ring Note—Perfect Circle No. 86 with coil spring type expander.

Replacement Rings: .005", .010", .020", .030", .040" OS. Triple Action Sets (std. & .020" OS.). *For installation of these sets see Packard Shop Notes.*

PISTON PIN Diameter—.875". **Length**—3 1/64".
Floating type retained by lock ring at each end. Split type bushing used in upper end of rod.
Pin Fit in Piston—Palm push fit with piston at 160°F. (heat piston in water only).
Pin Fit in Rod Bushing—Finger push fit at 70°F.
Piston Pin (Connecting Rod) Bushing Installation—*See "Piston Pins" in Packard Shop Notes.*

Replacement Pins: Std. and .003", .006" oversize.

CONNECTING ROD: Length 7 15/16" (8), 7 11/16" (Super 8).
Weight—35.7 ozs. (Eight), 35.4 ozs. (Super 8).
Connecting Rod Journal Diameter—2.250".
Lower Bearing—Shimless, precision, steel backed, Moraine Durex or Federal Mogul H-24.
Clearance—.0005-.0025". **Endplay**—.003-.011".

Bearing Adjustment: None (no shims). Replace bearings. Self-locking nuts used on cap bolts (tighten to 60-65 ft. lbs.).

Replacement Bearings: .001", .002", .003", .015" U. S.

Installing Rods: Oil squirt hole toward camshaft.

CRANKSHAFT: 5 bearing integral counterweights.
Vibration Dampener—Houde with Silicone fluid (8), Rubber Friction Disc (Super 8).
Dampener Removal Note—Use Puller Tool No. J-2636 to avoid damaging dampener.
Main Bearing Journal Diameter—2.7465".
Bearings—Interchangeable, shimless, precision, steel-backed Moraine Durex or Federal Mogul H-24.
Clearance—.0005-.0025".

Bearing Adjustment: None (no shims). Replace bearings (upper halves can be rotated in and out).

Replacement Bearings: Std., .001", .002" undersize.

End Thrust: At #3 bearing. **Endplay**—.003-.008".

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*

CAMSHAFT: 5 bearing. Non-adjustable chain drive.
►*LATE TYPE CAMSHAFT—Has redesigned cam lobe contour reducing tappet noise. Engines equipped with this camshaft marked "E" or "CE" after Eng. No.*
►*CAUTION—Different tappet clearance settings used for each camshaft. See Tappet Clearance under VALVE TIMING.*
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.003".

End Thrust: Taken by thrust plate in back of camshaft sprocket.
Endplay (8)—.004-.006", **(Super 8)** .0025-.006".

Timing Chain: Morse or Ramsey. Width 1¼". Pitch .375". Length 21¾" or 58 links.

Camshaft Setting: Install chain and sprockets together with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 43/64"	.3417"	5 7/8"
Exhaust	1 7/16"	.3398"	5 7/8"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.342"	.0005-.0031"
Exhaust	45°	.342"	.0024-.005"

Valve Guides: Lubrite coated. Pressed in block from above with upper end 31/32" below top of block. Exhaust guides counterbored on upper inner diameter to .375" diameter and .375" deep.
►*OVERSIZE VALVE GUIDES—Used on engines marked "A" following engine number.*

Valve Springs: Intake and exhaust springs interchangeable. Anti-rotation serrated washer installed on top of spring and seats in recess in block.

	Spring Pressure	Spring Length
Valve Closed	60-66 lbs.	1¾"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters: Mushroom type. Remove from below
Diameter—.6235-.6240". **Clearance**—.0003-.0012".
Replacement Lifters—.001", .002", .005" oversize. Use Tool S.T. 5144 (piloted in valve guide) and ream for .005" oversize lifters.

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—Special setting for early & late camshafts:*

►**ENGINES WITH EARLY CAMSHAFT**
.006" Intake, .008" Exhaust, Hot. (Supersedes original setting of .007" Int. & .010" Exh. to reduce tappet noise).

►**ENGINES WITH LATER CAMSHAFT**
►**With Code "CE" or "E" following Engine No.**
.007" Intake, .010" Exhaust, Hot.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 10° BTDC. Close 50° ALDC.
Exhaust Valves—Open 50° BLDC. Close 5° ATDC.
Above figures for .0125" Intake, .015" Exhaust tappet clearance.
Valve Timing Check—With .0125" tappet clearance #1 intake valve should open with #1 piston 10° BTDC. with 10th graduation before top dead center mark "#1UP.DC" on vibration dampener aligned with pointer. Reset tappet clearance .007" Hot.

LUBRICATI N

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters, and timing chain. Oil pump mounted externally on right side of engine.
►**Crankcase Capacity**—*CAUTION*—5½ quarts on unmarked engines. 7 quarts on engines marked "CD", "CE", "D", or "E" following engine number and "7 qt." mark on dip stick.
Normal Oil Pressure—40 lbs. Normal Driving.
Oil Pressure Regulator—On oil pump cover. Not adjustable. Pressure regulator spring tension should be 14 lbs. ± 2 ozs. at 1⅞".

Oil Pump: Gear type. On right side of crankcase.
Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*

Oil Filter: Opti. Replace cartridge at 8000-10000 miles or when oil shows signs of being dirty.

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Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41640.
Engine Unit—K-S No. 40767.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with pressure relief valve in filler cap and fan belt driven pump.
Capacity—18 qts. (Eight), 20 qts. (Super 8), with 2 quarts additional for heater and defroster.
Pressure Valve—AC 850005 Filler Cap. Opens 7 lbs.
Water Pump: Centrifugal, belt-driven, packless type.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: In cylinder head outlet.
Setting (std.)—Starts to open 145-150°F.
Setting (Optl. High Reading)—Starts to open 160-165°F. or 175-180°F.
Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41645.
Engine Unit—K-S No. 41085.
See Miscellaneous Section for complete data.

CLUTCH

Long 10CF-TI (Eight), 11CF-10½TI (Super Eight). Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.
Facings—Woven (U. S. Asbestos). Thickness .125". I.D. 6¾" (8), 7" (Super 8). Outside Diameter 10" (8), 10½" (Super 8).
Pedal Adjustment: (1948)—1¼-1½" free travel. Adjusting nut on rod between relay lever and throwout lever.
Pedal Adjustment: (1949)—*See "Clutch Notes" in Packard Special Data.*
Removal: Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect throwout linkage and remove throwout bearing. Remove clutch cover screws (release tension evenly), lower assembly out of car.

ELECTROMATIC CLUTCH

Electromatic Clutch: Vacuum type clutch actuation with electrical control. Optional equipment.
See Clutch Section for complete data.

TRANSMISSION

Own Make. Helical gear, constant-mesh, synchro-mesh (Second & High), constant-mesh (Low). Sliding spur gear (Reverse). Low & Second speed gears are ball bearing mounted.
See Transmission Section for complete data.
Transmission Control: Steering column type.
See Transmission Section for complete data.
Removal: Disconnect shifter rods, speedometer cable, hand brake cable at equalizer, engine ground strap, front universal (block driveshaft up against floor pan). Support rear of engine with jack and unbolt cross member (at frame ends and transmission), Disconnect clutch retractor spring and fore-and-aft restraint rod. Take out transmission-to-housing mounting screws, remove transmission.

OVERDRIVE

1948 WARNER R9

▷*INSTALLATION OF R11 OVERDRIVE (To replace original R9 Assembly)—See "Warner R11 Overdrive" in Transmission Section for complete data.*
Warner Model AS2-R9 (Eight), AS1-R9A (Super Eight). Optl. equipment used with Packard transmission. Overdrive is solenoid operated type no centrifugal pawls) with Governor Control and throttle operated "kick-down".
See Transmission Section for complete data.
▷**Overdrive Short-Circuit Correction**—Disconnect Plug under car (as shown in wiring diagram) discontinued on Late 1948 Cars to avoid short circuits at this point due to water and corrosion. On earlier cars Plug can be removed and wires spliced, soldered, taped and shellacked to prevent short circuits.
▷**Overdrive Safety Switch**—Mounted at lower end of steering column and operated by first and reverse shift lever when in reverse position to open circuit between battery and overdrive relay (see wiring diagram). Switch has two extra terminals to operate back-up light. **1947 & Earlier Clipper Models**—To prevent overdrive lock-up when car shifted to reverse, install Safety Switch (Kit No. 394484).
Overdrive Indicator Light—Next to high beam indicator under speedometer. Lights when overdrive ready to engage (22 MPH and up), goes out when accelerator pedal released to engage overdrive.
Overdrive Relay—D-R 1116823, Packard 347943.
Throttle Kick-down Switch—Packard No. 347496.
Safety (Rev. Lock-out) Switch—Packard 403303.
Lock-out Switch—Packard No. 354820.
Removal: See R11 Overdrive (following).

OVERDRIVE

1949 WARNER R11

Warner Model (Eight) AS3-R11, (Super Eight) AS4-R11. Optl. equipment used with Packard transmission. New simplified solenoid operated overdrive
▷**Series 2200 Note**—Started part production with Engine Serial No. G-272006 (Eight), G-424978 (Super 8). Started full production with Engine Serial No. G-285157 (Eight), G-427710 (Super Eight).
See Transmission Section for complete data.
▷**Early R11 Overdrive Failure to Engage Correction**—*See "Warner R11 Overdrive" in Transmission Section.*
Overdrive Solenoid—Packard No. 403942.
Governor—Packard No. 418447.
Control Relay—Packard No. 403940.
Kick-down Switch—Packard No. 403945.
Lock-out Switch—Packard No. 354820.
Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

UNIVERSALS

Mechanics Type 3CR (Type 3C used at front on Long WB. Cars with 3 universals). Needle bearing.

▷CAUTION—Rear universal flange nut controls rear axle pinion bearing pre-load which **must be adjusted whenever nut is loosened.** *See Packard Rear Axle article in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.
Model 2222 (141" WB. 7-Pass. Sedan) Note—Axle is Custom 8 type with Ring Gear Idler Roller.
See Rear Axle Section for complete data.
▷*REAR AXLE OIL SEAL LEAKAGE CORRECTION—See "Packard Rear Axle" in Rear Axle Section for complete data.*
Ratio—Std.: 3.9-1 (39-10). OD.: 4.1-1 (41-10).
NOTE—Some cars without Overdrive use 4.1-1 ratio.
2222 NOTE—Std. Ratio 4.09-1 (45-11).
Backlash—.004-.008". Screw adjustment.
Removal: Remove axle shafts (see Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with 2 x 4 inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier lock nuts, lift carrier out.
Axle Shaft Removal: Remove wheel, brake drum (use screw type puller KMO-476—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller
Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel for .050" or under, at both wheels if over .050" to secure .004-.007" endplay.
Endplay—.004-.007".

SHOCK ABSORBERS

Delco Model 1946-J, K (front), Model 1040-V (rear). Double acting (front), direct acting (rear).
Fifth Shock Absorber (Stabilizer): Monroe 373935. Direct acting, hydraulic (built-in rear stabilizer).

FRONT SUSPENSION

Front Suspension: Packard Clipper Safe-T-Flex, independent, linked parallelogram type with coil springs and double acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5°50' crosswise.
Caster—Neg. 1° ± ½°. Eccentric adjustment.
Camber—0° ± ¼°. Eccentric adjustment.
Toe In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.

STEERING GEAR

Packard—Gemmer Model 335—"3-tooth" Worm-and-Roller type with "push-pull" adjustment.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinder—Front 1 1/16" (1" on 7-pass.), Rear 15/16".
Drums—12" centrifuse type.
Lining—Marshall 2201H-8 (primary shoe), Marshall B-50 (secondary). Width 1¾". Thickness 3/16". Length per shoe 11½" (primary), 13" (secondary).
Model 2222 7-Pass. Note—Lining width 2¼" all shoes except 2" on rear wheel secondary shoe.
Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.
Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

►**1949 MODEL DESIGNATION**—These models are continuation of 1948 "2200" Series with "—9" following Model No. and Body No. Engine Nos. are continuation of 1948 Nos.

MODEL IDENTIFICATION

SERIAL NUMBER: On left side of cowl (use Eng. No.).

ENGINE NUMBER: Stamped on upper left side of cylinder block between #3 and #4 cylinders.
~~1948 Numbers—G-600001 Up.~~

►***ENGINE NUMBER CODE: Code marks following engine number indicate changes or differences over unmarked engines as follows:***
★—Engine Bore .020" Oversize.
"C"—Late type Pistons and Rings used.

TUNE-UP

COMPRESSION PRESSURE: 135 lbs. at 300 RPM.

VACUUM READING: Steady 18-20" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See Diagram.

SPARK PLUG GAP: .028". Limits .025-.030".
Plug Types—Auto-Lite P-4, AC No. 104, or Champion Y4A, 10 mm. Metric.
CAUTION—Tighten plugs with plug wrench snugly with fingers. Avoid overtightening.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—Set at .017". Limits .015-.019".
Cam Angle—27° closed, 18° open (with .017" gap)
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 6° BTDC.
Timing Procedure—*See Ignition Timing.*
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of this point. Set ignition contacts to open at 6th graduation before "DC"
Fuel Compensator Setting—Slight ping accelerating with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*

►***METERING ROD CHANCE ON EARLY 531-S CARBURETORS FOR SMOOTHER PERFORMANCE DURING WARM-UP AND AT LOW SPEED (ALSO INCREASED GAS MILEAGE): New rod No. 75-616 (stamped on shank of rod) installed on 531-S carburetors marked with round hole punched in brass inspection tag on carburetor. This rod used on all 531-SA carburetors (later type). Car manufacturer recommends this rod be installed on unmarked 531-S carburetors.***
Idle Setting—1½-2 turns open. Two screws—turn out for richer mixture.
Idle Speed (standard)—6 MPH.
Float Level—5/32" from top of float to cover with valve seated (remove gasket and invert to check).

Choke Setting: Coil Housing Centered at index.
Accelerating Pump—Not adjustable.
Fuel Pump Pressure—4-4¾ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: None in service (hydraulic type lifters).
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock Type 42-B.
Ignition Lock—Briggs & Stratton. B & S No. 50184.
Key Series—P1251 to P1500. **Groove**—No. 2.

COIL: Auto-Lite Model CE-4033.
Location—Left side of engine above distributor.
Ignition Current—2.4 amperes idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671J.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGT-4203. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot (marked 5½) on plate.
Breaker Gap—Set at .017". Limits .015-.019".
Cam Angle—27° closed, 18° open (with .017" gap).
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

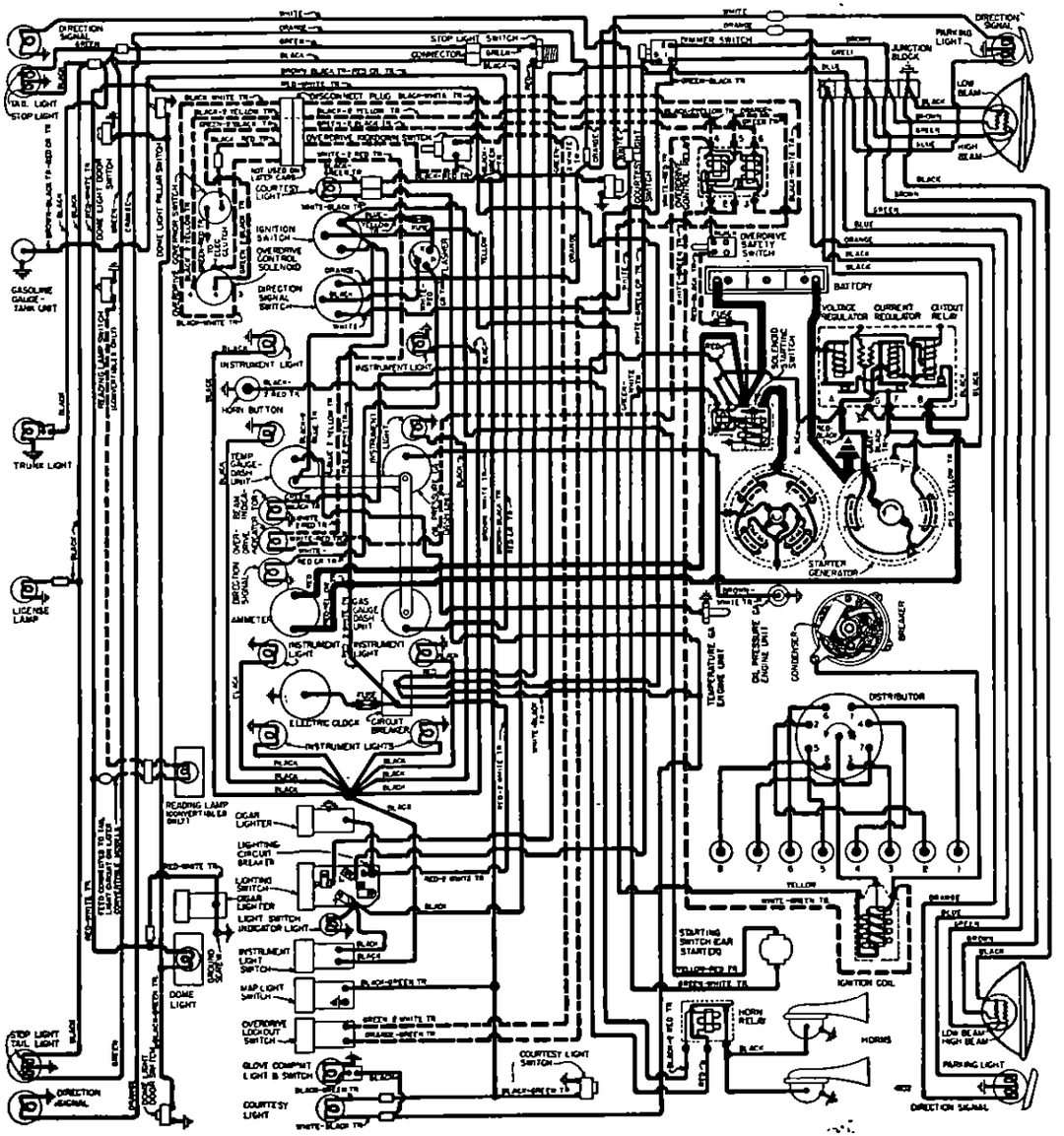
Automatic Advance

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	250	0	500
3	475	6	950
6	700	12	1400
9	1300	18	2600
11½	1800	23	3600

Fuel Compensator: 10° advance or retard manual adjustment at distributor. See Ignition Timing.

Vacuum Spark Control: Auto-Lite. On distributor, linked directly to breaker plate.

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Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7"
1°	2°	8⅝"
3°	6°	12"
4°	8°	13½"
5½°	11°	16"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw, lift off.

IGNITION

Std. Setting .....6° BTDC.
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.

Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.

Timing—Set Fuel Compensator at "0". With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampener in line with pointer on chain case cover (see table above). Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt. Check spark plug connections (see diagram), see that rotor opposite #1 segment in cap. Check Fuel Compensator Setting.

Timing (with Neon Timing Light)—Mark 6th line ahead of "#1UP.DC" mark on vibration dampener with white paint, clip timing light to #1 spark plug. Idle engine below 500 RPM., adjust distributor (as directed above) until mark lines up with pointer.

Fuel Compensator Setting—Should be set for slight ping when accelerating with wide open throttle. To adjust, loosen thumbnut, rotate distributor counterclockwise (if ping too severe), clockwise (if no ping noted), tighten thumbnut and recheck performance.

CARBURETOR

Carter WDO, No. 531S (Early), 531SA (Later). 1¼" Dual barrel downdraft type with Carter Climatic Control.
Casting No. on Flange—377 (for 531S), 564 (531SA).
See Carburetor Section for complete data.

▷**Production Change 531S to 531SA.** New metering rod used in 531SA carburetor for smoother performance during warm up and slow speeds (and improved gas mileage). Can be installed in 531S carburetors. *See Carter WDO Vacumeter Carburetor article in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Dual (WDO) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—Adjust fast idle screw for .023-.028" throttle opening (Gauge T109-189) with choke closed.

Automatic Choke: Carter Climatic Control (Dual Carburetors).
See Carburetion Equipment Section for complete data.
Setting—Centered (at index).

CARB. EQUIPMENT

Fuel Pump (Fuel-&-Vacuum): AC Type AH. No. 1539116.
Replacement Pump—AC No. 9116.
Pressure—4-4¾ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41635.
Tank Unit—K-S No. 41678.
See Carburetion Equipment Section for complete data.

Air Cleaner (std.—oil bath): AC No. 1542318.
Element—AC No. 14.
Servicing (oil bath type)—Clean filter element, clean and refill oil reservoir with SAE No. 50 engine oil (Summer), No. 30 (Winter) to level of indicator line on case (approx. 1 pint) every 5000 miles or oftener if required.

BATTERY

Auto-Lite Type PN-17ZR. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—138 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.1 minutes. Five second voltage—4.3 volts.
Grounded Terminal—Positive (+) to frame.
Dimensions—Length 19¼". Width 4". H. 8 29/32".
Location—On left side in engine compartment.

STARTER

Auto-Lite Model MAX-4052. Armature MAW-2069.
Drive—Overrunning clutch (solenoid pinion shift) through reduction gears.
Rotation—Clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—200-250 amperes.

Performance Data

Torque	RPM①	Volts	Amperes
0 ft. lbs.	2560	5.5	70
13.0 "	Lock	2.0	410

①—Pinion Shaft RPM. (reduction gear drive).

Removal: On left front face of flywheel housing. To remove, take out flange mounting screws.

Starting Switch: Auto-Lite Model SS-4205 Solenoid Switch on starter controlled by Carter Car Starter No. 192-11U on carburetor (accelerator pedal control).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite GDZ-4801G or GDZ-4801V. Arm. GDZ-2006F.
2 brush with voltage and current regulation.
Maximum Charging Rate—35 amperes, 8.0 volts.
Charging Rate Adjustment—None. See Regulator.

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
10	6.85	1200	10	6.85	1290
20	7.3	1480	20	7.3	1590
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounted at left front of engine. To remove, take out strap screw and mounting bolts.

Belt Adjustment: ¼" belt deflection between fan and generator. Loosen adjusting strap screw, pry generator out for ¼" setting, tighten screw.

REGULATOR

Auto-Lite VRP-4402A or B. Voltage-current type.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts, 920 RPM. (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on cover).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Left hand indicator below speedometer. Lighted when Upper Beam "on".

Direction Signal: Optl. *See Electrical Equip. Section.*
Direction Signal Indicator—Below speedometer. Flashes when Signal in use.

Switches

Lighting—Packard No. 393563.
Beam Selector—Delco-Remy No. 1997008.
Instrument—Packard No. 393565.
Map Light—Packard No. 396675.
Courtesy Light (Door Switch)—Packard 393517.
Dome Light—Packard No. 399289.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating, thermostatic types. Packard No. 410047 (Lighting), 393746 (Accy.).
Lighting—On lighting switch. 30 ampere.
Accessory (Stop & Body Lights)—Behind instrument panel above Clock. 30 ampere.
Hydro-Lectric Power (Convertible)—On engine side of dash on pump upper bracket.

FUSES: Clock—SFE 2 ampere in lead near Clock.
Direction Signal—SFE 9 ampere. In Flasher feed wire above speedometer.
Overdrive—SFE 30 ampere. In lead from Starter to Overdrive Safety Switch.
Electromatic Clutch—9 ampere. In lead from Ignition Switch to Electromatic Switch.
Radio—SFE 14 ampere in cable at left of radio.
Heater—SFE 30 ampere. In cable under clock.

HORNS: Sparton. Dual horns operated by relay.
Horn Current—22-25 amperes.

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

Form 248—1956-M

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.
Bore—3½"①. **Stroke**—4⅝".
①—*For Original Bore Sizes, see Packard Shop Notes.*

►*.020" OVERSIZE BORE ENGINES: Marked by star following engine number.*

Displacement—356 cubic inches. **Rated HP.**—39.2.
Developed Horsepower—160 at 3600 RPM.
Compression Ratio—7.0-1 std. cast iron head.
Compression & Vacuum Reading—*See Tune-Up data.*

OIL PAN REMOVAL: *See Packard Special Data.*

TIGHTENING TORQUES. *See Packard Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Packard Shop Notes.*

PISTONS: Aluminum alloy, autothermic strut type. *Original Piston Sizes & Markings, see Packard Shop Notes.*

►*LATE TYPE PISTONS AND RINGS: Used on engines marked with letter "C" following engine number.*
Length—3⅞".

Weight—19½ ozs. (stripped), 25⅞ (with rings & pin)
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting New Pistons.

Replacement Pistons: *See Packard Shop Notes.*

Fitting New Pistons: Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 12-18 lbs.

Install Pistons: Slot toward valves.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 70 second groove), one oil control ring (No. 86) per piston, all above pin. Oil ring groove has twelve 5/32" oil drain holes.

►*LATE TYPE PISTONS AND RINGS: Used on engines Marked with letter "C" following engine number.*

Ring	Width	End Gap	Side Clearance
Comp. (#1)	.0930-.0935"	.0054-.0233"	.0025-.003"
Comp. (#2)	.1235-.124"	.0054-.0233"	.0025-.003"
Oil Control	.186-.1865"	.0054-.0213"	.0025-.003"

Oil Ring Note—Perfect Circle No. 86 with coil spring type expander.

Replacement Rings: .005", .010", .020", .030", .040" OS. Triple Action Sets (std. & .020" OS.). *For installation of these sets see Packard Shop Notes.*

PISTON PIN Diameter—.875". **Length**—3 1/64".
Floating type retained by lock ring at each end. Split type bushing used in upper end of rod.
Pin Fit in Piston—Palm push fit with piston at 160°F. (heat piston in water only).
Pin Fit in Rod Bushing—Finger push fit at 70°F.
Piston Pin (Connecting Rod) Bushing Installation—*See "Piston Pins" in Packard Shop Notes.*

Replacement Pins: Std. and .003", .006" oversize.

CONNECTING ROD: Length 9¼". **Weight** 38.9 ozs.
Connecting Rod Journal Diameter—2.250".
Lower Bearing—Shimless, precision, steel backed, Moraine Durex or Federal Mogul H-24.
Clearance—.0005-.0025". **Endplay**—.004-.012".

Bearing Adjustment: None (no shims). Replace bearings. Self-locking nuts used on cap bolts (tighten to 60-65 ft. lbs.).

Replacement Bearings: .001", .002", .003", .015" U. S.

Installing Rods: Oil squirt hole toward camshaft.

CRANKSHAFT: 9 bearing with bolted-on counterweights. Rubber friction disc dampener on front end.
Main Bearing Journal Diameter—2.7465".
Bearings—Interchangeable, shimless, precision, steel-backed Moraine Durex or Federal Mogul H-24.
Clearance—.0005-.0025".

Bearing Adjustment: None (no shims). Replace bearings (upper halves can be rotated in and out).

Replacement Bearings: Std., .001", .002" undersize.

End Thrust: At #5 bearing. **Endplay**—.003-.008".

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*

CAMSHAFT: 8 bearing. Non-adjustable chain drive.
Bearings—Steel-backed, babbitt lined bushings.
Clearance—.001-.003".

End Thrust: Taken by thrust plate in back of camshaft sprocket. **Endplay**—.0025-.006".

Timing Chain: Morse. Width 1¼". Pitch .375" (⅜"). Length 23¼" or 62 links.

Camshaft Setting: Install chain and sprockets together with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 43/64"	.3417"	6 7/32"
Exhaust	1 7/16"	.3398"	6 7/32"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.342"	.0005-.0031"
Exhaust	45°	.342"	.00195-.00455"

Valve Guides: Lubrite coated. Pressed in block from above with upper end 31/32" below top of block. Exhaust guides counterbored on upper inner diameter to .375" diameter and .375" deep.

Valve Springs: Intake and exhaust springs interchangeable. Anti-rotation serrated washer installed on top of spring and seats in recess in block.

	Spring Pressure	Spring Length
Valve Closed	60-66 lbs.	1¾"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters: Wilcox-Rich "Zero-lash" type hydraulic lifters (mushroom type). Remove from below with camshaft out.
Diameter .7177-.7182". **Clearance** .0002" selective.

Hydraulic Valve Lifter Removal & Overhaul: *See "Hydraulic Valve Lifters" in Packard Special Data.*
Replacement Lifters—.001", .002", .005" oversize. Use Tool S.T. 5101 (piloted in valve guide) and ream for .005" oversize lifters.
Valve Lifter Clearance Check when Grinding Valves—*See Packard Shop Notes.*

VALVE TIMING

Tappet Clearance: None in service (hydraulic type lifters). See Valve Lifters above.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 4° BTDC. Close 51° ALDC.
Exhaust Valves—Open 49° BLDC. Close 10° ATDC.
Valve Timing Check—#1 exhaust valve closes 10° after top dead center (#1 piston .0438" ATDC) with hydraulic lifter dry (all oil drained out) and built up with feeler stock for zero tappet clearance.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters, and timing chain. Oil pump mounted externally on right side of engine.
Crankcase Capacity—7 quarts.
Normal Oil Pressure—50 lbs. Normal Driving.
Oil Pressure Regulator—On oil pump cover. Not adjustable. Pressure regulator spring tension should be 17½-18½ lbs. at 1⅞".

Oil Pump: Gear type. On right side of crankcase.
Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41640.
Engine Unit—K-S No. 40767.
See Miscellaneous Section for complete data.

Servicing—Wash filter element in gasoline and re-oil when changing oil (1000-2000 miles).

COOLING

Cooling System: Pressure type with pressure relief valve in filler cap and fan belt driven pump.
Capacity—20 qts.
Pressure Valve—AC No. 850005 pressure cap. Opens at 7 lbs.

Water Pump: Centrifugal, belt-driven, packless type. *See Water Pump Section for complete data.*
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head outlet.
Setting (std.)—Starts to open 145-150°F.
Setting (Optl. High Reading)—Starts to open 160-165°F. or 175-180°F.

Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41645.
Engine Unit—K-S No. 41085.
See Miscellaneous Section for complete data.

CLUTCH

Long Model 11CF-TI. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.
Facings—Woven (U. S. Asbestos). Thickness .125". Inside Diameter 7". Outside Diameter 11".

Pedal Adjustment: (1948)—1¼-1½" free travel. Adjusting nut on rod between relay lever and throwout lever.

Pedal Adjustment: (1949)—*See "Clutch Notes" in Packard Special Data.*

Removal: Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect throwout linkage and remove throwout bearing. Remove clutch cover screws (release tension evenly), lower assembly out of car.

ELECTROMATIC CLUTCH

Electromatic Clutch: Vacuum type clutch actuation with electrical control. Optional equipment.
See Clutch Section for complete data.

TRANSMISSION

Own Make. Helical gear, constant-mesh, synchro-mesh (Second & High); constant-mesh (Low). Sliding spur gear (Reverse). Low & Second speed gears are ball bearing mounted.
See Transmission Section for complete data.

Transmission Control: Steering column type.
See Transmission Section for complete data.

Removal: Disconnect shifter rods, speedometer cable, hand brake cable at equalizer, engine ground strap, front universal (block driveshaft up against floor pan). Support rear of engine with jack and unbolt cross member (at frame ends and transmission). Disconnect clutch retractor spring and fore-and-aft restraint rod. Take out transmission-to-housing mounting screws, remove transmission.

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OVERDRIVE

1948 WARNER R9

Warner Model AS1-R9A. Optl. equipment used with Packard Transmission. Overdrive is solenoid operated type (no centrifugal pawls) with Governor Control and throttle operated "kick-down". A new Overdrive Safety Switch is used.
See Transmission Section for complete data.

►**Overdrive Short-Circuit Correction**—Disconnect Plug under car (as shown in wiring diagram) discontinued on Late 1948 Cars to avoid short circuits at this point due to water and corrosion. On earlier cars Plug can be removed and wires spliced, soldered, taped and coated with shellac to prevent short circuits.

►**Overdrive Safety Switch**—Mounted at lower end of steering column and operated by first and reverse shift lever when in reverse position to open circuit between battery and overdrive relay (see wiring diagram). Switch has two extra terminals to operate back-up light. **1947 & Earlier Clipper Models**—To prevent overdrive lock-up when car shifted to reverse, this Safety Switch (Kit No. 394484) can be installed.

Overdrive Indicator Light—Next to high beam indicator under speedometer. Lights when overdrive ready to engage (22 MPH and up), goes out when accelerator pedal released to engage overdrive.

Overdrive Relay—D-R 1116823, Packard 347943.
Throttle Kick-down Switch—Packard No. 347496.
Safety (Rev. Lock-out) Switch—Packard 403303.
Lock-out Switch—Packard No. 354820.

Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

OVERDRIVE

1949 WARNER R11

►*INSTALLATION OF R11 OVERDRIVE (To replace original R9 Assembly)—See "Warner R11 Overdrive" in Transmission Section for complete data.*

Warner Model AS4-R11. Optl. equipment used with Packard transmission. New simplified solenoid operated overdrive.

►**Series 2200 Note**—Started part production with Engine Serial No. G-610359. Started full production with Engine Serial No. G-611500.
See Transmission Section for complete data.

►**Early R11 Overdrive Failure to Engage Correction**—*See "Warner R11 Overdrive" in Transmission Section.*
Overdrive Solenoid—Packard No. 403942.
Governor—Packard No. 418447.
Control Relay—Packard No. 403940.
Kick-down Switch—Packard No. 403945.
Lock-out Switch—Packard No. 354820.

Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

UNIVERSALS

Mechanics Type 3CR (Type 3C used at front on Long Wheelbase Cars with 3 Universals). Needle bearing type.

NOTE—One-piece shaft used on cars without Overdrive.

►CAUTION—Rear universal flange nut controls rear axle pinion bearing pre-load which **must be adjusted whenever nut is loosened.** *See Packard Rear Axle article in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive and Ring Gear Idler Roller.
See Rear Axle Section for complete data.

►*REAR AXLE OIL SEAL LEAKAGE CORRECTION—See "Packard Rear Axle" in Rear Axle Section for complete data.*

Ratio—Std. 3.92-1 (47-12). OD.: 4.09-1 (45-11).
NOTE—2226 (148" WB.) Std. Ratio 4.09-1 (45-11).

Backlash—.004-.006". Screw adjustment.

Removal: Remove axle shafts (see Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with 2 x 4 inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier lock nuts, lift carrier out.

Axle Shaft Removal: Remove wheel, brake drum (use screw type puller KMO-476—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner oil seal). Use Tool J-943-B to remove inner oil seal.

Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel for .050" or under, at both wheels if over .050" to secure .004-.007" endplay.
Endplay—.004-.007".

SHOCK ABSORBERS

Delco No. 1946-J, K (front), Monroe No. 18096 (rear). Hydraulic, double acting (front), direct (rear).
Fifth Shock Absorber (Stabilizer): Monroe 373935. Direct acting, hydraulic (built-in rear stabilizer).

FRONT SUSPENSION

Front Suspension: Packard Clipper Safe-T-Flex, independent, linked parallelogram type with coil springs and double acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5°50' crosswise.
Caster—Neg. 2° ± ½°. Eccentric adjustment.
Camber—0° ± ¼°. Eccentric adjustment.
Toe In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.

STEERING GEAR

Packard—Gemmer Model 335—"3-tooth" Worm-and-Roller type with "push-pull" adjustment. See Gemmer.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinder—Front 1". Rear 15/16". For Model 2226 7-Pass. 1¼" front, 1⅛" rear.
Lining—Marshall 2201H-8 (primary shoe), Marshall B-50 (secondary). Width 2¼" (front wheel), 2" (rear). Length per shoe 11½" (primary), 13" (secondary). Thickness 3/16".
Model 2226 7-Pass. Note—Marshall 9017 (secondary). All shoes 13" long, 2½" wide.
Clearance—.015" at both ends of secondary shoe
Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

ELECTRICAL EQUIPMENT NOTE: Both Auto-Lite and Delco-Remy electrical equipment are used.

MODEL IDENTIFICATION

SERIAL NUMBER: On left side of cowl (use Eng. No.).

ENGINE NUMBER: Stamped on upper left side of cylinder block between #3 and #4 cylinders.

►**1949 Numbers "2300" Series**—(Eight) H-200001 and Up. (Super Eight) H-400001 and Up.
1950 Numbers "2300-5" Series—Continuation of 1949 numbers.

►***ENGINE NUMBER CODE: Marks following no. indicate:***
★—Engine Bore. .020" Oversize.
"F"—Super 8 Engines with Hydraulic Valve Lifters.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking spd.

VACUUM READING: Steady 18-20" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAP: .028", Limits .025-.030".
Plug Types—Auto-Lite P-4, AC No. 104, or Champion Y4A, 10 mm. Metric.

DISTRIBUTOR: Breaker Gap—.017". Limits .013-.018".
Cam Angle—(Auto-Lite)—Closed 27°, Open 18°.
Cam Angle—(Delco-Remy)—Test limits with .016" gap—21-30°.
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 6° BTDC.
Timing Procedure—*See Ignition Timing.*
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of this point. Set ignition contacts to open at 6th graduation before "DC"
Fuel Compensator Setting—Slight ping accelerating with wide open throttle.

CARBURETION:
Idle Setting—(Eight—WDO) ⅝-1⅛ turns open, (8—WGD) 1-1½ turns open, (Super 8) ¾-1¼ turns open. Two screws—turning out gives richer mixture.
Idle Speed (standard)—6 MPH.
Idle Speed (Ultramatic Drive)—375 R.P.M. with selector lever in "H" position.
Float Level—(WDO) 5/32", (WGD) 13/64" from top of float to cover with valve seated (assy. inverted).
Accelerating Pump (644SA only)—Inner Hole (minimum) Normal. Outer hole if more charge needed.

Choke Setting (643SA, 644SA): Centered (at index).

Choke Setting: (728S) 2½ points lean. (728 SA) 2 points lean.

Fuel Pump Pressure: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

►**VALVE TAPPET CLEARANCE: (Eight & Early Super 8)**—.007" Intake, .010" Exhaust, Hot. **(Late Super 8)—If Engine Number Code has letter "F" following Engine Number, engine is equipped with Hydraulic Valve Lifters.**
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

AUTO-LITE

IGNITION SWITCH: Mitchellock Type 24.

COIL: Auto-Lite Model CE-4033.
Location—Left side of engine above distributor.
Ignition Current—2.75 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGP-4502B. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.
Breaker Gap—.017". Limits .013-.018".
Cam Angle—Closed 27°, Open 18°.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

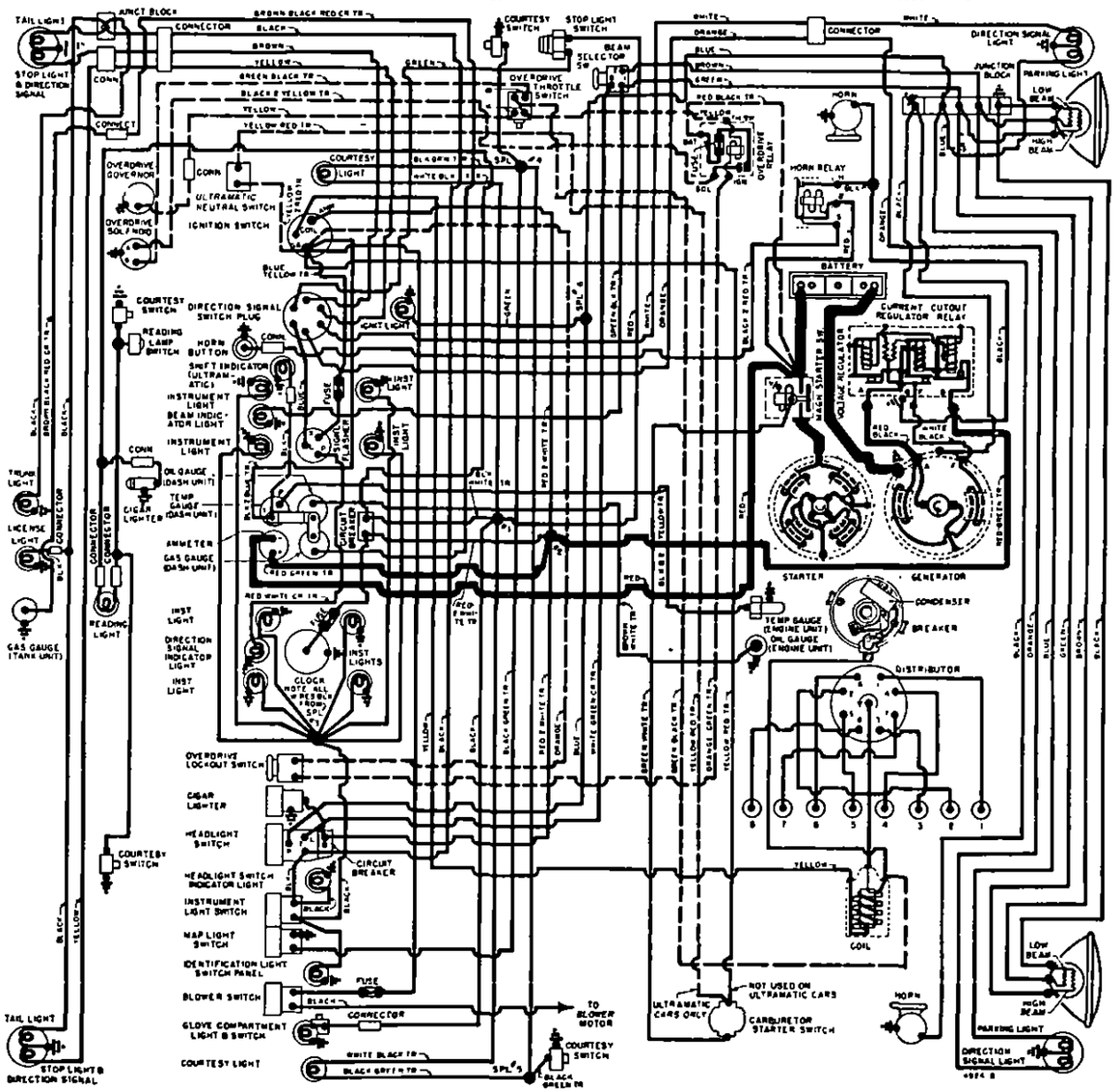
Automatic Advance (Auto-Lite)

Degrees Start	Distr. R.P.M.	Degrees Eng.	R.P.M.
1	300	0	600
3	400	2	800
6	600	6	1200
8	1200	12	2400
	1600	16	3200

Fuel Compensator: 40° range of adjustment on quadrant at vacuum link connection. See Ignition Timing.

Vacuum Spark Control: Auto-Lite. Mounted on hold-down plate and linked to adjusting quadrant on

CONTINUED ON NEXT PAGE



CARS WITH AUTO-LITE EQUIPMENT

CONTINUED FROM PRECEDING PAGE

distributor. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring.

Vacuum Advance (Auto-Lite)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	6"
2°	4°	9¾"
4°	8°	10½"
6°	12°	12⅞"
7°	14°	14"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down plate screw, lift off.

I NITION

DELCO-REMY

IGNITION SWITCH: Mitchellock Type 24.

COIL: Delco-Remy No. 1115376.
Location—Left side of engine above distributor.
Ignition Current—2.75 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Delco-Remy Model 1110811. Automatic advance type with Vacuum Spark Control and Fuel Compensator.
Breaker Gap—.017". Limits .013-.018".
Cam Angle—Test limits with .016" gap—21-30°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Delco-Remy)

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	300	2	600
4	600	8	1200
9	1600	18	3200

Fuel Compensator: 10° advance or retard adjustment at distributor. See Ignition Timing.

Vacuum Spark Control: Delco-Remy 1116041. Integral type mounted on distributor and linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit. Plunger Travel—5/32" max.

Vacuum Advance (Delco-Remy)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5-7"
7°	14°	13.0-15.0"

Distributor Removal: Same as for Auto-Lite (above)

IGNITI N TIMING

Std. Setting ..... 6° BTDC.
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.

Timing—With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampener in line with pointer on chain case cover, (see table above). Loosen vacuum unit link screw in distributor quadrant. (Auto-Lite distributors), or hold-down screw in advance arm (Delco-Remy distributors), rotate distributor until contacts begin to open, tighten screw.

Timing (with Neon Timing Light)—Mark 6th line ahead of "#1UP.DC" mark on vibration dampener with white paint, clip timing light to #1 spark plug. Idle engine below 600 RPM., adjust distributor (as directed above) until mark lines up with pointer.

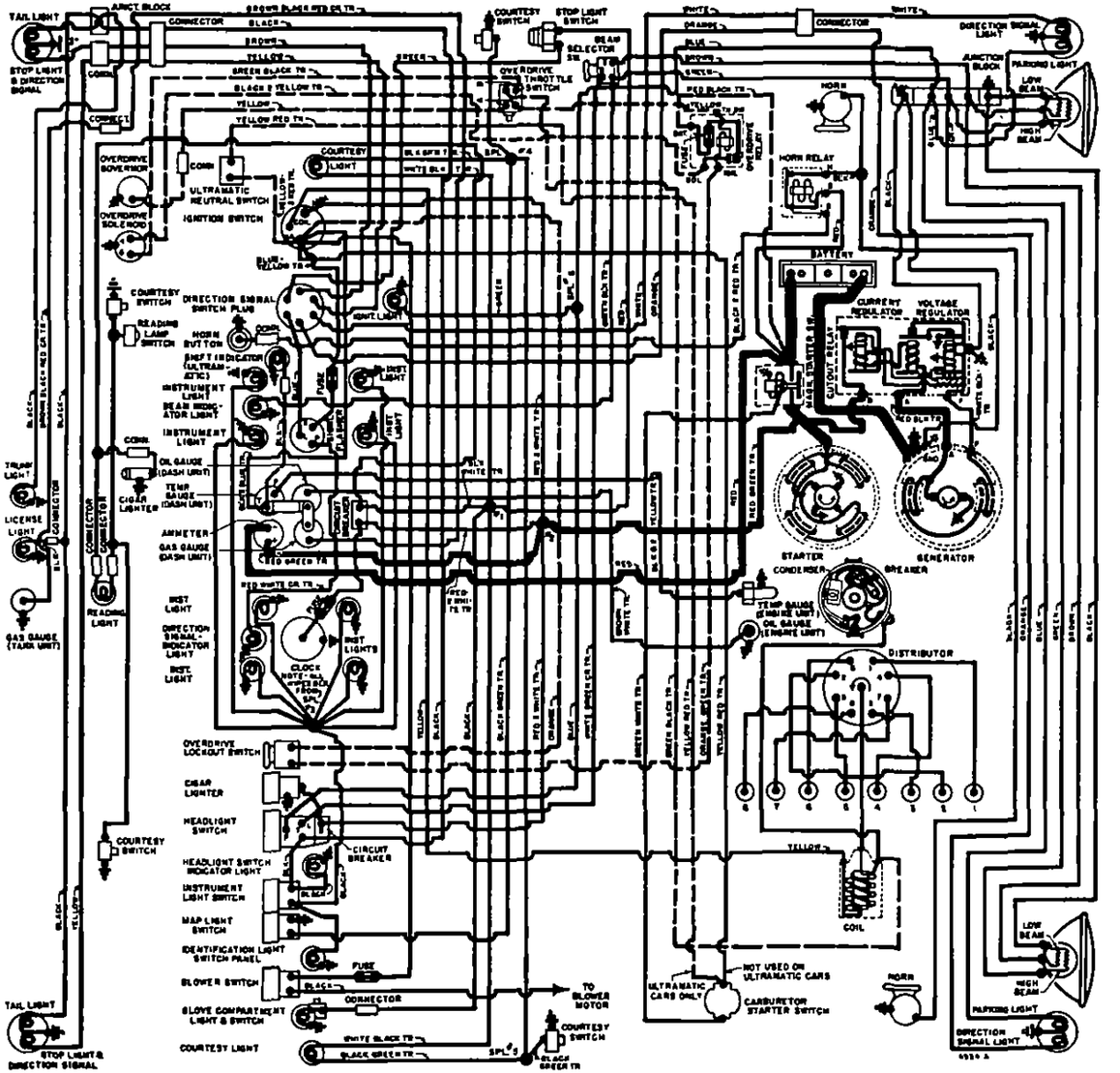
Fuel Compensator Setting—Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite Distributors), advance arm hold-down screw (Delco-Remy Distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping), until correct performance secured.

CARBURETOR

Eight (First Cars).....**Carter WDO, No. 644SA.**
Eight (Later Cars).....**Carter WGD, No. 728S & SA**
Super Eight.....**Carter WDO, No. 643SA.**
1¼" dual barrel downdraft types with Carter Climatic Control.
Casting No. on Flange—(WDO) 561, (WGD) 615.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

►**WGD Carburetor Jet Production Changes**—*See Carter "WGD" Carburetor in Carburetor Section.*



CARS WITH DELCO-REMY EQUIPMENT

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle (WDO): Carter Dual (WDO) Carburetor.
See Carburetion Equipment Section for complete data.
Setting—.026" (643SA), .020" (644SA) throttle opening with choke valve closed. Adjust by turning fast idle screw on high step of fast idle cam.

Fast Idle (WGD): Carter Dual (WGD) Carburetor.
See Carburetion Equipment Section for complete data.
Setting—.026" throttle opening with choke valve closed—(throttle must be opened first). Adjust by bending choke connector rod at lower angle.

Automatic Choke: Carter Climatic Control (Dual Carburetors).
See Carburetion Equipment Section for complete data.
Setting—(WDO) Centered. (WGD 728S) 2½ points lean. (WGD 728SA) 2 points lean.

CARB. EQUIPMENT

Air Cleaner (std.—oil-wetted): AC No. 1544276 (Type #6 element).
Opti. (oil bath)—AC. 1544277 (Type #7-S element).
Servicing (oil-wetted type)—Wash and re-oil filter element every 1000 to 2000 miles whenever crankcase oil is changed.
Servicing (oil bath type)—Clean filter element, clean and refill oil reservoir with SAE No. 50 engine oil (Summer), No. 30 (Winter) to level of indicator line on case (approx. 1 pint) every 5000 miles or oftener if required.

Fuel Pump (Fuel-&-Vacuum): AC Type AJ. No. 1523867.
Replacement Pump—AC No. 508.
Pressure—4-4¾ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41635.
Tank Unit—K-S No. 41676 (Eight), 41678 (Super 8).
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type PN-15ZR or Willard SW-1D-100.
6 volt, 15 plate, 100 amp. hr. capacity (20 hr. rate).
Starting Capacity—120 amperes (Auto-Lite), 122 amperes (Willard) for 20 minutes.
Zero Capacity—300 amperes for 3.3 minutes. Five second voltage—4.2 volts.
Grounded Terminal—Positive (+) to frame.
Dimensions—Length 19¼". Width 4". Hgt. 8 29/32".
Location—Left side in engine compartment.

STARTER

AUTO-LITE

Auto-Lite Model MCL-6003. Armature No. MCH-2021
Drive—Outboard Barrel Type Bendix No. A-1915.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data (Auto-Lite)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5300	5.5	65
8.0 "	Lock	2.0	410

Removal: On left front face of flywheel housing. To remove, take out flange mounting screws.

Starting Switch: Auto-Lite Model SS-4017 Magnetic Switch on starter controlled by Carter Car Starter No. 192-11U on carburetor (accelerator pedal control).
See Electrical Equipment Section for complete data.
►**Ultramatic Drive Starter Safety Switch**—Packard No. 421319. On left side of transmission case. Connected in starter control circuit so that starter operative only with lever in "N" Neutral or "P" Parking.

STARTER

DELCO-REMY

Delco-Remy Model 1107943. Armature No. 1910938.
Drive—Outboard Barrel Type Bendix No. A-1792.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—24-28 ozs. each.

Performance Data (Delco-Remy)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.7	65
16 "	Lock	3.0	600

Removal: *Same as Auto-Lite data (above).*

Starting Switch: Delco-Remy Model 1452 Magnetic Switch on starter controlled by Carter Car Starter No. 192-11U on carburetor (accelerator pedal control).
See Electrical Equipment Section for complete data.
►**Ultramatic Drive Starter Safety Switch**—Packard No. 421319 (Early 1950), No. 423439 (Late 1950). On left side of transmission case. Connected in starter control circuit so that starter operative only with with lever in "N" neutral, or "P" parking position.

GENERATOR

AUTO-LITE

Early.....**Auto-Lite GDZ-4801T.** Arm. GDZ-2006F.
Later.....**Auto-Lite GGW-6001E.** Arm. GGW-2006F.
Convt......**Auto-Lite GGU-6001C.** Arm. GGU-2006F.
Two brush types with current and voltage regulation.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data (Auto-Lite GDZ-4801T)

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (Auto-Lite GGU-6001C)

45	8.0	1550 Max.	

Performance Data (Auto-Lite GGW-6001E)

0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—(GDZ) 4.2-4.6 amps., (GGU) 5.5-6.5 amps., (GGW) 4.6-5.2 amperes, all at 6.0 volts.

Removal: Pivot mounted at left front of engine To remove, take out strap screw and mounting bolts.

Belt Adjustment: ½" belt deflection between fan and generator. Loosen adjusting strap screw, pry the generator out for ½" setting, tighten screw.

GENERATOR

DELCO-REMY

"2300".....Delco-Remy 1102715. Arm. No. 1912599
Two brush types with current and voltage regulation.
Maximum Charging Rate—See tables below.
Charging Rate Adjustment—None. See Regulator.

Performance Data (Delco-Remy)

	Amperes	Volts	R.P.M.
1102715 (Cold)	40	8.0	1900

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ounces each.
Field Current—1.90-2.05 amperes at 6.0 volts.
Removal & Belt Adjustment: See Auto-Lite above.

REGULATOR

AUTO-LITE

Auto-Lite VAV-4401B.....for GGU-6001C Generator
Auto-Lite VRP-4402A.....for GDZ-4801T Generator
Auto-Lite VRP-4402C.....for GGW-6001E Generator
All are current-voltage types.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.4-7.0 volts, (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at **hinge end of core).**

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator
Setting—As follows:
VAV-4401B 44-46 amperes (marked '45' on cover).
VRP-4402A 34-36 amperes (marked '35' on cover).
VRP-4402C 39-41 amperes (marked '40' on cover).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section for complete data.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

REGULAT R

DELCO-REMY

Delco-Remy 1118360.....for 1102715 Generator
►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay
Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator
Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator
Setting—As follows:
1118360.....40-46 amperes hot (set to 42 hot)
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot center 3" below lamp center height at 25 ft.).

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Beam Indicator—Light at top of speedomter dial. Lighted when Upper Beams "on".

Direction Signal: Std. *See Electrical Equipment Section.*

Direction Signal Indicator—Light at top of clock. Flashes when Signal in use.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating, thermostatic types.

Lighting—30 ampere. On lighting switch.

Accessory (Stop & Body Lamps)—30 ampere. Behind instrument panel below gauges. Protects Glove Box Lamp, Courtesy Lamps, Map Lamp, Stop Lamps, Dome Lamp, and Rear Cigar Lighter.

Hydro-Lectric Power (Convertible)—On engine side of dash on pump upper bracket.

FUSES: Clock—SFE 3 ampere in lead below Clock.

Direction Signal—SFE 9 ampere. In Flasher feed wire above Ash Tray.

Overdrive—SFE 30 ampere. On Overdrive Relay (at BAT terminal) on engine side of dash.

Electromatic Clutch—9 ampere. In lead from Ignition Switch to Electromatic Clutch Switch.

Heater—SFE 30 ampere. In cable near Ign. Switch.

HORNS: Sparton. Dual horns operated by relay.

Horn Current—22-25 amperes.

Horn Relay: Delco-Remy No. 1116775.

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

Contact Gap—.027". **Air Gap** .014" (contacts closed).

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.

	Eight	Super 8
Bore	3½"①	3½"①
Stroke	3¾"	4¼"
Displacement	288 cu. ins.	327 cu. ins.
Rated HP.	39.2	39.2
Developed HP.	135 at 3600	150 at 3600

Compression Ratio—7.0-1 std. cast iron head.

Compression & Vacuum Reading—*See Tune-Up data.*

①—*For Original Bore Sizes, see Packard Special Data.*

▷*.020" OVERSIZE BORE ENGINES: Marked by star following engine number.*

▷*HYDRAULIC VALVE LIFTERS: On Super 8 Engines marked by "F" following engine number.*

OIL PAN REMOVAL: *See Packard Special Data.*

TIGHTENING TORQUES: *See Packard Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Packard Special Data.*

PISTONS: Aluminum alloy, autothermic strut type. *Original Piston Sizes & Markings, See Packard Special Data.*

Length—3⅞".

Weight—19½ ozs. (stripped), 25½ (with rings & pin)

▷**Cyl. Bore Taper Note**—Car manufacturer recommends cylinders be re-bored and new pistons installed if cylinder taper exceeds .007-.010". If necessary, new rings only can be installed (without reboring) for taper up to .014".

Removal—Pistons and rods removed from above.

Clearance—.0005-.001". See Fitting New Pistons.

▷**Piston Skirt Expander Note**—Car manufacturer recommends skirt expanders be installed if cylinder diameter over .006" greater than piston skirt diameter (measured alongside upper end of piston skirt slot).

Replacement Pistons: *See Packard Special Data.*

NOTE—Check ring grooves for wear by installing new piston ring in groove—if .006" feeler can be inserted 1/16", wear excessive and piston should be replaced. Check top groove when testing.

Fitting New Pistons: Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 12-18 lbs.

NOTE—Piston should hold in any portion of bore of own weight, but should move when one or two finger pressure applied to piston with cyl. bore vertical.

Install Pistons: Slot toward camshaft.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 200 second groove), one oil control ring (No. 85) per piston, all above pin. Oil ring groove has twelve 5/32" oil drain holes.

Ring	Width	End Gap	Side Clearance
Comp. (#1, 2)	.0930-.0935"	.0054-.0233"	.0025-.003"
Oil (#3)	.186-.1865"	.0054-.0213"	.0025-.003"

Installing Rings—End gaps must be between pin holes with #2 ring on same side as skirt slot, #1 and #3 ring on side opposite slot.

Replacement Rings: Std., .020", .030", .040" oversize.

PISTON PIN Diameter—7/8". **Length**—3 1/64".

Floating type retained by lock ring at each end. Split type bushing used in upper end of rod.

Pin Fit in Piston—Palm push fit with piston at 160°F. (heat piston in water only).

Pin Fit in Rod Bushing—Finger push fit at 70°F.

Piston Pin (Connecting Rod) Bushing Installation—*See "Piston Pins" in Packard Special Data.*

Replacement Pins: Std. and .003", .006" oversize.

CONNECTING ROD: Length 7 15/16" (8), 7 11/16" (Super 8).

Weight—35.8 ozs. (Eight), 35.4 ozs. (Super 8).

Crankpin Journal Diameter—2.250".

Lower Bearing—Shimless, precision, steel backed, Moraine Durex or Federal Mogul H-24.

Clearance—.0005-.0025". **Endplay**—.003-.011".

Bearing Adjustment: None (no shims). Replace bearings. Self-locking nuts used on cap bolts (tighten to 60-65 ft. lbs.).

Replacement Bearings: Std., .001", .002", .020" US.

Installing Rods: Oil squirt hole toward camshaft.

CRANKSHAFT: 5 bearing type with integral counterweights.

Vibration Dampener—Houde with Silicone fluid (8), Rubber Friction Disc (Super 8).

Dampener Removal Note—Use a Puller Tool No. J-2582 for Friction Disc Dampeners, or J-2636 for Fluid type Dampeners.

Journal Diameter—2.7465".

Bearings—Interchangeable, shimless, precision, steel-backed Moraine Durex or Federal Mogul H-24.

Clearance—.001-.003".

Bearing Adjustment: None (no shims). Replace bearings (upper halves can be rotated in and out).

Replacement Bearings: Std., .001", .002", .020" US.

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*

End Thrust: At #3 bearing. **Endplay**—.0035-.0085".

CAMSHAFT: 5 bearing. Non-adjustable chain drive.

Bearings—Steel-backed, babbitt-lined bushings.

Clearance—.001-.003".

End Thrust: Taken by thrust plate in back of camshaft sprocket. **Endplay**—.004-.006".

Timing Chain: Morse. Width 1¼". Pitch .375". Length 21¾" or 58 links.

Camshaft Setting: Install chain and sprockets together with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 43/64"	.3417"	5 7/8"
Exhaust	1 7/16"	.3398"	5 7/8"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.342"	.002"
Exhaust	45°	.342"	.004"

Valve Guides: Lubrite coated. Pressed in block from above with upper end 31/32" below top of block. Use Valve Guide Driver and Depth Gauge No. J-2577—properly positions guides when gauge seats on block. Ream guides after installation with 11/32" (.3437") reamer. Upper end of exhaust guide counterbored.

Valve Guide Removal Note—If guides to be removed with tappets in engine, use Valve Guide Remover Tool J-2580 to drive guide down to just clear tappet (with tappet on heel of cam). Score guide with chisel inserted through valve ports, then break off lower end, finally drive remainder of guide out. If tappets out, guide can be driven down and out without breaking.

Valve Springs: Intake and exhaust springs interchangeable. Anti-rotation serrated cup washers installed on top of spring and seats in recess in block.

	Spring Pressure	Spring Length
Valve Closed	60-66 lbs.	1 3/4"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters (Conventional): Mushroom type. Remove from below. **(Hydraulic Lifters)**—Wilcox-Rich "Zero-lash" type hydraulic lifters (mushroom type). Removed from below with camshaft out of engine.

Hydraulic Valve Lifter Removal & Overhaul: *See "Hydraulic Valve Lifters" in Packard Special Data.*

Diameter—.6235-.6240". **Clearance**—.0003-.0012".

Replacement Lifters—.001", .002", .005" oversize. Use Tool S.T. 5144 (piloted in valve guide) and ream for .005" oversize lifters.

Valve Lifter Clearance Check When Grinding Valves—*See "Hydraulic Valve Lifters" in Packard Special Data.*

VALVE TIMING

▷**VALVE TAPPET CLEARANCE: (Eight & Early Super 8)**—.007" Intake, .010" Exhaust, Hot. **(Late Super 8)—If Engine Number Code has letter "F" following Engine Number, engine is equipped with Hydraulic Valve Lifters.**

Valve Timing: See Camshaft setting above.

Intake Valves—Open 15° BTDC .Close 45° ALDC.

Exhaust Valves—Open 50° BLDC. Close 9° ATDC.

Above figures for .01267" Intake, .015" Exhaust tappet clearance.

Valve Timing Check (Convtl.): With .01267" tappet clearance #1 intake valve should open with #1 piston 10° BTDC. with 10th graduation before top dead center mark "1UP.DC" on vibration dampener aligned with pointer. Reset tappet clearance .007" Hot.

CAUTION—If valve over 8° before or after this point in opening, camshaft setting incorrect.

Valve Timing Check (Hydraulic Lifters): Check by turning tappet plunger for No. 8 exhaust valve with fingers. Turn engine over until this valve fully open, turn engine further until valve nearly closed (plunger should not turn), continue turning engine while attempting to turn plunger, until plunger "breaks loose" or turns. This should be approx. 9° after top dead center—check at timing mark on vibration dampener.

CAUTION—If valve over 8° before or after this point in closing, camshaft setting incorrect.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters, and timing chain.

Crankcase Capacity—7 quarts.
Normal Oil Pressure—40 lbs. Normal Driving.
Oil Pressure Regulator—On oil pump cover. Not adjustable. Pressure regulator spring tension should be 14 lbs. ±2 ozs. at 1⅞".
Oil Pump: Gear Type. On right side of crankcase.
Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*
Oil Filter: Optl. Replace cartridge at 8000-10000 miles or when oil shows signs of being dirty.
Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41640.
Engine Unit—K-S No. 40767.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with pressure relief valve in filler cap and fan belt driven pump.
Capacity—18 qts. (Eight), 19 qts. (Super 8), with ½ quart additional for heater and defroster.
Pressure Valve—AC 850005 Filler Cap. Opens 7 lbs.
Water Pump: Centrifugal, belt-driven, packless type.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: In cylinder head outlet.
Setting (std.)—Starts to open 148-150°F.
Setting (Optl. High Reading)—Starts to open 157-165°F. or 175-184°F.
Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41645.
Engine Unit—K-S No. 41035 (1949), 42550 (1950).
See Miscellaneous Section for complete data.

CLUTCH

Long Eight 10CF-TI, (Super Eight) 11CF-10½TI. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.
Facings—Woven (U.S. Asbestos). Thickness .125". Inside Diameter (Eight) 6¾", (Super Eight) 7". Outside Diameter (Eight) 10", (Super Eight) 10½".
Pedal Adjustment: 1¼-1⅜" free travel. Adjusting nut on rod at throwout lever.
►**Clutch Pedal Over-Center Spring:** New adjustable type. *See "Clutch Notes" in Packard Special Data for adjustment.*
Removal: Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect throwout linkage and remove throwout bearing. Remove clutch cover screws (release tension evenly), lower assembly out of car.

ELECTROMATIC CLUTCH

Electromatic Clutch: Vacuum type clutch actuation with electrical control. Optional equipment.
See Clutch Section for complete data.

TRANSMISSION

Own Make. Helical gear, constant-mesh, synchromesh (Second & High), constant-mesh (Low). Sliding spur gear (Reverse). Low & Second speed gears are ball bearing mounted.
See Transmission Section for complete data.
Transmission Control: Steering column type.
See Transmission Section for complete data.
Removal: Disconnect shifter rods, speedometer cable, hand brake cable at equalizer, engine ground strap, front universal (block driveshaft up against floor pan). Support rear of engine with jack and unbolt cross-member (at frame ends and transmission). Disconnect clutch retractor spring and fore-and-aft restraint rod. Take out transmission-to-housing mounting screws, remove transmission.

OVERDRIVE

Warner Model (Eight) AS3-R11, (Super Eight) AS4-R11. Optl. equipment used with Packard transmission. New simplified solenoid operated overdrive with Governor Control and throttle operated "kick-down." *See Transmission Section for complete data.*
►**Early R11 Overdrive Failure to Engage Correction**—*See "Warner R11 Overdrive" in Transmission Section.*
Overdrive Solenoid—Packard No. 403942.
Governor—Packard No. 418447.
Control Relay—Packard No. 403940.
Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

ULTRAMATIC DRIVE

Own Make. Torque Converter (with hydraulically operated Direct Speed Clutch) and hydraulically operated planetary unit with manual control.
See Transmission Section for complete data including Testing & Trouble Shooting.
►**Production Changes & Oil Leak Corrections**—*See "Ultramatic Drive" in Transmission Section.*
Linkage Adjustment on Ultramatic Drive Cars: *See Packard "Ultramatic Drive" in Transmission Section.*
Lubrication—Check fluid level every 1000 miles, drain and refill every 25,000 miles.
Recommended Fluid. Packard Ultramatic Drive or Type "A" Automatic Transmission Fluid with AQ-ATF number on container.
Capacity. Approximately 12 quarts.
Draining & Refilling. *See Packard "Ultramatic Drive" in Transmission Section.*
Checking Fluid Level. ***CAUTION—Fluid must only be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute with selector lever in "N" position.*** Stop the engine, check level by removing dipstick from filler hole on left side of transmission (accessible from under car—release cap by turning ½ turn counter-clockwise). Add fluid as required to bring level up to FULL mark on dipstick.
Removal: *See "Packard Ultramatic Drive" in Transmission Section.*

UNIVERSALS

Mechanics 3CR or Spicer. Needle bearing types.

►***CAUTION***—Rear universal flange nut controls rear axle pinion bearing pre-load which **must be adjusted whenever nut is loosened.** *See "Packard Rear Axle" in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.
Model 2322 (141" WB. 7 Pass. Sedan) Note—Axle is Custom 8 type with Ring Gear Idler Roller.
See Rear Axle Section for complete data.

Model	Std.	O.D. Cars	Ultramatic Cars
	Std. Ratios		
2301	3.9-1	4.1-1	3.9-1
2302, 2332	3.9-1	4.1-1	3.54-1
2322	4.09-1	4.36-1	3.92-1
	Optl. Ratios		
2301	4.1-1	4.3-1	4.1, 4.3-1
2302, 2332	4.1-1	——	3.9, 4.1-1

Backlash—.003-.005". Screw adjustment.
Removal: Remove axle shafts (see Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with 2 x 4 inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier lock nuts, lift carrier out.
Axle Shaft Removal: Remove wheel, brake drum (use screw type puller J-4153—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner oil seal). Use Tool J-943-B to remove inner oil seal.
Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel for .050" or under, at both wheels if over .050" to secure .004-.007" endplay.
Endplay—.004-.007".

SHOCK ABSORBERS

Delco Model 1946-J, K (front), Delco or Monroe (rear). Double acting (front), direct acting (rear).
Fifth Shock Absorber (Stabilizer) Super 8: Monroe direct acting, hydraulic (built-in rear stabilizer).

FRONT SUSPENSI N

Front Suspension: Packard Clipper Safe-T-Flex, independent, linked parallelogram type with coil springs and double acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5°50' crosswise.
Caster—Neg. 1° ± ½°. Eccentric adjustment.
Model 2322: Neg. 2° ± ½°.
Camber—0° ± ¼°. Eccentric adjustment.
Toe In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.

STEERING GEAR

Gemmer Model 335. 3-tooth Worm-and-Roller (push-pull adjustment). *See Steering Gear Sect. for data.*

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear service brakes. *See Brake Sect. for data.*
Wheel Cylinder—Diam. Front 1 1/16" (1" 7-Pass.), Rear wheels 15/16".
Drums—12" centrifuse type.
Lining—Marshall 4112 (primary shoe), Marshall 9051 (secondary). Width 1 3/4". Thickness 3/16". Length per shoe 11½" (primary), 13" (secondary).
Model 2322 7-Pass. Note—Lining width 2¼" front wheel shoes, 2" rear wheel shoes.
Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.
Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders). *See Misc. Sect. for complete data.*
Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: On left side of cowl (use Eng. No.).

ENGINE NUMBER: Stamped on upper left side of cylinder block between #3 and #4 cylinders.

►**1949 Numbers "2300" Series**—H-600001 Up.
1950 Numbers "2300-5" Series—Continuation of 1949 numbers.

►***ENGINE NUMBER CODE: Code marks following engine number indicate changes or differences over unmarked engines as follows:***
★—Engine Bore. .020" Oversize.

TUNE-UP

COMPRESSION PRESSURE: 135 lbs. at 300 RPM.

VACUUM READING: Steady 18-20" idling at 6 MPH.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAP: .028", Limits .025-.030".
Plug Types—Auto-Lite P-4, AC No. 104, or Champion Y4A. 10 mm. Metric.
CAUTION—Tighten plugs with plug wrench snugly with fingers. Avoid overtightening.

DISTRIBUTOR: Breaker Gap—Set at .017". Limits .013-.018".
Cam Angle—27° closed, 18° open (with .017" gap).
Breaker Arm Spring Tension—19-23 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 6° BTDC.
Timing Procedure—*See Ignition Timing.*
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of this point. Set ignition contacts to open at 6th graduation before "DC" mark.
Fuel Compensator Setting—Slight ping accelerating with wide open throttle.

CARBURETION:
Idle Setting—1½-2 turns open. Two screws—turn out for richer mixture.
Idle Speed (standard)—6 MPH.
Idle Speed (Ultramatic)—375 RPM. with selector lever in "H" position.
Float Level—5/32" from top of float to cover with valve seated (remove gasket and invert to check).
Accelerating Pump—Not adjustable.

Choke Setting: Centered (at index).

Fuel Pump Pressure: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Automatic. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: None in service (hydraulic type lifters).
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock Type 24.

COIL: Auto-Lite Model CE-4033.
Location—Left side of engine above distributor.
Ignition Current—2.75 amperes idling, 4.5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671J.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGT-4203. Automatic advance type with Vacuum Spark Control and Fuel Compensator Adjustment.
Breaker Plate Identification—Maximum vacuum advance limited by slot (marked 5½) on plate.

Breaker Gap—Set at .017". Limits .013-.018".
Cam Angle—27° closed, 18° open (with .017" gap).
Breaker Arm Spring Tension—19-23 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	250	0	500
3	475	6	950
6	700	12	1400
9	1300	18	2600
11½	1800	23	3600

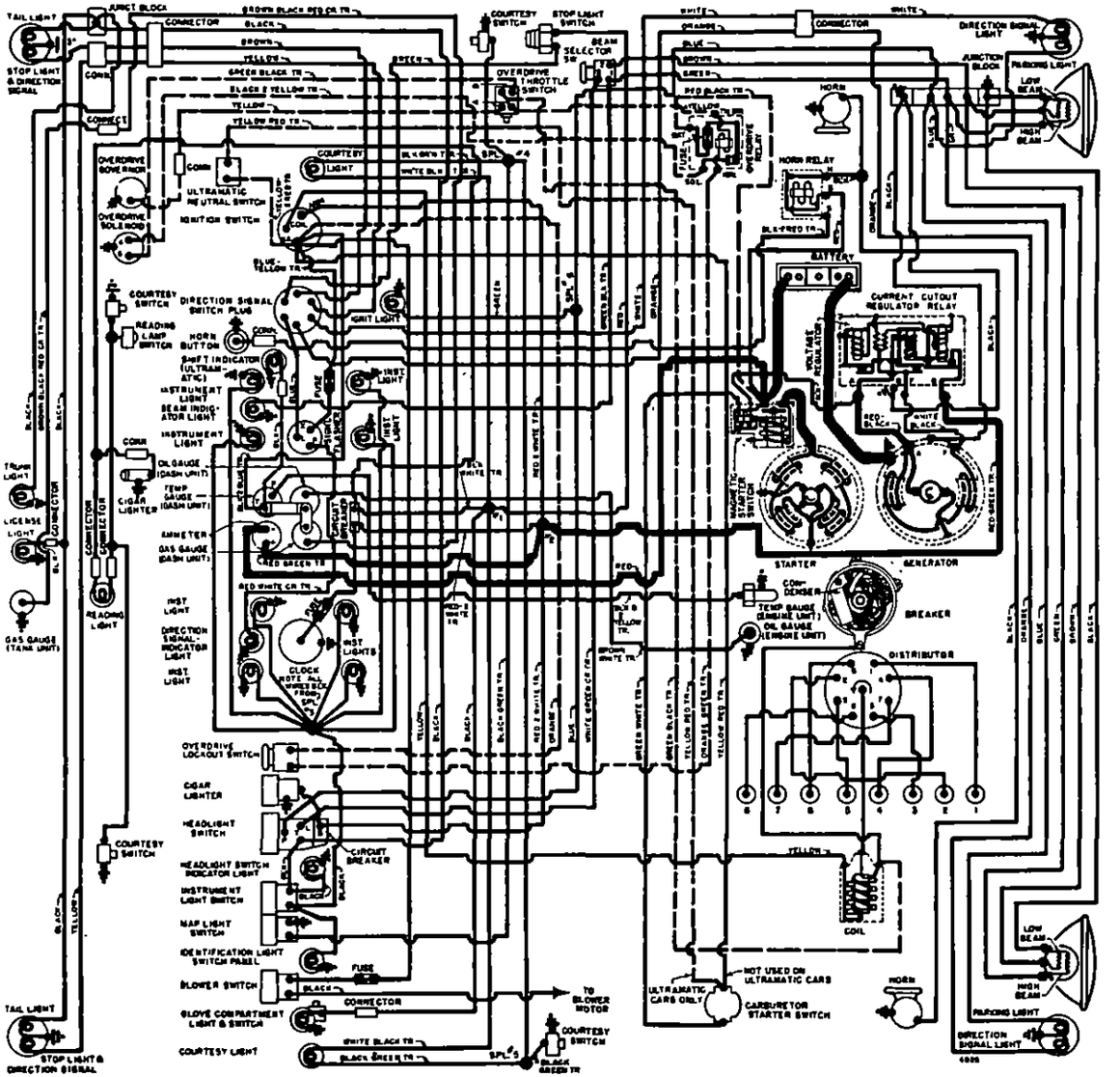
Fuel Compensator: 10° advance or retard manual adjustment at distributor. *See Ignition Timing.*

Vacuum Spark Control: Auto-Lite. On distributor, linked directly to breaker plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7"
1°	2°	8⅝"
3°	6°	12"
4°	8°	13½"
5½°	11°	16"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out hold-down screw, lift off.



I NITI N TIMING

Std. Setting.....6° BTDC.
NOTE—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting.
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.
Timing—Set Fuel Compensator at "0". With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampener in line with pointer on chain case cover (see table above). Loosen advance arm clamp bolt, rotate distributor until contacts begin to open, tighten clamp bolt. Check spark plug connections (see diagram), see that rotor opposite #1 segment in cap. Check Fuel Compensator Setting.
Timing (with Neon Timing Light)—Mark 6th line ahead of "#1UP.DC" mark on vibration dampener with white paint, clip timing light to #1 spark plug. Idle engine below 500 RPM., adjust distributor (as directed above) until mark lines up with pointer.
Fuel Compensator Setting—Should be set for slight ping when accelerating with wide open throttle. To adjust, loosen thumbnut, rotate distributor counterclockwise (if ping too severe), clockwise (if no ping noted), tighten thumbnut and recheck performance.

CARBURETOR

Carter WDO, No. 531SA. 1¼" Dual barrel downdraft type with Carter Climatic Control.
Casting No. on Flange—564.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***
Fast Idle: Carter Dual (WDO) Carburetor type.
See Carburetion Equipment Section for complete data.
Setting—Adjust fast idle screw for .023-.028" throttle opening (Gauge T109-189) with choke closed.
Automatic Choke: Carter Climatic Control (Dual Carburetors).
See Carburetion Equipment Section for complete data.
Setting—Centered (at index).

CARB. EQUIPMENT

Air Cleaner (std.—oil bath): AC No. 1542318.
Element—AC No. 14.
Servicing (oil bath type)—Clean filter element, clean and refill oil reservoir with SAE No. 50 engine oil (Summer), No. 30 (Winter) to level of indicator line on case (approx. 1 pint) every 5000 miles or oftener if required.
Fuel Pump (Fuel-&-Vacuum): AC Type AH. No. 1539116.
Replacement Pump—AC No. 9116.
Pressure—4-4¾ lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41635.
Tank Unit—K-S No. 41678.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type PN-17ZR. 6 Volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—138 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.1 minutes. Five second voltage—4.3 volts.
Grounded Terminal—Positive (+) to frame.
Dimensions—Length 19¼". Width 4". Hgt. 8 29/32".
Location—On left side in engine compartment.

STARTER

Auto-Lite Model MAX-4052. Armature MAW-2069.
Drive—Overrunning clutch (solenoid pinion shift) through reduction gears.
Rotation—Clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—200-250 amperes.

Performance Data

Torque	RPM①	Volts	Amperes
0 ft. lbs.	2560	5.5	70
13.0 "	Lock	2.0	410

①—Pinion Shaft RPM. (reduction gear drive).
Removal: On left front face of flywheel housing. To remove, take out flange mounting screws.
Starting Switch: Auto-Lite Model SS-4205 Solenoid Switch on starter controlled by Carter Car Starter No. 192-11U on carburetor (accelerator pedal control).
See Electrical Equipment Section for complete data.
►**Ultramatic Drive Starter Safety Switch**—Packard No. 421319 (Early 1950), No. 423439 (Late 1950). On left side of transmission case. Connected in starter control circuit so that starter operative only with with lever in "N" neutral, or "P" parking position.

GENERATOR

Early.....**Auto-Lite GDZ-4801V.** Arm. GDZ-2006F.
Later.....**Auto-Lite GGW-6001F.** Arm. GGW-2006F.
①**Convt.**.....**Auto-Lite GEG-4823F.** Arm. GEG-2006F.
②**Convt.**.....**Auto-Lite GGU-6001D.** Arm. GGU-2006F.
①—Early Cars. ②—Later Cars.
Two brush types with current and voltage regulation.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data (Auto-Lite GDZ-4801V)

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (Auto-Lite GEG-4823F)

Amperes	Volts	Cold—R.P.M.—Hot
40	8.0	1575 Max.

Performance Data (Auto-Lite GGU-6001D)

0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850

Performance Data (Auto-Lite GGW-6001F)

0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—64-68 ozs. (GEG), 35-53 ozs. (Others) New brushes.
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—(GDZ) 4.2-4.6 amps., (GGU) 5.5-6.5 amps., (GGW) 4.6-5.2 amps., (GEG) 4.7-5.2 amperes, all at 6.0 volts.
Removal: Pivot mounted at left front of engine To remove, take out strap screw and mounting bolts.
Belt Adjustment: ½" belt deflection between fan and generator. Loosen adjusting strap screw, pry the generator out for ½" setting, tighten screw.

REGULATOR

Auto-Lite VAV-4401B.....for GGU-6001D Generator
Auto-Lite VRP-4402A.....for GDZ-4801V Generator
Auto-Lite VRP-4402B.....for GEG-4823F Generator
Auto-Lite VRP-4402C.....for GGW-6001F Generator
All are current-voltage types.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay

Cuts In—6.4-7.0 volts, (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section for complete data.***
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—As follows:
VAV-4401B 44-46 amperes (marked '45' on cover).
VRP-4402A 34-36 amperes (marked '35' on cover).
VRP-4402B 39-41 amperes (marked '40' on cover).
VRP-4402C 39-41 amperes (marked '40' on cover).
Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section for complete data.***
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Hall "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Light at top of speedomter dial. Lighted when Upper Beams "on".
Direction Signal: Std. ***See Electrical Equipment Section.***
Direction Signal Indicator—Light at top of clock. Flashes when Signal in use.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating, thermostatic types.
Lighting—30 ampere. On lighting switch.
Accessory (Stop & Body Lamps)—30 ampere. Behind instrument panel below gauges. Protects Glove Box Lamp, Courtesy Lamps, Map Lamp, Stop Lamps, Dome Lamp, and Rear Cigar Lighter.
Hydro-Lectric Power (Convertible)—On engine side of dash on pump upper bracket.

FUSES: **Clock**—SFE 3 ampere in lead below Clock.
Direction Signal—SFE 9 ampere. In Flasher feed wire above Ash Tray.
Overdrive—SFE 30 ampere. On Overdrive Relay (at BAT terminal) on engine side of dash.
Electromatic Clutch—9 ampere. In lead from Ignition Switch to Electromatic Clutch Switch.
Heater—SFE 30 ampere. In cable near Ign. Switch.

HORNS: Sparton. Dual horns operated by relay.
Horn Current—22-25 amperes.

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027". **Air Gap** .014" (contacts closed).

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ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.
Bore—3½"①. **Stroke**—4⅝".
①—*For Original Bore Sizes, See Packard Special Data.*
▷*.020" OVERSIZE BORE ENGINES: Marked by star following engine number.*
Displacement—356 cubic inches. **Rated HP.**—39.2.
Developed Horsepower—160 at 3600 RPM.
Compression Ratio—7.0-1 std. cast iron head.
Compression & Vacuum Reading—*See Tune-Up data.*

OIL PAN REMOVAL: *See Packard Special Data.*

TIGHTENING TORQUES: *See Packard Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Packard Special Data.*

PISTONS: Aluminum alloy, autothermic strut type. *Original Piston Sizes & Markings, see Packard Special Data.*
Length—3⅞".
Weight—19½ ozs. (stripped), 25½ (with rings & pin).
▷**Cyl. Bore Taper Note**—Car manufacturer recommends cylinders be re-bored and new pistons installed if cylinder taper exceeds .007-.010". If necessary, new rings only can be installed (without reboring) for taper up to .014".
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting New Pistons.
▷**Piston Skirt Expander Note**—Car manufacturer recommends skirt expanders be installed if cylinder diameter over .006" greater than piston skirt diameter (measured alongside upper end of piston skirt slot).

Replacement Pistons: *See Packard Special Data.*
NOTE—Check ring grooves for wear by installing new piston ring in groove—if .006" feeler can be inserted 1/16", wear excessive and piston should be replaced. Check top groove when testing.

Fitting New Pistons: Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 12-18 lbs.
NOTE—Piston should hold in any portion of bore of own weight, but should move when one or two finger pressure applied to piston with cyl. bore vertical.

Install Pistons: Slot toward camshaft.

PISTON RINGS: Two compression rings (No. 200 top and second groove), one oil control ring (No. 85) per piston, all above pin. Oil ring groove has twelve 5/32" oil drain holes.

Ring	Width	End Gap	Side Clearance
Comp. (#1, 2)	.0930-.0935"	.0054-.0233"	.0025-.003"
Oil (#3)	.186-.1865"	.0054-.0213"	.0025-.003"

Installing Rings—End gaps must be between pin holes with #2 ring on same side as skirt slot, #1 and #3 ring on side opposite slot.

Replacement Rings: Std., .020", .030", .040" oversize.

PISTON PIN Diameter—7/8". **Length**—3 1/64".
Floating type retained by lock ring at each end. Split type bushing used in upper end of rod.
Pin Fit in Piston—Palm push fit with piston at 160°F. (heat piston in water only).
Pin Fit in Rod Bushing—Finger push fit at 70°F.
Piston Pin (Connecting Rod) Bushing Installation—*See "Piston Pins" in Packard Special Data.*

Replacement Pins: Std. and .003", .006" oversize.

CONNECTING ROD: Length 9¼". **Weight**—38.9 ozs.
Crankpin Journal Diameter—2.250".
Lower Bearing—Shimless, precision, steel backed, Moraine Durex or Federal Mogul H-24.
Clearance—.0005-.003". **Endplay**—.004-.012".

Bearing Adjustment: None (no shims). Replace bearings. Self-locking nuts used on cap bolts (tighten to 60-65 ft. lbs.).

Replacement Bearings: Std., .001", .002", .020" US.

Installing Rods: Oil squirt hole toward camshaft.

CRANKSHAFT: 9 bearing with bolted-on counterweights. Rubber friction disc dampener on front end.
Journal Diameter—2.7465".
Bearings—Interchangeable, shimless, precision, steel-backed Moraine Durex or Federal Mogul H-24.
Clearance—.001-.003".

Bearing Adjustment: None (no shims). Replace bearings (upper halves can be rotated in and out).

Replacement Bearings: Std., .001", .002", .020" US.

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*

End Thrust: At #5 bearing. **Endplay**—.003-.008".

CAMSHAFT: 8 bearing. Non-adjustable chain drive.
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.003".

End Thrust: Taken by thrust plate in back of camshaft sprocket. **Endplay**—.004-.006".

Timing Chain: Morse. Width 1¼". Pitch .375" (⅜"). Length 23¼" or 62 links.

Camshaft Setting: Install chain and sprockets together with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 43/64"	.3417"	6 7/32"
Exhaust	1 7/16"	.3398"	6 7/32"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.342"	.002"
Exhaust	45°	.342"	.004"

Valve Guides: Lubrite coated. Pressed in block from above with upper end 31/32" below top of block. Use Valve Guide Driver and Depth Gauge No. J-2577—properly positions guides when gauge seats on block. Ream guides after installation with 11/32" (.3437") reamer. Upper end of exhaust guide counterbored.
Valve Guide Removal Note—If guides to be removed with tappets in engine, use Valve Guide Remover Tool J-2580 to drive guide down to just clear tappet (with tappet on heel of cam). Score guide with chisel inserted through valve ports, then break off lower end, finally drive remainder of guide out. If tappets out, guide can be driven down and out without breaking.

Valve Springs: Intake and exhaust springs interchangeable. Anti-rotation serrated cup washers installed on top of spring and seats in recess in block.

	Spring Pressure	Spring Length
Valve Closed	60-66 lbs.	1 3/4"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters: Wilcox-Rich "Zero-lash" type hydraulic lifters (mushroom type). Remove from below with camshaft out of engine
Diameter—.7177-.7182". **Clearance**—.0002" selective.

Hydraulic Valve Lifter Removal & Overhaul: *See "Hydraulic Valve Lifters" in Packard Special Data.*
Replacement Lifters—.001", .002", .005" oversize. Use Tool S.T. 5101 (piloted in valve guide) and ream for .005" oversize lifters.

Valve Lifter Clearance Check When Grinding Valves—*See "Hydraulic Valve Lifters" in Packard Special Data.*

VALVE TIMING

Tappet Clearance: None in service (hydraulic type lifters). See Valve Lifters above.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 4° BTDC. Close 51° ALDC.
Exhaust Valves—Open 49° BLDC. Close 10° ATDC.
Valve Timing Check—Check by turning tappet plunger for No. 8 exhaust valve with fingers. Turn engine over until this valve fully open, turn engine further until valve nearly closed (plunger should not turn), continue turning engine while attempting to turn plunger, until plunger "breaks loose" or turns. This should be 10° after top dead center—check at timing mark on vibration dampener.
CAUTION—If valve over 8° before or after this point in closing, camshaft setting incorrect.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters, and timing chain. Oil pump mounted externally on right side of engine.
Crankcase Capacity—7 quarts.
Normal Oil Pressure—50 lbs. Normal Driving.
Oil Pressure Regulator—On oil pump cover. Not adjustable. Pressure regulator spring tension should be 17½-18½ lbs. at 1⅞".

Oil Pump: Gear type. On right side of crankcase.
Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*

Oil Pressure Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41640.
Engine Unit—K-S No. 40767.
See Miscellaneous Section for complete data.

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap, air intake). Outlet pipe in valve compartment cover at rear.
Servicing—Wash filter element in gasoline and re-oil when changing oil (1000-2000 miles).

COOLING

Cooling System: Pressure type with pressure relief valve in filler cap and fan belt driven pump.
Capacity—19 qts. Add ½ qt. for heater.
Pressure Valve—AC No. 850005 pressure cap. Opens at 7 lbs.

Water Pump: Centrifugal, belt-driven, packless type.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head outlet.
Setting (std.)—Starts to open 145-150°F.
Setting (Opt. High Reading)—Starts to open 160-165°F. or 175-180°F.

Temperature Gauge: King-Seeley Electric.
Dash Unit—K-S No. 41645.
Engine Unit—K-S 41085 (1949), 42550 (1950).
See Miscellaneous Section for complete data.

CLUTCH

Long Model 11CF-T1. Single plate, semi-centrifugal, dry disc type.
See Clutch Section for complete data.
Facings—Woven (U.S. Asbestos). Thickness .125". Inside Diameter 7". Outside Diameter 11".

Pedal Adjustment: 1¼-1⅜" free travel. Adjusting nut on rod at throwout lever.

▷**Clutch Pedal Over-Center Spring:** New adjustable type. *See "Clutch Notes" in Packard Special Data for adjustment.*

Removal: Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect throwout linkage and remove throwout bearing. Remove clutch cover screws (release tension evenly), lower assembly out of car.

ELECTROMATIC CLUTCH

Electromatic Clutch: Vacuum type clutch actuation with electrical control. Optional equipment.
See Clutch Section for complete data.

TRANSMISSION

Own Make. Helical gear, constant-mesh, synchromesh (Second & High), constant-mesh (Low). Sliding spur gear (Reverse). Low & Second speed gears are ball bearing mounted.
See Transmission Section for complete data.

Trahsmission Control: Steering column type.
See Transmission Section for complete data.

Removal: Disconnect shifter rods, speedometer cable, hand brake cable at equalizer, engine ground strap, front universal (block driveshaft up against floor pan). Support rear of engine with jack and unbolt cross-member (at frame ends and transmission). Disconnect clutch retractor spring and fore-and-aft restraint rod. Take out transmission-to-housing mounting screws, remove transmission.

OVERDRIVE

Warner Model AS4-R11. Optl. equipment used with Packard transmission. New simplified solenoid operated overdrive with Governor Control and throttle operated "kick-down".
See Transmission Section for complete data.

►**Early R11 Overdrive Failure to Engage Correction**—*See "Warner R11 Overdrive" in Transmission Section.*
Overdrive Solenoid—Packard No. 403942.
Governor—Packard No. 418447.
Control Relay—Packard No. 403940.
Kick-down Switch—Packard No. 403945.
Lock-out Switch—Packard No. 354820.

Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

ULTRAMATIC DRIVE

STD. EQUIPMENT ON SERIES 2306 & 2333

Own Make. Torque Converter (with hydraulically operated Direct Speed Clutch) and hydraulically operated planetary unit with manual control.
See Transmission Section for complete data including Testing & Trouble Shooting.

►**Production Changes & Oil Leak Corrections**—*See "Ultramatic Drive" in Transmission Section.*

Linkage Adjustment on Ultramatic Drive Cars: *See Packard "Ultramatic Drive" in Transmission Section.*

Lubrication—Check fluid level every 1000 miles, drain and refill every 25,000 miles.

Recommended Fluid. Packard Ultramatic Drive or any Type "A" Automatic Transmission Fluid which has an AQ-ATF number embossed on container.

Capacity. Approximately 12 quarts.

Draining & Refilling. *See Packard "Ultramatic Drive" in Transmission Section.*

Checking Fluid Level. *CAUTION—Fluid must only be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute with selector lever in "N" position.* Stop the engine, check level by removing dipstick from filler hole on left side of transmission (accessible from under car—release cap by turning ½ turn counterclockwise). Add fluid as required to bring level up to FULL mark on dipstick.

Removal: *See "Packard Ultramatic Drive" in Transmission Section.*

UNIVERSALS

Mechanics 3CR or Spicer. Needle bearing types.
NOTE—Cars without Overdrive use one-piece shaft.

►*CAUTION*—Rear universal flange nut controls rear axle pinion bearing pre-load which **must be adjusted whenever nut is loosened.** *See "Packard Rear Axle" in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive and Ring Gear Idler Roller.
See Rear Axle Section for complete data.

Ratios—As follows:

Model	Std.	O.D. Cars	Ultramatic Cars
	Std. Ratios		
2306, 2333	3.92-1	4.09-1	3.54-1
2313	4.54-1	4.7-1	———
	Optl. Ratios		
2306, 2333	4.09-1	———	3.92-1

Backlash—.004-.006". Screw adjustment.

Removal: Remove axle shafts (see Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with 2 x 4 inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier lock nuts, lift carrier out.

Axle Shaft Removal: Remove wheel, brake drum (use screw type puller J-4153—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner oil seal). Use Tool J-943-B to remove inner oil seal.

Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel for .050" or under, at both wheels if over .050" to secure .004-.007" endplay.
Endplay—.004-.007".

SHOCK ABSORBERS

Delco Model 1946-J, K (front), Delco or Monroe (rear). Double acting (front), direct acting (rear).

Fifth Shock Absorber (Stabilizer) Super 8: Monroe direct acting, hydraulic (built-in rear stabilizer).

FRONT SUSPENSI N

Front Suspension: Packard Clipper Safe-T-Flex, independent, linked parallelogram type with coil springs and double acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—5°50' crosswise (2°30' on 156" wheelbase hearse).
Caster—Neg. 2° ± ½°. Eccentric adjustment.
Camber—0° ± ¼°. Eccentric adjustment.
Toe In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.

STEERING GEAR

Packard—Gemmer Model 335. "3-tooth" Worm-and-Roller with "push-pull" adjustment. See Gemmer.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Wheel Cylinder—Front 1⅛". Rear 1" (1⅛" 156" WB.).
Drums: 12" centrifuse type.
Lining—Marshall 4112 (primary shoe). Marshall 9051 (secondary). Width 2¼" (front wheel), 2" (rear). Length per shoe 11½" (primary), 13" (secondary). Thickness 3/16".
156" WB. Hearse Note—Bonded lining used. All shoes 13" long, 2½" wide, 3/16" thick.
Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Power Operated Convertible Tops, Windows & Front Seat: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

ELECTRICAL EQUIPMENT NOTE: Both Auto-Lite and Delco-Remy equipment are used. Cars are equipped entirely with either one or the other system.

MODEL IDENTIFICATION

SERIAL NUMBERS: Stamped on plate mounted on left front door pillar post.

ENGINE NUMBERS: Stamped on left side of engine opposite #8 cylinder.

Starting Engine Numbers	1951	1952
200	J-200001	K-200000
250		K-*400000*
300	J-400001	K-400000
400	J-600001	K-600000

▷*ENGINE NUMBER NOTE: A "STAR" following engine number indicates .020" oversize cylinder bores.*

TUNE-UP

COMPRESSION PRESSURE: At 150 RPM. (Cranking Speed).
"200"—124 lbs., with 7.0-1 head.
"250" & "300"—134 lbs., with 7.0-1 head, 144 lbs., with 7.8-1 head.
"400"—144 lbs., with 7.8-1 head.

VACUUM READING: 18-21" idling at 400 RPM.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUG GAPS: .025".
Plugs—Auto-Lite A5, AC No. 46-5. Champion J8. 14 mm.

DISTRIBUTOR: Auto-Lite No. IGP-4502C. Automatic advance type with vacuum spark control and fuel compensator adjustment.
Breaker Gap—.017". Limits .015-.019".
Cam Angle—Closed 27°. Open 18°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
Fuel Compensator—40° range of adjustment on quadrant at vacuum link connection.

DISTRIBUTOR: Delco-Remy No. 1110825. Automatic and vacuum advance type with "center-bearing" breaker plate and fuel compensator adjustment.
Breaker Gap—.016".
Cam Angle—Test limits with .016" gap, 21-30°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
Fuel Compensator—10° advance or retard adjustment at distributor.

COIL: Auto-Lite No. CR-4001A, or Delco-Remy No. 1115380. *Use Auto-Lite Coil & Auto-Lite Distributor, or Delco-Remy Coil & Delco-Remy Distributor together.*
Ignition Current—2 amps. idling, 5 stopped.

CONDENSER: (Capacity)—.20-.25 microfarad (Auto-Lite). .18-.23 microfarad (Delco-Remy).

IGNITION TIMING: 6° BTDC. *NOTE*—Modify this setting for special fuel and altitude conditions. See Fuel Compensator (below).
Timing Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.

Fuel Compensator Setting: Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite distributors), advance arm hold-down screw (Delco-Remy distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping) until correct performance secured.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter WGD, No. ("200") 784S, (1951 "300" & "400") 767S, (1952 "250," "300," & "400") 928S. 1¼" dual down-draft type with Carter Climatic Control.
Idle Setting—½-1½ turns open. Adjust both screws equally. Turn screws out for richer mixture.
Idle Speed (Synchro-mesh Trans.)—6 MPH.
Idle Speed (Ultramatic)—375 RPM. with selector lever in "H" position.
Float Level—13/64" from top of float to cover with valve seated (assembly inverted).
Accelerating Pump—Not adjustable.

Choke Setting: 1 Point Rich (all models).

Fast Idle Setting: .023" throttle opening with choke valve closed (throttle must be opened first). Adjust by bending choke connector rod at lower end.

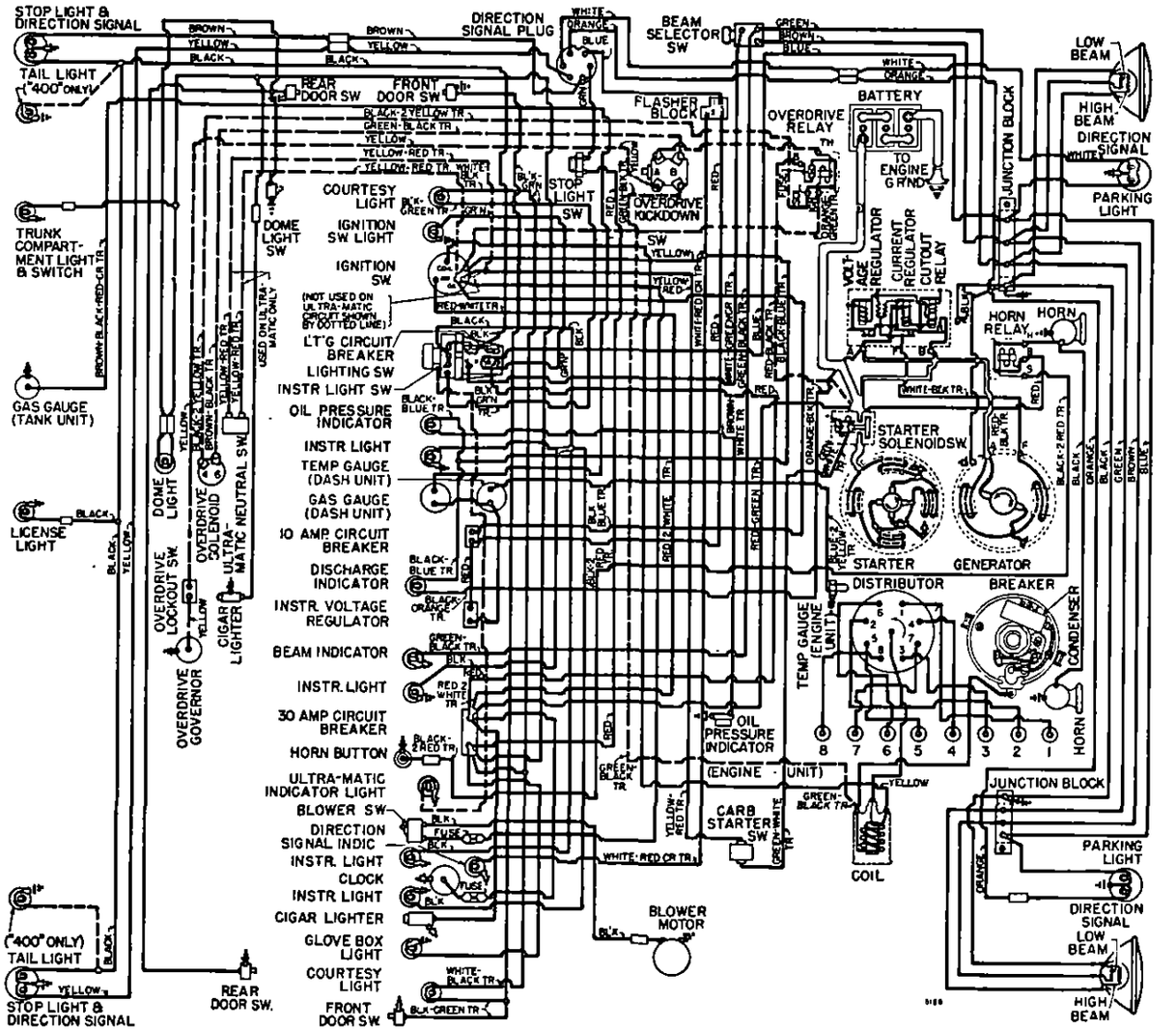
Fuel Pump Pressure: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment necessary.

VALVE TAPPET CLEARANCE: "200" Engine. .007" Intake. .010" Exhaust.
"250," "300" & "400" Engines—Hydraulic lifters used. No adjustment required.

IGNITION
AUTO-LITE

COIL: *Auto-Lite CR-4001A.*
Location—Left side of engine above distributor.
Ignition Current—2 amps idling, 5 stopped.



1951 MODELS (AUTO-LITE EQUIPMENT)

CONDENSER: Auto-Lite.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model No. IGP-4502C. Automatic advance type with Vacuum Spark Control and Fuel Compensator adjustment.
Breaker Gap—.017". Limits .013-.018".
Cam Angle—Closed 27°, Open 18°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Auto-Lite)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	400	2	800
3	600	6	1200
6	1200	12	2400
8	1600	16	3200

Fuel Compensator: 40° range of adjustment on quadrant at vacuum link connection. *See Ignition Timing.*

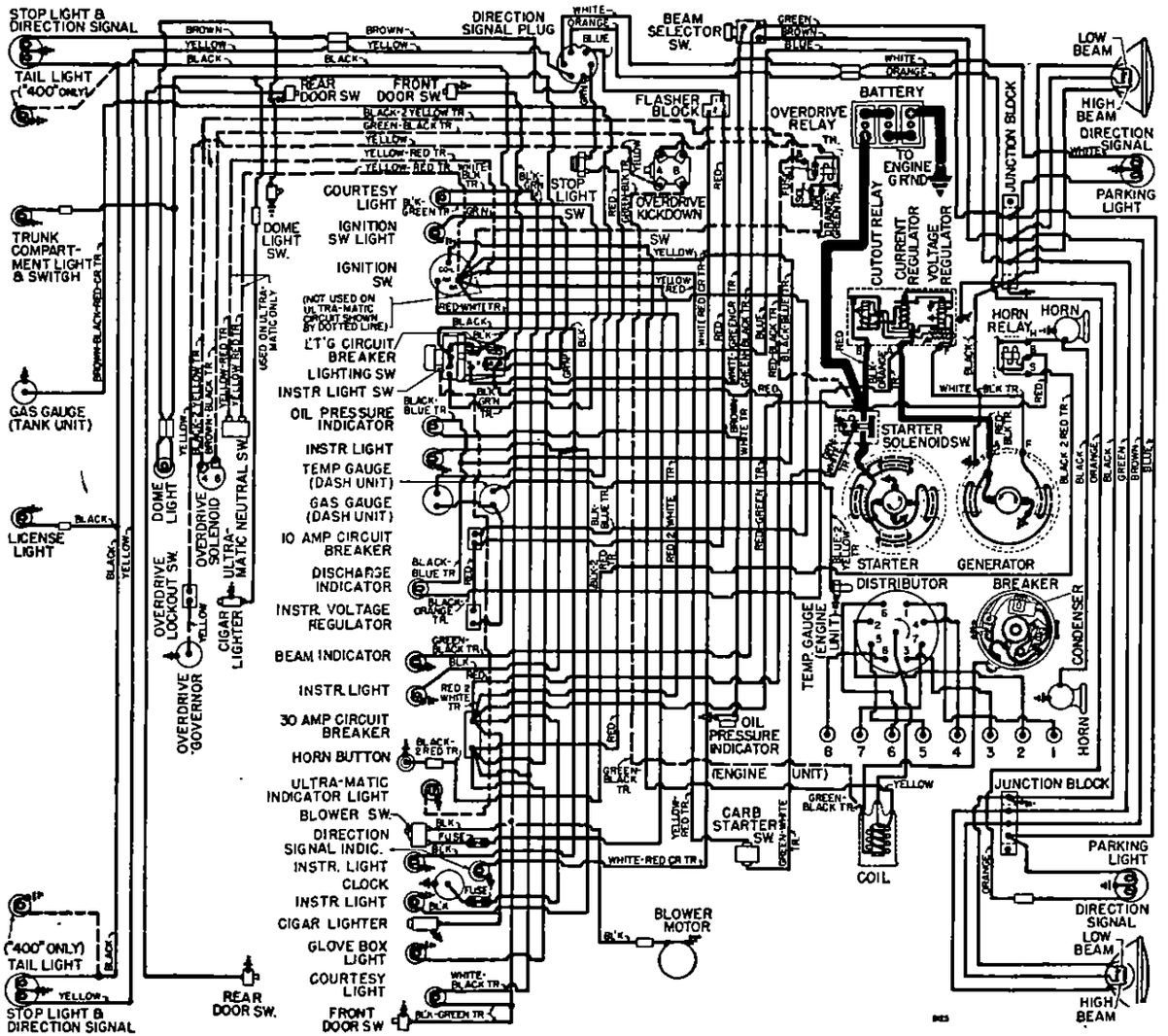
Vacuum Spark Control: Auto-Lite. Mounted on hold-down plate and linked to adjusting quadrant on distributor housing.

Vacuum Advance (Auto-Lite)

Dist. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6
1	2	6¾
5.7	11.4	10
9	18	14¾
10.5	21	17

DELCO-REMY

COIL: Delco-Remy No. 1115380.
Location—Left side of engine above distributor.



1951 MODELS (DELCO-REMY EQUIPMENT)

Ignition Current—2 amps. idling, 5 stopped.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy 1110825. Automatic and vacuum advance type with "center bearing" breaker plate and fuel compensator adjustment.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.
Breaker Gap—.017". Limits .015-.019".
Cam Angle—Test limits with .016" gap—21-30°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Delco-Remy)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	400	0-4	800
2-4	600	4-8	1200
4-6	1000	8-12	2000
7-9	1600	14-18	3200

Fuel Compensator: 10° advance or retard adjustment at distributor. *See Ignition Timing.*

Vacuum Spark Control: Delco-Remy 1116060. Integral type mounted on distributor and linked directly to breaker plate.

Vacuum Advance (Delco-Remy)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
9-11	18-22	19

Plunger Travel—7/32"-15/64".

IGNITION TIMING

Std. Setting ..... **6° BTDC.**
NOTE—Modify this setting for special fuel and altitude conditions. *See Fuel Compensator Setting.*
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.
Timing—With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampener in line with pointer on chain cover (see table above). Loosen vacuum unit link screw in distributor quadrant. (Auto-Lite distributors), or hold-down screw in advance arm Delco-Remy distributors), rotate distributor until contacts begin to open, tighten screw.
Fuel Compensator Setting—Should be set for slight ping when accelerating engine with wide-open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite distributors), advance arm hold-down screw (Delco-Remy distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping) until correct performance secured.

CARBURETOR

Carter WGD, No. ("200") 784S, (1951 "300" & "400") 767S, (1952 "250", "300" & "400") 928S. 1¼" dual down-draft type with Carter Climatic Control.
Casting No. on Flange—803.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rods & Jets—*See Carter Downdraft Jet Table in Carburetor Section.*

Fast Idle: Carter (WGD) Carburetor type.
Setting—.023" throttle opening with choke valve closed (throttle must be opened first). Adjust by bending choke connector rod at lower end.
See Carburetion Equipment Section for complete data.

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Automatic Choke: Carter Climatic Control (Dual Carburetors).
Setting—1 Point rich.
See Carburetion Equipment Section for complete data.

Air Cleaner: ("200") AC Oil-wetted (Std.), Oil-bath (Opt'l).
("250", "300" & "400") AC Oil-bath type.
Replacement Elements—("200") **AC No. 6** (Oil-wetted), **No. 19** (Oil-bath). ("250", "300" & "400") **No. 20.**

Fuel Pump: AC Fuel & Vacuum Type.
Replacement Pump—(1951 "200") 508 to Engine No. J-233206, (Later "200", All Others) 9590.
Pressure—4-4¾ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric "CV" (constant voltage) type with voltage regulator.

Model	Dash Unit	Tank Unit
1951 "200"	45654	44510
1951 "300" & "400"	45607	44510
1952 "200"	45953	44517
1952 "250", "300" & "400"	45607	44517

See Carburetion Equipment Section for complete data.

BATTERY

("200", "250", & "300"): Auto-Lite Type 2L-100 or Willard SW-2L-100, 6 volt, 17 plate, 100 ampere hr. capacity (20 hour rate).
("400"): Auto-Lite Type 2FH-120 or Willard HW-2F-120, 6 volt, 17 plate, 120 ampere hr. capacity (20 hr. rate).
rate).
Grounded Terminal—Positive (+) to engine at water pump.
Location—Left side of engine compartment.

STARTER

AUTO-LITE

Auto-Lite No. MCL-6003 (Early 1951 "200", "300"); No. MCL-6113 (Late 1951 & 1952 "200", "250" & "300"); No. MCL-6114 (1951, 1952 "400").
Armature—Auto-Lite MCH-2021 (MCL-6003), MCH-2028 (MCL-6113), MCH-2070 (MCL-6114).
Drive—(MCL-6003) Bendix Drive No. A-1915, (MCL-6113) Bendix Drive No. A-1792 (MCL-6114) Solenoid pinion shift.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data (Auto-Lite)

Torque		RPM.	Volts	Amperes
0	ft. lbs	4900.	5.0	65
8.0	"	Lock	2.0	410

Starting Switch: ("200", "250", "300") Auto-Lite SS 4017 Magnetic switch, ("400") Auto-Lite SSX-4102 solenoid pinion shift and switch. Controlled by Carter Car Starter No. 192-11U on carburetor (accelerator pedal starting).
See Electrical Equipment Section for complete data.

Ultramatic Drive Starter Safety Switch—Packard No. 423429. On left side of transmission case, connected in starter control circuit so that starter operative only with lever in "N" Neutral or "P" Parking.

STARTER

DELCO-REMY

Delco-Remy No. 1107943 (1951 & Early 1952); No. 1108008 (Late 1952). Armature No. 1910938.
Drive—Outboard barrel Type Bendix No. A-1792.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—24-28 ozs.

Performance Data (Delco-Remy)

Torque		R.P.M.	Volts	Amperes
0	ft. lbs	5500	5.7	65
16	"	Lock	3.0	600

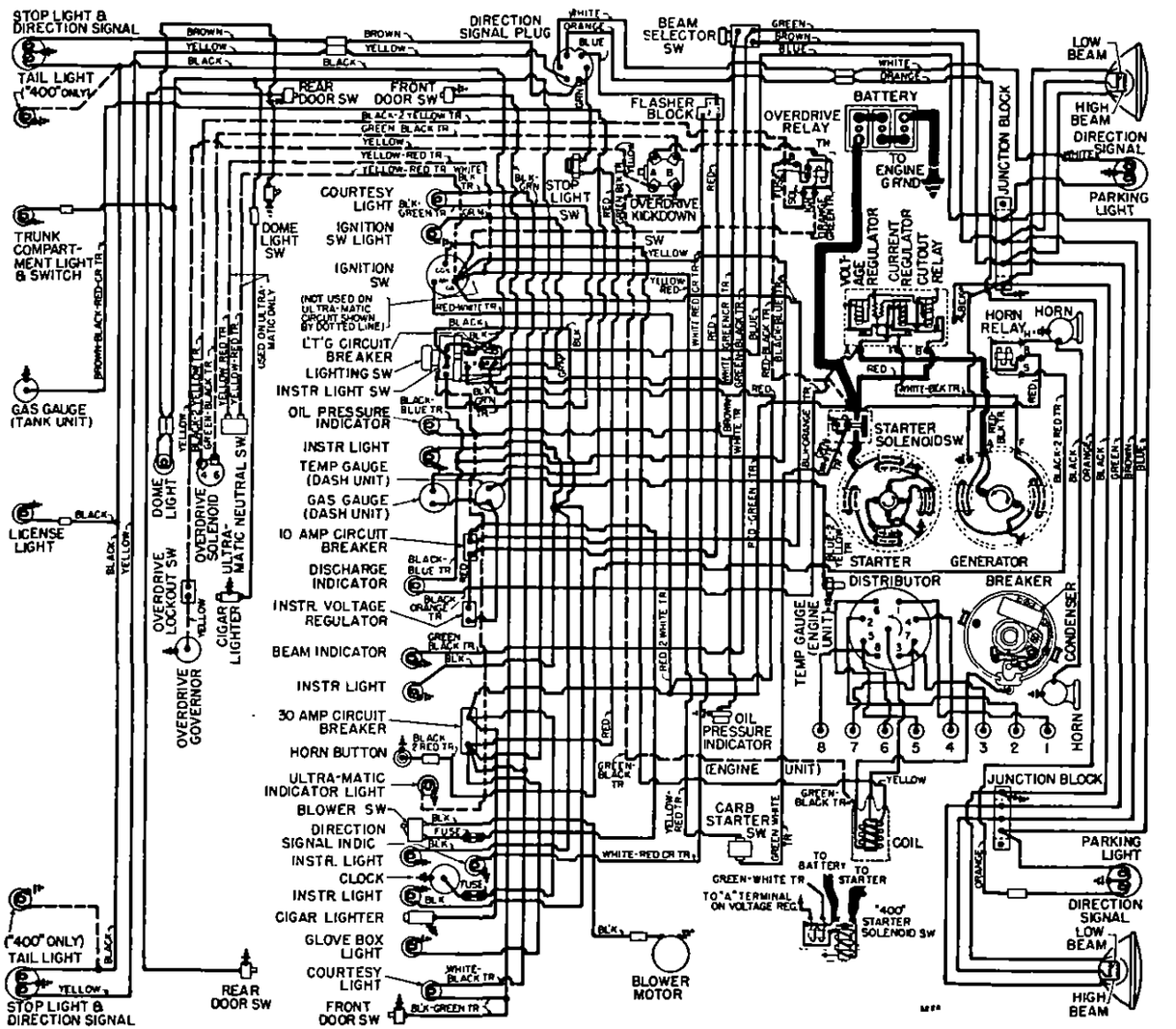
Starting Switch: Delco-Remy No. 1452 (for 1107943), 1465 (for 1108008) Magnetic Switch on starter, controlled by Carter Car Starter No. 192-11U on carburetor (accelerator pedal control).
See Electrical Equipment Section for complete data.

Ultramatic Drive Starter Safety Switch—Packard No. 423429. On left side of transmission case, connected in starter control circuit so that starter operative only with level in "N" Neutral or "P" Parking.

GENERATOR

AUTO-LITE

Auto-Lite GGW-6003A. Armature No. GGW-2006F. Two brush type with current and voltage regulation.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.



1952 MODELS (AUTO-LITE EQUIPMENT)

Performance Data

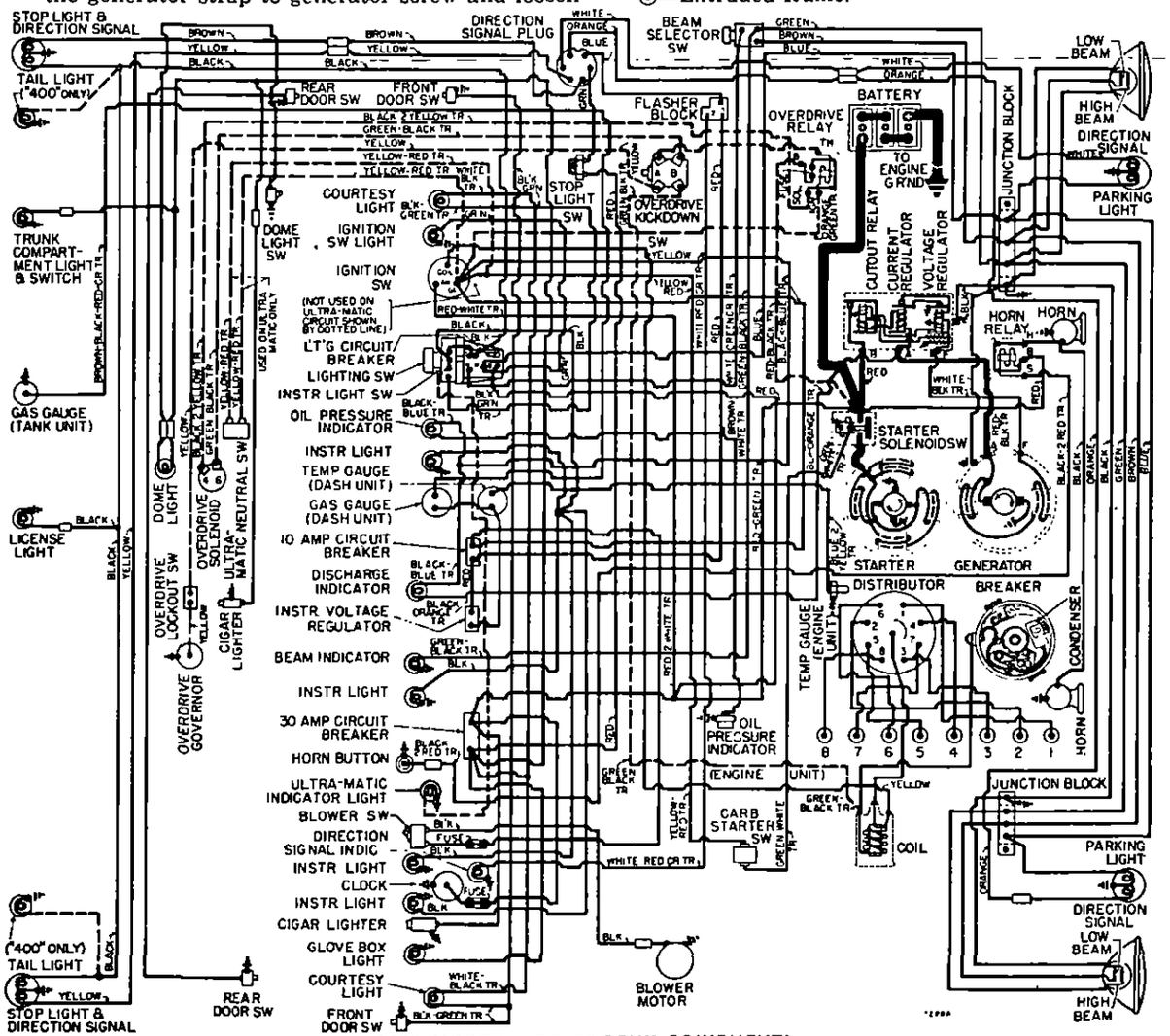
Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 950-1050
40	8 0	1800-2000 2150-2350
45	8 0	1925-2125 2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 amperes at 5.0 volts (70°F.).
Motoring Current—3.9-4.5 amperes at 5.0 volts (70°F.) with field terminal grounded to frame.
Generator Charge Indicator: Red light on right side of instrument cluster. Lights when ignition turned on, goes out when generator begins to charge battery.
Belt Adjustment: Loosen two generator bracket-to-generator screw nuts two or three turns. Loosen the generator strap to generator screw and loosen the generator to water pump screw. Place tool J-4714 over the head of the generator bracket front screw and rotate the tool clockwise until the arm of the tool contacts the edge of the generator drive end plate. Using a torque wrench with a 7/8" socket over the tool, rotate the wrench clockwise and move the generator outward until 15 ft. lbs. torque in indicated on the scale. The adjusting strap to generator screw should be tightened to hold the generator in this position while maintaining the 15 ft. lbs. torque. Tighten all screws previously loosened.

DELCO-REMY

Delco-Remy No.	Generator	Armature
1951	1102745	1912599
1952 (Early)	1102773	1921621
1952 (Later)①	1102778	1921621

①—Extruded frame.



1952 MODELS (DELCO-REMY EQUIPMENT)

Two brush type with current and voltage regulation.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data—1102745

	Amperes	Volts	R.P.M.
Cold	40	8.0	1950

Performance Data—1102773, 8

	Amperes	Volts	R.P.M.
Cold	45	8.0	2450

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.90-2.05 amperes at 6.0 volts.
Generator Charge Indicator: Red light on right side of instrument cluster. Lights when ignition turned on, goes out when generator begins to charge battery.
Belt Adjustment: Same as Auto-Lite (above).

REGULATOR

AUTO-LITE

Auto-Lite (1951) VRP-4402C, (1952) VBE-6102A. Current-voltage type. VBE-6102A has "Temperature-Compensated" current regulator.
NOTE—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.3-6.8 volts.
Cut Out—4.1-4.8 volts.
Contact Gap—.015" minimum.
Air Gap—.031-.034" (check at hinge end of core).
Checking & Adjusting & Detailed Data—*See Electrical Equipment Section.*

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. *(VBE) after 15 minutes operation charging at ½ maximum rate, (VRP) normal operation while charging at 10 amperes.*
Air Gap—.048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—VRP

Setting—39-41 amperes (marked "40" on cover).
Air Gap—.048-.052 with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—VBE

►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

Test A Operating Amperes	Test B
52 amperes	45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts).
Checking & Adjusting—*See Electrical Equip. Section.*

DELCO-REMY

Delco-Remy No. (1951) 1118360 for 1102745 Gen., (1952) 1118726 for 1102773 & 1102778 Gens.). Current-voltage type.
NOTE—Regulators have screw adjustment for settings and single regulator springs.
►*CAUTION*—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

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Checking & Adjusting & Detailed Data—*See Electrical Equipment Section.*

Voltage Regulator

Setting—7.0-7.7 volts (set to 7.4 hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—(1118360) 40-46 amperes, set to 42 hot. (1118726) 45-51 amperes, set to 47 hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equipment Section.*

Switches

Lighting—Packard No. 416288.
Beam Selector—Delco-Remy No. 1997008.
Instrument Switch—Part of Lighting Switch.
Stop Light—Packard No. 362862.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting—30 ampere. On lighting switch.
Accessory (Stop & Body Lamps)—30 ampere. Behind instrument panel below gauges. Protects Glove Box Lamp, Courtesy Lamps, Stop Lamps, Dome Lamp and Rear Cigar Lighter.
Hydro-Electric Power (Convertible)—On engine side of dash on pump upper bracket.
Directional Signal—10 ampere circuit breaker on instrument cluster.

FUSES: Clock—SFE 3 ampere in lead below clock.
Overdrive—SFE 30 ampere. On overdrive relay (at BAT terminal) on engine side of dash.
Heater—SFE 20 ampere. In cable near Ign. Switch.

HORNS: Sparton: Dual horns operated by relay.
Horn Current—22-25 amperes.

Horn Relay—Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027". **Air Gap**—.014" (contacts closed).

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45550—Consists of a thermo bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ten amp. circuit breaker and the instrument circuits. See Wiring Diagram.

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.

ENGINE

	"200"	"250"	"300"	"400"
Bore	3½"	3½"	3½"	3½"
Stroke	3¾"	4¼"	4¼"	4¼"
Displacement (cu. ins.)	288	327	327	327
Rated HP	39.2	39.2	39.2	39.2
Developed HP①	135	150	150	155
Comp. Ratio (Std.)	7.0-1	7.0-1	7.0-1	7.8-1
Comp. Ratio (Opt'l)	7.5-1	7.8-1	7.8-1	

①—HP at 3600 RPM., Std. Comp. Ratio.

►***HYDRAULIC VALVE LIFTERS: Standard on "250", "300" & "400" Engines.***

ENGINE & OIL PAN REMOVAL: *See Packard Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Packard Special Data.*

PISTONS: Aluminum alloy, autothermic strut type.
Original Bore & Pistons—*See Packard Special Data.*
Length—3 7/8".

►**Out-of-Round Note**—Car manufacturer recommends cylinder be rebored and new pistons installed if cylinder out-of-round exceeds .004".
Weight—19.575 ozs. (stripped), 25½ ozs. (with rings and pins).

►**Cyl. Bore Taper Note**—Car manufacturer recommends cylinders be rebored and new pistons installed if cylinder taper exceeds .007-.010". If necessary, new rings only can be installed (without reboring) for tapers up to .014".
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting New Pistons.

►**Piston Skirt Expander Note**—Car manufacturer recommends skirt expanders be installed if cylinder diameter over .006" greater than piston skirt diameter (measure alongside upper end of piston skirt slot).

Replacement Pistons: *See Packard Special Data.*

►*NOTE*—Check ring grooves by installing new piston ring in groove—if .006" feeler can be inserted 1/16", wear excessive and piston should be replaced. Check top groove when testing.

Fitting New Pistons: Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 10-16 lbs.

►*NOTE*—Piston should hold in any portion of the bore of its own weight, but should move when one or two finger pressure applied to piston with cylinder bore vertical.

Installing Pistons: Slot toward camshaft.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 200 second groove), one oil control ring (No. 85) per piston, all above pin. Oil ring groove has 12 holes 5/32" dia., for drainage.

Ring	Width	End Gap	Side Clearance
Comp. (#1, 2)	.0930-.0935"	.007-.017"	.0025-.003"
Oil (#3)	.186-.1885"	.007-.015"	.0025-.003"

Installing Rings—End gaps must be between pin holes with #2 ring on same side as skirt slot, #1 and #3 ring on side opposite slot.
Replacement Rings: Std., .020", .030", .040" oversize.

PISTON PIN: Diameter 7/8". **Length** 3 1/64".
Floating type retained by lock ring at each end. Split type bushings used in upper end of rod.
Pin Fit in Piston—Palm push fit with piston at 160°F. (heat piston in water only).
Piston Pin (Connecting Rod) Bushing Installation—*See "Piston Pins" in Packard Special Data.*

Replacement Pins: Std., .003" and .006" oversize.

CONNECTING ROD: (Length) 7 15/16" ("200"); 7 11/16" ("250", "300", "450"). Measured center-to-center.

Weight	1951	1952
"200"	35.8 ozs.	36.5 ozs.
"250"		36.0 ozs.
"300" & "400"	35.4 ozs.	36.0 ozs.

Crankpin Journal Diameter—2.250".

Lower Bearing—Shimless precision, steel backed, Moraine Durex or Federal Mogul 24.
Clearance—.0005-.0025". **Endplay**—.003-.011".
Bearing Adjustment—None (no shims). Replace bearings. Self-locking nut used on cap bolts (tighten to 60-65 ft. lbs.).

Replacement Bearings: Std., .001", .002", .020" US.

Installing Rods: Oil squirt hole toward camshaft.

CRANKSHAFT: Five bearing ("200", "250", "300" Engine), Nine bearing ("400" Engine).
Vibration Dampener—Hydraulic type, filled with silicone fluid.
Dampener Removal—Use puller tool No. J-2636.
Journal Diameter—2.7465".
Bearings—Interchangeable, shimless, precision, steel-backed. Moraine Durex or Federal Mogul.
Clearance—(1951) .001-.003", (1952) .0005-.0025".

Bearing Adjustment—None (no shims). Replace bearings (upper halves can be rotated in and out).

Replacement Bearings—Std., .001", .002", .020" US.

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*
End Thrust—At center bearing. **Endplay** .0035-.0085"

CAMSHAFT: 5 bearing. Non-adjustable chain drive.
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.003".

End Thrust: Taken by thrust plate in back of camshaft sprocket. **Endplay**—.004-.006".

Timing Chain: Morse. Width 1". Pitch .375". Length 58 links.

Camshaft Setting: Install chain and sprockets together with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	**Head Diam.**	**Stem Diam.**	**Length**
Intake	1 43/64"	.3417"	5 7/8"
Exhaust	1 7/16"	.3398"	5 7/8"

	Seat Angle	**Lift**	**Stem Clearance**
Intake	30°	.342"	.002"
Exhaust	45°	①.342"	.004"

①—.337" Lift on "250", "300" & "400" series.

Valve Guides: Lubrite coated. Pressed in block from above with upper end 31/32" below top of block. Use Valve Guide Driver No. J-2577. This tool properly positions guides when gauge seated on block. Ream guides after installation with 11/32" (.3437") reamer. Upper end of exhaust guide counterbored.

►**Valve Guide Removal Note**—If guides to be removed with lifters in engine, use Valve Guide Remover Tool J-2580 to drive guide down to just clear tappet (with tappet on heel of cam). Score guide with chisel thru valve chamber, then break off low end, finally driving remainder of guide out. If lifters out, guide can be driven down and out without breaking.

Valve Springs: Intake and exhaust springs interchangeable. Anti-rotation serrated cup washers installed on top of spring and seats in recess in block.

	Spring Pressure	**Spring Length**
Valve Closed	*60-66* lbs.	1 3/4"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters ("200" Engine): Conventional mushroom type. Remove from below with camshaft out.
Diameter—.6236-.6239". **Clearance**—.0001-.0016".
Replacement Lifters—.001", .002" Oversize.
Use Tool ST-5144 (piloted in valve guide) to ream for .005" oversize lifter installation.

Valve Lifters ("250", "300" & "400" Engines): Wilcox-Rich "Zero-Lash" hydraulic type (mushroom body). Remove from below with camshaft out.
Diameter—.6236-.6239". **Clearance**—.0001-.0016".

Hydraulic Valve Lifter Removal & Overhaul: *See "Hydraulic Valve Lifters" in Packard Special Data.*

Valve Lifter Clearance Check (When Grinding Valves)—*See "Hydraulic Valve Lifters" in Packard Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *Adjustment required only on "200" engines (hydraulic lifters on others).*

("200" Engine)—.007" Intake, .010" Exhaust, HOT.

("250", "300" & "400" Engines)—No adjustment required (hydraulic lifters).

VALVE TIMING: See Camshaft Setting above.

"200" Engine Valve Timing

Intake Valves—Open 15° BTDC. Close 43° ALDC.
Exhaust Valves—Open 50° BLDC. Close 9° ATDC.

"250", "300" & "400" Engine Valve Timing

Intake Valves—Open 15° BTDC. Close 43° ATDC.
Exhaust Valves—Open 53° BLDC. Close 4° ATDC.

Above figures for .0125" intake, .015" exhaust tappet clearance ("200" Engine).

Valve Timing Check ("200" Eng.): With .0125" tappet clearance #1 intake valve should be open, with #1 piston 10° BTDC, (10th graduation before top dead center mark "1UP.DC" on vibration dampener aligned with pointer). Reset tappet clearance to .007" Hot.

►*CAUTION*—If valve more than 8° before or after this point in closing, camshaft setting incorrect.

Valve Timing Check ("250", "300" & "400" Engines)—Check by turning No. 8 Exhaust tappet plunger with fingers. Turn engine over until this valve fully open, turn engine further until valve nearly closed (plunger should not turn), continue turning engine while attempting to turn plunger, until plunger "breaks loose" or turns. This should be approx. 4° after top dead center—check at timing mark on vibration dampener.

►*CAUTION*—If valve more than 8° before or after this point in closing, camshaft setting incorrect.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters and timing chain.

Crankcase Capacity—7 qts.

Normal Oil Pressure—40 lbs., Normal driving.

Oil Pressure Regulator—On oil pump cover. NOT adjustable.

Oil Pump: Gear type. Mounted externally on right side of engine.

Oil Pump Removal & Overhaul—*See "Oil Pump" in Packard Special Data.*

Oil Filter: Optl. ("200"), Std. ("250", "300" & "400"). Replace cartridge every 8000 miles or when oil shows signs of being dirty.

Oil Pressure Indicator: Red light on left side of instrument cluster. Lighted when oil pressure less than 10 lbs. (lights when ignition turned on, goes out when pressure exceeds 10 lbs.).

Engine Unit—King-Seeley No. 47110 Pressure Switch. Contacts open when pressure exceeds 10 lbs. (remain closed at lower pressures).

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap air intake. Outlet pipe in valve compartment at rear.

COOLING

Cooling System: Pressure type with pressure relief valve in filler cap and fan driven pump.

Capacity—20 qts., with 2/3 additional for heater and defroster.

Pressure Valve—AC No. 846713. Opens at 7 lbs.

Water Pump: Centrifugal belt driven, packless type. *See Water Pump Section for complete data.*

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In cylinder head outlet.

Setting (Std.)—Starts to open 148°-154°F.
Setting (Optl.)—Starts to open 157°-163° F. or 177°-183°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) type with Voltage regulator.

Dash Unit—(1951 "200") K-S No. 45658, (1952 "200") K-S No. 45956, (Others) K-S No. 45611.

Engine Unit—K-S No. 44215.

See Miscellaneous Section for complete data.

CLUTCH

Long ("200" Engine) 10CF-TI, ("250", "300" Engine) 11CF-10½TI. Single plate, semi-centrifugal, dry disc clutch.

See Clutch Section for complete data.

Facings—Woven (U.S. Asbestos). Thickness .125". Inside Diameter ("200") 6¾", ("250", "300") 7". Outside Diameter ("200") 10", ("250", "300") 10½".

Pedal Adjustment: 1¼-1½" free travel. Adjustment nut on rod at throw-out lever.

►**Clutch Pedal Over-Center Spring:** New adjustable type. *See "Clutch Notes" in Packard Special Data for Adjustment.*

Removal: Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect throw-out linkage and remove throw-out bearing. Remove clutch cover screws (release tension evenly), lower assembly out of car.

SYNCRO-MESH TRANSMISSION

Own Make. Helical gear, constant-mesh, synchromesh (second & high), constant-mesh (low), sliding spur gear (reverse). Low & Second speed gears are ball bearing mounted.

See Transmission Section for complete data.

Transmission Control: Steering column type.

See Transmission Section for complete data.

Removal: Disconnect shifter rod, speedometer cable, hand brake cable at equalizer, engine ground strap, front universal (block driveshaft up against floor pan). Support rear of engine with jack and unbolt cross-member (at frame ends and transmission). Disconnect clutch retractor spring and fore-and-aft restraint rod. Take out Transmission-to-housing mounting screws, remove transmission.

OVERDRIVE

Warner Model AS8-R11. Optional equipment with Packard transmission. Solenoid operated overdrive with Governor Control and throttle operated "kick-down."

►*NOTE*—AS8-R11 has new piloted ring gear housing, new ring gear and tail shaft.

See Transmission Section for complete data.

Overdrive Solenoid—Delco-Remy No. 1118155.
Governor—Packard No. 418447.
Control Relay—Packard No. 403940.
Kick-down Switch—Packard No. 403945.
Lock-out Switch—Packard No. 426453.

Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

ULTRAMATIC TRANSMISSION

Own Make. Torque Converter (with hydraulically operated Direct Speed clutch) and hydraulically operated planetary unit with manual control.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Packard Ultramatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See Transmission Section.*

Linkage Adjustment on Ultramatic Drive Cars: *See "Ultramatic Drive" in Transmission Section.*

Lubrication—Check fluid every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level. *CAUTION—Fluid must only be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute with selector lever in "N" position.* Stop the engine, check level by removing dipstick from filler hole on left side of transmission (accessible from under car—release cap by turning ½ turn counter-clockwise). Add fluid as required to bring level up to FULL mark on dipstick.

Recommended Fluid. Packard Ultramtic Drive or any Type "A" Automatic Transmission Fluid which has an AQ-ATF number embossed on container.

Capacity. Approximately 12 qts.

►*OTHER ULTRAMATIC SERVICE DATA: See Transmission Section.*

UNIVERSALS

Mechanics, Universal Products or Spicer. Needle bearing type.

►*CAUTION*—Rear universal flange nut controls rear axle pinion bearing preload which **must be adjusted whenever nut is loosened.** *See "Packard Rear Axle" in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

►*REAR AXLE OIL SEAL LEAKAGE CORRECTION—See "Packard Rear Axle" in Rear Axle Section for complete data.*

Model	Ratios Std.	O. D. Cars	Ultramatic
200 (1951)	3.9-1	4.1-1	3.9-1
200 (1952)	3.9-1	4.1-1	3.54-1
250	3.9-1	4.1-1	3.54-1
300	3.9-1	4.1-1	3.54-1
400			3.54-1

Backlash—.003-.005". Screw adjustment.

Removal: Remove axle shafts (see Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with 2x4

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inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier locknuts, lift carrier out.

Axle Shaft Removal: Remove wheel, brake drum (use screw type puller J-4153—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner seal). Use Tool J-943-B to remove inner seal.

Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel if .050" or under. At both wheels if over .050" to secure .004-.007" endplay.

Endplay—.004-.007".

SHOCK ABSORBERS

Direct acting hydraulic type. Front shock absorbers are inside front suspension coil springs.

FRONT SUSPENSION

Front Suspension: Packard Broad-Beam Suspension, independent, linked parallelogram type with coil springs and double acting shock absorbers.

See Front Suspension Section for complete data.

King Pin Inclination—5°50′ crosswise.

Caster—Neg. 1° ± ½°. Eccentric adjustment.

Camber—(1951) 0° ± ¼°, (1952) 0° (+¾° to —¼°).

Toe-In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.

STEERING GEAR

Packard-Gemmer Model 335. Worm & 3-tooth Roller type with "push-pull" adjustments.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix-Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinder—Diam. Front 1⅛", Rear Wheels 1".

Drums—12" Centrifuse type.

Lining—Marshall 4112 (Primary Shoes), Marshall 9051 (Secondary Shoes). Width—see table below. Thickness 3/16". Length per shoes 11½" (Primary), 13" (Secondary).

Lining Width	Front Wheels	Rear Wheels
200	1¾"	1¾"
250, 300, 400	2¼"	2"

Clearance—.015" at lower end of secondary shoe, .010" at upper end of secondary shoe with primary shoe forced out against drum.

Hand Brake: See Service Brake above.

Power Brakes: "Easamatic" (combination power cylinder and hydraulic master cylinder unit). Optl. *See "Power Brakes" in Brake Section for complete data.*

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated

See Miscellaneous Section for complete data.

►*ELECTRICAL EQUIPMENT NOTE*—Auto-Lite Equipment used on Patrician (2606) and Packard (2626). Other Models use Delco-Remy Equipment.

►*MODEL 2601 STARTER NOTE*—Auto-Lite starters used on some cars with remainder of electrical equipment being Delco-Remy (Delco-Remy starter used on other 2601 cars).

MODEL IDENTIFICATION

Model	Chassis Symbol
Clipper	2601
Cavalier	2602
Patrician	2606
Clipper Deluxe	2611
Commercial (327 cu. in.)	2613
Packard	2626
Mayfair & Convertible	2631
Commercial (288 cu. in.)	2633

SERIAL NUMBERS: Stamped on plate mounted on left front door pillar post.

ENGINE NUMBERS: Stamped on left side of engine opposite #8 cylinder.

►*ENGINE NUMBER NOTE: A "STAR" following engine number indicates .020" oversize cylinder bores.*

Starting Engine Numbers:

2601 & 2633	L-200011
2611 & 2613	L-300011
2602 & 2631	L-400011
2606 & 2626	L-600011

TUNE-UP

COMPRESSION PRESSURE: All cylinders should be equal within 10 lbs.

VACUUM READING: 18-21" at idling speed.

FIRING ORDER: 1-6-2-5-8-3-7-4.

SPARK PLUG GAPS: .023-.028".
Plugs Auto-Lite A7, AC 46-5, Champion J8. 14 mm.

DISTRIBUTOR (2606 & 2626): Auto-Lite No. IGP-4502D. Automatic advance type with vacuum spark control and fuel compensator adjustment.
Breaker Gap—.017". Limits .013-.018".
Cam Angle—Closed 27°. Open 18°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
Fuel Compensator—40° range of adjustment on quadrant at vacuum link connection.

DISTRIBUTOR (Others): Delco-Remy No. 1110836 (Early), No. 1110841 (Late). Automatic and vacuum advance type with "center-bearing" breaker plate and fuel compensator adjustment.
Breaker Gap—.016".
Cam Angle—Test limits with .016" gap, 26-33°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*
Fuel Compensator—10° advance or retard adjustment at distributor.

COIL (2606 & 2626) Auto-Lite No. CR-4001A. (Others) Delco-Remy No. 1115376.
Ignition Current—1.5 amperes idling, Hot.

CONDENSER: (Capacity)—.20-.25 microfarad (Auto-Lite). .18-.23 microfarad (Delco-Remy).

IGNITION TIMING: 6° BTDC. *NOTE*—Modify this setting for special fuel and altitude conditions. See Fuel Compensator (below).
Timing Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.

Fuel Compensator Setting: Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite distributors), advance arm hold-down screw (Delco-Remy distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping) until correct performance secured.
Timing Procedure—*See Ignition Timing.*

CARBURETION (2601, 2611, 2613, 2633): Carter WGD, No. 784S (2601 & 2633), No. 928S (2611 & 2613). Dual Downdraft type with automatic choke.
Idle Setting—½-1½ turns open. Adjust both screws equally. Turn screws out for richer mixture.
Idle Speed (Synchro-mesh Trans.)—6 MPH.
Idle Speed (Ultramatic)—375 RPM. with selector lever in "H" position.
Float Level—13/64" from top of float to cover with valve seated (assembly inverted).
Accelerating Pump—Not adjustable.

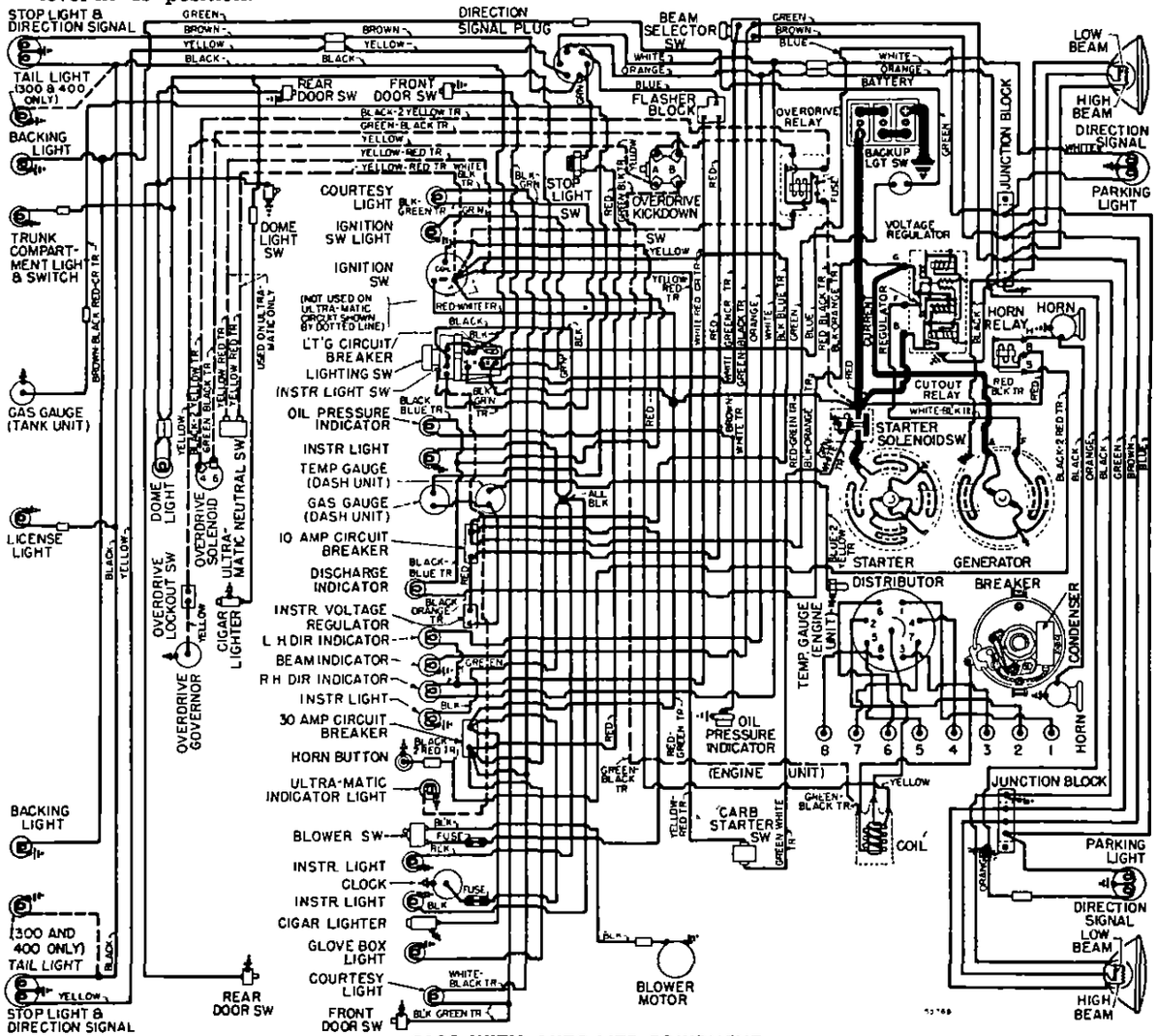
Ultramatic Throttle Linkage Adjustment: *See "Packard Ultramatic" in Transmission Section for complete data.*

Fast Idle Setting: With thermostatic cover and coil assembly removed, crack throttle, hold choke valve closed, release throttle. Throttle valve opening measured between edge of valve and bore on side opposite idle ports should be .023". Adjust by bending choke connector rod at lower angle.

Choke Setting: 1 Point Rich (all models).

Fuel Pump Pressure: 4-5 lbs.

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CARS WITH AUTO-LITE EQUIPMENT

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CARBURETION (2602, 2606, 2626, 2631): Carter WCFB No. 985S (First Cars), No. 2084S (Later Cars). Four barrel downdraft, with automatic choke.
See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section for complete data.

▷*CARBURETOR FLOODING CONDITION—See "Carter WCFB" in Carburetor Section for complete data.*

▷*CARBURETOR PRODUCTION & RECOMMENDED CHANGES: See "Carter WCFB" in Carburetor Section for new settings and other changes.*

Idle Setting—1-2 turns open. Adjust both screws equally. Turn screws out for richer mixture.
Idle Speed—(Synchro-mesh Trans.) 6 MPH.
Idle Speed—(Ultramatic Trans.) 375 RPM with selector lever in "H".
Other Settings—*See "Carter WCFB" in Carburetor Section for complete data.*

Ultramatic Throttle Linkage Adjustment: *See "Packard Ultramatic" in Transmission Section for data.*

Fuel Pump Pressure: 4-5 lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment necessary.

VALVE TAPPET CLEARANCE (2601, 2611, & 2633): .007" Intake, .010" Exhaust.

VALVE TAPPET CLEARANCE (Others): Hydraulic lifters used. No adjustment required.

IGNITION

AUTO-LITE

COIL: Auto-Lite CR-4001A.
Location—Left side of engine above distributor.
Ignition Current—1.5 amperes idling, hot.

CONDENSER: Auto-Lite IG-2671K.
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model No. IGP-4502D. Automatic advance type with Vacuum Spark Control and Fuel Compensator adjustment.
Breaker Gap—.017". Limits .013"-.018".
Cam Angle—Closed 27°, Open 18°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (Auto-Lite)

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	250	0	500
1	300	2	600
5	575	10	1150
7	1225	14	2450
7.5	1400	15	2800

Fuel Compensator: 40° range of adjustment on quadrant at vacuum link connection. *See Ignition Timing.*

Vacuum Spark Control: Auto-Lite. Mounted on hold-down plate and linked to adjusting quadrant on distributor housing.

Vacuum Advance (Auto-Lite)

Dist. Degrees	Eng. Degrees	(Vacuum (" of Hg)
Start	0	6
1	2	6½
3	6	7¾
5	10	9
6.5	13	10

DELCO-REMY

COIL: Delco-Remy No. 1115376.
Location—Left side of engine above distributor.
Ignition Current—1.5 amperes idling, hot.

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110836 (Early), No. 1110841 (Late). Automatic and vacuum advance type with "center-bearing" breaker plate and fuel compensator adjustment.
Breaker Gap—.016".
Cam Angle—Test limits with .016" gap—26-33°. *See*
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—No. 1110836

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	400	0-4	800
3-5	600	6-10	1200
5-7.5	1100	10-15	2200
6.5-9	1500	13-18	3000

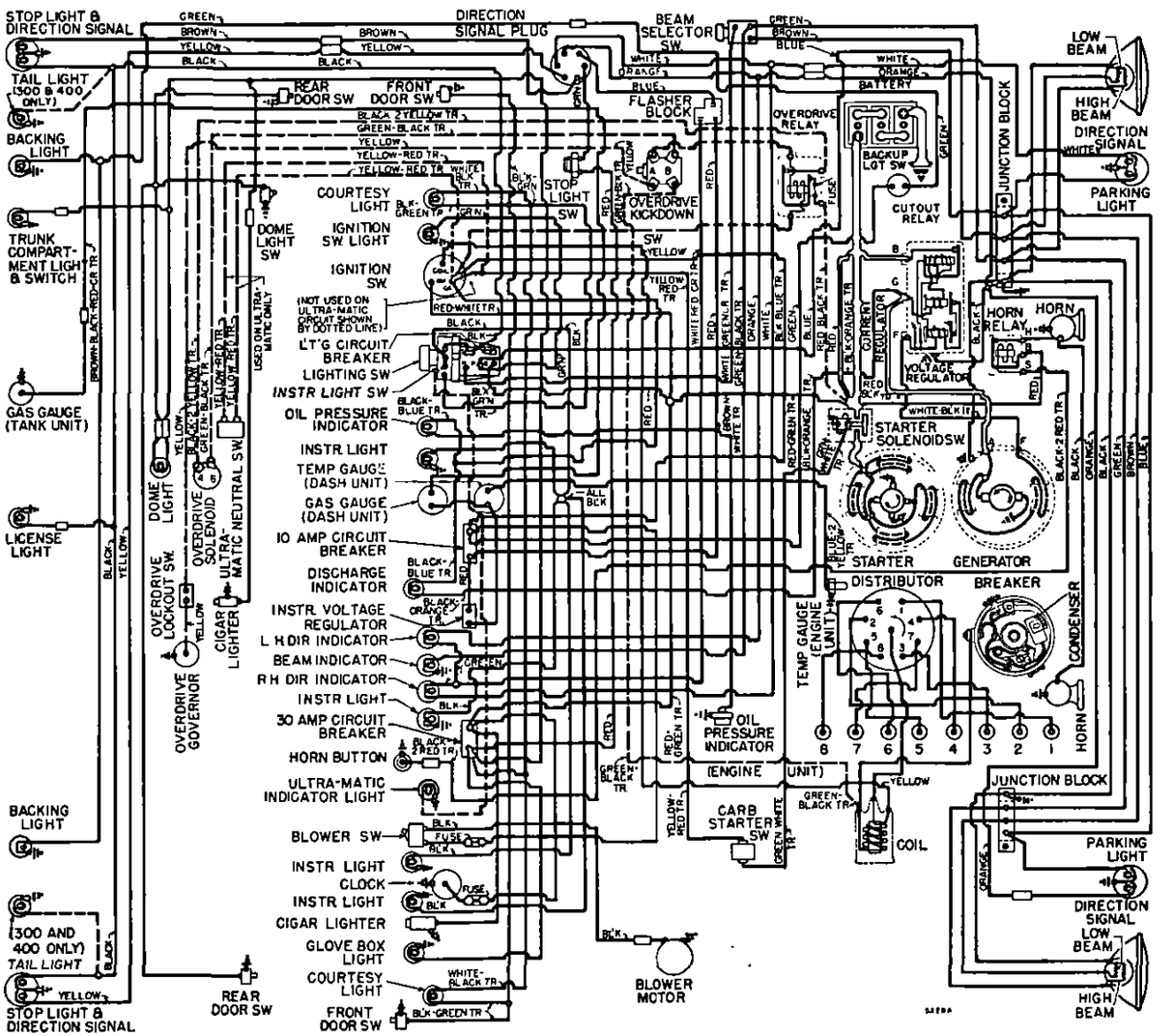
Automatic Advance—No. 1110841

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	375	0-4	750
2.5-4.5	550	5-9	1100
5-7	1100	10-14	2200
7-9	1600	14-18	3200

Fuel Compensator: 10° advance or retard adjustment at distributor. *See Ignition Timing.*

Vacuum Spark Control: D-R No. 1116070. Integral type mounted on distributor and linked directly to breaker plate.

Plunger Travel—9/64-⅛".



CARS WITH DELCO-REMY EQUIPMENT

Vacuum Advance (Delco-Remy)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
4-6	8-12	11

IGNITION TIMING

Std. Setting.....6° BTDC.
NOTE—Modify this setting for special fuel and altitude conditions. *See Fuel Compensator Setting.*
Vibration Dampener Mark—"#1UP.DC" with fifteen 1° graduations ahead of mark.
Timing—With #1 piston on compression, turn engine over until piston reaches firing position with correct mark on dampner in line with pointer on chain cover *(see table above)*. Loosen vacuum unit link screw in distributor quadrant. (Auto-Lite distributors), or holdown screw in advance arm (Delco-Remy distributors), rotate distributor until contacts begin to open, tighten screw.
Fuel Compensator Setting—Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite distributors), advance arm hold-down screw (Delco-Remy distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping) until correct performance secured.

CARBURETOR

CARTER TWO-BARREL

Carter WGD (2601, 2633) No. 784S, (2611, 2613) No. 928S. 1¼" dual barrel, downdraft types with Carter Climatic Control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rods & Jets—*See Carter Downdraft Jet Table in Carburetor Section.*

Fast Idle: Carter (WGD) Carburetor type.
Setting—.023" throttle opening with choke valve closed (throttle must be opened first). Adjust by bending choke connector rod at lower end.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control.
Setting—1 Point rich.
See Carburetion Equipment Section for complete data.

CARTER FOUR-BARREL

Carter WCFB (2602, 2606, 2626, 2631) No. 985S (First Cars), No. 2084S (Later Cars). Four barrel downdraft type with automatic choke.
►*CARBURETOR FLOODING CONDITION: See "Carter WCFB" in Carburetor Section for complete data.*
►*CARBURETOR PRODUCTION & RECOMMENDED CHANGES: See "Carter WCFB" in Carburetor Section for new settings and other changes.*

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., Oil-bath type Optl. (with 2-barrel Carb.), Oil-bath type Std. (with 4-barrel Carb.).

Fuel Pump: AC. Combination fuel-and-vacuum pump.
Replacement Pump—AC No. 9590.
Pressure—4-5 lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric "CV" (constant-voltage) type with voltage regulator.
Dash Unit—(2601, 2611, 2613, 2633) K-S No. 46084, (2602, 2606, 2626, 2631) K-S No. 46064.
Tank Unit—K-S No. 44517.
See Carburetion Equipment Section for complete data.

BATTERY

BATTERY: 2601, 2602, 2611, 2626, 2631, 2633:
Auto-Lite 2L-100 or Willard SW-2L-100. 6 Volt, 17 Plate, 100 Ampere Hour Capacity.
2606, 2613
Auto-Lite 2FH-120 or Willard HW-2F-120. 6 Volt, 17 Plate, 120 Ampere Hour Capacity.
Grounded Terminal—Positive (+) to engine at water pump.
Location—Left side of engine compartment.

STARTER

AUTO-LITE

Auto-Lite No. MCL-6122. Armature No. MCH-2028.
Drive—Bendix No. A-3281.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data (Auto-Lite)

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 "	Lock	2.0	410

Starting Switch: (2602, 2606, 2626, 2631) Auto-Lite No. SS-4017, Magnetic Switch. Controlled by Carter Car Starter Switch No. 192-21U on carburetor.
See carburetor data in Carburetor Section for switch adjustment.
Ultramatic Drive Starter Safety Switch—Packard No. 423439. On left side of transmission case, connected in starter control circuit so that starter operative with lever in "N" or "P" position.

DELCO-REMY

Delco-Remy No. 1107943 (200 Eng.), 1108008 (250 & 300 Engine).
Armature—Delco-Remy No. 1910938 (all).
Drive—Bendix Drive No. A3281.
Rotation—Counter-clockwise at commutator end.
Cranking Engine—175-225 amperes.
Brush Spring Tension—24-28 ozs.

Performance Data (Delco-Remy 1107943)

Torque	R.P.M.	Volts	Amperes
0 ft.lbs.	5500	5.0	65
16 "	Lock	3.0	600

Performance Data (Delco-Remy 1108008)

0 ft. lbs.	6000	5.0	60
15 "	Lock	3.0	600

Starting Switch: Delco-Remy Model 1465 Magnetic Switch on starter, controlled by Carter Car Starter No. 192-21U on carburetor.
See carburetor data in Carburetor Section for switch adjustment.
Ultramatic Drive Safety Switch—*See Auto-Lite Starter data above.*

GENERATOR

AUTO-LITE

Auto-Lite GGW-6003A. Armature No. GGW-2006F. Two brush type with current and voltage regulation.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 amperes at 5.0 volts (70°F).
Motoring Current—3.9-4.5 amperes at 5.0 volts (70°F) with field terminal grounded to frame.
Generator Charge Indicator: Red light on right side of instrument cluster. Lights when ignition turned on, goes out when generator begins to charge.
Belt Adjustment: Loosen two generator bracket-to-generator screw nuts two or three turns. Loosen the generator strap to generator screw and loosen the generator to water pump screw. Place tool J-4714 over the head of the generator bracket front screw and rotate the tool clockwise until the arm of the tool contacts the edge of the generator drive end plate. Using a torque wrench with a 7/8" socket over the tool, rotate the wrench clockwise and move the generator outward until 15 ft. lb. torque is indicated on the scale. The adjusting strap to generator screw should be tightened to hold the generator in this position while maintaining the 15 ft. lbs. torque. Tighten all screws previously loosened.

DELCO-REMY

Delco-Remy No. 1102778. Armature No. 1921621.
Maximum Charging Rates—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data (Delco-Remy)

	Amperes	Volts	R.P.M.
Cold	45	8.0	2450

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs.
Field Current—1.90-2.05 amperes at 6.0 volts.
Generator Charge Indicator: Red light on right side of instrument cluster. Lights when ignition turned on, goes out when generator begins to charge.
Belt Adjustment: Same as Auto-Lite (above).

REGULATOR

AUTO-LITE

Auto-Lite VBE-6102A for GGW-6003 Generator. Current-voltage type with "Temperature Compensated" current regulator.
NOTE—**Regulator cover sealed. Warranty void if seal broken.**

Cutout Relay

Cuts In—6.3-6.8 volts.
Cuts Out—4.1-4.8 volts.
Contact Gap—.015" minimum.
Air Gap—.031-.034" (check at hinge end of core).
Checking & Adjusting & Detailed Data—*See Electrical Equipment Section.*

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. *after 15 minutes operation charging at ½ maximum rate.*
Air Gap—.048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
52 amperes		45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts opening.
Checking & Adjusting—*See Electrical Equip. Section.*

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DELC -REMY

Delco-Remy No. 1118726 (For Gen. No. 1102778). Voltage and current regulator.
1118700 SERIES" *regulators have screw adjustment* for settings and single regulator springs.

▷***CAUTION***—**Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.**

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (*with contacts just closed*).
Checking & Adjusting & Detailed Data—*See Electrical Equipment Section.*

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point *where contacts are just touching.*
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—45-51 amperes hot (set to 47 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equipment Section.*

Switches

Lighting—Packard No. 416288.
Beam Selector—Delco-Remy No. 1997008.
Instrument Switch—Part of Lighting Switch.
Stop Light—Packard No. 362862.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Vibrating thermostatic types.
Lighting—30 ampere. On lighting switch.
Accessory (Stop & Body Lamps)—30 ampere. Behind instrument panel below gauges. Protects Glove Box Lamp, Courtesy Lamps, Stop Lamps, Dome Lamp and Rear Cigar Lighter.
Hydro-Electric Power (Convertible)—On engine side of dash on pump upper bracket.
Directional Signal—10 ampere circuit breaker on instrument cluster.

FUSES: Clock—AGA 3 ampere. In clock lead.
Overdrive—SFE 30 ampere. On overdrive relay (at BAT terminal) on engine side of dash.
Heater—SFE 20-ampere. In cable near Ign. Switch.

HORNS: Sparton. Dual horns operated by relay.
Horn Current—22-25 amperes.

Horn Relay—Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027". **Air Gap**—.014" (contacts closed).

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45550—Consists of a thermo-by-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the ten amp. circuit breaker and the instrument circuits. See Wiring Diagram.

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.

	2601, 2633	Others
Bore	3 1/2"	3 1/2"
Stroke	3 3/4"	4 1/4"
Displ. (cu. ins.)	288	327
Rated HP	39.2	39.2
Developed HP①	150	②180
Comp. Ratio	7.7-1	8.0-1

①—At 4000 engine RPM.
②—2611 & 2613 develop 160 at 3600 RPM.

▷***HYDRAULIC VALVE LIFTERS—Standard on all engines except 2601, 2611, & 2633.***

ENGINE & OIL PAN REMOVAL: *See Packard Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Packard Special Data.*

PISTONS: Aluminum alloy, autothermic strut type.
Original Bore & Pistons—*See Packard Special Data.*
Length—3 7/8".

▷**Out-of-Round Note**—Car manufacturer recommends cylinders be rebored and new pistons installed if cylinder out-of-round exceeds .004".
Weight—19.575 ozs. (stripped), 25½ ozs. (with rings and pins).

▷**Cyl. Bore Taper Note**—Car manufacturer recommends cylinders be rebored and new pistons installed if cylinder taper exceeds .007-.010". If necessary, new rings only can be installed (without reboring) for tapers up to .014".
Removal—Pistons and rods removed from above.
Clearance—.0005-.001". See Fitting New Pistons.

▷**Piston Skirt Expander Note**—Car manufacturer recommends skirt expanders be installed if cylinder diameter over .006" greater than piston skirt diameter (measured beside upper end of skirt slot).

Replacement Pistons: *See Packard Special Data.*

▷***NOTE***—Check ring grooves by installing new piston ring in groove—if .006" feeler can be inserted 1/16", wear excessive and piston should be replaced. Check top groove when testing.

Fitting New Pistons: Insert .0015" feeler ½" wide between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 10-16 lbs.

▷***NOTE***—Piston should hold in any portion of the bore of own weight but should move with one or two finger pressure (cylinder bore vertical).

Installing Pistons: Slot toward camshaft.

PISTON RINGS: Two compression rings (No. 200 top groove, No. 200 second groove), one oil control ring (No. 85) per piston, all above pin.

Ring	Width	End Gap①	Side Clearance
Comp.	.0925-.0935"	.007-.017"	.0025-.003"
Oil	.186-.1865"	.007-.015"	.0025-.003"

①—Top compr. ring gap .007-.015" (2602,6,26,31).

Installing Rings—End gaps must be between pin holes with #2 ring on same side as skirt slot. #1 and #3 ring on side opposite slot
Replacement Rings: Std., .020", .030", .040" oversize.

PISTON PIN: Diameter 7/8". Length 3 1/64".
Floating type retained by lock ring at each end. Split type bushing used in upper end of rod.
Pin Fit in Piston—Palm push fit with piston at 160°F. (heat piston in water only).
Piston Pin (Connecting Rod) Bushing Installation—*See "Piston Pins" in Packard Special Data.*

Replacement Pins: Std., .003" and .006" oversize.

CONNECTING ROD: Length—(2601, 2633) 7 15/16", (Others) 7 11/16". Measured from center-to-center.
Weight—(2601, 2633) 36½ ozs. (Others) 36 ozs.

▷***CONNECTING ROD CAUTION—Connecting rods for 2601 & 2633 engines are not interchangeable with connecting rods for other engines.***
Crankpin Journal Diameter—2.250".
Lower Bearing—Shimless precision, steel backed, Moraine Durex or Federal Mogul 24.
Clearance—.0005-.0025". **Endplay**—.003-.011".
Bearing Adjustment—None (no shims). Replace bearings. Self-locking nut used on cap bolts (tighten to 60-65 ft. lbs.).

Replacement Bearings: Std., .001", .002", .020" US.

Installing Rods: Oil squirt hole toward camshaft.

CRANKSHAFT: (2606, 2626) 9 bearings, (Others) 5 bearings. Thrust taken on center bearing.
Vibration Dampener—Hydraulic (silicone) type.
Dampener Removal—Use puller tool No. J-2636.
Journal Diameter—2.7465".
Bearings—Interchangeable, shimless, precision, steel-backed, Moraine Durex or Federal Mogul.
Clearance—.0005-.0025".

Bearing Adjustment—None (no shims). Replace bearings (upper halves can be rotated in and out).

Replacement Bearings—Std., .001", .002", .020" US.

Crankshaft Front & Rear Oil Seal Replacement: *See "Crankshaft & Main Bearings" in Packard Special Data.*
End Thrust—At center bearing. Endplay .0035-.0085"

CAMSHAFT: 5 bearing. Non-adjustable chain drive.
Bearings—Steel-backed, babbitt-lined bushings.
Clearance—.001-.003".
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Packard Special Data.*

End Thrust: Taken by thrust plate in back of camshaft sprocket. **Endplay**—.004-.006".

Timing Chain: Morse. Width 1". Pitch .375". Length 58 links.
Timing Chain & Sprocket Removal: *See "Valve System" in Packard Special Data.*

Camshaft Setting: Install chain and sprockets together with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 43/64"	.3417"	5 7/8"
Exhaust	1 7/16"	.3398"	5 7/8"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.342"	.002"
Exhaust	45°	①.342"	.004"

①—.337" Lift on "250", "300" & "400" series.

Valve Guides: Lubrite coated. Pressed in block from above with upper end 31/32" below top of block. Use Valve Guide Driver No. J-2577. This tool properly positions guides when gauge seated on block. Ream guides after installation with 11/32" (.3437") reamer. Upper end of exhaust guide counter bored.

▷**Valve Guide Removal Note**—If guides to be removed with lifters in engine, use Valve Guide Remover Tool J-2580 to drive guide down to just clear tappet (with tappet on heel of cam). Score guide with chisel thru valve chamber, then break off low end, finally driving remainder of guide out. If lifters out, guide can be driven down and out without breaking.

Valve Springs: Intake and exhaust springs interchangeable. Anti-rotation serrated cup washers installed on top of spring and seats in recess in block.

	Spring Pressure	Spring Length
Valve Closed	60-66 lbs.	1 3/4"
Valve Open	135-145 lbs.	1 13/32"

Valve Lifters (2601, 2611, 2633): Conventional mushroom type. Remove from below with camshaft out.
Diameter—.6236-.6239". **Clearance**—.0001-.0016".
Replacement Lifters—.001", .002" Oversize.
Use Tool ST-5144 (piloted in valve guide) to ream for .005" oversize lifter installation.

Valve Lifters (Others): Wilcox-Rich "Zero-Lash" hydraulic type (mushroom type body). Hydraulic unit can be removed from above. Lifter body removed from below with camshaft out.
Diameter—.6236-.6239", **Clearance**—.0001-.0016".

Hydraulic Valve Lifter Removal & Overhaul: *See "Hydraulic Valve Lifters" in Packard Special Data.*

Valve Clearance Check (When Grinding Valves): *See "Hydraulic Valve Lifters" in Packard Special Data.*

VALVE TIMING

VALVE TAPPET CLEARANCE: *Adjustment required only on 2601, 2611, & 2633 engines. Others have hydraulic valve lifters.*
(2601, 2611, 2633)—.007" Intake, .010"-Exhaust, HOT.

VALVE TIMING: See Camshaft Setting above.

2601, 2611, 2633 Valve Timing①
Intake Valves—Open 15° BTDC. Close 45° ALDC.
Exhaust Valves—Open 50° BLDC. Close 9° ATDC.
①—.0125" intake, .015" exhaust tappet clearance.

(Others) Valve Timing
Intake Valves—Open 15° BTDC. Close 43° ALDC.
Exhaust Valves—Open 53° BLDC. Close 4° ATDC.

Valve Timing Check (2601, 2611, 2633): With .0125" tappet clearance No. 1 intake valve should be open with No. 1 piston 10° BTDC. (10th graduation before top dead center mark "1UP.DC" on vibration dampener aligned with pointer). Reset tappet clearance to .007" hot.

►*CAUTION*—If valve more than 8° before or after this point in closing, camshaft setting incorrect.

Valve Timing Check (Others): Check by turning tappet plunger for No. 8 exhaust valve with fingers. Turn engine over until this valve fully open, turn engine further until valve nearly closed (plunger should not turn), continue turning engine until plunger "breaks loose" or turns. This should be approximately 9° after top dead center—check at timing mark on dampener.

►*CAUTION*—If valve more than 8° before or after this point in closing, camshaft setting incorrect.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, piston pins, valve lifters and timing chain.
Crankcase Capacity—7 qts.
Normal Oil Pressure—40 lbs., Normal driving.
Oil Pressure Regulator—On oil pump cover. Not Adjustable.

Oil Pump: Gear type mounted externally on right side of engine.
Oil Pump Removal, Overhaul & Installation: *See "Oil Pump" in Packard Special Data.*

Oil Filter: Purolator. Optl. 2601, 2611, 2631. Std. on other models. Replace oil filter cartridge every 8000 miles or more often if required.

Oil Pressure Indicator: Red light on left side of instrument cluster. Lighted when oil pressure less than 10 lbs. (lights when ignition turned on, goes out when pressure exceeds 10 lbs.).
Engine Unit—King-Seeley No. 47140. Pressure Switch. Contacts open when pressure exceeds 10 lbs. (remain closed at lower pressures).

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap air intake. Outlet pipe in valve compartment at rear.

COOLING

►*APPARENT OVERHEATING (Temperature Gauge reading high without boiling or loss of coolant): See Pressure Valve, Thermostat, and Temperature Gauge changes below.*

Cooling System: Pressure type with pressure relief valve in filler cap and fan driven pump.
Capacity—20 qts., with 2/3 qts. additional for heater and defroster.
Pressure Valve—*Two types used—See Note below.* Radiator Filler Cap. (2601, 2611, 2633) AC. No. 846713, 7 lbs. type. (2602, 2606, 2626, 2613) Packard No. 446546, 12 lbs. type.

►*2601, 2611, 2633 NOTE*—On cars with first type Thermostat (see Thermostat data below), later type thermostat AND 12 lb. type Pressure Valve can be installed to correct overheating.

Water Pump: Centrifugal belt driven, packless type. *See Water Pump Section for complete data.*
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: *CAUTION—New "capsule" type thermostat used beginning Engine Nos. L-216891, L-312370, L-409334, L-604405.*

►*OVERHEATING CORRECTION (First Cars): Above "capsule" type thermostat can be installed on earlier cars but must be used with 12 lb. type pressure valve. See Pressure Valve Note also.*
Setting (Std.)—Starts to open 148°-154°F.
Setting (Optl.)—Starts to open 157°-163°F. or 177°-183°F.

Temperature Gauge: CAUTION—*Two types of Engine Unit (sending unit) used. See Engine Unit below.*
King-Seeley "CV" (constant voltage) electric type with Gauge Voltage Regulator. *See MISC. ELECTRICAL for regulator data.*
Dash Unit—(2601, 2611, 2613, 2633) K-S No. 46087, (Others) No. 46067.
***Engine Unit* (Before Eng. No. L-202588, L-301595, L-401245, L-600503)**—King-Seeley No. 44215 (Packard No. 416281) used with special "Temperature Gauge Regulator" (resistor wire connected between temperature gauge feed terminal and feed terminal on fuel gauge).
NOTE—Temperature Gauge Regulator is Packard No. 436586.
Engine Unit (Later Cars—after above Eng. Nos.). King-Seeley No. 44225 (Packard No. 439368) used without special "temperature Gauge Regulator. May be identified by lead wire from gauge voltage regulator being connected directly to temperature gauge with jumper extending to feed terminal of fuel gauge.

►*CAUTION*—Whenever later type engine unit (King-Seeley No. 44225) used, Temperature Gauge Regulator (resistor wire between fuel gauge and temperature gauge dash unit) MUST NOT BE USED. Connections shown on wiring diagram are for this later type gauge.

CLUTCH

Synchro-mesh Transmission Cars. (2601, 2633) Long Model 10CF-TI, (Others) Long Model 11CF-10½TI. Single plate, semi-centrifugal type.
See Clutch Section for complete data.
Facings—Woven (U.S. Asbestos). Thickness .125". Inside Diameter ("200") 6¾", ("250", "300") 7". Outside Diameter ("200") 10", ("250", "300") 10½".
Pedal Adjustment: 1¼-1½" free travel. Adjustment nut on rod at throw-out lever.

►**Clutch Pedal Over-Center Spring:** New adjustable type. *See "Clutch Notes" in Packard Special Data for Adjustment.*

Removal: Remove transmission (see Transmission Removal following) and flywheel housing lower cover. Disconnect throw-out linkage and remove throw-out bearing. Remove clutch cover screws (release tension evenly), lower assembly out of car.

TRANSMISSION

SYNCHRO-MESH

Own Make. Helical gear, constant-mesh, synchro-mesh (second & high), constant-mesh (low), sliding spur gear (reverse). Low & Second speed gears are ball bearing mounted.
See Transmission Section for complete data.

Transmission Control: Steering column type.
See Transmission Section for complete data.

Removal: Disconnect shifter rod, speedometer cable, hand brake cable at equalizer, engine ground strap, front universal (block driveshaft up against floor pan). Support rear of engine with jack and unbolt cross-member (at frame ends and transmission). Disconnect clutch retractor spring and fore-and-aft restraint rod. Take out Transmission-to-housing mounting screws, remove transmission.

OVERDRIVE

Warner Model AS8-R11. Optional equipment with Packard transmission. Solenoid operated overdrive with Governor Control and throttle operated "kick-down."

►*NOTE*—AS8-R11 has new piloted ring gear housing, new ring gear and tail shaft.
See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy No. 1118155.
Governor—Packard No. 433613.
Control Relay—Packard No. 403940.
Kick-down Switch—Packard No. 403945.
Lock-out Switch—Packard No. 426453.

Removal: Disconnect control cable and all leads to solenoid and governor. Free mounting at rear of overdrive case. Then remove overdrive and transmission (see Transmission Removal above).

ULTRAMATIC TRANSMISSI N

Own Make. Torque Converter (with hydraulically operated Direct Speed clutch) and hydraulically operated planetary unit with manual control.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Packard Ultramatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See Transmission Section.*

Linkage Adjustment on Ultramatic Drive Cars: *See "Ultramatic Drive" in Transmission Section.*

Lubrication—Check fluid every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level. ***CAUTION—Fluid must only be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute with selector lever in "N" position.*** Stop the

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engine, check level by removing dipstick from filler hole on left side of transmission (accessible from under car—release cap by turning ½ turn counter-clockwise). Add fluid as required to bring level up to FULL mark on dipstick.

Recommended Fluid. Packard Ultramatic Drive or any Type "A" Automatic Transmission Fluid which has an AQ-ATF number embossed on container.

Capacity. Approximately 12 qts.

►*OTHER ULTRAMATIC SERVICE DATA: See Transmission Section.*

UNIVERSALS

Mechanics, Universal Products or Spicer. Needle bearing type.

►*CAUTION*—Rear universal flange nut controls rear axle pinion bearing preload which must be adjusted whenever nut is loosened. *See "Packard Rear Axle" in Rear Axle Section for complete data.*

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

►*PINION BEARING PRELOAD ADJUSTMENT CHANGE —Procedures for setting pinion bearing preload have been changed. See "Packard Hypoid" in Rear Axle Section for complete data.*

Standard Ratios

Model	Std.	O.D. Cars	Ultramatic
2601, 2602, 2631	3.9-1	4.1-1	3.54-1
2606			3.54-1
2611	3.9-1	4.1-1	3.23-1
2613	4.54-1	4.7-1	4.36-1
2626	4.1-1	4.55-1	3.90-1
2633	4.55-1	4.55-1	4.10-1

Optional Ratios

Model	Std.	O.D. Cars	Ultramatic
2601, 2602, 2631	4.1-1	3.9-1	3.23-1
2606			3.23-1
2611	4.1-1	3.9-1	3.54-1

Backlash—.003-.005". Screw adjustment.

Removal: Remove axle shafts (see Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with 2x4 inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier mounting nuts, lift carrier assembly out.

Axle Shaft Removal: Remove wheel, brake drum (use screw type puller J-4153—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner seal). Use Tool J-943-B to remove inner seal.

Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel if .050" or under. At both wheels if over .050" to secure .004-.007" endplay.

Endplay—.004-.007".

SHOCK ABSORBERS

Direct acting hydraulic type. Front shock absorbers are inside front suspension coil springs.

Packard Shock Absorber Nos.

Model	Front	Rear
2601, 2611	446233	446239
2602, 2606	446233	①446349
2613	446235	446240
2626	446361	446362
2631	446233	②446238
2633	446233	446241

①—Color Ident. White. ②—Color Ident. Blue. All other shocks PLAIN (no color ident.).

FRONT SUSPENSION

Front Suspension: Packard Broad-Beam Suspension, independent, linked parallelogram type with coil springs and double acting shock absorbers.

See Front Suspension Section for complete data.

Kingpin Inclination—(2613, 2633) 2°30'. (Others) 5°50'.

Caster—(2613, 2633) Neg. 2° ± ½°. (Others) Neg. 1° ± ½°.

Camber—0° (+ ¾° — ¼° range).

Toe-In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.

STEERING GEAR

Std. Steering Gear: Packard Gemmer Model 335. Worm and Roller type with push-pull adjustments.

See Steering Gear Section for complete data.

Optl. Power Steering—Bendix Hydraulic "Linkage Type" used with standard type steering gear.

See "Packard Power Steering" in Steering Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Drums—Centrifuse type. Front 12". Rear (2613, 2633) 14", (Others) 12".

Wheel Cyl. Diameter—Front Wheels 1⅛" (all), Rear Whls. (exc. 2613, 2633) 1", Rear Whls. (2613 & 2633 only) 1¼".

Lining—Primary Shoes (2613, 2633) Marshall 9051, (Others) Marshall 4112. **Secondary Shoes** (2613, 2633) Marshall 9032, (Others) Marshall 9051.

Lining Width—	Front Wheels	Rear Wheels
2601, 2611	1 3/4"	1 3/4"
2602, 2606, 2626, 2631	2 1/4"	2"
2613, 2633	2 1/2"	2 3/4"

Thickness	Front Wheels	Rear Wheels
2601, 2611	3/16"	3/16"
2602, 2606, 2626, 2631	3/16"	3/16"
2613, 2633	3/16"	¼"

Length (per shoe)	Primary	Secondary
2601, 2611	11½"	13"
2602, 2606, 2626, 2631	11½"	13"
2613, 2633	13"	14¾"

Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.

Hand Brake: See Service Brake above.

Power Brakes: Easamatic (combination power cylinder and hydraulic master cylinder unit). Optl.

See "Power Brakes" in Brake Section for complete data.

MISC. MECHANICAL

Window Regulators, Seat Control, Convt. Top Control: Hydro-Lectric type (hydraulic type with motor driven pump supplying oil under pressure).

See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum type, cable operated.

See Miscellaneous Section for complete data.

►*1954 AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Frigidaire Air Conditioning" in Miscellaneous Section.*

►*ELECTRICAL EQUIPMENT NOTE:* Auto-Lite Equipment used on Clipper Special (5400), Clipper Deluxe (5401), and Commercial (5433). Other models use Delco-Remy Equipment.

MODEL IDENTIFICATION

Model	Chassis Symbol
Clipper Special	5400
Clipper DeLuxe	5401
Cavalier	5402
Patrician	5406
Clipper Super	5411
Commercial (359 cu. in.)	5413
Custom	5426
Packard	5431
Commercial (288 cu. in.)	5433

SERIAL NUMBER: Stamped on plate mounted on left front door pillar post.

ENGINE NUMBERS: Stamped on left side of engine opposite #8 cylinder.

TUNE-UP

COMPRESSION PRESSURE: All cylinders should be equal within 10 lbs.

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE (5400, 5401, 5411, 5433): .007" Intake, .010" Exhaust. Engine warm.

VALVE TAPPET CLEARANCE (Others): Hydraulic lifters used. No adjustment required.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment required.

IGNITION

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAP: .023-.028".

Spark Plug—Champion J8. 14mm.

AUTO-LITE

COIL: Auto-Lite CR-4001A.

Ignition Current—1.5 amperes idling, HOT.

DISTRIBUTOR: Auto-Lite IGP-4502E.

Condenser—Auto-Lite IG-2671K. **Capacity** .20-.25 mfd.

Contact Point Set—Auto-Lite IGP-3028KS.

Breaker Gap—.015-.019". Set maximum gap to .017".

Cam Angle—27°±3°. Do not exceed gap limits to obtain dwell.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance (Auto-Lite)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		375	2		750
3.75		550	7.5		1100
7		1350	14		2700
8		1600	16		3200

Fuel Compensator: 40° range of adjustment on quadrant at vacuum link connection. *See Ignition Timing.*

Vacuum Spark Control: Auto-Lite. Mounted on hold-down plate and linked to adjusting quadrant on distributor.

Vacuum Advance (Auto-Lite)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6
1	2	6 3/4
3	6	8 3/8
4	8	9 1/4
5	10	10

DELCO-REMY

COIL: Delco-Remy 1115376.

Ignition Current—1.5 amperes idling, HOT.

DISTRIBUTOR: Delco-Remy 1110841 & 1110848.

Condenser—Delco-Remy 1869704. **Capacity** .18-.23 mfd.

Contact Point Set—Delco-Remy 1918148.

Breaker Gap—.016".

Cam Angle—Test limits with .016" gap, 26-33°

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110841

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		375	0-4		750
2.5-4.5		550	5-9		1100
5-7		1100	10-14		2200
7-9		1600	14-18		3200

Automatic Advance—1110848

Degrees	Distr.	RPM	Degrees	Eng.	RPM
.5-2.5		350	1-5		700
2-4		400	4-8		800
7-9		800	14-18		1600
9-11		950	18-22		1900

Vacuum Spark Control: Delco-Remy 1116070 (use with 1110841 Distr.). Delco-Remy 1116087 (use with 1110841 Distr.). Integral type mounted on distributor and linked directly to breaker plate.

Plunger Travel—7/64" (1116070), 3/16-13/64" (1116087).

Vacuum Advance—1116070

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
5	10	9.5-11

Vacuum Advance—1116087

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
9	18	12-14.5

IGNITION TIMING

Setting—(5400, 5401, 5411, 5402, 5433) 6° BTDC. **(5431, 5406, 5426, 5431)** TDC. *NOTE*—Modify this setting for special fuel and altitude conditions. See Fuel Compensator Setting (below).

Timing Mark—"#1 UP.DC" with fifteen 1° graduations ahead of mark.

Fuel Compensator Setting: Should be set for slight ping when accelerating engine with wide open throttle. To adjust, loosen vacuum unit link screw in distributor quadrant (Auto-Lite Distributors), advance arm hold-down screw (Delco-Remy Distributors), rotate distributor one graduation at a time counter-clockwise (if ping too severe), clockwise (if no ping) until correct performance secured.

CARBURETOR

CARTER 2-BARREL

Carter WGD (5400, 5433) 986S. (5401, 5411) 2102S. Dual downdraft types with Carter Climatic Control.

Idle Setting—1/2 to 1 1/2 turns open. Turn screws out for richer mixture.

Idle Speed—400-450 RPM. (Std. & Overdrive), 375 RPM. (Ultramatic).

Float Level—13/64" between top of float and bowl cover (Gauge T109-39), with bowl cover inverted and needle seated.

Accelerating Pump—No seasonal adjustment.

Fast Idle Setting: With thermostatic coil housing, gasket and baffle plate removed, crack throttle valve and hold choke valve closed. Then close throttle. There should now be .023" clearance (Gauge T109-189) between throttle valve and bore of carburetor (side opposite idle ports). Adjust by bending choke connector rod at lower angle.

Automatic Choke Setting: Set one point rich.

►*OTHER DATA: See "Carter WGD" Carburetor in Carburetor Section.*

Fuel Pump Pressure: 3½-5½ lbs.

CARTER 4-BARREL

Carter WCFB (5402) 2103S & 2142S, (5406, 5413, 5426, 5431) 2112S. Four-barrel downdraft types with Carter Climatic Control.

Idle Setting—(2103S) 1¼-2¼ turns open, (2112S) ¾-1¾ turns open, (2142S) 1-2 turns open. Turn screws out for richer mixture.

Idle Speed—400-450 RPM. (Std. & Overdrive, 375 RPM. (Ultramatic).

►*OTHER DATA: See "Carter WCFB" Carburetor in Carburetor Section*

Fuel Pump Pressure: 4-5 lbs.

CARB. EQUIPMENT

Fuel Pump: (5400, 5401, 5411, 5433) Carter M2049S, **(Others)** AC No. 1539920.

Pressure—(Carter) 3½-5½ lbs., (AC) 4-5 lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric "CV" (constant-voltage) type with voltage regulator. *See MISC. ELECTRICAL for regulator data.*

Dash Unit—(5400, 5401, 5411) K-S No. 46595, (Others) K-S No. 46570.

Tank Unit—K-S No. 44517.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

(5400, 5401, 5402, 5411, 5433) Auto-Lite 2L-100, National 2L-S-100, or Willard SW-2L-100. 6 volt, 17 plate, 100 ampere hour capacity.

(5406, 5413, 5426, 5431) Auto-Lite 2FH-120, National 2F-S-120, or Willard HW-2F-120. 6 volt, 17 plate, 120 ampere hour capacity.

Battery Ground—Positive.

Engine Ground—Left front of engine.

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STARTER

AUTO-LITE

Auto-Lite MCL-6129. Armature - MCH-2028.
Drive—Bendix No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs.

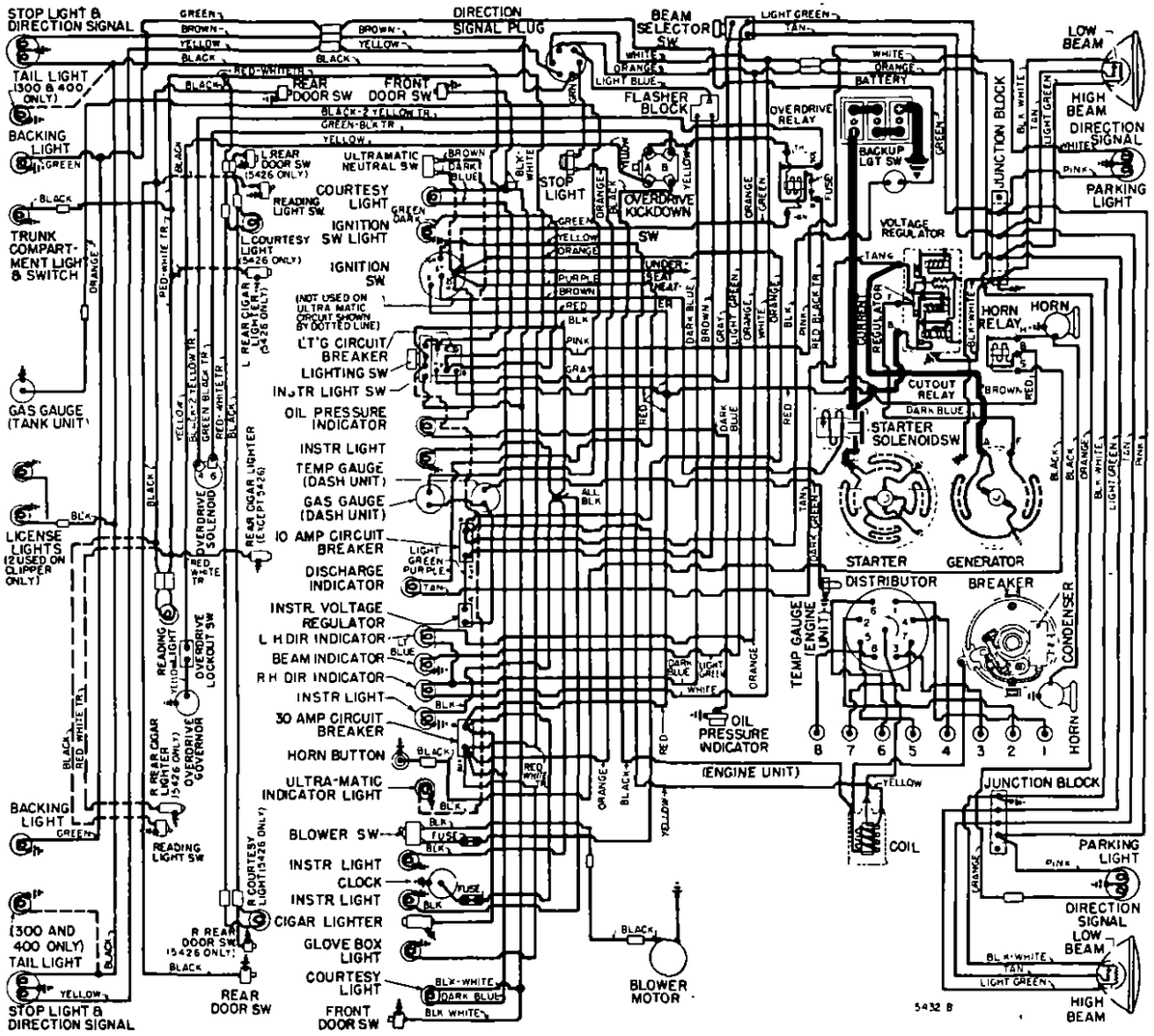
Performance Data—MCL-6129

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8 ft. lbs	Lock	2.0	410

Starting Switch: Auto-Lite SST-4010. Magnetic switch. Key starting. *See "Starter Controls" in Electrical Equip. Section.*
Ultramatic Neutral Safety & Backup Light Switch: *See Delco-Remy Starter data below.*

DELCO-REMY

Delco-Remy 1108027. Armature—1917855.
Drive—Delco-Remy 1873789. Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.



CARS WITH AUTO-LITE EQUIPMENT

Performance Data—1108027

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	5500	5.65	70
12 ft. lbs	Lock	3.15	570

Starting Switch: *Delco-Remy 1118136. Key starting with solenoid pinion shift. See "Starter Controls" in Electrical Equip. Sect.*
Neutral Safety Switch: Mounted on left side of transmission case. Connected in starter control circuit so that starter operative only with selector lever in "N" or "P" positions.

GENERATOR

AUTO-LITE

Auto-Lite GGW-6003A. Armature—GGW-2006F.

Performance Data (Auto-Lite)

Amperes	Volts	Cold - R.P.M. - Hot
0	6.4	870-970 — 950-1050
40	8.0	1800-2000 — 2150-2350
45①	8.0	1925-2125 — 2350-2550

①—Do not operate at higher output and do not operate at this voltage without ventilating fan.

Brush Spring Tension—35-53 ozs. with new brushes.
Field Current—1.4-1.5 amperes at 5.0 volts (70° F).
Motoring Current—4.8-5.3 amperes at 5.0 volts (70° F.) with field terminal grounded to frame.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Loosen two generator bracket screw nuts 2-3 turns. Loosen generator strap screw, then loosen generator-to-water pump screw. Place Tool J-4714 over the head of the generator bracket front screw and rotate the tool clockwise until the arm of the tool contacts edge of generator drive end plate. Using torque wrench with a 7/8" socket over the tool, rotate the wrench clockwise and move the generator outward until 15 ft. lbs. torque is indicated on the scale. The adjusting strap to generator screw should be tightened to hold the generator in this position while maintaining the 15 ft. lbs. torque.

DELCO-REMY

Delco-Remy 1102778. Armature—1921621.

Performance Data—1102778

	Amperes	Volts	R.P.M.
Cold	45①	8.0	2450

①—Not maximum. See Regulator.
Brush Spring Tension—28 ozs.
Field Current—1.87-2.0 amperes at 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: Same as Auto-Lite (above).

REGULATOR

AUTO-LITE

Auto-Lite VBE-6102A (for Auto-Lite GGW-6003A Gen.)

Cutout Relay

Cuts In—6.3-6.8 volts.
Cuts Out—4.1-4.8 volts.
Contact Gap—*.015" minimum.*
Air Gap—.031-.034" (check at hinge end of core).

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Voltage Regulator

Setting—7.2-7.5 volts at 70° F. *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap—.048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

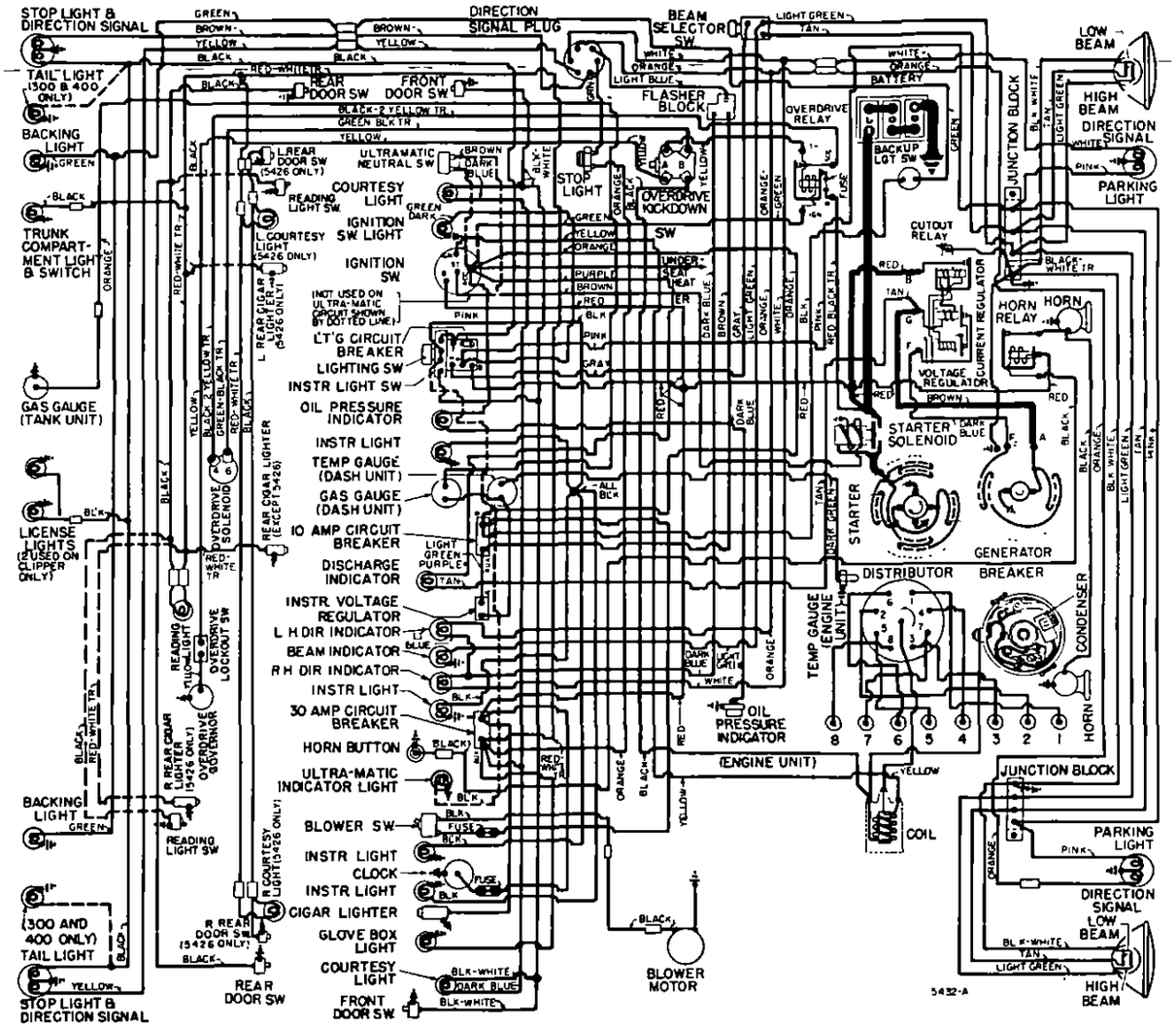
Test A	Operating Amperes	Test B
52 amperes	45	(43-47)

Test A—After 15 minutes operation charging at 1/2 maximum rate.
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

DELCO-REMY

Delco-Remy 1118829 (for Delco-Remy 1102778 Gen.) New "1118825 Series" regulator.

►*REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equip. Section. All specifications are "Normal" settings.*



CARS WITH DELCO-REMY EQUIPMENT

Cutout Relay

Cuts In—6.4 volts (hot).
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.3 volts (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—47 amperes (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
Lighting Switch Removal: Remove knob, then remove mounting nut on instrument panel with special wrench. Remove switch.
Stop Light Switch Location: At brake master cylinder outlet tee.

FUSES: Clock—AGA 3 amps. In clock lead.
Overdrive—SFE 30 amps. On overdrive relay.
Heater—SFE 20 amps. In cable near Ign. Switch.

CIRCUIT BREAKERS: Lighting—30 amps. On lighting switch.
Accessory (Body & Stop Lamps)—30 amps. Behind instrument panel below gauges.
Hydro-Electric Power (Convertible)—On engine side of dash on pump upper bracket.
Direction Signal—10 amps. On instrument cluster.

HORNS: Sparton. Dual horns operated by relay.
Horn Relay: Delco-Remy 1116775.
Contacts Close—2.75-4.0 volts (set to 3.5 volts).
Contact Gap—.027". **Air Gap**—.014" (contacts closed).

GAUGE VOLTAGE REGULATOR: King-Seeley 45677. Consists of a thermo-bi-metal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on the instrument cluster and is connected between the 10 ampere circuit breaker and the instrument circuits. See Wiring Diagram.

ENGINE

►*AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system. See "Frigidaire Air Conditioning" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 8 Cylinder, "L" Head.

Series	Bore	Stroke	Displmnt.
5400, 33	3 1/2"	3 3/4"	288 cu. ins.
5401, 11	3 1/2"	4 1/4"	327 cu. ins.
5402	3 1/2"	4 1/4"	327 cu. ins.
5406, 13, 26, 31	3 9/16"	4 1/2"	359 cu. ins.

Series	Rated HP	Dev. HP.	Comp. Ratio
5400, 33	39.2	150 at 4000 RPM	7.7-1
5401, 11	39.2	165 at 3600 RPM	8.0-1
5402	39.2	185 at 4000 RPM	8.0-1
5406, 13, 26, 31	40.6	212 at 4000 RPM	8.7-1

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Compression & Vacuum Reading—*See TUNE-UP.*

►*HYDRAULIC VALVE LIFTERS: Standard on all engines except 5400, 5401, 5411, & 5433.*

ENGINE & OIL PAN REMOVAL: *See Packard Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Packard Special Data.*

PISTONS

Autothermic strut type, aluminum alloy.

Original Bore & Pistons—*See Packard Special Data.*

Weight—(5400, 01, 02, 11, 33) 25.5 ozs. (Others) 25.7 ozs. Includes rings, pin and locks.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Clearance .0005-.001", ¾" from bottom of piston. Insert .0015" x 1/2" feeler between piston and cylinder wall on side opposite slot. Pull to withdraw feeler should be 10-16 lbs. NOTE—Piston should hold in any portion of bore of own weight but should move with one or two finger pressure (cylinder bore vertical).

Replacement Pistons: *See Packard Special Data.*

►*NOTE:* Cylinder bore out-of-round limit .004", taper limit .010".

►*PISTON SKIRT EXPANDER NOTE:* If cylinder diameter over .006" greater than piston skirt diameter (measured beside upper end of skirt slot) skirt expanders should be installed.

►*RING GROOVE NOTE:* Check ring grooves by installing new piston ring in groove—if .006" feeler can be inserted 1/16", wear is excessive and piston should be replaced. Check top groove when testing.

Installing Pistons: Slot toward camshaft.

PISTON PINS

Floating type retained by lock ring at each end. Split type bushing used in upper end of rod.

Diameter—7/8". **Length**—3 1/64"

Pin Fit in Piston—Palm push fit at 160° F. (heat piston in water only).

Pin Fit in Rod—Finger push fit.

Replacement Pins: Std., .003", .006" Oversize.

Piston Pin Bushing Installation: *See "Piston Pins" in Packard Special Data.*

PISTON RINGS

Models 5400, 5401, 5402, 5411, 5433

Ring	Width	End Gap	Side Clr.
Compr. (#1, #2)	.0925-.0935"	.0054-.0207"	①
Oil	.1860-.1865"	.0054-.0207"	①

Models 5406, 5413, 5426, 5431

Ring②	Width	End Gap	Side Clr.
Compr. (#1)	.0775-.078"	.0084-.0247"	①
Compr. (#2)	.0775"-.0785"	.0084-.0247"	①
Oil	.1860-.1865"	.0084-.0247"	①

①—With new ring installed in top groove (greatest wear in this groove), insert .006" feeler in this groove. If feeler can be inserted 1/16", side clearance is too great and piston should be replaced.

②—Top compression ring is chrome type.

Replacement Rings: Furnished in sets Std. .020", .030", .040" Oversize. *See "Piston Rings" in Packard Special Data.*

Installing Rings: Install top (#1) compression ring and oil ring with ring gap opposite slotted side of piston and midway between piston pin bosses. Install lower (#2) compression ring with gap toward slotted side of piston and midway between piston pin bosses.

CONNECTING RODS

Length—(5400, 5433) 7 15/16". **(Others)** 7 11/16". Measured center to center. *CAUTION*—5400, 5433 rods **not interchangeable** with others.

Weight—(5400, 5433) 36.5 ozs. **(Others)** 36 ozs.

Crankpin Journal Diameter—2.250".

Lower Bearing—Shimless precision, steel backed. No adjustment. Replace bearings.

Clearance—.0005-.0025". **Endplay**—.003-.011".

Replacement Bearings: Std., .001, .002", .020" Undersize.

Installing Rods: Oil hole toward camshaft.

CRANKSHAFT

Journal Diameter—2.7465". (5400, 01, 02, 11, 33) Five bearings. (Others) Nine bearings.

Bearings—Interchangeable, shimless, precision. No adjustment. Replace bearings.

Clearance—.0005-.0025".

Replacement Bearings: Std., .001", .002", .020" Undersize.

End Thrust: Taken by center bearing.

Endplay—.0035-.0085".

Crankshaft Oil Seals: *See "Crankshaft & Main Bearings" in Packard Special Data.*

CAMSHAFT

Five bearing.

Bearings—Steel-backed babbitt lined bushings.

Clearance—.001-.003".

End Thrust—Taken by thrust plate in back of camshaft sprocket. **Endplay**—.004-.006".

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Packard Special Data.*

Timing Chain: Morse. **Width**—1". **Pitch**—.375". **Length**—58 links.

Camshaft Setting: Install chain and sprockets together with "O" marks on sprockets adjacent and in line with straightedge across shaft centers.

VALVES

Tappet Clearance: (5400, 01, 11, 33) .007" Intake, .010" Exhaust, engine warm. **(Others)** None (hydraulic lifters).

Valves	Head Diameter	Stem Diameter	Length
Intake	1 51/64"①	.3417"	5 7/8"
Exhaust	1 7/16"	.3398"	5 7/8"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.342"	.0005-.0031"
Exhaust	45°	.342"②	.0024-.005"

①—Head Diameter 1 43/64" on 5400, 01, 02, 11, 33.

②—Lift .337" on 5402 exhaust valve.

Valve Springs: Single spring used on all valves. Intake and exhaust springs interchangeable. Shakeproof type washer between top of valve spring and cylinder block seat.

Valve Spring Specifications

Valve	Spring Pressure	Spring Length
Closed	60-66 lbs.	1 3/4"
Open	135-145 lbs.	1 13/32"

Valve Guides: If guides to be removed with lifters in engine, use Valve Guide Remover J-2580 to drive guide down to just clear tappet (with tappet on heel of cam). Score guide with chisel through valve chamber, then break off lower end, finally driving remainder of guide out. If lifters out, guide can be driven down and out without breaking. To install, press guide into block with upper end 31/32" below top of block, using Valve Guide Driver J-2577. This gauge properly positions guides when gauge seated in block. Ream guides after installation with 11/32" (.3437") reamer. Upper end of exhaust guide counter-bored.

Valve Lifters (5400, 5401, 5411, 5433): Conventional mushroom type (Standard). Hydraulic type (Optional). Standard type removed from below with camshaft out. To remove Hydraulic type see below.

Valve Lifters (Others): Wilcox-Rich "Zero Lash" hydraulic type (mushroom type body). Hydraulic unit can be removed from above. Lifter body removed from below with camshaft out.

Diameter—.6236-.6239". **Clearance in Block**—.0001-.0016".

Lifter Overhaul & Testing—*See "Valve System" in Packard Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

5400, 5433 Valve Timing

Intake Valves—Open 15° BTDC. Close 45° ALDC.
Exhaust Valves—Open 50° BLDC. Close 9° ATDC.

5401, 5411 Valve Timing

Intake Valves—Open 10° BTDC. Close 50° ALDC.
Exhaust Valves—Open 45° BLDC. Close 14° ATDC.

5402 Valve Timing

Intake Valves—Open 10° BTDC. Close 48° ALDC.
Exhaust Valves—Open 48° BLDC. Close 9° ATDC.

5406, 5413, 5426, 5431 Valve Timing

Intake Valves—Open 22° BTDC. Close 65° ALDC.
Exhaust Valves—Open 55° BLDC. Close 15° ATDC.

Valve Timing Check (5400, 5401, 5411, 5433): Set No. 1 intake valve tappet to .0125" (cold) and turn engine over until No. 1 intake valve just begins to open. Valves are properly timed and the camshaft and crankshaft sprockets properly related when the No. 1 intake valve starts to open at 15° (5400, 5433), 10° (5401, 5411) BTDC as indicated on timing scale on vibration damper.

Valve Timing Check (Others): Turn engine over until No. 8 exhaust valve has fully opened and continue turning the engine until valve is nearing its closed position. At this time, tappet plunger should not be able to be turned by finger pressure. While maintaining

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steady finger pressure to turn plunger, turn engine over until plunger suddenly "breaks loose" (plunger can be turned). At this point valve is closed. Pointer should register 9° (5402), 15° (5406, 5413, 5426, 5431) as noted on vibration damper.

►*VALVE TIMING NOTE:* If valves open or close in excess of 8° before or after their specified opening or closing positions, the camshaft and crankshaft sprockets are not properly related. *See "Camshaft Setting" under CAMSHAFT above.*

OILING SYSTEM

Crankcase Capacity: 7 quarts. One quart additional when filter changed.

Normal Oil Pressure: 40 lbs. at normal driving speed.

Pressure Regulator Valve—In oil pump cover. Not adjustable.

Oil Pressure Indicator— Red light on left side of instrument panel. Lighted when oil pressure less than 10 lbs. (lights when ignition turned on, goes out when pressure exceeds 10 lbs.).

Oil Pressure Switch (Engine Unit)—King-Seeley 47140. Contacts open when pressure exceeds 10 lbs. (remain closed at lower pressures).

Oil Pump: Gear type mounted externally on right side of engine.

Pump Removal, Overhaul & Installation—*See "Oil Pump" in Packard Special Data.*

Oil Filter: Purolator P-70. Optional on 5400, 5401, 5411. Standard on other models. Replace filter element every 8000 miles or more often as required.

Replacement Filter Element—AC P-31C or C-31G.

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve compartment in rear.

COOLING

Water Capacity: 20 quarts (20 2/3 quarts with heater).

Pressure Valve: Radiator filler cap, 12 lb. type.

Thermostat: "Capsule" type. In cylinder head water outlet flange. Starts to open 167-173°F. (Standard), 177-182°F. (Optl.).

Water Pump: Centrifugal, belt driven, packless type.
See "Packard" in Water Pump Section.

Pump Removal—Disconnect hose from water pump. Remove nut and washers attaching battery ground cable to water pump. Remove screws holding water pump to front face of engine cylinder block. Lift pump out.

Temperature Gauge: King-Seeley "CV" (constant voltage) electric type with Gauge Voltage Regulator. *See MISC. ELECTRICAL for regulator data.*

Dash Unit—(5400, 5401, 5411) K-S No. 46597, **(Others)** No. 46573.

Engine Unit—K-S No. 44225.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Synchro-mesh Transmission Cars. (5400, 5433) Long Model 10CF-TI, Assy. No. 267954, (Others) Long Model 11CF-10½TI, Assy. No. 268349.

See "Long Clutches" in Clutch Section.

Clutch Disc No. —Long (10CF-TI) 287952, (11CF-10½ TI) 287951.

Pedal Adjustment: 1⅛-1½" free travel. Adjustment nut rod at throw-out lever. *See "Clutch Notes" in Packard Special Data.*

Removal: Remove transmission (See Transmission Removal following). Remove flywheel lower housing, clutch release bearing and sleeve. Mark clutch cover plate and flywheel. Loosen capscrews that attach clutch cover to the flywheel in succession (to release tension evenly) until clutch cover is free. Remove clutch cover and pressure plate and clutch driven plate from flywheel housing. Remove clutch shaft pilot bearing using tool J-164 or J-489.

SYNCHRO-MESH TRANSMISSION

Own. *See "Packard Synchro-mesh" in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect speedometer cable, gear shift rods from levers on transmission case, and propeller shaft at rear universal joint. Remove propeller shaft completely by slipping the front universal joint flange off the transmission main shaft. *(CAUTION*—Wire or tape the two bearings of the universal joints together to prevent them from falling off). Support rear of engine with a jack. Remove rear engine support mounting and support cross members. Remove cap screws attaching transmission to flywheel housing. Using two pilots in the bolt holes, slip the transmission to the rear, so that the clutch release bearing pull-back spring may be unhooked. Remove transmission.

OVERDRIVE

Warner Type AS8-R11. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
See "Warner R11" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting overdrive control cable from lever on right side of overdrive case, electric leads at governor, lockout switch, and solenoid. Remove governor with tool J-4653, then remove solenoid.

ULTRAMATIC DRIVE

Own. Torque Converter (with hydraulically operated Direct Speed Clutch) and hydraulically operated planetary unit with manual control.
See "Ultramatic Transmission" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Ultramatic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Ultramatic Transmission" in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level—*(CAUTION—Fluid must only be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute with selector lever in "N" position).* Stop engine, check level by removing dipstick from filler hole *on left side of transmission(accessible from under car*—release cap by turning ½ turn counter-clockwise). Add fluid as required to bring level up to FULL mark on dipstick.

Capacity—Approximately 12 qts. *Use only Packard Ultramatic Drive or any Type "A" Transmission Fluid which has an AQ-ATF number embossed on container.*

►*OTHER "ULTRAMATIC" SERVICE DATA: See "Ultramatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer (Cross Type), **Detroit Universal** (Ball & Trunnion Type), **Mechanics** (Cross Type).

►*CAUTION:* Rear universal flange nut controls rear axle pinion bearing preload which **must be adjusted whenever nut is loosened.** *See "Packard Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss Drive.
See "Packard Hypoid" in Rear Axle Section.

Standard Axle Ratios

Model	Std. O.D. Cars	Ultramatic
5400, 5402, 5431	3.9-1, 4.1-1	3.54-1
5401, 5411	3.9-1, 4.1-1	3.23-1
5406		3.54-1
5413	4.54-1, 4.7-1	4.36-1
5426	4.1-1, 4.55-1	3.9-1
5433	4.55-1, 4.55-1	4.1-1

Optional Axle Ratios (Exc. 5426)

Standard	Overdrive	Ultramatic
4.1-1	3.9-1	3.23-1, 3.54-1
	3.54-1	3.9-1, 4.1-1

Backlash—.004-.008".

Carrier Removal: Remove axle shafts (see Axle Shaft Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with a 2x4 inserted inside frame X-member. Drain differential, replace drain plug. Clean off housing, take off carrier mounting nuts, lift carrier assembly out.

Axle Shaft Removal: Remove wheel and brake drum (use screw type puller J-4153—do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner seal). Use Tool J-943-B to remove inner seal.

Wheel Bearing Adjustment: Endplay controlled by shims between flanged end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel if .050" or under, at both wheels if over .050" to secure .004-.007" endplay.

Endplay—.004-.007".

SHOCK ABSORBERS

Delco or Monroe. Direct acting hydraulic type. Serviced by replacement.

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FRONT SUSPENSION

Independent. Coil spring and direct acting shock absorbers.
See "Packard" in Front Suspension Section.
Kingpin Inclination—(5413, 5433) 2°30'. **(Others)** 5°50'.
Caster—(5413, 5433) Neg. 2°±½°. **(Others)** Neg.1°±½°.
Camber—0° (Pos. ¾° to Neg. ¼° range).
Toe-In—0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.
Toe-Out on Turns—Inside wheel at 23¾° with outside wheel at 20°.

STEERING

Manual: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: Bendix. Linkage type. Used with Standard Steering Gear.
See "Bendix Power Steering" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Bendix hydraulic, Duo-Servo, Single Anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.
See "Bendix Hydraulic" in Brake Section.

Drum Diameter	Front	Rear
5400, 5401, 5411	11"	11"
5402, 5406, 5426, 5431	12"	12"
5413, 5433	12"	14"

Wheel Cylinder Diameter	Front	Rear
5400, 5401, 5411	1 1/8"	1 1/16"
5402, 5406, 5426, 5431	1 1/8"	1"
5413, 5433	1 1/8"	1 1/4"

Lining Width	Front	Rear
5400, 5401, 5411	2½"	2"
5402, 5406, 5426, 5431	2¼"	2"
5413, 5433	2½"	2¾"

Lining Thickness—(5413, 5433) ¼". **(Others)** 3/16".

Lining Length (per shoe)	Primary	Secondary
5400, 5401, 5411	9 5/16"	12"
5402, 5406, 5426, 5431	11 1/2"	13"
5413, 5433	13" (Fr.)	13" (Fr.)
5413, 5433	14 3/4" (Rr.).	14 3/4" (Rr.)

Clearance—.015" at both ends of secondary shoe with primary shoe forced out against drum.
Standard Master Cylinder: On bracket on left side of frame near transmission support.
Checking Fluid—Access hole in front floor pan at left corner of driver's seat.
Removal—Disconnect brake lines from master cylinder. Disconnect push rod at pedal. Remove gearshift selector linkage bell crank from mounting bolt stud. Remove mounting bolts and master cylinder.
Power Brakes: Bendix Easamatic. Combination power cylinder and hydraulic master cylinder unit..
See "Bendix Power Unit" in Brake Section.
Checking Fluid—Check level every 1000 miles. If level not up to full mark, add brake fluid.
Removal of Power Unit—Disconnect hose line and electrical wiring from power unit (raise hydraulic line above level of junction assembly to prevent fluid leakage). Disconnect and remove brake and accelerator pedals. Remove steering column grommet retainers, slide grommet up out of way. Remove carpet retainers and fold back carpet. Remove cover plate screws, then remove power brake and cover as an assembly, take out mounting screws and remove power brake from cover.

MISC. MECHANICAL

Windshield Wipers: Vacuum type, cable operated. *See "Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: Frigidaire. *See "Frigidaire" Air Conditioning in Miscellaneous Section.*
Window Regulators, Seat Control, Convertible Top Control: Hydro-Lectric type (hydraulic type with motor driven pump supplying oil under pressure). *See "Hydro-Lectric Top Controls" and "Hydro-Lectric Window & Seat Regulators" in Miscellaneous Section.*

►*TORSION LEVEL SUSPENSION CAR SERVICING CAUTION:* Do not jack car up in rear with jack placed under rear load arms or any part of torsion level suspension assembly. Rear load arm link may become disengaged from arm.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, See "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ELECTRICAL EQUIPMENT NOTE: Auto-Lite Equipment used on Clipper Deluxe & Super. Other models use Delco-Remy.*

MODEL IDENTIFICATION

Model	Model Designation	Series
Clipper Deluxe	5522	5540
Clipper Super	5542, 5547	5540
Clipper Custom	5562, 5567	5560
Packard	5582, 5587	5580
Caribbean	5588	5580

SERIAL NUMBER: Stamped on plate mounted on left front door pillar post.

ENGINE NUMBER: Stamped on front end of engine block between cylinder banks, directly behind water pump.

TUNE-UP

►*ROUGH IDLE, OR POOR PERFORMANCE OR GASOLINE ECONOMY (Cars with Carter 2284S Carburetor): See "Carter WCFB 4-Barrel" in Carburetor Section.*

COMPRESSION PRESSURE: 120 lbs. minimum at 150 RPM. Variation between cylinder should not exceed 10 lbs.

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE: None required in service (hydraulic). *See "Valves" below for initial setting if head removed or valves disturbed.*

MANIFOLD HEAT CONTROL: Thermostatic spring type located in left hand exhaust manifold outlet.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders – RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033-.037".
Spark Plug–Champion H-10. Tighten to 26-30 ft. lbs.

AUTO-LITE

COIL: Auto-Lite CAD-4001. *12 Volt.*
Ignition Current–1.25 amperes idling HOT.
Resistor–Auto-Lite PU-4001.

►*COIL RESISTOR NOTE: Resistor connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by lead from starter solenoid to coil.*

DISTRIBUTOR: Auto-Lite IBJ-4001 (No. 440689 Cyl. Hd. First Cars), IBJ-4001B (No. 440854 Cyl. Hd. Later Cars). *12 Volt.*
Condenser–Auto-Lite IBB-2015L. **Capacity** .25-.28 mfd.
Contact Set–Auto-Lite IGW-2028HS.
Breaker Gap–.016".
Cam Angle–27° ± 2°.
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance–IBJ-4001

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		325	2		650
11		600	22		1200
19		1135	38		2270
20		1200	40		2400

Automatic Advance–IBJ-4001B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		375	2		750
8		850	16		1700
15		1650	30		3300
16		1750	32		3500

Vacuum Spark Control: Integral type.

Vacuum Advance–IBJ-4001

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6
1	2	6-3/8
3	6	7
5	10	7-5/8
6	12	8

Vacuum Advance–IBJ-4001B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6 1/4
1	2	6 5/8
6	12	9
11	22	12 1/8
12	24	13

►*DISTRIBUTOR REMOVAL CAUTION: Mark position of rotor so that it can be replaced in the same position when distributor installed.*

Distributor Installation: If engine crankshaft rotated with distributor removed, proceed as follows: Rotate crankshaft until No. 1 cyl. is 5° BTDC on firing stroke. Place gasket on distributor shaft, and with distributor cap removed insert distributor to engage oil pump drive shaft by turning distributor rotor. Select the correct tooth so that when distributor is in full mesh with camshaft gear, rotor will be at No. 1 terminal.

DELCO-REMY

COIL: Delco-Remy 1115084 *12 Volt.*
Ignition Current–1.25 amperes idling HOT.
Resistor–Delco-Remy 1927809.

►*COIL RESISTOR NOTE: Resistor connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110854. *12 Volt.*
Condenser – Delco-Remy 1869704. **Capacity** – .18-.23 mfd.
Contact Point Set–Delco-Remy 1118148.
Breaker Gap–.016".
Cam Angle–26-33°.
Breaker Arm Spring Tension–19-23 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance–1110854

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		350	0-4		700
11-13		1300	22-26		2600
15-17		2100	30-34		4200

Vacuum Spark Control: Delco-Remy 1116093. Integral type mounted on distributor and linked directly to breaker plate.
Plunger Travel–17/64".

Vacuum Advance–1116093

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
12	24	13-15

►*DISTRIBUTOR REMOVAL CAUTION: Mark position of rotor so that it can be installed in the same position when distributor installed.*

Distributor Installation: Same as Auto-Lite above.

IGNITION TIMING

Setting–5° BTDC with engine running at 400 RPM.
Timing Marks–Timing indicator on chain cover marked "0" - "5" - "15". Align groove in vibration dampener with correct mark on indicator.

CARBURETOR

►*CARBURETOR APPLICATION: Carter 4-Barrel used on Clipper Deluxe & Custom. Rochester used on all other models. NOTE–Two Rochester 4-Barrel Carburetors used on "Caribbean" Model.*

THROTTLE LINKAGE ADJUSTMENT (ULTRAMATIC DRIVE): With engine at normal operating temperature, choke valve fully open and throttle in the slow idle position, adjust engine idle speed to 400 RPM (see "Carburetor" below for idle adjustment and Carburetor Synchronizing). Loosen the two locknuts (4 or 5 turns), that position the transmission throttle control rod cross shaft adjuster on accelerator-to-carburetor rod. Make sure that adjuster is free to move back and forth. Move transmission throttle shaft outer lever on right side of transmission so that it is at its rearward position. With carburetor throttle adjusting screw against its stop, adjust the throttle operating rod turnbuckle so that accelerator pedal rod lever just touches underside of the floorboard (this point is where rod from accelerator pedal extends through the floorboard), **then lengthen turnbuckle one full turn** to provide clearance. Tighten locknut on turnbuckle. Apply a slight forward pressure on transmission throttle rod adjuster and move rear locknut up to the adjuster. Move the front locknut up to the adjuster and tighten securely. Make sure that the alignment of the adjuster does not cause lever to bind.

CARTER WCFB
Nos. 2232S & 2284S

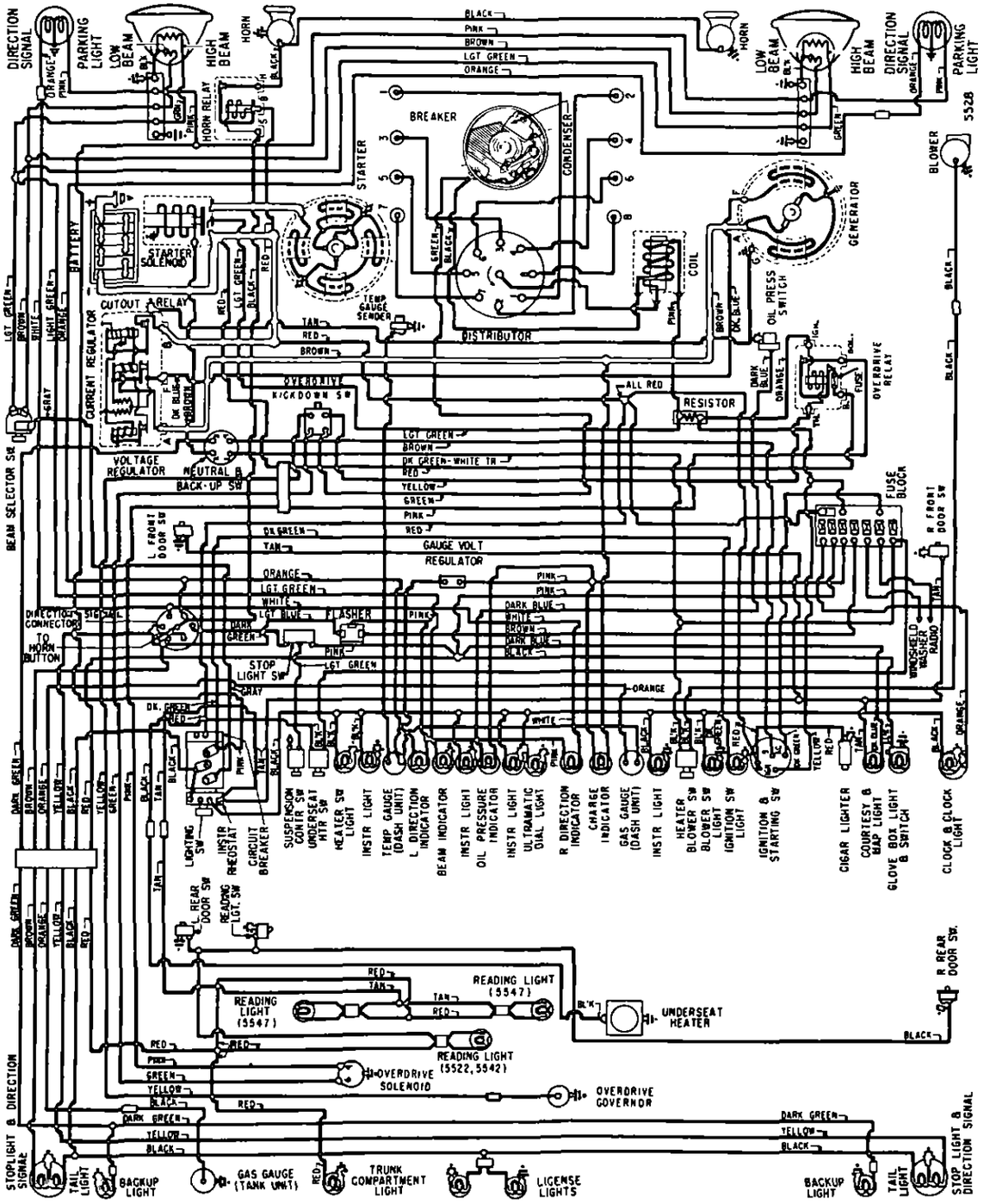
►*CARBURETOR PRODUCTION CHANGE: Carter No. 2232S used with first No. 440689 Cyl. Hd., No. 2284S used with later No. 440854 Cyl. Hd.*

►*CARTER 2284S HIGH VACUUM AT DISTRIBUTOR VACUUM PORT (Causing Rough Idle, Poor Performance or Poor Gasoline Economy): See "Carter WCFB 4-Barrel" in Carburetor Section for test and correction.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8. LEFT barrels 1-4-6-7.*
Idle Setting–1/2–1-1/2 turns open. Turn screws out for richer mixture.
Idle Speed–400-450 RPM (Synchro-mesh). 400 RPM with selector lever in "High" (Ultramatic).

►*OTHER DATA: See "Carter WCFB 4-Barrel" in Carburetor Section.*

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CLIPPER MODELS WITH AUTO-LITE ELECTRICAL EQUIPMENT

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Throttle Linkage Adjustment: *See "Carburetor" above.*
Fuel Pump Pressure: 3-1/2–5-1/2 lbs.

ROCHESTER 4GC (EXC. CARIBBEAN) No. 7007230

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT Barrels feed Cyl. 2-3-5-8. LEFT barrels 1-4-6-7.*
Idle Setting—1—1-1/2 turns open. Turn screws out for richer mixture.
Idle Speed—400-450 RPM (Synchro-mesh), 400 RPM, with selector lever in "High" (Ultramatic).
OTHER DATA: See "Rochester 4GC Carburetor" in Carburetor Section.
Throttle Linkage Adjustment: *See "Carburetor" above.*
Fuel Pump Pressure: 3-1/2–5-1/2 lbs.

ROCHESTER 4GC (CARIBBEAN) No. 7008230 (Front) No. 7008231 (Rear)

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8. LEFT barrels 1-4-6-7.*
Idle Setting—1—1-1/2 turns out. Turn screws out for richer mixture.
Idle Setting—400 RPM (Ultramatic), with selector lever in "High".

Synchronizing Carburetors: 1) Loosen both jam nuts on throttle rod at front carburetor throttle valve lever and both jam nuts at forward end of transmission throttle rod (where it connects with accelerator pedal rod), several turns.

2) Back out front and rear carburetor idle speed adjusting screws until throttle valves are closed. While holding the front carburetor throttle valves tightly closed, adjust jam nuts on throttle rod at front carburetor throttle lever so that pin fits freely in lever, then tighten jam nuts.

3) Turn in the idle speed screw on **front** carburetor until it makes contact and then turn it in **one additional turn.** Turn the four idle mixture screws (two each carburetor) all the way in and then **back them out one full turn.**

4) After engine is warmed up, adjust the **front carburetor** idle speed screw to obtain 400 RPM (with transmission selector lever in "Drive" position). *NOTE—The rear carburetor idle speed screw is not used and should therefore remain in the "backed out" position.*

5) Adjust the idle mixture screws to obtain a smooth idle in the following recommended manner: Turn each idle mixture screw in until the lean "drop-off" point (as noticed by a drop in the tachometer and vacuum gauge readings), counting the turns while turning the needle out to its rich "drop-off" point, then returning the screw to a position midway between the two "drop-off" points. Repeat with each idle mixture screw in the following sequence: right rear, right front, left front, left rear. Adjust for the highest possible RPM and vacuum reading. Readjust front carburetor idle speed screw to 400 engine RPM if necessary.

6) Raise the **rear** carburetor fast idle cam so that the idle speed adjusting screw rests on the high step of the cam. Adjust fast idle screw to obtain 2300-2350

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engine RPM and then drop cam away from the screw. Repeat this procedure with the **front** carburetor, adjusting the screw to obtain 1850 RPM, drop cam away from the screw. *NOTE—Because of the inaccessibility of the fast idle screws on both carburetors at low idle position, it will be necessary to shut the engine off and partially open the throttle to adjust the fast idle screws.*

Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 3-1/2–5-1/2 lbs.

CARB. EQUIPMENT

Fuel Pump: Carter (Fuel only). Vacuum pump is part of engine oil pump assembly.

Replacement Fuel Pump—Carter No. M-2198S.

Pressure—3-1/2–5-1/2 lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric "CV" (Constant Voltage) type with voltage regulator.

Dash Unit—(Except Clipper) K-S No. 46884, (Clipper) K-S No. 46924.

Tank Unit—K-S No. 44517.

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 3EA-60-R3 or Willard HDW-3KM-60. *12 Volt* 9 plate, 60 ampere hour capacity (20 hr. rate).

Battery Ground—Positive.

Engine Ground—Cylinder head to dash panel.

STARTER

AUTO-LITE

Auto-Lite MDD-6301. *12 Volt.* **Armature—MDC-2037.**

Drive—Bendix No. A3467.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	Free	10.1	60

Starting Switch: Auto-Lite SSW-4101. Magnetic switch, with key starting. *See "Starter Controls" in Electrical Equipment Section.*

Ultra-Matic Neutral Safety & Back-up Light Switch: *See "Delco-Remy Starter" data below.*

DELCO-REMY

Delco-Remy 1107635. *12 Volt.* **Armature—1926626.**

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35 ozs. minimum.

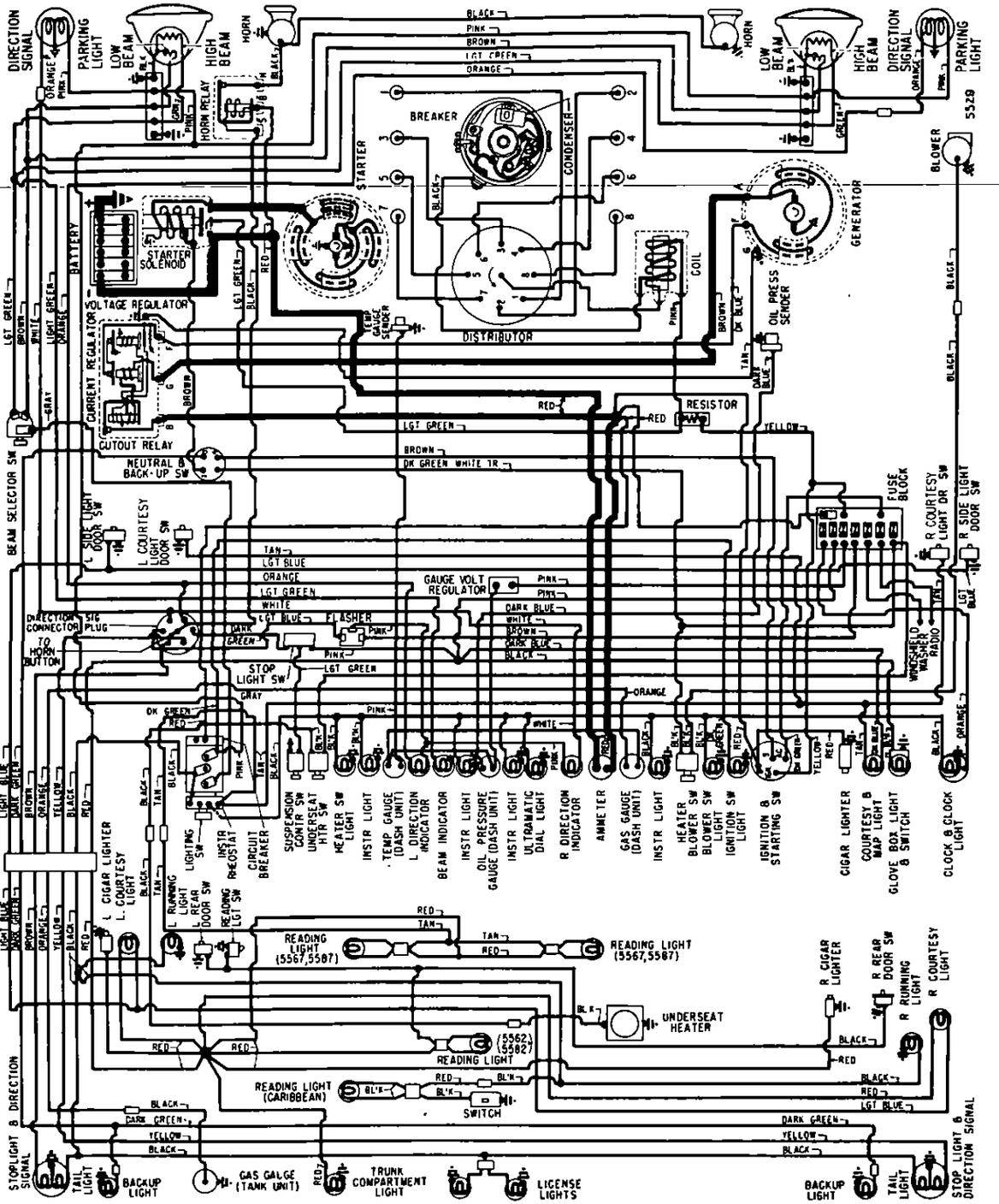
Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
10.5 ft. lbs.	Lock	5.4	470

Starting Switch: Delco-Remy Solenoid Switch No. 1119760 mounted on starter and controlled by Ignition & Starter Switch. Turn key full RIGHT to start. *See "Starter Controls" in Electrical Equipment Section.*

Ultramatic Neutral Safety & Backup Light Switch: Delco-Remy 1968118. Located on lower end of steering column. Connected in starter control circuit so that starter operative in "N" or "P" only.

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CLIPPER & PACKARD MODELS WITH DELCO-REMY ELECTRICAL EQUIPMENT

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GENERATOR

AUTO-LITE

Auto-Lite GJC-6001A. *12 Volt.* **Armature—GJC-2006F.**
Maximum Charging Rate—See Voltage Regulator.

Performance Data

Amperes	Volts	RPM
20	15.0	1750
30	15.0	2150

Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.23-1.32 amperes at 10.0 volts.
Motoring Current—3.4-3.9 amperes at 10.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: With generator mounting bolts and adjusting strap loose, adjust to 25 ft. lbs. at pivot bolt with torque wrench or 50 lbs. pull in direction of adjusting slot, using a scale.

DELCO-REMY

Delco-Remy 1102022. *12 Volt.* **Armature—1923535.**
Maximum Charging Rate—See Voltage Regulator.

Performance Data

	Amperes	Volts	RPM
Cold	30	14.0	2150

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.48-1.62 amperes at 12.0 volts.
Belt Adjustment: Same as for Auto-Lite above.

RE ULATOR

AUTO-LITE

Auto-Lite VRX-6007A (Use with Auto-Lite GJC-6001A Generator). *12 Volt.*

Cutout Relay

Cuts In—13.0-13.75 volts.
Cuts Out—8.2-9.3 volts.
Contact Gap—.015" minimum.
Air Gap—.031-.034".

Voltage Regulator

Setting—14.50 volts at 70°F. *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap—.048-.052", with contacts just opening (check at brass armature stop pin).
Checking & Adjusting—See *Electrical Equip. Section.*

Current Regulator

SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.

Operating Amperes

Test A	Test B
36 amperes	30 (28-32)

Test A—After 15 minutes operation at 1/2 maximum rate.
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts).
Air Gap—.048-.052", with contacts just opening.
Checking & Adjusting—See *Electrical Equip. Section.*

DELCO-REMY

Delco-Remy 1118953. *12 Volt. NOTE—Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cutout Relay

Cuts In—11.8-13.5 volts (hot).
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—13.8-14.8 volts (hot).
Air Gap—.075" *with armature pressed down to point* where contacts just touching.
Checking & Adjusting—See *Electrical Equip. Section.*

Current Regulator

Setting—27-33 amperes (hot).
Air Gap—.075" with contacts pressed down to point where contacts just touching.
Checking & Adjusting—See *Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. See *Electrical Equip. Section.*
Direction Signal: See *Electrical Equip. Section.*
Lighting Switch Removal: Remove knob, then remove nut on instrument panel with special wrench. Remove switch.
Stop Light Switch Location: On brake master cylinder outlet tee.
FUSES: All fuses except as noted are on a fuse block under instrument panel.
Clock—2 amperes.
Direction Signal—9 amperes.
Radio—7-1/2 amperes.
Heater—15 amperes.
Glove Box, Stop Light, Courtesy Light, Torsion Level Control, Body Wiring—20 amperes.
Windshield Washer—9 amperes.
Instruments—7-1/2 amperes.
Overdrive—15 amperes, on relay on dash panel.
Torsion Level Motor Feed—20 amperes, in fuse container near starter terminal.
CIRCUIT BREAKERS: 20 amperes, on headlight switch protects head, tail, and parking lights.
30 amperes—On engine side of dash. Protects Power Seat & Power Window relays.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*SERIES 5540 CYLINDER HEAD PRODUCTION CHANGE:* Cyl. Head No. 440689 used on first cars, No. 440854 used on later cars. Different Distributor and Carburetor used with each head.

►*IMPROVED OIL CONTROL PRODUCTION CHANGE & CORRECTION ON EARLY CARS:* THREE types of rocker arm shafts have been used in production and latest type should be installed if trouble experienced on cars with previous type shafts. *See "Rocker Arms" under VALVE SYSTEM in Packard Special Data.*

ENGINE SPECIFICATIONS: Own. V8 Valve in head.

Series	Bore	Stroke	Displacement
5540	3-13/16"	3-1/2"	320 cu. ins.
5560, 5580, 5588	4"	3-1/2"	352 cu. ins.

Series	Rated HP	Compr. Ratio	Developed HP
5540	46.5	8.5-1	225 at 4600 RPM
5560	51.2	8.5-1	245 at 4600 RPM
5580	51.2	8.5-1	260 at 4600 RPM
5588	51.2	8.5-1	275 at 4800 RPM

Compression & Vacuum Reading—See *TUNE-UP.*

TIGHTENING TORQUES: See *"Tightening Specifications" in Packard Special Data.*

ENGINE REMOVAL: See *"Engine" in Packard Special Data.*

OIL PAN REMOVAL: See *"Oiling System in Packard Special Data.*

CYLINDER HEAD REMOVAL & INSTALLATION: See *"Cylinder Head & Manifolds" in Packard Special Data.*

PISTONS

Aluminum alloy, cam ground, Autothermic flat head, slipper skirt, tin plated.
Weight—22.293 ozs. (Series 5540), 24.763 ozs. (Others).
Removal—Pistons and rods removed from above.
Clearance—.001-.0015" at bottom of skirt.
Fitting New Pistons: Using a .0015 x 1/2" feeler gauge placed against side of cylinder wall, insert piston without rings, in an inverted position in cylinder bore. Push piston down until bottom of skirt is slightly below top of cylinder block and piston pin bore is parallel to crankshaft. Pull to withdraw feeler should be 6-11 lbs.
Installing Pistons: Install with "F" cast in piston strut, and notch in piston head, toward front of engine. *See Rod Installation below.*
Replacement Pistons: *Std. size, .010", .020", .030"* oversize.

PISTON PINS

Floating type retained by lock ring at each end. Split type bushing used at upper end of rod. Pin is offset .0625" toward thrust side.
Pin Fit in Piston—(Clearance) .0000"-.0002". Hand push fit with piston heated to 160°F.
Pin Fit in Connecting Rod—(Clearance) .0000"-.0004". With pin held in a vise and connecting rod horizontal, rod should fall slowly of its own weight.
Replacement Pins: Std. size, .003", .006" oversize.
Piston Pin Bushing (In Connecting Rod) Installation: *See "Piston Pins" in Packard Special Data.*

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.	.078"	①	.0015-.005"
Oil	.186"	②	.0015-.005"

①—.015" (5540 Series); .019" (Other Series).
②—.015" (5540 Series); .018" (Other Series).
Replacement Rings: Std. size, .010", .020", .030" oversize.
Installing Rings: Install upper compression ring and oil ring with gap toward camshaft side of engine. Install lower compression ring with gap toward opposite side from camshaft. All gaps should be midway between pin bosses. Grooves on inner diameter of compression rings should be toward top of engine.

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CONNECTING RODS

Length–6-25/32". (center-to-center). **Weight**–26.688 ozs.
Crankpin Journal Diameter–2.250".
Lower Bearing–Replaceable precision type.
Clearance–.0005-.0025". **Sideplay**–.003-.011".
Replacement Bearings: Std. size, .001", .002", .020" Undersize.
Installing Rods: Install odd numbered rods in left bank and even numbered rods in right bank, with numbers on rods facing down and away from block and milled oil groove in connecting rod cap upward and toward crankshaft.

CRANKSHAFT

Journal Diameter–2.4990". Five bearings.
Bearings–Precision type. The four front crankshaft bearings are interchangeable.
Clearance–.0005-.0025".
Replacement Bearings: Std. size, .001", .002", .020" undersize.
End Thrust: Taken by No. 5 (rear) main bearing.
Endplay–.0035-.0085".
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Packard Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Packard Special Data.*
Crankshaft Removal & Installation (With Engine in Car): *See "Crankshaft & Main Bearings" in Packard Special Data.*
Vibration Dampener: *See "Vibration Dampener" in Packard Special Data.*

CAMSHAFT

Bearings–Five, steel-backed babbitt lined precision bearings.
Clearance–.0005-.0045".
End Thrust: Taken by thrust plate behind camshaft sprocket. **Endplay**–.004-.006".
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Packard Special Data.*
Timing Chain: Morse. **Width**–1". **Pitch**–.375". **Length**–64 links.
Engine Front Cover Removal: *See "Engine Front Cover" in Packard Special Data.*
Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Packard Special Data.*
Camshaft Setting: Both sprockets marked "O". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers.
Timing Chain & Sprocket Removal: *See "Timing Chain" in Packard Special Data.*

VALVES

Tappet Clearance: Hydraulic lifters. Adjustment not required unless cylinder head removed or valve lifters replaced. *See "Valve Tappet Adjustment" in Packard Special Data.*

Valve	Head Diam.	Stem Diam.	Length
Intake	1.937"	.3725"	5.712"
Exhaust	1.687"	.3715"	5.690"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.374"	.001-.002"
Exhaust	45°	.374"	.002-.003"

Valve Seat Width–3/64" (Intake), 5/64" (Exhaust).
Valve Springs: Single springs used. Install springs with the two closely wound coils against cylinder head.

Valve Spring Specifications

Valve	Spring Pressure	Spring Length
Closed	78-86 lbs.	1-3/4"
Open	158-172 lbs.	1-3/8"

Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance excessive. Valves are furnished with .003", .010", .020", .030" oversize stems.
Checking Valve Stem Clearance and Reaming Guides for Oversize Valve Stems: See "Valve System" in *Packard Special Data.*
Valve Lifters: Hydraulic type.
Hydraulic Lifter Removal, Overhaul & Testing–*See "Valve System" in Packard Special Data.*
Rocker Arm Assembly: *See "Valve System" in Packard Special Data.*
►*ROCKER ARM SHAFT PRODUCTION CHANGES (For Improved Oil Control): See "Valve System" in Packard Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves–Open 14° BTDC. Close 56° ALDC.
Exhaust Valves–Open 52° BLDC. Close 18° ATDC.
Valve Timing Check: Rotate engine to bring No. 6 piston up on compression stroke. Note mark on vibration dampener and stop turning engine just before the mark reaches the 15° timing indicator mark on engine front cover. With valve cover removed (left bank), attach a dial indicator to flange on cylinder head at No. 1 cylinder, left front bank, and rest point of indicator on milled surface end of intake rocker arm. With valve clearance lash at zero, continue to rotate engine until mark on dampener is at 14° BTDC timing mark. At this point the exhaust valve on No. 1 cylinder will be closing and the intake valve should just begin to open. *NOTE*–To compensate for any leakdown in in the hydraulic tappet, a feeler gauge can be used to maintain zero lash. *If timing chain deflection is greater than the maximum of 1/2", a variation will be noted in valve timing.*

OILING SYSTEM

***Crankcase Capacity:** 5 qts. (refill).*
Normal Oil Pressure: 45 lbs. at 2800 RPM.
Pressure Regulator Valve–In pump body. Not adjustable.
Pressure Relief Valve Spring–3-19/64" (free length). Compressed to 1-3/8", pressure should be 9–9-1/2 lbs.
Oil Pressure Indicator (Clipper Series)–Red light on instrument panel. Lighted when oil pressure low.
Oil Pressure Switch Engine Unit (Clipper Series)–K-S No. 47195.
Oil Pressure Gauge (Packard Series): King-Seeley "CV" (Constant Voltage) electric type with Gauge Voltage Regulator.
Dash Unit–K-S No. 46889.
Engine Unit–K-S No. 44000.
See "Oil Pressure Gauges" in Miscellaneous Section.
Oil Pump: Gear type. Located on rear main bearing cap and driven through distributor drive and camshaft gears. A vacuum pump is attached to oil pump cover plate and is driven by oil pump idler gear.
Oil Pump Removal, Overhaul & Installation–*See "Oiling System" in Packard Special Data.*
Vacuum Pump: Attached to engine oil pump. Serviced only as an assembly. Remove and install in same manner as oil pump. *See "Oiling System" in Packard Special Data.*
Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve tappet cover.

COOLING

Water Capacity: 26 qts. Additional pint for each heater.
Pressure Valve: Radiator filler cap. 12 lbs. type.
Thermostat: Capsule type. Starts to open 167-173°F (Std.), 177-182°F (High Std.).
Water Pump: Packless type with sealed ball bearing.
See "Packard" in Water Pump Section.
Temperature Gauge: King-Seeley "CV" (Constant Voltage) electric type with Gauge Voltage Regulator.
Dash Unit–K-S No. 46927 (Clipper), 46892 (Other Series).
Engine Unit–K-S No. 44235 (All Series).
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 11CF, Assembly No. 268349 (Clipper Series with Synchro-mesh Transmission).
See "Long Clutches" in Clutch Section.
Clutch Disc–Long No. 284339, 10-1/2" Diam. (Exc. Clipper Custom). Long No. 284330 11" Diam. (Clipper Custom).
Pedal Adjustment: 1-1/4–1-1/2" free travel.
Removal: Remove transmission (see below). Remove flywheel lower housing, and clutch release bearing. Mark flywheel and clutch cover. Remove clutch cover to flywheel bolts evenly to relieve tension.

SYNCHRO-MESH TRANSMISSION

Own. *See "Packard Synchro-mesh" in Transmission Section.*
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
Removal: Disconnect speedometer cable, gear shift rods from levers on transmission case, and propeller shaft at rear universal joint. Remove propeller shaft completely by slipping front universal joint flange off the transmission main shaft. *(CAUTION*–Wire or tape the two bearings of the universal joint together to prevent them from falling off). Support rear of engine with a jack. Remove rear engine support mounting and support crossmember. Remove capscrews attaching transmission to flywheel housing. Using two pilots in bolt holes, slip transmission to rear so that clutch release bearing pull back spring may be unhooked. Remove transmission.

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OVERDRIVE

Warner Type AS8-R11. Planetary gear type with solenoid operation and accelerator pedal controlled kickdown. Overdrive lockout switch not used.
See "Warner R11" Overdrive in Transmission Section.
Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after disconnecting overdrive control cable from lever on right side of overdrive case, electric leads at governor and solenoid. Remove governor, then remove solenoid.

ULTRAMATIC DRIVE

Own. "Twin Ultramatic", Torque converter (with hydraulically operated direct speed clutch) and hydraulically operated planetary unit with manual control.
See "Twin Ultramatic Transmission" in Transmission Section.
►*TESTING & TROUBLE SHOOTING: See "Twin Ultramatic Transmission" in Transmission Section.*
Lubrication: Check fluid level every 1000 miles, drain and refill every 25,000 miles.
Checking Fluid Level–*(CAUTION–Fluid level must be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute . to completely fill the transmission).* Run engine at low idle speed while fluid level is being checked, using the dipstick located in engine compartment. Add fluid through dipstick tube as required to bring level to "Full" mark on dipstick.
*NOTE–*If fluid level doubtful due to bent or distorted dipstick tube, check actual fluid level in transmission as follows: Place car on level floor and allow engine to run at idle speed for five minutes in "N" (neutral). Place a pan under rear of transmission and remove plug in rear of transmission case. If no oil runs out of opening, add oil until it begins to run out, install plug, then ADD ONE QT. If oil does run out when plug removed at rear of transmission, allow to drain to level of hole, then ADD ONE QT.
Capacity–Approximately 11 qts. Use only Packard Ultramatic Drive or any Type "A" Automatic Transmission Fluid which has an AQ-ATF number embossed on container.
►*OTHER TWIN ULTRAMATIC SERVICE DATA: See "Twin Ultramatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer (Std. & Overdrive Cars), Universal Products (Ultramatic Drive Cars).

►*CAUTION:* Rear universal joint flange nut controls rear axle pinion bearing preload which **must be adjusted** whenever nut is loosened. *See "Packard Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating hypoid gear type with Hotchkiss Drive.
See "Packard Hypoid" in Rear Axle Section.

Axle Ratios

Model	Std.	O.D. Cars	Ultramatic
5522	3.9-1	3.9-1	3.07-1
5542, 47	3.9-1	3.9-1	3.23-1
5562, 67	3.9-1	3.9-1	3.23-1
5582, 87, 88			①3.07-1

①–3.23-1 & 3.54-1 optional ratios.
Backlash–.004-.008".
Carrier Removal: Remove axle shafts (see Axle Shaft Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with a 2 x 4" inserted inside frame crossmember. Drain differential, replace drain plug. Clean off housing, take off carrier mounting nuts, lift carrier assembly out.
Axle Shaft Removal: Remove wheel and brake drum (use screw type puller J-4153 (do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner seal). Use Tool J-943-B to remove inner seal.
Wheel Bearing Adjustment: Endplay controlled by shims between flange end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel if .050" or under; at both wheels if over .050" to secure .004-.007" endplay.
Endplay–.004-.007".

SHOCK ABSORBERS

Delco or Monroe. Direct acting hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. Coil springs (Series 5540), "Torsion Level Suspension" (Series 5560 & 5580).
See "Packard" in Front Suspension Section.
Kingpin Inclination– 5°50'.
Caster–Neg. 1° ± 1/2°.
Camber–*0° (Pos. 3/4° to Neg. 1/4° range).*
Toe-In–0" (plus 1/16", minus 0").

STEERING

Manual: Gemmer. Worm and three tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering (Series 5540): Monroe Linkage Type.
See "Monroe Linkage Type" in Steering Section.
Power Steering (Series 5560 & 5580): Bendix Linkage type.
See "Bendix Linkage Type" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Bendix Hydraulic. Single Anchor (without eccentric). Hand lever applies rear wheel service brakes.
rear wheel service brakes.
See "Bendix Hydraulic" in Brake Section.
Drum Diameter–11" (Series 5540 & 5560). 12" (Series 5580).

Lining Width	Front	Rear
5540, 5560	2-1/2"	2"
5580	2-1/4"	2"

Lining Thickness–3/16" (all series).

Lining Length	① Primary	① Secondary
5540, 5560	9-5/16"	12"
5580	11-1/2"	13"

① –Front & Rear wheels.
Clearance–.015" at both ends of secondary shoe with primary shoe forced out against drum. Turn brake adjusting screw until wheel can just be turned by hand, then back off screw until wheel turns free.

Standard Master Cylinder: On bracket on left side of frame near transmission support.
Checking Fluid–Access hole in front floor pan at left corner of drivers seat.
Removal–Remove brake lines from master cylinder. Disconnect pushrod at pedal. Remove gearshift selector linkage bellcrank from mounting bolt stud. Remove mounting bolts and master cylinder.

Power Brakes: Bendix Easamatic. Combination power cylinder and hydraulic master cylinder.
See "Bendix Power Unit" in Brake Section.
Checking Fluid–Check level every 1000 miles. Add fluid to bring level to full mark.
Removal of Power Unit–Disconnect hose line and electrical wiring from power unit (raise hydraulic line above level of junction assembly to prevent fluid leakage). Disconnect and remove brake and accelerator pedal. Remove steering column grommet retainers, slide grommet out of way. Remove carpet retainers and fold carpet back. Remove cover plate screws, then remove power brake and cover as an assembly, take out mounting screws and remove power brake from cover.

MISC. MECHANICAL

Windshield Wipers: Vacuum type, cable operated. *See "Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: Frigidaire. *See "Frigidaire Air Conditioning" in Miscellaneous Section.*
Power Window Regulators: Electric type with individual motors in each window. *See "Electric Window Regulators" in Miscellaneous Section.*
Power Seat Controls: Individual electric motors for horizontal and vertical seat adjustment. *See "Electric Seat Controls" in Miscellaneous Section.*
Power Top Controls: Hydro-Lectric type. *See "Hydro-Lectric Top Controls" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-54 M DELS

	Ft.Lbs.
Spark Plugs	30-32
Cylinder Head Cap Screws	65-70
Main Bearing Cap Screws	80-85
Rear Main Oil Seal Screws	5-10
Connecting Rod Nuts	45-50
Crankshaft Nut	108
Flywheel Nuts	55-60
Oil Pump Body Screws	20-25

1955 6 CYL. MODELS

	Ft. Lbs.
Cylinder Head	70
Manifolds	20
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Crankshaft Pulley	135
Con Rod Caps	45
Engine Front Cover	15
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	25
Oil Filter	25
Clutch Housing	30
Transmission Mounting	45
Transmission Companion Flange	150

V8 MODELS

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	125
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Single Shaft)	30
Rocker Arm Cover (Single Rocker Shaft)	4.2
Engine Front Cover	15
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	30
Transmission Companion Flange	150

ENGINE

6 CYL. MODELS

ENGINE ASSEMBLY REMOVAL: Engine, clutch, and transmission assembly can be removed from car as an assembly, as follows: Remove hood and radiator core. Disconnect propeller shaft at transmission. Disconnect transmission controls at transmission (wires to overdrive controls), and speedometer cable. Disconnect clutch linkage at clutch housing. Disconnect fuel pump flexible line at pump, throttle and choke controls at carburetor, heat indicator tube at head. Disconnect wires from generator and starter, coil and distributor. Disconnect exhaust pipe at manifold. Disconnect oil gauge tube at flexible line. Remove crankcase breather pipe, and the front and rear engine support bolts. Disconnect hand brake linkage. Remove carburetor air cleaner. Connect hoist to engine and lift assembly out of chassis.

V8 MODELS

ENGINE ASSEMBLY REMOVAL: Drain cooling system (both cylinder bank drain cocks and radiator). Disconnect propeller shaft at transmission and disconnect wires and linkage at transmission and clutch. Remove exhaust pipes, hood, and battery. Disconnect the usual items under hood such as fuel lines, radiator hoses, wires, etc. If using engine lifting fixture C-3162, remove carburetor assembly after disconnecting integral choke tube, fuel lines as listed above.. Remove radiator shroud (if so equipped). Attach lifting fixture to carburetor flange studs on intake manifold, and hook chain hoist to eyebolt. Place a jack under transmission to relieve weight. Then remove engine rear support mounting bolts and cross-member. Then remove engine front support mounting bolts. Lower jack at transmission and remove from under car. Raise engine and at the same time, work engine out of chassis toward the left front fender.

ENGINE MOUNTINGS

1955 MODELS

►***HARSH ENGINE VIBRATION CORRECTION (Due to Short Insulator Spacer):*** To obtain proper clearance of engine support, install washer 1⅛" diameter, 1/16-3/32" thick with ½" hole, Part No. 446221, between lower end of insulator spacer assembly and large washer. A washer should be installed on both right and left engine rear mounts. Rubber washer on left engine mount should be installed above extra washer (if car model so equipped). Make sure that correct type rubber insulator is used. Use of harder insulator will cause transfer of engine vibration to car.

ENGINE MOUNTINGS: On some models, a rubber insulating washer 3/32" thick is provided for left mount only, and should be installed between frame and lower flat washer. This washer eliminates transfer of noise on rapid acceleration. Washer must not be compressed between frame and flat washer. *CAUTION*—Do not over-tighten rear engine mounting bolts. Over-tightening these bolts may collapse insulator spacer. ***For "Harsh Engine Vibration Correction (Due to Short Insulator Spacer)" see above.***

OIL PAN

1946-53 MODELS

OIL PAN REMOVAL: Drain oil, replace drain plug. Remove clutch housing underpan to avoid damaging oil pan gaskets on underpan dust shield. Remove oil level indicator, drop oil pan to tie-rod. Pan can then be removed by reaching in and raising oil strainer to clear baffle while sliding pan out to rear.

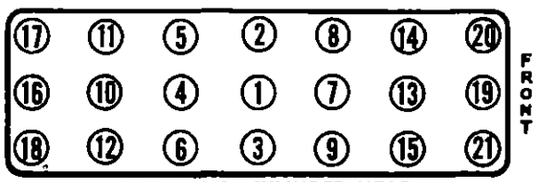
Installation—When installing new gaskets, end gaskets should extend ¼" to ⅛" above level of oil pan (these ends must not be cut off). Side gaskets installed with ends resting on top of protruding end gaskets. Gaskets will be compressed into place when oil pan screws tightened.

CYLINDER HEAD & MANIFOLD

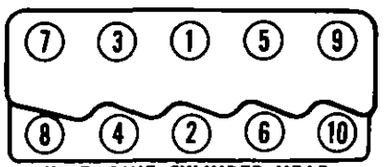
ALL M DELS

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

Tightening Torque—See Tightening (Torque Wrench) Specifications above.



6 CYL. ENG. CYLINDER HEAD



V8 ENGINE CYLINDER HEAD

6 CYL. M DELS

CYLINDER HEAD INSTALLATION: When installing cylinder head, use new gasket. Coat threads of capscrews with sealer except the three screws that lead into intake manifold ports. If sealer used on these capscrews, there is a possibility that it will be drawn into carburetor or valves. Use torque indicating wrench to tighten cylinder head bolt nuts and capscrews. Tighten in sequence shown in diagram.

6 CYL. MODELS

INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN. Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install assembled manifolds. While holding manifold and gaskets evenly against engine block, install long

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center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer). Install remaining washer and nuts. *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 15-20 ft. lbs. torque. Tighten the four bolts holding exhaust manifold to intake manifold.

V8 MODELS

CYLINDER HEAD INSTALLATION (Single Rocker Shaft): Before cylinder head removed, remove rocker shaft assembly. Slide out push rods and place them in sequence in a suitable rack in order that each push rod can be reinstalled in its original position. When installing cylinder head, use new gaskets. Make sure all holes are punched out. Be certain cylinder head enters both dowel guide pins in cylinder block. Tighten cylinder head bolts in sequence shown in diagram. Slide push rods in position. Lower rocker shaft assembly down on two locating studs. Install all washers, nuts and bolts. *CAUTION*—Extreme caution must be exercised when tightening rocker shaft bolts and nuts so that hydraulic tappets have time to bleed down to their operating length. If tappets are forced down too rapidly, damage to push rods, tappet bodies or rocker arms will result.

MANIFOLD HEAT CONTROL

V8 MODELS

MANIFOLD HEAT CONTROL VALVE: Attached to right cylinder block exhaust manifold, and can be removed and repaired without removing manifold.

Removal: Remove the two exhaust manifold flange bolts and nuts and apply pressure to exhaust pipe to separate and remove the heat control valve. Remove counter-weight tightening bolt and nut and remove counter-weight. Remove thermostatic spring, spacer washer, then remove horseshoe lock and remove the anti-rattle spring.

▷*CAUTION—Do not operate the engine without heat control valve in the manifold.*

Installation: Install the anti-rattle spring and horseshoe lock, and secure lock to shaft by squeezing end of horseshoe lock together. Check valve and shaft for free movement. Install spacer washer and place inner tongue of coil spring in shaft slot with outer tongue of spring toward forward side of valve and in a down position. Install bumpers on each side of counter-weight, and insert the counter-weight shaft key into counter-weight, securing it in position with the lock bolt. Hold heat control valve in the open position, and move the outer end of thermostatic spring around and up ¾ of a turn, hooking end of spring under forward stop screw. Hold valve in closed position and install counter-weight assembly on shaft. Center butterfly valve in valve body and line up bumpers to clear stop pin, then press counter-weight all the way onto the shaft, with the anti-rattle spring adjusted so that when the valve shaft is pulled up against anti-rattle spring there will be about 1/16" tensional drag on the shaft. Install manifold heat control valve assembly on exhaust manifold. Check assembly for free operation.

ORIGINAL BORE & PISTONS

6 CYL. MODELS

ORIGINAL PISTON & CYLINDER BORE SIZES: Original production (new engine) piston and bore sizes indicated by letter located as follows:

Piston Size—Letter stamped on piston head.

Bore Size—Letter stamped on distributor side of engine at top of block. Do not confuse this letter with 'Special Standard' size letter indicating oversize bore.

"Special Standard" Size Bore—Letter "A" or "AB" following engine number indicates engine has .020" oversize standard cylinder bore.

NOTE—When measuring piston diameter take reading at right angles to pin holes and ¾" from bottom of skirt.

PISTONS

1946-53 MODELS

REPLACEMENT PISTONS: Finished (Aluminum Alloy) Pistons—Furnished in standard size and .005", .020", .030", .040", .060" oversize, for all models.

Semi-Finished (Aluminum Alloy) Pistons—These pistons furnished in two sizes (1) For cylinder bores from standard to .023" oversize. (2) For cylinder bores .025" to .060" oversize. Pistons are finished (head & ring grooves) except for skirt. Pistons must be finished on cam grinding equipment. Do not finish pistons circular. Skirt is elliptical (.010"-.014") with smaller diameter across pin bosses than across thrust faces, and piston is tapered (.0005-.0015"), with smaller diameter at top of piston.

IMPORTANT—Use same type piston when replacing partial set. All pistons in engine must be of same type.

PISTON RINGS

1946-53 MODELS

REPLACEMENT PISTON RINGS: Three types of piston ring sets furnished by car manufacturer for service replacement as follows:

Mopar Oil Master Ring Sets—These rings designed to be installed in cylinders with walls tapered .005" to .030" when cylinder walls not to be reconditioned. No. 4 oil ring is special 4-piece type (*upper and lower rails with stepped segment* between rails and slotted expander). Mopar Oil Master Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Oil Saver Ring Sets—These ring sets are designed to be installed in cylinders with .005" or less taper, or where cylinder walls have been reconditioned. This set consists of the same rings as used in Oil Master Set except that No. 3 & No. 4 rings are alike (slotted oil ring with slotted expander). Mopar Oil Saver Ring Sets are furnished with either a regular top ring or a chromed top ring.

Mopar Chrome Master Ring Sets—These ring sets are designed to be installed in cylinders with walls tapered .005-.003" when cylinder walls are not to be reconditioned. Top and bottom rings are chromed.

Oil Ring Set Sizes—All piston ring sets are available in the following sizes: **Standard** (for standard to .009" oversize cylinders); **.010"** (for .010" to .019" oversize cylinders); **.020"** (for .020" to .029" oversize cylinders); **.030"** (for .030" to .039" oversize cylinders); **.040"** (for .040" to .049" oversize cylinders); **.050"** (for .050" to .060" oversize cylinders).

ORIGINAL BEARING SIZES

1946-53 MODELS

ENGINE NUMBER LETTERS ('SPECIAL STANDARD' BORE & BEARING SIZES): Letters used with engine number (not in circular pad) denote following 'special standard' sizes 'A'—.020" larger standard cylinder bore. 'B'—.010" smaller standard main and connecting rod bearings. 'AB'—Cylinder bore, main and connecting rod bearings 'special standard'.

▷**.001" THICKER WALL MAIN & CONNECTING ROD BEARINGS** *(One or more journals machined undersize)*—Inspect "hollowed out" section of crankshaft center counter-balance for stamped marks indicating main and connecting rod journals which are machined .001" undersize. Stamped marks indicate position of undersize journals in the following manner: "R" indicates connecting rod journal. "M" indicates main bearing journal. Number following letter indicates main or connecting rod journal number (counting from front of engine).

CONNECTING ROD & BEARINGS

1946-53 MODELS

▷*CAUTION—See ORIGINAL BEARING SIZES for markings indicating engines equipped with bearings other than standard sizes.*

CONNECTING ROD BEARINGS: Removal & Installation—Bearing shells can be removed after taking off bearing caps. When installing bearing shells, oil hole in rod and bearing must be aligned, and ear on bearing halves must be fitted in notch in rod and cap.

Fitting Bearings—To check bearing clearance, place oiled piece of feeler stock .0015" thick, ½" wide, ¾" long between bearing and crankshaft. Tighten bearing cap nuts. Bearing clearance is correct when slight drag is felt when turning crankshaft by hand. If no drag felt, and crankshaft out-of-round and taper not over .001", install proper undersize bearing listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", .010", .012" undersize. Install .001" or .002" undersize bearings on crankshafts which show slight wear, .010" undersize for 'Special Standard' .010" crankshafts (see Engine Lettering 'Special Standard' Bore & Bearing Sizes Note above), .012" undersize bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

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CRANKSHAFT & MAIN BEARINGS

►*1953 HY-DRIVE ENGINE REAR BEARING CHANGE:* New bearing (Service Pkg. No. 1450682) used in production and furnished for use in **Hy-Drive engines only.** Bearing upper half should be installed with oil groove toward **front** of engine, lower bearing oil groove should correspond (drain back groove and hole omitted, two shallow drain grooves on thrust face extend across entire length of thrust surface).

1946-53 MODELS

►***CAUTION—See ORIGINAL BEARING SIZES for markings indicating production engines equipped with bearings other than standard size.***

REPLACEMENT MAIN BEARING CAPS: Furnished for service replacement where original cap damaged or broken. These replacement caps same as original except for stud holes being 1/64" larger, and bearing cap length which is 1/16" shorter.

Fitting—Replacement caps must be fitted to engine by filing or shimming to obtain proper bearing clearance. This is only necessary when replacement cap originally fitted to engine (cap should not be filed or shimmed to compensate for bearing wear). *CAUTION*—When new bearings installed, always use complete bearing (do not use new bearing half with an old half). Upper and lower halves for all bearings are alike.

Fitting Bearings—To check bearing clearance, place a piece of oiled feeler stock .0015" thick, ½" wide, ¾" long between bearing and crankshaft. Tighten bearing cap nuts or capscrews. Bearing clearance is correct when slight drag is felt when crankshaft turned by hand. If no drag felt, and crankshaft journal out-of-round and taper not over .001", install proper undersize bearings listed below.

Undersize Bearings—Finished bearing shells furnished .001", .002", 010", .012" undersize. Install .001" or .002" undersize bearings on standard crankshaft which shows slight wear. .010" for 'Special Standard' .010" crankshaft (see Engine Lettering 'Special Standard' Bore & Bearing Size Note above), .012" undersize bearings for 'Special Standard' .010" crankshafts which show slight wear. Bearing size correct when proper clearance obtained (see Fitting Bearings).

6 CYL. MODELS

CRANKSHAFT OIL SEALS: Car manufacturer recommends that new oil seals be installed when chain cover or rear main bearing cap removed.

Front Oil Seal—Oil seal located in timing chain cover. Consists of spring backed composition seal in stamped steel housing pressed into chain case cover with composition gasket installed between seal and cover. To install, proceed as follows: Insert new composition gasket in chain case cover, install new seal in place with drift or similar tool slightly larger than seal (seal press fit in cover). Center seal on crankshaft when installing chain case cover as follows: Install chain case cover on engine with cover screws tightened just enough to hold cover in place, install centering tool C-522 on end of crankshaft and hold it in place by tightening crankshaft starting jaw nut finger tight, tighten chain case cover screws and as cover is being compressed, tighten crankshaft jaw nut so as to maintain slight tension between centering tool and seal. Remove tool after chain case cover screws secured. Tighten starter jaw nut to 198 ft. lbs.

1946-52 6 CYL. MODELS

Rear Main Bearing Seal—Rope type seal used, and seal surface on crankshaft is knurled. ***(CAUTION—Rope type seal is not interchangeable with later type neoprene seal).*** It is not necessary to replace upper half of seal unless inspection indicates leakage or wear. To replace lower seal, remove oil pan, clutch housing pan, and rear main bearing cap. Use care to prevent damage to cylinder block, bearing surface, or upper half of seal. Install new lower seal by applying a coating of sealing compound to both sides of lower retainer gasket. Position gasket so that edges of gasket and tabs on cap gasket butt together. Place retainer in position and partially tighten retainer screws. Then tighten bearing cap in position, properly locating seal in position in relation to crankshaft, and fully tighten main bearing cap bolts to 80-85 ft. lbs. torque.

►**Upper Seal Note—If** it is necessary to replace upper seal, remove flywheel, upper seal retainer capscrews, and then upper retainer.

1953-55 6 CYL. MODELS

Rear Main Bearing Seal—Neoprene type seal. ***(CAUTION—Neoprene type seal is not interchangeable with earlier rope type seal).*** When replacing seal, both upper and lower halves should be replaced. Remove oil pan, clutch housing pan, and rear main bearing cap. Remove seal from cap, and then remove upper seal by pushing one corner of seal until opposite end protrudes about ⅜" from block. Pull out with long-nosed pliers. Install new seal in lower half by carefully inserting lower half of seal into bearing cap. Before installing upper seal, coat seal contacting lip with grease. Insert one end of seal into block and push it into place with a rolling motion. Install main bearing cap, making certain that tabs of cap gasket fit in cap seal channel. Tighten cap bolts to 80-85 ft. lbs.

►***CRANKSHAFT CAUTION—Do not use a crankshaft with a knurled seal surface with a neoprene type oil seal.***

V8 MODELS

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos. With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap. Tap seal down in position with Tool C-3131 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine.

ENGINE FRONT COVER

1955 6 CYL. MODELS

FRONT OIL SEAL: To replace, drive old seal out with suitable drift. When installing seal, make sure seal is driven into place evenly to insure a tight fit. Use a new gasket and position cover in place.

FRONT COVER INSTALLATION: Use new gasket and position cover in place. Install screws but do not tighten. Install pulley and hub on crankshaft far enough so that seal can be evenly positioned on crankshaft. Tighten two screws on right side lightly. Then tighten remainder of screws in like manner. Repeat tightening procedure and torque screws to 15 ft. lbs.

V8 MODELS

ENGINE FRONT COVER (Single Rocker Shaft Engines): Proceed as follows:

Removal: Drain and remove radiator. Disengage fan belt and remove generator. Install Tool C-3033 over pulley and force pulley off end of crankshaft. Support engine with suitable chain hoist fastened to intake manifold. Remove motor support "U" bolts and nuts. Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads. Lift water pump housing, water pump, front motor support and insulator up and away from front of engine. Discard gaskets. Loosen bolts that hold oil pan to cylinder block. Drop pan slightly to clear chain case cover. Disconnect inlet and outlet fuel lines at fuel pump. Remove bolts that hold pump to chain case cover. Slide pump out and away from engine. Discard gasket. Remove bolts and washers from cover. Disengage cover from locating dowels, remove from engine. Discard gasket.

Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs. Install new gasket and position cover locating dowels. Coat screws with suitable sealer and tighten to 15 ft. lbs. *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil.

FRONT OIL SEAL: Remove old seal by driving it out with Tool C-3050. Place new seal on the chain case cover with the projecting flange facing the inside of the cover. Insert seal gasket and drive new seal in place with Tool C-3051.

CAMSHAFT & BEARINGS

6 CYL. MODELS

CAMSHAFT REMOVAL: Remove Front End Assembly as a unit. Remove cylinder head, fuel pump, oil pump, valve tappet cover plates, crankshaft pulley, front motor support (with front of engine jacked up), timing chain cover, camshaft sprocket and timing chain. If valves and valve springs are not to be removed, prop valves up by inserting wooden wedges at opposite sides under valve head. Raise tappets and hold in this position (use spring type clothes pins or similar tool to hold tappets up). Withdraw camshaft (rotate shaft to clear any obstructions).

V8 MODELS

CAMSHAFT REMOVAL: Drain radiator, remove radiator and crankshaft pulley. Support engine with chain hoist attached to intake manifold. Remove engine support U-bolts. Remove fan, water pump, and water pump housing assembly. Loosen oil pan

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bolts sufficiently in order that oil pan clears chain case cover, camshaft gear hub nut, fuel pump eccentric and dowel. Then remove camshaft gear and timing chain. Support engine at front of oil pan. Then remove intake manifold, distributor, distributor drive gear, tappet chamber cover, rocker cover, rocker shaft assemblies and push rods. Use Tool C-3158 to pull out hydraulic tappets. If varnish build-up is excessive, use puller part of Tool C-3158 and work tappet out of bore. Remove four camshaft thrust bolts, then remove camshaft.

VALVE SYSTEM

VALVE SEAT INSERTS

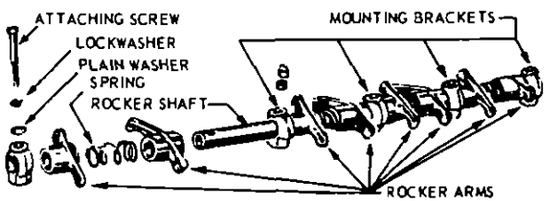
6 CYL. MODELS

EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished .010" oversize. Use Tool C-732 to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be from .002-.004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with Installing Tool C-767.

R CKER ARMS

V8 MODELS

ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft): Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down. Slide an intake rocker arm over shaft and down against bracket, with diagonal slant of arm close to bracket. Then slide a spacer spring over shaft and down against intake rocker arm. Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket. Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed. Slide push rods into push rod holes. Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head. Install flatwashers and nuts.

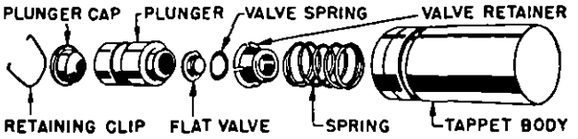


V8 ROCKER ARM ASSEMBLY

HYDRAULIC VALVE LIFTER

V8 MODELS

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type) Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body.. Oil is introduced to this unit through hole in side of lifter plunger.



V8 ONE-PIECE VALVE LIFTER

Removal: Drain cooling system to a point below level of intake manifold, and remove intake manifold. (CAUTION—cover intake port in cylinder head to avoid the entry of dirt). Remove crankcase ventilator pipe and valve chamber cover. Install rocker arm and valve compressor tool C-3024 over rocker arm so heel of tool rests on the valve stem side. Make certain that valve is seated and that valve lifter is on low side of camshaft lobe. (See "Low Point of Camshaft Lobe," following). Using handle of tool C-3024 for leverage, compress valve spring sufficiently to raise rocker arm above push rod end. While holding rocker arm in this position, slide rocker arm to one side along tube and remove push rod. Insert hooked portion of tool C-3158 into hole in lifter body (this portion of tool can be used to remove lifter without varnish build-up on lower end of lifter). Remove lifter from bore. If lifter sticks in bore, proceed as follows: Slide puller portion of tool C-3158 through cylinder head push rod holes and seat firmly in cap in lifter. Insert puller pin through lifter body and tool shaft in holes provided. Grasp tool handle and pull lifter out of bore with a twisting motion. As lifter clears bore, withdraw puller pin and remove puller. Remove lifter from chamber.

Disassembly: ***(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)*** Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body. Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting. Check to see that valve exerts a slight pressure on valve spring to insure valve seating. Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene. ***(CAUTION***—Container and kerosene must be absolutely clean). Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing. This will prevent possible scoring of lifter plunger when engine is first started.

Reassembly: Reverse disassembly procedure as noted above.

V8 MODELS

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos. 1 and 6 cylinders. Set timing mark "DC" located on crankshaft pulley to pointer. With rotor at No. 1 firing position, the following lifters will be on the low side of the cam lobe: No. 2 intake and exhaust, No. 4 exhaust, No. 7 intake, No. 8 intake and exhaust ***(NOTE***—To remove No. 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed). With rotor at No. 6 position, following lifters will be on low side of cam lobe: No. 3 intake and exhaust, No. 4 intake, No. 5 intake and exhaust, No. 7 exhaust ***(NOTE***—To remove No. 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed).

OILING SYSTEM

OIL PUMP

6 CYL. MODELS

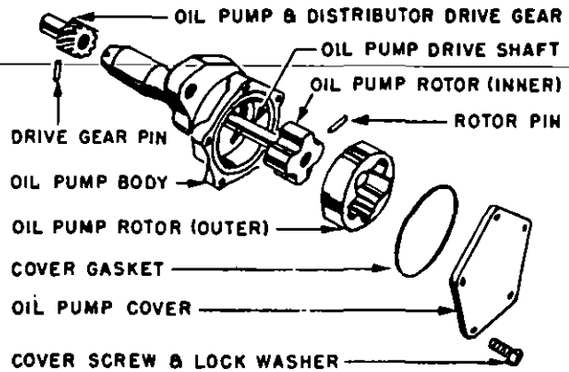
ROTOR TYPE OIL PUMP: Removal—Before removing oil pump, rotate crankshaft and make sure "DC" mark on crankshaft pulley lines up with pointer on timing chain case cover. Do not rotate engine with oil pump removed. Remove the attaching screws and remove pump from engine ***NOTE***—On some models it will be necessary to remove the two upper cover capscrews to obtain sufficient clearance to remove oil pump.

Disassembly & Inspection: Remove the oil pump cover and gasket. Hold hand over cover opening and with pump upside down, turn drive shaft until outer rotor slips out. Drive out the straight pin holding pump drive gear to shaft. Press the shaft out of drive gear and slide shaft and inner rotor assembly out of pump body. Wash all parts and dry with air. Inspect all parts and replace as necessary, then measure clearance between opposite lobe of inner rotor and outer rotor. Clearance should be .010" or less. If clearance is greater, replace both rotors. Measure thickness and diameter of outer rotor. If thickness is .748" or more and diameter is 2.245" or more, rotor is satisfactory. Thickness of inner rotor should be .748" or more. If either rotor is less than these dimensions, replace BOTH rotors. Insert both rotors into pump body and place a straight edge across pump body between bolt holes. Clearance between straight-edge and rotor should be .004" maximum. If greater, replace pump body. Press outer rotor to one side against pump body and measure clearance between rotor and body on op-

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posite side. Maximum clearance should be .008". If greater, replace pump body. Cover should be smooth and flat. If it is scratched or grooved, replace cover.

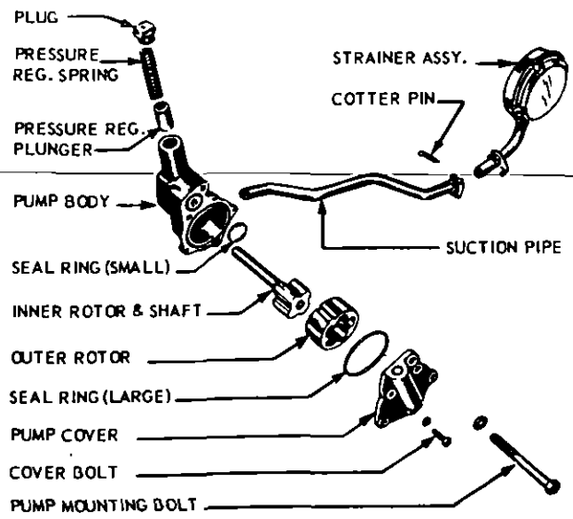


6 CYL. OIL PUMP

Check flatness by placing a straight-edge across inner surface of cover. If it is possible to insert a .001" feeler between cover and straight-edge, replace cover.

Reassembly: Slide the drive shaft and rotor assembly into pump body. Press drive gear on shaft until end play of shaft is from .003" to .010". Press rotor down in body with hand and measure clearance with feeler gauge. Install pin and peen over both ends. If pin holes do not line up, drill a new pin hole through gear and shaft, using a 5/32" drill. Slide outer rotor into place in pump body. Install new cover gasket and install cover and tighten screws evenly.

V8 M DELS



V8 OIL PUMP

ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe. Remove cover bolts and cover. Discard oil seal ring. Remove pump rotor shaft and lift out pump outer rotor. Remove oil pressure relief valve plug and lift out spring and plunger. Wash all parts in a suitable solvent and inspect for damage or excessive wear. Check all pump parts as follows:

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers. If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors.

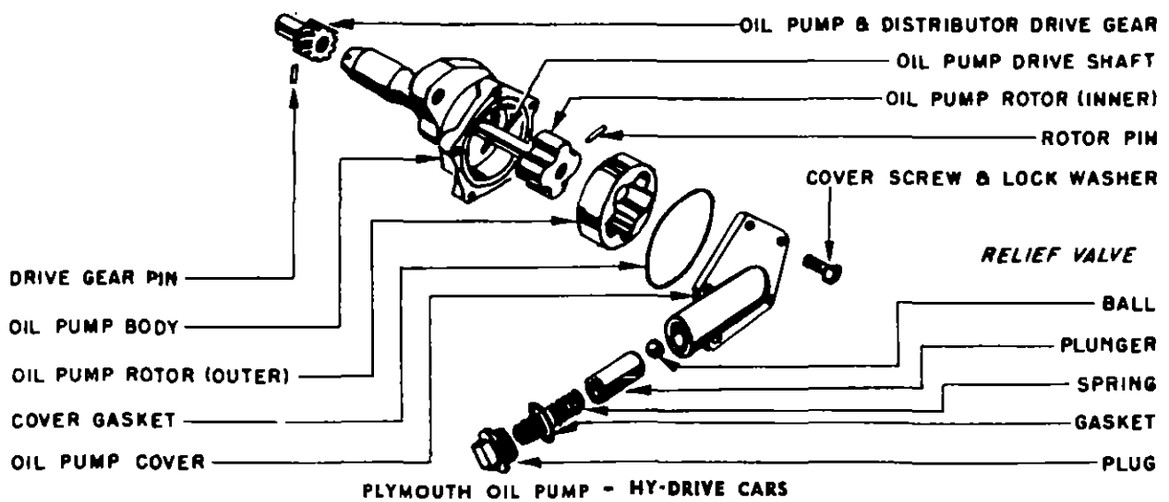
Inner Rotor—Measure thickness of inner rotor with micro-calipers. If thickness measures less than .998", replace both inner and outer rotors.

Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body. Use a feeler gauge and measure clearance between top of rotors and straightedge. If clearance in excess of .004", replace pump body.

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors. If clearance in excess of .010", replace both inner and outer rotors.

Reassembly: Use new oil seal ring between cover and body. Tighten cover bolts to 10-15 ft. lbs. Prime pump and then install new oil seal ring in pump mounting face.

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*



PLYMOUTH OIL PUMP - HY-DRIVE CARS

COOLING SYSTEM

6 CYL. MODELS

WATER DISTRIBUTION TUBE: Replace whenever engine completely overhauled. If tube becomes rusted or corroded, overheating of engine may occur due to failure of water to circulate properly through cylinder block. To replace tube, remove radiator core and water pump. Pull tube out of block with stiff hooked rod. Install tube with slots up and be sure tube is inserted far enough into block so that water pump will seat properly against block.

1946-53 MODELS

RADIATOR CORE REMOVAL: Raise hood, drain cooling system, disconnect hoses. Take out nuts and capscrews at each side, lift core out, tilting top toward rear.

IGNITION NOTES

V8 M DELS

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block.

Installation: Slide new bushing over burnishing end of Tool C-3053. Insert tool and bushing into bore of block. Drive bushing and tool down into position,

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using a soft hammer. As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. ***DO NOT REAM THE BUSHING.***

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

CLUTCH NOTES

1946-48 MODELS

CLUTCH OVER-CENTER SPRING: Service only if linkage disturbed or spring bracket on frame bent. Original setting can be obtained by using gauge C-705 as follows: Check spring bracket on frame and straighten if necessary, install gauge over pivot pins with lower end engaging coil spring bracket on frame (turn pedal rod turnbuckle until gauge fits properly). Then re-set pedal position and free travel as directed on car page.

1949-51 MODELS

CLUTCH-OVER CENTER SPRING: Check position of over-center spring bracket by measuring distance from center of pedal shaft grease fitting to lower edge of stamped hook directly above. This dimension should be ⅜" with pedal in returned position. Adjust spring tension by turning sleeve nut on spring eye-bolt. Correct adjustment for use with 9¼" and 9⅛" diameter clutch is obtained when threads on eye-bolt protrude through sleeve nut about 1/8-3/16". With 10" clutch, end of eye-bolt should be flush with outer face of sleeve nut to 1/16" inside the nut.

REAR AXLE NOTES

1946-52 MODELS

AXLE SHAFT OUTER OIL SEAL: Leather type seal mounted on brake support and bears on axle shaft.

Installation—With brake support removed and old seal driven out of support, new seal can be installed as follows: Soak new seal in thin oil for 30 minutes. Roll leather with smooth bar until pliable. Check seal bearing surface on axle shaft making sure surface is smooth. Install seal on front side of support and stake at three points on outer edge. Install sleeve tool C-745 in seal to protect it from damage during support installation. CAUTION—Lip of seal must not be folded when installing in support.

BRAKE NOTES

1946-55 MODELS

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for .015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015-.020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut.

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed .005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

1954-55 MODELS

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HOOD ADJUSTMENT & HOOD LOCK CONTROL CABLE ADJUSTMENT: *See Plymouth Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: On right front door hinge post.

	Detroit	Evansville	Los Angeles
1946 Deluxe	15,154,001	22,042,001	26,000,001
1947 Deluxe	15,206,936	22,053,040	26,003,589
1948 Deluxe	15,252,279	22,063,370	26,010,840
1946 Spec. Del.	11,496,001	20,165,001	25,000,001
1947 Spec. Del.	11,643,104	20,185,186	25,009,753
1948 Spec. Del.	11,854,386	20,233,168	25,035,586

ENGINE NUMBER: Stamped on boss on left front side of engine block between #1 and #2 cylinders.

TUNE-UP

COMPRESSION: Pressure—120 lbs. at cranking speed.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUGS: Auto-Lite Type A-5. 14 mm. Metric. Gaps—.030" ± .002".

►*RESISTOR TYPE SPARK PLUG NOTE—Auto-Lite No. 4S-140 Resistor type spark plug can be used without changing coil. Adjust distributor points to .020".*

IGNITION: See Coil, Condenser, and Distributor.
Breaker Gap—.020". Limits .018-.022".
Cam Angle or Dwell—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: See Ignition Timing.
Std. Setting—At Top Dead Center.
Timing Mark—'DC' mark on dampener aligned with pointer on chain case cover. Vary as follows:
Octane Selector—Set for slight ping when accelerating with wide open throttle between 10-30 MPH.

CARBURETION: See Carburetor & Carb. Equipment.
Idle Setting—With engine warm, set throttle stop-screw for 6 MPH. idle speed. Set idle adjusting screw ½-1¼ turns open (Carter B&B), 1¼-2¼ turns open (Carter W1), adjust all models for smooth idle.
Idle Speed—6 MPH. hot or slow idle speed.
Float Level (Carter B&B)—Top of the float (not soldered seam) 5/64" ± 1/64" below top edge of bowl.
Float Level (Carter W1)—½" from top of float at free end to machined surface (gasket seat) on bowl cover with valve closed (invert to check).
Float Level (Stromberg)—Fuel level 5/8" below top edge of bowl (even with bottom of inspection hole).
Accelerating Pump—Center Hole Normal Setting, Outer Hole (max.) Winter, Inner (min.) Summer. Carter W1 carburetor does not have adjustment.

Fuel Pump Pressure: 3-4½ lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type. Install coil so approx. one full turn (335°) required to hook free end over stop stud for correct operation.

VALVES: See Valve Timing.
Tappet Clearance—.008" Intake, .010" Exh., Hot.

IGNITION

IGNITION SWITCH: Briggs & Stratton or Mitchel-lock. NOTE—No armored cable used.

COIL: Auto-Lite No. IG-4806 or IG-4809. Mounted above distributor on ignition cable bracket.
Ignition Current—2¼ amperes idling, 5½ stopped.

CONDENSER: Auto-Lite Part No. IG-3927A.
Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite Model IGS-4207-1 (U. S.), IGS-4208B-1 (Canada). Automatic advance type with Vacuum Spark Control and Octane Selector.
Breaker Plate Identification—Maximum vacuum advance limited by slot in plate. Marked for identification by number: #10 (IGS-4207-1), #7 (IGS-4208B-1) stamped on plate.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Clockwise viewed from above.

Automatic Advance—IGS-4207-1

Distributor Degrees	Distributor R.P.M.	Engine Degrees	Engine R.P.M.
Start	350	0	700
3	400	6	800
5	700	10	1400
7	1000	14	2000
9	1300	18	2600

Automatic Advance—IGS-4208B-1

Start	350	0	700
3	400	6	800
6	850	12	1700
9	1300	18	2600
12	1750	24	3500

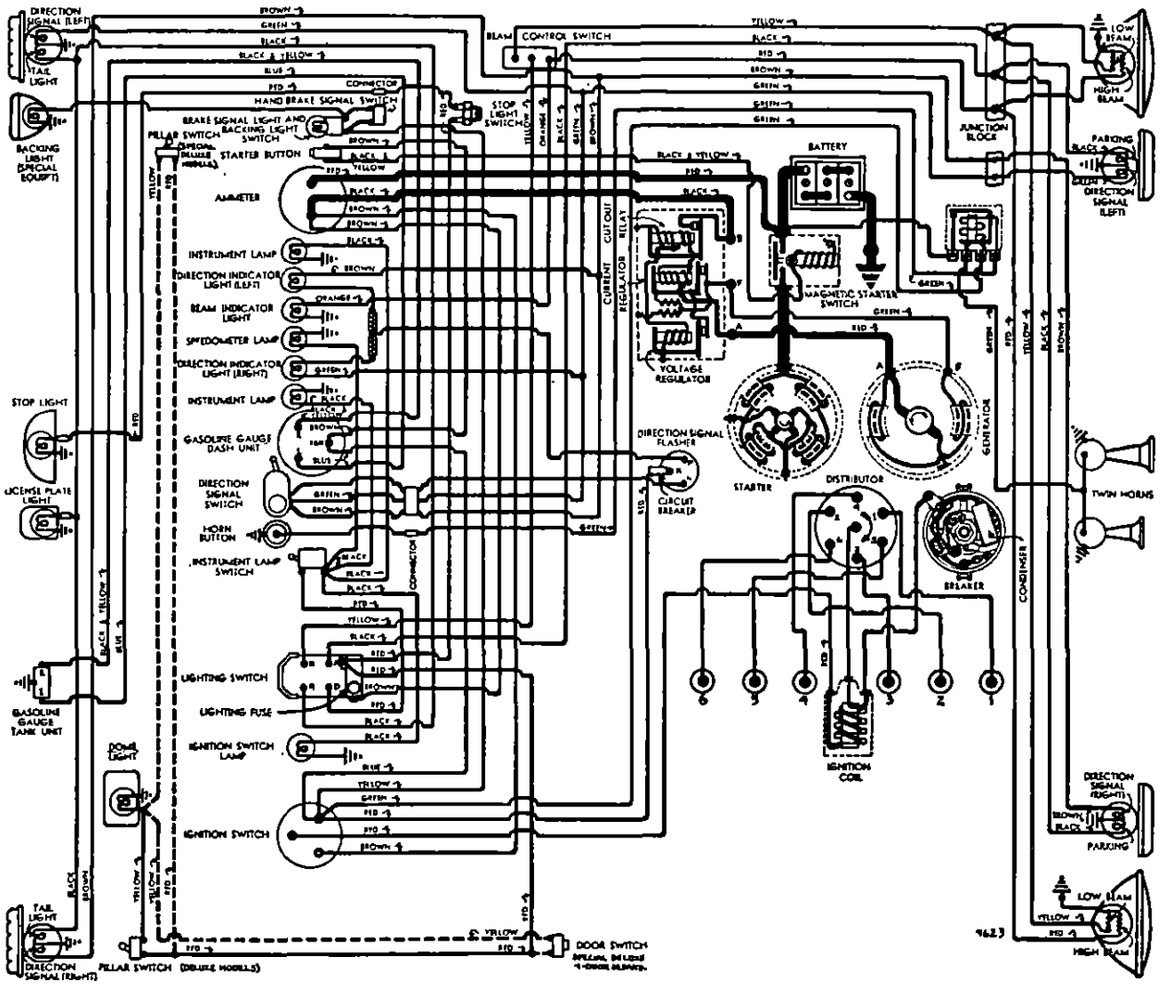
Vacuum Spark Control: Auto-Lite Units. Integral type (on distributor, linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring).

Vacuum Advance—IGS-4207-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	6¾"
5°	10°	9½"
8°	16°	12¼"
10°	20°	14"

Vacuum Advance—IGS-4208B-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
1°	2°	6¾"
3°	6°	9¼"
5°	10°	12⅛"
7°	14°	15"



Manual Adjustment—Provides for minor changes in ignition timing at distributor. See Ignition Timing.

Distributor Removal: Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position.

IGNITION TIMING

Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	0° at TDC	.000" TDC

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Timing Light)—Connect timing light between distributor primary terminal and battery terminal on generator regulator. Set #1 or #6 piston in firing position (see setting above) with correct mark on impulse neutralizer aligned with pointer on chain case cover. Loosen lock-plate hold-down screw, center pointer on scale, tighten screw. Loosen lock-plate clamp bolt, rotate distributor until timing light just goes out, tighten clamp bolt. Check Manual Adjustment (following) for final setting.

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine, adjust distributor as directed above until mark aligned with pointer on chain case cover.

Manual Adjustment—Set to give slight ping from 10-30 MPH accelerating with wide open throttle. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise (if ping too severe), tighten screw.

CARBURETOR

CARTER (B&B)

Carter (B&B) Model D6G1 (Std.), B6V1 or B6W1 (Econ. Models). 1½" (D6G1), 1¼" (B6V1, W1) Single barrel downdraft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jet—*See Carter (B&B) Jet Tables in Carburetor Section for complete jet data.*

CARBURETOR

CARTER W1

Carter W1, No. 574S. 1¼" Single barrel, downdraft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rod & Jet—*See Carter Jet Table in Carburetor Section for complete data.*

CARBURETOR

STROMBERG

Stromberg Model BXV-3. Stromberg No. 380220. Code No. 3-84. 1½" single barrel, downdraft type.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jet—*See Stromberg Jet Table in Carburetor Section for complete jet data.*

CARB. EQUIPMENT

Fast Idle: Throttle opened to fast idle position when choke valve closed. Not used on Economy carb.

Automatic Choke: Sisson type Optl.
See Carburetion Equipment Section for data.

Air Cleaner: AC No. 1543851 Heavy duty oil-bath type. Filter Element AC No. 1544091.
Servicing—Wash filter element in kerosene, drain and clean oil reservoir and refill to indicated level mark with 1 pint SAE No. 50 engine oil (SAE No. 20W for temperatures below freezing) at 1000 mile or 30 day intervals, or more often if required.
Oil Filler Cap (crankcase Ventilator) Air Cleaner: Wash filter element in cap in kerosene and re-oil by dipping in SAE No. 50 engine oil at 1000 mile or 30 day intervals or more often if required.
Crankcase Ventilator Outlet Air Cleaner—Special equipment for cars operating in dusty regions. Servicing same as given for Oil Filler Cap Cleaner.

Fuel Pump: AC No. 1539042 or Carter No. M594S. Diaphragm type fuel pump.
Replacement Pump—AC No. 577 (for 1539042).
Pressure—3½-5½ lbs.
See Carburetion Equipment Section for data.

Fuel Tank Filter: New Ollite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite Electric type. Dash Unit *No. NG-10878D, Tank Unit No. NG-10862T.*
See Carburetion Equipment Section for data.

BATTERY

Auto-Lite Type 1M-100D or Willard WT-1-15C (Orig. Equip.), Auto-Lite Type PN-15 or Willard HW-1-100 (Replacement). 6 volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.2 minutes (Auto-Lite), 3.3 minutes (Willard). Five second voltage 4.15 volts (Auto-Lite), 4.2 volts (Willard).
Grounded Terminal—Positive (+) to engine.
Location—*In left fender shield under engine hood.*
Dimensions—Length 9 3/32" (A-L), 9" (W). Width 7⅛" (A-L), 7" (W). Height 8⅝" (A-L), 8¾" (W).

STARTER

Auto-Lite Model MZ-4133 (U.S.), MAW-4041 (Can.).
Armature—Auto-Lite No. MZ-2108 (MZ-4133 Starter), MAW-2030 (MAW-4041 Starter).
Drive—Outboard Barrel Type Bendix No. A2089.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150-175 amperes, 5.1 volts.

Performance Data—MZ-4133

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4300	5.5	70
0.65	"	2500	5.5	100
2.55	"	1325	5.0	200
4.95	"	750	4.5	300
7.65	"	220	4.0	400
7.8	"	Lock	3.0	420
11.8	"	Lock	4.0	560

Performance Data—MAW-4041

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4900	5.5	65
.60	"	3300	5.5	100
2.75	"	1480	5.0	200
5.45	"	820	4.5	300
8.50	"	400	4.0	400
11.55	"	110	3.5	500
11.5	"	Lock	3.0	505
18.0	"	Lock	4.0	670

Removal: Disconnect wires (tape battery lead), remove mounting bolts, withdraw starter (not necessary to disturb oil filter or oil lines).

Starting Switch: Auto-Lite Model SST-4001. Magnetic type mounted on left front fender shield and controlled by pushbutton on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

STANDARD

Auto-Lite Model GDZ-4801A, Armature GDZ-2006F. Two brush (shunt) type with voltage and current regulation. Ventilated by fan on drive pulley.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, 8.0 volts, 2200 gen. RPM or approx. 25 MPH, and above with load or discharged battery (Current Regulator setting). Actual charging rate controlled by Voltage Regulator and dependent on battery condition.

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current regulator setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Pivot mounted at left side of engine at front. To remove, take out pivot and clamp bolts.

Belt Adjustment: Loosen pivot and clamp bolts, pull *out on generator until belt is snug (40-50 lbs. tension secured on scale attached to field frame)* or ¼" belt deflection between generator and pump

GENERATOR

SPECIAL EQUIPMENT

Auto-Lite GEG-4823A or GEG-4823B. Armature No. GEG-2006F. Two brush (shunt) type with voltage and current regulation. Ventilated.
SEE CHRYSLER 8 C39 PAGE FOR ALL DATA.

REGULATOR

Std. (for "GDZ" Gen.)—Auto-Lite VRP-4001A, VRP-4401A, VRP-4501A, VRP-4503A.

Spec. Equip. (for "GEG" Gen.)—Auto-Lite VRP-4001F, VRP-4401B, VRP-4501C (VRP-4005E for negative ground). Vibrating voltage and current regulators with Cutout Relay.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

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Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting (VRP-4001A, 4401A)—34-36 amperes ("35").
Setting (VRP-4001F, 4005E, 4401B)—39-41 amperes (marked "40").
Setting (VRP-4501A, 4503A)—35 amperes (42 amperes at 70°F. after 15 minutes run, 33-37 amperes at 70° after additional 15 minutes run). CAUTION—These regulators are temperature-compensated and setting decreases with temperature rise.
Setting (VRP-4501C)—40 amperes (46 amperes at 70°F. after 15 minutes run, 38-42 amperes at 70° after additional 15 minutes run). CAUTION—This regulator temperature-compensated and setting decreases with temperature rise as indicated.
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. *See Electrical Equipment Section for complete data.*

Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Red light directly above center of speedometer. Lighted with upper beams "on".

Direction Signal: Optl. *See Electrical Equipment Sec'n.*
Direction Signal Indicator—On either side of Headlamp Beam Indicator (above speedometer).

Switches

Lighting—Plymouth No. 910507.
Beam Selector—Plymouth No. 859974.
Instrument—Plymouth No. 1232617.
Map Light—Plymouth No. 1154278.
Dome Lamp Pillar—Plymouth No. 317180.
Door Switches—Plymouth No. 882943.
Stop Light—Plymouth No. 920355.
Direction Signal—Plymouth No. 1163984.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	45-35 watts	Sealed Beam
Parking	3	63
Park & Frt. Dir. Sig.	21-3	1158
Beam & Dir. Sig. Ind.	1	51
Instrument	3	63
Ign. Switch	1	51
Tail (No Dir. Sig.)	3	63
Tail & Rear Dir. Sig.	21-3	1158
Stop	21	1129
Rear License	3	63
Dome	15	87

MISC. ELECTRICAL

FUSES: Lighting—30 ampere. On back of lighting switch. NOTE—To replace fuse, press up on knurled cap or fuse and turn to left, withdraw cap and fuse.
Clock—2 ampere. In clock lead connector.
Radio—14 ampere. In fuse connector at radio.

CIRCUIT BREAKER: Direction Signal—On flasher behind instrument panel. 8 ampere, vibrating type.

HORNS: Auto-Lite Model HT-4011 (Low Pitch), HT-4012 (High Pitch). Dual horns operated by relay.

Horn Relay: Auto-Lite HRL-4101. Connected through ignition switch, operates only with ignition on.
Contact Close—1.5-3.0 volts (seal to core with 4 V).
Contacts Open—.5 volt min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type.
Bore—3¼". **Stroke**—4⅜".
Displacement—217.8 cu.ins. **Rated H.P.** 25.35.
Developed Horsepower—95 at 3600 RPM.
Compression Ratio—6.6-1 Std. Cast Iron Head.
Compression & Vacuum Reading—*See Tune-up data.*

ORIGINAL BORE & PISTONS: *See Plymouth Special Data.*

ORIGINAL BEARING SIZES: *See Plymouth Special Data.*

ENGINE & OIL PAN REMOVAL: *See Plymouth Special Data.*

TIGHTENING TORQUES & CYLINDER HEAD: *See Plymouth Special Data.*

PISTONS: Aluminum alloy, "U" slot, cam ground type. NOTE—Piston skirt is elliptical (.010-.012" smaller diameter across pin bosses than across thrust faces), and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).
Length—3 11/16". **Weight**—16.0 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—.028-.032" (Head & Ring Lands), .0005-.001" (Skirt—across thrust faces and ¾" up from bottom). See Fitting New Pistons.

Fitting New Pistons: With cylinder bore and piston clean and dry, piston should be fitted so it will pass through cylinder with a light push of the hand and will stop anywhere in the bore, holding itself in place without falling through of its own weight. NOTE—Fit piston at point of smallest bore diameter, and with piston at point of smallest bore diameter, and with piston pin removed from piston. Make certain that U-slot is away from valve side of engine.
Replacement Pistons: *See Plymouth Special Data.*
Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression, two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3, 4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down.
Replacement Rings: *See Plymouth Special Data.*

PISTON PIN: Diameter 55/64". Length 2¾".
Pin floats in piston and rod, held by lock rings.
Pin Fit in Piston—Thumb push fit (piston at 130°F).
Pin Fit in Rod Bushing—Tight thumb push fit at 70°F.
Replacement Pins: Std., .0006", .003", .008" Oversize.

CONNECTING ROD: Length 7 15/16". Weight 1.941 lbs. with bolts less bearings.
NOTE—Pin hole in rod bronze bushed.
Crankpin Journal Diameter—2.0615-2.0625". *See "Original Bearing Sizes" in Plymouth Special Data.*
Lower Bearing—Removable, precision type, steel-backed, thin babbitt lined. No shims.
Clearance—.001-.0015". **Sideplay** .0055-.0115".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps. *See "Connecting Rod & Bearings" in Plymouth Special Data.*
Replacement Bearings: *See Plymouth Special Data.*
Installing Rods: Wide portion of bearing to rear (#1, 3, 5), to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in Plymouth Special Data.*
Bearings—Removable, precision type, steel-backed, thin babbitt lined. No shims.
Clearance—.001-.0015".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.
Replacement Main Bearing Caps: *See "Crankshaft & Main Bearings" in Plymouth Special Data.*
Replacement Bearings: *See Plymouth Special Data.*
Crankshaft Front & Rear Oil Seals: *See Plymouth Special Data.*
End Thrust: Taken by flanged faces of #4 (rear) main bearing. **Endplay**—.003-.007".

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1¼".
Bearings—Removable, steel-backed, babbitt lined bushings (except #4—machined in crankcase).
Clearance—.001-.003".
Removal: *See "Camshaft & Bearings" in Plymouth Special Data.*
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal: *See "Timing Chain" in Plymouth Special Data.*
Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 25/32"
Exhaust	1 13/32"	.340-.341"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.003-.005"

Exhaust Valve Seat Inserts—*See Plymouth Special Data.*
Valve Guides: Remove from above. Press new guides in with stepped end down and upper end ⅞" below top of block, ream guides to inside diameter of .342-.343" (Intake), .344-.345" (Exhaust).

Valve Springs: Install with close-coil end to top.

Free Length 2".	Spring Pressure	Spring Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅝".

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust, Hot.
NOTE—Tappet screws self-locking type.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 5° to 17° or .011" to .122" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. New "Rotor" type oil pump.
Crankcase Capacity—5 qts. (refill).
Normal Oil Pressure—40-45 lbs. above 30 MPH.
Oil Pressure Regulator—Under plug on left side of crankcase (below starter). Opens at 40-45 lbs. Adjustable by replacing spring (Std. spring Unpainted, Lighter spring—Red, Heavier spring—Green).
CAUTION—Install replacement spring of same color as original spring.

Oil Pump: New "Rotor" type on right side of engine.
Servicing—*See "Oil Pump" in Plymouth Special Data.*

Oil Filter: On left side of engine above starter.
Servicing—Replace filter at 8000 mile intervals.

Oil Pressure Gauge: Auto-Lite No. G-10875 (not elec).

C OLING

Cooling System: Positive circulation with water pump on front of engine and water distribution tube in cylinder block. Special Deluxe model has by-pass type thermostat (with bypass between outlet on cylinder head and pump inlet) for re-circulation of water through engine with thermostat closed.
Capacity—15 quarts.

Radiator Core Removal & Water Distribution Tube
Servicing—*See "Cooling System" in Plymouth Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, loosen generator mounting bolts and remove fan belt. Disconnect water inlet hose at pump (and by-pass hose connection on Special Deluxe models). Remove pump mounting capscrews, lift out pump and fan.

Thermostat: In cylinder head water outlet connection. NOTE—By-pass type on Special Deluxe.
Setting—Starts to open at 157-162°F. Fully open at 183-187°F.

Temperature Gauge: Auto-Lite H-11002. Not electric.

CLUTCH

Borg & Beck.....9A7 (Std.), 10A7 (Fleet), 11A6 (Taxi)
Auburn (1948 Part Production).....Model 9251-11

Clutch Identification: 3 pressure plate springs used on Auburn, 9 springs on Borg & Beck.

Borg & Beck Nos. 926 (9A7), 957 (10A7), 931 (1946-47 11A6), 957 (1948 11A6).
See Clutch Section for complete data.
Facings (Borg & Beck)—Woven, 2 required.

	Inside Diam.	Outside Diam.	Thickness
9A7	6"	9¼"	.125" (⅛")
10A7	7"	10"	.125" (⅛")
11A6	6½"	11"	.125" (⅛")

Pedal Adjustment: Set pedal to just clear toeboard (stopscrew on lower end of pedal) and set for 1" free travel (adjust nut on connector link at fork).
NOTE—Do not disturb turnbuckle on pedal link.
Clutch Over-Center Spring—*See "Clutch Notes" in Plymouth Special Data for setting procedure.*

Removal: Remove Transmission (see Transmission Removal below), remove release fork pull-back spring and clutch housing underpan. Disconnect release fork from pivot, withdraw release bearing and sleeve from housing. Mark clutch and flywheel (to insure correct re-installation), remove all clutch cover mounting screws evenly, remove clutch cover assembly and driven member through opening at bottom of housing.

TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.
►*HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.*

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Jack up front end of car. Disconnect front universal by taking out bolts in shaft flange (if transmission to be dismantled, loosen flange retaining nut), and rear universal by removing bearing caps on rear axle yoke (wire bearing cups in place to prevent loss of bearing rollers). Disconnect speedometer cable, hand brake cable at brake band, gearshift control rod and selector rod at transmission case. Remove transmission mounting screws in clutch housing, pull transmission straight back to free clutch shaft, then lower transmission and remove from beneath car.
NOTE—When installing transmission, use pilot studs installed in upper mounting screw holes to maintain alignment and prevent springing clutch driven member.

UNIVERSALS

Detroit Universal Series 4283 (Early), 4200 (Late).
4283 is ball & trunnion front, cross type rear.
4200 is ball & trunnion front and rear.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio (Std.)—3.9-1 (exc. Sta. Wgn.), 4.1-1 (Sta. Wgn).
Ratio (Optl.)—3.54-1, 3.73-1, 4.1-1, 4.3-1, 4.56-1 & 4.78-1 (Export).
Backlash—.006-.010". Screw adjustment.

Removal: Hoist rear end of car. Remove rear wheels. Disconnect brake hose at frame bracket, disconnect lower end of shock absorbers. Disconnect propeller shaft by removing capscrews from bearing caps on rear axle yoke (wire bearing caps in place to prevent loss of bearing rollers). Support axle housing, remove rear spring "U" bolts, lower axle assembly and remove from beneath car.
NOTE—Carrier assembly can be removed without disturbing axle housing by removing axle shafts and taking out carrier-to-housing mounting screws.
Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use Puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Oil Seal: New leather type mounted on brake support (backing plate).
Oil Seal Servicing—*See "Rear Axle" in Plymouth Special Data.*

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Delco—Model 1030-C (Front), 1031-T (Rear).
Monroe—Model K-11148 (Front), K-11149 (Rear).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6° crosswise.
Camber—Positive ¼°. Limits 0° to Pos. ¾°.
Caster—Negative 1° to Positive 1°. No adjustment.
Toe In—0" (0-1/16"). Adjust by turning both tie rods equally.
Steering Geometry—Inner wheel 22½°. Outer 20°.

STEERING GEAR

Own Make. Worm-and-roller type with "push-pull" adjustments. Same as Gemmer design Model 305.
NOTE—See Gemmer Model 305 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic type as follows:
Front Wheels—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top and actuated by lower cylinder).
Rear Wheels—Double anchor type with single double-acting wheel cylinder.
See Brake Section for complete data.
Brake Squeak Correction—*See "Chrysler-Lockheed Safeguard" in Brake Section.*
Wheel Cylinders—Single acting type (front), double acting type with straight (1⅛") bore (rear).
Drums—Centrifuse type. Diameter 10".
Lining—Molded Asbestos. Width 2". Thick. 13/64". Length per wheel 21" (front wheels), 18½" (rear wheels).
Clearance—.006" at each end of all brake shoes.

Hand Brake: Independent type. Hand lever actuates band on drum at rear of transmission.
Drum Diameter—6". Cast-iron.
Lining—Width 2". Thickness 5/32". Lgth. 16 11/16".
Clearance—.015-.020" around band.
Adjustment—*See Plymouth Special Data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Vacuum power type.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

SERIAL NUMBER: Stamped on left front door hinge pillar post.

1949 Starting Serial Numbers

Assembly Plant	P17 Deluxe	P18 Deluxe	P18 Spec. Deluxe
Detroit	18,000,101	15,300,001	12,120,001
Los Angeles	26,000,101	26,025,001	25,075,001
Evansville	24,000,101	22,080,001	20,304,001

1950 Starting Serial Numbers

Assembly Plant	P19 Deluxe	P20 Deluxe	P20 Spec. Deluxe
Detroit	18,041,001	15,359,501	12,384,501
Los Angeles	28,004,001	26,030,501	25,097,501
Evansville	24,012,001	22,097,001	20,367,001
San Leandro	28,503,501	26,405,001	25,511,001

1951 Starting Serial Numbers

Assembly Plant	P22 Concord	P23 Cambridge	P23 Cranbrook
Detroit	18,126,001	15,460,001	12,635,001
Los Angeles	28,011,001	26,040,001	25,112,001
Evansville	24,042,001	22,132,001	20,435,001
San Leandro	25,513,001	26,512,001	25,531,001

ENGINE NUMBER: Stamped on boss on left front side of cylinder block.

Starting Engine Number: 1001 up (each year).

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" idling at 6 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .035" (1949-50); .038" (1951). **Plugs**—Auto-Lite Resistor Type AR5 (1949-50); AR8 (1951). 14 mm.

►*RESISTOR TYPE SPARK PLUG NOTE—Auto-Lite No. 4S-140 Resistor type spark plug can be used without changing coil. Adjust distributor points to .020".*

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022". **Cam Angle**—34½° to 38° Closed. **Breaker Arm Spring Tension**—17-20 ozs. **Condenser Capacity**—.25-.28 microfarad.

IGNITION TIMING: At Top Dead Center (TDC). **Timing Procedure**—*See Ignition Timing.* **Timing Mark**—Fan pulley marked "DC" at top dead center position with 15-1° graduations before and after this point. Set timing with DC mark at pointer on chain case cover, then set manual (octane selector) adjustment. **Octane Selector**—Set for slight ping when accelerating with wide open throttle between 10-30 MPH.

CARBURETION: **Idle Setting**—½-1½ turns open. Turn screw out for richer mixture. **Idle Speed**—450-500 RPM. **Float Level**—Top of the float (not soldered seam) 5/64" ±1/64" below top edge of bowl. ***Accelerating Pump**—Center Hole Normal Setting,* Outer Hole (max.) Winter, Inner (min.) Summer.

Choke Setting: Adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

***Fuel Pump Pressure:** 3-5 lbs.*

MANIFOLD HEAT CONTROL: Thermostatic coil type. Install coil so approx. one full turn (335°) required to hook free end over stop stud for correct operation.

VALVE TAPPET CLEARANCE: .008" Intake, .010" Exhaust (1949-50); .010" Intake, .010" Exhaust (1951), hot.

IGNITION

COIL: Auto-Lite No. CR-4001 (U.S.), IG-4809 (Canada). Mounted above distributor. **Ignition Current**—2¼ amperes idling, 5 stopped.

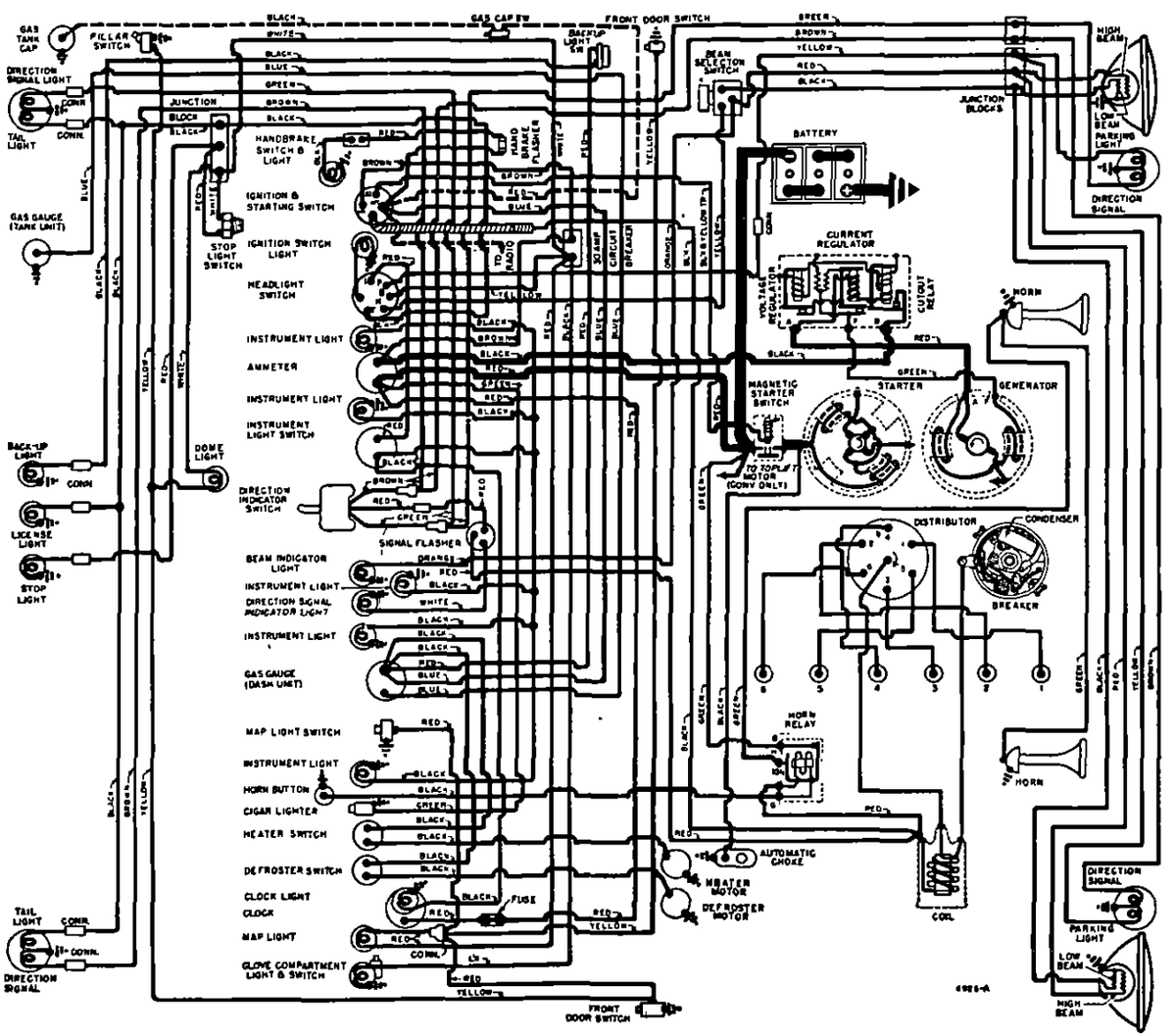
CONDENSER: Auto-Lite Part No. IG-3927G. Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite. Automatic advance type with Vacuum Spark Control as follows:

►*DISTRIBUTOR CAP POPPING OFF CORRECTION (Early "IAP" Distributors): See "Auto-Lite IAP Distributors" in Electrical Equipment Section.*

P17 (Std.)	IGS-4207B-1
P17 (Spec. Equip.)	IAP-4103A-1
P18 (Early)	IAP-4103-1
P18 (Late)	IAP-4103A-1
P17, P18 (Canada)	IAP-4102-1

CONTINUED ON NEXT PAGE



1949 MODELS

FOR P17 DIRECTION SIGNAL & STOP LIGHT SEE 1950 DIAGRAM (P18 SHOWN ABOVE)

CONTINUED FROM PRECEDING PAGE

P19 (Std.) Early Cars	IGS-4207B-1
P20 (Std.) P19 (Sp. Equip.) Early Cars	IAP-4103A-1
P19 & P20 (All) Late Cars	IAT-4003
P19 & P20 (Canada) Early Cars	IAP-4102-1
P19 & P20 (Canada) Late Cars	IAT-4004A
P22 & P23 (All)	IAT-4011
P22 & P34 (Canada)	IAT-4012A
P19 & P20 Taxi	IAT-4003B
P22 & P23 Taxi	IAT-4011B

►**"IAT" Distributor Note**—New "Pivoted Breaker Plate" type. *See Electrical Equipment Section for data.*
Rotation—Clockwise viewed from above.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—34½° to 38° Closed.
Breaker Arm Spring Tension—17-20 ozs.

Automatic Advance—IAP-4103-1, IAT-4003B, IAT-4011B

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
3	400	6	800
5	700	10	1400
7	1000	14	2000
9	1300	18	2600

Automatic Advance—IAP-4102-1, IAT-4004A IAT-4012A

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
3	400	6	800
6	850	12	1700
9	1300	18	2600
12	1750	24	3500

Automatic Advance—IGS-4207B-1, IAP-4103A-1, IAT-4003, IAT-4011

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Vacuum Spark Control: Auto-Lite Units. Integral type

Vacuum Advance—IAP-4102-1, IAT-4004A, IAT-4012A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
1°	2°	6¾"
3°	6°	9¼"
5°	10°	12⅛"
7°	14°	15"

Vacuum Advance—4207B-1, IAP-4103A-1, IAT-4003, B; IAT-4011, B

Start	0°	4½"
1°	2°	5½"
4°	8°	9⅛"
7°	14°	12¾"
8°	16°	14"

Vacuum Advance—IAP-4103-1

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5"
2°	4°	6¾"
5°	10°	9½"
8°	16°	12¼"
10°	20°	14"

Distributor Removal: Mounted on left side of crankcase. To remove, disconnect vacuum line, take out hold-down screw in lock plate. **Installation Note**—Install distributor with #1 piston in firing position.

IGNITION TIMING

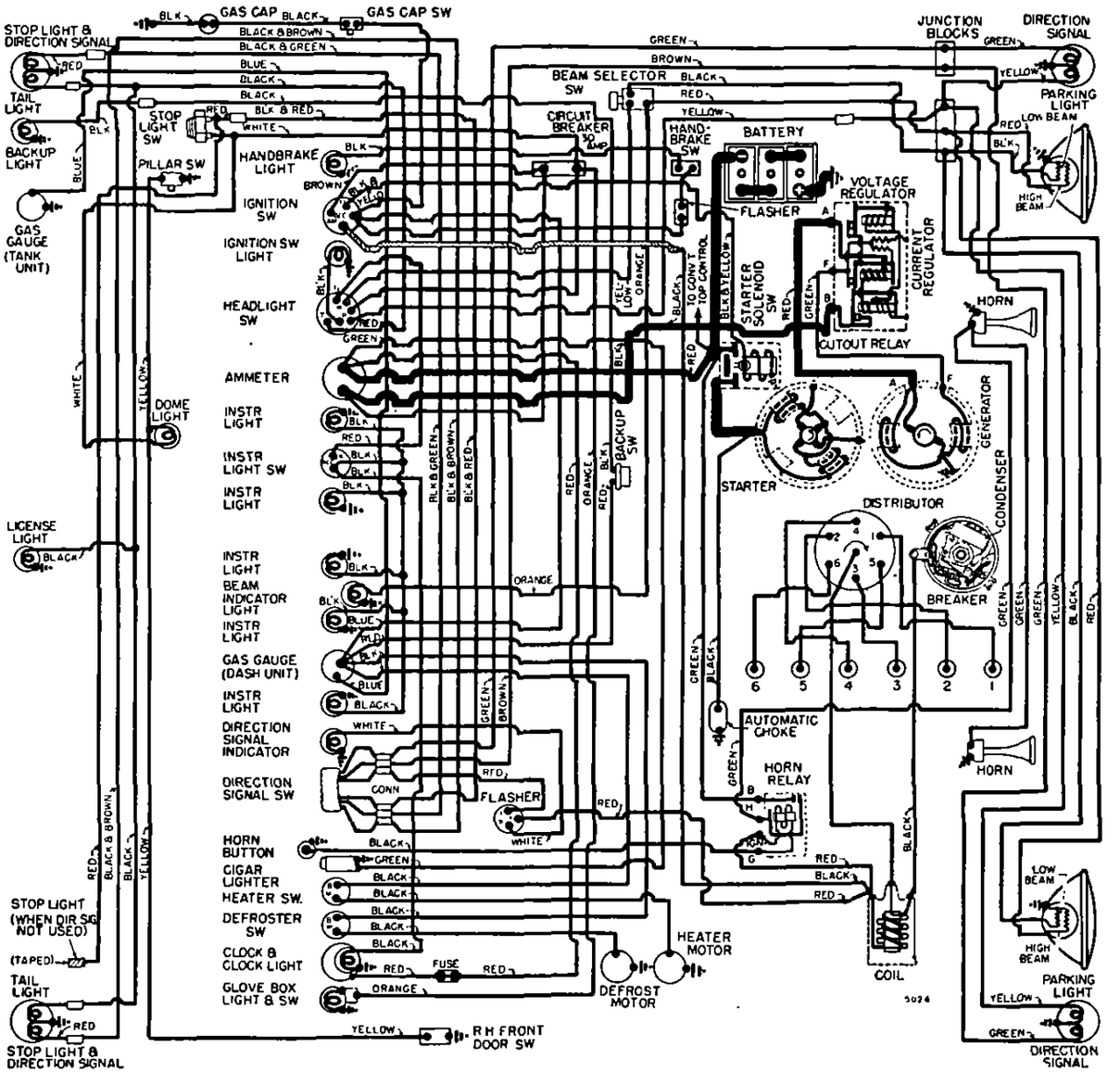
Std. Setting—Initial setting (for regular non-premium fuel) as shown below. See Manual Adjustment (following) for Final Setting.

	Flywheel Degrees	Piston Position
All Engines	At TDC	.000" TDC.

NOTE—Impulse neutralizer marked 'DC' at TDC. with 15 (1°) graduations on either side.

Timing (Using Synchroscope)—Tool C-374. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine, adjust distributor as directed above until

CONTINUED ON NEXT PAGE



1950 MODELS

CONTINUED FROM PRECEDING PAGE

mark aligned with pointer on chain case cover.

Manual Adjustment—Set to give slight ping from 10-30 MPH. accelerating with wide open throttle. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise (if ping too severe), tighten screw.

CARBURETOR

Carter (B&B)	Model No.
Std. (1949 Early)	D6H1
Std. (1949 Late, 1950-51)	D6H2
City Traffic (1949 Early)	D6N1
City Traffic (1949 Late, 1950-51)	D6N2

1½" single barrel downdraft type with Sisson automatic choke.

See Carburetor Section for complete data.

►**Carburetor Production Changes**—*See "Carter (B&B) Downdraft" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*

Fast Idle: Throttle opened to fast idle position when choke valve closed.

Automatic Choke: Sisson type Optl.

Setting—Choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting corburetor choke valve lever so that choke valve is tightly closed.

See Carburetion Equipment Section for data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544640 Heavy duty oil-bath type. Filter Element AC No. 21.

Fuel Pump: AC No. 1539042 (1949); 1538421 (1950-51). Fuel only. AC No. 1538418 (1949-51). Fuel & Vacuum. **Replacement Pump**—AC No. 588 (Fuel only). No. 9418 (Fuel & Vacuum).

Pressure—3-5 lbs.

See Carburetion Equipment Section for data.

Fuel Tank Filter: Ollite metal filter in tank.

Servicing—If more than 2 pints water in tank, fuel will not pass filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.

Dash Unit—Auto-Lite No. 11679A (1949); No. 12095A or 12310A (1950); No. 12327A (1951).

Tank Unit—Auto-Lite No. 11538A. (Suburban) NG-11816T.

See Carburetion Equipment Section for data.

BATTERY

Willard HW-1-100-C or Auto-Lite Type 1M-100D. 6 volt, 15 plate, 100 ampere hour capacity (20 hour rate).

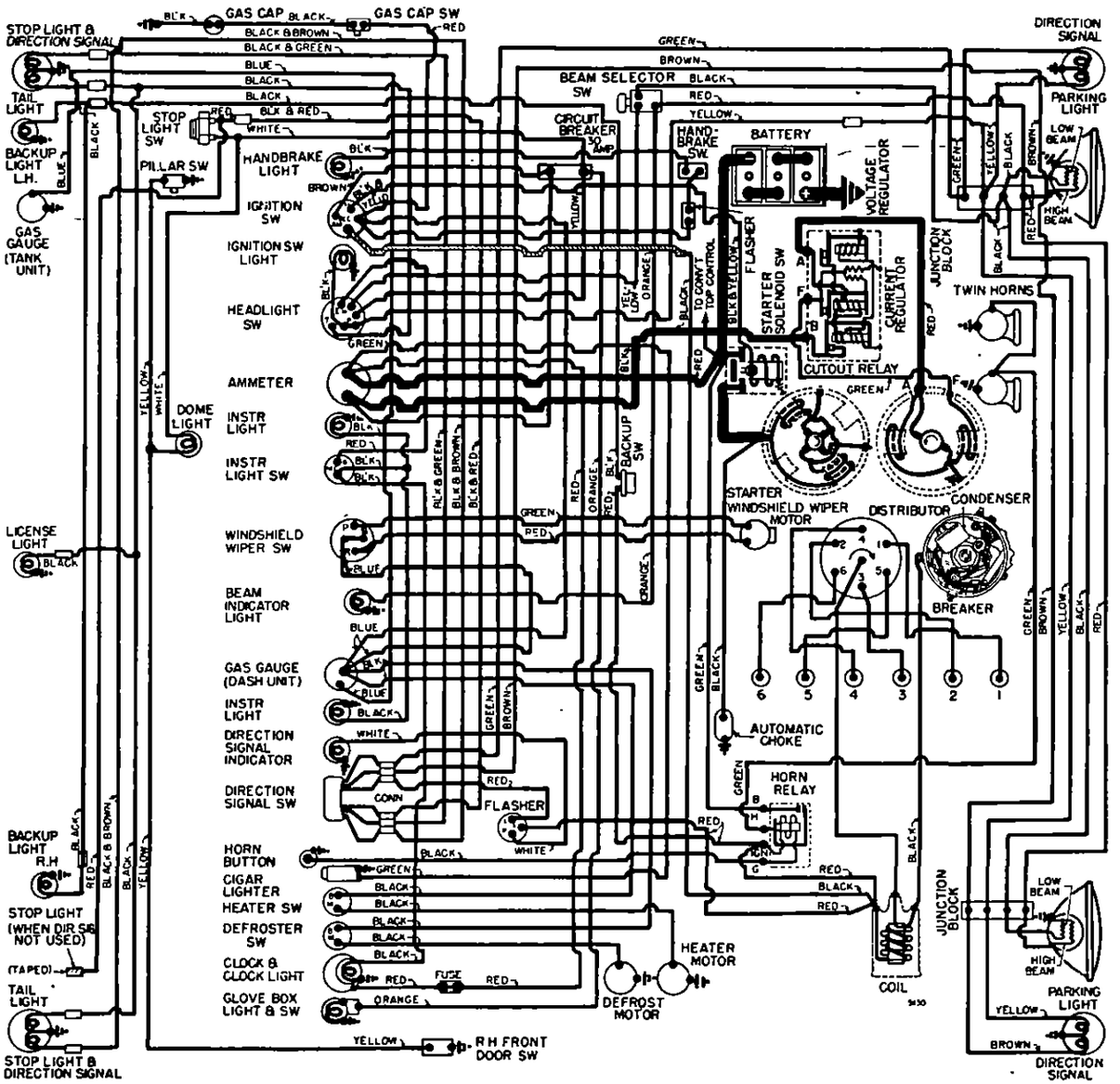
Starting Capacity—120 amperes for 20 minutes.

Zero Capacity—300 amperes for 3.2 minutes. Five second voltage 4.15 volts.

Grounded Terminal—Positive (+) to engine.
Location—In left fender shield under engine hood.
Dimensions—Length 9 3/32". Width 7 1/8". Height 8 5/8".

STARTER

U.S. Cars.....**Auto-Lite MCH-6101. Arm. MCH-2028**
Canada.....**Auto-Lite MAW-4041. Arm. MAW-2128**
Drive—Outboard Barrel Type Bendix No. A-2991.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).



1951 MODELS

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Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Starting Switch: Auto-Lite No. (1950) SST-4001, (1951) SST-4006. Magnetic type mounted on left front fender shield and controlled by turning ignition switch past "ON" position.

See Electrical Equipment Section for complete data.

GENERATOR

Year	Auto-Lite No.
1949 (Early)	GGW-6001B
1949 (Late)	GDZ-4801A
1949 State Police	GEG-4823B
1949 State Police	GGJ-6001B
1949 State Police	GGU-6001E
1949 City Police & Taxi	GGJ-6001A
1949 City Police & Taxi	GGU-6001A
1950 (Early)	GGW-6001B
1950 (Late)	①GGW-6001K
1950 (Canada)	GDZ-4801A
1951	①GGW-6001K
1950 (Early) City Police & Taxi	GGU-6001A
1950 (Early) State Police	GGJ-6001B
1950 State Police	GEG-4823B
1950 State Police	GGU-6001E
1950-51 City Police & Taxi	①GGU-6001G
1950-51 City Police & Taxi	① GGJ-6001F
1950-51 State Police	①GGU-6001H
1950-51 State Police	① GGJ-6001G

①—Narrow Groove Pulley.

Armature—Auto-Lite No. GGW-2006F (for GGW Gen.). **GDZ-2006F** (for GDZ Gen.). **GGJ-2101F** (for GGJ Gen.). **GGU-2006F** (for GGU Gen.). **GEG-2006F** (for GEG Gen.).

Maximum Charging Rate—See table below.

Charging Rate Adjustment—None. See Regulator.

Performance Data (GGW-6001B, K)

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
45	8.0	1925-2125	2350-2550

Performance Data (GDZ-4801A)

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
35	8.0	1800-2000	2150-2350

Performance Data (GEG-4823B)

40	8.0	1550 Max.	———

Performance Data—(GGJ-6001A,B,F,G)

0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750

Performance Data (GGU-6001A, E, G, H)

0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—(GDZ, GGU, GGW) 35-53 ozs. (new brushes); (GGJ) 30-37 ozs. (new brushes); (GEG) 64-68 ozs. (new brushes).

Field Current—(GDZ, GGW) 1.6-1.8 amperes, (GEG) 1.6-1.78 amperes, (GGJ) 1.7-1.9 amperes, (GGU) 1.7-1.8 amperes, all at 6.0 volts.

Motoring Current—(GDZ) 4.2-4.6 amps., (GEG) 4.7-5.2 amps., (GGJ) 4.3-4.8 amps., (GGU) 5.5-6.5 amps., (GGW) 4.6-5.2 amps., all at 6.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, pull out on generator until belt is snug (40-50 lbs tension secured on scale attached to field frame) or ¼" belt deflection between generator and pump).

REGULATOR

1949 Models

Regulator No.	Use with Gen. No.
VAV-4404A or VBA-4101A①	GGJ-6001A, B
VAV-4404B or VBA-4101B②	GGU-6001A, E
VRP-4401B③	GEG-4823B
VRP-4503A	GDZ-4801A
VRP-4503B or VRP-6004A	GGW-6001B

1950-51 Models

Regulator No.	Use with Gen. No.
VBA-4202 ④	GGJ-6001A, B, F, G
VAV-6001A⑤	GGU-6001A, E, G, H
VRP-6004A	GGW-6001B, K
VBE-6001A	GGW-6001K
VRP-4501C	GEG-4823B
VRP-4503A	GDZ-4801A

①—Use VBA-4104A for Neg. Ground.
②—Use VBA-4104B for Neg. Ground.
③—Use VRP-4403A for Neg. Ground.
④—Use VBA-4204A for Neg. Ground.
⑤—Use VAV-6002A for Neg. Ground.

See Electrical Equipment Section for complete data.

NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In (VAV, VRP)—6.4-6.9 volts (set to 6.4-6.6 volts).

Cuts In (VBA, VBE)—6.3-6.8 volts (set to 6.4-6.6 volts).

Cuts Out (All)—4.1-4.8 volts (Approx. 4-6 amps. disch.).

Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting (VAV, VBA, VBE)—7.1-7.4 volts at 70°F. **(VRP)**—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.

Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section.***

Current Regulator

▷(Temperature Compensated Regulators)

Regulator No.	Nominal Setting
VRP-4503A	35 amps.
VRP-4501C, 4503B, 6004A	40 amps.
VAV-4404B, 6001A, 6002A	45 amps.
VBA-4101B, 4104B, VBE-6001F	45 amps.
VAV-4404A	50 amps.
VBA-4101A, 4014A, VBA-4202A, 4204A	50 amps.

▷***CAUTION***—Nominal setting is approx. setting at 70°F. room temperature after regulator has been run (will be higher started cold). See Electrical Equip. Section for settings at various temperatures.

Checking (without breaking seals) & Adjustment—***See Electrical Equipment Section.***

Air Gap (All)—.048-.052" with contacts just opening.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type with new "Bull's-eye lens."

See Electrical Equipment Section for complete data.

Beam Indicator—On speedometer dial. Lighted when upper beams "on."

Direction Signal: ***See Electrical Equipment Section.***

Direction Signal Indicator—On speedometer dial. Flashes when direction signal operating.

MISC. ELECTRICAL

CIRCUIT BREAKER: 30 ampere. On back of instrument panel above headlight switch.

FUSES: Clock—2 ampere. In clock lead connector. **Radio**—14 ampere. In fuse connector at radio.

HORNS: Auto-Lite No. HW-4201 Low pitch; HW-4202 High pitch (1949-50). Auto-Lite No. HW-4107 Low pitch; HW-4108 High pitch (1951).

Horn Relay: Auto-Lite HRL-4103 or 4104. Connected thru ignition switch, operates only with ignition on.

Contact Close—1.5-3.0 volts (seal to core with 4 V).

Contacts Open—.5 volt min. (open from seal).

Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type. **Bore**—3¼". **Stroke**—4⅜". **Displacement**—217.8 cu. ins. **Rated H.P.**—25.35. **Developed Horsepower**—97 at 3600 RPM. **Compression Ratio**—7.0-1 Std. Cast Iron Head. **Compression & Vacuum Reading**—***See Tune-up data.***

ORIGINAL BORE & PISTONS: ***See Plymouth Special Data.***

ORIGINAL BEARING SIZES: ***See Plymouth Special Data.***

ENGINE & OIL PAN REMOVAL: ***See Plymouth Special Data.***

TIGHTENING TORQUES & CYLINDER HEAD: ***See Plymouth Special Data.***

PISTONS: Aluminum alloy, "U" slot, cam ground type. NOTE—Piston skirt is elliptical (.010-.012" smaller diameter across pin bosses than across thrust faces), and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).

Length—3 11/16". **Weight**—16.0 ozs. (stripped).

Removal—Pistons and rods removed from above. **Clearance**—.028-.032" (Head & Ring Lands), .0002-.0012" (Skirt—across thrust faces and ¾" up from bottom). See Fitting New Pistons.

Fitting New Pistons: Measure piston size with micrometer across thrust faces (right angles to pin bosses) ¾" up from bottom of skirt with piston at 70°F. To fit pistons, with cylinder wall and piston dry and clean and at 70°F., invert piston in cylinder bore. Piston should have slight drag but should pass slowly through bore of own weight.

Replacement Pistons: .005", .020", .030", .040", .060" OS.

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression (top ring chrome-plated), two slotted oil control, coated rings per piston, all above pin. Oil ring grooves drilled for oil drainage.

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Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	5/32"	.007-.015"	.001-.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down.

Replacement Rings: .005" .020" .030" .040" .050" .060" OS.

PISTON PIN: Diameter—55/64". **Length**—2¾". Pin floats in piston and rod, held by lock rings.
Pin Fit in Piston—.0000-.0005". Thumb push fit with piston heated to 130°F.
Pin Fit in Rod Bushing—.0001-.0002". Tight thumb push fit at normal room temp. (70°F.).

Replacement Pins: Std., .0006", .003", .008" Oversize.

CONNECTING ROD: Length—7 15/16". **Weight**—31.06 ozs. (with bolts, less bearings).

►*THICK-WALL BEARING CAUTION*—Inspect "hollowed-out" section of crankshaft center counterbalance for stamped mark (M-1, M-2, R-1, R-2, etc.) indicating which main or connecting rod journal uses THICK-WALL BEARING. *See "Original Bearing Sizes" in Plymouth Special Data.*

Crankpin Journal Diameter—2.0615-2.0625". *See "Original Bearing Sizes" in Plymouth Special Data.*

Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

Replacement Bearings: .001", .002", .003", .010", .012". Undersize.

Installing Rods: Wide portion of bearing to rear (#1, 3, 5), to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in Plymouth Special Data.*
Bearings—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015".

►*THICK-WALL BEARING CAUTION*—Inspect "hollowed-out" section of crankshaft center counterbalance for stamped mark (M-1, M-2, R-1, R-2, etc.) indicating which main or connecting rod journal uses THICK-WALL BEARING. *See "Original Bearing Sizes" in Plymouth Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

Replacement Bearings: .001", .002", .003", .010", .012" Undersize.

Replacement Main Bearing Caps: *See "Crankshaft & Main Bearings" in Plymouth Special Data.*

End Thrust: Taken by flanged faces of #4 (rear) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See Plymouth Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 1/4".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #4—machined in crankcase).
Clearance—.001-.003".

Camshaft Removal: *See "Camshaft & Bearings" in Plymouth Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.

Timing Chain Removal: *See "Timing Chain" in Plymouth Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 25/32"
Exhaust	1 13/32"	.340-.341"	4 25/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	3/8"	.001-.003"
Exhaust	45°	3/8"	.002-.004"

Valve Guides: Remove from above. Press new guides in with stepped end down and upper end 7/8" below top of block, ream guides to inside diameter of .342-.343" (Intake), .344-.345" (Exhaust).

Valve Springs: Install with close-coil end to top.

Free Length 2".	Spring Pressure	Spring Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅝". Service by reaming lifter holes (work from above piloting reamer in valve guide) and installing oversize lifters furnished .001", .008", .030" Oversize.

VALVE TIMING

Tappet Clearance: .008" Intake, .010" Exhaust (1949-50); .010" Intake & Exhaust (1951), hot.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 5° to 17° or .011" to .0125" BTDC with 5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover. Reset tappet clearance to running clearance .008" Hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain. "Rotor" type oil pump.

Crankcase Capacity—5 qts. (refill).

Normal Oil Pressure—40-60 lbs. above 30 MPH.

Oil Pressure Regulator—Under plug on left side of crankcase (below starter). Opens at 45 to 55 lbs. Adjustable by replacing spring (Std. spring Unpainted, Lighter spring—Red, Heavier spring—Green).

CAUTION—Install replacement spring of same color as original spring.

Oil Pump: "Rotor" type on right side of engine.
Servicing—*See "Oil Pump" in Plymouth Special Data.*

Oil Filter: On left side of engine above starter.

Servicing—Replace filter at 8000 mile intervals.

Oil Pressure Gauge: Auto-Lite No. 11678A (1949); 12096A (Early 1950); 12309A (Late 1950); 12324A (1951). Not electric.

C LING

Water Capacity: 15 qts. (1949-50); 13 qts. (1951).

Water Distribution Tube Servicing: *See "Cooling System" in Plymouth Special Data.*

Radiator Core Removal: *See "Radiator" in Plymouth Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.

Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.
Belt Adjustment—***See Generator Belt Adjustment.***

Thermostat: In cylinder head water outlet.
INSTALLATION NOTE—Install thermostat with 2 ports facing front, and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite No. 1680A (1949); 12094A (Early 1950); 12307A (Late 1950); 12326A (1951). Not electric.

CLUTCH

Borg & Beck Model 9A7 or Auburn Model 9251-17. Single plate, dry disc types.
BORG & BECK NOTE—**Cover Assy. marked 924** (Std.), 964 (Special Equipment).
See Clutch Section for complete data.

Facings—Molded woven type. I.D. 6", O.D. 9¼", Thickness .114" on .125" optional.

Facings (Auburn)—Molded type. I.D. 6⅛", O.D. 9⅛", Thickness .125".

Pedal Adjustment: Set pedal to just clear toeboard (stopscrew on lower end of pedal) and set for 1" free travel (adjust nut on connector link at fork).

NOTE—Do not disturb turnbuckle on pedal link.
Clutch Over-Center Spring—*See "Clutch Notes" in Plymouth Special Data.*

Removal: Remove Transmission (see Transmission Removal below), remove release fork pull-back spring and clutch housing underpan. Disconnect release fork from pivot, withdraw release bearing and sleeve from housing. Mark clutch and flywheel (to insure correct re-installation), remove all clutch cover mounting screws evenly, remove clutch cover assembly and driven member through opening at bottom of housing.

TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

►*HARD SHIFTING CORRECTION*—***See "Chrysler, DeSoto, Dodge & Plymouth Synchro-Mesh" in Transmission Section for complete data.***
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

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Removal: Jack up front end of car. Disconnect front universal by taking out bolts in shaft flange (if transmission to be dismantled, loosen flange retaining nut), and rear universal by removing bearing caps on rear axle yoke (wire bearing cups in place to prevent loss of bearing rollers). Disconnect speedometer cable, hand brake cable at brake band, gearshift control rod and selector rod at transmission case. Remove transmission mounting screws in clutch housing, pull transmission straight back to free clutch shaft, then lower transmission and remove from beneath car.
NOTE—When installing transmission, use pilot studs installed in upper mounting screw holes to maintain alignment and prevent springing clutch driven member.

UNIVERSALS

Detroit Universal Series 4200—Ball-and-Trunnion type (front & rear).

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.
Ratio—(P17, P19, P22)—3.73-1 Std. 3.9-1 Optl.
Ratio—(P18, P20, P23)—3.9-1 Std. 4.1-1 Optl.
Ratio—(Station Wagon)—4.1-1 Std.
Backlash—.006-.010". Screw adjustment.

Removal: Hoist rear end of car. Remove rear wheels. Disconnect brake hose at frame bracket, disconnect lower end of shock absorbers. Disconnect propeller shaft by removing capscrews from bearing caps on rear axle yoke (wire bearing caps in place to prevent loss of bearing rollers). Support axle housing, remove rear spring "U" bolts, lower axle assembly and remove from beneath car.
NOTE—Carrier assembly can be removed without disturbing axle housing by removing axle shafts and taking out carrier-to-housing mounting screws.

Axle Shaft Removal—Remove wheel, hub, and drum assembly (use screw type hub puller—Tool C-675), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller). NOTE—Use Puller C-293-E to remove bearing from shaft, puller C-748 or C-358 to remove inner oil seal, drift C-201 to install seal.

Axle Shaft Oil Seal: New leather type mounted on brake support (backing plate).
See "Rear Axle" in Plymouth Special Data.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Own Make—"Oriflow" hydraulic, direct acting, non-adjustable, non-refillable.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.
See Front Suspension Section for complete data.
Kingpin Inclination—4¾° to 6° crosswise.
Camber (1949-50)—Pos. ¼°. Limits 0° to Pos. ¾° (¼-½° higher on left).
Camber (1951)—Neg. ⅜° to Pos. ⅜°. (¼-½° higher on left side).
Caster—0° preferred. Limits Neg. 1° to Pos. 1°. No adjustment.
Toe In—0" (0-1/16"). Adjust by turning both tie rods equally.
Steering Geometry—Inner wheel 22½°. Outer 20°.

STEERING GEAR

Own Make. Worm-and-roller type with "push-pull" adjustments. Same as Gemmer design Model 305.
NOTE—See Gemmer Model 305 article for data.
See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic type as follows:
Front Wheels—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe anchored at top and actuated by lower cylinder).
Rear Wheels—Double anchor type with a single double-acting wheel cylinder.
See Brake Section for complete data.
Brake Squeak Correction—*See "Chrysler-Lockheed Safeguard" in Brake Section.*
Wheel Cylinders—Single acting type (front), double acting type with straight (1⅛") bore (rear).
Drums—Centrifuse type. Diameter 10".
Lining—Molded asbestos. **Width**—2". **Thickness**—3/16".
Length per wheel 21" (Front wheels), 18½" (Rear wheels).
Clearance—.006" at each end of all brake shoes.

Hand Brake: Independent type. Hand lever actuates band on drum at rear of transmission.
Drum Diameter—6". Cast-iron.
Lining—Width 2". Thickness 5/32". Length 15⅜".
Clearance—.015-.020" around band.
Adjustment—*See Plymouth Special Data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Hydro-Lectric type.
See Miscellaneous Section for complete data.

Windshield Wipers: (Exc. Convertible & Sta. Wgn.) (1949-50)—Vacuum controlled Link & Arm type; (1951)—Auto-Lite EWR-5001A. (Convertible & Sta. Wgn.) (1949-50)—Vacuum Link & Chain type; (1951)—Auto-Lite EWR-5001B.
See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Plymouth Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: On plate on left front door hinge pillar post. Starting numbers:

1952 Starting Serial Numbers—

	Concord	Cambridge	Cranbrook
Detroit	18,192,501	15,577,801	12,906,701
Evansville	24,056,701	22,159,601	28,485,001
Los Angeles	28,015,701	26,045,701	25,125,301
San Leandro	28,519,101	26,518,201	25,546,101

1953 Starting Serial Numbers—*See Note below.*

Detroit	13,070,001	Los Angeles	25,136,001
Evansville	20,520,001	San Leandro	25,560,001

►*1953 SERIAL NUMBER NOTE—Serial number is same for both Cambridge & Cranbrook models and BODY CODE NO. (on left side of firewall) should be used when necessary to distinguish models.*

Cranbrook	Cambridge
300—4 Dr. Sedan.	310—4 Dr. Sedan.
302—Club Coupe.	311—Club Sedan.
303—Belvedere.	313—Business Coupe.
304—Convt. Coupe.	317—Suburban.
307—Savoy.	

ENGINE NUMBER: Stamped on boss on left front side of engine block.
First Number (1952 & 1953)—1001 up.

►*ENGINE NUMBER LETTERS (Following Engine Number)—Identified as follows:*
"A"—ALL Cylinders .020" oversize.
"B"—ALL Crankshaft Journals .010" undersize.
"AB"—Both above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: Approximately 105 lbs. at cranking speed. 10 lbs. maximum variation between cylinders.

VACUUM READING: Steady 18-20" at idling speed.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .035".
Plugs—Auto-Lite AR8. 14 mm. Resistor type.

►*RESISTOR TYPE SPARK PLUG NOTE—Auto-Lite No. 4S-140 Resistor type spark plug can be used without changing coil. Adjust distributor points to .020".*

DISTRIBUTOR: Auto-Lite No. IAT-4011 (1952); IAT-4101 (1953). Canada—IAT-4012A. Automatic and vacuum advance.
Breaker Gap—.020".
Cam Angle—39° ± 3° closed. DO NOT exceed breaker gap limits to obtain dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite No. CR-4001 (U.S.), CR-6007B (Canada). Mounted above distributor.
Ignition Current—2.25 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IAT-3076RA (for IAT-4011); IAT-3076LA (for IAT-4101); IAT-3076RA (for IAT-4012A).
Capacity—.25-.28 microfarad.

IGNITION TIMING: TDC ①.
①—Ignition setting for regular fuel. See Ignition Timing for final setting.
Timing Mark—Crankshaft pulley or vibration dampener marked "DC" at top dead center point with 15 1°-graduations before and after this point.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter (B&B) No. D6H2 (Std.); D6N2 (City Traffic), D6U1 (Overdrive), D6P1 & D6P2 (Hy-Drive Trans.), D6R1 (Taxicab). 1½" Single barrel downdraft type with Sisson Automatic Choke.

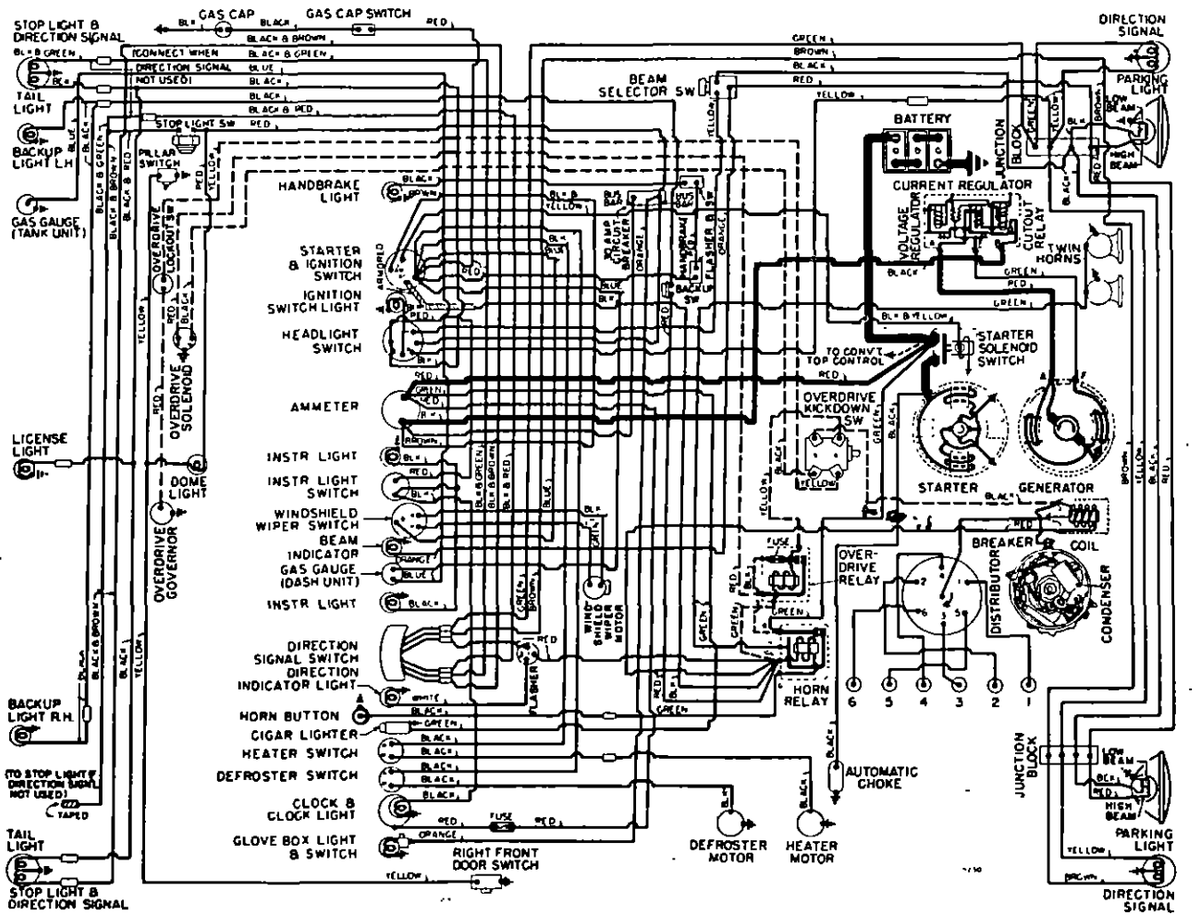
►*1953 SURGE CORRECTION (During Light Acceleration between 20 & 50 MPH)*—If not corrected by careful engine tune-up, this condition can be corrected by installing slightly richer Main Metering Jet and slightly leaner Step-up Power Jet. See Carburetor Section for complete data.
Idle Setting—Adjust for smooth idle (if vacuum gauge used, set for highest steady vacuum). Turn screw out for richer mixture.
Idle Speed—450-500 RPM.
Float Level—Top of float (not soldered seam) 5/64" plus or minus 1/64" below top edge of bowl.
Accelerating Pump—Center Hole normal setting. Outer Hole (max.) Winter, Inner (min.) Summer.
Fast Idle Setting: No adjustment required.
Choke Setting: Insert gauge pin through hole in automatic choke shaft and hole in base flange to position shaft. loosen choke valve lever screw and position choke so that valve is tightly closed.
Fuel Pump Pressure: 4-5½ lbs.
MANIFOLD HEAT CONTROL: Thermostatic coil type. See that valve operates freely. When installing coil, free end should have approx. ¾ turn wind-up (counter-clockwise) to hook over stop stud.
VALVE TAPPET CLEARANCE: .010" Intake & Exhaust HOT. Adjust with engine idling. NOTE—Adjusting screws are self-locking type.

IGNITION

IGNITION SWITCH: Mitchellock. Combination ignition-starter switch. Starter operates when key held fully to right (returns to "on" when released).

COIL: Auto-Lite No. CR-4001 (U.S.), CR-6007B (Canada). Mounted above distributor.
Ignition Current—2.25 amperes idling, 5 stopped.

CONTINUED ON NEXT PAGE



1952 MODELS

CONTINUED FROM PRECEDING PAGE

CONDENSER: Auto-Lite No. IAT-3076RA (for IAT-4011); IAT-3076LA (for IAT-4101); IAT-3076RA (for IAT-4012A).

Capacity—.25-.28 microfarad.

DISTRIBUTOR: Auto-Lite No. IAT-4011 (1952); IAT-4101 (1953). Canada—IAT-4012A. Automatic and vacuum advance.

Breaker Gap—.020" (.018-.022").

Cam Angle—39° ± 3°. DO NOT exceed breaker gap. limits to obtain dwell.

Breaker Arm Spring Tension—17-20 ounces.

Rotation—Clockwise viewed from above.

Automatic Advance—IAT-4011 & 4101

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Automatic Advance—IAT-4012A

Start	350	0	700
3	400	6	800
6	850	12	1700
9	1300	18	2600
12	1750	24	3500

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAT-4011 & 4101

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4¼"
1°	2°	5½"
4°	8°	9⅛"
7°	14°	12¾"
8°	16°	14"

Vacuum Advance—IAT-4012A

Start	0°	5"
1°	2°	6½"
3°	6°	9¼"
5°	10°	12⅛"
7°	14°	15"

Manual Adjustment—Provides for minor changes in timing at distributor. See Ignition Timing.

IGNITION TIMING

Std. Setting.....**①At TDC.**

①—Initial setting for regular fuel. See Manual Adjustment (below) for final setting.

Timing Mark—Crankshaft pulley or vibration dampener marked "DC" at top dead center point with 15-1° graduations before and after this point.

Timing (Using Synchroscope)—Loosen distributor lock-plate hold-down screw, center pointer on scale, tighten screw. Clip lead to #1 spark plug, direct light on impulse neutralizer (mark correct graduation with paint), idle engine, loosen lock-plate clamp bolt, rotate distributor until mark is aligned with pointer on front cover, tighten clampscrew.

Manual Adjustment—Set to give slight ping from 10-30 MPH, accelerating with wide-open throttle. To adjust, loosen lock-plate hold-down screw, move plate (not more than 4° or .007" before or after initial setting) counter-clockwise (if no ping), clockwise (if ping too severe), tighten screw.

CARBURETOR

Carter (B&B)	Model Nos.
Standard	D6H2
City Traffic	D6N2
Overdrive	D6U1
Hy-Drive Trans	D6P1 & D6P2
Taxicab	D6R1

1½" single barrel downdraft type with Sisson automatic choke.

►*1953 SURGE CORRECTION—See Tune-Up.*

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Jet—*See Carter (B&B) Jet Table in Carburetor Section for complete data.*

Fast Idle: Throttle opened to fast idle position when choke valve closed. No adjustment required.

Automatic Choke: Sisson type Optional.

Setting—Choke can be adjusted by inserting a gauge pin through hole in automatic choke lever shaft and slot in base mounting flange (to position shaft) and adjusting carburetor choke valve lever so that choke valve is tightly closed.

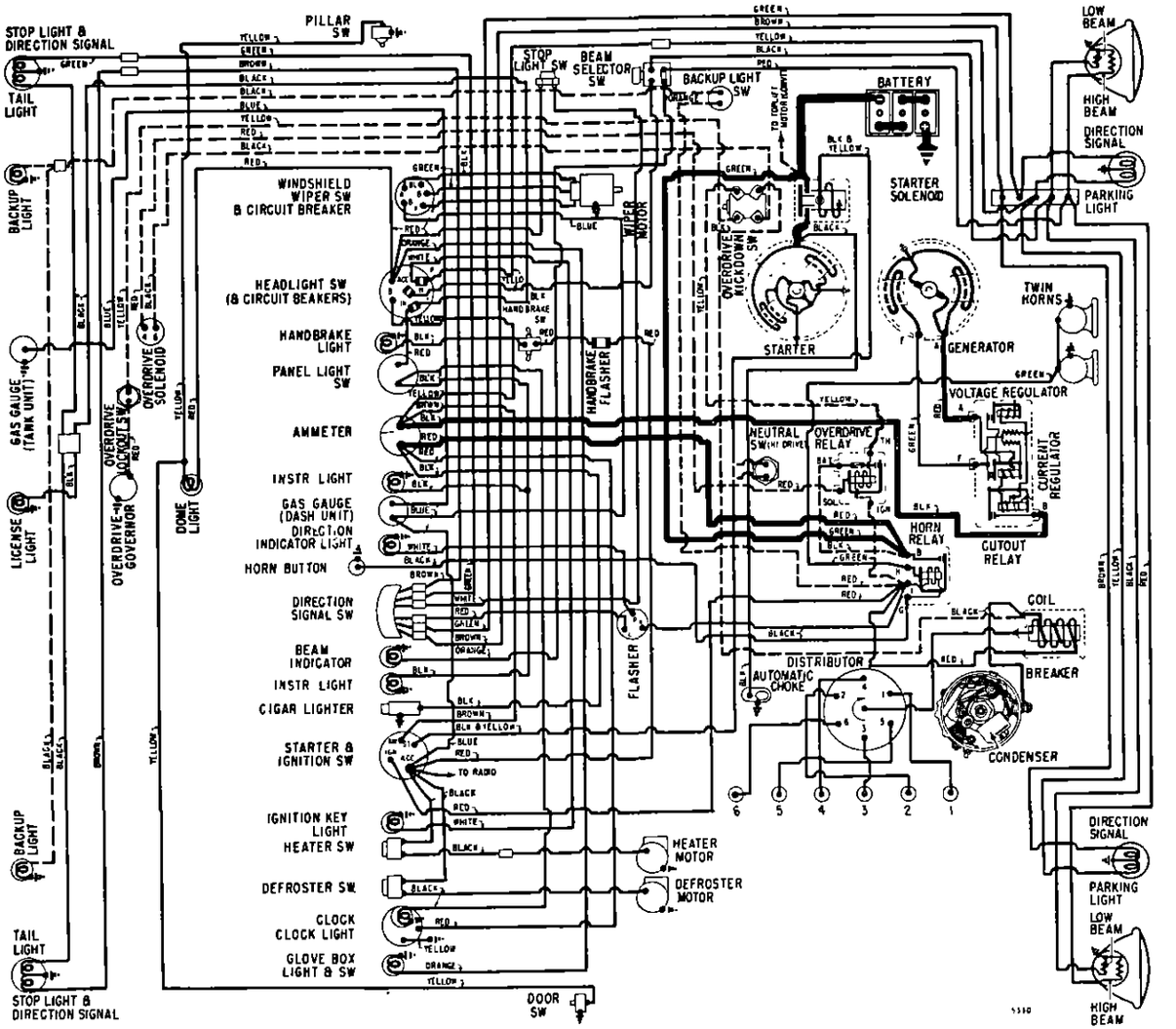
See Carburetion Equipment Section for data.

CARB. EQUIPMENT

Air Cleaner: Oil-bath type. Filter element AC No. 21.

Fuel Pump: AC diaphragm type. Fuel only (Std.); Fuel & Vacuum (Optional).

Replacement Pump: AC No. 588 or 9926.



1953 MODELS

Pressure—4-5½ lbs.
See Carburetion Equipment Section for data.

Fuel Tank Filter: Oilite metal filter in tank.
Servicing—If more than 2 pints water in tank, fuel will not pass through filter. Remove filler cap and drain plug, draining tank. Disconnect fuel line at some point between pump and tank, blow out line and filter with air, increasing pressure as filter is cleaned. Flush tank with clean gasoline.

Gasoline Gauge: Auto-Lite electric type.

►*1953 SUBURBAN FUEL GAUGE SERVICE REPLACEMENT NOTE*—A more accurate reading "Thermostatic" type fuel gauge, Plymouth Part No. 1594499 is available for service replacement.

►*1953 FUEL GAUGE CAUTION*—Suburban & Savoy models are REVERSED type and can be identified by green painted terminal insulator and reversed location of terminals (Dash Unit), longer float arm and green painted cap (Tank Unit). *THESE SPECIAL UNITS MUST BE USED TOGETHER.*

Dash Unit—Auto-Lite No. 12327A (Early 1952); No. 12780A (Late 1952 & 1953—Exc. 1953 Suburban & Savoy models); No. 13210A (Suburban & Savoy).

Tank Unit—Auto-Lite No. 12617A (exc. Suburban & Savoy), No. 12904A (Suburban & Savoy), No. 12618A (Special Equipment).
See Carburetion Equipment Section for data.

BATTERY

Willard HW-1-100-C or Auto-Lite Type 1M-100-D. 6 Volt, 15 Plate, 100 Ampere Hour (20 hr. rate).

►*1953 BATTERY RUNNING DOWN UNDER SLOW DRIVING CONDITIONS—See "Generator Pulley Production Change" (following).*
Grounded Terminal—Positive (+) to engine.
Location—In left fender shield under engine hood.

STARTER

Model	Auto-Lite No.
1952 (Early) (U.S.)	MCH-6201
1952 (Late) & 1953 (U.S.)	MCH-6205
1952 (Early) (Canada)	MCH-6202
1952 (Late) & 1953 (Canada)	MCH-6206

Armature—Auto-Lite No. MCH-2088 (All Cars).
Drive—Bendix No. A3274, "Folo-thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ounces (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6 "	Lock	2.0	335

Starting Switch: Auto-Lite No. SST-4006. Magnetic type mounted on left front fender shield and controlled by ignition switch.

GENERATOR

Model	Auto-Lite No.
Std. (1952 & Early 1953)	GGW-6001K
Std. (Late 1953)	GGW-6001J
City Police & Taxi	GGJ-6001F
City Police & Taxi	GGU-6001G
State Police	GGJ-6001G
State Police	GGU-6001R

2 brush types with voltage and current regulation.

►*1953 GENERATOR PULLEY PRODUCTION CHANGE (To prevent battery rundown under slow driving conditions)—3¼" pulley used on later 1953 cars (Plymouth Part No. 1345974). Can be installed on earlier 1953 cars if driving conditions warrant.*

Armature—GGW-2006F (GGW type generator); GGU-2006F (GGU type generator); GGJ-2101F (GGJ type generators).

Maximum Charging Rate—See table below.

Charging Rate Adjustment—None. See Regulator.

Performance Data—GGW-6001J, K

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
45	8.0	1925-2125 — 2350-2550

Performance Data—GGU-6001G, R

0	6.4	750-850 — 800-900
45	8.0	1450-1650 — 1650-1850
50	8.0	1550-1750 — 1750-1950

Performance Data—GGJ-6001F, G

0	6.4	600-700 — 650-750
50	8.0	1400-1600 — 1550-1750
55	8.0	1500-1700 — 1650-1850

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—(GGW-GGU) 35-53 ounces (new brushes), (GGJ) 30-37 ounces (new brushes).

Field Current—(GGW) 1.3-1.5 amperes; (GGU-GGJ) 1.4-1.6 amps., all at 5.0 volts.

Motoring Current—(GGW) 3.9-4.5 amperes; (GGU) 5.0-6.0 amps., (GGJ) 3.7-4.2 amps., all at 5.0 volts.

Belt Adjustment: Loosen pivot and clamp bolts, pull generator out for ½" belt deflection midway between generator and pump pulleys.

REGULATOR

Auto-Lite Regulator No.	for Auto-Lite Gen. No.
VAV-6001B or ①VAV-6002B	GGU-6001G, R
VBE-6001A	GGW-6001J, K
VBF-6001A or ①VBF-6002A	GGJ-6001F, G

①—For negative ground.

Voltage and current type with "Temperature Compensated" Current Regulator.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover sealed. Serviced on exchange basis if seals not broken.

Cutout Relay
Cuts In (All)—6.3-6.8 volts (set to 6.4-6.6 volts).
Cuts Out (All)—4.1-4.8 volts (4-6 amps. disch.).
Air Gap (All)—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting (VAV, VBE Reg.)—7.1-7.4 volts.
Setting (VBF Reg.)—7.15-7.45 volts.

►*NOTE—Set after 15 minutes operation charging at 10 amperes (VBF) or at ½ maximum rate (VAV & VBE).*
Air Gap (All)—.048-.052" with contacts just opening (at point side next to armature stop pin).
Checking & Adjusting—*See Elec. Equip. Section.*

Current Regulator
►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.:*

	Test A—Operating Amperes	Test B
VAV-6001B, 2B	55	50 (48-52)
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	66	55 (53-57)

Test A—After 15 minutes operation charging at 10 amperes (VBF) or at ½ max. rate (VAV & VBE).
Test B—After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-7.0 volts).
Air Gap (All)—.048-.052" with contacts just opening.
Checking & Adjusting—*See Elec. Equip. Section.*

LIGHTING

Headlamps: Sealed Beam type.
See Electrical Equipment Section for complete data.
Beam Indicator—On speedometer dial. Lighted when upper beams on.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—On speedometer dial. Flashes when direction signal operating.

Switches
Lighting—Plymouth No. (1952) 1339691, (1953) 1495859.
Beam Selector—Plymouth No. 1253003.
Instrument—Plymouth No. (1952) 1343740, (1953) 1495840.
Direction Signal—Plymouth No. 1440080.

MISC. ELECTRICAL

CIRCUIT BREAKER (1952): 30 ampere. On back of instrument panel above headlight switch.

CIRCUIT BREAKER (1953): In headlight switch assembly. Two 10 ampere and one 20 ampere, protect headlight, tail, stop light, accessory, and interior lighting circuits.

FUSES: Clock—3 ampere. In clock lead connector.
Overdrive—20 ampere. On overdrive relay.

HORNS: Dual horns operated by relay.

	Auto-Lite No.
1952 Low Pitch (U.S.)	HW-4205
1952 High Pitch (U.S.)	HW-4206
Early 1953 Low Pitch (U.S.)	HAB-4619
Early 1953 High Pitch (U.S.)	HAB-4620
Late 1953 Low Pitch (U.S.)	HAB-4655
Late 1953 High Pitch (U.S.)	HAB-4656
1952-53 Low Pitch (Canada)	HW-4107
1952-53 High Pitch (Canada)	HW-4108

Horn Relay: Auto-Lite HRL-4104. Connected through ignition switch, operates only with ignition on.
Contacts Close—1.5-3.0 volts (seal to core with 4 v.).
Contacts Open—.5 volts min. (open from seal).
Contact Gap—.026". **Air Gap**—.016-.020" (armature air gap with contacts closed but not sealed), .015-.018" (gap between armature leg and yoke with armature sealed to core).

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" hd. type.
Bore—3¼". **Stroke**—4⅜".
Displacement—217.8 cu. ins. **Rated HP.**—25.35.
Developed HP—(1952) 97, (1953) 100, at 3600 RPM.
Compression Ratio—(1952) 7.0-1, (1953) 7.1-1.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE & OIL PAN REMOVAL: *See Plymouth Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Plymouth Special Data.*

►*1952 CYLINDER HEAD CAUTION*—Two types of cylinder heads used. Head on later cars identified by

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ENGINE

CONTINUED FROM PRECEDING PAGE

casting No. 1405849 on top surface toward rear of head. Later head can be used for replacement on earlier models from "P-15" on, but must be used with new type gasket, Plymouth No. 1326319.

PISTONS: Aluminum alloy, "U" slot, cam ground type.
Original Bore & Piston Sizes—*See Plymouth Special Data.*
NOTE—Piston skirt is elliptical (.010-.012" smaller diameter across pin bosses than across thrust faces), and tapered (.0005-.0015" smaller diameter at top of skirt than at bottom).

▷*PISTON NOTE*—"Centerless Ground" and "Diamond Bore Turned" pistons used in production. Both types may be found in the same engine and the wear pattern on the piston wall will be different. "Centerless Ground" type will show normal vertical lines while the "Diamond Bore Turned" type will show horizontal lines. These conditions are normal and the pistons are interchangeable in the engine.

▷*CYLINDER BORE OVERSIZE CAUTION—Engine with letter "A" following engine number indicates that cylinder bore .020" oversize.*
Length—3 11/16". **Weight**—16.0 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—.028-.032" (Head & Ring Lands), .0002-.0012" (Skirt—across thrust faces and ¾" up from bottom). See Fitting New Pistons.

Fitting New Pistons: With cylinder bore and piston clean and dry, piston should be fitted so it will pass through cylinder with a light push fit of the hand and will stop anywhere in the bore, holding itself without falling through of its own weight.
NOTE—Fit piston at point of smallest bore diameter, and with piston pin removed from piston. Make certain that U-slot is away from valve side of engine.

Replacement Pistons: .005", .020", .030", .040", .060" OS.

Installing Pistons: "U" slot away from valves.

PISTON RINGS: Two compression (top ring chrome-plated, second tin-plated), two slotted oil control rings per piston, all above pin. Oil ring grooves drilled for oil drainage.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.0025-.004"
Compr. (#2)	3/32"	.007-.015"	.002-.0035"
Oil Contr. (#3,4)	.5/32"	.007-.015"	.001.0025"

Installing Rings—#1 Compr. with step on inner edge up. #2 Compr. with step on inner edge up or if step on outer edge, install with step down.

Replacement Rings: .005", .020", .030", .040", .050", .060" OS. *See "Piston Rings" in Plymouth Special Data.*

PISTON PIN: Diameter—55/64". **Length**—2 3/4". Pin floats in piston and rod, held by lock rings.
Pin Fit in Piston—.0000-.0005" or tight double thumb press fit at room temperature.
Pin Fit in Rod—.0001-.0002" or tight thumb press fit at room temperature.

Replacement Pins: Std., .0006", .003", .008" Oversize.

CONNECTING ROD: Length—7 15/16". **Weight**—31.06 ozs. (with bolts, less bearings).
Crankpin Journal Diameter—2 1/16".

▷*THICKER-WALL BEARING AND JOURNAL DIAMETER CAUTION (One or more Journals Machined Undersize). See "Original Bearing Sizes" in Plymouth Special Data.*
Lower Bearing—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015". **Sideplay**—.006-.011".

Bearing Adjustment: None (no shims). Replace bearings. *See "Connecting Rod & Bearings" in Plymouth Special Data.*
Journal Diameters—2.4995-2.5005". *See "Original Bearing Sizes" in Plymouth Special Data.*

Replacement Bearings: .001", .002", .003", .010", .012", .020" Undersize. *See "Original Bearing Sizes" in Plymouth Special Data.*

Installing Rods: Wide portion of bearing to rear (#1, 3, 5), to front (#2, 4, 6). Oil hole to camshaft.

CRANKSHAFT: 4 bearings, 7 integral counterweights, with vibration dampener on front end.

▷*1953 CRANKSHAFT CAUTION—Crankshaft is not interchangeable with previous models due to changes for new type oil seal.*

▷*1953 HY-DRIVE ENGINE SPECIAL REAR MAIN BEARING: See "Crankshaft & Main Bearings" in Plymouth Special Data.*

▷*THICKER-WALL BEARING & JOURNAL DIAMETER CAUTION—(One or More Journals Machined Undersize). See "Original Bearing Sizes" in Plymouth Special Data.*
Bearings—Removable, precision type, steel-backed, thin babbitt-lined. No shims.
Clearance—.0005-.0015".

Bearing Adjustment: None. Replace bearings. *See "Crankshaft & Main Bearings" in Plymouth Special Data.*

Replacement Main Bearing Caps: *See "Crankshaft & Main Bearings" in Plymouth Special Data.*

Replacement Bearings: .001", .002", .003", .010", .012", .020", .030", .040" Undersize. *See "Original Bearing Sizes" in Plymouth Special Data.*

End Thrust: Taken by flanged faces of #4 (rear) main bearing. **Endplay**—.003-.007".

Crankshaft Front & Rear Oil Seals: *See "Crankshaft and Main Bearings" in Plymouth Special Data.*

▷*1953 TIMING CHAIN COVER OIL SEAL PRODUCTION CHANGE*—To reduce oil leakage and hub wear, a new seal, Plymouth Part No. 1551061 is available for service replacement.

▷*1953 REAR MAIN OIL SEAL CAUTION—New type seals must be used with 1953 crankshaft and are NOT interchangeable with previous type seal.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1¼".
Bearings—Removable, steel-backed, babbitt-lined bushings (except #4—machined in crankcase).
Clearance—.001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Camshaft Removal & Installation: *See Plymouth Special Data.*

Timing Chain: Width 1". Pitch .500" (½"). Length 24" or 48 links.
Timing Chain Removal—*See "Timing Chain" in Plymouth Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:

	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.340-.341"	4 27/32"
Exhaust	1 13/32"	.340-.341"	4 27/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	⅜"	.001-.003"
Exhaust	45°	⅜"	.003-.005"

Exhaust Valve Seat Inserts—*See "Valve System" in Plymouth Special Data.*

Valve Guides: Remove from above. Press new guides in with stepped end down and upper end ⅞" below top of block, ream guides to inside diameter of .342-.343" (Intake), .344-.345" (Exhaust).

Valve Springs: Install with close-coil end to top.

Free Length 2".	Spring Pressure	Spring Length
Valve Closed	40-45 lbs.	1¾"
Valve Open	107-115 lbs.	1⅜"

Valve Lifters: Mushroom type (remove from below with camshaft out of engine). Stem diameter ⅜". Service by reaming lifter holes (work from above piloting reamer in valve guide) and installing oversize lifter furnished .001", .008", .030" Oversize.

VALVE TIMING

Tappet Clearance: .010" (All) Hot.
NOTE—Tappet screws self-locking type.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.
Valve Timing Check—With .014" tappet clearance (Cold), #6 intake valve should open with #6 piston 5° to 17° BTDC (5th to 17th graduation before DC mark on impulse neutralizer aligned with pointer on chain case cover). Reset tappet clearance to running clearance .010" hot.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearing and timing chain. "Rotor" type oil pump.
Crankcase Capacity—5 qts. refill (Std. & Overdrive Cars), 10 qts. (Hy-Drive Trans. Cars).
NOTE—1 qt. addtl. required when filter changed.

▷*HY-DRIVE TRANSMISSION NOTE*—Engine and torque converter oil systems combined. Maintain engine oil level as indicated on crankcase oil level dipstick. Change oil twice each year regardless of mileage. See Hy-Drive Transmission data.
Normal Oil Pressure—40-60 lbs. above 30 MPH.
NOTE—On Hy-Drive Cars, idling oil pressure will be lower and running oil pressure higher than on other cars.
Oil Pressure Regulator—Under plug on left side of crankcase (below starter). Opens at 45 to 55 lbs. Serviced by replacing spring. (Std. spring Unpainted, Lighter—Red, Heavier—Green. *Use replacement spring of same color as original spring.*

▷*HY-DRIVE TRANS. CAR NOTE*—Engines have internal by-pass relief valve in oil pump cover (recirculates oil within pump) and oil filter by-pass valve on left side of crankcase (this valve opens at approx. 40 lbs. and allows oil to flow through filter).

Oil Pump: Rotor type. On right side of engine.
Oil Pump Removal & Overhaul: *See Plymouth Special Data.*

Oil Filter: On left side of engine above starter. Replace filter element at 8,000 miles (Cars without

Hy-Drive); every 5,000 miles (Cars with Hy-Drive). or more often if required by operating conditions.

Oil Pressure Gauge: Auto-Lite No. 12324A (Early 1952); No. 12781 (Late 1952); No. 13093A (1953).

COOLING

►***ENGINE COOLING CAUTION:*** Clearance between fan and radiator core should be ¾" to 1" (measured at bottom of core—check all fan blades for alignment and clearance). If clearance greater than 1", install spacers, Part No. 920544, as required, between fan and pulley using new screws No. 122017 (with one spacer), No. 122022 (with two spacers).

Cooling System: Pressure type with pressure valve and relief valve in filler cap, by-pass type thermostat, and water distribution tube in block.
Pressure Valve—In filler cap. Opens at 7 lbs.
Capacity—13 qts.

Radiator Core Removal: *See "Radiator" in Plymouth Special Data.*

Water Distribution Tube Servicing: *See "Cooling System" in Plymouth Special Data.*

Water Pump: Packless type with grease fitting.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, lift fan and pump off.

Thermostat: In Cylinder head water outlet.
INSTALLING NOTE—Install thermostat with 2 ports facing front and 2 ports facing rear.
Setting—Starts to open 157-162°F. Fully open 183°F.

Temperature Gauge: Auto-Lite No. 12701A (Early 1952); No. 12782A (Late 1952 & 1953). Not electrical.

CLUTCH

Borg & Beck Model 9A7, Assembly No. 926 or Auburn Model No. 100052-1 (Std.). Borg & Beck Model 8.5A6, Assy. No. 1340 (Hy-Drive Cars). Borg & Beck Model 10A7 No. 957 or 11A6 No. 931 (Optl. Heavy Duty).
See Clutch Section for complete data.

►*1953 (HY-DRIVE CARS) CLUTCH NOISE CORRECTION: See Clutch Section for complete data.*
Facings—Molded type. **I.D.** 6" (Auburn), 6⅛" (926), 6½" (931), 7" (957), **O.D.** 8½" (1340), 9¼" (Auburn & 926), 10" (957), 11" (931). **Thickness** .115" (Auburn), .125" (All Borg & Beck).

Pedal Adjustment: Set pedal to just clear toeboard (stopscrew on lower end of pedal) and set for 1" free travel (adjust nut on connector link at fork). NOTE—Do not disturb turnbuckle on pedal link.

Removal: Remove Transmission (see Transmission Removal below), remove release fork pull-back spring and clutch housing underpan. Disconnect release fork from pivot, withdraw release bearing and sleeve from housing. Mark clutch and flywheel (to insure correct re-installation), remove all clutch cover mounting screws evenly, remove clutch cover assembly and driven member through opening at bottom of housing.

SYNCHRO-MESH TRANSMISSION

Own Make. All helical gear, constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

►*1952 HARD SHIFTING CORRECTION—See "Chrysler, DeSoto, Dodge & Plymouth Synchro-mesh" in Transmission Section for complete data.*

►*OVERDRIVE TRANS. LOW-&-REVERSE SHIFT RAIL PRODUCTION CHANGE: See Transmission Section for complete data.*

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Jack up front end of car. Disconnect front universal by taking out bolts in shaft flange (if transmission to be dismantled, loosen flange retaining nut), and rear universal by removing bearing caps on rear axle yoke (wire bearing cups in place to prevent loss of bearing rollers). Disconnect speedometer cable, hand brake cable at brake band, gearshift control rod and selector rod at transmission case. Remove transmission mounting screws in clutch housing, pull transmission straight back to free clutch shaft, remove transmission from below. NOTE—When installing transmission, use pilot studs installed in upper mounting screw holes.

OVERDRIVE

Warner Model AS1-R10G. Optional equipment with Plymouth transmission. Solenoid operated overdrive (governor control and throttle kick-down).
See Transmission Section for complete data.
Overdrive Solenoid—Delco-Remy No. 1118155.
Governor—Auto-Lite No. TGE-4008 (1952 & Early 1953); No. TGE-4010 (Late 1953).
Control Relay—Auto-Lite No. HRT-4001A.

►*1953 OVERDRIVE RELAY RELOCATION (To Eliminate Short)—See "Warner R-10 Overdrive" in Transmission Section for complete data.*
Overdrive Fuse—20 ampere. On control relay.

Removal: Disconnect two wires from rail lockout switch, two wires from solenoid, wire from control lever. Then remove overdrive and transmission (see Transmission Removal above).

HY-DRIVE TRANSMISSION

Own Make (Optional Equipment)—Unit consists of Torque Converter and std. 3-speed transmission.
See Transmission Section for complete data.

Hy-Drive Control: Remote type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

►**Neutral Safety Switch Checking & Adjusting**—Connect one end of a test wire to small terminal on solenoid switch. With transmission in neutral, ground wire to negative terminal of battery. If starter operates, remove neutral switch and check with a test lamp. Remove switch gasket if switch is satisfactory and apply sealer to switch threads. Reinstall switch. If test indicates switch is not making contact, machine .015-.020". off face of threads.

Lubrication: Two oil changes required per year (regardless of mileage). Drain engine and "Hy-Drive" Torque Converter separately. To refill, pour 10 qts. (11 qts. if filter changed) of correct viscosity oil into crankcase and run engine at fast idle for 5 minutes. Check engine oil level.
Capacity—10 qts. (1 qt. addtl. if filter changed).

►*OIL FILTER CHANGE CAUTION—On "Hy-Drive" Cars, oil filter element must be changed every 5,000 miles.*

REMOVAL: Disconnect battery cables and two wires leading to transmission neutral safety switch, drain crankcase and torque converter. Then proceed as follows:
1) Remove transmission. *See "Transmission Removal" on car model page.*
2) Remove clutch release fork, pull back spring and disconnect rear end of clutch fork rod assembly. Remove pivot bracket assembly from clutch housing, then remove torque shaft.
3) Remove rear engine-to-crossmember bolts, install engine support fixture Tool C-3162. Insert hooks of fixture firmly into holes on either side of frame sub side rails with support ends up against underside of cylinder block. Adjust support fixture adjusting bolt so it will support engine while removing rear engine crossmember. Remove crossmember-to-frame bolts, remove crossmember. Lower engine approximately 3 or 4 inches to permit access to upper clutch housing-to-torque converter housing bolts. Remove bolts and carefully remove clutch housing from underneath car.

►*CAUTION—Do not pry between housing flanges or pound housing to loosen. This would distort housing and result in misalignment.*
4) Punch mark clutch cover and clutch driving plate to insure reinstallation in same position. Remove clutch cover and pressure plate assembly and clutch disc from clutch driving plate.

►*CAUTION—Torque converter housing and clutch housing machined as assembly. If necessary to replace one or the other, replace both housings.*
5) Remove torque converter housing-to-adapter plate bolts and lockwashers. Three bolts are located on engine side of adapter plate. Housing is doweled to adapter plate and care should be exercised when removing housing. Do not pry between flanges to loosen as this will distort metal and result in misalignment. Carefully move housing straight back to avoid damage to torque converter impeller hub oil seal and turbine shaft oil seal ring. Remove seal rings between converter housing and adapter plate. Inspect mating surfaces of adapter plate and torque converter housing, remove burrs or rough spots with emery cloth.
6) Remove six bolts that hold metal dust shield to adapter plate, lift shield out. Remove eight nuts and lockwashers that hold converter unit to crankshaft (use Tool C-811). *The torque converter assembly is a welded unit and cannot be serviced except as an assembly.*
7) Remove bolts which hold adapter plate to engine block, carefully remove adapter plate. *Do not pry or pound on adapter plate to loosen it.* Remove oil rings and thoroughly inspect mating surfaces of adapter plate and engine block. Remove burrs and rough spots with emery cloth.

UNIVERSALS

Detroit. Ball-and-Trunnion type.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

	P-22	P-23	P-24
Standard Trans.	3.73-1	3.9-1	3.73-1
Overdrive	4.1-1	4.3-1	4.1-1
Hy-Drive			3.73-1
Optional①	4.1-1	4.3-1	4.1-1

①—Mountains & Hilly country.

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Backlash—.006-.010".

Removal: Hoist rear end of car. Remove rear wheels. Disconnect brake hose at frame bracket, disconnect lower end of shock absorbers. Disconnect propeller shaft by removing capscrews from bearing caps on rear axle yoke (wire bearing caps in place to prevent loss of bearing rollers). Support axle housing, remove rear spring "U" bolts, lower axle assembly and remove from beneath car.

►*LIFTING CAUTION*—To avoid possibility of transmission oil leaking onto clutch, DO NOT hoist rear tires more than 25" above floor when lifting at rear axle, or rear bumper more than 35" from floor.

Axle Shaft Removal—Remove wheel, hub and drum assembly (use screw type hub puller—Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support and oil seal, pull shaft and bearing with C-499 puller.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015" and .030" thick) equally at both wheels. **Endplay**—.003-.008".

SHOCK ABSORBERS

Own Make—"Oriflow" hydraulic, direct-acting, non-adjustable, non-refillable.

Plymouth Part Nos.	Front	Rear
Early 1952 (Std.)	1321127	1321128
Late 1952 & 1953 (Std.)	1326164	1326165
1952-53 (Heavy Duty)	1450041	1450075

►*1953 REAR SHOCK ABSORBER BRACKET PRODUCTION CHANGE & SERVICE REPLACEMENT—A new stronger shock absorber frame bracket Plymouth Part No. 1319554 used in production and for service replacement.*

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs and direct acting shocks.

►*CONTROL ARM & FRONT SPRING PRODUCTION CHANGE (Convertibles): See Front Suspension Section for complete data.*

Kingpin Inclination—5° to 6½° crosswise.

Camber—Neg. ⅜° to Pos. ⅜° (¼-½° higher on left).

Caster—0° preferred. Limits Neg. 1° to Pos. 1°.

Toe-In—0" preferred. Limits 0" to 1/16".

Toe-out on Turns—Inner wheel 21½° plus or minus 1° with outer wheel turned 20°.

STEERING GEAR

Own Make—Worm-and-roller type with "push-pull" adjustments. Same as Gemmer Model 305.

NOTE—See Gemmer Model 305 article for data.

See Steering Gear Section for complete data.

BRAKES

Service: Chrysler "Safe-guard" Lockheed Hydraulic.

Front Wheels—Two-cylinder type (front shoe anchored at bottom and actuated by upper cylinder, rear shoe actuated by lower cylinder.

Rear Wheels—Double anchor type with a single double-acting wheel cylinder.

See Brake Section for complete data.

►**Brake Squeak Correction**—*See "Chrysler Brakes" in Brake Section.*

Wheel Cylinders—Single-acting type (front) double-acting type (rear) with straight (1⅛") bore.

Drums—Centrifuse type. Diameter 10".

Lining—Molded asbestos. **Width** 2". **Thickness** .200". **Length per wheel**—21" (front), 18½" (rear).

Clearance—.006" at each end of all brake shoes.

Hand Brake: Independent type. Hand brake lever actuates band on drum at rear of transmission.

Drum Diameter—6". Cast iron.

Lining—**Width** 2". **Thickness** 5/32". **Length** 16 11/16".

Clearance—.015-.020" around band.

Adjustment—*See "Brake Notes" in Plymouth Special Data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electrical-mechanical type. *See Miscellaneous Section for data.*

WINDSHIELD WIPERS: Auto-Lite or Redmond. Electric type. *See Miscellaneous Section for data.*

►*1952 IMPROVED WINDSHIELD WIPER ACTION: See 1953 Redmond and Auto-Lite Electric Windshield Wipers for installation of new type linkage.*

MODEL IDENTIFICATION

Series	1954	1955
Plaza	P-25-1	P-26-1
Savoy	P-25-2	P-26-2
Belvedere	P-25-3	P-26-3

SERIAL NUMBER: On left front door hinge pillar post.

Starting Serial Numbers

Assembly Plant	1954	1955
Detroit	13,506,001	13,835,001
Los Angeles	25,163,001	20,745,001
Evansville	20,658,001	25,180,001
San Leandro	25,590,001	

ENGINE NUMBER: Stamped on left front side of cylinder block.

Starting Engine Number—1001 up (each year).

►*ENGINE NOTE: Two engines used in 1954. 217 Cu. In. (4 3/8" Stroke) used in Early 1954. 230 Cu. In. (4 5/8" Stroke) used in Late 1954 and 1955.*

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A"—ALL cylinders .020" oversize.

"B"—ALL crankshaft journals .010" undersize.

"AB"—BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 105 lbs. (217" Engine); 120-150 lbs. (230" Engine). At cranking speed of 150 RPM. 10 lbs., maximum variation between cylinders.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: .010", Intake and Exhaust. Engine must be hot and idling.

►*CONTINUOUS HIGH SPEED TAPPET CLEARANCE:* An additional .002" clearance for **exhaust** tappets is desirable.

MANIFOLD HEAT CONTRCL: Thermostatic coil type. See that valve operates freely. When installing coil, spring should be installed so that approximately ¾ turn is required to hook outer end of spring around stud.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .035".

Plugs—Auto-Lite Resistor 4S-140, 14mm. Torque to 32 ft. lbs.

COIL: Auto-Lite CR-4001 (Early 1954); CR-6012C (Late 1954 & 1955). CR-6007B (Canada).

Ignition Current—2.25 amperes idling. 5.0 stopped.

DISTRIBUTOR: Auto-Lite IAT-4101 (Early 1954); IAT-4101C (Late 1954); IAT-4101B (Later 1954 & 1955); IAT-4012 (Canada).

Condenser—IAT-3076RA. **Capacity**—.250-.285 mfd.

Contact Point Set—Auto-Lite IGW-3028BS.

Breaker Gap—.018-.022". Set maximum gap to .020".

Cam Angle—36-42°. DO NOT exceed breaker gap limits

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance—IAT-4101B

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	400	0	800
1	525	2	1050
4	875	8	1750
7	1225	14	2450
8	1350	16	2700

Automatic Advance—IAT-4101, 4012

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	0	700
1	450	2	900
5	800	10	1600
9	1300	18	2600
10	1425	20	2850

Automatic Advance—IAT-4101C

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	0	700
1	440	2	880
5	800	10	1600
8	1175	16	2350
9	1300	18	2600

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAT-4101, B, C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-3/4
1	2	5-7/8
4	8	9-3/8
7	14	12-7/8
8	16	14

Vacuum Advance—IAT-4012

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-1/4
2	4	6-3/4
4	8	8-5/8
6	12	10-3/4
9	18	15

►*DISTRIBUTOR INSTALLATION CAUTION: Make sure that No. 1 piston is at TDC on compression stroke and that distributor rotor is in No. 1 firing position.*

IGNITION TIMING

Setting—2° BTDC.

Timing Mark—On crankshaft drive pulley or vibration dampener. Five marks on each side of "DC" mark. Each mark is 2°.

Manual Adjustment—Timing may be advanced to 6° BTDC with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR

►*CARBURETOR APPLICATION: Carter Carburetors used as follows:*

Model	Carter Model & No.
1954 (Early)—Standard ①	BB D6H2
1954 (Early)—Overdrive ①	BB D6U1
1954 (Early)—HyDrive ①	BB D6P2
1954 (Early)—City Traffic ①	BB D6N2
1954 (Early)—Standard ②	BBS 920S
1954 (Early)—Overdrive ②	BBS 993S
1954 (Early)—Hy-Drive ②	BBS 994S
1954 (Early)—City Traffic ②	BBS 2203S
1954 (Late) & 1955—Standard ②	BBS 2063S,SA
1954 (Late) & 1955—Overdrive ②	BBS 2062S,SA
1954 (Late) & 1955—Hy-Drive ②	BBS 2116S,SA
1954 (Late) & 1955—PowerFlite ②	BBS 2116S,SA
1954 (Late) & 1955—City Traffic ②	BBS 2215S

①—217" Engine (4 3/8" Stroke).

②—230" Engine (4 5/8" Stroke).

CARTER B & B

Idle Setting—1/2-1-1/2 turns open. Turn screw out for richer mixture.

Idle Speed—450-500 RPM.

Float Level—Top of float (not soldered seam) 5/64" plus or minus 1/64" below top edge of bowl.

Accelerating Pump—Long stroke for cold weather, short stroke for hot weather.

Fast Idle: No adjustment required.

Automatic Choke Setting: Insert gauge-pin-through-hole in automatic choke shaft, and hole in base flange to position shaft, loosen choke valve screw and position choke so that valve is tightly closed.

Slow Closing Throttle (Dashpot): (D6P2) Tighten adjusting screw (top of bowl cover), then turn counter-clockwise 4-1/2 turns. Further adjustment outward will increase action of dashpot.

Overdrive Kickdown Switch Adjustment: (D6U1) With throttle valve in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kickdown lever and switch stem guide.

►*OTHER DATA: See "Carter BB" in Carburetor Section.*

Fuel Pump Pressure: 4-5-1/2 lbs.

CARTER BBS

►*1954 METERING JET PRODUCTION CHANGE (Carburetor Nos. 920S, 993S, 994S): See "Carter BBS & BBD Jet Specifications" in Carburetion Section for later type jets.*

►*1955 CARBURETOR PRODUCTION CHANGE:* Clearance between throttle shaft and holes in throttle body have been reduced to improve fit of parts. These carburetors identified by letters "D-S" punched in brass tag attached to carburetor.

►*REPLACEMENT CARBURETOR NOTE:* Carter BBS 2249S is replacement for above carburetors. With Overdrive use Unitized Pkg. 192-33U (Kickdown Switch), and with PowerFlite Unitized Pkg. 202-80U (Dashpot).

Idle Setting—1/2—1-1/2 turns open. Turn screw out for richer mixture.

Idle Speed—450-500 RPM.

Float Level—7/32" from top surface of body casting to top of each float. If one float lower than other, adjust by bending float arm. If both floats require same correction, adjust by bending lip on float arm.

Accelerating Pump—Center hole. Distance from top of bowl cover to top of plunger shaft should be 54/64". Adjust by bending throttle connector rod at lower angle.

Fast Idle: .019-.023" (920S, 993S, 994S); .022-.026" (Others), clearance between throttle valve and bore of carburetor (side opposite idle port), with choke valve held tightly closed and throttle stop screw backed off.

Automatic Choke: Set on index.

Slow Closing Throttle (Dashpot): (994S, 2116S, SA) Maximum dashpot action is obtained by loosening locknut and adjusting dashpot unit so that dashpot plunger can be moved inward approximately 3/32" with throttle valve tightly closed.

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Overdrive Kickdown Switch: (993S, 2062S, SA). With throttle valve in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kickdown lever and switch stem guide.

Throttle Linkage Adjustment (PowerFlite Cars): *See "PowerFlite" in Transmission Section.*

►*OTHER DATA: See Carter "BBS" in Carburetor Section.*

Fuel Pump Pressure: 4-5½ lbs.

CARB. EQUIPMENT

Fuel Pump: (1954)—AC diaphragm type. **Replacement Pump**—AC No. 588 or 9926. Fuel only.

Fuel Pump: (1955)—Carter diaphragm type. **Replacement Pump**— Carter No. M2242S.

Pressure—4-5½ lbs.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Auto-Lite electric type as follows.

NOTE—"Two Wire Thermostatic Type" used on Late 1954 Suburban. "One Wire Magnetic Type" used on all other models.

Dash Unit (1954)—Auto-Lite 12780A (Exc. Suburban); 13210A (Early Suburban); 13513A (Late Suburban).

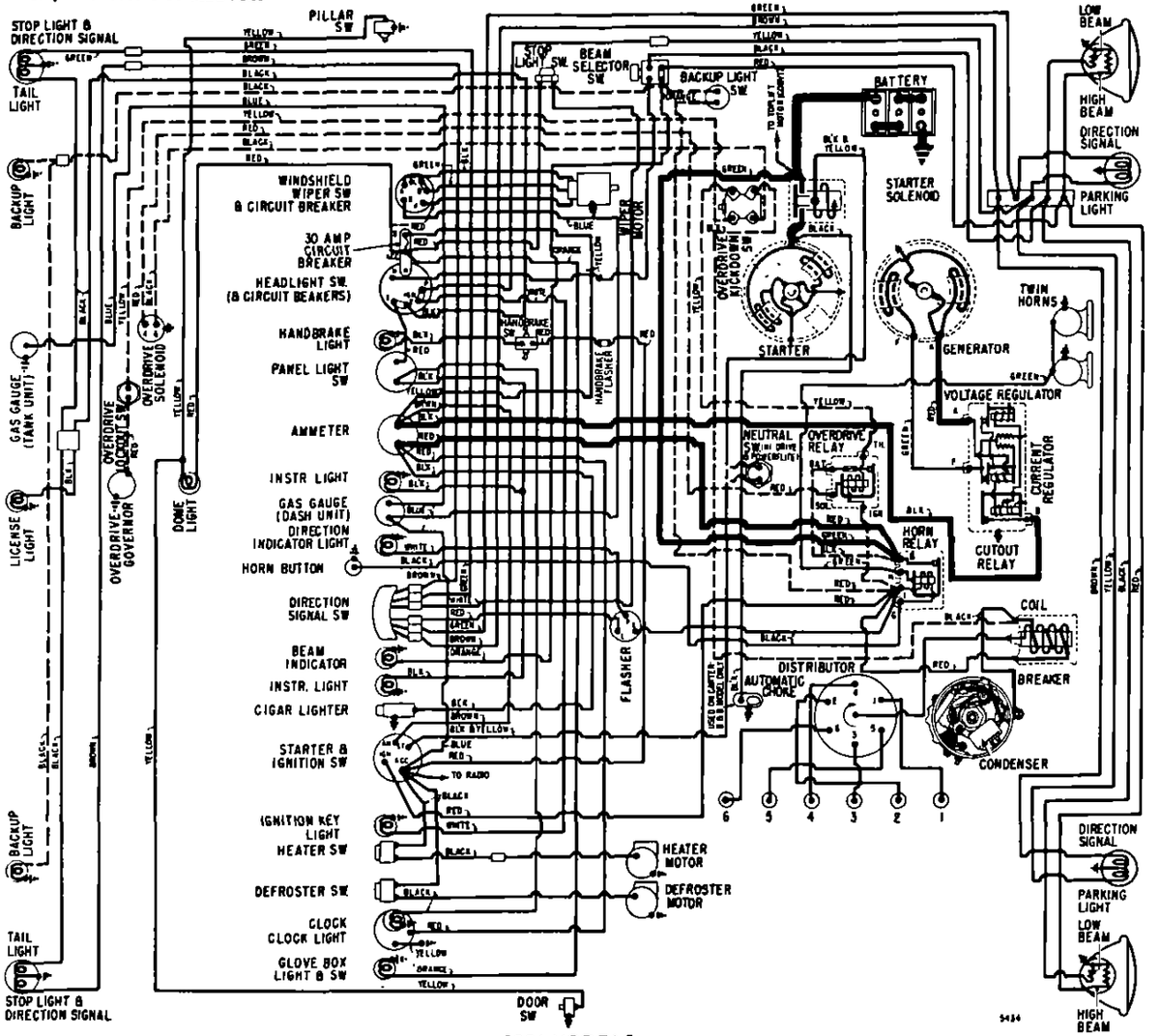
Dash Unit (1955)—Auto-Lite 13753A.

Tank Unit (1954)—Auto-Lite 12617A (Exc. Suburban); 12904A (Early Suburban; 13514A (Late Suburban).

Tank Unit (1955)—Auto-Lite 13794A.

See "Fuel Gauges" in Carburetion Equipment Section.

►*1955 FUEL TANK CAP CAUTION:* A vented fuel tank filler cap now incorporated in production. Previous production filler pipe had "V" slot at top to provide fuel tank venting. Current production does not have slotted vent. Care must be taken to match right cap with each pipe to insure proper venting and unrestricted flow of fuel to engine. Failure to vent tank will result in its collapse. If this occurs, tank can be restored to original shape by light application of air pressure.



1954 MODELS

BATTERY

Auto-Lite 1M-100-D or Willard HW-1-100-C. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate). **With PowerFlite**—Auto-Lite 2H-120-D. 6 volt, 120 ampere hour capacity (20 hr. rate).

Grounded Terminal—Positive.

Engine Ground—Left front of engine.

STARTER

Model	Auto-Lite No.	Armature
1954 (U.S.)	MCH-6205	MCH-2088
1955 (U.S.)	MCH-6305	MCH-2088
1954 (Canada)	MCH-6206	MCH-2088
1955 (Canada)	MCH-6204	MCH-2088

Drive—Bendix "Folo-thru" type.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (with new brushes).

Performance Data—MCH

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300 (Min.)	5.0	65
6.0 ft. lbs. (Min.)	Lock	2.0	335

Performance Data—MCL

Torque	RPM	Volts	Amperes
0 ft. lbs.	4900	5.0	65
8.0 ft. lbs.	Lock	2.0	410

Starting Switch: Auto-Lite SST-4006 (Std.), SST-4013 (PowerFlite). Magnetic type switch controlled by ignition switch. Neutral Safety Switch mounted on transmission on Automatic Transmission cars. *See "Starter Controls" in Electrical Equip. Section.*

Neutral Safety Switch Adjustment (Hy-Drive & PowerFlite Cars): *See "Hy-Drive" or "PowerFlite" Transmissions in Transmission Section.*

GENERATOR

Model	Auto-Lite Gen. No.	Armature No.
1954-55 Std.	GGW-6001J	GGW-2006F
1954-55 Spec.	GGU-6001G	GGU-2006F
1954-55 Spec.	GGJ-6001F	GGJ-2101F
1954 Spec.	GGJ-6001G	GGJ-2101F
1954 Spec.	GGU-6001R	GGU-2006F
1954 Spec.	GGW-6001K,Q	GGW-2006F
1954 Pow. St. ①	GGW-6008F,G,J	GGW-2045F
1954 Pow. St. ②	GGW-6008FA	GGW-2045F
1954-55 Taxi	GGU-6005A	GGU-2059F
1955 Pow. St. ①	GGW-6016A	GGW-2090F
1955 Pow. St. ①	GGU-6013D	GGU-2071F
1955 Pow. St. ②	GGW-6016E	GGW-2090F

①—U.S. Cars. ②—Canada Cars.

►*SPECIAL GENERATOR NOTE:* GGJ, GGU, and GGW type generators used. Performance specifications below apply equally to all generators, within any one of the three groups specified.

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Performance Data–GGJ

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	600-700	650-750
50	8.0	1400-1600	1550-1750
55	8.0	1500-1700	1650-1850

Performance Data–GGU

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	750-850	800-900
45	8.0	1450-1650	1650-1850
50	8.0	1550-1750	1750-1950

Performance Data–GGW

Amperes	Volts	Cold –R.P.M.–	Hot
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Brush Spring Tension–(GGJ) 34-41 ozs., (GGU, GGW) 35-53 ozs., with new brushes.
Field Current–(GGJ) 1.4-1.7 amperes, (GGU) 1.4-1.6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts
Motoring Current–(GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts.
Rotation–Counter-clockwise at commutator end.

Belt Adjustment: Approximately 1/4" slack (when pushed lightly with fingers from straight line between pulleys).

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW

Cutout Relay

Cuts In–6.3-6.8 volts.
Cuts Out–4.1-4.8 volts.
Contact Gap–.015" minimum.
Air Gap–.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting–7.1-7.4 volts at 70° F. *after 15 minutes operating charging at 1/2 maximum rate.*
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

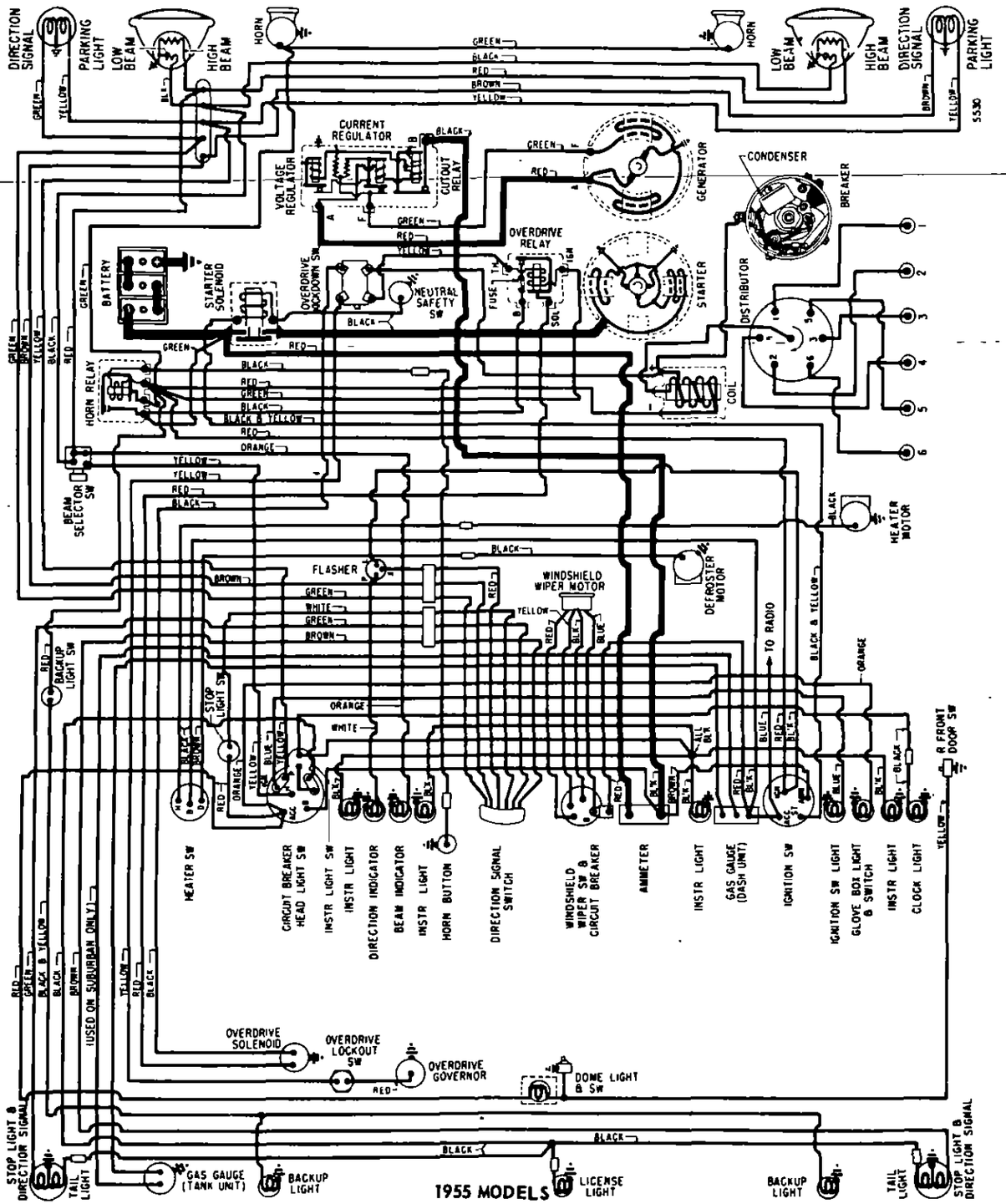
Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A –Operating Amperes–	Test B
VBE-6001A	52	45 (43-47)
VBF-6001A, 2A	66	55 (53-57)
VAV-6001B, 2B	55	50 (48-52)

Test A–After 15 minutes operating charging at 1/2 maximum rate.
Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF).
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

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MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
►*IGNITION STARTER SWITCH CAUTION: When installing accessories, use accessory terminal only on ignition-starter switch and not ammeter terminal post.*
Lighting & Panel Switch Removal: Remove knob (use small screwdriver to raise up special clip in knob, or remove small cross-head screw, depending on method used to hold knob). Remove hex nut and collar that holds assembly in place. Pry out switch (each switch has threaded sleeve with two flat sides. Sleeve fits snugly in respective switch hole in panel).
Stop Light Switch Location: (1954)–On frame left side rail. **(1955)**–On forward end of master cylinder.
CIRCUIT BREAKERS (1954): 30 amp. circuit breaker, part of light switch assembly, protects lighting circuits.
CIRCUIT BREAKERS (1955): Three circuit breakers located in lighting switch, as follows:
30 Amperes–Protects headlights, high beam indicator light and parking lights.
10 Amperes–Protects tail lights, license plate lights, clock and instrument panel lights.
10 Amperes–Protects stop lights, map light, dome light, glove box light, courtesy light, and trunk compartment light.
Windshield Wiper: 10 ampere circuit breaker located in wiper switch.
FUSES: Clock–3 amperes. In clock lead wire.
Radio–14 amperes. In feed behind radio.
Overdrive–20 ampere. On overdrive relay.
HORNS: Auto-Lite. Twin horns with relay.

Model	High Pitch	Low Pitch
1954 P-25-1 (Early) ①	HAB-4671	
1954 P-25-1 (Late) ①	HAB-4683	
1954 P-25-2 & 3	HAB-4656	HAB-4655
1954 Canada	HAB-4660	HAB-4659
1955 All Models	HAB-4702	HAB-4701
1955 Canada	HAB-4720	HAB-4719

①–Single horn used. Other models are dual horns.

Horn Relay: Auto-Lite HRL-4104 (Early 1954); RAF-4001 (Late 1954 & 1955).

ENGINE

ENGINE SPECIFICATIONS: Six Cylinder "L" head.
►*1954 ENGINE PRODUCTION CHANGE: 217" Engine (4 3/8" Stroke) replaced in production with 230" Engine (4 5/8" Stroke).*

Model	Bore	Stroke	Displacement
1954 (Early)	3¼"	4 3/8"	217.8 cu. Ins.
1954 (Late)	3¼"	4 5/8"	230.2 cu. Ins.
1955	3¼"	4 5/8"	230.2 cu. Ins.

Model	Compr. Ratio	Rated HP	Developed HP
1954 (Early)	7.1-1	25.35	100 at 3600 RPM
1954 (Late)	7.25-1	25.35	110 at 3600 RPM
1955	7.4-1	25.35	117 at 3600 RPM

Compression & Vacuum Reading–*See TUNE-UP.*
ENGINE REMOVAL: *See "Engine" in Plymouth Special Data.*
►*HARSH ENGINE VIBRATION CORRECTION (Due to Short Insulator Spacer): See "Engine Mountings" in Plymouth Special Data.*
OIL PAN REMOVAL: Remove clutch housing pan to prevent damaging oil pan gaskets on clutch housing pan dust seal. Turn crankshaft so No. 1 connecting rod journal is at bottom dead center. Remove tie rod. Remove oil level indicator. Drop pan and while holding up oil strainer so it clears baffle inside pan, slide pan to rear and remove. NOTE– New end gaskets should protrude 1/8" above oil pan. *Ends must not be cut off.*
ENGINE MOUNTINGS: *See "Engine Mountings" in Plymouth Special Data.*
CYLINDER HEAD: *See "Cylinder Head & Manifold" in Plymouth Special Data.*
►*MANIFOLD INSTALLATION CAUTION:* Two long capscrews extend into cylinder block water passage. Before installing, apply sealer to these capscrews. It is important that conical washers at flange ends of exhaust manifold be installed to permit expansion and contraction without loosening
TIGHTENING TORQUES: *See "Tightening Specifications" in Plymouth Special Data.*

PISTONS

Aluminum alloy, U-slot, cam ground type.
►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" Oversize.*
Weight–16 ozs. (stripped).
Removal–Pistons and rods removed from above.
Fitting New Pistons: .0007" measured ¾" from the bottom on thrust face. With piston pin and rings removed, cylinder wall and piston dry and clean, insert piston, upside down, into cylinder bore, with feeler stock, .002" x 1/2", inserted between cylinder wall and piston, on high spot of piston contour. Pull to withdraw feeler should be 5-10 lbs.
Replacement Pistons: Std., .005", .020", .030", .040," .060" Oversize.
Installing Pistons: "U" slot away from valves.

PISTON PINS

Full floating type.
Diameter–55/64". **Length**– 2-3/4".
Pin Fit in Piston–.0000-.0005". TIGHT DOUBLE THUMB push fit at room temperature (70°F).
Pin Fit in Rod Bushing–.0001-.0002". TIGHT THUMB push fit at room temperature (70°F).
Replacement Pins: Std., .003", .008" Oversize.
NOTE–Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.010-.020"	.0025-.004"
Compr. (#2)	3/32"	.010-.020"	.002-.0035"
Oil (#3)	5/32"	.010-.020"	.001-.0025"
Oil (#4)	5/32"	.010-.020"	.001-.0025"

Replacement Rings: Std., .010", .020", .030", .040", .050", .060" Oversize.
Installing Rings: #1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down, if step on outer edge).

CONNECTING RODS

Length (Center to Center)–7 15/16" (217" Engine); 7 13/16" (230" Engine).
Weight–31.1 ozs. (217" Engine); 27.9 ozs. (230" Engine).
►*THICKER WALL-BEARING & JOURNAL DIAMETER CAUTION (One or more Journals Machined Undersize). "See "CRANKSHAFT" below.*
Crankpin Journal Diameter–2.0625".
Maximum out-of-round and taper limits–.001".
Lower Bearings–Removable, precision type, thin babbitt on steel. No snims.
►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)–See "CRANKSHAFT" below.*
Clearance–.0005-.0015".
Endplay–.006-.011".
Bearing Adjustment: None. Replace bearings.
Replacement Bearings: Std., .001", .002", .003", .010", .012", .020" Undersize.
Installing Rods: Oil metering hole toward valve side of engine.

CRANKSHAFT

Journal Diameter–2.4995-2.5005". Four bearing.
Bearing Type–Removable, precision type, thin babbitt on steel. No shims.
►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows:
.010" UNDERSIZE (All Main & Connecting Rod Journals)–Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)–When replacing bearings, look for stamped number on middle throw arm of crankshaft. An "M" or "R" followed by a number indicates that a main or connecting rod bearing has a thicker-wall bearing. For example "M2" and "R1" means that .001" thicker-wall bearing inserts are used on the No. 2 main bearing and the No. 1 connecting rod bearing.
Clearance–.0005-.0015".
Replacement Bearings: Std., .001", .002", .003", .010", .012", .020", .030", .040" Undersize.
Crankshaft Rear Oil Seals: *See "Crankshaft & Main Bearings" in Plymouth Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Plymouth Special Data.*
End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**–.003-.007".

CAMSHAFT

Journal Diameters–(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-1/4".
Bearings–Removable, steel-backed babbitt lined bushings (exc. #4– machined in crankcase).

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Clearance—.001-.003" NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.

Removal & Installation: *See "Camshaft & Bearings" in Plymouth Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width—1". **Pitch**—.500". **Length**—24" or 48 links.

Camshaft Setting: Sprockets marked. Mesh chain in sprockets with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

Engine Front Cover Installation: *See "Engine Front Cover" in Plymouth Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Plymouth Special Data.*

VALVES

Tappet Clearance: .010" Intake. .010" Exhaust. Engine hot and idling. NOTE—.002" additional clearance on exhaust tappets if car driven at continuous high speed.

Valves	Head Diam.	Stem Diam.	Length
Intake	1-17/32"	.340-.341"	4-27/32"
Exhaust	1-13/32"	.340-.341"	4 25/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	3/8"	.001-.003"
Exhaust	45°	3/8"	.003-.005"

Valve Seat Width—1/16-3/32". Runout .0015" maximum.

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Plymouth Special Data.*

Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, ream guides to inside diameter of .342-.343" (Intake), .344-.345" (Exhaust). *CAUTION—Guides must be installed with counterbore end UP on exhaust valves and counterbore end DOWN on intake valves.*

Valve Springs: Can be installed with closely coiled end at either top or bottom. *NOTE—Springs are available in several colors. Colors do not refer to spring tension but merely identify the manufacturer.*
Free Length—2".

Valve Spring Specifications

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1-3/4"
Valve Open	107-115 lbs.	1-3/8"

Valve Lifters: Mushroom type (remove from below).
Stem Diameter—5/8". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".

Lifter Clearance in Block: .0002-.001"

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 12° BTDC. Close 44° ALDC.
Exhaust Valves—Open 50° BLDC. Close 6° ATDC.

Valve Timing Check—With .014" (Cold) tappet clearance No. 6 intake valve should open with No. 6 piston 12-13° or .0766-.0770" BTDC. Reset tappet clearance to .010" HOT running clearance.

OILING SYSTEM

Crankcase Capacity: 5 qts. (Except 1954 Hy-Drive Models). 10 qts. (1954 Hy-Drive Models). Add one quart to above capacities when filter is changed.

Normal Oil Pressure: 40-50 lbs. at 25-30 MPH.

Oil Pressure Relief Valve—Two types used as follows:
Standard, Overdrive, & PowerFlite Models—Located under plug on left side of crankcase below starting motor. Three different springs may be found in relief valve (see below for identification and specifications). When replacing spring in relief valve, same color spring as the one removed should be used.
Hy-Drive Models—Located under cover of oil pump. The spring used in this valve is painted blue for identification, and should not be replaced by any other color spring. Spring tension is 22-24 lbs., with spring compressed to 1 25/32".

Relief Valve Spring Identification

Color Code	Free Height	①Spring Pressure
Red (Light)	1 13/16"	12.4-13.8 lbs.
Black (Standard)	1 13/16"	14.4-15.8 lbs.
Green (Heavy)	1 13/16"	16.2-17.8 lbs.

①—Pressure with spring compressed to 1¼".

Oil Pressure Gauge: Auto-Lite 13093A (1954); 13751A (1955). Not electric.

Oil Pump: Rotor type. On right side of crankcase.
Overhaul—*See "Oiling System" in Plymouth Special Data.*

Oil Filter: Shunt type On left side of engine above starter.
Servicing—Replace filter every 5000 miles or more often in dusty areas.

Crankcase Ventilation: Filter in oil filler pipe cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 13 qts. (14 qts. with heater).

Pressure Valve: Plymouth No. 1373136. Radiator filler cap. Opens at 7 lbs.

Thermostat: By-pass type in cylinder head water outlet. Starts to open at 157-162° F.

Water Pump: *Packless type. Grease fitting for lubrication. See Water Pump Section for data.*
Pump Removal & Overhaul—*See Plymouth Special Data.*

Temperature Gauge: Auto-Lite 12782A. Not electric.

Water Distribution Tube: *See "Cooling System" in Plymouth Special Data.*

Temperature Gauge: Auto-Lite 12782A (1954); 13752A (1955). Not electric.

CLUTCH

1954 Models

Borg & Beck	Standard	Overdrive	Hy-Drive
Model	9A7	9A7	8.5A6
Assy. No. (Early)	926	926	1369
Assy. No. (Later)	951	951	1369
Disc No. (Early)	381843	382098	382094
Disc No. (Later)	382237	382237	382094

Heavy Duty—B&B 10A7, Assy. No. 957, Disc No. 381758.

1955 Models

Borg & Beck	Standard	Overdrive
Model	9A7	9A7
Assembly No. (U.S.)	361373	361373
Assembly No. (Can. Std.)	926	926
Disc No. (U.S.)	382237	382237
Disc No. (Can. O.D.)	381843	382098

Heavy Duty—B&B No. 10A7, Assy. No. 361368, Disc No. 381758 (U.S.), B&B No. 11A6, Assy. No. 931, Disc No. 381850 (Can.).
See "Borg & Beck" in Clutch Section.

Pedal Free Play Adjustment: *Adjust fork rod to secure* 1/8" to 5/32" (1954); 3/16" (1955) free movement of clutch fork outer end. This adjustment will provide 1" free pedal movement at pedal pad.

Over-Center Spring Adjustment (Hy-Drive Cars Only): Make certain clutch pedal free play is 1". Correctly position over-center spring bracket by loosening attaching nut and bolt. Then move bracket to position which will give desired over-center spring action. Retighten nut to hold bracket in place. Over-center spring tension is controlled by the spring eyebolt and bracket *adjusting nut. If clutch pedal action is soft and sluggish on return,* back off adjusting nut. If pedal action requires excessive effort, tighten nut until desired action is obtained.

Over-Center Spring Adjustment (1955 Models): Tighten eyebolt sleeve on clutch pedal over-center spring bolt finger tight with pedal in depressed position, then tighten four complete turns.

Removal: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods. Remove transmission (see Synchro-mesh Transmission). Mark clutch cover and flywheel (on cars with Hy-Drive mark clutch drive plate and clutch cover). Remove bolts holding clutch cover to flywheel, loosening each bolt a few turns at a time until cover is free. Remove clutch disc and pressure plate assembly.

SYNCHRO-MESH TRANSMISSION

Own. *See "Plymouth Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

►***1955 SYNCHRO-MESH TRANSMISSION NOTE & REPLACEMENT PARTS CAUTION:*** **A new transmission identified by letters "CK" stamped on left side of case was used on some cars. This transmission has different gear ratios than other transmissions and the parts are not interchangeable.** ***See "Plymouth Synchro-mesh" in Transmission Section.***

Removal: Disconnect propeller shaft at front universal (if transmission is to be disassembled, loosen companion flange nut, by first applying parking brake to hold mainshaft). Disconnect speedometer cable, gear shift rods and overdrive control wires. On Hy-Drive equipped cars remove neutral safety switch. Disconnect hand brake cable. Remove nuts holding transmission to clutch housing. Pull transmission straight back until transmission shaft clears clutch disc before lowering transmission.

OVERDRIVE

Warner Type AS1-R10G. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
See "Warner R10" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

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Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

HY-DRIVE TRANSMISSION

Own. Torque Converter and Standard 3-speed Transmission.
See "Hy-Drive" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hy-Drive" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hy-Drive" in Transmission Section.*

Dashpot Setting—See *TUNE-UP.*

Transmission Control: *See "Hy-Drive" Transmission in Transmission Section.*

Lubrication: Two oil changes required per year (regardless of mileage.) Drain engine and "Hy-Drive" Torque Converter separately. To refill, pour 10 qts. (11 qts. if filter changed) of correct viscosity oil into crankcase and run engine at fast idle for 5 minutes. Check engine oil level.
Capacity—10 qts. (11 qts. if filter changed).

►*OIL FILTER CHANGE CAUTION: On "Hy-Drive" cars, oil filter element must be changed every 5000 miles.*

►*OTHER "HY-DRIVE" SERVICE DATA: See "Hy-Drive" Transmission in Transmission Section.*

POWERFLITE TRANSMISSION

Torque. Converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).
Checking Fluid Level—Apply hand brake, place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid to bring level to full mark on oil level indicator.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball and Trunnion Type.

REAR AXLE

►*REAR AXLE PINION CARRIER BUMPER PRODUCTION CHANGE (To Provide Fuller Contact & Additional Protection Under Severe Bottoming Conditions):* New bumper now incorporated in production. Available under Part No. 1311417 and can be installed on earlier cars.
Own. Semi-floating, hypoid gear type with Hotchkiss drive.
See "Plymouth Hypoid" in Rear Axle Section.

Transmission	Rear Axle Ratio
Standard	3.73-1 (41-11), 4.1-1 (41-10)
Overdrive	4.1-1 (41-10)
PowerFlite	3.73-1 (41-11)
Hy-Drive	3.73-1 (41-11)

Backlash—.006-.008".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, drum, and hub assembly (use screw type hub puller—Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 Puller).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick (equally at both wheels). **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic type. Serviced by replacement.

Type	Plymouth Part No. Front	Rear
1954 Standard	1450629	1450632
1954 Hvy. Duty	1450041	1450635
1954 Special Hvy. Duty		1450075
1955 Standard	1614404	1450917
1955 Hvy. Duty	1617004	1450920
1955 Special Hvy. Duty		1450037

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers. *See "Plymouth" in Front Suspension Section.*

1954 Models

Kingpin Inclination—5 1/2° at 0° camber.
Camber—Pos. 3/8° to Neg. 3/8° (Left side 1/4-1/2° greater than right side within these limits).
Caster—Neg. 1° to Pos. 1° (0° preferred).
Toe-In—0" to 1/16" (0" preferred).
Toe-Out on Turns—Inside wheel at 20° with outside wheel at 18-3/4°.

1955 Models

Kingpin Inclination—5—6½° at 0° camber.
Caster—Neg. 2° to 0° (Left side 0° to Neg. 3/4°, Right side 0° preferred).
Camber—Pos. 1/4° ±3/8° (Left side Pos. 1/2°, Right side 0° preferred).
Toe-In—0" to 1/16" (0" preferred).
Toe-Out on Turns—Inside wheel at 20° with outside wheel at 17-1/2—19°.

STEERING

Manual Steering Gear: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering (1954): Monroe Linkage Type—Used with Standard steering gear.
See "Monroe Linkage Type" in Steering Section.

Power Steering (1955): Coaxial—Steering gear with built-in power unit.
See "Coaxial Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Plymouth "Safe-Guard" Lockheed hydraulic.
See "Plymouth Safe-Guard" in Brake Section.
Drums—Cast iron. Diameter 10".
Wheel Cylinder Diameter—1-1/8". Single acting (front), double acting (rear wheels).
Lining—Molded asbestos (bonded to shoe).
Length—Primary (Front & Rear) 10.5", Secondary (Front) 10.5", Secondary (Rear) 8.0".
Width—2". **Thickness**—3/16".
Braking Power—60% Front, 40% Rear.
Clearance—.006" at end of all shoes.

Master Cylinder (1954): On frame at base of brake pedal.
Checking Fluid Level—Access hole at left of front floor pan.
Removal—Remove floor mat and toe board. Disconnect pushrod. Remove horseshoe clip and slide brake pedal off shaft. Disconnect brake line tubes at master cylinder fittings. Remove bolt retaining master cylinder to frame.

Master Cylinder (1955): On engine side of dash panel.
Checking Fluid—Access hole at top of master cylinder
Removal—Disconnect pushrod. Disconnect brake line tubes at master cylinder fittings. Remove four stud nuts from studs, remove master cylinder.

Power Brakes: Combination vacuum power unit and master cylinder. Unit mounted on engine side of firewall and replaces regular master cylinder. *See "Plymouth Power Unit" in Brake Section.*

Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type is used with PowerFlite.
Adjustment—*See "Hand Brake Notes" in Plymouth Special Data.*

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	① 16-11/16"
7" Int Type	2"	5/32"	13-1/16"

①—Two-piece molded lining, 15-3/8" long, optional.
Clearance (External Type)—.015-.020" around band.
Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMD-4003B, Std. (1954); EMU-4101, Std. (1955); EMG-4102B, Two-Speed (1954); EMZ-4001, Two Speed (1955).
See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Convertible Top Control: Electrical-Mechanical type.
See "Dodge & Plymouth" Top Controls in Miscellaneous Section.

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Electric Window Regulators" in Misc. Section.*

Power Seat Adjusters: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Series	Model Identification
Plaza	P-27-1
Savoy	P-27-3
Belvedere	P-27-2

SERIAL NUMBER: On plate attached to left front door hinge pillar post.

Starting Serial Nos.	Detroit	Evansville	Los Angeles
All Series	15663001	22182001	26524001

ENGINE NUMBER: On center of engine behind water pump

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number)—Identified as follows:*
"A"—ALL cylinders .020" oversize.
"B"—ALL Main & Connecting Rod Bearings .010" undersize.
"AB"—BOTH above conditions exist.
"DIAMOND" (3/8" high)—.008" oversize tappets used.

TUNE-UP

COMPRESSION PRESSURE: 125-155 lbs. at cranking speed of 150 RPM.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: No adjustment required, except when valves are reconditioned (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic coil type, located in exhaust manifold of right cylinder block. Valve should operate freely. When installing coil, position shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer (tongue) end of spring below shaft, horizontal and facing front of engine. Press inner end of coil into slot and seat firmly. Now move outer (tongue) end up, around (counter-clockwise) and hook under left stud (toward rear of engine). *See "Manifold Heat Control" in Plymouth Special Data.*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .040" (2259SB, 2260SB, 2261SB, 2274SA Carbs,), .035" (Others).
Plugs—Auto-Lite Resistor 4S-165, 14mm. Torque to 32 ft. lbs.

COIL: Auto-Lite CR-6012-C.
Ignition Current—2.25 amperes idling, 5.0 amperes stopped.

DISTRIBUTOR: Auto-Lite IAZ-4003C.
Condenser—Auto-Lite IBB-2015R. Capacity—.25-.28 microfarad.
Contact Point Set—Auto-Lite IGP-3028ZS.
Breaker Gap—.015-.018". Set maximum gap to .017".
Cam Angle—34° ± 3° (both sets of contacts). Do not adjust gap outside limits to obtain specified cam dwell.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance—IAZ-4003C

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	370	2	740
5	450	10	900
17	1800	34	3600
18	1900	36	3800

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IAZ-4003C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-1/4
1	2	6
5	10	9-1/4
10	20	14-7/8
11.5	23	17

►*167 HP ENGINE VACUUM DIAPHRAGM CAUTICN:* When installing Carter BBD-2259SB, 2260SB, 2261SB, 2274SA carburetors or other Carter carburetors which have Carter Unitized Package 195-62U installed, it will be necessary to change vacuum diaphragm assembly with new diaphragm assembly (Plymouth No. 14339671, Auto-Lite No IAZ-2023RA). The spring, calibration washers, sealing washer and nut must be transferred from diaphragm assembly on distributor to new vacuum assembly *NOTE*—Maximum vacuum advance will be changed to 25° at 17" of vacuum *See "Carburetor" below for application.*

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in Plymouth Special Data.*

IGNITION TIMING

Setting—4° BTDC. See Manual Adjustment below.
Timing Mark—On crankshaft drive pulley.
Manual Adjustment—Timing may be advanced with some premium fuels. Range of timing should not exceed plus or minus 4° from recommended factory setting.

CARBURETOR

►*CARBURETOR APPLICATION: Carter BBD 2-Barrel Carburetors are Std., Carter WCFB 4-Barrel Carburetor is Special Equipment (Power Package).*

►*167 HP ENGINE CARBURETOR PRODUCTION CHANGE (Carter BBD 2259S, 2260S, 2261S, 2274S to Improve Cold Starting, Part Throttle Loading, & Road Load Economy): NOTE—Later 2259SA, 2260SA, 2261SA carburetors have necessary parts installed. See Carter "BBD" in Carburetor Section for data.*

►*167 HP ENGINE CARBURETOR KIT (To Correct Poor Mileage):* Unitized Package 195-62U available to correct poor mileage. This kit should not be installed on carburetors already set on lean limit (leanness or surge may be experienced if installed). *NOTE—Later 2259SB, 2260SB, 2261SB, 2274SA carburetors have parts in Unitized Package 195-62U installed. See Carter "BBD" in Carburetor Section for data.*

CARTER 2-BARREL BBD

Transmission	Carter No.
Synchro-mesh (157 HP Eng.)	BBD-2141S
Overdrive (157 HP Eng.)	BBD-2154S
PowerFlite (157 HP Eng.)	BBD-2155S
Synchro-mesh (167 HP Eng.)	BBD-2259S, SA, SB
Overdrive (167 HP Eng.)	BBD-2260S, SA, SB
PowerFlite (167 HP Eng.)	BBD-2261S, SA, SB

►*REPLACEMENT CARBURETOR NOTE:* Carter BBD-2262S is replacement for 157 HP engine, BBD-2274S SA for 167 HP engine. Use with unitized Pkg. 192-34U (Overdrive Cars) or 202-83U (PowerFlite Cars). *See BBD-2274S change above.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT Barrel 1-4-6-7.*

Idle Setting—1/2—1-1/2 turns open (157 HP Eng.), 1/4—1-1/4 turns open (167 HP Eng.). Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed—450-500 RPM.
Float Level—7/32" (Gauge T109-239) from top surface of body casting to top of each float. If one float lower than other, equalize by bending float arm. If both floats require same correction, adjust by bending lip on float arm.
Accelerating Pump—Normal setting, outer hole (medium stroke).

Fast Idle: .009-.013" (157 HP Eng.—Gauge T109-200), .015-.019" (167 HP Eng.—Gauge T109-44), clearance between throttle valve and bore of carburetor (side opposite idle port), with throttle valve tightly closed. Adjust by bending choke connector rod at lower angle (Tool T109-213).

Unloader Adjustment: After Fast Idle adjusted, hold throttle valve wide open with choke valve fully closed. Clearance between upper edge of choke valve and air horn wall should be 1/4". Adjust by bending arm on choke trip lever (Tool T109-214).

Automatic Choke Setting: 2 Points Lean (157 HP Eng. Carbs.) & Carb. Models 2259S, 60S, 61S (167 HP Eng.). Centered (all other 167 HP Eng. Carbs.). *See "Carburetor Production Change" under CARBURETOR above.*

Kickdown Switch Adjustment (2154S, 2260S, SA): With throttle valves in wide open position adjust hex nuts on switch to have 1/64-3/64" clearance between kickdown lever and switch stem guide. To adjust, bend kickdown lever to contact switch stem.

Slow Closing Throttle (Dashpot) Adjustment (2155S, 2261S, SA): Loosen lock nut and adjust dashpot unit so that plunger shaft can be bottomed with a 1/16" gauge placed between shaft and operating lever with throttle valves tightly closed. Tighten lock nut.

Throttle Linkage Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See Carter "BBD" in Carburetor Section.*

CARTER 4-BARREL WCFB NO. 2253S

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*
Idle Setting—1/2—1-1/2 turns open. For richer mixture, turn screws out.
Idle Speed—450-500 RPM with selector lever in neutral.

Throttle Linkage Adjustment *See "PowerFlite" Transmission in Transmission Section.*

►*OTHER DATA: See Carter "WCFB 4-Barrel" Carburetor in Carburetor Section.*

Fuel Pump Pressure: 5-6½ lbs.

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CARB. EQUIPMENT

▷*FUEL TANK FILLER CAP CAUTION:* Vented fuel tank filler cap now incorporated in production. Previous production filler pipe had "V" slot at top to provide fuel tank venting. Current production does not have slotted vent. Care must be taken to match right cap with each type pipe to insure proper venting and unrestricted flow of fuel to engine. Failure to vent tank will result in its collapse. If this occurs, tank can be restored to original shape by light application of air pressure.

Fuel Pump: AC or Auto-Lite. Diaphragm type. **Replacement Pump**—AC No. 4280 or Auto-Lite FB-4006.
Pressure—5-6½ lbs.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Auto-Lite.
Dash Unit—Auto-Lite 13753A.
Tank Unit—Auto-Lite 13794A.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 1M-100-D or Willard HW-1-100-C. 6 volt, 15 plate, 100 ampere hour capacity.
Grounded Terminal—Positive.
Engine Ground—Left front of engine.

STARTER

Auto-Lite MCH-6205. Armature—MCH-2088.
Drive—Bendix No. A3274. "Folo-thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs (with new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300 (Min.)	5.0	65
6.0 ft. lbs.	(Min.) Lock	2.0	335

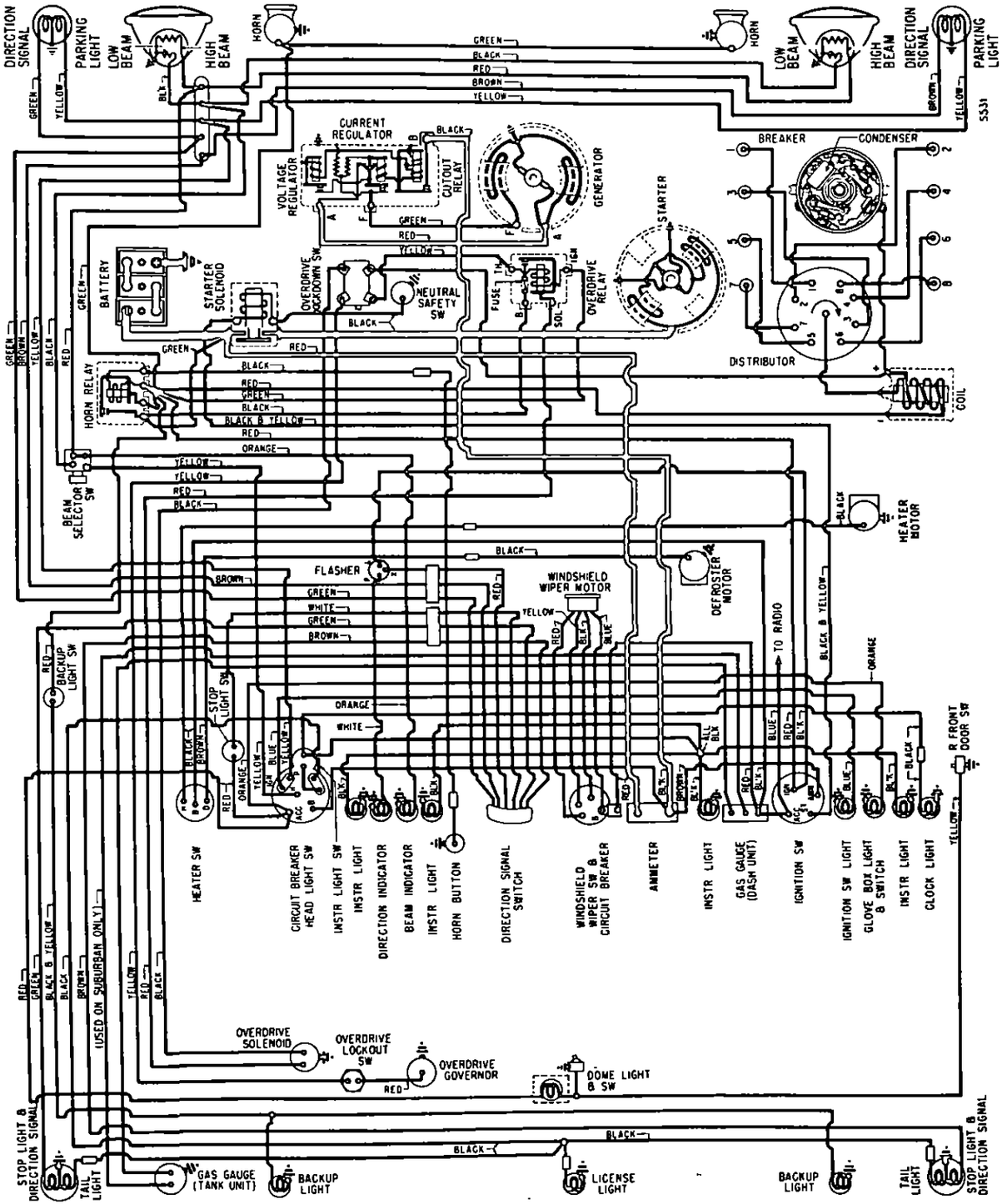
Starting Switch: Auto-Lite SST-4006 (Std.), SST-4013 (PowerFlite). Magnetic type switch controlled by ignition switch. Neutral safety switch mounted on transmission of automatic transmission cars. *See "Starter Controls" in Electrical Equipment Section.*

GENERATOR

Auto-Lite Generator No.	Armature No.
GGW-6012-B (Std.)	GGW-2006F
GGJ-6005-A (Spec. Equip.)	GGJ-2101AF
GGJ-6005-D (Spec. Equip.)	GGJ-2101AF
GGW-6016-A (Pow. St.)	GGW-2090F
GGU-6013-D (Pow. St.)	GGU-2071F
GGW-6016-E (Pow. St. Can.)	GGW-2090F
GGW-6017-A (Air Cond.)	GGW-2098F
GGU-6008-C (Air Cond.)	GGU-2063F
GGJ-6001-K (Air Cond.)	GGJ-2101AF
GGW-6016-C (A.C. & Pow. St.)	GGW-2090F
GGU-6013-C (A.C. & Pow. St.)	GGU-2071F
GGW-6016-F (A.C. & P.S. Can)	GGW-2090F

▷*SPECIAL GENERATOR NOTE:* GGJ, GGU, and GGW type generators used. Performance specifications below apply equally to all generators, within any one of these groups.

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Performance Data–GGJ

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	600-700 – 650-750
50	8.0	1400-1600 – 1550-1750
55	8.0	1500-1700 – 1650-1850

Performance Data-GGU

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	750-850 – 800-900
45	8.0	1450-1650 – 1650-1850
50	8.0	1550-1750 – 1750-1950

Performance Data-GGW

Amperes	Volts	Cold – R.P.M. – Hot
0	6.4	870-970 – 950-1050
40	8.0	1800-2000 – 2150-2350
45	8.0	1925-2125 – 2350-2550

Brush Spring Tension–(GGJ) 34-41 ozs., (GGU, GGW) 35-53 ozs., with new brushes.
Field Current–(GGJ) 1.4-1.7 amperes, (GGU) 1.4-1.6 amperes, (GGW) 1.6-1.7 amperes, all at 5.0 volts.
Motoring Current–(GGJ) 4.1-4.6 amperes, (GGU) 5.0-6.0 amperes, (GGW) 5.0-5.5 amperes, all at 5.0 volts.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: Approximately ½" slack (when pushed from a straight line midway between pulleys).

REGULATOR

Auto-Lite Regulator No.	Generator
VBF-6001A	GGJ
VBF-6002A (Neg. Gd.)	GGJ
VAV-6001B	GGU
VAV-6002B (Neg. Gd.)	GGU
VBE-6001A	GGW

Cutout Relay

Cuts In–6.3-6.8 volts.
Cuts Out–4.1-4.8 volts.
Contact Gap–.015" minimum.
Air Gap–.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting–7.1-7.4 volts at 70°F. *after 15 minutes operation charging at ½ maximum rate.*
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A – Operating Amperes – Test B
VBE-6001A	52 – 45 (43-47)
VBF-6001A, 2A	66 – 55 (53-57)
VAV-6001B, 2B	55 – 50 (48-52)

Test A–After 15 minutes operation charging at ½ maximum rate.
Test B–After additional 15 minutes operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts (VAV, VBE), 6.7-7.0 volts (VBF).
Air Gap–.048-.052" with contacts just opening.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section.*
►*IGNITION STARTER SWITCH CAUTION: When installing accessories, use accessory terminal only on ignition-starter switch and not ammeter terminal post.*
Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut. Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft. Headlamp knob is held on its shaft by a recessed hex screw.
Stop Light Switch (Location): On forward end of master cylinder.
FUSES: Clock–3 amperes. In clock lead wire.
Radio–14 amperes. In feed behind radio.
Overdrive–20 ampere. On overdrive relay.
LIGHTING CIRCUIT BREAKERS: Located in headlight switch assembly. Three in number, as follows:
30 Ampere Circuit Breaker–Protects headlights, high beam indicator light, and parking lights.
10 Ampere Circuit Breaker–Protects tail lights, license plate lights, clock light, and instrument panel light.
10 Ampere Circuit Breaker–Protects stop lights, map light, dome light, glove box light, courtesy light, and trunk compartment light.
HORNS: Auto-Lite. Twin horns with relay.
High Pitch–HAB-4702.
Low Pitch–HAB-4701.
Horn Relay: Auto-Lite RAF-4001.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*
►*TWO ENGINES USED AS FOLLOWS:* Both engines have polyspherical combustion chamber with lateral valves and single rocker arm shaft. Bore in two engines differs as indicated in ENGINE SPECIFICATIONS below.

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Engine	Bore	Stroke	Displacement
157 HP	3-7/16"	3-¼"	241 cu. ins.
167 HP	3-9/16"	3-¼"	267 cu. ins.

Engine	Compr. Ratio	Rated HP	Developed HP
157 HP	7.6-1	37.9	157 at 4400 RPM
167 HP	7.6-1	40.6	①167 at 4400 RPM

①–177 at 4400 RPM with special Power Package.

Compression & Vacuum Reading–*See TUNE-UP.*
ENGINE REMOVAL: *See "Engine" in Plymouth Special Data.*
►*HARSH ENGINE VIBRATION CORRECTION (Due to Short Insulator Spacer): See "Engine Mountings" in Plymouth Special Data.*
ENGINE MOUNTS: *See "Engine Mountings" in Plymouth Special Data.*
OIL PAN REMOVAL: Remove oil level indicator, drain oil, disconnect steering linkage at idler arm support bracket, and allow linkage to drop. Remove bolts that hold oil pan to cylinder block and slide pan out, down, and away from engine.
CYLINDER HEAD: *See "Cylinder Head & Manifold" in Plymouth Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Plymouth Special Data.*

PISTONS

Aluminum alloy, slipper type, elliptically turned, steel-banded, horizontal slot, tin-plated, with pin offset to right .006". **Weight**–16 ozs. (stripped).
Clearance–.001-.0015" (157 HP Eng.), .00075-.00125" (167 HP Eng.) at top of skirt, Pull to withdraw .0015" x ½" feeler between thrust face of piston and cylinder wall should be 5-10 lbs. at 70°F.
►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" oversize.*
Removal: Pistons and rods removed from above.
Replacement Pistons: Std., .005", .020", .030", .040", .060" oversize.
Installing Pistons: Assemble pistons to connecting rod on right hand cylinder bank (2-4-6-8) with indent on top of piston on side opposite to large chamfer at insert end of connecting rod. On left bank (1-3-5-7) assemble with indent on same side as large chamfer at insert end of connecting rod. *See Rod Installation.*

PISTON PINS

Full floating type.
Diameter–.8591-.8593". **Length**–2.880-2.890".
Clearance in Piston–.0000-.0005". Tight DOUBLE THUMB press fit at 70°F.
Clearance in Rod–.0001-.0004". Tight thumb press fit at 70°F.
Replacement Pins: Std., .003", .008" oversize.
NOTE: Fitted pins furnished with new pistons.
►*PISTON PIN INSTALLATION NOTE:* If pin cannot be installed as explained, use expansion reamer to enlarge hole. Use extreme care and take very light cuts, alternately reaming and fitting.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.010-.020"	.0015-.003"
Compr. (#2)	3/32"	.010-.020"	.001-.0025"
Oil (#3)	5/32"	.010-.020"	.001-.003"

Replacement Rings: Std., .010", .020", .030", .040", .050", .060" oversize.
Installing Rings: Compression rings with step on inner edge up.

CONNECTING RODS

Length (Center-to-Center)–5.94". **Weight**–21.1 ozs.
Crankpin Journal Diameter–1.9365-1.9375".
►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)–See "CRANKSHAFT" below.*
Lower Bearing–Replaceable precision type.
Clearance–.0005-.0015" desired.
Endplay–.006-.014" (two rods).
Bearing Adjustment: None. Replace bearings.
Replacement Bearings: Std., .001", .002", .003", .010", .012" undersize.
Installing Rods–*See "Pistons (Installation)" above.* Install rod and piston assembly with indent on top of piston pointing toward front of engine. NOTE–Connecting rod bores are chamfered more on one side than the other. Larger chamfer must be installed toward crankshaft journal fillet.

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►*BEARING INSERT CAUTION:* When installing lower bearing insert, make certain that "V" groove in insert is in line with "V" groove in cap. Tighten bearing cap nuts to 45 ft. lbs. torque.

CRANKSHAFT

Journal Diameter–2.3745-2.3755". Five bearing.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows:

.010" UNDERSIZE (Main & Connecting Rod Journals)–Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)–When replacing bearings, look for stamped number on middle throw arm of crankshaft. An "M" or "R" followed by a number indicates that a main or connecting rod bearing has a thicker wall bearing. For example, "M2" and "R1" means that .001" thicker wall bearing inserts are used on the No. 2 main bearing and the No. 1 connecting rod bearing.

Clearance–.0005-.0015".

Replacement Bearings: Std., .001", .002", .003", .012" undersize.

Crankshaft Rear Oil Seals: *See "Crankshaft & Main Bearings" in Plymouth Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Plymouth Special Data.*

End Thrust: Taken by center (No. 3) main bearing. **Endplay**–.002-.007".

CAMSHAFT

Journal Diameters–(1) 2", (2) 1 63/64", (3) 1 31/32", (4) 1 61/64", (5) 1 7/16".

Bearings–Removable, steel-backed babbitt lined bushings.

Clearance–.001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**–.002-.006".

Timing Chain: Width–1.12". **Pitch**–.38". **Length**–68 links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with center of camshaft. Temporarily install camshaft sprocket less chain, line up dowel pin holes in hub and gear, while at the same time positioning camshaft gear "Zero" mark exactly in line with center of crankshaft. (A straightedge should be used to check accuracy of this alignment). Remove camshaft gear and engage with timing chain. Place timing chain over crankshaft gear and at the same time, slide the camshaft gear over end of camshaft, keeping timing mark in position. With timing marks aligned, push gear on camshaft. Install fuel pump eccentric. Install nut.

Removal & Installation: *See "Camshaft & Bearings" in Plymouth Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Plymouth Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Plymouth Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

Valve	Head Diam.	Stem Diam.	Length
Intake	1-23/32"	.372-.373" ①	4 1/4"
Exhaust	1 15/32"	.371-.372" ①	4 13/64"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.360"	.001-.003"
Exhaust	45°	.360"	.002-.004"

①–Standard. See Valve Guides below.

Valve Seat Width–1/16-3/32" (Intake), 3/64-1/16" (Exhaust).

►*VALVE OVERSIZE NOTE:* "I" or "E" stamped on cylinder head at rock cover gasket boss, indicates that all intake or exhaust valves are oversize in that bank depending upon what letter is stamped.

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length of 1/32" or more from its factory installed position, the dimension from valve spring seat in the head to valve tip should be checked with gauge C-3436. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Guides: Cast integral with cylinder head. Service as follows: When valve stem clearance excessive, use Reamer Tool Set to ream guides for NEXT OVERSIZE Valve as follows: Tool C-3433 (.005" O.S.), Tool C-3430 (.015" O.S.), Tool C-3427 (.030" O.S.). Valves furnished Std. and .005", .015", .030" Oversize.

Valve Springs: Both intake and exhaust valve springs should have 134-136 lbs. pressure when compressed to 1-5/16". **Free Length**–1-15/16".

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height of spring is 1-11/16" or greater, install a 1/16" spacer (Part No. 1400482) in the head counterbore to bring spring height back to nominal 1 5/8–1 11/16".

►*VALVE SPRING NOISE CORRECTION (Caused by Spring Striking Head at Edge of Valve Recess):* To correct, bevel or chamfer edge of recess to provide necessary clearance for spring.

Valve Lifters: Hydraulic, one-piece integral type. *See "Hydraulic Valve Lifters" in Plymouth Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 17° BTDC. Close 47° ALDC.

Exhaust Valves–Open 55° BLDC. Close 9° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed.

Normal Oil Pressure–40-50 lbs. at 25-30 MPH.

Oil Pressure Relief Valve–Located in oil pump body. Adjustable by replacing springs (3 types). (1) Standard spring painted BLACK. (2) Lighter than standard spring painted RED. (3) Heavier than standard spring painted GREEN.

►*OIL PRESSURE RELIEF VALVE NOTE:* Springs identified as follows:

Color Code	Checking Height	Spring Pressure
Gray (Light)	3 1/32"	16.1-17.1 lbs.
Red (Standard)	2 27/32"	19.5-20.5 lbs.
Brown (Heavy)	2 31/32"	22.9-23.8 lbs.

Free Height–2 1/16".

Oil Pressure Gauge: Auto-Lite 13751A. Not electric.

Oil Pump: Rotor type. In crankcase at rear end. Mounted on rear bearing cap.

Overhaul–*See "Oiling System" in Plymouth Special Data.*

Priming Oil Pump (After Overhaul)–Prime oil pump before installing oil pump and strainer to rear main bearing cap.

Oil Filter: Shunt type. A portion of oil from oil pump is directed through this filter and the remainder flows directly into engine lubrication system.

Filter Element–Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 19 quarts (20 with heater).

Pressure Valve: Plymouth 1373136. Radiator filler cap. Opens at 7 lbs.

Thermostat: By-pass type in cylinder head water outlet. Starts to open at 159-165°F.

Water Pump: Packless type. Grease fitting for lubrication on early type only. *See Water Pump Note below. See Water Pump Section for data.*

Pump Removal–Drain cooling system, remove fan, belt, and pulley. Remove four water pump attaching bolts and remove water pump.

►*WATER PUMP NOTE:* Three types used. Early pump was bushing type with lubrication fitting. Two later types are ball-bearing, which are pre-lubricated and require no additional lubrication (have no lubrication fitting).

Temperature Gauge: Auto-Lite 13752A. Electric type.

CLUTCH

Borg & Beck	Model	Assy. No.	Disc No.
Standard	10A7	361368	382358
Heavy Duty	11A6	929	381850

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Turn clutch release fork rod adjusting nut until 3/16" free movement of clutch fork outer end is obtained. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: Tighten eyebolt sleeve on clutch pedal overcenter spring bolt finger tight with pedal in depressed position, then tighten four complete turns.

Removal: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods. Remove transmission (See Synchro-mesh Transmission). Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

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SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See "Plymouth Synchro-mesh" in Transmission Section.
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
►*CAR-TOWING-CAUTION:* If car is to be towed long distances, disconnect propeller shaft at rear axle carrier.

Removal: Disconnect propeller shaft, speedometer cable, hand brake cable, and control rods. If transmission is to be disassembled, apply hand brake to hold mainshaft while loosening flange nut. This method will also prevent possible brinelling of bearings, or other damage caused by pounding on wrench. Remove transmission by pulling it straight back until pinion shaft clears clutch disc before lowering transmission. This precaution will avoid bending clutch disc.

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
See "Warner R10" Overdrive in Transmission Section.
Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmission Section.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).
Checking Fluid Level—*Apply hand brake, place selector lever in neutral position. Allow engine to idle until normal operating temperature is reached. Shift selector lever through all ranges. Shift selector lever back to neutral and add Automatic Transmission Fluid (Type A) to bring level to full mark on oil level indicator.*
Oil Filler Tube (Location): At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball and Trunnion Type.

REAR AXLE

Own. Separate carrier, semi-floating hypoid, with Hotchkiss Drive.

Transmission (Ratios)	Standard	Optional
Synchro-mesh	3.73-1	4.1-1
Overdrive	4.1-1	
PowerFlite	3.54-1	

►*REAR AXLE PINION CARRIER BUMPER PRODUCTION CHANGE (To Provide Fuller Contact & Additional Protection under Severe Bottoming Conditions): New bumper now incorporated in production. Available under Part No. 1311417 and can be installed on earlier cars.*
Backlash—.006-.010".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, drum, and hub assembly (use screw type hub puller—Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 Puller). *NOTE*—Use Puller C-293-E to remove bearing from shaft, Puller C-748 or C-358 to remove inner oil seal, Drift C-359 to install seal. Use Tool C-452 to remove flange.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick (equally at both wheels). **Endplay**—.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic type. Serviced by replacement.

Type	Plymouth Part No. Front	Rear
Standard	1614404	1450917
Heavy Duty	1617004	1450920
Heavy Duty (Spec.)		1450037

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers. Shock absorbers located within coil springs.
Kingpin Inclination: 5—6½° at 0° camber.
Caster—Neg. 2° to 0° (Left side 0° to Neg. ¾° more than right side, Right side 0° preferred).
Camber—Neg. 1/8° to Pos. 5/8° (Left side Pos. ½°, Right side 0° preferred).
Toe-In—0" to Pos. 1/16" (0" preferred).
Toe-Out on Turns—With inside wheel at 20°, outside wheel should be 17½-19°.

STEERING

Manual: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.
See "Coaxial" Power Steering in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering-Wheel-&-Horn-Button-Removal: *See "Gemmer Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Plymouth "Safe-Guard" Lockheed hydraulic.
See "Plymouth Safe-Guard" in Brake Section.
Drum Diameter—11" (Front), 10" (Rear-Suburban only 11").
Wheel Cylinder Diameter—1 1/8". Single acting (front), double acting (rear wheels).
Lining—Molded asbestos (bonded to shoe).
Width—2". **Thickness**—3/16".
Braking Power—60% Front, 40% Rear.
Clearance—.006" at ends of all shoes.
Master Cylinder: On engine side of dash panel opposite base of brake pedal.
Checking Fluid—Filler plug at top of master cylinder (on dash panel in engine compartment).
Removal: Disconnect pushrod. Disconnect brake line tubes at master cylinder fittings. Remove four stud nuts from studs, remove master cylinder.
Power Brakes: Combination vacuum power unit and master cylinder Unit mounted on engine side of firewall and replaces regular master cylinder. *See "Plymouth Power Unit" in Brake Section.*
Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Transmissions. 7" Internal expanding type used with Powerflite Transmission.
Adjustment—*See "Hand Brake Notes" in Plymouth Special Data.*

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15 3/8"
7" Int. Type	2"	5/32"	13 1/16"

Clearance (External Type)—.015-.020" around band.
Internal Type—Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EMU-4101 (Std.), EMZ-4001 (Two-speed—Optl.). *See "Auto-Lite Electric Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: *See "Plymouth Airtemp" Air Conditioning in Miscellaneous Section.*
Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Electric Window Regulators" in Misc. Section.*
Power Seat Adjusters: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*
Convertible Top Control: Electrical-hydraulic type. *See "Power Top Controls" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

1946-54 MODELS

	Ft. Lbs.	In. Lbs.
Cylinder Head Capscrews	60	720
Main Bearing Capscrews①	95	1140
" (6 Cyl. Rear only)	120	1440
Connecting Rod Cap Nuts	45	540
Flywheel-to-Crankshaft②	105	1260
Piston Pin Lock Bolt	10-12	120-144
Frt. Eng. Mount-to-Support	60	720
Rear Eng. Mount-to-frame (SM)	35	420
Rear Eng. Mount-to-frame (HD)	60	720
Harmonic Balancer Bolt	95	1140
Spark Plugs	25-30	300-360

①—Except All 6 Cyl. & 1950 8 Cyl. Rear Main Bearing.
②—With self-locking bolts (no lockwashers), torque should be 100 ft. lbs. or 1200 in. lbs.
SM—Synchro-mesh Trans. cars.
HD—Hydra-Matic Drive Trans. cars.

1955 V8 MODELS

	Ft. Lbs.
Cylinder Head	95
Intake Manifold	40
Exhaust Manifold	25
Oil Pan	12
Main Bearing Caps (Exc. Rear)	95
Main Bearing Cap (Rear)	120
Flywheel	95
Con Rod Caps	45
Rocker Arm Cover	3
Pushrod Cover	10
Water Pump Mounting	15

ENGINE

1946-48 MODELS

POWER PLANT (ENGINE & TRANSMISSION) REMOVAL:—Remove hood, disconnect headlamp wires, take out radiator (see Radiator Core Removal). Drill out 4 rivets in fender support cross bar (when re-assembling bar use bolts in place of rivets). Disconnect engine front insulator at engine. Remove selector control rod from transmission, disconnect shift lever from transmission shifter shaft. Disconnect gas line from fuel pump, oil pressure gauge line, windshield wiper tube from manifold, throttle control rods, temperature gauge engine unit from head, engine ground strap, all wiring at generator and starter, etc., speedometer cable at transmission, clutch control bracket at flywheel housing, clutch throw-out fork, and exhaust pipe at manifold. Disconnect rear universal joint and remove propeller shaft (withdraw shaft from transmission). Disconnect front engine support (take out 2 bolts). Attach chain hoist to engine, remove bolts from rear engine mountings, lift engine free of rear support cross member, pull engine and transmission forward and remove from car. NOTE—When re-installing Power Plant, reverse Removal Procedure given above. Use new exhaust pipe gaskets. After engine installed, carefully adjust Safety-shift, Clutch Pedal, and Throttle Linkage.

1949-54 MODELS

POWER PLANT (ENGINE & TRANSMISSION) REMOVAL: Drain water, engine oil, and transmission lubricant, remove battery, remove hood. Then proceed as follows:

▷*ENGINE REMOVAL NOTE—On cars with Power Steering, remove pump belt, and pump with mounting bracket, leaving hose connected. Place pump in a position where it will not be damaged during engine removal.*

(1) Remove upper and lower radiator hoses, disconnect heater lines at cylinder head and radiator tank. Disconnect fuel line at fuel pump, oil line to pressure gauge at connection near rear of block, vacuum line at manifold or combination pump.

(2) Remove air cleaner, disconnect throttle linkage remove fuel pump-to-carburetor line, remove crankcase breather outlet pipe, disconnect exhaust pipe at manifold, free exhaust pipe bracket at flywheel housing.

(3) Disconnect following wires: Temperature gauge engine unit, coil primary lead, generator-to-regulator wires at generator (free wires from clips on side of engine), headlamp wire loom at junction block on right fender skirt (free loom from clips on fan shroud), all wires on starter solenoid.

(4) Disconnect control cable at hood latch. Remove radiator upper baffle assembly. Take out screws mounting fan shroud and radiator on radiator support, remove radiator, then remove shroud.

(5) Remove hood catch plate-to-radiator support brace. NOTE—Radiator support cross brace may be removed for extra clearance if desired (requires removal of four rivets—bolts can be used when brace replaced).

(6) Disconnect and remove gearshift linkage at transmission, disconnect clutch throw-out linkage at clutch fork, remove clutch control bracket from flywheel housing. Disconnect and remove propeller shaft.

(7) Attach hoist to engine (see Caution below), take out bolts attaching engine front insulator to frame. Lift weight of engine off rear insulators, remove bolts holding rear insulators to frame. Carefully hoist engine and transmission out of car, maintaining clearance at all points to prevent damaging parts.

▷*CAUTION*—If type of hoist used interferes with any engine accessories, remove following to prevent damage: Generator, Starter, Distributor, Carburetor, Fuel Pump.

▷**HYDRA-MATIC DRIVE NOTE**—On cars with Hydra-Matic Drive, remove frame cross-member on which engine rear insulators mounted and **use extreme care to prevent transmission swinging down when rear mountings disconnected (special precautions required due to extra weight of Hydra-Matic Drive).**

1955 V8 MODELS

ENGINE REMOVAL: *NOTE—The engine may be removed with the transmission attached, however if it is desired to remove transmission before removing engine, see "Transmission Removal" on Car Page.*

1) Drain engine oil, water, and transmission lubricant. With hood raised, remove hinge to cowl attaching screws and hinge to hood attaching screws, and remove hood. 2) Remove battery. Remove carburetor air cleaner and disconnect throttle linkage. On cars with power steering, remove power steering pump belt and pump with mounting bracket, leaving hoses connected. Place pump in position where it will not become damaged. Remove upper and lower radiator hoses and disconnect heater line from intake manifold and bottom of radiator. 3) Disconnect flex fuel line at fuel pump, oil pressure gauge line at connector near dash, and windshield wiper vacuum hose at rear of engine. Disconnect power brake vacuum hose at check valve to carburetor pipe. Remove thermo gauge unit from fitting in intake manifold. Disconnect coil primary lead at coil. Disconnect generator to regulator wires from generator (release from clips retaining to valve cover and pull clear of engine).

4) Disconnect wire loom running to right headlight across radiator at junction block on right side of radiator support to fender brace and release loom from clips retaining it to radiator. Remove fan, fan shroud, and radiator.

5) Remove engine right side apron and crankcase ventilator outlet pipe. Disconnect exhaust pipe from exhaust cross over pipe. Disconnect wiring from starter solenoid. Remove gearshift linkage at transmission. Disconnect linkage from clutch throwout fork and remove clutch control countershaft bracket from flywheel housing on synchromesh cars.

6) Hook a chain fall to intake manifold by means of a strong chain threaded through the openings in manifold just behind carburetor. Raise engine just enough to take weight off engine insulators. Remove screws holding front and rear insulators to frame crossmembers.

7) On Hydra-Matic Cars, support bottom of transmission with a jack and jack adapter J-2808 and remove frame crossmember to which engine rear insulators were fastened. *CAUTION*—Use care to prevent transmission swinging down when crossmember is removed.

8) Carefully hoist engine and transmission out of car checking frequently to see that sufficient clearance exists to prevent bending any parts.

ENGINE MOUNTINGS

1946-48 MODELS

ENGINE FRONT INSULATOR REMOVAL: Remove splash shields in back of radiator, disconnect exhaust pipe, remove two bolts from engine-to-mounting support, jack engine up enough at front end for access to insulator. Clean dirt off mounting from below, remove two screws holding mounting on frame, remove mounting. Reinstall in same manner and tighten all mounting bolts securely. Front insulator is designed to provide clearance for rebound clamp which is assembled over top of insulator. Insulator and clamp can be disassembled by clamping exposed ends of insulator with 'C' clamp.

1949-54 MODELS

ENGINE FRONT INSULATOR: Front mounting consists of a single assembly on cross-member bracket directly under front end of engine. Insulator has special rebound clamp assembled over top of insulator.

Removal & Disassembly: Drain cooling system, disconnect hoses at water pump and cylinder head. Remove front cross member-to-radiator cross member apron. Remove self-locking nuts from two front insulator-to-engine support bolts. Place jack under oil pan (use wood block to prevent damage to pan),

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raise engine sufficiently to remove weight from insulator, take out two insulator-to-frame bolts, remove insulator and rebound clamp as an assembly. Remove rebound clamp by using two clamps to compress exposed ends of insulator so that clamp can be slipped off.

Installation: *Force new insulator into position in* rebound clamp. Install assembly on engine support with open side of rebound clamp forward, tighten self-locking nuts to 60 ft. lbs. Lower engine but do not install two insulator-to-frame bolts until after rear insulators have been installed and tightened (see below).

NOTE—Front insulator should not touch rebound clamp with engine weight on insulator (will be tight in clamp when off engine).

1949-53 MODELS

ENGINE REAR INSULATORS: Consist of separate rear mounting on each side of engine. These mountings locate engine (see Adjustment below).

Removal: Support engine at rear to remove engine weight from insulators. Take out two bolts attaching insulators to frame cross-member, then take out two bolts holding insulator on flywheel housing.

Installation & Adjustment: With rear of engine securely supported and **with front insulator-to-frame bolts removed,** install rear insulator to frame crossmember and to flywheel housing bolts. Then raise front of engine slightly so that all weight removed from front insulator (to permit engine to shift into correct alignment as determined by rear insulators), then install and tighten front insulator-to-frame bolts.

1955 V8 MODELS

FRONT INSULATOR: *NOTE—If new rear insulators are also to be installed, they should be installed first since the engine locates from the rear insulators.*

Removal: 1) Take weight of engine off insulators using suitable lifting equipment *(CAUTION—Do not use a jack under oil pan).* Remove screws fastening engine support to timing chain cover.

2) Remove screws which fasten insulator to frame front crossmember (these screws can be reached through an access hole in bottom of front crossmember). Raise engine just clear of insulator and support assembly.

3) Disconnect exhaust crossover pipe at both manifolds and exhaust pipe so it can be lowered to provide clearance for removing insulator. Remove insulator and assembly.

Installation: 1) Position insulator and support assembly against timing chain cover and install attaching screws with lockwashers. Tighten to 60 ft. lbs.

2) Connect exhaust crossover pipe to both exhaust manifolds and exhaust pipe, using all new gaskets. Use four thin (.075"), or two thick (.135") gaskets at each flange. Tighten attaching bolts securely. Lower engine and install frame to insulator screws with lockwashers and tighten.

1955 V8 MODELS

REAR INSULATOR: *NOTE—Rear insulator locates engine. Front insulator must be allowed to position itself after rear insulator installed.*

Removal: Remove two front insulator to frame bolts. Support engine securely at rear to remove engine weight from rear insulators. *(CAUTION—Do not use jack under oil pan).* Remove two bolts holding each rear insulator to frame crossmember, and then remove insulators by removing two bolts holding each insulator to flywheel housing. Disconnect exhaust pipe from exhaust crossover pipe so exhaust pipe can be moved to gain access to right insulator frame bolts.

Installation: Install new insulators on flywheel housing using lockwashers under each of two bolts holding insulator. Lower engine so rear insulators are resting on frame crossmember and insert insulator to frame bolts from top. Install self locking nuts and tighten to 35 ft. lbs. Raise front of engine slightly to take weight off front insulator, then lower engine completely so it rests on front insulator and install two front insulator to frame bolts (with lockwasher and flat washer on each).

1946-48 8 CYL. MODELS

OIL PAN REMOVAL: All Eights. For access to attaching screws at front end of pan, remove radiator splash aprons as follows: Remove screws attaching aprons to front cross-member and radiator support, remove aprons from inside engine compartment by lifting aprons out with a circular motion (rotate right apron to right, and left apron to left, as they are being lifted out).

1949-54 MODELS

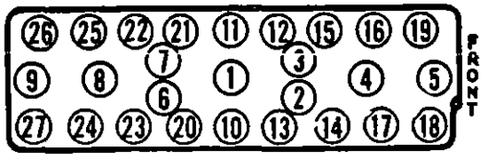
OIL PAN REMOVAL: Drain crankcase and cooling system, remove radiator hoses at water pump and cylinder head. Take out two bolts mounting steering idler arm support, drop steering linkage down to provide clearance at pan. Remove front cross member-to-radiator cross member apron. Take off two self-locking nuts mounting engine front insulator to engine support. Use jack under oil pan (place wood block on jack to prevent damage to pan) to raise front end of engine approximately 1" (CAUTION—do not raise engine more than necessary to remove front insulator), take out two bolts mounting front insulator and rebound clamp assembly on frame and remove assembly. Install block approximately 2½" high between frame and engine support, lower engine so that it rests securely on this block, remove jack from under pan. Take off flywheel housing lower cover. Remove oil pan (NOTE—Removal of one engine side apron may be necessary to provide clearance for removing the pan.

►***INSTALLATION CAUTION***—See Engine Front Insulator installation data under "Engine Mountings" on preceding page.

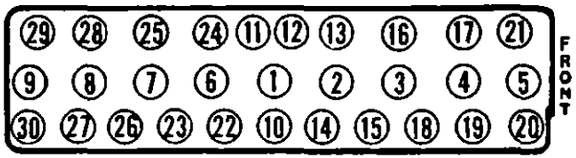
CYLINDER HEAD & MANIFOLD

1946-54 MODELS

CYLINDER HEAD INSTALLATION: Use torque indicating wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in diagram. Cast iron heads should be tightened cold and rechecked after engine has been run sufficiently to bring all parts to normal operating temperature. **Tightening Torque**—See Tightening (Torque Wrench) Specifications.



1946-54 SIX CYLINDER HEAD



1946-54 EIGHT CYLINDER HEAD

1955 V8 MODELS

CYLINDER HEAD: Removal—Remove intake manifold and push rod cover. Remove rocker arm covers (On left bank, remove spark plug wires and wire support). Remove battery and engine ground straps, Hydra-Matic level indicator tube bracket and indicator. Loosen all rocker arm adjusting nuts and move rocker arms off pushrods. Remove pushrods and place in order so they can be reinstalled in the same position (*NOTE*—The rearmost pushrod on left bank (cars with defroster) cannot be removed, withdraw rod part way and tie to head. Remove exhaust crossover pipe to manifold attaching screws and remove screws from cylinder head water outlet fitting. Remove cylinder head (dowel pins will hold head in place) and remove head with exhaust manifold attached *(NOTE*—When left head being removed, raise head off dowels, move it forward and "jockey" the the head in order to clear defroster, power steering, and power brake equipment).

Installation: *(NOTE—Right and left cylinder heads are interchangeable except for water passage plug in end of water passage which must be installed in correct position if new head installed).* To install, reverse removal procedure and note the following: Head screws are three different lengths and when properly installed, all screws will project an equal distance from head. *Do not use sealer of any kind on threads.*

PISTONS

1946-54 M DELS

REPLACEMENT PISTONS (Standard Size): Standard size pistons are furnished in three sizes since there is an allowable tolerance on size of standard bores and pistons. It is important to select pistons to fit bores or hone bores to give proper piston fit (See Car Model Pages for piston fitting specifications).

►***1953 6 CYL. PISTON CHANGE CAUTION—See Car Model pages for piston changes.***

Oversize Replacement Pistons:—Finished pistons furnished in following oversizes: .005", .010", .020", .030". NOTE—All factory replacement pistons held to

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uniform weight within 1/16 oz. and all oversize pistons up to .030" oversize are same weight as standard pistons.

CAUTION—Factory replacement pistons electorplated after being finished to size and must not be ground.

PISTON PINS

1946-EARLY 1952 MODELS
(CAST IRON PISTONS)

PISTON PIN FITTING (Pins with Setscrew Retainers —in Cast Iron Pistons): Oil bushings in connecting rod with light engine oil and coat piston pin bosses in piston with graphite grease. Rest piston on Block J-1325-1 so piston boss receiving lock screw is up. Place piston pin in position so slotted end first enters into boss receiving lock screw and also so slot in piston pin will be to side of piston boss when installed. Place Hydraulic Cylinder and Gauge J-1325-SA-1 on pin, and bring down press on hydraulic cylinder and gauge and force pin into piston. Reading on gauge should be 200-350 lbs. pressure. Install self locking piston pin lock screw and tighten to 10-12 ft. lbs. If pressure required to press pin into piston is not within the above limits with a standard size piston pin, use an oversize pin and hone piston and rod bushing as necessary.

▷*CAUTION—If hole in pin is not accurately aligned with hole in piston boss the taper of setscrew will wedge against taper of hole in pin, setting up a severe strain on piston boss which may cause piston breakage.*

LATE 1952 6 CYL MODELS
LATE 1952-54 8 CYL. MODELS

PISTON PIN FITTING (Pins with Snap Ring Retainers—in Cast Iron Pistons): Fit pins to pistons so that 150-250 lbs. pressure required to press pin through one boss (NOTE—With this fit pin will not remain permanently tight in engine, and high mileage engines may be found in which piston pins are free). Use special expansion reamer J-874-19 or similar tool to size piston holes to fit oversize pins. To install pins, coat bushing in connecting rod with light engine oil and insert rod in piston with piston skirt plug J-1325-3. Coat pin holes in piston with graphite grease. Position piston on Block J-1325-1 and press in piston pin. Install snap ring pin retainers making sure rings are fully seated in ring grooves.

1953-54 6 CYL. MODELS

PISTON PIN FITTING (Aluminum Pistons): Full floating pin used with a clearance of .0000-.0002". This clearance will be correct if pin can be pushed into place with the thumb. Clearance is excessive if pin will slide through of its own weight. Use special expansion reamer J-874-19 or similar tool to size piston pin holes to fit pins. Oil bushings in connecting rod and insert connecting rod in piston so oil hole in rod will be toward camshaft side of cylinder when "F" or notch in piston is toward front.

PISTON RINGS

1946-52 6 CYL. MODELS
1946-54 8 CYL. MODELS

REPLACEMENT PISTON RINGS: Regular Type. These rings should be used on engines where out-of-round does not exceed .003".

Sealed Power Type—Special piston ring sets furnished under Group No. 0.643 may be used where out-of-round is within limits of .003" to .009".

1953-54 6 CYL. MODELS

REPLACEMENT PISTON RINGS (6 CYL. MODELS): Two types of rings used in production (See Car Model Pages for fitting). LATER type only furnished for service replacement. Early type rings must not be used on later type pistons. These rings furnished in packages (sets of 6) as listed below and THESE RINGS SUPERSEDE FIRST OIL RING PACKAGES.

6 Cyl. Replacement Rings

	Top Compr.	Lower Compr.	Oil Ring
Standard	517266	517267	517863
.005" O.S.			517864
.010" O.S.	517364	517367	517865
.020" O.S.	517365	517368	517866
.030" O.S.	517366	517369	517867

1953-54 6 CYL. MODELS

OIL ECONOMY PISTON RINGS (6 CYL. HYDRA-MATIC CARS): For improved oil economy with either first or later type pistons, install special Oil Rings as listed below, together with special Oil Chamber Oil Baffles (see Oiling System for baffle installation).

Oil Control Ring (Part No. 517820)—These rings furnished in sets of six. Each ring consists of four pieces: 1 Spacer, 1 Spring, 2 Rails.

Compression (upper) (Part No. 517266)—Furnished singly, 6 required.

Compression (lower) (Part No. 517267)—Furnished singly, 6 required.

Valve Chamber Oil Baffle (Part No. 517877)—9 required. *See Oiling System for baffle installation.*

CONNECTING ROD & BEARINGS

1946-54 MODELS

CONNECTING ROD LOWER BEARING: Removable type. No adjustment. Shims should not be used or bearing caps filed. When replacing bearings check crankpins. If scored or out-of-round and taper exceeds .001" crankshaft should be replaced.

Checking Bearing Clearance (Brass Shim Method): Use .0015" brass shim stock ½" wide and ⅞" long. Remove cap and lay shim across bearing. Tighten cap (with shim in place). Check bearing fit as follows:—Rod should be locked when testing end movement by hand but should slide on crankpin when tapped lightly with hammer. With shim removed rod should move freely on pin. If rod can be moved by hand with shim in place install .001" undersize bearing.

Installation—Bearing shells fitted with tangs (Six —one to each edge of bearing. Eight—two on each edge). Install cap with tangs on opposite sides of rod (Six), on opposite ends of crankpin (Eight).

1946-54 M DELS

PISTON PIN FITTING (Connecting Rod Bushing): Press out old connecting rod bushing using Bushing Remover J-540-1 and Block J-526. Press new bushings into place using Bushing Replacer J-540-2 and Block J-526. This replacer tool must be used as the thin wall split bushings will distort on pressing into rod without support by shank of replacer tool. Swage or expand bushings into connecting rod by using Burnished Tool J-516 and Block J-526. (CAUTION—It is very essential that bushings be burnished into place as bushing may work out of connecting rod bore). Hone bushing to fit piston pin it is to be used with. A Sunnen hone or similar accurate equipment should be used for honing operation. **Do not use a hand reamer.**

1955 V8 MODELS

CONNECTING ROD BUSHING REPLACEMENT: Press out old bushing using Bushing Remover & Installer J-5753-3 and Block J-5753, (*NOTE*—For removal of bushing, the smallest diameter or third shoulder on tool is inserted in bushing). Press new bushing into place using same tools as for removal, but using opposite end of Bushing Remover & Installer. This tool must be used since the thin wall bushing will distort when pressed into rod unless supported by shank of tool. Drill a 5/32" hole in bushing through oil hole in top of rod, using care to prevent end of tool damaging opposite side of bushing. Swage or expand bushing into connecting rod using Burnisher Tool J-5753-1 and Block J-5753, pressing Burnisher Tool through bushing with connecting rod assembly supported on Block. Hone bushing to fit piston pin.

CRANKSHAFT & MAIN BEARINGS

1946-54 MODELS

Checking Bearing Clearance (Brass Shim Method): To check bearing fit, use .002" brass shim stock ½" wide and 1" long. With cap removed place shim across bearing. Tighten cap (with shim in place). Test bearing fit by rocking flywheel by hand. **Do not rock flywheel more than 1" in either direction** or bearing may be damaged by shim. If crankshaft locks with shim in place and rotates freely with shim removed bearing size correct. If shaft moves with shim in place use .001" undersize bearing. IMPORTANT—Do not file main bearing caps. These caps are not furnished separately.

1946-54 MODELS

MAIN BEARINGS: Removal. Remove the bearings with caps removed and crankshaft in place by inserting suitable tool (see NOTE following) in oil hole in shaft and rotating shaft in usual direction.

NOTE—Bearing Removal Tool can be made from ⅛"x1½" cotter key. Bend each end of key up 5/16" to make ⅝" long base. With this as a base, bend key to form 59° angle. With this tool inserted in place end will just protrude far enough to engage bearing.

Installation—Insert plain edge of bearing in indented side of bearing support, slowly rotate crankshaft until bearing seated.

1946-54 6 CYL. MODELS
1950-54 8 CYL. MODELS

REAR MAIN BEARING OIL SEAL: Seal consists of oil slinger on crankshaft to rear of main bearing, operating in groove formed in block and cap (drain hole in cap returns oil to crankcase) with asbestos seal

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fitted in separate groove at rear. Edges of seal groove in cylinder block and rear main bearing cap are chamfered to reduce pressure between seal and crankshaft and prevent pinching of seal. One end of groove in bearing cap is recessed and a portion of seal should be worked into this recess to prevent seal turning in service.

Installation—Remove bearing cap and upper half of bearing insert from first main bearing forward of the rear main bearing. Remove all connecting rod bearing caps. Remove rear main cap and loosen remaining main bearing caps sufficiently to allow crankshaft to be lowered approximately 3/8" at rear. Remove upper half of rear main bearing oil seal and with rear main bearing cap on bench, remove oil seal and insert. Install new seal using tool J-1045, and trim flush. *(CAUTION*—Do not pack seal into locking recess). Carefully remove seal from cap and slide it into groove in block over crankshaft. *(Caution*—Take particular care to install seal so that end of seal which was at locking recess in cap during forming operation, will meet locking recess in cap when cap is installed). Install bearing inserts and cap on main bearing forward of the rear main and torque to 95 ft. lbs. to properly seat crankshaft against new oil seal. (NOTE—Make sure that upper half of seal in rear main is flush with edge of block). *(CAUTION*—If inspection shows seal to be an improper length, remove and discard it, and form a new seal as follows: Install a new seal in bearing cap using tool J-1045 and trim one end flush; carefully remove seal from cap and reinstall in cap, rotating it so that trimmed end is below or above edge of cap the proper distance to correct for the improper length of the first seal. Reseat the seal with tool J-1045 and trim the uncut end flush with edge of cap. Reinstall in block groove). Install new seal in rear main bearing cap using tool J-1045 and pack end of seal into locking recess. Trim the other end flush and replace inserts. Install cap and torque to 120 ft. lbs. Remove rear main bearing cap again and inspect break line between cap and block to be certain that none of the seal material has been compressed between the two. Scrape surfaces to insure seating of cap. Re-install and torque to 120 ft. lbs.

Bearing Cap Seal: After rear bearing cap installed, drive wooden wedge seal into groove on each side of bearing cap next to block. ***CAUTION—Use care not to split these wooden wedges.***

NOTE—1950 and later rear main bearing cap seals differ from previous types and are not interchangeable. Early type is wedge shaped, while later type is square with beveled edges.

1955 V8 MODELS

REAR MAIN BEARING OIL SEAL REPLACEMENT: 1) Drain oil and remove oil pan, oil pump, and oil pump drive shaft. Remove oil baffle and cylinder block to oil baffle tube (lower oil level indicator tube). Remove transmission (See Synchro-mesh Transmission Removal on Car Page or Hydra-Matic Drive in Transmission Section).

2) Remove rear center main bearing cap and upper half of rear center main bearing shell to allow crankshaft to be lowered and to prevent damage to thrust surfaces of bearing. Remove rear main bearing cap and loosen remaining bearing caps sufficiently to allow crankshaft to be lowered approximately 3/8" at rear.

3) With crankshaft lowered to provide clearance, remove upper half of rear main bearing oil seal and bearing shell.

4) Install seal in cap with one end flush with cap and compress seal using hammer and Seal Compressor J-3048-A. *Do not pack seal into locking recess in cap.* Remove seal from cap and install in groove in block-by-slipping-over-crankshaft-into-cavity-of-block. Insert end which was flush with cap first. Install rear main bearing cap with bearing shell and tighten to 95 ft. lbs., to pull crankshaft up into place against seal. Carefully trim both ends of seal flush with block.

5) Install a new seal in cap, as above, *except that Seal must be packed into locking recess in cap.* Trim seal flush with cap. Install cap with shell and tighten to 95 ft. lbs. Remove rear main bearing cap again and inspect split line to be certain that none of seal material has been compressed between cap and block. Make sure mating surfaces are clean.

6) Apply a bead of sealer (Permatex No. 2), 3/64" to 1/16" in diameter to mating surface of cap extending from packing seal groove outward to the groove for oil pan cork rear gasket. Install rear main bearing cap and tighten to 120 ft. lbs. torque.

7) Remove rear center main bearing cap and reinstall upper half of bearing shell. Install cap and tighten to 95 ft. lbs. Tighten remaining bearing caps to 95 ft. lbs. Replace transmission, oil pump, oil pump drive shaft, oil baffle, oil pan and flywheel lower cover and shield.

►*CAUTION:* Seal must be installed exactly as detailed above to prevent oil leaks at rear bearing. Make certain that seals not cut too short and that mating surfaces of bearing cap and block are free of any packing material, dirt or oiliness (except for Permatex bead on cap) and that they are not scratched or burred.

VIBRATION DAMPENER

1946-54 MODELS

HARMONIC BALANCER SERVICING: No service operations required. Do not attempt to disassemble balancer (serviced by replacement).

Removal & Installation—Drain cooling system and disconnect radiator hoses. Remove radiator (see Radiator Removal), loosen and remove fan belt. Remove harmonic balancer retaining bolt, lockwasher, and balancer washer. Use J-2582-A or similar puller to remove balancer from crankshaft. When installing balancer, see that key in place in shaft keyway and balancer washer installed under retaining bolt lockwasher. Tighten bolt to 95 ft. lbs.

1955 V8 MODELS

VIBRATION DAMPENER: Removal—Loosen generator at adjusting strap and remove fan belt from vibration dampener. On card equipped with power steering, also remove power steering pump belt. Position fan so wide angles will be at top and bottom allowing access to balancer. Remove dampener attaching screw (15/16" socket) and retaining washer, and slide dampener off shaft.

Installation: Reverse the removal procedure.

ENGINE FRONT COVER

1955 V8 M DELS

ENGINE FRONT COVER: Removal—1) Drain radiator. On cars with power steering, remove pump with mounting bracket from pad on top of engine front cover and lay it back on fender skirt where it will be out of the way. *(CAUTION—Disconnect battery ground strap).*

2) Disconnect wires from generator and remove generator and mounting bracket and adjusting strap. Remove fan belt, power steering pump belt, and fan and pulley. Disconnect upper and lower radiator hoses, remove fan shroud, and remove radiator. Remove water inlet elbows from cylinder heads (leave hose attached). Remove fuel pump and remove vibration dampener.

3) Take weight off engine front insulator using suitable engine lifting equipment. *(CAUTION—Do not use jack under oil pan).* Remove screws and lockwashers attaching front insulator to engine front cover. Remove four front oil pan-to-engine front cover screws. Remove engine front cover-to-block attaching screws and nuts. Pull cover forward to clear studs and remove.

Installation: See Crankshaft Oil Seal (below), Install new front oil pan gasket (cement gasket to oil pan), Position new front cover gasket over studs on front of block, position front cover on engine, install all capscrews and nuts with lockwashers and tighten securely. Install four oil pan-to-front cover capscrews and lockwashers, tighten these screws to 10-12 ft. lbs. Install front engine support-to-front cover screws loosely, then lower engine and tighten screws to correct torque of 60 ft. lbs. Reassemble engine by reversing removal procedure (above).

1955 V8 M DELS

CRANKSHAFT FRONT OIL SEAL REPLACEMENT: After front cover removed (above), slide old seal off end of crankshaft. Coat face of new seal with graphite lubricant and install on crankshaft before installing front cover.

FLYWHEEL

1955 V8 M DELS

FLYWHEEL INSTALLATION: Clean mating surfaces of flywheel and crankshaft thoroughly (use Acetone to clean old Pliobond 30 from surfaces). Apply a thin coat approximately ½" wide) of Pliobond 30 sealing compound on surface of crankshaft at bolt circle. Smooth seal compound around toward outer edge and allow to dry about one minute. (*CAUTION*—In no case will a fibre gasket be used between flywheel and crankshaft. Use only Pliobond 30 sealing compound). Install flywheel on crankshaft flange carefully and enter all flywheel bolts through plates. Tighten bolts diametrically opposite uniformly to correct torque. (*NOTE*—Draw flywheel on evenly during this operation to prevent leakage and excessive runout). Mount a dial indicator so stem or button rests on torus cover gasket seal area and check flywheel runout. Runout should not exceed .005".

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CAMSHAFT & BEARINGS
1946-54 MODELS

CAMSHAFT: Removal. Remove Front Fender and Radiator Assembly (see above), remove fan belt, fan, and harmonic balancer (use Puller J-496). Support front end of engine with jack and remove front engine support, timing chain cover, chain, and sprockets. Remove cylinder head and valve covers, take out valves and lifters (lifters are barrel type and can be removed from above with valves out). Remove oil pump, fuel pump, and distributor. Take out screws and remove camshaft thrust plate, withdraw camshaft at front of engine. Re-install camshaft in same manner making certain that timing chain cover is properly centered (see Timing Chain Cover and Oil Seal data below). After camshaft installed, check Valve Timing, Ignition Timing, and Tappet Clearance.

CAMSHAFT BEARINGS: Use tool No. J-550 to remove and install camshaft bearings (rear bearing on Eight must be pulled out toward front as expansion plug at rear prevents driving on bearing from rear). Use driver to install all bearings making certain that oil hole in bearings is lined up with hole in block (holes are at bottom of bearings). Then line ream all bearings to finished sizes as follows:

Bearing Finished Size:	Six	Eight
#1 (Front)	1.9950-1.9955"	1.9950-1.9955"
#2	1.9637-1.9642"	1.9637-1.9642"
#3	1.9325-1.9330"	1.9325-1.9330"
#4	1.9012-1.9017"	1.9012-1.9017"
#5		1.8700-1.8705"

TIMING CHAIN
1946-54 MODELS

TIMING CHAIN REPLACEMENT: Timing chain must be installed "endless" with both sprockets off the engine as directed below. CAUTION—Any attempt to install the chain by removing only one sprocket will result in breaking of the chain.

Timing Chain Removal—Remove Front End Sheet Metal Assembly as a unit, remove fan belt and fan, remove Harmonic Balancer (see Vibration Dampener). Support front end of engine with support jack, remove front engine support (see Front Engine Insulator Removal), remove timing chain cover, timing chain and sprockets.

Timing Chain Installation—Mesh sprockets in chain with timing marks on both sprockets lined up for correct valve timing (see Camshaft Setting on car model pages), install both sprockets together being careful not to place any side strain on chain.

1946-54 MODELS

TIMING CHAIN COVER & OIL SEAL: Consists of cork seal and spring assembled on the crankshaft in front of the chain sprocket so that the cork bears against the inner face of the timing chain cover.

Installing New Cork Seal—Coat seal with graphite lubricant, rubbing lubricant well into the face of the cork, before installing seal in engine. This lubrication necessary to prevent noise at this point.

Installing Timing Chain Cover—Use J-546 tool to center timing chain cover before screws tightened.

NOTE: A timing chain bumper has been incorporated in the timing chain cover on the six cylinder engine. This bumper dampens timing chain vibration. The bumper consists of a synthetic rubber pad which is vulcanized to a steel bracket welded on the left edge of the timing chain cover on the driving side of the chain. The new cover is servicable as an assembly on past 6 cylinder engines.

1955 V8 MODELS

▷*TIMING CHAIN REMOVAL CAUTION:* **Do not rotate crankshaft with timing chain out of engine.** Damage to valves, pistons, or both will result due to piston striking valve. To rotate camshaft with timing chain off, crankshaft must be positioned so pistons are 45° before or after TDC, to avoid damage to valves.

TIMING CHAIN: Removal—Remove engine front cover (See Engine Front Cover above). Remove fuel pump eccentric. Align timing marks on sprockets. Slide timing chain and sprockets off camshaft and crankshaft.

Installation: Install new timing chain and sprockets making sure that marks on sprockets are aligned exactly on a straight line passing through shaft centers. Install fuel pump eccentric indexing pin on eccentric with hole in sprocket. Install retainer screw and retainer washer and tighten securely. Install engine front cover.

VALVE SYSTEM
1955 V8 MODELS

CHECKING VALVE STEM LENGTH: Position rocker arm on stud and hold in place using Rocker Arm Stud Installer J-5716. Slip valve into place and hold it against valve seat. While holding rocker arm and valve in position securely, insert Valve Train Gauge J-5710 through pushrod hole and seat snugly in pushrod seat of rocker arm. With all parts seated, step end of gauge should be at least flush with gasket face of head, but should not project past step on gauge. If gauge projects too far (indicating valve stem too long), grind off tip of valve stem as necessary. *CAUTION*—When grinding end of valve stem be careful not to overheat it which will soften the hardened stem.

ROCKER ARMS
1955 V8 MODELS

ROCKER ARM STUD REPLACEMENT: *NOTE—Use oversize stud (.003") only when original stud is found to be loose in cylinder head. Use Std. size stud for replacement when original stud threads are damaged).*

Removal: 1) Remove cylinder head from engine and remove rocker arm. Pull rocker arm stud out of cylinder head using washers or other suitable shims under a nut to extract stud. If oversize stud being installed, ream out stud hole with Reamer J-5715.

2) Remove plugs from ends of cylinder head oil gallery and thoroughly clean out metal deposits and foreign matter from cylinder head (head must be right side up so metal or foreign material will not lodge around studs).

Installation: 1) Position rocker arm on new rocker arm stud and place Rocker Arm Stud Installer J-5716 on stud in place of rocker arm ball. Carefully press stud into head using a 2-Ton press, until it is installed about half way (7/16").

2) Position Valve Train Gauge J-5710 in pushrod hole so that it seats properly in the rocker arm. With valve seated, slowly press rocker arm stud into cylinder head until gauge projects about midway between end of gauge and step with respect to gasket surface of cylinder head.

3) Remove Rocker Arm Stud Installer, rocker arm and ball. Blow air through hole in new stud to insure that passage is not restricted, and blow air through oil gallery. Replace plugs in ends of oil gallery. Check oil passages from oil gallery to all studs. Install rocker arm and ball and install nut loosely. Replace cylinder head.

HYDRAULIC LIFTERS
1955 V8 MODELS

HYDRAULIC VALVE LIFTER OVERHAUL: Removal—Remove intake manifold, pushrod cover and rocker arm cover. Loosen rocker arm ball nut and move rocker arm off pushrod. Remove pushrods (rear lifter on left bank cannot be removed if car is equipped with defroster, but must be raised and moved out of way for removal of lifter). Remove lifter from bore in cylinder block.

Disassembly: Remove pushrod seat retaining ring by holding down seat with pushrod while dislodging spring from lifter body with pointed tool (*NOTE*—it may be necessary to unseat lifter ball, using plunger unloader J-5097, before plunger can be pushed down). Invert lifter and allow plunger to slide out of body. If plunger sticks, place lifter in large end of Hydraulic Valve Lifter Plunger Remover J-4160-A, with pushrod end of lifter downward. Hold tool firmly in hand with thumb over lifter body and strike sharply against a block of wood until plunger falls out (it may be necessary to soak a lifter with a stuck plunger in cleaning solvent to loosen plunger in body). *CAUTION—If more than one lifter is being disassembled at a time make very sure that parts for each individual lifter be kept together so that parts are not intermixed.*

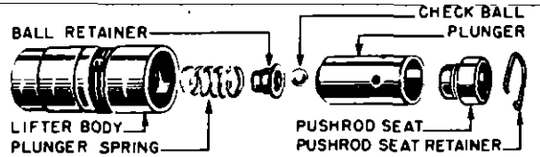
Inspection: Wash individual lifters separately, keeping parts for each lifter together. If necessary, soak lifter in suitable carbon solvent to dissolve varnish and carbon. Using a lint free cloth, clean each part with a hard wiping action. Use a bristle brush if required. Do not use a wire brush or sandpaper. Inspect lifter body for scoring, and check cam surface at end of lifter for wear. Check plunger, and using a magnifying glass, inspect check ball seat for defects, and outer surface of plunger for scratches or scores. Inspect pushrod seat for roughness and make sure hole in seat is open. Inspect lifter ball for nicks or scoring. If any part of lifter is found defective, replace entire unit.

Assembly: Rinse all parts in clean kerosene before assembly and assemble without drying. Rinse plunger spring and ball retainer and position retainer in spring. Install ball in retainer (check ball spring not necessary, and is not found in later type lifters). Rinse plunger

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and place on retainer so that seat on plunger mates with ball. Invert plunger with parts assembled thus far and, after rinsing body, install body over spring and plunger. Place lifter body on clean paper; rinse and install pushrod seat and retainer ring.



V8 HYDRAULIC LIFTER

Checking Leakdown Rate: Fill tester cup in Valve Lifter Leakdown Tester J-5790, to approximately 1 inch from top with special testing fluid. Swing weight arm up out of way, raise ram, and position lifter into boss in center of tester cup. Place ¼" steel ball in pushrod seat of lifter and lower ram onto ball. Adjust ram (with weight arm clear of ram) so that pointer is positioned on set line (marked "S"). Tighten jam nut to maintain setting. Operate lifter through full travel of plunger by pumping weight arm to fill lifter with test fluid and force out air. (Lifter must be completely submerged at all times). Continue pumping for several strokes after definite resistance is felt (*NOTE*–If noticeably weak resistance is felt during any one of last few strokes (of hard pumping), replace ball in lifter and repeat test to this point. Raise weight arm to allow plunger spring to expand fully, lower arm onto ram and commence turning crank slowly (1 revolution every 2 seconds). Time indicator travel from lower line (first line above set line) to line marked .094", while still rotating cup with crank. Lifter is satisfactory if rate is between 9 and 30 seconds. Retest all doubtful lifters.

Installation: *(CAUTION–If new lifter is to be installed, remove sealer coating from new lifter, making sure that hole in pushrod seat is not plugged with sealer coating. Check leakdown rate).* Place new lifter in lifter boss and replace pushrod exactly as removed (same end against rocker arm). Crank engine until lifter is on base circle of cam (completely off cam lobe). Position rocker arm on pushrod and adjust lifter plunger position as follows: Turn adjusting nut down until there is no axial movement (clearance between pushrod and rocker arm and lifter seats, making sure that plunger has not been depressed, **then turn nut down one complete turn.** Replace rocker arm cover, pushrod cover and intake manifold.

OILING SYSTEM

1946-54 MODELS

CRANKCASE OIL CLEANER: Pontiac type 'controlled flow' design consisting of settling chamber in oil inlet and filter screen housing in crankcase.

Servicing—No service required but Oil Cleaner should be removed and settling chamber cleaned out when oil pan removed for other work, or if car has been upset or turned over. Capacity of cleaner is 1 quart.

Removal & Installation—To remove cleaner with oil pan off engine, disconnect oil suction pipe from crankcase as a unit. Take out attaching screws and remove cleaner from bracket and suction pipe. Remove snap ring on bottom of cleaner and remove oil screen. Take out screws mounting cleaner head to housing shell and remove settling chamber from housing. Wash all parts in gasoline and scrape sediment from settling chamber. When reassembling cleaner see that all gaskets in good condition or use new gaskets. Turn head and housing shell upside down and insert 2 screws and place gasket inside shell, then set settling chamber in place and start screw threads, turn assembly right side up and install remainder of screws, tightening them securely. Assemble all other parts. Fill cleaner with fresh oil and install. CAUTION—Fill cleaner with fresh oil before installing in crankcase (avoids running bearings without oil when engine first started).

1953 6 CYL. MODELS

VALVE CHAMBER OIL BAFFLE INSTALLATION (6 CYL. CARS): Remove carburetor air cleaner (windshield washer jar and Autronic Eye Amplifier if so equipped). Remove valve covers and insert baffles in nine ventilating holes with open side of baffle toward wall of block. Press baffles down as far as possible. If baffle is loose in hole, spread the split round section to secure tight fit. Install all parts removed.

1946-54 MODELS

OIL FILLER CAP & CRANKCASE VENTILATOR CLEANER:—All oil filler caps (Std. & Heavy Duty type) serve as inlet for crankcase ventilating system and must be correctly installed on engine. Install cap with seam on side engaging groove in top of oil filler pipe and opening in cap toward fan. Standard Filler Cap—Wash copper gauze filter element in gasoline and re-oil by dipping in engine oil at 10,000 mile intervals (twice yearly) for ordinary conditions. Service at 2000 mile intervals, or more often if necessary, in dusty areas.

Heavy Duty Filler Cap—Used on cars with heavy duty (oil bath) type carburetor air cleaner. Similar to the standard cap except for greater cleaning capacity. Service in same manner as standard cap and always clean outlet pipe air cleaner at same time. **Crankcase Ventilator Outlet Pipe Air Cleaner**—Consists of a copper gauze filtering element in an elbow on the crankcase outlet pipe. Clean in same manner as filler cap (above). NOTE—No outlet pipe cleaner used on cars with Standard Filler Cap.

1955 V8 MODELS

OIL PASSAGE PLUG (IN CYLINDER HEAD) REPLACEMENT: *This plug is located on intake side of cylinder head bolt which feeds cylinder head oil gallery (toward rear of head on left bank, and toward front of head on right bank).*

Removal: Remove cylinder head bolt from hole which feeds oil gallery. Attach a piece of rag to a wire for removing rag, and push rag down into bolt hole past the oil passage in which plug is located. Drive old plug through passage into bolt hole where it will drop onto rag. Pull rag out pulling old plug with it.

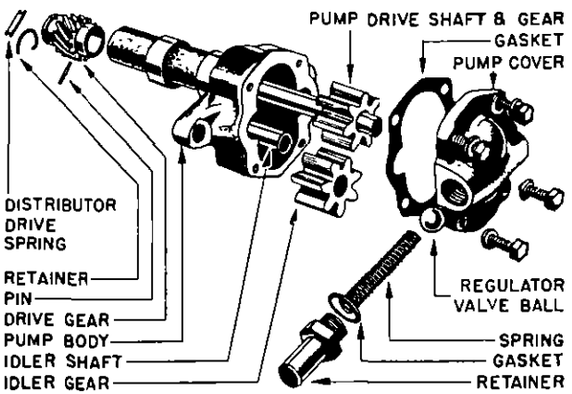
Installation: Drive plug into place using a tool which bears into bottom of plug (½" x 3" bolt can be used) until outer edge of plug is flush with surrounding surface of head.

OIL PUMP

1946-54 MODELS

OIL PUMP SERVICING: Pump is gear type mounted externally on right side of engine.

Removal: Turn crankshaft so that #1 piston on top dead center of compression stroke with distributor rotor at #1 firing position. Remove steering idler arm and right hand engine side pan. Take out pump mounting bolts and remove pump.



1946-54 PONTIAC 6 & 8 OIL PUMP

Overhaul: Remove cover assembly, lift out oil pump driven gear. Take out wire retainer and remove three distributor drive springs. Support pump on bottom surface, press pump shaft out of distributor gear (use drift of slightly smaller diameter than shaft inserted in end of drive gear to press on end of shaft). Take out relief valve plug, remove relief valve parts. Clean all parts thoroughly, replace worn or damaged parts. When re-installing parts, note specifications listed below. NOTE—Oil pump drive gear and shaft furnished as an assembly; distributor drive gear, pump driven gear, and driven gear shaft furnished as individual parts.

Pump Specifications—Driveshaft clearance in body .0025-.0005". Driven gear clearance on shaft .0020-.0005". Shaft fit in body .0025-.001" tight (press fit). Pump gear backlash .004-.006". Gear end clearance in body—Flush to .004" protrusion beyond cover surface of body (with gasket removed). Pump shaft end clearance .002-.006" (press distributor gear on shaft until clearance between gear and end of body is .002-.006".

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Relief Valve—Consists of a spring-loaded ball located under plug on pump cover. Not adjustable. Clean valve thoroughly and replace spring if length less than 2 5/16".

Distributor Drive Spring Installation—Install bank of three springs (with maximum thickness of .045" in end of distributor drive gear, install retainer ring with curved end hooked in hole in gear and ring seated in notches in both ends of springs. Check to see that drive springs slip readily in slot in distributor shaft when shaft entered in hole in distributor drive gear.

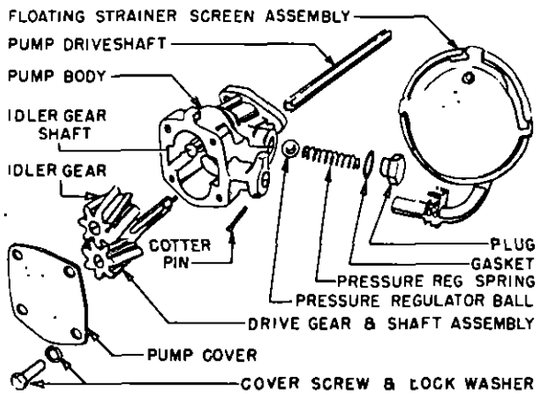
Installation: With crankshaft turned to #1 firing position, turn pump shaft so that drive springs in drive gear are parallel with center-line of crankshaft and punchmark on end of gear points downward (pump body positioned so that relief valve housing on pump cover toward rear of engine). Install pump in this position using new gasket on engine block.

1955 V8 MODELS

OIL PUMP OVERHAUL: Removal—Remove oil pan and remove oil pump attaching screws while holding pump in place. Carefully lower oil pump away from block with one hand while removing oil pump drive shaft with the other hand.

Disassembly: Remove cotter pin which retains floating screen to pump inlet and remove screen. Remove pressure regulator and spring retainer, spring and pressure regulator ball. Remove screws retaining cover to oil pump body and remove cover. Remove driven gear and drive gear with shaft.

Cleaning & Inspection: Clean all parts thoroughly (clean screen with Bendix Cleaner). Inspect pressure regulator spring for distortion, cracks, and wear on sides. Inspect pressure regulator ball for nicks or other damage. Inspect oil pump drive shaft (distributor to pump shaft) for wear or cracks. Inspect all other pump parts for wear. Replace parts as necessary.



PONTIAC V8 OIL PUMP

Assembly: Install drive and driven gears. Install cover and turn drive shaft by hand to insure that it turns freely and has a slight amount of endplay. Install pressure regulator ball, spring and retainer using a new gasket on retainer. *(CAUTION—Do not attempt to change oil pressure by varying length of pressure regulator spring).* Install screen assembly on oil pump and install new cotter pin retainer.

Installation: To install pump, position drive shaft into position in distributor and oil pump drive gear, then position oil pump in place on block, indexing drive shaft with pump drive gear shaft. Install two attaching screws with lockwashers and tighten securely. *(NOTE—*Removal and installation of pump does not disturb distributor timing). Install oil pan.

COOLING SYSTEM

1946-48 MODELS

RADIATOR CORE REMOVAL: Drain cooling system, disconnect radiator hoses, take out 3 capscrews at each side of radiator core and tip fan shroud back against front of engine. Lift radiator core up and out of shell, rotating fan to clear radiator outlet.

Water Distributing Tube Servicing—Consists of a metal tube installed in the engine block with closed end toward rear of engine which distributes cooling water through block. If engine overheats, check tube for corrosion or rust and replace tube. Install tube with closed end toward rear.

1946-48 Note—Water distributing tube beginning with 1946 engines is made of Brass to prevent corrosion.

1949-54 MODELS

RADIATOR CORE REMOVAL: Drain cooling system, remove upper and lower radiator hoses, disconnect heater return line at lower tank. Remove fan belt. Disconnect headlight wiring at right hand junction block, free wiring loom from top of fan shroud. Take out bolts attaching fan shroud to radiator and radiator to support. Turn fan so that blades clear outlet connections on radiator lower tank, lift the radiator out of support.

IGNITION NOTES

1949-53 MODELS

▷*1949-53 IGNITION DISTRIBUTOR CAP & HIGH TENSION CABLE CAUTIONS:* 1949 parts are different and are not interchangeable with 1950-53 parts because of different type radio interference suppression resistors used as follows:

1949 Distributor Cap & Cables—Distributor cap is special "High Tower" type with suppression resistance built-in the high tension cable terminal housing. Cap can be identified by the high towers and by word "Radio" embossed on lower flange. Cables used with this cap are conventional metallic-conductor type.

▷***CAUTION—Use only original type secondary cables with this "High Tower" distributor cap (1950 type cables MUST NOT BE USED).***

1950-53 Distributor Cap & Cables—Distributor cap is conventional "Low Tower" type without built-in suppression resistance. Ignition cables used with this cap are new "NON-METALLIC CONDUCTOR" type (conductors of graphite impregnated linen or rayon) with built-in suppression resistance. This 1950 cable can be identified by marking "RADIO-4000-GM" and individual cable resistances listed below.

▷***CAUTION—This "RADIO-4000-GM" 1950 cable must not be used on 1949 cars with "High Tower" distributor cap (combination will have excessive resistance).***

1950-53 Secondary Cable Resistance

▷Marked "Radio-4000-GM"

Cable	6 Cyl. (Ohms)	8 Cyl. (Ohms)
Ign. Coil Lead	2000-4400	2000-4400
#1	5200-12200	5200-12200
#2	4400-10300	5000-11500
#3	3600-8500	4200-10000
#4	4400-10300	4200-10000
#5	4400-10300	5500-13000
#6	5200-12200	6000-14000
#7		6300-14500
#8		7500-17500

▷***CABLE INSTALLATION CAUTION—Special procedure as given below necessary to secure good contact between cable conductors and terminals.***

Terminal Installation on 1950 Secondary Cables—Before installing terminals, insert piece of metal wire to depth of 7/8"" in end of cable to provide large area of contact with non-metallic conductor, bend end of wire across end of cable to provide good contact with metal of terminal, install conventional terminal on cable.

▷**Loose Spark Plug Cable Terminal Correction on early 1950 Cars (where cable terminal pops off spark plug and cylinder cuts out)**—On early cars with first type cable terminal (with single detent dimple on end), detent may not lock securely on later type spark plug nut (with single groove) allowing cable to pop off in service. If terminal bottoms on spark plug nut before detent snaps tightly in spark plug nut groove, **grind approximately 1/16" off end of cable terminal.**

NOTE—This trouble should not be experienced with "double detent" type cable terminals which have detent on each side.

FUEL SYSTEM NOTES

1955 V8 MODELS

FUEL FILTER (Draining & Cleaning): Remove drain plug and drain out dirt and water. If filter is excessively dirty remove filter from car and agitate it in a carburetor cleaner or solvent. Direct an air stream through the *outlet port* which will force water and dirt out through inlet port. Rinse filter in kerosene and again flush with air. Install drain plug and reinstall filter.

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EXCESSIVE FUEL PUMP PRESSURE (Causing Carburetor Flooding): If fuel pump pressure in excess of 5 lbs., check pump for incorrect diaphragm installation (insufficient slack) before replacing pump:

1) Mount pump in vise with fuel side up, loosen fuel pump cover screws two turns to free diaphragm.

2) Flex diaphragm by moving rocker arm up and down several times (use short piece of pipe fitted over rocker arm to provide leverage).

3) Hold rocker arm in extreme upper position while tightening all cover screws securely. This will provide slack in diaphragm.

4) Reinstall pump and check pressure. If pressure still in excess of 5 lbs., replace pump.

►*CARTER WGD CARBURETOR NOTE: See "Carter WGD Carburetor" in Carburetor Section for other recommended changes to correct flooding.*

CLUTCH NOTES

1946 MODELS

CLUTCH RELEASE BEARING NOISE CORRECTION: May be caused by excessive clearance of release bearing on support tube allowing bearing to move on tube, or by excessive run-out of clutch release fingers. Correct these conditions as follows:

Clutch Release Bearing Support—On cars with first type Release Bearing Support, Part No. 1308585 with tubular section diameter of 1.355-1.357", replace this bearing support with new type, Part No. 509158 with tubular section diameter of 1.368-1.371". Increased diameter of later type support will reduce excessive clearance of bearing on support and prevent bearing moving on tube.

Clutch Release Finger Runout—Maximum permissible runout of fingers is .030" on a 1 15/16" diameter circle (check with a dial indicator). NOTE—Release fingers are integral part of the diaphragm.

1946-54 MODELS

CLUTCH RELEASE BEARING & SUPPORT: Release bearing is new factory lubricated and sealed ball bearing type. Bearing is piloted on tubular support mounted in clutch housing and entirely enclosing transmission main drive gear shaft. This tubular support is installed and removed through rear face of clutch housing (with transmission off car) and a paper gasket is used between the support flange and the face of the housing. An oil slinger is provided on the main drive shaft ahead of the bearing in the transmission and a felt oil seal is installed against shoulder ahead of oil slinger retaining ring (in 1946 seal originally installed in groove on shaft).

Release Bearing Support Removal—When removing support, **do not pry on flange in clutch housing**, tap support out of housing from inside (do not strike tubular portion of support, tap bell end of support at rear lightly with soft hammer).

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: First number 1001 (All Models) with Model & Plant prefix as shown below. Stamped on plate on left side of dash under hood.

Serial No. Prefix Plant	46-25	47-25	Torpedo 46-26	Streamliner 47-26
Pontiac, Mich.	P6LA	P6MA	P6LB	P6MB
South Gate, Calif.	C6LA	C6MA	C6LB	C6MB
Linden, N. J.	L6LA	L6MA	L6LB	L6MB
Wilmington, Del.	W6LA	W6MA	W6LB	W6MB
Kansas City, Kans.	K6LA	K6MA	K6LB	K6MB
Atlanta, Ga.	A6LA	A6MA	A6LB	A6MB
Framingh'm, Mas.	F6LA	F6MA	F6LB	F6MB

Serial No. Prefix Plant	Torpedo 48-25	Streamliner 48-26
Pontiac, Mich.	P6PA	P6PB
South Gate, Calif.	C6PA	C6PB
Linden, N. J.	L6PA	L6PB
Wilmington, Del.	W6PA	W6PB
Kansas City, Kans.	K6PA	K6PB
Atlanta, Ga.	A6PA	A6PB
Framingham, Mass.	F6PA	F6PB

ENGINE NUMBER: Same as Serial Number. Stamped on boss on left upper front corner of engine block.

TUNE-UP

COMPRESSION: Pressure—160 lbs. at 1000 RPM or 118-120 lbs. at cranking speed (Std. 6.5-1 Head), 191 lbs. at 1000 RPM. (Optl. 7.5-1 Head). NOTE—7.5-1 Head requires use of Ethyl fuel at low altitudes.

VACUUM READING: 18-20" steady idling at 7-8 MPH. (365-385 RPM. on Hydra-Matic cars).

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plug Type—AC No. 45. 14 mm. Metric.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020". Limits .018-.024".
Cam Angle or Dwell—35° closed, 25° open.
Breaker Arm Spring Tension—17-21 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 6° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—First line of flywheel mark "/IGN ONE/" at pointer in inspection hole in left front face of flywheel housing above starter.
Gaselector Setting—Set for barely audible ping when accelerating between 20-30 MPH. with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—Set idle adjusting screw 1-1¾ turns open. Turn screw out for richer mixture.
Idle Speed (standard)—450-475 RPM. or 7-8 MPH
Idle Speed (Hydra-Matic)—365-385 RPM.
Float Level—7/16" from machined projection on cover to top of soldered seam at free end (invert to check).
Accelerating Pump—Lower hole Normal Setting, Upper hole for greater charge, Inner hole less Fuel Pump Pressure: 4 lbs. (AH), 3¾ lbs. (AJ Comb.).

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in approximately vertical position with valve closed (cold).
NOTE—Valve shaft bushings are Stainless Steel.

VALVE TAPPET CLEARANCE: .011-.013" Hot All Valves. (.011" gauge "Go", .013" gauge "No Go." NOTE—013" Exhaust tappet clearance recommended for sustained high speed.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

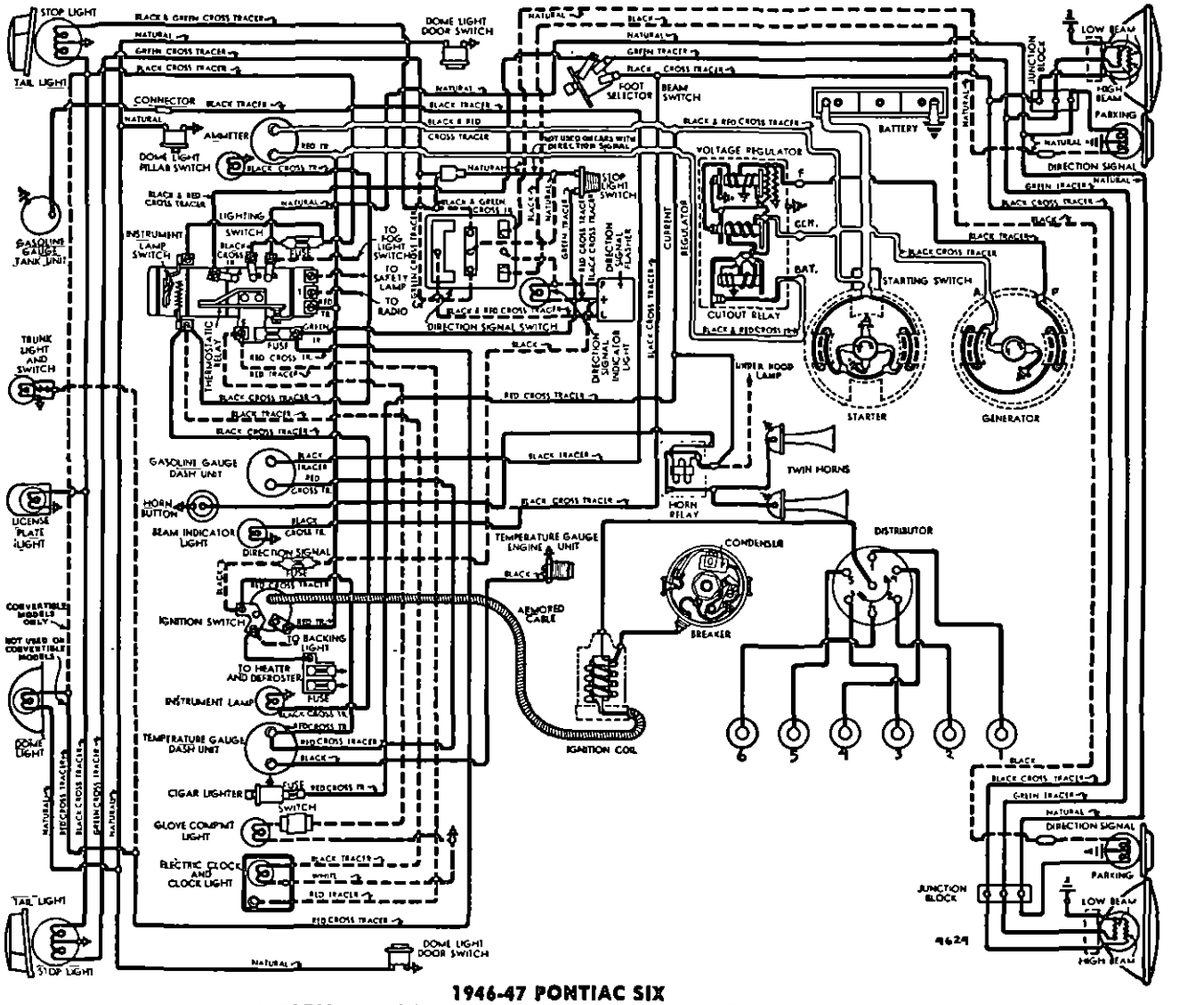
IGNITION SWITCH: Delco-Remy Nos. as follows:
1946-47—1116306 (LHD), 1116312 (RHD cars).
1948—1116455 (All cars).
NOTE—Armored cable not used on 1948 cars.
Ignition Lock Cylinder—Briggs & Stratton 45792. Key Series—8000 to 9499. Groove—No. 15.

COIL: Delco-Remy 1115126 ('46-47), 1115380 ('48). 1946 NOTE—Primary terminal on 6 Cyl. coils located on right side (toward front on 8 Cyl. cars). Some 6 Cyl. coils have primary terminal at front (as on 8 Cyl. coils), later coils of this type have figure "6" stenciled in red on coil. CAUTION—These coils should be used on 6 Cyl. cars only (coils must not be interchanged).
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.25 microfarad.

DISTRIBUTOR: Delco-Remy #647-D. Single breaker 6 lobe cam, full automatic advance type with auxiliary vacuum control and Gaselector adjustment.

▷**Late 1948 Distributor Cap**—Has built-in radio suppression. Can be identified by high wire towers and marks "Radio" on lower edge of cap on each side.



1946-47 PONTIAC SIX
▷EARLY 1946 WIRE COLORS NOT UNIFORM—SEE LIGHTING

Breaker Gap—.020". Limits .018-.024".
Cam Angle or Dwell—35° closed, 25° open.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	Distributor R.P.M	Engine Degrees	Engine R.P.M.
Start	400	4	800
8	1050	16	2100
8.5	1450	17	2900
14.25	2000	28.5	4000

Gaselector—Manual adjustment providing 10° advance or retard from center '0' position. See Ignition Timing for Gaselector Adjustment.

Vacuum Spark Control: Delco-Remy Mod. No. 681-M (integral type linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. **Plunger Travel**—9/64" total.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
7½	15°	13-16"①
7½-8½	15-17°	16-18"

①—At .125" plunger travel.

Removal:—Distributor mounted on left side of engine. To remove, disconnect vacuum line, take out screw in Gaselector arm, lift distributor out.

IGNITION TIMING

Std. Setting—As given below for Regular Fuel (Std. 6.5-1 Head), Ethyl Fuel (Optl. 7.5-1 Head). See Gaselector Setting (following) for correction for operating conditions and fuel regularly used.

	Flywheel Degrees	Piston Position
All Engines	6°BTDC	.0138"BTDC

Timing Mark Note—Two straight lines of ignition mark '/IGN.ONE/' indicate allowable timing range of 4° on flywheel. Use first (6°) line for setting ignition (second line is 2° before top dead center mark). NOTE—Manufacturer recommends use of HM-494 Timing Light or J-578 Synchroscope for Timing.

To Set Timing (With Timing Light)—Connect timing light between distributor terminal and ground, turn on ignition. With #1 piston on compression, turn engine over until piston is 6° or .0138" before top dead center with first line of ignition mark '/IGN.ONE/' lined up with pointer in inspection hole in left front face of flywheel housing above starter. Loosen Gaselector screw, center pointer scale ('0' mark at reference line), tighten screw. Loosen advance arm clamp bolt, rotate distributor until timing lamp lights (contacts just opening), tighten clamp bolt. Check Gaselector setting.

To Set Timing (With Synchroscope)—Connect synchroscope in series with #1 spark plug, fill in first line of ignition mark '/IGN.ONE/' with chalk or white paint, direct synchroscope light on flywheel (inspection hole on left side), idle engine at 6 MPH., adjust distributor as directed above.

Gaselector Setting—Should be set to provide best performance without spark knock or ping for particular operating conditions and octane rating of fuel used. To adjust, loosen Gaselector arm screw, move arm clockwise (toward 'ADV' end of scale) to advance spark, counter-clockwise (toward 'RET' end of scale) to retard spark, tighten locking screw.

CARBURETOR

Synchro-Mesh Trans......**Carter WA-1, No. 537S**
Hydra-Matic Drive.....**Carter WA-1, No. 652S**
1¼" single barrel downdraft types with Carter Climatic Control.
Casting No. on Flange—388 (537S), 592 (652S).
See Carburetor Section for complete data.

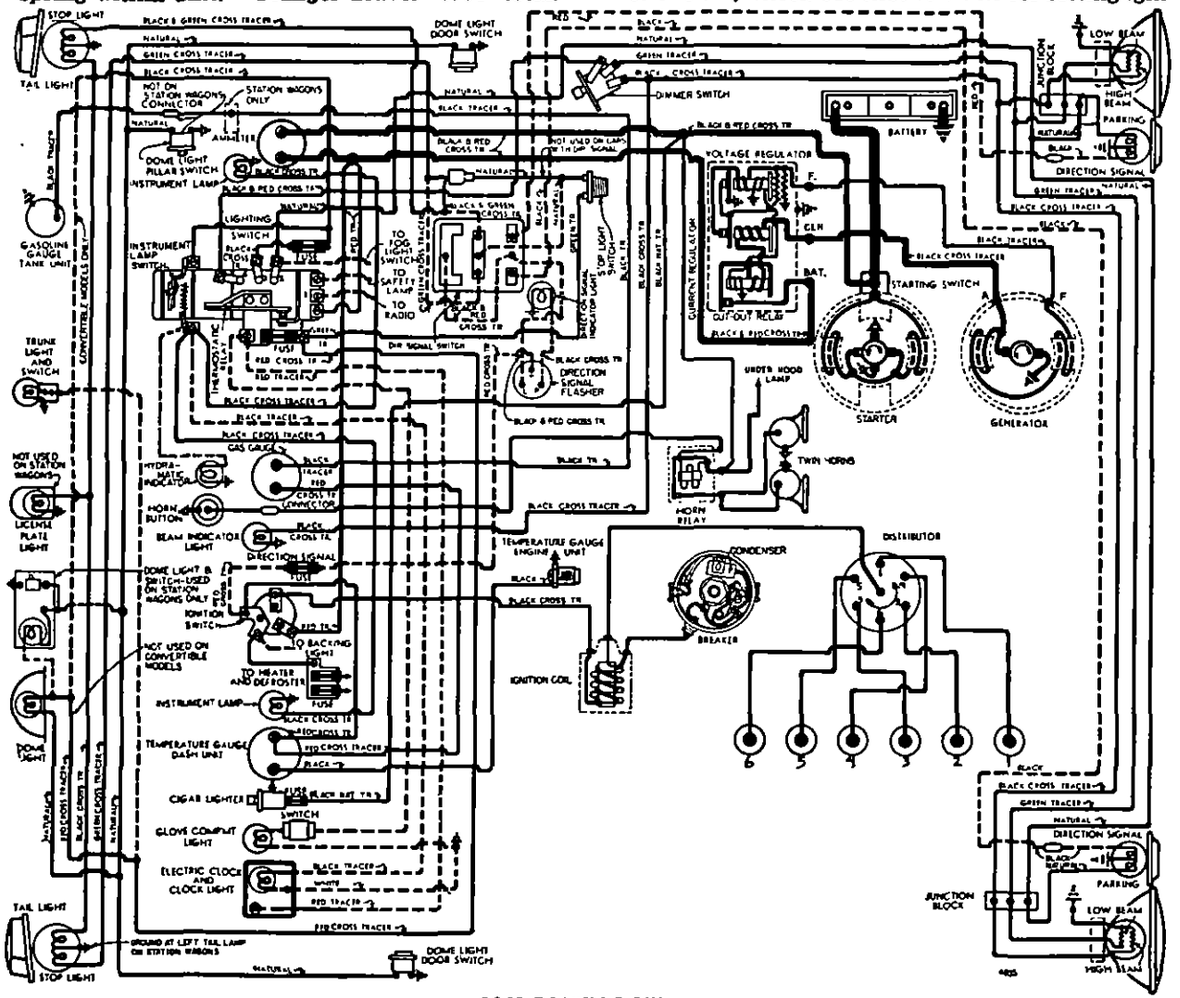
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rod & Jet—*See Carter Jet Table in Carburetor Section for complete data.*

► **Accelerator Pedal Service Note:** On new cars shipped from the factory, accelerator pedal hinge lockscrew is tightened only finger-tight (pedal must be removed for floor mat installation). **This screw must be securely tightened** (place screwdriver alongside locknut while turning screw in to lock hinge pin).

Accelerator Linkage Adjustment:—Must be set to provide correct 'throttle cracking' action for starting. To adjust, set carburetor idle speed at 450-475 RPM. (365-385 Hydra-Matic), disconnect battery cable at starting motor (to prevent starter cranking engine), insert 9/64" drill rod (or .138" diameter round steel rod) between throttle lever stopscrew and stop, fully depress starting pedal, adjust the adjusting screw on accelerator cross-shaft lug at idler lever (on Hydra-Matic, adjust throttle cracker lever mounted on throttle control lever—pin on starter lever must not strike throttle control lever) until gauge between the throttle stopscrew and stop just falls out with fast idle cam in slow idle position. NOTE—Before making this adjustment, check for full throttle opening with accelerator pedal fully depressed (adjust accelerator rod if required).

Hydra-Matic Throttle Adjustment: *See Hydra-Matic Drive article in Transmission Section.*



1948 PONTIAC SIX

CONTINUED ON NEXT PAGE

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Fast Idle: Carter Single Barrel Carburetor type.
See Carburetion Equipment Section for data.
Setting—With fast idle cam in hot or slow idle position, close choke valve until throttle stopscrew is against (not on) first step of fast idle cam, adjust by bending connector rod offset so that choke valve opening is 5/8" (check opening with gauge T109-85).

Automatic Choke: Carter Climatic Control (single carburetor type).
See Carburetion Equipment Section for data.
Setting—3 Notches Rich.

CARB. EQUIPMENT

Fuel Pump (std.): AC Type AH. No. 1523985.
Optl. (Fuel-&-Vacuum)—AC Type AJ. No. 1523986.
Replacement Pump—AC No. 496 (for AH), 515 (AJ).
Pressure—4 lbs. (AH), 3¾ lbs. (AJ).
See Carburetion Equipment Section for data.

Gasoline Gauge: AC Electric type.
Dash Unit—(1946) AC No. 1516818, (1947) 1516946, (1948) 1517065.
Tank Unit—AC No. 1516316 (All).
See Carburetion Equipment Section for data.

Air Cleaner (std.—oil-wetted): AC No. 1529871.
Optl. (oil-bath)—AC No. 1542070.
Servicing (Oil-wetted Type)—Wash and re-oil filter element at 10000 mile intervals (twice yearly) or more often if required by operating conditions.
Servicing (Oil-bath Type)—Wash filter element, drain and refill lower oil base with 1 pint SAE No. 50 engine oil (SAE 20W for temperatures below freezing) at 10000 mile intervals or more often if required by operating conditions.

BATTERY

Delco Type 15E-2W. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage 4.25 volts.
Grounded Terminal—Negative (—) to engine.
Engine Ground (Conv. Coupe & Cars with Radio)—Strap from left rear corner of cylinder head to upper left starter pedal bracket-to-dash screw.
Location—On left side in engine compartment.

Police Battery Delco Type 19E-3. 6 Volt, 19 Plate, 130 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Grounded Ter. & Location—Same as 15E-2 above.

STARTER

1946-47.....**Delco-Remy 1107032**
1948.....**Delco-Remy 1107070**
RHD Cars.....**Delco-Remy 1107934**
Armature No.—Delco-Remy No. 1867897.
EARLY 1946 NOTE—Starters on these cars have oiler at commutator end, later starters have graphite-impregnated bronze bearing at this point (no lubrication required).

▷**Starter Pedal Sticking Correction:** Lubricate starter pedal plunger with engine oil whenever car serviced (lack of lubrication will cause wear, noise, and faulty operation—may result in damage to starter). NOTE—Check all new cars (plunger not lubricated on some cars).

▷**Hydra-Matic Starter Interlock Adjustment:** *See the Hydra-Matic Drive article in Transmission Section.*

▷**Clicking Noise Correction at Starter (Hydra-Matic):** Noise when starter engaged on early Hydra-Matic cars may be due to ends of the torus cover-to-flywheel bolts striking starter clutch cover (¾" long bolts were used, also lock washers broke on some bolts). To correct, replace damaged starter clutch assembly (No. 1873789) and install set (30) of new shorter torus cover-to-flywheel bolts (No. 511849). Remove flywheel pan, replace bolts one at a time (tighten to 30 ft. lbs.) so as not to disturb cover to flywheel seal.

Drive—Overrunning clutch and pinon shift. Manual type (1107032, 70), solenoid pinion shift (1107934).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.
Cranking Engine—200 amperes at 5 volts.

Performance Data—1107032, 70

Torque		R.P.M.	Volts	Amperes
0 ft. lbs.		5000	5.0	65
12	"	Lock	3.37	525

Performance Data—1107934

0	ft. lbs.	6000	5.0	60
15	"	Lock	3.0	600

Removal:—Starter flange mounted on left front face of flywheel housing. To remove, take out flange mounting screws.

Starting Switch (1107032, 70): No. 820052. On top of starter and operated by starting pedal.
(1107934)—Delco-Remy Solenoid No. 1118102. Mounted on starter and controlled by Relay No. 269-G and pushbutton Switch No. 1996031 on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

1946-47.....**Delco-Remy 1102665**
1948.....**Delco-Remy 1102701**
Police Cars.....**Delco-Remy 1106403**
Armature No.—Delco-Remy 1879002 (1102665 & 701). Two brush (shunt) types with voltage and current regulation. Ventilated by drive pulley fan.
Charging Rate Adjustment—None. Charging rate controlled by Voltage Regulator, maximum output by Current Regulator. See Regulator data below.
Maximum Charging Rate—30 amperes, 8.0 volts, 1170 RPM. (1102665, 701), 1040 RPM. (1106403 Gen.), 25 MPH. and above (Current Regulator Setting) with load or discharged battery. Actual charging rate controlled by Voltage Regulator and dependent on battery.

Performance Data—1102665 & 701

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

Performance Data—1106403

Cold	35①	8.0	1040

①Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ounces each.
Field Current—1.75-1.9 amperes (1102665 & 1102701), 1.77-2.0 amperes (1106403) at 6.0 volts.

Removal: Generator pivot mounted on left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment: Belt deflection or sideplay midway between generator & pump pulley should be 1½".

REGULATOR

Delco-Remy 1118242.....**for 1102665 & 1102701 Gen.**
Delco-Remy 1118229.....**for 1106403 Generator**
Single Core Type. Vibrating type Voltage and Current Regulators in a single case with Cutout Relay.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 amperage discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts (1118242), 7.0-7.2 volts (1118229) hot (operating temperature). Regulator over-compensated for temperature. Should be checked with cover in place and hot.
Checking & Adjustment—*See Electrical Equip. Section.*
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).

Current Regulator

Setting—34-36 amperes hot (at operating temperature) for all models.
Checking & Adjustment—*See Electrical Equip. Section.*
Air Gap—.080" (check same as Voltage Regulator).

LIGHTING

1946-47 LIGHTING SYSTEM SERVICE NOTES

▷**Wiring Harness Wire Colors (1946)**—Some harnesses were used in which wires were incorrectly color-coded (tracers not as shown in wiring diagram). All such wires were marked by typed identification on paper sleeve attached to the wire. CAUTION—If these identification are removed from wires, it will be necessary to trace circuits for continuity.

▷**Chafing of Wiring Harness (causing a short in hot lead from starter terminal)**—Clearance between harness containing this lead and moving parts (Starter pedal lever, Accelerator pedal lever, Accelerator cross-shaft) must be ⅜-½". Make certain that harness is correctly installed (should pass down between starter and engine and then under starter), and that lower clamp-on clip on starter pedal bracket is closed tight so that harness cannot bend forward and rub on accelerator cross-shaft.

▷**Back-up Light Faulty Operation and Blown Fuses**—Faulty operation caused by bending of switch support by over-travel of gearshift lever on first cars with No. 5933752 switch support. Correct by installing new type flexible Switch Support, Part No. 509257, and Switch Actuating Stop, Part No. 509258. NOTE—New type Back-up Light Switch, Part No. 5936850 (with longer plunger) replaces No. 5933751.
Short-circuits causing Blown Fuses—May be caused by plastic tip of switch plunger cracking off on first type switches allowing plunger insert to short on switch stop. Install new switch No. 5936850.

▷**Cigar Lighter Faulty Operation and Short-circuits** Caused by Cowl Ventilator handle cutting into cigar lighter feed wire. Check open position of cowl ventilator, make certain that stop on handle is sufficiently high to prevent handle moving beyond open

position and cutting cigar lighter lead. Correct ineffective stops by drilling a #10 (.193") hole through the handle at the original stop point and installing fillister head machine screw (No. 100659), lockwasher (No. 138481), and nut (No. 120614) in hole.

►**Cigar Lighter Binding Correction (All Streamliner Models)**—This may be caused by misalignment of hole in instrument panel and hole in mounting bracket behind panel causing cigar lighter to stick in engaged position. Correct by installing special spacer, Part No. 509286, on mounting screw between instrument panel and bottom of bracket.

1948 LIGHTING SYSTEM SERVICE NOTES

►**Inoperative Stop Light (with Direction Signal):** On some early 1948 cars, 1 stop lamp (usually left) would not operate with brakes on and Direction Signal Switch in neutral due to misalignment at Direction Signal Switch. Correct by replacing direction signal base and wire assembly, part #5937832.

►**Underhood Light not turning off:** On some early 1948 cars, Underhood Light Switch improperly mounted resulting in light remaining on when hood closed. To correct, install lock washer between mounting nut and radiator baffle (was incorrectly assembled between switch and underside of radiator baffle which resulted in switch being set too low).

Headlamps: Guide "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—Pontiac emblem on face of speedometer dial. Lighted when upper beams in use.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—Pilot bulb in Direction Signal Switch. Lighted whenever Right or Left Direction Signal operating.

Switches

Lighting—D-R Nos. ('46-47) 1995024, ('48) 1995035.
Instrument—Part of Lighting Switch. Rheostat operated by turning lighting switch knob.
Beam Selector—Delco-Remy No. 1997008.
Stop Light—Delco-Remy No. 1997725.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps		Sealed Beam
Park & Frt. Direc. Signal	21-3	1154
Park (Without Signal)	3	63
Instrument, Ign. Lock	1½	55
Beam & Direc. Signal Ind.	1	51
Stop & Tail	21-3	1154
Rear License Plate	3	63
Dome	15	88
Dome (Convertible)	1½	55

MISC. ELECTRICAL

THERMOSTATIC RELAY: Lighting. On switch. Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adj.
Convertible Top—On rear of dash on right side. 30 ampere maximum capacity.

FUSES: Tail & Instrument Light. ('46-47) 9 ampere, ('48) SFE 14 ampere. In holder clipped to panel above lighting switch.
Stop & Dome Light—('46-47) 9 amp., ('48) SFE 14 ampere. On lighting switch.
Heater & Defroster—SFE 9 amp. each. In clip on instrument panel brace at steering column.
Direction Signal—SFE 9 amp. In connector in feed wire from ignition switch at panel brace.

HORNS: Delco-Remy No. 1999519 (Low Note), 1999520 (High Note). Vibrator type, blended tone, twin horns operated by relay.

Type	Current (at 6 volts)	Air Gap
1999519 (Low Note)	19-21 amperes	.044-.049"
1999520 (High Note)	18-20 amperes	.034-.039"

►**'46 Horn Ring Rattle & Failure of Horn to Blow (Deluxe Models) Correction**—*See Pontiac Shop Notes.*

►**'46 Horn Lead Wear Correction**—Blowing of horns when turning corners or when car is jarred may be caused by steering column shaft wearing through insulation of horn button lead at point where it enters steering column jacket. To correct this trouble (on first cars with rubber grommet in horn lead hole), remove and discard rubber grommet, install new horn button lead, No. 266918, which has 4-inch piece of protecting loom at point where wire enters jacket.

Horn Relay:—Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).
Contacts Close—2.75-4.0 volts.

ENGINE

ENGINE SPECIFICATIONS: Own. Six Cylinder, "L" Head type.
Bore—3 9/16". **Stroke**—4".
Displacement—239.2 cu. ins. **Rated HP**—30.4.
Developed Horsepower—93½ at 3400 RPM.
Compression Ratio—6.5-1 Std., 7.5-1 Optl. iron hds.
Compression & Vacuum Reading—*See Tune-up data.*

POWER PLANT ASSEMBLY REMOVAL & FRONT INSULATOR REMOVAL: *See Pontiac Shop Notes.*

TIGHTENING TORQUES: *See Pontiac Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Pontiac Shop Notes.*

PISTONS: Chrome nickel alloy, electro-plated type. Pistons have 20 oil drain holes in oil ring groove (same as 1942 type). NOTE—Pistons are plated with lead-tin alloy or pure tin (lead-tin alloy darker color) and cannot be ground. Use finished replacement pistons.
Length 3 19/32". **Weight**—27.1 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—Top Land .0175-.0295". Skirt .002".

Fitting New Pistons:—Insert .0015" x ½" feeler between piston and cylinder wall. Pull to withdraw feeler must be 10-20 lbs. Taper and out-of-round limits—Piston .0005", Cylinder .0005" max. new.

Replacement Pistons: *See Pontiac Shop Notes.*

PISTON RINGS: Two tapered-face compression rings above pin, one slotted oil control ring below pin. Oil ring groove has 20 oil drain holes.
NOTE—Rings are cadmium-plated or tin-plated.

Ring	Width	End Gap	Side Clearance
Compr. (#1,2)	3/32"	.006-.013"	.0015-.003"
Oil (#3)	3/16"	.007-.017"	.001-.0025"

Installing Rings—Install compression rings with mark "TOP" upward.

Replacement Rings: Furnished in Oversizes of .005", .010", .020", .030". *See "Piston Rings" in Pontiac Special Data.*

PISTON PIN: Diameter 15/16". Length 3 1/16". Pin is shot-peened type (shot-peened before final grinding and lapping). Pin is locked in one piston boss by self-locking lockscrew and opposite end slotted to permit piston pin movement.
Pin Fit in Piston—*See Pontiac Shop Notes for data.*
Pin Fit in Rod Bushing—.0004-.0006" clearance.

Pin Removal & Installation: *See Pontiac Shop Notes.*

Replacement Pins:—.001" (red & brown), .003" (red), .005" (blue) oversize. Paint marked on end of pin.

CONNECTING ROD: Weight 37 ozs. Length 7 9/16".
Piston Pin Bushing (Upper Bearing)—Split aluminum bronze bushings. *See Pontiac Shop Notes for data.*
Crankpin Journal Diameter—2.1237-2.1247".
Lower Bearing—New thin type, interchangeable, steel-backed, babbitt-lined type.
Clearance—.0001-.0021". **Sideplay** .007-.030".

Bearing Adjustment: None (no shims). *See Pontiac Shop Notes for Fitting and Installing Bearings.*

Replacement Bearings: Standard size & .001" Undersize. NOTE—Bearings have small tongue which must engage groove in rod and cap.

Installing Rods: Not offset (install either way).
NOTE—Rods and bearing caps marked to insure correct reassembly (marks must be together). These marks do not indicate cylinder in which rod used. CAUTION—Keep each connecting rod and its bearing cap together.

CRANKSHAFT: Four bearing type with integral counterweights and vibration dampener on forward end.

►**Flywheel to Crankshaft Bolts (on Synchro-Mesh Transmission)**—¾" hex head bolts (No. 508463) or 1" hex head bolts (No. 510832) are used. Either type can be used for replacement but head sizes must be alike on all bolts or engine balance will be destroyed.

►**Vibration Dampener (Harmonic Balancer) Removal**—*See Pontiac Shop Notes.*
Journal Diameters—#1, 2.4982-2.4992"; #2, 2.5294-2.5304"; #3, 2.5919-2.5929"; #4, 2.6232-2.6242".
Bearings—Thin type, removable, steel-backed, babbitt-lined. Upper and lower bearing halves alike.
Clearance—.0003-.0023".

Bearing Adjustment:—None (no shims). *See Pontiac Shop Notes for Removal and Fitting of Bearings.*

►**Rear Main Bearing Oil Seal Renewal**—*See Pontiac Shop Notes.*

Replacement Bearings: Standard size & .001" Undersize.

End Thrust: Taken by #3 (rear intermediate) bearing. **Endplay**—.003-.007".

CAMSHAFT: Four bearing type with non-adjustable (two sprocket) chain drive.
Camshaft Removal & Timing Cover Oil Seal Servicing—*See Pontiac Shop Notes.*
Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 29/32".
Bearings—Steel-backed, babbitt-lined bushings. *See Pontiac Shop Notes for bearing finished sizes.*
Clearance—.0015-.0025" (new).

End Thrust:—Steel thrust plate behind camshaft sprocket. Replace if worn. **Endplay**—.002-.005".

Timing Chain: Morse. Width 1". Pitch ⅜". Length 21" or 56 links.
Timing Chain Installation—*See Pontiac Shop Notes.*

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

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ENGINE

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VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 19/32"	.310-.311"	5.718"
Exhaust	1 15/32"	.310-.311"	5.718"

	Seat Angle	Lift	Stem Clearance
Intake	30°	19/64"	Free fit to .0006"①
Exhaust	45°	19/64"	Free fit to .0006"①

① Guides tapered (.0006" max. clearance at bottom).

Valve Guides:—Removable, tapered guides (.001" taper to the inch with greatest clearance at top). Use Tool J-2542 for removing valve guides.

Exhaust Guide Counterbore—Exhaust guides are counterbored to a depth of ¾". Use Tool Number J-2122 to clean out counterbore when servicing valves. This tool can be used to increase counterbore (from ½") if earlier type guides having this shallower counterbore are used.

▷NOTE—On 1946 cars before Eng. No. 6-39209, exhaust guide counterbore was 31/32" deep. Any stocks of this type guide, Part No. 509041 (with 31/32" counterbore), are satsifactory for service. New exhaust guides will have the shallower (¾" plus 1/32", minus 0") counterbore depth.

IMPORTANT—Measure clearance at bottom end. Valve should just fall through guide of own weight when started in guide. NOTE—Guides should be cleaned with Tool KMO-122 valve guide cleaner (blade type). Service guides straight cut, install guides and ream to provide proper stem clearance with P.R. 131 Reamer.

Valve Springs:—Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length**—2 9/16".

	Spring Pressure	Spring Length
Valved Closed	59½ lbs.	1 29/32"
Valve Open	101 lbs.	1 19/32"

Valve Lifters:—Barrel type, cast-iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed, use Valve Guide Removing Tool J-2542).

Clearance—Free fit. Lifter should just move freely with finger touch.

VALVE TIMING

Tappet Clearance:—.011-.013" all valves (engine warm). Use .011" feeler as 'go' gauge, .013" as 'no go'.

NOTE—Car manufacturer recommends .013" exhaust clearance for sustained high speed driving.

Valve Timing:—See Camshaft Setting above.

Intake Valves—Open 5° BTDC. Close 39° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Valve Timing Check—With .015" tappet clearance #6 intake valve should open with #6 piston 5° or .0096" before top dead center with first straight line of flywheel mark '/IGN.ONE/' slightly past indicator in left front face of flywheel housing. Reset tappet clearance .011-.013" (warm).

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, and timing chain. Oil pump mounted externally on right side of crankcase.

Crankcase Capacity—5 qts. (refill), 6 qts. (dry).

Normal Oil Pressure—35-45 lbs. at 40 MPH. with warm oil (10-30 lbs. idling).

Oil Pressure Regulator—On oil pump. Opens at 40 lbs. Non-adjustable. NOTE—Replace regulator spring if free length less than 2 5/16".

Oil Pump: Gear type. On right side of crankcase.

Oil Pump Servicing—*See Pontiac Shop Notes.*

Oil Cleaner: Pontiac precipitation type (in crankcase). **Servicing**—*See Pontiac Shop Notes.*

Oil Pressure Gauge: AC ('46) 1506803, ('47) 1507056, ('48) 1507221. Bourden Tube (not electric).

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compt. cover on right rear side of engine (cars with oil bath air cleaner equipped with 3-piece outlet pipe containing filter element).

Oil Filler (Crankcase Ventilator) Cap Servicing—Wash filter element and re-oil by dipping in engine oil when servicing air cleaner.

CAUTION—Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backward).

Crankcase Ventilator Outlet Pipe—On cars with Oil-bath type Air Cleaner, special 3-piece ventilator outlet pipe used which has copper gauze type air cleaner in container section. Wash and re-oil filter element when servicing air cleaner.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in radiator filler cap. Positive circulation with water pump on front of engine and water distributing tube in cylinder block.

Capacity—18 qts. (19¾ with Underseat Heater).

Pressure Valve AC No. 846740 (Radiator Filler Cap). Opens at 4 lbs. (3¼-4¼ lbs.).

Water Pump: Packless type with sealed ball bearing shaft. *See Water Pump Section for complete data.*

Removal—Drain cooling system, remove hose connection at pump, loosen belt adjustment and remove belt, take out water pump mounting bolts and lift pump out.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Harrison. In cylinder head outlet.

Setting—Starts to open 151° F. Fully open 173° F.

Radiator Removal: *See "Radiator" in Pontiac Special Data.*

Water Distributing Tube Servicing: *See "Cooling" in Pontiac Special Data.*

Temperature Gauge: AC Electric type.

Dash Unit—('46) 1511661, ('47) 1511874, ('48) 1512027.

Engine Unit—('46-47) 1511734, ('48) 1512015.

See Miscellaneous Section for complete data.

CLUTCH

Inland. Single Plate, "Diaphragm", dry disc type with Long Driven Member Model 9½CF-TS (except Taxicab), Model 10CF-CS (Taxicab).

See Clutch Section for complete data.

NOTE—Driven Members on 6 Cyl. and 8 Cyl. cars are same size but must not be interchanged. May be identified by stenciled notation on facings and color marking of torsional springs in hub as follows:

	Facing Mark	Spring Color
6 Cyl. Models	41-42 6 Cyl.	Orange & Dark Blue
8 Cyl. Models	41-42 8 Cyl.	Brown & Blue

Facings—Moulded type. 2 required. I. D. 6" (All Models); O. D. 9½" (except Taxicab), 10" (Taxicab); Thickness ⅛".

Pedal Adjustment:—Free travel ⅞-1⅛" (adjusting nut on link at clutch fork). Pedal height to lower face of pedal should be 4¾" (Torpedo), 5 3/16" (Streamliner). Adjust by means of stopscrew at lower end of pedal arm.

▷**1946 Clutch Pedal Shaft Installation Change**—*See Pontiac Shop Notes for new type mounting (used on later 1946 cars) to correct movement of clutch or brake pedal when other pedal is depressed.*

Removal: Remove Transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing), remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing (see Clutch Release Bearing & Support data), tapping the support from inside the clutch housing to aid in removing (CAUTION—avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure reinstallation in same position to maintain balance), remove clutch cover mounting bolts evenly, move clutch assembly away from flywheel at bottom and withdraw Driven Member, lower cover assembly and withdraw it through bottom of housing.

▷**Removal of Excess Release Bearing Lubricant to correct clutch sticking**—If recess in bore on release bearing over-lubricated when clutch assembly installed, excess lubricant may be found causing clutch sticking. Clean our excess lubricant found at the following points: transmission drive gear, driven plate hub, clutch facings, pressure plate and and cover assembly, release bearing support tube, fulcrum points of release fork, and recess in bore on release bearing (do not wash bearing, bearing is "sealed" type). Lubricate clutch parts exactly as described under Installation Note following to avoid above condition.

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retaining ring on Transmission Main Drive Gear (will bear against flared end of release bearing support when installed). This supersedes original position (on 1946 cars) where seal fitted in recess on Drive Gear. Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

Clutch Release Bearing & Support: *See Pontiac Shop Notes for description.*

TRANSMISSION

STANDARD

Own Make. All helical gear. Constant-mesh synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Pontiac "Safety-shift" remote control type with gearshift lever on steering column. *See Transmission Section for complete data.*

Removal:—Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear and lower out of car.

Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support).

NOTE—These guide pins may be made from ½-13 American National Thread bolts by cutting heads off and reducing over-all length to 4¼".

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Own Make. Consists of fluid coupling and 4 speed automatic transmission.

See Transmission Section for complete data including Testing & Trouble Shooting.

Lubrication—Check fluid level in transmission every 2000 miles (lubrication period). Drain and refill every 25,000 miles. Use only GM Hydra-Matic Drive Fluid.

Capacity—11 qts. (drain oil pan and torus cover and refill). **12 qts.** (drain, disassemble, assemble transmission and refill).

Checking Fluid Level—Roll back floor mat, remove cover on floor board, set hand brake and start engine, set control lever in "DR" position, allow to run about 2 minutes. Remove indicator, wipe dry, then return and check level of fluid with indicator. Add fluid until level is at "FULL" mark.

►*CAUTION—Always check oil level when oil is hot, engine idling, hand brake tightly set and control lever in "DR" position.*

►**Oil Level Indicator Change**—A new indicator, Part No. *8605800* (stamped on blade—earlier type not marked) reduces capacity approx. 1 pint providing slightly lower fluid operating level to reduce fluid foaming when oil is hot.

Hydra-Matic Linkage Adjustment—*See Hydra-Matic Drive article in Transmission Section.*

Removal: *See Hydra-Matic Drive article in Transmission Section.*

UNIVERSALS

Mechanics Model 2CR. Roller bearing type, 2 used.

►**1947-48 CAUTION**—Rear universal nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Pontiac Rear Axle article in Rear Axle Section for complete data.*

NOTE—Driveshaft is one-piece type (slip joint on transmission mainshaft, ahead of front universal).

REAR AXLE

1946 Type—Same as 1942. Hypoid gear, semi-floating type. This type axle has three setscrews equally spaced around pinion housing.

See Rear Axle Section for complete data.

1947-48—New hypoid gear, semi-floating type. Design similar to 1946 type except that pinion is mounted on two taper roller bearings and companion flange nut controls pinion bearing "pre-load." No setscrews are used.

►CAUTION—Rear universal companion nut controls pinion bearing "pre-load".

See Rear Axle Section for complete data.

Ratios—As shown. Axles may be identified by paint mark on end of right hand axle shaft.

Model	Ratio	Ident. Paint Mark
Torpedo Std.	4.1-1	Green
Streamliner Std.	4.3-1	White
Hydra-Matic (All)	3.63-1	Violet
All (Econ.)	3.9-1	Red
All (Heavy Duty)	4.55-1	Yellow

Backlash—.003-.012" (new), slightly over .012" (worn).

Removal:—Disconnect rear universal and wire trunnions (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing.

►**1947-48 CAUTION**—Rear U-joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal:—Remove wheel, brake drum, 4 backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with puller J-942 (do not drag axle shaft on oil seal).

Wheel Bearing Adjustment—None.

SHOCK ABSORBERS

Delco Model 1947-C,D (front), Model 1044-V (rear). Hydraulic, double acting (front), direct (rear).

Adjustment: None (except by changing valve calibration).

Refilling: Requires dismantling of unit. See Shock Absorber article in Shock Absorber Section for directions.

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.

See Front Suspension Section for complete data.

Kingpin Inclination—6½-8° crosswise.

Caster—Negative ¾°. Limits Neg. ½° to Neg. 1°.

Camber—0° preferred. Limits Neg. ¼° to Pos. ¼°.

Toe In—0-1/16". Adjust tie rod tubes equally.

Steering Geometry—Inner wheel 23° ± ½°. Outer 20°.

STEERING GEAR

Saginaw. Worm-and-Roller type.

See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type with eccentric adjustment. Hand lever applies rear service brakes.

See Brake Section for complete data.

►IMPORTANT SERVICE NOTE—**Brake Drums**—Two different makes are used: 1) Kelsey-Hayes type can be identified by one-piece stamping and flange having a sharp edge; 2) Motor Wheel type consisting of two-stampings and rolled flange. **Each pair of drums (on opposite sides of car) front or rear must be the same type.**

	Brake Drum Part Numbers		
	Front Wheel		Rear
	Left	Right	Wheel
Kelsey-Hayes	507371	507370	505300
Motor Wheel	509221	509220	409176

Drums—Pressed steel with alloy iron liner. Diameter 11".

Clearance—.010" at heel and toe of each shoe.

Lining—Moulded. Width per wheel: 2" (front), 1¾" (rear). Thickness 3/16". Length per shoe: 9 11/32" (primary), 11 31/32" (secondary).

Braking Power—56% Front, 44% Rear.

Master Cylinder Filling Note—*New cars shipped from the factory have master cylinder filled to level ⅞" below top of filler neck and this level is satisfactory for service (cylinders were filled to ½" below top).*

Hand Brake: See Service Brakes above.

NoRol: Optional. *See Brake Section for complete data.*

MISC. MECHANICAL

Convertible Top Control: Hydro-lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: First number 1001 (All Models) with Model & Plant prefix as shown below. Stamped on plate on left side of dash under engine hood.

Serial No. Prefix Plant	Torpedo 46-27	Torpedo 47-27	Streamliner 46-28	Streamliner 47-28
Pontiac, Mich.	P8LA	P8MA	P8LB	P8MB
South Gate, Calif.	C8LA	C8MA	C8LB	C8MB
Linden, N. J.	L8LA	L8MA	L8LB	L8MB
Wilmington, Del.	W8LA	W8MA	W8LB	W8MB
Kansas City, Kans.	K8LA	K8MA	K8LB	K8MB
Atlanta, Ga.	A8LA	A8MA	A8LB	A8MB
Framingham, Mass.	F8LA	F8MA	F8LB	F8MB

Serial No. Prefix— Plant	Torpedo 48-27	Streamliner 48-28
Pontiac, Mich.	P8PA	P8PB
South Gate, Calif.	C8PA	C8PB
Linden, N. J.	L8PA	L8PB
Wilmington, Del.	W8PA	W8PB
Kansas City, Kans.	K8PA	K8PB
Atlanta, Ga.	A8PA	A8PB
Framingham, Mass.	F8PA	F8PB

ENGINE NUMBER: Same as Serial Number. Stamped on boss on left upper front corner of engine block.

TUNE-UP

COMPRESSION: Pressure—158 lbs. at 1000 RPM. or 118-120 lbs. at cranking speed (Std. 6.5-1 Head), 189 lbs. at 1000 RPM. (Optl. 7.5-1 Head). NOTE—7.5-1 Head requires use of Ethyl fuel at low altitudes.

VACUUM READING: 18-20" steady idling at 7-8 MPH. (365-385 RPM. on Hydra-Matic Cars).

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plug Type—AC No. 45. 14 mm. Metric.

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.015". Limits .0125-.0175".
Cam Angle or Dwell—31° closed, 14° open.
Breaker Arm Spring Tension—19-23 ozs.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 6° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—First line of flywheel mark "/IGN. ONE/" at pointer in inspection hole in left front face of flywheel housing above starter.
Gaselector Setting—Set for barely audible ping when accelerating between 20-30 MPH. with wide open throttle.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—(1946 WDO Carb.) ¼-1¼ turns open, (1947-48 WCD Carb.) ¾-1¾ turns open, 2 screws, turning screws out gives richer mixture.
Idle Speed (standard)—450-475 RPM. or 7-8 MPH.
Idle Speed (Hydra-Matic)—365-385 RPM.
Float Level (1946 "WDO" Carb.)—5/16" from top of float to gasket seat on cover (invert to check).
Float Level (1947-48 "WCD")—3/16" from top of the float to gasket seat on bowl cover (Gauge T109-162). Sides of floats should barely touch vertical uprights on gauge (so float won't bind on sides of bowl).
Accelerating Pump—Lower Hole (min. stroke) Normal. Upper Hole (max. stroke)—if greater charge required.
Fuel Pump Pressure: 4¾ lbs. maximum.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in approximately vertical position with valve closed (cold).
NOTE—Valve shaft bushings are Stainless Steel.

VALVE TAPPET CLEARANCE: .011-.013" Hot All Valves. (.011" gauge "Go", .013" gauge "No Go". NOTE—.013" Exhaust tappet clearance recommended for sustained high speed.
Valve Timing Check—*See Valve Timing.*

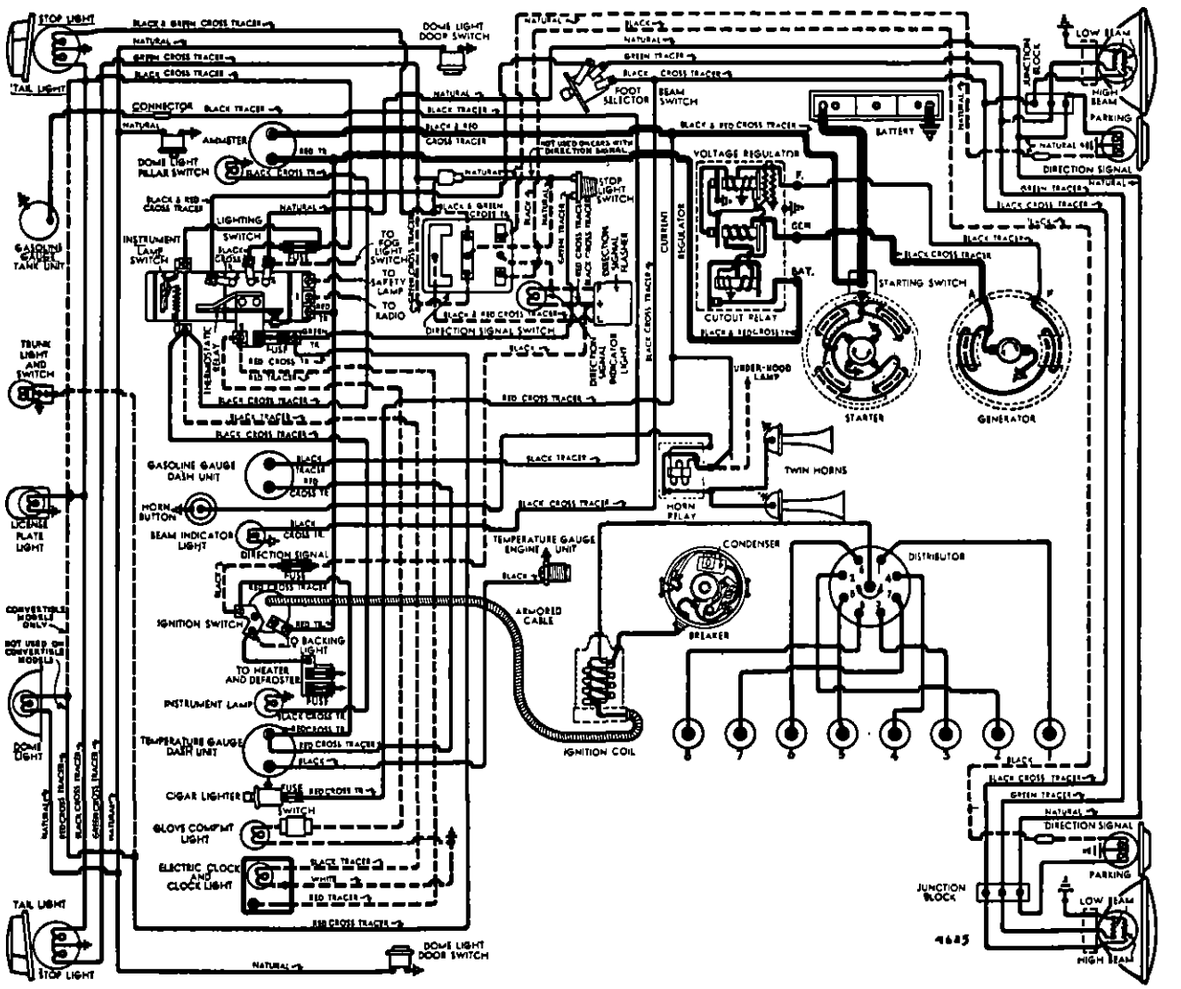
STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Delco-Remy Nos. as follows:
1946-47—1116306 (LHD), 1116312 (RHD cars).
1948—1116455 (All cars).
NOTE—Armored cable not used on 1948 cars.
Ignition Lock Cylinder—Briggs & Stratton 45792. Key Series—8000 to 9499. Groove—No. 15.

COIL: Delco-Remy 1115126 ('46-47), 1115380 ('48).
1946 NOTE—Primary terminal on 8 Cylinder is toward front. Some coils for 6 Cyl. cars have primary terminal located in same position but these coils are now marked by figure "6" stenciled in red. CAUTION—Do not use coils marked "6" or coils with primary terminal on right side on 8 Cyl. cars.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.25 microfarad.



1946-47 PONTIAC EIGHT
►EARLY 1946 WIRE COLORS NOT UNIFORM—SEE LIGHTING

DISTRIBUTOR: Delco-Remy 1110804. Single breaker, 8 lobe cam, full automatic advance type with auxiliary vacuum control and Gaselector adjustment.

►**Late 1948 Distributor Cap**—Has built-in radio suppression. Can be identified by high wire towers and marks "Radio" on lower edge of cap on each side.

Breaker Gap—.015". Limits .0125-.0175".

Cam Angle or Dwell—31° closed, 14° open.

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	300	2	600
7	1100	14	2200
8½	1500	17	3000
13½	2100	27	4200

Gaselector—Manual adjustment providing 10° advance or retard from center '0' position. See Ignition Timing for Gaselector adjustment.

Vacuum Spark Control. Delco-Remy Model No. 1116-021. (integral type linked directly to breaker plate). Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring within unit. **Plunger Travel—7/32".**

Distr. Degrees	Vacuum Advance Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
7½°	15°	13-16"
9-10°	18-20°	16-21"

Removal:—Distributor mounted on left side of engine. To remove, disconnect vacuum line, take out hold-down screw in Gaselector arm, lift distributor out.

IGNITION TIMING

Std. Setting—As given below for Regular Fuel (Std. 6.5-1 Head), Ethyl Fuel (Optl. 7.5-1 Head). See Gaselector Setting (following) for correction for operating conditions and fuel regularly used.

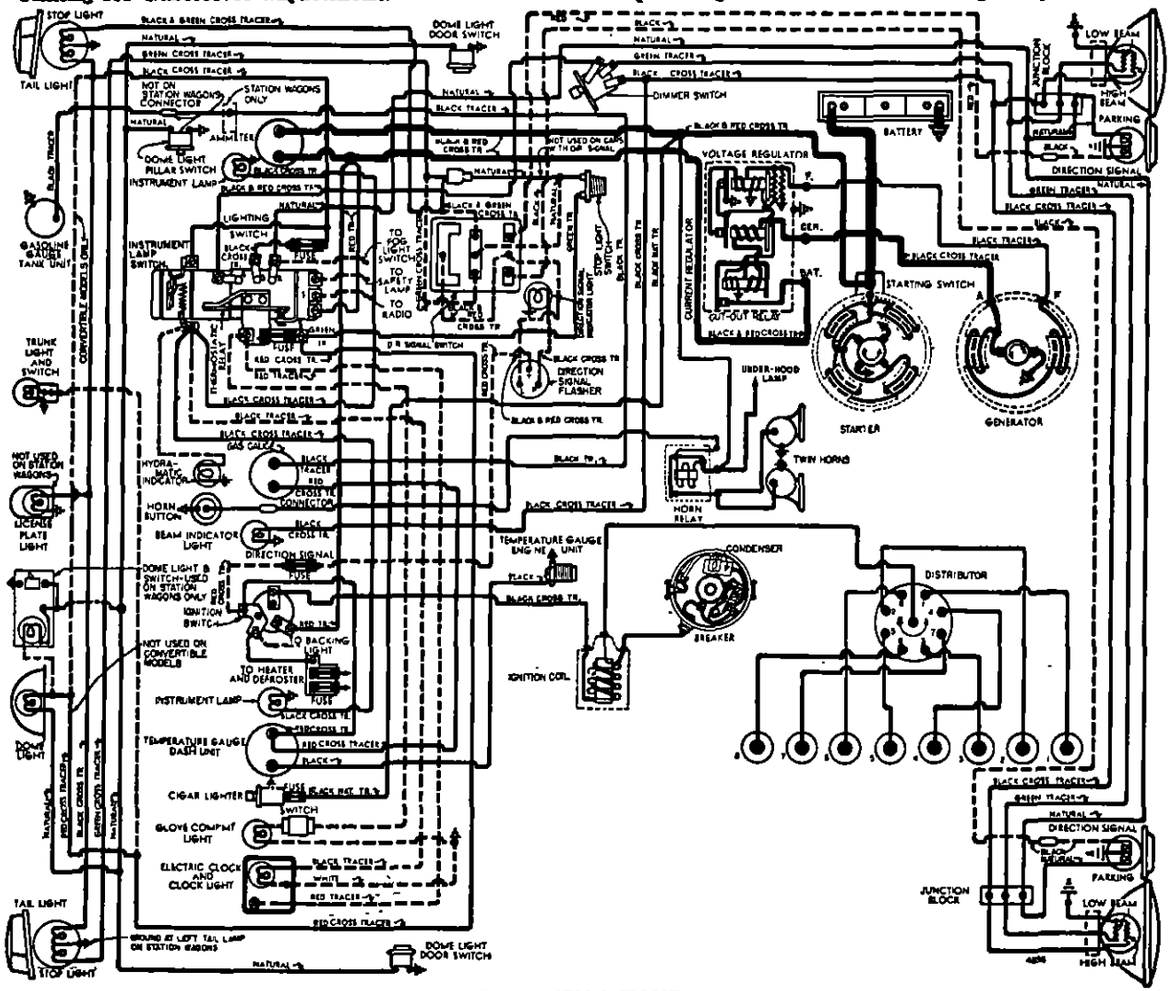
	Flywheel Degrees	Piston Position
All Engines	6° BTDC	.0128" BTDC.

Timing Mark Note—Two straight lines of ignition mark '/IGN.ONE/' indicate allowable timing range of 4° on flywheel. Use first (6°) line for setting ignition (second line is 2° before top dead center mark).

To Set Timing (With Timing Light)—Connect timing light between distributor terminal and ground, turn on ignition. With #1 piston on compression, turn engine over until piston is 6° or .0128" before top dead center with first line of ignition mark '/IGN.ONE/' lined up with pointer in inspection hole in left front face of flywheel housing above starter. Loosen Gaselector screw, center pointer scale ('0' mark at reference line), tighten screw. Loosen advance arm clamp bolt, rotate distributor until timing lamp lights (contacts just opening), tighten clamp bolt. Check Gaselector setting.

To Set Timing (With Synchroscope)—Connect synchroscope in series with #1 spark plug, fill in first line of ignition mark '/IGN.ONE/' with chalk or white paint, direct synchroscope light on flywheel (inspection hole on left side), idle engine at 6 MPH., adjust distributor as directed above.

Gaselector Setting—Should be set to provide best performance without spark knock or ping for particular operating conditions and octane rating of fuel used. To adjust, loosen Gaselector arm screw, move arm clockwise (toward 'ADV' end of scale) to advance spark, counter-clockwise (toward 'RET' end of scale) to retard spark, tighten locking screw.



1948 PONTIAC EIGHT

CARBURETOR

1946 TYPE "WDO"

Carter Type WDO, Model 548S. 1¼" Dual (double barrel), Downdraft type with Carter Climatic Control.

Casting No. on Flange—306.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*

Metering Rods Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Accelerator Linkage Adjustment: See 1947-48 information listed below.

Fast Idle: Carter Dual (WDO) Carburetor type.

See Carburetion Equipment Section for complete data.

Setting—With the carburetor set for correct 7-8 MPH hot or slow idle speed, hold choke valve tightly closed, turn fast idle adjusting screw in until clearance between throttle lever stopscrew and stop on carburetor casting is .073". NOTE—This adjustment can also be made by backing off throttle stopscrew so that throttle valves tightly closed, then hold choke valve closed, turn fast idle screw in until it contacts high point of fast idle cam, then turn screw in until throttle opening is exactly .026".

Automatic Choke: Carter Climatic Control (dual carburetor type).

See Carburetion Equipment Section for complete data.

Setting—Coil housing 2 Notches Rich.

CARBURET R

1947-48 TYPE "WCD"

Carter WCD, No. 630S, SA, or SB (Standard).
Carter WCD, No. 653S (Hydra-Matic Drive Cars).
1¼" dual barrel downdraft types with Carter Climatic Control.

CONTINUED ON NEXT PAGE

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Casting No. on Flange—373 (630S), 550 (630SA & SB), 558 (653S).
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Accelerator Pedal Service Note: On new cars shipped from the factory, accelerator pedal hinge lockscrew is tightened only finger tight (pedal must be removed for floor mat installation). **This screw must be securely tightened** (place screwdriver alongside locknut to hold nut while turning screw in to lock hinge pin).

Accelerator Linkage Adjustment:—Must be set to provide correct 'throttle-cracking' action for starting. To adjust, set idle speed at 450-475 RPM. (365-385 RPM on Hydra-Matic), disconnect battery cable at starting motor (to prevent starter cranking engine), insert .115" flat gauge between throttle stopscrew and stop on carburetor, fully depress starting pedal, adjust the adjusting screw on the accelarator cross-shaft lug at idler lever (on Hydra-Matic adjust throttle cracker lever mounted on throttle control lever—pin on starter lever must not strike throttle control lever) until gauge between the throttle stopscrew and stop just falls out with fast idle cam in slow idle position. NOTE—Before making adjustment, check for full throttle opening with accelerator pedal fully depressed (adjust accelerator rod if required).

Hydra-Matic Throttle Adjustment: *See Hydra-Matic Drive article in Transmission Section.*

Fast Idle: Carter Dual (WCD) Carburetor type.
See Carburetion Equipment Section for data.
Setting—With the choke valve tightly closed and fast idle adjusting screw on highest step of fast idle cam, adjust fast idle screw until throttle opening is exactly .026" (use Gauge T109-189 between edge of throttle valve and carburetor wall on side opposite idle ports).

Automatic Choke: Carter Climatic Control (dual carburetor type).
See Carburetion Equipment Section for complete data.
Setting (630S, SA, SB)—Centered at index (for 6-547S air horn), One Point Lean (for 6-576S air horn—latest).
Setting (653S)—Centered at index.

CARB. EQUIPMENT

Fuel Pump (Fuel & Vacuum): AC Type AJ, No. 153717.
Replacement Pump—AC No. 539.
Pressure—4¾ lbs. maximum.
See Carburetion Equipment Section for data.

Gasoline Gauge: AC Electric type.
Dash Unit—(1946) AC No. 1516818, (1947) 1516946, (1948) 1517065.
Tank Unit—AC No. 1516316 (All).
See Carburetion Equipment Section for data.

Air Cleaner (std.—oil-wetted): AC No. 1529473.
Optl. (oil bath)—AC No. 1529474.
Servicing (Oil-wetted Type)—Wash and re-oil filter element at 10000 mile intervals (twice yearly) or more often if required by operating conditions.
Servicing (Oil-bath Type)—Wash filter element, drain and refill lower oil base with 1 pint SAE No. 50 engine oil (SAE 20W for temperatures below freezing) at 10000 mile intervals or more often if required by operating conditions.

BATTERY
1946

Delco Type 17E-2W. 6 volt, 17 Plate, 120 Ampere Hour Capacity (20 hour rate).
Starting Capacity—140 amperes for 20 minutes.
Zero Capacity—300 amperes for 4.5 minutes. Five second voltage 4.4 volts.
Grounded Terminal & Location—As given below.

BATTERY
1947-48

Delco Type 15E-2W. 6 Volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five second voltage 4.25 volts.
Grounded Terminal—Negative (—) to engine.
Engine Ground (Conv. Coupe & Cars with Radio)—Strap from left rear corner of cylinder head to upper left hand starter pedal bracket-to-dash screw.
Location—On left side in engine compartment.

Police Battery: Delco Type 19E-3. 6 Volt, 19 Plate, 130 ampere hour capacity (20 hour rate).
Starting Capacity—150 amperes for 20 minutes.
Grounded Ter. & Location—Same as 15E-2 above.

STARTER

1946-47	Delco-Remy 1107921
1948	Delco-Remy 1107947
RHD Cars	Delco-Remy 1107934

Armature No.—Delco-Remy No. 1867897.
1946 NOTE—Starters on early cars have oiler at at commutator end, later starters have graphite-impregnated bronze bearing at this point (no lubrication required).

▷**Starter Pedal Sticking Correction:** Lubricate starter pedal plunger with engine oil whenever car serviced (lack of lubrication will cause wear, noise, and faulty operation—may result in damage to starter). NOTE—Check all new cars (plunger not lubricated on some cars).

▷**Hydra-Matic Starter Interlock Adjustment:** *See the Hydra-Matic Drive article in Transmission Section.*

▷**Clicking Noise Correction at Starter (Hydra-Matic):** Noise when starter engaged on early Hydra-Matic cars may be due to ends of the torus cover-to-flywheel bolts striking starter clutch cover (¾" long bolts were used, also lock washers broke on some bolts). To correct, replace damaged starter clutch assembly (No. 1873789) and install set (30) of new shorter torus cover-to-flywheel bolts (No. 511849). Remove flywheel pan, replace bolts one at a time (tighten to 30 ft. lbs.) so as not to disturb cover to flywheel seal.

Drive—Overrunning clutch and pinion shift. Manual (1107921, 47), solenoid pinion shift (1107934).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.
Cranking Engine—220-225 amperes at 5 volts.

Performance Data

Torque	R.P.M	Volts	Amperes
0 ft. lbs.	6000	5.0	60
16 "	Lock	3.0	600

Removal:—Starter flange mounted on left front face of flywheel housing. To remove, take out flange mounting screws.

Starting Switch (1107921, 47): No. 820052. On top of starter and operated by starting pedal.
(1107934)—Delco-Remy Solenoid No. 1118102. Mounted on starter and controlled by Relay No. 269-G and pushbutton switch No. 1996031 on instrument panel.
See Electrical Equipment Section for complete data.

GENERATOR

1946-47	Delco-Remy 1102665
1948	Delco-Remy 1102701
Police Cars	Delco-Remy 1106403

Armature No.—Delco-Remy 1879002 (1102665 & 701). Two brush (shunt) types with voltage and current regulation. Ventilated by drive pulley fan.
Charging Rate Adjustment—None. Charging rate controlled by Voltage Regulator, maximum output by Current Regulator. See Regulator data below.
Maximum Charging Rate—30 amperes, 8.0 volts, 1170 RPM. (1102665, 701), 1040 RPM. (1106403 Gen.), and above (Current Regulator Setting) with load or discharged battery. Actual charging rate controlled by Regulator according to battery condition.

Performance Data—Cold

	Amperes①	Volts	R.P.M.
1102665, 1102701	30	8.0	1750
1106403	35	8.0	1040

①—Current Regulator Setting—See Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ounces each.
Field Current—1.75-1.9 amperes (1102665 & 1102701), 1.77-2.0 amperes (1106403) at 6.0 volts.

Removal:—Generator pivot mounted on left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment:—Belt deflection or sideplay midway between generator & pump pulley should be 1½".

REGULATOR

Delco-Remy 1118242.....for 1102665 & 1102701 Gen.
Delco-Remy 1118229.....for 1106403 Generator
Single Core Type. Vibrating type Voltage and Current Regulators in a single case with Cutout Relay.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—6.2-6.7 volts hot.
Cuts Out—0-4.0 ampere discharge current.
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.4 volts (1118242), 7.0-7.2 volts (1118-229) Hot (at operating temperature).
Checking & Adjustment—*See Electrical Equip. Section.*
Air Gap—.070" between center of core and armature with contacts just closing (press down on armature to open contacts, release pressure, check gap at point where contacts just close).

Current Regulator

Setting—34-36 amperes Hot (at operating temperature) for all models.
Checking & Adjustment—*See Electrical Equip. Section.*
Air Gap—.080" (check same as Voltage Regulator).

LI HTING

1946-47 LIGHTING SYSTEM SERVICE NOTES

►**Wiring Harness Wire Colors (1946)**—Some harnesses were used in which wires were incorrectly color-coded (tracers not as shown in wiring diagram). All such wires were marked by typed identification on paper sleeve attached to the wire. CAUTION—If these identification are removed from wires, it will be necessary to trace circuits for continuity.

►**Chafing of Wiring Harness (causing a short in hot lead from starter terminal)**—Clearance between harness containing this lead and moving parts (Starter pedal lever, Accelerator pedal lever, Accelerator cross-shaft) must be ⅜-½". Make certain that harness is correctly installed (should pass down between starter and engine and then under starter), and that lower clamp-on clip on starter pedal bracket is closed tight so that harness cannot bend forward and rub on accelerator cross-shaft.

►**Back-up Light Faulty Operation and Blown Fuses**—Faulty operation caused by bending of switch support by over-travel of gearshift lever on first cars with No. 5933752 switch support. Correct by installing new type flexible Switch Support, Part No. 509257, and Switch Actuating Stop, Part No. 509258. NOTE—New type Back-up Light Switch, Part No. 5936850 (with longer plunger) replaces No. 5933751.

Short-circuits causing Blown Fuses—May be caused by plastic tip of switch plunger cracking off on first type switches allowing plunger insert to short on switch stop. Install new switch No. 5936850.

►**Cigar Lighter Faulty Operation and Short-circuits** Caused by Cowl Ventilator handle cutting into cigar lighter feed wire. Check open position of cowl ventilator, make certain that stop on handle is sufficiently high to prevent handle moving beyond open position and cutting cigar lighter lead. Correct ineffective stops by drilling a #10 (.193") hole through the handle at the original stop point and installing fillister head machine screw (No. 100659), lockwasher (No. 138481), and nut (No. 120614) in hole.

Cigar Lighter Binding Correction (Streamliner Models)—This may be caused by misalignment of hole in instrument panel and hole in mounting bracket behind panel causing cigar lighter to stick in engaged position. Correct by installing special spacer, Part No. 509286, on mounting screw between instrument panel and bottom of bracket.

1948 LIGHTING SYSTEM SERVICE NOTES

►**Inoperative Stop Light (with Direction Signal):** On some early 1948 cars, 1 stop lamp (usually left) would not operate with brakes on and Direction Signal Switch in neutral due to misalignment at Direction Signal Switch. Correct by replacing direction signal base and wire assembly, part #5937832.

►**Underhood Light not turning off:** On some early 1948 cars, Underhood Light Switch improperly mounted resulting in light remaining on when hood closed. To correct, install lock washer between mounting nut and radiator baffle (was incorrectly assembled between switch and underside of radiator baffle which resulted in switch being set too low).

Headlamps: Guide "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beams straight ahead (hot spot center 3" below lamp center height at 25 ft.).

Beam Indicator—Pontiac emblem on face of speedometer dial. Lighted when upper beams in use.

Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—Pilot bulb in Direction Signal Switch. Lighted whenever Right or Left Direction Signal operating.

Switches

Lighting—D-R Nos. ('46-47) 1995024, ('48) 1995035.
Instrument—Part of Lighting Switch. Rheostat operated by turning lighting switch knob.
Beam Selector—Delco-Remy No. 1997008.
Stop Light—Delco-Remy No. 1997725.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	Sealed Beam	
Park & Frt. Direc. Signal	21-3	1154
Park (Without Signal)	3	63
Instrument, Ign. Lock	1½	55
Beam & Direc. Signal Ind.	1	51
Stop & Tail	21-3	1154
Rear License Plate	3	63
Dome	15	88
Dome (Convertible)	1½	55

MISC. ELECTRICAL

THERMOSTATIC RELAY: Lighting. On switch. Contacts remain closed with 30 amperes, open in 3 minutes with current of 42 amperes at 70°F. Not adj. **Convertible Top**—On rear of dash on right side. 30 ampere maximum capacity.

FUSES: Tail & Instrument Light. (1946-47) 9 ampere, (1948) SFE 14 ampere. In holder clipped to panel above lighting switch.
Stop & Dome Light—('46-47) 9 amp., ('48) SFE 14 ampere. On lighting switch.
Heater & Defroster—SFE 9 amp. each. In clip on instrument panel brace at steering column.
Direction Signal—SFE 9 amp. In connector in feed wire from ignition switch at panel brace.

HORNS: Delco-Remy No. 1999519 (Low Note), 1999520 (High Note). Vibrator type, blended tone, twin horns operated by relay.

Type	Current (at 6 volts)	Air Gap
1999519 (Low Note)	19-21 amperes	.044-.049"
1999520 (High Note)	18-20 amperes	.034-.039"

►**'46 Horn Ring Rattle & Failure of Horn to Blow (Deluxe Models) Correction**—*See Pontiac Shop Notes.*

►**'46 Horn Lead Wear Correction**—Blowing of horns when turning corners or when car is jarred may be caused by steering column shaft wearing through insulation of horn button lead at point where it enters steering column jacket. To correct this trouble (on first cars with rubber grommet in horn lead hole), remove and discard rubber grommet, install new horn button lead, No. 266918, which has 4-inch piece of protecting loom at point where wire enters jacket.

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

ENGINE SPECIFICATIONS: Own. Eight Cylinder, "L" Head type.
Bore—3¼". **Stroke**—3¾".
Displacement—248.9 cubic ins. **Rated HP**—33.8.
Developed Horsepower—107½ at 3700 RPM.
Compression Ratio—6.5-1 Std. 7.5-1 Optl.
Compression & Vacuum Reading—*See Tune-up data.*

OIL PAN REMOVAL: *See Pontiac Special Data.*

POWER PLANT ASSEMBLY REMOVAL & FRONT INSULATOR REMOVAL: *See Pontiac Shop Notes.*

TIGHTENING TORQUES: *See Pontiac Shop Notes.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Pontiac Shop Notes.*

PISTONS: Chrome nickel alloy, electro-plated type. Pistons have 20 oil drain holes in oil ring groove (same as 1942 type). NOTE—Pistons are plated with lead-tin alloy or pure tin (lead-tin alloy darker color) and cannot be ground. Use finished replacement pistons.
Length—3 19/32". **Weight**—24.7 ozs. (stripped).
Removal—Pistons and rods removed from above.
Clearance—Top Land .0165-.0285". Skirt .002"

Fitting New Pistons:—Use .0015" x ½" feeler between piston and cylinder wall. Pull to withdraw feeler 10-20 lbs. Taper & out-of-round limits .0005" max.

Replacement Pistons: *See Pontiac Shop Notes.*

PISTON RINGS: Two tapered-face compression rings above pin, one slotted oil control ring below pin. Oil ring groove has 20 oil drain holes.
NOTE—Rings are cadmium-plated or tin-plated.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"	.008-.015"	.0015-.003"
Oil (#3)	3/16"	.006-.013"	.001-.0025"

Installing Rings—Install compression rings with mark "TOP" upward.

Replacement Rings: Furnished in Oversizes of .005", .010", .020", .030". *See "Piston Rings" in Pontiac Special Data.*

PISTON PIN: Diameter 15/16". Length 2⅞".
Pin is shot-peened type (shot-peened before final grinding and lapping). Pin is locked in one piston boss by self-locking lockscrew and opposite end slotted to permit piston pin movement.
Pin Fit in Piston—*See Pontiac Shop Notes for data.*
Pin Fit in Rod Bushing—.0004-.0006" clearance.

Pin Removal & Installation: *See Pontiac Shop Notes.*

Replacement Pins:—.001" (red & brown), .003" (red), .005" (blue) oversize. Paint marked on end of pin.

CONNECTING ROD: Weight 31.7 ozs. Length 7 9/16".
Piston Pin Bushing (Upper Bearing)—Split aluminum bronze bushings. *See Pontiac Shop Notes for data.*
Crankpin Journal Diameter—1.9987-1.9997".
Lower Bearing—Thin type, interchangeable steel-backed, babbitt-lined type.
Clearance—.0001-.0021". **Sideplay**—.007-.012".

Bearing Adjustment:—None (no shims). *Refer to Pontiac Shop Notes for Connecting Rod Lower Bearing.*

Installing Rods: No offset (can be installed either way).
NOTE—Rods and bearing caps marked to insure correct reassembly (marks must be together). These marks do not indicate cylinder in which rod used.
CAUTION—Keep each connecting rod and its bearing cap together.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.

►**Flywheel to Crankshaft Bolts (on Synchro-Mesh Transmission)**—¾" hex head bolts (No. 508463) or 1" hex head bolts (No. 510832) are used. Either type can be used for replacement but head sizes must be alike on all bolts or engine balance will be destroyed.

►**Vibration Dampener (Harmonic Balancer) Remov—*See Pontiac Shop Notes.***

Journal Diameters—#1, 2.3732-2.3742"; #2, 2.4044-2.4054"; #3, 2.4357-2.4367"; #4, 2.4669-2.4679"; #5, 2.4982-2.4992".

Bearings—Thin type, removable, steel-backed, babbitt-lined. Upper and lower bearing halves alike. **Clearance**—.0003-.0023".

►**Rear Main Bearing Oil Seal Renewal**—*See Pontiac Shop Notes.*

Bearing Adjustment:—None (no shims). *Refer to Pontiac Shop Notes for Bearing Removal & Fitting.*

Replacement Bearings: Standard size & .001" Undersize.

End Thrust: Taken by #4 (rear intermediate) bearing. **Endplay**—.003-.008".

CAMSHAFT: Five bearing type with non-adjustable (two sprocket) chain drive.

Camshaft Removal & Timing Cover Oil Seal Servicing—*See Pontiac Shop Notes.*

Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 29/32"; #5, 1⅞".

Bearings—Steel-backed, babbitt-lined bushings. *See Pontiac Shop Notes for bearing finished sizes.*

Clearance—.0015-.0025" (new).

End Thrust:—Steel thrust plate behind camshaft sprocket. Replace if worn. **Endplay**—.002-.005".

Timing Chain: Morse. Width ¾". Pitch ⅜". Length 21" or 56 links.

Timing Chain Installation—*See Pontiac Shop Notes.*

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 15/32"	.310-.311"	5.53"
Exhaust	1 11/32"	.310-.311"	5.53"

	Seat Angle	Lift	Stem Clearance
Intake	30°	19/64"	Free fit to .0006"①
Exhaust	45°	19/64"	Free fit to .0006"①

①Guides tapered (.0006" max. clearance at bottom).

Valve Guides:—Removable, tapered guides (.001" taper to the inch with greatest clearance at top). Use Tool J-2542 for removing valve guides.

Exhaust Guide Counterbore—Exhaust guides are counterbored to a depth of ¾". Use Tool Number J-2122 to clean out counterbore when servicing valves. This tool can be used to increase counterbore (from ½") if earlier type guides having this shallower counterbore are used.

►NOTE—On 1946 cars before Eng. No. 8-36900, exhaust guide counterbore was 31/32" deep. Any stocks of this type guide, Part No. 509041 (with 31/32" counterbore), are satsifactory for service. New exhaust guides will have the shallower (¾" plus 1/32". minus 0") counterbore depth.

IMPORTANT—Measure clearance at bottom end. Valve should just fall through guide of own weight when started in guide. NOTE—Guides should be cleaned with Tool KMO-122 valve guide cleaner (blade type). Service guides not tapered (install and ream to fit valve stems with Reamer P.R.131).

Valve Springs:—Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length**—2 9/16".

	Spring Pressure	Spring Length
Valved Closed	59½ lbs.	1 29/32"
Valve Open	101 lbs.	1 19/32"

Valve Lifters:—Barrel type, cast-iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed, use Valve Guide Removing Tool J-2542).

Clearance—Free fit. Lifter should just move freely with finger touch.

VALVE TIMING

Tappet Clearance:—.011-.013" all valves (engine warm). Use .011" feeler as 'go' gauge, .013" as 'no go'. NOTE—Car manufacturer recommends .013" exhaust clearance for sustained high speed driving.

Valve Timing:—See Camshaft Setting above.

Intake Valves—Open 5° BTDC. Close 39° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Valve Timing Check—With .015" tappet clearance #1 intake valve should open with #1 piston 5° or .0089" before top dead center with first straight line of flywheel mark '/IGN.ONE/' slightly past indicator in left front face of flywheel housing. Reset tappet clearance .011-.013" (warm).

LUBRICATION

Engine Oiling System: Pressure to main bearings, connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, and timing chain. Oil pump mounted externally on right side of crankcase.

Crankcase Capacity—5 qts. (refill), 6 qts. (dry).

Normal Oil Pressure—35-45 lbs. at 40 MPH. with warm oil (10-30 lbs. idling).

Oil Pressure Regulator—On oil pump. Opens at 40 lbs. Non-adjustable. NOTE—Replace regulator spring if free length less than 2 5/16".

Oil Pump: Gear type. On right side of crankcase.

Oil Pump Servicing—*See Pontiac Shop Notes.*

Oil Cleaner: Pontiac precipitation type (in crankcase). **Servicing**—*See Pontiac Shop Notes.*

Oil Pressure Gauge: *AC ('46) 1506803, ('47) 1507056,* ('48) 1507221. Bourden Tube (not electric).

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compt. cover on right rear side of engine (cars with oil bath air cleaner equipped with 3-piece outlet pipe containing filter element).

Oil Filler (Crankcase Ventilator) Cap Servicing—Wash filter element and re-oil by dipping in engine oil when servicing air cleaner.

Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backward).

Crankcase Ventilator Outlet Pipe—On cars with Oil-bath type Air Cleaner, special 3-piece ventilator outlet pipe used which has copper gauze type air cleaner in container section. Wash and re-oil filter element when servicing air cleaner.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in radiator filler cap. Positive circulation with water pump on front of engine and water distributing tube in cylinder block.
Capacity—19½ qts. (21¼ with Underseat Heater).
Pressure Valve AC No. 846740 (Radiator Filler Cap). Opens at 4 lbs. (3¼-4¼ lbs.).

Water Pump: Packless type with sealed ball bearing shaft. *See Water Pump Section for complete data.*
Removal—Drain cooling system, remove hose connection at pump, loosen belt adjustment and remove belt, take out water pump mounting bolts and lift pump out.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Harrison. In cylinder head outlet.
Setting—Starts to open 151° F. Fully open 173° F.

Radiator Removal: *See "Radiator" in Pontiac Special Data.*

Water Distributing Tube Servicing: *See "Cooling" in Pontiac Special Data.*

Temperature Gauge: AC Electric type.
Dash Unit—('46) 1511661, ('47) 1511874, ('48) 1512027.
Engine Unit—('46-47) 1511734, ('48) 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Inland. Single Plate, "Diaphragm", dry disc type with Long Driven Member Model 9½CF-TS (except Taxicab), Model 10CF-CS (Taxicab).
See Clutch Section for complete data.

NOTE—Driven Members on 6 Cyl. and 8 Cyl. cars are same size but must not be interchanged. May be identified by stenciled notation on facings and color marking of torsional springs in hub as follows:

	Facing Mark	Spring Color
6 Cyl. Models	41-42 6 Cyl.	Orange & Dark Blue
8 Cyl. Models	41-42 8 Cyl.	Brown & Blue

Facings—Moulded type, 2 required. I. D. 6" (All Models); O. D. 9½" (except Taxicab), 10" (Taxicab); Thickness ⅛".

Pedal Adjustment:—Free travel ⅞-1⅛" (adjusting nut on link at clutch fork). Pedal height to lower face of pedal should be 4¾" (Torpedo), 5 3/16" (Streamliner). Adjust by means of stopscrew at lower end of pedal arm.

►**1946 Clutch Pedal Shaft Installation Change**—*See Pontiac Shop Notes for new type mounting (used on later 1946 cars) to correct movement of clutch or brake pedal when other pedal is depressed.*

Removal: Remove Transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing), remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing (see Clutch Release Bearing & Support data), tapping the support from inside the clutch housing to aid in removing (CAUTION—avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure re-installation in same position to maintain balance),

remove clutch cover mounting bolts evenly, move clutch assembly away from flywheel at bottom and withdraw Driven Member, lower cover assembly and withdraw it through bottom of housing.

►**Removal of Excess Release Bearing Lubricant to correct clutch sticking**—If recess in bore on release bearing over-lubricated when clutch assembly installed, excess lubricant may be found causing clutch sticking. Clean our excess lubricant found at the following points: transmission drive gear, driven plate hub, clutch facings, pressure plate and and cover assembly, release bearing support tube, fulcrum points of release fork, and recess in bore on release bearing (do not wash bearing, bearing is "sealed" type). Lubricate clutch parts exactly as described under Installation Note following to avoid above condition.

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retaining ring on Transmission Main Drive Gear (will bear against flared end of release bearing support when installed). This supersedes original position (on 1946 cars) where seal fitted in recess on Drive Gear. Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

Clutch Release Bearing & Support: *See Pontiac Shop Notes for description.*

TRANSMISSION

Own Make. All helical gear. Constant-mesh synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for complete data.*

Transmission Control: Pontiac "Safety-shift" remote control type with gearshift lever on steering column. *See Transmission Section for complete data.*

Removal:—Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnion) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear and lower out of car.

Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing support).

NOTE—These guide pins may be made from ½-13 American National Thread bolts by cutting heads off and reducing over-all length to 4¼".

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Own Make. Consists of fluid coupling and 4 speed automatic transmission.
See Transmission Section for complete data including Testing & Trouble Shooting.

Lubrication—Check fluid level in transmission every 2000 miles (lubrication period). Drain and refill every 25,000 miles. Use only GM Hydra-Matic Drive Fluid.

Capacity—11 qts. (drain oil pan and torus cover and refill). 12 qts. (drain, disassemble, assemble transmission and refill).

Checking Fluid Level—Roll back floor mat, remove cover on floor board, set hand brake and start engine, set control lever in "DR" position, allow to run about 2 minutes. Remove indicator, wipe dry, then return and check level of fluid with indicator. Add fluid until level is at "FULL" mark.

►*CAUTION—Always check oil level when oil is hot, engine idling, hand brake tightly set and control lever in "DR" position.*

►**Oil Level Indicator Change**—A new indicator, Part No. 8605800 (stamped on blade—earlier type not marked) reduces capacity approx. 1 pint providing slightly lower fluid operating level to reduce fluid foaming when oil is hot.

Hydra-Matic Linkage Adjustment—*See Hydra-Matic Drive article in Transmission Section.*

Removal: *See Hydra-Matic Drive article in Transmission Section.*

UNIVERSALS

Mechanics Model 2CR. Roller bearing type, 2 used.

►**1947-48 CAUTION**—Rear universal nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Pontiac Rear Axle article in Rear Axle Section for complete data.*

NOTE—Driveshaft is one-piece type (slip joint on transmission mainshaft, ahead of front universal).

REAR AXLE

1946 Type—Same as 1942. Hypoid gear, semi-floating type. This type axle has three setscrews equally spaced around pinion housing.
See Rear Axle Section for complete data.

1947-48—New hypoid gear, semi-floating type. Design similar to 1946 type except that pinion is mounted on two taper roller bearings and companion flange nut controls pinion bearing "pre-load." No setscrews are used.

►CAUTION—Rear universal companion nut controls pinion bearing "pre-load".
See Rear Axle Section for complete data.

Ratios—As shown. Axles may be identified by paint mark on end of right hand axle shaft.

Model	Ratio	Ident. Paint Mark
Torpedo Std.	4.1-1	Green
Streamliner Std.	4.3-1	White
Hydra-Matic (All)	3.63-1	Violet
All (Econ.)	3.9-1	Red
All (Heavy Duty)	4.55-1	Yellow

Backlash—.003-.012" (new), slightly over .012" (worn).

Removal:—Disconnect rear universal (wire trunnions, do not disengage spline joint at transmission), remove axle shafts, carrier flange mounting screws and carrier.

►**1947-48 CAUTION**—Rear U-joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal:—Remove wheel, brake drum, 4 backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with puller J-942 (do not drag axle shaft on oil seal).

Wheel Bearing Adjustment—None.

SHOCK ABS RBERS

Delco Model 1947-C,D (front), Model 1044-V (rear). Hydraulic, double acting (front), direct (rear).

FRONT SUSPENSION

Front Suspension: Independent, linked parallelogram type with coil springs.
See Front Suspension Section for complete data.

Kingpin Inclination—5½-6° crosswise.

Caster—Negative ¾°. Limits Neg. ½° to Neg. 1°.

Camber—0° preferred. Limits Neg. ¼° to Pos. ¼°.

Toe In—0-1/16". Adjust tie rod tubes equally.

Steering Geometry—Inner wheel 23° ± ½°. Outer 20°.

STEERING GEAR

Saginaw. Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service: Bendix Hydraulic, Duo-Servo, Single Anchor type with eccentric adjustment. Hand lever applies rear service brakes.
See Brake Section for complete data.

►IMPORTANT SERVICE NOTE—**Brake Drums**—Two different makes are used: 1) Kelsey-Hayes type can be identified by one-piece stamping and flange having a sharp edge; 2) Motor Wheel type consisting of two stampings and rolled flange. Each pair of drums (on opposite sides of car) front or rear must be of the same type.

Brake Drum Part Numbers	Front Wheel Left	Front Wheel Right	Rear Wheel
Kelsey-Hayes	507371	507370	505300
Motor Wheel	509221	509220	409176

Drums—Pressed steel with alloy iron liner. Diameter 11".

Clearance—.010" at heel and toe of each shoe.

Lining—Moulded. Width per wheel 2" (front), 1¾" (rear). Thickness 3/16". Length per shoe 9 11/32" (primary), 11 31/32" (secondary).

Braking Power—56% Front, 44% Rear.

Master Cylinder Filling Note—New cars shipped from the factory have master cylinder filled to level ⅞" below top of filler neck and this level is satisfactory for service (cylinders were filled to ½" below top).

Hand Brake: See Service Brakes above.

NoRol: Optional. *See Brake Section for complete data.*

MISC. MECHANICAL

Convertible Top Control: Hydro-lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1949 Numbers—P6RS-1001 Up .....Synchro-mesh Tr.
P6RH-1001 Up.....with Hydra-Matic Drive
1950 Numbers—P6TS-1001 Up.....Synchro-mesh Tr.
P6TH-1001 Up.....With Hydra-Matic Drive

▷*NOTE*—First prefix letter indicates Assembly Plant (below).

▷**Assembly Plant Prefix Letter. P**—Pontiac, Mich., **C**—South Gate, **L**—Linden, **W**—Wilmington, **K**—Kansas City, **A**—Atlanta, **F**—Framingham.

ENGINE NUMBER: Same as Serial Number. Stamped on boss on left upper front corner of engine block.

TUNE-UP

COMPRESSION PRESSURE: 118 to 135 lbs. at 200 RPM (Std. 6.5-1 Head). 135 to 153 lbs. at 200 RPM (Optl. 7.5-1 Head).

VACUUM READING: *18-20" steady* idling at 7-8 MPH. or 365-385 RPM. on Hydra-Matic cars.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plugs—AC No. 45. 14 mm. Metric.

DISTRIBUTOR: Breaker Gap—.022" (new points), .020" (used points).

▷*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. ***Do not use feeler gauge for setting used points.***
Cam Angle—35°. Test limits with .022" gap 31-37°. ***See "Delco-Remy Cam Angle" in Electrical Equipment Section.***
Breaker Arm Spring Tension—17-21 ounces.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 6° BTDC (initial setting—See Gaselector Setting).
Timing Procedure—*See Ignition Timing.*
Timing Mark—First (6°) line on vibration dampener aligned with pointer on chain case cover (2nd line 2° or 3° BTDC, 3rd line TDC).
Gaselector Setting—Set for barely audible ping when accelerating at 20-30 MPH., full throttle.

CARBURETION: Carter WA-1.
Idle Setting—Set idle adjusting screw 1-1¾ turns open. Turning screw out gives richer mixture.
Idle Speed (standard)—450-475 RPM. or 7-8 MPH.
Idle Speed (Hydra-Matic)—365-385 RPM.
Float Level—7/16" from machined projection on cover (inverted) to top of soldered seam at free end.
Accelerating Pump—Lower hole Normal Setting, Upper hole max. charge, Inner hole min. charge.
Choke Setting: Coil housing 3 Points Rich.

CARBURETION: Rochester Model BC.
Idle Setting—Set idle adjusting screw 1½ turns out for preliminary setting. Adjust further for smooth engine performance. Turning screw out gives richer mixture.
Idle Speed (standard)—450-475 RPM. or 7-8 MPH.
Idle Speed (Hydra-Matic)—365-385 RPM.
Float Level—1½" from gasket to top of float seam with bowl cover inverted and needle valve seated. ***CAUTION—Do not damage lower seal on heat suction tube when removing bowl cover.***
Accelerating Pump—No adjustment.
Choke Setting—Index mark on choke cover centered on long center scale mark on air horn casting.

Fuel Pump Pressure: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in vertical position with valve closed (cold position).
NOTE—Valve shaft bushings are Stainless Steel.

VALVE TAPPET CLEARANCE: .011" to .013", Hot. .011" "Go" gauge, .013" "No Go" gauge.
High Speed Setting—.013" EXH. Hot.

▷**Cold Setting with Engine Stopped**—.012" to .014" Cold (room temperature). *CAUTION*—Check setting after engine warmed-up for limits of .011" to .013".

▷**NOTE**—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.
Valve Timing Check—*See Valve Timing.*

IGNITION

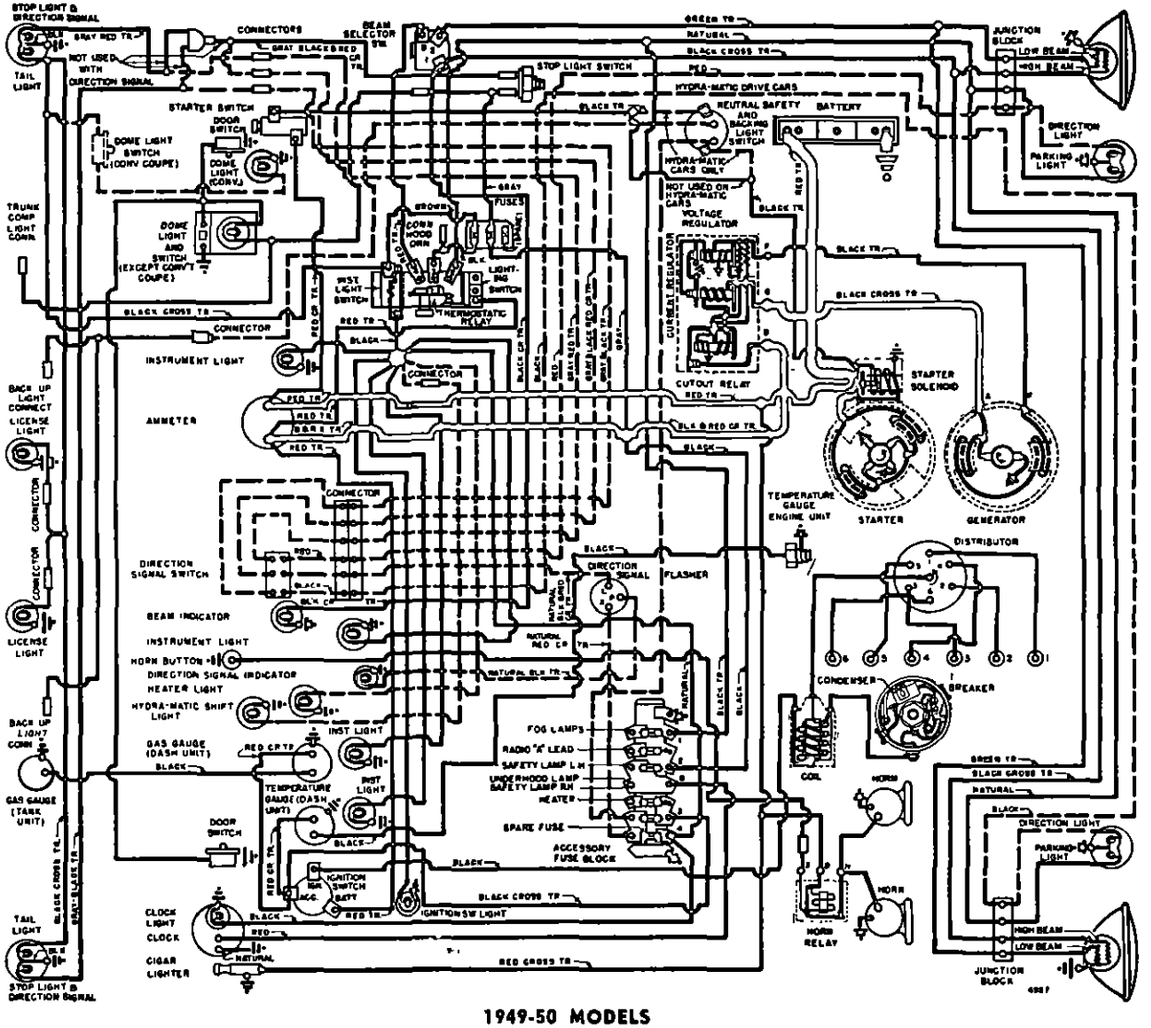
▷*IGNITION HIGH TENSION CABLE CAUTION*—Special non-metallic conductor cables (with built-in suppression resistance). Marked "RADIO-4000-GM." ***See "Ignition Notes" in Pontiac Special Data for cable installation data.***

▷*CAUTION*—This high-resistance cable must not be used on 1949 cars with "High Tower" resistor type distributor caps.

IGNITION SWITCH: Delco-Remy No. (1949) 1116461, *(1950) 1116464.*
Ignition Lock—Briggs & Stratton or Delco-Remy.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.



1949-50 MODELS

DISTRIBUTOR: Delco-Remy No. (1949) 1110219, (1950) 1110222. Automatic and vacuum advance type with "Center-Bearing" breaker plate.

►*CAUTION*—"High Tower" Distributor caps with built-in resistor used on 1949 distributor. "Low Tower" caps without resistor used on 1950-51 distributor. Never use a "High-Tower" cap with 1950 "High-Resistance" secondary cables.

►**Breaker Plate Bearing Assembly**—Plate rotates on 3 bakelite buttons on support plate with spring tension adjustment (shim washers) on underside of support plate. Pull required to move plate should be 8 oz. min., 16 oz. max. with breaker plate assembly out of housing.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.
Breaker Gap—.022" (new points), .020" (used pts.).

►*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. *Do not use feeler gauge for setting used points.*
Cam Angle—35°. Test limits with .022" gap 31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr.	R.P.M.	Degrees	Eng.	R.P.M.
Start		300	2		600
8.25		1100	16.5		2200
8.5		1400	17		2800
14		2050	28		4100

Gaselector—Manual adjustment at distributor. 10° advance or retard. See Ignition Timing.

Vacuum Spark Control: Delco-Remy (part of distr.).

Vacuum Advance—1110219

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
6.5	13½°	13-16"

Vacuum Advance—1110222

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
7½°	15°	14.5-16.5"

IGNITION TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
All Engines①	6° BTDC	.0138" BTDC.

①—Regular Fuel—Std. Hd. Ethyl Fuel—7.5-1 Hd. High Comp. Head Engines set 3° BTDC at factory.
Timing Mark—Three lines on vibration dampener. First (6°) line on vibration dampener aligned with pointer on chain case cover (2nd line 2° or 3° BTDC, 3rd line TDC).
Timing (with Timing Light)—Loosen gaselector indicator arm-to-block clamp bolt, set arm at 0, tighten bolt. Connect Timing Light (KMO318) to No. 1 spark plug, idle engine. Loosen advance arm clamp bolt, rotate distributor until timing light shows pointer at timing mark on vibration dampener which indicates 6° BTDC (1st line). Tighten clamp screw. Check Gaselector Setting (see below).
Gaselector Setting—Set to give best performance without spark knock or ping for fuel used. Marked "ADV" and "RET", adjust according to these marks.

CARBURETOR

Carter WA-1, No. 717S.....**Synchro-Mesh Trans.**
Carter WA-1, No. 718S.....**Hydra-Matic Drive**
1¼" single barrel downdraft types with Carter Climatic Control.
Casting No. on Flange—(717S) 388, (718S) 592.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rod & Jet—*See Carter Jet Table in Carburetor Section.*
NOTE—No "throttle cracker" used.
Hydra-Matic Throttle Linkage Adjustment: *See Pontiac Hydra-Matic Drive in Transmission Section.*
Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam. Adjust by bending connector link at lower offset (use Tool T109-41).
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (single barrel carburetors).
Setting—3 Points Rich.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1529871 oil-wetted type (std.), No. 1544486 heavy duty oil-bath type (optional).
Filter Element—AC #1 (std.), #21 (heavy duty).
Servicing—Clean and re-oil std. cleaner, or on heavy duty clean and refill reservoir with 1 pint SAE 50 (20W below freezing) oil, at 10,000 mile intervals (twice yearly) or more often if required.
Fuel Pump: (Std.) AC No. 1537352. (Optional) AC No. 1537317, (Fuel & Vacuum).
Replacement Pump—AC-539.
Pressure—4 to 4¾ lbs.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: AC Electric type.
Dash Unit—(1949-50) AC No. 1517117.
Tank Unit—(1949) AC No. 1517083. (1950) AC No. 1517249. Sta. Wgn. AC No. 1517122.
See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15E4. 6 volt, 15 plate 100 ampere hour capacity.
Grounded Terminal—Negative (—) to engine.
Location—On left side of engine compartment.
Police Battery—Delco Type 19E4. 6 volt, 19 plate, 130 ampere hour capacity.

STARTER

LHD.....**Delco-Remy 1107079. Arm. No. 1867897.**
RHD.....**Delco-Remy 1107934. Arm. No. 1867897.**
►*CAUTION—LHD starter operates whenever pushbutton depressed (and shift lever in neutral on Hydra-Matic)*
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs. each.

Performance Data—1107079

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Performance Data—1107934

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.15	570

Removal: Flange mounted at left front of flywheel housing. To remove, take out mounting screws.
Starting Switch (1107079 Starter): Delco-Remy Solenoid 1118140 (no relay used) mounted on starter and controlled by Push Button Switch No. 1996037 and Neutral Safety Switch No. 1997846 (Hydra-Matic cars).
CAUTION—Overrunning clutch pinion clearance must be adjusted if solenoid removed from starter.
See Electrical Equipment Section for complete data.
(1107934)—Delco-Remy Solenoid 1118102 on starter and controlled by Relay No. 269-G and Pushbutton Switch No. 1996039 (and Neutral Safety Switch 1997846 on Hydra-Matic Drive cars).
See Electrical Equipment Section for complete data.
Neutral Safety Switch Adjustment—*See Pontiac Hydra-Matic Drive in Transmission Section.*

GENERATOR

Year	Generator Delco-Remy No.	Armature Delco-Remy No.
1949-50	1102711	1879002
Police	1106403	1880252

Two brush types with voltage and current regulation.

Performance Data—Cold

	Amperes	Volts	R.P.M.
1102711	30①	8.0	1750
1106403	35	8.0	1040

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—(1102711) 1.75-1.9 amperes at 6.0 volts. (1106403) 1.77-2.0 amperes at 6.0 volts.
Belt Adjustment: Belt deflection or sideplay midway between generator & pump pulley should be 1½".

REGULATOR

Year	Regulator No.	For Generator No.
1949-50 (Std.)	1118301	1102711
Police	1118352	1106403

►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Elec. Equip. Section.*

Current Regulator

Setting (1118301).....32-40 amps. hot (set at 36 hot)
Setting (1118352).....33-37 amps. hot (set at 35 hot)
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Elec. Equip. Section.*

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LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot centered 3" below lamp center height at 25 ft.).
Beam Indicator—At speedometer. Lighted when upper beam in use.

Directional Signal: *See Electrical Equipment Section.*
Direction Signal Indicator—Red pilot light on speedometer dial. Flashes when signal in use.

Switches

Lighting—Delco-Remy No. 1995032.
Instrument—Part of lighting switch. Rheostat operated by turning Light Switch Knob.
Beam Selector—Delco-Remy No. 1997008.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

MAIN FUSE BLOCK: On left hand engine side of dash. Two fuses (plus 1 spare) as follows:
Tail Lamp—SFE 14 ampere. In gold colored fuse holder. Protects rear license, instrument, ignition key, and clock lamps (dome on convertible).
Stop Lamp—SFE 14 ampere. In gray colored fuse holder. Protects trunk light and dome light (except on Convertible).

ACCESSORY FUSE BLOCK: Six fuses mounted on fuse block on dash behind instrument panel. All fuses are 20 ampere except Radio fuse which is 14 ampere. (Spare Radio fuse on main fuse block on engine side of dash). Fuse identification printed inside fuse block cover.

HORNS: Delco-Remy No. 1999645 (Low Note). No. 1999646 (High Note). Vibrator types operated by relay.

Type	Current (at 6 volts)	Air Gap
Low Note	19-21 amperes	.047-.052"
High Note	18-20 amperes	.039-.044"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: Own. Six Cyl., "L" head.
Bore—3 9/16".
Stroke—4". **Displ.**—239.2 cu. ins. **Rated HP**—30.4.
Developed Horsepower—90 at 3400 RPM. (6.5-1 Head). 100 at 3400 (7.5-1 Head).
Compression Ratio—Std. 6.5-1. Optl. 7.5-1, iron hds.
Compression & Vacuum Reading—*See Tune-Up.*

ENGINE & OIL PAN REMOVAL: *See Pontiac Special Data.*

ENGINE FRONT MOUNTING REMOVAL: *See "Engine Mounting" in Pontiac Special Data.*

TIGHTENING TORQUES: *See Pontiac Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Pontiac Special Data.*

PISTONS: Chrome nickel alloy, electro-plated type. Pistons have 20 oil drain holes in oil ring groove.

▷*PISTON REPLACEMENT CAUTION—Late 1952 type pistons (with piston pin secured in piston with lock ring) can be used in 1949-50 engines in COMPLETE SETS ONLY.*
Length—3.572-3.582". **Weight**—27.1 ozs.
Removal—Pistons and rods removed from above.
Clearance—Top Land .015-.027". Skirt .002".

Fitting New Pistons: Insert .0015" X ½" feeler between piston and cylinder wall. Pull to withdraw feeler must be 10-20 lbs. **Taper and out-of-round limits**—Piston .0005". Cylinder .0005" max. new.

Replacement Pistons: *See Pontiac Special Data.*

PISTON RINGS: Two tapered-face compression rings above pin, one slotted oil control ring below pin. *NOTE*—Rings are cadmium-plated or tin-plated.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"	.007-.012"	.0015-.003"
Oil (#3)	3/16"	.007-.012"	.001-.0025"

Installing Compression Rings—Mark "TOP" up.

Replacement Rings: .005", .010", .020", .030" Oversize. *See Pontiac Special Data.*

PISTON PIN: Diameter—.9369-.9375". **Lgth**—3 1/16". *Pin is shot-peened type (shot-peened before final grinding and lapping).* Pin is locked in one piston boss by self-locking lockscrew and opposite end slotted to permit piston pin movement.
Pin Fit in Rod Bushing—.0004-.0006" clearance.

Piston Pin Removal & Installation: *See "Piston Pins" in Pontiac Special Data.*

Replacement Pins:—.001" (red & brown), .003" (red), .005" (blue) oversize. Paint marked on end of pin.

CONNECTING ROD: Weight 37 ozs. Length 7 9/16".
Crankpin Journal Diameter—2.1237-2.1247".
Lower Bearing—Thin type, interchangeable, steel-backed, babbitt-lined type.
Clearance—.0001-.0021". **Sideplay**—.007-.012".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Pontiac Special Data.*

Replacement Bearings: Standard size & .001" Undersize. *NOTE*—Bearings have small tongue which must engage groove in rod and cap.

Installing Rods: Not offset (install either way).
NOTE—Rods and bearing caps marked to insure correct reassembly (marks must be together). These marks do not indicate cylinder in which rod used.
CAUTION—Keep each connecting rod and its bearing cap together.

CRANKSHAFT: Four bearing type with integral counterweights and vibration dampener on forward end.

Vibration Dampener Removal & Installation: See "Vibration Dampener" in Pontiac Special Data.

▷**Flywheel to Crankshaft Bolts (Synchro-Mesh Transmission)**—¾" hex head bolts (No. 508463) or 1" hex head bolts (No. 510832) are used. Either type can be used for replacement but head sizes must be alike on all bolts or engine balance will be destroyed.
Journal Diameters—#1, 2.4982-2.4992"; #2, 2.5294-2.5304"; #3, 2.5919-2.5929"; #4, 2.6232-2.6242".
Bearings—Thin type, removable, steel-backed, babbitt-lined. Upper and lower bearing halves alike.
Clearance—.0003-.0023".
Rear Main Bearing Oil Seal Renewal—*See Pontiac Special Data.*

Replacement Bearings: Standard & .001" Undersize.

End Thrust: At #3 (rear intermediate) bearing.
Endplay—.003-.008".

CAMSHAFT: Four bearing, non-adjustable chain.

Camshaft Removal & Bearing Installation: *See "Camshaft & Bearings" in Pontiac Special Data.*
Clearance—.0015-.0025" (new).

End Thrust:—Steel thrust plate behind camshaft sprocket. Replace if worn. **Endplay**—.003-.007".

Timing Chain: Morse. Width 1". Pitch ⅜". Length 21" or 56 links. *NOTE:* 1951 cars equipped with a timing chain bumper to eliminate vibration.
Timing Chain Oil Cover Seal Installation—*See "Timing Chain" in Pontiac Special Data.*
Timing Chain Replacement—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting:—Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 19/32"	.310-.311"	5.718"
Exhaust	1 15/32"	.310-.311"	5.718"

	Seat Angle	Lift	Stem Clearance
Intake	30°	19/64"	Free fit to .0006"①
Exhaust	45°	19/64"	Free fit to .0006"①

①——Tapered (max. clearance at bottom .0006").

Valve Guides: Guides have tapered hole (.001" taper to inch—greatest clearance at top). Exhaust guides counterbored at top to depth of ¾".
Checking Valve Clearance in Guide—Clean guide with tool KMO122, clean counterbore in exhaust guide with Counterbore Cleaner J-2122. Valve should just fall through guide of own weight.
Installing Guides—Use Valve Guide Remover J-2542 to remove and install guides. Drive new guide down in block (counterbored end up on exhaust guides) until upper end 29/32" below top edge of valve seat. Ream guide with PR-131 tapered reamer and finish counterbore with Counterbore Cleaner J-2122 for correct clearance (see above).

▷*CAUTION*—Guides furnished with straight hole which must be taper reamed.
NOTE—Eight cylinder intake valve guide may be used on six cylinder cars.

Valve Springs:—Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length**—2 9/16".

	Spring Pressure	Length
Valve Closed	56-63 lbs.	1 29/32"
Valve Open	97-105 lbs.	1 19/32"

Valve Lifters:—Barrel type, cast-iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed, use Valve Guide Removing Tool J-2542).
Clearance—Free fit. Lifter should just move freely with finger touch.

VALVE TIMING

Tappet Clearance: .011" to .013", All Valves, Hot. .011" "Go" gauge, .013" "No Go" gauge.
High Speed Setting—.013" EXH. Hot.
Cold Setting with Engine Stopped—*.012" to .014"* Cold (room temperature). *CAUTION*—Check setting after engine warmed-up for limits of .011" to .013".

▷**NOTE**—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.

Valve Timing:—*See Camshaft Setting above.*
Intake Valves—Open 5° BTDC. Close 39° ALDC.
Exhaust Valves—Open 45° BLDC. Close 5° ATDC.
Valve Timing Check—With .015" tappet clearance #6 intake valve should open with #6 piston 5° or .0096" before top dead center with first straight line of dampener mark '/IGN.ONE/' slightly past pointer on left front face of chain cover. Reset tappet clearance .011-.013" (warm).

LUBRICATION

Engine Oiling System: Pressure to main bearings connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, and chain.
Crankcase Capacity—5 qts. (refill), 6 qts. (dry).
Normal Oil Pressure—35-45 lbs. at 40 MPH. with warm oil (10-30 lbs. idling).
Oil Pressure Regulator—On oil pump. Opens at 40 lbs. Replace spring if free length less than 2 5/16".

Oil Pump: Gear type. On right side of crankcase.

Oil Cleaner: Precipitation type (in crankcase).

Oil Pressure Gauge: AC No. 1507535. Not electric.

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compt. cover on right rear side of engine (cars with oil bath air cleaner use 3-piece outlet pipe containing filter element). Wash filter element and re-oil by dipping in engine oil when servicing air cleaner.
CAUTION—Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backward).
Crankcase Ventilator Outlet Pipe—On cars with Oil-bath type Air Cleaner, special 3-piece ventilator outlet pipe used with copper gauze air cleaner.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap.

►*1951 WATER PUMP PRODUCTION CHANGE—Water pump changed to include lubrication hole. Earlier type pumps can be changed to lubricated type. See "Pontiac Water Pumps" in Water Pump Section.*
Capacity—18½ qts.
Pressure Valve—AC No. 850549 Filler Cap. Opens at 7 lbs. (6¼-7½ lbs.).

Water Pump: Packless, sealed ball-bearing shaft.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove hose connection at pump, remove belt, take out water pump mounting bolts and lift pump out.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Harrison. In cylinder head outlet.
Setting—Starts to open 148-156°F. Fully open 176°F.

Radiator Removal: *See "Radiator" in Pontiac Special Data.*

Temperature Gauge: AC Electric type.
Dash Unit—AC No. (1949) 1512126, (1950) 1512287.
Engine Unit—AC No. 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Inland. Single Plate, "Diaphragm", dry disc type with Long Driven Member Model 9½CF-TS (except Taxicab), Model 10CF-CS (Taxicab).
See Clutch Section for complete data.

►**Heavy Duty Clutch Note**—No separate 1950 Heavy Duty Clutch used. Std. 8 Cyl. clutch cover assembly used with special 6 Cyl. 10" driven member.
See Clutch Section for complete data.
Facings—Woven type, 2 required. I.D. 6" (All O.D. 9½" (exc. Taxi), 10" (Taxi), Thickness ⅛".

Pedal Adjustment:—Free travel ⅞-1⅛" (adjusting nut on link at clutch fork).

Removal: Remove Transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing), remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing (see Clutch Release Bearing & Support data), tapping the support from inside the clutch housing to aid in removing (*CAUTION*—avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure re-installation in same position to maintain balance), remove clutch cover mounting bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member, lower cover assy. out.

►**Clutch Sticking Correction (Removal of Excess Release Bearing Lubricant):** If recess in bore on bearing over-lubricated when clutch assembly installed, excess lubricant may be found causing clutch sticking. Clean out excess lubricant found at the following points: transmission drive gear, driven plate hub, clutch facings, pressure plate and cover assembly, release bearing support tube, fulcrum points of release fork, and recess in bore on release bearing (do not wash bearing, bearing is "sealed" type). Lubricate clutch parts exactly as described under Installation Note following:
Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retaining ring on Transmission Main Drive Gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

Clutch Release Bearing & Support: *See Pontiac Special Data for description.*

TRANSMISSION

Own Make. All helical gear. Constant-mesh synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for data.*

Transmission Control: Pontiac "Safety-shift" remote control type with gearshift lever on steering column.
See Transmission Section for complete data.

Removal:—Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear, down and out.
Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing support.

►**New Transmission Main Drive Gear Oil Seal**—*See Transmission Section for complete data.*

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Four speed planetary type automatic transmission and fluid coupling.
See Transmission Section for complete data including Testing & Trouble Shooting.

►**NOTE:** *Different Hydra-Matic Transmission used as follows:*

	Hydra-Matic Model No.
1949 & First 10,000 cars 1950	185-49-P①
1950 (After 10,000 cars)	185-50-P②

①—P9 preceding Serial No. on black background.
②—P50 preceding Serial No. on black background.

►*NOTE:* P9, P50 also used on 8 cyl. cars. Check serial number plate.

►*CAUTION—P9 Transmission should not be used to replace P50 transmissions.*
See "Pontiac Hydra-Matic Drive" in Transmission Section.

Lubrication—Check fluid level in transmission every 2000 miles (at lubrication period). Drain and refill every 25,000 miles. Use only GM Hydramatic Fluid or "Automatic Transmission Fluid Type A."

Draining & Refilling—*See "Hydra-Matic Drive" in Transmission Section.*

Checking Fluid Level—Roll back right side of front floor mat. Clean all sand, lint, and dirt away from sheet metal cover in floor, remove cover, clean any dirt away from dipstick cover on transmission. **Set Hand Brake.** Run engine for approx. 1½ minutes at speed equivalent to 20 MPH. with selector lever in "Neutral." Reduce engine speed to **slow idle** and move selector lever to "Drive" position, measure level with dipstick, add fluid until level is at "FULL" mark with engine idling.

►*CAUTION—Engine must be idling slow and selector lever in "Drive" position when checking fluid level.*
Linkage Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

Removal: *See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics Model 2CR lock ring retainer type or **Saginaw** clamp plate retainer type.

►*CAUTION*—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Pontiac Rear Axle in Rear Axle Section.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with pinion mounted on two taper roller bearings.

►*CAUTION*—Rear Universal companion nut controls pinion bearing "pre-load" and must be adjusted each time nut is loosened.
See Rear Axle Section for complete data.

►**Filler Plug Production Change**—Moved from axle cover at rear to front face of carrier on right side

Model	Ratio	Paint Mark①
Hydra-Matic (All)	3.63-1	Violet or Blue
Synchro-Mesh	4.1-1	Green
Synchro-Mesh	3.9-1	Red
Synchro-Mesh	4.3-1	White
Synchro-Mesh	4.55-1	Yellow
Synchro-Mesh	3.63-1	Violet or Blue

①—On outer end of axle shafts.

Backlash—.003-.012" (new), slightly over .012" (worn).

Removal:—Disconnect rear universal and wire trunnions (do not disengage spline joint at transmission), remove axle shafts and carrier flange cap-screws. Withdraw carrier assembly from housing.

►CAUTION—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

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Axle Shaft Removal:—Remove wheel, brake drum, 4 backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with puller J-942 —(do not drag axle shaft on oil seal).

Wheel Bearing Adjustment—None.

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (non-refilliable) type. Serviced by replacement.

Year	Standard Pontiac No.	Heavy Duty Pontiac No.
1949-50 (Front)	5513190	5513562
1949-50 (Rear)	5513200	5513201

FRONT SUSPENSION

Front Suspension: New linked parallelogram type with direct acting shock absorber mounted within each coil spring.

See Front Suspension Section for complete data.

Rebound Noise Correction—*See "1949-50 Pontiac" in Front Suspension Section.*

Kingpin Inclination—4¾° to 5¼° crosswise.

Caster—Neg. ¾°. Limits Neg. ½° to Neg. 1°. Adjustable.

Camber—0°. Limits Neg. ¼° to Pos. ¼°. Adjustable.

Toe In—0-1/16". Adjust rod sleeves equally.

STEERING GEAR

Saginaw. Worm-and-Roller type.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type without eccentric adjustment. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinder Bore—Front wheels 1 1/16". Rear ⅞"

Drums—Steel & cast-iron. Diameter 11".

Lining—Molded. Width 2¼" (front wheels), 1¾" (rear). Thickness 3/16". Length per shoe: 9 11/32" (primary), 11 31/32" (secondary).

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Braking Power—60% front wheels, 40% rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type

See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL NUMBER: On left front door hinge post.

1949 Numbers—P8TS-1001 Up .....Synchro-mesh Tr.
P8TH-1001 Up.....with Hydra-Matic Drive

1950 Numbers—P8TS-1001 Up.....Synchro-Mesh Tr.
P8TH-1001 Up.....with Hydra-Matic Drive

Prefix letter indicates Assembly Plant (below).

►**Assembly Plant Prefix Letter.** P—Pontiac, Mich., C—South Gate, L—Linden, W—Wilmington, K—Kansas City, A—Atlanta, F—Framingham.

ENGINE NUMBER: Same as Serial Number. Stamped on boss on left upper front corner of engine block.

TUNE-UP

COMPRESSION PRESSURE: (Std. 6.5-1 Head) 118-135 lbs. at 200 RPM. (Optl. 7.5-1 Head) 135-153 lbs. at 200 RPM.

VACUUM READING: 18-20" steady idling at 7-8 MPH. or 365-385 RPM. on Hydra-Matic cars.

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plugs—AC No. 45. 14 mm. Metric.

DISTRIBUTOR: Breaker Gap—.016" (new points), .015" (used points).

►*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. ***Do not use feeler gauge for setting used points.***

Cam Angle—26°. Test limits with .016" gap 21-30°. ***See "Delco-Remy Cam Angle" in Electrical Equipment Section.***

NOTE—If dial indicator not available when setting Breaker Gap on Used Points, car manufacturer recommends gap be set by cam angle at 28° closed.

Breaker Arm Spring Tension—19-23 ounces.

Automatic & Vacuum Advance—***See Ignition.***

Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 6° BTDC (initial setting—See Gaselector Setting).

Timing Procedure—***See Ignition Timing.***

Timing Mark—First (6°) line on vibration dampener aligned with pointer on chain case cover (2nd line 2° or 3° BTDC, 3rd line TDC).

Gaselector Setting—Set for barely audible ping when accelerating at 20-30 MPH., full throttle.

CARBURETION:

Idle Setting—¾-1¼ turns open. Two screws—turning screws out gives richer mixture.

Idle Speed (standard)—450-475 RPM. or 7-8 MPH.

Idle Speed (Hydra-Matic)—365-385 RPM.

Float Level—3/16" from top of floats to gasket seat on bowl cover (Gauge T109-162). Sides of floats should barely touch vertical uprights on gauge (to avoid floats binding on sides of bowl).

Accelerating Pump—Lower Hole (minimum) Normal. Upper Hole (max.)—if more charge required.

Choke Setting: Centered at Index.

Fuel Pump Pressure: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in vertical position with valve closed (cold position).

VALVE TAPPET CLEARANCE: .011" to .013", Hot. .011" "Go" gauge, .013" "No Go" gauge.

High Speed Setting—.013" EXH. Hot.

►**Cold Setting with Engine Stopped**—.012" to .014" Cold (room temperature). *CAUTION*—Check setting after engine warmed-up for limits of .011" to .013".

►*NOTE*—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.

Valve Timing Check—***See Valve Timing.***

STARTING: ***See Batery, Starter, Generator, Regulator.***

IGNITION

►***IGNITION HIGH TENSION CABLE CAUTION***—Special non-metallic conductor cables (with built-in suppression resistance). Marked "RADIO-4000-GM." ***See "Ignition Notes" in Pontiac Special Data for cable installation data.***

►***CAUTION***—This high-resistance cable must not be used on 1949 cars with "High Tower" resistor type distributor caps.

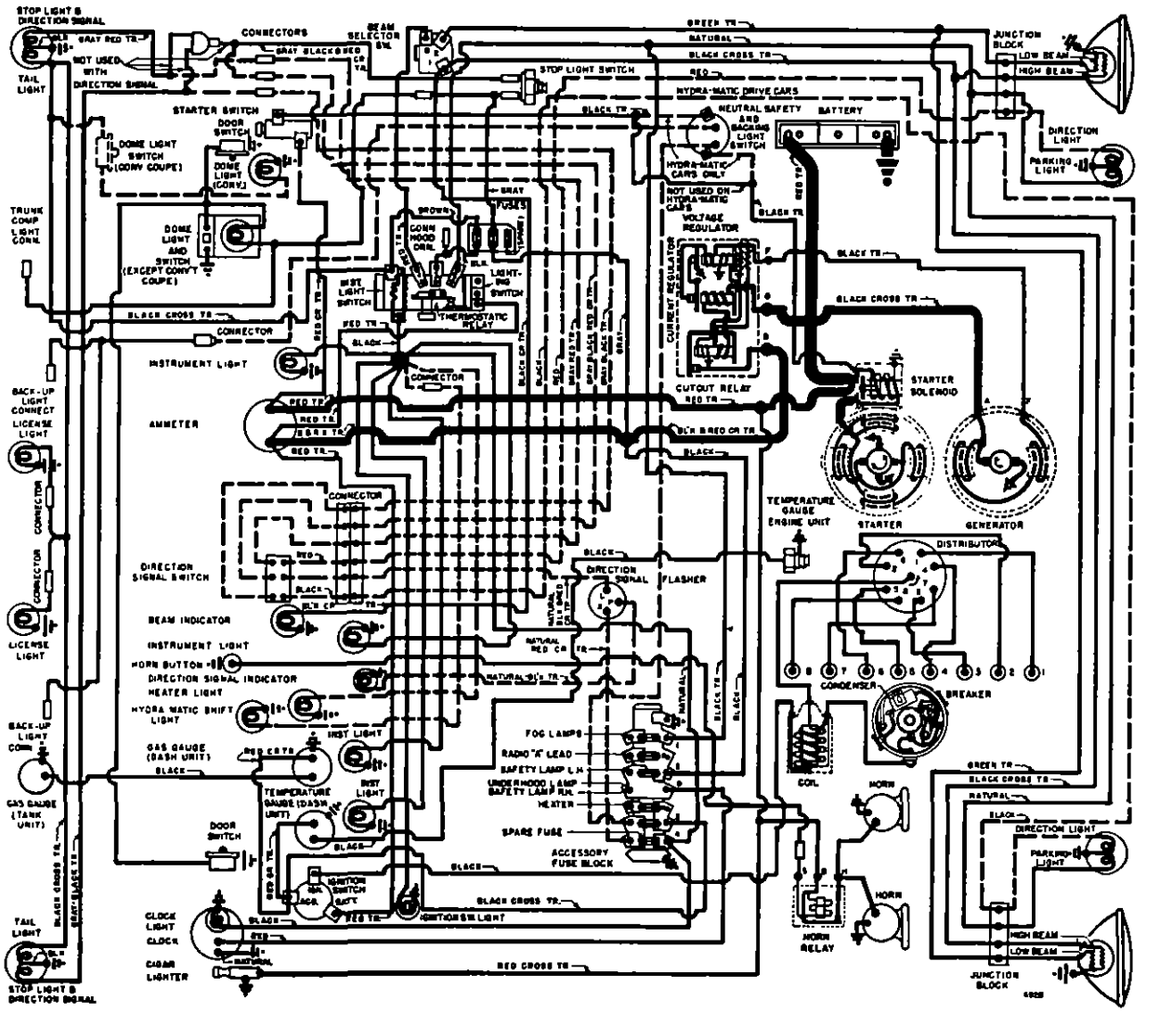
IGNITION SWITCH: Delco-Remy No. (1949) 1116461, (1950) 1116464.

Ignition Lock—Briggs & Stratton Delco-Remy.

COIL: Delco-Remy No. 1115380. Mounted on engine.

Ignition Current—2.5 amperes idling, 4.5 stopped.

CONTINUED ON NEXT PAGE



1949-50 MODELS

CONTINUED FROM PRECEDING PAGE

CONDENSER: Delco-Remy No. 1869704.

Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. (1949) 1110816, (1950) 1110818. Automatic and vacuum advance type with "Center Bearing" breaker plate.

►**Breaker Plate Bearing Assembly**—Plate rotates on 3 bakelite buttons on support plate with spring tension adjustment (shim washers) on underside of support plate. Pull required to move plate should be 8 oz. min., 16 oz. max. with breaker plate assembly out of housing.

See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

Breaker Gap—.016" (new points), .015" (used pts.).

►*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. *Do not use feeler gauge for setting used points.*

Cam Angle—26°, Test limits with .016" gap 21-30°.

See "Delco-Remy Cam Angle" in Electrical Equipment Section.

Breaker Arm Spring Tension—19-23 ounces.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	250	2	500
7.5	1200	15	2400
8.25	1500	16.5	3000
13.5	2100	27	4200

Gaselector—Manual adjustment at distributor. 10° advance or retard. See Ignition Timing.

Vacuum Spark Control: Delco-Remy No. 1116050. Integral type linked directly to breaker plate.

Plunger Travel—7/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
10°	20°	17.5-19.5"

Distributor Removal: On left side of engine. Disconnect vacuum line, take out Gaselector screw, lift out.

IGNITI N TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
All Engines①	6° BTDC	.0128" BTDC.

①—Regular Fuel—Std. Hd. Ethyl Fuel—7.5-1 Hd. High Comp. Head Engines set 3° BTDC at factory.

Timing Mark—Three lines on vibration dampener. First (6°) line on vibration dampener aligned with pointer on chain case cover (2nd line 2° or 3° BTDC, 3rd line TDC).

Timing (with Timing Light)—Loosen gaselector indicator arm-to-block clamp bolt, set arm at 0, tighten bolt. Connect Timing Light (KMO318) to No. 1 spark plug, idle engine. Loosen advance arm clamp bolt, rotate distributor until tming light shows pointer at timing mark on vibration dampener which indicates 6° BTDC (1st line). Tighten clamp screw. Check Gaselector Setting (see below).

Gaselector Setting—Set to give best performance without spark knock or ping for fuel used. Marked "ADV" and "RET", adjust according to these marks.

CARBURETOR

Carter WCD, No. 719S, SA.....**Synchro-mesh Trans.**
Carter WCD, No. 720S, SA.....**Hydra-Matic Drive**
1¼" dual downdraft with Carter Climatic Control. **Casting No.**—(719S, SA) 550, (720S, SA) 558.

►**Choke Valve anti-rattle correction:** *See "Carter WCD-719SA and WCD 720SA" in Carburetor Section. See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rod & Jet—*See Carter Jet Table in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See Pontiac Hydra-Matic Drive in Transmission Section.*

Fast Idle: Carter Dual (WCD) Carburetor type.

Setting—.026" throttle opening (Gauge No. T109-189) with choke valve tightly closed. Adjust by turning fast idle screw.

See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Dual Carburetor).

Setting—Centered at Index.

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544256 oil-wetted type (standard), No. 1544530 heavy duty oil-bath type (optl.).
Filter Element—AC #6 (std.), #7-S (heavy duty).
Servicing—Clean and re-oil std. cleaner, or on heavy duty clean and refill reservoir with 1 pint SAE 50 (20W below freezing) oil every 10000 miles.

Fuel Pump (Fuel-&-Vacuum): AC Type AJ, 1537317.

Replacement Pump—AC No. 539.

Pressure—4-4¾ lbs.

See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—(1949-50) AC No. 1517117.
Tank Unit—(1949) AC No. 1517083. (1950) AC No. 1517249. Sta. Wgn. AC No. 1517122.

See Carburetion Equipment Section for complete data.

BATTERY

Delco Type 15E4. 6 volt, 15 plate 100 ampere hour capacity.

Grounded Terminal—Negative (—) to engine.

Location—On left side of engine compartment.

Police Battery—Delco Type 19E4. 6 volt, 19 plate, 130 ampere hour capacity.

Grounded Ter. & Location—Same as 15E-4 above.

STARTER

LHD .....**Delco-Remy 1107957. Arm. No. 1867897.**
RHD .....**Delco-Remy 1107934. Arm. No. 1867897.**

►*CAUTION—LHD starter operates whenever pushbutton depressed (and shift lever in neutral on Hydra-Matic)*

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ozs. each.

Performance Data—1107957

Torque	RPM	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 ft. lbs.	Lock	3.0	600

Performance Data—1107934

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.15	570

Starting Switch (1107957 Starter): Delco-Remy solenoid 1118140 (no relay) mounted on starter and controlled by Pushbutton Switch No. 1996037 and Neutral Safety Switch No. 1997846 (Hydra-Matic Cars).

CAUTION—Overrunning clutch pinion clearance must be adjusted if solenoid removed from starter. *See Electrical Equipment Section for complete data.*

(1107934)—Delco-Remy Solenoid 1118102 on starter and controlled by Relay No. 269-G and Pushbutton Switch No. 1996039 (and Neutral Safety Switch 1997846 on Hydra-Matic Drive cars).

See Electrical Equipment Section for complete data.

Neutral Safety Switch Adjustment—*See Pontiac Hydra-Matic Drive in Transmission Section.*

GENERATOR

Year	Generator Delco-Remy No.	Armature Delco-Remy No.
1949-50	1102711	1879002
Police	1106403	1880252

Two brush types with voltage and current regulation.

Performance Data (Cold)

	Amperes	Volts	R.P.M.
1102711	30①	8.0	1750
1106403	35	8.0	1040

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—28 ozs.

Field Current—(1102711) 1.75-1.9 amperes at 6.0 volts. (1106403) 1.77-2.0 amperes at 6.0 volts.

Removal: Generator pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.

Belt Adjustment: Belt deflection or sideplay midway between generator & pump pulley should be 1½".

REGULATOR

Year	Regulator No.	For Generator No.
1949-50 (Std.)	1118301	1102711
Police	1118352	1106403

►*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.

See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate of High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).

Contact Gap—.020" (same for both contacts).

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.

Air Gap—.075" with armature pressed down to point where contacts are just touching.

Checking & Adjustment—*See Elec. Equip. Section.*

Current Regulator

Setting (1118301).....32-40 amps. hot (set at 36 hot)

Setting (1118352).....33-37 amps. hot (set at 35 hot)

Air Gap—.075" with armature pressed down to point where contacts are just touching.

Checking & Adjustment—*See Elec. Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).

Beam Indicator—At speedometer. Lighted when upper beams in use.

Directional Signal: *See Electrical Equipment Section.*

Direction Signal Indicator—Red pilot light on speedometer dial. Flashes when signal in use.

Switches

Lighting—Delco-Remy No. 1995032.

Instrument—Part of Lighting Switch. Rheostat operated by turning Light Switch Knob.

Beam Selector—Delco-Remy No. 1997008.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

MAIN FUSE BLOCK: On left hand engine side of dash. Two fuses (plus 1 spare) as follows:

Tail Lamp—SFE 14 ampere. In gold colored fuse holder. Protects rear license, instrument, ignition key, and clock lamps (dome on convertible).

Stop Lamp—SFE 14 ampere. In gray colored fuse holder. Protects trunk light and dome light.

ACCESSORY FUSE BLOCK: Six fuses mounted on fuse block on dash behind instrument panel. All fuses are 20 ampere except Radio fuse which is 14 ampere. (Spare Radio fuse on main fuse block on engine side of dash). Fuse identification printed inside fuse block cover.

HORNS: Delco-Remy No. 1999645 (Low Note). No. 1999646 (High Note). Vibrator types operated by relay.

Type	Current (at 6 volts)	Air Gap
Low Note	19-21 amperes	.047-.052"
High Note	18-20 amperes	.039-.044"

Horn Relay: Delco-Remy No. 1116775.

Contact Gap—.027". **Air Gap**—.014" (closed).

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.

	1949	1950
Bore	3¼"	3⅜"
Stroke	3¾"	3¾"
Displacement	248.9 cu. in.	268.2 cu. in.
Rated Horsepower	33.8	36.4
Developed Horsepower	104 at 3800	108 at 3600

Compression Ratio—Std. 6.5-1. Optl. 7.5-1, iron hds.

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE & OIL PAN REMOVAL: *See Pontiac Special Data.*

ENGINE FRONT MOUNTING REMOVAL: *See "Engine Mounting" in Pontiac Special Data.*

TIGHTENING TORQUES: *See Pontiac Special Data.*

CYLINDER HEAD: Tightening Torque & Cylinder Head Diagram—*See Pontiac Special Data.*

►*CAUTION*—New cylinder heads and thinner gasket used on 1950 engine. Interchange of heads on 1949-50 engines will change compression ratio. **Do not use thinner 1950 gasket on 1949 engines.**

PISTONS: Chrome nickel alloy, electro-plated type. Pistons have 20 oil drain holes in oil ring groove.

►*PISTON REPLACEMENT CAUTION—Late 1952 type pistons (with piston pin secured in piston with lock rings) can be used in 1950 engines in COMPLETE SETS ONLY.*

Length—3.593-3.603".

Weight—(1949) 24.64 ozs. (1950-51) 26.7 ozs.

Removal—Pistons and rods removed from above.

Clearance—Top Land .0165-.0284". Skirt—See Fitting New Pistons.

Fitting New Pistons: Insert .0015" X ½" feeler between piston and cylinder wall. Pull to withdraw feeler must be 10-20 lbs. Taper and out-of-round limits—Piston .0005". Cylinder .0005" max. new.

Replacement Pistons: *See Pontiac Special Data.*

PISTON RINGS: Two tapered-face compression rings above pin, one slotted oil control ring below pin.

NOTE—Rings are cadmium-plated or tin-plated.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"	.008-.015"	.0015-.003"
Oil (#3)	3/16"	.008-.015"	.001-.0025"

Installing Compression Rings—Mark "TOP" up.

Replacement Rings: .005", .010", .020", .030" Oversize. *See Pontiac Special Data.*

PISTON PIN: Dia. .9369-.9375". Length—2⅞". Pin is shot-peened type (shot-peened before final grinding and lapping). Pin is locked in one piston boss by self-locking lockscrew and opposite end slotted to permit piston pin movement.

Pin Fit in Piston—*See Pontiac Special Data.*

Pin Fit in Rod Bushing—.0004-.0006" clearance.

Pin Removal & Installation: *See Pontiac Special Data.*

Replacement Pins:—.001" (red & brown), .003" (red), .005" (blue) oversize. Paint marked on end of pin.

CONNECTING ROD: Wt.—32 ozs. **Lgth.**—7.560-7.565".

Piston Pin Bushing (Upper Bearing)—Split aluminum bronze bushings. *See Pontiac Special Data.*

Crankpin Journal Diameter—1.9987-1.9997".

Lower Bearing—Thin type, interchangeable, steel-backed, babbitt-lined type.

Clearance—.0001-.0021". **Sideplay**—.007-.012".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Pontiac Special Data.*

Replacement Bearings: Standard size & .001" Undersize. *NOTE*—Bearings have small tongue which must engage groove in rod and cap.

Installing Rods: Not offset (install either way).

NOTE—Rods and bearing caps marked to insure correct reassembly (marks must be together). These marks do not indicate cylinder in which rod used. *CAUTION*—Keep each connecting rod and its bearing cap together.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.

Vibration Dampener Removal & Installation: See "Vibration Dampener" in Pontiac Special Data.

1949 Journal Diameters—#1, 2.3732-2.3742"; #2, 2.4044-2.4054"; #3, 2.4357-2.4367"; #4, 2.4669-2.4679"; #5, 2.4982-2.4992".

1950-51 Journal Diameters—#1, 2.3732-2.3742; #2, 2.4044-2.4054"; #3, 2.4357-2.4367"; #4, 2.4669-2.4679"; #5, 2.6232-2.6242".

Bearings—Thin type, removable, steel-backed, babbitt-lined. Upper and lower bearing halves alike.

Clearance—.0003-.0023".

See "Crankhaft & Main Bearings" in Pontiac Special Data.

Bearing Adjustment:—None (no shims). *See Pontiac Special Data for Removal and Fitting of Bearings.*

Rear Main Bearing Oil Seal Renewal—*See Pontiac Special Data.*

Replacement Bearings: Standard & .001" Undersize.

End Thrust: Taken by #4 (rear intermediate) bearing. Endplay—.003-.008".

CAMSHAFT: Five bearing, non-adjustable chain.

Timing Chain Cover Oil Seal Installation—*See "Timing Chain" in Pontiac Special Data.*

Bearing Diameters—#1, 2"; #2, 1 31/32"; #3, 1 15/16"; #4, 1 29/32"; #5, 1 7/8". *For Bearing Finished Sizes, see "Camshaft & Bearings" in Pontiac Special Data.*

Bearings—Steel-backed, babbitt-lined bushings.

Clearance—.0015-.0025" (new).

Camshaft Removal & Bearing Installation: *See "Camshaft & Bearings" in Pontiac Special Data.*

End Thrust: Steel thrust plate behind camshaft sprocket. Replace if worn. **Endplay**—.003-.007".

Timing Chain: Morse. Width 27/32". Pitch ⅜". Length 21" or 56 links.

Timing Chain Oil Cover Seal Installation—*See "Timing Chain" in Pontiac Special Data.*

Timing Chain Replacement—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that "0" marks are adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 15/32"	.310-.311"	5.53"
Exhaust	1 11/32"	.310-.311"	5.53"

	Seat Angle	Lift	Stem Clearance
Intake	30°	19/64"	Free fit to .0006"①
Exhaust	45°	19/64"	Free fit to .0006"①

①——Tapered (max. clearance at bottom .0006").

Valve Guides: Guides have tapered hole (.001" taper to inch—greatest clearance at top). Exhaust guides counterbored at top to depth of 9/16". Guides have valve spring seat at lower end.

Check Valve Clearance in Guide—Clean guide with tool KMO-122, clean counterbore in exhaust guide with Counterbore Cleaner J-2122 *(CAUTION—Set tool for 9/16")*. Valve should just fall through guide with own weight.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Installing Guides—Use Valve Guide Remover J-2542 to remove and install guides. Drive new guide down in block (counterbored end up on exhaust guides) until upper end 29/32" (1949); 7/8" (1950) below top edge of valve seat. Ream guide with PR-131 tapered reamer and finish counter-bore with Counterbore cleaner J-2122 for correct clearance (see above).

▷*CAUTION*—Guides furnished with straight hole which must be taper reamed.

Valve Springs:—Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length—2 9/16".**

▷*CAUTION*—Dampeners located inside spring, with upper seat for spring located on valve guide. Eight cyl. guides not the same as the 6 cyl., but new 8 cyl. intake valve guides may be installed on 6 cyl.

1949 Valve Spring Specifications

	Spring Pressure	Spring Length
Valve Closed	59½ lbs.	1 29/32"
Valve Open	101 lbs.	1 19/32"

1950 Valve Spring Specifications

Valve Closed	62½ lbs.	1 23/32"
Valve Open	105 lbs.	1 13/32"

Valve Lifters:—Barrel type, cast-iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed, use Valve Guide Removing Tool J-2542).

Clearance—Free fit. Lifter should just move freely with finger touch.

VALVE TIMING

Tappet Clearance: .011" to .013", All Valves, Hot. .011" "Go" gauge, .013" "No Go" gauge.

High Speed Setting—.013" EXH. Hot.

Cold Setting with Engine Stopped—.012" to .014" Cold (room temperature). *CAUTION*—Check setting after engine warmed-up for limits of .011" to .013".

▷*NOTE*—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.

Valve Timing:—*See Camshaft Setting above.*

Intake Valves—Open 5° BTDC. Close 39° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Valve Timing Check—With .015" tappet clearance #1 intake valve should open with #1 piston 5° or .0089" before top dead center with first straight line of dampener mark '/IGN.ONE/' slightly past pointer on left front face of chain cover. Reset tappet clearance .011-.013" (warm).

LUBRICATION

Engine Oiling System: Pressure to main bearings connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, and chain.

Crankcase Capacity—5 qts. (refill), 6 qts. (dry).

Normal Oil Pressure—35-45 lbs. at 40 MPH. with warm oil (10-30 lbs. idling).

Oil Pressure Regulator—On oil pump. Opens at 40 lbs. Replace spring if free length less than 2 5/16".

Oil Pump: Gear type. On right side of crankcase.
Removal & Installation—*See Pontiac Special Data.*

Oil Cleaner: Precipitation type (in crankcase).
Removal & Installation—*See Pontiac Special Data.*

Oil Pressure Gauge: AC No. 1507350. Not electric.

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compt. cover on right rear side of engine (cars with oil bath air cleaner use 3-piece outlet pipe containing filter element).

Oil Filler (Crankcase Ventilator) Cap Cleaning—Wash filter element and re-oil by dipping in engine oil when servicing air cleaner.

CAUTION—Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backward).

Crankcase Ventilator Outlet Pipe—On cars with Oil-bath type Air Cleaner, special 3-piece ventilator outlet pipe used which has copper gauze type air cleaner in container section. Wash and re-oil filter element when servicing air cleaner.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap.

Capacity—19½ qts.

Capacity—18½ qts.

Pressure Valve—AC No. 850549 Filler Cap. Opens at 7 lbs. (6¼-7½ lbs.).

Water Pump: Packless, sealed ball-bearing shaft.

NOTE—Fan flange reversed over previous models. *See Water Pump Section for complete data.*

Removal—Drain cooling system, remove hose connection at pump, remove belt, take out water pump mounting bolts and lift pump out.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat:—Harrison. In cylinder head outlet.
Setting—Starts to open 151°F. Fully open 173°F.

Radiator Removal: *See "Radiator" in Pontiac Special Data.*

Temperature Gauge: AC Electric type.
Dash Unit—AC No. (1949) 1512126, (1950) 1512287.
Engine Unit—AC No. 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Inland. Single Plate, "Diaphragm," dry disc type with Long Driven Member Model 10CF-CS.
See Clutch Section for complete data.

Facings—Moulded type, 2 required. I.D. 6". O.D. 9½". Thickness 1/8".

Pedal Adjustment:—Free travel 7/8-1 1/8" (adjusting nut on link at clutch fork).

Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing), remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing (see Clutch Release Bearing & Support data), tapping the support from inside the clutch housing to aid in removing. (*CAUTION*—avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure re-installation in same position to maintain balance), remove clutch cover mounting bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member, lower cover assembly out.

▷**Clutch Sticking Correction (Removal of Excess Release Bearing Lubricant):** If Recess in bore on bearing over-lubricated when clutch assembly installed, excess lubricant may be found causing clutch sticking. Clean out excess lubricant found at the following points: transmission drive gear, driven plate hub, clutch facings, pressure plate and cover assembly, release bearing support tube, fulcrum points of release fork, and recess in bore on release bearing (do not wash bearing, bearing is "sealed" type). Lubricate clutch parts exactly as described under Installation Note following:

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retaining ring on Transmission Main Drive Gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

Clutch Release Bearing & Support: *See Pontiac Special Data for description.*

TRANSMISSION

Own Make. All helical gear. Constant-mesh synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for data.*

Transmission Control: Pontiac "Safety-shift" remote control type with gearshift lever on steering column. *See Transmission Section for complete data.*

Removal:—Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear, down and out.

Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support). *NOTE*—These guide pins may be made from ½-13 American National Thread bolts by cutting heads off and reducing over-all length to 4¼".

▷**New Transmission Main Drive Gear Oil Seal**—*See Transmission Section for complete data.*

HYDRA-MATIC DRIVE

OPTIONAL EQUIPMENT

Own Make. Consists of Fluid Coupling and automatic self-shifting 4-speed planetary transmission.
See Transmission Section for complete data including Testing & Trouble Shooting.

►**NOTE:** ***Different Hydra-Matic Transmission used as follows:***

	Hydra-Matic Model No.
1949 & First 10,000 cars 1950	185-49-P①
1950 (After 10,000 Cars)	185-50-P②
1950 (Late Production)	210-50-D③
1950 (Last 1000 cars)	210-51-D④

①—P9 preceding Serial No. on black background.
②—P50 preceding Serial No. on black background.
③—D50 preceding Serial No. on green background.
④—D51 preceding Serial No. on green background.

►***D-50 (Late 1950) HYDRAMATIC NOTE—Has Modulated Throttle Pressure.***

►***HYDRA-MATIC "BUZZING" CORRECTION***—Beginning with Hydra-Matic Serial No. D51-161050, a new front servo exhaust valve entered production to eliminate a buzzing sound encountered when shifting into reverse. This new assembly is interchangeable with previous part No. 8613116.

Lubrication—Check fluid level in transmission every 2000 miles (at lubrication period). Drain and refill every 25,000 miles. Use only GM Hydramatic Fluid or "Automatic Transmission Fluid Type A."

Draining & Refilling—***See "Hydra-Matic Drive" in Transmission Section.***

Checking Fluid Level—Roll back right side of front floor mat. Clean all sand, lint, and dirt away from sheet metal cover in floor, remove cover, clean any dirt away from dipstick cover on transmission. **Set Hand Brake.** Run engine for approx. 1½ minutes at speed equivalent to 20 MPH. with selector lever in "Neutral." Reduce engine speed to slow idle and move selector lever to "Drive" position; measure level with dipstick, add fluid until level is at "FULL" mark with engine idling.

►***CAUTION—Engine must be idling slow and selector lever in "Drive" position when checking fluid level.***

Linkage Adjustment—***See "Hydra-Matic Drive" in Transmission Section.***

Removal: ***See "Hydra-Matic Drive" in Transmission Section.***

UNIVERSALS

Mechanics Model 2CR lock ring retainer type or Saginaw clamp plate retainer type.

►***CAUTION***—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). ***See Pontiac Rear Axle in Rear Axle Section.***

REAR AXLE

Own Make. Hypoid gear, semi-floating type with pinion mounted on two taper roller bearings.

►***CAUTION***—Rear Universal companion nut controls pinion bearing "pre-load" and must be adjusted each time nut is loosened.

See Rear Axle Section for complete data.

►**Filler-Plug-Production-Change**—Moved from axle cover at rear to front face of carrier on right side on late cars.

Model	Ratio	Paint Mark①
Hydra-Matic (All)	3.63-1	Violet or Blue
Synchro-Mesh	4.1-1	Green
Synchro-Mesh	3.9-1	Red
Synchro-Mesh	4.3-1	White
Synchro-Mesh	4.55-1	Yellow
Synchro-Mesh	3.63-1	Violet or Blue

①—On outer end of axle shafts.

Backlash—.003-.012" (new), slightly over .012" (worn).

Removal:—Disconnect rear universal and wire trunnions (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing.

►CAUTION—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal:—Remove wheel, brake drum, 4 backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with puller J-942 —(do not drag axle shaft on oil seal).

Wheel Bearing Adjustment—None.

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

Year	Standard Pontiac No.	Heavy Duty Pontiac No.
1949-50 (Front)	5513190	5513562
1949-50 (Rear)	5513200	5513201

FRONT SUSPENSION

Front Suspension: New linked parallelogram type with direct acting shock absorber mounted within each coil spring.

See Front Suspension Section for complete data.

Rebound Noise Correction—***See "1949-50 Pontiac" in Front Suspension Section.***

Kingpin Inclination—4¾° to 5¼° crosswise.

Caster—Neg. ¾°. Limits Neg. ½° to Neg. 1°. Adjustable.

Camber—0°. Limits Neg. ¼° to Pos. ¼°. Adjustable

Toe In—0-1/16". Adjust rod sleeves equally.

STEERING GEAR

Saginaw. Worm-and-Roller type.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Wheel Cylinder Bore—Front wheels 1 1/16". Rear ⅞"

Drums—Steel & cast-iron. Diameter 11".

Lining—Molded. Width 2¼" (front wheels), 1¾" (rear). Thickness 3/16". Length per shoe: 9 11/32" (primary), 11 31/32" (secondary).

Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.

Braking Power—60% front wheels, 40% rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).

See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type

See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBERS: (Numbers are the same)—On left front door hinge post.

Starting Numbers	1951	1952
Synchro-mesh Trans.	6US-1001 Up	6 WS-1001 Up
Hydra-Matic Trans.	6UH-1001 Up	6 WH-1001 Up

▷*NOTE*—First letter of serial number prefix indicates assembly plant (below).

▷**Assembly Plant Prefix Letter—P**—Pontiac, Mich., **C**—South Gate, **L**—Linden, **W**—Wilmington, **K**—Kansas City, **A**—Atlanta, **F**—Framingham.

TUNE-UP

COMPRESSION PRESSURE: At cranking speed.

Head	Compr. Pressure
1951 Std. 6.5-1	118-135 lbs.
1951 High Compression 7.5-1	135-153 lbs.
1952 Synchro-mesh 6.8-1	123-141 lbs.
1952 Hydra-Matic 7.7-1	139-158 lbs.

VACUUM READING: 18-20" steady idling at 7-8 MPH. or 365-385 RPM. on Hydra-Matic cars.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plugs—AC No. (1951) 45, (1952) 44-5. 14 mm. Metric.

DISTRIBUTOR: Delco-Remy No. 1110222. Automatic and vacuum advance type with "Center Bearing" breaker plate.
Breaker Gap—.022" (new points), .020" (used pts.).

▷*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. *Do not use feeler gauge for setting used points.*
Cam Angle—35°. Test limits with .022" gap 31-37°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
NOTE—If dial indicator not available when setting Breaker Gap on Used Points, car manufacturer recommends gap be set by cam angle at 35° closed.
Breaker Arm Spring Tension—17-21 ounces.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115380.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: (With 7.5-1 & 7.7-1 heads) 6° **BTDC.** (With 6.5 & 6.8 Heads) 3° **BTDC.** Initial Setting—see Gaselector Setting. Check for slight ping on road.
Timing Mark—Three lines on vibration dampener. First is 6° BTDC, second is 3°, third is TDC.
Gaselector Setting—Set to give best performance without ping for fuel used.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Rochester Model BC. No. 7002870. For Synchro-mesh and Hydra-Matic Drive.
THROTTLE LEVER NOTE—Throttle rod is connected to long arm of throttle lever for Synchro-mesh cars; to short arm of throttle lever for cars with Hydra-Matic.
Idle Setting—Set idle adjusting screw 1½ turns out (preliminary setting), then adjust for smooth performance (turn screw out for richer mixture).
Idle Speed (standard)—450-475 RPM. or 7-8 MPH.
Idle Speed (Hydra-Matic)—365-385 RPM.
Accelerating Pump—No adjustment.
Float Level—1½" from gasket to top of float seam with bowl cover inverted and needle valve seated. *CAUTION—Do not damage lower seal on heat suction tube when removing bowl cover.*

Fast Idle Setting: With choke cover indexed, turn idle screw in to contact second step of fast idle cam. Hold screw against cam and bend choke rod at dog leg to give .059" clearance between choke valve and air horn.

Choke Adjustment: Index mark on choke cover centered on long center scale mark on air horn.

Fuel Pump Pressure—4-4¾ lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in vertical position with valve closed (cold position).

VALVE TAPPET CLEARANCE: 011" to .013" HOT. Use .001" "Go" gauge, .013" "No Go" gauge.
High Speed Setting—.013" (exhaust valves, HOT).

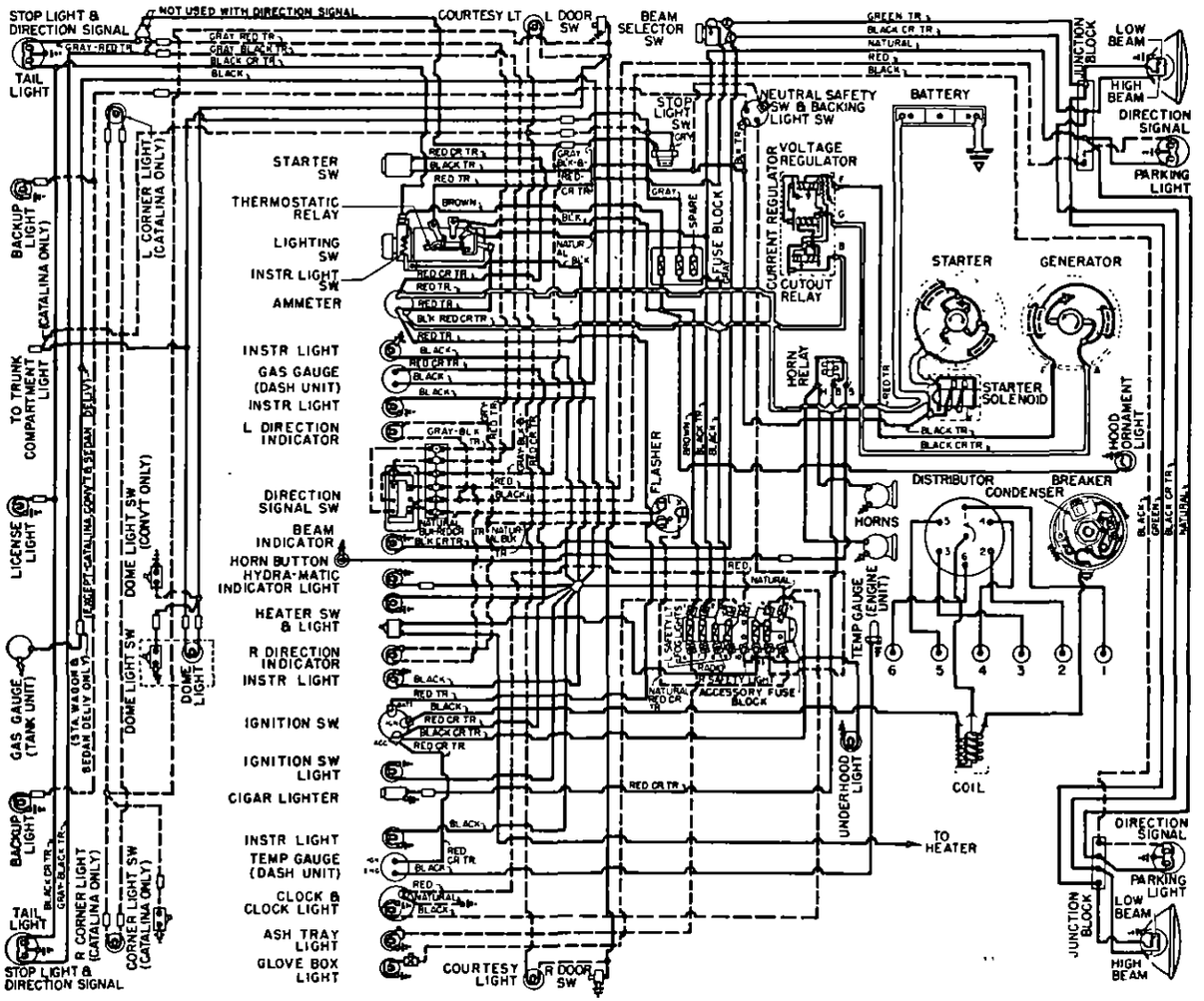
▷**Cold Setting with Engine Stopped**—.012" to .014". Check for .011" to .013" clearance with engine hot. *NOTE*—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.

IGNITION

▷*IGNITION HIGH TENSION CABLE CAUTION*—Special non-metallic conductor cables (with built-in suppression resistance). Marked "RADIO-4000-GM." Distributor cap is conventional type without built-in resistors. *DO NOT substitute other type ignition cables for these special cables.*

IGNITION SWITCH: Delco-Remy No. 1116464.
Ignition Lock—Briggs & Stratton or Delco-Remy.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2.5 amperes idling, 4.5 stopped.



1951 MODELS

CONDENSER: Delco-Remy No. 1869704.

Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110222. Automatic and vacuum advance type with "Center Bearing" breaker plate.

See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.

Breaker Gap—.022" (new points), .020" (used pts.).

►***CAUTION***—Dial-indicator-for-setting-point-gap recommended by car manufacturer. ***Do not use feeler gauge for setting used points.***

Cam Angle—35°. Test limits with .022" gap 31-37°. ***See "Delco-Remy Cam Angle" in Electrical Equipment Section.***

Breaker Arm Spring Tension—17-21 ounces.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
0-2	450	0-4	900
6.25-8.25	1100	12.5-16.5	2200
6.25-8.25	1300	12.5-16.5	2600
7-9	1500	14-18	3000
11.5-13.5	2000	23-27	4000

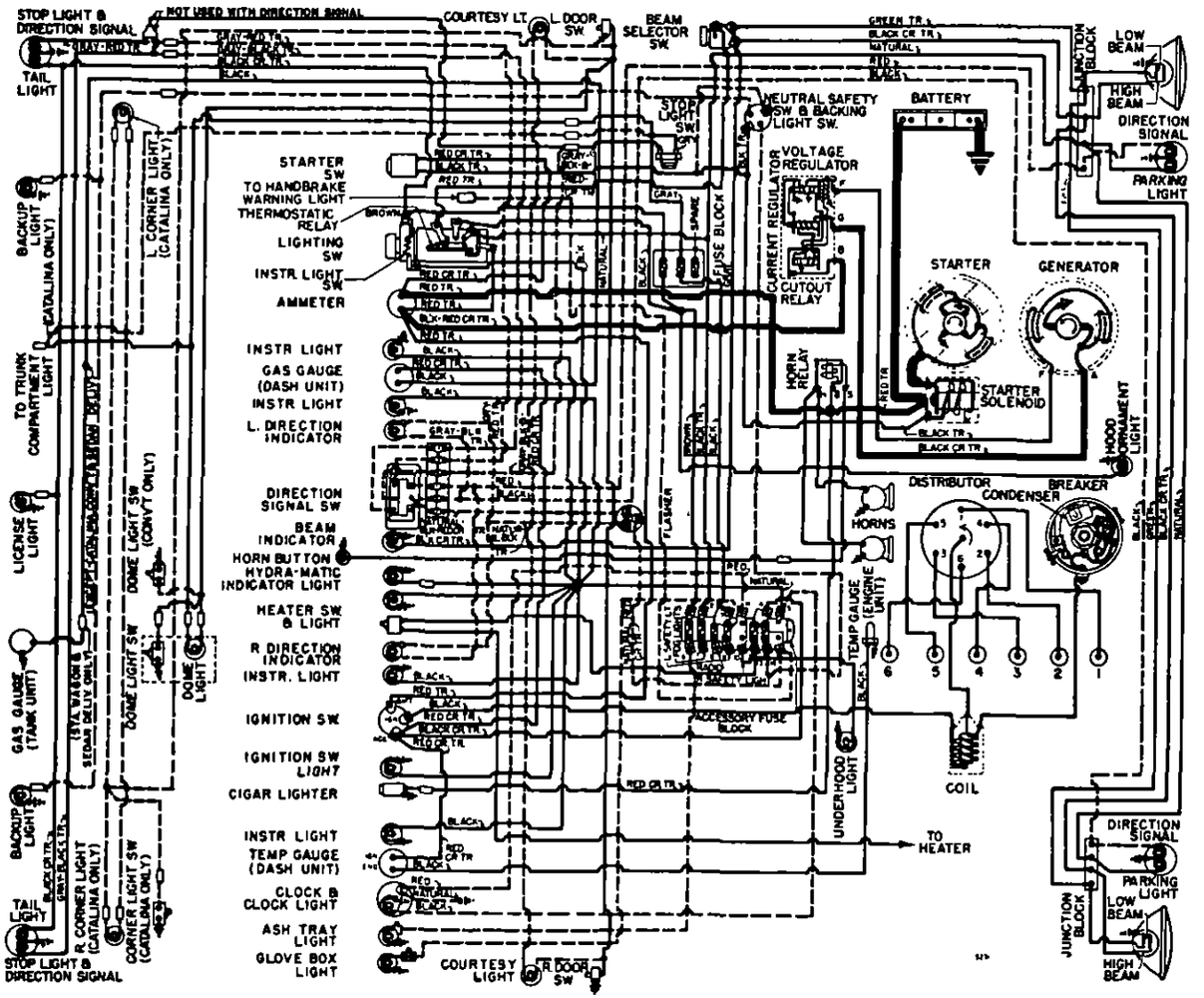
Gaselector—Manual adjustment at distributor. 10° advance or retard. See Ignition Timing.

Vacuum Spark Control—Delco-Remy No. 1116051.

Plunger Travel—9/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
7½°	15°	14.5-16.5"



1952 MODELS

IGNITION TIMING

Standard Setting	Flywheel Degrees
1951 Std. 6.5-1 Head①	3° BTDC
1951 High Compression 7.5-1 Head②	6° BTDC
1952 Synchro-mesh 6.8-1 Head①	3° BTDC
1952 Hydra-Matic 7.7-1 Head②	6° BTDC

①—Regular fuel; ②—Ethyl fuel.

Timing Mark—Three lines on vibration dampener. For cars with 7.7-1 and 7.5-1 Heads align first (6°) line on dampener with pointer on chain case cover. For cars with other heads (6.5 &6.8) align second (3°) line on dampener with pointer. Third line to pass pointer with engine turning over is TDC.

Timing (with Timing Light)—Loosen gaselector indicator arm-to-block clamp bolt, set arm at 0, tighten bolt. Connect Timing Light (KMO318) to No. 1 spark plug, idle engine. Loosen advance arm clamp bolt, rotate distributor until timing light shows pointer at correct timing mark on vibration dampener (see Standard Setting above). Tighten clampscrew. Check Gaselector Setting (see below).

Gaselector Setting—Set to give best performance without spark knock or ping for fuel used. Marked "ADV" and "RET", adjust according to these marks.

CARBURETOR

Rochester Model BC, No. 7002870. *Synchro-mesh* and Hydra-Matic Drive cars.
1¼" single barrel downdraft with automatic choke. ***See Carburetor Section for complete data.***

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up.***

Hydra-Matic Throttle Linkage Adjustment: ***See Pontiac Hydra-Matic Linkage Adjustment in Transmission Section.***

Fast Idle: Rochester "GM" Carburetor type.

Setting—With choke cover indexed, turn idle screw in to contact second step of fast idle cam. Hold screw against cam and bend choke rod at dog leg to give .059" clearance between choke valve and air horn.

See Carburetion Equipment Section for complete data.

Automatic Choke: Rochester "GM" Carburetor type. ***See Carburetion Equipment Section for complete data.***

Setting—Index centered on air horn center mark.

CARB. EQUIPMENT

Air Cleaner: AC oil-wetted type (std.), oil-bath type (optional).

Filter Element—AC #1 (std.), #24 (heavy duty).

Servicing—Clean and re-oil std. cleaner, or on heavy duty clean and refill reservoir with 1 pint SAE 50 (20W below freezing) oil, at 10,000 mile intervals (twice yearly) or more often if required.

Fuel Pump: AC Fuel & Vacuum type.

Replacement Pump—(Early 1951) AC-539, (Late 1951, 1952) AC-9640.

Pressure—4-4¾ lbs.

See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.

Dash Unit—AC No. 1517378.

Tank Unit—AC No. 1517411; Station Wagon, AC No. 1517410.

See Carburetion Equipment Section for complete data.

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BATTERY

Delco Model 15E6W. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Police Battery—Delco Model 19E6W. 6 volt, 19 plate, 130 ampere hour capacity (20 hr. rate).
Grounded Terminal—Negative (—) to engine.

►*ENGINE GROUND STRAP*—Ground strap is installed between rear end of cylinder head and dash on later cars and CAN BE INSTALLED ON EARLIER CARS.

Location—On left side of engine compartment.

NOTE—The "E6" battery is "Low Gravity Type." Specific gravity range of electrolyte at full charge is 1.260-1.280 "E4" models 1.275-1.290.

STARTER

Model	Starter No.	Armature No.
Early 1951 (LHD)	1107079	1867897
Late 1951 & 1952 (LHD)	1107107	1917855
1951, 52 (RHD)	1107934	1867897

Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data—1107079 & 1107107

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 "	Lock	3.25	550

Performance Data—1107934

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
12 ft. lbs.	Lock	3.15	570

Starting Switch (1107079 & 1107107 Starters): Delco-Remy Solenoid No. 1118140 (no relay) mounted on starter and controlled by Pushbutton Switch No. 1996045 (Early 1951); No. 1996053 (Late 1951 & 1952). Neutral Safety Switch No. 1997846 used on Hydra-Matic cars.

Starting Switch (1107934 Starters): Delco-Remy Solenoid No. 1118102 (with relay) mounted on starter and controlled by Pushbutton Switch No 1996039. Neutral Safety Switch No. 1997846 used on Hydra-Matic cars.

Starter Solenoid Relay—Delco-Remy No. 269-G.

►*CAUTION*—Overrunning clutch pinion clearance must be adjusted if solenoid removed from starter. *See Electrical Equipment Section for complete data.*

Neutral Safety Switch Adjustment—*See Pontiac Hydra-Matic Linkage Adjustment in Transmission Section.*

GENERATOR

Car Model	Delco-Remy No.
1951 Std. (Early)	1102750
1951 Std. (Later)	1102775
1952 Std.	1102769
1951 Heavy Duty (Early)	1106403
1951 (Late), 1952 Heavy Duty	1105900

Delco-Remy Armature No.	For Generator No.
1912599	1102750
1921621	1102775
1923069	1102769
1880252	1106403
1918009	1105900

►*1951 GENERATOR & REGULATOR CHANGE*—Later Delco-Remy Regulator No. 1118725 must be used with later 45 ampere Generators and Delco-Remy Regulator No. 1118722 must be used with later Heavy Duty Generator No. 1105900 (50 ampere).

►*1951-52 GENERATOR TESTING CAUTION—See "Delco-Remy Generators" in Electrical Equipment Section for special ALTERNATE WOUND ARMATURE generator data.*

Maximum Charging Rate—*See Current Regulator.*

Performance Data—Cold

	Amperes①	Volts	RPM
1102750	40	8.0	2150
1102775	45	8.0	2450
1102769	45	8.0	2450
1106403	35	8.0	1040
1105900	50	7.0	2100

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—(1106403) 25 ozs. (Others) 28 ozs.

Field Current—(1102750, 2769, 2775) 1.87-2.00 amperes, (1106403) 1.77-2.00 amperes, (1105900) 1.77-1.93 amperes. All at 6.0 volts.

Belt Adjustment: Belt deflection or sideplay should be ¼" midway between generator and pump pulleys.

REGULATOR

Delco-Remy Regulator No.	For Generator No.
1118300	1102750
1118725	1102769, 75
1118352	1106403
1118722	1105900

Voltage and current regulation.

►*1951 GENERATOR & REGULATOR CHANGE—See Generator above.*

►*ENGINE GROUND STRAP INSTALLATION (To correct clicking or oscillating of relay points): See Battery (above).*

See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4).
Regulator is over-compensated for temperature. Should be checked with cover in place and hot.

Air Gap—.075" with armature pressed down to point where contacts are just touching.

Checking & Adjustment—*See Elec. Equip. Section.*

Current Regulator

Setting (1118300)—40-46 amps. hot (set to 42 hot).
Setting (1118725)—45-51 amps. hot (set to 47 hot).
Setting (1118352)—33-37 amps. hot (set to 35 hot).
Setting (1118722)—48-52 amps. hot (set to 50 hot).

Air Gap—.075" with armature pressed down to point where contacts are just opening.

Checking & Adjusting—*See Elec. Equip. Section.*

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.

Beam Indicator—At speedometer. Lighted when upper beam in use.

Direction Signal: *See Electrical Equipment Section.*

Direction Signal Indicator—Red pilot light on speedometer dial. Flashes when signal in use.

Switches

Lighting—Delco-Remy No. 1995032.
Beam Selector—Delco-Remy No. 1997008.
Instrument—Part of lighting switch. Rheostat operated by turning Light Switch Knob.
Direction Signal—Pontiac No. 5943132.
Stop Light—Delco-Remy No. 1997725.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F. Not adjustable.

MAIN FUSE BLOCK: On left hand engine side of dash. Two fuses (plus 1 spare) as follows:

Tail Lamp—SFE 14 ampere. In gold colored fuse holder. Protects rear license, instrument, ignition key, and clock lamps (dome on convertible).

Stop Lamp—SFE 14 ampere. In gray colored fuse holder. Protects trunk light and dome light (except on Convertible).

ACCESSORY FUSE BLOCK: Six fuses mounted on fuse block on dash behind instrument panel. All fuses are 20 ampere except Radio fuse which is 14 ampere. (Spare Radio fuse on main fuse block on engine side of dash.)

HORNS: Delco-Remy No. 1999645 (Low Note). No. 1999646 (High Note). Vibrator types operated by relay.

Type	Current (at 6 volts)	Air Gap
Low Note	19-21 amperes	.047-.052"
High Note	18-20 amperes	.039-.044"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: Own. Six cyl., "L" head.
Bore—3 9/16". **Stroke**—4".
Displacement—239.2 cu. in. **Rated H.P.**—30.46.

Developed Horsepower—(At 3400 R.P.M.)	H.P.
1951 Std. 6.5-1 Head	96
1951 High Compr. 7.5-1 Head	100
1952 Synchro-mesh 6.8-1 Head	100
1952 Hydra-Matic 7.7-1 Head	102

Compression Ratio—	Ratio
1951 Standard	6.5-1
1951 High Compression	7.5-1
1952 Synchro-mesh	6.8-1
1952 Hydra-Matic	7.7-1

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE & OIL PAN REMOVAL: *See Pontiac Special Data.*

ENGINE FRONT MOUNTING REMOVAL: *See "Engine Mounting" in Pontiac Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Pontiac Special Data.*

PISTONS: Chrome-nickel alloy, electro-plated type.

►*1952 PISTON PRODUCTION CHANGE CAUTION*—Two types of pistons are used. **Early Type**—Piston pin is locked in piston with lock bolt in one piston boss. **Late Type**—Piston pin is secured in piston with lock rings at each end of pin. *LATE TYPE PISTONS ARE NOT INTERCHANGEABLE WITH PISTONS IN EARLIER ENGINES, EXCEPT IN SETS.*

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ENGINE

CONTINUED FROM PRECEDING PAGE

►*IDENTIFICATION NOTE*—Engine with later type pistons are identified by an "X" following the production engine number (this number will be found on raised pad at left rear corner of engine near the fire wall).

Original Bore & Pistons—*See Pontiac Special Data.*

Removal—Pistons and rods removed from above.

Clearance—Top Land .015-.027". Skirt .002".

Fitting New Pistons: Insert .0015" x ½" feeler between piston and cylinder wall. Pull to withdraw feeler must be 10-20 lbs. Taper and out-of-round limits—Piston .0005", Cylinder .0005" after reconditioning.

Replacement Pistons—*See Pontiac Special Data.*

PISTON RINGS: Two tapered-face compression rings above pin, one slotted oil control ring below pin.

NOTE—Rings are cadmium-plated or tin-plated.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"	.006-.013"	.0015-.003"
Oil (#3)	3/16"	.006-.013"	.001-.0025"

Installing Compression Rings—Mark "TOP" up.

Replacement Rings: .005", .010", .020", .030" Oversize.

PISTON PIN: *TWO TYPES USED—See Pistons (above).*

►*CAUTION—Early and Late type pin fitting in piston is DIFFERENT:* **Pin Fit in Piston (Early Type)**—Pin is locked in one piston boss by self-locking screw, and pressure required to press pin into piston should be 200-350 lbs. **(Late Type)**—Pin retained in piston by locking ring at each end and pressure required to press pin into piston should be 150-250 lbs. *Other pin fitting instructions unchanged from previous models.*

Diameter—.9369-.9375" (selective fit). **Length**—3 1/16".

Pin Clearance in Rod Bushing—.0004-.0006".

Replacement Pins: Early Type—.001" (red & brown), .003" (red), .005" (blue) oversize. **Late Type**—.001" (green), .003" (red), .005" (blue) oversize. Paint mark on end of pin.

Piston Pin Removal & Installation: *See "Piston Pins" in Pontiac Special Data.*

CONNECTING ROD: Weight—37 ozs. **Length**—7 9/16".

Piston Pin Bushing (Upper Bearing)—Split aluminum bronze bushings. *See Pontiac Special Data.*

Crankpin Journal Diameter—2.137-2.1247".

Lower Bearing—Thin type, interchangeable, steel-backed, babbitt-lined type.

Clearance—.0001-.0021". **Sideplay**—.007-.012".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rod & Bearings" in Pontiac Special Data.*

Replacement Bearings: Standard size and .001" and .002" Undersize. *NOTE*—Bearings have small tongue which must engage groove in rod and cap.

Installing Rods: Not offset (install either way).

NOTE—Rods and bearing caps marked to insure correct reassembly (marks must be together). These marks do not indicate cylinder in which rod used.

CRANKSHAFT: Four bearing type with integral counterweights and vibration dampener on forward end.

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

►**Flywheel to Crankshaft Bolts (Synchro-Mesh Transmission)**—¾" hex head bolts (No. 508463) or 1" hex head bolts (No. 510832) are used. Either type can be used for replacement but **head sizes must be alike on all bolts or engine balance will be destroyed.**

Journal Diameter—#1, 2.4982-2.4992"; #2, 2.5294-2.5304"; #3, 2.5919-2.5929"; #4, 2.6232-2.6242".

Bearings—Thin type, removable, steel-backed, babbitt-lined. Upper and lower bearing halves alike.

Clearance—.0003-.0023".

Rear Main Bearing Oil Seal Renewel—*See Pontiac Special Data.*

Replacement Bearings: Std. & .001", .002", Undersize.

End Thrust: At #3 (rear intermediate) bearing.

Endplay—.003-.008".

CAMSHAFT: Four-bearing, non-adjustable chain.

Timing Chain Cover Oil Seal Installation—*See "Timing Chain" in Pontiac Special Data.*

Bearing Diameters—*See Pontiac Special Data.*

Clearance—.0015-.0025" (new).

Camshaft Removal & Bearing Installation: *See "Camshaft & Bearings" in Pontiac Special Data.*

End Thrust: Steel thrust plate behind camshaft sprocket. Replace if worn. **Endplay**—.003-.007".

Timing Chain: Morse. Width 1". Pitch ⅜". Length 21" or 56 links. Timing chain bumper is installed to eliminate vibration.

Timing Chain Oil Cover Seal Installation—*See "Timing Chain" in Pontiac Special Data.*

Timing Chain Replacement—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that '0' marks are adjacent and in line with a straightedge across shaft centers.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 19/32"	.310-.311"	5.718"
Exhaust	1 15/32"	.310-.311"	5.718"

	Seat Angle	Lift	Stem Clearance
Intake	30°	.19/64"	Free fit to .0006"①
Exhaust	45°	.19/64"	Free fit to .0006"①

①—Tapered (max. clearance at bottom .0006").

Valve Guides: Guides have tapered hole (.001" taper to inch—greatest clearance at top). Exhaust guides counterbored at top to depth of ¾".

Checking Valve Clearance in Guide—Clean guide with tool KMO122, clean counterbore in exhaust guide with Counterbore Cleaner J-2122. Valve should just fall through guide of own weight.

Installing Guides—Use Valve Guide Remover J-2542 to remove and install guides. Drive new guide down in block (counterbored end up on exhaust guides) until upper end 29/32" below top edge of valve seat. Ream guide with PR-131 tapered reamer and finish counterbore with Counterbore Cleaner J-2122 for correct clearance (see above).

►**CAUTION**—Guides furnished with straight hole which must be taper reamed.

NOTE—Eight cylinder intake valve guides may be used on six cylinder cars.

Valve Springs: Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length**—2 11/32".

	Spring Pressure	Length
Valve Closed	56-63 lbs.	1 29/32"
Valve Open	97-105 lbs.	1 19/32"

Valve Lifters: Barrel type, cast-iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed, use Valve Guide Removing Tool J-2542).

Clearance—Free fit. Lifter should just move freely with finger touch.

VALVE TIMING

Tappet Clearance: .011" to .013", All Valves, Hot. .011"-"Go" gauge, .013"-"No-Go" gauge.

High Speed Setting—.013" EXH., Hot.

Cold Setting with Engine Stopped—.012-.014" Cold (room temperature). *CAUTION*—Check setting after engine warmed up for limits of .011" to .013".

NOTE—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.

Valve Timing—*See Camshaft Setting above.*

Intake Valves—Open 5° BTDC. Close 39° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Valve Timing Check—With .015" tappet clearance #1 intake valve should open with #1 piston 5° or .0096" before top dead center with first straight line of dampener mark '/IGN.ONE/' slightly past pointer on left front face of chain cover. Reset tappet clearance .011-.013" (warm).

LUBRICATION

Engine Oiling System: Pressure to main bearings connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, and chain.

Crankcase Capacity—5 qts. (refill), 6 qts. (dry).

Normal Oil Pressure—35-45 lbs. at 40 MPH. with warm oil (10-30 lbs. idling).

Oil Pressure Regulator—On oil pump. Opens at 40 lbs. Replace spring if free length less than 2 5/16".

Oil Pump: Gear type. On right side of crankcase.

Removal & Installation—*See Pontiac Special Data.*

Oil Cleaner: Precipitation type (in crankcase).

Removal & Installation—*See Pontiac Special Data.*

Oil Pressure Gauge: AC No. 1507535. Not electric.

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compt. cover on right rear side of engine (cars with oil bath air cleaner use 3-piece outlet pipe containing filter element). Wash filter element and re-oil by dipping in engine oil when servicing air cleaner.

CAUTION—Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backward).

Crankcase Ventilator Outlet Pipe—On cars with Oil-bath type Air Cleaner, special 3-piece ventilator outlet pipe used with copper gauze air cleaner.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap.

Capacity—18½ qts.

Pressure Valve—AC No. 850549 Filler Cap. Opens at 7 lbs. (6½-7½ lbs.)

Water Pump—Packless, sealed ball-bearing shaft.

►*WATER PUMP PRODUCTION CHANGE—Water pump body bore reduced to give .0015-.0025" press fit for water pump bearing on late 1952 pumps. Bearing is*

CONTINUED ON NEXT PAGE

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same for both early and late pumps. NOTE—Bearing should be pressed in until outer race flush with end of pump body (no lockwire used on these pumps with press-fit bearing).

Removal—Drain cooling system, remove hose connection at pump, remove belt, take out water pump mounting bolts and lift pump out.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head outlet.
Setting—(Std. 151°) Starts to open 148-156°F. Fully open 176°F. Two other thermostats available for use with permanent anti-freeze, 160° and 170°.

Radiator Removal: *See "Radiator" in Pontiac Special Data.*

Temperature Gauge: AC Electric type.
Dash Unit—AC No. 1512287.
Engine Unit—AC No. 1512015.
See Miscellaneous Section for complete data.

CLUTCH

Inland. Single Plate, "Diaphragm," dry disc type with Long Driven Member Model 9½CF-TS (except Taxicab), Model 10CF-CS (Taxicab).
See Clutch Section for complete data.

▷**Heavy Duty Clutch Note**—No separate Heavy Duty Clutch used. Std. 8 cyl. clutch cover assembly used with special 6 cyl. 10" driven member.

Facings—Woven type, 2 required. I.D. (exc. Taxi) 6", (Taxi) 6¾". O.D. (exc. Taxi) 9½", (Taxi) 10". Thickness ⅛".

Pedal Adjustment: Free travel ⅞-1⅛" (adjusting nut on link at clutch fork).

Removal: Remove Transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing), remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing (see Clutch Release Bearing & Support data), tapping the support from inside the clutch housing to aid in removing (*CAUTION*—avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure reinstallation in same position to maintain balance), remove clutch cover mounting bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member, lower cover assy. out.

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retaining ring on Transmission Main Drive Gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before installing transmission. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

TRANSMISSION

Own Make. All helical gear. Constant-mesh synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for data.*

Transmission Control: Pontiac "Safety-shift" remote control type with gearshift lever on steering column.
See Transmission Section for complete data.

Removal: Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear, down and out.

Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing support).

HYDRA-MATIC DRIVE

Optional equipment. Four-Speed planetary type automatic transmission and fluid coupling. Modulated throttle pressure and hydraulically operated reverse mechanism. 1952 model is "Dual Range" type.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION—See "Hydra-Matic Drive" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING—See Transmission Section.*

Lubrication—Check fluid every 2000 miles. Add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Hydra-Matic fluid (Automatic Transmission Fluid type "A").

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes **after** transmission has reached normal operating temperature. With selector lever in "N," remove dipstick and check fluid level (dipstick located under right front floor plate). Add the necessary amount of fluid to bring fluid level to "F" mark. *CAUTION—Use care not to allow dirt or lint to enter transmission.*

▷*CAUTION—Do not fill above "F" mark on dipstick.*

Capacity—Approximately **11 quarts** (refilling after draining). **12 quarts** (when transmission disassembled).

▷*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw. 'Mechanics' is lock ring retainer type and 'Saginaw' clamp plate retainer type.

▷*CHANGE NOTE*—Universals on 1952 cars are changed from previous models. Interchangeable as **complete** units.

▷*CAUTION*—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Pontiac Rear Axle in Rear Axle Section.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with pinion mounted on two taper roller bearings.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Rear Axle Section for complete data.*

Rear Axle Ratios— Hydra-Matic			
Model	**Ratio**	**Code No.①**	**Color②**
1951	3.63-1	6	Blue
1952 (Dual Range)	3.08-1	0	Yellow
Synchro-mesh			
1951-52 Standard	4.10-1	3	Green
1951-52 Mountain	4.30-1	2	White
1951-52 Plains	3.90-1	4	Red

①—Stamped on pad on differential carrier.
②—On end of axle shaft.

Backlash—.003-.012" (new), .012" (worn).

Removal: Disconnect rear universal and wire trunnions (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing.

▷*CAUTION*—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal: Remove wheel, brake drum, 4 backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with puller J-942—do not drag axle shaft on oil seal.

Wheel Bearing Adjustment—None.

SHOCK ABSORBERS

Delco. Direct-acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

Shock Absorber Part Nos.	Front	Rear
Standard	5516126	5516127
Taxicab & Police Cars	5513562	5513563

FRONT SUSPENSION

Front Suspension: Linked parallelogram type with shock absorber mounted within each coil spring.
See Front Suspension Section for complete data.

Kingpin Inclination—5° at 0° camber.
Caster— —¾° ± ½°.
Camber— 0° ± ½°.
Toe-In—0-1/16". Adjust rod sleeves equally.
Toe-out on Turns—Inner wheel 20°, Outer wheel 18-19°.

STEERING GEAR

Saginaw. Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.
See Brake Section for complete data.

▷*SQUEAKING BRAKE CORRECTION: See Brake Section for installation of Brake Drum Silencer Springs.*

Wheel Cylinders—Front Whls. 1 1/16". Rear ⅞".
Drums—Cast-iron. Diameter 11".
Lining—Molded. Width 2¼" (front wheels), 1¾" (rear). Thickness 3/16". Length per shoe: 9 11/32" (primary), 12 1/32" (secondary).
Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.
Braking Power—60% front wheels, 40% rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type.
See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBERS: (Numbers are the same)—On left front door hinge post.

Starting Numbers—	1951	1952
Synchro-mesh Trans.	8US-1001-Up	8WS-1001-Up
Hydra-Matic Trans.	8UH-1001 Up	8WH-1001 Up

►*NOTE*—First letter of serial number prefix indicates assembly plant (below).

►**Assembly Plant Prefix Letter—P**—Pontiac, Mich., **C**—South Gate, **L**—Linden, **W**—Wilmington, **K**—Kansas City, **A**—Atlanta, **F**—Framingham.

TUNE-UP

COMPRESSION PRESSURE: At cranking speed.

Head	Compr. Pressure
1951 Std. 6.5-1	118-135 lbs.
1951 High Compression 7.5-1	135-153 lbs.
1952 Synchro-mesh 6.8-1	123-141 lbs.
1952 Hydra-Matic 7.7-1	139-158 lbs.

VACUUM READING: 18-20" steady idling at 7-8 MPH, or 365-385 RPM on Hydra-Matic cars.

FIRING ORDER: 1-6-2-5-8-3-7-4. See Diagram.

SPARK PLUG GAPS: .025". Limits .023-.028".
Plugs—AC No. (1951) 45, (1952) 44-5. 14 mm. Metric.

DISTRIBUTOR Delco-Remy No. (1951) **1110818,** (1952) **1110831.** Automatic and vacuum advance type with "Center Bearing" breaker plate.
Breaker Gap—.016" (new points), .015" (used).

►*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. *Do not use feeler gauge for setting used points.*
Cam Angle—26°. Test limits with .016" gap 21-30°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
NOTE—If dial indicator not available when setting Breaker Gap on Used Points, car manufacturer *recommends gap be set by cam angle at 28° closed.*
Breaker Arm Spring Tension—19-23 ounces.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Delco-Remy No. 1115380.
Ignition Current—2.5 amperes idling, 4.5 stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: (With 6.5-1 & 6.8-1 Heads) 6° BTDC. (With 7.5-1 & 7.7-1 Heads) 3° BTDC. (Initial Settings—See Gaselector Setting).
Timing Mark—Three lines on vibration dampener. First is 6° BTDC, second is 3°, third is TDC.
Gaselector Setting—Set to give best performance without ping for fuel used.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter WCD-719SA (Synchro-mesh); WCD-720SA (Hydra-Matic). 1¼" Dual downdraft type with Climatic Control.
Idle Setting—¾-1¼ turns open. Two screws, adjust equally, turn out for richer mixture.
Idle Speed (Synchro-mesh)—450-475 RPM or 7-8 MPH. *(Hydra-Matic Cars)*—365-385 RPM.
Float Level—3/16" from top of float to gasket seat on bowl cover. (Gauge T109-162). Sides of floats should barely touch vertical uprights on gauge to avoid floats binding on sides of bowl.
Accelerating Pump—Lower hole (minimum) normal. Upper hole (maximum) if more charge required.

Choke Setting: Center at index.

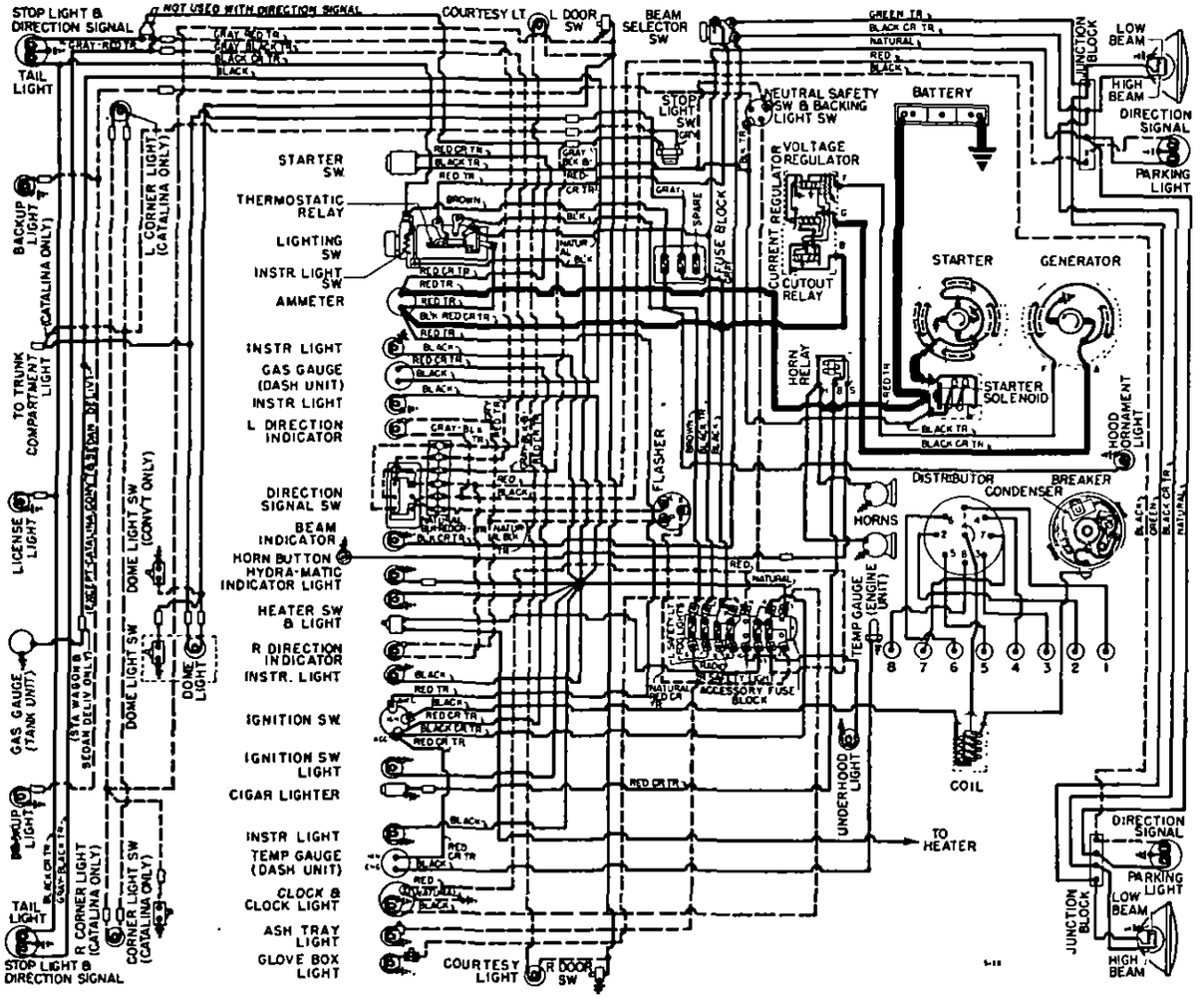
Fast Idle Setting: .026" throttle opening (Gauge T109-189) with choke valve tightly closed. Adjust by turning fast idle screw.

Fuel Pump Pressure: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in vertical position with valve closed (cold position).
NOTE—Valve shaft bushings are Stainless Steel.

VALVE TAPPET CLEARANCE: .011" to .013" Hot. .011" "Go" gauge, .013" "No Go" gauge.
High Speed Setting—.013" EXH. Hot.

►***Cold Setting with Engine Stopped***—*.012" to .014".* Check for .011" to .013" clearance with engine hot.
NOTE—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.



1951 MODELS

IGNITION

►*IGNITION HIGH TENSION CABLE CAUTION*—Non-metallic conductor cables (with built-in suppression resistance). Marked "RADIO-4000-GM." Distributor cap is conventional type without built-in resistor. *DO NOT substitute other type ignition cables for these special cables.*

IGNITION SWITCH: Delco-Remy No. 1116464.
Ignition Lock—Briggs & Stratton or Delco-Remy.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2.5 amperes idling, 4.5 stopped.

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CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. (1951) 1110818, (1952) 1110831. Automatic and vacuum advance type with "Center Bearing" breaker plate.
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.
Breaker Gap—.016" (new points), .015" (used pts.).

▷*CAUTION*—Dial indicator for setting point gap recommended by car manufacturer. *Do not use feeler gauge for setting used points.*
Cam Angle—26°. Test limits with .016" gap 21-30°. *See "Delco-Remy Cam Angle" in Electrical Equipment Section.*
Breaker Arm Spring Tension—19-23 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110818

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		400	0-4		800
5.5-7.5		1200	11-15		2400
6-8		1500	12-16		3000
10.5-12.5		2000	21-25		4000

Automatic Advance—1110831

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		400	0-4		800
5.5-7.5		1200	11-15		2400
6-8		1400	12-16		2800
7-9		1600	14-18		3200
10-12		1950	20-24		3900

Gaselector—Manual adjustment at distributor. 10° advance or retard. See Ignition Timing.

Vacuum Spark Control: Delco-Remy No. 1116050. Integral type linked directly to breaker plate.
Plunger Travel—7/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	7-9"
10°	20°	17.5-19.5"

IGNITION TIMING

Std. Setting	Flywheel Degrees
1951 Std. 6.5-1 Head①	6° BTDC
1951 High Compression 7.5-1 Head②	3° BTDC
1952 Synchro-mesh 6.8-1 Head①	6° BTDC
1952 Hydra-Matic 7.7-1 Head②	3° BTDC

①—Regular fuel; ②—Ethyl fuel.

Timing Mark—Three lines on vibration dampener. For cars with 7.5-1 and 7.7-1 heads align second (3°) line on dampener with pointer on chain case cover. For cars with other heads (6.5-1 & 6.8-1) align first (6°) line on dampener with pointer. Third line to pass pointer with engine turning over is TDC.

Timing (with Timing Light)—Loosen gaselector indicator arm-to-block clamp bolt, set arm at 0, tighten bolt. Connect Timing Light (KMO318) to No. 1 spark plug, idle engine. Loosen advance arm clamp bolt, rotate distributor until timing light shows pointer at correct timing mark on vibration dampener (see Standard Setting above). Tighten clampscrew. Check Gaselector Setting (below).

CARBURETOR

Carter WCD-719SA..... **Synchro-mesh Trans.**
Carter WCD-720SA..... **Hydra-Matic Trans.**
1¼" dual downdraft with Carter Climatic Control.
Casting No.—(719S, SA) 550, (720S, SA) 558.

▷**Choke Valve anti-rattle correction:** *See "Carter WCD-719SA and WCD 720SA" in Carburetor Section. See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rod & Jet—*See Carter Jet Table in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See Pontiac Hydra-Matic Drive in Transmission Section.*

Fast Idle: Carter Dual (WCD) Carburetor type.
Setting—.026" throttle opening (Gauge No. T109-189) with choke valve tightly closed. Adjust by turning fast idle screw.
See Carburetor Equipment Section for complete data.

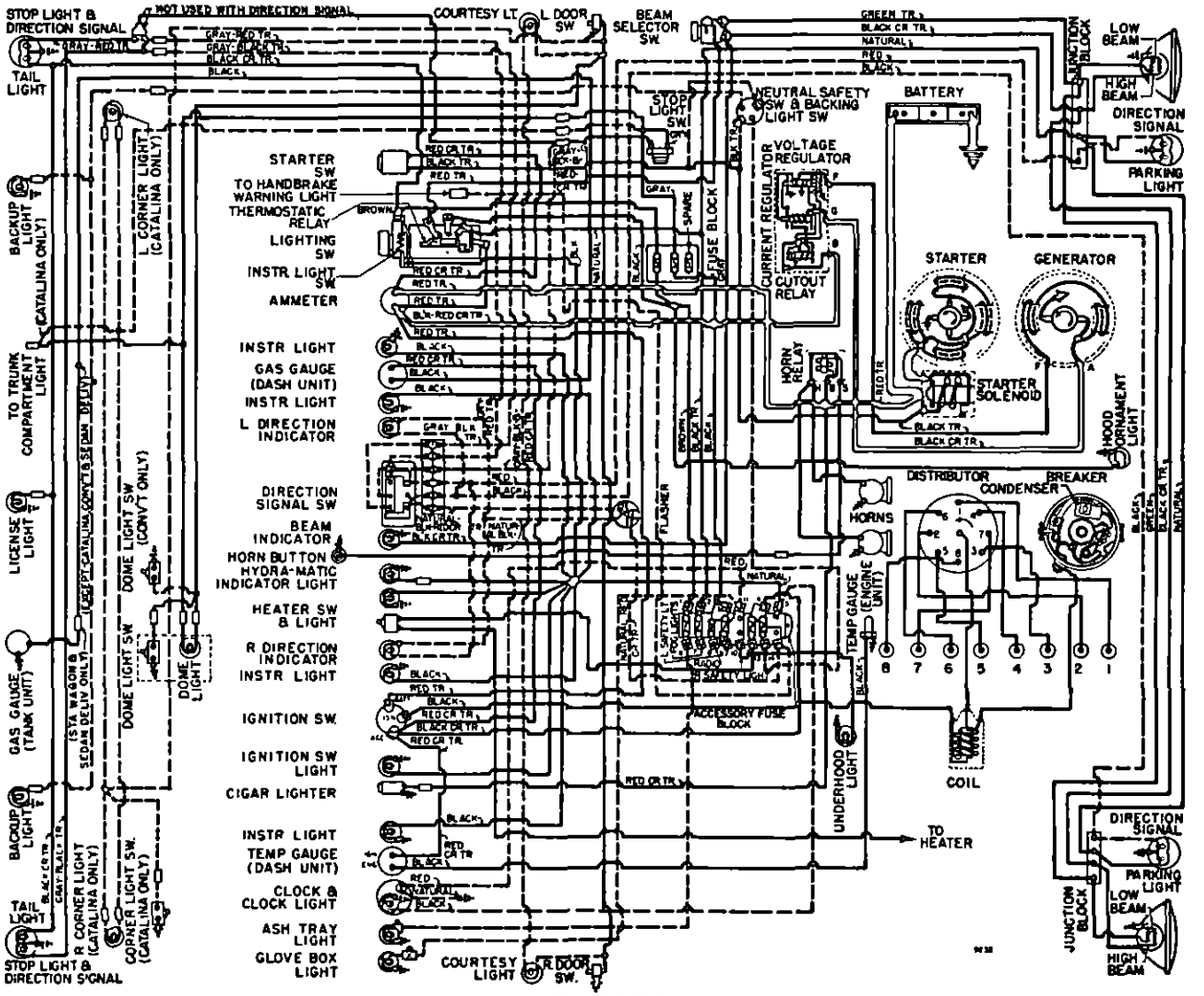
Automatic Choke: Carter Climatic Control (Dual Carburetor).
Setting—Centered at Index.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC oil-wetted type (std.), oil-bath type (optional).
Filter Element—AC #6 (std.), #20 (heavy duty).
Servicing—Clean and re-oil std. cleaner, or on heavy duty clean and refill reservoir with 1 pint SAE 50 (20W below freezing) oil every 10,000 miles.

Fuel Pump: AC Fuel & Vacuum Type.
Replacement Pump—(Early 1951) AC-539, (Late 1951, 1952) AC-9640.
Pressure—4 to 4¾ lbs.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517378.
Tank Unit—AC No. 1517411; Station Wagon, AC No. 1517410.
See Carburetion Equipment Section for complete data.



1952 MODELS

BATTERY

Delco Model 15E6W. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Police Battery—Delco Model 19E6W. 6 volt, 19 plate, 130 ampere hour capacity (20 hr. rate).
Grounded Terminal—Negative (—) to engine.

►***ENGINE GROUND STRAP***—Ground strap is installed between rear end of cylinder head and dash on later cars and CAN BE INSTALLED ON EARLIER CARS.
Location—On left side of engine compartment.
NOTE—"E6" battery is "Low Gravity Type." Specific gravity at full charge is 1.260-1.280.

STARTER

Standard (LHD) ..... **Delco-Remy 1107957**
Optional (RHD) ..... **Delco-Remy 1107994**
Delco-Remy No. 1107934
Armature—Delco-Remy No. (1107957) 1867897, (1107994) 1917855.
Drive—Overrunning clutch (sollenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(1107957) 24-28 ozs. (1107994) 36-40 ozs.

Performance Data—1107957

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 ft. lbs.	Lock	3.0	600

Performance Data—1107934, 1107994

Torque	RPM	Volts	Amperes
0 ft. lbs	5500	5.65	70
12 ft. lbs	Lock	3.15	570

Starting Switch (1107954, 1107994 Starters): Delco-Remy Solenoid No. 1118140 (no relay) mounted on starter and controlled by Pushbutton Switch No. *1996045 (Early 1951); No. 1996053 (Late 1951 & 1952).* Neutral Safety Switch No. 1997846 used on Hydra-Matic cars.

Starting Switch (1107934 Starter): Delco-Remy Solenoid No. 1118102 (with relay) mounted on starter and controlled by Pushbutton Switch No. 1996039. Neutral Safety Switch No. 1997846 used on Hydra-Matic cars.
Starter Solenoid Relay—Delco-Remy No. 269-G.

►***CAUTION***—Overrunning clutch pinion clearance must be adjusted if solenoid removed from starter. ***See Electrical Equipment Section for complete data.***
Neutral Safety Switch Adjustment—***See Pontiac Hydra-Matic Linkage Adjustment in Transmission Section.***

GENERATOR

Car Model	Delco-Remy No.
1951 Std. (Early)	1102750
1951 Std. (Later)	1102775
1952 Std.	1102769
1951 Heavy Duty (Early)	1106403
1951 (Late), 1952 Heavy Duty	1105900

Delco-Remy Armature No.	For Generator No.
1912599	1102750
1921621	1102775
1923069	1102769
1880252	1106403
1918009	1105900

►***1951 GENERATOR & REGULATOR CHANGE***—Later Delco-Remy Regulator No. 1118725 must be used with later 45 ampere Generators and Delco-Remy Regulator No. 1118722 must be used with later Heavy Duty Generator No. 1105900 (50 ampere).

►***1951-52 GENERATOR TESTING CAUTION—See "Delco-Remy Generators" in Electrical Equipment Section for special ALTERNATE WOUND ARMATURE generator data.***
Maximum Charging Rate—***See Current Regulator.***

Performance Data—Cold

	Amperes①	Volts	RPM.
1102750	40	8.0	2150
1102775	45	8.0	2450
1102769	45	8.0	2450
1106403	35	8.0	1040
1105900	50	7.0	2100

①—Not maximum output See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—(1106403) 25 ozs. (Others) 28 ozs.
Field Current—(1102750, 69, 75) 1.87-2.00 amperes, (1106403) 1.77-2.00 amperes, (1105900) 1.77-1.93 amperes. All at 6.0 volts.
Belt Adjustment: Belt deflection or sideplay should be ¼" midway between generator and pump pulleys.

REGULATOR

Delco-Remy Regulator No.	For Generator No.
1118300	1102750
1118725	1102769, 75
1118352	1106403
1118722	1105900

Voltage and current regulation.

►***1951 GENERATOR & REGULATOR CHANGE—See Generator above.***

►***ENGINE GROUND STRAP INSTALLATION (To correct click or oscillating of relay points): See Battery. See Electrical Equipment Section for complete data.***
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4).
Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

Current Regulator

Setting (1118300)—40-46 ams. hot (set to 42 hot).
Setting (1118725)—45-51 amps. hot (set to 47 hot).
Setting (1118352)—33-37 amps. hot (set to 35 hot).
Setting (1118722)—48-52 amps. hot (set to 50 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—***See Elec. Equip. Section.***

LIGHTING

Headlamps: Guide "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Beam Indicator—At Speedometer. Lighted when upper beam in use.
Direction Signal: ***See Electrical Equipment Section.***
Direction Signal Indicator—Red pilot light on speedometer dial. Flashes when signal in use.

Switches

Lighting—Delco-Remy No. 1995032.
Beam Selector—Delco-Remy No. 1997008.
Instrument—Part of lighting switch. Rheostat operated by turning Light Switch knob.
Direction Signal—Pontiac No. 5943132.
Stop Light—Delco-Remy No. 1997725.

MISC. ELECTRICAL

THERMOSTATIC CIRCUIT BREAKER: Delco-Remy. On back of light switch (part of switch assy.). Contacts remain closed with 30 amperes but open in 3 minutes with 42 amperes at 70°F.—Not adjustable.

MAIN FUSE BLOCK: On left hand engine side of dash. Two fuses (plus 1 spare) as follows:
Tail Lamp—SFE 14 ampere. In gold colored fuse holder. Protects rear license, instrument, ignition key, and clock lamps (dome on convertible).
Stop Lamp—SFE 14 ampere. In gray colored fuse holder. Protects trunk light and dome light.

ACCESSORY FUSE BLOCK: Six fuses mounted on fuse block on dash behind instrument panel. All fuses are 20 ampere except Radio fuse which is 14 ampere. (Spare Radio fuse on main fuse block on engine side of dash). Fuse identification printed inside fuse block cover.

HORNS: Delco-Remy No. 1999645 (Low Note). No. 1999646 (High Note). Vibrator types operated by relay.

Type	Current (at 6 volts)	Air Gap
Low Note	19-21 amperes	.047-.052"
High Note	18-20 amperes	.039-.044"

Horn Relay: Delco-Remy No. 1116775.
Contact Gap—.027". **Air Gap**—.014" (closed).
Contacts Close—2.75-4.0 volts (set to 3.5 volts).

ENGINE

ENGINE SPECIFICATIONS: 8 cylinder, "L" head type.
Bore—3⅜". **Stroke**—3¾".
Displacement—268.4 cu. ins. **Rated H.P.**—36.45.

Developed Horsepower—(At 3600 RPM.)	H.P.
1951 Standard 6.5-1 Head	116
1951 High Compression 7.5-1 Head	120
1952 Synchro-mesh 6.8-1 Head	118
1952 Hydra-Matic 7.7-1 Head	122

Compression Ratio—	Ratio
1951 Standard	6.5-1
1951 High Compression	7.5-1
1952 Synchro-mesh	6.8-1
1952 Hydra-Matic	7.7-1

Compression & Vacuum Reading—***See Tune-Up.***

ENGINE & OIL PAN REMOVAL: ***See Pontiac Special Data.***

ENGINE FRONT MOUNTING REMOVAL: ***See "Engine Mounting" in Pontiac Special Data.***

CYLINDER HEAD & TIGHTENING TORQUES: ***See Pontiac Special Data.***

PISTONS: Chrome-nickel alloy, electro-plated type.

►***1952 PISTON PRODUCTION CHANGE CAUTION***—Two types of pistons are used. **Early Type**—Piston pin is locked in piston with lock bolt in one piston boss. **Late Type**—Piston pin is secured in piston with lock rings at each end of the pin. ***LATE TYPE PISTONS ARE NOT INTERCHANGEABLE WITH PISTONS IN EARLIER ENGINES, EXCEPT IN COMPLETE SETS.***

►***IDENTIFICATION NOTE***—Engine with later type pistons are identified by an "X" following the pro-

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

duction engine number (this number will be found on raised pad at left rear corner of engine near fire wall).

Original Bore & Pistons—*See Pontiac Special Data.*

Removal—Pistons and rods removed from above.

Clearance—Top Land .015-.027". Skirt .002".

Fitting New Pistons: Insert .0015" x ½" feeler between piston and cylinder wall. Pull to withdraw feeler must be 10-20 lbs. Taper and out-of-round limits—Piston .0005", Cylinder .0005" after reconditioning.

Replacement Pistons: *See Pontiac Special Data.*

PISTON RINGS: Two tapered-face compression rings above pin, one slotted oil control ring below pin.

NOTE—Rings are cadmium-plated or tin-plated.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"	.008-.015"	.0015-.003"
Oil (#3)	3/16"	.008-.015"	.001-.0025"

Installing Compression Rings—Mark "TOP" up.

Replacement Rings: .005", .010", .020", .030" oversize.

PISTON PIN: *TWO TYPES USED—See Pistons (above).*

▷*CAUTION—Early and Late type pin fitting in piston is DIFERENT:* **Pin Fit in Piston (Early Type)**—Pin is locked in one piston boss by self-locking screw, and pressure required to press pin into piston should be 200-350 lbs. **(Late Type)**—Pin retained in piston by locking ring at each end and pressure required to press pin into piston should be 150-250 lbs. *Other pin fitting instructions unchanged from previous models.*

Pin Clearance in Rod Bushing—.0004-.0006".

Replacement Pins: Early Type—.001" (red & brown), .003" (red), .005" (blue) oversize. **Late Type**—.001" (green), .003" (red), .005" (blue) oversize. Paint mark on end of pin.

Piston Pin Removal & Installation: *See "Piston Pins" in Pontiac Special Data.*

CONNECTING ROD: Wt.—32 ozs. **Lgth.**—7.560-7.565".

Piston Pin Bushing (Upper Bearing)—Split aluminum bronze bushings. *See Pontiac Special Data.*

Crankpin Journal Diameter—1.9987-1.9997". *See "Crankshaft & Main Bearings" in Pontiac Special Data.*

Lower Bearing—Thin type, interchangeable, steel-backed babbitt-lined type.

Clearance—.0001-.0021". **Sideplay**—.007-.012".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rod & Bearings" in Pontiac Special Data.*

Replacement Bearings: Standard size and .001" and .002" undersize. *NOTE*—Bearings have small tongue which must engage groove in rod and cap.

Installing Rods: Not offset (install either way). *NOTE*—Rods and bearing caps marked to insure correct reassembly (marks must be together). These marks do not indicate cylinder in which rod used.

CRANKSHAFT: Five bearing type with integral counterweights and vibration dampener on forward end.

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

Journal Diameters—#1, 2.3732-2.3742"; #2, 2.4044-2.4054"; #3, 2.4357-2.4367"; #4, 2.4669-2.4679"; #5, 2.6232-2.6242".

Bearings—Thin type, removable, steel-backed, babbitt-lined. Upper and lower bearing halves alike.

Clearance—.0003-.0023".

See "Crankshaft & Main Bearings" in Pontiac Special Data.

Bearing Adjustment: None (no shims). *See Pontiac Special Data for Removal and Fitting of Bearings.*

Rear Main Bearing Oil Seal Renewal—*See Pontiac Special Data.*

Replacement Bearings: Std. & .001", .002" Undersize.

End Thrust: Taken by #4 (rear intermediate) bearing. **Endplay**—.003-.008".

CAMSHAFT: Five bearing, non-adjustable chain.

Timing Chain Cover Oil Seal Installation—*See "Timing Chain" in Pontiac Special Data.*

Bearing Diameters—*See Pontiac Special Data.*

Bearings—Steel-backed, babbitt-lined bushings.

Clearance—.0015-.0025" (new).

Camshaft Removal & Bearing Installation: *See "Camshaft & Bearings" in Pontiac Special Data.*

End Thrust: Steel thrust plate behind camshaft sprocket. Replace if worn. **Endplay**—.003-.007".

Timing Chain: Morse. Width 27/32". Pitch ⅜". Length 21" or 56 links.

Timing Chain Oil Cover Seal Installation—*See "Timing Chain" in Pontiac Special Data.*

Timing Chain Replacement—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that "0" marks are adjacent and in line with straightedge across shaft centers.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 15/32"	.310-.311"	5.53"
Exhaust	1 11/32"	.310-.311"	5.53"

	Seat Angle	Lift	Stem Clearance
Intake	30°	19/64"	Free fit to .0006"①
Exhaust	45°	19/64"	Free fit to .0006①

①—Tapered (max. clearance at bottom .0006").

Valve Guides: Guides have tapered hole (.001" taper to inch—greatest clearance at top). Exhaust guides counterbored at top to depth of 9/16". Guides have valve spring seat at lower end.

Check Valve Clearance in Guide—Clean guide with tool KMO-122, clean counterbore in exhaust guide with Counterbore Cleaner J-2122 (If necessary, deepen counterbore to ¾"). Valve should just fall through guide with own weight.

Installing Guides—Use Valve Guide Remover J-2542 to remove and install guides. Drive new guide down in block (counterbored end up on exhaust guides) until upper end ⅞" below top edge of valve seat. Ream guide with PR-131 tapered reamer and finish counterbore with Counterbore Cleaner J-2122 for correct clearance (see above).

▷*CAUTION*—Guides furnished with straight hole which must be taper reamed.

Valve Springs: Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length**—2 3/16".

▷*CAUTION*—Dampeners located inside spring, with upper seat for spring located on valve guide.

Valve Spring Specifications

	Spring Pressure	Spring Length
Valve Closed	59-66 lbs.	1 23/32"
Valve Open	100-110 lbs.	1 13/32"

Valve Lifters: Barrel type, cast-iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed, use Valve Guide Removing Tool J-2542).

Clearance—Free fit. Lifter should just move freely with finger touch.

VALVE TIMING

Tappet Clearance: .001" to .013", all Valves, Hot. .011" "Go" gauge, .013" "No Go" gauge.

High Speed Setting—.013" EXH. Hot.

Cold Setting with Engine Stopped—.012-.014". Cold (room temperature). *CAUTION*—Check setting for limits of .011-.013" after engine warmed up.

▷*NOTE*—A removable plate is installed in front fender skirt so tappets are accessible for adjustment.

Valve Timing: *See Camshaft Setting above.*

Intake Valves—Open 5° BTDC. Close 39° ALDC.

Exhaust Valves—Open 45° BLDC. Close 5° ATDC.

Valve Timing Check—With .015" clearance #1 intake valve should open with #1 piston 5° BTDC with first straight line of dampener mark 'IGN. ONE' slightly past pointer on chain cover. Reset tappet clearance .011-.013" (warm).

LUBRICATION

Engine Oiling System: Pressure to main bearings connecting rod lower bearings and piston pins (rifle-drilled rods), camshaft bearings, and chain.

Crankcase Capacity—5 qts. (refill), 6 qts. (dry).

Normal Oil Pressure—35-45 lbs. at 40 MPH. with warm oil (10-30 lbs. idling).

Oil Pressure Regulator—On oil pump. Opens at 40 lbs. Replace spring if free length less than 2 5/16".

Oil Pump: Gear type. On right side of crankcase.

Removal & Installation—*See Pontiac Special Data.*

Oil Cleaner: Precipitation type (in crankcase).

Removal & Installation—*See Pontiac Special Data.*

Oil Pressure Gauge: AC No. 1507535. Not electric.

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compt. cover on right rear side of engine (cars with oil bath air cleaner use 3-piece outlet pipe containing filter element).

Oil Filler (Crankcase Ventilator) Cap Cleaning—Wash filter element and re-oil by dipping in engine oil when servicing air cleaner.

CAUTION—Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backward).

Crankcase Ventilator Outlet Pipe—On cars with Oil-bath type Air Cleaner, special 3-piece ventilator outlet pipe used which has copper gauze type air cleaner in container section. Wash and re-oil filter element when servicing air cleaner.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valve) in filler cap.

Capacity—19½ qts.

Pressure Valve—AC No. 850549 Filler Cap. Opens at 7 lbs. (6½-7½ lbs).

Water Pump: Packless, sealed ball-bearing shaft.

▷*WATER PUMP PRODUCTION CHANGE—Water pump body bore reduced to give .0015-.0025" press fit for water pump bearing on late 1952 pumps. Bearing is same for both early and late pumps. NOTE*—Bearing should be pressed in until outer race flush with end of pump body (no lockwire used on these pumps with press-fit bearing).

Removal—Drain cooling system, remove hose connection at pump, remove belt, take out water pump mounting bolts and lift pump out.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In cylinder head outlet.
Setting—Starts to open 151°F. Fully open 173°F.

Radiator Removal: *See "Radiator" in Pontiac Special Data.*

Temperature Gauge: AC Electric type.
Dash Unit—AC No. 1512287.
Engine Unit—AC No. 1512015.

CLUTCH

Inland. Single plate, "Diaphragm" dry disc type with Long Driven Member Model 10CF-CS.
See Clutch Section for complete data.
Facings—Woven type, 2 required. I.D. 6¾". O.D. 10". Thickness ⅛".

Pedal Adjustment: Free travel ⅞-1⅛" (adjusting nut on link at clutch fork).

Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing), remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing (see Clutch Release Bearing & Support data), tapping the support from inside the clutch housing to aid in removing. *(CAUTION*—avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure re-installation in same position to maintain balance), remove clutch cover mounting bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member, lower cover assembly out.
Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retaining ring on Transmission Main Drive Gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

TRANSMISSION

Own Make. All helical gear. Constant-mesh synchro-mesh (Second & High), sliding gear (Low & Reverse). *See Transmission Section for data.*

Transmission Control: Pontiac "Safety-shift" remote control type with gearshift lever on steering column. *See Transmission Section for complete data.*

Removal: Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear, down and out.
Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support). *NOTE*—These guide pins may be made from ½-13 American National Thread bolts by cutting heads off and reducing over-all length to 4¼".

HYDRA-MATIC TRANSMISSION

Optional equipment. Four-speed planetary type automatic transmission and fluid coupling. Modulated throttle pressure and hydraulically operated reverse mechanism. 1952 model is "Dual-Range" type.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION—See "Hydra-Matic" Drive in Transmission Section.*

►*TESTING & TROUBLE SHOOTING—See Transmission Section.*

Lubrication—Check fluid every 1000 miles. Add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Hydra-Matic fluid (Automatic Transmission Fluid type "A").
Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes **after** transmission has reached normal operating temperature. With selector lever in "N," remove dipstick and check fluid level (dipstick located under right front floor plate). Add the necessary amount of fluid to bring the fluid level to "F" mark. *CAUTION—Use care not to allow dirt or lint to enter transmission.*

►*CAUTION—Do not fill above "F" mark on dipstick.*
Capacity—Approximately **11 quarts** (refilling after draining). **12 quarts** (when transmission disassembled).

►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics Model 2CR lock ring retainer type or **Saginaw** clamp plate retainer type.

CHANGE NOTE—Universals on 1952 cars are changed from previous models. Interchangeable as **complete** units.

►*CAUTION*—Rear universal companion nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See Pontiac Rear Axle in Rear Axle Section.*

REAR AXLE

Own Make. Hypoid gear, semi-floating type with pinion mounted on two taper roller bearings.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Rear Axle Section for complete data.*

Rear Axle Ratios— Hydra-Matic Model	Ratio	Code No.①	Color②
1951	3.63-1	6	Blue
1952 (Dual Range)	3.08-1.	0	Yellow
Synchro-mesh			
1951-52 Standard	3.90-1	4	Red
1951-52 Mountain	4.10-1	3	Green
1951-52 Plains	3.63-1	6	Blue

①—Stamped on pad on differential carrier.
②—On end of axle shaft.
Backlash—.003-.012" (new), .012" (worn).

Removal: Disconnect rear universal and wire trunnions (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing.

►*CAUTION*—Rear universal joint companion flange nut controls pinion bearing "pre-load" (must be adjusted whenever nut is loosened).

Axle Shaft Removal: Remove wheel, brake drum, 4 backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with puller J-942—(do not drag axle shaft on oil seal).
Wheel Bearing Adjustment—None.

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (non-refillable) type. Serviced by replacement.

Shock Absorber Part Nos.	Front	Rear
Standard	5516126	5516127
Taxicab & Police Cars	5513562	5513563

FRONT SUSPENSION

Front Suspension: Linked parallelogram type with shock absorber mounted within each coil spring. *See Front Suspension Section for complete data.*
Kingpin Inclination—5° at 0° camber.
Caster—¾° ± ½°.
Camber—0° ± ½°.
Toe-In—0-1/16". Adjust rod sleeves equally.
Toe-out on Turns—Inner wheel 20°, Outer wheel 18-19°.

STEERING GEAR

Saginaw—Worm-and-Roller type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix Hydraulic, duo-servo, single anchor type **without eccentric adjustment.** Hand lever applies rear wheel service brakes.

►*SQUEAKING BRAKE CORRECTION: See Brake Section for installation of Brake Drum Silencer Springs. See Brake Section for complete data.*

Wheel Cylinders—Front Whls. 1 1/16". Rear ⅞".
Drums—Cast iron. Diameter 11".
Lining—Molded. Width 2¼" (front wheels), 1¾" (rear). Thickness 3/16". Length per shoe: 9 11/32" (primary), 12 1/32" (secondary).
Clearance—.015" at both ends of secondary (rear) shoe with primary shoe forced out against drum.
Braking Power—60% front wheels, 40% rear.

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

Convertible Top Control: Hydro-Lectric type (hydraulic actuation with motor-driven pump supplying oil under pressure for power cylinders).
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum Link-&-Crank Arm type.
See Miscellaneous Section for complete data.

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBERS: (Numbers are the same). On left front hinge pillar post and on raised pad at front of left side of cylinder block.

Starting Serial & Engine Number. 1001 Up.

►*SERIAL & ENGINE NUMBER NOTE–Serial & Engine number (example C6ZS-1001) includes following identification in sequence).*

Assy. Plant	No. of Cyls.	Model ① Year	Trans.② Type	Serial No.
See below...	6	Z	S	1001 Up

①–X designates 1953. Z designates 1954.
②–S and C are Synchro-mesh Transmissions. H and A are Hydra-Matic Transmissions.

Assembly Plant Designations

A–Atlanta	L–Linden
C–South Gate	T–Arlington
F–Framingham	W–Wilmington
K–Kansas City	

TUNE-UP

►*1953 ENGINE ROUGHNESS ON POWERGLIDE CARS:* May be caused by incorrect adjustment of Engine Side Supports (used only on Powerglide Cars). *See Pontiac Transmission Installation in "1954 Chevrolet Powerglide" in Transmission Section for Side Support Adjustment.*

COMPRESSION PRESSURE: 123-141 lbs. (Synchro-mesh), 139-158 lbs. (Hydra-Matic), both at cranking speed of 200 RPM.

VACUUM READING: 18-20" idling at 520-540 RPM (Synchro-mesh), at 365-385 RPM (Hydra-Matic).

VALVE TAPPET CLEARANCE: .011" to .013", HOT. Use .011" "Go" gauge, .013" "No Go" gauge. **High Speed Setting**–.013" (Exhaust Valve, Hot).
Cold Setting With Engine Stopped–.012-.014". Check for .011-.013" after engine warm.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in vertical position with valve closed (cold position).

IGNITION

►*IGNITION HIGH TENSION CABLE CAUTION:* Non-metallic conductor cables (with built-in suppression resistance). Marked "Radio-4000 GM". Distributor cap is conventional type without built-in resistor. *Do not substitute other type cables.*

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .025" (.023-.028").

Spark Plug–AC No. 44-5 14mm. Tighten to 25 ft. lbs.

COIL: Delco-Remy 1115378 (1953); 1115380 (1954). Ignition Current–2.5 amps. idling. 4.5 stopped.

DISTRIBUTOR (1953): Delco-Remy 1110232 (Early Synchro-mesh Cars & All Hydra-Matic Cars). No. 1110233 (Late Synchro-mesh Cars).

►*1953 DISTRIBUTOR NO. 1110232 PRODUCTION CHANGE: Early distributor with BLACK cap retaining clips has different Automatic & Vacuum Advance Specifications than later distributor with CADMIUM clips. See below.*

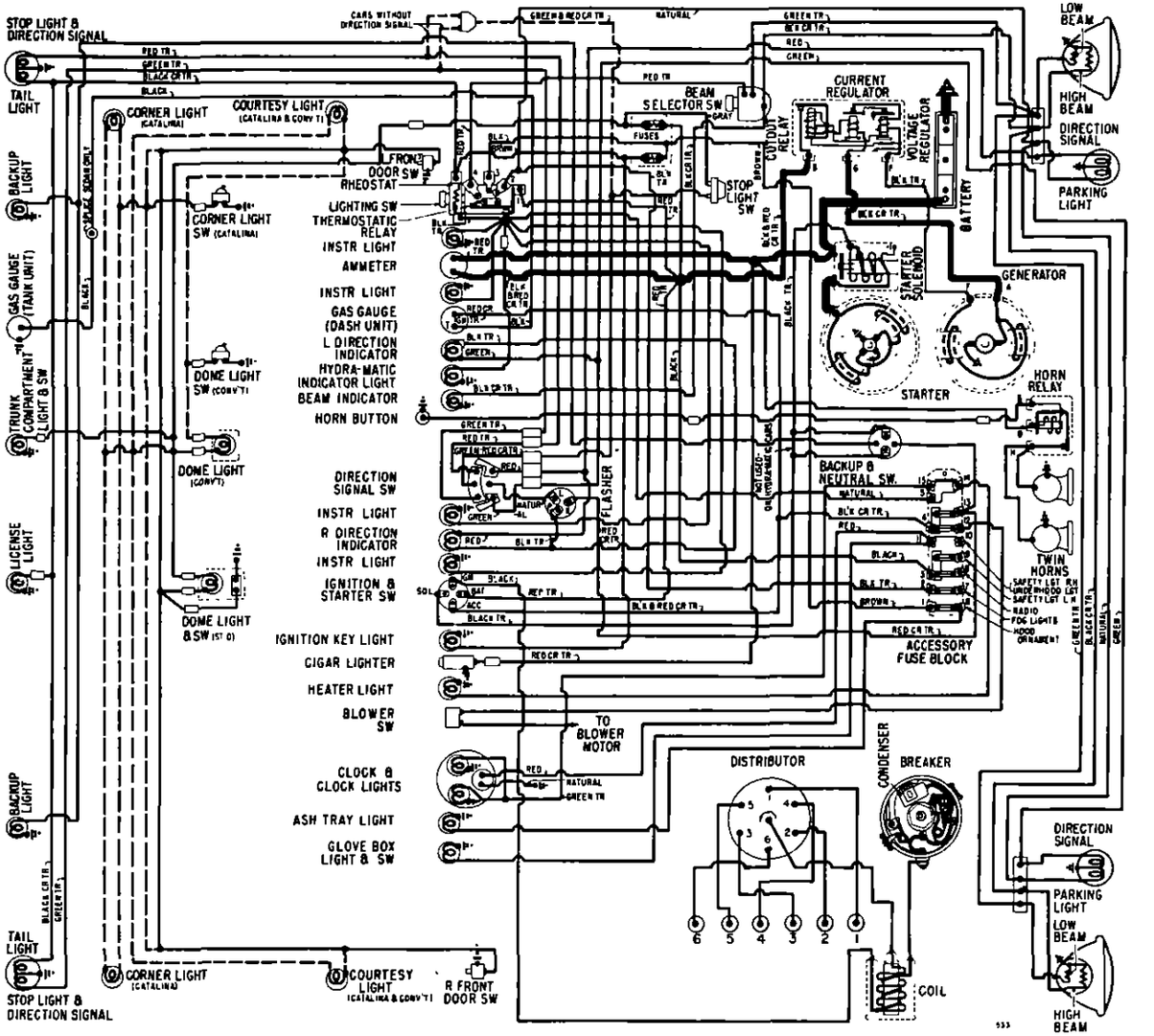
DISTRIBUTOR (1954): 1110235 (Synchro-mesh), No. 1110234 (Hydra-Matic).

Condenser–Delco-Remy 1869704. **Capacity**–.18-.23 mfd.
Contact Point Set–Delco-Remy 1871678.
Breaker Gap–.016".
Cam Angle–38°-45°.
Breaker Arm Spring Tension–19-23 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance–First 1110232 ►(Black Retaining Clips)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		450	0-4		900
5-7		1200	10-14		2400
9-10		1800	18-20		3600

CONTINUED ON NEXT PAGE



1953 MODELS

CONTINUED FROM PRECEDING PAGE

Automatic Advance—1110232 & 1110234
►(1110232 with Cadmium Retaining Clips)

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	450	0-4	900
5-7	1200	10-14	2400
10-12	1950	20-24	3900

Automatic Advance—1110233 & 1110235

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	500	0-4	1000
6-8	1050	12-16	2100
8-10	1400	16-20	2800
10.5-12.5	1800	21-25	3600

Vacuum Spark Control: Delco-Remy 1116051 (First 1110232), 1116077 (Later 1110232 & 1110233), 1116079 (1110234 & 1110235).
Plunger Travel—9/64" (1116051); 3/16-7/32" (Others).

Vacuum Advance—1116051

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7-9"
7.5	15	14.5-16.5"

Vacuum Advance—1116077

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6"
11	22	20.5"

Vacuum Advance—1116079

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6"
11	22	19-20.5"

IGNITION TIMING

Setting—3° BTDC.
Timing Marks—Timing marks on dampener indicating **TDC. - 3° BTDC. - 6° BTDC.** Pointer on chain case cover aligned with correct mark on dampener (See Ignition Timing above).

CARBURETOR

►*1954 CHOKE SETTING CHANGE (To Correct "Loading" During Engine Warm-up):* Change setting from center index to **2 points lean.**

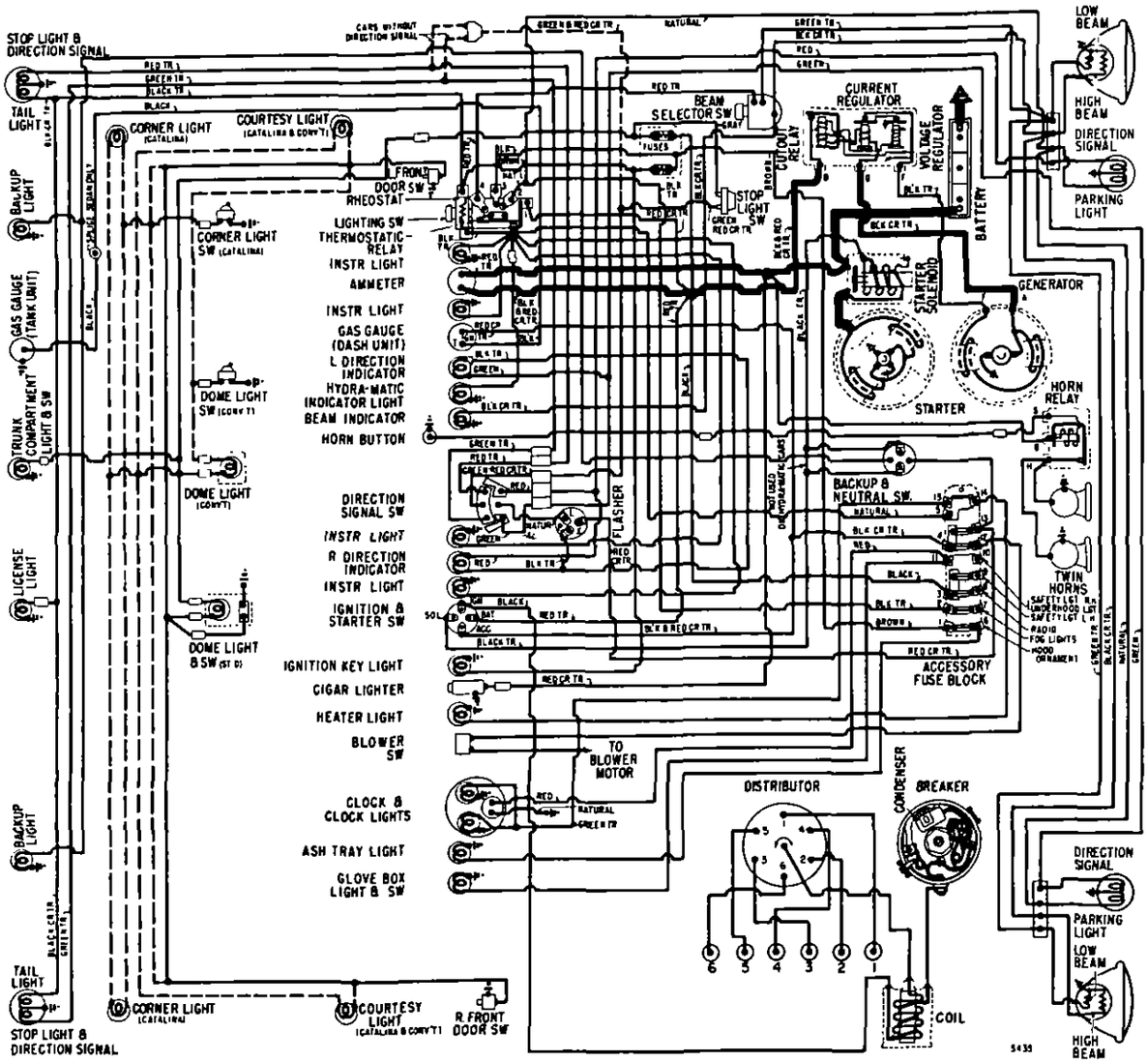
►*1953 ACCELERATION FLAT SPOT CORRECTION & PRODUCTION CHANGE:* This condition is noticeable when car is accelerated from part throttle to full throttle. New metering rods (Carter No. 75-910) have been installed to correct the condition in production. All carburetors code marked "C3" and later have the new type metering rods.

►*1953 CARBURETOR PRODUCTION CHANGE CAUTION:* Early carburetors have TWO idle adjusting screws, later carburetors have ONE screw only. Adjust as follows: First set idle mixture screws 1¼ turns open from lightly seated position (two screws on early carburetors; one screw on later carburetors). With engine warm and idling at correct idle speed, turn idle screw (FRONT screw only on early carburetors) in until engine falters from lean mixture, then turn screw out until engine idle speed is at maximum. *CAUTION—Do not adjust REAR screw on early carburetors.*

THROTTLE LINKAGE ADJUSTMENT (ALL MODELS): *Adjust exactly as follows:*

1) **Carburetor Throttle Rod**—Disconnect throttle rod at throttle lever on left side of transmission case. Check and adjust engine idle speed to 365-385 RPM, hot or slow idle with engine at normal operating temperature, transmission warm, and selector lever in "N" position. Install adjusting pin J-2544 through holes in carburdtor intermediate lever on left side of cylinder head and lever bracket. Adjust nuts at trunnion on carburetor throttle rod (back off one nut, tighten opposite nut) until adjusting pin is free with carburetor throttle lever stopscrew against its stop. Tighten trunnion nuts but **do not remove adjusting pin.**

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1954 MODELS

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2) Transmission Throttle Front Rod—Check adjustment by inserting a second J-2544 adjusting pin through holes in idler lever (left side of crankcase below starter) and lever bracket. If pin does not enter both holes freely, adjust length of transmission throttle front rod at trunnion on upper end of this rod, then tighten both locknuts securely, and remove both adjusting pins.

3) Accelerator Pedal Rod—Loosen front locknut on pedal rod at throttle control idler lever on left side of engine, depress accelerator pedal until carburetor throttle is just wide open. Check clearance between lower face of accelerator pedal and floor mat. If clearance is not ¼" at closest point, adjust pedal by turning rear nut at trunnion on forward end of rod in or out as required, then tighten front nut securely.

CARTER

Carter WCD 2010S. Dual downdraft type with automatic choke.

Idle Setting—First set screw 1¼ turns open from lightly seated position. With engine warm and idling at correct idle speed, turn idle screw in until engine falters from lean mixture, then turn screw out until engine speed is at maximum. One idle screw only.

Idle Speed—520-540 RPM (Synchro-mesh Cars), 365-385 RPM (Hydra-Matic Cars).

Float Level—*NOTE—Floats operate independently of each other, but are adjusted the same as a single type float.* 5/32" from top of float to gasket seat on bowl cover (with gasket removed) using Gauge T109-196. Sides of float should barely touch vertical uprights on gauge to avoid floats binding on sides of bowl.

Accelerating Pump—No seasonal adjustment.

Fast Idle: With choke valve tightly closed and fast idle screw on high step of fast idle cam, tighten adjusting screw until there is .026" clearance between throttle valve and bore of carburetor on side opposite idle ports.

Automatic Choke Setting: 2 points lean; *NOTE—Supersedes previous setting (Centered at index) to correct "Loading" during engine warm-up).*

►*OTHER DATA—See "Carter WCD Carburetors" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-4¾ lbs.

CARB. EQUIPMENT

Fuel Pump: AC. **Replacement No. 9630** (Fuel & Vacuum).
Pressure—4-4¾ lbs.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: AC Electric type.
Dash Unit—AC No. 1517603.

Tank Unit—AC No. 1517411 (1953); No. 1518093 (1954).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Delco. 15E6W. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Battery Ground—Negative, to engine.

STARTER

Delco-Remy 1107107. Armature—1917855.
Drive—Overrunning clutch (solenoid pinion shift).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: Delco-Remy Solenoid No. 1118140 (no relay) mounted on starter and controlled by Ignition Switch (combination starting & ignition). Neutral Safety Switch used on Hydra-Matic Cars.
See "Starter Controls" in Electrical Equipment Section.
Neutral Safety & Back-up Light Switch: Delco-Remy 1998039. At lower end of steering column. Connected in starter control circuit so that starter operates only when selector lever in "N" (Neutral).
Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy 1102794 (Std.), 1105900 (Hvy. Duty & Police).
Armature—Delco-Remy 1912599 (Std.), 1918009 (Hvy. Duty & Police).

Performance Data—Cold

Gen. No.	Amperes ①	Volts	RPM
1102794	45	8.0	2350
1105900	50	7.0	2100

①—Not maximum. See Regulator.

Brush Spring Tension—28 ozs.
Field Current—1.87-2.00 amps. (1102794), 1.77-1.93 amps. (1105900).
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: Belt deflection midway between generator and fan pulleys should be ½" with 10 lb. force applied.

REGULATOR

1953 Models

Delco-Remy 1118725 (1102794 Gen.).1118722 (1105900 Gen.). Voltage & current type.
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting (1118725)—7.0-7.7 volts hot (set to 7.4).
Setting (1118722)—6.8-7.5 volts hot (set to 7.2).
►*NOTE: Regulator is compensated for temperature. Check with cover in place and hot.*
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting (1118725)—45-51 amps. hot (set at 47 amps.).
Setting (1118722)—48-52 amps. hot (set at 50 amps.).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

1954 Models

Delco-Remy 1118827 (1102794 Gen.), 1118835 (1105900 Gen.). New "1118825 Series" Regulator.
►*1954 REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. Following specifications are "Normal" settings.*

Cutout Relay

Cuts In—6.4 volts (hot).
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.3 volts (hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—47 amps. (1118827), 52 amps (1118835), hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

►*1953 WIRING HARNESS INTERFERENCE (CONVERTIBLE): Make sure that wire harness is secured behind clip in left door hinge lower hinge box. If not enough slack, remove kick-pad for access to harness clips.*

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*

Lighting Switch Removal: Remove one battery cable from battery. Pull headlight switch knob to "on" position, push latch button on side of switch assembly and pull out switch knob assembly. Screw bushing from switch assembly allowing switch assembly to be removed from instrument panel.
Stop Light Switch Location: On brake master cylinder located on left frame side rail forward of brake pedal.

FUSES: Main Fuse Block—Left hand side of firewall in engine compartment. Two fuses (plus 1 spare) as follows:

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Gold Color Fuse Holder—14 amp. Protects tail, rear license light, instrument lights, ignition key light, and clock light (dome light on Conv.).

Grey Color Fuse Holder—14 amp. Protects trunk and dome lights (exc. dome light on Conv.).

Accessory-Fuse-Block—Six-fuses-mounted-on-fuse-behind instrument panel. All fuses are 20 amperes except Radio fuse which is 14 amperes. (Spare Radio fuse on main fuse block on engine side of firewall).

CIRCUIT BREAKER: 42 amps. Located in headlight switch.

HORNS: Delco-Remy 1999645 (Low note), 1999646 (High note).

Horn Relay: Delco-Remy 1116775.

Contacts Close—2.75-4.0 volts (set to 3.5 volts). **Contact Gap**—.027". **Air Gap**—.014" (closed).

ENGINE

►*1953 ENGINE ROUGHNESS CORRECTION (POWERGLIDE CARS): See "1954 Chevrolet Powerglide" in Transmission Section for Engine Side Support Adjustment.*

ENGINE SPECIFICATIONS: Own. 6 Cylinder "L" head. **Bore**—3 9/16". **Stroke**—4".
Displacement—239.2 cu. in. **Rated H.P.**—30.46.
Developed H.P.—115 at 3800 RPM (7.0-1 Head). 118 at 3800 (7.7-1 Head).
Compression Ratio—7.0-1 (Std. Head, Synchro-mesh). **7.7-1** (Optional Head used with Hydra-Matic).
Compression & Vacuum Reading—See *Tune-Up.*

ENGINE REMOVAL: *See Pontiac Special Data.*

OIL PAN REMOVAL: *See Pontiac Special Data.*

CYLINDER HEAD: *See Pontiac Special Data.*

TIGHTENING TORQUES: *See Pontiac Special Data.*

FRONT END ASSEMBLY REMOVAL: *See Pontiac Special Data.*

ENGINE FRONT MOUNTING REMOVAL: *See Pontiac Special Data.*

PISTONS

Aluminum alloy, tin plate, cam ground, Autothermic Steel Strut type.

►*1953 PISTON PRODUCTION CHANGE CAUTION:* Two types of pistons are used. *EARLY TYPE*—Area around piston boss is "strut" type with four openings on each side of piston. *LATER TYPE*-Area around piston pin boss is solid with two drilled openings on each side. *PISTONS ARE NOT INTERCHANGEABLE EXCEPT IN SETS.*

►*PISTON IDENTIFICATION NOTE:* Engines with later type pistons are identified by a "K" stamped after production engine number (this number will be found on raised pad at left rear corner of engine near the firewall). This letter should be stamped on Production Engine Number pad whenever new type pistons are used to replace the early type.

Removal—*Pistons and rods removed from above.*

Fitting New Pistons: Clearance .0005-.0010". If micrometer used on pistons, measure perpendicular to piston pin hole and just far enough above bottom of skirt to make sure micrometer is in full contact. Use .0015" x ½" feeler gauge inserted between piston and cylinder wall at right angles to piston pin. Pull to withdraw *feeler must be 8-15 lbs.*

Replacement Pistons: Std. size and .005", .010", .020" .030" oversize.

►*REPLACEMENT PISTON NOTE: All replacement pistons are same as late 1953 type (see note above).*

Installing Pistons: Piston pin offset in piston: Install piston to connecting rod with "F" on front of piston and notch on top of piston toward front of engine. Oil squirt hole in connecting rod must be toward camshaft side of engine.

PISTON PINS

Full floating type retained in piston with lock rings at both ends.
Diameter—.9369-.9375" selective. **Length**—3 1/16".
Clearance in Piston—.0000-.0002". Clearance will be correct if piston pin can be pushed through piston with thumb, excessive clearance if pin slides through of own weight.
Clearance in Connecting Rod—.0004-.0006".

Replacement Pins: .001" (green), .003" (red), .005" (blue) Oversize. Paint code marked on end of pin.

PISTON RINGS

►*1953 PISTON RING PRODUCTION CHANGE CAUTION: Two types of piston rings used as follows: EARLY TYPE*—Top compression ring chrome plated taper face with corners rounded and beveled on inner diameter. Lower compression ring Lubrite-coated taper face without rounded corners and beveled on inner diameter. Oil ring Lubrite-coated symmetrical ring with expander spring. *LATER TYPE*—Top compression ring chrome plated with slightly chamfered corners on outer face. Lower compression ring tin plated without chamfered corners on outer face. Oil ring is symmetrical and is used with expander spring. *DO NOT USE FIRST TYPE OIL RING WITH LATER TYPE 1953 PISTONS.*

Early 1953 Type Rings

Ring	End Gap	Side Clearance
Compr.	.008-.016"	.001-.003"
Oil	.012-.020"	.001-.004"

Late 1953 & 1954 Type Rings

Ring	End Gap	Side Clearance
Compr.	.008-.016"	.0015-.003"
Oil	.005-.015"	.002-.004"

Installing Rings: Install compression rings with marks "TOP" or "T" toward top of piston. Oil ring can be installed either way.

Replacement Rings: Std. .005", .010", .020", .030" Oversize.

CONNECTING RODS

Length—7.560-7.565" (center-to-center).
Weight—37 ozs. (less bearings).
Crankpin Journal Diameter—2.1237-2.1247".
Piston Pin Bushing (Upper Bearing)—Split bushings.
See "Connecting Rods & Bearings" in Pontiac Special Data.
Lower Bearing—Steel-backed, babbitt-lined-insert.
Clearance—.0001-.0021". **Sideplay**—.007-.012".
Replacement Bearings: Std. .001", .002" Undersize.
Installing Rods: Oil squirt hole in lower end must be toward camshaft side. Marks on rods must be together (marks do not indicate in which cylinder rod is used).

CRANKSHAFT

►*CRANKSHAFT TO FLYWHEEL BOLT REPLACEMENT & INSTALLATION CAUTION (Synchro-mesh Cars):* ¾" hex head bolts (No. 508463) or 1" hex head bolts (No. 510832) are used. *Either type can be used for replacement but head size must be the same on all bolts or engine balance will be destroyed.*

Journal Diameters—(1) 2.4982-2.4992", (2) 2.5294-2.5304", (3) 2.5919-2.5929", (4) 2.6232-2.6242".
Bearings—Thin type, removable, steel backed, babbitt lined. Upper and lower halves are interchangeable.
Clearance—.0003-.0023".

Replacement Bearings: Std. .001", .002" Undersize.
End Thrust: At No. 3 (rear intermediate) bearing.
Endplay—.003-.008".

Rear Main Bearing Oil Seal Renewal: *See "Crankshaft & Main Bearings" in Pontiac Special Data.*
Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

CAMSHAFT

Bearing Diameter & Installation: *See "Camshaft" in Pontiac Special Data.*
Clearance—.0015-.0025" (new).
End Thrust: Steel plate behind camshaft sprocket. Replace if worn. **End Play**—.003-.007".

Timing Chain: Morse. Width 1", Pitch 3/8". Length 21", or 56 links. Timing chain bumper is installed to eliminate vibration.

Chain Installation—*See "Timing Chain" in Pontiac Special Data.*
Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that 'O' marks are adjacent and in line with straightedge across centers.
Timing Chain Cover Oil Seal Installation: *See "Timing Chain" in Pontiac Special Data.*

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VALVES

Tappet Clearance: .011-.013" HOT. Use .011" "Go" gauge, .013" "No Go" gauge. High Speed Setting—.013" (exhaust valve, Hot).

Valve	Head Diam.	Stem Diam.	Length
Intake	1 19/32"	.310-.311"	5 23/32"
Exhaust	1 15/32"	.310-.311"	5 23/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	19/64"	①Free Fit to .0006"
Exhaust	45°	19/64"	①Free Fit to .0006"

①—Tapered (max. clearance at bottom .0006").

Valve Seq. Width—1/16".

Valve Springs: Intake and exhaust springs identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring. **Free Length**—2 11/32".

Spring Specifications

	Spring Pressure	Length
Valve Closed	59-66 lbs.	1 29/32"
Valve Open	97-105 lbs.	1 19/32"

Valve Guides: Guides have tapered hole (.001" taper to inch—greatest clearance at top). Exhaust guides counterbored at top to depth of ¾".

Checking Valve Clearance in Guide—Clean guide with tool KMO-122, clean counterbore in exhaust guide with Counterbore Cleaner J-2122. Valve should just fall through guide of own weight.

Installing Guides—Use Valve Guide Remover J-2542 to remove and install guides. Drive new guide down in block (counterbored end up on exhaust guides) until upper end 29/32" below top edge of valve seat. Ream guide with PR-131 tapered reamer and finish counterbore with Counterbore Cleaner J-2122.

►*CAUTION—Guides furnished with straight hole which must be taper reamed.*

Valve Lifters: Barrel type, cast iron. Guide holes reamed in block. Lifters furnished .005" Oversize (use pilot reamer J-706-P when reaming holes to maintain alignment—valve guides must be removed).

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 12°30' BTDC. Close 52°30' ALDC.

Exhaust Valves—Open 52°30' BLDC. Close 12°30' ATDC.

Valve Timing Check—With .0166" tappet clearance #6 valve should open with #6 piston 12°30' before top dead center. Reset tappet clearance to .011-.013".

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 6 qts. (dry).

Normal Oil Pressure: 30-45 lbs. at 40 MPH.

Pressure Regulator—On oil pump. Opens at 40 lbs. Replace spring if free length less than 2 5/16".

Oil Pressure Gauge—AC No. 1507707. Not electric.

Oil Pump: Gear type. On right side of crankcase

Pump Overhaul—*See "Oil Pump" in Pontiac Special Data.*

Oil Cleaner: Precipitation type (in crankcase).

Removal & Installation—*See "Oiling System" in Pontiac Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compartment cover on right rear side of engine (cars with oil bath air cleaner use a 3-piece outlet pipe containing filter element).

►*CAUTION:* Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backwards).

COOLING

Water Capacity: 18¾ qts (without heater), 20½ qts. (with heater).

Pressure Valve: AC No. 850549 Filler cap. Opens at 7 lbs. (6¼-7½ lbs.).

Thermostat: Harrison "Bellows" type. In cylinder head outlet. **(Std.)** Pontiac No. 3126560 opens at 151°. **(High Temp.)** Pontiac No. 3126562 opens at 160° Pontiac No. 3126562 opens at 160°.

Water Pump: Packless, sealed ball bearing shaft. *See "Pontiac" in Water Pump Section.*

Pump Removal—Drain cooling system, remove hose connections at pump, remove belt, take out water pump mounting bolts and lift pump out.

Temperature Gauge: AC No. 1512458. Not electric. *See "Temperature Gauges" in Miscellaneous Section.*

CLUTCH

Inland. Single plate, "Diaphragm", dry disc type with Long driven member. *See "Inland" in Clutch Section.*

Clutch Disc No. —Pontiac No. 508403 (Std.), No. 513582 (Heavy Duty).

Pedal Adjustment: Free travel 7/8-1 1/8" (adjusting nut on link at clutch fork).

Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing) remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing. Tap bearing support from inside clutch housing to aid removal. (CAUTION—Avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure reinstallation in same position to maintain balance), remove clutch cover bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member, lower cover assembly out.

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retainer ring on transmission main drive gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

SYNCHRO-MESH TRANSMISSION

Own. All helical gear. *See "Pontiac Synchro-Mesh" in Transmission Section.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear, down and out.

Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support). NOTE—These guide pins may be made from 1/2"-13 American National Thread bolts by cutting heads off and reducing overall length to 4¼".

POWERGLIDE TRANSMISSION

►*FOR 1953 CARS WITH POWERGLIDE TRANSMISSION: See "Chevrolet Powerglide" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual-Range" four speed automatic transmission and fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 2000 miles, drain and refill at 25,000 mile intervals.

Checking Fluid Level—Run engine for approximately 1½ minutes at speed equivalent to 20 MPH with selector lever in "N". Reduce engine speed to **slow idle** and move selector lever to "D" position, measure level with dipstick, add fluid until level is at "FULL" mark with engine idling.

Capacity—Approximately 11 qts. (refill).

Recommended Fluid—Use G.M. Hydra-Matic Fluid or Automatic Transmission Fluid Type A.

►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

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UNIVERSALS

Mechanics or Saginaw. Needle bearing type.

►*CAUTION:* Rear universal companion flange nut controls rear axle pinion bearing "pre-load" (must be adjusted whenever nut is loosened). *See "Pontiac Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Hypoid gear, semi-floating with Hotchkiss Drive.
See "Pontiac Hypoid" in Rear Axle Section.
Axle Identification—Code mark stamped on pad at forwardside of differential carrier between bottom web and right hand horizontal web. Axle shaft also marked with daub of paint on end of shaft to indicate ratio. See Code and Paint Markings in table below:

Axle Ratios & Code Marking

Ratio	Gear Teeth	①Code Mark	②Code Color
3.08-1③	40:13	0	Yellow
3.63-1④	40:11	6	Blue
3.9-1⑤	39:10	4	Red
4.1-1④	41:10	3	Green
4.3-1⑤	43:10	2	White
3.42-1⑤	41:12	8	Aluminum

①—See Axle Identification above.
②—Paint daub on end of axle shaft.
③—Hydra-Matic Drive Cars.
④—Synchro-mesh Transmission Cars.
⑤—Optional (for standard fuel engine).

Backlash—.003-.012" (new), .012" (used).

Axle Shaft Removal: Remove wheel, brake drum, four brake backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with Puller J-942 (do not drag axle shaft on oil seal).

Wheel Bearing Adjustment: None.

Differential Carrier Assembly Removal: Disconnect rear universal and wire trunnion in place (do not disengage spline joint at transmission), remove axle shafts, and carrier flange capscrews. Withdraw carrier assembly from housing.

►*CAUTION: Rear universal joint companion flange controls pinion bearing preload. Readjust whenever nut loosened.*

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (non-refillable). Serviced by replacement.

Model	Front	Rear
Standard	5303492	5303290
Taxi & Police Cars	5519438	5519439

FRONT SUSPENSION

Independent. Shock absorber mounted within front coil springs.
See "Pontiac" in Front Suspension Section.
Kingpin Inclination—4½° at ½° camber.
Caster—0° ± ½°.
Camber—Pos. ½° ± ½°.
Toe-In—0-1/16" measured 9" above floor.
Toe-Out on Turns—With inner wheel at 20°, outer wheel should be 18° 30'.

STEERING

Manual: Saginaw Worm & Roller. *See "Saginaw Worm & Roller" in Steering Section.*

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic cylinder. *See "Saginaw (GM) Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Bendix Hydraulic. Duo-servo, single anchor **(without eccentric adjustment)**. Hand lever applies rear wheel service brakes.
See "Bendix Brakes" in Brake Section.

►*1954 BRAKE PEDAL & MASTER CYLINDER CONNECTING ROD INTERFERENCE CORRECTION:* Difficulty may be experienced in getting correct pedal height adjustment due to interference between master cylinder connecting rod clevis and brake pedal. If pedal height of 4 3/8-4 5/8" cannot be obtained it can be corrected by grinding a relief in master cylinder connecting rod clevis on the lower side at a point approximately 2" from rod end and extending toward clevis end for 1".

►*1953 SQUEAKING BRAKE CORRECTION: See Brake Section for installation of Brake Drum Silencer Springs.*

Drums—Diameter 11".

Wheel Cylinder Diameter—Front 1 1/16". Rear 7/8".

Lining Width & Thickness

	Width	Thickness
Front	2½"	3/16"
Rear	1¾"	3/16"

Clearance—Tighten adjusting "Star Wheel" to point where wheel can just be turned by hand, then back off star wheel 14 notches.

Braking Power—60% front wheels. 40% rear wheels.

Standard Master Cylinder: Forward of brake pedal on bracket attached to engine rear cross member.

Checking Fluid—Fluid reservoir is part of master cylinder. Maintain fluid level to top of reservoir.

Removal—Remove from engine compartment. Not necessary to disturb other parts.

Power Brakes: Bendix Vacuum Power Unit (combination vacuum power unit and hydraulic master cylinder). Unit mounted on underside of toe board and replaces regular master cylinder.

See "Bendix Power Unit" in Brake Section.

Checking Fluid—Same as for standard master cylinder.

Removal of Power Unit—Disconnect upper end of vacuum hose attached to inlet tube of master cylinder, and hydraulic line from hydraulic cylinder. Remove stop light switch wires. Disconnect push rod from brake pedal and remove brake pedal from pivot bracket. Remove clutch pedal and steering column seals. Remove vacuum cylinder mounting plate screws while holding power unit by push rod. Remove mounting plate, working it over clutch pedal while holding power brake unit in position. Remove power brake unit.

MISC. MECHANICAL

Windshield Wipers: Cable operated Vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

►*1953 WINDSHIELD WIPER DRIVE PRODUCTION CHANGE & ADJUSTMENT CAUTION: See Miscellaneous Section for data.*

Window Regulators: Electric. Reversible motor in each window. Available on front doors only. *See "Window Regulators" in Miscellaneous Section.*

Power Top Control: Hydro-Lectric with reversible pump motor. *See "Power Top Controls" in Miscellaneous Section.*

HOOD & HOOD LOCK ADJUSTMENT: *See Pontiac Special Data.*

FRONT END SHEET METAL ASSEMBLY REMOVAL: *See Pontiac Special Data.*

►*1954 AIR-CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air-conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBERS (Numbers are the same): On left front hinge pillar post and on raised pad at front of left side of cylinder block.

Starting Serial & Engine Number—1001 Up.

►*ENGINE & SERIAL NUMBER NOTE—Engine & Serial number (example C8ZS-1001) includes following identification in sequence:*

Assy. Plant	No. of Cyls.	Model ① Year	Trans. ② Type	Serial No.
See below.	8	Z	S	1001 Up

①—X designates 1953. Z designates 1954.

②—S and C are Synchro-mesh Transmissions, H and A are Hydra-Matic Transmissions.

Assembly Plant Designations

A—Atlanta	**L**—Linden
C—South Gate	**T**—Arlington
F—Framingham	**W**—Wilmington
K—Kansas City	

TUNE-UP

COMPRESSION:PRESSURE: 123-141 lbs. (Synchro-mesh), 139-158 lbs. (Hydra-Matic), both at cranking speed of 200 RPM.

VACUUM READING: 18-20" idling at 450-475 RPM (Synchromesh), 365-385 RPM (Hydra-Matic).

VALVE TAPPET CLEARANCE: .011" to .013" HOT. Use .011" "Go" gauge, .013" "No Go" gauge. **High Speed Setting**—.013" (Exhaust Valve, Hot).

►*VALVE TAPPET NOTE (AIR-CONDITIONED CARS):* An access door is provided in right front fender splash apron to eliminate necessity of removing air-conditioner compressor or lines.

Cold Setting With Engine Stopped—.012-.014". Check for .011-.013" after engine warm.

MANIFOLD HEAT CONTROL: Thermostatic coil type, non-adjustable (fixed anchor pin). Counterweight should be securely clamped to shaft in vertical position with valve closed (cold position).

IGNITION

►*1953 ENGINE ROUGHNESS ON POWERGLIDE CARS:* May be caused by incorrect adjustment of Engine Side Supports (used only on Powerglide Cars). *See Pontiac Transmission Installation in "1954 Chevrolet Powerglide" in Transmission Section for Side Support Adjustment.*

►*IGNITION HIGH TENSION CABLE CAUTION:* Non-metallic cables (with built-in suppression resistance). Marked "Radio-4000 GM". Distributor cap is conventional type without built in resistor. *Do not substitute other type cables.*

FIRING ORDER: 1-6-2-5-8-3-7-4. See diagram.

SPARK PLUG GAP: .025" (.023-.028").

Spark Plug—AC No. 44-5, 14mm. Tighten to 25 ft. lbs.

COIL: Delco-Remy 1115380.

Ignition Current—2.5 amperes idling, 4.5 stopped.

DISTRIBUTOR: Delco-Remy 1110831.

Condenser—Delco-Remy 1869704. **Capacity** .18-.23 mfd.

Contact Point Set—Delco-Remy 1918148.

Breaker Gap—.016".

Cam Angle—21°-30°.

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
5.5-7.5	1200	11-15	2400
6-8	1400	12-16	2800
10-12	1950	20-24	3900

Vacuum Spark Control: Delco-Remy 1116050.

Plunger Travel—7/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7-9"
10	20	17.5-19.5"

IGNITION TIMING

Setting—6° BTDC (Synchro-mesh Cars). **3° BTDC** (Hydra-Matic Cars).

Timing Marks—Timing marks on dampener indicating **TDC.—3° BTDC.—6° BTDC.** Pointer on chain case cover aligned with correct mark on dampener (See Ignition Timing above).

CARBURETOR

Idle Speed-Up Control Adjustment (Cars With Air-Conditioning): With engine at normal operating temperature and slow idle adjustment completed, turn air-conditioner "ON", and place transmission selector lever in "N" neutral position. Adjust engine idle speed to 750 RPM by loosening locknut on diaphragm shaft and turning knurled nut to obtain specified RPM. Tighten locknut.

Speed-Up Control Switch (Hydra-Matic Cars)—*See (Hydra-Matic Drive Linkage Adjustment) in Transmission Section.*

Speed-Up Control Switch (Synchro-mesh Cars) Two switches used. Adjust as follows:

Gearshift Lever Speed-Up Control Switch—With Air-Conditioner turned "ON" and gear selector lever in neutral position, loosen nut retaining lower gearshift lever-to-switch rod at switch arm. Move switch arm so Speed-Up Control operates engine at fast idle with clutch pedal out (clutch engaged).

Clutch Pedal Speed-Up Control Switch—With Air-Conditioner turned "ON" and gear selector lever in neutral position, loosen bolts retaining clutch switch and move switch so Speed-Up Control operates engine at fast idle with clutch pedal out (clutch engaged), and at normal idle with clutch pedal in (clutch disengaged).

THROTTLE LINKAGE ADJUSTMENT (ALL MODELS): *Adjust exactly as follows:*

1) Carburetor Throttle Rod—Disconnect throttle rod at throttle lever on left side of transmission case. Check and adjust engine idle speed to 365-385 RPM (Cars without Air Conditioning); 460-480 RPM (Cars with Air Conditioning), hot or slow idle with engine at normal operating temperature, transmission warm, and selector lever in "N" position. Install adjusting pin J-2544 through holes in carburetor intermediate lever on left side of cylinder head and lever bracket. Adjust nuts at trunnion on carburetor throttle rod (back off one nut, tighten opposite nut) until adjusting pin is free with carburetor throttle lever stopscrew against its stop. Tighten trunnion nuts but **do not remove adjusting pin.**

2) Transmission Throttle Front Rod—Check adjustment by inserting a second J-2544 adjusting pin through holes in idler lever (left side of crankcase below starter) and lever bracket. If pin does not enter both holes freely, adjust length of transmission throttle front rod at trunnion on upper end of this rod, then tighten both locknuts securely and remove both adjusting pins.

3) Accelerator Pedal Rod—Loosen front locknut on pedal rod at throttle control idler lever on left side of engine, depress accelerator pedal until carburetor throttle is just wide open. Check clearance between lower face of accelerator pedal and floor mat. If clearance is not ¼" at closest point, adjust pedal by turning rear nut at trunnion on forward end of rod in or out as required, then tighten front nut securely.

CARTER

Carter WCD Models. Dual downdraft type with automatic choke control as follows:

Model	Carter No.
1953 Synchro-mesh	7195A
1953 Hydra-Matic	7205A
1954 Synchro-mesh (Early)	7195A
1954 Synchro-mesh (Late)	①7205A
1954 Hydra-Matic	2122S

①—Approximately 15,000 used on Hydra-Matic Drive cars.

Idle Setting—7195A, 7205A)—¾-1¼ turns open. Turn screw out for richer mixture. NOTE—Two idle screws used.

Idle Setting (2122S)—¾-1¾ turns open. Turn screw out for richer mixture. NOTE—Single idle screw on this carburetor.

Idle Speed—Different settings as follows:

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Model	Idle Speed
Synchro-Mesh Cars	450-475 RPM
Hydra-Matic Cars (without Air-Cond.)	365-385 RPM
Hydra-Matic Cars (with Air-Cond.) ①	460-480 RPM

①—This setting supersedes previous specifications which were same as for cars without air-conditioner.

Float Level—3/16" from top of float to gasket seat on bowl cover (with gasket removed) using gauge T109-162. Sides of float should barely touch vertical uprights on gauge to avoid floats binding on sides of bowl.

Accelerating Pump—Lower hole (min.) Normal.

Fast Idle Setting: With choke valve tightly closed and fast idle screw on high step of fast idle cam, tighten adjusting screw until there is .026" clearance between throttle valve and bore of carburetor on side opposite idle port.

Automatic Choke Setting: Centered (at index).

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Idle Speed-up Control (Air Conditioned Cars): *See "Carburetor" above.*

Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section.*

►*OTHER DATA: See "Carter WCD" Carburetors in Carburetor Section.*

Fuel Pump Pressure: 4-4¾lbs.

CARB. EQUIPMENT

Fuel Pump: AC. Replacement No. 9640 (Without Air-Conditioner), No. 539 (With Air-Conditioner). Fuel & Vacuum.

Pressure—4-4¾lbs.

See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: AC Electric type.

Dash Unit—AC No. 1517603.

Tank Unit—AC No. 1517411 (1953); No. 1518093 (1954).

See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Standard—Delco 15E6W. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).

Air-Conditioned Car—Delco 19E6W. 6 volt, 19 plate, 130 ampere hour capacity (20 hr. rate).

Battery Ground—Negative to engine.

Engine Ground—Rear of engine to firewall.

STARTER

Delco-Remy 1107957. Armature—1917855.

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6000	5.0	60
15 ft. lbs.	Lock	3.0	600

Starting Switch: Delco-Remy Solenoid No. 1118140 (no relay) mounted on starter and controlled by Ignition Switch (combination starting & ignition). Neutral Safety Switch used on Hydra-Matic Cars.

See "Starter Controls" in Electrical Equipment Section.

Neutral Safety & Backup Light Switch: Delco-Remy 1998039. At lower end of steering column. Connected in starter control circuit so that starter operates only when selector lever in "N" (Neutral).

Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy. Different generators used as follows:

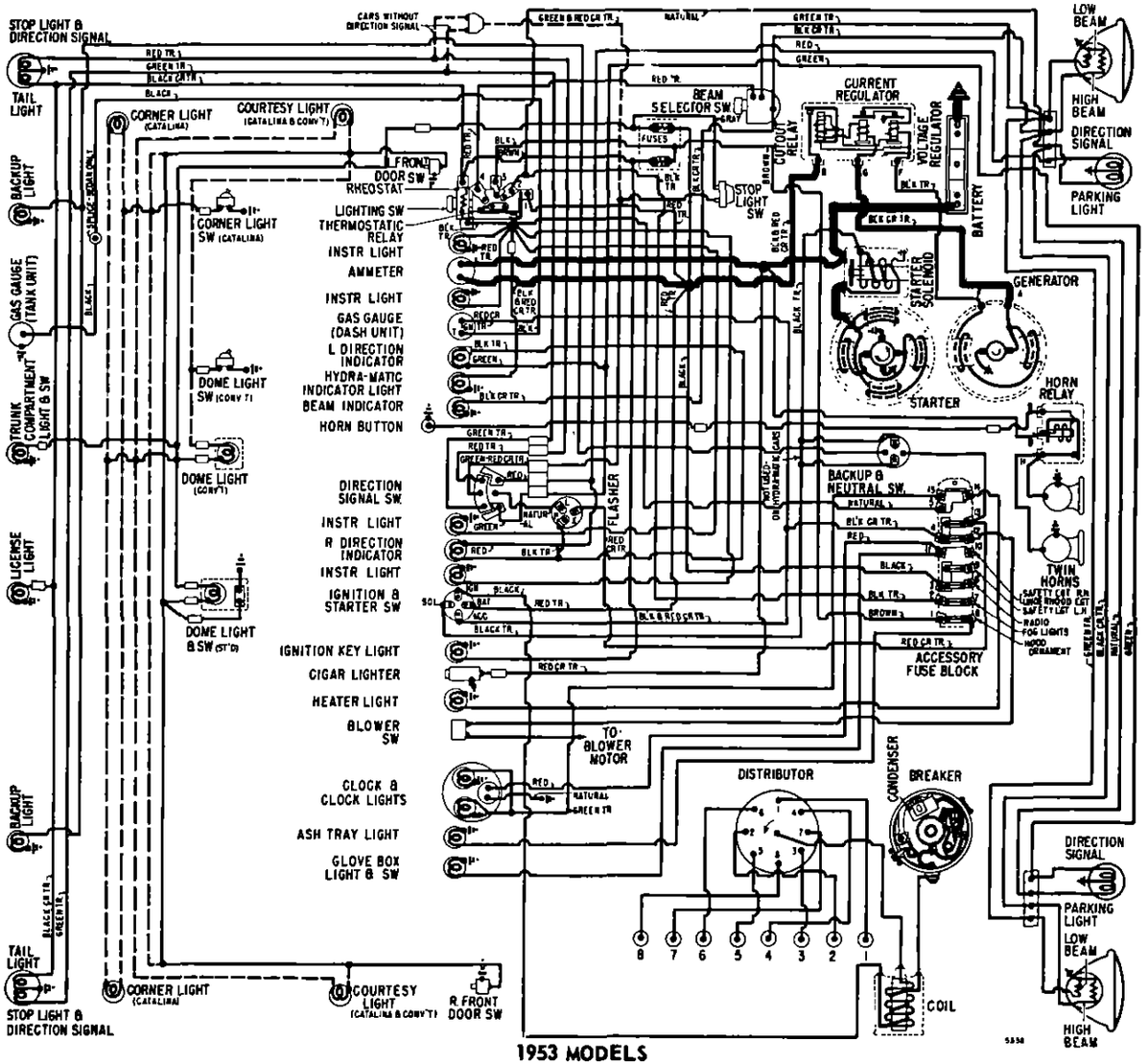
Model	Generator No.	Armature No.
Standard	1102794	1912599
Air Conditioned	1105015	
Hvy. Duty & Police	1105900	1918009

Performance Data

Gen. No.	Amperes ①	Volts	RPM
1102794	45	8.0	2350
1105015	50	7.0	2100
1105900	50	7.0	2100

①—Not maximum. See Regulator.

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1953 MODELS

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Brush Spring Tension—28 ozs.
Field Current—1.87-2.00 amps. (1102794), 1.77-1.93 amps. (1105015 & 1105900). At 6.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: Belt deflection midway between generator and fan pulleys should be ¼" with 10 lb. force applied.

REGULATOR

1953 Models

Delco-Remy—1118725 (1102794 Gen.). 1118722 (1105900 Gen.). Voltage & current type.
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4).
Contact Gap—.020" (same for both contacts).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting (1118725)—7.0-7.7 volts hot (set to 7.4).
Setting (1118722)—6.8-7.5 volts hot (set to 7.2).
▷*NOTE: Regulator is compensated for temperature. Check with cover in place and hot.*
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting (1118725)—45-51 amps. hot (set at 47 amps.).
Setting (1118722)—48-52 amps. hot (set at 50 amps.).
Air Gap—.075" with contacts pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

1954 Models

Delco-Remy 1118827 (1102794 Gen.). 1118835 (1105015 & 1105900 Gen.). New "1118825 Series" Regulator.
▷*1954 REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. Following Specifications are "Normal" settings.*

Cutout Relay

Cuts In—6.4 volts (hot).
Contact Gap—.020".
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.3 volts (hot)
Air Gap—.075" with armature pressed down to point where contact just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—47 amps. (1118827), 52 amps. (1118835), hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

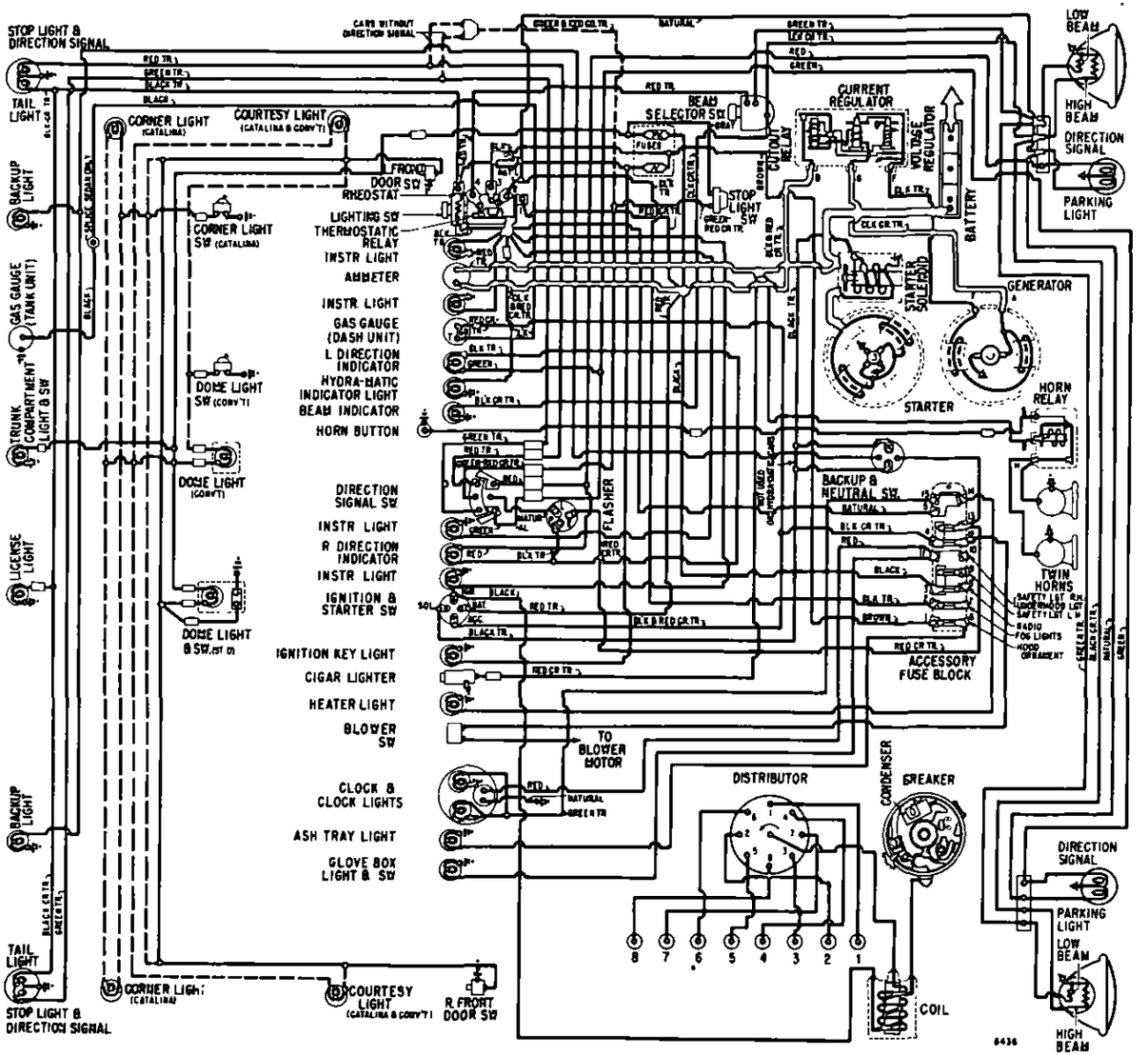
▷*1953 WIRING HARNESS INTERFERENCE (CONVERTIBLE): Make sure that wire harness is secured behind clip in left door hinge lower hinge box. If not enough slack, remove kick-pad for access to harness clips.*

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*
Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*

Lighting Switch Removal: Remove one battery cable from battery. Pull headlight switch knob to "on" position, push latch button on side of switch assembly and pull out switch knob assembly. Screw bushing from switch assembly allowing switch assembly to be removed from instrument panel.

Stop Light Switch Location: On brake master cylinder located on left frame side rail forward of brake pedal.

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1954 MODELS

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FUSES: Main Fuse Block—Left hand side of firewall in engine compartment. Two fuses (plus 1 spare) as follows:

Gold Color Fuse Holder—14 amp. Protects tail, rear license light, instrument lights, ignition key light, and clock light (dome light on Conv.).

Grey Color Fuse Holder—Protects trunk and dome lights (exc. dome light on Conv.).

Accessory Fuse Block—Six fuses mounted on fuse block behind instrument panel. All fuses 20 amps., except radio fuse which is 14 amps. (Spare Radio fuse on main fuse block on engine side of firewall).

CIRCUIT BREAKER: 42 amps. Located in headlight switch.

HORNS: Delco-Remy 1999645 (Low note), 1999646 (High note).

Horn Relay: Delco-Remy 1116775.

Contacts Close—2.75-4.0 volts (set to 3.5 volts).

Contact Gap—.027". **Air Gap**—014" (closed)

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*1953 ENGINE ROUGHNESS CORRECTION (POWERGLIDE CARS): See "1954 Chevrolet Powerglide" in Transmission Section for Engine Side Support Adjustment.*

ENGINE SPECIFICATIONS: Own. 8 Cylinder "L" head.

Bore—3 3/8". **Stroke**—3 3/4".

Displacement—268.4. cu. ins. **Rated HP**—36.45.

Developed HP (1953)—118 at 3600 RPM (6.8-1 Head). 122 at 3600 (7.7-1 Head).

Developed HP (1954)—122 at 3800 RPM (6.8-1 Head). 127 at 3800 RPM (7.7-1 Head).

Displacement—268.4 cu. in. **Rated H.P.**—30.46.

Developed H.P.—122 at 3800 RPM (6.8-1 Head). 127 at 3800 RPM (7.7-1 Head).

Compression Ratio—6.8-1 (Std. Head with Synchro-mesh), 7.7-1 (Optl. Head with Hydra-Matic).

Compression & Vacuum Reading—*See Tune-Up.*

ENGINE REMOVAL: *See Pontiac Special Data.*

OIL PAN REMOVAL: *See Pontiac Special Data.*

CYLINDER HEAD: *See Pontiac Special Data.*

TIGHTENING TORQUES: *See Pontiac Special Data.*

FRONT END ASSEMBLY REMOVAL: *See Pontiac Special Data.*

ENGINE FRONT MOUNTING REMOVAL: *See Pontiac Special Data.*

PISTONS

Chrome-nickel alloy iron, tin plated.

Removal—Pistons and rods removed from above.

Taper and Out-of-Round Limits—.001".

Fitting New Pistons: Insert .0015" x ½" feeler gauge between piston and cylinder wall on thrust side. Pull to withdraw feeler must be 10-20 lbs.

Replacement Pistons: Std. size and .010", .020", .030" Oversize.

PISTON PINS

Pressed into pistons and retained in place with retainer rings at each end, floating in connecting rod bushing.

Diameter—.9369-.9375" selective. **Length**—2 7/8".

Pin Fitting in Piston—*See "Piston Pins" in Pontiac Special Data.*

Pin Clearance in Rod Bushing— .0004- .0006".

Piston Pin Removal & Installation—*See "Piston Pins" in Pontiac Special Data.*

Replacement Pins: .001" (green), .003" (red), .005" (blue) Oversize. Paint code marked on end of pin.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Comp. (#1, #2)	3/32"	.008-.015"	.0015-.003"
Oil (#3)	3/16"	.008-.015"	.001-.0025"

Installing Rings: Install compression rings with marks "TOP" or "T" toward top of piston. Oil ring can be installed either way.

Replacement Rings: Std. size, .005", .010", .020", .030" Oversize.

CONNECTING RODS

Length—7.560-7.565" (center-to-center).

Weight—32 ozs. (less bearings).

Crankpin Journal Diameter—1.9987-1.9997".

Piston Pin Bushing (Upper Bearing)—Split aluminum bronze bushing. *See "Connecting Rod & Bearings" in Pontiac Special Data.*

Lower Bearing—Steel backed, babbitt lined insert. No shims.

Clearance—.0001-.0021". **Sideplay**—.007-.012".

Replacement Bearings: Std. .001", .002" Undersize.

Installing Rods: Not offset, install either way. Marks on rods and caps must be together (marks do not indicate in which cylinder rod is used).

CRANKSHAFT

Journal Diameters—(1) 2.3732-2.3742"; (2) 2.4044-2.4054"; (3) 2.4357-2.4367"; (4) 2.4469-2.4679"; (5) 2.6232-2.6242".

Bearings—Steel backed babbitt lined inserts. No shims. Upper and lower halves are interchangeable.

Clearance—.003-.0023".

Replacement Bearings: Std. .001", .002" undersize.

End Thrust: Taken at #4 (rear intermediate) bearing.

Endplay—.003-.008".

Rear Main Bearing Oil Seal Renewal: *See "Crankshaft & Main Bearings" in Pontiac Special Data.*

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

CAMSHAFT

Bearing Diameter & Installation: *See "Camshaft" in Pontiac Special Data.*

Clearance—.0015-.0025" (new).

End Thrust: Steel plate behind camshaft sprocket. Replace if worn. **End Play**—.003-.007".

Timing Chain: Morse. Width 27/32". Pitch 3/8". Length 21" or 56 links.

Chain Installation—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Sprockets marked. Mesh chain with sprockets turned so that "O" marks are adjacent and in line with straightedge across shaft centers.

Timing Chain Cover Oil Seal Installation: *See "Timing Chain" in Pontiac Special Data.*

VALVES

►*AIR-CONDITIONED CAR NOTE—An access hole is provided in right front fender apron for valve adjustment.*

Tappet Clearance: .011-.013" HOT. Use .011" "Go" gauge .013" "No Go" gauge. High Speed Setting-.013" (exhaust valve).

Valve	Head Diam.	Stem Diam.	Length
Intake	1 15/32"	.310-.311"	5.53"
Exhaust	1 11/32"	.310-.311"	5.53"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.19/64"	Ⓒ Free Fit to .0006"
Exhaust	45°	.19/64"	Ⓒ Free Fit to .0006"

Ⓒ—Tapered (max. clearance at bottom .0006").

Valve Seat Width—1/16".

Valve Springs: Intake and exhaust valve spring identical. Install with two closed coils at top and dampener on top of each spring. Use new dampeners whenever removed from spring.

Spring Specifications

	Spring Pressure	Length
Valve Closed	59-66 lbs.	1 29/32"
Valve Open	97-105 lbs.	1 19/32"

Valve Guides: Valve guides have tapered hole (.001" taper to inch - greatest clearance at top) Exhaust guides counterbored at top to depth of 3/4".

Checking Valve Clearance in Guide—Clean guide with tool KMO-122, clean counterbore in exhaust guide with Counterbore Cleaner J-2122. Valve should just fall through guide of own weight.

Installing Guides—Use Valve Guide Remover J-2542 to remove and install guides. Drive new guide down in block (counterbored end up on exhaust guides) until upper end 29/32" below top edge of valve seat. Ream guide with PR-131 tapered reamer and finish counterbore with Counterbore Cleaner J-2122.

►*CAUTION—Guides furnished with straight hole which must be taper reamed.*

Valve Lifters: Barrel type, cast iron. Guide holes reamed in block. Lifters furnished .005" oversize (use pilot reamer J-706-P when reaming holes to maintain alignment - valve guides must be removed).

Clearance—Free fit. Lifter should just move freely with finger touch.

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VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 5° BTDC. Close 39° ALDC.
Exhaust Valves—Open 45° BLDC. Close 5° ATDC.
Valve Timing Check—With .015" clearance, #1 intake valve should open with #1 piston 5° BTDC with first straight line of dampener mark (6°) slightly past pointer on chain cover. Reset Tappet clearance.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 6 qts. (dry).
Normal Oil Pressure: 30-45 lbs. at 40 MPH.
Pressure Regulator—On oil pump. Opens at 40 lbs. Replace spring if free length less than 2 5/16".
Oil Pressure Gauge—AC No. 1507707. Not electric.

Oil Pump: Gear type. On right side of crankcase.
Pump Overhaul—*See "Oil Pump" in Pontiac Special Data.*

Oil Cleaner: Precipitation type (in crankcase).
Removal & Installation—*See "Oiling System" in Pontiac Special Data.*
Crankcase Ventilation: Filter element in oil filler cap (inlet). Outlet pipe at valve compartment cover on right rear side of engine (cars with oil bath air cleaner use a 3-piece outlet pipe containing filter element).
►*CAUTION:* Filler cap must be installed with air opening in cap toward front of car and seam in line with groove in tube (may cause excessive oil consumption if installed backwards).

COOLING

►*AIR-CONDITIONED CAR NOTE: Radiator and radiator hoses used on these cars are of heavier construction than standard models.*
Water Capacity: (Without Air-Conditioner): 18¾ qts. (without heater). 20½ qts. (with heater).
With Air-Conditioner—20 qts. (without heater). 21 3/4 qts. (with heater).
Pressure Valve: AC No. 850549 (Without Air-Cond.) opens at 7 lbs. AC No. 850559 (With Air-Cond.) opens at 13 lbs.
►*PRESSURE VALVE CAUTION: Do not use 7 lb. pressure cap with Air-Conditioning.*
Thermostat: Harrison "Pellet" type. In cylinder head outlet. Pontiac No 3132436 opens at 160°.
►*CAUTION: Install with marks "front" & "to rad." toward radiator.*
Water Pump: Packless, sealed ball bearing shaft. *See "Pontiac" in Water Pump Section.*
Pump Removal—Drain cooling system, remove hose connections at pump, remove belt, take out water pump mounting bolts and lift pump out.
Temperature Gauge: AC No. 1512458. Not electric.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Inland. Single plate, "Diaphragm", dry disc type with Long driven member.
See "Inland" in Clutch Section.
Clutch Disc No.—Pontiac No. 513583.
Pedal Adjustment: *7/8-1 1/8" (adjusting nut on link at clutch fork).*
Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing) and remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing. Tap bearing support from inside clutch housing to aid removal (CAUTION—Avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure installation in same position to maintain balance), remove clutch cover bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member, lower clutch cover assembly out.
Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retainer ring on transmission main drive gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).
►*CLUTCH PEDAL SPEED-UP CONTROL SWITCH ADJUSTMENT (AIR-CONDITIONED CARS): See "Speed-Up Control Switch" under CARBURETOR above.*

SYNCHRO-MESH TRANSMISSION

Own. All helical gear.
See "Pontiac Synchro-Mesh" in Transmission Section.
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
Removal: Disconnect speedometer cable, gearshift selector and control rods from transmission. Disconnect rear universal (wire trunnions) and pull out propeller shaft. Remove upper transmission mounting screws, install guide pins (J-851), remove lower screws, pull transmission to rear, down and out.

Installation Note—Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support). NOTE—These guide pins may be made from ½"-13 American National Thread bolts by cutting heads off and reducing overall length to 4¼".

►*GEARSHIFT LEVER SPEED-UP CONTROL SWITCH ADJUSTMENT (AIR-CONDITIONED CARS): See "Speed Up Control Switch" under CARBURETOR above.*

POWERGLIDE TRANSMISSION

►*FOR 1953 CARS WITH POWERGLIDE TRANSMISSION: See "Chevrolet Powerglide" in Transmission Section.*

HYDRA-MATIC DRIVE

"Dual-Range" four speed automatic transmission and fluid coupling.
►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*
►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*
Lubrication—Check fluid level every 2000 miles, drain and refill at 25,000 mile intervals.
Checking Fluid Level—Run engine for approximately 1½ minutes at speed equivalent to 20 MPH. with selector lever in "N". Reduce engine speed to **slow idle** and move selector lever to "D" position, measure level with dipstick, add fluid until level is at "FULL" mark with engine idling.
Capacity—Approximately 11 qts. (refill).
Recommended Fluid—Use G.M. Hydra-Matic Fluid or Automatic Transmission Fluid Type A.
►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw. Needle bearing type.

►*CAUTION:* Rear universal companion flange nut controls rear axle pinion bearing "preload" (must be adjusted whenever nut is loosened). *See "Pontiac Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Hypoid gear, semi-floating with Hotchkiss Drive.
See "Pontiac Hypoid" in Rear Axle Section.
Axle Identification—Code mark stamped on pad at forward side of differential carrier between bottom web and right hand horizontal web. Axle shaft also marked with daub of paint on end of shaft to indicate ratio. See Code and Paint Markings in table below:

Axle Ratios & Code Marking

Ratio	Gear Teeth	① Code Mark	② Code Color
3.08-1 ③	40:13	0	Yellow
3.23-1 ③	42:13	9	Brown
3.42-1 ③	41:12	8	Aluminum
3.63-1 ④	40:11	6	Blue
3.9-1 ④	39:10	4	Red
4.1-1 ④	41:10	3	Green

①—See Axle Identification above.
②—Paint daub on end of axle shaft.
③—Hydra-Matic Drive Cars.
④—Synchro-mesh Transmission Cars.
⑤—Optional (for standard fuel engines).

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Backlash—.003-.012" (new), .012" (used).

Axle Shaft Removal: Removal wheel, brake drum, four brake backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with Puller J-942 (do not drag axle shaft on seal).

Wheel Bearing Adjustment: None.

Differential Carrier Assembly Removal: Disconnect rear universal and wire trunnion in place (do not disengage spline joint at transmission), remove axle shafts, and carrier flange capscrews. Withdraw carrier assembly from housing.

►*CAUTION: Rear universal joint companion flange controls pinion bearing preload. Readjust whenever nut loosened.*

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (non-refillable). Service by replacement.

Model	Front	Rear
Standard	5303492	5303290
Taxi & Police Cars.	5519438	5519439

FRONT SUSPENSION

►*FRONT SPRING NOTE—Heavier springs used on cars with Air-Conditioning.*

Independent. Shock absorber mounted within front coil springs.

See "Pontiac" in Front Suspension Section.

Kingpin Inclination—4½° at ½° camber.

Caster—0° ± ½°.

Camber—½° ± ½°

Toe-In—0-1/16" measured 9" from floor.

Toe-Out on Turns—With inner wheel at 20°, outer wheel should be 18° 30'.

STEERING

Manual: Saginaw Worm & Roller. *See "Saginaw Worm & Roller" in Steering Section.*

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic cylinder. *See "Saginaw (GM) Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Bendix Hydraulic. Duo-servo, single anchor (without eccentric adjustment). Hand lever applies rear wheel service brakes.

See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

►*1954 BRAKE PEDAL & MASTER CYLINDER CONNECTING ROD INTERFERENCE CORRECTION:* Difficulty may be experienced in getting correct pedal height adjustment due to interference between master cylinder connecting rod clevis and brake pedal. If pedal height of 4 3/8-4 5/8" cannot be obtained it can be corrected by grinding a relief in master cylinder connecting rod clevis on the lower side at a point approximately 2" from rod end and extending toward clevis end for 1".

►*1953 SQUEAKING BRAKE CORRECTION: See Brake Section for installation of Brake Drum Silencer Springs.*

Drums—Diameter 11".

Wheel Cylinder Diameter—Front 1 1/16". Rear 7/8".

Lining Width & Thickness	Width	Thickness
Front	2¼"	3/16"
Rear	1¾"	3/16"

Clearance—Tighten adjusting "Star Wheel" to point where wheel can just be turned by hand, then back off star wheel 14 notches.

Braking Power—60% front wheels. 40% rear wheels.

Standard Master Cylinder: Forward of brake pedal on bracket attached to engine rear cross member.

Checking Fluid—Fluid reservoir is part of master cylinder. Maintain fluid level to top of reservoir.

Removal—Remove from engine compartment. Not necessary to disturb other parts.

Power Brakes: Bendix Vacuum Power Unit (combination vacuum power unit and hydraulic master cylinder). Unit mounted on underside of toe board and replaces regular master cylinder.

See "Bendix Power Unit" in Brake Section.

Checking Fluid—Same as for standard master cylinder.

Removal of Power Unit—Disconnect upper end of vacuum hose attached to inlet tube of master cylinder, and hydraulic lines from hydraulic cylinder. Remove stop light wires. Disconnect push rod from brake pedal and remove brake pedal from pivot bracket. Remove clutch pedal and steering column seals. Remove vacuum cylinder mounting plate screws while holding power unit push rod. Remove mounting plate, working it over clutch pedal while holding power unit in position. Remove power brake unit.

MISC. MECHANICAL

Windshield Wipers: Cable operated Vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

►*1953 WINDSHIELD WIPER DRIVE PRODUCTION CHANGE & ADJUSTMENT CAUTION: See Miscellaneous Section for data.*

Air-Conditioning: Harrison type with magnetic compressor clutch (compressor operates only with air-conditioner switch turned on). *See "Harrison" Air-Conditioning in Miscellaneous Section.*

Window Regulators: Electric. Reversible motor in each window. Available on front doors only. *See "Window Regulators" in Miscellaneous Section.*

Power Top Control: Hydro-Lectric with reversible pump motor. *See "Power Top Controls" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL & ENGINE NUMBERS (Numbers are the same): On left front hinge pillar post and on raised pad at front of right hand cylinder block.

Starting Serial & Engine Number—1001 with prefix as indicated below.

►*ENGINE & SERIAL NUMBER NOTE: Engine and Serial number (example P755H 1001) includes following identification data in sequence:*

Assy. Plant	Model ①	Model Year	Trans. ② Type	Serial No.
See below	7	55	H	1001

① —7—27 Series. 8—28 Series.
② —H—Hydra-Matic Trans. S—Synchro-mesh Trans.

Assembly Plant Designations

P—Pontiac	K—Kansas City
C—South Gate	L—Linden
W—Wilmington	A—Atlanta
F—Framingham	T—Arlington

►*7.5-1 COMPRESSION RATIO ENGINE IDENTIFICATION: On Synchro-mesh Cars with 7.5-1 compression ratio, an "L" is stamped on engine number pad.*

TUNE-UP

COMPRESSION PRESSURE: 135-145 lbs. at cranking speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

►*ADJUSTMENT (When Cylinder Head or Valve System disturbed): See Valve Tappet Adjustment under "Valves" in ENGINE data.*

MANIFOLD HEAT CONTROL: Thermostatic coil type mounted in right hand exhaust manifold.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033-.038".
Spark Plugs—AC No. 44-5. 14 mm.

COIL: Delco-Remy 1115087. *12 Volt.*
Resistor—Delco-Remy 1927809.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by lead from starter solenoid-to-coil.

DISTRIBUTOR: Delco-Remy 1110828. *12 Volt.*
Condenser—Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set—Delco-Remy 1918148.
Breaker Gap—.016".
Cam Angle—26-33°.
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Counterclockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	325	0-4	650
10.5-12.5	1200	21-25	2400
12-14	1400	24-28	2800
14-16	1700	28-32	3400

Vacuum Spark Control: Delco-Remy 1116080.
Plunger Travel—11/64-3/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6"
8	16	12.5-13.5"

IGNITION TIMING

Setting—5° BTDC. With engine running at 400 RPM (Hydra-Matic Cars), 450 RPM (Synchro-mesh Cars).

Timing Marks—Three marks on harmonic balancer indicating **TDC—3° BTDC-5° BTDC.** Pointer on chain case cover aligned with correct mark on balancer.

CARBURETOR

►*CARBURETOR APPLICATION: Rochester and Carter 2-Barrel used on Hydra-Matic Drive Cars. Carter 2-Barrel used on Synchro-mesh Cars. Carter 4-Barrel WCFB or Rochester 4-Barrel 4GC are optional equipment (Power Pack).*

►*ENGINE LOADING CORRECTION (Cars with Rochester 2GC 2-Barrel Carburetor): New choke piston can be installed to provide greater initial choke opening to prevent loading. See "Rochester 2GC Carburetor" in Carburetor Section.*

►*CARBURETOR FLOODING (Due to Excessive Fuel Pump Pressure): See "Fuel System Notes" in Pontiac Special Data.*

►*HARD STARTING DUE TO UNSATISFACTORY UNLOADER OPERATION AFTER FLOODING (Cars with Carter WCFB 4-Barrel Carburetor): See "Carter WCFB 4-Barrel" in Carburetor Section for recommended rework of Carburetor and Throttle Linkage.*

►*CARBURETOR REPLACEMENT CAUTION:* First type intake manifolds with a curved section at rear of mounting flange will accomodate **Carter carburetors only.** Later manifolds with a fairly straight section at this point will accomodate either Rochester or Carter carburetors. A high vacuum leak will occur if Rochester carburetor used with first type intake manifold.

►*LOST MOTION OR LOOSENESS IN THROTTLE LINKAGE (EARLY SYNCHRO-MESH CARS):* Check distance between throttle rod hole center-lines and if found to be greater than 11.420", indicating an early type rod, increase bend in the rod so that distance between hole center-lines is 11.380-11.420".

►*HYDRA-MATIC TRANSMISSION THROTTLE ROD PRODUCTION CHANGE:* Transmission throttle control rod installed in lower hole on later cars and in upper hole on early cars. To decrease throttle valve pressure and increase accelerator linkage free travel, the rod on early cars can be installed in lower hole. *CAUTION*—When making this change, make sure that rod does not touch left rear engine mount at any point in its travel.

THROTTLE LINKAGE ADJUSTMENT: (HYDRA-MATIC DRIVE CARS): With engine at normal operating temperature, idle speed set at 390-410 RPM, and with transmission selector lever in neutral, install linkage adjustment pin J-2544 through holes in lever and bracket at rear of left engine block. Pin should fit free in holes without lever movement. If free fit not obtained, adjust trunnion nuts on carburetor throttle rod until pin is free, then lock nuts securely. Leave gauge pin in hole. Loosen trunnion nuts on transmission throttle control rod and push rod downward until control outer lever is felt to touch end of its travel (top nut must not be touching trunnion). **Shorten throttle control rod two turns** by loosening lower nut two turns and tightening upper nut 2 turns *Remove gauge pin. With* carburetor throttle in full open positive and Downshift Return Spring fully extended, adjust throttle control intermediate rod trunnion (at lever on engine bracket) so that accelerator pedal clears floor mat by approximately ¼" at closest point, tighten trunnion locknuts. *NOTE—See Hard Starting Correction in "Carter WCFB 4-Barrel" in Carburetor Section for special setting on cars with this carburetor.*

ROCHESTER 2GC 2-BARREL

Rochester Model 2GC No. 7006100 (Hydra-Matic Drive Cars).

►*CARBURETOR CHOKE PISTON CHANGE (to correct Engine Loading): See "Rochester 2GC Carburetor" in Carburetor Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting—1-1/2 turns open from lightly seated position (turn screws out for richer mixture). Adjust as necessary from this preliminary setting to give a smooth idle at correct idle speed (see below).

Idle Speed (Synchro-mesh Cars)—450-470 RPM.
Idle Speed (Hydra-Matic Cars)—390-410 RPM.

►*AIR-CONDITIONED CAR NOTE: Adjust idle speed with Air Conditioner turned "ON".*

Float Level—1-15/64" from air-horn gasket to top of float with assembly inverted. Use Gauge BT-105 so it rests against power piston shaft with outer leg in line with center of float. Adjust by bending float arm between pivot and float with Tool BT-69.

Float Drop—1-29/32" *between air-horn gasket and* lowest point on bottom of float with air-horn held upright (Gauge BT-105). Adjust by bending float tang toward float needle seat to lessen drop, and away from seat to increase drop.

Fast Idle: No adjustment of fast idle speed is provided. It is necessary however to correct relationship between fast idle cam position and choke valve position. Check & adjust as follows: Place end of idle adjusting screw on next to highest step of fast idle cam. Using Gauge J-5920, slide small end between upper edge of choke valve and carburetor bore, with gauge held vertically. If necessary, bend choke rod until correct clearance is obtained.

Unloader Adjustment—With throttle in wide open position and choke thermostat cover set at index, bend tang on throttle lever so that large end of Tool J-5920 just fits between upper edge of choke valve and inner side of air horn.

Automatic Choke Setting: Centered (at index).

►*OTHER DATA: See "Rochester 2GC Carburetor" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. *CAUTION—Pressure in excess of 5 lbs. will cause carburetor to flood. See "Fuel System Notes" in Pontiac Special Data.*

►*FUEL PUMP, ARM WEAR CORRECTION: See "Camshaft" below.*

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CARTER WGD 2-BARREL

Model	Carter No.
Synchro-mesh (Early)	2207S
Synchro-mesh (Late)	2207SB
Hydra-Matic (Early)	2182S
Hydra-Matic (Later)	2182SA
Hydra-Matic (Late)	2182SB

►*CARBURETOR FLOODING CORRECTION: See "Fuel System Notes" in Pontiac Special Data for excessive fuel pump pressure. See also "Carter WGD Carburetor" in Carburetor Section for other recommended changes.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting (2207-S & SB)–1/2–1-1/2 turns open. Turn screws out for richer mixture.
Idle Setting (2182S, SA & SB)–1-1/4–2-1/4 turns open. Turn screws out for richer mixture.
Idle Speed (Synchro-mesh Cars)–450-475 RPM.
Idle Speed (Hydra-Matic Cars)–390-410 RPM.

►*AIR-CONDITIONED CAR NOTE: Adjust idle speed with Air-Conditioner turned "ON".*

Float Level: 7/32" from top of float to gasket seat on bowl cover (with gasket removed). Use Gauge T109-106. Adjust by bending float arm.

Accelerating Pump–No seasonal adjustment.

Fast Idle Setting: .026" throttle opening or clearance between valve and wall on side opposite idle ports with choke valve tightly closed. Adjust by bending choke connector rod at lower angle.

Unloader Adjustment–With fast idle adjustment completed, hold throttle valve wide open and close choke valve as far as possible (do not force choke valve closed). Clearance between upper edge of choke valve and inner wall of air horn should be 5/16" (Gauge T109-154). Adjust by bending choke shaft unloader arm.

Automatic Choke Setting: *CAUTION–2 Settings used.*
(Synchro-mesh Cars–2207S, SB)–1 Point Lean.
(Hydra-Matic Cars–2182S, SA, SB)–1 Point Rich.

►*OTHER DATA: See "Carter WGD Carburetor" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5 lbs. *CAUTION–Pressure in excess of 5 lbs. will cause carburetor to flood. See "Fuel System Notes" in Pontiac Special Data.*

►*FUEL PUMP ARM WEAR CORRECTION: See "Camshaft" below.*

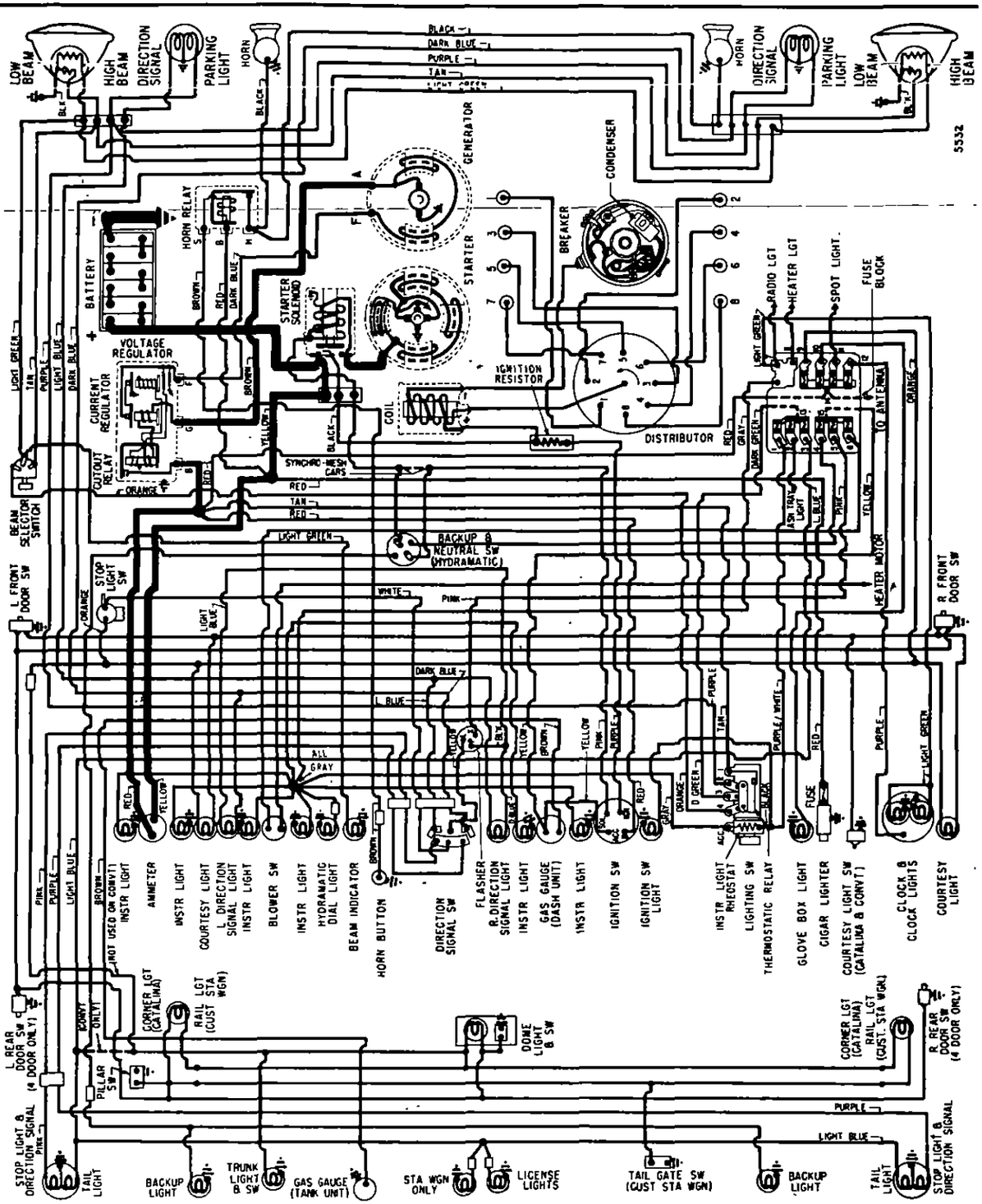
ROCHESTER 4GC 4-BARREL

Rochester 4GC No. 7007800 (Hydra-Matic Drive Cars).

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting–1½ turns open (preliminary setting). For final setting (with engine at normal operating temperature), adjust both idle mixture screws equally to give a smooth idle at specified RPM. Turn screws out for richer mixture.

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Idle Speed (Synchro-mesh Cars)–450-470 RPM.
Idle Speed (Hydra-Matic Drive Cars)–390-410 RPM.

►*AIR CONDITIONED CAR NOTE: Adjust idle speed with Air Conditioner turned "ON".*

►*OTHER DATA: See "Rochester 4GC 4-Barrel Carburetor" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5 lbs. *CAUTION–Pressure in excess of 5 lbs. will cause carburetor to flood. See "Fuel System Notes" in Pontiac Special Data.*

►*FUEL PUMP ARM WEAR CORRECTION: See "Camshaft" below.*

CARTER WCFB 4-BARREL

Model	Carter No.
Synchro-mesh	2283S
Hydra-Matic	2268S

►*CARBURETOR UNLOADER IMPROVEMENT (to correct Hard Starting due to unsatisfactory Unloader Operation): See "Carter WCFB 4-Barrel" in Carburetor Section for installation of new throttle lever flex spring.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–3/4–1-3/4 turns open. Turn screws out for richer mixture.
Idle Speed (Synchro-mesh Cars)–450-470 RPM.
Idle Speed (Hydra-Matic Cars)–390-410 RPM.

►*AIR CONDITIONED CAR NOTE: Adjust idle speed with Air Conditioner turned "ON".*

►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetor" in Carburetor Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5 lbs. *CAUTION–Pressure in excess of 5 lbs. will cause carburetor to flood. See "Fuel System Notes" in Pontiac Special Data.*

►*FUEL PUMP ARM WEAR CORRECTION: See "Camshaft" below.*

CARB. EQUIPMENT

►*HIGH FUEL PUMP PRESSURE CORRECTION (Causing Carburetor to Flood):* May be caused by the diaphragm being installed with insufficient slack. *See "Fuel System Notes" in Pontiac Special Data.*

►*FUEL PUMP ARM & ECCENTRIC WEAR CORRECTION & INSTALLATION CAUTION: See "Camshaft" below. See "Fuel Pumps" in Carburetion Equipment Section.*

Fuel Pump: AC. Replacement No. 4123 (Fuel & Vacuum). **Pressure**–4-5 lbs. *CAUTION–Fuel pump pressure must not exceed 5 lbs. pressure.*

Fuel Filter: Std. Equipment. This unit is a disc type filter which requires periodic service. *See "Fuel System Notes" in Pontiac Special Data.*

Gasoline Gauge: AC Electric type.
Dash Unit–AC No. 1518131.
Tank Unit–AC No. 1518093 (Exc. Sta. Wgn.). No. 1518250 (Sta. Wgn.).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Air Conditioned Cars–Delco 3SM70. *12 Volt,* 11 plate, 70 ampere hour capacity (20 hr. rate).
Except Air Conditioned Cars–Delco 2SM50. *12 Volt,* 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground–Negative.
Engine Ground–Between engine and fender at battery ground.

STARTER

Delco-Remy 1107631 (Std.), 1107632 (With Power Steering). *12 Volt.*
Armature–Delco-Remy 1926626.
Drive–Overrunning clutch (solenoid pinion shift).
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–35 ozs. minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
10.5 ft. lbs.	Lock	5.4	470

Starting Switch: Delco-Remy Solenoid 1119760 (no relay) mounted on starter and controlled by Ignition & Starter Switch, Delco-Remy No. 1116472. Neutral Safety Switch used on Hydra-Matic Drive Cars.

Neutral Safety & Back-up Light Switch: Delco-Remy 1998039. At lower end of steering column. Connected in starter control circuit so that starter operates only when selector lever in "N" (Neutral).

Adjustment–*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy Model:	Gen. No.	Armature No.
Standard	1100304	1928952
Hvy. Duty (1st type)	1102012	1923535
Hvy. Duty (2nd type)	1102018	1923535
Hvy. Duty (3rd type)	1102035	
Air. Cond. Car (1st type)	1105944	① 1932900
Air Cond. Car (2nd type)	1102027	②
Air Cond. Car (3rd type)	1102039	

①–Replaces Armature No. 1930814.
②–Replace Generator assembly with No. 1102039.

Maximum Charging Rate–*See Voltage Regulator.*

Performance Data–Cold

Generator	Amperes	Volts	RPM
1100304	25	14.0	2780
1102012	30	14.0	2150
1102018	30	14.0	2150
1102035	35	14.0	
1105944	35	14:0	2150
1102027	35	14:0	2350
1102039	35	14.0	

Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs.
Field Current–1.5-1.62 amps. (1100304); 1.48-1.62 amps. (1102012 & 1102018); 1.64-1.82 amps. (1102027); 1.54-1.67 amps. (1105944), all at 12 volts.

Belt Adjustment: ¼" belt deflection with approximately 8 lbs. pressure midway between pulleys.

REGULATOR

Delco-Remy Regulator No.	Use With Gen. No.
1118945	1100304
1118826	1102012 & 1102018
1118967	1102027 & 1102035
1118956	1105944

►*NOTE: Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cut-Out Relay

Cuts In–11.8-13.5 volts (hot).
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–13.8-14.8 volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section.*

Current Regulator

Setting (1118945)–23-27 amperes (hot).
Setting (1118826)–27-33 amperes (hot).
Setting (1118956 & 1118967)–32-37 amperes (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
►*LAMP BULB CAUTION: All lights are 12 Volts.*

Autronic Eye: *See "Autronic Eye" in Electrical Equipment Section.*

Direction Signal: *See "Direction Signals" in Electrical Equipment Section.*

►*DIRECTION SIGNAL SHORT CIRCUITING CORRECTION:* Direction signal wiring harness contacts gearshift lever support at upper end of steering column and in some instances may cause a short circuit. To correct, remove direction signal control assembly and replace the wiring harness and switch base assembly. Route the new harness in the guide clamp and push it down through clamp until it lies flush against underside of housing, then bend clamp around harness to hold it securely. Before installing control assembly, bend the clamp and harness toward center of housing to make sure it will not contact gearshift lever support.

Lighting Switch Removal: Remove one battery cable from battery. Pull headlight switch knob to "on" position, push latch button on side of switch assembly and pull out switch knob assembly. Screw bushing from switch

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assembly allowing switch assembly to be removed from instrument panel.

Stop Light Switch Location: Mechanical type switch located on bracket attached to steering column behind instrument panel.

Back-Up Light Switch: Located on left rear side of transmission case.

FUSES: Fuses listed below (except as noted) are located on a fuse block behind instrument panel on dash to left of steering column.

Instrument Panel–4 amps.
Hood Ornament & Ash Tray–7½ amps.
Stop Lights, Dome & Courtesy Lights–7½ amps.
Tail Lights–7½ amps.
Back-up Light–7½ amps.
Glove Box & Underhood Light–7½ amps.
Direction Signal & Brake Light–7½ amps.
Spot Lights–7½ amps.
Heater & Defroster–7½ amps.
Radio & Clock–7½ amps.
Air Conditioner–30 amp. Located in a line holder either on defroster core housing or if car not equipped with defroster, on front of dash where defroster should be.

LIGHTING THERMOSTATIC CIRCUIT BREAKER: *12 Volt*, 22 amperes. Located on lighting switch.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ENGINE "CLICKING" NOISE WHEN IDLING CAUTION:* May be caused by loose rivets in Vibration Dampener and is sometimes diagnosed as Hydraulic Lifter noise. Check vibration dampener before working on lifters. Correct by replacing Vibration Dampener. *See "Vibration Dampener" in Pontiac Special Data.*

►*GRINDING SOUND IN ENGINE CORRECTION:* Check oil pump drive shaft for evidence of shaft rubbing against hole in cylinder block. This evidence can be seen on outer diameter of shaft above the upset "nibs". Correct by grinding or turning the shaft for clearance. *CAUTION–Do not grind off the "nibs".*

►*OIL CONSUMPTION AT HIGH SPEED CORRECTION:* This condition may be caused by incorrectly installed crankcase ventilator outlet pipe. If ventilator pipe is pushed too far into push rod cover, high velocity air will carry oil directly out through pipe. Make sure that pipe is not forced past the two locating points on outlet pipe.

ENGINE SPECIFICATIONS: Own. V8 Valve-in-head.

Bore	Stroke	Displacement	Rated HP
3.75"	3.25"	287.3 cu. ins.	45

Engine	① Compr. Ratio	Developed HP
Standard	8.0-1	② 180 at 4600 RPM
With Power Pack	8.0-1	200 at 4600 RPM

①–7.5-1 optional compression ratio obtained by using different pistons. "L" stamped on engine number pad indicates low compression engine.
②–173 HP at 4400 RPM on "Low Compression" engine.

Compression & Vacuum Reading–*See Tune-Up.*

ENGINE REMOVAL: *See "Engine" in Pontiac Special Data.*

OIL PAN REMOVAL: Remove right and left engine side side aprons. Remove steering idler-lever support attaching screws and lower steering linkage as far as possible. Disconnect exhaust crossover pipe and jockey it around to a position where it can be removed without forcing. Remove flywheel housing lower cover and front shield. Loosen crankcase ventilator outlet pipe brace and swing brace out of way.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Pontiac Special Data.*

Oil Passage Plug (In Cylinder Head) Replacement: *See "Oiling System" in Pontiac Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Pontiac Special Data.*

INTAKE MANIFOLD: With **Special** flat washers under attaching nuts, tighten nuts evenly to 40-45 ft. lbs.

ENGINE MOUNTINGS: *See "Engine Mountings" in Pontiac Special Data.*

PISTONS

Cast aluminum alloy, slipper skirt, with piston pin offset 1/16" toward right side of engine.

►*DIFFERENT PISTONS USED IN "HIGH" & "LOW" COMPRESSION ENGINES:* Pistons identified as follows: High compression pistons are flat on top, and low compression pistons are "dished" out. Low compression pistons also have an "L" stamped on rear side near pin boss.

Removal–Pistons and rods removed from above.

Replacement Pistons: Std. size, and .005", .010", .020", .030" Oversize.

Fitting New Pistons: Clearance .0007-.0012" (measured just far enough above bottom of skirt to make sure micrometer is in full contact, and perpendicular to piston pin boss). Use a .0015" x ½" feeler gauge and spring scale. With piston and cylinder clean and dry, insert inverted piston and feeler gauge into lower half of cylinder (feeler 90° from pin hole). Pull required to withdraw feeler should be 8-15 lbs.

Installing Pistons: Install with notch in piston head and "F" mark on side of piston toward front of engine. *See Rod Installation.*

PISTON PINS

Pin is floating in piston and connecting rod and is retained by snap rings at each end.

Diameter–.9803-.9807".

Pin Fit in Piston–.0000"-.0002" loose with piston and pin at room temperature. When pin is toward high limit (.0002") pin can be inserted with light hand pressure, *pin should not fall through of its own weight.* When pin toward low limit (.0000"), considerable hand pressure will be required (a brass drift can be used to tap pin into place with light pressure).

Pin Fit in Connecting Rod–.0003"-.0005" loose.

Replacement Pins: Std. size, .001", .003", .005" Oversize.

PISTON RINGS

Upper compression ring is chrome plated. Both compression rings are taper faced and have either a chamfer or a step on inside diameter of top side.

Ring	Width	End Gap	Side Clearance
Upper Compr.	.078"	.010-.020"	.0012-.0027"
Lower Compr.	.078"	.008-.020"	.0012-.0032"
Oil	.183"	.015-.035"	.0025-.0095"

Installing Rings: Install compression rings with chamfer or step (on inside diameter) toward top of cylinder. Oil ring can be installed either way.

Replacement Rings: Std. size, .005", .010", .020", .030" Oversize.

CONNECTING RODS

Length–6.623-6.627" (center-to-center).
Crankpin Journal Diameter–2.2488-2.2498".
Connecting Rod Upper Bushing (Piston Pin) Removal & Installation–*See "Connecting Rods & Bearings" in Pontiac Special Data.*
Lower Bearing–Replaceable precision type.
Clearance–.0009-.0029" (new).
Sideplay–.006-.011".

Replacement Bearings: Std. size, .001", .002" Undersize.

Installing Rods: Install rods **2-4-6-8 (right bank)** with machined boss at lower end of rod toward the **rear.** Install rods **1-3-5-7 (left bank)** with boss toward the **front** of engine. When installed, machined bosses on rods will face each other. *See Pistons above.*

CRANKSHAFT

►*FRONT MAIN BEARING NOISE CORRECTION (POWER STEERING CARS):* Noticeable when engine warm and when power steering pump drive belt tightened to the high limit. Check by loosening belt below specified ft. lb. reading. DO NOT LEAVE BELT LOOSE. If noise not eliminated with belt tightened to low limit 58-65 ft. lbs., (new belt); 51-53 ft. lbs., (used belt) using Tool J-5574; decrease clearance between crankshaft and main bearing shells on front main bearing to a clearance of .001-.002".

►*MAIN BEARING CAP PRODUCTION CHANGE:* New bearing caps used in later production are heavier and have the bolt boss length increased. *Lockwashers are not used under attaching screws.*

Journal Diameter–2.2498-2.2499". Five bearings.
Bearings–Steel backed babbitt lined inserts. No shims.
Clearance–.0005-.003" (Except Rear), .0008-.0033" *(Rear).*

End Thrust: Taken by No. 4 (rear center) main bearing.
Endplay–.0035-.0085".

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Replacement Bearings: Std. size, .001", .002" Undersize.

Crankshaft Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Pontiac Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Pontiac Special Data.*

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Pontiac Special Data.*

CAMSHAFT

►*FUEL PUMP ARM & ECCENTRIC WEAR CORRECTION & INSTALLATION CAUTION:* If wear is found at the fuel pump arm or eccentric, replace 1½" inside diameter thrust plate with the later type having a 1 9/16" inside diameter. All service replacement thrust plates are 1 9/16" type.

Journal Diameters—1.8992-1.8997". Five bearings. **Clearance**—.0015-.0025".

End Thrust: Steel thrust plate located behind camshaft sprocket. Replace if worn or grooved. **Endplay**—.003-.007".

Timing Chain: Length—60 links. **Timing Chain Installation**—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Both sprockets marked '0'. Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers.

Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Pontiac Special Data.*

VALVES

►*INTAKE VALVE STEM OIL SPLASH SHIELD PRODUCTION CHANGE:* Beginning with Engine No. 54487, Oil Splash Shield, Part No. 520996 is installed over top of inner intake valve spring. Splash shields may be installed on early 1955 engines.

Tappet Clearance: None in service (hydraulic). *See "Initial Tappet Adjustment" below if cylinder head removed or valve system disturbed.*

Valve	Head Diam.	Stem Diam.	Length
Intake	1.778-1.784"	.3407-.3417"	5.250"
Exhaust	1.497-1.503"	.3407-.3417"	5.230"

Valve	Seat Angle	Lift	①Stem Clearance
Intake	29°	.327"	.0003-.0006"
Exhaust	44°	.327"	.0003-.0006"

①—In small end of taper reamed hole in guide. Correct fit of valve stem in valve guide is when valve will just drop through of its own weight and with no perceptible side play.

Valve Seat Width—3/64-1/16" (Intake), 1/16" (Exhaust).

Valve Stem Oil Seal: Neoprene type installed in second groove of intake valve stems. Later engines have an oil baffle installed over inner valve spring. *See "Intake Valve Stem Oil Splash Shield Production Change" above.*

Initial Tappet Adjustment: If cylinder head removed or valve assembly disturbed, adjust valve tappets as follows: Adjust valves for one cylinder at a time with piston in firing position (both valves completely closed). Loosen rocker arm ball nuts until pushrod is free to rotate, then tighten ball nut just until there is no axial movement (do not depress lifter plunger). **Tighten ball nut one complete turn.** Repeat this procedure for each cylinder.

Checking Valve Stem Length: *See "Valve System" in Pontiac Special Data.*

Valve Springs: Inner and outer valve springs used.

Valve Spring Specifications

Inner Spring Pressure	Inner Spring Length	Outer Spring Pressure	Outer Spring Length
54-60 lbs.	1.153"	98-106"	1.203"
23-29 lbs.	1.483"	55-61"	1.533"

Valve Guides: Pressed into cylinder head. Guides have tapered hole (.0015" taper to inch), with greater clearance at rocker arm end.

Valve Clearance in Guide—Valve should just fall through guide of own weight and with no perceptible side play.

Guide Replacement—Drive old guide out from combustion chamber side using Tool J-2542. Start chamfered end of guide into cylinder head and drive into place using Tool J-2542 until end of guide is 1 1/32" below roof of combustion chamber. Ream guides with taper reamer J-5713-2.

►*CAUTION: Guides furnished with straight hole which must be taper-reamed.*

Valve Lifters: Hydraulic type.

►*HYDRAULIC VALVE LIFTER REPLACEMENT CAUTION:* Lifters are coated with a plastic "wrap" at the factory and in some instances this coating may flow into hole in pushrod seat. Make sure that all traces of "wrap" are removed before installation.

►*VALVE LIFTER BALL CHECK VALVE SPRING PRODUCTION CHANGE;* This spring has been eliminated in early production and is not used on any of the succeeding type lifters.

►*HYDRAULIC VALVE LIFTER PRODUCTION CHANGE:* Three types of lifters have been used in production as follows: **1st Type**—Narrow groove in body (.219" wide), and undercut section at camshaft end. **2nd Type**—Wide groove (.400" wide), and undercut section at camshaft end. **3rd Type**—Wide groove (.400" wide), without undercut section. *All types are interchangeable in all respects.*
Diameter—.8420-.8427". **Length**—2.000".
Clearance (In Lifter Boss)—.0005-.0018".

Hydraulic Valve Lifter Overhaul: *See "Valve System" in Pontiac Special Data.*

Rocker Arms: Mounted individually on studs pressed into cylinder head.

Rocker Arm Stud Replacement—*See "Valve System" in Pontiac Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 22° BTDC. Close 67° ALDC.
Exhaust Valves—Open 63° BLDC. Close 27° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 6 qts. (when filter changed).

Normal Oil Pressure: 35-45 lbs.
Pressure Regulator—In oil pump body. Not adjustable.

Oil Pump: Gear type, located on right rear bottom of cylinder crankcase and driven by distributor drive gear. Distributor timing is not affected by removal and installation of pump.

►*OIL PUMP NOISE:* "Grinding" noise may be caused by upper end of oil pump drive shaft rubbing in hole in cylinder block. Examine outer diameter of shaft above upset nibs for rubbing and correct by reducing shaft diameter in this area by grinding or turning in a lathe. *CAUTION*—Do not remove nibs on shaft.

Pump Overhaul—*See "Oiling System" in Pontiac Special Data.*

Oil Filter: "Full Flow" type (optional). Replace filter element once every year or every 10,000 miles. *Use only AC Type PF-122 filter element.*

Oil Passage Plug (In Cylinder Head) Replacement: *See "Oiling System" in Pontiac Special Data.*

Crankcase Ventilator Air Filters: Located in oil filler cap and in ventilator outlet pipe. Clean and re-oil every 10,000 miles or oftener if necessary.

►*VENTILATOR OUTLET PIPE CAUTION: If pipe is removed from pushrod cover, make sure that when it is installed, it is not pushed into cover beyond the two locating points on pipe. Excessive oil consumption at high speed will result.*

Oil Pressure Gauge: AC No. 1508195. Not electric. *See "Oil Gauges" in Miscellaneous Section.*

COOLING

►*LOWER RADIATOR HOSE STRIKING FRAME FRONT CROSSMEMBER CORRECTION: Slot radiator mounting holes vertically and raise radiator so there is a minimum clearance of ¼" between hose and crossmember.*

Water Capacity (Without Air Conditioning): 22¾ qts. (without heater), 24½ qts. (with heater).
With Air Conditioning—23 qts. (without heater), 25 qts. (with heater).

Pressure Valve: AC No. 850549, 7 lbs.

Thermostat: Harrison No. 3133595 (151°), 3133596 (160°), 3133597 (170°).

Water Pump: Packless, sealed ball bearing shaft. *See "Pontiac" in Water Pump Section.*

Pump Removal—Drain radiator and engine block. Loosen generator adjusting strap and remove fan belt, fan, and

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pulley. Remove water pump retaining nuts and lockwashers and remove pump.

Temperature Gauge: AC No. 1512874: Not electric.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Inland. *Single plate, "Diaphragm", dry disc type with* Long driven member.
See "Inland" in Clutch Section.
Clutch Disc No.—Pontiac No. 518130.

Pedal Adjustment: 3/4-1 1/8". Adjust at clutch fork-to-countershaft rod.

Overcenter Spring Adjustment—Remove overcenter spring, spring extension, and pushrod. Loosen lock screw which clamps spring lever to countershaft. Install Gauge J-5819, inserting pins which are closest together into holes in overcenter spring link and lever from which pushrod was removed. Then, while applying rotation to clutch countershaft to hold clutch pedal against stop, rotate overcenter spring lever until third pin in gauge can be inserted into overcenter spring lever. Tighten lockscrew securely, and replace spring, spring extension, and pushrod.

Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing) and remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing. Tap bearing support from inside clutch housing to aid removal (*CAUTION*—Avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure installation in same manner to maintain balance), remove clutch cover bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member. Lower clutch assembly out of car.

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retainer ring on transmission main drive gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

SYNCHRO-MESH TRANSMISSION

Own. All helical gear type.
See "Pontiac Synchro-Mesh" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

►*TRANSMISSION SELECTOR LEVER INTERFERENCE CORRECTION (Causing inability to shift gears):* If trunnion pin at steering column end strikes exhaust manifold, reverse pin in trunnion so that it points toward center of car.

Removal: 1) Disconnect speedometer cable, gearshift selector rod, control rod and backup lamp switch wires from transmission.

2) Disconnect rear universal joint (use a wire or rubber band to prevent trunnions from slipping off spider). Remove propeller shaft by sliding it to rear off transmission mainshaft splines.

3) To give clearance for removing upper capscrew holding transmission to clutch housing, remove transmission shift lever spring yoke and extension. Remove shift lever screw while holding shift lever in neutral (center position) to avoid damage to shift levers on shaft inside transmission. Remove shift lever.

4) To give clearance for removing lower capscrew holding transmission to clutch housing, remove transmission outer lever. Remove transmission upper capscrews and install two transmission guide pins (pins can be made by cutting the heads off two transmission capscrews and sawing a screw driver slot in the ends). *CAUTION*—Guide pins must be used since they support transmission and prevent distortion of clutch driven plate hub when lower transmission capscrews are removed.

5) Remove lower capscrews and move transmission to rear, bringing rear bearing extension into intersection of frame "X" members until main drive gear is free, then lower to floor. *CAUTION*—Use care to avoid getting dirt into front bearing when pulling transmission away from clutch housing.

Installation Note: Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support).

HYDRA-MATIC DRIVE

"Dual-Range" four speed automatic transmission and fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level every 2000 miles, drain and refill at 25,000 mile intervals.

Checking Fluid Level—Run engine 1½ minutes at a speed equivalent to 20 MPH with selector lever in "N". Reduce speed to **slow idle** and move selector lever to "D" position. Measure oil level on dipstick (under hood). Add fluid through dipstick tube until level is at "FULL" mark.

Capacity—Approximately 11 qts. (refill).
Recommended Fluid—Use G.M. Hydra-Matic Fluid or Automatic Transmission Fluid Type A.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw. Needle bearing type.

►*CAUTION:* Rear universal joint companion flange nut controls rear axle pinion bearing preload (must be adjusted whenever nut is loosened). *See "Pontiac Hypoid" in Rear Axle Section.*

REAR AXLE

►*REAR SPRING SHACKLE TO FRAME INTERFERENCE CORRECTION:* Make sure spring upper frame bushing is flush with frame bracket toward car centerline. If spring clamp is touching frame, bend as necessary for clearance.

Own. Hypoid gear, semi-floating with Hotchkiss Drive.
See "Pontiac Hypoid" in Rear Axle Section.
Axle Identification—Code mark stamped on pad at forward side of differential carrier between bottom web and right hand horizontal web. Axle shaft also marked with daub of paint on end of shaft to indicate ratio. See Code & Paint Markings in table below.

Axle Ratios & Code Marking

Ratio	Gear Teeth	①Code Mark	②Code Color
3.08-1③④⑤	40:13	0	Yellow
3.23-1③⑥	42:13	9	Brown
3.64-1⑦	40:11	6	Blue
3.90-1⑧	39:10	4	Red

①—See Rear Axle Identification.
②—Paint daub on end of axle shaft.
③—Hydra-Matic Drive
④—Chieftain (27 Series).
⑤—Except Station Wagon.
⑥—Star Chief (28 Series), & Station Wagons.
⑦—Synchro-mesh Transmission (Standard).
⑧—Synchro-mesh Transmission (Optional).

Backlash—.003-.012" (new), .012" (used).

Axle Shaft Removal: Remove wheel, brake drum, four brake backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with Puller J-942 (do not drag axle shaft on seal).

Wheel Bearing Adjustment: None.

Differential Carrier Assembly Removal: Disconnect rear universal and wire trunnion in place (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing.

►*CAUTION: Rear universal joint companion flange nut controls rear axle pinion bearing preload. Readjust whenever nut loosened.*

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (not refillable). Service by replacement.

Model	Front	Rear
Standard	5352225	5513345
Taxi & Police Cars	5352226	5513346

FRONT SUSPENSION

Independent. Shock absorber mounted within front coil spring.
See "Pontiac" in Front Suspension Section.

Kingpin Inclination—4½° at ½° camber.

Caster—Neg. 1° ±½°.

Camber—Pos. ½° ±½°.

Toe-In—0" to 1/16".

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Toe-out on Turns—With inner wheel at 20°, outer wheel should be 18° 30'.

STEERING

Manual: Saginaw Worm & Roller. *See "Saginaw Worm & Roller" in Steering Section.*

Power Steering: Saginaw (GM) Hydraulic. Recirculating ball nut and worm type plus extended pitman shaft with gear sector in mesh with power rack. Power rack pinned to piston rod of hydraulic cylinder. *See "Saginaw (GM) Power Steering" in Steering Section.*

►*POWER STEERING NOISE CORRECTION: See "Saginaw (GM) Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Bendix Hydraulic. Duo-servo, single anchor (without eccentric adjustment). Hand brake applies rear wheel service brakes.

See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

Drum Diameter—12" (front), 11" (rear).
Wheel Cyl. Diameter—1 1/16" (front), 15/16" (rear).

Lining Width—2½" (front wheels), 1¾" (rear wheels). **Thickness**—13/64".

Clearance—Tighten adjusting "star wheel" to point where wheel can just be turned by hand, then back off star wheel 14 notches.

Standard Master Cylinder: Forward of brake pedal on engine side of fire wall.

Checking Fluid Level—Maintain fluid level in master cylinder reservoir to 7/8" from gasket surface of filler neck.

Power Brakes: Bendix or Moraine Power Unit. *See "Moraine Power Unit" or "Bendix Power Unit" in Brake Section.*

Checking Fluid Level—Maintain fluid level in master cylinder reservoir to within ½" of top of filler cap opening.

Removal of Power Unit—Disconnect upper end of vacuum hose attached to inlet at vacuum cylinder, and hydraulic lines at master cylinder. Disconnect pushrod from pedal and wires from stop light switch. Remove nuts from U-bolt retaining pedal pivot bracket to steering column and remove pedal and bracket (with stop light switch assembly attached). Remove clutch pedal and steering column seals at floorboard. On Hydra-Matic cars, remove screws retaining power brake unit to floor pan and remove mounting plate with power unit attached. On Synchro-mesh cars, remove screws retaining power unit to mounting plate (power unit will rest on frame). Remove screws attaching mounting plate to floor pan and remove mounting plate, "jockeying" it as necessary to clear clutch pedal. Remove power unit. *CAUTION*—Do not carry or support brake unit by pushrod as pushrod may be pulled out of cylinder.

MISC. MECHANICAL

Windshield Wipers: Cable operated vacuum type.
See "Windshield Wipers" in Miscellaneous Section.

Air Conditioner: Harrison type with magnetic compressor clutch (compressor operates only with air conditioning switch turned on). *See "Pontiac Air Conditioning" in Miscellaneous Section.*

►*AIR CONDITIONING COMPRESSOR DRIVE BELT MISALIGNMENT CORRECTION: See "Pontiac Air Conditioning" in Miscellaneous Section.*

Power Top Control: Hydro-Lectric with reversible pump motor,
See "Power Top Controls" in Miscellaneous Section.

Power Window Regulators: Electric. Reversible motor in each window. Available on front and rear door windows. *See "Power Window Regulators" in Miscellaneous Section.*

Form 288—1954-M

TIGHTENING SPECIFICATIONS

1950-54 MODELS

	Ft. Lbs.
Cylinder Head Nuts	57-60
Con. Rod Cap Nuts	27-30
Main Bearing Capscrews	65-70
Spark Plugs	30 max.

1955 MODELS

	Ft. Lbs.
Cylinder Head Stud Nuts	50-60
Con. Rod Cap Nuts	27-30
Main Bearing Cap Screws	66-70
Piston Pin Clamp Screw	18-22
Flywheel Retaining Cap Screw	100-110
Camshaft Sprocket Screw	50-55
Vibration Dampener Retaining Screw	65-70

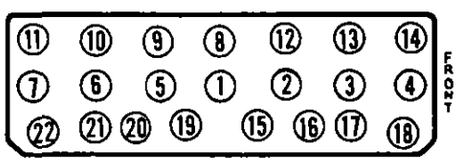
ENGINE

ENGINE REMOVAL: Engine is removed from below car. Place car on lift or place two high jacks under body sills just behind the rear engine support crossmember. Remove hood top and radiator core. Disconnect fuel line at fuel pump, and remove fuel line to carburetor. Disconnect wires at generator and oil and heat indicator engine units. Disconnect throttle linkage. Remove exhaust manifold and fasten out of the way against the side panel. Disconnect steering cross tie rod, shift rods at transmission, clutch linkage to clutch beam, speedometer cable (and Overdrive wiring if used). Place lifting fixture to head studs and lift engine just enough to support it. Remove four bolts holding front crossmember to side sills. Remove rear engine diagonal mounting braces and the four bolts holding the rear engine support crossmember to body sills. Engine will now be supported by the lifting device. Lower the engine slightly and move forward enough to slide the front universal off the transmission. Engine can now be lowered and removed from beneath the car.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use torque indicating wrench to tighten cylinder head stud nuts in sequence shown in cylinder head diagram. Torque specifications are for engine at operating temperature.

Cast Iron Heads—Tighten heads COLD, then recheck after engine has been run and thoroughly warmed up. **Aluminum Heads**—Tighten heads at room temperature, recheck again after period of operation, with engine at room temperature.



RAMBLER CYLINDER HEAD

Cylinder Head Gasket—Always use new gasket. Coat gasket with very light application of Perfect Seal Gasket Paste to insure tight seal between cylinder head and block.

ORIGINAL BORE & PISTONS

ORIGINAL BORE & CRANKSHAFT LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con. Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	.010" Undersize
Letter "C"	.010" Oversize
Letter "D"	.001" Undersize

ENGINES NOT MARKED ARE STANDARD.

ORIGINAL BEARING SIZES

ORIGINAL BORE & CRANKSHAFT LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con. Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	.010" Undersize
Letter "C"	.010" Oversize
Letter "D"	.001" Undersize

ENGINES NOT MARKED ARE STANDARD.

CONNECTING ROD & BEARINGS

CONNECTING ROD: Bearing Removal & Installation. Removable bearing shells used. To remove bearings, take off bearing caps, remove bearings from rod and cap. Fit bearings as directed below. When installing bearings, oil hole in upper half should register with oil spit hole in rod. Tongue on each bearing should engage groove in rod and cap.

Fitting Bearings—Use Plastigage across width of bearing cap. Tighten cap nuts to specified torque.

CRANKSHAFT & MAIN BEARINGS

MAIN BEARING REMOVAL & INSTALLING: Upper bearing halve may be 'rotated' out by inserting pin in oil hole in crankshaft and turning shaft in the direction of locating tongue on bearing. Bearings can be installed by reversing removal procedure.

Fitting Bearings—Use Plastigage across full length of bearing insert and tighten cap to 66-70 ft. lbs.

CRANKSHAFT END THRUST PLATE: Crankshaft end thrust taken by flanged edges of front bearing. A steel thrust plate is assembled between rear face of timing chain sprocket and flanged face of front bearing. Plate keyed to shaft by Woodruff key which also secures sprocket on shaft. When plate installed, chamfered edge on inner diameter should face toward the rear for tight fit against bearing journal.

Adjustment—If endplay not correct with all parts correctly assembled, replace front main bearings or thrust plate.

REAR OIL SEAL: Install new oil seal with rear main bearing cap off (crankshaft out of engine when replacing upper half). Packing in groove in block and cap behind oil slinger on crankshaft. Cap sealed with rubber plugs in groove on each side where cap fitted in the recess in the block. Use Tool J-1610 to install packing in groove in block and cap. Place packing in groove (with bearing shell removed), place small diameter of tool over packing, hit end of tool with lead hammer to seat packing, cut ends of packing flush with bearing cap seat, remove tool. Repeat operation for groove in block. Install rubber seal plugs on each side of bearing cap (where angle seal used, make certain that seal also seated in horizontal groove in block).

VIBRATION DAMPENER

REMOVAL & INSTALLATION: Non-adjustable, rubber cushioned type. To install hub assembly: Lock hub on shaft with woodruff key, install large lockwasher with notches on inner edge, cork seal ring, rubber seal ring and hub retainer in recess in hub. Install hex head lock screw with helical lockwasher under it in screw hole in end of crankshaft and tighten screw to 65-70 ft. lbs. torque. Rubber block retaining bolt nuts on front face of dampener hub must be drawn up tight.

►*CAUTION:* When installing vibration dampener on hub, timing marks must be aligned with the hub keyway and on same side.

ENGINE FRONT COVER

CRANKSHAFT FRONT OIL SEAL: A felt seal is fitted in the timing chain cover which bears against vibration dampener hub. Seal seat in hub has inner edge turned up to form a shedder on inside of cover. An oil slinger is assembled behind vibration dampener hub which extends over outer edge of oil shedder. Use Tool J-1430 installed on end of crankshaft when tightening timing chain cover screws to align seal properly. *NOTE*—A cork seal and rubber seal ring is assembled

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behind vibration dampener to seal front end of crankshaft. *See VIBRATION DAMPENER above.*

FLYWHEEL

►*FLYWHEEL REPLACEMENT CAUTION (Std. & Overdrive Trans. Cars):* Flywheel on which starter ring gear is installed is balanced as an assembly with crankshaft and vibration dampener. When flywheel is replaced, it is important that balance holes be duplicated as to size, depth, and angular location. After replacing flywheel, tighten crankshaft to flywheel stud nuts with a torque wrench.

CAMSHAFT & BEARINGS

REMOVAL: *Engine must be removed from chassis.* Remove fan assembly and cylinder head. Remove valve tappet covers and vibration dampener. Remove valves and valve springs, retain tappets with wire. Remove timing chain cover and oil slinger. Position engine with timing marks adjacent and in line across camshaft and crankshaft centers. Remove camshaft sprocket retaining screw and remove timing chain and sprockets. Sprockets can be pried off shafts.

End Play—Check endplay with dial indicator or feeler gauge placed between the rear of the camshaft sprocket and front face of camshaft thrust plate.

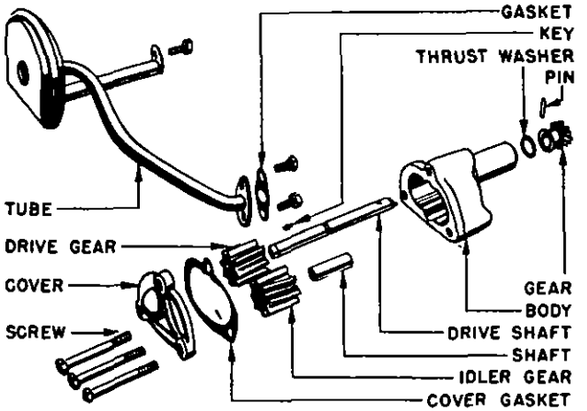
OIL PAN REMOVAL

OIL PAN REMOVAL: Remove steering linkage cross tie rod and front suspension pivot bar brace to permit removal of engine oil pan.

OIL PUMP

REMOVAL: Note position of pump drive gear keyway before removing oil pump and install in same position to retain distributor timing. Engine is properly timed when No. 1 cylinder is at TDC in firing position and the oil pump drive gear keyway is approximately at three-thirty o'clock position when viewed from lower section of pump body.

OVERHAUL: Remove capscrews, cover and gasket, then drive gear (in pump) and idler gear and their shafts. Remove key from keyway on drive shaft. Remove drive shaft and drive gear (camshaft end) assembly from pump body. (NOTE—Drive gear (camshaft end) is held on drive shaft by a pin). Remove thrust washer from drive shaft. To assemble, reverse disassembly procedures.



RAMBLER OIL PUMP

RAPPING CORRECTION

►*"RAPPING" NOISE CORRECTION (EARLY 1951 CARS):* In some cases, insufficient clearance may exist between the transmission at the drain plug boss and the rear engine support crossmember. This may result in a metallic rapping noise when driving over rough roads and may be diagnosed as a front suspension noise. Correct by lowering front crossmember, thereby raising rear end of transmission and providing sufficient clearance.

NOTE—Slotted holes in front crossmember will permit lowering the member.

SUSPENSION NOTES

►*1954 DRIVE LINE OR ROAD NOISE CORRECTION:* When this noise cannot be traced directly to the rear axle assembly it is advisable to install New Tension Shackle Package, Rambler No. 3117468, in conjunction with rear springs No. 3141137. This package consists of rear spring hanger (rear) right and left, rear spring rear shackle, rear spring front eye bushing, rear spring rear hanger bracket with attaching screws, nut and lockwashers.

Installation—Attach new bracket on frame side rail using rear bumper back bar front bolt for proper location. Drill 21/64" holes through bracket reinforcement at the first and third holes from front on underside as guides. Tap holes for 3/8"-24 thread and install screws to secure bracket to sill. Arc weld bracket to sill at both ends and sides, attach hanger to bracket.

MODEL IDENTIFICATI N

SERIAL NUMBER: On plate located on front wheelhouse panel at right side under hood.
1950 Numbers—D-1001 Up.
1951 Numbers—D-12501 Up.

ENGINE NUMBER: Stamped on right side of engine block above exhaust pipe.
1950 Numbers—F-1001 Up.
1951 Numbers—F-13001 Up.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking speed.
VACUUM READING: Steady 18-21", 450-500 RPM idle.
FIRING ORDER: 1-5-3-6-2-4. See diagram.
SPARK PLUG GAPS: .030".
Plugs—Auto-Lite A-7. 14 mm. Metric.
DISTRIBUTOR: Breaker Gap—.018-.024".
Cam Angle—35°. Test limit with .022" gap 31-37°.
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.
IGNITION TIMING: TDC. (At top dead center).
Timing Mark—"/" mark on dampener aligned with pointer on chain cover above dampener.
Timing Procedure—*See Ignition Timing.*
CARBURETION: (Early 1950) Carter 694S.
Idle Setting—Idle screw ¾-1¾ turns open. One screw—turning screw out gives richer mixture.
Idle Speed—450-500 RPM.
Float Level—½" from top of projection on underside of bowl cover to top of seam on free end of float (invert bowl cover and float to check level).
Accelerating Pump—Medium stroke (lower, outer hole) Normal, Inner (min.), Upper (max. stroke).
Choke Setting: 2 points rich.
Fuel Pump Pressure: 3-4½ lbs. (6 lbs. maximum).
CARBURETION: (Late 1950 & Early 1951) Carter 757S, SA, SB. (Late 1951) Carter No. 876S & SA.
►*CARBURETOR RECOMMENDED CHANGE FOR SMOOTHER ENGINE PERFORMANCE—See Carburetor Section for complete data.*
Idle Setting—(757S, SA, SB) 1 to 2 turns open. (876S, SA) ½ to 1½ turns open. For richer mixture, turn screw out.
Idle Speed—450-500 RPM.
Float Level—(757S, SA SB) ½", (876S) 5/16", (876SA) ½". Measure from underside of bowl cover to top of float with bowl cover inverted and weight of float on needle valve.
►*FLOAT NEEDLE & SEAT ASSEMBLY CHANGE—Solid type needle valve (876SA), Spring type needle valve (876S).*
Accelerating Pump—No seasonal adjustment provided and no pump stroke setting required.
Choke Setting—(757S, SA, SB) Center on index. (876S, SB) Set 1 point lean.
Fuel Pump Pressure—3-4½ lbs. (5 lbs. maximum).
VALVE TAPPET CLEARANCE: .015" Hot, all valves.
Cold Setting—Intake .016". Exhaust .018".
NOTE—Tappet adjusting screws self-locking type.

IGNITION

IGNITION SWITCH: Nash No. 3123588.
COIL: Delco-Remy No. (1950) 1115328, (1951) 1115380.
CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112351. Full automatic advance type with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.018-.024".
Cam Angle—35°. Test limits with .022" gap 31-37°.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

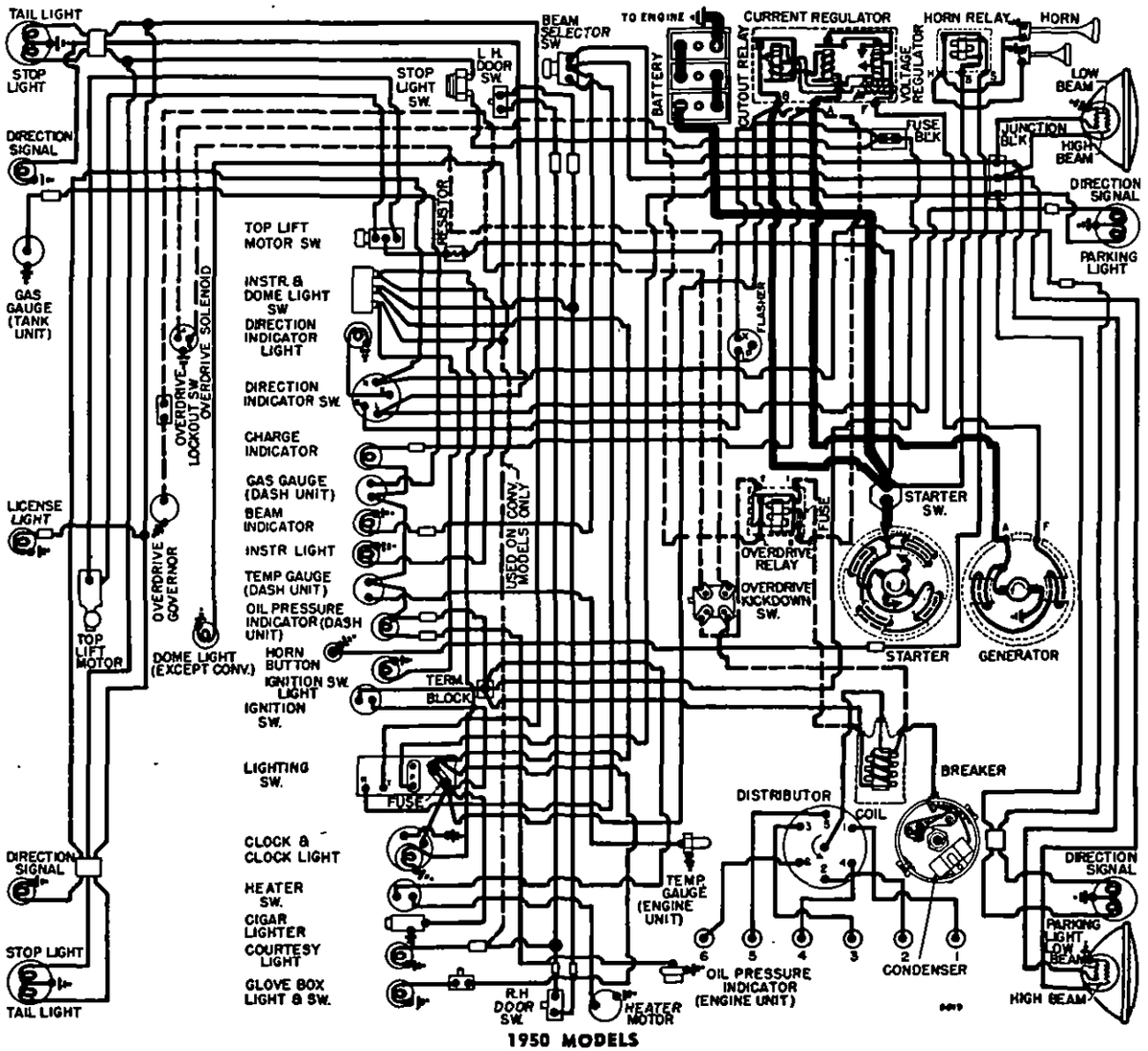
Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	2	600
5½	400	11	800
11	1400	22	2800

Vacuum Spark Control: Delco-Remy No. 1116045. Separate unit mounted on hold-down plate and linked to advance arm.
Plunger Travel—23/64".

	Vacuum Advance	
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3.5"
7½°	15°	14-16"

Distributor Removal: (Early 1950 Cars). Disconnect vacuum line, take out hold-down screw. Remove distributor cap and rotate shaft until flat side of shaft is toward bottom. Tilt engine toward right by prying with a bar sufficiently to withdraw distributor.
►*DISTRIBUTOR PRODUCTION CHANGE NOTE*—Late 1950 & 1951 engines have been changed to give the distributor more clearance, and it is not necessary to tilt the engine.



1950 MODELS

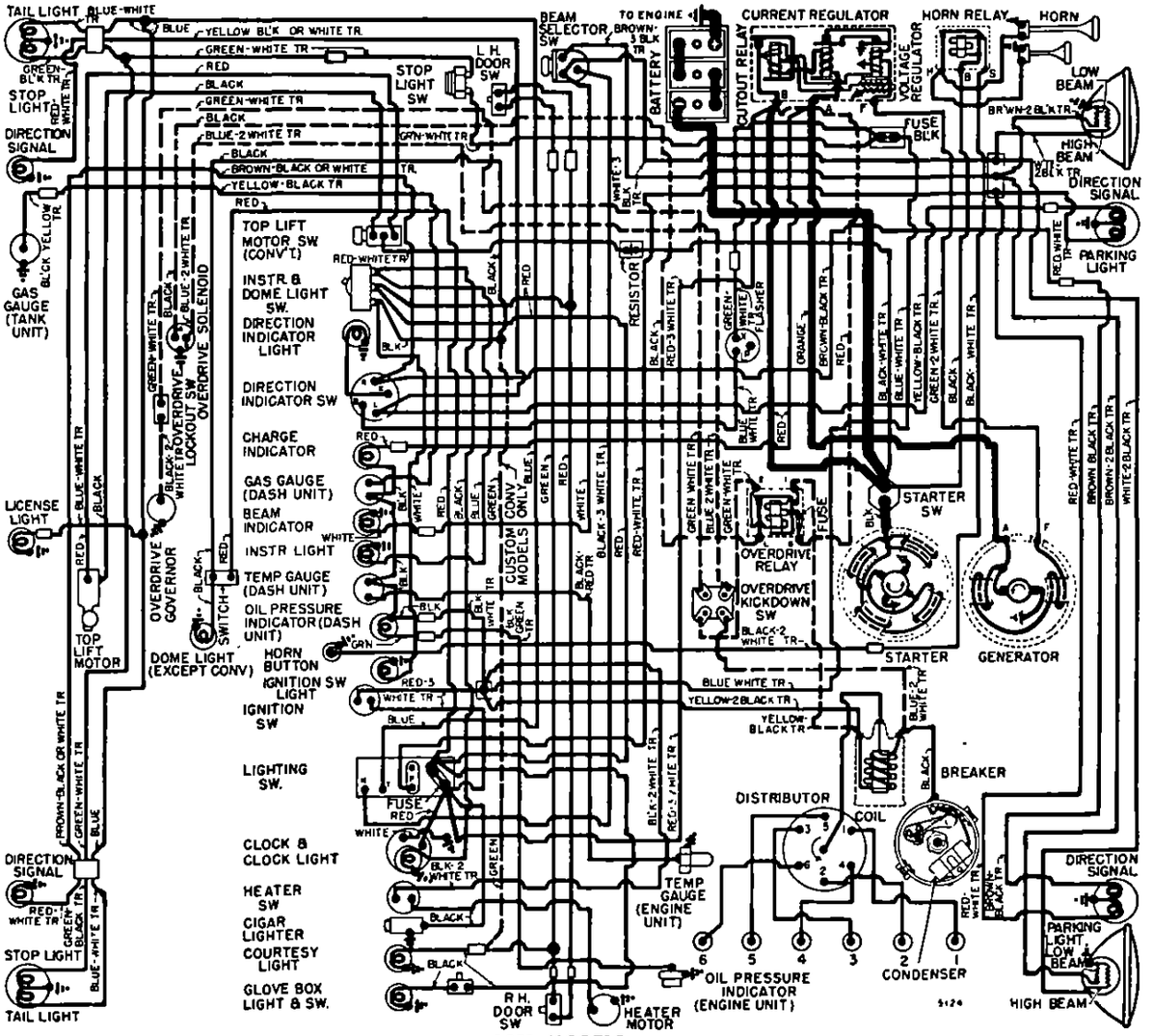
IGNITION TIMING

Std. Setting.....**At TDC.**
NOTE—Use of Neon Timing Light recommended.
Timing (Using Neon Timing Light)—Align ⅛" holes in clamp arm and distributor support and insert pin. Loosen distributor hold-down screw and center octane selector scale, tighten screw. Clip Neon Timing Light to #1 spark plug, direct light at vibration dampener at timing chain cover pointer. Idle engine at 450-500 RPM., loosen clamp arm bolt, rotate distributor until "/" mark on dampener aligned with pointer, tighten clamp bolt, remove ⅛" pin in support. Check Octane Selector Setting.
Octane Selector Setting—Loosen hold-down screw in distributor, adjust at scale for slight ping accelerating 10-15 MPH. with wide open throttle.

CARBURETOR

EARLY 1950 CARTER WA-1

Carter 694S. (Early 1950) 1¼" Single Barrel downdraft with Climatic Control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump Setting): ***See Tune-Up data.***
Metering Rods & Jets—***See Carter Jet Table in the Carburetor Section.***
Fast Idle: Carter Single Barrel Carburetor type.
Setting—⅝" clearance between choke valve and air horn (Gauge T109-85) with throttle valve closed and stopscrew against (not on) first step of fast idle cam (bend connector link at lower offset).
See Carburetion Equipment Section for complete data.



1951 MODELS

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—2 points rich.
See Carburetion Equipment Section for complete data.

1950-51 CARTER YF

Carter 757S, SA, SB (Late 1950 & Early 1951). Carter 876S, SA (Late 1951). 1¼" Single barrel downdraft with Climatic Control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***
►***CARBURETOR RECOMMENDED CHANGE FOR SMOOTHER ENGINE PERFORMANCE—See Carburetor Section for complete data.***
Metering Rods & Jets—***See Carter Jet Table in the Carburetor Section for complete data.***
Fast Idle: .054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate. Crack throttle valve and hold choke valve fully closed, then close throttle. Fast idle cam will revolve to fast idle position. With choke valve held tightly closed, and slight tension on throttle lever, check throttle opening. Adjust by bending connector link at lower bend.
See Carburetion Equipment Section for complete data.
Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).
Setting—**(757S, SA, SB)** Centered on index. **(876S, SA)** Set 1 point lean.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Oil-wetted (Std.), oil-bath (Optl.).
Fuel Pump: Carter No. M-774-S. Diaphragm type, Std.
Opt'l (with Overdrive) No. M-797-S.
Pressure—4-5¼ lbs. at 1800 RPM.
See Carburetion Equipment Section for complete data.
Gasoline Gauge: King-Seeley Electric type.
Dash Unit—KS-42951 (1950 Custom, & 1951 Std.). KS-42751 (1950 Std.).
Tank Unit—**KS No. 42760.**
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type IH-90D—6 volt, 13 plate, 90 Ampere Hour capacity (20 hour rate).
Starting Capacity—114 amperes for 20 minutes.
Grounded Terminal—Positive (+) grounded to wheelhouse (engine grounded at same point).
Location—Left side in engine compt. under hood.

STARTER

Delco-Remy No. (1950) 1109459, (1951) 1109463.
Armature—Delco-Remy No. 1915056 (for 1109459), 1917887 (for 1109463).
Drive—Delco-Remy No. 1915041 (for 1109459), 1917888 (for 1109463).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ounces.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	6000	5.7	60
11.5 "	Lock	3.3	540

Starting Switch: Delco-Remy No. 1996476. Mounted on toeboard, actuated by fully depressing clutch pedal.
Removal: Flange mounted on left front face of flywheel housing. To remove, work from above under

CONTINUED ON NEXT PAGE

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hood, disconnect shift rods at shift levers, disconnect starter cable, take out mounting screws.

GENERATOR

Delco-Remy No. (Std.) 1102730, (Optional) 1102748. Two brush with voltage and current regulation.
Armature—Delco-Remy No. 1913597 (for 1102730), **1917175** (for 1102748).
Car Speed for maximum charging rate—19 MPH up.
Charging Rate Adjustment—See Regulator.

Performance Data—1102730

	Amperes	Volts	R.P.M.
Cold	30①	8.0	1750

Performance Data—1102748

	Amperes	Volts	R.P.M.
Cold	40	8.0	1950

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—1.75-1.9 amperes (for 1102730), **1.90-2.05 amperes** (for 1102748). All at 6.0 volts.
Belt Adjustment: Adjust belt so that 25 lbs. pressure midway between fan and generator shaft pulley will deflect belt ½". To adjust, loosen fan mounting bracket screws, raise fan, tighten screws. Belt misalignment corrected by shims back of fan bracket.

REGULATOR

Delco-Remy No. 1118302 (for 1102730), **No. 1118382** (for 1102748). Voltage and current regulator.
►"*1118300 SERIES*" regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.8 volts hot (set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator

Setting—(1118302) 32-40 amperes hot (set to 36 hot).
Setting—(1118382) 40-46 amperes hot (set to 42 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Hall "Sealed Beam." Upper and lower beams controlled by selector switch on toeboard.
See Electrical Equipment Section for complete data.
Beam Indicator—Red jewel located in speedometer.

Switches

Lighting—Nash No. 3130348.
Beam Selector—Nash No. 3130120.
Instrument Light—Part of Lighting Switch.

MISC. ELECTRICAL

GENERATOR CHARGE INDICATOR: Indicator light in instrument cluster. Lights when ignition turned on, should go out when generator begins to charge.
LOW OIL PRESSURE INDICATOR: See "Oil Pressure Gauge" under LUBRICATION.
FUSES: Lighting—30 ampere on lighting switch.
Stop & Directional Signal—30 ampere located on left front wheelhouse panel.
Overdrive: 30 ampere on overdrive relay.
HORNS: E. A. Laboratories. Vibrator type twin horns.
Horn Current—12 amperes per horn.
Contact Gap—.031" ± .010".
Horn Relay: E.A. Laboratories. On horn bracket.

ENGINE

ENGINE SPECIFICATIONS: 6 cylinder, "L" head type. Cylinder cast Enbloc with intake manifold cast in block (Iso-thermal fuel intake system).
Bore—3⅛". Stroke—3¾".
Displacement—172.6 cubic ins.
Rated Horsepower—23.44.
Developed Horsepower—82 at 3800 RPM.
Compression Ratio—7.25-1 std. cast-iron head.
Compression & Vacuum Reading—*See Tune-Up.*
CYLINDER HEAD & TIGHTENING TORQUES: *See Rambler Special Data.*
ENGINE REMOVAL: *See Rambler Special Data.*
OIL PAN REMOVAL: *See Rambler Special Data.*
PISTONS: Aluminum alloy, Cam Ground, Tin plated, strut type with solid skirt. **Length—3⅜".**
Removal—Pistons and rods removed from above.
Clearance—.001-.002". See Fitting New Pistons.
NOTE—Cylinder out-of-round & taper limits .004".
Original Piston & Bore Sizes: *See Rambler Special Data.*
Fitting New Pistons: With all parts clean and dry, fit pistons so that piston will support its own weight in any portion of cylinder. If feeler gauge used, insert .002" x ½" feeler at right angles to pin bosses, pull to withdraw feeler must be 12-18 lbs.
Replacement Pistons: Furnished Std., and .002", .005", .010", .020" and Semi-finished.
Piston Installation: Pin hole in piston offset 1/16" from center-line. Install piston with heavy side away from camshaft (pin offset toward camshaft).
PISTON RINGS: 2 compression, 1 slotted oil and 1 Thompson U-Flex oil ring, (U-Flex ring in #4 groove), per piston. All rings above pin. Oil groove drilled with oil drain holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"①	.010-.015"	.002-.004"
Oil Control	5/32"②	.010-.015"③	.002-.004"

①—.0930" ± .0005". ②—.15475" ± .00025".
③—No end gap on Thompson U-Flex ring.
Installing Rings—Stepped inner edge of both compression rings must be UP.
PISTON PIN: Diameter—.8593-.8595". **Length—2¾".** Floating type with lock ring at each end.
Pin Fit in Piston—Thumb press fit or .0003" max. loose fit at room temperature (70°F.).
Pin Fit in Rod Bushing—Light thumb push fit at room temperature.
CONNECTING ROD: Length 6⅝". Weight—25 ozs.
Crankpin Journal Diameter—2 3/32" (2.094-2.095").
See "Original Bearing Sizes" in Rambler Special Data.
Lower Bearing—Removable steel-backed, babbitt lined type. No shims.
Clearance—.001-.002". **Sideplay**—.006-.014".
Bearing Adjustment: None. Replace bearings. *See "Connecting Rods & Bearings" in Rambler Special Data.*
Installing Rods: Oil squirt hole in lower end of rod toward right (camshaft side) of engine.
CRANKSHAFT: Four bearing, counter-weighted type with vibration dampener mounted on front end.
Vibration Dampener—*See Rambler Special Data.*
Journal Diameters—2 31/64" (2.479"). *See "Original Bearing Sizes" in Rambler Special Data.*
Bearings—Removable, steel-backed, micro-babbitt.
Clearance—.0007-.002".
Bearing Adjustment: None (no shims). Replace bearings. *See "Crankshaft & Main Bearings" in Rambler Special Data.*
Crankshaft Oil Seal: *See "Crankshaft & Main Bearings" in Rambler Special Data.*
End Thrust: Taken by front (#1) bearing (thrust plate on shaft ahead of flanged bearing).
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Rambler Special Data.*
Endplay—.006-.008".
►*FLYWHEEL REPLACEMENT CAUTION (Std. & Overdrive Cars)*—*See "Flywheel" in Rambler Special Data.*
CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Camshaft Removal—*See Rambler Special Data.*
Bearings—Steel-backed, babbitted bushings.
Clearance—.002".
End Thrust: Thrust plate assembled on front face of engine between #1 bearing and camshaft sprocket. Endplay controlled by position of timing chain sprocket (press fit on shaft). **Endplay** .004-.006".
CAUTION—Thrust plate has long oil groove on rear face which provides valve tappet lubrication from #1 camshaft bearing. Short groove on front face of plate lubricates timing chain and sprockets.
Timing Chain: Morse. Non-adjustable type. Width 1". Pitch ⅜". Length 22½" or 60 links.
Camshaft Setting: Install chain with punch mark on camshaft sprocket and inverted "V" mark on crankshaft sprocket adjacent and in line with straight-edge across shaft centers. To check, turn engine until camshaft sprocket mark at "1 o'clock" and crankshaft sprocket mark just meshing with chain, there should be 9½ links or 19 pins between marks.

VALVES	Head Diam.	Stem Diam.	Length
Intake	1 15/32"	.3407-.3412"	4 25/32"
Exhaust	1 9/32"	.3407-.3412"	4 25/32"

	Seat Angle	Lift	Stem Clearance
All Valves	①	.300"	.002-.003"

①—Valve face angle 44°. Valve angle in block 45°.
Valve Guides: Pressed in block. Remove guides using Tool J-2814. Install guides using Tool J-1429-A with adapter J-1429-4.
Valve Springs: Install springs with closed-coil end up against cylinder block and seated in counterbore in block. Spring free length 2 3/32".
►*CAUTION—Excessive wear of valve stem and guides will result if springs not properly seated in counterbore.*

	Spring Pressure	Length
Valve Closed	37-41 lbs.	1 3/4"
Valve Open	80-86 lbs.	1 7/16"

Valve Lifters: Mushroom type operating in reamed holes in block. Lifters removed from below with camshaft out of engine.

VALVE TIMING

Tappet Clearance: .015" Hot, running clearance.
Cold Setting—Intake .016". Exhaust .018".
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 6° BTDC. Close 50° ALDC.
Exhaust Valves—Open 46° BLDC. Close 10° ATDC.
Valve Timing Check—With tappet clearance set at .019", #1 exhaust valve should close with piston 10°

after top dead center and "DC" mark on vibration dampener 5/8" past pointer on timing chain cover. Reset tappet clearance at .015" Hot.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, valve tappets, and timing chain.
Crankcase Capacity—5 quarts.
Normal Oil Pressure—50 lbs. at 35 MPH.
Oil Pressure Regulator—Spring-loaded release valve under plug to rear of oil pump on lower edge of crankcase. Non-adjustable. Opens at 50-58 lbs.
Oil Pump: Gear type. Mounted externally on right side of crankcase.
Oil Filter: Optional. Replace cartridge every 8000 miles, or oftener if necessary.
Oil Pressure Gauge: King-Seeley Electric type.
Dash Unit—Warning indicator light used. Light goes on when ignition switch is turned on, and goes out when oil pressure exceeds 13 pounds.
Engine Unit—King-Seeley No. 47100.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve (relief valves) in filler cap, and positive circulation with water pump.
Capacity—12 quarts (13 quarts with heater).
Pressure Valve—AC #850501 Cap. Opens 4½ lbs.
▷*PRESSURE VALVE CHANGE NOTE*—Effective at car serial No. D-41833, a 7 lb. pressure radiator cap entered production.
Water Pump: New sealed-in, non-adjustable seal assembly. Grease fitting for bushing lubrication. Centrifugal pump driven from generator shaft.
See Water Pump Section for complete data.
Belt Adjustment—*See Generator Belt Adjustment.*
Removal—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove two pump mounting capscrews.
Thermostat: Dole. In cylinder head water outlet.
Setting—Starts to open 162-168°F. and should be fully open 20° above opening point.
Temperature Gauge: King-Seeley Electric type.
Dash Unit—KS No. 42735 (Std. Red dial).
No. 42953 (Custom Alum. dial).
Engine Unit—KS No. 42550.
See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 8A7—Single plate, dry disc type.
See Clutch Section for complete data.
Facings—Woven (flywheel side). Molded (pressure plate side). I.D. 5⅜". O.D. 8". Thickness ⅛".
Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.
▷*CAUTION—Do not disturb adjustment of clutch beam lever-to-pedal rod.*
Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punchmark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

TRANSMISSION

Warner AS35-T96 (Std.), AS36-T96 (Optl.—with Overdrive). Constant-mesh, synchro-mesh, all helical gear type.
See Transmission Section for complete data.
Transmission Control: Mech. steering column shift.
See Transmission Section for complete data.
Removal: Move rear axle back (see Universals for procedure) to slip front universal joint off transmission. Disconnect shift levers and speedometer cable, remove two upper transmission to bell housing bolts, and install special guide bolts in their place. Remove lower bolts, slide transmission out.

OVERDRIVE

Warner R10 Type (part of AS36-T96 Transmission). New centered ring gear type. Governor controlled with electrical solenoid operation and throttle operated kick-down switch.
See Transmission Section for complete data.
Overdrive Fuse—30 ampere on overdrive relay.
Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal (above).

UNIVERSALS

Mechanics or Saginaw. Needle bearing, cross type. Front joint slips on transmission mainshaft.

Lubrication—Pre-packed. Service every 15000 miles.
Propeller Shaft: Open drive line with front and rear universal joints.
▷*FRONT UNIVERSAL JOINT SPLINED FLANGE CAUTION*—Two types used in production. SHORT TYPE (3 13/16" from centerline of universal joint bore to end of flange) for cars **WITH OVERDRIVE.** LONG TYPE (4 7/32" from centerline of universal joint to end of flange) for cars **WITHOUT OVERDRIVE.**
Removal—Support rear of car at body side sills and rear axle at the housing. Loosen propeller shaft coupling nut by turning nut clockwise (facing rear of car) with Tool J-4486 (Shaft holding and Coupling wrenches). Disconnect rear shocks at axle tube, parking brake cable at adjusting yoke, and disconnect rear brake hose clip from body floor pan. Remove rear spring front bracket mounting nuts and lower the rear axle (continue to support body). Push rear axle assembly to rear; sliding propeller shaft yoke off transmission main shaft splines. Remove propeller shaft from pinion shaft by tapping with a soft hammer.
Installation—Install propeller shaft (coupling) onto pinion shaft until center of "U" joint is 4 3/16" from front face of rear axle housing. Push axle assembly to rear and slide front "U" joint onto transmission main shaft. Move the propeller shaft forward until front universal joint "bottoms" on the transmission main shaft; MARK THE YOKE AT THE TRANSMISSION REAR OIL SEAL; THEN ADJUST THE PROPELLER SHAFT SO THE MARK IS 5/32" TO THE REAR OF THE OIL SEAL. Loosen rear spring front eye bolt and tilt front bracket so rear holes are aligned with bolts in floor pan. Raise axle assembly, aligning rear spring front bracket with mounting bolts and secure the mounting nuts. TIGHTEN THE COUPLING NUT TO 300 FOOT POUNDS TORQUE with the use of tool J-4486 and 3' extensions applied to wrench handles. Reinstall brake clip. Connect rear shock absorbers.

REAR AXLE

Own Make. Semi-floating, hypoid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—**(Std.)** 3.8-1 (9-34), **(Overdrive)** 4.4-1 (8-35), **(Optional ratio with overdrive)** 4.1-1 (9-37). (Sta. Wgn.) 4.4-1 (8-35).
Backlash—.004-.006". Shim adjustment.
Removal: Raise and support rear end of body. Remove rear wheels, axle shaft nuts, and rear hub and drums. Disconnect parking brake cables at rear wheels, brake hose and shock absorbers. Remove rear spring clips and rear spring front eye brackets. Move axle to rear which will pull the front universal off the transmission mainshaft spline. Rear axle and propeller shaft now removed as an assy.
Axle Shaft Removal & Wheel Bearing Adjustment: See "1950-51 Nash Statesman" data.
Endplay—.002-.004".

SHOCK ABSORBERS

Delco. Direct acting, hydraulic type.

FRONT SUSPENSION

Front Suspension: New design, parallelogram type with coil springs and direct acting shock absorbers.
▷*"RAPPING" SOUND FROM FRONT END—See "Rapping Correction" in Rambler Special Data.*
▷*FRONT SUSPENSION BRACE NOTE—Effective with car serial No. D-66777, a front suspension brace entered production. This brace can be installed on all previous models.*
See Front Suspension Section for complete data.
Kingpin Inclination—8½° crosswise.
Caster—Pos. ¾° to 1¼° (1° preferred).
Camber—Pos. ¼° to ¾° (½° preferred).
Toe-In—⅛" to ¼". ¼" preferred.

STEERING GEAR

Gemmer Model 305. Worm-and-roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering (floating shoe) type. Hand lever applies rear wheel service brakes.
NOTE—No anchor pin adjustment on these brakes.
See Brake Section for complete data.
Wheel Cylinders—Front wheels 1", Rear 13/16".
Drums—Cast iron. Diameter 8".
Lining—Molded. **Lining Thickness** 3/16" (all).
▷*Lining—CAUTION—Different width and length used on each shoe in each wheel as follows:*

Lining	Length	Front—Width—Rear
Primary Shoes	8"	1¾"—1¼"
Secondary Shoe	8"	1½"—1"

Clearance—All shoes just free of drag with brakes centralized (by hard brake application and releasing pedal). Eccentric adjustment for each shoe.
Braking Power—60.2% front wheels, 39.8% rear.
Hand Brake: See Service Brakes (above).

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electric. Cable operated with electric motor operating winding drum behind rear seat.
See Miscellaneous Section for complete data.
WINDSHIELD WIPER: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: (1952 & Early 1953)—On plate attached to right front wheelhouse panel under hood.

Late 1953—On plate attached to center of cowl panel under hood.

Starting Serial Number—	1952	1953
Kenosha	D-79501	D-127501
El Segundo	DC-4101	DC-9001
Toronto	DT-1001	DT-1901

ENGINE NUMBER: Stamped on right side of engine above exhaust pipe.

Starting Engine Number—	1952	1953
Without Hydra-Matic	F-85001	F-140001
With Hydra-Matic		H-1001

►***ENGINE NOTE (HYDRA-MATIC DRIVE CARS)—STATESMAN ENGINE USED in cars with Hydra-Matic Drive. See Statesman Car Pages for engine specifications and data.***

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking spd.

VACUUM READING: *Steady 18-21", 500-550 RPM idle.*

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .030".

Plugs—Auto-Lite A-7 or AN-7, 14 mm. Tighten to 30 ft. lbs.

DISTRIBUTOR: Delco-Remy No. 1112382. Full automatic advance type with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.018-.024". (Set to .022").
Cam Angle—31-37°. DO NOT exceed Breaker Gap limits of .018-.024" to obtain dwell.
Breaker Arm Spring Tension—17-21 ozs. ***NOTE—Tension for high speed points 19-23 ozs.***
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

►***DISTRIBUTOR REMOVAL CAUTION (HYDRA-MATIC DRIVE CARS):*** Align Timing Mark on crankshaft vibration dampener with indicator on timing chain cover before removing distributor. Damage to No. 3 & No. 4 piston may result if this is not done.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2.3 amps. idling. 5 amps. stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

IGNITION TIMING: ***CAUTION—Different ignition timing on some models as follows:***

Model	Ignition Timing
1952 (All Models)	TDC
1953 (100" W.B.—Exc. Hydra-Matic)	TDC
1953 (100" W.B.—With Hydra-Matic)	4° ATDC
1953 (108" W.B.—All Models)	4° ATDC

Timing Mark—TDC mark is heavy milled line on vibration dampener, with lighter milled lines on either side indicating degrees. Pointer located on timing chain cover.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter YF (1952 & Early 1953) No. 876SA, (Late 1953) No. 2014S. Single barrel downdraft type with Climatic Control.
Idle Setting—½-1½ turns open. Turn screws out for richer mixture.
Idle Speed—(Std. & O.D. Trans. Cars) 550 RPM., (Hydra-Matic Cars) 375 RPM. with selector lever in Neutral "N" position.
Float Level—½". Measure from underside of bowl cover to top of float with bowl cover inverted and weight of float on needle valve.
Hydra-Matic Throttle Linkage Adjustment: *See "Hydra-Matic Drive" in Transmission Section.*
Fast Idle: .054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate. Adjust by bending connector link at lower end.
Choke Adjustment: Set one point lean.
Fuel Pump Pressure: 3-4½ lbs.

VALVE TAPPET CLEARANCE: ***Hot Setting***—.015" All Valves. ***Cold Setting***—.016" Intake, .018" Exhaust. NOTE—Tappet screws are self-locking type.

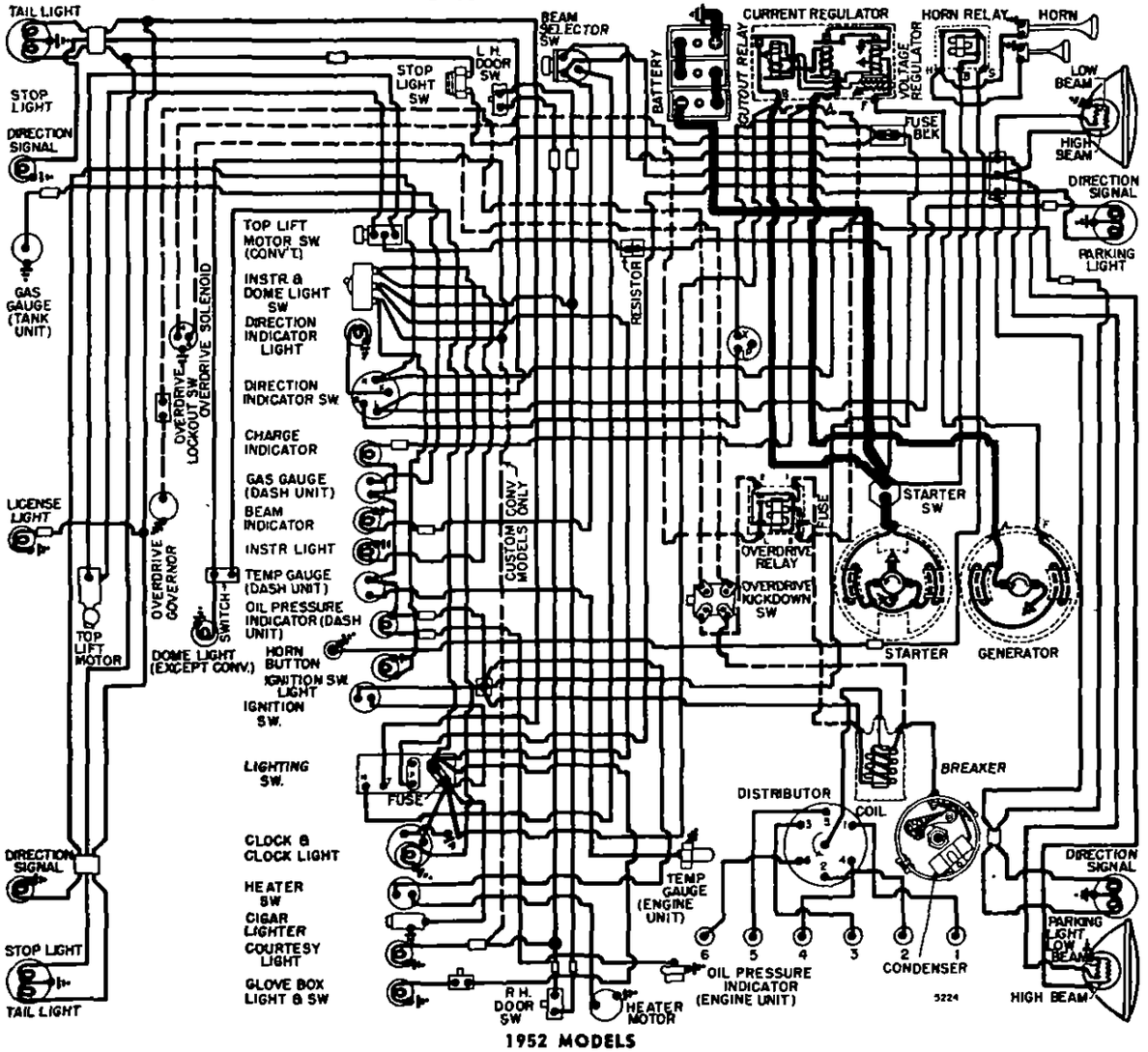
IGNITION

IGNITION SWITCH: Nash No. 3132762.

COIL: Delco-Remy No. 1115380. Mounted on engine.
Ignition Current—2.3 amps. idling. 5 amps. stopped.

CONDENSER: Delco-Remy No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1112382. Full automatic advance type, with separate vacuum spark control and octane selector adjustment.
Breaker Gap—.018-.024" (set to .022").
Cam Angle—31-37°. DO NOT exceed Breaker Gap limits of .018-.024" to obtain dwell.
Breaker Arm Spring Tension—17-21 ozs. ***NOTE—Tension for high speed points 19-23 ozs.***
Rotation—Counter-clockwise viewed from above.



1952 MODELS

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	325	0-4	650
3.5-5.5	400	7-11	800
7-9	950	14-18	1900
10-12	1400	20-24	2800

Vacuum Spark Control: Delco-Remy No. 1116045 (Early 1952). No. 1116072 (Late 1952 & 1953). Separate unit mounted on hold-down plate and linked to advance arm.

Plunger Travel—(1116045) 11/32-3/8". (1110672) 13/64-1/4".

Vacuum Advance—1116045

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3-5"
8.5°	17°	13-17"

Vacuum Advance—1116072

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4-6"
5.5°	11°	11"

Octane Selector Setting—Loosen hold-down screw in distributor, adjust so that slight ping secured at 10-15 MPH, with wide open throttle.

►***DISTRIBUTOR REMOVAL CAUTION (HYDRA-MATIC DRIVE CARS):*** Align timing mark on crankshaft vibration dampener with indicator on timing chain cover before removing distributor. ***Damage to No. 3 & No. 4 piston may result if this is not done.***

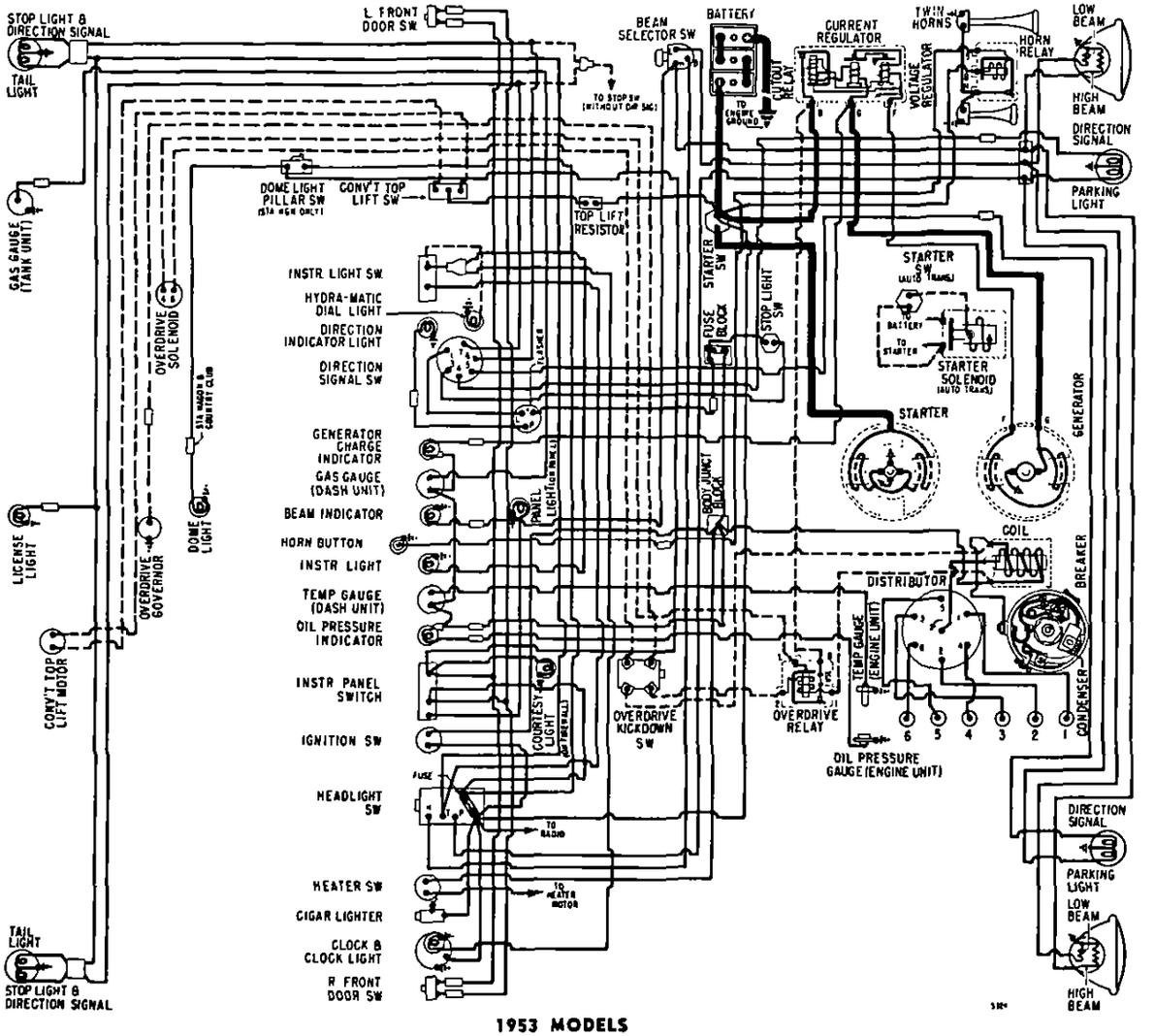
IGNITION TIMING

Standard Setting—***CAUTION—Different ignition timing on some models as follows:***

Model	Ignition Timing
1952 (All Models)	TDC
1953 (100" W.B.—Exc. Hydra-Matic)	TDC
1953 (100" W.B.—With Hydra-Matic)	4° ATDC
1953 (108" W.B.—All Models)	4° ATDC

Timing Mark—TDC mark is heavy milled line on vibration dampener, with lighter milled lines on either side indicating degrees. Pointer located on timing chain cover.

Timing (Using Timing Light)—Align 1/8" holes in clamp arm and distributor support and insert pin. Loosen distributor hold-down screw and center octane selector scale, tighten screw. Clip neon timing light to No. 1 spark plug, direct light at vibration damper at timing chain cover pointer. Idle engine at 400-500 RPM, loosen clamp arm bolt, rotate distributor until correct mark (see Standard Setting above) on dampener aligned with the pointer, tighten clamp arm bolt, remove 1/8" pin in support. Check Octane Selector Setting.



1953 MODELS

CARBURETOR

Carter YF 876SA (1952 & Early 1953), No. 2014S (Late 1953). Single barrel downdraft type with Climatic Control.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up.***

Metering Rods & Jets—***See Carter Jet Tables in Carburetor Section.***

Hydra-Matic Throttle Linkage Adjustment: ***See "Hydra-Matic Drive" in Transmission Section.***

Fast Idle: .054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate, adjust by bending connector link at lower end.

See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Barrel Carburetor).

Setting—Set 1 point lean.

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC Oil-wetted type Std. Oil-bath type Optl. Filter Element AC No. 30 (std. type).

Fuel Pump: Carter No. M-744S (Std.) Fuel only. No. M-797S (Optional) Fuel & Vacuum Pump.

Pressure—3-4½ lbs.

See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley Electric type. (Not "CV").

Dash Unit—(1952) K-S No. 42951, Nash No. 311387. (1953) K-S No. 46321, Nash No. 3116294.

Tank Unit—K-S No. 42760. Nash No. 3128741.

See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type 1M-100. 6 volt, 15 plate, 100 ampere hour capacity.

Grounded Terminal—Positive (+) terminal grounded to cylinder head.

BODY GROUND—SEPARATE ground strap connected between transmission and rear engine cross-member.

Location—Left side in engine compartment.

STARTER

Delco-Remy Numbers	Starter	Armature
Std. Trans. (LHD Cars)	1107119	1923018
Std. Trans. (RHD Cars)	1107120	1923018
Hydra-Matic Trans.	1107136	1925939

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Drive (Std.) Delco-Remy 1923008. Automatic type.
Drive (Hydra-Matic)—Delco-Remy No. 1923043.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	5500	5.65	70
11	"	Lock	3.25	550

Starting Switch (Std. Trans.): Delco-Remy No. 1996478. Mounted on toe-board, actuated by fully depressing clutch.

Starting Switch (Hydra-Matics Cars): Switch, Nash No. 3137292 mounted on left front fender apron, controlled by Control Switch mounted on steering column and operated by Hydra-Matic Selector lever (operative in "N" by lifting lever).

Control Switch: Delco-Remy No. 1996077.

Starter Control Switch Removal (Hydra-Matic Cars)—Disconnect both wires and battery cable from switch, remove switch from bracket using a ¼" drive ratchet handle and pronged socket on threaded bushing retaining switch on bracket.

GENERATOR

Delco-Remy No. (1952) 1102776, (1953) 1100021. Two brush type with current and voltage regulation.
Armature—Delco-Remy No. 1913597 (for 1102776 Gen.), 192590 (for 1100021 Gen.)

Performance Data—1102776

	Amperes	Volts	R.P.M.
Cold	30①	8.0	2050

Performance Data—1100021

	Amperes	Volts	R.P.M.
Cold	35①	8.0	2650

①—Maximum output controlled by current regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—28 ozs.
Field Current—(1102776 Gen.) 1.75-1.95 amps., (1100021 Gen.) 1.85-2.03 amps., at 6 volts.

Belt Adjustment: ½" deflection in belt midway between fan and generator pulley with an application of 25 lbs. pressure.

REGULATOR

Delco-Remy No. 1118731. Voltage and current regulator. Test units at full operating temperature. *See Electrical Equipment Section for complete data.*

►*TESTING NOTE—To obtain operating temperature, run regulator not less than 15 minutes with a charge rate of 8-10 amperes.*

►*CAUTION*—Check generator for grounded field coils and leads before changing regulator settings to correct for high charging rate or high voltage.

Cutout Relay

Cuts In—5.9-6.7 volts hot. (Set to 6.4 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.0-7.7 volts hot (set to 6.4 volts hot). Regulator is over compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—34-42 amperes hot (set to 38 hot).
Air Gap—.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type. Upper and lower beam controlled by selector switch on floor.
Beam Indicator—Red jewel located in speedometer.
Direction Signal:—*See Electrical Equipment Section.*
Direction Indicator—Bulb in direction signal switch handle. Lights when direction signals flashing.

Switches

Lighting—Nash No. 3130348.
Beam Selector—Nash No. 3130120.
Directional Signal—Nash No. (1952) 3128974, (1953) 3136368.
Instrument Light—Nash No. (1952) 3128971, (1953) 4368765.
Stop Light—Nash No. 99469.
Glove Box (1952)—Nash No. 4367923.
Dome Light (1952)—Nash No. 3128971.
Courtesy Lights (1953)—Nash No. 4373297.

MISC. ELECTRICAL

GENERATOR CHARGE INDICATOR: Indicator light in instrument cluster. Lights when ignition turned on, should go out when generator begins to charge.

LOW OIL PRESSURE INDICATOR: *See "Oil Pressure Gauge" under LUBRICATION.*

FUSES: (Main Lighting)—30 amp., on light switch.
Stop & Directional Lights—30 amps., under hood near voltage regulator.
Overdrive—20 amps., under hood on Overdrive relay.
Radio—10 amps., lower left hand corner of radio chassis.

HORNS: E.A. Laboratories. Vibrator type twin horns.
E.A. No. 7340 (Low Note), **E.A. No. 7341** (High Note).
Horn Current—12 amperes per horn.
Contact Gap—.031", (±) .010".

Horn Relay: E.A. Laboratories. On horn bracket.

ENGINE

►*ENGINE NOTE (HYDRA-MATIC DRIVE CARS)—STATESMAN ENGINE (With Different Cylinder Head) used in cars with Hydra-Matic Drive. See Rambler Engine (following) for Developed Horsepower and Compression ratio, and STATESMAN CAR PAGES for other Engine specifications.*

ENGINE SPECIFICATIONS: 6 cylinder "L" head type. Cylinders cast Enbloc with intake manifold cast in block (Iso-thermal fuel intake system).

Model	Bore	Stroke	Displacement
1952	3⅛"	3¾"	172.6 cu. ins.
1953 (Std. Trans.)	3⅛"	4"	184 cu. ins.
1953 (Hydra-Matic)	3⅛"	4¼"	195.6 cu. ins.

Rated Horsepower—23.44.

	Compr. Ratio	Developed H.P.
Std. Trans. (1952)	7.25-1	82 at 3800 RPM.
Std. Trans. (1953)	7.25-1	85 at 3800 RPM.
Hydra-Matic Trans.	7.30-1.	90 at 3800 RPM.

Compression & Vacuum Reading—*See Tune-Up.*
See STATESMAN for all other Hydra-Matic Engine data.

CYLINDER HEAD & TIGHTENING TORQUES: *See Rambler Special Data.*

ENGINE REMOVAL: *See Rambler Special Data.*

OIL PAN REMOVAL: Remove steering linkage cross-tie rod before removing oil pan.

PISTONS: Aluminum alloy, cam ground, tin plated, strut type with solid skirt.

►*PISTON NOTE—Piston pin is offset in piston, and should be installed with the heavy side toward the camshaft (measured across the top, side of piston having greatest measurement should be installed toward camshaft).*
Removal—Piston and rod removed from above.
Clearance—.001-.002". See Fitting Pistons.
Cylinder Out-of-Round & Taper Limits—.004". Rebore cylinder if taper exceeds .009".

Original Piston & Bore Sizes: *See Rambler Special Data.*

Fitting New Pistons: With all parts clean and dry, fit piston so that piston will support its own weight in any portion of cylinder. If feeler gauge used, insert .002 x ½" feeler at right angles to pin bosses, pull to withdraw feeler must be 12-18 lbs.

Replacement Pistons: Furnished Standard, .002", .005", .010", .020" and semi-finished.

Installing Pistons: Pin offset in piston. Install with side of piston having greatest measurement from pin centerline to side of piston (measured across top), toward camshaft. See Connecting Rod Installation.

PISTON RINGS: 2 compression, 1 slotted oil ring and 1 Thompson U-Flex ring, (U-Flex ring in No. 4 groove), per piston. All rings above pin. Oil ring grooves drilled with oil drain holes.

Ring	Width	End Gap
Top Compression	.0930-.0935"	.010-.020"
Lower Compression	.0930-.0935"	.010-.020"
Upper Oil	.1545-.1550"	.010-.020"
Lower Oil	.154-.155"	①

①—No end gap with U-Flex oil rings.
Ring Side Clearance—.002-.004" (all rings).

Installing Rings: Stepped inner edges of both compression rings must be UP.

PISTON PINS: Diameter—.8593-.8594". Length 2¾". Locked in rod.
Pin Fit in Piston—Thumb push fit or .0003" maximum loose fit at room temperature (70°F.).

Replacement Pins: Standard, .001", .003" oversize.

CONNECTING ROD: Length—6⅝" (6.623-6.627").
Weight—25 ozs.
Crankpin Journal Diameter—2 3/32" (2.094-2.095"). *See "Original Bearing Sizes" in Rambler Special Data.*
Lower Bearing—Steel backed, babbitt lined type.
Clearance—.001-.002". **Sideplay**—.005-.015".

Bearing Adjustment: None. Replace bearings. *See "Connecting Rod & Bearings" in Rambler Special Data. NOTE—Tang on bearing shells must engage slots in rods and caps. Palnuts used on rod bolt nuts. Replace with new Palnuts each time nuts are removed.*

Replacement Bearings: Furnished Standard, .002", .010", .012" undersize.

Installing Rods: Numbers on rod and bearing cap should be together and rod installed in same numbered cylinder with numbers toward camshaft side of engine.
NOTE—Rods and bearing caps are NOW assembled with identifying mark (raised dot on side) of rod toward front of engine, and bearing cap toward rear of engine.

►*CAUTION—See Piston Note above for piston installation.*

CRANKSHAFT: Four bearing counter-weighted type with vibration damper mounted on front end.

ENGINE

CONTINUED FROM PRECEDING PAGE

▷*CRANKSHAFT REPLACEMENT NOTE—Replacement crankshaft furnished complete with vibration damper and flywheel. Assembly is balanced as a unit.*
Journal Diameters—2 31/64" (2.479").
See "Original Bearing Sizes" in Rambler Special Data.
Bearings—Removable steel backed, micro-babbitt.
Clearance—.0007-.0029".

Bearing Adjustment: None. Replace bearing. *See "Crankshaft Main Bearings" in Rambler Special Data.*
NOTE—Upper bearing halves can be rotated in and out without removing crankshaft.

Replacement Bearings: Furnished Standard, .002", .010", .012" undersize.

Crankshaft Oil Seal: *See "Crankshaft & Main Bearings" in Rambler Special Data.*

End Thrust: Taken by front (No. 1) bearing. (Thrust plate on shaft ahead of flanged bearing).
Endplay Adjustment—*See "Crankshaft & Main Bearings" in Rambler Special Data.*
Endplay—.006-.008".

Vibration Dampener Removal & Installation: *See Rambler Special Data.*

CAMSHAFT: 4 bearing. Non-adjustable chain drive.
Camshaft Removal— *See Rambler Special Data.*
Bearings—Steel backed babbitted bushing.
Clearance—.002".

End Thrust: Thrust plate assembled on front face of block between No. 1 bearing and camshaft sprocket.
Endplay—.004-.006".
CAUTION—Thrust plate has long groove on rear face which provides valve tappet lubrication from No. 1 crankshaft bearing. Short groove on front face of plate lubricates timing chain and sprockets.

Timing Chain: Morse. Non-adjustable type. Width 1", Pitch ⅜". Length 22½" or 60 links.

Camshaft Setting: Install chain with the marked teeth of camshaft and crankshaft sprockets adjacent and in line with a straightedge across shaft centers. Check setting as follows: Turn engine over until punch mark on camshaft at 1 o'clock position, with mark on crankshaft sprocket just beginning to mesh with chain. There should be 9½ links or 19 pins (2 pins to each link) between marks.

VALVES:	Head Diam. 1952	Head Diam. 1953	Stem. Diam. 1952-53	Seat Angle 1952-53
Intake	1.469"	1.594"	3.407-3.412"	①
Exhaust	1.281"	1.343"	3.407-3.412"	①

	Lift 1952	Lift 1953	Stem Clearance 1952	Stem Clearance 1953
Intake	.300"	.340"	.0013-.0047"	.002-.003"
Exhaust	.300"	.300"	.0013-.0047"	.002-.003"

①—Valve Face Angle 44°. Seat Angle in Block 45°.

Valve Guides: Pressed in block. Remove guides using tool J-2814. Install guides using tool J-1429-A with adapter J-1429-4.

Valve Springs: Install springs with closed coil end up against cylinder block and seated in counter-bore in block. **Spring Free Length**—2 5/32".
CAUTION—Excessive wear of valve stem and guide will result if springs not properly seated in counter-bore.

	Spring Pressure	Length
Valve Closed	37-41 lbs.	1 3/4"
Valve Open	75-82 lbs.	1 7/16"

Valve Lifters: Mushroom type operating in reamed holes in block. Lifters removed from below with camshaft out of engine. *See "Camshaft & Bearings" in Rambler Special Data.*

VALVE TIMING

Tappet Clearance: Hot Setting—.015" All Valves.
Cold Setting—.016" Intake, .018" Exhaust.
NOTE—Tappet adjusting screws are self-locking.

Valve Timing: See Camshaft Setting above.

1952 Models

Intake Valves—Open 6° BTDC. Close 50° ALDC.
Exhaust Valves—Open 46° BLDC. Close 10° ATDC.

1953 Models

Intake Valves—Open 10° BTDC. Close 58° ALDC.
Exhaust Valves—Open 46° BLDC. Close 10° ATDC.

Valve Timing Check—Set No. 6 piston on TDC in firing position, then set valves on No. 1 cylinder to .003" clearance. Slowly rock crankshaft back and forth. If timing is set correctly, the exhaust valve should open before the "DC" mark on vibration damper lines up with the pointer. **Note this distance.** Intake valve should open an equal distance after the "DC" mark passes the pointer.

LUBRICATION

Engine Oiling System: Pressure to main, connecting rod, and camshaft bearings, valve tappets, and timing chain. Oil pump mounted on right of engine.

▷*FLASHING OF LOW OIL PRESSURE WARNING LIGHT AT IDLING SPEED: See Oil Pressure Warning Light.*
Crankcase Capacity—4 quarts.

▷*1952 CRANKCASE CAPACITY PRODUCTION CHANGE—Cars before Engine No. F-113390 requires 5 quarts of oil to bring level to "F" mark on dipstick. See Oiling System" in Rambler Special Data.*
Normal Oil Pressure—50 lbs. at 30 MPH.
Oil Pressure Regulator—Spring loaded release valve under plug to rear of oil pump on lower edge of crankcase. Non-adjustable, opens at 50-58 lbs.

Oil Pump: Gear type pump mounted on right side of engine, driven by inclined shaft.

Oil Filter: Optional. Replace cartridge at 8000 miles or more often if necessary.

Oil Pressure Warning Light: King-Seeley type pressure switch controlling light on instrument panel. **Dash Unit**—Warning light on instrument panel. Lights when ignition turned on, goes out when engine oil pressure sufficient to open engine unit contacts.

▷*FLASHING OF WARNING LIGHT AT IDLING SPEED (1952 & EARLY 1953 CARS)—If light indicates low oil pressure at idling speed (using light oil) and conditions not due to worn bearings or excessive clearances, Engine Unit—Carter No. A954S (Nash No. 3134704) should be used to replace original pressure switch.*
Engine Unit—(1952) King-Seeley No. 47100 or Carter No. A815S. (Early 1953) K-S No. 47130 or Carter No. A954S. (Late 1953) Carter No. A954S.

COOLING

Cooling System: Pressure type with pressure valve and vacuum valve located in filler cap, and positive circulation with water pump.
Capacity—11 qts. (12 qts. with heater).
Pressure Valve—Nash No. (1952) 3112649, (1953) 3136627. In filler cap, opens at 7 lbs.

Water Pump: Sealed packing & bushing type. Not adjustable.
See Water Pump Section for complete data.
Removal—Drain cooling system, remove distributor, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting screws.

Belt Adjustment: *See Generator Belt Adjustment.*

Thermostat: Dole. In water outlet in cylinder head. **Setting**—Starts to open at 167-173°, and should be fully open 20° above starting point.

Temperature Gauge: King-Seeley Electric type. (Not "CV").

Dash Unit—	King-Seeley No.	Nash No.
1952	42953	311388
1953	46325	3116293
Engine Unit—		
1952	42550	3112940
1953	45780	3133688

See Miscellaneous Section for complete data.

CLUTCH

Borg & Beck Model 8A7, Assy. No. 987. Single plate dry disc type.
See Clutch Section for complete data.
Facings—Inside Diameter—5⅜". Outside Diameter —8". Thickness—⅛".

Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.
CAUTION—Do not disturb adjustment of clutch beam lever-to-pedal rod.

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punchmark flywheel, clutch cover, and pressure plate. (Reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner AS35-T96 (Std.), AS36-T96 (Optional with Overdrive). Constant mesh, synchro-mesh, all helical gear type.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Warner Transmission" in Transmission Section.*

Transmission Control: Steering column shift.
See Transmission Section for complete data.

Removal: Move rear axle back (see Universals for procedure) to slip front universal joint off transmission. Disconnect shift levers and speedometer cable, remove two upper transmission to bell housing bolts, and install special guide bolts in their place. Remove lower bolts, slide transmission out.

OVERDRIVE

Warner R10 Type (part of AS36-T96 Transmission). Centered ring gear type. Governor controlled with electrical solenoid operation and throttle operated kick-down switch.
See Transmission Section for complete data.

▷*LOCKOUT SWITCH CHANGE (1953):* Switch not used on later cars (mounting hole on transmission closed by plate, and two switch leads connected together). *NOTE*—If switch inoperative on early

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cars, cut switch out of circuit by connecting both switch leads to same terminal.

Overdrive Solenoid—Delco-Remy No. 1118155.
Governor—Auto-Lite No. TGE-4004.
Control Relay—Nash No. 3123721.
Overdrive Fuse—30 ampere. On BAT terminal of overdrive relay.

Removal: Remove as a unit with transmission after disconnecting control cable and all wiring on overdrive case. See Transmission Removal above.

HYDRA-MATIC TRANSMISSION

"Dual Range", Four-Speed Planetary type automatic transmission and fluid coupling, Modulated Throttle Pressure, and hydraulically operated reverse mechanism.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See Transmission Section.*

Lubrication—Check fluid every 1000 miles. Add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Hydra-Matic Fluid (Automatic Transmission Fluid type "A").

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes after transmission has reached normal operating temperature. With selector lever in "N", remove dipstick and check fluid level (dipstick located under right front floor plate). Add the necessary amount of fluid to bring fluid level to "F" mark. *CAUTION—Use care not to allow dirt or lint to enter transmission.*

►*CAUTION—Do not fill above "F" mark on dipstick.*

Capacity—Approximately 8½ qts. (refilling after draining), 9½ qts. (when reassembled after overhaul).

OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.

UNIVERSALS

Mechanics or Saginaw. Needle bearing, cross type. Front joint slips on transmission main shaft.

Lubrication—Pre-packed. Disassemble and lubricate every 15000 miles.

Propeller Shaft: Open drive line with front and rear universal joints.

►*FRONT SPLINED FLANGE CAUTION*—Two types used in production. **Short Type** (3 13/16" from centerline of universal joint bore to end of flange) for cars with Overdrive. **Long Type** (4 7/32" from centerline to end of flange) for cars without Overdrive.

Removal: Support rear of car at body side sills and rear axle at the housing. Loosen propeller shaft coupling nut by turning nut clockwise (facing rear of car) with Tool J-4486 (Shaft holding and Coupling Wrenches). Disconnect rear shocks at axle tube, parking brake cable at adjusting yoke, and disconnect rear brake hose from body floor pan. Remove rear spring front bracket mounting nuts and lower rear axle (continue to support body). Push rear axle assembly to rear; sliding propeller shaft yoke off transmission main shaft splines. Remove propeller shaft from pinion shaft by tapping with a soft hammer.

Installation: Install propeller shaft (coupling) onto pinion shaft until center of "U" joint is 4 3/16" from front face of rear axle housing. Push axle assembly to rear and slide front "U" joint onto transmission main shaft. Move the propeller shaft forward until front universal joint "bottoms" on transmission main shaft. MARK THE YOKE AT THE TRANSMISSION REAR OIL SEAL, THEN ADJUST THE PROPELLER SHAFT SO THE MARK IS 5/32" TO THE REAR OF THE OIL SEAL. Loosen the rear spring front eye bolt and tilt front bracket so rear holes are aligned with bolts in floor pan. Raise axle assembly, aligning rear spring front bracket with mounting bolts and secure the mounting nuts. TIGHTEN THE COUPLING NUT TO 300 FT.LBS. TORQUE with the use of Tool J-4486 and 3 ft. extensions applied to wrench handles. Reinstall brake clip. Connect shock absorbers.

REAR AXLE

Own Make. Semi-floating, hyppid gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Axle Ratios

Transmission	Ratio
Standard	3.8-1 (9-34)
Overdrive	4.4-1 (8-35)
Overdrive (Optional)	4.1-1 (9-37)
Hydra-Matic	3.3-1 (13-43)

Backlash—.002-.006". Shim adjustment.

Removal: Raise and support rear end of body. Remove rear wheels, axle shaft nuts, and rear hub and drums. Disconnect parking brake cables at rear wheels, brake hose and shock absorbers. Remove rear spring clips and rear spring front eye brackets. Move axle to rear which will pull the front universal off the transmission mainshaft spline. Rear axle and propeller shaft now removed as an assembly.

Axle Shaft Removal & Wheel Bearing Adjustment: Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims. Withdraw axle using puller J-2498, do not drag shaft on inner oil seal.
Endplay—.002-.004".

SHOCK ABSORBERS

Delco. Direct acting type. Serviced by replacement. **Front**—Nash No. (1952 Early) 3133972, (1952 Late-1953) 3135447. **Rear**—Nash No. (1952 Early) 3130121, (1952 Late-1953) 3135448.

FRONT SUSPENSION

Front Suspension: Independent type with coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.

►*FRONT SPRING PRODUCTION CHANGE (Hydra-Matic Cars): See "Nash Front Suspension" in Front Suspension Section.*

►*STEERING LINKAGE TIE-ROD CAUTION—Tie-rod adjusting tube clamp bolt must be located at bottom side of adjusting tube to prevent interference with steering arms on extreme turns.*

Kingpin Inclination—8½° crosswise.
Caster—Pos. ¾° to 1¼° (1° preferred).
Camber—Pos. ¼° to ¾°. (½° preferred).
Toe-In—⅛" to ¼". (¼" preferred).
Toe-Out on Turns—Outer wheel turned 20°, inner wheel should be turned 22½°.

STEERING GEAR

Gemmer Model 305. Worm-and-Roller type with "push-pull" adjustments.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self centering (floating shoe) type. Hand lever applies rear wheel service brakes.

►*1953 FRONT BRAKE NOTE (HYDRA-MATIC DRIVE CARS)—Larger front wheel brakes used on cars with Hydra-Matic Drive. See Brake Specifications following:*

NOTE—No anchor pin adjustment.
See Brake Section for complete data.

Wheel Cylinders—Front Wheels 1". Rear 13/16".
Drums—8" (1952 & 1953—Except Front Wheels on 1953 Hydra-Matic Drive Cars). 9" (Front Wheels 1953 Hydra-Matic Drive Cars).
Lining—Molded type. **Thickness**—.214", (all shoes)

Lining Dimensions
1953 Hydra-Matic Drive Cars

Wheel & Shoe	Length	Width
Front Whl. Primary	9 7/8"	2"
Front Whl. Secondary	7 11/16"	1 3/4"
Rear Whl. Primary	8 27/64"	1 1/4"
Rear Whl. Secondary	8 27/64"	1"

Lining Dimensions
(Cars Without Hydra-Matic Drive)

Wheel & Shoe	Length	Width
Front Whl. Primary	8"	1 3/4"
Front Whl. Secondary	8"	1 1/2"
Rear Whl. Primary	8"	1 1/4"
Rear Whl. Secondary	8"	1"

Clearance—Eccentric adjustment for each shoe. Shoes should just be free of drag (*CAUTION*—make hard brake application to centralize shoes and release brakes before making adjustments).

Hand Brake: See Service Brakes above.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Cable operated type with motor operating winding drum behind rear seat.
See Miscellaneous Section for complete data.

WINDSHIELD WIPER: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

►*AIR CONDITIONING CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Designation
1954	5410
1955	5510

SERIAL NUMBER: Stamped on plate located on right side of cowl under hood.

Starting Serial Numbers

Model	Kenosha	El Segundo
1954	D-171501	DC-12301
1955	D-205001	DC-15001

ENGINE NUMBER: Stamped on machined surface on right side of cylinder block above exhaust pipe. Starting numbers as follows:
1954 (4" Stroke Engine)–F-17001.
1955 (4½" Stroke Engine)–H-12001.
1955-H-45001.

►*ENGINE NUMBER NOTE:* Three code letters adjacent to engine number indicates special bore or bearing sizes. *See "ORIGINAL BORE & PISTONS AND ORIGINAL BEARING SIZES" in Rambler Special Data.*

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking speed. Variation limit 10 lbs.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: .015" Hot, All Valves.

MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .030".

Spark Plug–Auto-Lite A7. Tighten to 30 ft. lbs.

COIL: Delco-Remy 1115380.
Ignition Current–2.3 amps. idling, 5 amps. stopped

DISTRIBUTOR: Delco-Remy 1112382.
Condenser–Delco-Remy 1869704. **Capacity.** .18-.23 mfd.
Contact Point Set–Delco-Remy 1855720.
Breaker Gap– 018-.024".
Cam Angle–31-37°.
Breaker Arm Spring Tension–17-21 ozs.
Rotation–Counter-clockwise viewed from above.

►*DISTRIBUTOR REMOVAL CAUTION: Align timing mark on crankshaft vibration damper with indicator on timing chain cover before removing distributor. Damage to No. 3 & 4 pistons may result if this is not done.*

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	325	0-4	650
3.5-5.5	400	7-11	800
7-9	950	14-18	1900
10-12	1400	20-24	2800

Vacuum Spark Control: Delco-Remy 1116072
Plunger Travel–13/64-¼".

Vacuum Advance

Distr. Degrees	Engine Degrees	Vacuum (" of Hg)
Start	0	4-6
5.5	11	11

IGNITION TIMING

Setting–TDC (4" Stroke Engine). **4° ATDC** (4½" Stroke Engine).

Timing Mark–Groove on damper aligned with pointer on chain cover.

CARBURETOR

►*R.H.D. CAR NOTE:* **Carter WA1 7805 Carburetor.** *See "Carter WA1" Carburetor in Carburetor Section.*
Carter YF 2014S–Single barrel downdraft with automatic choke.
Idle Setting–½-1½ turns open. Turn screw out for richer mixture.

Idle Speed (1954 Without Air Conditioning)–550 RPM (Synchro-mesh & O.D.). 475 RPM (Hydra-Matic, in "N").

Idle Speed (1955 Without Air Conditioning)–500-550 *RPM (Synchro-mesh & O.D.). 450 RPM (Hydra-Matic,* in "N").

Idle Speed (With Air Conditioning)–500 RPM with compressor operating (All transmissions, Hydra-Matic in neutral).

Float Level–½". Measure from under side of bowl cover to top of float with bowl inverted and weight of float on *needle valve.*

Accelerating Pump–No seasonal adjustment,

Fast Idle: .054" between throttle valve and bore of carburetor (side opposite port). Remove thermostatic coil housing and baffle plate. Adjust by bending connector link at lower end.

Automatic Choke Setting: One point lean.

Throttle Linkage Adjustment (Hydra-Matic): Adjust engine idle speed at 450 RPM (with air conditioning, 500 RPM compressor running) with engine temperature at 150-160°F., transmission warm and selector lever in neutral. Disconnect throttle rod, at throttle lever at side of transmission. Clean machined surface at back of transmission case and place throttle lever checking gauge J-2545-C flush against surface with edge of gauge against transmission side cover. The throttle lever stud should fit freely in notch of gauge. If gauge does not pass over throttle lever stud freely, use bending tool J-3310 and bend to proper location. Gauge notch must slide freely on stud pin. Adjust transmission throttle rod (which is threaded into upper throttle rod yoke) to fit freely on throttle lever stud; then shorten rod approximately two turns. Install rod on stud and replace wave washer, flat washer and cotterkey.

►*OTHER DATA: See "Carter YF Carburetor" in Carburetor Section.*

Fuel Pump Pressure: 3½-5¼ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter M-774S (Fuel only); M-797SA (Fuel & Vacuum).

Fuel Pump Pressure–3½-5¼ lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: King-Seeley Electric (Not "CV").
Dash Unit–King-Seeley 46321.
Tank Unit–King-Seeley 42760.
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Auto-Lite 1M-100. 6 volt 15 plate, 100 Ampere hour capacity (20 hr. rate).
Battery Ground–Positive. Battery to cylinder head.
Engine Ground–Flywheel housing to frame crossmember, right side.

►*ENGINE GROUND NOTE (1954 Convertible):* Engine ground is from timing chain cover to front engine support bolt.

STARTER

Delco-Remy Numbers	Starter	Armature
Std. Trans. (LHD)	1107119	1923018
Std. Trans. (RHD)	1107120	1923018
Hydra-Matic Trans.	1107136	1925939

Drive–Delco-Remy Automatic Drive or Bendix "Folo-thru" type.
Synchro-mesh & OD Cars–Delco-Remy 1923008 or Bendix A3283.
Hydra-Matic Cars–Delco-Remy 1923043 or Bendix A3338.
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11.0 ft. lbs.	Lock	3.25	550

Starting Switch: Two types used as follows:
Synchro-mesh & Overdrive Cars–Delco-Remy 1996478. Mounted on toeboard, actuated by fully depressing clutch pedal.

Hydra-Matic Cars–Rambler No. 3137192 Magnetic Switch mounted on left fender apron, actuated by Delco-Remy Control Switch 1996077 mounted on steering column and operated by lifting Hydra-Matic Selector lever in "N" position.
Control Switch Adjustment–*See "Hydra-Matic Drive Linkage Adjustment" in Transmission Section.*

GENERATOR

Delco-Remy Numbers	Generator	Armature
1954-55 (Std.)	1100021	1925960
1954-55 (Air Cond.) ℂ	1102777	1921981
1955 (Air.Cond.) ℂ	1102815	1921981

ℂ–Used before 1955 Serial No. H-56919.
ℂ–Used after 1955 Serial No. H-56919.

Performance Data–Cold

Generator No.	Amperes ℂ	Volts	RPM
1100021	35	8.0	2650
1102777	45	8.0	2450
1102815	45	8.0	2450

ℂ–Maximum output controlled by regulator.
Brush Spring Tension–28 ozs.
Field Current–1.85-2.03 amps. (1100021); 1.87-2.0 amps. (1102777 & 1102815). All at 6.0 volts.

Rotation–Counter-clockwise at commutator end.
Belt Adjustment: ½" deflection in belt midway between fan and generator pulleys with an application of 25 *lbs. pressure.*

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REGULATOR

Delco-Remy 1118841 (Gen. 1100021); **1118828**(Gen. 1102777 & 1102815).

►*REGULATOR NOTE: Checking procedure is different than for previous models. See "Delco-Remy 1118825 Series Regulators" in Electrical Equipment Section. All Specifications are "Normal" Settings.*

Cutout Relay

Cuts In–6.4 volts (Hot).
Contact Gap–.020".
Air Gap–.020" (With contacts just closed).

Voltage Regulator

Setting–7.3 volts (Hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–See *Electrical Equip. Section.*

Current Regulator

Setting–34-39 amps. (1118841); 42-47 amps. (1118828).

Air Gap–.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting–See *Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Directional Signals: *See Electrical Equip. Section.*
Lighting Switch Removal: Disconnect instrument switch panel from dash panel. With switch in full "ON" position insert stiff wire in hole on side of switch to release switch shaft and knob. Remove (French) nut.
Stop Light Switch: Located at tee fitting in front brake line.
FUSES: Located as follows:
Main Lights–30 Ampere at light switch.
Stop & Directional–30 Ampere on left front wheelhouse panel.
Overdrive–30 Ampere on Overdrive relay.
Radio–10 Ampere, lower left hand corner of radio chassis.
HORNS: Jubilee. Rambler No. (Left side) 3117124, (Right side) 3117125.
Horn Relay–Rambler No. 3113989.

ENGINE

►*AIR CONDITIONING CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section*

►*1954 ENGINE OIL CLEARANCE PRODUCTION CHANGE: Crankpin journal diameter increased .0005" beginning with Engine No. H-20966 (Synchro-mesh); H-20995 (Hydra-Matic).*

►*1954 ENGINE PRODUCTION CHANGE: 4" Stroke Engine used on early cars with Synchro-mesh or Overdrive Transmission. 4½" Stroke Engine used on all other models.*

ENGINE SPECIFICATIONS: 6 Cyl. "L" head. Two engines as follows:

Engine	Bore	Stroke	Displacement
"F" ①	3 1/8"	4"	184.0 cu. ins.
"H" ②	3 1/8"	4½"	195.6 cu. ins.

Engine	Compr. Ratio	Rated HP	Developed HP
"F" ①	7.25-1	23.44	85 at 3800 RPM
"H" ②	7.32-1	23.44	90 at 3800 RPM

①–4" Stroke Engine. "F" Engine Number Prefix.
②–4½" Stroke Engine. "H" Engine Number Prefix.

Compression & Vacuum Reading–*See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Rambler Special Data.*

OIL PAN REMOVAL: *Remove steering linkage cross tie rod before removing pan.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Rambler Special Data.*

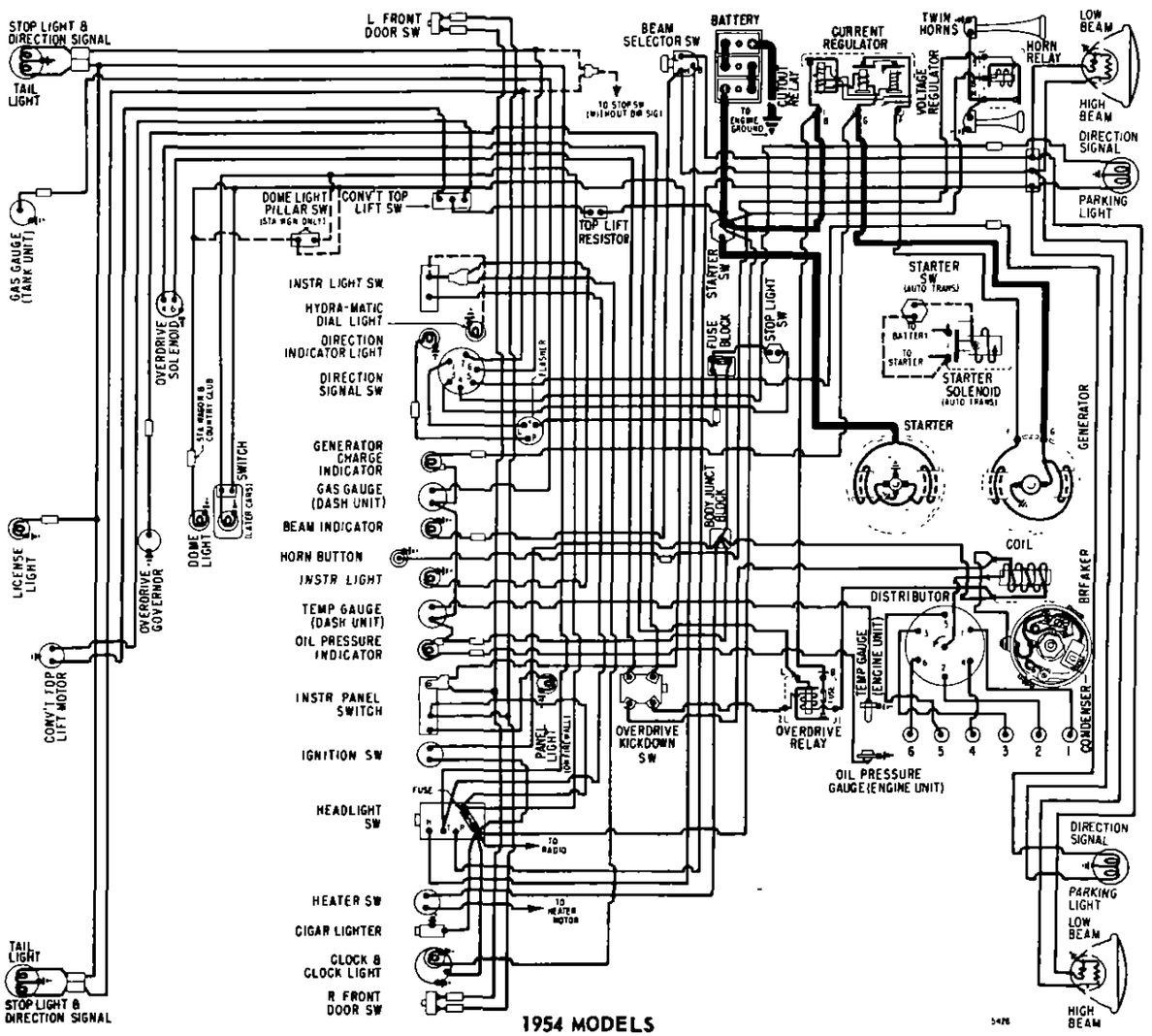
CYLINDER HEAD & MANIFOLD: *See "Cylinder Head & Manifold" in Rambler Special Data.*

PISTONS

Cam ground, aluminum alloy, tin-plated with steel strut and solid skirt.

►*CYLINDER BORE OVERSIZE CAUTION: Code letter adjacent to engine nymber indicates cylinder bores .010' oversize. See "Original Bore & Pistons" in Rambler Special Data.*

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1954 MODELS

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Weight–13.59 ozs.
Removal–Pistons & rods removed from above.

Fitting New Pistons: Piston to bore clearance .0006"-.0012". Piston properly fitted should support its own weight with piston and bore dry.

Replacement Pistons: Standard, .002", .005", .010" .020", .030" and .040" oversize.

Installing Pistons: Install piston with notch on top perimeter toward front of engine.

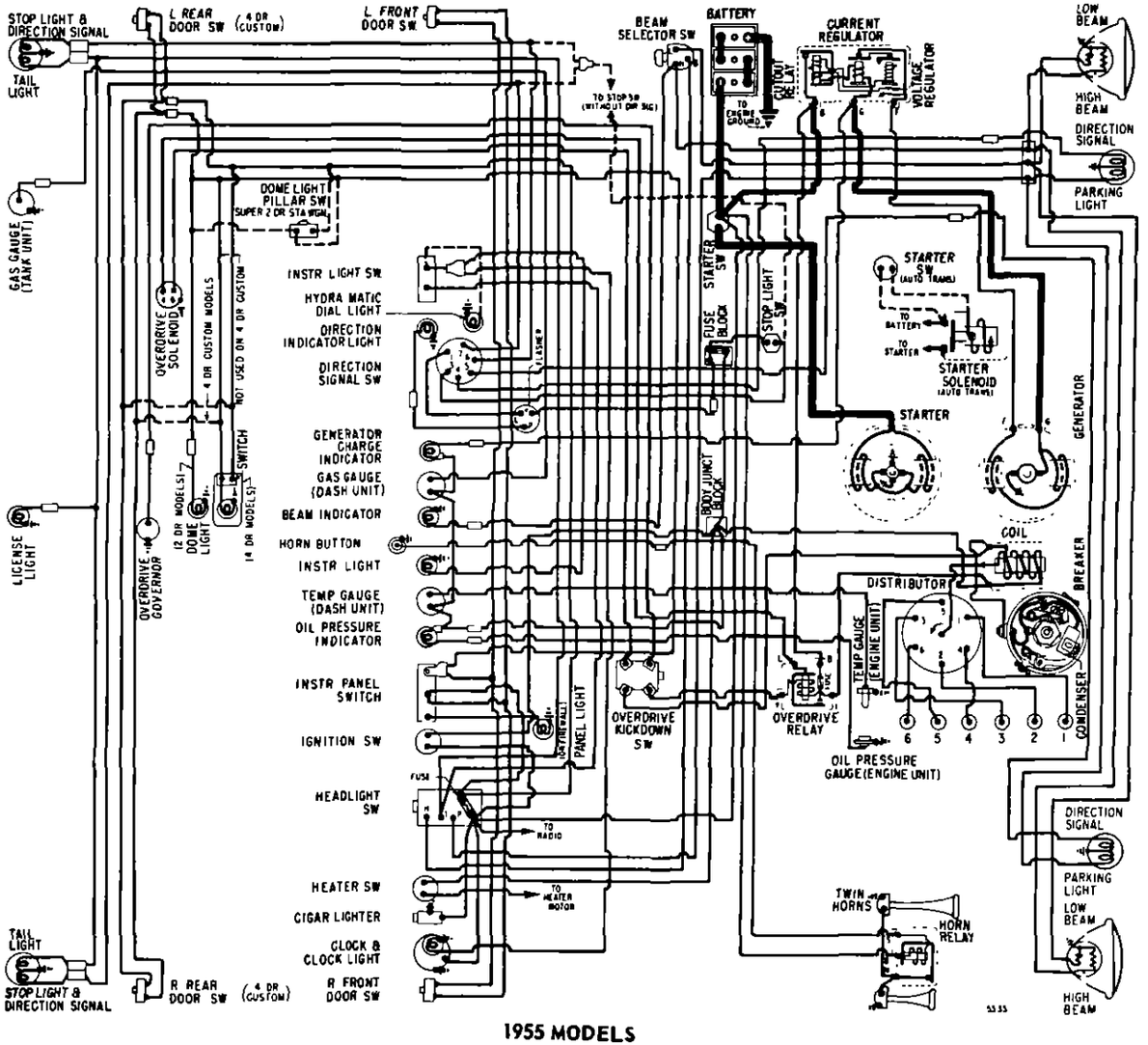
PISTON PINS

Locked in connecting rod by means of locking bolt.
Diameter– .8598-.8595". Length 2.755".
Clearance in Piston–.0002" maximum. Thumb push fit at 70°F.
Replacement Pins: Std., .001", .003" Oversize.
NOTE–Fitted pins furnished with pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1&2)	.0930-.0935"	.010-.020"	.002-.004"
Oil (#3)	.1545-.1550"	.010-.020"	.002-.004"
Oil (#4 U-flex)	.1545-.1550'		.002-.004"

Replacement Rings: Sets of Std. & .020" oversize.
Installing Rings: Stepped inner edges of both compression rings must be up.



1955 MODELS

PISTON PINS

Locked in connecting rod by means of locking bolt.
Diameter– .8598-.8595". Length 2.755".
Clearance in Piston–.0002" maximum. Thumb push fit at 70°F.
Replacement Pins: Std., .001", .003" Oversize.
NOTE–Fitted pins furnished with pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1&2)	.0930-.0935"	.010-.020"	.002-.004"
Oil (#3)	.1545-.1550"	.010-.020"	.002-.004"
Oil (#4 U-flex)	.1545-.1550'		.002-.004"

Replacement Rings: Sets of Std. & .020" oversize.
Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

►*1954 OIL CLEARANCE PRODUCTION CHANGE: Crankpin diameter increased .0005" on later engines to reduce oil clearance. See Journal Diameters below.*

►*CONNECTING ROD JOURNAL UNDERSIZE CAUTION: Code letter adjacent to engine number indicates journals are undersize. See "Original Bearing Sizes" in Rambler Special Data.*

Length–6.625" center-to-center. **Weight**–25 ozs.
Crankpin Journal Diameter–2.0943-2.095" (Before 1954 Eng. No. H-20966, Synchro-mesh, and H-20995, Hydra-Matic). **2.0948-2.0955** " (After above Eng. Nos.).

Original Bearing Sizes–*See "Original Bearing Sizes" in Rambler Special Data.*
Bearings–Steel-backed babbitt. No shims.
Clearance–.001"-.0015". **Side Play**–.005"-.015".
Replacement Bearings: Std., .001", .002", .010", .012" Undersize.
Installing Rods: Identification marks (raised surface on center of rod and cap) toward front of engine.

CRANKSHAFT

►*CRANKSHAFT JOURNAL DIAMETER CAUTION: Code letter adjacent to engine number indicates main & connecting rod journals undersize. See "Original Bearing Sizes" in Rambler Special Data.*

Journal Diameter–2.4791"-2.4798". Four Bearing.
Original Bearing Sizes–*See "Original Bearing Sizes" in Rambler Special Data.*
Bearings–Steel backed babbitt. No shims.
Clearance–.001"-.0015".
Replacement Bearings: Std., .002", .010", .012" Undersize.
End Thrust: Taken by flanged front main bearing.
End Play–.003"-.008".
Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Rambler Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Rambler Special Data.*
FLYWHEEL REPLACEMENT: *See "Flywheel" in Rambler Special Data.*
VIBRATION DAMPENER REMOVAL & INSTALLATION: *See "Vibration Dampener" in Rambler Special Data.*

CAMSHAFT

Bearings–Steel-backed babbitt bushings.
Clearance–.002".
Camshaft Removal–*See "Camshaft & Bearings" in Rambler Special Data.*
End Thrust: Thrust plate on front face of engine between No. 1 bearing and camshaft sprocket. Endplay controlled by sprocket on shaft. (Press fit on shaft). **Endplay** .004-.006".
Timing Chain: Morse non-adjustable type. **Width** 1", **Pitch** 3/8", **Length** 22½" or 60 links.
Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across centerline of sprockets.

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Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Rambler Special Data.*

VALVES

Tappet Clearance: Hot .015", Intake and Exhaust. Cold .016" Intake, .018" Exhaust.

Valve	Head Diameter	Stem Diameter	Length
Intake	1.594"	.3407-.3412"	4 25/32"
Exhaust	1.343"	.3407-.3412"	4 25/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45° ①	.340"	.0018-.0033"
Exhaust	45° ①	.340"	.0018-.0033"

①—Valve face angle 44° (Intake & Exhaust).

►*VALVE GRINDING CAUTION:* Replace valve when refacing reduces distance from top of valve face to top of valve to 1/32"

Valve Springs: Install springs with closed coil end up against cylinder block and seated in counterbore in block.

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	37-41	1 3/4"
Open	75-82	1 7/16"

Valve Guides: Use Tool J-2814 to remove guides, Tool J-1429-A to install guides. Drive guides flush with opening of guide bore in block.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 10° BTDC, close 58° ALDC.

Exhaust Valves—Open 49° BLDC, close 19° ATDC.

NOTE—Above readings with .019" valve lash.

Valve Timing Check—Set valves on No. 1 cylinder at .003" lash. With No. 6 piston at TDC in firing position, timing will be correct if exhaust valve opens the same amount before DC on vibration dampener as intake valve opens after DC mark.

OILING SYSTEM

Crankcase Capacity: 4 qts. (refill).

Normal Oil Pressure: 30 lbs. at 20 MPH, 12 lbs. minimum at 600 RPM.

Pressure Regulator Valve—Non-adjustable spring loaded release valve located under plug near oil pump. Opens at 50-58 P.S.I.

Oil Pressure Indicator—Light goes on when Ignition switch is turned "ON". Goes out as oil pressure reaches 5-8 lbs. Electric Switch Rambler No. 3142826 is located on right side of crankcase.

Oil Pump: Gear type mounted on right side of engine driven by inclined shaft.

Oil Pump Installation—*See "Oil Pump" in Rambler Special Data.*

Oil Filter: Partial flow type. Replace element every 5000 miles or less as needed.

Replacement Filter Element—Rambler No. 3113312.

Crankcase Ventilation: Breather pipe in Valve Cover and filter in crankcase filler cap.

COOLING

Water Capacity: 11 qts. (1954); 12 qts. (1955). Add 1 qt. for heater.

Pressure Valve: 7 lb. radiator filler cap (std.) Rambler No. 3142965. 14 lb. cap Rambler No. 3141371, used on cars equipped with Air Conditioning.

Thermostat: Choke type. Rambler No. 3131817 (167-173°F), No. 3132708 (150°F), 3131985 (177-182°F) for use with Permanent Type Anti-freeze only.

Water Pump: Sealed packing and bushing type.

►*WATER PUMP LUBRICATION CHANGE:* Starting engine number H-57911 water pump lubrication fitting was eliminated and prelubricated water pump seal cartridge was used.

See "Rambler" in Water Pump Section.

Pump Removal—Drain cooling system, remove distributor, disconnect pump drive coupling (take out rear bolt), disconnect inlet hose, remove pump mounting screws.

Temperature Gauge: King-Seeley Electric (not "CV").

Dash Unit—King-Seeley 46325.

Engine Unit—King-Seeley 45780.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 8A7. Assembly No. 987. Single plate.

See "Borg & Beck" in Clutch Section.

Clutch Disc Nos.	Borg & Beck No.	Nash No.
1954 (Std. Trans.)	381770	3133046
1954 (Overdrive Trans.)	381926	3133048
1955 (Std. & O.D.)	382347	3142241

Pedal Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.

►*CAUTION: The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project ½" from beam toward the rear to provide proper leverage.

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan, punch mark flywheel, clutch cover and pressure plate. (Reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner AS35-T96. 3 speed, helical gear type.

See "Warner Transmissions" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: (100" wheelbase cars and 108" wheelbase cars with Hydra-Matic Drive)—Move rear axle back, see "Removal" under REAR AXLE below, sliding propellor shaft universal joint from transmission. (108" wheelbase cars with Std. & Overdrive transmissions)—Disconnect center bearing crossmember from side rails, lower propeller shaft sufficiently to separate front section from transmission main shaft. Disconnect shift levers and speedometer cable, remove two upper transmission to bell housing bolts and install guide bolts in their place. Remove lower bolts and slide transmission out.

OVERDRIVE

Warner R10—*See "Warner R10" in Transmission Section.*

Overdrive Control: *See "Warner R10-R11 Overdrive Controls" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range four speed automatic transmission with fluid coupling.

See "Hydra-Matic Drive" in Transmission Section.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid every 1000 miles, drain and refill at 25,000 mile intervals.

Capacity—8½ qts. (9½ qts. after overhaul).

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located under right front floor plate). Add fluid to bring level to "F" mark.

►*CAUTION:* Do not check oil level when transmission is excessively hot and do not fill above "F" mark on dipstick.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer, Mechanics, or Detroit—Two used on 100" wheelbase and 108" with Hydra-Matic transmission. Three used with 108" wheelbase with Synchro-mesh and Overdrive. (Two propeller shafts).

REAR AXLE

Own. Semi-floating, hypoid type with Hotchkiss drive.

See "Rambler Rear Axles" in Rear Axle Section.

Axle Ratio—Std. 3.8-1 (9-34), Overdrive 4.4-1 (8-35) Hydra-Matic 3.3-1 (13-43).

Backlash—.002-.006". Shim adjustment.

Axle Shaft Removal: Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims. Withdraw axle using puller J-2498. Do not drag shaft on inner oil seal.

Rear Axle Assembly Removal: Raise and support rear end of body. Remove rear wheels, axle shaft nut and rear hub and drum. Disconnect parking brake cables at rear wheels, brake hose and shock absorbers. Remove rear spring clips and rear spring front eye brackets. Move axle to rear which will pull the front

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universal off the transmission mainshaft spline. *NOTE*–On 108" wheelbase cars with two propeller shafts, remove the rear propeller shaft coupling nut from the coupling and tap the coupling off the splines of the pinion shaft with a soft hammer. The rear axle assembly in both cases may now be removed.

Wheel Bearing Adjustment: Shims behind brake backing plate.

SHOCK ABSORBERS

Delco. Direct acting type. Serviced by replacement. **Front**–Rambler No. 3117361. **Rear**–3117362.

FRONT SUSPENSION

►*FRONT SUSPENSION NOTE:* Heavier spring for air conditioned cars. See "Rambler" in Front Suspension.

Independent. Linked parallelogram type with coil springs located between upper end of steering knuckle pin and seat in outer wheel house panel.
See "Rambler" in Front Suspension.

King Pin Inclination–8½°.
Caster–Pos. 1° desired (limits Pos. ¾° to Pos. 1¼°).
Camber–Pos. ½° desired (limits Pos. ¼° to Pos. ¾°).
Toe-in–⅛" (1/8" to 1/4").
Toe-in Adjustment Note–Turn adjusting tubes in opposite directions to change toe-in. Turn adjusting tubes in same direction to align steering wheel when toe-in is correct. In either case turn adjusting tubes equally.
Toe-out on Turns–Outer wheel 20°, Inner wheel 22½° +½° or -0°.

STEERING

►*INTERMITTANT HORN OPERATION NOTE:* Horn button retainer plate ground wire can be installed between steering wheel nut and lower spring retainer attaching screw. Use a piece of No. 14 wire, with the insulation removed.
Gemmer. Worm & Roller with push-pull adjustments. *See "Gemmer Worm & Roller" in Steering Section.*
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*
Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix (Lockheed) Hydraulic. Self centering (floating shoe) type. Hand lever applies rear wheel service brakes.
See "Bendix (Lockheed) Self-centering" in Brake Section.

►*1955 BRAKE SQUEAK CORRECTION: See "Bendix (Lockheed) Self-Centering" in Brake Section.*

►*1954 BRAKE PRODUCTION CHANGE (100" Wheelbase Synchro-mesh & Overdrive Trans. Cars):* Front wheel brake drums increased from 8" to 9" in diameter, beginning with Serial No. D-185770.
Drum Diameter–(Front Wheels) 9" (8" diameter on some early cars. See Production Change above).
Rear Wheels–8" (All Cars).
Wheel Cylinder Diameter–1" (front); 13/16" (rear).

Lining Width x Length

Primary Shoes	Front Wheels	Rear Wheels
Early 100" WB. ①	1¾" x 8 27/64"	1¼" x 8 27/64"
Other Cars ②	2" x 9 7/8"	1¼" x 8 27/64"

Secondary Shoes	Front Wheels	Rear Wheels
Early 100" WB. ①	1½" x 8 27/64"	1" x 8 27/64"
Other Cars ②	1¾" x 7 11/16"	1" x 8 27/64"

①–Synchro-mesh & Overdrive Cars only (see Production Change above).
②–Includes Early Hydra-Matic Drive & 108" WB. Cars, and all later cars.
Lining Thickness–.214" (All Cars).
Braking Power–(Early 100" WB. with 8" Front Drums) 60.2% Front, 39.8% Rear. (All Cars with 9" Front Drums) 63.7% Front, 36.3% Rear.
Clearance–All shoes just free of drag with brakes centralized (by hard application and releasing pedal). Eccentric adjustment for each shoe.

Standard Master Cylinder: In engine compartment under steering column.
Checking Fluid–Raise hood and fill from engine compartment. Check at 1000 mile intervals.
Removal–Remove from beneath car. Not necessary to disturb other parts.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit. Switch has two positions "LOW" and "HIGH".
See "Nash-Hudson Air Conditioning" in Miscellaneous Section.

Power Operated Top (Convertible Models): Electric type with reversible motor.
See "Power Operated Tops" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

1947-50 COMMANDER

	Ft. Lbs.
Cylinder Head	80-85
Connecting Rod Nuts	52-54
Vibration Dampener	160-170
Main Bearing Caps	88-93
Piston Pin Clamp Bolt	28-32
Engine Front Cover	13-17
Water Pump Plate-to-Block	28-32
Oil Pump Mounting	13-15
Flywheel	33-35

1947-55 CHAMPION
1951-55 V8 MODELS

	Champion Ft. Lbs.	Comm. & Pres. Ft. Lbs.
Cylinder Head	46-50	55-65
Intake Manifold	26-30	
Exhaust Manifold	25-30	25-30
Oil Pan	13-17	13-17
Main Bearing Caps	88-93	88-93
Flywheel	33-35	33-35
Vibration Dampener	130-140	130-140
Con Rod Caps	28-32	52-54
Piston Pin Clamp Bolt	20-25	20-25
Camshaft Gear	20-22	20-22
Rocker Arm Support Bracket		13-17
Rocker Arm Cover		8-10
Engine Front Cover	13-17	13-17
Water Manifold		13-17
Water Pump Mounting	13-17	13-17
Oil Pump Mounting	13-17	13-17
Oil Filter Cover	25-33	25-33
Clutch Housing ①	28-32	28-32
Clutch Housing ②	13-17	
Transmission Mounting	60-70	70-80

① —To cylinder block.
② —To Engine plate. Plate dowel bolt nut 28-32 ft. lbs.

ENGINE

1947-49 CHAMPION

ENGINE REMOVAL: For Oil Pan Removal & Engine Servicing. Drain cooling system, position car under chain hoist, disconnect and remove parts as follows:

1. Remove hood (disconnect at hinge arms).
2. Remove center cylinder head capscrew and install lifting eyebolt (cylinder head must be in place on block). Attach chain hoist to eyebolt and take up slack in hoist chain.
3. Remove two clutch housing to engine rear plate dowel bolts and nuts, and 4 housing to engine plate bolts and nuts on lower edge. Remove 3 capscrews at top of housing by working through opening in front floor (housing will be secured by one bolt and nut at oil pressure pipe).
4. Disconnect battery ground at battery.
5. Remove 3 radiator core-to-core support screws on left side and free headlamp wiring harness from clips on radiator and fender.
6. Remove 2 water outlet-to-cylinder head capscrews.
7. Disconnect wires at generator and primary lead at ignition coil.
8. Disconnect accelerator cross shaft from push rod and heat indicator from cylinder head.
9. Take off starter (not necessary to disconnect wires) and place to left of hand brake cable.
10. Remove water pump inlet hose and 3 radiator core-to-core support screws on right side.
11. Take out radiator core, rotate fan and move headlamp wiring harness to clear radiator inlet and outlet.
12. Remove 4 fan capscrews, remove fan and pulley. Lay headlamp harness on top of core support.
13. Disconnect flexible fuel pump connection from front gasoline line, and exhaust pipe from manifold, lower pipe off manifold studs.
14. Loosen engine breather pipe capscrew. Disconnect windshield wiper hose at manifold and flexible line from upper oil pressure gauge pipe.
15. Remove one bolt and nut on clutch housing at oil pressure pipe.
16. Remove front engine support from front frame cross-member and front engine insulator.
17. Push car to rear to free engine from clutch housing, slowly raise engine while moving forward, tilting engine until clutch clears transmission main drive gear shaft, and engine rear plate clears center tie rod, then push engine to rear, turning engine 45° to right, finally hoist engine slowly from chassis.

NOTE—Engine should be placed on an engine stand for ease in performing service work.

Engine Installation Note: When installing engine, align clutch driven plate with pilot bearing and lubricate bearing with wheel bearing grease. Place car in high gear so that transmission main drive gear can be rotated by moving car for engaging clutch driven member. Use two ¼" x 8" tapered drifts to align clutch housing and engine rear plate, coat two clutch housing dowel bolts with white lead, install these bolts and tighten in place with nuts.

CAUTION—Do not drive these dowel bolts into place.

Engine Rear Mounting Note—See same note for Commander model (below) for rear engine mounting installation directions.

1947-49 COMMANDER

ENGINE REMOVAL: For Oil Pan Removal & Engine Servicing. Drain cooling system, position car under chain hoist, disconnect and remove parts as follows:

1. Remove hood (disconnect at hinge arms).
2. Disconnect battery ground from cylinder head.
3. Remove exhaust pipe hanger ahead of muffler and bracket and clamp from pipe at clutch housing. Disconnect exhaust pipe at manifold.
4. Remove transmission (see Transmission Removal on car model page).
5. Disconnect clutch operating shaft from throwout shaft by taking out cotter pin and inner clevis pin from sleeve next to clutch housing and pulling shaft and sleeve toward frame.
6. Take out mounting bolts and remove rear engine mounting lower cushions and spacers and front engine mounting insulator-to-support bolts.
7. Remove center cylinder head capscrew and install lifting eyebolt (cylinder head must be in place on block). Attach chain hoist to eyebolt and take up weight of engine.
8. Remove right horn from cowl (not necessary to disconnect horn wires) and place on wiper motor.
9. Remove engine breather pipe. Disconnect windshield wiper hose at manifold and flexible line from upper oil pressure gauge pipe. Disconnect flexible fuel line coupling at fuel pump.
10. Disconnect radiator inlet and outlet hoses. Remove 6 radiator core-to-core support screws and free headlamp wiring harness from clips on radiator and fender.
11. Take out radiator core, rotate fan to clear radiator inlet and outlet. Remove fan and pulley.
12. Disconnect wires at generator and primary lead at ignition coil. Remove magnetic switch from starter without disconnecting wires and place switch to left of hand brake cable.
13. Disconnect accelerator cross shaft at push rod and heat indicator from cylinder head.
14. Push car to rear slowly, raise front of engine and maneuver front end into core support opening, then push engine to rear (swing rear end to right), finally hoist engine slowly from chassis.

NOTE—Engine should be placed on an engine stand for ease in performing service work.

Engine Installation Note: When installing engine, align clutch driven plate with pilot bearing and lubricate pilot bearing with wheel bearing grease.

Engine Rear Mounting Note—When installing rear mountings, make certain that spacer tube in place in biscuit type rubber mountings and tighten these mounting bolts with torque of 25-30 ft. lbs.

CAUTION—Spacer tube regulates compression of the rubber biscuits and must not be shortened or omitted. Excessive tightening of the bolts will damage spacer tubes.

1950-52 CHAMPION
1950 COMMANDER

ENGINE REMOVAL: Drain cooling system and disconnect water outlet from cylinder head. Remove hood and disconnect battery ground strap. Proceed as follows:

1. Disconnect inlet hose from water pump.
2. On Commander, remove radiator brace.
3. Remove fan blades and pulley.
4. Remove radiator and shroud assembly.
5. Remove center cylinder head capscrew and replace with an engine lifting eyebolt. Attach hoist and take up slack in chain.
6. On the Commander, remove stabilizer shaft assembly with frame brackets attached and turn steering wheel all the way to the right.
7. On the Champion, remove both clutch housing-to-engine rear plate dowel bolts and on the Commander, drive or pull out the dowel rings. Then remove bolts holding clutch housing to rear engine plate.
8. Remove clutch housing cover plate from floor pan and remove clutch housing-to-block capscrews.
9. Disconnect exhaust pipe front support clamp and then remove exhaust pipe flange-to-manifold nuts and lower pipe off manifold studs.
10. Disconnect windshield wiper hose and disconnect upper pressure pipe from flexible coupling.

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11. Remove distributor assembly and on the Champion, also remove oil level gauge adapter.
12. Remove starter (without disconnecting wires) and tie to left hood hinge.
13. Disconnect accelerator cross shaft from crank rod, and disconnect all other wiring from engine.
14. Disconnect fuel pump flex lines.
15. Remove front engine support insulator-to-crossmember (crossmember bracket on Champion) and also disconnect engine ground strap.
16. Roll car rearward and separate engine rear plate from clutch housing. Slowly pull engine up and forward, keeping engine tilted until clutch pressure plate clears transmission pinion. Move engine toward rear and turn engine to the right, then slowly lift engine out of chassis.

Engine Installation Note: Lubricate pilot bearing and make sure clutch driven plate is aligned with it. Locate chain hoist so lift chain will exert a rearward force on engine as it is lowered into position. On the Commander, place a hydraulic jack under rear of transmission and raise it so pinion is near its normal operating position. Slowly lower engine into chassis, tilting rear of engine downward, engage pinion and clutch release bearing. After end of pinion has entered clutch assembly, engage pinion shaft and driven plate splines. Temporarily align clutch housing with engine rear plate by means of two tapered drifts, then install dowel bolts of the Champion or the dowel rings of the Commander. Draw dowel bolts into place by tightening the nuts. ***CAUTION—Do not drive dowels into place.*** Install bolts which retain clutch housing to rear engine plate. Install clutch housing-to-block cap screws and install clutch housing cover plate. Complete installation by reversing removal procedure.

1951-52 COMMANDER

ENGINE REMOVAL: Remove battery. Remove hood. Drain coolant. Remove lock wire from hood latch. and remove the wiring harness from radiator air deflector clips. Disconnect the horn wires at the relay and push them through the hole in air deflector. Remove air deflector and radiator. Disconnect Climatizer hoses from water pump and swing them back out of the way. Remove Climatizer blower assembly from fire wall and swing back out of way. Remove carburetor air cleaner. Disconnect the throttle cross shaft-to-throttle control rod. Disconnect fuel line to pump coupling. Disconnect the vacuum line from vacuum advance. Disconnect coil to distributor wires and remove wires from spark plugs. Remove the spark plug wire retaining brackets from valve covers and remove distributor. Disconnect starter cable, heat indicator wire from cylinder head. Disconnect oil pressure gauge pipe. Remove the cotter pin from inner end of clutch operating shaft sleeve and move shaft away from the clutch release shaft. Remove transmission. *See Transmission Removal on Studebaker car page.*

▷*NOTE—Automatic Transmission Removal, see "Studebaker Automatic Transmission" in Transmission Section for complete data.*

Attach lifting hooks to the exhaust manifolds and take up the slack in the chain. Disconnect engine ground strap from frame front crossmember. Disconnect both front engine supports. Remove the two crossmember to engine rear support bolts. Disconnect exhaust pipe flange and remove exhaust pipe bracket. Raise engine until the exhaust connection and cross-over pipe can be slipped off the manifold studs. Remove manifold heater valve at this time. Lift the engine and at the same time pull the engine forward so that the clutch clears the fire wall. Tilt engine up at front and remove it from the car.

1953-54 MODELS

ENGINE REMOVAL: Drain cooling system and crankcase, and remove radiator inlet hose. Remove wiring junction block and horn relay from fan shroud. Pry open wiring harness clips and move harness out of way. Remove fan blades and pulley. Remove cap screws which hold radiator core to support, remove core. Disconnect Climatizer hoses (if so equipped) from water pump and cylinder head. Disconnect and remove battery. Remove carburetor air cleaner, fuel pipe between pump and carburetor. Disconnect fuel pipe-to-pump, and oil pressure gauge flexible couplings, windshield wiper hose (if used), and electric cables. Separate horn cable at connector. (On V8 remove spark modifier pipe between distributor and carburetor, remove distributor.) Disconnect accelerator cross shaft. Remove upper stud nuts from engine front support insulators. Disconnect engine ground strap from right front engine support bracket. Disconnect flexible coupling in fuel line. Remove exhaust pipe flange-to-manifold nuts and U-clamp at clutch or converter housing bracket. Lower pipe off manifold studs. (On V8 remove exhaust cross-over pipe.) Disconnect front propeller shaft from transmission companion flange and remove propeller shaft stud nuts. Slide propeller shaft assembly rearward on slip yoke splines. Tape bearings to hold in place. Move shaft to one side as far as possible and tie in position. Disconnect transmission linkage and remove speedometer cable and pinion from transmission case. Disconnect rod from clutch release shaft lever. Remove two screws holding clutch operating shaft, bracket and bearing assembly to transmission case and pull bracket and bearing assembly off shaft. **(Automatic Drive)** Remove four engine rear support screws which hold insulators to converter housing. **(Standard or Overdrive)** Remove two bolts which hold insulator and cage assembly to engine rear support crossmember. Turn wheels to right to clear oil pan. (On Champion replace center, No. 1, cylinder head cap screw with engine lifting eyebolt.) (On V8 attach sling to intake manifold and hoist.) Slowly hoist engine up and forward until transmission clears rear support crossmember, remove engine.

1955 CHAMPION

ENGINE REMOVAL: *NOTE*–If same engine block is to be reinstalled, engine should be disconnected at junction of clutch housing or torque converter housing (torque converter should be disconnected from engine drive plate so that converter will remain on transmission splines when engine removed). If new block to be installed, clutch housing or converter housing can be removed with engine, after removing transmission (this will allow housing alignment to be checked before engine reinstalled).

1) Remove hood and upper air deflector. On sedans and station wagons, remove radiator core. Disconnect Climatizer hoses (if so equipped) from water pump and cylinder head elbows. On coupe and hardtop models, remove fan blade assembly and fan shroud. Disconnect and remove battery and remove carburetor air cleaner.
2) Disconnect windshield wiper hose and oil pressure gauge line from the flexible coupling. Disconnect cables from generator, starter solenoid, ignition coil, and heat indicator engine unit.
3) Remove cotter key and take out clevis pin connecting accelerator cross shaft to bellcrank rod. Remove lower stud nut from engine front support insulators and disconnect engine ground strap from right front engine support bracket.
4) Remove exhaust pipe flange to manifold nuts, remove U-clamp at clutch or converter housing bracket, and lower exhaust pipe off manifold studs. Remove starter motor. On coupes and hardtops turn front wheels all the way to the right. On sedans and station wagons, disconnect one end of the front tie rod, remove shaft from steering bellcrank and remove bellcrank out of way to provide clearance for oil pan. Disconnect gas tank to fuel pump line at flexible coupling.
5) Remove center (No. 1) cylinder head capscrew and replace it with an engine lifting eyebolt. Attach lifting device and raise engine just enough to take weight off front supports.
6) On Automatic Drive models, disconnect wire from anti-creep switch and disconnect accelerator bellcrank to transmission rod. Remove converter housing lower plate, and disconnect torque converter from torque converter drive plate (*see "Studebaker Automatic Transmission" in Transmission Section*).
7) Remove clutch housing to engine bolts and drive out clutch housing dowel pins. Raise engine slightly and move it forward sharply to break it loose from clutch housing. Continue to push engine forward until transmission spline clears clutch assembly, then lift engine out of car.

1955 V8 MODELS

ENGINE REMOVAL: *NOTE*–If same engine block is to be reinstalled, engine should be disconnected at junction of clutch housing or torque converter housing (torque converter should be disconnected from engine drive plate so that converter will remain on transmission splines when engine removed). If new block to be installed, clutch housing should be removed with the engine for checking alignment.

1) Remove hood, upper air deflector and fan shroud. Disconnect and remove battery. On sedan and station wagon models, remove radiator core and water pump manifold. On coupe and hardtop models, remove fan blade assembly. Disconnect Climatizer hoses (if so equipped) from water manifold. Remove generator and fan belt.

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2) Remove starter and remove exhaust crossover pipe. On sedan and station wagon models, remove steering bellcrank shaft. On coupe and hardtop models, turn steering gear all the way to left to provide clearance.

3) Remove carburetor air cleaner, fuel pump to carburetor pipe, and the spark modifier pipe. Unhook spark plug wires, remove spark plug cable support brackets from rocker arm cover, remove distributor clamp screw and remove distributor. Disconnect fuel pump inlet line at flexible coupling, and disconnect any vacuum connections at intake manifold.

4) Disconnect oil pressure gauge line at flexible coupling and disconnect wires at heat indicator gauge and ignition coil. Disconnect accelerator pushrod at throttle control bellcrank. On cars equipped with overdrive, disconnect wire at kick-down switch. On cars with Automatic Drive, disconnect the wire at anti-creep switch and disconnect accelerator bellcrank to transmission rod at bellcrank. Remove converter drive plate to torque converter bolts (see *"Studebaker Automatic Transmission" in Transmission Section*).

5) Remove upper stud nuts from engine front support insulators and disconnect engine ground strap. Place a sling under intake manifold, attach hoist and raise engine just enough to take weight off engine supports. Remove clutch housing to engine bolts and take off the clutch housing front cover plate.

6) If clutch housing to be removed with engine, remove transmission. Remove the two capscrews holding clutch operating shaft, bracket, and bearing assembly to transmission case. Remove cotter key and clevis pin from inner end of clutch operating shaft sleeve and move clutch operating shaft away from clutch release shaft.

7) On models equipped with Automatic Transmission, remove the four engine rear support insulator capscrews which hold insulators to converter housing. On models equipped with overdrive or standard transmission, remove the two bolts which hold insulator and cage assembly to engine rear support crossmember.

8) On coupe and hardtop models, turn wheels to right to move steering bellcrank off to the side to provide additional clearance for oil pan. Push engine sharply forward to disengage clutch housing dowels. Continue to push engine forward until transmission spline is clear, then raise engine out of car.

ENGINE MOUNTINGS

1951-52 CHAMPION

1951-52 CHAMPION ENGINE MOUNT CHANGE (To Correct Low-speed Engine Vibration): When this vibration caused by rapid movement of engine in mountings when engine suddenly accelerated (but not due to rough engine in need of tune-up), this low-speed vibration can be reduced by installing new type engine mountings as follows:

(1) Front Support Insulator Spacer No. 519917. These spacers have been lengthened 3/32" (overall length 1 27/32"). Use with following insulators:

(2) Engine Front Insulators No. 514711 (Upper), No. 513104 (Lower). These insulators are of 40 durometer rating and are stamped "40" (previous type insulators were 50 rating).

(3) Engine Rear Support Insulator No. 532238. This insulator has same durometer rating as previous type but center block on lower or compression side has been removed (end blocks unchanged). If new insulator not available, previous type No. 529338 insulator can be modified by removing this center block.

CAUTION—When correcting vibration, make certain that no metal-to-metal contact exists between top of rear mounting insulator retainer and underside of clutch housing. If clearance at this point not adequate, install spacer washers against the spotfaced bolt holes in the housing.

OIL PAN

1947-49 MODELS

OIL PAN REMOVAL: Car manufacturer recommends that engine be removed from chassis. See ENGINE REMOVAL (preceding).

1947-49 CHAMPION

OIL PAN INSTALLATION: Check engine front plate gasket and replace if required. Install pan side gaskets with tight fit against front plate gasket. Next install oil pan filler block gasket (use only iron filler blocks on these cars). Do not tighten timing cover to block screws. Install rear oil pan gasket and guide oil pan into place using pilot screws. Tighten oil pan screws. Finally tighten oil pan filler block screws on timing gear cover.

1950-54 CHAMPION

OIL PAN REMOVAL & INSTALLATION: ***NOTE—it is not necessary to remove engine to remove oil pan.***

Removal: Remove oil level gauge. Raise car and support it with stands, and drain oil from crankcase. On 1953 Long Wheelbase models, swing wheels to right and remove oil pan screws and remove pan. On other models, disconnect tie rods and reach rod from steering bell-crank. Remove retaining pinch bolt and remove bell-crank from shaft. On 1950-52 models, remove shaft and bracket assembly from bell-crank and swing bell-crank to left as far as possible. If necessary, remove front splash pans for access to front screws in oil pan. Remove screws and oil pan.

Installation: Filler block should be removed for proper installation of oil pan side gaskets. Remove the four filler block block-to-engine plate screws and remove filler block. If filler block adheres to front engine plate gasket, use a thin spatula and carefully separate gasket and filler block. If gasket is damaged, cut away exposed section, then cut the amount required from a new gasket and fit it into place. Clean oil pan and mounting flanges of block. Apply Perfect Seal or its equivalent to flanges and position new side gaskets. Place filler block on front plate and install a screw in one of the upper holes. Using a hardwood stick, pry upward against filler block and install opposite screw. Install two remaining screws and tighten until heads of screws just engage lock washers. With all gaskets in position, install oil pan. After tightening oil pan screws securely, tighten the four support-to-filler block screws. Install front splash pan.

1950 COMMANDER

►**OIL PAN REMOVAL & INSTALLATION**—***Not necessary to remove engine from car.***

Removal: Drain oil, remove oil level gauge stick. Disconnect and remove front stabilizer shaft by disassembling link assembly at each side and taking *off shaft bushing retainer at each frame side rail.* Disconnect both tie rods at steering knuckle arms, remove steering bell crank shaft and bracket assembly by loosening clamp bolt holding bellcrank on shaft and taking out bracket mounting bolts. Swing bellcrank and tie rods toward left side of car and tie up out of the way. Remove lower right clutch housing bolt for clearance in removing pan. Remove engine front support-to-crossmember bolts. Place hydraulic jack under oil pan mounting flanges at each side of engine and as far forward as possible (CAUTION—do not place jack under center of pan), raise engine so that front support is 1½" from top of front crossmember and insert a block of wood to hold engine in this position. Remove jacks. Take out oil pan screws and remove pan.

Installation: After installing oil pan, raise engine just enough to remove wood block, then lower engine and reassemble all disconnected parts.

1951-54 V8 MODELS

►*1953 LONG WHEELBASE MODELS (EXCEPT LAND-CRUISER)*—Swing wheels to right to move steering bell-crank out of way and remove oil pan.

OIL PAN REMOVAL: Support car on jacks and drain the oil. Disconnect one of the battery cables and remove the starter. Disconnect one end of the right tie rod and the reach rod from the steering bellcrank. Remove the steering bellcrank shaft and bracket and swing the bellcrank out of the way to the left side of the car. Remove the exhaust crossover pipe. Remove oil pan screws and drop the pan.

Installation Oil Pan Gaskets: The front filler block must be removed to install the side pan gaskets. Remove the four screws holding the filler block to the timing gear cover, and using a thin spatula carefully separate the filler block from the timing gear cover gasket. If this gasket is damaged, cut away the exposed portion of the gasket and then from a new gasket, cut the required amount and fit it to the timing gear cover using Perfect Seal or its equivalent. Clean oil pan and oil pan mounting flanges of the block. Apply sealer to the flanges and place new gaskets on the side flanges. Place filler block against timing gear cover and install a screw in one of the upper holes. Using a hardwood stick, pry upward against the filler block and install the opposite upper screw. Install the remaining two screws and tighten until the heads just touch the lock washers. With all the gaskets in position install the oil pan and tighten the pan screws evenly. Then tighten the four timing gear cover-to-filler block screws.

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1955 CHAMPION

OIL PAN REMOVAL (CHAMPION): Remove oil level gauge. Raise car and support it with stands, drain oil, and remove splash pans. On sedans, and station wagons, swing wheels to right to move steering bellcrank out of the way. Remove oil pan screws and remove pan.

1955 V8 MODELS

OIL PAN REMOVAL (COMMANDER & PRESIDENT): Remove oil level gauge and adapter tube. Disconnect one battery cable. Raise car, drain oil and remove starter. On coupe and hardtop models, swing wheels to right to move steering bellcrank out of way. On sedans and station wagons, remove steering bellcrank assembly. Remove exhaust crossover pipe. Remove oil pan cap screws and remove pan.

1955 ALL MODELS

INSTALLATION (ALL MODELS): For installation of oil pan, the filler block must be removed. Remove the four screws holding filler block to engine front cover (V8), or to engine front plate (6 Cyl.). With a thin spatula or putty knife, carefully separate filler block from engine front cover gasket (V8) or engine front plate gasket (6 Cyl.). If this gasket is damaged, cut away the exposed portion of the gasket. Then cut the required amount from a new gasket and fit it in place as necessary using Perfect Seal or its equivalent to secure gasket in place. Apply a sealer to threads of the four front cover or front plate to filler block cap screws. Install filler block with a screw in one of the upper holes. Using a hardwood stick, pry upward against filler block and install a screw in the opposite upper hole. Install two remaining screws and tighten all four screws until heads just contact lockwasher. With all gaskets in position, install the oil pan and tighten the screws evenly. Then tighten the four filler block screws. Complete the installation by reversing removal procedure.

CYLINDER HEAD & MANIFOLD

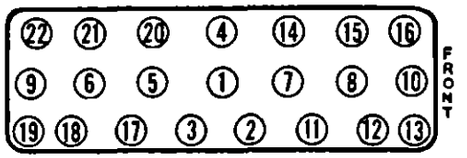
ALL MODELS

CYLINDER HEAD GASKET: Coat lower face of gasket and face of cylinder head with Perfect Seal gasket cement before installing (use sparingly and see that it does not enter screw holes and water passage openings).

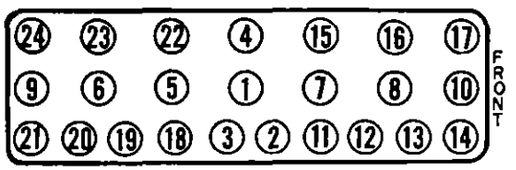
1947-55 MODELS (EXC. V8)

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in diagram. With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all capscrews (additional tightening may be necessary for correct tension).

Tightening Torques—*See "Tightening Specifications" above.*



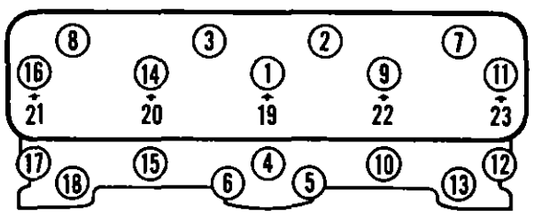
CHAMPION CYLINDER HEAD



1947-50 COMMANDER

V8 MODELS

CYLINDER HEAD INTERCHANGEABILITY (RIGHT TO LEFT BANK): Both cylinder heads are identical (water pump ports are provided at front and rear of all heads). It is necessary to block off the rear port not in use with a dummy plate and gasket. *NOTE*—Heat indicator engine unit must be mounted in the water outlet opening cover plate at rear of the left bank cylinder head.



V8 CYLINDER HEAD

V8 MODELS

CYLINDER HEAD INSTALLATION: Clean all threads using a tap and die. Check head for warping *(NOTE—* If necessary, head can be planed .015". Apply gasket compound to gasket and install. *(CAUTION—Be sure main oil gallery-to-rocker arm assembly oil passage at rear of the right bank (on front of left bank) is not blocked by gasket).* Install cylinder head on the hollow dowel. Dip capscrews in engine oil and install the nine short screws in the two outer rows of holes and the five medium length screws in the center row of holes and tighten finger tight. Install rocker arm assembly (see "Rocker Arm Assembly"). Install and tighten long head screws finger tight. Insert rocker arm assembly capscrews through rocker arm brackets. Tighten all cylinder head capscrews in correct sequence as shown in diagram. Tighten water pump manifold screws alternately until they are tight.

Tightening Torques—*See "Tightening Specifications" above.*

ORIGINAL BORE & PISTONS

1947-54 MODELS

ORIGINAL BORE & PISTON SIZES: Bore Sizes: Marked by figure stamped on top face of cylinder block next to each cylinder bore as follows:

Champion		6 Cyl. Commander	
Mark	Size	Mark	Size
0	3.000"	25	3.3125"
05	3.0005"	3	3.313"
1	3.001"	35	3.3135"
15	3.0015"	4	3.314"
2	3.002"	45	3.3145"
25	3.0025"	5	3.315"

Commander V8

Mark	Size
50	3.375"
55	3.3755"
60	3.376"
65	3.3765"
70	3.377"

Original Pistons—Stamped with size of cylinder bore in which pistons are installed.

Replacement Pistons—Stamped figure on top indicates actual size of piston. Pistons furnished std. & .002", .004", .010", .015", .020", .030" oversize.

1955 MODELS

ORIGINAL BORE & PISTON SIZES: Cylinder bore sizes are marked by a figure stamped on top face of cylinder block next to each cylinder bore as indicated below. Replacement pistons corresponding to these sizes are available under the part number for standard size pistons. The oversize is marked on the top of each piston. *NOTE—When replacing pistons in an engine which has been in use, the cylinder bore markings can no longer be used as a guide. It is important that pistons be selected to fit the cylinder bore.* See *"Fitting Pistons" on car model page.*

Cylinder & Piston Markings: Cylinder bores may vary in size from Standard to .0025" oversize in increments of .0005". Champion bore sizes vary from 3.000" (stamped "O"), to 3.0025" (stamped "25"). Commander and President bore sizes vary from 3.5625" (stamped "25"), to 3.5645" (stamped "45").

PISTON PINS

ALL MODELS

PISTON PIN REMOVAL & INSTALLATION: Use tool J-1293-A (Champion) J-1293-C (Comm. & Pres.).

Removal—Place rod and piston assembly on assembling fixture. Remove lock nut and star washer from clamp screw, and by tightening lock nut on other end of clamp screw, remove clamp screw, remove the

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screw from connecting rod. Then slide piston and connecting rod off piston pin.

Installation—Place piston pin on assembling fixture, slide piston and connecting rod into position. (Oil squirt hole and number on connecting rod should be on the solid side of the piston). Insert piston pin clamp screw in connecting rod, install star washer and lock nut, and tighten nut securely. On connecting rod Nos. 1, 3, & 5, the clampscrew nut is installed on the T-slot side of the piston. On Nos. 2, 4, & 6 the nut is installed on the solid side of the piston. When installing the screw regardless of the number of the rod, if the rod is held with the offset of the rod to the left and the screw is inserted from the front, the nut will be located on the correct side in relation to the piston. Be sure to align the flat surface on the piston pin with the flat surface on the clamp screw.

PISTON RINGS

1954-55 MODELS

Replacement Rings: Three types of Perfect Circle piston rings available for service replacement:

Standard Production Type Sets—Plain iron rings without chrome plating. To be used on relatively new engines. Furnished Std. and .020", .030", .040" Oversize.

Chrome Top Ring Sets—Same as standard ring set except that top ring is solid chrome-plated to increase ring life and oil control. Used on relatively new engines or after a rebore job, especially where heavy duty service is anticipated. Furnished Std. and .020", .030", .040" O.S.

"2 in 1" Chrome Sets—Set contains solid chrome-plated top ring and, in addition, an oil ring assembly made up of two chrome-plated steel rails, one cast iron separator or spacer and two complete sets of expander rings, one "Normal Pressure" set and one "Hi-Pressure" set. "Normal Pressure" set used where taper of bore does not exceed .006". "Hi-Pressure" set used where taper exceeds this limit. In general, use "2 in 1" set for all except new and rebored engines. Furnished Std. & .020", .030" O.S.

"2 IN 1" CHROME RING SET INSTALLATION CAUTION: Distribute oil control ring expander, separator, and ring rail gaps as follows: Place expander spring in ring groove with gap positioned above end of piston pin. Install one steel section with gap approximately 90° from spring gap. Install cast iron separator with gap approximately 90° from steel rail gap. Install remaining steel section with gap approximately 180° from gap of first steel rail. *NOTE*—Gap in rails and separator must not straddle humps on expander spring.

CRANKSHAFT & MAIN BEARINGS

V8 MODELS

►*V8 ENGINE OIL LEAK AT REAR OF ENGINE:* May be caused by step on rear bearing cap interfering with oil pan and preventing pan from compressing gasket properly. Check step on right rear corner of bearing cap and eliminate interference by grinding step down to a depth of 1/8" or even with crankcase flange (start grinding at rear of cap and extend relief forward to approximately center of capscrew boss).

►*V8 ENGINE REAR MAIN BEARING OIL SEAL PRODUCTION CHANGE & SERVICE INSTALLATION NOTE:* A revised type seal is being used in production and for service replacement. Later type seal can be identified by **two raised dots** immediately ahead of "Brummer Stude 530311" marking on seal (old seal had one dot). New seal has same Studebaker part number as old seal.

►*CHAMPION REAR MAIN BEARING OIL SEAL SERVICE INSTALLATION CHANGE:* It is recommended that new seals be installed "dry". Also it is not necessary to rotate seal halves as in the past, at time of installation. They may be installed horizontally in line with joint of bearing halves.

1949-50 COMMANDER

REAR MAIN BEARING OIL SEAL INSTALLATION: Seal assembly consists of bearing cap side seals, and "Brummer" type crankshaft seal.

Installation: "Brummer type" Oil Seal. Loosen the bearing capscrews of the three intermediate bearings two turns until the "Brummer" seal has been installed. If these screws are loosened too much while the front bearing screws are tight, the front bearing will be damaged. Place the neoprene seal in the cross grooves of the main bearing cap so that the inner end of each seal is flush with or inset not more than 1/16" from the inner end of the grooves. Thoroughly clean the channel just forward of the rear flange using a swab saturated with alcohol and pulling it through the channel several times. Dry the channel thoroughly. Dip the ends of the seal in liquid soap and spread the liquid soap throughout the inside of the center groove. Carefully insert the end of one half of the seal between the crankshaft and the cylinder block at the crankshaft rear flange. Work the seal around the crankshaft until the end emerges on the opposite side. Place the ends of the other half of the seal against the ends of the half that is in the engine. Then work both halves of the seal around the crankshaft until the exposed joint is approximately 45° from the lower surface of the block. During the installation procedure, great care must be taken to avoid scuffing the soft center sealing cushion at the bottom of the groove of the seal. Apply oil between the compression flange of the seal and the crankshaft journal. Install the bearing cap and the two neoprene seals. Be sure that the exposed part of the "Brummer" oil seal smoothly straddles the rear flange of the bearing cap. Install the bearing capscrews and tighten all capscrews to the specified torque of 88-93 ft. lbs. Lockwire all screw heads. Trim the end of the neoprene seal that protrudes past the cap flush with the side of the cap. Install new cork seals being sure seals are not damaged during the installation. Run the engine for 45 minutes then check for oil leaks.

1949-55 CHAMPION
1951-55 V8 MODELS

REAR MAIN BEARING OIL SEAL INSTALLATION: *NOTE*—Seal assembly consists of three types used together: (1) Cork Seals between sides of bearing cap and block, (2) Neoprene seals in groove in face of bearing cap, (3) "Brummer" type seal on crankshaft journal (installed in block and bearing cap). Install seals as follows:

Neoprene Seals—Place new seals in cross grooves of bearing cap with inner end of seal not more than 1/16" from inner end of groove, press seals firmly and uniformly into grooves and trim outer ends flush with sides of bearing cap. *CAUTION*—Seals must not be more than 1/16" from inner edge of bearing cap and must not be so long as to interfere with Brummer seal.

"Brummer" Type Seal—Remove old seal, thoroughly clean seal channel just forward of rear flange by using a swab saturated with alcohol or similar solvent, dry channel thoroughly. Blunt the sharp edge of the flange on which the seal is mounted using the flat side of a screwdriver blade or similar tool (this will prevent scuffing inner edge of seal during installation). Install seal DRY as follows: Insert upper half between crankshaft and block at the rear flange with the wiping lip of the seal pointing forward or away from the flywheel, work seal around crankshaft until ends are horizontal and in line with the bearing cap face (see V8 Engine Note below), use great care to avoid scuffing the soft center sealing cushion at the bottom of the seal groove. Install lower half of seal on bearing cap flange, oil wiping edge of seal and crankshaft journal, install bearing cap and tighten bearing cap bolts to correct torque.

Cork Seals—After bearing cap installed, drive new cork seals down into grooves between sides of bearing cap and block (use drift and light hammer). *CAUTION*—Use care not to split or damage these seals.

Oil Leak Check—After installing new seals, run engine for approximately 45 minutes, then check for oil leaks.

►*V8 ENGINE NOTE:* To facilitate installation of the upper half of the Brummer seal, the three intermediate bearing cap screws can be loosened two turns. *CAUTION*—Do not loosen these intermediate bearing caps more than indicated or front bearing may be damaged.

VIBRATION DAMPENER

ALL MODELS

VIBRATION DAMPENER & PULLEY ASSEMBLY: (Removal)—Remove fan shroud. Straighten edges of capscrew lock plate and remove vibration dampener capscrew and washer. Remove the six nuts from bolts in fan belt pulley hub and remove capscrew lock plate, pulley, and vibration dampener from bolts.

Installation—When assembling rubber cushions and dampener flywheel, be certain the cushions are seated in dampener to assure proper vibration control. Dampener and pulley must be assembled with bolt holes aligned. When installing vibration dampener on bolts, place lock plate against rubber cushion with mark on lock plate facing away from

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flywheel and pointing toward "IGN" mark on flywheel. Then install dampener on bolts so "IGN" mark is approximately aligned with keyway in hub. When pushing dampener on the bolts, lockplate prevents rubber cushion from being pushed out of flywheel holes. Place pulley on bolts and install capscrew lock plate (be sure lockplate is not installed on the offset bolts as it will interfere with installation of one of the nuts). Install and tighten vibration dampener nuts to 13-17 ft. lbs.

ENGINE FRONT COVER

1947-55 CHAMPION

ENGINE FRONT COVER: Removal—Remove fan shroud, radiator core, and vibration dampener. Using Puller Set HM-925, remove the crankshaft pulley (use HM-925-13 to prevent damage to crankshaft threads). Take out cover retaining screws and bolts and remove the cover.

Engine Front Cover Seal (Crankshaft Front Seal) Installation: Install new felt oil seal in cover, using hub of crankshaft pulley to seat it in recess in cover.

Engine Front Cover Installation: Install cover on engine using a new gasket. Install all the retaining bolts, leaving them finger tight so cover can center itself as the crankshaft pulley is installed. Using Pusher Set J-4704, press crankshaft pulley into position. Tighten cover bolts and screws securely and install vibration dampener, radiator core and shroud.

V8 MODELS

ENGINE FRONT COVER: Removal—Drain cooling system and remove fan shroud and radiator core. Remove fan belt and power steering belt (if so equipped). Remove fan blade assembly and take off the water manifold. Remove fuel pump to carburetor pipe and remove fuel pump. Remove vibration dampener and fan pulley hub (on Power Steering cars a second pulley is used). Remove cover screws and remove cover.

Engine Front Cover Seal (Crankshaft Front Seal) Installation: Remove felt oil seal with an ice pick and clean out the recess in cover before installing new seal *(NOTE—Do not remove the four self tapping screws holding the seal retainer plate in position).* Install a new seal and wet it with clean engine oil. Insert crankshaft pulley hub to locate seal in center position.

Engine Front Cover Installation: Install cover on engine, using a new gasket, and install cover screws, but do not tighten. Using Pusher Set J-4704, install crankshaft pulley hub to locate hub and center cover properly. Tighten cover screws. Install fuel pump and the fuel pump to carburetor pipe. Assemble and install vibration dampener and tighten retaining screws to proper torque. Install water manifold assembly using new gaskets, and replace fan blade assembly. Install fan belt and adjust it to proper tension. Install power steering belt (if so equipped) and adjust it to proper tension. Install radiator core and fan shroud.

CAMSHAFT & BEARINGS

1947-54 CHAMPION
1947-50 COMMANDER

CAMSHAFT (Removal—With Engine Out of Car): Remove vibration dampener assembly, and then remove fan drive pulley, using Universal Puller HM-925. Remove timing gear cover, and using Universal Puller, remove crankshaft gear (do not remove camshaft gear). Remove cylinder head, valves, and valve springs, and oil pump, and invert engine so lifters will not interfere with camshaft removal. Remove capscrews and lockwashers attaching timing gear thrust plate to cylinder block. Remove camshaft carefully to avoid damaging bearings.

Installation—Reverse removal procedure outlined above. Adjust camshaft endplay (see Camshaft Endplay following). Make sure that camshaft and crankshaft gears are aligned with marked tooth on camshaft gear meshed between two marked teeth on crankshaft gear.

1951-54 V8 MODELS

CAMSHAFT (Removal): Turn crankshaft until timing marks show "IGN" mark **directly** under pointer on timing gear cover, and the distributor rotor is in the No. 6 firing position. Remove rocker arm assemblies, push rods, and valve lifters. Remove timing gear cover. Turn camshaft just enough to expose thrust plate retaining screws (do not remove camshaft gear), and remove thrust plate screws (turn camshaft back to align timing marks of the two gears). Remove gear and shaft as a unit. CAUTION—After camshaft removed, be very careful not to disturb position of distributor rotor.

Installation—Install camshaft, positioning "O" mark on camshaft gear between timing marks on crankshaft gear. Check distributor rotor to make sure it is pointing directly to rear (No. 6 firing position). Turn camshaft to expose thrust plate screw holes in block. Position thrust plate and install capscrews and lockwashers. Check camshaft endplay (see Camshaft Endplay following): Install timing gear cover, valve lifters, rocker arm assemblies and pushrods.

1951-52 V8 MODELS

1951-52 REPLACEMENT CAMSHAFT (For Engines Before 1952 No. V-164807): *CAUTION—TWO DIFFERENT CAMSHAFT KITS HAVE BEEN FURNISHED. DATA BELOW APPLIES TO LATEST KIT No. 532310 (superseding Kit No. 532178).* Kit consists of one camshaft and additional parts listed below which must be INSTALLED AS A UNIT WITH THE CAMSHAFT. See installation directions below.

CAMSHAFT KIT No. 532310—Contains one camshaft (not furnished separately), 16 Adjusting Screws, and two Valve Tappet Clearance Setting Plates as follows:

Camshaft—This camshaft has smaller (1 1/16") base circle cams than original type, and increased (55° instead of 37°) cam ramp than 2nd type camshaft (as included in Kit No. 532178).

CAMSHAFT IDENTIFICATION—Above camshaft can be identified by either of the following marks: (1) 5/8" counterbore in forward end of shaft at camshaft gear retaining screw hole, OR (2) Two grooves machined in front end face of shaft.

CAUTION—All camshafts with above markings have increased cam ramp and REQUIRE SPECIAL TAPPET CLEARANCE as specified below.

Adjusting Screws—No. 531161. These screws are 1/16" longer than previous type and must be used with new camshaft (to compensate for decreased size of cam). These screws have wider oil groove to insure groove registering with rocker arm oil passage and CAN BE USED IN ALL ENGINES (regardless of camshaft type).

Valve Clearance Setting Instruction Plate—No. 532260 (2 furnished). These plates are designed to be attached to two center rocker arm shaft support studs on EACH cylinder head and specify special tappet clearance as follows: "Valve Clearance—.023-.025" Cold-Standing, .021-.023" Hot-Running."

VALVE LIFTER REPLACEMENT—*NEW LIFTERS MUST BE INSTALLED WHEN NEW CAMSHAFT INSTALLED.* Use new type lifters as listed below (these lifters have increased crown on lower face to move contact area away from edge of lifter). Select lifters for proper fit in guide holes in block as directed under Camshaft Installation below.

Part No.	V8 Valve Lifters	Size
531696		Standard
531721		.0005" Oversize
531722		.001" Oversize

Camshaft Installation: When camshaft being replaced to correct cam lobe wear, ENGINE MUST BE CAREFULLY CLEANED (see below), correct type Adjusting Screws and Valve Lifters must be installed (see "Valve System" following), and valve lifters must be selected for proper fit.

Cleaning Engine (when replacing Camshaft): With the engine out of the chassis and the old camshaft removed, remove engine oil pan and oil pressure regulator valve parts, then thoroughly clean engine as follows **with a flushing gun:**

1() Clean engine oil pan.
(2) Remove plugs from rocker arm shafts, clean oil passages with a rifle brush, thoroughly clean entire overhead valve mechanism.
(3) Remove pipe plug slightly to rear of distributor mounting pad, pipe plug in main oil gallery at rear of engine, pipe plug in cross-drilled passage of main oil gallery at right rear of engine, clean all oil passages.
(4) Clean all of the followng parts: Oil Pressure Relief Valve parts and oil passages, Camshaft bearing bores, Valve Lifter bores and valve lifter chamber, Timing Gear case and cover, inside of rocker arm covers and engine crankcase.
(5) Remove oil filter cartridge, thoroughly clean filter case, install NEW filter cartridge.
(6) After engine has been reassembled and installed in car, run 4 quarts of flushing oil through engine for approximately 5 minutes, then drain flushing oil and install correct quantity of NEW ENGINE OIL in crankcase.

Valve Clearance Setting Instruction Plate Installation THESE PLATES MUST BE INSTALLED ON ALL ENGINES WITH NEW CAMSHAFT (which has increased cam ramp) to insure correct tappet clearance being used on these engines.

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►*TAPPET CLEARANCE SETTING CAUTION*—All engines with the new camshaft must have tappet clearance set in accordance with the above instruction plate. ***See Tune-up and Valve Timing Data on Studebaker Commander V8 car pages for correct tappet clearance for each engine.***

1955-CHAMPION

CAMSHAFT REMOVAL (Champion): *NOTE—Camshaft can be removed with the engine in the chassis by removing fender, grille, and radiator core as an assembly.* Remove cylinder head, manifold assembly and valve cover plates. Take out valve locks, valves and valve spring retainers. Turn cylinder block over so that valve lifters will fall free of camshaft. If engine not removed from car, tie or block valve lifters so they will not interfere with cam lobes during removal. Remove oil pan, oil pump, and oil pump drive shaft. Remove vibration dampener, fan drive pulley and engine front cover. Unless camshaft is to be replaced, it is not necessary to remove camshaft gear. Turn crankshaft until camshaft thrust plate cap screws are visible through spokes of timing gear. Remove capscrews and lockwashers retaining thrust plate and carefully slide camshaft and gear out of cylinder block, being careful not to nick or scratch camshaft journals, lobes, or bearings.

1955 V8 MODELS

CAMSHAFT REMOVAL (Commander & President): With engine in car, camshaft can be removed as follows: Turn crankshaft until timing mark shows directly under pointer on engine front cover and distributor rotor is in the No. 6 firing position (in this position the timing mark on the camshaft gear is aligned between the marks on the crankshaft gear). On coupe and hardtop models, remove the fan shroud. On all models remove the radiator core, fan blade assembly and water manifold. Remove rocker arm covers, rocker arm assemblies and pushrods. Remove carburetor and intake manifold assembly. Remove breather pipe, valve lifter cover, and take out the valve lifters. Remove fuel pump and take off engine front cover (see "Engine Front Cover" above). Turn camshaft just enough to expose thrust plate retaining screws and remove screws. Turn gear back to align timing marks of the two gears. Remove camshaft and gear as an assembly, being careful not to damage camshaft bearings. *CAUTION—With camshaft removed, do not move crankshaft or disturb position of distributor rotor.*

1947-55 MODELS

CAMSHAFT ENDPLAY: Endplay regulated by thickness of spacer installed on camshaft directly behind timing gear and is equal to amount by which thickness of spacer exceeds thickness of thrust plate bolted on cylinder block. When installing new parts, measure both thrust plate and spacer with a micrometer, select parts so that endplay is .004-.006" (1947-48); .003-.006" (1949-55 Except V8 Models); .005-.007" (1951-54 V8 Models); .003-.006" (1955 V8 Models). The endplay is the difference in thickness of spacer and thrust plate, with the thrust plate being the thicker.

TIMING GEARS

ALL MODELS

TIMING GEARS: Camshaft Gears (All Models)—Holes provided in gears for gear puller to remove gears. Use Tool HM-925 Universal Puller. To install gears, use gear pusher Tool HM-861Y. *CAUTION*—Do not drive gear on with hammer which will loosen gear at hub.

Replacement Camshaft Gears: Furnished in three sizes. 'S'—Standard. 'H'—High Limit. When replacing gear on engine with considerable service, install next largest camshaft gear size. For reconditioned engines with new camshaft and main bearings, use same size gear as one removed. Crankshaft gear furnished in standard size only.

►**Crankshaft Gear Removal & Installation Note**—Use same puller and replacer tools as used for cmashaft gear.

VALVE SYSTEM

1947-55 MODELS (EXC. V8)

VALVE CHAMBER BAFFLES: *Oil baffle plates* are provided to prevent excessive oil splash in valve spring chamber. One baffle is used in each half of the chamber. Baffles straddle lifters. Champion baffles are same for both halves of the chamber and are interchangeable. Commander baffles are marked front and rear (install as marked).

Installation—Insert baffle so curved portion is upward, with notch aligned with cover plate screw hole. Install cover plate, making sure notches straddle cover plate screws. With cover installed, baffle is held tightly in place against cover and cover plate screws.

VALVE STEM SEALS

V8 MODELS

VALVE STEM SEAL TESTING: Using vacuum equipment on distributor analyzer, remove valve covers and rocker arm assembly. Wipe excess oil from top of valve spring retainers. Adjust vacuum control on analyzer to indicate 15" with hose closed off. Using a high tension cable nipple as an adapter on the end of the vacuum hose, place adapter in center of valve spring retainer, over valve stem. Vacuum on gauge should read 15" if seal is in good condition. *NOTE*—A fast check of seals can be made by compressing a small vacuum cup over valve spring retainer. If there is leakage, vacuum cup will not stay compressed.

VALVE SPRINGS

1947-55 MODELS (EXC. V8)

VALVE SPRING INSTALLATION: Springs should be installed with closed-coil end of spring upward.

Valve Lifter Tension Spring. Consists of 'U' shaped flat spring installed so as to engage lower end of valve stem and upper end of lifter (spring tension keeps lifter on cam lobe). Make certain that tension springs in place when valves and springs installed.

Spring Dampeners (Commander 6 Cyl.)—Consist of open sided cages installed on upper (closed coil) end of each valve spring. Make certain that dampeners in place when spring installed.

V8 MODELS

VALVE SPRING ASSEMBLY INSTALLATION: Install dampers on "closed coil" end of spring so that damper fingers contact sides of spring. Place springs on valve stem so damper is next to the cylinder head. Install the valve spring retainers on the springs making sure the retainers with the skirts are on the intake valves. Compress the spring until the retainer is past the inner groove of the valve stem far enough to permit installing the rubber seal. Place the keepers in position and slowly release the spring.

►*CAUTION*—Always install new rubber seals whenever valve springs have been removed.

VALVE GUIDES

V8 MODELS

VALVE GUIDE REMOVAL AND INSTALLATION: Valve guide tool J-4673 is used to remove and install the valve guides. Drive guide out of cylinder head from the combustion chamber side.

Installation—Coat valve guide lightly with white lead and start chamfered end into cylinder head from the combustion chamber side. Place the installing plate on the face of the head so that the long side of the plate is paraliel to the end of the head and the bore of the plate centered over the guide bore. The plate is marked "Intake" on one side and "Exhaust" on the other side. Be sure that the exposed mark of the plate corresponds to the valve guide being installed so that the depth of the counterbore of the plate will control the depth to which the guide is driven into the head. Insert the driver through the plate and into the guide. Drive the guide into the head until the shoulder of the driver contacts the bottom of the counterbore in the plate.

ROCKER ARMS

V8 MODELS

ROCKER ARM ASSEMBLY: Two identical hollow steel shafts (ends plugged) are used. Four removable supports doweled to each shaft with cylinder head capscrews. Three springs used to position rocker arms against supports. Lubrication is supplied by oil from the main oil galleys to a passage in the cylinder head which leads the oil up around the relieved capscrew shank in the rocker arm front support on the left bank and the rocker arm rear support on the right bank. The bracket is drilled to connect the capscrew hole with the rocker arm shaft hole. The oil flows under pressure to the rocker arms and through holes drilled in the rocker arms to the adjusting screws and through the center of the adjusting screws to the push rods.

►*DISASSEMBLY CAUTION:* Mark rocker arms, brackets, and the rocker arm shaft so that they can be reassembled in their original position.

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Reassembly—Make certain the oil holes and grooves in the rocker arm shaft and the oil holes in the brackets, rocker arms and adjusting screws are clean. Check rocker arms and shaft clearance which should be .0005" to .0025". Test springs. It should require 9-1/2 to 10-1/2 lbs. to compress springs to 2-1/32". If not within these limits, replace spring. Place a spring washer between two flat washers and install on one end of the rocker arm shaft and install a new cotter pin in the shaft. Place a rocker arm on the shaft next to the inner flat washer. *(CAUTION*—The oil groove side of the shaft must be at the bottom of the rocker arm and the adjusting screw end of the rocker arm be on the same side of the shaft as the cylinder head capscrew groove in the shaft). Place a shaft bracket on the shaft so that the bottom of the bracket is on the oil groove side of the shaft and align the cylinder head capscrew hole in the bracket with the capscrew groove in the shaft. Insert a capscrew through the bracket. Clamp the bracket in a vise, and install the second rocker arm on the shaft, positioning it in the same way as the first rocker arm. Slide a spacer spring on the shaft and, holding the spring compressed, slide the third rocker arm and the second bracket on the shaft and position it in the same way as the first bracket. Align the screw hole in the bracket with the groove in the shaft, insert a capscrew and release the spring. Install the rest of the rocker arms, springs and brackets in the same manner. Slip the two flat washers with the spring washer between them, on the end of the shaft and install a new cotter pin in the shaft. If correctly assembled, when installed on the engine, the flat side on the end of the rocker arm shaft will be at the rear on the right bank and at the front on the left bank.

VALVE LIFTER ALL MODELS

VALVE LIFTER INSTALLATION: Thoroughly clean lifter bores in cylinder block and inspect for smoothness. With lifter and bore clean and dry, check lifter fit and select correct lifter size. Lifters furnished Std., .001", .005" oversize. See ".005" Oversize Lifter Installation" below.

Checking Lifter Fit in Bore—When properly fitted, the valve lifter should just slide into place from its own weight. If .001" oversize lifter does not restore proper clearance, bore must be reamed to .005" oversize, and .005" oversize lifters installed.

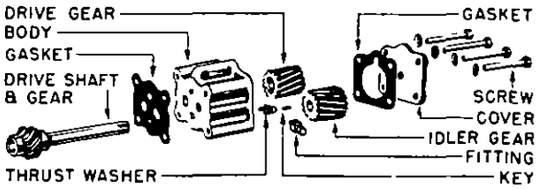
1949-55 MODELS

.005" OVERSIZE VALVE LIFTER INSTALLATION (1949-55 MODELS): .005" oversize service replacement valve lifters are available for all models (1949-55). Special reamers are required for reaming engine block lifter bores as follows: 32L-STB (1949-55 Champion & 1949-50 Commander 6); 1356-STB (1951-54 Commander V8); 1352-STB (1955 Commander & President V8).

OILING SYSTEM

1947-55 CHAMPION

OIL PUMP: Removal & Disassembly—Disconnect oil pressure pipe. After removing four cover screws and washers, remove pump body cover, gasket and idler gear. Remove drive gear using tool J-2959. Remove Woodruff key and horseshoe shaped thrust washer to permit removal of oil pump body and gasket. If it is necessary to remove pump drive shaft and gear, the oil pan must be removed. Remove distributor and push oil pump drive shaft inward, and remove it from the crankcase. To remove gear from oil pump drive shaft, press out the gear-to-shaft pin and then press shaft out of gear.



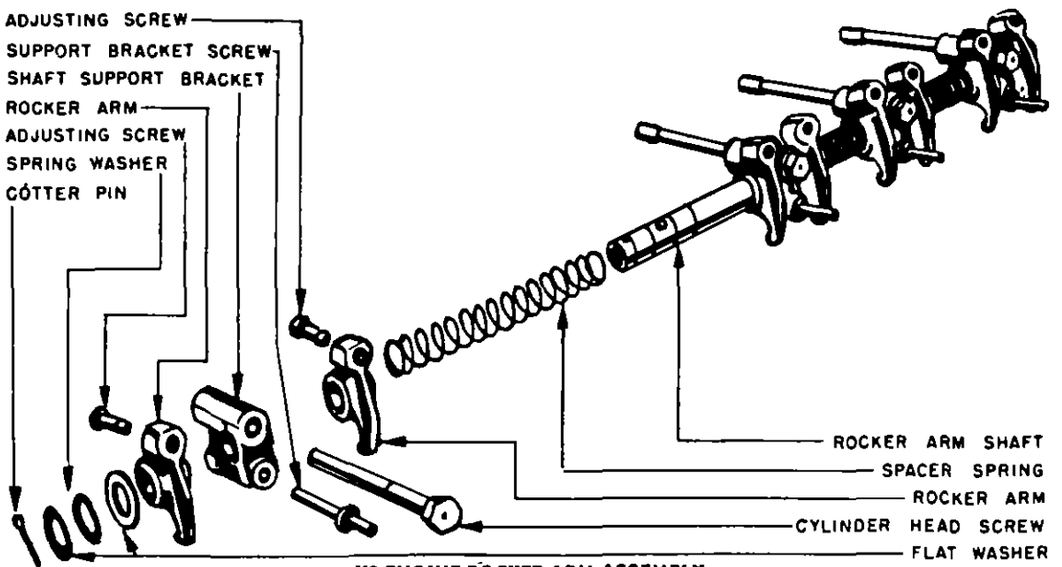
CHAMPION OIL PUMP

Inspection: Inspect pump cover for flatness and deep scratches or score marks. Check clearance between oil pump gears and pump body by placing a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. The pump should be locked tight. The total clearance should not exceed .010". If pump gears can be rotated with the two .005" feelers in place, the pump body is worn and should be replaced. Check gears for smoothness, deep scratches and score marks. Replace all defective parts. Clearance between end of gears and cover plate must not exceed .007". To check this clearance, the lower ends of the gears should be exactly flush with the lower surface of pump body when gears are resting against the upper part of pump body. A new gasket .004-.006" thick, when compressed will provide proper clearance.

Installation & Reassembly: *(CAUTION—If oil pump drive shaft removed, install EXACTLY as described below to obtain correct ignition timing).*

Oil Pump Drive Shaft Installation—Install drive shaft, temporarily engaging camshaft gear and oil pump drive gear in any position. Then turn the crankshaft until No. 1 piston is on a compression stroke and the "UDC 1-6" mark on vibration dampener is directly under pointer on engine front cover. Slide the oil pump drive shaft away from camshaft to disengage the camshaft gear and turn drive shaft until keyway is pointing directly upward when the two gears start to engage. Pull the shaft into position so that the two gears fully mesh (the drive shaft will rotate so that the keyway is toward rear of engine). Install distributor to hold oil pump drive shaft in position while installing remainder of pump assembly (with slot in end of distributor shaft engaged, rotor should line up with No. 1 terminal in distributor cap).

Oil Pump Assembly—Dip each part of pump in clean engine oil before assembly. Place a new gasket and oil pump body over pump shaft and install horseshoe washer, woodruff key, and drive gear. Install idler gear, new cover gasket, and pump body cover. Secure entire assembly in place with the four cover screws.



V8 ENGINE ROCKER ARM ASSEMBLY

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Remove oil pressure pipe fitting from pump body and prime pump with clean engine oil. Install fitting and oil pressure pipe.

COMMANDER (1947-48)

OIL PUMP REMOVAL: Car manufacturer recommends following procedure for oil pump removal (and vacuum booster pump on 1947 models) with engine in chassis:

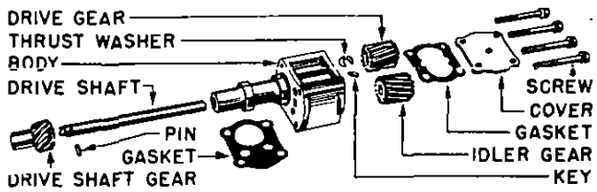
1. Drain radiator. Remove hood (disconnect at hinge arms). Position car under chain hoist with hook slightly to left of engine and turn front wheels to extreme right. Disconnect front engine insulator from engine support (take out bolts and nuts).
2. Remove center cylinder head capscrew and install lifting eyebolt. Attach chain hoist hook to eyebolt.

IMPORTANT—Upper end of chain hoist should be approx. 15° to left of engine.

3. Take off starter (not necessary to disconnect wires) and place to left of hand brake cable.
4. Disconnect clutch operating shaft from throwout shaft by taking out cotter pin and inner clevis pin from sleeve next to clutch housing and pulling shaft and sleeve toward frame.
5. Take out mounting bolts and remove rear engine mounting lower cushions and spacers.
6. Remove radiator inlet and outlet hoses.
7. Disconnect oil gauge pipe at pump. Loosen opposite end at flexible coupling and move pipe for clearance (do not bend pipe). On 1947 models with booster pump, remove pipe between vacuum booster (on outer end of oil pump) and manifold tee.
8. Hoist engine until bottom of right side of front engine support insulator is 1⅝" above support. With engine in this position, right front corner of cylinder head should be 17¼" from closest point on right fender skirt (if necessary engine can be levered and blocked into position for this clearance).
9. **On 1947 models,** remove booster body, gasket, and vane, by taking out 8 mounting screws (use 5/32" Allen wrench). Pull rotor off shaft using 3/16" drift punch inserted in hole on side of rotor. Take off booster base plate and gasket. Remove 4 screws in booster adapter plate (use 7/32" Allen wrench), take off plate, gasket and idler gear. **On 1948 models,** remove 4 oil pump cover plate screws, take off plate, gasket, and idler gear.
10. Pull pump out of engine with twisting action, keeping pump toward front of engine as far as possible (outer end of shaft will pass between ends of steering knuckle upper control arm-to-frame rear bracket bolts).
11. Remove pin from driveshaft gear, press shaft out of gear and pump body. Pump gear can then be removed from shaft by pressing on outer end of shaft.

Disassembly of Pump: With pump cover off, remove cover gasket, lift out idler gear, drive out pin in pump driveshaft gear, press shaft and gear out of driving gear in an arbor press. Then press pump gear off shaft, remove thrust "C" washer and woodruff key from shaft.

Reassembly of Pump: Install thrust "C" washer on shaft and woodruff key in slot adjacent to "C" washer groove, press oil pump drive gear on shaft. Install shaft with gear in pump body. Press driveshaft gear on opposite end of shaft with pin hole in shaft and gear in alignment. Use new 3/16" pin to lock gear to shaft (peen pin securely). If new driveshaft and driveshaft gear installed, proper endplay secured by pressing shaft on gear with .003" feeler inserted between gear and upper end of pump body, drill hole in shaft using hole in gear as a guide, ream hole to 3/16", use new 3/16" pin to lock gear (peen pin securely). Use new gaskets throughout. Install pump on engine, prime pump with engine oil by disconnecting oil gauge line at elbow on pump.



1947-50 COMMANDER OIL PUMP

Installation: Use new pump body gasket. Turn pump shaft so that pump drive gear keyway faces toward rear of car, make certain that crankshaft turned to #1 piston firing position with mark "UDC.1-6" at timing pointer, engage pump drive shaft gear with camshaft gear. With pump in position against engine block, keyway should point almost straight downward. Use new cover gasket when installing cover, reassemble all parts disconnected when removing pump.

1949-50 COMMANDER

OIL PUMP REMOVAL: Disconnect battery, turn crankshaft to #1 piston firing position with mark "UDC.1-6" at timing pointer. Proceed as follows:

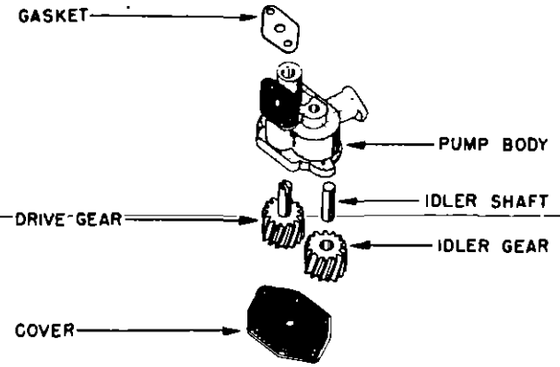
1)—Take out starter mounting capscrews, tie starter up out of the way (not necessary to disconnect cables and wires).
2)—Use jack to raise rear end of engine just enough to remove weight from rear engine mountings, remove support mountings from cross-member, remove clutch operating shaft bracket-to-crossmember bolts.
3)—Place hydraulic jack between right frame side rail and base of engine block with ram of jack just to rear of breather tube, move rear of engine about 2" to left.
4)—Disconnect oil pressure gauge line at oil pump cover elbow.
5)—Take out four capscrews in pump cover which mount pump body on engine, remove cover and pump body assembly.

Disassembly, Reassembly & Installation of Pump: *See 1947-48 Commander (above).*

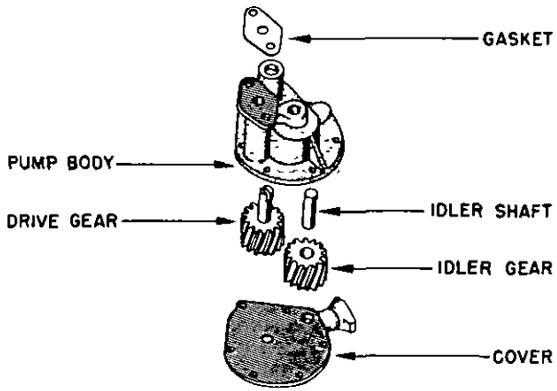
V8 MODELS

OIL PUMP: Removal—Remove oil pan and take out the two oil pump retaining nuts and lockwashers. Slip pump assembly off mounting pad studs and remove gasket.

Disassembly: Remove cotter key retaining floating oil strainer pipe in pump body and remove strainer. (NOTE—the floating oil strainer is serviced only as an assembly and should not be disassembled). Remove cover screws and pump body cover. Remove idler gear, drive gear and shaft (do not disassemble drive gear and shaft). Clean oil strainer with solvent and dry it thoroughly.



1953-55 V8 ENGINE OIL PUMP



1951-52 V8 ENGINE OIL PUMP

Inspection: Inspect pump cover for deep scratches or scores and for flatness. Check clearance between oil pump gears and pump body by placing a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. If pump gears can be rotated with the two .005" feelers in place, the pump body is worn and should be replaced. Check gears for smoothness, deep scratches and score marks. Replace all defective parts. With weight of gears resting against upper part of pump body, place a straightedge across face of pump body and measure distance between gear face and straightedge. This clearance should not exceed .007".

Reassembly: Place drive gear and shaft assembly in pump body. Install idler gear on idler shaft. Install pump body cover and cover screws (no gasket is used

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between body and cover). Insert pipe of floating oil strainer in cover inlet, making sure ears of strainer flange straddle projection on pump cover inlet and install cotter key. *CAUTION—Do not use a cotter key smaller than 1/8". If a smaller key is used float can become disengaged from pump, causing damage to engine.*

Installation: Clean all trace of old gasket off pump mounting flange and rear bearing cap pad. Install a new gasket and position slot in pump drive gear shaft so it will mate with tongue of the oil pump drive shaft and coupling, and install pump on mounting studs. Install nuts and lockwashers and tighten securely to 13-17 ft. lbs.

COOLING SYSTEM

1954 MODELS

►***COUPE & HARDTOP FAN SHROUD REWORK (To Prevent Interference With Radiator Core):*** On cars prior to Serial Nos. G-1288410 (15G) and 8364361 (5H) lower flange should be turned down. To make this correction support shroud on work bench and use a hammer to tap the flange evenly along its full length until turned edge is in approximate plane with shroud mounting flanges. When installing shroud, locate it upward as far as mounting holes permit.

IGNITION NOTES

V8 MODELS

DISTRIBUTOR DRIVE SHAFT ASSEMBLY: Removal—Turn crankshaft until "IGN" mark on vibration dampener is directly under pointer on engine front cover and distributor rotor is in line with No. 1 spark plug terminal of cap. Remove cap from distributor housing and carburetor air cleaner from carburetor. Disconnect coil-to-distributor secondary cable at coil. Remove spark plug cables, cable brackets and distributor cap as a unit. Disconnect coil-to-distributor primary wire at distributor. Disconnect spark modifier pipe. Remove distributor clamp capscrew and lift distributor out of cylinder block.

Installation: The "IGN" mark on vibration dampener must be directly beneath pointer. Position distributor so that spark modifier is to front and pointing slightly toward right. Turn rotor approximately 30° clockwise and insert the oil pump drive shaft and coupling into cylinder block opening. When the teeth on the distributor shaft gear contact the teeth on the camshaft gear, the rotor will turn counter-clockwise, and as the teeth mesh, the distributor assembly will seat on the cylinder block. At the same time the tongue of the oil pump drive shaft will enter the groove of the oil pump shaft. The rotor will now point directly forward and be in line with the No. 1 terminal of the distributor cap. (NOTE—Very slight misalignment may cause difficulty in engaging the oil pump drive shaft tongue with the groove of the oil pump shaft). After the distributor gear is in mesh with the camshaft gear, the engine may be cranked to give proper alignment. Maintain a light pressure on the distributor while cranking the engine to facilitate the engagement. Install distributor clamp and capscrew. Connect the coil-to-distributor cable. Connect spark modifier pipe. Install spark plug cables, cable brackets and secure cap with retainer springs. Connect coil-to-distributor secondary cable. Install carburetor air cleaner. Check timing.

FUEL SYSTEM NOTES

1951-54 V8 MODELS

►**FUEL PUMP SUPPORT BRACKET PRODUCTION CHANGE:** Several changes have been made during production as follows:

Support Change (Beginning Eng. No. V-96218): Part No. 531650. design changed to provide for closer or dowel fit of attaching bolts to provide uniform location of pump on support for better control of pump stroke.

Support Gasket Change (Beginning Eng. No. V-97480): New gasket, Part No. 531640, which is .007" thick used to insure support being firmly bolted in place and to provide desired fuel pump stroke. This gasket should always be used with Support No. 531650.

CAUTION—Whenever this No. 531640 gasket used with previous type fuel pump support, make certain that support is not positioned too close to block which **might result in excessive fuel pump stroke and damage to the pump.**

1951-54 V8 MODELS

FUEL PUMP SUPPORT BRACKET CHECKING: Check support to assure correct fuel pump stroke as follows: Place support on flat surface and measure height from bottom of support perpendicularly to line across bottom of pump mounting holes. This distance must be 4 35/64". *CAUTION*—Gasket No. 531640 (.007" thick) must be used when installing support on engine.

Fuel Pump Push Rod Checking—When support removed, check push rod for straightness and evidence of scoring.. If rod scored, polish scored areas until rod slides freely in guide bore. If rod bent, replace with new rod No. 529123.

CLUTCH NOTES

1950 CHAMPION

CLUTCH CHATTER (Champion Early 1950)—When clutch chatter in the 1950 Champion (prior to Serial No. G-573846) is the result of engine movement when car is being accelerated from low speed, newly designed clutch linkage should be installed. Remove old Clutch Operating Shaft and Lever assembly, Support Bracket and Clutch Pedal Shaft-to-Operating Shaft Rod. Mount new Support Bracket, Part No. 537911, on new Operating Shaft, Part No. 527893, using a new Bearing and Retainer Kit, Part No. 527424. Insert end of operating shaft in shaft sleeve and secure support bracket on frame cross-member with the upper bolts. Align hole in operating shaft with hole in sleeve and install retaining pin. Position Brake Cable Bracket, Part No. 527909, (with cable loop upward) on the forward side of frame cross-member, securing it with support bracket side mounting bolt. Attach front end of pedal shaft-to-clutch operating shaft rod, and then bend back half of rod to align it with clutch pedal lever. Adjust pedal free travel.

1950 CHAMPION & COMMANDER

CLUTCH OPERATING SHAFT RATTLE CORRECTION (Commander & Champion Early 1950)—Remove clutch operating shaft bracket and bearing and install neoprene washer Part No. 527281 between bushing and felt washer on each side of bushing. Thoroughly lubricate with SAE 30 motor oil and reassemble bracket and shaft.

1954 MODELS

►***CLUTCH PEDAL REWORK (To Prevent Spring Breakage):*** Hook of clutch pedal pull-back spring tends to open each time pedal is depressed, rather than slip in groove of anchor stud, causing spring end of hook to bend a slight amount and eventually causing spring wire fatigue and hook breakage. To prevent recurrence of condition with a new spring, it is necessary only to reduce contact area between anchor stud and the hook by cutting away the metal of the stud as follows: Start two 30° chamfers at two opposite ridges of hexagonal stud ½" from shoulder, and toward end of stud. Cut these chamfers equally to a point where a ⅛" thick section of the grooved end of the stud remains when metal toward end of stud and on each side of ⅛" section is cut away.

ALL MODELS

PROPELLER SHAFT & SUPPORT BEARING ASSEMBLY: Propeller shaft is a two unit type (separate front & rear shafts) with intermediate bearing in Support Assembly on frame crossmember.

Propeller Shaft & Support Bearing Removal: Mark yokes of universal joints to assure original position at reassembly. Disconnect rear propeller shaft from rear axle companion flange. Remove shaft support stud nuts, lock washers, and plain washers. Disconnect front propeller shaft from transmission companion flange. Remove bearing cups and bearings or tape them securely in place on joint crosses. Then move assembly rearward, slipping the shaft support off the cushions and threading the front shaft rearward through center crossmember.

Installation—Reverse removal procedure.

Rear Shaft Removal: Straighten ear of lockplate, loosen grease washer nut and unscrew it from shaft. Mark universal joint flange and rear axle companion flange to assure original position and balance at reassembly. Remove U-bolts holding rear joint bearing cups and cross to rear axle flange. Shift shaft forward and separate joint by prying with a suitable bar between companion flange and universal cross. Hold bearing cups on the cross while separating joint to avoid dropping cups and spilling bearings. Then remove bearing cups and bearings or tape them securely in place on cross.

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Slide shaft rearward, slipping end of slip yoke out of splines of front shaft. To remove grease washer nut from slip yoke, first remove cork grease washer and washer retainer from within the nut and slide nut off slip yoke. Cork grease washer and washer retainer are split to facilitate removal.

Installation—Reverse removal procedure. Tighten U-bolts and nuts to 20-22 ft. lbs. torque.

Front Shaft Removal: Remove rear shaft and shaft support assembly. Mark front shaft universal joint flange and transmission companion flange. Remove U-bolts holding joint bearing cups and cross to transmission companion flange. Separate joint by prying with suitable bar between companion flange and universal cross. Hold bearing cups on cross while separating joint to avoid spilling bearings. Remove bearing cups and bearings or tape them in place on the cross. Then slide rear end of shaft out of crossmember and remove from chassis.

Installation—Reverse removal procedure. Tighten U-bolts and nuts to 20-22 ft. lbs. torque.

Support Bearing Servicing: Bearing is sealed type (prepacked with lubricant) **and must never be washed in gasoline or other solvents.**

►*CAUTION: Do not re-install support bearing which has been washed in gasoline or solvent.*

Support Bearing Removal: Remove rear shaft. Remove lock plate and spacer from projecting end of front shaft, and remove shield. Remove shaft support stud nuts, lockwashers, and plain washers. Slide bearing and support assembly off front shaft and support cushions. Remove dust shields from front shaft. To remove support bearing from support use a suitable tube which will fit the outer race of the bearing and, with an arbor press, remove the bearing. NOTE—Use care not to damage bearing seal.

Installation—Reverse removal procedure. NOTE—Press bearing into support so that it is laterally centered in the support. Install dust shields on front shaft with concave side of shield against shoulder on shaft. If shaft support cushions removed, be sure to install studs in same holes from which removed.

1951-55 MODELS

PROPELLER SHAFT ALIGNMENT CHECKING (To Correct Vibration): Check propeller shaft with dial indicator at three positions as follows: Front end of shaft, center of shaft, and rear end of shaft. For accuracy, shaft should be sandpapered at all positions, and measurements should be taken approximately 1½" back of welded joint on shaft. Maximum run-out for the front propeller shaft is .010" at any of the three positions. Maximum run-out for rear shaft is .010" (front & rear end), and .015" at the center. Check transmission and differential flanges by checking run-out of propeller shaft at the flange. Note amount of run-out and mark high side on propeller shaft. Change shaft location 180° in flange and again check shaft run-out. If run-out follows position marked on shaft and is approximately the same amount of run-out, it can be assumed that flange is satisfactory. If run-out remains on same side of flange as formerly, although not necessarily in the same amount, it can be assumed flange is causing the run-out. If checking indicates that shaft run-out is not within limits indicated above, replace shaft, flange, or both.

SUSPENSION NOTES

1950 CHAMPION

CHAMPION FRONT END TROUBLE CORRECTION (1950 Cars): To correct conditions such as Excessive Right Front Tire Wear, Front End Vibration or Shimmy, Unstable Steering etc., check and correct following points:

1) Auxiliary Arm Bracket Distortion—Install special brace which will prevent bending or distortion of the bracket: No. 530284 Auxiliary Arm Bracket Brace, 520259 Spacer, 2-0734 Bolt, 2-0626 Bolt, and 361-07 Plain Washer. To install brace, remove right rear outer lower control arm innershaft mounting bolt and both auxiliary steering arm-to-bracket mounting bolts. Install the brace with the single hole to lower control arm and place spacer between the brace and frame cross-member flange. Install the 2-0734 bolt, flat washer, lockwasher and nut. Tighten nut loosely. Install both auxiliary steering arm-to-bracket bolts (use 2-0626 bolt in lower hole with bracket on outside of auxiliary steering arm), tighten bolts securely, then tighten control arm mounting bolt securely. Check front end alignment.

2) Worn or Loose Parts—Check and adjust or replace (end fittings, bushings, insulators, etc.).

3) Steering Gear Adjustment—Adjust if necessary.

4) Caster, Camber, Toe-In & Auxiliary Tie Rod Alignment—*See Front Suspension data.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door lock pillar post.

	South Bend	Los Angeles
1947 Numbers	G-212,501 Up	G-824,001 Up
1948 Numbers	G-314,501 Up	G-827,301 Up
1949 Numbers①	G-400,501 Up	G-839,701 Up

①—G-703,101 Up (Hamilton).

Body Symbol Letter—Used with model designation (and on body number plate) to indicate body type as follows: C, 5-Pass. Coupe; F, 2-Door Sedan; Q, 3-Pass. Coupe; S, Convertible; W, 4-Door Sedan.

ENGINE NUMBER: Stamped on pad on upper front left corner of engine block.

1947 Numbers—236,001 Up; **1948 Numbers**—432,001 Up; **1949 Numbers**—441,001 Up (South Bend & Los Angeles), C-4101 Up (1949 Hamilton).

NOTE—Letter "A" following engine number indicates crankshaft main bearing journals .005" Undersize.

TUNE-UP

COMPRESSION PRESSURE: 105 lbs. at 150 RPM.

VACUUM READING: Steady 17-18" idling at 8 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025" Limits .0225-.0275".

Plug Type—Champion Type J7 or J9. 14 mm.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".

Cam Angle—38° Closed, 22° Open.

Breaker Arm Spring Tension—17-20 ozs.

Automatic & Vacuum Advance—*See Ignition.*

Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 2° BTDC.

Timing Procedure—*See Ignition Timing.*

Timing Mark—Vibration dampener mark "IGN/" aligned with pointer on left side of engine. NOTE—Insert .020" feeler between modifier control arm and clamp arm before tightening clampscrew.

Octane Selector Setting—Set to just eliminate ping when engine hot and pulling hard.

CARBURETION:

Idle Setting—½-1½ turns open. Turn screw out for richer mixture.

Idle Speed—8-10 MPH. at normal operating temp.

Float Level—¼" (532S), ⅜" (661S, 715S). Measured from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and bowl cover assembly inverted.

Accelerating Pump—No seasonal adjustment.

Choke Setting: *CAUTION*—Different settings used:

Setting (532S)—Centered (cover centered on scale).

Setting (661S)—1 Point Lean.

Setting (715S)—Centered (at index).

Fuel Pump Pressure: 4-5 lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type operating in stainless steel bushings.

Setting—To test coil tension, free outer end of coil from anchor post. With valve closed (counterweight up), hooked end of coil should be approx. 90° from anchor post with coil at 70°F. NOTE—To overcome sticking, lubricate valve shaft with kerosene and soda solution or Bendix Carburetor Cleaner. If necessary, shaft diameter can be reduced for .005" clearance in bushings (do not ream bushings).

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.

Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock Switch Model 42-R. No. E-10336 (for Y & T lock) or E-10522.

Ignition Lock—Yale & Towne

COIL: Auto-Lite (Early '47) CE-4032, (Late '47 & '48-49) CE-6007. Mounted on engine above distributor (under spark plug cable bracket).

Ignition Current—½-1½ amps. idling, 4-5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671.

Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGC-4805. Full automatic advance type with vacuum spark control.

Breaker Gap—.020". Limits .018-.022".

Cam Angle—38° closed, 22° open.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Distributor Degrees	Automatic Advance R.P.M.	Engine Degrees	R.P.M.
Start	400	0	800
2	680	4	1360
4	975	8	1950
6	1265	12	2530
7	1400	14	2800

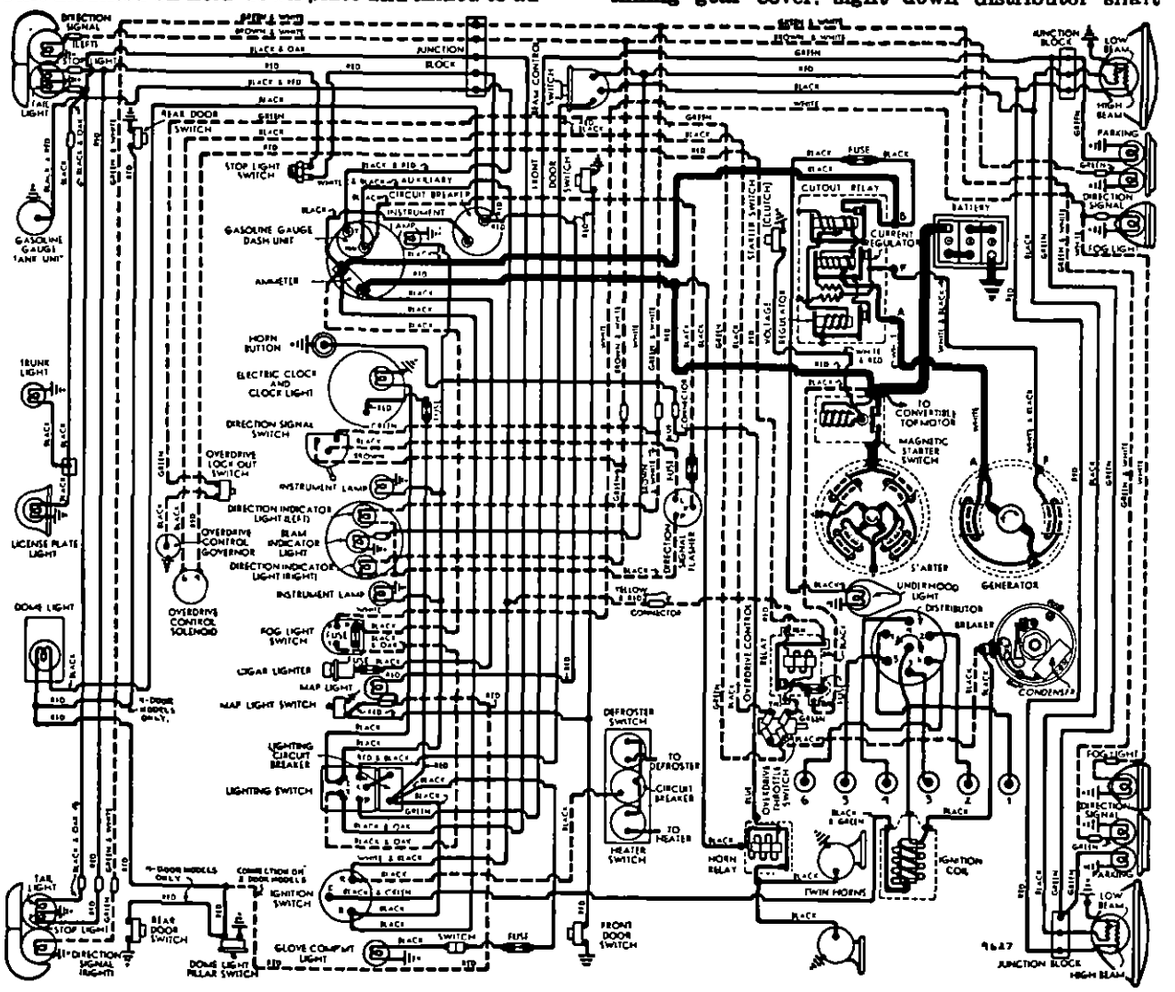
Vacuum Spark Control: Auto-Lite Model VC-4011. Unit mounted on hold-down plate and linked to advance plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.

Vacuum Advance			
Distr. Degrees	Eng. Degrees	Vacuum (" of HG)	
Start	0°		4"
2°	4°		5½"
5°	10°		7¾"
7°	14°		11¼"
9°	18°		14¾"

Octane Selector—Provides manual adjustment at distributor (hold-down plate marked with scale) for variation in timing depending on fuel regularly used. See Ignition Timing following for adjustment.

Distributor Removal: —Mounted on left side of engine. To remove, disconnect vacuum line, take out bolt in clamp arm, lift distributor off.

Installation Note—When installing distributor, crank engine to firing position for #1 cylinder (dampener mark 'IGN' in line with pointer on the timing gear cover, sight down distributor shaft



hole (distributor out) and see that distributor drive tongue in oil pump drive gear is parallel to and narrow half of offset toward camshaft. turn rotor to #1 segment, install distributor (insert .020" feeler between modifier control arm and clamp arm before tightening the clamp, to prevent binding).

IGNITION TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
All Engines	2° BTDC	.0016" BTDC

This setting correct for regular fuel (See Octane Selector Setting for service and fuel modification).

Timing (With Neon Timing Light)—Clip timing light lead in series with #1 spark plug, direct light on vibration dampener at front of engine. Loosen hold-down plate screw, center octane selector pointer on scale, tighten hold-down screw. Run engine at idle speed, loosen clamp arm, rotate distributor until "IGN/" mark on dampener appears in line with pointer on left side of timing gear cover, tighten clamp screw. Check Octane Selector setting. CAUTION—Insert .020" feeler between modifier arm and clamp arm when tightening clamp arm

Timing (Without Neon Timing Light)—With #1 piston on compression, turn engine over until "IGN/" mark on vibration dampener lines up with pointer on left side of timing gear case. Adjust distributor as directed above.

Octane Selector Setting—After setting timing (above), loosen selector hold-down screw, advance timing by turning distributor clockwise (move pointer toward "A" end of scale) until engine "pings" when hot and pulling hard, then retard timing by turning distributor counter-clockwise (move pointer toward "R") until ping disappears.

CARBURETOR

1947 Before Eng. #350,841.....**Carter WE-532S**
1947 After Eng. #350,841 & 1948.....**Carter WE-661S**
1949.....**Carter WE-715S**

1¼" single barrel, downdraft, with Carter Climatic Control.

Casting No. on Flange—375 (532S, 661S), 620 (715S). *See Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Carter Single Barrel Carburetor type. *See Carburetion Equipment Section for data.*

Setting (532S, 661S)—.054" throttle valve opening with choke valve closed. To check, open throttle wide to make certain fast idle cam drops into position, then with choke valve closed measure clearance between edge of throttle valve and carburetor wall on side opposite idle port (valve closed to fast idle position). To adjust, turn adjusting sleeve on connector link.

Setting (715S)—.046" between throttle valve and bore of carburetor. To check, remove thermostatic coil housing, gasket and baffle plate. Crack throttle valve and hold choke valve closed. Close throttle. Adjust by bending connector rod at lower angle.

Automatic Choke: Carter Climatic Control (Single Carburetor type). *See Carburetion Equipment Section for data.*

►*CAUTION—Setting different on each type carburetor.*

Setting (532S)—Centered (cover centered on scale).
Setting (661S)—1 Point Lean.
Setting (715S)—Centered (at index).

CARB. EQUIPMENT

Air Cleaner: AC No. 1543970 Oil-wetted type Std. Filter Element AC #1. Oil-bath Air Cleaner Optl.
Servicing (Oil-wetted type)—Clean and re-oil filter element at 1000 mile intervals.
Servicing (Oil-bath type)—Clean filter element and oil reservoir, fill reservoir to indicated level mark with SAE No. 40 or 50 engine oil at intervals as required by operating conditions.

Fuel Pump (Std.): AC #1539092 or AC #1539416.
Optl. Fuel & Vacuum (1948-49)—AC #1539218 or 1539528.
Exchange Pump—AC No. 576 (Std.), 9218 (Optl.).
Pressure—4-5 lbs. maximum.
See Carburetion Equipment Section for data.

Gasoline Gauge: Stewart-Warner Electric type.
Dash Unit—Studebaker No. 522177.
Tank Unit (1947-48)—Stude. No. 519423, (1949) 525548.
See Carburetion Equipment Section for data.

BATTERY

Willard Type HW-1-100, 6 volt, 15 plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five Second Voltage 4.3 volts.
Grounded Terminal—Positive (+) to cyl. head.
Location—In engine compartment on left side.

STARTER

1947.....**Auto-Lite MZ-4136. Arm. No. MZ-2211**
1947, 48, 49.....**Auto-Lite MZ-4151. Arm. No. MZ-2211**
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 amperes, 5.2 volts, 150 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.5	70
2.55 "	1325	5.0	200
7.65 "	220	4.0	400
7.8 "	Lock	3.0	420

Starting Switch: Magnetic switch mounted on starter and controlled by Auto-Lite Model SW-4016 manual switch on toeboard operated by clutch pedal.
Removal:—Flange mounted on engine rear plate at left side. To remove, take out flange mounting screws, take off starter and switch assembly.

GENERATOR

Auto-Lite Model GDZ-4804A. Armature No. GDZ-2006F. Two brush type with current-voltage control.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, 8.0 volts, 2250 Gen. RPM (hot), at car speed of 24 MPH & above with load or discharged battery (regulator setting).

Cold Performance Data			Hot Performance Data		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
8	6.75	1140	8	6.75	1235
16	7.15	1370	16	7.15	1460
24	7.5	1590	24	7.5	1730
28	7.7	1710	28	7.7	1900
35	8.0	1900	35	8.0	2250

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment:—Loosen pivot and clamp bolts, move generator out until ⅜-½" belt deflection midway between generator and fan pulleys is obtained

REGULATOR

Auto-Lite Model VRP-4004F. Voltage & Current Type. Consists of Cutout Relay and vibrating type Voltage & Current Regulators in case on dash. *See Electrical Equipment Section for complete data.*
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts), 10.4 MPH.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. *See Electrical Equipment Section for complete data.*
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—At center of speedometer dial. Lighted whenever Country (upper) beams in use.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—In face of Speedometer dial. Left or right indicator lighted when corresponding direction signal is in operation.

Switches

Lighting—Douglas. Studebaker No. 519798.
Beam Selector—Delco-Remy No. 1997008, Studebaker No. 519246.
Stop Light—Studebaker No. 666858.
Direction Signal—Studebaker No. 520304.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER (On Light Switch): Studebaker No. 522014. 30-ampere thermostatic type. Protects Headlamps, Parking, Tail, & Instrument Lamps by vibrating to limit current.
Auxiliary Circuit Breaker (On Panel): No. 523056, 15-ampere thermostatic type. Protects Body & Stop Lamps by vibrating to limit current.
ACCESSORY CIRCUIT BREAKER: One 15-ampere type used on cars with Climatizer and Defroster.
FUSES: Clock—3 ampere. In clock lead.
Direction Signal—14 ampere. In Flasher lead.
Overdrive—20 ampere. On Overdrive Relay.
Glove Compt. Light—5 ampere. In lamp lead.
Under Hood Light—5 ampere. In lamp lead.
Fog Lights—20 ampere. On Fog Light Switch.
HORNS: Sparton or Delco-Remy No. 1999610 (High Note), 1999611 (Low Note). Twin Airtone type horns operated by relay. **Horn Current**—12-15 ams. (each).
Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025" Air Gap—.015" (closed)

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ENGINE

ENGINE REMOVAL for Oil Pan Removal and all major engine work: *See Studebaker Shop Notes.*

ENGINE SPECIFICATIONS: Six cylinder, "L" Head.
Bore—3". Stroke—4".
Displacement ('47-48)—169.6, ('49)—170 cu. ins.
Rated Horsepower—21.6.
Developed Horsepower—80 at 4000 RPM.
Compression Ratio—6.5-1 Std. 7.0-1 Opti. iron hds.
NOTE—7.0-1 Head for 5000 ft. & higher altitudes.
Compression & Vacuum Reading—*See Tune-up data.*

ORIGINAL BORE & PISTONS: *See Studebaker Shop Notes.*

TIGHTENING TORQUES: *See Studebaker Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Studebaker Shop Notes.*

PISTONS: Lynite aluminum alloy, Cam ground, T-slot, bearing-metal plated type. **Length—2 29/32". Weight—8.48 ozs.** (without rings or pin).
Clearance—Selective fit (see Fitting Pistons).
Removal—Pistons and rods removed from above.

Fitting New Pistons: Insert .002" feeler, 1" wide, between piston and cylinder wall on camshaft side (piston pin parallel to camshaft, slot away from camshaft). Pull required to withdraw feeler should be 11-16 lbs

Replacement Pistons: *See Studebaker Shop Notes.*

Installing Pistons: T-slot away from camshaft.

PISTON RINGS: Two compression (Perfect Circle #200 Top, #70 —2nd), one Oil Control (#85).

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.0015-.002"
Compr. #2	1/8"	.007-.017"	.0015-.002"
Oil Contr. (#3)	.5/32"	.007-.017"	.0015-.002"

Installing Rings: Step up top ring, step down 2nd ring.

Replacement Rings: Sets furnished Std. size and .020", .030", .040" Oversize. Single rings Std. size and .010", .020", .030", .040" Oversize.

PISTON PIN: Diameter .7491-.7495". Length 2⅝". Pin is locked in rod by tapered pin and locknut.
Pin Fit in Piston—.0001-.0003" clearance or light finger-push fit at room temperature (70°F).

Installing Pins: Use Pin Assembly Tool J-1293. Install clamp bolt nut and star washer on heavy boss side of rod. NOTE—Threads on opposite end of clamp bolt used only to remove bolt from rod (install nut on this end, tighten nut to pull bolt out of rod).

Replacement Pins: Std. & .0025", .005" oversize. Use Hone No. PH-1 to obtain proper piston pin fit.
NOTE—Replacement pistons fitted with pins.

CONNECTING ROD: Length 6⅜". Weight 20.48 ozs.
Crankpin Journal Diameter—1.81175-1.81275"
Lower Bearing—Interchangeable steel-backed, micro-babbitt lined type. No shims.
Clearance—.0005-.002" Sideplay—.005-.009".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Make certain that small tongue on bearing shells engage grooves. Palnuts used on bolt nuts.

Replacement Bearings: Bearings furnished Std. Size and .001", .005", .010", .020" Undersize.

Installing Rods: Lower bearings "offset". Install rods with narrow portion of bearing toward front of engine (#1, 3, 5), toward rear (#2, 4, 6). Numbers on rods and bearing caps must be together and installed in same numbered cylinder with number and oil hole in lower end of rod toward camshaft side.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
Vibration Dampener—*See Studebaker Shop Notes.*
Journal Diameters—2.4370-2.4375" (All) Std.
▷*CAUTION—Journals are .005" Undersize on engines with letter "A" following Engine Number.*
Bearing Type—Removable type, steel-backed, micro-babbitt lined. *No shims.*
Clearance—.0005-.0025".
Rear Bearing Oil Seals—Consists of rubber ring, Studebaker No. 521544 (after 1948 Serial No. 284200), on crankshaft; two rubber seal strips, Studebaker No. 522144, in grooves on top of bearing cap; and two specially treated wood strips, Studebaker No. 197178, in grooves in side of bearing cap.
Seal Installation—*See "Crankshaft Oil Seals" in Studebaker Special Data.*
▷*CAUTION—Install new wood oil seals (above) each time rear main bearing cap removed and re-installed.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Front oil pan seal block may be removed for access to front main bearing cap by removing four lower timing gear cover retaining screws. Use only malleable iron type filler block on these cars.
▷*CAUTION—Do not securely tighten timing gear cover to-filler block screws until after oil pan screws tightened uniformly and securely.*

Replacement Bearings: Furnished as sets or single bearings Std. & .001", .005", .010", .020", .030" U. S.

End Thrust: Taken by thrust washer assembled between front main bearing and crankshaft gear. Controlled by shims between thrust washer and main bearing journal. Adjust by changing shims (.003", .005", .007" thick). **Endplay—.003-.006".**

CAMSHAFT: Four bearing type. Helical gear drive.
Journal Diameters—#1, 1.7475-1.7480"; #2, 1.7162-1.7170"; #3, 1.6857-1.6865"; #4, 1.6232-1.6240".
Bearings—Split, steel-backed, babbitted bushings.
Clearance—.0007-.0022" (#1), .0010-.0027" (others).

Bearing Adjustment: None. Replace bushings with camshaft removed. NOTE - Align bushing oil hole with oil hole in block.

Camshaft Removal: *See "Camshaft & Bearings" in Studebaker Shop Notes.*

End Thrust: Taken by thrust plate assembled on front face of engine block behind camshaft gear (spacer assembled on shaft behind gear hub).
Endplay—.003-.006". *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear Cast Iron, Camshaft gear Celoron with steel hub.
Backlash—.001-.003".
Replacement Gears—Camshaft gear furnished in three sizes: Standard (marked "S"), High Limit (marked "H"), Low Limit (marked "L"). Crankshaft gear furnished Standard size only.
Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Shop Notes.*

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 11/32"	5/16"	4 11/32"
Exhaust	1 9/32"	5/16"	4 11/32"

	Seat Angle	Lift	Stem Clearance
All 1947-48	45°	5/16"	.0015-.0035"
All 1949	45°	11/32"	.0015-.0035"

Valve Guides: Pressed in block from above with top of guide 1 3/16" below top of block. Finish ream guides to inside diameter of .312-3125". Use Valve Stem Guide Remover and Replacer Tool J-2034. Replace worn guides if clearance greater than .0035".

Valve Springs: Install with closed coil end up. Replace springs if more than 10% weaker than test pressure of 77-85 lbs. at 1 7/16" (U-15 or other accredited tester). Spring free length 2 3/32".

	Spring Pressure	Spring Length
Valve Closed (All)	52-56 lbs.	1 21/32"
Valve Open ('47-48)	90-94 lbs.	1 11/32"
Valve Open ('49)	93-103 lbs.	1 5/16"

NOTE—Install valve spring retainer with flange engaging flat surface on lower coil and tongue on inner diameter engaging groove in spring lock.

Valve Lifters: Mushroom type. Remove from below with camshaft out of engine. *For Camshaft Removal directions, refer to Studebaker Shop Notes.*
Valve Lifter Tension Spring—*See "Valve System" in Studebaker Shop Notes.*
Clearance—.0005-.00175".
Replacement Lifters—Furnished Std. size and .0005", .001" Oversize.

VALVE TIMING

Tappet Clearance: .016" All Valves, Engine cold.
NOTE - Self-locking tappet adjusting screws used. Tappet screw tension should be 25 in. lbs. minimum.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 15° BTDC. Close 49° ALDC.
Exhaust Valves—Open 54° BLDC. Close 10° ATDC.
Valve Timing Check—With .020" tappet clearance, #1 intake valve should open with #1 piston 15° or .0893" BTDC. with vibration dampener mark "IN. OP .1-6/" in line with pointer on left side of timing gear cover. Reset tappet clearance to .016" Cold

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, and camshaft bearings and to valve lifters. Timing gears lubricated by oil by-passed by pump.
Crankcase Capacity - 5 qts. ("Add Oil" point on oil level indicator stick is 3 qt. level).
Normal Oil Pressure—20-40 lbs. at 40 MPH.
Oil Pressure Relief Valve—On lower right front corner of engine. Opens at 40 lbs. Adjustable by inserting shims between outer end of spring and plug.

Oil Pan Removal: *See Engine Removal in Studebaker Shop Notes (recommended for pan removal).*

Oil Pump: Helical gear type. Mounted externally on right hand side of crankcase.
Oil Pump Removal & Installation—*See "Oil Pump" in Studebaker Shop Notes.*

Oil Filter (Opti.): Fram Model F3-P2 (Std. Service), F4-P2 (Heavy Duty). Replacement Cartridge Kit Studebaker No. 520829 (F3-P2), 520830 (F4-P2).

Oil Pressure Gauge: Stewart-Warner Bourden tube (not electric) type. Studebaker No. 522179.

Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe on left rear of engine (air outlet).
Servicing—Wash both filter elements in kerosene and re-oil at regular intervals. NOTE—Filter in outlet pipe removed by taking out cotter pin.

COOLING

Cooling System: Positive circulation with water pump mounted on front of block with fan.
Capacity—11 quarts.

Water Pump: Packless, sealed ball bearing type.
See Water Pump Section for complete data.
Removal—Slack off drive belt, take out capscrews in the fan pulley hub & remove fan blades. Disconnect hose connection, take out mounting screws in pump body flange, withdraw pump from engine
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Bishop & Babcock. In water outlet on cylinder head.
Setting—Starts to open at 151-155°F.

Temperature Gauge: Stewart-Warner Bourden tube type (not electric). Studebaker No. 522180.

CLUTCH

Borg & Beck Model 8A7 with Borglite Driven Member. Single plate, dry disc type. NOTE—Clutch assembly marked by number 980 stamped on cover.
See Clutch Section for complete data.
Facings—Moulded Metallic type, 2 required. I.D. 5⅜". O.D. 8". Thickness ⅛".

►*CAUTION—Special driven member used on cars with Overdrive. Identify each type by hub damper spring color as follows:* Damper Spring Color.
Cars with Conventional Trans.....2 Lavender, 2 Black
Cars with Overdrive Trans. ..... 4 Lavender

Pedal Adjustment: Pedal free travel ½" to 1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.
Cars before Serial No. G-217064—Pedal free travel must be set to ½" to ¾" on these cars.
Hill-Holder Note—Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages.

Hill-Holder Adjustment: *See Studebaker Shop Notes.*

Removal: Car manufacturer recommends Engine (with clutch attached) be removed. *See "Engine Removal" in Studebaker Shop Notes.* Block release levers. Remove six mounting screws in clutch cover flange, lift off clutch assembly and driven member.

TRANSMISSION

Warner Model AS1-T96 (Std.), AS2-T96 (Optl. 1948-49), AS24-T96 (Optl. Late 1949). Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse), all helical gear type. *NOTE—Optl. AS2 & AS24 Transmissions have R10 type Overdrive.*
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Drain transmission. Disconnect hand brake cable and move out of way for clearance. Disconnect front universal at transmission (wire caps or use clamp to prevent losing rollers). Take out center support bearing mounting bolts. Push front shaft and support to rear (will slide on splines on rear shaft). Disconnect shift rods from levers on case and speedometer cable (remove speedometer pinion). On Overdrive transmission disconnect all control wires and cable. Take out transmission to clutch housing capscrews, pull transmission straight back and remove from car.

OVERDRIVE

Warner R10 Type (part of AS2-T96 & AS24-T96 Transmission). Optl. Governor controlled type with electrical solenoid operation and throttle operated kick-down switch. *NOTE*—Overdrive in AS24-T96 assembly is new "centered ring gear" type.
See Transmission Section for complete data.
Overdrive Solenoid—Warner Model No. 3AR10B-62, Studebaker No. 521429.
Overdrive Governor—Warner Model No. AR10B-72, Studebaker No. 520454.
Control Relay—Auto-Lite HRT-4001, Studebaker No. 523297.
Throttle Kick-down Switch—Studebaker 515667.
Lock-out Switch—Studebaker No. 521436.
Fuse—20 ampere. On Overdrive Relay.

Removal: See Std. Transmission Removal data

UNIVERSALS

Spicer Model 1268-110X (Front & Rear), 1261-102X intermediate). Needle bearing type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft)

Propeller Shaft & Support Bearing: Two shafts used: 1) Front Shaft with intermediate universal yoke bolted on rear end (no slip-joint).
2) Rear Shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal & Servicing—*See "Propeller Shaft" in Studebaker Shop Notes.*

REAR AXLE

Spicer Salisbury Model 23. *Semi-floating, Hypoid* Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Ratio—4.1-1 Std. 4.56-1 Optl. (Std. with Overdrive).
NOTE—Rear axle ratio stamped on plate attached to axle by cover capscrew.

Backlash—.003-.006". Shim adjustment.

Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs and drums. Disconnect hand brake cable. Take out backing plate bolts from backing plates, free hydraulic brake line from axle housing clips (do not disconnect brake line). Backing plates and adjusting shims can then be wired to frame (do not disconnect brake line from wheel cylinders). Disconnect rear universal (wire caps or use clamp to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.

Axle Shaft Removal—Remove wheel, remove wheel hub (use puller J-446-A). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (CAUTION—do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with Puller HM-931.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). **Endplay**—.001-.005".

SHOCK ABSORBERS

Houde (Houdaille). Double acting, hydraulic type.
Front—Houde No. A-14269, Studebaker 523646.
Rear—Houde No. A-11478 (Left), A-11477 (Right), Studebaker No. 517696 (Left), 517695 (Right).

Adjustment: Adjusting pointer on end of shaft should be lined up with scribed line on end of shaft. Turn pointer clockwise for firmer action, counter-clockwise for softer action (not more than 1/32-1/16").

Refilling: Check at 5000 mile intervals. Fill to bottom of filler plug hole. CAUTION—Use only Houdaille Shock Absorber Fluid No. L-1404 (new type fluid for shock absorbers with new circular top filler plug

FRONT SUSPENSION

Front Suspension: Planar type independent suspension with transverse spring. NOTE—Suspension system has lower control arms (with leaf spring).
See Front Suspension Section for complete data.
Kingpin Inclination—5½° crosswise.
Caster (1947-48)—0° to Positive 1°. Not adjustable.
Caster (1949)—+½° to +1½°.
Camber (1947-48)—½° ± ½°, (1949) 0° to 1°. Shim adjustment (shims between upper control arm brackets and frame). One thin shim changes setting approx. ¼°. Thick shim equals 4 thin shims.
CAUTION—Add or remove shims equally at front and rear brackets when adjusting Camber.
Toe In—1/16-⅛". Adjust right hand tie rod only for toe in after left hand tie rod has been adjusted for wheel straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments on left hand tie rod.

STEERING GEAR

Ross Model T-12 Cam-and-Twin Lever type.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed (Wagner Electric) Hydraulic, Self-centering, Self-adjusting type. Brakes are new design with automatic spring-loaded adjusting wedge controlled by contact plug projecting through hole in lining of forward shoe (plug contacts drum when brakes applied). Hand lever applies rear wheel service brakes. NOTE—New type actuating spring used on brake shoe contact plug on 1948-49 cars (replaces hairpin locks and contact plug coil spring).
See Brake Section for complete data.
Drums—Composite type. Diameter 9".
Clearance—Adjustment necessary only when new linings installed. *See Brake article in Brake Section.*
Lining—Moulded type (all shoes). Width 2". Thickness 3/16". Length per wheel 18.5".
Braking Power—57% Front. 43% Rear.

Hand Brake: See Service Brake data (above).

Hill-Holder: Optional Equipment on all models.
See Brake Section for complete data.

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electric type with motor mounted on left hand lift assembly (right hand lift assembly driven through flexible drive
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum type—cable operated.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door lock pillar post.

	South Bend	Los Angeles
1947 Numbers	4232501 Up	4815501 Up
1948 Numbers	4287001 Up	4820501 Up
1949 Numbers	4361001 Up	4832701 Up

Body Symbol Letter—Used with model designation (and on body number plate) to indicate body type as follows: C, 5-Pass. Coupe; F, 2-Door Sedan; Q, 3-Pass. Coupe; S, Convertible; W, 4-Door Sedan; Y, Land Cruiser.

ENGINE NUMBER: Stamped on pad on upper front left corner of engine block.
1947 Numbers—H-182001 Up. **1948 Nos.** H-239001 Up.
1949 Numbers—H-326001 Up.

TUNE-UP

COMPRESSION PRESSURE: 105 lbs. at 150 RPM. cranking speed for Std. 6.5-1 Head.

VACUUM READING: Steady 18-20" idling at 8 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025" Limits .0225-.0275".
Plug Type—Champion Type J7 or J9. 14 mm.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° Closed. 22° Open.
Breaker Arm Spring Tension—17-20 ozs.
Condenser Capacity—.20-.25 microfarad.

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Vibration Dampener mark "IGN/" aligned with pointer on gear case cover. NOTE—Insert .020" feeler between modifier control arm and clamp arm before tightening clampscrew (to prevent binding).
Octane Selector Setting—Set to just eliminate ping when engine hot and pulling hard.

CARBURETION:
Idle Setting—Idle screw set for smooth idle. Turn screw out for richer mixture.
Idle Speed—8-10 MPH. at normal operating temp.
Float Level—Fuel level 5/8" below top edge of float bowl with engine idling.
Accelerating Pump—Center hole (med. stroke) Normal all-season setting. Inner hole (min.)—Summer, Outer hole (max.)—Winter used for temperature extremes.

Choke Setting: Centered (at index).
Fuel Pump Pressure: 4-5 lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type operating in stainless steel bushings.
Setting—To test coil tension, free outer end of coil from bracket on manifold. With valve closed, hooked end of coil should be approx. 90° from bracket at 70°F. Replace coil if incorrect.
NOTE—To overcome sticking, lubricate valve shaft with kerosene and soda solution or Bendix Carburetor Cleaner. If necessary, shaft diameter can be reduced for .005" clearance in bushings.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.
NOTE—Self-locking tappet screws used.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock Switch Model 42-R. No. E-10336 (for Y & T lock) or E-10522.
Ignition Lock—Yale & Towne.

COIL: Auto-Lite (Early '47) CE-4032, (Late '47 & '48-49) CE-6007. Mounted on engine above distributor (under spark plug cable bracket).
Ignition Current—½-1½ amps. idling, 4-5 stopped.

CONDENSER: Auto-Lite Part No. IG-2671.
Capacity—.20-.25 microfarad

DISTRIBUTOR: Auto-Lite Model IGC-4802. Full au-
Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

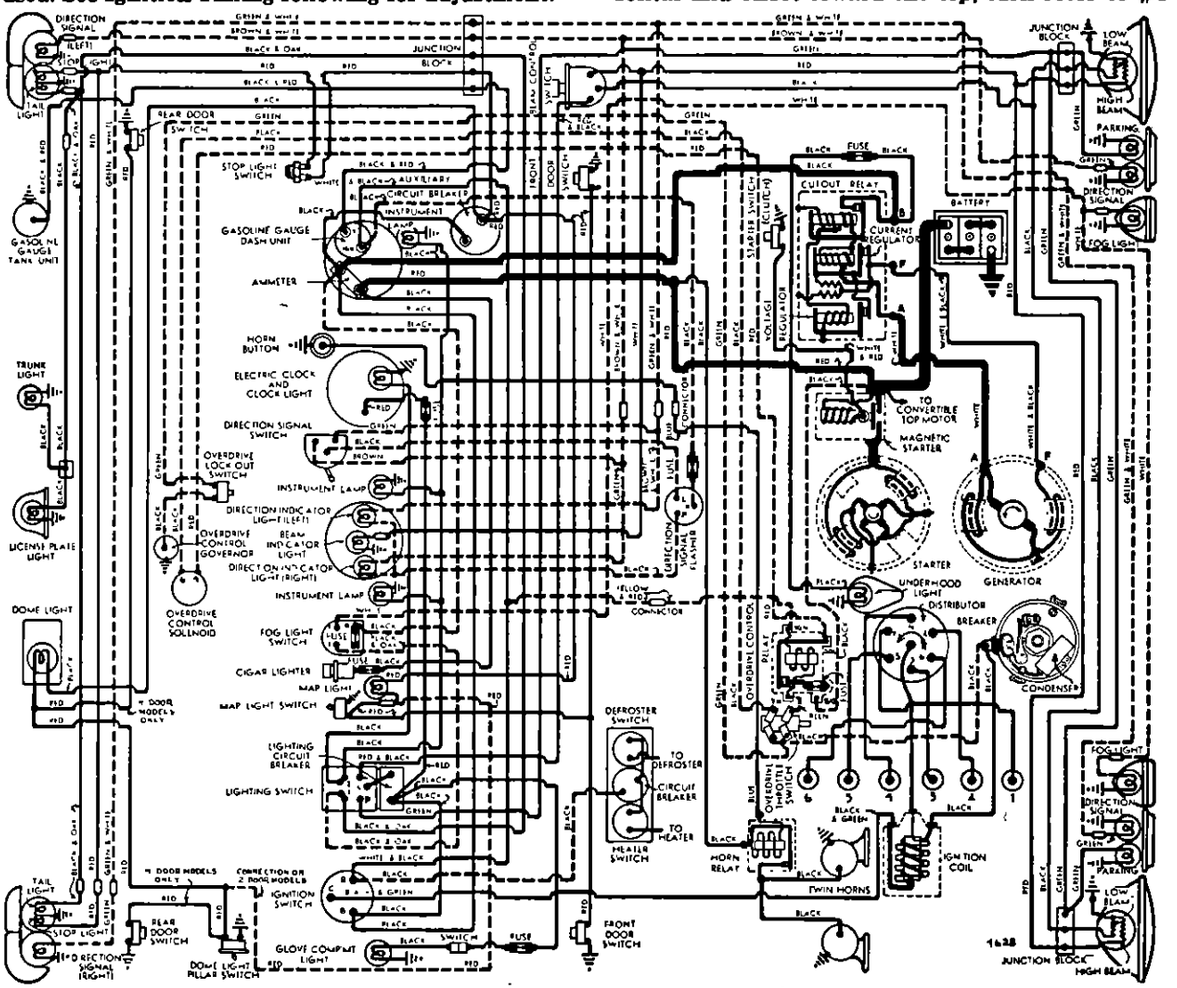
Distr. Degrees	Automatic Advance R.P.M.	Eng. Degrees	R.P.M.
Start	400	0	800
2	600	4	1200
5	900	10	1800
8	1200	16	2400
10	1400	20	2800

Octane Selector—Provides manual adjustment at distributor (hold-down plate marked with scale) for variation in timing depending on fuel regularly used. See Ignition Timing following for adjustment.

Vacuum Spark Control: Auto-Lite VC-4004. On hold-down plate and linked to advance plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle (spark retarded by return spring).

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
	Vacuum Advance	
Start	0°	3"
2°	4°	5"
3°	6°	6"
5°	10°	10"
6°	12°	12"

Distributor Removal:—Mounted on left side of engine. To remove, disconnect vacuum line, take out bolt in clamp arm, lift distributor off.
Installation Note—When installing distributor, crank engine to firing position for #1 cylinder ('IGN' on vibration dampener in line with pointer on timing gear cover), sight down distributor shaft hole (distributor out) and see that distributor drive tongue in oil pump drive gear is 30° from the horizontal and offset toward the top, turn rotor to #1



segment, install distributor (insert .020" feeler between modifier control arm and clamp arm before tightening clamp, to prevent binding), check timing.

IGNITION TIMING

Std. Setting — **Flywheel Degrees**
All Engines ..... 2° BTDC.
This setting correct for regular fuel (see Octane Selector Setting for service and fuel modification)
Timing (with Neon Timing Light)—Neon Light No. 890-recommended. Clip Neon light lead in series with #1 spark plug, idle engine and direct light on vibration dampener (at pointer on timing gear cover). Loosen hold-down plate screw, center scale on pointer, tighten screw. Loosen clamp arm, rotate distributor until 'IGN' mark on vibration dampener lines up with pointer on timing gear cover. Insert .020" feeler between modifier control arm and clamp arm before tightening clamp (to insure clearance for modifier control arm). Check Octane Selector
Timing (without Neon Timing Light)—Turn engine over to firing position for #1 piston with 'IGN' mark on vibration dampener in line with pointer on timing gear cover and distributor rotor opposite #1 segment in distributor cap. Adjust distributor.
Octane Selector Setting—After setting ignition timing (above), loosen selector hold-down screw, advance selector (move toward 'A' end of scale) until motor 'pings' when it is hot and pulling hard. Then retard until ping just disappears.

CARBURETOR

Stromberg Model BXOV-26. 1¼" Single Barrel, Downdraft, with Fast Idle & Automatic Choke.
Code No. (on bowl cover)—6-104.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up data.*
Metering Jet—*Refer to Carburetor Index for Stromberg Downdraft Carburetor Jet Specification Table.*
Fast Idle: Stromberg BXOV-26 carburetor type.
See Carburetion Equipment Section for data.
Fast Idle Setting—To check, hold stopscrew against lowest step of fast idle cam, move choke valve as far as possible toward closed position, check valve opening with 11/32" drill. Adjust by bending connector
Automatic Choke:—Stromberg BXOV-26 type.
See Carburetion Equipment Section for data.
Automatic Choke Setting—'R' mark on thermostat cover in line with highest projection on housing. Shift to 'M' if engine loads up or overchokes. Use 'H' setting only if highly volatile fuels used.

CARB. EQUIPMENT

Air Cleaner: AC No. 1544024 Oil-wetted type Std. Filter Element AC #6. Oil-bath Cleaner Optl.
Servicing (Oil-wetted Type)—Clean and re-oil filter element at 1000 mile intervals or as required.
Servicing (Oil-bath Type)—Clean filter element and oil reservoir, fill reservoir to indicated level mark with SAE No. 40 or 50 engine oil at intervals as required by operating conditions.
Fuel Pump (1947): AC #1537378, 1539415 or 1539067.
Fuel Pump (1948-49): AC #1539217 or 1539502, Combination fuel-and-vacuum pumps.
Pressure—4-5 lbs. maximum.
Exchange Pump (1947): 540, **(1948-49)**—9217.
►*NOTE—Oil pump vacuum booster (for windshield wiper operation) used on 1947 cars only.*
See Carburetion Equipment Section for data.
Gasoline Gauge: Stewart-Warner Electric type.
Dash Unit—Studebaker No. 522177.
Tank Unit—Stude. No. 519423 ('47-48), 525548 ('49).
See Carburetion Equipment Section for data.

BATTERY

Willard Type HW-1-100. 6 volt, 15 Plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.5 minutes. Five Second Voltage 4.3 volts.
Grounded Terminal—Positive (+) to cylinder head.
Dimensions—Length 9 3/64". Width 6 13/16". Height 8⅝".
Location—In engine compartment on left side.

STARTER

1947.....Auto-Lite MAW-4020, A. Arm. No. MAW-2091
1947-48-49 Auto-Lite MCH-4001. Arm. No. MCH-2006
Drive—Barrel Type Bendix Drive No. A1729 (MAW Starters), No. A1792 (MCH Starter).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—130 RPM, approx. 175 amperes at 5.0-5.5 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4900	5.5	65
2.75 "	1480	5.0	200
5.45 "	820	4.5	300
8.50 "	400	4.0	400
11.55 "	110	3.5	500
18.0 "	Lock	4.0	670

Removal:—Starter flange mounted on engine rear plate, on left side. To remove, take out flange mounting screws, remove starter assembly.
Starting Switch: Magnetic switch mounted on starter and controlled by Auto-Lite Model SW-4016 manual switch. Manual switch is mounted on toeboard and operated by clutch pedal when fully depressed.

GENERATOR

Auto-Lite Model GDZ-4805A. Armature No. GDZ-2006F. Two brush type with current-voltage control.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, 8.0 volts, 2250 Gen. RPM (hot), at car speed 25.8 MPH and up with load or discharged battery (regulator setting).

Performance Data

Cold Amperes	Cold Volts	Cold R.P.M.	Hot Amperes	Hot Volts	Hot R.P.M.
0	6.4	925	0	6.4	1000
4	6.6	1035	4	6.6	1120
8	6.75	1140	8	6.75	1235
12	6.95	1250	12	6.95	1350
16	7.15	1370	16	7.15	1460
20	7.3	1480	20	7.3	1590
24	7.5	1590	24	7.5	1730
28	7.7	1710	28	7.7	1900
32	7.9	1820	32	7.9	2090
35	8.0	1900	35	8.0	2250

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.60-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.
Removal:—Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment:—Loosen pivot and clamp bolts, move generator out until ⅜-½" belt deflection midway between generator and fan pulleys is obtained.

REGULATOR

Auto-Lite Model VRP-4004F. Voltage & Current Type. Consists of Cutout Relay and vibrating type Voltage & Current Regulators in case on dash.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts), 10.4 MPH.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked '35' on the cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTIN

Headlamps: Corcoran-Brown "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—At center of speedometer dial. Lighted whenever Country (upper) beams in use.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—In face of Speedometer dial. Left or right indicator lighted when corresponding direction signal is in operation.

Switches

Lighting—Douglas, Studebaker No. 519798.
Beam Selector—Delco-Remy No. 1997008, Studebaker No. 519246.
Stop Light—Studebaker No. 666858.
Direction Signal—Studebaker No. 520304.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER (On Light Switch): Studebaker No. 522014. 30-ampere thermostatic type. Protects Headlamps, Parking, Tail, & Instrument Lamps by vibrating to limit current.
Auxiliary Circuit Breaker (On Panel): No. 523056, 15-ampere type. Protects Body & Stop Lamps.
ACCESSORY CIRCUIT BREAKER: One 15-ampere type used on cars with Climatizer and Defroster.
FUSES: Clock—3 ampere. In clock lead.
Direction Signal—14 ampere. In Fasher lead.
Overdrive—20 ampere. On Overdrive Relay.
Glove Compt. Light—5 ampere. In lamp lead.
Under Hood Light—5 ampere. In lamp lead.
Fog Lights—20 ampere. On Fog Light Switch.
HORNS: Sparton or Delco-Remy No. 1999610 (High Note), 1999611 (Low Note). Twin Airtone type horns operated by relay. **Horn Current**—12-15 amps (ea.).
Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025". **Air Gap**—.015" (contacts closed).

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ENGINE

ENGINE REMOVAL for Oil Pan Removal and all major engine work: *See Studebaker Shop Notes.*

ENGINE SPECIFICATIONS: Six cylinder, "L" Head. Bore—3 5/16". Stroke ('47-48)—4 3/8", ('49)—4¾" Displacement ('47-48)—226.2, ('49)—245.6 cu. ins. Rated Horsepower—26.35. Developed Horsepower ('47-48)—94 at 3600 RPM., ('49)—100 at 3400 RPM. Compression Ratio—6.5-1 Std. 7.0-1 Optl. iron hds. *NOTE—7.0-1 Head for 5000 ft. & higher altitudes.*

Compression & Vacuum Reading—*See Tune-up data.*

ORIGINAL BORE & PISTONS: *See Studebaker Shop Notes.*

TIGHTENING TORQUES: *See Studebaker Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Studebaker Shop Notes.*

PISTONS: Lynite aluminum alloy, Cam-ground, T-slot, bearing-metal plated type. Length 3¾". Weight—14.4 ozs. (stripped). Clearance—Selective Fit (see Fitting Pistons). Removal—Pistons and rods removed from above.

Fitting New Pistons: Insert .002" feeler, 1" wide, between piston and cylinder wall on camshaft side (piston pin parallel to camshaft, slot away from camshaft). Pull required to withdraw feeler should be 14-19 lbs.

Replacement Pistons: *See Studebaker Shop Notes.*

Installing Pistons: T-slot away from camshaft.

PISTON RINGS: Two compression, one oil control ring per piston, all above pin. Oil drain holes provided in oil ring groove.

Ring	Width	End Gap	Side Clearance
Comp. (#1,2)	3/32"	.009-.014"	.0015-.002"
Oil Contr. (#3)	3/16"	.009-.014"	.0015-.002"

Installing Rings: Beveled side of compression rings (Sealed Power) up.

Replacement Rings: Sets furnished Std. size and .020", .030", .040" Oversize. Single rings Std. size and .010", .020", .030", .040" Oversize.

PISTON PIN: Diameter .8741-.8745". Length 2⅞". Pin is locked in rod by tapered pin and locknut.

Installing Pins: Use Pin Assembly Tool J-1293. Install clamp bolt nut and star washer on heavy boss side of rod. NOTE—Threads on opposite end of clamp bolt used only to remove bolt from rod (install nut on this end, tighten nut to pull bolt out of rod). Pin Fit in Piston—.0001-.0003" clearance or light finger push fit at room temperature (70°F).

Replacement Pins: Std. & .0025", .005" Oversize. Use Hone PH-1 to obtain proper piston pin fit. NOTE—Replacement pistons fitted with pins.

CONNECTING ROD: Lgth. ('47-48) 8⅛", ('49) 7 15/16" Weight—33.3 ounces. Crankpin Journal Diameter—2.18675-2.18775". Lower Bearing—Interchangeable steel-backed, micro-babbitt lined type. No shims. Clearance—.0005-.002". Sideplay .005-.009".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps. NOTE—Make certain that small tongue on bearing shells engage grooves. Palnuts used on bolt nuts.

Replacement Bearings: Bearings furnished Std. size and .001", .005", .010", .020" Undersize.

Installing Rods: Lower bearings "offset". Install rods with narrow portion of bearing toward front of engine (#1, 3, 5), toward rear (#2, 4, 6). Numbers on rods and bearing caps must be together and installed in same numbered cylinder with number and oil hole in lower end of rod toward camshaft

CRANKSHAFT: 4 bearing, 5 integral counterweights. Vibration dampener mounted on forward end.

Vibration Dampener—*See Studebaker Shop Notes.*

Journal Diameters ('47-48)—2.4995-2.5000", ('49)—2.8745-2.8750".

Bearings—Removable steel backed, babbitt-lined type. No shims. Clearance ('47-48)—.0005-.0025", ('49)—.0006-.0027". Rear Bearing Oil Seals—Consists of rubber ring, Studebaker No. 523134 (After 1948 Engine No. H-269-723), on crankshaft; two rubber seal strips, Studebaker No. 522144, in grooves on top of bearing cap; and two specially treated wood strips, Studebaker No. 187106, in grooves on sides of bearing cap. Seal Installation—*See "Crankshaft Oil Seals" in Studebaker Special Data.***

►***CAUTION—Install new wood oil seals (above) each time rear main bearing cap removed and re-installed.***

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

Replacement Bearings: Furnished as sets or single bearings in Std. Size and .001", .010", .020", .030" U.S.

End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and main bearing journal. Adjust by changing shims furnished .003", .005", .007" thick. Endplay—.003-.006".

CAMSHAFT: *Four bearing, helical gear drive.*

Journal Diameters—#1, 1.9975-1.9980"; #2, 1.9662-1.9670"; #3, 1.9357-1.9365"; #4, 1.1232-1.1240". Bearings—Split steel-backed, babbitted bushings. NOTE—Oil hole in bushings must be aligned with oil holes in engine block. Clearance—.0007-.0022" (#1), .0010-.0027" (others).

Camshaft Removal: *See "Camshaft & Bearings" in Studebaker Shop Notes.*

End Thrust: Taken by thrust plate assembled on front face of engine behind camshaft gear (spacer assembled back of gear hub). Endplay—.003-.006". *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear Cast Iron. Camshaft gear Celeron with steel hub. Backlash—.001-.003". Replacement Gears—Camshaft gear furnished in three sizes: Standard (marked "S"), High Limit (marked "H"), Low Limit (marked "L"). Crankshaft gear furnished Standard size only. Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Shop Notes.*

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth on crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 15/32"	11/32"	5 7/32"
Exhaust	1 9/32"	11/32"	5 7/32"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	11/32"	.0015-.0035"

Valve Guides: Pressed in block from above with upper end 1 5/32" below upper edge of valve seat and stepped end down. Ream guides to inside diameter of .3425-3445". Replace worn guides when clearance exceeds .0035".

Valve Springs: Install with closed-coil end up. Replace springs if more than 10% weaker than test pressure of 125-135 lbs. at 1¾" (U-15 or other accredited tester). Spring free length 2½".

	Spring Pressure	Length
Valve Closed	54-60 lbs.	2 3/32"
Valve Open	125-145 lbs.	1 3/4"

NOTE—Dampeners used on top of all springs.

Valve Lifters: Mushroom type. Remove from below with camshaft out of engine. ***For camshaft removal directions, see Studebaker Shop Notes.***

Valve Lifter Tension Spring—*See "Valve System" in Studebaker Shop Notes.*

Diameter—.624". Clearance—.0005-.00175".

Replacement Lifters—Std. & .0005", .001" O. S.

VALVE TIMING

Tappet Clearance: .016" All Valves, Engine Cold. NOTE—Self-locking tappet adjusting screws used. Tappet screw tension should be 25 in. lbs. minimum.

Valve Timing: See Camshaft Setting above.

Intake Valves—Open 15° BTDC. Close 49° ALDC.

Exhaust Valves—Open 54° BLDC. Close 10° ATDC.

Valve Timing Check—With .020" tappet clearance, No. 1 intake valve should open with No. 1 piston 15° BTDC. with the vibration dampener mark "IN. OP. 1-6/" aligned with pointer on timing gear cover. Reset tappet clearance at .016" Cold.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to valve lifters. Timing gears lubricated by oil by-passed by pump. Oil pump mounted externally on right side

Crankcase Capacity—6 quarts.

Normal Oil Pressure—20-40 lbs. at 40 MPH.

Oil Pressure Regulator—On lower right front corner of engine. Opens at 40 lbs. Adjustable by inserting shims between outer end of spring and plug.

Oil Pan Removal: *See "Engine Removal" in Studebaker Shop Notes (recommended for pan removal).*

Oil Pump: Helical gear type mounted externally on right side of engine.

NOTE—Oil pump vacuum booster (for windshield wiper operation) used on 1947 cars only.

Oil Pump Removal & Installation—*See "Oil Pump" in Studebaker Shop Notes.*

Oil Filter: Fram Model F4 or F30S. Replacement Cartridge Kit Studebaker No. 521948 (F4), 520831 (F30S).

Oil Pressure Gauge: Stewart-Warner Bourden Tube (not electric) type. Studebaker No. 522179.

Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe on left rear of engine (air outlet). Servicing—Wash both filter elements in kerosene and re-oil at regular intervals. NOTE—Filter in outlet pipe removed by taking out cotter pin.

COOLING

Cooling System: Positive circulation with water pump mounted on front of block with fan. Capacity—13 qts. (14 qts. with Climatizer).

Water Pump: Packless type. No lubrication required. ***See Water Pump Section for complete data.***

Removal—Slack off drive belt, take out capscrews in fan pulley hub and remove blades. Disconnect hose connection, take out mounting screws in pump

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Fulton or Bishop & Babcock. In water outlet on cylinder head.
Setting—Starts to open at 151-155°F.
Temperature Gauge: Stewart-Warner Bourden Tube type (not electric). Studebaker No. 522180.

CLUTCH

Borg & Beck Model No. 9A7 with Borglite Driven Member. Single plate, dry disc type.
NOTE—Clutch Assembly marked by number 943
See Clutch Section for complete data.

Facings—Moulded-metallic, 2 required. I.D. 6". O.D. 9¼". Thickness ⅛".

Adjustment: Pedal free travel ½ to 1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.
Hill-Holder Note—Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages. Adjusting nut and locknut at end of Hill-holder operating rod.

Hill-Holder Adjustment: *See Studebaker Shop Notes.*

Removal: Jack up rear end of car and rest on stands under rear axle. Remove transmission (see TRANSMISSION following). Disconnect one battery cable at battery take off starter and hang it clear of clutch housing. Remove clutch housing mounting capscrews and bolts at top, working through opening in front floor. Free speedometer cable from frame cross-member and wire it up out of the way. Support rear end of engine with jack placed under oil pan at rear (CAUTION—Do not damage oil pan). Disconnect rear engine mounting by taking off nuts, bolts with insulators, washers, and spacers. Disconnect parking brake cable at bracket, clutch operating shaft from release shaft, and brake pedal return spring. Loosen exhaust pipe flange nuts at manifold, take off exhaust pipe support bracket at housing, loosen clamp and turn bracket for clearance. Remove rear engine support cross member. Take out clutch housing mounting bolts and remove housing. Block clutch release levers. Remove six mounting screws in clutch cover flange, lift off clutch assembly and driven member.

TRANSMISSION

Warner Model AS1-T86E (Std.), AS2-T86E (Optl. 1948-49), AS32-T86E (Optl. Late 1949). Constant-mesh, synchro-mesh (Second & High), sliding gear (Low and Reverse), all helical gear type. *NOTE—Optl. AS2 & AS32 Transmissions have R10 type Overdrive.*
See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Drain transmission. Disconnect hand brake cable and move out of way for clearance. Disconnect front universal at transmission (wire caps or use clamp to prevent losing rollers). Take out center support bearing mounting bolts. Push front shaft and support to rear (will slide on splines on rear shaft). Disconnect shift rods from levers on case and speedometer cable (remove speedometer pinion). On Overdrive transmission disconnect all control wires and cable. Take out transmission to clutch housing capscrews, pull transmission straight back and remove from car.

VERDRIVE

Warner R10 Type (part of AS2-T86E & AS32-T86E Transmission). Optl. Governor controlled type with electrical solenoid operation and throttle operated kick-down switch. *NOTE*—Overdrive in AS32-T86E assembly is new "centered ring gear" type.
See Transmission Section for complete data.

Overdrive Control Units—*Same as Champion. See Champion (1947-48-49) page for data.*

Removal: See Std. Transmission Removal data

UNIVERSALS

Spicer Model 1268-111X (Front & Rear), 1261-102X Intermediate). Needle bearing type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft)

Propeller Shaft & Support Bearing: Two shafts used: 1) Front Shaft with intermediate universal yoke 2) Rear Shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal & Servicing—*See Studebaker Shop Notes.*

REAR AXLE

Spicer Salisbury Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.

Ratio—4.09-1 Std., 4.55-1 Optl. (Std. with Overdr.). NOTE—Rear axle ratio stamped on plate attached to axle by cover capscrew.
Backlash—.003-.006". Shim adjustment.

Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs and drums. Disconnect hand brake cable. Take out backing plate bolts from backing plates, free hydraulic brake line from axle housing clips (do not disconnect brake line). Backing plates and adjusting shims can then be wired to frame (do not disconnect brake line from wheel cylinders). Disconnect rear universal (wire caps or use clamp to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.
Axle Shaft Removal—*Remove wheel, remove wheel hub (use puller J-596-A). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (CAUTION—do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft assembly (Puller HM-931).*

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). **Endplay**—.001-.005".

SHOCK ABSORBERS

Houde (Houdaille)—Double acting, hydraulic type. Adjustable type with thermostatic control on rear.
Front (All)—Houde No. A-14269, Studebaker 523646.
Rear (exc. Convt.)—Houde No. A-14174, Studebaker 523497.
Rear (Convertible only)—Studebaker No. 523538 (Right), 523539 (Left).

Adjustment (Front): Pointer on end of shaft should be lined up with scribed line on end of shaft. Turn pointer clockwise for firmer action, counter-clockwise for softer action (not more than 1/32-1/16"). **(Rear Shocks)**—Remove cap on end of shaft to expose adjusting screw. Slot aligned with scribe mark between "0" and "S" mark is original factory setting. Use special tool No. T-2860 (do not use screwdriver). Turn screw clockwise (toward "S") for firmer action, counter-clockwise (toward "0") for softer action (not more than 1/32" at a time).

Refilling: Check at 5000 mile intervals. Fill to bottom of filler plug hole. CAUTION—Use only Houdaille Shock Absorber Fluid No. L-1404 (new type fluid for shock absorbers with new circular top filler plug

FRONT SUSPENSION

Front Suspension: Planar type independent suspension with transverse spring. NOTE—Suspension system has lower control arms (with leaf spring).
See Front Suspension Section for complete data.
Kingpin Inclination—5½° crosswise.
Caster—(Early 1947) 0° to Pos. ½°. Not adjustable. **(Late '47 & '48-49)** Neg. 2° to Neg. 3°. No adjustm't.
►1947 Serial Numbers when Caster Changed—*See Front Suspension Section for complete data.*
Camber—(1947-48) ½° ± ¼°. (1949) 0° to +1°. Shim adjustment (shims between upper control arm brackets and frame). One thin shim changes setting approx. ¼°. Thick shim equals 4 thin shims.
CAUTION—Add or remove shims equally at front and rear brackets when adjusting Camber.
Toe In—1/16-⅛". Adjust **right hand tie rod only** for toe in after left hand tie rod has been adjusted for wheel straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments on left hand tie rod.

STEERING EAR

Ross Model T-14 Cam-and-Twin Lever type.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed (Wagner Electric) Hydraulic, Self-centering, Self-adjusting type. Brakes are new design with automatic spring-loaded adjusting wedge controlled by contact plug projecting through hole in lining of forward shoe (plug contacts drum when brakes applied). Hand lever applies rear wheel service brakes. NOTE—New type actuating spring used on brake shoe contact plug on 1948-49 cars (replaces hairpin locks and contact plug coil spring).
See Brake Section for complete data.
Drums—Composite type. Diameter 11".
Clearance—Adjustment necessary only when new linings installed. *See Brake article in Brake Section.*
Lining—Moulded type (all shoes). Width 2". Thickness 3/16". Length per wheel 22¼".
Braking Power—57% Front, 43% Rear.
Hand Brake: See Service Brake data (above).
Hill-Holder: Std. *See Brake Section for complete data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electric type with motor mounted on left hand lift assembly (right hand lift assembly driven through flexible drive
See Miscellaneous Section for complete data.

Windshield Wiper: Vacuum type—cable operated.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door lock pillar post.

	1950	1951
South Bend	G-468101	G-1,000,001
Los Angeles	G-851801	G-889101
Hamilton	G-709401	G-724501

ENGINE NUMBER: Stamped on pad on upper front left corner of engine block.

	1950	1951
South Bend & Los Angeles	521001	778001
Hamilton	C-10501	C-25501

NOTE—Letter "A" following engine number indicates crankshaft main bearing journals .005" Undersize.

TUNE-UP

COMPRESSION PRESSURE: 120-140 lbs. at 150 RPM.

VACUUM READING: Steady 17-18" idling at 8 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025" Limits .0225-.0275".
Plug Type—Champion Type J7. 14 mm.

DISTRIBUTOR: Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° Closed, 22° Open.
Breaker Arm Spring Tension—17-20 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.20-.24 mfd. (IGC-4805), .21-.25 mfd. (IAT-4001).

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Vibration dampener mark "IGN/" aligned with pointer on left side of engine.

►*CAUTION*—On IGC-4805 Distr., insert .020" feeler between modifier arm and clamp arm when tightening clamp arm to prevent binding.
Octane Selector Setting—Set to just eliminate ping when engine hot and pulling hard.

CARBURETION:
Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed (Standard Trans.) —8-10 MPH. at normal operating temperature.
Idle Speed (Automatic Trans.)—500-550 RPM. with selector lever in "N". Adjust by turning idle adjusting screw in or out.
Float Level—⅜". Measured from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and bowl cover assembly inverted.
Accelerating Pump—No seasonal adjustment.
Choke Setting—(Early Production Cover 170P-77S) Centered on index. (Late Production Cover 170-U 61S) 1 point lean.

Fuel Pump Pressure: 4-5 lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type operating in stainless steel bushings.
Setting—To test coil tension, free outer end of coil from anchor post. With valve closed (counterweight up), hooked end of coil should be approx. 90° from anchor post with coil at 70°F. NOTE—To overcome sticking, lubricate valve shaft with kerosene and soda solution or Bendix Carburetor Cleaner. If necessary, shaft diameter can be reduced for .005" clearance in bushings (do not ream bushings).

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Mitchellock. Studebaker No. 521955.
Ignition Lock—Yale & Towne.

COIL: Auto-Lite CE-6007 or CR-6007. On engine above distributor (under spark plug cable bracket).
Ignition Current—½-1½ amps. idling, 4-5 stopped.

CONDENSER: Auto-Lite No. IG-2671 (IGC-4805).
Capacity—.20-.25 microfarad.

DISTRIBUTOR: Auto-Lite No. (Early 1950) IGC-4805, (Late 1950) IAT-4001, (1951) IAT-4010. Full automatic advance type with vacuum spark control.

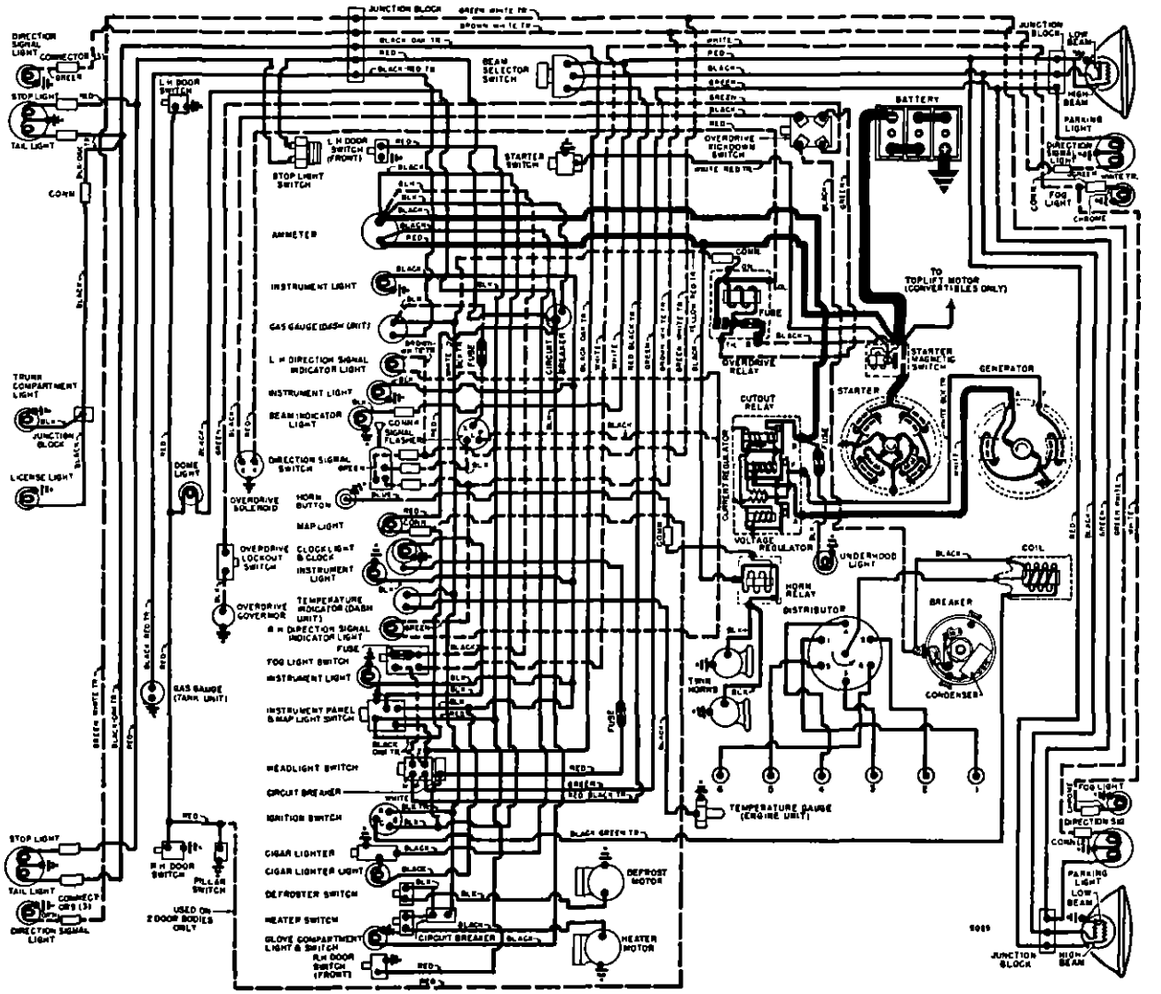
►*BREAKER PLATE BINDING CORRECTION (First "IAT" Distributors)—See "Auto-Lite "IAT" Distributors" in Electrical Equipment Section.*

►**"IAT" Distributor Note**—New "Pivoted Breaker Plate" type. *See Electrical Equipment Section for data.*

Breaker Gap—.020". Limits .018-.022".
Cam Angle—38° closed, 22° open.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Distributor Automatic Advance		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	400	0	800
2	680	4	1360
4	975	8	1950
6	1265	12	2530
7	1400	14	2800

Vacuum Spark Control: (IGC-4805)—Auto-Lite Model VC-4011. Unit mounted on hold-down plate and linked to advance plate. Provides additional advance at speeds above idling except when engine accelerated or operated with wide open throttle when spark retarded by return spring in unit.
IAT-4001 & IAT-4010—Integral type vacuum spark control.



1950 MODELS

Vacuum Advance—IAT-4001 & 4101

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4"
1°	2°	4⅞"
4°	8°	7½"
8°	16°	11⅛"
9°	18°	12"

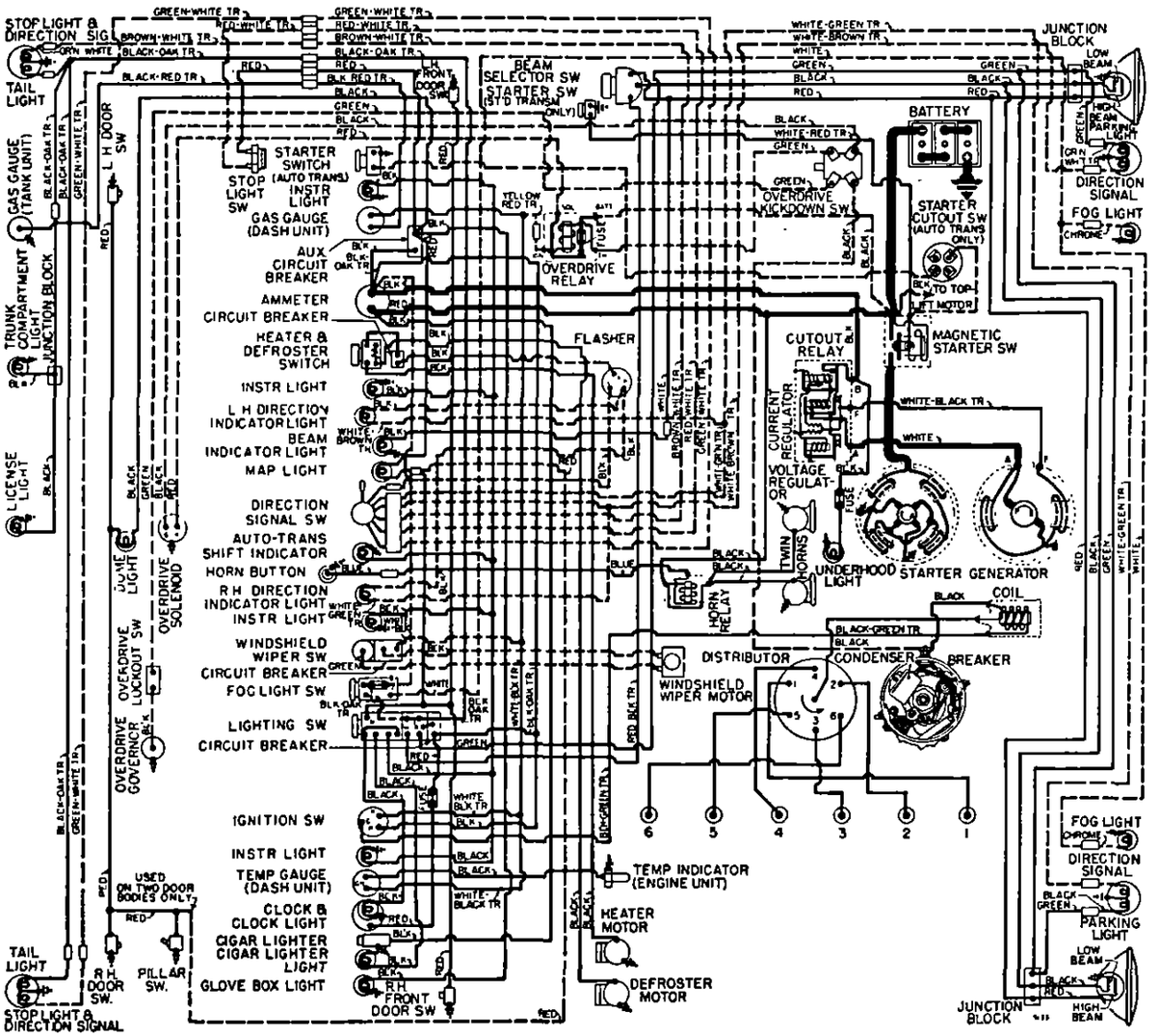
Vacuum Advance—IGC-4805

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4"
2°	4°	5½"
5°	10°	7¾"
7°	14°	11¼"
9°	18°	14¾"

Distributor Removal:—Mounted on left side of engine. To remove, disconnect vacuum line, take out bolt in clamp arm, lift distributor off.

Installation Note—When installing distributor, crank engine to firing position for #1 cylinder (dampener mark 'IGN' in line with pointer on the timing gear cover), sight down distributor shaft hole (distributor out) and see that distributor drive tongue in oil pump drive gear is parallel to and narrow half of offset toward camshaft, turn rotor to #1 segment, install distributor.

►*CAUTION*—On IGC-4805 Distr., insert .020" feeler between modifier arm and clamp arm when tightening clamp arm to prevent binding.



1951 MODELS

IGNITI N TIMING

Std. Setting	Flywheel Degrees	Piston Pos.
All Engines	2° BTDC	.0016" BTDC.

This setting correct for regular fuel (See Octane Selector Setting for service and fuel modification).

Timing (With Neon Timing Light)—Clip timing light lead in series with #1 spark plug, direct light on vibration dampener at front of engine. Loosen hold-down plate screw, center octane selector pointer on scale, tighten hold-down screw. Run engine at idle speed, loosen clamp arm, rotate distributor until "IGN/" mark on dampener appears in line with pointer on left side of timing gear cover, tighten clamp screw. Check Octane Selector setting.

►*CAUTION*—On IGC-4805 Distr., insert .020" feeler between modifier arm and clamp arm when tightening clamp arm.

Octane Selector Setting—After setting timing (above), loosen selector hold-down screw, advance timing by turning distributor clockwise (move pointer toward "A" end of scale) until engine "pings" when hot and pulling hard, then retard timing by turning distributor counter-clockwise (move pointer toward "R") until ping disappears.

CARBURET R

Carter WE-715S—1¼" single barrel, downdraft, with Carter Climatic Control.

Casting No. on Flange—620.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, & Accelerating Pump): ***See Tune-Up.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section.***

Fast Idle: Carter Single Barrel Carburetor type.

Setting—.046" between throttle valve and bore of carburetor. To check, remove thermostatic coil housing, gasket and baffle plate. Crack throttle valve and hold choke valve closed. Close throttle. Adjust by bending connector rod at lower angle.

See Carburetion Equipment Section for data.

Automatic Choke: Carter Climatic Control (Single Carburetor type).

Setting—(Early Production Cover 170P-77S) Centered on index. (Late Production Cover 170U-61S) 1 point lean.

See Carburetion Equipment Section for data.

CARB. EQUIPMENT

Air Cleaner: AC No. 1543970 Oil-wetted type Std. Filter Element AC #1. Oil-bath Air Cleaner Optl.

Servicing (Oil-wetted type)—Clean and re-oil filter element at 1000 mile intervals.

Fuel Pump (Std.): AC #1539416, diaphram type.

Optl. (Fuel & Vacuum): AC #1539218.

Pressure—4-5 lbs. maximum.

See Carburetion Equipment Section for data.

Gasoline Gauge: Stewart-Warner Electric type.

Dash Unit—Studebaker No. 522177.

Tank Unit—Studebaker No. 525548.

See Carburetion Equipment Section for data.

BATTERY

Willard (1950) HW-1-100. (1951) HDW-1-100, 6 volt, 15 plate, 100 ampere hour capacity (20 hour rate).

Starting Capacity—120 amperes for 20 minutes.

Zero Capacity—300 amperes for 3.5 minutes. Five

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Second Voltage 4.3 volts.
Grounded Terminal—Positive (+) to cyl. head.
Dimensions—L. 9 3/64". W. 6 13/16". H. 8⅝".
Location—In engine compartment on left side.

STARTER

Auto-Lite—(Early 1950) Model MZ-4151. (Late 1950 & 1951) Model MZ-4157.
Armature No.—Auto-Lite No. MZ-2211.
Drive—Barrel type Bendix No. A1792 (MZ-4151).
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—150 amperes, 5.2 volts, 150 RPM.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.5	70
.65 "	2500	5.5	100
2.55 "	1325	5.0	200
4.95 "	750	4.5	300
7.65 "	220	4.0	400
7.8 "	Lock	3.0	420
11.8 "	Lock	4.0	560

Starting Switch: Magnetic switch mounted on starter and controlled by manual switch.
Std. Trans. Cars—Auto-Lite SW-4016 (Studebaker 519829) mounted on toeboard under clutch pedal, operated by fully depressing pedal.
Automatic Trans. Cars: Studebaker No. 527553 pull switch on instrument panel and Delco-Remy No. 1997882 combination starter cut-out and backing light switch mounted on steering column. Starter operative only with transmission selector lever in "N" or "P" positions.

GENERATOR

Auto-Lite—(Early 1950) GDZ-4804A. (Late 1950 & 1951) GDZ-6001A.
Armature No. (GDZ-4804A)—GDZ-2006F.
Two brush type with current-voltage control.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—35 amperes, 8.0 volts, 2250 Gen. RPM. (hot), at car speed of 21.2 MPH & above with load or discharged battery (regulator setting).

Cold		Performance Data	Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.6-1.8 amperes at 6.0 volts.
Motoring Current—4.2-4.6 amperes at 6.0 volts.
Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment: Loosen pivot and clamp bolts, move generator out until ⅜-½" belt deflection midway between generator and fan pulleys is obtained.

REGULAT R

Auto-Lite Models—(Early 1950) VRP-4004F. (Late 1950) VRP-6001A. (1951) VRP-6005A.
Voltage & Current Typ. Consists of Cutout Relay and vibrating type Voltage & Current Regulators in case on dash.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover is sealed. Serviced on exchange basis if seals not broken (to remove cover).

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts), 10.4 MPH.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. See Electrical Equipment Section for settings at other temperatures.
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—VRP-4004F & VRP-6001A, 34-36 amperes (marked '35' on cover). VRP-6005A, 39-41 amperes (marked '40' on cover).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—At center of speedomter dial. Lighted whenever Country (upper) beams in use.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—In face of Speedometer dial. Left or right indicator lighted when corresponding direction signal is in operation.

Switches

Lighting—Studebaker No. 526380 (1950). No. 530058 (1951).
Beam Selector—Delco-Remy No. 1997008, Studebaker No. 519246.
Stop Light—Studebaker No. 666858.
Direction Signal—Studebaker No. 520304.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER (On Light Switch): Studebaker No. 522014. 30-ampere thermostatic type. Protects Headlamps, Parking, Tail, & Instrument Lamps by vibrating to limit current.
Auxiliary Circuit Breaker (On Instrument Panel): 20-ampere thermostatic type. Protects Body & Stop Lamps by vibrating to limit current.
Convertible Top Circuit Breaker—30 ampere.
ACCESSORY CIRCUIT BREAKER: One 15-ampere type used on cars with Climatizer and Defroster.
FUSES: Clock—3 ampere. In clock lead.
Direction Signal—14 ampere. In Flasher lead.
Overdrive—20 ampere. On Overdrive Relay.
Glove Compt. Light—5 ampere. In lamp lead.
Under Hood Light—5 ampere. In lamp lead.
Fog Lights—20 ampere. On Fog Light Switch.
Radio—14 ampere.
HORNS: Sparton or Delco-Remy No. 1999656 (High Note), 1999655 (Low Note). Twin Airtone type horns operated by relay. Horn Current—12-15 amps. (each).
Canada Cars—Auto-Lite HW-4035A (High Note). HW-4036A (Low Note).
Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" Head.
Bore—3". **Stroke**—4".
Displacement—169.6 cu. ins. **Rated H.P.**—21.6.
Developed Horsepower—85 at 4000 RPM.
Compression Ratio—7.0-1 Std.
Compression & Vacuum Reading—*See Tune-up data.*
ENGINE & OIL PAN REMOVAL: *See Studebaker Special Data.*
►*Not necessary to remove engine for pan removal.*
ORIGINAL BORE & PISTONS: *See Studebaker Shop Notes.*
TIGHTENING TORQUES: *See Studebaker Shop Notes.*
CYLINDER HEAD INSTALLATION: *See Studebaker Shop Notes.*
PISTONS: Lynite aluminum alloy, Cam ground, T-slot, bearing-metal plated type. **Length**—2 29/32". **Weight**—8.48 ozs. (without rings or pin).
Clearance—Selective fit (see Fitting Pistons).
Removal—Pistons and rods removed from above.
Fitting New Pistons: Insert .002" feeler, 1" wide, between piston and cylinder wall on camshaft side (piston pin parallel to camshaft, slot away from camshaft). Pull required to withdraw feeler should be 11-16 lbs.
Replacement Pistons: *See Studebaker Shop Notes.*
Installing Pistons: T-slot away from camshaft.
PISTON RINGS: Two compression (Perfect Circle #200 Top, #70 —2nd), one Oil Control (#85).

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.0015-.002"
Compr. #2	1/8"	.007-.017"	.0015-.002"
Oil Contr. (#3)	5/32"	.007-.017"	.0015-.002"

Installing Rings: Step up top ring, step down 2nd ring.
Replacement Rings: Sets furnished Std. size and .020", .030", .040" Oversize. Single rings Std. size and .010", .020", .030", .040" Oversize.
PISTON PIN: Diameter .7491-.7495". **Length** 2⅝". Pin is locked in rod by tapered pin and locknut.
Pin Fit in Piston—.0001-.0003" clearance or light finger-push fit at room temperature (70°F).
Pin Removal & Installation: *See Studebaker Special Data.*
Replacement Pins: Std. & .0025". .005" oversize. Use Hone No. PH-1 to obtain proper piston pin fit.
NOTE—Replacement pistons fitted with pins.
CONNECTING ROD: Length 6⅜". **Weight** 20.48 ozs.
Crankpin Journal Diameter—1.81175-1.81275".
Lower Bearing—Interchangeable steel-backed, micro-babbitt lined type. No shims.
Clearance—.0005-.002". **Sideplay**—.005-.009".
Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.
NOTE—Make certain that small tongue on bearing shells engage grooves. Palnuts used on bolt nuts.
Replacement Bearings: Bearings furnished Std. Size and .001", .005", .010", .020" Undersize.
Installing Rods: Lower bearings "offset". Install rods with narrow portion of bearing toward front of engine (#1, 3, 5), toward rear (#2, 4, 6). Numbers on

EN INE

CONTINUED FROM PRECEDING PAGE

rods and bearing caps must be together and installed in same numbered cylinder with number and oil hole in lower end of rod toward camshaft side.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.
Vibration Dampener—*See Studebaker Shop Notes.*
Journal Diameters—2.4370-2.4375"-(All)-Std.
►*CAUTION—Journals are .005" Undersize on engines with letter "A" following Engine Number.*
Bearing Type—Removable type, steel-backed, micro-babbitt lined. No shims.
Clearance—.0005-.0025".
Rear Bearing Oil Seals—Consist of rubber ring on crankshaft; two rubber seal strips in grooves on top of bearing cap; and two specially treated wood strips in grooves on sides of bearing cap.
See "Crankshaft Oil Seals" in Studebaker Special Data.
►*CAUTION—Install new wood oil seals (above) each time rear main bearing cap removed and re-installed.*
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
NOTE—Front oil pan seal block may be removed for access to front main bearing cap by removing four lower timing gear cover retaining screws. Use only malleable iron type filler block on these cars.
►*CAUTION—Do not securely tighten timing gear cover-to-filler block screws until after oil pan screws tightened uniformly and securely.*
Replacement Bearings: Furnished as sets or single bearings Std. & .001", .005", .010", .020", .030" U. S.
End Thrust: Taken by thrust washer assembled between front main bearing and crankshaft gear. Controlled by shims between thrust washer and main bearing journal. Adjust by changing shims (.003", .005", .007" thick). **Endplay**—.003-.006".

CAMSHAFT: Four bearing type. Helical gear drive.
Journal Diameters—#1, 1.7475-1.7480"; #2, 1-7162-1.7170"; #3, 1.6857-1.6865"; #4, 1.6232-1.6240".
Bearings—Split, steel-backed, babbitted bushings.
Clearance—.0007-.0022" (#1), .0010-.0027" (others).
Bearing Adjustment: None. Replace bushings with camshaft removed. NOTE—Align bushing oil hole with oil hole in block.
Camshaft Removal: *See "Camshaft & Bearings" in Studebaker Shop Notes.*
End Thrust: Taken by thrust plate assembled on front face of engine block behind camshaft gear (spacer assembled on shaft behind gear hub).
Endplay—.003-.006". *See "Camshaft & Bearings" in Studebaker Special Data.*
Timing Gears: Crankshaft gear Cast Iron, Camshaft gear Celeron with steel hub.
Backlash—.001-.003".
Replacement Gears—Camshaft gear furnished in two sizes; Standard (marked "S"), High Limit (marked "H"), Crankshaft gear furnished Standard size only.
Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Shop Notes.*
Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 11/32"	5/16"	4 11/32"
Exhaust	1 9/32"	5/16"	4 11/32"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	11/32"	.0015-.0035"

Valve Guides: Pressed in block from above with top of guide 1 3/16" below top of block. Finish ream guides to inside diameter of .312-.3125" Use Valve Stem Guide Remover and Replacer Tool J-2034. Replace worn guides if clearance greater than .0035".
Valve Springs: Install with closed coil end up. Replace springs if over 10% weaker than pressure listed.

	Spring Pressure	Length
Valve Open	93-103 lbs.	1 5/16"

NOTE—Install valve spring retainer with flange engaging flat surface on lower coil and tongue on inner diameter engaging groove in spring lock.
Valve Lifters: Mushroom type. Remove from below with camshaft out of engine. *For Camshaft Removal directions, refer to Studebaker Shop Notes.*
Valve Lifter Tension Spring—*See "Valve System" in Studebaker Special Data.*
Clearance—.0005-.00175".
Replacement Lifters—Furnished Std. size and .0005", .001" Oversize.

VALVE TIMING

Tappet Clearance: .016" All Valves, Engine cold.
NOTE—Self-locking tappet adjusting screws used. Tappet screw tension should be 25 in. lbs. minimum.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 15° BTDC. Close 49° ALDC.
Exhaust Valves—Open 54° BLDC. Close 10° ATDC.
Valve Timing Check—Set #1 intake valve to .020". Turning engine with #6 cylinder on compression stroke the intake valve should start to open when the mark "IN-OP 1-6" on front dampener lines up with pointer.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, and camshaft bearings and to valve lifters. Timing gears lubricated by oil by-passed by pump.
Crankcase Capacity—5 qts. ("Add Oil" point on oil level indicator stick is 3 qt. level).
Normal Oil Pressure—20-40 lbs. at 40 MPH.
Oil Pressure Relief Valve—On lower right front corner of engine. Opens at 40 lbs. Adjustable by inserting shims between outer end of spring and plug.
Oil Pump: Helical gear type. Mounted externally on right hand side of crankcase.
Oil Pump Removal & Installation—*See "Oil Pump" in Studebaker Shop Notes.*
Oil Pressure Gauge: Stewart-Warner Bourden tube (not electric) type.
Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe on left rear of engine (air outlet).
Servicing—Wash both filter elements in kerosene and re-oil at regular intervals. NOTE—filter in outlet pipe removed by taking out cotter pin.

COOLING

Cooling System: Positive circulation with water pump mounted on front of block with fan.
Capacity—10 quarts.
Water Pump: Packless, sealed ball bearing type.
See Water Pump Section for complete data.
Removal—Slack off drive belt, take out capscrews in the fan pulley hub & remove fan blades. Disconnect hose connection, take out mounting screws in pump body flange, withdraw pump from engine.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: Bishop & Babcock. In water outlet on cylinder head.
Setting—Starts to open at 151-155°F.
Temperature Gauge: Stewart-Warner electric type.
Dash Unit—Studebaker No. 530051.
Engine Unit—Studebaker No. 530127 (without adapter).

CLUTCH

Borg & Beck Model 8A7 with Borglite Driven Member. Single plate, dry disc type. NOTE—Clutch assembly marked by number 980 stamped on cover.
See Clutch Section for complete data.
►*CLUTCH CHATTER & RATTLE CORRECTION—See "Clutch Notes" in Studebaker Special Data.*
Facings—Moulded Metallic type, 2 required. I. D. 5⅜". O. D. 8". Thickness .125".
►*CAUTION—Special driven member used on cars with Overdrive. Identify each type by hub damper spring color as follows:*

	Damper Spring Color.
Cars with Conventional Trans.	2 Lavender, 2 Black
Cars with Overdrive Trans.	4 Lavender

Pedal Adjustment: *Pedal free travel ½" to 1".* To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.
Hill-Holder Note—Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages.
Clutch Housing Removal: Remove distributor and oil level gauge adapter, remove starter and tie up out of the way (not necessary to disconnect cables), remove front floor plate, take out upper clutch housing cap screws. Remove transmission (SEE TRANSMISSION). Disconnect clutch pedal rod at operating shaft-to-release shaft sleeve, pull operating shaft out and remove sleeve. Remove parking brake cable shield clip, unhook brake pedal pullback spring from cross-member, support engine weight on jack under rear end of oil pan (use block of wood on jack to prevent damage to pan), take out engine rear support bolts, remove lower support insulators. Remove cross-member (with clutch operating shaft support bracket). Loosen exhaust pipe flange nuts at manifold, remove exhaust pipe support bracket-to-clutch housing bolts, loosen clamp and swing bracket out of the way. Take out all clutch housing bolts, remove dowel bolts at right and left center, remove clutch housing.
►**Installation Caution**—Align clutch housing to rear engine plate with two tapered drifts, then install the dowel bolts. Draw the dowel bolts in place by tightening the nuts—**do not drive them in place.**
Clutch Removal: Remove clutch housing (above), remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member.

TRANSMISSION

Warner Model AS1-T96 (Std.), AS24-T96 with R10 type Overdrive (Opt.). All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

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Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Drain transmission. Disconnect hand brake cable and move out of way for clearance. Disconnect front universal at transmission (wire caps or use clamp to prevent losing rollers). Take out center support bearing mounting bolts. Push front shaft and support to rear (will slide on splines on rear shaft). Disconnect shift rods from levers on case and speedometer cable (remove speedometer pinion). On Overdrive transmission disconnect all control wires and cable. Take out transmission to clutch housing capscrews, pull transmission straight back and remove from car.

VERDRIVE

Warner R10 Type (part of AS24-T96 Transmission). New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."
NOTE—Overdrive is new "centered ring gear" type.
See Transmission Section for complete data.
Overdrive Solenoid—Warner Model No. 3AR10B-62, Studebaker No. 521429.
Overdrive Governor—Warner Model No. AR10B-72, Studebaker No. 520454.
Control Relay—Auto-Lite HRT-4001, Studebaker No. 523297.
Throttle Kick-down Switch—(1950) Studebaker No. 515667. (1951) Studebaker No. 529479.
Lock-out Switch—Studebaker No. 521436.
Fuse—20 ampere. On Overdrive Relay.

Removal: See Std. Transmission Removal data.

AUT MATIC TRANSMISSION

Torque converter and 3-speed automatic transmission with hydraulic control. Has mechanical parking lock and Anti-creep device which holds brakes applied when car standing and ignition "on."
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check oil level every 1000 miles and maintain oil level at "Full" mark on dip stick. Drain and refill every 15,000 miles. Use only premium type and refill every 15,000 miles. Use only Automatic Transmission Fluid Type "A".
Checking Oil Level—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Remove inspection cover on front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dip stick gauge. Add oil as required to bring level up to "Full" mark on dip stick (1 pint between "LOW" and "FULL").
CAUTION—Do not fill above "FULL" mark.
Draining and Refilling—*See "Studebaker Automatic Transmission" in Tranmission Section.*
Linkage Adjustment—*See "Studebaker Automatic Transmission" in Transmission Section.*

Removal: *See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer Model 1268-110X (Front & Rear), 1261-102X (intermediate). Needle bearing type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft).

Propeller Shaft & Support Bearing: Two shafts used:
1) Front Shaft with intermediate universal yoke bolted on rear end (no slip-joint).
2) Rear Shaft with slip-joint on forward end at intermediate universal.
►**Propeller Shaft Checking** (For Vibration)—*See "Propeller Shaft" in Studebaker Special Data.*
Propeller Shaft & Support Bearing Removal & Servicing—*See "Propeller Shaft" in Studebaker Shop Notes.*

REAR AXLE

Spicer Salisbury Model 23. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.1-1 Std. 4.56-1 Optl. (Std. with Overdrive). NOTE—Rear axle ratio stamped on plate attached to axle by cover capscrew and also on ring and pinion gears.
Backlash—.003-.006". Shim adjustment.

Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs and drums. Disconnect hand brake cable. Take out backing plate bolts from backing plates, free hydraulic brake line from axle housing clips (do not disconnect brake line). Backing plates and adjusting shims can then be wired to frame (do not disconnect brake line from wheel cylinders). Disconnect rear universal (wire caps or use clamp to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.
Axle Shaft Removal—Remove wheel, remove wheel hub (use puller J-446-A). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (CAUTION—do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with Puller HM-931.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003" .005", .010", .030" thick). **Endplay**—.001-.005".

SHOCK ABSORBERS

Houde (Houdaille) & Monroe—Direct acting, non-adjustable type. Front shocks are mounted within coil springs.
►*NOTE—Shock absorbers cannot be refilled or repaired.*
Front (All)—(1950) Studebaker No .524787 (Std.), Studebaker No. 527169 (Heavy Duty). (1951) Studebaker No. 527924 (Std.), Studebaker No. 530971 (Heavy Duty).
Rear (All)—(1950) Studebaker No. 524816 (Std.), Studebaker No. 527170 (Heavy Duty). (1951) Studebaker No. 530766 (Std.), Studebaker No. 530972 (Heavy Duty).

FRONT SUSPENSION

Front Suspension: Independent, Coil Spring Suspension with front Shock Absorbers located within coil springs.
See Front Suspension Section for complete data.
►**FRONT END CORRECTION (For Tire Wear, Shimmy, Vibration, etc.):** *See "Steering Notes" in Studebaker Special Data.*
Kingpin Inclination—5¼° crosswise.
Caster—Neg. 1° to Neg. 2½°. Eccentric pin adjustment.
►*NOTE*—Not more than ¾° variation between wheels.
Camber—0° to +1°. Eccentric pin adjustment.
►*NOTE*—½° more Camber favored on drivers side.
Toe-In—1/16-1/8". Adjust **right hand tie rod only** for toe-in after left hand tie rod has been adjusted for wheel straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments on left hand tie rod.

STEERING GEAR

1950 Models—Ross Model T-12 Cam-and-Twin Lever type.
1951 Models—Saginaw. Worm & Roller type.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed (Wagner Electric) Hydraulic, Self-centering, Self-adjusting type. Brakes have automatic spring-loaded adjusting wedge controlled by contact plug projecting through hole in lining of forward shoe (plug contacts drum when brakes applied). Hand lever applies rear wheel service brakes.
See Brake Section for complete data.
Drums—Composite type. Diameter 9".
Clearance—If adjustment required, see "Lockheed (Wagner) Hydraulic Self-Adjusting Brakes" in Brake Section.
Lining—Moulded type (all shoes). Width 2". Thickness 3/16". Length per wheel 18½".
Braking Power—57% Front. 43% Rear.

Hand Brake: See Service Brake data (above).

Hill-Holder: Optional Equipment on all models.
See Brake Section for complete data.

►**Anti-Creep (for Auto. Trans. Cars)** *See Brake Section for complete data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electric type with motor mounted on left hand lift assembly (right hand lift assembly driven through flexible drive).
See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum Cable operated type.
See Miscellaneous Section for complete data.

M DEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door lock pillar post.

	South Bend	Los Angeles
1950 Numbers	4398601 Up	4839001 Up

Body Symbol Letter—Used with model designation (and on body number plate) to indicate body type as follows: C, 5-Pass. Coupe; F, 2-Door Sedan; Q, 3-Pass. Coupe; S, Convertible; W, 4-Door Sedan; Y, Land Cruiser.

ENGINE NUMBER: Stamped on pad on upper front left corner of engine block.
1950 Numbers—H-370001 Up.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at 150 RPM. cranking speed for Std. 7.0-1 Head.

VACUUM READING: Steady 18-20" idling at 8 MPH.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .025" Limits .0225-.0275".
Plug Type—Champion Type J7, 14 mm.

DISTRIBUTOR: Breaker Gap—.022".
Cam Angle—Test limits with .022" gap—31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ozs.
Automatic & Vacuum Advance—*See Ignition.*
Condenser Capacity—.18-.23 microfarad.

IGNITION TIMING: 2° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Mark—Vibration Dampener mark "IGN/" aligned with pointer on gear case cover.

CARBURETION:
Idle Setting (Stromberg)—Idle screw set for smooth idle. Turn screw out for richer mixture. **(Carter)**—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed (Standard Trans.)—8-10 MPH. at normal operating temperature.
Idle Speed (Auto. Trans.)—500-550 RPM. with selector lever in "N". Adjust by turning idle adjusting screw switch in or out (switch replaces regular stopscrew).
Float Level (Stromberg)—Fuel level ⅝" below top edge of float bowl with engine idling.
(Carter)—7/16" from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and cover assembly inverted.
Accelerating Pump (Stromberg)—Center hole (med. stroke) Normal all-season setting. Inner hole (min.)—Summer, Outer hole (max.)—Winter used for temperature extremes.
(Carter)—No seasonal adjustment.

Choke Setting: Centered (at index).

Fuel Pump Pressure: 4-5 lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type operating in stainless steel bushings.
Setting—To test coil tension, free outer end of coil from bracket on manifold. With valve closed, hooked end of coil should be approx. 90° from bracket at 70°F. Replace coil if incorrect.
NOTE—To overcome sticking, lubricate valve shaft with kerosene and soda solution or Bendix Carburetor Cleaner. If necessary, shaft diameter can be reduced for .005" clearance in bushings.

VALVE TAPPET CLEARANCE: .016" All Valves, Cold.
NOTE—Self-locking tappet screws used.
Valve Timing Check—*See Valve Timing.*

STARTING: *See Battery, Starter, Generator, Regulator.*

IGNITION

IGNITION SWITCH: Mitchellock. Studebaker No. 526396.
Ignition Lock—Yale & Towne.

COIL: Delco-Remy #1115380. On engine above distributor (under spark plug cable bracket).

CONDENSER: Delco-Remy Part No. 1869704.
Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy #1110220. Automatic and vacuum advance type with new "center-bearing" breaker plate.

►**Breaker Plate Bearing Assembly**—Plate rotates on 3 bakelite buttons on support plate with spring tension adjustment (shim washers) on underside of support plate. Pull required to move plate should be 8 ozs. min., 16 ozs. max. with breaker plate assembly out of housing.

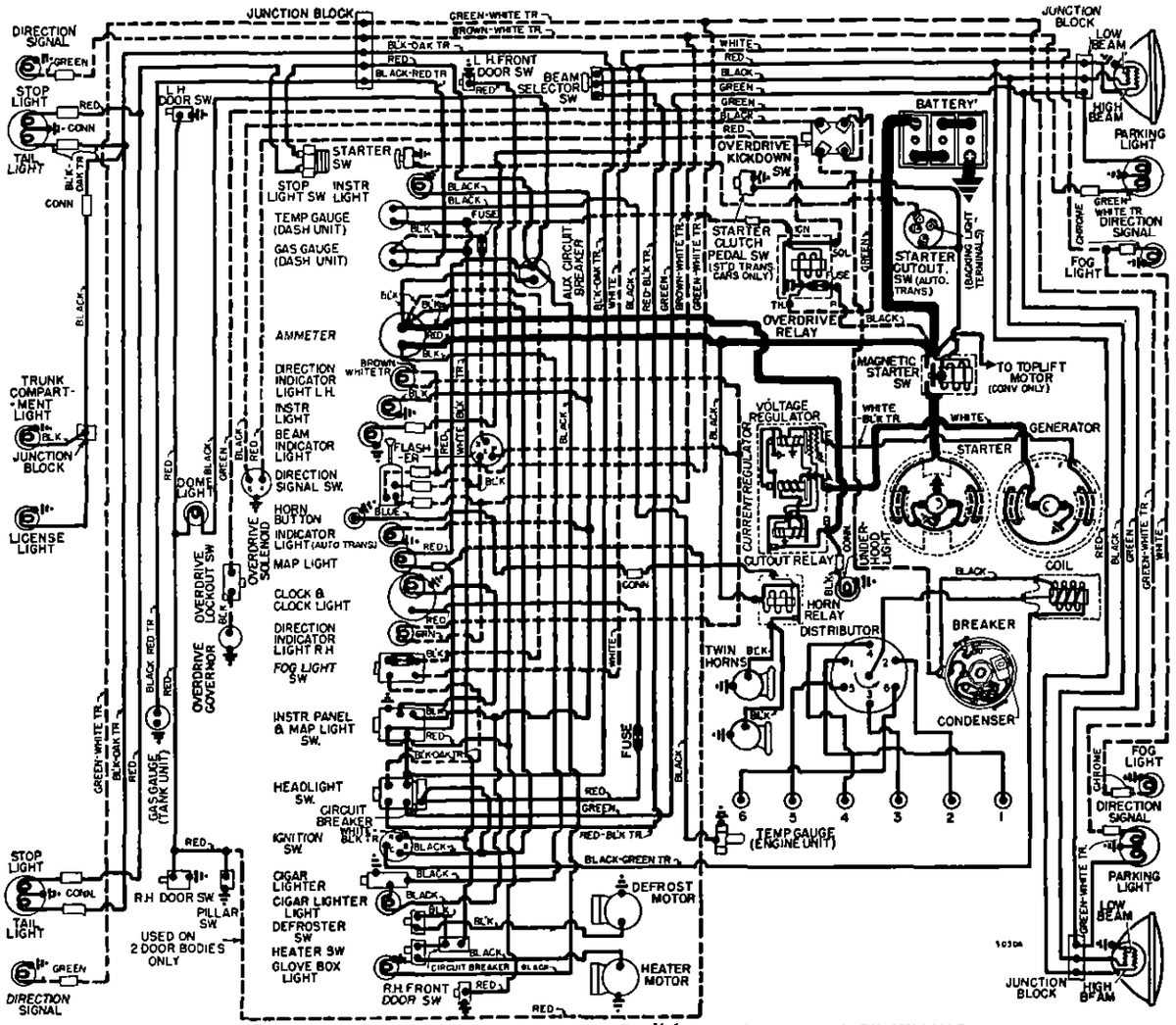
See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.
Breaker Gap—.022".
Cam Angle—Test limits with .022" gap—31-37°.
See "Delco-Remy Cam Angle" in Electrical Equipment Section.
Breaker Arm Spring Tension—17-21 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr. R.P.M.	Degrees	Eng. R.P.M.
Start	400	2	800
11	1400	22	2800

Vacuum Spark Control: Delco-Remy No. 1116052 linked directly to breaker plate. Provides additional advance at speeds above idling except when engine

CONTINUED ON NEXT PAGE



SEE BRAKE SECTION FOR AUTOMATIC TRANSMISSION "ANTI-CREEP" WIRING

CONTINUED FROM PRECEDING PAGE

accelerated or operated with wide open throttle when spark retarded by return spring.
Plunger Travel—⅛" maximum.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3-5"
6°	12°	9-14"

Distributor Removal: Mounted on left side of engine. To remove, disconnect vacuum line, take out bolt in clamp arm, lift distributor off.
Installation Note—When installing distributor, crank engine to firing position for #1 cylinder ('IGN' on vibration dampener in line with pointer on timing gear cover), sight down distributor shaft hole (distributor out) and see that distributor drive tongue in oil pump drive gear is 30° from the horizontal and offset toward the top, turn rotor to #1 segment, install distributor, check timing.

IGNITION TIMING

Std. Setting	Flywheel Degrees
All Engines	2° BTDC.

Timing (with Neon Timing Light)—Neon Light No. 890 recommended. Clip Neon light lead in series with #1 spark plug, idle engine and direct light on vibration dampener (at pointer on timing gear cover). Loosen clamp arm, rotate distributor until 'IGN' mark on vibration dampener lines up with pointer on timing gear cover.
Timing (without Neon Timing Light)—Turn engine over to firing position for #1 piston with 'IGN' mark on vibration dampener in line with pointer on timing gear cover and distributor rotor opposite #1 segment in distributor cap. Adjust distributor.

CARBURETOR

STROMBERG

Stromberg Model BXOV-26. 1¼" Single Barrel, Downdraft, with Fast Idle & Automatic Choke.
Code No. (on bowl cover)—6-104.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up data.*
Metering Jet—*Refer to Carburetor Index for Stromberg Downdraft Carburetor Jet Specification Table.*
Automatic Transmission Throttle Linkage Adjustment: *See Studebaker Automatic Transmission in Transmission Section.*
Fast Idle: Stromberg BXOV-26 carburetor type.
See Carburetion Equipment Section for data.
Fast Idle Setting—To check, hold stopscrew against lowest step of fast idle cam, move choke valve as far as possible toward closed position, check valve opening with 11/32" drill. Adjust by bending connector.
Automatic Choke: Stromberg BXOV-26 type.
See Carburetion Equipment Section for data.
Automatic Choke Setting—'R' mark on thermostat cover in line with highest projection on housing. Shift to 'M' if engine loads up or overchokes. Use 'H' setting only if highly volatile fuels used.

CARBURETOR

CARTER WE

Carter WE-627SA (On Cars between Eng. Nos. H-376, 298 and H-386,398), 1¼" Single Barrel, Downdraft with Carter Climatic Control.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*
Automatic Transmission Throttle Linkage Adjustment: *See Studebaker Automatic Transmission in Transmission Section.*
Fast Idle: Carter Single Barrel Carburetor type.
See Carburetion Equipment Section for data.
Setting—.054" throttle valve opening with choke valve closed. To check, open throttle wide to make certain fast idle cam drops into position, then with choke valve closed measure clearance between edge of throttle valve and carburetor wall on side opposite idle port (valve closed to fast idle position). To adjust, bend connector rod at lower angle.
Automatic Choke: Carter Climatic Control (Single Carburetor type).
See Carburetion Equipment Section for data.
Setting—Centered (cover centered on scale).

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type Std., Oil-bath Cleaner Optl.
Servicing (Oil-wetted Type)—Clean and re-oil filter element at 1000 mile intervals or as required.
Servicing (Oil-bath Type)—Clean filter element and oil reservoir, fill reservoir to indicated level mark with SAE No. 40 or 50 engine oil at intervals as required by operating conditions.
Fuel Pump (Std.): AC. Combination fuel-and-vacuum pump.
Pressure—4-5 lbs. maximum.
See Carburetion Equipment Section for data.
Gasoline Gauge: Stewart-Warner Electric type.
Dash Unit—Studebaker No. 522177.
Tank Unit—Studebaker No. 525548.
See Carburetion Equipment Section for data.

BATTERY

Willard Type HW-1-100. 6 volt, 15 plate, 100 Ampere Hour Capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Positive (+) to cylinder head.
Location—In engine compartment on left side.

STARTER

Delco-Remy Model 1107084. Armature No. 1878077.
Drive—Bendix Barrel type No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5000	5.7	65
12 "	Lock	3.4	525

Removal: Disconnect one cable from battery, and cables and wires from starter solenoid switch. Remove starter to clutch housing bolts, slip housing end of starter out of clutch housing and engine rear plate, and remove starter.
Starting Switch: Magnetic switch mounted on starter and controlled by manual switch.
Standard Trans. Cars—Switch mounted on toeboard under clutch pedal, operated by fully depressing pedal.
Automatic Trans. Cars—Pull switch under instrument panel. Starter operative only with transmission selector lever in "N" or "P" (Delco-Remy No. 1997870 Neutral Safety Switch mounted on steering column).

GENERATOR

Delco-Remy Model 1102728. Armature No. 1879002.
Two brush type with current-voltage control.
Charging Rate Adjustment—None. See Regulator.
Maximum Charging Rate—As given below.

Performance Data

	Amperes①	Volts	R.P.M.
Cold	30	8.0	1750

①—Not maximum output. See Current Regulator.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—25 ozs. each.
Field Current—1.75-1.9 amperes at 6.0 volts.
Removal: Pivot mounted at left front of engine. To remove, take out pivot and clamp bolts.
Belt Adjustment: Loosen pivot and clamp bolts, move generator out until ⅜-½" belt deflection midway between generator and fan pulleys is obtained.

REGULATOR

Delco-Remy Models #1118380 and 1118369 (tropical export). Voltage and Current Regulators.
▷*NEW "1118300 SERIES"* regulators have screw adjustment for settings and single regulator springs.
See Electrical Equipment Section for complete data.
CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—(1118380) 5.9-6.8 volts hot (set to 6.4 volts hot), (1118369) 5.7-6.6 volts hot (set to 6.2 volts hot).
Contact Gap—.020" (same for both sets).
Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—(1118380) 7.0-7.5 volts hot (set to 7.2 volts hot), (1118369) 6.5-7.2 volts hot (set to 6.8 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

Current Regulator

Setting—(1118380) 32-40 amperes hot (set to 36 hot), (1118369) 30-38 amperes hot (set to 34 hot).
Air Gap—.075" with armature pressed down to point where contacts are just touching.
Checking & Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).
Beam Indicator—At center of speedometer dial. Lighted whenever Country (upper) beams in use.
Direction Signal: *See Electrical Equipment Section.*
Direction Signal Indicators—In face of Speedometer dial. Left or right indicator lighted when corresponding direction signal is in operation.

Switches

Lighting—Studebaker No. 526350 (with circuit breaker).
Instrument—Studebaker No. 526351.
Beam Selector—Delco-Remy #1997008.
Direction Signal—Studebaker No. 526901P.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER (On Light Switch): Studebaker No. 522014.
30-Ampere thermostatic type. Protects Headlamps.

Parking, Tail, & Instrument Lamps by vibrating to limit current.
Auxiliary Circuit Breaker (On Instrument Panel): 20-ampere thermostatic type. Protects Body & Stop Lamps by vibrating to limit current.
Convertible Top Circuit Breaker—30 ampere.

ACCESSORY CIRCUIT BREAKER: One 15-ampere type used on cars with Climatizer and Defroster.

FUSES: Clock—3 ampere. In clock lead.
Direction Signal—14 ampere. In Flasher lead.
Overdrive—20 ampere. On Overdrive Relay.
Glove Compt. Light—5 ampere. In lamp lead.
Under Hood Light—5 ampere. In lamp lead.
Fog Lights—20 ampere. On Fog Light Switch.

HORNS: Sparton or Delco-Remy #1999656 (High Note), #1999655 (Low Note). Twin Airtone type horns operated by relay. **Horn Current**—12-15 amps
Horn Relay: Delco-Remy #1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025". **Air Gap** .015" (contacts closed).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" Head.
Bore—3 5/16". **Stroke**—4 3/4".
Displacement—245.6 cu. ins. **Rated H.P.**—26.33.
Developed Horsepower—102 at 3200 RPM.
Compression Ratio—7.0-1 Std.
Compression & Vacuum Reading—*See Tune-Up data.*

ENGINE & OIL PAN REMOVAL: *See Studebaker Special Data.*
►*Not necessary to remove engine for pan removal.*

►**REPLACEMENT ENGINE CAUTION (for Automatic Transmission Cars):** *See Studebaker Automatic Transmission in Transmission Section.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Studebaker Special Data.*

PISTONS: Lynite aluminum alloy, Cam-ground, T-slot, bearing-metal plated type. **Length** 3¾".
Original Bore & Pistons: *See Studebaker Special Data.*
Weight—14.4 ozs. (stripped).
Clearance—Selective Fit (see Fitting Pistons).
Removal—Pistons and rods removed from above.
NOTE—Car manufacturer recommends that cylinders out-of-round or tapered more than .002" be reconditioned.

Fitting New Pistons: Insert .002" feeler, 1" wide, between piston and cylinder wall on camshaft side (piston pin parallel to camshaft, slot away from camshaft). Pull required to withdraw feeler should be 14-19 lbs.
Replacement Pistons: *See Studebaker Special Data.*
Installing Pistons: T-slot away from camshaft.

PISTON RINGS: Two compression, one oil control ring per piston, all above pin. Oil drain holes provided in oil ring groove.

Ring	Width	End Gap	Side Clearance
Comp. (#1,2)	3/32"	.009-.014"	.0015-.002"
Oil Contr. (#3)	3/16"	.009-.014"	.0015-.002"

Installing Rings: Beveled side of compression rings (Sealed Power) up.
Replacement Rings: Sets furnished Std. size and .020", .030", .040" Oversize. Single rings Std. size and .010", .020", .030", .040" Oversize.

PISTON PIN: Diameter .8741-.8745". **Length** 2⅞". Pin is locked in rod by tapered pin and locknut.
Pin Fit in Piston—.0001-.0003" clearance or light finger push fit at room temperature (70°F.).
Pin Removal & Installation: *See Studebaker Special Data.*

Replacement Pins: Std. & .0025", .005" Oversize. Use Hone PH-1 to obtain proper piston pin fit.
NOTE—Replacement pistons fitted with pins.

CONNECTING ROD: Length 7 15/16". **Weight** 33.3 ozs.
Crankpin Journal Diameter—2.18675-2.18775".
Lower Bearing—Interchangeable steel-backed, micro-babbitt lined type. No shims.
Clearance—.0005-.002". **Sideplay**—.005-.009".
Bearing Adjustment: *None (no shims). Replace bearings. Do not file rods or caps.*
NOTE—Make certain that small tongue on bearing shells engage grooves. Palnuts used on bolt nuts.
Replacement Bearings: Bearings furnished Std. size and .001", .005", .010", .020" Undersize.
Installing Rods: Lower bearings "offset". Install rods with narrow portion of bearing toward front of engine (#1, 3, 5), toward rear (#2, 4, 6). Numbers on rods and bearing caps must be together and installed in same numbered cylinder with number *and oil hole in lower end of rod toward camshaft.*

CRANKSHAFT: 4 bearing, 5 integral counterweights. Vibration dampener mounted on forward end.
Vibration Dampener—*See Studebaker Special Data.*
Journal Diameters—2.8745-2.8750".
Bearings—Removable steel backed, babbitt-lined type. No shims.
Clearance—.0006-.0027".
Rear Bearing Oil Seals—*See "Crankshaft Oil Seals" in Studebaker Special Data.*
►*CAUTION—Install new wood oil seals (above) each time rear main bearing cap removed and re-installed.*
Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.
Replacement Bearings: Furnished as sets or single bearings in Std. Size and .001", .010", .020", .030" U.S.
End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and main bearing journal. Adjust by changing shims furnished .003", .005", .007" thick.
Endplay—.003-.006".

CAMSHAFT: Four bearing. Helical gear drive.
Journal Diameters—#1, 1.9975-1.9980"; #2, 1.9662-1.9670"; #3, 1.9357-1.9365"; #4, 1.1232-1.1240".
Bearings—Split steel-backed, babbitted bushings.
NOTE—Oil hole in bushings must be aligned with oil holes in engine block.
Clearance—.0007-.0022" (#1), .0010-.0027" (others).
Camshaft Removal: *See "Camshaft & Bearings" in Studebaker Special Data.*
End Thrust: Taken by thrust plate assembled on front face of engine behind camshaft gear (spacer assembled back of gear hub).
Endplay— 003-.006". *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear Cast Iron. Camshaft gear Celeron with steel hub. **Backlash**—.001-.003".
Replacement Gears—Camshaft gear furnished in two sizes; Standard (marked "S"), High Limit (marked "H"). Crankshaft gear Std. size only.
Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*
Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth on crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 15/32"	11/32"	5 7/32"
Exhaust	1 9/32"	11/32"	5 7/32"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	11/32"	.0015-.0035"

Valve Guides: Pressed in block from above with upper end 1 5/32" below upper edge of valve seat and stepped end down. Ream guides to inside diameter of .3425-.3445". Replace worn guides when clearance exceeds .0035".

Valve Springs: Install with closed-coil end up. Replace springs if more than 10% weaker than test pressure listed.

	Spring Pressure	Length
Valve Open	125-145 lbs.	1 3/4"

NOTE—Dampeners used on top of all springs.

Valve Lifters: Mushroom type. Remove from below with camshaft out of engine. *For camshaft removal directions, see Studebaker Special Data.*
Valve Lifter Tension Spring—*See "Valve System" in Studebaker Special Data.*
►**Valve Chamber Baffles**—*See "Valve System" in Studebaker Special Data.*
Diameter—.624". **Clearance**—.0005-.00175".
Replacement Lifters—Std. & .0005", .001" O. S.

VALVE TIMING

Tappet Clearance: .016" All Valves, Engine Cold.
NOTE—Self-locking tappet adjusting screws used. Tappet screw tension should be 25 in. lbs. minimum.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 15° BTDC. Close 49° ALDC.
Exhaust Valves—Open 54° BLDC. Close 10° ATDC.
Valve Timing Check—Set #1 intake valve to .020". Turning engine with #6 cylinder on compression stroke the intake valve should start to open when the mark "IN-OP 1-6" on front dampener lines up with pointer.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings, and to valve lifters. Timing gears lubricated by oil by-passed by pump. Oil pump mounted externally on right side.
Crankcase Capacity—6 quarts.
Normal Oil Pressure—20-40 lbs. at 40 MPH.
Oil Pressure Regulator—On lower right front corner of engine. Opens at 40 lbs. Adjustable by inserting shims between outer end of spring and plug.
Oil Pan Removal: *See Studebaker Special Data.*
Oil Pump: Helical gear type mounted externally on right side of engine.
Oil Pump Removal & Installation—*See "Oil Pump" in Studebaker Special Data.*
Oil Pressure Gauge: Stewart-Warner Bourden Tube (not electric) type.
Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe on left rear of engine (air outlet).
Servicing—Wash both filter elements in kerosene and re-oil at regular intervals. NOTE—Filter in outlet pipe removed by taking out cotter pin.

COOLING

Cooling System: Positive circulation with water pump mounted on front of block with fan.
Capacity—13.5 qts. (15 qts. with Climatizer).
Water Pump: Packless type. No lubrication required. *See Water Pump Section for complete data.*
Removal—Slack off drive belt, take out capscrews in fan pulley hub and remove blades. Disconnect hose connection, take out mounting screws in pump.
Belt Adjustment—*See Generator Belt Adjustment.*
Thermostat: Fulton or Bishop & Babcock. In water outlet on cylinder head.

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Setting—Opens at 151-155°F (Std.), 177°F (High).
Temperature Gauge: Stewart-Warner electric type.

CLUTCH

WITH STANDARD TRANSMISSION

Borg & Beck Model No. 9A7 with Borglite Driven Member. Single plate, dry disc type.
NOTE—Clutch Assembly marked by number 943
See Clutch Section for complete data.
▷*CLUTCH OPERATING SHAFT RATTLE CORRECTION: See "Clutch Notes" in Studebaker Special Data.*
Facings—Moulded-metallic, 2 required. I. D. 6". O. D. 9¼". Thickness ⅛".
Adjustment: Pedal free travel ½ to 1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.
Hill-Holder Note—Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages. Adjusting nut and locknut at end of Hill-holder operating rod
Clutch Housing Removal: Remove distributor, remove starter and tie up out of the way (not necessary to disconnect cables), remove front floor plate, take out upper clutch housing cap screws. Remove transmission (see Transmission). Take out clevis pin in clutch operating shaft-to-release shaft sleeve, pull operating shaft out and remove sleeve. Remove parking brake cable shield clip, unhook brake pedal pullback spring from cross-member, support engine weight on jack under rear end of oil pan (use block of wood on jack to prevent damage to pan), take out engine rear support bolts, remove lower support insulators. Take out clutch operating shaft support bracket bolts Remove cross-member. Loosen exhaust pipe flange nuts at manifold, remove exhaust pipe support bracket-to-clutch housing bolts, loosen clamp and swing bracket out of the way. Take out all clutch housing bolts, remove clutch housing.
▷**Installation Caution**—Align mounting holes of the cross-member and the frame and install the retaining bolts—do not tighten the bolts until the operating shaft support bracket bolts are installed.
Clutch Removal: Remove clutch housing (above), remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member.

TRANSMISSION

STANDARD

Warner Model AS1-T86E (Std.), AS32-T86E with R10B type Overdrive (Optl.). All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.
Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data.
Removal: Drain transmission. Disconnect hand brake cable and move out of way for clearance. Disconnect front universal at transmission (wire caps or use clamp to prevent losing rollers). Take out center support bearing mounting bolts. Push front shaft and support to rear (will slide on splines on rear shaft). Disconnect shift rods from levers on case and speedometer cable (remove speedometer pinion). On Overdrive transmission disconnect all control wires and cable. Take out transmission to clutch housing capscrews, pull transmission straight back and remove from car.

OVERDRIVE

OPTIONAL WITH STD. TRANS.

Warner R10 Type (part of AS32-T86E Transmission). New Governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled "kick-down."
NOTE—Overdrive is new "centered ring gear" type.
See Transmission Section for complete data.
Overdrive Control Units—*Same as Champion. See Champion 9G (1950) page for data.*
Removal: See Std. Transmission Removal data.

AUTOMATIC TRANSMISSION

OPTIONAL

Torque Converter and 3-speed automatic transmission with hydraulic control. Has mechanical parking lock and Anti-Creep device which holds brakes applied when car standing and ignition "on."
See Transmission Section for complete data including Testing & Trouble Shooting.
Lubrication—Check oil level every 1000 miles and maintain oil level at "Full" mark on dip stick. Drain and refill every 15,000 miles. Use only Automatic Transmission Fluid Type "A".
Capacity—Approximately 11½ quarts.
Checking Oil Level—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Remove inspection hole cover in front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dip stick gauge. Add oil as required to bring level up to "FULL" mark on dipstick (1 pint between Low and Full).
▷*CAUTION—Do not fill above FULL mark.*
Draining & Refilling—*See "Studebaker Automatic Transmission" in Transmission Section.*
Linkage Adjustment—*See "Studebaker Automatic Transmission" in Transmission Section.*
Removal: *See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer Model 1268-111X (Front & Rear), 1261-102X (intermediate). Needle bearing type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft).

Propeller Shaft & Support Bearing: Two shafts used: 1) Front Shaft with intermediate universal yoke. 2) Rear Shaft with slip-joint on forward end at intermediate universal.
Propeller Shaft & Support Bearing Removal & Servicing—*See Studebaker Special Data.*

REAR AXLE

Spicer Salisbury Model 41-2. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.09-1 Std., 4.55-1 Optl. (Std. with Overdr.).
Ratio (with Automatic Trans.)—3.54-1
NOTE—Rear axle ratio stamped on plate attached to axle by cover capscrew and also on gears.
Backlash—.003-.006". Shim adjustment.
Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs and drums. Disconnect hand brake cable. Take out backing plate bolts from backing plates, free hydraulic brake line from axle housing clips (do not disconnect brake line). Backing plates and adjusting shims can then be wired to frame (do not disconnect brake line from wheel cylinders). Disconnect rear universal (wire caps or use clamp to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.
Axle Shaft Removal—Remove wheel, remove wheel hub (use puller J-596-A). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (CAUTION—do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft assembly (Puller HM-931).
Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). **Endplay**—.001-.005".

SHOCK ABSORBERS

Houde (Houdaille)—Double acting, hydraulic type. Adjustable type with thermostatic control on rear.
Front—Studebaker No. 526092 (Right), 526093 (Left).
Rear—Studebaker No. 526148 (Right), 526149 (Left).
Refilling: Check at 5000 mile intervals. Fill to bottom of filler plug hole. CAUTION—Use only Houdaille Shock Absorber Fluid No. L-1404.

FRONT SUSPENSION

Independent type with coil springs.
See Front Suspension Section for complete data.
Kingpin Inclination—5¼° crosswise.
Caster——½° to —2½°. Eccentric pin adjustment.
▷*NOTE*—Not more than ¾° variation between wheels.
Camber—0° to +1°. Eccentric pin adjustment.
▷NOTE—½° more Camber favored on drivers side.
Toe In—1/16-1/8". Adjust **right hand tie rod only** for toe in after left hand tie rod has been adjusted for wheel straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments on left hand tie rod.

STEERING GEAR

Ross Model T-14 Cam-and-Twin Lever type.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed (Wagner Electric) Hydraulic, Self-centering, Self-adjusting type.
See Brake Section for complete data.
Drums—Composite type. Diameter 11".
Clearance—If adjustment required, see "Lockheed (Wagner) Hydraulic Self-Adjusting Brakes" in Brake Section.
Lining—Molded type (all shoes). Width 2". Thickness 3/16". Length per wheel 22¼".
Braking Power—57% Front, 43% Rear.
Hand Brake: See Service Brake data (above).
Hill-Holder: Std. on Std. Trans. Cars. *See Brake Section*
▷**Anti-Creep (for Auto. Trans. Cars)**—*See Brake Section for complete data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electric type with motor mounted on left hand lift assembly (right hand lift assembly driven through flexible drive).
See Miscellaneous Section for complete data.
Windshield Wipers: Vacuum Cable operated type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door lock post (1951 & Early 1952), hinge post (Late 1952).

Starting Serial Nos.	1951	1952
South Bend	8,110,001	8,217,001
Los-Angeles	8,800,001	8,816,001
Canada	8,952,001	8,954,001

***Model Symbol & Body Number Plate*—Located on** engine side of dash. Model designations as follows: (C) 5 Pass. Coupe, (F) Sedan 2-Door, (Q) 3 Pass. Coupe, (S) Conv., (W) Sedan 4-Door, (Y) Land Cruiser.

ENGINE NUMBER: Stamped on boss at the top side, rear end of cylinder block, next to distributor.

Starting Engine Nos.	1951	1952
South Bend & Los Angeles	V-101	V-123,001
Canada	VC-101	VC-2,036

TUNE-UP

►***CROSS-FIRING CORRECTION (1951 CARS BEFORE ENGINE No. V-114943):*** Cross-firing under heavy loads at low speed may be caused by arrangement of cables in LEFT cylinder bank conduit (#5 next to #7 and cross-firing). Rearrange cables from front to rear as follows: 1-5-3-7 (cross #3 and #5 as they leave conduit).

COMPRESSION PRESSURE: 120 to 140 lbs., at 150 RPM. (normal cranking speed). Not more than 10 lbs. variation between cylinders.

VACUUM READING: *Steady 18-20" Idling at 8 MPH.*

FIRING ORDER: 1-8-4-3-6-5-7-2. See Diagram.

SPARK PLUG GAPS: .0325"-.0375".
Plug Type—Champion Type H-8. 14 mm.

DISTRIBUTOR: Delco-Remy No. 1110822 (Early 1951); No. 1110826 (Late 1951 & 1952). Automatic and vacuum advance type with "Center-Bearing" breaker plate.
Cam Angle—28-34° (with .013" gap).
Breaker Arm Spring Tension—17 to 21 ozs.
Automatic & Vacuum Advance—*See Ignition Timing.*

COIL: Delco-Remy No. 1115380. On fire wall.
Ignition Current—2½ amperes idling, 4-5 amperes with engine stopped.

CONDENSER: Delco-Remy No. 1869704.
Condenser Capacity*—.18-.23 *microfarad.

IGNITION TIMING: 8° BTDC.
Timing Procedure—*See Ignition Timing.*
Timing Marks—Vibration Dampener mark "IGN/" aligned with pointer on gear case cover.

CARBURETION: Stromberg Model AAUVB-26 Code 6-107 & 6-107A (Early 1951); Code 6-111 (Late 1951 & 1952). Dual down-draft type with automatic choke.

►***EARLY 1951 CARBURETOR PRODUCTION CHANGE*** *—Rework Carburetor Code No. 6-107 to later type Code No. 6-107A when servicing. See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.*

►***AUTOMATIC CHOKE HOT-AIR STOVE CHANGE FOR IMPROVED ACTION (Code 6-107 & 6-107A Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.***

►***IMPROVED STARTING WITH HOT ENGINE CHANGE (Code 6-111 Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.***

►***ACCELERATION HESITATION (Code 6-111 Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.***

►***CHOKE BIND CORRECTION & CHANGES FOR IMPROVED ACTION (Code 6-111 Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.***

Idle Setting—Initial setting 1¾ turns open, final setting midway between missing & rolling points. Adjust both screws alike, turn screws in for leaner mixture.

Idle Speed (Std. Trans.)—550-600 RPM. Equivalent to 8 to 10 MPH.

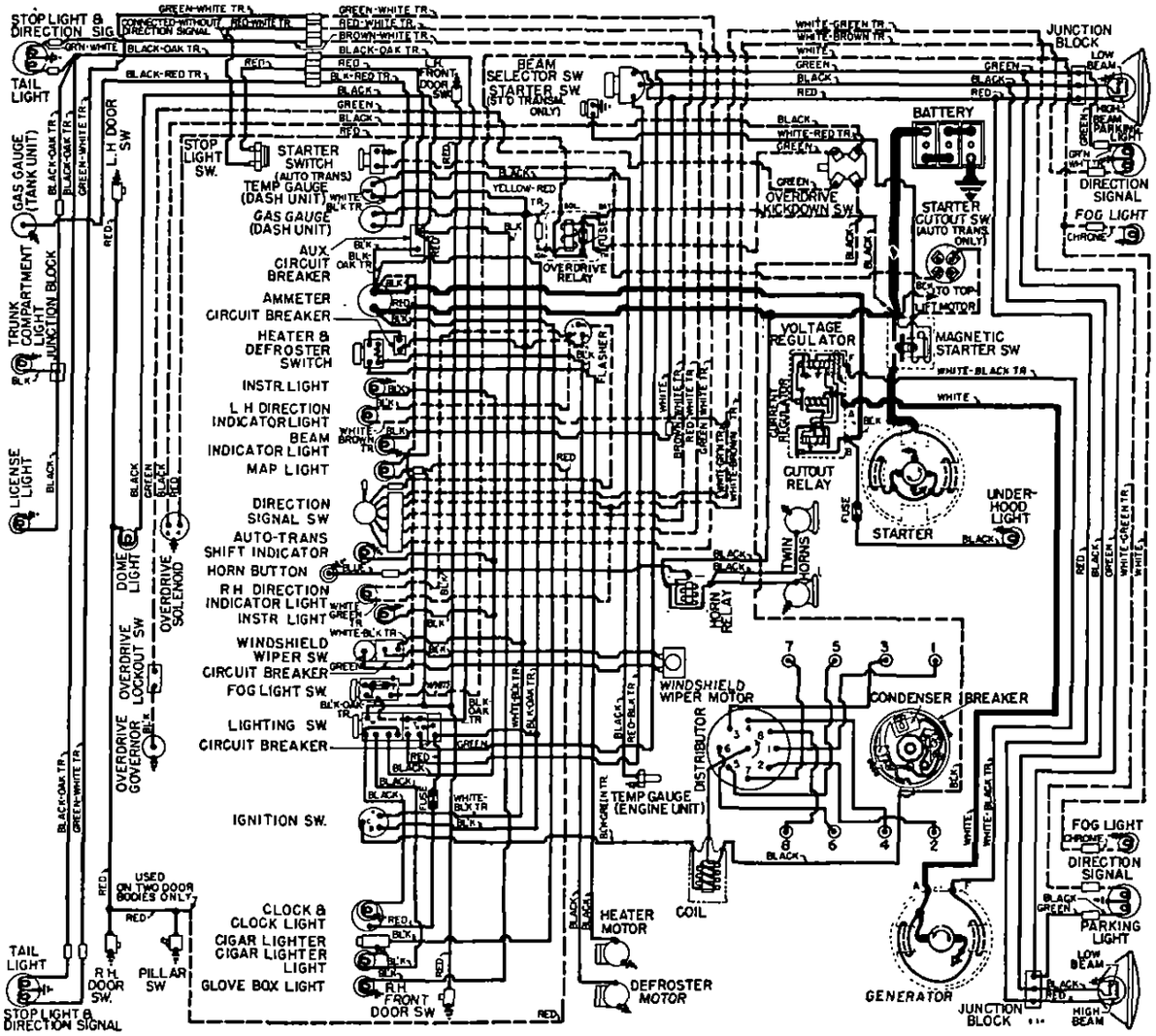
Idle Speed (Auto. Trans.)—500-550 RPM., with selector lever in "N" position. Adjust by turning idle adjusting screw switch in or out (switch replaces regular stopscrew).

Float Setting—Use KMO No. T-24971, Float Gauge. Hold air horn in inverted position and place float gauge on gasket. Tops of float should be 5/64" ABOVE tops of vertical guides. This will give the approximate fuel level.

Fuel Level—21/32"-below-top-surface of-float chamber (without gasket) at 5 lbs. pressure.

Accelerating Pump—Normal setting, inner hole (nearest throttle shaft). For more fuel install rod in outer hole.

CONTINUED ON NEXT PAGE



1951 MODELS

CONTINUED FROM PRECEDING PAGE

Choke Adjustment: (Except Code 6-107A—See Special Instructions below)—Centered on index. Inverted "V" on cover in line with boss on housing.

►***CODE 6-107A NOTE—THREE DIFFERENT CHOKE SETTINGS USED. See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.***

FUEL PUMP PRESSURE: 4-4¾ lbs.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Blocker type valve located in right bank exhaust pipe (diverts exhaust gas from right bank through hot spot to left side of engine when closed). **Setting**—To test coil spring tension, free outer end of coil spring from bracket on manifold. With valve closed, hooked end of coil should be approx. 90° from bracket at 70°F. Replace coil if incorrect.

►***NOTE***—To overcome sticking, lubricate valve shaft with kerosene and soda solution or Bendix Carburetor Cleaner. If necessary, shaft diameter can be reduced for .005" clearance in bushings.

VALVE TAPPET CLEARANCE: ***CAUTION—DIFFERENT SETTING REQUIRED FOR EACH TYPE CAMSHAFT (New Camshaft used beginning Engine No. V-164807) and FOR REPLACEMENT CAMSHAFT ON EARLIER ENGINES:***

►**1951 & 1952 Cars (before 1952 Engine No. V-164807)** ***WITH 1st TYPE CAMSHAFT (See Identification Note below):*** .012-.014" With engine hot & running, .014-.016" With engine cold & standing.

►**1952 Cars (After Engine No. V-164807) AND PREVIOUS CARS WITH NEW TYPE CAMSHAFT** ***(See Identification Note below):*** .021-.023" With engine hot & running. .023-.025" With engine cold & standing.

►***NEW CAMSHAFT IDENTIFICATION NOTE—All cars with new camshaft requiring different Tappet Clearance marked by Valve Clearance Adjustment Plate attached to two center rocker arm shaft support studs on EACH cylinder head.***

IGNITION

►***CROSS-FIRING CORRECTION (1951 CARS BEFORE ENGINE No. V-114943):*** Cross-firing under heavy loads at low speed may be caused by arrangement of cables in LEFT cylinder bank conduit (#5 next to #7 and cross-firing). Rearrange cables from front to rear as follows: 1-5-3-7 (cross #3 and #5 as they leave conduit)

Ignition Switch: Mitchellock. Studebaker No. 524637. **Ignition Lock**—Yale & Towne.

COIL: Delco-Remy No. 1115380. On fire wall. **Ignition Current**—2½ amperes idling, 4-5 amperes with engine stopped.

CONDENSER: Delco-Remy Part No. 1869704. Capacity—.18-.23 microfarad.

DISTRIBUTOR: Delco-Remy No. 1110822 (Early 1951); No. 1110826 (Late 1951 & 1952). Automatic and vacuum advance type with "Center-Bearing" breaker plate.

►***NOTE—See "Delco-Remy Center-Bearing Breaker Plate Distributor" in Electrical Equipment Section.***

Breaker Gap—.013-.018".

Cam Angle—28-34° (with .013" gap).

►***NOTE—See "Delco-Remy Cam Angle" in Electrical Equipment Section.***

Breaker Arm Spring Tension—17-21 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance—1110822

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		375	0-4		750
6-8		800	12-16		1600
13-15		1300	26-30		2600

Automatic Advance—1110826

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		400	0-4		800
5-7		800	10-14		1600
13-15		1450	26-30		2900

Vacuum Spark Control: Delco-Remy No. 1116058. Plunger Travel—11/64-3/16".

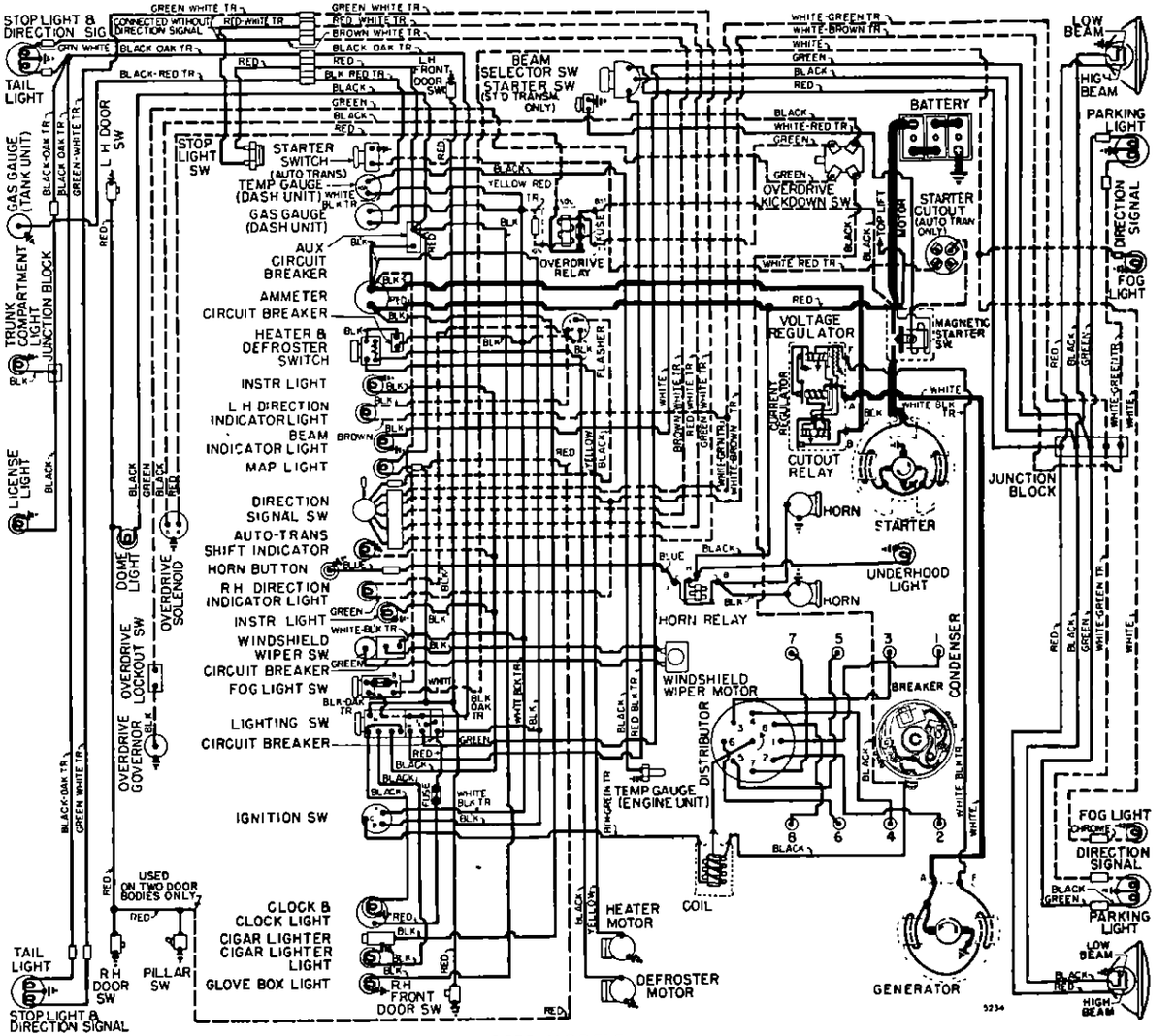
Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4-6"
7-9°	14-18°	12½"

Distributor Removal: Mounted between cylinder banks at rear of engine. Disconnect vacuum advance pipe and take out bolt in clamp arm to remove from engine.

Installation Note—The tongue of the distributor coupling is tapered and offset and, therefore, can be installed in the mating coupling of the intermediate shaft in only one position.

►***CAUTION—If distributor drive shaft assembly is removed or disturbed, see "Distributor Drive Shaft Assembly" in Studebaker Special Data.***



1952 MODELS

IGNITION TIMING

Std. Setting—8° BTDC. Vibration dampener marked "IGN/" at point 8° before top dead center.

Timing (with Neon Timing Light)—Neon timing light No. 890 recommended. Clip Neon light lead in series with #1 spark plug, idle engine and direct light on vibration dampener in line with pointer (at pointer on timing gear cover). Loosen clamp arm, rotate distributor until "IGN" mark on vibration dampener lines up with pointer on timing gear cover.

Timing (without Neon Timing Light)—Turn engine over to firing position for #1 piston with "IGN" mark on vibration dampener in line with pointer on timing gear cover and distributor rotor opposite #1 segment in distributor cap. Adjust distributor.

CARBURETOR

Stromberg Models AAUVB-26 Code 6-107 & 6-107A (Early 1951); Code 6-111 (Late 1951 & 1952). Dual down-draft type with automatic choke.

►*AUTOMATIC CHOKE HOT-AIR STOVE CHANGE FOR IMPROVED ACTION (Code 6-107 & 6-107A Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section for complete data.*

►*EARLY 1951 CARBURETOR PRODUCTION CHANGE—Rework Carburetor Code No. 6-107 to later type Code No. 6-107A when servicing. See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.*

►*IMPROVED STARTING WITH HOT ENGINE CHANGE (Code 6-111 Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.*

►*ACCELERATION HESITATION (Code 6-111 Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.*

►*CHOKE BIND CORRECTION & CHANGES FOR IMPROVED ACTION (Code 6-111 Carburetors)—See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.*

Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up data.*

Automatic Transmission Throttle Linkage Adjustment—*See Studebaker Automatic Transmission in Transmission Section.*

Fast Idle: Stromberg, AAUVB Carburetor type.

Fast Idle Setting—With the stop screw on the lower step of the fast idle cam, check the fast idle adjustment by closing the choke valve until the edge of the next higher step contacts the screw. The narrow side of the choke valve should just contact a 11/32" drill held vertically against the inside surface of the air horn. To adjust the valve opening, bend the fast idle rod as required.

See Carburetion Equipment Section for complete data.

Automatic Choke: Stromberg, AAUVB Carburetor type.

Choke Adjustment: (Except Code 6-107A—See Special Instructions below)—Centered on index. Inverted "V" on cover in line with boss on housing.

►*CODE 6-107A NOTE—THREE DIFFERENT CHOKE SETTINGS USED. See "Stromberg AAUVB & AAVB Carburetors" in Carburetor Section.*

See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: AC. Oil-wetted type (Std.). Oil bath type (Optional).

Servicing (Oil-wetted type)—Clean and re-oil filter element at 1000 mile intervals or as required.

Servicing (Oil Bath type)—Clean filter element and oil reservoir, fill reservoir to indicated level mark with SAE No. 40 or 50 engine oil at intervals as required by operating conditions.

Fuel Pump: AC. Diaphragm type fuel pump.

Replacement Pump—AC. No. 9647.

Pressure—4-5 lbs.

►*FUEL-PUMP-SUPPORT-BRACKET-CHANGES-&-INSTALLATION CAUTION: See "Fuel System" in Studebaker Special Data.*

See Carburetion Equipment Section for complete data.

Gasoline Gauge: Stewart-Warner electric type.

Dash Unit—Studebaker No. 526738.

Tank Unit—Studebaker No. 525548.

See Carburetion Equipment Section for complete data.

BATTERY

Willard Type HDW-1-100. 6 volt, 15 plate, 100 ampere hour capacity (20 hour rate).

Starting Capacity—120 amperes for 20 minutes.

Grounded Terminal—Positive (+) to water pump attaching bolt.

Location—In engine compartment on left hand side.

STARTER

Delco-Remy. Delco-Remy Nos. as follows:

Model	Std. & O.D. Trans	Auto. Trans.
1951	1107089	1107095
1952	1107115	1107116

Armature No.—Delco-Remy No. 1878077 (all).

Drive—Bendix. (1951) No. A1792 Barrel type. (1952) No. A3281 "Folo-thru" type.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—24-28 ozs.

Performance Data—1107089, 1107095

Torque	RPM	Volts	Amperes
0 ft. lbs.	5000	5.67	65
12 ft. lbs.	Lock	3.37	525

Performance Data—1107115, 1107116

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: Magnetic Switch, Delco-Remy No. 1494 (Studebaker 530039) mounted on dash and controlled by manual switch.

Std. Trans. Cars—Auto-Lite SW-4016 (Studebaker 519829) mounted on toeboard under clutch pedal, operated by fully depressing pedal.

Automatic Trans. Cars—Studebaker No. 527663 pull switch on instrument panel and Delco-Remy No. 1998882 combination starter cut-out and backing light switch mounted on steering column. Starter operative only with transmission selector lever in "N" or "P" positions.

GENERATOR

Delco-Remy No. 1102700 (1951); No. 1102778 (1952). Two brush type with current & voltage control.

Armature—Delco-Remy No. 1880550 (1102700 Gen.), No. 1921621 (1102778 Gen.).

Charging Rate Adjustment—See Regulator data.

Maximum Charging Rate—40 amperes (1951), 45 amperes (1952). Maximum rate controlled by regulator.

Performance Data—Cold

	Amperes①	Volts	RPM
1102700	40	8.0	2150
1102778	45	8.0	2450

①—Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—28 ozs. each.

Field Current—1.87-2.0 amperes at 6.0 volts.

Belt Adjustment: Hook spring type scale to the belt midway between generator and fan pulleys. Then adjust the tension on the belt so that a pull of 14 lbs. on the scale will lift the belt ½".

REGULAT R

Delco-Remy. Current & voltage regulator.

Model	Regulator No.	Use With Gen. No.
1951	1118392	1102700
1952	1118730	1102778

See Electrical Equipment Section for complete data.

CAUTION—Check generator for grounded field coils and leads before changing regulator settings to correct High Charging Rate or High Voltage.

Cutout Relay

Cuts In—5.9-6.7 volts hot (set to 6.4 volts hot).

Contact Gap—.020" (same for both sets).

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.6 volts hot (set to 7.4 volts hot). Regulator is over-compensated for temperature. Should be checked with cover in place and hot.

Air Gap—.068" with armature pressed down to point where contacts just touching.

Checking and Adjustment—*See Electrical Equipment Section.*

Current Regulator

Setting (1118392)—40-46 amps. hot (set to 42 hot).

Setting (1118730)—45-51 amps. hot (set to 27 hot).

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking and Adjustment—*See Electrical Equipment Section.*

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25 ft.).

Beam Indicator—At center of speedomter dial. Lighted whenever upper beam is in use.

Directional Signal: *See Electrical Equipment Section.*

Switches

Lighting and Instrument—Studebaker No. 530058 (with circuit breaker).

Beam Selector—Studebaker No. 519246.

Directional Signal—Studebaker No. 530468P.

MISC. ELECTRICAL

CIRCUIT BREAKERS: Lighting (On Light Switch). Studebaker No. 522014. 30 ampere thermostatic type. Protects head lamps, parking, tail, and instrument panel lamps by vibrating to limit current.

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Auxiliary Circuit Breaker (On Instrument Panel). 20 ampere thermostatic type. Protects body and stop lamps by vibrating to limit current.

Convertible Top Circuit Breaker—30 ampere.

ACCESSORY CIRCUIT BREAKER: One 15 amp. type used on cars with Climatizer and Defroster.

FUSES: Clock—3 ampere. In clock lead.

Directional Signal—14 ampere. In Flasher lead.

Overdrive—20 ampere. On overdrive relay.

Glove Compartment Light—5 ampere. In lamp lead.

Under Hood Light—5 ampere. In lamp lead.

Fog Lights—20 ampere. On fog light switch.

HORNS: Sparton or Delco-Remy No. 1999655 (Low Note), 1999656 (High Note). Airtone twin horns with relay.

Canadian Cars—Auto-Lite HW-4035A (Low Note), HW-4036A (High Note).

Horn Current—12-15 amperes each.

Horn Relay: Delco-Remy No. 1116775.

Contacts Close—2.75-4.0 volts.

Contact Gap—.025". **Air Gap** .015" (contacts closed).

ENGINE

ENGINE SPECIFICATIONS: Own make 8 cylinder "V" type valve-in-head.

Bore—3⅜". **Stroke**—3¼".

Displacement—232.6 cu. in. **Rated HP**—36.4.

Developed Horsepower—120 at 4000 RPM.

Compression Ratio—7.0-1 (Std.), 7.5-1 (Optional).

Compression & Vacuum Reading—*See Tune-Up data.*

ENGINE REMOVAL: *See Studebaker Special Data.*

OIL PAN REMOVAL: *See "Oil Pan Removal" in Studebaker Special Data.*

▷*Not necessary to remove engine for oil pan removal.*

ORIGINAL BORE AND PISTONS: *See "Original Bore & Pistons" in Studebaker Special Data.*

TIGHTENING TORQUES: *See Studebaker Special Data.*

CYLINDER HEAD INSTALLATION: *See Studebaker Special Data.*

▷**Head Interchangeability**—Same cylinder head and head gasket used for right and left cylinder banks. *See "Cylinder Head" in Studebaker Special Data.*

PISTONS: Lynite aluminum alloy. Cam ground, tin plated, full skirt "T" slot.

Weight—13.66 ozs.

Clearance—Selective fit. (see Fitting Pistons).

Removal—Pistons and rods removed from above.

NOTE—Car manufacturer recommends that cylinders out of round or tapered more than .002" be reconditioned.

Fitting New Pistons: Insert .002" feeler gauge, 1" wide, between piston and cylinder wall on right side (piston T-slot toward left side of engine). Pull required to withdraw feeler should be 11-16 lbs.

Replacement Pistons: Furnished Std. .010", .020", .030", .040" Oversize. *See "Pistons" in Studebaker Special Data.*

Installing Pistons: Install piston on rod with slot on same side as nut on piston pin clampscrew (away from oil squirt hole in rod). Install piston in cylinder with slot toward left side of engine (all pistons). See Connecting Rod Installation.

PISTON RINGS: Two compression, one oil control rings per piston, all above pin. Oil drain holes provided in oil ring groove.

Ring	Width	End Gap	Side Clearance
Comp. (#1, 2)	5/64"	.008-.016"	.0015-.002"
Oil Contr. (#3)	3/16"	.008-.016"	.0015-.002"

Installing Rings: Beveled side of compression rings (Sealed Power) up. Expander used with oil ring.

Replacement Rings: Sets furnished; Std., .020", .030", .040", Oversize. Single rings also furnished in same sizes.

PISTON PIN: Diameter .8741-.8745". Pin is locked in rod with tapered pin and lock nut.

Pin Fit in Piston—.0001-.0003" clearance or light finger push fit at room temperature (70°F.).

Pin Removal and Installation: *See Studebaker Special Data.*

Replacement Pins: Std., .0025" & .005" Oversize. Use Hone PH-1 to obtain proper piston pin fit.

NOTE—Replacement pistons fitted with pins.

CONNECTING ROD: Length 6⅝". Weight—23.71 ozs.

Crankpin Journal Diameter—1.99925-2.00025".

Lower Bearing—Interchangeable steel-backed, micro-babbitt lined type. No shims.

Clearance—.00005-.00215". **Sideplay**—.007-.012".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or caps.

NOTE—Make certain that small tongue on bearing shells engage grooves. Palnut used on bolt nuts.

Replacement Bearings: Bearings furnished; Std., .001", .005", .010", .020" Undersize.

Installing Rods: Number on rod and bearing cap must be on same side and rod installed in same numbered cylinder with nos. down toward oil pan (toward right on right bank rods, toward left on left bank rods) and oil squirt hole on all rods toward right of engine. Rods are offset with widest half of bearing toward rear (right bank), toward front (left bank).

▷**New (Unmarked) Rod Note**—Check right and left bank rods by holding rod up (piston pin end up, oil squirt hole toward you). Left bank rod offset (widest half of bearing) will be toward right, right bank rod offset will be toward left. Mark rods by stamping number on rod and cap on oil squirt hole side (right bank rod), opposite side (left bank rod).

CAUTION—Bearing cap must be assembled on rod with groove in cap and rod on same side.

CRANKSHAFT: 4 bearing, 5 integral counterweights. Vibration dampener mounted on forward end.

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Studebaker Special Data.*

Journal Diameters—2.4995-2.5000".

Bearings—Removable steel backed babbitt lined type. No shims.

Clearance—.0006-.0027".

Rear Bearing Oil Seals—Three seals are used. Cork between the cap and the block, Neoprene between the cap face and the block and the "Brummer" type seal used around the crankshaft journal.

See "Crankshaft Oil Seals" in Studebaker Special Data.

Bearing Adjustment: None (no shims). Replace bearings, do not file caps.

Replacement Bearings: Furnished as sets or single bearings in Std. Size and .001", .010", .020", .030" Undersize.

End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and face of main bearing journal.

End Play—.003-.006".

CAMSHAFT: Five bearing. Helical Drive gear.

▷*CAMSHAFT PRODUCTION CHANGE (Beginning Eng. No. V-164807): New camshaft (cams with smaller base circle) which requires new type Valve Lifters, Rocker Arm Adjusting Screws, and SPECIAL VALVE TAPPET CLEARANCE SETTING. See data below.*

▷*REPLACEMENT CAMSHAFT FOR ENGINES BEFORE NO. V-164807 (to correct cam lobe wear): See "Camshaft & Bearings" in Studebaker Special Data for Camshaft Kits (including other parts which must be installed with new Camshaft).*

Journal Diameters—#1, 1.86974-1.87075"; #2, 1.85375-1.85475"; #3, 1.83875-1.83975"; #4, 1.82275-1.82375"; #5, 1.24475-1.24575".

Bearings—Split steel-backed, babbitted bushings.

▷*NOTE—Oil hole in bushings must be aligned with oil holes in block.*

Clearance—.00075" to .00225" (#1), 0.001" to .00275" (all others).

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

End Thrust: Taken by a thrust plate located between the front camshaft bearing and the camshaft gear. **Endplay**—.005" to .007". *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear, cast-iron. Camshaft gear, Celeron with steel hub. **Backlash**—.001-.003". **Replacement Gears**—Camshaft gear furnished in two sizes: Standard (marked "S"), High-Limit (marked "H"). Crankshaft gear Std. size only.

Timing Gear Removal and Installation—*See "Timing Gears" in Studebaker Special Data.*

Timing Gear Replacement—*See "Timing Gears" in Studebaker Special Data.*

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth on crankshaft gear. *Note—This is the position for #6 cylinder to fire.*

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 13/32"	11/32"	5 11/64"
Exhaust	1 9/32"	11/32"	5 11/64"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	23/64"	.0015-.0035"

NOTE—Rubber seal rings installed on all valve stems (seated in groove on valve stem within spring retainer).

Valve Stem Seal Installation—*See valve spring installation data under "Valve System" in Studebaker Special Data.*

Valve Guides: Pressed in head from underside.

Guide Removal & Installation—*See "Valve System" in Studebaker Special Data.*

Valve Springs: *EXHAUST VALVE SPRING PRODUCTION CHANGE NOTE—Beginning with 1952 Engine No. V-203692, new type exhaust valve spring used. Later type springs can be used on earlier cars in complete sets only.*

EN INE

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Valve Spring Specifications
Intake Valves (1951-52)
Exhaust Valves (1951 & Early 1952)

	Pressure	Length
Valve Closed	67-83 lbs.	2 1/32"
Valve Open	147-169 lbs.	1 43/64"

Exhaust Valves (Late 1952)

	Pressure	Length
Valve Closed	45-55 lbs.	2 1/32"
Valve Open	105-115 lbs.	1 43/64"

NOTE—Dampers used on bottom of all springs.

Spring Removal & Installation—*See "Valve System" in Studebaker Special Data.*

Rocker Arms: Arms are pressure-lubricated from hollow rocker arm shafts and have oil lead to drilled passage in adjusting screw for pushrod lubrication.

►*ROCKER ARM & ADJUSTING SCREW CAUTION: See Replacement Camshaft under "Camshaft & Bearings" in Studebaker Special Data for NEW TYPE ADJUSTING SCREWS required for use with NEW TYPE CAMSHAFT.*

Rocker Arm & Shaft Removal & Installation—*See "Valve System" in Studebaker Special Data.*

Valve Lifters: Straight barrel type. Remove from above (not necessary to remove camshaft).

►*VALVE LIFTER PRODUCTION CHANGES: See "Valve System" in Studebaker Special Data.*

►*VALVE LIFTER CAUTION: See Replacement Camshaft under "Camshaft & Bearings" in Studebaker Special Data for NEW TYPE LIFTER required for use with NEW TYPE CAMSHAFT.*

Valve Lifter Fitting & Installation—*See "Valve System" in Studebaker Special Data.*

Replacement Lifters—Std., & .0005", .001" Oversize. *CAUTION*—When lifters removed, make certain they are re-installed in original positions.

VALVE TIMING

VALVE TAPPET CLEARANCE: *CAUTION—DIFFERENT SETTING REQUIRED FOR EACH TYPE CAMSHAFT (New Camshaft used beginning Engine No. V-164807) and FOR REPLACEMENT CAMSHAFT ON EARLIER ENGINES:*

►**1951 & 1952 Cars (before 1952 Engine No. V-164807)** *WITH 1st TYPE CAMSHAFT (See Identification Note below):* .012-.014" With engine hot & running, .014-.016" With engine cold & standing.

►**1952 Cars (After Engine No. V-164807) AND PREVIOUS CARS WITH NEW TYPE CAMSHAFT** *(See Identification Note below):* .021-.023" With engine hot & running. .023-.025" With engine cold & standing.

►*NEW CAMSHAFT IDENTIFICATION NOTE—All cars with new camshaft requiring different Tappet Clearance marked by Valve Clearance Adjustment Plate attached to two center rocker arm shaft support studs on EACH cylinder head.*

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 11° BTDC. Close 53° ALDC.
Exhaust Valves—Open 50° BLDC. Close 14° ATDC.
Valve Timing Check (ALL Engines)—Set tappet clearance of No. 1 intake valve at .020" (Eng. before No. V-164807 WITH 1ST OR 2ND TYPE CAMSHAFT) or at .030" (Eng. after No. V-164807 or EARLIER ENGINES WITH LATEST TYPE CAMSHAFT). Turn crankshaft until #6 piston is on compression stroke and vibration dampener mark "IN.OP. 1" is approaching pointer on timing gear cover, continue to turn crankshaft slowly while working #1 intake valve rocker arm up and down to determine point at which all clearance is taken up. At point where clearance entirely taken up, dampener mark "IN. OP. 1" should be directly under the pointer.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rods, camshaft bearings and valve lifters. Timing gears lubricated by oil by-passed through a relief valve from the front main bearing. Oil pump mounted on rear main bearing cap.
Crankcase Capacity—6 quarts.
Normal Oil Pressure—40 lbs. at 28 MPH.
Oil Pressure Regulator—Located on the right side at the front of the cylinder block slightly above the crankcase flange. Opens at 40 lbs. Not adjustable. *If necessary to increase oil pressure, install new spring.*

Oil Pan Removal: *See Studebaker Special Data.*

Oil Pump: Helical gear type. Mounted on rear main bearing cap.
Oil Pump Removal & Installation—*See "Oil Pump" in Studebaker Special Data.*

Oil Pressure Gauge: Stewart-Warner Bourden Tube (not electric).

Crankcase Ventilation: Filter element in oil filler cap (air intake) and breather tube at right rear of engine (air outlet). Air enters crankcase through filler tube and passes out through hole at rear into valve lifter chamber, then forward and through hole in cover baffle plate, to rear through cover and out through breather pipe.
Servicing—Wash both filter elements in kerosene and re-oil at *1000 mile intervals or more often if* required by operating conditions.

►**Breather Tube Filter Note**—Remove filter element (retained in lower end of tube by cotter pin) for servicing.

COOLING

Cooling System: Positive circulation with pump mounted on front of block with fan.
Capacity—17.25 qts. (1951), 17.5 qts. (1952); 19 qts. (with Climatizer).
Pressure Valve—Radiator Filler Cap, Studebaker No. 516009 (1951), No. 531826 (1952). *NOTE*—1952 type stamped "7" and opens at 7 lbs.

Water Pump: Packless type. No lubrication required. *See Water Pump Section for complete data.*
Removal—Remove fan belt and fan and pulley assembly. *Remove all hoses from pump and take out* the 4 capscrews holding pump to block. Remove pump and 4 gaskets.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Bellows type. Located in water outlet in pump body.
Setting—151°-155°.

Temperature Gauge: Stewart-Warner electric type.
Dash Unit—Studebaker No. 526739.
Engine Unit—Studebaker No. 530127 (with 529456 Adapter). Located at the rear of the left bank cylinder head in the water passage cover plate.

CLUTCH

Borg & Beck Model 9A7. Cover Assembly No. 926. Single plate dry disc type.
See Clutch Section for complete data.

Facings—Molded asbestos type, 2 required. I.D. 6", O.D. 9¼". Thickness .125".

Adjustment: Pedal free travel ½" to 1". To adjust, unhook pullback spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.
Hill-Holder Note—Check setting whenever clutch pedal adjusted and adjust Hill-Holder-to-release just as clutch engages. Adjusting nut and locknut at end of Hill-Holder operating rod.

Clutch Housing Removal: Remove distributor, remove starter and tie up out of the way (not necessary to disconnect cables), remove front floor plate, take out upper clutch housing capscrews. Remove transmission (see Transmission). Take out clevis pin in clutch operating shaft-to-release shaft sleeve, pull operating shaft out and remove sleeve. Remove parking brake cable shield clip, unhook brake pedal pullback spring from cross-member, support engine weight on jack under rear end of oil pan (use block of wood on jack to prevent damage to pan), take out engine rear support bolts, remove lower support insulators. Take out clutch operating shaft support bracket bolts. Remove cross-member. Loosen exhaust pipe flange nuts at manifold, remove exhaust pipe support bracket-to-clutch housing bolts, loosen clamp and swing bracket out of the way. Take out all clutch housing bolts, remove clutch housing.

►**Installation Caution**—Align mounting holes of the cross-member and the frame and install the retaining bolts—do not tighten the bolts until the operating shaft support bracket bolts are installed.

Clutch Removal: Remove clutch housing (above), remove *six screws evenly to relieve pressure, lift off* clutch assembly and driven member.

TRANSMISSI N

Warner Model AS53-T86E (Std.), AS54-T86E with Model R10B type Overdrive (Optional). All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data.

Transmission Control—Remote control type with gear shift lever mounted on steering column.
See Transmission Section for complete data.

Removal: Drain transmission. Disconnect hand brake cable and move out of way for clearance. Disconnect front universal at transmission (wire caps or use clamps to prevent losing rollers). Take out center support bearing mounting bolts. Push front shaft and support to rear (will slide on splines on rear shaft). Disconnect shift rods from levers on case and speedometer cable (remove speedometer pinion). On Overdrive transmission disconnect all control wires and cable. Take out transmission to clutch housing capscrews, pull transmission straight back and remove from car.

OVERDRIVE

Warner R10 Type (part of AS54-T86E Transmission). New governor controlled type (no centrifugal pawls) with electrical solenoid operation and throttle controlled kick-down.
NOTE—Overdrive is new "Centered Ring Gear" type.
See Transmission Section for complete data.

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Overdrive Solenoid—Warner Model No. 3AR10B-62, Studebaker No. 521429.
Overdrive Governor—Warner Model No. AR10B-72, Studebaker No. 520454.
Control Relay—Auto-Lite HRT-4001, Studebaker No. 523297.
Throttle Kick-down Switch—Studebaker No. 529479.
Lock-out Switch—Studebaker No. 521436.
Fuse—20 ampere. On overdrive relay.

Removal: See Std. Transmission removal data.

AUTOMATIC TRANSMISSION

Torque converter and 3 speed automatic transmission with hydraulic control. Has mechanical parking lock and Anti-creep device which holds brakes applied when car standing and ignition "on."

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmission" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "Studebaker Automatic Transmission" in Transmission Section.*

Lubrication—Check oil level every 1000 miles and maintain oil level at "Full" mark on dip stick. Drain and refill every 15,000 miles.
Recommended Lubricant—Automatic Transmission Fluid Type A (in container with "AQ-ATF" marking).
NOTE—Above fluid supersedes engine oil previously specified for these transmissions.
Capacity—11½ qts.
Checking Oil Level—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Remove inspection cover on front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dip stick gauge. Add oil as required to bring level up to "FULL" mark on dip stick (1 pint between "LOW" and "FULL").

▷*CAUTION—Do not fill above "FULL" mark.*

Draining and Refilling—*See "Studebaker Automatic Transmission" in Transmission Section.*
Linkage Adjustment—*CAUTION*—Two types of Linkage used. Adustments are different. *See "Studebaker Automatic Transmission" in Transmission Section.*

▷*OTHER AUTOMATIC TRANSMISSION SERVICE DATA: See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer Model 1268-111X (Front & Rear), 1261-102X (Intermediate). Needle type bearing. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft).

Propeller Shaft and Support Bearing: Two shafts used. Front shaft with intermediate universal yoke. Rear shaft with slip-joint on forward end at intermediate universal.

▷*1951-52 DRIVE LINE VIBRATION CORRECTIONS (Cars with Automatic Transmission)* May be noted as momentary shudder at 8-10 MPH (may appear at 18-25 MPH) while accelerating or in hill climbing. Correct as follows:
1) Relocation of Propeller Shaft Center Bearing (1951 Cars before Commander Serial No. 8216042, Land Cruiser No. 8215697): On these cars with support bearing mounting holes located in cross-member at horizontal center-line of support bearing hole, raise the support bearing mounting by drilling new holes ½" to ⅝" **above and directly in line with original holes** (CAUTION—Any deviation in alignment or in equality in height of holes may cause other drive line disturbances).
2) Realignment of Propeller Shaft Universal Joints (1951 Cars & 1952 Cars before Serial No. 8228649): Beginning with this serial number, universal joint on splined stub shaft was turned 90° out of phase with front propeller shaft universal joint yoke. This correction may be made on cars **before** above serial number by withdrawing splined shaft at center bearing and turning it four splines in either direction. Transmission shaft yoke, spline shaft yoke, and pinion shaft yoke should be on same plane.
Propeller Shaft & Support Bearing Removal & Servicing—*See Studebaker Special Data.*

REAR AXLE

Spicer Model 44-3. Semi-floating, Hypoid Gear, with Hotchkiss Drive.
See Rear Axle Section for complete data.

Axle Ratios

Std. Trans.	4.09-1
Overdrive	(1951) 4.56-1, (1952) 4.55-1
Auto. Trans.	3.54-1

NOTE—Rear Axle Ratio stamped on plate attached to axle by cover capscrew and also on gears.
Backlash—.003-.006". Shim adjustment.

Removal: Remove hub caps, take out cotter pin from axle shaft nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs and drums. Disconnect hand brake cable. Take out backing plate bolts from backing plate, free hydraulic brake lines from axle housing clips (do not disconnect brake lines). Backing plates and shims can then be wired to frame (do not disconnect brake lines from wheel cylinders). Disconnect rear universal (wire caps or use clamps to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.

Axle Shaft Removal—Remove wheel, remove wheel hub (use puller J-596-A). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame *(CAUTION—do not lose adjusting shims located between backing plate and axle housing flange).* Pull axle shaft assembly (Puller HM-931).

Wheel Bearing Adjustment: Use dial indicator to check axle shaft end-play. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick).
Endplay—.001-.005".

SHOCK ABSORBERS

Houde & Monroe—Direct acting, hydraulic type.

	Front	Rear
U. S. Cars (Std.)	527924	530766
U. S. Cars (Hvy. Duty)	530971	530972
U. S. Cars (1952 Optl. Hvy. Duty)	531884	531885
Canadian Cars (Std.)	530507	530512
Canadian Cars (Hvy. Duty)	530508	530513

FRONT SUSPENSION

Independent type with coil springs and Direct Acting shock absorbers located within the springs.
See Front Suspension Section for complete data.

▷*1952 WHEEL BALANCING NOTE:* If wheel spinner does not rotate wheel at sufficiently high speed, floating reverse shoe can be moved away from drum by backing off bearing adjusting nut far enough to move wheel out ¼", then shake wheel and drum assembly to loosen reverse shoe. DO NOT apply service brakes until balancing operation completed.
Kingpin Inclination—5¼° crosswise.
Caster—Neg. 1° to Neg. 2½°. Not more than ¾° variation between wheels. Eccentric pin adjustment.
Camber—0° to Pos. 1° with ½° more camber favored on driver's side. Eccentric pin adjustment.
Toe-In—1/16" to 1/8". **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so the steering gear arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments on left hand tie rod.
Toe-out on Turns—Inner wheel turned 23½° ± 1°, outer wheel turned 20°.

STEERING GEAR

1951—**Ross Model T-14.** Cam-and-Twin Lever type.
1952—**Saginaw.** Worm & Roller type.
See Steering Gear Section for complete data.

BRAKES

Service: Lockheed (Wagner Electric) Hydraulic, Self-centering, Self-adjusting type.
See Brake Section for complete data.

▷*1952 BRAKE NOTE*—Brake shoe return spring is NOT hooked to reverse (secondary shoe, but acts only on the forward (primary) shoe. Return spring is hooked to backing plate behind reverse shoe.

Drums—Composite type. Diameter 11".

Clearance—If adjustment required, *see "Lockheed (Wagner) Hydraulic Self-Adjusting Brakes" in Brake Section.*

▷*1952 ADJUSTING NOTE*—Reverse shoe eccentric must remain in "off" position at all times.

Lining—Molded type (all shoes). Width 2". Thickness 3/16". Length, (Front wheels) 22¼", (Rear wheels) 18½".

Braking Power—57% Front, 43% Rear.

Hand Brake: See Service Brake data above.

Hill-Holder: Std. on Std. Trans. Cars. *See Brake Section for complete data.*

Anti-Creep (for Automatic Transmission Cars)—*See Brake Section for complete data.*

MISC. MECHANICAL

CONVERTIBLE TOP CONTROL: Electric type with motor mounted on left hand lift assembly (right hand lift driven through flexible drive).
See Miscellaneous Section for complete data.

WINDSHIELD WIPER: Redmond. Electric type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door lock post (First 1952 Cars), hinge post (Later Cars).

Starting Serial Nos.—	1952	1953
South Bend	G-1115501	G-1197501
Los Angeles	G-907301	G-997701
Hamilton	G-735701	G-745101

ENGINE NUMBER: Stamped-on-pad-on-upper-front-left corner of engine block.

Starting Engine Nos.—	1952	1953
South Bend & Los Angeles	911501	1004001
Hamilton	C-36722	C-46501

►*NOTE—Letter "A" following engine number indicates crankshaft main bearing journals .005" Undersize.*

TUNE-UP

COMPRESSION PRESSURE: 120-140 lbs. at 150 RPM.

VACUUM READING: 17-18" idling at 8 MPH.

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAPS: .030" (.028-.033").
Plugs—Champion J-7.

DISTRIBUTOR: Auto-Lite No. IAT-4010. Full automatic advance type with vacuum spark control.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—39° ± 3°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

COIL: Auto-Lite No. CR-6007.
Ignition Current—½-1½ amps. idling, 4-5 stopped.

CONDENSER: Auto-Lite No. IAT-3076L.
Capacity—.21-.25 microfarad.

IGNITION TIMING: 2° BTDC (idling at 550 RPM.).
Timing Mark—On vibration dampener. "IGN" mark in line with pointer (left side of timing cover).
Octane Selector Setting—After setting timing (above), adjust Octane Selector until engine pings when hot and pulling hard, then retard timing by turning distributor counter-clockwise (move pointer toward "R") until ping disappears.
Timing Procedure—*See Ignition Timing.*

CARBURETION: Carter WE. 1¼" single barrel, down-draft type with automatic choke and fast idle.

Car Model	Carter WE No.
1952	715S
1953 (Early)	989S
1953 (Later)	989SA

►*ACCELERATION HESITATION OR STUMBLE (First 989S Carburetors): See "Carter WE" Carburetor in Carburetor Section.*

►*IMPROVED PART-THROTTLE ACCELERATION & OTHER CARBURETOR PRODUCTION CHANGES: See "Carter WE" Carburetors in Carburetor Section.*

Idle Setting—½-1½ turns open. Turn screw out for richer mixture.
Idle Speed—(Synchro-mesh Cars) 550-650 RPM. or 8-10 MPH. (Auto. Trans. Cars) 500-550 RPM. with selector lever in Neutral "N" position.
Float Level—⅜". Measured from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and bowl cover assembly inverted.
Accelerating Pump—No seasonal adjustment.

Automatic Transmission Throttle Linkage Adjustment: *See "Studebaker Automatic Transmission" in Transmission Section for complete data.*

Fast Idle Setting: .046" throttle opening with choke valve in closed position. To check, crack throttle valve, close choke valve, move throttle valve toward closed position as far as possible. Measure remaining throttle valve opening on side opposite idle ports (.045" end of Gauge T109-158 can be used). Adjust by bending choke connector rod at lower angle.

Choke Adjustment: 1 point lean.

Fuel Pump Pressure: 4-5 lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type.
To Check—With outer end of coil free from anchor, and valve closed (counter-weight up), hooked end of coil should be 90° from anchor post at 70°F.

VALVE TAPPET CLEARANCE: .016" All valves, cold. Self-locking tappet screws used.

IGNITION

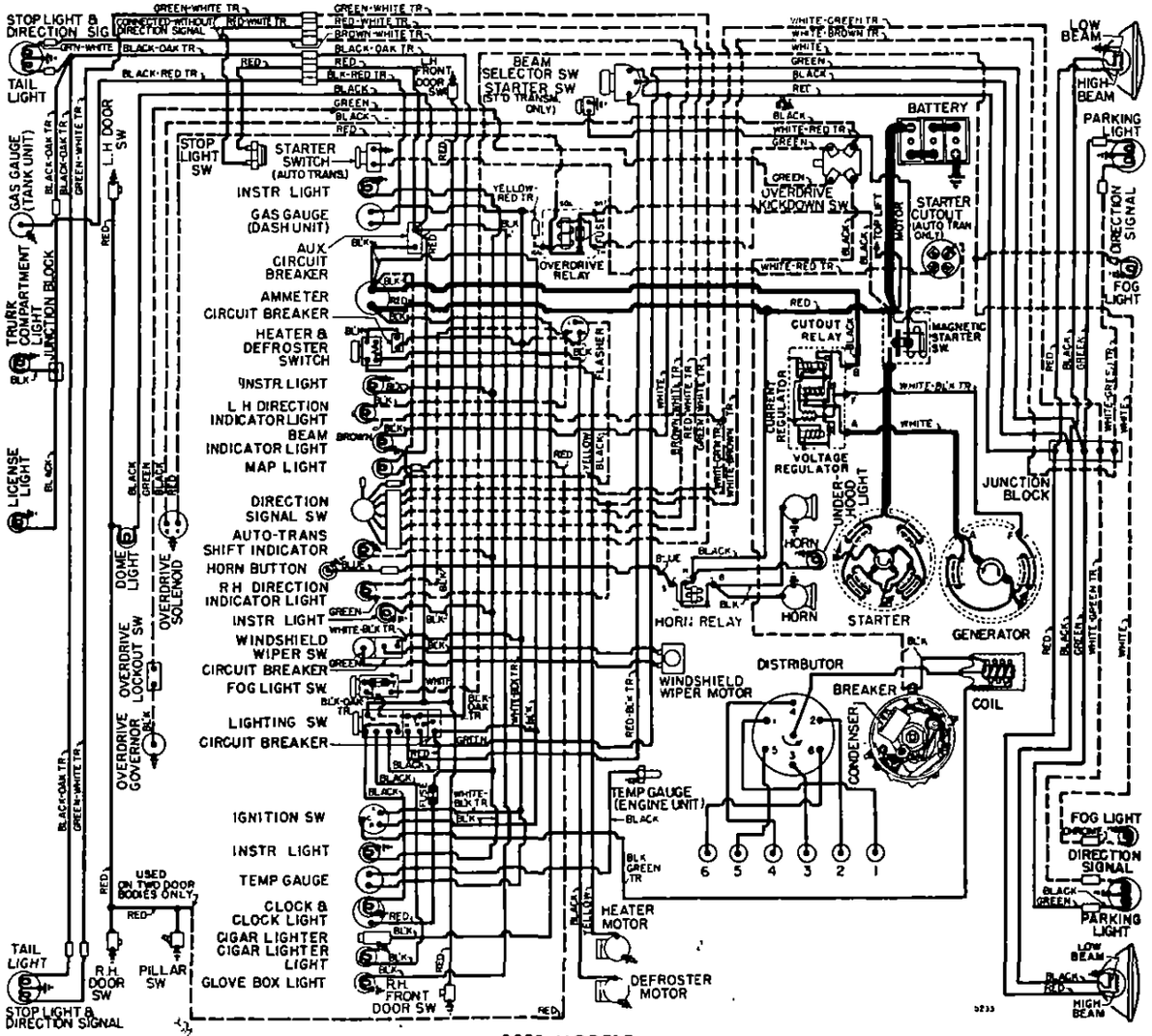
IGNITION SWITCH: Studebaker No. (1952) 521955, (1953) 532500.
Ignition Lock—Yale & Towne.

COIL: Auto-Lite CR-6007. On engine above distributor.
Ignition Current—½-1½ amps. idling, 4-5 stopped.

CONDENSER: Auto-Lite No. IAT-3076L.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Auto-Lite No. IAT-4010. Full automatic advance type with vacuum spark control. "Pivoted Breaker Plate" type.
Breaker Gap—.020". Limits .018-.022".

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1952 MODELS

CONTINUED FROM PRECEDING PAGE

Cam Angle—39° ± 3°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Octane Selector—Provides for minor changes in ignition timing at distributor. See Ignition Timing.

Automatic Advance

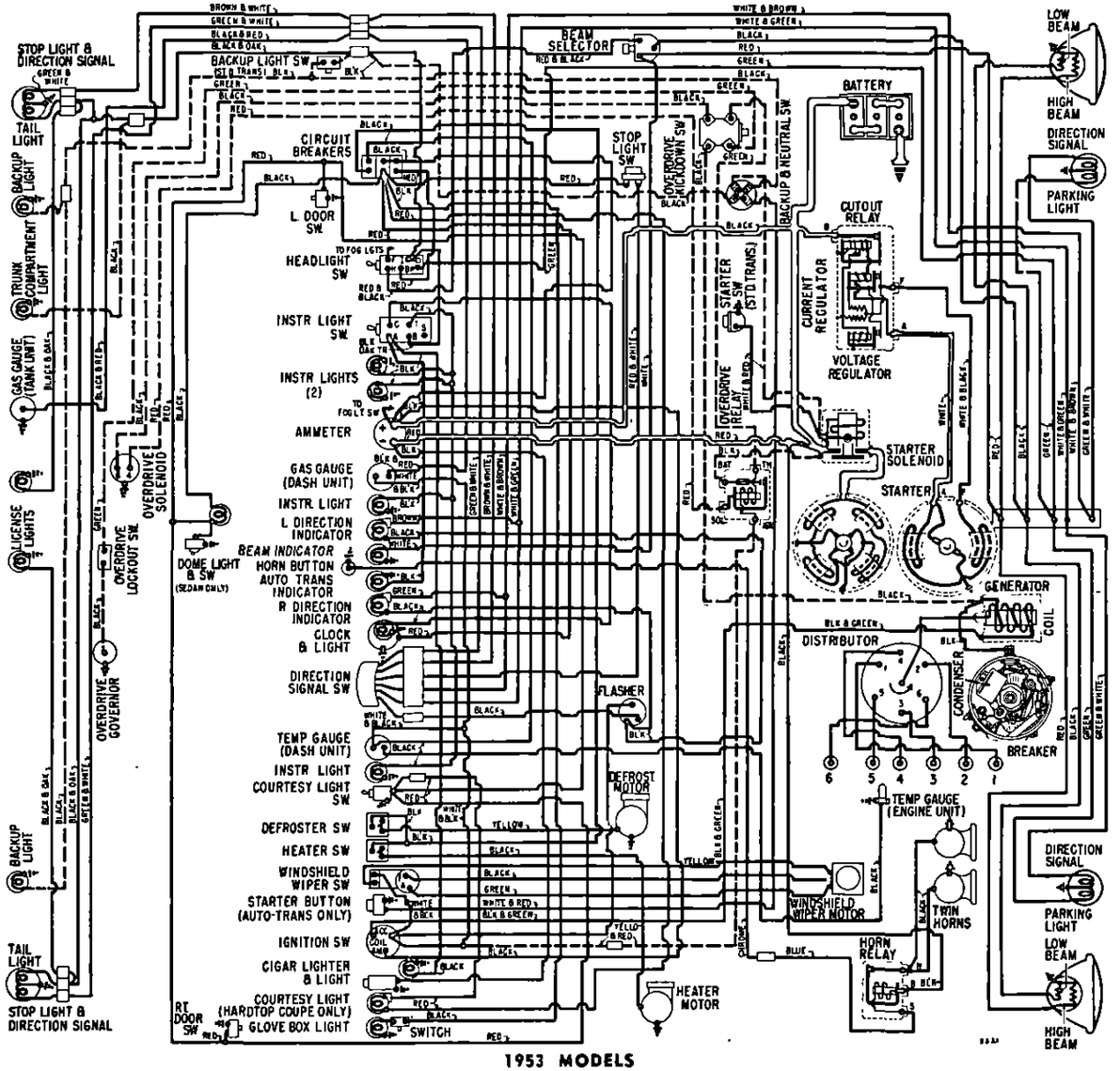
Distributor Degrees	R.P.M.	Engine Degrees	R.P.M.
Start	400	0°	800
2°	680	4°	1360
4°	975	8°	1950
6°	1265	12°	2530
7°	1400	14°	2800

Vacuum Spark Control: Integral type linked directly to breaker plate.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4"
1°	2°	4⅞"
4°	8°	7½"
8°	16°	11⅛"
9°	18°	12"

Distributor Installation Note: Crank engine to firing position for #1 cylinder (dampener mark 'IGN' at pointer on timing gear cover), sight down distributor shaft hole to check that distributor drive tongue is parallel to camshaft and that narrow half of offset is toward camshaft. Turn rotor to #1 segment, install distributor.



1953 MODELS

IGNITION TIMING

Std. Setting ..... 2° BTDC
Timing Mark—"IGN" mark on vibration dampener and pointer on left side of chain case cover.
Timing—Disconnect vacuum advance pipe at carburetor and plug hole in throttle body. Center octane selector. Idle engine, direct timing light at vibration damper and pointer, rotate distributor until 'IGN' mark aligns with pointer. Check Octane Selector (below):
Octane Selector Setting—After setting timing (above), loosen selector hold-down screw, advance by turning distributor clockwise (toward "A" mark on scale) until engine pings when wide-open between 10-30 MPH. Then retard until ping disappears.

CARBURETOR

Carter WE. 1¼" single barrel, downdraft type with automatic choke and fast idle.

Car Model	Carter WE No.
1952	715S
1953 (Early)	989S
1953 (Later)	989SA

▷*ACCELERATION HESITATION OR STUMBLE (First 989S Carburetors): See "Carter WE" Carburetor in Carburetor Section.*

▷*IMPROVED PART-THROTTLE ACCELERATION & OTHER CARBURETOR PRODUCTION CHANGES: See "Carter WE" Carburetors in Carburetor Section.*

Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Automatic Transmission Throttle Linkage Adjustment: *See "Studebaker Automatic Transmission" in Transmission Section for complete data.*

Fast Idle: Carter Single Barrel Carburetor type.
Setting—.046" throttle opening with choke valve closed. To check, crack throttle valve, close choke valve, move throttle valve toward closed position as far as possible. Measure remaining throttle valve opening on side opposite idle ports (.045" end of Gauge T109-158 can be used). Adjust by bending choke connector rod at lower angle.
See Carburetion Equipment Section for complete data.

Automatic Choke: Carter Climatic Control (Single Carburetor type).
Setting—1 point lean.
See Carburetion Equipment Section for complete data.

CARB. EQUIPMENT

Air Cleaner: Oil-wetted type Std., Oil-bath type Optl.

Studebaker No.—	1952	1953
Dry (Oil-wetted type)	519861	533022
Wet (Oil-bath type)	531658	533103

Servicing (Dry Type)—Service every 1,000 miles (more often under dusty conditions) by taking off cover, removing filter element and SHAKING off dust (*CAUTION*—Do not use compressed air or solvent cleaners). Replace filter element every 6 months or 10,000 miles. Use Studebaker No. 533334 (for 533022 Cleaner), AC No. 1 (for 519861 Cleaner) replacement filter elements.
Servicing (Oil-bath Type)—Service weekly (or more often in dusty areas). Remove filtering ele-

ment, wash in solvent, drain thoroughly, clean out lower oil base and install 1 pint SAE. engine oil (to level of indicator mark). Use SAE No. 40 or 50 (above 32°F), No. 20 (below 32°F).

Fuel Pump: AC Diaphragm type (Std.), Combination fuel-and-vacuum pump (Optl.).

►***FUEL PUMP ROCKER ARM SHAFT OIL LEAKAGE:*** Install new rocker arm pin and plugs furnished in kit, Part No. 532462. ***DO NOT USE ON COMBINATION FUEL & VACUUM PUMPS.***

Replacement Pumps—AC 9817 (Std.), 9559 (Optl.).
Pressure—4-5 lbs. maximum.
See Carburetion Equipment Section for complete data.

Gasoline Gauge: Stewart-Warner Electric type.
Dash Unit—Studebaker No. (1952) 530048 for LHD Cars, 526717 for RHD Cars, (1953) 532593.
Tank Unit—Studebaker No. (1952) 525548, (1953 Exc. Coupe & Hardtop) 525548, (1953 Coupe & Hardtop) 532261.

►***TANK UNIT CAUTION—Above tank units NOT interchangeable (will give incorrect reading if installed on wrong models).***

See Carburetion Equipment Section for complete data.

BATTERY

Willard HDW-1-100, 6 volt, 15 plate, 100 ampere hour capacity (20 hour rate).
Starting Capacity—300 amperes for 3.5 minutes. Five Second Voltage 4.3 volts.
Grounded Terminal—Positive (+) to cylinder head.
Location—Left side of engine compartment.

STARTER

Auto-Lite Model MZ-4157.
Armature No.—Auto-Lite No. MZ-2211.
Drive—Barrel type Bendix Drive No. A1792.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4000	5.0	68
4.4 "	Lock	2.0	280

Starting Switch: Magnetic switch mounted on starter and controlled by manual switch.
Std. Trans. Cars—Auto-Lite SW-4016 (Studebaker No. 519829) mounted on toeboard under clutch pedal and operated by fully depressing pedal.
Automatic Trans. Cars—Studebaker No. 531716 pull switch on instrument panel and Delco-Remy No. (1952) 1997882, (1953 Power Steering) 1998041, combination starter cut-out and backing light switch, (1953 without Power Steering) 1998038 Neutral Safety Switch, mounted on steering column. Starter operative only with transmission selector lever in "N" or "P" positions.

GENERATOR

Auto-Lite GGW-4801-A (Early), GGW-4801-C (Later). Two brush, with voltage and current regulation.
Armature—Auto-Lite No. GGW-2006F.
Maximum Charging Rate—See table below.
Charging Rate Adjustment—None. See Regulator.

Performance Data

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40	8.0	1800-2000	2150-2350
45	8.0	1925-2125	2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ounces (new brushes).
Field Current—1.4-1.5 amperes at 5.0 volts.
Motoring Current—4.8-5.3 amperes at 5.0 volts.

Belt Adjustment: Move generator out until ⅜-½" belt deflection midway between generator and fan pulleys is obtained.

REGULATOR

Auto-Lite Model VBE-6101A. Voltage and current type with "Temperature Compensated" current regulator.
See Electrical Equipment Section for complete data.
NOTE—Regulator case cover sealed. Serviced on exchange basis if seals not broken.

Cutout Relay

Cuts In—6.3-6.8 volts.
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts ***after 15 minutes operation charging at ½ maximum rate.***
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—***See Electrical Equip. Section.***

Current Regulator

SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.

Test A	Operating Amperes	Test B
52	45	(43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—***See Electrical Equip. Section.***

LIGHTING

Headlamps: Sealed Beam. ***See Electrical Equip. Section.***
Directional Signal: ***See Electrical Equipment Section.***
Directional Signal Lamps—Separate bulbs for front lamps, integral with stop lights in rear.

Switches

Lighting—Studebaker No. (1952) 530058, (1953) 532134.
Instrument Light—Studebaker No. (1953) 532132.
Beam Selector—Studebaker No. 519246.
Direction Signal—Studebaker No. (1952) 530468P, (1953 Factory Installed) 533518, (1953 Field Installed) 533243.
See Electrical Equipment Section for complete data.

►***DIRECTIONAL SIGNAL NOTE—(Factory Installed) Switch Plate stamped "4HD-A". (Field Installed) Switch Plate stamped "4HD-B".***

MISC. ELECTRICAL

CIRCUIT BREAKERS: Four circuit breakers mounted as a unit behind instrument panel. Thermostatic type.
1) Lighting—30 ampere. Protects all Lighting Switch circuits.
2) Auxiliary—20 ampere. Protects Stop Light, Dome Light, Courtesy Light, Clock, Glove Box Light, and Underhood Light circuits.
3) Heater & Defroster—20 ampere. Protects Climatizer and Defroster circuits.
4) Convt. Top Motor—40 ampere.

FUSES: Clock—3 ampere. In clock lead.
Direction Signal—14 ampere. In Flasher lead.
Overdrive—20 ampere. On Overdrive Relay.
Fog Lights—20 ampere. On Fog Light Switch.
Radio—14 ampere.

HORNS: Delco-Remy No. 1999683 (Low Note), No. 1999684 (High Note). Airtone twin horns with relay.
Horn Current—12-15 amperes.

Horn Relay: Delco-Remy No. 1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

ENGINE SPECIFICATIONS: Six cylinder, "L" head.
Bore—3". **Stroke**—4".
Displacement—169.6 cu. ins. **Rated H.P.**—21.6.
Developed Horsepower—85 at 4000 RPM.
Compression Ratio—7.0-1 (Synchro-mesh Trans. (Cars), 7.5-1 (Auto. Trans. Cars).
Compression & Vacuum Reading—***See Tune-Up.***

►***1952 ENGINE VIBRATION AT LOW SPEED CORRECTION: See "Engine Mountings" in Studebaker Special Data.***

ENGINE & OIL PAN REMOVAL: ***See Studebaker Special Data. NOTE—Not necessary to remove engine for pan removal.***

CYLINDER HEAD & TIGHTENING TORQUES: ***See Studebaker Special Data.***

PISTONS: Lynite aluminum alloy, cam ground, T-slot, bearing-metal plated type. **Length**—2 29/32".
Weight—9.14 ozs. (without rings or pin).
Clearance—Selective fit (see Fitting Pistons).
Removal—Pistons and rods removed from above.

Original Bore & Pistons: ***See Studebaker Special Data.***

Fitting New Pistons: With piston inverted, slotted side away from camshaft, and with bottom of piston about 1" below top of block, insert a 1" x .002" x 12" feeler gauge on camshaft side of piston. Pull to withdraw feeler should be 11 to 16 lbs.

Replacement Pistons: Furnished Standard and .010" .020", .030", .040" Oversize. ***See "Pistons" in Studebaker Special Data.***

Installing Pistons: T-slot away from camshaft.

PISTON RINGS: Two compression, one oil control ring per piston. All above pin.

Ring	Width	End Gap	Side Clearance
Comp. #1	3/32"	.007-.017"	.002-.006"
Comp. #2	1/8"	.007-.017"	.002-.006"
Oil #3	5/32"	.007-.017"	.0015-.006"

Installing Rings: Step up top ring, step down 2nd ring.
Replacement Rings: Sets furnished Std. size and .020", .030", .040" Oversize. Single rings Std. size and .010", .020", .030", .040" Oversize.

PISTON PIN: Diameter .7491-.7495". **Length** 2⅝". Pin is locked in rod by tapered pin and locknut.
Pin Fit in Piston—.0001-.0003" clearance or light finger-push fit at room temperature (70°F.).

Pin Removal & Installation: ***See Studebaker Special Data.***

Replacement Pins: Std. & .0025". .005" oversize. Use Hone No. PH-1 to obtain proper piston pin fit.
Note—Replacement pistons fitted with pins.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

CONNECTING ROD: Length 6⅜". **Weight** 20.48 ozs.

▷*CONNECTING ROD & CAP CAUTION—Two types of connecting rods and bolts used. Bolt head seat on rod not undercut on new type rod. DO NOT USE OLD TYPE BOLTS (Not chamfered on underside of head) ON NEW TYPE RODS. New type bolts (Part No. 533801) interchangeable on old type rods. Connecting rods are interchangeable providing correct bolts are used.*

Crankpin Journal Diameter—1.81175-1.81275".

Lower Bearing—Interchangeable steel-backed, micro-babbitt lined type. No shims.

Clearance—.00005-.00215". **Sideplay**—.005-.009".

Bearing Adjustment: None (no shims). Replace bearings. Do not file rods or bearing caps.

Replacement Bearings: Bearings furnished Std. Size and .001", .005", .010", .020" Undersize.

Installing Rods: Lower bearings "offset." Install rods with narrow portion of bearing toward nearest main bearing. Rods (#1, 3, 5) can not be interchanged with rods (#2, 4, 6). Numbers on rods and caps must be together and installed in same numbered cylinders, with oil hole in lower end toward camshaft side.

CRANKSHAFT: Four bearing type with integral counterweights. Vibration dampener on front end.

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Studebaker Special Data.*

Journal Diameters—2.4370-2.4375" (All) Std.

▷*CAUTION—Journals are .005" Undersize on engines with letter "A" following Engine Number.*

Clearance—.0005-.0025".

Rear Bearing Oil Seal—Two-piece rubber ring on crankshaft, neoprene strips in grooves on top of bearing cap; and two specially treated wood strips in grooves on sides of bearing cap.

See "Crankshaft Oil Seals" in Studebaker Special Data.

▷*CAUTION—Install new wood oil seals (above) each time rear main bearing cap removed and re-installed.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps.

NOTE—Front oil pan seal block may be removed for access to front main bearing cap by removing four lower timing gear cover retaining screws. Use only malleable iron type filler block on these cars.

▷*CAUTION—Do not securely tighten timing gear cover-to-filler block screws until after oil pan screws tightened uniformly and securely.*

Replacement Bearings: Furnished as sets or single bearings Std. & .001", .005", .010", .020", .030" U. S.

End Thrust: Taken by thrust washer assembled between front main bearing and crankshaft gear. Controlled by shims between thrust washer and main bearing journal. Adjust by changing shims (.003", .005", .007" thick). **Endplay**—.003-.006".

CAMSHAFT: Four-bearing type. Helical gear drive.

Journal Diameters—#1, 1.7475-1.7480"; #2, 1.7162-1.7170"; #3, 1.6857-1.6865"; #4, 1.6232-1.6240".

Bearings—Split, steel-backed, babbitted bushings.

Clearance—.0007-.0022" (#1), .0010-.0027" (others).

Bearing Adjustment: None. Replace bushings with camshaft removed. NOTE—Align bushing oil hole with oil hole in block.

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

End Thrust: Taken by thrust plate assembled on front face of engine block behind camshaft gear (spacer assembled on shaft behind gear hub).

Endplay—.003-.006". *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear Cast Iron, Camshaft gear Celeron with steel hub.

Backlash—.001-.003".

Timing Gear Replacement—*See "Timing Gears" in Studebaker Special Data.*

Replacement Gears—Camshaft gear furnished in two sizes: Standard (marked "S"), High Limit (marked "H"), Crankshaft gear furnished Standard size only.

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 11/32"	5/16"	4 11/32"
Exhaust	1 9/32"	5/16"	4 11/32"

	Seat Angle	Lift	Stem Clearance
All Valves	45°	11/32"	.0015-.0035"

Valve Seat Width—3/32".

Valve Guides: Pressed in block from above with top of guide 1 3/16" below top of block. Finish ream guides to inside diameter of .312-.3125". Use Valve Stem Guide Remover and Replacer Tool J-2034. Replace worn guides if clearance greater than .0035".

Valve Springs: Install with closed coil end up. Replace springs if over 10% weaker than pressure listed.

	Spring Pressure	Length
Valve Closed	49-54 lbs.	1 21/32"
Valve Open	93-103 lbs.	1 5/16"

NOTE—Install valve spring retainer with flange engaging flat surface on lower coil and tongue on inner diameter engaging groove in spring lock.

Valve Lifters: Mushroom type. Remove from below with camshaft out of the engine.

Valve Lifter Tension Spring—*See "Valve System" in Studebaker Special Data.*

Clearance—.0005-.00175".

Replacement Lifters—Furnished Std. size and .0005", .001" Oversize.

VALVE TIMING

Tappet Clearance: .016" All Valves, Engine cold.

NOTE—Self-locking tappet adjusting screws used. Tappet screw tension should be 25 in.lbs. minimum.

Valve Timing: See Camshaft Setting above.

Intake Valves—Open 15° BTDC. Close 49° ALDC.

Exhaust Valves—Open 54° BLDC. Close 10° ATDC.

Valve Timing Check—Set #1 intake valve to .020". Turning engine with #6 cylinder on compression stroke the intake valve should start to open when the mark "IN-OP 1-6" on front dampener lines up with pointer.

LUBRICATION

Lubrication System: Pressure to crankshaft, connecting rod, and camshaft bearings and to valve lifters. Timing gears lubricated by oil by-passed by pump.

Crankcase Capacity—5 qts. ("Add Oil" point on oil level indicator stick is 3 qt. level).

Normal Oil Pressure—20-40 lbs. at 40 MPH.

Oil Pressure Relief Valve—On lower right front corner of engine. Opens at 40 lbs. Adjustable by inserting shims between outer end of spring and plug.

Oil Pump: Helical gear type. Mounted externally on right hand side of crankcase.

Oil Pump Removal & Installation—*See "Oil Pump" in Studebaker Special Data.*

Oil Filter: Optl. Replace filter cartridge at 5000-6000 mile intervals (more often in dusty areas).

Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe on left rear of engine (air outlet).

Servicing—Wash both filter elements in kerosene and re-oil at regular intervals. NOTE—filter in outlet pipe removed by taking out cotter pin.

Oil Pressure Gauge: Studebaker No. (1952) 530050, (1953) 532596. Not electric.

COOLING

Cooling System: Pressure type with relief valve in filler cap and water pump on front of block.

Capacity—10 qts. **With Heater**—11½ qts.

Pressure Valve—Studebaker No. 531826 (stamped "7"). Radiator Filler Cap. Opens at 7 lbs.

▷*CAUTION*—Cars with Pressure Cap must have Dole type thermostat (see below). Previous "bellows" type thermostat MUST NOT BE USED ON CARS WITH PRESSURE CAP (may cause higher-than-normal engine operating temperatures).

Water Pump: Packless, sealed ball bearing type.

See Water Pump Section for complete data.

Removal—Slack off drive belt, take out capscrews in the fan pulley hub & remove fan blades. Disconnect hose connection, take out mounting screws in pump body flange, withdraw pump from engine.

Belt Adjustment—See Generator Belt Adjustment Studebaker No. 531470 (Std.), No. 532017 (High Temp. for use with permanent type Anti-freeze).

▷*CAUTION—The above thermostats must be used on all cars with radiator pressure cap.*

Setting (Std.)—Starts to open 155°F.

Setting (High Temp.)—Starts to open 170°F.

Temperature Gauge: Stewart-Warner Electric type.

Dash Unit—Studebaker No. (1952) 530051, (1953) 532597.

Engine Unit—Studebaker No. 530127 (without adapter).

CLUTCH

Borg & Beck Model 8A7 with Borglite Driven Member. Single plate, dry disc type. NOTE—Clutch assembly marked by number 980 stamped on cover.

See Clutch Section for complete data.

Facings—Molded Metallic type, 2 required. I. D. 5⅜". O. D. 8". Thickness .125".

▷*CAUTION—Special driven member used on cars with Overdrive. Identify each type by hub damper spring color as follows:*

	Damper Spring Color
Cars with Conventional Trans.	2 Lavender, 2 Black
Cars with Overdrive Trans.	4 Lavender

Pedal Adjustment: Pedal free travel ½" to 1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.

Hill-Holder Note—Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages.

Clutch Housing Removal: Remove distributor and oil level gauge adapter, remove starter and tie up out of the way (not necessary to disconnect cables), remove front floor plate, take out upper clutch housing cap screws. Remove transmission (SEE TRANSMISSION). Disconnect clutch pedal rod at operating shaft-to-release shaft sleeve, pull operating shaft out and remove sleeve. Remove parking brake cable shield clip, unhook brake pedal pullback spring from cross-member, support engine weight on jack under rear end of oil pan (use block of wood on jack to prevent damage to pan), take out engine rear support bolts, remove lower support insulators. Remove cross-member (with clutch operating shaft support bracket). Loosen exhaust pipe flange nuts at manifold, remove exhaust pipe support bracket-to-clutch housing bolts, loosen clamp and swing bracket out of the way. Take out all clutch housing bolts, remove dowel bolts at right and left center, remove clutch housing.

►**Installation Caution**—Align clutch housing to rear engine plate with two tapered drifts, then install the dowel bolts. Draw the dowel bolts in place by tightening the nuts—**do not drive them in place.**

Clutch Removal: Remove clutch housing (above), remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model AS1-T96 (Std.), AS24-T96 with R10 type Overdrive (Optl.). All helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transmission Control: Remote control type with gearshift lever mounted on steering column.

►**Gearshift Lever Adjustment (To Correct Hard Shifting)**—*See "Warner Transmission" in Transmission Section for complete data.*

►*SHIFT LEVER BINDING CORRECTION (SYNCHRO-MESH): See "Warner Transmission" in Transmission Section for complete data.*

See Transmission Section for complete data.

Removal: Drain transmission. Disconnect hand brake cable and move out of way for clearance. Disconnect front universal at transmission (wire caps or use clamp to prevent losing rollers). Take out center support bearing mounting bolts. Push front shaft and support to rear (will slide on splines on rear shaft). Disconnect shift rods from levers on case and speedometer cable (remove speedometer pinion). On Overdrive transmission disconnect all control wires and cable. Take out transmission to clutch housing capscrews, pull transmission straight back and remove from car.

OVERDRIVE

Warner R10 Type (part of AS24-T96 Transmission). Governor controlled, with electrical solenoid operation and throttle controlled "kick-down."

NOTE—Overdrive is "centered ring gear" type.

See Transmission Section for complete data.

Solenoid—Studebaker No. 521429.

Governor—Studebaker No. 520454.

Control Relay—Studebaker No. 523297.

Kick-down Switch—Studebaker No. (1952) 529479, (1953) 532896.

Lock-out Switch—Studebaker No. 521436.

Overdrive Fuse—20 ampere. On control relay.

Removal: See Std. Transmission Removal.

AUTOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission with hydraulic control. Has mechanical parking lock and Anti-creep device which holds brakes applied when car standing and ignition "on."

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmission" in Transmission Section for complete data.*

►*TESTING & TROUBLE SHOOTING—See Transmission Section.*

Lubrication—Check oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15,000 miles.

Recommended Lubricant—Automatic Transmission Fluid Type A (in containers with "AQ-ATF" symbol). *NOTE*—Above fluid replaces engine oil previously specified for these transmissions.

Capacity—9½ qts.

Checking Oil Level—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Remove inspection cover on front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dipstick gauge. Add oil as required to bring level up to "Full" mark on dipstick (1 pint between "LOW" and "FULL").

►*OTHER AUTOMATIC TRANSMISSION SERVICE DATA: See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer Model 1268-110X (Front & Rear), 1261-102X (Intermediate). Needle bearing type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller shaft).

Propeller Shaft & Support Bearing: Two shafts used:

1) Front shaft with intermediate universal yoke bolted on rear end (no slip-joint).

2) Rear shaft with slip-joint on forward end at intermediate universal.

►**Propeller Shaft Checking (For Vibration)**—*See "Propeller Shaft" in Studebaker Special Data.*

Propeller Shaft & Support Bearing Removal & Servicing—*See "Propeller Shaft" in Studebaker Special Data.*

REAR AXLE

Spicer Salisbury Model 23. Semi-floating, Hypoid Gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Model	Axle Ratio
Standard Trans.	4.1-1
Overdrive	4.56-1
Overdrive Opt'l (1952)	4.88-1
Overdrive Opt'l (1952-53)	4.1-1
Automatic Trans. (1952-53)	4.1-1
Automatic Trans. Opt'l (1952)	3.54-1

NOTE—Rear axle ratio stamped on plate attached to axle by cover capscrew and also on ring and pinion gears.

Backlash—.003-.008". Shim adjustment.

Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs and drums. Disconnect hand brake cable, take out backing plate bolts from backing plates, free hydraulic brake line from axle housing clips (do not disconnect brake line). Backing plates and adjusting shims can then be wired to frame (do not disconnect brake line from wheel cylinders). Disconnect rear universal (wire caps or use clamp to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.

Axle Shaft Removal—Remove wheel, remove wheel hub (use puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (CAUTION—do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with Puller HM-931.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). **Endplay**—.001-.005".

SHOCK ABS RBERS

Houde or Monroe—Direct acting hydraulic type.

Studebaker Shock Absorber Nos.

U.S. Cars	Front	Rear
Std. (1952)	527924	530766
Heavy Duty (1952 Houde)	530971	530972
Std. (exc. 1953 Coupe & Hardtop)	532736	532257
Std. (1953 Coupe & Hardtop)	533513	532257
Heavy Duty (1953 Houde)	532746	532747
Heavy Duty (1953 Monroe)	530508	532751
Canadian Cars		
Std. (1952)	530507	530512
Heavy Duty (1952)	530508	530513
Std. (exc. 1953 Coupe & Hardtop)	532742	532750
Std. (1953 Coupe & Hardtop)	532743	532750

FRONT SUSPENSI N

Front Suspension: Independent, coil spring suspension with front shock absorbers located within coil springs.

See Front Suspension Section for complete data.

►**WHEEL BALANCING NOTE**—If wheel spinner does not rotate wheel at a sufficiently high speed, floating reverse shoe can be moved away from drum by backing off the bearing adjusting nut far enough to move wheel out ¼", then shake wheel and drum assembly to break reverse shoe contact with drum. Do not apply service brakes until balancing operation is completed.

Kingpin Inclination—5¼° crosswise.

Caster—Neg. 1° to Neg. 2½°. Eccentric pin adjustment.

►*NOTE*—Not more than ¾° variation between wheels.

Camber—0° to + 1°. Eccentric pin adjustment.

►*NOTE*—½° more camber favored on driver side.

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Toe-In—1/16-1/8". **Adjust right hand tie rod only** for toe-in after left-hand tie rod has been adjusted for wheel straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments at left hand tie rod.

Toe-out on Turns—With inner wheel at 20°, outer wheel should be turned 17-18°.

STEERING GEAR

Standard: Ross Cam & Twin Lever or Saginaw Worm & Roller types.

See Steering Gear Section for complete data.

Power Steering (Optl. 1953): *TWO types used:*

First Cars—Studebaker Mechanical type. Power unit incorporated in steering gear and belt driven by power take-off on engine.

See "Studebaker Power Steering" in Steering Gear Section for complete data.

Later Cars—Saginaw Hydraulic type. Power unit and control valve assembly built-in steering gear, hydraulic power supplied by engine driven pump.

See "Saginaw (G.M.) Power Steering" in Steering Gear Section for complete data.

BRAKES

Service: Lockheed (Wagner Electric) Hydraulic, Self-centering, Self-adjusting type. Brakes have automatic spring-loaded adjusting wedge controlled by contact plug projecting through hole in lining of forward shoe (plug contacts drum when brakes applied). Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

►*1952 BRAKE NOTE*—Brake shoe return spring is not hooked to reverse (secondary) shoe, but acts only on the forward (primary) shoe. Return spring is hooked to backing plate behind reverse shoe.

►*1953 BRAKE NOTE*—On front wheel brakes, brake shoe return spring is not hooked to reverse (secondary) shoe, but acts on forward (primary) shoe only. Return spring is hooked to backing plate behind reverse shoe. On rear wheel brakes return spring is hooked to both forward and reverse shoes.

Drums—Composite. Diameter 9".

Wheel Cyl. Diameter—1" (Front & Rear).

Lining—Molded type (all shoes). Width 2". Thickness 3/16". Length 10¼" (All Primary Shoes), 7¾" (All Secondary Shoes).

Braking Power—57% Front, 43% Rear.

Clearance—If adjustment required, see "Lockheed (Wagner) Hydraulic Self-adjusting Brakes" in Brake Section.

►*1952 ADJUSTING NOTE*—Reverse shoe eccentric must remain in "off" position at all times.

►*1953 ADJUSTING NOTE*—No adjustment required on reverse shoe of front wheel brakes since they are "floating" type. Eccentric should remain in "off" position at all times.

Hand Brake: See Service Brake data (above).

►**Hand Brake Cable Installation Caution (Hard-Top & 5 Pass. Coupe)**—*See Brake Section for complete data.*

►**Hill-Holder (for Synchro-mesh Trans. Cars):** *See Brake Section for complete data.*

►**Anti-Creep (for Auto. Trans. Cars)**—*See Brake Section for complete data.*

MISC. MECHANICAL

1952 CONVERTIBLE TOP CONTROL: Electric type with motor mounted on left hand lift assembly (right hand lift assembly driven through flexible drive).

See Miscellaneous Section for complete data.

Windshield Wipers: Vacuum operated or Electric type.

Vacuum Type—Trico. Link-and-crank type.

Electric Type—Redmond.

►*ELECTRIC WIPER CONTINUING TO RUN WHEN TURNED OFF (First Cars): See "Redmond Windshield Wiper" in Miscellaneous Section for complete data.*

See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

Model	Series
1953 Commander	4H
1954 Commander	5H
1954 Land Cruiser	5HY

SERIAL NUMBER: Stamped on plate on left front door hinge post.

Starting Serial Numbers

Assembly Plant	1953	1954
South Bend	8290001	8354901
Los Angeles	8826801	8836801
Hamilton	8955401	8956741

ENGINE NUMBER: Stamped on cylinder block to left and front of fuel pump support.

Starting Engine Numbers

Assembly Plant	1953	1954
South Bend	V-207001	V-282501
Los Angeles		V-282501
Hamilton	VC-3501	V-282501

TUNE-UP

►*FUEL FILTER REPLACEMENT CAUTION:* On later cars with new type filter (see Fuel Pump), replace filter at 10,000 mile intervals or more often. Clogged filter will cause low top speed or carburetor leanness.

COMPRESSION PRESSURE: 120-140 lbs. at 150 RPM.

VACUUM READING: Steady 18-20" idling at 8 MPH.

VALVE TAPPET CLEARANCE: .021-.023" All valves (Engine hot). .023-.025" All valves (Engine cold). Self-locking tappet screws used. *NOTE*—Clearance setting instruction plates no longer used.

►*TAPPET ADJUSTMENT NOTE:* Manufacturer recommends use of "MAC" Tool No. S66 when adjusting tappet clearances.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Located on right bank exhaust pipe.

Checking Thermostatic Coil Spring—With outer end of coil free from anchor, and valve closed (counterweight up), hooked end of coil should be 90° from anchor at 70° F.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2. See diagram.

SPARK PLUG GAP: .0325-.0375".

Plugs—Champion H-10 (1953), H-11 (1954).

COIL: Delco-Remy 1115392 (1953), 1115380 (1954).

Ignition Current—2½ amperes idling, 4-5 amps. stopped.

DISTRIBUTOR: Delco-Remy 1110839.

►*DISTRIBUTOR ROTOR PRODUCTION CHANGE (To Correct Erratic Ignition):* New type rotor, bearing same Part No. 533942, now being used in production. When erratic ignition encountered, check resistor, and if loose, replace with new type rotor. New rotor identified by a dash in front of Delco-Remy trade mark. Dash points toward tip of rotor.

Condenser—Delco-Remy 1809704. **Capacity** .18-.23 mfd.

Contact Point Set—Delco-Remy 1918148.

Breaker Gap—.013".

Cam Angle—28-34°.

Breaker Arm Spring Tension—17-21 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	350	1-5	700
2-4	400	4-8	800
10-12	1050	20-24	2100
15-17	1450	30-34	2900

Vacuum Spark Control: Delco-Remy 1116058.

Plunger Travel—11/64-3/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum ("of HG)
Start	0	4-6
7-8	14-16	10.5-12.5

Removal & Installation: See *"Distributor" in Studebaker Special Data.*

IGNITION TIMING

Setting—4° BTDC (idling at 550 RPM).

Timing Mark—On vibration damper. "IGN" mark in line with pointer.

CARBURETOR

►*AIR CLEANER (WET TYPE) VENTING (To prevent damage to air cleaner caused by engine backfiring):* Drill four ¼" holes, equally spaced, about ¼" inward from the gasket surface inner ridge around outer edge of the silencer chamber.

►*1953 FUEL ECONOMY IMPROVEMENT & CARBURETOR PRODUCTION CHANGES: See "Stromberg WW (Studebaker)" Carburetor in Carburetor Section.*

►*1953-54 COMMANDER HESITATION OR LIGHT MISS AT 30-45 MPH. WITH CONSTANT THROTTLE (Cars with Stromberg Code 6-112 & 6-113 Carburetors):* If not corrected by careful tune-up of engine, this condition may be caused by a lean-limit carburetor and can be corrected by installing slightly richer Main Metering Jet. *See "1954 Stromberg WW (Studebaker)" in Carburetor Section.*

►*POROUS FUEL BOWL CAUTION:* Excessive cranking to start engine or indication of wetness of manifold or spark plugs may indicate a porous fuel bowl. *To check, see Stromberg "WW" Carburetor in Carburetor Section.*

►*ENGINE RACING WHEN BRAKES APPLIED CORRECTION: Adjust throttle linkage exactly as outlined below. This condition is caused by too tight setting of throttle linkage.*

►*1954 STATION WAGON THROTTLE LINKAGE RETURN SPRING INSTALLATION CORRECTION:* On a few station wagon models before Serial No. 8355631. throttle linkage return spring may have been incorrectly installed resulting in throttle not returning to idle position when accelerator released. Stronger of two springs (with opening close to spring's coil) should be attached to throttle shaft. Spring with 1" straight section between open end and spring coil should be connected to bellcrank at rear of engine block.

Throttle Linkage Adjustment (Synchro-mesh): Adjust throttle actuating spring (carburetor throttle-to-cross shaft connector) to provide 1/8-3/16" sag in spring with throttle valves closed.

Throttle Linkage Adjustment (Overdrive): Adjust idle speed to 550 RPM. Turn stop screw in bracket until actuating spring is taut and idle adjusting screw just starts to move away from choke cam. Then back off screw one complete turn. Secure screw with locknut. To adjust overdrive kick-down switch, open throttle to full open position, then turn adjusting screw until pad on adjusting screw contacts plunger of kickdown switch.

Throttle Linkage Adjustment (Automatic Transmission): Adjust engine idle speed to 500-550 RPM (with engine at normal operating temperature, choke valve in wide open position and fast idle inoperative).

►*1953 ACCELERATOR CROSS SHAFT-TO-CARBURETOR ACTUATING SPRING PRODUCTION CHANGE (To Correct Unintentional Engagement of Kickdown):* A new stiffer spring, Part No. 534230 (painted green) will be used in production, and can be used on earlier models to assure proper "feel" of accelerator pedal and prevent unintentional kickdown. New spring has a load of 9-11 lbs., at 9" length.

1) Place the idle adjusting screw on the fourth step of the fast idle cam (the lowest step being the first step). Adjust throttle check screw until it just contacts pad on throttle shaft lever.

2) Disconnect anti-creep release switch wire at switch. Remove anti-creep release switch from accelerator bellcrank bracket. Leave all three springs attached.

3) Loosen the two threaded locknuts (for adjusting throttle actuating spring tension) several turns. Hold cross shaft arm against bracket and at the same time tighten forward locknut on threaded rod until spring is taut. The idle adjusting screw will just start to break contact with lower step of fast idle cam. Back off forward threaded rod locknut just enough to let the idle adjusting screw lightly contact low step of fast idle cam.

4) Install anti-creep release switch in cross shaft bracket. Turn it in until idle adjusting screw just starts to break contact with low step of fast idle cam. Back off anti-creep switch **3 complete turns** and secure with locknut.

5) Back off the forward threaded rod locknut **3 complete turns.** This will allow approximately 1/8" to 3/16" sag in throttle actuating spring. Tighten the rear threaded rod locknut.

STROMBERG

Stromberg WWUVL-26. Dual downdraft with automatic choke.

Car Model	Stromberg Code No.
1953 (Late) Commander	6-112, 6-112-A
1953 (Late) & Early (1954) Commander	6-112-B
1954 (Late) Commander	6-112-C
1954 (Early) Landcruiser	6-112-B
1954 (Late) Landcruiser	6-113

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Idle Setting—Initial setting 1¾ turns open, final setting approximately midway between missing and rolling points. Set both screws alike, turn screws out for richer mixture.

Idle Speed—(Synchro-mesh Trans.) 550-600 RPM. (Automatic Trans.) 500-550 RPM. with selector lever in neutral "N" position.

Float Level—3/16" from top edge of bowl to top of float with needle valve seated. To check, remove air horn and bowl cover, remove gasket, place float level Gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool T-24733 (Studebaker No. KMO-269-S5).

Accelerating Pump—Normal setting, center hole; for less fuel install rod in inner hole; for more fuel install rod in outer hole.

Fast Idle Setting: With choke valve fully closed and fast idle cam in fast idle position, one-half diameter of button at end of throttle stop screw should rest against step of fast idle cam. If contact between button and cam not as indicated, bend choke ear up or down as required.

Automatic Choke Setting: Centered (arrow on edge of cover aligned with boss on air cleaner end of housing).

Throttle Linkage Adjustment (All Models): *See "Carburetor" above.*

►*OTHER DATA: See "Stromberg WW (Studebaker)" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs.

CARB. EQUIPMENT

Fuel Pump: AC No. 9647. Diaphragm type.
Pressure—4-5 lbs.
See "Fuel Pumps" in Carburetion Equipment Section.

►*FUEL PUMP FILTER PRODUCTION CHANGE:* Effective Eng. No. V-294128, NEW Filter No. 535702 was used (can be installed on earlier 1954 cars). *Filter should be replaced at 10,000 mile intervals.*

►*FUEL PUMP LUBRICATION NOTE:* Pump rocker arm is lubricated by oil line connection on side of pump body. *CAUTION*—Oil line connection must be tight to prevent leaks.

►*FUEL PUMP INSTALLATION CAUTION: See "Fuel System" in Studebaker Special Data.*

►**1953 FUEL PUMP ROCKER ARM SHAFT OIL LEAKAGE:** Correct by installing new rocker arm pin and plug furnished in Kit, Studebaker No. 532462.

Gasoline Gauge: Stewart-Warner Electric type.
Dash Unit—Studebaker No. 532593.
Tank Unit—Studebaker No. 525548 (exc. Coupe & Hardtop), No. 532261 (Coupe & Hardtop).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Willard HDW-1-100, 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Battery Ground—Positive.
Engine Ground—Left front of engine.

STARTER

Transmission	Delco-Remy Starter No.	Armature No.
Standard	1107115	1878077
Automatic	1107116	1878077

Drive—Bendix "Folo-thru" type No. A3281.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

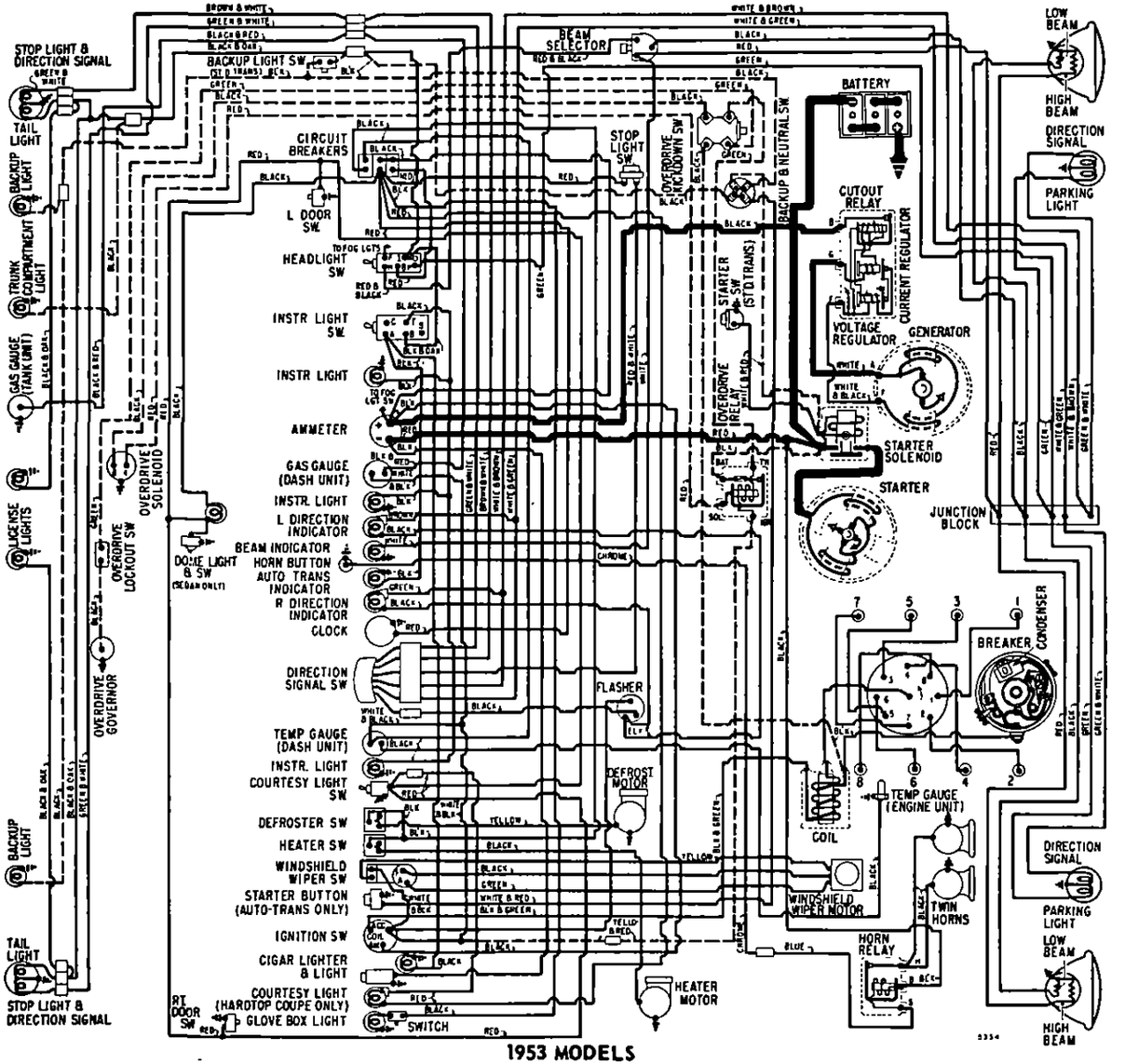
Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: Magnetic Switch, Studebaker No. 532874 (exc. Coupe & Hardtop). No. 530039 (Coupe & Hardtop). Mounted on dash and controlled by manual switch.

Std. Trans. Cars—Auto-Lite SW-4016 (Studebaker 519829 mounted on toeboard under clutch pedal. Operated by fully depressing pedal.

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1953 MODELS

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Automatic Trans. Cars—Studebaker No. 532135 switch on instrument panel and Delco-Remy 1998038 Neutral Safety Switch (without Power Steering), No. 1998059 (with Power Steering) mounted on steering column. Starter operative only with transmission selector lever in "N" or "P" position.

Neutral Safety Switch (Automatic Transmission Cars): Adjust switch so starter is operative only in "N" or "P" positions.

GENERATOR

Delco-Remy 1102778. Armature—No. 1921621.

Performance Data

	Amperes ①	Volts	R.P.M.
Cold	45	8.0	2450

①—Not maximum output. See Current Regulator.

Brush Spring Tension—28 ozs.

Field Current—1.87-2.0 amperes at 6.0 volts (80° F.)

Rotation—Counter-clockwise at commutator end.

Belt Adjustment: Hook spring type scale to belt midway between generator and fan pulleys. Adjust tension on belt so that pull of 14 lbs. on scale will lift belt 1/2".

REGULATOR

1953 Models—Delco-Remy 1118730. Current & voltage regulator.

See "Delco-Remy 1118700 Series Regulator" in Electrical Equipment Section.

1954 Models—Delco-Remy 1118828 (Early) 1118950 (Late). Current & voltage regulator.

►*1954 REGULATOR NOTE: Checking procedure is different than for 1953 regulators. See "Delco-Remy 1118825 Series Regulator" in Electrical Equipment Section. Specifications below are "Normal" settings for 1954 regulators.*

►*EARLY 1954 MODEL NOTE: If Delco-Remy 1118730 Regulator found on early cars, see "Delco-Remy 1118700 Series Regulator" in Electrical Equipment Section.*

Cutout Relay

Cuts In—5.9-6.7 volt (hot).

Contact Gap—.020" (same for both sets).

Air Gap—.020" (with contacts just closed).

Voltage Regulator

Setting—7.2-7.6 volts (hot).

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator

Setting—42-47 amperes (hot).

Air Gap—.075" with armature pressed down to point where contacts just touching.

Checking & Adjusting—*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

Direction Signal: *See Electrical Equip. Section.*

Lighting Switch Removal: Remove nut from toggle switch. Push switch through panel and remove from rear.

Stop Light Switch Location: On inner side of left frame rail just forward of the steering gear housing. *NOTE*—If stop light switch removed, it is necessary to bleed front brakes after re-installing switch.

►*STATION WAGON STOP LIGHT SWITCH SEATING CORRECTION (To Prevent Brake Fluid Leakage):* On some cars before Serial No. 8356126 it is possible that there is interference between switch and a corner of the T mounting bracket. To permit switch to seat properly, grind or cut off this corner at mounting bracket.

FUSES: Clock—3 ampere. In clock lead.

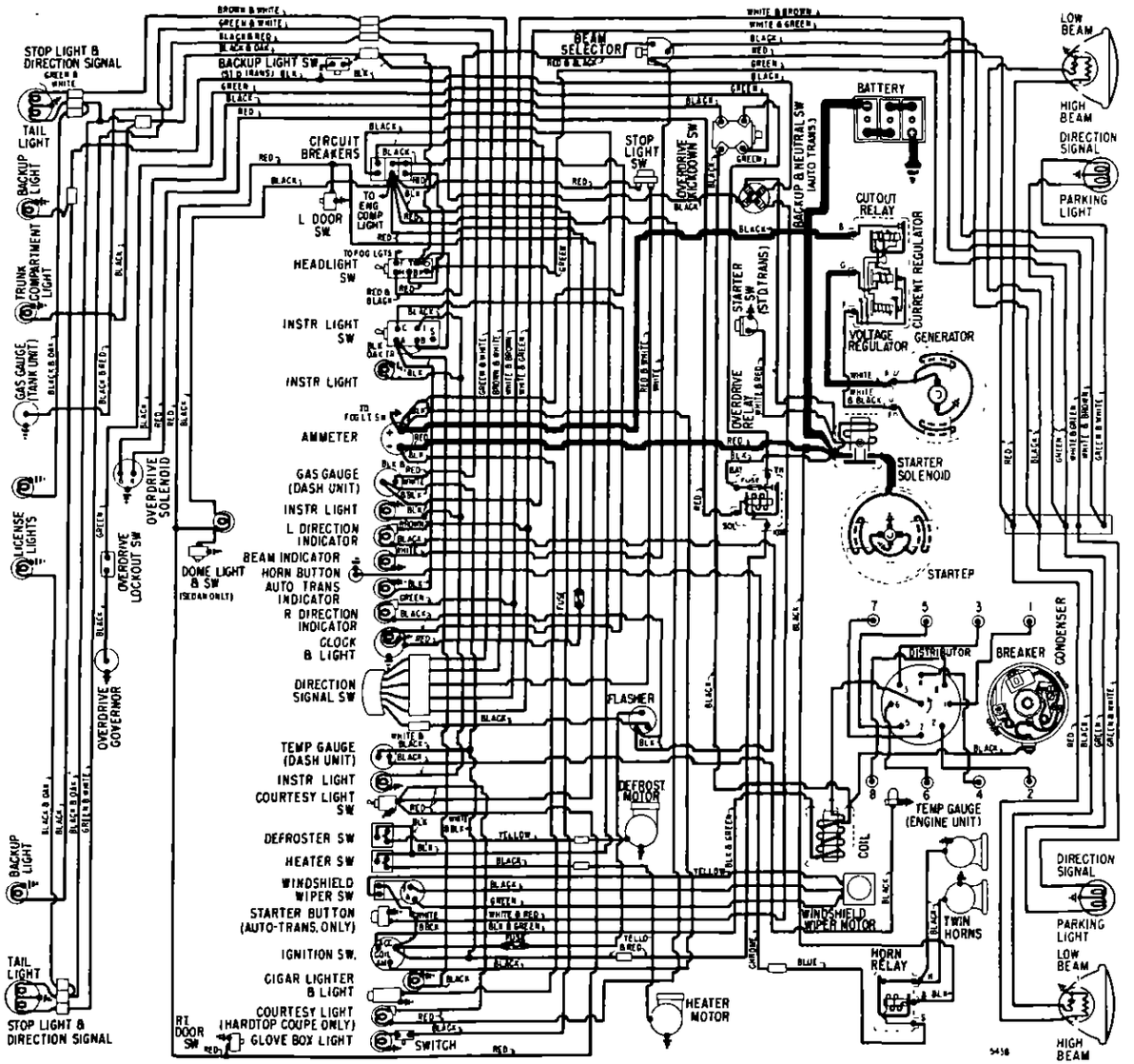
Overdrive—20 amperes. On overdrive relay.

Direction Signal—14 amperes. In flasher lead.

Radio—14 ampere.

Fog Lights—30 ampere. *Supersedes 20 ampere fuse previously prescribed.*

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1954 MODELS

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CIRCUIT BREAKERS: Mounted as unit behind instrument panel. Thermostatic type.
1) Lighting—30 amperes. Protects head, parking, tail, and instrument lights.
2) Auxiliary—20 amperes. Protects body and stop lights.

3) Climatizer & Defroster—20 amperes. Protects climatizer and defroster circuits.

HORNS: Delco-Remy 1999683 (Low Note), 1999684 (High Note). Twin horns with relay.
Horn Current: 12-15 amperes.
Horn Relay: Delco-Remy 1116775.
Contacts Close—2.75-4.0 volts.
Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

►*VALVE LIFTER REPLACEMENT CAUTION:* Different type valve lifters used with Cast Iron and Forged Steel Camshafts. Use Part Nos. 536508 (Std.), 536669 (.001" O.S.), 536638 (.005" O.S.) **with Cast Iron Camshaft.** Use Part Nos. 531696 (Std.), 531722 (.001" O.S.), 536637 (.005" O.S.) **with Forged Steel Camshaft.**

►*CAMSHAFT REPLACEMENT CAUTION: Make sure that the correct type valve lifters are used with the service replacement camshaft as this may be either Cast Iron or Forged Steel and different lifters are required for each type. See "Valve Lifter Caution" above.*

ENGINE SPECIFICATIONS: 90° V8, Valve-in-head.
Bore—3 3/8". **Stroke**—3 1/4".
Displacement—232.6 cu. ins. **Rated HP**—36.4.
Developed Horsepower—120 at 4000 RPM.

Compression Ratio—(1953) 7.0-1 (Std.), 7.5-1 (High Altitude). **(1954)** 7.5-1 (Std.).

Compression & Vacuum Reading—*See TUNE-UP.*

ENGINE & OIL PAN REMOVAL: *See Studebaker Special Data.*

CYLINDER HEAD & TIGHTENING TORQUES: *See Studebaker Special Data.*

PISTONS

Lynite aluminum alloy, cam ground, T-slot.
Weight—13.66 ozs. (without rings or pin).
Removal—Piston and rods removed from above.
NOTE—Car manufacturer recommends that cylinders out of round or tapered more than .002" be reconditioned.
Original Bore & Pistons: *See Studebaker Special Data.*
Fitting New Pistons: Clearance is selective fit. Clearance at top land is .018-.0205". With piston inverted, slotted side away from camshaft, and with bottom of piston about 1" below top of block, insert a 1"x.002" x 12" feeler on camshaft side of piston. Pull to withdraw feeler should be 11-16 lbs.
Replacement Pistons: Furnished Standard and .010", .020", .030", .040" Oversize.
Installing Pistons: Install piston on rod with slot on same side as nut on piston pin clampscrew (away from oil squirt hole in rod). Install piston in cylinder with slot toward left side of engine (all pistons). *See Connecting Rod Installation.*

PISTON PINS

Pin is locked in rod by tapered pin and locknut.
Diameter—.8741-.8745". **Length**— 2 7/8".
Clearance in Piston—.0001-.0003" or light finger push fit at room temperature (70 °F.).
Replacement Pins: Furnished Standard and .0025", .005" Oversize.
Removal & Installation—*See Studebaker Special Data.*

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.(#1, 2)	5/64"	.008-.016"	.002-.006"
Oil (#3)	3/16"	.008-.016"	.0015-.006"

Replacement Rings: *See Studebaker Special Data.*
Installing Rings: Bevelled side of compression rings (Sealed Power) up. Expander used with oil ring.

CONNECTING RODS

Length (Center to Center)— 6 5/8". **Weight**—23.71 ozs.
Crankpin Journal Diameter—1.99925-2.00025".
Lower Bearing—Interchangeable. Steel-backed, micro-babbitt lined type. No shims.
Clearance—.00005-.00215". **Sideplay**—.007-.012".
Replacement Bearings: Furnished Standard and .001", .005", .010", .020" Undersize.

Installing Rods: Number on rod and bearing cap must be on same side and rod installed in same numbered cylinder with numbers down toward oil pan (toward right on right bank rods, toward left on left bank rods) and oil squirt hole on all rods toward right of engine. Rods are offset with widest half of bearing toward rear (right bank), toward front (left bank).

►*NEW (UNMARKED) ROD NOTE:* Hold rod upright with oil hole toward you. Narrow part of offset will be to right on rods for right bank, and to left for rods in left bank.

►*CAUTION:* Install piston and pin on rod so that T-slot of piston is on side opposite oil hole in bearing bore. Insert tapered end of clamp screw so it will be toward heavy boss. Be careful to align flat surface of screw with flat on piston pin. Bearing cap must be assembled on rod with groove in cap and rod on same side.

CRANKSHAFT

Journal Diameter—2.4995-2.5000". 5 Bearing.
Bearings—Removable, steel-backed, micro-babbitt lined. No shims.
Clearance—.0006-.0027".
Replacement Bearings: Furnished Standard and .001", .010", .020", .030" Undersize.
End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and face of main bearing journal.
Endplay—.003-.006".
Rear Bearing Oil Seals: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*
►*VIBRATION DAMPER NOTE:* Vibration damper flywheel marked H-4 or 6H (underlined) are interchangeable. Those marked 6H are replacements for H-4 when supplies of latter are exhausted.

CAMSHAFT

►*CAMSHAFT REPLACEMENT CAUTION: Cast Iron and Forged Steel Camshafts furnished for service replacement. Different type valve lifters required for each type. See "Valve Lifters" below.*

Journal Diameters—(1) 1.86975-1.87075", **(2)** 1.85375-1.85475", **(3)** 1.83875-1.83975", **(4)** 1.82275-1.82375", **(5)** 1.24475-1.24575".
Bearings—Split, steel-backed, babbitted bushings.
Clearance—.00075-.00225" (#1) .001-.00275" (Others).
End Thrust: Taken by thrust plate located between the front camshaft bearing and the camshaft gear.
Endplay—.005-.007".
Timing Gears: Crankshaft gear, cast iron. Camshaft gear, Celeron with steel hub.
Backlash—.001-.003".
Replacement Gears—Camshaft gear furnished in two sizes: Standard (marked "S"), High-Limit (marked "H"). *Crankshaft gear Std. size only.*
Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth on crankshaft gear.

VALVES

Tappet Clearance—.021-.023" All valves (Engine hot). .023-.025" All valves (Engine cold). Self-locking tappet screws used.

Valves	Head Diameter	Stem Diameter	Length
Intake	1 13/32"	11/32"	5 11/64"
Exhaust	1 9/32"	11/32"	5 11/64"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.0015-.0035"
Exhaust	45°	23/64"	.0015-.0035"

Valve Seat Width—1/16".
►*NOTE:* Rubber seal rings installed on all valve stems (seated in groove on valve stem within spring retainer).
Valve Stem Seal Installation—*See valve spring installation data under "Valve System" in Studebaker Special Data.*
►*VALVE STEM SEAL TESTING: See "Valve System" in Studebaker Special Data.*

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Valve Springs: Single springs used. Install with closed coil end up. Replace springs if over 10% weaker than pressure listed.

Valve	Spring Pressure	Length
Closed	45-55 lbs	2 1/32"
Open	105-115 lbs	1 43/64"

Spring Installation—*See "Valve System" in Studebaker Special Data.*

►*NOTE:* Dampers used on bottom of all springs

Valve Guides: Pressed in head from underside.
Guide Removal & Installation: *See "Valve System" in Studebaker Special Data.*

Valve Lifters: Straight barrel type. Remove from above (not necessary to remove camshaft).

►*VALVE LIFTER REPLACEMENT CAUTION:* Different type valve lifters used with Cast Iron and Forged Steel Camshafts. "Step Type" lifters, Part Nos. 536508 (Std.), 536669 (.001" O.S.), 536638 (.005" O.S.) **used with Cast Iron Camshafts only.** "Plain Barrel" lifters, Part No. 531696 (Std.), 531722 (.001" O.S.), 536637 (.005" O.S.) **used with Forged Steel Camshafts only.**

Valve Lifter Installation & Fitting—*See "Valve System" in Studebaker Special Data.*
Replacement Lifters—Std. and .0005", .001" Oversize.

►*CAUTION:* When lifters removed, make certain they are installed in original positions.
Rocker Arms: *See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

1953 Models

Intake Valves—Open 11° BTDC. Close 53° ALDC.
Exhaust Valve—Open 50° BLDC. Close 14° ATDC.

1954 Models

Intake Valves—Open 11° BTDC. Close 54° 36' ALDC.
Exhaust Valves—Open 51° 36' BLDC. Close 14° ATDC.

Valve Timing Check—Set tappet clearance of No. 1 intake valve at .030". Turn crankshaft until No. 6 piston is on compression stroke and vibration damper mark "IN.OP.1" is approaching pointer on timing gear cover, continue to turn crankshaft slowly while working No. 1 intake valve rocker arm up and down to determine point at which all clearance is taken up. Dampener mark "IN.OP.1" should be directly under pointer.

OILING SYSTEM

►*OIL LEAKAGE AT REAR MAIN BEARING CAP: See "Crankshaft & Main Bearings" in Studebaker Special Data.*
Crankcase Capacity: 6 quarts.
Normal Oil Pressure: 40 lbs. at 1400-1600 RPM.
Pressure Regulator Valve—Located on right side at front of cylinder block slightly above crankcase flange. Opens at 40 lbs. Not adjustable. If necessary to increase oil pressure, install new spring.
Oil Pressure Gauge: Studebaker No. 532596 (1953); No. 536932 (1954). Not electrical.
Oil Pump: Helical gear type. Mounted externally on right side of crankcase.
Pump Overhaul—*See Studebaker Special Data.*
Oil Filter: Partial flow. Replace filter cartridge at 5000-6000 mile intervals. Change more often in dusty areas.
Replacement Filter Element—AC No. P-209 or C-209.
Crankcase Ventilation: Filter element in oil filler cap (air intake) and breather tube at right rear of engine (air outlet).
►*BREATHER TUBE FILTER NOTE:* Remove filter element (retained in lower end of tube by cotter pin) for servicing.

COOLING

►*1954 FAN SHROUD REWORK—HARDTOP & COUPE (To prevent interference with radiator core): See "Radiator" in Studebaker Special Data.*

Water Capacity: 17¼ quarts (18¾ qts. with heater).
Pressure Valve: Studebaker No. 531826 (stamped "7"). Radiator filler cap. Opens at 7 lbs.
Thermostat: Choke type. Opens at 152-163°F.
Water Pump: Packless, sealed ball bearing type.
See "Studebaker" in Water Pump Section.
Pump Removal—Drain cooling system. Loosen generator, push it inward to relieve tension on fan belt, remove fan belt. Remove fan-to-hub screws and remove fan and pulley. Remove fan shroud. Disconnect radiator outlet hose and Climatizer hose (if so equipped). Remove generator adjusting arm from top stud, then remove water pump manifold screws. Remove water pump manifold and four gaskets from engine block.
Temperature Gauge: Stewart-Warner Electric Type.
Dash Unit—Studebaker No. 532597.
Engine Unit—Studebaker No. 532579. Located at the rear of left cylinder bank in water passage cover plate.
See "Temperature Gauges" in Miscellaneous Equip. Section.

CLUTCH

Borg & Beck Model 9A7. Assy. No. 926.
See "Borg & Beck" in Clutch Section.
Clutch Disc No. Borg & Beck 381663.
Pedal Adjustment: Free travel ½-1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.

►*CLUTCH PEDAL REWORK (To Prevent Spring Breakage): See "Clutch Notes" in Studebaker Special Data.*
►*HILL-HOLDER NOTE:* Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages. Make sure Hill-holder operating rod installed with rod to inside (toward center of car) of clutch release shaft lever.

Clutch Housing Removal: Remove starter. Remove floor plate and clutch housing top cap screws. Remove clutch operating shaft. Remove transmission (See SYNCHRO-MESH TRANSMISSION). Remove two bolts which hold engine rear support insulator cage to crossmember. Place a small hydraulic jack at rear of oil pan and insert a clock of wood between jack pad and oil pan to prevent damage to pan. Raise engine just enough to take weight of engine off crossmember. Remove support crossmember-to-frame bolts and remove crossmember. Remove the two clutch housing bolts which hold exhaust pipe support bracket. Loosen clamp bolt and swing support bracket out of way. Remove clutch housing cover plate. Remove remaining housing mounting bolts or cap screws and remove clutch housing.

Clutch Removal: Remove clutch housing (above), remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model AS53-T86E (Std.), AS54-T86E with R10 type Overdrive.
See "Warner Synchro-mesh Transmission" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

►*1953 SYNCHRO-MESH TRANSMISSION SHIFT LEVER BINDING CORRECTION: See "Transmission Notes" in Studebaker Special Data.*

►*"HARD-SHIFTING" FROM LOW TO 2ND GEAR CORRECTION: See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission case. Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines. Move end of shaft to one side as far as possible and tie it in position. Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion. Remove cap screws which hold transmission case to clutch housing. Remove clutch operating shaft, bracket, and bearing from the transmission case. Then more case rearward until main drive pinion clears clutch pressure plate and remove unit from car. *NOTE*—On Coupes and Hardtops, it will be necessary to remove additional frame crossmember before removing transmission.

OVERDRIVE

Warner R10 Type (part of AS54-T86E Transmission).
See "Warner R10" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

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Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission with hydraulic control. Has mechanical parking lock and Anti-creep device which holds brakes applied when car standing and ignition "on".

See "Studebaker Automatic Transmission" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Studebaker Automatic Transmission" in Transmission Section.*

Lubrication: Check oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15,000 miles.

Checking Fluid Level—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Remove inspection cover on front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dipstick gauge. Add oil to bring level up to "Full" mark on dipstick (1 pint between "LOW" and "FULL").

Capacity—9½ quarts. *Use Automatic Transmission Fluid Type A (in containers with "AQ-ATF" symbol).*

►*OTHER AUTOMATIC TRANSMISSION SERVICE DATA: See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing cross type. Three used with intermediate universal at propeller shaft support bearing on crossmember.

Propeller Shaft & Support Bearings: Two shafts used:
1) Front shaft with intermediate universal yoke bolted to rear end (no slip-joint).
2) Rear shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal & Servicing—*See "Propeller Shaft" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss Drive.
See "Spicer Hypoid" in Rear Axle Section.

Standard Axle Ratios

Model	Synchro-mesh	Overdrive	Automatic
All (Exc. Land Cruiser)	4.09-1	①4.27-1	②3.54-1
Land Cruiser	4.09-1	4.09-1	3.54-1

Optional Axle Ratios

Model	Synchro-mesh	Overdrive
All (Exc. Land Cruiser)	4.55-1	4.55-1
	4.27-1	4.09-1
Land Cruiser	4.55-1	4.27-1
	4.27-1	4.55-1

①—4.55-1 on Station Wagon. ②—4.09-1 Optl.

NOTE—Rear axle ratio stamped on plate attached to axle by cover cap screw and also on ring and pinion gears.

Backlash— 003-.006".

Axle Shaft Removal: Remove wheel and wheel hub (use puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (CAUTION—Do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with puller HM-931.

Rear Axle Assembly Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs. Remove wheels, hubs, and drums. Disconnect hand brake cable, take out backing plate bolts from backing plates, free hydraulic brake lines from axle housing clips (do not disconnect brake lines from wheel cylinders). Disconnect rear universal (wire caps or use clamps to prevent losing rollers). Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims furnished .003", .005", .010", .030" thick). **Endplay**—.001-.005".

SHOCK ABSORBERS

Houde, Monroe, or Gabriel. Direct acting hydraulic type.

Studebaker Shock Absorber Nos.

1953 Models

U.S. Cars	Front	Rear
Std. (Exc. Coupe & Hardtop)	①532736	③532257
Std. (Exc. Coupe & Hardtop)	②534318	④534320
Std. (Coupe & Hardtop)	①533841	③533840
Std. (Coupe & Hardtop)	②534319	④534320
Heavy Duty	532746	532747
Canadian Cars		
Std. (Exc. Coupe & Hardtop)	532742	532750
Std. (Coupe & Hardtop)	533877	533880

1954 Models

U.S. Cars	Front	Rear
Standard	535318	534320
Heavy Duty	⑤536398	⑤536399
Candian Cars		
Std. (Exc. Coupe & Hardtop)	532742	532750
Std. (Coupe & Hardtop)	532743	532750
Heavy Duty	530508	532751

①—Used before Serial No. 8,322,372.
②—Used after Serial No. 8,322,372.
③—Used before Serial No. 8,316,764.
④—Used after Serial No. 8,316,764.
⑤—Service replacement for heavy duty shocks used in early 1954.

FRONT SUSPENSION

Independent. Coil spring suspension with front shock absorbers located within coil springs.
See "Studebaker" in Front Suspension System.
Kingpin Inclination—6° at 0° camber.
Caster—Neg. 1¾°±¼°. Not more than ¾° variation between wheels.
Camber—0° to Pos. 1°. ½° more camber favored on driver's side.
Toe-In—1/16-1/8". **Adjust right hand tie rod only** for toe-in after left-hand tie rod has been adjusted for wheel straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm and auxiliary steering arm parallel. **RHD Car Note**—Make toe-in adjustments at left hand tie rod.
Toe-Out on Turns—With inner wheel at 20°, outer wheel should be turned 17-18°.

STEERING

Manual: Ross Cam & Twin Lever or Saginaw Worm & Roller Types.
See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.
Power Steering: Saginaw. Integral type. Power unit and control valve assembly built into steering gear. Hydraulic power supplied by engine driven pump.
See "Saginaw (G.M.) Power Steering" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

BRAKES

1953 MODELS

Lockheed (Wagner) Hydraulic Self-Adjusting. Self-centering. Hand brake applies rear wheel service brakes.
See "Lockheed (Wagner) Hydraulic Self-Adjusting" in Brake Section.

►*1953 BRAKE NOTE:* On Front wheel brakes, brake shoe return spring is not hooked to reverse (secondary) shoe but acts on forward (primary) shoe only. Return spring is hooked to backing plate behind reverse shoe. On rear brakes, return spring is hooked to both forward and reverse shoes.

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►*1953 BRAKE GRAB CORRECTION (Cars before Serial No. 8344934 South Bend or 8835196 Los Angeles):* If not corrected by complete and correct brake adjustment, new type lining can be installed on all forward shoes, (front and rear wheels). This new lining is Marshall-Eclipse 2201-H8 identified by green and red marks along lining edge and is furnished in Kit Part No. 534941.

►*ENGINE RACING WHEN BRAKES APPLIED:* See *CARBURETOR above.*

Drum Diameter–11" (Frt. Whl.). 9" (Rear Whl.).

Whl. Cyl. Diameter–1" (Front & Rear).

Lining–Molded type (all shoes). **Width**–2". **Thickness**–3/16".

Length Per Shoe	Primary	Secondary
Front Wheels	12½"	9 5/8"
Rear Wheels	10¼"	7¾"

Clearance–If adjustment required, see *"Lockheed (Wagner) Hydraulic Self-Adjusting" in Brake Section.*

►*ADJUSTING NOTE: No adjustment required on reverse shoe of front brakes since they are the "floating" type. Eccentric should remain in the full "off" position at all times.*

Braking Power–62% Front, 38% Rear.

Standard Master Cylinder: On frame left side rail at base of brake pedal.

Checking Fluid–Access hole in front floor pan at left corner of drivers seat. Fluid should be maintained ½" below top of filler opening.

Hill-Holder: Used on Synchro-mesh Trans. Cars. *See "Hill-Holder" in Brake Section.*

Anti-Creep: Used on Automatic Trans. Cars. *See "Anti-Creep" in Brake Section.*

1954 MODELS

Wagner Lockheed Hydraulic Self-centering (With Bendix type shoes). Parking lever applies rear wheel service brakes.

See "Wagner Lockheed Self-centering" in Brake Section.

►*1954 PARKING BRAKE LEVER CLIP (IN REAR WHEEL BRAKE ASSEMBLY) BREAKING OFF CORRECTION:* This is due to incorrect assembly of shoe return springs. The proper method is to assemble rear shoe return spring to shoe and its spring retainer first, then assemble the front shoe return spring.

►*LINING PRODUCTION CHANGE & REPLACEMENT CAUTION: See "Wagner Lockheed Self-centering" in Brake Section.*

Drums–Diameter (Front)11", (Rear) 10".

Wheel Cylinder Diameter–(Front) 1 1/16", (Rear)7/8".

Braking Power–62% Front, 38% Rear.

Lining–Width (Front) 2¼", (Rear) 2". Thickness 3/16". Length (Primary & Secondary–Front) 12", (Primary & Secondary–Rear) 10 29/32". *NOTE*–Lining lengths given supersede those originally prescribed.

Clearance–Lock shoes against drum, then turn adjusting screw back eight notches or more as required to free drum.

Standard Master Cylinder: On frame left side rail at base of brake pedal.

Checking Fluid–Access hole in front floor pan at left corner of driver's seat. Fluid should be maintained at level 1½" below top of filler opening.

Removal–Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from its frame bracket and then from spring clip which is attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder (*NOTE*–Hill-holder equipped cars have one line, Automatic Drive cars have two lines). Remove brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder. Insert forward mounting bolt to support hill-holder (or anti-creep solenoid valve) while master cylinder is off car.

Hill-Holder: Used on Synchro-mesh Trans. Cars. *See "Hill-holder" in Brake Section for data.*

Anti-Creep: Used on Automatic Trans. Cars. *See "Anti-creep" in Brake Section for data.*

MISC. MECHANICAL

Windshield Wipers: Redmond and Bosch electric types. *See "Redmond Windshield Wipers" in Miscellaneous Section for data on Redmond Wipers.*

►*1953 WINDSHIELD WIPER CONTINUING TO RUN AFTER BEING TURNED OFF (First Cars): "See Redmond Windshield Wiper" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Designation
1954	15G
1955 Ⓒ	16G6

Ⓒ—Early & Later Series. *NOTE*—Late series cars are "Ultra-Vista" models except for Coupe & Hardtop.

SERIAL NUMBER: Located on left front door pillar post.

Starting Serial Numbers

Assembly Plant	1954	1955 Early	1955 Late
South Bend	G-1274001	G-1316501	G-1326201
Los Angeles	G-927401	G-932501	G-933601
Hamilton	G-753301	G-758201	G-759101

ENGINE NUMBER: Stamped on pad at upper front left corner of engine block.

Starting Engine Numbers

Assembly Plant	1954	1955
South Bend	1090001	1138001
Los Angeles	1090001	L-101
Hamilton		C-60501

►*1954 ENGINE NUMBER NOTE: Letter "A" following engine number indicates crankshaft main bearing journals are .005" Undersize.*

TUNE-UP

COMPRESSION PRESSURE: 130-150 lbs. at 150 RPM. *Variation limit between cylinders should not exceed* 10 lbs.

VACUUM READING: 17-18" at idle speed.

VALVE TAPPET CLEARANCE: .016" cold (Intake & Exhaust).

MANIFOLD HEAT CONTROL: Automatic thermostatic type.

Checking Thermostatic Coil Spring—With outer end of coil free from anchor, and valve closed (counterweight up), hook end of coil spring should be 90° clockwise from anchor post at 70°F.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .030". Limits .028-.033".

Spark Plug—Champion J7. Tighten to 25-30 ft. lbs.

COIL: Auto-Lite CR-6007.

Ignition Current—1½-2½ Amps. idling, 5-6 stopped.

DISTRIBUTOR: Auto-Lite IAT-4010 (Early 1954), IAT-4201 (Late 1954 & 1955).

Condenser—IAT-3076L (IAT-4010), IAT-2015L (IAT-4201).

Capacity—.21-.25 mfd.

Contact Point Set-Auto-Lite IGW-3028AS.

Breaker Gap—.020".

Cam Angle—38-40°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

►*DISTRIBUTOR SETTING & TIMING NOTE: See "Oil Pump Removal & Installation Change" under ENGINE below.*

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
2		680	4		1360
4		975	8		1950
6		1265	12		2530
7		1400	14		2800

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4
1	2	4 7/8
4	8	7 1/2
8	16	11 1/8
9	18	12

IGNITION TIMING

Setting—2° BTDC.

Timing Mark—On vibration damper. "IGN" mark in line with pointer (left side of timing cover).

Timing—Disconnect vacuum advance pipe at carburetor. Install plug in carburetor. With engine at idling speed, timing light should show index mark nearest IGN mark, directly under pointer.

CARBURETOR

Throttle Linkage Adjustment (Automatic Transmission): Adjust engine idle speed to 500-550 RPM (with engine at normal operating temperature, choke valve in wide *open position and fast idle inoperative).*

1) Disconnect accelerator cross shaft-to-bellcrank rod by removing clevis pin at cross shaft end of rod. Disconnect wire at Anti-Creep Switch on cross shaft bracket.

2) Hold contact plate on cross shaft lever firmly against end of Anti-Creep Switch, measure distance between contact plate and cross shaft bracket. If this measurement not ¼", adjust switch by loosening locknut and turning switch in or out of bracket, tighten locknut after correct ¼" clearance secured.

►*NOTE:* If ¼" clearance cannot be secured by adjusting switch, disconnect accelerator cross shaft-to-transmission rod at transmission end and check push rod and cross shaft for interference. *Do not bend contact plate or cross shaft bracket to secure correct switch setting.*

3) Connect accelerator cross shaft-to-bellcrank rod by installing clevis pin but **do not** install cotter pin at this time. Make certain that carburetor throttle valve in fully closed position (stopscrew on low end of fast idle cam and choke valve wide open).

4) With accelerator control fully released and carburetor throttle in fully closed slow idle position, check position of spring-loaded swivel on accelerator bellcrank end of carburetor throttle rod. Swivel should be close to, **but not touching** the swivel sleeve on carburetor side of rod. If swivel position not correct, disconnect accelerator cross shaft-to-bellcrank rod clevis, adjust clevis on rod until carburetor rod swivel position is correct. Tighten clevis locknut, connect bellcrank rod and install clevis cotter pin.

5) Place selector lever in Park "P" position. Set adjusting tool J-4391 at maximum length, hook one end of tool over cross shaft lever to which the transmission rod is connected, hook opposite end of tool over upper right rear corner of battery box, (this will rotate lever and partially open carburetor throttle). Shorten tool length by turning the turnbuckle until carburetor throttle valve is just wide open (at this point further movement will compress spring on throttle rod without changing throttle position). Leave tool in place to hold throttle linkage in this position if "Accelerator-to-Governor Linkage" is going to be adjusted.

CARTER WE

Model	Carter No.
1954 (Early)	989SA
1954 (Late)Ⓒ	2108S
1954 (Late)②	2190S
1955 (All Models)	2108S

Ⓒ—Except 2-Door & 4-Door Custom Sedan, after approximately Feb. 15, 1954.

②—2-Door & 4-Door Custom Sedan after Feb. 15, 1954.

Idle Setting—½-1½ turns open. Turn screw out for richer mixture.

Idle Speed—550-600 RPM (Std. Trans. & Overdrive). 500-550 (Automatic Trans.).

Float Level—3/8" (Gauge T-109-80) measured from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and bowl cover inverted.

Accelerating Pump—No seasonal adjustment.

Fast Idle: .046" throttle valve opening with choke closed. To check, crack throttle valve, hold choke closed, measure on side opposite idle ports using gauge T109-158. Adjust by bending connector rod.

Unloader Adjustment: After fast idle adjusted, hold throttle valve wide open and close choke valve as far as possible. Clearance between lower edge of choke valve and air horn wall should be 3/16" (Gauge T109-28). Adjust by bending arm on choke trip lever (use Tool T109-214).

Automatic Choke Setting: Set 1 point lean.

Throttle Linkage Adjustment (Automatic Trans.): *See "Carburetor" above.*

►*OTHER DATA: See "Carter WE Carburetor" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs. (1954), 4-5½ lbs. (1955).

CARB. EQUIPMENT

Fuel Pump: AC No. 527 (1954), No. 4156 (1955). Fuel only.

Fuel Pump Pressure—4-5 lbs. (1954), 4-5½ lbs. (1955). *See "Fuel Pumps" in Carburetion Equipment Section.*

Gasoline Gauge: Stewart Warner Electric Type.

Dash Unit—Studebaker No. 532593 (1954), 536929 (1955).

Tank Unit—Studebaker No. 525548 (2-Dr. & 4-Dr., and Landcruiser). No. 532261 (Hardtop, 5-Pass. Coupe & Station Wagon).

See "Fuel Gauges" in Carburetion Equipment Section.

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Air Cleaner: Dry Type or Oil Bath type.

►*DRY TYPE FILTER CAUTION:* Remove filter element every 1,000 miles and shake thoroughly to remove dirt. DO NOT WASH. Replace filter every six months or 10,000 miles.

BATTERY

Willard HDW-1-100, 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Battery Ground–Positive.
Engine Ground–Left front of engine.

STARTER

Auto-Lite No. MZ-4157. Armature–MZ-2211.
***Drive**–Bendix A1792. Barrel type drive.*
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft lbs.	4000	5.0	68
4.4 ft. lbs	Lock	2.0	280

Starter Switch (1954): Magnetic switch, Studebaker No. 191939, mounted on starter and controlled as follows:
Synchro-mesh Transmission Cars–Auto-Lite SW-4016 (Studebaker No. 519829) mounted on toe-board under clutch pedal and operated by fully depressing clutch pedal.
Automatic Transmission Cars–Studebaker No. 513183 pull switch on instrument panel and Delco-Remy 1998038, Neutral Safety Switch (without Power Steering), No. 1998059 (with Power Steering) mounted on steering column. Starter is operative only with transmission selector lever in "N" or "P" position.
Starting Switch (1955): Magnetic Switch, Studebaker No. 536127, mounted on starter and controlled by combination Starter & Ignition Switch (Studebaker No. 536139. On cars with Automatic Transmission, Delco-Remy 1998038, Neutral Safety Switch (without Power Steering), No. 1998059 (with Power Steering) mounted on steering column. Starter is operative only with transmission selector lever in "N" or "P" position.
Neutral Safety Switch (Automatic Transmission Cars): Adjust switch so starter is operative only in "N" or "P" positions.

GENERATOR

Auto-Lite GGW-4801E. Armature GGW-2006F.

Performance Data

Amperes	Volts	Cold –RPM– Hot
0	6.4	870-970 950-1050
40	8.0	1800-2000 2150-2350
45	8.0	1925-2125 2350-2550

Brush Spring Tension–35-53 ozs. (new brushes).
Field Current–1.6-1.7 amperes at 5.0 volts.
Motoring Current–5.0-5.5 amperes at 5.0 volts.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment–3/8-1/2" deflection midway between generator and fan pulleys.

REGULATOR

Auto-Lite VBE-6101A.

Cut-Out Relay

Cuts In–6.3-6.8 volts.
Cuts Out–4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap–.015" minimum.
Air Gap–.031-.034" with contacts open (check at hinge).

Voltage Regulator

Setting–7.35 volts *after 15 minutes operation charging at ½ maximum rate.*
Contact Gap–.015' (armature against stop pin)
Air Gap–.048-.052" with contacts just opening.

Checking & Adjusting–See Electrical Equip. Section.

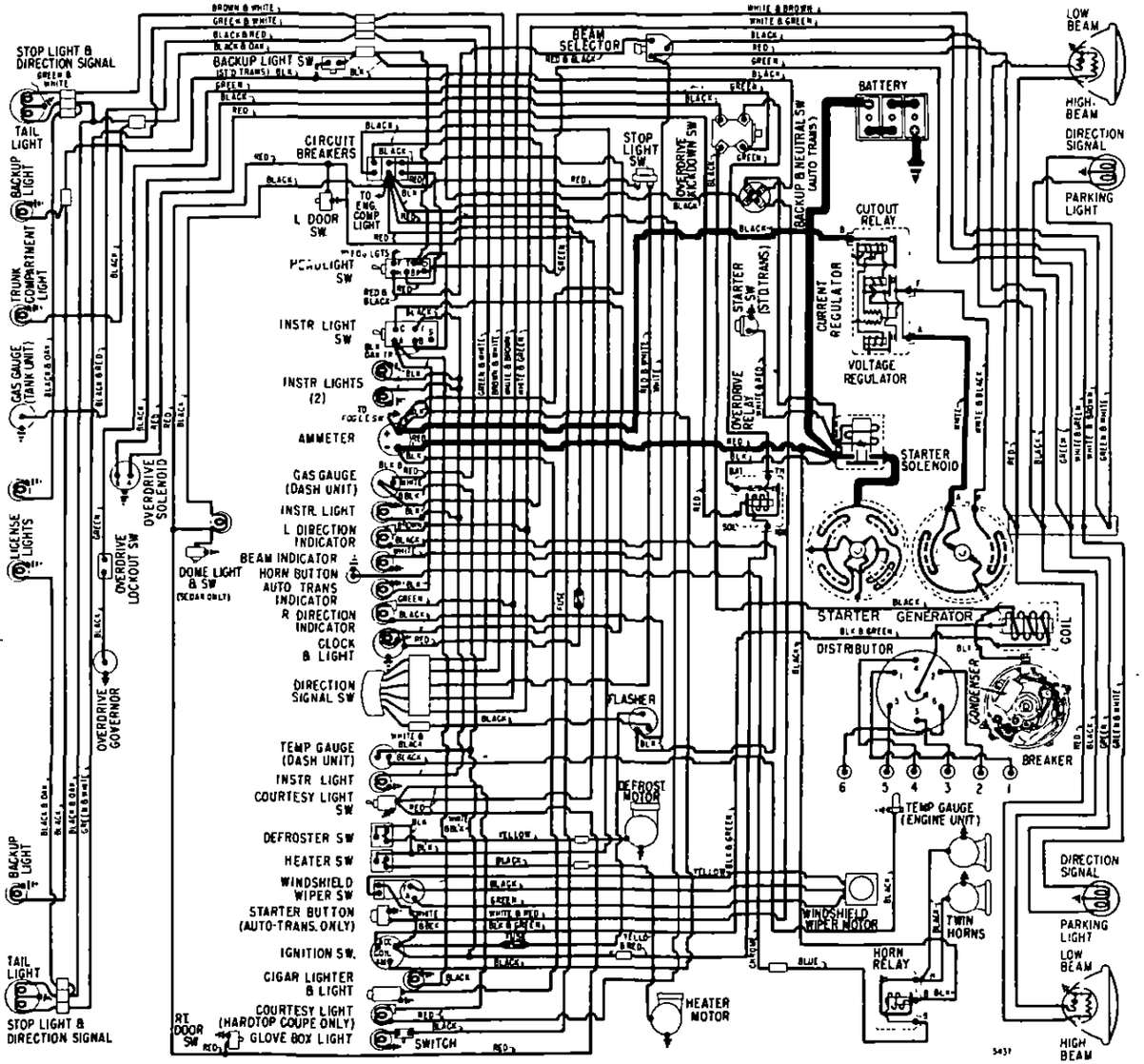
Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
52		45 (43-47)

Test A–After 15 minutes operation charging at ½ maximum rate.
Test B–After 15 minutes additional operation with current regulator operating (load applied to hold voltage 6.7-6.9 volts).

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1954 MODELS

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Contact Gap—.015" minimum (armature against stop pin).
Air Gap—.048-.052" with contacts just touching.
Checking & Adjusting—See *Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed beam. See *Electrical Equip. Section.*
Direction Signal: See *Electrical Equip. Section.*
Lighting Switch Removal: (Toggle type)—Remove retaining nut. Remove lower panel cover screws and covers. Slide toggle switch back through panel and disconnect wires. **(Knob type)**—Use stiff wire to remove spring from back side of switch knob and pull knob from shaft. Remove bezel nut and shove switch assembly back through panel and remove wires.
Stop Light Switch Location: Inner side of left frame rail just forward of steering gear housing, except on Power Brake equipped cars, where it is screwed into rear end of power unit, located under hood on left front fender apron.

FUSES: Overdrive—30 ampere on overdrive relay.
Fog Lights—30 ampere in feed wire.
Clock—2 ampere in feed wire.
Direction Signal—14 ampere in flasher feed wire.
Heater (Ultra-Vista Models)—20 amp. on heater switch.
Defroster (Ultra-Vista Models)—20 amp. on switch.

CIRCUIT BREAKER: Capacity and location as follows:
Lighting (Ultra-Vista Models)—30 amp. on main light switch.
Lighting (Except Ultra-Vista Models)—30 amp. on bracket attached to dash behind instrument panel.
Body & Stop Lights (Ultra Vista Models)—20 amp. on back side of instrument panel.
Body & Stop Lights (Except Ultra-Vista Models)—20 amp. on bracket attached to dash behind instrument panel.
Heater & Defroster (Except Ultra-Vista Models)—20 amp. on bracket attached to dash behind instrument panel.

HORNS: Sparton (Types A & B), Delco-Remy or Auto-Lite used. **Low Note** horn standard, **High Note** horn accessory.

	Low Note	High Note
Sparton (Studebaker Nos.) Type A	674005	674006
Sparton (Studebaker Nos.) Type B	536769	536768
Delco-Remy Nos.	1999683	1999684
Auto-Lite (Can.) Studebaker Nos.	530209	530208

Horn Relay: Delco-Remy 1116775.

ENGINE

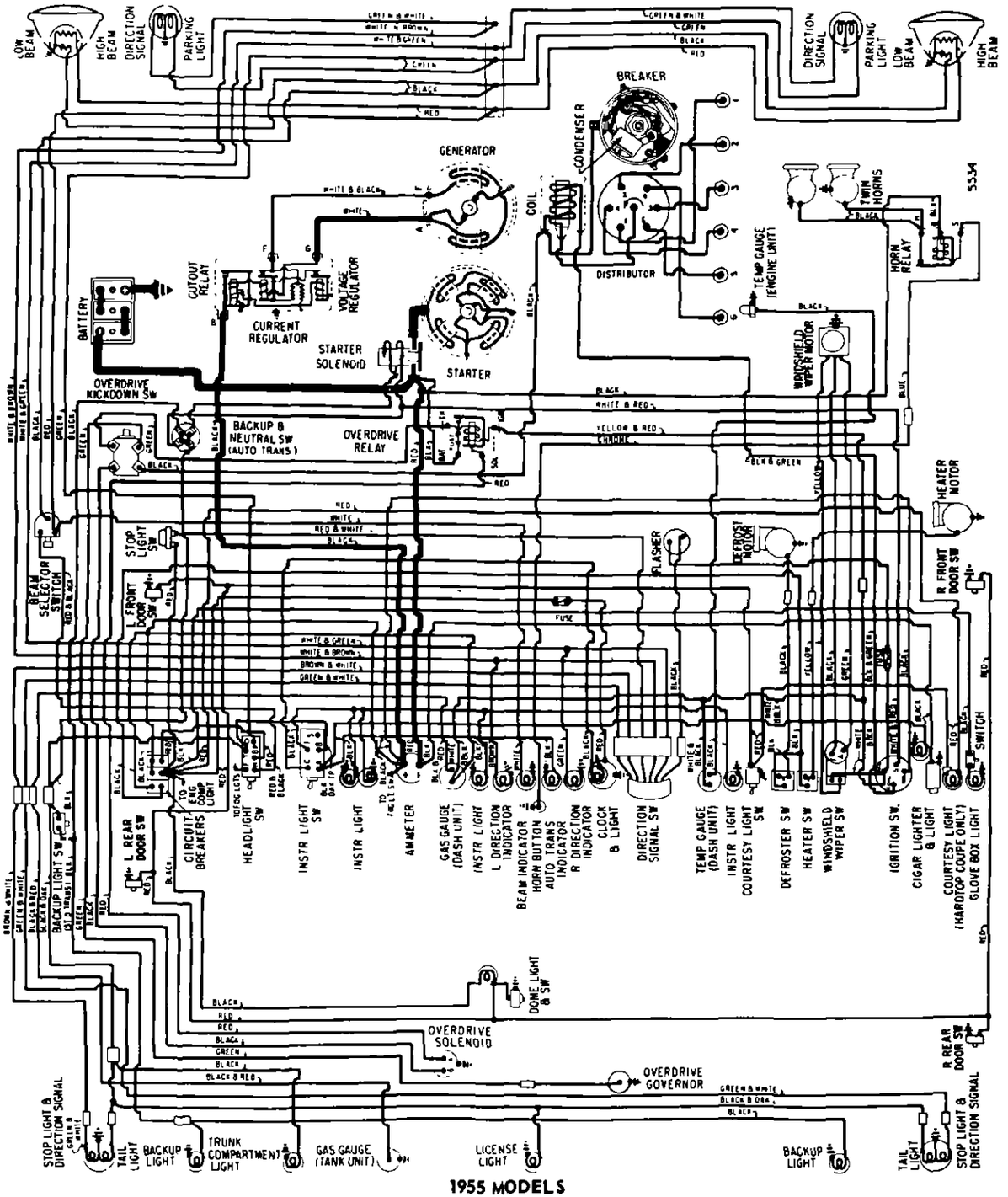
ENGINE SPECIFICATIONS: Own. 6 cyl. "L" head.

Model	Bore	Stroke	Displacement
1954	3"	4"	169.6"
1955	3"	4 3/8"	185.6"

Model	Compr. Ratio	Rated HP	Developed HP
1954	7.5-1	21.6	85 at 4000 RPM
1955	7.5-1	21.6	101 at 4000 RPM

Compression & Vacuum Reading—See *TUNE-UP.*
ENGINE REMOVAL: See *"Engine" in Studebaker Special Data.*
OIL PAN REMOVAL: See *"Oiling System" in Studebaker Special Data.*

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1955 MODELS

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CYLINDER HEAD: *See "Cylinder Head & Manifold" in Studebaker Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

Aluminum alloy, tin plated, cam ground and "T" slotted. Three ring type.

►*NOTE: 1955 pistons are 5/16" shorter than 1954 pistons and the side of the pistons have been cut away to provide clearance for the connecting rod and crankshaft. Do not use 1954 pistons in 1955 engines.*

Original Bore & Pistons—*See "Original Bore & Pistons" in Studebaker Special Data.*

Removal—Piston and rods removed from above.

Fitting New Pistons: Clearance—Selective feeler fit. Use feeler 1" wide, .002" thick, and 12" long inserted on camshaft side of cylinder bore. Insert inverted piston in bore with slotted side away from camshaft, and bottom edge 1" below top of cylinder bore. Pull required to remove feeler with properly fit piston should be 11 to 16 lbs.

Replacement Pistons: Std. .010", .020", .030" and .040" Oversize.

Installing Pistons: Install piston in cylinder bore with "T" slot away from camshaft side. *See Rod Installation.*

PISTON PINS

Pin is locked in rod by tapered pin and locknut.

►*PISTON PIN LOCKSCREW WASHER CHANGE: Early type washers were internal tooth, later production uses external tooth washer.*

Diameter—.7491-.7495". **Length** 2.625".

Clearance in Piston—.0001-.0003" (selective fit). Light thumb push fit at 70°F.

Piston Pin Removal & Installation—*See "Piston Pins" in Studebaker Special Data.*

Replacement Pins: Std. & .0025", .005" Oversize.

PISTON RINGS

1954 Models

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.002-.006"
Compr. #2	1/8"	.007-.017"	.002-.006"
Oil	5/32"	.007-.017"	.0015-.006"

1955 Models

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.002-.005"
Compr. #2	1/8"	.007-.017"	.002-.005"
Oil	5/32"	.007-.017"	.0015-.004"

Replacement Rings: Std., .020", .030", & .040" Oversize, in sets.

See "Piston Rings" in Studebaker Special Data.

Installing Rings: Top compression ring has step at the inside which must be installed up. Second compression ring has step at outside which must be installed down. Inner and outer oil ring end gaps must not come at the same point.

CONNECTING RODS

Length—(Center-to-center) 6 3/8". **Weight**—19.04 ozs.

Crankpin Journal Diameter—1.81175-1.81275"

Bearings—Steel backed, Microbabbitt lined, no shims.

Clearance—.0005-.002".

Side Play—.005-.009".

Replacement Bearings: Std., .001", .002", .005", .010" & .020" Undersize.

Installing Rods: Assemble piston and pin on rod so "T" slot of piston on side opposite oil hole in lower end of rod. Insert tapered end of clamp screw toward heavy boss on rod. With "T" slot of piston away from camshaft side, the narrow part of rod offset will be to right on odd numbered rods, to left on even numbered rods. Rods (#1, 3, 5) cannot be interchanged with rods (#2, 4, 6).

►*REPLACEMENT ROD NOTE:* (Unnumbered Rods)—With spit hole toward you, narrow part of offset will be to the right for odd numbered cylinders, and to the left for even numbered cylinders.

CRANKSHAFT

Journal Diameter—**(1954)** 2.4370-2.4375", **(1955)** 3.0623-3.0628". Four bearings.

►*1954 MAIN BEARING NOTE: Letter "A" following engine number indicates crankshaft main bearing journals are .005" Undersize.*

►*1955 FRONT MAIN BEARING CAP REMOVAL NOTE:* Remove engine front plate cork gasket and turn crankshaft until No. 1 rod journal is at 5 o'clock position or downward and toward camshaft. Separate bearing cap from block and swing end that is away from camshaft toward rear of engine, crossing the crankshaft cheek. Turn free end of bearing cap toward cylinder bore, and at the same time bring other end over crankshaft. Relieved bearing cap and crankshaft provide for this procedure.

►*MAIN BEARING CAPSCREW NOTE:* Lock wire not used with plain capscrew.

Clearance—.0005-.0025".

Replacement Bearings: Std., .001", .010", .020", and .030" Undersize.

End Thrust: Taken by thrust washer assembled between front main bearing and crankshaft gear. Controlled by shims between thrust washer and main bearing journal.

End Play—.003-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

Journal Diameters—**(1)** 1.7475-1.7478", **(2)** 1.7162-1.7170", **(3)** 1.6857-1.6865", **(4)** 1.6232-1.6240".

Bearings—Steel backed babbitt lined bushings.

Clearance—No. 1—.0007-.0022", Nos. 2, 3, 4—.0010-.0027".

End Thrust: Taken by thrust plate assembled on front face of engine block behind camshaft gear (spacer assembled on shaft behind gear hub). Tighten capscrews alternately a few turns at a time to prevent distortion of plate.

End Play—.003-.006".

►*1954 TIMING GEAR COVER LEAK CORRECTION:* When replacing cover, use four screws, Part No. 1-0512 (1/8" shorter than standard screws) at top of cover to prevent bottoming of screws before cover is securely sealed.

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear is Cast Iron, Camshaft gear is Celeron with steel hub.

Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*

Backlash—.001-.003".

Replacement Gears—Camshaft gear furnished in two sizes: Standard & High limit. Crankshaft gear furnished standard size only.

Camshaft Setting: Mesh marked tooth on camshaft gear between two marked teeth of crankshaft gear.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

Tappet Clearance: .016" cold. Intake & exhaust.

Valve	Head Diameter	Stem Diameter	Length
Intake	1 11/32"	5/16"	4 11/32"
Exhaust	1 9/32"	5/16"	4 11/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.0035"
Exhaust	45°	11/32"	.0015-.0035"

Valve Seat Width—1/16-3/32".

►*1954 VALVE COMPARTMENT COVER PRODUCTION CHANGE:* Effective at Engine No. 1106516, new valve compartment covers, gaskets and screws are being used to prevent distortion that might result in oil leaks. New gaskets and screws can be used with original covers.

►*RECONDITIONING VALVE CAUTION:* If reconditioning results in knife edge at top of valve, valve must be replaced.

Valve Springs: Install springs so that flanged edge of retainer fits over flat surface of lower coil spring. Tongue on lower side of retainer must fit in groove in spring retainer lock.

Valve Spring Specifications—93-103 lbs. ± 10% when compressed to a length of 1 5/16".

Valve Guides: Use Tool No. J-2034 and drive old guide down and out from top of block into valve spring chamber. Use Collar J-2034-5, guide pilot J-2034-2 on driver J-2034-1 and drive new guide down until driver bottoms against spacing collar.

Valve Lifters: Mushroom type. Remove from below with camshaft out of engine.

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Valve Lifter Installation & Fitting—See *"Valve System" in Studebaker Special Data.*

Replacement Lifters—Std., .001" & .005" Oversize.

►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore): See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 15° BTDC. Closes 49° ALDC.

Exhaust Valves—Open 54° BLDC. Closes 10° ATDC.

Valve Timing Check—Adjust No. 1 Intake valve at .020" cold. Rotate engine until No. 6 piston is on compression stroke (the IN-OP 1-6 marking on dampener should be several inches from pointer), then while moving lifter up and down continue to rotate crankshaft. Valve timing will be correct if lifter stops moving as above marking is directly below pointer.

OILING SYSTEM

Crankcase Capacity: 5 qts. refill.

Normal Oil Pressure: 40 lbs. at 1400-1600 RPM (1954 & early 1955); 25-50 lbs. at 40 MPH (Late 1955). *See Production Change Note below.*

►*1955 OIL PUMP PRESSURE PRODUCTION CHANGE:* Beginning with Engine No. 1165924 (So. Bend), L-1550 (Los Angeles), C64038 (Canada), a heavier oil pump relief valve spring, Part No. 536670 entered production and was made available for service replacement on previous models. *See "Normal Oil Pressure" above.*

Pressure Regulator Valve: On lower right front corner of engine. For access, remove engine front cover bolt. If spring is weak replace it, do not stretch spring.

Oil Pressure Indicator—Studebaker No. 536923. Not electrical.

Oil Pump: Helical gear type. Mounted on right side of crankcase.

Pump Removal, Overhaul & Installation—*See "Oiling System" in Studebaker Special Data.*

Oil Filter: Partial Flow. Replace filter cartridge at 5000-6000 mile intervals. Change more often in dusty areas.

Replacement Filter Element—Studebaker No. 520829 (F3 Filter); No. 520830 (F4 Filter); No. 196646 (F4 Filter, Waste Type).

Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe at left rear of engine (air outlet). Filter element in breather pipe replaceable.

COOLING

►*1954 FAN SHROUD REWORK ON HARDTOP & COUPE (To prevent interference with radiator core): See "Radiator" in Studebaker Special Data.*

Water Capacity: 10 qts. (11½ qts. with heater).

Pressure Valve: Radiator filler cap. (1954) Studebaker No. 531826 (stamped "7" opens at 7 lbs.). (1955) Studebaker No. 536502 (opens at 13 lbs.).

Thermostat: Studebaker No. 531470 (opens at 155°), No. 532017 (opens at 177°).

Water Pump: Packless, sealed ball bearing type. *See "Studebaker Champion" in Water Pump Section.*

Pump Removal—Remove shroud. *See "Cooling System" in Studebaker Special Data.* Loosen generator and remove belt. Remove fan-to-hub capscrews and remove fan blades and pulley. Disconnect Climatizer hose, and generator adjusting arm. Disconnect outlet hose and remove mounting capscrews.

Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data.*

Temperature Gauge: Electric type.

Dash Unit—(1954) Studebaker No. 532597; (1955) 536930.

Engine Unit—Studebaker No. 532579.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 8A7. Assembly No. 980 (1954). 9A7. Assembly No. 1365 (1955). Single plate dry disc type.

Clutch Disc No.—Borg & Beck 382276.

►*1954 CLUTCH PEDAL REWORK (To prevent spring breakage): See "Clutch Notes" in Studebaker Special Data.*

Pedal Adjustment: Free Travel ½-1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.

►*HILL-HOLDER NOTE:* Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages. Make sure Hill-holder operating rod installed with rod to inside (toward center of car) of clutch release shaft lever.

Housing Removal: Remove oil level gauge and tube. Remove starter mounting screws (only) and tie starter and cables up out of the way. Remove floor plate and clutch housing top capscrews. Remove transmission. *See "Transmission Removal" under Transmission.* Disconnect pedal rod at operating shaft-to-release sleeve, pull operating shaft out, remove sleeve. Remove two bolts holding rear engine support insulator cage to crossmember. Support engine at rear of oil pan (use block of wood on jack to protect oil pan). Remove crossmember. Remove two clutch housing bolts releasing exhaust pipe support bracket. Loosen clamp bolt and swing bracket out of way. Remove remaining housing bolts and remove housing. *NOTE*—Remove dowel bolts first.

►*INSTALLATION CAUTION:* Align clutch housing to rear engine plate with two tapered drifts, then install the dowel bolts. Draw dowel bolts in place by tightening the nuts—**do not drive them into place.**

Clutch Removal: Remove clutch housing (above), remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model AS1-T96 (Std.), AS24-T96 with R10 type Overdrive.

See "Warner Synchro-mesh Transmission" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

►*1954 HARD SHIFTING (FROM LOW TO 2ND GEAR) CORRECTION: See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission case. Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines. Move end of shaft to one side as far as possible and tie it in position. Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion. Remove capscrews which hold transmission case to clutch housing. Remove clutch operating shaft, bracket, and bearing from the transmission case. Then move case rearward until main drive pinion clears clutch pressure plate and remove unit from car.

NOTE—On Coupes and Hardtops, it will be necessary to remove additional frame crossmember before removing transmission.

OVERDRIVE

Warner R10. Governor controlled, solenoid operation with throttle controlled "kick-down".

See "Warner R10 Overdrive" in Transmission Section.

►*OVERDRIVE PRODUCTION CHANGE:* Reverse lockout switch discontinued, affecting the shift rail, control shaft assembly and the use of different overdrive housing. Complete units are interchangeable

Overdrive Control: *See "Warner R10 Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

Torque converter and 3-speed automatic transmission with hydraulic control. Has mechanical parking lock and Anti-creep device which holds brakes applied when car standing and ignition "on".

See "Studebaker Automatic Transmission" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Studebaker Automatic Transmission" in Transmission Section.*

Lubrication: Check Oil Level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15,000 miles.

Checking Fluid Level—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Remove inspection cover on front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dipstick gauge. Add oil to bring level up to "Full" mark on dipstick

Capacity—9½ quarts. *Use Automatic Transmission Fluid Type A (in containers with "AQ-ATF" symbol).*

►*OTHER AUTOMATIC TRANSMISSION DATA: See "Studebaker Automatic Transmission" in Transmission Section.*

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UNIVERSALS

Spicer. Needle bearing cross type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft).

Propeller Shaft & Support Bearing: Two shafts used; 1) Front shaft with intermediate universal yoke bolted on rear end (no slip-joint). 2) Rear shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal & Servicing—*See "Propeller Shaft" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss Drive.

See "Spicer Hypoid" in Rear Axle Section.

Axle Ratios

Transmission	Std. Ratio	Opt. Ratio
Syncho-mesh (1954-55)	4.10-1	4.56-1
Overdrive (1954)	①	4.56-1 ②
Overdrive (1955)	4.56-1	4.10-1, 4.88-1
Automatic	③	④

①—4.27-1 (1954 2 Dr. & 4 Dr. Custom). 4.88-1 (1954 Sta. Wgn.).

②—4.56-1, 4.10-1, 4.88-1 (2 Dr. & 4 Dr. Custom). 4.10-1, 4.27-1, 4.88-1 (Others except Sta. Wgn.).

③—4.10-1 (1954), 3.54-1 (1955).

④—3.54-1 (1954), 4.56-1 (1955).

NOTE—Rear axle ratio stamped on plate attached to axle by cover capscrew and also on gears.

Backlash—.003-.006". Shim adjustment.

Axle Shaft Removal: Remove wheel, remove wheel hub (use puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire plate to frame (*CAUTION*—Do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with puller HM-931.

Rear Axle Assembly Removal: Remove hub caps, take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs, Remove wheels, hubs and drums. Disconnect hand brake cable, take out backing plate bolts from backing plates. free hydraulic brake line from axle housing clips (do not disconnect brake line from wheel cylinders). Disconnect rear universal Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", .005", .010", .030" thick). **End Play**—.003-.006".

SHOCK ABSORBERS

Direct Acting type. See table below.

1954 Models

U.S. Cars	Front Studebaker Nos.	Rear
Standard	535318	534320
Heavy Duty (Houde)	532746	532747
Heavy Duty (Monroe)	530508	532751
Heavy Duty (Gabriel)	536398	536399
Canadian Cars	**Front**	**Rear**
Std. (Exc. Cpe. & Hardtop)	532742	532750
Std. (Cpe. & Hardtop)	532743	532750

1955 Models

U.S. Cars	Front	Rear
Standard	535403	534964
Heavy Duty (Houde)	532746	532747
Heavy Duty (Gabriel)	536398	536399
Canadian Cars	**Front**	**Rear**
Standard	535401	534965
Heavy Duty	530508	532751

FRONT SUSPENSION

Independent. Coil spring suspension with front shock absorbers located within coil springs.

See "Studebaker" in Front Suspension Section.

Kingpin Inclination—5¼°.

Caster—Neg. 1°—Neg. 2½°. Not more than ¾° variation between wheels.

Camber—0° to Pos. 1°. ½° more camber favored on drivers side.

Toe-In—1/16" to 1/8". **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for wheel straight ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm are parallel. **RHD Car Note**—Make toe-in adjustment at left hand tie rod.

Toe-Out on Turns—With outer wheel at 20°, Inner wheel should be turned 22½-23½°.

►*FRONT END NOISE CORRECTION:* Install hardened washer, Studebaker No. 1539073 between inner shaft boss of lower control arm assembly and hug nuts, to prevent movement at this point. Late production cars have these washers installed.

STEERING

Manual: Ross Cam & Twin Lever or Saginaw Worm & Roller Types.

See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.

Power Steering: Saginaw. Integral type.

See "Saginaw (G.M.) Power Steering" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Wagner Lockheed Hydraulic Self-centering (With Bendix type shoes). Parking lever applies rear wheel brakes.

See "Wagner Lockheed Self-centering" in Brake Section.

Drums—Diameter (Front) 10", (Rear) 9".

Wheel Cylinder Diameter—1" (Front); 7/8" (Rear 1954); 13/16" (Rear 1955).

►*1954-55 PARKING BRAKE LEVER CLIP (IN REAR WHEEL BRAKE ASSEMBLY) BREAKING OFF CORRECTION:* This is due to incorrect assembly of shoe return springs. The proper method is to assemble rear shoe return spring to shoe and its spring retainer first, then assemble the front shoe return spring.

►*1955 FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary lining is 1/4" thick, (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeal. This lining is applied the full length of the shoe and is marked "secondary" and "top" and should be installed as marked.

►*1955 PRIMARY REPLACEMENT CAUTION:* Early models may have either short or long primary lining installed. When relining, the primary lining must be the same length for both front wheels and for both rear wheels.

Lining Width & Length	Front Wheel	Rear Wheel
Primary Shoes	2" x 10 29/32"	2" x 9 27/32"
Secondary Shoes	2" x 10 29/33"	2" x 9 27/32"

Thickness—3/16" (except 1955 model front wheel secondary which is 1/4").

Clearance—Lock shoes against drum then turn adjusting screw back eight notches or more as required.

Hill Holder: Used on Synchro-mesh Trans. Cars. *See "Hill-holder" in Brake Section for data.*

Anti-Creep: Used on Automatic Trans. Cars. *See "Anti-creep" in Brake Section for data.*

Standard Master Cylinder: On frame left side rail at base of brake pedal.

Checking Fluid—Access hole in front floor pan at left corner of drivers' seat. Fluid should be maintained at level ½" below top of filler opening.

Removal—Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from frame bracket and then from spring clip which is attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder. (*NOTE—Hill-holder equipped cars have one line, Automatic* Drive cars have two lines). Remove brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder.

Power Brakes: (1955 Models)—Hydrovac Power unit used in conjunction with standard master cylinder and located under hood on left front fender apron.

See "Hydrovac Power Unit" in Brake Section.

Removal—Disconnect vacuum and brake lines, stop light wires, remove power unit-to-bracket bolts.

►*POWER BRAKE CONTROL CHANGE FOR SOFTER BRAKE ACTION (First Cars):* 7/16" control valve installed in production starting with Serial No. G-1334649 to give softer brake action. Conversion kit No. 537939 is available for use on early production cars that were equipped with 3/8" control valve. *NOTE—Use this conversion kit on factory installed power brake units ONLY. Not recommended for use with power brakes.*

MISC. MECHANICAL

Windshield Wipers: Trico. Vacuum link and crank type (Standard) **Auto-Lite or Redmond.** Electric (Optional).

See "Windshield Wipers" in Miscellaneous Section.

Power Window Regulators: Electrical, with reversible motors in each window. Individual switches at each door and master switch on left front door. *See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Two-way electric type.

See "Power Seat Adjusters" in Miscellaneous Section.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model ①	Model Identification
Commander	16G8
President	6H
President Speedster	6HK7

① –Early & Late Series. *NOTE–Late series cars are "Ultra-Vista" models, except for Coupe & Hardtop.*

SERIAL NUMBER: Stamped on plate on left front door hinge post.

Starting Serial Numbers (Commander)–

Assembly Plant	Early Series	Late Series
South Bend	8380601	8397201
Los Angeles	8841201	8843001
Hamilton, Ont.	8957601	8958101

Starting Serial Numbers (President)–

Assembly Plant	Early Series	Late Series
South Bend	7150001	7155401
Los Angeles	7805001	7805901
Hamilton, Ont.	7900001	7900201

ENGINE NUMBER: Stamped on cylinder block to left and in front of oil filler pipe.

Starting Engine Numbers

Model	South Bend	Los Angeles	Canada
Commander	① V-312701	② V-312701	③VC-5701
President	P-101	PL-101	PC-101

① –Second series engine number starts at V-331101.
② –Second series engine number starts at VL-101.
③ –Second series engine number starts at VC-6201.

TUNE-UP

COMPRESSION PRESSURE: 120-140 lbs. at 150 RPM.

VACUUM READING: Steady 18-20" idling at 8 MPH.

VALVE TAPPET CLEARANCE: .023-.025" engine hot and idling. .025-.027" engine cold.

MANIFOLD HEAT CONTROL: Automatic thermostatic type located on right bank exhaust manifold outlet.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders–RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033-.038".

Spark Plug–Champion H-11, 14mm. Tighten to 25-30 ft. lbs.

COIL: Delco-Remy 1115392.

Ignition Current–2-1/2 amps. idling, 4-5 amps. stopped.

DISTRIBUTOR: Delco-Remy 1110839.

Condenser–Delco-Remy 1869704. **Capacity.**18-.23 mfd.

Contact Point Set–Delco-Remy 1918148.

Breaker Gap–.013".

Cam Angle–28-34° (with .013" gap).

Breaker Arm Spring Tension–19-23 ozs.

Rotation–Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	350	1-5	700
2-4	400	4-8	800
10-12	1050	20-24	2100
15-17	1450	30-34	2900

Vacuum Spark Control: Delco-Remy 1116058. Integral type.

Plunger Travel–11/64–3/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
7-8	14-16	10.5-12.5

Distributor Removal & Installation: *See "Ignition Notes" in Studebaker Special Data.*

IGNITION TIMING

Model	Setting
Early Series Commander	4° BTDC
Late Series Commander	8° BTDC
President	8° BTDC
Speedster	8° BTDC

Timing Mark–"IGN" mark on vibration dampener.

Timing–Line up "IGN" mark on vibration dampener with pointer at left side of engine front cover, *after vacuum advance pipe has been disconnected and plugged at carburetor connection.*

►*IGNITION TIMING CAUTION: The manufacturer recommends that no attempt be made to time the engine except with a suitable timing light and that the timing mark on vibration dampener be directly under the pointer. DO NOT SET TIMING BY THE "PING" METHOD.*

CARBURETOR

►*CARBURETOR APPLICATION: Stromberg 2-Barrel Carburetor used on Commander and Carter 4-Barrel Carburetor used on President Models. NOTE–A Carter 4-Barrel Carburetor is optional equipment on Commander models.*

THROTTLE LINKAGE ADJUSTMENT (SYNCHRO-MESH & OVERDRIVE MODELS): Loosen stop screw at throttle cross shaft bracket on firewall, then making sure that carburetor throttle adjusting screw is on low step of choke cam, turn throttle adjusting screw as required to obtain an idle speed of 550 RPM. Turn stop screw in bracket until throttle actuating spring is taut and the idle adjusting screw just starts to move away from choke cam, then back off screw **one full turn** and secure with locknut. To adjust kick down switch, open throttle to full open position and turn kick down adjusting screw until pad on adjusting screw contacts plunger of kickdown switch.

THROTTLE LINKAGE ADJUSTMENT (AUTOMATIC DRIVE MODELS): With throttle valve closed and idle adjusting screw on low step of fast idle cam, adjust engine idle speed to 550 RPM. Adjust anti-creep switch until actuating spring is taut and the idle adjusting screw just starts to move away from fast idle cam, then back off the anti-creep switch **3 or 4 turns.** Position fast idle cam so that the adjusting screw contacts fourth step on cam. Adjust throttle return check screw so it just contacts tab on throttle lever arm. *Use a wrench to hold shaft when turning throttle check screw.* Hold accelerator pedal in the full wide open position without extending actuating spring, and turn transmission governor control lever on side of transmission forward until resistance of detent is felt. Adjust ball joint until stud is properly aligned with hole in governor lever.

►**Throttle Actuating Spring Note:** Throttle actuating spring is preloaded and acts as a rod until 8-1/2 lbs., or more tension is applied. In all positions from closed to wide open throttle the spring remains solidly coiled. A bracket mounted under left rocker arm cover has four holes for spring adjustment.

STROMBERG WW

Stromberg Series WW, Code 6-112C, D, E, F. 6-115, 6-116. Throttle Return Check used on Automatic Transmission Cars.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting–Initial setting, 1-3/4 turns open, final setting approximately midway between missing and rolling points. Set both screws alike, turn screws out for richer mixture.

Idle Speed–550-600 RPM (with selector lever in neutral "N" position on Automatic Drive Cars).

Float Level–3/16" from top edge of bowl to top of float with needle valve seated. To check, remove air horn and bowl cover, remove gasket, place float level gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool T-24733 (Studebaker No. KMO-269-S5).

Accelerating Pump–Center hole–Normal Setting. For less fuel install rod in inner hole, for more fuel install rod in outer hole.

Fast Idle Setting: With choke valve fully closed and fast idle cam in fast idle position, one-half diameter of button at end of throttle stop screw should rest against step of fast idle cam. If contact between button and cam not as indicated, bend choke ear up or down as required.

Unloader Adjustment: With choke valve tightly closed, open throttle valves to point where throttle lever stop rests against stop on throttle body. The choke valve should open sufficiently to allow a No. 1 drill to be inserted between choke valve and inner wall of air horn. Adjust as necessary by bending throttle lever ear which contacts choke lever.

Automatic Choke Setting: Centered (arrow on edge of cover aligned with boss on air cleaner end of housing).

Throttle Linkage Adjustment: *See "Carburetor" above.*

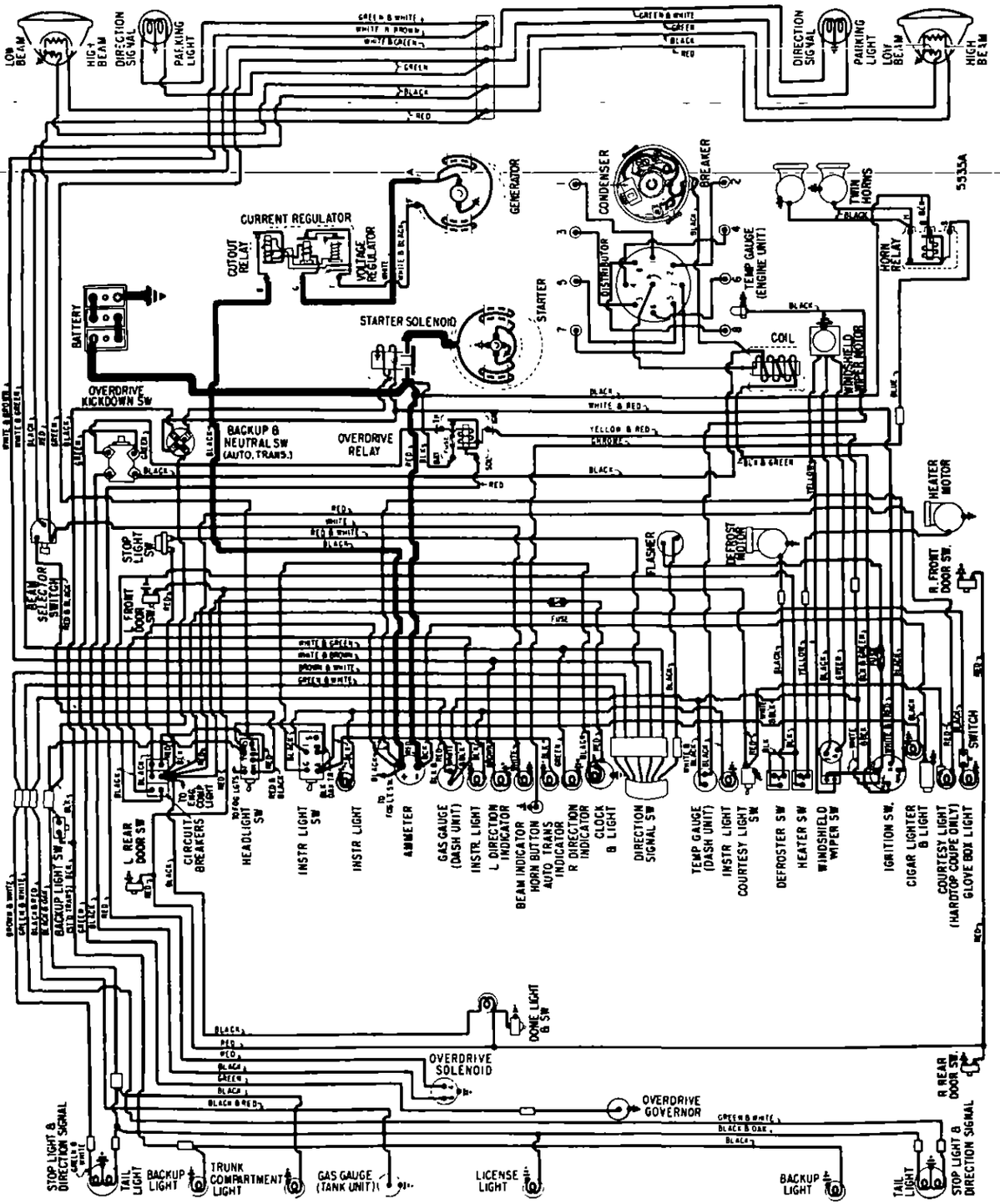
►*OTHER DATA: See "Stromberg WW Carburetor" in Carburetor Section.*

Fuel Pump Pressure: 4-5 lbs.

CARTER WCFB

Model	Carter No.
Synchro-mesh	2219S, SA
Automatic Drive	2214S, SA
All Models	2330S

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►**Replacement Carburetor Note**—2219SA can be used to replace 2214S, SA, when used with Carter Unitized Pkg. 202-81U (Throttle Return Check Assembly).

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cy. 1-4-6-7, LEFT barrels 2-3-5-8.*

EXCESSIVE FUEL CONSUMPTION CORRECTION: May be caused by improperly installed air cleaner-to-carburetor gasket. See "Carter WCFB Carburetor" in Carburetor Section.

Idle Setting—1/2—1-1/2 turns open. Turn screws out for richer mixture.

Idle Speed—550-600 RPM (all models).

Throttle Linkage Adjustment: *See "Carburetor" above.*

Fuel Pump Pressure: 4-5 lbs.

►*OTHER DATA: See "Carter WCFB Carburetor" in Carburetor Section.*

CARB. EQUIPMENT

Fuel Pump: Carter No. 2211S. Diaphragm type.
Pressure—4—5-1/2 lbs.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Stewart-Warner Electric type.
Dash Unit (Except Speedster)—Studebaker No. 536929.
Dash Unit (Speedster)—Studebaker No. 536838.
Tank Unit—Studebaker No. 425548 (2-Dr., 4-Dr., and Land Cruiser). No. 532261 (Hardtop, 5-Pass. Coupe & Sta. Wgn.).
See "Fuel Gauges" in Carburetion Equipment Section.

BATTERY

Willard HDW-1-100. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).
Battery Ground—Positive.
Engine Ground—Right front of engine.

STARTER

Delco-Remy 1107115 (Std. Trans.), 1107116 (Automatic Drive).
Armature—Delco-Remy 1878077.
Drive—Bendix "Folo-thru" type. No. A3281.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—24-28 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5500	5.65	70
11 ft. lbs.	Lock	3.25	550

Starting Switch: Delco-Remy 1494, "internal grounded" magnetic type controlled by combination Ignition and Starting Switch. Turn key full right to start engine.

Automatic Transmission Neutral Safety Switch: Delco-Remy 1998038 (without Power Steering), No. 1998059 (with Power Steering). Mounted on lower end of steering column. Starter will operate only when selector lever is in neutral position.

Neutral Safety Switch Adjustment—*See "Studebaker Automatic Transmission" in Transmission Section.*

GENERATOR

Delco-Remy 1102778. Armature—No. 1921621.

Performance Data

	Amperes ①	Volts	RPM
Cold	45	8.0	2450

① —Not maximum output. See Current Regulator.

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Brush Spring Tension–28 ozs.
Field Current–1.87-2.0 amperes at 6.0 volts (80°F).
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: Hook spring scale to belt midway between generator and fan pulleys. Adjust tension on belt so that pull of 14 lbs. on scale will lift belt 1/2".

REGULATOR

Delco-Remy 1118950. *NOTE–Regulator is "1118825 Series". Specifications below are for "Normal" settings.*

Cutout Relay

Cuts In–5.9-6.7 volts (hot).
Contact Gap–.020".
Air Gap–.020" (with contacts just closed).

Voltage Regulator

Setting–6.9-7.4 volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

Setting–42-47 amperes (hot)
Air Gap–.075" with contacts pressed down to point where contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equipment Section.*
Lighting Switch Removal: Toggle Type–Remove switch retaining nut. Push switch sleeve back into panel and disconnect wires from switch.
Push-pull Type–With a pointed tool, lift spring in back side of switch knob and remove knob from shaft. Remove bezel nut and bezel plate. Push switch out of instrument panel and remove wires.
Stop Light Switch Location: On inner side of left frame rail just forward of steering gear housing. *NOTE*–If stop light switch removed it is necessary to bleed front brakes after re-installing switch.
FUSES: Overdrive–30 amp. on overdrive relay.
Fog Lights–30 amp. in feed wire.
Radio–14 amp. in feed wire.
Clock–3 amp. in feed wire.
Direction Signal–14 amp. in flasher feed wire.
Heater (Ultra-Vista Models)–20 amp. on heater switch.
Defroster (Ultra-Vista Models)–20 amp. on defroster switch.
CIRCUIT BREAKERS: Capacity and location as follows:
Lighting (Ultra-Vista Models)–30 amp. on main light switch.
Lighting (Except Ultra-Vista Models)–30 amp. on bracket attached to dash behind instrument panel.
Body & Stop Lights (Ultra-Vista Models)–20 amp. on back side of instrument panel.
Body & Stop Lights (Except Ultra-Vista Models)–20 amp. on bracket attached to dash behind instrument panel.
Heater & Defroster (Except Ultra-Vista Models)–20 amp. on bracket attached to dash behind instrument panel.
HORNS: Three horns used on President Models, two horns used on Commander Models.

Make	Studebaker Part No. ① Low Tone	② High Tone
Sparton (Comm. & Pres.) ..	③ 674005	674006
Sparton (Comm. only)	536769	536768
Delco (Comm. only)	531757	531756
Auto-Lite (Comm. Canada) ..	530209	530208

① –Left Horn. ② –Right Horn.
③ –Sparton (Stude. No. 537015). Center horn on Pres. models.
Horn Relay: Delco-Remy 1116775.
Contacts Close–2.75-4.0 volts.
Contact Gap–.025". **Air Gap**–.015" (closed).

ENGINE

►*ENGINE PRODUCTION CHANGES: "Early" & "Late" Series cars have different engines as listed below.*
►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: Own V8, Valve-in-head.

Engine	Bore	Stroke	Displacement
Pacesetter ①	3-9/16"	2-13/16"	224.3 cu. ins.
Wildcat ②	3-9/16"	3-1/4"	259.2 cu. ins.
Bearcat ③	3-9/16"	3-1/4"	259.2 cu. ins.
Passmaster ④	3-9/16"	3-1/4"	259.2 cu. ins.

Engine	Compr. Ratio	Rated HP	Developed HP
Pacesetter ①	7.5-1	40.6	140 at 4500 RPM
Wildcat ②	7.5-1	40.6	175 at 4500 RPM
Bearcat ③	7.5-1 ⑤	40.6	162 at 4500 RPM
Passmaster ④	7.5-1 ⑤	40.6	185 at 4500 RPM

① –Early Series Commander. ② –Early Series Pres.
③ –Late Series Commander. ④ –Late Series President.
⑤ –8.0-1 Opti. Equipment.
Compression & Vacuum Reading: *See Tune-Up.*

ENGINE REMOVAL: *See "Engine" in Studebaker Special Data.*
OIL PAN REMOVAL: *See "Oil Pan" in Studebaker Special Data.*
CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Studebaker Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

Aluminum alloy, cam ground, T-slot, three ring type. *See "Original Bore & Pistons" in Studebaker Special Data.*
►*PISTON REPLACEMENT CAUTION: "Early Series" Commander (short stroke engine) pistons are not interchangeable with other 1955 engines. These pistons are longer than used in other engines and would cause damage to engine.*
Removal–Pistons and rods removed from above.
Fitting New Pistons: Clearance is selective fit. With piston inverted, slotted side away from camshaft, and with bottom of piston about 1" below top of block, insert a .002" x 1" x 12" feeler on camshaft side of piston. Pull to withdraw feeler should be 8-13 lbs. *NOTE*–This supersedes previous fitting specification of 11-16 lbs. pull.
Replacement Pistons: Std. size, .010", .020", .030", .040" oversize.
Installing Pistons: Install piston on rod with slot on same side as nut on piston pin clampscrew (away from oil squirt hole in rod). Install piston in cylinder with slot toward left side of engine (all pistons). *See Rod Installation.*

PISTON PINS

Pin is locked in rod by tapered pin and locknut. *NOTE*–The internal tooth "shakeproof" lockwasher has been replaced in production with an external tooth lockwasher.
Diameter–.8741-.8745". **Length**–2-7/8".
Clearance in Piston–.0001-.0003" or light finger push fit at room temperature (70°F).
Replacement Pins: Std. size, .0025", .005" oversize.
Removal & Installation: *See "Piston Pins" in Studebaker Special Data.*

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.008-.016"	.0025-.006"
Oil	3/16"	.008-.016"	.002-.006"

Replacement Rings: *See Studebaker Special Data.*
Installing Rings: Install rings with chamfered side of compression rings upward.

CONNECTING RODS

Length (Center-to-Center)–6-5/8". **Weight**–23.71 ozs.
Crankpin Journal Diameter–1.99925-2.00025".
Lower Bearing–Interchangeable. Steel backed, micro-babbitt lined type. No shims.
Clearance–.0005-.002". **Sideplay**–.007-.012".
Replacement Bearings: Std. size, .001", .005", .010", .020" undersize.
Installing Rods: Number on rod and bearing cap must be on same side and rod installed in same numbered cylinder with numbers down toward oil pan (toward right on right bank rods, toward left on left bank rods) and oil squirt hole on all rods toward right of engine. Rods are offset with widest half of bearing toward rear (right bank), toward front (left bank).
►*NEW (UNMARKED) ROD NOTE: Hold rod upright with oil hole toward you. Narrow part of offset will be to right on rods for right bank, and to left for rods on left bank.*
►*CAUTION:* Install piston and pin on rod so that T-slot of piston is on side opposite oil hole in bearing bore. Insert tapered end of clamp screw so it will be toward heavy boss. Be careful to align flat surface of screw with flat on piston pin. Bearing cap must be assembled on rod with groove in cap and rod on same side.

CRANKSHAFT

►*MAIN BEARING CAPSCREW LOCKWIRE PRODUCTION CHANGE: The lockwire used in main bearing capscrews is not used in later production engine.*
Journal Diameter–2.4995-2.5000".
Clearance–.0005-.0025".
Replacement Bearings: Std. size, .001", .010", .020", .030" undersize.

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End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and face of main bearing journal.
Endplay—.003-.006".
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.86975-1.87075", (2) 1.85375-1.85475", (3) 1.83875-1.83975", (4) 1.82275-1.82375", (5) 1.24475-1.24575".
Bearings—Precision type, steel backed babbitt lined.
Clearance — .00075-.00225" (No. 1), .001-.00275" (Others).
End Thrust: Taken by thrust plate located between front camshaft bearing and camshaft gear.
Endplay—.003-.006".
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*
Timing Gears: Cast iron crankshaft gear and "Celeron" camshaft gear.
Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*
Backlash—.001-.003".
Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.
Engine Front Cover Removal: *See "Engine Front Cover" in Studebaker Special Data.*
Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

Tappet Clearance—.023-.025" (Engine hot, running). .025-.027" (Engine cold, standing).

Valve	Head Diam.	Stem Diam.	Stem Clearance
Intake	1-21/32"	11/32"	.0015-.0035"
Exhaust	1-17/32"	11/32"	.0015-.0035"

Seat Angle—45° (all valves).
Lift—23/64" (all valves).
Valve Seat Width—1/16-3/32".

Valve Stem Oil Seal: Rubber seal rings installed on all valve stems (seated in groove in valve stem within spring retainer, with cupped side down).
Valve Stem Seal Testing—*See "Valve System" in Studebaker Special Data.*

Valve Springs: Single spring used. Replace spring if 10% weaker than pressure listed. *NOTE—dampener installed on lower end of all springs.*
Valve Spring Specifications—110 lbs., ± 5 lbs., when compressed to 1-43/64".

Valve Guides: Pressed in head from underside.
Guide Removal & Installation—*See "Valve System" in Studebaker Special Data.*
Valve Lifters: Straight barrel type. Remove from above. Not necessary to remove camshaft.

►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore): See "Valve System" in Studebaker Special Data.*
Valve Lifter Installation & Fitting—*See "Valve System" in Studebaker Special Data.*
Replacement Lifters—Std. size, .001", .005" oversize.

►*CAUTION—When lifters removed, make sure they are installed in original positions.*
Rocker Arms: *See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

"Early Series" Commander

Intake Valves—Open 19° BTDC. Close 46°36' ALDC.
Exhaust Valve—Open 59°36' BLDC. Close 6° ATDC.

President & "Late Series" Commander

Intake Valves—Open 11° BTDC. Close 54°36' ALDC.
Exhaust Valves—Open 51°36' BLDC. Close 14° ATDC.

Valve Timing Check—Set tappet clearance of No. 1 intake valve at .030". Turn crankshaft until No. 6 piston is on compression stroke and vibration dampener mark "IN.OP.1" is approaching pointer on timing gear cover, continue to turn crankshaft slowly while working No. 1 intake rocker arm up and down to determine point at which all clearance is taken up. Dampener mark "IN.OP.1" should be directly under pointer.

OILING SYSTEM

Crankcase Capacity: 6 quarts (refill).
Normal Oil Pressure: (Early Cars) 40 lbs. at 1400-1600 RPM. (Later Cars) 25-50 lbs. at 40 MPH. See following production change note.

►*OIL PRESSURE RELIEF VALVE SPRING PRODUCTION CHANGE NOTE:* A new valve spring, Studebaker No. 536670 increases the normal oil pressure to 25-50 lbs. at 40 MPH. This change became effective in production at Commander Engine No. V348336 (South Bend), VL-3155 (Los Angeles), VC-7316 (Canada). At President Engine No. P-15929 (South Bend), PL-1576 (Los Angeles), PC-404 (Canada). The new spring can be used as a replacement on all prior models.
Pressure Regulator Valve—Located on right side at front of engine block slightly above crankcase flange.
Oil Pressure Indicator—Not electrical.
Oil Pump: Helical Gear type. Mounted on rear main bearing cap and driven by camshaft gear.

►*OIL FLOAT INSTALLATION CAUTION:* **The correct cotter pin to use when installing the float assembly is 1/8".** If a smaller cotter pin is used float can become disengaged from oil pump, causing damage to engine.
Pump Removal, Overhaul & Installation—*See "Oiling System" in Studebaker Special Data.*
Oil Filter: Partial flow. Replace filter cartridge at 5000-6000 mile intervals. Change more often in dusty areas.
Replacement Filter Element—Studebaker No. 520830 or 196646.
Crankcase Ventilation: Filter element in oil filler cap (air intake) and breather tube at rear of engine (air outlet).

►*BREATHER TUBE FILTER NOTE: Remove filter element (retained in lower end of tube by cotter pin) for servicing.*

COOLING

Water Capacity: 17-1/4 qts. (18-3/4 qts. with heater).
Pressure Valve: Radiator filler cap. Opens at 12-15 lbs.
Thermostat: Bellows type. Opens at 158-163° F.
Water Pump: Packless, Sealed-ball-bearing type. *See "Studebaker" in Water Pump Section.*
Pump Removal—Drain cooling system. Loosen generator, push it inward to relieve tension on fan belt, remove fan belt. Remove fan-to-hub screws and remove fan and pulley. Remove fan shroud. Disconnect radiator outlet hose and Climatizer hose (if so equipped). Remove generator adjusting arm from top stud, then remove water pump manifold screws. Remove water pump manifold and four gaskets from engine block.
Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data.*
Temperature Gauge: Stewart-Warner Electric type.
Dash Unit (Exc. Speedster)—Studebaker No. 53690.
Dash Unit (Speedster)—Studebaker No. 536832.
Engine Unit (All Models)—Studebaker No. 536837.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck Model 9A7. Assembly No. 926 (Early Commander). Model 10A7. Assembly No. 361371 (Late Commander and All President models).
Clutch Disc No. Borg & Beck 381662 (Early Commander). Borg & Beck No. 382315 (Late Commander and All President models).
Pedal Adjustment: Pedal free travel 1/2-1". To make adjustment, loosen locknut securing clevis to rod connecting release shaft lever to clutch operating shaft lever and remove the clevis pin. Turn clevis to shorten or lengthen rod as necessary for correct pedal free travel. *NOTE—If car is equipped with "Hill-Holder", adjust "Hill-Holder" operating rod as outlined in Brake Section.*
Clutch Housing Removal: Remove starter. Remove floor plate and clutch housing top capscrews. Remove clutch operating shaft. Remove transmission (see Synchro-mesh Transmission Removal below). Remove two bolts holding engine rear support insulator cage to crossmember. Place a small hydraulic jack at rear of oil pan and insert a block between jack pad and oil pan to prevent damage to pan. Raise engine just enough to take weight of engine off crossmember. Remove support crossmember-to-frame bolts and remove cross member. Remove the two clutch housing bolts retaining exhaust pipe support bracket. Loosen clamp bolt and swing support bracket out of way. Remove clutch housing cover plate. Remove remaining housing mounting bolts or capscrews and remove clutch housing.
Clutch Removal: Remove clutch housing (above), remove six screws evenly to release pressure, lift off clutch assembly and driven member.

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SYNCHRO-MESH TRANSMISSION

Warner Model AS53-T86E (Std.), AS54-T86E with R10 type Overdrive.
See "Warner Synchro-mesh Transmission" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission case. Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines. Move end of shaft to one side as far as possible and tie it in position. Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion. Remove capscrews which hold transmission case to clutch housing. Remove clutch operating shaft, bracket, and bearing from transmission case. *NOTE*–On Coupes and Hardtops, it will be necessary to remove additional frame crossmember before removing transmission.

OVERDRIVE

Warner R10 Type (part of AS54-T86E Transmission). Governor controlled, with electric solenoid operation and throttle controlled "kickdown".
See "Warner R10" Overdrive in Transmission Section.

►*OVERDRIVE REVERSE LOCKOUT SWITCH PRODUCTION CHANGE: Reverse lockout switch discontinued* in production. Later type overdrive units are interchangeable in complete assemblies with earlier type.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control, mechanical parking brake, and "Anti-Creep" device which holds brakes applied when car is standing and ignition "on".

NOTE–Early Commander transmission is different than Late Commander and President models. Service procedures are the same.

►*CONVERTER HOUSING SCREEN PRODUCTION CHANGE: Screen is not being installed in production and is not required to be replaced on earlier models in service.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Studebaker Automatic Transmission" in Transmission Section.*

Lubrication: Check oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15,000 miles.

►*FLUID LEVEL CHECKING NOTE (To obtain accurate level reading): To prevent oil spray and torque converter drain back causing inaccurate dipstick reading, fluid level must be checked as indicated below, immediately after engine is stopped.*

Checking Fluid Level–*With car on a level floor, set* hand brake firmly. Place selector lever in "L" position and allow engine to warm up to normal operating temperature and then run engine at idle speed. Clean area around inspection hole and top of fluid level gauge. Remove gauge and wipe it dry. *Stop engine and immediately insert and withdraw gauge.* If any additional fluid is required, add it and then repeat the checking procedure. Use only Automatic Transmission Fluid Type "A", bearing an AQ-ATF symbol on the container.

Capacity–9-1/2 quarts, Automatic Transmission Fluid Type "A".

►*OTHER AUTOMATIC TRANSMISSION SERVICE DATA: See "Studebaker Automatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing cross type. Three used with intermediate universal at propeller shaft support bearing on crossmember.

Propeller Shaft & Support Bearings: Two shafts used.
1) Front shaft with intermediate universal yoke bolted to rear end (no slip-joint).
2) Rear shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal: *See "Propeller Shaft Notes" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss Drive. *See "Spicer Hypoid" in Rear Axle Section.*

►*REAR AXLE RATIO PRODUCTION CHANGE NOTE: Axle ratios were changed on some models (as indicated below) at beginning of "Late Series" production.*

Rear Axle Ratios

	①SM	②OD	③AUTO
Early Series (Std.)			
Comm. (Exc. Sta. Wgn.)	4.10-1	4.27-1	3.54-1
Comm. Sta. Wag.	4.09-1	4.55-1	3.54-1
President	3.92-1	4.27-1	3.54-1
Early Series (Optl.)	① SM	② OD	③ AUTO
Comm. (Exc. Sta. Wgn.)	④	⑤	⑥
Comm. Sta. Wgn.	⑦	4.27-1	⑥
President	⑧	⑨	⑥
Late Series (Std.)	① SM	② OD	③ AUTO
Comm. ⑩	3.73-1	3.54-1	3.07-1
Comm. ⑪	3.73-1	3.54-1	3.31-1
Comm. Sta. Wgn.	3.92-1	3.73-1	3.31-1
President ⑫	3.92-1	4.27-1	3.31-1
President ⑬	3.92-1	4.27-1	3.54-1
Late Series (Optl.)	① SM	② OD	③ AUTO
Comm. ⑩	⑭	3.54-1	3.31-1
Comm. ⑪	⑭	3.54-1	3.07-1
Comm. Sta. Wgn.	3.73-1	3.73-1	⑥

① –Synchro-mesh. ② –Overdrive. ③ –Automatic Trans.
④ –4.56-1 & 4.27-1. ⑤ –4.56-1 & 4.10-1.
⑥ –None available. ⑦ –4.27-1 & 4.55-1.
⑧ –4.09-1 & 4.27-1. ⑨ –4.55-1 & 4.09-1
⑩ –2-Dr. & 4-Dr. Ultra-Vista Models.
⑪ –Except 2-Dr. & 4-Dr. Ultra-Vista Models.
⑫ –4-Dr. Deluxe Ultra-Vista Models.
⑬ –Except 4-Dr. Deluxe Ultra-Vista Models.
⑭ –3.73-1 & 3.92-1.

Rear Axle Ratio Identification: Rear axle ratio stamped on plate attached to axle by cover cap screw and also on ring and pinion gears.
Backlash–.003-.006".

Axle Shaft Removal: Remove wheel and wheel hub (use Puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire to frame out of the way (*CAUTION*–Do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft with Puller HM-931.

Rear Axle Assembly Removal: Remove hub caps and axle shaft cotter pin. Loosen wheel nuts. Place car on stands (stands under frame just ahead of rear springs) and remove wheels, hubs, and drums. Disconnect hand brake cables, take out backing plate bolts and free hydraulic brake lines from axle housing clips (do not disconnect brake lines from wheel cylinders). Disconnect rear universal joint (wire caps or use clamps to prevent losing bearing rollers). Remove rear spring U-bolts, disconnect lower shock absorber links, remove rear axle assembly from car.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims furnished .003", .005", .010", .030" thick). **Endplay**–.001-.005".

SHOCK ABSORBERS

Houde, Monroe or Gabriel. Direct acting hydraulic.

Studebaker Shock Absorber Nos.

U.S. Cars	Front	Rear
Standard (Sedans)	535403	534964
Standard (Cpe. & Hardtop)	534319	534964
Heavy Duty (Houde)	532746	532747
Heavy Duty (Gabriel)	536398	536399
Canadian Cars	**Front**	**Rear**
Standard (Sedan)	535401	534965
Standard (Cpe. & Hardtop)	534329	534965
Heavy Duty (Monroe)	530508	532751

FRONT SUSPENSION

Independent. Coil spring suspension with front shock absorbers located within the springs. *See "Studebaker" in Front Suspension Section.*

►*FRONT END NOISE CORRECTION ("Chuckling" sound or a sharp "cracking" noise):* May be caused by looseness of lower support arm inner shaft attaching bolt nuts. Correct by installing a plain hardened steel washer, Studebaker No. 1539073 against the inner shaft boss. Install hug nut and tighten to 60-65 ft. lbs. Later production cars have hardened washer installed.

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►*SPEEDSTER FRONT SPRING SPACER NOTE:* Two front spring spacers, Studebaker Part No. 526830 are used on the left side only. One spacer is located between lower suspension arm and insulator, and the other is located between frame and upper insulator. These spacers used in production beginning with Car Serial 7166614.

►*CAR LEVELING NOTE: Speedster Front Spring Spacers, Part No. 526830 can be used to level any 1950-55 model passenger car.*

Kingpin Inclination–5-1/4° at 0° camber.

Caster–Neg. 1° to Neg. 2-1/2°. Not more than 3/4° variation between wheels.

Camber–0° to Pos. 1°. 1/2° more camber favored on driver's side.

Toe-In–1/16-1/8". **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel. **RHD Car Note**–Make toe-in adjustments at left hand tie rod.

Toe-Out on Turns–With outer wheel at 20°, inner wheel should be 22-1/2–23-1/2°.

STEERING

Manual: Ross Cam & Twin Lever or Saginaw Worm & Roller types.
See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.

Power Steering: Saginaw. Integral type. Power unit and control valve assembly built into steering gear.
See "Saginaw (GM) Power Steering" in Steering Section.

►*POWER STEERING PUMP BRACKET STUD BREAKING CORRECTION:* Breakage of these two special screws (either above or below the hex head) may be due to looseness of the screws in the block. Make sure both screws are tightened to the same torque as other cylinder head screws. It is important to keep these bolts tight.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Wagner Lockheed Hydraulic. Self-centering (with Bendix-type shoes). Parking brake applies rear wheel service brakes.
See "Wagner Lockheed Self-Centering" in Brake Section.

►*FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary lining is 7/32" thick (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeak. This lining is applied to the full length of the shoe and is marked "secondary" and "top", and should be installed as marked.

►*PRIMARY LINING REPLACEMENT CAUTION:* Early models may have either long or short primary lining installed. When relining, the primary lining must be the same length for both front wheels and for both rear wheels.

Drums–Diameter 11" (front), 10" (rear).

Braking Power–62% (front), 38% (rear).

Wheel Cylinder Diameter–1-1/16" (front), 7/8" (rear).

Lining Dimensions	Width	① Length	Thickness
Front Wheels	2-1/4"	12"	② 3/16"
Rear Wheels	2"	10-29/32"	3/16"

①–See "Lining Length Note" above.

②–Front wheel secondary lining is 7/32". See "Front Wheel Secondary Lining Note" above.

Clearance–Lock shoes against drum with adjusting screw, then back off adjusting screw 8 notches, or more notches as required to free drum.

Standard Master Cylinder: On frame left side rail at base of brake pedal.

Checking Fluid–Access hole in front floor pan at left corner of drivers seat. Fluid should be maintained 1/2" below top of filler opening.

Removal–Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from its frame bracket and then from spring clip attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder. (*NOTE*–Hill-holder equipped cars have one line, Automatic Drive cars have two lines). Remove brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder. Insert forward mounting bolt to hold hill holder (or Anti-Creep solenoid valve) while master cylinder is off car.

Power Brakes: Hydrovac power unit used with standard master cylinder.
See "Hydrovac Power Unit" in Brake Section.

Checking Fluid–Same as for Manual Brakes (same master cylinder used).

Removal of Power Unit–Disconnect manifold vacuum supply hose at the power unit and disconnect stop light switch wires. Disconnect hydraulic lines from power unit (lines leading to master cylinder and to wheel cylinders). Remove power unit-to-bracket mounting bolts and remove unit from car.

MISC. MECHANICAL

Windshield Wipers: Auto-Lite, Redmond and Bosch Electric type. *See "Auto-Lite Windshield Wiper 'Single End' Motors" and "Redmond Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: *See "Studebaker Air Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electrical, with individual reversible motors in each window. Control switches at each door with a master control switch located on left front door. *See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Two-way electric type with curved seat tracks for seat adjustment (seat raises and lowers with a tilting action).
See "Power Seat Adjusters" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

ALL MODELS

TIGHTENING TORQUES: When tightening capscrews or bolt nuts retaining the parts listed below, use a torque indicating wrench and tighten to tensions listed.

ALL MODELS (EXC. 6226 ENGINE)

	Ft.Lbs.
Cylinder Head Stud Nuts	60-70
Cylinder Head Screws	60-70
Main Bearing Cap Bolts	65-75
Con. Rod Cap Bolt Nut 3/8-24 with Palnut	35-40
Con. Rod Cap Bolt Nut 3/8-24 with Lock Nut	40-45
Con. Rod Cap Bolt Nut 7/16"	50-55
Con. Rod Cap Bolt Nut 11/32"	33-38
Crankshaft Counterweight Bolt	60-70
Flywheel to Crankshaft Bolts	35-41
Camshaft Thrust Plate Bolts 4 Cyl.	20-26
Camshaft Thrust Plate Bolts 6 Cyl.	14-20
Camshaft Gear to Camshaft Bolt	30-40
Int. & Exh. Manifold Bolts	29-35
Rocker Arm Bracket to Head Nut	30-36
Spark Plugs to Cyl. Head	26-30
Engine Mounting (Center Bolt)	45-55

6226 ENGINE

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	30-35	360-420
Spark Plugs	30	360
Con. Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mounting Bolts	35-40	420-480
Camshaft Sprocket Nut	35-40	420-480
Int. & Exh. Manifolds	30-35	360-420
Vibration Dampener Bolt	100-130	1200-1560

CAUTION—Torque figures given are for clean and dry threads.

ENGINE

UNIVERSAL JEEP

ENGINE REMOVAL: To remove engine from chassis as required for such engine items as crankshaft and camshaft overhaul, perform the following operations in sequence.

1)—Drain cooling system, and remove battery. Disconnect and remove upper and lower radiator hoses, stay rod, radiator hold down bolts, and lift radiator out.

2)—Remove air cleaner. Disconnect cable at starter terminal and remove starter. Disconnect generator leads and ignition coil leads, and remove heat indicator bulb at cylinder head, and oil gauge pressure line. Disconnect engine ground strap, and remove two bolts in engine mounting on each side.

3)—Disconnect throttle control and choke control rods at carburetor, governor dash control at governor. Remove horn. Disconnect fuel and windshield wiper lines at fuel pump. Disconnect exhaust pipe at manifold.

4)—Disconnect rear end of engine stay cable at frame cross-member, and remove bell housing **leaving one bolt at each side to support engine weight.**

5)—Attach chain hoist to engine and take up just enough to support engine without binding remaining bell housing bolts, and remove these bolts. Swing engine forward to withdraw clutch shaft from bushing in flywheel, lift engine from chassis.

►***INSTALLATION CAUTION***—Place small amount of grease in clutch shaft bushing in flywheel before installing engine.

STA. WGN., SEDAN DEL., TRUCKS

1947-55 MODELS

ENGINE REMOVAL: NOTE—It is recommended that engine be removed from chassis for overhauling.

1)—Disconnect battery, drain cooling system, and remove the bolts and nuts attaching hood to hinge and remove hood. Remove radiator brace rods, and both upper and lower radiator hoses (heater hoses if so equipped). Remove radiator attaching screws and remove radiator.

2)—Disconnect fuel line and flexible windshield wiper hose at fuel pump. Remove carburetor air cleaner, and disconnect the carburetor choke and throttle controls.

3)—Remove starter motor wires and starting motor. Disconnect generator wires at generator, and coil wires at coil. If car is equipped with overdrive, tag overdrive control wires and remove them. Disconnect heat indicator and oil gauge wires.

4)—Disconnect exhaust pipe at manifold, and remove the nuts and bolts from front engine supports. Remove flywheel-to-bell housing attaching bolts.

5)—Attach a suitable lifting sling on engine, and raise engine high enough to release weight from front engine supports, then pull engine forward until clutch clears the bell housing. Lift engine from chassis.

1952-53 PASSENGER CARS

ENGINE REMOVAL: ***(CAUTION—Engine must be removed from below, and it is necessary that a dolly be used on which to lower the engine. Approximate 'Dolly" dimensions are: 40" long, 20" wide, 14" high).*** Proceed as follows:

1)—Drain radiator and block, remove fresh air duct, carburetor air cleaner, and disconnect battery at positive cable.

2)—Disconnect wires from: Temperature sender, Coil, Starter Solenoid, Generator, Oil Pressure sender, and Overdrive solenoid and Lockout switch. Tag the above wires for easier identification.

3)—Remove coil, disconnect heater hose at engine. Disconnect throttle link and remove choke control from carburetor. Disconnect accelerator pedal link from throttle bellcrank and push back into car. Disconnect fuel line and windshield wiper line at fuel pump.

4)—Remove radiator hoses. Remove steering idler arm bracket from frame, and pitman arm from steering gear cross-shaft. Disconnect right hand tie-rod at wheel end and swing steering linkage out of way.

5)—Remove exhaust pipe. Remove splash guard, clutch arm support and clutch arm. Unhook pedal springs and disconnect pedal bracket from rear cross-member. Unhook hand brake cable from bellcrank on right side of rear cross-member, remove clip attaching cable to bell-housing and swing cable out of way.

6)—Remove battery cable from bell-housing (if attached). Disconnect and remove overdrive lockout cable. Disconnect speedometer cable, and gear shift rods at transmission, and disconnect front end of propeller shaft from transmission.

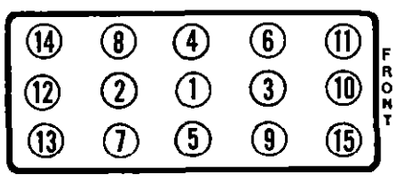
7)—Lower the car so that the engine support members rest on the dolly. Install blocks between dolly and engine front support brackets so that front cross-member will not twist when released. Remove three screws at each end of both front and rear cross-members and lift the car off engine. Watch engine at all sides while lifting to avoid interference and possible damage. If front cross-member does not come out from between sills freely, spread sills with a jack until it does. Lift car until engine can be rolled free.

CYLINDER HEAD

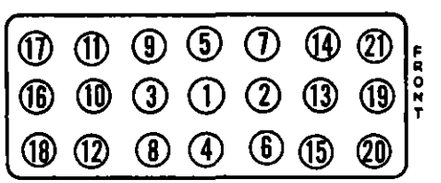
ALL MODELS

CYLINDER HEAD: Installation—Use a torque indicating wrench to tighten cylinder head stud nuts and capscrews, tighten in correct sequence as shown. Recheck with engine water at 150°F.

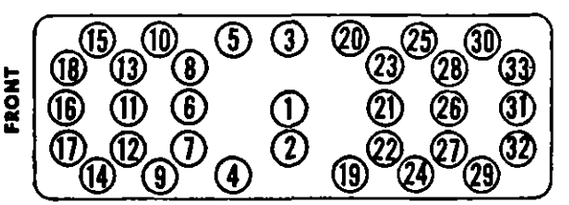
Tightening Torque—See Tightening (Torque Wrench) Specifications.



4 CYL. "L" HEAD ENGINES



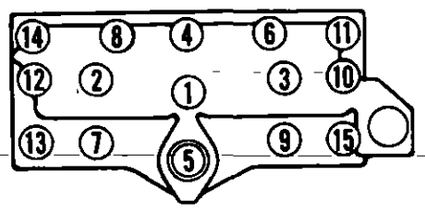
6 CYL. "L-HEAD" ENGINE



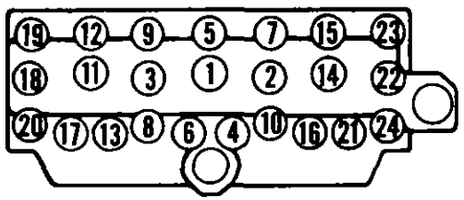
6226 "L" HEAD ENGINE

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4 CYL. "F-HEAD" ENGINE



6 CYL. "F-HEAD" ENGINE

ORIGINAL BORE & PISTONS

ALL MODELS (EXC. 6226 ENGINE)

BORE & PISTON SIZES: Engines originally equipped at factory with special oversize pistons may be identified by code letter stamped on engine following the engine number:

"B"—Pistons are .002" Oversize.

"AB"—Pistons .002" Oversize. Main and connecting rod bearings are Undersize (see Original Bearing Sizes following).

"C"—Piston Pins .002" Undersize.

4 CYLINDER MODELS

STANDARD BORE & PISTON SIZE VARIATION: bores and pistons are graded in four .0005" steps as shown in table below and are marked as follows:

Piston—Letter stamped on piston head.

Cylinder Bore—Letter stamped on top of block between valve ports and bore at center.

4 Cylinder Bore & Piston Sizes

Letter	Cylinder Bore Size	Piston Size
A	3.1255-3.1250"	3.1235-3.1230"
B	3.1260-3.1255"	3.1240-3.1235"
C	3.1265-3.1260"	3.1245-3.1240"
D	3.1270-3.1265"	3.1250-3.1245"

6 CYL. MODELS (EXC. 6226 ENG.)

STANDARD BORE & PISTON SIZE VARIATION: Cylinder bore and pistons are graded in six .0004" steps and are marked as follows:

Piston—Letter stamped on piston head.

Cylinder Bore—Similar letter stamped on top of block between valve ports and bore.

ORIGINAL BEARING SIZES

ALL MODELS (EXC. 6226 ENGINE)

MAIN & CONNECTING ROD BEARING SIZES: Engines originally equipped with special undersize mains and connecting rod bearings can be identified by code letter stamped on engine following the engine number:

"A"—Main & Con. Rod Bearings .010" Undersize.

"AB"—Main & Con. Rod Bearings .010" Undersize and Pistons Oversize (see Original Bore & Pistons).

"D"—Main Bearings .010" Undersize.

"E"—Connecting Rod Bearings .010" Undersize.

CRANKSHAFT & MAIN BEARINGS

ALL MODELS (EXC. 6226 ENGINE)

CRANKSHAFT SERVICING: Bearing Replacement—

►*CAUTION*—4 Cyl. engine must be removed from car for bearing replacement (bearings "doweled" in case and crankshaft must be taken out to remove and install bearings). 6 Cyl. bearings not doweled in this manner.

Make certain that oil holes in bearings line up with oil holes in crankcase. On 4 cylinder, see that bearings fit snugly on dowel pins in crankcase and bearing caps.

Rear Bearing Oil Seal (1946-Early 1953 4 Cyl. & 1946-53 6 Cyl.)—Consists of a wick type packing installed in grooves in bearing cap and crankcase. To install new packing, insert packing in groove, working both ends toward center with a round piece of wood or steel. With packing firmly seated in groove, cut off ends flush with surface. NOTE—Crankshaft must be removed to install packing in upper (crankcase) half of bearing.

►*NOTE:* Later "Lip" type seal (see below) can be used for replacement of above seals without removing crankshaft.

Rear Bearing Oil Seal (4 & 6 Cyl. 1953 & Later): ***Upper and lower halves of seal can be replaced without removing crankshaft from engine.*** Seal is neoprene with a steel back. Upper half of seal can be removed by using a suitable piece of strap steel (hack saw blade with teeth ground off). Rotate upper half of seal around shaft with steel strap until opposite end protrudes far enough to grasp end and remove. To install, coat both parts of seal with grease and install upper half by rotating it around crankshaft until it is in position with ends even at the engine block. Coat both ends of lower seal with Permatex before installing to insure good seal with upper half.

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case. When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. CAUTION—Do not cut off this protruding portion of the packing.

Front (Timing Cover) Oil Seal—Braided asbestos type impregnated with graphite and oil. Seal is installed in recess in inner face of timing chain cover and retained by steel retainer. To remove seal, pry out retainer and seal assembly.
CAUTION—Always use new steel retainer when installing new seal.

►**Production Change (Starting CJ-2A Eng. No. 62054, 4-63 Eng. No. 11080, All 2-WD & 4-WD Jeep Trucks)** New timing case cover (double baffle and spring loaded leather seal) and new crankshaft pulley (with polished surface for seal contact) used. This new cover and pulley can be installed as an assembly on earlier engines (either chain or gear drive).

6226 ENGINE

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket). Rear filler blocks (additional **upper filler block guard** in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger. Filler blocks can be removed and replaced without disturbing crankshaft as follows:

Front Filler Block (Lower) Servicing: Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block. When installing filler block, first install oil pan side gaskets (No. 200266), install filler block (use Perma-tex), install new end gasket (No. 200267) on block.

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal). Remove and discard old gasket or seal. Install new seal (no. 204654) in same manner as described below for Rear Filler Block (Upper) Guard. Install lower filler block **after** upper filler block guard has been installed.

Rear Filler Block (Upper) Guard Servicing: Guard is seated in groove in crankcase and can be "rotated" out without disturbing crankshaft after lower filler block removed. Remove and discard old gasket or seal, clean out seal groove. Install new graphite impregnated seal (no. 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard). **Do not use shellac or sealing compound in groove.**

►*CAUTION*—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft. If necessary, seal can be built up using 1/32" thick gasket material, 3/16" wide, as shims shellacked to groove in block or guard behind seal.

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ENGINE FRONT COVER

ALL M DELS (EXC. 6226 ENGINE)

FRONT COVER OIL SEAL: Cover has double metal baffle and spring-loaded leather seal which contacts polished surface of crankshaft pulley hub. When installing seal, make certain that seal lip is inward or toward rear of engine.

FLYWHEEL

ALL MODELS (EXC. 6226 ENGINE)

Flywheel—Mounted on crankshaft flange by two special dowel bolts and four special head bolts. Whenever flywheel removed, make certain that arrow on flywheel center lines up with arrow on crankshaft flange when re-installed (to insure correct position of timing marks), tighten bolt nuts with a torque indicating wrench to 36-40 ft.lbs. and check flywheel run-out when installed. Run-out *must not exceed .008".*

New Flywheel or Crankshaft Installation—Taper dowel bolts should be replaced with new special snug fitting bolts supplied to eliminate necessity of reaming the special tapered holes. Assemble new parts as follows: Install flywheel on crankshaft (lining up arrows on both parts) using the four straight bolts previously used, tighten these bolts securely. Drill out tapered bolt holes with a 35/64" drill, ream these holes with a 9/16" (.5625") straight reamer, install special bolts, Part No. 116295 (with No. 52330 Lockwasher and No. 52804 Nut), in these holes and discard the tapered dowel bolts used previously. Tighten bolts to 36-40 ft.lbs. and check flywheel run-out (.008" max.).

CAMSHAFT & BEARINGS

ALL MODELS (EXC. 6226 ENGINE)

CAMSHAFT SERVICING: Removal—Drain radiator and cylinder block, remove radiator and grille, cylinder head, manifold, valves, and valve springs. Remove oil pump, fuel pump, oil pan, crankshaft pulley (use puller), fan and governor drive belts, and fan assembly. Remove nuts on front engine support rubber insulators (Jeep only). Remove timing gear cover, remove camshaft gear and thrust plate, block up all valve lifters (can be tied up with string *to manifold studs). On Jeep only, place jack under* crankcase (use block of wood on jack to avoid damage to oil pan), raise front end of engine to provide clearance for camshaft. Remove camshaft through front of engine.

Gear Puller Tool—Use Puller Tool No. W-172 to remove gear on engines equipped with timing gears.

Camshaft Front Bearing—Consists of a steel-backed, babbitt-lined bushing which takes thrust. When installing this bushing, make certain oil hole lines up with drilled oil hole in crankcase, stake bearing in place to prevent turning in service.

Camshaft Thrust Plate (On Engines with Timing Gears)—Thrust plate assembled behind gear with a spacer assembled behind plate. If required, a thin shim can be installed behind spacer if too little *clearance, or spacer can be dressed to provide* greater clearance.

Camshaft Thrust Plunger (On Engines with Timing Chain)—Plunger and spring should be installed in camshaft hub with round end out. Stationary pin on timing chain cover must be perpendicular so as to bear on spring-loaded plunger.

***INSTALLATION CAUTION*—Make certain that thrust washer installed in back of camshaft sprocket. Coat end of thrust pin on timing chain cover with cup grease when installing cover.**

VALVE SYSTEM

TAPPET CLEARANCE ADJUSTMENT

6226 ENGINE

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below). Remove right front wheel and access cover in fender splash shield for access to valve compartment. Remove spark plugs so that engine can be turned over by moving fan or fan belt. By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment.**

Fully Raise Valve	Then ADJUST Valve:
Nos. 1 and 3	Nos. 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos. 2 and 6	Nos. 7 and 11
Nos. 10 and 12	Nos. 1 and 3
Nos. 4 and 5	Nos. 8 and 9
Nos. 7 and 11	Nos. 2 and 6

ROCKER ARMS

4 & 6 CYL. "F-HEAD" ENGINES

ROCKER ARM ASSEMBLY REMOVAL: Lock the rocker arms, shaft, brackets, and springs together as a unit by removing the cover studs in front and rear rocker arm shaft brackets and installing four 5/16"-24 thread set screws in the two front and two rear brackets in the same way the set screws are installed in center brackets. Remove the nuts on the six bracket studs and lift entire assembly off studs as a unit.

INSTALLATION: Check push rods, straighten or replace any that are bent. Place push rods in holes in head and block, being sure that they are properly seated in intake valve tappets. Place rocker arm assembly on its studs, seat intake valve adjusting screws in tops of push rods before installing nuts on bracket studs. Torque nuts to 30-36 ft. lbs. Remove four extra set screws from two front and two rear rocker arm shaft brackets, install cover studs in front and rear brackets with short end of stud down.

OILING SYSTEM

OIL PUMP

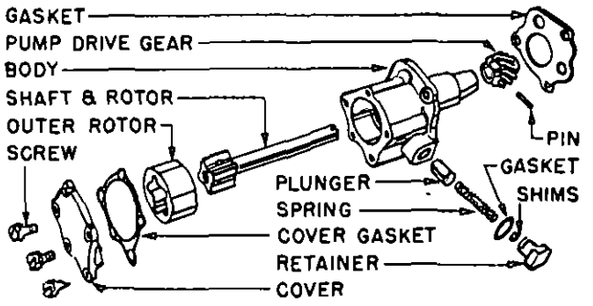
ALL MODELS (EXC. 6226 ENGINE)

OIL PUMP REMOVAL & OVERHAUL: (Removal)—Rotate engine until distributor rotor points to No. 1 firing position and timing mark on flywheel or vibration dampener is directly under pointer. On 4 Cyl. Models do not remove distributor (pump must be installed so gears mesh without moving rotor for correct engine timing). On 6 Cyl. Models, remove distributor. (CAUTION—Engine must not be rotated with oil pump removed). Remove pump mounting bolts and pull pump out as far as possible. Place a short jack between front suspension support and front lower edge of block and push engine to right until pump is free (Note—It may be necessary to loosen engine support bolts for more movement). Check pump shaft for wear before disassembling pump by mounting it in a vise with a dial indicator bearing against shoulder on gear, at right angles to relief valve housing. Move gear toward, then away from indicator and note total reading. If this play exceeds .010", replace complete pump.

Disassembly: Remove cover screws, cover and gasket and shake outer rotor from housing. Remove relief valve retainer, gasket, shims, spring, and plunger. If rotor is to be replaced, file off one end of gear retaining pin, pull gear off shaft and remove shaft and inner rotor from housing. Clean all parts in solvent and check for wear, pits and scoring.

Checking Rotor Clearance: Position inner rotor with one lobe engaged between two lobes of outer rotor, then measure clearance of opposite inner rotor lobe and lobe of outer rotor. This clearance should not exceed .010". To check end clearance, place a small piece of .010" shim stock on inner rotor so that it does not overhang edge of rotor at any point. Install cover and gasket and tighten screws. If shaft can be turned by hand, end clearance is excessive. Install new cover and repeat test. If rotors still not tight, replace rotors.

Reassembly: Install relief valve, spring, gasket and retainer. If shims were removed, install them between spring and retainer. If new rotors installed, slide gear on shaft after installing shaft and rotor in housing. Position gear so there is not over .010" clearance between gear and pump housing and drill a 5/32" hole through pump shaft for retaining pin. Install pin and peen ends. Install cover and gasket and tighten screws.



OIL PUMP (ALL ENGINES EXC. 6226)

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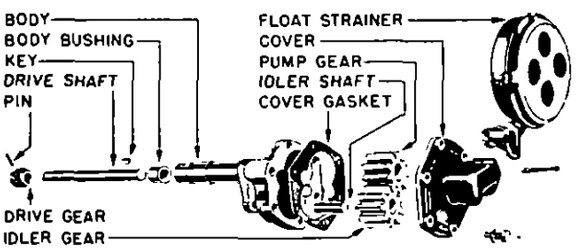
Installation (4 Cyl. Models): Check to see that timing marks on flywheel or vibration dampener are directly under pointer and distributor rotor is pointed toward No. 1 firing position. Insert pump in block with pump gear positioned so that it will engage camshaft gear and the distributor shaft drive key without moving distributor rotor. Installation can be made only in one position without moving distributor rotor as slot in drive gear and key on distributor shaft is machined off-center.

Installation (6 Cyl. Models): Make certain that No. 1 piston is on top dead center and that timing mark on flywheel or vibration dampener is directly under pointer. Install new gasket between pump and block and be sure that gasket matches pump intake and discharge ports. Start pump into mounting hole but do not engage gears. Insert a long screw driver through distributor hole and engage slot in pump drive gear. Rotate pump gear so that when meshed with camshaft gear, slot will be practically vertical with off-set to rear, as it enters camshaft gear. As pump is pushed in and gears are fully meshed, slot will be about 45° from vertical position. (NOTE—If gear is meshed one tooth away from the correct position, slot will be 36° off, which is readily noticeable). Install distributor and check ignition timing.

6226 ENGINE

OIL PUMP SERVICING: Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling. Service pump as follows:

Disassembly—Take out cotter pin and remove screen float assembly. Remove cover and gasket. Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear. remove idler gear (remove idler shaft if required). Take off lower drive gear (press fit and keyed to shaft).



6226 ENGINE OIL PUMP

Oil Pump Clearances—Check as follows:

1)—Pump Body Bushing: if over .005" clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to .500-.501".

2)—Pump Shaft: shaft diameter .4990-.4985".

3)—Lower Drive Gear: end of gear should be .001-.006" beyond gasket seat on pump body.

4)—*Upper Drive Gear: .002-.004" clearance between* underside of gear and upper end of pump body. Controlled by pressing lower drive gear on shaft until this clearance obtained.

NOTE—Cover plate should be replaced if worn from contact with gears, or if cracked.

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose). Replace by using drift inserted in distributor drive shaft bore from top of block. Install new bushing from below (must be flush with bottom of block).

Reassembly—Press upper drive gear on shaft with pin hole at right angles to tongue on shaft. Insert new pin and peen ends flush with gear. Install shaft and gear in pump body. Press lower drive gear on shaft (with key in place) until .002-.004" clearance obtained between upper drive gear and upper end of pump body. Press idler gear shaft in body, install idler gear. Install cover using new gasket and pin oil screen float assembly on cover. Check shaft and gears—must rotate freely when turned by hand.

Oil Pump Installation—Set #1 piston at top dead center. Insert distributor main drive shaft from top of block. Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx. parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut. Remove distributor shaft for cyl. head installation.

FRONT AXLE UNIVERSALS

ALL 4-WHEEL DRIVE MODELS

BENDIX CONSTANT-VELOCITY

NOTE: This 'constant velocity' universal joint used only on front axle shafts (at each front wheel).

SERVICING: With axle shaft assembly removed from housing, service universal as follows:

Disassembly: Drive out retainer pin locking center ball pin in outer axle shaft (pin located within shaft end yoke—use pin punch). Strike outer end of axle shaft on block of wood to cause center ball pin to move into recess in shaft and free center ball. Pull halves of joint apart as far as possible and bend shafts at sharp angle. Rotate center ball until grooved side lines up with one of the ball raceways, move adjacent ball past center ball and remove from joint. Remaining balls (including center ball) will then drop out.

Inspection & Servicing: Inspect raceways for wear, replace complete axle shaft and universal assembly if badly worn. Inspect center ball pin for wear, inspect all balls, replace balls if rough, grooved or with flat spots. CAUTION—If one or more balls being replaced, measure old ball with micrometer and replace with ball of exact same size unless larger balls needed to take up play. See Ball Service note following Reassembly (below).

Reassembly: If original balls not being re-used, see Ball Servicing Note below for selection of correct size balls. Clamp inner axle shaft in vise with universal yoke upward, place center ball in socket in end of shaft with groove and pin turned to one side. Drop center ball pin in recess in end of outer (wheel end) axle shaft, position this shaft on center ball, insert balls in three raceways. Bend shafts at sharp angle, turn center ball until groove lines up with fourth raceway, insert ball. Straighten shafts, turn center ball to align hole with center ball pin, install retainer pin, prick punch ends of pin to hold it in place securely. CAUTION—always use new retainer pin.

Ball Servicing Note: *Standard balls are .875" in diameter. If universal worn so that play evident, and raceways are in good condition, one or two larger balls (preferably .001", not more than .002" larger) may be used to take up play. Measure old ball with micrometer (std. diameter .875"). Balls are furnished in .001" steps from .003" undersize to .003" oversize. If all balls not same size, install larger balls diametrically opposite each other. CAUTION—all balls used must be within .001" of same size and total variation should not exceed .002".*

►*INSTALLATION NOTE: For axle shaft endplay adjustment (to center universal joint), see "FRONT AXLE" below.*

RZEPPA CONSTANT-VELOCITY

NOTE: This 'Constant Velocity' universal used only on front axle shafts (at each front wheel).

SERVICING: Axle shaft assembly removed from housing, service universal as follows:

Disassembly: Remove three screws retaining inner axle shaft in universal inner race, pull shaft out (retainer can be removed from shaft by taking out retainer ring on shaft). Lift out axle centering pin. Manipulate inner race and cage until all six balls have been taken out. Rotate inner race and cage assembly until pilot cup is exposed, lift pilot cup out. Turn cage until two of the bosses on outer race drop into elongated holes in cage, lift cage and inner race out. Remove inner race by rotating it until one boss drops into one of the elongated holes in the cage, shift race to one side and lift it out.

Inspection & Servicing: Inspect all parts for wear. Replace balls if rough, chipped, or with flat spots.

Reassembly: Reverse disassembly directions given above. Do not force parts into place which may cause damage.

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▷*INSTALLATION NOTE: For axle shaft endplay adjustment (to center universal joint), see "FRONT AXLE" below.*

FRONT AXLE

ALL 4-WHEEL DRIVE MODELS

Steering Knuckle Bearings: The steering knuckle is mounted on two "stub" kingpins with Timken roller bearings in ball ends of axle housing. Bearings are adjustable by adding or removing shims located under kingpin bearing caps (upper cap integral with steering arm). Disassemble bearings as follows:

Disassembly—With Axle Shaft & Universal Joint out, remove 8 screws holding oil seal retainers in place on inner face of knuckle support, remove oil seal retainer halves. Remove four nuts and lockwashers on lower bearing cap, remove bearing cap and bearing adjusting shims (under cap). Remove four nuts and lockwashers on upper bearing cap (steering arm), remove brake hose shield, steering arm, and bearing adjusting shims (under steering arm). Remove steering knuckle (CAUTION—Do not allow lower bearing cone and roller assembly to fall when knuckle is pulled off).

Bearing Adjustment—Install steering knuckle on axle housing (reverse order of disassembly directions) **without the oil seal** placing one each of the following shims under both the upper and lower bearing caps—.003", .005", .010", .030" (total shim thickness at each end .048"), tighten bearing cap stud nuts securely. Then check bearing tension by hooking spring scale in tie rod hole at end of steering arm and noting pull required to turn steering knuckle on axle end. This pull or bearing tension should be 25-35 in. lbs. with oil seals out. Adjust by adding or removing shims under bearing caps. CAUTION—Total shim thickness under upper and lower bearing caps must be equal. Shims furnished in thicknesses of 003", .005", .010", .030".

Oil Seal Replacement—Felt type mounted in metal retainers bolted on inner face of steering knuckle. When replacing oil seal, make certain that spherical surface of axle housing is not scored or scratched (smooth down any roughness with emery cloth), bolt seal retainer halves on housing using lockwashers under mounting screw heads, make certain that felts have good fit at center joint.

Wheel Bearing Adjustment: Jack up front wheel, remove hub cap, axle shaft nut and washer, driving flange capscrews, and flange (use puller on flange). Bend lip of adjusting nut lockwasher back to free nut, remove locknut. Tighten adjusting nut until wheel binds (turn wheel while tightening nut), back off nut 1/6 turn or until wheel rotates freely. Replace lockwasher and locknut, tighten locknut securely and bend ear of lockwasher up against nut to prevent loosening in service. Check adjustment of bearings by grasping front and rear of tire and shaking wheels from side to side. A barely perceptible shake should be felt in the bearings. Install flange shims and flange. On cars prior to Serial No. 37549 (CJ-3A), No. 44074 (4-WD), and No. 14284 (4-463), with Bendix Universals, check axle shaft endplay (below) before completing assembly. *NOTE*—On cars with Rzeppa Universals, disregard endplay note below and install shim pack of .060" under flange. No shims used in later cars, see "4-Wheel Drive Front Axle Change" below.

Axle Shaft Endplay Check (With Bendix Universal Joints)—Tighten the flange nut (do not install lockwasher), swing wheel to maximum left or right position with punchmark on end of axle shaft straight up or down. Back off flange nut until clearance between nut and flange is .050" (measure with feeler gauge). Tap end of shaft with a soft hammer (shaft will move in an amount equal to the endplay). Recheck clearance between nut and flange with a feeler gauge. **Subtract this measured clearance from the original .050" clearance.** If resulting figure is less than .015", add shims to shim pack under flange, if figure is more than .035", remove shims from shim pack under flange. With correct thickness of shim pack under flange, install axle shaft lockwasher, nut, and cotter pin.

4-Wheel Drive Front Axle Change—A change in endplay control of front axle shafts beginning with Serial No. 37549 (CJ-3A), No. 44074 (4-WD), and 14284 (4-463), eliminated the shim pack for endplay adjustment formerly located behind drive flange and added a flanged bushing on outer side of Universal Joint and a trust washer on inner side, centering Universal Joint directly under center line of spindle pivot points and allowing axle shaft to float in driving flange. This same change was made in the Rzeppa type, plus a snap ring added at outer end of shaft, giving the endplay control between the flanged bushing and the snap ring. In both types, replace the flanged bushing when endplay is excessive.

SPRING SHACKLES

JEEP & TRUCK MODELS

SPRING SHACKLES: Springs are fitted with "U" type shackle (front end of front springs, rear end of rear springs on Jeep; front end of front springs only on Trucks). Opposite end of all springs fitted with bronze bushing and conventional pivot bolt (rear shackle of rear springs on Trucks has same type bushing and bolt.) CAUTION—When removing springs, remove pivot bolt first, then remove bushings from "U" shackle. Install springs as follows:

Pivot Bolt Installation—Install bolts with head and grease fitting toward outside, tighten bolt nut with a torque indicating wrench to 27-30 ft.lbs.

"U" Shackle Installation—Install grease seal retainer and grease seal on each leg of "U" shackle, insert shackle through inner face of frame hanger and spring eye (threaded bushings installed with hexagonal head toward outside), hold shackle tightly against frame and start upper bushing on shackle (see Bushing Caution below) taking care that bushing is not cross-threaded on shackle or in spring eye. Turn bushing on shackle approximately halfway, then start lower bushing similarly, turn both bushings in alternately and evenly until heads of bushings are snug against frame bracket and bushing in spring eye is 1/32" away from spring (measured from inside hexagonal head to spring). Lubricate bushing with high-pressure lubricant, check shackles for binding by flexing spring. If shackle is tight, remove and re-install bushing.

BUSHING CAUTION—Left-hand threaded "U" shackles are used at left front spring and right rear spring (Jeep), at left front spring only (Trucks) with the left-hand threaded end down (toward spring eye) and special left-hand threaded bushings must be used with these shackles. Shackles may be identified by small boss forged on lower shank and bushings identified by groove around head. Right-hand shackles and bushings are unmarked.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on outside of left frame side rail at front end on Nameplate on right side of instrument panel.
1946 Numbers—10,001 Up.
1948 Numbers—148,459 Up.
1949 Numbers—10,001 Up.

ENGINE NUMBER: Stamped on boss on right front *upper corner of cylinder block near water pump.*

TUNE-UP

COMPRESSION PRESSURE: 115 lbs. at cranking speed of 185 RPM. for Std. 6.48-1 Head.

VACUUM READING: Steady 17-21" idling at 7-10 MPH.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAPS: .030".
***Plug Type**—Auto-Lite AN-7 or AN-7B, 14 mm.*

IGNITION: *See Coil, Condenser, and Distributor.*
Breaker Gap—.020" Limits .020-.024" (IGW-4177-1 & IGW-4189), .018-.022" (IAD-4008).
Cam Angle or Dwell—41° closed, 49° open (distr.).
Breaker Arm Spring Tension—17-20 ounces.
Automatic & Vacuum Advance—*See Distributor.*

IGNITION TIMING: 5° BTDC. *NOTE—Road test car for timing modifications for fuel and operating conditions.*
►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*
Timing Procedure—*See Ignition Timing.*
Timing Mark—Flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of housing below starter.
►**Timing Mark Change**—Flywheel marked "5°" (replacing "IGN/") starting Engine No. 175402.

CARBURETION: *See Carburetor & Carb. Equipment.*
Idle Setting—Idle screw 1-2 turns open (turn screw out for richer mixture.
Idle Speed—600 RPM. or 8 MPH.
Float Level—⅜" from top of float at free end to machined surface (gasket seat) on bowl cover. Invert to check (allow float to hang freely.
CAUTION—Do not compress spring in valve stem.
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 4½ lbs. maximum.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment required. When installing assembly, see that thermostatic spring end rests on top of spring stop bracket on manifold.

CRANKCASE VENTILATOR: Remove and clean Vacuum Control Valve on manifold. *See Crankcase Ventilator (following CARB. EQUIPMENT) for data.*

VALVE TAPPET CLEARANCE: .016" All Valves, Hot or Cold. NOTE—Self-locking adjusting screws used.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Willys No. 642073 (for Yale & Towne), No. 644001 (Hurd). In base of ign. coil.
Ignition Lock—Willys No. 661949 (for Yale & Towne), No. 644000 (for Hurd).

COIL: Auto-Lite Model IG-4314 or IG-4314A. Mounted on back of instrument panel with ignition switch in base.
Replacement Coil—Auto-Lite IG-3033XS with Service Bracket CE-12488.
Ignition Current—2.5 ampere idling, 5 stopped.

CONDENSER: Auto-Lite Part No. IGB-1025 (IGW-4177-1 & IGW-4189 Distr.), IGW-3139 (IAD-4008). Capacity—.20-.25 mfd. (IGB-1025), .23-26 mfd. (IGW-3139).

DISTRIBUTOR: Auto-Lite Model IGW-4177-1, IAD-4008, or IGW-4189. Single breaker, 4 lobe cam, full automatic advance type (vacuum spark control may be used with IGW-4189 distributor).
Breaker Gap—.020". Limits .020-.024" (IGW-4177-1 and IGW-4189), .018-.022" (IAD-4008).
Cam Angle—41° closed, 49° open.
***Breaker Arm Spring Tension**—17-20 ounces.*
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IAD-4008 & IGW-4177-1

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	250	0	500
3	580	6	1160
6	930	12	1860
9	1270	18	2540
11	1500	22	3000

Automatic Advance—IGW-4189

Start	350	0	700
2	560	4	1120
5	875	10	1750
8	1190	16	2380
11	1500	22	3000

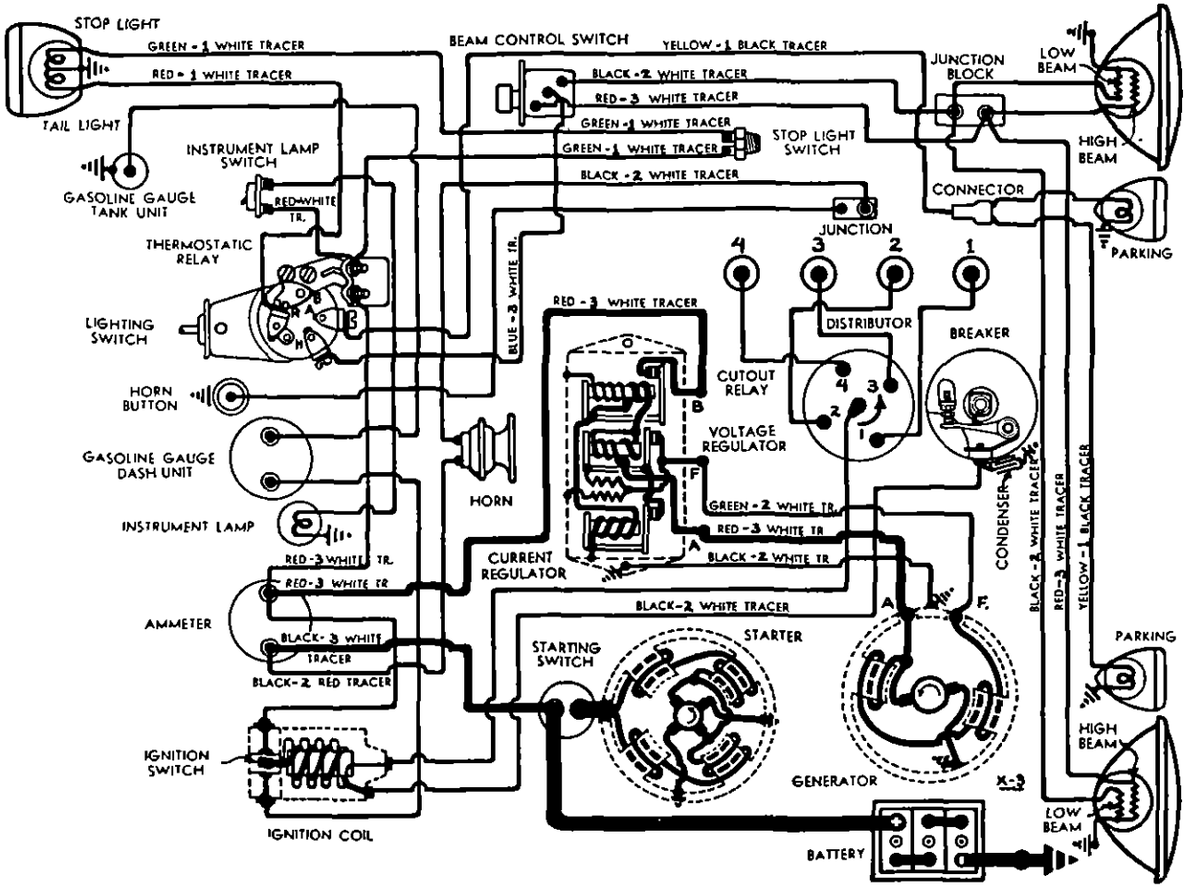
Vacuum Spark Control (IGW-4189 Distr.) Auto-Lite *Model VC-4010 Unit:* Separate unit mounted on hold-down plate and linked to advance arm. Provides additional advance for all speeds above idling except for acceleration and wide open throttle operation when spark retarded by return spring within unit.

Vacuum Advance (for IGW-4189 Distr.)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
2°	4°	5¾"
5°	10°	9¼"
8°	16°	12¾"
10°	20°	15"

Distributor Removal: Mounted on right hand side of engine. To remove, take out hold-down screw in advance arm.
***Installation Note**—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to cylinder #1 firing position (see Timing), turn distributor rotor to #1 distributor cap segment position (see diagram), insert distributor drive shaft in drive housing on engine.*

CONTINUED ON NEXT PAGE



FIRST CIVILIAN JEEP

CONTINUED FROM PRECEDING PAGE

rock shaft back and forth until drive lug on end of shaft enters slot in drive coupling, push distributor down into place and install hold-down screw. Check Ignition Timing.

CAUTION—If Oil Pump removed, refer to Oil Pump Installation directions in Willys Shop Notes.

IGNITION TIMING

Standard Setting.. ....5° BTDC

►*IGNITION TIMING NOTE—Road test car for timing modifications for fuel and operating conditions.*

►**Timing Mark Change**—Flywheel marked "5°" (replacing "IGN/") starting Engine No. 175402.

Timing (Without Timing Light)—With #1 piston on compression, turn crankshaft until piston reaches firing position, with flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of flywheel housing below starter. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open (press rotor clockwise to eliminate backlash), tighten clamp bolt. See that rotor is at #1 segment in distributor cap.

Timing (Using Timing Light—Engine Idling)—This method recommended by manufacturer. Direct timing light on flywheel, idle engine (engine must be warm), adjust distributor (as directed above) until timing mark is centered in inspection hole.

CARBURETOR

Carter WO Type 636SA superseding 596S & 636S. 1⅛" Single Barrel, downdraft, with manual choke control (interconnected with throttle to provide fast idle).

NOTE—Carburetor may be identified by Casting Number 458 (596S), 505 (636S) on face of flange.

See Carburetor Section for complete data.

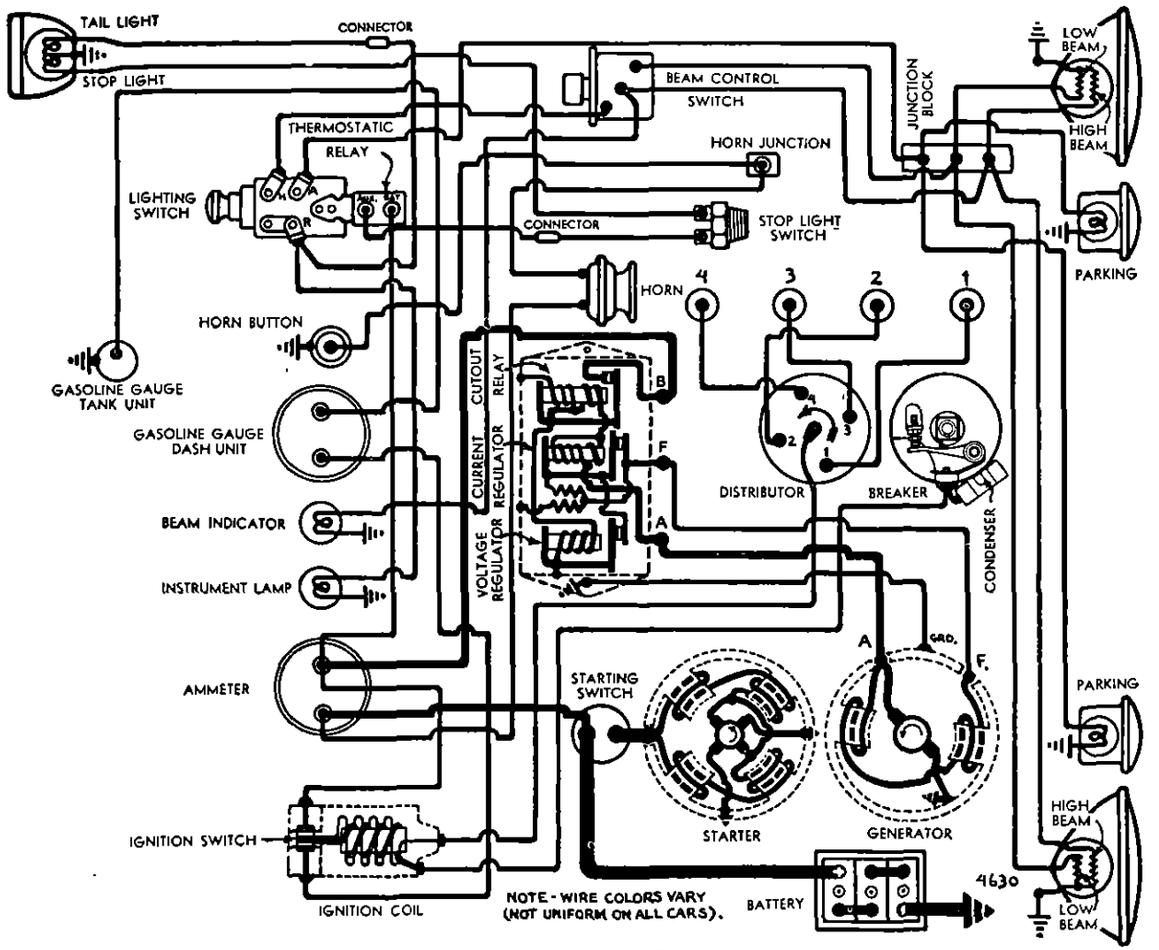
Idle Adjustment—With engine warm (choke valve wide open and fast idle inoperative), set throttle stopscrew for idling speed of 600 Engine RPM or 8 MPH. Turn idle adjusting screw out until engine begins to roll, then turn screw in until engines fires smoothly. Final setting of idle screw should be 1-2 turns open. Recheck idle speed.

Accelerating Pump—No seasonal adjustment.

Float Level—⅜" from top of float at free end to machined surface (gasket seat) on cover with valve seated. To check, invert assembly and allow float to hang freely. Do not compress spring in valve stem.

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section for complete data.***

Fast Idle: Choke valve interconnected with throttle valve to open throttle to fast idle position when choke in use. No adjustment required.



LATER CIVILIAN JEEP

CARB. EQUIPMENT

Governor (Special Equip.): King-Seeley "Handy" Model 26510-400 (CJ-2A), 26510-354 (CJ-3A) Monarch or Novi Governors. Centrifugal types. Mounted on left front corner of cylinder head and driven by special belt from the crankshaft.

Setting—1000 to 2600 RPM of engine in steps of 200 RPM (in accordance with position of dash control lever which has nine settings).

Adjustment—***See Willys Shop Notes for directions.***

Air Cleaner: Oakes Model No. 613300. Oil-bath type. **Servicing**—Clean and refill oil reservoir to indicated level with same grade engine oil used in crankcase at 2000 mile intervals (when crankcase drained), or more often if required by operating conditions (twice daily for extremely dust field conditions).

Fuel Pump: AC Type AF No. 1538886 Diaphragm type (Std.), AC Type AM No. 1537409 (CJ-2A), No. 1539353 (CJ-3A) combination fuel-and-vacuum pump.

Replacement Pump—AC No. 572 (1538886), 7409 or 9306 (1537409), 9353 (1539353).

See Carburetion Equipment Section for data.

Pressure—3 lbs. (4½ lbs. max. at 1800 RPM).

Gasoline Gauge: Auto-Lite (Motometer) elec. type.

Dash Unit—Auto-Lite No. NG-10764D.

Tank Unit—Auto-Lite No. NG-10762T.

See Carburetion Equipment Section for data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Consists of Air Intake Pipe from Air Cleaner to Crankcase Oil Filler (Oil Filler Cap has gasket and must seat tightly to prevent air leaks at this point) and Air Outlet Pipe from Valve Chamber Cover to Intake Manifold. There is a Vacuum Valve at the manifold connection and this valve must close at idling speed for satisfactory engine idling performance.

Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. Remove and clean control valve when tuning engine or whenever system does not operate satisfactorily.

Vacuum Control Valve: Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold, clamp valve in vise and remove top of housing, withdraw valve and spring. Clean valve and valve seat thoroughly. Reassemble and re-install unit.

BATTERY

Auto-Lite (U.S.L.) Type PN-15. 6 volt, 15 plate, 100 Ampere Hour capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Zero Capacity—300 amperes for 3.2 minutes. Five-second voltage 4.15 volts.
Grounded Terminal—Negative (—) terminal grounded to frame at right end of front cross-member (CJ-2A), at starter (CJ-3A).
Engine-Ground—Strap connector between right front engine mounting leg (under generator) and engine mounting bracket on frame side rail.
Dimensions—Length 8 15/16". Wid. 7⅛". Hgt. 8⅝".
Location—In engine compartment on right side.

STARTER

Auto-Lite Model MZ-4113. Armature No. MZ-2089.
Drive—Special type Bendix Drive No. A2233.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—185 RPM, 150-175 amps., 5 volts.

Performance Data

Torque		RPM	Volts	Amperes
0	ft. lbs.	4300	5.5	70
.65	"	2500	5.5	100
2.55	"	1325	5.0	200
4.95	"	750	4.5	300
7.65	"	220	4.0	400
7.8	"	Lock	3.0	420
11.7	"	Lock	4.0	560

Removal: Starter flange mounted on right front face of flywheel housing. To remove, take out two flange mounting capscrews and one bolt in bracket at commutator end.

Starting Switch: Auto-Lite Model SW-4015. Mounted under floor to right of accelerator pedal. Operated manually by button on toeboard.

GENERATOR

Auto-Lite Model GDZ-4817-A. Armature GDZ-2006F. Two brush, shunt type with external vibrating voltage and current regulation. Ventilated by fan on drive pulley.
Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM. Actual charging rate controlled by regulator and dependent on battery condition.
Charging Rate Adjustment—None. See Regulator.

Performance Data

Cold			Hot		
Amperes	Volts	RPM	Amperes	Volts	RPM.
0	6.4	925	0	6.4	1000
5	6.65	1060	5	6.65	1150
10	6.85	1200	10	6.85	1290
15	7.05	1340	15	7.05	1430
20	7.3	1480	20	7.3	1590
25	7.55	1620	25	7.55	1750
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.6-1.78 amperes at 6.0 volts.
Motoring Current—4.16-4.60 amperes at 6.0 volts.

Removal: Conventional pivot mounting at right front of engine. To remove, take out clamp bolt above generator and two pivot bolts under generator. Slip off drive belt and lift generator out.

Belt Adjustment: Loosen clamp and pivot bolts, swing generator out away from engine until belt can be deflected 1" midway between generator and fan pulleys with thumb pressure.

REGULATOR

Auto-Lite Model VRP-4007C-2, or VRP-6003A. Voltage-Current Type. Regulator mounted on right side in engine compartment. Consists of Cutout Relay and vibrating type Voltage and Current Regulator units.
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open measured at hinge end of core.

Voltage Regulator

Setting—7.35 volts (7.2-7.5) at 70°F. See Electrical Equip. Section for settings at other temperatures.

To Check—Connect ammeter in charging line at regulator "B" terminal (use short heavy leads), connect voltmeter between "B" terminal and ground. Operate generator at speed equivalent to 30 MPH. charging a full charged battery until voltage is steady (charging rate approx. 10 amperes). Note voltmeter reading which should agree with Setting given above.

To Adjust (with cover removed)—Change regulator armature spring tension by bending lower spring hanger slightly. Increase tension to increase operating voltage, decrease tension to lower voltage. See Electrical Equipment Section for complete adjustment directions.

Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked "35" on cover).

To Check—Connect test meters as for voltage check (above). Operate generator at speed equivalent to 30 MPH. charging battery, turn on car lights and accessories or connect load (bank of headlamp bulbs, etc.) between ammeter and battery so that generator charges at peak rate and Current Regulator operates. Note ammeter reading which should agree with Setting given above.

To Adjust—Same as for Voltage Regulator above.
Contact Gap & Air Gap—Same as Voltage Regulat'r.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Headlamp Adjustment—Aim upper beam straight ahead (hot spot center exactly 3" below lamp center height at 25 feet).

Switches

Lighting—Douglas No. A-457.
Beam Selector—Douglas No. 6351.
Instrument—Willys No. 635737 (first cars only). Controlled by lighting switch on later cars.
Stop Light—Willys No. A-1271.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Mounted on back of lighting switch. Protects lighting circuits by limiting current to 30 amperes. Vibrating thermostatic type. No adjustment.

HORNS: Sparton Model B-10419, Schwarze, or Auto-Lite Model HA-4033, HA-4037. Micro-vibrator type. **Horn Current**—8 amperes.

ENGINE

ENGINE SPECIFICATIONS: Own Make. Four cylinder, "L" Head type. Cylinder block and crankcase cast enbloc. Cylinders offset from center-line of crankshaft toward camshaft side of engine.
Bore—3⅛" (3.125-3.127"). **Stroke**—4⅜".
Displacement—134.2 cubic inches.
Rated Horsepower (SAE)—15.63
Developed Horsepower—60 at 4000 RPM.
Compression Ratio—6.48-1 Std. Cast Iron Head.
NOTE—7.0-1 Cylinder Head is optional.
Compression & Vacuum Reading—*See Tune-up data.*

ENGINE REMOVAL: *See Willys Shop Notes.*

ORIGINAL BORE & PISTON SIZES: *See Willys Shop Notes.*

ORIGINAL BEARING SIZES: *See Willys Shop Notes.*

TIGHTENING TORQUES: *See Willys Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Willys Shop Notes.*

PISTONS: Lo-Ex aluminum alloy (Lynite, Bohn, Permite, or Arrowhead), "T" slot, Cam ground, tin-plated type with heat insulation groove above top piston ring. **Length**—3¾".
Weight—12.7 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top Land .017-.019". Skirt .003".

Replacement Pistons: Finished pistons furnished .0002", .010", .015", .020", .025", .030", .035", .040", .045" Oversize.

CAUTION—Pistons must not be "lapped in." This will destroy tin-plated surface.

Fitting New Pistons: Use .003" feeler stock, ½" wide, inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.008-.013"	.0005-.001"
Oil Contr.	3/16"	.008-.013"	.001-.0015"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: For Rebored Cylinders—Furnished .005", .010", .015", .020", .025", .030", .035", .045" Oversize.
Service Type Rings (for cylinders not rebored) furnished Std.—.009", .010-.019", .020-.029", .030-.039", .040-.049" Oversize.

PISTON PIN: Diameter .8117-.8119". Length 2 25/32". Pin is locked in connecting rod by clampscrew.
NOTE—On new pistons, pin hole is .8118-.8120" in

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

diameter and is diamond-bored and tin-plated.
Pin Fit in Piston—.0001-.0005" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: No oversizes are available.

CONNECTING ROD: Length—9.1845-9.1905". **Weight**—39.41 ozs.

Crankpin Journal Diameter—1.9385-1.9375". *See "Original Bearing Sizes" in Willys Special Data.*

Lower Bearing—Steel-backed, babbitt-lined, replaceable type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.

Clearance—.0005-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps. *See Willys Shop Notes for "Palnut" installation.*

NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in lower end of rod toward right of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type with integral counterweights (up to Jeep Engine Number 55137), removable counterweights (after above no.).

Journal Diameters—2.3340" (all bearings). *See "Original Bearing Sizes" in Willys Shop Notes.*

Bearings—Steel-backed, babbitt-lined, replaceable type. Bearing shells are dowelled in bearing caps and crankcase.

Clearance—.001-.0025" (.0005-.001" new).
NOTE—Replace bearings when clearance exceeds .006" or when endplay exceeds .018".

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing Instructions in Willys Shop Notes.*

NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing. *See Engine Removal Instructions in Willys Shop Notes.*

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft sprocket thrust washer and sprocket. NOTE—Crankshaft sprocket must be removed with a gear puller in order to make endplay adjustments. Adjusting shims furnished .002", .004", .010" and .030" thick.

Endplay—.004-.006".

FLYWHEEL: Removal—*See Willys Special Data.*

CAMSHAFT: Four bearing. Non-adjustable chain drive (first), helical gear drive (later).
Journal Diameters—#1, 2.188"; #2, 2¼"; #3, 2 3/16"; #4, 1¾".
Bearings—Removable steel-backed, babbitt-lined bushing (front), machined in crankcase (all others).
Clearance—.002-.0035". Service limit .006" (front), .008" (all others).
Camshaft Removal—*See Willys Shop Notes for data.*

End Thrust (for Engines with Timing Chain Drive): End thrust taken by thrust washer behind camshaft sprocket and spring loaded plunger in forward end of camshaft which bears against stationary thrust pin on chain case cover. NOTE—Make certain that plunger and spring are in place when installing chain case cover.

End Thrust (for Engines with Timing Gear Drive): Taken by thrust plate assembled behind gear with a spacer assembled behind plate. If required, a thin shim can be installed behind spacer if too little clearance, or spacer can be dressed to provide greater clearance.
Endplay—.003-.0055".

▷**Timing Case Cover (& Front Oil Seal) Change:** *See "Crankshaft & Main Bearings" in Willys Shop Notes.*

▷**Timing Chain (to Jeep Engine Number 44417):** Link-Belt, non-adjustable. Width 1". Pitch ½". Length 23½" or 47 links.

▷**Timing Gears (after Jeep Engine Number 44417):** Crankshaft gear cast iron. Camshaft gear Fibre with steel hub.

▷**NOTE—Jeep Engine with Timing Gears carry engine mark "J" ahead of engine number.**

Timing Gear Backlash—.000-.002".

Camshaft Setting (First Cars with Timing Chain): With #1 piston on top dead center, mesh chain with marks on sprockets adjacent and in line with a straightedge across the shaft centers.

NOTE—Camshaft sprocket mounting screw holes offset to insure correct position of sprocket on shaft.

Later Cars (With Timing Gears)—Mesh gears with marked tooth of camshaft gear opposite marked space between gear teeth on crankshaft gear.

VALVES:	Head Diam.	Stem Diam.	Length
Intake	1 17/32"	.373"①	5 3/4"
Exhaust	1 15/32"	.3725"②	5 13/16"

①—.372-.373". ②—.371-.372" (1950 Models).

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.0015-.00325"
Exhaust	45°	23/64"	.0025-.0045"

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place to following dimensions:
Intake Guide—Top of guide 1 5/16" below top face of block. The shorter smaller-diameter section end of the guide should be up.
Exhaust Guide—Top of guide 1" below top face of block. Taper end (counter-bored end) of guide should be up.

Valve Springs: Install springs with closed-coil end up toward cylinder block. Spring free length 2½".

	Spring Pressure	Spring Length
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

Valve Lifters: Mushroom type operating in reamed holes in block. Serviced by installing oversize lifters. Lifters furnished .004" Oversize.

Lifter Diameter—.6240-.6245".

Lifter Clearance—.0005-.002".
NOTE—Camshaft must be removed for lifter removal.
See Camshaft Removal instructions in Willys Shop Notes.

VALVE TIMING

Tappet Clearance: .016" All Valves, Hot or Cold.
NOTE—Tappet adjusting screws are "self-locking" type (no locknuts).

Valve Timing: See Camshaft Setting (above).
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

▷**Timing Mark Change (starting CJ-2A Jeep Engine No. 175402)**—Flywheel marked "5°" (for 5° BTDC.) and "T.C." (top dead center). "I.O." mark not carried and intake opening point on these engines must be estimated.

Valve Timing Check—Set tappet clearance #1 intake valve at .020". This valve should open with #1 piston 9° or .039" before top dead center with flywheel mark "I.O." centered in inspection hole on right front face of flywheel housing below starter. Reset tappet clearance to .016" running clearance.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain or timing gears. Oil pump mounted externally on left hand side of crankcase.
Crankcase Capacity—4 qts. (refill), 5 qts. (dry or whenever oil filter drained).

Normal Oil Pressure—40-50 lbs. (35 lbs. at 30 MPH., 10 lbs. at idling speed of 600 RPM).

NOTE—On first Universal Jeep, 50 lbs. gauge pressure equivalent to 25 lbs. actual pressure (oil pressure relief valve opens at 25 lbs.).

▷**Oil Pressure Regulator (Early Universal Jeep)**—Under plug on oil pump cover. Opens at 25 lbs. (50 lbs. gauge pressure). Adjustable by adding or removing shims located above spring in plug.

▷**Oil Pressure Regulator (Later Universal Jeep)**—Under plug on side of pump housing. Opens at 35 lbs. Adjustable by adding or removing shims located above spring in plug.

▷**Oil Pump (up to Jeep Engine Number 44417):** Planetary gear type mounted on left side of crankcase.
Oil Pump Servicing—*See Willys Shop Notes.*

▷**Oil Pump (after Jeep Engine Number 44417):** Rotor type pump mounted on left side of crankcase.
Oil Pump Servicing— *See Willys Shop Notes.*

Oil Filter: Purolator. On cylinder head bracket at right front corner of cylinder head with oil outlet connected to top of timing chain cover.
CAUTION—Filter should be drained at each crankcase oil change (2000 mile intervals) and filter element replaced at 8000 mile intervals for normal service.

Oil Pressure Gauge: Auto-Lite No. G-10763. Bourden tube type (not electric).

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap.
Capacity—11 quarts with standard radiator.
NOTE—Special "Hot Climate" radiator Optl.
Pressure Valve—AC No. 846709 (Radiator Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).

Water Pump: Centrifugal, packless, ball bearing type. *See Water Pump Section for complete data.*

Pump Removal—Loosen drive belt adjustment and remove belt, disconnect hose, remove pump mount-

ing screws. Lift out pump and fan assembly.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: In outlet elbow on cylinder head.

Setting—Starts to open 145-155°F. Fully open 170°F.

Temperature Gauge: Auto-Lite No. H-10765. Bourden tube type (not electric).

CLUTCH

Auburn (Atwood) Model 8501-23 (with Borg & Beck Driven Member). Single plate, dry disc type.

See Clutch Section for complete data.

►**Jeep CJ-3A Release Lever Interference Correction (causing premature clutch wear on first cars):** *See "Auburn Clutch" in Clutch Section.*

Facings—Woven (pressure plate side), Molded Asbestos (flywheel side). I.D. 5⅛". O.D. 8½". Thickness .135" (.132-.138").

Pedal Adjustment: Set pedal free travel to 1¼" (to provide 1/16" clearance between release bearing and clutch release levers). To adjust, loosen locknut on clutch fork connecting cable clevis at cross-shaft connection, screw cable end in or out of clevis, tighten locknut.

Removal: Remove Transmission & Transfer Case Assembly (see Transmission Removal below), remove flywheel bell housing. Mark clutch pressure plate and flywheel to insure re-installation in same relative position. Take out mounting screws in clutch cover flange, turning all screws out evenly to relieve spring pressure, remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS1-T90C (Floor Mtd. Gearshift), AS3-T90A (Steering Col. Mtd. Gearshift): Three-speed type. Constant-mesh, synchro-mesh, helical gears (Second & High), sliding spur gear (Low & Reverse).

See Transmission Section for complete data.

Transfer Case: Spicer Model 18. Two-speed auxiliary transmission and front-wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front-wheel drive engagement (left hand lever).

See Transmission Section for complete data.

Transmission Control (AS3-T90A Transmission only): Remote control type with gearshift lever mounted on steering column.

See Transmission Section for complete data.

Removal: Transmission and transfer case are removed as an assembly. Disconnect front and rear propeller shafts at universal joints (NOTE—If equipped with Power Take-off drive, remove front end of power take-off propeller shaft assembly). Disconnect speedometer cable at transfer case, brake cable, transmission shift rods at transmission case levers, and clutch release cable at cross-shaft bell-crank. Place support jacks under engine and transmission, remove transfer case rubber snubber bolt nut (on right side) and rear mounting bolt nuts at cross-member under transmission case. Remove floor board inspection plate. Drain radiator and loosen upper radiator hose. Remove transfer case shift lever pivot pin screw, remove pin and shift levers (NOTE—If Power Take-off used, remove power take-off shift lever plate screws and lift lever out). Remove bolts holding center cross-member at frame side rails and remove cross-member (CAUTION—with cross-member removed, engine and transmission weight will rest on support jacks). Remove bolts holding transmission on bell housing, force transmission to right until ball stud end can be disengaged from end of clutch control cross-shaft. Lower support jacks under engine and transmission and slide transmission and transfer case assembly to rear until clutch shaft clears bell housing, remove assembly from beneath car.

UNIVERSALS

Front & Rear Drive Propeller Shaft Joints: Spicer needle roller bearing types as follows:

1261-102X.....Transmission End—Front Drive
1261-1X.....Transmission End—Rear Drive
1268-104X ..... Axle End—Front & Rear

Front Axle Shaft Joint: Bendix or Rzeppa Constant-velocity type. One joint used at outer end of each shaft (within steering knuckle housing).

See "Universal Joints" in Willys Special Data.

Power Take-off Propeller Shaft Joints: Detroit Ball-and-Trunnion type. Two used (one at each end of shaft—no splined joint used).

FRONT AXLE

Spicer (Salisbury) Model 25. Full-floating, hypoid gear type. NOTE—Differential Assembly (Ring and Pinion Gear Assembly) is identical with Full-floating Rear Axle and is serviced in same manner.

See Spicer (Salisbury) Full-Floating Rear Axle in Rear Axle Section for complete data.

Ratio—5.38-1 Std.

Backlash—.005-.007". Shim adjustment.

Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and steering linkage (at idler lever on frame front cross-member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear ends of springs and lower the springs, remove axle assembly from beneath the car.

INSTALLATION CAUTION—Bleed brake lines after axle re-installed and brake lines connected.

Spring Shackle & Pivot Pin Installation—*See "Spring Shackles" in Willys Shop Notes.*

Axle Shaft & Universal Joint Assy Removal: Remove wheel, hub cap, axle shaft cotter pin, nut, and washer. Remove drive flange capscrews and washers, remove flange with a puller. Bend lip on bearing nut lockwasher out and remove locknut, lockwasher, adjusting nut, and bearing lockwasher. Remove wheel hub and bearing assembly (CAUTION—use care not to damage oil seal). Disconnect brake tube, take out mounting screws on backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal assembly out of axle housing.

INSTALLATION CAUTION—Adjust front wheel bearings and bleed brake line when installation completed.

Steering Knuckle Bearing Disassembly & Adjustment: *See "Front Axle" in Willys Special Data.*

Wheel Bearing Adjustment: *See "Front Axle" in Willys Special Data.*

REAR AXLE

FULL-FLOATING TYPE
CJ-2A UP TO SERIAL NO. 13453

Spicer (Salisbury) Model 23-2. Full-floating, hypoid gear type with Hotchkiss Drive. NOTE—This axle used on first Universal Jeep models.

See Rear Axle Section for complete data.

Ratio—5.38-1 Std.

Backlash—.005-.007". Shim adjustment.

Removal: Support rear end of car securely with a chain hoist and support placed under frame ahead of rear springs, remove rear wheels. Disconnect rear shock absorbers, rear brake line (at frame connection), and propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove pivot bolts at front end of springs and lower the springs, remove axle assembly from beneath the car.

INSTALLATION CAUTION—Bleed brake lines after axle re-installed and brake lines connected.

Spring Shackle & Pivot Pin Installation—*See "Spring Shackles" in Willys Shop Notes.*

Axle Shaft Removal: Remove six capscrews and washers holding axle shaft driving flange on wheel hub, thread two of these screws into "extra" holes (between regular mounting screw holes) and turn screws up evenly to pull axle shaft out, withdraw axle shaft from housing.

Wheel Bearing Adjustment: Remove the six axle shaft flange screws, turn two of these screws into "extra" holes in flange to start shaft, withdraw axle shaft. Adjust bearings in same manner as front wheels (above). When re-installing axle shaft, make certain that gasket installed under flange.

REAR AXLE

SEMI-FLOATING TYPE
CJ-2A AFTER SERIAL NO. 13453 & ALL CJ-3A

Spicer (Salisbury) Model 23-1 or 41-2. Semi-floating, hypoid gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—5.38-1.

Backlash—.004-.008". Shim adjustment.

Removal: Support rear end of car securely with a chain hoist and supports placed under frame ahead of rear springs. Remove wheels. Disconnect rear shock absorbers, rear brake line (at frame connection), and rear brake cables and conduits. Disconnect propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of all weight, remove nuts on spring center clip "U" bolts, remove pivot bolts on front end of springs and lower springs, remove axle assembly from beneath car.

INSTALLATION CAUTION—Bleed brake lines after axle re-installed and brake lines connected.

Spring Shackle & Pivot Pin Installation—*See "Spring Shackles" in Willys Shop Notes.*

Axle Shaft Removal: Remove wheel, hub cap, and axle shaft nut. Use wheel puller to remove wheel hub. Disconnect brake line at wheel cylinder and parking brake cable. Take out bolts mounting back-

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ing plate, remove dust shield, oil seal and brake backing plate (CAUTION—Do not lose wheel bearing adjusting shims located between backing plate and axle housing flange). Pull axle shaft and bearing assembly out of the housing.

Wheel Bearing Adjustment: Bearing endplay controlled by shims between backing plate and axle housing flange. To adjust, remove wheel hub and backing plate (see Axle Shaft Removal above), add or remove shims between backing plate and housing flange for correct endplay. NOTE—In original production, shims used only at left hand end of axle housing. Shims may be installed at right hand end of axle housing, if required, for correct clearance with new axle shaft.

Endplay—.003-.005".

SHOCK ABSORBERS

Delco—Model 1030-K (Front), 1031-K (Rear).

Monroe—Model K-11436 (Front & Rear).

Direct acting, hydraulic types. Shock absorbers on first cars are adjustable.

Adjustment: Remove mounting bolt at lower end, fully collapse shock absorber by pressing up on lower end until adjusting key within unit engages slot in adjusting plate (can be determined by feel), turn unit in clockwise direction until limit of adjustment is reached (full range of adjustment is four turns), back off adjustment by turning unit counter-clockwise exactly two turns for standard setting. CAUTION—See that adjusting key does not slip out of engagement with slot while making adjustment. NOTE—Later type shocks not adjustable.

Refilling: Requires dismantling of unit.

NOTE—Later type shocks not refillable.

FRONT SUSPENSION

Front Axle: Spicer (Salisbury) Model 25. Special full-floating driving unit. *See Front Axle data (above).*

Front Suspension: Special front-wheel drive unit with semi-elliptic springs. Steering knuckle mounted on taper roller bearings carried on two stub shafts in spindle housing.

Endplay—.001-.003".

Steering Knuckle Bearing Servicing & Adjustment: *See Front Axle data (above).*

Kingpin Inclination—7½° crosswise.

Caster—3°. No adjustment. If caster incorrect, check entire front end and correct by installing new parts.

Camber—1½°. No adjustment. Correct by installing new parts. Do not attempt to correct camber by cold bending or heating of parts.

Toe In—3/64-3/32" (1/32" each wheel). To adjust, first set each front wheel straight ahead (see Note below), then set toe in by shortening each tie rod approximately ½ turn. This procedure necessary to maintain correct position of steering idler arm.

NOTE—To set front wheels straight ahead, first set tie rod end of steering bell crank (idler lever on frame front cross-member) exactly at right angles to front axle. Check front wheels by using a straight edge or sighting along rear and front wheels. Adjust each tie rod (loosen end clamp bolts and turn rod) until front wheels are exactly straight ahead. Then make toe in adjustment as directed above. Tie rod lengths between ball end centers should be 20⅞" (left), 25⅝" (right).

Steering Geometry—With inner wheel turned 20°, outer wheel should be turned exactly 18°30'.

STEERING GEAR

Steering Gear: Ross Model T-12. Cam-and-Twin Lever type.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Four wheel, Hydraulic, Double anchor type. Hand lever applies independent brake on drive shaft at rear of transfer case.

See Brake Section for complete data.

Drum Diameter—9".

Lining—Width 1¾". Thickness .206-.216". Length per shoe 10 7/32" (forward shoes), 6 39/64" (rear shoes). NOTE—Manufacturer recommends use of new or replacement shoe assemblies with factory-installed linings.

Clearance—.008" toe, .005" heel, for each shoe.

Hand Brake: Mechanical type. Two-shoe, internal expanding type with drum mounted on drive shaft at rear of transfer case.

Drum Diameter—8".

Lining——Woven type. Width 1¾". Thickness .206-.216". Length per shoe 8⅛".

Hand Brake (Adjustment for Wear)—Make certain that hand brake cable and linkage operate freely. Lubricate if sticking or binding is evident. Place brake handle on instrument panel in "off" position. Rotate brake drum until one pair of adjusting holes (three pairs located on back face of drum) is opposite the adjusting screws (notched wheels) within the brake. Insert a screwdriver or adjusting tool through each hole and turn each adjusting screw equally until the brake shoes are snug against the drum (NOTE—with tool against edge of hole as a fulcrum, move outer end of tool out away from center of driveshaft to expand shoes). **Back off each adjusting screw 7 notches** to provide correct shoe clearance.

Linkage Adjustment—When brake shoes replaced or major adjustment required, check and adjust brake operating lever and cable as follows:

Brake Lever—The lever position is determined by adjustment of cam and will not change when new shoes or linings installed. Check clearance between closest point on lever and brake backing plate with brakes "off." This clearance should be 3/32". Adjust the special lever ball nut as required.

Brake Cable—Disconnect cable (remove clevis pin at brake operating lever. Place brake handle in "off" position. Make certain that brake operating lever position is correct (see above). Adjust clevis on brake operating lever end of cable so that clevis pin can just be inserted without changing position of brake handle or brake operating lever.

MODEL IDENTIFICATI N

Model	Year
4-63 Sta. Wgn. Sed. Del.	1946-50
VJ-2 Jeepster	1948
VJ-3 Jeepster	1949-50

SERIAL NUMBER: Stamped on plate on floor riser left of driver's seat and on plate on front end of left frame side rail.
ENGINE NUMBER: Stamped on water pump boss at front end of cylinder block.

TUNE-UP

COMPRESSION PRESSURE: 115 lbs. at 160 RPM.
VACUUM READING: Steady 17-21" idling at 7-10 MPH.
FIRING ORDER: 1-3-4-2. See diagram.
SPARK PLUG GAPS: .030".
Plug Type—*Auto-Lite Type AN-7. 14 mm. Metric*
IGNITION: Breaker Gap—.020". Limits .020-.024".
Cam Angle—50.8°.
Breaker Arm Spring Tension—17-20 ozs.
IGNITION TIMING: 5° BTDC. *NOTE—Road test car for timing modifications for fuel and operating conditions.*
►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*
Timing Procedure—*See Ignition Timing.*
Timing Mark—Flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of housing below starter.
►**Timing Mark Change**—Flywheel marked "5°" (replacing "IGN/") starting 4-63 Engine No. 51379.
CARBURETION:
Idle Setting—Idle adjusting screw set for smooth idle with warm engine (on Carter Carb. ½-1½ turns open). For richer mixture, turn screw out on Carter, and Zenith 228 Series, in on Zenith 28 Series.
Idle Speed—600 RPM. or 8 MPH.
►*STUMBLE CORRECTION (738S, 768S, SA, 832S, CARBURETORS)—See "Carter YF" in Carburetor Section for complete data.*
Float Level (Carter 613S) 5/16" from top of machined projection on bowl cover to top of soldered seam on free end of float (float inverted).
Float Level (Carter 738S) 9/32" from float (float inverted) at free end to float chamber cover.
(Zenith)—1½" from top of float to gasket seat on bowl cover with needle valve seated (float inverted).
Accelerating Pump—(Carter) No seasonal adjust.
(Zenith)—3 grooves in pump plunger stem. Engage hairpin cotter as follows: Center Groove normal setting, Upper (min. stroke) Hot Weather, Lower (max. stroke) Cold Weather.
Fuel Pump Pressure: 3 lbs. (4½ lbs. max. at 1800 RPM).
CRANKCASE VENTILATOR: Remove and clean the vacuum control valve. *See Crankcase Ventilator (following Carb. Equipment) for directions.*
MANIFOLD HEAT CONTROL: Automatic thermostatic type. See that valve operates freely with spring end on top of manifold stop bracket.
VALVE TAPPET CLEARANCE: .016" All Valves, Hot or Cold. NOTE—Adjusting screws self-locking type.
Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Douglas or Mitchellock Switch.
COIL: Auto-Lite Model IG-4090A or IG-6009. Service Coil Model IG-8005 (with IG-1798S Service Bracket).
Ignition Current—2.5 amperes idling, 5 stopped.
CONDENSER: Auto-Lite Part No. IGB-1025.
Capacity—.20-.25 microfarad.
DISTRIBUTOR: Auto-Lite Model IGW-4129 or IGW-4189. Full automatic advance type with separate vacuum control unit linked to distributor assy.
Breaker Gap—.020". Limits .020-.024".
Cam Angle—50.8°.
Breaker Arm Spring Tension—17-20 ounces.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IGW-4129

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
2	550	4	1100
5	930	10	1860
7	1190	14	2380
9.5	1500	19	3000

Automatic Advance—IGW-4189

Start	350	0	700
2	560	4	1120
5	875	10	1750
8	1190	16	2380
11	1500	22	3000

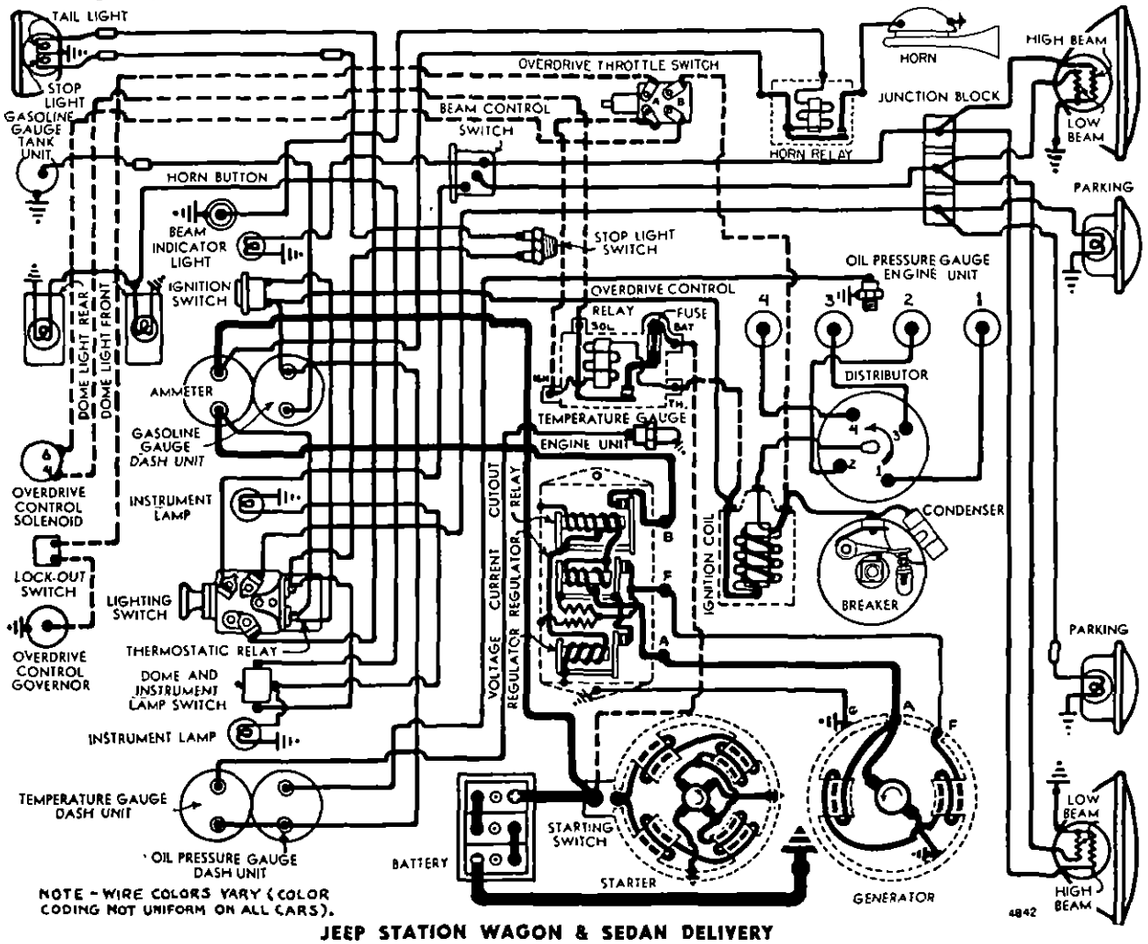
Vacuum Spark Control Unit: Auto-Lite Mod. VC-4010. Unit mounted on hold-down plate and linked to advance plate.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
2°	4°	5¾"
5°	10°	9¼"
8°	16°	12¾"
10°	20°	15"

Removal: Distributor is mounted on right side of engine. To remove, disconnect vacuum line, take out hold-down screw in mounting plate.
Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to Cylinder #1 firing position (see Timing), turn distributor shaft until rotor is in #1 firing position (at #1 segment in distributor cap—see diagram). Insert distributor drive shaft in housing on engine, rock shaft back and forth until drive lug on end of shaft enters drive coupling, push distributor down into place, install hold-down screw, check timing.
CAUTION—If oil pump removed, refer to Oil Pump installation directions in Willys Shop Notes.

CONTINUED ON NEXT PAGE



JEEP STATION WAGON & SEDAN DELIVERY

CONTINUED FROM PRECEDING PAGE

IGNITI N TIMING

Standard Setting..... 5° BTDC

►**Timing Mark Change**—Flywheel marked "5°" (replacing "IGN/") starting 4-63 Engine No. 51379.

Timing (Using Timing Light—Engine Idling)—This method recommended by manufacturer. Direct timing light at flywheel through inspection hole in front face of housing below starter, idle engine (engine must be warm), adjust distributor (as directed above) until timing mark is centered in inspection hole.

CARBURETOR

CARTER

Carter WA-1 No. 613S. 1¼", Single Barrel, Downdraft type with manual choke control.

Casting Number on Flange—485.

Carter YF Type 738S, 1¼" Single barrel downdraft type with manual choke control and "Diaphragm" type accelerating pump and metering rod control.

See Carburetor Section for complete data.

►*STUMBLE CORRECTION (738S, 768S, SA, 832S, CARBURETORS)—See "Carter YF" in Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—***See Carter Jet Table in Carburetor Section for complete data.***

ZENITH

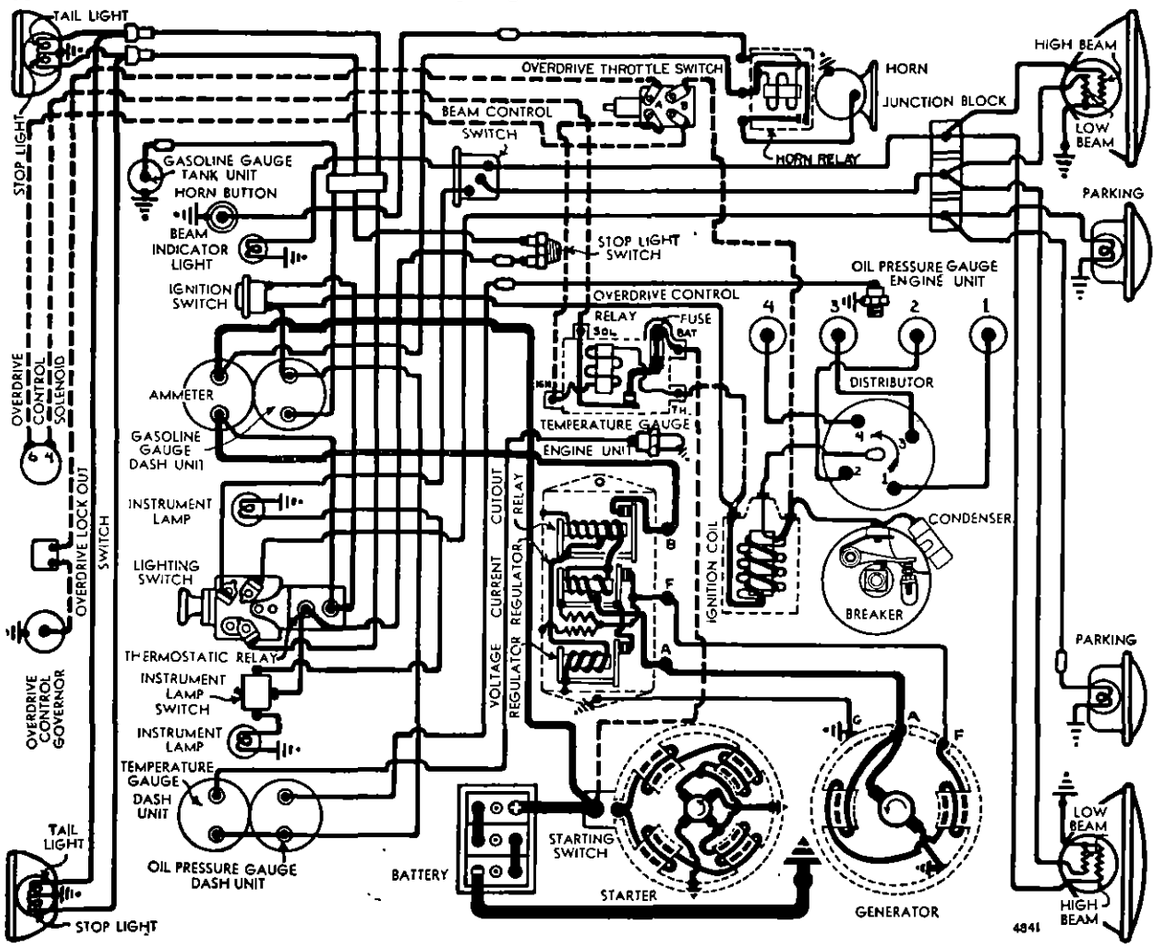
Zenith Model 228AV10 & 28BV10—Single barrel, downdraft with manual choke control.

Outline No.—(228AV10) 10760, (28BV10) 10569-A. On round metal tag riveted on top of float bowl cover. Use in ordering parts.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Jets—***See Zenith Jet Specifications in Carburetor Section.***



JEEPSTER MODELS

CARB. EQUIPMENT

Fast Idle: Interconnected linkage by which choke valve lever opens throttle to fast idle position when carburetor choked for starting.
Setting—No adjustment required.

Air Cleaner: Oakes Model 616615 Oil-wetted type Std., Model X616150 Oil-bath type Optl.
Servicing (Oil-wetted type)—Clean filter element and re-oil at 2000 mile intervals or more often if required by operating conditions.
Servicing (Oil-bath type)—Clean filter and fill with same oil used in engine crankcase at 2000 mile intervals (at oil change). Capacity approx. 1¼ pts.

Fuel Pump: AC No. 1537409 (1946-48), No. 1539306 (1949). Combination fuel-and-vacuum pump.
Replacement Pump—AC No. 7409 or 9306 (for 1537409), 9306 (for 1539306).
See Carburetion Equipment Section for data.
Pressure—3 lbs. (4½ lbs. max. at 1800 RPM).

Gasoline Gauge: King-Seeley Electric Type.
Dash Unit—King-Seeley No. 42570.
Tank Unit—King-Seeley No. 41285.
See Carburetion Equipment Section for data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation type. Air Intake Pipe (from air cleaner to oil filler pipe) furnishes clean air to crankcase and Air Outlet Pipe (from valve chamber cover to intake manifold) allows fumes from crankcase to be sucked into intake manifold. There is a vacuum control valve at the manifold connection and this valve **must close at idling speed**
Servicing—Make certain that connecting pipes are tight and that oil filler cap gasket seals cap tightly. Remove and clean vacuum control valve when tuning engine or if system operating incorrectly.
Vacuum Control Valve—Remove control valve by disconnecting pipe at valve chamber cover and unscrewing valve from manifold. Disassemble valve by clamping in vise and removing top, withdraw valve and spring. Clean valve and valve seat thoroughly.

BATTERY

Auto-Lite PN-15. 6 volt, 15 plate, 100 Amp. Hr.
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) terminal.
Engine Ground—At right front engine mounting.
Location—On right side of dash under hood.

STARTER

Auto-Lite Model MZ-4137. Armature MZ-2214.
Drive—Overrunning clutch and manual pinion shift
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—160 RPM., 150-175 amps., 5 volts.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.5	70
2.55 "	1325	5.0	200
7.65 "	220	4.0	400
7.8 "	Lock	3.0	420

Starter Removal—Flange mounted on right front face of flywheel housing. To remove, disconnect starting linkage and battery cable, take out two flange mounting capscrews and bolt in bracket at commutator end.
Starting Switch—Auto-Lite SW-2677A. Mounted on starter and operated by pinion shift lever.
See Electrical Equipment Section for complete data.

GENERAT R

Auto-Lite Model GDZ-4817A, Armature GDZ-2006F. Two brush with voltage and current regulation.

Charging Rate Adjustment—None. See Regulator.

Maximum Charging Rate—35 amperes, 8.0 volts, 1900 RPM. and above. Actual charging rate controlled by regulator and dependent on the battery.

Cold Performance Data			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	925	0	6.4	1000
10	6.85	1200	10	6.85	1290
20	7.3	1480	20	7.3	1590
30	7.8	1760	30	7.8	1980
35①	8.0	1900	35	8.0	2250

①—Current Regulator setting. See Regulator data.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.60-1.78 amperes at 6.0 volts.

Motoring Current—4.16-4.60 amps. at 6.0 volts.

Removal: Take out pivot and clamp bolts.

Belt Adjustment—Loosen clamp and pivot bolts, swing generator out until belt deflection midway between fan and generator pulleys is 1".

REGULATOR

Auto-Lite VRP-4007C-2. Voltage-Current Type. NOTE—Regulator cover sealed. Warranty void if seals broken.

See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.4-7.0 volts (set to 6.4-6.6 volts).

Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contacts open measured at hinge end of core.

Voltage Regulator

Setting—7.35 volts (7.2-7.5) at 70°F. See Electrical Equipment Section for other temperatures.

Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*

Contact Gap—.012" min. (armature against stop pin)

Air Gap—.048-.052" with contacts just opening.

Current Regulator

Setting—34-36 amperes (marked "35" on cover).

Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*

Contact Gap & Air Gap—Same as Voltage Regulator.

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Adjustment—Aim upper beam straight ahead (hot spot center 3" below lamp center height at 25').

Beam Indicator—On left side of instrument panel. Lighted when Upper Beams in use.

Switches

Lighting—Willys No. 645292.

Instrument—Willys No. 641732.

Beam Selector—Willys No. 640260.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: Mounted on light ing switch. Vibrating thermostatic type. Protects lighting circuits by limiting current to 30 amps.

FUSES: Overdrive—20 ampere. On control relay.

HORNS: Sparton #C-5992 or B-10419, Auto-Lite HA-4033 or HA-4037. Vibrator type single horn controlled by relay. Auto-Lite HW-4007 (Low Pitch), HW-4008 (High Pitch) twin horns.

ENGINE

ENGINE SPECIFICATIONS: Own. Four Cylinder, "L" Head type.

Bore—3⅛" (3.125-3.127"). *See Willys Special Data for Original Bore Sizes.*

Stroke—4⅜". **Displacement**—134.2 cu. ins.

Developed H.P.—63 at 4000 R.P.M. **Rated H.P.**—15.63

Compression Ratio—6.48-1 Std. Cast Iron Head.

Compression & Vacuum Reading: *See Tune-up data.*

ORIGINAL BORE & PISTON SIZES: *See Willys Shop Notes.*

ORIGINAL BEARING SIZES: *See Willys Shop Notes.*

TIGHTENING TORQUES: *See Willys Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Willys Shop Notes.*

ENGINE REMOVAL: *See Willys Special Data.*

PISTONS: Lo-Ex aluminum alloy (Lynite, Bohn, Permite, or Arrowhead). "T" slot, Cam ground, tin or brass plated type.

Weight—12.7 ozs. (stripped), **Length**—3¾".

Removal—Pistons and rods removed from above.

Clearance—.017-.019" top, .003" skirt.

Replacement Pistons: Finished pistons are furnished .0002", .010", .015", .020", .025", .030", .035", .040", .045" Oversize.

Fitting New Pistons: Use .003" feeler stock, ½" wide, between piston and cylinder wall on side opposite slot. Pull to withdraw feeler must be 5-10 lbs.

Installing Pistons: T-slot toward valve side of engine (opposite side from oil spray hole in lower end of connecting rod).

PISTON RINGS: Two compression rings, one oil control ring per piston, all above pin. Oil ring groove has oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compr. (#1, 2)	3/32"①	.008-.013"	.0005-.001"
Oil (#3)	3/16"②	.008-.013"	.001-.0015"

①—.0925-.0935" ②—.1860-.1865"

Installing Rings—Compression ring mark "TOP" (on side of rings) upward and inner bevel edge on top ring upward. Rings have taper face.

Replacement Rings (for Rebored Cyls.): Rings furnished .005", .010", .015", .020", .025", .030", .035", .045" Oversize.

Service Type Rings (for Cylinders not Rebored)—Furnished 1) Std.-.009", 2) .010-.019", 3) .020-.029", 4) .030-.039", 5) .040-.049" Oversize.

PISTON PIN: Pin is locked in rod by clampscrew. **Diameter**—13/16" (.8117-.8119"). **Length** 2 25/32"

Pin Fit in Piston—.0001-.0005" clearance or light thumb push fit with piston at 70°F.

Replacement Pins: No oversizes are available.

CONNECTING ROD: Length—9.1845-9.1905". **Weight**—39.41 ozs.

Crankpin Journal Diameter—1.9385-1.9375". *See "Original Bearing Sizes" in Willys Special Data.*

Lower Bearing—Replaceable steel-backed, babbitt lined type. No shims. CAUTION—Oil spray hole in bearing upper half must line up with oil hole in rod.

Clearance—.0005-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: None (replace the bearings). Do not file connecting rods or bearing caps. NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Palnut Installation—*See Willys Shop Notes.*

Replacement Bearings: Furnished Std. size and .010", .020", .030" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in rod toward right side of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type.

Journal Diameters—2.3341" (all bearings). *See "Original Bearing Sizes" in Willys Shop Notes.*

Bearings—Replaceable steel-backed, babbitt lined type. No shims. Bearing shells are dowelled in bearing caps and crankcase.

Clearance—.001-.0025" (.0005-.001" new).

NOTE—Replace bearings when clearance exceeds .006" or when endplay exceeds .018".

Bearing Adjustment: None (replace bearings). Do not file bearing caps. *See Crankshaft Servicing Instructions in Willys Shop Notes.*

NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing.

Replacement Bearings: Furnished Std. size and .010", .020", .030" Undersize.

End Thrust: Taken by flanged face of No. 1 (front bearing and thrust washer in back of crankshaft gear. Adjusted by adding or removing shims behind the thrust washer. NOTE—Crankshaft gear must be removed with a gear puller for endplay adjustment. Shims furnished .002", .004", .010", .030" thick.

Endplay—.004-.006".

FLYWHEEL: Removal—*See Willys Special Data.*

CAMSHAFT: Four bearing with helical gear drive.

Journal Diameters—#1, 2.188"; #2, 2¼"; #3, 2 3/16"; #4, 1¾".

Bearings—Removable steel-backed, babbitt-lined bushing (front), machined in crankcase (all others).

Clearance—.002-.0035". Service limit .006" (front), .008" (all others).

Camshaft Removal—*See Willys Shop Notes.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled behind plate. If required, a thin shim can be installed behind spacer if too little clearance, or spacer can be dressed to provide greater clearance.

Endplay—.003-.0055".

►**Timing Case Cover (& Front Oil Seal) Change:** *See "Crankshaft & Main Bearings" in Willys Special Data.*

Timing Gears: Crankshaft gear Cast Iron, Camshaft gear Fiber with steel hub. **Backlash**—.000—.002".

Camshaft Setting: Mesh marked tooth of camshaft gear opposite marked space between teeth of crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 17/32"	.373"	5 57/64"
Exhaust	1 15/32"	.3725"	5 13/16"

	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.0015-.00325"
Exhaust	45°	23/64"	.0025-.0045"

Valve Guides: Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place as follows:

Intake Guide—Top of guide 1 5/16" below top face of block. Smaller diameter section upward.

Exhaust Guide—Top of guide 1" below top face of block. Counter-bored end of guide upward.

Valve Springs: Install springs with closed coil end up toward cylinder block. Spring free length 2½".

	Spring Pressure	Spring Length
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Valve Lifters: Mushroom type. In reamed holes in block. Service by installing .004" oversize lifters.
NOTE—Camshaft must be removed for lifter removal. *See Camshaft Removal in Willys Shop Notes.*
Lifter Diameter—.6240-.6245". Clearance .0005-.002".

VALVE TIMING

Tappet Clearance: .016" All Valves, Hot or Cold.
NOTE—Tappet adjusting screws are self-locking
Valve Timing—See Camshaft Setting above.
Intake—Open 9° BTDC. Close 50° ALDC.
Exhaust—Open 47° BLDC. Close 12° ATDC.
▷**Timing Mark Change (starting 4-63 Engine Number 51379)**—Flywheel marked "5°" (for 5° BTDC.) and "T.C." (top dead center). "I.O." mark not carried and intake opening point must be estimated.
Valve Timing Check—Set tappet clearance #1 intake valve at .020". This valve should open with #1 piston 9° or .039" BTDC. with flywheel mark "I.O." centered in inspection hole in right front face of flywheel housing. Reset tappet clearance at .016".

LUBRICATION

Engine Oiling System: Pressure to crankshaft, conrod, and camshaft bearings, and to timing gears.
Crankcase Capacity—4 qts. refill.
Normal Oil Pressure—35 lbs. at 30 MPH. (10 lbs. idling at 600 RPM).
Oil Pressure Regulator—Opens at 35 lbs. Located under plug on side of pump housing. Adjustable by adding or removing shims above spring within plug.
Oil Pump: New rotor type pump mounted externally on left side of crankcase.
Oil Pump Servicing—*See Willys Shop Notes.*
Oil Pressure Gauge: King-Seeley Electric type.
Dash Unit—King-Seeley No. 42565.
Engine Unit—King-Seeley No. 40767.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type, relief valve in cap.
Capacity—11 quarts.
Pressure Valve—AC No. 846709 (Filler Cap). Opens at 3¾ lbs. (3¼-4¼ lbs.).
Water Pump: Centrifugal, belt-driven, packless type.
See Water Pump Section for complete data.
Removal—Loosen drive belt adjustment, remove belt, disconnect hose. Remove pump mounting screws and lift out pump and fan assembly.
Thermostat: Harrison. In outlet on cylinder head. Starts to open at 145-155°F. Fully open at 170°F.
Temperature Gauge: King-Seeley Electric type.
Dash Unit—King-Seeley No. 42575.
Engine Unit—King-Seeley No. 7000.
See Miscellaneous Section for complete data.

CLUTCH

Auburn (Atwood) Model 8501-19. Single plate, dry disc type with Borg & Beck 11735 Driven Member.
NOTE—Model 8501-19 has neoprene driving lug inserts and Return Clip Springs.
See Clutch Section for complete data.
▷**Clutch Facing Change & Return Clip Spring Installation to correct Clutch Chatter & Noise**—*See "Auburn Clutch" in Clutch Section.*
Facings—Moulded type. I.D. 5⅛" (5.094-5.156"), O.D. 8½" (8.520-8.480"). Thickness ⅛" (.132-.138").
Pedal Adjustment: Free travel 3/4" (provides 1/16" clearance between release levers and bearing). To adjust, loosen locknut and turn adjusting nut on connector link at clutch fork, tighten locknut.
Removal: Remove transmission (see Transmission Removal below), remove flywheel bell housing. Mark clutch pressure plate and flywheel to insure reinstallation in same position. Take out mounting screws in clutch cover flange (turn all screws out evenly), remove clutch and driven member.

TRANSMISSION

Without Overdrive.....Warner AS1-T96E
4-63 with Overdrive.....Warner AS12-T96
VJ-2 & VJ-3 with Overdrive.....Warner AS18-T96
Three-speed, helical gear type. Constant-mesh, (Second & High), sliding gear (Low & Reverse).
See Transmission Section for complete data
Transmission Control: Remote control type with gearshift lever mounted on steering column.
See Transmission Section for complete data
Removal: Disconnect shift rods at transmission. On Overdrive cars, disconnect wires from solenoid and rail switch, disconnect overdrive control cable and conduit, remove rubber mounted saddle support at rear end of overdrive, take off overdrive governor assembly. Disconnect front universal joint at transmission. Support engine weight on jack under flywheel bell housing, remove frame cross-member with rubber insulators attached. Place jack under engine to support engine. Back out four screws holding transmission to bell housing approximately ¾". Pull transmission back to bolt heads which will provide opening between the two housings and relieve pressure on clutch release fork in bell housing. Using a long screwdriver through opening in side of bell housing, pry the clutch release fork from engagement with clutch release bearing carrier. Remove four transmission attaching screws, and pull transmission back until clutch shaft clears bell housing and remove the assembly.

OVERDRIVE

Warner Type R10B (part of AS12-T96 & AS18-T96 Transmission Assemblies). New solenoid operated, governor controlled with throttle "kick-down".
See Transmission Section for complete data.
▷*NOTE*—Beginning Serial No. 91904 (4-63) & All VJ-3 Cars, Overdrive is new "centered ring gear" type with one rear bearing only (2 used previously).
Control Relay—Auto-Lite Model HRT-4001.
Overdrive Governor—Auto-Lite Model TGE-4002.
Transmission Solenoid—Delco-Remy 1118132.
Removal: Remove as a unit with transmission. Removal instructions same as for regular transmission (above) after governor and solenoid wires and lockout control disconnected and overdrive case-to-cross-member bolts removed.

UNIVERSALS

1949-50 MODELS

Spicer Model 1261-102X (Front—All Models), 1278-101X (Rear—All Models without Overdrive & First Cars with Overdrive), 1268-111X (Rear—Later models with Overdrive). Needle roller bearing type.

1946-48 MODELS

Detroit Series 4100. Ball & Trunnion type.

REAR AXLE

Spicer (Salisbury) Model 23-1. Semi-floating, Hypoid Gear type with Hotchkiss Drive.
See Rear Axle Section for complete data.
Ratio—4.88-1 Std., 4.56-1 & 5.38-1 Optl.
Backlash—.004-.008" Shim adjustment.
Removal: Support rear end of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs and lower springs, remove axle assembly
Axle Shaft Removal: Remove the wheel & hub assembly (use wheel puller), disconnect brake line at wheel cylinder, remove nuts on bolts holding backing plate and brake assembly on housing, remove dust shield, oil seal, and backing plate (with brake assembly). CAUTION—Do not lose bearing adjusting shims located between backing plate and flange on axle housing. Remove axle shaft and bearing.
Wheel Bearing Adjustment—Endplay .003-.005". Adjust by adding or removing shims between backing plate and axle housing flange (at each wheel). See axle shaft removal (above).
NOTE—Shims installed on **left hand** end of axle housing only in production. Shims can be installed on right hand end of axle housing, if necessary, for correct endplay.

SHOCK ABSORBERS

Delco—Model 1030-C (Front), 1031-Q (Rear).
Monroe—Model K-18004 (Front), K-18005 (Rear).
Direct acting, hydraulic, adjustable (first cars).
NOTE—Shock absorbers are sealed and cannot be refilled or serviced.

FRONT SUSPENSION

Planadyne Type. Independent, linked parallelogram type with transverse spring.
▷**Replacement Spring Caution:** *See Willys Front Suspension for recommended replacement springs.*
See Front Suspension Section for complete data.
Kingpin Inclination—5½° crosswise.
Caster—1° No adjustment.
Camber—1½° (1¼-1¾°).
Toe In—1/8-3/16".
▷*See Willys Front Suspension for Toe In adjustment.*

STEERING GEAR

Ross T-12, No. 13108. Cam-and-Twin Lever type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering. Hand lever applies rear wheel brakes.
See Brake Section for complete data.
Drums—Chrome-nickel type. Diameter 9.948".
Lining—Molded type. Width 1¾". Thick .182-.192" Length per wheel 19".
Clearance—.008" Toe, .005" Heel each shoe.
NOTE—No anchor pin adjustment provided. Brake shoes should be centralized by hard brake application (and then released) before adjustments made.
Hand Brake: See Service Brakes above.
Adjustment—Tighten link rod adjustment at lever on cross-member for slight drag with hand lever set two-notches "on" (must be free when released).

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.
See Miscellaneous Section for data.

M DEL IDENTIFICATION

SERIAL NUMBER: (Station Wagon) At left of driver's seat on floor riser, (Jeepster) On under edge of cowl above glove box door.

Model	Year
6-63 (Sta. Wgn. & Sedan Del.)	1948-49-50
673-SW (Sta. Wgn.)①	1950-51
673-VJ (Jeepster)①	1950-51
685 (Station Wagon)②	1952-53

①—"L-Head" Engine. ②—"F-Head" Engine.

ENGINE NUMBER: On upper front corner of engine block on right side.

►*ENGINE NUMBER NOTE—Letters following engine number denote the following:* (A)—Crankshaft journals (main & connecting rod) .010" UNDERSIZE. (B)—Cylinder bores .010" OVERSIZE. (AB)—Both above conditions exist in engine.

TUNE-UP

COMPRESSION PRESSURE: ("L-Head" Engine)—125 lbs. at 160 RPM (Cranking speed).

"F-Head" Engine—115 lbs. minimum, with all cylinders equal within 15 lbs.

VACUUM READING: Steady 18-21" idling at 600 RPM.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAPS: .030".

Plug Type—Champion J-7 ("L-Head" Engine); J-8 "F-Head" Engine).

►*Tighten Spark Plugs to 26-30 ft. lbs. torque.*

DISTRIBUTOR: Breaker Gap—.020" (.018-.022").

Cam Angle—39° ± 3°.

Breaker Arm Spring Tension—17-20 ozs.

Automatic & Vacuum Advance—*See Ignition.*

Condenser Capacity—(IGC-4514) .20-.25 mfd. (IAT-4007, 4007A) .21-.25 mfd.

IGNITION TIMING: 5° BTDC. *NOTE—Road test car for timing modifications for fuel and operating conditions.*

►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*

Timing Procedure—*See Ignition Timing.*

Timing Mark—Grooved line on vibration dampener rim in line with pointer on timing gear cover on right side.

Octane Selector Setting—Set to just eliminate ping with engine pulling hard.

CARBURETION: Carter WA1, Type 645S or Zenith Model 228AV10. (1948-50).

Idle Setting—Idle adjusting screw set for smooth idle with warm engine (on Carter Carb. 1-2 turns open). For richer mixture, turn screw out.

Idle Speed—600 RPM. or 6 MPH.

Float Level (Carter)—5/16" from top of machined projection on bowl cover to top of soldered seam on free end of float with cover assembly inverted.

(Zenith)—45/64" plus or minus 1/64" from upper edge of float seam at free end of float to gasket seat on bowl cover with cover assembly inverted.

Accelerating Pump—(Carter) No adjustment.

(Zenith)—3 grooves in pump plunger stem. Engage hairpin cotter as follows: Center Groove normal setting, Upper (min. stroke) Hot Weather, Lower (max.) Cold.

Choke Setting: No adjustment required.

Fuel Pump Pressure: 3½-4½ lbs. at 1800 RPM.

CARBURETION: Zenith Series 31, Assembly No. 11119 (1950-Early 1951); No. 11307 (Late 1951).

►*1950-51 ENGINE IDLING CORRECTION (Correct Idle Adjustment Cannot be Made): See "Zenith Model 31 Carburetor" in Carburetor Section for complete data.*

Idle Setting—Idle screw approximately 1½ turns open. Turn screw out for richer mixture.

Idle Speed—600 RPM. or 6 MPH.

Float Level—Top of float flush (plus or minus 1/32") with bottom of checking gauge C161-169 with needle valve closed (remove air horn and gasket, place gauge on top edge of bowl, press down on float lever directly above needle valve to raise float to valve closed position).

Accelerating Pump—No seasonal adjustment.

CARBURETION: Carter YF Type 924S, (1952 & Early 1953); 2071S (Late 1953).

Idle Setting—1-2 turns open (turn screw out for richer mixture).

Idle Speed—550 RPM.

Float Level—9/32" from top of float at free end to gasket seat on cover (Gauge T-109-26). Check by inverting cover and allow float to hang free.

►*CAUTION—Do not compress spring in intake needle (will give incorrect reading and wrong setting).*

Accelerating Pump—Diaphragm type. No adjustment.

Fast Idle Setting: Lip on fast idle arm should contact boss on body casting with choke valve wide open. Adjust by bending fast idle link at offset.

Choke Setting: Manual type. No adjustment required.

Fuel Pump Pressure: 3½-4½ lbs. at 1800 RPM.

CRANKCASE VENTILATOR: Remove and clean the vacuum control valve. *See "Crankcase Ventilator" (following Carb. Equipment) for directions.*

MANIFOLD HEAT CONTROL: Automatic thermostatic type. No adjustment. Valve must operate freely.

VALVE TAPPET CLEARANCE: ("L-Head" Engines)—.016" Intake & Exhaust.

"F-Head" Engines—.018" Intake, .016" Exhaust. COLD.

Valve Timing Check—*See Valve Timing.*

IGNITION

IGNITION SWITCH: Douglas or Mitchellock. Willys No. 641720.

COIL: Auto-Lite IG-6009 (First Cars), CR-6009 (Later cars). On right side of engine.

NOTE—Serial Nos. at which coil changed: (673-SW) No. 10994, (673-VJ) No. 10530.

Ignition Current—2.5 amperes idling, 5 stopped.

CONDENSER: Auto-Lite. IG-2671 (IGC Distributors), IAT-3076L (IAT Distributors).

Capacity—.20-.25 mfd., (IGC Distr.), .21-.25 mfd., (IAT Distr.).

DISTRIBUTOR: Auto-Lite Models as follows: Full automatic advance type with separate vacuum spark control (IGC Distr.), integral type vacuum control (IAT Distr.).

Year	Distr. No.
1948-50	IGC-4513 & IGC-4514
1950 (Late) & 1951	IAT-4007
1952-53	IAT-4007A

Breaker Gap—.020". Limits .018-.022".

Cam Angle—39° ± 3°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance—IGC-4513 & 4514, IAT-4007

Degrees	Distr. R.P.M.	Degrees Eng.	R.P.M.
Start	350	0	700
1	375	2	750
7	550	14	1100
11	1300	22	2800
12	1500	24	3000

Automatic Advance—IAT-4007A

Degrees	Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start		300	0	600
1		400	2	800
4		725	8	1450
8		1150	16	2300
9.5		1300	19	2600

Octane Selector: 20° advance or retard adjustment at distributor. See Ignition Timing.

Vacuum Advance—IGC-4513 & 4514, IAT-4007

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
1°	2°	5½"
3°	6°	9¼"
5°	10°	13"
6°	12°	15"

Vacuum Advance—IAT-4007A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅛"
1°	2°	6⅝"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

Distributor Removal: On right side of engine. To remove, disconnect vacuum line, take out hold-down screw in vacuum unit mounting bracket.

Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to #1 cylinder firing position (see Timing), turn distributor shaft until rotor opposite #1 segment in cap (see diagram), install distributor on engine, rocking shaft slightly to engage drive coupling, push distributor down into place, install hold-down screw, check timing.

CAUTION—If oil pump has been removed, see Oil Pump data in Willys Special Data.

IGNITION TIMING

Standard Setting ..... 5° BTDC.

►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*

NOTE—See Octane Selector Setting to compensate for special fuel and operating conditions.

Timing Marks—Line on rim of vibration dampener and pointer on timing gear cover. Flywheel also marked ("TC" on flywheel in line with horizontal center-line of inspection hole, right front face of housing.

Timing (Engine not Running)—With #1 piston on compression, turn engine until piston reaches firing position (5° BTDC) with line on vibration damper aligned with pointer on right side of timing gear cover. Loosen vacuum control link screw in distributor quadrant, center pointer on scale, tighten screw. Loosen clampscrew on hold-down plate, rotate entire distributor assembly until contacts begin to open, tighten clampscrew, see that rotor at #1 segment in distributor cap, check plug connections.

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Timing (Using Timing Light—Engine Idling). This method recommended by manufacturer. Direct timing light at vibration dampener, idle engine (engine must be warm), adjust distributor (as directed above) until timing mark lines up with pointer.
Octane Selector Setting—If engine pings on heavy pull, loosen vacuum control link screw at distributor quadrant, retard spark slightly by rotating distributor counter-clockwise. For High Octane Fuel, spark can be advanced by rotating distributor clockwise.

CARBURETOR

CARTER WA-1

Carter WA1 No. 645S. 1¼" Single Barrel, Downdraft type with manual choke control.
See Carburetor Section for complete data.

►**Carburetor Jet Calibration Production Change**—*See "Carter WA-1" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Rods & Jets—*See Carter Jet Table in Carburetor Section.*

Fast Idle: Interconnected linkage by which choke valve lever opens throttle to fast idle position when carburetor choked for starting.
Setting—No adjustment required.

ZENITH 31A11

Zenith Series 31A11, Assembly 11119 & 11307 (1950-51). Single barrel downdraft type with manual choke.

See Carburetor Section for complete data.

►*1950-51 ENGINE IDLING CORRECTION (Correct Idle Adjustment Cannot be Made): See "Zenith Model 31 Carburetor" in Carburetor Section for complete data.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Zenith Jet Specifications in Carburetor Section.*

Fast Idle: Fast idle cam serving as stop for throttle stopscrew is linked to choke valve lever and rotated to fast idle position when choke closed for starting.
Setting—No adjustment required.

ZENITH 228AV10

Zenith Model 228AV10—Single barrel, downdraft type with manual choke control.
See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*
Metering Jets—*See Zenith Jet Specifications in Carburetor Section.*

Fast Idle: Fast idle cam serving as stop for throttle stopscrew is linked to choke valve lever and rotated to fast idle position when choke valve closed for cold starting.
Setting—No adjustment required.

CARTER YF

Carter Model YF No. 924S (1952-Early 1953), 2071S (Late 1953). 1¼" Single barrel downdraft type with manual choke.

See Carburetor Section for complete data.

Settings (Idle Setting, Float Level, & Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Fast Idle: Lip on fast idle arm should contact boss on body casting with choke valve **wide open.** Adjust by bending fast idle link at offset.

Choke: Manual type.

CARB. EQUIPMENT

Air Cleaner: Oil wetted type (Std.), Oil bath type (Optl.).

Fuel Pump: AC Combination Fuel & Vacuum type, (Std.).

Replacement Pump—AC No. 9245 (1948-50 & Early 1952), No. 9993 (Late 1952 & 1953).

Pump Pressure—3½-4½ lbs. at 1800 Eng. RPM.
See Carb. Equipment Section for complete data.

Gasoline Gauge (1948-50): King-Seeley Electric (Not "CV").

Dash Unit—King-Seeley No. (1948) 41310, (1949-50) 42570.

Tank Unit—King-Seeley No. 41248.
See Carb. Equipment Section for complete data.

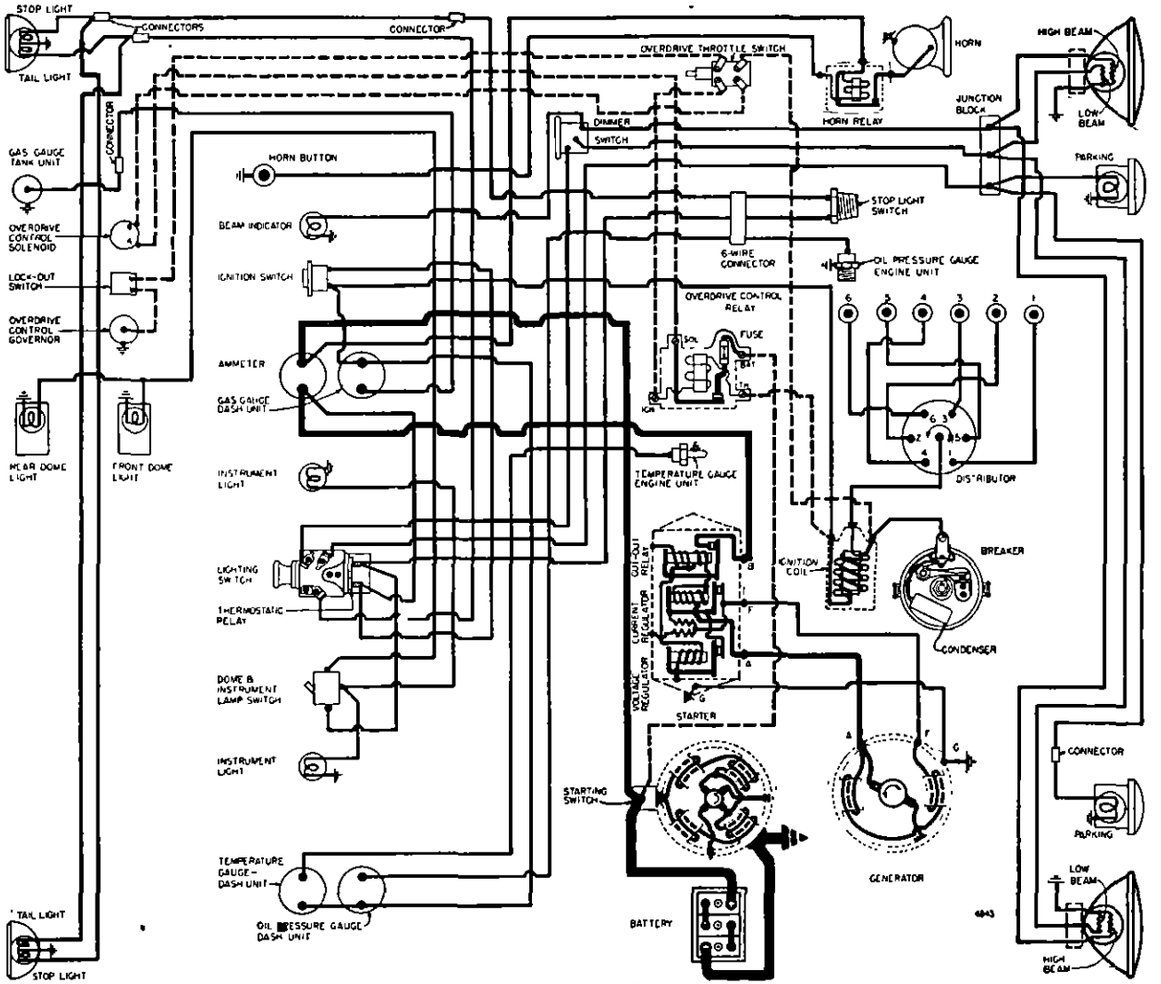
Gasoline Gauge (1950-53): King-Seeley Electric "CV" (constant voltage) type with voltage regulator.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—King-Seeley No. 44534 (1950), 45727 (1951-53).
Tank Unit—King-Seeley No. 44506 (all).
Gauge Voltage Regulator—*See Misc. Electrical for data.*
See Carburetion Equipment Section for complete data.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air intake pipe (from air cleaner to oil filler pipe) furnishes clean air to crankcase, air outlet pipe (from valve cover to

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1948-50 MODELS

CONTINUED FROM PRECEDING PAGE

manifold) allows fumes from crankcase to be sucked into intake manifold. Vacuum control valve at manifold connection **must close at idling speed** for satisfactory idling performance.

NOTE—Clean Vacuum Control Valve when engine tuned up.

Cleaning Vacuum Control Valve—Remove control valve by disconnecting pipe and unscrewing valve from manifold. Disassemble valve; withdraw valve and spring, clean valve and valve seat thoroughly.

Servicing—Make certain all connecting pipes tight and that oil filler cap gasket seals cap tightly. Remove and clean control valve when tuning engine or whenever system does not operate satisfactorily.

BATTERY

Auto-Lite PN-15 or Willard HW-1-100. 6 volt, 15 plate, 100 Ampere Hour capacity (20 hr. rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) grounded at starter.
Engine Ground—Strap at left front engine mount.
Location—Right hand side of dash in engine compt.

STARTER

Auto-Lite Model MZ-4137 (1948-Early 1950), MZ-4162 (Late 1950 & 1951), MCH-6203 (1952-53).

►*NOTE—Starter solenoid switch and key starting used with MCH-6203 starter.*

Armature—MZ-2217 (MZ-4137), MZ-2330 (MZ-4162), MCH-2088 (MCH-6203).
Drive—(MZ Starters)—Overrunning clutch and positive pinion shift actuated by pedal.
Drive—(MCH-Starters)—Bendix "Folo-thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—160 RPM., 150-175 amps., 5 volts.

Performance Data—MZ-4137, 4162

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.①	5000	5.5	60
0	ft. lbs.②	4000	5.0	68
4.4	"	Lock	2.0	280

①—Without Bendix. ②—With Bendix.

Performance Data—MCH-6203

Torque		R.P.M.	Volts	Amperes
0	ft. lbs.	4300	5.0	65
6.0	"	Lock	2.0	335

Starting Switch (MZ Starters)—Auto-Lite No.2077A Mounted on starter and operated by pinion shift lever.
Starting Switch (MCH Starters)—Auto-Lite No. SS-4018. Mounted on starter and operated by ignition switch (key starting).
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite GDZ-4817A (1948-Early 1950), GDZ-6001D (Late 1950-Early 1953), GGW-4801D (Late 1953). Two brush types.

Armature—Auto-Lite No. GDZ-2006F (GDZ-4817A Gen.), GGY-2006F (GDZ-6001D Gen.), GGW-2006F (GGW-4801D Gen.).
Charging Rate Adjustment—None. See Regulator.

Performance Data—GDZ-4817A, 6001D

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4.	870-970 — 950-1050
17.0	8.0.	1350-1500 — 1550-2350
35.0	8.0.	1800-2000 — 2150-2350

Performance Data—GGW-4801D

Amperes	Volt	Cold—R.P.M.—Hot
0	6.4.	870-970 — 950-1050
40.0	8.0	1800-2000 — 2150-2350
45.0	8.0	1925-2125 — 2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 (GDZ); 1.4-1.5 (GGW) amperes at 5.0 volts.
Motoring Current—3.9-4.4 (GDZ), 4.8-5.3 (GGW) amperes at 5.0 volts.

Belt Adjustment: 1" deflection (thumb pressure) midway between generator and pump pulleys. To adjust, loosen all mounting bolts, pull generator away from engine.

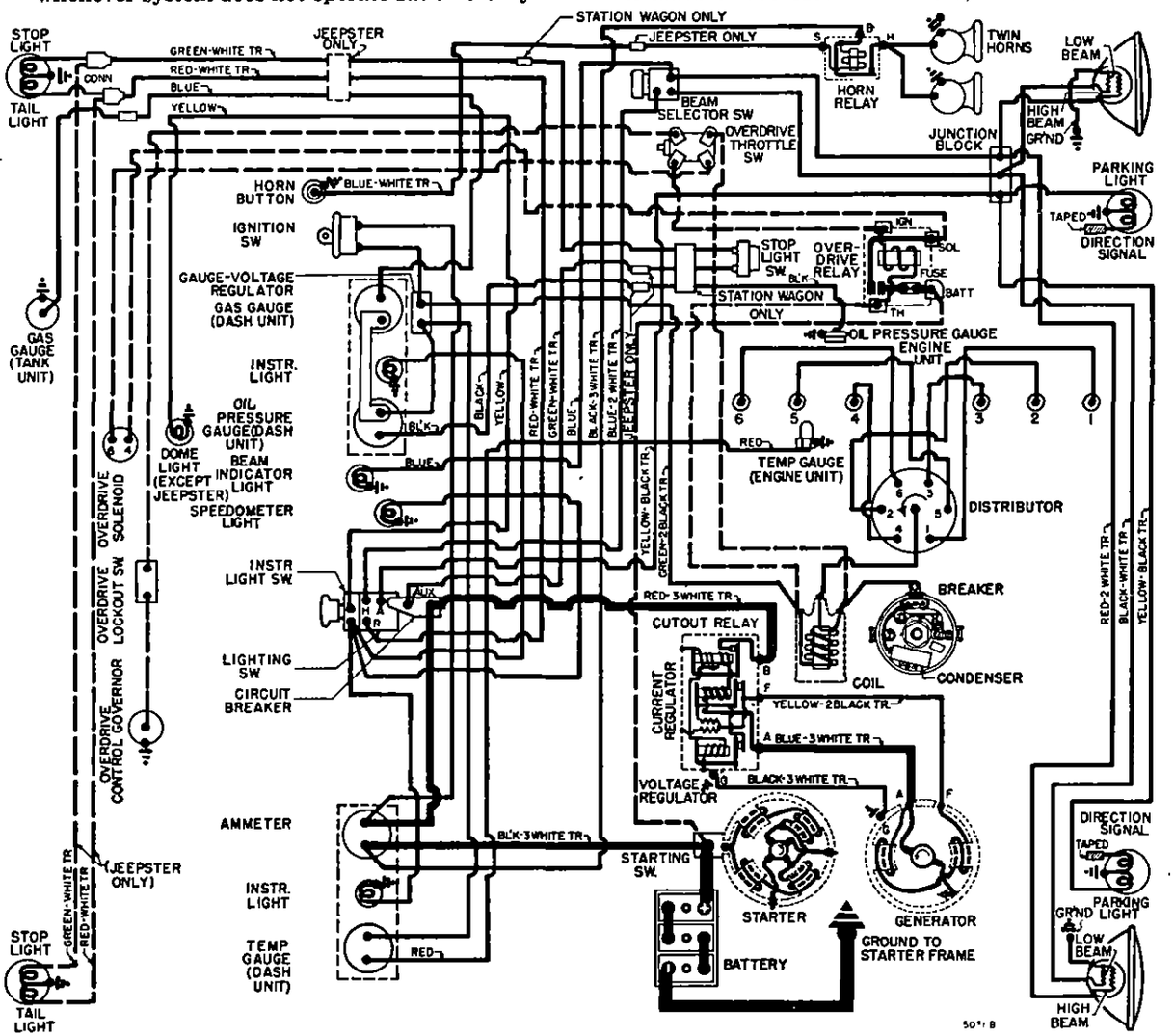
REGULATOR

Auto-Lite Models—Voltage & Current types as follows:

Regulator No.	Use with Gen. No.
VRP-4007C-2	GDZ-4817A
VRP-6003A	GDZ-4817A, 6001D
VBE-6105A	GGW-4801D

See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seals broken.

Cutout Relay
Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).



1950-EARLY 1952 MODELS
LATE 1952-53 MODELS—SEE 1952-53 2-WHL. DRIVE DIAGRAM

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Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (measured at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. after 15 minutes operation charging at 10 amperes (VRP), one-half maximum charging rate (VBE).
Checking (without breaking seal) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator—(VRP)

Setting—34-36 amperes (marked '35' on cover).
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VBE)

▷*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VBE-6105A	52	45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After fifteen minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Adjustment—Aim upper beam straight ahead with hot spot center 3" below lamp center height at 25 ft.
Beam Indicator—On left side of instrument panel (above Radio). Lighted when upper beams in use.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: 30-ampere type. Mounted on lighting switch. Vibrating thermostatic type. Protects lighting circuits by vibrating to limit current. No adjustment.
FUSES: Overdrive—20 ampere. On control relay.
GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter which is designed to maintain constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on instrument cluster and connected between ignition switch and gauge circuits. See Wiring Diagram.
HORNS: Auto-Lite or Sparks-Withington.
Horn Relay—Willys No. 643889.

ENGINE

"F-HEAD 1952-53

ENGINE SPECIFICATIONS: Own Make. 6 Cyl. "F-Head" type (Intake valves in head, exhaust valves in block).
Bore—3⅛". **Stroke**—3½".
Displacement—161 cu. ins. **Rated H.P.**—23.44.
Developed Horsepower—90 at 4200 RPM.
Compression Ratio—7.6-1.
▷**ALL OTHER ENGINE DATA:** *See 1952-53 Willys Aero Passenger Car pages.*

"L-HEAD" 1948-51

ENGINE SPECIFICATIONS: Own. "6-63" (1948-50), "Lightning" (1950-53). 6 Cylinder, L-Head type.

	Bore	Stroke	Displacement
1948-50	3"	3½"	148.44 cu. in.
1950-53	3⅛"	3½"	161 cu. in.

	Compr. Ratio	Rated HP	Developed HP
1948-50	6.42-1	21.6	72 at 4000 RPM
1950-53	6.9-1	23.44	75 at 4000 RPM

Compression & Vacuum Reading—*See Tune-Up.*

ORIGINAL BORE & PISTON SIZES: *See Willys Shop Notes.*

ORIGINAL BEARING SIZES: *See Willys Shop Notes.*

TIGHTENING TORQUES: *See Willys Shop Notes.*

CYLINDER HEAD INSTALLATION: *See Willys Shop Notes.*

PISTONS: Aluminum alloy, "T" slot, cam ground, tin or brass plated type. **Length**—3".
Weight—9.67 ozs., stripped.
Removal—Pistons and rods removed from above.
Clearance—.016-.0185" (top), .0015" (skirt).
Replacement Pistons: Furnished .005", .015", .020", .045" Oversize.
Fitting New Pistons: Use .0015" feeler gauge ½" wide between piston and cylinder wall on side opposite slot. Pull required to withdraw feeler must be 5-10 lbs.
Installing Pistons: T-slot toward left (valve) side of engine (opposite side from oil spray hole in rod).
PISTON RINGS: Two compression rings, one oil ring per piston, all above pin. Oil drain holes in oil ring groove.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"①	.010-.016"	.002-.004"
Compr. (#2)	3/32"①	.010-.016"	.0015-.0035"
Oil (#3)	3/16"②	.010-.016"	.001-.0025"

①—.0925-.0935". ②—.1860-.1865".

Installing Rings: Compression ring mark "TOP" (on side of rings) and bevel on inner edge must be UP.
Replacement Rings: Furnished in sets of Std. to .009", .010", .020", .030", .040" Oversize.
PISTON PIN: Locked in rod by clampscrew.
Diameter—.7497". **Length**—2 17/32".
Pin Fit in Piston—.0001-.0005" or a light thumb push fit at normal room temperature.
NOTE—Pin hole in piston diamond-bored to inside diameter of .7498-.7500".
Replacement Pins: Furnished Standard size only.
CONNECTING ROD: Length—6.343-6.347".
Crankpin Journal Diameter—1.875". *See "Original Bearing Sizes" in Willys Special Data.*
Lower Bearing—Replaceable steel-backed, babbitt lined type. No shims. CAUTION—Oil spray hole in bearing upper half must line up with oil hole in rod.
NOTE—Palnuts used as locknuts on rod bolts.
Clearance—.0004-.0025". **Sideplay**—.004-.010".
Bearing Adjustment: None (replace bearings). Do not file rods or bearing caps.
Palnut Installation—*See Willys Special Data.*
Replacement Bearings: Furnished Std. size and .010", .020" Undersize.
Installing Rods: Rods not offset. Install with oil spray hole in lower end toward right (away from camshaft) on all rods.
CRANKSHAFT: Four bearing with integral counterweights. Vibration dampener on forward end.
Journal Diameters—2.250" all Bearings. *See "Original Bearing Sizes" in Willys Special Data.*
Bearings—Replaceable steel-backed, babbitt lined type. No shims.
Clearance—.0009-.003".
Bearing Adjustment: None (replace bearings). Do not file bearing caps. Bearings can be removed and replaced without removing crankshaft.
Rear Bearing Oil Seal Servicing—*See "Crankshaft & Main Bearings" in Willys Special Data.*
Replacement Bearings: Furnished Std. size and .010", .020" Undersize.
End Thrust: Taken by #1 front bearing (flanged type) and thrustwasher in back of crankshaft gear. Adjusted by adding or removing shims behind thrust washer. Shims furnished .002" thick.
NOTE—Crankshaft gear must be removed with a gear puller for endplay adjustment.
Endplay—.004-.006".
FLYWHEEL: Removal—*See Willys Special Data.*
CAMSHAFT: Four bearing with helical gear drive.
Journal Diameters—#1, 1.8755-1.8760"; #2, 1.8425-1.8435"; #3, 1.8110-1.8120"; #4, 1.6245-1.6250".
Bearings—Removable steel-backed, babbitt-lined bushing (Front), machined in crankcase (all others). Front bearing reamed to 1.877" diameter.
Clearance—.001-.0025".
Camshaft Removal—*See Willys Special Data.*
End Thrust—Taken by thrust plate assembled behind camshaft gear with a spacer assembled behind plate. If required, a thin shim can be installed behind spacer if too little clearance, or spacer can be dressed to provide greater clearance.
Endplay—.003-.0055".
Timing Gears: Crankshaft gear Cast Iron. Camshaft gear Fibre with steel hub.
Gear Backlash—.000-.002".
Camshaft Setting: Mesh marked tooth of camshaft gear with marked space (between teeth) on crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	1 3/8"	.34075-.3415"	4½"
Exhaust	1 9/32"	.3395-.3405"	4½"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.284"	.0015-.00325"
Exhaust	45°	.306"	.0025-.0045"

Valve Guides: Removable type. Remove guides from above with puller. Install new guides with driver or press guides down until upper end ⅞" below upper edge of valve seat (taper end up).
Valve Springs: Springs can be installed with either end up. Free length 1 57/64".

	Spring Pressure	Length
Valve Closed	50 lbs.	1 5/8"
Valve Open	105 lbs.	1 21/64"

Valve Lifters: Mushroom type. In reamed holes in block. Service by installing oversize lifters.
Camshaft Removal—*See Willys Special Data.*
Lifter Diameter—.597-.605". **Length**—2".
Clearance in Block—.0005-.002".

VALVE TIMING

Tappet Clearance: .016" All Valves, Hot or Cold.
NOTE—Adjusting screws self-locking type.
Valve Timing: See Camshaft Setting above.
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—Set tappet clearance #1 intake valve at .020". This valve should be about to open (clearance taken up) with #1 piston 5° or

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.007" BTDC. with flywheel mark "5°/" centered in inspection hole in right front face of housing below starter. Reset tappet clearance to .016".

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, and camshaft bearings and to timing gears.

Crankcase Capacity—5 qts. refill.

Normal Oil Pressure—35 lbs. at 30 MPH., or 2000 RPM.

Oil Pressure Regulator—Opens at 25 lbs. Located on oil pump housing. Adjustable by adding or removing *shims from above spring within plug.*

►**1948-50 Low Oil Pressure:** If oil pressure less than 5 lbs. at idling speed with latest type oil gauge units installed (see Oil Gauge below), check main and connecting rod bearing clearance, oil pressure relief valve for sticking open, and timing gear jet oil hole size not greater than #54 drill.

Oil Pump: Internal Rotor type. Mounted externally on left side of crankcase.

Oil Pump Servicing—*See Willys Special Data.*

Oil Pressure Gauge (1948-50): King-Seeley Electric. (Not "CV").

►*CAUTION*—Gauge changed in production—correct Dash and Tank units must be used together.

Before Serial No. 13291

Dash Unit—King-Seeley No. 41305 (0-30-80 dial).
Engine Unit—King-Seeley No. 40767 (80 lb. type).

Beginning Serial No. 13291

Dash Unit—King-Seeley No. 42565 (0-20-50 dial).
Engine Unit—King-Seeley No. 40790 (50 lb. type).
See Miscellaneous Section for complete data.

Oil Pressure Gauge (1950-53): King-Seeley Electric "CV" (constant voltage) with voltage regulator.

Dash Unit—King-Seeley No. (First Cars) 45537, (Later Cars) 45729.

Engine Unit—King-Seeley No. 44030 (all).
See Miscellaneous Section for complete data.

Crankcase Ventilation: *See special data following "Carb. Equipment."*

COOLING

Cooling System: Pressure type with relief valve in radiator filler cap.

Capacity—8¾ qts. (9½ qts. with heater).

Pressure Valve—AC No. 846740. In filler cap. Opens at 3¾ lbs. (3¼-4¼ lbs.).

Water Pump: Centrifugal, packless type with special sealed ball bearing shaft (no lubrication required).
See Water Pump Section for complete data.

Removal—Loosen and remove drive belt, disconnect hose, remove pump mounting screws. Lift out pump and fan assembly.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: *Harrison. In outlet on cylinder head.* Starts to open at 145-155°F. Fully open at 173°F.

Temperature Gauge (1948-50): King-Seeley Electric (Not "CV").

Dash Unit—King-Seeley No. (1948) 41315, (1949-50) 42575.

Engine Unit—King-Seeley No. 7000.
See Miscellaneous Section for complete data.

Temperature Gauge (1950-53): King-Seeley Electric "CV" (constant voltage) with voltage regulator.

Dash Unit—King-Seeley No. (First Cars) 45545, (Later Cars) 45729; **Engine Unit**—No. 44200 (all).
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-19 (1948-50), 8501-36 (1950-53). Single plate type with Borg & Beck Driven Member.

NOTE—Clutch has neoprene driving lug inserts and Return Clip Springs for quieter operation.
See Clutch Section for complete data.

►**Clutch Return Clip Spring Installation to correct disengagement noise**—*See "Auburn Clutch" in Clutch Section.*

Facings—Molded (flywheel side), woven (pressure plate side). I.D. 5⅛". O.D. 8½". Thickness .132-.138".

Pedal Adjustment: Pedal free travel 1" (provides 1/16" clearance between release bearing and clutch levers). To adjust, loosen locknut and turn adjusting nut on connector link at clutch fork, tighten locknut.

Removal: Remove transmission (see Transmission Removal), remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws in clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS37-T96 (Std. Trans.). AS28-T96 (Sta. Wgn. with Overdrive). AS30-T96 (Jeepster with Overdrive). Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.

Transmission Control: Remote control type with gear-shift lever on steering column.
See Transmission Section for complete data.

Removal: Remove floor boards, take off bell housing inspection cover, disconnect clutch throw-out bearing retracting spring. Disconnect transmission control rods and speedometer cable at transmission case. Disconnect propeller shaft at universal joints and remove shaft. Support engine with jack placed under bell housing, remove rear engine support bolts from cross-member under transmission case, raise rear end of engine so that transmission clears cross-member (CAUTION—use care that fan blades do not damage radiator). Remove transmission to bell housing bolts, pull transmission straight back to clear clutch shaft, remove from car.

OVERDRIVE

Warner Type R10 (part of Transmission Assy.). New solenoid operated, governor controlled type overdrive (no centrifugal pawls) with throttle operated "kickdown." *See Trans. Section for complete data.*

Control Relay—Auto-Lite Model HRT-4001.

Overdrive Governor—Auto-Lite Model TGE-4002.

Transmission Solenoid—Delco-Remy Model 1118132

Removal: Remove as a unit with the transmission. Removal instructions same as for regular transmission (above) after governor and solenoid wires and lock-out control cable disconnected and overdrive case-to-cross-member bolts removed.

UNIVERSALS

1948—TO SERIAL NO. 11494

Spicer Model 1261-102X (Front), 1268-111X (Rear). Needle roller bearing type.

1948-53—AFTER SERIAL N . 11494

Detroit Universals Series 4100. Ball-and-trunnion type.

REAR AXLE

Spicer (Salisbury) Model 23-1. Semi-floating, Hypoid Gear type with Hotchkiss drive.
See Rear Axle Section for complete data.

Ratio—4.88-1 (without O.D.), 5.38-1 (with O.D.).

Backlash—.004-.009". Shim adjustment.

Removal: Support rear end of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs. Remove axle assembly.

Axle Shaft Removal: Remove wheel and hub assembly (use wheel puller), disconnect brake line at wheel cylinder, remove nuts on bolts holding backing plate and brake assembly on housing, remove dust shield, oil seal, and backing plate (with brake assembly). CAUTION—Do not lose bearing adjusting shims located between backing plate and flange on housing. Remove axle shaft and wheel bearing.

Wheel Bearing Adjustment—Endplay .003-.007". Adjust by adding or removing shims between backing plate and axle housing flange at each wheel. See axle shaft removal (above).

SHOCK ABSORBERS

Monroe or Gabriel. Direct acting, hydraulic type.

FRONT SUSPENSION

Planadyne Type. Independent, linked parallelogram type with transverse spring (spring acts as lower control arm). *See Front Suspension Sect. for data.*

Kingpin Inclination—5° crosswise.

Caster—1° No adjustment.

Camber—1½°. Limits 1¼-1¾°.

Toe-In—1/16-⅛". *See Willys Front Suspension in Front Suspension Section for Toe-In Adjustments.*

STEERING GEAR

Ross Model T-12. Cam-and-Twin Lever type.
See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering type. Hand lever applies rear wheel service brakes. *See Brake Sect. for complete data.*

Wheel Cylinders—Diameter: Front 1", Rear 7/8".

Drums—Chrome-nickel type. Diameter 10".

Lining—Moulded type (all shoes). Width 1.760". Thickness .182-.192". Length per shoe: 10 11/16" forward shoe, 8 5/16" reverse shoe.

Clearance—.008" toe, .005" heel, for each shoe. NOTE—No anchor pin adjustment provided. Brake shoes should be centralized by hard brake application (and then released) before adjustments made.

Hand Brake: See Service Brakes (above).

Adjustment—Tighten link rod adjustment (cable equalizer connector) at brake lever on frame cross-member for slight drag with hand lever set two notches "on". Release hand lever and make certain that brakes free of any drag.

MISC. MECHANICAL

Windshield Wipers: Vacuum type, cable operated.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

Model	Year
2WD & 4WD Trucks	1947-50
4X4-63 Sta. Wgn.	1949-50
473-HT & 473-4WD Trucks	1950-51
4X4-73 Sta. Wgn.	1950-51
475-4WD Truck	1952-53
4X475 Sta. Wgn. & Sedan Del.	1952-53

SERIAL NUMBER: On plate on outside of left frame side rail at front end, or on floor riser to left of driver's seat.

ENGINE NUMBER: (1947-49) Stamped on top of water pump boss at front of engine, (1950-53) Stamped on upper front corner of engine on right side.

►*ENGINE NUMBER NOTE—Letters following engine number denote the following:* **(A)**—Crankshaft journals (main & connecting rod) .010" UNDERSIZE. **(B)**—Cylinder bores .010" OVERSIZE. **(AB)**—Both above conditions exist in engine.

TUNE-UP

COMPRESSION PRESSURE: 115 lbs. at 160 RPM. ("L-Head" Engine), 130 lbs. at 200 RPM ("F-Head" Engine).

VACUUM READING: 17-21" idling at 7-10 MPH.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAPS: .030".

Plug Type—Auto-Lite AN-7 or Champ. J-7, 14 mm.

DISTRIBUTOR: Breaker Gap—.020" (.018-.022")

Cam Angle—See Ignition.

Breaker Arm Spring Tension—17-20 ozs.

Condenser Capacity—(IGB-1025) .20-.25 mfd., (IAT-4008 Distr.) .21-.25 mfd.

IGNITION TIMING: 5° BTDC. *NOTE—Road test car and modify timing for fuel and operating conditions.*

►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*

Timing Mark ("L-Head" & First "F-Head" Engines)—Flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of housing below starter.

►**Timing Mark Change**—Flywheel marked "5°" (replacing "IGN/") starting 2T Engine No. 13887, 4T Engine Number 14251.

Timing Mark (Later "F-Head" Engines)—Engines with 4½" starter DO NOT have timing marks on flywheel (Notch on inner edge of crankshaft pulley indicates TDC when lined up with boss on timing gear cover. TO TIME THESE ENGINES AT 5° BTDC, make new timing mark (if not already done) by notching pulley ¼" **clockwise** from old notch.

CARBURETION:	Carter Carb. No.
1947-49 & Early 1950①	③636S, SA, ④738S
1950 (Early)②	④768S, SA
1950 (Late) & 1951②	④832S, SA, SB
1952 (Early)②	④832SB
1952 (Late) & 1953②	④951S

①—"L-Head" Engine. ②—"F-Head" Engine. ③—Carter "WO" Carburetor. ④—Carter "YF" Carburetor.

►*ACCELERATION STUMBLE OR FLAT SPOT CORRECTION (Carter 832SB & 951S): See "Carter YF" Carburetor in Carburetor Section for complete data.*

►*STUMBLE CORRECTION (738S, 768S, SA, 832S, CARBURETORS)—See "Carter YF" in Carburetor Section for complete data.*

Idle Setting: Idle screw ½-1½ turns open (Carter WO Carb.), 1-2 turns open (Carter YF Carb.). Turn screw out for richer mixture.

Idle Speed—600 RPM. or 6 MPH.

Float Level (WO Carb.)—⅜" from top of float at free end to gasket seat on cover with needle valve closed (invert assembly).

Float Level (YF Carb.)—5/16" from bottom of float to gasket seat on cover with cover assembly inverted and needle valve seated.

►*CAUTION—Do not compress spring in valve stem (allow float to hang freely on inverted cover assembly).*

Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 4½ lbs. maximum.

CRANKCASE VENTILATOR: Remove and clean vacuum control valve. *See Crankcase Ventilator (following Carb. Equipment) for directions.*

MANIFOLD HEAT CONTROL ("L-Head" Engine): Automatic thermostatic valve must operate freely (no adjustment required). Spring end must rest on top of stop bracket.

VALVE TAPPET CLEARANCE: ("L-Head" Engine)—.016" (Intake & Exhaust—COLD).

"F-Head" Engine—.018" (Intake—COLD). .016" (Exhaust—"Thompson Roto-Valve"). .012" (Exhaust—"Eaton Free Valve"). Adjust with engine COLD.

IGNITION

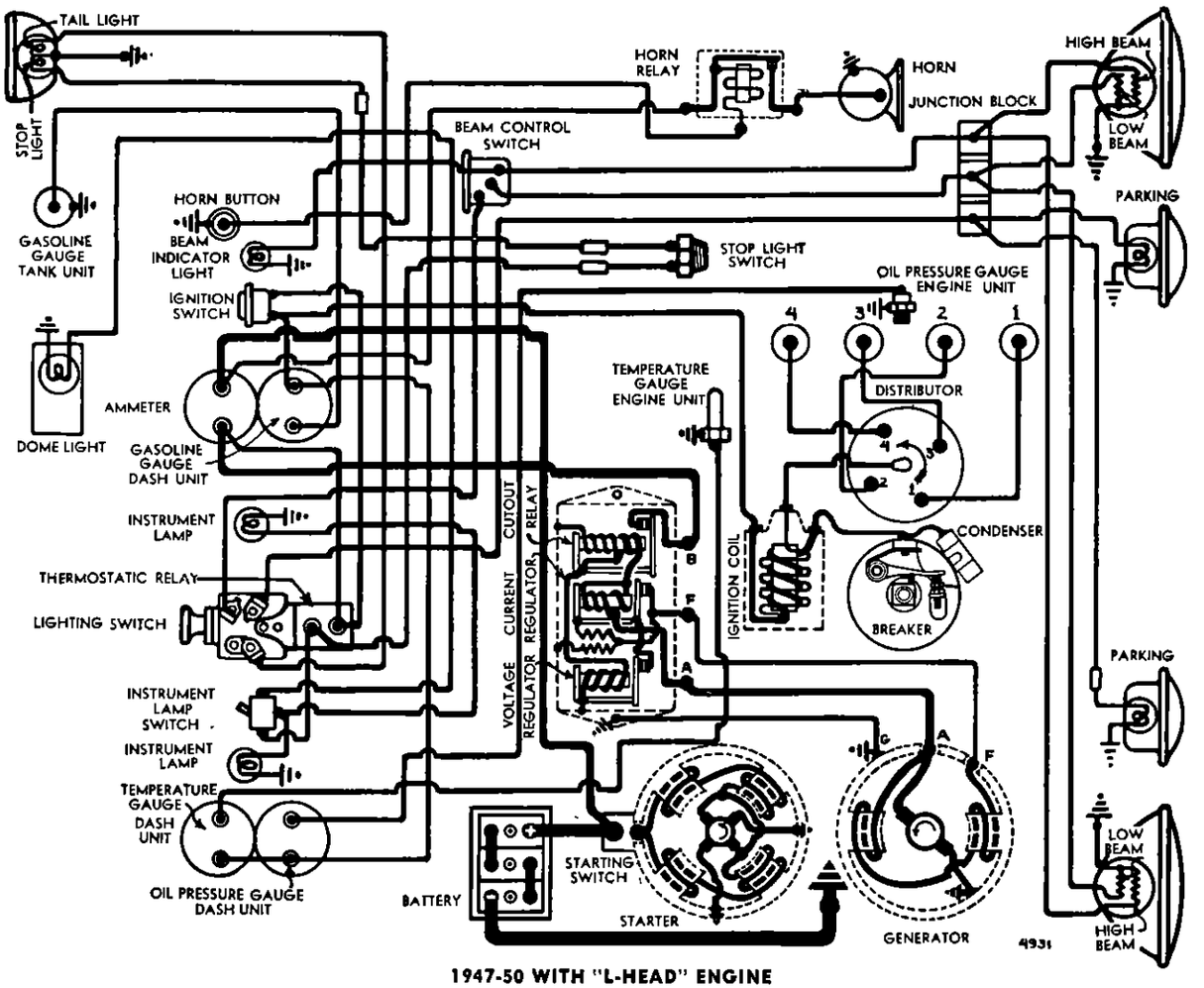
COIL: Auto-Lite No. IG-4090A or IG-6009 ("L-Head" Engines). No. CR-6009 ("F-Head" Engines).

Ignition Current—2.5 amperes idling, 5 stopped.

CONDENSER: Auto-Lite No. IGB-1025 (IGW Distributors); IAT-3076L (IAT Distributors).

Capacity—(IGB-1025) .20-.25 mfd., (IAT-3076L) .21-.25 mfd.

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1947-50 WITH "L-HEAD" ENGINE

CONTINUED FROM PRECEDING PAGE

DISTRIBUTOR: Auto-Lite models as follows: Full automatic advance type with separate vacuum control (IGW Distr.), integral type vacuum control (IAT Distr.).

Year	Distr. No.
1947-50 (Early)①	IGW-4189
1950 (Early)②	IGW-4189A
1950 (Late), 1951 & 1952 Early②	IAT-4008
1952 (Late) & 1953	IAT-4008B

①—"L-Head" Engine. ②—"F-Head" Engine.

Breaker Gap—.020" Limits .018"-.022"

Cam Angle—50.8° (IGW-4189). 42° ± 3° (Others).

Breaker Arm Spring Tension—17-20 ozs.

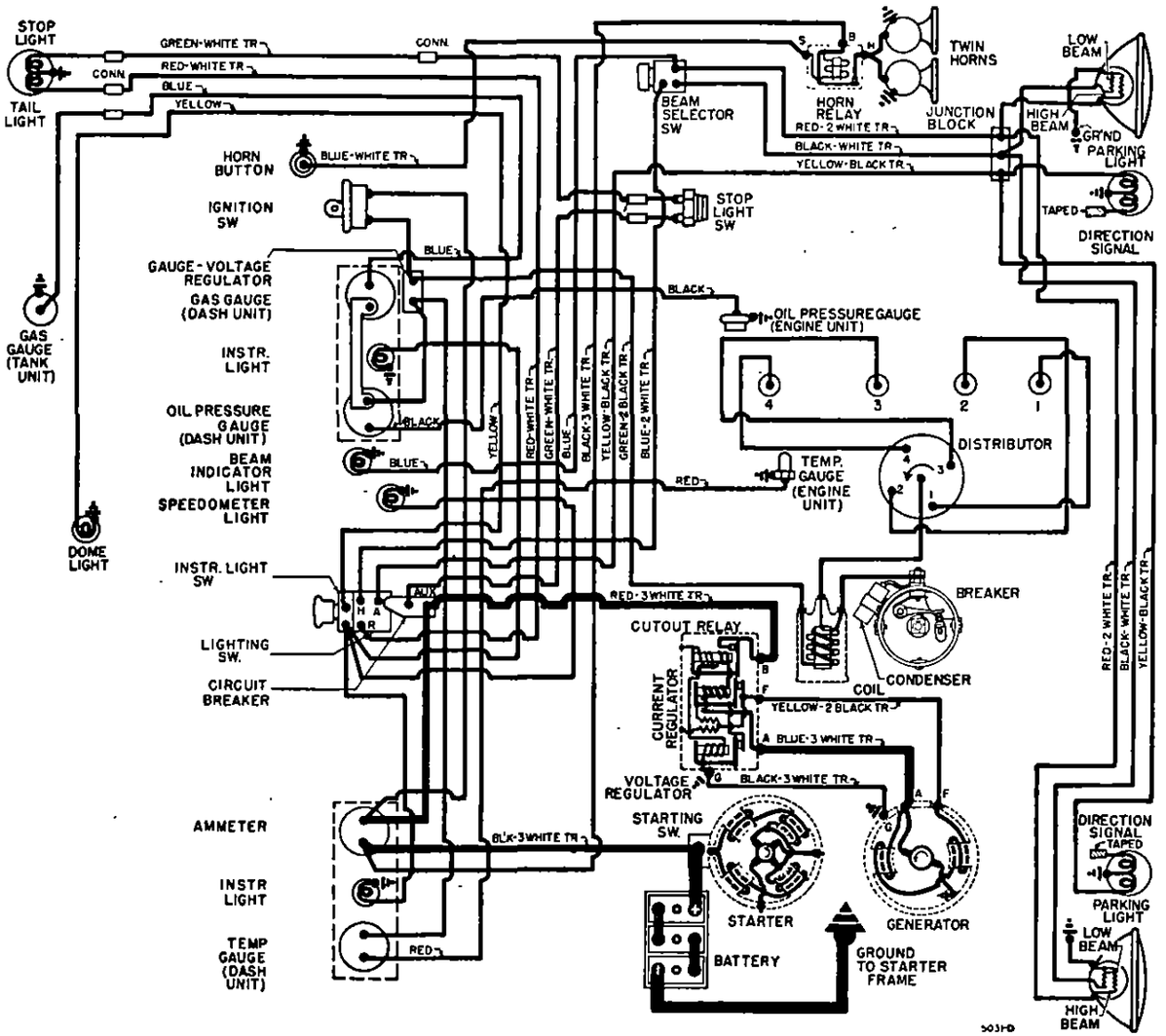
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IGW-4189

Start	350	0	700
2	560	4	1120
5	875	10	1750
8	1190	16	2380
11	1500	22	3000

Automatic Advance—IGW-4189A & IAT-4008

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	400	2	800
4	650	8	1300
10	1800	20	3600
11	2000	22	4000



1950-EARLY 1952 MODELS WITH "F-HEAD" ENGINE
LATE 1952-53 MODELS—SEE 1952-53 2-WHL. DRIVE DIAGRAM

Automatic Advance—IAT-4008B

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	425	2	950
6	1050	12	2050
10	1575	20	3150
11	1700	22	3400

Vacuum Spark Control: Auto-Lite Type VC-4010. (IGW-4189 Distr.). VC-4010A (IGW-4189A Distr.).

Vacuum Advance—IGW-4189

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
2°	4°	5¾"
5°	10°	9¼"
8°	16°	12¾"
10°	20°	15"

Vacuum Advance—IGW-4189A, IAT-4008

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4¾"
1°	2°	5⅜"
3°	6°	6¾"
4°	8°	7⅜"
5°	10°	8"

Vacuum Advance—IAT-4008B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅛"
1°	2°	6⅝"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

Distributor Removal: On right side of engine. To remove, disconnect vacuum line, take out hold-down screw in mounting plate.

Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to #1 cylinder firing position (see Timing), turn distributor shaft until rotor is at #1 segment (see diagram), install distributor on engine, rocking shaft slightly to engage drive coupling, push distributor down into place, install hold-down screw, check ignition timing.

CAUTION—If oil pump has been removed, see Oil Pump Installation under "Oil Pump" in Willys Special Data.

IGNITION TIMIN

Standard Setting ..... 5° BTDC.

NOTE—Road test car for timing modifications for fuel and operating conditions.

►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*

Timing Mark ("L-Head" & First "F-Head" Engines)—Flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of housing below starter. (See Timing Mark Change following).

►**Timing Mark Change**—Flywheel marked "5°" (replacing "IGN/") starting 2T Engine No. 13887, 4T Engine Number 14251.

Timing Mark (Later "F-Head" Engines)—Engines with 4½" starter DO NOT have timing marks on flywheel (Notch on inner edges of crankshaft pulley indicates TDC when lined up with boss on timing gear cover). TO TIME THESE ENGINES AT 5°

CONTINUED ON NEXT PAGE

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BTDC, make new timing mark (if not already done) by notching pulley ¼" clockwise from old mark.

Timing Using Timing Light—Direct timing light on timing mark (flywheel or crankshaft pulley) and adjust distributor until correct timing mark aligned with center of inspection hole or boss on timing gear cover.

CARBURETOR

Carter Types as follows: Single barrel downdraft type with manual choke control.

Model Year	Carter Carb. No.
1947-49 & Early 1950①	③636S, SA ④736S
1950 (Early)②	④768S, SA
1950 (Late) & 1951②	④832S, SA, SB
1952 (Early)②	④832SB
1952 (Late) & 1953②	④951S

①—"L-Head" Engine. ②—"F-Head" Engine ③—Carter "WO" Carburetor. ④—Carter "YF" Carburetor.

►***STUMBLE CORRECTION (738S, 768S, SA, 832S, CARBURETORS)—See "Carter YF" in Carburetor Section for complete data.***

See Carburetor Section for complete data.

►**768S Carburetor conversion to 768SA—*See "Carter YF Downdraft" in Carburetor Section.***

Settings (Idle Setting, Float Level, and Accelerating Pump): ***See Tune-Up data.***

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Fast Idle: Interconnected linkage by which choke valve lever opens throttle to fast idle position when carburetor choked for starting.

Setting (WO)—No adjustment required.

Setting (YF)—Lip on fast idle arm should contact boss on body with choke valve wide open. Adjust by bending connector rod at offset.

CARB. EQUIPMENT

Air Cleaner: Oil-wetted type (Std.), Oil bath type (Optl.).

Fuel Pump: AC Combination Fuel & Vacuum type.

Replacement Pump—AC No. 9106 or 9307 ("L-Head" Engine); No. 9562 ("F-Head" Engine).

Pressure—4½ lbs. maximum.

See Carburetion Equipment Section for complete data.

Gasoline Gauge: King-Seeley electric. ***NOTE—Voltage Regulator K-S No. 45557 used with 1950 & Later gauges.***

Dash Unit—King-Seeley No. 41310 (1947-48); No. 42570 (1949); No. 45534 (1950); No. 45727 (1951-53).

Tank Unit—King-Seeley No. 41285 (Truck), 41248 (Sta. Wgn.) (1947-49). No. 44506 (Truck & Sta. Wgn.) (1950-53).

See Carburetion Equipment Section for complete data.

Gauge Voltage Regulator—King-Seeley No. 45557. ***See Misc. Electrical for data.***

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type—Air intake pipe (from air cleaner to oil filler pipe) furnishes clean air to crankcase, air outlet pipe (from valve cover to manifold) allows fumes from crankcase to be sucked into intake manifold. Vacuum control valve at manifold connection **must close at idling speed** for satisfactory idling performance.

NOTE—Clean Valve when tuning engine.

Cleaning Vacuum Control Valve—Remove control valve by disconnecting pipe and unscrewing valve from manifold. Disassemble valve, withdraw valve and spring, clean valve and valve seat thoroughly.

Servicing—Make certain all connecting pipes tight and that oil filler cap gasket seals cap tightly. Remove and clean control valve when tuning engine or whenever system does not operate satisfactorily.

BATTERY

Auto-Lite Type PN-15—6 Volt, 15 Plate, 100 Ampere Hour capacity (20 hour rate).

Starting Capacity—120 amperes for 20 minutes.

Grounded Terminal—Negative (--) at starter.

Engine Ground—Strap at right front engine mount.

Location—Right hand side of dash in engine compt.

STARTER

Auto-Lite Model MZ-4137 (1947-Early 1950), MZ-4162 (Late 1950, 1951 & Early 1952), MCH-6207 (Late 1952 & 1953).

Armature—Auto-Lite No. MZ-2214 (MZ-4137). MZ-2330 (MZ-4162), MCH-2088 (MCH-6207).

Drive—(MZ-4137 & 4162)—Manual pinion shift operated by starter pedal.

Drive—(MCH-6207)—Bendix "Folo-thru" type.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs. (new brushes).

Cranking Engine—160 RPM., 150-175 amps., 5 volts.

Performance Data—MZ-4137, 4162

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.①	5000	5.5	60
0 ft. lbs.②	4000	5.0	68
4.4 "	Lock	2.0	280

①—Without Bendix. ②—With Bendix.

Performance Data MCH-6207

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4300	5.0	65
6.0 "	Lock	2.0	335

Starting Switch (MZ-4137 & 4162): Auto-Lite No. SW-2677A. Mounted on starter and operated by pinion shift lever.

MCH-6207—Auto-Lite No. SS-4018 (Early), SS-4018A (Later). Ignition key starting with magnetic switch.

See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GDZ-4817A (1947-Early 1950). GDZ-6001D (Late 1950-Early 1953). GGW-4801D (Late 1953). Two brush type with voltage and current regulation.

Armature—Auto-Lite No. GDZ-2006F (GDZ-4817A Gen.), GGY-2006F (GDZ-6001D Gen.), GGW-2006F (GGW-4810D Gen.).

Charging Rate Adjustment—None. See Regulator.

Performance Data—GDZ-4817A, 6001D

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
17.0	8.0	1350-1500 — 1550-1700
35.0	8.0	1800-2000 — 2150-2350

Performance Data—GGW-4801D

Amperes	Volts	Cold—R.P.M.—Hot
0	6.4	870-970 — 950-1050
40.0	8.0	1800-2000 — 2150-2350
45.0	8.0	1925-2125 — 2350-2550

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35-53 ozs. (new brushes).

Field Current—1.3-1.5 (GDZ); 1.4-1.5 (GGW) amperes at 5.0 volts.

Motoring Current—4.16-4.60 amperes (GDZ); 4.8-5.3 (GGW) at 5.0 volts.

Belt Adjustment: Loosen clamp and pivot bolts, swing generator out away from engine until belt can be deflected 1" midway between generator and fan pulleys with thumb pressure.

REGULATOR

Auto-Lite Models—Voltage & Current types as follows:

Regulator No.	Use With Gen. No.
VRP-4007C-2 or 6003A	GDZ-4817A
VRP-6003A	GDZ-6001D
VBE-6105A	GGW-4801D

NOTE—Regulator cover sealed. Warranty void if seals broken.

See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts).

Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).

Contact Gap—.015" minimum.

Air Gap—.031-.034" with contacts open measured at hinge end of core.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. after 15 minutes operation charging at 10 amperes (VRP), one-half maximum charging rate (VBE).

Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*

Contact Gap—.012" min. (armature against stop pin).

Air Gap—.048-.052" with contacts just opening.

Current Regulator—(VRP)

Setting—34-36 amperes (marked '35' on cover).

Contact Gap—.012" min. (armature against stop pin).

Air Gap—.048-.052" with contacts just opening.

Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VBE)

►***SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.***

Test A—Operating Amperes—Test B

VBE-6105A ..... 52 ..... 45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.

Test B—After fifteen minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts).

Air Gap—.048-.052" with contacts just opening.

Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type.

See Electrical Equipment Section for complete data.

Beam Indicator—On left side of instrument panel.

Switches

Lighting—Willys No. 800369 (1947-Early 1951), No. 801274 (Late 1951-53).

Beam Selector—Willys No. 801903.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: 30 ampere type. Mounted on lighting switch. Vibrating thermostatic

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type. Protects lighting circuits by vibrating to limit current. No adjustment.

HORNS: Auto-Lite or Sparks-Withington.

GAUGE VOLTAGE REGULATOR: King-Seeley. Consists of thermo-bimetal interrupter unit designed to maintain constant voltage of 5 volts (regardless of generator charging fluctuations) on gauge feed circuit. Unit-mounted on instrument panel cluster and connected between ignition switch and gauge circuits. See Wiring Diagram.

ENGINE

"L-HEAD" 1947-EARLY 1950

ENGINE SPECIFICATIONS: Own Make. Four cylinder, "L" Head type. Cylinder block and crankcase cast enbloc. Cylinders offset from center-line of crankshaft toward camshaft side of engine.

Bore—3⅛" (3.125-3.127"). ***See Willys Special Data for Original Bore Sizes.***

Stroke—4⅜".

Displacement—134.2 cubic inches.

Rated Horsepower (SAE)—15.63.

Developed Horsepower—60 at 4000 RPM.

Compression Ratio—6.48-1 Std. Cast Iron Head.

NOTE—7.0-1 Cylinder Head is optional.

Compression & Vacuum Reading—*See Tune-up data.*

►**ALL OTHER ENGINE DATA:** ***See 1946-51 Jeep, Universal Model.***

"F-HEAD" LATE 1950-53

ENGINE SPECIFICATIONS: Own 4 Cyl. Hurricane "F" Head type (Intake valves in head, exhaust valves in block).

Bore—3⅛". Stroke—4⅜".

Displacement—134.2 cu. ins.

Developed H.P.—72 at 4000 RPM. Rated H.P. 15.63.

Compression Ratio—Cast iron heads. Painted to indicate ratio—6.9 (Blue), 7.4 (Black), 7.8 (Yellow).

►**ALL OTHER ENGINE DATA:** ***See 1950-53 2-Whl. Dr. Station Wagon, Sedan Delivery, Jeepster with Hurricane "F-Head" Engine.***

VALVE TIMING

VALVE TAPPET CLEARANCE: ("L-Head" Engine)—.016" (Intake & Exhaust—COLD).

"F-Head" Engine—.018" (Intake—COLD)..**016"** (Exhaust—"Thompson Roto-Valve"). **.012"** (Exhaust—"Eaton Free Valve"). Adjust with engine COLD.

VALVE TIMING: All Engines

Intake Valves—Open 9° BTDC. Close 50° ALDC.

Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

Valve Timing Check—Set tappet clearance for #1 intake valve to .020" ("L-Head" Engines), .026" ("F-Head" Engines). Rotate crankshaft clockwise until piston in #1 cylinder is ready for intake stroke. Since intake valve starts to open at 9° BTDC, position TDC mark on flywheel or crankshaft pulley in center of hole in flywheel housing or in line with boss on timing gear cover, then estimate the 9° BTDC point in relation to the TDC mark and 5° BTDC mark, (5° BTDC mark is approximately ¼" clockwise from TDC mark). No. #1 intake tappet should JUST BE TIGHT against valve stem, indicating that timing is correct. Reset tappet clearance to correct setting.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain or timing gears. Oil pump mounted externally on left hand side of crankcase.

Crankcase Capacity—4 quarts.

Oil Pressure—35 lbs. at 35 MPH.

Oil Pressure Regulator—Under plug on side of pump housing. Opens at 35 lbs. Adjustable by adding or removing shims located above spring in plug.

Oil Pump: Rotor type pump mounted on left side of crankcase.

Oil Pump Servicing—*See Willys Special Data.*

Oil Filter: Purolator. On cylinder head bracket at right front corner of cylinder head with oil outlet connected to top of timing chain cover.

CAUTION—Filter should be drained at each crankcase oil change (2000 mile intervals) and filter element replaced at 8000 mile intervals for normal service.

Oil Pressure Gauge: King-Seeley Electric type.

Year	Dash Unit	Motor Unit
1947	42020	40767
1948	41305	40767
1949	42565	40790
1950	45537	44030
1951-53①	45729	44030

①—Voltage Regulator No. 45557 used in gauge circuit. ***See Misc. Electrical.***

See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap.

Capacity—11 qts.

Pressure Valve—Radiator Filler Cap. Opens at 3¾ lbs., (1947-51), 7 lbs. (1952-53).

Water Pump: Centrifugal, packless, ball bearing type. ***See Water Pump Section for complete data.***

Removal—Loosen and remove drive belt, disconnect hose. Remove pump mounting screws, lift out pump and fan assembly.

Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In outlet elbow on cylinder head. Starts to open at 145-155°F. Fully open at 170°F.

Temperature Gauge: King-Seeley electric.

Year	Dash Unit	Motor Unit
1947-48	41315	7000
1949	42575	7000
1950	45545	44200
1951①	45734	44200
1952-53①	45734	44220

①—Voltage Regulator No. 45557 used in gauge circuit. ***See Misc. Electrical.***

See Miscellaneous Section for complete data.

CLUTCH

Auburn Models 8501-19 ("L-Head" Engines); 8501-36 (1950-52 "F-Head" Engines); 8501-39 (1953), with Borg & Beck Driven Member. Single plate dry disc type.

See Clutch Section for complete data.

►**Clutch Facing Change & Return Clip Spring Installation to correct Clutch Chatter & Noise—*See "Auburn Clutch" in Clutch Section.***

Facings—Molded (flywheel side), Woven (pressure plate side). I. D. 5⅛". O. D. 8½". Thickness .132-.138".

Pedal Adjustment: Pedal free travel 1¼" (for 1/16" clearance between release bearing and clutch levers). To adjust, loosen locknut and turn adjusting nut on connector link at clutch fork, tighten locknut.

Removal: Remove transmission (see Transmission Removal), remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation, take out mounting screws in clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

TRANSMISSION

2-WHL. DRIVE

Warner Model AS1-T90E (2-WD before Serial No. 22536), AS39-T96 (473-HT). Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). ***See Transmission Section for complete data.***

Transmission Control (2-WD Before Serial No. 22536). Remote control type with gearshift lever on steering column. ***See Transmission Section for complete data.***

Removal: ***See Willys 2-Wheel Drive Station Wagon (1946-50) for complete data.***

4-WHL. DRIVE

Warner Model AS3-T90A (4-WD before Serial No. 34787), AS1-T90C (4-WD after No. 34787 & 473-4WD). Constant-mesh, synchro-mesh, helical gears (Second & High), sliding gear (Low & Reverse).

See Transmission Section for complete data.

Transfer Case: Spicer or Warner. Two-speed auxiliary transmission and front-wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front-wheel drive (left hand lever).

See Transmission Section for complete data.

Transmission Control (4-WD before Serial No. 34787). Remote control type with gearshift lever on steering column.

See Transmission Section for complete data.

Removal: Transmission and transfer case are removed as an assembly. Disconnect front and rear propeller shaft at front and rear universals. Disconnect speedometer cable at transfer case, brake cable, transmission shift rods at transmission case levers (remote control type) or remove shift levers (floor mounted gear shift), and clutch release cable at cross-shaft bell-crank. Place support jacks under engine and transmission, remove transfer case rubber snubber bolt nut (on right side) and rear mounting bolt nuts at cross-member under transmission case. Remove floor board inspection plate. Drain radiator and loosen upper radiator hose. Remove transfer case shift lever pivot pin screw, remove pin and levers. Remove bolts holding center cross-member at frame side rails and remove cross-member. (CAUTION—with cross-member removed, engine and transmission weight will rest on jacks). Remove bolts holding transmission on bell

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housing, force transmission to right until ball stud end can be disengaged from end of clutch control cross-shaft. Lower support jacks under engine and transmission and slide transmission and transfer case assembly to rear until clutch shaft clears bell housing, remove assembly from beneath car.

UNIVERSALS

2-WHL. DRIVE

Detroit Ball-and-Trunnion Type. Two used (First Trucks), three used (Later Trucks). NOTE—Later trucks have two propeller shafts with support bearing and intermediate universal at cross-member.

4-WHL. DRIVE

Front & Rear Drive Propeller Shaft Joints: Spicer needle roller bearing type.

Replacement Journal & Bearing Kit—Spicer No. 5-21X.

Front Axle Shaft Joint: Bendix or Rzeppa Constant-Velocity type. One joint used on outer end of each shaft (within steering knuckle housing).

See "Universal Joints" in Willys Special Data.

▷*1953 RZEPPA TYPE UNIVERSAL PRODUCTION CHANGE*—The inner shaft retainer and three screws have been eliminated, making it possible to pull the shaft end from the joint without dismantling joint.

Power Take-off Propeller Shaft Joints: Detroit Ball-and-trunnion type. Three used (additional joint at intermediate support bearing on cross-member.

FRONT AXLE

4-WHL. DRIVE

Spicer (Salisbury) Model 25. Full-floating, hypoid gear type. Differential assembly (ring and pinion gear assembly) is same as Spicer Rear Axle.

See Spicer (Salisbury) Full Floating Rear Axle in Rear Axle Section for complete data.

Ratio—5.38-1.

Backlash—.005-.007". Shim adjustment.

Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and steering linkage (at idler lever on frame front cross-member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear end of springs and lower the springs, remove axle assembly from beneath car.

Axle Shaft & Universal Joint Assy. Removal: Remove wheel, hub cap, axle shaft nut and washer. Take out drive flange capscrews and remove flange with a puller *(CAUTION*—do not lose shim pack under drive flange). Bend lip on bearing adjusting nut lockwasher out, remove locknut, lockwasher, adjusting nut, and bearing locking washer. Remove wheel hub and bearing assembly *(CAUTION*—use care not to damage oil seal). Disconnect brake tube, take out mounting screws on backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal joint assembly out of housing.

▷*INSTALLATION CAUTION*—Adjust front wheel bearings and bleed brakes after installation completed.

Steering Knuckle Bearing Disassembly & Adjustment: *See "Front Axle" in Willys Special Data.*

Wheel Bearing Adjustment: *See "Front Axle" in Willys Special Data.*

REAR AXLE

1947-51 2-WHL. & 4-WHL. DRIVE

Timken Model No. 51540. Semi-floating, spiral bevel gear type with Hotchkiss Drive.

See Rear Axle Section for complete data.

Ratio—5.38-1 Std. Optl. Ratios (2-WD only) 4.88-1 and 6.17-1.

Backlash—.004-.018". Shim adjustment.

Removal: Support rear end of truck securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables and propeller shaft at rear universal. Place support jacks under axle housing to relieve springs of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs to floor. Remove axle assembly.

Axle Shaft Removal: Remove wheel and hub assembly (use wheel puller), remove nuts on bolts holding backing plate and brake assembly, remove dust shield, oil seal, and backing plate. Remove axle shaft and wheel bearing. CAUTION—Do not lose bearing adjusting shims.

Wheel Bearing Adjustment—Endplay .003-.005". Adjust by adding or removing shims between backing plate and flange on axle housing. See axle shaft removal above for dismantling instructions.

1949-53 4-WHL. DRIVE

Spicer (Salisbury) Model 41-2 (1949-51); Model 44-1 (1952-53). Semi-floating Hypoid gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratio—5.38-1.

Backlash—.004-.008". Shim adjustment.

Removal: Support rear end of truck securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables and propeller shaft at rear universal. Place support jacks under axle housing to relieve springs of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs to floor. Remove axle assembly.

Axle Shaft Removal: Remove wheel and hub assembly (use wheel puller), remove nuts on bolts holding backing plate and brake assembly, remove dust shield, oil seal, and backing plate. Remove axle shaft and wheel bearing. CAUTION—Do not lose shims.

Wheel Bearing Adjustment—Endplay .003-.005". Adjust by adding or removing shims between backing plate and flange on axle housing.

SHOCK ABSORBERS

Gabriel. Hydraulic, direct acting, adjustable type.

FRONT SUSPENSION

2-WHL. DRIVE

Front Axle: "I" beam type with reverse Elliot ends. Conventional type with semi-elliptical springs.

Kingpin Inclination—7½° crosswise.

Caster—4¾° (1947-49), 3° (1950-51).

Camber—1°.

Toe-In—3/64-3/32".

4-WHL. DRIVE

Front Axle: Spicer Model 25. Special full-floating driving unit. *See Front Axle data.*

Front Suspension: Special front wheel drive unit with semi-elliptical springs. Steering knuckle mounted on taper roller bearings carried on two stub shafts.

Front Suspension Adjustments—*See Willys Jeep (1952-55) for complete data.*

Kingpin Inclination—7½° (All).
Caster—3° **Camber**—1½°. **Toe-In**—3/64-3/32".

STEERING GEAR

Ross Model T12, No. TA-13018, Cam-and-Twin Lever

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Four Wheel Hydraulic, self-centering type. Hand lever applies rear wheel service brakes.

See Brake Section for complete data.

Drum Diameter—11".

Lining—Molded type. Width 2", Thickness 3/16". Length per wheel 22 1/16".

Clearance—.008" toe, .005" heel for each shoe.

Hand Brake: See Service brakes above.

MISC. MECHANICAL

Windshield Wiper: Vacuum type, cable operated.

See Miscellaneous Section for data.

MODEL IDENTIFICATI N

Model	Year
473-SW (Sta. Wgn.)	1950-52
473-SD (Sed. Del.)	1950-52
473-VJ (Jeepster)	1950-51
475 (Sta. Wgn. & Sed. Del.)	1953

SERIAL NUMBER: (Sta. Wgn. & Sed. Del.). On floor riser to left of drivers seat. (Jeepster) On under edge of cowl above glove box door.

ENGINE NUMBER: Stamped on upper front corner of engine on right side.

►*ENGINE NUMBER NOTE—Letters following engine number denote the following:* (A)—Crankshaft journals (main & connecting rod) .010" UNDERSIZE. (B)—Cylinder bores .010" OVERSIZE. (AB)—Both above conditions exist in engine.

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. (125-145 lbs. depending on compression ratio) and equal within 10 lbs. for all cylinders.

VACUUM READING: Steady 17-21" idling.

FIRING ORDER: 1-3-4-2. See diagram.

SPARK PLUG GAPS: .030".
Plug Type—Auto-Lite AN-7 or Champ. J-7. 14 mm.

DISTRIBUTOR: Breaker Gap—.020" (.018-.022")
Cam Angle—41° (IGW-4189A); 40° ± 3° (IAT-4008, 4008B).
Breaker Arm Spring Tension—17-20 ozs.
Condenser Capacity—.20-.25 mfd. (IGW-4189A Distr.), .21-.25 mfd. (IAT-4008, 4008B Distr.).

IGNITION TIMING: 5° BTDC. *NOTE—Road test car and modify timing for fuel and operating conditions.*

►*IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.*
Timing Procedure—See Ignition Timing.
Timing Mark (Early 1950 Engines)—Flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of housing below starter.
Timing Mark (Later Engines)—Engines with 4½" starter DO NOT have timing marks on flywheel (Notch on inner edge of crankshaft pulley indicates TDC when lined up with boss on timing gear cover). TO TIME THESE ENGINES AT 5° BTDC, make new timing mark (if not already done) by notching pulley ¼" clockwise from old notch.

CARBURETION:	Carter Carb. No.
1950 (Early)	768S, SA
1950 (Late) & 1951	832S, SA, SB
1952 (Early)	832SB
1952 (Late) & 1953	951S

►*ACCELERATION STUMBLE OR FLAT SPOT CORRECTION: See "Carter YF" Carburetor in Carburetor Section for complete data.*
Idle Setting—Idle screw 1-2 turns open (turn screw out for richer mixture).
Idle Speed—600 RPM.
Float Level—5/16" top of float to gasket seat on cover with valve seated (cover assembly inverted). CAUTION—Do not compress spring in valve stem (allow float to hang freely on inverted cover).
Accelerating Pump—No seasonal adjustment.

Fuel Pump Pressure: 4½ lbs. maximum.

MANIFOLD HEAT CONTROL: No control valve used. Intake manifold is in cylinder head, controlled by head temperature.

VALVE TAPPET CLEARANCE: .018" (Intake). .016" (Exhaust—"Thompson Roto-Valve"). .012" (Exhaust—"Eaton Free-Valve." Adjust all valves with engine COLD.

IGNITI N

IGNITION SWITCH: Douglas or Mitchellock Switch.

COIL: Auto-Lite No. IG-6009 (First Cars), CR-6009 (Later Cars). On right side of engine.
Ignition Current—2.5 amperes idling, 5 stopped.

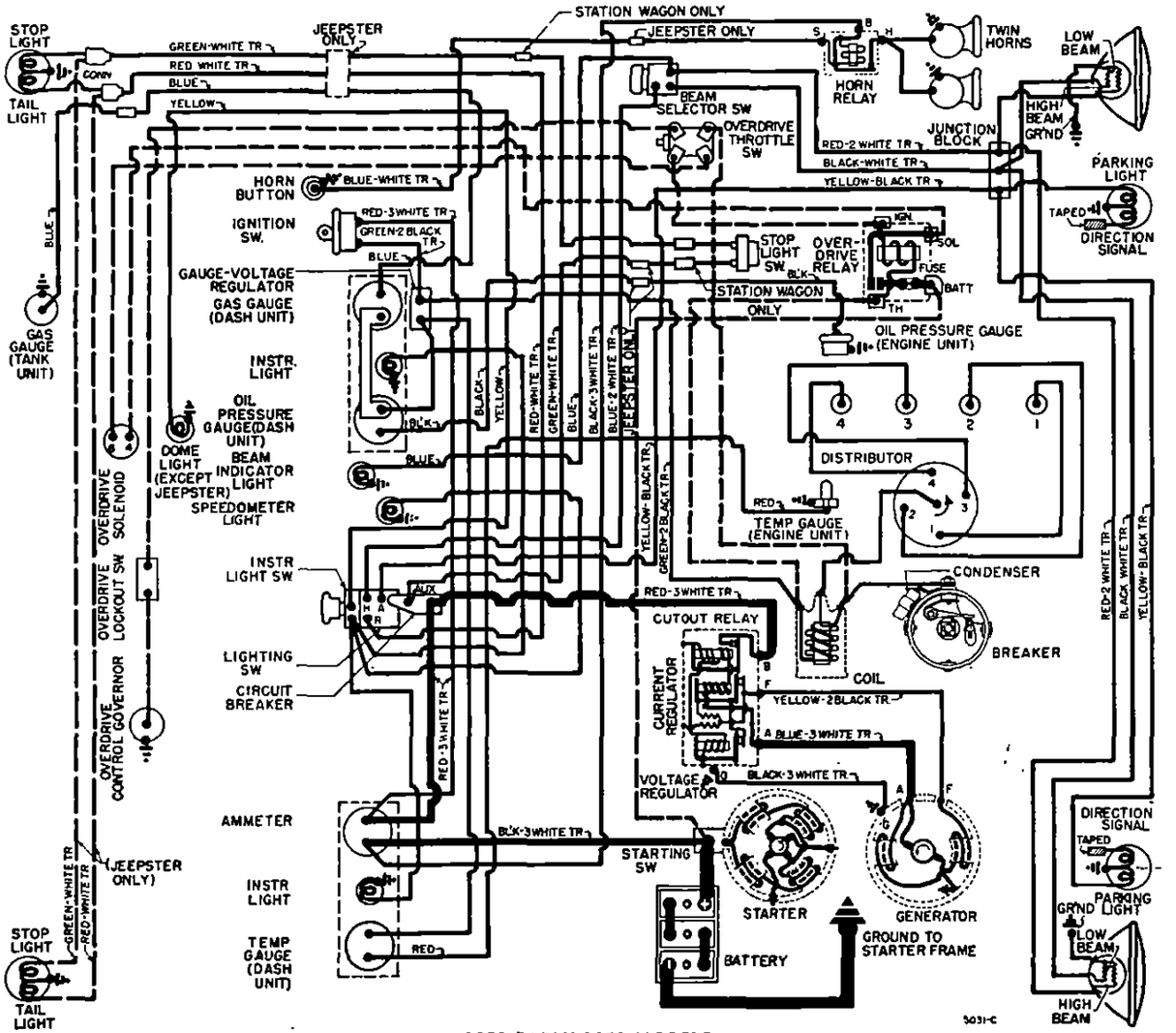
CONDENSER: Auto-Lite Part No. IGB-1025 (IGW-4189A Distr.), IAT-3076L (IAT-4008, 4008B Distr.).
Capacity—.20-.25 mfd. (IGW-4189A), .21-.25 mfd. (IAT-4008, 4008B).

DISTRIBUTOR: Auto-Lite Model IGW-4189A (Early 1950), IAT-4008 (Late 1950, 1951 & Early 1952), IAT-4008B (Late 1952 & 1953). Full automatic advance type with separate vacuum spark control (IGW Distr.) and integral vacuum spark control (IAT Distr.).
Breaker Gap—.020", Limits .018-.022".
Cam Angle—41° (IGW-4189A); 40° ± 3° (IAT-4008, 4008B).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IGW-4189A, IAT-4008

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	400	2	800
4	650	8	1300
10	1800	20	3600
11	2000	22	4000

CONTINUED ON NEXT PAGE



1950-EARLY 1952 MODELS

CONTINUED FROM PRECEDING PAGE

Automatic Advance—IAT-4008B

Degrees	Distr. R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	425	2	950
6	1050	12	2050
10	1575	20	3150
11	1700	22	3400

Vacuum Spark Control Unit: Auto-Lite No. VC-4010A (IGW-4189A Distr.). Separate unit linked to advance plate.

Vacuum Advance—IGW-4189A, IAT-4008

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	4¾"
1°	2°	5⅜"
3°	6°	6¾"
4°	8°	7⅜"
5°	10°	8"

Vacuum Advance—IAT-4008B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅛"
1°	2°	6⅝"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to #1 cylinder firing position (see Timing), turn distributor shaft until rotor is at #1 segment (see diagram), install distributor on engine, rocking shaft slightly to engage drive coupling, push distributor down into place, install hold-down screw, check ignition timing.

CAUTION—If oil pump has been removed, see Oil Pump Installation under "Oil Pump" in Willys Special Data.

IGNITION TIMING

Standard Setting ..... **5° BTDC**

Timing Mark (Early 1950 Engines)—Flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of housing below starter.

Timing Mark (Later Engines)—Engines with 4½" starter DO NOT have timing marks on flywheel (Notch on inner edge of crankshaft pulley indicates TDC when lined up with boss on timing gear cover). TO TIME THESE ENGINES AT 5° BTDC, make new timing mark if not already done) by notching pulley ¼" **clockwise** from old notch.

Timing (Without Timing Light)—With #1 piston on compression, turn crankshaft until piston reaches firing position, with flywheel mark "IGN/" (5° BTDC setting) centered in inspection hole in right front face of flywheel housing below starter. Loosen advance arm clamp bolt, rotate distributor until contacts begin to open (press rotor clockwise to eliminate backlash), tighten clamp bolt. See that rotor is at #1 segment in distributor cap.

Timing Using Timing Light—(Engine Running)—This method recommended by manufacturer. Direct timing light through inspection hole at flywheel, idle engine (engine must be warm), adjust distributor (as directed above) until "TC/" mark centered in inspection hole.

CARBURET R

Carter YF Types as follows: Single barrel downdraft type with manual choke control and "diaphragm" type accelerating pump and metering rod control.

Model Year	Carter Carb. No.
1950 (Early)	768S, SA
1950 (Late) & 1951	832S, SA, SB
1952 (Early)	832SB
1952 (Late) & 1953	951S

See Carburetor Section for complete data.

►***ACCELERATION STUMBLE OR FLAT SPOT CORRECTION: See "Carter YF" Carburetor in Carburetor Section for complete data.***

►**768S Carburetor conversion to 768SA**—*See "Carter YF Downdraft" in Carburetor Section.*

Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up data.*

Metering Rods & Jets—*See Carter Jet Table in Carburetor Section for complete data.*

Fast Idle: Interconnected linkage by which choke valve lever opens throttle to fast idle position when carburetor choked for starting.

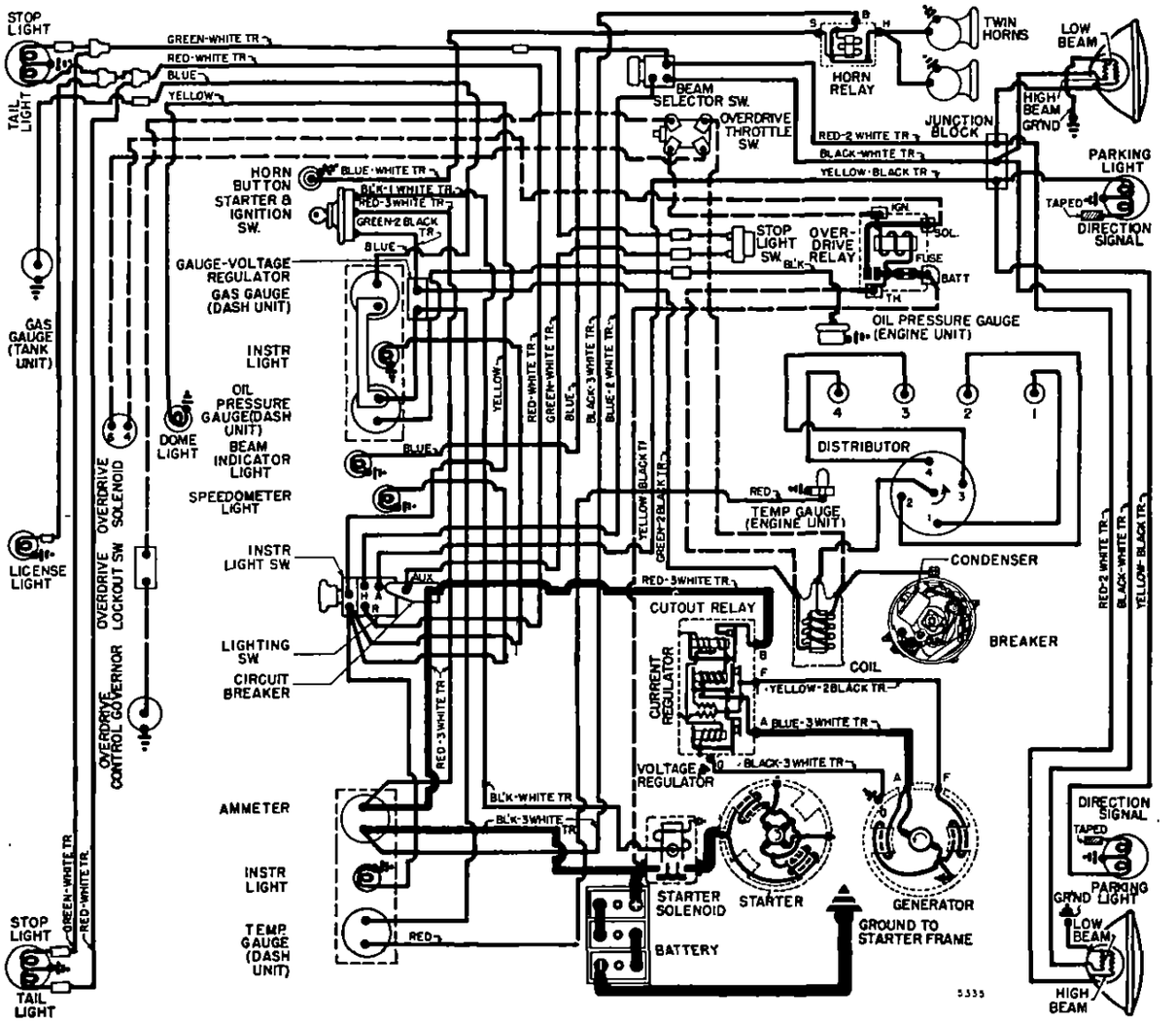
Setting—Lip on fast idle arm should contact boss on body with choke valve wide open. Adjust by bending connector rod at offset.

CARB. EQUIPMENT

Air Cleaner: Oil wetted type (Std.), Oil bath type (optional).

Fuel Pump: AC combination fuel & vacuum type.

Replacement Pump—AC No. 9562.



LATE 1952-53 MODELS

Pressure—3 lbs. (4½ lbs. max. at 1800 RPM.)
See Carburetion Equipment Section for data.

Gasoline Gauge: King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—King-Seeley No. 45534 (1950); No. 45727 (1951-53).
Gauge Voltage Regulator—King-Seeley No. 45557.
See Misc. Electrical for data.
Tank Unit—King-Seeley No. 44506 (all).
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite Type PN-15—6 Volt, 15 Plate, 100 Ampere Hour capacity (20 hour rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) grounded at starter.
Location—Right hand side of dash in engine compt.

STARTER

Auto-Lite Model MZ-4137 (Early 1950), MZ-4162 (Late 1950, 1951 & Early 1952), MCH-6207 (Late 1952 & 1953).
Armature—Auto-Lite No. MZ-2214 (MZ-4137), MZ-2330 (MZ-4162), MCH-2088 (MCH-6207).
Drive—(MZ-4137 & 4162)—Manual pinion shift operated by starter pedal.
Drive—(MCH-6207). Bendix "Folo-thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).
Cranking Engine—160 RPM., 150-175 amps., 5 volts.

Performance Data—MZ-4137, 4162

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.①	5000	5.5	60
0 ft. lbs.②	4000	5.0	68
4.4 "	Lock	2.0	280

①—Without Bendix. ②—With Bendix.

Performance Data MCH-6207

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Starting Switch (MZ-4137 & 4162): Auto-Lite No. SW-2677A. Mounted on starter and operated by pinion shift lever.
MCH-6207—Auto-Lite No. SS-4018 (Early), SS-4018A (Later). Ignition key starting with magnetic switch.
See Electrical Equipment Section for complete data.

GENERATOR

Auto-Lite Model GDZ-4817A (Early 1950). GDZ-6001D (Late 1950-Early 1953). GGW-4801D (Late 1953). Two brush type with voltage & current regulation.
Armature—Auto-Lite No. GDZ-2006F (GDZ-4817A Gen.), GGY-2006F (GDZ-6001D Gen.), GGW-2006F (GGW-4801D Gen.).
Charging Rate Adjustment—None. See Regulator.

Performance Data—GDZ-4817A, 6001D

Amperes	Volts	Cold—R.P.M.—Hot	
0	6.4	*870-970*	*950-1050*
17.0	8.0	1350-1500	1550-2350
35.0	8.0	1800-2000	2150-2350

Performance Data—GGW-4801D

Amperes	Volt	Cold—R.P.M.—Hot	
0	6.4	870-970	950-1050
40.0	8.0	1800-2000	2150-2350
45.0	8.0	1925-2125	2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—1.3-1.5 (GDZ); 1.4-1.5 (GGW) amperes at 5.0 volts.
Motoring Current—4.16-4.60 amperes at 5.0 volts.
Belt Adjustment: 1" deflection (thumb pressure) midway between generator and pump pulleys. To adjust, loosen all mounting bolts, pull generator away from engine.

REGULATOR

Auto-Lite Models—Voltage & Current types as follows:

Regulator No.	Use with Gen. No.
VRP-6003A	GDZ-4817A, 6001D
VBE-6105A	GGW-4801D

NOTE—Regulator cover sealed. Warranty void if seals broken
See Electrical Equipment Section for complete data.

Cutout Relay

Cuts In—6.3-6.8 volts (set to 6 4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open measured at hinge end of core.

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. after 15 minutes operation charging at 10 amperes (VRP), one-half maximum charging rate (VBE).
Checking (without breaking seals) & Adjustment—*See Electrical Equipment Section.*
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.

Current Regulator—(VRP)

Setting—34-36 amperes (marked '35' on cover).
Contact Gap—.012" min. (armature against stop pin).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VBE)

►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

Test A—Operating Amperes—Test B
VBE-6105A ... 52 ... 45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After fifteen minutes additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: Corcoran-Brown "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toeboard.
See Electrical Equipment Section for complete data.
Beam Indicator—On left side of instrument panel. Lighted when upper beams in use.

Switches

Lighting—Willys No. 800369 (1950-Early 1951), No. 801274 (Late 1951-1953).
Beam Selector—Willys No. 801903.

MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: 30 ampere type. Mounted on lighting switch. Vibrating thermostatic type. Protects lighting circuits by vibrating to limit current. No adjustment.
HORNS: Auto-Lite or Sparks Withington. Operated by relay.
Horn Relay—Willys No. 643889.
GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermo-bimetal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on instrument cluster and connected between ignition switch and gauge circuits. See Wiring Diagram.

ENGINE

ENGINE SPECIFICATIONS: Own "Hurricane" Four Cylinder "F" Head type (intake valves in head, exhaust valves in block).
Bore—3⅛". Stroke—4⅜".
Displacement—134.2 cu. in.
Developed H.P.—72 at 4000 RPM. **Rated H.P.**—15.63.
Compression Ratio—Cast iron heads. Painted to indicate ratio—*6.9 (Blue), 7.4 (Black), 7.8 (Yellow).* Used for following service.

	Domestic — Ratio — Export
Under 5000 ft.	7.4-1 — 6.9-1
Over 5000 ft.	7.8-1 — 7.4-1

CYLINDER HEAD & TIGHTENING TORQUES: *See Willys Special Data.*
ENGINE REMOVAL: *See Willys Special Data.*
PISTONS: Lo-Ex aluminum alloy (Lynite, Bohn, Permite), "T" slot, Cam ground, brass or tin-plated type with heat insulation groove above top piston ring.
Original Bore & Pistons—*See Willys Special Data.*
Length—3¾".
Weight—12.5 ozs. without rings or pin.
Removal—Pistons and rods removed from above.
Clearance—Top Land .017-.019". Skirt .003".
Replacement Pistons: Std. and .010", .020", .030", .040" Oversize.
Fitting New Pistons: Use .003" feeler stock, ½" wide, inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.
Installing Pistons: "T" slot toward valve (left) side of engine (opposite side from oil spray hole in connecting rod lower end).
PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compression	3/32"	.008-.013"	.0005-.001"
Oil Contr.	3/16"	.008-.013"	.001-.0015"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

CONTINUED ON NEXT PAGE

ENGINE

CONTINUED FROM PRECEDING PAGE

Replacement Rings: **For Rebored Cylinders**—Furnished .010", .020", .030", .040" Oversize.
Service Type Rings (for cylinders not rebored) furnished Std.—.009", .010-.019", .020-.029", .030-.039" .040-.049" Oversize

PISTON PIN: **Diameter**—13/16". **Length**—2 25/32". Pin is locked in connecting rod by clampscrew.
Pin Fit in Piston—.0001-.0005" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: No oversizes are available.

CONNECTING ROD: **Length**—9 3/16".
Weight—39.41 ozs.
Original Bearing Sizes—*See Willys Special Data.*
Crankpin Journal Diameter—1.9385-1.9375".
Lower Bearing—Steel-backed, babbitt-lined, replaceable type. CAUTION—Oil spray hole in upper half of bearing must line up with hole in rod.
Clearance—.0005-.0025". **Sideplay**—.005-.009".

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps. NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in lower end of rod toward right of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type with removable counterweights.
Original Bearing Sizes—*See Willys Special Data.*
Journal Diameters—2.3340".
Bearings—Steel-backed, babbitt-lined, replaceable type. Bearings shells are dowelled in bearing caps and crankcase.
Clearance—.001-.0025".
NOTE—Replace bearings when clearance exceeds .006" or when endplay exceeds .018".
Rear Bearing Oil Seal—*See Crankshaft & Main Bearings in Willys Special Data.*

►*1953 REAR MAIN OIL SEAL PRODUCTION CHANGE—Neoprene type seal replaces rope type. See "Crankshaft & Main Bearings" in Willys Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instructions in Willys Special Data.*
NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing.

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft sprocket thrust washer and sprocket. NOTE—Crankshaft sprocket must be removed with a gear puller in order to make endplay adjustments. Adjusting shims furnished .002", .004", .010" and .030" thick.
Endplay—.004-.006".

FLYWHEEL: **Removal**—*See Willys Special Data.*

CAMSHAFT: Four bearing, helical gear drive.
Journal Diameters—Front (#1) 2.188", (#2) 2¼", (#3) 2 3/16", (#4) 1¾".
Bearings—Removable steel-backed, babbitt-lined bushing (front), machined in crankcase (all others).
Clearance—.001-.0025". Service limit .006" (front), .008" (all others).

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled behind plate. If required, a thin shim can be installed behind spacer if too little clearance, or spacer can be dressed to provide greater clearance.
Endplay—.003-.0055".

Timing Gears: Crankshaft gear, steel. Camshaft gear; fibre with steel hub.
Gear Backlash—.000-.002".

Camshaft Setting: Mesh marked tooth of camshaft gear with marked space (between teeth) on crankshaft gear.

VALVES:	Head Diameter	Stem Diameter	Length
Intake	2"	.3733-.3738"	4 25/32"
Exhaust	1 15/32"	.371 -.372"	5.710"

	Seat Angle	Lift	Stem Clearance
Intake	45°	.260"	.0007-.0022"
Exhaust	45°	.351"	.002-.00375"

Valve Rotator (Exhaust)—On exhaust valve stem. Turns valve in service to provide longer operating period between valve grinds.
Rocker Arm Assembly Removal—*See "Valve System" in Willys Special Data.*

Valve Guides: Removable type in block (exhaust), in cylinder head (intake).

Valve Springs: Free Length (Intake) 1 31/32", (Exhaust) 2½". Install with closed coil end upward toward block (exhaust), down towards head (intake).

Intake Valve Springs	Pressure	Length
Valve Closed	73 lbs.	1 21/32"
Valve Open	160 lbs.	1 3/8"
Exhaust Valve Springs		
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

Valve Lifters: Mushroom type operating in reamed holes in block. Serviced by installing oversize lifters. Lifters furnished .004" Oversize.
Lifter Diameter—.6240-.6245".
Lifter Clearance—.0005-.002".
NOTE—Camshaft must be removed for lifter removal.

VALVE TIMING

Tappet Clearance: (Hot or Cold) .018" Intake, .016" Exhaust, (.012" with Free Type Valve).
NOTE—Self-locking tappet adjusting screws used for exhaust valves. Adjusting screw with locknut on rocker arm on cylinder head used for intake valves.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—Set Tappet clearance for #1 intake valve to .026". Rotate crankshaft clockwise until piston in #1 cylinder is ready for intake stroke. Since intake valve starts to open at 9° BTDC, position TDC mark on flywheel or crankshaft pulley in center of hole in flywheel housing or with boss on timing gear cover, then estimate the 9° BTDC point in relation to TDC mark and 5° mark (5° mark is approximately ¼" clockwise from TDC mark). No. 1 intake tappet should JUST BE TIGHT against valve stem, indicating that timing is correct. Reset tappet clearance to correct setting.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, and timing chain or timing gears. Oil pump mounted externally on left hand side of crankcase.
Crankcase Capacity—4 quarts.
Oil Pressure—35 lbs. at 35 MPH.
Oil Pressure Regulator—Under plug on side of pump housing. Opens at 35 lbs. Adjustable by adding or removing shims located above spring in plug.

Oil Pump: Rotor type pump mounted on left side of crankcase.
Oil Pump Servicing—*See Willys Special Data.*

Oil Pressure Gauge: King-Seeley "CV" (Constant Voltage) electric type with gauge voltage regulator.
Dash Unit—King-Seeley No. 45537 (1950), No. 45729 (1951-53).
Engine Unit—King-Seeley No. 44030 (all).
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap.
Capacity—11 qts.
Pressure Valve—Radiator Filler Cap. Opens at 3¾ lbs. (1950-51), 7 lbs. (1952-53).

Water Pump: Centrifugal, packless, ball bearing type. *See Water Pump Section for complete data.*
Removal—Loosen and remove drive belt, disconnect hose. Remove pump mounting screws, lift out pump and fan assembly.
Belt Adjustment—*See Generator Belt Adjustment.*

Thermostat: Harrison. In outlet elbow on cylinder head. Starts to open at 145-155°F. Fully open at 170°F.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) electric type with gauge voltage regulator.
Dash Unit—King-Seeley No. 45545 (1950), No. 45734 (1951-53).
Engine Unit—King-Seeley No. 44200 (1950-51), No. 44220 (1952-53).
Gauge Voltage Regulator—*See Misc. Electrical for data.*
See Miscellaneous Section for complete data.

CLUTCH

Auburn Model 8501-36 (1950-52), 8501-39 (1953), With Borg & Beck Driven Member. Single plate dry disc type.
NOTE—Clutch has neoprene driving lug inserts and Return Clip Springs for quieter operation.
See Clutch Section for complete data.
Facings—Molded (flywheel side), woven (pressure plate side). I.D. 5⅛". O.D. 8½". Thickness .132-.138"

Pedal Adjustment: Pedal free travel 1" (provides 1/16" clearance between release bearing and clutch levers). To adjust, loosen locknut and turn adjusting nut on connector link at clutch fork, tighten locknut.

Removal: Remove transmission (see Transmission Removal below), remove flywheel bell housing. Mark clutch pressure plate and flywheel to insure re-installation in same position. Take out mounting screws in clutch cover flange (turn all screws out evenly), remove clutch and driven member.

TRANSMISSION

Warner Model AS-37-T96 (Std. Trans.). AS-28-T96 (Sta. Wgn. with Overdrive). AS-30-T96 (Jeepster with Overdrive). Constant-mesh, synchro-mesh

(second & high), sliding gear (low & reverse).

Transmission Control: Remote control type with gear-shift lever mounted on steering column.

See Transmission Section for complete data.

Removal: Remove floor boards, take off bell housing inspection cover, disconnect clutch throw-out bearing retracting spring. Disconnect transmission control rods and speedometer cable at transmission case. Disconnect propeller shaft at universal joints and remove shaft. Support engine with jack placed under bell housing, remove rear engine support bolts from cross-member under transmission case, raise rear end of engine so that transmission clears cross-member. Remove transmission to bell housing bolts, pull transmission straight back to clear clutch shaft, remove from car.

OVERDRIVE

Warner Type R10 (part of AS28-T96 & AS30-T96 Transmissions). Solenoid operated, governor controlled type with throttle operated "kick-down." Overdrive is new "centered ring gear" type.

See Transmission Section for complete data.

Control Relay—Auto-Lite Model HRT-4001.

Overdrive Governor—Auto-Lite Model TGE-4002.

Transmission Solenoid—Delco-Remy Model 1118132.

Removal: Remove as a unit with the transmission. Removal instructions same as for regular transmission (above) after governor and solenoid wires and lock-out control cable disconnected, and overdrive case-to-cross-member bolts removed.

UNIVERSALS

Detroit Series 4100. Ball-and-trunnion type.

REAR AXLE

Spicer (Salisbury) Model 23-1. Semi-floating, Hypoid Gear type with Hotchkiss drive.

See Rear Axle Section for complete data.

Ratio—	Without O.D.	With O.D.
Sta. Wgn. & Sed. Del.	4.88-1	5.38-1
Jeepster	4.56-1	4.88-1

Backlash—.004-.009". Shim adjustment.

Removal: Support rear end of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs. Remove axle assembly from beneath car.

Axle Shaft Removal: Remove wheel and hub assembly (use wheel puller), disconnect brake line at wheel cylinder, remove nuts on bolts holding backing plate and brake assembly on housing, remove dust shield, oil seal, and backing plate (with brake assembly). CAUTION—Do not lose bearing adjusting shims located between backing plate and flange on housing. Remove axle shaft and wheel bearing.

Wheel Bearing Adjustment—Endplay .003-.007". Adjust by adding or removing shims between backing plate and axle housing flange at each wheel. See axle shaft removal (above).

SHOCK ABSORBERS

Monroe or Gabriel. Direct acting type.

FRONT SUSPENSION

Planadyne Type. Independent, linked parallelogram type with transverse spring (spring acts as lower control arm).

See Front Suspension Section for complete data.

Kingpin Inclination—5° crosswise.
Caster—1° No adjustment.
Camber—1½°. (1¼-1¾° limits).
Toe-In—1/16-1/8".

►***See Willys Front Suspension for Toe-in adjustment procedure.***

STEERIN GEAR

Ross Model T-12. Cam-and-Twin Lever type.

See Steering Gear Section for complete data.

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering type. Hand lever applies rear wheel service brakes.

NOTE—These self-centered brakes do not have anchor pin adjustment.

See Brake Section for complete data.

Drums—Chrome nickle. Diameter 10".

Lining (473-SW, SD, VJ)—Molded type. Width 1.760", Thickness 3/16". Length per shoe—10 11/16" (forward shoe—all wheels), 8 5/16" (rear shoe—all wheels),

Clearance—.008" toe, .005" heel, for each shoe.

NOTE—No anchor pin adjustment provided. Brake shoes should be centralized by hard brake application (and then released) before adjusting.

Hand Brake: See Service Brakes (above).

Adjustment—Tighten link rod adjustment (cable equalizer connector) at brake lever on frame cross-member for slight drag with hand lever set two notches "on". Release hand lever and make certain that brakes free of any drag.

MISC. MECHANICAL

Windshield Wipers: Vacuum type, cable operated.

See Miscellaneous Section for data.

MODEL IDENTIFICATION

Year	Engine	Model
1952, Early 1953	4 Cyl. "L"	CJ-3A
1953-54-55	4 Cyl. "F"	①CJ-3B
1953	4 Cyl. "F"	②CJ-3FJ
1955	4 Cyl. "F"	①CJ-5

①—1955 Model Designation as follows: 57348 (CJ-3B), 57548 (CJ-5).
②—Same as CJ-3B.

SERIAL NUMBER: On floor riser to left of driver's seat.
Starting Serial Number—10001 Up. All Models.

ENGINE NUMBER: Located as follows:
"L" Head Engine—Stamped on engine upper front corner of block.
"F" Head Engine—Stamped on top of water pump boss.

►*ENGINE NUMBER NOTE—Letters following the engine number denote the following:* **(A)**—Crankshaft journals diameters (main & connecting rod) machined .010" UNDERSIZE. **(B)**—Cylinder bores machined .010" OVERSIZE. **(AB)**—Both above conditions exist in engine.

TUNE-UP

COMPRESSION PRESSURE: 4 Cyl. "F" Head Engine 130 lbs. (125-145 lbs. depending on compr. ratio) and equal within 10 lbs. for all cylinders.
4 Cyl. "L" Head Engine—115 lbs. at 185 RPM. with all cylinders equal within 10 lbs.

VACUUM READING: 17-21" idling.

FIRING ORDER: 1-3-4-2. See Diagram.

SPARK PLUG GAPS: All Engines—.030".
Plugs—Champion J-8, 14 mm. Tighten to 26-30 ft. lbs.

DISTRIBUTOR:	Auto-Lite No.
CJ-3A	IAD-4008
CJ-3B	IAD-4008A
CJ-5	IAD-4041

Breaker Gap—.020". Limits .018-.022".
Cam Angle—(4-Cyl.) 47° ± 3°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

IGNITION TIMING: 5° BTDC. *NOTE—Road test car for timing modifications for fuel and operating conditions.*

►*IGNITION TIMING CHANCE NOTE—The above setting supersedes previous recommended setting.*
Timing Mark (4 Cyl. Engines)—Notch on fan drive pulley rim should be aligned with correct mark on timing gear cover. Gear cover has two lines marked "5" (5° BTDC), and "T" (TDC).

►*TIMING MARK CAUTION (EARLY 4 CYL. ENGINES):* On engines with flywheel timing marks, marks will not be visible if 4½" starter used. If notch on inner edge of crankshaft pulley indicates TDC when aligned with boss on timing gear cover, rework timing mark for timing at 5° BTDC as follows: Make new timing notch in pulley ¼" clockwise from old mark (facing front of engine).
Timing Procedure—*See Ignition Timing.*

COIL: Auto-Lite No. CR-6009 (All Models).
Ignition Current—2.5 amperes idling, 5 amperes at 6.3 volts stopped.

CONDENSER: Auto-Lite No. IGW-3139.
Capacity—.23-.26 microfarad.

CARBURETOR (CJ-3A): Carter WO Type 636SA, 1⅛" single barrel downdraft type, with manual choke.

Idle Setting—Idle screw 1-2 turns open (turn screw out for richer mixture).
Idle Speed—600 RPM or 8 MPH.
Float Level—⅜" from top of float at free end to machined surface (gasket seat) on bowl cover. Invert to check (allow float to hang free).

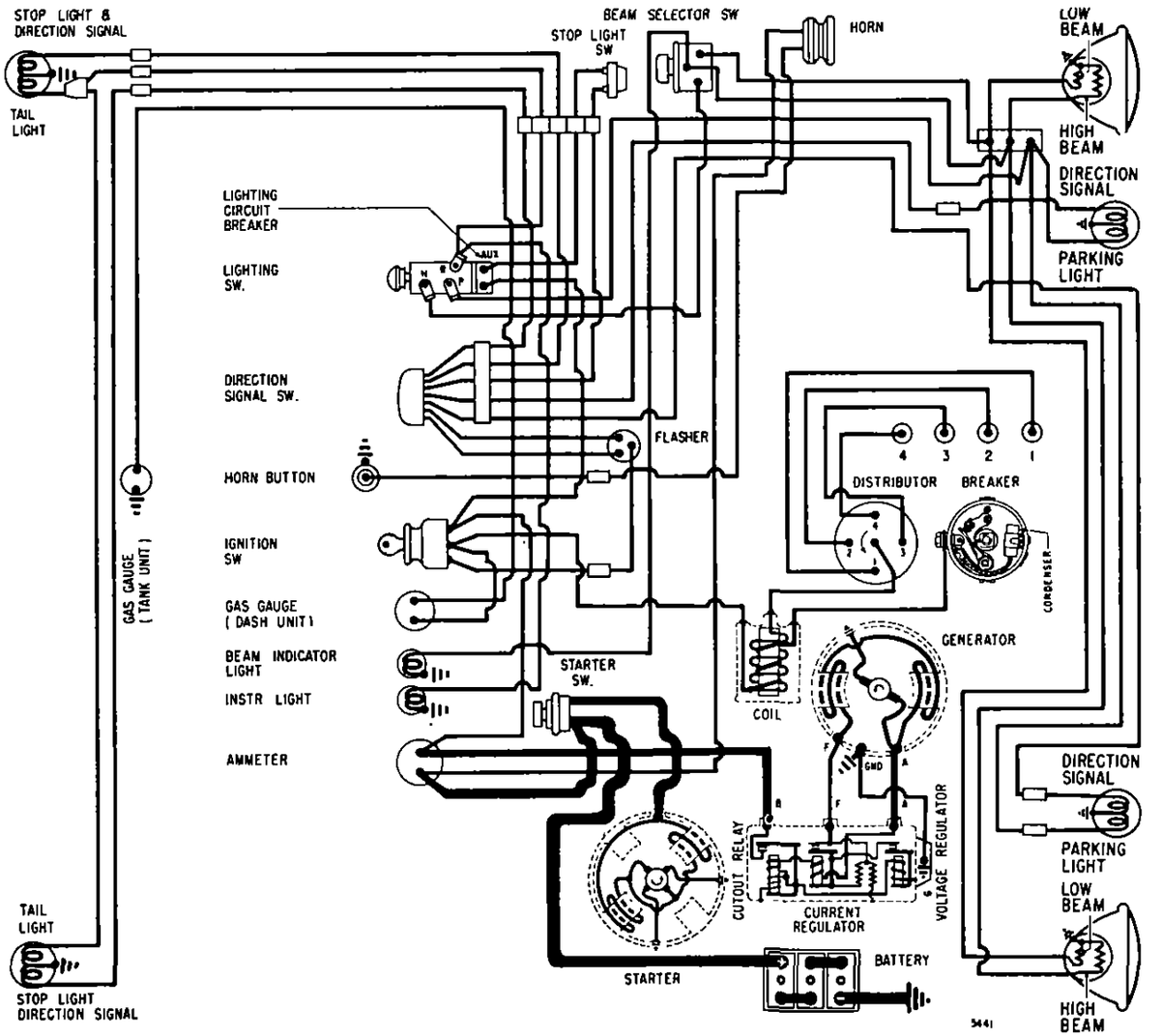
►***CAUTION—Do not compress spring in valve stem.***
Accelerating Pump—No seasonal adjustment.

CARBURETOR (CJ-3B & CJ-5): Carter YF-938S, SA. 1¼" single barrel downdraft type with manual choke control.

►***1953 CJ-3B JEEP IMPROVED IDLE OPERATION UNDER STEEP ANGLE CONDITIONS (Carter YF-938S Carburetor): See "Carter YF" in Carburetion Section.***
Idle Setting—¾-1¾ turns open. Turn screw out for richer mixture.
Idle Speed—600 RPM or 6 MPH.
Float Level—5/16" from bottom of float to gasket seat on cover with cover assembly inverted so that needle valve is seated.

►***CAUTION—Do not compress spring in valve stem (allow float to hang freely on inverted cover assembly).***
Accelerating Pump—No seasonal adjustment.

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CJ-3B JEEP (SEE 1946-51 JEEP FOR CJ-3A DIAGRAM)

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Fast Idle Setting: Lip on fast idle cam should contact boss on body casting with choke valve wide open. Adjust by bending fast idle link at offset.

Choke Setting: Manual type. No adjustment required.

CRANKCASE VENTILATOR: Remove and clean vacuum control valve on manifold. *See CRANKCASE VENTILATOR (following Carb. Equipment).*

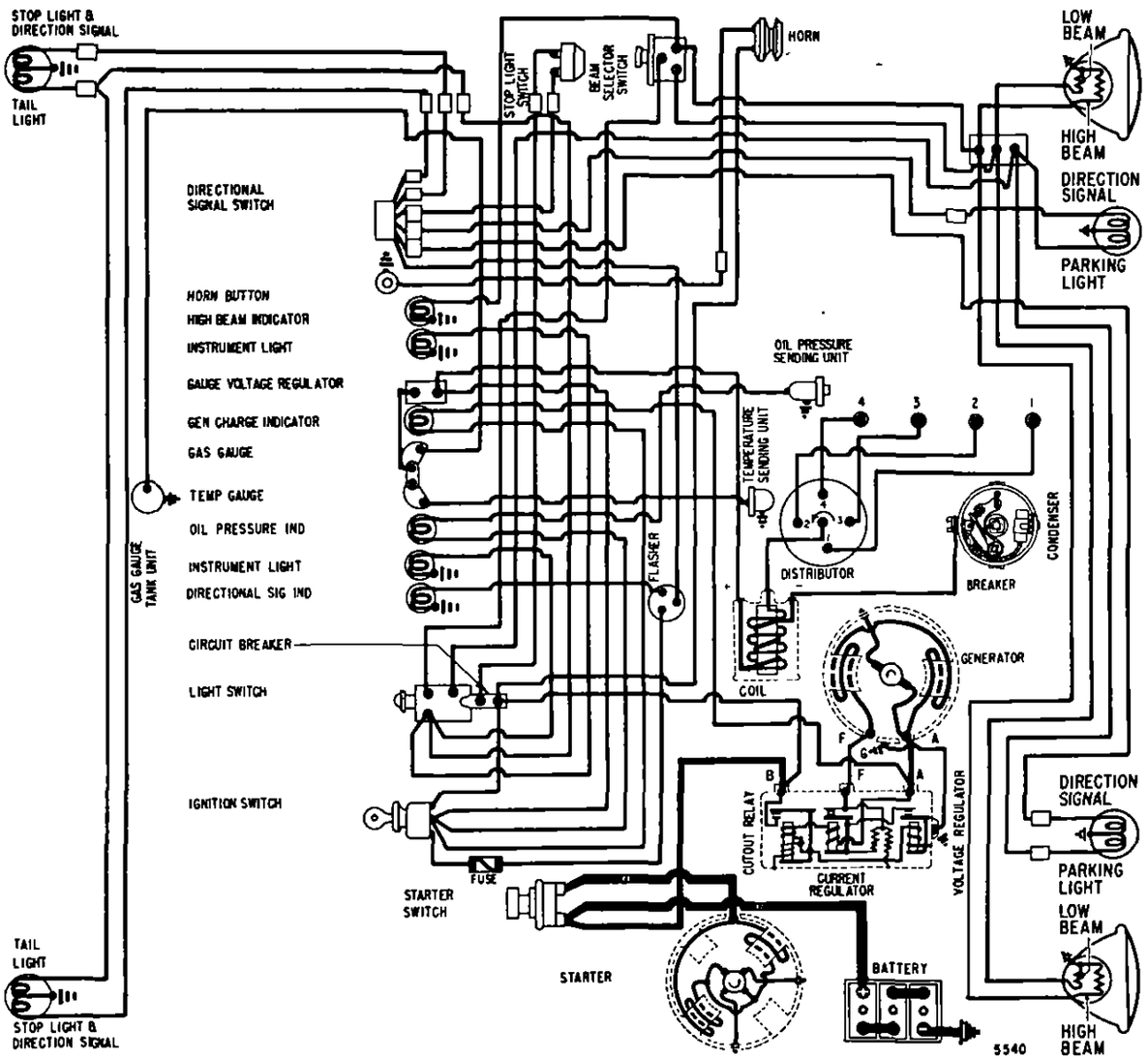
MANIFOLD HEAT CONTROL: (CJ-3A Jeep)—Automatic thermostatic type, no adjustment. Valve must operate freely. **("F" Head Engines)**—No control valve (intake passages located in cylinder head).

VALVE TAPPET CLEARANCE: ("L" Head Engine)—.016", all valves hot or cold. **("F" Head Engine)**—.018" (Intake), .016" (Exhaust —With "Thompson Roto-Valve"). .012" (Exhaust —With "Eaton Free Valve"). *Adjust "F" Head Engine valves with engine cold.*

IGNITION

IGNITION SWITCH: Douglas or Mitchellock.

COIL: Auto-Lite No. CR-6009. On right side of engine.
Ignition Current—2.5 amperes idling, 5 amperes at 6.3 volts stopped.



CJ-5 JEEP MODEL

CONDENSER: Auto-Lite No. IGW-3139.
Capacity—.23-.26 microfarad

DISTRIBUTOR: Auto-Lite No. IAD-4008 (CJ-3A); IAD-4008A (CJ-3B); IAD-4041 (CJ-5). Full automatic advance type without vacuum control.
Breaker Gap—.020". Limits .018-.022".
Cam Angle—47° ± 3°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IAD-4008

Distributor	R.P.M.	Engine	R.P.M.
Degrees		Degrees	
Start	250	0°	500
3°	580	6°	1160
6°	930	12°	1860
9°	1270	18°	2540
11°	1500	22°	3000

Automatic Advance—IAD-4008A, 4041

Distributor	R.P.M.	Engine	R.P.M.
Degrees		Degrees	
Start	300	0°	600
1°	425	2°	850
6°	1050	12°	2100
10°	1575	20°	3150
11°	1700	22°	3400

Octane Selector: 20° advance or retard adjustment at distributor. See Ignition Timing.
Vacuum Spark Control: None used on IAD type distributors.
Distributor Removal: On right side of engine. To remove, take out hold-down screw in mounting bracket.
Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to No. 1 cylinder firing position (see Timing), turn distributor shaft until rotor opposite No. 1 segment in cap (see diagram), install distributor on engine, rocking shaft slightly to engage drive coupling, push distributor down into place, install hold-down screw, check timing.
►***CAUTION—If oil pump has been removed, see Oil Pump data in Willys Special Data.***

IGNITION TIMING

Standard Setting ..... 5° BTDC.
►***TIMING NOTE—Road test car for timing modifications for fuel and operating conditions.***
►***IGNITION TIMING CHANGE NOTE—The above setting supersedes previous recommended setting.***
Timing Mark (4 Cyl. Engines)—Notch on fan drive pulley rim should be aligned with correct mark on timing gear cover. Gear cover has two lines marked "5" (5° BTDC), and "T" (TDC).
►***TIMING MARK CAUTION (EARLY 4 CYL. ENGINES):*** On engines with flywheel timing marks, marks will not be visible if 4½" starter used. If notch on inner edge of crankshaft pulley indicates TDC when aligned with boss on timing gear cover, rework timing mark for timing at 5° BTDC as follows: Make new timing notch in pulley ¼" clockwise from old mark (facing front of engine).
Timing—Direct timing light at vibration dampener (or flywheel through hole in housing), idle engine, adjust distributor until correct mark on flywheel or dampener lines up with center of hole in housing or line on timing gear cover.

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Octane Selector Setting—If timing light not available, road test car and set timing for light detonation when accelerating with wide open throttle. If engine pings on heavy pull, retard spark slightly by rotating distributor counter-clockwise.

CARBURETOR

CARTER WO

Carter WO Type 636SA. 1⅛" single barrel, downdraft type, with manual choke control (interconnected with throttle to provide fast idle).
See Carburetor Section for complete data.
Idle Adjustment—With engine warm (choke valve wide open and fast idle inoperative), set throttle stopscrew for idling speed of 600 RPM or 8 MPH. Turn idle adjusting screw out until engine begins to roll, then turn screw in until engine fires smoothly. Final setting of idle screw should be 1-2 turns open. Recheck idle speed.
Accelerating Pump—No seasonal adjustment.
Float Level—⅜" from top of float at free end to machined surface (gasket seat) on cover with valve seated. To check, invert assembly and allow float to hang freely. Do not compress spring in valve stem.
Metering Rods & Jets—*See Carter Jet Specification Table in Carburetor Section for complete data.*
Fast Idle: Choke valve interconnected with throttle valve to open throttle to fast idle position when choke in use. No adjustment required.
Choke Control: Manual type.

CARTER YF

Carter YF Type 938S, SA. 1¼" single barrel downdraft type with manual choke.
See Carburetor Section for complete data.
Settings (Idle Setting, Float Level, and Accelerating Pump): *See Tune-Up.*
Metering Rods & Jets—*See Carter Jet Tables in Carburetor Section for complete data.*
Fast Idle: Interconnected linkage by which choke valve lever opens throttle to fast idle position when carburetor choked for starting.
Setting—Lip on fast idle arm should contact boss on body with choke valve wide open. Adjust by bending connector rod at offset.
Choke Control: Manual type.

CARB. EQUIPMENT

Air Cleaner (All Models): Oil-bath type Std.
Servicing—Clean and refill oil reservoir to indicated level with same grade engine oil used in crankcase at 2000 mile intervals (when crankcase drained), or more often if required by operating conditions (twice daily for extreme dusty field conditions).
Fuel Pump: AC. Combination fuel-and-vacuum type.
Replacement Pump—AC No. 9562 (CJ-3A); No. 4032 (CJ-3B & CJ-5).
See "AC Fuel Pumps" in Carburetion Section.
Pressure—3½-4½ lbs. (AC No. 9562); 2½-3¾ lbs. (AC No. 4032).
Gasoline Gauge (CJ-3A & CJ-3B): Auto-Lite electric type.
Dash Unit—Auto-Lite No. 10764A.
Tank Unit—Auto-Lite No. 10762A.
See "Gasoline Gauges" in Carburetion Section.
Gasoline Gauge (CJ-5): King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—King-Seeley No. 46007 (100 MPH Speedometer); King-Seeley No. 46001 (80 MPH Speedometer).
Tank Unit—King-Seeley No. 44456.
See "Gasoline Gauges" in Carburetion Section.

CRANKCASE VENTILATOR

Sealed Positive Ventilation Type. Air intake pipe (from air cleaner to oil filler pipe) furnishes clean air to crankcase. Air outlet pipe (from valve cover to manifold) allows fumes from crankcase to be sucked into intake manifold. Vacuum control valve located at manifold connection (exc. CJ-3B Jeep), on valve chamber cover (CJ-3B).
▷*CAUTION—Vacuum control valve must close at idling speed for satisfactory idling performance and should be cleaned when engine tuned up.*
Cleaning Vacuum Control Valve—Remove control valve by disconnecting pipe and unscrewing valve from manifold. Disassemble valve, withdraw valve and spring, clean valve and spring seat thoroughly. Make certain all connecting pipes tight and that oil filler cap seals cap tightly. Remove and clean control valve when tuning engine or whenever engine does not operate satisfactorily.

BATTERY

Auto-Lite or Willard. 6 volt, 15 plate, 100 ampere hr. capacity (20 hr. rate).
Starting Capacity—120 amperes for 20 minutes.
Grounded Terminal—Negative (—) grounded at starter.
Engine Ground—Strap at left front engine support.
Location—In engine compartment on right side.

STARTER

Auto-Lite No. MZ-4162 (CJ-3A); MCH-6207 (CJ-3B & CJ-5).
Armature—Auto-Lite No. MZ-2330 (MZ-4162), MCH-2088 (MCH-6207).
Drive (MZ Starter)—Manual pinion shift operated by starter pedal.
Drive (MCH Starter)—Bendix "Folo-thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. with new brushes.

Performance Data—MZ-4162

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.①	5000	5.5	60
0 ft. lbs.②	4000	5.0	68
4.4 ft. lbs	Lock	2.0	280

①—Without Bendix. ②—With Bendix.

Performance Data—MCH-6207

	RPM	Volts	Amperes
0 ft. lbs	4300	5.0	65
6.0 ft. lbs	Lock	2.0	335

Starting Switch—(CJ-3B) Auto-Lite SW-4015 (Early), SW-4015A (Later). (CJ-3A)—Auto-Lite No. SW-2677A (On starter, operated by starting pedal).

GENERATOR

Auto-Lite No. GDZ-6001D (CJ-3A & Early CJ-3B). GGW-4801D (Late CJ-3B & CJ-5). Two brush type with voltage & Current regulation.

Armature—GGY-2006F (for GDZ-6001D). **GGW-2006F** (for GGW-4801D).
Maximum Charging Rate—(GDZ-6001D) 35 amperes. (GGW-4801D) 45 amperes, both at 8.0 volts cold with discharged battery (controlled by regulator).
Charging Rate Adjustment—None (see Regulator).

Performance Data—GDZ-6001D

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
17.0	8.0	1350-1500 — 1550-1700
35.0	8.0	1800-2000 — 2150-2350

Performance Data—GGW-4801D

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
40.0	8.0	1800-2000 — 2150-2350
45.0	8.0	1925-2125 — 2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. with new brushes.
Field Current—(GDZ) 1.3-1.5 amps. (GGW) 1.4-1.5 amps., both at 5.0 volts.
Motoring Current—(GDZ) 3.9-4.4 amps. (GGW) 4.1-4.6 amps., both at 5.0 volts.
Belt Adjustment: ½-⅝" deflection with thumb pressure midway between generator and pump pulley.

REGULATOR

Auto-Lite VRP-6003A (used with GDZ-6001D generator). VBE-6105A (used with GGW-4801D generator). Voltage & Current type. On right side of engine compartment.
See Electrical Equipment Section for complete data.
NOTE—Regulator cover sealed. Warranty void if seal broken.

Cutout Relay

Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 volts (approx. 4-6 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (measured at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F. after 15 minutes operation charging at 10 amperes (VRP), one-half maximum rate (VBE).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VRP)

Setting—34-36 amperes (marked '35' on cover).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VBE)

▷*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70°F.*

	Test A—Operating Amperes	Test B
VBE-6105A	52	45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After fifteen minute additional operation with current regulator operating (load applied to hold voltage to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type. Upper and lower beams controlled by Beam Selector Switch on toe board.
See Electrical Equipment Section for complete data.
Beam Indicator—On left side of instrument panel. Lighted when upper beam in use.

Switches

Lighting—Willys No. 801274. Instrument light controlled by rotating switch knob.
Beam Selector—Willys No. 801903.

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MISC. ELECTRICAL

LIGHTING CIRCUIT BREAKER: 30 ampere type. Mounted on lighting switch. Vibrating thermostatic type. Protects lighting circuits. No adjustment.

FUSES: Overdrive—20 amperes. On control relay.

HORNS: Auto-Lite No. HA-4037.

ENGINE

ENGINE SPECIFICATIONS: 4 Cyl. "L" Head, and 4 Cyl. "F" Head engines of own make.

►*NOTE—4 Cyl. "L-Head" Engine used on CJ-3A Jeep, 4 Cyl. "F-Head" Engine used on CJ-3B Jeep.*

Bore—3⅛". Stroke—4⅜".

Displacement—134.2 cu. ins. **Rated H.P.**—15.63.

Model	Compr. Ratio	Developed HP
CJ-3A	6.48-1	60 at 4000 RPM
CJ-3B	6.9-1①	72 at 4000 RPM
CJ-5	6.9-1①	75 at 4000 RPM

①—7.4-1 & 7.8-1 optional ratios.

Compression Ratio ("F" Head Engine)—Cast iron head. Heads painted to indicate ratio: 6.9-1 (Blue); 7.4-1 (Black), 7.8-1 (Yellow).

CYLINDER HEAD & TIGHTENING TORQUES: *See Willys Special Data.*

ENGINE REMOVAL: *See Willys Special Data.*

PISTONS: Lo-Ex Aluminum alloy (Lynite, Bohn, Permite, or Arrowhead), "T" slot, cam ground, tin plated type with heat insulation groove above top piston ring. **Length**—3¾".

►*PISTON OVERSIZE NOTE—Letter "B" or "AB" following engine number indicates that cylinders and pistons are .010" OVERSIZE.*

►*CAUTION—"L" Head & "F" Head pistons are different, do not interchange.*

Removal—Pistons and rods removed from above.

Clearance—Top Land—.017-.019". **Skirt**—.003.

Replacement Pistons: Finished pistons furnished .010", .020", .030", .040" Oversize.

CAUTION—Piston must not be lapped in. This will destroy tin plated surface.

Fitting New Pistons: Use .003" feeler stock, ½" wide, inserted between piston and cylinder wall on opposite side from "T" slot. Pull required to withdraw feeler must be within 5-10 lbs. at 70°F.

Installing Pistons: "T" slot toward valve (left side) of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON RINGS: Two compression, one oil control ring per piston, all above pin (piston has narrow heat insulation groove above top ring groove). Oil ring groove drilled with oil drainage holes.

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.007-.015"	.002-.004"
Compr. (#2)	3/32"	.007-.015"	.0015-.0035"
Oil Contr.	3/16"	.007-.015"	.001-.0015"

Installing Rings: Install compression rings with mark "TOP" (on side) toward top. Rings have taper face and must be installed correctly. Top ring inner bevel edge must be up.

Replacement Rings: For Rebored Cylinders—Furnished Std. and .010", .020", .030", .040" Oversize. **Servicing Ring Sets**—Furnished in following sizes for oversize range noted: Standard (0 to .010" O.S.), .020" O.S. (.011" to .024"), .030" O.S. (.025" to .034"), .040" O.S. (.035" to .049").

PISTON PIN: Diameter .8117-.8119". **Length** 2 25/32". Pin is locked in connecting rod by clampscrew.

NOTE—On new pistons, pin hole is .8120-.8122" in diameter and is diamond-bored and tin-plated.

Pin Fit in Piston—.0001-.0005" clearance or light thumb push fit with piston and pin at 70°F.

Replacement Pins: No oversizes are available.

CONNECTING ROD: Length 9 3/16" center-to-center. **Weight**—33.4 ozs.

►*JOURNAL DIAMETER UNDERSIZE NOTE—The letter 'A' following the engine number indicates that main and connecting rod journals are .010" UNDERSIZE.*

Crankpin Journal Diameter—1.9385-1.9375".

Lower Bearing—Steel-backed, babbitt-lined, replaceable type. CAUTION—Oil spray hole in upper half of bearing must line up with oil spray hole in rod.

Clearance—.0001-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: None (no shims). Replace bearings. Do not file connecting rods or bearing caps. NOTE—Replace bearings when clearance exceeds .005" or sideplay exceeds .013".

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), toward rear (#2, 4). Oil spray hole in lower end of rod toward right of engine (away from camshaft) on all rods.

CRANKSHAFT: Three bearing type with removable counter-weights.

►*JOURNAL DIAMETER UNDERSIZE NOTE—The letter 'A' following the engine number indicates that main and connecting rod journals are .010" UNDERSIZE.*

Journal Diameters—2.3341-2.3331" (all main journals).

Bearings—Steel backed, babbitt-lined, replaceable type. Bearing shells are dowelled in bearing caps and crankcase.

Clearance—.0014-.0029".

NOTE—Replace bearings when clearance exceeds .006" or when endplay exceeds .018".

Rear Bearing Oil Seals—*See Crankshaft & Main Bearings in Willys Special Data.*

►*REAR MAIN OIL SEAL PRODUCTION CHANGE—Neoprene type seal replaces rope type. See Willys Special Data.*

Bearing Adjustment: None (no shims). Replace bearings. Do not file bearing caps. *See Crankshaft Servicing instructions in Willys Special Data.*

NOTE—Engine must be removed from chassis for bearing replacement and crankshaft servicing.

Replacement Bearings: Furnished Standard & .010", .020", .030" Undersize.

End Thrust: Taken by flanged faces of #1 (front) bearing. Adjustable by adding or removing shims between crankshaft sprocket thrust washer and sprocket. NOTE—Crankshaft sprocket must be removed with a gear puller in order to make endplay adjustments. Adjusting shims furnished .002", .004", .010" and .030" thick.

Endplay—.004-.006".

FLYWHEEL: Removal—*See Willys Special Data.*

►*FLYWHEEL RING GEAR REPLACEMENT CAUTION:* Different flywheels used as follows: 97 **teeth** (CJ-3A with Old Type Std. Bendix Drive); 124 *teeth* (CJ-3A through Serial Number 30973 with overrunning clutch type drive); 129 **teeth** (All Models after CJ-3A, Serial No. 30973 with Bendix "Folo-thru" type drive. *CAUTION—Replacement ring gear must have the same number teeth as the original.*

CAMSHAFT: Four bearing, helical gear drive.

Journal Diameters—#1 2.1855-2.1860", #2 2.1215-2.1225", #3 2.590-2.600", #4 1.6225-1.6230".

Bearings—Removable steel-backed, babbitt-lined bushing (front), machined in crankcase (all others). **Clearance**—.001-.0025". Service limit .006" (front), .008" (all others).

Camshaft Removal—*See Willys Special Data.*

End Thrust: Taken by thrust plate assembled behind gear with a spacer assembled behind plate. If required, a thin shim can be installed behind spacer if too little clearance, or spacer can be dressed to provide greater clearance.

Endplay—.003-.0055".

Timing Gears: Crankshaft gear, steel. Camshaft gear, fibre with steel hub.

Gear Backlash—.000-.002".

Camshaft Setting: Mesh marked tooth of camshaft gear with marked space (between teeth) on crankshaft gear.

VALVES: ("L" Head Engine)

Valve	Head Diam.	Stem Diam.	Length
Intake	1 17/32"	.373"	5 51/64"
Exhaust	1 15/32"	.3725"	5 51/64"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	23/64"	.0015-.00325"
Exhaust	45°	23/64"	.0025-.0045"

Valves ("F" Head Engine)

Valve	Head Diam.	Stem Diam.	Length
Intake	2"	.3733-.3738"	4.937"
Exhaust	1 15/32"	.371-.372"	5.909"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.260"	.0007-.0022"
Exhaust	45°	.351"	.002-.00375"

►*EXHAUST VALVES ("F" HEAD ENGINE) NOTE—Thompson "Roto-Valve" or Eaton "Free Valve" rotators used.*

Valve Guides ("L" Head Engines): Removable type. Remove guides from above with puller, install new guides with driver or press guides down in place to following dimensions:

Intake Guide—Top of guide 1 5/16" below top face of block. The shorter, smaller-diameter section end of guide should be up.

Exhaust Guide—Top of guide 1" below top face of block. Taper end (counter-bored end) of guide should be up.

Valve Guides ("F" Head Engine): Removable type. Drive guides out with Tool W-240. To install, use W-240 with correct adapters to install guides:

Intake Guide—Drive guide in with taper end toward valve seat until inner end flush with port wall at guide hole.

Exhaust Guide—Drive guide down in block with taper end up toward valve seat until upper end 1" below top face of cylinder block.

Valve Springs: *CAUTION—Intake valve springs on "F" Head Engines are different than other valve springs. See Spring Data below.*

Valve Springs ("L" Head Engine)

Free Length—2½" (Intake and Exhaust).

Intake & Exhaust	Spring Pressure	Length
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1¾"

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Valve Springs ("F" Head Engine)
Free Length—1 31/32" (Intake), 2½" (Exhaust).

Intake	Spring Pressure	Length
Valve Closed	73 lbs.	1 21/32"
Valve Open	160 lbs.	1 3/8"
Exhaust	**Spring Pressure**	**Length**
Valve Closed	53 lbs.	2 7/64"
Valve Open	120 lbs.	1 3/4"

Valve Lifters: Mushroom type operating in reamed holes in block. Serviced by installing oversize lifters. Lifters furnished .004" oversize.
Lifter Diameter—.6240-.6245".
Lifter Clearance—.0005-.002".
NOTE—Camshaft must be removed for lifter removal and replacement.

VALVE TIMING

Tappet Clearance: ("L" Head Engine)—.016", all valves hot or cold. ("F" Head Engine)—.018" (Intake), .016" (Exhaust —With "Thompson Roto-Valve"). .012" (Exhaust—With "Eaton Free Valve"). Adjust "F" Head Engine valves with engine cold.

NOTE—Adjusting screws are self-locking type.

Valve Timing: See Camshaft Setting above.
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
Valve Timing Check—Adjust No. 1 cylinder Intake valve lash to .020" ("L" Head Engine), .026" ("F" Head Engine) with tappet resting on low side of cam lobe. Rotate crankshaft until No. 1 cylinder is coming toward top of cylinder on exhaust stroke, then continue to rotate crankshaft until No. 1 intake tappet is JUST TIGHT against valve stem indicating that valve is about to open. Check position of ignition timing mark on crankshaft pulley (5° BTDC) and estimate crankshaft position (5° mark should be approximately ¼" before reference point on timing gear cover). Reset tappet clearance to correct running clearance as given above.

LUBRICATION

Engine Oiling System: Pressure to main and connecting rod bearings, camshaft bearings, timing gears; and to rocker arm assembly on "F" Head Engine.
Crankcase Capacity—4 quarts.
Oil Pressure—35 lbs. at 35 MPH.
Oil Pressure Regulator—Under plug on side of pump housing. Opens at 40 lbs. Adjustable by adding or removing shims located above spring in plug.

Oil Pump: Rotor type pump mounted on left side of crankcase.
Oil Pump Overhaul—*See Willys Special Data.*

Oil Filter: Purolator. On cylinder head bracket at right front corner of cylinder head with oil outlet connected to timing gear cover.

▷*CAUTION*—Filter should be drained at each crankcase oil change (2000 mile intervals) and filter element replaced every 8000 miles (normal service).

Oil Pressure Gauge: (CJ-3A)—Auto-Lite No. 121250-A; (Early CJ-3B)—Auto-Lite No. 11987-A; (Late CJ-3B & CJ-5)—Auto-Lite No. 121250-A. Bourdon tube type, not electric.

COOLING

Cooling System: Pressure type with pressure valve (relief valve) in filler cap.
Capacity—11 qts. (12 qts. with Heater).
Pressure Valve—Radiator filler cap. Opens at 7 lbs.

Water Pump: Centrifugal, packless, ball bearing type. *See Water Pump Section for complete data.*
Removal—Loosen and remove drive belt, disconnect hose. Remove pump mounting screws, lift out pump
Belt Adjustment—See Generator Belt Adjustment.

Thermostat: Harrison. In water outlet elbow in cylinder head. Starts to open at 151°F (148°F min.).

Temperature Gauge (Exc. CJ-5): Auto-Lite No. 12149-A (CJ-3A); No. 11986-A (Early CJ-3B); No. 12149-A (Late CJ-3B). Bourdon tube type. Not electric.

Temperature Gauge (CJ-5): King-Seeley "CV" (Constant Voltage) electric type.
Dash Unit—K-S No. 46832 (with 100 MPH Speedometer). No. 46833 (with 80 MPH Speedometer).
Engine Unit—K-S No. 44230.

CLUTCH

Rockford Model 8½ RM or Auburn No. 8501-39. With Borg & Beck driven member. Single plate dry disc type. See Clutch Section for complete data.
Facings—Woven asbestos. I.D. 5⅛". O.D. 8½".
Thickness .135" (.132-.138").

Pedal Adjustment: Set pedal free travel to 1" (to provide 1/16" clearance between release bearing and clutch release levers). Adjust length of clutch control cable at clevis. Screw cable end in or out of clevis. Tighten locknut.

Removal: Remove transmission (Transmission & Case Assembly), see below. Remove flywheel bell housing. Mark clutch pressure plate and flywheel to insure installation in same position. Remove clutch cover screws evenly to remove spring pressure, then remove clutch assembly and driven member.

TRANSMISSION

Warner Model AS1-T90C (Floor Mounted Gearshift). Three speed type. Constant-mesh, synchro-mesh, helical gears (second & high), sliding spur gear (low & reverse).
See Transmission Section for complete data.

Transfer Case: Spicer or Warner. Two-speed auxiliary transmission and front-wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front-wheel drive engagement (left hand lever).
See Transmission Section for complete data.

Removal: Transmission and transfer case are removed as an assembly. Disconnect front and rear propeller shafts at universal joints (NOTE—If equipped with Power Take-off drive, remove front end of power take-off propeller shaft assembly). Disconnect speedometer cable at transfer case, brake cable, transmission shift rods at transmission case levers, and clutch release cable at cross-shaft bell-crank. Place support jacks under engine and transmission, remove transfer case rubber snubber bolt nut (on right side) and rear mounting bolt nuts at cross-member under transmission case. Remove floor board inspection plate. Drain radiator and loosen upper radiator hose. Remove transfer case shift lever pivot pin screw, remove pin and shift levers (NOTE—If Power Take-off used, remove power take-off shift lever plate screws and lift lever out). Remove bolts holding center cross-member at frame side rails and remove cross-member (CAUTION—with cross-member removed, engine and transmission weight will rest on support jacks). Remove bolts holding transmission on bell housing force transmission to right until ball stud end can be disengaged from end of clutch control cross-shaft. Lower support jacks under engine and transmission and slide transmission and transfer case assembly to rear until clutch shaft clears bell housing, remove assembly from beneath car.

UNIVERSALS

Front & Rear Drive Propeller Shaft Joints: Spicer needle roller bearing type.

Front Axle Shaft Joint: Bendix or Rzeppa Constant Velocity type. One joint used at outer end of each shaft (within steering knuckle housing).

▷*1953 RZEPPA TYPE UNIVERSAL JOINT PRODUCTION CHANGE:* The inner shaft retainer and three screws have been eliminated, making it possible to pull the shaft end from the joint without dismantling the joint.
See "Universal Joints" in Willys Special Data.

Power Take-off Propeller Shaft Joints: Detroit Ball-and-Trunnion type. Two used (one at each end of shaft—no splined joint used).

FRONT AXLE

Spicer (Salisbury) Model 25—Full-floating, hypoid gear type. Differential assembly (ring and pinion gear assembly) is identical with Spicer Model 23-2 and is serviced in same manner.
See Spicer (Salisbury) Full Floating Rear Axle in Rear Axle Section for complete data.
Ratio—5.38-1.
Backlash—.005-.007". Shim adjustment.

Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and steering linkage (at idler lever on frame front cross-member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear end of springs and lower the springs, remove axle assembly from beneath car.

Axle Shaft & Universal Joint Assy. Removal: Remove wheel, hub cap, axle shaft nut and washer. Take out drive flange capscrews and remove flange with a puller (*CAUTION*—do not lose shim pack under drive flange). Bend lip on bearing adjusting nut lockwasher out, remove locknut, lockwasher, adjusting nut, and bearing locking washer. Remove wheel hub and bearing assembly (*CAUTION*—use care not to damage oil seal). Disconnect brake tube, take out mounting screws on backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal joint assembly out of housing.

▷*INSTALLATION CAUTION*—Adjust front wheel bearings and bleed brakes after installation completed.

Wheel Bearing Adjustment: Tighten inner adjusting nut until wheel binds (turn wheel while adjusting), then back nut off 1/6 turn, install lockwasher and locknut and make certain nut locked by turning lockwasher ear up. Check axle shaft endplay.
Axle Shaft Endplay Checking & Adjustment—Tighten the axle shaft nut against the flange (do not install lockwasher), swing wheel to maximum

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left or right position with punchmark on end of axle shaft straight up or down. Back off flange nut until clearance between nut and flange is .050" (measure with feeler gauge). Tap end of shaft with a soft hammer (shaft will move in an amount equal to the endplay). Recheck clearance between nut and flange with a feeler gauge. **Subtract this measured clearance from the original .050" clearance.** If resulting figure is less than .015", add shims to shim pack under flange, if figure is more than .035", remove shims from shim pack under flange. With correct thickness of shim pack under flange, install axle shaft lockwasher, nut, and cotter pin.

Steering Knuckle Bearing Disassembly & Adjustment: *See "Front Axle" in Willys Special Data.*

Wheel Bearing Adjustment: *See "Front Axle" in Willys Special Data.*

REAR AXLE

Spicer Model 44-2. Semi-floating hypoid gear type with Hotchkiss drive.
See "Spicer Rear Axle" in Rear Axle Section.

Ratio—5.38-1.
Backlash—.004-.008". Shim adjustment.

Removal: Support rear end of truck securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables and propeller shaft at rear universal. Place support jacks under axle housing to relieve springs of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs to floor. Remove axle assembly.

Axle Shaft Removal: Remove wheel and hub assembly (use wheel puller), remove nuts on bolts holding backing plate and brake assembly, remove dust shield, oil seal, and backing plate. Remove axle shaft and wheel bearing. CAUTION—Do not lose shims.

Wheel Bearing Adjustment—Endplay .003-.005". Adjust by adding or removing shims between backing plate and flange on axle housing.
NOTE—Shims installed on **left hand** end of axle housing only in production. Shims can be installed on right hand end of axle housing, if necessary, for correct endplay.

SHOCK ABSORBERS

Monroe. Direct acting, hydraulic type. Not adjustable or refillable. Serviced by replacement.

FR NT SUSPENSI N

Front Axle: Spicer (Salisbury) Model 25. Special full-floating driving unit. *See Front Axle data (above).*
Front Suspension: Special front-wheel drive unit with semi-elliptic springs. Steering knuckle mounted on taper roller bearings carried on two stub shafts.
Endplay—.001-.003".
Kingpin Inclination—7½° crosswise.
Caster—3°. No adjustment. If caster incorrect, check front end, correct by installing new parts.
Camber—1½°. No adjustment. Correct by installing new parts. Do not attempt to correct camber by cold bending or heating of parts.
Toe-In—3/64-3/32" (1/32" each wheel). To adjust, first set each front wheel straight ahead (see Note below), then set toe-in by shortening each tie rod approximately ½ turn. This procedure necessary to maintain correct position of steering idler arm.
NOTE—To set front wheels straight ahead, first set tie rod end of steering bell crank (idler lever on frame front cross-member) exactly at right angles to front axle. Check front wheels by using a straight edge or sighting along rear and front wheels. Adjust each tie rod (loosen end clamp bolts and turn rod) until front wheels are exactly straight ahead. Then make toe-in adjustment as directed above. Tie rod lengths between ball end centers should be 20⅞" (left), 25⅝" (right).
Toe-out on Turns—With inner wheel turned 20°, outer wheel should be turned exactly 18°30'.

STEERING GEAR

Steering Gear: Ross Model T-12. Cam-and-Twin Lever
See Steering Gear Section for complete data.

BRAKES

JEEP CJ-3A

Service Brakes (CJ-3A Jeep): Bendix (Lockheed) Four-wheel Hydraulic, double anchor type. Hand lever applies independent brake on drive shaft at rear of transfer case.
See Brake Section for complete data.
Drum Diameter—9".
Lining—Width 1¾". Thickness .206-.216". Length per shoe 10 7/32" (forward shoes), 6 39/64" (rear shoes). NOTE—Manufacturer recommends use of new or replacement shoe assemblies with factory-installed linings.
Clearance—.008" toe, .005" heel, for each shoe.

Hand Brake: Mechanical type. Two-shoe, internal expanding type with drum mounted on drive shaft at rear of transfer case (See Hand Brake Adjustment following).

Drum Diameter—8".
Lining—Woven type. Width 1¾". Thickness .206-.216". Length per shoe 8⅛".

JEEP CJ-3B & CJ-5

Service Brakes (CJ-3B & CJ-5 Jeeps): Bendix-Lockheed hydraulic, self-centering type. Hand lever applies independent brake on drive shaft at rear of transfer case.
See "Bendix-Lockheed" in Brake Section.

Drum Diameter—9".
Whl. Cyl. Diameter—1" (Front), ¾" (Rear).
Lining—Molded asbestos. Width 1¾", Thickness .206-.216", Length per shoe 10 7/32" (primary or forward shoe), 6 39/64" (secondary or rear shoe).
Clearance—.008" toe, .005" heel, for each shoe.
NOTE—On self-centering type brakes, centralize shoes by hard brake application before making adjustment.
Braking Power—65% Front, 35% Rear.

Hand Brake: Mechanical type. Two-shoe internal expanding type with drum mounted on drive shaft at rear of transfer case (See Hand Brake Adjustment following).
Drum Diameter—8".
Lining—Width 1¾", Thickness .206-.216", Length per shoe 8⅛".

HAND BRAKE ADJUSTMENT

Hand Brake (Adjustment for Wear)—Make certain that hand brake cable and linkage operate freely. Lubricate if sticking or binding is evident. Place brake handle on instrument panel in "off" position. Rotate brake drum until one pair of adjusting holes (three pairs located on back face of drum) is opposite the adjusting screws (notched wheels) within the brake. Insert a screwdriver or adjusting tool through each hole and turn each adjusting screw equally until the brake shoes are snug against the drum (NOTE—with tool against edge of hole as a fulcrum, move outer end of tool out away from center of driveshaft to expand shoes). **Back off each adjusting screw 7 notches** to provide correct shoe clearance.

MISC. MECHANICAL

Windshield Wipers: Vacuum type, individual wiper motors.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

1952 Models	Body Type	Serial No. Prefix
675 Aero Lark	2 Dr. Sedan	652-KA2
685 Aero Wing	2 Dr. Sedan	652-LA1
685 Aero Ace	2 Dr. Sedan	652-MA1
1953 Models	**Body Type**	**Serial No. Prefix**
685A—Aero Ace	Cust. 2-Dr. Sdn	653-MA1
685A—Aero Ace	Cust. 4-Dr. Sdn	653-MB1
685A—Aero Eagle	Hard Top Sdn	653-MC1
675A—Aero Lark	Dlx. 2-Dr. Sdn	653-KA1
675A—Aero Lark	Dlx. 4-Dr. Sdn	653-KB1
675A—Aero Falcon	Super Dlx. 2-Dr. Sed.	653-PA1
675A—Aero Falcon	Super Dlx. 4-Dr. Sed.	653-PB1
475A—Aero Lark	Dlx. 2-Dr. Sdn	453-KA1
475A—Aero Lark	Dlx. 4-Dr. Sdn	453-KB1

SERIAL NUMBER: On plate on left front door hinge post.
Serial Numbers—10001 up, with model prefix as listed in Model Identification above.

ENGINE NUMBER: Stamped on pad on top right front corner of cylinder block.

▷*ENGINE NUMBER NOTE—Letters following engine number denote the following:*
A—Crankshaft journals .010" UNDERSIZE (all).
B—Cylinder bores are .010" OVERSIZE.
AB—Both above conditions exist in engine.

TUNE-UP

COMPRESSION PRESSURE: 115 lbs. minimum, with all cylinders equal within 10 lbs.

VACUUM READING: Steady 18-21" at idling speed.

FIRING ORDER: (675, 685) 1-5-3-6-2-4. See diagram. (475) 1-3-4-2. *See 1950-53 2-Whl. Dr. Diagram.*

SPARK PLUG GAPS: .030".
Plugs—Champion Type J8. 14 mm. metric.

▷***Tighten Spark Plugs to 26-30 ft. lbs. torque.***

DISTRIBUTOR: Auto-Lite. "IAT" type with full automatic advance and vacuum spark control.

Model	Distr. No.
475 (1953)	IAT-4008B
675 (Early 1952-53)	IAT-4007
675 (Late 1953)	IAT-4017
685 (1952-Early 1953)	IAT-4007A
685 (Late 1953)	IAT-4017A

Breaker Gap—.020". Limits .018-.022".
Cam Angle—39°±3° (6 Cyl.); 40°±3° (4 Cyl.).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
Automatic & Vacuum Advance—*See Ignition.*

IGNITION TIMING: 5° BTDC. Adjust for slight ping on hard acceleration in high gear.
Timing Mark (4 Cyl.): Notch on rim of crankshaft pulley aligned with correct mark on timing gear cover. Cover has two lines marked "5" (5° BTDC), and "T" (TDC).
Timing Mark (6 Cyl.): Fifth mark before top dead center mark "0" on vibration dampener and pointer on timing gear cover. Vibration dampener marked with 15-1° graduations before top dead center mark "0" and 5-1° graduations after this mark.
Timing Procedure—*See Ignition Timing.*

COIL: Auto-Lite CR-6009. On right side of engine.
Ignition Current—5 amperes at 6.3 volts (stopped).

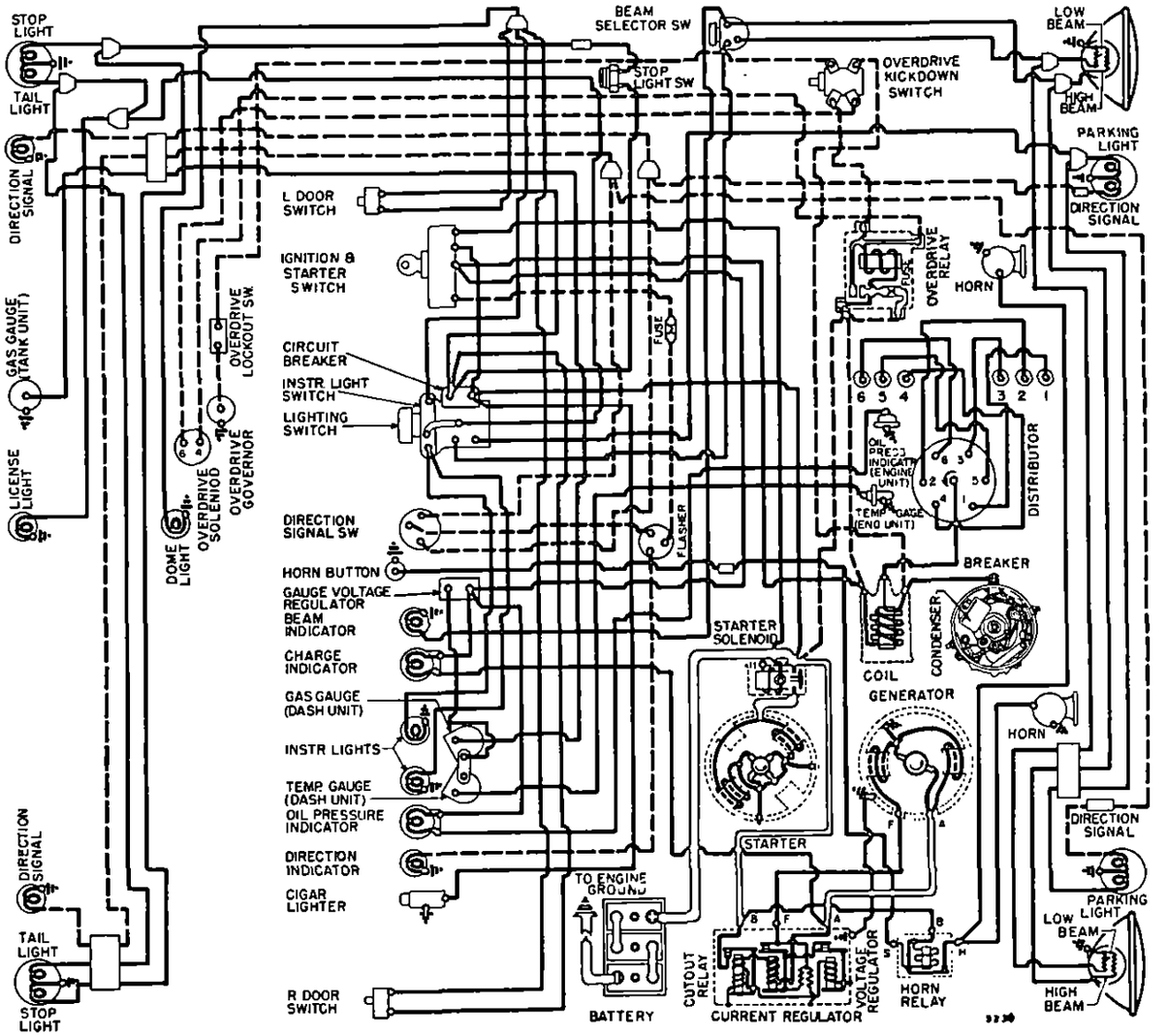
CONDENSER: Auto-Lite No. IAT-3076L.
Capacity—.21-.25 microfarad.

CARBURETION: Carter YF No. 937S (675); No. 924S (685—1952 & Early 1953); No. 2071S (685—Late 1953); No. 938S (475). 1¼" single barrel downdraft type with manual choke.

▷*1952 PASS. CAR ROUGH IDLE CORRECTION—See "Carter YF Carburetor" in Carburetor Section for complete data.*
Idle Setting (924S, 937S)—1-2 turns open (turn screw out for richer mixture).
Idle Setting—(938S, 2071S) ¾-1¾ turns open (turn screws out for richer mixture.
Idle Speed—600 RPM (475), 550 RPM (675), 575 RPM (685). *CAUTION—Exact idle speed extremely important on 685 Hydra-Matic Drive Cars.*
Float Level—9/32" (924S, 937S); 5/16" (938S, 2071S). From top of float at free end to gasket seat on cover, Gauge T109-26 (924S, 937S), T109-107 (938S, 2071S). Check with cover inverted and float hanging freely.

▷*CAUTION—Do not compress spring in intake needle (will give incorrect reading and wrong setting).*
Accelerating Pump—No adjustment.
Fast Idle Setting: Lip on fast idle arm should contact boss on body casting with choke valve wide open. Adjust by bending fast idle link at offset.
Choke Setting: Manual type. No adjustment required.
Fuel Pump Pressure: 3½-4½ lbs.
MANIFOLD HEAT CONTROL: (675) Automatic thermostatic type, no adjustment. Valve must operate freely. (685, 475) No control valve (intake manifold passages in cylinder head).
VALVE TAPPET CLEARANCE: (675) .016" All valves,

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(685, 475) .018" (Intake—COLD). .016" (Exhaust—Thompson "Roto-Valve"). .012" (Exhaust —"Eaton Free-Valve"). Adjust with engine COLD.

IGNITION

IGNITION SWITCH: Combination ignition and starting switch. Turn key to right, past the "On" position, to start.

COIL: Auto-Lite CR-6009. On right side of engine.
Ignition Current—5 amperes at 6.3 volts (stopped).

CONDENSER: Auto-Lite No. IAT-3076L.
Capacity—.21-.25 microfarad.

DISTRIBUTOR: Auto-Lite. "IAT" type with full automatic advance and vacuum spark control.

Model	Distr. No.
475 (1953)	IAT-4008B
675 (Early 1952-53)	IAT-4007
675 (Late 1953)	IAT-4017
685 (1952-Early 1953)	IAT-4007A
685 (Late 1953)	IAT-4017A

Breaker Gap—.020". Limits .018-.022".
Cam Angle—39°±3° (6 Cyl.); 40°±3° (4 Cyl.).
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IAT-4007, 4017

Degrees	Distr.	R.P.M.	Degrees	Eng.	R.P.M.
Start		350	0		700
1		380	2		760
7		550	14		1100
11		1300	22		2600
12		1500	24		3000

Automatic Advance—IAT-4007A, 4017A

Degrees	Distr.	R.P.M.	Degrees	Eng.	R.P.M.
Start		300	0		600
1		400	2		800
4		725	8		1450
8		1150	16		2300
9.5		1300	19		2600

Automatic Advance—IAT-4008B

Degrees	Distr.	R.P.M.	Degrees	Eng.	R.P.M.
Start		300	0		600
1		425	2		850
6		1050	12		2100
10		1575	20		3150
11		1700	22		3400

Vacuum Spark Control: Integral type (linked to breaker plate).

Vacuum Advance—IAT-4007, 4017

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	3½"
1	2°	5½"
3	6°	9¼"
5	10°	13"
6	12°	15"

Vacuum Advance—IAT-4007A, 4017A, 4008B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0°	5⅛"
1°	2°	6⅝"
3°	6°	9⅝"
5°	10°	12½"
6°	12°	14"

Installation Note—If crankshaft has been turned with distributor off engine, install distributor as follows: Turn crankshaft to No. 1 cylinder firing position (see Timing), turn distributor shaft until rotor is at No. 1 segment, install distributor on engine, rocking shaft slightly to engage drive coupling, push distributor down into place, install hold-down screw, check timing.

►*CAUTION—If oil pump has been removed see "Oil Pump" in Willys Special Data.*

IGNITION TIMING

Standard Setting.....5° BTDC
Timing Mark (4 Cyl.): Notch on rim of crankshaft pulley aligned with correct mark on timing gear cover. Cover has two lines marked "5" (5° BTDC), and "T" (TDC).
Timing Mark (6 Cyl.): Fifth mark before top dead center mark "0" on vibration dampener and pointer on timing gear cover. Vibration dampener marked with 15-1° graduations before top dead center mark "0" and 5-1° graduations after this mark.
Timing (using Timing Light)—Connect timing light to #1 spark plug, direct light on right side of vibration dampener. Disconnect vacuum advance line (to prevent vacuum advance operating), idle engine. Loosen distributor mounting screw and adjust distributor until ignition mark on dampener appears in line with pointer. Tighten mounting screw and connect vacuum line.

CARBURETOR

Carter Model YF No. 937S (675); No. 924S (685—1952 & Early 1953); No. 2071S (685—Late 1953); No. 938S (475). 1¼" single barrel downdraft type with manual choke.
See Carburetor Section for complete data.

►*1952 PASS. CAR ROUGH IDLE CORRECTION (924S)—See "Carter YF Carburetor" in Carburetor Section for complete data.*

Settings (Idle Setting, Float Level & Accelerating Pump) *See Tune-Up data.*
Metering Rods & Jets—See Carter Jet Table in Carburetor Section for complete data.

Fast Idle: Lip on fast idle arm should contact boss on body casting with choke valve **wide open.** Adjust by bending fast idle link at offset.

Choke: Manual type.

CARB. EQUIPMENT

Air Cleaner: AC Oil Bath type standard equipment.
Fuel Pump: Carter No. M893S (Fuel only Std.); M794S (Combination Fuel & Vacuum Optional).
Pressure—3½-5½ lbs.
Gasoline Gauge: King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—King-Seeley No. 46007.
Tank Unit—King-Seeley No. 44506.
See Carburetion Equipment Section for complete data.

BATTERY

Auto-Lite or Willard PN-15, 6 volt, 15 plate, 90 ampere hour capacity (20 hr. rate).
Grounded Terminal—Negative terminal.

STARTER

Auto-Lite Model MCH-6207 (4-Cyl.) MCH-6203 (6-Cyl.).
Armature—Auto-Lite No. MCH-2088.
Drive—Bendix "Folo-thru" type No. A3281.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs. (new brushes).

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 "	Lock	2.0	335

Starting Switch Note—Ignition key starting with Auto-Lite No. SS-4018 magnetic switch.

GENERATOR

Auto-Lite No. (Early) GDZ-6001D, (Late) GGW-4801D. Two brush type with current and voltage regulation.
Armature—Auto-Lite No. (for GDZ-6001D) GGY-2006F, (for GGW-4801D) GGW-2006F.
Maximum Charging Rate—(GDZ) 35 amperes. (GGW) 45 amperes, both at 8.0 volts.

Performance Data—GDZ-6001D

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
17.0	8.0	1350-1500 — 1550-1700
35.0	8.0	1800-2000 — 2150-2350

Performance Data—GGW-4801D

Amperes	Volts	Cold — R.P.M. — Hot
0	6.4	870-970 — 950-1050
40.0	8.0	1800-2000 — 2150-2350
45.0	8.0	1925-2125 — 2350-2550

Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—35-53 ozs. (new brushes).
Field Current—(GDZ) 1.3-1.5 amps., (GGW) 1.4-1.5 amps, both at 5.0 volts.
Motoring Current—(GDZ) 3.9-4.4 amps., (GGW) 4.1-4.6 amps., both at 5.0 volts.

Belt Adjustment: ½" to ⅝" deflection with thumb pressure midway between generator and pump pulleys.

REGULATOR

Auto-Lite No. (for GDZ-6001D Gen.) VRP-6003A, (for GGW-4801D Gen.) VBE-6105A. Voltage-Current Regulator.

►*CURRENT REGULATOR NOTE—VBE Current Regulator is "Temperature Compensated" type.*

Cutout Relay
Cuts In—6.3-6.8 volts (set to 6.4-6.6 volts hot).
Cuts Out—4.1-4.8 volts (4-5 amps. disch.).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator
Setting—7.2-7.5 volts at 70°F. after 15 minutes operation charging at 10 amperes (VRP), one-half maximum rate (VBE).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VRP)
Setting—34-36 amperes (marked "35" on cover).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

Current Regulator—(VBE)

►*SETTING CAUTION—"Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A—Operating Amperes	Test B
VBE-6105A	52	45 (43-47)

Test A—After 15 minutes operation charging at ½ maximum rate.
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Equip. Section.*

LIGHTING

Headlamps: "Sealed Beam" type.
See Electrical Equipment Section for complete data.
Lighting Switch—Pulls out for headlights and parking lights. Rotating switch to right dims instrument

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cluster lights. When turned to extreme left, it lights dome light.

MISC. ELECTRICAL

CIRCUIT BREAKER: 30 amperes. On main lighting switch. Protects entire lighting system.

FUSES: Clock—1 ampere. in clock lead.
Directional Signal—14 amperes. In flasher lead.
Overdrive—20 ampere. On control relay.

HORNS: Auto-Lite No. HW-4021 (Low Pitch), **HW-4022** (High Pitch). NOTE—Sparton horns also used

GAUGE VOLTAGE REGULATOR: King-Seeley No. 45557. Thermobimetal interrupter unit designed to maintain a constant voltage of 5 volts (regardless of generator charging voltage fluctuation) on gauge feed circuit. Unit is mounted on instrument cluster and connected between ignition switch and gauge circuits. See wiring diagram.

ENGINE

▷*SEE 1950-53 WILLYS 2-WHL. DR. STATION WAGON, SEDAN DELIVERY, JEEPSTER PAGES FOR 4 CYLINDER "F-HEAD" ENGINE DATA.*

ENGINE SPECIFICATIONS: 6 Cyl. "F" Head, and 6 Cyl. "L" Head types of own make.
Bore—3⅛". **Stroke**—3½".
Displacement—161 cu. in. **Rated H.P.** 23.44.
Developed Horsepower—("L" Head) 75 @ 4000 RPM. ("F" Head) 90 at 4200 RPM.
Compression Ratio—("L" Hd.) 6.9-1. ("F" Hd.) 7.6-1.
Compression & Vacuum Readings—*See Tune-Up.*

ENGINE REMOVAL: *See Willys Special Data.*

TIGHTENING TORQUES & CYLINDER HEAD: *See Willys Special Data.*

PISTONS: Aluminum alloy, "T" slot, cam ground, tin or brass plated type. **Length**—3".

▷*PISTON OVERSIZE NOTE—Letter "B" or "AB" following engine number indicates that cylinders and pistons are .010" OVERSIZE.*
Weight—10.9 ozs.
Removal—Pistons and rods removed from above.
Clearance—.018-.021" (top), .0021" (skirt).

Replacement Pistons: Furnished .010", .020", .030", .040", oversize.

Fitting New Pistons: Use .003" feeler gauge ½" wide between piston and cylinder wall on side opposite slot. Pull required to withdraw feeler should be 5-10 lbs.

Installing Pistons: T-slot toward left (valve side) of engine (opposite side from oil spray hole in rod).

PISTON RINGS: Two compression rings, one oil ring per piston, all above pin. Oil drain holes in oil ring groove.

Ring	Width	End Gap	Side Clearance
Top (Comp.)	3/32"	.007-.015"	.002-.004"
Center (Comp.)	3/32"	.007-.015"	.0015-.0035"
Bottom (Oil)	3/16"	.007-.015"	.001-.0025"

Installing Rings: Compression ring mark "TOP" (on side of ring) and bevel on inner edge must be up.

Replacement Rings: Ring sets furnished in following sizes for oversize range noted: Standard (0 to .010" O.S.), .020" O.S. (.011" to .024"), .030" O.S. (.025" to .034"), .040" O.S. (.035" to .049").

PISTON PIN: Locked in rod.
Diameter—.7497". **Length**—2 21/32".
Pin Fit in Piston—.0001-.0005". Light thumb push fit at normal room temperature.
NOTE—Pins furnished with piston only, not separately.

CONNECTING ROD: Length 6.345". **Wgt.** 22.5 ozs.

▷*JOURNAL DIAMETER UNDERSIZE NOTE—The letter "A" or "AB" following engine number indicates that main and connecting rod journals are .010" UNDERSIZE.*
Crankpin Journal Diameter—1.875".

▷*CAUTION—Oil spray hole in bearing upper half must be lined up with hole in rod.*
Clearance—.0001-.0025". **Sideplay**—.004-.010".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Furnished Std., .001", .002", .010", .011", .012", .020", .030", undersize.

Installing Rods: Rods not offset. Install with spray hole in lower end toward right side (away from camshaft), on all rods.

CRANKSHAFT: Four bearing with integral counterweights. Vibration dampener on forward end.

▷*JOURNAL DIAMETER UNDERSIZE NOTE—The letter "A" or "AB" following engine number indicates that main and connecting rod journals are .010" UNDERSIZE.*
Journal Diameters—2.25" all bearings.
Bearings—Replaceable steel-backed, babbitt-lined type, no shims.
Clearance—.0009-.003".

Bearing Adjustment: None. Replace bearings.

Rear Main Oil Seal: *See Crankshaft & Main Bearings in Willys Special Data.*

Replacement Bearings: Furnished Std. .001", .002", .010", .020", .030" undersize.

End Thrust: Taken by No. 1 (front bearing), and thrust washer in back of crankshaft gear. Adjusted by removing or adding shims behind thrust washer. Shims furnished .002" thick.
NOTE—Crankshaft gear must be removed with gear puller for endplay adjustment.
Endplay—.004-.006".

FLYWHEEL: Removal—*See Willys Special Data.*

CAMSHAFT: Four bearing with helical gear drive.
Journal Diameters—(1) 2"; (2) 1 31/32"; (3) 1 15/16"; (4) 1¾".

▷*CAUTION—"L" Head & "F" Head engine camshafts not interchangeable.*
Bearings—Front Only. Babbitt lined, steel backed.
NOTE—Other camshaft bearings are machined in case.
Clearance—.001-.0025".
Camshaft Removal—*See Camshaft & Bearings in Willys Special Data.*

End Thrust: Taken by thrust plate assembled behind camshaft gear with a spacer assembled behind plate. If end thrust not within limits, replace timing gear and thrust plate. Dressing face of thrust plate may be required to reduce its thickness for correct clearance.
Endplay—.004-.007".

Timing Gears: Crankshaft gear cast iron, camshaft gear fibre.

▷*CAUTION—Timing gears are not interchangeable on "F" & "L" Head Engines.*
Gear Backlash—.000-.002".

Camshaft Setting: Mesh marked tooth of camshaft gear with marked space (between teeth) on crankshaft gear.

Valves ("L" Head Engine)

Valve	Head Diam.	Stem Diam.	Length
Intake	1⅜"	.3407-.3415"	4 17/32"
Exhaust	1 9/32"	.3395-.3405"	4⅝"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.284"	.0015-.00325"
Exhaust	45°	.300"	.0025-.0045"

▷*EXHAUST VALVE NOTE—Thompson "Roto-Valve" or Eaton "Free-Valve" used on "F-Head" Engine exhaust valves.*

Valves ("F" Head Engine)

Valve	Head Diam.	Stem Diam.	Length
Intake	1¾"	.3733-.3738"	4 17/32"
Exhaust	1 9/32"	.3395-.3405"	4⅝"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.260"	.0007-.0022"
Exhaust	45°	.300"	.0025-.0045"

Valve Seat Width—3/64", (All Valves).

Valve Guides ("L" Head Engine): Removable type. Remove valve guides from above with puller. Install new guides with driver or press guides down until upper end is ⅞" below upper edge of valve seat (taper end up).

Valve Guides ("F" Head Engine): Removable type. Drive guides out with Tool W-240. To install, use Tool W-240 with correct adapters and drive guides into head and cylinder block until top of guide is ⅞" from top of valve seat (taper end toward seat).

Valve Springs: *CAUTION—Intake valve springs on "F" Head engines are different than other springs. See Spring data below.*

Valve Springs ("L" Head Engine)

Intake & Exhaust	Spring Pressure	Length
Valve Closed	50 lbs.	1 5/8"
Valve Open	105 lbs.	1 21/64"

Free Length—1 57/64".

Valve Springs ("F" Head Engine)

Intake	Spring Pressure	Length
Valve Closed	73 lbs.	1 21/32"
Valve Open	153 lbs.	1 13/32"

Free Length—1 31/32".

Exhaust	Spring Pressure	Length
Valve Closed	50 lbs.	1 5/8"
Valve Open	105 lbs.	1 21/64"

Free Length—1 57/64".

Valve Lifters: Mushroom type, in reamed holes in block. Service by installing oversize lifters.
Lifter Removal—Camshaft must be removed first. *See "Camshaft & Bearings" in Willys Special Data.*
Lifter Diameter—.6240-.6245" **Length**—2".
Clearance in Block—.0005-.002".

Rocker Arm Removal & Installation—*See Valve System in Willys Special Data.*

VALVE TIMING

Tappet Clearance: ("L-Head" Engine)—.016" Intake & Exhaust, (Hot or Cold). "F-Head Engine—.018" Intake—COLD. .016" (Exhaust—Thompson "Roto-Valve"). .012" (Exhaust—"Eaton Free-Valve"). Adjust with engine cold.

Valve Timing: See Camshaft Setting above.

"L-Head" Engine
Intake Valves—Open 5° BTDC. Close 44° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

"F-Head" Engine
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

Valve Timing Check—Adjust No. 1 cylinder Intake valve lash to .020" ("L" Head Engine), .026" ("F" Head Engine) with tappet resting on low side of cam lobe. Rotate crankshaft until No. 1 piston is coming toward top of cylinder on exhaust stroke, then continue to rotate crankshaft until the 9° BTDC mark on dampener is aligned with pointer on timing case cover. With the crankshaft in this

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position, No. 1 intake tappet should be JUST TIGHT against valve stem, and indicates that valve timing correct. Reset tappet clearance.

LUBRICATION

Engine Oiling System: Pressure to crankshaft, connecting rod, camshaft bearings, timing gears, and on "F" Head Engine to rocker arm shaft.
Crankcase Capacity—5 qts. (675, 685), 4 qts. (475).
Normal Oil Pressure—35 lbs. at 35 MPH. Safe oil pressure is 6 lbs. at idle, 20 lbs. min. at 2000 RPM.
Oil Pressure Regulator: Located on oil pump housing. Adjustable by removing or adding shims from above spring within plug.
Oil Pump: Internal rotor type. Mounted externally on left side of crankcase.
Oil Pump Overhaul—*See Oil Pump in Willys Special Data.*
Oil Filter: Optl. Replace filter cartridge at 8000 mile intervals (more often in dusty areas).
Oil Pressure Indicator: King-Seeley Electric type oil pressure switch, operates light on instrument panel.
Dash Unit—Warning indicator light used. Light goes on when ignition switch turned on, and goes out when oil pressure rises.
Engine Unit—King-Seeley No. 47150.
See Miscellaneous Section for complete data.

COOLING

Cooling System: Pressure type with relief valve in radiator cap.
Capacity—11 quarts, (12 qts. with heater).
Pressure Valve—In filler cap. Opens at 7 lbs.
Water Pump: Centrifugal, packless type with special sealed ball bearing shaft (no lubrication required).
See Water Pump Section for complete data.
Belt Adjustment: See Generator Belt Adjustment.
Thermostat: Harrison. In water outlet in cylinder head. Starts to open at 151°F. (148° min.).
Temperature Gauge: King-Seeley "CV" (Constant Voltage) type with voltage regulator.
Dash Unit—King-Seeley No. 46011.
Engine Unit—King-Seeley No. 44200.
See Miscellaneous Section for complete data.

CLUTCH

Rockford 8½ RM or Auburn 8501-39. With Borg & Beck driven member. Single plate dry disc type.
See Clutch Section for complete data.
Facings—Woven asbestos. I.D. 5⅛". O.D. 8½".
Thickness—.135" (.133-.138").
Pedal Adjustment: Pedal free travel 1½". To adjust, loosen locknut and turn adjusting nut on connecting link at clutch fork, tighten locknut.
Removal: Remove transmission (see Transmission Removal), remove flywheel bell housing. Mark pressure plate and flywheel to insure correct re-installation. Take out mounting screws in clutch cover flange (turn all screws out evenly), remove clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model AS-51-T96 (Std.). AS-50-T96 with R10 Type Overdrive (Optional). All helical gear type. Constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See Transmission Section for complete data.
Transmission Control: Remote control type, with gearshift lever mounted on steering column.
See Transmission Section for complete data.
Removal: Disconnect the remote control rods and the front universal joint companion flange at the transmission. Disconnect speedometer cable at transmission and plug the opening. Place a jack under the flywheel housing to support engine weight and remove the rear crossmember support with rubber insulators attached. Unscrew the four transmission-to-bell housing bolts as far as possible and yet support transmission weight. Pull transmission back to bolt heads and insert a long screw driver through opening in bell housing and pry the clutch release fork from engagement with clutch release bearing carrier. Remove the transmission mounting bolts and remove transmission from car.

OVERDRIVE

Warner Type R10 (Part of Transmission Assembly). Solenoid operated, governor controlled type overdrive (no centrifugal pawls) with throttle operated "kick-down."
See Transmission Section for complete data.
Control Relay—Auto-Lite No. HRT-4001.
Overdrive Governor—Auto-Lite No. TGE-4002.
Overdrive Solenoid—Delco-Remy No. 1118155.
Overdrive Fuse—20 ampere. On relay.
Removal: Remove as a unit with the transmission. Removal instructions same as for regular transmission after governor and solenoid wires and lock-out control cable disconnected, and rubber mounted saddle support at rear of overdrive housing is removed.

HYDRA-MATIC DRIVE

Optl. on 685 Ace & Eagle. "Dual Range" type. Four speed automatic transmission and fluid coupling.
See Transmission Section for complete data.
►*TESTING & TROUBLE SHOOTING: See "Hyrda-Matic Drive" in Transmission Section.*
Lubrication: Check fluid level every 1000 miles, add fluid as required to maintain level at "F" mark on dipstick. Drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type "A."
Capacity—Approximately 8½ qts. (refill), 9½ qts. (after disassembly or overhaul).
Checking Fluid Level—Check only with engine and transmission at normal running temperature, engine running at correct 575 RPM. idling speed, and selector lever in Neutral "N" position. Remove access plate in front floor pan (right side under floor mat), clean all dirt from around filler cap, check level as indicated on dipstick on filler cap. Add fluid as required to bring level up to "F" mark on dipstick. *CAUTION—Do not overfill transmission case.*
►*OTHER HYDRA-MATIC SERVICE DATA—See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit Universals. Ball-and-trunion type.

REAR AXLE

Spicer (Salisbury) Model 23-1. Semi-floating, Hypoid gear type with Hotchkiss drive.
See Rear Axle Section for complete data.
Ratio—(675, 685) 4.1-1 (Std.). 4.56-1 (Overdrive).
Ratio—(475) 4.56-1 (Std.). 4.56-1 or 4.88-1 (Overdrive).
Backlash—.004-.008". Shim adjustment.
Removal: Support rear of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line at "T" block on axle housing, rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of spring, lower springs. Remove axle assembly from beneath car.
Axle Shaft Removal: Remove wheel and hub assembly, using wheel puller Tool W-230, disconnect brake line at rear wheel cylinder, remove nuts on bolts holding backing plate and brake assembly on axle housing. Remove dust sheld, oil seal, and backing plate and flange on housing. Remove axle shaft and wheel bearing.
Wheel Bearing Adjustment—Endplay .003-.007". Adjust by adding or removing shims between backing plate and axle housing flange at each wheel. See Axle Shaft Removal above.

SHOCK ABSORBERS

Monroe. Direct acting hydraulic type.

FRONT SUSPENSION

Independent linked parallelogram type of new design, with coil springs and direct acting shock absorbers. *See Front Suspension Section for complete data.*
►*FRONT SUSPENSION PRODUCTION CHANGE—Front suspension cross-member used on later cars. Kit No. 809562 available for all previous models.*
Kingpin Inclination—8°.
Caster—1° ± ½°.
Camber—1° ± ¼°.
Toe-In—3/32-5/32".
Toe Out on Turns—With inner wheel turned 20°, outer wheel should be turned 19°.

STEERING GEAR

Gemmer. Worm & Roller, or **Ross.** Cam & Twin Lever types. *See Steering Gear Sec. for complete data.*
►*STEERING GEAR REPLACEMENT CAUTION—Steering knuckle arms used with Ross Steering Gears are not the same as those used with Gemmer Steering Gears. If one type Steering Gear is replaced with the other type, STEERING KNUCKLE ARMS MUST BE CHANGED ALSO.*

BRAKES

Service Brakes: Bendix (Lockheed) Hydraulic, self-centering. Hand lever applies rear wheel brakes. *NOTE*—Brakes do not have anchor pin adjustment.
See Brake Section for complete data.
Drums—Cast Iron. Diameter 9".
Wheel Cyl. Diameter—1⅛" (Frt.), 13/16" (Rear).
Lining—Molded type, all shoes.

Shoes	Length	Width	Thickness
Primary	9⅞"	2"	.214"
Secondary	7 11/16"	1¾"	.214"

Clearance—.005" at heel of each shoe.
NOTE—No anchor pin adjustment provided. Brake shoes should be centralized by hard brake application (and then released) before adjustment made.
Braking Power—65% Front, 35% Rear.
Hand Brake: See Service Brakes.
Adjustment—Raise rear of car and pull hand brake lever up three notches, then tighten adjustment (brake equalizer connector) until rear brakes drag slightly. Release hand lever and check rear wheels for drag. The rear wheels must turn freely with brake lever released.

MISC. MECHANICAL

Windshield Wipers: Vacuum type.
See Miscellaneous Section for complete data.

MODEL IDENTIFICATION

1954 MODELS

Model Designation	Body Type & Engine
475-4WD	Truck (4 Cyl. F-Hd)
6226-4WD	Truck (6 Cyl. L-Hd)
4X475-SW	Sta. Wgn. (4 Cyl. F-Hd)
4X475-SD	Sedan Del. (4 Cyl. F-Hd)
4X6-226-SW	Sta. Wgn. (6 Cyl. L-Hd)
4X6-226-SD	Sedan Del. (6 Cyl. L-Hd)
685-SW	Deluxe Sta. Wgn. (6 Cyl. F-Hd)
CJ-3B & FJ	Jeep (4 Cyl. F-Hd)

►*1954 MODEL NOTE: All models are 4-Wheel Drive except DeLuxe Station Wagon.*

1955 MODELS

Type	Engine	Model Desig.
475 Sta. Wgn.	4 cyl. "F"	54747
475 Sedan Del.	4 cyl. "F"	54847
475 2x4 Sta. Wgn.	4 cyl. "F"	54147
475 2x4 Sedan Del.	4 cyl. "F"	54247
475 4x4 Sta. Wgn.	4 ctl. "F"	54148
475 4x4 Sedan Del.	4 cyl. "F"	54248
475 4WD	4 cyl. "F"	55148
6-226 2x4 Sta. Wgn.	6 cyl "L"	54167
6-226 2x4 Sedan Del.	6 cyl. "L"	54267
6-226 4x4 Sta. Wgn.	6 cyl. "L"	54168
6-226 4x4 Sedan Del.	6 cyl. "L"	54268
6-226 4WD Truck	6 cyl. "L"	55168
685 Sta. Wgn.	6 cyl. "F"	54727
685 Sedan Del.	6 cyl. "F"	54827
CJ-5 Univ. Jeep	4 cyl. "F"	57548
CJ-3B Univ Jeep	4 cyl. "F"	57348

SERIAL NUMBER: Located as follows:
All Station Wagons—On plate mounted on riser to left of drivers seat.
All 475-4WD Trucks—On plate mounted on dash under hood near steering tube.
Model 6226-4WD Truck—On plate mounted on dash near right hood hinge.

ENGINE NUMBER: Located as follows:
4 Cyl. "F" head. Stamped in top of water pump boss.
6 Cyl. 6-226 "L" head. Right top of cylinder block near front.
6 Cyl. 685 "F" Head. Stamped on right side of cylinder block at upper front.

►*ENGINE NUMBER NOTE:* Letters following engine number denote the following:
"A" .010" main & connecting rod journals undersize.
"B" .010" cylinder bore and pistons oversize.
"AB" Both above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: Taken with wide open throttle. Should be equal to within 10 lbs. with 100 lbs. minimum.

Engine	Comp. Press.
475	125 lbs. at 185 RPM
6226	120 lbs. at 70 RPM
685	155 lbs. at 185 RPM

VACUUM READING: 17-21" at idling speed.

VALVE TAPPET CLEARANCE: Taken with engine cold.

Engine	Intake	Exhaust
475	.018"	.016"
685	.018"	.016"
6226	.014"	.014"

MANIFOLD HEAT CONTROL: (474 & 685) water thermostat controlled. (6226) none used.

IGNITION

FIRING ORDER: (4 cyl.) 1-3-4-2. (6 cyl.) 1-5-3-6-2-4. See diagram.
SPARK PLUG GAP: .030".
Spark Plug—Champion J8, 14mm.
COIL: Auto-Lite CR-6009.
Ignition Current—2.5 amperes idling, 5 amperes at 6.3 volts stopped.

DISTRIBUTOR: **Auto-Lite.** *If Delco-Remy used, see "Willys Pass. Cars".*

Model	1954	1955
475	A-L No. IAT-4008B	A-L No. IAT-4204A
685	A-L No. IAT-4017A	A-L No. IAT-4205A
6226	A-L No. IAT-4019	A-L No. IAT-4206

Condenser—Auto-Lite No. IAT-3076A. **Capacity** .23 -.25 mfd.
Contact Point Set—Auto-Lite IGW-3028SA.
Breaker Gap—.020".
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.
►*DISTRIBUTOR TIMING NOTE: See "OIL PUMP" in Willys Special Data.*

Automatic Advance (IAT-4008B & 4204A)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	425	2	850
6	1050	12	2100
10	1575	20	3150
11	1700	22	3400

Automatic Advance (IAT-4017A & 4205A)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	300	0	600
1	400	2	800
4	725	8	1450
8	1150	16	2300
9.5	1300	19	2600

Automatic Advance (IAT-4019 & 4206)

Degrees Distr.	R.P.M.	Degrees Eng.	R.P.M.
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Vacuum Spark Control: Auto-Lite IAT-2023LE (Exc. IAT-4019 & 4206); **IAT-2023LD** (IAT-4019 & 4206).

Vacuum Advance (Except IAT-4019 & 4206)

Distr. Degrees	Eng. Degrees	Vacuum ("of HG)
Start	0	5-1/8
1	2	6-5/8
3	6	9-5/8
5	10	12-1/2
6	12	14

Vacuum Advance (IAT-4019 & 4206)

Distr. Degrees	Eng. Degrees	Vacuum ("of HG)
Start	0	10
1	2	11
3	6	13
4	8	14
5	10	15

IGNITION TIMING

Setting—5° BTDC (Exc. 6226 Eng.). 4° BTDC (6226 Eng.).
Timing Mark (475)—Timing gear cover. Notch on rim of fan pulley to align with correct mark on timing gear cover. Two lines on cover marked 5° (5° BTDC) and T(TDC)..
6226 & 685—Vibration dampener. Align correct graduation with pointer on timing gear cover. Damper marked "0" at TDC with 1° graduations before and after this point.

CARBURETOR

Model	Carter Carburetor No.
475 (1954-55)	YF-951S
685 (1954-55)	YF-2071S
6226 (Early 1954)	WGD-2052S, SA
6226 (Late 1954 & 1955)	WCD-2204S

CARTER YF

►*1955 MODEL "FLAT SPOT" ON ACCELERATION CORRECTION: See "Carter YF" in Carburetor Section.*
Idle Setting—¾-1¾ turns open (951S), 1-2 turns open (2071S). Turn screw out for richer mixture.
Idle Speed—600 RPM..
Float Level—(951S) 5/16"; (2071S) 9/32" from top of float at free end to gasket seat on cover with assembly inverted and float resting freely on intake needle.
CAUTION—Do not compress spring in intake needle.
Fast Idle: With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.
Automatic Choke Setting: None, Manual Choke.
►*OTHER DATA: See "Carter YF" in Carburetor Section.*
Fuel Pump Pressure: 3½-5½ lbs. at 1800 RPM.

CARTER WGD

Idle Setting—1/2-1-1/2 turns open. Turn out for richer mixture.
Idle Speed—550 RPM.
Float Level—9/32" between top of float and bowl cover with gasket removed and cover inverted.
Accelerating Pump—No seasonal adjustment.

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Fast Idle: .018-.023" throttle valve opening gauge T109-29) with choke valve closed and thermostatic coil housing, gasket and baffle plate removed.
Automatic Choke Setting: Set two points rich.
►*OTHER DATA: See "Carter WGD" in Carburetor Section.*
Fuel Pump Pressure: 3½-5½ lbs. at 1800 RPM.

CARTER WCD

Idle Setting—1-2 turns open. Turn screws out for richer mixture.
Idle Speed—500 RPM.
Float Level—3/16" between top of float and machined surface of casting (Gauge T109-28).
Accelerating Pump—No seasonal adjustment.
Fast Idle Setting: Two settings required.
Cam Clearance—Loosen choke valve lever clamp-screw on choke valve, insert .040" feeler gauge (T109-193) between lip of fast idle cam and boss on flange casting, hold choke valve tightly closed, remove all slack from linkage by pressing choke valve lever toward closed position, tighten choke valve lever clamp-screw.
Screw Setting—Hold choke valve tightly closed, tighten fast idle adjusting screw against high step of fast idle cam until throttle valve opening or clearance between edge of valve and carburetor bore on side opposite ports is .016" (T109-29). Be sure fast idle adjusting screw is on high step of cam while making this adjustment.
Automatic Choke Setting: Centered (At Index).
►*OTHER DATA: See "Carter WCD" carburetors in Carburetor Section.*
Fuel Pump Pressure: 3½-5½ lbs. at 1800 RPM.

CARB. EQUIPMENT

Fuel Pump: AC No. 9562 (475), fuel & vacuum. **Carter No. M893S** (685), fuel only. **Carter No. M794S** (685), fuel & vacuum. **Carter No. M957S** (6226), fuel & vacuum.
Pressure—3½-5½ lbs. at 1800 RPM.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 45727 (all models).
Tank Unit—K-S No. 44506 (Exc. Trucks).
Tank Unit—K-S No. 44508 (Trucks).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Auto-Lite or Willard. 6 volt, 15 plate, 100 ampere (20 hr. rate).

Battery Ground—Negative (—) ground. (4 cyl. Eng.) right side of engine. (6 cyl. Eng.) left side of engine.

Engine Ground—Strap from engine to frame at right front engine mounting.

STARTER

Auto-Lite. *If Delco-Remy used, see "Willys Pass. Car" data.*

Auto-Lite Numbers	Starter	Armature
475	MCH-6207	MCH-2088
6226	MCH-6210	MCH-2088
685	MCH-6203	MCH-2088

Drive—Bendix A3281 "Follow-thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0	4300	5.0	65
6.0	Lock	2.0	335

Starting Switch: Auto-Lite SSW-4012. Key starting (magnetic switch controlled by turning ignition switch past "ON" position.

GENERATOR

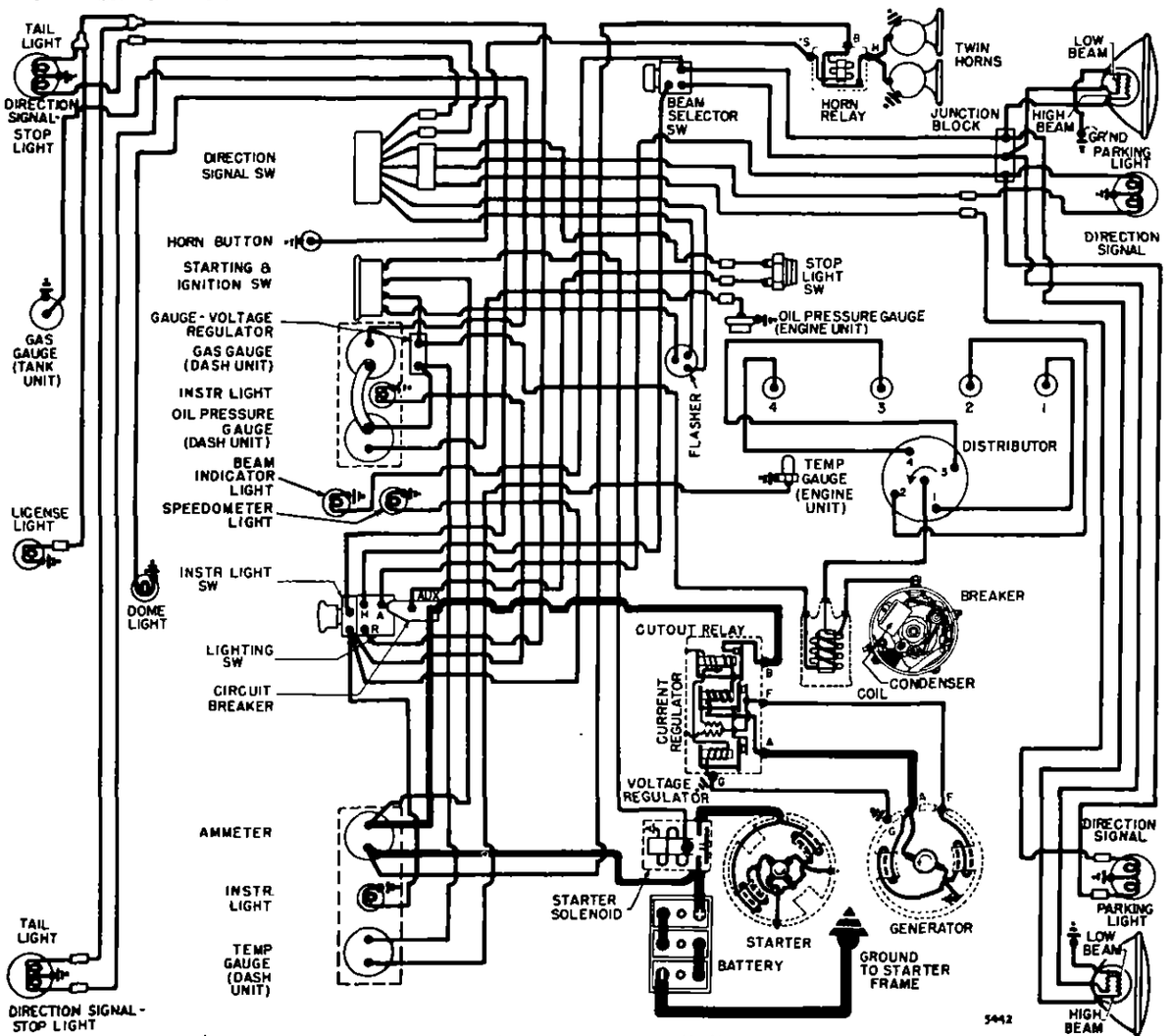
Auto-Lite GGW-4801D (475 & 685-B Eng.). **GGW-4801EN** (6226 Eng.).
Armature—Auto-Lite GGW-2006F (All Cars).

Performance Data

Amperes	Volts	Cold —RPM—	Hot
0	6.4	870-970	950-1050
40.0	8.0	1800-2000	2150-2350
45.0	8.0	1925-2125	2350-2550

Brush Spring Tension—35-53 ozs.
Field Current—1.4-1.5 Amperes at 5.0 volts.
Rotation—Counter-clockwise at commutator end.

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UTILITY MODELS WITH 4 CYL. "F" HEAD ENGINE
(SEE PASS. CAR DIAGRAM FOR 6-CYL. 6226 "L" HEAD ENGINE)

CONTINUED FROM PRECEDING PAGE

Belt Adjustment: 1/2-5/8" deflection with thumb pressure midway between generator and pump pulleys.

REGULATOR

Auto-Lite VBE-6105A. Voltage & Current type with "Temperature Compensated" Current Regulator.

Cutout Relay

Cuts In–6.3-6.8 Volts (set to 6.4-6.6 volts).
Cuts Out–4.1-4.8 Volts (4.6 amps. discharge).
Contact Gap–.015" minimum.
Air Gap–.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting–7.2-7.5 volts at 70° F *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap–.048-.052" with contacts just touching.
Checking & Adjusting–See *Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

Test A –Operating Amperes–	Test B
VBE-6105A 52	..... 45 (43-47)

Test A–After 15 minutes operation with current at 1/2 maximum rate.
Test B–After 15 minutes additional operation with current regulator operating (load applied to hold to 6.7-6.9 volts).
Air Gap–.048-.052" with contacts just touching.
Checking & Adjusting–See *Electrical Equip. Section.*

MISC. ELECTRICAL

Head Lamps: Sealed Beam. See *Electrical Equip. Section.*
Directional Signals: See *Electrical Equip. Section.*
Lighting Switch Removal: Loosen set screw on side of control knob and remove knob. Remove retaining nut and push switch through panel.
Stop Light Switch Location: At front end of brake master cylinder.
CIRCUIT BREAKER: 30 ampere. Thermal type on light switch.
FUSES: Direction Signal–14 amp., in flasher lead.
Radio–9 amp., in lead in radio.
Overdrive–20 amp., at overdrive relay.
Heater–14 amp. in lead to heater.
HORNS: Auto-Lite HAB-4603 (Low Pitch), HAB-4604 (High Pitch).

ENGINE

►*THREE DIFFERENT ENGINES USED AS FOLLOWS:*

6 CYL. "L" HEAD (6226 ENG.)

Bore–3-5/16", **Stroke**–4-3/8".
Displacement–226.2 cu. ins. **Rated HP**–26.3.
Developed Horsepower–115 at 3650 RPM.
Compression Ratio–7.3-1.

►*FOR ALL OTHER ENGINE DATA SEE WILLYS PASS. CAR (FOLLOWING).*

4 CYL. "F" HEAD (475 ENG.)

Bore–3 1/8". **Stroke**–4 3/8".
Displacement–134.3 cu. ins. **Rated HP**–15.63.
Developed Horsepower–75 at 4000 RPM.
Compression Ratio–6.9-1 (Std.). 7.4-1 (Optional).

►*FOR ALL OTHER ENGINE DATA SEE 1952-55 CJ-3A, CJ-3B, CJ-5 JEEP PAGES.*

6 CYL. "F" HEAD (685 ENG.)

Bore	Stroke	Displmnt.
3 1/8"	3½"	161 Cu. Ins.

Compr. Ratio	Rated HP	Developed HP
7.6-1	23.44	90 at 4200 RPM

Compression & Vacuum Reading–See *TUNE-UP.*

►*ENGINE NUMBER NOTE:* Letters following engine number denote the following:
"A" .010" Undersize main and connecting rod journals.
"B" .010" Oversize cylinder bore and pistons.
"AB" both above conditions exist.

CYLINDER HEAD & GASKETS: See *"Cylinder Head & Manifolds" in Willys Special Data.*
TIGHTENING TORQUES: See *"Tightening Specifications" in Willys Special Data.*

PISTONS

Aluminum alloy, cam ground, T slot, Tin or Brass plated.
►*PISTON OVERSIZE NOTE:* Letter "B" or "AB" following engine number indicates that cylinder bore and pistons are .010" Oversize.
Weight–10.9 ozs.
Removal–Pistons and rods removed from above.
Fitting New Pistons: Place .003 x 1/2" ribbon feeler between thrust side of piston and cylinder wall. Pull required to remove ribbon feeler should be 5 to 10 lbs.
Replacement Pistons: Std. and .010", .020", .030" and .040" Oversize.
Installing Pistons: "T" slot toward valve (left side) of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON PINS

Locked in rod with clamp screw.
Diameter–.7496-.7498".
Clearance in Piston–*.0000-.0004" max.* Push fit at 70° F.
Replacement Pins: Not furnished separately.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (Top)	3/32"	.007-.023"	.002-.004"
Compr. (2nd)	3/32"	.007-.023"	.0015-.0035"
Oil	3/16"	.007-.023"	.001-.0025"

Replacement Rings: Ring sets furnished in following sizes for oversize noted: Standard (0-.010" O.S.), .020" O.S. (.011-.024"), .030" O.S. (.025-.034"), .040" O.S. (.035-.049").
Installing Rings: Compression ring marked "Top" (on side of ring) and bevel on inner edge must be up.

CONNECTING RODS

Length–6.345" (Center to Center).
Crankpin Journal Diameter–1.875".
►*JOURNAL DIAMETER UNDERSIZE NOTE:* The letter "A" or "AB" following engine number indicates that main and connecting rod journals are .010" Undersize.
Bearings–Steel Backed Babbitt.
Clearance–.0001-.0025". **Side Play**–.004-.010".
Replacement Bearings: Std., .001", .002", .010", .011", .012", .020" and .030" Undersize.
Installing Rods: Rods not offset. Install with spray hole in lower end toward right side (away from camshaft) on all rods.

CRANKSHAFT

Journal Diameter–2.25" all bearings.
►*JOURNAL DIAMETER UNDERSIZE NOTE:* The letter "A" or "AB" following the engine number indicates that the main and connecting rod journals are .010" Undersize.
Bearings–Steel Backed Babbitt.
Clearance–.0009-.003".
Replacement Bearings: Std., .001", .002", .010", .011", .012", .020" and .030" Undersize.
End Thrust: Taken by No. 1 (front main bearing), and thrust washer in back of crankshaft gear. Adjusted by removing or adding shims behind thrust washer. Shims furnished .002" thick.
NOTE–Crankshaft gear must be removed with gear puller for end play adjustment.
End Play–.004-.006".
Crankshaft Rear Main Bearing Oil Seal: See *"Front & Rear Filler Blocks" under "Crankshaft & Main Bearings" in Willys Special Data.*

CAMSHAFT

Journal Diameters–(1) 1.8770-1.8765", (2) 1.8445-1.8435", (3) 1.8130-1.8120", (4) 1.6260-1.6255".
►*CAUTION: 675-B and 685-B camshafts not interchangeable.*
Bearings–#1 steel backed babbitt. #2, 3, & 4 cast iron.
Clearance–.001-.0025".
End Thrust: Taken by thrust plate behind camshaft gear with spacer assembled behind plate. If end thrust not within these limits, replace timing gear and thrust plate. Dressing face of thrust plate may be required to reduce thickness for correct clearance.
End Play–.004-.007".
Timing Gears: Crankshaft gear Cast Iron, Camshaft gear fibre.
Gear Backlash–*.000-.002".*
Camshaft Setting: Mesh marked tooth of camshaft gear with marked space (between teeth) on crankshaft gear.
Engine Front Cover Oil Seal (Crankshaft Front Seal): See *"Engine Front Cover" in Willys Special Data.*

VALVES

Tappet Clearance: Intake .018", Exhaust .016" Cold.

Valve	Head Diam.	Stem Diam.	Length
Intake	1 3/4"	.3733-.3738"	4 17/32"
Exhaust	1 9/32"	.3395-.3405"	4 5/8"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	260"	.0007-.0022"
Exhaust	45°	360"	.0025-.0045"

►*EXHAUST VALVE NOTE:* Thompson type rotators used on exhaust valves.
Valve Seat Width: 3/64" (All valves).
Valve Springs: Intake & Exhaust springs not interchangeable. See table below.

Valve Spring Specifications

Valve	Intake	Exhaust
Closed	73 lbs. at 1.66"	50 lbs. at 1 5/8"
Open	153 lbs. at 1.40"	105 lbs. at 1 21/64"

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Free Length—1.968" (Intake), 1.890" (Exhaust).
Valve Guides: Removable type. Drive guides out with Tool W-240. To install, use Tool W-240 with correct adaptors and drive guides into head and cylinder block until top of guide is 7/8" from top of valve seat (taper end toward seat).
Rocker Arm Assembly Removal: *See "Valve System" in Willys Special Data.*
Valve Lifters: Mushroom type, in reamed holes in block. Service by installing oversize lifters.
Lifter Removal—Camshaft must be removed first. *See "Camshaft & Bearings" in Willys Special Data.*
Lifter Diameter—.6240-.6245". **Length**—2".
Clearance in Block—.0005-.002".

VALVE TIMING

See "Camshaft Setting" under Camshaft.
Intake Valves—Open 9° BTDC. Close 50° ALDC.
Exhaust Valves—Open 47° BLDC. Close 12° ATDC.
NOTE—Set Intake valve tappet for timing .026" Cold.
Valve Timing Check—Set Intake tappet clearance as given above with tappet resting on low side of cam lobe. Rotate crankshaft until No. 1 piston is coming toward top of cylinder on Exhaust stroke, then continue to rotate crankshaft until the 9° BTDC mark on dampener is aligned with pointer on timing gear case. With crankshaft in this position No. 1 Intake tappet should be JUST TIGHT against valve stem if timing is correct. Reset tappet clearance to .018". *See "Camshaft Setting" under Camshaft.*

OILING SYSTEM

Crankcase Capacity: 4 quarts.
Normal Oil Pressure: 35 lbs. at 30 MPH (2000 RPM).
Pressure Regulator—Under plug on side of pump housing. Adjust to 35 lbs. pressure by adding or removing shims located above spring in plug.
Oil Pressure Indicator: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 45729.
Engine Unit—K-S No. 44030.
See "Oil Pressure Gauges" in Miscellaneous Section.
Oil Pump: Rotor type. On left side of crankcase.
Pump Overhaul—*See "Oil Pump" in Willys Special Data.*
Oil Filter: Fram or Purolator. Located on cylinder head bracket at right front corner of cylinder head with oil outlet connected to timing gear cover.

COOLING

Water Capacity: 12 quarts. Add 1 quart for heater.
Pressure Valve: Radiator filler cap. Opens at 7 lbs.
Thermostat: Harrison. In water outlet elbow in cylinder head. Opens at 163-168°.
Water Pump: Centrifugal, packless, ball bearing type.
See "Willys" in Water Pump Section.
Temperature Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—K-S No. 45734.
Engine Unit—K-S No. 44220.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Rockford 8½ RM, Auburn 8501-39, Borg & Beck 10A7, Single Plate type. Use as follows:
475 & 685 Engines—Rockford 8½ RM or Auburn 8501-39.
6226 Engine—Borg & Beck 10A7. Assembly No. 982.
See Clutch Section for complete data.
Clutch Disc—As follows: *(NOTE—Borg & Beck Clutch Disc used with Rockford Clutch).*

Engine	Borg & Beck No.	Auburn No.
475	381580	100020
685	382113 & 382231	100043
6226	381806	

Pedal Adjustment: 1¼" free travel (475 & 685 Engines). 1" free travel (6226 Engine). Loosen two locknuts on pedal adjusting link and adjust as necessary.
Removal: Remove transmission (and transfer case on 4-wheel drive models). See Transmission Removal (below). Remove flywheel bellhousing. Mark clutch and flywheel for installation in the same position. Remove clutch cover screws evenly to remove spring pressure, then remove clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

4 WHL. DRIVE

Warner AS1-T90J (6226 Eng.), **AS1-T90C** (475 Eng.). Three speed type. Constant mesh, synchro-mesh, helical gears (second & high), sliding spur gear (low & reverse).
See "Warner Transmissions" in Transmission Section.
Transfer Case: Spicer or Warner. Two speed auxiliary transmission and front wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front wheel drive engagement (left hand lever).
See Transmission Section for complete data.
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
Removal: (4 Whl. Drive) Transmission and transfer case are removed as an assembly. Disconnect front and rear propeller shafts at universal joints *(NOTE*—If equipped with Power Take-off drive, remove front end of power take-off propeller shaft assembly). Disconnect speedometer cable at transfer case, brake cable, and clutch release cable at cross shaft bell crank (Jeep). Place support jacks under engine and transmission, remove transfer case rubber snubber bolt nut (on right side) and rear mounting bolt nuts at cross member under transmission case. Remove floor board inspection plate. Drain radiator and loosen upper radiator hose. Remove transfer case shift lever pivot pin screw, remove pin and shift levers *(NOTE*—If Power Take-off used, remove power take-off shift lever plate screws and lift lever out). Remove bolts holding center cross-member at frame side rails and remove cross-member *(CAUTION* -With cross-member removed, engine and transmission weight will rest on support jacks). Remove bolts holding transmission on bell housing, force transmission to right until ball stud end can be disengaged from end of clutch control cross shaft. Lower support jacks under engine and transmission and slide transmission and transfer case assembly to rear until clutch shaft clears bell housing, remove assembly from beneath car.

2-WHL. DRIVE

Warner AS50-T96 with Overdrive (685 Engine). Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear type.
Transmission Control: Remote control type with gear-shift lever on steering column. *See "Transmission Controls" in Transmission Section.*
Removal: (2 Whl. Drive) Remove floor boards, take off bell housing inspection cover, disconnect clutch throw-out bearing retracting spring. Disconnect transmission control rods and speedometer cable at transmission case. Disconnect propeller shaft at universal joints and remove shaft. Support engine with jack placed under bell housing, remove rear engine support bolts from cross-member under transmission case, raise rear end of engine so transmission clears cross-member *(CAUTION* –Use care that fan blades do not damage radiator). Remove transmission bell housing bolts, pull transmission straight back to clear clutch shaft, remove from car.

OVERDRIVE

Warner R10. Part of transmission assembly. *NOTE—Lockout Switch not used on 1955 models.*
See "Warner R10 Overdrive" in Transmission Section.
Overdrive Controls: *See "Warner R10 & R11 Overdrive Controls" in Transmission Section.*
Removal: Same as for standard transmission after control wiring and cables removed.

UNIVERSALS

2-WHL. DRIVE

Spicer (Cross) or Detroit (Ball & Trunnion). One at each end of propeller shaft.

4 WHL. DRIVE

Drive Shaft Joints—Spicer (Cross) One used at front and rear of both front and rear propeller shafts.
Front Axle Shaft Joint—Rzeppa Constant Velocity type. One joint used at outer end of each shaft (within steering knuckle housing).
See "Universal Joints" in Willys Special Data.
Power Take-off Shaft Joints—Detroit Ball-and-Trunnion type. Two used (one at each end of shaft-no splined joint used).

FRONT AXLE

4 WHL. DRIVE

Spicer (Salisbury) Model 25. Full floating, Hypoid gear type. Differential assembly (ring and pinion gear assembly) is serviced in same manner as Spicer Rear Axles.
See "Spicer(Salisbury)" in Rear Axle Section.
Ratio—5.38-1 (Exc. 6226-4X4SW, 4WD). 4.88-1 (6226-4X4SW, 4WD).
Backlash—.004-.007". Shim Adjustment.
Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and

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steering linkage (at idler lever on frame front cross member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear end of springs and lower springs, remove axle assembly from beneath car.

Axle Shaft & Universal Joint Assy. Removal: Remove wheel, hub cap, axle shaft nut and washer. Take out drive flange cap screws and remove flange with puller, (*CAUTION*–do not lose shim pack under drive flange). Bend lip of bearing adjusting nut lockwasher out, remove locknut, lockwasher, adjusting nut, and bearing locking washer. Remove wheel hub and bearing assembly.((*CAUTION*–use care not to damage oil seal). Disconnect brake tube, take out mounting screws on backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal joint assembly out of housing.

►*INSTALLATION CAUTION:* Adjust front wheel bearings and bleed brakes after installation completed.

Wheel Bearing Adjustment: *See "Front Axle" in Willys Special Data.*

Steering Knuckle Bearing Disassembly & Adjustment: *See "Front Axle" in Willys Special Data.*

REAR AXLE

Spicer Model 44-2 (Exc. 475-4WD & 6226-4WD). Model 53 (475-4WD & 6226-4WD). Semi-floating hypoid gear type with Hotchkiss drive.

►*TIMKEN SPIRAL BEVEL REAR AXLE NOTE: These used intermittantly in production on 4-WD Trucks. See "Timken Rear Axle" in Rear Axle Section.*

See "Spicer Hypoid Semi-Floating" or "Timken Semi-Floating" in Rear Axle Section.

Axle Ratios

Model	Std. Trans.	O.D. Trans.
2-Wheel Drive	4.88-1	©4.88-1
4 Cyl. 4-Wheel Drive	5.38-1	
6 Cyl. 4-Wheel Drive	4.88-1©	

©–5.38-1 Optional.

Backlash–.004-.007". Shim adjusted.

Axle Shaft Removal: *See "Spicer Hypoid Semi-Floating" in Rear Axle Section.*

Rear Axle Assembly Removal: Support rear end of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs. Remove axle assembly from beneath car.

Wheel Bearing Adjustment: End Play .003-.007". Adjust by adding or removing shims between backing plate and axle housing flange at each wheel. See "Axle Shaft Removal" above.

SHOCK ABSORBERS

Monroe or Gabriel. Direct acting type.

FRONT SUSPENSION

2 WHL. DRIVE

Planadyne Type. Independent, linked parallelogram type with transverse spring (spring acts as lower control arm).

See "Willys Front Suspension" in Front Suspension Section.

Kingpin Inclination–5° crosswise.

Caster–1° No adjustment.

Camber–1°.

Toe-in–1/16-1/8". *See "Willys Planadyne" in Front Suspension Section for Toe-in Adjustments.*

4 WHL. DRIVE

Special front-wheel drive unit with semi-elliptic springs. Steering knuckle mounted on taper roller bearings carried on two stub shafts.

End Play–.001-.003".

Kingpin Inclination–7-1/2°.

Caster–3°. No adjustment. If caster incorrect, check front end, correct by installing new parts.

Camber–1-1/2°. No adjustment. Correct by installing new parts. Do not attempt to correct camber by cold bending or heating of parts.

Toe-in–3/64-3/32". (1/32" each wheel) To adjust first set each front wheel straight ahead (see note below), then set toe-in by shortening each tie rod approximately 1/2 turn. This procedure necessary to maintain correct position of steering idler arm.

NOTE–To set front wheels straight ahead, first set tie rod end of steering bell crank (idler lever on frame cross member) exactly at right angles to front axle. Check front wheels by using a straight edge or sighting along rear and front wheels. Adjust each tie rod (loosen end clamp bolts and turn rod) until front wheels are exactly straight ahead. Then make toe-in adjustment as directed above. Tie rod lengths between ball end centers should be 20-7/8"(left), 25-5/8"(right).

Toe-Out on Turns–With inner wheel turned 20°, outer wheel should be turned exactly 19°.

STEERING

Ross T-12, No. 13108. Cam & *Twin* Lever type.
See "Ross Cam & Twin Lever" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" in Steering Section.*

BRAKES

Bendix-Lockheed (Self-Centering). Without anchor pin adjustment. Hand lever applies rear service brakes (Exc. Jeep). Independent brake on drive shaft at rear of transfer case (Jeep).

See "Bendix-Lockheed (Self-Centering)" in Brake Section.

Drums–Diameter 10"(2-Whl.Drive); 11" (4-Whl. Drove).

Wheel Cylinder Diameter–(Front) 1 1/8". (Rear) 1".

Model	Lining Length Primary	Secondary
2 Whl. Drive	10 11/16"	8 5/8"
4 Whl. Drive	12 1/4"	10"

Thickness–.212" (2 Whl. Drive); .187" (4 Whl. Drive).

Width–1¾" (2-Whl. Drive); 2" (4-Whl. Drive).

Braking Power–Front 65%. Rear 35% (2-Whl. Drive); Front 57%. Rear 43% (4-Whl. Drive).

Clearance–.005-.008" all models.

MISC. MECHANICAL

Windshield Wipers: Vacuum type. Single motor operates wiper arms by cable control.
See "Windshield Wipers" in Miscellaneous Section.

MODEL IDENTIFICATION

Model	Engine
1954 675-B Aero Lark	6 Cyl. "L" Head
1954 685-B Aero Lark	6 Cyl. "F" Head
1954 685-B Aero Eagle	6 Cyl. "F" Head
1954 685-B Aero Ace	6 Cyl. "F" Head
1954 6-226 Eagle	6 Cyl. "L" Head
1954 6-226 Ace	6 Cyl. "L" Head
1955 6-226-A Bermuda	①6 Cyl. "L" Head
1955 6-226-A Custom	①6 Cyl. "L" Head

①—1955 Model Designation as follows: 52567 (Bermuda), 52367 (Custom).

SERIAL NUMBER: Located on left front door pillar. **Starting Serial Number—10001 up.**

ENGINE NUMBER: Stamped on engine block as follows:
685-B & 6-226 Engines—Stamped at right top of cylinder block near the front.
675-B Engine—Stamped either on top of the water pump boss or on right side of cylinder block at upper front.

►*ENGINE NUMBER NOTE:* Letters following engine number denote the following:
"A" .010" undersize main and connecting rod journals.
"B" .010" oversize cylinder bore and pistons.
"AB" both conditions above exist.

TUNE-UP

COMPRESSION PRESSURE: (675B) 135 lbs. at 185 RPM., (685B) 155 lbs. at 185 RPM., (6226) 120 lbs. at 70 RPM.

VACUUM READING: Steady 17-21" at idling speed.

VALVE TAPPET CLEARANCE: Set all tappets cold as follows:

Engine	Intake	Exhaust
6226	.014"	.014"
675B	.016"	.016"
685B	.018"	.016"

MANIFOLD HEAT CONTROL: (675B) Automatic thermostatic type (no adjustment). (685B) None (water thermostat controlled). (6226) None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUG GAP: .030".
Spark Plug—Champion J8, 14 mm.

COIL: Auto-Lite CR-6009.
Ignition Current—2.5 amperes idling, 5 amperes at 6.3 volts stopped.

DISTRIBUTOR: Auto-Lite IAT-4017A (675-B & 685-B); IAT-4019 (1954 6-226); IAT-4206 (1955 6-226-A).
Condenser (IAT-4017A & 4019)—IAT-3076L. **Capacity** .23-.25 mfd.
Condenser (IAT-4206)—IAT-2015L. **Capacity** .21-.25 mfd.
Contact Point Set—Auto-Lite IGW-3028AS.
Breaker Gap—.020".
Cam Angle—39°±3°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance (IAT-4017A)

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
1	400	2	800
4	725	8	1450
8	1150	16	2300
9.5	1300	19	2600

Automatic Advance (IAT-4019 & 4206)

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	325	0	650
1	450	2	900
6.5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Vacuum Spark Control: Auto-Lite IAT-2023LE (IAT-4017A Distr.), Auto-Lite IAT-2023LD (IAT-4019 Distr.).

Vacuum Advance (IAT-4017A)

Distr. Degrees	Engine Degrees	Vacuum ("of HG)
Start	0	5-1/8
1	2	6-5/8
3	6	9-5/8
5	10	12-1/2
6	12	14

Vacuum Advance (IAT-4019 & 4206)

Distr. Degrees	Engine Degrees	Vacuum ("of HG)
Start	0	10
1	2	11
3	6	13
4	8	14
5	10	15

IGNITION TIMING

Setting—5° BTDC (Exc. 6-226 Eng.). 4° BTDC (6-226 Eng.).
Timing Mark—On Vibration Damper. Vibration Damper marked "0" at TDC with 1° graduations before and after this point. Align correct graduation with pointer on timing cover.

CARBURETOR

Car Model	Carter Carburetor No.
675B	YF 937S
685B	YF 2071S
6226	WGD 2052S, SA

CARTER YF

Idle Setting—3/4—1-3/4 turns open (937S), 1-2 turns open (2071S). Turn screw out for richer mixture.
Idle Speed—575 RPM.
Float Level—(937S) 5/16", (2071S) 9/32" from top of float at free end to gasket seat on cover with assembly inverted and float resting freely on seated needle.
CAUTION—Do not compress spring in intake needle.
Accelerating Pump—No seasonal adjustment.
Fast Idle: With choke held in wide open position, lip on fast idle arm should contact boss on body casting. Adjust by bending at offset of fast idle link.
Automatic Choke Setting: None, Manual Choke.
►*OTHER DATA: See "Carter YF" in Carburetor Section.*
Fuel Pump Pressure: 5 lbs. Max. at 1800 RPM.

CARTER WGD

Idle Setting—1/2—1-1/2 turns open. Turn out for richer mixture.
Idle Speed—550 RPM Std. Trans., 425-450 RPM Hydra-Matic.
Float Level—9/32" between top of float and bowl cover with gasket removed and cover inverted.
Accelerating Pump—No seasonal adjustment.
Fast Idle—.018-.023" throttle valve opening (Gauge T109-29) with choke closed and thermostatic coil housing, gasket, and baffle plate removed.
Automatic Choke Setting: Set two points rich.
►*OTHER DATA. See "Carter WGD" in Carburetor Section.*
Fuel Pump Pressure: 5 lbs. Max. at 1800 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter 794S (675 & 685B). Carter M957S (6226).
Pressure—5 lbs. at 1800 RPM.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: King-Seeley "CV" (Constant Voltage) electric type with voltage regulator.
Dash Unit—King-Seeley 46663.
Tank Unit—K-S No. 44506 (1954); No. 44521 (1955).
Regulator—K-S No. VR-46667.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Auto-Lite or Willard. 6 Volt, 15 plate, 90 Ampere (20 hr. rate).
Battery Ground—Negative (—) terminal.
Engine Ground—Strap from engine to frame at right front engine mounting.

STARTER

Auto-Lite Number	Starter	Armature
675B & 685B	MCH-6203	MCH-2088
6226 (Synchro-mesh)	MCH-6210	MCH-2012BS
6226 (Hydra-Matic)	MCH-6211	MCH-2012BS

Drive—Bendix A3281 "Folo-Thru" type.
Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—42-53 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4300	5.0	65
6.0 ft. lbs.	Lock	2.0	335

Starting Switch: Auto-Lite SST-4012. Key starting (magnetic switch) controlled by turning key past "ignition on" position.

GENERATOR

Auto-Lite GGW-4801D (675B & 685B Eng.), **GGW-4801EN** (6226 Eng.).
Armature—Auto-Lite GGW-2006F (All models).

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Performance Data

Amperes	Volts	Cold -RPM-	Hot
0	6.4	870-970	950-1050
40.0	8.0	1800-2000	2150-2350
45.0	8.0	1925-2125	2350-2550

Brush Spring Tension–35-53 ozs.
Field Current–1.4-1.5 amperes at 5.0 volts.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: 1/2-5/8" deflection with thumb pressure midway between generator and pump pulleys.

REGULATOR

Auto-Lite VBE-6105A. Voltage & Current type with "Temperature Compensated" Current Regulator.

Cutout Relay

Cuts In–6.3-6.8 Volts (Set to 6.4-6.6 Volts).
Cuts Out–4.1-4.8 Volts (4.6 amps. discharge).
Contact Gap–.015" minimum.
Air Gap–.031-.034 with contacts open (check at hinge end of core).

Voltage Regulator

Setting–7.2-7.5 Volts at 70° F *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap–.048-.052" *with contacts just touching.*
Checking & Adjusting–*See Electrical Equip. Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A – Operating Amperes –	Test B
VBE 6105A	52	45 (43-47)

Test A–After 15 minutes operation with current at 1/2 maximum rate.
Test B–After 15 minutes additional operation with current regulator operating (load applied to hold to 6.7-6.9 volts).
Air Gap–.048-.052" with contacts just touching.
Checking & Adjusting–*See Electrical Equip. Section.*

MISC. ELECTRICAL

Head Lamps: Sealed Beam. *See Electrical Equip. Section.*
Directional Signals: *See Electrical Equip. Section.*
Lighting Switch Removal: *Loosen set screw on side of* control knob and remove knob. Remove retaining nut and push switch through panel.
Stop Light Switch Location: Located in front end of brake Master Cylinder.
CIRCUIT BREAKER: 30 ampere. Thermal type on light switch.
HORNS: **Auto-Lite HAB-4603** (Low Pitch), **HAB-4604** (High Pitch).

ENGINE

►*THREE DIFFERENT ENGINES USED AS FOLLOWS:*

6 CYL. "L" HEAD (675-B ENG.)

Bore–3 1/8". **Stroke**–3 1/2".
Displacement–161 cu. ins. **Rated HP**–23.44.
Developed Horsepower–75 at 4000 RPM.
Compression Ratio–6.9-1.
Compression & Vacuum Reading–*See TUNE-UP.*
►*FOR ALL OTHER ENGINE DATA SEE 1952-53 WILLYS PASSENGER CAR PAGES.*

6 CYL. "F" HEAD (685-B ENG.)

Bore–3 1/8". **Stroke**–3 1/2".
Displacement–161 cu. ins. **Rated HP**–23.44.
Developed Horsepower–90 at 4200 RPM.
Compression Ratio–7.6-1
Compression & Vacuum Reading–*See TUNE-UP.*
►*FOR ALL OTHER ENGINE DATA SEE 1952-53 WILLYS PASSENGER CAR PAGES.*

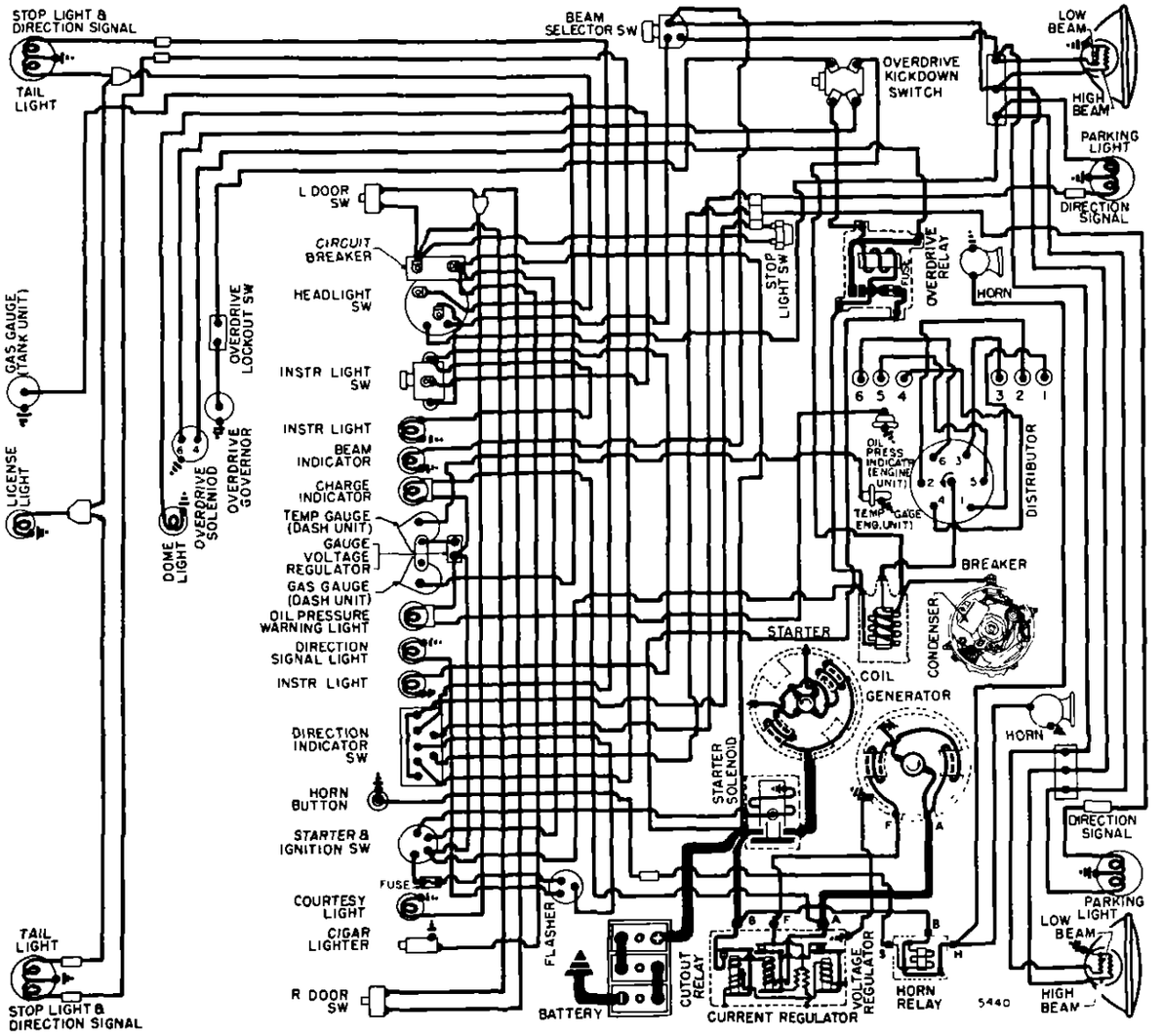
6 CYL. "L" HEAD (6-226 & 6-226-A ENG.)

ENGINE SPECIFICATIONS: 6 cyl. "L" head.
Bore–3-5/16". **Stroke**–4-3/8".
Displacement–226.2 cu. ins. **Rated HP.**–26.3
Developed Horsepower–115 at 3650 RPM.
Compression Ratio–7.3-1.
Compression & Vacuum Reading–*See TUNE-UP above.*
►*ENGINE NUMBER NOTE:* Letters following engine number denote the following:
"A" .010" Undersize main and connecting rod journals.
"B" .010" Oversize cylinder bore and pistons.
"AB" both above conditions exist.

CYLINDER HEAD & GASKET INSTALLATIONS: *See Willys Special Data.*

TIGHTENING TORQUES: *See Willys Special Data.*

CONTINUED ON NEXT PAGE



MODELS WITH 675-B & 685-B ENGINES

CONTINUED FROM PRECEDING PAGE

PISTONS

Aluminum alloy, steel band, T-slot Cam Ground, Tin Plated.

►*PISTON OVERSIZE NOTE:* Letter "B" or "AB" following engine number indicates that cylinder bore and pistons are .010" Oversize.

Weight—15.312 ozs. Less rings and pin.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Place .0015" x 2" ribbon feeler between thrust side of piston and cylinder wall. Pull required to remove feeler should be 5 to 10 lbs.

Piston Replacement—Std., .010", .020", .025", .030", .040", .050", and .060" Oversize.

Installing Pistons: Slot in skirt toward left or away from camshaft.

PISTON PINS

Floating type with lock ring at each end.

Diameter—.8591-.8593".

Clearance in Piston—.0001" (Selective Fit).

Replacement Pins: Std., .003" and .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (Upper)	.0925-.0935"	.008-.016"	.002-.004"
Compr. (Lower)	.0925-.0935"	.008-.016"	.003-.007"
Oil (Top ring)	.1545-.1555"	.008-.016"	.006-.010"
Oil (Bottom ring)	.1545-.1555"	.008-.016"	.0025-.004"

Replacement Rings: Ring sets and single rings furnished in following sizes for oversize ranges indicated: Std. (Std.-.009"), .020" (.010-.029"), .030" (.030-.039"), .040" (.040-.049"), .060" (.050-.069").

Installing Rings: Side marked "Top" (compression rings) upward. Chrome plated ring must be installed in top (#1) ring groove.

CONNECTING RODS

Length—6.998"-7.002" (Center to center).

Crankpin Journal Diameter—2.0619-2.0627".

►*JOURNAL DIAMETER UNDERSIZE NOTE:* The letter "A" or "AB" following engine number indicates that the main and connecting rod journals are .010" Undersize.

Bearings—Steel Backed Babbitt.

Clearance—.0005-.0015". **Side Play**—.006-.011".

Replacement Bearings: Std. and .001", .002", .010" and .012" Undersize.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. *NOTE*—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 forward), (#2, 4, 6 toward rear).

CRANKSHAFT

Journal Diameter—2.3744-2.3752".

►*JOURNAL DIAMETER UNDERSIZE NOTE:* The letter "A" or "AB" following the engine number indicates that the main and connecting rod journals are .010" Undersize.

Bearings—Steel Backed Babbitt.

Clearance—.0005-.0015".

Replacement Bearings: Std. and .001", .002", .010" and .012" Undersize.

End Thrust: Taken by #4 rear main bearing which is flanged type.

End Play—.002-.006".

Rear Bearing Oil Seal Installation: *See "Crankshaft and Main Bearings" in Willys Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.8725-1.8735". (2) 1.8095-1.8105". (3) 1.7472-1.7485". (4) 1.2475-1.2485".

Bearings—Steel Backed Babbitt.

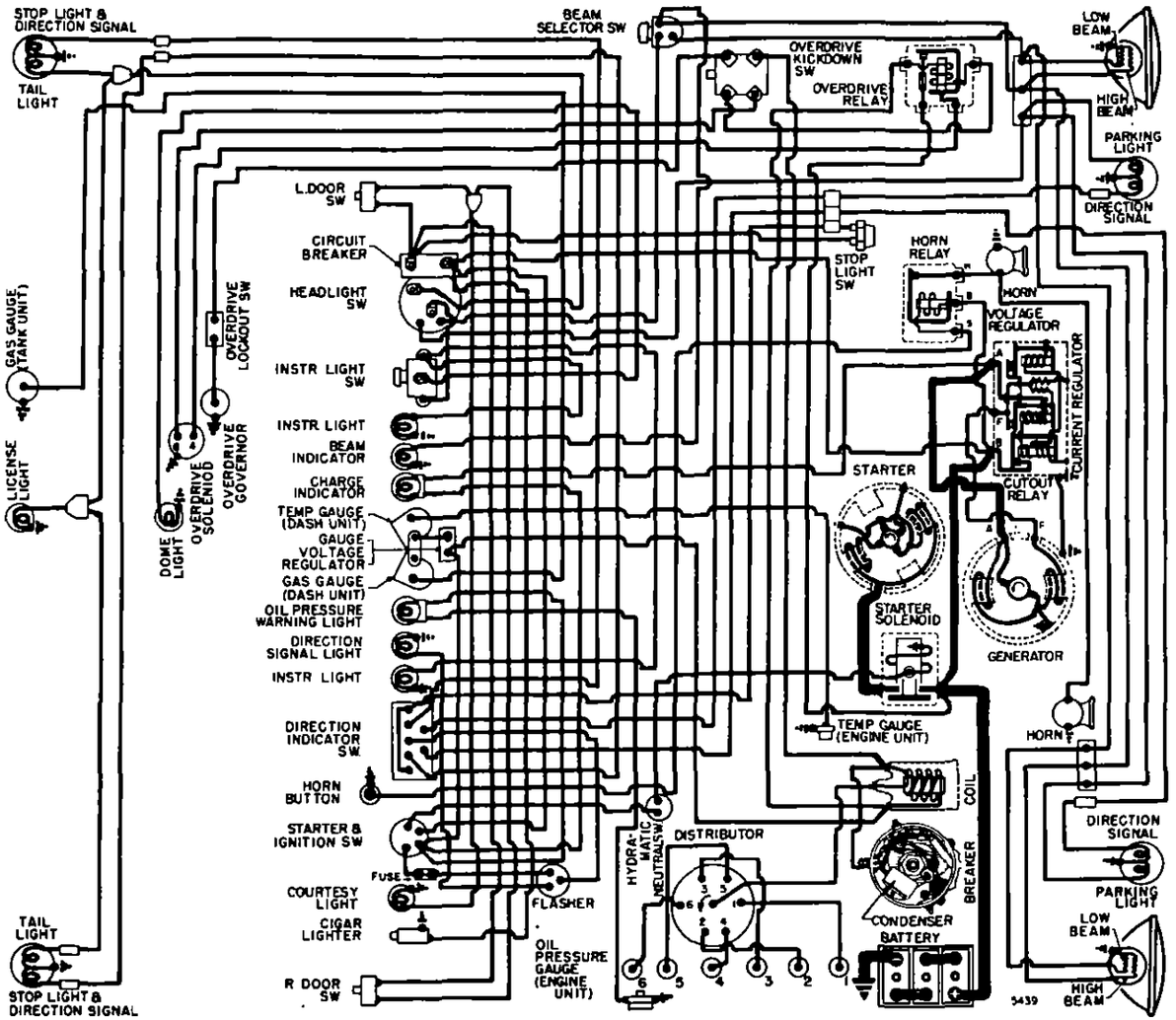
Clearance—.001-.003".

End Thrust: Taken by thrust plate on front of engine (between front bearing journal and hub of sprocket).

End Play—.003-.007".

Timing Chain: Non-adjustable type. Width 1". Pitch .500". Length 23" or 46 links.

►*TIMING CHAIN CAUTION: Morse and Link Belt chains used. Chains and sprocket interchangeable only in COMPLETE SETS.*



MODELS WITH 6-226 ENGINE

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Camshaft Setting: Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES

Tappet Clearance: Intake and Exhaust .014" Cold.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.520"	.3406-.3414"	5.190"
Exhaust	1.328"	.3382-.3390"	5.200"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.3520"	.001-.003"
Exhaust	45°	.3315"	.0032-.0052"

Valve Seat Width: 5/64-3/32" (intake), 3/32-7/64" (exhaust).

NOTE–Rotators used on Exhaust valves.

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides to inside diameter of .3432-3422".

Replacement Guides–Std., .0005" (marked "A"), .0055" (marked "L") to insure .0005-.003" press fit.

Guide Installation–Place guide (tapered end of guide toward top) in position in bore and drive in to correct position of 1-7/32" below top face of cylinder block.

Valve Springs: Intake & Exhaust valve spring interchangeable.

Free Length–1-31/32".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	51	1.672"
Open	118	1.312"

Valve Lifters: Mushroom type with self locking adjusting screws.

Diameter–.6855-.6860".

Clearance–Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.

Replacement Lifters–Furnished in Std. and the following oversizes marked as indicated: "B" is .001", "D" is .002", and "K" is .005" O.S.

VALVE TIMING

See *"Camshaft Setting" under CAMSHAFT above.*

Intake Valves–Open 10° BTDC. Close 60° ALDC.

Exhaust Valves–Open 55° BLDC. Close 10° ATDC.

Valve Timing Check–With .020" tappet clearance, #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark after top dead center "0" mark on dampener aligned with pointer at front of engine. Reset tappet to .014" clearance COLD.

OILING SYSTEM

Crankcase Capacity: 5 quarts.

Normal Oil Pressure: 20 lbs. at 2000 RPM. 6 lbs. at idle.

Pressure Regulator Valve–Located on oil pump housing. Adjustable by removing or adding shims from above spring within plug.

Oil Pressure Indicator–King-Seeley electric type oil pressure switch, operates light on instrument panel.

Dash Unit–Warning indicator light used. Light goes on when ignition switch turned on, and goes out when oil pressure rises.

Engine Unit–King-Seeley 47150.

Oil Pump: Internal rotor type. Mounted externally on left side of crankcase (675-B & 685-B). Attached to rear intermediate main bearing cap (6226).

Pump Overhaul–*See Willys Special Data.*

Oil Filter: Fram or Purolator. Located left side of engine (6226) right side of engine (675-B) on top of rocker arm cover (685-B). Replace cartridge every 8000 miles or more often should vehicle be operated under dusty conditions.

Crankcase Ventilation: Filter in Oil filler cap and ventilator tube attached to valve cover.

COOLING

Water Capacity: 11 qts. (675-B & 685-B); 13 qts. (6-226 & 6-226-A). Add 1 qt. for heater.

Pressure Valve–4 lbs. (675-B, 685-B). 7 lbs. (6226). Radiator filler cap.

Thermostat: Harrison (675-B & 685-B). Dole (6226) choke type. Harrison opens at 151°. Dole opens at 148-150°.

Water Pump: Centrifugal, prelubricated ball bearing. *See "Willys" in Water Pump Section.*

Pump Removal–675-B & 685-B) Remove fan belt, blades and pulley. Remove water pump to motor attaching bolts. **(6226)** Remove generator adjusting link (by removing pump bolt). Remove fan belt and remaining pump mounting bolts and remove pump.

Temperature Gauge: King-Seeley "CV" (Constant Voltage) electric type.

Dash Unit–K-S No. 46665.

Engine Unit–K-S No. 44200 (1954); No. 44214 (1955).

Regulator–K-S No. VR-46667.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Rockford 8-1/2 RM, Auburn 8501-39, Borg & Beck 10A7. Single plate type. Used as follows:

(675-B & 685-B) Rockford 8-1/2 RM or Auburn 8501-39.

(6226) Borg & Beck 10A7. Assy. No. 982.

See Clutch Section for complete data.

Pedal Adjustment: (675-B & 685-B) 1-1/2" free travel. Lengthen or shorten the clutch control rod by loosening locknut and screwing adjusting nut in or out as required. Tighten locknut.

Pedal Adjustment: (6226) 1" free travel. Loosen two locknuts on pedal adjusting link. Turn nuts forward to increase or backward to decrease free travel. Tighten locknut.

Removal: Remove transmission (see Transmission Removal), remove flywheel bell housing. Mark pressure plate and flywheel to insure correct installation. Take out mounting screws in clutch cover flange (turn screws out evenly), remove clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Numbers	Std. Trans.	Overdrive
(675-B & 685-B)	AS51-T96	AS50-T96
(6226)	AS71-T86E	

See "Warner Transmissions" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect remote control rods and the front universal joint companion flange at transmission. Disconnect speedometer cable at transmission and plug opening. Place a jack under flywheel housing to support engine weight and remove rear crossmember support with rubber insulators attached. Loosen the four transmission-to-bell housing bolts as far as possible and yet support transmission weight. Pull transmission back to bolt heads and insert a long screwdriver through opening in bell housing and pry the clutch release fork from engagement with bearing carrier. Place a jack under the engine for support when transmission removed, then remove transmission mounting bolts and remove transmission from car.

OVERDRIVE

Warner R10. Part of transmission assembly. *NOTE–Lockout Switch not used on 1955 models.*

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Controls: *See "Warner R10 & R11 Overdrive Controls" in Transmission Section.*

Removal: Same as for standard transmission after control wiring and cables removed.

HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with fluid coupling.

See "Hydra-Matic Drive" in Transmission Section.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING AND TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication–Check fluid level every 1,000 miles and drain and refill Torus cover and Oil Pan every 25,000 miles.

Capacity–11 quarts.

Checking Fluid Level–Check only when engine and transmission at operating temperature, with selector lever in "N" position and engine idling at 575 RPM. Remove access plate from right front floor pan, clean all dirt from around filler cap, check level as indicated on dipstick and maintain level to "F" mark.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer (Cross) (6226), **Detroit (Ball & Trunnion)** (675-B & 685-B). One at each end of propeller shaft.

REAR AXLE

Spicer Hypoid Semi-floating. *See "Spicer Hypoid Semi-floating" in Rear Axle Section.*

Axle Ratio

Model	Std. Trans.	Overdrive	Automatic
675-B, 685-B	4.1-1 (41-10)	4.56-1 (41-9)	
6226	3.54-1 (46-13)	4.1-1 (41-10)	3.31-1 (43-13)

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Rear Axle Ratio Note–Ratio is stamped on metal tag attached to rear axle cover.
Backlash–.004-.007". Shim adjusted.
Axle Shaft Removal: Remove wheel and hub assembly. Disconnect brake line at rear wheel cylinder, remove nuts on bolts holding backing plate and brake assembly on axle housing. Remove dust shield, oil seal, and backing plate and flange on housing. Remove axle shaft and wheel bearing.
Rear Axle Assembly Removal: Support rear of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line at "T" fitting on axle housing, rear brake cables and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of spring, lower springs, remove axle assembly from beneath car.
Wheel Bearing Adjustment: End play .003-.007". Adjust by adding or removing shims from between backing plate and axle housing flange, at each wheel.

SHOCK ABSORBERS

Monroe or Gabriel. Direct Acting. Service by replacement.

FRONT SUSPENSION

Independent. Linked parallelogram type, with coil springs and direct acting shock absorbers.
See "Willys Front Suspension" in Front Suspension Section.
King Pin Inclination–8-1/4° crosswise.
Caster–Pos. 1° ± 1/2°.
Camber–Pos. 1° ± 1/4°.
Toe-in–3/32-5/32".
Toe-out on Turns–Outside wheel at 19°, inside wheel 20°.

STEERING

Ross Cam & Twin Lever (Except Power Steering). *See "Ross Cam & Twin Lever" in Steering Section.*
Gemmer Worm & Roller (Power Steering). *See "Gemmer Worm & Roller" in Steering Section.*
Power Steering: Monroe Hydraulic (685-B & 6226) Linkage type.
See "Monroe Power Steering" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" or "Ross Cam & Twin Lever" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" or "Ross Cam & Twin Lever" in Steering Section.*

BRAKES

Bendix (Lockheed) Hydraulic. Self centering. Hand lever applies rear service brakes.
Drums–9".
Wheel Cylinder Diameter–Front 1-1/8", Rear 13/16".
Lining–Molded Asbestos.
Lining Specifications–As follows:

Shoe	Length	Width	Thickness
Primary	9-7/8"	2"	.214"
Secondary	7-11/16"	1-3/4"	.214"

Braking Power–65% front, 35% rear.
Clearance–.005-.008".

NOTE–No anchor pin adjustment provided. Brake shoes should be centralized by hard application (and then released) before adjustment made.
Master Cylinder: Located just ahead of brake pedal and filled from engine compartment.
Removal–Remove from engine compartment without disturbing other parts.
Checking Fluid–Check fluid level every 1,000 miles and keep full at all times.

MISC. MECHANICAL

Windshield Wipers: Vacuum type. *See Miscellaneous Section for complete data.*

EQUIPMENT INDEX

AIR CONDITIONING: Pag
SERVICE ITEMS
SERVICE CAUTIONS 470
TROUBLE SHOOTING 470
LEAK TESTS 470
CAR APPLICATION
Buick 475
Cadillac 475
Chevrolet 475
Chrysler 471
DeSoto 471
Dodge 471
Ford 473
Hudson 471
Lincoln 474
Mercury 474
Nash 471
Oldsmobile 475
Packard 475
Plymouth 471
Pontiac 475
Rambler 471
Studebaker ..... Pg. 500 in 1955 Annual Data or later Manual edition.

AUTOMATIC TRANSMISSIONS:
See *SEPARATE INDEX* 367

BRAKES:
See *SEPARATE INDEX* 301

CARBURETORS:
See *SEPARATE INDEX* 240

CLUTCHES:
See *SEPARATE INDEX* 324

ELECTRICAL EQUIPMENT:
Autronic Eye 297
Lincoln & Mercury Auto. Headlight Dimmer 297
Oldsmobile Temperature Indicator 297
Distributors:
Delco-Remy "Window" Type 294
Ford, Lincoln, Mercury "Loadomatic" 295
Regulators:
Auto-Lite 296
Delco-Remy 298
Ford, Lincoln, Mercury 300

SUSPENSIONS & WHEEL ALIGNMENT:
See *SEPARATE INDEX* 339

FRONT WHEEL DRIVE AXLE:
Willys (Spicer — See Rear Axle) 327

POWER BRAKES:
See *SEPARATE INDEX* 301

POWER STEERING:
See *SEPARATE INDEX* 346

Page
POWER SEAT CONTROLS:
Buick, Cadillac 6-Way 487
Buick, Cadillac 2-Way 488
Chevrolet 488
Chrysler, DeSoto, Dodge 488
Ford, Lincoln, Mercury 486
Oldsmobile 6-Way 487
Oldsmobile 2-Way 488
Packard 488
Plymouth 488
Pontiac 487
Studebaker 489

POWER TOP CONTROLS:
Motor & Pump (Rotor Type) 489
Buick 490
Cadillac 490
Chevrolet & Corvette 490
Chrysler, DeSoto, Dodge 492
Ford 492
Lincoln 491
Mercury 492
Oldsmobile 490
Packard 492
Plymouth 492
Pontiac 490

POWER WINDOW REGULATORS:
Buick 481
Cadillac 481
Chevrolet 481
Chrysler, DeSoto, Dodge 483
Ford 478
Hudson 485
Lincoln, Mercury 478
Nash 485
Oldsmobile 481
Packard 483
Plymouth 483
Pontiac 481
Studebaker 483

REAR AXLES:
See *SEPARATE INDEX* 327

STEERING GEARS:
See *SEPARATE INDEX* 346

TRANSMISSIONS:
See *SEPARATE INDEX* 367

TRUNK LID LOCK:
Cadillac 492

WINDSHIELD WIPERS:
Auto-Lite 496
Chevrolet & Pontiac Electric 494
Metropolitan 495
Vacuum Types:
Cable Operated 493
Link & Crank Arm 494

CAR MODEL INDEX

Page
BUICK Special Data 4
All Series 7
CADILLAC Special Data 14
All Series 17
CHEVROLET Special Data 24
6 Cyl. 29
V8 & Corvette 35
Trucks 42
CHRYSLER Special Data 49
Chrysler & Imperial 52
DE SOTO Special Data 59
All Models 62
DODGE Special Data 68
6 Cyl. & V8 72
FORD Special Data 80
6 Cyl. 86
V8 & Thunderbird 92
Trucks 100
HUDSON Special Data 6 Cyl. 107
Special Data V8 140
Wasp & Hornet 6 Cyl. 109
Hornet Special V8 153
Hornet V8 158
LINCOLN Special Data 114
Lincoln & Continental 118
MERCURY Special Data 125
All Models 128
METROPOLITAN Special Data 134
Hudson & Nash Models 136
NASH Special Data 140
Statesman 145
Ambassador 6 Cyl. 149
Ambassador Special V8 153
Ambassador V8 158
OLDSMOBILE Special Data 163
All Series 165
PACKARD Special Data 171
All Models 174
PLYMOUTH Special Data 181
6 Cyl. & V8 185
PONTIAC Special Data 193
All Series 196
RAMBLER Special Data 203
Hudson & Nash Models 205
STUDEBAKER Special Data 209
Champion 215
Commander & President 221
Golden Hawk 227
WILLYS Special Data 231
Utility Models 233
(Jeep, Station Wagon, Trucks)

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►IMPORTANT FACTORY PRODUCTION & RECOMMENDED CHANGES (S N xt Pag)

IMPORTANT FACTORY PRODUCTION & RECOMMENDED CHANGES
FOR PREVIOUS MODELS & 1956 MODELS

BUICK

► *LATE 1955 SERIES 40 STROMBERG "WW" CARBURETORS: See 1956 "Stromberg WW (Buick) Carburetor" in Carburetion Section for data on this model.*

► *1954-56 DETONATION CORRECTION: See "IGNITION NOTES" in 1956 Buick Special Data (Pg. 6) for recommended procedure.*

► *1953-56 V8 REDUCING OIL FLOW TO VALVE MECHANISM ON CYLINDER HEAD·* If oil flow to rocker arms and pushrods is excessive, special reducer can be installed in oil lead in cylinder head. *See "VALVE SYSTEM" in 1956 Buick Special Data (Pg. 5) for recommended procedure.*

► *1955 BUICK HYDRAULIC LIFTER "LEAK DOWN" RATE CHANGE·* Hydraulic lifter test "leak-down" rate was changed to provide greater clearance between lifter body and plunger to reduce chance of sticking lifters. New specification is 9-30 seconds (superseding 12-40 seconds). Make this change on 1955 Buick Special Data Pg. 6 in 1955 Final Data (shown as 12-14 seconds).

► *1955-56 CRANKSHAFT REAR MAIN BEARING ALIGNMENT (To prevent wear on thrust surfaces):* When installing rear main bearing cap, thrust faces should be aligned as follows to prevent unequal wear Install rear main bearing cap leaving bolts loose, force crankshaft as far rearward as possible (to align front thrust faces), then force crankshaft as far forward as possible (to align front thrust faces). Hold shaft in this position while tightening bearing cap bolts to correct torque.

► *1953-55 REPLACEMENT "FLOATING" PROPELLER SHAFT (To Reduce Rear Axle Noise)· See 1956 Buick Rear Axle in Rear Axle Section for installation of this new type propeller shaft.*

► *1955-56 BUICK POWER BRAKE PEDAL SLOW RETURN OR NOT RETURNING TO RELEASED POSITION (Caused by Vacuum Leaks)· See "CHANGES, CAUTIONS" on 1956 Moraine Power Brakes in Brake Sect.*

CADILLAC

► *1956 ENGINE DETONATION (In Low Octane Areas): See "Ignition Timing" on 1956 Cadillac Page 17.*

► *1955 HYDRAULIC LIFTER PRODUCTION CHANGE & REPLACEMENT CAUTION* Improved Hydraulic Lifter with additional spring under ball check valve was used in production beginning approximately Engine No. 88700. This spring provides more accurate control of oil flow through lifter and reduces pump-up and valve float. *Use this new lifter, Part No. 5231375, as service replacement on 1955 engines (Previous lifter No. 5231260 can be used on 1949-54 engines).*

► *1949-55 REPLACEMENT WATER PUMP:* 1955 Water Pump Assembly No. 3630518 is furnished as service replacement on 1949-55 cars and will provide improved cooling. This pump can be identified by "C55" cast on upper left leg of body. *NOTE* - When installing this pump on 1954 engines, install No. 1462815 Nipple for heater hose take-off, and install a Tee in right hand heater hose between pump and Ranco Valve (connect left hand Ranco Valve to this tee).

CHEVROLET

► *REPLACEMENT INTAKE & EXHAUST VALVE SEAT ANGLE CHANGE.* To facilitate seating of valves with regular shop equipment (when re-using old valves or installing replacement valves), valve seat and valve face angle specifications can be changed as listed below. This will require refacing old or new valves to the "odd" angle listed and will allow valve seat in head to be finished to standard 30° or 45° as indicated.

Valve	Valve Face Angle	Valve Seat Angle
6 Cyl. Intake ①	29°	③ 30°
6 Cyl. Exhaust ②	44°	④ 45°
V8 All Valves ②	44°	④ 45°

① — Valves have 30° angle (must be reworked).
② — Valves have 45° angle (must be reworked).
③ — 31° on new engines. ④ — 46° on new engines.

► *1955 SIX CYLINDER POWERGLIDE THROTTLE LINKAGE ADJUSTMENT SPECIFICATION CHANGE·* When checking position of Transmission Throttle Valve Outer Lever (step 3 of Linkage Adjustment), install gauge in extreme **lower rear** bolt hole on left side cover on ALL cars and set lever to the dimension listed below. Make this change on Pg. 27 & 395 (1955 Final Data), or on Pg. 163 & 2653 (1955 Manual Edition).

1955 Early Cars (With First Type Throttle Valve Control Outer Lever No. 3720634 & Longer Throttle Valve Control Rod No. 3710631) - 6 3/8" (change from 7 3/32").

1955 Later Cars (With Later Type Throttle Valve Control Outer Lever No. 3720323 & Shorter Throttle Valve Control Rod No. 3715711) - 7 3/32" measured to lower rear bolt hole (change in checking hole location only).

► *1955 TRUCK (2ND SERIES) CASTER SPECIFICATION CHANGE: Caster on these trucks should be set to same specification as corresponding 1956 series. See 1956 Chevrolet Truck data on Pg. 48.*

► *1955 CHEVROLET 6 CYL. DISTRIBUTOR ROTATION:* Distributor rotation is Clockwise (viewed from above). Make this notation on 1955 Final Data Page 27 (in text) and on Page 28 (in diagram).

► *1955 CHEVROLET V8 POWERGLIDE LINKAGE ADJUSTMENT:* When adjusting linkage, Transmission Throttle Valve Outer Lever should be rotated Counter-clockwise to the open throttle position. Make this change on 1955 Final Data Page 33 (Col. 3, Line 7), and Page 396 (Col. 1, Line 11).

►*1955 SYNCHRO-MESH CARS HARD SHIFTING CORRECTION:* Can be corrected by installation of Transmission Control Conversion Kit, Chevrolet No 3731061, reinforcement of transmission control idler support, and installation of three new transmission gears as listed below *(NOTE*—These gears used in production beginning July, 1955). *See "1955 Chevrolet Synchro-mesh Transmission" in 1955 Annual Data or later Manual editions for transmission disassembly and re-assembly data.*

Chevrolet New Transmission Gears

Gear	New Part No.	Old Part No.
Low & Reverse	3725646	3845056
Counter Gear Assy.	3845201	3845051
Reverse Idler	3845203	3845052

CHRYSLER, DE SOTO, DODGE

► *1955 CHRYSLER, DE SOTO, DODGE, PLYMOUTH CO-AXIAL STEERING GEAR PRODUCTION CHANGE & OVERHAUL CAUTION:* On later steering gears, a new "D" section rubber piston ring seal without metal spacer or backing ring was used with a new piston as listed below. This ring replaced original "L" section ring seal which must not be used at any time. New "D" section piston ring seals can be used with original piston if installed as follows

"D" Section Piston Ring Seal Installation (On Original Piston) — Remove old "L" section piston ring seals and metal spacer or backing rings from piston, discard the "L" type neoprene rings. Install new "D" section rings on original piston, then install original metal spacer rings behind "D" rings (toward center of piston). *NOTE* - If necessary to replace the original metal spacer rings, use Assembly No. 1692657 (contains "D" rings and metal spacers).

Co-axial Power Steering Piston Assy.

Part	New Part No.	Old Part No.
Power Piston	1639169	1554388
"D" Sect. Ring Seal	1618789	1531420

FORD

► *1955 FORD V8 DISTRIBUTOR APPLICATION & MODIFICATION TO CORRECT DETONATION (Ford V8 Pass. Cars, Interceptor, Thunderbird)* Various distributors were used on these models as listed below. The Distributor Modification (to correct detonation) as listed on 1955 Final Data Page 97 should NOT be made on Distributor No. B5A-12127-B used on the 272 Engine with 2-Barrel Carburetor (will result in excessive spark advance and cause detonation). The later No. B5A-12127-F & B5S-12127-E distributors have this modification made in production.

Car Model	1955 V8 Distributors	Part N .
272 Eng. (Std. 2-Barrel Carb.)		B5A-12127-B
272 Eng. (Spec. 4-Barrel Carb.) ①		FEC-12127-A
272 Eng. (Spec. 4-Barrel Carb.)		B5A-12127-F
292 Interceptor & Thunderbird ①		B5S-12127-D
292 Interceptor & Thunderbird		B5S-12127-E

① - Early Cars - Modify Distributor.

►*1955 FORD & THUNDERBIRD V8 ENGINE ROUGH IDLE:* Can usually be corrected by this procedure:

1) Tappet Clearance Adjustment—Adjust with engine hot and idling, use .018" feeler as "GO" gauge, .020" feeler as "NO GO" gauge. This will insure tappet clearance being .019"± 001".

2) High Tension Coil & Spark Plug Wire Installation—If wires loosen at plug and coil connections, check location of pressure relief hole in boot. If this hole is too low, pierce a new .062" hole in the boot ½-¾" above lower edge of boot.

3) Carburetor Float Level—Check for fuel level fluctuation caused by burrs or rough areas on float hinge or pin, worn or ridged fuel inlet needle or seat, or incorrect float setting. Set fuel level at 11/16"±1/32" from top of bowl (2-Barrel Carburetors), ½"±1/32" from top of bowl (4-Barrel Carburetors). *See Carbur tor data in 1955 Annual Data or later Manual edition.*

►Se Data Sh ts f r additional Chang s & C rr cti ns

Form 1R—1956 E

IMPORTANT FACTORY PRODUCTION & RECOMMENDED CHANGES
FOR PREVIOUS MODELS & 1956 MODELS

FORD CONTINUED

►*1955 FORD & THUNDERBIRD BRAKE LINING & REPLACEMENT CAUTION:* Later cars have "shorter" Primary Shoe Brake Lining and modified brake shoes to reduce any tendency toward pulling or diving when brakes applied. *See "Ford Bendix" in 1956 Brake Section for installation cautions.*

►*1952-56 FORD 6 & 1954-56 FORD V8 EXHAUST VALVE STEM DIAMETER CHANGE (For Increased Stem Clearance):* Stem diameter has been decreased .0005" for increased stem clearance in guide to minimize valve sticking. These valves should be fitted to .0025-.0035" stem clearance and maximum clearance in service should be .006". *See "Valve System" in 1956 Ford Special Data for new valve sizes.*

►*1955 6 CYL. ENGINES WITH 1956 CAMSHAFTS & VALVE SPRINGS:* New 1956 type camshaft and valve springs were used on approximately 2000 1955 engines (Engines not marked). **Correct 1955 or 1956 Camshaft & Valve Springs must be used together.** *CAUTION—Use of wrong valve springs with either camshaft may cause early failure of camshaft or result in valve float at high speed.*

Camshaft Identification—Can be determined by cam lobe lift of .242" (1955), .273" (1956).

Valve Spring Identification—1955 springs have 7½ coils with lower coils closely spaced. 1956 springs have 7 equally spaced coils.

HUDSON

►*1955 HUDSON SIX DISTRIBUTOR ROTATION:* Distributor rotation on both Wasp & Hornet Six is Clockwise (viewed from above). Make this notation on 1955 Final Data Page 119. *NOTE* - Rotation shown in wiring diagrams (Pgs. 120 & 121) is correct.

►*1955 HUDSON V8 SLOW COLD STARTING & POOR WARM-UP CORRECTION: On cars with Carter WGD 2231S carburetor, refer to 1956 Carter WGD Carburetor in Carburetion Section for recommended changes.*

►*1955 HUDSON V8 ULTRAMATIC LINKAGE ADJUSTMENT CHANGE:* Manufacturer recommends that 1956 procedure and settings be used on these cars. *Refer to 1956 Hudson Hornet V8 Linkage Adjustment on Pg. 158.*

►*1955-56 HUDSON V8 VALVE SPRING BAFFLE INSTALLATION FOR IMPROVED OIL CONTROL:* On engines before Engine No. P-25589, valve spring baffles should be installed to divert oil from springs and valve stems (baffles used in production on later engines). *See 1956 NASH & HUDSON V8 SPECIAL DATA for installation instructions.*

LINCOLN

►*1955 LATE PRODUCTION "DEVIATED" ENGINES: For specifications and non-interchangeable parts, see "Engine" on Pg. 114 of 1956 Lincoln Special Data.*

►*1952-55 REPLACEMENT CAMSHAFTS (With Improved Wear Characteristics):* Shafts with added copper for better wear are now available. These shafts identified by letter "C" followed by two dimples between first two lobes at front of shaft and should be used as follows: **1952-54** Part EAD-6250-G, **1955** Part EBJ-6250-B.

►*1955 VALVE STEM OIL SEAL CHANGE (For Improved Oil Control):* New valve stem oil seal, Part No. B5A-6571-A, has a .100" longer skirt to protect greater area of valve stem from oil splash. This seal used in production on later 1955 engines.

►*1955 IDLE SPEED-UP CONTROL ON AIR CONDITIONED CARS:* This automatic throttle control device may be found on 1955 cars (increases engine idle speed to 800 RPM with air conditioning turned on and transmission selector lever in Neutral). *For adjustment, see "Carburetor" on 1956 Lincoln, Page 119.*

►*1952-56 EXHAUST VALVE STEM DIAMETER CHANGE:* Stem diameter decreased .0005" to provide increased stem clearance. *See "Valve System" in 1956 Lincoln Special Data for new valve sizes.*

►*1952-56 "SELF-LOCKING" VALVE ADJUSTING SCREWS: For installation of 1956 type self-locking adjusting screws and rocker arms, see "Valve System" in 1956 Lincoln Special Data.*

►*1952-56 CRANKSHAFT WITH INTEGRAL REAR OIL SLINGER & INSTALLATION OF SEPARATE FRONT OIL SLINGER (For improved Seal Operation): For installation of these parts, see "Crankshaft & Main Bearings" in 1956 Lincoln Special Data.*

MERCURY

►*1954-55 ENGINE CAMSHAFT SETTING CORRECTION:* Marks on both sprockets should be aligned with similarly marked links on timing chain with both sprocket marks toward **left** side of engine (not adjacent as previously stated). Make this change on the 1954 and 1955 Mercury data sheets.

►*1955 VALVE STEM OIL SEAL CHANGE (For Improved Oil Control):* New valve stem oil seal, Part No. B5A-6571-A has .100" longer skirt to protect greater area of valve stem from oil splash. This seal used in production on later 1955 engines. *NOTE* - This seal must be used with following service cylinder heads: **(1954)** No. B4A-6049-F, **(1955)** No. B5A-6049-J and B5S-6049-B.

►*1954-56 EXHAUST VALVE STEM DIAMETER CHANGE:* Stem diameter has been decreased .0005" to provide increased stem clearance. *See "Valve System" in 1956 Mercury Special Data for new valve sizes.*

►*1954-56 "SELF-LOCKING" VALVE ADJUSTING SCREWS: For installation of these parts, see "Valve System" in 1956 Mercury Special Data.*

NASH

►*1955 NASH V8 SLOW COLD STARTING & POOR WARM-UP CORRECTION: On cars with Carter WGD 2231S Carburetor, refer to 1956 Carter WGD Carburetor in Carburetion Section for recommended changes.*

►*1955 NASH V8 ULTRAMATIC LINKAGE ADJUSTMENT CHANGE:* Manufacturer recommends that 1956 procedure and settings be used on these cars. *See 1956 Nash Ambassador V8 Linkage Adjustment on Page 158.*

►*1955-56 NASH AMBASSADOR V8 VALVE SPRING BAFFLE INSTALLATION FOR IMPROVED OIL CONTROL:* On engines before Engine No. P-25589, valve spring baffles should be installed to divert oil from springs and valve stems (baffles used in production on later engines). *See "Valve System" in 1956 Nash & Hudson V8 Special Data for installation data.*

►*1956 NASH AMBASSADOR V8 ENGINE DETONATION OR PRE-IGNITION CORRECTION: See Distributor data under "Tune-Up" on 1956 Nash Ambassador V8 car model pages for recommended conversion of first type distributors to later type advance performance.*

PACKARD

►*1956 DETONATION IN LOW OCTANE FUEL AREAS (First Cars): See Distributor data in "Tune-Up" on 1956 Packard car model pages for recommended conversion of first type distributors to later type advance performance.*

PLYMOUTH

►*1954-56 PLYMOUTH 6 TAXICAB CARBURETOR IMPROVED ECONOMY (Carter BBS 2062S, SA; 2063S, SA Carburetors):* Improved gasoline economy can be secured by installing parts furnished in Carter Unitized Pkg. No. 195-67U. *See "Carter BBS" Carburetor in Carburetion Section.*

►*1955 PLYMOUTH CO-AXIAL STEERING GEAR PRODUCTION CHANGE & OVERHAUL CAUTION: See same item under Chrysler (above) for power piston seal ring change.*

PONTIAC

►*1955-56 ROCKER ARM STUD REPLACEMENT:* Tool set is now available to facilitate removal of old studs from cylinder head. *See Rocker Arms under "Valve System" in 1956 Pontiac Special Data for data.*

►*1955 OIL PUMP INSTALLATION CAUTION:* When installing Oil Pump in engine, a gasket No. 522103 should be used between the pump and the block to insure a good seal at this point. This gasket was used in production on later cars.

STUDEBAKER

►*1955 COMMANDER & PRESIDENT V8 HARD STARTING:* On early cars, this may be caused by fuel pump not priming quickly (due to valve warpage). On cars with fuel pump code dated before J-5-1 or J-5-2, improved fuel pump, Studebaker No. 535541, can be installed when this trouble experienced. All pumps code dated J-5-1 or J-5-2 and later are of this improved type.

►*1955 V8 ENGINE ROCKER ARM RETURN PASSAGE CAUTION:* Beginning with 1955 production, front oil return passages in cylinder block were discontinued to improve coolant circulation around No. 1 & 2 cylinders. A single oil return passage is used for each cylinder bank at the rear of the block. *DO NOT attempt to drill out front oil passages on these engines (would break through into water jacket).*

WILLYS

►*1954-56 WILLYS 6-226 ENGINE CYLINDER HEAD TIGHTENING SEQUENCE:* Manufacturer recommends that new tightening sequence be followed when installing cylinder head. *See Cylinder Head Tightening Diagram in 1956 Willys Special Data.*

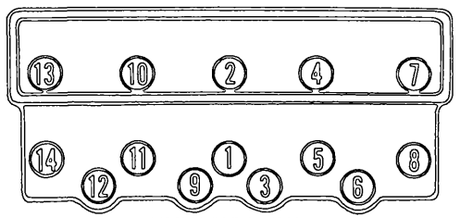
TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	63-73
Intake Manifold	25-30
Exhaust Manifold	10-15
Oil Pan	6-15
Main Bearing Caps	100-110
Flywheel	50-55
Vibration dampener	100-110
Con Rod Caps	40-45
Piston Pin Clamp Bolt	25-30
Rocker Arm Support Bracket	30-35
Rocker Arm Cover	4-5
Engine Front Cover	20-25
Water Manifold	25-30

ENGINE MOUNTINGS

ENGINE MOUNTINGS: The engine and transmission assembly must rest in a normal position which does not impose any side strain on the three rubber mountings. To adjust, tighten engine front mounting pad stud nuts under supports on frame and tighten mounting bracket-to-crankcase bolts. Loosen upper mounting pad-to-bracket bolts. Disconnect torque tube from torque ball, then tighten transmission support-to-frame X member attaching bolts. Tighten transmission mounting pad-to-transmission support and to transmission rear bearing retainer. Tighten thrust pad-to-thrust plate stud nuts (rear) and loosen thrust pad-to-transmission support stud nuts (front). Remove shims located between thrust pad and transmission support. Shake engine sideways to let assembly rest freely and normally on all mounting pads, then install sufficient shims between thrust pad and transmission support to snugly fill the existing space. Tighten thrust pad front stud nuts and connect torque tube to torque ball. Tighten front mounting pad-to-bracket bolts.

CYLINDER HEAD & MANIFOLD



EXHAUST SIDE
BUICK V8 CYLINDER HEAD

CYLINDER HEAD & GASKET: When handling the thin crimped steel gasket, use care not to damage lacquered surface coat or kink sealing rings stamped in gasket. *(CAUTION—Do not coat lacquered surface of gasket with any type of sealing material and DO NOT RE-USE THE OLD GASKET as stamped sealing rings are flattened in a used gasket).* Right and left cylinder heads are identical except that the water inlet port is open at front end and is plugged at rear end as installed on engine. After installation of cylinder head, tighten all bolts a little at a time, about three times around, in sequence shown in diagram, finally tighten bolts to correct torque of 63-73 ft.lbs. in same sequence. After engine warmed up to correct operating temperature, recheck bolts for correct torque.

PISTON PINS

PRESS-FIT PISTON PIN REMOVAL & INSTALLATION: *CAUTION—Special tools (see Tool Note below) must be used to avoid damage to piston assembly parts.*

Pin Removal: Place piston and rod assembly in press. Using Piston Support J-6047-A (with full radial face up) under the Piston, place Drive Pin J-6047-4 in upper end of piston pin and press pin from rod and piston.

Pin Installation: Place Piston Support J-6047-5, Return Spring J-6047-3, and Guide Pin J-6047-2 in base plate of press. Use the piston support with the full radial face upward. Place rod in piston with oil spurt notch on same side as valve depressions in piston dome, lubricate piston pin and inside diameter of pin holes with Lubriplate. Insert pin into piston boss, pushing pin through to move rod over against opposite pin boss. Place small end of Drive Pin J-6047-4 in hole in upper (protruding) end of piston pin and position the assembly in the press. Make certain that all units are in alignment, then apply pressure and force pin through rod and piston until Guide Pin J-6047-2 stops downward travel.

▷*PISTON PIN TOOL NOTE (Press-fit Pins):* Special tool set consists of Piston Pin Remover & Replacer J-6047 (Base Plate, Piston Support, Guide Pins, & Spring) used in an arbor press or with 12 Ton Ram J-6180 (with Power Screw & Cross Yoke) adapted for this use by installation of screws furnished in Ram Adapter Kit J-6208.

CRANKSHAFT & MAIN BEARINGS

CRANKSHAFT REAR OIL SEAL: Braided fabric seal fitted in groove behind slinger groove in crankcase and bearing cap. Vertical joint between cap and crankcase fitted with cork seals at each side.

Installation—With crankshaft removed, place new braided fabric seal in groove in crankcase with both ends extending out from bearing parting line, force seal in groove with hammer handle or smooth piece of wood so that seal seats within 1/16" of crankcase. Cut ends of seal off flush with crankcase (use razor blade or sharp knife). Repeat operation for bearing cap. Coat vertical grooves in cap with gasket cement (allow to set until tacky), use new cork gasket and fit into groove with putty knife (ends will project beyond cap). Place cap in vise to lightly compress seals in grooves, cut ends of cork seals flush with cap surface. Coat cork gaskets with vaseline, install cap in crankcase.

▷*CAUTION—Engine must be operated at slow speed when first started after new braided seal installed.*

ENGINE FRONT COVER

TIMING CHAIN COVER: Removal—Drain cooling system, remove radiator core, shroud, fan belt, fan and pulley, and vibration dampener. Take out all bolts attaching timing chain cover and water manifold to cylinder head heads and crankcase (DO NOT remove the five water pump mounting bolts). Remove cover and water pump as an assembly. *CAUTION—Use care to avoid damaging oil pan gasket.*

FRONT OIL SEAL: Installation – After removing braided fabric packing with a screw driver and tapping pressed steel shedder out of timing chain cover, work the new packing into the shedder, then drive shedder into recess in timing chain cover, using installer tool J-5250-2 through the seal to expand packing into place. Apply a light coating of vaseline to packing. *NOTE – A more effective seal will be made if butted ends of packing are installed in the upward position in timing chain cover.*

▷*CAUTION: Engine must be operated at slow speed when first started after braided packing seal installed.*

FLYWHEEL

FLYWHEEL REPLACEMENT: Flywheel or Ring Gear can be replaced separately on Synchro-mesh Cars (gear is shrink fit on flywheel), but must be replaced as an assembly on Dynaflow Drive Cars (gear is welded in place and not furnished separately).

Ring Gear Replacement (Synchro-mesh Cars): Remove old ring gear by drilling 5/16" hole in gear between two teeth, split the gear at this point with a chisel and remove the old gear. Polish several spots on new ring gear with emery cloth, heat gear uniformly on a hot plate or with a torch until polished spots turn blue which will indicate a temperature of approximately 600°F. *(CAUTION*—Heating gear in excess of 800°F. will destroy factory heat treatment). Install ring gear on flywheel with beveled end of teeth out or away from shoulder, allow gear to cool.

Installation of Flywheel (All Models): Make certain that flywheel and crankshaft flange are clean and free from burrs which might cause run-out (remove burrs with a mill file). Install flywheel and tighten all bolts evenly to 50-55 ft.lbs. torque. On Dynaflow Drive Cars, check flywheel run-out (see below). On all cars, check engine for vibration after transmission installed and correct any unbalance caused by replacement of parts. *See ENGINE BALANCING*

Flywheel Run-out (Dynaflow Drive Cars): Mount dial indicator on flywheel housing so that indicating stem bears on rear ground face of flywheel at inner side of large holes in rim. Turn flywheel making certain that crankshaft end thrust held in one direction and note run-out at flywheel face. Run-out must not exceed .008". If run-out exceeds .008" and cannot be corrected by tapping high side of flywheel with a mallet, remove flywheel and check for dirt or burrs between flywheel and face of crankshaft flange. If run-out still exceeds .008" after reinstallation of flywheel, check run-out of crankshaft flange rear face.

ENGINE BALANCING

▷*IF VIBRATION NOTED AFTER INSTALLATION OF CRANKSHAFT, FLYWHEEL, AND OTHER ROTATING PARTS, CORRECT THIS UNBALANCED CONDITION AS FOLLOWS:*

▷*CAUTION:* Procedure below will correct minor unbalance caused by replacement of individually balanced parts. Extreme vibration caused by parts abnormally out of balance, or different in weight from corresponding parts, should be corrected by replacement of these parts.

Critical Speed of Vibration—Determine speed at which vibration is most evident (use tachometer) and operate engine at this speed to check results from the following corrective procedures.

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SYNCHRO-MESH ENGINE UNBALANCE CORRECTION:

1)—If clutch assembly has been removed and re-installed, make certain all clutch cover bolts are same type and length and that lockwasher used with each bolt See that alignment marks on clutch cover and flywheel (made before clutch removal) are together If vibration not caused by clutch, mark clutch cover and flywheel and remove clutch assembly

2)—Operate engine with clutch removed and check for vibration If vibration eliminated (indicating unbalance is in clutch), re-install clutch and balance the assembly as directed in step (3) following If vibration still present, balance the flywheel as follows Install one clutch cover bolt in successive flywheel bolt holes and operate engine with bolt in each location until a position is found in which vibration is eliminated (this test weight can be varied by using a shorter bolt or by adding washers to the bolt) When engine runs smoothly, remove bolt and drill shallow holes on DIAMETRICALLY OPPOSITE side of flywheel *(CAUTION*—use ⅜" drill and DO NOT drill any hole more than ¼" deep) When engine runs smoothly, re-install clutch as follows

3)—Install clutch assembly *(CAUTION*—align marks made before removal), operate engine and check for vibration If vibration noted, balance clutch by installing plain washer successively under each mounting bolt lockwasher until engine runs smoothly *NOTE*—If necessary, plain washers can be installed on two adjacent bolts to obtain sufficient weight for clutch balance

DYNAFLOW DRIVE ENGINE UNBALANCE CORRECTION: *See Buick "Variable Pitch Dynaflow Drive" in Transmission Section.*

VALVE SYSTEM

OIL FLOW REDUCTION TO VALVE MECHANISM: Install plug, Part No. 1343643 (with .077" orifice) in both cylinder heads as follows: Remove rocker arm and shaft assembly from each cylinder head. Install plug, Part No. 1343643 in oil feed hole located within counterbore of front rocker arm mounting bracket bolt hole (this oil passage angles downward toward bottom of head, between front center head bolt and front valve). Drive plug into place with a 3/16" diameter punch or rod so that open end of plug is flush with edge of oil hole.

ROCKER ARMS

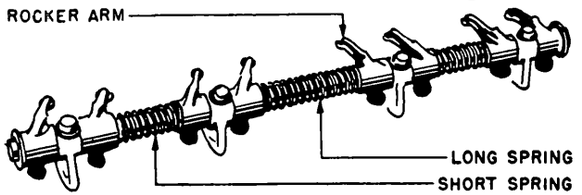
ROCKER ARM ASSEMBLY: One assembly mounted on each cylinder head (see illustration)

Disassembly: Remove cotter pin, flat washer, and spring washer from each end of shaft Pull mounting bolts out of support brackets, slide shaft out of rocker arms and brackets

Reassembly: See illustration for location of parts Install longer spring at center of shaft and install rocker arms with offset (slant) toward center of shaft (two types of rocker arms used—see table below for proper location of each type) Turn shaft so that notch in one end of shaft is upward or toward top of bracket and install bolt through bracket and shaft to maintain this position *(CAUTION*—Notch must be upward to place rocker shaft oil holes in proper relationship to rocker arms)

Rocker Arms

Part No.	Location
1343454	4 Right Front & 4 Left Rear
1343455	4 Left Front & 4 Right Rear



BUICK V8 ROCKER ARM ASSEMBLY (ONE ASSEMBLY FOR EACH BANK)

Installation Make certain that notch in one end of rocker arm shaft is upward, position assembly on head with dowels engaging blind holes in brackets, tighten all bracket bolts evenly to 30-35 ft lbs

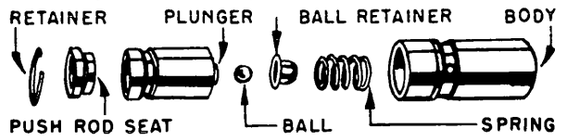
HYDRAULIC LIFTERS

Removal: Remove air cleaner disconnect all pipes and wires from carburetor and intake manifold, remove carburetor and manifold as an assembly Thoroughly clean cylinder heads, rocker arm covers, and adjacent areas to prevent dirt entering engine Remove rocker arm cover and rocker arm assemblies, remove pushrods Remove valve lifter cover lift out individual valve lifters and ***place them in numbered compartments of a holding fixture to insure re-installation in original position in engine.***

Disassembly: Use a push rod to hold down the push rod seat in lifter while removing plunger retainer from body with Retainer Remover J-5238 Remove push rod seat and plunger from lifter body Body bore above plunger may be caked with carbon and varnish In this case, place lifter in large end of Plunger Remover Tool J-4160-A, with plunger inward While holding lifter with thumb, rap open end of remover against a block of wood with just enough force to jar plunger from body

►*IMPORTANT NOTE*—Disassemble one lifter at a time to avoid interchanging parts Be careful not to score or nick lifter parts

Cleaning and Inspection: Wash all parts in a suitable carbon solvent and remove all trace of carbon and varnish Inspect plunger and lifter body for scoring or other damage that would prevent free movement Inspect lower end of lifter body for nicks or identations If any exist, replace complete lifter assembly Dry lifter parts with air, then install



HYDRAULIC VALVE LIFTER

plunger in lifter body without other parts and check for free movement Plunger should drop of own weight into body bore

Reassembly: Test check ball travel before reassembling lifter (see Testing below) It is recommended that all parts be rinsed in clean kerosene and then assembled without drying (this will eliminate all lint and dust adhering to parts) Hold plunger in vertical position with feed hole up, install check ball, ball retainer, spring, and body over the plunger Invert assembly and install push rod seat and plunger retainer in end of body, use handle of tool J-5238 to depress these parts until retainer engages groove in body Test lifter for "leak down rate" (see Testing below) Protect lifter assembly by wrapping in clean paper until it is installed in the engine

Testing: (Check Ball Travel)—Install Sleeve KMO-30-K on Test Fixture J-5095, to mount dial indicator so that stem of indicator bears squarely on upper end of pin in attachment Place a new ball check in seat in lifter plunger, then hold plunger and ball firmly against attachment arm with plunger centered over pin and stepped flange While holding ball and plunger firmly in place set dial indicator to "0" Remove plunger and ball, place ball in retainer, and install these parts on plunger Center plunger over pin and stepped flange of check attachment and while pressing plunger and retainer firmly against attachment arm, note dial indicator reading Ball travel must be 004-008" to insure satisfactory lifter operation

Leakdown Rate—Prepare a special test fluid by placing 20 ozs, of Special Buick Oil for Dynaflow Drive in a clean and accurate container, then fill container to the "one gallon" mark with kerosene Stir and shake container to thoroughly mix oil and kerosene Clean cup of Test Fixture J-5095 and fill it to within ½" of top with test fluid Install Gauge Sleeve J-5180-5 in cup, install Gauge Rod Nose J-5182-2 in ram Swing weight arm up out of the way, raise the ram and place the valve lifter (top side up) in the sleeve in cup Make certain lifter is completely covered by fluid Lower ram to rest in lifter push rod seat, then lower weight arm to rest on roller of ram Operate lifter plunger through its full travel to force out all air by using a pumping action on weight arm Continue pumping until considerable resistance is built up in lifter and a definite grab point is felt at top of the stroke, when indicator pointer is at bottom of the scale Finally pump vigorously for approximately 10 additional strokes to make sure all air is out of lifter (NOTE—If one stroke offers noticeable weak resistance during the last 10 strokes, replace the check ball in lifter and repeat leakdown test to this point) Raise arm to allow lifter plunger to come up to its retainer, then lower the arm to rest on ram roller As the pointer starts moving upward, start rotating fluid cup by turning handle one revolution every two seconds Use a stop watch to check time required for pointer to move from lower to upper mark on scale (upper mark labeled "8-in-line" or "V-8") The leakdown rate, (time between marks) must be 12-14 seconds Check doubtful lifters 3-4 times and replace any lifter which does not test within these limits

OILING SYSTEM

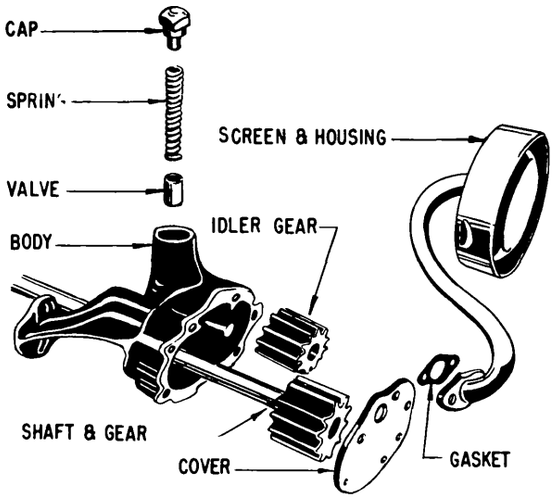
OIL PUMP

OIL PUMP: Gear Type. Driven by distributor shaft which is driven from camshaft through spiral gears.

Disassembly: Carefully pry screen out of housing, remove attaching screws and remove parts in following order Pump Inlet, Gasket, Screen Housing, Gasket Body Cover, Shaft & Gear, and Idler Gear Remove plug on side of body and take out pressure regulator spring and valve

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BUICK V8 OIL PUMP

Cleaning & Inspection: Wash screen and all pump parts in solvent and dry with air. See that oil pressure valve operates freely in body and that hole is not oversize, check spring for wear, distortion or collapsed coils. Inspect pump body, gears, and shaft for wear or scoring Check gear end clearance by installing gears in body and placing straightedge across cover flange Clearance between straightedge and face of gears must be less than .004" and gears must turn freely. For other clearances, see table:

Oil Pump Clearances

Drive Shaft Bearing Clearance	001- 0025"
Idler Gear Bearing Clearance	.001- 0025"
Driving Gear Backlash	.003- 006"
Pump Gears Backlash	.006-.012"
Pump Gear End Clearance in Body	.0005-.004"
Regulator Valve Clearance in Body	.003-.006"

Reassembly: Reverse disassembly procedure above.

Installation: Install oil pump with gasket on crankcase, turning pump shaft as required to engage driving tongue on distributor shaft. Install pump attaching bolts with lockwashers, then tighten bolts alternately a little at a time with one hand while turning pump shaft back and forth through gear lash with other hand. Pump shaft must be free of bind when bolts are securely tightened. If shaft binds, rap pump body lightly with a rawhide mallet.

IGNITION NOTES

CHECKING TIMING MARK LOCATION: If the timing mark on the balancer is suspected of being off, it may be checked by removing the balancer and checking the timing mark in relation to keyway. Draw a straight line approximately 7" long on a clean piece of white paper, then using a compass, draw a 1½" diameter circle in center of straight line. Place balancer (with pulley mounting bolt holes upward) over circle drawn on paper so that centerline passes through center of balancer keyway. The timing mark should be located .100" (approx. 3/32") clockwise from centerline at outside diameter of balancer.

►*CHECKING FOR PROPER DISTRIBUTOR CAM (Improper cam will cause rotor tip to burn badly at one corner):* Remove rotor and hold straight edge (6" steel rule) flat against the counter-clockwise edge of rotor positioning slot and angling down towards the breaker cam. If correct cam is installed, the straight edge will be on the counter-clockwise side of the nearest cam lobe. If improper cam is installed, the straight edge will be toward the clockwise side of the nearest lobe.

SPARK PLUG CABLE WIRING AFTER WORK ON ENGINE (To prevent mis-firing): Cables should be arranged in following order in grommets on cylinder head to prevent consecutively firing plug cables from being adjacent to each other:

Right Bank Cables—Arrange cables in following order in grommet on head and at entrance to spark plug cover: 3, 5, 7, 1 (front to rear). Arrange #1 plug cable over rear cover stud and #5 spark plug, under #3 spark plug, and over front cover stud Arrange #3 plug cable under rear cover stud and #5 spark plug This will prevent #1 and #3 cables from being parallel

Left Bank Cables—Arrange cables in following order in grommet on head and at entrance to spark plug cover: 4, 6, 2, 8 (front to rear). Arrange #2 plug cable under rear cover stud and #6 spark plug, and over #4 spark plug Arrange #4 plug cable over rear cover stud and under #6 spark plug.

DETONATION CORRECTION (ALL SERIES): Proceed as follows:

1) Check spark plug cable wiring (see above)
2) Check for excessive oil consumption Correct as necessary
3) Check initial distributor setting and if necessary reset to 5° BTDC
4) Check to see if centrifugal and vacuum advance of distributor falls within specified limits Check distributor for dwell angle variation. Dwell should not vary more than 3° total between idle speed and 1500 RPM
5) Make sure fuel is highest octane conveniently available
6) If the above procedures do not correct the detonation the initial distributor setting may be retarded to TDC without any noticeable loss in performance or economy If detonation still occurs, remove all traces of carbon from combustion chambers

►*NOTE: Also see "Engine" on Car Page for lowering compression ratio.*

ELECTRICAL NOTES

DIRECTIONAL SIGNAL SWITCH STICKING CORRECTION: If the trip mechanism in signal switch housing sticks, and does not return to "off" position after a turn is completed, it may be caused by centering pins being bent or trigger spring hanging up on lever. Correct as follows: Remove steering wheel and check centering pins for straightness. Remove trigger spring and sand off any burrs under the tangs. Lubricate trigger spring with Lubriplate, and reassemble, making sure spring operates freely in tangs.

BRAKE NOTES

PARKING BRAKE RELEASE ROD TRUNNION ADJUSTMENT: Disconnect battery and lower the fuse block to gain access to release rod trunnion. With parking brake in fully released position, disconnect trunnion from release rod lever trigger. Push trigger toward cowl as far as possible, and while holding trigger in this position, lengthen release rod by turning trunnion until it extends approximately ¼" beyond hole in trigger while holding release rod lightly against spring pressure. Connect trunnion to release rod lever trigger. After this adjustment has been performed, approximately 1/8" clearance should exist between knob and escutcheon. Clearance at this point can be obtained by loosening screw in knob and positioning knob as required to obtain specified clearance. Tighten knob screw.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate on left front door pillar post and on left frame side rail.
Starting Serial Number—001001 (at each plant).

►*SERIAL NUMBER NOTE: Serial number (example 4C2001001) includes the following identification data in sequence:*

Series ①	Year ②	Assy. Plant ③	Serial No.
4	C	2	001001

①—See Series Designation following.
②—Year designation (1956).
③—See Assembly Plant Designation following.

Series Designation

4—40 Special	6—60 Century
5—50 Super	7—70 Roadmaster

Assembly Plant Designation

1	Flint	5	Wilmington
2	South Gate	6	Atlanta
3	Linden	7	Framingham
4	Kansas City	8	Arlington

ENGINE NUMBER: Stamped on outside of left bank of cylinders on extension of top face of block between middle branches of exhaust manifold.

►*ENGINE NUMBER NOTE: Dash following engine number indicates that cylinder bores and pistons are .010" Oversize. NOTE—Do not confuse dash with vertical groove on pad designating Series 40.*

TUNE-UP

►*DETONATION CORRECTION (ALL SERIES): See "Ignition Notes" in Buick Special Data.*

►*STALLING & LOADING UP DURING FIRST FEW MILES IN COLD WEATHER CORRECTION (CARS WITH ROCHESTER CARBURETOR): Install Choke Modification Kit, Part No. 7009948. See "Rochester 4GC Carburetor" in Carburetion Section.*

►*ROUGH ENGINE IDLE CORRECTION: This condition may be caused by the use of an incorrect vacuum switch piston which allows a vacuum leak at the switch. The piston used on Carter 4-Barrel Carb., has a horizontal slot while the piston used with all other carburetors is slotted vertically.*

►*SPARK PLUG CABLE ROUTING (To prevent misfiring): See "Ignition Notes" in Buick Special Data.*

COMPRESSION PRESSURE: 140 lbs. (Series 40 Synchromesh); 160 lbs. (Series 40 Dynaflow); 170 lbs. (Other Series). At cranking speed (140 RPM). All cylinders must be equal within 10 lbs.

VACUUM READING: 15.5" (minimum) with engine idling at 450 RPM. *NOTE - This is lower than for previous models and is caused by new engine design.*

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatically controlled valve in forward end of left exhaust manifold. Valve must operate freely.

IGNITION

►*BURNED DISTRIBUTOR ROTOR TIP CORRECTION (May be caused by improper distributor cam):* If distributor rotor is badly burned at one corner of the tip, check to determine if the proper cam is being used. *See "Ignition Notes" in Buick Special Data.*

FIRING ORDER: 1-2-7-8-4-5-6-3.
Cylinders—RIGHT BANK 1-3-5-7. LEFT BANK 2-4-6-8.

SPARK PLUG GAP: .030-.035".
Spark Plugs - AC 44. 14 mm. Torque to 25 ft. lbs.

COIL: Delco-Remy 1115087. 12 Volt.
Ignition Current—2.5 amps. idling, 4.5 amps. stopped.
Resistor—Delco-Remy 1927809. On cowl near ignition coil. Resistance 1.4-1.65 ohms, at 75°F.

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110861. 12 Volt.
Condenser—Delco-Remy 1869704 (Closed-end terminal), 1928111 (Open-end terminal). **Capacity** .18-.23 mfd.
Contact Point Set—Delco-Remy 1924499.
Breaker Gap—.0125-.0175".
Cam Angle—26-33° (with .016" gap).

►*BREAKER GAP CAUTION:* Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set point gap.
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Clockwise viewed from above.

►*DISTRIBUTOR REMOVAL NOTE:* Removal of distributor can be facilitated by use of Special Wrench J-5727 (Kent-Moore) or S-9832 (Snap-On).

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-1.5	375	0-3	750
6-8	850	12-16	1700
9.5-11.5	1450	19-23	2900
11-13.5	1750	22-27	3500

Vacuum Spark Control: Delco-Remy 1116090.
Plunger Travel—7/32".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6.5-8.5
9-10.5	18-21	11.5-15

IGNITION TIMING

Setting—5° BTDC exactly.

►*DETONATION CORRECTION:* Ignition timing can be retarded to TDC without noticeable loss in performance.

►*IGNITION TIMING CAUTION: Lower engine idle speed to not exceed 350 RPM when setting ignition timing with timing light. Reset to 450 RPM when completed.*
Timing Mark—Timing indicator marked with four lines indicating 0°, 2.5°, 5°, 7.5° BTDC, located on right side of timing chain cover below fuel pump. Line up mark on fan drive pulley (Series 40), harmonic balancer (other series) with correct line (5°) on timing indicator for normal operating conditions.

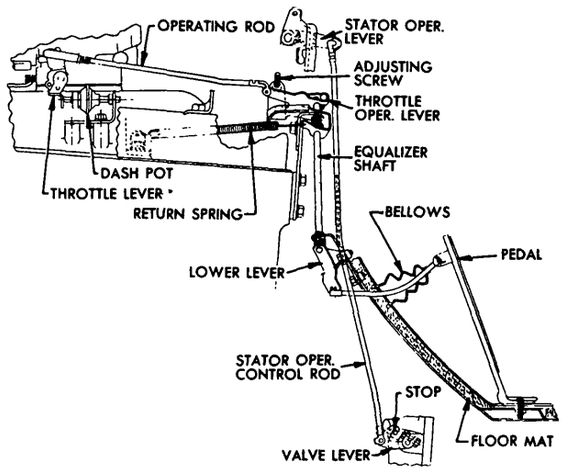
►*CHECKING FOR IMPROPERLY LOCATED TIMING MARKS ON ENGINE BALANCER: See "Ignition Notes" in Buick Special Data.*

CARBURETOR

►*CARBURETOR APPLICATION: "Carter" and "Stromberg" 2-Barrel carburetors used on Series 40. "Carter" and "Rochester" 4-Barrel carburetors used on other Series.*

►*1956 SERIES 40 & 60 FAILURE TO OBTAIN FULL THROTTLE CORRECTION: If a Series 50 & 70 accelerator pedal stop is installed on Series 40 & 60, throttle cannot be opened fully. Series 50 & 70 stops is 1 1/8" long. Series 40 & 60 stop is 5/8" long.*

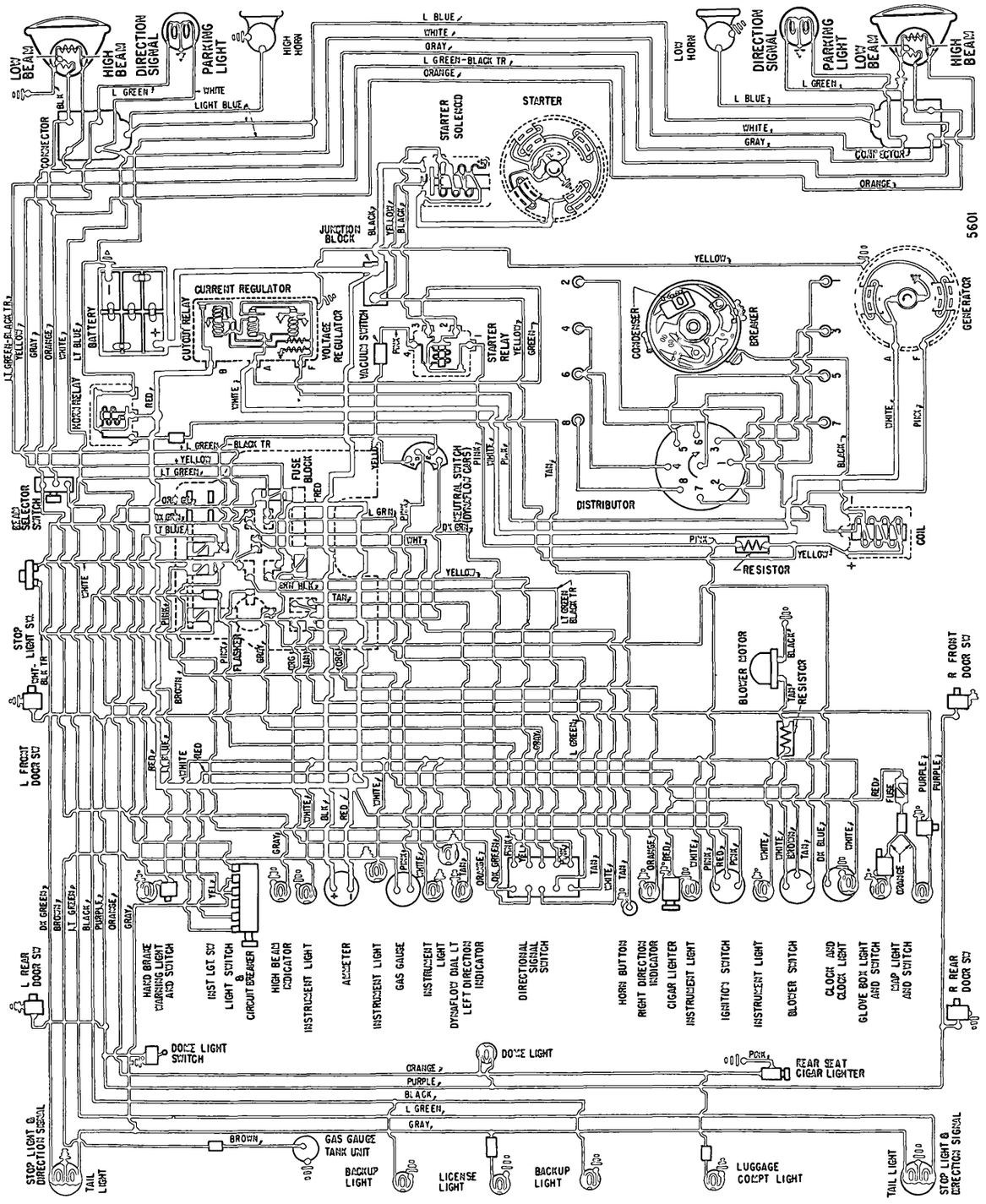
►***WATER IN AUTOMATIC CHOKE HOUSING CORRECTION:*** **This condition is caused by improper location of heat tube which is pressed into exhaust manifold. Correct by replacing exhaust manifold.**



DYNAFLOW THROTTLE LINKAGE

THROTTLE LINKAGE ADJUSTMENT: Adjust idle speed to 450 RPM. Disconnect throttle return spring. Disconnect throttle rod from lever on equalizer shaft. Back off stator pick-up lever adjusting screw on Dynaflow cars until screw end is flush with lever. Adjust throttle rod at carburetor so 5/8" of thread is exposed. Press accelerator against floor mat, hold throttle wide open and hold rod at hole in operating lever. Adjust lever on equalizer shaft to obtain 1/16" distance between rod and hole in lever. Tighten clamp and connect rod. With throttle closed to idle position, a minimum clearance of 1/16" must exist between equalizer lower lever and stop lug in mounting bracket. Adjust operating rod as necessary to obtain this clearance. On Dynaflow cars, depress accelerator pedal against floor mat, then turn stator pick-up lever adjusting screw against lever until all vertical play is removed from stator operating rod. Turn screw back 1/2 turn.

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DASHPOT ADJUSTMENT (Dynaflow Cars): Adjust dash pot only after throttle linkage has been adjusted and engine is at normal operating temperature. Rotate fast idle cam to extreme cold idle position (choke closed), hold throttle lever against .030" feeler gauge placed between stop screw and highest step of fast idle cam. Adjust dashpot until it just clears arm of throttle lever, tighten locknut. With transmission in Direct Drive and brakes firmly applied speed engine up to about 1500 RPM and immediately release throttle, noting engine operation as throttle valves close. If engine stalls from too rapid closing of throttle valves, move dashpot forward until its action prevents engine stalling. If excessive time is required for throttle valves to reach closed position, move dashpot rearward. Tighten locknut after each adjustment. If proper control cannot be obtained by adjustment, replace dashpot.

CARTER 2-BARREL WGD

2378S (Synchro-mesh), 2400S (Dynaflow)

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 1-4-6-7. LEFT barrel 2-3-5-8.*

Idle Setting–¼-1¼ (2378S), ½-1½ (2400S) turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–450 RPM. (Selector lever in Neutral on Dynaflow Cars).

Float Level–¼" (Gauge T109-31) between top of float (at center) and bowl cover.

Fast Idle Setting: .015" throttle opening or clearance between valve and wall on side opposite idle ports with choke valve tightly closed. Adjust by bending choke connector rod at lower angle.

Automatic Choke Setting: Centered (on index).

▷*OTHER DATA: See "Carter WGD Carburetors" in Carburetion Section.*

Dynaflow Throttle Linkage Adjustment: *See CARBURETOR above.*

Fuel Pump Pressure: 4½ - 6½ lbs. at pump outlet.

STROMBERG WW

Code 7-105 & 7-105A

▷*1956 SERIES 40 (EARLY) LEANNESS CORRECTION (Cars with Code 7-105 Carburetors):* Install carburetor kit, Buick Part No. 1392722 consisting of new idle tubes, main metering jets, and main discharge jets. After modification, change Code No. to 7-105A.

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting–1¾ turns. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–450 RPM. (Selector lever in neutral on Dynaflow Cars).

Float Level–3/16" below top edge of bowl (without gasket), with needle valve seated.

▷*OTHER DATA: See "Stromberg WW (Buick) Carburetor" in Carburetion Section.*

Dynaflow Throttle Linkage Adjustment: *See CARBURETOR above.*

Fuel Pump Pressure: 4½ - 6½ lbs. at pump outlet.

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CARTER WCFB 4-BARREL
2347S

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 1-4-6-7, LEFT barrels 2-3-5-8.*
Idle Setting–1 1/8 turns open Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed–450 RPM with Dynaflow Selector lever in neutral.

►*OTHER DATA: See "Carter WCFB Carburetor" in Carburetion Section.*

Dynaflow Throttle Linkage Adjustment: *See CARBURETOR above.*

Fuel Pump Pressure: 4½ - 6½ lbs. at pump outlet.

ROCHESTER 4GC 4-BARREL
7009200

►*STUMBLE ON LIGHT ACCELERATION (DURING COLD WEATHER) CORRECTION:* Change the accelerating pump spring from .041" to .042" wire diameter. *See "Rochester 4GC Carburetor" in Carburetion Section.*

►*STALLING OR LOADING UP WITH COLD ENGINE:* Install new Automatic Choke parts. See "Rochester 4-Barrel Carburetor on Pg. 82. NOTE: Carburetors stamped "C" on lower left corner of brass tag have these new parts and do not require modification.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 1-4-6-7, LEFT barrels 2-3-5-8.*
Idle Setting–Adjust idle mixture screws for smooth idle and recheck for correct idle speed.
Idle Speed–450 RPM with Dynaflow Selector lever in neutral.

►*OTHER DATA: See "Rochester 4GC Carburetor" in Carburetion Section.*

Dynaflow Throttle Linkage Adjustment: *See CARBURETOR above.*

Fuel Pump Pressure: 4½ - 6½ lbs. at pump outlet.

CARB. EQUIPMENT

Fuel Pump: AC. **Replacement No.** 4304.
Pressure - 4½ - 6½ lbs. at pump outlet.

►*LIGHT ENGINE KNOCK CORRECTION & FUEL PUMP ARM PRODUCTION CHANGE:* A light engine knock caused by early pressed steel type fuel pump arm striking timing chain cover can be corrected by replacing fuel pump with one having a forged arm, or pump with later type pressed steel arm (identified by daub of green paint on cover).
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: AC. Electric type.
Dash Unit - AC No. 1518438 (Red & Green background on dial), No. 1518765 (Plain Black background on dial).
Tank Unit - AC No. 1518138 (Series 40 & 60), No. 1518137 (Series 50 & 70).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Delco 3KMR62. *12 Volt.* 9 Plate, 62 Ampere Hour capacity (20 hr. rate).
Ground Terminal - Negative (–) terminal.
Engine Ground - Between engine and cowl.

STARTER

Delco-Remy 1107646. *12 Volt.* **Armature** - 1926626.
Drive - Overrunning clutch (solenoid pinion shift).
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 35 ozs. min.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95
11 ft. lbs.	Lock	5.2	460

Starting Switch: Delco-Remy Solenoid 1119760. *12 Volt.* Starter solenoid controlled by separate relay, Delco-Remy 1116876, and Accelerator Vacuum Switch (on carburetor). *See "Starter Controls" in Electrical Equipment Section.*

Accelerator Vacuum Switch: Carter 192-11U (Carter & Stromberg 2-Barrel), 192-21U (Carter 4-Barrel).

►*STARTER RELAY PRODUCTION CHANGE:* A new starter relay, Part No. 1116921 (made waterproof by dipping in vinyl plastic) replaces starter relay, Part No. 1116876.

Accelerator Vacuum Switch Setting–*See data on each carburetor type in Carburetor Section.*

Dynaflow Neutral Safety & Back-Up Light Switch: Delco-Remy 1998101. Mounted on steering column jacket under cowl. Connected in starter control circuit so that starter operative only when selector lever in "N" Neutral, or "P" Parking position.

Adjustment–*See "Buick Dynaflow Drive" in Transmission Section.*

►*NEUTRAL SAFETY & BACK-UP LIGHT SWITCH CONNECTION CAUTION: Wires must be connected in correct order as shown on wiring diagram.*

GENERATOR

Delco-Remy. *12 Volt.* As follows:

Model	Generator	Armature
Early (Without Air Cond.)	1102008 ①	1923535
Late (Without Air Cond.)	1102053 ②	1932900
All (With Air Cond.)	1102051 ②	1932900

①-With pulley. Delco-Remy 1102005 (without pulley).
②-With pulley. Delco-Remy 1102061 (without pulley).

Performance Data - Cold

Generator	Amperes ①	Volts	RPM
1102008	30	14	2150
1102051	35	14	2300
1102053	35	14	2300

①-Not maximum output. See Regulator.

Brush Spring Tension - 24-32 ozs.
Field Current - 1.48-1.72 amps. (1102005 Gen.), 1.62-1.82 amps. (1102051 & 1102053 Gen.). All at 12.0 volts.
Rotation - Counter-clockwise at commutator end.

Belt Adjustment: 3/8" belt deflection with normal thumb pressure midway between generator and fan pulleys.
NOTE: On air conditioned cars, deflection should be ½" midway between fan and compressor pulleys.

REGULATOR

Delco-Remy No.	Use with Generator No.
1119003	1102008
1119168 ①	1102051
1119162	1102053

①-Delco-Remy No. 1119162 Regulator is service replacement for No. 1119168.

►*REGULATOR GROUNDING CORRECTION: See "Delco-Remy 1119000 Series Regulator" in Electrical Section.*

►*NOTE: Specifications below are for "Normal" settings. See "Delco-Remy 1119000 Series Regulator" in Electrical Section.*

Cutout Relay
Cuts In - 11.8-13.5 volts (hot).
Contact Gap - .020"
Air Gap - .020" (with contacts just closed).

Voltage Regulator
Setting - 13.8-14.8 volts (hot).
Air Gap - .075" with armature pressed down to point where contacts just opening.
Checking & Adjusting - *See Electrical Section.*

Current Regulator
Setting (1119003) - 30 amperes (hot).
Setting (1119162 & 1119168) - 35 amperes (hot).
Air Gap - .075" with armature pressed down to point where contacts just opening.
Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*

►*DIRECTION SIGNAL SWITCH STICKING CORRECTION: See "Electrical Notes" in Buick Special Data.*

Lighting Switch Removal: Disconnect battery cable from junction block and disconnect wires from lighting switch. Pull switch knob out to last notch, then depress spring loaded latch button on switch body while pulling rod and knob assembly out of switch. Remove switch mounting nut with wrench J1589 and remove switch and escutcheon from instrument panel.

Stop Light Switch: (Location)–On brake pipe distributor fitting near master cylinder on left side at transmission support.

FUSES: Located on fuse panel under cowl unless otherwise specified.
Back-Up Light - 10 amps.
Dome & Luggage Compartment Light - 20 amps.
Electric Clock - 2 amps.
Heater & Defroster - 20 amps.
Parking Brake Warning Light - 10 amps.
Stop & Direction Signal Lights - 9 amps.
Cigar Light - Special fuse in back of lighter.
Air Conditioner Motor - 15 amps. (in wiring connector near switch).
Air Conditioner Blower - 20 amps. (in fuse block)
Air Conditioner Clutch Contr l - 5 amps. (in fuse block).
Glove Box Light - 2 amps. (in wiring connector).

CIRCUIT BREAKER: 22 amperes. Vibrating type on Headlight Switch.

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HORNS: D lc -R my. No. 1999769 (Low Note), No. 1999770 (High Note). *12 Volt.*

Horn R lay: Delco-Remy 1116781. *12 Volt.*

C ntacts Cl s —2.75-4.0 volts.
Contact Gap—.025". **Air Gap**—.015" (closed).

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: Own 90° V8 (All Series).

Seri s	B r	Stroke	Displacement
All	4.00"	3.20"	322 cu. ins.

S ri s	C mp. Rati	Rated HP	①Dev. HP
40 (Synchro-mesh)	7.6-1	51.2	
40 (Dynaflow)	8.9-1	51.2	220
50, 60, 70	9.5-1	51.2	255

①- At 4400 RPM.

Compression & Vacuum Reading—*See TUNE-UP.*

►*ENGINE IDENTIFICATION NOTE:* See Engine Number for suffix digit designating each series. Series 40 engine also has vertical groove 3/8" wide and 1/8" deep) cast in engine number pad approximately 1¼" to rear of pad centerline.

►*ENGINE COMPRESSION RATIO NOTE:* Same cylinder head used for all engines. Different compression ratios on Series 40 is secured by the use of different pistons. Head gaskets are the same on all models (.015" thick). *See Piston data bel w.*

►*ENGINE DETONATION (Low Octane Areas):* If octane rating of available fuel results in detonation complaints, this condition can be corrected by lowering the compression ratio as follows:
S ri s 40 (Synchr -mesh) - 7.35 - 1 compression ratio can be obtained by using cylinder head gasket, Part No. 1343995 (.045" thick).
Series 40 (Dynafl w) - 8.4-1 compressi on ratio can be obtained by using cylinder head gasket, Part No. 1343995 (.045" thick).

Seri s 50, 60, 70 (Dynaflow) - 8.4-1 compression ratio can be obtained by using cylinder head gasket, Part No. 1343995; and engine pistons, Parts No. 1392566.

►*ENGINE KNOCK AT IDLE SPEED OR UNDER LIGHT LOAD CORRECTION (Due to loose harmonic balancer):* Check the balancer hub flat washer to see that it does not bottom against crankshaft, and that balancer bolt does not bottom in tapped hole in crankshaft. If either or both conditions exist, install a second flat washer between present washer and balancer hub, so that clearance exists between washer and crankshaft.

►*FAN SHROUD RATTLE CORRECTION:* Drill a 9/32" hole in bottom of shroud approximately 5/16" from edge of shroud and install a rubber bumper, Part No. 503865.

►*EXHAUST MANIFOLD STUD BREAKAGE CORRECTION:* When installing a new stud, drill out the old hole to .368" (size "U" drill) and thread with a 7/16"-14 tap. Install a 7/16" stud and file out flange holes to accommodate the larger stud.

ENGINE MOUNTINGS: *See "Engine Mountings" in Buick Special Data*

OIL PAN REMOVAL: Disconnect steering idler arm bracket from right frame side rail and lower steering linkage for clearance, then remove pan. *CAUTION*—Do not allow bracket to turn on idler arm (will change toe-in adjustment).

CYLINDER HEAD & GASKET: Same cylinder head and gasket used on all engines (except as noted in "Engine Detonation Note" above). Different compression ratios secured by use of different pistons as noted under "Pistons" following.

Cylinder Head & Gasket Installation—*See "Cylinder Head & Manifold" in Buick Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Buick Special Data.*

PISTONS

Pistons—Aluminum alloy, dome head, cam ground, full skirt with transverse slots in oil ring groove, Anodized finish.

►*PISTON REPLACEMENT NOTE:* Different pistons used as follows:

Model	Std. Size Piston No.
Series 40 (Synchro-mesh)	Buick No. 1392564
Series 40 (Dynaflow)	Buick No. 1392566
Series 50, 60, 70 (Dynaflow)	Buick No. 1392565

►*ORIGINAL CYLINDER BORE CAUTION:* Engines with ¼" long dash following engine number have .010" Oversize Cylinder Bore & Pistons. Standard cylinder bore size: (All Models) 3.9985-4.0015".

Removal—Pistons and rods removed from above.

►*CAUTION*—Mark pistons, rods, and bearing caps with cylinder number before removal to insure correct reinstallation. Use Rod Bolt Guides (short guide J-5239-1 on lower bolt, long guide J-5239-2 on upper bolt) to retain bearing shell and assist in pushing assemblies out.

Fitting New Pistons: Clearance .0014-.0020". If micrometer used on pistons, measure at top and bottom of skirt 90° from pin hole (top diameter very slightly less than bottom in service). Use .003" x ½" x 12" feeler gauge to fit pistons with cylinder block in normal position. Insert feeler on lower side of bore 90° from piston pin hole. Pull to withdraw feeler should be 7-13 lbs. at 70°F. (piston and bore clean and dry).

Replacement Pistons: Standard ("High Limit" or maximum diameter production size) and .005", .010", .020", .030" Oversize. *NOTE*—Pistons furnished only with fitted pins.

Installing Pist ns: Assemble pistons on rods with valve depressions in head on same side as clamp bolt in rod. Install pistons with valve depressions toward camshaft. *See Rod Installation.*

PISTON PINS

Diamet r - .940". L ngth - 3.400".
Clearance in Piston-.003-.005", or easy push fit at 70° F.
Piston Pin Removal & Installation: *See "Piston Pins" in Buick Special Data. CAUTION - Pistons may b damaged if special procedure and tools not used.*
Replacement Pins: Std. size only. Fitted pins furnished with all new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearanc
Compr	.078"	010- 020"	002- 004"
Oil	.186"	015- 035"	0035 0095"

►*OIL RING NOTE.* Ring is three-piece (two rails and spacer) with expander. New rings are cemented assembly for ease in handling (will separate in service).

Replacement Rings: Production type rings furnished singly and in sets Standard & .010", .020", .030" Oversize. Special Service Ring sets furnished Standard (use up to .019" O.S.), & .020", .030" Oversize.

Installing Rings: Compression ring groove or bevel (on inner edge) upward. Oil ring expander gap ends should be at either end of piston pin (in unslotted portion of groove) and side rail gaps must be on valve depression side of piston (upward when installed in cylinder).

CONNECTING RODS

Length—6" **Weight**—22.16 ozs.
Crankpin Journal Diameter—2.249-2.250"
Out-of-round limit . 0015".
Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.
Clearance—.0002-.0023" (service limit .003").
Sideplay - .005-.012".

Replacement Bearings: Standard & .001", .002", .020", .021" Undersize. Size is stamped on back of bearing at or near tang.

Installing Rods: *See Installing Pistons above.* Rib on edge of cap and conical boss on web of rod must be toward rear of engine on all rods in RIGHT bank or toward front of engine in LEFT bank.

CRANKSHAFT

►*CRANKSHAFT & FLYWHEEL UNBALANCE OR VIBRATION (After replacement of parts - Synchro-mesh & Dynaflow Cars): See "Engine Balancing" in Buick Special Data.*

Journal Diameter—2.498-2-499". Five bearings.
Out-of-round limit .0015".
Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.

BEARING NOTE—Bearing upper halves can be rotated out and in by using tool KMC-734 in oil hole.

Clearance - .0005-.0025".

Replacement Bearings: Standard & .001", .002" Undersize. *NOTE*—First four bearings identical and interchangeable. Rear bearing longer and flanged.

End Thrust: Taken by rear (#5) flanged bearing.
Endplay—.004-.008".

Crankshaft R ar Main B aring Oil S al: *S "Crankshaft & Main B arings" in Buick Sp cial Data.*

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Crankshaft Fr nt Oil Seal· *See "Engine Front Cover" in Buick Special Data*

FLYWHEEL REPLACEMENT *See "Flywheel" in Buick Special Data*

CAMSHAFT

►*CAMSHAFT THRUST PLATE & TIMING GEAR PRODUCTION CHANGE (APPROXIMATELY 5000 1956 CARS):* The camshaft thrust plate and spacer ring have been eliminated and the timing gear has been changed. If difficulty is encountered on these cars, install a standard type timing gear, spacer plate and thrust ring. The standard timing gear is identified by a cam shaped hub while the supplementary gear has a round hub.

►*CAMSHAFT IDENTIFICATION NOTE & NON-INTERCHANGE CAUTION:* Camshafts are identified as follows: **Series 40 (Synchro-mesh Trans.)** - No grooves in land just forward of No. 3 camshaft bearing journal. **All Other Series** - Two grooves in land just forward of No. 3 camshaft bearing journal.

Journal Diameters—(1) 1 685-1 686 , (2) 1 655-1.656", (3) 1 625-1.626", (4) 1 595-1 596" (5) 1.565-1.566 '.

Bearings—Steel-backed, babbitt lined bushings.

Clearance—.0005- 0035' (service limit .0015-.004').

End Thrust Spacer ring installed on shaft between front bearing journal and thrust plate bolted to crankcase behind camshaft sprocket **Endplay**—.004-.008".

Timing Chain: Link Belt **Width** .688", **Pitch** .500" **Length** 26 or 52 links.

Camshaft Setting: Mesh chain on sprockets with two copper-plated washers (12 links apart) in line with O' marks on sprockets with marks toward left side of engine. Turn camshaft so that keyway is straight downward, turn crankshaft so that #1 and #4 pistons are on top dead center, install sprockets and chain as an assembly.

Engine Front Cover Removal· *See "Engine Front Cover" in Buick Special Data*

Engine Front Cover Oil Seal (Crankshaft Front Seal)· *See "Engine Front Cover" in Buick Special Data.*

VALVES

►*OIL FLOW REDUCTION TO VALVE MECHANISM NOTE:* Where the valve mechanism is receiving an excessive amount of oil and it is desirable to reduce the flow, a new plug having a .077" orifice can be installed in cylinder head. *See "Valve System" in Buick Special Data".*

►*VALVE ROCKER ARM PRODUCTION CHANGE:* A heavier type rocker arm with a relocated oil hole is now being used in production. The oil hole in the later type rocker arm is located in center of bearing casting and not in boss on rocker arm. The later rocker arm is completely interchangeable with early type.

Tappet Clearance· None in service (hydraulic).

Valve	Head Diameter	Stem Diameter	Length
Intake	1 750	3720'	4 704"
Exhaust	1 375'	3715'	4 704"

Valv	S at Angl	Litt	St m Cl aranc
Intake	45°	.378"	.002-.003"
Exhaust	45°	.378"	.003-.004"

Valv Seat Width—1/16" (3/64-5/64")

►*VALVE GRINDING CAUTION*· If height of valve stem end raised .075" by valve grinding, height must be reduced by grinding end of stem or replacing valve to insure correct operation of hydraulic lifter.

Valve Springs· Double springs used on all valves. Install springs with closed-coil end toward cylinder head.

Valve Spring Specifications

	Inner Spring		Outer Spring	
Valve	Lbs.Press.	Lgth.	Lbs.Press.	Lgth.
Closed	24-29	1.53"	43-48	1.5"
Open	58-64	1.15"	91-97	1.12"

Valve Guides: Drive old guides out from combustion chamber side using Driver J-269. Install new guides from top of head using Valve Guide Aligner J-5240-2 over guide hole and installer J-5240-1 to drive guide down until installer shoulder contacts top of aligner which will position guide correctly in head. Finish ream guides with Valve Guide Reamer J-129-3.

Hydraulic Valve Lifters: Barrel type.

Diameter—.8425". **Clearance in Block**—.0015-.003".

Lifter Overhaul & Testing—*See "Valve System" in Buick Special Data*

►*VALVE GRINDING CAUTION See Valves (above)*

Rocker Arm Assembly· *See "Valve System" in Buick Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Synchro-mesh Models

Intake Valve - Opens 25° BTDC. Close 77° ALDC.
Exhaust Valve - Opens 75° BLDC. Close 42° ATDC.

Dynaflow Models

Intake Valve - Opens 30° BTDC. Close 82° ALDC.
Exhaust Valve - Opens 78° BLDC. Close 44° ATDC.

Valve Timing Check—Timing chain cover must be removed to check chain and sprocket marks. *See Camshaft Setting under CAMSHAFT above.*

OILING SYSTEM

Crankcase Capacity: 6 qts. (refill), 8 qts. (dry engine). NOTE— 1 qt. additional for dry filter.

Normal Oil Pressure· 35 lbs. at 35 MPH.

Pressure Regulator Valve In oil pump body. Not adjustable.

Oil Pressure Indicator - AC No. 1508362. Not electric.

Oil Pump· Helical gear (early cars), spur gear (later cars), in crankcase at rear of engine

Pump Overhaul—*See "Oiling System" in Buick Special Data*

Oil Filter· Full-flow. On pad at right rear of engine. NOTE—Ball check valve in filter base by-passes oil directly to engine when pressure differential between inlet and outlet ports reaches 4½-5½ lbs.

Replacement Filter Elem nt—AC No. PF-122.

Crankcas Ventilation: Filter element in oil filler cap (air intake) and in rear end of valve lifter cover (air outlet) to which ventilator pipe is connected.

COOLING

►*FAN "OUT-OF-BALANCE" OR DRIVEN PULLEY CRACKING CORRECTION:* This condition may be caused by the counterbore in fan spacer being too shallow. Check to determine if the fan spacer is clamping fan driven pulley against water pump hub. If fan spacer does not clamp, deepen the counterbore to 3/8" using a 5/8" reamer, to provide clearance for water pump shaft.

Water Capacity: (Synchro-mesh Cars) 16 5 qts (without heater), 18 qts. (with heater), **(Dynaflow Cars)** 18 5 qts (without heater), 20 qts (with heater)

Pressure Valve: AC No 850549 (7 lb—Without Air Conditioning), No 850559 (13 lb—With Air Conditioning) Radiator Filler Cap

►*PRESSURE VALVE NOTE:* A 13 lb. pressure valve *(same as used on air-condition d cars) may b us d on cars without air conditioning, wh n operating in t mperatures above 110°.*

Thermostat: Pellet type in water manifold above pump. (Std.) Buick No. 1391226 opens at 157-162°F. (High Temp.) Buick No. 1391225 opens at 177-182°F.

Water Pump: Packless, sealed ball bearing type. *See "Buick V8" in Water Pump Section.*

Pump Removal—Remove fan blade assembly, spacer, and pulley from pump shaft hub, then remove pump cover assembly and gasket from timing chain cover.

Temperature Gauge: AC No. 1513110 (Cars without air conditioning). No. 1513392 (Cars with air conditioning). *See "Temperature Gauges" in Misc llaneous S ction.*

CLUTCH

►*CLUTCH EQUALIZER ASSEMBLY & ENGINE BRACKET INTERFERENCE CORRECTION:* Grind 1/8" from end of equalizer shaft nearest engine and grind off ¼" from both ends of the reinforcing ridge on equalizer engine bracket. Check to see that the long side of the clutch over-center spring extension is upward (this may be installed upside down).

Own. Single plate (conventional spring type).

►*CLUTCH NOTE:* Service replacement parts are not furnished for this clutch.
See "Buick Single Plate" in Clutch S ct i n.
Clutch Disc No. - Buick No. 1391632.

Pedal Adjustment—Free travel ¾-1". Adjust by loosening locknut and turning adjusting nut on release rod at clutch fork.

Removal—Remove rear axle and transmission (See below), take off clutch underpan, disconnect linkage at yoke, remove clutch release bearing support by taking out spring washer in housing, pull out yoke (with release bearing) from fulcrum, mark clutch and flywheel, remove cover mounting screws.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh.
See "Buick Synchro-m sh in Transmissi n S cti n.
Transmissi n Contr l: *S "Transmissi n C ntr ls" in Transmission S ction.*

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Removal: Disconnect rear axle assembly and move it back out of way. Disconnect speedometer cable, shift rod and selector rod. Disconnect rubber thrust pad from transmission support and remove shims. Remove bolts attaching transmission mounting pad to support. Place a jack under engine and raise engine and transmission just enough to relieve load on transmission support. *(CAUTION - Note the location and number of shims).* Remove support from frame. Remove two top transmission to flywheel housing bolts and install Guide Pins J-851 to support transmission. Remove lower bolts and remove transmission, sliding it straight back. *CAUTION - If guide pins are not used and weight of transmission is allowed to rest on main drive gear in clutch driven hub, the drive plate will be damaged.*

DYNAFLOW DRIVE

"Variable Pitch" Dynaflow Drive. Torque Converter and hydraulically operated planetary transmission. A two position (high & low) stator is used in the torque converter to multiply engine output torque when required (controlled by accelerator pedal at the wide open position) *See "Buick Variable Pitch Dynaflow Drive" in Transmission Section*

▷*DYNAFLOW OIL LEAKAGE CORRECTION (Oil flowing from breather pipe):* This condition caused by uncovered oil hole in transmission mainshaft. *See "Buick Dynaflow Drive" in Transmission Section.*

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION. See "Buick Variable Pitch Dynaflow Drive" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING See "Buick Variable Pitch Dynaflow Drive" in Transmission Section.*

Throttle Linkage Adjustment and Dash Pot Setting on Dynaflow Drive Cars. *See "Tune-up".*

Lubrication—Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level—Engine must be idling with selector lever at "P" (parking) and transmission at normal operating temperature. Add oil to "Full" mark on dip stick only.

Capacity—10 quarts.(Add 1¾ pints for dry transmission). *Use only Special Buick Oil for Dynaflow Drive or Automatic Transmission Fluid Type A.*

▷*OTHER DYNAFLOW SERVICE DATA See "Buick Variable Pitch Dynaflow Drive" in Transmission Section.*

UNIVERSALS

Saginaw & Spicer. One used (in torque ball at rear of transmission).
See Universals Section for complete data.

REAR AXLE

Own. Semi-floating hypoid gear type of new design, and torque tube drive.

▷*TORQUE TUBE FRONT FLANGE LOOSENING CORRECTION.* This condition is due to uneven flange which does not allow proper seating of bolt head. To correct, file flange rear face, under head of bolt so that a full bearing of the bolt is obtained. Install later type bolts, Part No. 183822 (identified by six radial marks in bolt head) and torque to 50-60 ft. lbs.

▷*UNIVERSAL JOINT ROUGHNESS ON DECELERATION CORRECTION:* This condition may be due to the torque tube ball retainer being oversize or off center on the flange which prevents it seating fully in recess in end of rear bearing retainer. Correct by filing down outer diameter of retainer so retainer is free to float when torque ball assembled. Tighten flange bolts alternately.

▷*REAR AXLE "CLUNKING" NOISE CORRECTION (At speeds below 25 MPH): May be caused by excessive clearance between differential side gears and bore in differential case. See "Buick Hypoid" in Rear Axle Sect.*

▷*SERIES 70 REAR AXLE OIL PUMP NOTE:* Beginning with early May 1956 production, the oil pump formerly used in Series 70 rear axle assemblies has been eliminated. Service replacement parts connected with the oil pump have also been discontinued. When pump is removed for any reason, it should be left out of the assembly. Series 50 & 70 axle shafts and differential carriers are interchangeable.

▷*REAR WHEEL BEARING OIL LEAK CORRECTION: See "Buick Hypoid" in Rear Axle Section.*

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Buick Hypoid" in Rear Axle Section.*

Axle Ratios

Series	Synchro-mesh	Dynaflow
40	3.91-1	2.23-1
50, 60, 70		3.36-1

▷*REAR AXLE RATIO NOTE:* Ratio is stamped on bottom of axle housing as follows: 3/2 (3.23-1), 3/4 (3.36-1), 3/9 (3.91-1).

Backlash - .007-.009".

Axle Shaft Removal: Remove rear wheel and brake drum. Remove nuts attaching wheel bearing retainer plate to brake backing plate leaving bolts in place to support backing plate. Pull out axle assembly using Puller J-6176 with a slide hammer (be careful not to disturb brake backing plate). *See "Buick "Hypoid" in Rear Axle Section for disassembly procedure.*

Rear Axle Assembly Removal: Place stands under rear axle with wheels clear of floor and place a jack under center of axle housing so it supports weight of axle assembly. Disconnect radius rod at axle end. Disconnect lower ends of rear springs and lower ends of rear shock absorbers. Disconnect parking brake cable at rear cable sheave and at bracket on torque tube. Disconnect brake hose from pipe at frame cross-member and remove yoke (cover hose and brake pipe openings). Loosen torque ball retainer bolts so ball is free. Remove two opposite torque tube flange bolts, replacing them with 3" long guide pins, then remove other flange bolts. Roll rear axle assembly out from under car.

Wheel Bearing Adjustment: None required.

Rear Suspension: *See "Buick Rear Suspension" in Suspension & Wheel Alignment Section.*

Torque Ball Adjustment: New design torque ball assembly does not require adjustment.

SHOCK ABSORBERS

Delco. Direct-acting hydraulic (front & rear). Front shock absorbers mounted within front suspension coil springs.

Front Shock Absorbers

Model	Std.	200# Overload
40, 60 (Exc. 49, 69) Early	5522798	5383669
40, 60 (Exc. 49, 69) Late	5531226	5531225
49, 69 (Early)	5383669	
49, 69 (Late)	5531225	
50, 70 (Early)	5383669	5382679
50, 70 (Late)	5531225	5532070

Rear Shock Absorbers

Model	Std.
41, 43, 48, 63, 63D	5531240
46C, 46R, 66C, 66R	5531428
49, 69, 52, 53, 72, 73	5531242
56C, 56R, 76C, 76R	5531427

▷*REAR SHOCK ABSORBER MOUNTING BOLT LOOSENING CORRECTION:* Replace the mounting bolt and nut with Part No. 454961 (bolt), and Part No. 454939 (nut). Torque to 80-90 ft. lbs. The later type bolt is identified by 6 radial marks on head.

FRONT SUSPENSION

Independent. Shock absorbers mounted within the coil springs.
See "Buick" in Suspension & Wheel Alignment Section.

▷*FRONT TIRES RUBBING ON FRAME CORRECTION (Early 1956 cars):* Install a 1/32" plain washer under the bolt head of the rear steering arm bolt on both right and left sides.

▷*ADJUSTMENT CAUTION.* Check spring height and position of Idler arm before changing adjustments.

Kingpin Inclination - 7° at 7/8° camber.

Caster - 0° to Neg. 2° (Neg. 1° desired at both wheels). *NOTE - This caster setting supersedes the former setting of Neg. ½° to Neg. 1½°.*

Camber - Pos. 7/8° to Neg. 5/8° (Pos. 3/8° desired). Camber on both wheels must be within ¾° of each other.

Toe-In - 1/16" to 1/8".

Toe-out on Turns—Outer wheel 20°, inner wheel 22½° ± 3/4°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut type.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: "Saginaw (In-Line) Hydraulic". Recirculating ball nut and worm type with the worm and ball nut, power piston and rack, and the power cylinder all on a single center line.
See "Saginaw (In-Line) Power Steering" in Steering Sect.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

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Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic (Single Anchor): Conventional two shoe with short molded lining front (Primary) and long molded lining rear (Secondary). Parking "Step-On" lever applies rear wheel service brakes.

See "Bendix Hydraulic (Without Eccentric)" in Brake Section.

►*BRAKE SQUEAK CORRECTION:* Install Anti-Squeak Spring, Part No. 1345469 on all four brake drums. Spring is installed on O.D. of drum and held in place with clips, Part No. 1172311, disregard hole in clip as inboard side of wheel will hold them in place.

►*BRAKE PEDAL TWISTING CORRECTION (MANUAL BRAKES):* On early 1956 Dynaflow models a bending or twisting of the brake pedal plate can be corrected by removing the brake pedal pivot lock nut, bolt and pedal as well as the dash insulator retainer. Drill a 9/32" hole through the cowl using the unused hole in brake pedal bracket as a guide. Install a ¼" x 20" x ¾" bolt, washer and locknut and tighten to cowl panel.

►*DISTORTED AND OUT-OF-ALIGNMENT POWER BRAKE PEDAL CORRECTION:* Loosen pivot bolt locknut on right side of brake pedal bracket and with pedal in fully released position, turn eccentric pivot bolt at left side of bracket until there is just enough clearance between push rod and air valve sleeve to prevent contact at any point in pedal travel. Tighten locknut, making sure that adjustment does not change. If the above procedure does not correct the trouble, it will be necessary to shim between pedal plate and power cylinder, as necessary to correct the alignment.

►*POWER BRAKE PEDAL SLOW RETURN CORRECTION:* Install Power Brake Pedal Return Spring, Part No. 1175435 on eccentric bolt and hook it back of brake pedal.

►*BRAKE MASTER CYLINDER PRODUCTION CHANGE:* A new master cylinder, Part No. 5456000 is being used in production and for service replacement. A new master cylinder repair kit, Part No. 5455765 is available and can be used on the earlier type master cylinder to convert it to the later design. *See "Buick Hydraulic Brake Master Cylinder" in Brake Section.*

►*PARKING BRAKE PEDAL SLIPPAGE CORRECTION:* This condition is caused by incorrect adjustment of parking brake release rod trunnion and can be corrected by adjusting the trunnion so when parking brake is in fully released position, the release rod spring will be compressed approximately ¼" to give it a desired preload of approximately 4 - 6 lbs. *See "Brake Notes" in Buick Special Data.*

Drums—Diameter 12" Rebore limits. .060"

Wheel Cyl. Diameter—Front 1-1/8", Rear 1".

Replacement Lining & Shoes—Linings or shoes with linings come in Standard and .030" oversize, and differ between Regular and Power brakes, as well as between car Series.

Lining Width & Thickness

Model	Front Wheels	Rear Wheels
Series 40, 50, 60	2.25" x .187"	2.25" x .187"
Series 70	2.50" x .250"	2.25" x .187"

Braking Power - 53% Front, 47% Rear.

Clearance - Heavy drag and back off 15-17 notches.

Standard Master Cylinder: "Displacement" type. Located on engine side of cowl panel directly below brake pedal. *See "Buick Master Cylinder" in Brake Section.*

Checking Fluid - Maintain fluid level ½" to 1" below top of filler opening.

Removal - Disconnect brake pipe and tape end of pipe. Disconnect stop light wire, and disconnect push rod from brake pedal and remove brake pedal. Remove screws holding steering column jacket rubber seal retainer to floor pan and push it up on steering column jacket. Pull floor mat away from pedal plate and remove pedal plate and master cylinder together.

Power Brakes: Moraine Suspended type power brake unit (replaces conventional master cylinder). Reservoir is integral with master cylinder.

See "Moraine Power Unit" in Brake Section.

►*HYDROVAC POWER BRAKE NOTE: If this type power brake found on car, see "Hydrovac Power Unit" in Brake Section.*

Checking Fluid Level - Maintain fluid level ½" to 1" below top of filler opening.

Removal of Power Unit - Disconnect brake pipe from master cylinder and tape end of pipe. Disconnect vacuum hoses from power cylinder, and stop light wires from switch. Place drip pan under reservoir and remove reservoir. Disconnect push rod from brake pedal. Remove eccentric bolt and remove pedal. Remove screws holding dash insulator retainer to pedal plate. Remove retainer and push steering column seal up column jacket. Pull floor mat out of way and remove pedal plate and power brake unit from car.

MISC. MECHANICAL

Air Conditioning: Frigidaire-Harrison type with solenoid controlled compressor clutch (compressor operates only with air-conditioning switch turned on). *See "Frigidaire-Harrison Air-Conditioning" in Miscellaneous Sect.*

Windshield Wipers: Cable operated vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Electric type with reversible motor in each window. *See "GM Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters (Two-Way): Electric type with single reversible type motor for horizontal adjustment. *See "GM Two-Way Seat Regulators" in Miscellaneous Section.*

Power Seat Adjusters (Six-Way): Electric type with single reversible motor. *See "GM Six-Way Seat Regulators" in Miscellaneous Section.*

Power Top Control: Hydro-Lectric with reversible pump motor. *See "Power Top Controls" in Miscellaneous Sect.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	65-70
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan Screws	10-12
Oil Pan Nuts	15-18
Main Bearing Caps	90-100
Vibration Dampener	60-65
Con Rod Caps	40-45
Camshaft Sprocket	15-18
Water Pump Mounting	25-29
Oil Pump Mounting	25-30
Flywheel Housing (Upper)	45-50
Flywheel Housing (Lower)	25-30

ENGINE

ENGINE REMOVAL (WITH TRANSMISSION IN CAR): *(CAUTION—If car is equipped with Air Conditioning, see Air Conditioning Section for precautions to take when removing equipment or disconnecting refrigerant lines).* Proceed as follows:

1—Drain cooling system, crankcase and transmission. Remove hood top panel (see Hood Removal above). Disconnect battery, and wires from generator. Remove upper and lower radiator hoses and remove radiator core.

2—Disconnect power steering pump to valve body hoses at pump and install caps on fittings to prevent oil leakage. Disconnect refrigerant lines (See Air Conditioning Section). Disconnect all heater hoses at water pump and remove right heater hose from thermostatic valve.

3—If car is equipped with power brakes, disconnect vacuum line at intake manifold. Remove carburetor air cleaner, disconnect throttle linkage and fittings and remove carburetor. Disconnect flexible fuel line at fuel pump and remove line from clips. Disconnect ground straps, primary wire at distributor, oil pressure and cooling system temperature switch wires Disconnect wires at porcelain resistor.

4—Disconnect windshield wiper vacuum hoses at manifold line and vacuum pump line. Raise front of car and install stands.

5—Disconnect propeller shaft at rear axle and remove assembly from car by sliding yoke out of transmission extension housing. Remove transmission linkage slush deflector, and disconnect speedometer cable and shift linkage at transmission. Remove starter from car.

6—Disconnect front engine supports at frame. Disconnect exhaust pipes from exhaust manifold. Remove idler arm support screws from frame and lower idler arm and steering connector link. Loosen hand brake cable at relay. Remove stands from front of car and lower car to floor.

7—Install a chain or rope around intake manifold and attach chain hoist above engine. Take up all slack and then remove rear engine support bracket from frame and extension housing. Lift engine, with transmission, out of car.

OIL PAN

OIL PAN REMOVAL: Drain engine oil, and remove oil level indicator. Disconnect battery ground strap and wires from starter solenoid. Remove starter motor assembly. Remove idler arm support screws and lower support from frame side bar. Remove water hose and clip from center of crossmember. Remove oil pan screws and nuts and remove oil pan.

Oil Pan Installation: Install new cork seals in rear main bearing cap and in front cover, being sure ends of gaskets are in recess provided for them. Cement pan gaskets to both sides of pan, being sure holes in gasket line up with holes in pan. Place a small amount of chassis grease on each of the four corners of gasket which hang over front and rear cutouts, which will permit pan to slide over corks and insure a good seal. Place pan in position on bottom surface of cylinder block over the four studs, and install nuts and lockwashers loosely. Install remaining screws and tighten screws and nuts in rotation to 7-10 ft. lbs. torque. Complete installation by reversing removal procedure.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use a Torque Wrench and tighten cylinder head capscrews starting from the center row of bolts and working outward and toward each end.

▷*CYLINDER HEAD TIGHTENING CAUTION—Loosen intake manifold before checking the cylinder head capscrew torque. This will prevent the upper row of screws from being under-torqued due to the bridging effect of the manifold.*

Cylinder Head Gasket. Install with side stamped "Top" UP

Cylinder Head Capscrews. 8 short screws in outside row, 5 medium length screws in center row, 4 long screws at rocker arm shaft.

Tightening Torque. See Tightening (Torque Wrench) Specifications.

ORIGINAL BORE & PISTONS

ORIGINAL PRODUCTION ENGINE BORE & PISTON SIZES: Piston and cylinder size variation indicated by letter ("A" through "M") stamped on top of block at outer edge of cylinder bore. Each letter indicates two sizes ("—" if letter to left of bore, "+" if to right of bore center). These letters used in production for selective fitting of pistons.

PISTONS

FITTING NEW PISTONS: Pistons should be fitted by Micrometer Gauge Method or Feeler Gauge Method as described below. Piston skirt clearance is .0015" at top of skirt, and .000" at bottom (with proper allowance for temperature variation).

Feeler Gauge Method:—Use ½" feeler stock .002", .0025", or .003" thick (see Feeler Gauge Note and table below) on side of piston directly over "T" slot (center feeler on slot) with lower rounded end of feeler extending ½" down on piston skirt past horizontal slot (feeler must not extend further down on piston skirt because skirt is tapered with greater diameter at bottom) Install piston and feeler in cylinder with piston right side up and feeler toward side, measure pull required to withdraw feeler Pull will vary in accordance with thickness of feeler gauge used and with piston temperature. See table below for correct pull for each feeler gauge thickness to obtain proper skirt clearance listed above

Feeler Pull	Piston Clearance (70°F.)		
(In lbs.)	.002" Feeler	.0025" Feeler	.003" Feeler
1	.00225"	.00275"	.00326"
2	.002"	.00252"	.00304"
3	.00175"	.00228"	.0028"
4	.0015"	.00205"	.00258"
5	.00125"	00182"	.00235"
6	001"	.00157"	.00213"
7	.00075"	.00133"	.0019"

PISTON PINS

PISTON PIN FITTING: *(NOTE—Special tool J-3848 is required to fit pins to connecting rods).* See following for Removal and Installation:

Removal—Install pilot of tool J-3848 on puller screw and insert this assembly through piston and pin from side of piston stamped "REAR." Install support (part of tool J-3848) over puller screw with small end of support against front side of piston (side opposite to that stamped "REAR"). Install nut loosely on puller screw and place assembly in arbor press with support positioned over slot in press table to allow screw to extend down. Press piston pin out of piston and rod assembly Remove tool from piston and rod

Installation—Lubricate pin holes and install pilot (part of tool J-3848) through piston and rod, lubricate pin and insert it in piston pin hole on "REAR" side of piston. Install puller screw through pin and pilot from "REAR" side of piston. Insert spacer (part of tool J-3848) between connecting rod and front side of piston until it is seated on the pilot Install support over puller screw with smaller end toward front of piston (opposite to side stamped "REAR") Mount piston and tool assembly in vise with side of piston stamped "REAR" down and flats of puller screw gripped in vise Install nut on threaded end of puller and tighten with torque wrench to start piston pin into connecting rod. *(CAUTION—If* pin can be started into rod with less than 15 ft.lbs. minimum torque, the clearance between piston pin and rod is excessive and either the piston and pin assembly or connecting rod must be replaced). Remove assembly from vise and install in arbor press with large side of support down Install collar (part of tool J-3848) over piston pin and press puller screw down until top of pin is level with top of collar *REMOVE COLLAR and SPACER.* Pin will be projecting slightly from rod, and must be guided into pin boss next to support to assure correct alignment When aligned, press pin in until pilot bottoms in support This properly positions pin in rod

CRANKSHAFT & MAIN BEARINGS

CRANKSHAFT REMOVAL (Engine in Car): Jack up all four wheels and install a stand at each wheel. Drain crankcase and cooling system. Remove oil pan (see Oil Pan Removal), oil pump (see Oil Pump Removal), timing chain (see Timing Chain Removal), and flywheel (see Flywheel Removal). Take off steering idler at right frame side bar and lower linkage to floor. Remove spark plugs. Take off rod caps and push rod and piston assemblies up into bores to clear shaft. Remove front and rear main bearing caps, support shaft at front and rear and remove three remaining caps, lower shaft out of engine.

REAR MAIN BEARING OIL SEAL: Wiper seal installed in rear groove in bearing cap and block (oil slinger operates in front groove).

Oil Seal Installation – With crankshaft out of engine (see Crankshaft Removal). and bearing cap off, install length of new packing in groove in block. Use Tool J-6349 and drive seal into place. With tool in place, cut ends of packing flush at each end. Repeat operation for bearing cap.

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►*NOTE:* To prevent seal from rotating in groove (because of thrust caused by transmission) after a new seal is installed, place gasket sealer on ends of cap over the seal, then place a piece of .001" polyester tape (Scotch Brand No. 850 or equivalent) over ends of cap and the new seal. Install gasket sealer over the tape and install bearing cap.

ENGINE BALANCING

ENGINE BALANCE CHECK & UNBALANCE CORRECTION: 1) – Connect a tachometer to engine and run engine at progressively higher speeds (with transmission in neutral). Note degree of vibration at various speeds.

2) – If greatest vibration is noted at approximately 2800 RPM, either the torus cover, flywheel, or flex plate may be out of balance. To correct, add a washer under one of the four flex plate-to-flywheel attaching nuts. Recheck for vibration. If the addition of the washer increases vibration, remove washer and place it under one of the other three attaching nuts until the best over-all balance is obtained. In order to perfect the balance, it may be necessary to add additional washers under other flywheel-to-torus cover attaching nuts in the area of the first washer.

3) – If greatest vibration is noticed at 3500 RPM, the flywheel or flex plate may have excessive lateral runout. Check runout as follows: Remove transmission and inspect flywheel for weld spots which may hold flex plate away from the flywheel.

4) – Mount a dial indicator on rear of engine. Rotate flex plate to check each leg for runout on the surface that contacts the flywheel. The total runout at this point should not exceed .010". If the runout is in excess of .010", use the flex plate leg which is the most rearward as a standard. Then bend back the legs that are too far forward until they are within .005" of standard leg. *NOTE* – Be sure to bend the complete leg.

5) – Install transmission. Tighten flex plate-to-wheel nuts alternately to 5 ft. lbs. Then, tighten to 15-20 ft. lbs. Recheck engine for vibration. If vibration continues to exist at 3800 RPM, the flywheel and torus assembly have excessive runout and should be replaced.

NOTE: The flex plate checking procedure should be followed whenever transmission is removed

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Remove hood lock plate support plate. If car is equipped with air conditioning, remove the condenser (see "Air Conditioning" in Miscellaneous Section). Remove radiator core and remove timing chain and sprockets. Remove valve lifters and slide camshaft slowly forward out of engine. *CAUTION – Do not allow camshaft lobes to score camshaft bushings.*

Camshaft Alignment Check: Check camshaft for proper alignment whenever it is removed from the engine. *See "Camshaft Alignment Check" below.*

Camshaft Bushing Removal & Installation: Use Bearing Remover & Installer Tool J-3063 to pull old bushings out. Install new bushings with same tool and see that oil holes in bushing line up with oil holes in block (check oil leads with piece of wire after tool removed).

Camshaft Installation: Lower camshaft into position between radiator grille and engine and guide it carefully into cylinder block. Be sure distributor is timed correctly when inserting camshaft. Reverse removal procedure.

CAMSHAFT ALIGNMENT CHECK: Put shaft on surface plate and support at front and rear bearing journals on "V" blocks, or on centers. Mount dial indicator on surface plate over centerline of camshaft with pointer touching shaft. Check heel of each cam through 180° rotation with dial set at zero. Replace camshaft if dial reading greater than .0015".

TIMING CHAIN

TIMING CHAIN REMOVAL: Set engine in firing position for No. 6 cylinder. Remove water pump (see Cooling on car page), oil pan (see Oil Pan Removal), crankshaft pulley and engine front cover. Take out the two camshaft sprocket screws and lockwashers. Remove sprocket with chain from camshaft, remove crankshaft sprocket.

Timing Chain Installation: Reverse removal instructions given above. Timing marks on sprocket must be together and aligned with straightedge across shaft centers.

VALVE SYSTEM

VALVE REMOVAL: With cylinder head removed, take out spark plugs. Install head upside down on Cylinder Head Holding Stand J-3064. Install Holding Strap J-3064-6 over heads of valves. Turn head right side up, compress valve springs with compressor bar and stirrup of Holding Tool, remove valve keepers. Release bar and remove valve spring retainer, also rubber seal from lower groove on valve stem. Turn head over, remove Holding Strap, take out valves. *CAUTION – Note location of each valve, which must be installed in same location.*

Installation: Reverse removal procedure.

VALVE STEM SEALS

VALVE STEM OIL SEALS: Seals are installed in lower groove (nearest valve head) ahead of valve keepers. Check for proper sealing after keepers installed by striking end of valve stems to seat keepers, then using suction cup (similar to type used for grinding valves), compress cup on valve spring retainer. If cup will not stick, seal is broken and a new seal should be installed.

ROCKER ARMS

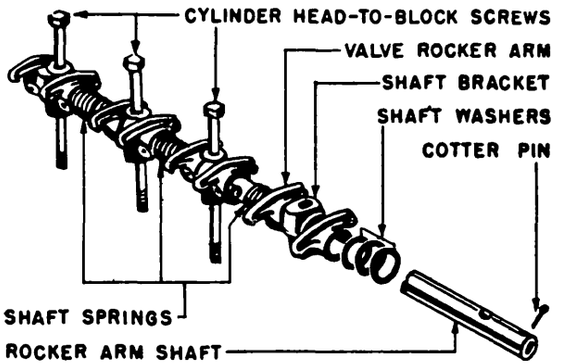
ROCKER ARM ASSEMBLIES: Drain radiator, remove radiator hoses, six radiator-to-air-deflector screws, and radiator anchor nut and spacers at frame bracket (check number of spacers and reinstall same number when radiator replaced). Lift out radiator.

Disassembly & Reassembly: See illustration for correct order of parts. Parts can be removed from shaft by removing cotter pin at end.

Installation: When installing rocker arm assemblies on cylinder head note the following precautions:

Rocker Arm Shafts—Locating notch on front end of shaft must point inward and down.

Rocker Shaft Brackets—Front and rear rocker shaft brackets have screw hole for rocker arm cover screws. These screw holes must be upward and toward outside of engine from rocker shaft center arm.

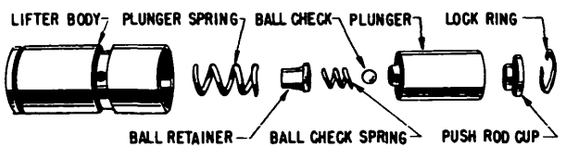


CADILLAC ROCKER ARM ASSY.

HYDRAULIC LIFTERS

VALVE LIFTERS: Hydraulic, Barr 1 Type. Consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet or body (See illustration). Oil is introduced to this unit from main oil gallery through hole in side of lifter plunger and body.

Removal: Disconnect power brake vacuum line from intake manifold. Remove heater hoses from clips on rocker arm covers and remove covers. Remove intake manifold. Remove valve compartment cover screws. Loosen engine ventilator pipe clampscrew at flywheel housing, remove long ventilator pipe screw at valve compartment and remove cover. Remove rocker arm assemblies *(NOTE* – When only one or two lifters are to be removed, do not remove rocker arm assembly. Compress valve spring, slide rocker arm over and remove the push rod.) Remove push rods, keeping them in order so they may be replaced in the same location. Using Valve Lifter Remover Tool J-3049, remove lifters from engine. Keep lifters in order so they may be replaced in the same location.



HYDRAULIC VALVE LIFTER

Disassembly: Press down on center of valve lifter push rod cup, and with a pointed tool, remove lockwire from groove. Invert lifter and slide out push rod cup, plunger, ball retainer and spring. *NOTE*— If plunger is stuck in body, place lifter push rod end down, in Valve Lifter Plunger Remover Tool J-4160. Holding tool firmly in hand with thumb over lifter body, strike tool sharply on block of wood until plunger falls out of body.

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Cleaning & Inspection: Wash all parts in a suitable carbon solvent and remove all trace of carbon and varnish. Inspect plunger and lifter body for scoring or other damage that would prevent free movement. Inspect lower end of lifter body for nicks or indentations. If any exist, replace complete lifter assembly. Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement. Plunger should drop of own weight into body bore.

Reassembly: Place ball on its seat in lower end of plunger while holding plunger upside down. Place small spring on ball. Position ball retainer over ball and end of plunger. Move retainer up and down to be sure spring is in working order. Place spring over ball retainer. Lower lifter body over plunger assembly on an angle to seat spring. If necessary probe with a small wire through oil hole to allow assembly to be seated. Turn assembly right side up and fill plunger with clean engine oil. Jiggle ball with a small piece of wire until oil drains out of plunger into body and trapped air is released from body. Refill plunger with oil and place push rod cup on plunger. Position lock wire over cup. Using Valve Lifter Lock Wire Installer J-2730, press lock wire into groove.

Testing (Leak Down Rate)—Remove distributor cap, coil and rocker arm covers as an assembly. Set timing mark "C" on harmonic balancer to the pointer and observe position of distributor rotor. Check each lifter as outlined in following table, using Valve Lifter Leakdown Tool J-3074:

With rotor at No. 1 firing position (pointing toward rear of engine), check:

No. 1 Intake	No. 3 Exhaust	No. 6 Exhaust
No. 1 Exhaust	No. 4 Exhaust	No. 7 Intake
No. 2 Intake	No. 5 Intake	No. 8 Intake
No. 2 Exhaust	No. 6 Intake	No. 8 Exhaust

With rotor at No. 6 firing position (pointing toward front of engine) check:

No. 3 Intake	No. 5 Exhaust
No. 4 Intake	No. 7 Exhaust

Insert feeler gauge of tool between valve stem and rocker arm, at the same time compressing the tool "pop-out" spring against valve spring *(NOTE*—Tool should be installed as quickly as possible to avoid any unnecessary leakdown of lifter). Note the interval of time during which the tool is held in place by valve spring pressure. It will be found through this test that bad lifters or lifter will have the shortest leakdown time.

OILING SYSTEM

▷*AIR IN OILING SYSTEM (Causing oil foaming or noisy Hydraulic Lifter operation): See Oil Pump Reassembly below for sealing of pump intake float tube and Oil Pump Installation for correct positioning of oil pan baffle.*

OIL PUMP

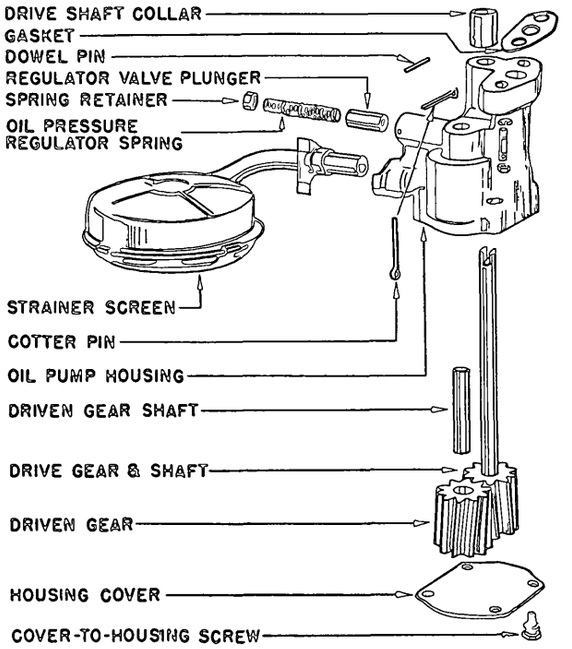
▷*OIL PUMP PRODUCTION CHANGE:* A felt washer, Part No. 392454, has been installed in the oil pump intake beginning with Engine No. 001148 to insure correct sealing of pump from air.

OIL PUMP REMOVAL: Take off oil pan (see Oil Pan Removal). Remove oil pan baffle, and two nuts securing pump to rear main bearing cap. Remove pump and float and screen as an assembly.

Disassembly: Remove float and screen assembly. Take out retaining cotter pin and withdraw pressure regulator parts from pump body. Remove pump lower cover for pump gear and shaft removal.

Oil Pump Specifications: Backlash between gears .008-.012". Driveshaft to Body Clearance .0010-.0025" (new), .005" max. (worn). Endplay between cover and gears .001-.004" (new), .006" max. (worn).

Pressure Regulator—Valve Plunger to Body Clearance .0020-.0035" (new), .005" (worn). Spring Free Length 2 25/64". Spring Pressure at 1 13/32"—5 3/4 to 6 1/4 lbs.



OIL PUMP

Reassembly: To correct air in system, remove pump float and inspect float tube and tube bore in pump body for burrs, remove burrs with fine sandpaper. Install an "O" ring seal, Part No. 5665829, on float tube against the shoulder 1 1/16" from end of tube, insert float tube in body and secure with new cotter pin. Check float for free movement. Complete pump assembly by reversing disassembly procedure (above).

Installation: When installing pump, use new gasket between pump and bearing cap. Make certain that clearance between oil pan baffle and sides of pan is at least ¼" on each side. Bend baffle as necessary to secure this clearance. *CAUTION*—Insufficient clearance will prevent oil from returning to pump on hills or during sudden stops and will allow air to enter system.

VACUUM PUMP

VACUUM PUMP (Removal): Drain engine oil and remove oil pan. Remove oil pan baffle and disconnect vacuum line at engine block. Remove six screws holding vacuum pump to oil pump, and remove vacuum pump with the oil pump idler gear. Remove hexagonal drive shaft. *CAUTION*—Oil pump idler gear may fall when pump removed.

Disassembly—Remove two screws holding plate to vacuum pump and remove plate from dowels. Turn pump upside down and shake out rotor assembly. Remove springs and vanes from pump rotor.

Vacuum Pump Clearances—Vane to cover plate .002-.005". Rotor to cover plate .004-.007". Socket to cover plate .0144-.0324". Socket to rotor face .0104-.0254". Rotor to shaft .0010-.0023". Rotor to depression in body cavity .0005-.0034"

Installation—Install vacuum lines to pump and replace hexagonal shaft. Install idler gear in oil pump and install vacuum pump below oil pump with six screws. Connect vacuum line to engine block. Install oil pan baffle, then install oil pan.

Reassembly—Inspect inside of body for scores or wear. Inspect plate for wear and dress down on surface plate. (CAUTION—Make sure that all parts are clean and that no foreign material is in housing). Install vanes and spring in rotor. Compress vanes and install rotor in pump body. Position plate on doweled pump body so that hole in plate lines up with hexagonal hole in rotor. Install screws in cover plate.

COOLING SYSTEM

RADIATOR CORE REMOVAL: Drain cooling system and loosen upper and lower radiator hoses. On air conditioned cars, remove condenser assembly. Remove six screws (also four spacer screws on air conditioned cars) which hold radiator to support. Remove radiator assembly with hoses.

Radiator Core Installation: Reverse removal instructions given above. NOTE—Core must be properly positioned for spacing between core and fan—this space must be ½" to 1".

BRAKE NOTES

▷*BRAKE PEDAL BINDING CORRECTION:* Check clearance between brake pedal to relay rod and opening in toe board. Correct by moving the pedal attaching bracket at support mount, or enlarge hole in toe board. Check metal retainer over felt seal on inside of toe board and centralize hole in retainer as necessary by rotating seal and retainer. Punch or drill new holes as necessary. Check relay-to-brake rod clevis for interference at relay connecting point. Clevis pin should fit easily into clevis hole. Remove stock from relay as necessary to provide free entry of clevis in hole. Check brake pedal for correct horizontal position as viewed from seat. Level pedal by shimming between attaching bracket and steering column support.

►*AIR CONDITIONED CAR SERVICE CAUTION: B for disc nnecting any part f air c nditi ning quipment r lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

ENGINE & SERIAL NUMBER: Stamped on upper right corner on front face of right hand block, on right frame side member just to rear of engine support bracket, and on lubrication plate on front side of left body pillar (Exc. Coupe), on left door lock pillar (Coupe).

Series	First 1956 Nos.
60S	566000001
62	566200001
75	567500001
86	568600001

Identification—First two figures indicate year, third and fourth indicate model (last five figures are numbered consecutively regardless of series).

Engine Unit Number Note: Use for identification. Stamped on top of crankcase to rear of left hand block with prefix indicating model:

Series	Engine Unit Prefix
60S, 62, 75 (Standard)	4X-1 and up.
60S, 62, 75 (Air Conditioned)	4XK-1 and up.
86 (Standard)	5X-1 and up.
86 (Air Conditioned)	5XK-1 and up.
60S, 62 (Dual Carburetors)	7X-1 and up.
60S, 62 (Dual Carbs. & Air Conditioned)	7XK-1 and up.

►*ENGINE NUMBER NOTE:* "L.C." will be added as a suffix to engine unit number on all engines built to low compression specifications.

►*NOTE:* Mark * preceding Engine Unit Number indicates cylinder bore and pistons are .010" oversize.

TUNE-UP

►*1956 DETONATION CORRECTION (Early Cars in Low Octane Areas): See "Ignition Timing" below.*

►*POWER LOSS OR "STUMBLE" AFTER HARD LEFT TURN CORRECTION (CARS WITH CARTER CARBURETOR):* May be caused by fuel leakage from bowl into choke vacuum passage. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

►*FLAT SPOT & "SHUDDER" CORRECTION (ELDORADO ENGINE): See "Cadillac (Carter & Rochester Carburetors" in Carburetion Section.*

►*SURGE UNDER FULL THROTTLE OR LEANNESS AT HIGH SPEED CORRECTION (CARTER CARBURETORS): See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

►*PART THROTTLE DETONATION CORRECTION:* Install Vacuum Advance Unit, Delco-Remy Part No. 1116103 on early cars which were equipped with Part No. 1116097.

COMPRESSION PRESSURE: 165 to 185 lbs., (at cranking speed). 212 to 230 lbs., (at 1000 RPM).

VACUUM READING: Not specified. *NOTE*—Beginning with Eng. No. 033849, new Camshaft used which results in decrease in manifold vacuum (normal vacuum at sea level with new camshaft is 13-15" idling).

►*VACUUM CHECKING CAUTION: When checking engine vacuum, shut off engine before removing vacuum hose. The plunger in the vacuum operated throttle check will increase engine speed to approximately 900 RPM if hose is removed with engine running. Set hand brake firmly before checking engine vacuum.*

VALVE TAPPET CLEARANCE: None in service (Hydraulic Lifters).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Valve diverts exhaust gases of left hand cylinder bank through carburetor heating passages in intake manifold to right hand exhaust system during warm-up period.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plugs—AC No. 44 (All Engines), 14mm.

COIL: Delco-Remy 1115082. *12 Volt.*

Ignition Current—1.25 amps. idling. 3 amps. stopped.

Resistor—Delco-Remy 1927809. On coil bracket.

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil.*

DISTRIBUTOR: Delco-Remy 1110858 (Except Eldorado), 1110859 (Eldorado Engine). *12 Volt.* New "Window type" with external adjustment. *See "Delco-Remy (Window type) Distributor" in Electrical Section.*

Condenser—Delco-Remy 1932004. **Capacity** .18-.23 mfd.

Contact Point Set—Delco-Remy 1931988.

Breaker Gap—.016" (new & used points).

Cam Angle—26-33°.

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	575	0-4	1150
6-8	1275	12-16	2550
9-11	1950	18-22	3900

Vacuum Spark Control: Delco-Remy 1116097 (Early); 1116103 (Later). *See "Part Throttle Detonation Correction" above.*

Vacuum Advance - 1116097

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
18	36	15.5-17.25

Plunger Travel - 3/8-13/32"

Vacuum Advance - 1116103

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6.5-8.5
15.5	31	13.5-16

Plunger Travel - 5/16-11/32".

IGNITION TIMING

►*1956 ENGINE DETONATION (Low Octane Areas):* If octane rating of available fuel results in detonation complaints, this condition can be corrected as follows:

1) Ignition Timing—Check timing. Timing can be retarded to 2½° BTDC (midway between "A" and "C" on harmonic balancer), or in extreme cases to TDC ("C" mark on balancer), without noticeable decrease in performance.

2) Distributor Vacuum Advance—If detonation not corrected by timing change, original Vacuum Advance Unit, Delco-Remy No. 1116097, can be replaced with late type unit No. 1116103.

3) Lowering Compression Ratio—On engines before Eng. No. 033849, compression ratio can be lowered by installing shim., Part No. 1466224, under each cylinder head. After installing shim, torque head bolts to 65-70 ft. lbs. and retorque after 500 miles to 75-80 ft. lbs. *NOTE*—Beginning Eng. No. 033849, engines have extra head gasket, shim, or modified cylinder head installed in production and it should not be necessary to lower compression ratio.

4) Low Compression Pistons—For travel in foreign countries where octane rating of fuel is not equivalent to average U.S. fuel, a set of low compression pistons, Part No. 3630680, can be installed.

►*SETTING CAUTION: Settings below are latest recommendations and should be followed exactly to avoid detonation and possible damage to engine. THESE SETTINGS ARE CORRECT FOR FUEL OF 97 OCTANE RATING AND TIMING MUST BE RETARDED IF FUEL OF LOWER OCTANE RATING USED.*

Car Model	Ignition Setting
First Cars (To Eng. No. 033849)	2½° BTDC
Later Cars (Beginning No. 033849)	5° BTDC

Timing—Disconnect vacuum line to distributor and tape end of line. Idle engine at 400 RPM, set timing midway between "A" and "C" line on balancer (First Cars—2½° BTDC setting), or at "A" line on balancer (Later Cars - 5° BTDC setting).

Timing Mark—Two lines on vibration balancer at front of engine marked "A" (5° BTDC) and "C" (TDC) and pointer on right side of chain case cover.

CARBURETOR

►*CARBURETOR APPLICATION: One 4-Barrel Carter or Rochester 4-Barrel Carburetor used on all models except Eldorado. Two Carter 4-Barrel Carburetors used on Eldorado.*

►*1956 DETONATION CORRECTION: (Early Cars in Low Octane Areas): See "Ignition Timing" below.*

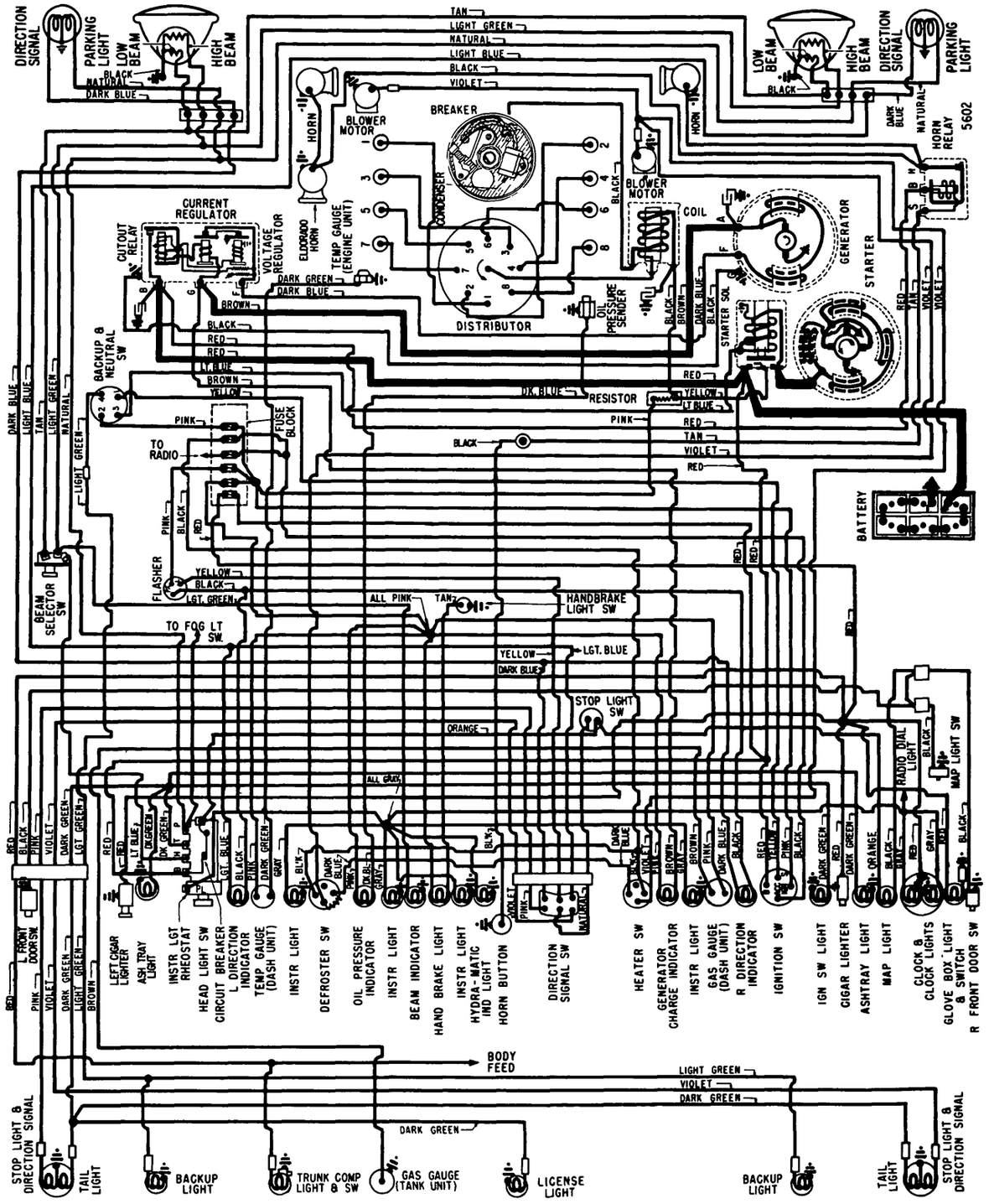
►*CARBURETOR PRODUCTION CHANGES & RECOMMENDED CORRECTIONS: See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

►*FAILURE TO OBTAIN WIDE OPEN THROTTLE POSITION (Due to improper accelerator pedal adjustment):* Adjust accelerator pedal arm-to-trunnion, on the accelerator pedal linkage, up or down to obtain 4¼" clearance from underside of top of pedal to floor pan. With carpet installed, this dimension should be 3¼" to top of carpet.

►*IMPROPER CARBURETOR CHOKE OPERATION CORRECTION:* This condition may be caused by oil leaking from the right rocker arm cover and draining down to the hot air stove on the right exhaust manifold where it is then drawn up into the choke housing. Check for indications of oil in choke assembly and clean if necessary. Replace right rocker arm cover gasket.

►*IDLE SPEED (AIR CONDITIONED CARS): Summer and Winter Idle Speed Adjustment is different as follows:* **Summer Setting (Air Conditioner in Operation)**—With transmission selector lever in either "Dr" range, and

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with air conditioner "ON" set idle speed at 420 RPM (Cars with Standard Engine). 490-510 RPM (Cars with Eldorado Engine).

Winter Setting (Air Conditioner Not in Operation)– With transmission selector lever in either "Dr" range, and with air conditioner "OFF" set idle speed at 420 RPM (Cars with Standard Engine), 490-510 RPM (Cars with Eldorado Engine).

Idle Speed-Up Control Adjustment (Cars with Air Conditioning): With engine at normal operating temperature and slow idle adjustment completed, turn air conditioner "ON", and place transmission selector lever in "N" position. Adjust engine idle speed to 900 RPM by loosening locknut on diaphragm shaft and turning knurled nut ot obtain specified RPM. Tighten locknut.

►***THROTTLE CHECK ADJUSTMENT CAUTION (CARS BETWEEN ENGINE NOS. 033849 & 053286):*** **S t plunger gap at .185" to prevent return check opening throttle when vacuum is low (the camshaft change at Engine No. 003849 resulted in lower manifold vacuum).** ***See Production Change below for later type Throttl Check Assembly.***

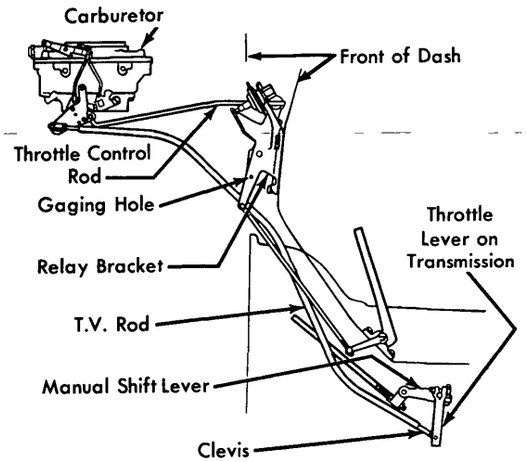
►***THROTTLE CHECK ASSEMBLY PRODUCTION CHANGE:*** **Starting at Engine No. 053286, a new Throttle Check Assembly entered production to prevent return check opening throttle during low vacuum periods. This later assembly is furnished in kit, Part No. 7009892 (identified by black check valve nipple, and tin plated throttle plunger) and can be used for service replacement on cars after Engine No. 033849.**

Throttle Check Adjustment (Standard Method): With engine at normal operating temperature, allow engine to idle and make sure that check plunger is not in contact with throttle relay lever. Open throttle wide momentarily to allow engine manifold vacuum to drop and throttle check plunger to come out. Let throttle snap shut and observe delay caused by throttle check. If engine races, throttle check plunger is too long. If engine stalls, plunger is too short. Adjust plunger screw as necessary for correct operation. *NOTE* – On cars between Engine No. 033849 & 053286, plunger gap must be set at .185". *See "Throttle Check Adjustment Caution" above.*

Throttle Check Adjustment (Alternate Method): With engine running at operating temperature and selector lever in "Park" position, remove hose from throttle return check assembly and place a piece of masking tape over end of hose to prevent vacuum leak. Hold plunger with a wrench and turn hex-head stem to obtain an engine speed of approximately 1100 RPM. Connect vacuum hose, making certain that engine speed returns to 420 RPM in "DR" (single carburetor engines); 500 RPM (dual carburetor engines). With foot brake fully applied, check adjustment by momentarily speeding up engine to full throttle with transmission in "DR" range, then quickly release accelerator. When properly adjusted, the engine will barely keep from stalling when foot is released from accelerator. *CAUTION* – Make sure that excessive overrun of throttle check is not present.

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HYDRA-MATIC THROTTLE LINKAGE

THROTTLE LINKAGE ADJUSTMENT: Remove clip from carburetor throttle rod trunnion and remove trunnion from relay bracket lever (at front of dash). Place a ¼" drill shank through gauging hole in relay lever and dash relay bracket. With engine running, set throttle lever in hot idle position (Air Conditioner turned "OFF"). Adjust carburetor throttle rod trunnion to allow free entry into dash relay lever and install trunnion and spring clip. Push end of throttle valve rod (rod from carburetor to transmission throttle lever) toward rear of car to position transmission throttle lever against its stop. Turn front jam nut on throttle valve rod against trunnion until all slack is taken up. **Then tighten nut the number of turns as indicated below** (due to engine throttle adapter plate and transmission changes). Tighten rear jam nut being careful not to put binding force on carburetor plate. *NOTE – Because of differences in carburetion and hydraulic characteristics in the transmission, throttle valve rod adjustments may be varied 1½ turns in either direction to provide correct shift points.*

Throttle Valve Rod Adjustment
Before Engine No. 033849
①(Cars with Single Carburetor)

Trans. No.	②Throttle Plate No.	③ Turns
Up to C-32200 or A-2539	#1	3
After C-32199 or A-2538	#3	4

After Engine No. 033848
(Cars with Single Carburetor)

Trans. No.	②Throttle Plate No.	④ Turns
Up to C-32200 or A-2539	④ #1	④ 3
After C-32199 or A-2538	#3	3

①-4 Turns on all engines with dual 4 Bbl. Carburetors.
②-Plate stamped "1" or "3".
③-Tighten nut on T.V. rod the number of turns indicated.
④-Remove throttle plate #1 and install kit, Part No. 3630753 which includes a #3 throttle plate. Adjust throttle valve 3 turns.

CARTER WCFB
(Standard Engin)

Carter WCFB 2333S, SA (Early), 2543S (Late) Cars without Air Conditioning. Carter WCFB 2334S, SA (Early), 2544S (Late) Cars with Air Conditioning.

►*CARBURETOR REPLACEMENT NOTE: Carter WCFB 2370SA can be used to replace WCFB 2333S, SA, & 2334S, SA. Carter WCFB 2545S can be used to replace WCFB 2543S, & 2544S. On cars with Air Conditioning, Unitized Package 202-44U must also be used.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*NOTE: Carburetors No. 2334S, SA & 2544S have Idle Speed-up Control for use with Air Conditioning.*

►*IDLE SPEED ADJUSTMENT NOTE: Idle Air By-Pass screw on throttle body is used to adjust idle speed. Throttle valves are normally closed at slow idle.*

Idle Speed – 420 RPM in "DR" range. (Cars with Air-Conditioning should have the same idle speed, with Air Conditioner turned on). *NOTE – This idle speed setting supersedes the previous setting of 400 RPM.*

Idle Mixture & Idle Speed Setting – Special procedure required to insure correct mixture and speed (idle air) screw settings. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

►*IDLE SPEED ADJUSTING STOP SCREW NOTE:* An idle speed stop screw has been added to some Carter carburetors to improve idle characteristics during the break-in period. The idle stop screw is not necessary after the break-in period and should be removed at the 1000 mile point.

►*OTHER DATA: See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 5¼ - 6½ lbs. at 4800 RPM.

ROCHESTER 4GC
(Standard Engine)

ROCHESTER 4GC No, 7008750 (Early - Without Air Conditioning); No. 7009750 (Late - Without Air Conditioning); 7008751 (Early - With Air Conditioning); 7009751 (Late - With Air Conditioning).

►*CARBURETOR REPLACEMENT NOTE: Rochester 4GC No. 7009901 can be used to replace 7008750 & 7009750. Rochester 4GC can be used to replace 7008751 & 7009751.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feel Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

►*NOTE: Carburetors No. 7008751 & 7009751 have Idle Speed-up Control for use with Air Conditioning.*

►*IDLE SPEED ADJUSTMENT NOTE: Idle Air By-pass screw on throttle body is used to adjust idle speed. Throttle valves are normally closed at slow idle.*

►*ROCHESTER CHOKE SETTING CHANGE (To eliminate hard starting after engine stalls while choke is on):* Adjust choke to index mark instead of one point rich mark as previously used.

►*FLAT SPOT CORRECTION (ROCHESTER CARBS.):* Install primary main metering jet No. 7002651. Carburetors with the new jet are identified by a black or red carburetor tag.

Idl Spe d – 420 RPM in "DR" range. (Cars with Air-Conditioning should have the same idle speed, with Air Conditioner turned on). *NOTE – This idl sp ed setting supersedes the previous s tting f 400 RPM.*

Idle Mixture & Idle Speed Setting – Special procedure required to insure correct mixture and speed (idle air) screw settings. *See "Cadillac (Cart r & R ch ster) Carburetor" in Carburetion Section.*

►*OTHER DATA: See "Cadillac (Cart r & Rochest r) Carburetor" in Carburetion S cti n.*

Hydra-Matic Throttle Linkag Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 5¼ - 6½ lbs. at 4800 RPM.

CARTER WCFB (2)
(Eldorado Engine)

Carter WCFB 2371S (Front-With ut Air Conditi ning). 2373S (Front-With Air Conditi ning). 2372S (R ar-All Models).

►*FLAT SPOT CORRECTION (B for Engin N . 044963, Cars without Air Conditioning; 044986, Cars with Air Conditioning): See "Cadillac (Carter & Roch ster Carburetors)" in Carburetion Section.*

►*IMPROVED IDLE STABILITY NOTE: Wind th t rsion closing spring one additional turn ar und th sec ndary throttle shaft.*

►*CARBURETOR REPLACEMENT NOTE: Cart r WCFB 2371S can be used for service r placement of 2372S & 2373S. Unitized Package 202-100U must be used wh n replacing 2373S (Air Conditioned Cars).*

►*CARBURETOR INSTALLATION NOTE: Front & Rear Carburetors operate together as follows:*

►*MANIFOLD FUEL DISTRIBUTION (FRONT CARB.):* Right PRIMARY & Left SECONDARY barrels feed Cyl. 2-3-5-8, Left PRIMARY & Right SECONDARY barrels feed 1-4-6-7.

►*MANIFOLD FUEL DISTRIBUTION (REAR CARB.):* Left PRIMARY & Right SECONDARY barrels feed Cyl. 2-3-5-8, Right PRIMARY & Left SECONDARY barrels feed 1-4-6-7.

►*NOTE: 2373S has Idle Speed-Up Control for us with Air Conditioning.*

►*IDLE SPEED ADJUSTMENT NOTE: Idle Air By-Pass screw on throttle body is used to adjust idle speed. Throttle valves are normally closed at slow idle.*

Idle Speed – 490-510 RPM in "DR" range.

Idle Mixture & Idle Speed Setting – Special procedure required to insure correct mixture and speed (idle air) screw settings. *See "Cadillac (Carter & Rochester Carburetors)" in Carburetion S ction.*

Hydra-Matic Throttle Linkag Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 4¼ - 6½ lbs. at 4800 RPM.

CARB. EQUIPMENT

Fuel Pump: AC (Fuel only). Vacuum pump is part of engine oil pump.

R placement Fuel Pump – AC No. 4269.

Pr ssur – 5¼ - 6½ lbs. at 4800 RPM.

See "Fu l Pumps" in Carburetion Section.

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Gas lin Gaug : AC Electric.
Dash Unit – AC No. 1518488.
Tank Unit – AC No. 1517215.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Delc 3EMR70-W. *12 Volt,* 11 plate, 70 ampere hour capacity (20 hr. rate).
Batt ry Gr und – Negative.
Engin Gr und – Connected between engine and cowl.

STARTER

►*STARTER MOTOR HARNESS CHAFING CORRECTION (B f r Eng. No. 036253): Reroute harness above br ath r pip so it will not rub against corner of engine bl ck.*

D lco-R my 1107642 (Early); 1107657 (Late). *12 Volt.*
Armatur – Delco-Remy 1926626 (1107642); 1932185 (1107657).
Driv –Overrunning clutch (solenoid pinion shift)
Rotation–Counter-clockwise at commutator end.
Brush Spring T nsi n–35 ozs minimum

P rf rmance Data

Torque	RPM	Volts	Amperes
0 ft lbs	3500	10 1	95
10 5 ft lbs	Lock	5 4	470

►*STARTER PINION ADJUSTMENT NOTE:* The later type starter, Delco-Remy No. 1107657 has an extended nose casting that covers all exterior linkage. The starter pinion adjustment is pre-set at the factory and field adjustment is not required.

Starting Switch: Delco-Remy Solenoid Switch No. 1119777 (Starter No. 1107642); No. 1119910 (Starter No. 1107657), mounted on starter and controlled by Ignition & Starter Switch, Delco-Remy No. 1116470. Turn key full RIGHT against spring tension to start.
See "Start r Contr ls" in Electrical Section.

N utral Safety & Back-up Light Switch: Delco-Remy 1998137.
Adjustment – *See "Hydra-Matic Drive" in Transmission Secti n.*

GENERATOR

D lco-R my 1102002 (Std.), 1102011 (Air Conditioned Cars). Armature N . 1923535 (All). *12 Volt.*

►*REPLACEMENT GENERATOR:* Delco-Remy 1102005 (Less Fan & Pulley).
Maximum Charging Rate–See Current Regulator.

Performance Data

	Amperes	Volts	RPM
Cold	30	14	2150

Rotati n–Counter-clockwise at commutator end.
Brush Spring T nsion–28 ozs. each.
Field Current–1.48-1.62 amperes at 12 volts.

Generator Charge Indicator: Red light on instrument panel. *See Diagram.*

Belt Adjustment: Loosen both pivot bolts and adjusting strap screw pull generator out until belt just tight enough to drive generator without slip.

REGULATOR

Delco-Remy 1119001. *12 V lt.*

►*REGULATOR NOTE: Specifications below are for "Normal" setting. See "Delco-Remy 1119000 Series Regulator" in Electrical Section.*

Cutout Relay
Cuts In – 11.8-13.5 volts (hot).
Contact Gap – .020".
Air Gap – .020" (with contacts just closed).

Voltage Regulator
Setting – 13.8-14.8 volts (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting – *See Electrical Section.*

Current Regulator
Setting – 27-33 amperes (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjustment – *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Autronic Eye: *See "Autronic Eye" in Electrical Section.*
Direction Signal: *See "Direction Signals" in Electrical Section.*

Stop Light Switch (Location): Mechanical type located to left of steering column adjacent to pedal retaining bar.

FUSES: Located on fuse panel under instrument panel on cowl insulating board just to left of car centerline except as noted below.
Air Conditioner & Heater – 25 amps.
Antenna – 14 amps.
Back-up Lights – 9 amps.
Cigar Lighters, Clock, Dome or Bow Light, Glove Box, & Trunk Light – 25 amps. Body Feed fuse on panel protects these circuits.
Instruments – 9 amps.
Radio – 7½ amps.
Turn Signals – 6 amps.
Spotlight – 9 amps. On steering column support.

CIRCUIT BREAKERS: (Lighting) – 20 amps. Located in headlamp switch. Protects the following circuits: Headlights, Fog Lights, Ash Tray Lights, Instrument Lights, Map Light, Parking Lights, & Stop Lights.
Hydro-Lectric System (When Used) – 15 amps., in feed circuit.
Power Seats & Windows – 40 amps. Located on left inner cowl panel.
Electric Trunk Lock – 5 amps. Located on left inner cowl panel.

HORNS: (Exc. Eldorado)–Delco-Remy 1999765 (Low Note), 1999766 (High Note). *12 Volt.*
Eldorado–Delco-Remy 1999585 (Trumpet type), *12 Volt.*

Horn Relay: Delco-Remy 1116908. *12 Volt.*
Contacts Close–5.0-9.5 volts.
Contact Gap–.027". **Air Gap–**.014".

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipm nt or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*"BOOMING" NOISE ON AIR CONDITIONED CARS CORRECTION (Appar nt at 25 MPH r at ff-idl speeds):* Noise can be eliminated or reduced by installing an oil filter-to-hydraulic pump support brace, Part No. 1463022.

►*ENGINE BALANCE CHECK & UNBALANCE CORRECTION: See "Engine Balancing" in Cadillac Special Data.*

Bore	Stroke	Displacement	Rated HP
4"	3 5/8"	365 cu. ins.	51.2

Engine	Compr. Ratio	Developed HP
Standard	9.75-1	285 at 4600 RPM
Eldorado	9.75-1	305 at 4700 RPM

►*OVERSIZE CYLINDER BORE CAUTION: Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have a .010" oversize cylinder bore and pistons.*

ENGINE REMOVAL: *See "Engine" in Cadillac Special Data.*

OIL PAN REMOVAL: *See "Oil Pan" in Cadillac Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Cadillac Special Data.*

►***CYLINDER HEAD PRODUCTION CHANGE** (At Engine No. 033849):* A new cylinder head, Part No. 3630695 (Right hand); No. 3630696 (Left hand) with improved combustion chamber design are used on all models after above engine number.

TIGHTENING TORQUES: *See "Tightening Specifications" in Cadillac Special Data.*

PISTONS

►*ORIGINAL CYLINDER BORE CAUTION:* Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have .010" oversize pistons and cylinder bore. Standard cylinder bore size: 3.8125-3.8145".
Original Bore & Pistons–*See "Original Bore & Pistons" in Cadillac Special Data.*
Pistons – Aluminum alloy, T-slot, cam ground, "stannate" coated.
Weight – 22.72 ozs. (less pin).
Removal–Piston and rod assemblies removed from above. Install connecting rod Guide Studs J-3224, on connecting rod bolts to guide rod out through bore without nicking or scratching. *CAUTION–Do not nick lower edge of bore when pushing rod up.*
Fitting New Pistons: Use micrometer or feeler gauge. *See "Pistons" in Cadillac Special Data.*
Replacement Pistons: Standard "High Limit" or maximum production size, and .010", .020", .030" oversize. Pistons furnished only with fitted pins.
Installing Pistons: Install in cylinder with piston pin boss marked "Rear" toward rear of engine. *See "Connecting Rods" (below) for installation of pistons on rods.*

PISTON PINS

Pin is pressed in connecting rod.
Diameter–1.000". **L ngth–**3 3/32".
Pin Fit in Piston–.00005"-.0001" clearance at 70°F. Not fitted in field (replace piston & pin assembly).
Pin Fit in Rod–(NOTE–Special tools required). *See "Piston Pins" in Cadillac Special Data.*

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PISTON RINGS

Top compression ring is chrome plated rolled steel and the other two rings are cast iron An expander is not used behind the oil ring in production.

Ring	Width	End Gap ①	Side Clearance
Compr. (#1 & 2)	5/64"	.013-.023"	.0017-.0035"
Oil (#3)	3/16"	.013-.023"	.0008-.0026"

①- With Standard 4.0000" cylinder.

Replacement Rings: Standard, 010", .020", .030" oversize.

►*REPLACEMENT RING NOTE–If re-ring set is to be installed in new or low mileage bores, it is not necessary to install oil ring expander.*

Installing Rings: Chamfered face of both compression rings must be installed toward top of piston.

CONNECTING RODS

Length–6 5/8" (center-to-center).
Weight–23.49 ozs.
Crankpin Journal Diameter–2.2488-2.2493".
Out-of-Round Limits–.00025".
Bearings–Moraine-Durex, bearing shell is steel backed aluminum. Bearing halves interchangeable. No shims.
Clearance – .0005-.0020" (Service limit .0045").
Sideplay– 008-.014" (total both rods).

Replacement Bearings: Furnished in standard size only.

Installing Rods (In Pistons): On pistons Nos. 2-4-6-8, install rod so mark 'REAR' on piston pin boss is to **left** side of rod (with stamped number on rod facing operator). On pistons Nos. 1-3-5-7, install rod so mark 'REAR' on piston pin boss to to **right** side of rod (with stamped number on rod facing operator). **After piston and rod assembly installed in engine, re-check to see that the numbered side of connecting rod on No. 1, 3, 5, 7 rods are on LEFT side of engine and No. 2, 4, 6, 8 are on RIGHT side of engine and that rods are on the proper crank pins.**

CRANKSHAFT

Journal Diameters – 2 5/8".
Out-of-Round Limits – .0025".
Clearance – .0008-.0025" (service limits .005" max.).
End Thrust– Taken by flanged rear main bearing.
End Play – .001-.005" (service limit .010" max.).
Bearings – Rear main bearing is a steel backed babbit, shell type insert. Other bearings are aluminum inserts.

►*REAR MAIN BEARING INSERT PRODUCTION CHANGE (To reduce leaks):* The later type inserts, Part No. 3630741 do not have a chamfer across full width of bearing ends.

Replacement Bearings: Furnished in standard size only.

Crankshaft Removal: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Cadillac Special Data.*

CAMSHAFT

►*CAMSHAFT PRODUCTION CHANGE:* A new camshaft was used in production beginning Engine No. 033849. Later camshaft has slight increase in valve overlap, which results in a decrease in intake manifold vacuum.

►*CAUTION:* Handle shaft with care to avoid damage or mis-alignment. Check whenever removed.
Removal, Alignment & Installation–*See "Camshaft & Bearings" in Cadillac Special Data.*
Bearings–Steel backed babbitt bushings.
Clearance–.001-.0022' (service limit .004" max.).
Bearing Out-of-Round Limit–.002" max.

Timing Chain: Link-Belt side guide type. Width 11/16", Pitch .500", Length 23" or 46 links.
Installation & Removal–*See "Timing Chain" in Cadillac Special Data.*

Camshaft Setting: Both sprockets marked '0'. Mesh chain with sprockets turned so that marks adjacent and in line with straightedge across shaft.

►*CAUTION.* Install chain as a unit with camshaft sprocket (sprocket press fit on shaft with locating dowel and two retaining capscrews).

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diam.	Stem Diam.	Length
Intake	1 750"	3415- 3425"	①4 628-4 648"
Exhaust	1 562"	3415-.3420"	4 21/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	②44°	411"	③ 0005- 0025"
Exhaust	②44°	411"	③ 001- 0025"

①–"Rich" Valves "Eaton" Valves 4 628-4 653"

②–New valves (Valves in service can be refaced to 45° if seat width recommendation not exceeded).

③–New valves and guides Worn limit .005" max.

►*VALVE SEATING CAUTION:* Do not lap or grind so that seat width is more than 1/64" (1° difference between valve and seat angle designed to provide "hairline" contact.

►**Valve Seat Recommendations:** 3/64-1/16" (moderate speed or city driving), 1/16-3/32" (high speed driving). Cut seat so that distance from outer edge to edge of flange on valve head not more than 1/32".
Valve Stem Oil Seal–Rubber oil seal installed in lower groove on valve stem (below valve keeper).

Oil Seal Installation: *See "Valve System" in Cadillac Special Data.*

Valve Removal & Installation: *See "Valve System" in Cadillac Special Data.*

Valve Guides: Pressed in cylinder head with counterbored end down toward valve head. Use Remover Tool J-3062 to drive old guides out toward top of head, Installer Tool J-3066 to drive new guides in (tool plate serves as stop for driver).

Valve Springs: (Free Length) 1.980".

Valve Spring Specifications

	Pressure	Length
Valve Closed	62-68 lbs	1 696"
Valve Open	152-162 lbs	1 285"

►*SPRING INSTALLATION CAUTION: Lower end of valve spring must be seated in recess in cylinder head*

Valve Lifters: Hydraulic.
See "Valve System" in Cadillac Special Data.
Valve Lifter Removal–*See "Valve System" in Cadillac Special Data.*

Rocker Arms: Rocker arm end shaft assemblies are mounted on each cylinder head *NOTE*–No adjustment screws provided on rocker arms.

Rocker Arm Installation–*See "Valve System" in Cadillac Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

(Before Eng. N . 033849).
Intake Valves – Open 22° BTDC. Close 67° ALDC.
Exhaust Valves – Open 63° BLDC. Close 27° ATDC.

(After Eng. N . 033849).
Intake Valves – Open 25° BTDC. Close 78° ALDC.
Exhaust Valves – Open 70° BLDC. Close 28° ATDC.

Valve Timing Check – Not practical to check in field. Manufacturer recommends removing timing chain cover and checking timing gears.

OILING SYSTEM

Crankcase Capacity: 5 qts. One quart additional for dry filter.

Normal Oil Pressure: 30-35 lbs. min. at 30 MPH. 15 lbs at idle speed
Pressure Regulator Valve–On oil pump Not adjustable.
Oil Pressure Indicator – Light on instrument panel controlled by pressure switch, Cadillac No. 1508434 mounted on engine.

Oil Pump: Helical gear. In crankcase at rear of engine.

Oil Pump Removal & Overhaul: *See "Oiling System" in Cadillac Special Data.*

Vacuum Pump: Part of Oil Pump assy. *See "Vacuum Pump" in Cadillac Special Data.*

Oil Filter: Partial flow. Replace element every 6000 miles or more frequently in dusty areas.
Replacement Filter Element–AC No. 1P-115

Crankcase Ventilation: Air intake in oil filler cap (oil wetted type) with outlet connection at rear of valve compartment cover, and outlet pipe extending down below engine at right corner.

COOLING

►*THERMOSTAT INSTALLATION CAUTION: Install with spring strap parallel to car center line otherwise right engine bank will operate at higher temperature*

►*ELDORADO ENGINE COOLING LOSS CORRECTION:* **Improper positioning of right hand ignition wire bracket may permit bracket to rub against heater hose. Loosen bracket nut on carburetor and swing bracket as close to firewall as possible. Tighten nut.**

►*ALUMINUM RADIATOR CORE CAUTION & IDENTIFICATION NOTE:* **Aluminum radiator cores have been used in partial production. The letters "ALC" following the serial number on the plate attached to radiator upper tank identify these radiators. When cleaning these radiators, only clear water should be used, Caustic cleaning solutions will corrode and damage the radiator.**

Water Capacity: (Exc. Series 75) 19¼ qts., with heater; 17¼ qts., without heater. (Series 75) 21¾ qts., with heater; 17¼ qts., without heater.

Pressure Valve: AC No. 850800. Radiator filler cap. Opens at 12-15 lbs.

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Th rm stat Dole type In water outlet at top of pump body

Standard S tting—Starts to open at 163° to 168°F

High T mp.—Starts to open at 177° to 182°F

Water Pump· Packless, sealed ball bearing type

See "Cadillac" in Water Pump Section.

Pump R moval—Remove upper and lower radiator hoses after draining cooling system Remove generator drive belt and take out capscrew mounting pump and water manifold assembly on front of engine, lift out pump and fan NOTE—Water manifold and thermostat housing are part of pump casting

Radiator Rem val & Installation· *See "Cooling System" in Cadillac Special Data*

Temperature Gaug s· AC Electric

Dash Unit - AC No. 1513158.

Engin Unit – AC No. 1513130.

See "T mp rature Gaug s" in Miscellaneous Section.

HYDRA-MATIC DRIVE

"J taway". A new four speed hydraulically controlled automatic transmission having two fluid couplings.

►*HYDRA-MATIC "SQUEAK" CORRECTION:* This squeak may occur in first and reverse gears, and in "Dr3" under full throttle. *S "Dual-Coupling Hydra-Matic" in Transmissi n S cti n.*

►*1-2 OR 2-3 LATE SHIFT CORRECTION:* May be caused by improper throttle valve rod adjustment, dirt in control valve assembly, or interchanged valve springs. *See "Dual-Coupling Hydra-Matic" in Transmission Section.*

►*ROUGH SHIFT CORRECTION:* May be caused by bent throttle valve rod striking the accelerator pedal arm which would prevent the throttle valve rod from returning to its stop for proper adjustment. Check rod for straightness and adjust for correct shift pattern.

►*ERRATIC SHIFT CORRECTION: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

►*FILLER PIPE LEAK CORRECTION:* A new service package, Part No. 8616956 is available to correct oil leakage originating at point where filler pipe fits into sleeve in transmission case.

►*TRANSMISSION OIL FOAMING CORRECTION:* This condition may be caused by leakage in oil cooler. *See "Dual-Coupling Hydra-Matic" in Transmission Section.*

►*SLIPPING 2-3 SHIFT CORRECTION (EXC. ELDORADO ENGINE):* If this condition cannot be corrected by throttle valve rod adjustment, and is not caused by sticking valves, install an inner accumulator spring, Part No. 8617469. *See "Dual-Coupling Hydra-Matic" in Transmissi n Secti n.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual-Coupling Hydra-Matic" in Transmissi n S cti n.*

►*TESTING & TROUBLE SHOOTING: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

Lubricati n – Check fluid level every 2000 miles along with regular car lubrication. Drain and refill every 25,000 miles. Use only Cadillac Hydra-Matic Fluid.

Capacity – 12 qts. (approximately). *NOTE – Th correct lev l is d t rmin d by the "Full" mark n gaug , with transmission hot.*

Ch cking Fluid L v l – With selector lever in "N" or "P" position, run engine at speed of 20 MPH for about 1½ minutes (to be sure fluid coupling is full). With engine idling, add fluid to bring level to within ¼" of the "F" mark on dipstick *(NOTE* – Fluid level should be ¼" below "F" mark when cold, and at the "F" mark when hot). *CAUTION – Do not fill above "F" mark on dipstick as this will cause foaming when oil is hot.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type Two used (three on commercial cars with center bearing)

See Universals Section for complete data

►*DRIVE LINE "THUMP" CORRECTION (Cars between Engine No. 017541 and 046805. Or cars prior to engine No. 017541 which have the late type replacement transmission):* Install the late type front universal joint yoke, Part No. 5670522, which must be lubricated with one ounce of special lubricant, Part No. 1098652. Th e later type yoke must be lubricated every 25,000 miles by removing the yoke and applying lubricant to the splines.

►*TRANSMISSION REPLACEMENT CAUTION:* If a transmission is replaced on cars with a late type yoke, the extension housing and output shaft of the transmission must be of the late design. Check the output shaft and measure depth of bore in extension housing to make sure it is machined to clear the longer yoke. If the transmission has the early extension housing, use the early type yoke, Part No. 1456508, or special service yoke, Part No. 1465331.

►*REAR UNIVERSAL YOKE CAUTION Do not disturb nut on end of pinion shaft retaining rear universal joint yoke unless yoke or oil seal should be replaced. Pinion bearing preload must be adjusted whenever this nut disturbed*

REAR AXLE

Own Make. Hypoid gear, semi-floating with Hotchkiss Drive

See "Cadillac Hypoid" in Rear Axle Section.

►*OVERHAUL CAUTION*· Manufacturer recommends that Carrier Assembly be serviced by replacement Do not disassemble this unit or attempt service work other than oil seal and universal joint replacement

Axle Identification—Axles marked by number stamped bottom of differential case below center of pinion shaft (First Cars) or on oil return hole boss at front end of differential case (beginning Engine No 94850) Ratios and marks are as follows

Series	Ratio	Mark
60S, 62 (Std.)	3.07-1	"3"
60S, 62 (Optl.) ①	3.36-1	"6"
75	3.36-1	"6"
86	3.77-1	"7"

①—Standard on cars with Dual 4-Bbl. Carburetors.

►**Pinion Bearing Pre-Load Caution**· Must be adjusted each time pinion shaft nut loosened *See "Cadillac Hypoid" in Rear Axl Section.*

Backlash– 003- 010' Screw adjustment

Axle Shaft Rem val: Remove wheel and take out screws holding brake drum on axle shaft flange and remove drum Remove nuts and lockwashers from bolts holding bearing retainer and backing plate on axle housing, use Puller J-942-1 and Slide Hammer J-2619 to remove axle shaft

►*CAUTION* Use care not to damage axle shaft oil seal when sliding axle shaft out and do not disturb position of backing plate on housing

Commercial Cars—Remove wheel, remove nut and washer on end of shaft Use Puller (Snap-On No S4567 or similar five jaw type) to remove wheel hub and brake drum Disconnect brake line Take out retaining screws and remove dust shield (bearing retainer) and backing plate Use Puller J-838 to pull axle shaft and bearing assembly out, using care not to damage oil seal in housing

Differential Carrier Removal· Disconnect rear universal joint and remove lubricant from rear axle housing Remove axle shafts (see above) Remove nuts and washers holding carrier to axle housing and remove entire assembly with gasket *See "Overhaul Caution" above.*

Wheel Bearings Sealed ball-bearing type

CAUTION—Check bearings for loss of lubricant when shaft removed If bearings spin freely indicating loss of lubricant, replace bearings

Pinion Bearing Preload Adjustment Pinion should be adjusted whenever nut on end of pinion shaft disturbed (for universal joint yoke or oil seal replacement)

See "Cadillac Hypoid" in Rear Axle Section.

SHOCK ABSORBERS

Delco. Direct acting permanently sealed, airplane type located within coil springs (front), "Sea-Leg" type installation (rear), as follows

Series	① Front	① R ar
60S, 62	5352611	5352612
75, 86	5352613	5513719

①- Cadillac part numbers.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within coil springs

Kingpin Inclination—5°51' with 0° camber

Caster—0° to Neg 1° Adjustment must be equal within ½° or less on both sides of car

Camber—Neg 3/8° to Pos 3/8° with ¼-½° more positive camber on left side

Toe-In – 5/32-7/32" (standing). Loosen clamp bolts, turn adjusters at outer end of each tie rod equally.

Toe-Out n Turns – With outer wheel turned 20°, inner wheel should be 22°40'.

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STEERING

Power Steering: Saginaw (In-Line) Hydraulic. Hydraulically operated in-line power steering gear which combines the recirculating ball type gear with a concentric hydraulic booster.

See "Saginaw (In-Line) Power Steering" in Steering Sect.

►*POWER STEERING GEAR PUMP "SQUEAL" CORRECTION (Pump pressures reduced): See "Saginaw (In-Line) Power Steering" in Steering Section.*

►*POWER STEERING "CLUNKING" NOISE CORRECTION (Can be heard on hard turns and when steering wheel turned with car standing and engine running): See "Saginaw (In-Line) Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Sect.*

Steering Wheel & Horn Button Removal: *See "Saginaw (In-Line) Power Steering" in Steering Section.*

Steering Gear Removal: *See "Saginaw (In-Line) Power Steering" in Steering Sect.*

BRAKES

Bendix (Hydraulic) Single Anchor. Conventional two-shoe. Parking lever applies rear wheel service brakes. Bendix or Moraine Power Brakes are standard equipment.

►*BRAKE PEDAL BINDING CORRECTION: See "Brake Notes" in Cadillac Special Data.*

Drums—Diameter 12" (all Series). Regrinding limits .060".

See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

	Brake Lining Length	Width	Thickness
Primary	11.52" ①	2½"	¼"
Secondary	12.98"	2½"	¼"

①—(60S & 62). 12.98" (75 & 86 Series).

►*1956 BRAKE LINING PRODUCTION CHANGE:* To reduce possibility of brake squeal, brake lining on all cars beginning Engine No. 000519 has a .004 - .008" crown. *NOTE* - This crowned lining furnished for service replacement on all 1953-56 cars.

Braking Power—(Exc. 86 Series) 55.8% (front), 44.2% (rear). (86 Series) 52.8% (front), 47.2% (rear).

Clearance—.010" (top), .015" (bottom). Adjusting screw backed off 14 notches from point where wheel can just be turned by hand.

Power Brakes: Bendix or Moraine Power Brake units integral with master cylinder and fluid reservoir located on left front frame member.

Master Cylinder – Integral with power brake unit.

Checking Fluid Level – Maintain fluid level to within ¾" of top of filler cap boss.

Removal of Power Unit – Disconnect relay to unit rod at clevis and disconnect relay rod from push rod. Disconnect both vacuum hoses from power brake unit, and disconnect hydraulic line at outlet fitting. Remove four screws and lockwashers and nuts from cylinder mounting bracket and remove power brake assembly.

MISC. MECHANICAL

Windshield Wipers: Cable operated—Vacuum type.

See "Windshield Wipers" in Miscellaneous Section.

Windshield Washer: Connected with windshield wiper so that when windshield washer is operated, wiper motor automatically operates to clean windshield.

Power Window Regulators: Electric, with reversible motor in each window.

See "Electric Window Regulators" in Miscellaneous Section for data.

Power Top Control: Hydro-Lectric with "sealed" system which does not require periodic draining and refilling.

See "Top Controls" in Miscellaneous Section.

Power Seat Adjusters (Two-Way): Electric type with single reversible type motor for horizontal adjustment.

See "GM Two-Way Seat Regulators" in Miscellaneous Section.

Power Seat Adjusters (Six-Way): Electric type with single adjustable motor.

See "GM Six-Way Seat Regulators" in Miscellaneous Section.

►*SIX-WAY POWER SEAT "CHUCKING" CORRECTION: See "GM Six-Way Seat Regulators" in Miscellaneous Section.*

Trunk Lid Lock: Reversible electric motor operating a jack screw and limit switches which control opening and closing of the trunk lid.

See "GM Electric Trunk Lid Lock" in Miscellaneous Section.

Air Conditioning: Frigidaire with magnetic compressor clutch (compressor operates only with switch "on").

See "Frigidaire (GM) Air Conditioning" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

	6 Cyl. Ft. Lbs.	V8 Ft. Lbs.
Cylinder Head	90-95	60-70
Intake Manifold	① 15-20	25-35
Exhaust Manifold	①15-20	25-35
Oil Pan	② 12 1/2-15	②12-15
Main Bearing Caps	100-110	60-70
Flywheel	50-65	55-65
Con Rod Caps	35-45	30-35
Rocker Arm Support Bracket	25-30	
Rocker Arm Cover		2 1/2
Engine Front Cover	6-7 1/2	6-8
Clutch Housing	45-55	25-35

①—Tighten two end clamp bolts to 25-30 ft. lbs.
②—Corner bolts Tighten other flange bolts to 6-7½ lbs. (6 Cyl.), 6-9 lbs. (V8).

ENGINE

6 CYL. PASS. CARS

ENGINE REMOVAL: Drain cooling system, crankcase, and transmission and proceed as follows

1) Scribe alignment marks on hood around hood hinges. Disconnect right hand headlamp, parking lamp, and horn wires and remove wires from radiator core support brace. Remove both horns. Remove radiator hoses and heater hoses on models so equipped. On Powerglide models, remove and plug oil cooler lines.

2) Remove radiator core support to fender bolts, core support to fender side baffle bolts and core support to front cross member bolts. Remove radiator core and core support. Remove battery, battery support and battery cables.

3) Disconnect starter and generator wires, engine to body ground strap, oil pressure indicator wire at switch on block and coil primary lead at coil Remove windshield wiper motor. Remove temperature indicator element from cylinder head. Remove air cleaner.

4) Disconnect gasoline feed pipe from fuel pump and disconnect vacuum lines at intake manifold. Remove exhaust pipe to manifold bolts. Disconnect carburetor control rod from dash panel bell crank. Remove transmission control rods. Remove clutch control bellcrank and control rods on conventional transmission models. On overdrive models, disconnect overdrive wires and cables. On Powerglide models, remove oil filler tube and plug opening

5) Disconnect speedometer cable at transmission. Split universal joint. Remove propeller shaft. Remove rocker arm cover and install lifting hooks from Kit J-4536 in cylinder head bolt holes. Raise engine slightly and remove all four engine mounts. Remove the engine and transmission from chassis as a unit.

V8 PASS. CARS

ENGINE REMOVAL: Drain cooling system, crankcase, and transmission and proceed as follows·

1) Scribe alignment marks on hood around hood hinges and remove hood from hinges. Remove radiator hoses and heater hoses. Remove radiator core support to core bolts and shims. On Powerglide models, remove and plug oil cooler lines Remove radiator core.

2) Remove battery, battery support and battery cables. Disconnect starter and generator wires, engine to body ground strap, oil pressure indicator wire at switch on block and coil primary lead at coil

3) Remove windshield wiper motor. Remove temperature indicator element from cylinder head. Remove air cleaner, fan blade and pulley. Disconnect gasoline feed pipe from carburetor and vacuum lines from intake manifold. Remove distributor and coil. Disconnect carburetor control rod from dash panel bell crank.

4) Disconnect exhaust cross over pipe from exhaust pipe and muffler assembly. Remove transmission control rods Remove clutch bell crank and control rods on conventional transmission models. On Overdrive models, disconnect overdrive wires and cables. On Powerglide models, remove oil filler tube, plug opening and disconnect oil cooler lines Disconnect speedometer cable at transmission.

5) Split rear universal joint and remove propeller shaft Remove choke heat tube and rocker arm cover and install two eye bolts and spacers from Kit J-4536-A in cylinder head bolt holes. Raise engine slightly and remove all four engine mounts Remove engine and transmission from chassis as a unit, tilting engine to clear radiator core support

6 CYL. TRUCKS

ENGINE REMOVAL (6 CYL. TRUCKS): Drain cooling system, crankcase, and transmission, then proceed as follows.

1) Disconnect hood springs and hinges, remove hood. Remove radiator support bracket-to-fender bolts, support-to-frame crossmember bolts, then remove radiator and support.

2) Remove battery cable and ammeter wire from starter switch terminal. On vehicles with push-button starter, remove battery cable and ammeter wire from large terminal on solenoid and starter switch wire from small terminal (tape end of battery cable to prevent shorting).

3) Disconnect coil lead from distributor terminal and pull coil high tension wire from center of distributor cap. Remove two coil mounting screws and lay coil with wires attached on dash. Disconnect engine ground strap from frame, gasoline line from fuel pump, generator and field wires from generator.

4) Remove air cleaner and disconnect choke and throttle control cables from carburetor (when used). Remove temperature indicator element from cylinder head and disconnect oil pressure line at cylinder block.

5) Disconnect windshield wiper and Hydrovac vacuum lines (if so equipped). Remove exhaust pipe flange-to-manifold bolts. Remove starter pedal, then remove accelerator pedal from accelerator rod (if so equipped).

6) One ½ and ¾ Ton with conventional transmission, remove control rods from bellcrank on left side of clutch housing. On automatic transmission models, disconnect transmission control and throttle linkage rods from transmission. On 1 Ton models, remove coolant line clips from dash and frame panels. On other models, remove floor mat and transmission floor pan cover.

7) On 1 Ton models, remove cotter key and pin attaching parking brake pull rod assembly to parking lever. On 1½ and 2 Ton models, disconnect parking brake lever return spring from brake operating lever and remove cotter key and pin attaching inner and outer levers to parking brake operating lever.

8) On 1, 1½, and 2 Ton models, remove transmission cover with parking and gearshift lever. Place piece of cardboard on top of transmission to prevent dirt falling in during removal.

9) Disconnect speedometer cable from transmission and clutch link-to-pedal arm (if so equipped). Remove propeller shaft.

10) Remove rocker arm cover, rocker arm attaching bolts, rocker arm, shaft assembly and pushrods.

11) With Lift Kit J-4536-A, raise engine slightly, remove all four engine mounts and raise engine and transmission from chassis as a unit. Remove crankcase ventilator pipe, then remove starting motor, generator and fan belt.

V8 TRUCKS

ENGINE REMOVAL (V8 TRUCKS): Same as V8 Pass. Cars except as follows· Remove windshield wiper motor. Disconnect Hydra-Matic oil cooler and plug the openings. Remove propeller shaft.

ENGINE MOUNTINGS

PASS. CARS & TRUCKS

ENGINE MOUNTING REPLACEMENT: (Front Mounts)— Remove top and bottom stud nuts and remove washer and cushion between each nut and the cross member or engine bracket Raise front of engine (On V8 models, remove the distributor cap before raising engine). *CAUTION—Raise engine only far enough for clearance.* Replace necessary cushions

Rear Mounts: Support engine weight to relieve rear mounts Remove mount attaching bolts from frame outrigger and flywheel housing (or Powerglide Transmission) and remove support. Install new support and bolts and tighten securely with engine weight resting on mounts.

CYLINDER HEAD & MANIFOLD

ALL ENGINES

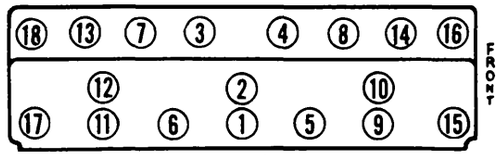
CYLINDER HEAD INSTALLATION (6 CYL. ENGINES): Use torque indicating wrench to tighten cylinder head capscrews in correct sequence as shown in diagram

CYLINDER HEAD INSTALLATION (V8 ENGINES): Coat steel cylinder head gaskets with a good head gasket paste and install gaskets in position on cylinder block. Install heads over dowel pins in the block. Oil threads of all long cylinder head bolts and coat threads of all short bolts with Permatex No. 3 (short head bolts protrude into water passages) Use a torque indicating wrench and tighten bolts a little at a time to 60-70 ft. lbs , in the sequence shown in diagram.

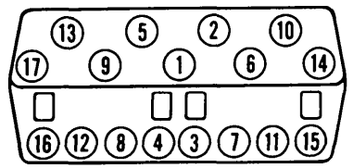
INTAKE MANIFOLD INSTALLATION (V8 ENGINES): Install manifold end gaskets on cylinder block. Coat ends of intake manifold side gaskets around water passages with a good sealing compound and install heads Tighten bolts a little at a time to 25-35 ft. lbs torque.

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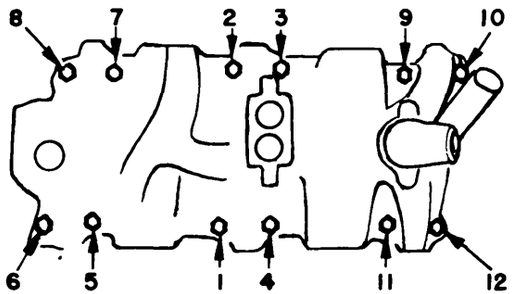
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CHEVROLET 6 CYL. CYLINDER HEAD



CHEVROLET V8 CYLINDER HEAD



CHEVROLET V8 INTAKE MANIFOLD

PISTON PINS

V8 ENGINES

PISTON PINS (V8 ENGINE): Removal–Install pilot of Tool J-5538 on puller screw and install puller screw, with pilot, through piston and pin. Install tool support over threaded end of puller screw with small end of support against piston. Install nut loosely on puller screw and place assembly in arbor press so that pin can be pressed out through support.

Installation: Lubricate pin holes and position connecting rod in its respective piston so that flange or heavy side of rod at bearing end will be toward **front** of piston (cast depression in head of piston and "F" marks on piston struts) on #1-#3-#5-#7 pistons and rod flange to **rear** of piston on #2-#4-#6-#8 pistons. Install piston pin on puller screw and pilot on screw. Install puller screw through piston and rod, indexing pilot through piston and rod. Install support over threaded end of puller screw with small diameter toward piston. Install nut on puller screw and tighten with a torque wrench to start piston pin into connecting rod *(CAUTION–If pin can be started into connecting rod with less than 15 ft. lbs. torque, clearance is excessive).*

CRANKSHAFT & MAIN BEARINGS

ALL ENGINES

6 CYL. & V8 MAIN BEARING REPLACEMENT (With Engin in Car): Upper bearing halves can be "rolled" out for replacement. Proceed as follows:

1) Remove spark plugs and remove engine oil pan. Remove bearing cap and bearing shell.

2) Install main bearing shell removing and installing tool (or use a cotter pin bent as required). Rotate crankshaft in direction of usual rotation and roll upper bearing shell out of engine.

3) Oil new bearing shell and insert plain (un-notched) end of shell between crankshaft and block on the indented or notched side. Rotate bearing into place. Install new bearing shell in bearing cap.

REAR MAIN BEARING OIL SEAL (6 CYLINDER ENGINE): Remove rear main bearing cap and remove old seal from groove. Insert new packing in bearing cap and roll firmly into place with a rounded tool (roll from both ends toward center). Use a round block of wood, same diameter as crankshaft flange, to hold packing in place. Cut off both ends of packing evenly and flush with bearing cap face. Install upper half of seal in crankcase in same manner, with engine out of car.

REAR MAIN BEARING OIL SEAL (V8 ENGINE): Remove rear main bearing cap and remove old seal from groove. Insert new seal in groove with fingers, and then with Tool J-5788 (Oil Seal Installer), and a hammer, pound seal firmly into groove. Cut the small portion of the seal that protrudes from groove flush with surface of bearing cap. Replace upper half of seal in crankcase in same manner, with engine out of car.

VIBRATION DAMPENER

ALL ENGINES

VIBRATION DAMPENER (6 CYL. ENGINE): Removal–Remove radiator. On Powerglide models, remove oil cooler lines and plug outlets, Remove fan belt and install Puller J-1287-B and pull dampener assembly from crankshaft.

Installation: Remove puller and install two 3/8"-16 x 1" (16 thread) capscrews in dampener to support wheel portion during installation. Position dampener on crankshaft with key and keyway on alignment and drive dampener on shaft until it bottoms against crankshaft gear. Use a heavy hammer and bar through the grille, taking care that a straight installation is made. Remove the two capscrews previously installed. Install radiator.

VIBRATION DAMPENER (V8 ENGINE): Removal–Remove radiator. On Powerglide models, remove oil cooler lines and plug outlets. Remove fan belt, fan, and pulley, and install Puller J-1287-B and pull dampener assembly from crankshaft.

Installation: Install two 3/8"-16 x 1½" capscrews to hold the hub and flywheel portion of dampener together.

during assembly. Coat cover seal contact on dampener with engine oil and position dampener on crankshaft. Use Transmission Front Bearing Installer J-5590 and drive dampener on shaft until hub bottoms on timing sprocket. Remove the two screws installed previously and install pulley, fan, and fan belt. Install radiator.

ENGINE FRONT COVER

ALL ENGINES

FRONT OIL SEAL INSTALLATION: Pry old seal out of front cover. Install new seal so that open end of seal is toward inside of cover and drive it into position with Oil Seal Driver J-996. *CAUTION–Support cover at sealing area while installing seal.*

CAMSHAFT & BEARINGS

6 CYL. ENGINES

CAMSHAFT REMOVAL & INSTALLATION: Remove rocker arm and pushrod covers. Remove rocker shaft assembly, pushrods and valve lifters. Remove timing gear cover attaching screws and two bolts that are installed from back through front main bearing cap, remove cover and gasket. Pull crankshaft gear with Puller T-126-R. Remove two camshaft thrust plate screws by working through holes in camshaft gear. Remove camshaft and gear assembly by pulling it through front of block *(CAUTION* - Support shaft carefully to avoid damage to camshaft bearings). To install camshaft, reverse removal procedures.

6 CYL. CAMSHAFT BEARING REPLACEMENT: Use Bearing Remover & Replacer J-6356. Install No. 1 and No. 2 bearings first, then rear two bearings. *(CAUTION* –Align oil holes in bearings with oil holes in block before pulling into place), Install plug flush to 1/32" deep from clutch housing face of case.

Reaming: Special reamer with four cutters on one bar recommended by car manufacturer (for proper alignment). Insert reamer through #1, #2, & #3 bearings. Start reamer cutter in all four bearings at the same time (wash metal cuttings away with a liberal supply of kerosene while reaming), turn reamer slowly until cutters pass through bearings. Remove reamer by rotating in same direction as when reaming bearings and withdraw from engine. Bearing cuttings must be blown out with compressed air. Install camshaft and check bearing clearances with narrow feeler gauge. Clearance should be .002-.004". Install expansion plug to rear of rear bearing.

V8 ENGINES

CAMSHAFT REMOVAL & INSTALLATION: Remove rocker arm covers and intake manifold. Back off rocker arm nuts until arms may be pivoted away from pushrods. Remove pushrods and valve lifters *(NOTE* - Place or mark lifters and rods so that they may be reinstalled in their original positions). Remove fuel pump. Remove two adapter mounting bolts and lockwashers and remove fuel pump adapter and gasket from block. Remove pushrod. Remove grille assembly. Drain radiator, disconnect hoses. With Powerglide, disconnect oil cooler radiator lines from core. Remove radiator core-to-core support bolts and remove radiator core. Note spacer shims removed, if any. Remove fan belt, fan and pulley. Remove harmonic balancer with Puller J-1287-B. Remove oil pan and heater hose from water pump if so equipped. Remove water pump, then remove front end cover and gaskets. Crank engine until "O" marks on camshaft and crankshaft sprockets are in alignment. Remove three camshaft sprocket-to-camshaft bolts. Remove camshaft sprocket and timing chain together *(NOTE* - Sprocket is a light press fit on camshaft for approximately 1/8". If sprocket does not come off easily, a light blow with a plastic-faced hammer on lower edge should dislodge the sprocket). Install two 5/16"-18 x 4" bolts in two of camshaft bolt holes. Remove

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camshaft from engine. *(CAUTION* - Camshaft journals are of same diameter and care must be exercised to avoid damage to bearings). To install camshaft, reverse removal procedures.

V8 CAMSHAFT BEARING REPLACEMENT: Use Bearing Remover & Replacer J-6356. Remove bearing nearest center of block first, then No. 2 and No. 4 bearings, and finally front and rear bearings (with this sequence minimum number of turns are required to locate Remover & Replacer for removal of next bearing). When installing, install No. 1 or front bearing first. This bearing will act as guide for tool and center the No. 2 and No. 3 bearings being pulled into place. *(CAUTION*–Use care when installing rear bearing due to smaller size of oil pressure holes in rear bearing. When installing end plug, install flush to 1/32" deep to maintain level surface on rear of cylinder block).

TIMING GEARS

6 CYL. ENGINES

REPLACEMENT TIMING GEARS: Fibre type camshaft gear and steel crankshaft gear used on passenger cars Aluminum camshaft gear and steel crankshaft gear used on trucks.

TIMING GEAR INSTALLATION Gears are press fit on crankshaft and camshaft and must be removed and installed as follows

Crankshaft Gear–To remove gear, attach Puller T126-R by threading puller screws in tapped holes in gear, pull gear off When installing gear, make certain that two woodruff keys installed in crankshaft keyways, drive gear on shaft until it seats against shoulder on shaft

Camshaft Gear–To remove gear, install Gear Remover J-971 on shaft in back of gear (remover consists of support sleeve), place camshaft assembly in arbor press *(CAUTION*–Thrust plate must be positioned so that it will not be damaged by woodruff key in shaft as shaft pressed out), press shaft out of gear To install gear, place shaft in arbor press (support shaft securely directly back of front bearing journal), install gear spacer ring and thrust plate over end of shaft, and install woodruff key in shaft keyway. Install camshaft gear and press it on shaft until it bottoms against the gear spacer ring. End clearance of thrust plate should be .001" to .005". Install camshaft assembly in engine block, being careful not to damage bearings or cams. With crankshaft installed turn camshaft and crankshaft so that valve timing marks on gear teeth will line up, then push camshaft into position. Install camshaft thrust plate-to-block screws and tighten securely. Camshaft and crankshaft gear runout should not exceed .004" for camshaft and .003" for crankshaft. Backlash between timing gear teeth should not be less than .004" nor more than .006". *CAUTION*–Press on hub only when installing camshaft gear.

TIMING CHAIN

V8 ENGINE

TIMING CHAIN Removal–Remove vibration dampener, timing chain cover, and oil slinger Rotate engine until timing marks on sprockets are in alignment and in alignment and adjacent Remove three camshaft sprocket screws and remove camshaft sprocket and chain together

Installation Install chain on camshaft sprocket Hold sprocket vertical with chain hanging below, and line up 'O' timing marks on both sprockets so they are adjacent and in line with a straight edge across shaft centers Align dowel in camshaft with dowel hole in sprocket and install sprocket on camshaft Draw camshaft sprocket onto shaft using the three mounting bolts Tighten to 15-20 ft lbs *CAUTION–Do not attempt to drive sprocket onto shaft as welch plug at rear of engine can be dislodged.*

VALVE SYSTEM

ALL ENGINES

ENGINE NORMALIZING PROCEDURE (For Valve Tappet Clearance Adjustment) Clearance changes while engine is warming up. Adjust only after engine has been 'normalized' as follows Run engine at 600 RPM and check oil temperature with thermometer at overflow pipe on valve rocker arm shaft connector until no change noted in oil temperature for a period of five minutes (oil temperature will become stabilized at some point between 150° and 225°F) This normalizing period will be from 5 to 30 minutes depending on engine temperature when started.

VALVE TAPPET ADJUSTMENT

6 CYL. & V8 ENGS. WITH HYDRAULIC LIFTERS

NOTE–Required when cylinder head has been removed or when rocker arm or valve assemblies have been replaced.

6 Cylinder Engines: The hydraulic lifters must be at the lowest point of travel when adjusted (piston in firing position) Remove distributor cap and turn engine until rotor is in firing position (points just breaking) for cylinder being set Starting with #1 cylinder, turn valve adjusting screw down until rocker arm just contacts valve This can be determined by checking push rod side play at adjusting screw end while turning the adjusting screw At the point where no side play can be felt, continue turning the adjusting screw down 1-1/2 turns and tighten lock nut securely Adjust each cylinder following the same sequence as the firing order (1-5-3-6-2-4)

V8 Engines· With No. 1 Cyl. at TDC firing position adjust Exhaust valves 1-3-4-8, Intake valves 1-2-5-7 by backing off the adjusting nut on rocker arm until there is play in valve push rod, then tighten adjusting nut to just remove all push rod-to-rocker arm clearance, **then tighten adjusting nut an additional 3/4 turn** to place hydraulic lifter in center of its travel Crank engine one revolution so that #6 cylinder is in firing position, and then proceeding as above, adjust Exhaust valves 2-5-6-7, and Intake valves 3-4-6-8

VALVE STEM OIL SEALS

6 CYL. ENGINES

VALVE STEM OIL SEAL INSTALLATION: Seal consists of synthetic rubber ring installed in second groove of valve stem directly under valve locks on all valves. When assembling valves, install seal as follows Install valve spring and spring retainer on valve stem, compress spring until lower groove on valve stem is exposed, install seal in this groove *(CAUTION* - Seal must seat flat in groove and not be twisted). Install valve locks in upper groove in valve stem, relieve spring tension, check to see that seal is properly retained in spring retainer and that locks are engaged.

V8 ENGINES

VALVE STEM OIL SEAL INSTALLATION: TWO seals used as follows: 1) Cup shaped shedder or shield installed over upper end of valve spring (retained by spring retainer), and 2) Synthetic rubber ring installed in second groove of valve stem directly under valve locks. These seals used on all valves. Install as follows·

Oil Shedder – Install shedder on top of valve spring with cupped end down over spring before installing spring retainer. *NOTE - This type shedder supersed s previous type shield with smaller diameter cup within spring.*

Oil Stem Seal – Install in same manner as seal on 6 Cyl. Engines (above).

VALVE GUIDES

6 CYL. ENGINES

VALVE GUIDE INSTALLATION (6 CYL. ENGINES): Install guides to proper position in head with the following special tools (see table below for correct height of guide above machined surface of cylinder head). Use Valve Guide Driver J-5599 to install exhaust valve guides and Driver J-5598 to install intake valve guides. After guides installed, ream to .343".

Valve Guide Installation Height
6 Cyl. Engine

Engine	Intake	Exhaust
235" & 261"	1"	15/16"

►*NOTE* Above specifications are different than those given for earlier models

ROCKER ARMS

6 CYL. ENGINES

ROCKER ARMS (6 CYL. ENGINES): Diamond bored and "granodized" (no bushings) and fit directly on rocker arm shafts. Different rocker arms used as follows

Rocker Arm Identification
6 Cyl. Engines

Type	Cylinder	Part N .
L H. Intake	2-4-6	3837029
R.H. Intake	1-3-5	3837030
L.H. Exhaust	1-3-5	3837031
R.H. Exhaust	2-4-6	3837032

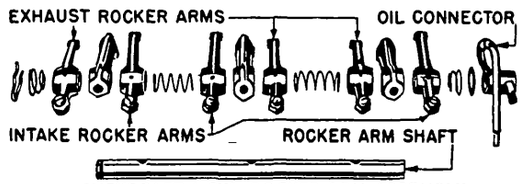
Installation Assemble rocker arms as indicated in illustration with open end of shaft toward center, and baffle in rear shaft open end in vertical position

V8 ENGINES

ROCKER ARM STUD REPLACEMENT (V8 ENGINES) Oversize rocker arm studs are available in 003" & 013" oversizes for service replacement. Remove old stud by placing Spacer J-5802 over stud, installing

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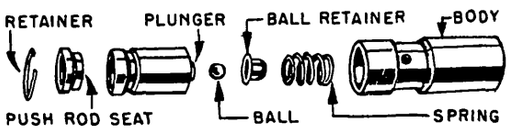
CHEVROLET 6 CYL. ROCKER ARM ASSEMBLY
(REAR ASSY. SHOWN—FRONT ASSY. SIMILAR)

nut and flat washer and removing stud by turning nut. Ream hole for oversize stud with Reamer J-5715 (.003"), J-6036 (.013"). Coat press-fit area of stud with hypoid lubricant and install stud to correct height of 1-41/64".

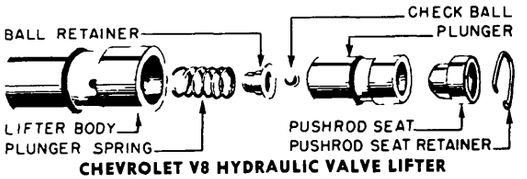
►*STUD INSTALLER TOOL J-5801 REWORK (For Installing Stud to 1¾" Height):* Grind 3/32" off bottom of tool. With reworked tool drive stud in to 1¾" height, then press studs in further to 1-41/64" height.

HYDRAULIC LIFTERS
6 CYL. & V8 ENGINES

HYDRAULIC VALVE LIFTERS: Barrel type, consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet or body (see illustration). Oil is introduced to this unit through oil gallery in block.



CHEVROLET 6 CYL. HYDRAULIC VALVE LIFTER



CHEVROLET V8 HYDRAULIC VALVE LIFTER

Removal: On 6 cylinder engines, remove rocker arm assemblies, push rods and push rod cover. On V8 engines, remove intake manifold and back off the rocker arm nuts until rocker arm can be swung away from push rods Remove push rods

Disassembly: Hold plunger down with a push rod and using a small screw driver or pointed awl, remove plunger retainer. Remove push rod seat, plunger, ball check valve, ball retainer and spring. Clean all parts in solvent and inspect each part carefully for nicks and burrs, or wear. Replace complete assembly if any parts are damaged.

R assembly (6 Cyl. Engin s): Invert plunger and set check valve ball into hole in plunger and place check valve ball retainer over ball and on plunger. Place check valve retainer spring over retainer and then assemble lifter body over the complete assembly, being careful to line up the feed holes in plunger and lifter body. Turn assembly over and fill with S.A.E. 10 engine oil, then insert end of Tool J-4274 through ball seat hole in bottom of plunger and press down solid, at which point holes in lifter body and plunger will be aligned. Insert pin (part of Tool J-4274) through both holes to hold plunger down against spring tension, then remove tool from top of lifter. Fill assembly with S.A.E. 10 engine oil, install push rod seat and spring retainer. Press down on push rod seat and remove pin.

Reassembly (V8 Engines): Invert plunger and set ball into hole in plunger, and place check valve ball retainer over ball and on plunger. Place check valve retainer spring over retainer. Assemble valve lifter body over the complete assembly. Turn assembly over and install push rod seat. Compress plunger with push rod and install retainer. Compress plunger to open oil holes and fill plunger with S.A.E. 10 engine oil Work plunger up and down to refill.

Installation: Reverse removal procedure.

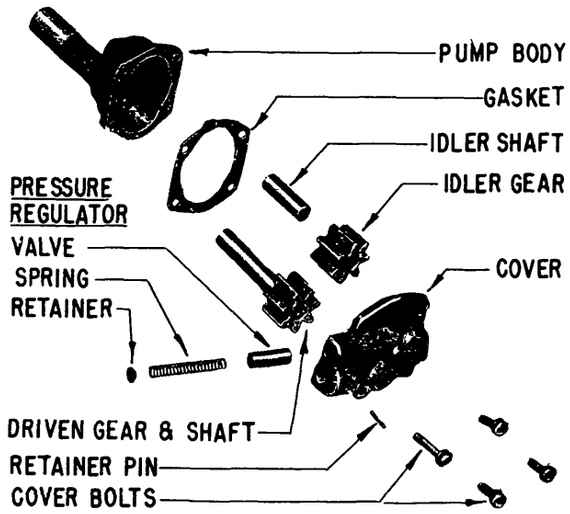
OILING SYSTEM
6 CYL. ENGINES

OIL LEAD TO VALVE ROCKER ARMS (6 CYL. ENGINES): Rocker arm shaft oil line pipe extends forward to push rod compartment from a fitting in tappet ledge just above rear camshaft bearing, to center of engine then upward to a fitting between the hollow rocker arm shafts. To replace this pipe, cut a new pipe to proper length, install new nipples at each end and install pipe to cylinder block fitting, then bend pipe to contour so that clearance is provided for the push rods and push rod cover and so that end of pipe extends straight up for cylinder head lubrication.

OIL PUMP
6 CYL. ENGINES

6 CYL. OIL PUMP (Removal & Disassembly): Drain oil, remove oil pan and disconnect oil pump-to-block oil line. Remove oil pump retaining sleeve lock screw and remove oil pump and oil pump-to-block oil line. Remove pressure oil line from pump and remove pump cover attaching screws, cover, gasket, idler gear and drive gear and shaft. Remove regulator valve pin and valve parts. Remove intake pipe and fixed screen as an assembly. Wash all parts in solvent and inspect pump body for cracks or excessive wear. Check shaft for looseness in housing and gear and cover for wear.
connector nuts securely. Replace intake pipe and screen.

Ass mbly: Install drive gear and shaft in body. Install idler gear with smooth side toward cover. Install cover and new gasket. Tighten screws securely and check to see that shaft turns free Install pump oil line to pump, leaving it loose.



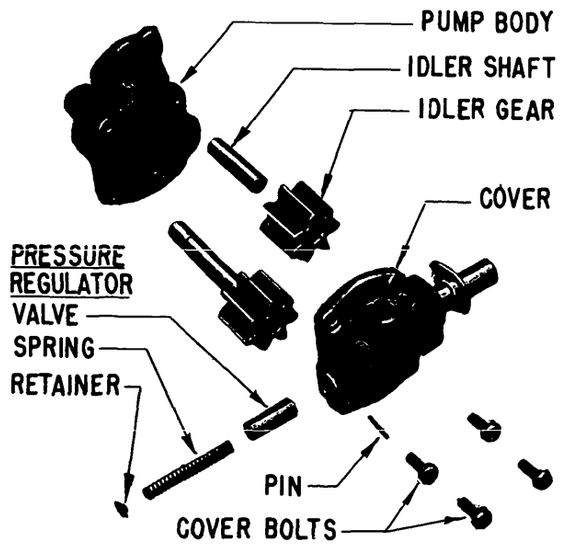
CHEVROLET 6 CYL. OIL PUMP

Installation: Install pump in block and align oil lines and install retaining sleeve lock screw and tighten securely *(CAUTION*—Make sure tapered end of lock screw draws down into hole in oil pump body). Tighten oil pump-to-block oil line and pump-to-screen oil line connector nuts securely. Replace intake pipe and screen.

V8 ENGINE

V8 OIL PUMP (Removal): Drain oil, remove oil pan, and remove pump-to-rear main bearing cap bolt and remove pump, extension shaft and collar. Remove pump cover attaching screws, cover idler gear and drive gear and

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CHEVROLET V8 OIL PUMP

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shaft. Remove intake pipe and fixed screen as an assembly. Wash all parts in solvent and inspect pump body for cracks or excessive wear. Check shaft for looseness in housing and gear and cover for wear.

Ass mbly: Place drive gear and shaft in pump body and install idler gear so that smooth side of gear will be toward cover. Install cover and attaching screws. Tighten screws to 6-9 ft. lbs. and check to see that shaft turns freely. Install intake pipe and fixed screen. Assemble collar end of extension shaft assembly over pump drive shaft, aligning tang of extension shaft with slot in end of pump drive shaft. Install retaining clip with flat end of clip in groove of pump drive shaft.

Installation; Assemble pump and extension shaft to rear main bearing cap, aligning slot at top end of extension shaft with drive tang on lower end of distributor drive shaft. Install pump to rear main bearing cap bolt and tighten to 45-50 ft. lbs. Install oil pan.

COOLING SYSTEM

ALL PASS. CARS

RADIATOR REMOVAL (Passenger Cars): Drain radiator and remove radiator hoses. On models equipped with Powerglide transmission, remove oil cooler lines from radiator and plug lines and radiator fittings. Remove radiator core to radiator support bolts and lift radiator core straight up to remove. *NOTE*—When removing radiator note the shims at support bolts and install at the same location when radiator is installed.

►*POWERGLIDE OIL COOLER CAUTION:* If foreign matter of any kind is allowed to enter cooler, the core should be cleaned with an air stream and flushed thoroughly with automatic transmission oil. Serious damage will be done to transmission if dirt or foreign matter remains in cooler.

BRAKE NOTES

SLOW POWER BRAKE PEDAL RETURN CORRECTION: When this condition is encountered, check the following points and correct as necessary.

Push Rod Lever Assembly—Power brake unit pushrod has been installed on the outboard side of lever assembly at pedal linkage. Correct by assembling on inboard side. Lubricate all linkage pivot points.

Power Brake Rubber Boot—Bellows or rubber boot may be gathered at front side of dash panel causing a bind on pushrod. Correct by pulling bellows through smaller hole in dash panel and mounting plate at same time power unit is being assembled to mounting plate.

Power Unit Valve Sleeve—Remove power unit from dash. Remove rubber boot from end plate of unit and squirt rubber lubricant (Ru-Glyde) between valve sleeve into which pushrod is assembled and the sleeve bore in valve assembly to lubricate "O" ring seal on valve sleeve.

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extrem car wh n disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model Designation

Series	Serial Prefix	Model
1500①	A	ONE-FIFTY
2100	B	TWO-TEN
2400	C	BEL-AIR
1508	D	SEDAN DELIVERY

①–Except Sedan Delivery.

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post.

Starting Serial Number–001001 (at each plant).

►*SERIAL NUMBER NOTE: Serial Number (examp B56F001025) includes following identification date in sequence.*

Series①	Year	Assy. Plant②	Serial No.
B	56	F	001025

①–See Model Designation above.

②–See Assembly Plant Designation below.

Assembly Plant Designation

A–Atlanta	**J**–Janesville	**O**–Oakland
B–Baltimore	**K**–Kansas City	**S**–St. Louis
F–Flint	**L**–Los Angeles	**T**–Tarrytown
	N–Norwood	

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor.

Starting Engine Number–0001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ("F" for Flint, and "T" for Tonawanda), Model Year, and Model Type. See following for Model Type Designation.

Model Type Designation

Engine	Suffix
Regular "235"	Z
Regular "235" (with H.D. Clutch)	ZC
Powerglide "235"	Y

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. at cranking speed. A variation of 20 lbs. between cylinders indicates need for cylinder reconditioning.

VACUUM READING: At 500 RPM – 14.4" (With selector lever in Drive Range – Powerglide Cars), 16.7" (With transmission in Neutral). At 450 RPM – 14.5" (With selector lever in Drive Range - Powerglide Cars), 16.3 (With transmission in neutral).

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation when tuning engine. Should require ½ turn from unhooked to hooked position. *Distorted springs should be replaced.*

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .035".

Plugs – AC No. 44-5. 14 mm. Torque to 20-25 ft. lbs.

►*SPARK PLUG INSTALLATION CAUTION:* Spark plug flash-over or misfire on 1956 engines may be caused if 1955 plugs are used. Insulators on 1956 plugs have four annular ribs that help prevent flash-over. Spark plug boot has larger inside diameter.

COIL: Delco-Remy 1115087. *12 Volt.*

Ignition Current – 1.8 amps. idling, 4 amps. stopped.

Resistor – Delco-Remy 1931614. 1.40-1.62 ohms. On firewall.

►*COIL RESISTOR NOTE:* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when key turned to "Start Engine" position).

DISTRIBUTOR: Delco-Remy 1112403. *12 Volt.*

Condenser–Delco-Remy 1928111. **Capacity**–.18-.23 mfd.

Contact Point Set–Delco-Remy 1924571.

Breaker Gap–.016-.021 (New points), .0125-.0175". (Used points).

Cam Angle–28-35° with .016" gap.

►*BREAKER GAP CAUTION: Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension–19-23 ozs.

Rotation – Clockwise viewed from above.

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		375	0-4		750
4-6		700	8-12		1400
9-11		1350	18-22		2700
12-14		1750	24-28		3500

Octane Selector: Adjustment on distributor provides 10° spark advance or retard from center 'O' position.

Vacuum Spark Control: Delco-Remy 1116089.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum ("of HG)
Start	0	4-6
7.5	15	7.5-10

Plunger Travel – 3/16-3/32".

IGNITION TIMING

Setting – TDC at idle speed. *NOTE - The Manufacturer recommends setting timing to 5° BTDC with engine operating at 1000 RPM and distributor vacuum disconnected.*

Timing Mark–Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on 'O'. Then adjust Selector as follows:

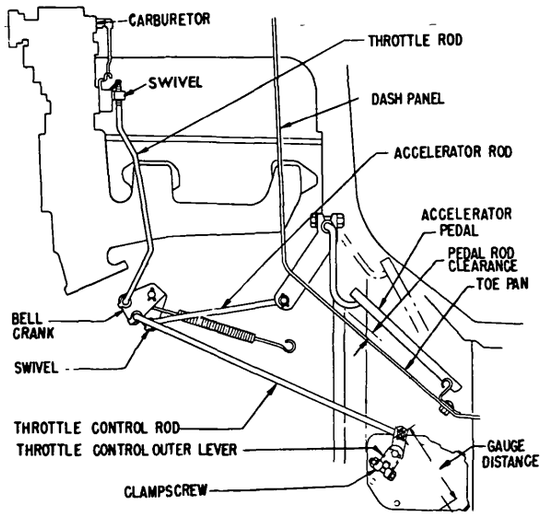
Octane Selector Setting–Set for slight ping when accelerating with wide open throttle.

CARBURETOR

►*FAST IDLE CONTROL CAUTION (AIR CONDITIONED CARS):* Fast idle control is set to provide 900 RPM engine speed when Fast Idle Control Knob on dash is pulled out. **Make sure knob is pushed in when making normal fast idle adjustments** and that fast idle control linkage does not interfere with normal operation of the carburetor linkage when fast idle is not in operation.

THROTTLE LINKAGE ADJUSTMENT (All Mod ls): *POWERGLIDE NOTE - Adjust transmission throttle control linkag BEFORE adjusting carburetor throttl linkage (see below).*

Carburet r Throttle Linkage (All M d ls): With accelerator pedal depressed, clearance between lowest point on accelerator link and toe pan (floor mat removed) should be exactly 1". With throttle actuating lever in wide open position, adjust upper throttle rod swivel for free entry into lever.



POWERGLIDE THROTTLE LINKAGE

THROTTLE LINKAGE ADJUSTMENT (POWERGLIDE CARS): Engine must be at normal operating temperature and transmission warm (choke valve wide open and fast idle inoperative with throttle stopscrew against low step of fast idle cam) when adjustments made.

1) Adjust engine idle speed to 425 RPM with selector lever in "D" range (set hand brake firmly to hold car while making adjustments).

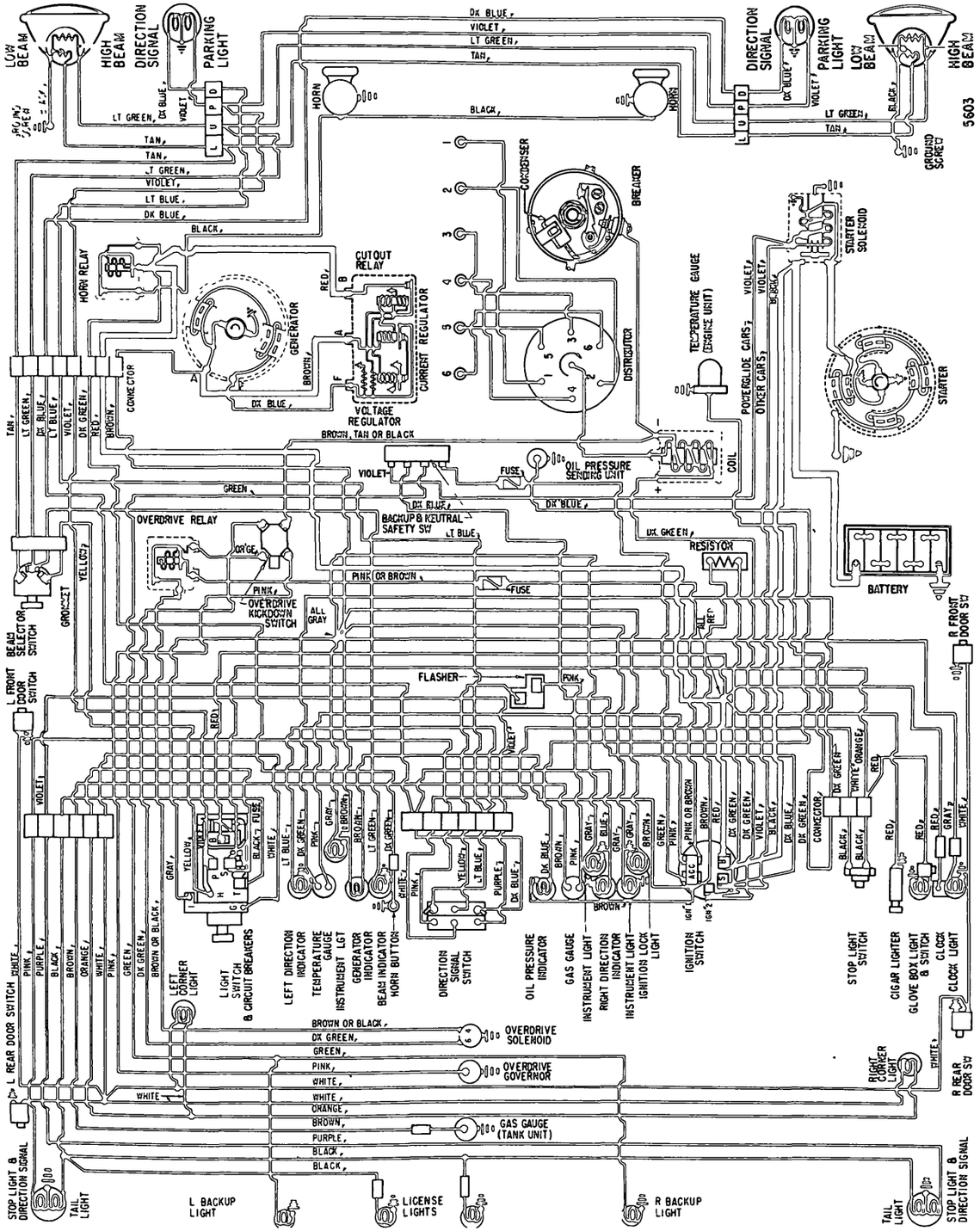
2) Disconnect control rod from throttle lever on transmission cover. Remove lower bolt at rear of transmission side cover. Rotate throttle valve control outer lever assembly counter-clockwise to the open throttle position.

3) Hold lever in this position and with throttle valve outer lever gauge J-5806 set at 7.09" measure distance from left side cover lower rear bolt and hole in throttle lever. If pins of gauge will enter holes, adjustment is correct. If necessary to adjust, loosen lever to clamp attaching bolt and adjust lever on throttle shaft as necessary. Reconnect control rod.

4) Disconnect bellcrank-to-transmission throttle lever rod at throttle valve lever. Disconnect accelerator-to-bellcrank rod at bellcrank.

5) Force bellcrank-to-transmission throttle lever rod forward against stop in transmission (open throttle position) and adjust bellcrank-to-carburetor throttle rod for free entry of swivel pin in throttle valve lever, with carburetor throttle valve in wide open position.

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6) With carburetor throttle valve held in wide open position and accelerator fully depressed, adjust accelerator-to-bellcrank rod for free entry of swivel pin into hole in bellcrank.

THROTTLE RETURN CHECK ADJUSTMENT (POWERGLIDE CARS): With engine idle speed set at 425 RPM, shut off engine, close choke valve and position throttle stop screw on highest step of fast idle cam. Using a 9/32" wrench on flat section of return check shaft, hold from turning, and turn the adjusting screw until it just contacts the throttle lever contact arm.

ROCHESTER BC

Model	Rochester No.
Std. Transmission	7009255
Powerglide	7009254

Idle Setting–1-2½ turns open.
Idle Speed (Synchro-mesh)–475 RPM.
Idle Speed (Powerglide)–425 RPM with Powerglide Selector lever in "D" (Drive) range.
Float Level–1 9/32" (Gauge M-250). With air-horn inverted and gasket in place, position Gauge M-250 over the floats with the tang inserted in the discharge nozzle. Bend float arms as necessary so that top of each float just touches the gauge and the float is centered between the gauge legs.
Float Drop–Bend float tang as necessary to obtain a distance of 1¾" from the gasket surface to the bottom of the float, with the air-horn upright and the float hanging free.
Choke Adjustment: Centered on index.
Fast Idle: With idle adjusting screw on next to highest step of fast idle, Gauge BT-99 (.076") should just slide between lower edge of choke valve and carburetor bore. To adjust, bend connector rod.
▷ *OTHER DATA: See "Rochester BC" Carburetors in Carburetion Section.*
Fuel Pump Pressure: 3½-4½ lbs.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.
Replacement Fuel Pump–AC No. 4149 (Fuel only), No. 4138 (Fuel & Vacuum).
Pressure–3½-4½ lbs.
See "Fuel Pumps" in Carburetion Equipment Section.
Gasoline Gauge: AC Electric.
Dash Unit – AC No. 1518473.
Tank Unit – AC No. 1518158.
"See "Fuel Gauges" in Carburetion Section.

BATTERY

Delco 2SMR53W. 12 Volt. 9 plate, 53 ampere hour capacity (20 hr. rate).
Battery Ground – Negative.
Engine Ground – Engine to cowl at rear head bolt.

STARTER

Delco-Remy 1107644. 12 Volt. Armature – 1926626.
Drive – Overrunning clutch (solenoid pinion shift).
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 35 ozs. minimum.

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Perf rmanc Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: Delco-Remy Solenoid Switch 1119789 mounted on starter and controlled by Ignition & Starter Switch 1116512.

See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Section.

Neutral Safety & Back-Up Light Switch: Delco-Remy 1998106 (Powerglide cars only).

Adjustment–*See "Chevrolet Powerglide" in Trans.Sect.*

GENERATOR

Delco-Remy. *12 Volt.* Application as follows:

Generator	Armature
1100326 (Std.)	1928952
1102041 (Pow. St.)	1929640
1102042 (Air Cond.)	1923535
1105947 (Taxi)	
1106981 (Taxi & City Pol.)	1929360

Maximum Charging Rate – *See Voltage Regulator.*

Performance Data

Generator	Amperes	Volts	RPM
1100326	25	14.0	2780
1102041, 42	30	14.0	2150
1105947	32	14.0	1850
1106981	40	13.0	1500

R tation – Counter-clockwise at commutator end.

Brush Spring Tension – 28 ozs.

Field Current – (1100326) 1.5-1.62 amps., (1102041, 42) 1.48-1.62 amps., (1105947) 1.54-1.67 amps., (1106981) 1.37-1.50 amps. All at 12.0 Volts.

B lt Adjustment: 5/16" belt deflection with light thumb pressure midway between generator and pump pulleys.

REGULATOR

Delco-Remy. *12 Volt.* Used with generators as follows:

Delco-Remy Regulator No.	Generator No.
1119000	1100326, 1102041
1119001	1102042, 1105947
1119004	1106981

NOTE – Regulator is "1119000 Series". Specifications b low are "Normal" settings.

Cutout Relay

Cuts in – 11.5-13.0 volts (1119004) 11.8 - 13.5 volts (Others). Hot.

Contact Gap – .020".

Air Gap – .020" (with contacts just closed).

Voltage Regulator

Setting – 13.6-14.3 volts (1119004), 13.8 - 14.8 volts (Others). Hot.

Air Gap – .063" (1119004), .075" (Others) with armature pressed down to point where contacts just touch.

Ch cking & Adjusting – *S "D lco-Remy 1119000 S r- i s" R gulator in El ctrical S ction.*

Curr nt R gulat r

S tting (1119000) – 23-27 amperes (hot).

S tting (1119001) – 27-33 amperes (hot).

S tting (1119004) – 37-42 amperes (hot).

Air Gap – .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting – *See "Delco-Remy 1119000 Series" Regulator in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Direction Signal: *See Electrical Section.*

Autronic Eye: *See Electrical Section.*

Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) and pull shaft and knob out. Remove switch retaining nut and switch assembly.

Stop Light Switch Location: Mechanical type mounted under instrument panel adjacent to brake pedal lever.

Adjustment–Adjust position of switch so that stop light goes on when brake pedal is depressed 5/8" from fully released position.

FUSES: All accessory fuses except as indicated below are contained on the accessory fuse and junction block located on upper inside of dash panel to left of steering column.

Overdrive–14 amps. Located in Lucite cartridge in overdrive relay feed line on engine side of dash to left of steering column.

Radio–In feed line adjacent to radio.

Back-up Light–On accessory fuse block.

► *LIGHTING SWITCH FUSE NOTE:* A 3 ampere fuse has been added to light switch to protect instrument panel rheostat from burning out.

LIGHTING CIRCUIT BREAKERS: Two 13-amp. circuit breakers located on main light switch, protect all lighting circuits.

HORNS: Delco-Remy 1999759 (Low Note), **1999760** (High Note). *12 Volt.*

Horn Relay: Delco-Remy 1116781 or 1116913.

Contacts Close – 5.0-9.5 volts.

Contact Gap – .027".

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Section.*

►*NOTE: The following repair data applies to all Pass. Car & Truck Engines.*

Bore	Stroke	Displacement	Rated HP
3 9/16"	3 15/16"	235.5 cu. ins.	30.4

Compression Ratio	Developed HP
8.0-1	140 at 4200 RPM

Compression & Vacuum Reading – *See TUNE-UP.*

ENGINE REMOVAL: *See Chevrolet Special Data.*

OIL PAN REMOVAL: Remove bolts attaching steering idler arm bracket to frame side rail and drop for clearance. Remove pan retaining bolts and remove pan.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Ch vrolet Special Data.*

ENGINE MOUNTINGS: *See Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS

Aluminum alloy, cam ground, tin plated, with pin offset 5/64".

Weight–1.18 lbs. (235" Engine), 1.36 lbs. (261" Engine).

Removal–Pistons and rods removed from above.

Clearance – .005-.0011" measured 1.29" from top of piston, .033-.041" at top land, Selective fit.

Replacement P i s t o n s: Furnished Std. & .001", .020" .030", .040" oversize. *STANDARD SIZE PISTON NOTE* –Std. pistons furnished in four sizes with size stamp and size rang e as follows: **S4**(3.5625" -3.5630"), **S5** (3.5630"-3.5635"), **S6**(3.5635"-3.5640"), **S7**(3.5640"-3.5645").

Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry. insert feeler and inverted piston into cylinder to a point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.

Installing Pistons: Install piston with notch in piston mark "Front" toward front of engine.

PISTON PINS

Locked in rod. No bushing used in piston.

Diameter – .8660-.8665". **L ngth** – 3.168-3.198".

Pin Fit in Piston – Thumb push fit (at room temp.). To check fit, with piston and pin at 60° F., apply light oil film to pin, insert pin vertically in one piston boss (one end of pin in either piston boss). Pin should hold own weight, but should install easily with thumb pressure.

Replacement Pins: Furnished Std. & .0015", .003", .005", oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.(1&2)..	.0930-.0935"	.010-.020"	.001-.003"
Oil (3)	.181-.188"	.015-.055" ①	.000-.008" ②

① – On rails. ② – 3-piece, chrome rails (2) and spacer.

► *RING INSTALLATION CAUTION: Install compression rings with side marked "TOP" upward.*

Replacement Rings: Furnished Std. & .005", .010", .020", .030", .040" oversize.

CONNECTING RODS

Length–6 13/16". **Weight**–31.76 ozs. (Exc. 261" Engine).

Crankpin Journal Diameter–2.311"-2.312", all engines.

Lower Bearing–Replaceable precision type.

Clearance–.0007-.0028". Not adjustable, replace bearings.

Sideplay–.005-.012" at lower end.

Replacement Bearings: Std. .001", .002", .010", .020" undersize.

Installing Rods: Numbers on rods and caps must be together and installed in same numbered cylinders with numbers and pin clamp bolt toward camshaft side.

CRANKSHAFT

►*CAUTION: No. 1 (front) and No. 2 (front intermediate) bearings similar in appearance but must not be int r-changed. No. 2 bearing marked by "T" in oil groov .*

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Journal Diameters—(1) 2.6835"—2.6845", (2) 2 7145"-2 7155", (3) 2 7455"—2.7465", (4) 2 7765"—2.7775" *NOTE*—Journal taper or out-of-round limits .001". Run-out Limits for Nos. 2 & 3 journals is .002".

Cl aranc —.0005" minimum,. 003" maximum (new bearings), Service limits .0005" min. .0045" maximum. See Adjustment below.

NOTE—Precision type bearings can be replaced singly

Bearings—Steel backed thin wall babbitt. *Boring or reaming not required*

B aring Adjustment: Solid shims. Remove shims until light drag secured when shaft turned by hand, then replace .002" shim on one side for clearance (if unequal number of shims used, place extra shim on same side of all bearings).

Replacement Bearings: Furnished Std. .002", .010", .020", .030" undersize.

Bearing Installation: Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrol t Special Data.*

Bearing Cap Installati n—No. 2 & No. 3 bearing caps marked for identification. Install No 2 cap with mark "FRONT" toward front of engine, No. 3 cap with mark "REAR" toward rear of engine

Crankshaft R ar Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chevrolet Special Data*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chevrolet Special Data*

End Thrust: Taken by No. 3 (rear intermediate) bearing. To check endplay, force crankshaft to rear, check clearance at rear of No. 3 bearing. Adjust by replacing bearing. **Endplay**—.0035"-.0095".

Vibration Dampener: *See "Vibration Dampener" in Chevrolet Special Data.*

CAMSHAFT

J urnal Diameters—(1) 2.1537-2.1547", (2) 2.0912-2.0922", (3) 2.0287-2.0297", (4) 1.9662-1.9672".

►*NOTE:* Journal out-of-round limits .001". Run-out limits .002".

Bearing Type—Steel backed babbitt lined bushing (staked in place). *NOTE*—Bearings must be line reamed

Se "Camshaft & Bearings" in Chevrolet Special Data

Clearanc —.0015-.0035".

End Thrust: Taken by thrust plate behind camshaft gear (gear position on shaft controls endplay).

Endplay Adjustment—*See "Timing Gears" in Chevrolet Special Data.*

Endplay—Free fit to .003" maximum.

Timing Gears: Fibre (Pass. Cars. Exc. Corvette), Aluminum (Corvette and Trucks). Steel crankshaft gear.

R placement Timing Gears & Installation: *See "Timing Gears" in Chevrolet Special Data.*

Timing G ar Backlash — .003-.005".

Camshaft S tting: Gears punch marked. Punch marks on both gears must line up directly opposite each other.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chevrolet Special Data*

VALVES

Tappet Clearanc : (Passenger Cars) — None in Service (hydraulic).

(Trucks) — (235") .006" Intake, .016" Exhaust. (261") .006" Intake, .020" Exhaust, HOT. **See** *Valve System" in Chevrolet Special Data.*

Valve	Head Diam.	Stem Diam.	Length
Intake	1 7/8"	.3410-.3417"	6.376-6.396"
Exhaust	1 1/2"	.3410-.3417"	4.913-4.933"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	30° ℄	.4004"	.0010-.0027"
Exhaust	45° ℄	.4004"	.0010-.0027"

℄ — Seat angle in block 1° additional.

►*VALVE GRINDING CAUTION:* Replacement valves are furnished with face angles of 30° and 45°. When seats are ground to new recommendations of 30° and 45°, valves must be ground to recommended angle of 29° (Intake) and 44° (Exhaust) whether valves are being re-used or new valves are being installed.

Valve Seat Width — 3/64"-1/16" (Intake), 1/16-3/32" (Exhaust).

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*

Valve Guides: Precision type. Pressed in head.

Valve Guide Installation—*See "Valve System" in Chevrolet Special Data.*

Valve Springs: Install springs with closed coil end down.

Spring Specifications

	Pressure	Length
Valve Closed	74-82 lbs.	1.858"
Valve Open	196-208 lbs.	1.462"

Free Length — 2.281"

►*VALVE SPRING HEIGHT CAUTION:* Check installed height of valve springs. If distance from spring seat in head to top of valve spring exceeds 1 55/64", install shim approximately 1/16" thick. At no time should spring be shimmed to give installed height of less than 1 51/64".

Valve Lifters (Pass. Cars) — Hydraulic type. *See "Valve System" in Chevrolet Special Data.*

Hydraulic Lifter Overhaul & Testing — *See "Valve System" in Chevrolet Special Data.*

Valve Lifters (Trucks): Mechanical type.

Rocker Arm Assembly: *See "Valve System" in Chevrolet Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

235" Engine

Intake Valves — Open 10°30' BTDC, Close 53°30'ALDC.

Exhaust Valves — Open 49° BLDC, Close 15° ATDC.

Valve Timing Check — *(CAUTION* - It will be necessary to replace the hydraulic valve lifter and pushrod operating No. 1 exhaust valve, with a conventional lifter and pushrod). Remove all tappet clearance from No. 1 exhaust valve Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer on right face of flywheel housing. Mount dial indicator on rocker arm shaft with stem of indicator contacting No 1 exhaust valve adjusting screw and set the dial indicator to .058". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset tappet to correct running clearance.

OILING SYSTEM

Crankcase Capacity: 5½ qts (dry), 5 qts (refill)

Normal Oil Pressure: 35 lbs. (approx.).

Pressure Regulator Valve—In oil pump body. Not adjustable

Oil Pressure Indicator—Light located at right side of instrument cluster, controlled by a pressure operated switch, Delco-Remy 1998149, located in main oil gallery on left side of engine. Switch closes at 4-6 lbs.

Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

Oil Pump Overhaul—*See "Oiling System" in Chevrolet Special Data.*

Oil Filter Element: AC P-115

Rocker Arm Oil Lead & Overflow Pipe: *See "Oiling System" in Chevrolet Special Data.*

Crankcase Ventilation (Standard): Air intake through valve rocker arm cover, outlet through pipe on right side of engine.

Servicing — On all models with air cleaner mounted on valve rocker arm cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

Crankcase Ventilation (Optional): Positive Type. Vacuum operated ventilator consisting of a vacuum pipe from oil filler pipe to ventilator valve in fitting on intake manifold. Valve is spring loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling to give proper air-fuel mixture.**

Servicing — Every 10,000 miles (or oftener if required) clean vacuum pipe, valve, and filler pipe thoroughly. Filler cap gasket must seal tightly.

►*VACUUM VALVE CAUTION:* If improper action of spring is suspected due to spring being distorted, or etched from corrosive action, the valve assembly should be replaced.

COOLING

►*RADIATOR REMOVAL CAUTION (POWERGLIDE CARS): Transmission oil cooler is part of radiator lower tank, and must be TIGHTLY SEALED after removal or during repairs to avoid entrance of foreign material.*

Water Capacity: 16 qts (17 qts with heater).

Pressure Valve: AC No. 850795. Radiator filler cap. 7 lb. type. **Replacement Valve** - AC No. RC-1.

Thermostat: Harrison. In cylinder head water outlet.

Standard — No. 3133595 (stamped 151) 151°. Can be used for alcohol anti-freeze.

Optional—No. 3123994 (stamped 160), 160°, No. 3133597 (stamped 170) 170°.

Temperature Gauge: AC Electric.

Dash Unit — AC No. 1513134.

Engine Unit — AC No. 1513130.

See "Temperature Gauges" in Miscellaneous Section.

Wat r Pump: Double outlet, packless type with sealed ball-bearing shaft.

See "Chevrolet" in Water Pump Section.

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Radiator Removal & Installation: *See "Radiator" in Chevrolet Special Data.*

CLUTCH

Own (Exc. Powerglide Cars)—Diaphragm spring type.

See "Chevrolet (Own)" in Clutch Section.

Clutch Disc—Chevrolet No 3836103 (Molded) 3836121 (Woven), 3836119(Hvy. Duty)

P dal Adjustment: Pedal free travel ¾-1' Loosen check nut at connecting link at clutch fork Turn adjusting nut to remove all lash at fork, **then back off two turns.** Tighten check nut.

Removal: Remove transmission (see Transmission Removal below). Remove throwout bearing from fork. Remove clutch fork tension spring from fork, disconnect clutch fork pushrod. Remove clutch fork by forcing it forward and toward center of vehicle. Install Clutch Pilot Tool J-5824, to support clutch assembly during removal. Loosen clutch attaching bolts one turn at a time until diaphragm spring is released. Remove Pilot Tool, then remove clutch assembly from car. *CAUTION*- When installing clutch, align "X" mark on clutch cover with "X" mark on flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh.

See "Chevrolet 3-Speed" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Drain Transmission and disconnect speedometer cable and shift rods. Disconnect propeller shaft at rear universal and slide shaft toward rear to disengage from transmission. Remove two top transmission to clutch housing screws and install Guide Pins J-1126. Remove the two lower screws and slide transmission back until clutch spines are disengaged. Remove transmission from below car.

OVERDRIVE

Warner Model AS1-R10H. Solenoid operated type with governor control and throttle operated kickdown. Lockout Switch not used.

See "Chevrolet Overdrive" in Transmission Section.

Ov rdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

R moval: Same as for Synchro-mesh transmission (above) after disconnecting control cable and wiring

POWERGLIDE TRANSMISSION

Torque converter and hydraulically operated planetary gear unit with manual controls.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS See "Chevrolet Powerglide" in Trans. Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubricati n· Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing an "AQ-ATF" marking on container.

Capacity—5 qts. (refill), 11 qts. (after overhaul).

►*POWERGLIDE DRAINING CAUTION—There is no drain plug on converter. Drain transmission case only, add 4½ qts. of fluid initially, recheck after idling engine.*

Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in "N" range when taking dipstick readings. Dipstick is located under hood on right side just opposite starter

►*OTHER DATA: See "Chevrolet Powerglide" in Transmission Section.*

UNIVERSALS

Own. Yoke & Spider (Trunnion) type.

►*CAUTION:* Rear bearing companion flange nut controls rear axle pinion bearing preload. Preload must be adjusted whenever companion flange nut loosened. *See "Chevrolet Pass. Car (Hotchkiss Drive) in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type, with Hotchkiss Drive. Pinion bearing adjustment is different than on previous models.

See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.

►*PINION BEARING PRELOAD CAUTION.* Rear universal joint companion flange controls rear axle pinion bearing preload. Bearing preload must be adjusted whenever companion flange nut is loosened

Car Model	Axle Ratio	Serial Prefix
Std Transmission	3 70-1	AA or BA
Overdrive	4 11-1	AC or BC
Powerglide	3.55-1	AB or BB

Backlash — .006-.009" (.008" preferred).

Removal: Raise car and support with jack stands under frame side rails. Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cables from clamps at frame. Disconnect hydraulic brake lines at rear axle housing. Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor

Axle Shaft Removal: Raise car and place jack stands under axle housing Remove tire, wheel and brake drum assembly. Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange). Attach axle Puller J-5748,with slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate. *NOTE*—If bearing retainer and parking brake strut interfere, raise strut slightly with screw driver to obtain clearance.

SHOCK ABSORBERS

D lc . Direct acting non-adjustable. Serviced by replacement.

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs and new spherical type joints connecting control arms and steering knuckles.

See "Chevrolet (Spherical Joint)" in Front Suspension Section.

Kingpin Inclination — 3½-4½°.

Caster — Pos. ½-1½°.

Camber — 0° to Pos. 1°.

►*CASTER & CAMBER ADJUSTMENT NOTE: Adjusted by shims located between upper control arm inner support shaft and support bracket.*

Toe-In — 1/16-1/8" (per wheel), 1/8-1/4" (total both wheels).

Toe-Out on Turns — With inside wheel at 20°, outside wheel should be 18° 10".

STEERING

Manual: Saginaw Ball Bearing W rm & Nut. Recirculating ball worm and nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Own (Linkag Typ). *S e "Chevrolet Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Butt n R moval: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic, without anchor pin adjustment Hand lever applies rear wheel service brakes

See "Chevrolet-Bendix Hydraulic" in Brake Section

►*REPLACEMENT BRAKE SHOE GRINDING CAUTION:* To compensate for lack of brake anchor adjustment, brake shoes are ground to a 057- 087" smaller diameter than the drum diameter Grinding shoes to the true drum diameter on bench grinders will cause heel and toe contact, resulting in erratic brake action *NOTE—If spindle mounted type grinder is used, the shoes should be ground to the true drum diameter*

Drums—Diameter 11"

Wheel Cylinder Diameter—Front 1 1/8", Rear 1".

	Brake Lining Width	Thickness
Front Whl	2"	.187- 194"
Rear Whl	1 3/4"	.187- 194"

Length Per Shoe—9.3125" (Primary), 11.6875" (Secondary).

Braking Power—55.9% (front wheels), 44 1% (rear wheels`.

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Cl aranc –Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.

Standard Mast r Cylind r: Located on engine side of firewall in line with brake pedal

Ch cking Fluid–Reservoir is integral with master cylinder. Maintain level in cylinder to lower edge of filler hole

R m val–Disconnect hydraulic line from end of cylinder and remove bolted brass fitting Remove four retaining nuts and lock washers holding master cylinder to firewall and remove cylinder.

Installati n–Reverse removal procedure making sure that push rod clevis is straddling the brake pedal Refill master cylinder and bleed all brake lines. Adjust push-rod-to-main cylinder clearance as follows· Make sure brake pedal returns to fully released position with no binding, and that pedal retracting spring has not lost its tension, then adjust brake pedal clevis to give a barely perceptible .end play between main cylinder piston and brake pushrod (1/16-3/16" pedal movement should be felt).

Power Brakes: Bendix Vacuum Type Power Unit replaces conventional master cylinder.
See "Bendix Power Unit" in Brake Section.

►*SLOW POWER BRAKE PEDAL RETURN CORRECTION: See "Brake Notes" in Chevrolet Special Data*

MISC. MECHANICAL

Windshield Wipers: Cable operated type (Std.). Electric type (Optional)
See "Windshield Wipers" in Miscellaneous Section.

Window Regulators: Electric type with reversible motor operating each door window assembly.
See "Power Window Regulators" in Miscellaneous Section.

Power Top Control: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjuster: Reversible electric motor controls horizontal front seat movement. *See "Power Seat Adjusters" in Miscellaneous Section.*

Air Conditioning: *See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model Designation

Series	Serial Prefix	Model
1500	VA	ONE-FIFTY
2100	VB	TWO-TEN
2400	VC	BEL-AIR
2934	VE	CORVETTE
1508	VD	SEDAN DELIVERY

SERIAL NUMBER: Stamped on plate on left front door hinge pillar post.

Starting Serial Number–001001 (at each plant) for all models except Corvette.

►*SERIAL NUMBER NOTE: Serial Number (example VB56F001025) includes following identification information in sequence.*

Series ①	Year	Assy. Plant ②	Serial No.
VB	56	F	001025

①–See Model Designation above.

②–See Assembly Plant Designation below.

Assembly Plant Designation

A-Atlanta	J–Janesville	O–Oakland
B–Baltimore	K–Kansas City	S–St. Louis
F–Flint	L–Los Angeles	T–Tarrytown
	N–Norwood	

ENGINE NUMBER: Stamped on pad at front right hand side of cylinder block behind water pump.

Starting Engine Number–001001 (at each plant). Suffix letters and numerals indicate plant at which engine built ("F" for Flint, "T" for Tonawanda), Model Year (56) and Model Type Designation (see below).

Model Type Designation

Engine	Suffix
V8 with 3-Speed Trans.	G
V8 with Overdrive	GC
V8 with Air Cond. & Overdrive	GQ
V8 with Powerpack & Overdrive	GE
V8 with Air Cond. & 3-Spd. Trans.	GF
V8 with Hvy. Duty Clutch	GJ
V8 with Air Cond. & H.D. Clutch	GK
V8 with Power Pack	GL
V8 with Air Cond. & Power Pack	GM
V8 with Power Pack, O.D. & Air Cond.	GN
V8 with Powerglide	F
V8 with Powerglide & Power Pack	FB
V8 with Powerglide & Air Cond.	FC
V8 with Powerglide, Air Cond , Pow.Pack	FD
V8 (Corvette) with 3-Spd. Trans.	GR
V8 (Corvette) with Powerglide	FG

TUNE-UP

COMPRESSION PRESSURE: 150 lbs. (162 & 170 HP Engs.), 160 lbs. (Others), at cranking speed. A variation of 20 lbs. between cylinders indicates need for cylinder reconditioning.

VACUUM READING: Steady 17-21" at idling speed.

VALVE TAPPET CLEARANCE: (Corvette) – .008" Intake, .018" Exhaust, with engine HOT and idling. (Others) – None in service - hydraulic.

MANIFOLD HEAT CONTROL: V8 (Std.) – Single exhaust with crossover pipe. Heat control valve with counterweight and thermostatic coil spring located between right manifold and exhaust pipe. Hook coil spring under stop stud. Install counterweight with square projection up and upper end of spring stop resting on top of stop stud.

V8 (Corvette Std., Others Optl.) – Dual exhaust system. Coil spring and counterweight same as other V8 (Std.) engines.

►*DUAL EXHAUST NOTE:* With valve closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders – RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7

SPARK PLUG GAP: .035".

Spark Plugs – AC No. 44-5 (Std. V8), AC No. C-43 (Corvette). 14 mm. Torque to 20-25 ft. lbs.

►*SPARK PLUG INSTALLATION CAUTION:* Spark plug flash-over on 1956 engines may be caused if 1955 plugs are used. Insulators on 1956 plugs have four annular ribs that help prevent flash-over, and larger inside diameter on spark plug boot. If 1955 plugs installed, flash-over or misfire will be prevalent due to loose fit of boot.

COIL: Delco-Remy 1115087 (Std.), 1115091 (Corvette). *12 Volt.*

Ignition Current – 1.8 amps. idling, 4 amps. stopped.

Resistor – Delco-Remy 1931614. 1.40-1.62 ohms. On firewall.

►*COIL RESISTOR NOTE:* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when key turned to "Start Engine" position).

DISTRIBUTOR: Delco-Remy. *12 Volt.* Single breaker, or double breaker types with 8 lobe cam. Used as follows:

Application	Delco-Remy Distr. No.
V8 (Std.), 2-Bbl.Carb.(Early)	1110866, 1110869
V8 (Std.), 2-Bbl.Carb.(Later)	1110847
V8 (Std.), 4-Bbl.Carb.(Early)	1110866, 1110869
V8 (Std.), 4-Bbl.Carb.(Later)	1110878
V8 (Corvette), 4-Bbl.Carb.(Early)	1110872
V8 (Corvette), 4-Bbl.Carb.(Later)	1110879
V8 & Corvette, TWO 4-Bbl.Carb.(Early)	1110872
V8 & Corvette, TWO 4-Bbl.Carbs.(Later)	1110879

Condenser – Delco-Remy 1869704. **Capacity** .18- 23 mfd.

Contact Point Set - Delco-Remy 1924499 (Distributor 1110847, 66, 69, 78), Delco-Remy 1918148 (Distributor 1110872 & 79 - Two used).

Breaker Gap - .019" (New Points - Distr. 1110847, 66, 69, 78), .015" (New Points - Distr. 1110872, 79), .016" (Used Points).

Cam Angle–26-33° with .016" gap (Distributor 1110847, 66, 69, 78), 34° plus or minus 1° for both sets of points operating together (Distributor 1110872, 79).

►*CAM ANGLE NOTE (Double Breaker Distributors):* Adjust each set of points separately for cam angle of 29° plus or minus 1° (block other set of points open with insulator at least .025" thick). Cam angle for both sets operating together should then be 34° plus or minus 1° with breaker gap of .014-.018".

►*BREAKER GAP CAUTION: Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension – 19-23 ozs.

Rotation – Clockwise viewed from above.

Automatic Advance – 1110847

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	400	0-4	800
8-10	1150	16-20	2300
15-17	1800	30-34	3600

Automatic Advance – 1110866, 69, 72

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	350	0-4	700
7.5-9.5	750	15-19	1500
10-12	1200	20-24	2400
13-15	1750	26-30	3500

Automatic Advance - 1110878, 79

Degrees Distr.	RPM	Degrees Eng.	RPM
.5-2.5	400	1-5	800
6-8	750	12-16	1500
9.5-11.5	1300	19-23	2600
13-15	1850	26-30	3700

Vacuum Spark Control: Delco-R my 1116100 (Distributor 1110847 & 66), **1116104** (Distributor 1110869 & 78). *NOTE* - No vacuum control used on Distributor 1110872 & 79.

Plunger Travel – 15/64-1/2" (1116100), 15/64-17/64" (1116104).

Vacuum Advance – 1116100

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
11.75	23.5	12-20.5

Vacuum Advance – 1116104

Distr. Degress	Eng. Degrees	Vacuum (" of HG)
Start	0	7-9
11.75	23.5	14-15.5

IGNITION TIMING

Setting – Set timing to setting indicated below. *Manufacturer recommends setting timing at 1000 RPM and with distributor vacuum disconnected.*

Distributor No.	Setting (At Idl)	Setting (at 1000 RPM, Vac. Discon.)
1110847	4° BTDC	8° BTDC
1110866	4° BTDC	12° BTDC
1110869	4° BTDC	12° BTDC
1110872 (1 Carb.)	4° BTDC	12° BTDC
1110872(2 Carbs.)	① 8° BTDC	② 16° BTDC
1110878	4° BTDC	10° BTDC
1110879(1 Carb.)	4° BTDC	10° BTDC
1110879 (2 Carbs.)	③ 8° BTDC	② 14° BTDC

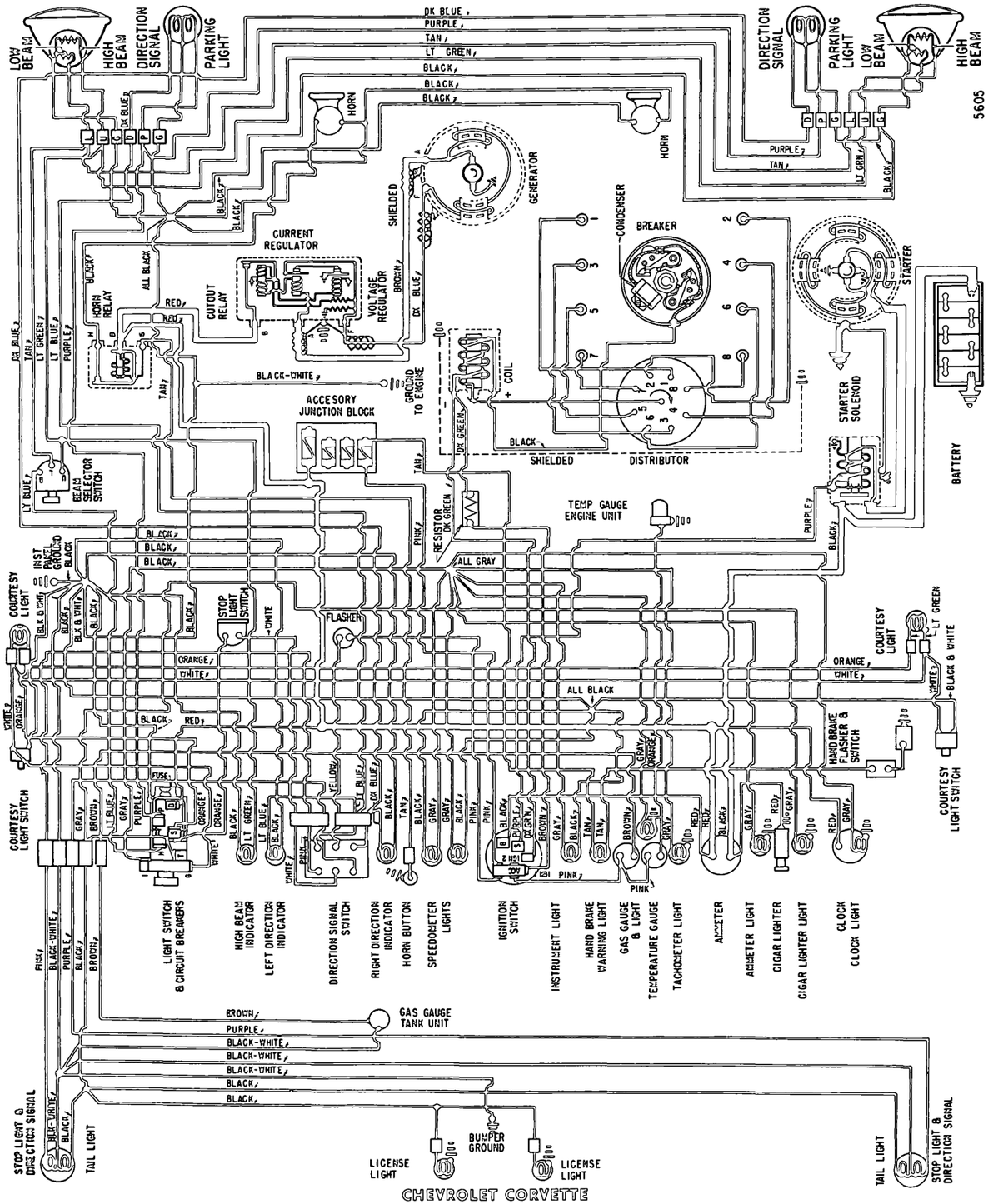
① – Do not exceed 10°.
② – Do not exceed 18°.
③ – Do not exceed 12°.

Timing Mark – Mark on vibration damper and an indicator on left side of valve chain cover. Indicator is marked with five lines on each side of "O" mark. Each line represents 2°.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: Rochester 2GC Dual Carburetor is Std. on all models (Exc. Corvette).*

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CHEVROLET CORVETTE

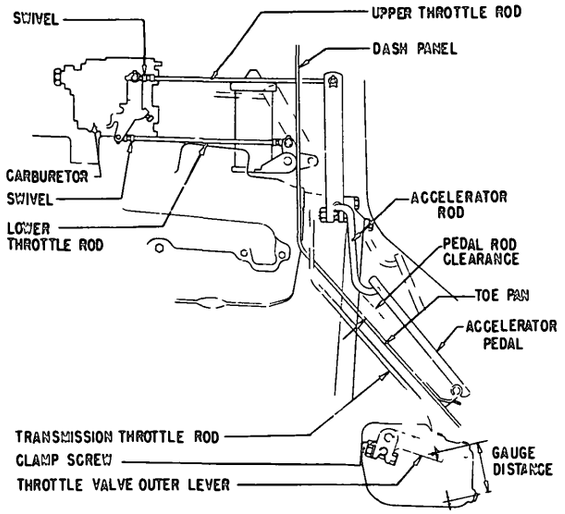
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Rochester 4GC and Carter WCFB 4-Barrel Carburetors used on a mixed basis on models (Exc. Corvette) with Power Package. A single or TWO Carter WCFB 4-Barrel Carburetors used on Corvette.

▷ *FAST IDLE CONTROL CAUTION (AIR CONDITIONED CARS):* Fast idle control is set to provide 900 RPM engine speed when Fast Idle Control Knob on dash is pulled out. Make sure knob is pushed in when making normal fast idle adjustments and that fast idle control linkage does not interfere with normal operations of the carburetor linkage when fast idle is not in operation.

THROTTLE LINKAGE ADJUSTMENT (All Models): *POWERGLIDE NOTE – Adjust transmission throttle linkage BEFORE adjusting carburetor throttle linkage (see below).*

Carburetor Throttle Linkage (All Models): With accelerator pedal depressed so that clearance between lowest point on accelerator link and toe pan (floor mat removed) is exactly ¾" (2-Bbl. Carbs.), 1" (4-Bbl. Carb. - except Corvette), 3/8" (Corvette - single and double carbs.); adjust upper throttle rod swivel so that it enters carburetor throttle lever freely (rear carburetor on Corvette double carburetor installation), connect rod.



POWERGLIDE THROTTLE LINKAGE

Transmission Throttle Control Linkage Adjustment (Powerglide Cars): With selector lever in "D" (Drive) range and with hand brake applied, adjust engine idle to correct speed (engine and transmission at normal operating temperature). Turn engine off and check choke valve to make sure it is fully open and that throttle stop screw is against low step of fast idle cam. Disconnect transmission throttle rod at transmission. Remove extreme lower rear bolt in side cover on transmission. Rotate transmission throttle valve outer lever assembly counter-clockwise to the open

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throttle position (against stop). Hold in this position and with throttle valve positioning gauge J-5906 set to 2 7/8", measure the distance between the bolt hole inside cover and hole in throttle lever. If pin or gauge enters hole, adjustment of lever is correct. If necessary to adjust, loosen lever to clamp attaching screw and adjust outer lever to obtain correct adjustment. Install bolt in side cover and attach throttle rod to transmission lever. Force transmission throttle control rod forward against stop in transmission (open throttle) and adjust lower rod on carburetor throttle lever for free entry of swivel pin into carburetor throttle lever, with carburetor throttle valve in wide open position. Adjust upper throttle rod as outlined in Carburetor Throttle Linkage above

ROCHESTER 2GC

Model	Rochester No.
Std. Transmission	7008387
Powerglide	7008388

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting—After idle speed set to correct specifications (see Idle Speed below), turn both idle mixture screws for smooth idle with highest vacuum reading and RPM.

Idle Speed—450-500 RPM (Synchro mesh), 400-450 RPM (Powerglide—with Selector Lever in "D" range).

Float Level—1¼" (Gauge BT-129). With air-horn inverted and gasket in place, position the float level gauge over the float so it rests against the pump side of power piston shaft, with the outer gauge leg in line with the center of the float. Bend float arm to adjust.

Float Drop—Bend float tang as required to obtain a distance of 1 29/32" from the gasket surface to bottom of the float, with air-horn upright and float hanging free. Use scale or scribed mark on float and pump gauge.

Automatic Choke Setting: Centered at index.

►*OTHER DATA: See "Rochester 2GC Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 4-5¼ lbs.

ROCHESTER 4GC 4-BARREL
No. 7008737

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting—Adjust idle mixture screws for highest steady vacuum.

Idle Speed—450-500 RPM (Std. & O.D.), 400-425 RPM (Powerglide - with Selector Lever in "D" range).

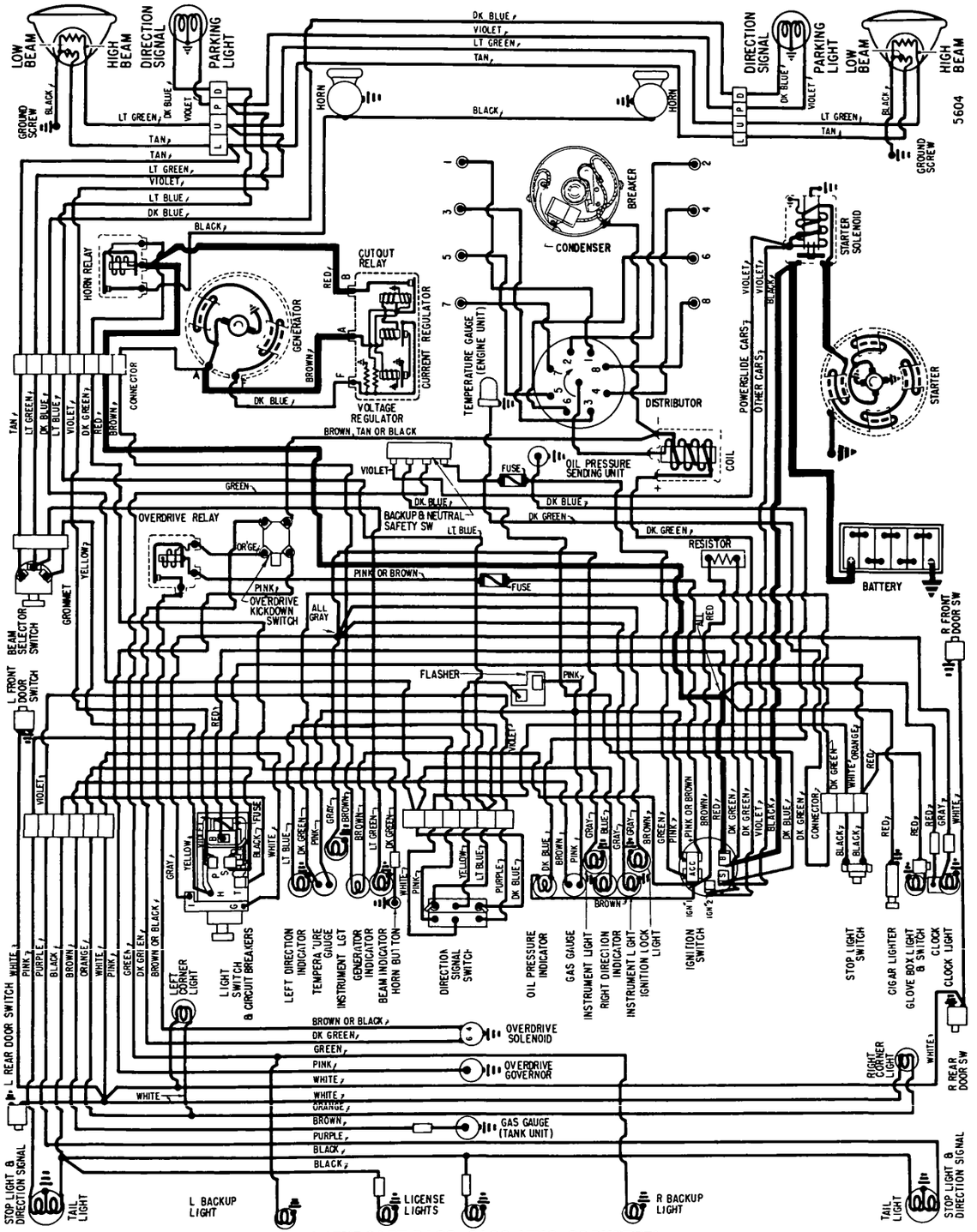
►*OTHER DATA: See "Rochester 4GC" Carburetor in Carburetion Section.*

Fuel Pump Pressure: 4-5¼ lbs.

CARTER WCFB 4-BARREL
No. 2366S, SA (Std. V8 Power Pkg. & Corvette with Single Carb.)

►*CHOKE SETTING PRODUCTION CHANGE & STALLING CORRECTION: Adjust automatic choke to 1 point rich, superseding previous setting of "center d" setting.*

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CHEVROLET PASS. CARS (EXC. CORVETTE)

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►*MANIFOLD FUEL DISTRIBUTION· Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*
Idle Setting–¼-1¼ turns open Adjust both screws alike Turn screws out for richer mixture
Idl Sp d–(Exc. C rv tte) 450-500 RPM (S.M. & O.D.) 400-450 RPM (Powerglide – With Selector Lever in "D" range).
Idl Sp d–(C rv tt) 600 RPM. *NOTE* - On Powerglide Cars with Selector Lever in "D" Range and brake set.
►*OTHER DATA: S "Carter WCFB" Carburetors in Carbur tion S ction.*
Fu l Pump Pr ssur : 4-5¼ lbs.

CARTER WCFB 4-BARREL
N . 2419S (Fr nt), No. 2362S (Rear)
(C rv tt Eng. with TWO Carbs.)

►*CARBURETOR NOTE:* These carburetors have special "Air Mixture Screws" (idle air by-pass adjustment) which control idle speed. These screws must be adjusted in conjunction with regular idle mixture adjustment screws.
►*CARBURETOR INSTALLATION NOTE:* Front and rear carburetors operate together at idle speed and for high speed or full power operation. Front carburetor throttle begins to open when rear carburetor throttle valves are approximately at half-throttle position.
Idle Mixtur & Idl Sp d Setting – Special procedure required to insure correct mixture and speed (idle air) screw settings. *See "Chevrolet Corvette (Two Carter Carbs.)" in Carbur tion S ction.*
Thr ttl C ntrol Linkag Adjustment (Powerglide Cars): *See CARBURETOR above.*
►*OTHER DATA: See "Chevrolet Corvette (Two Carter Carbs.)" in Carbur ti n Section.*
Fu l Pump Pr ssur : 4-5¼ lbs.

CARB. EQUIPMENT

Fu l Pump: AC Diaphragm type.
Replac m nt Pump – AC No. 4150 (Fuel only), No. 4141 or 708 (Fuel & Vacuum). *NOTE* - No. 4150 only used on Corvette.
Pr ssur – 4-5¼ lbs.
Se "Fuel Pumps" in Carburetion Section.
Gasolin Gaug : AC Electric.

Dash Unit – (Corvette) AC 1518244, (Others) 1518473.
Tank Unit – (Corvette) AC 1617911, (Others) 1518158.
S e "Fuel Gaug s" in Carburetion Section.

BATTERY

D lc 2SMR53W (Std. V8), 25M53W (Corvette). *12 Volt,* 9 plate, 53 ampere hour capacity (20 hr. rate).
Batt ry Gr und – Negative.
Engin Gr und – Engine to cowl at rear head bolt.

STARTER

D lc -R my. *12 Volt.* Application as follows

Car M d l	Starter No.
V8, Std. Trans.	1107645
V8, Powerglide	1107649
Corvette	1107627

Armatur (All) – Delco-Remy No. 1926626.
Driv – Overrunning clutch (solenoid pinion shift).
R tati n – Counter-clockwise at commutator end.
Brush Spring Tensi n – 35 ozs. minimum.

P rf rmanc Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75 max.
10.5 ft. lbs. min.	Lock	5.8	435 max.

Starting Switch: Delco-Remy Solenoid Switch 1119767 (Corvette), 1119789 (Others) mounted on starter and controlled by Ignition & Starter Switch 1116512. Turn key full RIGHT against spring tension to start. *See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Section.*
Neutral Safety & Back-up Light Switch: Delco-Remy No.1998112 (Corvette), 1998106 (Others).
Adjustment'– *See "Chevrolet Powerglide" in Transmission Section.*

GENERATOR

Delco-Remy. *12 Volt.* Application as follows

Application	Generator	Armature
V8 Std.	1100321	1928952
V8 Pwr. Strg.	1102041	1929640
V8 Air Cond.	1102042	1923535
V8 Spec. (Cab)	1105947	
V8 Spec. (Cab & Pol.)	1106981	1929360
Corvette	1102043	1929640

Performance Data

Generator	Amperes ①	Volts	RPM
1100321	25	14.0	2780
1102041, 42, 43	30	14.0	2150
1105947	32	14.0	1850
1106981	40	13.0	1500

① – Not maximum output. See Regulator data.

Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 28 ozs.
Field Current – (1100321) 1.5-1.62 amps., (1102041, 42, 43) 1.48-1.62 amps., (1105947) 1.54-1.67 amps., (1106981) 1.37-1.50 amps., all at 12.0 volts.
Belt Adjustment: 13/16" belt deflection midway between fan and generator pulleys with light pressure applied.

REGULATOR

Delco-Remy. *12 Volt.* Application as follows:

Regulator No.	Generator
1119000	1100321
1119001	1102041, 42, 43, 1105947
1119004	1106981

NOTE – Regulators are "1119000 Series Regulators". Specifications below are for "Normal" Settings.

Cutout Relay

Cuts In – 11.8-13.5 volts Hot (1119000, 1), 11.5-13.0 volts Hot (1119004).
Contact Gap – .020".
Air Gap – .020" (with contacts just closed).

Voltage Regulator

Setting'– 1119000, 1) 13.8-14.8 volts Hot, (1119004) 13.6-14.3 volts Hot.
Air Gap – .075" (1119000, 1), .063" (1119004) with armature pressed down to point where contacts just touch.
Ch cking & Adjusting – *See "D lco-R my 1119000 Series R gulator" in El ctrical Section.*

Curr nt R gulat r

Setting – (1119000) 23-27 amperes Hot, (1119001) 27-33 amperes Hot, (1119004) 37-42 amperes Hot.
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting – *See "Delco-Remy 1119000 Series Regulator" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signals: *See Electrical Section.*
Autronic Eye: *See Electrical Section.*
Direction Signals: *See Electrical Section*
Lighting Switch Removal: Disconnect all wires from switch (make sure that all wires are tagged for identification). Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) and pull shaft and knob out. Remove switch retaining nut and switch assembly.
Stop Light Switch Location: Mechanical type mounted under instrument panel adjacent to brake pedal lever.
Adjustment–Adjust position of switch so that stop light goes out when brake pedal depressed 5/8" from fully released position.

FUSES: All accessory fuses except as indicated below are contained on the accessory fuse and junction block located on upper inside of dash panel to left of steering column.
Overdrive–14 amps Located in Lucite cartridge in overdrive relay feed wire on engine side of dash panel to left of steering column
Radio–In feed wire adjacent to radio.
Back-up Light –On accessory fuse block.
►*LIGHTING SWITCH FUSE NOTE:* A 3 ampere fuse has been added to light switch to protect instrument panel rheostat from burning out.
LIGHTING CIRCUIT BREAKERS: Two 13-amp. circuit breakers located on main light switch, protect all lighting circuits.
HORNS: Delco-Remy 1999759 (Low Note), **1999760** (High Note). *12 Volt.*
Horn Relay: Delco-Remy No. 1116913, or 1116781.
Contacts Close – 5.0-9.5 volts.
Contact Gap – .027".

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Us extreme care when disconnecting any part of air conditioning equipment or lines for access to engin . See "Air Conditioning Service Cautions" in Misc. S ct.*
►*PASSENGER CAR ENGINE NOTE: Hydraulic valv lifters are used on the Standard V8 Engine and solid Type lifters are used on the Corvette engine.*
ENGINE SPECIFICATIONS: V8, Valve-in-Head.

Bore	Stroke	Displacement	Rated HP
3¾"	3"	265 cu. ins.	45

Engine	Compr. Ratio	Developed HP
V8 Std.	8.0-1	162 at 4400 RPM
V8 Powerglide	8.0-1	170 at 4400 RPM
V8 Power Package	9.25-1	205 at 4600 RPM
V8 Corvette	9.25-1	225 at 5200 RPM

Compr ssion & Vacuum R ading – *See TUNE-UP.*

ENGINE REMOVAL: *Se "Engine" in Ch vrolet Sp cial Data*

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OIL PAN REMOVAL: Disconnect steering idler arm bracket from frame side rail and drop for clearance.

ENGINE MOUNTINGS: *See "Engine Mountings" in Chevrolet Special Data.*

CYLINDER HEAD & MANIFOLDS: *See Chevrolet Special Data.*

TIGHTENING TORQUES: *See Chevrolet Special Data.*

PISTONS

Cast aluminum, slipper skirt, with piston pin offset 5/64".

Weight—18.77 ozs.

Removal—Pistons and rods removed from above.

Replacement Pistons: Furnished Std. Size & .020", .030", .040" oversize.

►*STANDARD SIZE PISTON NOTE:* Standard pistons furnished in four sizes with size code stamped on piston. The sizes and codes are: **S4** (3.7500-3.7505"), **S5** (3.7505-3.7510"), **S6** (3.7510-3.7515"), **S7** (3.7515-3.7520").

Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to a point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.

Installing Pistons: Install pistons with cast depression in head and "F" mark cast in side of piston toward front of block. *See Rod Installation.*

PISTON PINS

Piston pin is pressed into connecting rod and retainers are not used.

Diameters—.9270-.9273". **Length**—3.1200".

Pin Fit in Piston—.00015-.00025". Pins should be capable of supporting own weight in either pin boss at 60°F.

Pin Fit in Connecting Rod—*NOTE—Special tools required for removal & installation. See "Piston Pins" in Chevrolet Special Data.*

Replacement Pins: Furnished only in assembly with piston. Oversizes not available.

PISTON RINGS

Upper compression ring is chrome plated and oil control ring is 3-piece type (2 chrome plated rails and spacer).

Ring	Width	End Gap	Side Clearance
Compr. No. 1	.077-.078"	.008-.016"	.001-.003"
Compr. No. 2	.077-.078"	.009-.018"	.001-.003"
Oil	.181-.188"	.015-.055" ①	.000-.008"

① — On rails.

►*RING INSTALLATION CAUTION:* Install compression rings with side marked "TOP" upward.

Replacement Rings: Furnished Std. & .020", .030", .040" Oversize.

CONNECTING RODS

Length (Center to Center) — 5.7000". **Weight** — 19.02 ozs.

Crankpin Journal Diameter—1.999-2.000".

Lower Bearing—Replaceable precision type.

Clearance—.001-.003" (new), .001-.004" (used).

Side play—.008-.014" (both rods).

Replacement Bearings: Furnished Standard size, .001", .002", .010", .020" Undersize.

Installing Rods: Install rod in piston so that flange or heavy side of rod at bearing end will be toward front of piston (cast depression in head of piston and "F" mark on piston strut) on Nos. 1, 3, 5, and 7 pistons, and rod flange to rear of piston on Nos. 2, 4, 6, and 8 pistons. Install rod and piston assembly in cylinder with cast depression in piston head and "F" mark on strut toward front of cylinder block.

CRANKSHAFT

Journal Diameter—2.2978-2.2988".

►*NOTE: Journal runout at intermediate bearing is .002" maximum.*

Clearance—.001-.003" (new bearings), .001-.004" (used bearings).

End Thrust—Taken at No. 5 (rear) main bearing.

Endplay—.002-.006". Check at front end of rear main bearing.

Replacement Bearings: Furnished Standard size, .001", .002", .010", .020" Undersize.

Bearing Installation: Not necessary to remove crankshaft or engine from car. *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chevrolet Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chevrolet Special Data.*

Vibration Dampener: *See "Vibration Dampener" in Chevrolet Special Data.*

CAMSHAFT

►*CAUTION: Camshafts differ on engines as follows:*

Model	Chevrolet No.
Corvette (All)	3711354
Others (Synchro-mesh)	① 3704212
Others (Powerglide)	② 3728779

① — Cast 3703906. ② — Cast 3728284.

Journal Diameters—1.8682-1.8692" (all journals).

Clearance—.0015-.0035".

Bearings—Steel backed babbitt lined bushing.

Replacement Bearings: "Precision" type (do not require reaming). Use Tool Set J-6098 to remove and install bearings.

Camshaft Setting: Both sprockets marked '0'. Install chain with sprocket marks adjacent and in line with straight edge across shaft centers.

►*CAUTION: When installing sprocket on camshaft, line up dowel holes in sprocket and shaft. DO NOT DRIVE SPROCKET ON SHAFT, use three mounting bolts and DRAW sprocket into place.*

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Chevrolet Special Data.*

Timing Chain: Link Belt. **Width** — .875". **Pitch** — .500. **Length** — 46 links.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chevrolet Special Data.*

VALVES

Tappet Clearance: (Corvette) — .008" Intake, .018" Exhaust, with engine hot and idling. (Others) — None in service - hydraulic.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.720"	.3415-.3422"	4.902-4.922"
Exhaust	1½"	.3410-.3417"	4.913-4.933"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45° ③	①	.001-.0027"
Exhaust	45° ③	②	.0015-.0032"

① — .3336" (Std. V8 S.M.), .3732" (Std. V8 Powerglide) .40432" (Corvette).

② — .3336" (Std. V8 S.M.), .3732" (Std. V8 Powerglide), .41355" (Corvette).

③ — Seat angle in head is 46°.

►*VALVE GRINDING CAUTION:* Replacement valves furnished with face angle of 45°. When seats are ground to new recommendation of 45°, valves must be ground to recommended angle of 44° (Intake & Exhaust), whether valves being re-used or new valves installed.

Valve Seat Width—3/64"-1/16" (Intake), 1/16"-3/32" (Exhaust).

Valve Stem Oil Seal Installation: *See "Valve System" in Chevrolet Special Data.*

►*VALVE SEAL PRODUCTION CHANGE:* New "shedders" installed over upper end of valve springs used on later cars and should be installed on all engines. These shedders replace previous type shield within valve springs. *See "Valve System" in Chevrolet Special Data.*

Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance is excessive. Valves are furnished with .003", .015", .030" oversize stems. Use Reamer Set J-5830.

Valve Springs: Install springs with closed coil end of spring toward cylinder head. On intake valve springs a baffle is used inside spring.

Spring Specifications (Std. V8)

	Pressure	Length
Valve Closed	76-84 lbs.	1.696"
Valve Open	155-165 lbs.	1.366"

Spring Specifications (Corvette)

	Pressure	Length
Valve Closed	65-72 lbs.	1.696"
Valve Open	151-161 lbs.	1.306"

►*VALVE SPRING INSTALLED HEIGHT CAUTION:* Check installed height of valve spring after grinding valves by measuring the distance from spring seat in cylinder head to top of valve spring. If this dimension exceeds 1 45/64", install valve spring seat shim furnished 1/32" & 1/16" thick. Installed height of spring must be 1 11/16 - 1 45/64".

Valve Lifters (Std. V8): Hydraulic type. *See "Valve System" in Chevrolet Special Data.*

Valve Lifters (Corvette): Plain barrel type. Remove in same manner as for hydraulic valve lifters. *See "Valve System" in Chevrolet Special Data.*

Rocker Arms: Mounted individually on studs pressed into cylinder head.

Rocker Arm Stud Replacement — *See "Valve System" in Chevrolet Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Conventional Std. V8 Valve Timing

Intake Valves — Open 18° BTDC, Close 54° ALDC.

Exhaust Valves — Open 52° BLDC, Close 20° ATDC.

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Powerglide Std. V8 Valve Timing

Intake Valves – Open 26°30' BTDC, Close 63°30' ALDC.
Exhaust Valves – Open 66°30' BLDC, Close 23°30' ATDC

Corvette Valve Timing

Intake Valves – Open 21°30' BTDC, Close 62°30' ALDC.
Exhaust Valves – Open 62°30' BLDC, Close 23°30' ATDC.

OILING SYSTEM

Crankcase Capacity: 4 qts. (refill), 5 qts. (dry).
Normal Oil Pressure: 30 lbs. at 1170-1200 RPM.
Pressure Regulator Valve – In oil pump. Not adjustable.
Oil Pressure Indicator (Std. V8) – Light on right side of instrument cluster, controlled by pressure switch, Delco-Remy No. 1998149, located on left side of engine. Switch operates at 4-6 lbs.
Oil Pressure Indicator (Corvette) – AC No. 1508063. Not electric.
Oil Filter: Full flow type. Replace element at 6000 mile intervals. Use new seal, tighten center bolt to 20-25 ft. lbs.
Replacement Filter Element – AC No. PF-131.
Oil Pump: Gear type Located in crankcase, driven by distributor gear
Oil Pump Overhaul–*See "Oiling System" in Chevrolet Special Data.*
Crankcase Ventilation–Air intake through valve rocker arm cover, outlet through pipe on right side of engine

COOLING

►*RADIATOR REMOVAL CAUTION (POWERGLIDE CARS) Transmission oil cooler is part of radiator lower tank, and must be TIGHTLY SEALED after removal or during repairs to avoid entrance of foreign material.*

Water Capacity: 16 qts. (17 qts. with heater).
Pressure Valve: AC Type RC-1, Chevrolet No. 850795. 7 lb. type radiator filler cap.
Thermostat: Harrison. In water outlet on intake manifold.
(Std.) No. 3133595 (stamped 151), 151°.
(Optl.) No. 3123994 (stamped 160), 160°, or No. 3133597 (stamped 170), 170°.
Temperature Gauge (Std. V8): AC. Electric type.
Dash Unit – AC No. 1513134.
Engine Unit – AC No. 1513130.
See "Temperature Gauges" in Miscellaneous Section.
Temperature Gauge (Corvette): AC No. 1513198. Not electric.
Water Pump: Packless type with ball bearing shaft.
See "Chevrolet" in Water Pump Section.
Radiator Removal & Installation: *See "Cooling System" in Chevrolet Special Data.*

CLUTCH

Own (Diaphragm Spring Type) or Borg & Beck. Single plate.
See "Chevrolet (Own)" or "Borg & Beck" Clutches in Clutch Section.

Borg & Beck	Model	Assy. No.	Disc No.
V8 Std. (Pow. Pkg.)	10A9	361404	382527
V8 O.D. (Pow. Pkg.)	10A9	361404	382526
Corvette	10.5A9	361402	382528

Own (Diaphragm Spring Typ)	Cover No.	Disc No.
Synchro-mesh (10")	3836723	3836708
H.D. & O.D. (11")	3836719	3836906

►*STD. V8 OVERDRIVE DRIVEN PLATE REPLACEMENT NOTE (BORG & BECK CLUTCH):* New Clutch Driven Plate Assy., Part No. 3741089, has been released to replace Clutch Driven Plate Assembly, Part No. 3729780, to eliminate drive line rattle. New assembly has six inner damper springs instead of the four on old assembly.

Pedal Adjustment: Pedal Free Travel ¾-1". Loosen check nut at connecting link at clutch fork. Turn adjusting nut to remove all lash at fork, **then back off two turns.** Tighten check nut.

Removal (Borg & Beck): Remove transmission (see Transmission Removal below). Remove clutch housing pan. Pull out clutch release bearing and sleeve. Mark flywheel, cover, and one pressure plate lug with punch to insure proper reassembly. Loosen holding screws a turn or two at a time to avoid bending rim of cover, until cover is free. Remove clutch assembly and clutch disc assembly from clutch housing. When removing driven disc be sure to mark flywheel side.

Removal (Diaphragm Spring Type): Remove transmission (see Transmission Removal below). Remove clutch throwout bearing from fork, then clutch fork tension spring from fork. Remove clutch fork by forcing it forward and toward center of vehicle. Install Clutch Pilot Tool J-5824 to support clutch assembly. Loosen clutch attaching bolts one turn at a time until diaphragm spring is released. Remove tool, then clutch assembly from vehicle. *NOTE* - When installing clutch, align "X" marks on cover and flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh
See "Chevrolet 3-Speed" in Transmission Section.
Transmission Control: *See "Transmission Controls" in in Transmission Section*
Removal: Drain transmission and disconnect speedometer cable and shift rods Disconnect propeller shaft at rear universal and slide shaft toward rear to disengage from transmission Remove two top transmission to clutch housing screws and install Guide Pins J-1126 Remove the two lower screws and slide transmission back until clutch splines disengage Remove transmission from below car

OVERDRIVE

Warner Model AS1-R10H. Solenoid operated type with with governor control and throttle operated kickdown Lockout Switch not used
See "Chevrolet Overdrive" in Transmission Section.
Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring

POWERGLIDE TRANSMISSION

Powerglide Transmission–Torque converter and hydraulically operated planetary gear unit with manual controls

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Chevrolet Powerglide" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING See "Chevrolet Powerglide" in Transmission Section.*

Lubrication–Check fluid level in transmission every 1000 miles Oil should be added only when level gets down to "Add One Quart" mark on dipstick Change oil, remove and clean oil suction screen every 25,000 miles Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing an "AQ-ATF" marking on container
Capacity–5 qts (refill), 11 qts (after overhaul)

►*POWERGLIDE DRAINING CAUTION There is no drain plug on converter Drain transmission case only, add 4½ qts. of fluid initially, recheck after idling engine.*

►*CHECKING FLUID LEVEL & FILLING TRANSMISSION NOTE* A filler plug has been added to transmission side cover for use in checking fluid level and adding fluid to transmission This change made necessary because filler tube and dipstick is not accessible from under hood on air conditioned cars

Checking Fluid Level–Engine must be idling with parking brake set, transmission warm, and the selector lever in "N" position when taking dipstick readings (on cars without air conditioning), or checking level at filler plug on side of transmission (cars with air conditioning) Maintain fluid level to "F" mark on dipstick (cars without air conditioning), or to bottom of filler plug hole on side of transmission (cars with air conditioning)

►*OTHER DATA See "Chevrolet Powerglide" in Transmission Section*

UNIVERSALS

Own. Yoke & Spider (Trunnion) type

►*CAUTION* Rear bearing companion flange nut controls rear axle pinion bearing preload Preload must be adjusted whenever companion flange nut loosened *See "Chevrolet Pass Car (Hotchkiss Drive)" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type, with Hotchkiss Drive Pinion bearing adjustment is different than on previous models
See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.

►*PINION BEARING PRELOAD CAUTION* Rear universal joint companion flange controls rear axle pinion bearing preload Bearing preload must be adjusted whenever companion flange nut is loosened

Axle Ratios	Standard	Optional
Std. V8 (Synchro-mesh)	3.70-1	
Std. V8 (Overdrive)	4.11-1	
Std. V8 (Powerglide)	4.55-1	
Corvette (Synchro-mesh)	3.55-1	3.27-1
Corvette (Powerglide)	3.55-1	3.27-1

Backlash – .006-.009" (.008" preferred).

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Removal: Raise car and support with jack stands under frame side rails Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cable from clamps at frame Disconnect hydraulic brake lines at rear axle housing Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor

Axl Shaft Removal: Raise car and place jack stands under axle housing. Remove tire, wheel and brake drum assembly Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange) Attach Axle Puller J-5748, with slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate *NOTE*–If bearing retainer and parking brake strut interfere, raise strut slightly with screwdriver to obtain clearance

SHOCK ABSORBERS

Delco. Direct acting non-adjustable Serviced by replacement

FRONT SUSPENSION

Independent with direct acting shock absorbers within front coil springs. Different types used as follows:
Corvette – "Threaded Bushing" type pivot points on upper and lower control arms.
Others – "Spherical Joint" type pivot points between control arms and steering knuckle support.
See "Chevrolet" in Suspension & Wheel Alignment Sect.
Kingpin Inclination – 3½ - 4½° crosswise.
Caster – (Corvette) 0° to Pos. 1°, (Others) Pos. ½-1½°.
Camber – 0° to Pos. 1°.
Toe-In – (Corvette) 0-1/8". (Others) 1/16"-1/8" per wheel or 1/8-1/4" total.
Toe-Out on Turns – With outside wheel at 20°, inside wheel should be 23° (Corvette), 22-26° (Others).

STEERING

Manual: Different type steering systems used as follows: **Corvette - Saginaw Worm & Roller.** Push-pull adjustment.
Others – Saginaw Ball & Baring Worm & Nut. Recirculating ball type.
See Saginaw "Worm & Roller" or "Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw Linkage type. *See "Saginaw (Linkage Type)" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic, without anchor pin adjustment. Hand lever applies rear wheel service brakes
See "Chevrolet-Bendix Hydraulic" in Brake Section.

►*REPLACEMENT BRAKE SHOE GRINDING CAUTION* To compensate for lack of brake anchor adjustment, brake shoes are ground to a 057- 087" smaller diameter than the drum diameter Grinding to the true diameter on a bench grinder will cause heel and toe contact, resulting in faulty brake action. *NOTE–If spindle mounted type grinder is used, the shoes should be ground to the true drum diameter*

►*SLOW BRAKE PEDAL RETURN CORRECTION: See "Brake Notes" in Chevrolet Special Data.*

Drums–Diameter 11"
Wheel Cylinder Diameter–Front 1 1/8", Rear 1".

Lining	Width	Thickness
Front Whl.	2"	.187- 194"
Rear Whl	1¾"	187-.194"

Length Per Shoe–9.3125" (Primary), 11.6875" (Secondary).
Braking Power–55 9% (Front Wheels), 44.1% (Rear Wheels).
Clearance–Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment.

Standard Master Cylind r: Located on engine side of firewall in line with brake pedal
Checking Fluid–Reservoir is integral with master cylin'er. Maintain level in cylinder to lower edge of filler hole.
Removal–Disconnect hydraulic line from end of cylinder and remove bolted brass fitting. Remove four retaining nuts and lock washers holding master cylinder to firewall and remove cylinder.

Installation–Reverse removal procedure making sure that push rod clevis is straddling the brake pedal. Refill master cylinder and bleed all brake lines. Adjust push rod-to-main cylinder clearance as follows. Make sure brake pedal returns to fully released position with no binding, and that pedal retracting spring has not lost its tension, then adjust brake pedal clevis to give a barely perceptible end play between main cylinder piston and brake pushrod (1/16-3/16" pedal movement should be felt).

Power Brakes· Bendix Vacuum Type Power Unit replaces conventional master cylinder
See "Bendix Power Unit" in Brake Section.

MISC. MECHANICAL

Windshield Wipers: Cable operated type (Std). Electric type (Optional)
See "Windshield Wipers" in Miscellaneous Section

Power Window Regulators: Electric type with reversible motor operating each door window assembly.
See "Power Window Regulators" in Miscellaneous Section.

Power Top Controls: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjuster: Reversible electric motor controls horizontal front seat movement. *See "Power Seat Adjusters" in Miscellaneous Section.*

Air Conditioning: See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section.

MODEL IDENTIFICATION

Series	Model Designation Serial Prefix	Wheelbase	Type
3100	3A	114"	Half Ton
3200	3B	123¼"	Half Ton
3400	3C	104	①¾ Ton
3500	3D	125"	①¾ Ton
3600	3E	123½"	¾ Ton
3700	3F	137"	①¾ Ton
3800	3G	135"	1 Ton
4100	4A	130"	1½ Ton
4400	4B	154"	1½ Ton
4500	4C	154"	② 1½ Ton
5100	5A	112 5/8"	③ 2 Ton
5400	5B	136 5/8"	③ 2 Ton
5700	5C	160 5/8"	③ 2 Ton
5100S	5D	112 5/8"	④ 1½ Ton
5400S	5E	136 5/8"	④ 1½ Ton
5700S	5F	160 5/8"	④ 1½ Ton
6100	6A	130"	2 Ton
6400	6B	154"	2 Ton
6500	6C	172"	2 Ton
6700	6D	194"	② 2 Ton
6800	6E	220"	② 2 Ton
6100S	6F	130"	⑤ 1½ Ton
6400S	6G	154"	⑤ 1½ Ton
6500S	6H	172"	⑤ 1½ Ton

①—Forward Control. ②—School Bus Chassis
③—Low Cab Forward. ④—Low Cab Forward Special
⑤—Special

►*SERIAL PREFIX NOTE (MODELS WITH V8 ENGINE). A "V" will precede the Serial Prefix, "V3X", etc.*

SERIAL NUMBER: Stamped on metal plate and attached to the body as follows **Forward Control Models**—On instrument panel support **Flat Face Cowl Models**—On cowl inner panel **All Other Models**—Left front door hinge pillar

Starting Serial Number: 001001 at each assembly plant regardless of series

►*SERIAL NUMBER NOTE: Serial number (example 3A56K001083) includes following identification data in sequence.*

Series①	Year	Assembly Plant②	Serial No.
3A	56	K	001083

①—Serial Prefix for each model (Models with V8 engine will have a "V" preceding the "3A")
②—See Assembly Plant Designation below

Assembly Plant Designation

A—Atlanta	**K**—Kansas City	**S**—St Louis
B—Baltimore	**L**—Los Angeles	**T**—Tarrytown
F—Flint	**N**—Norwood	**O**—Oakland
J—Janesville		

ENGINE NUMBER (6 Cyl): Stamped on right side of block to rear of distributor

ENGINE NUMBER (V8): Stamped on pad at front right hand side of cylinder block behind water pump.

Starting Engine Number: 0001001 (at each plant) Suffix letters and numerals indicate plant at which engine built ("F" for Flint, "T" for Tonawanda, "C" for Canadian), Model Year, and Model Type *See following for Series Type Designation.*

►*ENGINE NUMBER NOTE: Engine number (example 0001025 F 56 X) includes following identification data in sequence*

Serial No.	Engine Plant①	Year	Series②
0001025	F	56	X

①—See Starting Engine Number (above)
②—Engine Series Type Designation

Series Type Designation

Series	Engine	Designation
31, 32, 36, 3800	Thriftmaster 235" ①	X
31, 32, 36, 38, 4000	Thriftmaster 235" ②①	XG
34, 35, 3700	Thriftmaster 235" ③	W
34, 35, 3700	Thriftmaster 235" ④	WA
31, 32, 26, 28, 4000	Thriftmaster 235" ⑤	V
4000, 6000	Thriftmaster 235" ⑥	U
4000	Thriftmaster 235" ⑦	UD
6000	Jobmaster 261" ⑦	TA
6000	Jobmaster 261" ⑧	TD
31, 32, 36, 38, 4000	V8 Conv. ①	A
31, 32, 36, 38, 4000	V8 Hydramatic ①	B
31, 32, 36, 38, 4000	V8 H.D. Clutch ①	M
34, 35, 3700	V8 Forward Control	D
34, 35, 3700	V8 F.C., Hydramatic	DA
34, 35, 3700	V8 F.C., H.D. Clutch	DB
5000	V8 Conv.	E
5000	V8 Optional ⑧	EA
4000, 6000	V8 Conv. ⑥	H
6000	V8 Optional ⑧	JB

① — "A" stamped following suffix when this engine is used in 3600 Series, "B" when used in 3800 Series, "C" when used in 4000 Series.
② — With Hydra-Matic Transmission.
③ — Updraft Carburetor.
④ — Updraft Carburetor & Hydra-Matic Transmission.
⑤ — Heavy Duty Clutch. "A" stamped following suffix when this engine used in 3600 Series, "B" if used in 3800 Series, "C" if used in 3100 & 3200 Series.
⑥ — "A" stamped following suffix if used in 4000 Series.
⑦ — Optional, Heavy Duty.
⑧ — Optional, Heavy Duty. Allison Transmission.

TUNE-UP

COMPRESSION PRESSURE: (6 Cyl.) 130 lbs.,**(V8)** 140 lbs. at cranking speed. Variation of 20 lbs. between cylinders indicates need for cylinder head reconditioning.

VACUUM READING: 6 Cyl. Engine—17-21" at idling speed
V8 Engine—Adjust to highest steady vacuum reading

VALVE TAPPET CLEARANCE: *NOTE—Conventional type lifters used on 6 Cyl. engines. Hydraulic valve lifters used on V8 Engines.*
6 Cyl. Engines—(3000 Series)—Intake 006" Exhaust 016" **(Other Series)**—Intake .006" Exhaust 020"
V8 Engines (With Hydraulic Lifters)—No adjustment required unless cylinder head removed or valve lifters replaced.

MANIFOLD HEAT CONTROL: 6 Cyl. — Thermostatic type. Check for free operation when tuning engine. Should require 1/2 turn from unhooked to hooked position. *Distorted springs should be replaced.*
V8 — Heat control valve with counterweight and thermostatic coil spring located between right manifold and exhaust pipe. Hook coil spring under stop stud. Install counterweight with square projection up and upper end of spring stop resting on top of stop stud.

IGNITION

FIRING ORDER: 6 Cyl. — 1-5-3-6-2-4
V8 — 1-8-4-3-6-5-7-2.
Cylinders (V8) — RIGHT BANK 2-4-6-8. LEFT 1-3-5-7.

SPARK PLUG GAP: .035"
Spark Plug — AC No. 44 or 45-Com. (½, ¾, 1, 1½ Ton), AC No. C43 (2 Ton V8). 14 mm. Torque to 20-25 ft.lbs.
►*SPARK PLUG INSTALLATION CAUTION:* Spark plugs flash-over on 1956 engines may be caused if 1955 plugs are used. Insulators on 1956 plugs have four annular ribs that help prevent flash-over, and larger inside diameter on spark plug boot. If 1955 plugs installed, flash-over or misfire will be prevalent due to loose fit of boot.

COIL: Delco-Remy 1115087. *12 Volt.*
Ignition Current — 1.8 amps. idling, 4 amps. stopped.
Resistor — Delco-Remy 1931614. 1.40-1.62 ohms. On firewall.

►*COIL RESISTOR NOTE (6 Cyl Trucks Exc. Forward Control).* Resistor connected to ignition switch by two leads. Second lead is connected through starter switch and provides a direct connection to coil when starter switch operated

►*COIL RESISTOR NOTE (6 Cyl Forward Control & All V8 Models).* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when key turned to "Start Engine" position)

DISTRIBUTOR: Delco-Remy. *12 Volt.* Application as follows:

Engine	Distributor No.	Condenser	Contact Set
235" Engine	1112403	1928111	1924571
261" Engine	1112407	1928111	1924571
V8 Engine	1110847	1924499	1924499

Condenser Capacity — .18-.23 mfd. (all models).
Breaker Gap—.019" (new points), 016" (used points)
Cam Angle— 028-035" (Dist Nos 1112403 & 1112407) 026-033" (Dist No 1110847) All at 016" gap

►*BREAKER GAP CAUTION Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*
Breaker Arm Spring Tension—19-23 ozs
Rotation—Clockwise viewed from above

Automatic Advance—1110847

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-2		400	0-4		800
8-10		1150	16-20		2300
15-17		1800	30-34		3600

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Automatic Advance–1112403

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Automatic Advance–1112407

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	350	0-4	700
7-9	750	14-18	1500
11-13	1200	22-26	2400
16-18	1800	32-36	3600

Vacuum Spark Control: Delco-Remy 1116089 (for Dist. Nos. 1112403 & 1112407). No. 1116100 (for Dist. No. 1110847).

Plunger Travel – 3/16-7/32" (1116089), 15/64-1/2" (1116100).

Vacuum Advance – 1110847

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5-7
11.75	23.5	12-20.5

Vacuum Advance – 1112403, 7

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
7.5	15	7.5-10

IGNITION TIMING

Setting – Set timing to setting indicated below. *Manufacturer recommends setting timing at 1000 RPM and with distributor vacuum disconnected.*

Model	Setting (At Idle)	Setting (At 1000 RPM, Vac. Discon.)
6 Cyl. (235" & 261")	TDC	5° BTDC
V8 Engine	4° BTDC	8° BTDC

Timing Mark – 6 Cyl. - Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on "O". Adjust Octane Selector as follows: Set for slight ping when accelerating with wide open throttle.

V8 – Mark on vibration damper and an indicator on left side of valve chain cover. Indicator is marked with five lines on each side of "O" mark. Each line represents 2°.

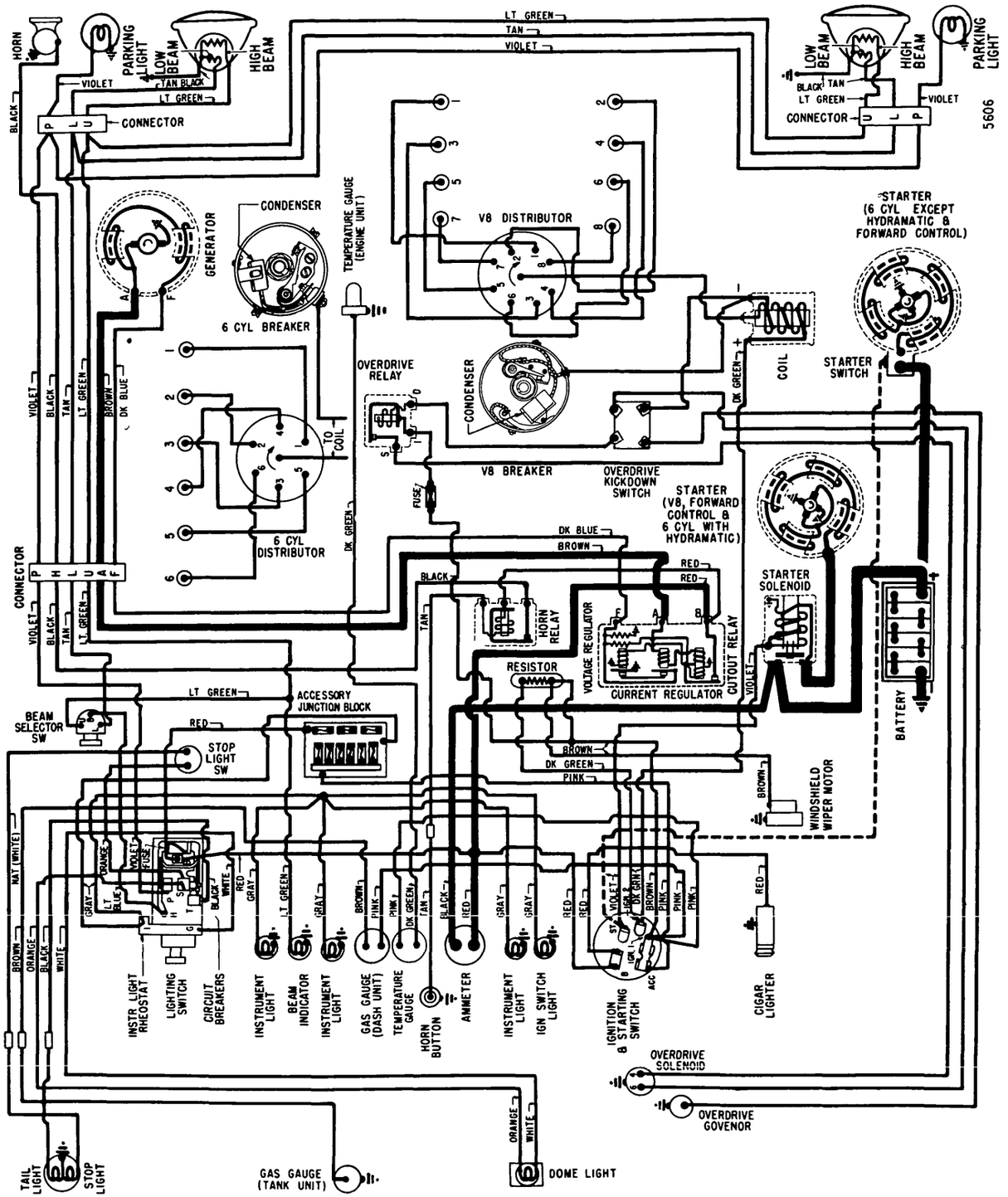
CARBURETOR

►*CARBURETOR APPLICATION: Rochester "B" & "BC" Carburetors are standard on all 6 Cyl. Models (Except Forward Control). Rochester "2G" Carburetor is standard on all V8 Models. Carter Updraft Carburetor is standard on Forward Control Models.*

THROTTLE LINKAGE ADJUSTMENT: *NOTE–On Automatic Transmission Cars, adjust transmission throttle control linkage BEFORE adjusting carburetor throttle linkage.*

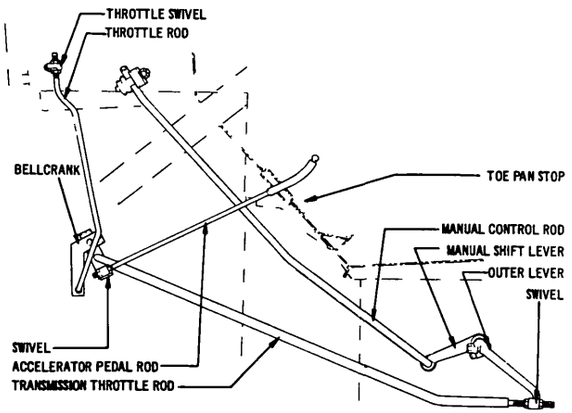
Carburetor Throttle Linkage: With accelerator depressed fully and throttle valve wide open, adjust threaded swivel at throttle lever for free entry into throttle lever. Then lengthen control rod by turning swivel **tw full turns.** Connect rod to throttle lever.

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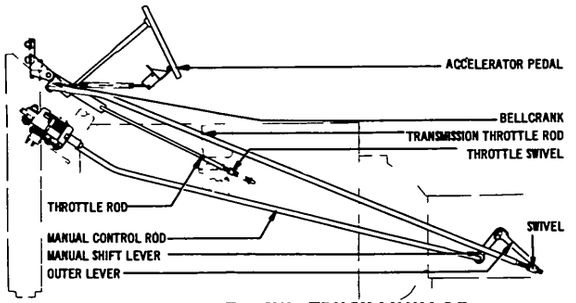
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Thr ttl Linkage Adjustm nt: (6 Cyl. Hydra-Matic Drive Trucks, exc pt F rward Control) – With engine at normal operating temperature and idle speed set at 425 RPM, remove lower end of carburetor throttle lever-to-bell crank rod from lever on bell crank. Install Lever Positioning Gauge J-5609 in hole in lever and gauge hole in pan rail of engine block (hole is located toward rear of bell crank position), and leave gauge in this position. Remove swivel from bell crank-to-transmission outer lever at transmission and move transmission outer lever back against stop. Check distance from hole in outer lever to back of transmission with Gauge J-2545-C. Bend lever as necessary for free entry of gauge in lever hole using Tool J-5260 *(CAUTION–Do not apply force to stops at either end of lever travel).* Hold outer lever back against stop and adjust swivel position on bell crank-to-transmission rod so it just enters hole in transmission lever. Remove Positioning Gauge from bell crank and reinstall throttle rod. Recheck engine idle speed with idle screw against stop on carburetor, and adjust carburetor throttle-to-bell crank rod so swivel at upper end freely enters hole in throttle lever. At this point, **sh rt n** bell crank-to-transmission outer lever by turning swivel lock nuts **two full turns.** Remove bell crank-to-carburetor throttle rod upper swivel from lever and pull rod upward until linkage is stopped by forward stop in transmission. Hold in this position and adjust accelerator-to-bell crank rod swivel until accelerator pedal is against floor stop, then shorten rod **one full turn.** Replace upper end of throttle-to-bell crank rod in throttle lever.



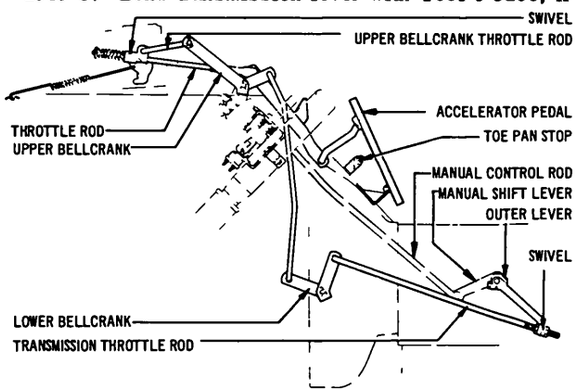
CHEVROLET 6 CYL. TRUCK LINKAGE (EXCEPT FORWARD CONTROL)

Thr ttl Linkage Adjustment: (6 Cyl. Hydra-Matic Forward C ntrol) – With engine at normal operating temperature and idle speed set at 425 RPM, remove accelerator pedal-to-bellcrank rod and install Carburetor Control Lever Adjusting Gauge J-5629 with slotted end resting on inside shoulder of hex head brass fitting on intake manifold and pin end in rod hole in lever on bell crank. Leave gauge in this position. Remove swivel from bell crank-to-transmission outer lever rod at transmission and move lever back against stop. Check distance from hole in outer lever to back of transmission with Gauge J-2545-C. Bend lever as necessary for free entry of gauge in lever hole using tool J-5260 *(CAUTION-Do not apply force to stops at either end of lever travel).* Hold outer lever back against stop and adjust swivel position on bell crank-to-transmission rod so it just enters hole in transmission lever, then **shorten** bell crank-to-transmission outer lever rod **two full turns.** Recheck engine idle speed with idle screw against stop on carburetor. Adjust carburetor throttle-to-bell crank rod so swivel at lower end freely enters hole in throttle lever. Remove Positioning Gauge from bell crank lever Remove carburetor throttle-to-bell crank rod from throttle lever and pull bell crank-to-transmission outer lever rod up toward floorboard until linkage is stopped by forward stop in transmission. Hold rod in this position and install accelerator pedal-to-bell crank rod in bell crank lever, and adjust swivel so accelerator pedal is against toe board stop. Install carburetor throttle-to-bell crank rod, then **shorten** accelerator pedal-to-bell crank rod **one full turn.**



CHEVROLET 6 CYL. TRUCK LINKAGE (FORWARD CONTROL)

Throttle Linkage Adjustment: (V8 Hydra-Matic Drive Trucks) – Back out throttle valve adjusting screw so throttle valve is in the tightly closed position and swivel on end of throttle rod is against lug on upper bellcrank throttle rod. Remove swivel from transmission throttle lever and move lever back against its internal stop. Check distance from hole in lever to rear face of transmission case with Throttle Lever Checking Gauge J-2545-C. Bend transmission lever with Tool J-5260, if necessary, to allow entry of gauge into hole *(CAUTION-Do not apply force against stop at ither nd of lever travel).* Adjust length of transmission throttle rod so swivel just enters hole in transmission throttle lever. Adjust engine idle speed to 425 RPM with selector lever in "N" position. This adjustment will move transmission throttle lever off its internal stop. Depress accelerator pedal to obtain 5/8" distance between toe pan stop and bottom of pedal, then adjust length of throttle rod to give full open throttle. Depress pedal until transmission throttle lever is tight against forward stop on transmission and turn screw on toe pan stop up against accelerator pedal. Release pedal and turn screw upward **two full turns** and secure screw with jam nut (transmission throttle lever will be moved slightly off forward stop on transmission).



CHEVROLET V8 TRUCK LINKAGE

ROCHESTER "B" & "BC"

Downdraft types with manual choke (Rochester Model "B"), and automatic choke (Rochester Model "BC")

Models	Rochester Nos.
235" Engine ①	②7004468
235" Engine ③	④7009255
261" Engine	②7005140

①–Except Forward Control & Automatic Transmission models
②–With Manual Choke.
③–With Automatic Transmission (Except Forward Control models)
④–With Automatic Choke.

Idle Setting (Exc. 7009255) – 1-2½ turns open (turn screw out for richer mixture).
Idle Setting (7009255) – 2½ turns open (turn screw out for richer mixture).
Idle Speed – 400-450 RPM (Exc. Auto. Trans. models), 425 RPM (Auto. Trans. models with Selector Lever in "N" position).
Float Level – 1 9/32" from bottom of each float to cover gasket (do not remove gasket). Use Gauge M-250. With assembly inverted, place gauge with projection inserted in discharge nozzle. Carefully bend float lip vertically so that each float just touches top portion of gauge. Bend float arms to bring them into alignment and to center them in gauge. Tilt assembly 90° on each side and check to see that floats do not touch gauge.
Float Drop–Turn cover right side up so float drops down Distance from gasket on cover to bottom of each float should be 1¾" on all models Adjust by bending tang at rear of each float assembly
►*CAUTION· Both floats must be set alike and must not be twisted out of alignment*
Accelerating Pump–No seasonal adjustment
Choke Adjustment: Centered on index
Fast Idle (7009255)· With fast idle screw on next to highest step of fast idle cam, Gauge BT-99 (076") should just slide between lower edge of choke valve and carburetor bore To adjust, bend connector rod
Throttle Linkage Adjustment (Hydra-Matic Drive Trucks): *Se "Carburetor" above.*
►*OTHER DATA· See "Rochester B & BC" Carburetors in Carburetion Section.*
Fu l Pump Pressure: 3½-4½ lbs.

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ROCHESTER "2G"

Dual downdraft type with manual choke.

Model	Rochester No.
Synchro-mesh Trans.	7008389
Overdrive Trans.	7008383

►*V8 TRUCK ENGINE CARBURETOR-TO-MANIFOLD GASKET PRODUCTION CHANGE (To Eliminate Hard Hot Starting):* New intake manifold-to-carburetor gasket, Part No. 3733281, with better insulation characteristics, is now being used in production and should be used on all 2-barrel carburetor V8 Truck installations when replacement required. Former gasket, Part No. 3704952, will continue to be used on passenger cars.

►*MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrel feeds Cyl 2-3-5-8, LEFT barrel 1-4-6-7*

Idle Setting—After idle speed set to correct specifications (see Idle Speed below), turn both idle mixture screws for smooth idle with highest vacuum reading and engine RPM

Float Level—1¼" from air horn gasket to top of float with assembly inverted Use Gauge BT-129 so it rests against power piston shaft with outer leg in line with center of float Adjust by bending float arm between pivot and float with Tool BT-69

Fast Idle: No adjustment of fast idle speed is provided It is necessary, however, to have correct relationship between fast idle cam position and choke valve position Check & adjust as follows. Place end of idle adjusting screw on next to highest step of fast idle cam Using Gauge J-5921, small end of gauge must slide easily between upper edge of choke valve and bore of carburetor, with gauge held vertically If necessary, bend choke rod until correct clearance is obtained

Throttle Linkage Adjustment (Hydra-Matic Drive Trucks): *See "Carburetor" above.*

►*OTHER DATA: See "Rochester 2G' Carburetors in Carburetion Section.*

Fuel Pump Pressure: 4-5¼ lbs.

CARTER

Carter (BB) 871SB (Forward Control Models). Single barrel updraft type with manual choke control

Idle Setting—½-1½ turns open (turn screw out for richer mixture)

Idle Speed—450-500 RPM (Synchro-mesh), 400-450 RPM (Hydra-Matic)

Float Level—Top of float (not seam) 0" to 1/32"below top of bowl with needle valve seated Use Gauge J-818-13A on top edge of bowl (gasket removed). Press float lever lip firmly against needle

Accelerating Pump—Inner holes (in plunger shaft and throttle lever) Summer Outer hole Winter

Thr ttl Linkag Adjustm nt (Hydra-Matic Driv Cars): *S "Carbur tor" abov .*

►*OTHER DATA: See "Cart r (BB)" Carburetors in Carbur ti n S ction.*

Fu l Pump Pr ssur : 3½-4½ lbs.

CARB. EQUIPMENT

Fuel Pump: AC Diaphragm type.

Model	AC Pump No.
6 Cyl., Std. (Fuel only)	4149
6 Cyl., Optl. (Fuel & Vacuum)	4138, 707
V8, Std. (Fuel only)	4150
V8, Optl. (Fuel & Vacuum)	4141, 708

Pump Pressure—(6 Cyl.) 3½-4½ lbs. (V8) 4-5¼ lbs.

Gasoline Gauge: AC Electric.

Dash Unit—AC No. 1518461.

Tank Unit	Truck Model
AC No. 1518258	Half Ton
AC No. 1518236	¾ Ton
AC No. 1518498	1½ & 2 Ton
AC No. 1518234	School Bus

See "Fuel Gauges" in Carburetion Section.

BATTERY

Delco 2SMR53 (Exc. School Bus). *12 Volt,* 9 plate, 53 ampere hour capacity (20 hr. rate).

Delco 3SM70 (School Bus). *12 Volt,* 11 plate, 70 ampere hour capacity (20 hr. rate).

Battery Ground—Negative.

Engine Ground—(6 Cyl.) Engine to frame, (V8) Engine to dash.

STARTER

Model	Delco-Remy No.
6 Cyl. (Exc Fwd Cont & Hydra-Matic)	①1107634
6 Cyl (With Hydra-Matic)	②1107633
6 Cyl (Fwd. Cont W/O Hydra-Matic)	②1107626
V8 (Exc. Hydra-Matic)	②1107627
V8 (Hydra-Matic)	②1107643

①—Manual Pinion Shift ②—Solenoid Pinion Shift.

Armature—Delco-Remy 1926626 (all models)

Drive (6 Cyl. Synchro-mesh Trans., Exc. Fwd. Cont.)—Overrunning clutch with pedal operated manual pinion shift

Drive (6 Cyl. Fwd. Cont. & Hydra-Matic Models. All V8 Models)—Overrunning clutch with solenoid pinion shift

Rotation—Counter-clockwise at commutator end

Brush Spring Tension—35 ozs minimum

Performance Data			
Torque	RPM	Volts	Amperes
0 ft lbs	6900	10 3	75
10 5 ft. lbs.	Lock	5 8	435

Starting Switch: (Solenoid Pinion Shift Models)—Delco-Remy Solenoid Switch No 1119767 mounted on starter and controlled by Ignition & Starter Switch 1116522 Turn key full RIGHT against spring tension to start

Starter Switch: (Manual Pinion Shift Models)-Starter switch mounted on starter and controlled by pedal operated lever

Hydra-Matic N utral Saf ty Switch: Delco-Remy No 1998111 (Exc Forward Control) Delco-Remy 1998110 (Forward Control)

Adjustment—*See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

D lco-R my. *12 Volt.* Generators used as follows:

Model	G n rat r N .	Armatur N .
All (Std.)	1100326	1928952
Optl., Pow. St., 30 amps.	1102041	1929640
Optl., Pow. St., 40 amps.	1106982	1932349
Optl., 30 amps.	1105947	
Optl., 40 amps.	1106981	1929360

Maximum Charging Rate—Controlled by regulator and governed by battery condition.

Performanc Data - C ld			
Generator	Amperes ①	V lts	RPM
1100326	25	14.0	2780
1102041	30	14.0	2150
1105947	32	14.0	1850
1106981, 2	40	13.0	1500

① — Not maximum output. See Current Regulator.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—28 ozs.

Field Current—1.5-1.62 amps. (1100326), 1.48-1.62 amps. (1102041), 1.54-1.67 amps. (1105947), 1.37-1.50 amps. (1106981, 2). All at 12.0 volts.

Belt Adjustment: 5/16" (6 Cyl.), 13/16"(V8) deflection midway between water pump and generator pulleys with light load applied to belt.

REGULATOR

Delco-Remy. *12 Volt.* Regulators used with generators as follows:

Regulator No.	G n rat r N .
1119000	1100326, 1102041
1119001	1105947
1119004	1106981, 2

►*NOTE: Regulator is "1119000 S ri s R gulator". Sp cifications below are for "Normal" s ttings.*

Cutout R lay

Cuts In—(1119000, 1119001) 11.8 - 13.5 volts HOT. (1119004) 11.5-13.0 volts HOT.

Contact Gap—.020".

Air Gap—.020" (with contacts just closed).

Voltage R gulat r

S tting—(1119000, 1119001) 13.8-14.8 volts HOT. (1119004) 13.6-14.3 volts HOT.

Air Gap—.063" (1119004), .075" (Others), with armature pressed down to point where contacts just touch.

Checking & Adjusting—*Se "D lco-R my 1119000 S ri s Regulator" in Electrical S ction.*

Current R gulat r

Setting (1119000)—23-27 amperes HOT.

Setting (1119001)—27-33 amperes HOT.

Setting (1119004)—37-42 amperes HOT.

Air Gap—.075" with armature pressed down to point where contacts just touch.

Checking & Adjusting—*Se "D lco-R my 1119000 Series Regulator" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *Se El ctrical S cti n.*

Direction Signals: *See Electrical Section.*

Lighting Switch R moval: Disconnect all wires from switch (make sure that all wires are tagged for identification) Depress switch shaft retainer on top side of switch assembly (rear of instrument panel) Remove switch retaining nut and switch assembly

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►*LIGHTING SWITCH FUSE NOTE:* A 3 ampere fuse has been added to lighting switch assembly to prevent instrument panel rheostat from burning out.

Stop Light Switch L cati n: Mechanical type mounted on underside of toeboard and operated by brake pedal

CIRCUIT BREAKERS: Two 13 amperes circuit breakers located in main lighting switch One protects headlamps and parking lamps and the other circuit breaker protects all other light circuits

HORNS: Delco-Remy 1999760 (High), 1999759 (Low)

H rn R lay: Delco-Remy 1116913. *12 Volt.*
Contacts Close – 5.0-9.5 volts.
C ntact Gap – .027".

ENGINE

►*ENGINE APPLICATION NOTE· Three variations of 235" Thriftmaster engine, the 261" Jobmaster engine, and two V8 engines (the 265" Taskmaster & Trademaster) are used in 1956 production. See "Truck Model Identification" for engine application.*

Engin	Series
Thriftmaster 6 Cyl.	① 3000, 4000
Thriftmaster Special 6 Cyl.	② 3400, 3500, 3700
Thriftmaster Hvy. Duty 6 Cyl.	③ 6000
Jobmaster 6 Cyl.	④ 6000
Trademaster V8	⑤ 3000, 4000
Trademaster Hvy. Duty V8	⑥ 5000

①—Std. Equip. Conventional Models.
②—Std. Equip. Forward Control Models.
③—Std. Equip. Optional on 4000 Series.
④—Optional Equip.
⑤—Optional Equip. Conventional & Forward Control.
⑥—Std. Equip. Optional on 4000, 6000 Series.

ENGINE SPECIFICATIONS: Own. 6 Cylinder & V8 valve-in-head engines.

Engin	B r	Stroke	Displmnt
235" Thriftmaster	3 9/16"	3 15/16"	235.5"
261" Jobmaster	3 3/4"	3 15/16"	261.0"
265" V8 Trademaster	3 3/4"	3"	265.0"
265" V8 Taskmaster	3 3/4"	3"	265.0"

Engine	C mpr. Ratio	Rated HP	Dev. HP
235" Thriftmaster	8.0-1	30.4	140 at 4200
261" Jobmaster	7.8-1	33.7	148 at 4000
265" V8 Trademaster	7.5-1	45.0	155 at 4200
265" V8 Taskmaster	7.5-1	45.0	155 at 4200

Compr ssi n & Vacuum Reading – *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Chevrolet Special Data*

OIL PAN REMOVAL: (V8 Engines)–Disconnect steering idler arm bracket from right frame side rail and drop for clearance

ENGINE MOUNTINGS: *See "Engine Mountings" in Chevrolet Special Data*

CYLINDER HEAD & MANIFOLDS: *See "Cylinder Head & Manifold" in Chevrolet Special Data*

TIGHTENING TORQUES: *See "Tightening Specifications" in Chevrolet Special Data*

►*OTHER ENGINE DATA· S e 1956 Passeng r Car pages and note the following.*

ALL 6 CYL. & V8 ENGINES: Valves – High alloy steel exhaust valves replace those formerly used.
Oil Control Ring–Three-piece oil control rings replace four-piece type used previously. New ring consists of two chrome plated rails and spacer.

6 CYL. ENGINES· Upper Main Bearing Insert–"Roll-out" type upper main bearings used. Inserts are retained by a tang which bears against cap and fits into matching groove in cylinder block. Bearings can be rolled out by removing bearing cap and inserting special plug in crankshaft oil hole.
Valve Guide Installation – On both 235" & 261" engines, exhaust valve guides are installed in head so they will extend 15/16" above the head, and intake valve guides are installed to extend 1" above the head. Use Tool J-5599 to install exhaust guides, Tool J-5598 to install intake guides.

►*THRIFTMASTER 235" HEAVY DUTY ENGINE NOTE·* Upper compression rings are chrome plated and rotators are standard equipment on exhaust valves.

V8 ENGINES: Rings – Top compression rings are chrome plated.
Valve Rotators – Standard on all exhaust valves.
Valve Spring Dampers & Oil Shields – Used on all intake and exhaust valves.

►*TASKMASTER V8 PISTON NOTE:* Two small notches are ground into crown of each piston to provide additional piston-to-valve clearance (minimizing possibility of valve-piston collision during engine over-speeding conditions).

►*VALVE SPRING HEIGHT CAUTION (V8 ENGINES):* Check installed height of valve springs. Distance from top of shim, or spring seat, to top of valve spring shield should not be in excess of 1 45/64". If so, install a 1/16" or 1/32" shim to obtain an installed spring height of 1 5/8" for exhaust, 1 11/16" for intake.

VALVE TIMING: As indicated below

235" Thriftmaster & 261" Jobmaster

Intake Valves–Open 11°30' BTDC, Close 52°30' ALDC.
Exhaust Valves – Open 51° BLDC, Close 13° ATDC.

265" Trademaster & Taskmaster

Intake Valves – Open 18° BTDC, Close 54° ALDC.
Exhaust Valves – Open 52° BLDC, Close 14° ATDC.

Valve Timing Check (235" & 261" Engines): Remove all tappet clearance from No 1 exhaust valve Turn engine over until this valve opens and just starts to close and until triangular mark on flywheel lines up with pointer in flywheel housing opening Mount dial indicator on rocker arm shaft support with stem contacting No 1 exhaust valve adjusting screw set dial indicator to .063". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset No. 1 exhaust valve to correct running clearance.

OILING SYSTEM

Crankcase Capacity (6 Cyl)–5 qts (refill) 5½ qts (dry) **(V8)**–4 qts (refill), 5 qts (dry)

Normal Oil Pressure: (6 Cyl –45 lbs **(V8)**–35 lbs

Pr ssur R gulator Valv s–In oil pump body Not adjustable

Oil Pressur Indicator–AC No 1508246 Not electric

Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

►*OIL PUMP INTAKE NOTE·* Oil pump intake is fixed screen type and replaces "floating" type previously used. Intake and screen are removed as an assembly.

Oil Pump Overhaul–*See "Oiling System" in Chevrolet Special Data*

Crankcase Ventilation (Standard): Air intake through valve rocker arm cover, outlet through pipe on right side of engine
Servicing–On all models with air cleaner mounted on valve rocker arm cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions

Crankcase Ventilation (Optional): Positive Type Vacuum operated ventilator consisting of a vacuum pipe from oil filler pipe to ventilator valve in fitting on intake manifold Valve is spring loaded variable opening type giving constant crankcase ventilation at all speeds **Valve must close at idling to give proper air-fuel mixture**
Servicing–Every 10 000 miles (or oftener if required) clean vacuum pipe, valve and filler pipe thoroughly Filler cap gasket must seal tightly

►*VACUUM VALVE CAUTION* If improper action of spring is suspected due to spring being distorted or etched from corrosive action the valve assembly should be replaced

►*TASKMASTER V8 CRANKCASE VENTILATION NOTE* Positive type crankcase ventilation is Standard.

COOLING

Water Capacity· As follows

Model	235"	265"	261"
½, ¾, 1 Ton	17 qts.	17½ qts.	
½, ¾, 1 Ton H.D.	17½ qts.	18 qts.	
1½ Ton Special	17½ qts.	18 qts.	
1½ Ton Special H.D.	18 qts.	18½ qts.	
5000 Ser., 4 or 5 speed		18 qts.	
5000 Series, H.D.		18½ qts.	
5000 Series, Powermatic		21 qts.	
6000 Series, 4 or 5 Speed	17½ qts.	18 qts.	17 qts
6000 Series, H.D.	18 qts.	18½ qts.	
6000 Series, Powermatic		21½ qts.	21 qts.

NOTE – Add one quart for models with heater.

Pressure Valve: AC No. 850795. Radiator filler cap. 7 lb. type. **Replacement Valve** – AC No. RC-1.

Thermostat: Harrison. In cylinder head water outlet (6 Cyl.). In water outlet in intake manifold (V8).
Standard – No. 3133595 (stamped 151), 151°. Can be used for alcohol anti-freeze.
Optional – No. 3123994 (stamped 160), 160°. No. 3133597 (stamped 170), 170°.

Temperature Gauge· AC No. 1513138. Not electric.

Water Pump· Packless type with sealed ball bearing shaft. *See "Chevrolet" in Water Pump Section.*

CLUTCH

6 CYL. ENGINES

Own. Diaphragm spring, single plate, dry disc type. *See "Chevrolet (Own)" in Clutch Section.*

Mod l	Cover	Woven Disc	Molded Disc
Standard (10")	3836716	3826119	3836097
Heavy Duty (11")	3836720	3826011	

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Pedal Adjustment: Pedal free travel ¾-1". To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. *NOTE*–Use finger pressure only when checking clutch free travel.

Removal: Remove transmission (see Transmission Removal). Remove throwout bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. *CAUTION*–Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align "X" mark on cover with "X" mark on flywheel.

CLUTCH

V8 ENGINES

Borg & Beck. Single plate, dry disc type.

Series	Model	Assy. No.	Disc No.
3000 & 4000	10.5A9	361402	352528
5000 & 6000 Ⓒ	11A9	361403	382286

Ⓒ–Heavy Duty on 3000 & 4000 Series.

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Adjust clutch pedal until free travel is 1". Make sure that pedal pad contacts toeboard when pedal pressed down.

Removal: Remove transmission (see Transmission Removal). Before removing clutch assembly, punch mark flywheel, clutch cover and one pressure plate lug so these parts may be assembled in their same relative positions. Loosen hold-down screws evenly and remove cover. *NOTE*–Mark flywheel side of driven plate for correct reassembly.

TRANSMISSION

3-SPEED LIGHT DUTY

Own. Three speed, all helical gear type. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

See "Chevrolet 3-Speed (Light Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever. *See "Transmission Controls" in Transmission Section.*

Removal (½ & ¾ Ton): Drain transmission. Disconnect speedometer cable at transmission and shift control rods from transmission levers. Remove propeller shaft. Remove the two top transmission to clutch housing capscrews and insert two transmission guide pins, Tool J-1126, in these holes. Remove the two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until clutch gear is free of splines in the clutch disc.

3-SPEED (HEAVY DUTY)

Own. Three speed, constant mesh (second & high), sliding gear (low & reverse).

See "Chevrolet 3-Speed (Heavy Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever.

See "Transmission Control" in Transmission Section.

Removal: Same as for "3-Speed (Light Duty)" above.

4-SPEED

Own. Four-speed, constant mesh, synchro-mesh, helical gear (2nd, 3rd, & 4th), sliding spur gear (low & reverse). Floor mounted gearshift.

See "Chevrolet 4-Speed" in Transmission Section.

Transmission Control: (All Models exc. Forward Control) –Floor mounted gearshift lever.

Removal (½ & ¾-Ton): See "3-Speed (Light Duty)" above.

Removal (Other Trucks): Remove screws fastening steering jacket grommet and slide grommet up out of way. Remove accelerator pedal and floor mat. Remove sheet metal screws attaching transmission cover to body floor and remove cover. On Forward Control models remove both front and rear floor pans. Remove speedometer cable from transmission rear bearing retainer. On 1-Ton, remove cotter key and pin attaching parking brake pull rod to parking lever. On 1½ & 2-Ton, disconnect parking brake lever return spring from parking brake operating lever and remove cotter key and pin attaching inner and outer levers to parking brake operating lever. Remove parking brake lever lock, flat washer and spring and remove parking brake lever. Drain lubricant from transmission. On 1-Ton, break universal joint at transmission joint flange and tape trunnions and bearings together. On 1½ & 2-Ton, disconnect intermediate universal joint by removing two trunnion bearing "U" clamps, split joint and lower front end of rear propeller shaft to floor. Remove the four universal joint flange nuts. Remove nuts attaching propeller shaft bearing support bracket to frame cross member and remove front propeller shaft and bearing assembly. On all models, remove the two capscrews attaching transmission to clutch housing and insert two Guide Pins J-1126 in these holes. Remove flywheel underpan and remove two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until transmission free of splines in clutch disc. Remove transmission.

OVERDRIVE

Warner R10. Used with Chevrolet Truck 3-Speed (Light Duty) Transmission.

See "Chevrolet Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cables have been disconnected.

HYDRA-MATIC DRIVE

Dual Range. Four speed type with fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication–Check fluid level in transmission every day. Drain & refill every 25,000 miles. Use only "Automatic Transmission Fluid" Type A.

Checking Fluid Level–With selector lever in "N" position, parking brake set, and transmission at normal operating temperature, remove access hole cover plate in floor pan, and **check fluid level with engine at idling speed.** Add sufficient fluid to bring level in transmission to "F" mark on dipstick.

Capacity–8½ qts. (refill), 9 qts. (after overhaul). *NOTE*–1 qt. additional with oil cooler.

►*OTHER HYDRA-MATIC SERVICE DATA–See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

REAR AXLE

SEMI-FLOATING (HALF-TON)

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE*–Same design as passenger car axle.

See "Chevrolet Hypoid Semi-Floating" in Rear Axle Section.

Ratio–(Synchro-mesh & Hydra-Matic) 3.90-1 (39:10). **(Overdrive)** 4.11-1 (37:9).

►*AXLE SHAFT NOTE: Shafts unequal length (right shaft longer) and may be identified by mark stamped on shaft, or by length as follows:*

Axle	Part No.	Length
Left	3694769①	29 5/8"
Right	3694770①	30 5/8"

①–Part No. stamped on axle for identification.

Backlash–.005-.008".

Removal of Rear Axle Assembly: Disconnect and remove parking brake pull back spring. Remove cotter pins and clevis pins from each parking brake cable clevis, and remove clevis. Remove springs and retaining clips from cables at frame brackets. Disconnect universal joint trunnion bearing "U" bolts and split rear universal joint. Disconnect shocks from anchor plates. Disconnect hydraulic brake line to connector at rear frame bracket. Remove spring "U" bolts, nuts and anchor plates. Raise rear of truck and roll assembly out toward rear. *CAUTION–Be careful when pulling parking brake cables through openings in frame.*

Axle Shaft Removal: *See "Chevrolet Hypoid Semi-Floating" in Rear Axle Section.*

Axle Shaft Endplay–Free fit to .014" maximum.

FULL-FLOATING (¾, 1, 1½ & 2-TON) (EXC. LCF MODELS)

Own. Full-floating hypoid gear (straddle mounted pinion) with Hotchkiss drive.

►*AXLE ASSEMBLY NOTE; ¾ & 1-Ton axle assemblies are different design than used on 1½ & 2-Ton with standard rear axle assemblies.*

See "Chevrolet Truck Hypoid Full-Floating" in Rear Axle Section

►*AXLE RATIO IDENTIFICATION NOTE: Axle ratios are identified by prefix letters in rear axle numbers stamped on top of carrier housing between reinforcing ribs. See Axle Ratios following:*

Axle Ratio Identification

Ratio	Prefix Letters
5.14-1 (36:7)	CA, CB, CE, CF
4.57-1 (32.7)	CC, CD
6.17-1 (37:6)	CG, CH, CJ
7.2-1 (36:5)	CM

Backlash–.005-.008". Screw adjustment.

Removal of Axle Assembly: Remove differential cover and axle shafts (see below). Disconnect rear universal

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by removing two "U" bolts from rear yoke (wire trunnions to retain bearings) Slide shaft forward and lower to floor Remove differential carrier mounting bolts

Axle Shaft Rem val (¾ & 1-Ton): Remove eight capscrews and lockwashers in axle shaft flange, install two ½"x13" screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft, withdraw shaft from housing, remove and discard gasket *Use new gasket when installing shaft.*

►*CAUTION* Thoroughly clean all lubricant from axle shaft flange and end of wheel hub before installing axle shaft *Grease at this point will cause loosening of axle shaft flange capscrews.*

Axl Shaft Removal (1½ & 2-Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover. J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. *NOTE*—When reinstalling axle shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align splines on shaft with both wheel hub and differential side gear splines), use new hub gasket.

►**Axl Shaft N te:** Shafts unequal length (rightshaft longer than left). Install in correct position.

Wh l B aring Adjustment: Remove wheels and axle shafts (see above) Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight, using special wrench J-2222 (¾ & 1-Ton), J-870 (1½ Ton), J-5670 (2-Ton) while turning hub by hand, then back off nut 45°, check for free turning, install adjusting nut lock with lock tangs aligned with slots in adjusting nut Bend tang down into notch in adjusting nut, install locknut and tighten securely Bend tang of lock down into notch of locknut

HEAVY DUTY FULL-FLOATING (2-TON & LCF MODELS)

Own. Full floating, hypoid gear, roller pinion bearings (straddle mounted pinion), with Hotchkiss drive.
See "Ch vrolet Truck Heavy Duty Hypoid Full Floating" in Rear Axle Section.

Rati s—Same as for "Standard Full-Floating" above.

Backlash— 005- 008".

Rem val Of R ar Axl Assembly: Same as for "Standard Full-Floating" above

Axle Shaft R moval: Same as for 1½ & 2-Ton "Standard Full-Floating" above.

►**Axl Shaft Not :** Shafts unequal length (right shaft longer than left). Install in correct position.

Wh el Bearing Adjustm nt: Same as for "Standard Full-Floating" above

PLANETARY 2-SPEED

Own. Full-floating, two-speed planetary reduction type. with hypoid primary pinion and ring gear.
See "Ch vrolet Truck Planetary 2-Speed" in Rear Axl Section.

►*NOTE: Two gear ratios available as follows:*

Power Rati —6.40-1 (high), 8.72-1 (low). 32:5 Primary gears

Speed Ratio—5.83-1 (high), 7.95-1 (low). 35:6 Primary gears.

Two-Speed Shift Control: Vacuum power type with control on gearshift lever.

Carrier Assembly Removal: *See "Chevrolet Truck Planetary 2-Speed" in Rear Axle Section.*

Axle Shaft Removal & Wheel Bearing Adjustment: Same as for "Standard Full-Floating" above.

SHOCK ABSORBERS

Delco. Direct Acting (Airplane Type) shock absorbers as follows:

Front Shocks

Model	Delco No.
½, ¾, 1 Ton	820R
2 Ton School Bus	682Z

Rear Shocks

Model	Delco No.
½ Ton (114")	800W
½ Ton (123¼")	800Z
¾ Ton	800Z
1 Ton	684U
1½ Ton	660U
2 Ton School Bus (Exc. H.D.)	660U
2 Ton School Bus (H.D.)	660W

FRONT SUSPENSION

Conventional "I" Beam section, with Reverse Elliott ends and semi-elliptic springs.

Kingpin Inclination – 6-8°

Caster (At designed load) – See Table below.

Camber – 1°.

Toe-In – See Table below.

Model	Caster	Toe-In
3100, 3200	1½°	1/8-7/32"
34, 35, 37, 40, 5000	2°	1/4-7/32"
3600	1½°	1/4-7/32"
3800, 6000	2¼°	1/4-7/32"

STEERING

Manual: Saginaw Ball Bearing Worm & Nut (recirculating ball).
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Bendix Linkage Type – *See "Chevrolet Truck (Bendix)" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

►*NOTE: Two different type brakes used on trucks as indicated below.*

Chevrolet-Bendix (Except Rear Wheels of 1½ & 2-Ton Models—Duo-servo, single anchor, hydraulic (without eccentric adjustment).
See "Chevrolet-B ndix Hydraulic" in Brake Section.

►*HALF-TON TRUCK BRAKE SHOE GRINDING CAUTION:* If bench type grinder used, grind shoes to .057" to .087" smaller diameter than drum size. If spindle type grinder used, grind shoe to drum diameter.

Ch vrol t-Twinpl x (R ar Wheels 1½ & 2-T n M d ls)—Two-cylinder, four-anchor type hydraulic Shoes are self-centering and self-energizing
See "Chevrolet Twinplex" in Brake Section.

Wheel Cylinders— Size stamped on housing under adjusting lock spring.

Drums—Cast iron with steel web.

Drum Diameter

Model	Front	Rear
½-Ton	11"	11"
¾-Ton	12"	12"
1-Ton	12"	14"
1½ & 2-Ton	14"	15"

Lining—Molded type. Riveted on 1½ & 2-Ton Models and bonded on all others.

Thickness & Width

Model	Thickness	Width
½-Ton (Front Whl)	202-.222"	2"
½-Ton (Rear Whl.)	.202-.222"	1¾"
¾-Ton (Front & Rear)	264-.284"	2"
1-Ton (Front Whl)	264-.284"	2"
1-Ton (Rear Whl.)	.267-.287"	2½"
1½ & 2-Ton (Front Whl.)	.267-.287"	2½"
1½ & 2-Ton (Rear Whl)	.392- 412"	4"

Clearance—Adjust for clearance as follows.

All Models (Except 1½ & 2-Ton Rear Brakes)—Remove adjusting hole cover and turn brake adjusting screw until light drag is felt, then back off adjusting screw 7 notches (Half-Ton Models), or just enough to eliminate brake drag (Other Models), but not more than 7 notches.

Rear Wheels (1½ & 2-Ton Models)—Remove adjusting hole covers from flange plate and turn rear adjusting screw until slight drag is felt, then back off 3 notches. Repeat on front adjusting screw (2 adjustments on each wheel)

Parking Brakes: Hand lever applies rear wheel service brakes on Half-Ton & ¾-Ton Models, and an independent brake on propeller shaft on all other models.

Adjustment (½ & ¾-Ton Models)—*See "Chevrolet-Bendix Hydraulic" in Brake Section.*

Adjustment (1, 1½, 2-Ton Models & ¾-Ton with 4-Spe d Transmission)—*See "Chevrolet Twinplex" in Brake Section.*

Master Cylinder: Located under floorboard on left hand side of truck

Checking Fluid—Maintain fluid level to lower edge of filler hole.

Removal—Remove from below. *CAUTION*—On 1½ & 2 Ton Low Cab Forward, spacer between cylinder and body bracket will fall out when mounting bolts removed.

Installation—Reverse removal procedure. On LCF Models make sure the spacers are reinstalled

Power Brakes: *See "Hydrovac Power Unit" in Brake Sect.*

Removal—Remove vacuum line, brake fluid line to wheel and master cylinders, and air cleaner hose from vacuum unit. Remove nuts and bolt securing unit to its bracket on right side rail of frame.

MISC. MECHANICAL

Windshi ld Wip rs: Linkage type. Vacuum motor (Std. Equip.). Electric motor (Optl. Equip.).
See "Windshield Wipers" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

ALL ENGINES	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	①85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	35
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Single Shaft)	30
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover	25
Engine Front Cover	15
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	50

①—Use of lockwashers discontinued during 1956 model year Be sure to use lockwashers on reassembly of bearing caps which had lockwashers to prevent bottoming of screws

ENGINE

ENGINE ASSEMBLY REMOVAL: Drain cooling system, remove battery. Remove fan shroud, radiator, and hood. *(NOTE* - Before removing hood, scribe outline of hinge brackets to insure proper adjustment when reinstalling.) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor. Attach engine lifting Tool C-3466 to carburetor flange studs on intake manifold and attach chain hoist to fixture eyebolt. Raise car and disconnect propeller shaft at transmission Disconnect wires and linkage at transmission. Disconnect wires and linkage at transmission and clutch. Remove exhaust pipe (make sure exhaust system is supported while engine is removed). Drain engine and transmission oil. Remove rear crossmember-to-transmission support attaching bolts. *(NOTE* - Place a roll-away jack under transmission to relieve weight from crossmember. Place a wood block between head of jack and transmission to avoid damaging transmission oil pan. Jack must support weight of rear of engine and must be able to roll with engine as engine is removed). Remove crossmember-to-frame bracket attaching bolts. Remove crossmember and rear engine support. Lower car to convenient working height, then remove engine front support mounting bolts. With chain hoist, raise engine and, at same time, work engine out of chassis toward left front fender.

CYLINDER HEAD & MANIFOLD

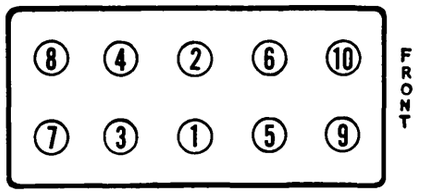
ALL ENGINES

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

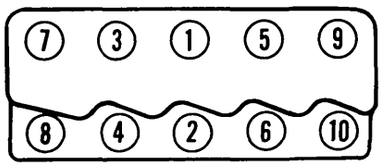
Tightening Torque—See Tightening (Torque Wrench) Specifications above

V8 ENGINES – SINGLE ROCKER SHAFT

CYLINDER HEAD INSTALLATION (Single Rocker Shaft): Before cylinder head removed, remove



V8 ENGINES (DOUBLE ROCKER ARM SHAFT)



V8 ENGINES (SINGLE ROCKER ARM SHAFT)

rocker shaft assembly Slide out push rods and place them in sequence in a suitable rack in order that each push rod can be reinstalled in its original position When installing cylinder head, use new gaskets Make sure all holes are punched out Be certain cylinder head enters both dowel guide pins in cylinder block Tighten cylinder head bolts in sequence shown in diagram Slide push rods in position Lower rocker shaft assembly down on two locating studs Install all washers, nuts and bolts *CAUTION*—Extreme caution must be exercised when tightening rocker shaft bolts and nuts so that hydraulic tappets have time to bleed down to their operating length If tappets are forced down too rapidly, damage to push rods, tappet bodies or rocker arms will result

V8 ENGINES – DOUBLE ROCKER SHAFT

CYLINDER HEAD INSTALLATION (Double Rocker Shaft): Use new gaskets when installing head. Insert cylinder head bolts into rocker arm support brackets. Insert pushrods through holes in head (short rods in upper holes - intake, long rods in lower holes - exhaust). Place rocker arm assemblies in position on heads, then position pushrods. Starting at top center, tighten all cylinder head bolts to correct torque (see Tightening Specifications above). Install exhaust manifolds, crankcase breather tube, and intake manifold. *NOTE* - When installing intake manifold, insert short bolts in holes on extreme ends of manifold.

CRANKSHAFT & MAIN BEARINGS

ALL ENGINES

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap Tap seal down in position with Tool C-3511 until tool is seated in bore Hold tool down and cut off protruding ends flush with cap Install bearing insert and both cap seals The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine

ENGINE FRONT COVER

V8 ENGINES – SINGLE ROCKER SHAFT

ENGINE FRONT COVER (Single Rocker Shaft Engines): Proceed as follows

Removal: Drain and remove radiator Disengage fan belt and remove generator Install Tool C-3033 over pulley and force pulley off end of crankshaft Support engine with suitable chain hoist fastened to intake manifold Remove motor support "U" bolts and nuts Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads Lift water pump housing, water pump, front motor support and insulator up and away from front of engine Discard gaskets Loosen bolts that hold oil pan to cylinder block Drop pan slightly to clear chain case cover Disconnect inlet and outlet fuel lines at fuel pump Remove bolts that hold pump to chain case cover Slide pump out and away from engine Discard gasket Remove bolts and washers from cover Disengage cover from locating dowels, remove from engine Discard gasket.

Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs Install new gasket and position cover locating dowels Coat screws with suitable sealer and tighten to 15 ft lbs *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil

V8 ENGINES – DOUBLE ROCKER SHAFT

ENGINE FRONT COVER (Double Rocker Shaft Engines): Proceed as follows

Removal: Remove water pump Remove vibration dampener retainer bolt and washer Remove two of the vibration dampener pulley bolts and install puller Tool C-3033 Remove crankshaft pulley and vibration dampener as an assembly Remove felt dust seal and vibration dampener hub key from crankshaft slot Remove left cylinder bank exhaust pipe Disconnect fuel lines at fuel pump, remove fuel pump Remove oil level indicator Remove starter using Tool C-455 Drain engine oil and remove oil pan Remove chain case cover bolts and lockwashers Drive chain case cover off two dowel pins using a soft hammer

Installation: Be sure mating surfaces of cylinder block and cover are clean Apply moderate coat of sealing compound to block and cover faces, install new gasket Make sure crankcase oil slinger is in proper position (flange end pointing toward seal) Position cover on two dowel pins and gently tap cover in place Install cover bolts and lockwashers and tighten to 30 ft lbs Install other items be reversing removal procedure

FRONT OIL SEAL: Remove crankshaft pulley and water pump housing. Loosen oil pan bolts sufficiently until pan clears chain case cover. Install Tool C-3506 and remove seal. Discard seal and retainer. Position new seal and retainer assembly in housing and press into place using Tool C-3506. Seal must be tight against seat surface. *CAUTION* - Always have thin shoulder away from front of cover with stamped case cover, thick shoulder away from front of cover with cast iron cover.

CAMSHAFT & BEARINGS

V8 ENGINES – SINGLE ROCKER SHAFT

CAMSHAFT REMOVAL: Drain radiator, remove radiator and crankshaft pulley Support engine with chain hoist attached to intake manifold Remove engine support U-bolts Remove fan, water pump, and water pump housing assembly Loosen oil pan

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bolts sufficiently in order that oil pan clears chain case cover, camshaft gear hub nut, fuel pump eccentric and dowel Then remove camshaft gear and timing chain Support engine at front of oil pan Then remove intake manifold, distributor, distributor drive gear, tappet chamber cover, rocker cover, rocker shaft assemblies and push rods Use Tool C-3158 to pull out hydraulic tappets If varnish build-up is excessive, use puller part of Tool C-3158 and work tappet out of bore Remove four camshaft thrust bolts, then remove camshaft

V8 ENGINES – DOUBLE ROCKER SHAFT

CAMSHAFT REMOVAL: With intake manifold, tappet cover, pushrods, tappets and timing gears removed, remove distributor. Lift out distributor drive gear and stub shaft. Remove camshaft thrust plate attaching bolts and oil trough. Withdraw camshaft and spacer, being careful not to damage cam bearings with cam lobes.

VALVE SYSTEM

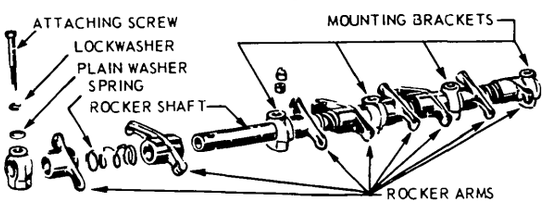
V8 ENGINES – DOUBLE ROCKER SHAFT

EXHAUST VALVE SEAT INSERT REPLACEMENT. Furnished 010" O S Use special Tool C-3140 (Double Rocker Shaft Engines) to remove inserts After inserts have been removed from engine, smooth any roughness of seat with a blunt drift Valve seat inserts should be from 002- 004 larger than counterbore to insure correct fit If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert Place inserts in dry ice for approximately 10 minutes Clean counterbore thoroughly and install a chilled insert with valve side up and drive it into place with Installing Tool C-767

ROCKER ARMS

V8 ENGINES – SINGLE ROCKER SHAFT

ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft). Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down Slide an intake rocker arm over shaft and down against bracket, with diagonal slant of arm close to bracket Then slide a spacer spring over shaft



ROCKER ARM ASSEMBLY (SINGLE ROCKER ARM SHAFT)

and down against intake rocker arm Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed Slide push rods into push rod holes Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head Install flatwashers and nuts

V8 ENGINES – DOUBLE ROCKER SHAFT

ROCKER ARM ASSEMBLY (Double Rocker Arm Shaft):

Removal: Remove rocker arm covers Place cotter pins in holes of first and last rocker arm brackets to last rocker arm brackets (if not already there) to prevent springs on rocker from pushing assembly apart when cylinder bolts removed Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block Grasp support bracket at each end of head pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068 *CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.*

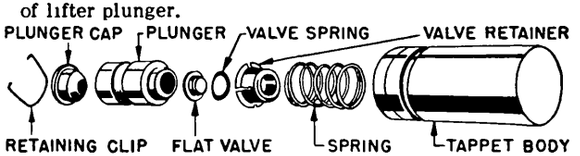
Installation Insert cylinder head bolts in brackets, with **short** bolts in intake side Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes) Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above *When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.* Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly

HYDRAULIC VALVE LIFTER

ALL ENGINES

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type)

Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body. Oil is introduced to this unit through hole in side of lifter plunger.



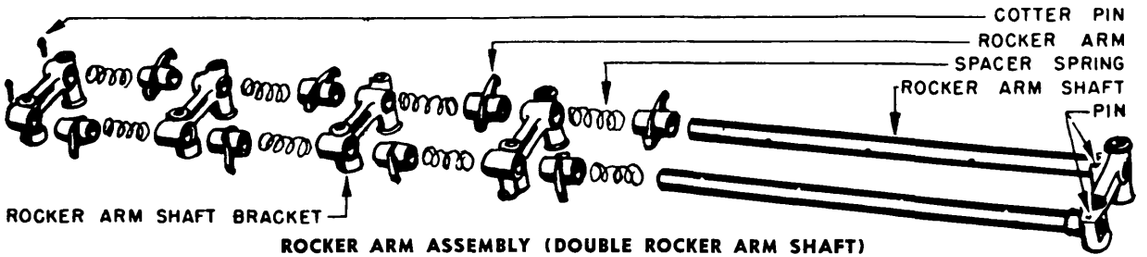
V8 ONE-PIECE VALVE LIFTER

Removal (Single Rocker Arm Shaft Engine): Remove rocker covers, then remove bolts, nuts and flatwashers holding shaft to heads. Lift rocker shaft and arms straight up and away from heads. Drain cooling system to point below level of intake manifold. Remove carburetor air cleaner, disconnect fuel and vacuum lines, overdrive kick-down switch wires and accelerator linkage at carburetor. Disconnect coil wires and disconnect heat indicator wire at intake manifold. Disconnect heater hose and automatic integral choke heat tube at carburetor. Remove intake manifold bolts, then lift intake manifold, coil and carburetor straight up and away from engine. Discard gaskets (*CAUTION* - Cover intake ports in cylinder head to avoid entry of dirt). Remove crankcase ventilator pipe and gasket. Remove tappet chamber cover bolts. Lift cover up and away from engine. Discard gaskets. Insert hooked portion of Tool C-3158 into hole in tappet body (this portion of tool can be used to remove tappets without a varnish build-up at lower part of tappet body). Lift tappet out of bore. If lifter sticks in bore, slide puller portion of Tool C-3158 through cylinder head (pushrod) openings and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and slowly pull tappet out of bore with sharp twisting motion. As tappet clears bore, withdraw puller pin and puller tool, then lift tappet out of chamber.

Removal (Double Rocker Arm Shaft Engine): Drain cooling system to a point below level of intake manifold. Install valve spring compression Tool C-3024 over rocker arm so heel of tool rests on valve stem side. Make certain valve is seated and tappet body is resting on low point of camshaft lobe (see below). Using handle of tool for leverage, compress valve springs sufficiently to raise rocker arm above pushrod. While holding rocker arm in this position, slide rocker arm to one side along tube (*CAUTION* - To avoid damage to valves, be sure piston head is well below top of travel before compressing valve springs). Remove carburetor air cleaner, disconnect coil wires and wire from heat indicator sending unit. Disconnect heater hose and carburetor heat tube at integral choke. Remove intake manifold, coil and carburetor as an assembly. Remove tappet chamber cover and gasket. Insert hooked portion of Tool C-3216 into hole in tappet body (this portion of tool can be used to remove tappets without varnish build-up). Lift tappet out of bore. If tappet sticks, slide puller portion of tool C-3316 through cylinder head (pushrod) holes and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and pull tappet out of bore with twisting motion.

Disassembly: *(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)* Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting Check to see that valve exerts a slight pressure on valve spring to insure valve seating Clean lifter assembly in clean solvent and remove all traces of varnish and carbon Blow parts dry with air DO NOT USE A CLOTH

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ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

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AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene (*CAUTION*—Container and kerosene must be absolutely clean) Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing This will prevent possible scoring of lifter plunger when engine is first started

Reassembly: Reverse disassembly procedure as noted above

LOW POINT OF CAMSHAFT LOBE. Remove distributor cap, noting position of rotor for Nos 1 and 6 cylinders Set timing mark "DC" located on crankshaft pulley to pointer With rotor at No 1 firing position, the following lifters will be on the low side of the cam lobe No 2 intake and exhaust, No 4 exhaust, No 7 intake, No 8 intake and exhaust (*NOTE*—To remove No 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed) With rotor at No 6 position, following lifters will be on low side of cam lobe No 3 intake and exhaust, No 4 intake, No 5 intake and exhaust, No 7 exhaust (*NOTE*—To remove No 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed)

OILING SYSTEM

OIL PUMP

ROTOR TYPE OIL PUMP. Removal—Drain engine oil, remove oil pan Remove oil pump mounting bolts and lower pump straight down

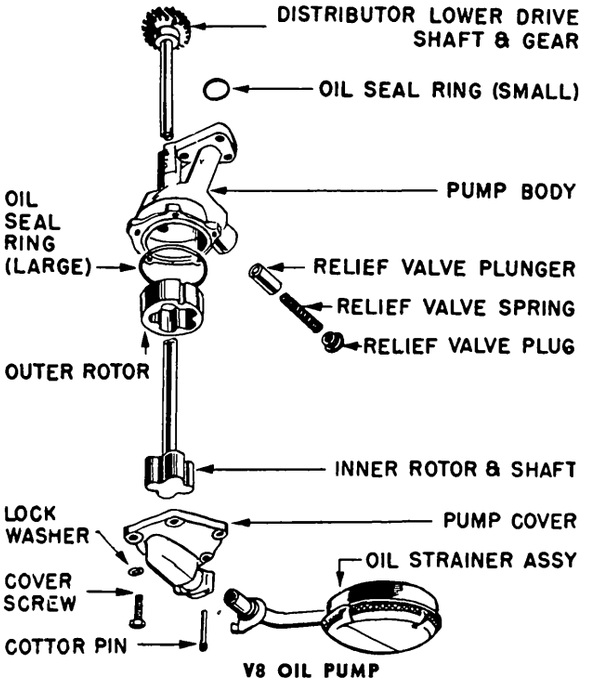
Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe Remove cover bolts and cover Discard oil seal ring Remove pump rotor shaft and lift out pump outer rotor Remove oil pressure relief valve plug and lift out spring and plunger Wash all parts in a suitable solvent and inspect for damage or excessive wear Check all pump parts as follows

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers If diameter less than 2 244' or thickness less than 998 , replace both inner and outer rotors

Inner Rotor—Measure thickness of inner rotor with micro-calipers If thickness measures less than 998 , replace both inner and outer rotors

Rotor Depth—Slide rotors in pump body Place a straightedge across pump body Use a feeler gauge and measure clearance between top of rotors and straightedge If clearance in excess of 004", replace pump body

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors If clearance



V8 OIL PUMP

in excess of 010 , replace both inner and outer rotors

Reassembly: Use new oil seal ring between cover and body Tighten cover bolts to 10-15 ft lbs Prime pump and then install new oil seal ring in pump mounting face

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

IGNITION NOTES

ALL ENGINES

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block

Installation: Slide new bushing over burnishing end of Tool C-3053 Insert tool and bushing into bore of block Drive bushing and tool down into position, using a soft hammer As the burnisher is pulled through the bushing by pressure applied to puller nut tool will wedge bushing tight in its bore and will burnish bore to correct size *DO NOT REAM THE BUSHING*

DISTRIBUTOR BASIC TIMING Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows Rotate crankshaft until No 1 cylinder is at TDC (or firing position) When cylinder is in this position the pointer on chain case cover should be over "DC" on vibration dampener Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear Coat shaft of drive gear with engine oil Install it so that after the gear spirals into place it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase)

PROPELLER SHAFT

PROPELLER SHAFT CENTER BEARING. To remove assembly remove nuts and lockwashers from differential and transmission companion flanges to free propeller shafts at front and rear Take out four center bearing housing-to-frame crossmember mounting bolts remove propeller shaft and center bearing as an assembly

BRAKE NOTES

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released Disconnect front end of propeller shaft and remove adjusting screw cover plate Loosen brake cable guide clamping screw and back off cable adjusting nut Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx 010" clearance (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve) The cable length adjusting nut should be positioned against cable housing so there is at least 005" (but not more than 010") clearance between operating lever and brake shoe cable To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car Install adjusting screw cover plate and connect propeller shaft

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for 015- 020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw Loosen guide bolt locknut and adjust guide bolt adjusting nut for 015- 020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut Turn large adjusting bolt nut (on lower end of bolt below springs) for 015- 020" band to drum clearance for upper half of band Groove in upper end of this nut must contact ridge on band operating lever spacer above nut
NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed 005" (if clearance excessive band may be distorted when brake applied) To correct, compress saddle in vise or place on block and tap lightly with a hammer.

►*1956 AIR CONDITIONED CAR SERVICE CAUTION: Use xtreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning "Misc llan us Cauti ns" in Miscellaneous Section.*

MODEL IDENTIFICATION

S ri s	Model Identification
Windsor	C-71
New Yorker	C-72
Chrysler 300B	C-72-300
Imperial	C-73
Crown Imperial	C-70

SERIAL NUMBER: Stamped on metal plate attached to left front door hinge post.

Starting S rial Nos.	Detroit	Los Angeles
Windsor V8	W 56 1001	W 56 L 1001
New Yorker V8	N 56 1001	N 56 L 1001
Imperial & Crown Imp.	C 56 1001	
Chrysler 300B	**3N 56 1001**	

ENGINE NUMBER: Stamped on boss on top of cylinder block just back of water pump.

Starting Engin N s. W E 56 1001 (Windsor), N E 56 1001 (New Yorker), C E 56 1001 (Imperial & Crown Imp.). **3 N E 56 1001 (Chrysler 300B).**

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A"—All Cylinders .020" oversize.

"B"—All Crankshaft Journals .010" undersize.

"AB"—Both above conditions exist.

"MALTESE CROSS" (3/8" high)—ONE OR MORE crankshaft Journals .001" undersize. *See "Connecting Rods" and "Crankshaft" below.*

"DIAMOND" (3/8" high)—ALL valve lifters .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: 140-170 lbs. (C-71), 150-180 lbs. (Others), at 150 RPM with plugs removed. Variation limit 15 lbs.

VACUUM READING: 18-21" idling.

VALVE TAPPET CLEARANCE: (C-70, C-71, C-72, C-73) No adjustment required in service (hydraulic lifters).

(C72-300) Intake .015", Exhaust .024", HOT. Intake .015", Exhaust .028", COLD.

MANIFOLD HEAT CONTROL: *NOTE* - Before installing valve on engine, lubricate valve shaft with graphi grease.

(C71 Standard): Single exhaust on right cylinder block with thermostatically controlled valve. Install heat control valve with counterweight toward front of engine and small anti-rattle spring retaining pin toward rear and adjacent to cylinder block.

(C70, C71 with P w r Pack, C72, C73, C-72-300): Dual exhaust system used. Heat control valve is in right exhaust pipe.

Coil Spring Installation - Position valve shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer end of tongue of spring in upper left hand position. Press inner end of coil into slot of shaft and seat firmly. Move outer end tongue of spring around and hook under pin (left pin when facing coil end of valve).

Counterweight Installation - Place counterweight over shaft (shield upward) and insert lock in shaft slot. Center counterweight on shaft and turn weight on shaft until seated. Install stop, and tighten nut securely with tool T-109-173.

►*DUAL EXHAUST NOTE:* When valve is closed most exhaust gases are discharged through the left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plugs-Auto-Lite AR-52 (C71), AGR-42 (C70, C72, C73), AGR-41 (C-72-300), AGR-31 (C-72-300 with 10 to 1 optional head). 14 mm. Tighten plugs to 30-32 ft.lbs.

COIL: Auto-Lite CAD-4002, CAD 4003, CAH-4001. *12 Volt.*

Ignition Current—2.5 Amps. idling, 3.1 stopped.

Resistor—Auto-Lite PU-4002. Connected in circuit between "IGN" terminal of Horn Relay and (+) terminal of coil. *Resistor must be in circuit when testing coil output.*

DISTRIBUTOR: Auto-Lite. *12 Volt.* As follows:

Model	Auto-Lite No.
C71 (Std.) Early	① IBJ-4303A
C71 (Std.) Later	① IBJ-4303C
C71 (Power Pack - To Eng. WE-56-13366)	② IBK-4301A
C71 (Power Pack - After Eng. WE-56-13366)	① IBJ-4303C
C70, C72, C73	② IBK-4301A
C72-300	② IBK-4301C

①- Single breaker distributor.
②-Double breaker distributor.

Condenser - Auto-Lite IBB-2015R. **Capacity** .25-.28 mfd.
Contact Point Set - Auto-Lite IGW-3028MS (IBJ Distr.), IGW-3028KS (IBK Distr.).
Breaker Gap - .017" ± .002".
Cam Angle (IBJ) - 31° ± 3°. Do not set contact gap outside limits to obtain specified cam dwell.
Cam Angle (IBK) - 38° ± 3° with both sets of contacts. Do not set contact gaps outside limits to obtain specified cam dwell.

Breaker Arm Spring Tension—17-20 ozs.
Rotation—Clockwise viewed from above.

Automatic Advance (IBJ-4303A)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		375	2		750
5.5		475	11		950
13		1850	26		3700
14		2025	28		4050

Automatic Advance (IBJ-4303C)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300-400	0		600-800
0-4.5		400	0-9		800
4.5-6.7		500	9-13.4		1000
13-15		2025	26-30		4050

Aut matic Advanc (IBK-4301A)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		430	2		860
5		750	10		1500
8		1850	16		3700
9.5		2400	19		4800

Automatic Advance (IBK-4301C)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
1		415	2		830
3.5		450	7		900
7		1025	14		2050
8		1200	16		2400

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance (IBJ-4303A)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6 3/8
1	2	7 1/8
5	10	9 3/4
10	20	14 1/8
11	22	15 1/2

Vacuum Advance (IBJ-4303C)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6-7
2	4	7.25 - 8.25
6.5	13	10-12
10.5-12.5	21-25	17

Vacuum Advance (IBK-4301A)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7 1/2"
1	2	8 1/8"
5	10	10 7/8"
10	20	15 1/8"
11.5	23	17"

Vacuum Advance (IBK-4301C)

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7 1/2
1	2	8 1/4
4	8	10 1/2
7	14	12 3/4
8	16	13 1/2

Distributor Basic Timing & Drive Shaft Bushing: See *"Ignition Notes" in Chrysler Special Data.*

IGNITION TIMING

Model	Std. Setting
C71 (Std.)	2° BTDC
C71 (Powerpack-To Eng. WE56-13366) ①	10° BTDC
C71 (Powerpack-After Eng. WE56-13366) ②	4° BTDC
C70, C72, C73	4° BTDC
C72-300	8° BTDC

①—With Distributor No. IBK-4301-A.
②- With distributor No. IBJ-4303C.

►*TIMING CAUTION (C72-300):* Disconnect distributor vacuum line, set ignition at 8° BTDC and reset engine idle back to 650 RPM.

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Timing Mark - On vibration damper with pointer on left side of front cover.

CARBURETOR

Car Model	Carter Carburetor No.
C70, C72, C73	WCFB 2314S, SA
C71 (Std. Trans,)	BBD 2312S
C71 (PowerFlite)	BBD 2313S
C71 (Power Package)	WCFB 2367S, SA
C72-300	WCFB 2444S (Front), 2445S (Rear)

►*CARBURETOR PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: Later "SA" Carburetors have different specifications. See Carter WCFB 4-Barrel" Carburetors in Carburetion Section.*

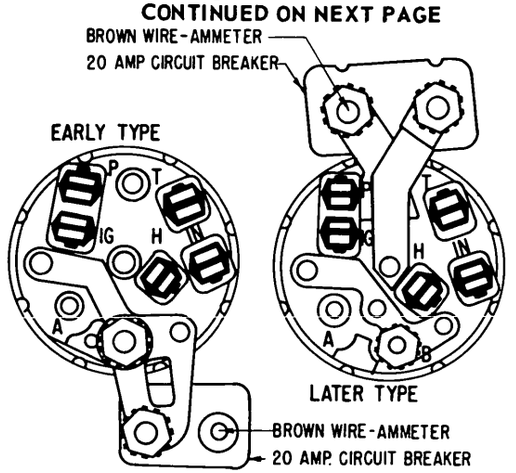
►*IDLE SPEED (AIR CONDITIONED CARS): Summer and winter Idle Speed Adjustments are different and must be made as follows:*

Winter Setting (Air Conditioner not in Operation)– Back off round adjusting nut on diaphragm shaft away from pawl to prevent interference with idle adjustment. Start engine, attach tachometer and with transmission control in neutral ("N") position and engine at operating temperature adjust engine idle to 475-500 RPM.

Summer Setting (Air Conditioner in Operation)–Adjust engine idle as for winter operation, then adjust fast idle device as follows:

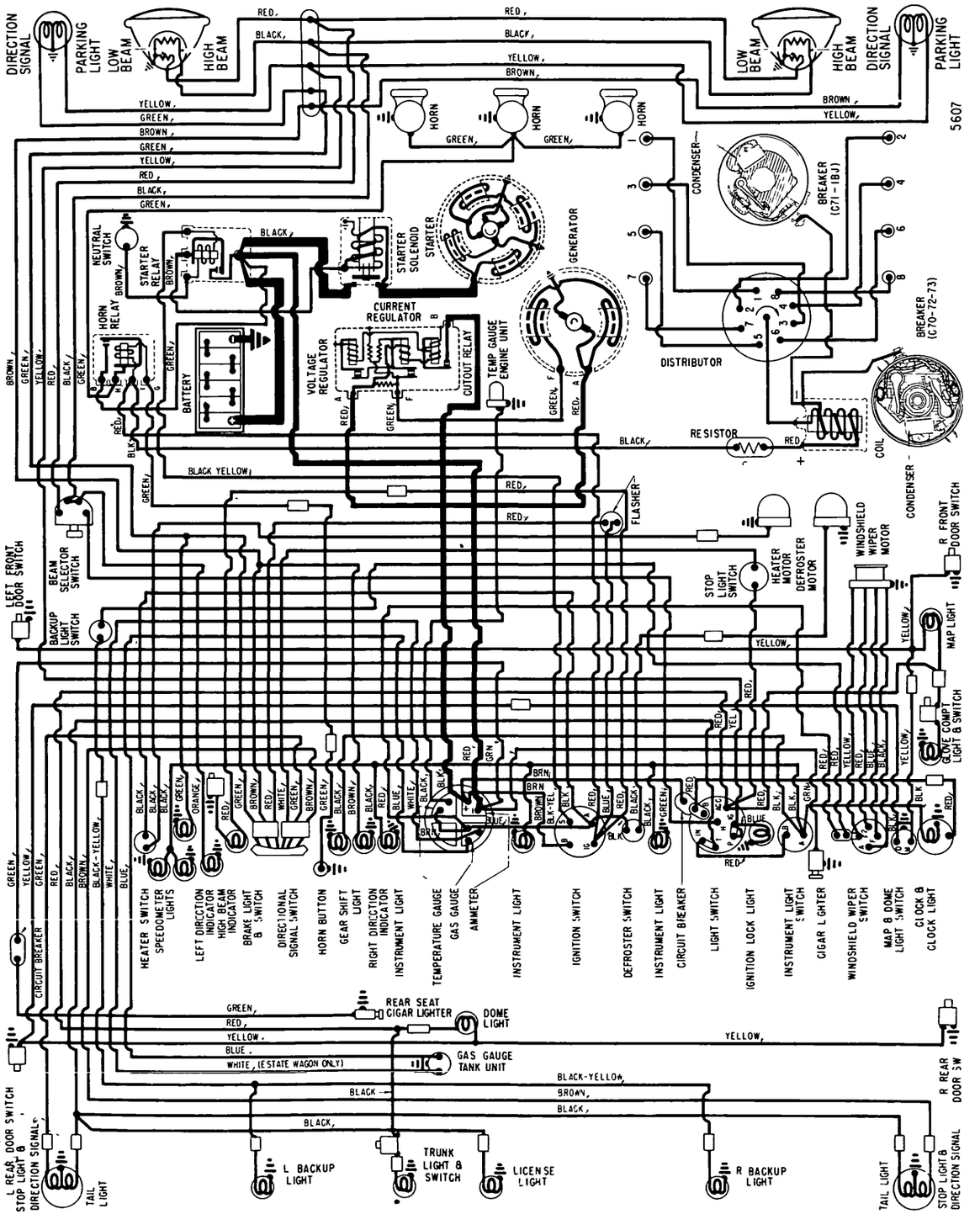
Idle Speed-Up Control Adjustment (Cars with Air Conditioning)–Turn blower control switch to first position, temperature control switch to second position. Adjust round adjusting nut on fast idle diaphragm shaft to increase engine RPM to from 700 to 800 RPM.

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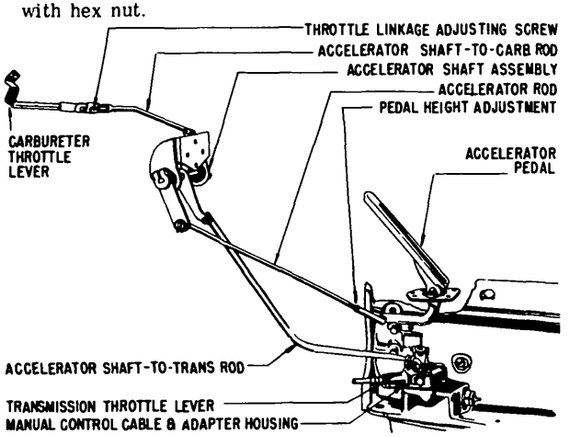
P-YELLOW WIRE TO PARKING LIGHTS
T- BLACK WIRE TO TAIL LIGHTS
IG-BLUE WIRE TO IGNITION LOCK LIGHT
H- GREEN WIRE TO FOOT DIMMER SWITCH
IN-RED WIRE TO INSTRUMENT LIGHT SWITCH
A-RED WIRES TO GLOVE COMPT, TURN SIGNAL & GEARSHIFT LGTS

FIRST & LATER TYPE LIGHT SWITCH



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With hand brake on, move transmission control lever to drive ("Dr") range then back to neutral ("N") position. Readjust fast idle if necessary. Lock round nut with hex nut.



POWERFLITE & TORQUEFLITE THROTTLE LINKAGE

THROTTLE LINKAGE ADJUSTMENT: Check and remove any binding condition in throttle linkage, bring engine up to operating temperature, remove air cleaner to make sure choke is fully opened (off fast idle cam), connect tachometer, adjust idling adjusting screw to give 650 RPM (C72-300B), 475-500 RPM (Others), with transmission in neutral. Loosen throttle linkage screw located on accelerator shaft to carburetor rod, move rear portion of accelerator to carburetor rod rearward until it is stopped by the idle stop on the transmission throttle cam. With rods in line and rear portion of rod lightly pre-loaded, lock throttle linkage adjusting screw to 15 ft. lb. torque.

CARTER B8D 2312S, 2313S
C71 (Exc. Power Package)

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel feeds 1-4-6-7.*

Idl Setting–¼-1¼ turns open. Turn screws out equally for richer mixture.

Idle Speed - 500 RPM. *For "Idle Speed Setting" and "Idl Speed-Up Contr l Adjustment" on Air Conditioned Cars, s CARBURETOR above.*

Float Lev l - 1/4" (Gauge T109-282) between top of each float and top surface of body casting. *NOTE* - This supersedes previous 7/32" setting.

Acc l rating Pump–Install throttle connector rod in center hole (medium stroke) of throttle lever and inner hole of pump arm.

Fast Idl Cam Setting: .020" (Gauge T109-29) between lip of fast idle cam and boss on casting, with choke valve closed and lip on inner choke shaft lever contacting .lug on outer lever. Adjust by bending lip on inner choke shaft lever. On late carburetors, align index mark on cam with adjusting screw.

Fast Idle Throttle Cl arance: .015" (Gauge T109-44) between lower edge of valve and bore of carburetor with adjusting screw on high step of cam.

Aut matic Chok Setting: (2312S) Centered - set at index. (2313S) Set 1 point rich.

Slow Closing Throttle (Dashpot) Adjustment: 1/16" between shaft and operating lever with throttle valves closed and plunger shaft bottomed. Adjust by loosen-lock nut and turning dashpot unit in or out.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter BBD" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 6-7 lbs.

CARTER WCFB 4-BARREL

No. 2314S, SA (C70, C72, C73)
No. 2367S, SA (C71 Power Package)

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels feed 1-4-6-7.*

Idle Setting - (2314S, SA) 1-2 turns open, (2367S, SA) 3/4-1 3/4 turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed - 500 RPM in neutral.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter WCFB 4-Barrel" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 6-7 lbs.

CARTER WCFB 4-BARREL

No. 2444S (Front), 2445S (Rear)
(C72-300)

Idle Setting - 1/4-1 1/4 turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed–650 RPM. Selector lever in neutral.

Idle Adjustment–Connect tachometer to engine and set hand brake. Place selector lever in neutral, warm up engine to operating temperature with choke fully released and carburetor on slow idle, adjust both idle screws until a smooth engine idle is obtained at 600-650 RPM. **To synchronize both carburetors,** remove throttle control rod and throttle connector rod. Install connector rod studs and return springs. Starting with closed throttle valves, open each an equal amount, open all four mixture screws **one turn.** Start engine and adjust speed of 600-650 RPM. Install connector rod, adjusting length so there is slight end play and no binding with both carburetors at idle. Attach throttle control rod, making sure it is adjusted so that the carburetor position is not disturbed.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter WCFB 4-Barrel" Carburetor in Carburetion Section.*

Fuel Pump Pressure: 6 - 7 lbs.

CARB. EQUIPMENT

Fuel Pump: Carter M961S (Early), M2413S (Later). Mechanical type.

Pressure - 6-7 lbs.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Auto-Lite Electric Type.

Dash Unit - 14046A (Exc. Sub. & Est. Wgn.), 13705A (Sub. & Est. Wgn.)

Tank Unit - 13970A (Exc. Sub. & Est. Wgn.) 13872A (Sub. & Est. Wgn.)

See "Fu l Gaug s" in Carbur tion Secti n.

BATTERY

(C71) Auto-Lit 11-HS-60 r Willard HO-11-60. *12 Volt.* 11 plate, 60 ampere hour capacity.

(Others) Auto-Lite 12H-70. *12 volt,* 13 plate, 70 ampere hour capacity.

Grounded Terminal - Negative.

►*CAUTION:* This is reversed from previous models.

Engine Ground - Left front of engine

STARTER

Auto-Lite MDF-6001. *12 Volt.* **Armature** - MDF-2006.

Drive - Overrunning clutch (solenoid pinion shift).

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 42-53 ozs. (new brushes).

Performance Data - MDF

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10.0	60 max.
6.5 ft.lbs.min.	Lock	4.0	240 max.

Starting Switch: Auto-Lite SAD-4001. Solenoid pinion shift and starting switch used with neutral safety switch (on transmission - Auto.Trans. cars) and SEPARATE relay, Auto-Lite RAJ-4001, mounted on fender splash shield. *See "Starter Controls" in Electrical Section.*

Neutral Safety Switch Adjustment: *See "PowerFlit " or "Torque-Flite" Transmission in Transmission Section.*

GENERATOR

Car Model	Auto-Lite Generator	Armatur
C70 (Pow. St.)	GGA-6002B	
C70 (Pow. St. & A.C.)	GGA-6002B, C	
Others (Std.)	GJC-7002A, B	GJC-2030 F
Others (Pow. St.)	GJC-7003A, C	GJC-2090 F
Others (Air Cond.)	GJC-7006A, B	
Others (Air Con d.)	GHM-6004C	
Others (P.S. & A.C.)	GJC-7003A, C	GJC-2090F
Others (P.S. & A.C.)	GHM-6003B	

►*SPECIAL GENERATOR NOTE:* GGA, GHM, and GJC type generators used. Performance specifications below apply equally to all generators, within any one of the three groups specified.

Performance Date - GGA - 12 Volt

Amperes	Volts	RPM 70 F.
4.0	14.6	950 max.
40.0 ℄	14.6	1600 max.
40.0 ℄	15.0	1600 max.

Performance Data - GHM - 12 Volt

Amperes	Volts	RPM C ld
5.0	14.0	875 max.
25.0 ℄	14.0	1325 max.
30.0 ℄	15.0	1350 max.

Performance Data - GJC - 12 Volt

Amperes	Volts	RPMC ld
20.0 ℄	15.0	1750 max.
30.0 ℄	15.0	2050-2250

℄ - Do not operate at high output without ventilating fan for any length of time. To do so may result in burned armatures and fields.

Fi ld Curr nt - (GGA, GHM) 1.1-1.3 amperes at 10.0 volts, (GJC) 1.2-1.3 amperes at 10.0 volts. Readings at 70° F.

Mot ring Curr nt - (GGA) 2.3-2.6 amperes. 3.1-3.5

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amperes with felt oil seal in drive end head. (GHM) 3.0-3.5 amperes. (GJC) 3.4-3.9 amperes, all at 10.0 volts (70° F).

Rotation - Counter-clockwise at commutator end.

Belt Adjustment: Adjust generator so belt deflection midway between pulleys is ¼" with 9-12 lbs. pressure.

REGULATOR

Auto-Lite. *12 Volt.* Used with generators as follows:

Auto-Lite Regulator No.	Generator Type
VAT-6201A	GGA
VRX-6003B	GHM
VRX-6201A	GJC

Cutout Relay

Cuts In - 13.0-13.7 volts (VRX), 13.0-13.75 volts (VAT).

Cuts Out - 8.2-9.3 volts (approx. 3-5 amps. discharge)

Contact Gap - .015".

Air Gap - .031-.034".

Voltage Regulator

Setting - 14.5 volts at 80° F. while charging at 10.0 amperes or with .25 ohm resistor in series between regulator and battery.

Air Gap - .048-.052" with contacts just opening.

Checking & Adjusting - *See Electrical Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A - Operating Amperes	Test B
VRX	36 Max.	30 (28-32)
VAT	46 Max.	40 (38-42)

Test A - After 15 minutes operation charging at 10 amps.

Test B - After additional 15 minutes operation on current regulator (with load applied to hold voltage at 13.7-13.9 volts (VAT), 13.6-13.8 volts (VRX).

Air Gap - .048-.052" with contacts just opening.

Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Direction Signal: *See Electrical Section.*

Headlight & Panel Light Switch Removal: Remove knob on headlight switch after removing recessed head screw, then remove panel light switch control (indexed on its shaft by lugs in tab plate and slots in shaft). Remove hex nut from threaded sleeve, then remove switch (switches) from instrument panel.

Stop Light Switch Location: On forward end of master cylinder.

►*IGNITION-STARTER SWITCH CAUTION:* When installing accessories, use accessory terminal **only** on ignition-starter switch and **not** the ammeter terminal post.

CIRCUIT BREAKERS: Lighting - Three circuit breakers on back of lighting switch. Protect circuits as follows:

15 Ampere (Early), 20 Ampere (Later) - Protects Head and Beam Indicator Lights.

6 Ampere - Protects Parking, Tail, License Plate, Instrument, Ignition and Clock Lights.

6 Amper - Protects Stop, Map, Dome, Glove Compartment, Courtesy and Trunk Compartment Lights.

Windshield Wiper & Back-Up Lights: 5 Ampere. Mounted on rear of windshield wiper switch.

Window Lifts: 20 Ampere. Mounted behind left front kick panel.

Four Way Seat: 15 Ampere. Mounted behind left front kick panel.

HORNS: Auto-Lite, Jubilee, or Sparton. Dual horns with relay. *12 Volt.*

Auto-Lite - (High Pitch) HAD-4717, (Low Pitch) HAD-4029.

Horn Relay: Auto-Lite RAH-4002. *12 Volt.*

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ENGINE NOTE: Two types of engines used. Spitfire (single rocker shaft engine) used on C71 Windsor models. Fire Power (double rocker shaft engine) used on other models.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Model	Bore	Stroke	Displacement
C71	3.81"	3.63"	331 cu. ins.
Others	3.94"	3.63"	354 cu. ins.

Model	Compr. Ratio	Rated HP	Dev. HP & RPM
C71	8.5	46.5	225 at 4400
C71 (Pwr.Pkg.)	8.5	46.5	250 at 4600
C72-300	9.0	49.7	340 at 5200
C72-300 (Optl.Hd.)	10.0	49.7	355 at 5200
C70, C72, C73	9.0	49.7	280 at 4600

Compression & Vacuum Reading - *See TUNE-UP.*

OIL PAN REMOVAL: Remove the oil lever indicator, crankcase plug and drain lubricating oil. Disconnect steering linkage at idler arm support bracket, and allow linkage to settle away from bottom of oil pan. Remove bolts that hold oil pan to cylinder block, slide pan out and down away from engine.

►*C71 NOTE:* On C71 (with single exhaust), disconnect crossover and "Y" pipe at exhaust manifolds and at clamp to exhaust extension so that crossover and "Y" pipe can be moved out of way. Make sure remainder of exhaust system is sufficiently supported.

ENGINE REMOVAL: *See "Engine" in Chrysler Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Chrysler Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Chrysler Special Data.*

PISTONS

Two types used as follows:

C-71. Aluminum Alloy, thermally controlled by steel band, horizontal slot, elliptically turned, tin plated.

C-70, C-72, C-72-300B, C-73. Aluminum Alloy, slipper type, thermally controlled by steel strut, elliptically turned, tin plated.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore is .020" oversize.*

Weight - **(C71)** 21 ozs., **(Others)** 22.8 ozs.

Removal - Pistons and rods removed from above.

Clearance - **(C71)** .00075-.00125" at top of skirt, **(Others)** .00075-.00125" measured 1.5" from bottom of skirt.

Fitting New Pistons: Insert piston in bore, upside down, with .002" x 1/2" feeler stock between thrust face of piston and cylinder wall. Pull required to withdraw feeler stock should be 8-12 lbs. at room temperature of 70° F.

Replacement Pistons: Standard, .005", .020", .030", .040", .060" oversize. Fitted pins included with new pistons.

Installing Pistons: Assemble pistons to connecting rod on right hand cylinder bank (2-4-6-8) with indent on top of piston on side opposite to large chamfer at insert end of connecting rod. On left bank (1-3-5-7) assemble with indent on same side as large chamfer at insert end of connecting rod. *See Rod Installation.*

PISTON PINS

Floating type with lock ring at each end. *NOTE* - Pin offset in piston toward right side of engine.

►*PISTON PIN CAUTION:* 1956 pins have thicker wall section and must not be interchanged with 1955 type (will affect engine balance).

Diameter - .9841-.9843". **Length** - 3.140-3.150".

Clearance in Piston—.0000-.0005" or thumb press fit at 70° F.

Clearance in Rod—.0001-.0004". Selective fit.

Replacement Pins: Standard, .003", .008" oversize.

NOTE—Fitted pins are furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775-.0780"	.010-.020"	.002-.0035"
Compr. (#2)	.0775-.0780"	.010-.020"	.002-.0035"
Oil (#3)	.1860-.1865"	.101-.020"	.001-.0025"

C-C-71 Side Clearance #1 .0015-.0030", #2 .0010-.0025, #3 .0010-.003".

C-72-300 RING NOTE - Top compression ring is chrome.

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .040", .060" oversize.

Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length—6 5/8". **Weight** 25.2 ozs.

Crankpin Journal Diameter—2.249-2.250". Out-of-round and taper limits .001".

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals machined UNDERSIZE). See "Crankshaft" below.*

Bearings (Lower) - Steel-backed babbitt (except C72-300 which are Tri-Metal).

C72-300 NOTE - Crankshaft special hardened type.

Clearance—.0005-.0015".

Endplay—.006-.014" (total for both rods).

Replacement Bearings: Standard, .001", .002", .003", .010", .012" undersize.

Installing Rods: (*NOTE*—Connecting rod bores are chamfered more on one side than other. This larger chamfer must be installed toward crankshaft fillet). When installing lower bearing shell, make certain that "V" groove in shell is in line with "V" groove in cap. This allows lubrication of cylinder wall. Bearing shells should always be installed so that small formed tang fits into machined grooves of rod. Oil ring expander gap should be toward outside of "V" of engine.

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Oil ring gap should be toward inside of "V" of engine
See Piston Installation above

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Five bearings. Out-of-round limit .001".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counterweight in following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine)

Bearings - Steel-backed babbitt (except C72-300 which are Tri-Metal)

Clearance - 0005-0015" (except C72-300 Rear Main Bearing - .0015-.0025").

Replacement Bearings: Std., .001", 002", 003", .010", .012" undersize. Upper and lower halves of bearings Nos. 1, 2, and 4 are alike and interchangeable, Upper No. 3 is interchangeable with Lower No. 3, Upper & Lower No. 5 are **not interchangeable.**

End Thrust: Taken by center (#3) main bearing.

Endplay: .002-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chrysler Special Data.*

CAMSHAFT

Journal Diameters—(Nos. 1, 2, 3, 4) 1.998-1.999. (No.5) 1.4355-1.4365".

Bearings—Removable, steel-backed, babbitt lined bushings

Clearance — 001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width 1 1/8". **Pitch** .375". **Length** 68 links.

Camshaft Setting: Timing Check: Marks on gears should be adjacent and in line with straightedge across shaft centers **Chain Installation:** Install chain and gears as an assembly Mesh crankshaft gear in chain with keyway out toward chain, mesh camshaft gear in chain with keyway toward crankshaft gear and mark on gear in line with **23rd chain pin** clockwise from pin at mark on crankshaft gear Install assembly on engine, turning camshaft and crankshaft to line up keys with gear keyways, install fuel pump eccentric (must engage camshaft key), tighten camshaft cupwasher and bolt to 35 ft lbs Check timing as above

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Chrysler Special Data*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Chrysler Special Data*

VALVES

Tappet Clearance: (C72-300) 015" Intake, 024" Exhaust, HOT 015" Intake, 028" Exhaust, COLD

(Others) None in service (hydraulic)

Valves	Head Diam.	Stem Diam.	Length
C71 Intake	1 13/16"	372-373"	4 25/32"
C71 Exhaust	1 1/2"	371-372"	4 3/4"
Others Int	1 15/16"	372-373"	5 1/32"
Others Exh	1 3/4"	371-372"	4 63/64"

Valves	Seat Angle	Lift	Stem Clearance
C73-300 Int	45°	444"	001-003"
C72-300 Exh	45°	435"	002-004"
Others Int	45°	381"	001-003"
Others Exh	45°	357"	002-004"

Valve Seat Width - 1/16-3/32" (Int), 3/64-1/16" (Exh)

►*C71 OVERSIZE VALVE STEM NOTE:* Valves with oversize stems are available in 005", .015", 030" oversize *See Valve Guides below*

►*C72-300 EXHAUST VALVE SEAT INSERT CAUTION: See "Valve System" in Chrysler Special Data*

Intake Valve Stem Oil Seal - Seal installed on intake valve stem after valve is inserted in head and before installation of springs Seal will seat itself in correct position on guide

►*VALVE GRINDING CAUTION:* Valve and seat grinding should not change position of valve in head more than 1/32" from original position Use Gauge C-3436 (C-71), C-3061 (Others) to check distance stem extends through cylinder head If valve tip exceeds maximum allowable on gauge, grind tip as necessary (do not go below minimum allowable on gauge) Improper valve clearance at high speed will result if condition not corrected

Valve Springs: One used on all except C72-300 which used Inner and Outer springs (same as previous models)

Free Length-2" (Except 300B) 1 7/8" Outer, 1 25/32" Inner (300B)

Valve Spring Specifications (C-70,C-71,C-72,C-73)

Valve	Lbs. Pressure	Length
Open	166	1 31"
Closed	72	1 69"

(C 72-300)

	Inner Spring		Outer Spring	
Valve	Lbs.Press.	Length	Lbs.Press.	Length
Open	66	1 09"	158	1 22"
Closed	28	1 53"	60	1 66"

►*CAUTION: Springs must be square within 1/16" (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION* If valves or seats are reground, check **installed** height of spring If height is 1 23/32" or greater install a 1/16" spacer (Part No. 1400482) in the head counter-bore to bring height back to a nominal 1 5/8-1 11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump up" will restrict engine speed and cause valves to burn if valve spring loads are not maintained.*

Valve Guides (C71 Spitfire): Cast integral with cylinder head When valve stem clearance excessive, use reamer tool set to ream guides for next oversize valve as follows: C-3433 (379-380" - 005" O S), C-3430 (389-390" - 015" O S), C-3427 (404-405" - 030" O S)

Valve Guides (Others) - Drive old guides out through top of head using tool C-3150 Install new guides by driving them up through valve port opening To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole Ream guide to 374-375" with tool C-741

►*CAUTION Oil hole in top of exhaust guide must face up*

NOTE—If Valve Guide Tool C-3150 is not available, drive guides in, measuring from top of valve seat as follows: Intake 31/32", Exhaust 1 3/64"

Hydraulic Valve Lifters: Integral flat-valve type.

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are 008" oversize

Diameter— 9040-9045" **Clearance in Block**— 0005-0015"

Lifter Overhaul & Testing—*See "Valve System" in Chrysler Special Data.*

►*VALVE GRINDING CAUTION:* See Valves (above).

Rocker Arm Assembly: *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing (C71)

Intake Valves - Open 5° BTDC, Close 67° ALDC
Exhaust Valves - Open 39° BLDC, Close 25° ATDC

Valve Timing (C70, C72, C73)

Intake Valves - Open 15° BTDC, Close 57° ALDC
Exhaust Valves - Open 49° BLDC, Close 15° ATDC

Valve Timing (C72-300)

Intake Valves—Open 35° BTDC Close 65° ALDC
Exhaust Valves—Open 65° BLDC Close 25° ATDC

Valve Timing Check (Exc. C-300)—With No 1 intake valve closed Insert a 210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid) Set dial indicator at "Zero", turn crankshaft until dial indicator shows that valve has lifted 021" Pointer on cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft **counter-clockwise** until lifter is back down to the valve closed position. Re-

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move spacer from between rocker arm and valve stem *See "Camshaft Setting" under CAMSHAFT above.*

►*CAUTION Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism*

Valve Timing Check (C72-300) - Turn crankshaft until No 1 intake valve is closed and No 1 piston is on TDC Install a dial indicator so that pointer contacts valve spring retainer as nearly at right angle as possible Adjust valve rocker screw to provide zero clearance Set dial indicator to zero and turn crankshaft **clockwise** (normal running direction) until dial indicator shows valve has lifted 081" Timing marks on vibration damper should read 5° BTDC to 7° ATDC If reading not within specified limits, check gear index marks and inspect timing chain for wear After valve timing checked, reset valve lash to specified operating limits *See "Camshaft Setting" under CAMSHAFT above*

OILING SYSTEM

►*AIR-CONDITIONED CAR FILTER CARTRIDGE CHANGE NOTE* Due to interference from fender skirt or air conditioning lines immediately above filter cover, filter assembly must be removed from engine to change filter cartridge

Crankcase Capacity: 5 qts (refill) Add one additional quart when filter changed

Normal Oil Pressure: 40-65 lbs with warm oil operating at 40-50 MPH

►*OIL PRESSURE CAUTION:* Oil pressure will drop to 15-20 lbs when FILTER ELEMENT IS CLOGGED Replace element

Oil Pressure Relief Valve—Mounted in oil pump Adjustable. *NOTE*—When replacing relief valve spring use same color spring

Oil Pressure Gauge—Auto-Lite 13700A Not Electric

Oil Pump· Rotor type In crankcase at rear end Driven by lower distributor drive shaft

Pump Overhaul—*See "Oiling System" in Chrysler Special Data*

Priming Oil Pump (After Installation)—Before installing filter assembly, introduce ½ pint of engine oil into the lower hole of the filter pad with a pressure gun or long nosed oil can

Oil Filter: Full-flow At right rear engine All oil enters lubrication system of engine through filter at full pump pressure Safety valve in filter opens if element is clogged, allowing oil to pass into lubrication system under a reduced pressure of 25-45 lbs

Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required) Change oil at same time filter element is changed

►*AIR-CONDITIONED CAR FILTER CARTRIDGE CHANGE NOTE* Due to interference from fender skirt or air conditioning lines immediately above filter cover, filter assembly must be removed from engine to change filter cartridge

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe

COOLING

Water Capacity: (C71) 24 qts , (Others) 25 qts One additional quart on all models with heater

Pressure Valve: Chrysler 1373136 (Opens at 7 lbs) Radiator filler cap 14 lb type used with Air Conditioning

Thermostat: Choke type in cylinder head water outlet Starts to open at 160-165° F

Water Pump· Ball bearing type No lubrication required *See "Chrysler" in Water Pump Section for data*

Pump Removal—Drain cooling system Remove radiator shroud assembly fan belt, pulley and fan Remove radiator outlet hose from thermostat housing Remove wire from temperature gauge sending unit Remove pump housing-to-cylinder block attaching bolts, remove pump housing assembly

Temperature Gauge: Auto-Lite. Electric type

Dash Unit - 14145A

Engine Unit-13550A Mounted in pump housing assembly

CLUTCH

Borg & Beck	Model	Assy. No.	Disc No.
Standard	10A7	361376	382366

See "Borg & Beck" Clutches in Clutch Section

Pedal Adjustment: Turn clutch release fork rod adjusting nut until 3/16" free play at outer end of clutch fork is obtained This adjustment will give necessary 1" free play at pedal

Over-Center Spring Adjustment: With clutch pedal in fully released position, and with over-center spring eyebolt finger tight, hold spring eyebolt, spring and bracket assembly as a single unit and with an adjusting wrench tighten adjusting nut seven full turns

Removal: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods Remove transmission (See Synchro-mesh Transmission) Mark clutch cover and flywheel Remove bolts that hold clutch cover to flywheel, loosening each bolt a few turns (in succession) until cover is free Remove clutch disc and pressure plate assembly from clutch housing

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh
See "Chrysler Synchro-mesh" in Transmission Section

Transmission Controls: *See "Transmission Controls" in Transmission Section*

Removal Jack up car at front and place floor jacks under lower control arms Disconnect propeller shaft at front end If transmission is to be disassembled, loosen companion flange nut Disconnect speedometer cable, and hand brake cable at brake band Disconnect gearshift and gearshift selector control rods at transmission Remove capscrews and nuts which attach transmission to clutch housing Remove transmission assembly by pulling it back, down and out of car

NOTE—When installing transmission use pilot studs to avoid springing clutch disc

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission
See "PowerFlite" Transmission in Transmission Section for complete data.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION See "PowerFlite" Transmission in Transmission Section for data.*

►*TESTING & TROUBLE SHOOTING See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

►*OVERFILLING CAUTION:* High engine speed or high temperature operating conditions may cause transmission oil to expand to point where transmission is, in effect, overfilled, causing governor pressure to drop to point to permit a high speed downshift in transmission *See "Checking Fluid Level" below*

Checking Fluid Level - *NOTE* - Manufacturer recommends checking fluid level with engine cold (normal temperature of 70° F)

Cold Check - If oil level between (L) Low mark and end of dipstick, **1 pint** of Transmission Fluid Type "A" may be added, but no more than 1 pint

After Operation Check - If oil level is above (L) Low mark, do not add oil If oil level is above (F) Full mark, drain to 1/2" below full mark Add oil only WHEN OIL LEVEL IS BELOW THE (L) LOW MARK on dipstick, and transmission has been brought up to operating temperature by actual driving In this case add **1 pint** of oil only

Oil Pan Filler Tube (Location)—At right rear of engine compartment.

►*CAUTION* To prevent dirt from entering transmission, make sure oil level indicator is properly seated in filler tube

Linkage Adjustments: *See "PowerFlit " Transmission in Transmission Section*

►*OTHER "POWERFLITE" SERVICE DATA See "PowerFlite" Transmission in Transmission Section for data.*

TORQUE-FLITE TRANSMISSION

Wide range torque converter and automatically operated planetary gear transmission

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION See "Torque-Flite" Transmission in Transmission Section for data*

►*TESTING & TROUBLE SHOOTING*· *See "Torque-Flite" Transmission in Transmission Section*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A)

Checking Fluid Level - Idle engine in (N) Neutral while checking fluid level (L) Low mark on dipstick is proper level for a cold (Room temperature of 70° F)

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transmission. After transmission has been brought up to operating temperature, oil level should rise to (F) Full mark on dipstick. If above (F) mark at operating temperature, drain oil to bring level to (F) Full mark or add oil to bring level to (F) Full mark if below.

Oil Filler Tube (Location) - At right rear of engine compartment.

Linkage Adjustments: *See "Torque-Flite" Transmission in Transmission Section.*

►*OTHER "TORQUE-FLITE" SERVICE DATA: See "Torque-Flite" Transmission in Transmission Section*

UNIVERSALS

Detroit Universals. (C71, C72, C72-300) Ball & Trunnion used at front, cross type used at rear. (C70, C73) Cross type used at front, rear, and center bearing joints.

Propeller Shaft Center Bearing: *See "Propeller Shaft" in Chrysler Special Data.*

REAR AXLE

Own. Semi-floating type with hypoid gear and Hotchkiss Drive. Barrel type. *NOTE* - Axle gear thrust screw and pad no longer used.

See "Chrysler Hypoid" in Rear Axle Section.

Axle Ratios	Standard Trans.	Auto. Trans.
C70		3.54 (39-11)
C71 Pass.	3.73 (41-11)	3.54 (39-11)
C71 T & C Wgn.	3.91 (43-11)	3.73 (41-11)
C72 Pass.	3.07 (40-13)	3.36 (37-11)
C72 T & C Wgn.		①3.54 (39-11)
C73		②3.07 (40-13)
C72-300	③	③

① - Optional Ratios 3.07 (40-13), 3.36 (37-11).
② - Optional Ratios 3.36 (37-11), 3.54 (39-11).
③ - 12 optional ratios available ranging from 3.07 (40-13) to 6.17 (37-6).

Backlash - .006-.008"

Carrier Removal: Disconnect rear universal, remove axle shafts,(see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub, and drum assembly (use screw type hub puller - Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust,.remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels.

Endplay—.003-.008"

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic, non-adjustable. Serviced by replacement.

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.

See "Chrysler" in Front Suspension Section for complete data.

Kingpin Inclination - (C70) 7°. (Others) 5.5°. At 0° camber.

Caster—Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° with Power Steering. Left side should be 0° to ¾° greater than right side within these limits).

Camber—Neg. 1/8° to Pos. 5/8° (Left side Pos. 1/2°, Right side 0° preferred).

Toe-In - 1/8" preferred.

Toe-Out on Turns-Inner wheel 21½°±1°, outer wheel 20°.

STEERING

Manual: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.
See "Coaxial" Power Steering in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" Steering Section.*

BRAKES

►*BRAKE "SQUEAK" CORRECTION: See Chrysler "Center Plane" Brakes in Brake Section.*

Service: Center Plane (Floating Shoe) hydraulic type. *See Chrysler "Center Plane" Brakes in Brake Section.*

Drums—Centrifuse. Diameter 12".

Wheel Cylinder Diameter—1 1/8" bore. Single acting (front), double acting (rear wheels)

Replacement Linings & Shoes—Linings or shoes with linings furnished in Standard & .030" oversize.

Lining—Molded asbestos (bonded to shoe). Length—12.57 per shoe. Width - 2½". Thickness - 13/64".

Braking Power - 60% front, 40% rear.

Clearance - Front Wheels - Turn each adjusting cam in direction of forward wheel rotation until shoe lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction (each cam a little at a time) until no drag is felt.

Rear Wheels - Same as front wheels except that on rear wheels forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe adjusting cams are rotated in direction of reverse wheel rotation.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid—Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal—Disconnect pushrod. Disconnect brake line tube at master cylinder. Disconnect stop light switch leads, remove four stud nuts from studs, remove master cylinder.

Power Brakes: "Bellows or "Piston" Assist type. Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder). *See Chrysler, DeSoto, Dodge, Plymouth Bellows Type" or "Piston Type" power brakes in Brake Section.*

Removal of Power Unit - Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket, to prevent trigger arm from extending beyond extremities of bracket (*NOTE* - If pedal linkage is allowed to extend through hole in dash panel, trigger arm may be damaged). Disconnect vacuum hose at power unit. Remove complete power unit and bracket assembly by removing four nuts and lockwashers. Carefully withdraw unit from dash panel.

Parking Brake: On propeller shaft at rear of transmission. 6" External contracting type used with standard transmission. 7" Internal expanding type used with Automatic Transmission.

Adjustment - *See "Hand Brake Notes" in Chrysler Special Data.*

Lining - Width - 2". Thickness - 5/32". Length - 13.06" (Int. Exp.), 15.38" (Ext. Contr.).

Clearance (Internal Expanding) - Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

Clearance (External Contracting) - Adjust anchor screw so clearance between band and drum at anchor is .015-.020".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EPF-4001. Electric type.

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Chrysler "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

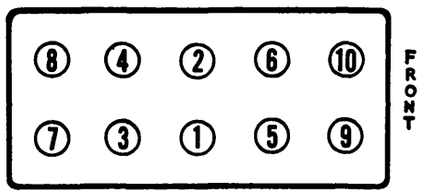
Power Window Regulators: Auto-Lite. Electric type. Reversible type motor in each window. Controlled by switch and master control switch. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Auto-Lite. Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Auto-Lite. Electrical-Hydraulic type. *See "Chrysler Top Control" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps (Without Lockwashers)	100
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	35
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover	2.5
Engine Front Cover	30-35
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	50



V8 ENGINES

ENGINE

ENGINE ASSEMBLY REMOVAL: Drain cooling system, remove battery. Remove fan shroud, radiator, and hood. *(NOTE* - Before removing hood, scribe outline of hinge brackets to insure proper adjustment when reinstalling.) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor. Attach engine lifting Tool C-3466 to carburetor flange studs on intake manifold and attach chain hoist to fixture eyebolt. Raise car and disconnect propeller shaft at transmission. Disconnect wires and linkage at transmission. Disconnect wires and linkage at transmission and clutch. Remove exhaust pipe (make sure exhaust system is supported while engine is removed). Drain engine and transmission oil. Remove rear crossmember-to-transmission support attaching bolts. *(NOTE* - Place a rollaway jack under transmission to relieve weight from crossmember. Place a wood block between head of jack and transmission to avoid damaging transmission oil pan. Jack must support weight of rear of engine and must be able to roll with engine as engine is removed). Remove crossmember-to-frame bracket attaching bolts. Remove crossmember and rear engine support. Lower car to convenient working height, then remove engine front support mounting bolts. With chain hoist, raise engine and, at same time, work engine out of chassis toward left front fender.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

Tightening Torque—See Tightening (Torque Wrench) Specifications above.

CYLINDER HEAD INSTALLATION (Double Rocker Shaft): Use new gaskets when installing head. Insert cylinder head bolts into rocker arm support brackets. Insert pushrods through holes in head (short rods in upper holes - intake, long rods in lower holes - exhaust). Place rocker arm assemblies in position on heads, then position pushrods. Starting at top center, tighten all cylinder head bolts to correct torque (see Tightening Specifications above). Install exhaust manifolds, crankcase breather tube, and intake manifold. *NOTE* - When installing intake manifold, insert short bolts in holes on extreme ends of manifold.

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos. With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap. Tap seal down in position with Tool C-3511 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine.

ENGINE FRONT COVER

ENGINE FRONT COVER (Double Rocker Shaft Engines): Proceed as follows:

Removal: Remove water pump. Remove vibration dampener retainer bolt and washer. Remove two of the vibration dampener pulley bolts and install puller Tool C-3033. Remove crankshaft pulley and vibration dampener as an assembly. Remove felt dust seal and vibration dampener hub key from crankshaft slot. Remove left cylinder bank exhaust pipe. Disconnect fuel lines at fuel pump. Remove fuel pump. Remove oil level indicator. Remove starter using Tool C-455. Drain engine oil and remove oil pan. Remove cover bolts and lockwashers. Drive chain case cover off the two dowel pins, using soft hammer.

Installation: Be sure mating surfaces of cylinder block and cover are clean. Apply moderate coat of sealing compound to block and cover faces, install new gasket. Make sure crankcase oil slinger is in proper position (flange end pointing toward seal). Position cover on two dowel pins and then gently tap cover in place. Install cover bolts and lockwashers and tighten to 30 ft. lbs. Install other items by reversing removal procedure.

FRONT OIL SEAL: Remove crankshaft pulley and water pump housing. Loosen oil pan bolts sufficiently until pan clears chain case cover. Install Tool C-3506 and remove seal. Discard seal and retainer. Position new seal and retainer assembly in housing and press into place using Tool C-3506. Seal must be tight against seat surface. *CAUTION* - Always have thin shoulder away from front of cover with stamped case cover, thick shoulder away from front of cover with cast iron cover.

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: With intake manifold, tappet cover, pushrods, tappets and timing gears removed, remove distributor. Lift out distributor drive gear and stub shaft. Remove camshaft thrust plate attaching bolts and oil trough. Withdraw camshaft and spacer, being careful not to damage cam bearings with cam lobes.

VALVE SYSTEM

EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished .010" O.S. Use special Tool C-3140 (Double Rocker Shaft Engines) to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be from .002-.004" larger than counterbore to insure correct fit. If inserts found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with Installing Tool C-767.

ROCKER ARMS

ROCKER ARM ASSEMBLY: Removal—Remove rocker arm covers. Place cotter pins in holes of first and last rocker arm brackets (if not already there) to prevent springs on rocker from pushing assembly apart when cylinder bolts removed. Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block. Grasp support bracket at each end of head, pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068. ***CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.***

Installation: Insert cylinder head bolts in brackets, with **short** bolts in intake side. Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes). Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms. Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above. ***When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.*** Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly.

HYDRAULIC VALVE LIFTER

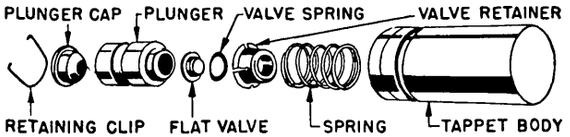
HYDRAULIC VALVE LIFTERS (One-Piece Integral Type): Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body. Oil is introduced to this unit through hole in side of lifter plunger.

Removal (Double Rocker Arm Shaft Engine): Drain cooling system to a point below level of intake manifold. Install valve spring compression Tool C-3024 over rocker

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arm so heel of tool rests on valve stem side. Make certain valve is seated and tappet body is resting on low point of camshaft lobe (see below). Using handle of tool for leverage, compress valve springs sufficiently to raise rocker arm above pushrod. While holding rocker arm in this position, slide rocker arm to one side along tube (*CAUTION* - To avoid damage to valves, be sure piston head is well below top of travel before compressing valve springs). Remove carburetor air cleaner, disconnect coil wires and wire from heat indicator sending unit. Disconnect heater hose and carburetor heat tube at integral choke. Remove intake manifold, coil and carburetor as an assembly. Remove tappet chamber cover and gasket. Insert hooked portion of Tool C-3216 into hole in tappet body (this portion of tool can be used to remove tappets without varnish build-up). Lift tappet out of bore. If tappet sticks, slide puller portion of tool C-3316 through cylinder head (pushrod) holes and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and pull tappet out of bore with twisting motion.



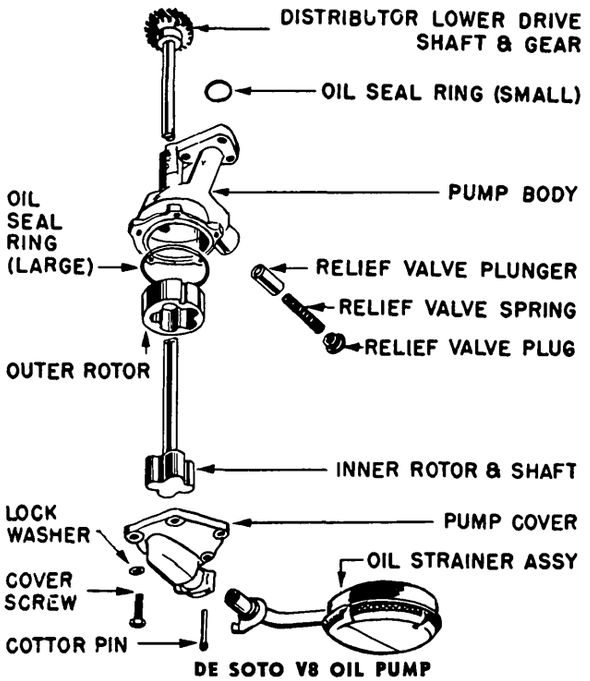
DE SOTO V8 ONE-PIECE VALVE LIFTER

Disassembly: *(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)* Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting Check to see that valve exerts a slight pressure on valve spring to insure valve seating Clean lifter assembly in clean solvent and remove all traces of varnish and carbon Blow parts dry with air DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene *(CAUTION*—Container and kerosene must be absolutely clean) Allow lifter to fill with kerosene then remove and replace the plunger cap Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing This will prevent possible scoring of lifter plunger when engine is first started

Reassembly: Reverse disassembly procedure as noted above.

LOW POINT OF CAMSHAFT LOBE. Remove distributor cap, noting position of rotor for Nos 1 and 6 cylinders Set timing mark "DC" located on crankshaft pulley to pointer With rotor at No 1 firing position, the following lifters will be on the low side of the cam lobe No 2 intake and exhaust, No 4 exhaust, No 7 intake, No 8 intake and exhaust *(NOTE*—To remove No 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed) With rotor at No 6 position, following lifters will be on low side of cam lobe No 3 intake and exhaust, No 4 intake, No 5 intake and exhaust, No 7 exhaust *(NOTE*—To remove No 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed)



DE SOTO V8 OIL PUMP

OILING SYSTEM

OIL PUMP

ROTOR TYPE OIL PUMP. Removal—Drain engine oil, remove oil pan Remove oil pump mounting bolts and lower pump straight down

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe Remove cover bolts and cover Discard oil seal ring Remove pump rotor shaft and lift out pump outer rotor Remove oil pressure relief valve plug and lift out spring and plunger Wash all parts in a suitable solvent and inspect for damage or excessive wear Check all pump parts as follows

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers If diameter less than 2 244" or thickness less than 998', replace both inner and outer rotors

Inner Rotor—Measure thickness of inner rotor with micro-calipers If thickness measures less than 998", replace both inner and outer rotors

Rotor Depth—Slide rotors in pump body Place a straightedge across pump body Use a feeler gauge and measure clearance between top of rotors and straightedge If clearance in excess of 004", replace pump body

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors If clearance in excess of 010", replace both inner and outer rotors

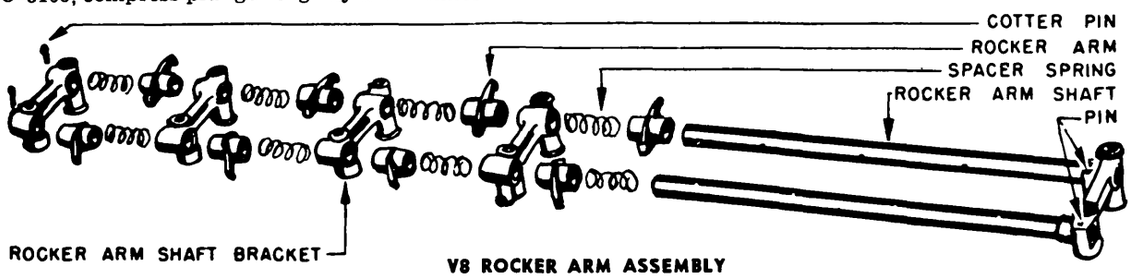
Reassembly: Use new oil seal ring between cover and body Tighten cover bolts to 10-15 ft lbs Prime pump and then install new oil seal ring in pump mounting face

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below*

IGNITION NOTES

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block

Installation: Slide new bushing over burnishing end of Tool C-3053 Insert tool and bushing into bore of block Drive bushing and tool down into position, using a soft hammer As the burnisher is pulled through the bushing by pressure applied to puller nut tool will wedge bushing tight in its bore and will burnish bore to correct size *DO NOT REAM THE BUSHING*



V8 ROCKER ARM ASSEMBLY

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DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

BRAKE NOTES

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for .015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015-.020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut.

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed .005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

►*DESOTO "ADVENTURER" NOTE:* This model has Special High Compression Engine with TWO 4-Barrel Carburetors and other special equipment as listed below

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Identification
Firedome	S-23
Fireflite	S-24
Fireflite Adventurer	S-24A

SERIAL NUMBER: Stamped on metal plate attached to left front door body hinge post

Starting Serial Nos.	Detroit	Los Angeles
Firedome S-23	55258001	64028001
Fireflite S-24	50366001	62048001
Fireflite S-24A ©		

© - Assembled at Detroit only.

ENGINE NUMBER: Stamped on machined boss on top of front side of cylinder block just behind water pump

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A"—All cylinders .020" oversize.

"B"—All Main & Connecting Rod Bearings .010" undersize.

"AB"—BOTH above conditions exist.

"MALTESE CROSS" symbol (3/8" high)—ONE OR MORE Crankshaft Journals .001" undersize. *See "Connecting Rods" & "Crankshaft" under ENGINE below.*

"DIAMOND" symbol (3/8" high)—ALL Tappet Bodies are .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: 115-145 lbs. (S-23), 145-175 lbs. (S-24), 160-190 lbs. (S-24A) at cranking speed of 150 RPM (plugs removed, wide open throttle). Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21" idling.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: *NOTE* - Lubricate valve shaft with graphite grease before installing valve.

(C23, C24 Standard): Single exhaust on right cylinder block with thermostatically controlled valve. Install heat control valve with counterweight toward front of engine, with small anti-rattle spring retaining pin toward rear and adjacent to cylinder block.

(C24A Standard, Optl. Others): Dual exhaust system. Heat control valve is in right exhaust pipe.

Coil Spring Installation - Position valve shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer end tongue of spring in upper left hand position. Press inner end of coil into slot of shaft and seat firmly. Move outer end tongue of spring around and hook under pin (left pin when facing coil end of valve).

Counterweight Installation - Place counterweight over shaft (shield upward) and insert lock in shaft slot. Center counterweight on shaft and turn weight on shaft until seated. Install stop, and tighten nut securely with Tool T-109-173.

►*DUAL EXHAUST NOTE:* When valve is closed, most exhaust gases are discharged through the left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plugs - Auto-Lite AR-51 (S-23), AR-52 (S-24), AR-31 or AS-250 (S-24A). Resistor type 14 mm. Tighten to 30-32 ft. lbs.

COIL: Auto-Lite CAD-4002. *12 Volt.*

Ignition Current - 2.5 amps. idling, 3.1 amps. stopped.

Resistor - Auto-Lite PU-4002. Mounted on left fender splash shield.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. When testing coil, include resistor with coil

DISTRIBUTOR: Auto-Lite IBJ-4302A (S-23), IBJ-4302 (S24 Early), IBJ-4302B (S24 Later), IBK-4303 (Adventurer). *12 Volt. NOTE:* IBK-4303 "double breaker".

Condenser - Auto-Lite IBB-2015R. **Capacity** .25-.28 mfd.

Contact Point Set - Auto-Lite IGW-3028MS (IBJ Distr.), IGW-3028KS (IBK Distr.).

Breaker Gap - 017" ± .002".

Cam Angle—28-34° (IBJ Distr.), 35-41° with both sets of contacts operating together (IBK Distr.).

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance—IBJ-4302

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	375	2	750
6.5	550	13	1100
7	1000	14	2000
8.5	2200	17	4400

Automatic Advance—IBJ-4302A

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	425	2	850
3	575	6	1150
5	725	10	1450
6	800	12	1600

Automatic Advance - IBJ-4302B, IBK-4303

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	400	2	800
4	525	8	1050
7	660	14	1320
8	700	16	1400

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IBJ-4302, B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5½
1	2	6
5	10	8 3/8
10	20	13¼
12.5	25	15

Vacuum Advanc —IBJ-4302A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5½
1	2	6
5	10	8½
10	20	13
11.5	23	15

Vacuum Advance - IBK-4303

Distr. Degrees	Eng Degrees	Vacuum (" of HG)
Start	0	6 1/2
1	2	7
6	12	10 3/8
10	20	14 1/4
11 5	23	16 1/4

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in DeSoto Special Data.*

IGNITION TIMING

Model	Standard Setting
S-23	8° BTDC
S-24	4° BTDC
Adventurer	6° BTDC

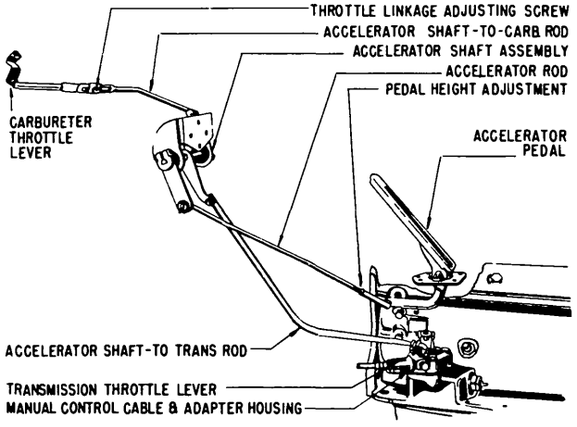
Timing Mark—On crankshaft vibration damper. Aligned with pointer on engine front cover

CARBURETOR

►*CARBURETOR APPLICATION: Carter BBD 2-Barrel Carburetors used on Firedome S-23 Models, Carter WCFB Carburetor used on Fireflite S-24 Models. TWO Carter WCFB carburetors used on Adventurer.*

THROTTLE LINKAGE ADJUSTMENT (PowerFlite Cars): Correct any binding conditions. Run engine until normal operating temperature is reached. Remove air cleaner to make certain choke is in the fully open position Connect tachometer leads to coil and ground. Adjust engine idle to 475-500 RPM (transmission in neutral position) Stop engine and loosen throttle linkage adjusting screw (located on accelerator shaft-to-carburetor rod). Move rear portion of accelerator shaft or carburetor rod rearward until it is stopped by idle stop on transmission throttle cam. With rods in line and front portion of rod pre-loaded by its spring,

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POWERFLITE THROTTLE LINKAGE

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lock throttle linkage adjusting screw by applying 10-15 ft. lbs. torque. Start engine and recheck idle setting (475-500 RPM), with transmission in neutral and hand brake set. Stop engine and remove tachometer.

Pr ssure Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

CARTER 2-BARREL BBD

Transmission	Carter No.
Standard	BBD 2308S
Overdrive	BBD 2309S
PowerFlite	BBD 2310S

►***MANIFOLD FUEL DISTRIBUTION:*** *Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting - 1/4-1 1/4 (2250S), 1/2-1 1/2 (Others) turns open. Adjust both screws alike. Turn screws for richer mixture.

Float Level - 1/4" (Gauge T109-282) from top of each float to top surface of body casting. *NOTE* - This supersedes previous 7/32" setting.

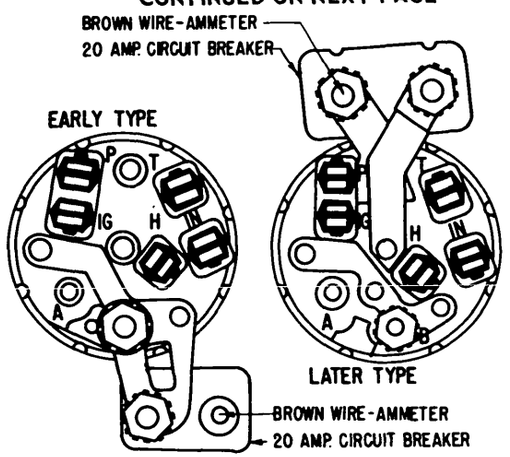
Accelerating Pump - Center hole (medium stroke) of throttle lever, and inner hole of pump arm.

Fast Idle Cam Clearance: .020" (Gauge T109-29) between lip on fast idle cam and boss on casting with choke valve closed and lip on inner choke shaft lever contacting lug on outer lever. Adjust by bending lip on inner choke shaft lever. On late carburetors, align index mark on cam with adjusting screw.

Fast Idle Throttle Clearance: .015" (Gauge T109-44) between lower edge of throttle valve and carburetor bore with adjusting screw on high step of cam.

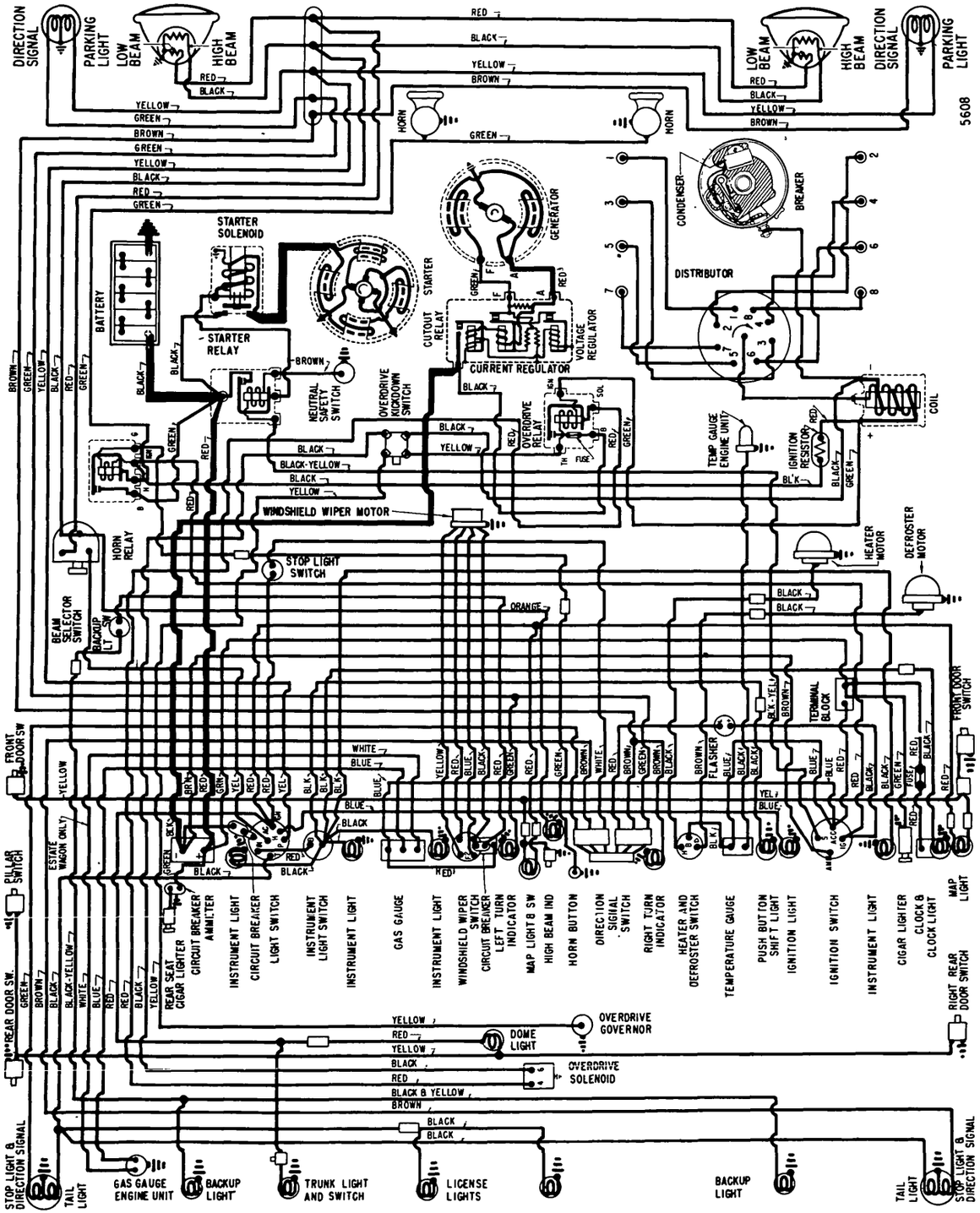
Automatic Choke Setting: (2308S, 9S) Centered - At Index, (2310S) 1 Point Rich.

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P-YELLOW WIRE TO PARKING LIGHTS
T- BLACK WIRE TO TAIL LIGHTS.
IG-BLUE WIRE TO IGNITION LOCK LIGHT.
H- GREEN WIRE TO FOOT DIMMER SWITCH.
IN-RED WIRE TO INSTRUMENT LIGHT SWITCH.
A-RED WIRES TO GLOVE COMPT.,TURN SIGNAL & GEARSHIFT LGTS.

FIRST & LATER TYPE LIGHT SWITCH



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Dashpot Adjustment: Close throttle valves and bottom plunger shaft with 1/16" gauge between shaft and operating lever To adjust, loosen locknut and turn dashpot in or out

Overdrive Kickdown Switch Adjustment: With throttle valves wide open there should be 1/64-3/64" between kickdown lever and switch stem guide To adjust, loosen locknuts and adjust switch

Throttle Linkage Adjustment: *See CARBURETOR above*

►*OTHER DATA: See "Carter BBD" Carburetors in Carburetion Section*

Fuel Pump Pressure: 3½ - 5½ lbs

CARTER 4-BARREL WCFB
S-24 N . 2311S, SA

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*

Idle Setting - 1-2 turns open Set both screws alike Turn screws out for richer mixture

Idle Speed - 450-500 RPM (transmission in neutral)

Throttle Linkage Adjustment: *See CARBURETOR above*

►*OTHER DATA: See "Carter WCFB 4-Barrel" Carburetors in Carburetion Section*

CARTER 4-BARREL WCFB
S-24A Adventurer

►*NOTE Carburetors changed in production as follows*

First Cars	TWO Carter 2317S
Later Cars	Carter 2476S (Frt), 2445S (Rear)

Carburetor Adjustment *Adjust all carburetors exactly as follows for balanced operation*

1) **Connector Rod**—Open both carburetor throttles to wide open position If either front or rear carburetor throttle valves do not open fully adjust length of connector rod Rod must not bind on pivot studs

2) **Idle Speed**—With engine at normal operating temperature, disconnect accelerator shaft rod at rear carburetor set idle speed to 600 RPM (use tachometer) as follows Back off front idle speed screw adjust speed with rear carburetor screw turn front carburetor screw up to point where it contacts stop

3) **Idle Mixture**—Turn rear carburetor idle mixture screws in until lightly seated then back screws out ½ turn Repeat with front carburetor Trim front carburetor idle mixture screws only to obtain smoothest engine idle Connect accelerator shaft rod

►*OTHER DATA: See "Carter WCFB 4-Barrel" Carburetors in Carburetion Section*

CARB. EQUIPMENT

Fuel Pump: Carter M2241S. Vacuum diaphragm type

Pressure - 3½ - 5½ lbs

See "Fuel Pumps" in Carburetion Section

Gas Gauge: Auto-Lite Electric type

Dash Unit - 14032A (Exc Sub & Est Wgn), 14035A (Sub & Est Wgn)

Tank Unit - 13970A (Exc Sub & Est Wgn), 13872A (Sub & Est Wgn)

See "Fuel Gauges" in Carburetion Section

BATTERY

Auto-Lite 11-HS-60 or Willard HO-11-60. *12 Volt*, 11 plates, 60 ampere hour capacity

Ground Terminal - Negative

►*CAUTION: This is reversed from previous models*

Engine Ground - Left front of engine

STARTER

Auto-Lite MDF-6001. *12 Volt* **Armature** - MDF-2006

Drive - Overrunning clutch (solenoid pinion shift)

Rotation - Counter-clockwise at commutator end

Brush Spring Tension - 42-53 ozs (with new brushes)

Performance Data - MDF

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10 0	60 max
6 5 ft lbs min	Lock	4 0	240 max

Starting Switch: Auto-Lite SAD-4001 Solenoid pinion shift and starting switch used with neutral safety switch (on transmission - PowerFlite cars) and SEPARATE relay, Auto-Lite RAJ-4001 mounted on fender splash shield *See "Starter Controls" in Electrical Section*

Neutral Safety Switch Adjustment: *See "PowerFlite" Transmission in Transmission Section*

GENERATOR

Auto-Lite Generator No.	Application
GJC-7002A or GGA-6001K, L	Standard
GJC-7003B or GGA-6002A	Power Steering
GJC-7006B or GGA-6001N	Air Cond
GJC-7003C or GJC-6002C	Pwr Strg & Air Cond

►*SPECIAL GENERATOR NOTE:* GJC & GGA type generators used Performance specifications below apply equally to all generators within either of the groups specified

Performance Data - GGA - 12 Volt

Amperes	Volts	RPM 70° F
4 0	14 6	950 max
40 0①	14 6	1600 max
40 0①	15 0	1600 max

Performance Data - GJC - 12 Volt

Amperes	Volts	RPM Cold
20 0①	15 0	1750 Max
30 0①	15 0	2050-2250

①-Do not operate at high output without ventilating fan for any length of time To do so may result in burned armatures and fields

Brush Spring Tension - (GGA) 34-41 ozs, (GJC) 18-36 ozs with new brushes

Field Current - (GGA) 1 1-1 3 amperes, (GJC) 1 2-1 3 amperes, at 10 0 volts (70° F)

Motoring Current - (GGA) 2 3-2 6 amperes 3 1-3 5 amperes with felt oil seal in drive end head (GJC) 3 4-3 9 amperes, all at 10 0 volts (70° F)

Rotation - Counter-clockwise at commutator end

Belt Adjustment: Adjust deflection so there is 1/4" slack (when pushed with a force of 9-12 lbs from a straight line midway between pulleys)

REGULATOR

Auto-Lite Regulator No.	Generator
VAT-6201A	GGA
VRX-6201A	GJC

Cut out Relay

Cuts In - 13 0-13 7 volts (VRX), 13.0-13.75 volts (VAT).

Cuts Out - 8 2-9 3 volts (approx 3-5 amps discharge)

Contact Gap - 015"

Air Gap - 030-034"

Voltage Regulator

Setting - 14 5 volts at 80° F while charging at 10 0 amperes or with 25 ohm resistor in series between regulator and battery

Air Gap - 048-052" with contacts just opening

Checking & Adjusting - *See Electrical Section*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type Set to following specifications at 70° F*

	Test A - Operating Amperes - Test B
VRX	36 Max 30 (28-32)
VAT	46 Max 40 (38-42)

Test A - After 15 minutes operation charging at 10 amps

Test B - After additional 15 minutes operation on current regulator (with load applied to hold voltage at 13 7 -13 9 volts (VAT) 13 6-13 8 volts (VRX)

Air Gap - 048-052" with contacts just opening

MISC. ELECTRICAL

Checking & Adjusting - *See Electrical Section*

Headlamps: Sealed Beam *See Electrical Section*

Direction Signals: *See Electrical Section*

►*IGNITION-STARTER SWITCH CAUTION: When installing accessories, use accessory terminal* **only** *on ignition-starter switch and* **not** *the ammeter terminal post.*

Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft Headlamp knob is held on its shaft by means of a recessed hex screw

Stop Light Switch Location: On forward end of master cylinder

CIRCUIT BREAKERS: Lighting - Three circuit breakers on back of lighting switch Protect circuits as follows:

15 Ampere - Protects Head and Beam Indicator Lights

6 Ampere - Protects Parking Tail, License Plate Instrument, Ignition and Clock Lights

6 Ampere - Protects Stop Map, Dome, Glove Compartment, Courtesy and Trunk Compartment Lights

Windshield Wiper & Back-Up Lights - 5 Ampere Mounted on rear of windshield wiper switch

Window Lifts - 20 Ampere Mounted behind left front kick panel

Four Way Seat - 20 Ampere Mounted behind left front kick panel

HORNS: Auto-Lite, Jubilee, or Sparton. Dual horns with relay

Horn Relay: Auto-Lite RAH-4002 *12 Volt*

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models)

Model	Bore	Stroke	Displmnt	Rated HP
S23, S24	3.72"	3.80"	330 cu.ins.	44.3
S24A	3.78"	3.80"	341.4 cu.ins.	45.7

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Model	Compr. Ratio	Developed HP
S23	8.5-1	230 at 4400 RPM
S24	8.5-1	255 at 4400 RPM
S24A	9.25-1	320 at 5200 RPM

Compression & Vacuum Reading - *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in DeSoto Special Data.*

OIL PAN REMOVAL (Single Exhaust): Drain oil and remove oil level indicator. Disconnect crossover and "Y" pipe at exhaust manifolds and at clamp to exhaust extension so that crossover and "Y" pipes can be moved out of way. *(NOTE* - Make sure remainder of exhaust system is sufficiently supported). Disconnect steering linkage at idler arm support bracket, and allow linkage to settle away from bottom of pan. Remove oil pan attaching bolts, remove pan.

OIL PAN REMOVAL (Dual Exhaust): Same as for single exhaust except that crossover and "Y" pipes not used.

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in DeSoto Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in DeSoto Special Data.*

PISTONS

Aluminum alloy, horizontal slot, elliptically turned, tin plated, thermally controlled by steel belt.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" oversize.*

Weight - 19.9 ozs. (stripped).

Removal - Pistons and rods removed from above.

Fitting New Pistons: Clearance: .029-.036" at top land, .0005-.0015" at top of skirt. Pull required to remove .002" x 1/2" feeler inserted between cylinder wall and piston (piston inverted, pin removed) should be 8-12 lbs. at 70°F.

Replacement Pistons: Std., .010", .020", .030", .040", .050", .060" oversize. *NOTE* - .005", .020" O.S. only on S24A.

Installing Pistons: Install pistons with marking on top of piston toward front of engine.

►*PISTON INSTALLATION CAUTION:* Pistons must be assembled to rods on right cylinder bank (2-4-6-8) with indent on piston head opposite to larger chamfer on large end of connecting rod. On left hand cylinder bank (1-3-5-7) assemble rods to pistons with indent on piston head on same side as larger chamfer on large end of connecting rod.

PISTON PINS

Floating type with lock ring at each end.

Diameter—.9216-.9218". **Length**—3-1/16".

NOTE—Piston pin is offset in piston toward right side of engine.

Clearance in Piston—.0000-.0005" or thumb press fit at 70° F.

Clearance in Rod—.0001-.0004". Selective fit.

Replacement Pins: Standard, .003", .008" oversize.

NOTE—Fitted pins are furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775-.0780"	.010-.020"	.0015-.003"
Compr. (#2)	.0775-.0780"	.010-.020"	.001-.0025"
Oil (#3)	.1860-.1865"	.010-.015"	.001- .003"

Replacement Rings: Furnished in sets Standard, .010", .020", .030", .060" oversize.

Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length (Center to Center) - 6.621-6.625". **Weight**-25.1 ozs.

Crankpin Journal Diameter - 2.249-2.250".

Maximum out-of-round and taper limits—.001".

Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*

Clearance—.0005-.0015" desired. Maximum—.0025".

Endplay—.006-.014".

Bearing Adjustment—None. Replace bearings.

Replacement Bearings: Std., .001", .002", .010", .012" undersize.

Installing Rods: *See "Pistons (Installation)" above.* Larger chamfer of connecting rod bore must be installed toward crankshaft journal fillet. When installing lower bearing shell, make certain that "V" groove in shell is in line with "V" groove in cap. Install shells so that small formed tang fits into machined grooves of rods.

CRANKSHAFT

Journal Diameter - 2.4995-2.5005". 5 bearings.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of the undersize journals are stamped on the machined surface of the center (#3) counterweight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).

Bearings—Removable, precision type, steel-backed, babbitt lined. No shims.

Clearance—.0005-.0015".

Replacement Bearings: Std., .001", .002", .003", .010", .012" undersize. Upper and lower halves of bearings Nos. 1, 2, and 4 are alike and interchangeable; Upper No. 3 is interchangeable with Lower No. 3; Upper & Lower No. 5 are **not interchangeable.**

End Thrust: Taken by center (#3) main Bearing.

Endplay—.002-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in DeSoto Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in DeSoto Special Data.*

CAMSHAFT

Journal Diameters - (1) 2.000-2.001", **(2)** 1.984-1.985", **(3)** 1.969-1.970", **(4)** 1.953-1.954", **(5)** 1.4375-1.4385".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001-.003"

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width—1-1/8". Pitch—.375". Length—68 links.

Camshaft Setting: Timing Check: Marks on gears should be adjacent and in line with straightedge across shaft centers. **Chain Installation:** Install chain and gears as an assembly. Mesh crankshaft gear in chain with keyway out toward chain, mesh camshaft gear in chain with keyway toward crankshaft gear and mark on gear in line with 23rd chain pin clockwise from pin at mark on crankshaft gear. Install assembly on engine, turning camshaft and crankshaft to line up keys with gear key ways, install fuel pump eccentric (must engage camshaft key), tighten camshaft cupwasher and bolt to 35 ft. lbs. Check timing as above.

Camshaft Removal: *See "Camshaft & Bearings" in DeSoto Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in DeSoto Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in DeSoto Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

Valves	Head Diameter	Stem Diameter	Length
Intake	1.9325-1.9425"	.372-.373"	4.84"
Exhaust	1.745-1.755"	.371-.372"	4.86"

Valves	Seat Angle	Lift	Stem Clearance
Int., S23, S24	45°	.381"	.001-.003"
Int., S24A	45°	.357"	.001-.003"
Exh., S23, S24	45°	.431"	.002-.004"
Exh., S24A	45°	.413"	.002-.004"

Valve Seat Width - 1/16-3/32" (Int.), 3/64-1/16" (Exh.)

Intake Valve Stem Oil Seal - Seal installed on intake valve stem after valve is inserted in head and before installation of springs. Seal will seat itself in correct position on guide.

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from valve spring seat in the head to valve tip should be checked with gauge C-3061. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

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Valve Springs: **Single springs used on S-23 & S-24. Double springs used on each valve on S-24A. Install with closed coil toward cylinder head.** Free Length - **2" (S-23, S-24), 1 7/8" Outer, 1 25/32" Inner (S-24A).**

Valve Spring Specifications - S-23, S-24

Valve	Lbs. Pressure	Length
Open	166	1.31"
Closed	72	1.69"

Valve Spring Specifications S-24A

Inner Spring			Outer Spring		
Valve	Lbs. Press.	Length	Valve	Lbs. Press.	Length
Open	66	1.09"	Open	158	1.22"
Closed	28	1.53"	Closed	60	1.66"

▷*CAUTION: Spring ends must be square within 1/16". (Use steel square on surface plate—revolve spring against square noting alignment of top coil).*

▷*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check installed height of spring. If height of spring is 1-23/32" or greater, install a 1/16" spacer (Part No. 1400482) in the head counterbore to bring spring height back to normal 1-5/8—1-11/16".

▷*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.*

Valve Guides: Remove old guides by driving them out through top of head using tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3150 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

▷*CAUTION: Oil hole in top of exhaust guide must face up. Oil hole must face toward intake guide.*

NOTE—If Valve Guide Tool C-3150 is not available, drive guide in, measuring from top of valve seat as follows: Intake—1". Exhaust—1-3/32".

Hydraulic Valve Lifters: Diameter—.9040-.9045". Clearance—.0005-0015".

▷*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are .008" oversize.

Lifter Overhaul & Testing—*See "Valve System" in DeSoto Special Data.*

Rocker Arm Assembly: *See "Valve System" in DeSoto Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Firedome S-23 Valve Timing
Intake Valves - **Open 4° ATDC. Close 76° ALDC.**
Exhaust Valves - **Open 54° BLDC. Close 10° ATDC.**

Firoflite S-24 Valve Timing
Intake Valves - **Open 15° BTDC. Close 57° ALDC.**
Exhaust Valves - **Open 49° BLDC. Close 15° ATDC.**

Firoflite S-24A (Adventurer) Valve Timing
Intake Valves - **Open 35° BTDC. Close 65° ALDC.**
Exhaust Valves - **Open 65° BLDC. Close 25° ATDC.**

Valve Timing Check—Turn crankshaft until #1 intake valve closed. Insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at Zero, turn crankshaft until dial indicator shows that valve has lifted .016". Pointer on chain cover should indicate between 5° BTDC to 7° ATDC if timing correct. Then turn crankshaft counter-clockwise until lifter backed down and valve closed, remove spacer from valve stem.

▷*CAUTION: Do not turn crankshaft further than indicated above, which might bottom spring and damage valve mechanism.*

OILING SYSTEM

Crankcase Capacity: **4 qts. (refill). Add one additional quart if filter changed.**
Normal Oil Pressure: **40-65 lbs. at 2000 RPM.**
Oil Pressure Relief Valve - **Mounted in oil pump. Adjustable.** *NOTE* - **When replacing relief valve spring, use same color spring.**
Oil Pressure Gauge - **Auto-Lite 14033A**
Oil Pump: Rotary type. In crankcase at rear end. Mounted on rear bearing cap.
Overhaul—*See "Oiling System" in DeSoto Special Data.*
Priming Oil Pump (After Overhaul)—Before installing oil pump and strainer to rear main bearing cap, prime pump.
Oil Filter: Shunt type. A portion of oil from oil pump is directed through this filter and the remainder flows directly into engine lubricating system.
Filter Element—Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is replaced.
Crankcase Ventilation: **Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.**

COOLING

Water Capacity: **23 qts. (24 with heater).**
Pressure Valve: **DeSoto 1373136. Radiator filler cap. Opens at 7 lbs. 14 lb. type used with Air Conditioning.**
Thermostat: **By-pass type in cylinder head water outlet. Starts to open at 160-165° F.**
Water Pump: **Centrifugal type.** *See Water Pump Section.*
Pump Removal - **Drain cooling system, remove radiator inlet hose and upper half of fan shroud. Loosen idler pulley and generator adjusting lock bolts, remove drive belts. Remove fan, spacer, and pulley. Remove pump.**
Temperature Gauge: Auto-Lite. Electric type.
Dash Unit - 14034A.
Engine Unit - 13550A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck	Model	Assy. No.	Disc No.
Std. & O.D. (S-23)	10A7	361376	382366
Heavy Duty (S-23)	11A6	361382	381850

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: **Adjust fork rod to secure 3/16" free movement of clutch fork outer end. This adjustment will provide necessary 1" free play at pedal.**

Over-Center Spring Adjustment: **With clutch pedal in fully released position, and with over-center spring finger tight, hold spring eyebolt, spring, and bracket assembly as a single unit and tighten adjusting nut seven full turns.**

Removal: Remove transmission (See Synchro-mesh Transmission). Remove clutch housing pan. Pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove cap screws, which hold clutch cover to flywheel, loosening each cap screw a few turns (in succession) until cover is free. Remove clutch assembly and clutch disc assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "DeSoto Synchro-mesh" Transmission in Transmission Section.*
Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing. Then remove transmission by pulling it back, down, and out of car.

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down. *See "Warner R10" Overdrive in Transmission Section.*
Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission.
See "PowerFlite" Transmission in Transmissi n Section.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmissi n Section.*

Lubrication: **Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).**

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►*OVERFILLING CAUTION:* High engine speed or high temperature operating conditions may cause transmission oil to expand to point where transmission is, in effect, overfilled, causing governor pressure to drop to point to cause a high speed downshift in transmission. *See "Checking Fluid Level" below.*

Checking Fluid Level - *NOTE* - Manufacturer recommends checking fluid level with engine cold (70° F.)

Cold Check - If oil level between (L) Low mark and end of dipstick, **1 pint** of Transmission Fluid Type "A" may be added, but no more than 1 pint.

After Operation Check - If oil level is above (L) Low mark, do not add oil. If oil level is above (F) Full mark, drain to 1/2" below full mark. Add oil ONLY WHEN OIL LEVEL IS BELOW THE (L) LOW MARK on dipstick, and transmission has been brought up to actual operating temperatures by actual driving. In this case add **1 pint** of oil only.

Oil Filler Tube (Location)—At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit. Ball & Trunion type (front), Cross type (rear).

REAR AXLE

Own. (S-23 Exc. Sta. Wgn.) Cage type, (Others) Barrel type. Hypoid gear with Hotchkiss drive.
See "DeSoto Hypoid" in Rear Axle Section.

Rear Axle Ratios

Model	Synchro-mesh	Overdrive	PowerFlite
S23 Sta.Wgn.	4.1,3.91,4.3-1	4.3,4.1-1	
S23 (Others)	3.9,3.73,4.1-1	4.3,4.1-1	
S23 (All)			3.73,3.9,4.1-1
S24 Sta.Wgn			3.54,3.73,3.36-1
S24 (Others)			3.91,4.1,3.73-1
S24A			①

① 5 Optional ratios available ranging from 3.07 (40-13) to 3.91 (43-11).

Backlash - .006-.008".

Carrier Removal: Drain lubricant. Back off brake adjusting cams (See Brakes) before removing hubs and drums. Remove wheel hub and drum assemblies, using wheel puller C-845. Remove axle shafts (see below). Disconnect rear universal joint and drop propeller shaft. Remove carrier assembly from axle housing.

Axle Shaft Removal: Block brake pedal and disconnect brake lines at wheel cylinders. To protect axle bearing outer oil seal, remove rear axle drive shaft keys and install Tool C-745. Remove axle shaft seals, brake supports and bearing shims. Remove rear axle shaft oil seal from brake support with Tool C-839. *(NOTE* - When removing axle bearing shims from ends of axle housing, keep each set of shims separate to assure proper reassembly). Remove axle drive shaft and bearings with Puller C-499.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay** - .003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. Coil springs and direct acting shock absorbers.
See "DeSoto" in Front Suspension Section.

Kingpin Inclination—5-6½°

Caster—Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° preferred with Power Steering). Left side should be between 0° and ¾° more negative than right right side.

Camber—Pos. 1/4°±3/8° (Left side Pos. 1/2°, Right side 0° preferred).

Toe-In - 1/8" ± 1/32" (1/8" preferred).

Toe-Out on Turns —Inner wheel 21½° plus or minus 1° with outer wheel at 20°.

STEERING

Manual Steering Gear: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of and concentrically around axis of steering column.
See "Coaxial" Power Steering in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

►*BRAKE "SQUEAK" CORRECTION: See DeSoto "Center Plane" Brakes in Brake Section.*

Service: Center Plane (Floating Shoe) hydraulic type.
See DeSoto "Center Plane" Brakes in Brake Section.

Drums—Centrifuse. Diameter 12".

Wheel Cylinders Diameter—1-1/8" bore. Single acting (front), double acting (rear wheels).

Replacement Linings & Shoes—Linings or shoes with linings are furnished Standard and .030" oversize.

Lining—Molded asbestos (bonded to shoe). Length—12.57" per shoe. Width - 2.5". Thickness - 13/64".

Braking Power - 60% Front, 40% Rear.

Clearance - Front Wheels - Turn each adjusting cam in direction of forward wheel rotation until shoe lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction until no drag is felt.

Rear Wheels - Same as front wheels except that on rear wheels forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe adjusting cams are rotated in direction of reverse wheel rotation.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid—Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal—Disconnect pushrod. Disconnect brake line tube at master cylinder. Disconnect stop light switch leads, remove four stud nuts from studs, remove master cylinder.

Power Brakes: "Bellows" or "Piston" Assist type. Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder). *See "Chrysler, DeSoto, Dodge, Plymouth Bellows Type" or "Piston Type" Brakes in Brake Section.*

Removal of Power Unit - Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket, to prevent trigger arm from extending beyond extremities of bracket *(NOTE* - If pedal linkage is allowed to extend through hole in dash panel, trigger arm may be damaged). Disconnect vacuum hose at power unit. Reomve complete power unit and bracket assembly by removing four nuts and lockwashers.

Parking Brake: On shaft at rear of transmission, 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type used with PowerFlite.

Adjustment—*See "Hand Brake Notes" in DeSoto Special Data.*

Lining—	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15-3/8"
7" Int. Type	2"	5/32"	13-1/16"

Clearance (Internal Expanding) - Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

Clearance (External Contracting) - Adjust anchor screw so clearance between band and drum at anchor is .015-.020".

MISC. MECHANICAL

Windshield Wipers: Auto-Lit EPF-4001. Electric type. *See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.*

Air Conditioning: DeSoto "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjuster: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Electrical-hydraulic type. *See "Power Top Control" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

6 CYL. ENGINES

	Ft. Lbs.
Cylinder Head	70
Manifolds	20
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Crankshaft Pulley	135
Con Rod Caps	45
Engine Front Cover	15
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	25
Oil Filter	25
Clutch Housing	50

V8 ENGINES

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	35
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Single Shaft)	30
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover	25
Engine Front Cover	30
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	50

ENGINE

6 CYL. ENGINES

ENGINE ASSEMBLY REMOVAL: Engine, clutch and transmission assembly can be removed from car as an assembly, as follows Remove hood and radiator core Disconnect propeller shaft at transmission Disconnect transmission controls at transmission (wires to overdrive controls) and speedometer cable Disconnect clutch linkage at clutch housing Disconnect fuel pump flexible line at pump, throttle and choke controls at carburetor, heat indicator tube at head Disconnect wires from generator and starter, coil and distributor Disconnect exhaust pipe at manifold Disconnect oil gauge tube at flexible line Remove crankcase breather pipe, and the front and rear engine support bolts Disconnect hand brake linkage Remove carburetor air cleaner Connect hoist to engine and lift assembly out of chassis

V8 ENGINES

ENGINE ASSEMBLY REMOVAL: Drain cooling system, remove battery. Remove fan shroud, radiator, and hood. *(NOTE* - Before removing hood, scribe outline of hinge brackets to insure proper adjustment when reinstalling.) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor. Attach engine lifting Tool C-3466 to carburetor flange studs on intake manifold and attach chain hoist to fixture eyebolt. Raise car and disconnect propeller shaft at transmission. Disconnect wires and linkage at transmission. Disconnect wires and linkage at transmission and clutch. Remove exhaust pipe (make sure exhaust system is supported while engine is removed). Drain engine and transmission oil. Remove rear crossmember-to-transmission support attaching bolts. *(NOTE* - Place a roll-away jack under transmission to relieve weight from crossmember. Place a wood block between head of jack and transmission to avoid damaging transmission oil pan. Jack must support weight of rear of engine and must be able to roll with engine as engine is removed). Remove crossmember-to-frame bracket attaching bolts. Remove crossmember and rear engine support. Lower car to convenient working height, then remove engine front support mounting bolts. With chain hoist, raise engine and, at same time, work engine out of chassis toward left front fender.

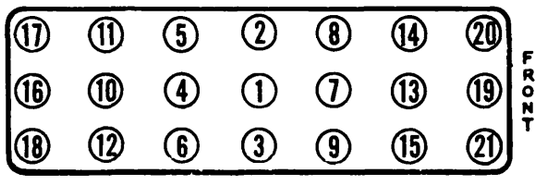
CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

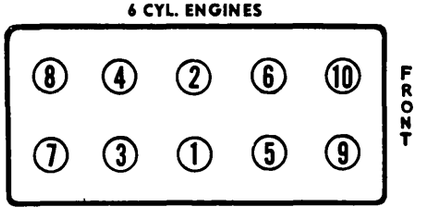
Tightening Torque—See Tightening (Torque Wrench) Specifications above

6 CYL. ENGINES

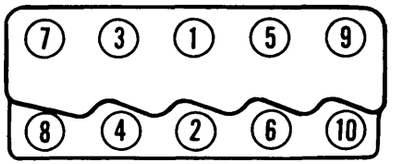
CYLINDER HEAD INSTALLATION: When installing cylinder head, use new gasket Coat threads of capscrews with sealer except the three screws that lead into intake manifold ports If sealer used on these capscrews, there is a possibility that it will be drawn into carburetor or valves Use torque indicating wrench to tighten cylinder head bolt nuts and capscrews Tighten in sequence shown in diagram



6 CYL. ENGINES



V8 ENGINES (DOUBLE ROCKER ARM SHAFT)



V8 ENGINES (SINGLE ROCKER ARM SHAFT)

INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install assembled manifolds While holding manifold and gaskets evenly against engine block, install long center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer) Install remaining washer and nuts *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 15-20 ft lbs torque Tighten the four bolts holding exhaust manifold to intake manifold

V8 ENGINES – SINGLE ROCKER SHAFT

CYLINDER HEAD INSTALLATION (Single Rocker Shaft): Before cylinder head removed, remove rocker shaft assembly Slide out push rods and place them in sequence in a suitable rack in order that each push rod can be reinstalled in its original position When installing cylinder head, use new gaskets Make sure all holes are punched out Be certain cylinder head enters both dowel guide pins in cylinder block Tighten cylinder head bolts in sequence shown in diagram Slide push rods in position Lower rocker shaft assembly down on two locating studs Install all washers, nuts and bolts *CAUTION*—Extreme caution must be exercised when tightening rocker shaft bolts and nuts so that hydraulic tappets have time to bleed down to their operating length If tappets are forced down too rapidly, damage to push rods, tappet bodies or rocker arms will result

V8 ENGINES – DOUBLE ROCKER SHAFT

CYLINDER HEAD INSTALLATION (Double Rocker Shaft): Use new gaskets when installing head. Insert cylinder head bolts into rocker arm support brackets. Insert pushrods through holes in head (short rods in upper holes - intake, long rods in lower holes - exhaust). Place rocker arm assemblies in position on heads, then position pushrods. Starting at top center, tighten all cylinder head bolts to correct torque (see Tightening Specifications above). Install exhaust manifolds, crankcase breather tube, and intake manifold. *NOTE* - When installing intake manifold, insert short bolts in holes on extreme ends of manifold.

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CRANKSHAFT & MAIN BEARINGS

6 CYL. ENGINES

REAR MAIN BEARING SEAL: Neoprene type seal. When replacing seal, both upper and lower halves should be replaced. Remove oil pan, clutch housing pan, and rear main bearing cap. Remove seal from cap, and then remove upper seal by pushing one corner of seal until opposite end protrudes about ⅜" from block. Pull out with long-nosed pliers. Install new seal in lower half by carefully inserting lower half of seal into bearing cap. Before installing upper seal, coat seal contacting lip with grease. Insert one end of seal into block and push it into place with a rolling motion. Install main bearing cap, making certain that tabs of cap gasket fit in cap seal channel.

V8 ENGINES

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos. With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap. Tap seal down in position with Tool C-3511 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine.

ENGINE FRONT COVER

6 CYL. ENGINES

FRONT COVER INSTALLATION: Use new gasket and position cover in place. Install screws but do not tighten. Install pulley and hub on crankshaft far enough so that seal can be evenly positioned on crankshaft. Tighten two screws on right side lightly. Then tighten remainder of screws in like manner. Repeat tightening procedure and torque screws to 15 ft. lbs.

FRONT OIL SEAL: To replace, drive old seal out with suitable drift. When installing seal, make sure seal is driven into place evenly to insure a tight fit. Use a new gasket and position cover in place.

V8 ENGINES – SINGLE ROCKER SHAFT

ENGINE FRONT COVER (Single Rocker Shaft Engines): Proceed as follows:

Removal: Drain and remove radiator. Disengage fan belt and remove generator. Install Tool C-3033 over pulley and force pulley off end of crankshaft. Support engine with suitable chain hoist fastened to intake manifold. Remove motor support "U" bolts and nuts. Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads. Lift water pump housing, water pump, front motor support and insulator up and away from front of engine. Discard gaskets. Loosen bolts that hold oil pan to cylinder block. Drop pan slightly to clear chain case cover. Disconnect inlet and outlet fuel lines at fuel pump. Remove bolts that hold pump to chain case cover. Slide pump out and away from engine. Discard gasket. Remove bolts and washers from cover. Disengage cover from locating dowels, remove from engine. Discard gasket.

Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs. Install new gasket and position cover locating dowels. Coat screws with suitable sealer and tighten to 15 ft. lbs. *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil.

V8 ENGINES – DOUBLE ROCKER SHAFT

ENGINE FRONT COVER (Double Rocker Shaft Engines): Proceed as follows:

Removal: Remove water pump. Remove vibration dampener retainer bolt and washer. Remove two of the vibration dampener pulley bolts and install puller Tool C-3033. Remove crankshaft pulley and vibration dampener as an assembly. Remove felt dust seal and vibration dampener hub key from crankshaft slot. Remove left cylinder bank exhaust pipe. Disconnect fuel lines at fuel pump, remove fuel pump. Remove oil level indicator. Remove starter using Tool C-455. Drain engine oil and remove oil pan. Remove chain case cover bolts and lockwashers, **including one inside the pump opening.** Drive chain case cover off the two dowel pins, using soft hammer.

Installation: Be sure mating surfaces of cylinder block and cover are clean. Apply moderate coat of sealing compound to block and cover faces, install new gasket. Make sure crankcase oil slinger is in proper position (flange end pointing toward seal). Position cover on two dowel pins and gently tap cover in place. Install cover bolts and lockwashers and tighten to 30 ft. lbs. Install other items be reversing removal procedure.

ALL ENGINES

FRONT OIL SEAL: Remove old seal by driving it out with Tool C-3050. Place new seal on the chain case cover with the projecting flange facing the inside of the cover. Insert seal gasket and drive new seal in place with Tool C-3051.

CAMSHAFT & BEARINGS

6 CYL. ENGINES

CAMSHAFT REMOVAL: Remove Front End Assembly as a unit. Remove cylinder head, fuel pump, oil pump, valve tappet cover plates, crankshaft pulley, front motor support (with front of engine jacked up), timing chain cover, camshaft sprocket and timing chain. If valves and valve springs are not to be removed, prop valves up by inserting wooden wedges at opposite sides under valve head. Raise tappets and hold in this position (use spring type clothes pins or similar tool to hold tappets up). Withdraw camshaft (rotate shaft to clear any obstructions).

V8 ENGINES – SINGLE ROCKER SHAFT

CAMSHAFT REMOVAL: Drain radiator, remove radiator and crankshaft pulley. Support engine with chain hoist attached to intake manifold. Remove engine support U-bolts. Remove fan, water pump, and water pump housing assembly. Loosen oil pan bolts sufficiently in order that oil pan clears chain case cover, camshaft gear hub nut, fuel pump eccentric and dowel. Then remove camshaft gear and timing chain. Support engine at front of oil pan. Then remove intake manifold, distributor, distributor drive gear, tappet chamber cover, rocker cover, rocker shaft assemblies and push rods. Use Tool C-3158 to pull out hydraulic tappets. If varnish build-up is excessive, use puller part of Tool C-3158 and work tappet out of bore. Remove four camshaft thrust bolts, then remove camshaft.

V8 ENGINES – DOUBLE ROCKER SHAFT

CAMSHAFT REMOVAL: With intake manifold, tappet cover, pushrods, tappets and timing gears removed, remove distributor. Lift out distributor drive gear and stub shaft. Remove camshaft thrust plate attaching bolts and oil trough. Withdraw camshaft and spacer, being careful not to damage cam bearings with cam lobes.

VALVE SYSTEM

ALL ENGINES

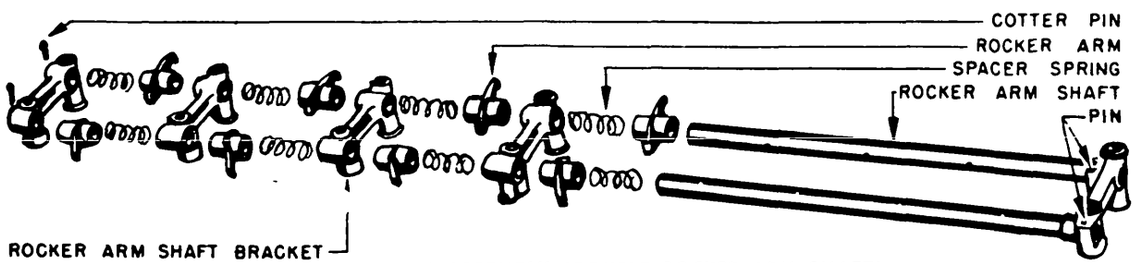
EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished .010" O.S. Use special Tool C-732 (6 Cyl.), C-3140 (Double Rocker Shaft V8) to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be from .002-.004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with installing tool C-767.

ROCKER ARMS

V8 ENGINES – SINGLE ROCKER SHAFT

ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft): Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down. Slide an intake rocker arm over shaft and down

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V8 ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

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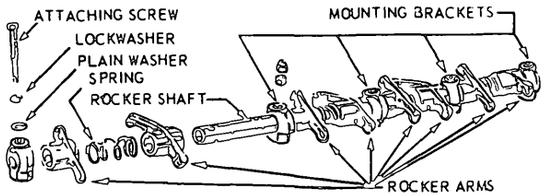
against bracket, with diagonal slant of arm close to bracket. Then slide a spacer spring over shaft and down against intake rocker arm. Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket. Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed. Slide push rods into push rod holes. Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head. Install flatwashers and nuts.

V8 ENGINES – DOUBLE ROCKER SHAFT

ROCKER ARM ASSEMBLY (Double Rocker Arm Shaft):

Removal: Remove rocker arm covers. Place cotter pins in holes of first and last rocker arm brackets to prevent springs on rocker from pushing assembly apart when cylinder bolts removed. Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block. Grasp support bracket at each end of head, pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068. *CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.*

Installation: Insert cylinder head bolts in brackets, with short bolts in intake side. Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes). Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms. Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above. *When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.* Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly.

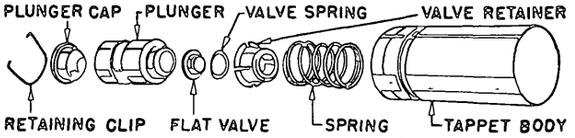


V8 ROCKER ARM ASSEMBLY
(SINGLE ROCKER ARM SHAFT)

HYDRAULIC VALVE LIFTER
V8 ENGINES

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type) Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body. Oil is introduced to this unit through hole in side of lifter plunger.

Removal (Single Rocker Arm Shaft Engine): Remove rocker covers, then remove bolts, nuts and flatwashers holding shaft to heads. Lift rocker shaft and arms straight up and away from heads. Drain cooling system to point below level of intake manifold. Remove carburetor air cleaner, disconnect fuel and vacuum lines, overdrive kick-down switch wires and accelerator linkage at carburetor. Disconnect coil wires and disconnect heat indicator wire at intake manifold. Disconnect heater hose and automatic integral choke heat tube at carburetor. Remove intake manifold bolts, then lift intake manifold, coil and carburetor straight up and away from engine. Discard gaskets (*CAUTION* - Cover intake ports in cylinder head to avoid entry of dirt). Remove crankcase ventilator pipe and gasket. Remove tappet chamber cover bolts. Lift cover up and away from engine. Discard gaskets. Insert hooked portion of Tool C-3158 into hole in tappet body (this portion of tool can be used to remove tappets without a varnish build-up at lower part of tappet body). Lift tappet out of bore. If lifter sticks in bore, slide puller portion of Tool C-3158 through cylinder head (pushrod) openings and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and slowly pull tappet out of bore with sharp twisting motion. As tappet clears bore, withdraw puller pin and puller tool, then lift tappet out of chamber.



V8 ONE-PIECE VALVE LIFTER

Removal (Double Rocker Arm Shaft Engine): Drain cooling system to a point below level of intake manifold. Install valve spring compression Tool C-3024 over rocker arm so heel of tool rests on valve stem side. Make certain valve is seated and tappet body is resting on low point of camshaft lobe (see below). Using handle of tool for leverage, compress valve springs sufficiently to raise rocker arm above pushrod. While holding rocker arm in this position, slide rocker arm to one side along tube (*CAUTION* - To avoid damage to valves, be sure piston head is well below top of travel before compressing valve springs). Remove carburetor air cleaner, disconnect coil wires and wire from heat indicator sending unit. Disconnect heater hose and carburetor heat tube at integral choke. Remove intake manifold, coil and carburetor as an assembly. Remove tappet chamber cover and gasket. Insert hooked portion of Tool C-3216 into hole in tappet body (this portion of tool can be used to remove tappets without varnish build-up). Lift tappet out of bore. If tappet sticks, slide puller portion of tool C-3316 through cylinder head (pushrod) holes and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and pull tappet out of bore with twisting motion.

Disassembly: *(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)* Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body. Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting. Check to see that valve exerts a slight pressure on valve spring to insure valve seating. Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene. *(CAUTION—Container and kerosene must be absolutely clean).* Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing. This will prevent possible scoring of lifter plunger when engine is first started.

Reassembly: Reverse disassembly procedure as noted above.

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos. 1 and 6 cylinders. Set timing mark "DC" located on crankshaft pulley to pointer. With rotor at No. 1 firing position, the following lifters will be on the low side of the cam lobe: No. 2 intake and exhaust, No. 4 exhaust, No. 7 intake, No. 8 intake and exhaust *(NOTE—To remove No. 1 intake and exhaust lifter,* rotate crankshaft ¼ turn clockwise from above position after removing lifters listed). With rotor at No. 6 position, following lifters will be on low side of cam lobe: No. 3, intake and exhaust, No. 4 intake, No. 5 intake and exhaust, No. 7 exhaust *(NOTE—To remove No. 6 intake and exhaust lifter,* rotate crankshaft ¼ turn clockwise from above position after removing lifters listed).

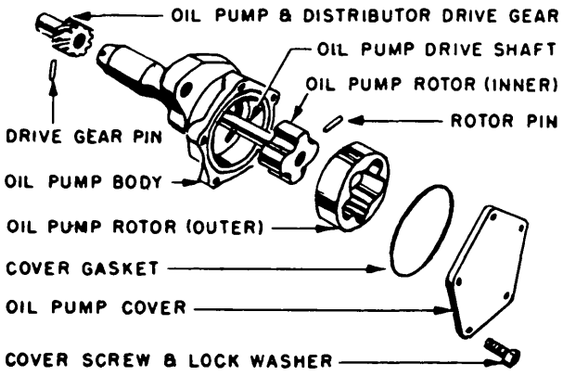
OILING SYSTEM
OIL PUMP
6 CYL. ENGINES

ROTOR TYPE OIL PUMP: Removal—Before removing oil pump, rotate crankshaft and make sure "DC" mark on crankshaft pulley lines up with pointer on timing chain case cover. Do not rotate engine with oil pump removed. Remove the attaching screws and remove pump from engine *NOTE—On some* models it will be necessary to remove the two upper cover capscrews to obtain sufficient clearance to remove oil pump.

Disassembly & Inspection: Remove the oil pump cover and gasket. Hold hand over cover opening and with pump upside down, turn drive shaft until outer rotor slips out. Drive out the straight pin holding pump drive gear to shaft. Press the shaft

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6 CYL. OIL PUMP

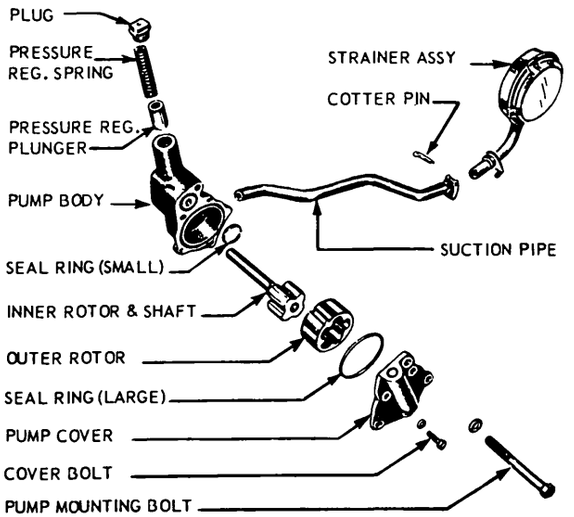
out of drive gear and slide shaft and inner rotor assembly out of pump body Wash all parts and dry with air Inspect all parts and replace as necessary, then measure clearance between opposite lobe of inner rotor and outer rotor Clearance should be 010" or less If clearance is greater, replace both rotors Measure thickness and diameter of outer rotor If thickness is 748" or more and diameter is 2 245" or more, rotor is satisfactory Thickness of inner rotor should be 748' or more If either rotor is less than these dimensions, replace BOTH rotors Insert both rotors into pump body and place a straight edge across pump body between bolt holes Clearance between straight-edge and rotor should be 004" maximum If greater, replace pump body Press outer rotor to one side against pump body and measure clearance between rotor and body on opposite side Maximum clearance should be 008 If greater, replace pump body Cover should be smooth and flat If it is scratched or grooved, replace cover Check flatness by placing a straight-edge across inner surface of cover If it is possible to insert a 001" feeler between cover and straight-edge, replace cover

Reassembly: Slide the drive shaft and rotor assembly into pump body Press drive gear on shaft until end play of shaft is from 003" to 010" Press rotor down in body with hand and measure clearance with feeler gauge Install pin and peen over both ends If pin holes do not line up, drill a new pin hole through gear and shaft, using a 5/32" drill Slide outer rotor into place in pump body Install new cover gasket and install cover and tighten screws evenly

V8 ENGINES

ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan Remove oil pump mounting bolts and lower pump straight down

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe Remove cover bolts and cover. Discard oil seal ring Remove pump rotor shaft and lift out pump outer rotor Remove oil pressure relief valve plug and lift out spring and plunger Wash all parts in a suitable solvent and inspect for damage or excessive wear Check all pump parts as follows.



V8 OIL PUMP

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers If diameter less than 2 244" or thickness less than 998', replace both inner and outer rotors

Inner Rotor—Measure thickness of inner rotor with micro-calipers If thickness measures less than 998", replace both inner and outer rotors

Rotor Depth—Slide rotors in pump body Place a straightedge across pump body Use a feeler gauge and measure clearance between top of rotors and straightedge If clearance in excess of 004", replace pump body

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors If clearance in excess of 010", replace both inner and outer rotors

Reassembly: Use new oil seal ring between cover and body Tighten cover bolts to 10-15 ft lbs Prime pump and then install new oil seal ring in pump mounting face

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

COOLING SYSTEM

6 CYL. ENGINES

WATER DISTRIBUTION TUBE: Replace whenever engine completely overhauled If tube becomes rusted or corroded, overheating of engine may occur due to failure of water to circulate properly through cylinder block To replace tube, remove radiator core and water pump Pull tube out of block with stiff hooked rod Install tube with slots up and be sure tube is inserted far enough into block so that water pump will seat properly against block

IGNITION NOTES

V8 ENGINES

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block

Installation: Slide new bushing over burnishing end of Tool C-3053 Insert tool and bushing into bore of block Drive bushing and tool down into position, using a soft hammer As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size ***DO NOT REAM THE BUSHING.***

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows Rotate crankshaft until No 1 cylinder is at TDC (or firing position) When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear Coat shaft of drive gear with engine oil Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase)

BRAKE NOTES

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. 010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least 005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car Install adjusting screw cover plate and connect propeller shaft

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for 015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015- 020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed 005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

►*DODGE "500" NOTE:* This model has a special High Compression Engine with different Valve Timing (Adjustable Tappet Clearance), Ignition Setting, Spark Plugs, and Carburetor (Carter 4-Barrel). See Data below.

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model Identification
Coronet 6 Cyl.	D-62-1, 2
Coronet V8	D-63-1
Royal V8	D-63-2
Custom Royal V8	D-63-3
Dodge "500" V8	D-500

SERIAL NUMBER: Stamped on plate attached to left front door hinge pillar post.

Starting Serial Nos.	Detroit	Los Angeles
D-62-1, 2	32227001	48016501
D-63-1, 2, 3	34972001	42608001

ENGINE NUMBER: (6 Cyl.) Stamped on boss at left front section of cylinder block. **(V8)** Stamped on boss at center of cylinder block directly behind water pump and next to oil filler tube.

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A"—All cylinders .020" oversize.

"B"—All Main & Connecting Rod Bearings .010" undersize.

"AB"—BOTH above conditions exist.

"DIAMOND" symbol (3/8"high)—ALL tappet bodies are .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: (6 Cyl.) 120-150 lbs., **(V8)** 90-155 lbs., at cranking speed of 150 RPM (plugs removed, throttle wide open). Maximum variation between cylinders 15 lbs.

VACUUM READING: (6 Cyl.) 18-20", **(V8)** 18-21", idling.

VALVE TAPPET CLEARANCE: (D63-1, 2, 3). None in service (hydraulic).

D-62-1, 2 – .010" Intake & Exhaust (Hot & Idling).

NOTE – Tappet screws are self-locking. For continuous high speed an additional .002" exhaust clearance is desirable.

D-500 – .012" Intake, .022" Exhaust (Hot & Idling).

MANIFOLD HEAT CONTROL: Application as follows:

(D-62-1, 2): Thermostatic coil spring type with counterweight. Valve should operate freely. When installing coil, place coil spring in position over shaft slot, with outer end (tongue) of spring in the upper left hand position (10 o'clock). Press inner end of coil into slot and seat firmly. Move outer end of spring down (counterclockwise), around and up over stop stud.

(D-63-1, 2, 3 Standard): Single exhaust on right cylinder block with thermostatically controlled valve. Install heat control valve with counterweight toward front of engine, with small anti-rattle spring retaining pin toward rear and adjacent to cylinder block.

(D-500 Std., D-63-2, 3 with Power Package): Dual exhaust. Heat control valve is in right exhaust pipe.

Coil Spring Installation – Position valve shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer end tongue of spring in upper left hand position. Press inner end of coil into slot of shaft and seat firmly. Move outer end tongue of spring around and hook under pin (left pin when facing coil end of valve).

Counterweight Installation – Place counterweight over shaft (shield upward) and insert lock in shaft slot. Center counterweight on shaft and turn weight on shaft until seated. Install stop, and tighten nut securely with Tool T-109-173.

►*DUAL EXHAUST NOTE:* When valve is closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

6 CYL. ENGINES

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: 035".

Plugs—Auto-Lite Resistor Type AR80 14mm. Torque to 30-32 ft lbs.

COIL: Auto-Lite CAF-4002. *12 Volt.*

Ignition Current—1 8 amps. idling, 2.4 amps. stopped.

Resistor—None used.

DISTRIBUTOR: Auto-Lite IAT-4101B. *12 Volt.*

Condenser—Auto-Lite IAT-3076RA. **Capacity** 250-.285 microfarad.

Contact Point Set—Auto-Lite IGW-3028BS

Breaker Gap—.018-.022".

Cam Angle—36-42°. DO NOT exceed breaker gap limits to obtain dwell

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
1		525	2		1050
4		875	8		1750
7		1225	14		2450
8		1350	16		2700

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4 3/4
1	2	5 7/8
4	8	9 3/8
7	14	12 7/8
8	16	14

►*DISTRIBUTOR INSTALLATION CAUTION:* Make sure that No. 1 piston is at TDC on compression stroke and that distributor rotor is in No. 1 firing position.

V8 ENGINES

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: 035".

Spark Plugs—(D-63-1, 2, 3) Auto-Lite AR-52, ("500") 4S-250. 14 mm. Resistor type. Torque to 30-32 ft. lbs.

COIL: Auto-Lite CAD-4002, 3. *12 Volt.*

from negative terminal of coil to distributor breaker arm terminal. When testing coil, include resistor with coil. Test without resistor will show coil to be defective.

DISTRIBUTOR: Auto-Lite IBJ-4301A (D-63-1), IBJ-4303 (D-63-2, 3 Std.), IBJ-4303B (D-63-2, 3 Power Pack). ("500") IBK-4301A. *12 Volt. NOTE*—IBK-4301A is "Double Breaker" type.

Condenser—Auto-Lite IBB-2015R. **Capacity** .25-.28 microfarad.

Contact Point Set—Auto-Lite IGW-3028MS (All "IBJ" Distr.), IGW-3028KS ("IBK" Distr.).

Breaker Gap—.015-.019". Set gap to .017".

Cam Angle – 28-34° ("IBJ" Single Breaker), 35-41° ("IBK" Double Breaker with both sets operating together). Do not set gap outside limits to obtain specified cam dwell.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Automatic Advance—IBJ-4301A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		400	2		800
6.5		700	13		1400
14		1975	28		3950
15		2150	30		4300

Automatic Advance—IBJ-4303

Degrees	Distr.	RPM	Degrees	Eng	RPM
Start		350	0		700
1		415	2		830
3.5		575	7		1150
15		2200	30		4400
16		2350	32		4700

Automatic Advance—IBJ-4303B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		410	2		820
7		775	14		1550
14		2150	28		4300
15		2350	30		4700

Automatic Advance—IBK-4301A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		430	2		860
5		750	10		1500
8		1850	16		3900
9.5		2400	19		4800

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance—IBJ-4301A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5 1/2
1	2	6
5	10	8 3/8
11	22	13¼
12.5	25	15

Vacuum Advance—IBJ-4303

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6 3/8
1	2	7 1/8
5	10	9 3/4
10	20	14 1/8
11	22	10 1/2

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Vacuum Advanc –IBJ-4303B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5 1/4
1	2	6
4	8	8 1/4
7	14	11
8	16	12

Vacuum Advance–IBK-4301A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7 1/2
1	2	8 1/8
5	10	10 7/8
10	20	15 1/8
11.5	23	17

Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in Dodge Special Data.*

IGNITION TIMING

Model	Std. Setting
D-62-1, 2	2° BTDC
D-63-1	4° BTDC
D-63-2, 3	6° BTDC
D-500	2° BTDC

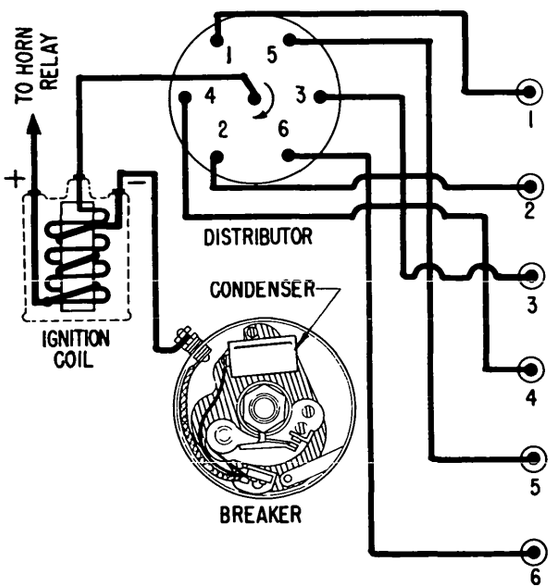
Timing Mark –(6 Cyl.) 2° BTDC mark on vibration damper under pointer under front cover. **(V8)** On crankshaft pulley (on vibration damper with Power Package), aligned with pointer on chain case cover.

Manual Adjustment – Timing may be advanced or retarded depending on fuel used or altitude. Range of timing should not exceed plus or minus 6° from recommended factory setting.

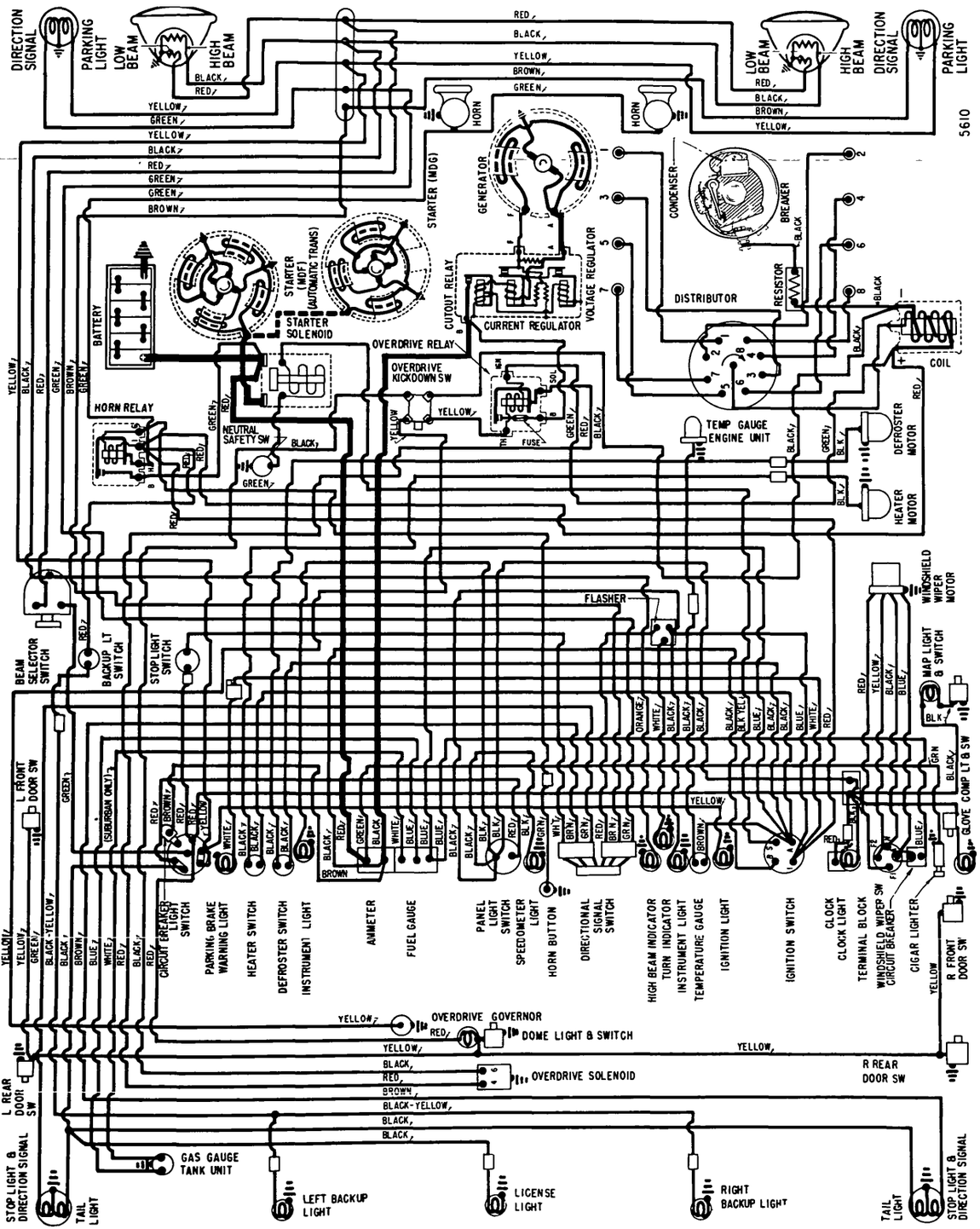
CARBURETOR

► *CARBURETOR APPLICATION: Stromberg WW 2-barrel Carburetors used as standard equipment on all models.*

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6 CYL. IGNITION WIRING



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Carter WCFB 4-barrel Carburetor used on D-63-2, 3 Super Red Ram with Power Package & D-500. D-500 with P wer Package used TWO Carter WCFB Carburetors.

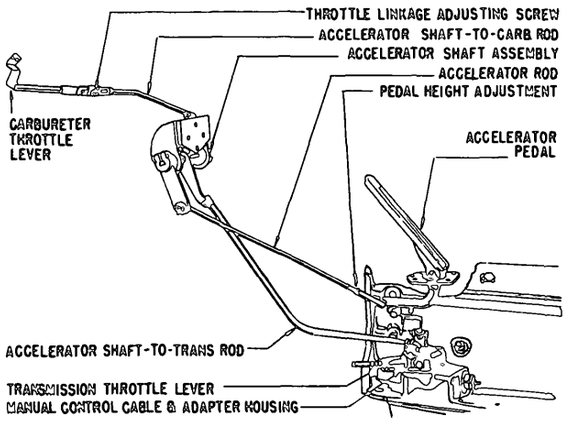
THROTTLE LINKAGE ADJUSTMENT (PowerFlite Cars): Correct any binding corrections. Run engine until normal operation temperature is reached. Remove air cleaner to make sure choke is fully open. Connect tachometer leads to coil and ground. Adjust engine idle speed to 475-500 RPM with transmission in neutral. Stop engine. Loosen throttle linkage adjusting screw (located on throttle control rod from engine to carburetor on 6 Cyl. engines, on accelerator shaft-to-carburetor rod on V8 engines).

6 Cyl. Engines – While holding throttle control rod from engine to carburetor against closed throttle stop, move bellcrank arm just enough to start extending accelerator return spring (Do not extend spring more than 1/8" in opposite direction).

V8 Engines – Move rear portion of accelerator shaft-to-carburetor rod rearward until it is stopped by the idle stop on transmission throttle cam.

All Engines – With control rods in line and pre-loaded lightly, lock throttle linkage adjusting screw by applying 10-15 ft. lbs. torque. Start engine and recheck idle speed (475-500 RPM) with transmission in neutral and hand brake set. Stop engine and remove tachometer.

Pressure Adjustment: *See "PowerFlite" Transmission in Transmission Section.*



POWERFLITE THROTTLE LINKAGE

STROMBERG 2-BARREL WW

Transmission	Stromberg No.
Synchro-mesh (D-62-1, 2)	WW3-124
Overdrive (D-62-1, 2)	WW3-125
PowerFlite (D-62-1, 2)	WW3-126
Synchro-mesh (D-63-1)	WW3-135
Overdrive (D-63-1)	WW3-136
PowerFlite (D-63-1)	WW3-137
Synchro-mesh (D-63-2, 3)	WW3-138
Overdrive (D-63-2,3)	WW3-139
PowerFlite (D-63 2,3)	WW3-140

▷*6 CYL. MANIFOLD FUEL DISTRIBUTION: Each barrel feeds all cylinders.*

▷*V8 MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting – (6 Cyl.) 1 turn open, (V8) ¾ - 1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed (6 Cyl.) – 475-500 RPM with transmission in Neutral.

Idle Speed (V8) – 450-500 RPM (Std. & O.D.), 475-500 RPM (PowerFlite) with selector button in neutral.

Float Level – 3/16" from top of main body (gasket removed) with gauge (T-25569) at center of float and float lip held firmly against fuel inlet needle, To adjust, bend float lip (Do not force float) with Tool T-24733.

Accelerating Pump – Normal setting, center hole; for less fuel install rod in inner hole; for more fuel install rod in outer hole. Pump travel should be 7/32 to ¼" (V8), 3/16" to 7/32" (6 Cyl.). Adjust by bending pump rod.

Fast Idle: With throttle valves in fully closed position, turn fast idle stop screw in so it just contacts throttle lever, then turn adjusting screw in 4½ turns (V8), 5 1/8 turns (6 Cyl.). With choke valve closed and throttle lever held against fast idle screw, insert a No. 48 drill between tang on contact lever and first step of fast idle cam. Drill should just fit. To adjust, bend tang on cam contact lever (Tool T-26863).

Fast Idle Cam – Open throttle valves sufficiently to clear fast idle cam. With choke valve tightly closed and throttle valves forced closed, tang on cam contact lever should just clear high step of fast idle cam. This clearance should not exceed .020". Adjust by bending fast idle rod (at angle), using Tool T-109-213.

Automatic Choke Setting: Centered (indicator mark on cover coincides with center mark on housing).

Dashpot Adjustment: With idle speed adjusting screw set for normal idle speed, there should be 1/16-3/32" clearance between end of dashpot plunger and ear on throttle lever when plunger is pushed to end of its travel. To adjust, loosen locknut and turn dashpot in bracket to obtain correct clearance.

Kickdown Switch Adjustment: With throttle valves in wide position, there should be 1/64-1/32" clearance between ear on throttle lever and threaded portion on switch housing. To adjust, loosen adjusting nuts and move switch in or out until correct clearance has been obtained.

Throttle Linkage Adjustment: See CARBURETOR above.

▷*OTHER DATA: See "Stromberg WW" Carburetors in Carburation Section.*

Fuel Pump Pressure: 4½ - 6½ lbs.

CARTER 4-BARREL WCFB

D-63-2, 3 (Power Pack) Early	2303S, SA, SB
D-63-2, 3 (Std. & O.D.) Later	2474S
D-63-2, 3 (PowerFlite) Later	2432S
"500" (Standard)	2443S, SA
"500" (Power Pack)	(front) 2476S, (rear) 2445S

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting – ½-1½ turns open (2432S; 2474S; 2303S, SA, SB), ⅜-1¾ turns open (2443S, SA), ½-1¼ turns open (2445S, 2476S). Turn screws out for richer mixture.

Carburetor Adjustment (2476S & 2445S): *Adjust carburetors exactly as f llows for balanced operation:*

1) Connector Rod – Open both carburetor throttles to wide open position. If either front or rear carburetor throttle valves do not open fully, adjust length of connector rod. Rod must not bind on pivot studs.

2) Idle Speed – With engine at normal operating temperature, disconnect accelerator shaft rod at rear carburetor, set idle speed to 500 RPM (use tachometer) as follows: Back off idle speed screw, turn front carburetor screw up to point where it contacts stop.

3) Idle Mixture – Turn rear carburetor idle mixture screws in until lightly seated, then back screws out ½ turn. Repeat with front carburetor. Trim front carburetor idle mixture screws only to obtain smoothest engine idle. Connect accelerator shaft rod.

Idle Speed – 450-500 RPM (Std. & O.D.), 475-500 (PowerFlite) with transmission in neutral.

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷*OTHER DATA: See Carter "WCFB" Carburetors in Carburation Section.*

Fuel Pump Pressure: 4½-6½ lbs.

CARB. EQUIPMENT

Fuel Pump: Auto-Lite FA-4005 (6 Cyl.), FB-4006 (V8 Early), Carter M2414 (V8 Later).

Pressure - 4½ - 6½ lbs.

See "Fuel Pumps" in Carburation Section of Manual.

Gasoline Gauge: Auto-Lite. Electric.

Dash Unit - 14007A (Sub. & Est. Wgn.), 14010A (Others).

Tank Unit - 13905A (Sub. & Est. Wgn.), 13969A (Others).

See "Fuel Gauges" in Carburation Section.

BATTERY

Auto-Lite 11-HS-60 or Willard HO-11-60 (D-63-2, 3 & D-500). 12 Volt, 11 plate, 60 ampere hour capacity.

Auto-Lite 11-HS-50 or Willard HO-11-50 (Others). 12 volt, 9 plate, 50 ampere hour capacity.

Warm Climate Option (Exc. Air Conditioned Cars) – Auto-Lite 11-MS-45 or Willard MO-11-45. 12 volt, 7 plate, 45 ampere hour capacity.

Grounded Terminal – Negative.

▷*CAUTION: This is reversed from previous models.*

Engine Ground – Left front of engine.

STARTER

Auto-Lite. 12 Volt. Application as follows:

Model	Auto-Lite Starter No.
Standard (D-62-1, 2)	MDG-6001
PowerFlite (D-62-1, 2)	MDF-6002
Std. (D-63-1, 2, 3, D-500)	MDG-6002
PowerFlite (D-63-1, 2, 3, D-500)	MDF-6007

Armature (All) – Auto-Lite MDF-2088.

Drive – Bendix "Folo-Thru" No. EBB-20.

Rotation – Counter-clockwise at commutator end.

Brush Spring Tension – 42-53 ozs. (new brushes).

Performance Data - MDF

Torque	RPM	Volts	Amperes
0 ft.lbs.	3200 Min.	10.0	60 Max.
6.5 ft.lbs. Min.	Lock	4.0	240 Max.

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Performance Data - MDG

Torque	RPM	Volts	Amperes
0 ft.lbs.	4400 Min.	10.0	50 Max.
5 ft.lbs.Min.	Lock	4.0	210 Max.

Starting Switch: Auto-Lite SAE-4001 (Std.), SAE-4002 (PowerFlite). Magnetic type switch controlled by ignition switch. Neutral safety switch mounted on transmission on Automatic Transmission Cars. *See "Starter*

Neutral Safety Switch Adjustment: *See "PowerFlite" in Transmission Section.*

GENERATOR

Auto-Lite *12 Volt.* Application as follows:

Auto-Lite Generator No.	Application
GJC-7002A or GGA-6001K, L	6 Cyl. Std.
GJC-7001A, C or 7002A	V8 Std.
GJC-7003B or GGA-6002A	Pow. St.
GJC-7006B or GGA-6001N	Air Cond.
GJC-7003C or GGA-6002C	Air Cond. & Pow. St.
GGA-6003A	Special

►*SPECIAL GENERATOR NOTE:* GGA and GJC type generators used. Performance specifications below apply equally to all generators within either of the two groups specified.

Performance Data - GJC

Amperes	Volts	RPM Cold
20.0 ①	15.0	1750 Max.
30.0 ①	15.0	2050-2250

Performance Data - GGA

Amperes	Volts	RPM (70° F.)
4.0	14.6	950 Max.
40.0 ①	14.6	1600 Max.
40.0 ①	15.0	1600 Max.

① - Do not operate generator for any length of time in excess of controlled output setting. To do so may result in burned armatures and fields.

Brush Spring Tension - (GGA) 34-41 ozs., (GJC) 18-36 ozs., with new brushes.

Field Current - (GGA) 1.1-1.3 amperes, (GJC) 1.2-1.3 amperes, all at 10.0 volts (70° F.)

Motoring Current - (GGA) 2.3-2.6 amperes. 3.1-3.5 amperes with felt oil seal in drive end head. (GJC) 3.4-3.9 amperes. All at 10.0 volts.

Rotation - Counter-clockwise at commutator end.

Belt Adjustment: Loosen generator adjusting strap and generator-to-generator bracket mounting bolts. With Tool C-3379 hooked over generator and a torque wrench attached to tool, apply torque of 45 ft. lbs. (new belt), 27 ft. lbs. (old belt), to pull generator outward. While holding generator outward at required torque, securely tighten generator mounting bolts and adjusting strap.

REGULATOR

Auto-Lite. *12 Volt.* Used with generators as follows:

Auto-Lite Regulator No.	Generator
VAT-6201A	GGA
VRX-6201A	GJC

Cut Out Relay

Cuts In - 13.0-13.7 volts (VRX), 13.0-13.75 volts (VAT).

Cuts Out - 8.2-9.3 volts (approx. 3-5 amps. discharge).

Contact Gap - .015".

Air Gap - .031-.034".

Voltage Regulator

Setting – 14.5 volts at 80° F. while charging at 10.0 amperes or with .25 ohm resistor in series between regulator and battery.

Air Gap – .048-.052" with contacts just opening.

Checking & Adjusting – *See Electrical Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A – Operating Amperes	Test B
VRX	36 Max.	30 (28-32)
VAT	46 Max.	40 (38-42)

Test A – After 15 minutes operation charging at 10 amps.

Test B – After additional 15 minutes operation on current regulator (load applied to hold voltage at 13.7-13.9 volts (VAT), 13.6-13.8 (VRX).

Air Gap – .048-.052" with contacts just opening.

Checking & Adjusting – *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Direction Signal: *See Electrical Section.*

►*IGNITION-STARTER SWITCH CAUTION: When installing accessories, use accessory terminal only on ignition-starter switch and not the ammeter terminal post.*

Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut. Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft. Headlamp knob is held on its shaft by means of a recessed hex screw.

Stop Light Switch Location: On forward end of master cylinder.

CIRCUIT BREAKERS: Lighting – Three circuit breakers on back of lighting switch. Protect circuits as follows:

15 Ampere – Protects Head & Beam Indicator Lights.

6 Ampere – Protects Parking, Tail, License Plate, Instrument, Ignition and Clock lights.

6 Ampere – Protects Stop, Map, Dome, Glove Compartment, Courtesy and Trunk Compartment lights.

Windshield Wiper & Back-Up Lights: 5 Ampere. Mounted on rear of windshield wiper switch.

Window Lifts: 20 Ampere. Mounted behind left front kick panel.

Four Way Seat: 15 Ampere. Mounted behind left front kick panel.

HORNS: Auto-Lite or Sparton. Dual horns with Relay. *12 Volt.*

Horn Relay: Auto-Lite RAH-4002. *12 Volt.*

ENGINE

6 CYL. ENGINES

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditiining equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Sect.*

ENGINE SPECIFICATIONS: Six Cylinder "L" head.

Bore	Stroke	Displacement
3.25"	4.63"	230 cu. ins.

Compr. Ratio	Rated HP	Developed HP
7.4-1	25.4	123 at 3600 RPM

Compression & Vacuum Reading—*See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Dodge Special Data.*

►*MANIFOLD INSTALLATION CAUTION:* Two long capscrews extend into cylinder block water passage. Before installing, apply sealer to these capscrews. It is important that conical washers at flange ends of exhaust manifold be installed to permit expansion and contraction without loosening.

OIL PAN REMOVAL: Drain engine oil. As soon as oil is drained, install drain plug and tighten securely. Remove clutch housing pan to prevent damaging oil pan gaskets on clutch housing pan dust seal. Remove oil level indicator and drop pan on tie rod. Lift up oil strainer so it clears baffle inside pan. With strainer lifted, slide pan to rear and remove. NOTE—New end gaskets should protrude 1/4" to 1/8" above oil pan. *Ends must not be cut off.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Dodge Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Dodge Special Data.*

PISTONS

Aluminum alloy, U-slot, cam ground type.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.*

Weight—16 ozs. (stripped).

Removal—Pistons and rods removed from above.

Fitting New Pistons: Clearance between piston skirt (¼-¾" from bottom of piston) and cylinder wall should be .0002-.0012" at 70° F. Pull to withdraw feeler, .002" x ½", should be 6-10 lbs. (piston inverted in bore, pin and rings removed).

Replacement Pistons: Std., .005", .020", .030", .040", .060" oversize.

Installing Pistons: "U" slot away from valves.

PISTON PINS

Full floating type.

Diameter—55/64". **Length**—2-3/4".

Pin Fit in Piston—.0000-.0005". DOUBLE THUMB push fit at room temperature (70° F.)

Pin Fit in Rod Bushing—.0001-.0002". Tight thumb push fit at room temperature (70° F.)

Replacement Pins: Std., .003", .008" oversize.

NOTE—Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.010-.020"	.0025-.004"
Compr. (#2)	3/32"	.010-.020"	.002-.0035"
Oil (#3)	5/32"	.010-.020"	.001-.0025"
Oil (#4)	5/32"	.010-.020"	.001-.003"

Replacement Rings: Std., .010", .020", .030", .040", .050", .060" oversize.

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Installing Rings: #1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down, if step on outer edge).

CONNECTING RODS

Length (Center to Center)—7-13/16". **Weight**—27.9 ozs.
Crankpin Journal Diameter—2.0625".
Maximum out-of-round and taper limits—.001"
Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*
Clearance—.0005-.0015".
Endplay—.006-.011".
Bearing Adjustment: None. Replace bearings.
Replacement Bearings: Std. and .001", .002", .003", .010", .012", .020", .030", .040" undersize.
Installing Rods: Oil metering hole toward valve side of engine.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Four bearing.
Bearing Type—Removable, precision type, thin babbitt on steel. No shims.
►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows: **.010" UNDERSIZE (All Main & Connecting Rod Journals)**—Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
Clearance—.0005-.0015" desired.
Replacement Bearings: Std. and .001", .002", .003", .010", .012", .030", .040" undersize.
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Dodge Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Dodge Special Data.*
End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**—.003-.007".

CAMSHAFT

Journal Diamet rs—(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-1'4".
Bearings—Removable, steel-backed babbitt lined bushings (exc. #4—machined in crankcase).
Clearance—.001-.003". NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.
End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".
Timing Chain: **Width**—1". **Pitch**—.500". **Length**—24" or 48 links.
Camshaft Setting: Sprockets marked. Mesh chain with sprockets so that "O" marks on sprockets are adjacent and in line with a straightedge across shaft centers.
Engine Front Cover Installation: *See "Engine Front Cover" in Dodge Special Data.*
Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Dodge Special Data.*

VALVES

Tappet Clearance: .010" Intake. .010" Exhaust (engine hot and idling). NOTE—.002" additional clearance on exhaust tappets if car driven at continuous high speed.

Valves	Head Diam.	Stem Diam.	Length
Intake	1-17/32"	.340-.341"	4-27/32"
Exhaust	1-13/32"	.340-.341"	4-25/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.001-.003"
Exhaust	45°	23/64"	.003-.005"

Valve Seat Width—1/16-3/32". Runout .0015" maximum.
►*VALVE SEAT INSERT CAUTION: See "Valve System" in Dodge Special Data.*
Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, finish ream to give correct valve stem clearance (See Valve Stem Clearance above). *CAUTION—Guides must be installed with counterbore end UP on exhaust valves and counterbore end DOWN on intake valves.*

Valve Springs: Install with closely coiled end up.
Free Length—1 15/16".

Valve Spring Specifications

	Spring Pressure	Length
Valve Closed	49-57 lbs.	1 11/16"
Valve Open	134-146 lbs.	1 5/16"

Valve Lifters: Mushroom type (remove from below).
Stem Diameter—5/8". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".
Lifter Clearance in Block—.000-.001".

ENGINE

V8 ENGINES

►*TWO ENGINES USED AS FOLLOWS:* **D-63-1, 2, 3**—Polyspherical combustion chamber with lateral valves (single rocker arm shaft).
D-500—Hemispherical combustion chamber with laterally inclined valves (double rocker arm shafts).

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Model	Bore	Stroke	Displmnt
D-63-1	3.625"	3.256"	270 cu. ins.
D-63-2, 3	3.63"	3.80"	315 cu. ins.
D-500	3.63"	3.80"	315 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
D-63-1	8.0-1	42.2	189 at 4400 RPM
D-63-2, 3	8.0-1	42.2	218 at 4400 RPM
D-63-2, 3 ①	8.0-1	42.2	230 at 4400 RPM
D-500	9.25-1	42.2	260 at 4800 RPM
D-500 ②	9.25-1	42.2	

①—With Power Package (Carter WCFB 4-Barrel Carburetor and Dual Exhaust System).
②—With Power Package (Two Carter WCFB 4-Barrel Carburetors).

Compression & Vacuum Reading—*See TUNE-UP.*
ENGINE REMOVAL: *See "Engine" in Dodge Special Data.*
OIL PAN REMOVAL: Remove oil level indicator, drain oil, disconnect steering linkage at idler arm support bracket, and allow linkage to drop. Remove bolts that hold oil pan to cylinder block and slide pan out, down, and away from engine.
CYLINDER HEAD: *See "Cylinder Head & Manifold" in Dodge Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Dodge Special Data.*

PISTONS

Aluminum alloy, horizontal slot, elliptically turned, tin plated, thermally controlled by steel band.
►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" oversize.*
Weight—16.2 ozs. (D-63-1), 17.2 ozs. (D-63-2, 3), 18.0 ozs. (D-500).
Removal—Pistons and rods removed from above.
Clearance—.0005-.0015" at top of skirt.
Fitting New Pistons: Insert piston in bore, upside down, with .0015" x ½" feeler stock between thrust face of piston and cylinder wall. Pull required to withdraw feeler stock should be 5-10 lbs. at 70° F.
Replacement Pistons: Std., .005", .020", .030", .040", .060" Oversize.
Installing Pistons: Notch on head of piston must point toward front of engine and larger chamfer of connecting rod bore must be installed toward crankshaft journal fillet. *See Rod Installation below.*

PISTON PINS

Floating type with lock ring at each end.
Diameter—.8591-.8593" (D-63-1), .9215-.9218" (Others).
Length—2.880-.2.890" (D-63-1), 3.065-3.075" (Others).
Pin Fit in Piston—.0000—.0005". Tight thumb press fit at 70° F.
Pin Fit in Rod Bushing—.0001—.0004". Tight thumb press fit at 70° F. Selective fit.
Replacement Pins: Std., .003", .008" Oversize.
NOTE—Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearanc
Compr. (#1)	.0775-.0780"	.010-.020"	.0015-.0030"
Compr. (#2)	.0775-.0780"	.010-.020"	.0010-.0025"
Oil (#3)	.1860-.1865"	.010-.020"	.001-.003"

Replacement Rings: Furnished Std., .005", .020", .030", .040", .060" Oversize.
Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length (Center to Center)—5.9335-5.9375" (D-63-1), 6.616-6.620" (Others).
Weight—21.2 ozs. (D-63-1), 24.0 ozs. (Others).
Crankpin Journal Diameter -1.9365-1.9375" (D-63-1), 2.2495-2.2505" (Others).
Maximum out-of-round and taper limits .001".
Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.
►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*
Clearance—.0005—.0015". Maximum—.0025".
Endplay—.006—.014".

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Bearing Adjustment–None. Replace bearings.

Replacement Bearings: Std., .001", .002", .003", .010", .012" Undersize.

Installing Rods: *(NOTE* – Connecting rod bores are chamfered more on one side than other. This larger chamfer must be installed toward crankshaft fillet). When installing lower bearing shell, make certain that "V" groove in shell is in line with "V" groove in cap. This allows lubrication of cylinder wall. Bearing shells should always be installed so that small formed tang fits into machined grooves of rod. Oil ring expander gap should be toward outside of "V" of engine. Oil ring gap should be toward inside of "V" of engine. *See Piston Installation above.*

►*CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank **are not interchangeable** with the other bank.

CRANKSHAFT

Journal Diameter–2.3745-2.3755" (D-63-1), 2.5" (Others).

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:*

.010" UNDERSIZE (Main & Connecting Rod Journals)– Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.

Bearings–Removable, precision type, steel-backed, babbitt lined. No shims.

Replacement Bearings: Std., .001", .002", .003", .010", .012" Undersize. Halves of Nos. 1, 2, and 4 bearings are interchangeable with one another (caps are not interchangeable); upper and lower halves of No. 3 bearing are interchangeable; No. 5 halves are NOT INTERCHANGEABLE.

End Thrust: Taken by center (#3) main Bearing.

Clearance–.0005-.0015".

Endplay–.002-.007". Maximum .010".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Dodge Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Dodge Special Data.*

CAMSHAFT

Journal Diameters–(1) 1.998–1.999", (2) 1.982–1.983", (3) 1.967–1.968", (4) 1.951–1.952", (5) 1.4355–1.4365".

Bearings–Removable, steel-backed, babbitt lined bushings.

Clearance–.001–.003". Maximum–.005".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay–.002–.006". Maximum–.010".

Timing Chain: Width–1-1/8". **Pitch**–.375". **Length**–68 links.

Camshaft Setting: Timing Check: Mark on gears should be adjacent and in line with straightedge across shaft centers. **Chain Installation:** Install chain and gears as an assembly. Mesh crankshaft gear in chain with keyway out toward chain, mesh camshaft gear in chain with keyway toward crankshaft gear and mark on gear in line with **23rd chain pin** clockwise from pin at mark on crankshaft gear. Install assembly on engine, turning crankshaft and camshaft to line up keys with gear keyways, install fuel pump eccentric (must engage camshaft key), tighten camshaft cupwasher and bolt to **35 ft. lbs.** Check timing as above.

Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Dodge Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Dodge Special Data.*

VALVES

Tappet Clearance (D-500) .012" Intake, .022" Exhaust, with engine hot and idling.

(D-63-1, 2, 3) None in service (hydraulic).

►***CAUTION: Valve train on D-500 different than on other engines.***

D-63-1, 2, 3

Valve	Head Diameter	Stem Diameter	Length
Intake	1.72"	① .371-.372"	4.25"
Exhaust	1.47"	① .372-.373"	4.20"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.360"	.002"
Exhaust	45°	.360"	.003"

D-500

Valve	Head Diameter	Stem Diameter	Length
Intake	1.87"	Ⓒ .371-.372"	4.83"
Exhaust	1.53"	Ⓒ .372-.373"	4.85"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.400"	.002"
Exhaust	45°	.409"	.003"

Ⓒ – Standard Valve. *See Valve Guides (below).*

Intake Valve Stem Oil Seal–Seal installed on intake valve stem after valve is inserted in head and before installation of springs. Seal will seat itself in correct position on guides.

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length by 1/32" or more from its factory installed position, the dimension from valve spring seat in the head to valve tip should be checked with gauge C-3436. If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge). Improper valve clearance at high speed will result if this condition is not corrected.

Valve Springs: *SINGLE springs used on D-63-1, 2, 3, DOUBLE springs used on D-500.*

Valve Spring Specifications
D-63-1, 2, 3

Valve	Lbs. Pressure	Length
Closed	53 lbs.	1.69"
Open	140 lbs.	1.31"

	Inner Springs		Outer Springs	
Valve	Lbs. Press.	Length	Lbs. Press.	Length
Closed	28	1.52"	61.5	1.66"
Open	66.5	1.09"	158.5	1.22"

►*CAUTION: Springs must be square within 1/16". (Use steel square on surface plate–revolve spring against square noting alignment of top coil).*

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats are reground, check **installed** height of spring. If height of spring is 1-11/16" or greater, install a 1/16" spacer under valve spring.

►*VALVE SPRING LOAD CAUTION: Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.*

Valve Guides: D-63-1, 2, 3– Guides are integral with head. If valve stem clearance excessive, use tool set to ream hole to NEXT oversize and install valve with OVERSIZE stem. Valves are furnished .005", .015", .030" oversize.

►***OVERSIZE VALVE STEM REAMING NOTE:*** Before reaming valve guides, check rocker cover gasket boss at one end of cylinder head for either a stamped "E" (exhaust) or "I" (Intake). If a letter is found, all guides in the head (either intake or exhaust, depending on letter) will be oversize. Standard production reaming of both intake and exhaust is .374-.375". Use reamer C-3433 to ream to .379-.380", C-3430 to ream to .389-.390", C-3427 to ream to .404-.405".

D-500 – Guides are separate pressed-in parts and are serviced by installing new guide and reaming to size for standard valve. Remove guides by driving out through top of head using tool C-3159. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place a steel scale across combustion chamber and drive valve guide in until punch mark on tool C-3159 is flush with face of cylinder head. To install EXHAUST valve guide, drive it in until it is flush with the machined face of the hole. Ream guide to .374-.375" with tool C-741.

►*CAUTION: Oil hole in top of exhaust guide must face up.*

NOTE–If Valve Guide Tool C-3159 is not available, drive guide in, measuring from top of valve seat as follows: **Intake**–15/16". **Exhaust**–1-3/32".

Hydraulic Valve Lifters: *NOTE* – **Not used on D-500.**

Diameter–.9040-.9045". **Clearance**–.0005-.0015".

Lifter Overhaul & Testing–*See "Valve System" in Dodge Special Data.*

Rocker Arm Assembly: *See "Valve System" in Dodge Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

6 Cyl. D-62-1 & 2

Intake Valves–Open 12° BTDC. Close 44° ALDC.
Exhaust Valves–Open 50° BLDC. Close 6° ATDC.

V8 ENGINES

See "Camshaft Setting" under CAMSHAFT above.

V8 D-63-1

Intake Valves – Open 14° BTDC. Close 50° ALDC.
Exhaust Valves – Open 52° BLDC. Close 12° ATDC.

V8 D-63-2, 3

Intake Valves – Open 11° BTDC. Close 53° ALDC.
Exhaust Valves – Open 49° BLDC. Close 15° ATDC.

D-500

Intake Valves – Open 12° BTDC. Close 60° ALDC.
Exhaust Valves – Open 54° BLDC. Close 18° ATDC.

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Valve Timing Check (6 Cyl.) – With .014" (Cold) tappet clearance, No. 6 valve should open with No. 6 piston 12-13° BTDC or .0766-.0770" BTDC. Reset tappet clearance to .010" HOT running clearance.

Valve Timing Check (D-63-1, 2, 3) – With No. 1 intake valve closed, insert a .210" spacer between rocker arm and #1 intake valve stem, install dial indicator over this valve so that pointer contacts valve spring at a right angle. Wait until seat stops moving (indicating that plunger bottomed so that lifter is solid). Set dial indicator at "Zero", turn crankshaft until dial indicator shows that valve has lifted .024". Pointer on cover should indicate between 5° BTDC and 7° ATDC if timing correct. Then turn crankshaft counter-clockwise until lifter is back down to the valve closed position. Remove spacer from between rocker arm and valve stem. *See "Camshaft Setting" under CAMSHAFT above.*

▷*CAUTION: Do not turn crankshaft further than indicated above. To do so might bottom spring and damage valve mechanism.*

OILING SYSTEM

6 CYL. ENGINES

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed.

Normal Oil Pressure: 40-50 lbs. at 25-30 MPH.

Oil Pressure Relief Valve–Oil pressure relief valve opens at 45-55 lbs. Under plug on left side of crankcase below starting motor. Provides additional oil at idling speeds. Adjustable by replacing springs (3 types). (1) Standard spring is not painted. (2) Lighter than standard painted RED. (3) Heavier than standard painted GREEN. When replacing springs, same color springs should be used.

Oil Pressure Gauge – Auto-Lite 14008A. Not electric.

Oil Pump: Rotor type on right side of crankcase.

Overhaul–*See "Oiling System" in Dodge Special Data.*

Oil Filter: By-pass type. On left side of engine above starter.

Servicing–Install new filter element and cover gasket at 8000 mile intervals (more often in dusty areas). Change oil at same time filter is changed.

Crankcase Ventilation: Filter in oil filler tube and air cleaner in crankcase ventilation outlet pipe.

V8 ENGINES

Crankcase Capacity: 5 qts. (refill). Add one additional quart if filter changed.

Normal Oil Pressure: 50-65 lbs. with warm oil and engine operating at 1500 RPM.

Oil Pressure Relief Valve–Mounted in oil pump. Adjustable by replacing springs (3 types). (1) Standard spring painted RED. (2) Lighter than standard spring painted GRAY. (3) Heavier than standard spring painted BROWN. When replacing relief valve spring use same color spring.

Oil Pressure Gauge: Auto-Lite 14008A. Not electric.

Oil Pump: Rotary type. In crankcase at rear end. Mounted on rear bearing cap.

Overhaul – *See "Oiling System" in Dodge Special Data.*

Priming Oil Pump (After Overhaul): Prime pump before installing oil pump and strainer to rear main bearing cap.

Oil Filter: Shunt type. A portion of oil from oil pump is directed through this filter and the remainder flows directly into engine lubrication system.

Filter Element–Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

6 CYL. ENGINES

Water Capacity: 13 qts. (14 qts. with heater).

Pressure Valve: Dodge No. 1373136. Radiator filler cap. Opens at 7 lbs.

Thermostat: By-pass type in cylinder head water outlet. Starts to open at 155-160° F.

Water Pump: Packless type. Grease fitting for lubrication. *See Water Pump Section for data.*

Pump Removal–Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs. Remove pump.

Water Distribution Tube: *See "Cooling System" in Dodge Special Data.*

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit – Auto-Lite 14009A.

Engine Unit – Auto-Lite 13550A.

See "Temperature Gauges" in Misc. Section.

V8 ENGINES

Water Capacity: 19 qts. (D-63-1), 20 qts. (Others). One additional quart with heater.

Pressure Valve: Radiator filler cap. Opens at 7 lbs (D-63-1), 14 lbs. (Others).

Thermostat: Choke type. In water pump to radiator connector. Starts to open at 157-162° F.

Water Pump: Packless, ball bearing type. No lubrication required.

See Water Pump Section for data.

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit – Auto-Lite 14009A.

Engine Unit – Auto-Lite 13550A.

See "Temperature Gauges" in Misc. Section.

CLUTCH

6 CYL. ENGINES

Borg & Bock	Model	Assy. No.	Disc No.
Std. (Exc. Sta. Wgn.)	9A7	361373	382237
Sta. Wgn.	10A7	361368	382358

Auburn – No. 100052-2 (Standard).

See "Borg & Bock" & "Auburn" Clutches in Clutch Sect.

V8 ENGINES

Borg & Bock	Model	Assy. No.	Disc No.
Std. (D-63-2,	10A7	361376	382366
Hvy. Duty	11A6	361382	381850

See "Borg & Bock" Clutches in Clutch Section.

Pedal Adjustment: Adjust the fork rod to secure 3/16" free movement of clutch fork outer end. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: (*NOTE*–Over-center spring located above brake pedal and attached to pedal mounting bracket). Disconnect clutch pedal pushrod. Remove overcenter eyebolt adjusting nut. Reinstall adjusting nut, tighten finger tight, then further tighten four complete turns. This adjustment will require 12-15 lbs. pressure to hold clutch pedal down when it is 1" from fully released position.

Removal: Remove transmission or transmission and overdrive (See Synchro-mesh Transmission). Remove clutch housing pan, pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "Dodge Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission is to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing. Then remove transmission by pulling it back, down, and out of car.

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down. *See "Warner R10" Overdrive in Transmission Section.*

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary transmission.

See "PowerFlite" Transmission in Transmission Section.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

▷*OVERFILLING CAUTION:* High engine speed or high temperature operating conditions may cause transmission oil to expand to point where transmission is, in effect, overfilled, causing governor pressure to drop to point to permit a high speed downshift in transmission. *See "Checking Fluid Level" below.*

Checking Fluid Level – *NOTE* – Manufacturer recommends checking fluid level with engine cold (normal temperature of 70° F.)

Cold Check – If oil level between (L) Low mark and end of dipstick, 1 pint of Transmission Fluid Type "A" may be added, but no more than 1 pint.

After Operation Check – If oil level is above (L) Low mark, do not add oil. If oil level is above the (F) Full

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mark, drain to ½" below full mark. Add only WHEN OIL LEVEL IS BELOW THE (L) LOW MARK on dipstick, and transmission has been brought up to operating temperature by actual driving. In this case add 1 pint of oil only.

Oil Filler Tube Location: At right rear of engine compartment.

►*CAUTION:* To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball & Trunnion (6 Cyl. & D-63-1 front and rear, others front only). Cross type D-63-2, 3 & D-500 rear only).

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE* – "Barrel" type differential assembly used on V8 Cars with PowerFlite (four differential pinion and two side gears); others use differential assembly with two pinion and two side gears.

See "Dodge Hypoid" in Rear Axle Section.

Standard ..... Ⓒ 3.73-1 (41-11), 3.9-1 (39-10)
Overdrive 4.1-1 (41-10), 4.3-1 (43-10)
PowerFlite ..... Ⓒ 3.54-1 (39-11), 3.73-1 (41-11)

Ⓒ – D-500 has six optional ratios ranging from 3.54-1 to 4.78-1 available for use with 8¼" Pinion Ring Gear, and ten optional ratios ranging from 3.07-1 to 4.89-1 for use with 8¾" Pinion Ring Gear.

Backlash–.006-.010".

Thrust Pad Clearance (Barrel Type)–.006-.008".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub and drum assembly (Use puller C-845). *(CAUTION–Do not strike end of axle shaft to loosen hub; otherwise, possible damage to axle shaft bearings and thrust block might result).* Block brake pedal, disconnect brake line at wheel cylinders, remove axle shaft key, install sleeve C-757 in axle bearing outer oil seal before removing brake support plate from axle housing. Remove shims from each end of axle housing. (Each set should be kept separate so that at reassembly, central location of axle shafts, wheels and thrust block, will be assured). Remove axle shafts and bearings from housing (Use puller C-293-C to remove bearings from axle shafts, puller C-637 to remove inner oil seal, drift C-241 to install seal.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check end play with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**–.003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers.

See "Dodge" in Front Suspension Section.

Kingpin Inclination–5-1/2° at 0° camber.

Caster–Neg. 2° to 0° (Neg. 2° preferred with Manual Steering, 0° preferred with Power Steering). Left side should be between 0° and ¾° more negative than right side.

Camber–Pos. 1/4°±3/8° (Left side Pos. ½°, Right side 0° preferred).

Toe-In – 1/8" preferred.

Toe-Out on Turns – With outside wheel at 20°, inside wheel should be 21½°±1°.

STEERING

Manual: Gemmer. Worm and three-tooth roller.

See "Gemmer Worm & Roller" in Steering Section.

Power Steering: Coaxial. Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.

See "Coaxial" Power Steering in Steering Section.

►*JERKY OPERATION OF POWER STEERING GEAR CORRECTION:* Adjust generator drive belt (See Generator), then adjust fan drive belt so that a maximum of ¼" deflection is obtained when applying a 10 lb. pull with spring scale at middle of widest belt span.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Dodge "Safe-Guard" Lockheed hydraulic (Except D-500). Center Plane (Floating Shoe) hydraulic (D-500).

See Dodge "Safe-Guard" or "Center Plane" Brakes in Brake Section.

Drum Diameter – 12" (D-500), 11" (Others).

Wheel Cylinder Diameter–1-1/8". Single acting (front), double acting (rear wheels).

Replacement Linings & Shoes–Linings or shoes with linings are furnished Standard and .030" Oversize.

Lining–Molded asbestos (bonded to shoe).

Length (D-500) – 12.57" per shoe.

Length (Others)–(Primary, front & rear) 11.5", (Secondary, front) 11.5", (Secondary, rear) 8.8".

Width – (D-500) 2.5", (Others) 2".

Thickness – (D-500) 13/64", (Others) .200".

Braking Power – 60% front, 40% rear.

Clearance (Exc. D-500)–.006" at each end of all shoes.

Clearance (D-500)–Front Wheels – Turn each adjusting cam in direction of forward wheel rotation until shoe lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction (each cam a little at a time) until no drag is felt.

Rear Wheels – Same as front wheels except on rear wheels forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe adjusting cams are rotated in direction of reverse wheel rotation.

►*BRAKE "SQUEAK" CORRECTION: (CENTER PLANE BRAKES): See Dodge "Center Plane" Brakes in Brake Section.*

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid–Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal – Disconnect brake line tube at master cylinder. Disconnect stop light switch leads, remove four stud nuts from studs, remove master cylinder.

Power Brakes: "Integral", "Bellows" or "Piston" Assist types used. "Integral" type replaces regular master cylinder and is mounted on engine side of firewall. "Bellows" and "Piston" Assist types are mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder).

See "Dodge Power Unit (Integral Type)" or Chrysler, DeSoto, Dodge, Plymouth "Bellows" or "Piston" Type Power Brakes in Brake Section.

Removal of Integral Type Power Unit – Same as for standard master cylinder, after stop light wires and hydraulic lines are removed.

Removal of "Bellows" & "Piston" Type Power Units – Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket, to prevent trigger arm from extending beyond extremities of bracket *(NOTE* – If pedal linkage is allowed to extend through hole in dash panel, trigger arm may be damaged). Disconnect vacuum hose at power unit. Remove complete power unit and bracket assembly by removing four nuts and lockwashers. Carefully withdraw unit from dash panel.

Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type used with Automatic Transmissions.

Adjustment–*See "Hand Brake Notes" in Dodge Special Data.*

Lining–	Width	Thickness	Length
6" Ext. Type	2"	5/32"	15-3/8"
7" Int. Type	2"	5/32"	13-1/16"

Clearance (Internal Expanding) – Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

Clearance (External Contracting) – Adjust anchor screw so clearance between band and drum at anchor is .015-.020".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite. Electric.

Car Model	Auto-Lite No.
D-62-1, 2; D-63-1 Std.	EPH-4101A
Others Std., D-62-1, 2 & D-63-1 Optl. 2-Spd.	EPF-4001A

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.

Air Conditioning: Dodge "Airtemp". *See "Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Electric Window Regulators" in Misc. Section.*

Power Seat Adjuster: Electric type. *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Electrical-hydraulic type. *See "Power Top Controls" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head (Hot) ℄(223, 272, 292 Eng.)	60-75
Cylinder Head (Hot) ℄(312 Eng.)	60-90
Intake Manifold	23-28
Exhaust Manifold	23-28
Oil Pan	12-15
Main Bearing Caps	95-105
Flywheel	75-85
Rear Bearing Seal Retainer (V8)	75-85
Vibration Dampener (223, 272, 292 Eng.)	85-95
Vibration Dampener (312 Eng.)	130-145
Con Rod Caps	45-50
Camshaft Sprocket (223 Eng.)	45-50
Camshaft Sprocket (272, 292 Eng.)	35-45
Camshaft Sprocket (312 Eng.)	15-18
Rocker Arm Support Bracket (6 Cyl.)	45-55
Rocker Arm Support Bracket (V8)	12-15
Rocker Arm Cover	2-2.5
Engine Front Cover (6 Cyl.)	6-9
Engine Front Cover (V8) 3/8" Bolt	23-28
Engine Front Cover (V8) 5/16" Bolt	12-15
Water Pump Mounting (223 Eng.)	23-28
Water Pump Mounting (272, 292 Eng.)	12-15
Water Pump Mounting (312 Eng.)	23-28
Oil Pump Mounting (6 Cyl.)	30-35
Oil Pump Mounting (V8)	12-15
Oil Filter	20-25

℄ – See Cylinder Head Installation (below) for head tightening procedure. Three different torque applications must be made.

ENGINE

ALL PASSENGER CARS (EXCEPT THUNDERBIRD)

ENGINE REMOVAL: Disconnect transmission from engine

1) Cars with Standard r Overdrive Transmission: Disconnect clutch release spring Remove screws retaining equalizer bar support to flywheel housing, then remove support and bushing Disconnect accelerator linkage at manifold bellcrank Remove two upper flywheel housing bolts Remove flywheel housing cover, support transmission with jack, then remove remaining flywheel housing bolts Then following procedures under **3)** below

2) Cars With F rd matic Transmission: Disconnect transmission throttle linkage at cross shaft, tie linkage to dash panel Remove idler arm bracket Fold back floor mat, remove two rubber plugs, then two top converter housing-to-engine bolts Jack up front of vehicle and position safety stands Support transmission with jack, then remove remaining converter housing-to-engine bolts Remove converter housing lower access cover, then turn flywheel till flywheel drive plate is in position to remove three bolts. Turn flywheel 180° and remove other three bolts. *CAUTION* - Turn drive plate 90° so that flex plates will not catch on converter housing when engine is removed. Drain transmission. Remove bracket that secures transmission oil level indicator tube to engine. Disconnect tube at transmission oil pan, and remove tube assembly. Remove transmission control linkage splash shield from cylinder block, then remove oil filter.

3) Engine Rem val – Remove hood, drain cooling system and crankcase. Remove heater hoses, heater inlet duct and blower motor. Remove radiator upper and lower hoses and remove radiator, and fan. Disconnect battery ground cable at cylinder block and fuel flex line at fuel pump. Disconnect windshield wiper vacuum hose, temperature sending unit wire, and oil pressure sending unit wire. Disconnect primary wire at coil, remove starter cable at starter, ground cable at rear of engine. Remove air cleaner and tape air horn closed. Disconnect choke cable at carburetor and disconnect accelerator linkage. Disconnect muffler inlet pipes at exhaust manifold Attach engine lifting hook(s) and remove right and left front splash aprons. On 8 cylinder engines, remove retainer and lower insulator from engine front steady rest. On 6 cylinder engines, loosen the two engine front steady rest to spacer bolts. Raise car and position safety stands. On 8 cylinder engines, remove engine left insulator. Remove cap screws from engine right insulator at the engine. On 6 cylinder engines, remove left insulator to bracket bolts at the insulator and the right bracket bolts at the engine. Raise engine slightly, then carefully pull it from transmission. Carefully lift engine out of engine compartment. Do not let engine swing against grille.

THUNDERBIRD

ENGINE REMOVAL: Disconnect transmission from engine, follow steps **1)** or **2)** under "Engine Removal–All Passenger Cars (Except Thunderbird)" above, then remove engine as follows Remove hood, drain cooling system and crankcase Remove fan, then remove radiator and shroud as an assembly Remove air cleaner Disconnect engine ground wire at dash Disconnect battery ground cable at engine and battery-to-starter relay cable at battery, Disconnect vacuum pump line, and fuel inlet line at fuel pump Disconnect starter cable at starter solenoid, then remove cable clamp at dash panel Disconnect ignition switch-to-coil wire at coil. Disconnect the two heater hoses Remove generator wires, and wires from oil pressure and temperature sending units Remove heater blower assembly Disconnect tachometer cable Disconnect accelerator rod, then disconnect link bracket at block (this bracket also serves as ignition cable bracket) Raise vehicle and position safety stands Disconnect exhaust pipes at exhaust manifold Remove engine front mount bolt and insulator. Remove engine right and left steady rest bracket bolts, at the engine, then turn the brackets to one side so engine will clear them upon removal. Remove safety stands and lower vehicle. Install engine lifting sling. Raise engine slightly, then carefully pull engine from transmission. Carefully lift engine out of engine compartment.

CONVENTIONAL TRUCKS

ENGINE REMOVAL· *For trucks equipped with Fordomatic, see Note below.* Drain cooling system and crankcase Remove hood, fan assembly and fan belt Disconnect heater hoses at engine. Remove radiator and shroud assembly. Remove air cleaner, then tape carburetor air horn closed. Disconnect windshield wiper hose at manifold Disconnect hand throttle control, choke cable, accelerator rod, and accelerator retracting spring at carburetor Disconnect engine temperature and oil pressure sending unit wires, and ignition coil primary wire Disconnect generator wires Disconnect flexible fuel line at fuel pump and muffler inlet pipe at exhaust manifold Disconnect clutch release lever retracting spring, starter cable at starter, and battery ground strap at engine. Remove starter assembly Install engine lifting sling Remove flywheel housing-to-engine bolts, then flywheel housing lower cover. Remove bolts from engine front support. Take up weight of engine with hoist. Support transmission with jack, then move engine forward to separate clutch from transmission input shaft Lift engine carefully from chassis

►*FORDOMATIC ENGINE REMOVAL NOTE*· On Conventional & Cab Forward Trucks. In addition to procedures given, perform following. Disconnect transmission oil-to-water cooler inlet and outlet tubes Remove upper and lower screws retaining converter housing to engine Remove converter housing lower access cover, then using Tool T52L-7950-A, turn flywheel until flywheel drive plate is in position so that three bolts can be removed Turn flywheel 180°, and remove other three bolts Install engine lifting sling and remove engine in usual manner

CAB FORWARD TRUCKS

ENGINE REMOVAL: *For trucks with Fordomatic Transmission, see NOTE at end of "Conventional Truck Engine Removal" immediately above.* Drain cooling system and crankcase. Disconnect throttle return spring Remove floor mat, then battery cover. Disconnect one of battery cables. Remove floor pan. Disconnect ignition coil primary wire and ground wire at coil mounting bracket Remove screws securing loom clip, tail light wire clip, and speedometer cable, then move wires and speedometer cable out of way Remove distributor cap and rotor Remove fan assembly, belt, and air cleaner Tape carburetor air horn closed Disconnect radiator upper and lower hoses, and heater hoses at engine. Remove upper and center grille sheet metal. Remove radiator, shroud assembly, and radiator-to-front fender apron supports Disconnect hand throttle control and choke control Disconnect accelerator linkage. Remove windshield wiper hose from intake manifold (or vacuum pump inlet) Remove temperature sending unit wire and generator wires Remove oil dipstick. Remove engine front support nuts and washers. Disconnect flexible fuel line at fuel pump Close off main fuel line to prevent loss of fuel. Disconnect muffler inlet pipe, and pull it away from manifold flange. Remove flywheel housing lower cover. Remove flywheel housing-to-engine retaining screws Disconnect starter cable and battery ground strap, remove starter Install engine lifting sling. Position floor jack under engine, place wood block between jack and oil pan Raise engine slightly, and remove engine front support bolts and rubber pad Raise engine carefully with hoist, move it forward to clear transmission input shaft, and remove it from chassis

PARCEL DELIVERY

ENGINE REMOVAL: (*NOTE*–Engine & transmission re-

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moved as assembly). Remove driver's seat and support. Drain crankcase. Disconnect air cleaner tube and elbow from carburetor, then remove air cleaner from engine cover bracket. Tape carburetor air horn closed. Drain cooling system. Remove clutch pedal plate. Remove brake pedal pad, then remove pedal opening plate and slide it over brake pedal rod. Remove pedal opening rubber mat. Remove two screws retaining dimmer switch, and drop switch through floor board. Disconnect accelerator rod from pedal. Remove left floor plate (the accelerator pedal and engine front cover hood lock are removed with floor plate). Remove brake master cylinder inspection cover. Remove ten screws from engine cover base plate. Remove nuts and bolts retaining center floor plate to engine cover base plate. Loosen three bolts securing crossmember reinforcing plate to left and right wheel housings. (*NOTE*–Drive wedge between reinforcing plate and left and right wheel housings). Remove center floor plate, then remove one reinforcing plate-to-crossmember bolt from end of body crossmember. Remove engine cover and base plate assembly. Disconnect windshield wiper vacuum line at fuel pump, and the fuel flex line at tank fuel line. (*NOTE*–On Fordomatic equipped vehicles disconnect transmission selector rods at transmission). Disconnect radiator upper and lower hoses at radiator. Disconnect radiator-to-cylinder outlet tube and hose at water pump. Disconnect primary wire from coil and ground wire at coil bracket. Disconnect heat and oil pressure indicator wires. Disconnect starter cable at solenoid and starter ground strap at starter. Disconnect exhaust inlet pipe at exhaust manifold. Remove emergency brake cable clevis pin, then remove emergency brake holding bracket. Remove emergency brake holding bracket. Remove emergency brake hold down bracket. Pull emergency brake cable out of way. Remove speedometer cable holding bracket, then remove speedometer cable from transmission speedometer gear, and move assembly out of way. Remove fan assembly and belt. Disconnect generator wires. Remove body crossmember. Disconnect choke cable at carburetor. Remove engine front support bolts, rear support mount bolts and lower right and left-hand pads. Remove universal joint "U" bolts and drop rear of drive shaft. Disconnect universal joint knuckle dust cap. Remove drive shaft spline from universal joint knuckle and plug assembly. Remove carburetor inlet fitting and fuel line from carburetor. Remove valve rocker arm cover, then install the appropriate engine lifting bracket. Position hoist through right door and attach it to lifting bracket. Lift engine and remove engine and transmission through the front door.

ENGINE MOUNTINGS

(EXCEPT THUNDERBIRD)

ENGINE FRONT STEADY REST REMOVAL & INSTALLATION: Removal – On 8 cylinder engine, drain cooling system, remove radiator, fan, drive belts, and crankshaft damper. All engines, remove two clamp bolts at front of steady rest bracket. Remove spacer bolt that retains insulators in bracket. Remove three bolts (6 Cyl.), four bolts (8 Cyl.) that secure bracket to engine and remove bracket.

Installation – Install bracket on front engine cover, tighten bolts to 23-28 ft. lbs. torque. Install, but do not tighten insulators, spacer bolts, and clamp bolts. If necessary, center spacer bolt in frame bracket by shifting engine mounts in frame brackets. Tighten spacer bolts to 20-25 ft. lbs. torque. Make sure engine weight is not transferred to insulators, then tighten clamp bolts 25-30 ft. lbs. torque. On 8 Cylinder engines, install crankshaft damper, drive belts, and radiator.

(THUNDERBIRD)

ENGINE STEADY REST REMOVAL, ASSEMBLY & ADJUSTMENT: Removal – Remove upper and lower bracket retaining bolts and remove steady rests as assemblies.

Assembly – Assemble bottom nut, washer, insulator and bracket on the upper end of rod. Install the top insulator washer, and nut on the upper end of rod. Assemble top washer, bushing, and bracket on lower end of rod. Install bottom washer, bushing, washer, and nut on lower end of rod.

Installation & Adjustment – Install assembly in car and tighten bracket bolts to 30-35 ft. lbs. torque. **Adjust insulators as follows:** Loosen lower rod and upper nuts on both steady rests. Let engine seek its own level position. Turn lower rod assembly nut, washer and insulator of each steady rest up against lower (chassis) support bracket. Tighten lower nut until overall dimension of insulator with retainer is 1.29-1.33". Turn lower nut, washer, and insulator at top of each rod assembly up against the engine support bracket, so dimension of lower retainer and insulator is 1.08", then turn upper nut, washer and insulator at top of rod assembly down against engine support bracket until dimension of this insulator is .77". Overall dimension of top portion of rod assembly should be 1.97-2.02".

CYLINDER HEAD & MANIFOLD

6 CYL. ENGINE

CYLINDER HEAD: Removal – Drain cooling system, remove radiator upper hose and heater hose, air cleaner and tape carburetor air horn closed. Disconnect battery cable at cylinder head. Disconnect windshield wiper vacuum line, accelerator rod, choke cable, temperature sending unit wire, and oil pressure sending unit wire. Disconnect coil from head (move it to one side), and remove spark plug wires and spark plugs. Disconnect fuel line at carburetor and fuel pump, distributor vacuum line at carburetor and distributor. Disconnect manifold vacuum line at manifold and at booster pump, then remove three lines as an assembly. Remove rocker arm cover, the capscrew and clip from No. 6 rocker arm support bracket. Pull oil feed line out of bracket, then pull it out of block with pliers. DO NOT damage line. Loosen all rocker arm adjusting screws (to remove valve spring load from rocker arms), then remove rocker arm shaft assembly. Remove pushrods in sequence and identify them for installation in original positions. Remove manifold to head bolts, pull manifold assembly away from head, bracing assembly so that inlet pipe will not be damaged. Install cylinder head holding fixture, remove all cylinder head bolts, install cylinder head guide studs (7/16" - 14 x 6" bolt, cut off head, taper end and slot for screw driver), lift cylinder head assembly off engine.

Installation – Apply coating of cylinder head gasket sealer to both sides of gasket, position gasket over guide studs, place cylinder head over guides and lower carefully. Coat threads of each bolt with small amount of water resistant sealer, install two bolts at opposite ends of head to hold gasket in place and remove guide studs. Install balance of bolts, remove cylinder head holding fixture and tighten bolts in sequence as shown in diagram, as follows: 1) Tighten to 55 ft. lbs. (cold) in proper sequence, then 65 ft. lbs. in proper sequence (cold). Install pushrods in proper locations, position rocker arm assembly on head and install oil drain line, clip and retaining screw on No. 1 bracket. Make sure line enters shaft locating hole. Position oil feed line on No. 6 bracket, with lower end of oil line "O" ring seal in oil supply counterbore, then install bolt. Tighten all remaining bolts to 45-55 ft. lbs. torque. Make preliminary (cold) valve lash adjustment. Install manifolds, lines, and wires. Connect wiper hose, battery cable and fill cooling system. Remove tape from air horn, connect choke wire, start and run engine at 1200 RPM for approximately 30 minutes. Tighten cylinder head bolts in proper sequence to 75 ft. lbs. torque (hot) recheck valve lash and engine idle as necessary.

V8 ENGINES

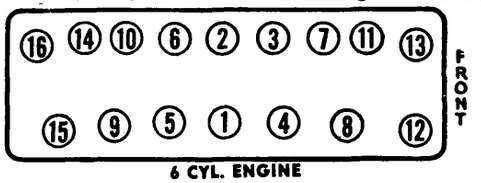
CYLINDER HEAD: Removal– Drain cooling system. Clean outside of valve chamber cover. Remove cover, exhaust manifold, spark plugs, intake manifold, ignition harness bracket from right hand cylinder head (remove distributor cap when removing right hand head from Thunderbird). On cars, others than Thunderbird, disconnect battery ground cable, and oil dipstick tube bracket from cylinder head. Remove generator bracket-to-cylinder head bolt, remove generator from mounting bolt, and move generator out of way. Release spring tension on rocker arms by loosening adjusting screws, then remove rocker arm assembly and oil baffle plates. Remove valve pushrods in sequence. Identify pushrods so that they can be replaced in original positions. Disconnect wire from temperature sending unit (left-hand head). Remove cylinder head bolts. Install cylinder head holding fixtures. (*NOTE*–Distributor location on Thunderbird will not permit installation of rear holding fixture on right hand head in its normal position. Install fixture one hole forward). Lift cylinder head off block. Do not pry between head and block. Remove head gasket.

Installation: Using new gasket with sealer applied to both sides, position cylinder head on engine. Remove holding fixture brackets. Install cylinder head bolts, and tighten them to 55 ft. lbs. torque (cold) in proper sequence (see diagram). Repeat operation and tighten to 65 ft. lbs. (cold). (See Cylinder Head Torquing following for special tools required). Install pushrods in their proper locations. Position oil baffle plates on head. Place rocker arm assembly on plates, then install bracket retaining screws and nuts. Be sure to install the oil drain tube on same end bracket from which it was removed. The bracket end of the tube must enter locating hole in rocker shaft. (*CAUTION*–Be

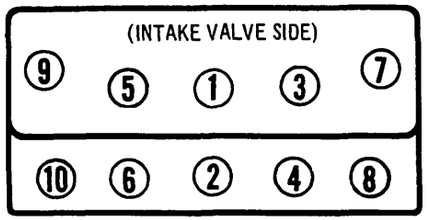
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sure rocker shaft support brackets are not upside down when assembly installed. There is a .020" difference in bracket height when reversed. Tightening the screws with brackets reversed can result in a broken rocker shaft). Tighten bracket retaining screws and



6 CYL. ENGINE



V8 ENGINE

nuts to 12-15 ft. lbs. torque. Make a preliminary valve lash adjustment. Connect temperature sending unit (left hand head). After installing right hand head on all vehicles **xc pt Thunderbird,** position generator, install the generator front mounting bolt, then fasten generator bracket to cylinder head. Connect battery ground cable and dipstick bracket. After installing right hand head on Thunderbird, install distributor cap. Install ignition harness bracket on right hand cylinder head. Install intake manifold. Install spark plugs, then install heat shields and exhaust manifold. Fill cooling system, and run engine until it has reached normal operating temperature. Then tighten head bolts to 75 ft. lbs. torque (hot). Check the valve lash and adjust the lash as necessary. Cement new gasket on rocker arm cover if necessary, then install cover. Tighten cover nuts to 2.0-2.5 ft lb. torque.

►*V8 CYLINDER HEAD TIGHTENING NOTE:* Due to position of rocker arm assemblies and exhaust manifolds, special tools are required to properly torque cylinder head. On both right and left hand bolts 1-2-3-4-5-6-7-8-9 use Wrench S-8663-A. On right hand bolt No. 10 use 11/16" socket, 1 5/16" long plus SX-5 Extension. On left hand bolt No. 10 use S-8663-A Wrench. *When using socket and extension on a Fordomatic equipped vehicle, work from the top of the manifold, and force the socket extension past the Fordomatic oil level indicator tube in order to get the socket on the bolt head.*

MANIFOLD HEAT CONTROL

V8 "256" ENGINE

►*1954-55 "256" ENG. MANIFOLD HEAT CONTROL INSTALLATION (For Cold Weather Op ration):* If poor engine operation encountered on 256 Eng. Trucks under stop and go conditions, an exhaust thermostat control valve may be installed on 1954-55 models as follows:

Engin s Built Thr ugh S pt mb r 2, 1954: Equipped with EBU-5267-B crossover pipe and B5T-5293-A spacer. Remove spacer and install B4A-9685-A exhaust thermostat control valve.

Engines Built From September 2, 1954 to December 1, 1954: Equipped with EBZ-5267-A crossover pipe and four attaching studs (353721-S). Remove pipe and studs, and replace with EBU-5267-B crossover pipe, 88413-S studs, 33816-S nuts. Install B4A-9685-A exhaust thermostat control valve.

Engines Built From December 1, 1954 Through 1955: Equipped with B5C-5267-A crossover pipe, four attaching studs (88448-S), and EBU-9450-B gaskets. Remove pipe, studs, and gaskets. Replace with B5A-5267-B crossover pipe, 88413-S studs, 33816-S nuts, B5A-9450-A gaskets. Install B5A-9685-C exhaust thermostat control valve. *NOTE*–B5A-9685-D exhaust thermostat control valve has been released to minimize engine stalling and improve fuel distribution. See Ford Truck Model pages.

CRANKSHAFT & MAIN BEARINGS

ALL ENGINES

►*1956 CRANKSHAFT & CRANKSHAFT FRONT OIL SLINGER PRODUCTION CHANGE (To improve seals):* New crankshafts with integral rear oil slingers are used in production on 6 and V8 engines. A Front Oil Slinger. Ford No. B6A-6310-A (6 Cyl. Engine), No. B6A-6310-B (All V8 Engines) can be installed to improve crankshaft front oil seal operation. *6 CYL. ENGINE CAUTION -* New Cylinder Front Cover, Ford No. B6A-6019-A must be used when this front oil slinger is installed.

►*INSTALLATION OF CRANKSHAFT WITH INTEGRAL REAR OIL SLINGER & USE OF FRONT OIL SLINGER ON 1952-56 ENGINES:* New type crankshaft with integral rear oil slinger and separate front oil slinger can be installed on previous engine models as follows:

1952-53 6 Cyl. "215" Engine – Front Oil Slinger, No. B6A-6310-A. *NOTE* - New Cylinder Front Cover No. B6A-6019-A must be used with this slinger.

1954-56 6 Cyl. "223" Engine – Crankshaft No. B6A-6303-E, Front Oil Slinger No. B6A-6310-A. *NOTE* - New Cylinder Front Cover No. B6A-6019-A must be used with this front slinger.

1954-55 V8 "239" & "256" Truck Engines – Crankshaft Front Oil Slinger No. B6A-6310-B.

1955-56 V8 "272", "292", & "312" Engines – Crankshaft No. B6A-6303-D (272 & 292 Engines), No. B6A-6303-C (312 Engine), Front Oil Slinger No. B6A-6310-B.

(ALL ENGINES)

CRANKSHAFT THRUST BEARING ALIGNMENT: Install No. 1, 2 & 4 main bearing caps and torque to specifications. Install No. 3 main bearing cap with bolts finger tight. Pry crankshaft forward against upper half of No. 3 main bearing, pry No. 3 main bearing cap to rear to align thrust surfaces of both halves, and tighten bolts, while holding shaft forward and cap to rear, to torque specifications. Check crankshaft end play.

(ALL ENGINES)

REAR MAIN BEARING OIL SEALS: *NOTE* - Crankshaft seal is installed in groove in block and in bearing cap (6 Cyl.) or in seal retainer directly behind rear main bearing (V8). Bearing cap or retainer is sealed in block by special sealing strips inserted in vertical grooves in sides of bearing cap or retainer after they are installed in block.

Seal Installation: Install new seal in groove in cylinder block using Tool T52L-6701-AGD to drive it in place. Install seal in Bearing cap groove (6 Cyl.), in retainer groove (V8), using Tool as above. Cut surplus seal flush with block, bearing cap or retainer. Coat Bearing cap (6 Cyl.) or retainer (V8) mating surfaces with sealer, install bearing cap (6 Cyl.) or retainer (V8), and tighten bolts to correct torque. Dip side seals in engine oil and quickly install them in vertical grooves. *NOTE*– It may be necessary to drive seals in place the last ½" of travel. DO NOT use sealer on side seals. They will expand when dipped in engine oil.

Testing Seal Installation – To check vertical seal installation for leaks, squirt a few drops of oil into parting lines between cap or retainer and cylinder block from the outside. Blow compressed air against seals from the inside of the block. If air bubbles appear in the oil, it is an indication of oil leakage.

ENGINE FRONT COVER

6 CYL. ENGINES

ENGINE FRONT COVER: Removal – Remove radiator, crankshaft damper, oil pan, and cover retaining screws, cover and gasket. **Installation** – Coat gasket surface of block and cover with sealer. Install cover and tighten screws to specifications. Install oil pan, crankshaft damper and belt. On Power Steering cars, install power steering pump pulley and belt. Install radiator.

V8 ENGINES

ENGINE FRONT COVER: Removal – Remove radiator, fan blades and hub, dampener, fuel pump, and oil pan. On Power Steering Cars, disconnect power steering pump bracket from water pump, and move power steering pump out of way. On passenger cars, remove engine steady rest. On Thunderbirds, support engine, then remove engine support. On Air Conditioned cars, remove condenser brackets from front cover and move out of way. Remove generator mounting bracket bolts from cylinder front cover, and move bracket out of way. Loosen generator adjusting bracket and move it out of way. Disconnect water by-pass tube. Remove remaining bolts, then remove water pump (and spacer on Thunderbird), and front cover as an assembly.

Installation – Coat gasket surface of block, cover and cover bolt threads with sealer. Place new gasket in position. Insert large diameter end of oil seal pilot in bore of cover, position cover and pilot assembly over end of crankshaft and against block. Push in on pilot at same time tighten cover bolts to specifications. Install oil pan. On passenger cars, install engine steady rest. On Thunderbird, install engine front support. On power Steering cars. connect power steering pump bracket to water pump. On Air Conditioned cars, connect condenser brackets to cylinder front cover. Install water by-pass tube and crankshaft damper. Install fuel pump (with new gasket), fan blades and hub, install and adjust drive belts. Install radiator.

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FRONT COVER OIL SEAL: Drive out old seal with a pin punch, then clean out recess in cover. Coat new seal with grease, then install seal with Tool T52L-6700-BEE. Drive seal in until it is fully seated in recess. Check seal to be sure spring did not come out during installation.

CAMSHAFT & BEARINGS

(6 CYL. ENGINE)

CAMSHAFT REMOVAL: Remove radiator support bar, radiator, radiator grille assembly, cylinder front cover, and oil pan. Remove rocker arm cover, disconnect ignition switch to coil wire from engine clips, then remove pushrod chamber cover. Remove rocker arm assembly, pushrods in sequence. Remove camshaft sprocket bolt. Turn crankshaft until marks on sprockets and chain are on driving side with 12 pins between marks. Remove distributor cap, scribe line on distributor housing and cylinder block to mark position of rotor and distributor housing for installation, remove distributor. Remove sprockets and timing chain, camshaft thrust plate, woodruff key and spacer. Turn camshaft until lifters can be raised up with a magnet or fingers clear of the camshaft lobes and secure them in this position. Carefully remove camshaft.

6 CYL. ENGINE

CAMSHAFT BEARING REMOVAL & INSTALLATION: Remove camshaft, drill a ½" hole in plug at rear camshaft bearing bore, remove plug with Tool 7600-E. Remove bearings from block with Tool T52L-6261-CEE. To install, position bearing at bearing bore and press it into place with Tool T52L-6261-CEE. No. 1 cam bearing must be pressed in .005-.025" below front face of bearing bore. Press remaining bearings in sufficiently to align oil supply holes. Clean out plug recess in camshaft rear bore. Coat outer rim of new plug lightly with Sealer 8A-19554-A, and install plug with Tool T52L-6266-BGD. Install camshaft. *NOTE*–No. 3 Bearing not interchangeable with other bearings.

(V8 ENGINE)

CAMSHAFT REMOVAL: Remove radiator, radiator grille support bracket, cylinder front cover and oil pan. Remove intake manifold, carburetor and coil as an assembly. Remove rocker arm covers, rocker arm assemblies and valve pushrods in sequence. Remove pushrod chamber cover. Crank engine until timing marks on sprockets and chain are both on drive side of chain and 12 pins between marks. Remove distributor cap, scribe line on distributor housing and cylinder block to mark position of rotor and distributor housing for installation, then remove distributor. Remove camshaft sprocket bolt, fuel pump eccentric and counterweight. Remove sprockets and timing chain as an assembly. Remove camshaft thrust plate, woodruff key and spacer. Turn camshaft until lifters can be raised up, with a magnet or fingers, until clear of cam lobes, and secure them in this position. Carefully remove camshaft.

V8 ENGINES

CAMSHAFT BEARING REMOVAL & INSTALLATION: Remove camshaft. Drill ½" hole through plug at camshaft rear bearing bore, then remove plug with Tool 7600-E. Pull bearings out of block with Tool T52L-6261-CEE. To install bearings use Tool T52L-6261-CEE (A bearing adapter with larger flange is used to install bearings in cylinder block). (*NOTE*–No. 1 camshaft bearing has one oil hole, other four camshaft bearings have five holes and are interchangeable) *Be sure to align holes in camshaft bearings with oil holes in cylinder block when bearings are installed.* Particular care should be taken with No. 3 cam bearing since it supplies oil to rocker arms. *CAUTION* - Front camshaft bearing should be installed .005-.020" below front face of cylinder block to allow proper installation of thrust plate. After all bearings are installed, coat new camshaft rear bearing bore plug with oil resistant sealer and install plug with Tool T53L-200-A (Handle), T54L-6266-A (Adapter).

VALVE SYSTEM

► *EXHAUST VALVE STEM DIAMETER CHANGE FOR INCREASED STEM CLEARANCE (All Overhead Valve Engines except 1956 272-ECR Heavy Duty Engine):* Exhaust valve stem diameter decreased .0005" for increased stem to guide clearance. New Valve sizes are as follows:

Exhaust Valves

Size	Stem Diameter
Std. (Red)	.3400 - .3405"
Std. (Green)	.3405 - .3410"
.003" (Oversize)	.3430 - .3440"
.015" (Oversize)	.3555 - .3560"
.030" (Oversize)	.3700 - .3710"

ALL ENGINES

ROTATABLE VALVES: "Rotatable" type valves operate directly in valve guide holes in cylinder head and are removed and installed as follows:

Valve Removal: Use Tool 6513-EE to compress valve springs, remove vaove spring locks, retainer sleeve, retainer, spring, and "umbrella" type oil seal. Discard oil seal.

Valve Assembly Installation: Install valve in port from which it was removed. Install valve stem oil seal with cupped side toward valve guide boss. Install valve spring, spring retainer, retainer sleeve, and valve locks.

VALVE SEAT INSERTS

V8 "256" ENGINE

"256" ENGINE VALVE SEAT INSERT: Removal–Invert head and insert drift through exhaust valve port, drive seat out.

Installation: Counterbore insert recess to engine specifications. Cut slightly (.001-.002") below old counterbore depth to clean up this face. Clean out chips and all oil from recess. Chill oversize insert and installation tool in dry ice for ½ hour. Position insert on tool with small radius on outer edge facing outward. Pilot the driving tool in valve guide, then drive the insert into counterbore until it is fully seated. Do not peen area around insert. Reface new valve seat insert. *CAUTION*–Installation of insert must be performed immediately on removal of tool and insert from dry ice. Protect hands with gloves when handling chilled insert and tool.

VALVE GUIDES
ALL ENGINES

VALVE GUIDES (Oversize Valve Stem Installati n): Use Tool T52L-6085-AEE Piloted Reamer to ream cylinder head valve guides for oversize stems. Reamers are furnished in .003", .015", .030" oversizes. Pilots are furnished Standard, .003", .015". Use reamers with correct pilots in sequence when reaming from standard to oversize holes. Regrind valve seats AFTER reaming guides.

ROCKER ARMS
(6 CYL. ENGINES)

ROCKER ARMS: Removal – Remove rocker arm cover, cap screw and clip from No. 6 rocker arm support bracket, pull oil feed line out of bracket, then pull it out of block with pliers, being careful not to damage line. Loosen rocker arm adjusting screws to remove valve spring load from rocker arms, then remove rocker shaft assembly.

Disassembly – Pull oil drain line and clip out of No. 1 support bracket, remove cotter pins at each end of rocker arm shaft, and remove flat washers and spring washers, and plugs from each end of shaft. *NOTE* - Plugs are interference fit. To remove, drill or pierce plug at one end, then force other end out with steel rod, and repeat on first plug. Slide rocker arms, springs, and brackets off of shaft, being sure to identify parts.

Reassembly – Oil all parts with engine oil. Drive new plugs in each end of shaft with cup side out using a blunt tool, install a flat washer, spring washer, another flat washer, and a cotter pin on end of shaft. Install rocker arms, support brackets, and springs in order shown in diagram, and complete assembly by installing remaining flat washers with spring washer between them and install cotter key.

(V8 ENGINES)

ROCKER ARMS: Removal – Remove rocker arm cover, loosen adjusting screws to release valve spring tension on rocker arms, then remove rocker arm assembly, and baffle plates. Note position of oil tube and bracket for oil drain into No. 1 exhaust (right rocker arm assembly), No. 8 exhaust (left rocker arm assembly). Remove and identify pushrods for correct reassembly.

Disassembly – Remove cotter pin from each end of rocker shaft, remove flat washers and spring washers, slide rocker arms, springs and brackets off shaft. *NOTE* - Oil tubes must go in same bracket from which they were removed. Identify parts for correct reassembly. Remove plugs from each end of shaft. *NOTE* - Plugs are interference fit. To remove, drill or pierce plug at one end, then force out other plug with steel rod, then force out first plug.

Reass mbly – Oil all parts with engine oil. Drive new plugs in each end of shaft with cup side out, using a blunt tool. Install a flat washer, spring washer, another flat washer, and a cotter pin on end of shaft. Install

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rocker arms, support brackets, and springs in order shown in diagram, and complete assembly by installing remaining washers with spring washer between them and install cotter key. Position oil baffle plates on cylinder head, place rocker arm assembly on plates. Install but do not tighten bracket retaining screws and nuts. Be sure to install the oil drain tube on the same end bracket from which it was removed. The bracket end of tube must enter locating hole in rocker shaft to properly position shaft. Position oil drain tube on right rocker arm assembly so oil will drain in the front (No. 1 exhaust) pushrod opening, and position oil drain in end (No. 8 exhaust) opening. *CAUTION* - Be sure rocker support brackets are not installed upside down as there is a difference in height when installed in this position. Tighten bracket retaining screws and nuts to specifications.

OILING SYSTEM

OIL PUMP

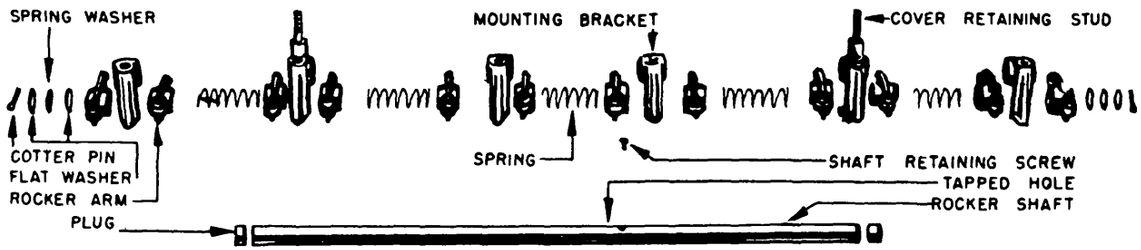
6 CYL. ENGINE

OIL PUMP- Gear type oil pump mounted in crankcase in line with distributor Pump driven by means of a hex drive shaft Shaft is pinned in end of distributor drive shaft by a roll pin, and other end seats in end of oil pump drive shaft Pressure relief valve is incorporated in oil pump housing

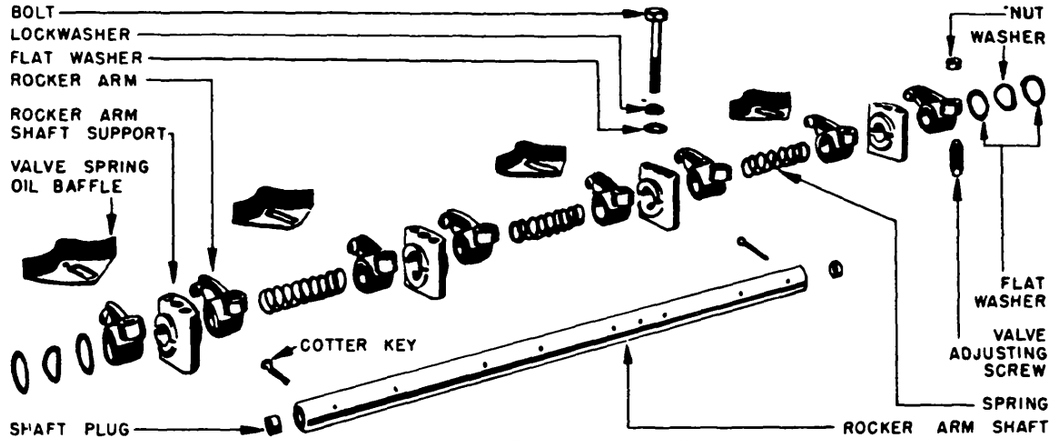
R m val – Remove distributor, oil level indicator, and oil pan. Remove two nuts and lockwashers retaining pump to cylinder block. Remove pump and gasket.

Disass mbly: Remove screen assembly retaining screws, screen assembly, and gaskets Remove cover retaining screws, cover, and gasket. Push pump drive shaft and drive gear assembly from pump housing Remove driven gear. Remove oil pressure relief valve plug, spring, and and plunger Remove snap wire retaining pump screen, and remove screen from housing

Insp cti n- Wash all parts in a solvent and dry them thoroughly Use a brush to clean inside of pump housing and pressure relief valve bore. Be sure all dirt and chips are removed Remove all old gasket material from pump body and cover. Check pump housing for damage or excessive wear Check pump gear teeth for damage or wear Check compression of relief valve spring (9.76-9 84 lbs at 1 56") Check relief valve clearance in relief valve bore Check driven shaft clearance (.001- 002" maximum) Pump shaft should be free running fit without excessive play in pump housing (0015-.0029") Replace any worn or defective parts



6 CYL. ENGINE ROCKER ARM ASSEMBLY



V8 ENGINE ROCKER ARM ASSEMBLY

Reassembly: Place snap ring on groove on upper end of lower drive shaft Slide drive gear and shaft assembly into housing. Position gasket on housing, then lay a piece of Plastigage over face of gear and install cover Remove cover and note reading on Plastigage Gear endplay may be .0015-.0055" (Clearance of .0015-.003" preferred) An alternate method of checking gear endplay is as follows Position gasket on housing, and lay a straightedge across gasket directly over gear Check gear endplay by placing tip of dial indicator on gear and moving gear back and forth, between housing and straightedge Subtract .005" from reading to allow for compression of gasket Install pump drive gear, cover plate gasket, cover plate, and retaining screws Tighten screws to 12-15 ft. lbs Install pressure relief valve plunger, spring, and plug. Tighten plug to 33-38 ft. lbs Install screen in screen cover and secure it with snap wire Install gasket, screen and cover assembly, and retaining screws Tighten screws to 10-12 ft. lbs Rotate pump shaft by hand to make sure it turns freely.

Installation: Place new gasket on retaining bolts, slide pump mounting flange over retaining bolts, install lockwashers and nuts Install oil pan, fill crankcase Run engine, check pressure

V8 ENGINES

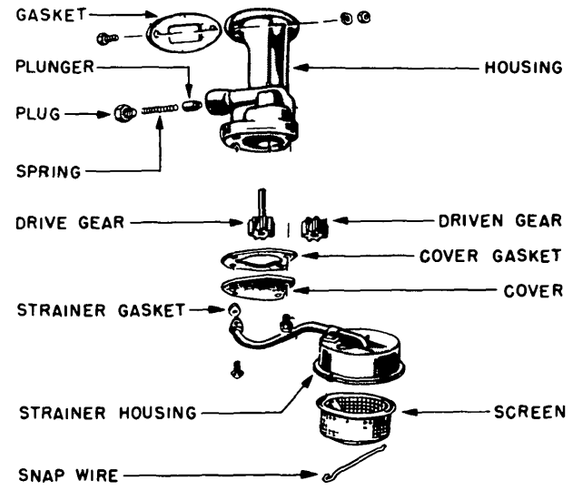
OIL PUMP: Gear type pump Oil pressure relief valve is mounted in pump housing Pump is driven by an intermediate shaft from distributor shaft

Removal: Disconnect pump inlet tube at pump, and loosen tube at pan Remove three cap screws and lockwashers securing pump body to block Remove pump and gasket and intermediate shaft (if it comes out with pump)

Disassembly: Remove four capscrews retaining pump cover to pump body Remove the cover plate and gasket *Do not tap pump drive shaft to drive cover off pump body.* Remove oil pump gear and shaft assembly and oil pump idler gear Remove oil pressure relief valve plug, gasket, spring, and plunger

Inspection- Wash all parts in a solvent and dry them thoroughly Use a brush to clean inside of pump housing and pressure relief valve bore Be sure all dirt and chips are removed Remove all old gasket material

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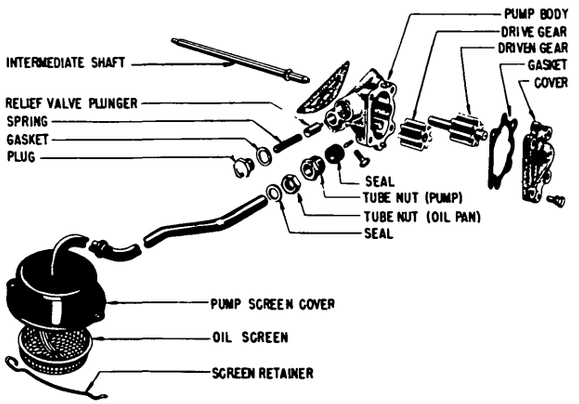


6 CYL. OIL PUMP

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from pump body and cover. Check pump housing for damage or excessive wear. Check pump gear teeth for damage or wear. Check compression of relief valve spring (10.82-10.90 lbs. at 1.40"). Check relief valve clearance in relief valve bore. Check driven shaft clearance (.001-.002" maximum). Pump shaft should be free running fit without excessive play in housing (.0015-.0029"). Replace any worn or defective parts.

R assembly: Oil all parts thoroughly. Install oil pressure relief valve plunger, spring, cover plug, and gasket. Install idler gear and oil pump gear and shaft assembly. Install cover plate with new gasket, and tighten cover plate screws to 12-15 lbs. Check oil pump shaft endplay with a dial indicator or Plastigage (.0015-.0055")



V8 OIL PUMP

Installation: Insert oil pump intermediate shaft in oil pump shaft. Note position of distributor shaft, and set oil pump shaft so that intermediate shaft will engage distributor shaft. Coat both sides of a new gasket with with sealer, position pump housing and gasket on block, install three retaining screws, and tighten them to 12-15 ft. lbs. (*CAUTION*– Do not attempt to force pump in position if it will not seat against block. Intermediate shaft may be out of alignment with seat in distributor shaft. Align seat and shaft if necessary). Install oil pump inlet tube and new seal in pump. Tighten oil tube-to-oil pump nut and oil to-oil pan nut to 10-12 ft. lbs.

OIL FILTER
ALL ENGINES

OIL FILTER: Filter is full-flow type and should be replaced at 4000 mile intervals (or more often if required by operating conditions).

►*REPLACEMENT CAUTION: Use Replacement Kit, Part No. B2A-6731-A, which includes correct filter element and NEW GASKETS WHICH MUST BE USED. CAUTION–Use of by-pass filter element would restrict oil flow and might cause failure of engine.*

Filter Installation: Wash all parts in a solvent and dry them thoroughly. Make sure all openings in center bolt are clean. Install new fibre gasket on center bolt, then place bolt through filter housing. Install spring and spring assembly on bolt, making sure seat tangs are engaged in spring. Install a new neoprene gasket and new filter element over center bolt. (*NOTE*–Be sure two elongated holes in oil filter diaphragm are at top when positioned on block). Install new neoprene gasket in filter housing recess. Place filter assembly in position, and thread center bolt into adapter, finger tight. Rotate filter assembly slightly, in each direction, to make sure gasket is seated evenly. Tighten center bolt ¾-1 complete turn (20-25 ft. lbs.). With engine at normal operating temperature and operating at fast idle, check for oil leaks past housing gasket or around center bolt gasket. If oil leaks past housing gasket, check housing for proper seating. If oil leaks past center bolt gasket, check center bolt for proper torque or replace gasket. *NOTE*–Pressed paper type element does not use neoprene gasket.

TRANSMISSION NOTES
(ALL CARS)

►*1955-56 PREMATURE GEAR TOOTH WEAR CORRECTION:* When interference between gear shift and clutch rods result in improper gear engagement and excessive gear tooth wear, install parts as follows:

Conventional Trans.
B6A-7326-C Rod (2nd and High).
B6A-7521-A Rod (Clutch Release).
B6A-7515-A Lever (Clutch Release) ①
B6A-7542-A Bracket (Clutch Retracting Spring) ②

Overdrive
B6A-7328-B Rod (Low and Reverse).
B6A-7326-B Rod (2nd and High).
B6A-7515-A Lever (Clutch Release) ①
B6A-7542-A Bracket (Clutch Retracting Spring) ②

① – 1954-56. ② – 1954-55.

CLUTCH NOTES
THUNDERBIRD

►*CLUTCH PEDAL INTERFERENCE (Thunderbird) CORRECTION:* Rework stabilizer bar by grinding a relief section, starting 10½" from end having horizontal holes and continue for 4½". Remove material (1" radius) at 10 o'clock position of round hole in insulator and remove felt section of insulator at upper left side of oblong hole for a distance of 1¾" horizontally in line with top of hole and down to point 4" from top of insulator.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate on left front body pillar.

First Numb r—100001.

►*VEHICLE NUMBER NOTE:* Vehicle number (example *A6FS 100001*) includes following identification data in sequence:

Eng. Type ①	Year ②	Assy. Plant	Body Style ③	Serial No.
A	6	See below	See below	100001 up

①—**A**—6 Cyl., 223 cu. in. engine; **M**—8 Cyl., 292 cu. in. engine; **P**—8 Cyl., 312 cu. in. engine (Thunderbird & & Interceptor); **U**—8 Cyl., 272 cu. in. engine.

②—Last digit of model year.

③—**C**—Sunliner (Conv.); **F**—Victoria (Fairlane 4-Dr.) **H**—Thunderbird; **R**—Ranch Wagon (Customline); **S**—Sedan Delivery; **T**—Fordor & Tudor (Fairlane); **V**—Victoria (2-Dr.); **W**—Crown Victoria; **X**—Country Sedan; **Y**—Country Squire; **G**—All others (Fordor, Tudor—Mainline & Customline).

Ass mbly Plant Designation

A—Atlanta	**F**—Dearborn	**N**—Norfolk
B—Buffalo	**G**—Chicago	**P**—St. Paul
C—Chester	**K**—Kansas City	**R**—San Jose
D—Dallas	**L**—Long Beach	**S**—Somerville
E—Mahwah	**M**—Memphis	**U**—Louisville

TUNE-UP

►*SUDDEN ENGINE STOPPAGE CORRECTION:* Inspect distributor primary terminal wire assembly Ford No. B6A-12216-A for defective welds at brass terminals.

COMPRESSION PRESSURE: 150 lbs. at cranking speed. Maximum variation between cylinders 10 lbs.

VACUUM READING: Steady 18-19" idling at 475-500 RPM in neutral.

VALVE TAPPET CLEARANCE: .019" Intake and Exhaust (Hot & Cold).

MANIFOLD HEAT CONTROL: Automatic thermostatic type with counterweight. Valve is closed when engine is at normal operating temperature and *running at slow idle,* and opens when *operating at high RPM.* Spring is installed with ¾ turn wind-up and hooked over stop pin.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .032-.036".

Spark Plugs—Champion 870. 18mm.

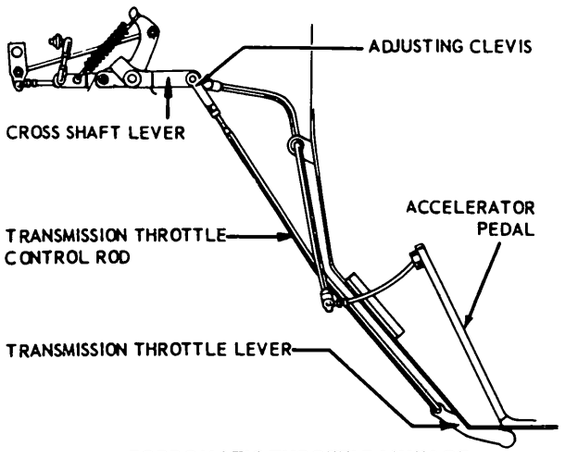
►*SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be torque tightened within the range 15-20 ft. lbs.

COIL: Ford N . B6A-12029-B. *12 Volt.*

Igniti n Curr nt—2.5 amps. idling, 4.5 amps. stopped.

R sistor—Ford B6A-12250-B (Early), **B6A-12250-C** (Later). Mounted next to coil.

►*IGNITION RESISTOR PRODUCTION CHANGES:* Two types of resistors, Ford No. B6A-12250-C used in production to replace original resistor B6A-12250-B. First type replacement identified by copper flashing on heads of rivets which support elements. A piece of fibre glass is cemented to inside channel of support bracket.



FORDOMATIC THROTTLE LINKAGE

Second type has sheet metal cover snapped over channel and rivets are cadmium plated. Replace original type when servicing ignition system.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

DISTRIBUTOR: Ford No. B6A-12127-E. *12 Volt.*

►*DISTRIBUTOR DIAPHRAGM PRODUCTION CHANGE:* A new distributor diaphragm, Ford No. B6A-12370-B, used on all engines after Nov. 15, 1955, and is available for replacement of all B6A-12370-A diaphragms. It can be identified by a die cast end cover in place of stamped cover and incorporates new type material in secondary diaphragm giving it much greater strength.

Condenser—Ford 7RA-12300-C. **Capacity**—.21-.25 mfd.

Contact Point Set—Ford FAA-12171-A.

Breaker Gap—.024-.026".

Cam Angle—35-38°.

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Clockwise viewed from above.

Advance Performance
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
0±½	18	300
¼-1¼	32	400
1¾-2¾	50	500
8-9¼	2.59	1200
10¾-11¾	4.22	1600
13-14½	6.00	2000

►*DISTRIBUTOR INSTALLATION CAUTION:* Be sure oil pump intermediate shaft engages the seat in the oil pump. It may be necessary to turn over the engine with starter after distributor drive gear is partially engaged, in order to engage intermediate shaft fully in oil pump.

Initial Distribut r Timing: Set engine crankshaft so that No. 1 cylinder is at TDC after compression stroke (with timing mark in line with pointer). Install distributor so that rotor points to the No. 1 spark plug wire terminal in distributor cap.

IGNITION TIMING

Setting—4° BTDC (Std.), 6° BTDC (Fordomatic) with engine idling at 475 RPM and vacuum line disconnected. *See Initial Distributor Timing above. NOTE*—Maximum initial timing recommended is 6° BTDC (Std.) and 8° BTDC (Fordomatic).

Timing Mark—Vibration damper marked "TDC", and "3", "5", "7", "9" degrees BTDC. Align correct mark with pointer on cylinder front cover.

CARBURETOR

Ford No. B6A-9510-H (Exc. Fordomatic), B6A-9510-G (Fordomatic). "Visi-flo", single barrel.

►*CARBURETOR MAIN METERING JETS PRODUCTION CHANGE:* For main metering jets used in production starting approximately June 1st, 1956 *See "Ford Visi-Flo" in Carburetion Section.*

Initial Setting – Initial setting 1 turn open. Turn adjusting screw in until engine begins to run roughly from lean mixture, then turn screw out until engine begins to roll from rich mixture. Turn screw in until engine runs smoothly. Favor a slightly rich mixture.

Idle Speed – 475-500 RPM (Std. & O.D.), 475-500 RPM (Fordomatic) with selector lever in Neutral with 425-450 RPM final check with selector lever in Dr. range.

Fuel Level – 11/16" ± 1/32" below power valve mounting surface. (Tool T52L-9550-AEE) *See "Ford Visi-flo" in Carburetion Section.*

Accelerating Pump: Inner hole for average or hot weather operation, outer hole for cold weather operation.

Fast Idle: Integral type operated by choke valve. No adjustment required.

Throttle Linkage Adjustment (Fordomatic Cars): Adjust engine idle speed to 475-500 RPM with selector lever in "N" position and engine at normal operating temperature. Adjust anti-stall dashpot (see below). Remove cotter pin and clevis pin from upper end of throttle control rod. Pull upward firmly but gently on throttle control rod to hold transmission lever against its internal stop. Rotate throttle rod clevis until pin enters holes in the clevis and the accelerator assembly shaft. Lengthen throttle control rod by rotating clevis 2½ turns counter-clockwise. Assemble throttle control rod to accelerator assembly shaft with clevis pin and cotter pin. Adjust accelerator pedal height by turning threaded trunnion on accelerator connecting link until top surface of accelerator pedal is 4 9/16" from floor pan. Check throttle linkage, and relieve any binding conditions. Road test car. If band or clutch slippage is evident, increase rod length to 3 turns, *but do not exceed 3½ turns of the clevis.*

Anti-Stall Dashpot (Fordomatic Cars): Adjust engine idle speed to 475-500 RPM with selector lever in "N" position and engine at normal operating temperature. Loosen dashpot adjusting screw locknut. Hold throttle in closed position, and turn dashpot adjusting screw out (counter-clockwise) until head of screw pushes dashpot rod up to the end of its travel. Turn dashpot adjusting screw in (clockwise) 1½-2 turns to obtain a clearance of .045-.064" between rod and screw head. After adjustment made, tighten adjusting screw locknut.

Fu l Pump Pressur : 4-5 lbs. at 500 RPM.

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CARB. EQUIPMENT

Fuel Pump: **Ford 35A-9350-A,** Fuel only (Except Fordomatic & Overdrive Cars), **B5A-9350-B,** Fuel & Vacuum (Fordomatic & Overdrive Cars).
Fuel Pump Pressure – 4-5 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: King-Seeley Electric.
Dash Unit – Ford B6A-9280-D.
Tank Unit – Ford B6A-9275-C (Exc. Sta. Wgn. & Sed. Del.). Ford B6A-9275-B (Sta. Wgn. & Sed. Del.).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Ford No. B6A-10655-C. *12 Volt,* 11 plate, 55 Ampere hour capacity, or **B6A-10655-E.** *12 Volt,* 13 plate, 70 Ampere hour capacity.
Battery Ground – Negative to engine block.
► *CAUTION: This is reversed from previous models.*
Engine Ground – Cylinder head to dash.

STARTER

Ford No. B6A-11002-A. *12 Volt.* **Armature–**B6A-11005-A.
► *IMPULSE STARTING (Back-Up Light Equipped Cars) CORRECTION:* Before replacing neutral safety switch to correct short between light and solenoid terminals causing engine to start, interchange leads at switch. Connect longest lead (beyond taped portion of harness) to "A" terminal and short lead to "B" terminal.
Drive – Ford 1CM-11350-C. Bendix "Folo-Thru".
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 48-56 ozs.
Cranking Speed – 150-180 RPM with engine warm.

Performance Data.

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	12.0	120
	150-180 ②		190 max.

① – With starter on engine and engine idling.
② – Cranking speed with engine warm.

Starting Switch: Magnetic type, Ford No. B6A-11450-A. Starter Switch is controlled by ignition switch. *NOTE* - Neutral Safety Switch used on Fordomatic transmission cars.
Fordomatic Neutral Safety Switch: Ford No. FAC-15812-C.
Adjustment – *See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

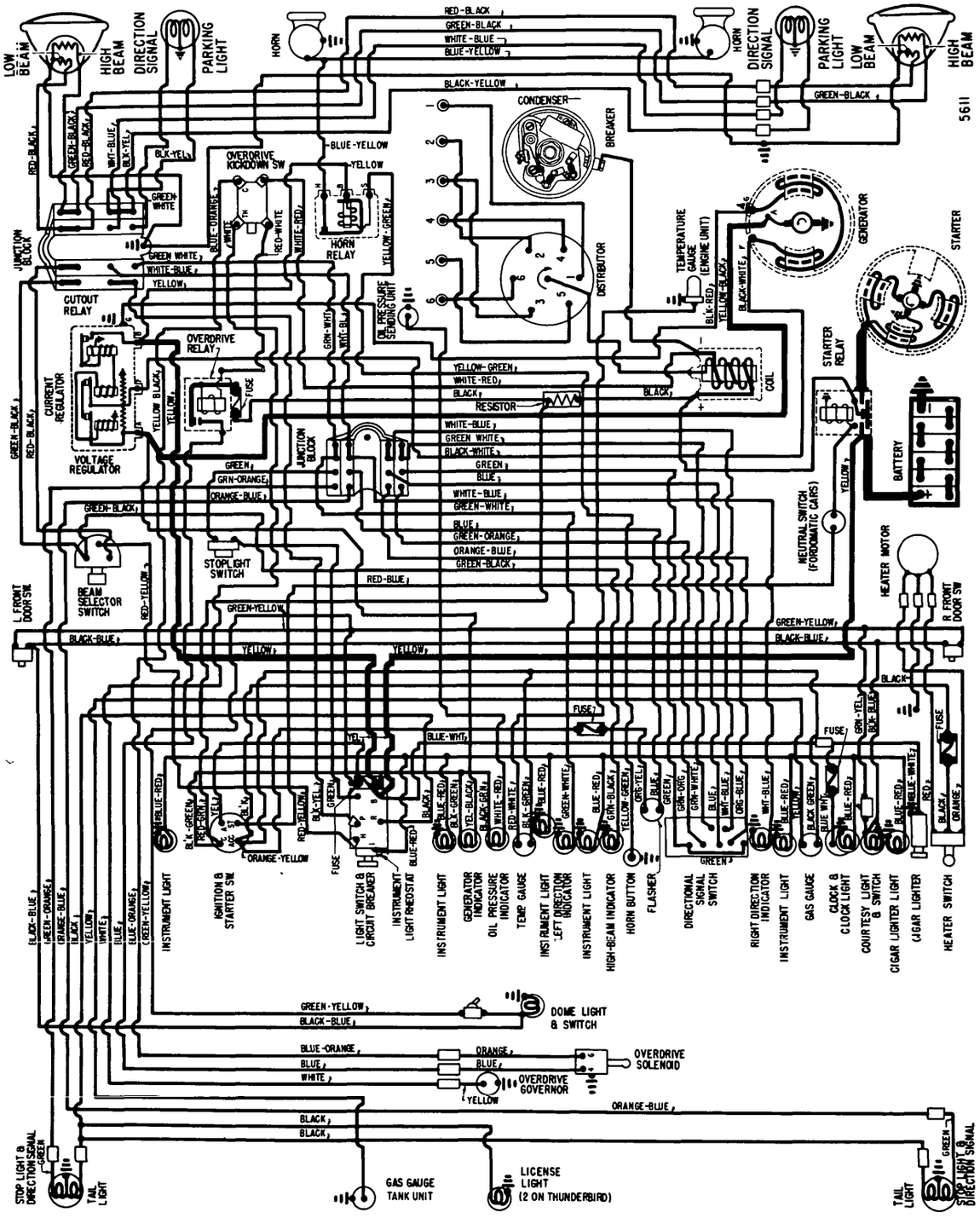
Ford No. B6A-10002-A, *12 Volt.* **Armature –** B6A-10005-A.
► *GENERATOR INDICATOR LIGHT (Idle Speed) CORRECTION:* When generator light comes "ON" when engine idles, install a 75 ohm, 25 Watt resistor (Vitreous enamel type with eyelets moulded into resistor body), at terminal "A" of regulator in series with indicator light wire (Yellow with black tracer). Adjust engine idle speed to high limit. *NOTE* - Light will now have lower illumination than oil indicator light.

Performance Data

Amperes ①	Eng. RPM
30	1250

① – See Regulator for maximum charging rate.
Brush Spring Tension – 26-34 ozs.

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Field Current – 1.4-1.6 amperes at 12.0 volts.
Rotation – Counter-clockwise at commutator end.
Belt Adjustment: ¼" belt deflection midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Ford No. B6A-10505-A. *12 Volt.*

► *SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 75° F., ambient (engine compartment) temperature, after ½ hour operation in vehicle, or after regulator heated and stabilized.*

Cutout Relay

Cuts In – 12.0-12.8 volts.

Voltage Regulator

Setting – 14.6-15.4 volts.
Checking & Adjusting – *See Electrical Section.*

Current Regulator

Setting – 28-32 amperes.
Checking & Adjusting – *See Electrical Section.*

MISC. ELECTRICAL

► *DOME LIGHT FAILURE (High Voltage) CORRECTION:* When dome lights fail due to high voltage, remove head light switch, remove dome light wire from switch (green wire with yellow tracer) and install 1.5 Ohm, 5-Watt vitreous enamel resistor in dome light circuit.

Head Lamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Lighting Switch Removal: With control knob in "OFF" position, press spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N. Remove switch and disconnect all wires.
Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), on top of booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment.
FUSES: Located as follows:
Interior Lights – 7.5 ampere. On lighting switch.
Overdrive – 30 ampere on overdrive relay.
Cigar Lighter – Special fuse in lighter base.
Clock – 3 amps. in clock lead.
Heater – 7.5 amps. in blower switch lead.
Radio – 7.5 amps. on radio signal speaker.
Turn Signal Fuse – 7.5 amps. In flasher to switch lead.
CIRCUIT BREAKERS: On headlight switch. Combination headlight switch, circuit breaker, and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument, parking, stop and tail light circuits.
► *1956 CIGAR LIGHTER CAUTION:* 12 volt socket and element smaller than 6 volt. 12 volt socket has ink mark stamped on it for identification. DO NOT use 12 volt element in 6 volt socket as heated element will eject onto front seat.
HORNS: (Except West Coast). Ford B5T-13832-B (High Pitch), B5T-13833-B (Low Pitch). *12 Volt.*
(West Coast Only). Ford B6A-13832-A (High Pitch), use bracket Ford No. B6A-13830-A, Ford B6A-13833-A (Low Pitch), use bracket Ford No. B6A-13831-A. *12 Volt.*
Horn Current – 9.2-9.6 amperes at 12-12.6 volts.
Horn Relay: Ford No. 2G-13853-A.

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. Valve-in-head.

Bore	Stroke	Displacement
3.62"	3.60"	223 cu. ins.
Compr. Ratio	**Rated HP**	**Developed HP**
8.0-1	31.54	137 at 4200 RPM

Compression & Vacuum Reading – *See TUNE-UP.*
► *CRANKSHAFT OIL SEAL LEAK CORRECTION:* For application of new type front oil slinger and crankshaft with integral oil slinger, *See "Crankshaft & Main Bearings" in Ford Special Data.*
CYLINDER HEAD: *See "Cylinder Head & Manifold" in Ford Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Ford Special Data.*
ENGINE REMOVAL: *See "Engine" in Ford Special Data.*
ENGINE FRONT MOUNTING: *See "Engine Mountings" in Ford Special Data.*
OIL PAN REMOVAL: Drain crankcase. Remove oil level indicator. Remove engine left and right front splash aprons. Remove flywheel housing inspection cover. Remove oil pan retaining screws and remove pan.

PISTONS

Autothermic type. Solid skirt with three rings above pin.
Removal – Pistons and rods removed from above.
Fitting New Pistons: Use ½" feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows:
New Piston in New Bore – .0015" feeler. 5-10 lbs. pull.
New Piston in Used Bore – .002" feeler. 5-10 lbs. pull.
Used Piston in Used Bore – .0025" feeler. 5-10 lbs. pull.
Replacement Pistons: Standard size, .020", .030", .040", .060" Oversize. Pistons furnished only with fitted pins.
Installing Pistons: Install with small indentation in head toward FRONT of engine.

PISTON PINS

Floating type with lock rings at each end.
► *1955-56 PISTON PIN INSTALLATION CAUTION:* New B5A-6135-A Pin used in 1956 cars is heavier than the EAA-6135-B Pin used in 1955. *The two pins should not be mixed in any one engine assembly as a vibration or unbalanced condition may result.* New pin can be identified from old pin by machining of the ends. Old pin may be almost flush or chamfered at the internal diameter. New pin will have either a recessed internal diameter as though the ends of the pin were spot faced, or will not be completely drilled through.
Diameter – .9120-.9123". **Length** – 3.016-3.030".
Pin Fit in Piston – .0001-.0008". Hand push fit at 70° F.
Pin Fit in Rod Bushing – .0001-.0008" clearance. Selective fit. Light thumb press fit at 70° F.
Replacement Pins: Standard and .001" and .002" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (1 & 2)	3/32"	.010-.027"	.006"
Oil (3)	3/16"	.015-.062"	

Replacement Rings: Standard, .020", .030", .040" and .060" Oversize.
► *REPLACEMENT PISTON RING NOTE:* "Snap Type" rings furnished in Std. size only. "Expander Type" furnished in all oversizes above. "Steel Section Type" furnished in Standard, .020" and .030" Oversize.

CONNECTING RODS

Journal Diameter – 2.2980-2.2988".
Clearance – .0033" maximum.
Side Clearance – .012" maximum.
Replacement Bearings: Standard size (4 sizes marked **Red & Blue** for selective fitting) and .010", .020", .030", Undersize.
Installing Rods: Install rod in piston so that squirt hole is to right when indentation on top of piston is toward front of engine.

CRANKSHAFT

► *CRANKSHAFT PRODUCTION CHANGE: See "Crankshaft Oil Seal Leak Correction" under ENGINE above.*
Journal Diameter – 2.4980-2.4988". Four Bearings.
Bearings – Steel backed, copper lead alloy, or lead babbitt.
Clearance – .0031" maximum (lead babbit bearings), .0035" (copper lead bearings).
Replacement Bearings: Standard size, (4 sizes marked **Red** or **Blue** for selective fitting) and .010", .020", .030" Undersize.
End Thrust: Taken on rear intermediate No. 3 bearing.
Thrust Bearing Alignment – *See "Crankshaft & Main Bearings" in Ford Special Data.*
End Play – .012" maximum.
Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Ford Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Ford Special Data.*
► *OIL SLINGER NOTE:* A crankshaft front oil slinger is incorporated on all cars and truck engines to reduce oil leakage at front oil seal. Slinger is held in place by crankshaft pulley and cylinder front cover. To remove slinger, remove cylinder front cover and slide slinger off crankshaft.

CAMSHAFT

Journal Diameter – 1.9255-1.9265".
Clearance – .006".
End Thrust: Taken by thrust plate and spacer (between camshaft sprocket and shoulder on camshaft). *NOTE* - Chamfer on inside of spacer must be to the rear in assembly.
End Play – .012".
Replacement Bearings: Finished bearings furnished Standard and .015" Undersize. *CAUTION* - Rear intermediate (No. 3) bearing not interchangeable with other bearings.
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Ford Special Data.*
Timing Chain: Side-guide type. Length 56 links.
► *REPLACEMENT NOTE:* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure slack on opposite side). Remove and install chain endless as a unit with both sprockets.
Camshaft Setting: Sprockets marked by "O" at one tooth. Mesh chain so that there are 12 pins between "O" marks on driving side of chain.
Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Ford Special Data.*
Engine Front Cover Removal: *See "Engine Front Cover" in Ford Special Data.*

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VALVES

Tappet Clearance: .019" Intake & Exhaust (Hot or Cold).

Valve	Head Diameter	Stem Diameter ①
Intake	1.775-1.785"	② .3415-.3420" or ③ .3420-.3425"
Exhaust	1.505-1.515"	② .3400-.3405" or ③ .3405-.3410"

Valve	Seat Angle	Lift ④	Stem Clearance
Intake	45°	.268" min.	.004" max.
Exhaust	45°	.268" min.	.006" max.

① – Furnished with .003", .015", .030" oversize stems. *See "Valve System" in Ford Special Data.*

② – Color coded RED. Use with RED valve guide.

③ – Color coded GREEN. Use with GREEN valve guide.

④ – Cam lobe lift service limit.

►*EXHAUST VALVE STEM DIAMETER PRODUCTION CHANGE: Stem diameter decreased .0005" for increased stem-to-guide clearance to minimize valve sticking. See "Valve System" in Ford Special Data.*

Valve Seat Width – .060.,080" (Intake), .070-.090" (Exhaust).

►*ROTATABLE VALVE NOTE:* All valves are rotatable type. *See "Valve System" in Ford Special Data.*

Valve Stem Oil Seals – "Umbrella" type oil seals used on intake and exhaust valve stems. Seals are installed with cupped side down on valve stem at guide boss on cylinder head. *Install new seals whenever valves removed or when seals become loose on stem.*

Valve Springs: Install with closed coil end toward cylinder head.

Free Length – 2.09" approximately.

Valve Spring Specifications

	Pressure	Length
Valve closed	64-79 lbs.	1.780"
Valve open	145-177 lbs.	1.390"

►*VALVE SPRING INSTALLATION NOTE:* Measure valve spring assembled height from machined surface of cylinder head spring pad to spring retainer contact surface. If assembled height is 1 13/16" or greater, install .030" spacer between cylinder head valve spring pad and valve spring to bring assembled height to recommended dimension of 1 25/32-1 13/16". *CAUTION* - Use of spacers in excess of recommendations will result in overstressing valve springs and lead to excessive load loss and spring breakage.

Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (see table above), ream guides and install oversize valves. *See "Valve System" in Ford Special Data.*

Valve Lifters: Mushroom type. Removed from below with camshaft out.

Rocker Arm Assembly: *See "Valve System" in Ford Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE: The following valve opening and closing points are with camlift as indicated.*

Intak Valves–Open 24° ① BTDC. Close 46° ② ALDC.

Exhaust Valves–Open 68° ① BLDC. Close 2° ② ATDC.

① – Camlift .016". ② – Camlift .019".

Valve Timing Check – Remove rocker arm cover. Back off No. 1 intake valve adjusting screw, slide rocker arm assembly to one side. With push rod in lifter socket, install dial indicator to indicate push rod movement. Turn engine slowly until cam lobe contacts lifter. Zero indicator and continue to turn crankshaft until .016" (desired lift) is obtained. Timing indicator on pulley should read 24° BTDC.

OILING SYSTEM

Crankcase Capacity: 4 qts. (refill), 5 qts. (when filter changed).

Normal Oil Pressure: 45-50 lbs. at 2000 RPM.

Pressure Regulator Valve–In pump body, not adjustable.

Oil Pressure Indicator – Indicator light on instrument panel, operated by Engine Unit – Ford No. FDA-9278-A (Stamped No. 7 on Hex.). Lights when ignition switch turned on, goes out when engine starts and pump operates.

Oil Pump: Gear type pump located in crankcase, in line with distributor.

►*OIL PUMP CAUTION: New type oil pump has aluminum body. Use extreme care when servicing to prevent damaging body.*

Pump Overhaul: *See "Oil Pump" in Ford Special Data.*

Oil Filter: Full-flow type (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.

Replacement Filter Element – Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION: This special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication). See "Oil Filter" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

COOLING

Water Capacity: 14.5 qts., add 1 qt. for heater.

►*LOSS OF COOLANT CORRECTION:* Lower generator mounting bracket bolt holes are tapped into cylinder water jacket. For loss of water at this point, or when replacing bolts, apply a good coating of waterproof sealer.

Pressure Valve: Ford LA-8100-A Radiator filler cap. Opens at 12-15 lbs. *CAUTION* - If replacement required use 12-15 lb. type.

Thermostat: Ford No. EAA-8575-A (157-162°) standard. Ford EAA-8575-B, (177-182 lb.) for use with permanent anti-freeze.

Water Pump: Packless, sealed ball bearing type. *See "Ford 6" in Water Pump Section.*

Temperature Gauge: King-Seeley Electric.

Dash Unit – Ford No. B6A-10883-A.

Engine Unit – Ford No. B6A-10884-A.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 9½ CF, No. 268594. Semi-centrifugal type.

►*HEAVY DUTY CLUTCH PRODUCTION CHANGE:* Heavy duty clutch Ford No. B6A-7563-A, incorporating oil slinger; and release bearing incorporating lubrication fitting now used in production. New heavy duty clutch disc Ford No. B6A-7550-A released for service. *See "Long Clutches" in Clutch Section.*

Clutch Disc – Long No. 288824.

Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper and bracket until correct travel is within limits. Adjust assist spring link to give assist spring length of 6 5/8" when clutch is fully released.

Pedal Free Travel – 1 1/8 - 1 3/8". Loosen locknut on clutch pedal release rod, turn adjusting nut until correct travel is reached. *NOTE* - Check free travel by operating engine at 3000 RPM with transmission in neutral position. There should be a minimum of ½" free travel under these conditions. Readjust as necessary.

Removal: Remove transmission (see Transmission removal below), and slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar bracket from flywheel & clutch housing and remove equalizer bar. Remove split bronze bushing from bracket and then remove flywheel housing. Install Tool 7563 and remove clutch pressure plate assembly (if tool not available, clutch may be released by backing off the attaching bolts evenly).

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

►*PREMATURE GEAR TOOTH WEAR CORRECTION:* Caused by incorrect gear engagement, *See "Transmission Control Notes" in Ford Special Data.*

►*SYNCHRO-MESH & OVERDRIVE THREE SPEED TRANSMISSION GEAR REPLACEMENT CAUTION:* Shot peened gears used in 1956 models. Shot peened gears can be used in past model transmissions. DO NOT use past model gears in 1956 transmission. *See "Ford Synchro-mesh" in Transmission Section.*

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect gearshift linkage at transmission. Remove speedometer cable and gear. Disconnect drive shaft at transmission and remove the capscrews attaching transmission extension to rear engine support. Place a support under engine and remove the frame cross member and rear engine support. Remove transmission-to-flywheel housing capscrews and install two guide pins. Pull transmission back until main drive gear splines clear housing, and lower transmission from car.

OVERDRIVE

Warner Model AS4-R10F. Solenoid operated type, with governor control and throttle operated kick-down. No Lock-Out Switch used. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *See "Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock. *See "Fordomatic & Mercomatic" in Transmission Sect.*

►*FORDOMATIC PRODUCTION CHANGES:* For improved Throttle Control Inner Lever Installation, change in Pressure Regulator Valve Body, and new location of pressure take off plug, *See "Fordomatic & Mercomatic"*

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in Transmission Section.

►*FORDOMATIC "LOCK-UP" CORRECTION (1955-56 Cars & Trucks):* Caused by cross leakage in front servo piston. *See "Fordomatic & Mercomatic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication – Check transmission oil level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain & refill every 15,000 miles.

Checking Fluid Lev l – Apply parking brakes, place transmission selector lever in "N" position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (Parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator. Wipe indicator clean and insert in tube (make sure indicator is pushed down all the way). Remove indicator and read level. Add sufficient fluid to raise level to full mark on indicator. Replace indicator.

►*FORDOMATIC TRANSMISSION FLUID CHANGE CAUTION:* New type oil is green colored, similar to engine oil. DO NOT USE IT IMPROPERLY. "Type A" (reddish brown) may be used when adding oil to transmission filled with new type oil.

Throttl Linkag Adjustment: *See CARBURETOR above.*

►*OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type.

►*CAUTION (All Cars Except Station Wagon & Sedan Delivery): Rear universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). See "Ford & Mercury (Separate Carrier Type) Hypoid" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own. Separate Carrier, semi-floating hypoid, with Hotchkiss drive.

►*NOTE: Axle not same as Station Wagon & Sedan Delivery. See "Ford & Mercury (Separate Carrier Type) Hypoid" in Rear Axle Section.*

►*LUBRICATION BAFFLE NOTE:* 1956 rear axle housing has lubrication baffle, held in place by two housing bolts, for directing lubricant to differential side bearings. Recommended for installation on earlier models. Ford No. B5A-4018-A.

Axl Ratios

Synchro-mesh	Overdrive	Fordomatic
3.89-1 (35-9)	4.11-1 (37-9)	Ⓒ 3.22-1 (29-9)

Ⓒ – 3.55-1 (32-9) Optl.

►*RATIO, DRIVE GEAR & DIFFERENTIAL CASE IDENTIFICATION:* When differential case is to be replaced, be sure new case is same as old one. Refer to following table for identification:

Driv G ar Ratio	Gear T th Drive	Pinion	Diff r ntial Case Color
3.22-1	29	9	Gray
3.55-1	32	9	Red
3.89-1	35	9	Black
4.11-1	37	9	Black

Backlash – .003-.008".

Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: Disconnect rear universal. Remove axle shafts (see above). Remove carrier from housing.

Wheel Bearing Adjustment: None required.

STA WGN. & SED. DEL.

Own. Integral Carrier, semi-floating hypoid, with Hotchkiss drive.

►*NOTE: Axle not same as passenger cars. See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.*

Ratios

Standard Transmission – 4.09-1 (45-11).
Overdrive Transmission – 4.27-1 (47-11).
Fordomatic Transmission – 3.54-1 (46-13).

Axle Shaft Removal: Same as Pass. Cars (above).

Rear Axle Assembly Removal: Remove hub caps, loosen wheel stud nuts, raise car at rear and disconnect hydraulic brake hose from brake line at rear axle. Disconnect parking brake cable from equalizer rod, remove cable assembly from frame brackets. Remove wheels, disconnect drive drive at rear axle universal joint flange. Remove "U" bolts. Remove assembly from under car.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

Model	Ⓒ Front	Ⓒ Rear
Pass. Cars (Std.)	B5A-18124-A	B5A-18125-A
Pass. Cars (Hvy. Duty)	B5A-18124-D	B5A-18125-C
Sta. Wgn. & Sed. Del.		B5A-18125-D

Ⓒ – Furnished in kits which include shock absorber mounting bushings.

►*SHOCK ABSORBERS (1955-56 Taxi Cabs) PRODUCTION CHANGE:* Export type shock absorbers used in production as standard equipment, in place of heavy duty type on taxi cab units to eliminate possibility of "bottoming". *NOTE* - Replace heavy duty type with export type in sets only.

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs. *See "Lincoln, Mercury, Ford (Ball Joint)" in Suspensions and Wheel Alignment Section.*

Kingpin Inclinati n – 6 - 7° crosswise.
Cast r – Pos. ½° to Pos. 1½°
Camb r – Pos. ¼° to Pos. 1¼°.
T e-In – 1/16" to 1/8".

►*TOE-IN ADJUSTMENT NOTE:* When checking toe-in on cars with Power Steering, engine should be running so that power steering control valve will be properly centered.

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type. *See "Gemmer Worm & Roller (3 tooth)" in Steering S ct.*

Power Steering: Ford-Mercury Bendix Linkage type. Used in conjunction with standard type steering gear. *See "Ford & Mercury Bendix" in Steering Section.*

►*STEERING ARM INTERFERENCE (Power Steering Cars):* To correct interference between steering connecting rod clamps and/or bolts with power steering control valve, *See "Ford & Mercury Bendix Linkag Power Steering" in Steering Section.*

►*POWER STEERING BELT SQUEAL CORRECTION:* When belt slippage or squeal cannot be corrected by belt adjustment, install new pulley, Ford No. B6A-33556-A, and new solid type belt, Ford No. B6A-33558-A. *NOTE* - Previous type belt (with serrations) can be used with either type pulley.

Steering Linkage: *See "Steering Linkage" in Steering Sect.*

Steering Wheel & Horn Button Removal: *See "Gemm r Worm & Roller (3 tooth)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (3 tooth)" in Steering Section.*

BRAKES

Ford-Bendix Hydraulic. Hand lever applies rear wheel service brakes.
See "Ford, Lincoln, Mercury Bendix" in Brake Section.

►*BRAKE DESIGN CHANGES:* Front wheel brakes do not have eccentric and front and rear anchor pins are fixed (No adjustment).

Drum Diameter – 11" front and rear.

Wheel Cylinder Diameter – 1 1/8" (Front - All), 7/8" (Rear - Pass. Cars), 15/16" (Rear - Sta. Wgn. & Sed. Del.).

Lining Specifications

Passenger Car

Lining	Width	Thickness	Length
Front Primary	2¼"	3/16"	10 27/32"
Front Secondary	2¼"	15/64"	10 27/32"
Rear - All	1¾"	3/16"	10 27/32"

Sedan Delivery & Station Wagon

Lining	Width	Thickness	Length
Front Primary	2¼"	7/32"	9 9/32"
Front Secondary	2¼"	7/32"	11 15/16"
Rear Primary	2"	7/32"	9 9/32"
Rear Secondary	2"	7/32"	11 15/16"

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Clearance – Adjusting screw backed off 10 to 12 notches from point where shoes are tight against drum.

Brake Pedal Free Play Adjustment: 5/16" to 7/16". If play not correct after brake adjustment, loosen locknut on the eccentric bolt that attaches brake pedal assembly to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder: Located on engine side of firewall.

Checking Fluid – Maintain fluid level to within ½" of top of reservoir.

Removal – Disconnect brake line from master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lockwashers attaching master cylinder to firewall.

Power Brakes: Midland Hy-Power Unit mounted on left side of car in engine compartment and connected in hydraulic brake line between master cylinder and wheel cylinders. There are no mechanical connections and no adjustments are required.
See "Midland Power Unit" in Brake Section.

Checking Fluid – Same as for manual brakes (above).

Removal of Power Unit – Depress brake pedal a few times to remove all vacuum from system. Disconnect hydraulic lines at the power unit and remove wires from brake stop light switch. Remove power unit to mounting bracket boltsand lockwashers and remove the power unit.

MISC. MECHANICAL

Windshield Wipers: Vacuum link and crank arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Reversible motor in each window. *See "Electric Window Regulators" in Misc. Sect.*

Power Top Control: Electric-Hydraulic with reversible pump motor. *See "Power Top Controls" in Misc. Sect.*

Power Seat Adjusters: "Fourway" Electric Screw and jack type with individual motors and transmissions for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate, on left front body pillar (V8 Pass. Cars), on dash panel in engine compartment (Thunderbird).
First Number–100001.

►*VEHICLE NUMBER NOTE:* Vehicle number (Example *M6FS 100001*) includes following identification data in sequence:

Eng. Type ①	Year ②	Assy. Plant	Body Style ③	Serial No.
M	6	See below	See below	100001 up

①–**A**–6 Cyl., 223 cu. in. engine; **M**–8 Cyl., 292 cu. in. engine; **P**–8 Cyl., 312 cu. in. engine (Thunderbird & Interceptor) **U**–8 Cyl., 272 cu. in. engine.
②–Last digit of model year.
③–**C**–Sunliner (Conv.); **F**–Victoria (Fairlane 4-Dr.) **H**–Thunderbird; **R**–Ranch Wagon (Customline); **S**–Sedan Delivery; **T**–Tudor & Fordor (Fairlane); **V**–Victoria (2-Dr.); **W**–Crown Victoria; **X**–Country Sedan; **Y**–Country Squire; **G**–All others (Fordor, Tudor–Mainline & Customline).

Assembly Plant Designation

A–Atlanta	**F**–Dearborn	**N**–Norfolk
B–Buffalo	**G**–Chicago	**P**–St. Paul
C–Chester	**K**–Kansas City	**R**–San Jose
D–Dallas	**L**–Long Beach	**S**–Somerville
E–Mahwah	**M**–Memphis	**U**–Louisville

TUNE-UP

►*SUDDEN ENGINE STOPPAGE CORRECTION:* Inspect distributor primary terminal wire assembly Ford No. B6A-12216-A for defective welds at brass terminals.

COMPRESSION PRESSURE: At cranking speed, compression pressures are as follows:

Engine	Compr. Ratio	Compr. Press.
272 cu. in.	8.0-1	160 lbs.
272 cu. in.	8.4-1	165 lbs.
292 cu. in.	8.0-1	155 lbs.
292 cu. in.	8.4-1	160 lbs.
312 cu. in.	8.0-1	155 lbs.
312 cu. in.	8.4-1	160 lbs.
312 cu. in.	9.0-1	165 lbs.

VACUUM READING: 19-20" at 475-500 RPM in neutral.

VALVE TAPPET CLEARANCE: .019" Intake and Exhaust (Hot & Cold).

MANIFOLD HEAT CONTROL: Automatic thermostatic type with counterweight. Valve on cars with single exhaust system is located between front end of right hand exhaust manifold and crossover pipe. Valve on cars with dual exhaust system is located between rear end of right hand exhaust manifold and muffler inlet pipe. Thermostat spring is installed with a ¾ turn wind-up and hooked over stop pin. *Valve is closed when engine is at normal operating temperature and running at slow idle, and opens when op rating at high RPM.*

►*DUAL EXHAUST NOTE:* When valve closed, most exhaust gases are discharged through left hand exhaust pipe.

►*LUBRICATION NOTE:* Use lock lubricant Ford No. B6Q-19587-A at shaft and spring bearing positions.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders–RIGHT BANK 1-2-3-4. LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .032-.036".
Spark Plugs–Champion 870. 18mm.

►*SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be torque tightened within range 15-20 ft. lbs.

►*SPARK PLUG MISFIRING CORRECTION:* If misfiring occurs between No. 6 and No. 8 cylinders, interchange No. 5 and No. 6 spark plug wire positions in all insulator blocks and separator blocks on left side of engine.

COIL: Ford No. B6A-12029-B. *12 Volt.*
Ignition Current – 2.5 amps. idling, 4.5 amps. stopped.
Resistor – Ford B6A-12250-B, (Early), B6A-12250-C, (Later). Mounted next to coil. *See changes following.*

►*IGNITION RESISTOR PRODUCTION CHANGES:* Two types of resistors Ford No. B6A-12250-C used in production to replace original resistor B6A-12250-B. First type replacement identified by copper flashing on heads of rivets which support elements. A piece of fibre glass is cemented to inside channel of support bracket. Second type replacement has sheet metal cover snapped over channel and rivets are cadmium plated. Replace original type when servicing ignition system.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

DISTRIBUTOR: Ford No. B6A-12127-A (272 Eng. with 2-Barrel Carb.), **B6A-12127-B** (272, 292, & 312 Engs. with 4-Barrel Carb.) *12 Volt.* New double diaphragm, pressure type with separate vacuum lines to manifold and carburetor used with cars equipped with 4-Barrel Carburetors.

►*DISTRIBUTOR DIAPHRAGM PRODUCTION CHANGE:* A new distributor diaphragm Ford No. B6A-12370-B used on all engines after Nov. 15th, 1955, and is available for replacement of all B6A-12370-A diaphragms. It can be identified by the die cast end cover in place of stamped cover and it incorporates new type material in secondary diaphragm giving it much greater strength.

►*POOR ACCELERATION OR ROUGH IDLE CORRECTION (Due to Distributor Diaphragm Leaking on Cars Equipped With 4-Barrel Carbs.):* Check for leaks as follows: Disconnect carburetor and manifold fittings at diaphragm. Attach screw-in adapter from distributor stroboscope to primary diaphragm (large fitting). Adjust distributor stroboscope vacuum pump to a steady reading of 20" of vacuum. Connect hose to primary diaphragm fitting. If reading less than 20" of vacuum, one or both diaphragms are leaking and should be replaced If readings hold at 20" of vacuum, further check for small pin holes in the diaphragm by adjusting distributor stroboscope vacuum pump to obtain a steady 3-5" of vacuum. Again connect hose to primary diaphragm fitting. If a steady reading is not maintained, one or both diaphragms are leaking and should be replaced. New diaphragm assemblies, Part No. B6A-12370-D, should be checked at both vacuum settings before installation.
Condenser–Ford FAB-12300-A. **Capacity**–.21-.25 mfd.
Contact Point Set–Ford FAB-12171-B.
Breaker Gap–.014-.016".
Cam Angle – 26-28° ± 5°.
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Counter-clockwise viewed from above.

Advance Performance–B6A-12127-A
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
0±½	15	300
¼-1¼	28	400
6½-7½	96	800
11½-12¾	2.21	1200
14½-15½	3.41	1600
16-17¼	4.60	2000

Advance Performance–B6A-12127-B
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
0±½	16	300
0-1	29	400
5½-6½	88	800
8½-9½	1.27	1200
11-12	1.73	1600
13-14¼	2.19	2000

►*DISTRIBUTOR INSTALLATION CAUTION:* Be sure distributor shaft engages oil pump intermediate hex shaft. If may be necessary to turn engine over with starter, after the distributor drive gear is partially engaged, in order to engage the intermediate shaft.

Initial Distributor Timing: Remove No. 1 spark plug. Hold thumb over spark plug hole until piston starts up on compression. Slowly "bump" engine over with starter until timing mark is aligned with pointer. Find No. 1 spark plug socket in distributor cap and fit distributor cap to distributor housing. Mark distributor housing to indicate No. 1 spark plug wire position. Position rotor approximately 20° counter-clockwise from mark made on distributor housing. Engage distributor drive gear and install distributor in engine.

IGNITION TIMING

Setting–3° BTDC (Std.), 6° BTDC (Fordomatic) with engine idling at 475 RPM and vacuum line disconnected (2-Barrel Carb.), PRIMARY (inner diaphragm) vacuum line disconnected (4-Barrel Carb.). *See Initial Distributor Timing above. NOTE*–Maximum initial timing recommended is 6° BTDC (Std.), 8° BTDC (272,292 Eng. Fordomatic), 6° BTDC (312 Eng. Fordomatic).

Timing Mark–Vibration damper marked "TDC", and "2", "4", "6", "8", "10" degrees BTDC. Align correct mark with pointer (bolted to water pump).

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CARBURETOR

►*CARBURETOR APPLICATION Two-barrel Carburetors used on 272 cu in engine Four-barrel Carburetors used on 292 and 312 cu in engines*

►*WIDE OPEN THROTTLE INTERFERENCE CORRECTION (272 Eng.)* Interference with intake manifold may prevent accelerator assembly bar from traveling to wide open position To correct, bend forward upper end if accelerator assembly bar

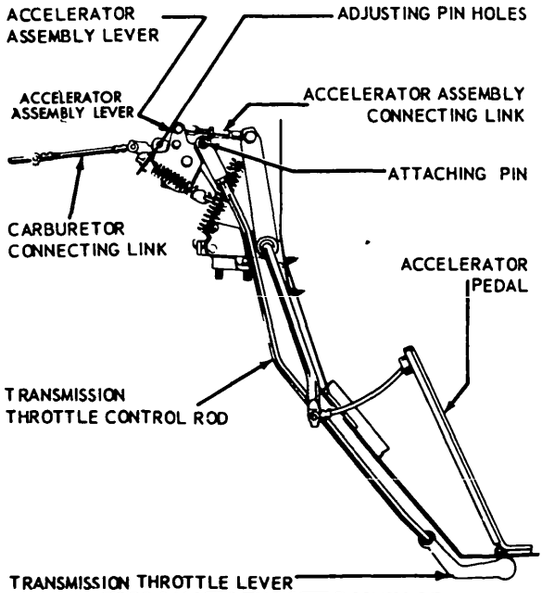
►*HARD STARTING (272 Pass. Car Eng.) CORRECTION:* New choke thermostat with the new bi-metal spring Ford No. B6A-9848-D, identification mark "56F1" can be installed to replace early choke thermostats with identifications either "56F" or "56D".

►*ACCELERATOR PUMP PISTON ROD STICKING CORRECTION (272 Eng.):* When this rod sticks or binds, install new rod Ford B6A-9531-A, identified by deep blue color. Old rod was zinc plated. Free carburetor of burrs or foreign material when installing new rod.

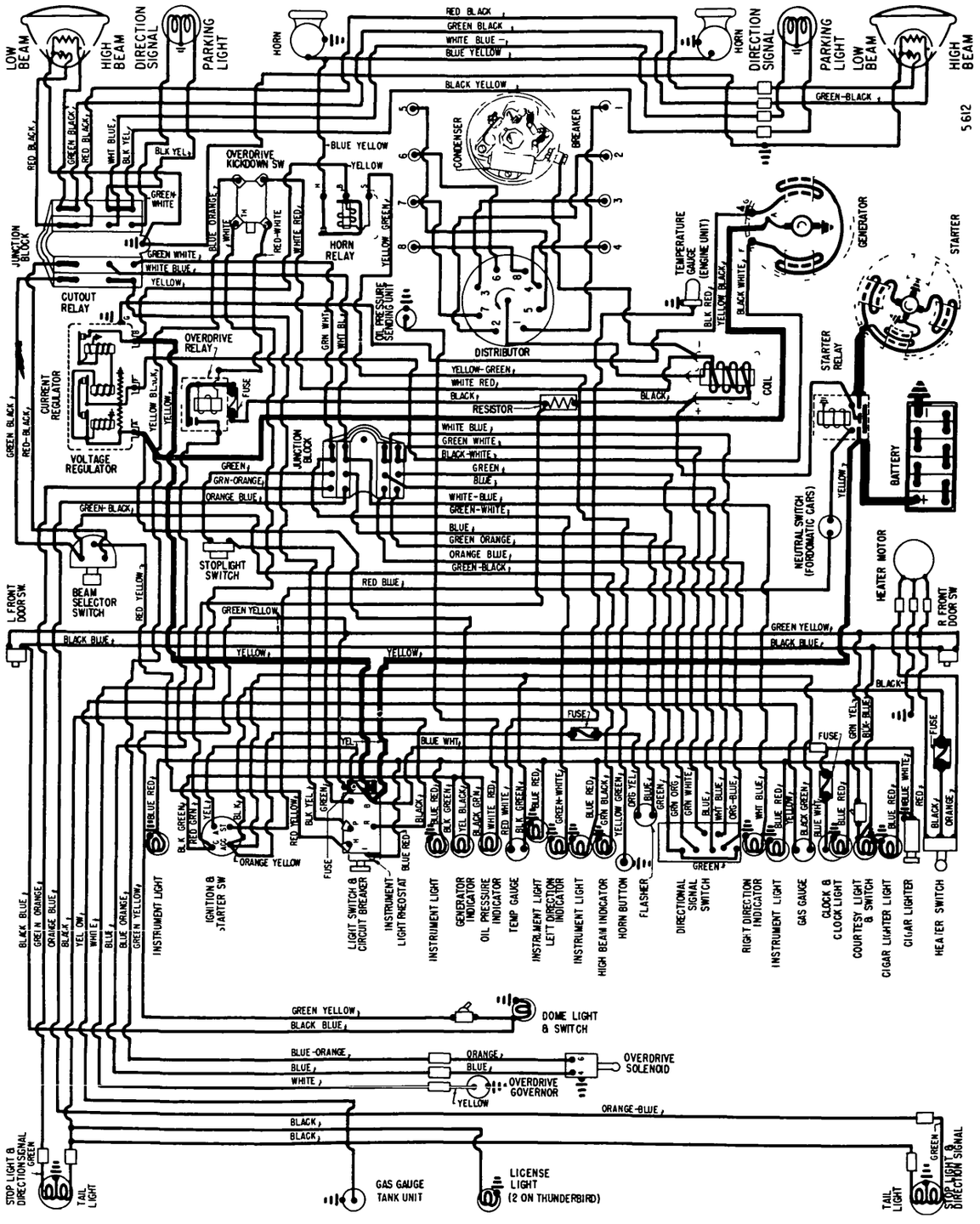
►*ACCELERATOR ASSEMBLY BAR INTERFERENCE CORRECTION:* For elimination of bind or interference (Std. & O.D. Trans.) between bar and distributor diaphragm vacuum line or intake manifold. *See "Ford Dual Downdraft Carburetors" in Carburetion Section.*

Throttle Linkage Adjustment (Fordomatic Cars): Set hand brake and adjust engine idle speed to 475-500 RPM with engine at normal operating temperature and transmission in "N" (Neutral) position *Make sure that fast idle cam is in slow position* Adjust anti-stall dashpot (see below) Turn engine off Disconnect throttle control rod from accelerator assembly Insert a

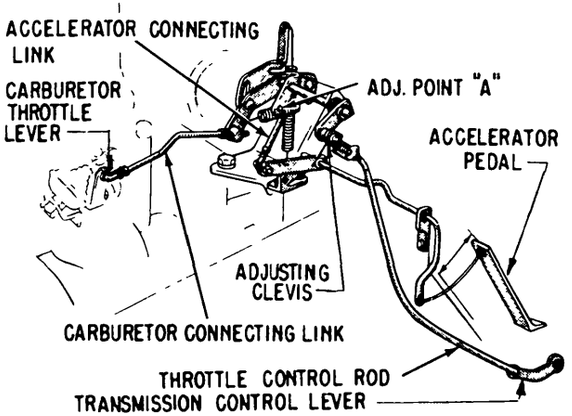
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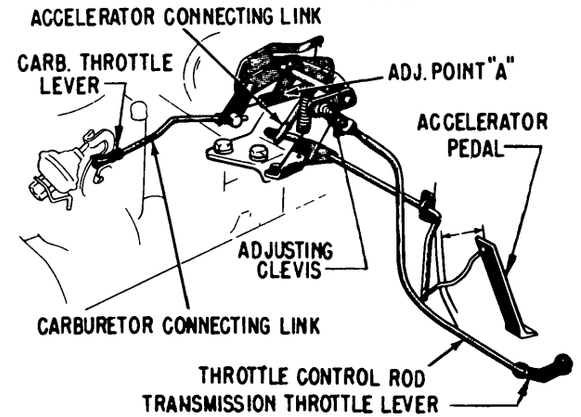
FORDOMATIC THROTTLE LINKAGE (2-BARREL CARBURETOR)



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FORDOMATIC THROTTLE LINKAGE (4-BARREL CARBURETOR)



FORDOMATIC THROTTLE LINKAGE (THUNDERBIRD)

locking pin (¼" drill rod) through holes in lever and assembly. Adjust length of carburetor connecting link to close carburetor against its stop. Adjust the accelerator assembly connecting link to obtain a pedal height of 3 11/16" (cars with 2-barrel carburetors), 3 9/16" (cars with 4-barrel carburetors except Thunderbird cars), 4 1/4" (Thunderbird Cars). Remove locking pin and check alignment. Pin must re-enter freely. Remove locking pin and adjust throttle control rod. Pull upward gently but firmly on rod to hold transmission lever against its internal stop. Rotate clevis until clevis freely fits pin on accelerator assembly lever. Lengthen throttle control rod by rotating clevis 3 turns counter-clockwise. Assemble throttle control rod to the accelerator assembly lever. Hold clevis in alignment to prevent binding, tighten locknut. Check throttle linkage, and relieve any binding conditions. Road Test car. If band or clutch slippage is evident, increase length of the throttle control rod to 3½ turns, but d not xc d f ur turns of the cl vis. On cars with 2-barrel carburetors, check alignment of the accelerator cross shaft-to-accelerator assembly lever connecting link. Connecting link must be parallel to centerline of engine. If connecting link is misaligned, loosen the adjustment screw locknut, then turn adjustment screw until correct alignment is obtained.

Dashpot Adjustment (Fordomatic Cars): Adjust engine idle speed to 475-500 RPM with selector lever in "N" position, engine at normal operating temperature. *Make sure that fast idle cam is in slow position.* Loosen dashpot adjusting screw locknut. Hold throttle in closed position, and turn dashpot adjusting screw out (counter-clockwise) until head of screw pushes dashpot rod up to the end of its travel. Turn dashpot adjusting screw in (clockwise) 1½-2 turns to obtain a clearance of .045-.064" between rod and screw head. After adjustment made, tighten adjusting screw locknut.

FORD TWO-BARREL

Ford No. B6A-9510-J (Exc. Fordomatic), B6A-9510-K (Fordomatic). Dual, downdraft type.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting—Initial setting 1 turn open. Set both screws alike. Turn adjusting screws in until engine begins to run rough from the lean mixture, then turn screws out until engine begins to roll from rich mixture. Turn screws in until engine runs smoothly. Favor a slightly rich mixture. Turn screws out for richer mixture.

Idle Speed—475-500 RPM (Std. & O.D.), 475-500 RPM (Fordomatic) with selector lever in "N" position.

Fuel Level—11/16" below top surface of float bowl (Tool T52L-9550-AGE).

Float Level—1.374-1.438" from flange surface of air horn (inverted) to edge of soldered seam on bottom side of float. It should be equal on both ends of float.

Accelerating Pump: Center hole for normal operation, shortest stroke (closest hole to throttle shaft) for hot weather operation, longest stroke for cold weather operation.

Fast Idle: Integral type operated by choke valve. No adjustment required.

Automatic Choke: Index mark on cover aligned with center mark on housing.

Throttle Linkage Adjustment (Fordomatic Cars): *See CARBURETOR above.*

►*OTHER DATA: See "Ford Dual Downdraft Carburetors" in Carburetion Section.*

Fuel Pump Pressure: 4-5 lbs. at 500 RPM.

FORD FOUR-BARREL

Ford No. B6A-9510-L (Early Exc. Fordomatic), B6A-9510-M (Early Fordomatic), B6A-9510-N, Q, (Later).

►*CARBURETOR PRODUCTION CHANGES & RECOMMENDED CHANGES FOR IMPROVED STARTING & WARM-UP PERFORMANCE: See "Ford, Lincoln, Mercury 4-Barrel Centri-Quad" in Carburetion Section.*

►*ACCELERATOR RETURN SPRING (Fordomatic) BIND:* To eliminate bind causing throttle to stick open or prevent transmission from kicking down, shorten each end hook of accelerator bellcrank lever spring 1/16".

►*ROUGH IDLE (Caus d by Plugg d S c ndary High Sp d Air Bl ed):* When adjusting idle mixture screws does not correct condition, look for fuel being discharged from secondary transfer holes or secondary discharge nozzles. Clean bleed holes to eliminate siphoning.

►*AIR CLEANER WING SCREW TIGHTENING CAUTION:* Tighten anchor screw to 135 inch lbs. only, and wing nut just finger tight. Overtightening will permit anchor screw removal with air cleaner and cause lock washer to be drawn into carburetor venturi and engine.

►*4-BARREL CARBURETOR CHOKE LINKAGE INTERFERENCE CORRECTION:* Heat baffle or shield front portion may be bent toward the rear, causing it to bind on carburetor choke linkage.

►*4-BARREL CARBURETOR HARD COLD STARTING CORRECTION:* Choke plates may be operating improperly because wire link in choke housing has become disconnected from choke piston or the choke spring link. Move choke plates manually to see if any spring tension is present. If choke plates are completely free, correct as follows: Remove choke thermostat housing assembly and thermostatic housing plate and connect wire link. It is suggested that ends of wire link be bent slightly in order to make link more secure in proper holes. *NOTE*—Care should be exercised when reworking this link so that shape of link is not changed. Change of shape might cause a bind in the choke mechanism.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting—Initial setting 5/8 turn open. Place choke fast idle cam in slow position. Turn both screws in until engine begins to run roughly from lean mixture. Turn screws out until engine begins to roll from rich mixture. Then turn screws in until engine begins to run smoothly. Favor a slightly rich mixture. Final setting may vary ½ turn between screws.

Idle Speed—475-500 RPM (Std. & O.D.), 475-500 RPM (Fordomatic) with selector lever in "N" position.

Throttle Linkage Adjustment (Fordomatic Cars): *See CARBURETOR above.*

►*OTHER DATA: See "Ford, Lincoln, Mercury, Centri-Quad Carburetors" in Carburetion Section.*

Fuel Pump Pressure: 4-5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Fuel only or Fuel & Vacuum.

Model	Ford Pump No.
Thunderbird (Std. Trans.)	B5S-9350-A
Thunderbird (O.D. & Fordomatic)	B5S-9350-B
All Others (Std. Trans.)	B5A-9350-C
All Others (O.D. & Fordomatic)	B5A-9350-D

Pressure – 4-5 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley Electric.

Model	Dash Unit	Tank Unit
Thunderbird	B6S-9280-A	B6A-9275-C
Sta. Wgn. & Sed. Del.	B6A-9280-D	B6A-9275-B
Others	B6A-9280-D	B6A-9275-C

See "Fuel Gauges" in Carburetion Section.

BATTERY

Ford N . B6A-10655-C. *12 V lt,* 11 Plate, 55 ampere hour capacity **r F rd N . B6A-10655-E,** *12 Volt,* 13 plate, 70 ampere hour capacity.

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Battery Ground – Negative, to engine block.
► *CAUTION: This is reversed from previous models.*
Engine Ground – Cylinder head to dash.

STARTER

Ford No. B6A-11002-A. *12 Volt.* **Armature–B6A-11005-A.**

► *IMPULSE STARTING (Back Up Light Equipped Cars) CORRECTION:* Before replacing neutral safety switch to correct short between light and solenoid terminals causing engine to start, interchange leads at switch. Connect longest lead (beyond taped portion of harness) to "A" terminal and short lead to "B" terminal.

Drive – Ford 1CM-11350-C. Bendix "Folo-Thru".
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 48-56 ozs.
Cranking Speed – 150-180 RPM with warm engine.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	12.0	120
	150-180 ②		190 max.

① – With starter on engine and engine idling.
② – Cranking speed with warm engine.

Starting Switch: Magnetic type, Ford No. B6A-11450-A, Starter Switch is controlled by ignition switch. *NOTE* - Neutral Safety switch used on Fordomatic transmissions.
Fordomatic Neutral Safety Switch: Ford No. FAC-15812-C.
Adjustment – *See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Ford No. B6A-10002-A (Exc. Thunderbird), B6S-10002-A (Thunderbird). *12 Volt.*
Armature – Ford No. B6A-10005-A (All).

► *GENERATOR INDICATOR LIGHT (Idle Speed) CORRECTION:* When generator light comes "ON" when engine idles, install a 75 ohm, 25 Watt resistor (Vitreous enamel type with eyelets moulded into resistor body), at "A" terminal of regulator in series with indicator light wire (Yellow with black tracer). Adjust engine idle to high limit. *NOTE* - Light will now have lower illumination than oil indicator light.

Performance Data

Amperes ①	Eng. RPM
30	1388

① – See Regulator for maximum charging rate.
Brush Spring Tension – 26-34 ozs.
Field Current – 1.4-1.6 amps. at 12.0 volts.
Rotation – Counter-clockwise at commutator end.
Belt Adjustment: Approximately ½" deflection on belts midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Ford No. B6A-10505-A. *12 Volt.*

► *SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 75° F. ambient (engine compartment) temperature, after ½ hour operation in vehicl , or aft r regulator h ated and stabiliz d.*

Cut ut Relay
Cuts In – 12.0-12.8 volts.

V ltag R gulat r
Setting – 14.6-15.4 volts.
Checking & Adjusting – *S El ctrical S cti n.*

Curr nt R gulator
Setting – 28-32 amperes.
Checking & Adjusting – *See Electrical Section.*

MISC. ELECTRICAL

► *DOME LIGHT FAILURE (High Voltage) CORRECTION:* When dome lights fail due to high voltage, remove head light switch, remove dome light wire from switch (green wire with yellow tracer), and install 1.5 Ohm, 5 Watt Vitreous enamel resistor in dome light circuit.
Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Lighting Switch Removal: With control knob in the "OFF" position, press spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N.
Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), and on top of brake booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment.
FUSES: Located as follows:
Interior Lights – 14 ampere. On lighting switch.
Overdrive – 30 ampere. On overdrive relay.
Cigar Lighter – Special fuse in lighter base.
Clock – 3 ampere. In clock lead.
Heater – 14 ampere. In blower switch lead.
Radio – 7.5 ampere. On radio signal speaker.
Turn Signal Fuse–7.5 ampere. In flasher to switch lead.
CIRCUIT BREAKERS: On headlight switch. Combination headlight switch, circuit breaker, and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument, parking, stop and tail light circuits.
► *1956 CIGAR LIGHTER CAUTION:* 12 volt socket and element smaller than 6 volt. 12 volt socket has ink mark stamped on it for identification. DO NOT use 12 volt element in a 6 volt socket as element when heated will eject onto front seat.
HORNS: (Except West Coast). Ford B5T-13832-B (High Pitch), B5T-13833-B (Low Pitch). *12 Volt.*
(West Coast Only) Ford B6A-13832-A (High Pitch),use bracket Ford No. B6A-13830-A; Ford B6A-13833-A (Low pitch), use bracket Ford No. B6A-13831-A. *12 Volt.*
Horn Current – 9.2-9.6 amperes at 12 - 12.6 volts.
Horn Relay: Ford No. 2Q-13853-A.

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Engine	Bore	Stroke	Displmnt
272 Eng.	3.62"	3.30"	272 cu. ins.
292 Eng.	3.75"	3.30"	292 cu. ins.
312 Eng.	3.80"	3.44"	312 cu. ins.

Engine	Rated HP	Compr. Ratio	Dev. HP at RPM
272 Eng. ①	42.05	8.0-1	173 at 4400
272 Eng. ②	42.05	8.4-1	176 at 4400
292 Eng. ③	45.00	8.0-1	200 at 4600
292 Eng. ④	45.00	8.4-1	202 at 4600
312 Eng. ⑤	46.21	8.0-1	210 at 4600
312 Eng. ⑥	46.21	8.4-1	215 at 4600
312 Eng. ⑦	46.21	9.0-1	225 at 4600

①–Customline & Mainline (Synchro-mesh Trans. & Overdrive). 2-barrel Carburetor.
②–Customline & Mainline (Fordomatic). 2-barrel Carburetor.
③–Fairlane & Station Wagon Models (Synchro-mesh Trans. & Overdrive). 4-barrel Carburetor & Dual Exhaust.
④–Fairlane & Station Wagon Models (Fordomatic). Thunderbird (Synchro-mesh Trans.), 4-barrel Carburetor & Dual Exhaust.
⑤–Police Interceptor (Synchro-mesh Trans. & Overdrive). 4-barrel Carburetor & Dual Exhaust.
⑥–Police Interceptor (Fordomatic) & Thunderbird (Overdrive). Optl. on Fairlane & Station Wagon. 4-barrel Carburetor & Dual Exhaust.
⑦–Thunderbird Engine (Fordomatic). Optional on Fairlane & Station Wagon. 4-barrel Carburetor & Dual Exhaust.

Compression & Vacuum R ading–*See TUNE-UP.*

CYLINDER HEAD: *See "Cylind r Head & Manifold" in Ford Special Data.*

► *CYLINDER HEAD IDENTIFICATION: H ads can be identified by designation cast in top of head as list d below. Use of incorrect head will caus rough engine.*

Engine	Compr. Rati	H ad Id nt.
272	8.0-1	ECZ-C
272	8.4-1	ECG-H
292	8.0-1	ECZ-B
292	8.4-1	ECZ-C
292	9.0-1	ECG-H
312	8.0-1	ECZ-A
312	8.4-1	ECZ-B
312	9.0-1	ECZ-C

► *CYLINDER HEAD PART NO. CHANGE (272 & 292 ENGINES):* Cylinder Heads Nos. B6A-6049-K and B6A-6049-E have been used on these engines. See Valve Springs for types used with each head.

► *CYLINDER HEAD BOLT INSTALLATION CAUTION:* Cylinder head olts used on 1956 cars differ from those used previously. New bolt (B6A-6066-B), used at the four dowel hole locations, is 5/16" longer than other cylinder head bolts. (B6A-6066-A). New bolts should be used at dowel hole locations only, as there is a possibility that bolts will bottom at other locations. Use of regular shorter bolts at dowel hole locations may result in cylinder block thread failure.

► *CRANKCASE VENTILATOR COVER OIL LEAK CORRECTION:* Install new .090" thick cover gasket. Old type gasket was .060".

TIGHTENING TORQUES: *See "Tightening Specifications" in Ford Special Data.*
ENGINE REMOVAL: *See "Engine" in Ford Spec. Data.*
ENGINE FRONT MOUNTING: *S "Engin M untings" in Ford Special Data.*

► *EXCESSIVE VIBRATION (312 Eng.) CORRECTION:* Replace insulator assemblies AE-6038-B (identified by ½" band of white paint), with AE-6038-A insulator assemblies.

OIL PAN REMOVAL: Remove oil level indicator, drain crankcase. Remove engine front splash pans. On Ford-

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omatic equipped cars, remove converter housing cover assembly. Disconnect oil pump inlet pipe at oil pump. Remove "O" ring seal from pump end of tube. Remove oil pan retaining nuts and screws, then remove oil pan. *NOTE* - No. 5 piston must be approximately TDC before oil pan can be removed.

PISTONS

Autothermic type. Solid skirt with three rings above pin.

Rem val – Pistons and rods removed from above.

Fitting N w Pistons: Use ½" feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Pull to withdraw feeler should be 5-10 lbs. with feeler thickness as follows: .0015" (New Piston in New Bore), .002" (New Piston in Used Bore), .002" (Used Piston in Used Bore).

Replacement Pistons: Standard, .020", .030", .040", .060" Oversize. Pistons furnished only with fitted pins.

Installing Pist ns: Install with small indentation in head toward FRONT of engine. *See Rod Installation.*

PISTON PINS

Floating type with lock rings at each end.

Diamet r – .9120-.9123". **Length** – 3.016-3.030".

Pin Fit in Pist n – .0001-.0008" clearance or light thumb push fit at 70° F.

Pin Fit in Rod Bushing – .0008" clearance or light thumb push fit at 70° F.

Replac ment Pins: Standard (Green), & .001" (Blue), .002" (Yellow) Oversize. Fitted pins furnished with new pistons.

PISTON RINGS

Two compression, one oil ring per piston. Oil ring is "side-sealing" type (two steel rails with spring spacer between them).

Ring	Width	End Gap	Side Clearance
Compr.(1 & 2)	3/32"	.010-.027" ①	.006" max.
Oil (3)	3/16"	.015-.062" ②	③

① – .012-.029" on 312 Engine.
② – On rails.
③ – "Side-sealing" type.

R plac ment Rings: Furnished in sets as follows: **"Snap Typ "** Std. & .020", .030", .040", .060" Oversize (except Std. size only for 312 Engine), **"Steel Section"** Std. & .020", .030" Oversize (272 Engine), Std. & .020", .030", .040", .060" Oversize (292 Engine).

CONNECTING RODS

Crankpin J urnal Diam t r – 2.1880-2.1888".

Low r B aring – Steel backed, copper lead alloy lined type. Upper and lower halves interchangeable.

Clearance – .0037" (272, 292 Engs.), .0036" (312 Eng.) maximum.

Sid Clearanc – .019" (two rods) maximum.

R plac m nt B arings: Standard (2 sizes marked **Red** and **Blu** for selective fitting) and .010", .020", .030" Undersize.

Installing Rods: Install rod in piston so that rod bearing lock slots in connecting rod are toward outside of engine when indentation in head of piston is toward front of engine. Numbers on bearing caps and rods must be on same side when installed. Install in same numbered cylinders.

CRANKSHAFT

►*1956 CRANKSHAFT PRODUCTION CHANGE (To minimize oil leaks at front and rear oil seals):* New Crankshaft with integral Rear Oil Slinger, Part No. B6A-6303-D (272 & 292 Engines), B6A-6303-C (312 Engine), used with separate Front Oil Slinger, Part No. B6A-6310-B. Slingers will divert oil away from seals. *NOTE* - New crankshaft and front slinger can be installed in 1955 272 & 292 engines also.

Journal Diameter – 2.4980-2.4988" (272 & 292 Eng.), 2.6235-2.6243" (312 Eng.).

Bearings – Steel-backed, lead-babbitt (272 Eng.), copper-lead (292 & 312 Eng.).

Clearance – .0031" max. (272 Eng.), .0042" max. (292 Eng.), .0036" max. (312 Eng.).

Replacement Bearings: Standard (2 sizes marked **Red & Blue** for selective fitting) and .010", .020", .030" Undersize.

End Thrust: Taken by No. 3 main bearing. Replace bearing if end play excessive.

Thrust Bearing Alignment – *See "Crankshaft & Main Bearings" in Ford Special Data.*

Endplay – .010" max.

Crankshaft Rear Oil Seal Installation: *See "Crankshaft and Main Bearings" in Ford Special Data.*

Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Ford Special Data.*

CAMSHAFT

►*CAMSHAFT REPLACEMENT INSTALLATION CAUTION:* 1956 camshafts have an oil groove around perimeter of journal, replacing oil holes in 1955 camshaft. 1955 and 1956 camshafts and center bearings are **not** interchangeable.

►*312 ENGINE CAMSHAFT PRODUCTION CHANGE (Fordomatic Engines):* New camshaft, Part No. B6A-6250-C (superseding No. B6A-6250-B) used in production beginning Sept. 7, 1956 to reduce engine noise level. Engines with this camshaft marked by daub of blue paint on right side near date stamp. Cam lobe lift and tappet clearance are unchanged with this new camshaft. *See Valve Timing below.*

Journal Diameters – 1.9255-1.9265".

Clearance – .006" max.

End Thrust: Taken by thrust plate and spacer located between camshaft sprocket and shoulder on camshaft.

►*CAMSHAFT THRUST SPACER NOTE:* Chamfer on the inside of spacer must be to the rear or face camshaft journal.

End Play – .012" max.

Replacement Camshaft Bearings: Finished bearings furnished Standard and .015" undersize.

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Ford Special Data.*

Timing Chain: Double strand "Diamond" (272 Eng.), Side-guide type (Others). Length 56 links.

►*TIMING CHAIN REPLACEMENT NOTE:* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure slack on opposite side). Remove and install chain "endless" as a unit with both sprockets.

Camshaft Setting: Sprockets marked by round depressions on one tooth. Mesh chain so that there are 12 chain link pins between timing marks on sprockets when marks are both on drive side of chain.

Engin Fr nt Cov r Oil S al (Crankshaft Fr nt S al) Installation: *See "Engine Front Cover" in Ford Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Ford Special Data.*

VALVES

Tappet Clearance: .019" (Intake or Exhaust) either cold or hot. *NOTE* - Valve tappet clearance on truck engines is different.

Valve	Head Diam.	Stem Diam. ①	Length
Intake	1.775-1.785"	②	5.02"
Exhaust	1.505-1.515"	③	5.02"

Valve	Seat Angle	Lift ④	Stem Clearanc
Intake	45°	.259"	.004" max.
Exhaust	45°	.267"	.006" max.

① – Furnished with .003", .015", .030" oversize stems.
② – .3415-.3420" (Coded RED), .3420-.3425" (Coded GREEN).
③ – .3400-.3405" (Coded RED), .3405-.3410" (Coded GREEN).
④ – Cam lobe lift. Service limit.

►*EXHAUST VALVE STEM DIAMETER PRODUCTION CHANGE:* Valve stem diameter decreased .0005" for increased stem clearance to minimize valve sticking. *See "Valve System" in Ford Special Data.*

Valve Seat Width – .060-.080" (Intake), .070-.090" (Exhaust).

►*ROTATABLE VALVE NOTE:* All valves are rotatable type. *See "Valve System" in Ford Special Data.*

Valve Stem Oil Seals – "Umbrella" type seals on intake and exhaust valve stems. Install seals on valve stems with cupped side down to cover guide boss on head. Install new seals whenever valves removed or when seals become loose on valve stems.

►*VALVE SPRING OIL BAFFLE PRODUCTION CHANGE:* Valve spring oil baffles were discontinued on all 8 cylinder engines approximately May 14th, 1956. Improved rocker arm lubrication eliminates need for these baffles.

Valve Springs: Install with closed coil end toward cylinder head.

►*VALVE SPRING CAUTION:* Valve Spring No. EAA-6513-A (7½ coils, 2.12" free length) used with Cylinder Head No. B6A-6049-K, Spring No. B6A-6513-A (7 coils, 2.09" free length) used with Cylinder Head No. B6A-6049-E. *See Cylinder Head Change above.*

Spring Specifications

	Pressure	Length
Valve Closed	64-79 lbs.	1.780"
Valve Open	145-177 lbs.	1.390"

►*VALVE SPRING INSTALLATION NOTE:* Measure valve spring assembled height from machined surface of cylinder head spring pad to under side of spring retainer. If assembled height is 1 13/16" or greater, install necessary .030" spacers between cylinder head valve spring pad and valve spring to bring assembled height to recommended 1 25/32 - 1 13/16". *CAUTION - DO NOT install spacers unless necessary.*

Valv Guid s: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (See table above), ream guides and install oversize valves. *See "Valve System" in Ford Special Data.*

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Valve Lifters: Mushroom type. Remove from below after camshaft removed from engine.
Clearance – .0026".

Rocker Arm Assembly: *See "Valve System" in Ford Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE:* The following valve opening and closing points are with camlift as indicated.

►*312 ENGINE WITH FORDOMATIC CAMSHAFT PRODUCTION & VALVE TIMING CHANGES:* For production change, *See CAMSHAFT above; For Valve Timing change, see below.*

Valve Timing
Exc. 312 Eng. With B6A-6250-C Camshaft
Intake Valves—Open 12° ① BTDC. Close 54° ② ALDC.
Exhaust Valves—Open 58° ③ BLDC. Close 8° ④ ATDC.
312 Eng. With B6A-6250-C Camshaft (Fordomatic)
Intake Valves—Open 20° ⑤ BTDC. Close 54° ② ALDC.
Exhaust Valves—Open 58° ③ BLDC. Close 8° ④ ATDC.
①— Camlift .016". ②—Camlift .019". ③—Camlift .015"
④— Camlift .018". ⑤—Camlift .014".

Valve Timing Check: Remove right rocker arm cover. Back off No. 1 intake valve adjusting screw, slide rocker arm assembly to one side. With push rod in lifter socket, install dial indicator to indicate push rod movement. Turn engine slowly until cam lobe contacts lifter. Zero indicator and continue to turn engine until correct lift is obtained (see table above). Compare degrees on pulley with specifications.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 6 qts. (when filter changed).

Normal Oil Pressure: 45-50 lbs. at 2000 RPM (Hot).
Pressure Regulator Valve—In pump body, not adjustable.
Oil Pressure Indicator – Indicator light on instrument panel, operated by Engine Unit, Ford No. FDA-9278-A (stamped No. 7 on Hex.). Lights when ignition switch turned on, goes out when engine starts and pump pressure reaches a safe value (7 lbs.).

Oil Pump: Gear type, located on left side of engine crankcase, driven by distributor shaft.
Pump Overhaul—*See "Oiling System" in Ford Spec. Data.*

Oil Filter: Full-flow type (Std. Equip.) with pressure relief valve in center filter bolt. Replace filter element at 4000 miles or when oil dirty or polluted.
Filter Element Installation – *See "Oiling System" in Ford Special Data.*
Replacement Filter Element – Ford No. B2A-6731-A (Kit includes new gaskets).

►*CAUTION: This Special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication). See "Oil Filter" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

COOLING

Water Capacity: 19 qts. (Pass. Cars and Sta. Wgn.), 20 qts. (Thunderbird). Add 1 qt. for heater.

►*LOSS OF COOLANT CORRECTION:* Lower generator mounting bracket bolt holes are tapped into cylinder water jacket. For loss of coolant at this point or when replacing bolts, apply a good coating of waterproof sealer.

Pressure Valve: Radiator filler cap. Ford No. LA-8100-A, 12-15 lbs. (marked "13" or "14"). *CAUTION* - If replacement required, use 12-15 lb. type.

►*OIL PUMP CAUTION:* New type oil pump has aluminum body. Use extreme care when servicing, to save damaging body.

Thermostat: 157-162° F. (Std.), 177-182° F. (High Temp.) for use with permanent type anti-freeze.

Water Pump: Packless, sealed ball bearing type.
See "Ford V8" in Water Pump Section.
Pump Removal – (On Thunderbird) remove engine left hand splash shield). Drain cooling system, disconnect lower radiator hose and heater hose. Remove fan belt, fan, fan spacer, and pulley. (On Thunderbird, remove generator support bracket bolt at the water pump housing and bolt at generator, then move bracket out of way, remove remaining bolts, retaining water pump assembly and timing pointer). On other cars, remove four bolts retaining water pump to cover. Remove pump and timing pointer.

Temperature Gauge: King-Seeley Electric.
Dash Unit – Ford No. B6S-10883-A (Thunderbird), B6A-10883-D (Others).
Engine Unit – Ford No. B6A-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 10CF (272 & 292 Eng.), 11CF (Taxi, Interceptor & Thunderbird 292 & 312 Eng.). Single plate, semi-centrifugal type. *NOTE* - 11CF used on 272 & 292 Engines as Heavy Duty equipment.

Cover Assembly	Long No.	Ford No.
10CF	265125	B6A-7563-B
11CF	265126	B6A-7563-A
Clutch Disc	**Long No.**	**Ford No.**
272 Pass. Car	284978	B5A-7550-B
292 Pass. Car	285182	B6A-7550-C
272, 292 H.D.	281982	B5A-7550-B
Thunderbird	281982	B5S-7550-A
Interceptor	284961	

See "Long Clutches" in Clutch Section.

►*HEAVY DUTY CLUTCH PRODUCTION CHANGE:* Heavy Duty clutch incorporating an oil slinger to protect disc from excessive lubrication along with release bearing incorporating lubrication fitting, used in production. New heavy duty disc, Ford No. B6A-7550-A, released for service.

►*CLUTCH PEDAL INTERFERENCE (Thunderbird):* For rework of dash panel stabilizer or dash panel insulator to eliminate binding or interference by clutch pedal, *See "Clutch Notes" in Ford Special Data.*

Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper and bracket until correct travel is within limits. Adjust assist spring link to give assist spring length of 6 5/8" when clutch is fully released.
Pedal Free Travel – 1 1/8" - 1 3/4". Loosen locknut on clutch pedal release rod, turn adjusting nut until correct travel is reached. *NOTE* - Check free travel by operating engine at 3000 RPM with transmission in neutral position. There should be a minimum of ½" free travel under these conditions. Readjust as necessary.

Removal (Exc. Thunderbird): Remove transmission (see transmission below), slide clutch release bearing off clutch release lever. Disconnect clutch pedal release rod from clutch release lever assembly. Remove clutch release equalizer bar. Remove split bronze bushing from bracket, remove flywheel housing. Install Tool 7563 and remove clutch pressure plate assembly (if tool not available, clutch may be released by backing off attaching bolts evenly).
Thunderbird – Drain transmission, remove drive shaft, disconnect shift rods at transmission, disconnect transmission from flywheel housing, move transmission back, so that clutch parts can be removed from flywheel housing. Slide clutch release bearing and hub assembly off end of release lever assembly. Remove pressure plate and cover assembly and clutch disc from engine flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). *See "Ford Synchro-mesh" in Transmission Section.*

►*SYNCHRO-MESH & OVERDRIVE THREE SPEED TRANSMISSION GEAR REPLACEMENT CAUTION:* Shot peened gears used in 1956 models. DO NOT use past model gears in 1956 transmission.

►*GEARSHIFT LINKAGE & CLUTCH RELEASE RODS PRODUCTION CHANGES AND CORRECTIONS:* For application of parts to eliminate interference causing premature gear tooth wear, *See "Transmission Control Notes" in Ford Special Data.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: (Exc. Thunderbird) – Drain transmission, disconnect gear shift linkage at transmission. Remove speedometer cable and gear, remove drive shaft. Remove bolts which hold transmission extension to engine rear support. Remove frame crossmember and engine rear support. Remove bolts and lockwashers which attach transmission to clutch housing, then install two guide pins. Move transmission assembly to rear until input shaft splines clear clutch housing, then lower transmission and pull forward to remove from car.
Thunderbird – Drain transmission, disconnect gear shift linkage at transmission. Remove speedometer cable and gear. Remove drive shaft. Remove cover from bottom of clutch housing, then remove starter from clutch housing. Disconnect clutch pedal linkage from clutch release lever. Raise rear of engine slightly, disconnect engine rear mount and remove frame crossmember. Support transmission on jack, and remove transmission to clutch housing bolts. Move transmission to rear so that clutch parts can be removed from clutch housing. Slide clutch release bearing and hub assembly off end of release lever assembly. Remove pressure plate and cover assembly and clutch disc from engine flywheel. Remove clutch housing-to-engine bolts and lower the clutch housing, then remove transmission.

OVERDRIVE

Warner AS4-R10F. Solenoid operated type, with governor control and throttle operated kick-down. Lockout switch not used on this model.

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See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 Overdrive Control" in Transmission Section.*

R moval: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock. *See "Fordomatic & Mercomatic" in Transmission Sect.*

► *FORDOMATIC "LOCK-UP" CORRECTION (1955-56 Cars & Trucks):* Caused by cross leakage in front servo piston. *See "Fordomatic & Mercomatic" in Transmission Section.*

► *FORDOMATIC TRANSMISSION FLUID COLOR CHANGE CAUTION:* New Fordomatic transmission oil used in production is green colored, similar to color of engine oil. DO NOT USE IT IMPROPERLY. "Type A" (reddish brown) may be used when adding oil to transmission filled with new type oil.

► *FORDOMATIC PRODUCTION CHANGES:* For improved Throttle Control Inner Lever Installation, change in Pressure Regulator Valve Body and new location of pressure take off plug, *See "Fordomatic & Mercomatic" in Transmission Section.*

► *PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubricati n – Check transmission fluid level at 1000 mile intervals and maintain level at "F" (Full) mark on indicator. Drain & refill every 15,000 miles.

Ch cking Fluid Level: With selector lever in "N" (Neutral) and emergency brake applied, run engine approximately four minutes at idle speed. Check to see that emergency brake is applied and that engine is on slow idle, then move selector lever to "P" (Park) position. *NOTE -* When engine and transmission are at normal operating temperature move selector lever through all ranges to assure fluid distribution throughout transmission. Remove indicator and read fluid level. Add Automatic Transmission Fluid as necessary to bring fluid level to "Full" mark on indicator.

THROTTLE LINKAGE ADJUSTMENT: *See CARBURETOR above.*

► *OTHER "FORDOMATIC" SERVICE DATA: See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type.

► *CAUTION (All Cars Except Sta. Wgn., Sed. Del. & Interceptor):* Rear universal joint companion flange nut controls pinion bearing pre-load (must be adjusted whenever nut is loosened). *See "Ford & Mercury" (Separate Carrier)" in Rear Axle Section.*

REAR AXLE

PASSENGER CARS

Own. Separate Carrier, semi-floating hypoid with Hotchkiss drive.

► *LUBRICATION BAFFLE NOTE:* 1956 rear axle housing has lubrication baffle (retained by two housing bolts) to direct lubricant to differential side bearings. *NOTE-* This baffle, Ford No. B5A-4018-A, can be installed on earlier models.

► *THUNDERBIRD REAR SPRING THUMP CORRECTION:* Replace early type rubber bumper with new soft rubber bumper Ford No. B6A-5783-B.

NOTE- Axle not same as Station Wagons & Sedan Delivery. *See "Ford & Mercury (Separate Carrier)" in Rear Axle Section.*

Ratios	Standard	Overdrive	Fordomatic
V8 Cars	3.78-1 or 3.89-1	4.11-1	3.22-1 or 3.55-1

► *RATIO, DRIVE GEAR & DIFFERENTIAL CASE IDENTIFICATION:* When differential case is to be replaced be sure new case is same as old one. Refer to following table for identification.

Drive Gear Ratio	Gear Teeth Drive	Pinion	Differential Case Color
3.22-1	29	9	Gray
3.55-1	32	9	Red
3.78-1	34	9	Black
3.89-1	35	9	Black
4.11-1	37	9	Black

Backlash – .003-.008"

Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: Drain lubricant from rear axle housing. Remove carrier-to-housing nuts, then remove identification tag (ratio) and set it aside for reference during assembly of axle. Remove carrier assembly from axle housing.

STA. WGN., SED. DEL., THUNDERBIRD & INTERCEPTOR

Own. Integral Carrier, semi-floating hypoid with Hotchkiss drive.

► *NOTE:* Axle assembly not same as passenger cars. *See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.*

Ratios	Standard	Overdrive	Fordomatic
S.W. & S.D.	4.09-1	4.27-1	3.54-1
Thbd. & Intr.	3.73-1	3.92-1	3.31-1 or 3.54-1

Axle Shaft Removal: Same as passenger cars (above).

Rear Axle Assembly Removal: Remove hub caps, loosen wheel stud nuts, raise car at rear and disconnect hydraulic brake hose from brake line at rear axle. Disconnect parking brake cable from equalizer rod, remove cable assembly from frame brackets. Remove wheels, disconnect drive shaft at rear axle universal joint flange. Remove "U" bolts. Remove assembly from under car.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

Model	© Front	© Rear
All (Exc. S.W. & S.D.)	B5A-18124-A	B5A-18125-A
All (Hvy. Dty.)	B5A-18124-D	B5A-18125-C
S. W. & S.D.		B5A-18125-D
Thunderbird	B5S-18124-C	B5S-18125-B

© — Furnished in kits which include shock absorber mounting bushings.

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs. *See "Lincoln, Mercury, Ford (Ball Joint)" in Suspension and Wheel Alignment Section.*

Kingpin Inclination – 6-7°, crosswise.

Caster – Pos. ½° to Pos. 1½°. Maximum variation between wheels ½°.

Camber – Pos. ¼° to Pos. 1¼°. Maximum variation between wheels ¼°.

Toe-In – 1/16-1/8". *NOTE -* When checking toe-in on cars with power steering, engine should be running so that power steering control valve will be properly centered.

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type. *See "Gemmer Worm & Roller (Type 305)" in Steering Sect.*

Power Steering: Ford - Mercury Linkage type. Used in conjunction with standard steering. *See "Ford & Mercury Bendix Linkage Type" in Steering Section.*

► *STEERING ARM INTERFERENCE (Power Steering Cars) CORRECTION:* To correct interference between steering connecting rod clamps and bolts with power steering control valve, *See "Ford & Mercury Bendix Linkage Type" Power Steering in Steering Section.*

► *POWER STEERING BELT SQUEAL CORRECTION:* When belt slippage or squeal cannot be corrected by belt adjustment, install new pulley Ford No. B6A-33556-A and new solid type belt Ford No. B6S-33558-A (Thunderbird), B6A-33558-A (Others). *NOTE -* Old type belt with serrations can be used with either the new or old type pulley.

Pump Belt Adjustment: Install torque wrench on pump pulley bolt. Check torque required to slip pulley against belt friction. If torque is not 14-16 ft. lbs. adjustment is required. To adjust, position a heavy duty 1½" "C" clamp with bottom against lower side of pump support bracket and top of clamp resting on pump bracket at its center. Loosen four pump attaching bolts until pump body may be repositioned by tightening "C" clamp. Tighten "C" clamp until torque of 14-16 ft. lbs. is required to slide pump pulley. *(NOTE -* Hold final torque as close as possible to upper limit). Tighten pump attaching bolts, remove "C" clamp, and make a final check of pulley sliding torque.

Steering Linkag : *See "Steering Linkage" in Steering Sect.*

Steering Wh l & H rn Butt n R m val: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

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Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305)" in Steering Section.*

BRAKES

Bendix Hydraulic, Single Anchor. Hand lever applies rear wheel service brakes.
See "Ford, Lincoln, Mercury Bendix" in Brake Section.
► *BRAKE DESIGN CHANGES:* Front wheels do not have eccentric and front and rear anchor pins are fixed (No adjustment).
Drum Diameter – 11" front and rear.

LINING SPECIFICATIONS

Passenger Car

Lining	Width	Thickness	Length
Front Primary	2¼"	3/16"	10 27/32"
Front Secondary	2¼"	15/64"	10 27/32"
All-Rear	1¾"	3/16"	10 27/32"

Sedan Delivery & Station Wagon

Lining	Width	Thickness	Length
Front Primary	2¼"	7/32"	9 9/32"
Front Secondary	2¼"	7/32"	11 15/16"
Rear Primary	2"	7/32"	9 9/32"
Rear Secondary	2"	7/32"	11 15/16"

Thunderbird

Lining	Width	Thickness	Length
Front Primary	1¾"	3/16"	10 27/32"
Front Secondary	2¼"	15/64"	10 27/32"
All-Rear	1¾"	3/16"	10 27/32"

Clearance – Adjusting screw backed off 10 to 12 notches from point where shoes are tight against drum.

Brake Pedal Free Play Adjustment: 5/16" to 7/16". If play not correct after brake adjustment, loosen locknut on the eccentric bolt that attaches brake pedal assembly to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder: Located on engine side of firewall.

Checking Fluid – Maintain fluid level to within ½" of top of reservoir.

Removal – Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to firewall.

Power Brakes: Midland Hy-Power Unit mounted on left side of car in engine compartment and connected in hydraulic brake line between master cylinder and wheel cylinder. There are no mechanical connections and no adjustments are required.
See "Midland Power Unit" in Brake Section.
Checking Brake Fluid – Same as for manual brakes (above).
Removal of Power Unit – Depress brake pedal a few times to remove all vacuum from system. Disconnect hydraulic lines at power unit and remove wires from brake stop light switch. Remove power unit to mounting bracket bolts and lockwashers and remove power unit.

MISC. MECHANICAL

Windshield Wipers: Vacuum link and crank arm type. *See "Windshield Wipers" in Miscellaneous Section.*
Power Window Regulators: Reversible motor in each window. *See "Electric Window Regulators" in Misc. Sect.*
Power Top Control: Electric-Hydraulic with reversible pump motor. *See "Power Top Controls" in Misc. Sect.*
Power Seat Adjusters: "Four-way" type. Electric screw and jack type with individual motors for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*
Air Conditioning: *See Ford "SelectAire" in Misc. Sect.*

MODEL IDENTIFICATION

VEHICLE NUMBER: On Rating Plate attached to inside of glove compartment door. Vehicle Number is also Engine Number.
First Number - 10001.

► *ENGINE IDENTIFICATION NOTE*· 6 Cyl. and V8 engines used. 6 Cyl. (223 Eng. prefix EBR-S-T), V8 (272 Eng. prefix ECY-W, light duty, ECR heavy duty). Reference is made to engine by displacement (223 Eng. -223" displacement).

► *VEHICLE NUMBER NOTE.* Vehicle number (Example "F10D6 10001") includes identification in the following sequence.

Serial Code ①	Engine Symbol ②	Year ③	Assy. Plant	Serial Number
F10	D	6	See below	10001 up

① - See Model & Serial Code Table below.
② - **D** - 6 Cyl. 223 Eng., **V** - V8 Eng. (2-Barrel Carb. Light Duty), **Z** - V8 Eng. (2-barrel Carb. Heavy Duty), **R** - V8 Eng. (4-barrel Carb. Heavy Duty).
③ - Last digit of model year (1956).

Models & Serial Codes

Truck Model	Serial Codes Pickup	Light	18,000 lb. max.
F-100 Conv	F-10	F-11	
F-250 Conv	F-25	F-26	
F-350 Conv	F-35	F-36	
P-350 Par Del	P-35	P-36	
F-500 Conv	F-50	F-51	
B-500 Sch. Bus	B-50	B-51	
C-500 Cab Fwd.	C-50	C-51	
P-500 Par.Del	P-50	P-51	
F-600 Conv.	F-60	F-61	F-63
B-600 Sch. Bus.	B-60	B-61	B-63
C-600 Cab Fwd.	C-60	C-61	C-63
P-600 Par. Del	P-60	P-61	

Assembly Plant Designation

A–Atlanta	**F**–Dearborn	**N**–Norfolk
B–Buffalo	**G**–Chicago	**P**–St Paul
C–Chester	**H**–Detroit Truck	**R**–San Jose
D–Dallas	**K**–Kansas City	**S**–Somerville
E–Mahwah	**L**–Long Beach	**U**–Louisville
	M–Memphis	

TUNE-UP

COMPRESSION PRESSURE: At cranking speed, compression pressures are as follows:

Engine	Compr. Ratio	Compr. Press.
223 Eng.	7.8-1	150 lbs.
272 Eng. (ECY-W)	7.8-1	160 lbs
272 Eng.(ECR–2 Bbl. Carb.)	7.8-1	160 lbs.
272 Eng. (ECR–4 Bbl. Carb.)	7.8-1	155 lbs.

VACUUM READING: 18-19" (223 Eng.), 19-20" (272 Eng.) idling at 475-500 RPM in neutral.

VALVE TAPPET CLEARANCE: .019" (223 Eng.), .018" (272 Eng.) Intake and Exhaust (Hot & Cold).

MANIFOLD HEAT CONTROL: *(NOTE*–Manifold heat control valve is **n t** used on 272 ECR Engine). Automatic thermostatic type with counterweight. On 6 Cylinder engine valve is located at outlet of exhaust manifold. On 8 Cylinder engine valve is located between crossover pipe and inlet of right exhaust manifold Spring stop is at top of valve housing and spring is hooked on stop pin when valve is properly installed. Valve is closed when engine is at normal operating temperature and *running at idle speed, and opens at high RPM.*

IGNITION

FIRING ORDER: 6 Cyl. Engine–1-5-3-6-2-4. **8 Cyl. Engine**–1-5-4-8-6-3-7-2.

Cylinders (8 Cyl. Eng.)–RIGHT BANK 1-2-3-4 LEFT BANK 5-6-7-8.

SPARK PLUG GAP: 028"-.032"
Spark Plugs–Champion 860 18mm.

► *V8 ENGINE SPARK PLUG MISFIRE CORRECTION*· If misfiring occurs at either No. 6 or No. 8 cylinders, interchange position of No. 5 and No. 6 spark plug cables in all insulator blocks and separator blocks on left side of engine.

► *SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be torque tightened within limits 15-20 ft

COIL: Ford No. B6A-12029-B. *12 Volt*
Ignition Current–2 5 amps idling, 4 5 amps stopped
Resistor–**Ford B6A-12250-B** (Early), **B6A-12250-C** (Later), Mounted next to coil.

► *IGNITION RESISTOR PRODUCTION CHANGES:* Two types of resistors Ford No. B6A-12250-C used in production to replace original resistor B6A-12250-B. First type replacement identified by copper flashings on heads of rivets which support elements. A piece of fibre glass is cemented to inside of support bracket. Second type has sheet metal cover snapped over channel and rivets are cadmium plated. Replace earlier type when servicing ignition system.

► *COIL RESISTOR NOTE*· Resistor is connected in lead from ignition switch to coil Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil

DISTRIBUTOR: *12 Volt.* Ford distributors used as follows

Engine	Carb.	Air. Cl.	Distr. No.
223 Eng. (EBR-S-T)	1-Bb	Oil Bath	B6A-12127-E
223 Eng. (EBR-S-T)	1 Bbl.	Dry Type	B6A-12127-E
272 Eng. (ECY-W)	2 Bbl		B6A-12127-A
272 Eng (ECR)	2 Bbl.		B6T-12127-A
272 Eng. (ECR)	4 Bbl.		B6T-12127-B

► *SUDDEN ENGINE STOPPAGE CORRECTION:* Inspect distributor primary terminal wire assembly Ford No. B6A-12216-A, for defective welds at brass terminals.

► *DISTRIBUTOR DIAPHRAGM PRODUCTION CHANGE:* A new distributor diaphragm Ford No. B6A-12370-B used on all engines after Nov. 15th. 1955, and is available for replacement of all B6A-12370-A diaphragms. It can be identified by die cast end cover in place of stamped cover and incorporates new type material in secondary diaphragm giving it much greater strength.

Condenser–Ford 7RA-12300-C (223 Eng.), FAB-12300-A (272 Eng.) **Capacity**– 21- 25 microfarad.
Contact Point Set–Ford FAA-12171-A (223 Eng.), FAB-12171-B (272 Eng).
Breaker Gap– 024- 026" (6 Cyl), 014-.016" (8 Cyl)
Cam Angle–35-38° (6 Cyl), 26-28 5° (8 Cyl)
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Clockwise (6 Cyl.), counter-clockwise (8 Cyl) viewed from above.

Advance Performance
►With Distributor on Test Stand
B6A-12127-E (With Oil Bath Air Cl.)

Distr. Degrees	Vacuum (" of HG)	Distr RPM
0	0	200
0±½	18	300
¼-1¼	.32	400
1¾-2¾	50	500
8-9¼	2 59	1200
10¾-11¾	4.22	1600
13-14½	6.00	2000

B6A-12127-E (With Dry Type Air Cl.)

Distr. Degrees	Vacuum (" of HG)	Distr RPM
0	0	200
0±½	.11	300
0-1	.19	400
1½-2½	.29	500
4½-5½	48	600
7¼-8¼	83	800
9¼-10¼	1.88	1200
10¾-12	3.28	1600
12¼-13½	4.26	2000

B6A-12127-A

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	0	200
0±½	.15	300
¼-1¼	28	400
6½-7½	.96	800
11½-12¾	2.21	1200
14½-15½	3 41	1600
16-17¼	4 60	2000

B6T-12127-A

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0±½	11	300
0-1	13	400
6¼-7¼	80	800
10-11	1 71	1200
12¼-13½	2.66	1600
13¾-15	3 33	2000

B6T-12127-B

Distr. Degrees	Vacuum (" of HG)	Distr RPM
0±½	.11	300
2½-3½	19	400
7½-8½	50	800
7¾-8¾	54	900
10¼-11¼	.80	1200
12½-13¾	1 19	1600
14¼-15½	1 50	2000

► *DISTRIBUTOR INSTALLATION CAUTION* On 6 Cylinder engines, be sure oil pump intermediate shaft

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engages seat in oil pump. On 8 Cylinder engines, be sure distributor shaft engages oil pump intermediate hex shaft

Initial Distributor Timing (6 Cyl. Engine): Set engine crankshaft so that No 1 cylinder is at TDC after compression stroke (with timing mark in line with pointer) Install distributor so that rotor points to the No. 1 spark plug wire terminal in distributor cap

Initial Distributor Timing (8 Cyl Engine): Remove No. 1 spark plug. Hold thumb over spark plug hole until piston starts up on compression. Slowly "bump" engine over with starter until timing mark is aligned with pointer, Find No. 1 spark plug sprocket in distributor cap and fit distributor cap to distributor housing. Mark distributor housing to indicate No. 1 spark plug wire position. Position rotor approximately 20° counter-clockwise from mark made on distributor housing. Engage distributor drive gear and install distributor in engine.

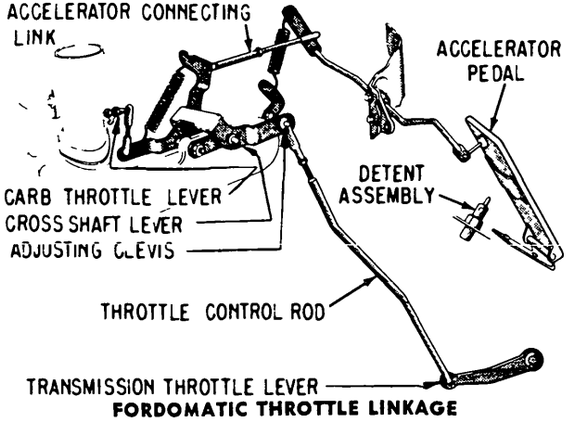
IGNITION TIMING

Setting–223 Engine–5° BTDC (Std & Fordomatic) with engine idling at 475 RPM and vacuum line disconnected. *NOTE*–Maximum initial timing recommended is 5° BTDC (Std.), 6° BTDC (Fordomatic). *See Initial Distributor Timing above.*

272 Engine–10° BTDC (Std. & Fordomatic) with engine idling at 475 RPM and vacuum line disconnected. *NOTE*–Maximum initial timing recommended is 10° BTDC. *See Initial Distributor Timing above.*

Timing Mark–6 Cyl. Engine–Vibration damper marked "TDC", and "3", "5", "7", "9" degrees BTDC Align correct mark with pointer on cylinder front cover.

8 Cyl. Engine–Vibration damper marked "TDC", and "2", "4", "6", "8", "10" degrees BTDC Align correct mark with pointer (bolted to water pump).

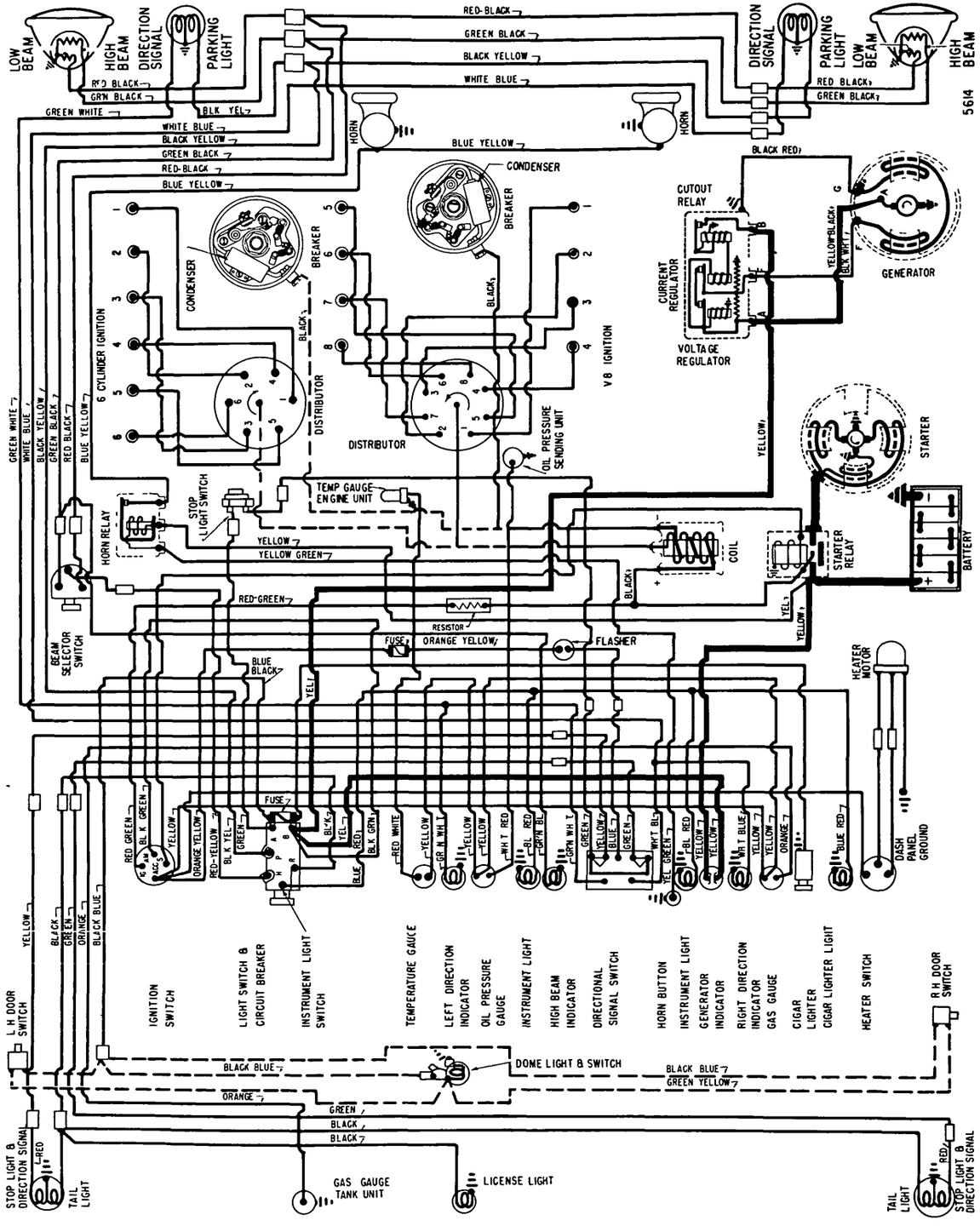


FORDOMATIC THROTTLE LINKAGE (6 CYLINDER TRUCKS)

CARBURETOR

► *CARBURETOR APPLICATION:* Ford Single Barrel Carburetor used on 223 Engine, and Ford 2-Barrel and 4-Barrel Carburetors on the 272 Engine (2-Barrel on ECW-Y Eng., 2-Barrel & 4-Barrel on ECR Eng.).

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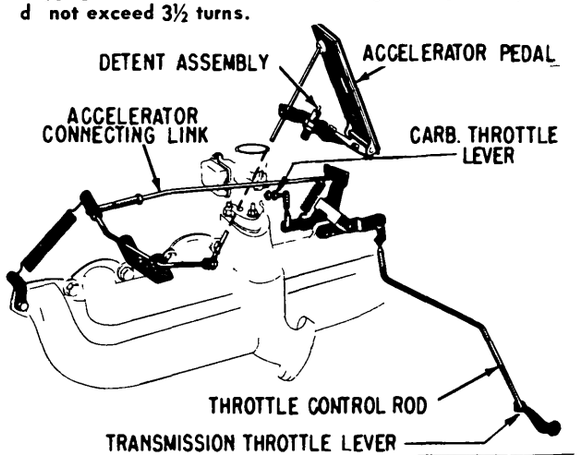
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►*LOW POWER OUTPUT (4-Barrel Carburetor) CORRECTION:* Incorrect routing of governor vacuum lines at fitting (Governor Housing) causes governor to close throttle plates at speeds above 700 RPM, limiting power output. Attach line from vacuum pump to hole at bend of fitting. Attach line from governor controlling unit in conventional or side opening. *NOTE* - Be sure throttle stops have been removed.

►*AIR CLEANER WING SCREW TIGHTENING (4-Barrel Carbur tor) CAUTION:* Tighten anchor screw to 135 inch lbs. only, and wing nut just finger tight. Overtightening will permit anchor screw removal with air cleaner and cause lock washer to be drawn into carburetor venturi and engine.

►*AIR CLEANER AIR LEAK CORRECTION (C-500 & 600 Series Trucks):* Correct by installing two gaskets between elbow and carburetor and reversing holding clamp to provide better seating.

Throttle Linkage & Dashpot Adjustments (Fordomatic): *See "Carburetor" on Ford 6 and V8 Passenger Car pages and note the following exceptions:* Adjust accelerator pedal height so pedal just touches detent stem when carburetor lever hits its wide-open stop (2 5/8" on V8 trucks). Initial adjustment of control rod is 2½ turns counter-clockwise. If band or clutch slippage evident, increase rod length to 3 turns, **but d not exceed 3½ turns.**



F RDOMATIC THROTTLE LINKAGE (PARCEL DELIVERY)

FORD SINGLE BARREL 223 ENGINE

Ford N . B6C-9510-A (Exc. Fordomatic), **B6A-9510-G** (Fordomatic). Single barrel, downdraft type, with manual choke.

►*6 CYL. TRUCK ECONOMY CARBURETOR:* Carburetor B5A-9510-S has been released for owners who desire more fuel economy, but do not require maximum acceleration or top speed.

Idle Setting–Initial setting 1½ turns open. Turn adjusting screw in until engine begins to run roughly from lean mixture, then turn screw out until engine begins to roll from rich mixture. Turn screw in until engine runs smoothly. Favor a slightly richer mixture. Turn screw out for richer mixture.

Idle Speed–475-500 RPM (Std. & Overdrive), 475-500 RPM (Fordomatic) with selector lever in "N" position.

Fuel Level–11/16"±1/32" below power valve mounting surface (Tool T52L-9550-AEE). *See "Ford Visi-flo" in Carburetion Section of Manual.*

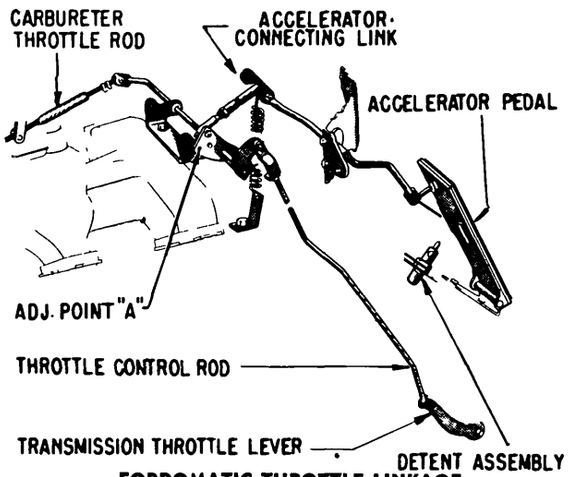
Accelerating Pump: Shortest stroke (closest hole to throttle shaft) for average or hot weather operation, longest stroke for cold weather operation.

Fast Idle: Integral type operated by choke valve. No adjustment required.

Throttle Linkage Adjustment (Fordomatic Trucks): *See CARBURETOR above.*

►*OTHER DATA: See "Ford Visi-flo" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 3.5-5.5 lbs. at 500 RPM.



FORDOMATIC THROTTLE LINKAGE (V8 ENGINE TRUCKS)

FORD TWO-BARREL 272 (ECY-W) ENGINE

Ford No. B6Y-9510-A (Exc. Fordomatic), **B6C-9510-C** (Fordomatic). Dual barrel, downdraft type, with manual choke.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–Initial setting 1 turn open. Set both screw s alike. Turn adjusting screws in until engine begins to run roughly from lean mixture, then turn screws out until engine begins to roll from rich mixture. Turn screws in until engine runs smoothly. Favor a slightly richer mixture. Turn screws out for richer mixture.

Idle Speed–475-500 (Std. & Overdrive) 475-500 RPM (Fordomatic) with selector lever in "N" position.

Fuel Level–11/16"±1/32" below power valve mounting surface (Tool T56L-9562-A).

Float Level–1.374-1.438" from air horn gasket surface to float bottom (carburetor inverted). It should be equal on both ends of float.

Acc lerating Pump: Center hole for normal operation, shortest stroke (closest hole to throttle shaft) for hot weather operations, longest stroke for cold weather.

Fast Idle: Integral type operated by choke valve. No adjustment required.

Throttle Linkage Adjustment (Fordomatic Trucks): *See CARBURETOR above.*

►*OTHER DATA: See "Holley Ford" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 3.5-5.5 lbs. at 500 RPM.

FORD TWO-BARREL 272 (ECR) ENGINE

Ford No. B6T-9510-A. Dual "Concentric" downdraft type with manual choke control, governor actuating assembly, and "depopper" valve.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting–Initial setting ½ turn open. Set both screws alike. Turn screws in until engine begins to run roughly from lean mixture, then turn screws out until engine begins to roll from rich mixture. Then turn screws in until engine runs smoothly. Favor a slightly rich mixture. Turn screws out for richer mixture.

Idle Speed–475-500 RPM (Std.), 475-500 RPM (Fordomatic) with selector lever in "N" position.

Fuel Level–½"±1/32" below top surface of float bowl, with engine idling.

Accelerating Pump: Center hole for normal operation, shortest strike (nearest hole to throttle shaft) for hot weather operation, longest stroke for cold weather operation.

Fast Idle: No adjustment required.

Throttle Linkage Adjustment (Fordomatic Trucks): *S CARBURETOR above.*

Depopper Valve Adjustment: *See "Ford Truck Dual Centri-flo" Carburetor in Carburetion Section.*

►*OTHER DATA: See "Ford Truck Dual Centri-flo" Carburetor in Carburetion Section.*

Fuel Pump Pressure: 3.5-5.5 lbs. at 500 RPM.

FORD FOUR-BARREL 272 (ECR) ENGINE

Ford No. B6T-9510-B. "Centri-Quad" 4-Barrel, downdraft type, with manual choke control, and NEW ball-type "depopper" device.

►*MANIFOLD FUEL DISTRIBUTION:* Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels feed 1-4-6-7.

Idle Setting - Initial setting 1/2 turn open. Turn both screws in until engine begins to run roughly from lean mixture, then turn screws out until engine begins to roll from rich mixture. Then turn screws in until engine begins to run smoothly. Favor a richer mixture. Final setting may vary 1/2 turn difference between the screws.

Idle Speed - 475-500 RPM (Std.), 475-500 RPM (Fordomatic) with selector lever in "N" position.

Depopper Valve Adjustment: *See "Ford, Lincoln, Mercury Centri-Quad 4-Barrel" Carburetor in Carburetion Section.*

Throttle Linkage Adjustment (Fordomatic Trucks): *S CARBURETOR above.*

►*OTHER DATA: Se "Ford, Linc ln, M rcury C ntri-Quad 4-Barrel" Carburet r in Carbur tion Secti n.*

Fu l Pump Pr ssur : 3.5-5.5 lbs. at 500 RPM.

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CARB. EQUIPMENT

► *AIR CLEANER AIR LEAK (C-500, 600 Trucks) CORRECTION:* Install two gaskets between elbow and carburetor, and reverse the holding clamps to provide better seating.

Fuel Pump: AC. Fuel only or Fuel & Vacuum types.

Car Model	Ford Pump No.
223 Eng. (Fuel only)	B5A-9350-A
272 Eng. (2-Bbl. Carb.)	B6C-9350-A
223 & 272 Opt'l. (Fuel & Vacuum)	B6T-9350-A
272 Eng. (4-Bbl. Carb.)	B6T-9350-A

Pressure - 3.5-4.5 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley Electric.
Dash Unit - Ford No. B6C-9280-B (P-350, P-500); B6C-9280-C (All Others Exc. Open Face Cowl); B6C-9280-D (All Others with Open Face Cowl Exc. C-500, C-600).
Tank Unit - Ford No. B6C-9275-A (All with Closed Cab exc. P-350, P-500), No. B6C-9275-B (F-100, 250, 350 without Closed Cab & P-350, P-500 with 17 Gal. Tank), No. B6T-9273-A (F-500, 600; B-500, 600; and P-500 with 30 Gal. Tank).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Ford No. B6A-10655-C. *12 Volt,* 11 plate, 55 ampere hour capacity, or **B6A-10655-E.** *12 Volt,* 13 plate, 70 ampere hour capacity.
Grounded Terminal - Negative to engine block.
► *CAUTION: This is reversed from previous models.*
Engine Ground - Cylinder head to dash.

STARTER

Ford No. B6A-11002-A. Armature B6A-11005-A. *12 Volt.*
► *IMPULSE STARTING (Back-Up Light Equipped Cars) CORRECTION:* Before replacing neutral safety switch to correct short between light and solenoid terminals causing engine to start, interchange leads at switch. Connect longest lead (beyond taped portion of harness) to "A" terminal and short lead to "B" terminal.
Drive - Ford 1CM-11350-C. Bendix "Folo-Thru".
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 48-56 ozs.
Cranking Speed - 150-180 RPM with warm engine.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	12.0	120
	150-180 ②		190 max.

① - With starter on engine and engine idling.
② - Cranking speed with warm engine.

Starting Switch: Magnetic type, Ford No. B6A-11450-A, Starter switch is controlled by ignition switch. *NOTE* - Neutral Safety switch used on Fordomatic transmissions.
Fordomatic Neutral Safety Switch: Ford No. FAC-15812-C.
Adjustment - *See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Ford No. B6A-10002-A. *12 Volt.*
Armature - Ford No. B6A-10005-A (223 Eng. - with rear bushing), No. B6A-10005-B (223 & 272 Eng. - with rear ball bearing).

Performance Data

Generator	Armature	Amperes①	RPM
B6A-10002-A	B6A-10005-A	30	1250
B6A-10002-A	B6A-10005-B	30	1388

①—See Regulator for maximum charging rate.
Brush Spring Tension—26-34 ozs.
Field Current—1.4-1.6 amps. at 12.0 volts.
Rotation—Counter-clockwise at commutator end.

Belt Adjustment: (*NOTE*—Two belt arrangements used. In one, fan and generator are driven by a single belt. In the other, fan and generator are driven by separate belts). Adjust belt or belts to have ½" deflection midway between generator and fan pulleys or generator and water pump pulleys, with normal thumb pressure.

REGULATOR

Ford No. B6A-10505-A. *12 Volt.*
► *SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 75°F. ambient (engine compartment) temperature, after ½ hour operation, or after regulator heated and stabilized.*

Cutout Relay
Cuts In - 12.0-12.8 volts.

Voltage Regulator
Setting - 14.6-15.4 volts.
Checking & Adjusting - *See Electrical Section.*

Current Regulator
Setting - 28-32 amps.
Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signal - *See Electrical Section.*
Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N. Remove switch and disconnect all wires.
Stop Light Switch Location: On brake master cylinder, or on brake power unit assembly. Master cylinder located on engine side of firewall (F-100), and on bracket attached to left frame member below brake pedal (Other Trucks).
LIGHTING CIRCUIT BREAKERS: Combination headlight switch, circuit breaker and fuse assembly is used. One circuit breaker protects headlight circuit, and second circuit breaker protects remaining lighting circuits. Fuse, on back of assembly, protects the interior lighting circuit.

FUSES: Heater—14 amps. On blower switch.
Interior Lights—7.5 amps. On headlight switch.
Overdrive—3AG 15 amps. On overdrive relay.
Directional Signals—7.5 amps. In flasher to switch lead.

HORNS (Exc. West Cast): Ford No. B5T-13832-B (High Pitch), No. B5T-13833-B (Low Pitch). *12 Volt.*
(West Cast Only exc. Parcel Delivery) - Ford No. B6A-13832-A (High Pitch), No. B6A-13833-A (Low Pitch), *12 Volt. NOTE* - Use Bracket Nos. B6A-13830-A and B6A-13831-A with these horns.
Horn Current - 9.2-9.6 amperes at 12-12.6 volts.
Horn Relay: Ford No. 2Q-13853-A. *12 Volt.*

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. 223" Engine (EBR-S-T), and V8 272" Engine (ECY-W and ECR Heavy Duty). All engines are Overhead Valve type.

Engine	Bore	Stroke	Displacement
223	3.62"	3.60"	223 Cu. Ins.
272	3.62"	3.30"	272 Cu. Ins.

Engine	Compr. Ratio	Rated HP	Developed HP
223	7.8-1	31.5	133 at 4000 RPM
272 (ECY-W)	7.8-1	42.0	167 at 4400 RPM
272 (ECR) ①	7.8-1	42.0	158 at 3800 RPM
272 (ECR) ②	7.8-1	42.0	168 at 3800 RPM

① - 2-Bbl. Carb. ② - 4-Bbl. Carb.

CYLINDER HEAD: *See Ford Special Data.*
► *272" V8 CYLINDER HEAD CHANGE:* Cylinder head Part No. B6A-6049-K and R6A-6049-E have been used on these engines. See Valve Springs for type used with each head. *NOTE* - On 1955 256" Engines, Head Part No. has been changed from B6A-6049-K to B5T-6049-C (use with No. B5T-6049-B).
TIGHTENING TORQUES: *See Ford Special Data.*
ENGINE REMOVAL: *See Ford Special Data.*
OIL PAN REMOVAL (223" Engine): Drain crankcase. Pull dipstick out of tube. Remove flywheel housing inspection cover. Remove oil pan retaining screws and remove oil pan and gasket.
OIL PAN REMOVAL (272" Engine): Drain crankcase, remove oil level indicator, engine front splash pans. On Fordomatic equipped trucks, remove converter housing dust cover. Disconnect oil pump inlet tube at oil pump. Remove "O" ring seal from pump end of tube. Remove retaining screws and remove oil pan and gasket.

223" 6 CYL. ENGINES
(See Engine Specifications Above)

See 1956 Ford 6 Passenger Car Pages. Engine is similar to those used in 1956 Pass. Cars, and all passenger car engine data applies to truck engines.

272" V8 ENGINES
(See Engine Specifications Above)

See 1956 Ford V8 Passenger Car Pages. Engine is similar to those used in 1956 Pass. Cars, and all passenger car engine data applies to truck engines EXCEPT AS NOTED BELOW.
► *272" H. D. ENGINE EXHAUST VALVE CAUTION:* Exhaust valves are Sodium cooled and require special disposal handling to prevent possibility of fire or explosion due to chemical reaction. DO NOT DISCARD SODIUM COOLED VALVES with other scrap material. Bury in ground not subjected to excavation or in deep water not subjected to dredging.
► *MAIN BEARING REPLACEMENT CAUTION (272-ECR Eng.):* Some early production 272-ECR engines may have either lead-babbitt or copper-lead type bearings. Replace all lead-babbitt type bearings found in 272 ECR engines with copper-lead type when overhauling engines.

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VALVES:

	Head Diameter	Stem Diameter ①	Length
Intake	1.775-1.785"	②	④ 5.02"
Exhaust	1.505-1.515"	③	④ 5.02"

Valve	Seat Angle	Lift ⑤	Stem Clearance
Intake	45°	⑥	.004"
Exhaust	45°	⑦	⑧ .006"

① - Furnished with .003", .015", .030" oversize stems.
② - .3415-.3420" (Coded RED), .3420-.3425" (Coded GREEN).
③ - .3400-.3405" (Coded RED), .3405-.3410" (Coded GREEN) late engines. Early engines and All 272 H.D. engines .0005" greater (both colors).
④ - 272 H.D. engine, Intake 5.0275", Exhaust 4.920".
⑤ - Cam lobe lift. Service limit.
⑥ - .268" (L.D. eng.), .259" (H.D. eng.).
⑦ - .268" (L.D. eng.), .257" (H.D. eng.).
⑧ - 272 H.D. Eng. .005".

VALVE TIMING: *NOTE - The following valve opening and closing points are with cam lift as indicated.*

272" V8 Engine Valve Timing

Intake Valves - Open 8° ① BTDC. Close 44° ② ALDC.
Exhaust Valves - Open 47° ① BLDC. Close 5° ② ATDC.
① - Cam lift .015". ② - Cam lift .019".
Valve Seat Width - .060-.080" (Intake), .070-.090" (Exhaust).

OILING

Crankcase Capacity: 6 qts. (272 H.D. Eng. with 4-barrel Carb.), 5 qts. (Others). 1 qt. additional with filter change.
Normal Oil Pressure: 45-50 lbs at 2000 RPM (Hot).
Pressure Regulator Valve - In oil pump body. Not adjustable. *NOTE* - Valve spring pressure should be 9.80 lbs. at 1.56" (223 Eng.) 10.86 lbs. at 1.40"(272 Eng.).
Oil Pressure Indicator: Warning light (F-100, 250, 350, 500, 600), King-Seeley Gauge (P-350, 500; C-500, 600).
Dash Unit - Ford No. B6D-9273-B (P-350, 500; C-500, 600).
Engine Unit - Ford No. B6A-9278-A (P-350, 500; C-500, 600), FDA-9278-A (F-100, 250, 350, 500, 600).
See "King-Seeley Gauges" in Miscellaneous Section.
Oil Pump: Gear type pump mounted inside crankcase in line with distributor shaft (223 Eng.), externally mounted on lower left corner of engine (272 Eng.). An external inlet tube from oil pan feeds inlet side of pump.
Pump Removal & Overhaul - *See "Oil Pump" in Ford Special Data.*
Oil Filter: Full-flow (Std. Equip.) with pressure relief valve in center bolt. Replace filter element at 5000 mile intervals or when oil becomes dirty or polluted.
Replacement Filter Element - Ford No. B2A-6731-A (Kit includes new gasket).
► *CAUTION:* This special Full-flow filter element must be used for replacement (use of by-pass type element would restrict oil flow and result in insufficient engine lubrication).
► *FILTER INSTALLATION CAUTION & OIL LEAKAGE CORRECTION: See "Oiling System" in Ford Special Data.*
Crankcase Ventilation: Filter in oil filler cap (inlet) with outlet pipe in rear of crankcase on right side of engine.

COOLING

► *LOSS OF COOLANT CORRECTION:* Lower generator mounting bracket bolt holes are tapped into cylinder water jacket. For loss of coolant at this point or when replacing bolts, apply a good coating of waterproof sealer.
Water Capacity (Without Heater): 18.5 qts. (223 Eng.), 23 qts. (272 Eng. except C,D,Y), 22 qts.(272 Eng.C,D,Y).
Pressure Valve: Ford No. LT-8100-A, Radiator filler cap (opens at 4 lbs.).
Thermostat: **223 Eng.** Ford No. B5C-8575-A (152-157°), EBR-8575-A (167-172°). **272 Eng.** Ford No. B4C-8575-A (152-157°), B4C-8575-B (167-172°). Single, spring and cartridge type.
Water Pump: Packless, sealed ball bearing type. *See "Ford 6" or "Ford V8" in Water Pump Section.*
Temperature Gauge: King-Seeley Electric type.
Dash Unit - Ford No. B6J-10883-A (P-350, P-500). B6C-10883-B (All others with open face cowl Exc. C-500, C-600). B6C-10883-C (All others Exc. open face cowl).
Engine Unit - Ford No. B6C-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long L-5222 (10"), 264300 (10½"), L1478 (11") Semi-centrifugal type used as follows:

Model	Long No.	Ford No.
F-100,250 (6 Cyl.) ①	L5222	② AE-7563-A
F-100 (8 Cyl.) ①	264300	B6C-7563-A
F-100,250 Optl.	L1478	③ 8MTH-7563-A
All Others	L1478	③ 8MTH-7563-A

① - 3 Spd. L.D. or H.D. Trans. and/or O.D.
② - Supersedes AB-7563-C.
③ - Supersedes 51-7563-A.

Clutch Disc - Use with cover assembly as follows:

Model	Long No.	Ford No.
F-100,250 (6 Cyl.) ①	② CD 870	B4C-7550-A
F-100,250 (8 Cyl.) ①	284299	B6C-7550-A
F-100,250 Optl.	③ CD 606	④ ⑤ 81T-7550-A
All Others	③ CD 606	④ ⑤ 81T-7550-A

① - 3 Spd. L.D. or H.D. Trans. and/or O.D.
② - CD 887 Heavy Duty.
③ - CD 607 Heavy Duty.
④ - Supersedes 59T-7550-A.
⑤ - Moulded linings. Woven linings (Thermoid) TDAA-7550-A.

Pedal Adjustment: 1 1/8-1 3/8" free travel. Adjusting clevis provided at forward end of connecting rod between pedal shaft and equalizer shaft. *NOTE* - Check free travel by operating engine at 3000 RPM with transmission in neutral position. There should be a minimum of ½" free travel under these conditions. Readjust as necessary.
Removal: Disconnect clutch pedal retracting spring from clutch release lever. Remove lock nut and adjusting nut from release lever rod, then remove rod. Remove transmission assembly from clutch housing (see below). Remove clutch release bearing and hub from release lever. Mark pressure plate and cover assembly and flywheel so that parts may be reinstalled in same relative positions. Loosen pressure plate and cover assembly-to-flywheel bolts until pressure plate springs are expanded, then remove bolts. Remove pressure plate and cover assembly and clutch disc assembly through opening in bottom of clutch housing. Remove pilot bearing from flywheel with Tool 7600-E.

SYNCHRO-MESH TRANSMISSION

3-SPEED (LIGHT DUTY)

Own. 3-speed, all helical gear. Constant mesh, synchro-mesh (second and high), sliding gear (low and reverse). Steering column shift standard.
See "Ford Truck 3-Speed (Light Duty)" in Transmission Section.
► *SYNCHRO-MESH & OVERDRIVE THREE SPEED TRANSMISSION GEAR REPLACEMENT CAUTION:* Shot peened gears used in 1956 models. Shot peened gears can be used in past model transmissions. DO NOT use past model gears in 1956 transmissions.
Removal: Remove floor mat and floor plate. Loosen two nuts that secure top of transmission to clutch housing studs. Raise truck, then drain lubricant from transmission. Disconnect the drive shaft from the transmission. If truck equipped with band-type parking brake, disconnect brake cable at brake and at gear shift housing. Disconnect gear shift linkage at transmission, then disconnect clutch pedal retracting spring from clutch release lever. Remove bolts and lockwashers which attach clutch release equalizer bar anchor bracket to transmission. Disconnect speedometer cable from transmission. Remove dust cover from bottom of clutch housing. Position transmission jack under transmission. Remove two top nuts, two bottom bolts, and lockwashers that secure transmission to clutch housing. Move transmission to rear until input shaft splines clear clutch housing. Be careful not to allow clutch release bearing and hub to drop out of release lever fork. Lower transmission to floor.

3-SPEED (MEDIUM DUTY)

Own. 3-Speed medium duty with steering column shift standard. *See "Ford Truck 3-Speed (Medium Duty)" in Transmission Section.*
► *3-SPEED (M.D.) TRANSMISSION SHIFT TUBE LEVER & BRAKE PEDAL INTERFERENCE CORRECTION:* To correct, disconnect shift rods at transmission levers, turn sleeve on rod to increase length, leaving ¼" of rod beyond sleeve. Check brake pedal movement and readjust rods to obtain proper cross-over with full travel into transmission detents.
Removal: Same as for 3-Speed (Light Duty) above.

3-SPEED (HEAVY DUTY)

Own. 3-Speed, helical gear (second & high), spur gear (low & reverse). Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Steering column shift standard.
See "Ford Truck 3-Speed (Heavy Duty)" Transmission in Transmission Section.
► *3-SPEED HEAVY DUTY TRANSMISSION SHIFT LEVER BREAKAGE CORRECTION: For corrective parts and procedures see "Ford Truck 3-Speed Heavy Duty" Transmission in Transmission Section.*
Removal: Same as for 3-Speed (Light Duty) above.

4-SPEED

Own. 4-Speed, Constant mesh, synchro-mesh (second, third & high). Helical gears used for second, third & high. Spur gears used for low & reverse. Center, floor mounted gear shift lever standard.

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See "Ford Truck 4-Speed (Synchro-mesh)" in Transmission Section.

Removal: Same as for 3-Speed (Light Duty) above and note following *If hoist not used, it may be necessary to remove gear shift lever assembly and lever housing before transmission can be removed from truck.* Disconnect drive shaft, or coupling shaft, at parking brake drum. If truck equipped with coupling shaft support disconnect support bracket from support plate, then remove coupling shaft.

OVERDRIVE

Warner Model AS4-R10F. Overdrive with solenoid operated (no centrifugal pawls) with governor control and throttle operated kick-down. There is no lockout switch on this unit.

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for 3-Speed Synchro-mesh Transmission (above), after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.

See "Fordomatic & Mercomatic" in Transmission Section.

► *FORDOMATIC "LOCK-UP" CORRECTION (1955-56 Trucks).* Caused by cross leakage in front servo piston. *See "Fordomatic & Mercomatic" in Transmission Section.*

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION. See "Fordomatic & Mercomatic" in Transmission Section.*

► *TESTING & TROUBLE SHOOTING See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication - Check transmission oil every 1000 miles and maintain fluid level at "Full" mark on dipstick. Drain and refill every 15,000 miles. *See Fluid Change Caution below.*

► *FORDOMATIC TRANSMISSION FLUID CHANGE CAUTION.* New type fluid is green colored, similar to engine oil. DO NOT USE IT IMPROPERLY "Type A" (reddish brown) may be used when adding oil to transmission filled with new type oil.

Checking Fluid Level - Apply parking brakes, place transmission selector lever in "N" (neutral) position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator. Wipe clean and insert in tube (make sure indicator is pushed all the way down). Remove indicator and read level. Add sufficient fluid to raise level to full mark on indicator. Replace indicator.

► *OTHER FORDOMATIC SERVICE DATA See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

► *UNIVERSAL JOINT INSTALLATION CAUTION.* Make sure that all universal joint yokes in drive line are in same plane to avoid drive line unbalance.

Coupling Shaft Center Bearing: Consists of cushion mounted ball bearing bolted to underside of frame intermediate cross member. Bearing is mounted on end of coupling shaft in a sleeve with felt retainer on each end and bearing baffle on front end.

REAR AXLE

SEMI-FLOATING

Own. Semi-floating, hypoid gear with Hotchkiss drive. *NOTE* - Same axle as used in Station Wagon & Sedan Delivery.

See "Ford & Mercury (Integral Carrier Type) Hypoid" in Rear Axle Section.

Ratios - 3 92-1, 4 27-1, 4 09-1.

Backlash - .003-.008".

Axle Shaft Removal: Remove brake drum from axle flange. Work through hole in axle shaft flange to remove bolts that secure brake carrier plate to axle housing. Use Tool 4235-N to pull axle shaft assembly out of housing, but DO NOT DISLODGE BRAKE CARRIER PLATE OR DAMAGE OIL SEAL in housing.

Axle Assembly Removal: Raise rear of truck, then disconnect hydraulic brake hose from hydraulic brake line at rear axle. Disconnect parking brake cable from equalizer rod, then remove screws which attach brake cable brackets to frame crossmember. Disconnect drive shaft at rear axle universal joint flange. Remove nuts from rear spring clips (U-bolts), then remove spring clips. Loosen shock absorber stud nuts and move shock absorbers out of way. Roll axle assembly away from truck, remove wheels.

Wheel Bearing Adjustment: None required in service.

FULL FLOATING

Own. Full floating, Hypoid gear, with Hotchkiss drive.

Model	Rear Axle Type
F-250, P-350	Integral Housing
F-350 and 500, 600 Series	Banjo Housing

See Various types of Ford Rear Axles in Rear Axle Section.

Axle Ratios

Model	Axle Ratios
F-250,P-350	4.56-1(41-9), 4.88-1(39-8), 5.88-1(37-8) ①
F-350	4.86-1(39-7), 5.14-1(36-7), 5.83-1(35-6) ②
F,C,P,B-500	5.83-1(35-6), 6.2-1(31-5), 6.8-1(34-5) ③
F,C,B-600	6.17-1(37-6) ④, 6 67-1(40-6) ③

① - .008 .013" backlash. ② - .004-.018" backlash.
③ - .006-.012" backlash. ④ - .006-.016" backlash.

Axle Shaft Removal: Drain lubricant from axle housing, then remove axle shaft stud nuts and washers. Tap center of axle flanges to loosen tapered dowels, then remove dowels. Remove axle shaft from housing, remove hub and drum assembly.

Axle Assembly Removal: (Integral Carrier) - See "Semi-floating" above. **(Banjo Housing)** - Loosen wheel stud nuts, raise rear of truck, disconnect hydraulic brake hose from hydraulic brake pipe. Disconnect drive shaft at rear universal joint flange, remove spring clips (U bolts), roll axle from under car and remove wheels.

Wheel Bearing Adjustment: Remove axle shafts (see above), use special bearing adjusting wrench and remove bearing locknut (outer nut), and lockwasher. Adjust bearings by turning bearing adjusting nut (inner nut) up until tight then backing off 1/8 turn. Install bearing lockwasher. *(NOTE* - If adjusting nut equipped with dowel, make sure lockwasher fits over dowel). Install bearing locknut and draw nut up tight. If flange type lockwasher is used, bend one flange over adjusting nut and one flange over locknut. Install axle shaft and lower vehicle.

TWO-SPEED

Own. Electrically operated shift, Two-speed, Full-floating spur gear planetary unit (reduction gearing). Spiral bevel gear final drive.

See "Ford Truck Two-Speed" in Rear Axle Section.

Ratio - 5 83-1 (Direct Speed), 8.11-1 (Second Speed); 6.33-1 (Direct Speed), 8.81-1 (Second Speed).

Backlash - .006-.016".

Removal: Same as for standard axle (above) after removal of wiring harness.

SHOCK ABSORBERS

Direct acting hydraulic. Shock absorbers are sealed units and are not adjustable or refillable.

► *REPLACEMENT SHOCK ABSORBER NOTE* Shocks are supplied for service replacement in kits consisting of shock absorber and necessary bushings.

Replacement Shock Absorbers

Model	Front Ford Nos.	Rear
F-100	B6C-18124-A	B6C-18125-A
F-250	B6D-18124-A	B6C-18125-A
F-350	B6D-18124-A	B3Y-18125-A
P-350	B6J-18124-A	B6C-18125-A
P,F,C-500, F,C-600	B3T-18124-A	B3T-18125-A

FRONT SUSPENSION

Conventional "I" beam section front axle with Reverse-Elliot ends and semi-elliptical springs.

Kingpin Inclination - 4° ± ½°.

Caster	Min.	Max.
F-100,250	3°	4°
F-350,500,(Exc. F-500 154" W B)	3°	5°
B-500,600, F-600 & F-500 154" W B)	3½°	5½°
C,P-500,C-600	2½°	.4°

½° maximum variation between wheels.

Camber - ¼° to 1° Pos. ¼° maximum variation between wheels.

Toe-In - 0 to 1/16".

STEERING

Own. (Gemmer 305 & 335 Design). Worm-and-roller types with push-pull adjustment.

► *F-100, 250 DRAG LINK INSTALLATION CAUTION.* Due to design of drag link (THAA-3305-A) it is possible to install link in a reverse position causing steering interference. When properly installed, offset end of drag link is attached to sector shaft arm, and lubrication fittings will be at bottom side of link.

See "Gemmer Worm-and-Roller Types" in Steering Section.

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (Type 305 & 335)" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller (Type 305 & 335)" in Steering Section.*

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BRAKES

Brake types are as listed in application table below. Hand lever applies rear wheel service brakes on F-100 only (independent shaft brake on other models).

► *SECONDARY BRAKE LINING PRODUCTION CHANGE (F-100 8 Cyl.)* Thickness of secondary lining, on F-100 8 cyl. trucks, increased to ¼" from 3/16". *CAUTION* - DO NOT MISMATCH LININGS when servicing F-100 truck. ¼" thick lining kits for both 6 and 8 cyl. are B6C-2007-A (Front), B6C-2007-B (Rear).

► *REAR WHEEL BRAKE LEAK CORRECTION (1953-56F, C, B-500, 600, P-500).* Install Brake Cylinder Assembly B5T-2261-A (Front), B5T-2262-A (Rear) and Link B5T-2042-A or Conversion Kit B5T-2222-A.

Brake Type Application

Truck Model	Front	Rear
F-100	Duo-Servo	Duo-Servo
F,P-250,F-350	Uni-Servo	Duo-Servo
F,B,C,P-500,F,B,C-600	Uni-Servo	2 Cyl.

Uni-Servo - Ford-Bendix. Single anchor. Wheel cylinder actuates primary shoe. Ratchet adjusting screw.
See "Ford-Bendix Uni-Servo Hydraulic" in Brake Section.

Duo-Servo - Ford-Bendix. Single anchor, self energizing. Wheel cylinder actuates both shoes. Ratchet adjusting screw.
See "Ford-Bendix Hydraulic" in Brake Section.

Two-Cylinder Type - Two wheel cylinders in each brake assembly.
See "Ford Truck Two-Cylinder" in Brake Section.

Brake Drum Diameter

Model	Front	Rear
F-100	11"	11"
F-250	12"	12 1/8"
F-350 Conventional	12"	13"
P-350 Parcel Delivery	12"	12 1/8"
F-500 Single Speed	13"	14 1/8"
F-500 Two Speed	13"	15"
F-600 All Models	13"	15"

Lining Width & Thickness

Model	Front	Rear
F-100	2" X 3/16"	① 1 3/4" X 3/16"
F-250	2" X 3/16"	2" X 1/4"
F-350 Conv.	2" X 3/16"	2 1/2" X 1/4"
P-350 Par. Del.	2" X 1/4"	2" X 1/4"
F-500 Single Spd.	2 1/4" X 1/4"	3 1/2" X 3/8"
F-500 2 Spd.	2 1/4" X 1/4"	4" X 3/8"
F-600 All Models	2 1/4" X 1/4"	4" X 3/8"

① - F-100 V8 Secondary 1/4" thick.

Lining Length (Primary Shoe)

Model	Front Wheel	Rear Wheel
F-100	11 29/32"	11 29/32"
F-250	11 33/64"	11 33/64"
F-350 Conventional	11 33/64"	12 45/64"
P-350 Parcel Delivery	11 33/64"	11 33/64"
F-500 Single Speed	12 45/64"	14 29/64"
F-500 Two Speed	12 45/64"	15 11/32"
F-600 All Models	12 45/64"	15 11/32"

Lining Length (Secondary Shoe)

Model	Front Wheel	Rear Wheel
F-100	11 29/32"	11 29/32"
F-250	12 31/32"	12 31/32"
F-350 Conventional	12 31/32"	13 61/64"
P-350 Parcel Delivery	12 31/32"	12 31/32"
F-500 Single Speed	13 61/64"	14 29/64"
F-500 Two Speed	13 61/64"	15 11/32"
F-600 All Models	13 61/64"	15 11/32"

Clearance - Brake lining to drum clearance differ as follows

Uni-Servo & Duo-Servo - .010" clearance measured 1½" from each end of secondary shoe.

Two-Cylinder Type - Reduce clearance until drum drags, back off until drum is free, plus one turn to give working clearance.

Hand Brake (Exc. F-100): External contracting type, consisting of a brake drum bolted to transmission main shaft companion flange, and an external contracting band mounted on rear of transmission.

Adjustment—On cable controlled parking brakes, move lever to full released position. On transmission mounted parking brake levers, set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, adjust clevis rod to allow flat portion to rest on brake band bracket. Install clevis and cotter pins. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until .010" clearance is established between brake lining and drum at anchor bracket. Loosen locknut on adjusting screw from lower half of brake band. Adjust for .010" clearance between lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting rod nut until .010" clearance is established between upper half of band and drum. Re-install lockwire in anchor adjusting screw.

Hand Brake Drum Diameter—(F-250, 350) 8", (Others) 7 13/16"

Hand Brake Lining

Series	Length	Width	Thickness
F-250, 350	24 5/8"	2"	5/32"
P-350, 500①	23 5/64'	2½"	1/4"
B, C, F-500, 600	24 5/8"	2½"	1/4"

①—Three-piece lining used

Brake Pedal Free Play Adjustment: 3/16-3/8". Adjust free play by loosening brake pedal-to-master cylinder push rod and rotating rod to obtain correct free play. Tighten lock nut while holding push rod securely.

Standard Master Cylinder: Located on bracket attached to left frame side member below brake pedal.

Checking Fluid—Maintain fluid level to within ½" of top of reservoir.

Removal—Disconnect brake lines from master cylinder and depress brake pedal a few times to empty master cylinder. Remove brake pedal return spring from brake pedal clevis pin and remove clevis pin. Disconnect stop light switch wires at switch. Remove assembly from bracket.

Power Brakes: Midland or Hydrovac unit mounted in various positions depending on truck model and connected in hydraulic brake line between master cylinder and wheel cylinders. There are no mechanical connections and adjustments are not required.
See "Midland" or "Hydrovac" Power Units in Brake Section.

Checking Brake Fluid—Same as for manual brakes (above).

Removal of Power Unit—Depress brake pedal several times to remove all vacuum from system. Loosen brake power unit air inlet tube clamp and remove tube. Disconnect master cylinder to power unit hydraulic line at power unit. Disconnect vacuum tube at power unit. If stop light switch located on brake power unit, disconnect wires. Remove mounting bracket bolts and power unit.

TIGHTENING SPECIFICATIONS

HUDSON 6

	Foot Lbs. Hornet	Wasp
Cylinder Head ①	② 85-90	60-65
Intake Manifold	12-15	12-15
Exhaust Manifold	20-35	20-30
Oil Pan	15-20	15-20
Main Bearing Caps	75-80	75-80
Flywheel	40-45	40-45
Vibration Dampener	100-120	80-90
Con Rod Caps	40-45	40-45
Camshaft Sprocket	20-30	20-30
Engine Front Cover	15-20	15-20

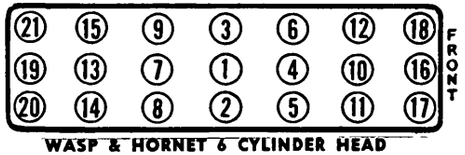
①—Aluminum heads tightened at room temperature. Cast Iron heads at operating temperature.

② - Supersedes original specification of 75-80 ft. lbs.

CYLINDER HEAD & MANIFOLD

HUDSON 6

CYLINDER HEAD INSTALLATION: Use torque indicating wrench to tighten cylinder head capscrews in sequence shown in diagram.



WASP & HORNET 6 CYLINDER HEAD

CYLINDER HEAD GASKET INSTALLATION: Inspect the mating surfaces of cylinder head and block for cleanliness and squareness with a straight edge. Use guide pins 3" x ½"-13 (Hornet) 3" x 7/16"-14 (Wasp) to properly locate gasket on cylinder block. Use non-hardening gasket paste on gasket and a sealing compound on all cylinder head capscrews.

ORIGINAL BORE & PISTONS

HUDSON 6

ORIGINAL BORE LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter ..... Size of Bore
Second letter ..... Size of Main Bearings
Third letter ..... Size of Con Rod Bearings

Letter Size Code

Letter "A" ..... Standard
Letter "B" ..... .010" Undersize.
Letter "C" ..... .010" Oversize.
Letter "D" ..... .001" Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

REPLACEMENT PISTONS: Pistons furnished (less Piston Pin) in Oversizes and Code markings as follows:

Code	Oversize	Code	Oversize	Code	Oversize
(B)	Std.	(P)	.007"	(BB)	.020"
(D)	.001"	(BO)	.010"	(DD)	.021"
(F)	.002"	(DO)	.011"	(FF)	.022"
(J)	.004"	(FO) ①	.0115"	(B000)	.030"
(L)	.005"	(LO) ②	.0145"	(E000)	.0315"

①—(Wasp). Hornet .012" ②—(Wasp). Hornet .015"

ORIGINAL BEARING SIZES

HUDSON 6

ORIGINAL BEARING LETTER CODE: A three letter code stamped adjacent to engine number indicates as follows:

Letter Sequence Code

First letter ..... Size of Bore
Second letter ..... Size of Main Bearings
Third letter ..... Size of Con Rod Bearings

Letter Size Code

Letter "A" ..... Standard
Letter "B" ..... .010" Undersize
Letter "C" ..... .010" Oversize
Letter "D" ..... .001" Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

CRANKSHAFT & MAIN BEARINGS

HUDSON 6

CRANKSHAFT FRONT & REAR MAIN BEARING SEALS: Metal backed neoprene lined seal (two identical halves), plus cotton waste for vertical and horizontal packing holes in cap.

Removal—Upper half can be removed without removing crankshaft by using ¼" brass rod to drive old seal from around shaft while rotating shaft.

Installation—Coat groove of seal with non-hardening sealer. Use 4" punch with diameter smaller than vertical holes to force cotton waste into vertical holes, leaving enough waste protruding to seal between pan gasket and bearing cap.

VIBRATION DAMPENER

HUDSON 6

VIBRATION DAMPENER: Removal—Remove radiator core for puller clearance, remove retaining capscrew. **Hornet** vibration dampener has two punch marks for alignment to maintain proper balance when dampener is disassembled for replacement of rubber discs. **Wasp** vibration dampener has an offset screw location to insure proper reassembly for balance. Use pulley Remover J-676-C and Replacer J-483 for **Hornet** and Remover J-5371 and Replacer J-5369 for **Wasp.** Tighten retaining screw to specifications shown in table above.

ENGINE FRONT COVER

HUDSON 6

ENGINE FRONT COVER: Removal—Remove Vibration Dampener (see above), remove retaining screws attaching cover to block and remove cover.

Installation: Reverse removal procedure, cover alignment is automatically made during assembly.

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION: Remove engine front cover (see above). Use Tool J-2776 to remove and install seal. Insert collar so that slot in collar engages depression in cover. Support cover when driving out seal with straight side of driver. Use tapered side of driver for installing seal. *NOTE*—Apply coating of white or red lead in well in timing cover and recheck to make sure that lip of leather is in good condition and not curled over.

CAMSHAFT & BEARINGS

HUDSON 6

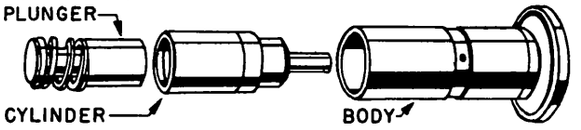
CAMSHAFT REMOVAL: Remove radiator, radiator grille, fan assembly, intake and exhaust manifolds. Remove vibration dampener, (see above). Remove engine front cover, (see above). Cut sprocket mounting bolt safety wire, rotate engine to bring timing marks on chain to marks on sprockets, remove camshaft sprocket and chain assembly (Puller J-471). Remove valve side covers, raise valves and install tools J-1612-3-A to hold lifters out of way. Remove oil spout on Wasp, spout and chain silencer on Hornet. Remove thrust plate and camshaft.

VALVE SYSTEM

HYDRAULIC LIFTERS

HORNET 6

HYDRAULIC VALVE LIFTERS: Removal - Remove Cylinder head, valve cover, valve springs and valves. Cylinder assembly of lifter may now be removed from lifter body without removing camshaft. *NOTE* - To clean or replace lifter body (Mushroom type) it is necessary to remove camshaft.



HORNET 6 HYDRAULIC LIFTER

Disassembly: Remove plunger from cylinder assembly by twisting plunger and spring (in spring windup direction), while pulling on plunger. If plunger sticks, release oil from compression chamber by raising ball check off of seat with small round rod. With oil released, plunger will drop down and it will be possible to remove carbon ring usually found between plunger and spring. Remove plunger. *CAUTION* - Keep parts of each lifter together as components are selectively fitted. Only complete assemblies supplied for service.

Inspection: Clean all parts in solvent to remove engine oil, soft carbon, or varnish deposits. Inspect for scratches, nicks, or plugged oil passages. Plunger must be free fit in cylinder.

Testing: Clean unit completely, removing all traces of oil. Hold cylinder in one hand and start plunger in cylinder. Depress plunger and release quickly. Plunger should bounce. If plunger does not bounce, it indicates air leakage through ball check or past plunger. To check for **ball check** leakage, hold finger over inlet hole and depress plunger and release quickly. If plunger now bounces it indicates that plunger fit is proper but leakage occurs at ball check. However if plunger will not bounce, it indicates leakage occurs past plunger (fit is defective), and lifter must be replaced. *NOTE* - Always repeat above check several times (cleaning cylinder assembly before each check) before replacing lifter.

Reassembly: Reinstall plunger in cylinder and engage spring by pushing "IN" and twisting plunger and spring in direction of spring windup.

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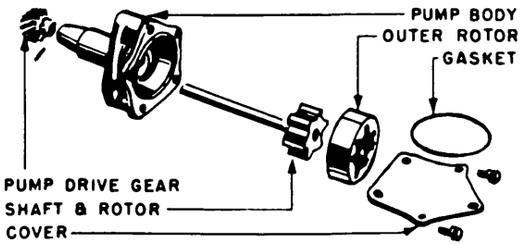
OILING SYSTEM

IL PUMP

HUDSON 6

OIL PUMP: Removal– Lift off distributor cap, rotate engine crankshaft until distributor is in firing position for No 6 cylinder **Do not** disturb this position of engine while oil pump is removed Remove oil pump to block attaching screws, remove oil pump

Overhaul: Remove pump cover and mark one lobe of inner rotor and corresponding point on outer rotor to insure reassembling in same relative position With rotors meshed in this position, measure clearance between inner and outer rotors at point diametrically opposite marks Replace rotors and shaft if clearance exceeds .010". Rotor end clearance (measure between rotors and straightedge laid across cover flange on body) must not exceed .004" Outer rotor clearance in body (press rotor against body and measure clearance on opposite side) must not exceed .008" Inner surface of cover must not be worn more than 002"



WASP & HORNET 6 OIL PUMP

Installati n: If crankshaft inadvertently turned while pump removed, install pump as follows to insure correct timing

1) **Hornet–**Crank engine to TDC position (exhaust stroke) of No 1 cylinder **Wasp–**Crank engine to TDC position (firing position) of No 1 cylinder

2) Install Aligning Tool J-2794 in distributor mounting hole so that guide pin indexes with distributor mounting screw hole

3) Install oil pump, turn pump shaft so that slot in shaft indexes with tang on aligning tool (tool will be pushed out as pump installed)

4) Install distributor with rotor turned to No. 6 cylinder terminal in cap (Hornet), No. 1 cylinder terminal (Wasp)

FOR HUDSON HORNET V8 SPECIAL DATA
SEE NASH & HUDSON SPECIAL DATA (PG. 140)

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disc nnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Model No.
Wasp 6	35640
Hornet 6	35660

SERIAL NUMBER: Stamped on plate attached to cowl under hood

Starting Serial Number (Wasp)—Domestic W-8101, Unassembled Export WKD-1201, Canada WT-1401

Starting Serial Number (Hornet)—Domestic X-7601, Unassembled Export XKD-1401

ENGINE NUMBER: Stamped on machined surface on left side of cylinder block at No. 2 cylinder.

Starting Engine Number—(Wasp) M-8701, (Hornet) F-8601

TUNE-UP

COMPRESSION PRESSURE: 100 lbs minimum at cranking speed. Allowable variation limit 10 lbs

VACUUM READING: 17-20" at idling speed

VALVE TAPPET CLEARANCE: Wasp—Intake 010" (Go), 011" (No Go), Exhaust 014" (Go), 015" (No Go), COLD **Hornet**—None in service (hydraulic lifters)

MANIFOLD HEAT CONTROL: Automatic thermostatic type No adjustment Valve must operate freely

IGNITION

FIRING ORDER: 1-5-3-6-2-4

SPARK PLUG GAP: (Wasp) 032", (Hornet) 030"

Spark Plug—(Wasp)-Champion H-10, torque to 30 lbs (Cast Iron Head), 25 ft. lbs. (Aluminum Head).

(Hornet) – Champion H-11. Torque to 25 ft. lbs.

COIL: Auto-Lite CAF-4003. *12 Volt.*

NOTE: No resistor used in the coil circuit.

Ignition Current – 2.75 amperes (stopped).

►***IGNITION COIL POLARITY CAUTION:*** Negative (—) coil primary terminal must be connected to distributor breaker terminal (misfiring and short breaker point life will result if coil terminals reversed).

DISTRIBUTOR: (Wasp) Auto-Lite IAT-4202, (Hornet) Auto-Lite IAT-4203A.

Condenser—Auto-Lite IAT-2015R **Capacity**— 21-25 mfd.

Contact Point Set—Auto-Lite IGW-3028BS

Breaker Gap— 020"± 002"

Cam Angle – 39° ± 3°.

Breaker Arm Spring Tension—17-20 ozs

Rotation—Clockwise viewed from above

Automatic Advance (IAT-4202)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		350	2		700
4 5		500	9		1000
12		1325	24		2650
13 5		1500	27		3000

(IAT-4203A)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		500	0		1000
1		670	1		1340
4		1150	8		2300
8		1825	16		3650
9		2000	18		4000

Vacuum Spark Control: Auto-Lite integral type

Vacuum Advance (IAT-4202)

Distr Degrees	Eng Degrees	Vacuum (" of HG)
Start	0	5 1/4
1	2	5 3/4
4	8	7 1/2
6	12	8 3/4
7 5	15	9 1/2

(IAT-4203A)

Distr Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	9 1/2
1	2	10
2	4	10 3/8
3	6	10 7/8
3.75	7 5	11 1/4

IGNITION TIMING

Setting—TDC at idle speed

Timing Mark—(Wasp)—Long line before "1UDC" on damper (Hornet)—Long line before "UDC1" on flywheel

CARBURETOR

►*CARBURETOR APPLICATION NOTE· One or two (Twin-H-Power) Carburetors used as follows*

Model	Carter No.
Wasp (HI-TORQUE)	WA1 2009SA
Wasp (TWIN-H-POWER)	WA1 2013S
Hornet (CHAMPIONSHIP 6)	WGD 2252S
Hornet (TWIN-H-POWER)	WA1 2113S

Throttle Linkage Adjustment (Hydra-Matic): Adjust idle speed at 490-510 RPM (with compressor running), engine at normal operating temperature, transmission warm and selector lever in neutral position

Wasp—Use aligning pins J-2544 at rear upper throttle lever and lower bell crank One pin to adjust carburetor rods to rear upper throttle lever, one pin to adjust vertical rod between upper carburetor control lever and lower bell crank. Adjust rods so that both pins index at rear upper throttle lever and lower bell crank, and hole in boss on cylinder block

Hornet—Aligning pin J-2544 should fit freely in bell crank lever and hole in boss in cylinder block If pin does *not* index with lever and hole in boss, remove carburetor to throttle rod lever clevis pins and adjust carburetor idle adjusting screws

All Models—Disconnect throttle rod at left side of transmission case Clean machined surface at back of transmission case and check lever using Tool J-2195 flush against the transmission side of cover. Gauge rod should fit freely in hole of throttle valve lever Use bending Tool J-3310 to bend lever as necessary Loosen two locking nuts on throttle valve rod trunnion (Wasp), at bell crank (Hornet) and adjust trunnion so that rod fits freely in hole in trunnion, then shorten throttle rod 1/16" or approximately two turns Reconnect throttle rods

CARTER WA1 (Wasp HI-TORQUE) (2009SA Singl Carb).

Idle Setting—½-1½ turns open Turn screw out for richer mixture

Idle Speed (Without Air C nditi ning)—540-560 RPM (Standard Trans), 575 RPM (Overdrive), 490-510 RPM (Hydra-Matic in Neutral)

Idle Speed (With Air Conditi ning)—Same as above with compressor running

Float Level—7/16" from tip of cover projection to soldered edge of seam on float with cover inverted

Accelerating Pump—Outer hole normal, inner hole if less charge is required

Fast Idle: 5/8" clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) fast idle cam Adjust by bending link at lower offset

Automatic Choke Setting: Set at Index

Throttle Linkage Adjustment: See *CARBURETOR above.*

►***OTHER DATA: See "Carter WA1" carburetors in Carburetion Section.***

Fuel Pump Pressure: 3½ – 5½ lbs. Max.

CARTER WGD (Hornet Championship 6) (2252S Singl Carb.)

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-2-3, LEFT barrel 4-5-6.*

Idle Setting—1¾-2¾ turns open Turn screw out for richer mixture

Idle Speed (Without Air Conditioning)—540-560 RPM (Standard Trans), 575 RPM (Overdrive), 490-510 RPM (Hydra-Matic in Neutral)

Idle Speed (With Air Conditioning)—Same as above with compressor running.

Float Level—¼" between top of float and bowl cover (gasket removed) and cover inverted

Accelerating Pump—No seasonal adjustment

Fast Idle: .030" clearance between throttle valve and bore of carburetor (side opposite idle port) with choke valve closed

Automatic Choke Setting: Set at Index

Throttle Linkage Adjustment: See *CARBURETOR above.*

►***OTHER DATA: See "Carter Dual WGD" carbur tors in Carburetion Section.***

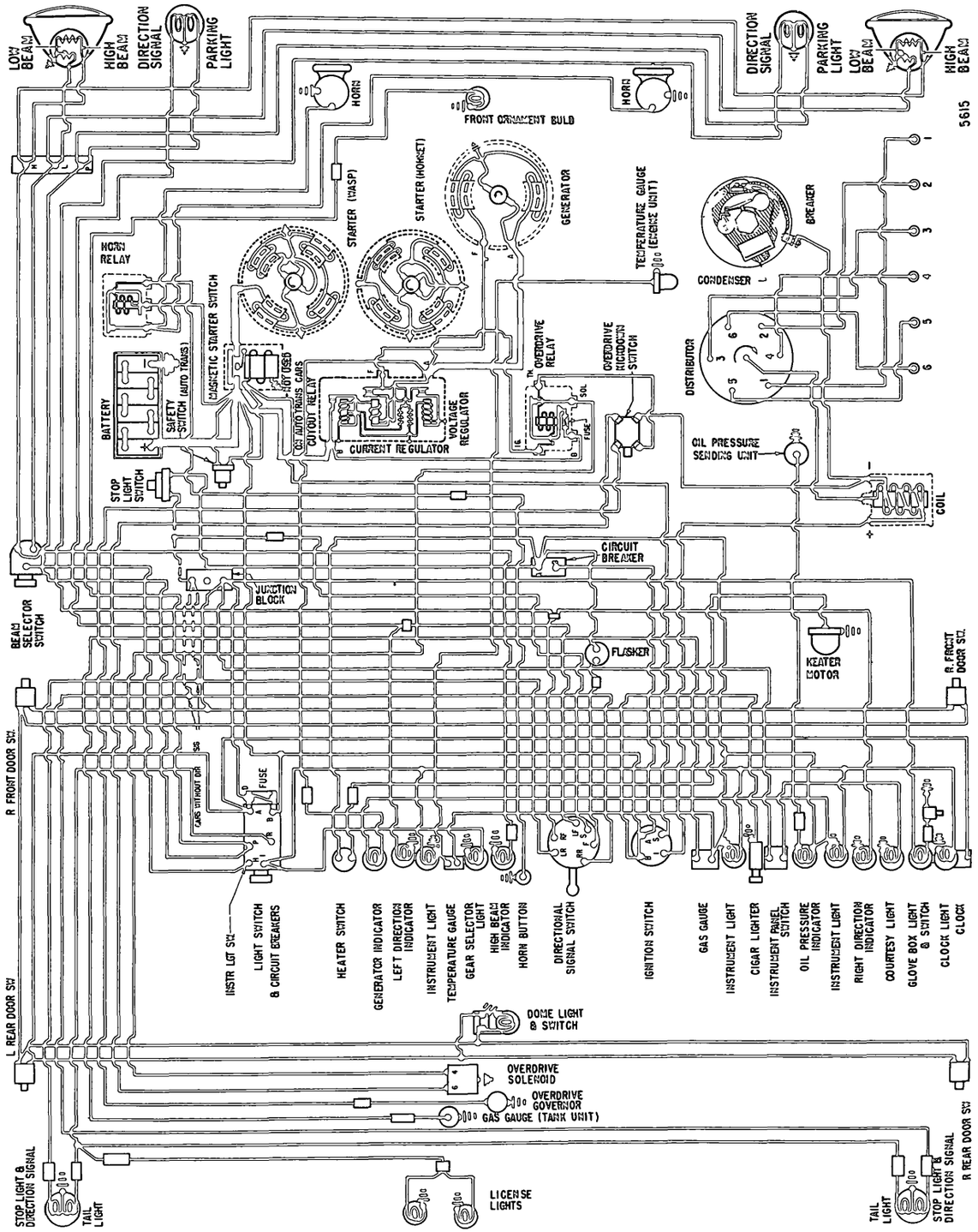
Fuel Pump Pressure: 3½ – 5½ lbs. Max.

Carter WA1 (TWIN H-POWER) (2013S & 2113S)

►*MANIFOLD FUEL DISTRIBUTION: An internal manifold compensator port incorporated in twin carburetor manifolds.*

Idle Setting—For correct synchronization of both carburetors Remove clevis pins from throttle shaft to carburetor rod clevis Connect vacuum gauge and tachometer Hold fast idle cam in normal idle position and adjust idle speed screws until throttle valves just seated in closed position. Adjust idle mixture screws (½-1½ turns out (Wasp), 1¼-2¼ turns out (Hornet) Run engine until temperature normalized Hold front carburetor throttle valve closed and adjust rear carburetor

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idle speed 25-40 RPM less than specified. After rear carburetor mixture for best operation. Adjust front carburetor idle speed to where an increase of 10-15 RPM is noted (Idle mixtures). Readjust the rear carburetor until the specified RPM is obtained and then adjust the front carburetor until a slight increase in RPM is noted. Readjust idle mixture to obtain best mixture and manifold vacuum. Adjust throttle shaft to carburetor rod clevis, retaining the throttle valves in idle position and accelerator linkage in released position. Reinstall clevis pins.

Idle Speed (Without Air Conditioning)–540-560 RPM (Standard Trans.), 575 RPM (Overdrive), 490-510 RPM (Hydra-Matic in Neutral).

Idle Speed (With Air Conditioning)–Same as above with compressor running.

Float Level–¼" (2013S), ½" (2113S) from tip on lower edge of cover to seam on float with cover inverted.

Accelerating Pump–Outer hole normal, inner hole if less charge is desired.

Fast Idle: ½" (2013S), 5/8" (2113S) clearance between choke valve and air horn with throttle valve closed and stop screw against (not on) first step of fast idle cam. Adjust by bending link at offset portion.

Automatic Choke Setting: Set one point lean.

Throttle Linkage Adjustment: See *CARBURETOR* above.

▷ *OTHER DATA: See "Carter WA1" carburetors in Carburation Section.*

Fuel Pump Pressure: **3½ - 5½ lbs. Max.**

CARB. EQUIPMENT

Air Cleaner: *DRY TYPE - DO NOT WASH.* **Clean at 1,000 mile intervals by removing cartridge and shaking thoroughly to remove dirt. Replace cartridge every 10,000 miles or six months.**

Fuel Pump: **(Wasp) Carter M-729SZ (Std. Trans. Single Action). (Wasp & Hornet) AC 4250 (With Overdrive & Twin Carb.), or (With Hydra-Matic Drive & Single Carb.). Fuel & Vacuum. (Hornet) Carter M-2033S. Fuel & Vacuum.**

Pressure – **3½ - 5½ lbs. Max.**

See "Fuel Pumps" in Carburation Section.

Gasoline Gauge: **Stewart Warner & Auto-Lite. Electric.**

Dash Unit – **Hudson No. 3119555.**

Tank Unit – **Hudson No. 3146814.**

See "Fuel Gauges" in Carburation Section.

BATTERY

(Std.) – Auto-Lite 11-HS-50. *12 Volt,* 11 Plate, 50 Ampere hour capacity (20 hr. rate).

(Air Cond. Cars) – Auto-Lite 11-HS-60. *12 Volt,* 11 Plate, 60 Ampere hour capacity (20 hr. rate).

Battery Ground – Negative. Grounded to engine.

▷ *CAUTION:* **This is reversed from previous models.**

Engine Ground – Transmission to rear engine cross-member.

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STARTER

Auto-Lite. *12 Volt.* Used as follows:

Auto-Lite No.	Starter	Armature
Wasp (Std. & O.D. Trans.)	MBG-4101	MZ-2312A
Wasp (Hydra-Matic)	MBG-4102	MZ-2023
Hornet (Std. & O.D. Trans.)	MDF-6011	MDF-2026
Hornet (Hydra-Matic)	MDF-6012	MDF-2088

Drive – Bendix.
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 42-53 ozs.

Performance Data (MBG-4101 & 4102)

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10	50
5.2 ft. lbs.	Lock	4	235

(MDF-6011 & 6012)

0 ft. lbs.	3200	10	60
6.5 ft. lbs.	Lock	4	240

GENERATOR

Auto-Lite. *12 Volt.* Used as follows:

Auto-Lite No.	Generator	Armature
Standard	GJC-7008A	GJC-2030 F
Air Cond. Cars	GJC-7008B	

Maximum Charging Rate – *See Voltage Regulator.*

Performance Data (Cold)

Volts	Amperes	Max. RPM
15.0	20.0	1750
15.0	30.0	2050-2250

Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 18-36 ozs.
Field Current – 1.2-1.3 Amps. at 10 volts, at 70° F.

REGULATOR

Auto-Lite VRX-6008A. *12 Volt.*

Cutout Relay

Cuts In – 13.0-13.7 Volts.
Cuts Out – 8.2-9.3 Volts.
Contact Gap – .015" minimum.
Air Gap – .031-.034".

Voltage Regulator

Setting – 14.5 volts at 80° F. charging at 10 amps.
Air Gap –.048-.052" with contacts just opening.
Checking & Adjusting – *See "Auto-Lite Regulators" in Electrical Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

Test A	Operating Amperes	Test B
36 max.		30 (28-32)

Test A – After 15 minutes run at 10 amps. output.
Test B – After additional 15 minutes operation with current regulator operating.
Air Gap – .048-.052".
Checking & Adjusting – *See "Auto-Lite Regulators" in Electrical Section.*

MISC. ELECTRICAL

►*BACK-UP LIGHT WIRING CIRCUIT CAUTION (Early Cars): Incorrect assembly of wire to back-up light switch and circuit breaker causes back-up light to operate incorrectly. See "Electrical Notes" in Hudson Special Data.*

Head Lamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Light Switch Removal: Disconnect battery. With Switch in "OFF" position, press button release on top of light switch assembly, pull knob and shaft clear of switch. Remove slotted nut, pull switch out to rear of instrument panel.
Stop Light Switch: Located at tee fitting in line to left front brake.
FUSES: 7.5 Ampere. On lighting switch for Courtesy and Glove Box lights.
15 Ampere. Located on overdrive relay.
5 Ampere. Located in radio wire back of instrument panel.
CIRCUIT BREAKERS: Three used as follows:
12 Ampere. On light switch for Instrument, Tail and Dome lights.
12 Ampere. On light switch for Head and Parking Lights.
30 Ampere. For Stop Lights, Instruments and Indicators, Heater and Directional Signals. Located back of Instrument panel.
HORNS: Auto-Lite No. HAD-4737 (Low Pitch), **HAD-4738** (High Pitch). *12 volt.*
Horn Relay – Nash No. 3145684.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 6 cylinder "L" head.

Model	Bore	Stroke	Displacement
Wasp	3"	4¾"	202 cu. ins.
Hornet	3 13/16"	4½"	308 cu. ins.

Model	Compr. Ratio	Rated HP	Dev. HP & RPM
Wasp	7.5-1	21.6	120 at 4000
(Twin Carb.)	7.5-1	21.6	130 at 4000
Hornet	Ⓒ 7.5-1	34.88	165 at 3800
(Twin Carb.)	Ⓒ 7.5-1	34.88	175 at 4000

Ⓒ – Optional Ratio 8.0-1.

Compression & Vacuum Reading – *See TUNE-UP.*
CYLINDER HEAD & MANIFOLD: *See "Cylinder Head & Manifold" in Hudson Special Data.*
►*CYLINDER HEAD TORQUE CHANGE (1955-56 Hornet):* Tightening torque for ½" cylinder head capscrews has been increased to 85-90 ft. lbs. Cold (was 75-80 ft. lbs.) to prevent corrosion and leakage at cylinder head.
TIGHTENING TORQUES: *See "Tightening Specifications" in Hudson Special Data.*

PISTONS

Aluminum alloy, cam ground, with taper ground skirt.
Original Bore & Pistons – *See "Original Bore & Pistons" in Hudson Special Data.*
Weight – 10.4 ozs. (Wasp), 18.5 ozs. (Hornet).
Removal – Pistons & rods removed from above.
Fitting New Pistons: Use ribbon feeler .002" thick and scale with both piston and cylinder bore at 70°F. Pull required to remove feeler 3-4 lbs.
Replacement Pistons: *See "Original Bore & Pistons" in Hudson Special Data.*
Installing Pistons: Notch in top of piston must be toward front of engine.

PISTON PINS

Floating type with locking ring at each end.

	Length	Diameter
Wasp	2.4375" ±.005"	.7499"+.000" - .00025"
Hornet	2.942-2.932"	.9687-.96845"

Clearance in Piston – Hand push fit with piston heated to 200°F.

Clearance in Rod – .0003". Rod should turn in piston under its own weight.
Replacement Pins: (Wasp) Std. & .002", .005", .010", .015", .020" Oversize. (Hornet) Std. & .002", .005", .010" Oversize.

PISTON RINGS

	Width	End Gap	Side Clearance
Compr.	.0775"	.004-.009" ①	.002-.004"
Oil #3	.186"	.004-.009" ①	.001-.003"
Oil #4	1514"	.004-.009" ①	.001-.003"

①–Wasp, (Hornet .006-.014").

Replacement Rings: Sets of Std. and .020" Oversize.
Installing Rings: Rings are pinned in piston to prevent rotation. Ring clearance on pin must be same as end gap.

CONNECTING RODS

Crankpin Journal Diameter – 1.937-1.938" (Wasp), 2.1244-2.1254" (Hornet).
Original Bearing Sizes – *See "Original Bearing Sizes" in Hudson Special Data.*
Bearings – Steel backed babbitt. No shims.
Clearance – .0005-.0015". **Side Play** – .007-.013".
Replacement Bearings: Std. .001", .002", .010", .012" Undersize.
Installing Rods: Notch in top of piston toward front of engine. Spit hole in rod to thrust or camshaft side of engine.

CRANKSHAFT

Journal Diameter – 2.4988-2.4998". Four bearings.
Original Bearing Sizes – *See "Original Bearing Sizes" in Hudson Special Data.*
Bearings – Steel-backed babbitt. No Shims.
Clearance – .0005-.0015".
Replacement Bearings: Std., .001", .002", .010", .012" Undersize.
End Thrust: Taken by No. 3 main bearing.
End Play – .003-.009".
Crankshaft Front & Rear Bearing Oil Seals: *See "Crankshaft & Main Bearings" in Hudson Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Hudson Special Data.*
VIBRATION DAMPENER: *See "Vibration Dampener" in Hudson Special Data.*

CAMSHAFT

Bearings – Steel-backed babbitt-lined bushings.
Clearance – .0005-.0015" (Wasp), .0015-.002" (Hornet).
Camshaft Removal – *See "Camshaft & Bearings" in Hudson Special Data.*
End Thrust: Controlled by thrust plate behind camshaft sprocket.
End Play – .003-.005".
Timing Chain: Link Belt. **Width** 1.000" (Wasp), 1.250" (Hornet). **Pitch** .375". **Length** 60 links.

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Camshaft S tting: Timing chain has two marked links, six full links apart Both crankshaft and camshaft have a marked tooth With crankshaft sprocket installed and turned to TDC position, install one marked link of chain over crankshaft marked tooth, insert camshaft sprocket into chain with marked link over marked tooth, rotate camshaft until screw holes line up and install screws

Engine Front C ver Oil S al (Crankshaft Front Seal): *See "Engine Front Cover" in Hudson Special Data.*

VALVES

Tappet Cl aranc : (Wasp) Intake .010" (Go), .011" (No Go); Exhaust .014" (Go), .015" (No Go).
(H rn t) – None in service (Hydraulic lifters).

Wasp Valves

Valv	H ad Diam.	Stem Diam.	Length
Intake	1 495-1 505"	3412- 3422"	5 045"
Exhaust	1 390-1 400"	3412- 3422"	5 043"

Valve	Seat Angl	Lift	Stem Clearance
Intake	45°	346"	001- 003"
Exhaust	46°	346"	002- 004"

H rnet Valves

Valv	Head Diam.	Stem Diam.	Length
Intake	1 831/"	3412- 3422"	5 815"
Exhaust	1 556"	3402- 3412"	5.815"

Valv	S at Angle	Lift	Stem Clearance
Intake	45°	.346"	.0015-.003"
Exhaust	45°	.346"	.002-.004"

NOTE–Valve face and valve seat angle are the same

►*VALVE GRINDING CAUTION:* Replace valve when grinding reduces distance from upper edge of valve seat to top of valve to less than 1/16"

Valv Springs: Install springs with closed coils toward head of valve

Valv Spring Specifications

Wasp	Pr ssure	Length
Open	116-124 lbs	1 19/32"
Closed	40-48 lbs.	1 61/64"

Fr Length–2 3/16" approximately

Hornet	Pressure	Length
Open	153-165 lbs.	1 27/32"
Closed	73-81 lbs.	2 3/16"

Free Length– 2½" approximately

Valve Guides: Remove old guides through valve seat opening using Tool J-2814 Install new guides as follows· **Wasp**–Use Tool J-883-A with Pilot J-883-10 to install guides to depth of 1 9/32" from top of guide to top face of block. **H rnet**–Use Tool J-883-A with Pilot J-883-8 or 9 and install guides to depth of 1 7/16' (Intake), 1 3/32" (Exhaust) from top of guide to top face of block

Valv Lift rs (Wasp): Mushroom type fitted directly in crankcase. Remove from below with camshaft out.

Valv Lift rs (H rn t): Hydraulic with mushroom type body.

Hydraulic Valv Lift r R moval, Overhaul, & Testing: *S e "Valv System" in Huds n Sp cial Data.*

VALVE TIMING

S "Camshaft Setting" under CAMSHAFT abov .

Wasp Valv Timing ℄

Intak Valv s – Open 26.8° BTDC. Close 99.7° ALDC
Exhaust Valv s–Open 64.9° BLDC. Close 45.7° ATDC.

H rnet Valv Timing

Intak Valv s–Open 33.7° BTDC. Close 80.1° ALDC.
Exhaust–Valves–Open 73.9° BLDC. Close 28.4°ATDC.
℄ – Valve lash .008" Intake. .010" Exhaust.

Valve Timing Check (Wasp) – Crank engine to TDC, exhaust stroke of No. 1 cylinder. Install dial indicator on No. 1 exhaust valve head through spark plug opening. Crank engine until indicator indicates valve seated. Chalk mark edge of vibration damper directly below pointer. Valve timing will be correct when distance from chalk mark around perimeter of damper to TDC is 1¾" ± 1/8" with cold valve lash of .015". *NOTE* – For one tooth off, dimension will be affected 19/32" (Camshaft sprocket), 1 3/16" ' (Crankshaft sprocket).

OILING SYSTEM

Crankcase Capacity: 5 qts (Wasp), 7 qts (Hornet) Add ½ qt. for dry engine

Normal Oil Pressure: 40 lbs. at 30 MPH

Pressure Regulator Valve–Non-adjustable spring loaded, located on left side of cylinder block

Oil Pressure Indicator Switch: King-Seeley 47185 (Wasp), 47170 (Hornet). On right side of engine above oil pump Contacts open at 11-15 lbs Switch is sealed (not adjustable)

Oil Pump: Rotor type. Angle mounted on right side of engine and driven by camshaft

Pump Overhaul, Removal & Installation–*See "Oiling System" in Hudson Special Data*

Oil Filter· Fram or Hudson. Replace filter cartridge at 5000 mile intervals

Replacement Filter Element–Hudson No. 8990183

Crankcase Ventilation: Oil-wetted type filter element in oil filler cap (air intake) Outlet pipe in rear valve compartment cover on right side of engine

COOLING

Water Capacity: 13 qts. (Wasp), 18.5 qts. (Hornet). Add 1 qt. for heater.

Pressure Valve: Radiator filler cap. 7 lb. standard, 13 lb. with air conditioning.

Thermostat: Hudson No. 5325066 Std. (157-162°), No. 3131817 (167-173°) or No. 3131985 (177-182°) for Permanent anti-freeze. Located in cylinder head water outlet housing.

Water Pump: Centrifugal type with non-adjustable packless type seal. *NOTE* – **Water pump discharges into brass water distributing tube to provide uniform circulation around valves.**
See "Hudson" in Water Pump Section.
Pump Removal – **Remove generator adjusting bracket, remove fan blade assembly, remove pump mounting bolts.**

Temperature Gauge: Stewart Warner & Auto-Lite. Electric.
Dash Unit – Hudson No. 3119681.
Engine Unit – Hudson No. 3144585.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck. (Wasp) 9A7, (Hornet) 10A6.
Assembly No.–(Wasp) 1361, (Hornet) 1385
Clutch Disc. N .–(Wasp) 382118 Std , 382191 Overdrive
Clutch Disc. N .–(Hornet) 382372 Std , 382215 Overdrive

Pedal Adjustment: Pedal free travel ½-¾" Adjust length of beam to throw-out lever rod Lengthening rod reduces free play *NOTE*–Do not disturb clutch pedal to beam rod adjustment

►*CAUTION.* Pedal-to-beam rod should not be disturbed in service. This rod can be checked (with pedal against floor board) as follows: **Wasp**–Clearance between flat surface of beam lever and rear edge of bracket should be 7/8". **Hornet**–Outer end of beam lever should project 5/16" from beam toward the rear.

►*WASP CLUTCH BEAM INSULATOR DISTORTION CORRECTION:* To correct this condition, reinforce the new insulator with .015" shim made up to same dimensions as insulator

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove housing and pan, punchmark flywheel, clutch cover, and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange Remove clutch and driven disc

SYNCHRO-MESH TRANSMISSION

Warner. 3 Speed Std. Transmission & Overdrive Optl
See "Warner Transmissions" in Transmission Section

►***TRANSMISSION REAR BEARING SNAP RING BREAKAGE CORRECTION:*** **Caused by heavy duty operation or maladjustment of torque tube trunnion. For installation of sleeve and adjustment of trunnion See *"Nash Transmission" in Transmission Section.***

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect brake tube bracket on underside of body. Disconnect torque tube (see Rear Axle Removal below). Disconnect hand brake cable at bellcrank and brake cable housing at bellcrank bracket. Move rear axle to rear to disconnect front universal joint from transmission mainshaft Disconnect speedometer cable and shift rods (On Overdrive Cars, disconnect overdrive control and wiring) Remove two upper transmission mounting screws, install guide pins (Tool J-1434) in these holes, remove two lower mounting screws, slide transmission straight back to clear clutch pilot bearing, remove transmission from beneath car

OVERDRIVE

Warner R10. *See "Warner R10 Overdrive" in Transmission Section*

Overdrive Control: *See "Warner R10 Overdrive Controls" in Transmission Section*

HYDRA-MATIC DRIVE

Dual Range four speed automatic transmission with fluid coupling
See "Hydra-Matic Drive" in Transmission Section

►***HYDRA-MATIC REVERSE GEAR SLIP-OUT CORRECTION:*** **To check and correct this condition, first dis-**

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connect back-up light switch at manual control lever on side of transmission, and operate transmission in reverse. If condition not corrected, adjust back-up light switch to proper tension by placing control lever in reverse, and adjusting switch cable just enough to allow spring to pull switch to the contact position.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section*

Lubrication—Check fluid every 1000 miles, drain and refill at 25,000 mile intervals

Capacity—8½ qts. (9½ qts. after overhaul)

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of two minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located under right front floor plate). Add "AQ-ATF" Hydra-Matic fluid to bring level to "F" mark.

►*CAUTION.* Do not check fluid level when transmission is excessively hot and do not fill above "F" mark on dipstick

►*OTHER HYDRA-MATIC DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer (Wasp—Std.), Detroit (Hornet—Std.), Mechanics (All Models - Hydra-Matic). One used on forward end of driveshaft.

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive.

See "Hudson Rear Axles" in Rear Axle Section.

Axle Ratio	Std.	Overdrive	Hydra-Matic
Wasp	4.4-1 (9-40)	4.9-1 (8-39)	3.6-1 (12-43)
Hornet	4.1-1 (10-41)	4.4-1 (9-40)	3.2-1 (13-41)

Backlash— 002-.006". Shim adjustment.

Axle Shaft Removal: Remove wheel Pull drum (use hub puller J-736-B) Disconnect brake line and cable Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims Withdraw axle shaft with puller J-2498 Do not drag shaft splines on inner oil seal

Rear Axle Assembly Removal: Raise and support rear of body Disconnect hand brake cable at bell crank and cable housing at bracket. Disconnect torque tube at transmission, rear brake hose at bracket on body floor pan, rear springs and shock absorbers from axle tube, and stabilizer bar at tube. Roll assembly from beneath car

Wheel Bearing Adjustment: Shims behind brake backing plate

Rear Suspension: *See "Hudson & Nash" in Suspensions & Wheel Alignment Section.*

SHOCK ABSORBERS

Direct acting hydraulic type. Serviced by replacement. **Front** — Hudson No. 3140879. **Rear** — Hudson No. 3140406.

►*REAR SHOCK ABSORBER NOISE CORRECTION (Early Cars):* Before replacing a rear shock absorber for being noisy, check for damaged shock absorber grommet spacer or limit sleeve, (caused by incorrect retainer with oversize hole). If grommet spacer damaged, discard it. When reassembling without grommet spacer, do not use retainer Hudson No. 3136432; however, do not compress shock absorber grommets excessively.

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs located between upper end of steering knuckle pin and seat in outer wheel house panel.

See "Hudson" in Suspensions & Wheel Alignment Sect.

►*EXCESSIVE TIRE WEAR (Early Cars) CAUTION:* Set stop screws on pitman arms to limit turning radius to 36°. Should tires still contact brake hose brackets, trim rear corner of brackets approximately 1/8".

►*TOE-IN ADJUSTMENT (POWER STEERING) CAUTION:* Operate engine so that power steering pump will supply oil pressure to center spool in power cylinder valve.

Drum Diameter — 10" (Wasp), 11" (Hornet).

Wheel Cylinder Diameter — 1 1/8" Front, 15/16" (Early Cars), 7/8" (Later Cars) Rear.

King Pin Inclination—3°36'

Caster—(Without Power Steering) Pos. ½° desired, limits 0° to Pos. ½°. (With Power Steering) 1° desired, limits Pos. ½° to Pos. 1°

Camber—0° desired, limits Neg. ¼° to Pos. ¼°

Toe-In—1/16-3/16"

Toe-Out on Turns—Outer wheel 20°, Inner wheel 24° (Wasp), 26° (Hornet)

STEERING

Gemmer. Worm & Roller with push-pull adjustments

See "Gemmer Worm & Roller" in Steering Section

Power Steering: Monroe Linkage type *See "Monroe Linkage Power Steering" in Steering Section*

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" Steering Gear in Steering Section*

Steering Gear Removal: *See "Gemmer Worm & Roller" Steering Gear in Steering Section*

BRAKES

Bendix Hydraulic, Single Anchor (without Eccentric). Service brake system has "Mechanical Follow-up" linkage (between pedal and parking brake linkage) Hand lever applies rear wheel service brakes

See "Bendix Hydraulic, Single Anchor" in Brake Section.

►*REAR WHEEL BRAKE CYLINDER PRODUCTION CHANGE:* Beginning with Serial No. W-9403 (Wasp), No. X-9204 (Hornet), the diameter of the rear wheel brake cylinder was decreased to 7/8" from 15/16" to improve brake distribution.

Replacement Linings & Shoes—Shoes with linings, or linings only, furnished in Std. size only.

	Lining Width & Length	
Wasp	**Front**	**Rear**
Primary	2" x 8 7/8"	1¾" x 8 7/16"
Secondary	2½" x 10 31/32"	1¾" x 10 25/32"
Hornet	**Front**	**Rear**
Primary	2½" x 9 3/8"	2" x 9 5/16"
Secondary	2½" x 12"	2" x 12"

Clearance—.015" heel and toe of secondary shoe with primary shoe out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

Mechanical Follow-up Cable Adjustment—Depress brake pedal against 3½" spacer block on floor (with pedal cable and pushrod disconnected), adjust mechanical follow-up cable length at clevis end so that clevis pin can be installed freely with no slack in cable

Standard Master Cylinder: Under front floor at left of transmission.

Checking Fluid—Roll back floor mat, remove access hole cover in floor pan, maintain fluid ½-1" below filler opening.

Removal—Remove from beneath car. Not necessary to disturb other parts

Power Brakes: Bendix Power Unit. *See "Bendix Power Unit" in Brake Section*

Checking Fluid—Check every 1,000 miles. Maintain fluid to within ½" of filler opening

MISC. MECHANICAL

Windshield Wipers: Vacuum operated type. *See "Windshield Wipers" in Miscellaneous Section*

Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit

See "Nash-Hudson Air Conditioning" in Miscellaneous Section

Power Window Regulators: Electric. Reversible motor in each door.

See "Power Window Regulators" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head Bolts	① 90 (Hot)
Intake & Exhaust Manifolds	23-28
Main Bearing Cap Bolts	120-130
Oil Pan	12-15
Flywheel	75-85
Oil Pump	12-15
Oil Filter	20-25
Engine Front Cover	23-28
Water Outlet Connection	23-28
Camshaft Sprocket	15-18
Crankshaft Damper or Pulley	130-145
Con Rod Nuts	45-50
Rocker Shaft Support	22-25
Rocker Arm Clearance Locknut	30-35
Rocker Arm Cover	2-2½
Valve Chamber Covers	2-2½
Water Pump	23-28
Oil Pump Pick-up Tube Nut	10-12
Oil Pan Pick-up Tube Nut	28-32

① – See Cylinder Head Installation (below) for tightening procedure. Three different torque applications must be made.

ENGINE

▷ *1955 SPECIAL ENGINE OVERHUAL CAUTION (Engines identified by yellow paint at water outlet connection housing)* Approximately 600 engines at close of 1955 production have special parts listed below which are not identical with regular engine parts. *Observe the following cautions when working on these engines.*

Crankshaft & Main Bearings - Crankshaft main bearing journal diameters are .0005" smaller (increasing clearance from 0007-.0029" to 0015-.0033") and the main bearings listed below must be used with this crankshaft.

Piston Pin - Pins are heavier but they can be intermixed and used in any engine.

Crankshaft Rear Oil Seal - This seal is approximately .012" less in thickness than regular engine seal but can be used with either crankshaft.

Special Engine Parts

Part	Part No.
Crankshaft	EAM-6303-B
Main Bearing (Rear)	① EAM-6331-J, ② EAM-6331-K
(Frt. & Int.)	① EAM-6333-J, ② EAM-6333-K
(Center)	① EAM-6337-J, ② EAM-6337-K
Rear Oil Seal	EAM-6701-A
Piston Pin	EAM-6135-A or D

① - Marked RED. ② - Marked BLUE.

▷ *1955 VALVE STEM OIL SEAL CHANGE* New oil seal, Part No. B5A-6571-A, was used in production on later 1955 engines and is furnished for use on all 1955 engines. This seal has a skirt lengthened .100" to protect more of the valve stem from oil splash.

LINCOLN

ENGINE REMOVAL (Less Transmission):

1) Disconnect battery, drain radiator and cylinder block, remove hood.

2) Disconnect distributor primary wire at coil, pull secondary coil lead from distributor cap. Disconnect and remove defroster blower motor and duct assembly, loosen two duct clips on firewall and disconnect wires at bullet connectors.

3) Remove capscrew securing transmission oil filler tube bracket to exhaust manifold. Disconnect two right heater hoses at water pump and cylinder block.

4) Disconnect generator wires at generator, remove carburetor air cleaner and air duct as an assembly.

5) Disconnect upper and lower radiator hoses and remove radiator. Remove fan, spacer, water pump pulley, and belts. Disconnect left heater inlet hose at pipe and power brake vacuum line at vacuum pipe.

6) Loosen power steering drive belt and capscrew securing power steering hose bracket to cylinder block. Remove power steering pump. Wire pipe securely to left hood hinge in a position that will prevent oil leakage.

7) Remove accelerator shaft retracting springs. Disconnect carburetor-to-control shaft rod at carburetor. Remove capscrews securing control shaft assembly and accelerator shaft bracket to engine. Wire control shaft assembly and accelerator shaft bracket to dash panel.

8) Disconnect engine ground strap at engine. Disconnect temperature sending unit at sending unit and oil pressure warning light wire at bullet connector. Disconnect wiper at vacuum pipe.

9) Raise vehicle. Remove starter. Disconnect resonator inlet pipes from exhaust manifolds. Remove radiator splash shields. Drain engine oil and remove oil filter.

10) Remove converter housing-to-cylinder block capscrews. Remove converter cover, then bolts securing converter to flex plate. Lower vehicle. Support transmission with floor jack.

11) Disconnect and remove radio speaker. Fold back front center floor carpet and pad. Remove two rubber plugs from access holes in dash panel. Remove two converter housing-to-cylinder block capscrews. Remove two capscrews from each engine front support bracket.

12) Attach Engine Hoisting Sling Tools 6000-B-A and 6000-C. Position sling to lift engine less transmission. Lift engine slightly. Have second mechanic push forward to clear dash panel. Continue to lift engine until clear of engine compartment while second mechanic guides engine.

CONTINENTAL

ENGINE REMOVAL (Less Transmission);

1) Drain radiator and block, remove hood.

2) Disconnect distributor primary wire at distributor. Pull secondary coil lead from distributor cap.

3) Remove capscrew securing transmission oil filler tube bracket to exhaust manifold. Disconnect two right heater hoses at heater control valve and return pipe. Disconnect right heater control valve vacuum hose at valve

4) Remove nuts and lockwashers securing right front exhaust pipe to exhaust manifold. Slide inlet stud free of studs (*NOTE* - Hold exhaust control valve with nut).

5) Remove carburetor air cleaner and duct as an assembly. Disconnect upper and lower radiator hoses. Remove capscrews and lockwashers securing radiator to its support. Remove radiator. Remove fan, spacer, water pump pulley, and drive belts.

6) Loosen power steering drive belt and capscrew securing power steering hose bracket to cylinder block. Remove power steering pump. Wire pump securely to left hood hinge in position to prevent oil leakage.

7) Disconnect battery ground cable. Remove converter housing-to-cylinder block capscrews. Remove two accelerator shaft retracting springs. Disconnect carburetor-control shaft rod at carburetor. Remove capscrews securing control shaft assembly to engine, wire control shaft assembly to dash panel.

8) Disconnect temperature sending unit wire at sending unit and oil pressure gauge sending unit at bullet connector. Remove capscrew, lockwasher, and clamp and disconnect tachometer drive cable at distributor (*CAUTION - Remove tachometer drive assembly from cable*). Remove nuts and lockwashers securing left front exhaust pipe to exhaust manifold. Slide pipe free of studs.

9) Disconnect two left heater hoses at heater control valve and return pipe. Disconnect left heater control valve vacuum line at valve and power brake vacuum hose at intake manifold pipe.

10) Raise vehicle. Disconnect generator wires at generator. Disconnect starter cable and engine ground cable at starter. Remove starter. Disconnect antenna and windshield washer vacuum line at connection under generator. Disconnect flex hose at fuel line, plug fuel line. Drain engine and remove oil filter.

11) Remove throttle linkage splash pan and lower left converter housing-to-cylinder block capscrew. Remove converter cover, then remove bolts securing converter to flex plate.

12) Lower vehicle and support transmission with floor jack. Remove capscrews from each engine support bracket. Attach Hoisting Sling Tools 6000-B-A and 6000-C to exhaust manifolds. Position sling to lift engine less transmission. Lift engine slightly. Have another mechanic push engine forward slightly and then guide assembly as it is lifted from engine compartment.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD REMOVAL: Loosen all pushrod adjusting nuts and screws to relieve tension on pushrods. Remove all rocker arm bracket attaching screws and nuts, remove oil overflow pipe from end support (front end on right bank, rear end on left bank), lift rocker arm assembly up over studs and remove as an assembly (see Rocker Arm data under "Valve System" below). Remove all pushrods, remove oil baffle plates from rocker arm pads. Remove the two end cylinder head capscrews and install Pilot Studs, Part No. 6051-A, in these two holes. Install cylinder head holding fixture 6085-A (CAUTION—this fixture recommended to protect machined surfaces of head while it is off the engine AND SHOULD NOT BE REMOVED FROM HEAD UNTIL IT IS RE-INSTALLED ON ENGINE). Remove remaining cylinder head capscrews, lift head up and off the locating dowels and pilot studs Remove gasket. *CAUTION—Never pry between cylinder head and block.*

▷ *CYLINDER HEAD INTERCHANGEABILITY:* Heads can be changed from one bank to the other if the rocker arm shafts and supports are changed to properly line up oil feed and drain passages Water jacket plugs must be installed in hole at rear of the cylinder head. Use Tool 6085-C to install new plugs.

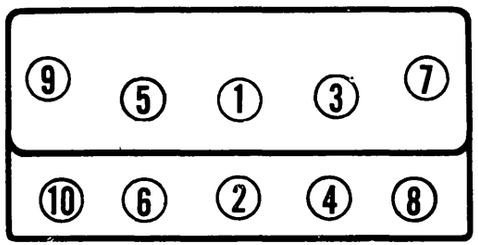
CYLINDER HEAD INSTALLATION: Install pilot studs, Tool 6051-A in two end capscrew holes in block Coat NEW steel head gasket lightly with 8M-19554 sealer and install gasket over pilot studs and dowels Install cylinder head assembly over

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studs and dowels **with plugged water jacket hole to rear of engine.** Install 8 cylinder head capscrews, then remove pilot studs and install remaining two capscrews in these holes. Tighten all capscrews evenly as follows with Cyl. Head Wrench and adapter (Snap-On Tool Nos. S-9513-C & S-9526). ***(CAUTION—Three torque applications must be made as indicated below).*** **Initial** COLD torque should be 70 ft. lbs. **Second** COLD torque should be 80 ft. lbs., **Third** HOT torque should be 90 ft. lbs. after 20 minute fast idle warm up. *NOTE*—After above procedure has been completed, the cylinder head capscrews require no additional torquing and should not be disturbed for installation of engine lifting hooks, etc.

►***CYLINDER HEAD GASKET INSTALLATION CAUTION:*** Gaskets are interchangeable from one cylinder bank to the other but MUST BE INSTALLED WITH MARK "FRONT" TOWARD FRONT OF ENGINE. Make certain that water passage holes in gasket and block line up.



EXHAUST SIDE

CRANKSHAFT & MAIN BEARINGS

►*1956 CRANKSHAFT & CRANKSHAFT FRONT OIL SLINGER PRODUCTION CHANGE (To Improve Oil Seals):* New crankshaft with integral rear oil slinger used in production on later engines. A separate Front Oil Slinger is also used in conjunction with a new Front Cylinder Cover. Slingers divert oil away from the oil seals.

►*INSTALLATION OF CRANKSHAFT WITH INTEGRAL REAR OIL SLINGER AND USE OF FRONT OIL SLINGER ON 1952-56 ENGINES:* New type crankshaft with integral rear oil slinger can be installed on early 1956 engines, and separate front oil slinger can be installed on 1952-56 engines as follows:

1956 Engine – Crankshaft No. ECU-6303-B, Front Oil Slinger No. B6Q-6310-B. Cylinder Front Cover No. B6Q-6059-C. *NOTE* - New Cylinder Front Cover must be used with front oil slinger.

1952-55 Engines - Front Oil Slinger No. B6Q-6310-B and Cylinder Front Cover No. B6Q-6059-C. *NOTE* - Both these parts must be used together.

REAR MAIN BEARING OIL SEAL: Install new packing in crankcase and bearing cap using Tool 6701 to seat packing. Before removing tool cut off edges flush with surface. Make certain there are no ragged edges protruding. Install outer "L" shaped neoprene seal on bearing cap and coat with lubricant. Install Pilot Studs Tool 6336-A1, and place unit over pilot studs. Push bearing cap through tool and into position in block. Remove bearing replacing tool and trim vertical seals, leaving approximately 5/64" of seal above cap. Remove pilot studs and install the self locking main bearing cap bolts. Tighten to 120-130 ft. lbs. torque.

CRANKSHAFT THRUST BEARING ALIGNMENT: After #1, #2, and #4 bearing caps and inserts have been installed and properly torqued, install #3 bearing cap and insert. Install capscrews snug, then pry crankshaft toward rear of engine. Reverse this action by prying crankshaft forward (toward front of engine). This will align thrust surfaces of both halves of thrust bearing. RETAIN THIS FORWARD PRESSURE on the crankshaft, and tighten capscrews to 120-130 ft. lbs. torque. Check crankshaft endplay which should be .004-.008"

ENGINE FRONT COVER

CRANKSHAFT FRONT OIL SEAL (In Timing Chain Cover): Coat new seal with engine oil and install on Tool 6700. Center seal and tool over front cover boss and drive in until seated. Make sure spring on inside of seal is properly seated.

ENGINE FRONT COVER INSTALLATION: Coat new cover gasket with sealer, install gasket and front cover on engine. Align cover and oil seal on crankshaft, BEFORE installing capscrews by positioning Tool 6059 on crankshaft. Tighten cover capscrews to correct torque (see Tightening Specifications).

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Remove cylinder Head covers and rocker arm assemblies from cylinder heads (see Cylinder Head Removal). Remove valve pushrods and hydraulic valve lifters. Remove timing chain and sprockets (see Timing Chain). Remove fuel pump drive sleeve from camshaft eccentric and remove timing chain oil deflection plate. With Tool 9400-B remove snap ring retainer from fuel pump push rod and remove rod. Carefully withdraw camshaft to avoid damaging camshaft bearings.

VALVE SYSTEM

EXHAUST VALVE STEM DIAMETER CHANGE FOR INCREASED STEM CLEARANCE (1952-56 Engines): Exhaust valve stem diameter has been decreased .0005" to provide increased stem to guide clearance. These valves furnished for service on 1952-56 engines as follows:

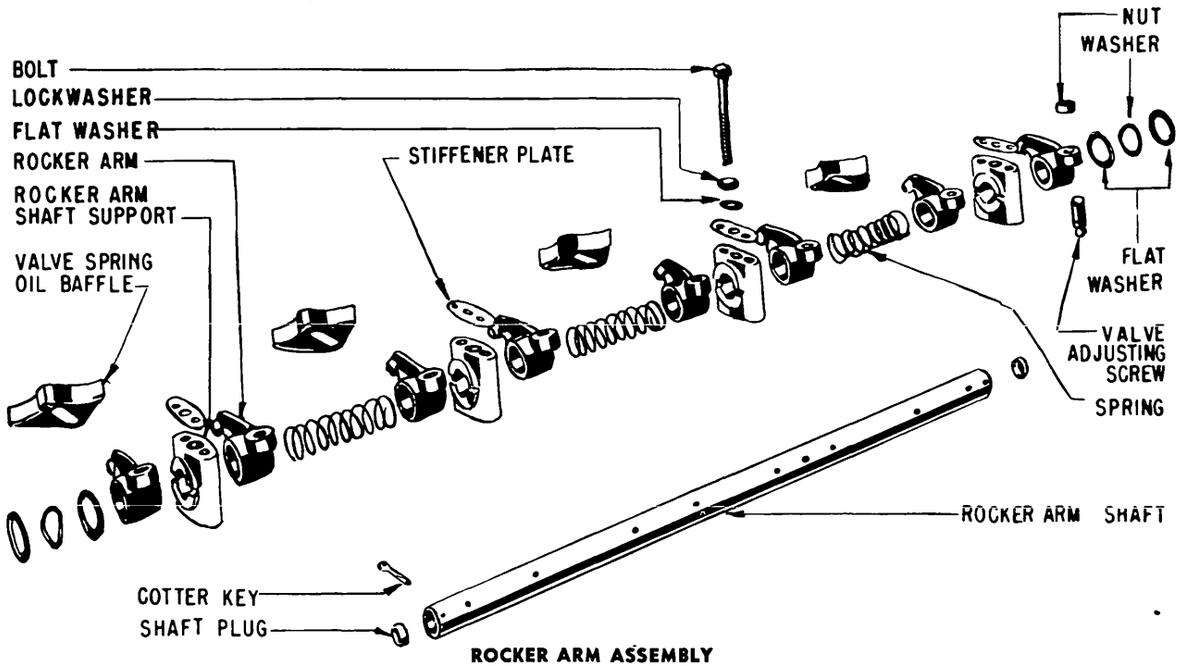
1952-56 Exhaust Valves

Size	Stem Diameter
Std. (Red)	.3400-.3405"
Std. (Green)	.3405-.3410"
.003" Oversize	.3430-.3440"
.015" Oversize	.3550-.3560"
.030" Oversize	.3700-.3710"

SELF-LOCKING VALVE TAPPET ADJUSTING SCREWS (1956 Production Change): "Self-locking" adjusting screws used with new type rocker arms on later 1956 engines. Torque specifications for these new self-locking screws is 7-15 ft. lbs. This torque decreases with each valve adjustment and rocker arms should be replaced when torque decreases to 3 ft. lbs.

►*INSTALLATION OF SELF-LOCKING TAPPET ADJUSTING SCREWS IN EARLIER ENGINES (1952-56):* When installing self-locking screws to replace earlier type (with locknut), all parts listed below must be installed as a unit:

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ROCKER ARM ASSEMBLY

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Adjusting Screw – Lincoln No. B6A-6549-C.
Rocker Arms – Lincoln No. ECU-6564-B (Right Hand), No. ECU-6576-B (Left Hand).
Pushrod – Lincoln No. ECU-6565-B. *NOTE* - These pushrods are 1/8" shorter to compensate for longer length of new adjusting screws .

OVERSIZE VALVE STEM INSTALLATION: Use Tool 6085 Piloted Reamer to ream cylinder head valve guides for oversize valve stems. Reamers are furnished in .003", .015", & .030" oversizes. Pilots are furnished Std., .003", & .015". Use reamers in sequence with correct pilots when reaming from standard to oversize. Regrind valve seats AFTER reaming guides.

INITIAL VALVE CLEARANCE: To insure valve being on the low side of the cam, make all adjustments in the following sequence, and with No. 1 & No. 6 pistons in the indicated position.
No. 1 Piston at TDC (Compression Stroke)—Adjust **No. 1** In. & Ex., **No. 2** In. & Ex., **No. 5** In. & Ex., **No. 7** In., **No. 4** Ex.
No. 6 Piston at TDC (Compression Stroke)—Adjust **No. 6** In. & Ex., **No. 3** In. & Ex., **No. 7** Ex., **No. 8** In. & Ex., **No. 4** In.
Turn valve adjusting screw clockwise while moving push rod up and down until **all slack is removed.** ***(CAUTION—Plunger unit of hydraulic lifter should not be forced down into body during this operation).*** With all slack removed, turn adjusting screw an **additional 2½ turns.** Hold adjusting screw, tighten locknut to 30-35 ft.lbs. torque. *NOTE*—If lifter is noisy in operation, adjustment can be varied by turning adjusting screw ±¼ turn from original 2½ turn setting. Repeat operation on all valves.

ROCKER ARMS

ROCKER ARM ASSEMBLY: After assembly removed from cylinder head (see Cylinder Head Removal above), disassemble and reassemble the assembly as follows:

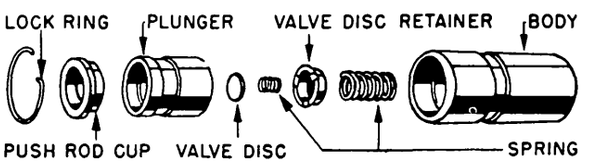
Rocker Arm Disassembly: Remove cotter keys, washers, rocker arms, springs, supports and plugs from shaft. ***Keep all parts in order as removed so they may be reinstalled in same position.*** Inspect all parts for wear and replace worn parts. If rocker arm radius is scored, replace arm, do not try to regrind radius.

Rocker Arm Reassembly: Reverse disassembly procedure. Install so valve ends of arms point outward away from support. See Illustration.

HYDRAULIC LIFTERS

HYDRAULIC VALVE LIFTERS: Lifters are "barrel type," integral units with a flat, disc type check valve. Lifter has three holes in outside diameter groove and four holes in plunger. Lifters are furnished in unit packs of eight.

Removal: Remove cylinder head covers. Take out rocker arm assembly support bolts and remove rocker arm assemblies, and valve push rods. Valve lifters can then be removed from lifter bores in block.



HYDRAULIC VALVE LIFTER

Disassembly: Immerse all lifters in solvent to remove all varnish and carbon deposits. DO NOT CUT OR SCRAPE CARBON FROM LIFTER. With needle nose pliers, remove lock ring from top of body. Remove push rod seat, plunger, valve disc assembly and spring from body. ***(CAUTION—Disassemble one lifter at a time to avoid inter-mixing lifter parts).***

Reassembly: Place push rod seat upside down on bench. Install plunger on push rod seat and place valve disc assembly on plunger and set spring on valve disc retainer. Place body over assemblies and push body down over plunger. Lift assembly and push plunger and push rod seat up into body. Install lock ring using tool 6500-C.

OILING SYSTEM

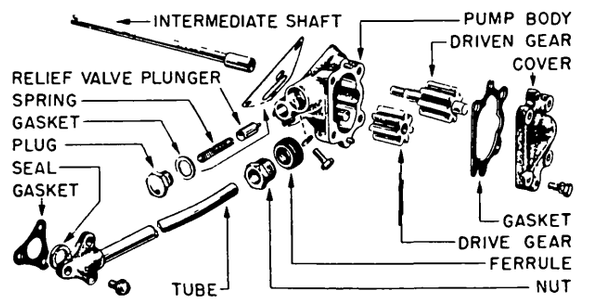
OIL PUMP

GEAR TYPE OIL PUMP

Removal: Disconnect external oil line. Remove attaching capscrews and remove pump and intermediate shaft.

Disassembly: Remove capscrews retaining bottom cover to pump body. Tap cover gently with a soft hammer if stuck. (CAUTION—Do not tap end of drive gear shaft). Remove gears from pump body, relief valve plug gasket, spring and relief valve. Pull oil inlet pipe ferrule assembly from large hole of pump body.

Inspection: Wash all parts in solvent. Check all parts for signs of wear, or grooves that might cause an oil leak. Check drive gear shaft length (short end .500"± .030"). If more than .530" replace drive gear shaft to insure proper engagement of distributor shaft to intermediate shaft groove when distributor assembled to engine. Check oil pump relief valve spring tension which should be 9.82 lbs. at 1.71". Check gears, and if worn or scored, replace as necessary.



GEAR TYPE OIL PUMP

Reassembly: Install gears in pump body and install cover using a new gasket. Install new oil inlet tube ferrule assembly in large hole of pump body. Position relief valve in bore and install spring and plug with new gasket.

ROTOR TYPE OIL PUMP

Removal: Disconnect external oil line. Remove attaching capscrews (two from bottom, one from above). Remove pump and intermediate shaft.

Disassembly: Remove capscrew securing cover to body assembly. Remove cover and "O" ring gasket. Remove rotor and shaft assembly. Remove relief valve nut, spring and relief valve.

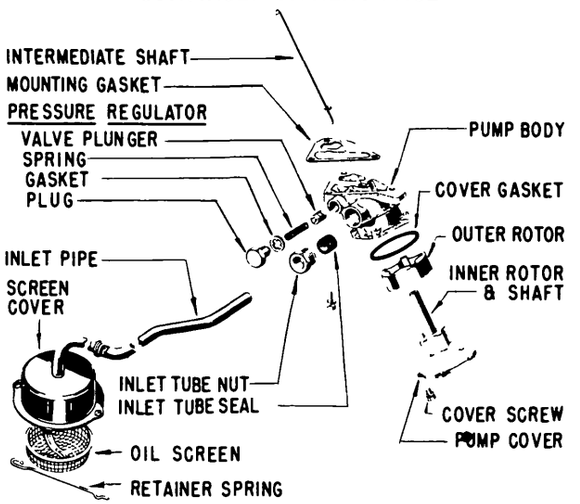
Inspection: Clean all parts in suitable solvent. Check pump housing and rotors for damage or excessive wear. Check compression of relief valve spring which should be 6.1-7.3 lbs. at .80". Check relief valve clearance in body assembly. Measure outer rotor race to body clearance. Clearance should be .006-.009". With rotor and shaft assembly installed in housing, place straightedge over rotor assembly and pump body. Measure clearance between straightedge and pump at rotor. Clearance should be .001-.0035". Check cover for wear, and if scored or grooved, replace it. Drive gear shaft length should be 3.36-3.38" from rotor assembly face to shaft end. *NOTE* - Outer rotor and shaft and rotor assembly are replaced as a unit.

Reassembly: Reverse disassembly procedures. Check assembled pump to see that it rotates without bind.

OIL FILTER

OIL FILTER SERVICING: Filter is full-flow type and should be replaced at 4000 mile intervals (or more often if required by operating conditions).

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ROTOR TYPE OIL PUMP

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►*REPLACEMENT CAUTION*—Use Replacement Kit, Part No. HCK-6731-A, which includes correct Filter Element and NEW GASKETS WHICH MUST BE USED.

Filter Removal: Take out center bolt in filter cover, remove filter assembly. Remove and discard cover mounting gasket from filter mounting pad, remove and discard filter element. Remove and discard neoprene gasket from center bolt, remove spring and seat assembly from center bolt, then remove center bolt from cover, remove and discard fiber center bolt-to-cover gasket. Wash all parts and filter pad on block with solvent and make certain they are clean.

Filter Installation: Install NEW fiber gasket on center bolt, install bolt in cover, install spring and seat assembly on bolt with open end of seat toward cover (*CAUTION*—seat must be attached to spring by tangs). Install NEW neoprene gasket on center bolt next to spring seat, install new filter element. Install NEW filter mounting gasket in block recess (*CAUTION*—DO NOT use sealing compound on this gasket). Install filter assembly on engine making certain that filter is seated in recess and not "cocked" over shoulder of recess. Tighten center bolt just enough to bring case up against gasket, rotate housing slightly to assure even seating, then tighten center bolt to 20-25 ft.lbs. torque. *CAUTION*—DO NOT overtighten the bolt which may strip threads, distort cover, or cause leaks. After engine started up, allow it to idle until lubrication established and normal oil pressure secured, then speed up engine and check for oil leaks.

FUEL SYSTEM NOTES

LINCOLN & CONTINENTAL

CARBURETOR AIR INTAKE DUCT ASSEMBLY (WITH THERMOSTATIC CONTROL): Thermostatically controlled valve in air intake duct assembly should be fully closed at 65° F. (for air intake from rear "heated" opening), and should start to open at 75° F. At temperature of 95° F., valve should be wide open (for air intake from front "cool" opening). If valve does not operate satisfactorily, remove duct assembly and test operation as follows:

Duct Assembly Removal: Loosen clampscrew and slide flexible hose off end of duct. Remove wing nut retaining air cleaner on carburetor, remove nut and washer retaining duct assembly on bracket. Lift air cleaner and duct assembly off engine. Loosen two clampscrews and slide duct assembly from air cleaner.

Testing: Place duct assembly in pan of water at temperature below 65° F. (thermostat must be covered by water). Valve should be in closed "heat on" position. Heat the water slowly. At temperature of 75° F., valve should start to open (*NOTE* - If valve does not start to open, hold water temperature at 75° F. for eight minutes before discarding thermostat as defective). Increase water temperature to 95° F. Valve should now be wide open in "heat off" position (*NOTE* - If valve not wide open, hold water temperature at 95° F. for eight minutes before discarding thermostat as defective). If valve operation not satisfactory, remove thermostat and spring assembly and check valve shaft for binding. If valve moves freely, replace thermostat and duct assembly. If valve does not operate correctly, adjust thermostat rod as follows:

Adjustment: Increase rod length to move valve toward "heat off" position, decrease rod length to move valve toward "heat on" position.

▷*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on patent plate attached to left front body pillar between door hinges.
First Number – (Lincoln) 5001, (Continental) 1001.

▷*LINCOLN SERIAL NUMBER NOTE: Serial number (example *56LA5001L*) includes following identification data in sequence.*

Year	Assy. Plant	Serial No.	Engine Type
56	Ⓒ	5001	Ⓔ L

Ⓒ – LA – Los Angeles. WA – Wayne. Ⓔ – Lincoln.

▷*CONTINENTAL SERIAL NUMBER NOTE: Serial number (example *C5681001*) includes following identification data in sequence.*

Eng. Type	Year	Month	Serial No.
C Ⓒ	56	Ⓔ	1001

Ⓒ – Continental.
Ⓔ – Model year began June, 1955. Numbers (6 for June through 9 for September and 0 for October) or letters (beginning with A for November 1955 and alphabetically thereafter) are used

TUNE-UP

▷*HARD STARTING CORRECTION: See CARBURETOR below.*

COMPRESSION PRESSURE: 150±10 lbs. at cranking speed.

VACUUM READING: 18-19" at 475-500 RPM in neutral.

VALVE TAPPET CLEARANCE: None in service (hydraulic). Adjustment required only when servicing valves or hydraulic lifters.
Initial Valve Tappet Clearance Adjustment - See "Valve System" in Lincoln Special Data.

▷*TAPPET CLEARANCE ADJUSTING SCREW NOTE: "Self-l cking" screws used on later cars. See "Valve System" in Lincoln Special Data.*

LINCOLN MANIFOLD HEAT CONTROL: External valve at right exhaust manifold connection to exhaust pipe. Valve is automatic, requires no adjustment but should operate freely. When valve is closed, most exhaust gases are discharged through left hand exhaust pipe.

CONTINENTAL MANIFOLD HEAT CONTROL: Valve is mounted at end of right hand manifold. Valve is automatic, requires no adjustment but should operate freely. Dual exhaust system used.

▷*NOTE:* When valve is closed, gases are discharged through left exhaust manifold back through left resonator (one in each exhaust pipe ahead of muffler) to the cross-over pipe where gases are again divided and discharged through the right and left mufflers. Cross-over pipe has been included to equalize exhaust system.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders-RIGHT BANK 1-2-3-4. LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .032-.036".
Spark Plug-Champion 860. 18mm.

▷*SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be tightened within limits of 15-18 ft. lbs.

▷*LINCOLN SPARK PLUG MISFIRE CORRECTION:* If misfire condition exists at either No. 8 or No. 6 cylinder, interchange No. 6 & No. 5 spark plug wire positions in all insulator blocks.

COIL: Lincoln No. B6A-12029-A. *12 Volt.*
Ignition Current-2.5 amps. idling, 4.5 amps. stopped.
Resistor-Lincoln No. B6A-12250-B. On bracket attached to top of coil.

▷*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

DISTRIBUTOR: (Lincoln) Lincoln No. FDU-12127-B, (Continental) No. FEG-12127-A. *12 Volt.* New double diaphragm, pressure type with separate vacuum lines to manifold and carburetor.

▷*LINCOLN GROUNDING OF DISTRIBUTOR TERMINAL PRIMARY WIRE ASSY. CORRECTION:* Screws securing distributor identification plate extend into housing and may penetrate primary wire insulation and ground wire. To correct, grind or file off sharp points, replace damaged wire.

▷*INTERMITTENT OR COMPLETE IGNITION FAILURE CORRECTION:* May be caused by having distributor primary wire improperly welded to one or both of its terminal lugs (insulated wire from terminal on distributor to breaker point terminal).
Condenser-Lincoln No. FAB-12300-A. Capacity .21-.25 microfarad.
Contact Point Set-Lincoln No. FAB-12171-B.
Breaker Gap-.014-.016".
Cam Angle-26-28.5°.
Breaker Arm Spring Tension-17-20 ozs.
Rotation-Counter-clockwise viewed from above.

Advance Performance
▷With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	.12	350
¼-1¼	.21	400
3-4	.46	600
5¼-6¼	.70	800
6¾-8	.90	1000
8¼-9½	1.09	1200
10¼-11½	1.42	1500
12¾-14	1.88	2000

DISTRIBUTOR INSTALLATION NOTE: It may be necessary to crank engine slightly if distributor is not seated properly in cylinder block. Crank engine, while holding distributor down, until intermediate shaft is engaged and distributor drops into place. *CAUTION-Do not start engine until distributor clamp and nut are in place.*

Initial Distributor Timing: Remove No. 1 spark plug. Crank engine until piston starts up on compression. Slowly "bump" engine over with starter until timing mark is aligned with pointer. Find No. 1 spark plug socket in distributor cap and fit cap to distributor housing. Mark distributor housing to indicate No. 1 spark plug wire position. Position rotor approximately 20° counter-clockwise from mark made on distributor housing. Engage distributor drive gear and install distributor in engine.

IGNITION TIMING

Setting-5° BTDC. with engine idling at 475 RPM and PRIMARY (inner diaphragm) vacuum line disconnected. *See Initial Distributor Timing above.*
Timing Mark-Crankshaft pulley marked TDC with twenty 2° lines before this point. Space between 2nd and 3rd line before TDC mark should be aligned with pointer on engine front cover.

CARBURETOR

Lincoln (Holley), ECU-9510-B, C, D, E. 4-Barrel carburetor with integral automatic choke.

▷*CARBURETOR PRODUCTION CHANGES – ECU-9510-D, E (To Provide Improved Choke Operation & Eliminate Possibility of Fuel Leakage at Fuel Inlet Valve): See "Holley (Ford, Lincoln, Mercury) 4-Barrel Centri-Quad" in Carburetion Section.*

▷*CARBURETOR AIR INTAKE DUCT ASSEMBLY (THERMOSTATIC CONTROL):* Carburetor air intake duct to air cleaner has thermostatically controlled valve which provides warm air for cold engine (air taken in through muff or shroud around exhaust manifold), or cool air for warm engine (air taken in at front in front of radiator). Thermostat begins to open valve at 75° F. and valve should be wide open with air temperature of 95° F. or higher. *See "Fuel System Notes" in Lincoln Special Data for testing and adjusting data.*

▷*HARD ENGINE STARTING CORRECTION (Due to Disengagement of Choke Link):* If choke link found disengaged, reinstall choke link and bend tab of choke thermostat lever toward link sufficiently to prevent link from becoming disengaged, allowing sufficient clearance between the tab of thermostat lever and choke link to permit operation without binding or sticking. Loop on thermostat spring must fit over tang on thermostat lever.

▷*HARD STARTING, STALLING & ENGINE BACKFIRE CORRECTION (When Due to Improperly Installed or Broken Automatic Choke Fresh Air Heater Tube):* An improperly installed or broken tube may cause choke plates to stick open creating above conditions. Tube must pass completely through manifold so that ends are visible. New tube, Part No. ECU-9890-A, is available for service replacement. *See "Holley (Ford, Lincoln, Mercury) Centri-Quad" in Carburetion Section.*

▷*HARD COLD STARTING (ECU-9510-B Carburetor):* If, after depressing accelerator, choke plates do not set themselves, choke fast idle cam should be checked. If too much stock has been removed from upper tip of cam at point where cam contacts choke link roller, there is a possibility that the cam will bind and wedge the linkage. This occurs when cam tip falls below roller center line, wedging the linkage.

▷*LINCOLN VAPOR LOCK CORRECTION:* Check fuel pump-to-fuel tube hose assembly. Correct hose, Part No. LE-9288-A, has an inside opening of .31". A hose with too small an inside opening will contribute to the vapor lock condition.

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►*IDLE SPEED (AIR CONDITIONED CARS)*· Automatic throttle control is incorporated on air conditioned cars and is adjusted as follows. With engine warm, air conditioning system operating, and transmission in neutral, adjust knurled nut at end of operating rod of the control assembly to obtain an idle speed of 800 RPM, tighten locknut Check idle to make sure that it returns to normal whenever air conditioning is turned off or the transmission is shifted out of neutral

NOTE – Engine idle should be checked and set to specifications before attempting to adjust fast idle device.

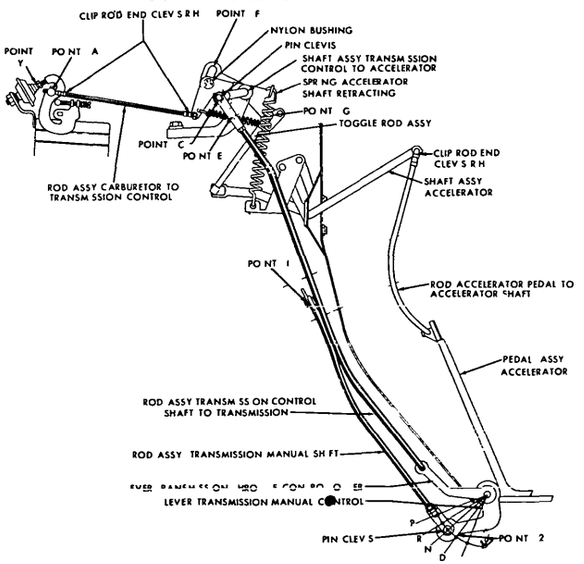
►*MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyl. 2-3-5-8. LEFT barrels 1-4-6-7.*

Idle Setting–1¼ turns open (set both screws alike)

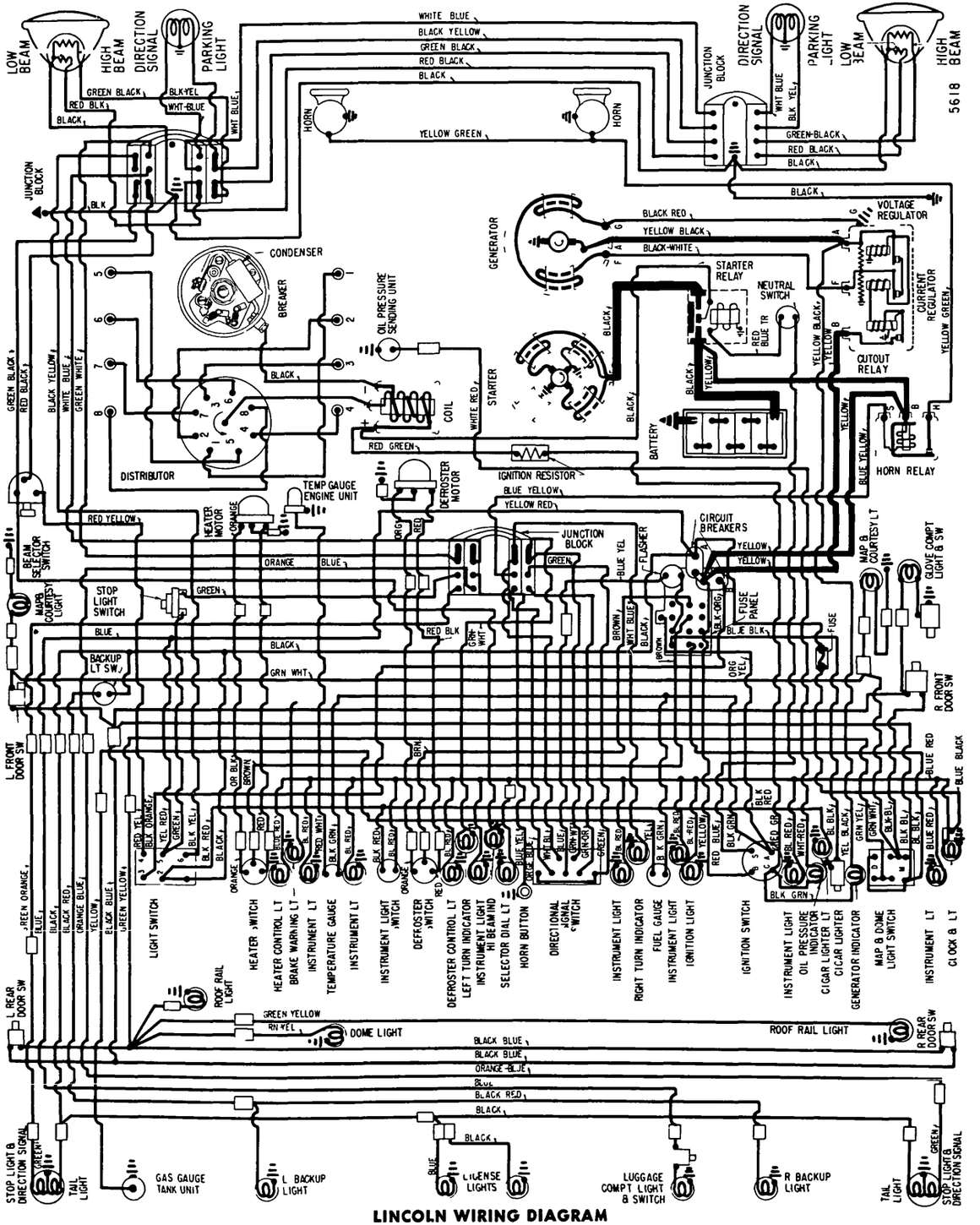
Idle Speed–425-450 RPM with selector lever in "DR" position

Throttle Linkage Adjustment: Set hand brake and adjust engine idle to 425 RPM with engine at normal operating temperature, fast idle cam in low idle position, and transmission in "DR" position Adjust anti-stall dashpot (see below) Disconnect clevis pin from transmission control to accelerator shaft and transmission shaft-to-transmission rod assembly Disconnect carburetor to transmission control rod Insert gauge pin through bellcrank and bracket in transmission control-to-accelerator shaft assembly Set carburetor at low idle manually Adjust carburetor-to-transmission control rod assembly so that with trunnion pin in place at rear end of rod, trunnion at forward end will go in freely Assemble in this position Remove gauge pin Pull upward gently but firmly on transmission control shaft-to-transmission rod assembly This will position

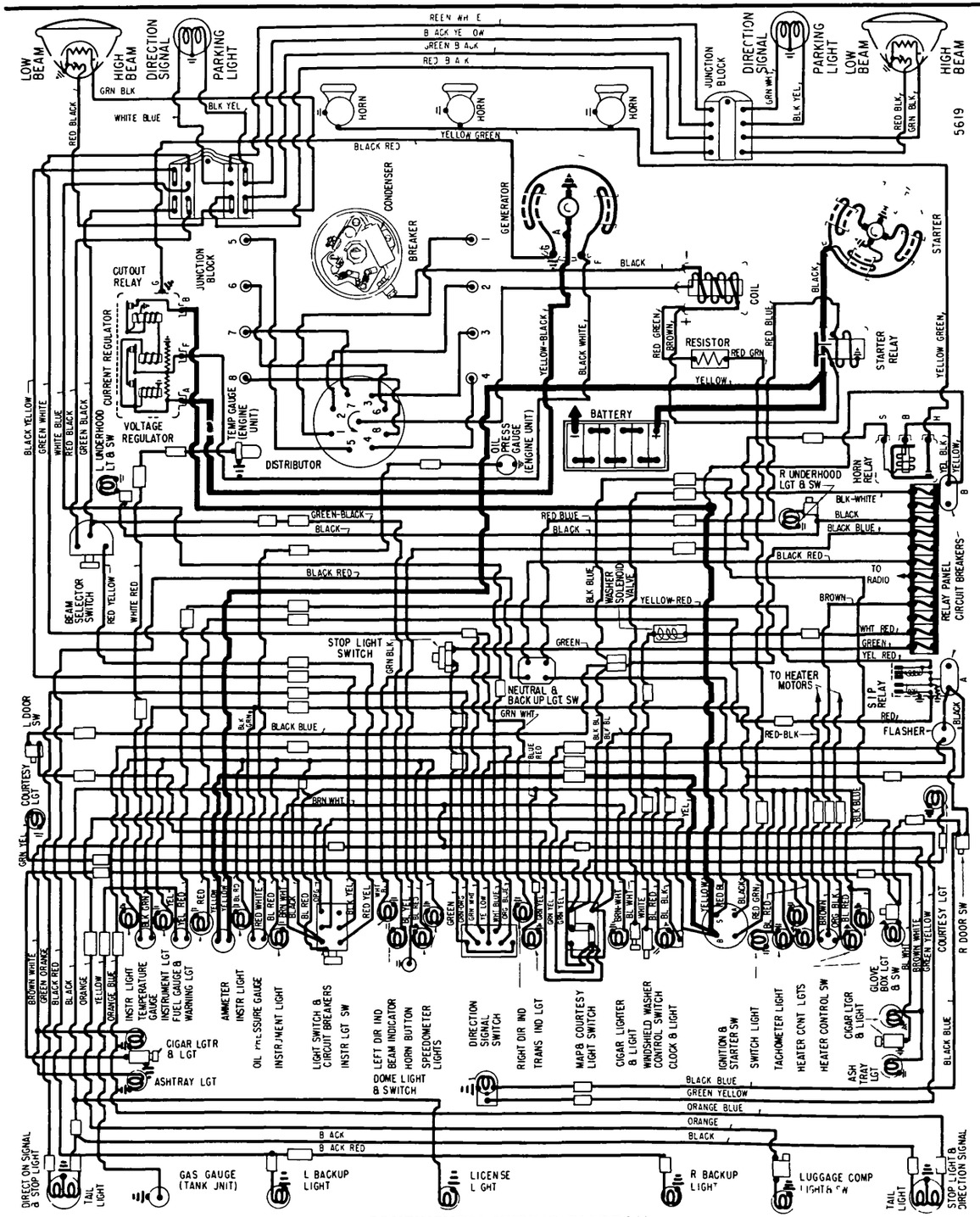
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TURBO-DRIVE THROTTLE LINKAGE



LINCOLN WIRING DIAGRAM



CONTINENTAL WIRING DIAGRAM

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throttle lever in the stop position at transmission. Adjust clevis pin at forward end of transmission control-to-accelerator shaft assembly so that clevis pin enters assembly freely. Lengthen transmission control shaft-to-transmission rod assembly by turning clevis 2½ turns and assemble in place. With ignition off and accelerator depressed to full kickdown position, adjust length of toggle rod assembly so that the nylon bushing has a clearance of .25" (Lincoln), .10" (Continental) from top of slot in accelerator shaft assembly. Adjust lateral angle of toggle rod to a vertical plane, by loosening jam nut at lower end of rod, inserting screwdriver in slot of stud provided and turning ball stud in required direction, tighten jam nuts. *NOTE* - Toggle rod assembly is installed in lower and forward hole (Lincoln) and upper hole (Continental) of transmission control-to-accelerator shaft.

Dashpot Adjustment: Turn throttle lever set screw out until dashpot plunger bottoms, then back it off to give .045-.064" clearance between end of screw and plunger.

► *OTHER DATA: See "Holley (Ford, Lincoln, Mercury) 4-Barrel Centri-Quad" Carburetors in Carburetion Sect.*

Fuel Pump Pressure: 4-6 lbs. at 500 RPM

CARB. EQUIPMENT

Fuel Pump: (Lincoln) Lincoln No. ECU-9350-A, (Continental) No. ECV-9350-A. Fuel and vacuum type.
Pressure – 4-6 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley Electric type.
Dash Unit – (Lincoln) Lincoln No. FDU-9280-A, (Continental) Part of instrument cluster 4049792.
Tank Unit – (Lincoln) Lincoln No. FDU-9275-A, (Continental) No. 4047440.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Lincoln – Lincoln No. FDU-10655-C. *12 Volt,* 13 plate, 65 ampere hour capacity (20 hour rate).

► *LINCOLN BATTERY INSTRUCTION DECAL CAUTION*
A few cars were released with wrong instruction decal on battery box cover, indicating that positive cable grounded. 1956 Lincoln has **negative** ground.

Continental – Lincoln No. 4047942. *12 Volt,* 13 plate, 65 ampere hour capacity (20 hr. rate).

Location – (Lincoln) In vertical compartment beneath right side of dash panel. (Continental) In engine compartment.

Battery Ground – Negative, to engine block.

► *CAUTION: This is reversed from previous Lincoln models.*

Engine Ground – Cylinder head to dash.

STARTER

Lincoln No. B6A-11002-A. Armature – B6A-11005-A. *12 Volt.*
Drive – Bendix "Folo-Thru". Lincoln No. 1CM-11350-C.
Rotation – Counter-clockwise at commutator end.
Brush Spring T nsion – 48-56 ozs.
Cranking Sp ed – 150-180 RPM with warm engine.

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Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4800 max.	12.0	100-120
	150-180 Ⓒ	8 or more	210 max.

Ⓒ – Cranking speed with warm engine.

Starting Switch: Relay, Lincoln No. B6A-11450-A, controlled by Ignition & Starter Switch, Lincoln No. B5A-11572-A, and Turbo-Drive Neutral Safety Switch, located on steering column.

Turbo-Drive Neutral Safety Switch Adjustment: *See "Turbo-Drive" in Transmission Section.*

► *SELF-STARTING OF ENGINES & CONTINUOUS OPERATION OF BACK-UP LIGHTS CORRECTION:* Neutral Safety Switch Insulator Assembly has been modified to prevent above condition. Original Part No. FDK-15827-B remains the same, but modified assembly can be recognized by two ridges approximately .020" high on each side and parallel to brass strip.

GENERATOR

Lincoln No. 86A-10002-A. *12 Volt.* **Armature** – B6A 10005-B.

Performance Data

Amperes	Volts	Gen. RPM
30	15	Ⓒ 2500

Ⓒ – At 1500 Engine RPM.

Brush Spring Tension – 26-34 ozs.

Field Current – 1.5-1.6 amps. at 15 volts (Hot).

Rotation – Counter-clockwise at commutator end.

Belt Adjustment: Approximately ½" deflection on belts midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Lincoln No. B6A-10505-A. *12 Volt.*

► *SETTING NOTE:* Settings are for regulator at NORMAL OPERATING TEMPERATURE (after running engine for 20 minutes at 1500 RPM if started cold, or until temperature gauge is steady for 5 minutes if engine previously warmed up) with room temperature at 75° F.

Cutout Relay

Cuts In – 12.0-12.8 volts.

Cuts Out – 2.0-6.0 amps. (reverse current).

Voltage Regulator

Setting – 14.6-15.4 volts.

Checking & Adjusting – *See Electrical Section.*

Current Regulator

Setting – 28-32 amperes.

Checking & Adjusting – *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Direction Signals: *See Electrical Section.*

Automatic Headlight Dimmer – *See Electrical Section.*

Lighting Switch Removal: (*NOTE* – Toggle type used on Lincoln, push-pull type used on Continental). Remove anti-rattle bezel from switch, then remove switch from rear of dash panel.

► *DIMMER SWITCH INSTALLATION CAUTION:* A few defective dimmer switches, Part No. FDU-13740-A, were installed in early production. Only switches with yellow spot should be installed in service.

Stop Light Switch Location: On forward end of brake master cylinder (integral with power brake unit). Master cylinder or power brake unit located on firewall in engine compartment.

FUSES: Interior Lights – SFE 7.5 amps.
Direction Signals – SFE 7.5 amps.
Heater Blowers – SFE 14 amps. (2 on Lincoln).
Radio – SFE 7.5 amps.
Clock – AG 1 amp.
Cigar Lighter – SFE 15 amps. (Lincoln), SFE 20 amps. (Continental).
Windshield Washer – SFE 7.5 amps.
Back-Up Lights – SFE 7.5 amps.
Underhood Lights – SFE 7.5 amps. (Continental).
Automatic Headlight Dimmer – AGC 3 amps.
Air Conditioning – SFE 20 amps. (Continental).
Radio Antenna – SFE 14 amps. (Lincoln).

CIRCUIT BREAKERS: Lighting – Two 12 ampere circuit breakers (one for headlights, one for auxiliary lights) mounted on headlight switch (Continental) on fuse panel behind instrument panel (Lincoln).
Windows & Seats – One 15 ampere for each window motor. One 15 ampere common to both seat motors.
Convertible Top (Lincoln) – 30 ampere circuit breaker.
Air Conditioning (Lincoln) – 15 ampere circuit breaker.
Underhood Lights (Lincoln) – 12 ampere circuit breaker.
Stop Lights (Continental) – 12 ampere circuit breaker.

HORNS: Dual (Lincoln), Triple (Continental) horns operated by relay. *12 Volt.*

Lincoln Horns

Lincoln Nos.	Trumpet Type	Sea Shell Type
High Pitch	FDT-13832-B	FDU-13832-A
Low Pitch	FDT-13833-B	FDU-13833-A

Continental Horns

Lincoln Nos.	Trumpet Type	Sea Shell Type
High Pitch		B5T-13832-B
Low Pitch		B5T-13833-B
Third Horn	4049179	

Horn Relay – Lincoln No. 2Q-13853-A.

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air conditioning Service Cautions" in Misc. Section.*

► *VALVE STEM SEAL & CYLINDER HEAD PRODUCTION CHANGE:* Short length of valve stem seal has been increased .100" in order to shield a greater area of valve stem from oil splash. As a result of seal change it was necessary to increase length of the outside diameter of the valve guide. *New seal should be used with New Head* (New Seal, Part No. B6Q-6571-A. New Head, Part No. ECU-6049-C). Present seals can be used with either the old or new head.

ENGINE SPECIFICATIONS: 90° V8.

Bore	Stroke	Displacement
4.00"	3.66"	368 cu. ins.
Rated HP	**Compr. Ratio**	**Developed HP**
51.2	9.0-1	285 at 4600 RPM

Compression & Vacuum Reading – *See TUNE-UP.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Lincoln Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Lincoln Special Data.*

ENGINE REMOVAL: *See "Engine" in Lincoln Spec. Data.*

OIL PAN REMOVAL: Remove oil inlet pipe hex fittings at oil pump and side of oil pan and remove pipe. Remove oil pan capscrews, then remove oil pan and gasket.

NOTE – When this operation is performed, turn crankshaft until rear counterweights of crankshaft are up. The oil pan can then be removed from front of engine.

PISTONS

Aluminum alloy, autothermic slipper type with three rings above pin. Tin-plated.

► *ORIGINAL BORE & PISTON SIZES:* Std. cylinder bore limits are 4.0000-4.40024" and TWO Standard Pistons are used for selective fitting as follows: 3.9993-3.9996" Diameter (marked "2" on dome), 4.0005-4.0008" Diameter (marked "6" on dome). *NOTE* - Std. piston furnished for service in these two sizes.

Removal – Rod and piston assembly removed from above.

Fitting New Pistons: Using 1/2" wide feeler gauge inserted between piston and cylinder wall at right angle to pin on thrust side, pull should be 6-12 lbs. when using feeler gauge thicknesses as follows: New Piston in New Bore - .0015". New piston in Used Bore - .002". Used Piston in Used Bore - .003".

Replacement Pistons: Standard (Two sizes - see Original Bore & Piston Sizes above), and .020", .030", .040" Oversize.

Installing Pistons: Install all pistons with indentation on head toward front of engine. *See Rod Installation.*

PISTON PINS

Floating type with lock rings at each end.

Diameter – .9120-.9123". **Length** - 3.162-3.176".

Clearance in Piston – .0008" maximum.

Clearance in Rod – .0008" maximum. Select for light thumb press fit at 70° F.

Replacement Pins: Standard (marked Green), and .001" (marked Blue), .002" (marked Yellow) oversize.

PISTON RINGS

► *OIL CONTROL RING PRODUCTION CHANGE:* Effective engines built Jan. 6, 1956 (Continental) and Jan. 17 (Wayne) & Feb. 2, 1956 (Los Angeles) for Lincoln, new type oil control rings are being used in production. These rings are of the side sealing type.

Ring	Width	End Gap	Side Clearance
Compr.(1)	.0775-.0780"	.013-.030"	.006" max.
Compr.(2)	.0925-.0935"	.013-.030"	.006" max.
Oil (3)	.1860-.1865"	.010-.027"	Ⓒ.005" max.

Ⓒ – Early type ring. Later type ring is side sealing type. See Production Change above.

Replacement Rings: Standard size and .020", .030", .040" oversize.

► *SPACING NOTE:* Ring gaps should be spaced 120° apart, with oil ring gap to the side opposite spark plug side of cylinder bores.

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CONNECTING RODS

Length – 7.064-7.066". Weight - 28.36 ozs.
Journal Diameter – 2.2482-2.2486" (Color coded BLUE), 2.2486-2.2490" (Color coded RED). Use with bearing of same color.
Lower Bearing – Steel-backed, copper lead alloy lined.
Clearance – .0007-.0036".
Side Clearance – .006-.014". .017" Service max.
Replacement Bearings – Standard (2 sizes marked RED & BLUE for selective fitting) and .010", .020", .030", .040" undersize.
Installing Rods – Assemble rods to piston so indentation embossed on piston head will face front of engine. Numbered side of rods on the right bank should face right side of engine and rods for left bank will face left side of engine. Place caps on connecting rods so numbered sides match and install in same numbered cylinders.

CRANKSHAFT

▷*CRANKSHAFT PRODUCTION CHANGE (To Minimize Oil Leakage at Front & Rear Oil Seals):* New crankshaft has integral rear oil slinger as part of shaft. New front oil slinger may be installed on 1952-56 crankshafts. *See "Crankshaft & Main Bearings" in Lincoln Special Data.*
Journal Diameter – 2.6235-2.6239" (Color coded BLUE), 2.6239-2.6243" (Color coded RED).
Out-of-Round Limits – .0005" max. Taper Limits - .001".
Bearings – Steel-backed copper-lead alloy lined.
Clearance – .008-.0036".

▷*NOTE:* Any combination of Red or Blue bearing inserts may be used to obtain desired clearance. If desired clearance cannot be obtained, it will be necessary to regrind journals and install undersize bearing inserts.
Replacement Bearings: Std. (2 sizes color coded RED & BLUE for selective fitting) and .010", .020", .030", .040" undersize (Center & Rear Bearings), .020", .030" .040" undersize (Front & Intermediate Bearings).
End Thrust: Taken by No. 3 main bearing.
Thrust Bearing Alignment – *See "Crankshaft & Main Bearings" in Lincoln Special Data.*
Endplay – .012" maximum.
Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" In Lincoln Special Data.*
Crankshaft Front Seal Installation: *See "Engine Front Cover" in Lincoln Special Data.*

CAMSHAFT

▷*CAMSHAFT PRODUCTION CHANGE:* Two different camshafts used in production. New Camshaft, Part No. ECU-6250-C, replaced Camshaft, Part No. ECU-6250-B, in early production. New camshaft can be identified by by annular grooves around centers of Nos. 2 & 4 journals, instead of cross-drilled holes used previously. Similar groove has been cut in No. 3 journal to increase lubrication to journal. If new shaft installed, it will be necessary to replace EAD-6262-B bearings in No. 2 & 4 positions with new type B6Q-6262-A bearings.
Journal Diameter – 2.1240-2.1247". Out-of-Round Limit - .001".
Bearings – Steel-backed babbit lined bushings.
Clearance – .006" maximum. Endplay - .003" (restrained by thrust spring and plunger).
Replacement Bearings: Std. & .015" undersize.
Camshaft Removal: *See "Camshaft & Bearings" in Lincoln Special Data.*
Timing Chain: Width 1.25". Pitch .5". Length 25".
Deflection – 1/2".
Camshaft Setting: Timing marks on camshaft and crankshaft sprockets adjacent and in line with straightedge across shaft centers.
Timing Chain Cover Seal Installation (Crankshaft Front Seal): *See "Engine Front Cover" in Lincoln Spec. Data.*

VALVES

Valve Tappet Clearance: None in service (hydraulic). Adjustment required only when servicing valves or hydraulic lifters.
Initial Valve Tappet Clearance Adjustment–*See "Valve System" in Lincoln Special Data.*
▷*TAPPET CLEARANCE ADJUSTING SCREW NOTE: "Self-locking" screws used on later cars. See "Valve System" in Lincoln Special Data.*

▷*VALVE STEM SEAL PRODUCTION CHANGE: See "Valve Stem Seal & Cylinder Head Production Change" under ENGINE above.*
▷*EXHAUST VALVE STEM PRODUCTION CHANGE:* Stem diameter of all standard and oversize production and service exhaust valves has been reduced .0005" in order to increase stem-to-guide clearance. *See "Valve System" in Lincoln Special Data.*

Valve	Head Diam.	Stem Diameter Ⓒ
Intake	2.000-2.010"	Ⓒ.3415-.3420" or Ⓖ.3420-.3425"
Exhaust	1.630-1.640"	Ⓒ.3400-.3405" or Ⓖ.3405-.3410"

Valve	Seat Angle	Lift④	Stem Clearance
Intake	45°	256" min.	.001-.004" max.
Exhaust	45°	256" min.	.002-.005" max.

Ⓒ – Furnished with .003", .015", .030" oversize stems
NOTE – Early production exhaust valve stems, both std. and oversize were .0005" larger.
Ⓒ – Color coded RED. Use with RED valve guide.
Ⓖ – Color coded GREEN. Use with GREEN valve guide.
④ – Cam lobe lift (service limit).

Valve Seat Width – 1/16-5/64" (Intake), 5/64-3/32" (Exhaust).
Oversize Valve Stem Installation: *See "Valve System" in Lincoln Special Data.*
Valve Springs: Free Length – 2-1/8".

Spring Specifications

	Pressure	Length
Valve Closed	60 lbs.	1.80"
Valve Open	165 lbs.	1.38"

▷*SPRING HEIGHT CORRECTION:* Measure valve spring assembled height from point where spring contacts cylinder head to point where it contacts retainer. Assembled height of spring should be 1 25/32-1 13/16". Spacers are available in steps of .030" & .060" to bring assembled height within these limits or as near to this measurement as possible.
▷*SPRING SQUARENESS CAUTION:* If springs more than 1/16" out of square, with spring closed coil end on surface plate and measured with steel square, they should be replaced.
Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" intake, .005" exhaust), ream guides and install oversize valves. *See "Valve System" in Lincoln Special Data.*
Valve Lifters: Hydraulic, barrel type. Lifters can be removed from above with camshaft in engine.
Diameter–.8740-.8745". Clearance in Block .0025" max.
Initial Valve Clearance – *See "Valve System" in Lincoln Special Data.*
Lifter Overhaul – *See "Valve System" in Lincoln Special Data.*
Rocker Arm Assembly: *See "Valve System" in Lincoln Special Data.*
▷*ROCKER ARM COVER LEAK CORRECTION (Early Cars):* Grind away approximately 1/16" of inner flange for a length of 1½" at rear of cover.
▷*VALVE ROCKER ARM PRODUCTION CHANGE (Self-locking Valve Adjusting Screws). See "Valve System" in Lincoln Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
▷*VALVE TIMING NOTE: The following valve opening and closing points are with a camlift as indicated.*
Intake Valves – Open 18° Ⓒ BTDC, Close 72° Ⓒ ALDC.
Exhaust Valves – Open 59° Ⓒ BLDC, Close 31° Ⓒ ATDC.
Ⓒ – Camlift .002". Ⓒ – Camlift .004".
Valve Timing Check – With rocker cover removed, loosen adjusting locknut and screw of valve to be tested. Slide rocker arm to one side in order to have pushrod in the clear. With pushrod in tappet socket install a dial indicator in such a manner as to have actuating arm of indicator in the pushrod socket, in the same plane of pushrod movement (dial indicator used should have at least a total movement of .300" or more). Place a quadrant on the crankshaft pulley. If intake valve opening is being checked, engine is rotated slowly until dial indicator shows .002" camlift. At this point the actual opening reading in degrees is taken (18° BTDC). The engine is further rotated to check the valve closing. Dial indicator should read .004" camlift (72° ALDC)

OILING SYSTEM

▷*OIL LEVEL INDICATOR CAUTION:* Two types used. Indicator used with air conditioned cars has expanded anti-rattle section adjacent to tube cover and distance from cover to "Full" mark is 25.97" and is about 3" longer than that used with other cars. Distance from cover to "Full" mark on standard type is 23.01".
Crankcase Capacity) 5 qts. (refill). 6 qts. (when filter changed).
Normal Oil Pressure: 45-50 lbs. at 2000 RPM (Hot).
Pressure Regulator Valve–In pump body. Not adjustable.
Oil Pressure Indicator (Lincoln): Light on instrument panel. Light is on when oil pressure is low.
Oil Pressure Gauge (Continental): King-Seeley Electric.
Engine Unit - (Lincoln) Lincoln No. B6A-9278-A pressure switch. (Continental) No. FDA-9278-A.
See "Oil Pressure Gauges" in Miscellaneous Section.

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Oil Pump: Gear and rotor types used. Located on left side of engine crankcase and driven by distributor drive gear.

►*OIL PUMP INSTALLATION CAUTION (Aluminum Body):* Attaching screw, Part No. 20446-S8 (5/16"-18 x 1¼") and lockwasher, Part No. 34806-S7, should be used in threaded hole of pump body instead of 1-1/8" used previously. Former screw had tendency to strip softer aluminum thread. Screw should not be longer than 1¼" to prevent possibility of its bottoming.

Pump Overhaul—*See "Oiling System" in Lincoln Special Data.*

Oil Filter: Full-flow type with pressure relief valve in center filter bolt. Replace filter element at 4000-5000 miles or when oil becomes dirty or polluted.

Replacement Filter Element—HCK-6731-A (Kit includes new gaskets).

See "Oiling System" in Lincoln Special Data.

CAUTION—Special "full-flow" filter element must be used for replacement (use of by-pass type filter element will restrict engine oil flow and result in insufficient engine lubrication).

Crankcase Ventilation: Combination oil filler and road draft tube and air filter cap, located on front of valve pushrod cover. Clean and oil the oil filler cap filter every 2000 miles.

COOLING

Water Capacity: 23 qts. total - without heater (22 qts. recommended). Additional 2.4 qts. with heater.

Pressure Valve: Lincoln No. LA-8100-A3 (14 lbs.), LA-8100-A4 (13 lbs.). Radiator filler cap, stamped with figure "14" or "13".

Thermostat: Lincoln No. EAD-8575-D (157-162° F.), B4Q-8575-B (168-173° - use with permanent anti-freeze)

Water Pump: Packless, sealed ball bearing type.

See "Lincoln" in Water Pump Section.

Temperature Gauge: King-Seeley Electric.

Dash Unit — (Lincoln) Lincoln No. FDU-10883-A, (Continental) Part of Instrument Cluster, Lincoln No. 4049792.

Engine Unit — Lincoln No. B6A-10884-A (All).

See "Temperature Gauges" in Miscellaneous Section.

TURBO-DRIVE TRANSMISSION

Torque converter and three-speed automatic transmission with hydraulic control and mechanical parking lock.

See "Turbo-Drive" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Turbo-Drive" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Turbo-Drive" Transmission in Transmission Section.*

Lubrication — Check transmission oil level every 2000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 16,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level—With selector lever in "N" (Neutral) and emergency brake applied, run engine approximately four minutes at idle speed. Check to see that emergency brake is applied and that engine is on slow idle, move selector lever to the "P" (Park) position. *(NOTE*—When engine and transmission are at normal operating temperature, move selector lever through all ranges to assure fluid distribution throughout transmission). Raise hood and wipe top of oil level indicator. Remove indicator and read fluid level. Add Automatic Transmission Fluid "Type A" if necessary to bring fluid level to "Full" mark on indicator.

THROTTLE LINKAGE ADJUSTMENT: *See CARBURETOR above.*

►*OTHER "TURBO-DRIVE" SERVICE DATA: See "Turbo-Drive" Transmission in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

REAR AXLE

►*REAR AXLE PINION SEAL "SQUEAL" CORRECTION: See "Ford, Lincoln, Mercury (Integral Carrier)" in Rear Axle Section for installation of special type pinion seal.*

►*LINCOLN REAR SUSPENSION "THUMP" CORRECTION:* May be caused by differential housing hitting against differential bumper. To correct, replace rear spring torque reaction bumpers, Part No. LD-55786-C, with heavier bumpers, Part No. MA-55712. Rear spring riding height should also be checked.

Own. Semi-floating hypoid gear, with Hotchkiss drive. *See "Lincoln, Mercury, Ford (Integral Carrier)" in Rear Axle Section.*

Ratios — 3.07-1 (Std.), 3.31-1 (Optl. on Lincoln).

Backlash—.003-.008" with .002" maximum variation per gear set.

Axle Shaft Removal: Remove rear wheels and take out screws holding brake drum to axle shaft flange. Remove hydraulic brake lines from brake backing plate. Take out axle retainer nuts (working through opening in axle shaft flange). Use Tool 4235-C2 to remove axle shaft and bearing assembly from axle housing. Take off backing plate and gasket and remove axle being careful not to damage oil seal.

Axle Assembly Removal: Raise rear of car and remove axle shafts and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers and spring U-bolts. Remove axle housing assembly from car.

Wheel Bearing Adjustment: None required.

FRONT SUSPENSION

Independent. "Ball-Joint" suspension with direct acting shock absorbers mounted within front coil springs.

See "Lincoln, Mercury, Ford (Ball Joint)" in Suspensions and Wheel Alignment Section.

Alignment Specifications	Lincoln	Continental
Kingpin Inclination	① 7°10'	① 7°
Caster	② 0°-Neg. 1½°	③Pos. 1°±¼°
Camber	③ 0°-Pos. ¾°	③Pos. ¾°±¼°
Toe-In	④ 1/8-3/16"	3/32-5/32"

① — With Pos. 3/4° camber.
② — Within 1/2° from one side of car to other.
③ — Within 1/4° from one side of car to other.
④ — Supersedes previous specification of 1/32-3/32".

Toe-Out on Turns — With wheels at maximum turning angle, outer wheel is at 26° and inner wheel is at 36°.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

Shock Absorber Nos.	Front	Rear
Lincoln (Std.)	LD-18045-A	LD-18080-A
Lincoln (Hvy. Duty)	LD-18045-H	LD-18080-H
Continental	4048114	4048113

STEERING

►*TIRE RUBBING ON FRAME CORRECTION:* If front tires rub against frame or any other part of vehicle on a full turn, steering arm stops should be replaced with new stops, Part Nos. LD-33590-C and LD-33591-C. New stops can be identified by half-round notch located on edge of part between mounting holes.

►*LINCOLN STEERING COLUMN RATTLE CORRECTION:* Inspect upper steering column bushing and if steering column shaft-to-bushing clearance is excessive, bushing should be removed and be replaced with a spring-loaded nylon type bearing, Part No. FDT-3517-A.

Power Steering: Saginaw In-Line. *See "Saginaw In-Line" Power Steering in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw In-Line" Power Steering in Steering Section.*

Steering Gear Removal: *See "Saginaw In-Line" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Sect.*

BRAKES

Bendix Hydraulic. Duo-servo with fixed anchor pins. No eccentric adjustment. Parking lever applies rear wheel service brakes.

See "Ford, Lincoln, Mercury Bendix" in Brake Section.

►*BRAKE "SQUEAL" CORRECTION:* An anti-squeal spring, Part No. 51A-1140, is available for installation on outside of brake drum.

Drums — Diameter 12"front and rear.

Wheel Cylinder Diameter — 1 3/32" (front),,15/16" (rear).

Lining — Molded type riveted to shoe.
Width — 2.5" (front), 2" (rear). **Thickness** — 7/32".

Braking Power — 55.5% (front), 44.5% (rear).
Clearance — Tighten adjusting screw about 5 or 6 clicks after wheel stops turning (shoes tight against drum), then back adjusting screw off 12 to 14 clicks.

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Brake P dal Adjustm nt: Adjust eccentric bolt attaching brake pedal to master cylinder pushrod to give 1/4-7/16" free movement of pedal pad before rod moves master cylinder.

Standard Mast r Cylinder: Located on engine side of firewall.

Ch cking Fluid – Maintain fluid level to within ¼" of top of reservoir.

R moval–Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to fire wall.

P w r Brak s: Bendix Vacuum Power Unit (combination vacuum power unit and master cylinder). Unit mounted on engine side of fire wall and replaces regular master cylinder.

Se *"Bendix Power Unit" in Brake Section.*

Checking Fluid–Same as for regular master cylinder.

Removal of Power Unit–Disconnect valve pushrod from brake pedal assembly in drivers compartment. Remove master cylinder outlet fitting bolt from master cylinder.

(NOTE–It is not necessary to remove stop light switch, wires or hose assembly from outlet fitting. Do not disturb outlet fitting in master cylinder). Loosen clamp securing manifold vacuum hose to check valve on power unit. Remove hose from valve. Loosen clamp securing vacuum reserve tank hose to fitting on check valve. Remove four capscrews securing power brake assembly to bracket on dash panel and remove power brake assembly.

MISC. MECHANICAL

Windshield Wip rs: Cable operated vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Own. *See "Lincoln Air-Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Power Window Regulators" in Miscellaneous Section.*

Power Top Control: Reversible type motor (mounted under seat) drives two screw type jacks (one on each side) through flexible cables. Controlled by relay and two-way switch. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: Electric type. Individual motor for vertical and horizontal adjustment. *See "P w r Seat Adjusters" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	① 75
Main Bearing Cap Bolts	95-105
Oil Pan	12-15
Flywheel	75-85
Intake & Exhaust Manifolds	23-28
Oil Pump	12-15
Oil Filter	20-25
Engine Front Cover (3/8")	23-28
Engine Front Cover (5/16')	12-15
Water Outlet	12-15
Rocker Arm Cover	2-2½
Camshaft Sprocket	35-45
Crankshaft Damper or Pulley	85-95
Con. Rod Nuts	45-50
Camshaft Thrust Plate	12-15
Rocker Shaft Support	12-15
Rocker Arm Adjustment Screw Locknut	30-35
Valve Chamber Covers	2-2½
Water Pump	12-15
Oil Pump Pick-up Tube	10-12
Oil Pan Pick-up Tube	28-32
Fuel Pump	23-28

①—See Cylinder Head Installation (below) for tightening procedure Three different torque applications must be made

ENGINE

ENGINE REMOVAL (LESS TRANSMISSION) · 1) Mask edge of hood, fender and cowl, place fender covers on fenders Remove capscrews that retain hinge assembly to hood, remove hood

2) Remove carburetor air cleaner, disconnect and remove battery

3) Drain cooling system and oil pan (Drain cocks in engine assembly are located on each side and to front of cylinder block)

4) Disconnect both upper and lower radiator hoses, then remove radiator (Radiator is retained by three bolts, nuts and lockwashers at each side) Remove fan assembly

5) Disconnect heater hoses at water control valve and water pump Disconnect and remove heater blower and duct assembly

6) Disconnect starter cable at starter motor (On Merc-O-Matic disconnect transmission fill tube bracket at exhaust manifold) Disconnect primary ignition wire to coil, water temperature gauge sending unit and oil pressure sender unit wires

7) Disconnect flexible fuel line at fuel pump and windshield wiper vacuum hose from vacuum booster pump If car equipped with windshield washer, disconnect and remove windshield washer

8) **On Standard or Overdrive Transmissions,** disconnect clutch pedal retracting spring and release rod from clutch release lever Disengage equalizer bar tension spring and remove equalizer bracket assembly from flywheel housing Let equalizer bar and clutch release rod hang from frame

9) **On Merc-O-Matic Transmissions,** disconnect accelerator linkage (Z-bar) at firewall and throttle valve rod at clevis (linkage remains on engine)

10) Disconnect engine ground strap at firewall

NOTE—If vehicle equipped with power brake or power steering, remove these units at this time

11) From underneath car, remove splash shield in front of linkage and the end and lower converter access covers from transmission bell housing

12) Disconnect accelerator pedal linkage at accelerator shaft

13) Remove starter assembly To remove starter, turn wheels to extreme left turn position and pull starter down between tie rods and tubular engine support crossmember

14) Disconnect generator field and ground wires from generator

15) Disconnect exhaust manifold-to-muffler inlet pipe

16) Remove hex bolts (6) and nuts securing flex plate to converter (Merc-O-Matic only)

17) Remove capscrews (2) securing engine assembly to flywheel housing

18) Position transmission lift under transmission to support transmission while engine is out of vehicle

19) Remove capscrews (2), each side, securing engine to front engine mounts, and loosen self-locking nuts retaining engine mounts to engine front cover support

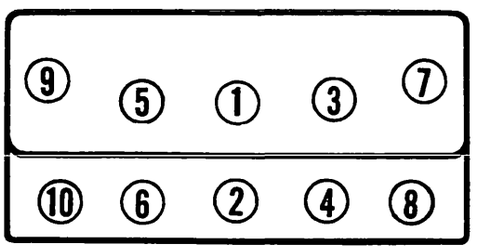
20) Inside of vehicle, pull front carpet and insulation away from floor pan and remove rubber grommets (2) covering openings to two upper capscrews securing engine assembly to flywheel housing and remove capscrews

21) Attach hoisting sling to engine, positioning sling to properly lift engine without transmission, and take up load of engine with hoist Adjust transmission lift and gently pull engine away from transmission Raise engine, carefully pull it forward and lift out of engine compartment *CAUTION*—When removing engine, be sure oil pump pickup tube and oil filter are clear of engine mount

Installation: Reverse removal procedure above

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Install pilot studs (made from cylinder head bolts with head cut off) in two end capscrew holes in block, coat NEW steel head gasket lightly with 8M-19554-A Sealer and install gasket over studs and dowels Install cylinder head assembly over studs and dowels with plugged water jacket hole to rear of engine Install cylinder head capscrews and tighten screws as follows Tighten all screws to 55 ft lbs torque, engine cold, then retighten to 65 ft lbs, with engine cold After engine assembly has been completed, run engine for a minimum of 20 minutes at fast idle and retighten all head screws to 75 ft lbs torque Use Tool S-8663-A to tighten all screws on right bank and lower screws on left bank Use Tool P-8675 to tighten screws under rocker arm on left bank



EXHAUST SIDE

MERCURY CYLINDER HEAD

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING OIL SEALS: *NOTE*—Crankshaft seal is installed in groove in block and in Seal Retainer (directly behind rear main bearing) Retainer is sealed in block by special sealing strips inserted in grooves in sides of retainer after it is installed in the block

Seal Installation: With crankshaft out, install new packing in groove in block and in groove in retainer using Tool 6701-A to seat packing Cut packing off flush with surface before removing tool *(CAUTION*—do not leave frayed edges which may prevent proper seating of retainer in block) After crankshaft installed, coat retainer-to-block mating surface lightly with oil resisting sealing compound install retainer **without** side seals tighten retainer screws securely (see Seal Retainer Production Change above) Dip side seal strips in engine oil and install immediately (seals are special graphite coated rubber asbestos composition and will swell immediately on contact with engine oil) Side seals may be tapped in place with a mallet but should project approximately 050-070' below oil pan gasket surface after installation DO NOT cut off this excess length

Testing Seal Installation—Squirt engine oil along seal retainer-to-block parting line, direct compressed air nozzle at inner upper corners of retainer If air bubbles noted, remove and clean retainer thoroughly, install new side seals

CRANKSHAFT THRUST BEARING ALIGNMENT. After #1 #2, and #4 bearing caps and inserts have been installed and properly torqued, install #3 bearing cap and insert Install capscrews snug, then pry crankshaft toward rear of engine Reverse this action by prying crankshaft forward (toward front of engine) This will align thrust surfaces of both halves of thrust bearing RETAIN THIS FORWARD PRESSURE on the crankshaft, and tighten capscrews to 95-105 ft lbs Check crankshaft endplay which should be 002-010"

ENGINE FRONT COVER

CRANKSHAFT FRONT OIL SEAL INSTALLATION Coat seal with engine oil, place seal on Tool 6700-B Center tool and seal over inner end of bore in front cover drive seal in until it is seated

► *FRONT OIL SLINGER CAUTION* Make certain that front oil slinger, Part No. B6A-6310-B, is installed on forward end of crankshaft (in front of crankshaft sprocket) before installing Engine Front Cover.

ENGINE FRONT COVER INSTALLATION Use new gasket and position Tool 6059 on crankshaft to align cover with block before installing cover capscrews Tighten screws to correct torque (see Tightening Specifications)

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL & INSTALLATION: Camshaft can be removed WITH ENGINE IN CAR as follows

Removal· 1) Drain cooling system

2) Disconnect all fuel and vacuum lines, and accelerator linkage, on top of engine. If windshield washer installed, remove container and detachable bracket. Remove heater blower motor and duct assembly.

3) Remove accelerator shaft bracket from engine and

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wire control shaft assembly and bracket to dash panel.

4) Disconnect upper radiator hose at water outlet connection and bypass tube from water pump. Disconnect heater outlet hose.

5) Remove Intake Manifold and gasket, remove both Rocker Arm Covers and gaskets, remove Push Rod Chamber Cover and gasket.

6) Loosen rocker arm adjusting screws to relieve tension, push rocker arms to one side and remove all push-rods.

7) Disconnect lower radiator hose and remove radiator assembly.

8) Remove generator belt, fan assembly, spacer, and water pump pulley. *NOTE* - If Power Steering installed, remove pump belt, detach pump from engine without disconnecting hoses, place assembly out of the way on fender apron.

9) Remove crankshaft damper with puller (Tool 6316-FF). Remove Water Pump, Timing Indicator, Fuel Pump, Generator and bracket.

10) Remove oil pan and gasket.

11) Remove Engine Front Cover using care not to damage crankshaft front oil seal. Remove woodruff key and front oil slinger from crankshaft.

12) Remove capscrew from end of camshaft, remove flat washer, spacer, fuel pump eccentric, and counterweight from end of shaft.

13) Remove both sprockets and timing chain as a unit.

14) Remove distributor from engine block. Remove hood lock dowel support, front fender apron, and radiator support tie bar.

15) Block all valve lifters in upper position to clear camshaft lobes (*NOTE* - Spring type clothespins can be used for this purpose by cutting nose of pins down to thickness of 3/16").

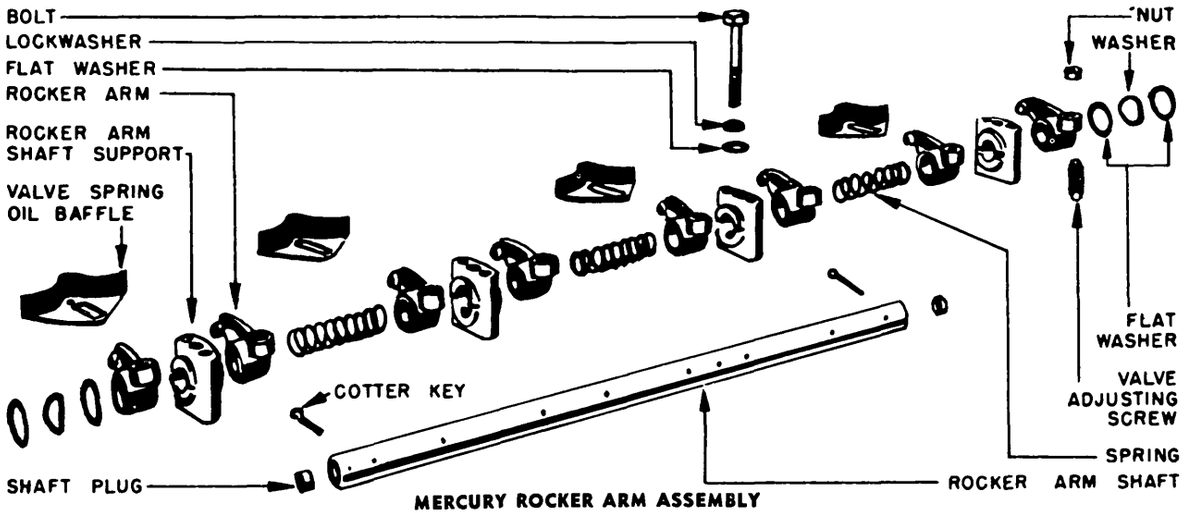
16) Remove camshaft thrust plate, woodruff key and spacer.

17) Withdraw camshaft through front of engine. *CAUTION - Use extreme care not to allow camshaft lobes to strike or damage bearings as shaft is withdrawn.*

Installation: Reverse removal procedure and note the following points: Install camshaft spacer with large inside chamfer toward front camshaft journal. Tighten all screws and bolts to specified torque (see Tightening Specifications). Check Camshaft endplay after assembly completed.

CAMSHAFT BEARING REMOVAL & INSTALLATION: **Removal**—Remove camshaft and drill a ½" hole through plug at rear bearing bore and remove plug. Remove bearings from block with Camshaft Bearing Remover & Installer 6261-C and adapter pilots 6261-F.

Installation—Install bearings with same tool used for removal making sure that oil holes in bearings are in line with holes in cylinder block web. Notch on edge of bearing should face front of engine at bottom of bore. *(CAUTION*—#1 camshaft bearing must be at least .005" and not more than .020" below front face of bearing bore in cylinder block. Install bearings with oil hole in line with oil hole in cylinder block web and notch on edge of bearing facing front of engine at bottom of bore



MERCURY ROCKER ARM ASSEMBLY

VALVE SYSTEM

EXHAUST VALVE STEM DIAMETER CHANGE FOR INCREASED STEM CLEARANCE (1954-56 Engines): Exhaust valve stem diameter was decreased .0005" to provide increased stem to guide clearance. These valves furnished for service on 1954-56 engines as follows:

1954-56 Exhaust Valves

Size	Stem Diameter
Std. (Red)	.3400-.3405"
Std. (Green)	.3405-.3410"
.003" Oversize	.3430-.3440"
.015" Oversize	.3550-.3560"
.030" Oversize	.3700-.3710"

OVERSIZE VALVE STEM INSTALLATION: Use Tool 6085 Piloted Reamer to ream cylinder head valve guides for oversize valve stems. Reamers are furnished in .003", .015", .030" oversizes. Pilots are Std., .003", .015". Use reamers in sequence with correct pilot when reaming from standard to oversize. Regrind valve seats after reaming guides.

INITIAL VALVE CLEARANCE: To insure valve being on low side of the cam, make all adjustments in the following sequence and with No. 1, 3, & 4 pistons in the indicated position:

No. 1 Piston at TDC (Compression Stroke)—Adjust No. 1 Intake & Exhaust, No. 2 Intake, No. 4 Exhaust, No. 5 Exhaust, and No. 7 Intake.

No. 4 Piston at TDC (Compression Stroke)—*(NOTE —Rotate engine 180° from the point where No. 1 piston is at TDC).* Adjust No. 6 Exhaust, No. 4 Intake, No. 8 Exhaust, No. 5 Intake.

No. 3 Piston at TDC (Compression Stroke)—*(NOTE —Rotate engine 270° from the point where No. 4 piston is at TDC).* Adjust No. 2 Exhaust, No. 3 Intake & Exhaust, No. 6 Intake, No. 7 Exhaust, No. 8 Intake.

►*CAUTION*—Final tappet adjustment is made after engine assembly is completed and with engine at normal operating temperature. The final setting is .019".

VALVE SERVICING: Valves are "Rotatable" type operating directly in valve guide holes in cylinder head and are removed and installed as follows:

Valve Removal—Use Tool 6513-EE to compress valve springs, remove valve spring locks, retainer sleeve, retainer, spring, and "umbrella" type oil seal. Discard oil seal.

Valve Assembly Installation—Install valve in port from which it was removed. Install valve stem oil seal with cupped side toward valve guide boss. Install valve spring, spring retainer, retainer sleeve, and valve locks.

ROCKER ARMS

SELF-LOCKING VALVE TAPPET ADJUSTING SCREWS (1956 Production Change): "Self-Locking" adjusting screws used with new type rocker arms on later 1956 engines. Torque specification for new self-locking screws is 7-15 ft. lbs. This torque decreases with each valve adjustment and **rocker arms should be replaced when torque decreases to 3 ft. lbs.**

►*INSTALLATION OF SELF-LOCKING TAPPET ADJUSTING SCREWS IN EARLIER ENGINES (1954-56):* When installing self-locking screws to replace earlier type (with locknut), all parts listed below must be installed as a unit:

1956 Engines – Self-locking Tappet Adjusting Screws Part No. B6A-6549-C AND Valve Rocker Arms Part No. B6A-6564-C.

1954-55 Engines – Self-locking Tappet Adjusting Screws Part No. B6A-6549-C must be used with NEW Valve Rocker Arms Part No. B6A-6564-D and NEW Valve Push Rods Part No. B6A-6565-B.

ROCKER ARM SERVICING: Disassembly—Remove assembly from head by taking out rocker arm shaft bracket retaining screws. Remove cotter pins at each end of rocker arm shaft and remove flat wash-

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ers and spring washers. Slide rocker arms, springs, and washers off shaft *(Be sure to identify each part for assembly in same position)*. Pull oil tube out of end rocker arm support to remove shaft from support.

Rocker Arm Shaft Assembly—Oil moving parts with engine oil. Install a plug at each end of shaft. **Do not peen plugs to make them tight.** Assemble rocker arm shaft parts in order shown in illustration. Install oil outlet tube in end of rocker arm support and make certain end of tube enters hole in shaft. Tighten rocker arm shaft support-to-cylinder head bolts to 12-15 ft. lbs. torque. Install rocker arm covers and tighten hold down bolts finger tight after making preliminary valve adjustment. Make final adjustment after engine warmed up to normal operating temperature. Install new gaskets (cement to cover only), install cover, and tighten hold down bolts to 2-2½ ft. lbs. torque.

OILING SYSTEM

OIL PUMP

GEAR TYPE OIL PUMP

OIL PUMP: Gear type pump mounted on left hand side of engine crankcase and driven by intermediate shaft from distributor shaft. Pressure relief valve in oil pump housing.

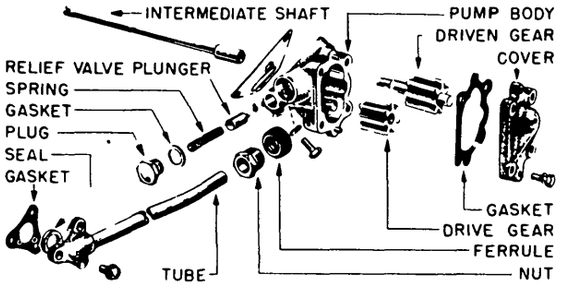
Removal: Remove oil pump inlet pipe. Remove capscrews and lockwashers securing pump to engine block. Remove pump and gasket, and the intermediate shaft (if shaft comes out with pump).

Disassembly: Remove capscrews retaining pump cover to body and remove cover plate and gasket. Do not tap pump drive shaft to drive cover off pump. Remove oil pump gear and shaft assembly and oil pump idler gear. Remove oil pressure relief valve plug, gasket, spring and plunger.

Inspection: Check oil pump housing for cracks or wear. Pump shaft should have a free running fit without excessive play in pump housing (clearance is .0015-.0029" upper end, and .001-.002" lower end). Check pump gear teeth for scratches and wear. Check compression of relief valve spring which should be 10.86 lbs., at 1.40". Replace any worn or defective parts. Short end of drive gear should be .490-.510". If not within limits replace drive shaft to insure proper engagement of distributor shaft and intermediate shaft hex when distributor installed on engine.

Reassembly: Oil all parts thoroughly. Install oil pressure relief valve plunger, spring, and cover plug and gasket. Install idler gear and oil pump gear and shaft assembly. Install cover plate with new gasket, and tighten cover plate screws to 12-15 ft. lbs. torque.

Installation: Reverse removal procedure using a new gasket between pump mounting flange and engine.



GEAR TYPE OIL PUMP

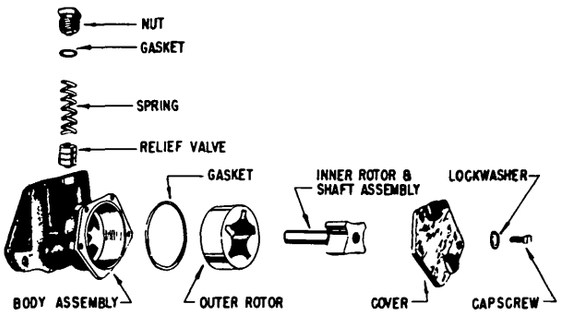
ROTOR TYPE OIL PUMP

Removal: Disconnect external oil line. Remove attaching capscrews (two from bottom, one from above). Remove pump and intermediate shaft.

Disassembly: Remove capscrew securing cover to body assembly. Remove cover and "O" ring gasket. Remove rotor and shaft assembly. Remove relief valve nut, spring and relief valve.

Inspection: Clean all parts in suitable solvent. Check pump housing and rotors for damage and excessive wear. Check compression of relief valve spring which should be 9.2-10.4 lbs. at .80". Check relief valve clearance in body assembly. Measure outer rotor race to body clearance. Clearance should be .006-.009". With rotor and shaft assembly installed in housing, place straightedge over rotor assembly and pump body. Measure clearance between straightedge and pump at rotor. Clearance should be .001-.0035". Check cover for wear, and if scored or grooved, replace it. Drive gear shaft length should be 3.36-3.38" from rotor assembly face to shaft end. NOTE - Outer rotor and shaft and rotor assembly are replaced as a unit.

Reassembly: Reverse disassembly procedures. Check assembled pump to see that it rotates without bind.



ROTOR TYPE OIL PUMP

OIL FILTER

OIL FILTER SERVICING: Filter is full-flow type and should be replaced at 4000-5000 mile intervals (or more often if required by operating conditions).

►***REPLACEMENT CAUTION:*** Use Replacement Kit, Part No. HCK-6731-A, which includes correct Filter Element and NEW GASKETS WHICH MUST BE USED.

Filter Removal: Take out center bolt in filter cover, remove filter assembly. Remove and discard cover mounting gasket from filter mounting pad, remove and discard filter element. Remove and discard neoprene gasket from center bolt, remove center bolt from cover, remove and discard fibre center bolt-to-cover gasket. Wash all parts and filter pad on block with solvent and make certain they are clean.

Filter Installation: Install NEW fibre gasket on center bolt, install bolt in cover, install spring and seat assembly on bolt with open end of seat toward cover *(CAUTION—Seat must be attached to spring by tangs)*. Install NEW neoprene gasket on center bolt next to spring seat, install filter element. Install NEW filter mounting gasket in block recess *(CAUTION—DO NOT use sealing compound on this gasket)*. Install filter element on engine, making sure that filter is seated in recess and not "cocked" over recess of shoulder. Tighten center bolt just enough to bring case up against gasket, rotate housing slightly to seat evenly, then tighten center bolt to 20-25 ft. lbs. torque. *CAUTION*—DO NOT overtighten the bolt which may strip threads, distort cover, or cause leaks. After engine started up allow it to idle until lubrication established and normal oil pressure secured, then speed up engine and check for oil leaks. ***NOTE—An adapter is provided in cylinder block which can be easily replaced in case of stripped threads.***

►*SPECIAL "M-260 ENGINE" NOTE:* This engine is optional equipment and has the following principal components which are special Cylinder Heads, Intake Manifold and Carburetors (two 4-barrel), Camshaft, Valve Train (Lifters, Pushrods, Springs), Fuel Pump Distributor, Spark Plugs, and other small parts. All parts required for conversion of standard engine to this "M-260" are furnished in Optl Engine Kit No MGK-66005-AA

►*1956 AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning S rvice Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on patent plate attached to left front body pillar extension.

First Number–10001 Up.

►*SERIAL NUMBER NOTE Serial number (example #56ME10001M#) includes following identification data in sequence.*

Year	Assembly Plant	Serial No.	Eng. Type
56	See Below	.10001	M

Assembly Plants– Indicated in serial number by the following codes: **LA**–Los Angeles. **ME**–Metuchen. **SL**–St. Louis. **WA**–Wayne.

ENGINE IDENTIFICATION: Five different engines used. Engines can be identified by cylinder head identification letters (stamped or cast on outer side of cylinder head between spark plugs and exhaust ports) and color of component parts as follows:

Engin HP & Compr. Ratio	Cyl. Head Ident.	Carb. Type	Air Clnr. Color	Valve Cover
210 HP(8.0-1)	ECZ-A	Holley	Red	Red
215 HP(8.4-1)	ECZ-B	Holley	Red	Red
225 HP(9.0-1)	ECZ-C	①	Blue	Blue
235 HP(9.0-1)②	ECZ-C	①	Blue	Silver
260 HP(9.75-1)		Holley (Two)		

①—Holley or Carter Carburetor.

②—235 HP replaced 225 HP engine beginning engine date code 162V as a result of camshaft production change. *See "Camshaft Production Change" under CAMSHAFT below.*

TUNE-UP

COMPRESSION PRESSURE: (8.0-1 Eng.) 155 lbs.,(8.4-1 Eng.) 160 lbs., (9.0-1 Eng.) 165 lbs. plus or minus 10 lbs. at cranking speed.

VACUUM READING: 19-20" at 475-500 RPM in neutral.

TAPPET CLEARANCE: (Exc. M-260) .019" (Final HOT), Intake & Exhaust. (M-260). .018" (Final HOT), Intake & Exhaust.

►*TAPPET CLEARANCE ADJUSTING SCREW NOTE: "Self-locking" screws used on later cars. See "Valve System" in Mercury Special Data.*

Initial Valv Tappet Clearance Adjustment – *See "Valve System" in Mercury Special Data.*

MANIFOLD HEAT CONTROL: Butterfly type valve mounted between right hand manifold and exhaust pipe (Single & Dual exhaust systems). When installing, make certain counterweight is toward right front.

►*DUAL EXHAUST NOTE:* When valve closed, all exhaust gases are discharged through left hand exhaust pipe.

IGNITION

►*IGNITION FAILURE CORRECTION: Intermittent or* complete ignition failure can result if distributor primary wire is improperly welded to terminal lugs (insulated wire leads from terminal on distributor housing to breaker point terminal). In some cases terminal wires are crimped to wire insulation but not at all or partially welded to wire.

FIRING ORDER: 1-5-4-8-6-3-7-2.

Cylinders–RIGHT BANK 1-2-3-4, LEFT BANK 5-6-7-8.

SPARK PLUG GAP: 032-036" (exc M-260), 023-028" (M-260 Engine)

Spark Plug–Champion 870. 18mm.

►*SPARK PLUG CAUTION.* Spark plug has tapered seat and does not require a sealing gasket It is important that plugs be tightened within limits of 15-18 ft. lbs.

►*SPARK PLUG MISFIRE CORRECTION:* If misfire occurs at either No. 8 or No. 6 cylinders, interchange position of No. 6 and No. 5 wires in all insulator blocks.

COIL: Mercury No. B6A-12029-B. *12 Volt.*

Ignition Current–2.5 amps. idling, 4 5 amps. stopped.

Resistor–Mercury No. B6A-12250-B. On bracket attached to top of coil.

►*COIL RESISTOR NOTE* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

DISTRIBUTOR: Mercury No. B6A-12127-D (exc. M-260), FDS-12127-E (M-260 Engine). *12 Volt.* New double-diaphragm, pressure type with separate vacuum lines to manifold and carburetor

►*SHORTING OF DISTRIBUTOR TERMINAL PRIMARY WIRE ASSEMBLY CORRECTION:* Screws which secure identification plate to housing extend inside housing and penetrate primary wire insulation, grounding wire. Sharp points should be ground or filed off, replace damaged wire.

Condenser–Mercury No. FAB-12300-A. **Capacity** .21-.25 microfarad.

Contact Point Set–Mercury No. FAB-12171-B.

Breaker Gap–.014-.016'.

Cam Angle–26-28.5°.

Breaker Arm Spring Tension–17-20 ozs.

Rotation–Counter-clockwise viewed from above.

Advance Performance–B6A-12127-D

►With Distributor on Test Stand

Distr. Degrees Plus or Minus ½'	Vacuum (" of HG)	Distr. RPM
0-1	29	400
5½-6½	.88	800
8½-9½	1.27	1200
11-12	1.73	1600
13-14¼	2 19	2000

►*DISTRIBUTOR INSTALLATION NOTE* It may be necessary to crank engine slightly if distributor is not seated properly in cylinder block. Crank engine, while holding distributor down, until intermediate shaft is engaged and distributor drops into place.

Initial Distributor Timing: Remove No. 1 spark plug. Hold thumb over spark plug hole until piston starts up on compression. Slowly "bump" engine over with starter until timing mark is aligned with pointer. Find No. 1 spark plug socket in distributor cap and fit fit distributor cap to distributor housing. Mark distributor housing to indicate No. 1 spark plug wire position. Position rotor approximately 20° counter-clockwise from mark made on distributor housing. Engage distributor drive gear and install distributor in engine.

IGNITION TIMING

Engine	① Std. Setting
With Synchro-mesh or Overdrive	3° BTDC
With Merco-Matic Trans	6° BTDC
"M-260" Engine	12° BTDC

①–With engine idling at 475 RPM and the PRIMARY (inner diaphragm) vacuum line disconnected. *See Initial Distributor Timing above. NOTE*–Maximum recommended initial timing for Standard and Overdrive Transmissions is 6° BTDC.

Timing Mark–Crankshaft pulley is marked at TDC, 10° BTDC, and 20° BTDC, with marks at 2° increments between. Pointer should line up with third mark (6°) on vehicles equipped with automatic transmissions, and half-way between first and second marks (3°) on vehicles equipped with standard transmissions.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: All carburetors are 4-barrel type. Holley used on 210 & 215 HP Engines, Holley or Carter WCFB used on 225 & 235 HP Engines. TWO Holley carburetors used on special M-260 engine.*

►*HOLLEY CARBURETOR PRODUCTION CHANGES AND RECOMMENDED CHANGES FOR IMPROVED CHOKE OPERATION & HARD STARTING CORRECTION: See "Holley (Ford, Lincoln, Mercury) 4-Barrel Centri-Quad" in Carburetion Section.*

►*AUTOMATIC CHOKE STICKING (Hard Starting, Stalling, Poor Gas Mileage, or Backfiring when cold): May be caused by breakage of Fresh Air Heat Tube in manifold. For installation of tube, see "Ford, Lincoln, Mercury 4-Barrel Centri-quad" in Carburetion Section.*

►*IMPROPER UNLOADER ACTION (MERCOMATIC CARS):* May be caused by transmission control-to-accelerator bellcrank-to-lever spring of less than required load resulting in choke valve not opening sufficiently to unload carburetor. Replace spring with spring Part No. MC-7345B (painted Yellow). *NOTE* - This condition may also cause transmission to downshift prior to reaching detent position during heavy throttle operation.

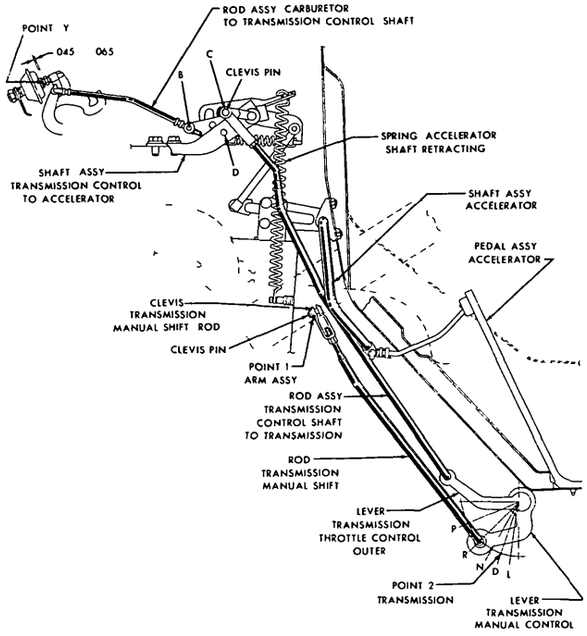
►*IDLE SPEED (AIR CONDITIONED CARS).* Automatic throttle control is incorporated on air conditioned cars and is adjusted as follows With engine warm, air conditioning system operating, and transmission in neutral, adjust knurled nut at end of operating rod of the control assembly to obtain an idle speed of 800 RPM, tighten locknut. Check idle to make sure that it returns to normal whenever air conditioning is turned off or the transmission is shifted out of neutral.

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►*CARBURETOR THROTTLE LEVER BINDING OR STICKING CORRECTION:* To correct, drive choke fresh air tube into manifold fitting until it bottoms. If this does not correct condition, remove choke fresh air tube and cut approximately ¼" from manifold end of line to provide sufficient clearance for throttle lever. Remove burrs from end of line before installing in manifold fitting.

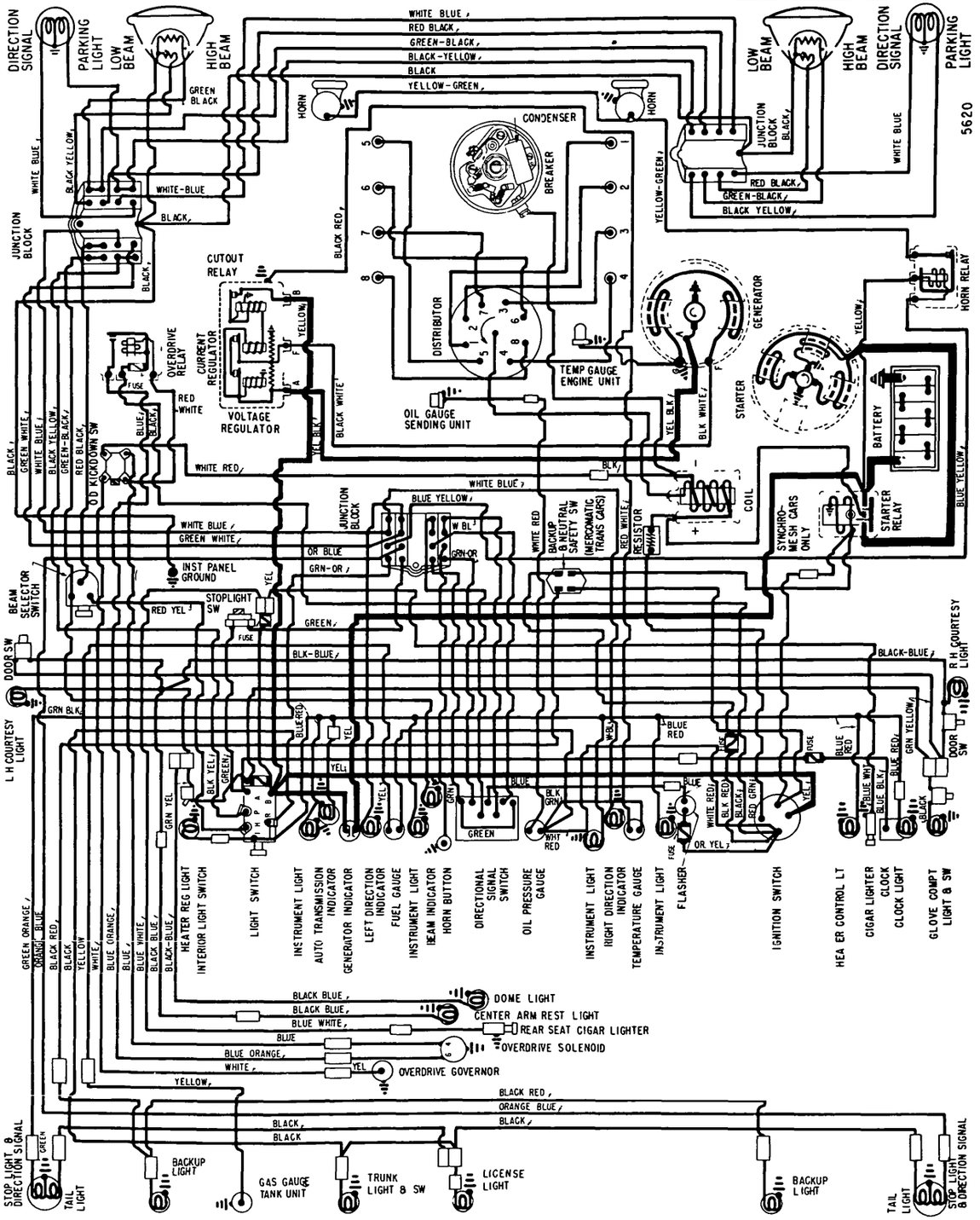
►*COLD HARD STARTING CORRECTION (Early Cars):* A few early Holley Carburetors built before 3rd week in September, 1955 (date code is shown on accelerator pump tower of float bowl cover—Example: 5-9-3 means 1955, September, 3rd week). To correct this condition, turn automatic choke cover clockwise three (3) additional notches.



MERC-O-MATIC THROTTLE LINKAGE

Throttle Linkage Adjustment (Merc-O-Matic Cars). Set hand brake and adjust engine idle to 425 RPM with engine at normal operating temperature and transmission "DR" range. Adjust anti-stall dashpot (see below). Disconnect clevis pin from transmission control-to-accelerator shaft and transmission control shaft-to-transmission rod assembly. Disconnect carburetor-to-transmission control shaft rod at carburetor. Insert gauge pin through bellcrank and bracket in transmission control-to-accelerator shaft assembly. Set carburetor at low idle manually. Adjust carburetor-to-transmission control rod assembly so that with trunnion pin in place at rear end of rod, trunnion pin at carburetor end

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will go in freely. Assemble in this position. With gauge pin locking bellcrank, pull upward gently but firmly on transmission control shaft-to-transmission rod assembly. This will position the throttle lever in the stop position at the transmission. Adjust clevis at upper end of transmission control shaft-to-transmission rod assembly so that clevis pin enters clevis and lever on transmission control-to-accelerator shaft assembly freely. Lengthen transmission control shaft-to-transmission rod assembly by turning clevis 3 full turns counter-clockwise and assemble in place. Remove gauge pin.

Dashpot Adjustment: Turn throttle lever set screw out until dashpot plunger bottoms, then back it off to give .045-.064" clearance between end of screw and plunger.

HOLLEY 4-BARREL

M rcury No. B6A-9510-L, M, N, Q. 4-Barrel carburetor with integral automatic choke. *M-260 NOTE* - Two 4-Barrel Carburetors, Part No. EDB-9510-C, used.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8. LEFT barrels 1-4-6-7.*

Idl Setting—Preliminary setting 1¼ turns open (set both screws alike). With engine at normal operating temperature, turn one screw at a time out until engine begins to roll from richness, then turn screw in just enough to provide smoothest idle performance.

Idl Sp d—475-500 RPM (Std. & O.D.); 425-450 RPM (Merc-O-Matic), in "DR" position.

Throttle Linkage Adjustment (Merc-O-Matic Cars): *See CARBURETOR abov .*

►*OTHER DATA: S "Ford, Lincoln, Mercury 4-Barrel Centri-quad" in Carbur tion Section.*

Fuel Pump Pressure: 3½-5½ lbs. at 500 RPM.

CARTER WCFB 4-BARREL

Cart r N . 2361S, SA (Merc-O-Matic Cars). 4-Barrel, downdraft type with automatic choke. *NOTE* - Carburetor is Mercury No. ECZ-9510-D.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting—Preliminary setting 1¼ turns open (set both screws alike). With engine at normal operating temperature, set idle speed (see below). Turn one one screw at a time out until engine begins to roll from richness, then turn screw in just enough to provide smoothest idle performance.

Idl Spe d—425-450 RPM, with selector lever in "DR" position.

Throttle Linkage Adjustm nt (Merc-O-Matic Cars): *See CARBURETOR above.*

►*OTHER DATA: See "Carter WCFB 4-Barrel" in Carbur tion Section.*

Fu l Pump Pr ssure: 3½-5½ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Mercury No. B5A-9350-D. Fuel & Vacuum.
Pr ssure – 3½-5½ lbs. at 500 RPM.
Se "Fuel Pumps" in Carbur tion Section.
Gas lin Gauge: King-Seeley Electric type.
Dash Unit – Mercury No. FDT-9280-A.
Tank Unit – Mercury No. B6A-9275-B (Sta. Wgn.), B6A-9275-C (Others).
See "Fuel Gauges" in Carburetion Section.

BATTERY

Mercury No. FDT-10655-C. *12 Volt,* 11 plate, 55 ampere hour capacity (20 hr. rate), **or FDU-10655-C.** *12 Volt,* 13 plate, 65 ampere hour capacity (20 hr. rate).
Battery Ground – Negative, to engine block.
►*CAUTION – This is reversed from previous models.*
Engine Ground – Cylinder head to dash.

STARTER

Mercury No. B6A-11002A. *12 Volt.* **Armature** B6A-11005-A.
►*NOISY STARTER MOTOR (Merc-O-Matic with Steel Torque Converter):* May be caused by starter motor seal, No. EBU-6436B, improperly installed or cocked.
Drive – Mercury No. 1CM-11350-C. Bendix "Folo-Thru".
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 48-56 ozs.
Cranking Speed – 150-180 RPM with warm engine.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4800 max.	12.0	100-120
	150-180 Ⓒ	8 or more	210 max.

Ⓒ – Cranking speed with warm engine.

Starting Switch: Relay, Part No. B6A-11450-A, controlled by Ignition and Starter Switch, Part No. B5A-11572-A, and Merc-O-Matic Neutral Safety Switch located on steering column.
►*SELF-STARTING OF ENGINE OR CONTINUOUS OPERATION OF BACK-UP LIGHTS:* May be caused by contact fingers of Neutral Switch Terminal Block touching brass strip on insulator assembly. Correct by installing new Neutral Switch Insulator Assembly No. FDK-15827-B (same number as original type) with two .020" high ridges on each side and parallel to brass strip.
Merc-O-Matic Neutral Safety Switch Adjustment: *See "Fordomatic & Merc-O-Matic" in Transmission Section.*

GENERATOR

Mercury No. B6A-10002-A. *12 Volt.* **Armature** B6A-10005-A.

Performance Data

Amperes	Volts	Gen. RPM
30	15	Ⓒ 2500

Ⓒ – At 1500 Engine RPM.
Brush Spring Tension – 26-34 ozs.
Field Current – 1.5-1.6 amps. at 15 volts (Hot).
Rotation – Counter-clockwise at commutator end.
Belt Adjustment: Approximately ½" deflection on belts midway between generator and pump pulleys with normal thumb pressure.

REGULATOR

Mercury No. 36A-10505-A. *12 Volt.*
►*SETTING NOTE:* Settings are for regulator at NORMAL OPERATING TEMPERATURE (after running engine for 20 minutes at 1500 RPM if started cold, or until temperature gauge is steady for 5 minutes if engine previously warmed up) with room temperature at 75° F.

Cut ut Relay

Cuts In – 12.0-12.8 volts.
Cuts Out – 2.0-6.0 amps. (reverse current).

Voltage Regulator

S tting – 14.6-15.4 volts.
Ch cking & Adjusting – *S e El ctrical S ction.*

Current Regulator

Setting – 2&32 amperes.
Checking & Adjusting – *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signals: *See Electrical Section.*
Automatic Headlight Dimmer: *See Electrical Section.*
Lighting Switch Removal: With control knob in "OFF" position, press spring release button on switch housing, turn shaft slightly and pull knob and shaft out of switch. Remove screw assembly from inside bezel. Remove bezel, spacer, then remove switch from behind dash panel.
Stop Light Switch Location: On forward end of brake master cylinder (integral with power brake unit). Master cylinder or power brake unit located on firewall in engine compartment.
FUSES: Interior Lights – SFE 7.5 amps. On light switch.
Turn Signals – SFE 7.5 amps.
Heater Blowers – SFE 14 amps.
Radio – SFE 7.5 amps.
Clock – AG 1 amp.
Cigar Lighter – AGC 15 amps.
Overdrive – AGC 15 amps.
Windshield Washer – SFE 7.5 amps.
Back-Up Lights – SFE 7.5 amps.
Spotlight – SFE 7.5 amps.
Glove Box Light – SFE 7.5 amps. (on interior light circuit).
Automatic Headlight Dimmer – AGC 3 amps.
Multi-Luber – SFE 7.5 amps.
CIRCUIT BREAKERS: Lighting – On headlight switch. Combination headlight switch, circuit breaker and fuse assembly. One circuit breaker protects headlight circuit and second circuit breaker protects auxiliary lights. Fuse protects interior lighting circuit.
Windows & Seats – One 15 ampere circuit breaker for each window motor. One 15 ampere circuit breaker common to both seat motors.
Convertible Top – 30 ampere circuit breaker.
Underhood Lights – 12 ampere circuit breaker.
Air Conditioning – 15 ampere circuit breaker. *NOTE* - 20 ampere circuit breaker should be used if temperatures extremely high. Replace blower switch feed wire from 18 to 16 gauge.
HORNS: Dual horns operated by relay.

Type	High Pitch	Low Pitch
Sea Shell	B5T-13832-B	B5T-13833-B
Trumpet	FDT-13832-B	FDT-13833-B

Horn Relay – Mercury No. 2Q-13853-A.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care before disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models). *S "Engin Id ntification" Not " und r MODEL IDENTIFICATION abov .*

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Engin	Bore	Strok	Displac m nt
All	3.80"	3.44"	312 cu. ins.
Engine	**Compr. Ratio**	**Rated HP**	**Developed HP**
ECZ-6007-F	8.0-1 ①	46.2	210 at 4600 RPM
ECZ-6007-F	8.4-1 ②	46.2	215 at 4600 RPM
ECZ-6007-F, G④	9.0-1 ③	46.2	225 at 4600 RPM
ECZ-6007-F, G④	9.0-1 ③	46.2	235 at 4600 RPM
M-260	9.75-1	46.2	260

① – Head marked "ECZ-A".
② – Head marked "ECZ-B".
③ – Head marked "ECZ-C".
④ – ECA-6007-F (Holley Carb.), ECZ-6007-G (Carter).

Compression & Vacuum Reading – *See TUNE-UP above.*

CYLINDER HEAD: *See "Cylinder Head & Manifold in Mercury Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Mercury Special Data.*

ENGINE REMOVAL: *See "Engine" in Mercury Spec. Data.*

OIL PAN REMOVAL: Remove oil inlet pipe hex fittings at oil pump and side of oil pan, remove pipe. Remove oil pan capscrews, then remove oil pan and gasket.

NOTE - When this operation is performed, turn crankshaft until rear counterweights of crankshaft are up. The oil pan can then be removed from front of engine.

PISTONS

Aluminum alloy, Autothermic, solid skirt type with three rings above pin. *NOTE* - Pin is offset in piston.

► *ORIGINAL BORE & PISTON SIZES:* Std. cylinder bore limits are 3.8000-3.8024" and TWO Std. pistons used for selective fitting as follows: 3.7993-3.7996" Diam. (marked "2" on dome), and 3.8005-3.8008" Diameter (marked "6" on dome). *NOTE* - Std. piston furnished for service in these two sizes.

Removal – Pistons and rods removed from above.

Fitting New Pistons: Use 1/2" wide feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side. Feeler thickness as follows.

New Piston in New Bore–.0015" feeler. 5-10 lbs. pull.
New Piston in Used Bore–.002" feeler. 5-10 lbs. pull.
Used Piston in Used Bore–.0025" feeler. 5-10 lbs. pull.

Replacement Pistons: Standard (Two sizes - see Original Bore & Piston Sizes above), .0225", .0325", .0425" Oversize. Pistons are furnished with fitted pins.

Installing Pistons: Indentation or notch on top of piston must face toward front of engine. *See Rod Installation.*

PISTON PINS

Clearance in Piston – .0001-.0003" loose. Select fit. Service maximum - .0008".

Clearance in Rod – .0001-.0003" loose. Select fit. Service maximum -.0008".

Replacement Pins: Std. (Green), .001" O.S. (Blue), .002" O.S. (Yellow).

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (1)	5/64"	.012-.029"	.006" max.
Compr. (2)	3/32"	.012-.019"	.006" max.
Oil (3)	3/16"	.015-.029"	①

① – Side sealing type ring

SPACING NOTE – Ring gaps should be placed 120° apart, with oil ring gap positioned so it will be on inside of "V" (high side of cylinder bore).

Replacement Rings: Standard size, .020", .030", .040" Oversize.

CONNECTING RODS

► *ROD INSTALLATION CAUTION: Previous installation procedures have been superseded. See "Installing Rods" below.*

Journal Diameter – 2.1880-2.1884" (Color coded BLUE), 2.1884-2.1888" (Color coded RED). Use with bearing of same color.

Out-of-Round Limit – .0005". **Taper Limit** - .001".

Lower Bearing – Steel backed, copper lead lined. Upper and lower halves interchangeable.

Clearance – .0008-.0027". Service Limit .0037".

Side Clearance – Service maximum .019" (two rods).

Replacement Bearings: Standard (two sizes color coded RED and BLUE for selective fitting), .010", .020", .030" Undersize.

Installing Rods: Assemble rods to pistons with oil squirt hole in lower end of rod toward right (right bank rods numbered 1-2-3-4), toward left (left bank rods numbered 5-6-7-8) with indentation on piston head toward front of engine (all pistons). Install piston and rod assemblies in engine with numbered side of rod and bearing cap together, facing toward outside of block, and in same numbered cylinder.

CRANKSHAFT

► *1956 CRANKSHAFT PRODUCTION CHANGE (To minimize oil leaks at front and rear oil seals):* New crankshaft, No. B6A-6303C, used with separate Front Oil Slinger, No. B6A-6310B. Slingers will divert oil away from seals. *1955 NOTE* - Same design crankshaft, No. B6A-6303D, furnished for installation in 1955 cars with same Front Oil Slinger, No. B6A-6310B.

Journal Diameters – 2.6235-2.6239" (Color coded BLUE), 2.6239-2.6243" (Color coded RED).

Out-of-Round Limit – .0005". **Taper Limit** – .001".

Bearings – Steel-backed, copper lead lined.

Clearance – .0008-.0026". Service limit .0036".

Replacement Bearings: Std. size (two sizes color coded RED and BLUE for selective fitting), and .010", .020", .030" Undersize.

End Thrust: Taken by No. 3 main bearing.

Thrust Bearing Alignment – *See "Crankshaft & Main Bearings" in Mercury Special Data.*

Endplay – .010" maximum.

Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Mercury Special Data.*

Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Mercury Special Data.*

CAMSHAFT

► *CAMSHAFT PRODUCTION CHANGES:* Four different camshafts used in production and can be identified as follows:

Engine	Camshaft No.	① Identification
Early Engines (All)	B6A-6250B	ECK
Later 210 & 215 HP	B6A-6250C	ECZ
First 235 HP	EDB-6250B	② ECK
Later 235 HP	EDB-6250C	③ ECK

① – Cast in shaft.
② – Letter "E" stamped on hub end also.
③ – Letter "C" stamped on hub end also.

See "Valves" & "Valve Timing" below for camshaft differences.

Journal Diameter – 1.9255-1.9265".

Clearance – .001-.006".

End Thrust: Taken by thrust plate on forward end (between camshaft sprocket and shoulder on block).

Endplay – .003-.012".

Replacement Camshaft Bearings: Finished bearings furnished Standard size, .015" Undersize. *CAUTION– Oil holes in bearings must be lined up correctly. See "Camshaft & Bearings" in Mercury Special Data.*

Camshaft Bearing Removal & Installation: *See "Camshaft & Bearings" in Mercury Special Data.*

Timing Chain: Side-guide type. Length 56 links.

►*REPLACEMENT NOTE:* Replace timing chain and sprockets when deflection on shaft side exceeds 1/2" (take up all slack on driving side, measure slack on opposite side). Remove and install chain "endless" as a unit with both sprockets.

Camshaft Setting: Marks on both sprockets should be aligned with similarly marked links on timing chain with both marks toward **I ft** side of engine (at 3 o'clock facing front of engine after installation made).

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Mercury Special Data.*

Timing Chain Cover Seal Installation (Crankshaft Front Oil Seal): *See "Engine Front Cover" in Mercury Special Data.*

VALVES

► *EXHAUST VALVE STEM DIAMETER CHANGE:* Later production exhaust valves have .0005" smaller stem diameter for increased stem clearance. *See "Valve System" in Mercury Special Data.*

► *VALVE PUSHROD REPLACEMENT CAUTION:* 1956 valve pushrods are shorter than 1954-55 pushrods (similar in appearance) and must not be interchanged. 1956 rods can be identified by two parallel radial ridges on outside of adjusting screw socket end and length of 7.98" plus or minus .010" (1954-55 rod length is 8.11" plus or minus .010").

Tappet Clearance: (Exc. M-260) –.019" (Final HOT), Intake & Exhaust. (M-260) .018" (Final HOT), Intake & Exhaust.

► *TAPPET CLEARANCE ADJUSTING SCREW NOTE: "Self-locking" screws used in rocker arms on later cars. See "Valve System" in Mercury Special Data.*

Initial Valve Tappet Clearanc – *See "Valve System" in Mercury Special Data.*

Valve	Head Diam.	St m Diam t r ①
Intake	1.775-1.785"	②.3415-.3420" or ③.3420-.3425"
Exh.	1.505-1.515"	②.3400-.3405" or ③.3405-.3410"

Valve	Seat Angle	Lift	St m Clearance
Intake	45°	④	. ⑤ .001-.002"
Exhaust	45°	④	⑥ .0025-.0035"

① – Furnished with .003", .015", .030" oversize stems.
② – Color coded RED. Use in RED valve guides.
③ – Color coded GREEN. Use in GREEN valve guides.
④ – See special table below.
⑤ – Service limit .0045".
⑥ – Service limit .0065".

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Valve Lift
(68A-6250B & C Camshaft)

Valv	Normal Lift	⑥ Service Limit
Intake	.264"	.259" min.
Exhaust	.262"	.257" min.
(ED8-6250B Camshaft)		
Intake & Exhaust	.278"	.273" min.
(ED8-6250C Camshaft)		
Intake	.272"	.267" min.
Exhaust	.285"	.280" min.

⑥ – Replace camshaft if lift less than minimum.

Valv S at Width – 1/16-5/64" (Intake), 5/64-3/32" (Exhaust).

Valve St m Oil S als – "Umbrella" type oil seals used on all valves. Seals are installed with cupped side down on valve stem at guide boss on cylinder head. *Install new seals whenever valves removed or when seals become loose on valve stems.*

Valv Springs: Fr L ngth – 2.09" approximately.

Valv Spring Specifications

	Pressure	Length
Valve Closed	64 lbs.	1.780"
Valve Open	145 lbs.	1.390"

Valve Guid s: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" Intake, .005" Exhaust), ream guides and install oversize valves. *See "Valve System" in Mercury Special Data.*

Valv Lifters: Mushroom type. Removed from below with camshaft removed.

R ck r Arm Ass mbly *See "Valve System" in Mercury Special Data.*

►*ROCKER ARM & ADJUSTING SCREW PRODUCTION CHANGE:* New "self-locking" adjusting screws used on later cars with new design rocker arms. Can be installed as an assembly on earlier engines. *See "Valve System" in Mercury Special Data.*

►*TORQUING NOTE (NEW TYPE ROCKER ARMS).* Torque valve adjusting screw to 7-15 ft. lbs. With each valve adjustment this will decrease. When it reaches 3 ft. lbs., rocker arm should be replaced or self-locking screw removed and standard valve adjusting screw and locknut should be installed.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE: The following valve opening and closing points are with a camlift as indicated in notes following tables.*

210, 215, 225 HP Eng. Valve Timing
(With 68A-6250B & C Camshaft)

Intak Valves – Open 12° ⓒBTDC, Close 54° ⓒ ALDC.
Exhaust Valv s – Open 58° ⓒBLDC, Close 8° ⓓATDC.
ⓒ – Camlift .016". ⓒ – Camlift .015".
ⓒ – Camlift .019" ⓓ – Camlift .018".

235 HP Eng. Valv Timing
(With ED8-6250-8 Camshaft)

Intake Valv s – Open 22° ⓒBTDC, Close 58° ⓒALDC.
Exhaust Valves – Open 58° ⓒBLDC, Close 14°ⓒATDC.
ⓒ – Camlift .015".

235 HP Eng. Valv Timing
(With EDB-6250-C Camshaft)

Intake Valves–Open 18° ⓒ BTDC. Close 58° ⓒ ALDC.
Exhaust Valves–Open 66° ⓒ BLDC. Close 10° ⓒ ATDC.
ⓒ–Camlift .015". ⓒ–Camlift .014". ⓒ – Camlift .017".

Valve Timing Check–Slide rocker arm to one side and install a dial indicator so reading can be taken from end of valve push rod (use an indicator that will read .300" or more). Install a quadrant (reading in degrees) on crankshaft pulley to check amount of crankshaft rotation. Rotate engine slowly until dial indicator reading for valve being checked is same as indicated in table above. Amount of crankshaft rotation should be the same as shown in valve timing table.

OILING SYSTEM

►*OIL LEVEL INDICATOR CAUTION.* Two different oil level indicators used. With air conditioning, indicator has expanded anti-rattle section adjacent to tube cover, and distance from cover to "Full" mark is 20.94". On cars **not** equipped with air conditioning, anti-rattle section is half-way down to "Full" mark and distance from cover to "Full" mark is 21.35".

Crankcase Capacity: 5 qts. (refill). Add one quart when filter changed.

Normal Oil Pressure· 45-50 lbs. at 2000 RPM (Hot).

Pressure Regulator Valve – In pump body. Not adjustable.

Oil Pressure Indicator: King-Seeley Electric type.
Dash Unit – Mercury No. FDT-9273-A.
Engine Unit – Mercury No. B6A-9278-A.
See "Oil Pressure Gauges" in Miscellaneous Section.

Oil Pump. Gear or rotary type pump. Located on left side of engine crankcase and driven by distributor drive gear.
Pump Overhaul – *See "Oiling System" in Mercury Special Data.*

Oil Filter: Full-flow type with pressure relief valve in center filler bolt. Replace filter element at 4000-5000 mile intervals or when oil becomes dirty or polluted. *See "Oiling System" in Mercury Special Data.*

Replacement Filter Element–Mercury No. HCK-6731-A (Kit includes new gaskets).

►*CAUTION Special "full-flow" filter element must be used for service replacement (use of by-pass type filter element will restrict engine oil flow and result in insufficient engine lubrication).*

Crankcase Ventilation: Filter in oil filler cap (inlet) and road draft tube. Clean and oil every 2,000 miles or more often in dusty areas.

COOLING

Water Capacity· 19 qts. (total capacity), 18 qts.(recommended capacity). Add 1 quart for heater.

Pressure Valve: Mercury No. LA-8100-A (12-15 lbs.). Radiator filler cap.

►*THERMOSTAT INSTALLATION NOTE*· Install thermostat with word "TOP" up and toward front of engine to prevent a retarding of flow of coolant.

Water Pump: Packless, sealed ball bearing type.
See "Mercury" in Water Pump Section.

T mp rature Gaug : King-Seeley Electric type.
Dash Unit – Mercury No. FDT-10883-A.
Engin Unit – Mercury No. B6A-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & B ck M del 10A6. Single plate, dry disc type.

Part	Borg & Beck No.	Mercury N .
Assembly No.	361354	MC-7563-B
Disc No.	382175	MC-7550-A

Pedal Adjustment: If pedal free travel is not 1 to 1-1/4", loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.

Removal: Remove transmission (see Transmission Removal below), and disengage clutch pedal retracting spring and release rod from clutch release lever. Disengage equalizer bar tension spring and remove two capscrews retaining equalizer bracket assembly to flywheel housing. Remove flywheel housing. Mark position of flywheel and pressure plate so parts may be installed in original position. Compress clutch pressure plate assembly with Tool 7563. Remove capscrews, pressure plate and disc.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second and high), sliding gear (low and reverse).
See "Mercury Synchro-mesh" in Transmission Section.

►*20-45 MPH DRIVELINE RINGING NOISE CORRECTION:* New sound-deadened driveshaft, Part No. MC-4602-F (Exc. Sta. Wgn.), MC-4602-G (Sta. Wgn.) is available to correct above condition on 1955-56 cars.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal· If equipped with overdrive, remove kickdown switch retainer nut and push switch through floor. Raise car and drain transmission. On overdrive cars remove governor, solenoid, and control cable. Disconnect speedometer cable and remove speedometer drive gear. Remove transmission shift rods at transmission. Remove bolts retaining rear universal joint to companion flange and remove drive shaft. Support rear of engine and remove the detachable cross-member of the frame. Remove two top capscrews retaining transmission to flywheel housing and install a couple of studs to act as guide pins. Remove lower capscrews and slide transmission to rear as far as possible and lower front end. Remove from below car.

►*SINGLE EXHAUST SYSTEM NOTE:* When removing transmission, it will be necessary to remove nuts that secure muffler inlet and exhaust pipes to exhaust manifold, and to remove manifold outlet pipe from mounting bracket at rear of manifold and move exhaust system away from working area.

OVERDRIVE

Warner Model AS1-R10F. Solenoid operated type, with governor control and throttle operated kickdown. Lockout Switch not used on this model.
See "Warner R10 Overdrive" in Transmission Section.

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

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MERC-O-MATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.

See "Fordomatic & Mercomatic" in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION See "Fordomatic & Mercomatic" in Transmission Section*

►*TESTING & TROUBLE SHOOTING See "Fordomatic & Mercomatic" in Transmission Section*

Lubrication – Check transmission oil level every 2000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 16,000 miles. **Use only Automatic Transmission Fluid Type A.**

Checking Fluid Level–Apply parking brakes, place transmission selector lever in "N" (Neutral) position, run engine at idle speed for approximately four minutes. With parking brake applied and engine running at slow idle, move selector lever to "P" (Parking) position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission. Return selector lever to "P" position. Raise hood, clean dirt away from fluid level cap, remove indicator, wipe clean and insert in tube (make sure indicator is pushed all the way down). Remove indicator and read level. Add sufficient fluid to raise level to "Full" mark on indicator. Replace indicator.

THROTTLE LINKAGE ADJUSTMENT· *See CARBURETOR above*

►*OTHER MERCOMATIC SERVICE DATA See "Fordomatic & Mercomatic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type.

REAR AXLE

Own. Integral carrier, semi-floating hypoid type with Hotchkiss Drive.

See "Ford, Lincoln, Mercury (Integral Carrier)" in Rear Axle Section.

►*REAR AXLE "CLUNK" & "SQUEAK" CORRECTION See Ford, Lincoln, Mercury (Integral Carrier)" in Rear Axle Section.*

Transmission	Ratios Standard	Optional
Merc-O-Matic (Sta Wgn)	3 54-1	3 15-1
Merc-O-Matic (Others)	3 15-1	3 54-1
Synchro-mesh (Sta Wgn)	4 09-1	3 73-1
Synchro-mesh (Others)	3 73-1	4 09-1
Overdrive (All)	4 09-1	3 73-1

Backlash – .003-.008".

Axle Shaft Removal· Remove wheel and brake drum Remove axle shaft retainer locking type nuts (work through opening in axle shaft flange) Use Puller and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal) Replace one nut to secure brake backing plate

Rear Axle Assembly Removal Raise rear end of car and disconnect rear universal. Remove axle shafts. Disconnect brake lines at "T" on left side of axle housing. Disconnect hand brake cable, shock absorbers, spring U-bolts and shackles. Remove axle housing assembly from car.

SHOCK ABSORBERS

Direct acting, non-adjustable Service by replacement.

Front Shock Absorbers

Model	Standard	Heavy Duty
All (Exc.Sta.Wgn.)	MC-18045-F,H	MC-18045-B,K
Station Wagon	MC-18045-E,J	MC-18045-C,L
All (Exc. Conv.& Sta.Wgn.)		MC-18045-G

Rear Shock Absorbers

Model	Standard	Heavy Duty
All (Exc.Sta.Wgn.)	MC-18080-F,J	MC-18080-G,L
Station Wagon	MC-18080-E,K	MC-18080-C,M
All (Exc.Conv.& Sta.Wgn.)		MC-18080-H

FRONT SUSPENSION

Independent. "Ball-Joint" suspension with direct acting shock absorbers mounted within front coil springs.

See "Lincoln, Mercury, Ford (Ball-Joint)" in Front Suspension Section.

Kingpin Inclination–7° with Pos. 3/4° camber.
Caster–0° to Neg. 1-1/2°. Maximum variation between wheels is 1/2°.
Camber–0° to Pos. 3/4°. Maximum variation between wheels is 1/4°.
Toe-In–3/32" to 5/32".
Toe-Out on Turns – With front wheels at maximum turning angle, outer wheel should be 27°40' (Exc. Conv.), 26°50' (Conv.), and inner wheel should be 38° (Exc. Conv.), 36° (Conv.).

STEERING

Manual, Gemmer 2 & 3-Tooth Worm & Roller (Early), **Saginaw** Recirculating Ball Nut type (Later).
See "Gemmer Worm & Roller" or "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering Ford-Mercury Linkage type. Used in conjunction with standard type steering gear.
See "Ford & Mercury Power Unit" in Steering Section

Steering Linkage *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" or "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal *See "Gemmer Worm & Roller" or "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic, Single Anchor (Without eccentric and fixed anchor pins). Parking lever applies rear wheel service brakes.
See "Ford, Lincoln, Mercury Bendix" in Brake Section.
Drum Diameter – 11" front and rear.
Wheel Cyl. Diameter – 1 1/8" (Front), 7/8" (Rear)
Lining – Molded type riveted to shoe
Width – 2½' (Front wheels), 2" (Rear wheels) **Thickness** - 3/16"
Braking Power – 55 5% (Front), 44 5% (Rear)
Clearance – Adjusting screw backed off 12 to 14 clicks from point where shoes are tight against drum.

Brake Pedal Free Play Adjustment 1/4–7/16". If play not correct after brake adjustment, loosen lock nut on the eccentric bolt attaching brake pedal to master cylinder pushrod, rotate eccentric bolt for desired clearance.

Standard Master Cylinder· Located on engine side of firewall.

Checking Fluid–Maintain fluid level to within ¼' of top of reservoir.

Removal–Disconnect brake line from master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to firewall.

Power Brakes· Bendix Vacuum Power Unit (combination vacuum power unit and master cylinder). Unit mounted on engine side of firewall and replaces regular master cylinder.

See "Bendix Power Unit" in Brake Section.

Checking Fluid Level–Same as for regular master cylinder.

Removal of Power Unit–Disconnect valve pushrod from brake pedal assembly in drivers compartment. Remove master cylinder outlet fitting bolt from master cylinder. *(NOTE*–It is not necessary to remove stop light switch, wires or hose assembly from outlet fitting. Do not disturb outlet fitting in master cylinder). Loosen clamp securing manifold vacuum hose to check valve on power unit. Remove hose from valve. Loosen clamp securing vacuum reserve tank hose to fitting on check valve. Remove four capscrews securing power brake assembly to bracket on dash panel and remove power brake assembly.

MISC. MECHANICAL

Windshield Wipers: Vacuum, Link & Crank Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Electric Reversible motor in each window Controlled by door switch and master control switch. *See "Window Regulators" in Miscellaneous Section.*

Power Top Control: Reversible type motor (mounted under seat) drives two screw type jacks (one on each side) through flexible cables. Controlled by relay and two-way switch. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters· Electric type. Individual motor for vertical and horizontal adjustment. *See "Power Seat Adjusters" in Miscellaneous Section.*

Air Conditioning *See "Lincoln & Mercury" Air Conditioning in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs. (Dry Thds.)
Spark Plugs	30
Cylinder Head Nuts	45
Main Bearing Cap Nuts	77-80
Con. Rod Bearing Capscrews	35
Flywheel Stud Nuts	32

ENGINE

►*ENGINE REMOVAL NOTE:* Engine assembly (with clutch and transmission) can be removed from below, or engine only (less transmission) can be removed from above. This latter method is recommended for engine replacement.

ENGINE ASSEMBLY REMOVAL (From below): Drain engine oil pan, transmission case, and radiator and block. Then proceed as follows:

(1) Remove hood top, radiator, air cleaner and cylinder head cover.

(2) Disconnect all lines, hoses, and electrical connections at engine, and cables and controls at transmission.

(3) Disconnect exhaust pipe at engine and muffler, remove pipe, wire muffler to left side of underbody.

(4) Disconnect and remove propeller shaft (disconnect shaft at rear universal companion flange, pull shaft out and off transmission shaft splines).

(5) Attach Engine Lifting Fixture (see Note below), support engine weight, remove all Front and Rear Cross-member attaching bolts at body side sills.

(6) Lower engine assembly and remove from beneath car.

ENGINE REMOVAL (From above): Drain engine oil pan, radiator, and block. Then proceed as follows:

(1) Remove top hood, radiator, air cleaner, and cylinder head cover.

(2) Disconnect all lines, hoses, and electrical connections at engine, disconnect exhaust pipe at exhaust manifold.

(3) Remove starter from right side of engine.

(4) Attach Engine Lifting Fixture (see Note below), remove engine support bracket-to-front cross-member bolts (4 on each side), support engine weight with lifting fixture.

(5) Remove all clutch housing-to-engine rear plate attaching bolts. Move engine forward to disengage transmission drive shaft from pilot bearing, then lift engine up and maneuver it out of engine compartment.

► **Engine Lifting Fixture Note**—Fixture can be made up from two pieces of channel with hole in each end of each piece to fit the end cylinder head studs on each side of head. Lifting holes in channel should be centered between the cylinder head stud holes (for engine removal only), 3 3/8" to rear of center point (for engine and transmission assembly removal).

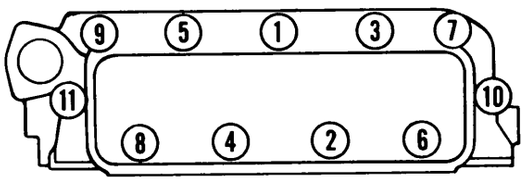
CYLINDER HEAD & MANIFOLD

REMOVAL: Remove head as complete assembly with rocker arms and shaft after loosening tappet adjusting screws and removing pushrods. *See Pushrod Removal under VALVES below.* Inspect cylinder head studs for tightness in block. If studs removed, use sealing compound on studs when replacing.

INSTALLATION: Install head (see Gasket Note below), tighten all stud nuts finger-tight, install Pushrods, tighten cylinder head nuts, adjust valve clearance. *NOTE*—Recheck cylinder head nut torque and recheck valve tappet clearance after approximately 100 miles of operation.

Tightening Cylinder Head Nuts—Tighten nuts in order as shown in cylinder head diagram to recommended torque of 40 ft. lbs. with dry threads.

Cylinder Head Gasket Note—Use non-hardening gasket paste and install gasket with "Top" mark upward.



CYLINDER HEAD

CRANKSHAFT & MAIN BEARINGS

FRONT & REAR MAIN BEARING CAPS: Removal—Remove front and rear end plates, then use tool J-5559 to pull bearing caps from recesses in block. *NOTE*—This tool is combination Main Bearing Cap and Pinion Bearing Remover.

Installation—Install caps with punchmark toward camshaft side of engine. Transverse groove for oil seal should be on outer edge of bearing cap.

Oil Seal Installation: Install cork strip in transverse groove in front and rear main bearing caps.

FLYWHEEL

FLYWHEEL REPLACEMENT: With engine removed, flywheel can be removed by taking off nuts on flywheel mounting studs. When installing flywheel, tighten mounting stud nuts to 32 ft. lbs. torque.

CAMSHAFT & BEARINGS

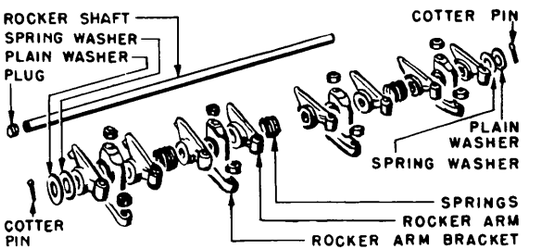
CAMSHAFT REMOVAL: With engine removed from car, remove pushrods, remove valve side covers, remove all valve lifters through side openings. Pull crankshaft pulley, remove timing cover and oil shedder, remove camshaft sprocket capscrews, pull both sprockets and timing chain as a unit. Remove camshaft retaining and thrust plate (*CAUTION*—note location of oil hole for timing chain lubrication). Remove oil pump and distributor drive gear shaft. Slide camshaft out through front of engine.

CAMSHAFT BEARING REPLACEMENT: Punch old bearings out, tap new bearings into position (*CAUTION*—line up oil holes in bearings and block). Line-ream new bearings for correct clearance of .001-.002".

VALVE SYSTEM

PUSHROD REMOVAL: Loosen tappet clearance adjusting screws in rocker arms completely, depress valve spring until pushrod socket end is free from ball end of adjusting screw, push rocker arm to one side. Remove pushrod (*CAUTION*—maintain side pressure on pushrod to insure lower end snapping out of lifter without pulling lifter up and out of its bore in the block). When removing end pushrods (front and rear), take out cotter pin in end of rocker shaft and slide rocker arm off shaft.

ROCKER ARM ASSEMBLY: Removal—Remove nuts from all rocker arm support brackets (left hand nuts are on cylinder head studs), lift entire unit off as an assembly. To disassemble unit, remove cotter pins from ends of shaft, slide rocker arms, spacing springs, and support brackets off shaft. *NOTE*—Remove plug from end of rocker arm shaft and clean sludge accumulations from hollow shaft.



ROCKER ARM ASSEMBLY

Rocker Arm Specifications

Rocker Arm Shaft Diameter	.624-.625"
Rocker Arm Bushing Inside Diameter	.6255-.626"
Shaft Clearance	.0005-.004"

Installation—All rocker arms are the same. Install arm on each side of each support bracket with spacing spring between adjacent rocker arms (no spring for end rocker arms which are assembled on each end of shaft and retained by cotter pin). When installing assembly, make certain that oil lead in FRONT support bracket lines up with oil lead in cylinder head at support bracket mounting pad. *CAUTION*—This oil lead in front bracket supplies oil for rocker arm assembly (feeds into hollow rocker arm shaft through front support bracket).

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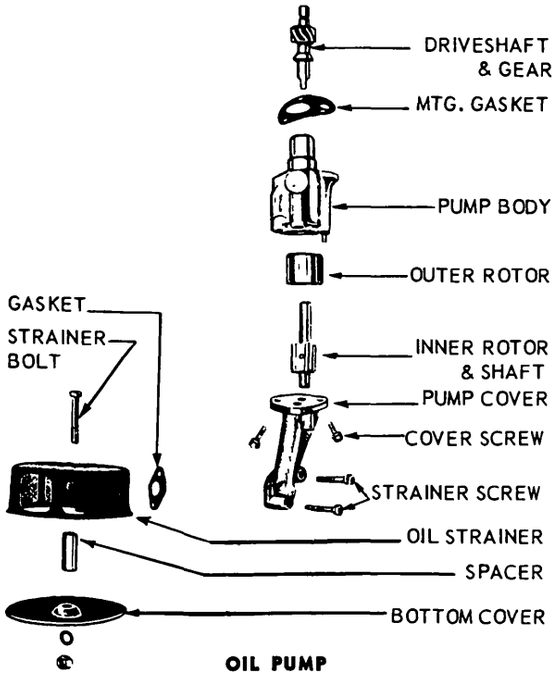
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OIL PUMP

OIL PUMP REMOVAL & INSTALLATION: With oil pan off, remove nuts from oil pump mounting studs, slide pump down off mounting studs (*CAUTION*–Pump drive shaft and gear assembly may remain in engine and can be removed by pulling it down to disengage drive gear). Install pump by reversing this procedure. Make certain that holes in pump mounting gasket line up with holes in block (*CAUTION*–Pump delivery is through oil channel in pump body and block), and that drive gear tang engages slot in upper end of pump shaft.

PUMP OVERHAUL: Disassembly–Remove oil strainer assembly from side of pump lower cover. Take out two pump cover attaching screws, lift off cover, remove inner and outer pump rotors and pump shaft. Inner rotor is pinned to shaft.

Reassembly–Reverse disassembly procedure above. After assembly completed and with lower cover tight, make certain that shaft can be turned freely by hand without binding.



OIL PUMP

IGNITION NOTES

DRIVESHAFT NOTE: This shaft and gear assembly is installed in the cylinder block and has a slot in the flanged upper end for distributor shaft drive. The assembly need not be disturbed unless replacement is required or camshaft is being removed. *CAUTION–Remove and install assembly exactly as detailed below to insure correct ignition timing.*

Removal–Use a tool made up from a piece of rod with threaded end (5/16" - 24 N.F. THD.) as a remover and installer tool. With distributor and drive bushing removed, insert threaded end of rod into upper end of the driveshaft and remove the shaft with a turning motion which will prevent the shaft disengaging from the rod and dropping into the crankcase while it is being removed.

Installation–Turn crankshaft until #1 piston is on TDC. of compression stroke. Install driveshaft in engine (using threaded rod in upper end of shaft) so that offset slot is slightly off the vertical (approximately equal to 12:30 - 6:30 of a clock face) and large portion of offset is toward REAR of engine with drive gear fully meshed with camshaft gear and driveshaft assembly fully seated in cylinder block.

MODEL IDENTIFICATION

NOTE - Electrical Syst m is 12 volt typ .

Convertible ... .561 Hardtop Model 562

SERIAL NUMBER: Stamped on plate on right side of dash panel in engine compartment and on upper flange of right dash-to-front wheelhouse panel brace near top corner of brace (below serial number plate).
First Serial Number – E-21008.

ENGINE NUMBER: Stamped on plate on upper edge of cylinder block on right side at center.
First Engin Number – IH-14001.

TUNE-UP

COMPRESSION PRESSURE: 120-135 lbs. at cranking speed of 300-350 RPM.

VALVE TAPPET CLEARANCE: .015" All Valves Cold.

MANIFOLD HEAT CONTROL: "Hot Spot" plate located between intake manifold and exhaust manifold with baffle to direct exhaust gas to center of plate. No moving parts or external controls.

IGNITION

FIRING ORDER: 1-3-4-2.

SPARK PLUG GAP: .023-.025".
Spark Plug – Champion N-8-B or Auto-Lite No. AG-5. Tighten plugs to 30 ft. lbs. torque.

COIL: Lucas LA-12. *12 Volt.* On generator.
Igniti n Curr nt – .9 amps. (Idling), 2.7 amps. (Stopped).

DISTRIBUTOR: Lucas DM-2. *12 Volt.* Distributor has "micrometer" adjuster for fine timing adjustments.
Cond ns r – Lucas. Metropolitan No. 8112147.
Capacity – .2 microfarad.
C ntact Point Set – Metropolitan No. 8112145.
Break r Gap – .014-.016".
Cam Angl – 60° ± 3° (closed).
Br aker Arm Spring T nsi n – 20-24 ozs. (at contacts).
R tati n – Counter-clockwise viewed from above.

Aut matic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		600	0		1200
7		1700	14		3400

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	6
12	24	16

Distribut r R m val & Installation: Distributor assembly (including mounting clamp) can be lifted out after hold-down screw removed from drive bushing flange (under mounting clamp plate). Drive tang in lower end of shaft is offset and distributor can only be installed in correct position.
Distribut r Driv Shaft & Gear Removal & Installation– *See "Ignition Not s" in Metropolitan Special Data.*

IGNITION TIMING

Setting–11° BTDC.
Timing Mark–Crankshaft pulley marked at TDC point.
*TIMING ADJUSTMENT NOTE–*Timing should be set by loosening mounting clamp bolt and rotating distributor within mounting clamp. The "micrometer" adjuster nut (knurled nut on opposite side of distributor housing from vacuum spark control mounting stud) can be used for fine timing adjustments to compensate for operating conditions and fuel.

CARBURETOR

Zenith 30 VIG-10. Single barrel downdraft type with manual choke control.
Idle Setting–0-1 turn open. Turn screw in for richer mixture. Adjusting screw controls idle air bleed.
Idle Speed–500 RPM. at normal operating temperature.
Float Level–No adjustment (float is free in bowl and bears directly against intake needle in cover).

Accelerating Pump–Two holes in throttle lever. Upper Hole–long stroke. Lower Hole–short stroke.
Fast Idle–1/32" throttle valve opening with choke valve closed. Adjust by loosening setscrew and changing connector rod position in choke shaft swivel.
Choke Control: Manual (cable) control.

►*OTHER DATA: See "Zenith VIG-10" in Carburetor Section.*

Fuel Pump Pressure: 1.5-2.5 lbs. at carburetor inlet.
*NOTE–*Fuel pump has priming handle at side of sediment bowl for manual operation.

CARB. EQUIPMENT

Fuel Pump: AC. Type T. Pump has "Priming Handle" at side of sediment bowl for manual operation.
Replacement Pump – Metropolitan No. 8111797.
Pressure–1.5-2.5 lbs. at carburetor inlet.
See "Fuel Pumps" in Carburetion Equipment Section.

Gasoline Gauge: Electric.
Dash Unit–Metropolitan No. 8110706.
Tank Unit–Metropolitan No. 8110398.
See "Gasoline Gauges" in Carburetion Equipment Section.

BATTERY

Lucas GTW-9A. *12 Volt.* 9 plate, 58 ampere hour (20 hour rate). Local battery may be installed. (Delco or Auto-Lite)
Grounded Terminal–Positive (+) terminal.
Engine Ground–Cable from flywheel housing to frame on right side.
Location–Under rear seat on right side (lift seat pad for access to battery box cover).

STARTER

Lucas M-35-G-1. *12 Volt.*
Armature–Metropolitan No. 8111090.
Drive–Bendix Barrel Type.
Brush Spring Tension–15-25 ozs.
Rotation–Counter-clockwise at commutator end.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	5800	12.0	45
4.9 "	1000	8.9-9.3.	250-270
9.3 "	Lock .	7.3-7.7 .	370-390

Starting Switch: ST-19/1. On dash in engine compartment with cable actuation by button on instrument panel.

GENERATOR

Lucas C-39-PV-2. *12 Volt.* Two brush type.
Armature–Metropolitan No. 8111074.

Performance Data

Amperes	Volts	RPM.
0	13.0	1050-1200
19	13.5	2000-2150

Brush Spring Tension–22-25 ozs. (new brushes).
Field Current–Field resistance 6.2 ohms.
Rotation–Counter-clockwise at commutator end.
Belt Adjustment: 1" deflection with light finger pressure midway between generator and crankshaft pulleys.

REGULATOR

Lucas RB-106-2. *12 Volt.* Two unit type with combined voltage-current regulator. Compensated.

Cutout Relay

Cuts In – 12.7-13.3 volts (1050-1200 Gen. RPM).
Cuts Out– 8.5-11 volts with 3.5 amps. discharge current.
Contact Gap – .018".
Air Gap – .025-.030".

Voltage & Current Regulator

Voltage Setting – 15.6-16.2 volts at 68° F. (Generator RPM 1000 minimum).
Air Gap – .015".

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Equip. Section.*
Direction Signal: *See Electrical Equip. Section*
Lighting & Ignition Switch: Combination switch (ignition lock cylinder located in light switch knob).
Removal–Remove spring clamp screw and clamp behind instrument panel, pull switch assembly out. *NOTE–*Ignition lock cylinder can be removed by rotating light switch knob until cylinder retaining pin lines up with access hole in side of switch case, insert key, use rod to depress retaining pin, withdraw lock cylinder.
Stop Light Switch: In front brake line fitting on inside of left front wheelhouse panel.
FUSES: Two fuses on fuse block on firewall adjacent to Regulator. Spare fuse provided for each circuit.
Lighting-Ignition-Gauges – 30 or 35 ampere.
HORNS: *12 Volt.* As follows:
Low Note – Metropolitan No. 8112149.
High Note – Metropolitan No. 8112150.

ENGINE

ENGINE SPECIFICATIONS: Austin A-50. 4 Cylinder, valve in head.
Bore – 2 7/8". **Stroke –** 3 1/2".
Displacement – 90.89 cu. ins. **Rated HP –** 13.22.
Compression Ratio – 7.2-1
Compression & Vacuum Reading – *See TUNE-UP.*

OIL PAN REMOVAL: No obstructions.

ENGINE REMOVAL: *See "Engine" in Metropolitan Special Data*

CYLINDER HEAD: *See "Cylind r H ad & Manifold" in M tropolitan Special Data.*

TIGHTENING TORQUES: *See "Tight ning Specifications" in Metropolitan Special Data.*

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PISTONS

Aluminum alloy, cam ground, split skirt, 4-ring.
Removal—Pistons and rods removed from above.
Fitting New Pistons: Clearance .0009-.0015" measured at bottom of skirt at right angles to piston pin. Check fit by inverting piston in clean dry bore. Piston should just support its own weight.
R placement Pistons: Furnished with pins in Standard size and .010", .020" Oversize.

PISTON PINS

Pin is locked in rod by a clampscrew.
Diameter – .6869". Length – 2.568-2.578".
Clearance in Piston – .0003" maximum. Fit pin palm push fit in piston bosses at 70° F.
R placement Pins: Standard & .001", .003" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (1, 2, 3)	.077-.078"	.013"	.001-.003"
Oil (4)	.1552-.1562"	.013"	.0025-.003"

Replacement Rings: Standard & .020" Oversize.
Installing Rings: Plain compression ring in top groove, taper-faced rings in No. 2 & 3 grooves, oil ring in bottom groove. All rings are oxidized-coated.

CONNECTING RODS

Rods have lower end split at an angle (to permit removal through cylinder bore), lower bearing is offset toward camshaft side of engine, and bearing has "narrow side" toward main bearing journal.

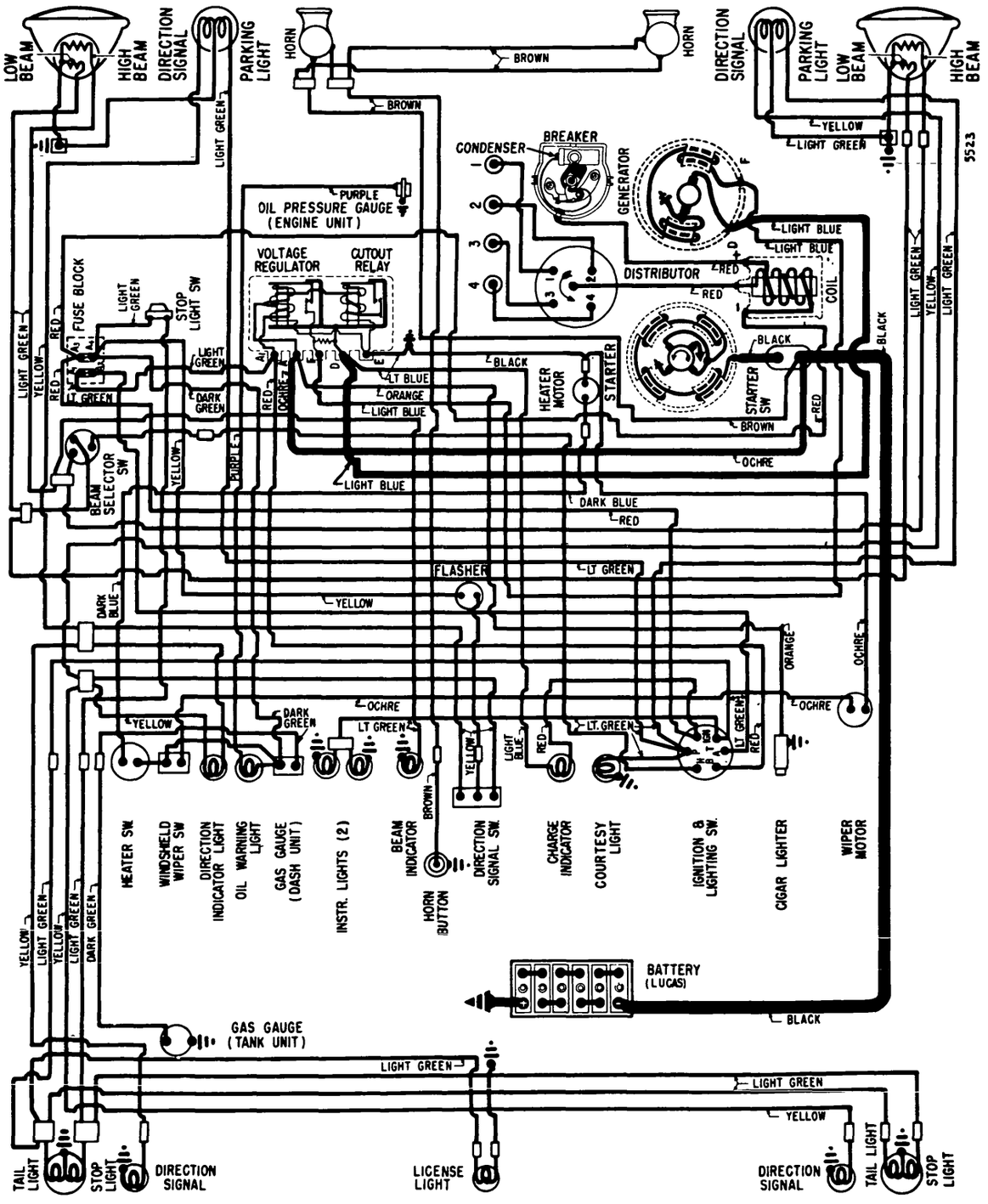
Crankpin Journal Diameter—1.8759-1.8764".
Bearings—Steel-backed, babbitt-lined, precision type inserts.
Clearance – .001-.0016".
Side Play – .008-.012".
Replacement Bearings: Standard & .002", .010" Undersize.
Installing Rods: Rods are stamped for cylinder location. Install rods in numbered cylinder with bearing offset and shorter side of rod toward left or camshaft side (oil spray hole in lower end of rod will be toward right side of engine). *NOTE*—"Narrow" side of lower bearing must toward nearest main bearing (#1 & #3 forward, #2 & #4 toward rear).

CRANKSHAFT

Journal Diameter—2.0005-2.001". Three bearings.
Bearings—Steel-backed, babbitt precision type.
BEARING NOTE—Upper bearing halves can be rotated out and in by using a pin type tool (made up from cotter pin) inserted in oil hole in journal.
Clearance—.00075-.002".
R placement Bearings: Standard & .002", .010" Undersize.
End Thrust: Taken by split thrustwashers at center main bearing (upper washers retained in recesses in bearing support in crankcase, lower washers retained by tabs fitting in recesses in bearing cap).
End Play – .002-.003".
Front & Rear Bearing Caps & Oil Seal Installation: *See Metropolitan Special Data.*

►*MAIN BEARING REMOVAL NOTE:* Engine assembly, engine end plates, oil pump and strainer assembly must be removed to remove main bearing caps.

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FLYWHEEL REPLACEMENT: *See "Flywheel" in Metropolitan Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.78875-1.78925", (2) 1.72875-1.72925", (3) 1.62875-1.62325".

Bearings—Steel-backed, babbitt bushings.

Clearance—.001-.002".

End Thrust: Taken by thrust plate on front end plate behind camshaft sprocket. **Endplay**—.002-.008".

Camshaft Removal & Bearing Replacement: *See "Camshaft" in Metropolitan Special Data.*

Timing Chain—Double Roller. Metropolitan No. 8110131.

NOTE—Camshaft sprocket has rubber Tensioner Ring (installed in groove in outer rim) for quiet operation.

Camshaft Setting: Mesh sprockets in chain (on the bench) with marks on sprockets adjacent and line with a straightedge across shaft centers. Turn crankshaft until #1 & #4 pistons are at TDC., turn camshaft so that #1 & #2 valves are in overlap position (exhaust valve closing, intake valve opening), install chain and sprockets as an assembly.

VALVES

Tappet Clearance: .015" All Valves Cold.

Valv	Head Diameter	Stem Diameter
Intake	1 3/8"	.34175-.34225"
Exhaust	1 3/16"	.34175-.34225"

Valv	Seat Angl	Lift	Stem Clearance
Intake	45°	.325"	.0015-.0025"
Exhaust	45°	.325"	.0010-.0020"

Valv Seat Width - 1/16" (3/32" maximum).

Valv Stem Seals: Used on all valves. Seal washer installed between Seal Retainer and Spring Retainer on upper end of valve stem. Use NEW seals when installing valves.

Valv Springs: Free length 2 1/64".

Valve Spring Specifications

	Lbs. Pressure	Length
Valve closed	75.5-79.5	1 17/32"
Valve open	128-132	1.206"

►*VALVE LOCK INSTALLATION CAUTION*—Safety pin (hairpin spring) must be installed in groove in locks.

Valv Guides: Drive old guides out from top of head. Use Driver J-5564 to install new guides from combustion chamber side, drive guides in until they extend 11/16" beyond machined spring seat surface on head.

Valv Lifters: Two-piece barrel type (pushrod cup is pressed in main body). Remove from above (through side opening of block) after side covers and pushrods removed. *CAUTION*—Re-install lifters in same bore.

Rock r Arm Assembly: *See "Valve System" in Metropolitan Special Data for removal and assembly.*

Rock r Arm Clearanc —.0005-.004"

VALVE TIMING

See CAMSHAFT SETTING above.

Intake Valves—Open 5° BTDC. Close 45° ALDC.

Exhaust Valves—Open 40° BLDC. Close 10° ATDC.

NOTE—These specifications apply with .020" tappet clearance.

Valv Timing Check—Turn crankshaft so that #1 & #4 piston on top dead center with #4 piston entering power stroke. At this point, #1 & #2 valves should be in "overlap" position (exhaust valve closing and intake valve opening).

OILING SYSTEM

Crankcase Capacity: 4 quarts (refill).

Normal Oil Pressure: 55-60 PSI at 30 MPH.

Pressure Regulator Valve—Located under plug on left side at the rear of engine.

Oil Pressure Indicator—Warning light on lower left face of speedometer controlled by Pressure Switch on right side of engine block. Lamp should light when ignition turned on and should go out when engine oil pressure exceeds 7 lbs.

Oil Pressure Switch —Metropolitan No. 3134704.

Oil Pump: Rotor type. In crankcase on left side.

Pump Removal & Installation—*See "Oil Pump" in in Metropolitan Special Data.*

Oil Filter: Accessory.

Replacement Filter Element— Metropolitan No. 8990183.

Crankcase Ventilation: Air intake in rocker arm cover (hose connection to air cleaner), outlet pipe on left side of engine at rear.

COOLING

Water Capacity: 8 qts. (with heater).

Pressure Valve: Metropolitan No. 8111524 Radiator Filler Cap 3.5-4.5 lbs.

Thermostat: In water outlet elbow on cylinder head. **(Std.)** Metropolitan No. 8110247. Opens at 158-167°F. **(Permanent Anti-freeze)** Metropolitan No. 8111202. Opens at 180°F.

Water Pump: Packless. *NOTE*—Pump has oil plug on top of body (lubricate with light engine oil at 10,000 mile intervals).

See "Metropolitan" in Water Pump Section.

Pump Removal—Remove radiator core first, then remove pump from block.

CLUTCH

Borg & Beck Type A—Single plate.

See "Borg & Beck Type A" in Clutch Section.

Clutch Disc—Metropolitan No. 8111732. Facing Set (Including rivets) No. 8111739.

Pedal Adjustment: Freeplay ½-¾". Adjust length of rod between clutch pedal and clutch master cylinder.

Hydraulic Clutch Control: Consists of standard master cylinder located adjacent to brake master cylinder, attached to clutch cover. Adjusting link between clutch pedal and master cylinder, connecting rod only between clutch operating cylinder and clutch throwout lever.

Filling Master Cylinder: Filler cap accessible through hole in floor pan. Maintain level to mark on cylinder. Bleed hole in clutch operating cylinder permits bleeding procedure the same as for brake system.

►*MASTER CYLINDER VENT CAUTION:* Floor pan hole cover gasket may block off air vent hole. Cut 2" diameter holes in gasket directly over both clutch and brake master cylinder.

Removal: Remove transmission and integral bell housing (see below), mark clutch cover, pressure plate, and flywheel (to insure re-installation in same position), relieve spring pressure by turning out all cover screws evenly.

SYNCHRO-MESH TRANSMISSION

Own. Three-speed, helical gear, constant mesh gears. *See Transmission Section for complete data.*

Transmission Control: See "Transmission Controls" in *Transmission Section.*

Removal: Remove four top transmission to engine mounting bolts (from engine compartment). Raise & support car securely. Drain transmission. Install engine support fixture Tool J-5565. Disconnect propellor shaft at the rear axle companion flange and pull the shaft from the transmission main shaft splines. Remove rear crossmember from rear transmission supports and side sill members. Disconnect speedometer cable and shift rods from transmission levers. Disconnect clutch operating cylinder rod from clutch throwout lever, remove two capscrews holding cylinder to transmission but DO NOT disturb hydraulic lines. Remove four remaining lower transmission to engine bolts and remove starter. Lower the engine support fixture approximately 1¼" and lift transmission toward the rear, while supporting weight to eliminate possible damage to clutch drive plate.

UNIVERSALS

Cross type. Two used.

REAR AXLE

Own. 3/4-Floating, Hypoid Gear, Hotchkiss Drive, with separate differential gear carrier.

See "Rear Axle Section" for Complete Data.

Ratio – 4.2-1 (9-38).

Axle Shaft Removal: Remove rear wheel, drain axle housing. Remove drum locating screw, tap brake drum off hub. Remove axle shaft retaining screw (in shaft flange—exposed when drum removed), pull axle shaft straight out (if flange tight, pry flange loose from studs).

►*INSTALLATION CAUTION—Always use NEW gasket between axle shaft flange and hub when installing shaft.*

Rear Axle Removal: *Carrier Assembly can be removed separately, or complete Axle Assembly can be removed as follows:*

Carrier Removal—Raise rear end of car, drain axle housing, remove axle shafts (see above). Disconnect propeller shaft at rear universal companion flange and remove shaft. Remove nuts on differential carrier studs and lift assembly out of housing.

Axle Assembly Removal— Disconnect brake cable at balance lever and brake hose at "Tee" fitting. Disconnect propeller shaft at rear universal companion flange and remove shaft. Disconnect rear springs by removing "U" bolts at spring seats. Remove axle assembly from beneath car.

Wheel Bearing Adjustment: None. Bearing nuts on outer end of axle housing should be kept tight.

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SHOCK ABSORBERS

Direct acting, hydraulic (front & rear). Service by replacement.
Front–Metropolitan No. 8111425.
Rear–Metropolitan No. 8111426.

FRONT SUSPENSION

Independent. Parallelogram type with coil springs mounted above knuckle pin and independent direct acting shock absorbers.
See Front Suspension Section for complete data.

Kingpin Inclination–6½° crosswise.
Caster–Pos. 2° to Pos. 3°. No adjustment.
Camber–Pos. ½° to Pos. 1½°. No adjustment.
Toe-In–0-1/16". Adjust center tie-rod (between steering gear pitman arm and idler arm).
Toe-Out on Turns–With outer wheel turned 20°, inner wheel should be 24½°+½°-0°.

STEERING

R ss. Cam-and-Lever type.
See "Ross Cam-and-Lever" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam-and-Lever" in Steering Section.*

Steering Gear Removal: *See "Ross Cam-and-Lever" in Steering Section.*

BRAKES

Girling Hydraulic. Front Wheels–Twin Cylinder, floating shoes (single acting cylinder actuating one shoe and serving as anchor for other shoe). Rear Wheels - Single cylinder, floating, non-servo lever (shoes anchored at adjuster bracket, piston actuates one shoe, lateral movement of cylinder actuates opposite shoe). Parking lever applies rear wheel service brakes.

See "Girling Hydraulic" in Brake Section.

►*MASTER CYLINDER VENT CAUTION:* Floor pan hole cover gasket may block off air vent hole. Cut 2" diameter holes in gasket directly over both clutch and brake master cylinder.

Drums–Diameter 8".
Wh l Cylind rs–¾" diameter (all whls.).
Replacement Lined Shoes–Shoes with bonded or riveted lining furnished for replacement as follows:

Metropolitan No.	Front Wh l	R ar Wh el
Shoe & Lining Set	8112228	8112265

Lining Width–1.25". **Length**–7.68".

Clearance–Shoes just free of drag (eccentric adjuster for each front wheel shoe, single wedge adjuster on backing plate for both rear wheel shoes).

Master Cylinder: Under front compartment floor on left side.

Checking Fluid–Filler access hole in front floor pan on left side. Check fluid level at 1000 mile intervals.
Removal–Remove from beneath car after disconnecting brake line fitting, pedal pushrod, and return spring.

MISC. MECHANICAL

Windshield Wiper: Lucas. Electric.
See "Lucas Electric Windshield Wiper" in Misc. S ct.

TIGHTENING SPECIFICATIONS

STATESMAN & AMBASSADOR 6

	Foot Lbs. Stsm.	Amb. 6
Cylinder Head	57-60	65 70
Main Bearing Caps	66-70	①66-70
Flywheel	100-110	100-110
Vibration Dampener	65-70	90-100
Con Rod Caps	27-30	52-56
Camshaft Sprocket	50-55	35 40

①—Special hollow center main bearing capscrew (oil pump screw) 70-75 ft-lbs

HORNET & AMBASSADOR SPECIAL V8

	Ft. Lbs.
Cylinder Head	60-65
Main Bearing Cap (Rear)	50-55
Main Bearing Cap (Others)	80-85
Con Rod Caps	52-56

HORNET & AMBASSADOR V8

	Ft. lbs.
Cylinder Head	55-60
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan	15-18
Main Bearing Caps	90-95
Flywheel	55-60
Vibration Dampener	130-150
Con Rod Caps	40-45
Camshaft Sprocket ①	25-30
Rocker Arm Support Bracket	55-60
Upper Valve Tappet Cover	15-18
Rocker Arm Cover	15-18
Water Pump Manifold	25-30
Water Pump Mounting	15-18
Oil Pump Mounting	25-30

①—Fuel pump eccentric retaining screw

CYLINDER HEAD & MANIFOLD

STATESMAN

CYLINDER HEAD INSTALLATION: Use torque indicating wrench to tighten cylinder head studs in sequence shown in cylinder head diagram. Torque specifications are for engine at operating temperature.

Cylind r H ad Gask t - Always use new gasket. Coat gasket with non-hardening gasket paste to insure tight seal between cylinder head and block.

AMBASSADOR 6

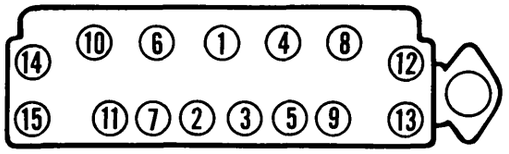
INSTALLING CYLINDER HEAD: Use torque indicating wrench to tighten cylinder head stud nuts in sequence shown in cylinder head diagram

Cast Iron H ads—Torque to specifications with engine at normal operating temperature

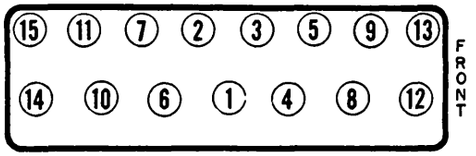
Aluminum H ads—Torque to specifications with engine cold or at room temperature

Cylinder H ad Gasket—Always use new gasket Coat gasket with non-hardening gasket paste

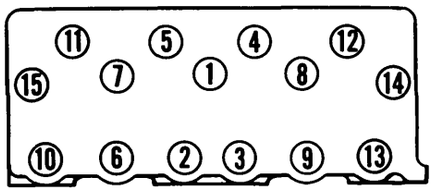
Tightening T rqu —See Tightening (Torque Wrench) Specifications above



STATESMAN CYLINDER HEAD



AMBASSADOR 6 CYLINDER HEAD



HUDSON HORNET & NASH AMB. SPECIAL V8 CYLINDER HEAD

HORNET & AMBASSADOR SPECIAL V8

CYLINDER HEAD INSTALLATION: Cylinder block has two sleeve locating dowels to assist in lining up cylinder head and gasket during installation. Coat gasket with non-hardening gasket paste, install gasket with marks "AM" and "TOP" upward. Install cylinder head, pushrods, and rocker arm assembly *(CAUTION* - Special drilled capscrew must be installed in rear rocker arm support bracket to provide lubrication for rocker arms). Tighten head bolts in sequence shown in diagram to correct torque. See Tightening Specifications.

HORNET & AMBASSADOR V8
AMBASSADOR V8

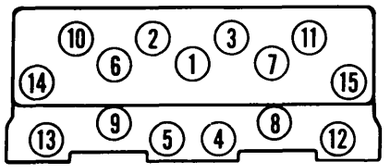
CYLINDER HEAD INSTALLATION: Cylinder block has two sleeve locating dowels to assist in lining up and holding position of cylinder head and gasket during installation Coat gasket with a non-hardening gasket compound Install Cylinder Head Lifter J-4159 in the front and rear spark plug holes and install head over dowels (dowels are drilled for oil return from rocker arm chamber) Install pushrods, rocker arm assembly, and the cylinder head capscrews Tighten all head bolts in the sequence indicated in diagram to correct torque. See Tightening Specifications.

STATESMAN

►*INTAKE MANIFOLD COVER CORRECTION (For exhaust leak into Intake Manifold):* To correct exhaust leakage due to excessive corrosion, causing rough engine operation, remove intake manifold cover and tap and install Two Nash Part No. 3125657 Allen Head pipe plugs in lower side of cover blocking off heat passages. These plugs should be flush with intake manifold gasket surface.

HORNET & AMBASSADOR V8

►*INTAKE MANIFOLD GAS PASSAGE CORRECTION* Poor automatic choke operation can be traced to either a stuck manifold heat control valve or restrictions in the exhaust gas passages of intake manifold Free up or replace stuck manifold heat control valve. Remove any casting fins that extend into exhaust passages of intake manifold If found they can be removed or broken out with a small rod. When intake manifold is not discolored, in center section, from passage of exhaust gases it indicates that restrictions or fins are blocking the passage of exhaust gases.



HUDSON HORNET & NASH AMBASSADOR V8 CYLINDER HEAD

ORIGINAL BORE & PISTONS

STATESMAN & AMBASSADOR 6

ORIGINAL BORE LETTER CODE· A three letter code stamped adjacent to engine number indicates as follows

Letter Sequence Code	
First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code	
Letter "A"	Standard
Letter "B"	010 Undersize
Letter "C"	010 Oversize
Letter "D"	001 Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD.

PISTON PINS

STATESMAN & AMBASSADOR 6
HORNET & AMBASSADOR SPECIAL V8

PISTON PIN: Pin is press fit in connecting rod and no clamp bolt or locking rings are used to retain the pin. Piston pin must be removed and installed as detailed below to prevent distortion or damage to piston.

Removal - Remove pins with special Piston Pin Remover J-6360 and an arbor press. Place piston in remover support so pin will enter support when pressed out with piloted driver.

Installation - Place piston pin pilot in support, insert piston and connecting rod. This aligns piston and connecting rod piston pin bores. Press piston pin into connecting rod and piston assembly until lower pilot bottoms in support which will properly center rod on pin

►*CAUTION* Pin must be tight press fit in connecting rod

HORNET & AMBASSADOR V8

PISTON PIN BUSHING (IN CONNECTING ROD) INSTALLATION· After pressing old bushing out with an arbor press, install new bushing so that it is flush with both sides of rod Position Burnisher Tool J-6055 in bushing, then applying plate of tool under rod, push

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burnisher through bushing with an arbor press Make sure oil hole in bushing lines up with oil hole in rod *NOTE*–If bushing not drilled for an oil hole, drill a 3/16" hole before reaming bushing

ORIGINAL BEARING SIZES

STATESMAN & AMBASSADOR 6

ORIGINAL BEARING LETTER CODE· A three letter code stamped adjacent to engine number indicates as follows

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	010 ' Undersize
Letter "C"	010 Oversize
Letter "D"	001 Undersize

ENGINES MARKED "AAA" OR UNMARKED ARE STANDARD

CRANKSHAFT & MAIN BEARINGS

STATESMAN

CRANKSHAFT END THRUST PLATE: Crankshaft end thrust taken by flanged edges of front bearing A steel thrust plate is assembled between rear face of timing chain sprocket and flanged face of front bearing Plate keyed to shaft by Woodruff key which also secures sprocket on shaft When plate installed, chamfered edge on inner diameter should face toward the rear for tight fit against bearing journal

STATESMAN

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Packing in groove in block and cap behind oil slinger on crankshaft Cap sealed with rubber plugs in groove on each side where cap fitted in recess in block Use Tool J-1610 to install packing in groove in block and cap Place packing in groove (with bearing shell removed), place small diameter of tool over packing, hit end of tool with lead hammer to seat packing, cut ends of packing flush with bearing cap seat, remove tool Repeat operation for groove in block Install rubber seal plugs on each side of bearing cap (where angle seal used, make certain that seal also seated in horizontal groove in block)

AMBASSADOR 6

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Steel backed synthetic rubber seal Install upper half in block, lower half in bearing cap, make certain that seal fits snugly over edge of rear bearing oil return groove See that surface on crankshaft to rear of oil slinger (on which seal rides) is rough **NOTE**–Manufacturer now recommends roughing seal position on crankshaft with No 240 grit emery cloth **DO NOT** create spiral scratches which may conduct oil against and under seal lip Check depth of bearing cap seal groove (.050-.055") Insufficient depth will prevent crankshaft seal from contacting crankshaft Install rubber seal strips on either side of bearing cap (three strips overlap bearing cap and seal sides and end surfaces of bearing cap in crankcase)

HORNET & AMBASSADOR SPECIAL V8

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Install hemp packing in block and in bearing cap using tool J-3048-A to seat packing in groove. Trim excess packing off flush with face of cap.

HORNET & AMBASSADOR V8

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Apply Lubriplate to groove in bearing cap and install oil seal, using Oil Seal Installer J-3048-A and a hammer, drive seal into place With seal installed and tool still in place, trim ends of seal flush with surface of cap To install upper half of seal in crankcase, remove crankshaft and install seal in same manner as for bearing cap **NOTE**–At time of pan installation, place a generous bead of non-hardening Permatex along edge of bearing cap and crankcase to insure a perfect seal

VIBRATION DAMPENER

STATESMAN & AMBASSADOR 6

INSTALLATION: Non-adjustable, rubber cushioned type To install hub assembly install large lockwasher with notches on inner edge, cork seal ring, rubber seal ring and hub retainer in recess in hub, install hex head lock screw with helical lockwasher under it, in screw hole in end of crankshaft and tighten screw securely On Ambassador 6 models, dampener hub retained by a special nut shake-proof lockwasher (no seal installed behind hub) On both models, rubber block retaining bolt nuts on front face of dampener hub must be drawn up tight *CAUTION*–When installing vibration dampener on hub, timing marks must be aligned with hub key-way and on same side

HORNET & AMBASSADOR V8

VIBRATION DAMPENER: Removal–Drain cooling system Remove radiator core and fan assembly Remove vibration dampener retainer screw and lockwasher and if car is equipped with Power Steering or Air Conditioning, remove the drive pulleys by prying them-off dampener assembly Install center adapter J-5992-2. in threads of crankshaft Install screw assembly J-5992-3 in remover body J-5992-1 and removedampener

Installation: Lubricate oil seal in engine front cover and position dampener over crankshaft and tap it into place with a rawhide hammer Assemble Vibration Dampener Installer J-5992 by placing the ¾" nut on screw assembly J-5992-3 and slide spacer J-5992-4 over screw assembly Start screw in end of crankshaft and tighten until it bottoms in the threads With one end of spacer against dampener, turn nut on screw until dampener hub bottoms the crankshaft oil slinger against a shoulder on crankshaft Install Power Steering and/or Air Conditioning pulleys, retainer washer, and screw. Tighten retainer screw to 130-150 ft lbs

ENGINE FRONT COVER

STATESMAN & AMBASSADOR 6

CRANKSHAFT FRONT OIL SEAL: A felt oil seal is fitted in the timing chain cover which bears against vibration dampener hub Seal seat in hub has inner edge turned up to form a shedder on inside of cover An oil slinger is assembled behind vibration dampener hub which extends over outer edge of oil shedder Use Tool J-1430 installed on end of crankshaft when tightening timing chain cover screws to align seal properly **NOTE**–On Statesman a cork seal and rubber seal is assembled behind vibration dampener to seal front end of crankshaft See Vibration Dampener above

HORNET & AMBASSADOR SPECIAL V8

CRANKSHAFT FRONT OIL SEAL: Oil seal is installed in timing chain cover at vibration dampener hub. To replace seal, remove water pump, fuel pump assembly, vibration dampener, and timing chain cover. Remove old seal from cover Install new seal in cover. *NOTE* - When installing timing chain cover, place cover on locating dowels but leave cover-to-block screws loose until vibration dampener is installed, then tighten cover screws.

HORNET & AMBASSADOR V8

ENGINE FRONT COVER: Removal–Remove vibration dampener (see above), and water pump manifold assembly Disconnect and remove fuel pump Remove screws attaching front cover to block and remove cover

Installation: Using a new gasket, install engine front cover in place and start capscrews in threads, **but do not tighten.** Lubricate oil seal in cover and install vibration dampener assembly, using hub on dampener as a pilot to align front cover Complete installation by reversing removal procedure

HORNET & AMBASSADOR V8

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION· Remove engine front cover (see above), drive out old seal with a hammer and punch, being careful not to damage cover Install a new seal using tool J-5983, pressing seal into place with an arbor press

►*FRONT OIL SEAL LEAK CORRECTION:* Caused by seal assembly rotating with crankshaft. To correct, remove front cover, pry out old seal assembly. Before installing new seal, drill two 11/64" holes through seal opening flange on inside of cover locating the holes approximately 35° on each side of upper end of vertical line through seal opening. When new seal installed, upset seal material into these holes with a blunt punch so that seal is secured in place.

FLYWHEEL

STATESMAN & AMBASSADOR 6

►*FLYWHEEL REPLACEMENT CAUTION (Std. & Ov r-drive Trans.):* Flywheel on which starter ring gear is installed is balanced as an assembly with crankshaft and vibration dampener. When flywheel is replaced, it is important that balance holes be duplicated as to size, depth, and angular location After replacing flywheel, tighten crankshaft to flywheel stud nuts with torque wrench

CAMSHAFT & BEARINGS

STATESMAN

CAMSHAFT REMOVAL NOTE: Special valve tappet retaining clips supplied in sets of 16(Tool No J-1612) Clips should be installed on upper ends of valve lifters to hold lifters up out of the way while the camshaft is being removed

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AMBASSADOR 6

CAMSHAFT REMOVAL: Remove pushrods Remove valve cover on side of engine, lift up each valve lifter and use rubber bands to hold lifters up out of the way while camshaft is being withdrawn

HORNET & AMBASSADOR SPECIAL V8

CAMSHAFT REMOVAL: Remove spark plug wires, cylinder head covers, and rocker arm assemblies. Remove intake manifold and carburetor. Remove all pushrods and hydraulic valve lifters *(CAUTION* - Keep these parts in order so they can be installed in same relative positions). Remove fuel pump. Remove vibration dampener and timing chain cover. Remove water pump and cylinder head water distribution manifold. Crank engine until timing marks on chain sprockets line up on vertical line through shaft centers. Remove fuel pump eccentric, remove both sprockets and timing chain as an assembly. Remove camshaft retainer thrust plate and thrust spacer. Carefully withdraw camshaft through front of engine.

HORNET & AMBASSADOR V8

CAMSHAFT: Rem val—Remove cylinder head covers, ignition wires, rocker arm assemblies, intake manifold, and carburetor Remove water pump and manifold assembly Remove upper oil breather and tappet assembly cover Remove inner oil baffle cover Remove pushrods, keeping them in their relative operational positions Remove hydraulic tappets and keep in their relative operational positions Remove fuel pump, vibration dampener, and engine front cover Crank engine until timing marks on camshaft and crankshaft sprockets line up with shaft centers Remove oil shedder from crankshaft and fuel pump eccentric from camshaft Timing chain, camshaft, and crankshaft sprockets can be pried off Remove camshaft retainer and thrust plate and end plate thrust spacer Remove camshaft

Installati n: Reverse removal procedure and note the following· Install camshaft gear about 1/16" beyond a position flush with camshaft end to allow mounting of fuel pump eccentric

TIMING CHAIN

AMBASSADOR V8

TIMING CHAIN: R moval—Remove engine front cover (see above). Pry off oil slinger from end of crankshaft and remove fuel pump eccentric Rotate engine to line up marks on sprockets with marks adjacent and in line across shaft centers Remove sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts

Installati n: Install camshaft and crankshaft sprocket keys being sure that they are properly seated in keyways Rotate engine or crankshaft to bring No 1 cylinder to firing position Slide crankshaft sprocket part way on the crankshaft and assemble camshaft sprocket in chain, locating and lining up the "O" marks on the sprockets in line with camshaft and crankshaft centers. Position chain on crankshaft sprocket and start camshaft sprocket on camshaft. Using a rawhide hammer, alternately tap both sprockets into proper position Camshaft gear must be installed about 1/16" beyond a position flush with end of camshaft for installation of fuel pump eccentric Complete installation by reversing removal procedure

VALVE SYSTEM

HORNET & AMBASSADOR V8

VALVE SPRING BAFFLE INSTALLATION (For Improved Oil Control): Beginning at Engine No. P-25889, valve spring baffles, Nash No. 6480914, were installed in production. Baffles are installed under springs with flange extending upward on high side of spring. *These baffles can be installed on earlier engines if valve system disassembled (for Valve Grinding etc.) or special type baffles can be installed WITHOUT disassembling valve system as follows*

Service Installation of Special Baffles (Without disassembling Valves) - Install Baffle Kit, Nash No. 6484-396 (Four No. 6489127 Valve Spring Baffles, Eight No. 6489048 Lockwashers) as follows Remove cylinder head covers, loosen rocker arm shaft bolts and lift off rocker arm shaft assemblies. Place baffles in position on rocker arm assemblies using two baffles on each cylinder head assembly (baffle should circle springs on rocker arm shaft side and mounting lugs should rest on top of shaft brackets). Install rocker arm shaft assembly on cylinder head, replace original lockwashers with new type square lockwashers, tighten bolts to correct torque *(CAUTION* - See that lockwashers do not turn with bolts and distort baffles).

VALVE TAPPET ADJUSTMENT

AMBASSADOR V8

VALVE TAPPET ADJUSTMENT: *(NOTE—Checking must be done with no oil in compression chamber of tappet and plunger completely bottomed, with tappet on base circle of cam).* With piston on compression stroke and both valves closed, press downward on the pushrod end of rocker arm to compress plunger spring and force plunger to bottom position While still holding down on rocker arm, measure the lash The clearance between valve stem end and rocker arm tip should be 050" to 210"

VALVE STEM SEALS

STATESMAN

HORNET & AMBASSADOR SPECIAL V8

VALVE STEM OIL SEAL: Consists of a rubber deflector installed on valve stem of all valves. Install deflector on valve stem with cupped side down over upper end of valve guide before installing valve spring and locks. Use new deflector whenever valves ground or replaced.

AMBASSADOR 6

VALVE STEM OIL SEAL: Consists of a neoprene valve stem seal and a felt seal under metal retainer, which is mounted over top of valve guide The neoprene seal prevents excessive oil passage past valve stem while felt seal provides initial starting lubrication An upper neoprene rubber seal is also installed in groove on valve stem below valve locks on all valves. Install these seals as follows After installing valve spring and spring retainer, compress spring, so that lower groove of valve stem exposed, install neoprene seal in this groove, install valve locks in upper groove, relieve spring tension

HORNET & AMBASSADOR V8

VALVE STEM OIL SEAL: Rubber oil deflectors used on all valves Same as Statesman and other V8 models (above).

VALVE GUIDES

HORNET & AMBASSADOR V8

VALVE GUIDE REAMING & INSTALLATION OF VALVES WITH OVERSIZE STEMS: Valve guides are integral with head and whenever stem clearance is excessive (see Checking Valve Stem Clearance below), guides should be reamed out to next oversize and valves with oversize stems installed.

Checking Valve Stem Clearance - After valves have been removed from head, and with valve stems and guides clean, install valve in respective guide bore and measure side-to-side play crosswise to the cylinder head using a dial indicator or thin strips of feeler gauge material placed between stem and guide bore If clearance is excessive, guides should be reamed and valves with oversize stems installed

Valve Guide Reaming - Four oversize reamers (.003", .010", .020", .030" Oversize) are furnished in Valve Guide Set J-6042 which will provide correct stem clearance for installation of same oversize valve (.001- 002" Intake, .002- 003" Exhaust). After checking clearance (above), select proper oversize reamer and pilot for the oversize valve to be installed.

ROCKER ARMS

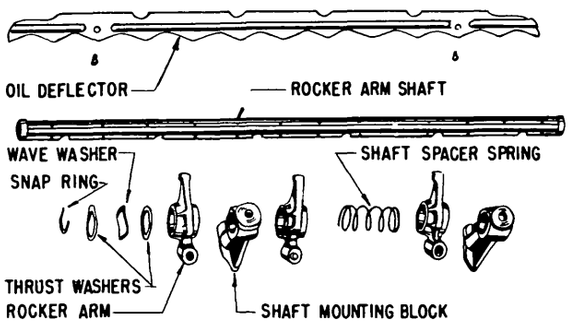
STATESMAN

ROCKER ARM ASSEMBLY: Rocker arm shaft is one piece type and entire rocker arm assembly can be removed after taking out mounting bolts in shaft brackets.

Disassembly & Inspection: Remove snap ring on end of shaft, slide thrustwashers, wave washer, rocker arms, mounting brackets, and springs off shaft. Inspect all parts for wear, see that end plugs are tight in shaft.

Reassembly & Installation: Install all parts in same relative positions *(CAUTION* - Rocker arms are "Right" and "Left" and must not be interchanged). Install assembly with rocker arm lubricating holes in shaft down or toward cylinder head. Make certain that baffle installed on rocker shaft supports does not interfere with rocker arm.

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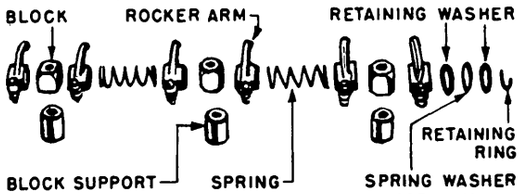
STATESMAN ROCKER ARM ASSEMBLY

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AMBASSADOR 6

ROCKER ARM ASSEMBLY: See illustration for sequence of assembly.

►*ROCKER ARM & LUBRICATION CAUTION:* Hollow bolt must be in front mounting bolt hole of rocker arm assembly for proper lubrication.



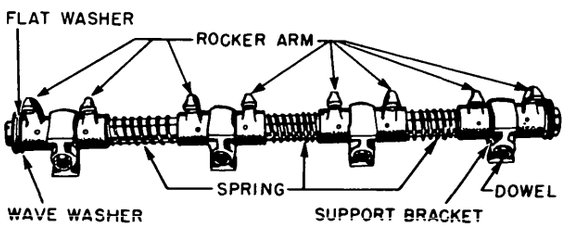
AMBASSADOR 6 ROCKER ARM ASSEMBLY

HORNET & AMBASSADOR SPECIAL V8

ROCKER ARM ASSEMBLY: Complete assembly mounted on cylinder head by four long cylinder head retaining capscrews *(CAUTION* - Rear bolt is special hollowtype for rocker arm lubrication). Assembly can be removed by taking out the retaining screws.

Disassembly & Inspection: Remove snap ring on end of shaft and slide all parts off shaft. Keep all parts in order so they can be reassembled in same relative positions. Clean and inspect all parts for wear. Inspect rocker arm radius at valve stem end for wear and replace worn rocker arms. Make certain that plugs are tight in ends of shaft.

R assembly & Installation: Install all parts in same relative positions *(CAUTION* - Rocker arms are "Right" and "Left" and will not contact valve stem properly if interchanged). When installing assembly, make certain that special hollow bolt installed in rear support bracket (necessary for correct rocker arm lubrication).



ROCKER ARM ASSEMBLY
HUDSON HORNET & NASH AMB. SPECIAL V8
HUDSON HORNET & NASH AMBASSADOR V8

HORNET & AMBASSADOR V8

ROCKER ARM AND SHAFT DISASSEMBLY: Remove rocker arm and shaft assembly from cylinder head. Remove pins and wave washers from end of shaft. Remove rocker arms, springs and supports, keeping all parts in order so they can be reassembled in original position.

Inspecti n: Clean and inspect all parts for wear. Inspect rocker arm radius at valve stem ends, and if worn replace the rocker arm. Inspect plugs at each end of shaft for tightness.

R ass mbly: Reverse disassembly procedure and note the following: Rocker arm shaft must be assembled with the grooved oil hole in the downward position, or facing the cylinder head.

►*CAUTION: There is a right and left rocker arm and if reversed in assembly they will not contact the valve stem properly.*

HYDRAULIC LIFTERS

HORNET & AMBASSADOR (ALL) V8

HYDRAULIC VALVE LIFTERS: Removal—Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm assembly. Remove upper valve tappet cover and breather tube and then remove lower tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in same relative position.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. *(CAUTION—Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove all varnish and gum deposits.

Inspection: Inspect the plunger and wall of body for scratches (if plunger or body is scratched, replace complete unit). Try the plunger for fit in body. If check valve removed from plunger, inspect flat disc valve, spring and seat.

Reassembly: Reverse disassembly procedure. See illustration for correct sequence.

Testing: Use a clean container deep enough to cover the lifter assembly (in an upright position). Fill container with clean kerosene. Remove the pushrod socket and place lifter in kerosene in an upright position, allowing it to fill up. Remove lifter and replace pushrod socket. Place lifter assembly between jaws of checking tool J-5978-A. Check leak-down by depressing tool. A decided resistance should be felt. If plunger collapses immediately, the lifter should be checked again. Replace if no resistance felt.

Tool Note - To alter tool J-5978 for use with late type V8 lifter, Nash No. 6476060, grind bottom face of lower jaw on tool back 5/8" to reduce thickness of jaw to .150-.160".

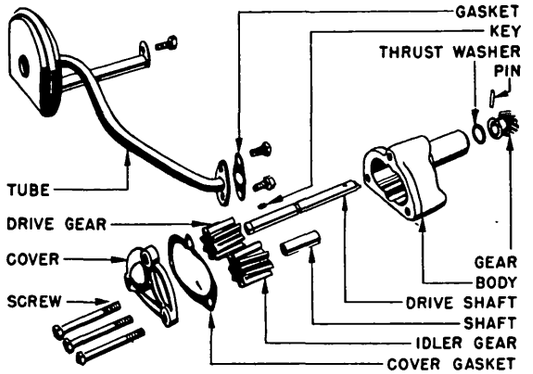
OILING SYSTEM

OIL PUMP

STATESMAN

OIL PUMP: Removal - Pump mounted externally on right side of engine. Remove pump by taking out three capscrews in pump cover.

Overhaul: Remove pump cover and gasket. Lift out pump drive gear, idler gear, and idler gear shaft. Remove key from keyway in shaft. Remove shaft and driving gear assembly through upper end of pump body *(NOTE* - Driving gear is held on shaft by a pin). Remove thrustwasher from shaft. Reassemble pump by reversing this disassembly procedure.

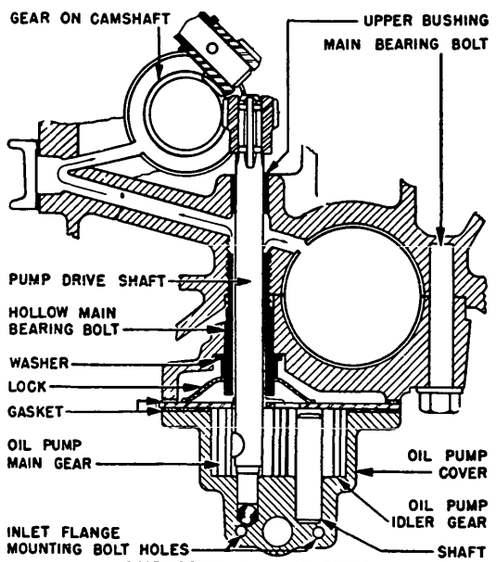


STATESMAN OIL PUMP

AMBASSADOR 6

OIL PUMP: Removal—Pump is mounted on center main bearing cap and must be dismantled for removal as follows: Take out pump mounting screws, withdraw pump body and idler gear assembly (shaft will remain in engine). Withdraw shaft from below disengaging drive gear from splines on upper end of shaft as shaft is withdrawn. Gear is free fit on shaft splines and can be lifted out after it is freed from the shaft. Pump shaft operates in thin wall bushing pressed in block (upper), in pump body (lower). Remove and replace bushing from beneath with pump and shaft out of engine. Ream bushing to diameter of .500" after installation.

CONTINUED ON NEXT PAGE



AMBASSAD R 6 IL PUMP

CONTINUED FROM PRECEDING PAGE

►*CAUTION: Excessive clearance of shaft in bushing will result in low oil pressure (pump oil delivery is up along shaft to oil channel in block–upper bushing prevents oil leakage from channel).*

Installati n: Make certain that loose thrust ball is installed in pump body at lower end of pump shaft. Install pump in reverse order of disassembly and removal above.

CAUTION–Maintain a tight connection between inlet flange and pump body.

HORNET & AMBASSADOR SPECIAL V8

OIL PUMP: R m val - Remove oil pan and screws retaining oil pump to rear main bearing cap, remove oil pump.

NOTE - Oil pump is driven by distributor drive shaft so removal of oil pump does not affect ignition timing.

Disass mbly - Remove inlet tube and screen assembly from pump cover. Remove cover retaining screws, cover, pump gears, relief valve spring and plunger.

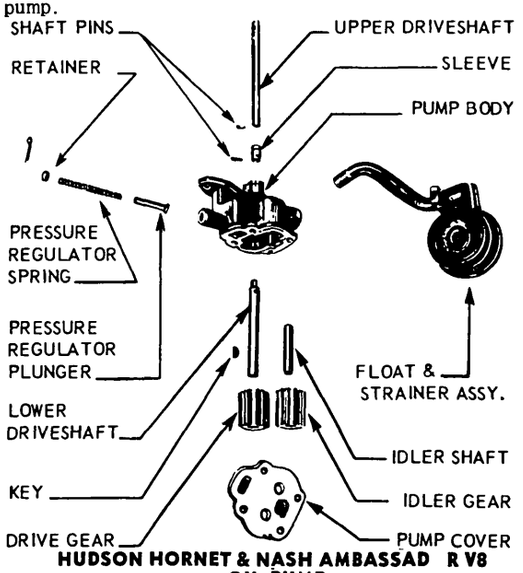
Insp cti n - Check gear to cover clearance by placing straight edge across pump body with gears in operational cavity. Clearance should not exceed .004". A clearance of .008" maximum should exist between gears and walls of gear cavity opposite point of gear mesh.

R ass mbly & Installati n - Reverse disassembly procedure. Before installing pump on engine, check for free operation.

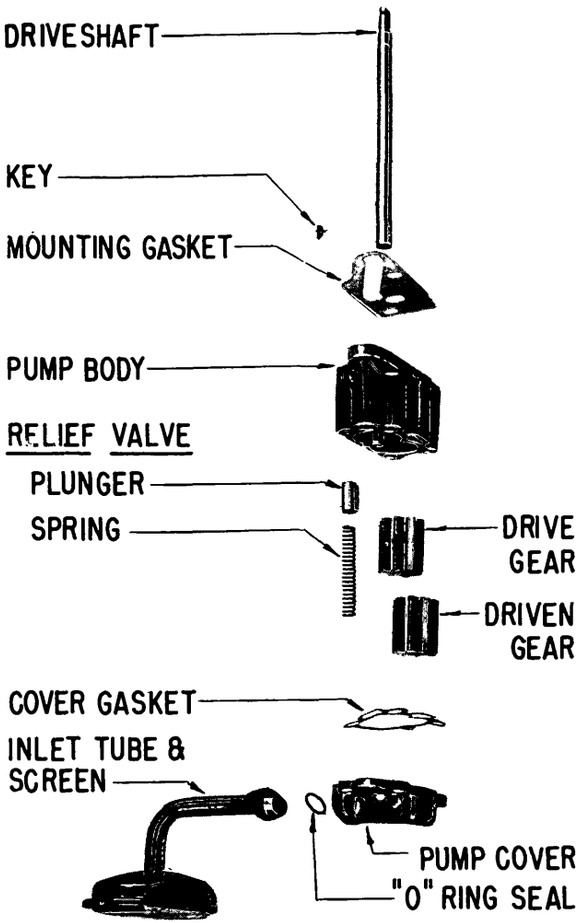
HORNET & AMBASSADOR V8

OIL PUMP: R moval–Remove engine oil pan and remove the two screws attaching oil pump to rear main bearing cap and remove oil pump and strainer assembly.

Disassembly: Remove screws attaching pump cover to pump and remove the cover. Remove idler gear. Remove pin from shaft and drive off sleeve. Remove upper and lower oil pump driving shafts and gear. If necessary, press shaft out of gear. If necessary to remove the float assembly, the tube can be unscrewed from pump.



HUDSON HORNET & NASH AMBASSAD R V8 OIL PUMP



HUDSON HORNET & NASH AMB. SPECIAL V8 OIL PUMP

Inspection: Wash all parts in clean solvent and blow dry with air. Inspect float for leaks. Inspect strainer. Inspect pump shaft for wear, scores or pits. Check clearance between pump housing and gears (opposite point of gear mesh). This clearance should not be greater than .008". Check gear endplay using a straight-edge across gears and housing. Endplay should not exceed .004". Inspect relief valve piston for scores.

Reassembly & Installation: Reverse disassembly and removal procedure indicated above.

CLUTCH NOTES

STATESMAN & AMBASSADOR 6

CLUTCH LINKAGE: Linkage consists of a beam lever, with a support mounted at one end in a hook plate on engine (later models use a flexible link) and the other end held in position by a fulcrum plate and guide fastened to a steering gear housing boss bolt which also bolts steering gear to frame. The outer end of the beam lever connects to the clutch pedal with a rod, and the inner end connected by rod to the release bearing fork arm. Both rods are adjustable. Only the latter rod must be used when making clutch pedal free play adjustments. The fulcrum plate guide centers the beam support. If the beam support is not centered it will climb out of the hook and cause chattering. The beam is held in position by the beam anchor spring, and the pedal return spring.

►*CAUTION: Do not disturb the length of the pedal to beam rod (All Models).*

Clutch Linkage Adjustment: Pedal free play adjustment is made by lengthening or shortening the beam to release bearing fork arm rod. Do not disturb the pedal to beam rod setting. In the event it is necessary to adjust the pedal to beam rod the adjustment is made so that the outer end of the beam lever projects (½" on "Statesman" and 5/16" on "Ambassador") from the beam, toward the rear, with the clutch pedal against the floorboard.

MISC. ELECTRICAL

ALL MODELS

►*BACK-UP LIGHT WIRING CORRECTION (First Cars):* If Backing Light comes on when shift lever placed in Reverse position, with Ignition Switch "Off", back-up light circuit should be checked and the following changes made:

Synchro-mesh & Overdrive Cars - If Back-up Light feed wire is attached to red wires of center terminal on Body Junction Block (behind battery), proceed as follows:

1) Disconnect this back-up light feed wire from the Body Junction Block, remove eye terminal from wire and replace with Douglas terminal.

2) Locate Back-up Light Switch Wire Extension (No. 18 red wire in harness) attached to "AUX" terminal of Circuit Breaker and extending through main wiring harness grommet in dash. This wire has Douglas terminal on engine side of dash. *NOTE* - If this wire missing, install the wire, Nash No. 4382421, and connect the eye terminal end to the "AUX" terminal of the circuit breaker.

3) Connect Douglas terminal of above wire (2) to the Douglas terminal installed on back-up light switch feed wire (1).

Automatic Transmission Cars - If Back-up Light feed wire is attached to right hand terminal of Body Junction Block (green wires), disconnect this wire and proceed in accordance with (1), (2), (3) above.

BRAKE NOTES

►*SPONGY BRAKE PEDAL CORRECTION (EXCEPT POWER BRAKES):* The small hole of the keyhole slot in master cylinder-to-pedal shaft brace may not fully engage groove at outer end of pedal shaft allowing the pedal shaft to flex within the keyhole. Correct as follows: Remove master cylinder-to-pedal shaft brace and elongate the master cylinder attaching hole as necessary to provide a full engagement of small hole of keyhole slot to groove in outer end of pedal shaft. Replace brace using two "bite" washers in place of the regular lockwashers on the master cylinder attaching screws.

►*AIR CONDITIONED CAR SERVICE CAUTION: Us xtr me care wh n disc nnecting any part f air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.
Starting Serial Number–K-649201 (Domestic), 4KD-5701 (Unassembled Export), KT-11101 (Canada).

ENGINE NUMBER: Stamped on machined surface at upper left front corner of cylinder block.
Starting Engine Number–DB-1001.

TUNE-UP

►*BURNED BREAKER POINTS OR HIGH SPEED MISS CORRECTION:* **May be caused by use of incorrect ignition primary resistor. Use only resistor with Delco-Remy trademark. See Resistor data below.**

COMPRESSION PRESSURE: 120 lbs. at cranking speed.

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE: .012" Int., .016" Exh. hot & running.

MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: 030".
Spark Plug–Auto-Lite AL-7. Torque to 30 ft. lbs

COIL: Delco-Remy 1115393. *12 Volt.*
Ignition Current – 1.7 amperes idling, 3.75 stopped.
Resistor–Delco-Remy No 1927809. 1 40-1.62 ohm.

►*COIL RESISTOR NOTE:* Connected in series between battery and coil. Resistor is by-passed during cranking by solenoid or magnetic starter switch, making direct lead from battery to coil.

DISTRIBUTOR: Delco-Remy No. 1110242. *12 Volt.*
Condenser–Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set – Delco-Remy No. 1918148.
Breaker Gap–.016".
Cam Angle–28°-35°.
Breaker Arm Spring Tension–19-23 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0-4.	700
6.5-8.5	550	13-17	1100
11-13	1100	22-26	2200
15-17	1600	30-34	3200

Vacuum Spark Control: Delco-Remy No. 1116099.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum ("of Hg.)
Start	0	6-8
5	10	11-12

IGNITION TIMING

S tting–TDC. (Supersedes original specification of 4° ATDC)

►*IGNITION TIMING CHANGE:* Starting with engine number DB-1598 ignition timing was changed from 4° ATDC to TDC. On engines prior to above number, paint mark vibration dampers and set ignition to new specification "TDC".

Timing Mark–Vibration Damper.

CARBURETOR

►*ROUGH ENGINE CORRECTION (Exhaust gas leakage into Intake Manifold):* **May be caused by corrosion of intake manifold cover. For corrective procedure, see** *"Cylinder Head & Manifold" in Nash Special Data.*

Carter WCD No. 2350S. Dual type with automatic choke.

►*MANIFOLD FUEL DISTRIBUTION: Both barrels feed all cylinders*
Idle Setting–½-1½ turns open. Turn screws out for richer mixture.
Idle Speed–550 RPM (Standard & Overdrive Trans.), **475 RPM** (Hydra-Matic in Neutral), **500 RPM** (Hydra-Matic in Neutral with Air Conditioning turned on)
Float Level–5/32" (Gauge T109-196). Distance from top of each float to gasket seat on cover (cover inverted)
Accelerating Pump–No seasonal adjustment
Fast Idle: 020" between throttle valve and bore (side opposite idle port) with choke fully closed
Automatic Choke: Centered (At Index)

Throttle Linkage Adjustment (Hydra-Matic Cars): Adjust engine idle speed to 450 RPM (with air conditioning 500 RPM, compressor running), with engine temper-150-160°F, transmission warm and selector lever in neutral. Disconnect throttle rod at throttle lever at side of transmission Clean back of transmission case, place checking Gauge J-2545-D flush against machined surface with edge of gauge against transmission side cover. Throttle lever stud should fit freely in notch of gauge. Use bending Tool J-3310 to correct throttle lever position. Gauge notch must be in alignment with pin through hole in T.V. lever with lever held against its stop to the rear. When properly adjusted, connect throttle rod to T.V. lever. Remove upper end of throttle rod at bellcrank. Disconnect carburetor to bellcrank rod at carburetor throttle rod. Insert an aligning pin in holes of the bell crank and bracket. Adjust carburetor to bellcrank rod. Fasten rod in place with clip fasteners. Adjust T.V. rod at bellcrank to fit freely with the hole in lever. Then shorten T V. rod **three full turns.** Connect T.V. rod at bellcrank; remove **aligning pin.**
NOTE–Gauge 2545-C can be reworked by adding another notch behind original notch so that distance from center of notch to rear inside surface of gauge is 6½ .

►*OTHER DATA: See "Carter Dual WCD" in Carburetion Section.*
Fuel Pump Pressure: 3½-5¼ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter. Fuel and vacuum.
Replacement Pump – Carter No. M-2379S.
Pressure – 3½ - 5¼ lbs. at 500 RPM.
See " Fu l Pumps" in Carbur ti nS cti n.
Gasolin Gaug : Auto-Lite Electric type.
Dash Unit – Auto-Lite 14159A.
Tank Unit – Auto-Lite 14165A.
See "Fuel Gaug s" in Carbureti n S cti n.

BATTERY

Standard – Auto-Lite 11-HS-50. *12 V lt.* 11 plate, 50 Ampere Hour Capacity (20 Hr. rate).
Air Conditioned Cars ∠ Auto-Lit 11-HS-60. *12 Volt.* 11 plate, 60 Ampere Hour Capacity (20 Hr. rate).
Battery Ground – Negative.
►*CAUTION: This is reversed from previous models.*
Engine Ground – Battery to engine with body ground from transmission to engine rear crossmember.

STARTER

Delco-Remy 1107647. *12 Volt.* **Armatur - 1926626.**
Drive–Overrunning clutch (solenoid pinion shift).
Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–35 ozs

Performance Data

Torque	RPM	Volts	Amperes
0 ft lbs.	6900	10 3	75
10.5 ft. lbs	Lock	11.3	435

Starter Switch: Delco-Remy No. 1119793 solenoid switch located on starter, actuated by combination ignition and starter switch (Std. and Overdrive cars), by Delco-Remy No. 1996084 switch operated by raising shift lever upward (Hydra-Matic).

GENERATOR

Delco-Remy. *12 Volt.* **Used as follows:**

Application	Gen rat r	.Armatur
Without Air Cond.	1100323	1933352
With Air Cond.	1102049	1934326

►*GENERATOR ARMATURE SHAFT PRODUCTION CHANGE:* Generators with tag code stamped 5K-20 or later have heavier brazing of water pump drive extension on armature shaft to prevent breaking. Brazing should withstand 25 ft lb. torque applied to generator pulley (belt released) with pump shaft coupling held stationary.

Performanc Data

	Amperes	Volts	RPM
Standard	25	14 0	2780
Air Cond.	30	14.0	2150

Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs.
Field Current–1.50-1.62 amperes (1100323), 1.48-1.62 amperes (1102049), 12 volts at 80°F
Belt Adjustment: ½" deflection with 25 lbs pressure applied midway between fan and generator pulleys.

REGULATOR

Delco-Remy 1119122 (1100323 G n.), 1119003 (1102049 Gen.). *12 Volt. NOTE*–**Specifications are "Normal" Settings.**

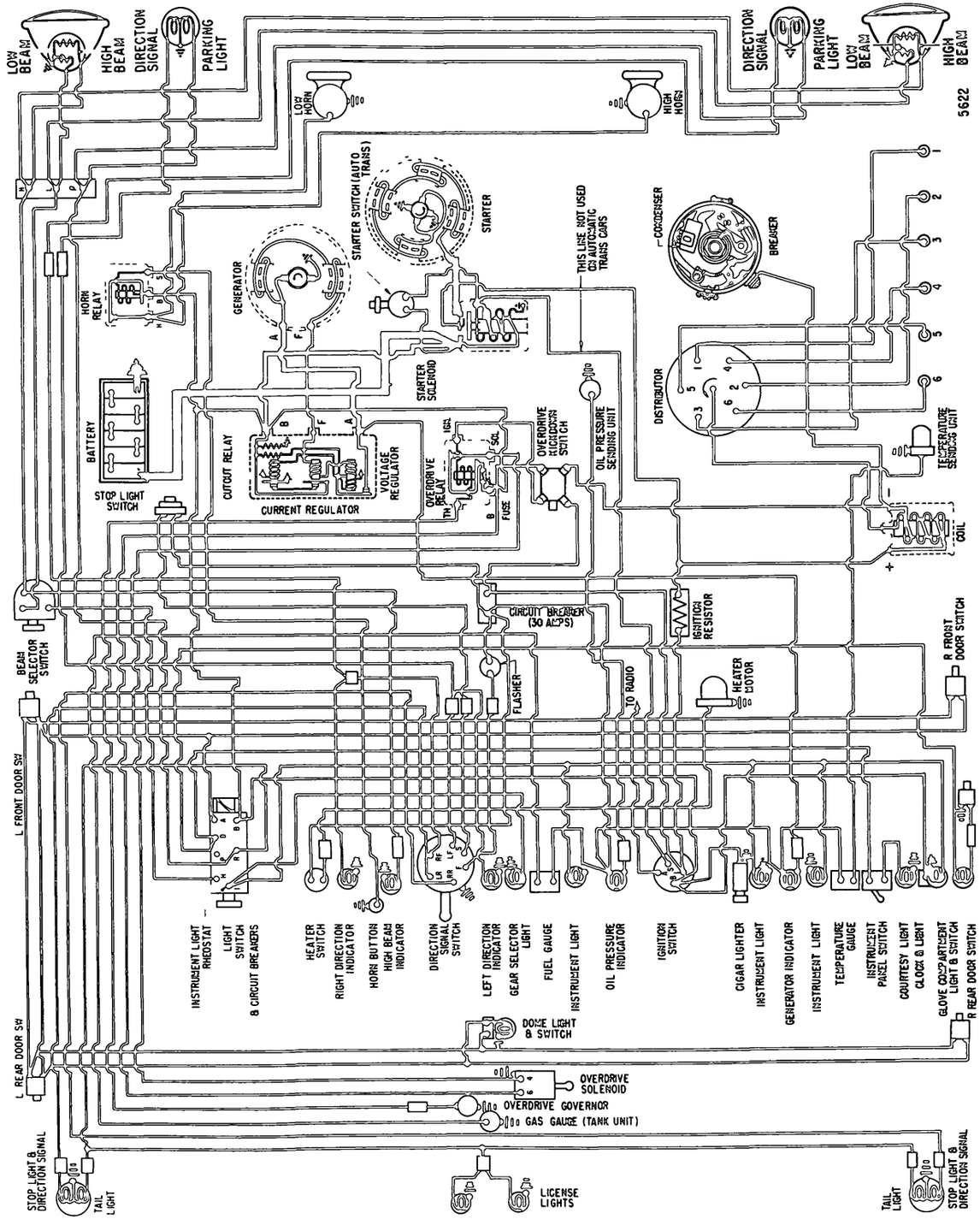
Cut-Out R lay

Cuts-In–11.8-13.5 volts
Contact Gap–.020".
Air Gap– 020" with contacts just closed

Voltage Regulat r

S tting–13.8-14.8 Volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching
Checking & Adjusting–*See "Delco-Remy 1119000*

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Series Regulators" in Electrical Section.

Current Regulator

Setting (1119122)–23-27 amperes (hot).
Setting (1119003)–27-33 amperes (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–See *"Delco-Remy 1119000 Series Regulators" in Electrical Section.*

MISC. ELECTRICAL

▷*BACK-UP LIGHT WIRING CIRCUIT CAUTION (Early Cars):* Incorrect assembly of wire to back-up light switch and circuit breaker causes back-up light to operate incorrectly. *See "Electrical Notes" in Rambler Special Data.*

Headlamps: Sealed Beam. *See Electrical Section.*

Directional Signals: *See Electrical Section.*

Light Switch Removal: Disconnect battery. With switch in "OFF" position, press button release on top of light switch assembly, and pull knob and shaft clear of switch. Remove slotted nut, pull switch to rear of instrument panel.

Stop Light Switch: Located at tee fitting in line to left front brake.

FUSES: 7.5 Ampere. On lighting switch for Courtesy and Glove Box Light.
15 Ampere. Located on overdrive relay.
5 Ampere. Located in Radio wire back of instrument panel.

CIRCUIT BREAKERS: Three used as follows:
12 Ampere. On light switch for Instrument, Tail and Dome Lights.
12 Ampere. On light switch for Head and Parking Lights.
30 Ampere. For Stop Light, Instruments and Indicators, Heater and Directional Signals. Located back of Instrument panel.

HORNS: Auto-Lite HAD-4737 (Low Pitch), HAD-4738 (High Pitch). 12 Volt.
Horn Relay – Nash No. 3145684.

ENGINE

▷*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Sect.*

▷*ENGINE NOISE (Similar to bearing noise) CORRECTION:* A noise usually diagnosed as a bearing noise may come from improperly assembled Vibration Damper. Reassemble Cushions, Disc and Rubber correctly on engines built prior to Engine No. DB-2567.

▷*WATER PUMP LUBRICATION CHANGE:* Lubrication fitting now included. Use hand pressure lubrication gun to lubricate at 5,000 mile intervals.

ENGINE SPECIFICATIONS: 6 Cyl. valve-in-head.

Bore	Stroke	Displacement
3 1/8"	4¼"	195.6 cu. ins.
Compr Ratio	**Rated HP**	**Dev l p d HP**
7 47-1	23.44	130 at 4500 RPM

Compression & Vacuum Reading–See *TUNE-UP.*

OIL PAN REMOVAL: Remove steering linkage cross

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tie-rod before removing pan.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Cam ground, aluminum alloy, tin plated, with steel strut and solid skirt.

Original Bore & Piston Sizes—*See "Original Bore & Pistons" in Nash Special Data.*

Weight—13.59 ozs.

Removal—Remove from above.

Fitting New Pistons: Clearance .0006-.0012". Pistons should just support own weight at any point in cylinder bore (piston and bore dry and clean).

Replacement Pistons: Standard, .002", .005", .010", .020", .030", .040" Oversize.

Installing Pistons: Piston pin is offset in piston. Piston is marked with notch that should face front of engine when installed. *See Rod Installation.*

PISTON PINS

Press fit in connecting rod. No locking device.

Diameter – .8597". Length – 2¾".

Clearance in Piston – .0002" maximum. Thumb push fit at 70°.

Pin Removal & Installation – *See "Piston Pins" in Nash Special Data.*

Replacement Pins: Standard, .003", .005" Oversize.

NOTE – Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.	.0930-.0935"	.010-.020"	.002-.004"
Oil #3	.1545-.1550"	.010-.020"	.002-.004"
Oil #4	.1545-.1550"	"U Flex"	.002-.004"

Replacement Rings: Standard & .020" Oversize in sets.

Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

Length—6.625" center-to-center. **Weight**—25 ozs.

Crankpin Journal Diameter—2.0948-2.0955".

Original Bearing Sizes—*See "Original Bearing Sizes" in Nash Special Data.*

Bearings—Steel-backed babbitt. No shims.

Clearance—.0010-.0015". **Sideplay**—.005-.015".

Replacement Bearings: Std. & .001", .002", .010" and .012" Undersize.

Installing Rods: Identification marks (raised section on center of rod and bearing cap) toward front of engine.

CRANKSHAFT

Journal Diameter—2.4791-2.4798". Four bearing.

Original Bearing Sizes—*See "Original Bearing Sizes" in Nash Special Data.*

Bearings—Steel-backed babbitt. No shims.

Clearance—.001-.0015".

Replacement Bearings: Std. & .002", .010", .012" Undersize.

End Thrust: Taken by front main bearing. *See "Crankshaft & Main Bearings" in Nash Special Data.*

Endplay—.003-.008".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Nash Special Data.*

VIBRATION DAMPENER REMOVAL: *See "Vibration Dampener" in Nash Special Data.*

CAMSHAFT

Bearings—Steel backed babbitt bushings.

Clearance—.002".

End Thrust: Thrust plate on front of engine between No. 1 bearing and camshaft sprocket. End play controlled by position of sprocket on shaft (press fit on shaft).

Endplay—.004-.006".

Timing Chain: Morse. **Width** 1". **Pitch** 3/8". **Length** 22-1/2" or 60 links.

Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across center line of sprockets.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

VALVES

Tappet Clearance: Intake .012", Exhaust .016" (Running Hot).

Valve	Head Diam.	Stem Diam.	Length
Intake	1.594"	.3412-.3417"	4.759"
Exhaust	1.343"	.3407-.3412"	4.759"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45° ①	.383"	.0015-.0035"
Exhaust	45° ①	.385"	.002-.004"

① Valve face angle 44°.

►*VALVE GRINDING CAUTION:* Replace valves when refacing reduces distance from top of valve face to top of valve to less than 1/32".

Valve Seat Width – 5/64-3/32".

Valve Stem Oil Seal – Rubber deflectors mounted on all valve stems at upper end of guide.

Valve Springs: Valve springs may be removed without removing cylinder head by maintaining 90 lb. air pressure in combustion chamber to hold valve against valve seat.

Free Length – 2 3/8".

Valve Spring Specifications

Valve	Lbs. Pressure	Length
Closed	65-70	1.13/16"
Open	115-125	1 7/16"

Valve Guides: Use Tool J-1429-A to remove and replace guides. Guides should extend ¾" above cylinder head.

Rocker Arm Assembly: *See "Valve System" in Rambler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valve – Open 12°30' BTDC, Close 51°30' ALDC

Exhaust Valve – Open 53°30' BLDC, Close 10°30' ATDC

Valve Timing Check – Set valves on No. 1 cylinder at .003" lash. With No. 6 piston at TDC in firing position, timing will be correct if exhaust valve opens the same amount before DC on vibration dampener as intake valve opens after DC as engine is rocked back and forth over DC.

OILING SYSTEM

Crankcase Capacity: 4 qts. refill.

Normal Oil Pressure: 30 lbs. at 20 MPH. 12 lbs. minimum at 600 RPM.

Pressure Regulator Valve – Non-adjustable spring loaded valve located in cylinder block where oil enters oil distribution channel.

Oil Pressure Indicator: Light goes on when Ignition switch is turned on, goes out as oil pressure reaches 6½ lbs. ± 1½ lbs. Sending unit Rambler No. 3142826 located on right rear side of engine block.

Oil Pump: Gear type. Mounted on right side of engine. *See "Oiling System" in Rambler Special Data.*

Oil Filter – Partial Flow type. Replace element every 5000 miles or less as needed.

Replacement Filter Unit – Rambler No. 8990068.

Crankcase Ventilation: Filter in crankcase filler cap, and vent in rocker arm cover.

COOLING

Water Capacity: 11 quarts.

Pressure Valve: 7 lb. Radiator Filler Cap Rambler No. 3142965 (less Air Conditioning), 14 lb. No. 3141371 (with Air Conditioning).

Thermostat: Choke type. (Std.) 170° type Rambler No. 3131817, (Optl.) 180° type Rambler No. 3131985 for use with permanent anti-freeze.

Water Pump: Sealed packing and bushing type. *See "Rambler" in Water Pump Section.*

Pump Removal – Drain cooling system, disconnect coupling, hoses, and pump mounting screws.

Temperature Gauge: King-Seeley Electric Constant-Voltage ("CV") type with gauge voltage regulator, King-Seeley No. 46439.

Dash Unit – King-Seeley 49476.

Engine Unit – King-Seeley 44200.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 8.5A7. Assy. No. 1391. Single plate. *See "Borg & Beck" in Clutch Section.*

Clutch Disc No.	Borg & Beck	Nash No.
Standard	382394	3144937
Overdrive	382490	3147133

Pedal Adjustment: Pedal free play 1/2-3/4". Adjust by loosening locknut and turning adjusting nut on connector link at clutch fork.

►*CAUTION: The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project 1/2" from beam toward the rear.

Clutch Linkage – *See "Clutch Notes" in Nash Special Data.*

Removal: Remove transmission (see below), disconnect

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clutch pedal linkage, remove clutch housing and pan, punch mark flywheel, clutch cover and pressure plate. (Reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Own. 3 Speed, All helical gear type.
See "Nash Transmission" in Transmission Section.

►*TRANSMISSION REAR BEARING SNAP RING BREAKAGE CORRECTION:* **Caused by heavy duty operation or maladjustment of torque tube trunnion. For installation of sleeve or adjustment of trunnion, *See "Nash Transmission" in Transmission Section.***

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect brake tube bracket at body, and torque tube at rear of transmission. Disconnect brake cable at bell crank and cable housing at bell crank bracket. Move rear axle assembly to rear off transmission main shaft splines. Disconnect speedometer cable and shifter rods, (if overdrive equipped, disconnect wires at solenoid and overdrive cable at lever) Use guide pins, Tool J-1434, in two upper cap screw positions and slide transmission free of pilot bearing and clutch disc

OVERDRIVE

Warn r R10. Used with Nash transmission.
See "Warner R10 Overdrive" in Transmission Section.

Overdriv C ntrol: *Se "Warner R10 Transmission Control" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Rang . Four speed automatic transmission with fluid coupling.
See "Hydra-Matic Drive" in Transmission Section.

►*HYDRA-MATIC REVERSE GEAR SLIP-OUT CORRECTION:* **To check and correct this condition, first disconnect back-up light switch at manual control lever on side of transmission, and operate transmission in reverse. If condition not corrected, adjust manual control linkage. If condition corrected adjust back-up light switch to proper tension by placing control lever in reverse, and adjusting switch cable just enough to allow spring to pull switch to the contact position.**

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid every 1,000 miles, drain and refill at 25,000 mile intervals.

Capacity—8-1/2 qts. (9-1/2 qts. after overhaul).

Ch cking Fluid Lev l—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located in engine compartment on right side). Add fluid to bring level up to "F" mark.

▲*CAUTION:* Do not check oil level when transmission is excessively hot and do not fill above the "F" mark on dipstick.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit—Cross type. One used at forward end of propeller shaft.

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive.
See "Nash Rear Axles" in Rear Axle Section.

Axle Ratios	Standard	Optional
Synchro-mesh	4.4-1 (9-40)	4.4-1 (9-40)
Overdrive	4.9-1 (8-39)	
Hydra-Matic	3.6-1 (12-43)	

Rear Suspension: *See "Nash" in Suspensions & Wheel Alignment Section.*

Backlash— 002-.006". Shim adjustment.

Axle Shaft Removal: Remove wheel, pull drum (use hub puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer. backing plate, and wheel bearing adjusting shims. Withdraw axle shaft using puller J-2498. Do not drag shaft on inner oil seal.

Rear Axle Assembly Removal: Jack up and support rear end of body. Disconnect rear brake cable at equalizer, torque tube at rear of transmission, brake hose and shock absorbers at rear axle end (allow shocks and brake hose to hang from body). Roll axle assembly out from under car.

Wheel Bearing Adjustment: Shims behind brake backing plate.

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.

Front — Nash No. 3140879. **Rear** — Nash No. 3140406.

►*REAR SHOCK ABSORBER NOISE CORRECTION (Cars before Serial No. K-651528):* **Before replacing a rear shock absorber for being noisy, check for damaged shock absorber grommet spacer or limit sleeve, (caused by incorrect retainer with oversize hole). If grommet spacer damaged discard it. When reassembling without grommet spacer, do not use retainer Nash No. 3136432, however, do not compress shock absorber grommets excessively.**

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs located between upper ends of steering knuckle pin and seat in outer wheel house panel.
See "Nash" in Suspensions & Wheel Alignment Section.

King Pin Inclination—6-1/2°.

Caster (Manual Steering)—Pos. 1/2° desired (limits 0° to Pos. 1/2°). **(Power Steering)** Pos. 1° desired (limits Pos. 1/2° to Pos. 1°).

Camber—0° desired (limits Neg. 1/4° to Pos. 1/4°).

Toe-In—1/16"-3/16".

►*TOE-IN ADJUSTMENT (POWER STEERING) CAUTION:* **Operate engine so that power steering pump will supply oil pressure to center spool in power cylinder valve.**

Toe-Out on Turns—Outer wheel 20-3/4°, Inner wheel 25°.

►*FRONT CROSSMEMBER INSTALLATION CAUTION:* When installing front crossmember, distance between centers of either front or rear mounting bracket bolt holes must be 19-1/2" to insure maintaining front wheel alignment.

STEERING

Manual: Gemmer. Worm & Roller with "push-pull" adjustments.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering: Monroe "Power Guide". Linkage type.
See "Monroe Power Guide" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix Hydraulic, Single Anchor. Hand lever applies rear wheel service brakes.
See "Bendix Hydraulic, Single Anchor" in Brake S ct.

Drums — Diameter 10" (Front and Rear).

Wheel Cylinder Diameter — 1 1/8" (Front), 7/8" (Rear).

►*REAR WHEEL BRAKE CYLINDER PRODUCTION CHANGE:* **Beginning with Car Serial Number K-652321 the diameter of the rear wheel brake cylinder was decreased to 7/8" from 15/16" to improve brake distribution.**

Replacement Lining & Shoes — Linings and shoes with linings furnished standard size only.

Lining Width & Length	Front Wheel	Rear Wh l
Primary Shoes	2" x 8 7/8"	1¾" x 8 7/16"
Secondary Shoes	2½" x 10 31/32"	1¾" x 10 25/32"

Clearance - .015" heel & toe of secondary shoe with primary out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

Standard Master Cylinder: Mounted on support under floor pan.

Checking Fluid — Roll back floor mat, remove access hole cover, maintain fluid level ½-1" below filler opening.

Removal — Remove from below without disturbing other units.

Power Brakes: Bendix Power Unit. Replaces standard master cylinder.
See "Bendix Power Unit" in Brake Section.

Checking Fluid—Same as for standard master cylinder.

Removal—Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Miscellaneous Section.

Wind w R gulat rs: Electric with reversible motor. *See "Nash Window Regulators" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Us xtrem care wh n disc nn cting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.
Starting Serial Number–R-757901 (Domestic), 6KD-4601 (Unassembled Export)

ENGINE NUMBER: Stamped on machined surface at upper right hand, front corner of cylinder block.
Starting Engine No.–A-279001 (Super Jet Fire–one carburetor), LMA-277001 (LeMans–two carburetors)

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking speed
VACUUM READING: 18-21" at idling speed.
VALVE TAPPET CLEARANCE: 012" (Intake), .016" (Exhaust) Running Hot.
MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.
SPARK PLUG GAP: .030".
Spark Plug–Auto-Lite A-7. Torque to 30 ft. lbs.
COIL: Auto-Lite CAF-4003. *12 Volt.*
NOTE - **No resistor used in primary circuit.**
DISTRIBUTOR: Auto-Lite IAT-4301. *12 Volt.*
Condenser–Auto-Lite IAT-2015R **Capacity** 21-.25 mfd.
Contact Point Set–Auto-Lite IGW-3028BS
Breaker Gap–.020"±.002".
Cam Angle–36-42°.
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
3	450	6	900
7	650	14	1300
10	950	20	1900
14	1350	28	2700

Vacuum Spark Control: Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	5
1	2	6½
3	6	9½
5	10	12½
6	12	14

IGNITION TIMING

Setting–4° ATDC.
Timing Mark–Vibration damper.

CARBURETOR

►*CARBURETOR APPLICATION NOTE:* One carburetor (Carter YH 2368S) used on Super Jet Fire Engine two carburetors (Carter YH 2369S) used on LeMans Engine.

►*WARM-UP & ACCELERATION STUMBLE CORRECTION (Carter YH-2368S):* Improved body castings used on carburetors bearing Code "L-5" or higher (Nov. 1955) on brass tag. Porous main body castings and imperfect sealing between bowl cover and main body near accelerating pump passage (early carburetors) resulted in too lean mixture causing poor warm-up and acceleration. Install carburetor with date tag "L-5" or later

Throttle Linkage Adjustment: Adjust engine idle speed to 450 RPM (with air conditioning 500 RPM, with compressor running), with engine temperature at 150-160°F, transmission warm and selector lever in Neutral. Disconnect throttle rod at throttle lever at side of transmission. Clean back of transmission case, place checking Gauge J-2545-D flush against machined surface with edge of gauge against transmission side cover. Throttle lever stud should fit freely in notch of gauge. Use bending Tool J-3310 to correct throttle lever position. Gauge notch must be in alignment with pin through hole in T.V. lever, with lever held against its stop to the rear. When properly adjusted, connect throttle rod to T.V. lever. After checking adjustment of T.V. lever at transmission disconnect T.V. rod at Carburetor throttle shaft lever. Adjust T.V. rod to fit freely in hole of throttle shaft lever. Then shorten T.V. rod three full turns. *NOTE*– Gauge 2545-C can be reworked by adding another notch behind the original notch so that distance from center of notch to rear inside surface of Gauge is 6½".

CARTER YH-2368S

Idle Setting– ½-1½ turns open. Turn screw out for richer mixture
Idle Speed–550 RPM (Standard & Overdrive), 475 RPM (Hydra-Matic in Neutral), 500 RPM (Hydra-Matic in Neutral with Air Conditioning turned on).
Float Level–5/16" (T-109-107). Distance from bowl cover to top of float with cover inverted and gasket removed.
Fast Idle: .030" between throttle valve and bore (side opposite idle port) with choke fully closed.
Automatic Choke: 1 point rich.
Throttle Linkage Adjustment: See *CARBURETOR* above.
►*OTHER DATA: See "Carter YH" in Carburetion Sect.*
Fuel Pump Pressure: 3½ - 5¼ lbs. at 500 RPM.

CARTER YH-2369S (Two Used)

Idle Setting–½-1½ turns open. Turn screws out for richer mixture.
Idle Speed–**550 RPM** (Standard & Overdrive Trans.), **475 RPM** (Hydra-Matic in Neutral), **500 RPM** (Hydra-Matic in Neutral with Air Conditioning turned on).
Idle Adjustment–*To insure proper synchronization make idle adjustments in following sequence:*
1) Remove air cleaner boots and "Tee" from carburetor airhorns.
2) Adjust throttle stop screw on rear carburetor as follows. Hold choke valve open, back off throttle stop screw until throttle valve is just closed, then turn screw in approximately 2 turns to crack throttle valve slightly Adjust front carburetor similarly
3) Start engine and allow it to idle until normal temperature reached. Attach Tachometer.
4) Adjust rear carburetor stop screw for minimum idle speed (See above).
5) While noting idle speed, synchronize front carburetor by adjusting connecting throttle linkage between carburetors, opening front carburetor throttle just to the point where further opening begins to increase engine speed. At this point, air suction noise in both carburetors should be identical.
6) Replace air cleaner boots and "Tee" connections.
7) Adjust idle mixture on rear carburetor by turning adjusting screw in (to lean mixture) until engine begins to be rough, then turn screw out ¼ turn. Adjust idle mixture for front carburetor similarly.
8) Recheck idle speed. If not within limits (see above) repeat synchronization (1 thru 5).
Float Level–7/16". Distance from bowl cover (gasket removed) and top of float at free end. Gauge T-109-81.
Accelerating Pump–No seasonal adjustment.
East Idle: .018" between throttle valve and bore (side opposite idle port) with choke fully closed.
Automatic Choke Setting: 2 points lean.
►*OTHER DATA: See "Carter YH" in Carburetion Sect.*
Fuel Pump Pressure: 3½ - 5¼ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: AC. Fuel and vacuum pump.
Replacement Pump – AC No. 4309.
Pressure – 3½ to 5¼ lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: Auto-Lite. Electric type.
Dash Unit – Auto-Lite 14159A.
Tank Unit – Auto-Lite 14165A.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Standard – Auto-Lite 11-HS-50. *12 Volt.* 11 plate, 50 Ampere hour capacity (20 hour rate).
Air Conditioned Cars – Auto-Lite 11-HS-60. *12 Volt.* 11 plate, 60 Ampere hour capacity (20 Hr. rate).
Grounded Terminal – Negative.
►*CAUTION: This is reversed from previous models.*
Engine Ground – Battery to engine with body ground from transmission to rear crossmember.

STARTER

Auto-Lite. *12 Volt.* Used as follows:

Auto-Lite No.	Starter	Armature
Std. & O.D. Trans.	MDF-6010	MDF-2037
Hydra-Matic	MDF-6009	MDF-2088

Drive–Bendix A2033 (Std. Trans.), A3281 (Hydra-Matic).
Rotation – Counter-clockwise from commutator end.
Brush Spring Tension – 42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10.0	60 Max.
6.5 ft. lbs.	Lock	4.0	240 Max.

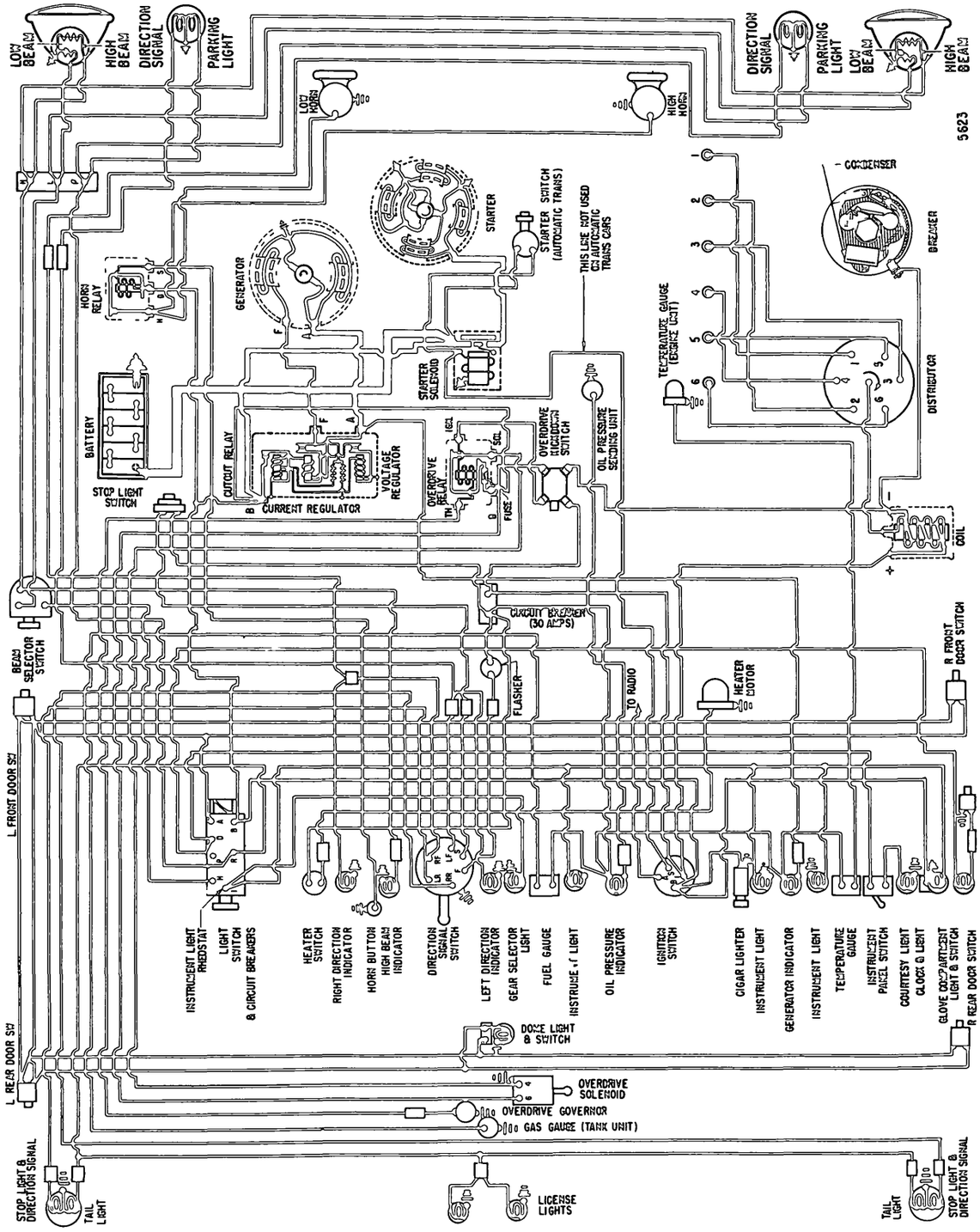
Starter Switch: Nash No. 3146189 magnetic switch located on starter, actuated by combination Ignition and Starter Switch (Standard and Overdrive), by Delco-Remy 1996085 Switch (Hydra-Matic), by raising shift lever while in Neutral position.

GENERATOR

Auto-Lite. *12 Volt.* Used as follows:

Auto-Lite No.	Generator	Armature
Standard	GJC-7007A	GJC-2052F
Air Cond.	GJC-7007B	GJC-2052F

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Performance Data—Cold

Amperes	Volts	RPM
20	15.0	1750
30	15.0	2250

NOTE—Do not operate at high output without ventilating fan for any length of time as to do so may result in burned armature or fields.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—18-36 ozs.

Field Current—1.23-1.32 amperes at 10 volts at 70°F.

Belt Adjustment: ½" deflection upon application of 25 lb. pressure applied midway between fan and Generator pulleys.

REGULATOR

Cutout Relay

Cuts In—13.0-13.7 volts

Cuts Out—8 2-9.3 volts at approx. 3-5 amperes discharge.

Contact Gap—.015" min.

Air Gap—031-034", with contact open (check at hinge end of core).

Auto-Lite VRX-6008A. *12 Volt.*

Checking & Adjusting — *See Electrical Section.*

Voltage Regulator

Setting—14.5 volts (80°F), charging at 10 amperes or with .25 ohm resistor between regulator and battery.

Air Gap—.048-.052" with contacts just opening.

Current Regulator

▷*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
36 max.		30 (28-32)

Test A—After 15 minutes operation at 10 amperes.

Test B—After an additional 15 minutes operation on current regulator (with load to give 13.6-13.8 volts).

Air Gap—.048-.052" with contact just opening.

Checking & Adjusting — *See Electrical Section.*

MISC. ELECTRICAL

▷*BACK-UP LIGHT WIRING CIRCUIT CAUTION (Early Cars):* Incorrect assembly of wire to back-up light switch and circuit breaker causes back-up light to operate incorrectly. *See "Electrical Notes" in Nash Special Data.*

Headlamps: Sealed Beam. *See Electrical Section.*

Directional Signals: *See Electrical Section.*

Light Switch Removal: Disconnect battery. With switch in "OFF" position, press button release on top of light switch assembly, pull knob and shaft clear of switch. Remove slotted nut, pull switch out to rear of instrument panel.

Stop Light Switch: Located at tee fitting in line to left front brake.

FUSES: 7.5 Ampere on lighting switch for Courtesy and Glove Box Light.

15 Ampere. Located on overdrive relay.

5 Ampere. Located in radio wire back of instrument panel.

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CIRCUIT BREAKERS: Three used as follows:
12 Ampere – On light switch for Instrument, Tail and Dome lights.
12 Ampere – On light switch for Head and Parking lights.
30 Ampere – For Stop Light, Instruments and Indicators, Heater and Directional Signals. Located back of Instrument panel.

HORNS: **Auto-Lite HAD-4737** (Low Pitch), **HAD-4738** (High Pitch).
Horn Relay – Nash No. 3145684.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTIONS: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Sect.*

►*ENGINE NOISE (Similar to Bearing Noise) CORRECTION:* A noise usually diagnosed as a bearing noise may be caused by improperly assembled Vibration Damper, Reassemble cushions, Disc, and Rubber correctly on cars built prior to Engine No. A-280018.

►*WATER PUMP LUBRICATION CHANGE:* Lubrication fitting now used on pump. Lubricate at 5000 mile intervals using hand pressure gun.

ENGINE SPECIFICATIONS: 6 Cyl. Valve in head. **Super Jet Fire** (1 carburetor) & **LeMans** (2 carburetors).

	Bore	Stroke	Displacement
All Engines	3½"	4 3/8"	252.6 cu. ins.

	Compr. Ratio	Rated HP	Developed HP
Super Jet Fire	7.6-1	29.4	135 at 3700 RPM
LeMans	7.6-1	29.4	145 at 4000 RPM

Compression & Vacuum Reading–*See TUNE-UP.*

OIL PAN REMOVAL: Remove steering linkage cross tie-rod before removing pan.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Cam ground, aluminum alloy, tin plated, with steel strut and solid skirt.
Original Bore & Piston Sizes–*See "Original Bore & Pistons" in Nash Special Data.*
Weight–19.57 ozs.
Removal–Remove from above.

Fitting New Pistons: Clearance .0009-.0015". Fit piston so that it will support itself in any part of cylinder bore (dry piston & bore).

Replacement Pistons: Std., .002", .005", .010", .020", .030" & .040" Oversize.

Installing Pistons: Notch on front edge of piston must be toward front of engine. *See Rod Installation.*

PISTON PINS

Press fit in connecting rod. No locking device.
Diameter – .9308". Length – 3 3/16".
Clearance in Piston – .0002" maximum. Thumb push fit at 70°
Pin Removal & Installation – *See "Piston Pins" in Nash Special Data.*
Replacement Pins: Standard & .003", .005" Oversize.
NOTE – Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.	.0930-.0935"	.007"	.002-.004"
Oil #3	.1545-.1550"	.007"	.002-.004"
Oil #4	.1545-.1550"	②	.002-.004"

② No end gap with U-flex ring.

Replacement Rings: Std. & .020" Oversize. In sets.
Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

Length–8.750" center to center. **Weight**–29 ozs.
Crankpin Journal Diameter–2.0010-2.0003".
Original Bearing Sizes–*See "Original Bearing Sizes" in Nash Special Data.*
Bearings–Steel backed babbitt. No shims.
Clearance–.001-.015". **Side Play**–.005-.015".
Replacement Bearings: Std., .001", .002", .010", .012" Undersize.
Installing Rods: The identification boss on center of rod is installed to front of engine.

CRANKSHAFT

Journal Diameter–2.4791-2.4798". Seven main bearings.
Original Bearing Sizes–*See "Original Bearing Sizes" in Nash Special Data.*
Bearings–Steel backed babbitt.
Clearance–.001-.0015".
Replacement Bearings: Std., .002", .010", .012" Undersize.
End Thrust: Taken on center No. 4 main bearing.
End Play–.003-.008".
Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Nash Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Nash Special Data.*

VIBRATION DAMPENER REMOVAL & INSTALLATION: *See "Vibration Dampener" in Nash Special Data.*

CAMSHAFT

Bearings–Steel-backed babbitt bushings (except #1 Cast Iron with babbitt lining).
Clearance–.002".
Camshaft Removal: *See "Camshaft & Bearings" in Nash Special Data.*
End Thrust: Controlled by position of chain sprocket & No. 1 bearing.
End Play–.004-.006".
Timing Chain: Morse. **Width**–1". **Pitch**–3/8". **Length**–22-1/2" or 60 links.

Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across center line of sprockets.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

VALVES

Tappet Clearance: Intake .012" Hot. Exhaust .016" Hot.

Valve	Head Diameter	Stem Diameter	Length
Intake	1.787"	.3720-.3730"	5-31/64"
Exhaust	1.468"	.3725-.3735"	5-31/64"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30° ①	.393"	.002-.004"
Exhaust	45° ②	.3945"	.002-.004"

① –Valve face 29°. ② –Valve face 44°.

►*VALVE GRINDING CAUTION:* Replace valve when refacing reduces distance from top of valve face to top of valve to 1/32".
Valve Stem Oil Seal: *See "Valve System" in Nash Special Data.*
Valve Springs: Install springs with closed-coil end toward valve seat. **Free Length**–2-1/16".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	53-58	1-13/16"
Open	144-154	1-7/16"

Valve Guides: Pressed in. Use Tool J-4687 to replace guides. *NOTE*–Before removing guides, check height of guide and install guide to same height.
Rocker Arm Assembly: *See "Valve System" in Nash Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves–Open 12-1/2° BLDC. Close 51-1/2° ALDC.
Exhaust Valves–Open 53-1/2° BLDC. Close 10-1/2° ATDC.
Valve Timing Check–With No. 6 piston on TDC in firing position, set tappet clearance on No. 1 Intake & Exhaust at .003". Rock engine back and forth over TDC. Timing is correct if the Exhaust valve opens before TDC same amount that the Intake opens after the TDC mark.

OILING SYSTEM

Crankcase Capacity: 6 qts.
Normal Oil Pressure: 30 lbs. at 20 MPH, 12 lbs. minimum at 600 RPM.
Pressure Regulator Valve–Non adjustable, located in pump body. Opens at 50-58 lbs.
Oil Pressure Indicator–Light goes on when Ignition Switch is turned on, goes out as oil pressure reaches **5-8 lbs. Pressure Switch, Nash No. 3142826, located on right side of crankcase.**
Oil Pump: Gear type, driven off camshaft, mounted on center main bearing cap.
Pump Overhaul – *See "Oiling System" in Nash Special Data.*
Oil Filter: Partial flow type. Replace element every 8000 miles or less as needed.
Replacement Filter Element – Nash No. 3137443.
Crankcase Ventilation: Breather pipe in valve cover and filter in crankcase filler cap.

COOLING

Water Capacity: 17 qts. Add 1 qt. for heater.

CONTINUED ON NEXT PAGE

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Pressur Valve: 7 lb. Radiator Filler Cap Nash No. 3142965 (less Air Conditioning), 14 lb. No. 3141371 (with Air Conditioning).

Th rm stat: Choke type, Nash No. 3131817 (167-173°), Use 3131985 (177-182°) for permanent anti-freeze.

Wat r Pump: Sealed packing and bushing type.
S e "Nash" in Water Pump Section.

Pump R moval—Drain cooling system, disconnect pump drive coupling (remove rear bolt), disconnect inlet hose, remove pump mounting screws.

Temperatur Gauge: Auto-Lite. Electric type.
Dash Unit – Auto-Lite 14158A.
Engin Unit – Auto-Lite 13550A.
See "T mperatur Gauges" in Miscellaneous Section.

CLUTCH

B rg & B ck 10A7 Assy. No. 950. Single plate.
See "Borg & Beck" in Clutch Section.

Clutch Disc No.—Borg & Beck CD 752. Nash No. 3125822.

P dal Adjustment: Pedal free travel 1/2-3/4". Adjust by loosening locknut and turning adjusting nut on control link at clutch fork.

►*CAUTION: The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project 5/16" from beam toward the rear, to provide proper leverage.

Clutch Linkag –*See "Clutch Notes" in Nash Special Data.*

R moval: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan. Punch mark flywheel clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner AS25-T86E (Standard), AS46-T86E (With Overdrive). Three speed, helical gear type.
See "Warner Transmissions" in Transmission Section.

Transmissi n Contr ls: *See "Transmission Controls" in Transmission Section.*

R m val: Move rear axle back (see Universals for procedure) to slip front universal joint off transmission. Disconnect shift levers and speedometer cable, remove two upper transmission to bell housing bolts, and install special guide bolts in their place. Remove lower bolts slide transmission out.

OVERDRIVE

Warn r R10. *See "Warner R10 Overdrive" in Transmission Section.*

Ov rdriv Control: ***See "Warner R10 Overdrive Controls" in Transmission S ction.***

HYDRA-MATIC DRIVE

Dual Range. Four speed automatic transmission with with fluid coupling.
See "Hydra-Matic Driv " in Transmission Section.

►*HYDRA-MATIC REVERSE GEAR SLIP-OUT CORRECTION: See "Hydra-Matic Driv " in Trans. S ction.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid every 1,000 miles, drain and refill at 25,000 mile intervals.

Capacity—11 qts. 12 qts. after disassembly.

Checking Fluid Level—Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position remove dipstick and check fluid level (dipstick located in engine compartment on right side). Add fluid to bring level up to "F" mark.

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit—Cross type. One used at rear of transmission

REAR AXLE

Own. Semi-floating, hypoid gear type with torque tube drive. *See "Nash Hypoid" in Transmission Section.*

Axle Ratio—4.1-1 (10-41) Std., 4.4-1 (9-40) with Overdrive, 3.2-1 (13-41) with Hydra-Matic.

Backlash—.002-.006" shim adjusted.

Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims, and replace same amount when reassembling). Withdraw shaft using puller J-2498, do not drag on inner seal.

Rear Axle Assembly Removal: Raise and support rear end of car. Disconnect rear brake cables at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at axle end (let hang from body). Roll axle free.

Wheel Bearing Adjustment: Shims behind brake backing plate.

Rear Suspension: ***See "Nash" in Suspensions & Wheel Alignment Section.***

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.
Front – Nash No. 3140879. Rear – Nash No. 3140406.

►***REAR SHOCK ABSORBER NOISE CORRECTION (Cars before Serial No. R-759717):*** **Before replacing a rear shock absorber for being noisy, check for damaged shock absorber grommet spacer or limit sleeve, (caused by incorrect retainer with oversize hole). If grommet spacer damaged, discard it. When reassembling without grommet spacer, do not use a retainer (Nash No. 3136432), however, do not compress shock absorber grommets excessively.**

FRONT SUSPENSION

Independent. With coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.
See "Nash" in Susp nsions & Whe l Alignment S ction.

►***FRONT TIRE WEAR CORRECTION (Early Cars):*** **Wear due to tire contact with brake hose bracket can be corrected as follows: Set stopscrews on pitman arm to limit turning radius to 36°. If tire still contacts bracket, trim rear corner of bracket approximately 1/8" Cars built after April 11, 1956 have reworked brackets.**

King Pin Inclination—6-1/2°.

Caster—**(Std.)** Pos ½° desired (limits 0° to Pos. ½°). **(Power Steering)** Pos. 1° desired (limits Pos. ½° to Pos 1°)

Camber—0° desired with 1/4° Neg. to 1/4° Pos. Limit.

Toe-In – 1/16" to 3/16". *CAUTION* – When adjusting toe-in on power steering cars, operate engine so that pump will supply oil pressure to center spool in power cylinder valve.

Toe-Out on Turns – Outer wheel 20¼°. inner wheel 25°.

STEERING

Manual: Gemmer Model 305. Worm & Roller with "push-pull" adjustments.
See "Gemmer Steering Gears" in Steering Section.

Power Steering: Bendix Linkage type.
See "Bendix Linkage Type" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix Hydraulic Single Anchor. Hand lever applies rear wheel service brakes.
See "Bendix Hydraulic, Single Anchor" in Brake Section.

Drums—11" front & rear.

Wheel Cylinder Diameter – Front 1 1/8". Rear 7/8".

►***REAR WHEEL BRAKE CYLINDER PRODUCTION CHANGE:*** **Rear brake cylinder reduced to 7/8" (was 15/16") beginning with Serial No. R-760903 to improve brake distribution.**

Lining Width & Length

Shoe	Front	Rear
Primary	2-1/2" x 9-3/8	2" x 9 5/16"
Secondary	2-1/2" x 12"	2" x 12"

Clearance—.015" heel & toe of secondary shoe with primary out against drum, or adjusting screw backed off 14 notches or clicks from point where wheel can just be turned by hand.

Standard Master Cylinder: Mounted on support under floor pan to left of transmission.

Checking Fluid—Roll back floor mat, remove access hole cover, maintain fluid 1/2-1" below filler opening.

Removal—Remove from below without disturbing other parts.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Miscellaneous Section.

P w r Window R gulat rs: Electric with reversible motor. *See "Nash Window Regulators" in Misc l-laneous Section.*

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Hudson Hornet Special V8 ..... Model 35650
Nash Ambassador Special V8 ..... Model 5650

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.

Starting Serial Number – (Hudson) Z-1001 (Domestic), ZKD-1001 (Unassembled Export).

(Nash) U-1001 (Domestic), UKD-1001 (Unassembled Export).

ENGINE NUMBER: Stamped vertically on lower right front corner of cylinder block above oil pan flange. *NOTE* – Number also stamped on plate on valve compartment cover.

Starting Engine Number – G-1001.

TUNE-UP

► *BURNED BREAKER POINTS OR HIGH SPEED MISS CORRECTION:* Caused by use of incorrect ignition primary circuit resistor. Use only resistor with Delco-Remy trademark. *See Resistor data below.*

COMPRESSION PRESSURE: 140 lbs. at cranking speed of 315 RPM (throttle wide open).

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Located between left bank exhaust manifold and exhaust cross-over pipe (exhaust gases diverted through heat passages in manifold when valve closed).

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders – RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plug – Auto-Lite AL-7. Torque to 30 ft. lbs.

COIL: Delco-Remy 1115084. *12 Volt.*

Resistor – Delco-Remy 1927809. 1.40-1.62 ohms.

► *COIL RESISTOR NOTE:* Connected in series between battery and coil. Resistor is by-passed during cranking by solenoid or magnetic starter switch, making direct lead from battery to coil.

DISTRIBUTOR: Delco-Remy 1110863. *12 Volt.*

Condenser – Delco-Remy 1869704. **Capacity** .18-.23 mfd.

Contact Point Set – Delco-Remy 1918148.

Breaker Gap – .016".

Cam Angle – 26°-33°.

Breaker Arm Spring Tension – 19-23 ozs.

Rotation – Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
.5-2.5		350	1-5		700
2-4		400	4-8		800
7-9		800	14-18		1600
11-13		1125	22-26		2250

Vacuum Spark Control: Delco-Remy 1116095.

Vacuum Advanc

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	5-7
10	20	11.5-13.5

Plunger Travel – 7/32-15/64".

IGNITION TIMING

Setting – 5° BTDC, at idling speed.

Timing Mark – Timing indicator on front cover and 5° mark on vibration damper.

► *DISTRIBUTOR INSTALLATION CAUTION:* When distributor installed and correctly timed (5° BTDC), upper distributur oil cap must be in center toward front of engine or few degrees to right side. If oil cap is to left of center, oil supply to right bank hydraulic lifter oil gallery may by-pass back to pan and cause noisy lifter operation.

CARBURETOR

► *THROTTLE VALVE LINKAGE ROD MEASUREMENT CHANGE:* The lower rod measurement has been changed to 16 1/8" plus .000", minus 1/32" (from 15¼") to improve shift patterns. *See complete adjustment below.*

THROTTLE LINKAGE ADJUSTMENT (HYDRA-MATIC CARS): Make adjustments in the following order:

1) – Disconnect throttle valve rod from throttle valve lever on transmission case, disconnect vent pipe at lower left of case. Hold throttle lever to rear against stop. Distance from machined surface on rear of case to center of pin on throttle lever should be 5 9/16". Bend lever to correct position.

2) – Measure length of lower throttle valve rod from center of lower hole to outer surface of upper end. Length should be 16 1/8" (plus 0", minus 1/32"). Adjust by bending rod. *See Rod Change above.*

3) – Set carburetor throttle at slow idle (closed throttle). Adjust upper throttle rod at carburetor throttle rod bracket so that rod enters hole in bracket freely; then lengthen rod by turning adjusting end one full turn to left, tighten locknut and connect rod.

CARTER WGD 2352S

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel feeds 1-4-6-7.*

Idle Setting – ½-1½ turns open. Turn screws out for richer mixture.

Idle Speed – (Std. & O.D.) 550 RPM, (Hydra-Matic) 425 RPM in Neutral, (Hydra-Matic & Air Cond.) 450 RPM in Neutral with Air Conditioning turned on.

Float Level – 7/32" (Gauge T109-106) between top of float and bowl cover, gasket removed, cover inverted and needle seated. Adjust by bending float arm.

Fast Idle: .023" between throttle valve and bore (side opposite idle port), with choke valve fully closed. Gauge T109-189. Adjust by bending choke connector rod at lower angle. *NOTE* – This fast idle setting will provide 1700-1800 RPM engine fast idle speed.

Automatic Choke: Centered (At Index).

Hydra-Matic Throttle Linkage Adjustment: *See Carburetor above.*

► *OTHER DATA: See "Carter Dual WGD" in Carb.Sect.*

Fuel Pump Pressure: 4-5½ lbs. Max.

CARB. EQUIPMENT

Fuel Pump: Carter M-2433S, Nash No. 3145119 (before Serial No. Z-1227), Nash No. 3149268 (Starting with Serial No. Z-1227.)

Pr ssure – 4-5½ lbs. maximum.

S e "Fuel Pumps" in Carburetion S ction.

Gasoline Gauge: Stewart Warner (Hudson) or Auto-Lite (Nash). Electric type.

Dash Unit – Hudson 3119655 (Stewart Warner 441168), Nash 3119503 (Auto-Lite 14159A).

Tank Unit – Hudson & Nash 3146814 (Auto-Lite 14165A).

See "Fuel Gauges" in Carburetion Section.

BATTERY

(Std.) – Auto-Lite 11-HS-50. *12 Volt,* 11 plate, 50 ampere hour capacity (20 hour rate).

(Air Cond. Cars) – Auto-Lite 11-HS-60. *12 Volt,* 11 plate, 60 ampere hour capacity (20 hr. rate).

Battery Ground – Negative.

Engine Ground – Battery to engine with body ground from transmission to engine rear cross member.

STARTER

Delco-Remy 1107648. *12 Volt.* **Armature 1926626.**

Drive – Overrunning clutch (solenoid pinion shift).

Rotation – Counter-clockwise at commutator end.

Brush Spring Tension – 35 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft.lbs.	Lock	11.3	435

Starter Switch: Delco-Remy No. 1119760 solenoid switch located on starter, actuated by combination ignition and starter switch (Std. and Overdrive cars), by Delco-Remy No. 1996084 Switch operated by raising shift lever upward (Hydra-Matic).

GENERATOR

Delco-Remy. *12 Volt.* Used as follows:

Delco-Remy No.	G nerator	Armatur
Without Air Cond.	1100324	1928952
With Air Cond.	1103011	1923535

Performance Data

Generator	Amperes	Volts	RPM
1100324	25	14.0	2780
1103011	30	14.0	2150

Rotation – Counter-clockwise at commutator end.

Brush Spring Tension – 28 ozs.

Field Current – 1.50-1.62 amperes (1100324), 1.48-1.62 amperes (1103011), 12 volts at 80° F.

Belt Adjustment: ½" deflection with 25 lbs. pressure applied midway between fan and generator pulleys.

REGULATOR

Delco-Remy 1119122 (1100324 Gen.), 1119003 (1103011 Gen.). *12 Volt. NOTE – Specifications are "Normal" Settings.*

Cut-Out Relay

Cuts-In – 11.8-13.5 volts.

Contact Gap – .020".

Air Gap – .020" with contacts just closed.

Voltage Regulator

Setting – 13.8-14.8 volts (Hot).

Air Gap – .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting – *See "Delco-Remy 1119000 Series Regulators" in Electrical Section.*

Current Regulator

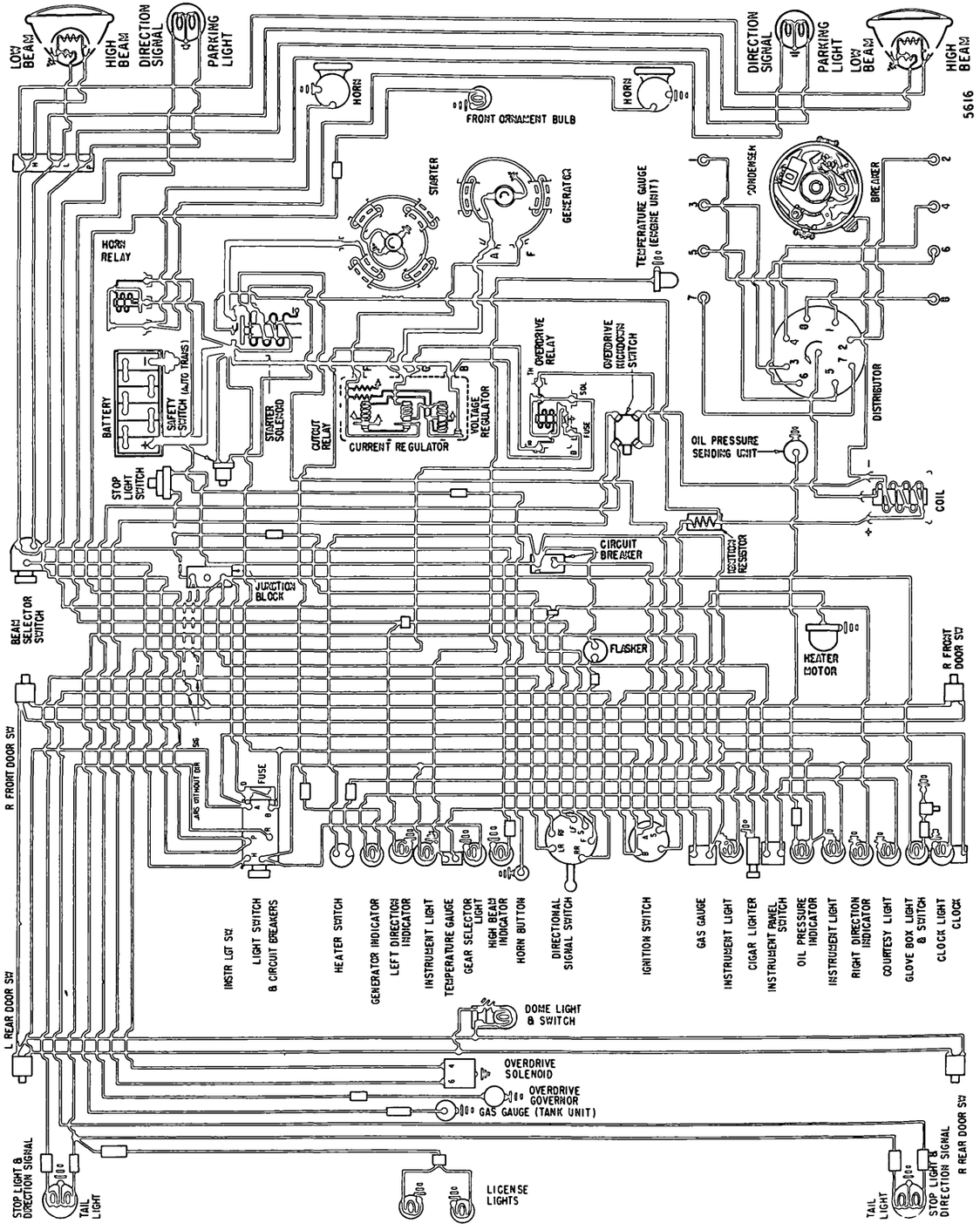
Setting (1119122)-23-27 amperes (Hot).

Setting 1119003)-27-33 amperes (Hot).

Air Gap – .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting – *See "Delco-Remy 1119000 Series Regulators" in Electrical Section.*

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HUDSON HORNET SPECIAL V8 WIRING DIAGRAM

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MISC. ELECTRICAL

▷ *BACK-UP LIGHT WIRING CIRCUIT CAUTION (Early Cars):* Incorrect assembly of wire to back-up light switch and circuit breaker causes back-up light to operate incorrectly. *See "Electrical Notes" in Nash Special Data.*

Headlamps: Sealed Beam. *See Electrical Section.*

Directional Signals: *See Electrical Section.*

Light Switch Removal: Disconnect battery. With switch in "OFF" position, press release on top of light switch assembly, and pull knob and shaft clear of switch. Remove slotted nut, pull switch out to rear of instrument panel.

Stop Light Switch: Located in tee fitting in line to left front brake.

FUSES: 7.5 Ampere. On lighting switch for Courtesy and Glove Box lights.
15 Ampere. Located on overdrive relay.
5 Ampere. Located in Radio wire back of instrument panel.

CIRCUIT BREAKERS: Three used as follows:
12 Ampere. On light switch for Instrument, Tail and Dome lights.
12 Ampere. On light switch for Head and Parking lights.
30 Ampere. For Stop Light, Instruments and Indicators, Heater and Directional Signals. Located back of Instrument panel.

HORNS: Auto-Lite HAD-4737 (Low Pitch), HAD-4738 (High Pitch). 12 Volt.
Horn Relay – Nash No. 3145684.

ENGINE

▷ *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Sect.*

▷ *NOISY VALVE LIFTER OPERATION (Right Cylinder Bank Only):* May be caused by incorrect distributor installation allowing oil to by-pass back to pan. *See Distributor Installation Caution under Ignition Timing.*

▷ *REAR MAIN BEARING CAP TORQUE CHANGE:* Rear bearing cap screws should be tightened to 50-55 ft.lbs. to avoid possibility of distorting cap (changed from 80-85 ft. lbs.). All other main bearing caps should be tightened to 80-85 ft. lbs.

ENGINE SPECIFICATIONS: Own V8. Valve in head.

Bore	Stroke	Displacement
3½"	3¼"	250 Cu. Ins.
Compression Ratio	**Rated HP**	**Developed HP**
8.0-1	39.2	190 at 4900 RPM

Compression & Vacuum Reading – See TUNE-UP.

CYLINDER HEAD INSTALLATION: *See "Cylinder Head & Manifolds" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Aluminum alloy, slipper type, tapered skirt, cam ground with steel reinforcement. Piston pin offset toward thrust side of piston.
Removal – Piston & Rods removed from above.

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Clearanc – .001-.0015" (Top of skirt), .0009-.0015" (Bottom of skirt).

R placement of Pistons: Std., .002", .005", .010", .020", .030", .040" Oversize.

Installing Pistons: Install with "F" cast in piston strut and notch in piston head toward front of engine.

PISTON PINS

Press fit in connecting rod. No locking device.

Pin Fit in Piston – Palm press fit at room temperature.

Pin Removal & Installation – *See "Piston Pins" in Nash Special Data.*

R placement Pins: Std., .003", .005" Oversize.

PISTON RINGS

Three rings (two compression & one oil) used. Upper ring is chrome plated. Oil control ring is three piece type (two oil control wiper rails with a segmented steel spacer between them).

Ring	Width	End Gap	Side Clearance
Compr. #1	.0775-.0780"	.010-.020"	.002-.0035"
Compr. #2	.0775-.0780"	.010-.020"	.002-.004"
Oil(Steel Rail)	.015-.055"		.001-.0079"

CONNECTING RODS

Crankpin Journal Diameter – 2.2483-2.2490".

Lower Bearing – Precision, steel-backed, babbitt.

Clearance – .0007-.0028". **Side Clearance** –.004-.012".

Replacement Bearings: Std., .001", .002", .010", .012" Oversize.

Installing Rods: Assemble connecting rod with notch in piston and connecting rod identification mark to front of engine. Cylinder numbers on connecting rod should be toward outside of bank in which they are installed.

CRANKSHAFT

Journal Diameter – 2.4983" - 2.4990". Five bearings.

Bearings – Precision, steel-backed, babbitt.

Clearance – .0006"-.0032".

R placement Bearings: Std., .001", .002", .010", .012" Oversize.

End Thrust: Taken by No. 1 flanged bearing.

Endplay – .003-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

CAMSHAFT

Bearings – Five, steel-backed, babbitt lined bushings pressed in block and line reamed.

Clearance – .001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket.

End Play – .003-.006".

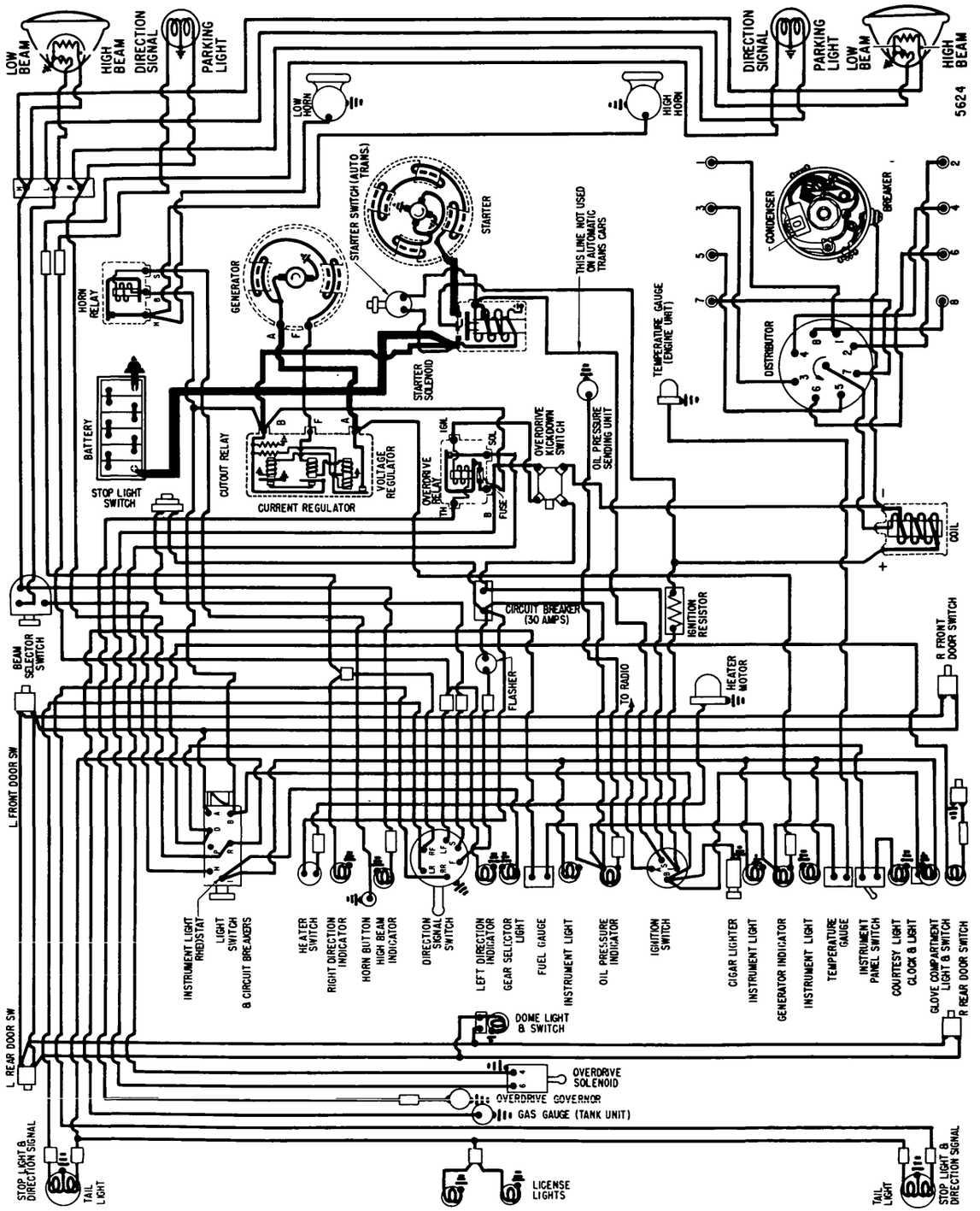
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Nash Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Nash Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

Camshaft Setting: Both sprockets marked "O". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers. To check assembly – Rotate crankshaft until timing mark on camshaft sprocket is on horizontal line at either

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NASH AMBASSAD R SPECIAL V8 WIRING DIAGRAM

CONTINUED FROM PRECEDING PAGE

3 or 9 o'clock position. There should be 10 links or 20 pins between timing marks.

VALVES

Tappet Clearance – None in service (Hydraulic).

Valv	H ad Diameter	Stem Diameter
Intake	1.787"	.3412-.3417"
Exhaust	1.406"	.3407-.3412"

Valv	Seat Angle	Lift	Stem Clearance
Intake	30° ①	.375"	.0013-.0028"
Exhaust	45° ②	.375"	.0018-.0033"

Valv Seat Width – .078-.093" (Intake), .093-.104" (Exhaust).

Valv Stem Seals – Rubber deflector installed on valve stem and over top of guide on all valves.

Valve Springs: Install springs with closed coil end against cylinder head. **Free Length** - 2.20".

Valve Spring Specifications

Valves	Spring Pressure	Spring Length
Closed	85 - 91 lbs.	1 13/16"
Open	150 -160 lbs.	1 7/16"

Valve Guides: Drive old guides out, drive new guides in to height of ¾" ± 1/64" above cylinder head (measure from top of guide to flat machined surface of lower spring retainer on head). Ream all guides to I.D. of .3430-.3440" after installation.

Valve Lifters: Hydraulic type.

Hydraulic Valve Lifter Removal, Overhaul & Testing – *See "Valve Syst m" in Nash Special Data.*

Rocker Arm Assembly: *See "Valve System" in Nash Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 12°30' BTDC. Close 51°30' ALDC.

Exhaust Valves– Open 53°30' BLDC. Close 10°30' ATDC.

Valve Timing Check: Remove valve compartment cover and spark plugs. Crank engine until #6 piston in right bank is on TDC of compression stroke (#1 piston will be on TDC of exhaust stroke in overlap position). Rotate crankshaft 90° counter-clockwise. Install dial indicator on #1 intake rocker arm pushrod end. Crank engine in a clockwise direction until dial indicator dicates pushrod movement, (hydraulic lifter should be fully charged for this check). At time indicator moves, ignition timing pointer on front cover should align with a point approximately 25/32" before TDC position on vibration damper. *NOTE* – If more than ½" variance in either direction, remove timing chain cover and inspect installation. Replace if deflection exceeds 1/2".

OILING SYSTEM

Crankcase Capacity – 5 quarts.

Normal Oil Pr ssur : 10 lbs. minimum at 600 RPM.

Pr ssure R gulat r – In oil pump. Opens at 55-60 lbs. Not adjustable.

Oil Pr ssur Indicat r – Light on instrument panel controlled by pressure switch, Nash No. 3142826, located on left side at rear of engine. Light goes on when Ignition Switch turned on, goes out when oil oil pressure reaches 6½ lbs. ± 1½ lbs.

Oil Pump: Gear type. Mounted on rear main bearing cap and driven by distributor drive shaft. *NOTE* – Removal of oil pump does not disturb ignition timing.

Oil Pump Rem val, Overhaul and Installation – *See "Oiling System" in Nash Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air inlet) and outlet pipe in valve tappet cover.

COOLING

Water Capacity: 21 quarts, add 1 quart for heater.

Pressure Valve: Radiator filler cap. 7 lbs. (Std.), 14 lbs. (Air Cond.).

Thermostat: Choke type, Nash No. 3132708 (150°), No. 3131817 (167 - 173°), No. 3131985 (177 - 182°) for use with permanent anti-freeze.

Water Pump: Packless type with sealed ball bearing. *See "Hudson & Nash V8 Special" in Water Pump Sect.*

Temperature Gauge: Stewart Warner (Hudson) or Auto-Lite (Nash). Electric type.

Dash Unit – Hudson 3119681, Nash 3119504 (Auto-Lite 14158A).

Engine Unit – Hudson & Nash 3144585 (Auto-Lite 13550A).

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 10A7 Assy. No. 950 or 1436. Single plate. *See "Borg & Beck" in Clutch Section.*

Clutch Disc No.–Borg & Beck CD 752. Nash No. 3125822.

Pedal Adjustment: Pedal free travel ½ - ¾". Adjust by loosening locknut and turning adjusting nut on control link at clutch fork.

► *CAUTION: The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project 3/8" forward of the rear edge of beam bracket, to provide proper leverage.

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan. Punch mark flywheel clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner. Three speed, helical gear type.

See "Warner Transmissions" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Move rear axle back to slip front universal joint off transmission. Disconnect shift levers and speedometer cable, remove two upper transmission to bell housing bolts, and install special guide bolts in their place. Remove lower bolts, slide transmission out.

OVERDRIVE

Warner R10. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

HYDRA-MATIC DRIVE

"Flashaway" Hydra-Matic. New four speed, hydraulically controlled transmission with two fluid couplings. *See "Dual Coupling Hydra-Matic Driv " in Transmission S ction.*

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual C upling Hydra-Matic Driv " in Transmission S ction.*

► *TESTING & TROUBLE SHOOTING: S "Dual C upling Hydra-Matic Drive" in Transmission Section.*

Lubrication – Check fluid every 1,000 miles. Drain and refill every 25,000 miles (remove oil pan and clean oil screen). Use Automatic Transmission Fluid type "A" ("AQ-ATF").

Checking Fluid Level – Bring transmission to normal operating temperature. Idle engine to 425 RPM, with selector lever in "P" (Park) position, with car on level floor. Remove fluid level indicator, wipe clean, reinsert it, then remove it again and note reading.

► *OTHER HYDRA-MATIC SERVICE DATA: See "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit or Mechanics. One universal used at front end of propeller shaft.

REAR AXLE

Spicer. Semi-floating, hypoid gear with torque tube drive.

See "Spicer Hypoid" in Rear Axle Section.

Axle Ratios – Std., 4.1-1 (11-45), **Overdrive** 4.5-1 (11-50), **Hydra-Matic** 3.5-1 (13-46).

Backlash – .002-.006".

Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims, and replace same amount when reassembling). Withdraw shaft using Puller J-2498; do not drag on inner seal.

Rear Axle Assembly Removal: Raise and support rear end of car. Disconnect rear brake cables at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at axle end (let hang from body). Roll axle free.

Wheel Bearing Adjustment: Shims behind brake backing plate. *NOTE* – Adjust axle shaft end play on **Right Hand Side Only.**

Rear Suspension: *See "Nash" in Suspensions & Wh l Alignment Section.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Service by replacement.

Front – Nash No. 3140879. **Rear** – Nash No. 3140406.

FRONT SUSPENSION

Independent. With coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.

See "Nash" in Suspensions & Wheel Alignment Secti n.

King Pin Inclination – 3°36' (Hudson), 6½° (Nash).

Caster – (Std.) ½° Pos. desired. Limits 0-½° Pos.

(Power Steering) 1° desired. Limits ½° - 1° Pos.

Camber – 0° desired. Limits ¼° Neg. to ¼° Pos.

Toe-In – 1/16" to 3/16". *CAUTION* – When adjusting toe-in on Power Steering Cars, operate engine so that pump will supply oil pressure to center spool in power cylinder valve.

T e-Out n Turns – (Hudson) Outer wheel 20°, inner wheel 24°. (Nash) Outer wheel 20¾°, inner wheel 25°.

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STEERING

Manual: Gemmer Model 305. Worm & Roller with "push-pull" adjustment.
See "Gemmer Steering Gears" in Steering Section.

Power Steering: Monroe Power Guide. Linkage type.
See "Monroe Power Guide" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix Hydraulic, Single Anchor. Hand lever applies rear wheel service brakes.

See "Bendix Hydraulic, Single Anchor" in Brake Sect.

Drums – Diameter 10". (Front and Rear).

Wheel Cylinder Diameter – 1 1/8"(Front), 7/8" (Rear).

Replacement Lining & Shoes: Linings and shoes with linings furnished standard size only.

Lining Width & Length

	Front Wheel	Rear Wheel
Primary Shoes	2" x 8 7/8"	1¾" x 8 7/16"
Secondary Shoes	2½" x 10 31/32"	1¾" x 10 25/32"

Clearance – .015" heel and toe of secondary shoe with primary shoe out against drum, or adjusting screw backed off 14 notches from point where wheel can just be turned by hand.

Standard Master Cylinder: Mounted on support under floor pan.

Checking Fluid – Roll back floor mat, remove access cover. Maintain fluid level ½ - 1" below top of filler opening.

Removal – Remove from below without disturbing other units.

Power Brakes: Bendix Power Unit. Replaces standard master cylinder.
See "Bendix Power Unit" in Brake Section.

Checking Fluid – Same as for standard master cylinder.

Removal – Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Misc. Sect.

Window Regulators: Electric with reversible motor. *See "Nash Window Regulators" in Miscellaneous Section.*

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extr me car wh n disconnecting any part of air conditioning equipm nt or lin s. See "Air Conditioning Service Cautions" in Misc llaneous Section.*

MODEL IDENTIFICATION

Hudson Hornet V8 ..... Model 35680
Nash Ambassador V8 ..... Model 5680

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.
Starting Serial Numb r (Hudson): Y-7201 (Domestic), YKD-1001 (Unassembled Export).
Starting Serial Numb r (Nash): V-11501 (Domestic), 8KD-1001 (Unassembled Export).

ENGINE NUMBER: Stamped on machined surface on top of cylinder block.
Starting Engine Number – P-21001.

TUNE-UP

►*DETONATION OR PRE-IGNITION CORRECTION: See Distributor Conversion Data below.*

►*SLOW COLD STARTING & POOR WARM-UP CHANGE & CORRECTION: See CARBURETOR below.*

►*POOR ENGINE PERFORMANCE (Automatic Choke) CORRECTION:* Restrictions in exhaust gas passages of intake manifold affects automatic choke operation. *S "Cylind r H ad & Manifold" in Nash Special Data.*

COMPRESSION PRESSURE: 140 lbs. Min. at 150 RPM with wide open throttle.

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE: None in service (Hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic type. Located at left manifold outlet.

IGNITION

►*BURNED BREAKER POINTS OR HIGH SPEED MISS CORRECTION:* May be caused by incorrect ignition primary resistor. Use only resistor with Auto-Lite trade mark. *S Resistor Data below.*

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylind rs–RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033"-.037".
NOTE – Champion N-8 used up to Eng. No. P-21543 with .035-.037" gap. Use Champion N-18 for replacement.

COIL: Auto-Lit CAD-4004. *12 Volt.*
Igniti n Curr nt – 2.2 amperes (Idling, Hot).
Resist r – Auto-Lite PU-4001 (.665-.735 ohms).

DISTRIBUTOR: Auto-Lit IBK-4001B (Through Eng. No. P-25305), IBJ-4001D (Eng. No. P-25306 to P-28608), IBJ-4001C (Eng. N . P-28609 & Later), IBJ-4001E (R pl. & C nv rsi n f IBJ-4001D & C - see below). Double Breaker type (IBK-4001B), Single Breaker type (All others).

►*DISTRIBUTOR CONVERSION TO CORRECT PRE-IGNITION (IBJ-4001D & IBJ-4001C):* If pre-ignition occurs when using premium fuel, and this cannot be corrected by retarding ignition, removing carbon, or other corrective procedures, distributors can be converted as detailed below. Install new IBJ-4001E nameplate (in kit) after conversion. *NOTE* - Complete IBJ-4001E furnished for replacement.

IBJ-4001D C nversion – Install all parts furnished in Conversion Kit Nash No. 6484607 (Vacuum Advance Chamber, Vacuum Spring, Governor Weight Spring, and small parts). Automatic and Vacuum advance will be the same as IBJ-4001E below.

IBJ-4001C Conversion – Install all parts furnished in Conversion Kit Nash No. 6484609 (Distributor Stop & Cam plate, Governor Weight Spring, Vacuum Spring, and small parts). Automatic & Vacuum advance will be the same as IBJ-4001E below.

Condenser–Auto-Lite IBB-2015L (IBK & IBJ Distributors). **Capacity** .25-.28 mfd.
Contact Point Set–Auto-Lite IGW-3028JS (IBK Distributor), IGW-3028 HS (IBJ Distributor).
Breaker Gap–.017" ± .002".
Cam Angle–38° ±3° (IBK Distr.-both sets of contacts operating together), 31° ±3° (IBJ Distr.).
Breaker Arm Spring Tension–17-20 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance–IBK-4001B

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
1	375	2	750
8	850	16	1700
15	1650	30	3300
16	1750	32	3500

Automatic Advance – IBJ-4001C

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
10	850	20	1700
15	2000	30	4000

Automatic Advance–IBJ-4001D

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
1	350	2	700
10	850	20	1700
13	1485	26	2970
14	1700	28	3400

Automatic Advance – IBJ-4001E

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	300	0	600
1	375	2	750
8	900	16	1800
12	2000	24	4000
14	2550	28	5100

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance–IBK-4001B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6 1/4
1	2	6 5/8
6	12	9
11	22	12 1/8
12	24	13

Vacuum Advance – IBJ-4001C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7
10	20	13

Vacuum Advance–IBJ-4001D

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6
1	2	6 3/8
6	12	8 5/8
11	22	11 5/8
12	24	12 1/2

Vacuum Advanc – IBJ-4001E

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	8
1	2	8 5/8
6	12	12
9	18	14 3/4
10	20	16

IGNITION TIMING

Setting–5° BTDC.
Timing Mark–Timing indicator on chain case cover marked 0-5-10-15. Align groove in vibration dampener with "5" mark on indicator.

CARBURETOR

►*POOR WARM-UP PRODUCTION CHANGE & CORRECTION: See "Carter WGD" in Carburetion Section f r installation of parts furnished in Unitized Packag as follows:*

1) Vacuum Piston Spring Change – Install on carburetors tag-dated before "M-5" (later carburetors have new spring installed).

2) Metering Rod Change – Install on cars before Eng. No. P-24900 (later engines have new rods).

►*SLOW COLD STARTING CORRECTION:* To correct, check spark plugs, ignition points, engine timing, and electrical connections. Choke valve must have .005" clearance in all positions, choke valve and shaft must operate freely, choke piston must be free in cylinder, and operate freely with no bind between unloader arm on choke lever and fast idle link. *NOTE*–Climatic control may be set one notch either rich or lean from standard setting.

THROTTLE LINKAGE ADJUSTMENT (1955-56): The carburetor throttle rod from carburetor to lever at the vertical rod must be 15½" from center of ball pivot at carburetor to "L" bend at rear end of rod. The adjuster rod that is connected to carburetor throttle rod and to the lever of the cross-shaft must be 6 9/16" from center-to-center of ends of rod. To change dimension, bend rod at present bend to obtain 6 9/16". The TV rod from cross shaft lever to the TV lever at the transmission must be 26 1/8" from center of pins. Bend rod to correct measurement. The TV lever must be adjusted so that taper on end of lever should contact a straight edge held against the machined surface at rear of transmission case. If necessary to adjust, loosen lever clamp screw nut and turn shaft counterclockwise until valve has reached its stop. Hold shaft in this position and rotate lever on shaft so that taper on lever lines up with milled surface on rear of case. After measurements have been corrected, warm up engine, set carburetor idle to 400 RPM. Stop engine and loosen two locknuts at front and rear end of adjuster on rod. PLACE REAR END OF ROD IN CENTER HOLE OF THE CROSS SHAFT LEVER. Tighten two locknuts so that adjuster rod fits freely in lever. *NOTE*–Early production 1956 cars had adjuster rod in bottom hole of cross shaft lever. Relocate to center hole to improve shift characteristics.

CARTER WGD 2231S, SA

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

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Idle Setting—½-1½ turns open. Turn screws out for richer mixture.

Idle Speed—425 RPM with transmission in "N" (Air Conditioning turned on).

Float Level—¼" from underside of bowl cover to top of float at center with needle valve seated. Measure with bowl cover and float assembly inverted.

Fast Idle: .030" throttle opening or clearance between valve and wall on side opposite idle ports with choke valve tightly closed. Adjust by bending choke rod at lower angle.

Automatic Choke: 1 point rich.

Ultramatic Throttle Linkage Adjustment: *See "Carburetor" above.*

►*OTHER DATA: See "Carter WGD" in Carburetion Sect.*

Fu l Pump Pressure: 3½-5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter M2256S (Fuel & Vacuum).
Pressure – 3½-5 lbs. Max. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Stewart Warner (Hudson) or Auto-Lite (Nash). Electric type.
Dash Unit—Hudson 3119655 (Stewart Warner 441168), Nash 3119503 (Auto-Lite 14159A).
Tank Unit—Hudson & Nash 3146814 (Auto-Lite 14165A).
See "Fuel Gauges" in Carburetion Section.

BATTERY

(Std.) Auto-Lite 11-HS-50. *12 Volt.* 11 plate, 50 ampere hour capacity (20 hr. rate).
(Air-Cond. Cars) Auto-Lite 11-HS-60. *12 Volt.* 11 plate, 60 ampere hour capacity (20 hr. rate).
Battery Ground – Negative.
NOTE – This is reversed from previous models.
Engine Ground – Battery to engine with body ground from transmission to rear crossmember.

STARTER

Auto-Lite MDF-6008. *12 Volt.* **Armature** MDF-2122.
Drive – Overrunning Clutch (solenoid pinion shift).
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10.0	60
6.5 ft. lbs.	Lock	4.0	240

Starting Switch: Auto-Lite Solenoid SAD-4101 on starter and control switch, Hudson & Nash No. 3146490, on steering column. Operated by lifting selector lever in "P" or "N" position.

GENERATOR

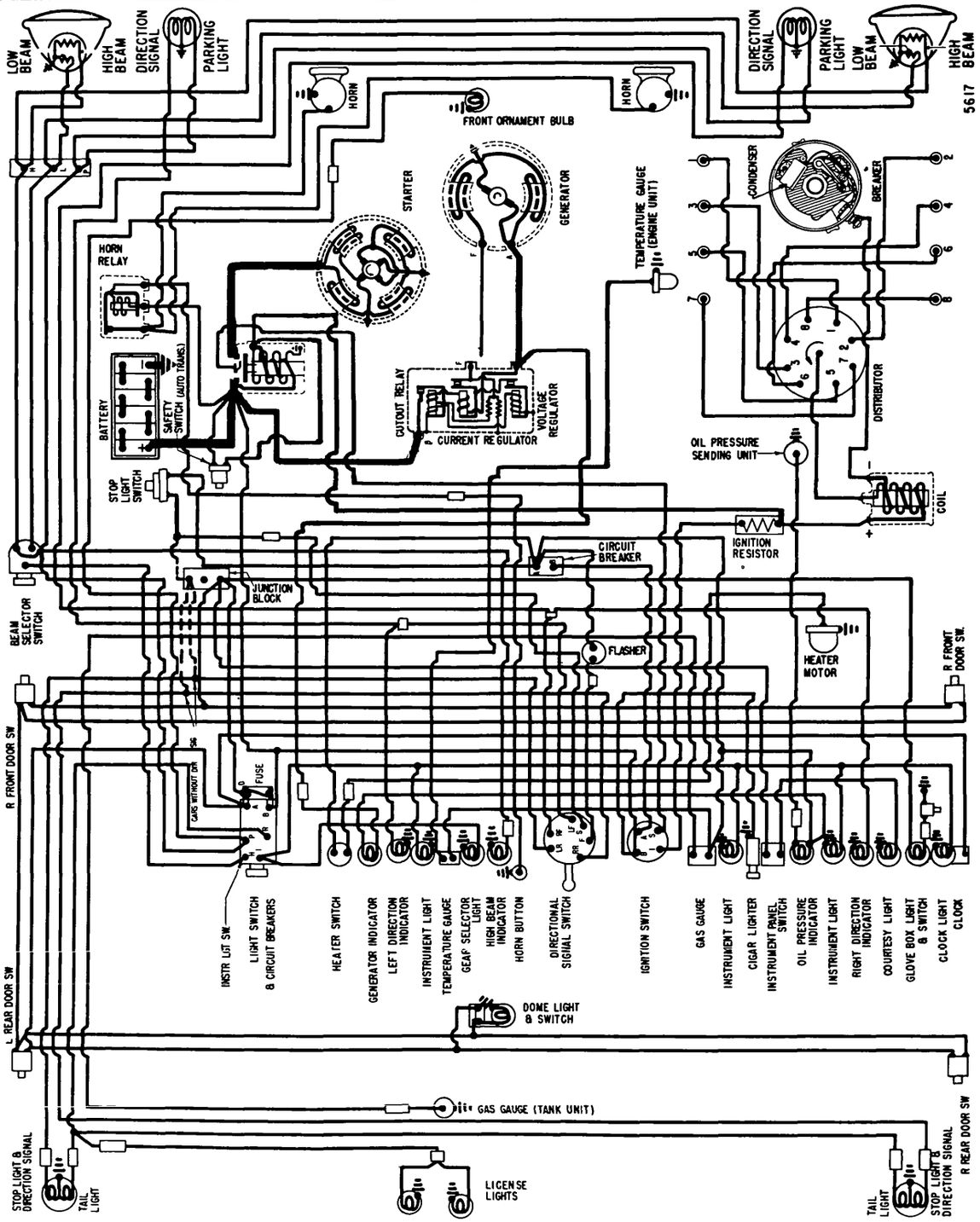
Auto-Lite GJC-7002F. *12 Volt.*
Armature—Auto-Lite GJC-2030J.
Maximum Charging Rate—*See Voltage Regulator.*

Performance Data—Cold

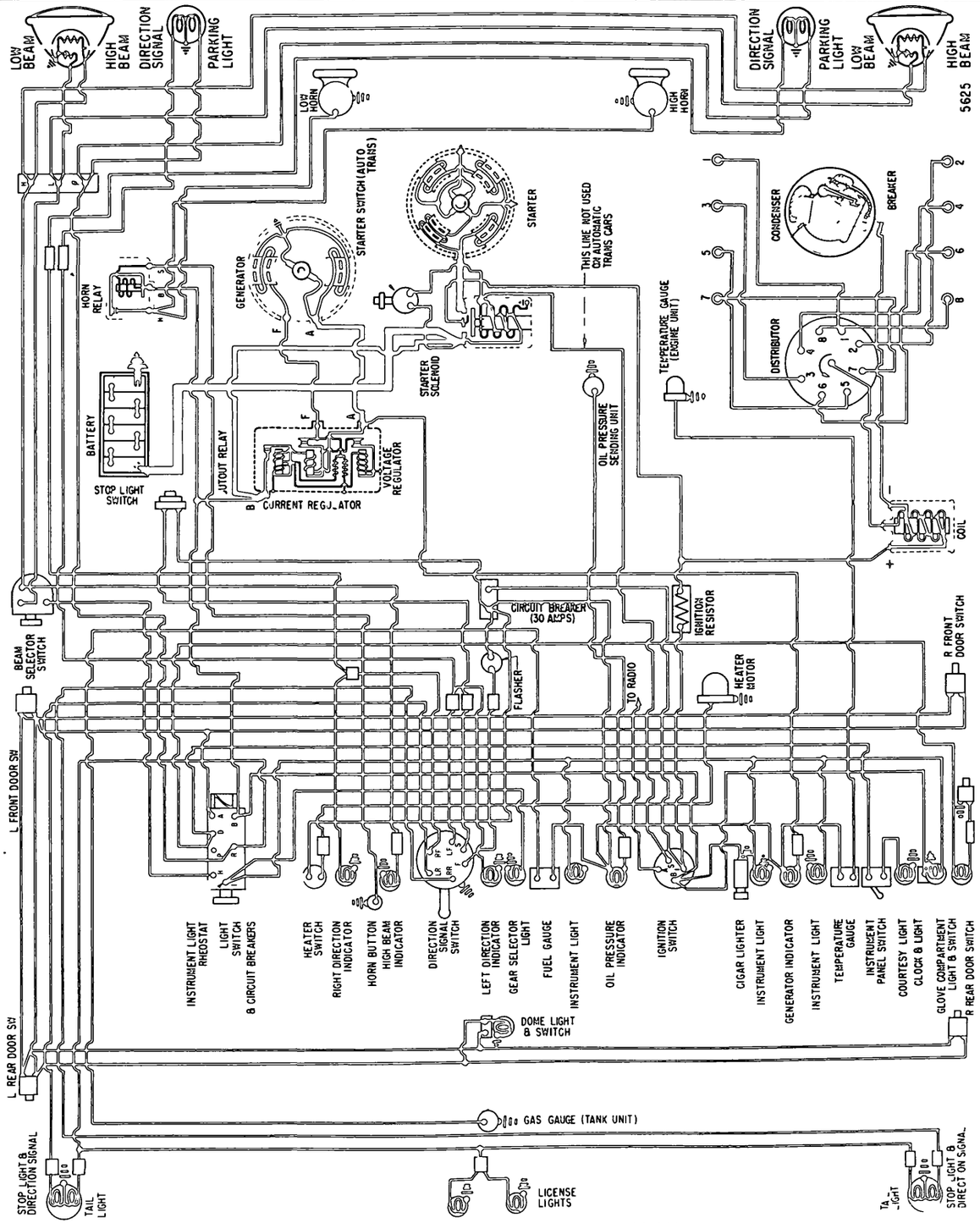
Amperes	Volts	RPM
20	15.0	1750
30	15.0	2250

NOTE—Do not operate at high output without ventilating fan for any length of time as to do so may result in burned armature or fields.

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HUDSON HORNET V8 WIRING DIAGRAM



NASH AMBASSADOR V8 WIRING DIAGRAM

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Rotation—Counter-clockwise at commutator end.
Brush Spring Tension—18-36 ozs.
Field Current—1.2-1.3 amperes at 10.0 volts (70°F).
Belt Adjustment: ½" deflection midway between water pump and generator pulleys.

REGULATOR

Auto-Lite VRX-6008A. *12 Volt.*

Cutout Relay

Cuts In—13.0-13.7 volts.
Cuts Out—8.2-9.3 volts at approx. 3-5 ampere discharge.
Contact Gap—.015" min.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—14.5 volts (80°F), charging at 10 amperes or with .25 ohm resistor between regulator and battery.
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Section.*

Current Regulator

▷*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
36		30 (28-32)

Test A—After 15 minutes operation at 10 amperes.
Test B—After an additional 15 minutes operation on current regulator (with load to give 13.6-13.8 volts).
Air Gap—.048-.052" with contacts just opening.
Checking & Adjusting—*See Electrical Section.*

MISC. ELECTRICAL

▷*BACK-UP LIGHT WIRING CIRCUIT CAUTION (Early Cars):* Incorrect assembly of wire to back-up light switch and circuit breaker, causes back-up light to operate incorrectly. *See "Electrical Notes" in Nash Special Data.*
Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Light Switch Removal: Disconnect battery. With switch in "OFF" position, press button release on top of light switch assembly, pull knob and shaft clear of switch. Remove slotted nut, pull switch out to rear of instrument panel.
Stop Light Switch: Located at tee fitting in line to left front brake.
FUSES: Lighting—7.5 ampere. On lighting switch. Protects Courtesy Light and Glove Box Light.
Overdrive—15 ampere. On overdrive relay.
CIRCUIT BREAKER: Three used as follows:
12 Ampere—On light switch. Protects instrument lights, tail lights, and dome light.
12 Ampere—On light switch. Protects head lights and parking lights.
30 Ampere—On dash behind instrument panel. Protects Stop Light, Directional Signals, Instrument Gauges and Indicators, and Heater.
HORNS: Auto-Lite HAD-4737 (Low Pitch), HAD-4738 (High Pitch), *12 Volt.*
Horn Relay—Nash No. 3145684.

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ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►***IMPROVED OIL CONSUMPTION CHANGE (1955-56 Cars before Eng. No. 0-25589):*** **Valve spring baffles (as used on later engines) can be installed (Two types available for field installation). *See "Valve System" in Nash Special Data.***

►*ENGINE FRONT COVER OIL SEAL LEAK CORRECTION: See "Engine Front Cover" in Nash Special Data.*

ENGINE SPECIFICATIONS: V8 Valve-in-head type.

Bore	Stroke	Displacement
4"	3½"	352 cu. ins.
Compr. Ratio	**Rated HP**	**Developed HP**
9.55-1	51.2	220 at 4600 RPM

Compression & Vacuum Reading: *See TUNE-UP.*

OIL PAN REMOVAL: Remove steering idler arm attaching bolts and drop steering linkage. Remove exhaust crossover pipe

CYLINDER HEAD INSTALLATION: *See "Cylinder Head & Manifolds" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Nash Special Data.*

PISTONS

Aluminum alloy, slipper type, tapered skirt, cam ground with steel reinforcement. Piston pin offset toward thrust side of piston

Removal—Pistons and rods removed from above

Clearance—.001-.0015" (top of skirt), 000-0015" (bottom of skirt)

Fitting New Pistons; Use .0015" x ½" feeler gauge between piston and cylinder wall (insert inverted piston in bore with pin hole parallel to crankshaft, push piston down until bottom of skirt slightly below top of block). Pull to withdraw feeler should be 6-11 lbs.

Replacement Pistons: Furnished Std. size, .010", .020". .030" oversize

Installing Pistons: Install with "F" cast in piston strut and notch in piston head toward front of engine

PISTON PINS

Full floating type. Retained in piston by lock rings at each end. **Diameter**—.9803"

Pin Fit in Piston—Palm press fit with piston heated

Pin Fit in Connecting Rod—Palm press fit at room temperature

Replacement Pins: Std. size, .003", .006" oversize

Piston Pin Bushing (In Connecting Rod) Installation: *See "Piston Pins" in Nash Special Data.*

PISTON RINGS

Three rings (two compression & one oil) used. Upper compression ring is chrome plated.

Ring	Width	End Gap	Side Clearance
Compr.	.078"	.010-.018"	.0015-.005"
Oil	.186"	.010-.018"	.0015-.005"

Installing Rings: Install upper compression ring and oil ring with gap toward camshaft side of engine. Install lower compression ring with gap toward opposite side from camshaft. All gaps should be midway between piston pin bosses

CONNECTING RODS

Length—6 25/32" (center-to-center)

Crankpin Journal Diameter—2.250"

Lower Bearing—Replaceable precision type

Clearance—.0005-.0025" **Sideplay** .003-.011"

Replacement Bearings: Std. size, .001", 002", .020" undersize

Installing Rods: Install odd numbered rods in left bank and even numbered rods in right bank, with numbers on rods facing down and away from block and milled oil groove in connecting rod cap upward and toward crankshaft

CRANKSHAFT

Journal Diameter—2.500" Five bearings

Bearings—Precision type. The four front crankshaft bearings are interchangeable.

Clearance—.0005-.0025"

Replacement Bearings: Std. size, .001", .002", .020" undersize

End Thrust: Taken by No. 5 (rear) main bearing.

Endplay—.0035-.0085"

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

Vibration Dampener: *See "Vibration Dampener" in Nash Special Data.*

CAMSHAFT

Bearings—Five, steel-backed babbitt lined precision bearings.

Clearance—.0005-.0045"

End Thrust: Taken by thrust plate behind camshaft sprocket.

Endplay—.004-.006"

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Nash Special Data.*

Timing Chain: Morse. **Width**—1" **Pitch**—.375". **Length**—64 links.

Timing Chain & Sprocket Removal—*See "Timing Chain" in Nash Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Nash Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data*

Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers. ***NOTE*** **— Install camshaft sprocket 1/16" beyond position flush with end of camshaft to permit installation of fuel pump drive eccentric.**

VALVES

►***VALVE SPRING BAFFLE INSTALLATION (Cars before Eng. No. P-25589): Will improve oil consumption. See "Valve System" in Nash Special Data.***

Tappet Clearance: Hydraulic lifters. **Adjustment not required unless cylinder head removed or valve lifters replaced. *See "Valve Tappet Adjustment" in Nash Special Data.***

Valve	Head Diam.	Stem Diam.	Length
Intake	2.000"	.3725"	5.712"
Exhaust	1.687"	.3715"	5.690"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.398"	.001-.002"
Exhaust	45°	.388"	.002-.004"

Valve Seat Width — 3/64" (Intake), 5/64" (Exhaust).

Valve Stem Seals (Intake Valves) — Consist of a rubber deflector installed on intake valve stems and over top of valve guides.

Valve Springs: Single springs used Install springs with two closely wound coils against cylinder head

Valve Spring Specifications

Valves	Spring Pressure	Spring Length
Closed	78-86 lbs.	1¾"
Open	158-172 lbs.	1 3/8"

►***SPECIAL VALVE SPRING SEAT (For High Speed):*** **Special hardened Upper Valve Spring Seat, Nash No. 6492077 (identified by daub of red paint), is furnished for use where valve spring retainer (split lock) has pulled through upper spring seat. Recommended for replacement on cars operated at extreme high speeds.**

Valve Guides: Integral with cylinder head Ream valve guide holes for oversize valves if valve stem clearance excessive. Valves are furnished with 003", 010", .020", .030" oversize stems.

Checking Valve Stem Clearance and Reaming Guides for Oversize Valve Stems — *See "Valve System" in Nash Special Data.*

Valve Lifters: Hydraulic type.

►***LIFTER PRODUCTION CHANGE:*** **Hydraulic Lifter, Nash No. 6476060, has been changed for slower leakdown and improved noise level on initial start.**

Hydraulic Lifter Removal, Overhaul & Testing — *See "Valve System" in Nash Special Data.*

Rocker Arm Assembly: ***See "Valve System" in Nash Special Data.***

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves — Open 14° BTDC. Close 62° ALDC.

Exhaust Valves — Open 54° BLDC. Close 18° ATDC.

Valve Timing Check — Remove left bank rocker arm cover. Turn engine until No. 1 cylinder intake valve is open. Let engine stand for several minutes, until hydraulic lifter has leaked down completely. Then hold pressure against the top of the pushrod to keep lifter arm from refilling, and turn engine until valve closes. Insert tip of a screwdriver between end of valve stem and rocker arm to keep plunger in lifter bottomed, and turn engine until just before mark on timing gear reaches the 15° mark on the timing chain case cover as No. 6 cylinder comes up on compression stroke. Attach a dial indicator to the flange on cylinder head so that it will read any movement of the No. 1 intake valve rocker arm at the pushrod end of the arm. Turn engine very slowly until rocker arm just starts to move. At this point, mark on damper should be just 14° BTDC. *NOTE*— Maximum deflection of timing chain should be ½". If deflection is greater, it will cause a variation in the valve timing.

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OILING SYSTEM

Crankcase Capacity: 5 qts. (refill).
Normal Oil Pressure: 45 lbs. at 40 MPH. 10 lbs. at idle speed.

Pr ssur R gulat r—In oil pump. Not adjustable.
Oil Pr ssure Indicator: Red light on instrument panel. Lighted when engine oil pressure low.
Oil Pressur Switch—King-Seeley 47195.
Oil Pump: Gear type. On rear main bearing cap, driven through distributor drive and camshaft gear.
Oil Pump R moval, Ov rhaul and Installation—*See "Oiling System" in Nash Special Data.*
Crankcas Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve tappet cover.

COOLING

Wat r Capacity: 28 qts. (with heater), 27 qts. (without heater).

Pr ssur Valve Radiator filler cap. 7 lbs. (Std.), 14 lbs. (with Air Cond.).
Th rm stat: (Std.) 170°. (Optl.) 150° for alcohol anti-freeze, 180° for permanent anti-freeze.
Wat r Pump: Packless type with sealed ball bearing. *See "Nash V8" in Water Pump Section.*
Temp ratur Gaug : Stewart Warner (Hudson) or Auto-Lite (Nash). Electric type.
Dash Unit—Hudson 3119681, Nash 3119504 (Auto-Lite 14158A).
Engin Unit — Hudson & Nash 3144585 (Auto-Lite 13550A).
S e "T mperatur Gaug s" in Miscellaneous Section.

ULTRAMATIC DRIVE

Packard "Twin-Ultramatic". Torque converter (with hydraulic operated direct speed clutch) and hydraulic operated planetary unit.

►*TESTING & TROUBLE SHOOTING:* See *"Twin-Ultramatic Transmission" in Transmission Section.*

Lubricati n: Check fluid level every 1000 miles, drain and refill every 25,000 miles.
Ch cking Fluid Lev l—*(CAUTION—Fluid level must be checked at normal operating temperature and after engine has been idling at 800 RPM for at least one minute to compl tely fill system).* Run engine at low idle speed while fluid level is being checked, using dipstick located in engine compartment. Add fluid as required to bring level to "Full" mark on dipstick.
Capacity—22 pints. Use only Automatic Transmission Fluid Type A having an AQ-ATF number on can.

►*OTHER TWIN-ULTRAMATIC DATA:* See *"Twin-Ultramatic" in Transmission Section.*

UNIVERSALS

Mechanics: One universal joint used at front end of propeller shaft.

REAR AXLE

Own. Semi-floating, Hypoid Gear with Torque Tube drive. *See "Nash Hypoid" in Rear Axle Secti n.*
Axl Rati — 3.2-1 (13-41).
Backlash — .002-.006". Shim adjustment.
R ar Axl Ass mbly R moval: Raise rear of body. Disconnect hand brake cable at bellcrank and the housing at bracket. Disconnect torque tube from transmission, rear brake hose at bracket on body floor pan, rear springs, shock absorbers and rear axle stabilizer bar at axle tube. Roll axle from under car and remove truss rods, torque tube and propeller shaft from rear axle.
Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644-B). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims and replace same amount when reassembling). Withdraw shaft using Puller J-2498, do not drag on inner seal.
Wheel Bearing Adjustment: Shims behind brake backing plate.
Rear Suspension: *See "Nash" in Suspensions & Wheel Alignment Section.*

SHOCK ABSORBERS

Delco or Monroe. Direct acting type. Serviced by replacement.
Front — Nash No. 3140879. **Rear** — Nash No. 3140406.

►*REAR SHOCK ABSORBER NOISE CORRECTION (Cars before Serial No. V-13160):* Before replacing a rear shock absorber for being noisy, check for damaged shock absorber grommet spacer or limit sleeve (caused by incorrect retainer with oversize hole). If grommet spacer damaged, discard it. When reassembling without grommet spacer, do not use retainer (Nash No. 3136432), however, do not compress shock absorber grommets excessively.

FRONT SUSPENSION

Independent. Coil springs located between upper ends of steering knuckle pin and seat in upper wheelhouse panel.
See "Hudson & Nash" in Suspension & Wheel Alignment Section.

►*FRONT TIRE WEAR CORRECTION (Early Cars):* Wear due to tire contact with brake hose bracket can be corrected as follows: Set stopscrews on pitman arm to limit turning radius to 36°. If tire still contacts bracket, trim rear corner of bracket approximately 1/8". Cars built after April 11, 1956 have reworked brackets.
Kingpin Inclination — 3° 36' (Hudson), 6½° (Nash).
Caster —**(Std.)** ½° Pos. desired. Limits 0-½° Pos.
(Power Steering) 1° Pos. desired. Limits ½ - 1° Pos.
Camber — 0° desired. Limits ¼° Neg. to ¼° Pos.
Toe-In — 1/16" to 3/16". *CAUTION* — When setting toe-in on Power Steering Cars, operate engine so that pump oil pressure will center spool in power cylinder valve.
Toe-Out on Turns — **(Hudson)** Outer wheel 20°, Inner wheel 26°. **(Nash)** Outer wheel 20¼° (Std.), 21¾° (Power Steering), Inner wheel 25° (All).

STEERING

Manual: G mmer Mod l 305. Worm & Roller with "push-pull" adjustments.
See *"Gemmer Steering Gears" in Steering Section*
Pow r St ring: Monroe "Linkag Type". *See "Monroe Power Steering" in St ering Section.*
St ring Linkage: *See "Steering Linkage" in Steering S ction.*
Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*
Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix. Hydraulic duo-servo single anchor type without eceentric adjustment. Hand lever applies rear wheel service brakes.
See "Bendix Hydraulic" in Brake Section.
Wheel Cyl. Diameter — 1 1/8" (Front), 7/8" (Rear).

►*REAR WHEEL BRAKE CYLINDER PRODUCTION CHANGE:* Beginning with car Serial Number Y-9019 (Hudson), V-13514 (Nash), diameter of rear wheel brake cylinder was decreased to 7/8" from 15/16" to improve brake distribution.

Lining Width & Length

	Front	Rear
Primary	2½" x 9 3/8"	2" x 9 5/16"
Secondary	2½" x 12"	2" x 12"

Clearance—Back off adjusting screw 14 notches from point where wheel can just be turned by hand.
Standard Master Cylinder: Mounted on support under floor pan to left of transmission.
Checking Fluid—Remove access cover under floor mat on left side. Maintain level ½-1" below filler top.
Removal—Remove from below without disturbing other parts.

Power Brakes: Bendix Power Unit. Replaces standard cylinder.
See "Bendix Power Unit" in Brake Section.

Removal of Power Unit—Remove vacuum and air cleaner hoses at inlet tubes. Remove hydraulic line. Disconnect pushrod from brake pedal linkage. Remove unit from mounting brackets.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Own. Compressor clutch controlled magnetically. Inoperative unless control knob turned "ON". *See "Nash Air Conditioning" in Miscellaneous Section.*

Pow r Window R gulat rs: Electric. Individual motors in each window. *See "Power Window Regulators" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	60-70
Intake Manifold (Bolts & Nuts)	22-26
Exhaust Manifold (Bolts & Nuts)	22-26
Oil Pan	9-11
Main Bearing Caps (except Rear)	100
Main Bearing Caps (Rear)	140
Flywheel	85-95
Crankshaft Pulley	45-50
Con Rod Caps	40-50
Camshaft Sprocket & Pump Eccentric	14-17
Rocker Arm Support Brackets	14-17
Engine Front Cover (3/8 & 7/16" Bolts)	30-35
Water Manifold	22-26
Oil Pump Mounting	11-14
Oil Filter to Cylinder Block	30-35
Oil Filter Housing to Base	40-45
Oil Filter Pad Cover	30-35
Flywheel Lower Housing	50-55
Transmission Mounting	60-70

ENGINE MOUNTINGS

FRONT ENGINE MOUNT INSTALLATION: Cap screws fastening mounting to frame or bracket should first be screwed finger tight, then tightened alternately, one turn at a time DO NOT TIGHTEN ONE CAP SCREW IN POSITION INDEPENDENTLY OF THE OTHER, since lower portion of assembly would not seat evenly in upper portion. Front mounting must be properly positioned and tightened, otherwise mounting will not function properly as an insulator.

OIL PAN

OIL PAN REMOVAL: Remove starter and exhaust cross-over pipe. Disconnect idler arm from frame and drop steering relay rod. Remove oil pan capscrews and withdraw pan.

Installation: Cement new cork gaskets to pan, assemble front and rear synthetic seals to pan. Place coat of graphite grease on exposed surface of seals to insure that seal maintain their proper position in pan and do not hang up on front cover and main bearing sealing surfaces during oil pan installation.

CYLINDER HEAD & MANIFOLD

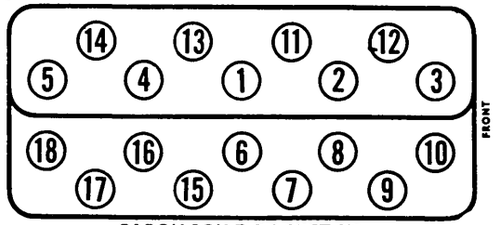
CYLINDER HEAD REMOVAL: Drain radiator and cylinder block. Remove intake manifold and generator, disconnect exhaust pipes. Remove valve cover and rocker arm shaft assembly. Rock rods to break oil seal between rod and lifter seat to avoid pulling lifter from bore, remove pushrods, then remove remaining cylinder head bolts. Remove cylinder head with exhaust manifold attached.

CYLINDER HEAD INSTALLATION: Reverse removal procedures given above and note the following:

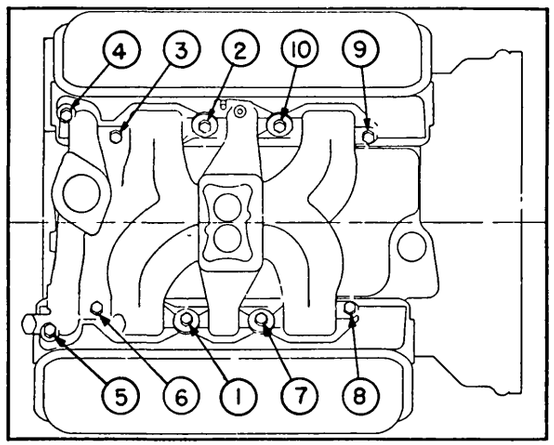
Gaskets - Use all new gaskets. Use P. O. B. No. 4 sealer on both sides of head gasket. Cement new gasket to valve cover.

Cylinder Head Bolts - 7/16" bolts used as follows. Four 6" bolts at rocker arm supports. Ten 4 7/16" bolts through center of head. Four 2 3/8" bolts at bottom. Use a torque wrench (see Tightening Specifications) and tighten in sequence shown in head diagram.

INTAKE MANIFOLD INSTALLATION: Apply Permatex No. 3 sealer around gasket water holes. Dip threads of intake manifold bolts in C. P. No. 9 sealer. Use large flatwashers under manifold nuts, small flatwashers on bolts. Use a torque wrench (see Tightening Specifications) and tighten in sequence shown in manifold diagram.



OLDSMOBILE ROCKET V8



ROCKET V8 INTAKE MANIFOLD

PISTONS

FITTING STANDARD SIZE PISTONS: *CAUTION* - When fitting standard size pistons **do not** select a piston which has same coding as marked on cylinder block. Instead, fit piston according to revised pounds pull specification of 5-12 lbs. Standard size pistons (Part No. 564503) are furnished in four sizes ranging from DD (smallest) through D, EE, to E (largest).

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING OIL SEAL: Asbestos covered wiper seal installed in rear groove in bearing cap and block (oil slinger operates in front groove).

Oil Seal Installation - With crankshaft out of engine and bearing cap off, use new seal coated with graphite grease, crowd seal by hand into rear groove in cap and block. Using Tool BT-12, drive seal into place. With tool resting on seal, cut ends flush with parting line between upper and lower bearing. Ends of seal must be cut clean so no frayed ends will be clamped between block and cap. Seal must entirely fill the groove.

ENGINE FRONT COVER

ENGINE FRONT COVER (Removal): Disconnect lower radiator hose and heater hose from front cover and disconnect generator link at generator. Remove oil pan and remove the two bolts attaching front engine mount to frame. Support engine with Special Tool BT-29 (engine must clear front cross member). Remove radiator assembly, fan blades and pulley and crankshaft pulley. Remove fuel and vacuum pump assembly. Remove front cover attaching bolts and front cover Reverse removal sequence to install cover, using a new gasket coated on one side with gasket cement. Lubricate sealing surface of front oil seal and fuel pump operating arm. Dip attaching cover bolts in POB No. 3 sealer

Engine Front Cover Oil Seal (Crankshaft Front Oil Seal) Replacement: ***(NOTE—Front cover oil seal can be replaced without removing front cover by using Tool J-4176).*** Remove crankshaft pulley and replace large capscrew in crankshaft end. Place fingers of Tool J-4176 over end of crankshaft and turn tool fingers so that hooks will pass through clearance between crankshaft end and inner diameter of front oil seal, (some light taps on tool center screw will force fingers behind rubber ring of oil seal) Use an end wrench on fixed nuts below puller plate and rotate each finger outward 90° to engage the finger hooks with ring of oil seal, then tighten nuts on upper plate for puller to hold fingers in position. Rotate puller center screw against crankshaft screw and remove seal.

Installation—Use Tool J-4177 to replace seal in cover by first placing seal in cover and then assembling adapter ring and driver so slot in driver will clear crankshaft key. Drive seal into place until adapter bottoms on cover face.

FLYWHEEL HOUSING

SYNCHRO-MESH & "DUAL RANGE" HYDRA-MATIC

LOWER FLYWHEEL HOUSING ALIGNMENT: *(NOTE* - Misalignment is evident as a "step" between block and lower housing resulting from location of housing too far forward or rearward on block). To correct misalignment, elongate dowel pin holes so as to allow lower housing to move to rear or front as required. Do not remove dowel pins or enlarge dowel pin holes with an oversize drill, as correct side-wise location of lower housing must be maintained for proper engagement of starter pinion and ring gear.

REAR FLYWHEEL HOUSING ALIGNMENT: Loosen capscrews slightly. Remove dowel pins, then shift housing with a lead hammer to bring within limits. *(NOTE* - On Synchro-mesh cars it will be necessary to remove rear housing and saw off dowel pins close to block before driving pins through). After aligning housing, again tighten housing attaching bolts and recheck radial runout. Using Reamer J-4832-3 and ratchet wrench J-808-6, ream two engine block-to-rear housing dowel pin holes. Finish ream with reamer J-4832-4 and install oversize dowel pins, Part No. 557754, with large chamfer end out. *(NOTE* - Above reamers must be shortened to 4" over-all length if operation is to be performed with housing in car).

REAR FLYWHEEL HOUSING ALIGNMENT CHECK: *NOTE* - It is not necessary to have lower housing in place during this check.

1) Install pilot mounting strap J-2548 on flywheel. Install rear housing and tighten bolts. Install pilot shaft and mount dial indicator. Tap crankshaft to rear of engine.

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2) Using large button on dial indicator, install indicator assembly so button contacts face of housing with approximately .015" compression. With dial indicator positioned against rear face of housing (2 3/4" radius on Hydra-Matic & 2 3/8" radius on Synchro-mesh, from centerline of crankshaft) revolve flywheel 360° and note indicator reading. Limits for this reading are not to exceed .003" on indicator within 360°. If reading exceeds limit, shim as necessary between housing and engine block to bring within limits.

3) Assemble dial indicator to pilot shaft using attachments 8-50 and 8-51, then check radial runout of housing bore as follows. Mark flywheel housing with pencil or chalk to indicate horizontal and vertical positions. With indicator positioned at zero at either horizontal mark, rotate flywheel 180°. Indicator reading at this opposite point must not exceed .004" plus or minus. With indicator positioned at zero at top mark, rotate flywheel 180°. Indicator reading at bottom must be between .000" and minus .008".

4) If not within above limits, proceed with Rear Flywheel Housing Alignment above.

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL & INSTALLATION: Remove valve lifters, distributor, engine front cover, fuel pump eccentric, camshaft sprocket and timing chain. Remove camshaft CAREFULLY by sliding out from front of engine. To install, reverse removal procedures.

VALVE SYSTEM

ROCKER ARMS

ROCKER ARM SHAFT ASSEMBLIES: Identical hollow steel tube shafts (ends plugged) are used. Four removable supports for each shaft, one support doweled to shaft for oil feed (at oil line from #2 camshaft bearing on left side, from #4 camshaft bearing on right side) Three springs used to position center rocker arms against supports. End rocker arms retained by wave washer, flat washer, and cotter key.

Rocker Arm Shaft Disassembly: With assembly off engine, remove cotter key and washers from end of shaft. Remove rocker arms, supports (except doweled support which should not be removed from shaft), and springs.

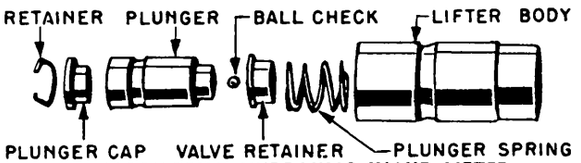
►*CAUTION—Rocker arms should be stored so that they can be reassembled in their original position.*

Rocker Arm Shaft Reassembly: Assemble supports in proper position as to doweled support (oil supply). Push rod end of rocker arms must be on same side as large cylinder head bolt hole in each support.

HYDRAULIC LIFTERS

VALVE LIFTERS: Hydraulic, Barrel Type. Consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet body (See illustration) Oil is introduced to this unit from main oil gallery through hole in side of lifter plunger and body

Removal: Remove intake manifold, cylinder block cover, valve covers, rocker arm shaft assemblies, push rods and valve lifters



OLDSMOBILE HYDRAULIC VALVE LIFTER

►*CAUTION*—Valve lifters must be installed in same bores from which they were removed

Disassembly: Remove plunger retainer with Lock Spring Tool, BT-31 Remove push rod seat, plunger, ball check valve, ball retainer and spring If plunger is stuck in lifter body, remove plunger by engaging Remover Tool BT-38, in plunger oil hole, and while holding tool lug in vise, turn "T" handle counterclockwise until plunger in drawn from lifter body NOTE—Soak heavily varnished lifters in solvent before disassembling

Cleaning & Inspection: Wash all parts in a suitable cargon solvent and remove all trace of carbon and varnish Inspect plunger and lifter body for scoring or other damage that would prevent free movement Inspect lower end of lifter body for nicks or indentations If any exist, replace complete lifter assembly Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement Plunger should drop of own weight into body bore

Reassembly: *(NOTE—Body and plunger are selectively fit and must not be interchanged, or replaced individually)* Place plunger over push rod seat and then turn plunger over holding push rod seat in place, and install ball on its seat in plunger Place ball check valve retainer over ball and then place valve retainer spring over retainer Carefully assemble valve lifter body over complete assembly Turn assembly over and while holding push rod seat down, install retaining lock spring, using Tool BT-31

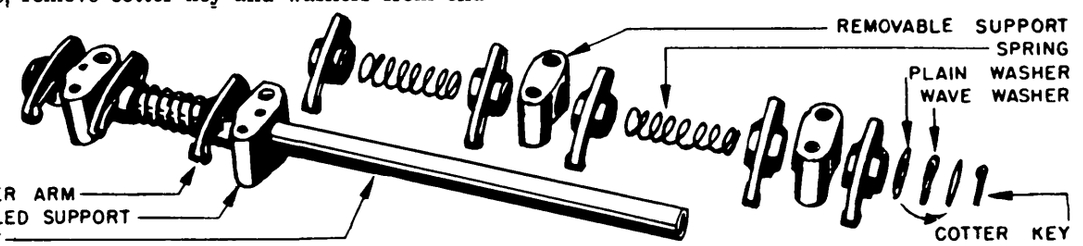
Identification Note—It is important when replacing lifters that the correct oversize lifter be used An identification number is etched on all lifter bodies except standard Lifters are furnished in Std size and the following oversizes .001", .002", .003", .005" The cylinder block is marked 1, 2, 3, or 5 for lifter size on rail under engine top cover

OILING SYSTEM

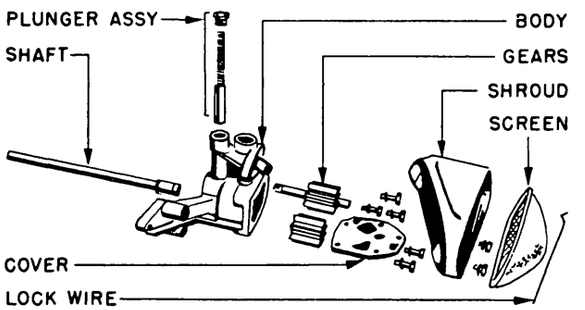
OIL PUMP

OIL PUMP: Removal & Disassembly—Remove oil pan, then remove pump Remove oil screen lock wire and screen, and oil screen shroud Remove extension shaft and coupling by removing lower snap ring from coupling Remove oil pump cover, oil pump gears and pressure regulator nut, spring and valve

Reassembly & Installation: Reverse removal & disassembly procedures outlined above



OLDSMOBILE ROCKER ARM ASSEMBLY



OLDSMOBILE OIL PUMP

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconn cting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBERS: On left body pillar post.
Starting Serial Number — 1001.

►*SERIAL NUMBER NOTE: Complete serial number (example 567M 1001) includes following identification data in sequence.*

Year	Series①	Assy. Plant②	Serial No.
56	7	M	1001

① — Series Designation: 7 — (88 Series). 8 — (Super 88 Series). 9 — (98 Series).

② — See Assembly Plant Designation following.

Assembly Plant Designation

M — Lansing	L — Linden
A — Atlanta	C — South Gate
B — Framingham	W — Wilmington
K — Kansas City	T — Arlington

ENGINE NUMBER: Stamped on machined pad located on top of left hand cylinder bank of block. The number can be observed between the front and center exhaust manifold ports.
Starting Engine Number—V1,000,001.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. minimum at cranking speed. Reading on low cylinders should not be less than 80% of high cylinder.

VACUUM READING: Steady 17" minimum at idling speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic coil type located on left side between exhaust manifold and exhaust pipe. Stop spring should strike stop before counter-weight touches pin to prevent valve rattle when cold.

►*DUAL EXHAUST NOTE:* When heat control valve closed, most exhaust gases are discharged through right exhaust pipe.

►*DUAL EXHAUST INSTALLATION CAUTION (To prevent Excessive Exhaust Noises From Being Transmitted Into Car):* It is important that intermediate bracket clamp be tightened AFTER other clamps and supports are tightened. If tightened first, vibrations will be transmitted to car.

IGNITION

FIRING ORDER: 1—8—7—3—6—5—4—2.
Cylinders—RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .030".
Spark Plugs—AC No. 44.14mm. Torque to 23-28 ft. lbs.

COIL: D lco-R my 1115087. *12 V lt.*
Igniti n Current—2.0 amperes idling. 4.5 stopped.
R sistor—D lc -R my 1928016. On bracket adjacent to ignition coil.

►*COIL RESISTOR NOTE: R sistor is connect d in lead from ignition switch-to-coil. This resistor is by-pass d during cranking by a lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110857. *12 Volt.* New external adjustment "Window" type. *See "Delco-Remy (Window Type) Distributor" in Electrical Section.*
Condenser—Delco-Remy 1932004. **Capacity** .18-.23 mfd.
Contact Point Set — Delco-Remy 1931988.
Breaker Gap — .016"
Cam Angle — 26-33°
Breaker Arm Spring Tension — 19-23 ozs.
Rotation — Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
7¾-9¾	1000	15½-19½	2000
9-11	1200	18-22	2400
11-13	2000	22-26	4000

Vacuum Spark Control: Delco-Remy 1116096.
Plunger Travel — 7/32—15/64".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4.5—6.5
10.75	21.50	15.25—16.0

IGNITION TIMING

Setting—5° BTDC, with engine idling at 850 RPM and vacuum line to distributor disconnected and carburetor opening taped closed.

►*DETONATION CAUTION: If engine detonates (due to low octane fuel or carbon build-up) set timing to 2½° BTDC. For high altitude operation, timing can be adjusted to 7½° BTDC, if detonation does not occur.*
Timing Mark— Slot in rim of crankshaft pulley and pointer on front cover. Leading edge of slot is 5° BTDC. Trailing edge is TDC. Midway between these points is 2½° BTDC.

CARBURETOR

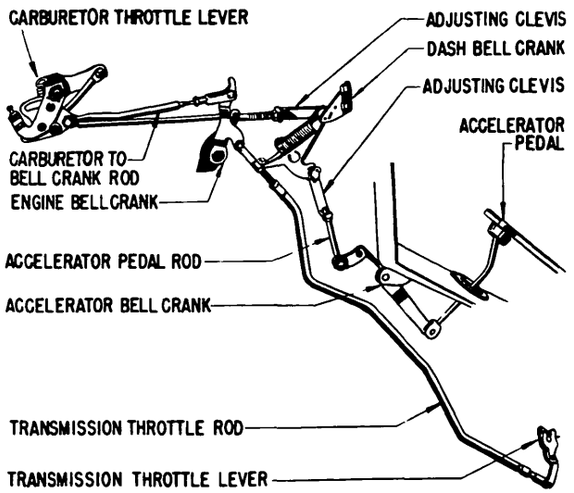
►*CARBURETOR APPLICATION: Rochester 2GC 2-Barrel used on 88 Series, Rochester 4GC 4-Barrel used on Super 88 & 98 Series.*

►*IDLE ADJUSTMENT NOTE: A "Split" throttle lever permits idle speed adjustment after Hydra-Matic Throttle Linkage adjustment made (without affecting that adjustment).*

Throttle Return Check Adjustment (Cars with "Jetaway" Hydra-Matic): With transmission in "N" (Neutral) and engine at normal operating temperature, set carburetor on fast idle and adjust to 1500 RPM. Flash throttle and allow to return to slow idle, then turn off the ignition switch. Set carburetor on fast idle and check clearance between throttle return check plunger and throttle lever. Adjust to .020" using two wrenches so that diaphragm is not permitted to turn.

THROTTLE LINKAGE ADJUSTMENT (HYDRA-MATIC DRIVE CARS): Install Throttle Return Check Holding Tool J-6342 to hold plunger away from throttle lever. Proceed as follows:

1) Remove throttle rod from transmission throttle lever and move throttle lever to rear against its stop, and with Throttle Lever Gauge J-5605 (88 Series with Std. Hydra-Matic); Gauge J-6344 (All Series with "Jetaway" Hydra-Matic), placed flat against rear face of transmission case, rod on gauge should just enter hole in throttle lever. Adjust throttle lever by bending with tool J-2029. Attach throttle rod to lever.



HYDRA-MATIC THROTTLE LINKA E

2) With carburetor on slow idle adjust rod between throttle lever on carburetor and bellcrank on dash so a clearance of 11/32" to 13/32" exists between bellcrank lever and dash *(NOTE — Op n sid of cl vis should face away from engin with 4-Barr l carbur tor, and toward engine with 2-Barr l carbur tor).*

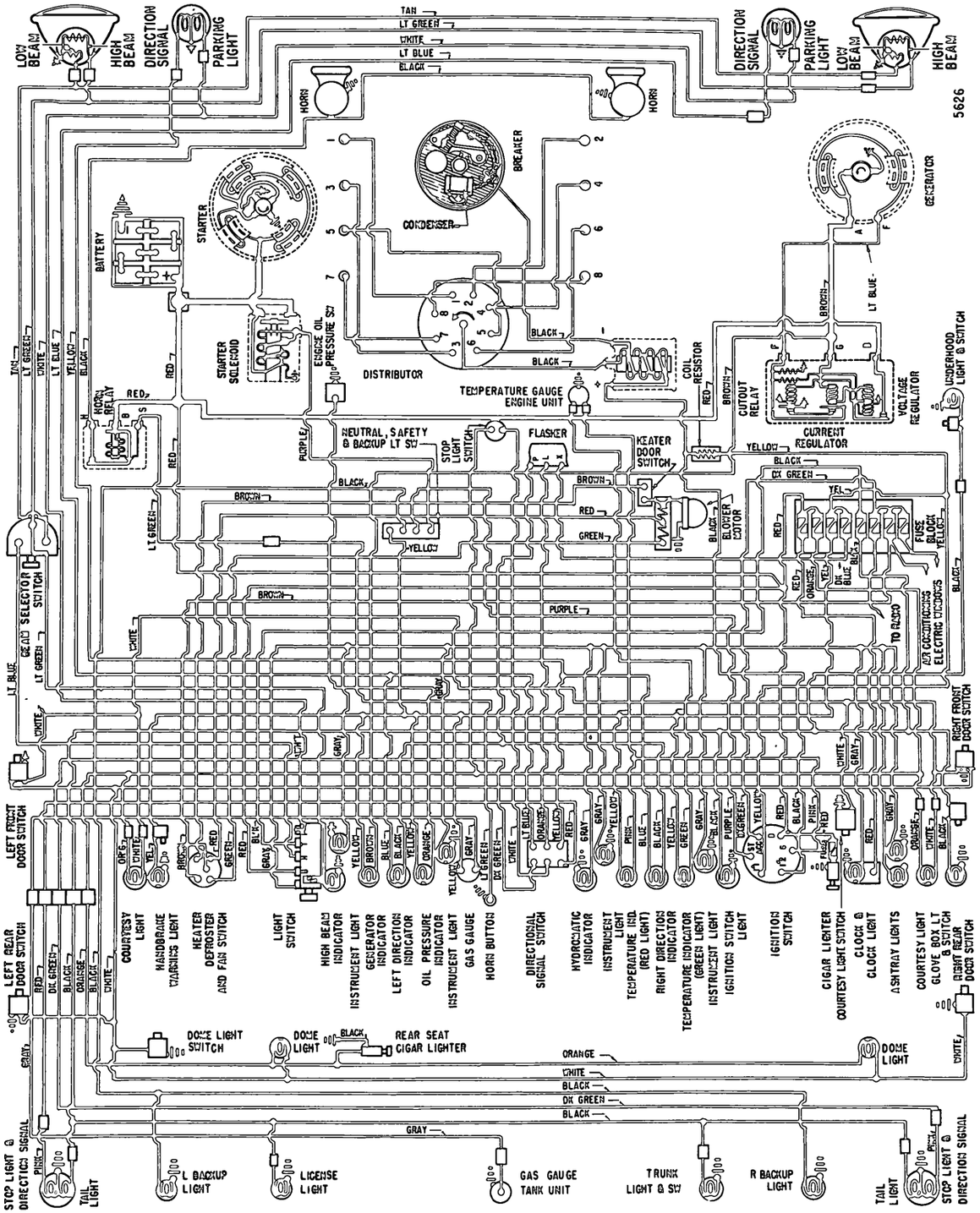
3) Loosen jam nuts and remove both clevis pins and rods from bellcrank on rear of cylinder head. With bellcrank held against the stop and bellcrank-to-transmission throttle lever rod pushed back against the stop, adjust clevis so pin will enter freely into holes in clevis and bellcrank. Install cotter pin and tighten jam nut (bellcrank should be against the stop. If it is away from the stop, transmission throttle lever rod is too long). Adjust short rod rrom carburetor -to -bellcrank so that clevis pin just touches gauge point (gauge point is forward face of elongated section of lever directly above upper hole in lever) on bellcrank, or is one-half turn short.

NOTE — Throttle rod should be pulled lightly toward rear of engine to remove slack and bellcrank should be against the stop when adjustments made.

4) Install clevis pin and cotter pin and tighten jam nut.

5) Hold choke wide open and pull forward on bellcrank on dash until throttle is wide open. Then go beyond to the point of maximum transmission lever travel (this point is a matter of feel and care must be taken not to bend or stretch linkage beyond the actual point of maximum transmission lever travel). With throttle held in this position adjust stopscrew on carburetor throttle lever to just touch the tang on the downshift lever

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(carburetor-to-bellcrank rods are attached to downshift lever). *NOTE* – This adjustment will prevent linkage from bending when a detent downshift is made.

6) Adjust accelerator pedal as follows: Place a wood block 3 7/8" long on the top center of the floor mat retainer and bring bottom of accelerator pedal down to rest on block. With carburetor in the slow idle position (choke completely off), pedal should just touch gauge block. If necessary to adjust, disconnect rod assembly between bellcrank on dash and accelerator pedal bell and adjust rod so that clevis just slides over pin with wood block in position and carburetor in slow idle position. Reassemble rod between dash bellcrank and accelerator bellcrank, making sure that open side of rod is facing away from engine, then remove wood block.

ROCHESTER 2GC (CONCENTRIC BOWL) No. 7007223

The new 2GC (Concentric Bowl) Rochester Carburetor is similar in design to the 2GC (Side Bowl) carburetor used on previous models, the principal difference being the concentric bowl design and the relocation of the metering jets toward the center of the carburetor.

▷*ENGINE STALLING WHEN COLD CORRECTION (First Cars)*: Caused by carburetor dropping down to slow idle before engine fully warmed up. Correct by drilling 3/64" hole in end of choke piston to reduce vacuum behind piston. *NOTE–Carburetors tag-dated "B" and later incorporate changes in piston and choke housing DO NOT require this modification.*

▷*CARBURETOR PRODUCTION CHANGES (To Correct Cold Drive-away & Low Speed Acceleration Difficulties): See "Rochester 2GC Carburetor" in Carburetion Section.*

Service Replacement Carburetor – Rochester No. 7009300 (Service Package), furnished less Throttle Return Check Assembly.

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 1–4–6–7, LEFT barrel 2–3–5–8.*

Idle Setting – 1 1/2 turns open (initial setting). With engine at normal operating temperature, turn each idle adjusting screw in or out for smoothest possible idle (highest vacuum and RPM), then turn each screw out (rich) 1/4 turn. *NOTE* – If engine rolls from richness when throttle snapped closed, turn each screw in 1/8 turn.

Idle Speed – 425 RPM (Synchro-mesh); 400 RPM (Hydra-Matic – With selector lever in "Dr" range).

Float Level – *NOTE – Double floats used in this carburetor.* With air horn inverted and gasket in place, distance from gasket surface to top of floats should be 1 7/16". Use Float Setting Gauge J-6337 (Oldsmobile), BT-125 (Rochester) and position gauge over both floats so that gauge rests against curvature of air horn. Bend float arm tang until floats just touch the gauge. Align floats vertically in gauge slots.

Float Drop – With air horn held upright, distance from bottom of float to gasket surface should be 2". Bend the float tang toward needle seat to lessen drop and away from seat to increase drop.

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Fast Idle· 1700 RPM with fast idle screw on high step of fast idle cam. Adjust screw as necessary to obtain the correct engine RPM.

Unloader: Index the throttle levers by backing out the idle stop screw, then turn it **in one turn** beyond the point where the outside lever begins to move. With the throttle valves wide open, the large end of Gauge J-6338 (Oldsmobile), BT-127 (Rochester), should just fit between the upper edge of the choke valve and the air horn wall (this distance is .155"). To adjust, bend the throttle lever tang with Tool BT-69.

Automatic Choke Setting: One notch rich. *NOTE*–Supersedes previous "Centered (at index)" specification.

►*OTHER DATA*· *See "Rochester 2GC Carburetor" in Carburetion Section.*

Throttle Return Check Adjustment (Hydra-Matic Drive Cars): *See CARBURETOR above.*

Hydra-Matic Throttle Linkage Adjustment: *See CARBURETOR above.*

Fuel Pump Pressure: 4 – 5 1/4 lbs. at 450-1000 RPM.

ROCHESTER 4GC

Rochester No. 7007221 (Hydra-Matic), 7007222 (Synchro-mesh).

►*MANIFOLD FUEL DISTRIBUTION. Carburetor RIGHT barrels feed Cyls. 1–4–6–7, LEFT barrels 2–3–5–8.*

Idle Setting – With engine at operating temperature, set the idle speed (see below), turn each screw in or out for smoothest possible idle (highest vacuum and RPM), then turn each screw out (rich) 1/4 turn. NOTE – If engine rolls from richness when throttle snapped closed, turn each screw in (lean) 1/8 turn.

Idle Speed – 425 RPM (Synchro-mesh), 400 RPM (Hydra-Matic – With selector lever in "Dr" range).

►*OTHER DATA: See "Rochester 4GC Carburetor" in Carburetion Section.*

Throttle Return Check Adjustment (Hydra-Matic Drive Cars)· *See CARBURETOR above.*

Hydra-Matic Throttle Linkage Adjustment: *See CARBURETOR above.*

Fuel Pump Pressure: 4-5¼ lbs. at 450-1000 RPM.

CARB. EQUIPMENT

Fuel Pump: AC Replacement No. 4317. Fuel & Vacuum.
Pressure – 4-5¼ lbs. at 450-1000 RPM.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: AC Electric type.
Dash Unit – AC No. 1518430.
Tank Unit – AC No. 1518409.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Delco 3KMR62. *12 Volt,* 9 plate, 62 ampere hour capacity (20 hour rate).
Battery Ground – Negative
Engine Ground–Connected between engine and forward side of firewall.

STARTER

Delco-Remy 1107638. *12 Volt.* **Armature** 1927343.
Drive – Overrunning clutch (solenoid pinion shift).
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 35 ozs. minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3500	10.1	95 max.
10.5 ft. lbs.	Lock	5.4	470 max.

Starting Switch: Solenoid switch, Delco-Remy 1119780, mounted on starter and controlled by combination Starter & Ignition Switch, Delco-Remy 1116521, and Neutral Safety Switch (see below). *NOTE* - Neutral Safety Switch used on all models with automatic transmission.

Hydra-Matic Neutral Safety Switch: Delco-Remy 1998135 (88 Series with Std. Hydra-Matic – 5 - position switch). **Delco-Remy 1998125** - All Series with "Jetaway" Hydra-Matic - 6-position). Combination Neutral Safety and Back-up Light Switch.
Adjustment – *See "Dual Range" or "Dual Coupling" Hydra-Matic in Transmission Section.*

GENERATOR

Delco-Remy 1102003 (Std.), 1102021 (Air Conditioned Cars). *12 Volt. NOTE* – Above listed generators are with pulley. Generator without pulley is Delco-Remy 1102005.

►*GENERATOR WARNING LIGHT NOTE:* Warning light lights when ignition turned on. As generator speed increases, light will go out.

Armature – Delco-Remy 1923535 (All Models).
Maximum Charging Rate – *See Voltage Regulator.*

Performance Data

Amperes	Volts	RPM
30 Ⓒ	14	2150

Ⓒ – Not maximum. See Regulator.
Brush Spring Tension – 28 ozs.
Field Current – 1.48-1.62 amperes at 12 volts.
Rotation – Counter-clockwise at commutator end.

Belt Adjustment: Loosen generator attaching bolt and place Tool J-4170-B against generator between bracket and generator housing. Attach torque wrench to tool to apply torque of 16 ft. lbs. (Std.), 20 ft. lbs. (Air Conditioning). Tighten generator attaching bolts while holding tension on wrench.

REGULATOR

Delco-Remy 1119001. *12 Volt. NOTE - Regulator is "1119000 Series" Specifications below are "Normal" settings.*

Cutout Relay
Cuts In – 11.8-13.5 volts (hot).
Contact Gap – .020".
Air Gap – .020" (with contacts just closed).

Voltage Regulator
Setting – 13.8-14.8 volts (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting–*See "1119000 Series Regulator" in Electrical Section.*

Current Regulator
Setting – 27-33 amperes (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting – *See "1119000 Series Regulator" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signal: *See Electrical Section.*
Autronic Eye: *See Electrical Section.*

Lighting Switch Removal Disconnect battery cable and disconnect wires from lighting switch Pull switch knob out to last notch then depress spring loaded latch button on switch body while pulling rod and knob assembly out of switch Remove switch mounting nut and remove switch and escutcheon from instrument panel

Stop Light Switch Location (Std. Brakes): Mechanical type on toe board near brake pedal

Stop Light Switch Location (Power Brakes)· Directly above brake pedal on firewall Adjust so lights come on within free travel of brake pedal

FUSES: All fuses (exc. Instrument Panel fuses) are located on a combination fuse and junction block under the instrument panel A color code is used on the fuse panel corresponding to the color code of circuits protected by each fuse. The following fuses will be found on this panel·

(1) Clock (Std. on 98 Series only) 1 ampere.
(2) Courtesy Lights, Dome & Stop Lights, and Rear Cigar Lighter. 25 amperes.
(3) Fuel & Temp. Gauges, Hand Brake Signal Light, Hydra-Matic Shift Indicator, and Back-up Lights. 9 amperes
(4) Turn Signal. 9 amperes
(5) Glove Box, Underhood, Key Ill, Tail, Trunk, & Spot Lights. 9 amperes
(6) Radio. 7.5 amperes.
(7) Heater & Air Conditioner. 20 amperes (without Air Conditioner), 25 amperes (with Air Conditioner)
(8) Electric Windows & Antenna. 20 amperes
Instrument Panel Lights–2 amperes located on headlight switch
Cigar Lighter–20 amperes located behind lighter

CIRCUIT BREAKER: 22 amps. Located in headlamp switch

HORNS: Delco-Remy 1999753 (Low Note) **1999754** (High Note) *12 Volt*

Optional (Trumpet Type) – **Delco-Remy 1999586.** *12 Volt.*

Horn Relay: Delco-Remy 1116781. *12 Volt.*
Contacts Close – 5-9 Volts. Set to 6.5 if outside limits.
Contact Gap – .027". **Air Gap** – .014" (closed).

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 with overhead valve.

Bore	Stroke	Displacement	Rated HP
3 7/8"	3 7/16"	324 cu. ins.	48

Engine	Compr. Ratio	Developed HP
88	9.25-1	230 at 4400 RPM
Super 88 & 98	9.25-1	240 at 4400 RPM

Compression & Vacuum Reading – *See TUNE-UP.*

CYLINDER HEAD: *See Oldsmobile Special Data.*

INTAKE MANIFOLD INSTALLATION: *See "Cylinder Head & Manifold" in Oldsmobile Special Data.*

TIGHTENING TORQUES: *See Oldsmobile Special Data.*

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OIL PAN REMOVAL: *See Oldsmobile Special Data.*

ENGINE FRONT MOUNT INSTALLATION: *See Oldsmobile Special Data.*

PISTONS

Aluminum alloy, three ring, autothermic, steel strut, slipper skirt, cam ground, tin plated.

Length – 4.05". **Weight** – 22.07 ozs. (less rings & pin).

►*CAUTION:* Mark piston, rods, and bearing caps with cylinder number before removal to insure correct reinstallation.

Fitting New Pistons: .0005-.0010" clearance at thrust surface (Selective fit). With piston inverted and pin removed, insert piston into bore. Pull required to withdraw a .0015" x 1/2" x 12" feeler placed at 90° to normal position of pin and piston at center of normal travel, should be 5-12 lbs. *See "Pistons" in Oldsmobile Special Data.*

►*CAUTION: Allow rebored cylinders to cool to normal room temperature before fitting pistons.*

Replacement Pistons: Std. & .020", .030" Oversize. Pistons furnished only with fitted pins.

Installing Pistons: Install pistons 1, 3, 5, 7 in left bank, and 2, 4, 6, 8 in right bank with letter "F" cast on each side of piston pin hole, and notch in piston head, toward front of engine.

PISTON PINS

Floating type with rock rings at each end.

►*CAUTION: Discard old lock rings and install new service type lock rings when installing pins.*

Diameter – .9803-.9807". **Length** – 3.126".

Pin Fit in Piston – Pin should not fall through piston of own weight when using the low limit (.0000" fit). Piston can be tapped into place using brass drift.

Pin Fit in Rod Bushing – .0003-.0005" loose.

Replacement Pins: Std. size & .001", .003" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compression	.077-.078"	①	.001-.003"
Oil	.180-.186"	②	.0023-.0039"

① – Perfect Circle .010-.020". Sealed Power .008-.016".
② – Perfect Circle & Sealed Power .013-.033".

Replacement Rings: Furnished Std. & .010" Oversize (not in sets), Std. & .030" Oversize (in sets).

Installing Rings: Install upper chrome and lower black compression rings with side marked "TOP" up. Install oil ring (either side up) with gap on same side of piston as rod spit hole. Install oil ring expander with gap on side opposite rod spit hole.

CONNECTING RODS

Length—6 5/8" (Center to center). **Weight**—29.54 ozs.

Crankpin Journal Diameter—2.2488-2.2498".

Out of Round Limit—.0015".

Bearings—Durex 100A, steel backed, full precision type. Both halves interchangeable. No shims.

Clearance – .0009-.0029" (vertical), .0019-.0039" (horizontal).

Side play—.002-.011" (total for both rods).

Replacement Bearings: Standard size, .002", .010", .020" Undersize.

Installing Rods: *CAUTION*—Rods have plain side and boss side (two machined bosses at lower end). Install rods **1, 3, 5, 7 with plain side to front, and 2, 4, 6, 8 with boss side to front** (*NOTE*—Pistons marked "F" on front side). Caps offset and cannot be installed incorrectly. Groove on rod and cap, and pads for numbering caps and rods are on same side.

►*CAUTION—Use Guide tool BT-22 over rod bolts to prevent damaging crankpin journals when removing and installing piston and rod assemblies.*

NOTE—Oil spit hole for lubrication of opposite cylinder wall provided in rod above cap joint.

CRANKSHAFT

Journal Diameter—#1, 2, 3, 4 2.498-2.499", #5 2.623-2.624".

Bearings—Durex 100A, steel backed, full precision type. Rear bearing flanged.

Clearance—.0005-.002" (Front—See Note below), .002-.0035" (Rear - See Note below), .0005-.003" (Others).

►*FRONT MAIN BEARING NOTE: Selective fit bearing used.* **On cars with Power Steering or Air Conditioning it is very important that front bearing fit be held as close as possible because of the increased pump drive and compressor drive belt load.** Bearing Part No. 565770 (Marked "M" on tang) will reduce bearing clearance .0005" Bearing Part No. 564771 (marked "H" on tang) will reduce bearing clearance 001". These bearings are in addition to regular replacement bearings

►*REAR BEARING NOTE* Rear bearings are selective fit during manufacture, 3 sizes used: "M" Medium, "T" Thin, "H" heavy. **Use same size bearing (indicated by letter on tang) when replacing bearing.**

Replacement Bearings: Standard size, .002", .010", .020" Undersize. In addition to lettered bearings used at front and rear. *See Front & Rear Bearing Notes above.*

End Thrust: Taken by rear (#5) flanged bearing.

Endplay—.004-.008"

Crankshaft Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Special Data*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Oldsmobile Special Data*

Flywheel & Clutch Housing Alignment: *See "Flywheel Housing" in Oldsmobile Special Data.*

CAMSHAFT

Journal Diameters – 1.9970-1.9975".

Bearings – Steel backed babbitt.

Clearance – .0018-.0038".

End Thrust: Forward thrust taken by plunger and spring on front of engine, rear thrust at front of cylinder block.

►*CAUTION:* Two main oil gallery holes in block sealed by hex head bolt. A small hole in bolt for right hand gallery provides lubrication to timing chain, fuel pump eccentric and lever.

Camshaft Removal & Installation: *See "Camshaft" in Oldsmobile Special Data.*

Timing Chain:	Link-Belt	Morse
Width	11/16"	13/16"
Pitch	.500"	.375"
Length (Links)	48	64

►*NOTE—Morse and Link-Belt chains not interchangeable unless sprockets also changed*

Engine Front Cover Removal & Installation: *See "Engine Front Cover" in Oldsmobile Special Data*

Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Oldsmobile Special Data*

Camshaft Setting: Mesh chain with sprocket marks adjacent and in line with a straight edge across shaft centers (or use Tool BT-11).

►*NOTE—Fuel pump eccentric bolted to front of camshaft ahead of sprocket. Assemble with "0" mark to front, machined step against sprocket*

VALVES

Valves	Head Diam.	Stem Diam.	Length
Intake	1.745-1.755"	.3417-.3425"	4.989-5.009"
Exhaust	1.557-1.567"	.3930-.3938"	4.989-5.009"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.418"	.0017-.0040"
Exhaust	45°	.418"	.0022-.0045"

Valve Seat - .042-.071" (Intake & Exhaust).

Intake & Exhaust Valve Stem Oil Seals – A "Top Hat" type oil seal (deflector) is installed on valve stem below valve spring retainer.

Valve Springs: Intake and exhaust valve springs are alike. Dampers are used on lower end of all valve springs.

Valve Spring Specifications

Valve	Pressure	Length
Closed	95-105 lbs.	1.880"
Open	183-197 lbs.	1.480"

Spring Free Length – 2.38" approximately.

►*CAUTION:* Lower end of damper and spring must seat in recess in head. Install closely wound spring coils toward cylinder head.

Valve Guides: Press guide in head until top of guide is .787" above top of head. Ream inside diameter of guide, after installation, to .3442-.3457" (Intake), .3960-.3975" (Exhaust).

Hydraulic Valve Lifters: Barrel type.

►*HYDRAULIC LIFTER INSTALLATION CAUTION.* FIVE different sizes used in production as follows (marked as indicated) Standard (unmarked), 001 O S (marked "1"), 002 O S (marked "2"), 003 O.S (marked "3"), 005 O S (marked "5") **Lifters** marked by etched number on lifter body, **Cylinder Block** marked by number on rail under engine top cover *Reinstall lifter in same hole or replace with proper size.*

Diameter—.8424-.8427". **Length**—2" (Overall).

Clearance in Block—.0005-.0018" (Selective).

Replacement Lifters: Standard size, .001", .002", .003", .005" Oversize.

Hydraulic Lifter Overhaul & Testing—*See "Valve System" in Oldsmobile Special Data*

Rocker Arm Assembly: *See "Valve System" in Oldsmobile Special Data*

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VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves – Open 11½° BTDC. Close 52½° ALDC.

Exhaust Valves – Open 51° BLDC. Close 13° ATDC.

Valve Timing Check–Remove left hand cylinder head rocker arm assembly and rotate engine so that #1 piston is on top dead center (firing stroke). Trailing edge of notch in vibration dampener will be aligned with pointer on timing chain cover. Install tool J-5374 in place of rear rocker shaft bracket with step plunger over #7 cylinder exhaust push rod. The 7/10" diameter pilot at bottom of tool will fit into cylinder head bolt hole. Screw main body of gauge down so step plunger contacts push rod and small diameter of step plunger is flush with top of main body Tighten clamp bolt. Rotate engine one complete revolution so that #1 piston is again at TDC (intake stroke). Distributor rotor should now be pointing toward rear of engine. If timing chain is installed properly, top of tool plunger will rise so the top of main body of tool is flush with the third step. If camshaft is retarded one tooth, the third step will rise above top of main body, and if advanced one tooth, second step will be below main body

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). 6 qts. (dry).
NOTE– 1 qt. additional for dry filter.

Normal Oil Pressure: 35-45 lbs. at 50 MPH.
Pressure Regulator Valve–In pump body Not adjustable.
Oil Pressure Indicator – Oil pressure warning light on instrument panel and oil pressure switch in engine block or oil filter. Lights when pressure below 3 lbs.
Engine Unit – AC No. 1508319.
See "Oil Pressure Indicators" in Miscellaneous Section.

Oil Pump Gear type. In crankcase at rear end.
Pump Overhaul–*See "Oil Pump" in Oldsmobile Special Data.*

Oil Filter: AC No. PM-90-3 full flow type (optional). On lower right side of crankcase at rear.
Replacement Filter Element–AC No PF-122

►*CAUTION*–If filter (or pad cover if filter not used) is replaced, used a new gasket (coat both sides with POB No. 5 Sealer) and tighten bolts to 30-35 ft. lbs. Oil filter or pad mounted externally on lower right side of crankcase at rear. Oil filter is full flow type (all oil from pump delivered to oil filter) requires pad when filter not used to return oil to main oil gallery.

Crankcase Ventilation. Air intake in oil filler cap has oil-wetted cleaner, AC No. 1552233 (Std.) No. 1551509 (Heavy Duty). Outlet is connected to ventilating baffle at rear of block above right bank. Outlet pipe is push fit at ventilator and extends down below right rear corner of engine.

►*NOTE* Air cleaner also used in lower section of ventilator outlet tube on cars with heavy duty inlet breather in filler cap and oil bath air cleaner

COOLING

Water Capacity: 20½ qts. (without heater), 21½ qts. (with heater).
Pressure Valve: AC Type RC-1, No. 850795. Radiator filler cap. 7 lb. type.
Thermostat: Dole or Harrison.

Oldsmobile No.	Dole Type	Harrison Type
160° ①	563219	3126289
180° ②	563311	3126290

① – Use with alcohol anti-freeze.
② – Use with permanent type anti-freeze.

Water Pump Packless, sealed ball bearing type.
See "Oldsmobile" in Water Pump Section.
Pump Removal–Remove fan and fan pulley. Remove six mounting bolts (4 to engine cover, 2 to engine block). Remove pump. *NOTE*–When installing pump, coat one side of pump housing gasket with gasket cement, dip bolts in CP No. 9 Sealer.

Temperature Indicator: New TWO light system (Red & Green) with temperature switch in engine block. GREEN light is lighted when engine running cold and goes off when engine temperature reaches 111-115° F. RED light remains off during normal engine operation but comes on when engine temperature reaches 218-222° F. *NOTE*- Red light will come on when ignition key turned to "Start" position but should go out when key returned to running position (this tests bulb and circuit each time engine started).
Engine Unit – AC No. 1998140.
See "Temperature Indicators" in Miscellaneous Section.

CLUTCH

Long 11CF Type. Single plate, semi-centrifugal type.
See "Long" Clutches in Clutch Section.

Part	Long No.	Oldsmobile No.
Cover Assy. (Std.)	262832	562619
Disc (Std.)	282687	565059

Pedal Adjustment- Pedal free travel 1 1/8-1 3/8". Adjust by turning adjusting nut on clutch connector link at throw-out yoke

Removal: Remove transmission (see Transmission), remove right and left splash pans, engine breather pipe, and right and left lower flywheel housing bolts. Install Engine Rear Support Tool BT-28, entering pilot supports into lower housing bolt holes. Remove engine rear mount bolts at clutch housing, and remove frame cross member by removing three bolts at each end. Remove clutch housing by removing eight bolts holding housing to flywheel housing Remove clutch assembly from flywheel.

Clutch Housing Alignment- *See "Flywheel Housing" in Oldsmobile Special Data.*

SYNCHRO-MESH TRANSMISSION

Own. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse) all helical gear type
See "Oldsmobile Synchro-mesh" in Transmission Section

Transmission Control *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission and disconnect manual control rods and speedometer cable at transmission. Remove propeller shaft. Remove bolts holding transmission to clutch housing, and remove transmission by moving rearward until main drive gear clears clutch assembly.

HYDRA-MATIC DRIVE

"Dual Range" or "Dual Coupling". Four speed automatic transmission and fluid coupling.

►*APPLICATION NOTE- Early Series 88 used "Dual Range" Hydra-Matic (same as 1955 Mod Is). Later Series 88, Super 88 & 98 use the new "Jetaway (Dual Coupling)" type.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION. See "Dual Range" or "Dual Coupling" Hydra-Matic Drive in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Dual Range" or "Dual Coupling" Hydra-Matic Drive in Trans. Sect.*

Lubrication – Check fluid level every 1000 miles. Drain and refill every 25,000 miles. Use GM Hydra-Matic Drive Fluid Type "A" (can marked AQ-ATF).

Checking Fluid Level – Check with engine at normal operating temperature, idling, and selector lever in "N" (Neutral) on Series 88 Dual Range type, and selector lever in "P" (Park) position on later Series 88, Super 88 and 98 "Dual Coupling" type. Add Hydra-Matic Fluid Type "A" (can marked AQ-ATF) to bring level to "FULL" mark on dipstick.

►*CAUTION: Do not fill above "FULL" mark (will cause foaming and improper operation of the transmission).*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Dual Range" or "Dual Coupling" Hydra-Matic in Trans. Sect.*

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UNIVERSALS

Mechanics. Roller bearing type.

►*PROPELLER SHAFT YOKE LUBRICATION CAUTION* Remove plug, install fitting and lubricate with hand pressure gun using high melting point, low viscosity lubricant, Oldsmobile Part No 567196 Remove fitting and replace plug **Do not use chassis grease at this point.**

►*CAUTION*—Rear universal companion flange nut controls rear axle pinion bearing pre-load (must be adjusted whenever nut loosened) *See "Oldsmobile Hypoid" in Rear Axle Section*

REAR AXLE

Own. Hypoid gear, semi-floating type with Hotchkiss drive.
See "Oldsmobile Hypoid" in Rear Axle Section.

Ratio	Axle Ratios	① Code
3.08-1 (40:13)		0
3.64-1 (40:11)		6
3.42-1 (41.12)		8
3.23-1 (42:13)		9

① — Rear axle ratio code number stamped on lower locating boss on forward side of carrier.
Backlash — .004-.008". (*NOTE* - As much as .012" may be necessary in some cases to correct tooth contact for noise).

Axle Shaft Removal: Remove wheel and take off brake drum by removing two Tinnerman nuts from wheel studs (if nuts removed by turning off threads they can be reused, if nuts damaged, new nuts must be used). Remove backing plate mounting nuts and static collector. Loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft and bearing with Puller J-942 (do not allow shaft to drag on oil seal), replace one nut to hold backing plate in position.

Differential Carrier Assembly Removal: Remove axle shafts (see above). Clean differential carrier and axle housing around carrier to prevent dirt entering housing. Disconnect propeller shaft at rear universal joint after having wired trunnion blocks together to avoid loss of rollers. Mark universal joint so it can be replaced in the same position. Drain oil by removing nuts from carrier mounting studs and moving carrier away from housing.

CAUTION—Do not wash exterior of carrier until differential has been disassembled

Wheel Bearing Adjustment: None required. Bearings are built with .012-.015" endplay between balls. Check endplay before removing axle shaft and if endplay greater than .020", replace bearings. *CAUTION*— If bearings removed from shaft, they cannot be reused.

SHOCK ABSORBERS

Delco. Direct acting front and rear. Service by replacement.

Shock Absorbers

Model	Front	Delco No.	Rear
88, Super 88	5352644		5352648
98	5352645		5352649

FRONT SUSPENSION

Independent. Direct acting shock absorbers are mounted within front coil springs.
See "Oldsmobile" in Suspensions & Wheel Alignment Section.

Kingpin Inclination—5° 51' 10" crosswise.
Caster— 0° to Neg. ¾°. Variation between both sides should not exceed ½°.
Camber—Neg. ¾° to Pos. ¾°. Variation between both sides should not exceed ½°
Toe-In—1/16" to 1/8".
Toe-Out on Turns—23°±½° on inner wheel with outer wheel turned 20°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm & nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (In Line). *See "Saginaw (In Line)" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic (Single Anchor). Conventional two shoe with short molded lining front (Primary), and long molded lining rear (Secondary). Parking brake applies rear wheel service brakes.
See "Bendix Hydraulic" in Brake Section

Drums—Diameter 11" Rebore limits .060 .

Wheel Cylinder Diameter—Front 1 1/32". Rear 31/32".
Lining—Molded. **Width**—2½" (front wheels), 2" (rear wheels). **Thickness**—7/32".

Length—(Primary) 9 3/8', (Secondary) 12 1/32'

Clearance—Adjusting screw backed off 16 notches from point where wheels can just be turned by hand

Braking Power—56% Front. 44% Rear.

Standard Master Cylinder: On left chassis frame front extension under hood

Checking Fluid—Fluid reservoir is part of master cylinder. Maintain fluid level to within ½" of top of master cylinder gasket surface.

Removal—Remove from above. Not necessary to disturb other parts.

Power Brakes: Bendix or Moraine Power Unit (combination vacuum power unit and hydraulic master cylinder) Unit is mounted on under side of toe board and replaces regular master cylinder *See "Bendix Power Unit" or "Moraine Power Unit" in Brake Section.*

Checking Fluid—Same as for standard master cylinder.

Removal of Power Unit — Disconnect positive battery cable at junction block on right fender filler plate, disconnect purple solenoid lead wire from wiring harness, then pull cable through sleeve on power brake. Disconnect hydraulic line at master cylinder and secure hose so end is above level of junction assembly. Disconnect vacuum hoses at power cylinder, and remove dipstick. Disconnect leads from stop light switch and fold back floor mat. Remove three brake pedal bracket attaching bolts and remove pedal and bracket. Remove mast jacket grommet retainer and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws, cover plate and power cylinder assembly. Remove two cover plate-to-power cylinder bolts and remove cover plate. Remove power unit through toe pan opening.

MISC. MECHANICAL

Windshield Wipers: Cable operated, vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: *See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type with individual motors in each window

See "Power Window Regulators" in Miscellaneous Section

Power Top Control: Hydro-Lectric *See "Power Top Controls" in Miscellaneous Section*

Power Seat Adjuster (Two-way): Electric type with single reversible type motor for horizontal adjustment.
See "GM Two-way Seat Regulators" in Misc. Section.

Power Seat Adjuster (Six-way): Electric type with single reversible motor.
See "GM Six-way Seat Regulators" in Misc. Section.

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	55-60
Intake Manifold	25-30
Exhaust Manifold	25-30
Oil Pan	15-18
Main Bearing Caps	90-95
Flywheel	55-60
Vibration Dampener	130-150
Con Rod Caps	40-45
Camshaft Sprocket ①	25-30
Rocker Arm Support Bracket	55-60
Valve Lifter Cover Screws ②	12-15
Rocker Arm Cover ②	15-18
Engine Front Cover	15-18
Water Pump Manifold	25-30
Water Pump Mounting	15-18
Oil Pump Mounting	25-30

① —Fuel Pump eccentric retaining screw.
②—To obtain proper seal, tighten these screws to required torque three successive times.

ENGINE

ENGINE REMOVAL: *(NOTE—On Synchro-mesh cars, Engine and transmission can be removed as an assembly providing front fenders and grille are first removed).*

1) Drain engine oil pan. Remove hood assembly and drain cooling system. Remove radiator core. Disconnect heater hose at cylinder head and remove water pump and manifold assembly. Remove battery and carburetor air cleaner.

2) Remove coil, bracket, distributor cap and ignition wiring as an assembly. Remove carburetor assembly. Disconnect power brake vacuum line at power cylinder (if car so equipped). Disconnect vacuum hose at windshield wiper motor. Disconnect flexible fuel pump line.

3) Remove generator assembly. Disconnect wire leads to water temperature and oil pressure indicator sending units. Disconnect engine ground wire at dash. If car equipped with Power Steering, remove screws at pump bracket and place pump pressure lines and hose assembly out of way.

4) Remove valve tappet cover vent tube. Remove starting motor and flywheel housing lower cover. Disconnect exhaust pipe from exhaust manifold. Drain transmission oil pan and remove transmission filler tube assembly. Disconnect oil cooler lines at transmission. Loosen transmission rear support bracket, *but do not remove bolts.* Support transmission using a block of wood and a jack. Disconnect throttle control valve linkage at transmission.

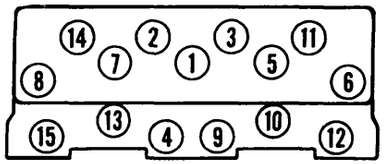
5) Remove converter clutch housing to flywheel retaining nuts, and bell housing to flywheel housing cap-screws Disconnect front motor supports at frame. Install a flexible lifting cable or rope around intake manifold and attach a chain fall or hoist. Clamp or wire converter to transmission case to keep converter from sliding out of transmission. Raise engine and slide forward to clear transmission and slide out of chassis.

OIL PAN

OIL PAN REMOVAL: Drain engine oil and remove screws attaching steering idler lever to frame and lower steering linkage. Remove engine oil level indicator. On cars not equipped with the dual exhaust system the crossover pipe from left to right banks must be removed, on cars with dual exhaust, remove left exhaust pipe. Remove starting motor and flywheel lower housing. Remove attaching screws and washers and remove oil pan.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD: Removal—Drain cooling system. Remove generator (if removing right bank head), or fan belt (if removing left bank head). Remove fan, water pump, and manifold assembly. Remove air cleaner. Remove ignition coil and bracket, disconnect ignition cables and place the coil and wiring out of way. Remove carburetor and intake manifold assembly. Remove valve cover and remove bolts attaching rocker lever shaft to cylinder head, and lift off the rocker lever shaft assembly. Disconnect exhaust manifold from exhaust pipe. Remove cylinder head bolts. Install Cylinder Head Lifter J-4159 in the front and rear spark plug holes and lift off cylinder head. *NOTE*—To remove right bank head it will be necessary to remove heater and oil level indicator. On cars equipped with Twin Ultramatic Transmission the filler tube assembly will have to be removed. On removing the left bank head, the oil filter and bracket will have to be loosened from cylinder head, On cars equipped with Power Steering the bracket bolts will have to be removed and pump and hose assembly will have to be moved out of way



V8 CYLINDER HEAD

Installation: Clean gasket surfaces of cylinder head and engine block. Coat gasket with Perfect Seal No. 5 and install on block. Install cylinder head over dowels (dowels are drilled for oil return from rocker arm chamber). Install flat washers on head bolts and start the five medium length bolts in center holes of head Install valve pushrods making sure they engage in sockets in valve lifters, and carefully install rocker shaft lever assembly. The two end rocker shaft mounting brackets are doweled to line up with bosses on cylinder head *(NOTE* - Left Front and Right Rear brackets provide oil lead to hollow rocker arm shafts for rocker arm lubrication). Install four longest bolts in rocker arm brackets, engage pushrods in rocker arm sockets and tighten bolts evenly. Install short cylinder head bolts along lower edge of cylinder head. Tighten all bolts in sequence shown in diagram to correct torque (see Tightening Specifications).

PISTON PINS

PISTON PIN BUSHING (IN CONNECTING ROD) INSTALLATION: After pressing old bushing out with an arbor press, install new bushing so that it is flush with both sides of rod. Position Burnisher Tool J-6055 in bushing, then applying plate of the tool under the rod, push burnisher through bushing with an arbor press. After bushing has been burnished, and before reaming bushing, the oil hole in bushing should be drilled using a 3/16" drill.

CRANKSHAFT & MAIN BEARINGS

CRANKSHAFT: Removal (With Engin in Car)—Remove transmission. Drain cooling system and remove radiator core. Drain and remove engine oil pan Remove water pump and manifold assembly. Remove fuel pump. Remove engine vibration dampener, engine front cover, timing chain and sprockets. Remove oil and vacuum pump assembly. Remove spark plugs. Disconnect connecting rods and push piston assemblies up into cylinder bores so that crankshaft can be removed without interfering with connecting rods. Remove front and rear main bearing caps Support crankshaft at front and rear journals and remove the three intermediate bearing caps Carefully lower crankshaft and flywheel assembly.

Installation: Install new rear main bearing seals in upper crankcase and in bearing cap (See Rear Main Bearing Oil Seal Installation below). Install new front crankshaft seal in engine front cover. Reverse removal procedure indicated above.

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Apply Lubriplate to groove in bearing cap and install oil seal. Using Oil Seal Installer J-3048-A and a hammer, drive seal into place With seal still in place, trim ends of seal flush with surface of cap. To install upper half of seal in crankcase, remove crankshaft and install in same manner as for bearing cap

VIBRATION DAMPENER

VIBRATION DAMPENER: Removal—Drain cooling system, remove radiator core and top splasher Remove fan assembly. Remove vibration dampener retainer screw and washer and if car is equipped with Power Steering or Air Conditioning, remove the drive pulleys by prying them off dampener assembly. Install center adapter J-5992-2 in threads of crankshaft Install screw assembly J-5995-3 in remover body J-5992-1 and remove dampener.

Installation: Lubricate oil seal in engine front cover, and position dampener over crankshaft and tap it into place by tapping it with a rawhide hammer. Assemble Vibration Dampener Installer J-5992 by placing the 3/4" nut on screw assembly J-5992-3 and slide spacer J-5992-4 over screw assembly Start screw in end of crankshaft and tighten until it bottoms in the threads. With one end of the spacer against dampener, turn

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nut on screw until dampener hub bottoms the crankshaft oil slinger against a shoulder on the crankshaft. Install Power Steering and/or Air Conditioning Pulleys, retainer washer and screw Tighten retainer screw to 130-150 ft. lbs.

ENGINE FRONT COVER

ENGINE FRONT COVER: Removal—Remove vibration dampener (see above), and water pump manifold assembly. Disconnect and remove fuel pump. Remove screws attaching front cover to block, loosen engine oil pan, remove cover.

Installati n: Using a new gasket, install engine front cover in place and start capscrews in threads, *but do not tighten.* Lubricate oil seal in cover, and install vibration dampener assembly, using hub on dampener as a pilot to align front cover Complete installation by reversing removal procedure. Use new gasket on oil pan.

ENGINE FRONT COVER OIL SEAL (CRANKSHAFT FRONT SEAL) INSTALLATION: Remove engine front cover (see above), drive out old seal with a hammer and punch, being careful not to damage cover Install a new seal using tool J-5983, pressing seal into place with an arbor press

CAMSHAFT & BEARINGS

CAMSHAFT: R moval (With Engine in Car)—Drain and remove radiator. Remove fan, water pump and manifold assembly. Remove air cleaner, ignition coil, carburetor and intake manifold. Remove vacuum line to distributor, disconnect ignition cables and place out of way. Remove distributor. Remove valve rocker covers, the four rocker lever shaft capscrews (both banks), and lift off shaft assemblies Remove upper valve tappet cover and breather tube, and remove the lower cover. Remove pushrods and hydraulic lifters (keeping them in sequence so they will be installed in the same location). Remove vibration dampener (see above). Drain engine oil and remove oil pan. Remove engine front cover (see above). Pry off oil slinger from end of crankshaft. Remove fuel pump drive eccentric. Rotate engine to line up marks on camshaft and crankshaft sprockets so marks are adjacent and in line across shaft centers. Remove the sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts. Remove the three camshaft retainer plate screws and remove plate and camshaft spacer. Carefully pull camshaft forward into the radiator grille far enough to clear engine block, taking care not to damage camshaft or bearings.

Installati n: Reverse removal procedure and note the following: Install camshaft gear about 1/16" beyond a position flush with camshaft end, to allow mounting of fuel pump eccentric.

TIMING CHAIN

TIMING CHAIN: Removal—Remove engine front cover (see above). Pry off oil slinger from end of crankshaft and remove fuel pump eccentric. Rotate engine to line up marks on sprockets so marks are adjacent and in line across shaft centers. Remove sprockets by alternately prying on them and slide chain and sprocket assembly off the shafts

Installation: Install camshaft and crankshaft sprocket keys being sure they are properly seated in keyways. Rotate engine crankshaft to bring No. 1 cylinder to firing position. Slide crankshaft sprocket part way on the crankshaft and assemble camshaft sprocket in chain, locating and lining up the "O" marks on the sprockets in line with camshaft and crankshaft centers. Position chain on crankshaft sprocket and start camshaft sprocket on camshaft. Using a rawhide hammer, alternately tap both sprockets into proper position. Camshaft gear must be installed about 1/16" beyond a position flush with end of camshaft for installation of fuel pump eccentric. Complete installation by reversing removal procedure

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT

VALVE TAPPET ADJUSTMENT: *NOTE—Checking must be done with no oil in compression chamber of tappet and the plunger completely bottomed, with tappet on base circle of cam* With piston on compression stroke and both valves closed, press downward on the pushrod end of rocker arm to compress plunger spring and force plunger to its bottom position. While still holding down on rocker arm, measure the lash. The clearance between valve stem end and rocker arm tip should be .050" to 210".

VALVE GUIDES

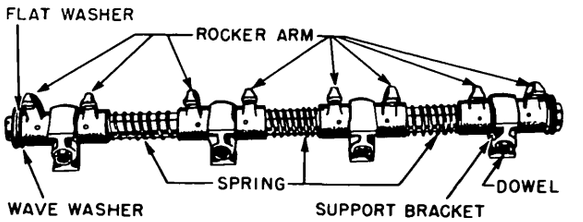
CHECKING VALVE STEM CLEARANCE: After valves have been removed from head, and with valve stems and guides clean, install valve in respective guide bore and measure side-to-side play crosswise to the cylinder head using a dial indicator or thin strips of feeler gauge material placed between stem and guide bore. If clearance is greater than .004" (intake), or .005" (exhaust) guides should be reamed and oversize valves installed.

VALVE GUIDE REAMING: Four oversize reamers are available in Valve Guide Set J-6042 which will provide the desired clearance of .001-.002" (Intake), and .002-.003" (Exhaust) between stem and guide. After checking clearance, select the proper oversize reamer and pilot for the oversize valve to be installed.

ROCKER ARMS

ROCKER ARM AND SHAFT: Disassembly—Remove rocker arm and shaft assembly from cylinder head. Remove cotter pins, and flat and wave washers from end of shaft. Remove rocker arms, springs and supports, keeping all parts in order so they can be replaced in original position.

Insp cti n: Clean and inspect all parts, making sure that all oil holes are open. Inspect shaft and arms for wear. Inspect rocker arm radius at valve stem end, and if worn replace the rocker arm. Inspect plugs at each end of shaft for tightness.



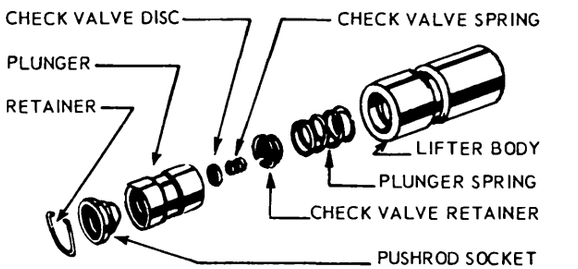
ROCKER ARM ASSEMBLY

Reassembly: Reverse disassembly procedure and note the following: Rocker arm shaft must be assembled with the grooved oil hole in the downward position, or facing the cylinder head.

►*CAUTION: There is a right and left rocker arm and if reversed in assembly they will not properly contact the valve stem.*

HYDRAULIC VALVE LIFTER

HYDRAULIC VALVE LIFTERS: Removal—Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm shaft assembly. Remove



HYDRAULIC VALVE LIFTER

upper valve tappet cover and breather tube and then remove lower valve tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in the same relative position. *NOTE*—Lifters can be removed from block with Valve Lifter Remover J-5962 or a wire hook.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. *(CAUTION—Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove any varnish or gum deposits.

Inspection: Inspect plunger and walls of body for scratches (if plunger or body are scratched, replace complete unit). Try the plunger for fit in body. If check valve assembly removed from plunger, inspect flat disc valve, spring and seat.

R ass mbly: Reverse disassembly procedure. See illustration for correct sequence.

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Testing: Use a clean container deep enough to cover the lifter assembly (in an upright position) Fill container with clean kerosene Remove the pushrod socket and place lifter in kerosene in an upright position, allowing it to fill up. Remove lifter and replace pushrod socket Place lifter assembly between jaws of checking tool (see J-5978 & J-5978-A Tool Note below) Check leakdown by depressing the tool. A decided resistance should be felt. If plunger collapses immediately, the lifter should be checked again. Replace if no resistance felt.

► *TOOL J-5978 & J-5978-A TOOL NOTE* Two types of lifters used. Tool J-5978 can be used with early type lifter. Tool J-5978-A must be used with later type lifter and can be used with early type. New valve lifters have narrower oil groove in body and groove is raised slightly. If Tool J-5978-A not available, Tool J-5978 can be reworked as follows for use with later type lifter Grind two ears of lower jaw down to a 5/32' thickness (grind away lower surface of jaw) and back 5/8". Use Adapter J-5978-6 with modified tool.

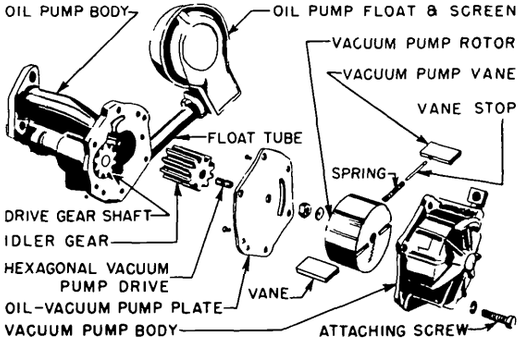
OILING SYSTEM

OIL PUMP

OIL PUMP: Removal—Remove engine oil pan Disconnect vacuum pump line to crankcase. Remove the two screws attaching oil pump to rear main bearing cap and remove oil pump, vacuum pump and strainer assembly.

Disassembly: Remove screws attaching vacuum pump to oil pump body and remove vacuum pump Do not lose the small hexagonal drive. Remove idler gear. Remove pin from shaft and drive off sleeve. Remove upper and lower oil pump driving shaft and gear. If necessary, press shaft out of gear If necessary to to remove the float assembly, the tube can be unscrewed from pump.

Inspection: Wash all parts in clean solvent and blow dry with air . Inspect float for leaks Inspect strainer. Inspect pump shaft and gears for wear, scores or pits. Check clearance between gears and pump housing using a feeler gauge. This clearance should not exceed 005" Check gear endplay using a straightedge across gears and housing Endplay should not exceed 003" Check clearance between shaft and body. Clearance should not exceed .003". Inspect pressure relief valve piston for scores. Inspect relief valve



V8 OIL & VACUUM PUMP ASSEMBLY

spring Free length of spring should be approximately 3-19/64" When compressed to 1-3/8", pressure should be 9–9-1/2 lbs Inspect pump cover for wear. Dress down on a surface plate if necessary.

Reassembly: If float and suction tube removed from pump body, special care should be taken when installing to see that suction tube is tight in threads of pump body, and that float is properly positioned. To position float and tube (vacuum pump must be removed), measure the distance between machined face of pump housing and top edge of float. This distance must be 3/4" *(CAUTION—When positioning float, do not unscrew tube to position float, but continue one more turn).* Install key in pump shaft keyway and press driving gear on shaft until flush with bottom of gear. Install upper and lower shafts and gear in pump body. Install sleeve on shaft Install pin in sleeve and stake both ends of pin Install idler gear and hexagonal drive in end of gear. Position vacuum pump on oil pump body to line up with dowel pins and install attaching screws.

Installation: Start oil pump driving shaft in hole in rear main bearing cap and turn shaft to engage mating end on distributor shaft Start the two screws and lockwashers and tighten screws to 25-30 ft. lbs. Connect vacuum pump line to crankcase. Install engine oil pan.

IGNITION NOTES

DISTRIBUTOR REMOVAL: Mark position of rotor with respect to housing so that rotor may be placed in same position when distributor is reinstalled. If crankshaft is rotated while distributor is removed, it will be necessary to follow procedure outlined under "Installation" below.

DISTRIBUTOR INSTALLATION (If Crankshaft Rotated with Distributor Removed): Rotate crankshaft until No 1 cylinder (front left bank) is on TDC firing stroke Place gasket on distributor shaft, and with distributor cap removed, insert distributor to engage oil pump drive shaft by turning distributor rotor. Select proper tooth so that when distributor gear is in full mesh with camshaft gear the position of rotor will be on No. 1 terminal. After distributor is in bottom position, install retainer clamp, washer and screw. Connect distributor vacuum and wire connections and cap. Set ignition timing (see Car Model pages).

►*TORSION LEVEL SUSPENSION CAR SERVICING CAUTION:* Do not jack car up in rear with jack placed under rear load arms or any part of torsion level suspension assembly. Rear load arm link may become disengaged from arm.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines, see "Air Conditioning Service Cautions in Miscellaneous Section.*

►*ELECTRICAL EQUIPMENT NOTE: Both Auto-Lite and Delco-Remy electrical equipment used.*

MODEL IDENTIFICATION

Model	Model Designation	Series
Clipper Deluxe	5622	5640
Clipper Super	5642, 5647	5640
Clipper Custom	5662, 5667	5660
Packard (290 HP)	5682, 5687	5680
Packard (310 HP)	5697, 5699	5688
Packard Executive	5672A, 5677A	5670

SERIAL NUMBER: Stamped on plate attached to left front hinge pillar post

ENGINE NUMBER: Stamped on front end of engine block between cylinder banks, directly behind water pump

►*DETONATION CORRECTION (First Cars in Low Octane Areas):* If detonation not eliminated by correcting other engine conditions (carbon deposits etc.), early Distributors can be converted to later type with different advance performance. *See Auto-Lite & Delco-Remy Distributors below.*

TUNE-UP

COMPRESSION PRESSURE: 120 lbs minimum at 150 RPM Variation between cylinders should not exceed 10 lbs.

VACUUM READING: 18-21" at idling speed.

VALVE TAPPET CLEARANCE: None required in service (hydraulic)

MANIFOLD HEAT CONTROL: Thermostatic spring type mounted between right bank exhaust manifold and exhaust pipe With heater valve in closed position, hook in end of coil should assume a position approximately 90° clockwise from coil anchor pin at normal room temperatures. Valve should operate freely

►*NOTE:* When valve is closed, most exhaust gases are discharged through left exhaust pipe

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2
Cylinders—RIGHT BANK 2-4-6-8 LEFT BANK 1-3-5-7

SPARK PLUG GAP: 033-.037".
Spark Plugs—Champion N-18. 14mm. Torque to 26-30 ft lbs

AUTO-LITE

COIL: Auto-Lite CAD-4004. *12 Volt.*
Ignition Current—2.2 amps. idling HOT.
Resistor—Auto-Lite PU-4001.

►*COIL RESISTOR NOTE:* Resistor is connected in series with primary circuit between battery and coil Resistor is by-passed during cranking by lead from starter solenoid to coil

DISTRIBUTOR: Auto-Lite IBJ-4001-D (5640 Early), IBJ-4001C (5660 Early), IBJ-4001E (5640, 60, 70 Later). *12 Volt. NOTE* - Delco-Remy Distributor 1110865 also used on later 5640, 60, 70.

►*DISTRIBUTOR CONVERSION TO CORRECT DETONATION (IBJ-4001C & IBJ-4001D):* Install all parts furnished in conversion kit for each distributor as listed below. Install new IBJ-4001E nameplate (furnished in kit) and check advance performance which should agree with IBJ-4001E data below.

IBJ-4001C Conversion – Install all parts furnished in Conversion Kit No. 6484609 as follows: Distributor Stop & Cam Plate, Governor Weight Springs (Weak & Heavy Spring), Vacuum Advance Unit Spring, and small parts.

IBJ-4001D Conversion – Install all parts furnished in Conversion Kit No. 6484607 as follows: Vacuum Advance Unit, Vacuum Spring, Governor Weight Springs (Weak & Heavy Spring), and small parts.

Condenser – Auto-Lite IBB-2015L. **Capacity** .25-.28 mfd.
Contact Point Set – Auto-Lite IGW-2038HS.
Breaker Gap—.017".
Cam Angle—31°±3°.
Breaker Arm Spring Tension—17-20 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance—IBJ-4001C

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
1	350	2	700
10	850	20	1700
14	1765	28	3530
15	2000	30	4000

Automatic Advance—IBJ-4001D

Start	300	0	600
1	350	2	700
10	850	20	1700
13	1485	26	2970
14	1700	28	3400

Automatic Advance – IBJ-4001E

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
1	375	2	750
8	900	16	1800
13	2275	26	4550
14	2550	28	5100

Vacuum Spark Control: Integral type.

Vacuum Advance—IBJ-4001C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7
1	2	7 1/2
5	10	9 5/8
9	18	12 1/8
10	20	13

Vacuum Advance—IBJ-4001D

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6
1	2	6 3/8
6	12	8 5/8
11	22	11 5/8
12	24	12 1/2

Vacuum Advance – IBJ-4001E

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	8
1	2	8 5/8
5	10	11 1/4
9	18	14 3/4
10	20	16

Distributor Removal & Installation: *See "Ignition Notes" in Packard Special Data.*

DELCO-REMY

COIL: Delco-Remy 1115087. *12 Volt.*
Ignition Current—1 25 amps idling HOT.
Resistor—Delco-Remy 1927809

►*COIL RESISTOR NOTE:* Resistor is connected in series with primary circuit between battery and coil Resistor is by-passed during cranking by lead from starter solenoid to coil

DISTRIBUTOR: Delco-Remy 1110865 (5680 Early, 5640, 60, 70 Later), 1110873 (5688 Early), 1110880 (5680, 88 Later). *12 Volt. NOTE* - Auto-Lite Distributors also used on 5640, 60, 70.

►*DISTRIBUTOR CONVERSION TO CORRECT DETONATION (Early Distributors):* Install all parts furnished in Conversion Kit No. 6484596.

Condenser—Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set—Delco-Remy 1918148
Breaker Gap—.016"
Cam Angle—26-33°
Breaker Arm Spring Tension—19-23 ozs.
Rotation—Counter-clockwise viewed from above.

Automatic Advance - 1110865

Degrees Distr.	RPM	Degrees Eng.	RPM
1-3	450	2-6	900
7-9	900	14-18	1800
9 5-11 5	1600	19-23	3200
11-13	2000	22-26	4000

Automatic Advance - 1110873

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
10	1300	20	2600

Automatic Advance – 1110880

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	625	0-4	1250
4-6	1100	8-12	2200
7-9	1800	14-18	3600

Vacuum Spark Control: Delco-Remy 1116101 (1110865 Distr.).
Plunger Travel - 11/64-3/16" (1116101)

Vacuum Advance - 1110865

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6-8
8 75	17.5	14.5-15.5

Vacuum Advance - 1110873

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
5	10	16

Vacuum Advance – 1110880

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6-8
9-11	18-22	12-13.75

Distributor Removal & Installation: *See "Ignition Notes" in Packard Special Data.*

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IGNITION TIMING

Model	℄ Ignition Setting
5640, 60, 70 (A-L Distr.)	5° BTDC
5680, 88 to Eng. No. D-1834 (D-R Distr.)	5° BTDC
5680, 88 Eng. No. D-1834 Up (D-R Distr.)	10° BTDC
5640, 60, 70, (D-R Dist.)	10° BTDC

℄—See Timing procedure following.

Timing - When setting timing, disconnect vacuum advance line at carburetor, place selector button or lever in "H" (Ultramatic), idle engine at 450-500 RPM (Synchro-mesh & Overdrive Cars), 450 RPM (Ultramatic Cars).

► *TIMING NOTE* - 10° setting should be altered, as necessary, in areas where octane rating of fuel is lower than average.

Timing Mark—Timing indicator on chain cover marked "0", "5", "10", "15", Align index mark (groove) on vibration damper with correct mark on indicator

CARBURETOR

► *CARBURETOR APPLICATION: Carter & Rochester Two and Four Barrel Carburetors used as follows:*

Car Model	Carburetor
5640	Carter WGD 2393S
5660, 5670	Carter WCFB 2394S
5680	Rochester 4GC 7008610
5688	Rochester 4GC 7009600 & 7009601

THROTTLE LINKAGE ADJUSTMENT (Ultramatic Drive Cars): With engine at normal operating temperature, choke valve fully open and throttle in the slow idle position, adjust engine idle speed to 450 RPM (see "Carburetor" below for idle adjustment and Carburetor Synchronizing). Loosen the two locknuts (4 or 5 turns) that position the transmission throttle control rod cross shaft adjuster on accelerator-to-carburetor rod Make sure that adjuster is free to move back and forth Move transmission throttle shaft outer lever on right side of transmission so that it is at its rearward position. With carburetor throttle adjusting screw against its stop, adjust the throttle operating rod turnbuckle so that accelerator pedal rod lever just touches underside of the floorboard (this point is where rod from accelerator pedal extends through the floorboard), **then lengthen turnbuckle one full turn** to provide clearance. Tighten locknut on turnbuckle. Apply a slight forward pressure on transmission throttle rod adjuster and move rear locknut up to the adjuster. Move the front locknut up to the adjuster and tighten securely. Make sure that the alignment of the adjuster does not cause lever to bind.

CARTER WGD 2-BARREL
No. 2393S

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

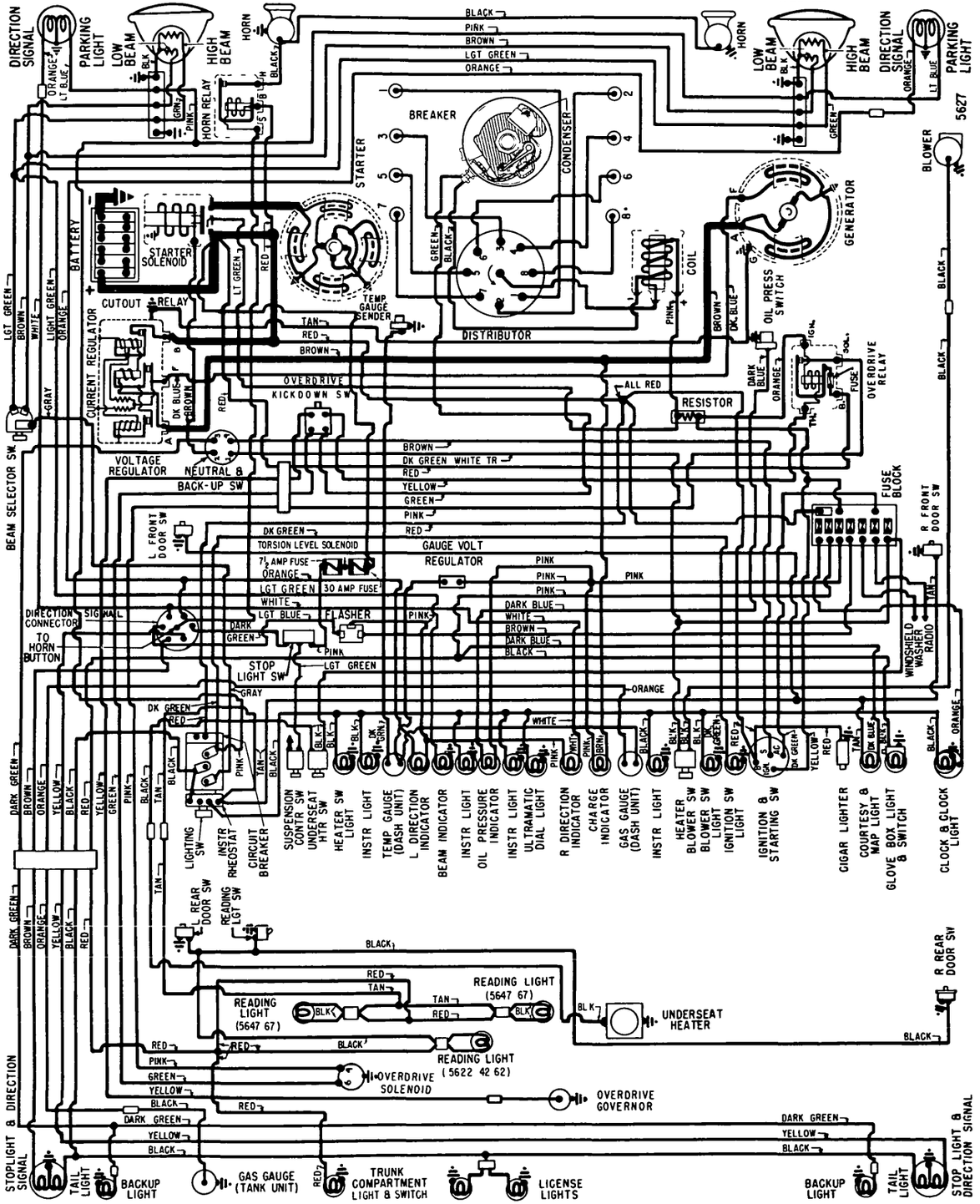
Idle Setting—¾ to 1¾ turns open Turn screws out for richer mixture.

Idle Speed (Synchro-mesh & O.D.)—450-500 RPM.

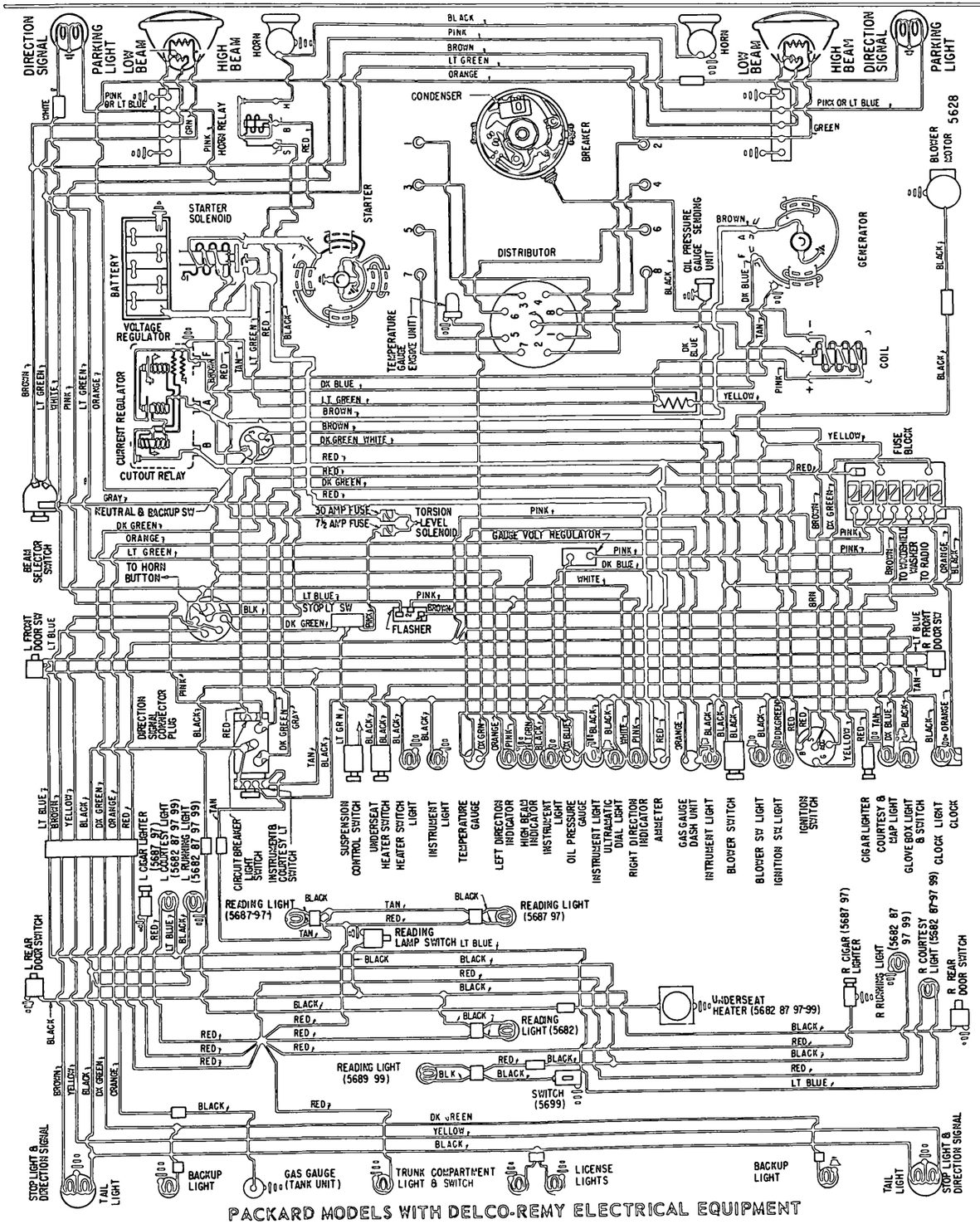
Idle Speed (Ultramatic Trans.)—450 RPM with selector lever or button in "H" range.

Float Level: With bowl cover gasket removed, bowl cover inverted and needle seated, distance between

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CLIPPER MODELS WITH AUTO-LITE ELECTRICAL EQUIPMENT



PACKARD MODELS WITH DELCO-REMY ELECTRICAL EQUIPMENT

CONTINUED FROM PRECEDING PAGE

top of float and bowl cover should be 3/16" Adjust by bending float lever

Accelerating Pump—No seasonal adjustment

Fast Idle Setting: 024" clearance (Gauge T109-189) between throttle valve and bore of carburetor (side opposite idle port) with choke valve tightly closed Adjust by bending choke connector rod at lower angle (Use bending tool T109-213)

Automatic Choke Setting Two points rich

Throttle Linkage Adjustment (Ultramatic) *See CARBURETOR above*

▷ *OTHER DATA See "Carter WGD" Carburetors in Carburetion Section*

Fuel Pump Pressure: 3½-5 lbs at 500 RPM

CARTER WCFB 4-BARREL
No. 2394S

▷ *ROUGH IDLE CORRECTION (Cars before Engine No B-1792 with Carter 4-Barrel Carburetor)* Rough engine idle on these cars may be caused by slight opening of secondary throttle valves and can be corrected by increasing wind-up on secondary throttle valve return springs from ½ to 1½ turns *NCTE* - On cars after Eng No B-1792, the return spring has this additional wind-up

▷ *MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*

Idle Setting—¾ to 1¾ turns open Turn screws out for richer mixture

Idle Speed (Synchro-mesh & O D)—450-500 RPM

Idle Speed (Ultramatic Trans)—450 RPM with selector lever or button in "H" range

Throttle Linkage Adjustment (Ultramatic) *See CARBURETOR above*

▷ *OTHER DATA See "Carter WCFB 4-Barrel" in Carburetion Section.*

Fuel Pump Pressure: 3½-5 lbs. at 500 RPM.

ROCHESTER 4GC 4-BARREL
No. 7008610

▷ *MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT Barrels Feed Cyl. 2-3-5-8, LEFT Barrels 1-4-6-7.*

Idle Setting – 1 - 1½ turns open. Turn screws out for richer mixture.

Idle Speed – 450 RPM with selector lever or pushbutton in "H" range.

Throttle Linkage Adjustment (Ultramatic): *See CARBURETOR above.*

▷ *OTHER DATA See "Rochester 4GC 4-Barrel" in Carburetion Section.*

Fuel Pump Pressure: 3½-5 lbs. at 500 RPM

ROCHESTER 4GC (CARIBBEAN)
No. 7009600 (Front), 7009601 (Rear)

▷ *CARBURETOR ADJUSTMENT CAUTION Carburetor linkage must be adjusted to synchronize carburetion as directed below.*

▷ *MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyl. 2-3-5-8. LEFT barrels 1-4-6-7*

Idle Setting—1-1-1/2 turns out Turn screws out for richer mixture

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Idl Sp d – 450 RPM with selector lever or pushbutton in "H" range.

Synchronizing Carburetors: 1) Loosen both jam nuts on throttle rod at front carburetor throttle valve lever and both jam nuts at forward end of transmission throttle rod (where it connects with accelerator pedal rod), several turns.

2) Back out front and rear carburetor idle speed adjusting screws until throttle valves are closed. While holding the front carburetor throttle valves tightly closed, adjust jam nuts on throttle rod at front carburetor throttle lever so that pin fits freely in lever, then tighten jam nuts.

3) Turn in the idle speed screw on **front** carburetor until it makes contact and then turn it in **one additional turn.** Turn the four idle mixture screws (two each carburetor) all the way in and then **back them ut one full turn.**

4) After engine is warmed up, adjust the **front carburetor** idle speed screw to obtain 450 RPM (selector lever in "D" or pushbutton in "H" position).

NOTE–The rear carburetor idle speed screw is not used and should therefore remain in the "backed out" position.

5) Adjust the idle mixture screws to obtain a smooth idle in the following recommended manner. Turn each idle mixture screw in until the lean "drop-off" point (as noticed by a drop in the tachometer and vacuum gauge readings), counting the turns while turning the needle out to its rich "drop-off" point, then returning the screw to a position midway between the two "drop-off" points. Repeat with each idle mixture screw in the following sequence right rear, right front, left front, left rear. Adjust for the highest possible RPM and vacuum reading. Readjust front carburetor idle speed screw to 450 RPM if necessary.

6) Raise the **rear** carburetor fast idle cam so that the idle speed adjusting screw rests on the high step of the cam. Adjust fast idle screw to obtain 2300-2350 engine RPM and then drop cam away from the screw. Repeat this procedure with the **front** carburetor, adjusting the screw to obtain 1850 RPM, drop cam away from the screw. *NOTE–Because of the inaccessibility of the fast idle screws on both carburetors at low idle position, it will be necessary to shut the engine off and partially open the throttle to adjust the fast idle screws.*

Throttle Linkage Adjustment (Ultramatic): *See CARBURETOR above.*

► *OTHER DATA· See "Rochester 4GC" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 3½-5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter (Fuel only). Vacuum pump is part of engine oil pump assembly.

Replacement Fuel Pump - Carter No. M-2198S.

Fu l Pump Pr ssur - 3½-5 lbs. at 500 RPM

See "Fuel Pumps" in Carburetion Section.

Gas lin Gaug : King-Seeley Electric "CV" type (Constant Voltage) type with voltage regulator.

Dash Unit - K-S No. 49546 (5640, 60, 70), 49506 (5680, 88).

Tank Unit - K-S No. 44519.

See "Fuel Gauges" in Carburetion Section.

BATTERY

Auto-Lite 3EA-60 or Willard HDW-3KM-60. *12 Volt,* 9 plate, 60 ampere hour capacity (20 hr. rate).

Battery Ground - Negative.

► *CAUTION This is reversed from previous models.*

Engine Ground - Cylinder head to dash panel.

STARTER

AUTO–LITE

Auto-Lite MDF-6008. *12 Volt.* **Armature** MDF-2122.

Drive - Solenoid pinion shift (over-running clutch).

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200 min.	10.0	60 max.
6.5 ft. lbs. min.	Lock	4.0	240 max.

Starting Switch: Auto-Lite SAD-4101. Solenoid switch, with key starting. *See "Starter Controls" in Electrical Section.*

Ultramatic Neutral Safety & Back-up Light Switch: *See "Delco-Remy Starter" data below.*

DELCO–REMY

Delco-Remy 1107656. *12 Volt.* **Armature** 1926626.

Drive - Overrunning clutch (solenoid pinion shift).

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 35 ozs. min.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3240	10.6	91
	Lock	3.5	395

Starting Switch: Delco-Remy 1119760 solenoid switch, mounted on starter and controlled by Ignition & Starter Switch. Turn key full RIGHT to start. *See "Starter Controls" in Electrical Section.*

Ultramatic Neutral Safety & Back-up Light Switch: Delco-Remy 1998118. Located on lower end of steering column. Connected in starter control circuit so that starter operative in "N" or "P" only.

GENERATOR

AUTO–LITE

Auto-Lite GJC-6001A (Early), GJC-7002F(Later). *12 Volt.*

Armature - Auto-Lite GJC-2006F (GJC-6001A Gen.), GJC-2030F (GJC-7002F Gen.).

Maximum Charging Rate - *See Voltage Regulator.*

Performance Data

Amperes	Volts	RPM
20 Ⓒ	15.0	1750 max.
30 Ⓒ	15 0	2050-2250

Ⓒ - Do not operate at high output without ventilating fan for any length of time. To do so may result in burned armature and fields.

Brush Spring Tension - 35-53 ozs. (GJC-6001A), 18-36 ozs. (GJC-7002F), with new brushes.

Field Current - 1 2-1.3 amps. at 10.0 volts (70°F.).

M toring Curr nt - 3.4-3.9 amps. at 10.0 volts (70°F.).

Rotati n - Counter-clockwise at commutator end.

B lt Adjustm nt: Loosen generator-to-mounting bracket bolts and adjusting arm screw. Place Fan Belt Adjusting Tool J-4672 over head of front mounting bolt and rotate tool until arm of tool contacts edge of generator end plate. Then using torque wrench, turn tool counter-clockwise until a 20-25 ft. lbs. torque is indicated on wrench scale. While holding wrench at proper torque, tighten adjusting arm screw securely. Remove tool and tighten the generator-to-mounting bracket bolts.

DELCO–REMY

Delco-Remy 1102003. *12 Volt.* **Armatur** 1923535.

Maximum Charging Rate - *See Voltage Regulator.*

Performance Data–Cold

Amperes	Volts	RPM
30	14.0	2150

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 28 ozs.

Field Current - 1.48-1.62 amps. at 12.0 volts (80°F.).

Belt Adjustment: Same as for Auto-Lite above.

REGULATOR

AUTO–LITE

Auto-Lite VRX-6009A. *12 Volt.*

Cutout R lay

Cuts In - 13.0-13 7 volts.

Cuts Out - 8 2-9.3 volts.

Contact Gap - .015" minimum.

Air Gap - .031-.034".

Voltage R gulator

Setting - 14.2-14.8 volts at 80°F., *unit operating normally while charging at 10 amps. or with a .25 hm resistor between regulator and battery.*

Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).

Checking & Adjusting - *See Electrical Section.*

Current R gulat r

► *SETTING CAUTION. "Temperature Compensated" type, Set to following specifications at 70°F.*

Test A	Operating Amp r s	Test B
36 amps.		30 (28-32)

Test A - After 15 minutes operation charging at 10 amps.

Test B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts).

Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).

Checking & Adjusting - *See Electrical Section.*

DELCO–REMY

Delco-Remy 1119123. *12 Volt. NOTE - Regulator is "1119000 Series". Specifications below are "Normal" settings.*

Cutout R lay

Cuts In - 11.8-13.5 volts (Hot).

Contact Gap - .020".

Air Gap - .020" (with contacts just closed).

Voltage Regulator

Setting - 13.8-14.8 volts (Hot).

Air Gap - .075" with armature pressed down to point where contacts just touching.

Checking & Adjusting - *See "1119000 S ries" Regulator in Electrical Section.*

Curr nt R gulat r

Setting - 27-33 amps. (Hot).

Air Gap - .075" with armature pressed down to point where contacts just touching.

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Checking & Adjusting - *See "1119000 Series" Regulator in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signal: *See Electrical Section.*
Lighting Switch Removal: Remove knob, then remove nut on instrument panel with special wrench. Remove switch.
Stop Light Switch Location: On brake master cylinder outlet tee.
FUSES: All fuses, except as noted are located on a fuse block under instrument panel.
Stop Light - AGW-7½ amps. (SFE-20 amps. fuse with Spring Suspension on Clipper Deluxe 4-Dr. Sedan).
Body Wiring - SFE-20 amps.
Dome Light - SFE-20 amps.
Direction Signal - SFE-9 amps.
Courtesy Light - SFE-20 amps.
Clock - AGA-2 amps.
Overdrive - AGC-15 amps., on relay on dash panel.
Instruments - AGW-7½ amps.
Windshield Washer - SFE-9 amps.
Heater - AGC-15 amps.
Radio - AGW-7½ amps.
Antenna (Electric) - SFE-20 amps.
Torsion Level Motor - AGC-30 amps., in container near starter.
Torsion Level Control - AGW-7½ amps., in container near starter.
CIRCUIT BREAKERS: Lighting - 20 ampere circuit breaker on headlight switch protects head, tail, and parking lights.
HORNS: Sparton. Dual horns with relay.
Horn Relay: Delco-Remy 1116781.

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: Own 90° V8 (All Models).

Model	Bore	Stroke	Displmnt.
5640, 60, 70	4"	3½"	352 cu. ins.
5680, 5688	4 1/8"	3½"	374 cu. ins.

Model	Rated HP	Compr. Ratio	Developed HP
5640	51.2	9.5-1	240 at 4600 RPM
5660, 70	51.2	9.5-1	275 at 4600 RPM
5680	54.45	10.0-1	290 at 4600 RPM
5688	54 45	10.0-1	310 at 4600 RPM

Compression & Vacuum Reading–*See TUNE-UP.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Packard Special Data.*
ENGINE REMOVAL: *See "Engine" in Packard Special Data.*
OIL PAN REMOVAL: *See "Oiling System in Packard Special Data*
CYLINDER HEAD REMOVAL & INSTALLATION: *See "Cylinder Head & Manifolds" in Packard Special Data.*

PISTONS

Aluminum alloy, cam ground, Autothermic flat head, slipper skirt, tin plated.
Weight - 24.762 ozs. (5640, 60, 70), 26.067 ozs. (5680, 88).
Removal - Pistons and rods removed from above.
Clearance - .000-.0015" at bottom of skirt.
Fitting New Pistons: Using a .0015 x 1/2" feeler gauge placed against side of cylinder wall, insert piston without rings, in an inverted position in cylinder bore. Push piston down until bottom of skirt is slightly below top of cylinder block and piston pin bore is parallel to crankshaft Pull to withdraw feeler should be 6-11 lbs
Installing Pistons: Install with "F" cast in piston strut, and notch in piston head, toward front of engine. *See Rod Installation below.*
Replacement Pistons: Std size, 010", 020", 030" oversize

PISTON PINS

Floating type retained by lock ring at each end Split type bushing used at upper end of rod Pin is offset 0625" toward thrust side
► *PISTON PIN LOCK CAUTION* 5640 60, 70 (4" bore) engines prior to Engine Plant Nos. A-1347 and B-1196 use piston pin locks, Part. No. 440847 (.080" wire size). All 5680 & 5688 engines and 5640, 60, 70 engines beginning at above Engine Plant Nos. use piston pin locks, Part No. 440995 (.063" wire size).
Pin Fit in Piston–(Clearance) 0000" - 0002" Hand push fit with piston heated to 160°F
Pin Fit in Connecting Rod–(Clearance) .0000" -.0004". With pin held in a vise and connecting rod horizontal, rod should fall slowly of its own weight
Replacement Pins: Std size, 003", 006" oversize.
Piston Pin Bushing (In Connecting Rod) Installation: *See "Piston Pins" in Packard Special Data.*

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (1 & 2)	.078"	Ⓒ	.0015-.005"
Oil	.186"	.015"	.0015-.005"

Ⓒ - .019"(5640, 60, 70),.018" (5680, 5688).
Replacement Rings. Std size, 010", 020", 030" oversize
Installing Rings: Install upper compression ring and oil ring with gap toward camshaft side of engine Install lower compression ring with gap toward opposite side from camshaft All gaps should be midway between pin bosses Grooves on inner diameter of compression rings should be toward top of engine

CONNECTING RODS

Length–6-25/32", (center-to-center). **Weight**–26.688 ozs.
Crankpin Journal Diameter–2.250".
Lower Bearing–Replaceable precision type.
Clearance–.0005-.0025". **Sideplay**–.003-.011".
Replacement Bearings: Std. size, .001", .002", .020" Undersize.
Installing Rods: Install odd numbered rods in left bank and even numbered rods in right bank, with numbers on rods facing down and away from block and milled oil groove in connecting rod cap upward and toward crankshaft.

CRANKSHAFT

Journal Diameter–2.4990". Five bearings.
Bearings–Precision type. The four front crankshaft bearings are interchangeable.
Clearance - .003-.0023".
Replacement Bearings: Std. size, .001", .002", .020" undersize.
End Thrust: Taken by No. 5 (rear) main bearing.
Endplay–.0035-.0085"
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Packard Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Packard Special Data.*
Crankshaft Removal & Installation (With Engine in Car): *See "Crankshaft & Main Bearings" in Packard Special Data.*
Vibration Dampener. *See "Vibration Dampener" in Packard Special Data.*

CAMSHAFT

Bearings–Five, steel-backed babbitt lined precision bearings.
Clearance–.0005-.0045".
End Thrust: Taken by thrust plate behind camshaft sprocket. **Endplay** - .0035-.0065".
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Packard Special Data.*
Timing Chain: Morse. **Width**–1". **Pitch**–.375". **Length**–64 links.
Engine Front Cover Removal: *See "Engine Front Cover" in Packard Special Data.*
Engine Front Cover Oil Seal (Crankshaft Front Seal). *See "Engine Front Cover" in Packard Special Data.*
Camshaft Setting: Both sprockets marked "O". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers.
Timing Chain & Sprocket Removal: *See "Timing Chain" in Packard Special Data.*

VALVES

Tappet Clearance: Hydraulic lifters. Adjustment not required unless cylinder head removed or valve lifters replaced. *See "Valve Tappet Adjustment" in Packard Special Data.*

Valve	Head Diam.	Stem Diam.	Length
Intake	.2"	.3725"	5.712"
Exhaust	1.687"	.3715"	5.690"

Valve	Seat Angle	Lift	Stem Clearanc
Intake	30°	398"	.001-.002"
Exhaust	45°	.388"	.002-.003"

Valve Seat Width - 3/64" (Intake), 5/64" (Exhaust).
Valve Springs: Single springs used. Install springs with the two closely wound coils against cylinder head.

Valve Spring Specifications

Valve	Spring Pressure	Length
Closed	87-97 lbs.	1 3/4"
Open	173-187 lbs.	1 3/8"

Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance excessive. Valves are furnished with .003", .010", .020", .030" oversize stems.

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Ch cking Valve St m Clearance and R aming Guid s f r Oversize Valve Stems: *See "Valve System" in Packard Special Data.*

Valve Lifters· Hydraulic type.

Hydraulic Lifter Removal, Overhaul & Testing—*See "Valve System" in Packard Special Data.*

R cker Arm Assembly: *See "Valve System" in Packard Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves - Open 14° BTDC, Close 62° ALDC.

Exhaust Valves - Open 54° BLDC, Close 18° ATDC.

Valve Timing Check - Remove left bank rocker arm cover. Turn engine until No. 1 cylinder intake valve is open. Let engine stand for several minutes, until hydraulic lifter has leaked down completely. Then hold pressure against the top of the pushrod to keep lifter from refilling, and turn engine until valve closes. Insert tip of a screwdriver between end of valve stem and rocker arm to keep plunger in lifter bottomed, and turn engine until just before mark on timing gear reaches the 15° mark on the timing chain case cover as No. 6 cylinder comes up on compression stroke. Attach a dial indicator to the flange on cylinder head so that it will read any movement of the No. 1 intake valve rocker arm at the pushrod end of the arm. Turn engine very slowly until rocker arm just starts to move. At this point, mark on damper should be just 14° BTDC. *NOTE* - Maximum deflection of timing chain should be ½". If deflection is greater, it will cause a variation in the valve timing.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill).

Normal Oil Pressure: 45 lbs. at 2800 RPM.

Pressure Regulator Valve—In pump body. Not adjustable.

Pressure Relief Valve Spring—3-19/64" (free length). Compressed to 1-3/8", pressure should be 9—9-1/2 lbs.

Oil Pressure Indicator (Clipper Series)—Red light on instrument panel. Lighted when oil pressure low.

Oil Pressure Switch Engine Unit: King-Seeley No. 47195.

Oil Pressure Gauge (Packard Series): King-Seeley "CV" (Constant Voltage) electric type with Gauge Voltage Regulator.

Dash Unit - K-S No. 49512.

Engine Unit - K-S No 44000.

See "Oil Pressure Gauges" in Miscellaneous Section.

Oil Pump: Gear type. Located on rear main bearing cap and driven through distributor drive and camshaft gears. A vacuum pump is attached to oil pump cover plate and is driven by oil pump idler gear.

Oil Pump Removal, Overhaul & Installation—*See "Oiling System" in Packard Special Data.*

Vacuum Pump: Attached to engine oil pump. Serviced only as an assembly. Remove and install in same manner as oil pump. *See "Oiling System" in Packard Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve tappet cover.

COOLING

Wat r Capacity: 26 qts. Additional pint for each heater.

Pressure Valve: Radiator filler cap. 12 lbs. type.

Thermostat: Capsule type. Starts to open 167-173°F (Std.), 177-182°F (High Std.).

Water Pump: Packless type with sealed ball bearing. *See "Packard" in Water Pump Section.*

Temperature Gauge: King-Seeley "CV" (Constant Voltage) electric type with Gauge Voltage Regulator.

Dash Unit-K-S No. 49516 (5680, 88), 49550 (5640, 60, 70).

Engine Unit - K-S No. 44235.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long 11CF, Assy. No. 268349 (5640, 60, 70 with Synchro-mesh Trans.).

See "Long" Clutches in Clutch Section.

Clutch Disc - Long No. 284340 (11").

Pedal Adjustment: 1-1/4—1-1/2" free travel.

Removal: Remove transmission (see below). Remove flywheel lower housing, and clutch release bearing. Mark flywheel and clutch cover. Remove clutch cover to flywheel bolts evenly to relieve tension.

SYNCHRO-MESH TRANSMISSION

Own. *See "Packard Synchro-mesh" in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect speedometer cable, gear shift rods from levers on transmission case, and propeller shaft at rear universal joint. Remove propeller shaft completely by slipping front universal joint flange off the transmission main shaft. *(CAUTION*—Wire or tape the two bearings of the universal joint together to prevent them from falling off). Support rear of engine with a jack. Remove rear engine support mounting and support crossmember. Remove capscrews attaching transmission to flywheel housing. Using two pilots in bolt holes, slip transmission to rear so that clutch release bearing pull back spring may be unhooked. Remove transmission.

OVERDRIVE

Warner R11 Type. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down. Overdrive lockout switch not used.

See "Warner R11" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after disconnecting overdrive control cable from lever on right side of overdrive case, electric leads at governor and solenoid. Remove governor, then remove solenoid.

ULTRAMATIC DRIVE

Own. "Twin Ultramatic", Torque converter (with hydraulically operated direct speed clutch) and hydraulically operated planetary unit with manual control.

See "Twin Ultramatic Transmission" in Transmission Section.

►*TESTING & TROUBLE SHOOTING: See "Twin Ultramatic Transmission" in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level—*(CAUTION—Fluid level must be checked at normal operating temperatures and after engine has been idling at 800 RPM. for at least one minute to completely fill the transmission).* Run engine at low idle speed while fluid level is being checked, using the dipstick located in engine compartment. Add fluid through dipstick tube as required to bring level to "Full" mark on dipstick.

NOTE—If fluid level doubtful due to bent or distorted dipstick tube, check actual fluid level in transmission as follows: Place car on level floor and allow engine to run at idle speed for five minutes in "N" (neutral). Place a pan under rear of transmission and remove plug in rear of transmission case. If no oil runs out of opening, add oil until it begins to run out, install plug, then ADD ONE QT. If oil does run out when plug removed at rear of transmission, allow to drain to level of hole, then ADD ONE QT.

Capacity—Approximately 11 qts. Use only Packard Ultramatic Drive or any Type "A" Automatic Transmission Fluid which has an AQ-ATF number embossed on container.

►*OTHER TWIN ULTRAMATIC SERVICE DATA: See "Twin Ultramatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer (Std. & Overdrive Cars), Universal Products (Ultramatic Drive Cars).

►*CAUTION:* Rear universal joint flange nut controls rear axle pinion bearing preload which **must b adjusted** whenever nut is loosened. *See "Packard Hypoid" in Rear Axle Section.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss drive. *See "Spicer Hypoid" in Rear Axle Section.*

Axle Ratios - Optional ratios available as follows·

Synchro-mesh - 3.54-1, 4.09-1.

Overdrive - 3.54-1, 4.09-1.

Ultramatic - 2.87-1, 3.07-1, 3.31-1, 3.54-1, 4.09-1.

Backlash - .003- 006"

Carrier Removal: Remove axle shafts (see Axle Shaft Removal below). Disconnect rear universal (wire trunnions), wire or prop propeller shaft up against floor pan with a 2 x 4" inserted inside frame crossmember Drain differential, replace drain plug. Clean off housing, take off carrier mounting nuts, lift carrier assembly out.

Axle Shaft Removal: Remove wheel and brake drum (use screw type puller J-4153 (do not use knock-out type puller or thrust block may be damaged). Disconnect brake line at wheel cylinder. Remove nuts at oil seal guard and take off seal guard, gasket, retainer, oil seal, brake support plate, and bearing shims. Remove axle shaft and bearing using Puller J-2552 (do not drag shaft on inner seal). Use Tool J-943-B to remove inner seal.

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Wh l B aring Adjustm nt: Endplay controlled by shims between flange end of housing and brake backing plate. Add or remove shims (furnished .005", .007", .020" thick) at one wheel if .050" or under, at both wheels if over .050" to secure .004-.007" endplay. Normally adjust by tightening nut to 20 ft. lbs. and back off one hex and lock.

Endplay - .004-.007".

SHOCK ABSORBERS

D lc r M nroe. Direct acting hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Ind p nd nt. Coil springs (5640), "Torsion Level Suspension" (others).

See "Packard" & "Packard Torsion Level Suspension" in Susp nsions & Wheel Alignment Section.

Kingpin Inclinati n– 5° 50'.

Caster–Neg. 1° ± 1/2°.

Camber–0° (Pos. 3/4° to Neg. 1/4° range).

T e-In–0" (plus 1/16", minus 0").

STEERING

Manual: Gemmer. Worm and three tooth roller.

See "Gemmer Worm & Roller" in Steering Section.

P w r St ring: Bendix or Monroe Linkage Types.

NOTE - Gemmer Worm & 2-Tooth Roller Steering Gear used with both types.

See "Bendix Linkage Type" or "Monroe Linkage Type" Pow r Steering in Steering Section.

St ering Linkag : *S e "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Bendix Hydraulic. Single Anchor (without eccentric) Hand lever applies rear wheel service brakes rear wheel service brakes.

See "Bendix Hydraulic" in Brake Section.

Drum Diameter - 11"(5640, 60, 70),12" (5680, 5688).

Lining Width	Front	Rear
5640, 5660, 5670	2½"	2"
5680, 5688	2¼"	2"

Lining Thickness - 3/16" (All Series).

Lining Length	① Primary	① Secondary
5640, 5660, 5670	9 5/16"	12"
5680, 5688	11 1/2"	13"

① - Front & Rear wheels.

Clearance - Turn brake adjusting screw until wheel can just be turned by hand, then back off shoe until wheel turns free.

Standard Master Cylinder: On bracket on left side of frame near transmission support.

Checking Fluid–Access hole in front floor pan at left corner of drivers seat.

Removal–Remove brake lines from master cylinder. Disconnect pushrod at pedal. Remove gearshift selector linkage bellcrank from mounting bolt stud. Remove mounting bolts and master cylinder.

P w r Brak s: Bendix. Combination power cylinder and hydraulic master cylinder.

See "Bendix Power Unit" in Brake Section.

Checking Fluid–Check level every 1000 miles Add fluid to bring level to full mark.

Removal of Power Unit–Disconnect hose line and electrical wiring from power unit (raise hydraulic line above level of junction assembly to prevent fluid leakage). Disconnect and remove brake and accelerator pedal. Remove steering column grommet retainers, slide grommet out of way. Remove carpet retainers and fold carpet back. Remove cover plate screws, then remove power brake and cover as an assembly, take out mounting screws and remove power brake from cover.

MISC. MECHANICAL

Windshield Wipers: Vacuum type, cable operated. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Harrison. *See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type with individual motors in each window. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Controls: Individual electric motors for horizontal and vertical seat adjustment. *See "Electric Seat Controls" in Miscellaneous Section.*

Power Top Controls: Hydro-Lectric type. *See "Hydro-Lectric Top Controls" in Miscellaneous Section.*

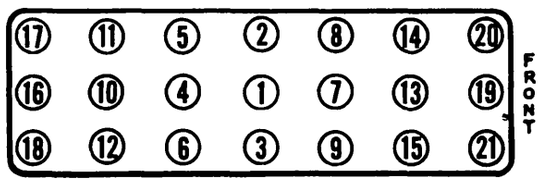
TIGHTENING SPECIFICATIONS

6 CYL. ENGINES

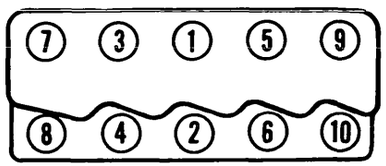
	Ft. Lbs.
Cylinder Head	70
Manifolds	20
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Crankshaft Pulley	135
Con Rod Caps	45
Engine Front Cover	15
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	25
Oil Filter	25
Clutch Housing	50

V8 ENGINES

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	35
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Single Shaft)	30
Rocker Arm Cover	2.5
Engine Front Cover	30
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	25
Clutch Housing	50



6 CYL. ENGINES



V8 ENGINES

ENGINE

6 CYL. ENGINES

ENGINE ASSEMBLY REMOVAL: Engine, clutch, and transmission assembly can be removed from car as an assembly, as follows: Remove hood and radiator core. Disconnect propeller shaft at transmission. Disconnect transmission controls at transmission (wires to overdrive controls), and speedometer cable. Disconnect clutch linkage at clutch housing. Disconnect fuel pump flexible line at pump, throttle and choke controls at carburetor, heat indicator tube at head. Disconnect wires from generator and starter, coil and distributor. Disconnect exhaust pipe at manifold. Disconnect oil gauge tube at flexible line. Remove crankcase breather pipe, and the front and rear engine support bolts. Disconnect hand brake linkage. Remove carburetor air cleaner. Connect hoist to engine and lift assembly out of chassis.

V8 MODELS

ENGINE ASSEMBLY REMOVAL: Drain cooling system, remove battery. Remove fan shroud, radiator, and hood. *(NOTE* - Before removing hood, scribe outline of hinge brackets to insure proper adjustment when reinstalling.) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor. Attach engine lifting Tool C-3466 to carburetor flange studs on intake manifold and attach chain hoist to fixture eyebolt. Raise car and disconnect propeller shaft at transmission. Disconnect wires and linkage at transmission. Disconnect wires and linkage at transmission and clutch. Remove exhaust pipe (make sure exhaust system is supported while engine is removed). Drain engine and transmission oil. Remove rear crossmember-to-transmission support attaching bolts. *(NOTE* - Place a roll-away jack under transmission to relieve weight from crossmember. Place a wood block between head of jack and transmission to avoid damaging transmission oil pan. Jack must support weight of rear of engine and must be able to roll with engine as engine is removed). Remove crossmember-to-frame bracket attaching bolts. Remove crossmember and rear engine support. Lower car to convenient working height, then remove engine front support mounting bolts. With chain hoist, raise engine and, at same time, work engine out of chassis toward left front fender.

ENGINE MOUNTINGS

ENGINE MOUNTINGS: On some models, a rubber insulating washer 3/32" thick is provided for left mount only, and should be installed between frame and lower flat washer. This washer eliminates transfer of noise on rapid acceleration. Washer must not be compressed between frame and flat washer. *CAUTION*—Do not over-tighten rear engine mounting bolts. Over-tightening these bolts may collapse insulator spacer.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

Tightening Torque—See Tightening (Torque Wrench) Specifications above.

6 CYL. ENGINES

CYLINDER HEAD INSTALLATION: When installing cylinder head, use new gasket. Coat threads of capscrews with sealer except the three screws that lead into intake manifold ports. If sealer used on these capscrews, there is a possibility that it will be drawn into carburetor or valves. Use torque indicating wrench to tighten cylinder head bolt nuts and capscrews. Tighten in sequence shown in diagram.

INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN. Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install assembled manifolds. While holding manifold and gaskets evenly against engine block, install long center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer). Install remaining washer and nuts. *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 15-20 ft. lbs. torque. Tighten the four bolts holding exhaust manifold to intake manifold.

V8 ENGINES

CYLINDER HEAD INSTALLATION (Single Rocker Shaft): Before cylinder head removed, remove rocker shaft assembly. Slide out push rods and place them in sequence in a suitable rack in order that each push rod can be reinstalled in its original position. When installing cylinder head, use new gaskets. Make sure all holes are punched out. Be certain cylinder head enters both dowel guide pins in cylinder block. Tighten cylinder head bolts in sequence shown in diagram. Slide push rods in position. Lower rocker shaft assembly down on two locating studs. Install all washers, nuts and bolts. *CAUTION*—Extreme caution must be exercised when tightening rocker shaft bolts and nuts so that hydraulic tappets have time to bleed down to their operating length. If tappets are forced down too rapidly, damage to push rods, tappet bodies or rocker arms will result.

CRANKSHAFT & MAIN BEARINGS

6 CYL. ENGINES

REAR MAIN BEARING SEAL: Neoprene type seal. When replacing seal, both upper and lower halves should be replaced. Remove oil pan, clutch housing pan, and rear main bearing cap. Remove seal from cap, and then remove upper seal by pushing one corner of seal until opposite end protrudes about 3/8" from block. Pull out with long-nosed pliers. Install new seal in lower half by carefully inserting lower half of seal into bearing cap. Before installing upper seal, coat seal contacting lip with grease. Insert one end of seal into block and push it into place with a rolling motion. Install main bearing cap, making certain that tabs of cap gasket fit in cap seal channel.

V8 ENGINES

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos. With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap. Tap seal down in position with Tool C-3511 until tool is

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seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine.

ENGINE FRONT COVER

6 CYL. ENGINES

FRONT OIL SEAL: To replace, drive old seal out with suitable drift. When installing seal, make sure seal is driven into place evenly to insure a tight fit. Use a new gasket and position cover in place.

FRONT COVER INSTALLATION: Use new gasket and position cover in place. Install screws but do not tighten. Install pulley and hub on crankshaft far enough so that seal can be evenly positioned on crankshaft. Tighten two screws on right side lightly. Then tighten remainder of screws in like manner. Repeat tightening procedure and torque screws to 15 ft. lbs.

V8 ENGINES

ENGINE FRONT COVER (Single Rocker Shaft Engines): Proceed as follows:

Removal: Drain and remove radiator. Disengage fan belt and remove generator. Install Tool C-3033 over pulley and force pulley off end of crankshaft. Support engine with suitable chain hoist fastened to intake manifold. Remove motor support "U" bolts and nuts. Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads. Lift water pump housing, water pump, front motor support and insulator up and away from front of engine. Discard gaskets. Loosen bolts that hold oil pan to cylinder block. Drop pan slightly to clear chain case cover. Disconnect inlet and outlet fuel lines at fuel pump. Remove bolts that hold pump to chain case cover. Slide pump out and away from engine. Discard gasket. Remove bolts and washers from cover. Disengage cover from locating dowels, remove from engine. Discard gasket.

Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs. Install new gasket and position cover locating dowels. Coat screws with suitable sealer and tighten to 15 ft. lbs. *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil.

FRONT OIL SEAL: Remove crankshaft pulley and water pump housing. Loosen oil pan bolts sufficiently until pan clears chain case cover. Install Tool C-3506 and remove seal. Discard seal and retainer. Position new seal and retainer assembly in housing and press into place using Tool C-3503. Seal must be tight against seat surface. *CAUTION* - Always have thin shoulder away from front of cover with stamped case cover, thick shoulder away from front of cover with cast iron cover.

CAMSHAFT & BEARINGS

6 CYL. ENGINES

CAMSHAFT REMOVAL: Remove Front End Assembly as a unit. Remove cylinder head, fuel pump, oil pump, valve tappet cover plates, crankshaft pulley, front motor support (with front of engine jacked up), timing chain cover, camshaft sprocket and timing chain. If valves and valve springs are not to be removed, prop valves up by inserting wooden wedges at opposite sides under valve head. Raise tappets and hold in this position (use spring type clothes pins or similar tool to hold tappets up). Withdraw camshaft (rotate shaft to clear any obstructions).

V8 ENGINES

CAMSHAFT REMOVAL: Drain radiator, remove radiator and crankshaft pulley. Support engine with chain hoist attached to intake manifold. Remove engine support U-bolts. Remove fan, water pump, and water pump housing assembly. Loosen oil pan bolts sufficiently in order that oil pan clears chain case cover, camshaft gear hub nut, fuel pump eccentric and dowel. Then remove camshaft gear and timing chain. Support engine at front of oil pan. Then remove intake manifold, distributor, distributor drive gear, tappet chamber cover, rocker cover, rocker shaft assemblies and push rods. Use Tool C-3158 to pull out hydraulic tappets. If varnish build-up is excessive, use puller part of Tool C-3158 and work tappet out of bore. Remove four camshaft thrust bolts, then remove camshaft.

VALVE SYSTEM

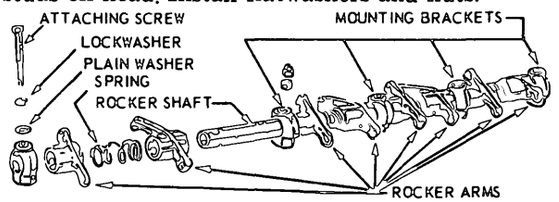
6 CYL. ENGINES

EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished .010" oversize. Use Tool C-732 to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat inserts should be from .002-.004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with Installing Tool C-767.

ROCKER ARMS

V8 ENGINES

ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft): Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down. Slide an intake rocker arm over shaft and down against bracket, with diagonal slant of arm close to bracket. Then slide a spacer spring over shaft and down against intake rocker arm. Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket. Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed. Slide push rods into push rod holes. Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head. Install flatwashers and nuts.



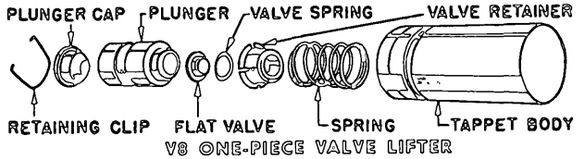
V8 ROCKER ARM ASSEMBLY

HYDRAULIC VALVE LIFTER

V8 ENGINES

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type) Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body. Oil is introduced to this unit through hole in side of lifter plunger.

Removal (Single Rocker Arm Shaft Engine): Remove rocker covers, then remove bolts, nuts and flatwashers holding shaft to heads. Lift rocker shaft and arms straight up and away from heads. Drain cooling system to point below level of intake manifold. Remove carburetor air cleaner, disconnect fuel and vacuum lines, overdrive kick-down switch wires and accelerator linkage at carburetor. Disconnect coil wires and disconnect heat indicator wire at intake manifold. Disconnect heater hose and automatic integral choke heat tube at carburetor. Remove intake manifold bolts, then lift intake manifold, coil and carburetor straight up and away from engine. Discard gaskets (*CAUTION* - Cover intake ports in cylinder head to avoid entry of dirt). Remove crankcase ventilator pipe and gasket. Remove tappet chamber cover bolts. Lift cover up and away from engine. Discard gaskets. Insert hooked portion of Tool C-3158 into hole in tappet body (this portion of tool can be used to remove tappets without a varnish build-up at lower part of tappet body). Lift tappet out of bore. If lifter



V8 ONE-PIECE VALVE LIFTER

sticks in bore, slide puller portion of Tool C-3158 through cylinder head (pushrod) openings and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and slowly pull tappet out of bore with sharp twisting motion. As tappet clears bore, withdraw puller pin and puller tool, then lift tappet out of chamber.

Disassembly: (*CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.*) Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body. Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting. Check to see that valve exerts a slight pressure on valve spring to insure valve seating. Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene. (*CAUTION*—Container and kerosene must be absolutely clean). Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill

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lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing. This will prevent possible scoring of lifter plunger when engine is first started.

Reassembly: Reverse disassembly procedure as noted above.

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos. 1 and 6 cylinders. Set timing mark "DC" located on crankshaft pulley to pointer. With rotor at No. 1 firing position, the following lifters will be on the low side of the cam lobe: No. 2 intake and exhaust, No. 4 exhaust, No. 7 intake, No. 8 intake and exhaust (*NOTE*—To remove No. 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed). With rotor at No. 6 position, following lifters will be on low side of cam lobe: No. 3 intake and exhaust, No. 4 intake, No. 5 intake and exhaust, No. 7 exhaust (*NOTE*—To remove No. 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed).

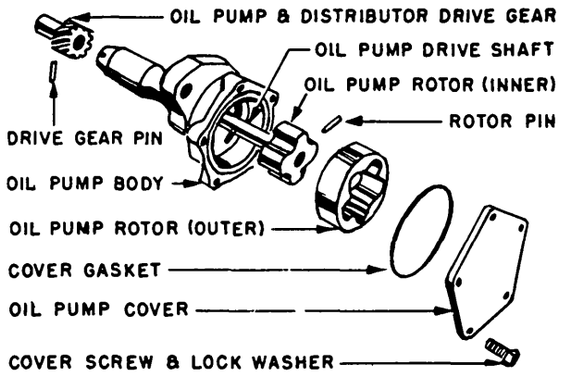
OILING SYSTEM

OIL PUMP

6 CYL. ENGINES

ROTOR TYPE OIL PUMP: Removal—Before removing oil pump, rotate crankshaft and make sure "DC" mark on crankshaft pulley lines up with pointer on timing chain case cover Do not rotate engine with oil pump removed Remove the attaching screws and remove pump from engine *NOTE*—On some models it will be necessary to remove the two upper cover capscrews to obtain sufficient clearance to remove oil pump

Disassembly & Inspection: Remove the oil pump cover and gasket Hold hand over cover opening and with pump upside down, turn drive shaft until outer rotor slips out. Drive out the straight pin holding pump drive gear to shaft Press the shaft out of drive gear and slide shaft and inner rotor assembly out of pump body Wash all parts and dry with air. Inspect all parts and replace as necessary, then measure clearance between opposite lobe of inner rotor and outer rotor. Clearance should be .010" or less. If clearance is greater, replace both rotors Measure thickness and diameter of outer rotor. If thickness is .748" or more and diameter is 2.245" or more, rotor is satisfactory Thickness of inner rotor should be .748" or more If either rotor is less than these dimensions, replace BOTH rotors. Insert both rotors into pump body and place a straight edge across pump body between bolt holes Clearance between straight-edge and rotor should be 004" maximum If greater, replace pump body. Press outer rotor to one side against pump body and measure clearance between rotor and body on opposite side Maximum clearance should be 008". If greater, replace pump body. Cover should be smooth and flat. If it is scratched or grooved, replace cover. Check flatness by placing a straight-edge across inner surface of cover If it is possible to insert a .001" feeler between cover and straight-edge, replace cover.



6 CYL. OIL PUMP

Reassembly: Slide the drive shaft and rotor assembly into pump body Press drive gear on shaft until end play of shaft is from 003" to 010". Press rotor down in body with hand and measure clearance with feeler gauge. Install pin and peen over both ends. If pin holes do not line up, drill a new pin hole through gear and shaft, using a 5/32" drill. Slide outer rotor into place in pump body Install new cover gasket and install cover and tighten screws evenly.

V8 ENGINES

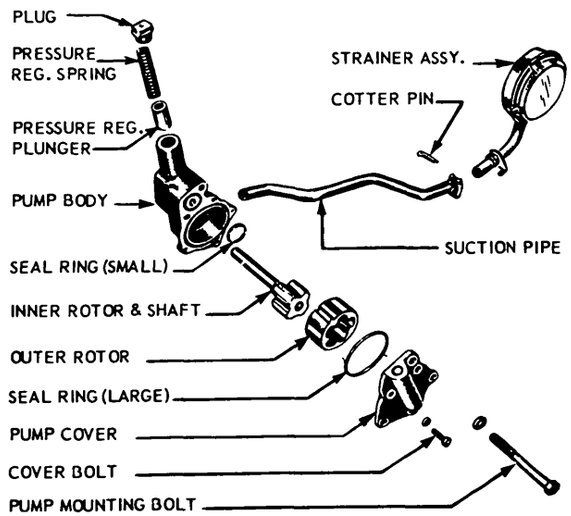
ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe. Remove cover bolts and cover. Discard oil seal ring. Remove pump rotor shaft and lift out pump outer rotor. Remove oil pressure relief valve plug and lift out spring and plunger. Wash all parts in a suitable solvent and inspect for damage or excessive wear. Check all pump parts as follows:

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers. If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors.

Inner Rotor—Measure thickness of inner rotor with micro-calipers. If thickness measures less than .998", replace both inner and outer rotors.

Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body. Use a feeler gauge and measure clearance between top of rotors and straightedge. If clearance in excess of .004", replace pump body.



V8 OIL PUMP

Outer Rotor to Pump Body Clearance—To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors. If clearance in excess of .010", replace both inner and outer rotors.

Reassembly: Use new oil seal ring between cover and body. Tighten cover bolts to 10-15 ft. lbs. Prime pump and then install new oil seal ring in pump mounting face.

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

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IGNITION NOTES
V8 ENGINES

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block.

Installation: Slide new bushing over burnishing end of Tool C-3053. Insert tool and bushing into bore of block. Drive bushing and tool down into position, using a soft hammer. As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. ***DO NOT REAM THE BUSHING.***

COOLING SYSTEM
6 CYL. ENGINES

WATER DISTRIBUTION TUBE: Replace whenever engine completely overhauled. If tube becomes rusted or corroded, overheating of engine may occur due to failure of water to circulate properly through cylinder block. To replace tube, remove radiator core and water pump. Pull tube out of block with stiff hooked rod. Install tube with slots up and be sure tube is inserted far enough into block so that water pump will seat properly against block.

BRAKE NOTES

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HAND BRAKE ADJUSTMENT (External Type): The hand brake adjustments can be made from beneath car as follows: Fully release hand lever (cable length adjusted by means of clevis at lower end). Adjust anchor screw for .015-.020" band to drum clearance by bending back tab of anchor screw lock and turning screw (on lower right side of brake), then lock screw by bending tab against flat of screw. Loosen guide bolt locknut and adjust guide bolt adjusting nut for .015-.020" band to drum clearance (these two nuts located in front of release springs at left side), then tighten locknut. Turn large adjusting bolt nut (on lower end of bolt below springs) for .015-.020" band to drum clearance for upper half of band. Groove in upper end of this nut must contact ridge on band operating lever spacer above nut.

NOTE—Clearance between side of anchor bracket at center of band and anchor must not exceed .005" (if clearance excessive band may be distorted when brake applied). To correct, compress saddle in vise or place on block and tap lightly with a hammer.

►*"FURY" NOTE:* This model has a special High Compression Engine with different valve timing (adjustable tappet clearance), ignition setting, spark plugs and carburetor (Carter 4-Barrel). See data below.

►*V8 AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

6 CYL. MODELS

Series	Model Identification
Plaza	P-28-1
Savoy	P-28-2
Belvedere	P-28-3

V8 MODELS

Series	Model Identification
Plaza	P-29-1
Savoy	P-29-2
Belvedere	P-29-3
Fury	P-29-3

SERIAL NUMBER: On plate attached to left front hinge pillar post.

Serial Nos.	Detroit	Evansville	Los Angeles
6 Cyl. (All)	14,720,001	20,820,001	25,202,001
V8 (All)	15,873,001	22,247,001	26,552,001

ENGINE NUMBER: 6 Cylinder - Stamped on boss at left front side of cylinder block.

V8 - Located on left front face of cylinder block.

Starting Engine Numbers - 6 Cylinder - 1001 and up.

V8 - In blocks of numbers as follows:

270 Cu. In. Engine - 41,001 through 80,000 & 250,001 through 274,009.

277 Cu. In. Engine - 1,001 through 40,000, 80,001 through 250,000, 274,001 & Up.

330 Cu. In. (Fury) Engine - Engine No. preceded by prefix letter "F".

►*ENGINE NUMBER LETTERS & MARKS (Following engine number): Indicate as follows:*

"A" - All cylinders .020" oversize.

"B" - All Main & Connecting Rod Journals .010" undersize.

"AB" - Both above conditions exist.

"DIAMOND" (3/8" high) - .008" oversize tappets used.

TUNE-UP

COMPRESSION PRESSURE: 6 Cyl. - 120-150 lbs. at cranking speed of 150 RPM. Maximum allowable variation between cylinders 10 lbs.

V8 - 125-165 lbs. at cranking speed of 150 RPM. Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: 6 Cyl. - .010" Intake & Exhaust, with engine hot and idling.

V8(270 Cu.In.Eng.) - None in service (hydraulic lifters).

V8(277 Cu.In.Eng.) - .008" Intake, .018" Exhaust, with engine hot and idling.

V8 (Fury 303 Cu.In.Eng.) - .010" Intake, .018" Exhaust with engine hot and idling.

MANIFOLD HEAT CONTROL: 6 Cyl. - Thermostatic coil type. Valve should operate freely. When installing coil, spring should be installed so that about one full turn (355° of wrap) is required to hook outer end of spring around stop stud.

V8 (270 & 277 Cu.In.Std.) - Single Exhaust with Crossover pipe. Located in right exhaust manifold (277 Cu. In. Eng.), between right exhaust manifold and exhaust pipe (270 Cu. In. Eng.).

V8 (303 Cu. In. (Fury) Std. 277 Cu. In. Optl. with Power Package). Dual Exhaust. Heat control valve in right exhaust pipe.

Coil Spring Installation - Position valve shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer end tongue of spring in upper left hand position. Press inner end of coil into slot of shaft and seat firmly. Move outer end tongue of spring around and hook under pin (left pin when facing coil end of valve on 270 Cu. In. Single Exhaust and all Dual Exhaust systems).

Counterweight Installation - Place counterweight over shaft (shield upward) and insert lock in shaft slot. Center counterweight on shaft and turn weight on shaft until seated. Install stop, and tighten nut securely.

►*DUAL EXHAUST NOTE:* When valve is closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION
6 CYLINDER ENG.

FIRING ORDER: 1-5-3-6-2-4

SPARK PLUG GAP: .035".

Plugs – Auto-Lite Resistor AR-80. 14mm. Torque to 30-32 Ft. Lbs.

COIL: Auto-Lite CAF-4002. *12 Volt.*

Ignition Current – 2.4 Amperes stopped, 1.8 Amperes

Resistor – None used.

DISTRIBUTOR: Auto-Lite IAT-4101B. *12 Volt.*

Condenser – Auto-Lite IAT-3076RA. **Capacity** – .25-.285 mfd.

Contact Point Set – Auto-Lite IGW-3028BS.

Breaker Gap-.020". **Cam Angle**-39°±3°.

Breaker Arm Spring Tension – 17-20 ozs.

Rotation – Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	400	0	800
1	525	2	1050
4	875	8	1750
7	1225	14	2450
8	1350	16	2700

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	4 3/4
1	2	5 7/8
4	8	9 3/8
7	14	12 7/8
8	16	14

►*DISTRIBUTOR INSTALLATION CAUTION: Make sure that No. 1 piston is at TDC on compression stroke and that distributor rotor is in No. 1 firing position.*

IGNITION
V8 ENGINE

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders–RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035" (All).

Spark Plug–Auto-Lite 4S-250 (Fury), AR-52 (Others) 14mm. Tighten to 32 ft lbs.

COIL: Auto-Lite CAD-4003. *12 Volt.*

Ignition Current–3.1 amps. stopped, 2.5 amps. idling.

Resistor–Auto-Lite PU-4002. Check coil and resistor separately.

DISTRIBUTOR: Auto-Lite. (270", 277" Std.) IBJ-4301A. (277" Pwr. Pkg.) IBJ-4301B. (303" Fury) IBK-4302.

NOTE - IBK-4302 is double breaker type distributor.

Condenser - Auto-Lite IBB-2015R. **Capacity** .25-.28 mfd.

Contact Point Set - Auto-Lite IGW-3028MS (IBJ Distr.), IGW-3028KS (IBK Distr.).

Breaker Gap - .017" ± .002".

Cam Angle - 31° ± 3° (IBJ), 38° ± 3° with both sets of contacts (IBK).

Breaker Arm Spring Tension–17-20 ozs.

Rotation–Clockwise viewed from above.

Automatic Advance–IBJ-4301A

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	400	2	800
6.5	700	13	1400
14	1975	28	3950
15	2150	30	4300

Automatic Advanc –4301B

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	385	2	770
9.5	700	19	1400
15	1800	30	3600
16	2000	32	4000

Automatic Advanc - IBK-4302

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	415	2	830
6	750	12	1500
11	2050	22	4100
12	2300	24	4600

Vacuum Spark Control: Integral type.

Vacuum Advanc –IBJ-4301A

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	5 1/2
1	2	6
5	10	8 3/8
11	22	13 1/4
12.5	25	15

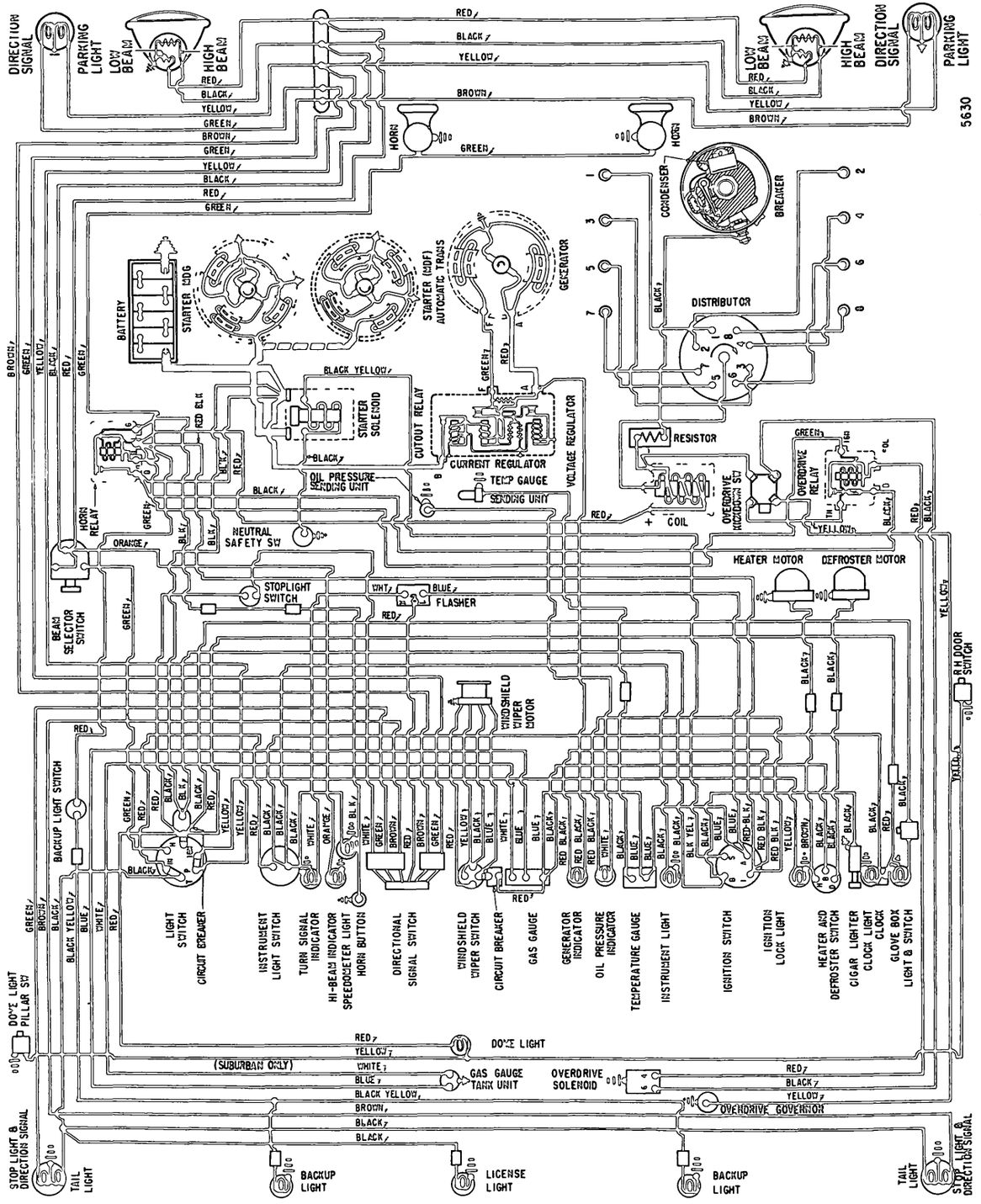
Vacuum Advance–IBJ-4301B

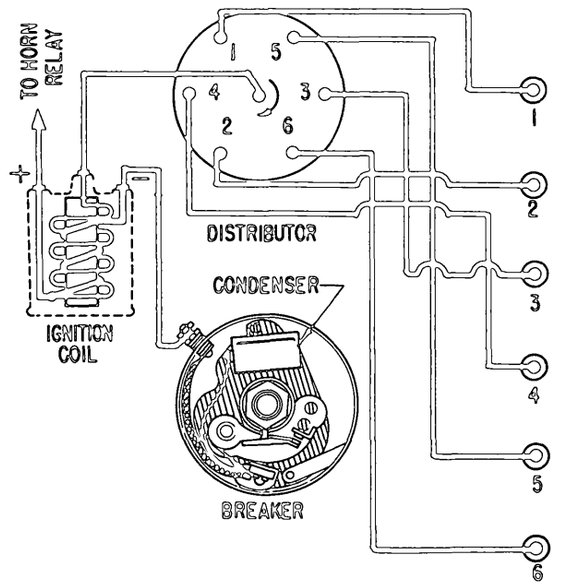
Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	5 1/2
1	2	6
5	10	8 1/2
10	20	13
11.5	23	15

Vacuum Advanc - IBK-4302

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7 1/2
1	2	8 1/8
5	10	10 7/8
10	20	15 1/8
11.5	23	17

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6 CYL. IGNITION WIRING

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Distributor Basic Timing & Drive Shaft Bushing: *See "Ignition Notes" in Plymouth Special Data.*

IGNITION TIMING

Setting - 2° BTDC (6 Cyl.), 4° BTDC (Others Exc. 277" Eng. with Power Package), TDC (277" Eng. with Power Package). *NOTE* - It is recommended that only premium grade gasoline be used in "Fury" engines and V8 engines with Power Package.

Timing Mark - Fan Drive Pulley or Vibration Damper.

CARBURETOR
6 CYLINDER ENG.

▷*CARBURETOR APPLICATION: Carter single barr l is standard equipment on Powerflow 6 engines. Stromberg dual barrel carburetor with special larger air cleaner, intake manifold, and gear ratio of 3.9–1 on Power Package engines.*

THROTTLE LINKAGE ADJUSTMENT (PowerFlite): Loosen vertical clamp rod and adjust the carburetor throttle lever rod to provide a 5 7/16" distance between the anchor points of the throttle return spring. Then with engine idling (off fast idle), take up slack at the vertical rod and tighten the clamp nut.

THROTTLE PRESSURE ADJUSTMENT: *See "PowerFlite" Transmission in Transmission Section.*

CARTER BBS

Model	Carburetor Model
Synchro-mesh	2063SA ℂ, 2293S
Overdrive	2062SA ℂ, 2294S
PowerFlite	2116SA ℂ, 2295S
City Traffic	② 2403S
Taxicab	2410S

ℂ - Temporary production. ② - With Throttle Restrictor.

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Idle Setting - ½-1½ turns open (2062SA, 63SA, 2116SA), ½-1¾ turns open (2293S, 94S, 95S; 2403S), 1-2 turns open (2410S). Turn screw out for richer mixture.

Idle Speed - 450-500 RPM (Synchro-mesh & Overdrive), 475-500 RPM (PowerFlite - In Neutral).

Float Level - 7/32" (Except 2403S, 10S), 9/32" (2403S, 10S) from top of each float to top surface of body casting with float pin retainer removed and float pin at bottom of guide slots.

Accelerating Pump - Install connector rod in center hole of throttle lever (medium stroke).

Fast Idle: .022-.026" (2062SA, 63SA, 2116SA), .016-.020" (All Others) clearance between lower edge of throttle valve and carburetor bore with fast idle cam in fast idle position. Adjust by bending connector rod at lower angle (Tool T109-213).

Automatic Choke: Centered - At Index (All Models).

Slow Closing Throttle (Dashpot): Maximum dashpot action is obtained by loosening locknut and adjusting dashpot unit so that dashpot plunger shaft can be moved inward approximately 3/32" with throttle valve fully closed.

Overdrive Kickdown Switch: With throttle valve in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kickdown lever and switch stem guide.

Throttle Linkage Adjustment (PowerFlite): *See CARBURETOR above.*

►*OTHER DATA: See "Carter BBS" Carburetor in Carburetion Section.*

Fuel Pump Pressure: 4-5½ lbs.

STROMBERG WW (DUAL)

Transmission	Stromberg Code No.
Synchro-mesh	3-124
Overdrive	3-125
PowerFlite	3-126

►***MANIFOLD FUEL DISTRIBUTION: Each barrel feeds all cylinders.***

Idle Setting - ¾-1¾ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed - 450-500 RPM Synchro-mesh & Overdrive, 475-500 RPM PowerFlite in neutral.

Float Level - 3/16" from top of main body to top of float, measured at center of float, with float lip held firmly against needle valve. Use depth gauge or Tool T-25569 to measure float level. To reset float level, bend float lever next to float with Tool T-24733.

Accelerating Pump - Normal setting, center hole: for less fuel install rod in inner hole; for more fuel install rod in outer hole.

Fast Idle: With throttle valves in fully closed position turn throttle stop screw in until it just contacts throttle lever, then turn stop screw in 5 1/8 turns. When properly adjusted a No. 59 drill gauge should just pass between throttle valve and wall of carburetor body. With choke valve closed and throttle lever held against throttle stop screw, a No. 48 drill gauge should just fit clearance between ear on contact lever and first step of fast idle cam. To adjust bend cam contact ear.

Automatic Choke: Centered at Index.

Kickdown Switch Adjustment: With throttle valves in wide open position, there should be 1/64"-1/32" clearance between ear on throttle lever and threaded section of switch housing. To adjust, loosen adjusting nuts and adjust to correct position.

Slow Closing Throttle (Dashpot) Adjustment: With throttle stop screw set for normal idle speed, there should be a 1/16"-1/32" clearance between end of dashpot plunger and ear of throttle lever when dashpot plunger is pushed into end of its stroke.

Throttle Linkage Adjustment (PowerFlite): *See CARBURETOR above.*

►*OTHER DATA: See "Stromberg WW (Dodge & Plymouth)" Carburetor in Carburetion Section.*

CARBURETOR

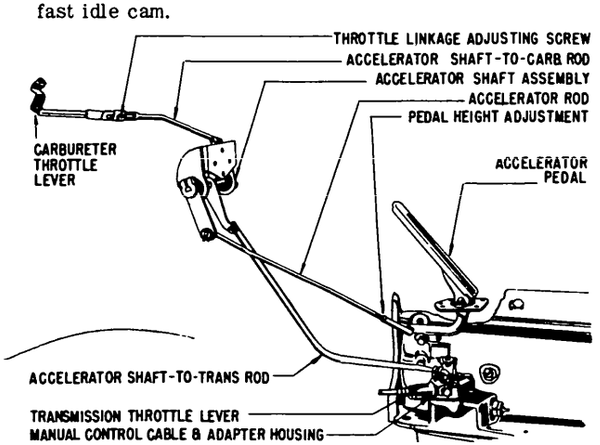
►*CARBURETOR APPLICATION NOTE: Carter Dual Carburetors standard on all engines. Carter Four Barrel Carburetors used on 277 cu. in. engine with Power Package and 303 cu.in. "Fury" Model.*

►*EXCESSIVE FAST IDLE OR CONTINUOUS FAST IDLE AFTER WARM-UP CORRECTION:* When above condition exists on early production (277 Cu. In. Eng.) cars, check for installation of late type fast idle cam, identified by yellow coating over plating or 1/8" circle on inside face near trademark. Check fast idle adjustment. *See "Fast Idle Adjustment" below.*

►***"FURY" IMPROPER CHOKE ACTION CORRECTION (Due to Interference Between Carburetor Throttle Lever & Dashpot):*** **Install three regular gaskets, Part No. 1731516. Place spacer on intake manifold first, then regular gaskets. Three regular gaskets can be used if spacer not available. Correction has been made on later cars.**

►*CARBURETOR PRODUCTION CHANGE:* **Dashpots were eliminated on all V8 cars with PowerFlite about the middle of 1956.**

THROTTLE LINKAGE ADJUSTMENT (PowerFlite): Loosen locknut on throttle control rod and slide the rear part of rod toward the rear of car to take up all slack. Tighten locknut. Be sure carburetor is "OFF" fast idle cam.



POWERFLITE THROTTLE LINKAGE 6 CYL. & V8

Throttle Pressure Adjustment (PowerFlite): *See "PowerFlite" Transmission in Transmission Section.*

CARTER BBD (Dual) (277 Cu. In. Eng.)

Transmission	Carter Carb. Nos.
Synchro-mesh	①BBD 2299S or 2407S
Overdrive	①BBD 2300S or 2408S
PowerFlite	**①BBD 2301S or 2409S, SA**

(270 Cu. In. Eng.)

Synchro-mesh	②BBD 2259SB or 2422S
Overdrive	②BBD 2260SB or 2423S
PowerFlite	②BBD 2261SB or 2424S

① - "Cross-over" type choke. ② - "Integral" choke.

Idle Setting - ¼-1¼ turns open (2259SB, 60SB, 61SB), ½-1½ turns open (All Others). Turn both screws out equally for richer mixture.

Idle Speed-450-500 RPM (Synchro-mesh or Overdrive), 475-500 RPM (PowerFlite in neutral).

Float Level - ¼" distance from top surface of body castcasting to top of each float (float pin retainer and gasket removed and float pin down at bottom of guide slots. *NOTE* - This supersedes previous setting of 7/32" on some models.

Accelerating Pump (277")-Install connector rod in center hole (Medium stroke) of throttle lever and inner hole of pump arm.

Accelerating Pump (270")-Install throttle connector rod in outer hole (medium stroke) of throttle lever and inner hole of pump arm.

Fast Idle Cam Clearance (277"): .020" (Gauge T109-29) between lip on fast idle cam and boss on casting with choke valve closed and lip on inner choke shaft lever contacting lug on outer lever. Adjust by bending lip on inner choke shaft lever. On late carburetors, align index mark on cam with adjusting screw.

Fast Idle Throttle Clearance (270" & 277"): .015-.019" (270"), .015" (277") clearance between lower edge of throttle valve and carburetor bore with adjusting screw on high step on cam.

Automatic Choke (Integral Type): Set at Index.

Slow Closing Throttle (Dashpot): Maximum dashpot action is obtained by placing 1/16" gauge between shaft and operating lever, then adjust dashpot in or out to obtain fully closed throttle.

Overdrive Kickdown Switch: With throttle valves wide open there should be 1/64-3-64" between kickdown lever and switch stem guide.

Throttle Linkage Adjustment (PowerFlite): *See CARBURETOR above.*

►*OTHER DATA: See "Carter BBD (Dual)" Carburetor in Carburetion Section.*

Fuel Pump Pressure: 5-6½ lbs.

Model	CARTER WCFB Carburetor Model
All Trans. (277 Cu. In. Eng.)	WCFB 2302S, SA, SB
"Fury" (303 Cu. In. Eng.)	WCFB 2442S

►***MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.***

Idle Setting - 1 - 2 turns open. Turn screws out for richer mixture.

Idle Speed - 450-500 RPM (Synchro-mesh & Overdrive), 475-500 RPM (PowerFlite), with transmission in neutral.

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Throttle Linkage Adjustment: *See CARBURETOR above.*
▷*OTHER DATA: See Carter "WCFB" Carburetors in Carburation Section.*
Fuel Pump Pressure: 5 - 6½ lbs.

CARB. EQUIPMENT

Fuel Pump: Carter or Auto-Lite. Mechanical type.

Model	Auto-Lite	Carter
6 Cyl. (All)	FA-4005	M2242S
V8 (270° Eng.)	FB-4006	M2361S, M2348S
V8 (Others)	FB-4006	M2241S

Pressure - 5 - 6½ lbs.
See "Fuel Pumps" in Carburation Section.
Gasoline Gauge: Auto-Lite. Electric type.
Dash Unit - 14038A (Suburban), 13997A (Others).
Tank Unit - 13905A (Suburban), 13969A (Others).
See "Fuel Gauges" in Carburation Section.

BATTERY

Auto-Lite 11-HS-50 or Willard HO-11-50 (Std.). *12 Volt,* 9 plate, 50 ampere hour capacity.
Optl. (Warm Climate) - Auto-Lite 11-MS-45 or Willard MO-11-45. *12 Volt,* 7 plate, 45 ampere hour capacity.
Grounded Terminal - Negative.
▷*CAUTION - This is reversed from previous models.*
Engine Ground - Left front of engine.

STARTER

6 Cyl. - Auto-Lite MDG-6001 (Std.), MDF-6002 (PowerFlite). *12 Volt.*
V8 - Auto-Lite MDG-6002 (Std.), MDF-6007 (PowerFlite). *12 Volt.*

Armature (All) - Auto-Lite MDF-2088.
Drive - Bendix "Folo-Thru" type EBB 20.
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 42-53 ozs. (with new brushes).

Performance Data - MDF

Torque	RPM	Volts	Amperes
0 ft.lbs.	3200 min.	10.0	60 max.
6.5 ft.lbs. min.	Lock	4.0	240 max.

Performance Data - MDG

Torque	RPM	Volts	Amperes
0 ft.lbs.	4400 min.	10.0	50 max.
5 ft.lbs. min.	Lock	4.0	210 max.

Starting Switch: Auto-Lite SAE-4001 (Std.), SAE-4002 (PowerFlite). Magnetic type switch controlled by ignition switch. Neutral safety switch mounted on transmission on Automatic Transmission cars. *See "Starter Controls" in Electrical Section.*
Neutral Safety Switch Adjustment: *See "PowerFlite" Transmission in Transmission Section.*

GENERATOR

12 Volt. Application as follows:

Auto-Lite Generator No.	Armature No.
GJC-7002A or GGA-6001L (6 Cyl. Std.)	GJC-2030F
GJC-7001A or GGA-6003A (V8 Std.)	GJC-2030F
GJC-7003B or GGA-6002A (Pow. St.)	GJC-2090F
GJC-7006B or GGA-6001N (Air Con.)	
GJC-7003C or GGA-6002C (P.S. & A.C.)	

▷*SPECIAL GENERATOR NOTE: GGA & GJC* type generators used. Performance specifications below apply equally to all generators within either of the groups specified.

Performance Data - GGA - 12 Volt

Amperes	Volts	RPM 70° F.
4.0	14.6	950 max.
40.0 ①	14.6	1600 max.
40.0 ①	15.0	1600 max.

Performance Data - GJC - 12 Volt

Amperes	Volts	RPM Cold
20.0 ①	15.0	1750 max.
30.0 ①	15.0	2050-2250

① - Do not operate at high output without ventilating fan for any length of time. To do so may result in burned armatures and fields.

Brush Spring Tension - 18/36 ozs. (GJC), 34-41 ozs. (GGA) with new brushes.
Field Current - 1.2-1.3 amps. (GJC), 1.1-1.3 amps. (GGA), all at 10.0 volts (70°F.).
Metering Current - 3.4-3.9 amps. (GJC), 2.3-2.6 amps. or 3.1-3.5 amps. with felt oil seal in drive end head (GGA), all at 10.0 volts (70° F.).
Rotation - Counter-clockwise at commutator end.
Belt Adjustment: 1/2" deflection between generator and compressor (air conditioning) or water pump (Others) with normal thumb pressure.

REGULATOR

12 Volt. Use with generators as follows:

Auto-Lite Regulator No.	Generator
VAT-6201A	GGA
VRX-6201A	GJC

Cutout Relay
Cuts In - 13.0-13.7 volts (VRX), 13.0-13.75 volts (VAT).
Cuts Out - 8.2-9.3 volts (approx. 3-5 amps. discharge).
Contact Gap - .015".
Air Gap - .031-.034".

Voltage Regulator
Setting - 14.5 volts at 80° F. while charging at 10.0 amperes or with .25 ohm resistor in series between regulator and battery.
Air Gap - .048-.052" with contacts just opening.
Checking & Adjusting - *See Electrical Section.*

Current Regulator
▷*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A - Operating Amperes	Test B
VRX	36 Max.	30 (28-32)
VAT	46 Max.	40 (38-42)

Test A - After 15 minutes operation charging at 10 amperes.
Test B - After additional 15 minutes operation on current regulator (load applied to hold voltage at 13.7-13.9 volts (VAT), 13.6-13.8 volts (VRX).
Air Gap - .048-.052" with contacts just opening.
Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signal: *See Electrical Section.*
▷*IGNITION - STARTER SWITCH CAUTION: When installing accessories, use accessory terminal only on ignition-starter switch and not ammeter terminal post.*
Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut. Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft. Headlamp knob is held on its shaft by a recessed hex screw.
Stop Light Switch (Location): On forward end of master cylinder.

CIRCUIT BREAKERS: Lighting - 20 ampere. Mounted on headlight switch. Protects all lighting circuits.
Windshield Wiper & Back-Up Lights - 5 ampere (single speed wiper), 8 ampere (2-speed wiper). Mounted on wiper switch. Protects wiper and back-up lights.
HORNS: Auto-Lite. Dual horns with relay.
High Pitch - HAD-4702.
Low Pitch - HAD-4701.
Horn Relay: Auto-Lite RAH-4002.

ENGINE

6 CYL. ENGINE

ENGINE SPECIFICATIONS: Six Cylinder "L" head.

Bore	Stroke	Displacement
3½"	4 5/8"	230 cu. ins.

Compr. Ratio	Rated HP	Developed HP
7.6-1 ①	25.4	② 125 at 3600 RPM

① - 7.9-1 compression ratio engine available for taxicabs and other vehicles with H.D. 10" clutch. Special cylinder head used, Part No. 1676377.
② - 131 at 3600 RPM with Power Package.
Compression & Vacuum Reading - *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Plymouth Special Data.*
OIL PAN REMOVAL: Remove clutch housing pan to prevent damaging oil pan gaskets on clutch housing pan dust seal. Turn crankshaft so No. 1 connecting rod journal is at bottom dead center. Remove tie rod. Remove oil level indicator. Drop pan and while holding up oil strainer so it clears baffle inside pan, slide pan to rear and remove. NOTE— New end gaskets should protrude 1/8" above oil pan. *Ends must not be cut off.*

ENGINE MOUNTINGS: *See "Engine Mountings" in Plymouth Special Data.*
CYLINDER HEAD: *See "Cylinder Head & Manifold" in Plymouth Special Data.*
▷*MANIFOLD INSTALLATION CAUTION:* Two long capscrews extend into cylinder block water passage. Before installing, apply sealer to these capscrews. It is important that conical washers at flange ends of exhaust manifold be installed to permit expansion and contraction without loosening
TIGHTENING TORQUES: *See "Tightening Specifications" in Plymouth Special Data.*

PISTONS

Aluminum alloy, U-slot, cam grouhd type.
▷*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" Oversize.*
Weight - 16 ozs. (stripped).
Removal - Pistons and rods removed from above.
Fitting New Pistons: .0007" measured ¾" from the bottom on thrust face. With piston pin and rings removed, cylinder wall and piston dry and clean, insert

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piston, upside down, into cylinder bore, with feeler stock, .002" x 1/2", inserted between cylinder wall and piston, on high spot of piston contour. Pull to withdraw feeler should be 6-10 lbs.

Replacement Pistons: Std., .005", .020", .030", .040", .060" Oversize.

Installing Pistons: "U" slot away from valves.

PISTON PINS

Full floating type.

Diameter—55/64". **Length**—2-3/4".

Pin Fit in Piston—.0000-.0005". DOUBLE THUMB push fit at room temperature (70° F.).

Pin Fit in Rod Bushing—.0001-.0002". Tight thumb push fit at room temperature (70° F.).

Replacement Pins: Std., .003", .008" Oversize.

NOTE—Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.010-.020"	.0025-.004"
Compr. (#2)	3/32"	.010-.020"	.002-.0035"
Oil (#3)	5/32"	.010-.020"	.001-.0025"
Oil (#4)	5/32"	.010-.020"	001-.0025"

Replacement Rings: Std., .010", .020", .030", .040", .050", .060" Oversize.

Installing Rings: #1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down, if step on outer edge).

CONNECTING RODS

Length (Center.to.Center)—7 13/16"

Weight—27.9 ozs

►*THICKER WALL-BEARING & JOURNAL DIAMETER CAUTION (One or more Journals Machined Undersize). "See "CRANKSHAFT" below.*

Crankpin Journal Diameter—2.0625".

Maximum out-of-round and taper limits—.001".

Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*

Clearance—.0005-.0015".

Endplay—.006-.011".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Std., .001", .002", .003", .010", .012", .020" Undersize.

Installing Rods: Oil metering hole toward valve side of engine.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Four bearing.

Bearing Type—Removable, precision type, thin babbitt on steel. No shims.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows: **.010" UNDERSIZE (All Main & Connecting Rod Journals)**—Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—When replacing bearings, look for stamped number on middle throw arm of crankshaft. An "M" or "R" followed by a number indicates that a main or connecting rod bearing has a thicker-wall bearing. For example "M2" and "R1" means that .001" thicker-wall bearing inserts are used on the No. 2 main bearing and the No. 1 connecting rod bearing.

Clearance—.0005-.0015".

Replacement Bearings: Std., .001", .002", .003", .010", .012", .020", .030", .040" Undersize.

Crankshaft Rear Oil Seals: *See "Crankshaft & Main Bearings" in Plymouth Special Data*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Plymouth Special Data*

End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**—.003-.007".

CAMSHAFT

Journal Diameters—(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-1/4".

Bearings—Removable, steel-backed babbitt lined bushings (exc. #4— machined in crankcase).

Clearance—.001-.003" NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.

Removal & Installation: *See "Camshaft & Bearings" in Plymouth Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width—1". **Pitch**—.500". **Length**—24" or 48 links.

Camshaft Setting: Sprockets marked. Mesh chain in sprockets with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

Engine Front Cover Installation: *See "Engine Front Cover" in Plymouth Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Plymouth Special Data.*

VALVES

Tappet Clearance: .010" Intake. .010" Exhaust. Engine hot and idling. NOTE—.002" additional clearance on exhaust tappets if car driven at continuous high speed.

Valves	Head Diam.	Stem Diam.	Length
Intake	1-17/32"	.340-.341"	4-27/32"
Exhaust	1-13/32"	.340-.341"	4 25/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	.365"	.001-.003"
Exhaust	45°	.365"	.003-.005"

Valve Seat Width—1/16-3/32". Runout .0015" maximum.

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Plymouth Special Data.*

Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, ream guides to inside diameter of .342-.343" (Intake), .344-.345" (Exhaust). *CAUTION—Guides must be installed with counterbore end UP on exhaust valves and counterbore end DOWN on intake valves.*

Valve Springs: Can be installed with closely coiled end at either top or bottom. *NOTE—Springs are available in several colors. Colors do not refer to spring tension but merely identify the manufacturer.*

Free Length—2".

Valve Spring Specifications	Spring Pressure	Length
Valve Closed	40-45 lbs.	1-3/4"
Valve Open	110-120 lbs.	1-3/8"

Valve Lifters: Mushroom type (remove from below).

Stem Diameter—5/8". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".

Lifter Clearance in Block—.002" maximum.

V8 ENGINE

►***AIR CONDITIONED CAR SERVICE CAUTION:*** *Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ENGINE NOTE:* Three engines used. All have polyspherical combustion chamber with lateral valves and single rocker arm shaft. Bores and strokes differ in engines as indicated in Specifications below.

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Engine	Bore	Stroke	Displacement
P-29-1,2,3 Std.	3.75"	3.13"	277 cu. ins.
P-29-1,2 Optl.	3.63"	3.256"	270 cu. ins.
P-29-3 (Fury)	3.8125"	3.3125"	303 cu. ins.

Engine	Compr. Ratio	Rated HP	Dev. HP at RPM
P-29-1,2,3 Std.	8.0	45.0	①187 at 4400
P-29-1,2 Optl.	8.0	42.2	180 at 4400
P-29-3 (Fury)	9.25	46.5	240 at 4800

①- 200 at 4400 RPM with Power Pack.

Compression & Vacuum Reading - *SEE TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Plymouth Special Data.*

ENGINE MOUNTS: *See "Engine Mountings" in Plymouth Special Data.*

OIL PAN REMOVAL: Remove starter, clutch housing dust cover, front and rear engine mounting bolts, oil pan capscrews, and idler bracket at right frame sub side rail. Lower tie rods. Place base of hydraulic jack against lower control arm and opposite end of jack against torque converter housing at starter location. Move engine approximately ¾ - 1" toward rear of car and remove oil pan.

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Plymouth Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Plymouth Special Data.*

PISTONS

Aluminum alloy, elliptically turned, horizontal slot, tin-plated, thermally controlled by steel band.

Clearance - .005-.0015" at top of skirt. Pull to withdraw .0015" x 1/2" feeler should be 5-10 lbs. at 70° F.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" oversize.*

Removal: Pistons and rods removed from above

Replacement Pistons: Std., .005", .020", .030", .040",

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.060" oversize

Installing Pistons: Assemble pistons to connecting rod on right hand cylinder bank (2-4-6-8) with indent on top of piston on side opposite to large chamfer at insert end of connecting rod. On left bank (1-3-5-7) assemble with indent on same side as large chamfer at insert end of connecting rod. *See Rod Installation*

PISTON PINS

Full floating type.

Diameter - .859" (270 Cu. In. Eng.), .984" (Others).

Clearance in Piston - .0000-.0005". Tight double thumb press fit at 70° F.

Clearance in Rod - .0001-.0004". Tight thumb press fit at 70° F.

Replacement Pins: Std., .003", .008" oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	.0775-.0780"	.010-.020"	.0015-.003"
Compr. (#2)	.0775-.0780"	.010-.020"	.001-.0025"
Oil (#3)	.1860-.1865"	.010-.020"	.001-.003"

Replacement Rings: Std., .010", .020", .030", .040", .050", .060" oversize.

Installing Rings: Compression rings with step on inner edge up.

CONNECTING RODS

Length (Center to Center) - 5.94" (270 Cu. In. Eng.), 6.12" (Others).

Crankpin Journal Diameter - 1.94" (270 Cu.In. Eng.), 2.13" (Others).

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE): See "CRANKSHAFT" below.*

Lower Bearing - Replaceable, precision type.

Clearance - .0005-.0015" (270 Cu. In. Eng.), .0007-.0022" (Others).

Endplay—.006-.014" (two rods)

Bearing Adjustment: None. Replace bearings

Replacement Bearings: Std., .001", .002", .003", .010', .012" undersize

Installing Rods—*See "Pistons (Installation)" above.* Install rod and piston assembly with indent on top of piston pointing toward front of engine. NOTE—Connecting rod bores are chamfered more on one side than the other. Larger chamfer must be installed toward crankshaft journal fillet

►*BEARING INSERT CAUTION:* When installing lower bearing insert, make certain that "V" groove in insert is in line with "V" groove in cap. Tighten bearing cap nuts to 45 ft. lbs.

CRANKSHAFT

Journal Diameter - 2.38" (270 Cu. In. Eng.), 2.50" (Others).

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows:

.010" UNDERSIZE (Main & Connecting Rod Journals)—Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—When replacing bearings, look for stamped number on middle throw arm of crankshaft. An "M" or "R" followed by a number indicates that a main or connecting rod bearing has a thicker wall bearing. For example, "M2" and "R1" means that .001" thicker wall bearing inserts are used on the No. 2 main bearing and the No. 1 connecting rod bearing

Clearance - .0005-.0015" (270 Cu. In. Eng.), .0007-.0023" (Others).

Replacement Bearings: Std., .001", .002", .003", .012" undersize.

Crankshaft Rear Oil Seals: *See "Crankshaft & Main Bearings" in Plymouth Special Data*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Plymouth Special Data.*

End Thrust: Taken by center (No. 3) main bearing. **Endplay**—.002-.007"

CAMSHAFT

Journal Diameters—(1) 2", (2) 1 63/64", (3) 1 31/32", (4) 1 61/64", (5) 1 9/16".

Bearings - Removable, Steel-backed babbitt.

Clearance - .001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay** - .002-.006".

Timing Chain: Width - 1.125" (270 Cu. In. & 303 Cu. In. Engs.), 1.02" (277 Cu. In. Eng.). **Pitch** - .38". **Length** - 68 Links.

Camshaft Setting: Place crankshaft "Zero" mark exactly in line with center of camshaft. Temporarily install camshaft sprocket less chain, line up dowel pin holes in hub and gear, while at the same time positioning camshaft gear "Zero" mark exactly in line with center of crankshaft. (A straightedge should be used to check accuracy of this alignment). Remove camshaft gear and engage with timing chain. Place timing chain over crankshaft gear and at the same time, slide the camshaft gear over end of camshaft, keeping timing mark in position With timing marks aligned, push gear on camshaft. *CAUTION* - block camshaft to prevent rearward movement. If shaft allowed to move back, there is possibility of striking rear camshaft plug.

Removal & Installation: *See "Camshaft & Bearings" in Plymouth Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Plymouth Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Plymouth Special Data.*

VALVES

Tappet Clearance: 270 Cu. In. Eng. - None in service. Hydraulic lifters.

277 Cu. In. Eng. - .008" Intake, .018" Exhaust, with engine hot and idling.

303 Cu. In. Eng. (Fury) - .010" Intake, .018" Exhaust, with engine hot and idling.

270 Cu. In. Eng.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.72"	.372-.373" ②	4.25"
Exhaust	1.47"	.371-.372" ②	4.20"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.360"	.001-.003"
Exhaust	45°	.360"	.002-.004"

277 Cu. In. & 330 Cu. In. (Fury)

Valve	Head Diam.	Stem Diam.	Length
Intake	1.84"	.372-.373" ②	4.54"
Exhaust	1.56"	.371-.372" ②	4.48"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.374" ①	.001-.003"
Exhaust	45°	.380" ①	.002-.004"

① - On 303 Cu. In. Eng. (Fury) Intake .379", Exhaust .376".

② - Standard. *See Valve Guides Below.*

Valve Seat Width—1/16-3/32" (Intake), 3/64-1/16" (Exhaust).

►*VALVE OVERSIZE NOTE:* "I" or "E" stamped on cylinder head at rock cover gasket boss, indicates that all intake or exhaust valves are oversize in that bank depending upon what letter is stamped.

►*VALVE GRINDING CAUTION:* If the position of the valve in the head has been changed (due to valve or valve seat grinding) so as to shorten the operating length of 1/32" or more from its factory installed position, the dimension from valve spring seat in the head to valve tip should be checked with gauge C-3436, If the valve tip exceeds the maximum allowable on the gauge, grind the tip as necessary (do not go below the minimum allowable on the gauge) Improper valve clearance at high speed will result if this condition is not corrected.

Valve Guides: Cast integral with cylinder head Service as follows. When valve stem clearance excessive, use Reamer Tool Set to ream guides for NEXT OVERSIZE Valve as follows Tool C-3433 (.005" O.S.), Tool C-3430 (.015" O.S.), Tool C-3427 (.030" O.S.) Valves furnished Std and .005", .015", .030" Oversize

►*VALVE SPRING NOISE CORRECTION:* Adjust tappets. If noise continues, increase engine revolutions until noise is at highest level, then rotate valve spring left to right ¼ to ½ turn.

Valve Springs: Same spring used on intake and exhaust valves. **Free Length.**- 1 15/16" (270"), 2" (Others).

270 Cu. In. Eng.

	Pressure	Length
Valve Open	134-146 lbs.	1 5/16"
Valve Closed	49-57 lbs.	1 11/16"

277 Cu. In. & 303 Cu. In. (Fury)

	Pressure	Length
Valve Open	160-172 lbs.	1 5/16"
Valve Closed	68-76 lbs.	1 11/16"

►*VALVE SPRING HEIGHT CAUTION.* If valves or seats are reground, check **installed** height of spring If height of spring is 1-11/16" or greater, install a 1/16" spacer (Part No 1400482) in the head counterbore to bring spring height back to nominal 1 5/8—1 11/16"

►*VALVE SPRING NOISE CORRECTION (Caused by Spring Striking Head at Edge of Valve Recess).* To correct, bevel or chamfer edge of recess to provide necessary clearance for spring

Valve Lifters (270 Cu. In. Eng.): Hydraulic, one-piece integral type.

See "Hydraulic Valve Lifters" in Plymouth Special Data.

Valve Lifters (Others): Mushroom type. Remove from below.

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VALVE TIMING

S *"Camshaft Setting" under CAMSHAFT above.*

6 Cyl. Engine

Intake Valves - Open 12° BTDC, Close 44° ALDC.
Exhaust Valves - Open 50° BLDC, Close 6° ATDC.

V8 (270 & 277 Cu. In. Engines)

Intake Valves - Open 14° BTDC, Close 50° ALDC.
Exhaust Valves - Open 52° BLDC, Close 12° ATDC.

V8 (303 Cu. In. Eng. - Fury)

Intake Valves - Open 9° BTDC, Close 55° ALDC.
Exhaust Valves - Open 47° BLDC, Close 17° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add one additional quart when filter changed.

Normal Oil Pressure: 40-50 lbs. at 25-30 MPH.

Oil Pressure Relief Valve - (6 Cyl.) Located on left side of cylinder block below starter. **(V8)** Located on oil pump body. Adjustable by replacing springs.

►*OIL PRESSURE RELIEF VALVE NOTE:* Springs identified as follows:

6 Cyl. Engine

Color	Free Height	Spring Pressure & Checking Height
Gray (Light)	2 1/16"	16.1-17.1 at 3 1/32"
Red (Standard)	2 1/16"	19.5-20.5 at 2 27/32"
Brown (Heavy)	2 1/16"	22.9-23.9 at 2 31/32"

Color	Free Height	Spring Pressure & Checking Height
Red (Light)	1 13/16"	12 4-13 8 at 1¼'
Black (Standard)	1 13/16"	14 4-15 8 at 1¼'
Green (Heavy)	1 13/16"	16 2-17 8 at 1¼"

Oil Pressure Gauge

Oil Pump (6 Cyl.): Rotor type. On right side of crankcase.

Oil Pump (V8): Rotor type. In crankcase at rear end. Mounted on rear bearing cap.

Priming Oil Pump (V8 - After Overhaul) - Prime oil pump before installing oil pump and strainer to rear main bearing cap.

Overhaul (All) - *See "Oiling System" in Plymouth Special Data.*

Oil Filter: Different types used as follows:

6 Cyl. Engines - By-pass type. With relief valve closed, all oil passes through filter. When oil pressure is greater than relief valve tension, valve starts to open, and excess oil returns to crankcase. *NOTE* - No filter used on P-28-1.

270 Cu. In. V8 Eng. - Shunt type. A portion of oil from oil pump is directed through filter and remainder flows into engine lubrication system.

277 & 303 Cu. In. Engs. - Full flow type. All oil enters engine lubrication system through filter at full pump pressure. Safety valve in filter opens if filter is clogged, allowing oil to pass into lubrication system under a reduced pressure.

Filter Element - Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: (P-28) 13 qts., (P-29 270" Eng.) 19 qts., (P-29 Others) 20 qts. Add one additional quart for models with heater.

Pressure Valve (Exc. Fury & Air Cond.) - Plymouth 1373136. Radiator filler cap. Opens at 7 lbs.

Pressure Valve (Fury & Air Cond.) - Radiator filler cap. Opens at 14 lbs.

Thermostat: Bellows type (Exc. Fury & Air Cond.). Pellet type (Fury & Air Cond.). Located in cylinder head water outlet. Bellows type starts to open at 155-160° F. Pellet type starts to open at 157-162°.

Water Pump: (6 Cyl.) - Packless type. Grease fitting for lubrication.

(V8) - Ball bearing type. No lubrication required. *NOTE* - 270 Cu. In. Engine pump not interchangeable with pumps on other V8 models.

Water Distribution Tube (6 Cyl. Eng.): *See "Cooling System" in Plymouth Special Data.*

Temperature Gauge: Auto-Lite 13998A. Electric type.

CLUTCH

Borg & Beck. *NOTE* - Auburn Clutch Optional on 6 Cyl.

Borg & Beck	Model	Assy. No.	Disc. No.
P-28 (Exc.Stn.Wgn.)	9A7	361373	382237
P-28 (Stn.Wgn.)	10A7	361368	382358
P-29	10A7	361368	382358
P-28 H.D.	10A7	361378	382358
P-29 H.D.	11A6	929	381850
P-28 (Can.)	9A7	361383	382237
P-29 (Can.)	10A7	361368	382358
P-88, 29(Can.) H.D.	11A6	929	381850

Auburn - Assembly No. 100052-2 (P-28 Std.).
See Borg & Beck" or "Auburn" Clutches in Clutch Sect.

Pedal Adjustment: Turn clutch release fork rod adjusting nut until 3/16" free movement of clutch fork outer end is obtained. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: Tighten eyebolt sleeve on clutch pedal overcenter spring bolt finger tight with pedal in depressed position, then tighten four complete turns.

Removal: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods. Remove transmission (See Synchro-mesh Transmission). Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel, loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse)
See "Plymouth Synchro-mesh" in Transmission Section.

Transmission Controls *See "Transmission Controls" in Transmission Section*

►*CAR TOWING CAUTION* If car is to be towed long distances, disconnect propeller shaft at rear axle carrier.

Removal: Disconnect propeller shaft, speedometer cable, hand brake cable, and control rods. If transmission is to be disassembled, apply hand brake to hold mainshaft while loosening flange nut. This method will also prevent possible brinelling of bearings, or other damage caused by pounding on wrench. Remove transmission by pulling it straight back until pinion shaft clears clutch disc before lowering transmission. This precaution will avoid bending clutch disc.

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down
See "Warner R10" Overdrive in Transmission Section

Overdrive Controls *See "Overdrive Controls" in Transmission Section*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary transmission
See "PowerFlite" Transmission in Transmission Section

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION* *See "PowerFlite" Transmission in Transmission Section*

►*TESTING & TROUBLE SHOOTING* *See "PowerFlite" Transmission in Transmission Section*

►***THROTTLE VALVE "BUZZING" DURING DOWNSHIFT CORRECTION: See Production Changes under "PowerFlite" Transmission in Transmission Section.***

►***DRAINING OF TRANSMISSION PROCEDURE CHANGE:*** Approximately April 15, 1956 oil pan drain plug was discontinued. Draining of transmission is accomplished by removing filler tube connector at oil pan.

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid "Type A".

►***OVERFILLING CAUTION:*** High engine speed or high temperature operating conditions may cause transmission oil to expand to point where transmission is, in effect, overfilled, causing governor pressure to drop to point to cause a high speed downshift in transmission. *See "Checking Fluid Level" below.*

Checking Fluid Level - Manufacturer recommends checking fluid level with engine cold (70° F.).

Cold Check - If oil level between (L) Low mark and end of dipstick, **1 pint** of Transmission Fluid "Type A" may be added, but no more than 1 pint.

After Operation Check - If oil level is above (L) Low mark, do not add oil. If oil level is above (F) Full mark, drain to ½" below full mark. Add oil ONLY WHEN OIL LEVEL IS BELOW THE (L) LOW MARK on dipstick and transmission has been brought up to actual operating temperatures. In this case add **1 pint** of oil only.

Oil Filler Tube (Location) At right rear of engine compartment

►*CAUTION* To prevent dirt from entering transmission make sure oil level indicator is properly seated in filler tube.

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►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Universal. Ball & Trunnion, front and rear (Exc. Fury). Ball & Trunnion - front, Cross type - rear (Fury).

REAR AXLE

Own. Semi-floating with separate carrier and Hotchkiss Drive.

Transmission (Ratios)	Standard	Optional
Standard	3.73-1	3.54,3.9,4.1,4.3-1
Overdrive	4.1-1	3.9, 4.3-1
PowerFlite (P-28)	3.73-1	3.9, 4.3-1
PowerFlite (P-29)	3.54-1	3.73, 3.9, 4.1-1
PowerFlite (Fury)	3.73-1	3.54, 3.9-1

►*REAR WHEEL BEARING PRODUCTION CHANGE:* Rear wheel bearing grease holes and plugs were eliminated during production. Relubrication during normal life of car is not required (clean and repack bearings if removed).

Backlash—.006-.010"

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly

Axle Shaft Removal: Remove wheel, drum, and hub assembly (use screw type hub puller—Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 Puller)

Wheel Bearing Adjustment: Shims between backing plate and axle housing With wheel and hub removed check endplay with dial indicator To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick (equally at both wheels). **Endplay**—.003-.008"

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic type Serviced by replacement

FRONT SUSPENSION

Independent. Coil springs and direct-acting shock absorbers. Shock absorbers located within coil springs.

Kingpin Inclination: 5—6½° at 0° camber

Caster—Neg. 2° to 0° (Left side 0° to Neg. ¾° more than right side, Right side 0° preferred)

Camber—Neg. 1/8° to Pos. 5/8° (Left side Pos. ½°, Right side 0° preferred)

Toe-In - 1/8" preferred.

Toe-Out on Turns - With inside wheel at 20°, outside wheel should be 17½-19°.

STEERING

Manual: Gemmer. Worm and three-tooth roller *See "Gemmer Worm & Roller" in Steering Section.*

Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column *See "Coaxial" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Plymouth "Safe-Guard" Lockheed hydraulic *See "Plymouth Safe-Guard" in Brake Section*

Drum Diameter - 10" front and rear (P-28), 11" front, 10" rear exc. Suburban (P-29), 11" rear (P-29 Suburban), 11" front and rear (Fury).

Wheel Cylinder Diameter - 1 1/8". Single acting (front), double acting (rear).

Lining - Molded asbestos (bonded to shoe).

Width - 2". **Thickness** - 3/16". **Length** - (P-28 Exc. Rear Secondary) 10.5". (Rear Secondary) 8". (P-29 & Fury-Exc. Rear Secondary) 11.5". (Rear Secondary) 8.8".

Braking Power - 60% front (P-28 & Fury), 40% rear (P-28 & Fury). 62% front (P-29), 38% rear (P-29).

Clearance - .006" at each end of all shoes.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid - Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal - Disconnect pushrod. Disconnect stop light wires and brake line tube at master cylinder. Remove four stud nuts from studs, remove master cylinder.

►*MASTER CYLINDER REPLACEMENT COVER CAUTION:* Some new replacement covers have reduced lower crown or a reduced overall height. Original hold-down bolt will bottom when used with these covers. Use bolt, Part No. 1671571, which is ¼" shorter.

Power Brakes: Synchro-mesh Cars - Integral type. Replaces regular master cylinder. Unit mounted on engine side of firewall.

PowerFlite Cars - Bellows type. Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder).

Removal of Integral Type Power Unit - Same as for standard master cylinder, after stop light wires and hydraulic lines are removed.

Removal of Bellows Type Power Unit - Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket, to prevent trigger arm from extending beyond extremities of bracket *(NOTE* - If pedal linkage is allowed to extend through hole in dash panel, trigger arm may be damaged). Disconnect vacuum hose at power unit. Remove complete power unit and bracket assembly by removing four nuts and lockwashers.

Parking Brake: On shaft at rear of transmission 6" external contracting type used with Synchro-mesh Transmissions. 7" Internal expanding type used with Powerflite Transmission.

Adjustment—*See "Hand Brake Notes" in Plymouth Special Data.*

Lining—	Width	Thickness	Length
6" Ext Type	2"	5/32"	15 3/8'
7" Int Type	2"	5/32"	13 1/16"

Clearance (Internal Expanding) - Adjusting nut on shoe link backed off one notch from point where shoes just drag against drum, approximately .010".

Clearance (External Contracting) - Adjust anchor screw so clearance between band and drum at anchor is .015-.020".

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EPH-4101 (Std.), EPF-4001 (2-Speed - Optl.). *See "Auto-Lite Electric Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: *See "Plymouth Airtemp" Air Conditioning in Miscellaneous Section.*

Power Window Regulators: Electric type Reversible type motor in each window Controlled by door switch and master control switch *See "Electric Window Regulators" in Misc. Section.*

Power Seat Adjusters: Electric type *See "Power Seat Adjusters" in Miscellaneous Section.*

Convertible Top Control: Electrical-hydraulic type. *See "Power Top Controls" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	95
Intake Manifold	40
Exhaust Manifold	25
Oil Pan	12
Main Bearing Caps (Exc Rear)	95
Main Bearing Cap (Rear)	120
Flywheel	95
Con Rod Caps	45
Rocker Arm Cover	3
Pushrod Cover	10
Water Pump Mounting	15

ENGINE

ENGINE REMOVAL: *NOTE—The engine may be removed with the transmission attached, however if it is desired to remove transmission before removing engine, see "Transmission Removal" on Car Page.*

1) Drain engine oil, water, and transmission lubricant. With hood raised, remove hinge to cowl attaching screws and hinge to hood attaching screws, and remove hood.
2) Remove battery. Remove carburetor air cleaner and disconnect throttle linkage. On cars with power steering, remove power steering pump belt and pump with mounting bracket, leaving hoses connected. Place pump in position where it will not become damaged. Remove upper and lower radiator hoses and disconnect heater line from intake manifold and bottom of radiator
3) Disconnect flex fuel line at fuel pump, oil pressure gauge line at connector near dash, and windshield wiper vacuum hose at rear of engine. Disconnect power brake vacuum hose at check valve to carburetor pipe. Remove thermo gauge unit from fitting in intake manifold. Disconnect coil primary lead at coil Disconnect generator to regulator wires from generator (release from clips retaining to valve cover and pull clear of engine).
4) Disconnect wire loom running to right headlight across radiator at junction block on right side of radiator support to fender brace and release loom from clips retaining it to radiator. Remove fan, fan shroud, and radiator
5) Remove engine right side apron and crankcase ventilator outlet pipe Disconnect exhaust pipe from exhaust cross over pipe. Disconnect wiring from starter solenoid. Remove gearshift linkage at transmission. Disconnect linkage from clutch throwout fork and remove clutch control countershaft bracket from flywheel housing on synchromesh cars.
6) Hook a chain fall to intake manifold by means of a strong chain threaded through the openings in manifold just behind carburetor. Raise engine just enough to take weight off engine insulators. Remove screws holding front and rear insulators to frame crossmembers
7) On Hydra-Matic Cars, support bottom of transmission with a jack and jack adapter J-2808 and remove frame crossmember to which engine rear insulators were fastened. *CAUTION*—Use care to prevent transmission swinging down when crossmember is removed.
8) Carefully hoist engine and transmission out of car checking frequently to see that sufficient clearance exists to prevent bending any parts.

ENGINE MOUNTINGS

FRONT INSULATOR: *NOTE—If new rear insulators are also to be installed, they should be installed first since the engine locates from the rear insulators.*

Removal: 1) Take weight of engine off insulators using suitable lifting equipment *(CAUTION—Do not use a jack under oil pan).* Remove screws fastening engine support to timing chain cover.
2) Remove screws which fasten insulator to frame front crossmember (these screws can be reached through an access hole in bottom of front crossmember). Raise engine just clear of insulator and support assembly
3) Disconnect exhaust crossover pipe at both manifolds and exhaust pipe so it can be lowered to provide clearance for removing insulator. Remove insulator and assembly.

Installation: 1) Position insulator and support assembly against timing chain cover and install attaching screws with lockwashers. Tighten to 60 ft. lbs.
2) Connect exhaust crossover pipe to both exhaust manifolds and exhaust pipe, using all new gaskets. Use four thin (075"), or two thick (.135") gaskets at each flange. Tighten attaching bolts securely. Lower engine and install frame to insulator screws with lockwashers and tighten

REAR INSULATOR: *NOTE—Rear insulator locates engine. Front insulator must be allowed to position itself after rear insulator installed.*

Removal: Remove two front insulator to frame bolts. Support engine securely at rear to remove engine weight from rear insulators *(CAUTION—Do not use jack under oil pan)* Remove two bolts holding each rear insulator to frame crossmember, and then remove insulators by removing two bolts holding each insulator to flywheel housing. Disconnect exhaust pipe from exhaust crossover pipe so exhaust pipe can be moved to gain access to right insulator frame bolts

Installation: Install new insulators on flywheel housing using lockwashers under each of two bolts holding insulator. Lower engine so rear insulators are resting on frame crossmember and insert insulator to frame bolts from top. Install self locking nuts and tighten to 35 ft. lbs. Raise front of engine slightly to take weight off front insulator, then lower engine completely so it rests on front insulator and install two front insulator to frame bolts (with lockwasher and flat washer on each)

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD: Removal—Remove intake manifold and push rod cover. Remove rocker arm covers (On left bank, remove spark plug wires and wire support). Remove battery and engine ground straps, Hydra-Matic level indicator tube bracket and indicator. Loosen all rocker arm adjusting nuts and move rocker arms off pushrods Remove pushrods and place in order so they can be reinstalled in the same position (*NOTE*—The rearmost pushrod on left bank (cars with defroster) cannot be removed withdraw rod part way and tie to head. Remove exhaust crossover pipe to manifold attaching screws and remove screws from cylinder head water outlet fitting. Remove cylinder head (dowel pins will hold head in place) and remove head with exhaust manifold attached (*NOTE*—When left head being removed, raise head off dowels, move it forward and "jockey" the the head in order to clear defroster, power steering, and power brake equipment).

Installation: (*NOTE—Right and left cylinder heads are interchangeable except for water passage plug in end of water passage which must be installed in correct position if new head installed).* To install, reverse removal procedure and note the following: Head screws are three different lengths and when properly installed, all screws will project an equal distance from head. Do not use sealer of any kind on threads.

CONNECTING ROD & BEARINGS

CONNECTING ROD BUSHING REPLACEMENT: Press out old bushing using Bushing Remover & Installer J-5753-3 and Block J-5753, (*NOTE*—For removal of bushing, the smallest diameter or third shoulder on tool is inserted in bushing). Press new bushing into place using same tools as for removal, but using opposite end of Bushing Remover & Installer. This tool must be used since the thin wall bushing will distort when pressed into rod unless supported by shank of tool. Drill a 5/32" hole in bushing through oil hole in top of rod, using care to prevent end of tool damaging opposite side of bushing. Swage or expand bushing into connecting rod using Burnisher Tool J-5753-1 and Block J-5753, pressing Burnisher Tool through bushing with connecting rod assembly supported on Block. Hone bushing to fit piston pin.

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING OIL SEAL REPLACEMENT:
1) Drain oil and remove oil pan, oil pump, and oil pump drive shaft. Remove oil baffle and cylinder block to oil baffle tube (lower oil level indicator tube). Remove transmission (See Synchro-mesh Transmission Removal on Car Page or Hydra-Matic Drive in Transmission Section).
2) Remove rear center main bearing cap and upper half of rear center main bearing shell to allow crankshaft to be lowered and to prevent damage to thrust surfaces of bearing. Remove rear main bearing cap and loosen remaining bearing caps sufficiently to allow crankshaft to be lowered approximately 3/8" at rear.
3) With crankshaft lowered to provide clearance, remove upper half of rear main bearing oil seal and bearing shell.
4) Install seal in cap with one end flush with cap and compress seal using hammer and Seal Compressor J-3048-A. *Do not pack seal into locking recess in cap.* Remove seal from cap and install in groove in block by slipping over crankshaft into cavity of block Insert end which was flush with cap first Install rear main bearing cap with bearing shell and tighten to 95 ft. lbs., to pull crankshaft up into place against seal. Carefully trim both ends of seal flush with block.

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5) Install a new seal in cap, as above, *except that Seal must be packed into locking recess in cap.* Trim seal flush with cap. Install cap with shell and tighten to 95 ft. lbs. Remove rear main bearing cap again and inspect split line to be certain that none of seal material has been compressed between cap and block. Make sure mating surfaces are clean.

6) Next, apply a bead of sealer (Permatex No. 3) approx. 1/16" in diameter to mating surface of cap extending from packing seal groove outward to the groove for oil pan cork rear gasket. Install rear main bearing cap and tighten to 120 ft. lbs. torque.

7) Remove rear center main bearing cap and reinstall upper half of bearing shell. Install cap and tighten to 95 ft. lbs. Tighten remaining bearing caps to 95 ft. lbs. Replace transmission, oil pump, oil pump drive shaft, oil baffle, oil pan and flywheel lower cover and shield.

▷*CAUTION:* Seal must be installed exactly as detailed above to prevent oil leaks at rear bearing. Make certain that seals not cut too short and that mating surfaces of bearing cap and block are free of any packing material, dirt or oiliness (except for Permatex bead on cap) and that they are not scratched or burred.

VIBRATION DAMPENER

VIBRATION DAMPENER: Removal–Loosen generator at adjusting strap and remove fan belt from vibration dampener. On card equipped with power steering, also remove power steering pump belt. Position fan so wide angles will be at top and bottom allowing access to balancer. Remove dampener attaching screw (15/16" socket) and retaining washer, and slide dampener off shaft.

Installation: Reverse the removal procedure.

ENGINE FRONT COVER

ENGINE FRONT COVER: Removal–1) Drain radiator. On cars with power steering, remove pump with mounting bracket from pad on top of engine front cover and lay it back on fender skirt where it will be out of the way. *(CAUTION–Disconnect battery ground strap).*

2) Disconnect wires from generator and remove generator and mounting bracket and adjusting strap. Remove fan belt, power steering pump belt, and fan and pulley. Disconnect upper and lower radiator hoses, remove fan shroud, and remove radiator. Remove water inlet elbows from cylinder heads (leave hose attached). Remove fuel pump and remove vibration dampener.

3) Take weight off engine front insulator using suitable engine lifting equipment. *(CAUTION–Do not use jack under oil pan).* Remove screws and lockwashers attaching front insulator to engine front cover. Remove four front oil pan-to-engine front cover screws. Remove engine front cover-to-block attaching screws and nuts. Pull cover forward to clear studs and remove.

Installation: See Crankshaft Oil Seal (below), install new front oil pan gasket (cement gasket to oil pan), Position new front cover gasket over studs on front of block, position front cover on engine, install all capscrews and nuts with lockwashers and tighten securely. Install four oil pan-to-front cover capscrews and lockwashers, then tighten these screws to 10 ft. lbs. Install front engine support-to-front cover screws loosely, then lower engine and tighten screws to correct torque of 60 ft. lbs. Reassemble engine by reversing removal procedure (above).

CRANKSHAFT FRONT OIL SEAL REPLACEMENT: After front cover removed (above), slide old seal off end of crankshaft. Coat face of new seal with graphite lubricant and install on crankshaft before installing front cover.

FLYWHEEL

HYDRA-MATIC DRIVE CARS

FLYWHEEL INSTALLATION: Clean mating surfaces of flywheel and crankshaft thoroughly (use Acetone to clean old Pliobond 30 from surfaces). Apply a thin coat approximately ½" wide) of Pliobond 30 sealing compound on surface of crankshaft at bolt circle. Smooth seal compound around toward outer edge and allow to dry about one minute. *(CAUTION–*In no case will a fibre gasket be used between flywheel and crankshaft. Use only Pliobond 30 sealing compound). Install flywheel on crankshaft flange carefully and enter all flywheel bolts through plates. Tighten bolts diametrically opposite uniformly to correct torque. *(NOTE–*Draw flywheel on evenly during this operation to prevent leakage and excessive runout). Mount a dial indicator so stem or button rests on torus cover gasket seal area and check flywheel runout. Runout should not exceed .005".

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL & INSTALLATION: Drain radiator. Remove intake manifold, crankcase ventilator outlet pipe, pushrod cover and rocker arm covers. Disconnect and move spark plug wires out of way. Loosen rocker arm ball nuts so rocker arms can be disengaged from pushrods and turned sideways. Remove pushrods and hydraulic lifters. Mark or store pushrods and lifters so they can be installed in original positions *(NOTE* - Exhaust valve pushrod of No.7 cylinder cannot be removed because of interference with defroster core. It should be blocked up so that it will not interfere with removal of camshaft. Use spring-loaded clothes pin). Remove radiator and timing chain cover. Remove timing chain cover seal and fuel pump eccentric. Slide timing chain and sprockets off ends of crankshaft and camshaft. Remove camshaft thrust plate attaching screws and remove thrust plate. Slide camshaft out of engine carefully, making sure not to damage bearings in block. Front of engine should be raised as necessary to permit shaft to slide between grille and hood catch support plate. To install camshaft, reverse removal procedure.

TIMING CHAIN

▷*TIMING CHAIN REMOVAL CAUTION:* Do not rotate crankshaft with timing chain out of engine. Damage to valves, pistons, or both will result due to piston striking valve. To rotate camshaft with timing chain off, crankshaft must be positioned so pistons are 45° before or after TDC, to avoid damage to valves.

TIMING CHAIN: Removal–Remove engine front cover (See Engine Front Cover above). Remove fuel pump eccentric. Align timing marks on sprockets. Slide timing chain and sprockets off camshaft and crankshaft.

Installation: Install new timing chain and sprockets making sure that marks on sprockets are aligned exactly on a straight line passing through shaft centers. Install fuel pump eccentric indexing pin on eccentricwith hole in sprocket. Install retainer screw and retainer washer and tighten securely. Install engine front cover.

VALVE SYSTEM

EXC. 285 HP ENGINE

▷*NOTE: Valves on 285 HP Engine are 3/32" longer than on regular production engines.*

CHECKING VALVE STEM LENGTH: Position rocker arm on stud and hold in place using Rocker Arm Stud Installer J-6301. Slip valve into place and hold it against valve seat. While holding rocker arm and valve in position securely, insert Valve Train Gauge J-6324 through pushrod hole and seat snugly in pushrod seat of rocker arm. With all parts seated, step end of gauge should be at least flush with gasket face of head, but should not project past step on gauge. If gauge projects too far (indicating valve stem too long), grind off tip of valve stem as necessary. *CAUTION–*When grinding end of valve stem be careful not to overheat it which will soften the hardened stem.

ROCKER ARMS

ROCKER ARM STUD REPLACEMENT: *NOTE–Use oversize stud (.003") only when original stud is found to be loose in cylinder head. Use Std. size stud for replacement when original stud threads are damaged).*

Removal: 1) Remove cylinder head from engine. With rocker arm removed, file two slots 3/32" to 1/8" deep on opposite sides of rocker arm stud. Top of slots should be 1/4-3/8" below thread travel. Place washer J-6392-3 at bottom of rocker arm stud. Position Rocker Arm Stud Remover J-6392-1 on rocker arm stud and tighten screws securely with 5/32" allen wrench. Place spacer J-6392-2 over stud remover. Thread 7/8" standard nut on stud remover and turn nut until rocker arm stud is out of cylinder head. If oversize stud being installed, ream out stud hole with Reamer J-5715.

2) Remove plugs from ends of cylinder head oil gallery and thoroughly clean out metal deposits and foreign matter from cylinder head (head must be right side up so metal or foreign material will not lodge around studs).

Installation: 1) Position rocker arm on new rocker arm stud and place Rocker Arm Stud Installer J-6301 on stud in place of rocker arm ball. Carefully press stud into head using a 2-Ton press, until it is installed about half-way (7/16").

2) Position Valve Train Gauge J-6324 in pushrod hole so that it seats properly in the rocker arm. With valve seated, slowly press rocker arm stud into cylinder head until gauge projects about midway between end of gauge and step with respect to gasket surface of cylinder head.

3) Remove Rocker Arm Stud Installer, rocker arm and ball. Blow air through hole in new stud to insure that passage is not restricted, and blow air through oil

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gallery. Replace plugs in ends of oil gallery. Check oil passages from oil gallery to all studs. Install rocker arm and ball and install nut loosely Replace cylinder head

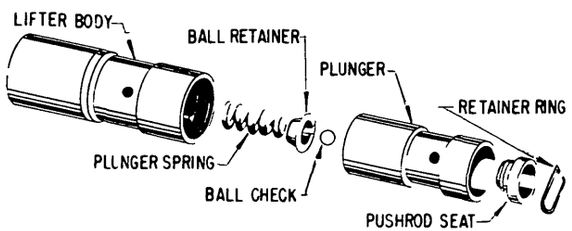
HYDRAULIC LIFTERS

HYDRAULIC VALVE LIFTER OVERHAUL: Removal–Remove intake manifold, pushrod cover and rocker arm cover. Loosen rocker arm ball nut and move rocker arm off pushrod. Remove pushrods (rear lifter on left bank cannot be removed if car is equipped with defroster, but must be raised and moved out of way for removal of lifter). Remove lifter from bore in cylinder block.

Disassembly: Remove pushrod seat retaining ring by holding down seat with pushrod while dislodging spring from lifter body with pointed tool (*NOTE*–it may be necessary to unseat lifter ball, using plunger unloader J-5097, before plunger can be pushed down) Invert lifter and allow plunger to slide out of body. If plunger sticks, place lifter in large end of Hydraulic Valve Lifter Plunger Remover J-4160-A, with pushrod end of lifter downward. Hold tool firmly in hand with thumb over lifter body and strike sharply against a block of wood until plunger falls out (it may be necessary to soak a lifter with a stuck plunger in cleaning solvent to loosen plunger in body) *CAUTION–If more than one lifter is being disassembled at a time make very sure that parts for each individual lifter be kept together so that parts are not intermixed.*

Inspection: Wash individual lifters separately, keeping parts for each lifter together. If necessary, soak lifter in suitable carbon solvent to dissolve varnish and carbon. Using a lint free cloth, clean each part with a hard wiping action Use a bristle brush if required. Do not use a wire brush or sandpaper. Inspect lifter body for scoring, and check cam surface at end of lifter for wear Check plunger, and using a magnifying glass, inspect check ball seat for defects, and outer surface of plunger for scratches or scores Inspect pushrod seat for roughness and make sure hole in seat is open. Inspect lifter ball for nicks or scoring. If any part of lifter is found defective, replace entire unit.

Assembly: Rinse all parts in clean kerosene before assembly and assemble without drying Rinse plunger spring and ball retainer and position retainer in spring **Install ball in retainer (check ball spring not used in regular production lifters, used in 285 HP engine). Rinse plunger and place on retainer so seat on plunger mates with ball. Invert plunger with parts assembled thus far and, after rinsing body, install body over spring and plunger. Place lifter body on clean paper, rinse and install pushrod seat and retainer ring.**



V8 HYDRAULIC LIFTER

Checking Leakdown Rate: Fill tester cup in Valve Lifter Leakdown Tester J-5790, to approximately 1 inch from top with special testing fluid Swing weight arm up out of way, raise ram, and position lifter into boss in center of tester cup. Place ¼" steel ball in pushrod seat of lifter and lower ram onto ball Adjust ram (with weight arm clear of ram) so that pointer is positioned on set line (marked "S") Tighten jam nut to maintain setting. Operate lifter through full travel of plunger by pumping weight arm to fill lifter with test fluid and force out air, (Lifter must be completely submerged at all times). Continue pumping for several strokes after definite resistance is felt (*NOTE*–If noticeably weak resistance is felt during any one of last few strokes (of hard pumping), replace ball in lifter and repeat test to this point Raise weight arm to allow plunger spring to expand fully, lower arm onto ram and commence turning crank slowly (1 revolution every 2 seconds) Time indicator travel from lower line (first line above set line) to line marked .125" or 1/8", while still rotating cup with crank. Lifter is satisfactory if rate is between 12 and 30 seconds. Retest all doubtful lifters.

Installation: *(CAUTION–If new lifter is to be installed, remove sealer coating from new lifter, making sure that hole in pushrod seat is not plugged with sealer coating. Check leakdown rate).* Place new lifter in lifter boss and replace pushrod exactly as removed (same end against rocker arm). Tighten rocker arm ball retaining nuts to 15 ft. lbs. Replace rocker arm cover, pushrod cover and intake manifold.

OILING SYSTEM

OIL PASSAGE PLUG (IN CYLINDER HEAD) REPLACEMENT: *This plug is located on intake side of cylinder head bolt which feeds cylinder head oil gallery (toward rear of head on left bank, and toward front of head on right bank).*

Removal: Remove cylinder head bolt from hole which feeds oil gallery. Attach a piece of rag to a wire for removing rag, and push rag down into bolt hole past the oil passage in which plug is located. Drive old plug through passage into bolt hole where it will drop onto rag. Pull rag out pulling old plug with it.

Installation: Drive plug into place using a tool which bears into bottom of plug (½" x 3" bolt can be used) until outer edge of plug is flush with surrounding surface of head.

OIL PUMP

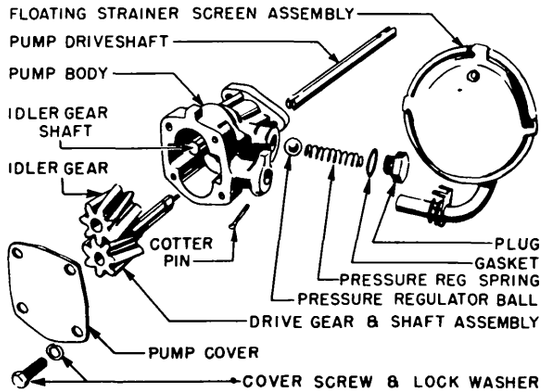
OIL PUMP OVERHAUL: Removal–Remove oil pan and remove oil pump attaching screws while holding pump in place. Carefully lower oil pump away from block with one hand while removing oil pump drive shaft with the other hand

Disassembly: Remove cotter pin which retains floating screen to pump inlet and remove screen. Remove pressure regulator and spring retainer, spring and pressure regulator ball Remove screws retaining cover to oil pump body and remove cover. Remove driven gear and drive gear with shaft.

Cleaning & Inspection: Clean all parts thoroughly (clean screen with Bendix Cleaner). Inspect pressure regulator spring for distortion, cracks, and wear on sides. Inspect pressure regulator ball for nicks or other damage Inspect oil pump drive shaft (distributor to pump shaft) for wear or cracks. Inspect all other pump parts for wear. Replace parts as necessary.

Assembly: Install drive and driven gears. Install cover and turn drive shaft by hand to insure that it turns freely and has a slight amount of endplay. Install pressure regulator ball, spring and retainer using a new gasket on retainer *(CAUTION–Do not attempt to chang oil pressure by varying length of pressure regulator spring).* Install screen assembly on oil pump and install new cotter pin retainer.

Installation: To install pump, position drive shaft into position in distributor and oil pump drive gear, then position oil pump in place on block, indexing drive shaft with pump drive gear shaft. Install two attaching screws with lockwashers and tighten securely *(NOTE–*Removal and installation of pump does not disturb distributor timing). Install oil pan.



V8 OIL PUMP

FUEL SYSTEM NOTES

FUEL FILTER (Draining & Cleaning): Remove drain plug and drain out dirt and water. If filter is excessively dirty remove filter from car and agitate it in a carburetor cleaner or solvent. Direct an air stream through the *outlet port* which will force water and dirt out through inlet port. Rinse filter in kerosene and again flush with air. Install drain plug and reinstall filter.

EXCESSIVE FUEL PUMP PRESSURE (Causing Carburetor Flooding): If fuel pump pressure in excess of 5 lbs., check pump for incorrect diaphragm installation (insufficient slack) before replacing pump.

1) Mount pump in vise with fuel side up, loosen fuel pump cover screws two turns to free diaphragm.

2) Flex diaphragm by moving rocker arm up and down several times (use short piece of pipe fitted over rocker arm to provide leverage)

3) Hold rocker arm in extreme upper position while tightening all cover screws securely This will provide slack in diaphragm.

4) Reinstall pump and check pressure. If pressure still in excess of 5 lbs., replace pump

► *FUEL FILTER PRODUCTION CHANGE (To Prevent Carburetor Flooding): See "CARBURETOR" on Pontiac Car Model Pages.*

► *SPECIAL 285 HP "STRATO-STREAK" V8 ENGINE NOTE This engine furnished as a factory install d option on all models exc pt those with air conditioning. Service adjustments and specifications are included below.*

► *AIR CONDITIONED CAR SERVICE CAUTION Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model	Series Designation
Star Chief	56-28
Star Chief Safari	56-27
Eight Seventy (870)	56-27
Eight Sixty (860)	56-27

SERIAL & ENGINE NUMBERS (Numbers are the same): On left front hinge pillar post and on raised pad at front of right hand cylinder block.

► *ENGINE & SERIAL NUMBER NOTE Engine and Serial number (example P756H 1001) includes following identification information in sequence.*

Assembly Plant	Model ①	Model Year	Trans. Type ②	Serial No.
See below	7	56	H	1001

①–**7** (27 Series). **8** (28 Series).
②–**H** (Hydra-Matic). **S** (Synchro-mesh).

Assembly Plant Designations

P–Pontiac	**K**–Kansas City
C–South Gate	**L**–Linden
W–Wilmington	**A**–Atlanta
F–Framingham	**T**–Arlington

TUNE-UP

► *SPECIAL 285 HP "STRATO-STREAK" V8 ENGINE SERVICE NOTE* Service specifications and procedures are different than standard engines, as noted below

COMPRESSION PRESSURE: 145-155 lbs. (8 9-1 Head), 120-130 lbs. (7.9-1 Head), at 160-170 RPM cranking speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

► *VALVE ADJUSTMENT NOTE Because of new design, it is no longer necessary to initially adjust the tappet clearance when cylinder head or valve system disturbed.*

MANIFOLD HEAT CONTROL: Thermostatic coil type mounted in right hand exhaust manifold.

► *DUAL EXHAUST NOTE* Optional equipment on all but 860 four door station wagon. With control valve closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders–RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035", (.033-.038").

Spark Plugs - AC No. 46. 14 mm. Torque to 25 ft. lbs. max. or finger tight plus ¾ turn with wrench. *NOTE* - Supersedes AC No. 44 plug previously recommended.

COIL: Delco-Remy 1115087 (Exc. 285 HP Engine), 1115099 (285 HP Engine). *12 Volt.*
Ignition Current - (1115087) 1.2 amps. idling, 3.5 amps. stopped, (1115099) 1.8 amps. idling, 4.0 amps. stopped.
Resistor - Delco-Remy 1927809 (Exc. 285 HP Engine). 1931395 (285 HP Engine). **Resistance** - 1.40-1.65 ohms (1927809), .27-.39 ohm (1931395).

► *COIL RESISTOR NOTE Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by lead from starter solenoid to coil.*

DISTRIBUTOR: Delco-Remy 1110862 (Exc. 285 HP Engine); 1110875 (285 HP Engine). *12 Volt.*

► *1110875 DISTRIBUTOR (285 HP ENGINE) NOTE:* This distributor is equipped with a dual set of contacts and has centrifugal advance only (vacuum advance is not provided).

Condenser - Delco-Remy 1869704. **Capacity** - .18-.23 mfd.
Contact Point Set - Delco-Remy 1918148.
Breaker Gap - .016" (Exc. 285 HP Engine), .014-.018" (285 HP Engine).
Cam Angle - 26-33° (Exc. 285 HP Engine), 29°±1° (individual breaker operating), 34°±1° (both breakers operating - 285 HP Engine).
Breaker Arm Spring Tension–19-23 ozs.
Rotation–Counter-clockwise viewed from above.

Automatic Advance–1110862

Degrees Distr.	RPM	Degrees Eng.	RPM
0.5-2.5	525	1-5	1050
7-9	1050	14-18	2100
8-10	1400	16-20	2800
9-11	1800	18-22	3600

Automatic Advance–1110875

Degrees Distr.	RPM	Degrees Eng.	RPM
0-0.5	350	0-1	700
1-3	600	2-6	1200
5-7	1000	10-14	2000
6.5-8.5	1500	13-17	3000
8-10	2000	16-20	4000

Vacuum Spark Control (Exc. 285 HP Engine): 1116080.
Plunger Travel - 11/64-3/16"

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6"
8	16	12.5-13.5"

IGNITION TIMING

Setting (Exc. 285 HP Engine)–5° BTDC, with distributor vacuum line disconnected and engine idling at 450-470 RPM (transmission selector in "N").
Setting (285 HP Engine) - 10° BTDC, with engine idling at 650 RPM (normal idle speed).
Timing Marks - On harmonic balancer.

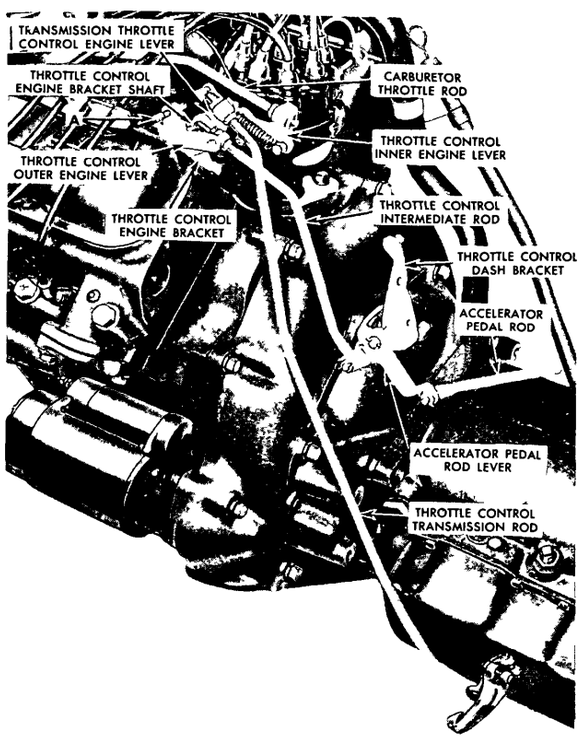
CARBURETOR

► *CARBURETOR APPLICATION: Rochester 2-barrel Carburetors are standard on 56-27 Series Cars. Rochester 4-Barrel Carburetors used on 56-28 Series Cars with Standard Transmission. Rochester or Carter 4-Barrel Carburetors used on 56-28 Series Cars with Hydra-Matic Transmission. Rochester or Carter 4-Barrel carburetors optional on 56-27 Series Cars. Two Rochester 4-Barrel Carburetors are standard on 285 HP Engine.*

► *FUEL FILTER PRODUCTION CHANGE (To Correct Carburetor Flooding Conditions):* New glass bowl, impregnated fiber element, precipitation type fuel filter is now being used in production and is available for installation on earlier cars. Filter Package, Part No. 854345, can be installed using one 90° elbow, Part No. 504500 or 114920.

THROTTLE LINKAGE ADJUSTMENT (DUAL-RANGE HYDRA-MATIC DRIVE CARS) *NOTE–On cars with "Strato-Flight Hydra-Matic" see below.* With engine at normal operating temperature, idle speed set at 450-470 RPM, and with transmission selector lever in "N" (neutral), install linkage adjustment pin J-2544 through holes in lever and bracket at rear of left head Pin should fit freely in holes without lever movement. If free fit not obtained, adjust trunnion nuts on carburetor throttle valve rod until pin is free then tighten nuts securely Leave gauge pin in hole Loosen trunnion nuts on transmission throttle control rod and push rod downward until control outer lever is felt to touch end of its travel (top nut must not be touching trunnion). **Shorten throttle control rod two turns** by loosening lower nut two turns and tightening upper nut two turns Remove gauge pin. With carburetor throttle in full open position and Downshift Return Spring fully extended, adjust throttle control intermediate rod trunnion (at lever on engine bracket) so that accelerator pedal clears floor mat by approximately 1/4" at closest point, tighten trunnion locknuts.

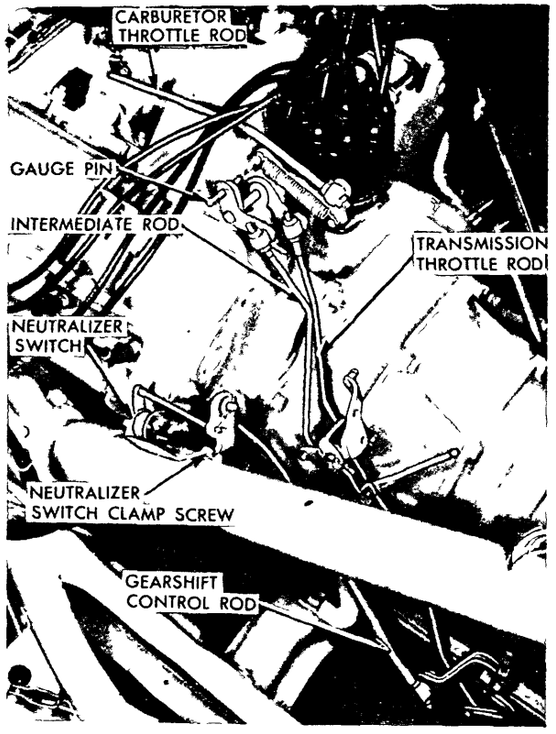
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DUAL RANGE HYDRA-MATIC THROTTLE LINKAGE

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THROTTLE LINKAGE ADJUSTMENT (STRATO-FLIGHT DUAL COUPLING HYDRA-MATIC DRIVE): *NOTE - cars with "Dual-Range Hydra-Matic" see above.* With engine at normal operating temperature and idle speed set to 460 RPM, adjust carburetor throttle rod so that linkage pin fits freely in gauge holes in throttle control bracket assembly. Loosen trunnion on transmission throttle control rod. Push transmission throttle control rod downward until transmission throttle



DUAL COUPLING HYDRA-MATIC THROTTLE LINKAGE

valve control lever is lightly against end of its travel (make sure that top trunnion locknut does not contact trunnion). While holding rod in this position tighten top trunnion locknut until it just touches trunnion, **then two complete turns further.** Tighten lower locknut securely. Adjust throttle control intermediate rod so that with carburetor throttle lever in wide open position there is 1/8" clearance between accelerator rod lever and underside of accelerator rubber bellows.

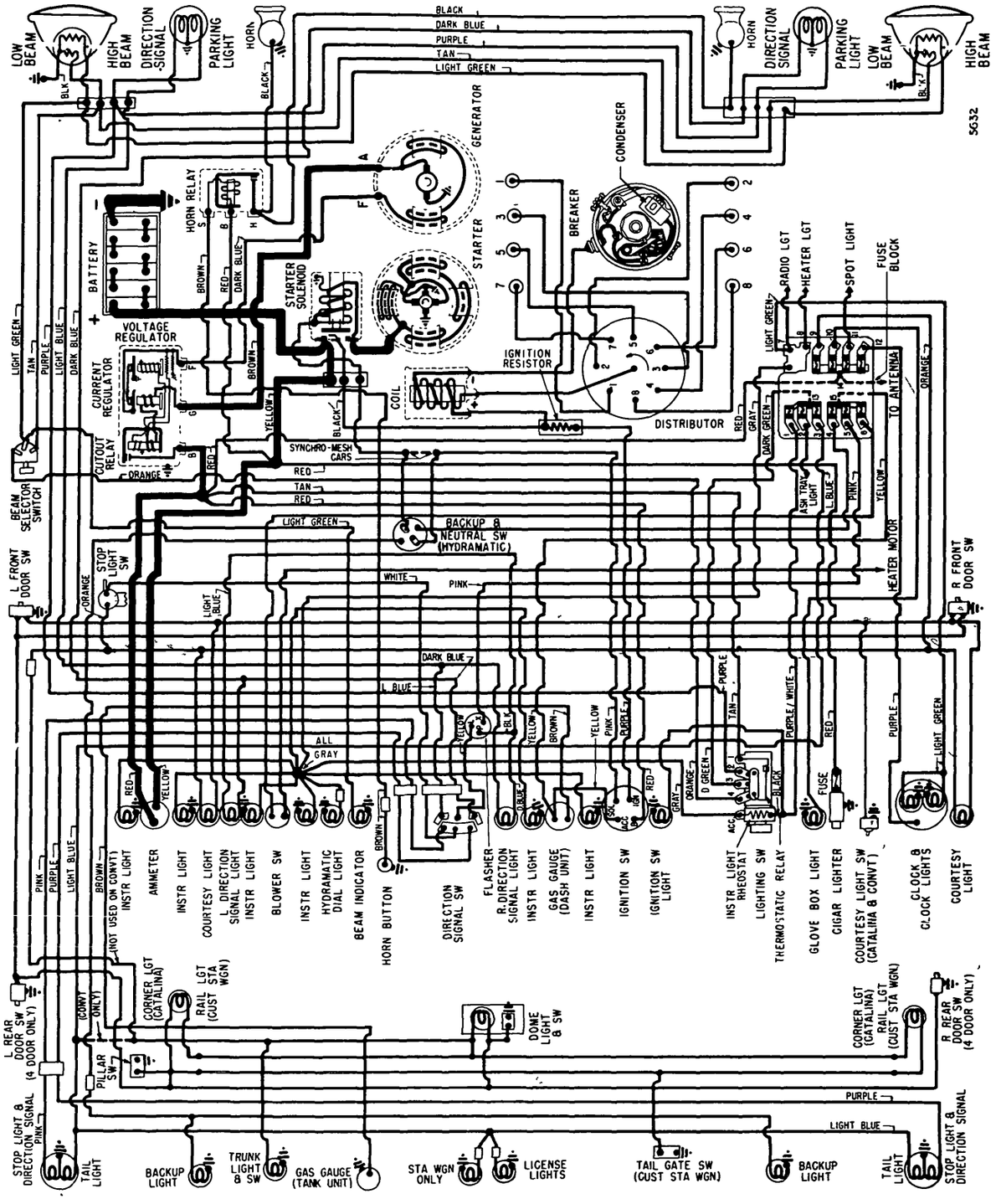
ROCHESTER 2GC

Rochester 2GC, No. 7008695 (Hydra-Matic Cars); No. 7008696 (Synchro-mesh Cars).

MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls 2-3-5-8, LEFT barrel 1-4-6-7.

Idl Setting—1 1/2 turns open from lightly seated position (turn screws out for richer mixture).

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Idl Sp ed (Exc pt Air Conditi n d)–450-470 RPM (with transmission in "N" position).

Idl Sp ed (Air Condition d Cars)–510-530 RPM (with Air conditioner turned off).

Float L v l–1-15/64" from air horn gasket to top of float assembly with assembly inverted. Use Gauge BT-105

Fl at Drop–1-29/32" between air horn gasket and lowest point on bottom of float with air horn held upright (Gauge BT-105).

Fast Idl : No adjustment of fast idle is provided. It is necessary however to have correct relationship between fast idle cam position and choke valve position. Check & adjust as follows Turn the idle screw in until it just contacts the second step of the fast idle cam, then with the screw on the second step and against the shoulder of the high step, the small end of Gauge BT-128 (.061"), should just fit into place between the upper edge of the choke valve and the wall of the air horn. To adjust, bend counter-weight tang on choke lever.

Automatic Ch k S tting: Centered (at index).

►*OTHER DATA See "Rochester 2GC Carburetor" in Carburetion Section.*

Throttl Linkag Adjustm nt: See *CARBURETOR above.*

Fu l Pump Pr ssur - 4-5 lbs. at 450-1000 RPM.

ROCHESTER 4GC
(Standard Engine)

Rochester 4GC, No. 7008697 (Hydra-Matic Cars); No. 7007900 (Synchro-m sh Cars).

S rvice Replac m nt Carburetors–Rochester No. 7009906 (7008697), No. 7009905 (7007900).

►*ENGINE STALLING DURING WARM-UP CORRECTION: See "Rochester 4GC" Carburetor in Carburetion Section.*

►*MANIFOLD FUEL DISTRIBUTION. Carburetor RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idl S tting–1-1/2 turns open Adjust both screws alike. Turn screws out for richer mixture.

Idl Sp d–450-470 RPM (all models–with transmission in "N").

►*AIR CONDITIONED CAR NOTE. Adjust idle speed with Air Conditioner turned "ON".*

►*OTHER DATA: See "Rochester 4GC" Carburetor in Carburetion Section.*

Thr ttl Linkag Adjustm nt: See *CARBURETOR above.*

Fuel Pump Pr ssur : 4-5 lbs. at 450-1000 RPM.

CARTER WCFB
(Standard Engine)

Carter WCFB 2364S, SA (Hydra-Matic Drive Cars).

►*ENGINE STALLING DURING WARM-UP CORRECTION: Se "Cart r WCFB" Carburetor in Carburetion Section.*

►*LEFT TURN "CUT-OUT" CORRECTION: See "Carter WCFB" Carburetor in Carburetion Section.*

►*MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idl S tting–1-1/4–2-1/4 turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idl Sp ed–450-470 RPM (all models–with transmission in "N").

►*AIR CONDITIONED CAR NOTE. Adjust idle speed with Air Conditioner "ON".*

►*OTHER DATA: See "Carter WCFB" Carburetor in Carburetion Section.*

Throttle Linkage Adjustment: See *CARBURETOR above.*

Fuel Pump Pressure: 4-5 lbs. at 450-1000 RPM.

ROCHESTER 4GC
(285 HP Engine)

Rochester 4GC, No. 7009820 (Two Used).

►*MANIFOLD FUEL DISTRIBUTION: Carburetor. RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Speed, Mixture Adjustment & Synchronization: Turn idle mixture screws in finger tight and then open each screw on both carburetors 2-1/2 turns. Proceed as follows:

1) Hold choke valve fully open (use a pump return spring or other light spring meshed over top edge of choke valve and dividing wall of air horn in such a manner as to provide a slight clamping action). Remove cotter pin and anti-rattle spring and disconnect carburetor throttle rod (rod between bellcrank at rear of engine and front carburetor) from throttle lever of front carburetor.

2) Remove cotter pin and anti-rattle spring and disconnect inter-connecting rod (rod between throttle valve levers of front and rear carburetors), and remove inter-connecting rod. Spacer washer between rod and throttle levers may be left in position. Check pins in throttle levers for tightness. Tighten if necessary

3) Back off idle speed adjusting screws until throttle valves are fully closed (hold throttles closed with suitable springs hooked between throttle levers and some point on engine). Turn idle speed adjusting screws in on both carburetors until they **just touch** fast idle cams *(CAUTION–It is very important that idle screws are contacting cam equally and from this point to completion of adjustment, screws are turned equally to maintain balance between carburetors).*

4) Adjust trunnion on end of throttle inter-connecting rod so that rod can be installed over pins on carburetor throttle levers freely without changing throttle lever position. Install inter-connecting rod over pins of both carburetors (trunnion toward rear and front end of rod pointing toward engine). Make sure that spacers are still in position between rod and throttle levers.

5) Turn each idle speed adjusting screw in 1 1/4 turns (to give approximate idle adjustment). Check throttle inter-connecting rod for freeness and if found to be tight, repeat adjustment as outlined above. Remove springs holding throttle valves closed.

6) Install anti-rattle spring and cotter pin at rear end of inter-connecting rod. Install carburetor throttle, anti-rattle spring and cotter pin on throttle lever at front carburetor. Check rods to see that trunnions on rear of both rods are positioned so flats on front ends of rods are parallel with throttle lever. Remove springs holding choke valves open. Start engine and allow to warm up thoroughly Install tachometer.

7) With engine warm and fast idle cam fully released, turn both idle speed screws equally to obtain an idle speed of 650 RPM. Adjust idle mixture screws for best quality and highest engine idle. Recheck engine idle speed and readjust to 650 RPM if necessary.

►*OTHER DATA: See "Rochester 4GC" Carburetor in Carburetion Section.*

Thr ttl Linkag Adjustm nt: See *CARBURETOR above.*

NOTE - Normal idle speed 650 RPM.

Fuel Pump Pressure: 4-5 lbs. at 450-1000 RPM.

CARB. EQUIPMENT

►*HIGH FUEL PUMP PRESSURE CORRECTION (Causing Carburetor to Flood):* May be caused by the diaphragm being installed with insufficient slack *See "Fuel System Notes" in Pontiac Special Data*

►*FUEL FILTER PRODUCTION CHANGE: See CARBURETOR above.*

Fuel Pump: AC. Replacement - AC No. 4123 (Fuel & Vacuum - used with vacuum wipers), AC No. 4239 (Fuel only - used with electric wipers).

Pressure - 4-5 lbs. at 450-1000 RPM.

►*FUEL PUMP PRESSURE CAUTION - If pressure too high or too low, replace pump.*

Fuel Filter: Disc type. *See "Fuel System Notes" in Pontiac Special Data & "Production Change" above.*

Gasoline Gauge: AC Electric type.

Dash Unit - AC No. 1518504.

Tank Unit - AC No. 1518395. (Exc. Sta. Wgn.), No. 1518524 (860 Sta. Wgn. - 4-Dr.), No. 1518467 (870 4-Dr., 860 2-Dr., Star Chief Safari Sta. Wgns).

►*PASS. CAR IMPROPER GASOLINE GAUGE READING CORRECTION (EXC. STA. WGN.):* Caused by tank unit rheostat float arm being positioned improperly. To correct condition, remove unit, place in vise, and bend float arm so that it is 7/32" lower in tank. Condition has been corrected in production. Units so corrected have a daub of red paint on tank unit outlet tube (over 90 day period).

See "Fuel Gauges" in Carburetion Section.

BATTERY

Standard - Delco 2SMR53. *12 Volt,* 9 plate, 53 ampere hour capacity (20 hr rate).

Air Conditioning & Police - Delco 3SMR72. *12 Volt,* 11 plate, 72 ampere hour capacity (20 hr. rate).

Battery Ground- Negative Left front corner of left head.

Engine Ground - Between engine and fender at battery ground.

STARTER

Delco-Remy 1107641. *12 Volt.*

Armature - Delco-Remy 1932185.

Drive–Overrunning clutch (solenoid pinion shift).

Rotation–Counter-clockwise at commutator end.

Brush Spring Tension–35 ozs minimum.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs	3500	10.1	95
10.5 ft. lbs.	Lock	5 4	. 470

Starting Switch: Delco-Remy Solenoid 1119760 (no relay) mounted on starter and controlled by Ignition & Starter Switch, Delco-Remy No. 1116472. Neutral Safety Switch used on Hydra-Matic Drive Cars.

Neutral Safety & Back-up Light Switch: Delco-Remy 1998039. At lower end of steering column Connected

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in starter control circuit so that starter operates only when selector lever in "N" (Neutral).

Adjustment - *See "Dual Range" or "Dual Coupling" Hydra-Matic Drive in Transmission Section.*

GENERATOR

Delco-Remy. *12 Volt.* Application as follows

Delco-Remy Generator No.	Armature
1100304 (Standard)	1928952
1102052 (Air Cond.) Early	1932900
1102073 (Air Cond.) Later	1932900
1102054 (Hvy. Duty)	1932900
1100333 (285 HP Eng.) ①	1928952

① - Replacement Generator No. 1100313.

Maximum Charging Rate - *See Voltage Regulator.*

Performance Data - Cold

Generator	Amperes	Volts	RPM
1100304	25	14.0	2780
1102052	35	14.0	2100
1102073	35	14 0	2100
1102054	35	14.0	2100
1100333	25	14.0	2570

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 28 ozs.

Field Current - 1.5-1 62 amps. (1100304, 1100333), 1.62-1 82 amps (1102052, 1102073, 1102054). All at 12.0 volts (80°F.).

B lt Adjustment: ¼" belt deflection with approximately 8 lbs. (5 lbs. with Air Conditioning) pressure midway between pulleys.

REGULATOR

Delco-Remy Regulator No.	Use with Gen. No.
1119000	1100304, 1100333
1119002	1102052, 1102073, 1102054

►*NOTE: Regulator is "1119000 Series". Specifications below are for "Normal" settings.*

Checking & Adjusting - *See "1119000 Series" Regulator in Electrical Section.*

Cut-Out Relay

Cuts In–11.8-13.5 volts (hot).
Contact Gap– 020".
Air Gap– 020" (with contacts just closed).

Voltage Regulator

Setting–13.8-14.8 volts (hot).
Air Gap–075" with armature pressed down to point where contacts just touching.
Checking & Adjusting – *See "1119000 Series" Regulator in Electrical Section.*

Current Regulator

Setting (1119000) - 23-27 amps. (hot).
Setting (1119002) - 32-37 amps. (hot).
Air Gap - 075" with armature pressed down to point where contacts just touch.
Checking & Adjusting - *See "1119000 Series" Regulator in Electrical Section.*

MISC. ELECTRICAL

H adlamps: Sealed Beam. *See El ctrical S ction.*
Dir cti n Signals: *S e Electrical Section.*
Autronic Ey : *See Electrical Section.*
Lighting Switch Rem val: Remove one battery cable from battery. Pull headlight switch knob to "on" position, push latch button on side of switch assembly and pull out switch knob assembly. Screw bushing from switch assembly allowing switch assembly to be removed from instrument panel
Stop Light Switch Location: Mechanical type switch located on bracket attached to steering column behind instrument panel.
Back-Up Light Switch: Located on left rear side of transmission case.
FUSES: Fuses listed below (except as noted) are located on a fuse block behind instrument panel on dash to left of steering column
Instrument Panel–4 amps.
Hood Ornament & Ash Tray–7½ amps.
Stop Lights, Dome & Courtesy Lights–7½ amps.
Tail Lights–7½ amps.
Back-up Light–7½ amps.
Glove Box & Underhood Light–7½ amps.
Direction Signal & Brake Light–7½ amps.
Spot Lights–7½ amps.
Heater & Defroster–7½ amps.
Radio & Clock–7½ amps.
Air Conditioner–30 amp. Located in a line holder either on defroster core housing or if car not equipped with defroster, on front of dash where defroster should be.

LIGHTING THERMOSTATIC CIRCUIT BREAKER: *12 Volt.* 22 amperes. Located on lighting switch.

HORNS: Delco-Remy. Dual horns operated by relay (Std.).
Low Pitch - Delco-Remy 1999763.
High Pitch - Delco-Remy 1999768.
Optional - (Trumpet type) Delco-Remy 1999588, (Tri-tone type) Delco-Remy 1999793.
Horn Relay: Delco-Remy 1116781. *12 Volt.*
Air Gap - .014". **Point Opening** - .027".
Closing Voltage - 5 0-9.5 volts.

►*HORN RELAY CORROSION CAUTION* An irregular shaped opening occurs where left hand radiator baffle and radiator cross bar join in front of horn relay. This opening should be sealed with auto body putty or similar compound. At time sealing operation is performed, relay mounting screws should be removed and base inspected for corrosion. If evidence of corrosion exists, relay should be replaced.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions in Miscellaneous Section.*

ENGINE SPECIFICATIONS: Own. V8 Valve-in-head.

Engine	Bore	Stroke	Displacement
All.	3.94"	3.25"	316.6 cu. ins.

Engine ①	Compr. Ratio ②	Rated HP	Dev. HP
S M ③	8.9-1	49.6	192 at 4400 RPM
S M ④	8.9-1	49.6	216 at 4800 RPM
H M ③	8.9-1	49.6	205 at 4600 RPM
H M ④	8.9-1	49.6	227 at 4800 RPM
Special ⑤	10.0-1	49 6	285 at 5100 RPM

①–S M (Synchro-mesh), H M (Hydra-Matic).
②–7.9-1 Compression Ratio Optional.
③–Standard engine with 2-Barrel Carb.
④–Standard engine with 4-Barrel Carb.
⑤–Special engine optional on all models except Air Conditioner equipped cars.

C mpr ssion & Vacuum R ading - *Se TUNE-UP above.*

ENGINE REMOVAL: *See "Engine" in Pontiac Special Data.*

OIL PAN REMOVAL: Remove right and left engine side side aprons. Remove steering idler lever support attaching screws and lower steering linkage as far as possible. Disconnect exhaust crossover pipe and jockey it around to a position where it can be removed without forcing. Remove flywheel housing lower cover and front shield. Loosen crankcase ventilator outlet pipe brace and swing brace out of way.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Pontiac Special Data.*

►*CYLINDER HEAD REPLACEMENT CAUTION 1956 cylinder heads are not interchangeabl with previous models.*

►*285 HP ENGINE CYLINDER HEAD CAUTION· This cylinder head not interchangeable with other 1956 models.*

Oil Passage Plug (In Cylinder Head) R plac ment: *See "Oiling System" in Pontiac Special Data.*

TIGHTENING TORQUES: *See "Tightening Sp cifications" in Pontiac Special Data.*

INTAKE MANIFOLD: With **Special** flat washers under attaching nuts, tighten nuts evenly to 40-45 ft lbs.

ENGINE MOUNTINGS: *See "Engine Mountings" in Pontiac Special Data.*

PISTONS

Cast aluminum alloy, slipper skirt, with piston pin offset 1/16" toward right side of engine.

►*DIFFERENT PISTONS USED IN "HIGH" & "LOW" COMPRESSION ENGINES:* Pistons identified as follows: High compression pistons are flat on top, and low compression pistons are "dished" out. Low compression pistons also have an "L" stamped on rear side near pin boss.

Removal–Pistons and rods removed from above.

Replacement Pistons: Std. size, and .005", .010", .020", 030" Oversize.

Fitting New Pistons: Clearance .0007-.0017" (measured). just far enough above bottom of skirt to make sure micrometer is in full contact, and perpendicular to piston pin boss). Use a .0015" x ½" feeler gauge and spring scale. With piston and cylinder clean and dry, insert inverted piston and feeler gauge into lower half of cylinder (feeler 90° from pin hole). Pull required to withdraw feeler should be 8-15 lbs.

Installing Pistons: Install with notch in piston head and "F" mark on side of piston toward front of engine. *See Rod Installation.*

PISTON PINS

Pin is floating in piston and connecting rod and is retained by snap rings at each end.

Diameter–.9803-.9807".

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Pin Fit in Pist n - .0000-.0004" loose with piston and pin at room temperature. When pin is toward high limit (.0004") pin can be inserted with light hand pressure, *pin should not fall through of its own weight.* When pin toward low limit (.0000"), considerable hand pressure will be required (a brass drift can be used to tap pin into place with light pressure).

Pin Fit in C nn cting R d - .0001-.0006" loose

R plac m nt Pins: Std. size, .001", .003", .005" Oversize.

PISTON RINGS

Upper compression ring is chrome plated. Both compression rings are taper faced and have either a chamfer or a step on inside diameter of top side.

Ring	Width	End Gap	Side Clearance
Upper Compr.	.078"	.010-.020"	.0012-.0027"
Lower Compr.	078"	.008-.020"	.0012-.0032"
Oil	.183"	.015-.035"	.0025-.0095"

Installing Rings: Install compression rings with chamfer or step (on inside diameter) toward top of cylinder. Oil ring can be installed either way.

Replac m nt Rings: Std. size, .005", .010", .020", .030" Oversize.

CONNECTING RODS

L ngth—6.623-6.627" (center-to-center).

Crankpin J urnal Diam t r—2.2488-2.2498".

C nn cting R d Upp r Bushing (Piston Pin) Removal & Installation—*See "Connecting Rods & Bearings" in Pontiac Special Data.*

Lower B aring—Replaceable precision type.

Cl arance—.0009-.0029" (new).

Sid play—.006-.011"

Replac m nt Bearings: Std. size, .001', .002" Undersize.

Installing R ds: Install rods **2-4-6-8 (right bank)** with machined boss at lower end of rod toward the **rear.** Install rods **1-3-5-7 (left bank)** with boss toward the **front** of engine. When installed, machined bosses on rods will face each other *See Pistons above.*

CRANKSHAFT

►*REAR MAIN BEARING PRODUCTION CHANGE* Engines built beginning Jan. 3, 1956 have new type rear bearing shell. However, a number of engines were built after Dec. 16, 1955 with grooves machined in block and cap but with first type bearing shells installed. If leaks are encountered on engines having new groove and first type shells, second type shells may be installed. Part No. of new shell is 522825 (one upper and one lower). New shells have oil drain groove and three oil drain holes.

Journal Diamet r—2.2498-2.2499". Five bearings.

Bearings—Steel backed babbitt lined inserts. No shims.

Cl arance—.0005-.003" (Except Rear), .0008-.0033" (Rear).

End Thrust: Taken by No. 4 (rear center) main bearing

Endplay—.0035-.0085".

R plac m nt B arings: Std. size, 001", .002" Undersize.

Crankshaft R ar Main B aring Oil S al Installati n: *See "Crankshaft & Main Bearings" in Pontiac Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Pontiac Special Data.*

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

FLYWHEEL INSTALLATION (Hydra-Matic Cars): *See "Flywheel" in Pontiac Special Data.*

CAMSHAFT

►*CAMSHAFT IDENTIFICATION. Camshafts can be identified by numeral stamped on front end of shaft or absence of that numeral. Standard engine with synchro-mesh transmission has numeral "0", standard engine with Hydra-Matic transmission has numeral "4", and 285 HP engine has no marking.*

Journal Diameters—1.8992-1.8997". Five bearings.

Clearance—.0015-.0025".

End Thrust: Steel thrust plate located behind camshaft sprocket. Replace if worn or grooved.

Endplay—003-.007".

Timing Chain: Length—60 links.

Timing Chain Installation—*See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Both sprockets marked '0'. Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers.

Camshaft Removal & Installation: *See Camshaft & Bearings" in Pontiac Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): Installation - *See "Engine Front Cover" in Pontiac Special Data.*

VALVES

►*VALVE REPLACEMENT CAUTION Valves used on 285 HP engine are 3/32" longer than valves used on other engines (not interchangeable).*

►*VALVE ADJUSTMENT NOTE Because of new design, it is no longer necessary to initially adjust the tappet clearance when cylinder head or valve system is disturbed. See "Rocker Arms" below.*

Tappet Clearance: None in service (hydraulic).

Valve Specifications

Valve	Head Diam.	Stem Diam.	Length
Intake	1.778-.1.784"	.3407-.3417"	① 5.250"
Exhaust	1.497-1.503"	.3407-.3417"	② 5.230"

Valve	Seat Angle	Lift	③ Stem Clearance
Intake	30° ⑤	.370" ④	.0002-.0008"
Exhaust	45° ⑤	.370" ④	.0002-.0008"

①—5.340" (Special 285 HP Engine).

②—5.330" (Special 285 HP Engine).

③—In small end of taper reamed valve guide hole in head (valve guide integral with head), or hole in valve guide (pressed into head). Correct fit of valve stem in guide is when valve will just drop through of its own weight and with no perceptible side play.

④—Standard Synchro-mesh Engine. Standard Hydra-Matic Engine (.400"). Special 285 HP Engine, Intake (.409"), Exhaust (.413").

⑤—Valve face angle 29° (Intake), 44° (Exhaust).

Valv S at Width - 3/64-1/16" (Intake), 1/16" (Exhaust).

R plac m nt Valv s: Furnished Standard size, .001", .003" oversize.

Valv St m Oil Seal: Neoprene seal installed in second groove of intake valve stems. An oil splash shield is installed over top of inner intake valve spring (except 285 HP Engine).

Checking Valve Stem Length: *See "Valve System" in Pontiac Special Data.*

Valve Springs: Inner and outer valve springs used.

Standard Engines

Inner Spring Pressure	Inner Spring Length	Outer Spring Pressure	Outer Spring Length
54-60 lbs.	1.153"	98-106 lbs.	1.203"
23-29 lbs.	1.483"	55-61 lbs.	1.533"

285 HP Engines

Inner Spring Pressure	Inner Spring Length	Outer Spring Pressure	Outer Spring Length
33 lbs.	1.48"	59 lbs.	1.53"
95 lbs.	1.08"	128 lbs.	1.13"

►*285 HP ENGINE VALVE SPRING NOTE.* Interference may be found between inner and outer valve springs during assembly. In such a case, springs must be forced together.

Valve Guides: Cast integral with cylinder head. When valve stem clearance excessive, ream guides using Valve Guide Reamer J-5713 (.001"), J-6341 (.003"). *See Valve Guide Note Below.*

►*VALVE GUIDE NOTE:* Some production engines may be found with removable type guides (same as 1955 models). Guides have tapered hole (.0015" taper to inch), with greater clearance at rocker arm end. To replace guide, drive old guide out from combustion chamber side using Tool J-2542. Start chamfered end of guide into cylinder head and drive into place using Tool J-2542 until end of guide is 1 1/32" below roof of combustion chamber. Ream guides with taper reamer J-5712-2. *CAUTION* - Guides furnished with straight hole which must be taper-reamed.

Valve Clearance in Guide - .0002-.0008". Valve should just fall through guide of own weight and with no perceptible side play.

Valve Lifters: Hydraulic type. *NOTE* - Three different type lifters used in production. Lifters used on standard engines have ribs or a radial groove on lifter body. Lifters used in 285 HP engine are identified by letter "A" stamped on lifter body and area that contacts cam has a lubrited (blackened) finish. The 285 HP engine lifter has spring under ball check valve and redesigned ball check valve retainer. *CAUTION* - It is extremely important that regular production lifters are not used in the 285 HP engine.

Diameter - .8424-.8427". **Length** - 2.000".

Clearance (In Lifter Boss) - .0013-.0028".

Hydraulic Valve Lifter Overhaul: *See "Valve System" in Pontiac Special Data.*

Rocker Arms: Mounted individually on studs pressed into cylinder head.

Installation of Rocker Arm to Stud - When valve rocker arm ball retaining nut is tightened to 15 ft. lbs., proper location of rocker arm, with respect to pushrod and valve lifter, is automatically assured.

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Rocker Arm Stud Replacement - *See "Valve System" in Pontiac Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Synchro-mesh Engines
Intake - Opens 22° BTDC. Close 67° ALDC.
Exhaust - Opens 63° BLDC. Close 27° ATDC.

Hydra-Matic Engines
Intake - Opens 27° BTDC. Close 73° ALDC.
Exhaust Opens 69° BLDC. Close 31° ATDC.

Special 285 HP Engines
Intake - Opens 34° BTDC. Close 75° ALDC.
Exhaust - Opens 81° BLDC. Close 37° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 6 qts. (when filter changed).

Normal Oil Pressure: 35-45 lbs. at 40 MPH.

Pressure Regulator—In oil pump body. Not adjustable.

Oil Pump: Gear type, located on right rear bottom of cylinder crankcase and driven by distributor drive gear. Distributor timing is not affected by removal and installation of pump.

▷*OIL PUMP NOISE:* "Grinding" noise may be caused by upper end of oil pump drive shaft rubbing in hole in cylinder block. Examine outer diameter of shaft above upset nibs for rubbing and correct by reducing shaft diameter in this area by grinding or turning in a lathe. *CAUTION*—Do not remove nibs on shaft.

Pump Overhaul—*See "Oiling System" in Pontiac Special Data.*

Oil Filter: "Full Flow" type (optional). Replace filter element once every year or every 15,000 miles. *Use only AC Type PF-122 filter element.*

Oil Passage Plug (In Cylinder Head) Replacement: *See "Oiling System" in Pontiac Special Data.*

Crankcase Ventilator Air Filters: Located in oil filler cap and in ventilator outlet pipe. Clean and re-oil every 10,000 miles or oftener if necessary.

▷*VENTILATOR OUTLET PIPE CAUTION: If pipe is removed from pushrod cover, make sure that when it is installed, it is not pushed into cover beyond the two locating points on pipe. Excessive oil consumption at high speed will result*

Oil Pressure Gauge: AC No. 1508429. Not electric.

COOLING

Water Capacity: Without Heater - 22¾ qts.
With Undercoat Heater - 24½ qts.
With Hydra-Matic Drive - 23½ qts.
With Hydra-Matic Drive & Air Cond. - 23 qts.
With Undercoat Heater & Air Cond. - 25 qts.

Pressure Valve: AC No. 850795 (Exc. Air Cond.). 7 lb. type. AC No. 850800 (Air Cond.). 13 lb. type. Radiator filler cap.

Thermostat: Harrison No. 3133596 (Exc. Air Cond.) 160° No. 3126289 (Air Cond.) 160°. No. 3133597 (Exc. Air Cond. - use with permanent anti-freeze) 170°.

Water Pump: Packless, sealed ball bearing shaft. *See "Pontiac" in Water Pump Section.*

Temperature Gauge: AC No. 1513171. Not electric. *See "Temperature Gauges" in Miscellaneous Section.*

CLUTCH

Inland. Single plate, "Diaphragm", dry disc type with Long driven member.
See "Inland" in Clutch Section.

Clutch Disc No. - Pontiac No. 518130.

Pedal Adjustment: 7/8-1 1/8". Adjust at clutch fork-to-countershaft rod.

Overcenter Spring Adjustment—Remove overcenter spring, spring extension, and pushrod. Loosen lock screw which clamps spring lever to countershaft. Install Gauge J-5819, inserting pins which are closest together into holes in overcenter spring link and lever from which pushrod was removed. Then, while applying rotation to clutch countershaft to hold clutch pedal against stop, rotate overcenter spring lever until third pin in gauge can be inserted into overcenter spring lever. Tighten lockscrew securely, and replace spring, spring extension, and pushrod.

Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing) and remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing. Tap bearing support from inside clutch housing to aid removal (*CAUTION*—Avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure installation in same manner to maintain balance), remove clutch cover bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member. Lower clutch assembly out of car.

Clutch Installation Note—Install new felt oil seal against shoulder ahead of oil slinger retainer ring on transmission main drive gear (will bear against flared end of release bearing support when installed). Lubricate seal with engine oil before transmission installed. Coat entire length of outer diameter of release bearing support tube with grease. Lubricate release fork fulcrum points with a very light coat of grease. Apply light coat of Lubriplate on main driving gear splines. Use new paper gasket between support flange and clutch housing, make certain that flange is not bent or distorted (will cause misalignment of transmission).

SYNCHRO-MESH TRANSMISSION

Own. All helical gear type.
See "Pontiac Synchro-Mesh" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: 1) Disconnect speedometer cable, gearshift selector rod, control rod and backup lamp switch wires from transmission.

2) Disconnect rear universal joint (use a wire or rubber band to prevent trunnions from slipping off spider). Remove propeller shaft by sliding it to rear off transmission mainshaft splines.

3) To give clearance for removing upper capscrew holding transmission to clutch housing, remove transmission shift lever spring yoke and extension. Remove shift lever screw while holding shift lever in neutral (center position) to avoid damage to shift levers on shaft inside transmission. Remove shift lever.

4) To give clearance for removing lower capscrew holding transmission to clutch housing, remove transmission outer lever. Remove transmission upper capscrews and install two transmission guide pins (pins can be made by cutting the heads off two transmission capscrews and sawing a screw driver slot in the ends). *CAUTION*—Guide pins must be used since they support transmission and prevent distortion of clutch driven plate hub when lower transmission capscrews are removed.

5) Remove lower capscrews and move transmission to rear, bringing rear bearing extension into intersection of frame "X" members until main drive gear is free, then lower to floor. *CAUTION*—Use care to avoid getting dirt into front bearing when pulling transmission away from clutch housing.

Installation Note: Use guide pins installed in two upper transmission mounting holes to assist in sliding transmission straight forward into place (to avoid damage to clutch release bearing tubular support).

HYDRA-MATIC DRIVE

"Dual Range" or "Dual Coupling". Four speed automatic transmission and fluid coupling. *NOTE* - "Dual Range" Hydra-Matic used on early Series 27 cars (same as used in 1955). "Strato-Flight (Dual Coupling)" Hydra-Matic used on later Series 27 and other cars.

▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual Range" or "Dual Coupling" Hydra-Matic Drive in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "Dual Range" or "Dual Coupling" Hydra-Matic Drive in Transmission Section.*

Lubrication - Check fluid level every 1000 miles, drain and refill every 25,000 miles. Use "G.M. Hydra-Matic Fluid" or Automatic Transmission Fluid "Type A" (marked AQ-ATF on container).

Checking Fluid Level (Dual Range) - Run engine 1½ minutes at a speed equivalent to 20 MPH with selector lever in "N". Reduce speed to slow idle and move selector lever to "D" position. Measure oil level. Add fluid to bring level to "FULL" mark on dipstick.

Checking Fluid Level (Dual Coupling) - With selector lever in "P" position, engine at normal operating temperature and idling at normal idling speed (450-470 RPM) measure oil level. Add fluid to bring level to "FULL" mark on dipstick.

Capacity - (Dual Range) 11 qts. refill. (Dual Coupling) 9½ qts. refill.

▷*OTHER HYDRA-MATIC SERVICE DATA: See "Dual Range" or "Dual Coupling" Hydra-Matic Drive in Transmission Section.*

UNIVERSALS

Mechanics or Saginaw. Needle bearing type.

▷*CAUTION:* Rear universal joint companion flange nut controls rear axle pinion bearing preload (must be adjusted whenever nut is loosened). *See "Pontiac Hypoid" in Rear Axle Section.*

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REAR AXLE

►*REAR SPRING SHACKLE TO FRAME INTERFERENCE CORRECTION* Make sure spring upper frame bushing is flush with frame bracket toward car centerline If spring clamp is touching frame, bend as necessary for clearance

Own. Hypoid gear, semi-floating with Hotchkiss Drive. *See "Pontiac Hypoid" in Rear Axle Section.*

Axle Identification–Code mark stamped on pad at forward side of differential carrier between bottom web and right hand horizontal web. Axle shaft also marked with daub of paint on end of shaft to indicate ratio. See Code & Paint Markings in table below

Axle Ratios & Code Marking

Ratio	Gear Teeth	① Code Mark	② Code Color
3.08-1③⑨⑤	40 13	D	Yellow
3.23-1③⑥	42 13	9	Brown
3.64-1⑦	40 11	6	Blue
3.90-1⑧	39 10	4	Red

①–See Rear Axle Identification
②–Paint daub on end of axle shaft
③–Hydra-Matic Drive
⑨ – 27 Series.
⑤ – Except Station Wagon.
⑥ – 28 Series & Station Wagons.
⑦–Synchro-mesh Transmission (Standard)
⑧–Synchro-mesh Transmission (Optional)

Backlash–.003-.012" (new), 012" (used)

Axle Shaft Removal· Remove wheel, brake drum, four brake backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged) Pull shaft with Puller J-942 (do not drag axle shaft on seal)

Wheel Bearing Adjustment· None

Differential Carrier Assembly Removal· Disconnect rear universal and wire trunnion in place (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing

►*CAUTION. Rear universal joint companion flange nut controls rear axle pinion bearing preload. Readjust whenever nut loosened.*

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (not refillable) Service by replacement

Model	Front	Rear
Standard	5522515	5524031
Taxi, Police, H D	5352226	5513346

FRONT SUSPENSION

Independent. Shock absorber mounted within front coil spring.
See "Pontiac" in Front Suspension Section.

Kingpin Inclination–4½° at ½° camber

Caster–Neg 1°±½°

Camber–Pos ½°±½°

Toe-In–0" to 1/16"

Toe-Out on Turns- With inner wheel at 20°, outer wheel should be 18-19°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (In Line). *See "Saginaw (In Line)" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic. Duo-servo, single anchor (without eccentric adjustment). Hand brake applies rear wheel service brakes

See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

Drum Diameter - 12" (front), 11" (rear).

Wheel Cyl. Diameter - 1 1/16" (front), 15/16" (rear).

Lining Width - 2¼" (front wheels), 1¾" (rear wheels).

Thickness - 13/64".

Clearance–Tighten adjusting "star wheel" to point where wheel can just be turned by hand, then back off star wheel 14 notches.

Standard Master Cylinder: Forward of brake pedal on engine side of fire wall.

Checking Fluid Level–Maintain fluid level in master cylinder reservoir to 7/8" from gasket surface of filler neck.

Power Brakes: Bendix or Moraine Power Unit. *See "Moraine Power Unit" or "Bendix Power Unit" in Brake Section.*

Checking Fluid Level–Maintain fluid level in master cylinder reservoir to within ½" of top of filler cap opening.

Removal of Power Unit–Disconnect upper end of vacuum hose attached to inlet at vacuum cylinder, and hydraulic lines at master cylinder. Disconnect pushrod from pedal and wires from stop light switch Remove nuts from U-bolt retaining pedal pivot bracket to steering column and remove pedal and bracket (with stop light switch assembly attached). Remove clutch pedal and steering column seals at floorboard. On Hydra-Matic cars, remove screws retaining power brake unit to floor pan and remove mounting plate with power unit attached. On Synchro-mesh cars, remove screws retaining power unit to mounting plate (power unit will rest on frame). Remove screws attaching mounting plate to floor pan and remove mounting plate, "jockeying" it as necessary to clear clutch pedal Remove power unit. *CAUTION*–Do not carry or support brake unit by pushrod as pushrod may be pulled out of cylinder.

MISC. MECHANICAL

Windshield Wiper: Vacuum or electric type.
See "Windshield Wipers" in Miscellaneous Section.

Air Conditioning: Harrison. *See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section.*

Power Top Control: Hydro-Lectric with reversible pump motor. *See "Power Top Controls" in Miscellaneous Section.*

Power Window Regulators: Electric type with individual motors in each window. *See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Six-way electric type. Fore & Aft, Up & Down, and Tilting movement provided through three switches and two motors. *See "Power Seat Adjusters" in Miscellaneous Section.*

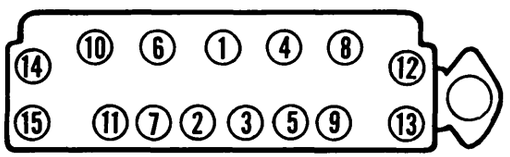
TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head Stud Nuts	60-65
Con Rod Cap Nuts	27-30
Main Bearing Cap Screws	66-70
Flywheel Retaining Cap Screw	100-110
Camshaft Sprocket Screw	50-55
Vibration Damper Retaining Screw	70-80

CYLINDER HEAD & MANIFOLD

►*RELOCATION OF VACUUM BOOSTER PUMP OUTLET CONNECTION (To eliminate rough engine idle when windshield wipers turned "ON")* Remove carbruetor, plug intake manifold with greased shop cloth to catch drill chips. Mark and drill 21/64" hole in left rear side of carburetor mounting pad and tap hole for 1/8" pipe thread. *NOTE* - Coat drill and tap with grease to prevent chips from falling into intake manifold. Remove vacuum outlet fitting from rear of intake manifold cover (plug opening with 1/8" pipe plug), and reinstall it in new location. Cut 4" section from flared end of vacuum line, and install this piece in newly located fitting. Connect line with 10" piece of windshield wiper hose. Reinstall carburetor and reroute line to clear throttle linkage.

CYLINDER HEAD INSTALLATION Use torque indicating wrench to tighten cylinder head stud nuts in sequence shown in cylinder head diagram Torque specifications are for engine at operating temperature



RAMBLER CYLINDER HEAD

Cylinder Head Gasket—Always use new gasket Coat gasket with very light application of Perfect Seal Gasket Paste to insure tight seal between cylinder head and block

ORIGINAL BORE & PISTONS

ORIGINAL BORE & CRANKSHAFT LETTER CODE A three letter code stamped adjacent to engine number indicates as follows

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	010" Undersize
Letter "C"	010" Oversize
Letter "D"	.001" Undersize

ENGINES NOT MARKED ARE STANDARD

PISTON PINS

PISTON PIN: Pin is press fit in connecting rod and no clamp bolt or locking rings are used to retain the pin. Piston pin must be removed and installed as detailed below to prevent distortion or damage to piston.

Removal - Remove pins with special Piston Pin Remover J-6360 and an arbor press. Place piston in remover support so pin will enter support when pressed out with piloted driver.

Installation - Place piston pin pilot in support, insert piston and connecting rod. This aligns piston and connecting rod piston pin bores. Press piston pin into connecting rod and piston assembly until lower pilot bottoms in support which will properly center rod on pin

►*CAUTION* Pin must be tight press fit in connecting rod.

ORIGINAL BEARING SIZES

ORIGINAL BORE & CRANKSHAFT LETTER CODE A three letter code stamped adjacent to engine number indicates as follows

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	010' Undersize
Letter "C"	010 Oversize
Letter "D"	001 Undersize

ENGINES NOT MARKED ARE STANDARD

CRANKSHAFT & MAIN BEARINGS

MAIN BEARING REMOVAL & INSTALLING· Upper bearing halve may be 'rotated' out by inserting pin in oil hole in crankshaft and turning shaft in the direction of locating tongue on bearing Bearings can be installed by reversing removal procedure

Fitting Bearings—Use Plastigage across full length of bearing insert and tighten cap to 66-70 ft lbs

CRANKSHAFT END THRUST PLATE· Crankshaft end thrust taken by flanged edges of front bearing A steel thrust plate is assembled between rear face of timing chain sprocket and flanged face of front bearing Plate keyed to shaft by Woodruff key which also secures sprocket on shaft When plate installed, chamfered edge on inner diameter should face toward the rear for tight fit against bearing journal

Adjustment—If endplay not correct with all parts correctly assembled, replace front main bearings or thrust plate

REAR OIL SEAL· Install new oil seal with rear main bearing cap off (crankshaft out of engine when replacing upper half) Packing in groove in block and cap behind oil slinger on crankshaft Cap sealed with rubber plugs in groove on each side where cap fitted in the recess in the block Use Tool J-1610 to install packing in groove in block and cap Place packing in groove (with bearing shell removed), place small diameter of tool over packing, hit end of tool with lead hammer to seat packing, cut ends of packing flush with bearing cap seat, remove tool Repeat operation for groove in block Install rubber seal plugs on each side of bearing cap (where angle seal used, make certain that seal also seated in horizontal groove in block)

ENGINE FRONT COVER

CRANKSHAFT FRONT OIL SEAL· A felt seal is fitted in the timing chain cover which bears against vibration dampener hub Seal seat in hub has inner edge turned up to form a shedder on inside of cover An oil slinger is assembled behind vibration dampener hub which extends over outer edge of oil shedder Use Tool J-1430 installed on end of crankshaft when tightening timing chain cover screws to align seal properly *NOTE*—A cork seal and rubber seal ring is assembled behind vibration dampener to seal front end of crankshaft *See VIBRATION DAMPENER above*

VIBRATION DAMPENER

REMOVAL & INSTALLATION· Non-adjustable, rubber cushioned type To install hub assembly Lock hub on shaft with woodruff key, install large lockwasher with notches on inner edge, cork seal ring, rubber seal ring and hub retainer in recess in hub Install hex head lock screw with helical lockwasher under it in screw hole in end of crankshaft and tighten screw to correct ft. lbs. torque. Rubber block retaining bolt nuts on front face of damper hub must be drawn up tight.

►*CAUTION* When installing vibration dampener on hub, timing marks must be aligned with the hub keyway and on same side

FLYWHEEL

►*FLYWHEEL REPLACEMENT CAUTION (Std & Overdrive Trans. Cars)* Flywheel on which starter ring gear is installed is balanced as an assembly with crankshaft and vibration dampener When flywheel is replaced, it is important that balance holes be duplicated as to size, depth, and angular location After replacing flywheel, tighten crankshaft to flywheel stud nuts with a torque wrench

CAMSHAFT & BEARINGS

REMOVAL: *Engine must be removed from chassis.* Remove fan assembly and cylinder head Remove valve tappet covers and vibration dampener Remove valves and valve springs, retain tappets with wire Remove timing chain cover and oil slinger Position engine with timing marks adjacent and in line across camshaft and crankshaft centers Remove camshaft sprocket retaining screw and remove timing chain and sprockets Sprockets can be pried off shafts

VALVE SYSTEM

VALVE STEM SEALS

VALVE STEM OIL SEAL: Consists of a rubber deflector installed on valve stem of all valves. Install deflector on valve stem with cupped side down over upper end of

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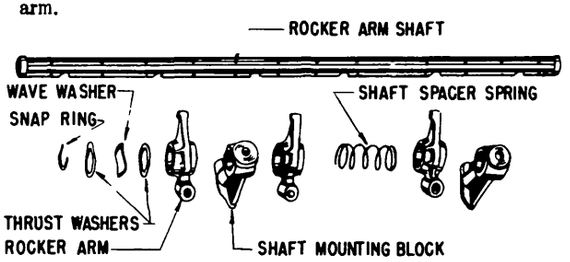
valve guide before installing valve spring and locks. Use new deflector whenever valves ground or replaced.

ROCKER ARMS

ROCKER ARM ASSEMBLY: Rocker arm shaft is one piece type and entire rocker arm assembly can be removed after taking out mounting bolts in shaft brackets.

Disass mbly & Inspecti n: Remove snap ring on end of shaft, slide thrustwashers, wave washer, rocker arms, mounting brackets, and springs off shaft. Inspect all parts for wear, see that end plugs are tight in shaft.

R ass mbly & Installati n: Install all parts in same relative positions *(CAUTION* - Rocker arms are "Right" and "Left" and must not be interchanged). Install assembly with rocker arm lubricating holes in shaft down or toward cylinder head. Make certain that baffle installed on rocker shaft supports does not interfere with rocker arm.

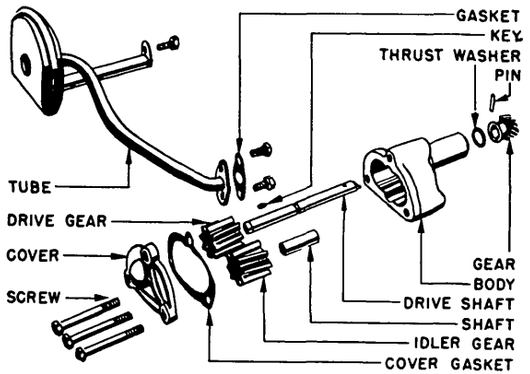


RAMBLER ROCKER ARM ASSEMBLY

OIL PUMP

OIL PUMP: Removal - Pump mounted externally on right side of engine. Remove pump by taking out three capscrews in pump cover.

Overhaul: Remove pump cover and gasket. Lift out pump drive gear, idler gear, and idler gear shaft. Remove key from keyway in shaft. Remove shaft and driving gear assembly through upper end of pump body *(NOTE* - Driving gear is held on shaft by a pin). Remove thrustwasher from shaft. Reassemble pump by reversing this disassembly procedure.



RAMBLER OIL PUMP

ELECTRICAL NOTES

►*BACK-UP LIGHT WIRING CORRECTION (First Cars):* If Backing Light comes on when shift lever placed in Reverse position, with Ignition Switch "Off", back-up light circuit should be checked and the following changes made:

Synchro-mesh & Overdrive Cars - If Back-up Light feed wire is attached to red wires of center terminal on Body Junction Block (behind battery), proceed as follows:

1) Disconnect this back-up light feed wire from the Body Junction Block, remove eye terminal from wire and replace with Douglas terminal.

2) Locate Back-up Light Switch Wire Extension (No. 18 red wire in harness) attached to "AUX" terminal of Circuit Breaker and extending through main wiring harness grommet in dash. This wire has Douglas terminal on engine side of dash. *NOTE* - If this wire missing, install the wire, Nash No. 4382421, and connect the eye terminal end to the "AUX" terminal of the circuit breaker.

3) Connect Douglas terminal of above wire (2) to the Douglas terminal installed on back-up light switch feed wire (1).

Automatic Transmission Cars - If Back-up Light feed wire is attached to right hand terminal of Body Junction Block (green wires), disconnect this wire and proceed in accordance with (1), (2), (3) above.

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment equipes for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on plate attached to center of cowl panel under hood.

Starting Serial No.—D-276101 (Domestic), DKD-5601 (Unassembled Export), DT-5401 (Canada).

ENGINE NUMBER: Stamped on machined surface at upper left front corner of cylinder block.

Starting Engine No.—B-1001

TUNE-UP

►*BURNED BREAKER POINTS OR HIGH SPEED MISS CORRECTION:* May be caused by incorrect ignition primary resistor. Use only resistor with Delco-Remy trademark. *See Resistor data below.*

COMPRESSION PRESSURE: 120 lbs. at cranking speed.

VACUUM READING: 18-21" at idling speed

VALVE TAPPET CLEARANCE: .012" Int., .016" Exh. hot & running.

MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .030".

Spark Plug—Auto-Lite AL-7. Torque to 30 ft. lbs.

COIL: Delco-Remy 1115393. *12 Volt*

Resistor—Delco-Remy No. 1927809. 1 40-1.62 ohm.

►*COIL RESISTOR NOTE:* Connected in series between battery and coil. Resistor is by-passed during cranking by solenoid or magnetic starter switch, making direct lead from battery to coil.

DISTRIBUTOR: Delco-Remy No. 1110242. *12 Volt.*

Condenser—Delco-Remy 1869704 **Capacity** .18-.23 mfd.

Contact Point Set — Delco-Remy No. 1918148.

Breaker Gap—.016".

Cam Angle—28°-35°.

Breaker Arm Spring Tension—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

		Automatic Advance		
Degrees	Distr.	RPM	Degrees	Eng. RPM
Start		350	0-4	700
6.5-8.5		550	13-17	1100
11-13		1100	22-26	2200
15-17		1600	30-34	3200

Vacuum Spark Control: Delco-Remy No. 1116099.

	Vacuum Advance	
Distr. Degrees	Eng. Degrees	Vacuum ("of Hg)
Start	0	6-8
5	10	11-12

IGNITION TIMING

Setting—TDC. (Supersedes original specification of 4° ATDC).

►*IGNITION TIMING CHANGE:* Starting with engine number B-2461, ignition timing was changed from 4° ATDC to TDC. On engines prior to above number, paint mark vibration dampers and set ignition to new specification "TDC".

Timing Mark—Vibration Damper.

CARBURETOR

Carter AS No. 2349S. Single barrel downdraft.

►*CARBURETOR FLOAT PRODUCTION CHANGE: Carburetors with Brass Tag date B-6 or higher have split floats. See "Float Level" for adjustment of split type float carburetors.*

►*ROUGH ENGINE CORRECTION (Exhaust gas leakage into Intake Manifold):* May be caused by corrosion of of intake manifold cover. *For corrective procedure, see "Cylinder Head & Manifold" in Rambler Special Data.*

►*ROUGH ENGINE IDLE (Windshield Wipers Operating) CORRECTION:* For relocation of vacuum booster pump outlet connection, *See "Cylinder Head & Manifold" in Rambler Special Data.*

►*CARBURETOR FLOODING (Date Prior to B-6) CORRECTION:* If flooding is eliminated by loosening the needle seat, (gas line to carburetor fitting), it indicates a bind or interference between the float hinge and inner end of float needle seat. To correct, install needle and seat assembly Carter No. 25-313S, included in Repair Kit 1916A.

Idle Setting—¼-1½ turns open. Turn screw out for richer mixture.

Idle Speed—550 RPM (Std. & O.D. Trans.), 475 RPM (Hydra-Matic in Neutral), 500 RPM (Hydra-Matic in Neutral with Air Conditioning turned on)

Float Level — With cover gasket and float pin retainer removed, hold lip of float arm against seated needle with float pin at bottom of guide slots. Distance from top of casting to top of float should be ¼" (Gauge T-109-282). Adjust by bending lip on float arm. After adjusting floats, check clearance between overlapping tangs of float levers as follows: Replace pin retainer, invert carburetor to seat intake needle, check tang clearance with feeler gauge. Clearance should be .010-.015". Adjust by bending long tang of left hand float.

Fast Idle: .043" (T109-158) between throttle valve and bore of carburetor (side opposite idle port) with choke fully closed and fast idle cam in fast idle position.

Automatic Choke: 1 point lean.

Throttle Linkage Adjustment (Hydra-Matic Cars): Adjust engine idle speed to 450 RPM (with air conditioning 500 RPM, compressor running), with engine temperature 150-160°F, transmission warm and selector lever in neutral. Disconnect throttle rod at throttle lever at side of transmission. Clean back of transmission case, place checking Gauge J-2545-D flush against machined surface with edge of gauge against transmission side cover. Throttle lever stud should fit freely in notch of gauge. Use bending Tool J-3310 to correct throttle lever position. Gauge notch must be in alignment with pin through hole in T.V. lever with lever held against its stop to the rear. When properly adjusted, connect throttle rod to T.V. lever. Remove upper end of throttle rod at bellcrank. Disconnect carburetor to bellcrank rod at carburetor throttle rod. Insert an aligning pin in holes of the bell crank and bracket. Adjust carburetor to bellcrank rod. Fasten rod in place with clip fasteners. Adjust T.V. rod at bellcrank to fit freely with the hole in lever. Then shorten T.V. rod three full turns. Connect T.V. rod at bellcrank; remove aligning pin.

NOTE—Gauge 2545-C can be reworked by adding another notch behind original notch so that distance from center of notch to rear inside surface of gauge is 6½".

►*OTHER DATA: See "Carter AS Carburetors" in Carburetion Section.*

Fuel Pump Pressure: 3½ - 5¼ lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Fuel only or Fuel and vacuum.

Replacement Pump — Carter No. M-7975 (Fuel only), No. M-2379S (Fuel & Vacuum).

Pressure — 3½ -5¼ lbs. at 500 RPM.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley Electric Constant-voltage ("CV") type with gauge voltage regulator, King-Seeley No. 46439.

Dash Unit — King-Seeley No. 49474.

Tank Unit — King-Seeley No. 44606.

See "Fuel Gauges" in Carburetion Section.

BATTERY

Standard — Auto-Lite 11-HS-45. *12 Volt,* 11 plate, 45 ampere hour capacity (20 hr. rate).

Air Conditioned Cars — Auto-Lite 11-HS-60. *12 Volt,* 11 plate, 60 ampere hour capacity (20 hr. rate).

Battery Ground — Negative.

►*CAUTION:* This is reversed from previous models.

Engine Ground — Battery to engine with body ground from transmission to rear engine cross member.

STARTER

Delco-Remy No. 1107647. *12 Volt.* **Armature** — 1926626.

Starter Switch: Delco-Remy No. 1119793 solenoid switch located on starter, actuated by combination ignition and starter switch (Std. and Overdrive cars), by Delco Remy No. 1996084 switch operated by raising shift lever upward (Hydra-Matic Drive).

Drive—Overrunning clutch (solenoid pinion shift).

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—35 ozs.

	Performance Data		
Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	11.3	435

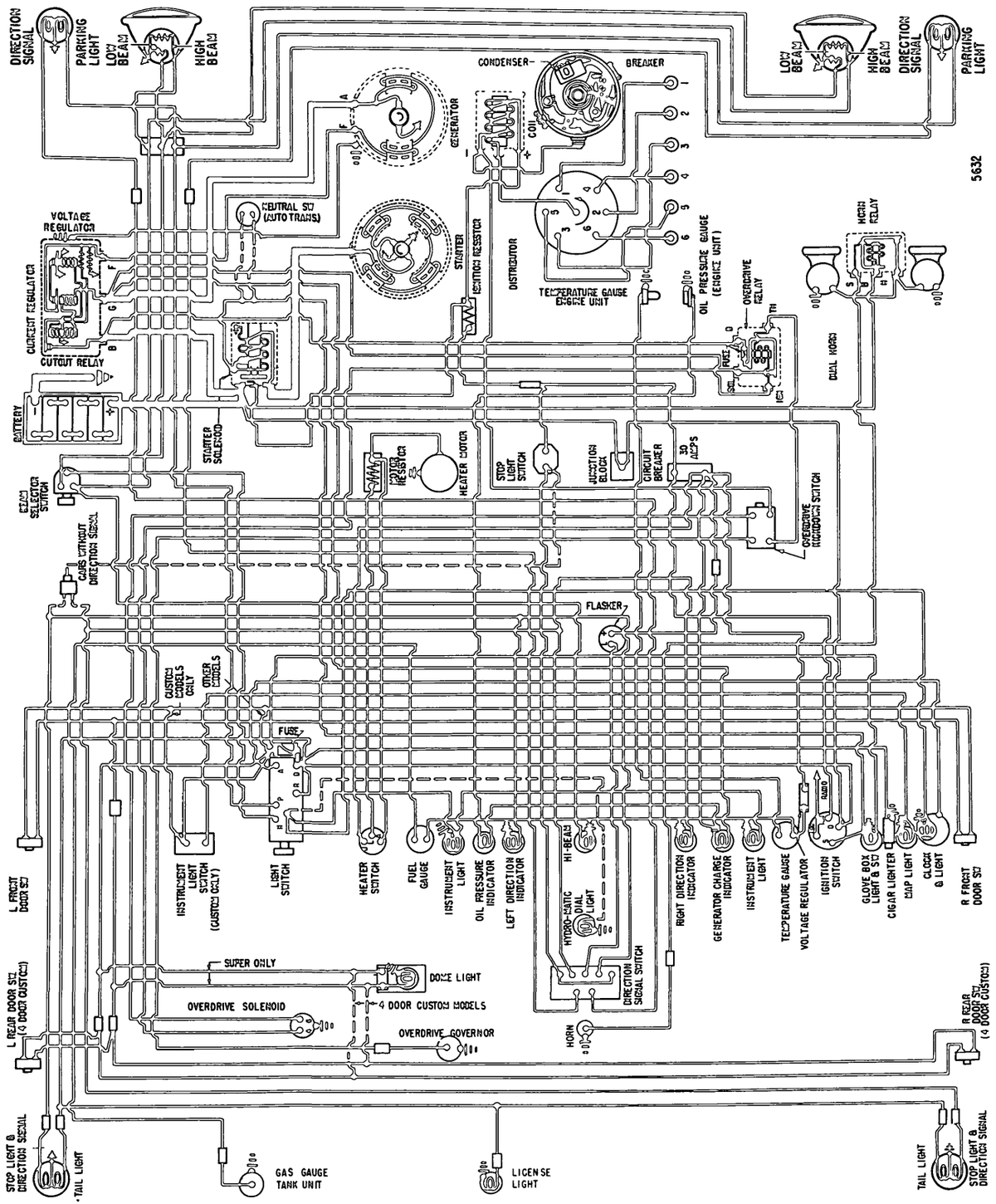
GENERATOR

Delco-Remy. *12 Volt.* Used as follows:

Application	Generator	Armature
Without Air Cond.	1100323	1933352
With Air Cond.	1102049	1934326

►*GENERATOR ARMATURE SHAFT PRODUCTION CHANGE:* Generators with tag code stamped 5K-20 or later have heavier brazing of water pump drive extension on armature shaft to prevent breaking. Brazing should withstand 25 ft. lb. torque applied to generator pulley (belt released) with pump shaft coupling held stationary.

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Performance Data

	Amperes	Volts	RPM
Standard	25	14.0	2780
Air Cond.	30	14.0	2150

Rotation–Counter-clockwise at commutator end.
Brush Spring Tension–28 ozs.
Field Current–1.50-1.62 amperes (1100323), 1.48-1.62 amperes (1102049), 12 volts at 80°F.
Belt Adjustment: ½" deflection with 25 lbs. pressure applied midway between fan and generator pulleys.

REGULATOR

Delco-Remy No. 1119122 (1100323 Gen.), 1119003 (1102049 Gen.), 12 Volt. *NOTE – Specifications are "Normal" settings.*

Cut-Out Relay

Cuts-In–11.8-13.5 volts.
Contact Gap–.020".
Air Gap–.020" with contacts just closed.

Voltage Regulator

Setting–13.8-14.8 Volts (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1119000 Series Regulators" in Electrical Section.*

Current Regulator

Setting (1119122)–23-27 amperes (hot).
Setting (1119003)–27-33 amperes (hot).
Air Gap–.075" with armature pressed down to point where contacts just touching.
Checking & Adjusting–*See "Delco-Remy 1119000 Series Regulators" in Electrical Section.*

MISC. ELECTRICAL

▷*BACK-UP LIGHT WIRING CIRCUIT CAUTION (Early Cars):* Incorrect assembly of wire to back-up light switch and circuit breaker causes back-up light to operate incorrectly. *See "Electrical Notes" in Rambler Special Data.*

Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Light Switch Removal: Disconnect battery. With switch in "OFF" position, press button release on top of light switch assembly, and pull knob and shaft clear of switch. Remove slotted nut, pull switch to rear of instrument panel.
Stop Light Switch: Located at tee fitting in line to left front brake.
FUSES: 7.5 Ampere. On lighting switch for Courtesy and Glove Box Light.
15 Ampere. Located on overdrive relay.
5 Ampere. Located in Radio wire back of instrument panel.
CIRCUIT BREAKERS: Three used as follows:
12 Ampere. On light switch for Instrument, Tail and Dome Lights.

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12 Amp re. On light switch for Head and Parking Lights.
30 Ampere. For Stop Light, Instruments and Indicators, Heater and Directional Signals. Located back of Instrument panel.

HORNS: Auto-Lite No. HAD-4741. (Low Pitch), **HAD-4742** (High Pitch).
Horn Relay – Nash No. 3145684.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use xtreme care when disconnecting any part of air conditioning system or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous S ction.*

►*ENGINE NOISE (Similar to bearing noise) CORRECTION:* A noise usually diagnosed as a bearing noise may come from improperly assembled Vibration Damper. Reassemble Cushions, Disc and Rubber correctly on engines built prior to Engine No. B-3597.

►*WATER PUMP LUBRICATION CHANGE:* Lubrication fitting now included. Use hand pressure lubrication gun to lubricate at 5,000 mile intervals.

ENGINE SPECIFICATIONS: 6 Cyl. valve-in-head.

Bore	Stroke	Displacement
3 1/8"	4¼"	195.6 cu. ins.
Compr Ratio	**Rated HP**	**Developed HP**
7.47-1	23.44	120 at 4200 RPM

Compression & Vacuum Reading–*See TUNE-UP.*

OIL PAN REMOVAL: Remove steering linkage cross tie rod before removing pan.

TIGHTENING TORQUES: *See "Tightening Specifications" in Rambler Special Data.*

CYLINDER HEAD & MANIFOLD: *See "Cylinder Head & Manifold" in Rambler Special Data.*

PISTONS

Cam ground, aluminum alloy, tin-plated with steel strut and solid skirt.
Original Bore & Piston Sizes–*See "Original Bore & Pistons" in Rambler Special Data.*
Weight–13.59 ozs.
Removal–Pistons & rods removed from above.,

Fitting New Pistons: Piston to bore clearance .0006"-.0012". Piston properly fitted should support its own weight with piston and bore dry.

R placement Pistons: Standard, .002", .005", .010" .020", .030" and .040" oversize.

Installing Pistons: Install piston with notch on top perimeter toward front of engine

PISTON PINS

Press fit in connecting rod. No locking device.
Diameter – .8597". **Length** – 2¾".
Cl arance in Pist n–.0002" maximum. Thumb push fi at 70°.
Pin R m val & Installati n – *S "Piston Pins" in Rambl r Sp cial Data.*

R plac m nt Pist n Pins: Standard & .003", .005" Oversize.
NOTE – Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1&2)	.0930-.0935"	.010-.020"	.002-.004"
Oil (#3)	.1545-.1550"	.010-.020"	.002-.004"
Oil (#4 U-flex)	.1545-.1550"		.002-.004"

Replacement Rings: Sets of Std. & .020" oversize.
Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

Length–6.625" center-to-center. **Weight**–25 ozs.
Crankpin Journal Diameter–2.0948"-2.0955".
Original Bearing Sizes–*See "Original Bearing Sizes" in Rambler Special Data.*
Bearings–Steel-backed babbitt. No shims.
Clearance–.001"-.0015". **Side Play**–.005"-.015".
Replacement Bearings: Std., .001", .002", .010", .012" Undersize.
Installing Rods: Identification marks (raised surface on center of rod and cap) toward front of engine.

CRANKSHAFT

Journal Diameter–2.4791"-2.4798". Four Bearing.
Original Bearing Sizes–*See "Original Bearing Sizes" in Rambler Special Data.*
Bearings–Steel backed babbitt. No shims.
Clearance–.001"-.0015".
Replacement Bearings: Std., .002", .010", .012" Undersize.
End Thrust: Taken by flanged front main bearing.
End Play–.003"-.008".
Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Rambler Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Rambler Special Data.*

FLYWHEEL REPLACEMENT: *See "Flywheel" in Rambler Special Data.*

VIBRATION DAMPENER REMOVAL & INSTALLATION: *See "Vibration Dampener" in Rambler Special Data.*

CAMSHAFT

Bearings–Steel-backed babbitt bushings.
Clearance–.002".
End Thrust: Thrust plate on front face of engine between No. 1 bearing and camshaft sprocket. Endplay controlled by sprocket on shaft. (Press fit on shaft). **Endplay** .004-.006".
Timing Chain: Morse non-adjustable type. **Width** 1", **Pitch** 3/8", **Length** 22½" or 60 links.
Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across centerline of sprockets.
Engin Fr nt Cov r Oil Seal (Crankshaft Fr nt Seal): *See "Engin Fr nt Cov r" in Rambl r Sp cial Data.*

VALVES

Tapp t Cl aranc : Intake .012", Exhaust .016" (Running Hot).

Valve	Head Diam.	St m Diam.	L ngth
Intake	1.594"	.3412-.3417"	4.759"
Exhaust	1.343"	.3407-.3412"	4.759"
Valve	**Seat Angle**	**Lift**	**St m Cl aranc**
Intake	45° ①	.383"	.0015-.0035"
Exhaust	45° ①	.385"	.002-.004"

① Valve face angle 44°.

►*VALVE GRINDING CAUTION:* Replace valves when refacing reduces distance from top of valve face to top of valve to less than 1/32".
Valve Seat Width – 5/64-3/32".
Valve Stem Oil Seal – Rubber deflectors mounted on all valve stems at upper end of guide.

Valve Springs: Valve springs may be removed without removing cylinder head by maintaining 90 lb. air pressure in combustion chamber to hold valve against valve seat.
Free Length – 2 3/8".

Valve Spring Sp cificati ns

Valve	Lbs. Pr ssure	Length
Closed	65-70	1.13/16"
Open	115-125	1 7/16"

Valve Guides: Use Tool J-1429-A to remove and replace guides. Guides should extend ¾" above cylinder head.
Rocker Arm Assembly: *See "Valve Syst m" in Rambler Special Data.*

VALVE TIMING

See "Camshaft Setting" und r CAMSHAFT above.
Intake Valve – Open 12°30' BTDC, Close 51°30'ALDC.
Exhaust Valve – Open 53°30' BLDC, Close 10°30'ATDC.
Valve Timing Check – Set valves on No. 1 cylinder at .003" lash. With No. 6 piston at TDC in firing position, timing will be correct if exhaust valve opens the same amount before DC on vibration dampener as intake valve opens after DC as engine is rocked back and forth over DC.

OILING SYSTEM

Crankcase Capacity: 4 qts. refill.
Normal Oil Pressure: 30 lbs. at 20 MPH. 12 lbs. minimum at 600 RPM.
Pressure Regulator Valve – Non-adjustable spring loaded valve located in cylinder block wher oil enters oil distribution channel.
Oil Pressure Indicator: Light goes on when Ignition switch is turned on, goes out as oil pressure reaches 6½ lbs. ± 1½ lbs. Sending unit Rambler No. 3142826 located on right rear side of engine block.
Oil Pump: Gear type. Mounted on right side of engine. *See "Oiling System" in Rambler Special Data.*
Oil Filter – Partial Flow type. Replace element every 5000 miles or less as needed.

Replacement Filter Unit – Rambler No. 8990068.
Crankcas Ventilati n: Filter in crankcase filler cap, and vent in rocker arm cover.

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COOLING

Water Capacity: 11 quarts.
Pressure Valve: 7 lb. Radiator Filler Cap Rambler No. 3142965 (less Air Conditioning), 14 lb. No. 3141371 (with Air Conditioning).
Thermostat: Choke type. (Std.) 170° type Rambler No. 3131817, (Optl.) 180° type Rambler No. 3131985 for use with permanent anti-freeze.
Water Pump: Sealed packing and bushing type.
See "Rambler" in Water Pump Section.
Pump Removal – Drain cooling system, disconnect coupling, hoses, and pump mounting screws.
Temperature Gauge: King-Seeley Electric Constant-Voltage ("CV") type with gauge voltage regulator, King-Seeley No. 46439.
Dash Unit – King-Seeley 48476.
Engine Unit – King-Seeley 44200.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 8.5A7. Assy. No. 1391. Single plate.
See "Borg & Beck" in Clutch Section.

Clutch Disc No.	Borg & Beck	Nash No.
Standard	382394	3144937
Overdrive	382480	3147133

Pedal Adjustment: Free play should be ½"-¾". Adjust at connecting link between throwout lever and release idler shaft assembly. Lengthening link reduces free play.
Removal: Remove transmission (see below), disconnect linkage, remove clutch housing and pan, punch mark flywheel, clutch cover and pressure plate, (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner. 3 speed, helical gear type.
See "Warner Transmissions" in Transmission Section.
Transmission Controls: *See "Transmission Controls" in Transmission Section.*
Removal: Disconnect brake tube at bracket underside of body, torque tube at rear of transmission, hand brake cable at bell crank and brake cable housing at the rear brake cable bracket. Move rear axle to rear to remove universal joint from transmission shaft. Disconnect speedometer cable and shifter rods. On overdrive cars, disconnect wires at solenoid, governor and overdrive cable at lever. Use two guide pins in place of two upper capscrews to guide transmission back to clear pilot bearing and clutch disc.

OVERDRIVE

Warner R10–*See "Warner R10" in Transmission Section.*
Overdrive Control: *See "Warner R10-R11 Overdrive Controls" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range four speed automatic transmission with fluid coupling.
See "Hydra-Matic Drive" in Transmission Section.

▷*HYDRA-MATIC REVERSE GEAR SLIP-OUT CORREC-* Caused by incorrect adjustment of back-up light switch or manual linkage, or need for increased detent plunger spring tension. *See "Dual-Range Hydra-Matic Drive" in Transmission Section.*

▷*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication–Check fluid every 1000 miles, drain and refill at 25,000 mile intervals.
Capacity–8½ qts. (9½ qts. after overhaul).

Checking Fluid Level–Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located under right front floor plate). Add fluid to bring level to "F" mark.

▷*CAUTION:* Do not check oil level when transmission is excessively hot and do not fill above "F" mark on dipstick.

▷*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer or Mechanics – One used at transmission end.
Torque Tube Bracket Adjustment–*See "Hudson & Nash Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid type with torque tube drive.
See "Hudson & Nash Hypoid" in Rear Axle Section.
Axle Ratio – Std. 3.8-1 (8-34), Overdrive 4.4-1 (8-35), Hydra-Matic 3.3-1 (13-43). *NOTE* – 3.58-1 (12-43) used in Hydra-Matic Cars with Air Conditioning or Outside Wheel Carrier to Serial No. D-325171.
Backlash – .002 - .003". Shim Adjustment.
Axle Shaft Removal: Remove wheel, pull drum (use hub puller J-1644-B or J-736-B). Remove brake support plate, slide plate, oil seal, and shims off axle. Attach special puller J-2498-A to axle shaft and remove shaft from housing.
Rear Suspension: *See "Hudson & Nash" in Suspensions & Wheel Alignment Section.*
Rear Axle Assembly Removal: Drain lubricant, raise and support rear of body. Disconnect hand brake cable at bellcrank, and hand brake cable housing at bracket. Disconnect torque tube from transmission, rear brake hose at bracket on body floor pan, shock absorbers from brackets and rear axle stabilizer bar at rear axle tube. Roll axle free from car.
Wheel Bearing Adjustment: Shims behind brake backing plate.

SHOCK ABSORBERS

Delco. Direct acting type. Serviced by replacement.
Front – Rambler No. 3119821. Rear – 3147605 (Before Serial No. D-287222), No. 3119822 (beginning Serial No. D-287222).

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs located between upper end of steering knuckle pin and seat in outer wheel house panel.
See "Rambler" in Suspensions & Wheel Alignment Sect.
▷*FRONT SUSPENSION SPRING NOTE:* Heavier spring used for Air Conditioned cars. *See "Rambler" in Front Suspension Section.*
King Pin Inclination – 6½°.
Caster (Std.) – ½° desired. Limits 0° to ½°.
(Pwr. Strg.) – 1° desired. Limits ½° to 1°.
Camber – 0° desired. Limits ¼° Neg. to ¼° Pos.
Toe-In – 1/16" to 3/16". CAUTION –When adjusting toe-in on Power Steering Cars, operate engine to supply oil pressure which will center spool in power cylinder valve.
Toe-Out on Turns – Outer wheel 22°, inner wheel 25°.

STEERING

Manual: Gemmer. Worm & Roller with push pull adjustments.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: Monroe "Power Guide". Linkage type.
See "Monroe Power Guide" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Sect.*
Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*
Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix (Lockheed) Hydraulic. Self centering (floating shoe) type. Hand lever applies rear wheel service brakes.
See "Bendix (Lockheed) Self-centering" in Brake Sect.
Drum Diameter – 9".
Wheel Cylinder Diameter – 1 1/16" (Front) 7/8" (Rear).
Replacement Linings & Shoes – Linings and shoes with linings furnished in standard size only.

	Lining Width & Length	
	Front Wheel	Rear Wheel
Primary Shoes	2½" x 9 7/8"	2" x 9 7/8"
Secondary Shoes	2¼" x 7 21/32"	1¾" x 7 21/32"

Clearance – All shoes just free of drag with brakes centralized (with slight drag on shoes rotate wheel in both directions). Eccentric adjustment for each shoe.
Standard Master Cylinder: In engine compartment under steering column.
Checking Fluid – Raise hood and fill from engine compartment. Check at 1000 mile intervals.
Removal – Remove from beneath car. Not necessary to disturb other parts.
Power Brakes: Bendix Power Unit. *See "Bendix Power Unit" in Brake Section.*
Checking Fluid – Same as for standard master cylinder.
Removal – Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*
Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Misc. Section.

TIGHTENING SPECIFICATIONS

	Champion Ft. Lbs.	Comm. & Pres. Ft. Lbs.
Cylinder Head	46-50	55-65
Intake Manifold		26-30
Exhaust Manifold	26-30	26-30
Oil Pan	13-17	13-17
Main Bearing Caps	88-93	88-93
Flywheel	33-35	33-35
Vibration Dampener	130-140	130-140
Con Rod Caps	28-32	52-54
Piston Pin Clamp Bolt	20-25	20-25
Camshaft Gear	20-22	20-22
Rocker Arm Support Bracket		13-17
Rocker Arm Cover		8-10
Engine Front Cover	13-17	13-17
Water Manifold		13-17
Water Pump Mounting	13-17	13-17
Oil Pump Mounting	13-17	13-17
Oil Filter Cover	20-25	20-25
Clutch Housing ①	28-32	28-32
Clutch Housing ②	13-17	
Transmission Mounting	60-70	70-80

①—To cylinder block.
②—To Engine plate. Plate dowel bolt nut 28-32 ft. lbs.

ENGINE

CHAMPION

ENGINE REMOVAL: *NOTE*—If same engine block is to be reinstalled, engine should be disconnected at junction of clutch housing or torque converter housing (torque converter should be disconnected from engine drive plate so that converter will remain on transmission splines when engine removed). If new block to be installed, clutch housing or converter housing can be removed with engine, after removing transmission (this will allow housing alignment to be checked before engine reinstalled).

1) Remove hood and upper air deflector. On sedans and station wagons, remove radiator core. Disconnect Climatizer hoses (if so equipped) from water pump and cylinder head elbows. On coupe models, remove fan blade assembly and shroud (see Cooling System below). Disconnect and remove battery, remove carburetor air cleaner.

2) Disconnect windshield wiper hose and oil pressure gauge line from the flexible coupling. Disconnect cables from generator, starter solenoid, ignition coil, and heat indicator engine unit.

3) Remove cotter key and take out clevis pin connecting accelerator cross shaft to bellcrank rod. Remove lower stud nut from engine front support insulators and disconnect engine ground strap from right front engine support bracket.

4) Remove exhaust pipe flange to manifold nuts, remove U-clamp at clutch or converter housing bracket, and lower exhaust pipe off manifold studs. Remove the starter motor. On coupe models, turn front wheels all the way to the right. On sedans and station wagons, disconnect one end of the front tie rod, remove shaft from steering bellcrank and remove bellcrank out of way to provide clearance for oil pan. Disconnect gas tank to fuel pump line at flexible coupling.

5) Remove center (No. 1) cylinder head capscrew and replace it with an engine lifting eyebolt. Attach lifting device and raise engine just enough to take weight off front supports.

6) On automatic transmission models, disconnect accelerator bellcrank-to-transmission rod. Remove converter housing lower plate, and disconnect torque converter from converter drive plate *(see "Automatic" or "Flightomatic" Transmission in Transmission Section).*

7) Remove clutch housing to engine bolts and drive out clutch housing dowel pins. Raise engine slightly and move it forward sharply to break it loose from clutch housing. Continue to push engine forward until transmission spline clears clutch assembly, then lift engine out of car.

COMMANDER & PRESIDENT

ENGINE REMOVAL: *NOTE*—If same engine block is to be reinstalled, engine should be disconnected at junction of clutch housing or torque converter housing (torque converter should be disconnected from engine drive plate so that converter will remain on transmission splines when engine removed). If new block to be installed, clutch housing should be removed with the engine for checking alignment. On cars with air conditioning, remove compressor mounting bracket and compressor as an assembly without disconnecting refrigerant lines (see Compressor Removal under "Studebaker Air Conditioning" in Miscellaneous Section). Move assembly to position on front of right fender, being careful to keep compressor crankcase lower than compressor cylinder head, so that oil will not leak into chamber above compressor pistons.

1) Remove hood, upper air deflector and fan shroud. Disconnect and remove battery. On sedan and station wagon models, remove radiator core and water pump manifold. On coupe and hardtop models, remove fan blade assembly. Disconnect Climatizer hoses (if so equipped) from water manifold. Remove generator and fan belt.

2) Remove starter and remove exhaust crossover pipe. On sedan and station wagon models, remove steering bellcrank shaft. On coupe and hardtop models, turn steering gear all the way to left to provide clearance.

3) Remove carburetor air cleaner, fuel pump to carburetor pipe, and the spark modifier pipe. Unhook spark plug wires, remove spark plug cable support brackets from rocker arm cover, remove distributor clamp screw and remove distributor. Disconnect fuel pump inlet line at flexible coupling, and disconnect any vacuum connections at intake manifold.

4) Disconnect oil pressure gauge line at flexible coupling and disconnect wires at heat indicator gauge and ignition coil. Disconnect accelerator pushrod at throttle control bellcrank. On cars equipped with overdrive, disconnect wire at kick-down switch. On cars with Automatic Drive, disconnect the wire at anti-creep switch and disconnect accelerator bellcrank to transmission rod at bellcrank. Remove converter drive plate to torque converter bolts *(see "Studebaker "Flightomatic" Transmission in Trans. Section.*

5) Remove upper stud nuts from engine front support insulators and disconnect engine ground strap. Place a sling under intake manifold, attach hoist and raise engine just enough to take weight off engine supports. Remove clutch housing to engine bolts and take off the clutch housing front cover plate.

6) If clutch housing to be removed with engine, remove transmission. Remove the two capscrews holding clutch operating shaft, bracket, and bearing assembly to transmission case. Remove cotter key and clevis pin from inner end of clutch operating shaft sleeve and move clutch operating shaft away from clutch release shaft.

7) On cars equipped with Flightomatic Transmission remove the four engine rear support insulator capscrews which hold insulators to converter housing. On models equipped with overdrive or standard transmission, remove the two bolts which hold insulator and cage assembly to engine rear support crossmember.

8) On coupe and hardtop models, turn wheels to right to move steering bellcrank off to the side to provide additional clearance for oil pan. Push engine sharply forward to disengage clutch housing dowels. Continue to push engine forward until transmission spline is clear, then raise engine out of car.

OIL PAN

CHAMPION, COMMANDER & PRESIDENT

OIL PAN REMOVAL (CHAMPION): Remove oil level gauge. Raise car and support it with stands, drain oil. On long wheelbase models, swing wheels to right to move steering bellcrank out of way. On short wheelbase models, disconnect tie rods and reach rod from steering bellcrank, remove retaining pinch bolt, and remove bellcrank from shaft. On all models, remove oil pan capscrews and remove pan.

OIL PAN REMOVAL (COMMANDER & PRESIDENT): Remove oil level gauge and adapter tube. Disconnect one battery cable. Raise car, drain oil and remove starter. On coupe and hardtop models, swing wheels to right to move steering bellcrank out of way. On sedans and station wagons, remove steering bellcrank assembly. Remove exhaust crossover pipe. Remove oil pan cap screws and remove pan.

INSTALLATION (ALL MODELS): For installation of oil pan, the filler block must be removed. Remove the four screws holding filler block to engine front cover (V8), or to engine front plate (6 Cyl.). With a thin spatula or putty knife, carefully separate filler block from engine front cover gasket (V8) or engine front plate gasket (6 Cyl.). If this gasket is damaged, cut away the exposed portion of the gasket. Then cut the required amount from a new gasket and fit it in place as necessary using Perfect Seal or its equivalent to secure gasket in place. Apply a sealer to threads of the four front cover or front plate to filler block cap screws. Install filler block with a screw in one of the upper holes. Using a hardwood stick, pry upward against filler block and install a screw in the opposite upper hole. Install two remaining screws and tighten all four screws until heads just contact lockwasher.

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With all gaskets in position, install the oil pan and tighten the screws evenly. Then tighten the four filler block screws. Complete the installation by reversing removal procedure.

CYLINDER HEAD & MANIFOLD

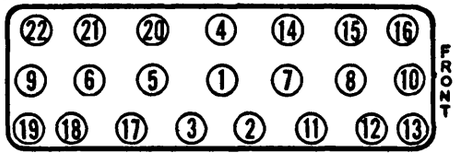
CHAMPION, COMMANDER & PRESIDENT

CYLINDER HEAD GASKET: Coat lower face of gasket and face of cylinder head with Perfect Seal gasket cement before installing (use sparingly and see that it does not enter screw holes and water passage openings).

CHAMPION

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in diagram. With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all capscrews (additional tightening may be necessary for correct tension).

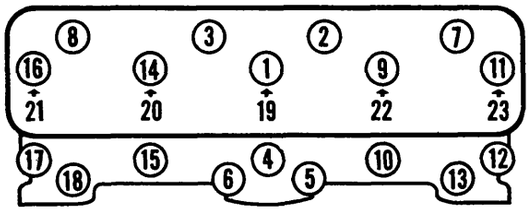
Tightening Torques—*See "Tightening Specifications" above.*



CHAMPION CYLINDER HEAD

COMMANDER & PRESIDENT

CYLINDER HEAD INTERCHANGEABILITY (RIGHT TO LEFT BANK): Both cylinder heads are identical (water pump ports are provided at front and rear of all heads). It is necessary to block off the rear port not in use with a dummy plate and gasket. *NOTE*—Heat indicator engine unit must be mounted in the water outlet opening cover plate at rear of the left bank cylinder head.



COMMANDER & PRESIDENT CYLINDER HEAD

COMMANDER & PRESIDENT

CYLINDER HEAD INSTALLATION: Clean all threads using a tap and die. Check head for warping *(NOTE*—If necessary, head can be planed .015". Apply gasket compound to gasket and install. *(CAUTION—Be sure main oil gallery-to-rock r arm assembly oil passage at rear of th right bank (on front of left bank) is not blocked by gask t).* Install cylinder head on the hollow dowel. Dip capscrews in engine oil and install the nine short screws in the two outer rows of holes and the five medium length screws in the center row of holes and tighten finger tight. Install rocker arm assembly (see "Rocker Arm Assembly"). Install and tighten long head screws finger tight. Insert rocker arm assembly capscrews through rocker arm brackets. Tighten all cylinder head capscrews in correct sequence as shown in diagram. Tighten water pump manifold screws alternately until they are tight.

Tightening Torques—*See "Tightening Specifications".*

ORIGINAL BORE & PISTONS

CHAMPION, COMMANDER, & PRESIDENT

ORIGINAL BORE & PISTON SIZES: Cylinder bore sizes are marked by a figure stamped on top face of cylinder block next to each cylinder bore as indicated below. Replacement pistons corresponding to these sizes are available under the part number for standard size pistons. The oversize is marked on the top of each piston. *NOTE—When replacing pistons in an engine which has been in use, the cylinder bore markings can no longer be used as a guide. It is important that pistons be selected to fit the cylinder bore. See "Fitting Pistons" on car model page.*

Cylinder & Piston Markings: Cylinder bores may vary in size from Standard to .0025" oversize in increments of .0005". Champion bore sizes vary from 3.000" (stamped "O"), to 3.0025" (stamped "25"). Commander and President bore sizes vary from 3.5625" (stamped "25"), to 3.5645" (stamped "45").

PISTON PINS

CHAMPION, COMMANDER & PRESIDENT

PISTON PIN REMOVAL & INSTALLATION: Use tool J-1293-A (Champion) J-1293-C (Comm. & Pres.).

Removal—Place rod and piston assembly on assembling fixture. Remove lock nut and star washer from clamp screw, and by tightening lock nut on other end of clamp screw, remove clamp screw, remove the screw from connecting rod. Then slide piston and connecting rod off piston pin.

Installation—Place piston pin on assembling fixture, slide piston and connecting rod into position. (Oil squirt hole and number on connecting rod should be on the solid side of the piston). Insert piston pin clamp screw in connecting rod, install star washer **and locknut, and tighten nut securely.**

6 Cylinder Engines — On connecting rods Nos. 1, 3, and 5 the clampscrew nut is installed on the T-slot side of the piston. On Nos. 2, 4, and 6 the nut is installed on the solid side of the piston. When installing the screw regardless of the number of the rod, if the rod is held with the offset of the rod to the left and the screw is inserted from the front the nut will be located on the correct side in relation to the piston. Be sure to align the flat surface on the piston pin with the flat surface on the clamp screw.

V8 Engines — If connecting rod is new and has not been marked, it should be checked to see if it is a left or a right bank rod. Hold rod so oil holes face you. All rods are offset at crankpin end. When held as above, left bank rods have offset or widest part of rod to the right; a right bank rod would have offset to left. Stamp correct number on rod and rod cap on oil hole side if even numbered or right bank rod, and on side away from oil hole if odd numbered or left bank rod. Be sure that when pin is inserted nut will be installed on slotted side of piston and that flat surface of clampscrew mates properly with flat surface of piston pin.

PISTON RINGS

CHAMPION, COMMANDER & PRESIDENT

Replacement Rings: Three types of Perfect Circle piston rings available for service replacement:

Standard Production Type Sets—Plain iron rings without chrome plating. To be used on relatively new engines. Furnished Std. and .020", .030", .040" Oversize.

Chrome Top Ring Sets—Same as standard ring set except that top ring is solid chrome-plated to increase ring life and oil control. Used on relatively new engines or after a rebore job, especially where heavy duty service is anticipated. Furnished Std. and .020", .030", .040" O.S.

"2 in 1" Chrome Sets—Set contains solid chrome-plated top ring and, in addition, an oil ring assembly made up of two chrome-plated steel rails, one cast iron separator or spacer and two complete sets of expander rings, one "Normal Pressure" set and one "Hi-Pressure" set. "Normal Pressure" set used where taper of bore does not exceed .006". "Hi-Pressure" set used where taper exceeds this limit. In general, use "2 in 1" set for all except new and rebored engines. Furnished Std. & .020", .030" O.S.

"2 IN 1" CHROME RING SET INSTALLATION CAUTION: Distribute oil control ring expander, separator, and ring rail gaps as follows: Place expander spring in ring groove with gap positioned above end of piston pin. Install one steel section with gap approximately 90° from spring gap. Install cast iron separator with gap approximately 90° from steel rail gap. Install remaining steel section with gap approximately 180° from gap of first steel rail. *NOTE*—Gap in rails and separator must not straddle humps on expander spring.

CRANKSHAFT & MAIN BEARINGS

CHAMPION, COMMANDER & PRESIDENT

►*V8 ENGINE OIL LEAK AT REAR OF ENGINE:* May be caused by step on rear bearing cap interfering with oil pan and preventing pan from compressing gasket properly. Check step on right rear corner of bearing cap and eliminate interference by grinding step down to a depth of 1/8" or even with crankcase flange (start grinding at rear of cap and extend relief forward to approximately center of capscrew boss).

►*REAR BEARING OIL SEAL PRODUCTION CHANGE & INSTALLATION CAUTION:* Revised type oil seal (less susceptible to shrinkage at high temperature) now being used in production and only this type seal should be used for replacement. Revised seal can be identified by TWO RAISED DOTS immediately ahead of "Brummer Stude 530311" marking (old seal had one dot at this point) and carries same part number (530311) as old seal.

REAR MAIN BEARING OIL SEAL INSTALLATION: *NOTE*—Seal assembly consists of three types used together: (1) Cork Seals between sides of bearing cap

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and block, (2) Neoprene seals in groove in face of bearing cap, (3) "Brummer" type seal on crankshaft journal (installed in block and bearing cap). Install seals as follows:

Neoprene Seals–Place new seals in cross grooves of bearing cap with inner end of seal not more than 1/16" from inner end of groove, press seals firmly and uniformly into grooves and trim outer ends flush with sides of bearing cap. *CAUTION*–Seals must not be more than 1/16" from inner edge of bearing cap and must not be so long as to interfere with Brummer seal.

"Brummer" Type Seal–Remove old seal, thoroughly clean seal channel just forward of rear flange by using a swab saturated with alcohol or similar solvent, dry channel thoroughly. Blunt the sharp edge of the flange on which the seal is mounted using the flat side of a screwdriver blade or similar tool (this will prevent scuffing inner edge of seal during installation). Install seal DRY as follows: Insert upper half between crankshaft and block at the rear flange with the wiping lip of the seal pointing forward or away from the flywheel, work seal around crankshaft until ends are horizontal and in line with the bearing cap face (see V8 Engine Note below), use great care to avoid scuffing the soft center sealing cushion at the bottom of the seal groove. Install lower half of seal on bearing cap flange, oil wiping edge of seal and crankshaft journal, install bearing cap and tighten bearing cap bolts to correct torque.

Cork Seals–After bearing cap installed, drive new cork seals down into grooves between sides of bearing cap and block (use drift and light hammer). *CAUTION*–Use care not to split or damage these seals.

Oil Leak Check–After installing new seals, run engine for approximately 45 minutes, then check for oil leaks.

►*V8 ENGINE NOTE:* To facilitate installation of the upper half of the Brummer seal, the three intermediate bearing cap screws can be loosened two turns. *CAUTION*–Do not loosen these intermediate bearing caps more than indicated or front bearing may be damaged.

ENGINE FRONT COVER

CHAMPION

ENGINE FRONT COVER: Removal–Remove fan shroud, radiator core, and vibration dampener. Using Puller Set HM-925, remove the crankshaft pulley (use HM-925-13 to prevent damage to crankshaft threads). Take out cover retaining screws and bolts and remove the cover.

Engine Front Cover Seal (Crankshaft Front Seal) Installation: Install new felt oil seal in cover, using hub of crankshaft pulley to seat it in recess in cover.

Engine Front Cover Installation: Install cover on engine using a new gasket. Install all the retaining bolts, leaving them finger tight so cover can center itself as the crankshaft pulley is installed. Using Pusher Set J-4704, press crankshaft pulley into position. Tighten cover bolts and screws securely and install vibration dampener, radiator core and shroud.

COMMANDER & PRESIDENT

ENGINE FRONT COVER: Removal–Drain cooling system and remove fan shroud and radiator core. Remove fan belt and power steering belt (if so equipped). Remove fan blade assembly and take off the water manifold. Remove fuel pump to carburetor pipe and remove fuel pump. Remove vibration dampener and fan pulley hub (on Power Steering cars a second pulley is used). Remove cover screws and remove cover.

Engine Front Cover Seal (Crankshaft Front Seal) Installation: Remove felt oil seal with an ice pick and clean out the recess in cover before installing new seal *(NOTE–Do not remove the four self tapping screws holding the seal retainer plate in position).* Install a new seal and wet it with clean engine oil. Insert crankshaft pulley hub to locate seal in center position.

Engine Front Cover Installation: Install cover on engine, using a new gasket, and install cover screws, but do not tighten. Using Pusher Set J-4704, install crankshaft pulley hub to locate hub and center cover properly. Tighten cover screws. Install fuel pump and the fuel pump to carburetor pipe. Assemble and install vibration dampener and tighten retaining screws to proper torque. Install water manifold assembly using new gaskets, and replace fan blade assembly. Install fan belt and adjust it to proper tension. Install power steering belt (if so equipped) and adjust it to proper tension. Install radiator core and fan shroud.

CAMSHAFT & BEARINGS

CHAMPION

CAMSHAFT REMOVAL (Champion): *NOTE–Camshaft can be removed with the engine in the chassis by removing fender, grille, and radiator core as an assembly.* Remove cylinder head, manifold assembly and valve cover plates. Take out valve locks, valves and valve spring retainers. Turn cylinder block over so that valve lifters will fall free of camshaft. If engine not removed from car, tie or block valve lifters so they will not interfere with cam lobes during removal. Remove oil pan, oil pump, and oil pump drive shaft. Remove vibration dampener, fan drive pulley and engine front cover. Unless camshaft is to be replaced, it is not necessary to remove camshaft gear. Turn crankshaft until camshaft thrust plate cap screws are visible through spokes of timing gear. Remove capscrews and lockwashers retaining thrust plate and carefully slide camshaft and gear out of cylinder block, being careful not to nick or scratch camshaft journals, lobes, or bearings.

COMMANDER & PRESIDENT

CAMSHAFT REMOVAL (Commander & President): With engine in car, camshaft can be removed as follows: Turn crankshaft until timing mark shows directly under pointer on engine front cover and distributor rotor is in the No. 6 firing position (in this position the timing mark on the camshaft gear is aligned between the marks on the crankshaft gear). On coupe and hardtop models, remove the fan shroud. On all models remove the radiator core, fan blade assembly and water manifold. Remove rocker arm covers, rocker arm assemblies and pushrods. Remove carburetor and intake manifold assembly. Remove breather pipe, valve lifter cover, and take out the valve lifters. Remove fuel pump and take off engine front cover (see "Engine Front Cover" above). Turn camshaft just enough to expose thrust plate retaining screws and remove screws. Turn gear back to align timing marks of the two gears. Remove camshaft and gear as an assembly, being careful not to damage camshaft bearings. *CAUTION–With camshaft removed, do not move crankshaft or disturb position of distributor rotor.*

TIMING GEARS

CHAMPION, COMMANDER & PRESIDENT

TIMING GEAR REMOVAL: Remove engine front cover *(see "Engine Front Cover" above).* Remove gear retaining screw, lockwasher, and flat washer. On Commander & President, remove fuel pump cam and lockplate. Using Puller HM-925, install puller screws in threaded holes provided in camshaft gear hub and pull gear from camshaft. Remove crankshaft pulley key and oil slinger. Remove crankshaft gear with Puller HM-925. Use HM-925-12 Adapter Plug to protect threads in end of crankshaft.

VALVE GUIDES

COMMANDER & PRESIDENT

VALVE GUIDE REMOVAL AND INSTALLATION: Valve guide tool J-4673 is used to remove and install the valve guides. Drive guide out of cylinder head from the combustion chamber side.

Installation–Coat valve guide lightly with white lead and start chamfered end into cylinder head from the combustion chamber side. Place the installing plate on the face of the head so that the long side of the plate is paralliel to the end of the head and the bore of the plate centered over the guide bore. The plate is marked "Intake" on one side and "Exhaust" on the other side. Be sure that the exposed mark of the plate corresponds to the valve guide being installed so that the depth of the counterbore of the plate will control the depth to which the guide is driven into the head. Insert the driver through the plate and into the guide. Drive the guide into the head until the shoulder of the driver contacts the bottom of the counterbore in the plate.

ROCKER ARMS

COMMANDER & PRESIDENT

ROCKER ARM ASSEMBLY: Two identical hollow steel shafts (ends plugged) are used. Four removable supports doweled to each shaft with cylinder head capscrews. Three springs used to position rocker arms against supports. Lubrication is supplied by oil from the main oil galleys to a passage in the cylinder head which leads the oil up around the relieved capscrew shank in the rocker arm front support on the left bank and the rocker arm rear support on the right bank. The bracket is drilled to connect the capscrew hole with the rocker arm shaft hole. The oil flows under

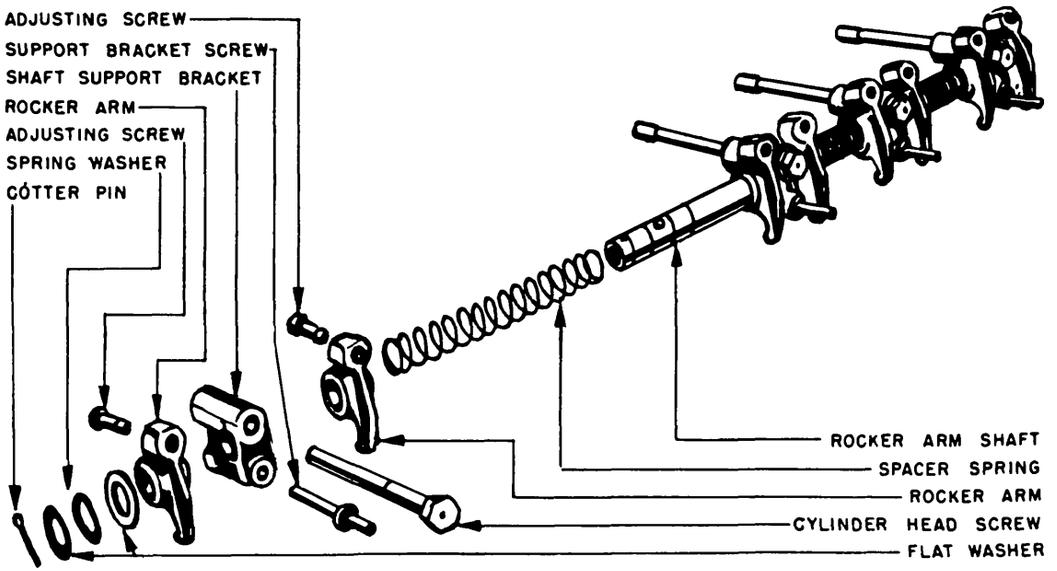
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pressure to the rocker arms and through holes drilled in the rocker arms to the adjusting screws and through the center of the adjusting screws to the push rods.

►*DISASSEMBLY CAUTION:* Mark rocker arms, brackets, and the rocker arm shaft so that they can be reassembled in their original position.

Reassembly—Make certain the oil holes and grooves in the rocker arm shaft and the oil holes in the brackets, rocker arms and adjusting screws are clean. Check rocker arms and shaft clearance which should be .0005" to .0025". Test springs. It should require 9-1/2 to 10-1/2 lbs. to compress springs to 2-1/32". If not within these limits, replace spring. Place a spring washer between two flat washers and install on one end of the rocker arm shaft and install a new cotter pin in the shaft. Place a rocker arm on the shaft next to the inner flat washer. (*CAUTION*—The oil groove side of the shaft must be at the bottom of the rocker arm and the adjusting screw end of the rocker arm be on the same side of the shaft as the cylinder head capscrew groove in the shaft). Place a shaft bracket on the shaft so that the bottom of the bracket is on the oil groove side of the shaft and align the cylinder head capscrew hole in the bracket with the capscrew groove in the shaft. Insert a capscrew through the bracket. Clamp the bracket in a vise and install the second rocker arm on the shaft, positioning it in the same way as the first rocker arm. Slide a spacer spring on the shaft and, holding the spring compressed, slide the third rocker arm and the second bracket on the shaft and position it in the same way as the first bracket. Align the screw hole in the bracket with the groove in the shaft, insert a capscrew and release the spring. Install the rest of the rocker arms, springs and brackets in the same manner. Slip the two flat washers with the spring washer between them, on the end of the shaft and install a new cotter pin in the shaft. If correctly assembled, when installed on the engine, the flat side on the end of the rocker arm shaft will be at the rear on the right bank and at the front on the left bank.



COMMANDER & PRESIDENT R CKER ARM ASSEMBLY

VALVE LIFTER

CHAMPION, COMMANDER & PRESIDENT

VALVE LIFTER INSTALLATION: Thoroughly clean lifter bores in cylinder block and inspect for smoothness. With lifter and bore clean and dry, check lifter fit and select correct lifter size. Lifters furnished Std., .001", .005" oversize. See ".005" Oversize Lifter Installation" below.

Checking Lifter Fit in Bore—When properly fitted, the valve lifter should just slide into place from its own weight. If .001" oversize lifter does not restore proper clearance, bore must be reamed to .005" oversize, and .005" oversize lifters installed.

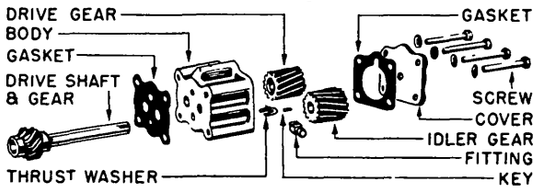
.005" OVERSIZE VALVE LIFTER INSTALLATION (1949-56 MODELS): .005" oversize service replacement valve lifters are available for all models (1949-56). Special reamers are required for reaming engine block lifter bores as follows: 32L-STB (1949-56 Champion & 1949-50 Commander 6); 1356-STB (1951-54 Commander V8); 1352-STB (1955-56 Commander & President V8).

OILING SYSTEM

OIL PUMP

CHAMPION

OIL PUMP: Removal & Disassembly—Disconnect oil pressure pipe. After removing four cover screws and washers, remove pump body cover, gasket and idler



CHAMPION OIL PUMP

gear. Remove drive gear using tool J-2959. Remove Woodruff key and horseshoe shaped thrust washer to permit removal of oil pump body and gasket. If it is necessary to remove pump drive shaft and gear, the oil pan must be removed. Remove distributor and push oil pump drive shaft inward, and remove it from the crankcase. To remove gear from oil pump drive shaft, press out the gear-to-shaft pin and then press shaft out of gear.

Inspection: Inspect pump cover for flatness and deep scratches or score marks. Check clearance between oil pump gears and pump body by placing a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. The pump should be locked tight. The total clearance should not exceed .010". If pump gears can be rotated with the two .005" feelers in place, the pump body is worn and should be replaced. Check gears for smoothness, deep scratches and score marks. Replace all defective parts. Clearance between end of gears and cover plate must not exceed .007". To check this clearance, the lower ends of the gears should be exactly flush with the lower surface of pump body when gears are resting against the upper part of pump body. A new gasket .004-.006" thick, when compressed will provide proper clearance.

Installation & Reassembly: *(CAUTION—If oil pump drive shaft removed, install EXACTLY as described below to obtain correct ignition timing).*

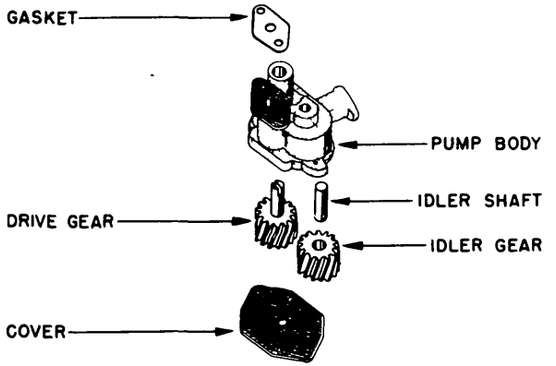
Oil Pump Drive Shaft Installation—Install drive shaft, temporarily engaging camshaft gear and oil pump drive gear in any position. Then turn the crankshaft until No. 1 piston is on a compression stroke and the "UDC 1-6" mark on vibration dampener is directly under pointer on engine front cover. Slide the oil pump drive shaft away from camshaft to disengage the camshaft gear and turn drive shaft until keyway is pointing directly upward when the two gears start to engage. Pull the shaft into position so that the two gears fully mesh (the drive shaft will rotate so that the keyway is toward rear of engine). Install distributor to hold oil pump drive shaft in position while installing remainder of pump assembly (with slot in end of distributor shaft engaged, rotor should line up with No. 1 terminal in distributor cap).

Oil Pump Assembly—Dip each part of pump in clean engine oil before assembly. Place a new gasket and oil pump body over pump shaft and install horseshoe washer, woodruff key, and drive gear. Install idler gear, new cover gasket, and pump body cover. Secure entire assembly in place with the four cover screws

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Remove oil pressure pipe fitting from pump body and prime pump with clean engine oil. Install fitting and oil pressure pipe.



COMMANDER & PRESIDENT OIL PUMP

COMMANDER & PRESIDENT

OIL PUMP: Removal–Remove oil pan and take out the two oil pump retaining nuts and lockwashers. Slip pump assembly off mounting pad studs and remove gasket.

Disassembly: If necessary to replace strainer, straighten tab, and slip strainer off pipe. If floating strainer is to be cleaned, remove pump and strainer assembly. Do not remove the strainer by bending retaining tab. *(NOTE–the floating oil strainer is serviced only as an assembly and should not be disassembled).* Remove cover screws and pump body cover. Remove idler gear, drive gear and shaft (do not disassemble drive gear and shaft). Clean oil strainer with solvent and dry it thoroughly.

Insp ction: Inspect pump cover for deep scratches or scores and for flatness. Check clearance between oil pump gears and pump body by placing a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. If pump gears can be rotated with the two .005" feelers in place, the pump body is worn and should be replaced. Check gears for smoothness, deep scratches and score marks. Replace all defective parts. With weight of gears resting against upper part of pump body, place a straightedge across face of pump body and measure distance between gear face and straightedge. This clearance should not exceed .007".

Reassembly: Place drive gear and shaft assembly in pump body. Install idler gear on idler shaft. Install pump body cover and cover screws (no gasket is used between body and cover). Insert pipe of floating oil strainer in cover inlet finger tight and set up strainer to get its proper position. While holding assembly so strainer is up against upper stop, lower surface of strainer should be parallel with pump cover and 1 7/8" below cover. Scribe aligning marks on pump body and pipe. Then, using suitable pipe wrench, tighten pipe until tight and aligning marks are aligned.

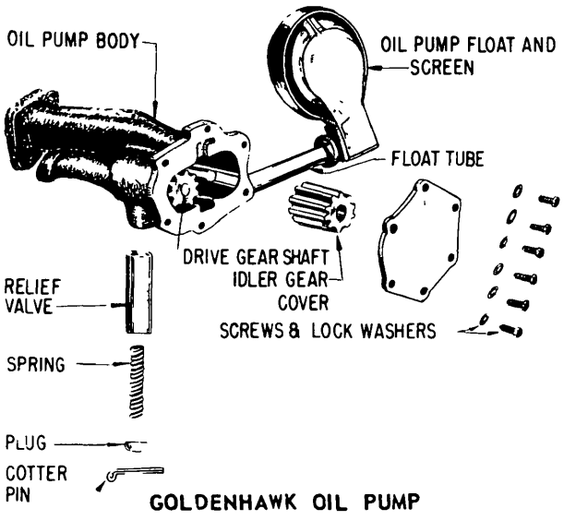
Installation: Clean all traces of old gasket off pump mounting flange and rear bearing cap pad. Install a new gasket and position slot in pump drive gear shaft so it will mate with tongue of the oil pump drive shaft and coupling, and install pump on mounting studs. Install nuts and lockwashers and tighten securely to 13-17 ft. lbs.

COOLING SYSTEM

GOLDENHAWK

OIL PUMP: Removal – Remove oil pan and remove two screws attaching oil pump to rear main bearing cap, remove oil pump and strainer assembly.

Disassembly: Remove cover screws and pump body cover. Remove idler gear, then remove pin from sleeve on shaft and drive sleeve off shaft. Remove upper and lower pump driving shaft and gear from housing. Press shaft out of driving gear, if necessary. To remove strainer, straighten tab which retains strainer on pipe, slip strainer off pipe. To remove oil pressure relief valve, pull out cotter pin which holds spring retainer *(CAUTION* – Spring retainer is under considerable tension). After removing spring retainer and spring, insert a 23/64" drill into skirt of valve piston and withdraw piston from pump housing.



GOLDENHAWK OIL PUMP

Inspection: Inspect float for leaks. Inspect strainer. Inspect relief valve spring (free length should be approximately 3 19/64". When compressed to 1 3/8", pressure should be 9-9½ lbs.). Inspect pressure relief valve plunger and bore in pump housing for scores and wear which might cause plunger to stick in housing. Check pump cover plate. It should be flat, smooth, and without any deep scratches or score marks. Clearance between oil pump gears and pump body should not exceed .010". To measure this clearance place a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. Pump should be locked tight. If gears can be rotated, pump body is worn excessively and should be discarded. Clearance between end of gears and cover plate must not exceed .003" with weight of gears resting against upper part of pump body. Place straightedge across face of pump body, and with feeler gauges measure distance between each gear face and straightedge.

Reassembly: Install key in pump shaft keyway and press driving gear on shaft until it is flush with bottom of gear. Install upper and lower shafts and gear in pump body. Install sleeve on shafts. Install pin in sleeve and stake both ends of pin. Install idler gear on its shaft. Install oil pressure relief valve plunger, spring, and spring retainer. Compress spring and install cotter pin. Slip strainer over end of pipe and bend tab to retain strainer. If strainer pipe has been removed from pump body, be sure threads are tight and that strainer is properly positioned. Check position with scale and straightedge. With float in lowest position, there should be ¾" between center of button on top of strainer and lower surface of pump. Install cover on pump body.

Installation: Clean mating surfaces of pump and mounting pad. Start pump driving shaft into hole of rear main bearing cap and turn shaft to engage mating ends on distributor shaft. Torque screws to 25-30 ft. lbs.

RADIATOR & FAN SHROUD REMOVAL & INSTALLATION (Coupe & Hardtop): Shr ud - Drain radiator and remove inlet hose. Remove wiring. junction block from fan shroud. Pry open wiring harness clips and move harness out of way. Remove fan-to-hub screws and remove fan blades. Remove four capscrews holding shroud to radiator core support and remove fan shroud. To install, reverse removal procedures.

Radiator – Drain cooling system, disconnect battery and tie up hood. Remove horn relay and headlamp junction block screws, and free wires across top of shroud from clips. Except on Champion models, remove gasoline pipe clip screw. If car has power steering, free upper hose from hose support. Remove fan blade assembly. Disconnect upper and lower hoses from radiator. Remove screws and remove radiator core.

IGNITION NOTES

COMMANDER & PRESIDENT

DISTRIBUTOR DRIVE SHAFT ASSEMBLY: R m val– Turn crankshaft until "IGN" mark on vibration dampener is directly under pointer on engine front cover and distributor rotor is in line with No. 1 spark plug terminal of cap. Remove cap from distributor housing and carburetor air cleaner from carburetor. Disconnect coil-to-distributor secondary cable at coil. Remove spark plug cables, cable brackets and distributor cap as a unit. Disconnect coil-to-distributor primary wire at distributor. Disconnect spark modifier pipe. Remove distributor clamp capscrew and lift distributor out of cylinder block.

Installation: The "IGN" mark on vibration dampener must be directly beneath pointer. Position distributor so that spark modifier is to front and pointing slightly toward right. Turn rotor approximately 30° clockwise and insert the oil pump drive shaft and coupling into cylinder block opening. When the teeth on the distributor shaft gear contact the teeth on the camshaft

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gear, the rotor will turn counter-clockwise, and as the teeth mesh, the distributor assembly will seat on the cylinder block. At the same time the tongue of the oil pump drive shaft will enter the groove of the oil pump shaft. The rotor will now point directly forward and be in line with the No. 1 terminal of the distributor cap. (NOTE—Very slight misalignment may cause difficulty in engaging the oil pump drive shaft tongue with the groove of the oil pump shaft). After the distributor gear is in mesh with the camshaft gear, the engine may be cranked to give proper alignment. Maintain a light pressure on the distributor while cranking the engine to facilitate the engagement. Install distributor clamp and capscrew. Connect the coil-to-distributor cable. Connect spark modifier pipe. Install spark plug cables, cable brackets and secure cap with retainer springs. Connect coil-to-distributor secondary cable. Install carburetor air cleaner. Check timing.

GOLDENHAWK

DISTRIBUTOR DRIVE SHAFT ASSEMBLY: Removal – Turn crankshaft until ignition mark on vibration damper is directly under 5° mark and distributor rotor is in line with No. 1 spark plug terminal of cap. Unsnap retainer springs and remove distributor cap from housing. Remove carburetor air cleaner. Disconnect coil-to-distributor cable at distributor. Disconnect spark modifier pipe. Remove distributor clamp capscrew and clamp. Lift distributor out of block.

Installation: Line up ignition indicator mark on vibration damper with 5° timing mark with No. 1 cylinder on firing stroke. With distributor cap removed, insert distributor to engage oil pump drive shaft by turning distributor rotor. With rotor pointing at right cylinder bank, select proper tooth so that when distributor is placed in full mesh with the camshaft gear, rotor will be pointing to the right bank and 37° rearward from the transverse line. This will also be the position for the No. 1 spark plug wire terminal. **Line up, but do not connect spark modifier pipe.** After distributor is in its bottom position, install retainer clamp, washer and screw. Install distributor cap, making sure that each of spark plug wires is tight in cap. Install coil-to-distributor cable. Before installing spark modifier pipe, check ignition timing and adjust. Install spark modifier pipe.

PROPELLER SHAFT

ALL MODELS

PROPELLER SHAFT & SUPPORT BEARING ASSEMBLY: Propeller shaft is a two unit type (separate front & rear shafts) with intermediate bearing in Support Assembly on frame crossmember.

Rear Shaft Removal: Straighten ear of lockplate, loosen grease washer nut and unscrew it from shaft. Mark universal joint flange and rear axle companion flange to assure original position and balance at reassembly. Remove U-bolts holding rear joint bearing cups and cross to rear axle flange. Shift shaft forward and separate joint by prying with a suitable bar between companion flange and universal cross. Hold bearing cups on the cross while separating joint to avoid dropping cups and spilling bearings. Then remove bearing cups and bearings or tape them securely in place on cross. Slide shaft rearward, slipping end of slip yoke out of splines of front shaft. To remove grease washer nut from slip yoke, first remove cork grease washer and washer retainer from within the nut and slide nut off slip yoke. Cork grease washer and washer retainer are split to facilitate removal.

Installation—Reverse removal procedure. Tighten U-bolts and nuts to 14-17 ft. lbs.

Front Shaft Rem val: Remove rear shaft and shaft support assembly. Mark front shaft universal joint flange and transmission companion flange. Remove U-bolts holding joint bearing cups and cross to transmission companion flange. Separate joint by prying with suitable bar between companion flange and universal cross. Hold bearing cups on cross while separating joint to avoid spilling bearings. Remove bearing cups and bearings or tape them in place on the cross. Then slide rear end of shaft out of crossmember and remove from chassis.

Installation—Reverse removal procedure. Tighten U-bolts and nuts to 14-17 ft. lbs.

Support Bearing Servicing: Bearing is sealed type (prepacked with lubricant) **and must never be wash d in gasoline or other solvents.**

►*CAUTION: Do not re-install support bearing which has been washed in gasoline or solvent.*

Support Bearing Removal: Remove rear shaft. Remove lock plate and spacer from projecting end of front shaft, and remove shield. Remove shaft support stud nuts, lockwashers, and plain washers. Slide bearing and support assembly off front shaft and support cushions. Remove dust shields from front shaft. To remove support bearing from support use a suitable tube which will fit the outer race of the bearing and, with an arbor press, remove the bearing. NOTE—Use care not to damage bearing seal.

Installation—Reverse removal procedure. NOTE—Press bearing into support so that it is laterally centered in the support. Install dust shields on front shaft with concave side of shield against shoulder on shaft. If shaft support cushions removed, be sure to install studs in same holes from which removed.

MODEL IDENTIFICATION

Mod l	Model Designation
Champion (All Models)	56 G

SERIAL NUMBER: Located on left front door pillar post.

Assembly Plant	Starting Numbers
South Bend	G 1,357,501
Los Angeles	G 936,701
Hamilton	G 763,701

ENGINE NUMBER: Stamped on pad on upper front left corner of engine block.

Starting Engine Number—1180251 (South Bend), L-3201 (Los Angeles).

TUNE-UP

COMPRESSION PRESSURE: 130-150 lbs. at 150 RPM. Variation limit (between cylinders) 10 lbs.

VACUUM READING: 17-18" idle speed.

VALVE TAPPET CLEARANCE: .016" cold. Intake & exhaust.

MANIFOLD HEAT CONTROL: Automatic thermostatic type.

Checking Thermostatic Coil Spring — With outer end of coil free from anchor, and valve closed (counter-weight up), hooked end of coil should be 90° clockwise from anchor post at 70° F.

IGNITION

FIRING ORDER: 1–5–3–6–2–4,

SPARK PLUG GAP: .030". Limits .028-.033"

Spark Plug — Champion J 7.

COIL: Auto-Lite CAF-4004. *12 Volt.*

Ignition Current — 4 Amps. (Idling).

►*IGNITION RESISTOR NOTE: Resistor not used.*

DISTRIBUTOR: Auto-Lite IAT-4201. *12 Volt.*

Condenser—Auto-Lite IAT-2015L. **Capacity** .21-.25 mfd.

Contact Point Set — Auto-Lite IGW-3028AS.

Breaker Gap — .020"

Cam Angle - 39°±3°.

Breaker Arm Spring Tension - 17-20 ozs.

Rotation - Counter-clockwise viewed from above.

►*DISTRIBUTOR SETTING & TIMING NOTE: See "Oil Pump Removal & Installation Change" under OILING SYSTEM below.*

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
2		680	4		1360
4		975	8		1950
6		1265	12		2530
7		1400	14		2800

Vacuum Spark Control: Auto-Lite, Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4
1	2	4 7/8
4	8	7 1/2
8	16	11 1/8
9	18	12

IGNITION TIMING

Setting — 2° BTDC.

Timing Mark — On vibration damper. "IGN" mark in line with pointer (left side of timing cover).

Timing — Disconnect vacuum advance pipe at carburetor. Install plug in carburetor. With engine at idling speed, timing light should show index mark nearest IGN mark, directly under pointer.

CARBURETOR
CARTER WE

Car Model	Carter Carburetor
56G (to Serial No. G-1,182,938)	2108S
56G (After above Number)	2417S

Idle Setting — ½-1½ turns open. Turn screw out for richer mixture.

Idle Speed — 550 RPM. (With selector lever in "N" or "P" position on "Flightomatic" or "Automatic Transmission" cars).

Float Level — 3/8" measured from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and bowl cover inverted.

Accelerating Pump — No seasonal adjustment.

Fast Idle: .046" throttle valve opening with choke valve closed. To check, crack throttle valve, hold choke closed, measure on side opposite idle ports using Gauge T109-158. Adjust by bending connector rod.

Automatic Choke Setting: 1 point lean.

FLIGHTOMATIC THROTTLE LINKAGE ADJUSTMENT: With transmission selector lever in "N" (Neutral) or "P" (Park) position, engine at normal operating temperature and choke valve wide open, proceed as follows:

1) Disconnect rod which connects accelerator bracket on firewall to auxiliary bellcrank on side of engine.

2) Connect a tachometer to engine and set engine idle speed at 550 RPM by adjusting the carburetor idle speed screw. Disconnect the rod which connects the main bellcrank on firewall to auxiliary bellcrank on engine by removing the main bellcrank ball joint stud from main bellcrank lever. Adjust the screw on main bellcrank to provide a 5/16" clearance between bellcrank and pad (use a 5/16' drill as a gauge).

3) Adjust the ball joint on main bellcrank-to-auxiliary bellcrank rod until ball joint freely enters hole in main bellcrank lever. During this adjustment the carburetor idle speed screw must be against its stop and the 5/16" gap at the bellcrank must be maintained.

4) Disconnect and adjust length of the main bellcrank-to-throttle valve outer lever (on transmission) so that ball joint stud freely enters the throttle valve outer lever. During this adjustment the throttle valve outer lever must be against its internal stop (outer lever held to rear of transmission). Remove the ball joint stud from the throttle valve outer lever **and shorten the rod four complete turns** of the ball joint assembly. Reinstall the ball joint stud and tighten nut. Hold accelerator bracket arm approximately 3 7/8" from the firewall and adjust bracket-to-auxiliary bellcrank rod clevis until clevis pin freely enters clevis and bracket arm.

AUTOMATIC TRANSMISSION THROTTLE LINKAGE ADJUSTMENT: *See "Studebaker Automatic Transmission" in Transmission Section.*

►*OTHER DATA: See "Carter WE" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 3½-5 lbs.

CARB. EQUIPMENT

Fuel Pump: AC No. 4156. Fuel only.

Fuel Pump Pressure: 3½-5 lbs.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Electric type.

Dash Unit — Studebaker No. 1541286 (Sedans & Sta. Wgn.), 1539880 (Hard Top "Hawk").

Tank Unit — Studebaker No. 1540262 (Sedans & Hard Top "Hawk"), 1540263 (Station Wagon).

See "Fuel Gauges" in Carburetion Section.

Air Cleaner: Dry Type or Oil Bath type

►*DRY TYPE FILTER CAUTION:* Remove filter element every 1,000 miles and shake thoroughly to remove dirt. DO NOT WASH. Replace filter every six months or 10,000 miles

BATTERY

Willard HDW-2SM-50. *12 Volt,* 9 plate, 50 ampere hour capacity (20 hr. rate).

Battery Ground - Negative.

►*CAUTION: This is reversed from previous models.*

Engine Ground - Left front of engine.

STARTER

Auto-Lite MBG-4103. *12 Volt.* **Armatur** MZ-2367.

Drive - Bendix A-3519. Barrel-Anchor Plate type.

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension — 42-53 ozs.

Performanc Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.0	50 max.
5.2 ft. lbs.min.	Lock	4.0	235 max.

Starter Switch; Magnetic Switch mounted on starter and controlled by combination Starter & Ignition Switch. *NOTE* - Automatic drive cars have Neutral Safety and Back-up Light Switch.

Automatic Transmission Neutral Saf ty Switch: Delco-Remy 1998038 (without Power Steering), No. 1998059 (with Power Steering). Mounted on lower end of steering column. Starter will operate only when selector lever is in "N" or "P" position.

Adjustment - *See 'Studebak r Automatic" or "Flightomatic" Transmission in Transmission Section.*

GENERATOR

Auto-Lite GJC-7002-F. *12 V lt.* **Armatur** GJC-2030F.

Performanc Data

Amperes	Volts	RPM
20	15.0	1750 max.
30	15.0	2050-2250

Brush Spring Tension - 18-36 ozs.

Field Current - 1.2-1.3 amps. at 10.0 volts (70°F.).

Motoring Current - 3.4-3.9 amps. at 10.0 volts (70°F.).

Rotation - Counter-clockwise at commutator end.

Belt Adjustment: 3/8-1/2" deflection midway between generator and fan pulleys.

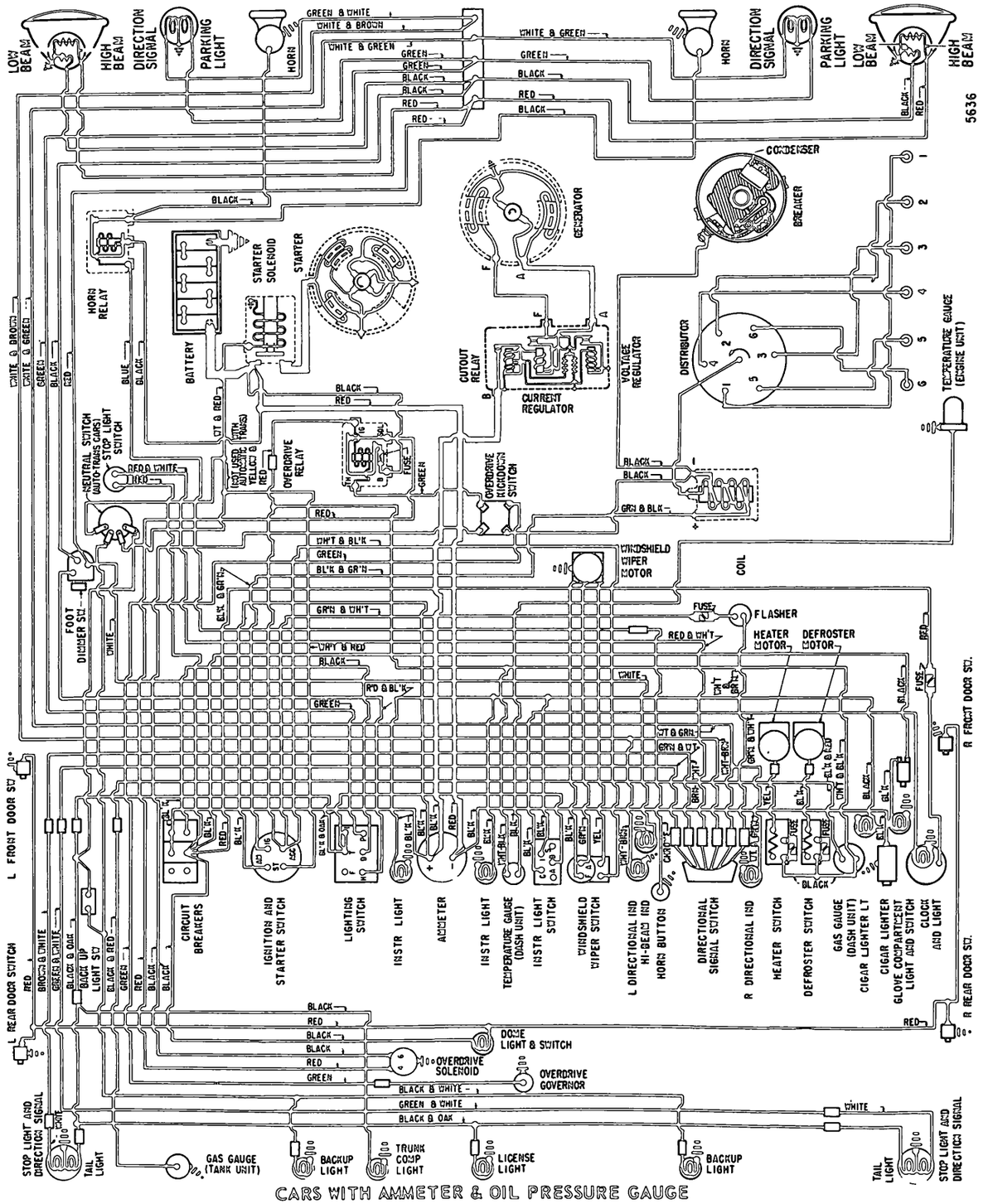
REGULATOR

Auto-Lit VRX-6008A. *12 Volt.*

Cut ut R lay

Cuts In - 13.0-13.7 volts.

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CARS WITH AMMETER & OIL PRESSURE GAUGE

CONTINUED FROM PRECEDING PAGE

Cuts Out - 8.2-9.3 volts.
Contact Gap - .015" minimum.
Air Gap - .031-.034".

Voltage Regulator

Setting - 14.2-14.8 volts at 80°F., unit operating normally while charging at 10 amperes or with a .25 ohm resistor between regulator and battery.
Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting - *See Electrical Section.*

Current Regulator

▷ *SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
36 amps		30 (28-32) amps.

Test A - After 15 minutes operation charging at 10 amps.
Test B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts).
Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signals: *See Electrical Section.*

Lighting Switch Removal: (Toggle type)—Remove retaining nut. Remove lower panel cover screws and covers. Slide toggle switch back through panel and disconnect wires. (Knob type)—Use stiff wire to remove spring from back side of switch knob and pull knob from shaft. Remove bezel nut and shove switch assembly back through panel and remove wires.

Stop Light Switch Location: Inner side of left frame rail just forward of steering gear housing, except on Power Brake equipped cars, where it is screwed into rear end of power unit, located under hood on left front fender apron.

FUSES: Located as follows:
Overdrive - 20 amps. (in relay on dash panel).
Radio - 9 amps. (in lead behind instrument panel).
Direction Signal - 14 amps. (in bracket behind instrument panel).
Electric Clock - 3 amps. (in lead behind instrument panel).
Climatizer & Defroster - 14 amps. (Coupe & Hardtop); 15 amps. (Other Models), (on Climatizer & Defroster switch).

CIRCUIT BREAKERS: Located as follows:
1) - Head, Parking & Instrument Lights - 18 amps. (on main lighting switch).
2) - Body & Stop Lights - 15 amps. (below headlight switch on instrument panel).
3) - Windshield Wiper - 5 amps. (in wiper switch).
4) - Window Lift - 20 amps. (on left cowl panel).
5) - Seat Adjuster - 20 amps. (on left cowl panel).

HORNS: Dual horns with relay (Exc. Champion Custom models which have one horn).

Delco-Remy No.	Low Note	High Note
All Models	1999757	1999758

Horn Relay: Delco-Remy 1116781. 12 Volt.

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ENGINE

ENGINE SPECIFICATIONS: "Sweepstakes 185". 6 Cyl. "L" head.

Bore	Stroke	Displacement
3"	4-3/8"	185.6 cu. ins.
Compr. Ratio	**Rated HP**	**Developed HP**
7.5-1 ℂ	21.6	101 at 4000 RPM

ℂ — 8.0-1 Optl. compression ratio.

Compression & Vacuum Reading—*See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Studebaker Special Data.*

OIL PAN REMOVAL: *See "Oiling System" in Studebaker Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Studebaker Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

"T" slotted, cam ground, tin plated aluminum alloy. Three ring type.

Original Bore & Pistons—*See "Original Bore & Pistons" in Studebaker Special Data.*

Removal—Pistons and rods removed from above.

Fitting New Pistons: Clearance—Selective feeler fit. Use feeler 1" wide, .002" thick, and 12" long inserted on camshaft side of cylinder bore. Insert inverted piston in bore with slotted side away from camshaft, and bottom edge 1" below top of cylinder bore. Pull required to remove feeler with properly fit piston should be 11 to 16 lbs.

Replacement Pistons: Std. .010", .020", .030" and .040" Oversize.

Installing Pistons: Install piston in cylinder bore with "T" slot away from camshaft side. *See Rod Installation.*

PISTON PINS

Pin is locked in rod by tapered pin and locknut.

Diameter—.7491-.7495". **Length** 2.625".

Clearance in Piston—.0001-.0003" (selective fit). Light thumb push fit at 70°F.

Piston Pin Removal & Installation—*See "Piston Pins" in Studebaker Special Data.*

Replacement Pins: Std. & .0025", .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.002-.005"
Compr. #2	1/8"	.007-.017"	.002-.005"
Oil	5/32"	.007-.017"	.0015-.004"

Replacement Rings: Std., .020", .030", & .040" Oversize, in sets.

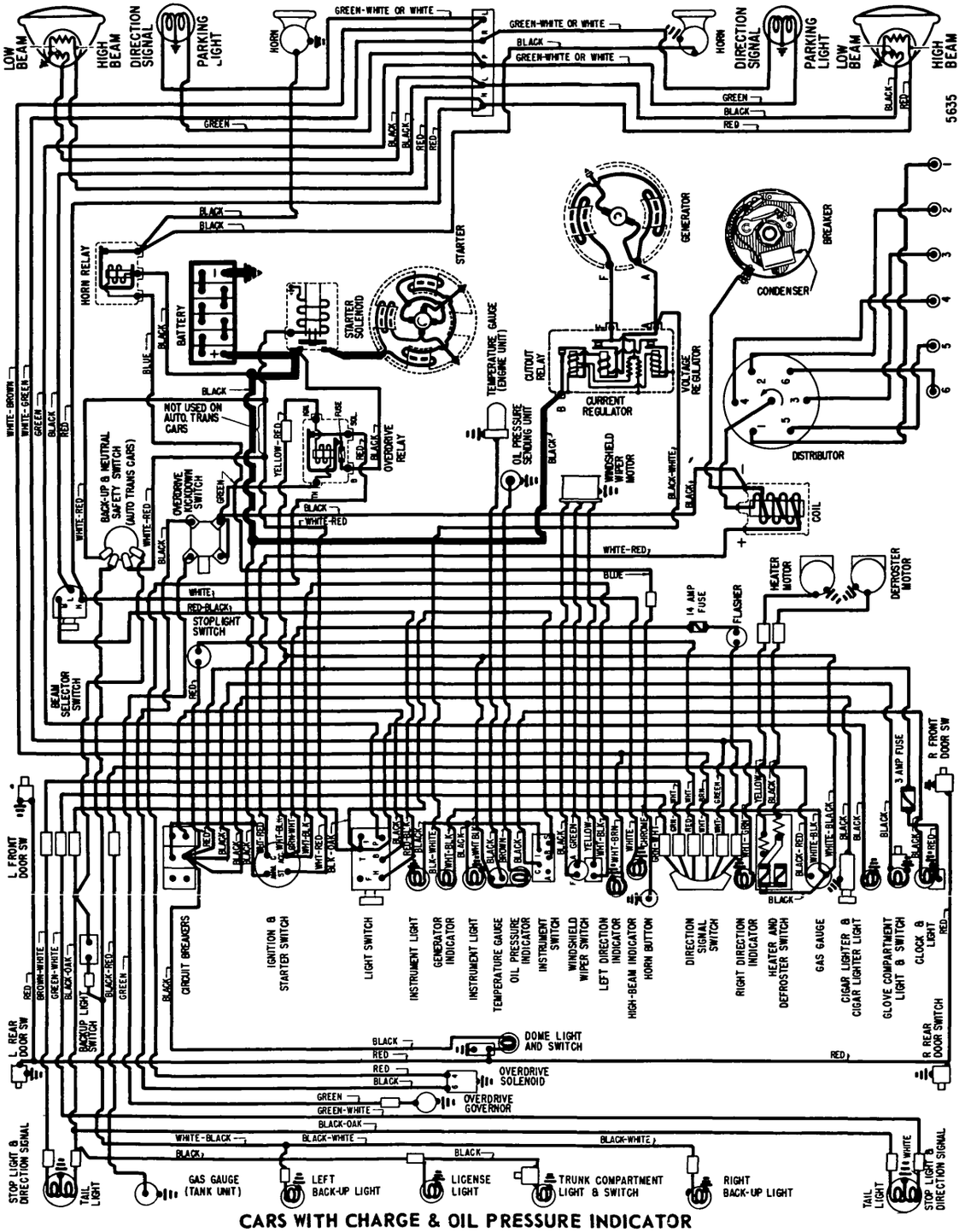
See "Piston Rings" in Studebaker Special Data.

Installing Rings: Top compression ring has step at the inside which must be installed up. Second compression ring has step at outside which must be installed down. Inner and outer oil ring end gaps must not come at the same point.

CONNECTING RODS

Length—(Center-to-center) 6 3/8". Weight—19.04 ozs.

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CARS WITH CHARGE & OIL PRESSURE INDICATOR

CONTINUED FROM PRECEDING PAGE

Crankpin Journal Diameter—1.81175-1.81275"
Bearings—Steel backed, Microbabbitt lined, no shims
Clearance—.0005-.002"
Side Play—.005-.009"
Replacement Bearings: Standard & .001", .005", .010", .020" Undersize.
Installing Rods: Assemble piston and pin on rod so "T" slot of piston on side opposite oil hole in lower end of rod. Insert tapered end of clamp screw toward heavy boss on rod. With "T" slot of piston away from camshaft side, the narrow part of rod offset will be to right on odd numbered rods, to left on even numbered rods. Rods (#1, 3, 5) cannot be interchanged with rods (#2, 4, 6).
►*REPLACEMENT ROD NOTE.* (Unnumbered Rods)—With spit hole toward you, narrow part of offset will be to the right for odd numbered cylinders, and to the left for even numbered cylinders.

CRANKSHAFT

Journal Diameter—3.0623-3.0628" Four bearings.
►*FRONT MAIN BEARING CAP REMOVAL NOTE:* Turn crankshaft until No. 3 and No. 4 pistons are at top of their travel. Remove bearing cap bolts, then remove cap by twisting end away from camshaft toward rear of engine.
Clearance—.0005-.0025"

Replacement Bearings: Std., 001', .010', .020", and 030" Undersize.
End Thrust: Taken by thrust washer assembled between front main bearing and crankshaft gear. Controlled by shims between thrust washer and main bearing journal.
End Play—003-.006"
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.7475-1.7480", (2) 1.7162-1.7170", (3) 1.6857-1.6865", (4) 1.6232-1.6240".
Bearings—Steel backed babbitt lined bushings.

Clearance—No.1—.0007-.0022", Nos. 2,3,4—0010-.0027"
End Thrust: Taken by thrust plate assembled on front face of engine block behind camshaft gear (spacer assembled on shaft behind gear hub). Tighten capscrews alternately a few turns at a time to prevent distortion of plate.
End Play—.003-.006"

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Crankshaft gear is Cast Iron, Camshaft gear is Celeron with steel hub.

Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*

Backlash—.001-.003"
Replacement Gears—Camshaft gear furnished in two sizes. Standard & High limit. Crankshaft gear furnished standard size only.

Camshaft Setting: Mesh marked tooth on camshaft gear between two marked teeth of crankshaft gear.
Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

Tappet Clearance: .016" cold. Intake & exhaust.

Valve	Head Diameter	Stem Diameter	Length
Intake	1 11/32"	5/16"	4 11/32"
Exhaust	1 9/32'	5/16"	4 11/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	0015-.0035"
Exhaust	45°	11/32"	0015-.0035"

Valve Seat Width—1/16-3/32'
►*RECONDITIONING VALVE CAUTION.* If reconditioning results in knife edge at top of valve, valve must be replaced.
Valve Springs: Install springs so that flanged edge of retainer fits over flat surface of lower coil spring. Tongue on lower side of retainer must fit in groove in spring retainer lock.
Valve Spring Specifications—93-103 lbs. ± 10% when compressed to a length of 1 5/16".
Valve Guides: Use Tool No. J-2034 and drive old guide down and out from top of block into valve spring chamber. Use Collar J-2034-5, guide pilot J-2034-2 on driver J-2034-1 and drive new guide down until driver bottoms against spacing collar.
Valve Lifters: Mushroom type. Remove from below with camshaft out of engine.
Valve Lifter Installation & Fitting—*See "Valve System" in Studebaker Special Data.*
Replacement Lifters—Std., .001" & .005' Oversize.
►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore) See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
Intake Valves—Open 15° BTDC. Closes 49° ALDC.
Exhaust Valves—Open 54° BLDC. Closes 10° ATDC.
Valve Timing Check—Adjust No. 1 Intake valve at .020" cold. Rotate engine until No. 6 piston is on compression stroke (the IN-OP 1-6 marking on dampener should be several inches from pointer), then while moving lifter up and down continue to rotate crankshaft. Valve timing will be correct if lifter stops moving as above marking is directly below pointer.

OILING SYSTEM

Crankcase Capacity: 5 quarts refill.
Normal Oil Pressure: 40 lbs. at 1400-1600 RPM.
Pressure Regulator Valve: On lower right front corner of engine. For access, remove engine front cover bolt. If spring is weak, replace it (do not stretch spring).
Oil Pressure Indicators: Coupe & Hardtop Models—Direct reading, non-electric type gauge.
Other Than Coupe & Hardtop Models—Red indicator light on instrument panel. If light on at highway speeds, after warm-up, low oil level or other difficulty is indicated.
Oil Pressure Switch—Studebaker No. 1539898.
Oil Pump: Helical gear type. Mounted on right side of crankcase.
Pump Removal, Overhaul & Installation: *See "Oiling System" in Studebaker Special Data.*
►*OIL PUMP REMOVAL & INSTALLATION CHANGE:* Turn crankshaft away from No. 1 TDC position to give clearance between counterweight and cylinder block. Have crankshaft in same position for replacement of oil pump. With pump and gear entered with shaft in this position, turn engine to No. 1 TDC position. Disengage pump shaft and gear from camshaft, turn pump shaft until keyway in shaft points toward bottom of engine. Draw pump shaft and gear into engagement with camshaft. This will turn the keyway toward the rear of the engine. This will be the correct location for distributor setting and timing.
Oil Filter: Partial Flow. Replace filter element at 5000 mile intervals. Change more often in dusty areas.
Replacement Filter Element: AC No. P-203X (Std.), No. P-209 (Optl.)
Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe at left rear of engine (air outlet). Filter element in breather pipe replaceable.

COOLING

Water Capacity: 11 qts. (with heater 12½ qts.).
Pressure Valve: Radiator filler cap. 13 lb. type.
Thermostat: Choke type. (170° Std.), 155° & 177° (Optl.).
Water Pump: Packless, sealed ball bearing type.
See "Studebaker Champion" in Water Pump Section.
Pump Removal—Remove shroud. *See "Cooling System" in Studebaker Special Data.* Loosen generator and remove belt. Remove fan-to-hub capscrews and remove fan blades and pulley. Disconnect Climatizer hose, and generator adjusting arm. Disconnect outlet hose and remove mounting capscrews.
Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data.*
Temperature Indicators: Coupe & Hardtop Models—Direct reading, electric type gauge.
Other Than Coupe & Hardtop Models—Red-green indicator on instrument panel. Electric type. When indicator shows any green, engine is operating at normal temperature. If it turns red through entire range, engine operating temperature is above normal.
Dash Unit—Studebaker No. 1541287 (Sedans & Sta. Wgn.), 1539879 (Hard Top "Hawk").
Engine Unit—Studebaker No. 1539876 (All Models).
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 9A7. Assy. No. 361365 (U.S.), No. 361379 (Canada). Single plate, dry disc type.
Clutch Disc. No.—Borg & Beck No. 382276
Pedal Adjustment: Free Travel ½-1' To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.
►*HILL-HOLDER NOTE* Check setting whenever clutch

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pedal adjusted and adjust Hill-holder to release just as clutch engages Make sure Hill-holder operating rod installed with rod to inside (toward center of car) of clutch release shaft lever

Housing Removal· Remove oil level gauge and tube Remove starter mounting screws (only) and tie starter and cables up out of the way Remove floor plate and clutch housing top capscrews Remove transmission. *See "Transmission Removal" under Transmission.* Disconnect pedal rod at operating shaft-to-release sleeve, pull operating shaft out, remove sleeve Remove two bolts holding rear engine support insulator cage to crossmember Support engine at rear of oil pan (use block of wood on jack to protect oil pan) Remove crossmember Remove two clutch housing bolts releasing exhaust pipe support bracket Loosen clamp bolt and swing bracket out of way Remove remaining housing bolts and remove housing *NOTE*–Remove dowel bolts first

►*INSTALLATION CAUTION* Align clutch housing to rear engine plate with two tapered drifts, then install the dowel bolts. Draw dowel bolts in place by tightening the nuts—**do not drive them into place.**

Clutch Removal: Remove clutch housing (above),remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member

SYNCHRO-MESH TRANSMISSION

Warner Model AS1-T96 (Std.), AS24-T96 with R10 type Overdrive.

See "Warner Synchro-mesh Transmission" in Transmission Section

Transmission Controls: *See "Transmission Controls" in Transmission Section*

Removal: Drain transmission case Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer Move front propeller shaft and support assembly rearward on slip yoke splines Move end of shaft to one side as far as possible and tie it in position Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion Remove cap screws which hold transmission case to clutch housing. Remove clutch operating shaft, bracket, and bearing from the transmission case Then move case rearward until main drive pinion clears clutch pressure plate and remove unit from car

NOTE–On Coupes and Hardtops, it will be necessary to remove additional frame crossmember before removing transmission

OVERDRIVE

Warner R10. Governor controlled, solenoid operation with throttle controlled "kick-down"

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 Overdrive Control" in Transmission Section*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

AUTOMATIC TRANSMISSION

►*AUTOMATIC TRANSMISSION DISCONTINUANCE NOTE:* Effective Serial No. G-1360743 (Coupe & Conv.) & No. G-1361697 (Others) South Bend produced models, all cars will be equipped with the Flightomatic Transmission as optional equipment. The Studebaker Automatic Transmission is no longer used. *See "Flightomatic Transmission" below.*

Torque converter and 3-speed automatic transmission with hydraulic control Has mechanical parking lock and Anti-creep device which holds brakes applied when car standing and ignition "on"

See "Studebaker Automatic Transmission" in Transmission Section

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Studebaker Automatic Transmission" in Transmission Section*

►*TESTING & TROUBLE SHOOTING: See "Studebaker Automatic Transmission" in Transmission Section*

Lubrication: Check Oil Level every 1000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 15,000 miles

Capacity–9½ quarts. *Use Automatic Transmission Fluid Type A (in containers with "AQ-ATF" symbol)*

Checking Fluid Level–Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached) Remove inspection cover on front floor carpet over transmission case, clean all dirt from around inspection hole, check oil level with dipstick gauge Add oil to bring level up to "Full" mark on dipstick (1 pint between "LOW" and "FULL")

►*OTHER AUTOMATIC TRANSMISSION DATA: See "Studebaker Automatic Transmission" in Transmission Sect.*

FLIGHTOMATIC TRANSMISSION

►*NOTE: See "Automatic Transmission Discontinuance Note" under AUTOMATIC TRANSMISSION above.*

Hydraulic torque converter and a hydraulically controlled automatic three-speed planetary type transmission which provides automatic operation in "D" range, and additional "Lo", "R", and "P" ranges which are controlled manually. In "D" position, the car starts in low gear and progresses to intermediate and high as car speed is increased.

See "Flightomatic" Transmission in Transmission Sect.

►*"NO REVERSE" CORRECTION: See "Flightomatic" Transmission in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Flightomatic" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Flightomatic" Transmission in Transmission Section.*

Lubrication: Check fluid every 1000 miles, drain and refill every 15,000 miles. Use Automatic Transmission FluidType "A" (container marked AQ-ATF).

Checking Fluid Level–Place selector lever in "P" position. Start engine and operate it for approximately four minutes or until engine and transmission have reached operating temperature. Remove floor mat from right side and remove oil inspection hole cover. Clean all dirt and foreign material from dipstick. Apply parking brake and foot brake, and move selector lever slowly from "P" position to "R" position, then back to "D" position. Remove dipstick, wipe clean, and install in transmission and **turn clockwise to lock position.** Remove dipstick and read fluid level. Add fluid to bring level to "FULL" mark on dipstick (1½ pints between "LOW" and "FULL" marks on dipstick).

Capacity–9 qts. Use Automatic Transmission Fluid Type "A" (container marked AQ-ATF).

►*OTHER FLIGHTOMATIC DATA: See "Flightomatic" Transmission in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing cross type Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft)

Propeller Shaft & Support Bearing: Two shafts used 1) Front shaft with intermediate universal yoke bolted on rear end (no slip-joint)

2) Rear shaft with slip-joint on forward end at intermediate universal

Propeller Shaft & Support Bearing Removal & Servicing–*See "Propeller Shaft" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss Drive

See "Spicer Hypoid" in Rear Axle Section

Transmission	Axle Ratios Standard	Optional
Standard	4 10-1	4 56-1
Overdrive	4 56-1	4 10, 4 88-1
Automatic	3 54-1	4.10-1

NOTE–Rear axle ratio stamped on plate attached to axle by cover capscrew and also on ring and pinion gears

Backlash–.003-.006". Shim adjustment

Axle Shaft Removal: Remove wheel, remove wheel hub (use puller J-1644-B) Take out backing plate retaining bolts, remove outer oil seal Pull backing plate out over end of axle shaft and wire plate to frame *(CAUTION*–Do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with puller HM-931

Rear Axle Assembly Removal: Remove hub caps,take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs, Remove wheels, hubs and drums. Disconnect hand brake cable, take out backing plate bolts from backing plates free hydraulic brake line from axle housing clips (do not disconnect brake line from wheel cylinders) Disconnect rear universal (wire caps or use clamp to prevent losing rollers) Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange(shims .003", 005", .010", 030" thick)

End Play–.001-.006".

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SHOCK ABSORBERS

Hydraulic, Manual and Direct Acting. Direct acting, hydraulic type. Serviced by replacement. *NOTE* - Heavy Duty Shocks are Gabriel.

Hydraulic Shocks (Studebaker Nos.)

	Front	Rear
2 Dr. Sedanet & "Hawk" ①	537021	537025

Manual Shocks (Studebaker Nos.)

Station Wagon	1539527	1539545
Others ②	1539525	1539543

Direct Acting Shocks (Studebaker Nos.)

All (Exc. Sta. Wgn.) ②	1539987	1539997

Gabriel Shocks (Studebaker Nos.)

Heavy Duty (Non-Adj.)	536398	536399
Heavy Duty (Adj.)	537712	537714

① – Before Serial No. G-1,359,504.
② – After above No. on 2 Dr. Sedanet & "Hawk".

FRONT SUSPENSION

Independent. Coil spring suspension with front shock absorbers located within coil springs.
See "Studebaker" in Suspensions & Wheel Alignmt Sect.

►*FRONT SUSPENSION NOISE CORRECTION (Due to Looseness of Bushing at Upper Control Arm Inner Shaft): See "Studebaker" in Suspensions & Wheel Alignment Section.*

Kingpin Inclination–5¼°.
Caster–Neg. 1°–Neg. 2½°. Not more than ¾° variation between wheels.
Camber–0° to Pos. 1°. ½° more camber favored on drivers side.
Toe-In–1/16-1/8".
Toe-Out on Turns–With outer wheel at 20°, Inner wheel should be turned 22½-23½°.

STEERING

Manual: Ross Cam & Twin Lever or Saginaw Worm & Roller Types.
See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.

Power Steering: Saginaw. Integral type.
See "Saginaw (G.M.) Power Steering" in Steering Section.

►*POWER STEERING GEAR "CHUCKLE" CORRECTION: See "Saginaw (GM)" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Wagner Lockheed Hydraulic Self-centering (With Bendix type shoes). Parking lever applies rear wheel service brakes.
See "Wagner Lockheed Self-centering" in Brake Section.
Drums–Diameter (Front) 10", (Rear) 9".
Wheel Cylinder Diameter–(Front) 1", (Rear) 13/16".

►*FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary is ¼" thick, (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeal. This lining is applied to the full length of the shoe, and is marked "secondary" and "top" and should be installed as marked.

Braking Power – 62% (front wheels), 38% (rear wheels).

Lining Width & Length

	Front Wheel	Rear Wheel
Primary Shoes	2" x 10 29/32"	2" x 9 27/32"
Secondary Shoes	2" x 10 29/32"	2" x 9 27/32"

Thickness–3/16" (all except front wheel secondary), ¼" front wheel secondary.
Clearance–Lock shoes against drum then turn adjusting screw back eight notches or more as required to free drum.

Hill Holder: Used on Synchro-mesh Trans. Cars. *See "Hill-holder" in Brake Section for data.*

Standard Master Cylinder: On frame left side rail at base of brake pedal.
Checking Fluid–Access hole in front floor pan at left corner of drivers' seat. Fluid should be maintained at level ½" below top of filler opening.
Removal–Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from frame bracket and then from spring clip which is attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder. (*NOTE*–On cars equipped with Hill-holder, only one line is connected to master cylinder). Remove brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder. Insert forward mounting bolt ing bolt to hold Hill-holder while master cylinder is off car.

Power Brakes: Hydrovac Power Unit. Used in conjunction with standard master cylinder and located under hood on left front fender apron.
See "Hydrovac Power Unit" in Brake Section.
Removal–Disconnect vacuum and brake lines, stop light wires, remove power unit-to-bracket mounting bolts.

MISC. MECHANICAL

Windshield Wipers: Trico. Vacuum link and crank type (Standard) **Auto-Lite or Redmond.** Electric type (Optional).
See "Windshield Wipers" in Miscellaneous Section.

Power Window Regulators: Electrical, with reversible motors in each window. Individual switches at each door and master switch on left front door. *See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Two-way electric type with curved seat tracks for seat adjustment.
See "Power Seat Adjusters" in Miscellaneous Section.

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Misc. Section.*

MODEL IDENTIFICATION

Model	Model Designation
Commander	56B
President	56H

SERIAL NUMBER: Stamped on plate on left front door hinge post.

Starting Serial Numbers—As follows:

Assembly Plant	Commander	President
South Bend	8429601	7171001
Los Angeles	8849101	7808501
Hamilton	8960001	7900601

ENGINE NUMBER: Stamped on cylinder block to left and in front of oil filler pipe.

Starting Engine Numbers—As follows:

Assembly Plant	Commander	President
South Bend	V-363751	P-22001
Los Angeles	VL-6301	PL-2701
Hamilton	VC-8101	PC-601

TUNE-UP

COMPRESSION PRESSURE: 130-150 lbs. at 150 RPM cranking speed.

VACUUM READING: Steady 18-20" at idling.

VALVE TAPPET CLEARANCE: .023-.025" engine hot and idling. .025-.027" (cold).

MANIFOLD HEAT CONTROL: Automatic Thermostatic type located in right bank exhaust manifold outlet. Single exhaust with cross-over pipe standard on Commander models. Dual exhaust standard on President models.

►*DUAL EXHAUST NOTE:* When control valve closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders—RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033-.038".

Spark Plug—Champion H-11, 14mm. Torque to 30 ft. lbs. or seat spark plug on new gasket finger tight, then tighten an additional ½ turn.

COIL: Delco-Remy 1115087. *12 Volt.*

Ignition Current—3.8 amps. (idling).

Resistor—Delco-Remy 1927809. Located on firewall.

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil. Resistor is by-passed during cranking by lead from starter-solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110864. *12 Volt.*

Condenser—Delco-Remy 1869704. **Capacity**—.18-.23 mfd.

Contact Point Set—Delco-Remy 1918148.

Break r Gap—.015".

Cam Angle—26°-33° (with .016" gap).

Break r Arm Spring T nsion—19-23 ozs.

Rotation—Counter-clockwise viewed from above.

Aut matic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0.5-2.5	350	1-5	700
2-4	400	4-8	800
7-9	800	14-18	1600
11-13	1125	22-26	2250

Vacuum Spark Control: Delco-Remy 1116058. Integral type.

Plunger Travel—11/64-3/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
8	16	10-11.5

Distributor Removal & Installation: *See "Ignition Notes" in Studebaker Special Data.*

IGNITION TIMING

Setting—4° BTDC with vacuum line to distributor disconnected and opening in carburetor plugged. Engine at normal idle speed.

Timing Mark—"IGN" mark on vibration dampener.

Timing—Line up "IGN" mark on vibration dampener with pointer at left side of engine front cover, *after vacuum advance pipe has been disconnected and plugged at carburetor connection.*

►*IGNITION TIMING CAUTION: The manufacturer recommends that no attempt be made to time the engine except with a suitable timing light and that the timing mark on vibration dampener be directly under the pointer. DO NOT SET TIMING BY THE "PING" METHOD.*

CARBURETOR

►*CARBURETOR APPLICATION: Stromberg 2-Barrel Carburetor standard on all models except President Skyhawk & 4-Door Sedan. Carter 4-Barrel Carburetors standard on President Skyhawk & 4-Door Sedan and optional on all other models.*

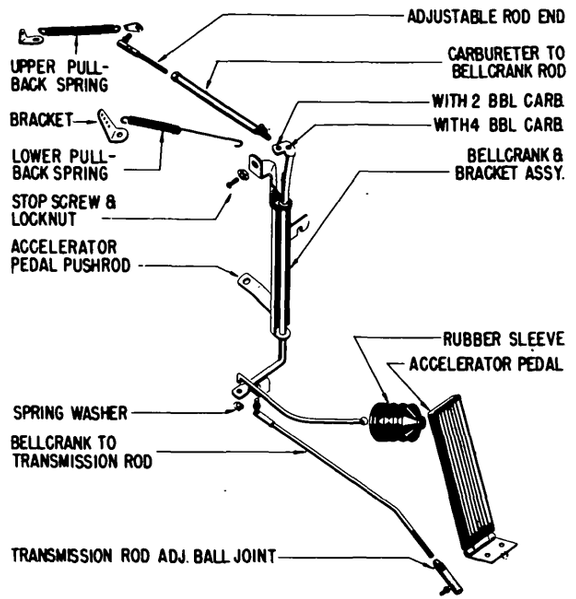
FLIGHTOMATIC THROTTLE LINKAGE ADJUSTMENT: With engine at normal operating temperature, choke valve wide open and throttle return check operating correctly, proceed as follows:

1) Adjust engine idle speed to 550 RPM with transmission selector lever in "N" (Neutral) position. Set the stop on the bellcrank (at rear of engine) to provide a 17/64" gap between bellcrank pads (use a 17/64" drill as a gauge). After stop is adjusted, hold in this position. Make sure that the carburetor-to-bellcrank rod ball joint is in the outer hole of the bellcrank pad (away from centerline of engine), and that the ball joint is on the underneath side of the lever.

►***2-BARREL CARBURETOR NOTE:*** It may be found to be impossible to shorten accelerator cross shaft-to-carburetor rod sufficiently to obtain proper bellcrank pad-to-stopscrew adjustment. If condition encountered, cut off ¼" of threaded portion of adjustment rod of cross-shaft-to-carburetor rod.

2) Adjust the carburetor-to-bellcrank rod until the idle speed adjusting screw just begins to leave its stop.

3) With the carburetor on the low step of the idle cam, hold the transmission throttle valve lever against its stop and adjust the bellcrank-to-transmission throttle valve lever rod until the ball joint stud enters the throttle valve lever freely. Shorten the rod by turning the ball joint assembly **thr c mpl t turns** (4-Barrel Carburetor); ***four complete turns*** (2-Barrel Carburetor). Install ball joint stud in throttle lever and install the stud nut.



FLIGHTOMATIC THROTTLE LINKAGE

THROTTLE RETURN CHECK (4-BARREL CARBURETOR) ADJUSTMENT: Loosen throttle return check assembly screw locknut and adjust the return check in the bracket until plunger just breaks contact with tab on throttle lever. Mark position of check assembly relative to bracket, then turn check assembly **1¾ t 2 turns toward lever.** Tighten locknut.

THROTTLE RETURN CHECK (2-BARREL CARBURETOR) ADJUSTMENT: Place idle speed adjusting screw on fourth step of fast idle cam (lowest step being No. 1). Adjust throttle return check screw until it just contacts the pad on throttle shaft lever.

STROMBERG WW

Model	Str mb rg Cod N.
Comm. (To Eng. No. V-336979)	6-115, 115A
Comm. (After above No.)	6-117, 117A
President	6-117, 117A

►*MANIFOLD FUEL DISTRIBUTION: Carbur tor RIGHT barrel feeds Cyls. 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting—Initial setting, 1-3/4 turns open, final setting approximately midway between missing and rolling points. Set both screws alike, turn screws out for richer mixture.

Idl Speed—550-600 RPM (with selector lever in neut-

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ral "N" position on Automatic Drive Cars).

Fl at Level–3/16" from top edge of bowl to top of float with needle valve seated. To check, remove air horn and bowl cover, remove gasket, place float level gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool T-24733 (Studebaker No. KMO-269-S5).

Accelerating Pump–Center hole–Normal Setting. For less fuel install rod in inner hole, for more fuel install rod in outer hole.

Fast Idle Setting: With choke valve fully closed and fast idle cam in fast idle position, one-half diameter of button at end of throttle stop screw should rest against step of fast idle cam. If contact between button and cam not as indicated, bend choke ear up or down as required.

Aut matic Choke Setting: (6-115) Centered with arrow on cover aligned with boss on housing. (6-117) 1 point lean with arrow on cover one notch lean from boss on housing.

Thr ttle Linkage Adjustment: See *CARBURETOR* above.

▷*OTHER DATA: See "Stromberg WW Carburetor" in Carburetion Section.*

Fuel Pump Pressure: 3½-5 lbs.

CARTER WCFB

Model	Carter No.
Synchro-mesh & Overdrive	2219SA, SB
Flightomatic	2214SA, SB

▷*REPLACEMENT CARBURETOR NOTE:* 2219SB can be used to replace 2214SA, SB when used with Carter Unitized Pkg. 202-81U (Throttle Return Check Assy.).

▷*"BACKFIRING" CORRECTION: See Carter WCFB "Carburetors in Carburetion Section.*

▷*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels f ed Cyl. 1-4-6-7, LEFT barrels 2-3-5-8.*

Idl Setting–½-1½ turns open. Turn screws out for richer mixture.

Idle Speed–550-600 RPM (all models).

Throttle Linkage Adjustment: See *CARBURETOR* above.

▷*OTHER DATA: See "Carter WCFB" Carburetors in Carburetion Section.*

Fuel Pump Pressure: 3½-5 lbs.

CARB. EQUIPMENT

Fuel Pump: Carter No. M2211S. Diaphragm type.

Pressure – 3½-5 lbs.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Electric type.

Dash Unit – Studebaker No. 1541286 (Sedans & Station Wagon), 1539880 (Hard Top "Hawks").

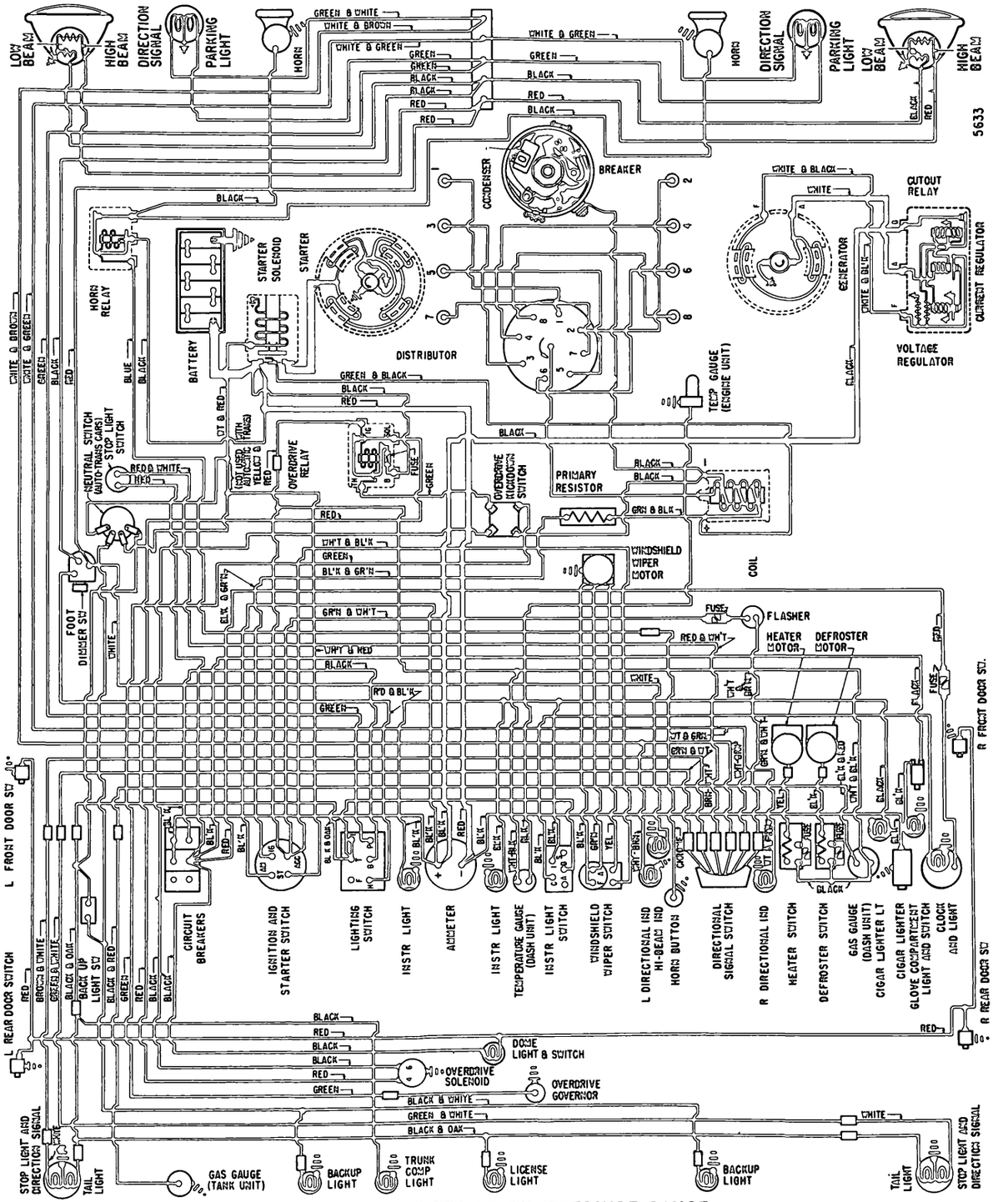
Tank Unit – Studebaker No. 1540262 (Sedans), 1540263 (Station Wagon & Hard Top "Hawks").

See "Fuel Gauges" in Carburetion Section.

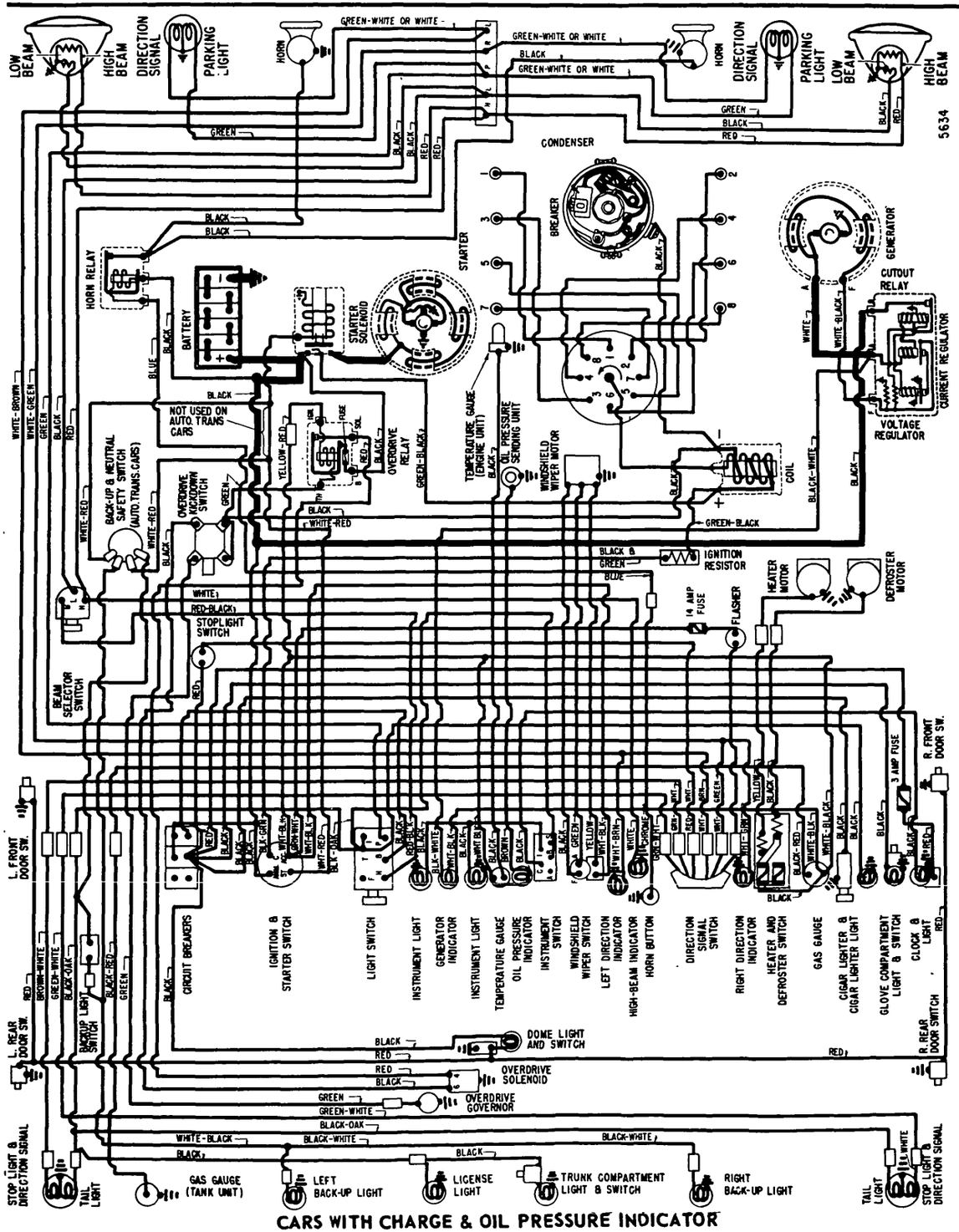
Air Cleaner: Dry type or Oil Bath Type.

▷*DRY TYPE FILTER CAUTION:* Remove filter element every 1000 miles and shake thoroughly to remove dirt. DO NOT wash element or blow out with compressed

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CARS WITH AMMETER & OIL PRESSURE GAUGE



CARS WITH CHARGE & OIL PRESSURE INDICATOR

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air. Replace filter every six months or 10,000 miles.

BATTERY

Willard HDW-2SM-50. *12 Volt,* 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground – Negative.
► *CAUTION: This is revers d fr m pr vi us mod ls.*
Engine Ground – Right front of engine.

STARTER

Delco-Remy 1107650 (Synchro-m sh & Overdriv), 1107651 (Flightomatic). *12 Volt.* **Armatur** 1933789.
Drive – Bendix "Folo-thru" type.
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 35 ozs. minimum

Performanc Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: Magnetic type switch, controlled by combination Ignition & Starting Switch. Turn key full right to start engine.
Automatic Transmission Neutral Safety Switch: Delco-Remy 1998038 (without Power Steering), No. 1998059 (with Power Steering). Mounted on lower end of steering column. Starter will operate only when selector lever is in "N" or "P" position.
Adjustment: *See "Flightomatic" Transmissi n in Transmission Section.*

GENERATOR

Delco-Remy 1102003. *12 Volt.* **Armatur** 1923535.
Maximum Charging Rate – *S Voltage R gulator.*

Performanc Data–C ld

Amperes	Volts	RPM
30	14.0	2150

Brush Spring Tension – 28 ozs.
Field Current – 1.48-1.62 amps. at 12.0 volts.
Rotation – Counter-clockwise at commutator end.
Belt Adjustment: Hook a spring scale to belt midway between generator and fan pulleys, then adjust belt tension so that pull of 14 lbs. on scale will lift belt ½".

REGULATOR

Delco-Remy 1119123. *12 Volt. NOTE - Regulator is "1119000 Series". Specifications below are for "Norm l" Settings.*

Cutout R lay

Cuts In – 11.8-13.5 volts (hot).
Contact Gap – .020"
Air Gap – .020" with contacts just closed.

Voltage R gulat r

Setting – 13.8-14.8 volts (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting – *S "1119000 Seri s" R gulator in Electrical Section.*

Current R gulat r

Setting – 27-33 amps. (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Ch cking & Adjusting – *S e "1119000 S ri s" R gulator in El ctrical S ction.*

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MISC. ELECTRICAL

H adlamps: Sealed Beam. *See Electrical Section.*

Dir cti n Signals: *See Electrical Section.*

Lighting Switch Rem val: Toggle Type—Remove switch retaining nut. Push switch sleeve back into panel and disconnect wires from switch.

Push-pull Typ —With a pointed tool, lift spring in back side of switch knob and remove knob from shaft. Remove bezel nut and bezel plate. Push switch out of instrument panel and remove wires.

St p Light Switch Locati n: On inner side of left frame rail just forward of steering gear housing. On models with power brakes, switch is screwed into hydraulic cylinder of power brake unit.

FUSES: Located as follows:

Ov rdriv – 20 amps. (in relay on dash panel).

Radi – 9 amps. (in lead behind instrument panel).

Dir cti n Signal – 14 amps. (in bracket behind instrument panel).

El ctric Cl ck – 3 amps. (in lead behind instrument panel).

Climatiz r & D fr st r – 14 amps. (Coupe & Hardtop); 15 amps. (Other Models), (On Climatizer & Defroster Switch).

CIRCUIT BREAKERS: Located as follows:

1) H ad, Parking & Instrument Lights – 18 amps. (On main lighting switch).

2) B dy & St p Lights – 15 amps. (below headlight switch on instrument panel).

3) Windshi ld Wip r – 5 amps. (in wiper switch).

4) Wind w Lift – 20 amps. (on left cowl panel).

5) S at Adjust r – 20 amps. (on left cowl panel).

HORNS: Dual horns with relay. *12 Volt.*

D lco-R my N .	Low Note	High Note
All Models	1999757	1999758

H rn R lay: Delco-Remy 1116781. *12 Volt.*

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: "Sweepstakes 259" & "Sweepstakes 289". V8, valve-in-head.

Engin	8 r	Stroke	Displacement
259	3 9/16"	3 1/4"	259.2 cu. ins.
289	3 9/16"	3 5/8"	289 cu. ins.

Engin	C mpr. Rati	Rated HP	Dev. HP
259	7.8-1 Ⓒ	40.6	Ⓒ
289	7.8-1 Ⓒ	40.6	Ⓢ

Ⓒ – 8.3-1 Optional.

Ⓒ – 170 HP at 4500 RPM with 2-Barrel Carburetor. 185 HP at 4500 RPM with 4-Barrel Carburetor.

Ⓢ – 195 HP at 4500 RPM with 2-Barrel Carburetor. 210 HP at 4500 RPM with 4-Barrel Carburetor.

C mpr ssi n & Vacuum R ading – *See TUNE-UP.*

OIL PAN REMOVAL: *See "Oil Pan" in Studebaker Special Data.*

ENGINE REMOVAL: *See "Engine" in Studebaker Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Studebaker Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

Aluminum alloy, cam ground, T-slot, three ring type. *See "Original Bore & Pistons" in Studebaker Special Data.*

► *PISTON REPLACEMENT CAUTION: "259" & "289" Engine pistons are NOT INTERCHANGEABLE. "Flat Head" piston used on 259" Engine. "Concave Head" Piston used on 289" Engine.*

Fitting New Pistons: Clearance is selective fit. With piston inverted, slotted side away from camshaft, and with bottom of piston about 1" below top of block, insert a .002" x 1" x 12" feeler on camshaft side of piston. Pull to withdraw feeler should be 8-13 lbs.

Replacement Pistons: Std. size & .010", .020", .030", .040" oversize. Pistons furnished with fitted pins.

Installing Pistons: Install piston on rod so that solid side of piston is on same side as oil hole in bearing bore. Install piston in cylinder with the slot toward the left side of engine. *See Rod Installation.*

PISTON PINS

Locked in rod by tapered pin and locknut.

Diameter – .8741-.8745". **Length** – 3 1/16".

Clearance in Piston – .0001-.0003" (selective fit). Light finger push fit at 70° F.

Replacement Pins: Std. size & .0025", .005" oversize.

Removal & Installation: *See "Piston Pins" in Studebaker Special Data.*

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compression	5/64"	.008-.016"	.002-.005"
Oil	3/16"	.008-.016"	.0015-.005"

Replacement Rings: *See Studebaker Special Data.*

Installing Rings: Install rings with chamfered side of compression rings upward.

CONNECTING RODS

Length (Center-to-Center)—6-5/8". **Weight**—23.71 ozs.

Crankpin Journal Diameter—1.99925-2.00025".

Lower Bearing—Interchangeable. Steel backed, micro-babbitt lined type. No shims.

Clearance – .0005-.002". **Sideplay** – .008-.013".

Replacement Bearings: Std. size, .001", .005", .010", .020" undersize.

Installing Rods: Number on rod and bearing cap must be on same side and rod installed in same numbered cylinder with numbers down toward oil pan (toward right on right bank rods, toward left on left bank rods) and oil squirt hole on all rods toward right of engine. Rods are offset with widest half of bearing toward rear (right bank), toward front (left bank).

► *NEW (UNMARKED) ROD NOTE: Hold rod upright with oil hole toward you. Narrow part of offset will be to right on rods for right bank, and to left for rods on left bank.*

► *CAUTION:* Install piston and pin on rod so that T-slot of piston is on side opposite oil hole in bearing bore. Insert tapered end of clamp screw so it will be toward heavy boss. Be careful to align flat surface of screw with flat on piston pin. Bearing cap must be assembled on rod with groove in cap and rod on same side.

CRANKSHAFT

Journal Diameter—2.4995-2.5000".

Clearance—.0005-.0025".

Replacement Bearings: Std. size, .001", .010", .020", .030" undersize.

End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and face of main bearing journal.

Endplay—.003-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.86975-1.87075", (2) 1.85375-1.85475", (3) 1.83875-1.83975", (4) 1.82275-1.82375", (5) 1.24475-1.24575".

Bearings—Precision type, steel backed babbitt lined.

Clearance – .00075-.00225" (No. 1), .001-.00275" (Others).

End Thrust: Taken by thrust plate located between front camshaft bearing and camshaft gear.

Endplay—.003-.006".

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Cast iron crankshaft gear and "Celeron" camshaft gear.

Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*

Backlash—.001-.003".

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.

Engine Front Cover Removal: *See "Engine Front Cover" in Studebaker Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

► *VALVE NOISE CORRECTION (When Due to Cupped Valve Stem Ends):* Valve stem caps, Part No. 536426 are available to correct above condition. Caps should be installed in complete sets. It is not necessary to disassemble rocker assembly to install caps. Loosen rocker arm bracket screws and cylinder head capscrews that hold rocker assembly to head, insert caps, retighten capscrews. Readjust valve clearance to original specifications.

► *1955-56 ROCKER ARM OIL RETURN PASSAGE CAUTION:* On these engines there is but one return hole in each bank of cylinders for oil from rocker arm chamber to crankcase. **These are at the rear.** Any attempt to drill front oil passages through into block would result in a passage into engine water jacket.

Tappet Clearance—.023-.025" (Engine hot, running). .025-.027" (Engine cold, standing).

Valve	Head Diam.	Stem Diam.	St m Clearance
Intake	1-21/32"	11/32"	.0015-.0035"
Exhaust	1-17/32"	11/32"	.0015-.0035"

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Seat Angle—45° (all valves).
Lift—23/64" (all valves).
Valve Seat Width—1/16-3/32".

Valve Stem Oil Seal: "Umbrella" type, rubber seals installed on all exhaust and intake valve stems (with cupped side down toward top of valve guide) within valve spring below spring retainer.

Valve Springs: Single spring used. Replace spring if 10% weaker than pressure given in specifications below. *NOTE* - Damper installed on lower (close-coiled) end of all springs.

Valve Spring Specifications—110 lbs., ± 5 lbs., when compressed to 1-43/64".

Valve Guides: Pressed in head from underside.
Guide Removal & Installation—*See "Valve System" in Studebaker Special Data.*

Valve Lifters: Straight barrel type. Remove from above. Not necessary to remove camshaft.

►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore): See "Valve System" in Studebaker Special Data.*

Valve Lifter Installation & Fitting—*See "Valve System" in Studebaker Special Data.*

Replacement Lifters—Std. size, .001", .005" oversize.

►*CAUTION—When lifters removed, make sure they are installed in original positions.*

Rocker Arms: *See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 11° BTDC. Close 54° 36' ALDC.
Exhaust Valves—Open 51° 36' BLDC. Close 14° ATDC.

Valve Timing Check—Set tappet clearance of No. 1 intake valve at .030". Turn crankshaft until No. 6 piston is on compression stroke and vibration dampener mark "IN.OP.1" is approaching pointer on timing gear cover, continue to turn crankshaft slowly while working No. 1 intake rocker arm up and down to determine point at which all clearance is taken up. Dampener mark "IN.OP.1" should be directly under pointer.

OILING SYSTEM

Crankcase Capacity: 5 qts. (add one quart when filter changed).
Normal Oil Pressure: 40 lbs. at 1400-1600 RPM.
Pressure Regulator Valve – Located on right side at front of engine block slightly above crankcase flange.
Oil Pressure Indicator – Coupe & Hardtop Models – Direct reading, non-electric type gauge. Studebaker No. 1539878.

Other Than Coupe & Hardtop Models – Red indicator light on instrument panel controlled by pressure switch, Studebaker No. 1539898, on engine. Light should go on when ignition turned on but should not be lighted with engine running.

Oil Pump: Spur gear type. Mounted on rear main bearing cap and driven by camshaft gear.

Pump Removal, Overhaul & Installation: *See "Oiling System" in Studebaker Special Data.*

Oil Filter: Partial Flow. Replace filter element at 5000 mile intervals. Change more often in dusty areas.
Replacement Filter Element – AC No. P-209.

Crankcase Ventilation: Filter element in oil filler cap (air intake) and breather tube at rear of engine (air outlet).

COOLING

Water Capacity: 17 qts. (18.5 qts. with heater).
Pressure Valve: Radiator filler cap. 13 lb. type.
Thermostat: Choke type. 170° (Std.), 160° & 180° (Optl.).
Water Pump: Packless type. Sealed ball bearing type.
Pump Removal – Drain cooling system. Loosen generator, remove belt. Remove fan-to-hub screws and remove fan and pulley. On Coupe and Hardtop models, remove shroud. Remove four capscrews retaining pump cover to water pump manifold. Remove pump from manifold.

Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data.*

Temperature Indicators: Coupe & Hardtop Models – Direct reading, electric type gauge.
Other Than Coupe & Hardtop Models – Red-green indicator on instrument panel. Electric type. When indicator shows any green, engine is operating at normal temperature. If it turns red through entire range, engine operating temperature is above normal.
Dash Unit – Studebaker No. 1541287 (Sedans & Station Wagon), Studebaker No. 1539879 (Hard Top "Hawks").
Engine Unit – Studebaker No. 1539876 (All Models).
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck. Single plate, dry disc type.

Series	Clutch Model	Assy. No.	Disc No.
Commander	10A7	361371	382315
President	10A6	361386	382389

See "Borg & Beck" in Clutch Section.

Pedal Adjustment: Pedal free travel 1/2-1". To make adjustment, loosen locknut securing clevis to rod connecting release shaft lever to clutch operating shaft lever and remove the clevis pin. Turn clevis to shorten or lengthen rod as necessary for correct pedal free travel. *NOTE—If car is equipped with "Hill-Holder", adjust "Hill-Holder" operating rod as outlined in Brake Section.*

Clutch Housing Removal: Remove starter. Remove floor plate and clutch housing top capscrews. Remove clutch operating shaft. Remove transmission (see Synchro-mesh Transmission Removal below). Remove two bolts holding engine rear support insulator cage to crossmember. Place a small hydraulic jack at rear of oil pan and insert a block between jack pad and oil pan to prevent damage to pan. Raise engine just enough to take weight of engine off crossmember. Remove support crossmember-to-frame bolts and remove cross member. Remove the two clutch housing bolts retaining exhaust pipe support bracket. Loosen clamp bolt and swing support bracket out of way. Remove clutch housing cover plate. Remove remaining housing mounting bolts or capscrews and remove clutch housing.

Clutch Removal: Remove clutch housing (above), remove six screws evenly to release pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model AS53-T86E (Std.), AS54-T86E with R10 type Overdrive.
See "Warner Synchro-mesh Transmission" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission case. Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines. Move end of shaft to one side as far as possible and tie it in position. Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion. Remove capscrews which hold transmission case to clutch housing. Remove clutch operating shaft bracket, and bearing from transmission case. Move case rearward until the main drive pinion clears clutch pressure plate and remove unit from car.

OVERDRIVE

Warner R10 Type (part of AS54-T86E Transmission). Governor controlled, with electric solenoid operation and throttle controlled "kickdown".
See "Warner R10" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

FLIGHTOMATIC TRANSMISSION

Hydraulic torque converter and hydraulically controlled three-speed planetary type transmission which provides automatic operation in "D" range and additional "Lo", "R", and "P" ranges which are controlled manually. In "D" position, the car starts in low gear and progresses to intermediate and high as car speed is increased.

►*See "Flightomatic" Transmission in Transmission Sect.*

►*"NO REVERSE" CORRECTION: See "Flightomatic" Transmission in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Flightomatic" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Flightomatic" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 15,000 miles. Use only Automatic Transmission Fluid Type "A" (marked AQ-ATF on container).

Checking Fluid Level – Place selector lever in "P" position. Start engine and operate it for approximately four minutes or until engine and transmission have reached operating temperature. Remove floor mat from right side and remove oil inspection hole cover. Apply parking brake and foot brake, move selector lever slowly from "P" position to "R" position, then back to "D" position. Remove dipstick and read fluid level. Add fluid to bring level to "FULL" mark on dipstick (1½ pints between "LOW" and "FULL" marks on dipstick).

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Capacity – 9 qts. Use Automatic Transmission Fluid Type "A" (marked AQ-ATF on container).

►*OTHER FLIGHTOMATIC DATA: See "Flightomatic" Transmission in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing cross type. Three used, with intermediate universal at propeller shaft support bearing on crossmember.

Propeller Shaft & Support Bearings: Two shafts used.

1) Front shaft with intermediate universal yoke bolted to rear end (no slip-joint).

2) Rear shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal: *See "Propeller Shaft Notes" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss Drive. *See "Spicer Hypoid" in Rear Axle Section.*

Series	Std.	O.D.	Auto.
Commander	3.54-1	3.92-1	3.31-1
President (Exc. 4-Dr. Classic)	3.54-1	3.92-1	3.31-1
President (4-Dr. Classic)	3.54-1	4.09-1	3.31-1

Rear Axle Ratio Identification: Rear axle ratio stamped on plate attached to axle by cover cap screw and also on ring and pinion gears.

Backlash–.003-.006".

Axle Shaft Removal: Remove wheel and wheel hub (use Puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire to frame out of the way (*CAUTION*–Do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft with Puller HM-931.

Rear Axle Assembly Removal: Remove hub caps and axle shaft cotter pin. Loosen wheel nuts. Place car on stands (stands under frame just ahead of rear springs) and remove wheels, hubs, and drums. Disconnect brake pipes at wheel cylinders, remove backing plate bolts from both backing plates. Remove brake pipe clamps and capscrew which holds brake pipe tee to housing, remove brake pipe from housing. Remove backing plate and shims (suspend from frame). Remove rear universal joint U-bolts and nuts, disconnect rear propeller shaft and move to one side. Remove rear spring U-bolts and disconnect shock absorbers from spring plate. On President models, disconnect stabilizer shaft from spring plates. Remove rear axle assembly.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims furnished .003" .005" .010" .030" thick). **Endplay** – .001-.006".

SHOCK ABSORBERS

Hydraulic, Manual, Direct Acting. Direct acting, hydraulic type.

NOTE - Heavy Duty Shocks are Gabriel.

Hydraulic Shocks (Studebaker Nos.)

	Front	Rear
Comm. "Hawk" Ⓒ	537021	537025
Comm. 2 Dr. Sedans	537022	537026
Comm. "Hawk" Ⓒ	1539526	1539544
Comm. 2 Dr. Sedans	1539526	1539544
Comm. & Pres. Sta. Wgn.	1539527	1539545
Comm. & Pres. Others	1539526	1539544

Delco Shocks (Studebaker Nos.)

Comm. "Hawk" Ⓒ	1539986	1539996
Comm. 2 Dr. Sedans	1539986	1539996
Comm. & Pres. Others	1539986	1539996

Gabriel Heavy Duty Shocks

Comm. & Pres. (Non-Adj.)	536398	536399
Comm. & Pres. (Adj.)	537712	537714

Ⓒ - Before Serial No. 8,430,316

Ⓒ – Beginning with above number.

FRONT SUSPENSION

Independent. Coil spring suspension with shock absorbers mounted within coil springs.

See "Studebaker" in Suspensions & Wheel Alignmt. Sect.

►*FRONT SUSPENSION NOISE CORRECTION (Due to Bushing Looseness at Upper Control Arm Inner Shaft): See "Studebaker" in Suspensions & Wheel Alignmt. Sect.*

Kingpin Inclination–5-1/4° at 0° camber.

Caster–Neg. 1° to Neg. 2-1/2°. Not more than 3/4° variation between wheels.

Camber–0° to Pos. 1°. 1/2° more camber favored on driver's side.

Toe-In–1/16-1/8". **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel.

RHD Car Note–Make toe-in adjustments at left hand tie rod.

Toe-Out on Turns–With outer wheel at 20°, inner wheel should be 22-1/2–23-1/2°.

STEERING

Manual: Ross Cam & Twin Lever or Saginaw Worm & Roller types.

See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.

Power Steering: Saginaw (G.M.). *See "Saginaw (G.M.) Power Steering" in Steering Section.*

►*POWER STEERING "CHUCKLE" CORRECTION: See "Saginaw (G.M.) Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Wagner Lockheed Hydraulic. Self-centering (with Bendix type shoes). Parking brake applies rear wheel service brakes.

See "Wagner Lockheed Self-Centering" in Brake Section.

►*FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary lining is 7/32" thick (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeak. This lining is applied to the full length of the shoe and is marked "secondary" and "top", and should be installed as marked.

Drums – Diameter 11" (front), 10" (rear).

Braking Power – 62% (front), 38% (rear).

Wheel Cylinder Diameter – 1 1/16" (front), 7/8" (rear).

Lining Dimensions	Width	Length	Thickness
Front Wheels	2¼"	12"	Ⓒ 3/16"
Rear Wheels	2"	10 29/32"	3/16"

Ⓒ – Front wheel secondary lining is 7/32" See "Front Wheel Secondary Lining Note" above.

Clearance–Lock shoes against drum with adjusting screw, then back off adjusting screw 8 notches, or more notches as required to free drum.

Standard Master Cylinder: On frame left side rail at base of brake pedal.

Checking Fluid–Access hole in front floor pan at left corner of drivers seat. Fluid should be maintained 1/2" below top of filler opening.

Removal–Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from its frame bracket and then from spring clip attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder.

(*NOTE* - One line with Hill-holder). Remove the brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder. Insert forward mounting bolt to Hill-holder while master cylinder is off car.

Power Brakes: Hydrovac Power Unit. Used with standard master cylinder.

See "Hydrovac Power Unit" in Brake Section.

Checking Fluid–Same as for Manual Brakes (same master cylinder used).

Removal of Power Unit–Disconnect manifold vacuum supply hose at the power unit and disconnect stop light switch wires. Disconnect hydraulic lines from power unit (lines leading to master cylinder and to wheel cylinders). Remove power unit-to-bracket mounting bolts and remove unit from car.

MISC. MECHANICAL

Windshield Wipers: Auto-Lite, Redmond and Bosch Electric type. *See "Auto-Lite Windshield Wiper 'Single End' Motors" and "Redmond Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: *See "Studebaker Air Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electrical, with individual reversible motors in each window. Control switches at each door with a master control switch located on left front door. *See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Two-way electric type with curved seat tracks for seat adjustment (seat raises and lowers with a tilting action).

See "Power Seat Adjusters" in Miscellaneous Section.

MODEL IDENTIFICATION

Model	Model Identification
Golden Hawk (Hardtop)	56J

SERIAL NUMBER: Stamped on plate attached to left front hinge pillar post
Starting Serial Numbers—6,030 001 (South Bend) 6,800 001 (Los Angeles)

ENGINE NUMBER: Stamped on front end of engine block between cylinder banks, directly behind water pump
Starting Engine Numbers (South Bend & Los Angeles): K-1001 (Overdrive) S-1001 (Ultramatic)

TUNE-UP

►*DETONATION CORRECTION (In Low Octane Areas)* If detonation not caused by carbon deposits, rough combustion chamber, or sharp edges in cylinder head, convert original Distributor IBJ-4001C to later IBJ-4001E performance (see DISTRIBUTOR below). If detonation still present, Ignition Timing may be retarded slightly from standard 5° BTDC setting.

COMPRESSION PRESSURE: 120 lbs minimum at 150 RPM Maximum variation between cylinders 10 lbs

VACUUM READING: 18-21" at idling speed

VALVE TAPPET CLEARANCE: None (hydraulic)

MANIFOLD HEAT CONTROL: Thermostatic spring type mounted between right bank exhaust manifold and exhaust pipe With heater valve in closed position hook in end of coil should assume a position approximately 90° clockwise from coil anchor pin at normal room temperatures Valve should operate freely

►*NOTE* With valve in closed position, most exhaust gases are discharged through the left exhaust pipe

IGNITION

►*ENGINE "MISS" CORRECTION* May be caused by cross-fire between No. 5 & 7 cylinders. Correct by installing new brackets and cables as follows

Transmission	Cable Set	Rt. Bracket	Left Bracket
Overdrive	6484554	6489377	6489917
Ultramatic	6484554	6489377	

NOTE - Eight No. 6489378 grommets also used.

►*ENGINE FAILURE TO START CORRECTION (Due to Moisture in Distributor Cap)* Remove tachometer drive unit assembly and drill two 7/64" holes in groove adjacent to outer rim.

FIRING ORDER: 1-8-4-3-6-5-7-2
Cylinders—RIGHT BANK 2-4-6-8 LEFT BANK 1-3-5-7

SPARK PLUG GAP: 033- 038"
Spark Plugs—Champion N8-67B 14mm Torque to 30 ft. lbs. *NOTE* - Champion N8-64B can be used if colder plug desirable.

COIL: Auto-Lite CAD-4004 *12 Volt*
Ignition Current—2 2 amps idling HOT
Resistor—Auto-Lite PU-4001

►*COIL RESISTOR NOTE* Resistor is connected in series with primary circuit between battery and coil Resistor is by-passed during cranking by lead from starter solenoid to coil

DISTRIBUTOR: Auto-Lite IBJ-4001C r IBJ-4001E *12 Volt.* Single breaker type.

►*DISTRIBUTOR CONVERSION TO CORRECT DETONATION (IBJ-4001C)* Install all parts furnished in Conversion Kit, No. 6486409, as follows Distributor Stop & Cam Plate, Governor Weight Springs (Weak & Heavy Springs), Vacuum Spring, and small parts. Install new IBJ-4001E nameplate (furnished in kit). Check Automatic & Vacuum Advance which should agree with IBJ-4001E specifications below.
Condenser—Auto-Lite IBB-2015L **Capacity**— 25- 28 microfarad
Contact Point Set—Auto-Lite IGW-2028HS
Breaker Gap— 017"
Cam Angle—31°±3°
Breaker Arm Spring Tension—17-20 ozs
Rotation—Counter-clockwise viewed from above

Automatic Advance—IBJ-4001C

Degrees	Distr	RPM	Degrees	Eng	RPM
Start		300	0		600
1		350	?		700
10		850	20		1700
14		1765	28		3530
15		2000	30		4000

Automatic Advance - IBJ-4001E

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1		375	2		750
8		900	16		1800
13		2275	26		4550
14		2550	28		5100

Vacuum Spark Control Auto-Lite Integral type

Vacuum Advance—IBJ-4001C

Distr	Degrees	Eng	Degrees	Vacuum (" of HG)
Start			0	7
1			2	7 1/2
5			10	9 5/8
9			18	12 1/8
10			20	13

Vacuum Advance - IBJ-4001E

Distr.	Degrees	Eng.	Degrees	Vacuum (" of HG)
Start			0	8
1			2	8 5/8
5			10	11 1/4
9			18	14 3/4
10			20	16

IGNITION TIMING

Setting—5° BTDC with engine idling at 550-600 RPM with transmission in neutral Before checking setting disconnect vacuum advance pipe at carburetor

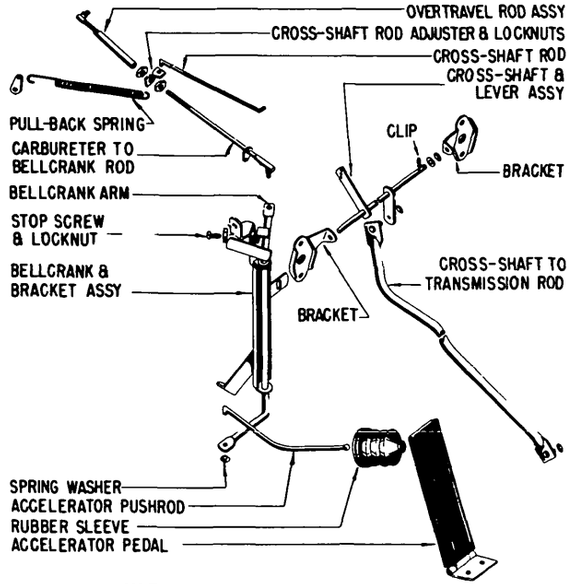
►*DETONATION NOTE* - Timing may be retarded slightly from standard 5° BTDC setting if necessary to correct detonation. *See Detonation Correction under TUNE-UP above.*
Timing Mark—Timing indicator on chain cover marked "0" "5" "10" "15" Align index mark (groove) on vibration damper with correct mark on indicator

CARBURETOR

Carter WCFB-2394S. Four-barrel downdraft type

►*MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*
Idl S tting—¾-1¾ turns open Turn screws out for richer mixture
Idle Sp d—550-600 RPM with transmission in neutral

►*OTHER DATA See "Carter WCFB" Carburetor in Carburetion Section.*
Fu l Pump Pr ssur : 3½-5 lbs.
Throttle Linkage Adjustment (Ultramatic) Replace any excessively worn linkage, check for free action without bind, bring engine to operating temperature Set engine speed at 400 RPM (selector lever in "D" Drive position) with choke in wide open position Apply brakes, block open choke valve, disconnect rod at throttle valve outer lever (rear of transmission), hold lever against its stop, straight edge against milled surface of transmission case Taper end of lever should just contact straight edge To correct, loosen lever clamp nut, turn shaft to left against stop, reposition lever on shaft to proper position and secure clamp nut With adjuster to cross-shaft rod in the center in cross-shaft lever *(Supersedes the lower hole specification used previously),* both locknuts at adjuster released 4 or 5 turns, disconnect carburetor bell crank rod ball joint at bell crank, set stop to provide ¼" gap at bell crank Hold carburetor idle screw against its stop (¼" gap at bell crank), loosen overtravel end assembly and adjust until ball joint stud on carburetor to bell crank rod freely enters hole in bell crank arm Lock nut at overtravel end assembly Hold cross shaft lever forward and tighten rear locknut against adjuster then secure front nut

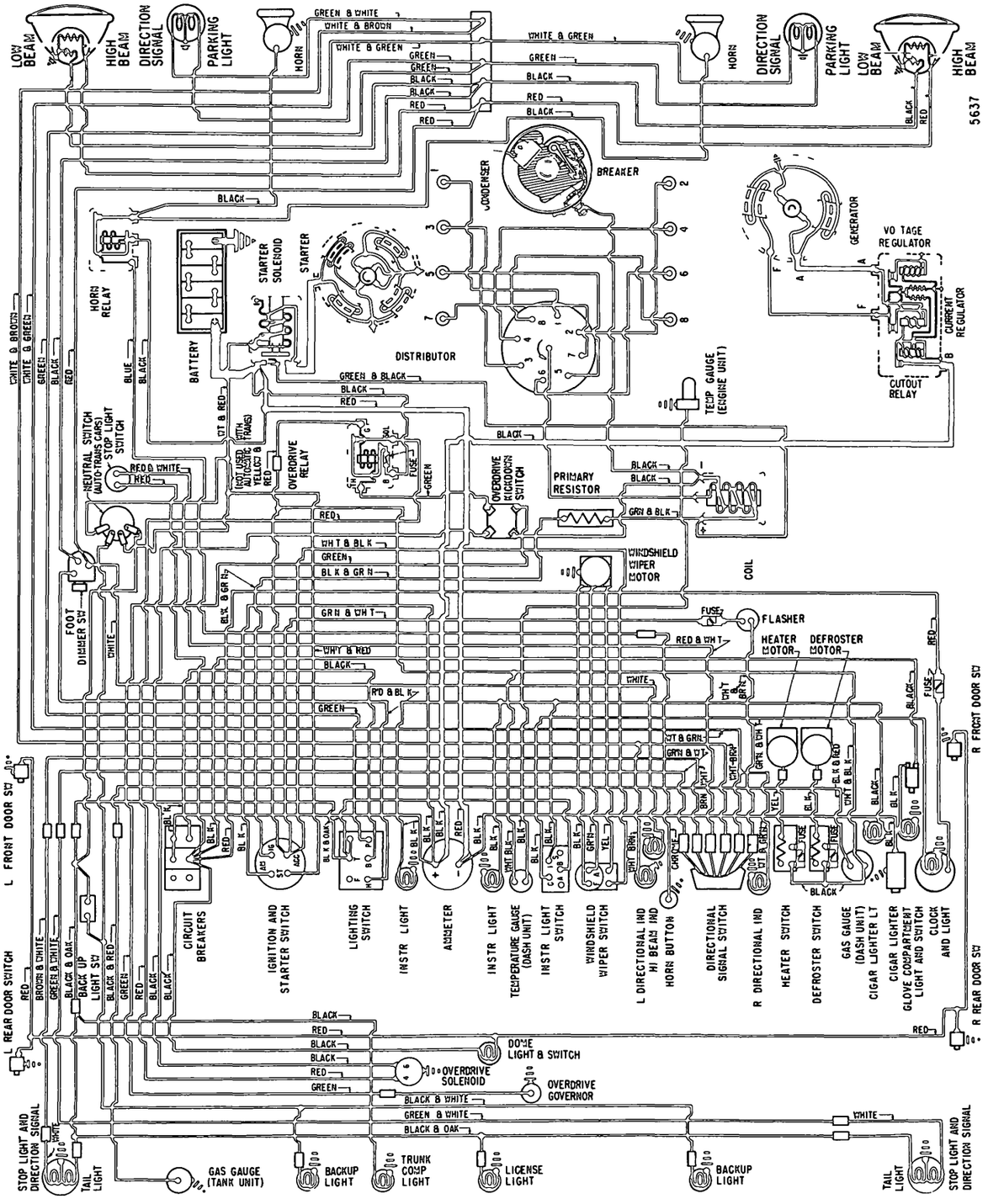


ULTRAMATIC THROTTLE LINKAGE

CARB. EQUIPMENT

Fuel Pump: AC No. 4299. Fuel only
Fuel Pump Pressure - 3½-5 lbs.
See "Fuel Pumps" in Carbur tion Section
Gas lin Gaug : Electric type.
Dash Unit - Studebaker No. 1539880.
Tank Unit - Studebaker No. 1540263.
S e "Fu l Gauges" in Carburetion Section

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BATTERY

Willard HDW-2SM-60. *12 Volt*, 9 plate, 60 ampere hour capacity (20 hr. rate).
Battery Ground - Negative.
Engine Ground - Cylinder head to dash.

STARTER

Auto-Lite MDF-6008. *12 Volt*. Armature MDF-2122.
Drive - Overrunning clutch (solenoid pinion shift).
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 42-53 ozs. with new brushes.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200 min.	10.0	60 max.
6.5 ft. lbs. min.	Lock	4.0	240 max.

Starting Switch: Auto-Lite SAD-4101 Solenoid Switch, mounted on starter and controlled by Ignition & Starter Switch. Turn key full RIGHT to start. *See "Starter Controls" in Electrical Section.*
Ultramatic Neutral Safety & Back-up Light Switch: Delco-Remy 1998038 (Without power steering), 1998059 (With power steering). Located at base of steering column jacket. Connected in starter control circuit so that starter operative only in "N" or "P" position.
Adjustment - *See "Ultramatic" Transmission in Transmission Section.*

GENERATOR

Auto-Lite GJC-7002F. *12 Volt*. Armature GJC-2030F.

Performance Data - Cold

Amperes	Volts	RPM
20 Ⓒ	15.0	1750 max.
30 Ⓒ	15.0	2050-2250

Ⓒ - Do not operate at high output for any length of time without ventilating fan. To do so may result in burned armature and fields.
Brush Spring Tension - 18-36 ozs. with new brushes.
Field Current - 1 2-1 3 amperes at 10.0 volts (70°F.).
Metering Current - 3.4-3 9 amps. at 10.0 volts (70°F.).
Rotation - Counter-clockwise at commutator end.
Belt Adjustment: Loosen generator-to-mounting bracket bolts and adjusting arm screw. Place Fan Belt Adjusting Tool J-4672 over head of front mounting bolt and rotate tool until arm of tool contacts edge of generator end plate. Then using torque wrench, turn tool counter-clockwise until a 20-25 ft. lbs. torque is indicated on wrench scale. While holding wrench at proper torque, tighten adjusting arm screw securely. Remove tool and tighten the generator-to-mounting bracket bolts.

REGULATOR

Auto-Lite VRX-6008A. *12 Volt*.

Cutout Relay

Cuts In - 13 0-13.7 volts.
Cuts Out - 8 2-9 3 volts (point opening amperage discharge approximately 3-5 amps.).
Contact Gap - .015".
Air Gap - .031- 034".

Voltage Regulator

Setting - 14.2-14 8 volts at 80° F., unit operating normally while charging at 10 amps.
Air Gap - .048- 052" with contact just opening.

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Checking & Adjusting - *See Electrical Section.*

Current Regulator

►*SETTING CAUTION "Temperature Compensated" type. Set to following specifications at 70°F.*

Test A	Operating Amperes	Test B
36 amps.		30 (28-32)

Test A - After 15 minutes operation at 10 0 amps.

Test B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts).

Air Gap - .048-.052" with contacts just opening.

Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Direction Signals: *See Electrical Section.*

Lighting Switch Removal: Toggle Type - Remove switch retaining nut. Push switch sleeve back into panel, disconnect wires from switch.

Stop Light Switch Location: Located on inner side of left frame rail just forward of steering gear housing (except cars with power brakes). On cars with power brakes, switch is located in end of hydraulic cylinder of power brake unit.

FUSES: Located as follows

Overdrive - 20 amps. (in relay on dash panel).

Radio - 9 amps. (in lead behind instrument panel.)

Direction Signal - 14 amps. (in bracket behind instrument panel).

Electric Clock - 3 amps. (in lead behind instrument panel).

Climatizer & Defroster - 14 amps. (on Climatizer & Defroster switch.)

CIRCUIT BREAKERS: Located as follows

1) - Head, Parking & Instrument Lights - 18 amps. (on main lighting switch).

2) - Body & Stop Lights - 15 amps. (below headlight switch on instrument panel).

3) - Windshield Wiper - 5 amps. (in wiper switch).

4) - Window Lift - 20 amps. (on left cowl panel).

5) - Seat Adjuster - 20 amps. (on left cowl panel).

HORNS: Dual horns with relay.

High Pitch - Delco-Remy 1999758.

Low Pitch - Delco-Remy 1999757.

Horn Relay: Delco-Remy 1116781. *12 Volt.*

ENGINE

ENGINE SPECIFICATIONS: 90° V8.

Bore	Stroke	Displmnt.	Rated HP
4"	. 3½"	352 cu. ins.	51.2

Compr. Ratio	Developed HP
9 5-1	275 at 4600 RPM

Compression & Vacuum Reading - *See TUNE-UP.*

OIL PAN REMOVAL: Remove steering bellcrank assembly. Remove left exhaust pipe, starter motor, and flywheel lower housing. Remove oil pan and screws.

►*OTHER ENGINE DATA See Packard 5660 Engine on Packard Car Model pages.*

OILING SYSTEM

Crankcas Capacity: 5 qts. (refill).

N rmal Oil Pr ssur : 45-50 lbs. at 2800 RPM.

Pr ssur R gulat r Valv - In pump body. Not adjustable.

Pr ssure R li f Valv Spring - 3 19/64" (free length). Compressed to 1 3/8", pressure should be 9-9½ lbs.

Oil Pressure Gauge: Studebaker No. 1539878. Not electric.

Oil Pump: Spur gear type. Located on rear main bearing cap and driven through distributor drive and camshaft gears.

Oil Pump Removal, Overhaul & Installation - *See "Oiling System" in Studebaker Special Data.*

Crankcase Ventilation: Filter element in oil filler cap (air intake). Outlet pipe in valve tappet cover.

COOLING

►*FAN BLADE ASSEMBLY PRODUCTION CHANGE (To Correct Cracks & Breakage)* A new fan assembly, Part No. 1542138-P, entered production effective with Car Serial No. 6033140. New assembly uses 15 instead of 14 gauge steel, and has 8 instead of 4 rivets.

Water Capacity: 25 quarts (1½ qts. additional with heater).

Pressure Valve: Radiator filler cap. 13 lb. type.

Thermostat: 170° F. (Std.), 160° & 180° F. (Optional).

Water Pump: Packless type with sealed ball bearing *See "Studebaker" in Water Pump Section.*

Temperature Gauge: Electric type.

Dash Unit - Studebaker No. 1539879.

Engine Unit - Studebaker No. 1539876.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long 11CF. Single plate, dry disc type.

Assembly No. Studebaker No. 403502. **Disc No.** 473176.

See "Long" Clutches in Clutch Section.

Pedal Adjustment: 1½" free travel.

Removal: *(NOTE* - Clutch housing and transmission removed as an assembly). Remove transmission and clutch housing (see Synchro-mesh Transmission below). Remove cover retaining screws by alternately backing off screws until spring pressure is released. Remove clutch pressure plate assembly and driven plate. *See "Hill-holder" in Brake Section for adjustment.*

SYNCHRO-MESH TRANSMISSION

Warner. 3-Speed, helical gear type with Overdrive (Std.). *See "Warner Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls See "Transmission Controls" in Transmission Section.

Removal: *(NOTE* - Clutch housing and transmission with overdrive must be removed as an assembly.).

1) Disconnect clutch adjusting rod from release bearing lever. Remove operating shaft support bracket-to-transmission screws, swing bracket down and slip the bracket and ball stud out of operating shaft. Disconnect shift rods from shift levers. Disconnect propeller shaft from transmission Disconnect overdrive wiring and control cable.

2) Using jack or suitable lift to support engine, remove engine rear support mounting bolts, remove crossmembers.

3) Remove capscrews which attach bellhousing to flywheel housing and remove housing and transmission as an assembly.

4) Disconnect release lever pull-back spring and remove release bearing from transmission front flange. Remove transmission screws and remove housing.

OVERDRIVE

Warn r R10 Type. Governor controlled, with electric solenoid operation and throttle controlled "kick-down". *See "Warner R10" Overdrive in Transmission Section.*

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

ULTRAMATIC TRANSMISSION

"Twin Ultramatic". Torque converter with hydraulically operated direct speed clutch and hydraulically operated planetary unit with manual control.

See "Twin Ultramatic" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Twin Ultramatic" in Trans. Section.*

►*TESTING & TROUBLE SHOOTING See "Twin Ultramatic" in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 25,000 miles.

Checking Fluid Level - Place selector lever in "P" position, start engine and operate for approximately four minutes or until engine and transmission have reached operating temperature. Remove inspection hole cover from floor pan above transmission. Clean area around inspection hole. Apply parking and foot brakes and move selector lever from "P" position to "R" position and back to the "D" position. Remove dipstick, wipe clean, and reinstall in transmission. Remove and read dipstick. Add fluid through dipstick hole to bring level to "F" mark (Fluid required to raise level from "L" to "F" mark is 1½ quarts). *Use only Automatic Transmission Fluid Type "A" (marked AQ-ATF on container).*

Capacity - Approximately 11 quarts.

►*OTHER TWIN ULTRAMATIC SERVICE DATA Se "Twin Ultramatic" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

Propeller Shaft & Support B arings: Two shafts used.

1) Front shaft with intermediate universal yoke bolted to rear end (no slip-joint).

2) Rear shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support B aring R m val: *See "Propeller Shaft Notes" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear, with Hotchkiss Drive. *See "Spicer Hypoid" in Rear Axle Section.*

Rear Axle Ratios: 3 92-1 (Overdrive), 3.07-1 (Ultramatic).

Identification - Rear axle gear ratio stamped on plate attached to assembly by cover cap screw and also on ring and pinion gears.

Backlash—.003-.006".

Axle Shaft Removal Remove wheel and wheel hub (use Puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire to frame out of the way *(CAUTION*—Do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft with Puller HM-931.

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Rear Axle Assembly Removal: Remove hub caps and axle shaft cotter pin. Loosen wheel nuts. Place car on stands (stands under frame just ahead of rear springs) and remove wheels, hubs, and drums. Disconnect brake pipes at wheel cylinders, remove backing plate bolts from both backing plates. Remove brake pipe clamps and capscrew which holds brake pipe tee to housing, remove brake pipe from housing. Remove backing plate and shims (suspend from frame). Remove rear universal joint U-bolts and nuts, disconnect rear propeller shaft and move to one side. Remove rear spring U-bolts and disconnect shock absorbers from spring plate. Remove rear axle assembly.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flahge (shims furnished .003", .005", .010", .030" thick). **Endplay** - .001-.006".

SHOCK ABSORBERS

Monroe. Direct acting, hydraulic type. Serviced by replacement. *NOTE* - Heavy duty shocks are Gabriel.

Shock Absorbers (Studebaker Nos.)

	Front	Rear
Monroe (Std.)	1539527	1539543
Gabriel (H.D.)	536398	536399
Gabriel (H.D. Adj.)	537712	537714

FRONT SUSPENSION

Independent. Coil spring suspension with shock absorbers mounted within coil springs.

See "Studebaker" in Suspensions & Wheel Alignment Section.

►*FRONT SUSPENSION NOISE CORRECTION (Due to Bushing Looseness At Upper Control Arm Inner Shaft):* *See "Stud bakr" in Suspensions & Wheel Alignment Section.*

Kingpin Inclination—5-1/4° at 0° camber.
Caster—Neg. 1° to Neg. 2-1/2°. Not more than 3/4° variation between wheels.
Camber—0° to Pos. 1°. 1/2° more camber favored on driver's side.
Toe-In—1/16-1/8". **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel.
RHD Car Note—Make toe-in adjustments at left hand tie rod.
Toe-Out on Turns—With outer wheel at 20°, inner wheel should be 22-1/2—23-1/2°.

STEERING

Manual: Ross Cam & Twin Lever or Saginaw Worm & Roller types.
See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.

Power Steering: Saginaw (G.M.). *See "Saginaw (G.M.)" Power Steering in Steering Section.*

►*POWER STEERING "CHUCKLE" CORRECTION: See "Saginaw (G.M.)" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" or "Saginaw Worm & Roller" in Steering Section.*

BRAKES

Wagner Lockheed Hydraulic. Self-centering (with Bendix type shoes). Parking brake applies rear wheel service brakes.
See "Wagner Lockheed Self-Centering" in Brake Section.

►*FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary lining is 7/32" thick (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeak. This lining is applied to the full length of the shoe and is marked "secondary" and "top", and should be installed as marked.
Drums - Diameter 11" (front), 10" (rear).
Braking Power - 62% (front), 38% (rear).
Wheel Cylinder Diameter - 1 1/16" (front), 7/8" (rear).

Lining Dimensions	Width	Length	Thickness
Front Wheels	2¼"	12"	① 3/16"
Rear Wheels	2"	10 29/32"	3/16"

① - Front wheel secondary lining is 7/32". See "Front Wheel Secondary Lining Note" above.

Clearance—Lock shoes against drum with adjusting screw, then back off adjusting screw 8 notches, or more notches as required to free drum.
Standard Master Cylinder: On frame left side rail at base of brake pedal.
Checking Fluid—Access hole in front floor pan at left corner of drivers seat. Fluid should be maintained 1/2" below top of filler opening.
Removal—Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from its frame bracket and then from spring clip attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder. *(NOTE* - One line with Hill-holder). Remove the brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder. Insert forward mounting bolt to Hill-holder while master cylinder is off car.
Power Brakes: Hydrovac Power Unit. Used with standard master cylinder.
See "Hydrovac Power Unit" in Brake Section.
Checking Fluid—Same as for Manual Brakes (same master cylinder used).
Removal of Power Unit—Disconnect manifold vacuum supply hose at the power unit and disconnect stop light switch wires. Disconnect hydraulic lines from power unit (lines leading to master cylinder and to wheel cylinders). Remove power unit-to-bracket mounting bolts and remove unit from car.

MISC. MECHANICAL

Windshield Wipers: Auto-Lite, Redmond and Bosch Electric type. *See "Auto-Lite Windshield Wiper 'Single End' Motors" and "Redmond Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Electrical, with individual reversible motors in each window. Control switches at each door with a master control switch located on left front door. *See "Power Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Two-way electric type with curved seat tracks for seat adjustment (seat raises and lowers with a tilting action).
See "Power Seat Adjusters" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS
ALL MODELS

TIGHTENING TORQUES When tightening capscrews or bolt nuts retaining the parts listed below, use a torque indicating wrench and tighten to tensions listed

4 CYL. ENGINES

	Ft. Lbs.
Cylinder Head Stud Nuts or Screws	60-70
Main Bearing Cap Bolts	65-75
Con. Rod Cap Bolt Nut 3/8'	35-40
Con. Rod Cap Bolt Nut 7/16'	50-55
Con. Rod Cap Bolt Nut 11/32'	33-38
Crankshaft Counterweight Bolt	60-70
Flywheel to Crankshaft Bolts	36-40
Camshaft Thrust Plate Bolts	20-26
Camshaft Gear to Camshaft Bolt	30-40
Intake & Exhaust Manifold Bolts	31-35
Rocker Arm Bracket to Head Nuts	30-36
Spark Plugs	25-30
Engine Mounting (at frame crossmember)	38-42

6 CYL. ENGINES

	Ft. Lbs.	In. Lbs.
Cylinder Head Bolts	30-35	360-420
Spark Plugs	30	360
Con Rod Bearing Bolts	40-45	480-540
Main Bearing Cap Bolts	85-95	1020-1140
Flywheel Mounting Bolts	35-40	420-480
Camshaft Sprocket Nut	35-40	420-480
Int & Exh Manifolds	30-35	360-420
Vibration Dampener Bolt	100-130	1200-1560

CAUTION—Torque figures given are for clean and dry threads

CYLINDER HEAD & MANIFOLD
ALL MODELS

►*"F' HEAD CYLINDER HEAD BOLT CAUTION* One head bolt is located under carburetor in intake manifold.

►*6 CYL. HEAD TIGHTENING SEQUENCE CHANGE* New sequence is indicated in diagram and supersedes previous instructions. *See "Cylinder Head & Manifold' below.*

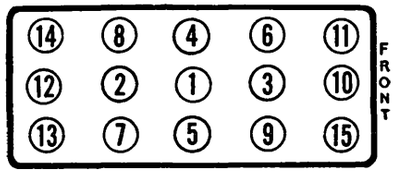
CYLINDER HEAD Installation—Use a torque indicating wrench to tighten cylinder head stud nuts and capscrews tighten in correct sequence as shown Recheck with engine water at 150°F

Tightening Torque—See Tightening (Torque Wrench) Specifications.

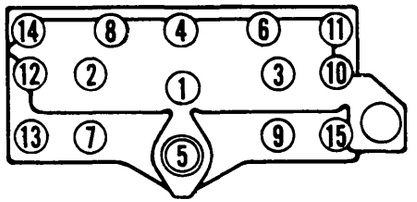
CRANKSHAFT & MAIN BEARINGS
4 CYL. ENGINES

CRANKSHAFT SERVICING: Bearing Replacement – Engine must be removed from car for bearing replacement (bearings "doweled' in case and crankshaft must be taken out to remove and install bearings). Make certain that oil holes in bearings line up with oil holes in crankcase, and that bearings fit snugly on dowel pins in crankcase and bearing caps.

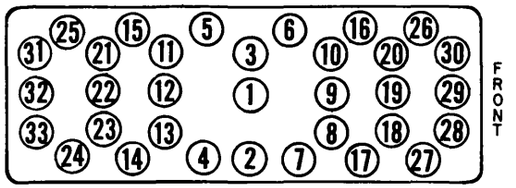
Rear Bearing Oil Seal (Neoprene Type—*NOTE Upper and lower halves of seal can be replaced without removing crankshaft from engine* Seal is neoprene with a steel back Upper half of seal can be removed by using a suitable piece of strap steel (hack saw blade with teeth ground off) Rotate upper half of seal around shaft with steel strap until opposite end protrudes far enough to grasp end and remove To install coat both parts of seal with grease and install upper half by rotating it around crankshaft until it is in position with ends even at the engine block Coat both ends of lower seal with Permatex before installing to insure good seal with upper half



4 CYL. "L" HEAD ENGINES



4 CYL. "F-HEAD" ENGINE



6 CYL. 6226 "L" HEAD ENGINE

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. CAUTION—Do not cut off this protruding portion of the packing

6 CYL. ENGINES

►*FRONT FILLER BLOCK (LOWER) OIL SEAL PRODUCTION CHANGE·* Effective in early production new type seal used to prevent leakage between filler blocks and oil pan. To install new seal on earlier models, coat inner surfaces of filler block with gasket cement Install seals in grooves evenly centered so that each end extends an equal distance of 1/16' above faces of filler block ends. Be sure they are well seated in grooves and allow cement to dry Do not trim off ends. If necessary to use cork seals, follow procedure outlined below, **but first soak cork seals in water for a minimum of three hours to make them sufficiently pliable for satisfactory use.**

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket) Rear filler blocks (additional **upper filler block guard** in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger Filler blocks can be removed and replaced without disturbing crankshaft as follows

Front Filler Block (Lower) Servicing. Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block When installing filler block, first install oil pan side gaskets (No 200266), install filler block (use Perma-tex), **install new end gasket on block**

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal) Remove and discard old gasket or seal Install new seal (no 204654) in same manner as described below for Rear Filler Block (Upper) Guard Install lower filler block **after** upper filler block guard has been installed

Rear Filler Block (Upper) Guard Servicing Guard is seated in groove in crankcase and can be 'rotated' out without disturbing crankshaft after lower filler block removed Remove and discard old gasket or seal, clean out seal groove Install new graphite impregnated seal (no 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard) **Do not use shellac or sealing compound in groove.**

►*CAUTION*—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft If necessary, seal can be built up using 1/32" thick gasket material, 3/16' wide, as shims shellacked to groove in block or guard behind seal

ENGINE FRONT COVER
4 CYL. ENGINES

FRONT COVER OIL SEAL: Cover has double metal baffle and spring-loaded leather seal which contacts polished surface of crankshaft pulley hub When installing seal, make certain that seal lip is inward or toward rear of engine

CAMSHAFT & BEARINGS
4 CYL. ENGINES

CAMSHAFT SERVICING: Removal—Drain radiator and cylinder block, remove radiator and grille, cylinder head, manifold, valves and valve springs Remove oil pump fuel pump, oil pan, crankshaft pulley (use puller), fan and governor drive belts, and fan assembly Remove nuts on front engine support rubber insulators (Jeep only). Remove timing gear cover, remove camshaft gear and thrust plate, block up all valve lifters (can be tied up with string to manifold studs) On Jeep only, place jack under crankcase (use block of wood on jack to avoid damage to oil pan), raise front end of engine to provide clearance for camshaft Remove camshaft through front of engine

Gear Puller Tool—Use Puller Tool No. W-172 to remove gear on engines equipped with timing gears.

Camshaft Front Bearing—Consists of a steel-backed, babbitt-lined bushing which takes thrust. When installing this bushing, make certain oil hole lines up with drilled oil hole in crankcase, stake bearing in place to prevent turning in service

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Camshaft Thrust Plate (On Engines with Timing Gears)—Thrust plate assembled behind gear with a spacer assembled behind plate If required, a thin shim can be installed behind spacer if too little clearance, or spacer can be dressed to provide greater clearance

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT

6 CYL. ENGINES

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below) Remove right front wheel and access cover in fender splash shield for access to valve compartment Remove spark plugs so that engine can be turned over by moving fan or fan belt By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment**

Fully Raise Valve	Then ADJUST Valve:
Nos 1 and 3	Nos 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos 2 and 6	Nos. 7 and 11
Nos 10 and 12	Nos. 1 and 3
Nos. 4 and 5	Nos. 8 and 9
Nos 7 and 11	Nos. 2 and 6

ROCKER ARMS

4 CYL. "F" HEAD ENGINES

ROCKER ARM ASSEMBLY REMOVAL: Lock rocker arms, shaft, brackets and springs together as a unit by removing cover studs in front and rear rocker arm shaft brackets and installing 5/16'-24 thread set screws in the front and rear brackets in same manner set screws are installed in center brackets. Remove nuts on bracket studs and lift entire assembly off studs as a unit.

Installation: Check push rods, straighten or replace any that are bent. Place push rods in holes in head and block, being sure that they are properly seated in intake valve tappets. Place rocker arm assembly on its studs, seat intake valve adjusting screws in tops of push rods before installing nuts on bracket studs. Torque nuts to 30-36 ft. lbs. Remove extra set screws from front and rear rocker arm shaft brackets, install cover studs in front and rear brackets with short end of stud down.

OILING SYSTEM

OIL PUMP

4 CYL. ENGINE OIL PUMP

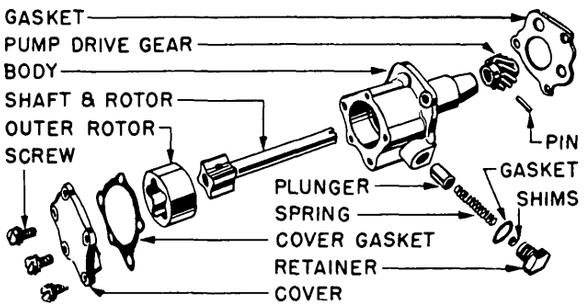
OIL PUMP REMOVAL & OVERHAUL: (Removal)—Rotate engine until distributor rotor points to No 1 firing position and timing mark on flywheel or vibration dampener is directly under pointer (do not remove distributor, pump must be installed so gears mesh without moving rotor for correct engine timing) ***CAUTION***—Crankshaft must not be rotated with oil pump removed) Remove pump mounting bolts and pull pump out as far as possible Place a short jack between front suspension support and front lower edge of block and push engine to right until pump is free (Note—It may be necessary to loosen engine support bolts for more movement) Check pump shaft for wear before disassembling pump by mounting it in a vise with a dial indicator bearing against shoulder on gear, at right angles to relief valve housing Move gear toward, then away from indicator and note total reading If this play exceeds 010", replace complete pump

Disassembly Remove cover screws cover and gasket and shake outer rotor from housing Remove relief valve retainer, gasket shims spring, and plunger If rotor is to be replaced file off one end of gear retaining pin pull gear off shaft and remove shaft and inner rotor from housing Clean all parts in solvent and check for wear pits and scoring

Inspection: Measure clearance between outer rotor and pump body Replace body if clearance exceeds 012" Check body to make certain inner surface is not rough or scored and that lower face is flat within 001" Rotors must be within 001" thickness of each other With gear installed on pump shaft, clearance between gear and pump body should be 003- 010"

Checking Rotor Clearance· Position inner rotor with one lobe engaged between two lobes of outer rotor, then measure clearance of opposite inner rotor lobe and lobe of outer rotor This clearance should not exceed 010 To check end clearance place a small piece of 010 shim stock on inner rotor so that it does not overhang edge of rotor at any point Install cover and gasket and tighten screws If shaft can be turned by hand, end clearance is excessive Install new cover and repeat test If rotors still not tight, replace rotors

Reassembly: Install relief valve, spring, gasket and retainer If shims were removed, install them between spring and retainer If new rotors installed, slide gear on shaft after installing shaft and rotor in housing Position gear so there is not over 010' clearance between gear and pump housing and drill a 5/32 hole through pump shaft for retaining pin Install pin and peen ends Install cover and gasket and tighten screws



4 CYL. ENGINE OIL PUMP

Installation (4 Cyl Models): Check to see that timing marks on flywheel or vibration dampener are directly under pointer and distributor rotor is pointed toward No 1 firing position Insert pump in block with pump gear positioned so that it will engage camshaft gear and the distributor shaft drive key without moving distributor rotor Installation can be made only in one position without moving distributor rotor as slot in drive gear and key on distributor shaft is machined off-center

6 CYL. ENGINE OIL PUMP

OIL PUMP SERVICING Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling Service pump as follows

Disassembly—Take out cotter pin and remove screen float assembly Remove cover and gasket Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear remove idler gear (remove idler shaft if required) Take off lower drive gear (press fit and keyed to shaft)

Oil Pump Clearances—Check as follows

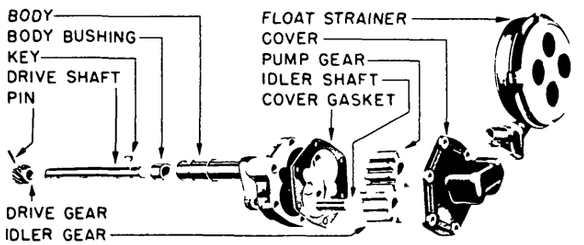
1)—Pump Body Bushing if over 005' clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to 500- 501'

2)—Pump Shaft shaft diameter 4990- 4985"

3)—Lower Drive Gear end of gear should be 001- 006" beyond gasket seat on pump body

4)—Upper Drive Gear 002- 004" clearance between underside of gear and upper end of pump body Controlled by pressing lower drive gear on shaft until this clearance obtained

NOTE—Cover plate should be replaced if worn from contact with gears, or if cracked



6226 ENGINE OIL PUMP

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose) Replace by using drift inserted in distributor drive shaft bore from top of block Install new bushing from below (must be flush with bottom of block)

Reassembly—Press upper drive gear on shaft with pin hole at right angles to tongue on shaft Insert new pin and peen ends flush with gear Install shaft and gear in pump body Press lower drive gear on shaft (with key in place) until 002- 004" clearance obtained between upper drive gear and upper end of pump body Press idler gear shaft in body, install idler gear Install cover using new gasket and pin oil screen float assembly on cover Check shaft and gears—must rotate freely when turned by hand

Oil Pump Installation—Set #1 piston at top dead center Insert distributor main drive shaft from top of block Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut Remove distributor shaft for cyl head installation

MODEL IDENTIFICATION

Type	Engin	Symb l
DJ-3A Jeep Dispatcher	4 Cyl "L"	56337
CJ-5 Univ Jeep	4 Cyl "F"	57548
CJ-6 Univ Jeep	4 Cyl "F"	57748
CJ-3B Univ Jeep	4 Cyl "F"	57348
F4-134 4X2 Jeep Utility Wgn	4 Cyl "F"	54147
F4-134 4X2 Jeep Utility Del	4 Cyl "F"	54247
L6-226 4X2 Jeep Utility Wgn	6 Cyl "L"	54167
L6-226 4X2 Jeep Utility Del	6 Cyl "L"	54267
F4-134 4X4 Jeep Utility Wgn	4 Cyl "F"	54148
F4-134 4X4 Jeep Utility Del	4 Cyl "F"	54248
L6-226 4X4 Jeep Utility Wgn	6 Cyl "L"	54168
L6-226 4X4 Utility Del	6 Cyl "L"	54268
F4-134 4WD Jeep Truck	4 Cyl "F"	55948
L6-226 4WD Jeep Truck	6 Cyl "L"	55968

SERIAL NUMBER: On plate at drivers seat (Utility Wagon & Del) on dash (Others)

ENGINE NUMBER: Located as follows

4 Cyl. "L" Head. Stamped on boss on right front upper corner of cylinder block

4 Cyl. "F" Head Stamped in top of water pump boss

6 Cyl. "L" Head. Right top of water pump boss

TUNE-UP

COMPRESSION PRESSURE:	Pressure & Speed
4 Cyl "L" head	90-110 lbs at 185 RPM
4 Cyl "F" head	125 lbs at 195 RPM
6-226 "L" head	120-130 lbs at 185 RPM

VACUUM READING: 17-21" at idling speed

VALVE TAPPET CLEARANCE:	Intake ①	Exhaust ①
4 Cyl. "L" Hd	.016"	016"
4 Cyl "F" Hd.	018"	016"
6-226 "L" Hd.	.014"	.014"

① - Cold

MANIFOLD HEAT CONTROL: Used as follows—

4 Cyl "L" Head. Thermostatic coil on manifold

4 Cyl. "F" Head. Water jacketed intake manifold

6-226 "L" Head. Exhaust heat from No. 3 & No 4 cylinders enters heat chamber under intake manifold

IGNITION

FIRING ORDER. 1 3-4-2 (4 cyl), 1-5-3-6-2-4 (6 Cyl)

SPARK PLUG GAP: 030"

Spark Plug - Auto-Lite A7 or Champion J8. 14 mm. Torque to 28-30 ft. lbs

COIL: Auto-Lite CR-6009.

DISTRIBUTOR:	Auto-Lite No
4 Cyl "L" Jeep	IAY-4012
4 Cyl "F" Univ Jeep	IAD-4041
4 Cy "F" Others	IAT-4204A
6-226 "L" All	IAT-4206

Condenser—Auto-Lite (IAY Distr) IAT-3076LA, (IAD Distr) IGW-3139, (IAT Distr) IAT-2015L

Capacity—(IAT-3076LA) 25- 28 mfd (IGW-3139) 23-26 mfd (IAT 2015L) 21- 25 mfd

Contact Point Set—Auto-Lite (IAY Distr) IGW-3028DS, (IAD Distr) IGP-3028FS, (IAT Distr) IGW-3028AS

Breaker Gap— 020"

Cam Angl - 36-42° (IAT-4206), 39-45° (Others).

Break r Arm Spring T nsi n—17-20 ozs

Rotati n—Counter-clockwise viewed from above

Automatic Advanc

(IAY-4012, IAD-4041, IAT-4204A)

Degrees	Distr	RPM	Degrees	Eng	RPM
Start		300	0		600
1		425	2		850
6		1050	12		2100
10		1575	20		3150
11		1700	22		3400

(IAT-4206)

Start		325	0		650
1		450	2		900
6 5		1200	13		2400
8		1475	16		2950
9		1675	18		3350

Vacuum Spark Control: None used on IAY, IAD Distr

Vacuum Advance—IAT-4204A

Distr	Degrees	Eng. Degrees	Vacuum (" of HG)
Start		0	5 1/8
1		2	6 5/8
3		6	9 5/8
5		10	12 1/2
6		12	14

Vacuum Advance - IAT-4206

Start	0	10
1	2	11
3	6	13
4	8	14
5	10	15

IGNITION TIMING

Setting - 5° BTDC (All 4 Cyl), **4° BTDC** (All 6 Cyl)

Timing Mark—(All 4 Cyl. engines). Notch on rim of fan pulley to align with correct mark on timing gear cover **(6 Cyl. engines)** Align correct graduation with pointer on timing gear, Damper mark "0" at TDC and with 1° graduations before and after this point

CARBURETOR

Model	Carter Carb. No.
4 Cyl "L" Jeep Dispatcher	YF 2392S
4 Cyl "F" Univ Jeep	YF 938SA
4 Cyl. "F" (Exc. Univ. Jeep)	YF 951S
6-226 "L" All (Early)	WCD 2204S
6-226 "L" All (Later)	YF 2467S

CARTER YF

Idle Setting - ¾-1¾ turns open (938SA, 951S), ½-2 turns open (2392S), 1-2½ turns open (2467S). Turn screw out for richer mixture.

Idle Speed - 600 RPM

Float Level - (2392S, 2467S) 9/32" - Gauge T109-126 (938SA, 951S) 5/16" - Gauge T109-107 From top of float at free end to gasket seat on cover with assembly inverted and float resting freely on intake needle.

Fast Idle. With choke held in wide open position, lip on fast idle arm should contact boss on body casting

► *OTHER DATA: See "Carter YF" in Carburetion Section.*

Fuel Pump Pressure 2½-3¾ lbs at 1800 RPM

CARTER WCD

Idle Setting—1-2 turns open Turn screws out for richer mixture

Idle Sp d—500 RPM

Fl at L v l—3/16" (Gauge T109-28) from top of each float to gasket seat on cover with assembly inverted

Accel rating Pump—No seasonal adjustment

Fast Idl S tting Hold choke valve tightly closed, tighten fast idle adjusting screw against high step of fast idle cam until throttle valve opening or clearance between edge of valve and carburetor bore on side opposite ports is 016" (T109-29)

Automatic Choke Setting: Centered (At Index)

Fuel Pump Pressure. 3 5-5 5 lbs at 1800 RPM

► *OTHER DATA: See "Carter WCD" in Carburetion S ction.*

CARB. EQUIPMENT

Fuel Pump: AC No 4032 (Jeep & Jeep Utility), Carter M957S (6-226), fuel and vacuum Carter M2195S (DJ-3A), fuel only.

Pressure - 2½-3¾ lbs. (4 Cyl), 3½-5½ lbs. (6 Cyl) at 1800 RPM.

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: King-Seeley Electric type

Model	Dash Unit	Tank Unit
Jeep	49452	44556
Truck	45727	44508
Station Wagon	45727	44506

See "Fuel Gauges" in Carburetion Section.

CRANKCASE VENTILATOR

Sealed Positive Ventilation (4 Cyl.). Clean air is drawn into oil filler tube and rocker arm cover through a hose to the air cleaner. All connections and gasket on filler tube must be air tight. The crankcase is ventilated by a sealed system from air cleaner tube to intake manifold. A valve is attached to valve spring cover in the line to air cleaner. This valve must be free of carbon and operate freely at all times to obtain smooth idle. Remove and clean valve every 5000 miles or more often if engine must run at idle speed excessively or is used for stationary power.

BATTERY

Auto-Lite 1H-100. 6 volt, 15 plate, 100 ampere hour capacity (20 hr. rate).

Battery Ground—Negative Battery to body

Engine Ground—Left front engine support (6-226), right front engine support (other models)

STARTER

Auto-Lite. Used as follows

Engine	Starter	Armature
4 Cyl. (Exc. Univ. Jeep)		MCH-2088
6 Cyl.		MCH-2088
4 Cyl. (Univ. Jeep)		MCH-2088

Drive—Bendix A3281 "Follow-thru" type.

Rotation—Counter-clockwise at commutator end.

Brush Spring Tension—42-53 ozs.

Performance Data

Torque	R.P.M.	Volts	Amperes
0	4300	5.0	65
6.0	Lock	2.0	335

Starting Switch. (Jeep) Auto-Lite SW-4015 foot operated. **(Other models)** Auto-Lite SST-4012. Key starting (magnetic switch controlled by turning key past "Ignition On" position).

GENERATOR

Auto-Lit GGW-4801D (4 Cyl.), GGW-4801EN (6 Cyl.).

Armature—Auto-Lite GGW-2006F (All Cars).

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Performance Data

Amperes	Volts	Cold	-RPM-	Hot
0	6.4	870-970		950-1050
40.0	8.0	1800-2000		2150-2350
45.0	8.0	1925-2125		2350-2550

Brush Spring Tension - 35-53 ozs.
Field Current - 1.6-1.7 amps. at 5.0 volts (70°F).
Motoring Current - 5.0-5.5 amps. at 5.0 volts (70°F).
Rotation—Counter-clockwise at commutator end.
Belt Adjustment 1/2-5/8" deflection with thumb pressure midway between generator and pump pulleys.

REGULATOR

Autolite VBE-6105A. Voltage & Current type with "Temperature Compensated" Current Regulator.

Cutout Relay

Cuts In—6.3-6.8 Volts (set to 6.4-6.6 volts).
Cuts Out—4.1-4.8 Volts (4.6 amps. discharge).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

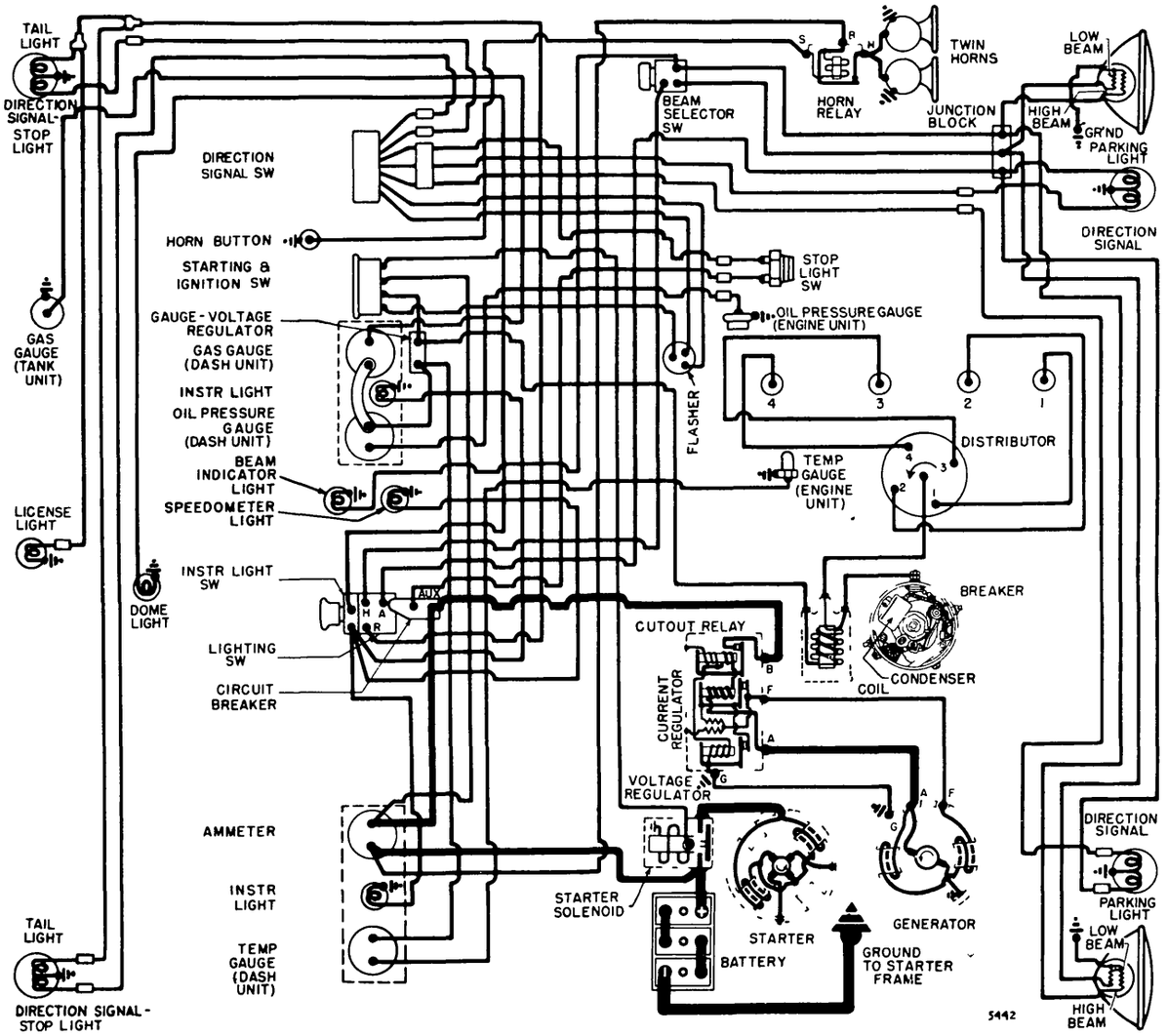
Setting—7.2-7.5 volts at 70° F *after 15 minutes operation charging at 1/2 maximum rate.*
Air Gap—.048-.052" with contacts just touching.
Checking & Adjusting - *See Electrical Section.*

Current Regulator

►*SETTING CAUTION "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A	-Operating Amperes-	Test B
VBE-6105A	52		45 (43-47)

Test A - After 15 minutes operation at 10.0 amperes
Test B—After 15 minutes additional operation with current regulator operating (load applied to hold to 6.7-6.9 volts).
Air Gap—.048-.052" with contacts just touching.
Checking & Adjusting - *See Electrical Section.*



UTILITY MODELS WITH 4 CYL. "F" HEAD ENGINE

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Direction Signal: *See Electrical Section.*
Lighting Switch Removal Loosen set screw on side of control knob and remove knob. Remove retaining nut and push switch through panel.
Stop Light Switch Location At front end of brake master cylinder.
CIRCUIT BREAKER: 30 ampere. Thermal type on light switch.
FUSES: Directional Indicator—SFE-14 ampere in flasher lead
Radio—SFE-9A ampere in lead to radio
Heater—SFE-14 ampere in lead to heater
Overdrive—SFE-20 at overdrive relay
HORNS: Auto-Lite HA-4037 (Jeep), HAB-4603 (Low Pitch) HAB-4604 (High Pitch) (Other Models).

ENGINE

►*THREE DIFFERENT ENGINES USED See "Model Identification" for application.*

4 CYL. "F" HEAD

Bore	Stroke	Displmnt.
3 125"	4.375"	134.2 cu. ins.
Compression Ratio	**Rated HP**	**Developed HP**
6.9-1 (Std. Hd.) Ⓒ	15.63	Ⓒ 72 at 4000 RPM
7.4-1 (Optl. Hd.) Ⓒ	15 63	Ⓒ 72 at 4000 RPM

Ⓒ -On F-4-134 4X2 Jeep Utility Std. Hd. Compr. Ratio is 7 4-1, Optl. Hd. 7.8-1 and Developed HP is 75 at 4000 RPM
Compression & Vacuum Reading—*See TUNE-UP*
►*ENGINE NUMBER NOTE* Letters following engine number denote the following
"A" .010" main & connecting rod journals Undersize.
"B" .010" cylinder bore and pistons Oversize.
"AB" both above conditions exist.
CYLINDER HEAD & GASKET: *See "Cylinder Head & Manifolds" in Willys Special Data*
TIGHTENING TORQUES: *See "Tightening Specifications" in Willys Special Data*

PISTONS

Aluminum alloy, cam ground, T slot, Tin or Brass plated.
►*PISTON OVERSIZE NOTE* Letter "B" or "AB" following engine number indicates that cylinder bore and pistons are .010" Oversize.
Weight—13.5 ozs.
Removal—Pistons & Rods removed from above.

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Fitting New Pistons: Place .003" x ¾" ribbon feeler between thrust side of piston and cylinder wall. Pull required to remove ribbon feeler should be 5 to 10 lbs.

Replacement Pistons: Std. and .010", .020", .030" and .040" Oversize.

Installing Pistons: "T" slot toward valve (left side) of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON PINS

Locked in rod with clamp screw.

Diameter -.8118-.8120". **Length** - 2 25/32".

Clearance in Piston—.0001-.0005" Thumb push fit at 70° F.

Replacement Pins: No oversizes available.

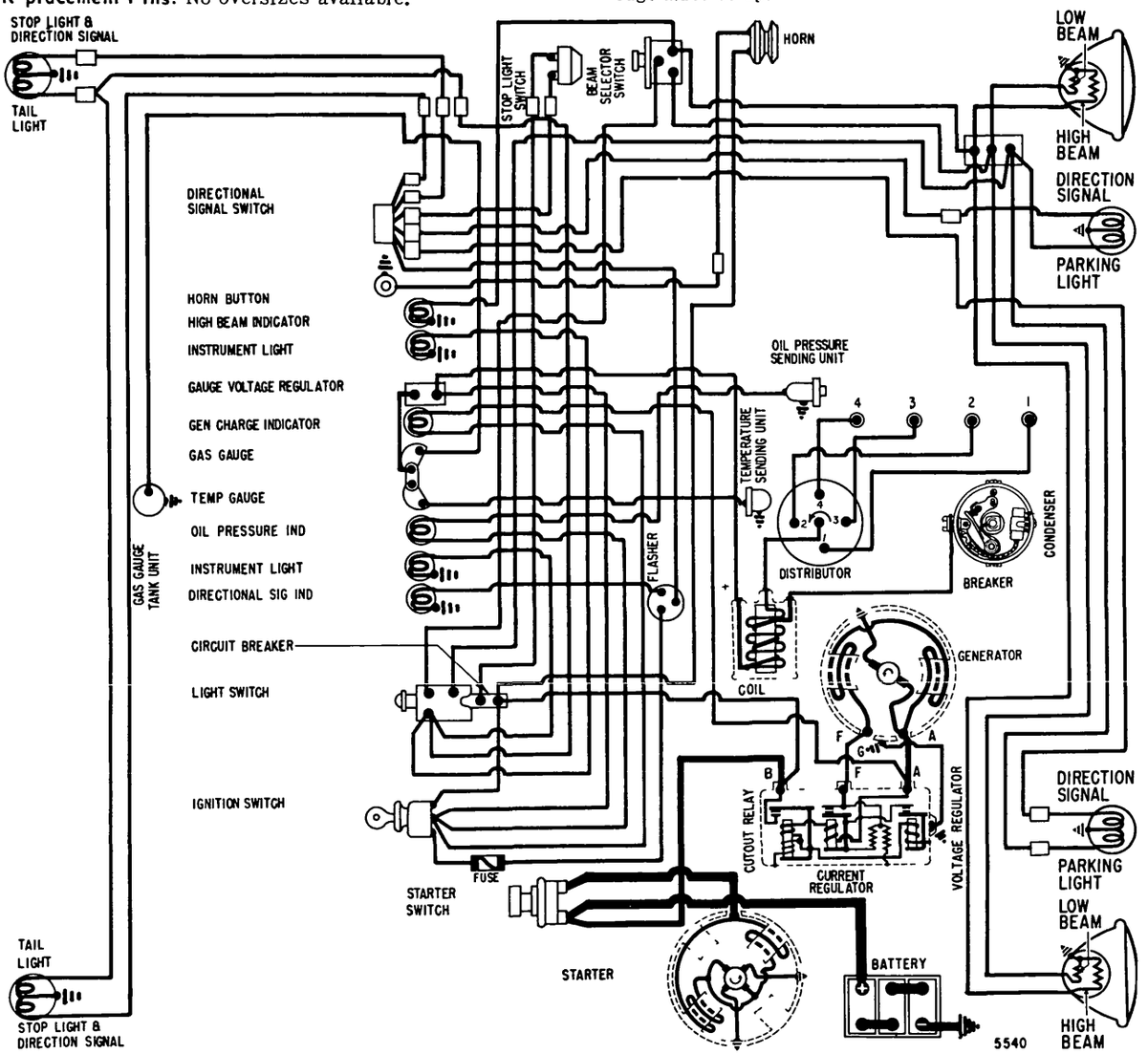
PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.008-.013"	.002-.004"
Compr #2	3/32"	.008-.013"	.0015-.0035"
Oil	3/16"	.008-.013"	.001-.0025"

Replacement Rings: (For rebored cylinders)—Furnished .010", .020", .030" and .040" Oversize.

Service Type Rings—(For Cylinders not Rebored)—Furnished Std. (.000-.009"), .010" (.010-.019"), .020" (.020-.029"), .030" (.030-.039"), .040" (.040-.049") Oversize.

Installing Rings: Install compression rings with mark "Top" (on side) toward top. Rings have tapered face and must be installed correctly. Top ring inner bevel edge must be up.



CJ-5 JEEP MODEL

CONNECTING RODS

Length (Center to Center) - 9.1845-9.1905. **Weight** - 32 ozs.

Crankpin Journal Diameter - 1.9375".

►*JOURNAL DIAMETER UNDERSIZE NOTE.* The letter "A" or "AB" following the engine number indicates that main and connecting rod journals are .010" Undersize.

Bearings—Steel backed babbitt.

Clearance—.0005-.0025"

Side Play - .004-.010".

Replacement Bearings: Std., .010", .020", .030" Undersize.

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), and toward rear (#2, 4). Oil spray hole in lower rod bearing toward right of engine (away from camshaft) on all rods.

CRANKSHAFT

Journal Diameter—2.3341-2.3331". All main bearings.

►*JOURNAL DIAMETER UNDERSIZE NOTE:* The letter "A" or "AB" following engine number indicates that main and connecting rod journals are .010" Undersize.

Bearings—Steel backed babbitt.

Clearance—.0003-.0029".

Replacement Bearings: Std., .010", .020", .030" Undersize.

Crankshaft Servicing: *See "Crankshaft & Main Bearings" in Willys Special Data.*

End Thrust: Taken at #1 main bearing. Shims between crankshaft thrust washer and shoulder on the crank.

Endplay—.004-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Willys Special Data.*

CAMSHAFT

Journal Diameters - **(1)** 2.1860-2.1855", **(2)** 2.1225-2.1215", **(3)** 2.0600-2.0590", **(4)** 1.6230-1.6225".

Journal Diameters—**(1)** 2.188" **(2)** 2-1/4", **(3)** 2-3/16", **(4)** 1-3/4".

Bearings—#1 steel backed babbitt. #2, 3 & 4 cast iron.

Clearance—.001-.0025".

End Thrust: Taken by thrust plate assembled behind gear. To reduce clearance, add shim behind spacer. To increase clearance, reduce thickness of spacer.

End Play—.004-.007".

Camshaft Servicing: *See "Camshaft & Bearings" in Willys Special Data.*

Timing Gears: Crankshaft gear, steel. Camshaft gear, fibre with steel hub.

Camshaft Setting: Mesh marked tooth of camshaft with marked space (between teeth).

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Willys Special Data.*

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VALVES

Tappet Clearance : Intake .018", Exhaust .016" Cold.

Valve	Head Diameter	Stem Diameter	Length
Intake	2"	.3733-.3738"	4.781"
Exhaust	1-15/32"	.371-.372"	5 909"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.260"	.0007-.0022"
Exhaust	45°	.351"	.0025-.0045"

►*EXHAUST VALVE NOTE:* Thompson Valve Rotators used.

Valve Seat Width—3/64".

Valve Springs: Install with closed coil upward toward block (Exhaust), down towards head (Intake).

Free Length—1 31/32" (Intake), 2½" (Exhaust)

Valve Spring Specifications

Valve	Intake	Exhaust
Closed	73 lbs at 1 21/32"	53 lbs at 2 7/64"
Open	160 lbs at 1 3/8"	120 lbs at 1 3/4"

Valve Guides: Use Tool W-177 to remove and install guides. Drive Exhaust guide down into valve compartment to remove. Drive new Exhaust guide to 1" below surface of cylinder block and new Intake guide flush with bottom of valve guide bore in cylinder head.

Rocker Arm Assembly Removal: *See "Valve System" in Willys Special Data.*

Valve Lifters: Mushroom type operating in reamed holes in block. Serviced by installing oversize lifters. Lifters furnished .004" Oversize.

Diameter—.6240-.6245". **Clearance**—.0005-.002".

►*NOTE:* Camshaft must be removed for lifter removal.

VALVE TIMING

See "Camshaft Setting" under "CAMSHAFT" above.

Intake Valves—Open 9° BTDC. Close 50° ALDC.

Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

Valve Timing Check—Set Intake valve clearance at .026". Rotate engine clockwise until No. 1 cylinder is ready for intake stroke. Intake opens 9° BTDC. Note the distance between TDC and the 5° mark and estimate 9° from this distance. With the crankshaft in this position timing is correct if lifter is just tight against valve stem.

ENGINE

4 CYL. "L" HEAD

Bore	Stroke	Displmnt.	Rated HP
3.125"	4.375"	134.2 cu. ins.	15.63
Compression Ratio			**Developed HP**
6.48-1			60 at 4000 RPM

►*OTHER ENGINE DATA* *See "4 Cyl. "F" Head" above and note the following differences.*

►*ENGINE NUMBER NOTE* *Letters stamped after engine number denote the following*

"A" - .010" undersize main & connecting rod bearings.
"B" - .010" oversize cylinder bore.
"AB" - Both above conditions exist.
"C" - .002" undersize piston pin.
"D" - .010" undersize main bearing journals only.
"E" - .010" undersize connecting rod bearing journals only.

VALVES: Tappet Clearance - .016" Cold (Intake & Exhaust).

Valve	Head Diam.	Stem Diam.	Length
Intake	1 17/32"	.373"	5 51/64"
Exhaust	1 15/32"	.3715"	5 51/64"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	3 51"	.0007-.0022"
Exhaust	45°	3.51"	.0025-.0045"

Valve Seat Width - 3/64".

Valve Springs: Free Length - 2½".

Valve Spring Specifications

Valve	Intake	Exhaust
Closed	53 lbs. at 2 7/64"	53 lbs. at 2 7/64"
Open	120 lbs. at 1 3/4"	120 lbs. at 1 3/4"

Valve Guides: Use W-177 to remove and install guides. Drive guides into valve compartment to remove. Drive new exhaust guide to 1" below surface of cylinder block and new intake guide 1 5/16" below surface of cylinder block.

Valve Timing Check: Set No. 1 cylinder intake valve tappet clearance to .020" for check. After check made, reset No. 1 cylinder intake valve tappet clearance to a running clearance of .016".

ENGINE

6 CYL. "L" HEAD (6-226 ENG.)

Bore	Stroke	Displmnt.
3.312"	4.375"	226.2 cu. ins.
Compression Ratio	**Rated HP**	**Developed HP**
6.86-1 (Std. Hd.)	26.33	115 at 3650 RPM
7.3-1 (Optl. Hd.)	26.33	115 at 3650 RPM

Compression & Vacuum Reading—*See TUNE-UP above.*

►*ENGINE NUMBER NOTE:* Letters following engine number denote the following.

"A" .010" Undersize main and connecting rod journals.
"B" .010" Oversize cylinder bore and pistons.
"AB" Both above conditions exist.

CYLINDER HEAD & GASKET INSTALLATION: *See "Cylinder Head & Manifolds" in Willys Special Data*

TIGHTENING TORQUES: *See "Tightening Specifications" in Willys Special Data*

►*FILLER BLOCK-OIL PAN OIL SEAL PRODUCTION CHANGE (To Prevent Oil Leakage Between Filler Block & Oil Pan):* Neoprene oil seal, Part No. 910220, was placed in early production and is available for installation on earlier models. Replaces earlier type cork seal. To install new seal, coat inner surfaces of filler block grooves with gasket cement. Install gaskets in grooves evenly centered so each end extends 1/16" above faces of filler block ends. Do not trim off ends. Install filler blocks, dust gaskets with graphite and install oil pan.

PISTONS

Aluminum alloy, steel band, T-slot Cam Ground. Tin Plated.

►*PISTON OVERSIZE NOTE* Letter "B" or "AB" following engine number indicates that cylinder bore and pistons are .010" Oversize.

Weight—15.312 ozs. Less rings and pin.

Removal—Pistons and rods removed from above.

Fitting New Pistons: Place .0015" x 2" ribbon feeler between thrust side of piston and cylinder wall. Pull required to remove feeler should be 5 to 10 lbs.

Piston Replacement—Std., .010", .020", .025, .030", 040", 050", and .060" Oversize

Installing Pistons. Slot in skirt toward left or away from camshaft.

PISTON PINS

Floating type with lock ring at each end.

Diameter - .8591-.8593". **Length** - 2.779".

Clearance in Piston - .0002". Selective fit. Push fit at 160°F.

Clearance in Rod - .0002-.0006". Press fit.

Replacement Pins. Std., .003" and .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (Upper)	.0930-.0935"	.008-.016"	.002-.004"
Compr. (Lower)	.0930-.0935"	.008-.016"	.003-.007"
Oil (Top ring)	.1545-.1550"	.008-.016"	.006-.010"
Oil (Bottom ring	.1545-.1550"	.008-.016"	.0025-.004"

Replacement Rings: Ring sets and single rings furnished in following sizes for oversize ranges indicated Std. (Std.-.009"), .020" (.010-.029"), .030" (.030-.039"), .040" (.040-.049"), .060" (.050-.069").

Installing Rings Side marked "Top" (compression rings) upward. Chrome plated ring must be installed in top (#1) ring groove.

CONNECTING RODS

Length—6.998"- 7.002" (Center to center).

Crankpin Journal Diameter—2.0619 - 2.0627".

►*JOURNAL DIAMETER UNDERSIZE NOTE.* The letter "A" or "AB" following engine number indicates that the main and connecting rod journals are .010" Undersize.

Bearings—Steel Backed Babbitt.

Clearance - .0018" maximum. **Sideplay** - .006-.011".

Replacement Bearings Std. and .001", .002", .010" and .012" Undersize.

Installing Rods: Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. *NOTE*—Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 forward), (#2, 4, 6 toward rear).

CRANKSHAFT

Journal Diameter—2.3744-2.3752".

►*JOURNAL DIAMETER UNDERSIZE NOTE* The letter "A" or "AB" following the engine number indicates that the main and connecting rod journals are .010" Undersize.

Bearings—Steel Backed Babbitt.

Clearance - .0007-.0020".

Replacement Bearings Std. and .001", .002", 010" and .012" Undersize.

End Thrust Taken by #4 rear main bearing which is flanged type.

End Play— 002-.006".

Rear Bearing Oil Seal Installation *See "Crankshaft and Main Bearings" in Willys Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.8725-1.8735". (2) 1.8095-1.8105". (3) 1.7472-1.7485". (4) 1.2475-1.2485".

Bearings—Steel Backed Babbitt.

Clearance—.001-.003".

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End Thrust Taken by thrust plate on front of engine (between front bearing journal and hub of sprocket).
End Play—.003-.007".

Timing Chain Non-adjustable type. Width 1". Pitch .500". Length 23" or 46 links.

►*TIMING CHAIN CAUTION Morse and Link Belt chains used. Chains and sprocket interchangeable only in COMPLETE SETS.*

Camshaft Setting Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

VALVES

Tappet Clearance: Intake and Exhaust .014" Cold.

►*TAPPET CLEARANCE ADJUSTMENT PROCEDURE: See "Valve System" in Willys Special Data*

Valve	Head Diam.	Stem Diam.	Length
Intake	1 520"	3402-.3410"	5.187"
Exhaust	1 328"	.3382- 3390"	5 205 '

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	.3520"	.001-.003"
Exhaust	45°	.3315"	.0032-.0052"

Valve Seat Width· 5/64-3/32" (intake), 3/32-7/64" (exhaust).

NOTE—Rotators used on Exhaust valves.

Valve Guides· Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides to inside diameter of .3432-3422".

Replacement Guides—Std., .0005" (marked "A"), .0055" (marked "L") to insure .0005-.003" press fit.

Guide Installation—Place guide (tapered end of guide toward top) in position in bore and drive in to correct position of 1-7/32" below top face of cylinder block.

Valve Springs· Intake & Exhaust valve spring interchangeable.

Free Length—1-31/32".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	51	1.672'
Open	118	1.312

Valve Lifters· Mushroom type with self locking adjusting screws.

Diameter—.6855-.6860".

Clearanc—Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.

R placem nt Lift rs—Furnished in Std. and the following oversizes marked as indicated "B" is .001", "D" is .002", and "K" is .005" O.S.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 10° BTDC. Close 60° ALDC.

Exhaust Valves—Open 55° BLDC. Close 10° ATDC.

Valve Timing Check—With .020" tappet clearance, #1 exhaust valve should close with piston 10° or .045" after top dead center with ten-degree mark, after top dead center "0" mark on dampener aligned with pointer at front of engine. Reset tappet to .014" clearance COLD.

OILING SYSTEM

Crankcase Capacity: (4 Cyl.) 4 qts., (6 Cyl.) 5 qts. (refill).

Normal Oil Pressure: 35 lbs. at 1700 RPM (6 Cyl.) at 2000 RPM (4 Cyl.).

Pressure Regulator - In pump housing (4 Cyl.), right side of cylinder block below valve chamber to rear of engine (6Cyl.).

Oil Pressure Indicator; DJ-3A, CJ-5, CJ-6, CJ-3B Jeeps - Red telltale lamp, and Oil Pressure Switch, King-Seeley No. 47150.

Other Models—King-Seeley "CV" (Constant Voltage) electric type with voltage regulator
Dash Unit—King-Seeley No 45729
Engine Unit—King-Seeley No 44030
See "Oil Pressure Gauges" in Miscellaneous Section

Oil Pump: Gear type attached to rear intermediate main bearing (6226). Rotor type on left side of crankcase (475, 685).

Pump Overhaul—*See "Oiling System" in Willys Special Data*

Oil Filter Fram or Purolator. Located on cylinder head bracket at right front corner of cylinder head with oil outlet connected to timing gear cover.

Crankcase Ventilation: (4 Cyl) See Crankcase Ventilator above. (Others) Ventilator on Rocker Arm cover and tube from crankcase ventilator baffle on valve side cover.

COOLING

Water Capacity: 11 quarts Add 1 quart for heater.

Pressure Valve. Radiator filler cap. Opens at 7 lbs.

Thermostat Harrison. In water outlet elbow in cylinder head. Opens at 163-168°.

Water Pump Centrifugal, packless, ball bearing type.
See "Willys" in Water Pump Section.

Temperature Gauge: King-Seeley Electric.

King-Seeley No.	Dash Unit	Engine Unit
DJ-3A, CJ-5, 6, 3B	49454	44230
Others (4 Cyl.)	45734	44230
Others (6 Cyl.)	45734	44214

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Auburn 8501-39, Rockf rd 8½ RM, Borg & B ck 9A7 & 10A7. Single plate types. Used as follows
4 Cyl. (All) - Auburn 8501-39 or Rockford 8½RM. 8½".
6 Cyl. Utility (4X2) - Borg & Beck 9A7, Assy. No. 951
6 Cyl. Utility (4X4) & Trucks (4WD) - Borg & Beck 10A7, Assy. No. 360982.
See Clutch Section for compl t data.
Clutch Disc - (4 Cyl.) B & B No. 382298, (6 Cyl. 4X2) B & B No. 381929, (6 Cyl. 4X4 & 4WD) B & B No. 381806.

Pedal Adjustment: (4 Cyl.) 1½". Adjust cable length. (6 Cyl.) Adjust rod length between clutch control lever and clutch control tube lever.

SYNCHRO-MESH TRANSMISSION

4 WHEEL DRIVE

Warner AS1-T90. Three speed type. Constant mesh, synchro-mesh, helical gears (second & high), sliding spur gear (low & reverse).
See "Warner Transmissions" in Transmission S ction.

►*VIBRATION CORRECTION (4x4 Utility Models "Coasting Down Hill" with closed throttle)* May be due to endplay in transfer case output shaft. To correct, remove shims from between rear bearing cap and transfer case housing, so that when bearing cap is pulled up tight against case, endplay in shaft and bearings is just eliminated. Shims are in sets consisting of four .003", two .010", and two 031". *CAUTION* - Output shaft must roll freely by hand **aft r** bearing capscrews are tightened securely.

Transfer Case· Spicer Model 18. Two speed auxiliary transmission and front wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front wheel drive engagement (left hand lever).
See Transmission Section for complete data.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal· (4 Whl. Drive) Transmission and transfer case are removed as an assembly. Disconnect front and rear propeller shafts at universal joints *(NOTE*—If equipped with Power Take-off drive, remove front end of power take-off propeller shaft assembly). Disconnect speedometer cable at transfer case, brake cable, and clutch release cable at cross shaft bell crank (Jeep), Place support jacks under engine and transmission, remove transfer case rubber snubber bolt nut (on right side) and rear mounting bolt nuts at cross member under transmission case. Remove floor board inspection plate. Drain radiator and loosen upper radiator hose. Remove transfer case shift lever pivot pin screw, remove pin and shift levers (*NOTE*—If Power Take-off used, remove power take-off shift lever plate screws and lift lever out). Remove bolts holding center cross-member at frame side rails and remove cross-member (*CAUTION* -With cross-member removed, engine and transmission weight will rest on support jacks). Remove bolts holding transmission on bell housing, force transmission to right until ball stud end can be disengaged from end of clutch control cross shaft. Lower support jacks under engine and transmission and slide transmission and transfer case assembly to rear until clutch shaft clears bell housing, remove assembly from beneath car.

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2 WHL. DRIVE

Warn r AS50 with Ov rdrive. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear type.

Transmission Contr l: Remote control type with gear-shift lever on steering column. *See "Transmission Controls" in Transmission Section.*

R moval: (2 Whl. Drive) Remove floor boards, take off bell housing inspection cover, disconnect clutch throw-out bearing retracting spring. Disconnect transmission control rods and speedometer cable at transmission case. Disconnect propeller shaft at universal joints and remove shaft. Support engine with jack placed under bell housing, remove rear engine support bolts from cross-member under transmission case, raise rear end of engine so transmission clears cross-member *(CAUTION* –Use care that fan blades do not damage radiator). Remove transmission bell housing bolts, pull transmission straight back to clear clutch shaft, remove from car.

OVERDRIVE

Warner R10. *See "Warner R10" in Transmission Section.*

Overdriv Control: *Se "Warner R10 & R11 Overdrive Controls" in Transmission Section.*

R m val: Same as for Synchro-mesh Transmission (2 Wheel Drive above) after disconnecting control cable and wiring.

UNIVERSALS

2 WHEEL DRIVE

Spic r. Cross type. One at each end of propeller shaft.

4 WHEEL DRIVE

Driv Shaft J ints - Spic r. Cross type. One used at front and rear of both front and rear propeller shafts.
Fr nt Axl Shaft J ints - Rzeppa. Constant velocity type. One joint used at outer end of each shaft (within steering knuckle housing).

Pow r Tak - ff Shaft J ints - Detroit Ball-and-Trunion typ . Two used (one at each end of shaft - no splined joint used).

FRONT AXLE

4 WHL. DRIVE

Spic r (Salisbury) Mod l 25. Full floating, Hypoid gear type. Differential assembly (ring and pinion gear assembly) is serviced in same manner as Spicer Rear Axles.
See "Spicer(Salisbury)" in Rear Axle Section.

Rati - 5.38-1 (Exc. 6-226 4X4 & 4WD), 4.88-1 (6-226 4X4 & 4WD).
Backlash–.004-.007". Shim Adjustment.

Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and steering linkage (at idler lever on frame front cross member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear end of springs and lower springs, remove axle assembly from beneath car.

Axle Shaft & Universal Joint Assy. Removal: Remove wheel, hub cap, axle shaft nut and washer. Take out drive flange cap screws and remove flange with puller, (*CAUTION*–do not lose shim pack under drive flange). Bend lip of bearing adjusting nut lockwasher out, remove locknut, lockwasher, adjusting nut, and bearing locking washer. Remove wheel hub and bearing assembly.(*(CAUTION*–use care not to damage oil seal). Disconnect brake tube, take out mounting screws on backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal joint assembly out of housing.

►*INSTALLATION CAUTION:* Adjust front wheel bearings and bleed brakes after installation completed.

Wheel Bearing Adjustment: Tighten inner adjusting nut until wheel binds (turn wheel while adjusting), then back nut off 1/6 turn, install lockwasher, locknut, and make certain nut locked by turning lockwasher ear up.

Axle Shaft End Play–No adjustment. Shims (.060") between driving flange and wheel hub establish correct endplay.

REAR AXLE

Spicer 44-2. Hypoid Semi-floating with Hotchkiss drive. *NOTE*–6226-4WD may have Timken Spiral Bevel as alternate equipment.

See "Spicer Hypoid Semi-floating" or "Timken Semi-floating" in Rear Axle Section.

Axle Ratios

Model	Standard	Overdrive
DJ-3A Jeep	4.56	
CJ-5, 6, 3B Jeep	5.38	
4 Cyl. Utility (4X4)	5.38	
4 Cyl. Utility (4X2)	4.89, 5.38	4.89, 5.38
6 Cyl. Utility (4X4)	4.27, 4.89, 5.38	
6 Cyl. Utility (4X2)	4.27, 4.89, 5.38	4.89, 5.38
4 Cyl. 4WD Truck	5.38	
6 Cyl. 4WD Truck	4.88, 5.38, 4.27	

Backlash–.004-.007". Shim adjusted.
Axle Shaft Removal: *See "Spicer Hypoid Semi-Floating" in Rear Axle Section.*

Rear Axle Assembly Removal: Support rear end of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs. Remove axle assembly from beneath car.

Wheel Bearing Adjustment: End Play .003-.007". Adjust by adding or removing shims between backing plate and axle housing flange at each wheel. See "Axle Shaft Removal" above.

SHOCK ABSORBERS

Monroe or Gabriel. Direct acting type.

FRONT SUSPENSION

2 WHL. DRIVE

Planadyne Type. Independent, linked parallelogram type with transverse spring (spring acts as lower control arm).
See "Willys Front Suspension" in Front Suspension Section.
Kingpin Inclination - 7½° crosswise.
Caster - 3° (DJ-3A Jeep), 4¾° (Others).
Camber - 1° (DJ-3A Jeep), 1½° (Others).
Toe-In - .047-.094". *See "Willys Planadyne" in Suspensions & Wheel Alignment Section for Toe-In Adjustments.*
Toe-Out of Turns - With inner wheel turned 20°, outer wheel should be 19°.

4 WHL. DRIVE

Special front-wheel drive unit with semi-elliptic springs. Steering knuckle mounted on taper roller bearings carried on two stub shafts.

End Play–.001-.003".
Kingpin Inclination–7-1/2°.
Caster–3°. No adjustment. If caster incorrect, check front end, correct by installing new parts.
Camber–1-1/2°. No adjustment. Correct by installing new parts. Do not attempt to correct camber by cold bending or heating of parts.
Toe-in–3/64-3/32". (1/32" each wheel) To adjust first set each front wheel straight ahead (see note below), then set toe-in by shortening each tie rod approximately 1/2 turn. This procedure necessary to maintain correct position of steering idler arm.

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NOTE–To set front wheels straight ahead, first set tie rod end of steering bell crank (idler lever on frame cross member) exactly at right angles to front axle. Check front wheels by using a straight edge or sighting along rear and front wheels. Adjust each tie rod (loosen end clamp bolts and turn rod) until front wheels are exactly straight ahead. Then make toe-in adjustment as directed above. Tie rod lengths between ball end centers should be 20-7/8" (left), 25-5/8" (right).

Toe-Out on Turns–With inner wheel turned 20°, outer wheel should be turned 19° (Utility Wgn. & Del.), 19½° (Trucks), 20° (Univ. Jeep & DJ-3A Jeep).

STEERING

Ross. Cam & Lever type.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" in Steering Section.*

Steering Gear Removal: *See "Ross Cam & Twin Lever" in Steering Section.*

BRAKES

Bendix-Lockheed (Self-Centering). Hand brake applies rear service brakes (Exc. Univ. Jeep). Independent brake on drive shaft at rear of transfer case (Univ. Jeep). *See "Bendix-Lockheed (Self-Centering)" in Brake Section.*

Drums - (DJ-3A, CJ-5, 6, 3B Jeeps) 9", (Others) 11" front & rear.

Wheel Cyl. Diameter - Application as follows

Model	Front	Rear
DJ-3A Jeep Disp.	1 1/8"	13/16"
CJ-5, 6, 3B Jeeps	1"	3/4"
Others	1 1/8"	1"

Lining Length & Width

Model	Primary	Secondary
DJ-3A Jeep Disp.	9 7/8" x 2"	7 11/16" x 1 3/4"
CJ-5, 6, 3B Jeeps	10 7/32" x 1 3/4"	6 39/64" x 1 3/4"
Others	12 1/4" x 2"	10 1/32" x 2"

Thickness - (DJ-3A Jeep Disp.) .214", (CJ-5, 6, 3B Jeep) .211", (Others) .212".

Braking Power - (DJ-3A, CJ-5, 6, 3B Jeeps) Front 65%, Rear 35%. (Others) Front 57%, Rear 43%.

Clearance - Turn eccentric until shoe contacts drum, then back off until wheel turns freely.

Parking Brake (Univ. Jeep): Be certain hand brake cable and linkage operate freely. Lubricate if sticking or binding is evident. Place brake handle on instrument panel to "OFF" position. Rotate brake drum until one pair of adjusting holes (three pairs located on back face of drum) is opposite the adjusting screws (notched wheels) within the brake. Insert a screwdriver or adjusting tool through each hole and turn each adjusting screw equally until the brake shoes are snug against the drum (*NOTE*–with tool against edge of hole as a fulcrum, move outer end of tool out away from center of driveshaft to expand shoes). **Back off each adjusting screw 7 notches** to provide correct shoe clearance.

MISC. MECHANICAL

Windshield Wipers: Vacuum type.

(Univ. Jeep) - Individual motors operate wiper arms direct.

(Other Models) - Single motor operates wiper arms by cable control.

See "Windshield Wipers" in Miscellaneous Section.

1956 CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor & Model No.	Page
BUICK			
1955 Late	40	Stromberg WW, 7-104	287
1956	40	Stromberg WW, 7-105, A	287
		Carter WGD, 2378S, 2400S	254
	50, 60, 70	Rochester 4GC, 7009200	277
		Carter WCFB, 2347S	245
CADILLAC			
1956 Early	Std. Engine	Carter WCFB, 2333, 2334S, SA	241
		Rochester 4GC, 7008750, 7008751	241
1956 Late	Std. Engine	Carter WCFB, 2543, 2544S	241
		Rochester 4GC, 7009750, 7009751	241
	Eldorado Engine	Carter WCFB, 2371, 2372, 2373S	241
CHEVROLET CARS			
1956	6 Cyl.	Rochester BC, 7009254, 7009255	283
	V8 (Std.)	Rochester 2GC, 7008387, 7008388	284
	V8 (Powerpack)	Rochester 4GC, 7008737	277
		Carter WCFB, 2366S, SA	245
	V8 Corvette (1 Carb.)	Carter WCFB, 2366S, SA	245
	V8 Corvette (2 Carbs.)	Carter WCFB, 2362S, 2419S	244
CHEVROLET TRUCKS			
1956	6 Cyl. 235" Eng.	Rochester B, 7004468, BC, 7009255	283
	6 Cyl. 261" Eng.	Rochester B, 7005140	283
	6 Cyl.(Fwd. Cont.)	Carter BB, 871SA	267
	V8	Rochester 2G, 7008383, 7008389	284
CHRYSLER & IMPERIAL			
1956	C71 (Std.)	Carter BBD, 2312S, 2313S	265
	C71 (Powerpack)	Carter WCFB, 2367S, SA	245
	C70, C72, C73	Carter WCFB, 2314S, SA	245
1956 Early	C72-300	Carter WCFB, 2317S	245
1956 Late	C72-300	Carter WCFB, 2444, 2445S	245
DESOTO			
1956	S23	Carter BBD, 2308S, 09S, 10S, 2250S	265
	S24	Carter WCFB, 2311S, SA	245
1956 Early	Adventurer	Carter WCFB, 2317S	245
1956 Late	Adventurer	Carter WCFB, 2445S, 2476S	245
DODGE			
1956	6 Cyl. D62	Stromberg WW, 3-124, 125, 126	289
	V8 D63 (Std.)	Stromberg WW, 3-135,36,37,38,39,40	289
1956 Early	V8 D63 (Powerpack)	Carter WCFB, 2303S, SA, SB	245
1956 Late	V8 D63 (Powerpack)	Carter WCFB, 2432S, 2474S	245
1956	V8 D-500 (Std.)	Carter WCFB, 2443S, SA	245
	V8 D-500 (Powerpack)	Carter WCFB, 2445S, 2476S	245
FORD CARS			
1956	6 Cyl.	Holley-Ford, B6A-9510-G, H, S, V	274
	V8 272" Engine	Holley-Ford, B6A-9510-J, K	273
	V8 292" & 312" Eng.	Holley-Ford, B6A-9510-L, M, N, Q	268
FORD TRUCKS			
1956	6 Cyl. (Synchro-mesh)	Holley-Ford, B6C-9510-A	274
	6 Cyl. (Fordomatic)	Holley-Ford, B6A-9510-G, S, V	274
	V8 272" (ECY-W) Eng.	Holley-Ford, B6Y-9510-A, C	273
	V8 272" (ECR) Eng.	Holley-Ford, B6T-9510-A	275
	V8 272" (ECR) Eng.	Holley-Ford, B6T-9510-B	268
HUDSON			
1956	Wasp (Std.)	Carter WA1, 2009SA	261
	Wasp (Twin-H-Power)	Carter WA1, 2013S	261
	Hornet 6 (Std.)	Carter WGD, 2252S	254
	Hornet 6 (Twin-H)	Carter WA1, 2113S	261
	Hornet Spec. V8	Carter WGD, 2352S	254
	Hornet V8	Carter WGD, 2231S, SA	254
LINCOLN & CONTINENTAL			
1956	All	Holley-Ford, ECU-9510-B, C, D, E	268
MERCURY			
1956	All Trans.	Holley-Ford, B6A-9510-L, M, N, Q	268
	Mercomatic	Carter WCFB, 2361S, SA	245
METROPOLITAN			
1956	All	Zenith, 30 VIG-10	293
NASH			
1956	Statesman	Carter WCD, 2350S	253
	Amb. 6 (Super Jetfire)	Carter YH, 2368S	257
	Amb. 6 (Dual Jetfire)	Carter YH, 2369S	257
	Amb. Spec. V8	Carter WGD, 2331S, SA	254
	Amb. V8	Carter WGD, 2352S	254
OLDSMOBILE			
1956	88	Rochester 2GC, 7007223, 7008800	284
	Super 88 & 98	Rochester 4GC, 7007221, 7007222	277
PACKARD			
1956	5640	Carter WGD, 2393S	254
	5660, 5670	Carter WCFB, 2394S	245
	5680 (290 HP Eng.)	Rochester 4GC, 7008610	277
	5680 (310 HP Eng.)	Rochester 4GC, 7009600, 7009601	277
PLYMOUTH			
1956	6 Cyl. (Synchro-mesh)	Carter BBS, 2062, 63SA, 2293, 94S	263
	6 Cyl. (PowerFlite)	Carter BBS, 2116SA, 2295S	263
	6 Cyl. (Taxi)	Carter BBS, 2410S, 2403S	263
	6 Cyl. (Powerpack)	Stromberg WW, 3-124, 125, 126	289
	V8 270" (Synchro-mesh)	Carter BBD, 2259, 60SB, 2422, 23S	265
	V8 270" (PowerFlite)	Carter BBD, 2261SB, 2424S	265
	V8 277" (Synchro-mesh)	Carter BBD, 2299S, 2300S, 2407, 08S	265
	V8 277" (PowerFlite)	Carter BBD, 2301S, 2409S, SA	265
	V8 277" (Powerpack)	Carter WCFB, 2302S, SA, SB	245
	V8 Fury	Carter WCFB, 2442S	245
PONTIAC			
1956	56-27 (Std.)	Rochester 2GC, 7008695, 7008696	284
	56-27 (Powerpack)	Rochester 4GC, 7007900, 7008697	277
	56-27 (Powerpack)	Carter WCFB, 2364S, SA	245
	56-28 (Synchro-mesh)	Rochester 4GC, 7007900	277
	56-28 (Hydra-Matic)	Rochester 4GC, 7008697	277
	56-28 (Hydra-Matic)	Carter WCFB, 2364S, SA	245
	285 HP Engine	Rochester 4GC, 7009820	277
RAMBLER			
1956	All	Carter AS, 2349S	256
STUDEBAKER			
1956	Champion	Carter WE, 2108S	260
	Comm. & Pres.	Stromberg WW, 6-115, 117, 117A	290
	Comm. & Pres. (Powerpack)	Carter WCFB, 2214, 2219SA, SB	245
	Goldenhawk	Carter WCFB, 2394S	245
WILLYS			
1956	4 Cyl. Engine	Carter YF, 2392S	258
1956 Early	6 Cyl. Engine	Carter WCD, 2204S	253
1956 Late	6 Cyl. Engine	Carter YF, 2467S	258

CARBURETOR JET SPECIFICATIONS

CARTER Single & Dual Carburetor Jets ... 262
CARTER 4-Barrel Carburetor Jets ... 251,2
CARTER BBS Carburetor Jets ... 264
CARTER BBD Carburetor Jets ... 267
CARTER BB Updraft Carburetor Jets ... 267
HOLLEY-FORD Single & Dual Carburetor Jets ... 272
HOLLEY-FORD 4-Barrel Carburetor Jets ... 272
ROCHESTER Single & Dual Carburetor Jets ... 281
ROCHESTER 4-Barrel Carburetor Jets ... 282
STROMBERG WW Carburetor Jets ... 292
ZENITH Carburetor Jets ... 293

CADILLAC (CARTER & ROCHESTER) CARBURETORS

CARTER 4-BARREL WCFB

CADILLAC	Carburetor Model No.
1956 All Series except Eldorado Engine.	
Early (No Air Cond.)	2333S, SA
Late (No Air Cond.)	2543S
Early (With Air Cond.)	2334S, SA
Late (With Air Cond.)	2544S
Replacement Carburetor	© 2370SA
Replacement Carburetor	℗ 2545S
1956 Eldorado Engine (Two Carburetors).	
(No Air Cond.)	(Front) 2371S, (Rear) 2372S
(With Air Cond.)	(Front) 2373S, (Rear) 2372S
Replacement Carburetor	© 2371S

ROCHESTER 4-BARREL 4GC

1956 All Series except Eldorado Engine.	
Early (No Air Cond.)	7008750
Late (No Air Cond.)	7009750
Early (With Air Cond.)	7008751
Late (With Air Cond.)	7009751

© - Replaces Carburetor Nos. 2333S, SA, 2334S, SA. When installing this carburetor on Air Conditioned Cars, it will be necessary to also use Unitized Package No. 202-44U.

℗ - Replaces Carburetor Nos. 2543S & 2544S. When installing this carburetor on Air Conditioned Cars, it will be necessary to also use Unitized Package No. 202-44U.

© -Replaces Carburetor Nos. 2372S & 2373S. When using this carburetor to replace 2373S (Front carburetor on cars with Air Conditioning), it will be necessary to also use Unitized Package No. 202-100U.

►CHANGES & CORRECTIONS

►*IDLE SPEED ADJUSTING SCREW ON CARTER CARBURETORS (For use during first 1000 Mile Break-in Period):* This idle speed adjusting screw (throttle stopscrew) installed on some carburetors after Eng. No 035500, and can be installed on cars between Eng No 033849 and 035500 where it is not possible to secure proper idle by use of the Idle Air Bypass Screw only. This screw is not necessary after break-in period and should be removed at end of the first 1000 miles *NOTE*–Later carburetors will have enlarged idle air bypass passage eliminating need for this idle speed screw

►*FLAT SPOT & SHUDDER CORRECTION (Eldorado Engines with Carter Carburetors before Engine No. 014141)* Install Accelerator Pump Jet Housing, Cadillac Part No. 7002451. The later type housings have larger bores and longer jets which reduce flat spots and shudder. The later type housing is installed in production after the above engine number.

►*FLAT SPOT CCRRECTION (Eldorado Engines with Carter Carburetors before Engine No. 044963 without Air Conditioning, or No. 044986 with Air Conditioning):* Install all parts furnished in special kit, Cadillac No. 3630751, as detailed below. *NOTE* - Later carburetors with **black** tag have these parts installed in production and no modification required.

1) Carburet r Parts Chang s–Install new Metering Rods, Vacumeter (vacuum piston) Springs, and Primary Jet Clusters furnished in kit

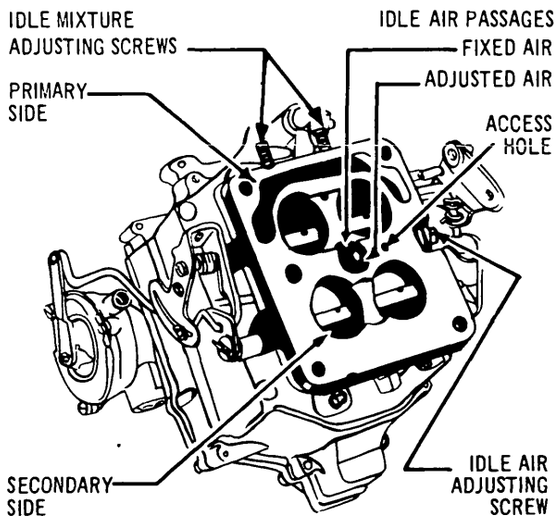
2) Carburetor Setting Changes–Secondary Throttle Shaft Torsion Spring should be wound up one additional turn. This will assure better idle stability.

3) Transmission Changes–Accumulator Inner Spring (furnished in kit) must be installed inside original accumulator outer spring (under accumulator piston in Servo & Accumulator Body) on transmissions prior to Transmission No. 56-5239 This spring is required due to increased engine torque when carburetor changes are made (above) and will change Throttle Valve adjustment from 18 flats to 24 flats. *NOTE*–Do not install this accumulator inner spring on transmissions after No 56-5239.

►*FULL THROTTLE LEANNESS OR SURGE CORRECTION (Cars with Carter Carburetors):* This condition may be caused by air leakage around metering rod dust cover and can be corrected by filing down the heavy flashing at both ends of cover until cover is level and will seat properly. It may also be necessary to file edge of cover at air horn to prevent interference at this point.

►*ENGINE STALLING CORRECTION (Cars with Carter Carburetors):* This stalling condition is noticeable when a hard left or right hand turn is made at zero throttle opening and is caused by air leakage between air horn and bowl gasket. Correct by installing an extra bowl gasket and securely tighten air horn-to-bowl screws. Readjust float level, metering rods and choke.

►*IMPROVED PERFORMANCE & ELIMINATION OF FLAT SPOTS ON ACCELERATION: (Cars with Carter Carburetors, except Eldorado Engine)* A kit, Cadillac Part No. 1467454 consisting of late type metering rods and vacumatic spring is available for service replacement on cars before Engine No 080810. In the event a late type throttle body, Carter Part No. 1-1436S (same as used on 2543S, 2544S & 2545S) is installed on earlier carburetors, the new kit should also be installed. It will not be necessary to install the throttle stop adjusting screw.



CADILLAC CARBURETOR IDLE SYSTEM

►*JET AND IDLE ADJUSTING SCREW PRODUCTION CHANGE (Cars with Carter Carburetors, except Eldorado)* To improve idle stability, new Primary & Secondary Metering Rod Jets, Carter Nos. 120-163 & 120-185 are being used in production beginning with Engine No. 113864. The diameter of the idle adjusting screw also has been changed.

►*IMPROPER AUTOMATIC CHOKE OPERATION NOTE (All Models)* Oil leakage at the rear of right hand rocker arm cover may affect choke operation. If oil is indicated in choke housing, the choke housing should be removed and cleaned, and the rocker arm cover gasket should be replaced.

►*ENGINE STUMBLE CORRECTION (Cars with Carter Carburetors):* Loss of power after a sharp left turn may be caused by fuel leakage from carburetor bowl into the choke vacuum passage. To correct, install a brass standpipe, Carter No. 145-142, tapping it into the choke vacuum passage in carburetor body.

►*THROTTLE LEVER ADJUSTING SCREW CHANGE (Cars with Carter Carburetors, except Eldorado)* Beginning with Engine No. 126955, the throttle lever adjusting screw has been eliminated. A 3/16" hole in each secondary venturi skirt will provide increased air for the idle by pass system.

►*FLAT SPOT CORRECTION (First Cars with Roch ster Carburetors):* On carburetors with original **brass** tag, new Primary Metering Jet No 7002651 can be installed to correct this condition *NOTE*–Later carburetors with **black** or **red** tag have this new jet installed in production.

DESCRIPTION: Four barrel downdraft types with idle air bypass system of same design used on 1955 models.

ADJUSTMENT: *All adjustments should be mad exactly as detailed below and sequence of adjustments should be followed as indicated*

Idling Adjustment: *Each model must be adjusted exactly as detailed below. This is important to secure correct balance between Idle Mixture and Idle Air settings.*

Cadillac (Singl Carburet r)

►*CAUTION These carburetors have TWO Idle Mixture Adjusting Screws and ONE Idle Air Adjusting Screw (regulates idle speed by controlling air for both primary barrels). See Idle Speed Adjusting Screw Not under "Changes & Corrections" above*

1) Make an initial adjustment by setting Air Adjusting Screw 3 turns open, set each Idle Mixture Screw 1 3/4-1-2 turns open (Carter Carburetor 2543S, 2544S, 2545S). 1-1 1/4 turns open (Rochester). Connect vacuum gauge and tachometer to engine, set hand brake securely, start engine and operate it until it **r ach s n rmal perating temperature** with choke valve wide open and fast idle not operating.

2) Loosen both jam nuts on transmission throttle control rod at carburetor throttle lever trunnion Place selector lever in either "Dr" position

CONTINUED ON NEXT PAGE

CADILLAC (CARTER & ROCHESTER) CARBURETORS (C nt.)

3) Adjust idle speed by turning Air Adjusting Screw in or out for engine speed of 420 RPM (supersedes original specification of 400 RPM) *On air conditioned cars, Air Conditioner must be turned on* Turn screw out minimum amount necessary to secure this idle speed

4) Adjust each idle mixture adjusting screw in turn until highest engine RPM is secured

5) Readjust idle speed (step 3 above)

6) Repeat steps 3-4-5 until no increase in RPM is noted when idle mixture adjusting screws are adjusted and smoothest engine idle is obtained

7) Adjust transmission throttle rod *See Throttle Linkage Adjustment under CARBURETOR in Cadillac data*

Eld rado Engin (Two Carburetors)

►*CAUTION Each carbur tor is same design as single carburetor (above) Linkage connecting the two carburetors must be adjusted for secure balanced operation*

1) Make an initial adjustment of each carburetor by setting Air Adjusting Screws 3 turns open set each Idle Mixture Adjusting Screw 1-2 turns open Connect Vacuum Gauge and Tachometer to engine set hand brake securely, start engine and operate it until it reaches **n rmal p rating temperature** with both choke valves wide open *NOTE*–Air cleaners must be in place for following adjustments

2) Disconnect manual throttle control rod from front carburetor and loosen jam nut on primary throttle control Check connector link between front and rear carburetors as follows Open throttle on front carburetor and then release throttle and allow engine to return to idle press on throttle lever to determine if front carburetor throttle valves can be closed further If engine speed drops more than 20 RPM, throttle connector link is too long Check rear carburetor similarly If engine speed drops off more than 20 RPM when rear carburetor throttle lever pressed closed, connector link is too short Adjust connector link trunnion in accordance with results of above tests With correct adjustment pressing either front or rear carburetor throttle lever toward closed position should not reduce engine speed more than 20 RPM Tighten connector link jam nut

3) Check and adjust Auxiliary Throttle Valve Connector on each carburetor as follows Disconnect one end of connector link attached to counterweight lever on auxiliary throttle valve shaft see that weights seat auxiliary throttle valves *(CAUTION*–Make certain that secondary lockout is not holding valves open) Adjust connector link by bending at center angle (use Tool J-1137) until link can be connected without disturbing valve position, connect link

4) Connect manual throttle control rod at front carburetor loosen both jam nuts at transmission throttle control rod trunnion

5) Start engine, place selector lever in "Dr" position Set hand brake Turn Air Conditioner ' on"

6) Adjust each idle mixture screw in the following sequence (1) Right Rear (2) Right Front (3) Left Front (4) Left Rear turning each screw in until lean limit reached (RPM will fall off or flutter will be noted), then turn screw out ¼ turn to enrich mixture

7) Adjust both Air Adjusting Screws equally (one for each carburetor) for idle speed of 490-510 RPM

8) Readjust Idle Micture Screws (step 6) to obtain highest possible engine RPM with highest possible manifold vacuum

9) Repeat Air Adjusting Screw adjustment (step 7), adjusting idle mixture screws each time the air adjusting screws are changed until engine idles smoothly at correct speed with highest possible manifold vacuum

10) Adjust transmission throttle rod *See Throttle Linkage under CARBURETOR in Cadillac data*

Fast Idle Adjustment· *CAUTION–When Fast Idle set "Off Engine", a final adjustment should be made "On Engine" as detailed below.*

"Off Engine" Fast Idle Setting

Carter Carburetors–Hold choke valve tightly closed so that high step of fast idle cam is in line with fast idle screw, turn fast idle screw in until primary throttle valve opening or clearance between edge of valve and wall opposite idle ports is 015" (Gauge T109-44)

Rochester Carburetors–Hold choke valve tightly closed and hold throttle lever in closed position so that fast idle screw rests on high step of fast idle cam Turn fast idle screw in until throttle valve opening or clearance between edge of valve and air horn wall is 020 (SMALL end of Gauge BT 67)

"On Engine" Fast Idle Setting

All Carburetors–After completing Idle Adjustment (above) idle engine place selector lever in Neutral rotate fast idle cam so that fast idle screw contacts highest step of cam, adjust fast idle screw for engine speed of 1700 RPM.

Throttle Return Check. Allow engine to idle and make certain that return check plunger does not contact throttle relay lever Open throttle fully momentarily and then snap throttle closed Throttle return check should insure smooth return to idle If engine races, throttle check plunger is too long If engine stalls plunger is too short Adjust plunger screw as necessary for correct operation

►*ADJUSTMENT CAUTION (Beginning Eng No 033849)* These engines have new camshaft which results in lower manifold vacuum and Throttle Return Check may open throttle when vacuum is low if check valve gap is set as low as 140" On these cars set gap to 185" *NOTE*–Later cars will have throttle return check with changed bleed hole size or spring.

Idle Speed-Up Control (Air Conditioned Cars)· After idling adjustment completed, and with engine at normal operating temperature, position selector lever in Neutral and turn Air Conditioning "On" Engine should idle at 900 RPM Adjust by loosening locknut on diaphragm shaft and turning knurled nut for correct idling speed

Accelerating Pump Rod Adjustment· Throttle valves must be tightly closed (fast idle screw must be backed off) when making this adjustment

Carter Carburet rs–See that pump link is connected in outer hole (long stroke) of pump arm Remove dust cover and gasket Place straightedge across dust cover boss at pump arm Flat on top of pump arm should be parallel to straightedge and top of pump plunger shaft should be 9/32" below top edge of dust cover boss Adjust by bending throttle connector rod using bending tool T109-213 (Cadillac No J-1137)

Rochester Carburetors–Use scale placed on end on bowl cover to measure height of pump plunger rod Distance from top of bowl cover to bottom edge of plunger rod should be 63/64" Adjust by bending throttle connector rod at lower angle

Metering Rod Adjustment (Carter Carburetors): *No gauge required and metering rods used only on primary sid of carburetor. Check metering rods after making pump rod adjustment (above)* Make certain that throttle valves seated in bores Remove dust cover and gasket Loosen metering rod arm clampscrew, press down on vacumeter link until metering rods bottom in carburetor body Hold rods in this position, rotate metering rod arm until finger on arm contacts lip on vacumeter link, carefully tighten clampscrew

Atmospheric Idle (Bowl Vapor) Vent Adjustment· *On Carter WCFB carburetors, make this adjustment after Pump and Metering Rod Adjustments completed.*

Carter Carburetors–With throttle valves seated in bores, clearance between lower edge of bowl vapor vent valve and dust cover should be 1/16 (Gauge T109-197) To adjust remove dust cover bend vent arm up or down

Rochester Carburetors–Open primary throttle valves 063' by inserting LARGF end of Gauge BT 79 between edge of valve and bore on side opposite idle adjusting screws Operating tang on pump lever should just contact vent valve Adjust by bending tang on contact arm using BT-69 bending tool

Float Level Adjustment· *Primary and secondary floats must both be adjusted VERTICALLY and LATERALLY and Float Drop must also be adjusted.*

Carter Carburetors

Carter Float Level–With bowl cover assembly removed from carburetor and inverted, **remove cover gask t,** place correct gauge (see table) directly under center of floats with notched portions of gauge fitted over edges of cover **Vertical Adjustment**–Floats should just clear horizontal portion of gauge (see table for vertical distance between tops of floats and machined surface of cover) Adjust by bending float arms up or down

Lateral Adjustment– Sides of floats should just clear vertical uprights of gauge Adjust by bending float arms as required

Carter Float Level

	Checking Gauge	Vertical Distanc
Primary (All)	①T109-232	1/8
Secondary (All)	②T109-222	3/16'

①–Cadillac No J-5457 ②–Cadillac No J-5458

Carter Float Drop - Hold bowl cover assembly upright so that floats hang down freely. Use scale to measure distance from machined lower surface of bowl cover (gasket removed) to top of floats at center If distance not correct (see table below) adjust by bending stop tabs on float bracket

Carter Float Drop

Primary (All)	5/8"
Secondary (All)	11/16

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CADILLAC (CARTER & ROCHESTER) CARBURETORS (C nt.)

Rochester Carburetors

Rochester Float Level—With bowl cover assembly removed from carburetor and inverted, and **cover gasket in place,** place correct gauge (see table) directly over center of floats with gauge against curvature in air horn bore. **Vertical Adjustment**—Floats should just touch top portion of gauge between gauge legs (see table for vertical distance from bottom of each float to gasket). Adjust by bending float arm at rear of float assembly. **Lateral Adjustment**—Each float should be centered between the gauge legs. Adjust by bending float arms horizontally. Check by tilting air horn assembly 90° to each side and make certain floats do not touch gauge legs

Rochester Float Level

	Checking Gauge	Vertical Distance
Primary & Secondary	③BT-101	1 19/32"

③—Cadillac No. J-5683.

R chester Float Drop—Hold bowl cover upright with floats down at limit of travel. Measure distance from bottom of floats at center to gasket on bowl cover. Adjust by bending float tang at rear of float toward needle seat to lessen drop and away from seat to increase drop

Rochester Float Drop

Primary & Secondary (All)	2 1/8"

Aut matic Choke & Modifier Adjustment: Choke setting on all models is given below. With this setting of the choke cover assembly, modifier lever should be adjusted as indicated

Automatic Choke Setting

Carter (Single Carburetor)	1 Point Lean
Carter (Eldorado Dual Carbs,)	Centered
Rochester (Single Carburetor)	Centered

Carter Choke Modifier—Set cover assembly as indicated above) Disconnect choke modifier rod at lower end, rotate metal pointer and lever (to which rod connected) until it is in line with raised pointer on coil housing. Hold pointer in this position, loosen clampscrew in modifier lever, rotate lever until scribed line on lever is vertical, tighten clampscrew Make certain that throttle valves fully seated, bend rod at upper angle until rod freely enters hole in throttle arm. Connect rod

R chester Choke Modifier—Set cover assembly at index for centered setting. Make certain that throttle valves fully seated, loosen lockscrew in modifier lever on choke cover, rotate index pointer counter-clockwise until it lines up with long scribed line on cover (choke valve should be closed), tighten lockscrew securely

Choke Rod Adjustment: *This adjustment should be made BEFORE adjusting Fast Idle, Unloader, and Secondary Throttle Linkage.*

Cart r Carburetors—Loosen clamp screw on lever on choke shaft Insert 015" feeler gauge between lip of fast idle cam and boss on flange casting, hold choke valve tightly closed and remove all slack from linkage by pressing choke lever toward closed position, tighten clampscrew while holding lever in this position

Rochester Carburetors—Turn fast idle adjusting screw in until it contacts the SECOND step of the fast idle cam, close choke valve until screw is against high step of cam and make certain that choke trip lever is in contact with counterweight lever Hold linkage in this position and check choke valve opening or clearance between upper edge of valve and dividing wall in air horn using SMALL end of Gauge BT-102 (040") Adjust by bending choke rod

Unloader Adjustment: *This is done after Choke Rod adjusted.*

Carter Carburetors—Move throttle lever to wide open position Check choke valve opening or clearance between upper edge of valve and inner wall of air horn using Gauge T109-39 (13/64"). Adjust by bending unloader lip on throttle shaft lever using T109-41 bending tool

Rochester Carburetors—Move throttle lever to wide open position and hold trip lever down in contact with choke counterweight Check choke valve opening or clearance between upper edge of valve and dividing wall in air horn using LARGE end of Gauge BT-102 (125"). Adjust by bending tang on fast idle cam using BT-69 bending tool

Secondary Throttle Linkage: Separate adjustments required on each carburetor as follows

Carter Carburetors

1) Secondary Throttle Lever (All Carburetors)—With choke valve wide open, move primary throttle valves to wide open position and note movement of secondary throttle valves which should reach wide open position at same time as primary valves. If no adjustment required, remove secondary throttle operating link, check wide open stops for both primary and secondary valves and adjust by bending tangs so that wide open position can be secured, connect link Bend link using heavy pliers so that both throttle shafts contact wide open stops at the same instant With both primary and secondary throttle valves tightly closed, measure clearance between positive closing shoes on primary and secondary levers using Tool T109-29 If clearance not 017- 022", adjust by bending shoe on primary lever

NOTE—Secondary throttle link should be connected in inner hole (nearest throttle shaft center) on both the primary and secondary throttle shaft levers.

2) Secondary Throttle Lock-out (Single Carburetors)—With Fast Idle adjustment correctly made (above), close choke valve and hold tightly closed so that throttle valves are open 015" *(NOTE*—This can be accomplished by inserting .015" wire gauge, Tool KMO-657 between edge of primary throttle valve and wall on side opposite idle ports and holding fast idle cam clear of fast idle adjusting screw) Secondary lock pawl should now be in unlocked position If not, adjust by bending tang on lock pawl which contacts primary throttle lever using bending tool T109-105 or long-nosed pliers Adjust secondary throttle shaft tang sideways to obtain clearance 015" between the side of the tang and the notch in the secondary lock-out cam Hold primary throttle valves halfway open, open choke valve fully, then open primary throttle valves all the way Lockout lever should fall free allowing secondary throttle valves to open before primary throttle valves are fully open. Adjust by bending tang on secondary throttle lever to obtain minimum clearance of .015" between tang and lockout cam. Make certain that tang on cam trip lever returns lockout cam to locked position when choke valve is fully closed

3) Auxiliary (Secondary) Lock-out (Eldorad Eng. Carburetors)—With choke valve held fully closed, hook on lockout arm should have maximum contact with locking step on auxiliary throttle shaft. Open choke valve slowly Auxiliary throttle valves should become unlocked and be free to open just before choke valve reaches wide open position. Adjust by bending tang on choke trip lever under lockout arm using long-nosed pliers

Rochester Carburet rs

1) Secondary Throttle Lever—With choke valve wide open, move throttle lever to wide open position and note movement of secondary throttle valves which should reach wide open position at the same time as primary valves If adjustment required, remove secondary throttle actuating link, check wide-open stops for both primary and secondary valves and adjust by bending tangs so that wide-open position can be secured, connect link Bend link so that both throttle shafts contact wide-open stops at the same instant

2) Secondary Throttle Lock- ut—With choke valve partially closed and throttle valves closed, check clearance between secondary lock-out lever tang and edge of slot in fast idle cam using a feeler gauge Clearance should be 015' Adjust by bending tang horizontally using bending tool BT-18

3) Secondary Throttle Contour Clearance—With choke valve wide open, open throttle valves so that tang on secondary lock-out lever rides over top of fast idle cam Measure clearance between tang and fast idle cam edge using a feeler gauge Clearance should be 015" Adjust by bending tang up or down using bending tool BT-91

OVERHAUL: *See "Carter WCFB 4-Barrel" and "Rochester 4GC 4-Barrel" Carburetors.*

SERVICE PARTS: Gasket Sets - Carter No. 277 (2333S, SA, 2334S, SA, 2370S, SA, 2371S, 2372S, 2373S). Carter No. 277A (2543S, 2544S, 2545S). Rochester No. 7009941 (Rochester Carburetors).

Repair Package - Carter No. 1818 (2333S, SA, 2334S, SA, 2370S, SA). Carter No. 1819 (2371S, 2372S, 2373S). Carter No. 1847 (2543S, 2544S, 2545S). Rochester No. 7009921 (Rochester Carburetors).

CHEVROLET CORVETTE (TWO CARTER CARBURETORS)

Carburetor Application

	Carter No.
Front ①	WCFB 2419S
Rear	WCFB 2362S

① - This carburetor does not have an automatic choke or choke valves, fast idle adjustment, unloader adjustment or secondary throttle lockout adjustment.

DESCRIPTION: Four-barrel downdraft types with automatic choke (rear carburetor), without automatic choke or choke valves (front carburetor). These carburetors have a new idle system as follows

Idle System - Consists of SEPARATE Primary Idle Fuel System and Idle Air System as described below. Vapor vent passages located in throttle bores directly above the throttle valves dissipate spill-over fuel from above throttle valves and improve engine idle performance.

Idle Fuel System - Primary idle fuel system is similar to other Carter WCFB Carburetors with Idle Mixture Adjusting Screw controlling fuel discharge through lower idle port below the throttle valves. Throttle valves are completely closed at low idle and air is admitted through Idle Air System (below). Secondary idle fuel system has been modified by elimination of closed throttle idle ports (below primary throttle valves) so that secondary idle system does not operate during closed throttle idling. At part throttle positions, the secondary idle system discharges fuel through ports located above the primary throttle valves.

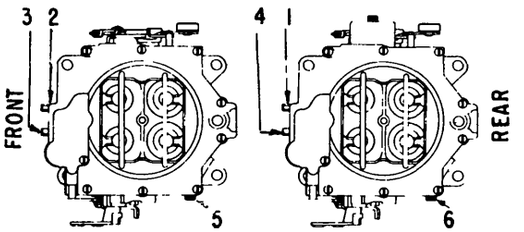
Idle Air System - Consists of air by-pass passage (primary barrels only) through which air for closed throttle idling is taken from above the throttle valves and discharged into manifold below the throttle valves through a metered (non-adjustable orifice) and adjustable orifice in each primary barrel. An Idle Speed Screw (single screw for both barrels) controls this adjustable orifice and all Idle Speed Adjustments are made by means of this screw (no throttle stop used). Throttle valves are **completely** closed at low idling speed.

ADJUSTMENTS: *NOTE - Accelerator Linkage and Idle Adjustments are made with the engine running at normal operating temperature.*

Accelerator Linkage Adjustment: Remove carpet adjacent to accelerator pedal. Remove air cleaner and throttle pull-back spring on carburetor. With **rear** carburetor on wide open throttle, accelerator pedal should be 3/8" from toe board. Lengthen or shorten rear accelerator rod by removing spring clip and turning trunnion nut. Hold rear carburetor on wide open throttle and adjust nut on front carburetor control shaft until throttle on front carburetor wide open against stop. Front carburetor should begin to open when rear carburetor half open.

Idle Adjustment: Open and close throttle valve several times to make sure valves seat properly. Connect tachometer and vacuum gauge (on Powerglide models, place transmission selector lever in "DR" and set hand brake securely). Initially adjust by-pass screw (located on left side of carburetor) **2 turns** off seat making sure that by-pass screw on each carburetor is adjusted an equal number of turns. Adjust the two idle mixture screws on the forward side of each carburetor individually to their lean limit then back off or enrich **1 full turn.** Start engine and adjust idle by-pass screw on each carburetor an equal amount of turns counterclockwise, to obtain 600 RPM on engine. Adjust idle mixture screw on right side of rear carburetor until highest vacuum reading or best engine "feel" and highest engine RPM is obtained. Repeat this operation with idle mixture screw on right side of front carburetor, then left side of front carburetor, and finally on left side of rear carburetor. Readjust idle by-pass screw in both carburetors to set idle speed at 600 RPM. *(CAUTION - Idle by-pass screws must be turned equally).* After smooth idle is obtained, turn mixture screws in the same sequence as above 1/16 to 1/3 turn (1 to 2 flats of screw) clockwise (to lean). *NOTE* - This may roughen engine idle but engine will smooth out after thorough running.

IDLE MIXTURE ADJUSTING SCREWS



IDLE BYPASS ADJUSTING SCREWS

CARBURETOR IDLE ADJUSTMENT SEQUENCE

Float Level Adjustment: *Primary and secondary floats must both be adjusted vertically and laterally and Float Drop must also be adjusted.* With bowl cover assembly inverted, bowl cover gasket removed and float resting on seated needle, place float gauge directly under center of floats with notched portion of gauge fitted over edge of casting. **Lateral Adjustment** - Side of floats should just clear the vertical uprights of float gauge. Adjust by bending float arms. **Vertical Adjustment** - Floats should just clear horizontal portion of gauge (see table below for vertical distance between tops of floats and machined surface of cover). Adjust by bending float arms up or down.

Float Level

	Checking Gauge	Vertical Distance
Primary	T109-232	1/8"
Secondary	T109-223	1/4"

Float Drop: With bowl cover held in upright position and measuring from center of float, the distance between top of floats and bowl cover should be as indicated in table below. Adjust by bending stop tabs on float bracket.

Float Drop

Primary	5/8"
Secondary	3/4"

Accelerating Pump Adjustment: *Throttle valves must be tightly closed (fast idle screw must be backed off) when making this adjustment.* Install pump connector link in inner hole (short stroke) of pump arm, with ends extending toward countershaft arm. Remove dust cover and gasket. Place straightedge across dust cover boss at pump arm. Flat on top of pump arm should be parallel to straight edge. Adjust by bending throttle connector rod at lower angle.

Metering Rod Adjustment: *No gauge required and metering rods used only on primary side of carburetor. Check metering rods after making pump rod adjustment (above).* Make certain that throttle valve seated in bores. Remove dust cover and gasket. Loosen metering rod arm clamp screw. With metering rods in place, press down on vacumeter link until metering rods bottom in carburetor body. Hold rods in this position, with throttle valves seated, and rotate metering rod arm until finger on arm contacts lip of vacumeter link. Hold in place and carefully tighten clamp screw.

Fast Idle Adjustment: (Rear Carburetor Only) - *NOTE - When Fast Idle set "Off-Engine", a final adjustment should be made "On-Engine" as detailed below to insure correct engine warm-up.*

"Off-Engine" Fast Idle Setting

Loosen choke lever clamp screw on choke shaft. Insert .020" feeler gauge (T109-29) between lip of fast idle cam and boss of flange casting. Hold choke valve tightly closed and take slack out of linkage by pressing choke lever towards closed position. Hold in place and tighten clamp screw. With choke valve tightly closed bend fast idle adjusting tang until there is .015" (Gauge T109-44) opening between throttle valve and bore of carburetor side opposite idle port. Be sure fast idle adjusting tang is on high step of cam while making this adjustment.

"On-Engine" Fast Idle Setting

With idle adjusting tang on high step of fast idle cam, engine speed should be 1800 RPM, with engine at normal operating temperature.

Unloader Adjustment: (Rear Carburetor Only) - With throttle wide open there should be 3/16" (Gauge T109-28) clearance between upper edge of choke valve and inner wall of air horn. Adjust by bending unloader lip on throttle shaft lever (use Tool T109-41).

Atmospheric Idle (Bowl Vapor) Vent Adjustment: *This adjustment must be made after completing pump and metering rod adjustments.* Install dust cover and gasket. Back out throttle lever stop screw to allow throttle valves to seat in bores of carburetor. There should be 1/16" (Gauge T109-197) between lower edge of bowl vapor vent valve and dust cover. To adjust, remove dust cover and bend vapor vent arm.

Secondary Throttle Lever Adjustment: Primary and secondary throttle valves should reach wide open position at the same time. *(NOTE - Secondary throttle valves will be a few degrees from wide open).* To adjust, bend throttle operating rod at upper angle. With primary and secondary throttle valves in tightly closed position there should be .017-.022" (Gauge T109-29) clearance between positive closing shoes on primary and secondary throttle levers. To adjust, bend shoe on primary lever.

Secondary Throttle Lock-out Adjustment: (Rear Carburetor Only) - *This adjustment should be made after completing fast idle and secondary throttle lever adjustments.* Crack throttle valves and hold choke valve tightly closed, then close throttle. Tang on secondary throttle lever should freely engage in notch of lock-out dog. If necessary to adjust, bend tang on secondary throttle lever.

Automatic Choke Adjustment: (Rear Carburetor Only) - Choke setting is CENTERED (at index).

OVERHAUL: *See "Carter 4-Barrel Carburetors".*

SERVICE PARTS: Gasket Set - Carter No. 286 & 286A.

CARTER WCFB 4-BARREL CARBURETORS

	Carter Carb. No.
BUICK	
1956 Series 50, 60, 70	2347S
CADILLAC	
See SEPARATE "Cadillac (Carter & Rochester)" data.	
CHEVROLET	
1956 V8 Cars (Power Pack)	2366S, SA
1956 Corvette (One Carb.)	2366S, SA
1956 V8 Cars & Corvette (Two Carbs.)	*See "Chevrolet Corvette (Two Carter Carburetors)" data.*
CHRYSLER	
1956 C-71 (Power Pack)	2367S, SA
1956 C-70, C-72, C-73	2314S, SA
1956 (Early) 300B	(Two) 2317S
1956 (Late) 300B	(Front) 2444S
1956 (Late) 300B	(Rear) 2445S
DESOTO	
1956 S-24 Fireflite	2311S, SA
1956 (Early) Adventurer	(Two) 2317S
1956 (Late) Adventurer	(Front) 2476S
1956 (Late) Adventurer	(Rear) 2445S
DODGE	
1956 (Early) D-63-2, 3 (Power Pack)	2303S, SA, SB
1956 (Late) D-63-2, 3 (Power Pack) ①	2474S
1956 (Late) D-63-2, 3 (Power Pack) ②	2432S
1956 D-500 (Standard)	2443S, SA
1956 D-500 (Power Pack)	(Front) 2476S
1956 D-500 (Power Pack)	(Rear) 2445S
MERCURY	
1956 All Models (Mercomatic)	2361S, SA
PACKARD	
1956 Series 5660 & 5670	2394S
PLYMOUTH	
1956 V8 277" Engine (Power Pack)	2302S, SA, SB
1956 Fury	2442S
PONTIAC	
1956 Series 56-28	2364S, SA
1956 Series 56-27 (Optl.)	2364S, SA
STUDEBAKER	
1956 Pres. Classic & Skyhawk ①	2219SA, SB
1956 Pres. Classic & Skyhawk ③	2214SA, SB
1956 Other Pres. & Comm. Models ① (Optl.)	2219SA, SB
1956 Other Pres. & Comm. Models ③ (Optl.)	2214SA, SB
1956 Goldenhawk	2394S

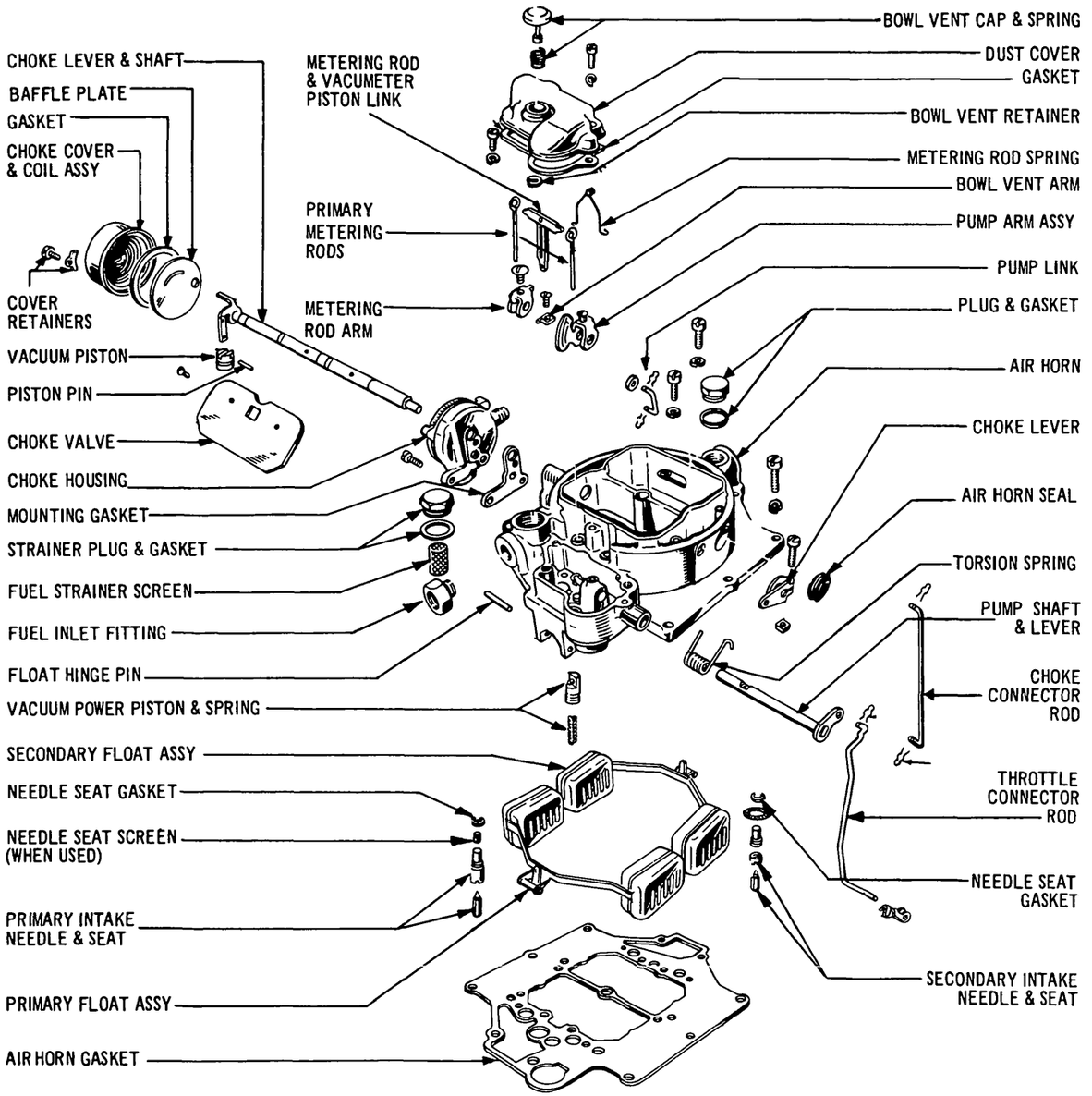
① – Synchro-mesh Trans. & Overdrive Trans.
② – Powerflite Transmission.
③ – Automatic Transmission.

►CHANGES, CAUTIONS, CORRECTIONS

►*ENGINE CUTTING OUT ON LEFT HAND TURN CORRECTION* A new standpipe, Carter Part No. 145-142 may be installed into the choke vacuum passage in main body casting. The standpipe (bushing) is tapered and should be tapped lightly into place. The use of this part provides a more positive seal and prevents fuel leakage from bowl into choke vacuum passage.

►*1956 BUICK METERING ROD PRODUCTION CHANGE (For Increased Fuel Economy)* In later production, a new metering rod, Carter No. 75-1235 is being used in production and can be used for service replacement. Carburetors having the later metering rod can be identified by the letter G, H. J, etc., following the carburetor number stamped on the brass tag attached to carburetor.

►*CHRYSLER 300B & DESOTO ADVENTURER (With Two Carburetors)* Special Idle Adjustment procedure must be followed to insure balanced operation of the two carburetors *See Chrysler & DeSoto car model data for complete procedure*



CARTER WCFB CARBURETOR AIR HORN & FLOAT ASSEMBLY

►*1955-56 DESOTO (EXCEPT ADVENTURER) ENGINE STALLING CORRECTION* Adjust slow idle speed to 500 RPM, and fast idle speed to 1200 RPM. Change choke setting to 1 notch rich (1956), 2 notches lean (1955). Adjust dashpot so plunger moves 1/16" when throttle closed. Check manifold heat control for free operation. Check manifold to carburetor heat tube as

CONTINUED ON NEXT PAGE

CARTER WCFB CARBURETORS (C nt.)

follows. Move asbestos cover to expose a small portion of tube, then run engine for one minute. Tube should be too hot to touch. If not, tube is cracked or loose in manifold.

►*1956 PLYMOUTH FURY IMFROPER CHOKE ACTION CORRECTION·* This condition may be caused by interference between carburetor throttle lever and dashpot mounted on intake manifold. Correct by installing three gaskets, Plymouth Part No. 1731516.

►*1956 PLYMOUTH (POWERFLITE) DASHPOT ELIMINATION:* The carburetor dashpot has been eliminated on later production cars.

►*1956 PONTIAC HARD STARTING CORRECTION (With Partially Warmed-up Engine):* Change choke setting from one notch rich to center index. If hard starting is not completely eliminated with this change, set choke to one point lean.

►*1956 PONTIAC CARBURETOR FLOODING CORRECTION (Early Cars):* Install fuel filter, Part No. 854345 which is a precipitation type filter having an impregnated fibre element.

►*1956 PONTIAC COLD ENGINE STALLING & WARM UP OPERATION IMPROVEMENT·* On carburetors tagdated before M-5, install ALL of the following parts and change settings as follows

1) Vacumeter Spring No. 61-478, identified by a free length of approximately 1½" (supersedes 61-496).
2) Choke Piston No 160-138 (supersedes 160-110S)
3) Automatic Choke Setting—1 Point Rich (changed from Centered setting)
NOTE—Carburetors tag-dated M-5 and later have these changes made in production

►*1956 STUDEBAKER 259" & 289" ENGINE CARBURETOR "BLOW-UP" PREVENTION NOTE·* To prevent gasoline collecting in air horn pockets in which bowl vapor vents are located (and igniting from engine backfire), drain holes must be provided through wall of choke valve chamber, on both sides of carburetor as follows Remove and disassemble air horn. With air horn inverted, locate the holes in wall of air horn at a point 3/8" from center line of choke chamber baffle (one hole on each side of baffle), and 5/32" below air horn gasket surface. Locate the other two holes in same location in wall at opposite end of baffle. Using a 1/16" (No. 53) drill, drill the holes from inside of air horn into pocket at an angle of approximately 20°. Clean all chips from air horn and reassemble.

DESCRIPTION: These 4-Barrel carburetors are same general design as used on 1955 car models and have the following new or special features

Aut matic Sec ndary Throttle Contr l (Chrysler 2314 S, SA & 2367S, SA, DeS to 2311S, SA, M rcury 2361S, SA). Consists of a diaphragm type vacuum control unit which opens and closes the secondary throttle valves in accordance with air velocity through primary venturi (vacuum passage connected at primary venturi). A mechanical override linkage ensures that secondary valves will always close with primary valves.

Auxiliary Throttle Valves (Buick 2347S, Chrysler 2317S, 2444S, 2445S, DeSoto 2317S, 2476S, 2445S, Dodge (All) Packard (All), Plymouth (All), Pontiac (All), Studebaker (2394S): Velocity type valves located directly over secondary valves (action is controlled by counterweight on the shaft and valves are not operated by the throttle linkage). On some carburetors, these valves are "locked out" when choke is operating and this lock-out must be adjusted (see Adjustments).

Spring-Loaded Primary Throttle Linkage (Chrysler 2314S, SA, 2367S, SA, DeSoto 2311S, SA, Mercury 2361S, SA): Consists of a torsion spring on the throttle shaft between the flex dog and the throttle spring arm with a stop pin located on the throttle shaft dog. This provides smoother operation and requires special Throttle Linkage Adjustment (see Adjustments).

"Cross-Over" Type Automatic Choke (Plymouth 2302S, SA & 2442S): On these models, the Thermostatic Coil Assembly is mounted in a well in the manifold and is linked to the choke shaft lever by a rod (a plain cover is used on the choke housing on the air horn and a lever is mounted in end of the choke shaft where it extends through cover). This type automatic choke is adjusted differently (see Adjustments).

ADJUSTMENTS: *Make all adjustments in sequence as listed below*

IDLE SETTING

Idle Setting: *Adjust only with engine at normal operating temperature with automatic choke not operating* (choke valve wide open, fast idle inoperative so that engine idles at hot or slow idle speed) If initial adjustment required to allow engine to be started and warmed up, set both idle adjusting screws as indicated in table below With engine warm, adjust idle speed adjusting screw for correct engine idle speed as shown in table below (use tachometer), then adjust each idle mixture adjusting screw (one screw for each primary carburetor barrel—two screws only) until engine idles smoothly and RPM is at maximum

Idle Mixture Setting

Car & Carb.	Idle Screw Opening
Buick 2347S	1 1/8 turns
Chevrolet 2366S, SA	1/4-1 1/4 turns
Chrysler 2314S, SA	1-2 turns
Chrysler 2317S, SA, 2444S, 2445S	1/4-1 1/4 turns
Chrysler 2367S, SA	3/4-1 3/4 turns
DeSoto 2311S, SA	1-2 turns
DeSoto 2317S, 2445S, 2476S	1/4-1 1/4 turns
Dodge 2303S, SA, SB, 2432S, 2474S	1/2-1 1/2 turns
Dodge 2443S, SA	3/4-1 3/4 turns
Dodge 2445S. 2476S	1/4-1 1/4 turns
Mercury 2361S, SA	3/4-1 3/4 turns
Packard 2394S	3/4-1 3/4 turns
Plymouth 2302S, SA, SB, 2442S	1-2 turns
Pontiac 2364S, SA	1 1/4-2 1/4 turns
Studebaker 2214SA, SB, 2219SA, SB	1/2-1 1/2 turns
Studebaker 2394S	3/4-1 3/4 turns

Idl Speed S tting

Car	Synchr -m sh Trans	Aut . Trans.
Buick		450 RPM
Chevrolet	450-500 RPM	①400-450 RPM
Chrysler (1 Carb)		③ 450-500 RPM
Chrysler (2 Carb)		650 RPM
DeSoto (1 Carb)	475-500 RPM	③475-500 RPM
DeSoto (2 Carb)		600 RPM
Dodge	450-500 RPM	③475-500 RPM
Dodge (2 Carb.)		. ③ 500 RPM
Mercury		①425-450 RPM
Packard	450-500 RPM	②450 RPM
Plymouth	450-500 RPM	③475-500 RPM
Pontiac		③450-470 RPM
Studebaker	550-600 RPM	③550-600 RPM

①—With selector lever in Drive position
②—With selector lever in High position
③—With selector lever in Neutral position

Throttle Return Check (Dashpot) Adjustment: Used with automatic transmission See Throttle Linkage Adjustment under CARBURETOR on each car model data page

ACCELERATING PUMP

Accelerating Pump Stroke· *CAUTION—This is a linkag adjustment and not a seasonal change recommendation* Remove dust cover, make certain that pump connector link installed in **outer** (long stroke) hole of pump arm Back off throttle stopscrew so that primary throttle valves are fully seated Hold a straightedge across top of dust cover boss at pump arm The flat on the top of the pump arm should be parallel with straightedge Adjust by bending pump connector link at lower angle on all carburetors except the following which should be bent at the upper angle 2303S, SA, SB, 2317S, 2444S, 2445S, 2476S, Early 2302S, SA, SB, Early 2432S, Early 2442S, Early 2443S, SA, Early 2347S, Early 2474S. Use Tool T109-213 to bend connector link.

►*STUDEBAKER NOTE* On carburetors with dashpot, after completing pump rod adjustment (above), make certain that clearance between lower edge of countershaft arm and dashpot bracket is 015" minimum Correct by bending pump connector rod slightly

METERING RODS

Metering Rods (Primary Side)· *No gauge required for this adjustment and no metering rods used on secondary side.* With dust cover removed and primary throttle valves fully seated (as for Pump Stroke Adjustment above), loosen setscrew in metering rod arm on pump countershaft just enough so that arm has slight bind on shaft, lift arm slightly Depress metering rod link until metering rods just bottom in bowl casting, position metering rod arm so that it contacts link, tighten arm setscrew Then adjust Atmospheric Idle Vent (following)

FLOAT LEVEL SETTING

Float Setting *CAUTION—Primary and Secondary Float Assemblies must be checked and adjusted separately and both FLOAT LEVEL and FLOAT DROP must be checked for each assembly.* Remove bowl cover and float assembly from carburetor for these checks

CONTINUED ON NEXT PAGE

CARTER WCFB CARBURETORS (C nt.)

Fl at L v l—*Primary and Secondary Float Assemblies set to different heights (Except on Pontiac, Oldsmobile and Studebaker)* Check and adjust as follows Remove bowl cover gasket (take out float hinge pins, remove float assemblies with intake needles attached, remove gasket, re-install floats) Invert bowl cover, install correct gauge for each float assembly (see table below) on bowl cover under center of floats with notched ends of gauge fitted tightly against sides of bowl cover casting Both floats should just clear horizontal section of gauge (adjust by bending float arms as required) and each float should barely touch vertical uprights on gauge (bend float arms sideways for this clearance) This sideways adjustment is extremely important to prevent floats hanging up on sides of bowl casing

Float Level Setting
Primary Floats

Car & Carb.		Height	Gauge No.
Buick 2347S		3/16"	T109-222
Chevrolet 2366S, SA		1/8"	T109-232
Chrysler 2314S, SA, 2367S, SA	①	5/32"	T109-236
Chrysler 2317S, 2444S, 2445S		7/32"	T109-283
DeSoto 2311S, SA	①	5/32"	T109-236
DeSoto 2317S, 2445S, 2476S		7/32"	T109-283
Dodge 2303S, SA, SB		7/32"	T109-283
Dodge 2443S, 2445S, 2476S		7/32"	T109-283
Dodge 2432S, 2474S		1/8"	T109-232
Mercury 2361S		1/8"	T109-232
Packard 2394S		1/8"	T109-232
Plymouth 2302S, SA, SB, 2442S		7/32"	T109-283
Pontiac 2364S		3/16'	T109-222
Studebaker 2214SA, SB, 2219SA, SB		3/16'	T109-222
Studebaker 2394S		1/8'	T109-232

① — Supersedes previous float setting of 1/8".

Secondary Floats

Car & Carb.		Hgt.	Gauge No.
Buick 2347S		3/16"	T109-222
Chevrolet 2366S, SA		1/4"	T109-223
Chrysler 2314S, SA, 2367S, SA	②	7/32"	T109-283
Chrysler 2317S, 2444S, 2445S		11/32"	T109-285
DeSoto 2311S, SA	②	7/32"	T109-283
DeSoto 2317S, 2445S, 2476S		11/32"	T109-285
Dodge 2303S, SA, SB, 2443S, SA		9/32"	T109-284
Dodge 2445S, 2476S		11/32	T109-285
Dodge 2432S, 2474S		3/16"	T109-222
Mercury 2361S		3/16"	T109-222
Packard 2394S		3/16"	T109-222
Plymouth 2302S, SA, SB		9/32"	T109-284
Pontiac 2364S		9/32"	T109-284
Studebaker 2214SA, SB, 2219SA, SB		3/16"	T109-222
Studebaker 2394S		3/16"	T109-222

② — Supersedes previous float setting of 3/16"

Float Drop—*Primary and Secondary Float Drop is different (except Oldsmobile, Pontiac, Studebaker). Check and adjust as follows* Hold bowl cover assembly upright so that floats hang down freely Use scale to measure distance from machined lower surface of bowl cover (gasket removed) to top of floats at center If distance not correct (see table below), adjust by bending stop tabs on float bracket

Fl at Drop S tting

Car & Carb.	Primary	Secondary
Buick 2347S	11/16"	11/16"
Chevrolet 2366S, SA	5/8'	3/4"
Chrysler 2314S, SA, 2367S, SA	① 21/32"	②23/32"
Chrysler 2317S, 2444S, 2445S	23/32"	27/32"
DeSoto 2311S, SA	① 21/32"	②23/32"
DeSoto 2317S, 2445S, 2476S	23 '32"	27/32'
Dodge 2303S, SA, SB, 2443S, SA	23/32"	25/32"
Dodge 2432S, 2474S	5/8"	11/16"
Dodge 2445S, 2476S	23/32"	27/32"
Mercury 2361S	5/8"	11/16"
Packard 2394S	5/8"	11/16"
Plymouth 2302S, SA, SB, 2442S	23/32"	25/32"
Pontiac 2364S	11/16"	11/16"
Studebaker 2214SA, SB, 2219SA, SB	11/16"	11/16"
Studebaker 2394S	5/8"	11/16"

① — Supersedes previous setting of 5/8".
② — Supersedes previous setting of 11/16"

BOWL VAPOR VENT

Bowl Vapor Vent (Atmospheric Idle Vent) Adjustment· *This vapor vent not used on all carburetors*

Checking & Adjustment—With dust cover and gasket installed Back out throttle lever stopscrew so that primary throttle valves fully closed Check clearance between lower edge of vapor vent valve and dust cover using Gauge T109-197. Clearance should be 1/16". Adjust by removing dust cover and bending vapor vent arm.

AUTOMATIC CHOKE

Automatic Choke Setting· See table below for settings Adjust by loosening choke cover screws and rotating cover and coil assembly Then adjust connector rod

Automatic Choke Setting

Car & Carb.	Choke Setting
Buick 2347S	1 Point Lean
Chevrolet 2366S, SA	Index
Chrysler 2314S, SA, 2367S, SA	1 Point Rich
Chrysler 2317S, 2444S, 2445S	Index
DeSoto 2311S, SA	1 Point Rich
DeSoto 2317S, 2445S, 2476S	Index
Dodge 2303S, SA, SB	1 Point Rich
Dodge 2432S, 2443S, SA, 2445S	Index
Dodge 2474S, 2476S	Index
Mercury 2361S	2 Points Rich
Packard 2394S	Index
Plymouth 2302S, SA, SB, 2442S (See below)	Index
Pontiac 2364S	① 1 Point Rich
Studebaker 2214SA, SB, 2219SA, SB	1 Point Rich
Studebaker 2394S	Index

① — See 'Pontiac Hard Starting Correction' above.

Plymouth 2302S, SA, SB & 2442S Choke Setting — "Cross Over" type choke mounted in well in manifold casting. To adjust, with unit off engine, loosen mounting post locknut and turn mounting post with screwdriver until index mark on disc is centered on scale. When choke installed on engine, lift cover disc and open and close choke valve manually to make certain connector rod clears sides of hole in housing cover. If rod does not clear, replace unit (bending rod will affect calibration).

Choke Rod· *This adjustment is preliminary to checking and adjusting Fast Idle, Unloader, and Secondary Throttle Lock-out.* Loosen choke lever clampscrew, insert wire gauge of correct thickness (see table below) between tang on fast idle cam and boss on throttle body casting (hold gauge in place by pressure on choke lever) and take up all slack in linkage Hold choke valve tightly closed and tighten clampscrew

Choke Rod Setting

Car & Carb.	Checking Gauge Size & No.
Buick 2347S	.020' T109- 29
Chevrolet 2366S, SA	.020" T109- 29
Chrysler (All Carburetors)	.020" T109- 29
DeSoto 2311S, SA, 2317S	.020" T109- 29
DeSoto 2445S, 2476S	.015" T109- 44
Dodge 2303S, SA, SB	.020" T109- 29
Dodge 2432S, 2443S, SA, 2474S	.020" T109- 29
Dodge 2445S, 2476S	.015" T109- 44
Mercury 2361S	①
Packard 2394S	.025" T109-189
Plymouth 2302S, SA, SB, 2442S	.020" T109- 29
Pontiac 2364S	.020" T109- 29
Studebaker 2214SA, SB, 2219SA, SB	.020" T109- 29
Studebaker 2394S	.025" T109-189

①—No clearance (cam lip should lightly contact boss on flange casting)

FAST IDLE

Fast Idle· *This adjustment can be made with carburetor "Off Engine" (on the bench) or "On Engin " (with engine operating)*

Fast Idle Adjustment "Off Engine" — Hold choke valve tightly closed so that fast idle cam is rotated to point where high step of cam is under fast idle screw (fast idle lug on Chevrolet). Turn fast idle screw (bend fast idle lug on Chevrolet) in or out until primary throttle valve opening is correct (see table below). Measure this opening between edge of valve and carburetor wall on side opposite idle ports.

Fast Idle Setting
"Off Engine"

Car & Carb	Checking Gauge Size & No.
Buick 2347S	.020" T109- 29
Chevrolet 2366S, SA	.015" T109- 44
Chrysler 2314S, SA, 2367S, SA	.012" T109-200
Chrysler 2317S, 2444S, 2445S	.006-.010" T109-200
DeSoto 2311S, SA	.012" T109-200
DeSoto 2317S, 2445S, 2476S	.006-.010" T109-200
Dodge 2303S, SA, SB	.012 T109-200
Dodge 2432S, 2474S, 2443S, SA	.012" T109-200
Dodge 2445S, 2476S	.006-.010" T109-200
Mercury 2361S	.023" T109-189
Packard 2394S	.023" T109-189
Plymouth 2302S, SA, SB	.015" T109- 44
Plymouth 2442S	.012" T109-200
Pontiac 2364S	.030" T109- 29
Studebaker 2214SA, SB, 2219SA, SB	.024" T109-189
Studebaker 2394S	.023" T109-189

Fast Idle Adjustment "On Engin "—Engine and Transmission must be at operating temperature, shift lever in neutral and air cleaner in place (Buick—Disconnect fast idle connector rod from trip lever so that cam may be held in "cold" position while engine running

CONTINUED ON NEXT PAGE

CARTER WCFB CARBURETORS (C nt.)

with choke valve fully open) On models listed below, rotate fast idle cam so fast idle screw rests on high step of cam Adjust fast idle screw to obtain fast idle speed as indicated in table below

Car M d l	Fast Idle Speed	Engine RPM
Buick		1300
Chevrolet		1800
Chrysler		1450-1500
DeSoto		1350-1400
Dodge		1300-1350
Mercury		① 650
Pontiac		1900
Plymouth		1350-1400

①—With fast idle screw on lowest step of cam.

UNLOADER

Unl ader: *After Choke Rod adjusted (above),* rotate primary throttle valves to wide open position and hold valves in this position Check choke valve opening by inserting correct Unloader Gauge (see table below) between edge of choke valve and air horn wall. With correct setting, choke valve should have slight drag on gauge Adjust by using bending tool T109-41 to bend unloader tang on throttle lever as required

Unloader Setting

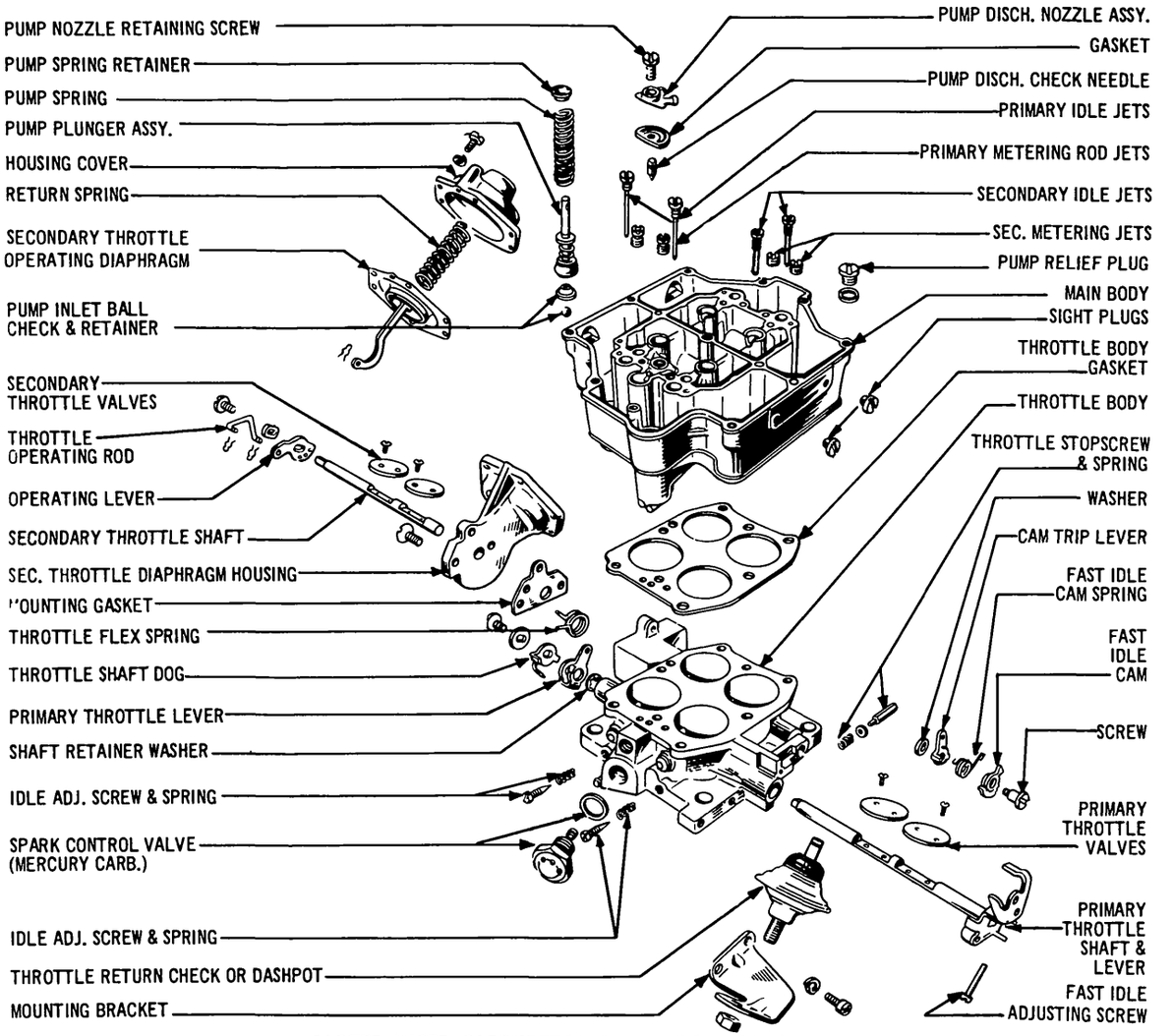
Car & Carb.	Checking Gauge Size & No.
Buick 2347S	5/32" T109-154
Chevrolet 2366S, SA	3/16" T109- 28
Chrysler (All Carburetors)	3/16" T109- 28
DeSoto 2311S, SA, 2317S	3/16" T109- 28
DeSoto 2445S, 2476S	11/64" T109-166
Dodge (Except 2432S, 2474S)	11/64" T109-166
Dodge 2432S, 2474S	3/16" T109- 28
Mercury 2361S	1/8" T109- 36
Packard 2394S	9/32" T109-126
Plymouth (All Carburetors)	11/64" T109-166
Pontiac 2364S	1/8" T109- 36
Studebaker 2214SA, SB, 2219SA, SB	1/8" T109- 36
Studebaker 2394S	9/32" T109-126

AUXILIARY THROTTLE VALVES

Auxiliary Throttle Valves (Buick 2347S, Chrysler 2317S, 2444S, 2445S, DeSoto 2445S, 2476S, 2317S, Dodge 2432S, 2474S, Packard & Studebaker 2394S, Plymouth 2302 S, SA, S3, Pontiac 2364S): Velocity type valves located directly above secondary throttle valves. On some models, these auxiliary valves are locked out when choke is operating and lockout adjustment is required. *NOTE* - No lockout adjustment required on Packard & Studebaker 2394S, Pontiac 2364S.

Auxiliary Throttle Valv Adjustment (Chrysler 2317S, 2444S, 2445S, De S t 2317S, 2445S, 2476S, Dodge 2432S, 2474S, Plym uth 2302S, SA, S3) — Disconnect secondary throttle operating rod. Adjust stop lug on secondary throttle lever using bending Tool T109-214 until clearance between lower edge of auxiliary throttle valve and bore is 27/64" (Gauge T109-242) with stop lug against stop on flange.

Auxiliary Throttl Lock ut Adjustment (All M d ls with Auxiliary Throttl Valv s Except Packard & Stud bak r 2394S, Pontiac 2364S) —After fast idle adjusted, proceed as follows· **(1)** With choke valve closed, make certain that edge of hook on lockout arm contacts auxiliary throttle lever with maximum contact on locking step on lever. **(2)** Open choke valve and make certain that auxiliary valves are unlocked a few degrees before choke reaches wide open position. Adjust be bending the lockout arm.



CARTER WCFB CARBURETOR THROTTLE BODY (WITH AUTOMATIC SECONDARY THROTTLE CONTROL)

SECONDARY THROTTLE LINKAGE

►*CAUTION: Adjustment procedure and settings differ due to diff rent linkage designs Secondary lock-out is not used on all carburetors with Auxiliary Throttle Lock-out (above)*

Secondary Throttle Linkage Adjustment (Buick 2347S, Chrysler 2317S, 2444S, 2445S, DeSoto 2317S, 2445S, 2476S, Dodge (All Carburetors), Plymouth (All Carburetors): Stop lug on both the primary throttle lever and secondary throttle lever should contact the stop bosses on the throttle body at the same instant *(NOTE* - At this point, secondary throttle valves will be a few degrees from wide open position). Adjust by bending secondary throttle operating rod at angle bend using T109-213 bending tool.

Ch vr l t, Packard, Pontiac & Stud bak r—Primary and secondary throttle valves must reach wide open

CONTINUED ON NEXT PAGE

CARTER WCFB CARBURETORS (C nt.)

position at same instant. Adjust by bending throttle operating rod at upper angle using T109-213 bending tool. Close both primary and secondary throttle valves tightly, check clearance between positive closing shoes on primary and secondary throttle levers. This clearance should be .017-.022" (Gauge T109-29 can be used). Adjust by bending the shoe on the primary lever.

Chrysler 2314S, SA, 2367S, SA, DeSoto 2311S, SA – Make following adjustments in order: **(1)** Move primary throttle valves to wide open position. Secondary valves should be 10° open (Chrysler), clearance between upper edge of secondary valves and bore should be .054" using gauge T109-193 (DeSoto). Adjust by bending secondary operating link. **(2)** Open primary throttle valves 40° (Chrysler), or until 1/4" gauge T109-31 can be inserted between upper edge of primary valve and bore (DeSoto). Secondary throttle valves should start to open at this point. Adjust by bending long tang on primary throttle shaft dog. **(3)** On Chrysler, bend flex spring arm to give positive tension on flex spring during last 5° movement of primary valves toward closed position. On DeSoto, hold primary and secondary throttle valves closed, bend short tang on primary throttle shaft dog for clearance of .040" (gauge T109-193) between short tang on primary throttle shaft dog and outer arm of flex spring.

Mercury–Block choke valve in wide open position, back out throttle stopscrew so that primary throttle stopscrew so that primary throttle valves fully closed Hold secondary throttle valves slightly open, close primary throttle valves. Secondary throttle valves should close tightly at same instant as primary valves. Hold primary valves closed. It should not be possible to open secondary valves. Adjust by bending throttle operating rod (Secondary connector rod) slightly at, the angle bend

Secondary Throttle Lock-out (Chevrolet, Packard, Pontiac, Studebaker): After fast idle and secondary throttle lever adjustment completed, crack primary throttle valves, manually close choke valve, then close throttle valve. Tang on secondary throttle lever should freely engage notch in lockout arm. Adjust by bending tang on secondary throttle lever.

Automatic Secondary Throttle Control (Chrysler 2314S, SA, 2367S, SA, DeSoto 2311S, SA): This unit requires no adjustment. Bend operating rod as necessary to insure secondary valves closing simultaneously with primary valves. See that linkage is free and that there are no vacuum leaks between carburetor body and unit.

CARTER CAR STARTER (BUICK)

Checking & Adjusting: Place transmission in neutral, set hand brake, remove left oil filler cap. Back off throttle stopscrew, see that fast idle cam in slow idle position, fully close throttle valve (On Dynaflow cars, see that Dashpot does not prevent throttle closing). Hold 6" scale or straightedge against rear face of throttle lever lower arm with scale resting on rocker cover. Mark rocker cover at edge of scale. Turn on ignition, slowly open throttle until starter begins to operate, make second mark on rocker cover at this point. Distance between marks should be ½-13/16". Adjust switch by changing timing shims on contact spring

OVERHAUL: *CAUTION–When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor reassembled.*

Disassembly: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Bowl and Throttle Body) which can be overhauled separately.

Air Horn & Bowl Cover–Remove fuel inlet fitting, gasket, and strainer assembly. Disconnect and remove choke connector rod, accelerating pump rod, secondary throttle return spring. Remove dust cover and gasket. Remove metering rods by rotating rods off pins on vacumeter link and lifting rods out carefully. Remove pump connector link by removing pin spring, sliding upper end of link out of pump lever, and rotating link around lever. Remove vent arm (when used) by taking out vent arm screw. Loosen (do not remove) screw holding pump operating lever on pump countershaft and screw in metering rod arm, slide pump countershaft and lever assembly out, remove pump arm and metering rod arm. Take out all air horn attaching screws (inner screws will be lifted out after air horn removed), make certain that screw located within pump countershaft housing is removed, lift air horn assembly straight up (*CAUTION*–use care not to damage floats). Disassemble remaining parts from air horn as follows: Invert air horn on bench, take out float hinge pins, remove floats with intake needles and clips attached, remove needle seats and gaskets (*CAUTION*–Keep each float assembly, intake needle, and needle seat together, DO NOT mix primary and secondary side parts). Remove vacuum piston by rotating it 90° in either direction and lifting it out. Remove accelerator pump plunger assembly. Remove and discard bowl cover gasket. If automatic choke to be disassembled, proceed as follows Remove choke lever from choke shaft, remove choke valve (file burrs from staked ends of attaching screws before removing the screws), take out attaching screws and remove thermostatic coil housing and gasket remove baffle plate, rotate choke shaft counter-clockwise to disengage vacuum piston from cylinder, withdraw choke shaft and piston assembly, disconnect piston from link by pushing piston pin out with a piece of wire. Take out attaching screws and remove choke housing and gasket (vacuum passage rubber gasket can be removed from inner side of choke housing by rotating gasket using blunt end of a thin wire).

Carburetor Bowl–Invert bowl to remove pump spring and vacuum piston spring. Take out housing screw and remove pump jet housing, gasket, and pump discharge check needle (needle will drop out if bowl inverted). Remove primary and secondary metering jets (*CAUTION*–keep these jets separate). Remove pump relief valve plug and gasket. Remove pump intake ball retainer from bottom of pump cylinder, invert bowl to remove intake check ball. Remove all primary and secondary low speed jets. (*NOTE* - No low speed jets used on secondary side of Cadillac 2371S, 2372S, 2374S, Chevrolet 2362S, 2419S, 2366S, SA, Mercury 2361S, SA, Packard, Pontiac or Studebaker carburetors). Loosen bowl to throttle body attaching screws, remove throttle body from bowl, remove screws, remove and discard gaskets.

Throttle Body – Remove two idle adjusting screws and springs (used on primary side only). Remove four idle port rivet plugs. Remove idle stop screw and spring, and fast idle adjusting screw. On carburetors with vacuum diaphragm assembly remove hairpin clips holding throttle operating link to primary and secondary operating levers. Slide link out and away from levers (don't lose washers). Disengage throttle flex spring from tang on throttle flex dog and slide flex dog off primary shaft. Remove operating lever and flex spring. Disconnect vacuum diaphragm plunger from secondary operating lever by removing hairpin clip. Remove operating lever retaining screw and washer, the slide lever off secondary throttle shaft. Remove screws attaching vacuum diaphragm to throttle body and remove diaphragm and gasket. On all carburetors, take out fast idle mounting screw, remove all fast idle parts (fast idle cam, spring, trip lever, and lockout cam and pawl). Remove primary-to-secondary throttle connector rod, remove secondary throttle lever by loosening clamp screw and sliding lever off shaft, remove primary throttle lever screw from end of shaft, remove all lever parts from shaft. On Buick carburetors, remove accelerator vacuum switch (remove terminal cap and spring, lift out switch guide block with contact spring and shims, turn body over to allow plunger and ball to drop out). **It is recommended that throttle body not be disassembled further,** however, if necessary to remove throttle valves and shaft, proceed as follows: *(NOTE - Mark all throttle valves so they can be reinstalled in the proper position with the correct side of valve upward).* File burrs from staked ends of all throttle valve screws and remove screws and valve from shaft. Remove secondary throttle shaft. Remove primary throttle shaft by using a rawhide hammer to tap shaft through retaining washer. Remove auxiliary throttle valves and shaft when so equipped.

Cleaning & Inspection: Wash all parts in carburetor cleaning solvent **except** pump plunger assembly, thermostatic coil and housing assembly, and choke housing gasket (clean these parts in clean gasoline). Clean and blow out all passages with compressed air. Remove all gum and carbon deposits. Make certain all calibrated restrictions are clean but DO NOT use drills to clean out these passages. Inspect floats for dents and leaks Check choke and throttle shafts for excessive wear, inspect pump plunger leather and replace plunger if cracked or creased. See that choke piston operates freely in cylinder (if carbon or dirt present in slots, remove welch plug in bottom of housing to clean slots, install NEW welch plug and make certain that it is air-tight).

Reassembly: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure (above), pay particular attention to the following points.

Valve Installation–Use new screws when installing valves, install primary and secondary as follows:

► *MERCURY SECONDARY THROTTLE VALVE INSTALLATION NOTE:* Place a piece of .002" x ¼" feeler gauge stock between lower edge of each secondary throttle plate and carburetor bore (side of bore closest to primary). Hold throttle tightly closed against feeler.

CONTINUED ON NEXT PAGE

CARTER WCFB CARBURETORS (Cont.)

Before tightening screws. shift valves to provide closest possible fit in barrel in closed position (short end of auxiliary valves should have a good bearing on stop bosses), tighten screws securely and stake ends lightly (*CAUTION*–Support shaft on steel block while staking screws). Install retaining washer on end of primary throttle shaft with prongs outward, press washer in on shaft just far enough to obtain snug fit without endplay in shaft.

①THROTTLE VALVE SETTING

Carb. No.	Idl Port Opening Primary	Secondary	Vacuum Port
2214, 19SA, SB	.113-.119"	④	②.000-.010"
2302S, SA, SB	.116-.122"	.059-.065"	③.022-.032"
2303S, SA, SB	.116-.122"	.059-.065"	③.035-.045"
2311, 14S, SA	.130-.134"	.071-.077"	③.032-.042"
2317S	.116-.122"	.059-.065"	③.035-.045"
2333, 34S, SA	.091-.097"	.050-.056"	③.027-.035"
2347S	.092-.098"	.065-.071"	②.008-.014"
2361S, SA	.107-.113"	④	③.025-.035"
2362S	.065-.071"	④	⑤
2364S, SA	.139-.145"	④	③.029-.039"
2366S, SA	.113-.119"	④	③.028-.038"
2367S, SA	.130-.134"	.071-.077"	③.032-.042"
2370SA	.091-.097"	.050-.056"	③.027-.035"
2371, 72, 73S	.061-.067"	④	③.007-.015"
2394S	.130-.136"	④	②.000-.006"
2419S	.065-.071"	④	⑤
2432S	.049-.055"	.059-.065"	③.035-.045"
2442, 43S	.092-.098"	.065-.071"	③.022-.032"
2444, 45S	.116-.122"	.059-.065"	③.035-.045"
2474, 76S	.116-.122"	.059-.065"	③.035-.045"
2543, 44, 45S	.091-.097"	.050-.056"	③.027-.035"

① – Port opening above top edge of throttle valve.
② – Bottom of port above top edge of valve.
③ – Top of port above top edge of valve.
④ – No secondary idle system.
⑤ – None used.

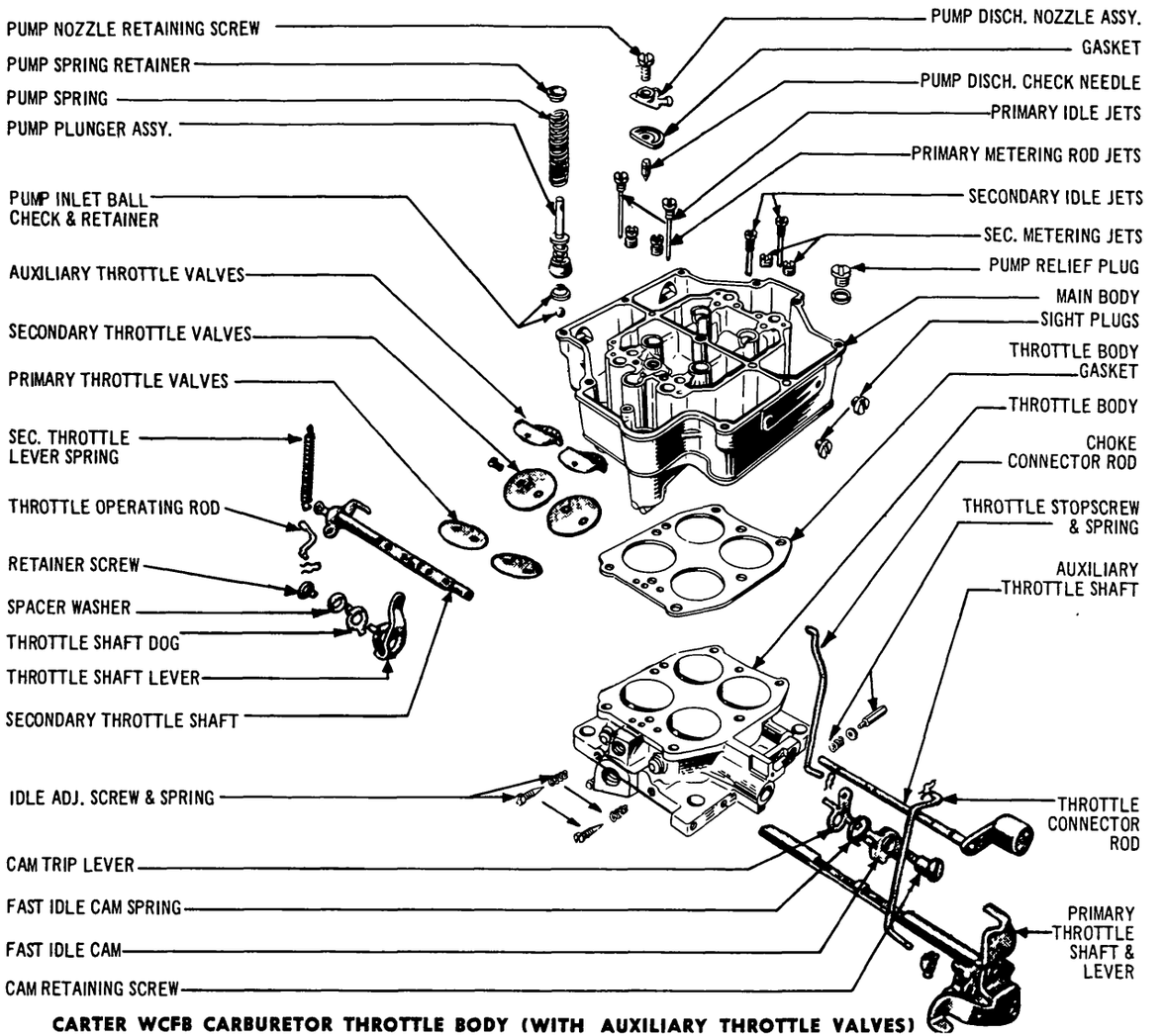
Buick Vacuum Switch Installation. Assemble contact spring in guide block with original number of timing shims. Place ball in body flange, guide block in switch plunger and install in body flange with grooved side of plunger upward toward main body flange. Install switch return spring and terminal cap.

Sec ndary Thr ttle Linkage–Secondary throttle lever, return spring, and operating rod design and hook-up differ on these carburetor models and each type should be assembled and connected as follows:

Buick–Single hole provided in primary throttle lever and secondary throttle lever for operating rod engagement. Likewise single hole provided in secondary throttle lever for return spring connection.

Cadillac – Install throttle connector link (end with short leg) in inner hole of secondary throttle lever. Long leg of link goes into hole nearest center of secondary actuating lever.

Chrysl r, D S t , Dodge & Plym uth (Carburet rs With ut Vacuum Controlled Automatic Sec ndary Thr ttl) - Connect secondary throttle operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in single hole of secondary throttle operating lever (on Secondary throttle shaft).



CARTER WCFB CARBURETOR THROTTLE BODY (WITH AUXILIARY THROTTLE VALVES)

Chrysler, DeSoto & Mercury (With Vacuum Controlled Automatic Secondary Throttle) - Connect throttle operating link in single hole of primary and secondary throttle levers.

Packard & Studebaker 2394S – Connect secondary operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in single hole of secondary throttle operating lever.

Chevrolet 2366S, Pontiac 2364S, Studebaker 2214, 19SA, SB – Connect secondary throttle operating rod in single hole in primary throttle inner lever and single hole in secondary throttle lever.

Choke Assembly–When installing choke housing, line up choke shaft hole with bore in air horn so that shaft will not bind.

Vacumet r Piston Link–Install link with lip or tang at center opening pointing toward air horn.

SERVICE PARTS: Gasket Sets – Carter No. 234 (2302S, SA, SB, 2303S, SA, SB, 2432S), No. 260 (2214SA, SB, 2219SA, SB), No. 269A (2317S, 2445S, 2474S, 2476S), No. 270 (2361S, SA), No. 273 (2347S), No. 277 (2333S, SA, 2334S, SA, 2370S, 2371S, 2372S, 2373S), No. 277A (2543S, 2544S, 2545S), No. 279A (2364S, SA), No. 281A (2366S, SA), No. 282 (2311S, SA, 2314S, SA, 2367S SA), No. 283 (2394S), No. 286 (2362S, 2419S), No. 288 (2442S, 2443S, 2444S).

Repair Package (With Standard Metering Rods) – Carter No. 1783 (2214SA, SB, 2219SA, SB), No. 1804A (2361S, SA), No. 1818 (2333S, SA, 2334S, SA, 2370S), No. 1819 (2371S, 2372S, 2374S), No. 1821A (2364S, SA), No. 1822A (2374S), No. 1828A (2366S. SA), No. 1829 (2394S), No. 1832 (2314S, SA), No. 1833 (2367S, SA), No. 1834 (2311S, SA), No. 1835S (2302S, SA, SB), No. 1847 (2543S, 2544S, 2545S).

1956 CARTER 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Metering Rod No.			Metering Rod Jet		Main Nozzl		Low Speed Jet		Pump Jet	
			Standard	1 Size Lean	2 Size Lean	Size	Part No.	Size	Part No.	Size	Part No.	Size	Part No.
BUICK													
50, 60, 70	1956	2347S Pri.	75-1231	75-1235	75-1236	.0995"	120-224	(10)		#66	11-288S	#70	48-226
		2347S Sec.				.086"	120-165	(10)		#66	11-288S		
CADILLAC Std. Engine													
All (No A.C.)	1956	2333S, SA Pri.	75-1229	75-1260U (42)		.096"	120-160	(10)		#67	11-286S	#74	48-185
		2333S, SA Sec.				.070"	120-222	(10)		#67	11-286S		
All (With A.C.)	1956	2334S, SA, Pri.	75-1229	75-1260U (42)		.096"	120-160	(10)		#67	11-286S	#74	48-185
		2334S, SA Sec.				.070"	120-222	(10)		#67	11-286S		
Repl. Carb.	1956	2370S, SA Pri.	75-1229	75-1260U (42)		.096"	120-160	(10)		#67	11-286S	#74	48-185
		2370S, SA Sec.				.070"	120-222	(10)		#67	11-286S		
CADILLAC Eldorado Eng.													
Front (No A.C.)	1956	2371S Pri.	75-1272 (43)	75-1301U (42)		.096"	120-160	(10)		#69	11-247S	#69	(45) 48-253S
		2371S Sec.				.059"	120-184	(10)					
Front (With A.C.)	1956	2373S Pri.	75-1272 (43)	75-1301U (111)		.096"	120-160	(10)		#69	11-247S	#69	(45) 48-253S
		2373S Sec.				.059"	120-184	(10)					
Rear (All)	1956	2372S Pri.	75-1272 (43)	75-1301U (111)		.096"	120-160	(10)		#69	11-247S	#69	(45) 48-253S
		2372S Sec.				.059"	120-184	(10)					
CHEVROLET V8													
V8 (Powerpack)	1956	2366S, SA Pri.	75-1161			.091"	120-155	(10)		#68	11-263S	#73	48-233S
		2366S, SA Sec.				.054"	(46) 120-227	(10)					
Corvette (Frt.)	1956	2419S Pri.	75-1255			.086"	120-165	(10)		#65	11-294S	#73	48-233S
		2419S Sec.				.051"	120-187	(10)					
Corvette (Rear)	1956	2362S Pri.	75-1255			.086"	120-165	(10)		#65	11-294S	#73	48-233S
		2362S Sec.				051"	120-187	(10)					
CHRYSLER													
C71 (Powerpack)	1956	2367S, SA Pri.	75-1263 (47)	75-1180	75-1181	.096"	120-160	(10)		.035"	11-278S	#74	48-174S
		2367S, SA, Sec.				.055"	120-174	(10)		.035"	11-278S		
C70, 72, 73	1956	2314S, SA Pri.	75-1263 (47)	75-1180	75-1181	.096"	120-160	(10)		.035"	11-278S	#74	48-174S
		2314S, SA Sec.				.061"	120-186	(10)		.035"	11-278S		
C72-300	Early 1956	2317S Pri.	75-1186	75-1178	75-1179	.089"	120-159	(10)		.0293"	11-247S	#74	48-174S
		2317S Sec.				.053"	120-217	(10)		.0293"	11-247S		
C72-300 (Frt.)	Late 1956	2444S Pri.	75-1273			.089"	120-159	(10)		.0293"	11-247S	#74	48-174S
		2444S Sec.				.055"	120-174	(10)		.0293"	11-247S		
C72-300 (Rear)	Late 1956	2445S Pri.	75-1274			.0935"	120-166	(10)		.0293"	11-247S	#74	48-174S
		2445S Sec.				.055"	120-174	(10)		.0293"	11-247S		
DE SOTO													
S24	1956	2311S, SA Pri.	75-1210 (48)			.096"	120-160	(10)		.035"	11-278S	#74	48-178S
		2311S, SA Sec.				.0595"	120-196	(10)		.035"	11-278S		
Advntr.	Early 1956	2317S Pri.	75-1186	75-1178	75-1179	.089"	120-159	(10)		.0293"	11-247S	#74	48-174S
		2317S Sec.				.053"	120-217	(10)		.0293"	11-247S		
Advntr. (Frt.)	Late 1956	2476S Pri.	75-1273			.089"	120-159	(10)		#69	11-247S	#74	48-174S
		2476S Sec.				.055"	120-174	(10)		#69	11-247S		
Advntr. (Rear)	Late 1956	2445S Pri.	75-1274			.0935"	120-166	(10)		#69	11-247S	#74	48-174S
		2445S Sec.				.055"	120-174	(10)		#69	11-247S		
DODGE													
D-63-3	Early 1956	2303S, SA, SB Pri.	75-1251 (49)	75-1280	75-1281	.089"	120-159	(10)		.032"	(50) 11-295S	#74	48-174S
		2303S, SA, SB Sec.				.0492"	120-181	(10)		.032"	(50) 11-295S		
D-63-3	Late 1956	2432S Pri.	75-1179			.0935"	120-166	(10)		#69	11-247S	#70	48-221S
		2432S Sec.				.057"	120-193	(10)		#69	11-247S		
D-63-3	Late 1956	2474S, SA Pri.	75-1181			.0935"	120-166	(10)		#69	11-247S	#74	48-174S
		2474S, SA Sec.				.057"	120-193	(10)		#69	11-247S		
D-500	1956	2443S, SA Pri.	75-1264			.0995"	120-224	(10)		.035"	11-278S	#74	48-174S
		2443S, SA Sec.				.067"	120-185	(10)		.035"	11-278S		
D-500 Spec. (Frt.)	1956	2476S Pri.	75-1273			.089"	120-159	(10)		#69	11-274S	#74	48-174S
		2476S Sec.				.055"	120-174	(10)		#69	11-274S		
D-500 Spec. (Rear)	1956	2445S Pri.	75-1274			.0935"	120-166	(10)		#69	11-274S	#74	48-174S
		2445S Sec.				.055"	120-174			#69	11-274S		

1956 CARTER 4-BARREL CARBURETOR JET SPECIFICATIONS (Continued)

Car Model	Year	Carburetor No.	Metering Rod No. Standard	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Size Lean	Metering Rod Jet Size	Metering Rod Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Low Speed Jet Size	Low Speed Jet Part No.	Pump Jet Size	Pump Jet Part No.
MERCURY													
Mercomatic	1956	2361S, SA Pri.	75-1206	75-1253	75-1254	.0935"	120-166	(10)		#69	11-282S	#67	48-218S
		2361S, SA Sec.	.....	.....	.....	.057"	(61) 120-193	(10)		.....	.....	.....	.....
PACKARD													
5660	1956	2394S Pri.	75-1241 (62)	75-1296	75-1312U (53)	.0935"	(54) 120-166	(10)		#65	11-287S	#72	48-195S
		2394S Sec.	.....	.....	.....	.0635"	(55) 120-176	(10)		.....	.....	.....	.....
PLYMOUTH													
P29 (Powerpack)	1956	2302S,SA,SB Pri.	75-1247 (56)	75-1178	75-1179	.089"	120-159	(10)		.031"	11-283S	#74	48-174S
		2302S,SA,SB Sec.	.....	.....	.....	.053"	(57) 120-217	(10)		.031"	11-283S	.....	.....
Fury	1956	2442S Pri.	75-1180	(58)	.....	.1015"	120-162	(10)		.035"	11-278S	#74	48-174S
		2442S Sec.	.....	.....	.....	.073"	120-175	(10)		.035"	11-278S	.....	.....
PONTIAC													
V8	1956	2364S, SA Pri.	75-1240	75-1269U (59)	75-1270U (60)	.0995"	120-224	(10)		.036"	11-291S	#72	48-235S
		2364S, SA Sec.	.....	.....	.....	.070"	(61) 120-222	(10)		.....	.....	.....	.....
STUDEBAKER													
56B, 56H (Synchro-mesh)	1966	2319SA, SB, Pri.	75-1141	75-1154	75-1155U (37)	.089"	120-159	(10)		#68	(18)	#73	48-228S
		2319SA, SB Sec.	.....	.....	.....	.0595"	120-196	(10)		.....	.....	.....	.....
56B, 56H (Auto. Trans.)	1956	2314SA, SB Pri.	75-1141	75-1154	75-1155U (37)	.089"	120-159	(10)		#68	(18)	#73	48-228S
		2314SA, SB Sec.	.....	.....	.....	.0595"	120-196	(10)		.....	.....	.....	.....
56J	1956	2394S Pri.	75-1241 (62)	.....	.....	.0935"	120-176	(10)		#65	(63) 11-294S	#72	48-195S
		2394S Sec.	.....	.....	.....	.0785"	120-166	(10)		.....	.....	.....	.....

(10) – Nozzle installed permanently. **Do not remove.**
(18) – Installed permanently. **Do not remove.**
(37) – Two sizes Lean Pkg. (Metering Rod 75-1164, Metering Jet 120-174, Vacuum Piston Spring 61-230).
(42) – Altitude Pkg. (Metering Rod 75-1258, Metering Jet 120-185).
(43) – Supersedes No. 75-1228.
(44) – Altitude Pkg. (Metering Rod 75-1299, Metering Jet 120-193, Vacuum Piston Spring 61-332).
(45) – Supersedes No. 48-243S (#70).
(46) – Supersedes No. 120-187.
(47) – Supersedes No. 75-1210.
(48) – Supersedes No. 75-1143.
(49) – Supersedes No. 75-1227.
(50) – Supersedes No. 11-285S.
(51) – Supersedes No. 120-176.
(52) – Supersedes No. 75-1230.
(53) – Two Sizes Lean Pkg. (Metering Rod 75-1297 & Metering Jet 120-186).
(54) – Supersedes No. 120-165.
(55) – Supersedes No. 120-176.
(56) – Supersedes No. 75-1222.
(57) – Supersedes No. 120-181.
(58) – One Size Rich No. 75-1210.
(59) – One Size Lean Pkg. (Metering Rod 75-1267 & Metering Jet 120-228).
(60) – Two Sizes Lean Pkg. (Metering Rod 75-1268 & Metering Jet 120-185).
(61) – Supersedes No. 120-226 (2364S only).
(62) – Supersedes No. 75-1230.
(63) – Supersedes No. 11-287S.

CARTER DUAL "WCD"

NASH	Carter Carburetor No.
1956 Statesman	2350S
WILLYS	
1956 6-226 "L" Early	2204S

DESCRIPTION: Dual downdraft carburetors with automatic choke. Same design as used on previous models except as noted below.

ADJUSTMENT: *Set these carburetors to the following specifications:*

►*CAUTION—Adjust only with engine warmed up so that choke valve wide open and fast idle inoperative. See individual car model pages for complete Tune-Up instructions.*

IDLING ADJUSTMENT

Idle Mixture Screw Setting

Car	Idle Screw Opening
Nash	½-1½ turns
Willys	1-2 turns

Idle Speed Setting

Car	Synchro-mesh	①Auto. Trans.
Nash	550 RPM	② 475 RPM
Willys	500 RPM	

① — With Selector Lever in Neutral.
② — 500 RPM with Air Conditioning turned on.

ACCELERATING PUMP

Pump Stroke Checking Note—"Gauge" reading in table below is gauge reading with gauge inverted on edge of dust cover boss on carburetor and gauge finger just touching upper end of plunger shaft, "Scale" reading is distance from top of pump plunger shaft to top of dust cover boss as measured with a scale. Throttle stopscrew must be backed out so that throttle valves tightly closed and pump plunger connector link must be connected in correct hole of pump arm on countershaft as listed below when checking pump stroke. Adjust by bending throttle connector rod at upper angle. Then check and adjust metering rods.

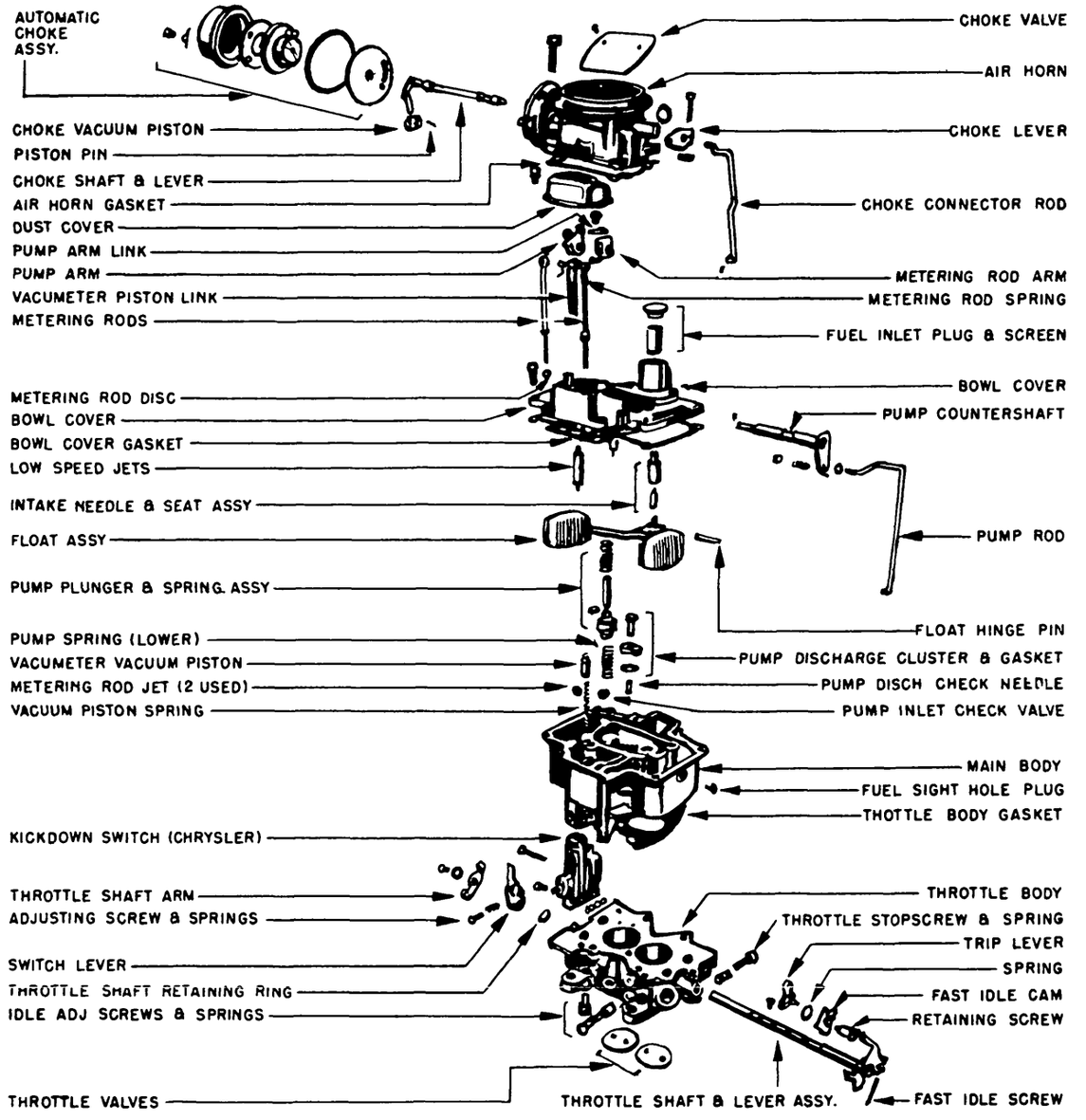
Pump Stroke Setting

Car	Gauge	Scale	Pump Setting
Nash			Special (Below)
Willys	33	22/64"	Long Stroke

►*NASH PUMP STROKE ADJUSTMENT CAUTION—* On these models, back out throttle stopscrew so that throttle valves seated (see that fast idle screw does not hold throttle open). Place straightedge across top of dust cover boss at pump arm. Flat on top of pump arm should be parallel to straightedge. Adjust by bending throttle connector rod at upper angle using bending tool T109-213.

METERING ROD SETTING

Metering Rod Check— Check and adjust rods as follows: Back off throttle lever stopscrew so that throttle valves tightly closed, loosen metering rod arm clampscrew (on countershaft under dust cover on bowl cover), press down on vacumeter link until both metering rods just bottom in carburetor casting, rotate metering rod arm until finger on arm contacts lip on vacumeter link, tighten clampscrew (*CAUTION*—do not disturb arm position).



CARTER "WCD" DUAL CARBURETOR

FLOAT LEVEL SETTING

Float Level Setting—With bowl cover and float assembly removed from carburetor, invert assembly, remove cover gasket, install correct gauge on cover directly under floats with notched portions of gauge fitting over edge of cover casting. Sides of floats should just barely touch vertical legs of gauge (lateral adjustment). Adjust by bending arms of floats. Both floats should just clear horizontal portion of gauge (vertical adjustment).

►***FLOAT SETTING CAUTION—Floats must be adjusted laterally (parallel to gauge uprights) as well as vertically (Float Level figure in table below).***

CONTINUED ON NEXT PAGE

CARTER "WCD" (C nt.)

Float Level Setting

Car	Float Level	Checking Gauge
Nash	5/32"	T109-196
Willys	3/16"	T109-28

►*NASH "SPLIT" FLOAT NOTE* Float assembly consists of two floats (right & left hand) and auxiliary lever Floats are adjusted in same manner as on other carburetors and should be set for uniform height (float level or vertical adjustment)

Fuel Level Note—Quick check for correct float setting can be made by removing sight hole plug on side of bowl. Fuel level should be even with bottom of sight hole (or just run out of hole with engine idling).

CLIMATIC CONTROL (CHOKE) SETTING

Car	Choke Setting
Nash	Centered (At Index)
Willys	Centered (At Index)

FAST IDLE SETTING

CAUTION—TWO settings (1) and (2) required as explained below.

(1) Fast Idle Cam Clearance—Loosen choke valve lever clampscrew on choke shaft, insert gauge of correct thickness (See Checking Gauge (1) in table below) between lip of fast idle cam and boss on flange casting, hold choke valve tightly closed, remove all slack from linkage by pressing choke valve lever toward closed position, tighten choke valve lever clampscrew.

(2) Fast Idle Screw Setting—Hold choke valve tightly closed, tighten fast idle adjusting screw against high step of fast idle cam until throttle valve opening or clearance between edge of valve and carburetor bore on side opposite idle ports is correct (see Checking Gauge (2) in table below

Car	Setting & Checking Gauge (1)	(2)
Nash	026" T109-189	020" T109-29
Willys	040" T109-193	016" T109-29

UNLOADER SETTING

►*CAUTION—Fast Idle Cam Clearance (Fast Idle Setting (1) above) must be adjusted before Unloader Setting is adjusted*

Car	Choke Opening	Checking Gauge
Nash	3/16"	T109-28
Willys	1/8"	T109-36

Unloader Setting—Check choke valve opening with throttle valve held wide open. Adjust by bending unloader lip on throttle shaft lever using bending tool T109-41

THROTTLE VALVE SETTING

Car	Idle Port	Vacuum Port
Nash	③.074-.080"	⑤.033-.043"
Willys	⑤.125-.131"	⑤.027-.037"

③—Opening above upper edge of throttle valve

⑤—Top of port above upper edge of valve

OVERHAUL: *See "Carter WCD" in Carburetion Section of 1955 Final Data or later Manual editions.*

SERVICE PARTS

Gasket Sets – Carter No. 258 (2204S), No. 285 (2350S).
Repair Pkg. – Carter No. 1836 (2350S).

CARTER DUAL "WGD"

	Carter Carburetor No.
BUICK	
1956 Series 40 S-M	2378S
1956 Series Dynaflow	2400S
HUDSON	
1956 Hornet (Champion 6)	2252S
1956 Hornet V8	2231S,SA
1956 Hornet Spec. V8	2352S
NASH	
1956 Ambassador V8	2231S,SA
1956 Ambassador Spec V8	2352S
PACKARD	
1956 5640	2393S

►CHANGES & CORRECTIONS

►*1956 HUDSON & NASH POOR WARM-UP PRODUCTION CHANGE & CORRECTION* The following items were changed in production and are incorporated in Unitized package Carter No 75 1271-U, Hudson Nash No 311-9897 for installation in earlier carburetors

Vacuum Piston Spring (2231S,SA before Code date M-5) - Heavier Vacuum Piston Spring No 61 332 replaced Vacuum Piston Spring No 61-226 to improve choke operation, on later carburetors

Metering Rods (2231S Carbs.) - Metering Rods with 003" smaller power step used starting with Engine Serial Number P-24900

NOTE - Before installing these parts in earlier carburetors, they should be checked for the following items

1) Choke valve must have minimum of 005" clearance between valve and air horn from full open to full closed position
2) Choke valve shaft must be free of gum deposits, and operate freely in air horn.
3) Unloader arm must not bind on fast idle link (bend unloader arm to obtain clearance)
4) Baffle must be installed correctly with no bind and choke shaft arm must extend through small circular hole in outer revolving baffle
5) Choke piston must be free in bore
6) Choke heat tube must be free of any obstruction.
7) Automatic Choke must be set to specifications, plus or minus one notch

DESCRIPTION: Dual (double barrel), downdraft type with Carter Climatic Control of same design as used on previous models.

ADJUSTMENT: *Set carburetors to these specifications:*

IDLING ADJUSTMENT

►*CAUTION: Adjust only with engine warmed up so that choke valve is wide open and fast idle screw inoperative.*

Idle Screw Setting

Car & Carb.	Idle Screw Opening
Buick 2378S	1/4 - 1 1/4 turns
Buick 2400S	1/2 1 1/2 turns
Hudson 2252S	1 3/4 2 3/4 turns
Hudson 2231S,SA	1/2 - 1 1/2 turns
Hudson 2352S	1 2 turns
Nash 2231S,SA	1/2 - 1 1/2 turns
Nash 2352S	1 2 turns
Packard 2393S	3/4 1 3/4 turns

Idle Speed Setting

Car & Carb.	Synchro-mesh	Ⓒ Auto. Trans.
Buick 2378S	450 RPM	450 RPM
Buick 2400S	450 RPM	450 RPM
Hudson 2252S	② 540-560 RPM	490-510 RPM
Hudson 2231S,SA	425 RPM	425 RPM
Hudson 2352S	550 RPM	③ 425 RPM
Nash 2231S,SA	425 RPM	425 RPM
Nash 2352S	550 RPM	③ 425 RPM
Packard 2393S	450-500 RPM	④ 450-500 RPM

Ⓒ With selector lever in "N" Neutral, compressor running on air conditioned cars.

② Overdrive 575 RPM

③ 450 RPM with air conditioning turned on

④ With selector lever or button in "H" range

ACCELERATING PUMP

Pump Stroke Check—Back off idle screw to fully close throttle valves and have choke valve wide open Place straight edge across dust cover boss at pump arm Bend throttle rod at upper angle (Tool T109-213) until pump arm is parallel with straight edge

METERING ROD ADJUSTMENT

►***CAUTION—Adjust metering rods AFTER Pump Stroke adjustment has been completed.***

Adjustment Note—*No Gauge required*..Remove dust cover, back off throttle lever stopscrew so that throttle valves tightly closed, loosen clampscrew on metering rod arm on pump countershaft, press down on vacumeter link until metering rods just bottom in carburetor casting, hold link and rods in this position, revolve metering rod arm until lip on arm just contacts vacumeter link, tighten clampscrew.

FLOAT LEVEL

Float Level Checking Note—Remove bowl cover and float assembly and invert so that float hangs freely with needle valve closed. Measure from top of float at center to gasket face on cover. Adjust by bending lip on float arm.

Float Level Setting

Car & Carb.	Checking Gauge	Float Level
Buick 2378S	T109 31	1/4'
Buick 2400S	T109 31	1/4"
Hudson 2252S	T109 31	1/4"
Hudson 2231S,SA	T109 31	1/4"
Hudson 2352S	T109-106	7/32"
Nash 2231S SA	T109 31	1/4"
Nash 2352S	T109 106	7/32"
Packard 2393S	T109-28	3/16"

FAST IDLE SETTING

Fast Idle Checking Note—Thermostatic coil housing, gasket, and baffle plate must be removed. Crack throttle valve (to allow choke to close), close choke valve, then close throttle (will allow fast idle cam to revolve to fast idle position). With choke held tightly closed and slight tension on throttle lever, measure clearance between edge of throttle valve and carburetor wall on side opposite idle port See table below for correct clearance or throttle valve opening Adjust by bending choke connector rod at lower angle

CONTINUED ON NEXT PAGE

CARTER "WGD" (C nt.)

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Buick 2378S	T109-44	.015"
Buick 2400S	T109-44	.015"
Hudson 2252S	T109-29	.030"
Hudson 2231S,SA	T109-29	.030"
Hudson 2352S	T109-189	.023"
Nash 2231S,SA	T109-29	030"
Nash 2352S	T109-189	.023"
Packard 2393S	T109-189	.024"

►*CAUTION—Unloader must be checked and adjusted after Fast Idle adjustment completed.*

UNLOADER

Unloader Checking Note—Unloader must be adjusted AFTER fast idle adjustment has been made. Hold throttle valve wide open and close choke valve as far as possible (*CAUTION*—DO NOT force valve closed), check choke valve opening or clearance between upper edge of valve and air horn wall. Adjust by bending unloader arm on throttle lever with Tool T109-105 (except Packard 2393S), by bending unloader arm on choke piston lever with Tool T109-213 (Packard 2393S)

Unloader Setting

Car & Carb.	Checking Gauge	Choke Opening
Buick 2378S	T109-154	5/32"
Buick 2400S	T109-154	5/32"
Hudson 2252S	T109-106	7/32"
Hudson 2231S,SA	T109-28	3/16"
Hudson 2352S	T109-28	3/16"
Nash 2231S,SA	T109-28	3/16"
Nash 2352S	T109-28	3/16"
Packard 2393S	T109-36	1/8"

AUTOMATIC CHOKE SETTING

Car & Carb.	Choke Setting
Buick 2378S	Centered (At Index)
Buick 2400S	Centered (At Index)
Hudson 2252S	Centered (At Index)
Hudson 2231S,SA	One Point Rich
Hudson 2352S	Centered (At Index)
Nash 2231S,SA	One Point Rich
Nash 2352S	Centered (At Index)
Packard 2393S	Two Points Rich

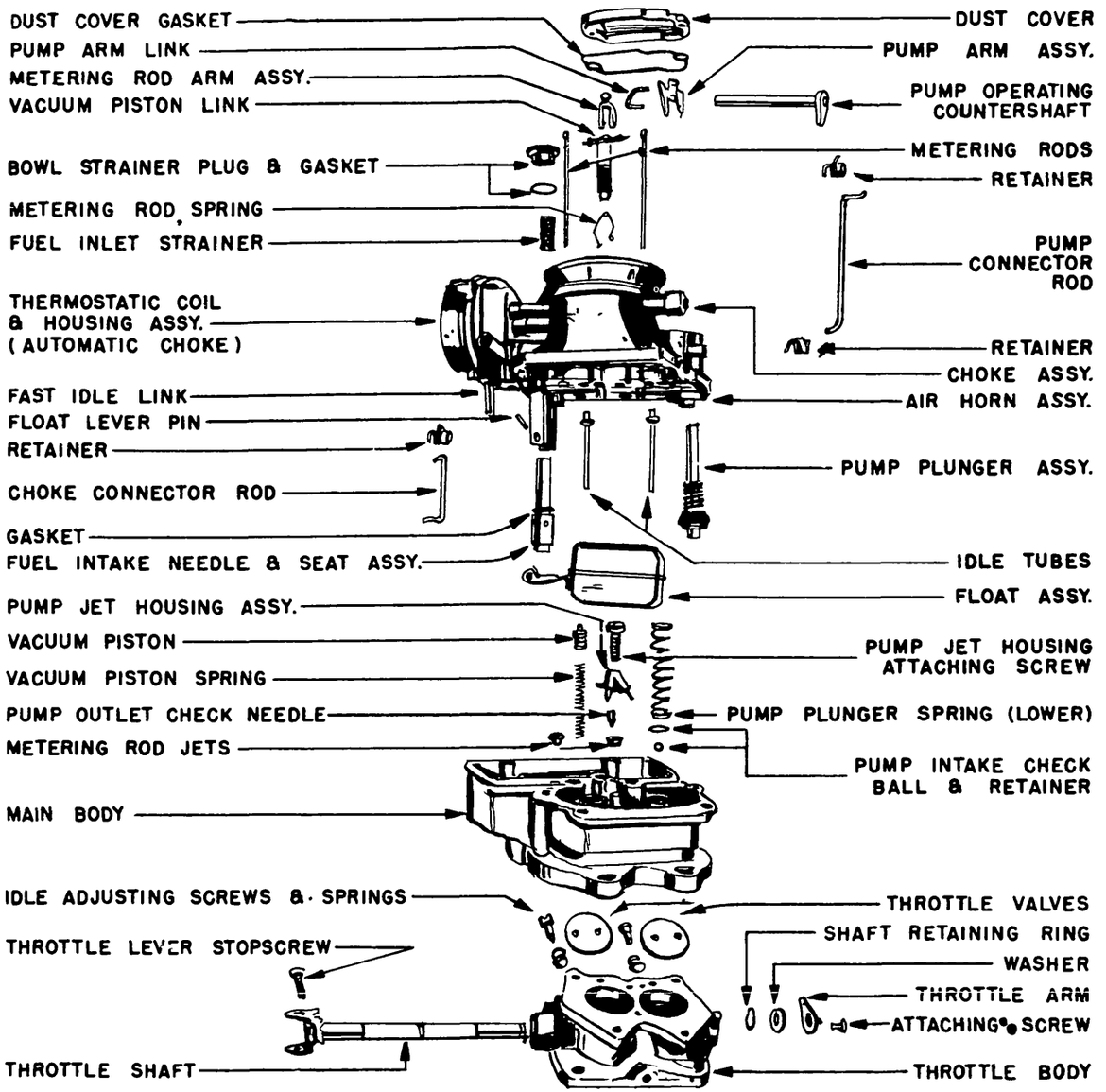
Throttle Valve Setting

Car & Carb.	① Idle Port	Vacuum Port
Buick 2378S	.077 .083"	② .010-.016"
Buick 2400S	.077-.083"	② .010-.016"
Hudson 2252S	.112- 118"	③ .028"
Hudson 2231S	.109-.115"	② .038-.044"
Hudson 2231SA	.109-.115"	② .018-.024"
Hudson 2352S	.109-.115"	② .018-.024"
Nash 2231S	.109-.115"	② .038- 044"
Nash 2231SA	.109-.115"	② .018-.024"
Nash 2352S	.109-.115"	② .018-.024"
Packard 2393S	.109-.115"	② .000-.006"

① Opening above upper edge of throttle valve.
② Bottom of port above top edge of throttle valve.
③ Top of port above top edge of throttle valve.

CAR STARTER SETTING

Car Starter Switch Adjustment (Buick)—Connect test lamp across starter switch Hold choke valve wide open, adjust idle speed screw until it just contacts stop lug on throttle lever when throttle is fully closed Hold a scale between center of idle screw and top edge of throttle lever stop lug, open throttle until light comes on, indicating contact Distance from top edge of stop lug to center of idle speed screw should be between 31/64" and 11/16" Adjust by adding or reducing number of shims in switch guide block Shims available Carter Nos 153-11 (018") and 153-12 (006")



CARTER TYPE WGD CARBURETORS

OVERHAUL: *See 1955 Annual Data or later Manual dition.*

SERVICE PARTS

Gask t Sets - Carter No. 249 (2231S,SA, 2252S, 2393S), No. 274 (2378S, 2400S), No. 289 (2352S).

Repair Pkg. - Carter No. 1802A (2231S,SA), No 1823 (2378S), No. 1824 (2400S), No. 1831 (2393S), No 1843 (2352S).

CARTER "AS" DOWNDRAFT

RAMBLER	Carter Carburetor No.
1956 (Nash & Hudson)	2349S

►CHANGES & CORRECTIONS

► *CARBURETOR FLOAT PRODUCTION CHANGE:* Carburetors with Brass Tag Date B-6 or higher have split floats. *See "Float Level" for adjustment of split type float carburetors.*

► *CARBURETOR FLOODING (Date Prior to B-6) CORRECTION:* If flooding is eliminated on early carburetors by loosening needle seat, (gas line to carburetor fitting), it indicates a bind or interference between float hinge and inner end of float needle seat. To correct, install needle and seat assembly, Carter No. 25-313S, included in Repair Kit 1816A.

DESCRIPTION: Single barrel downdraft type, with automatic choke and fast idle. Fuel for idle and early part throttle operation is supplied through low speed circuit. Fuel for part throttle and full throttle operation is supplied through high speed circuit.

Low Speed Circuit - Gasoline enters idle well through metering rod and step up jets. Low speed jet measures amount of fuel for idle and early part throttle operation. Air by-pass, economizer, and idle air bleed are calibrated and break up liquid fuel mixing it with air prior to its reaching idle and idle adjusting screw ports.

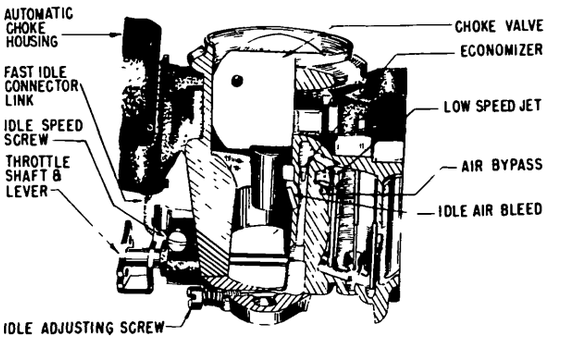
High Speed Circuit - Position of metering rod in metering rod jet, and step up rod in step up jet, controls amount of fuel admitted to high speed nozzle. *NOTE* - Metering rod is larger in diameter at its lower end. As throttle is opened, metering rod moves downward and more fuel will flow through metering rod jet. Vacuum at vacuum piston controls position of step up rod. Step up rod is held in down position by manifold vacuum overcoming step up piston spring tension, metering fuel around large diameter of step up rod in step up rod jet. When vacuum drops, spring tension moves rod out of jet into power position. *NOTE* - There is no adjustment for step up rod. Permanently installed anti-percolating plugs or bushings and passages prevent vapor bubbles in nozzle passage and low speed well by venting vapors and relieving pressure so fuel is not pushed out nozzle.

ADJUSTMENTS: Set these carburetors to the following specifications:

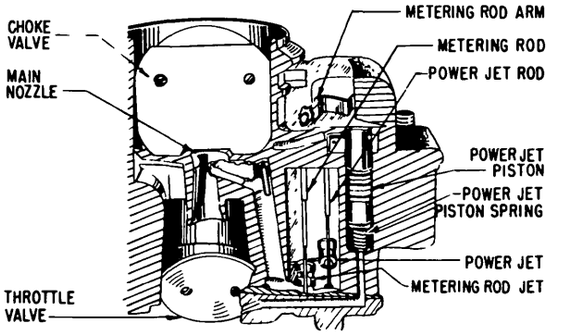
Idling Adjustment: Warm up engine thoroughly, so that choke valve is wide open and fast idle inoperative. See table for idle screw setting. Turn screw out for richer mixture. See car model pages for complete tune-up data.

Idle Mixture Setting

Car & Carb.	Idle Screw Setting
Rambler All Models	1/4 - 1 1/2 turns



CARTER "AS" LOW SPEED SYSTEM



CARTER "AS" HIGH SPEED SYSTEM

Idle Speed Setting

Car & Carb.	S-M & O.D.	Auto. Trans.
Rambler All Models	550 RPM	① 475 RPM

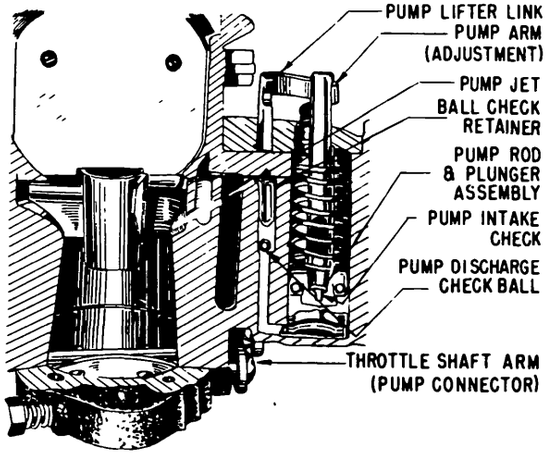
① - 500 RPM in Neutral with air conditioning turned on.

Float Setting: *See "Float Production Change" above.* Remove bowl cover, gasket and float pin retainer. Gauge and adjust each float arm against seated needle, making sure that float pin is at bottom of its guide slot. Measure distance from top surface of body casting and top of float shell at free end. Adjust by bending lip on float arm. Install float pin retainer, invert carburetor so floats will contact seated needle. Clearance between overlapping tangs on float levers should be .010-.015". To adjust bend long tang on left hand float.

Float Setting

Car & Carb.	Checking Gauge	Float Setting
Rambler All Models	T109-282	1/4"

Pump Adjustment: Top of pump arm that engages slot in pump shaft must be parallel to top surface of bowl cover. To adjust bend pump arm.



CARTER "AS" PUMP SYSTEM

Metering Rod Adjustment: With throttle wide open, metering rod should just bottom in carburetor casting. To adjust bend metering rod arm. When metering rod is properly adjusted, some movement can be noted around eye of metering rod retainer clip when throttle is moved slightly from wide open position. If rod is too low, it will tend to push metering rod retainer clip up. If rod is too high, it will be possible to push rod down.

Fast Idle Adjustment: Remove thermostat coil housing, gasket and baffle plate. Crack throttle valve and hold choke valve closed to rotate fast idle cam to fast idle position. Close throttle. Measure clearance between throttle valve and bore of carburetor (side opposite idle port). See table below. Adjust (bending Tool T109-213), by bending link at lower angle.

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Rambler All Models	T109-158	.043"

Unloader Adjustment: Hold throttle valve wide open and close choke valve without forcing it. Measure clearance between upper edge of choke valve and inner wall of carburetor air horn. See table below. To adjust, bend choke shaft unloader arm.

Unloader Setting

Car & Carb.	Choke Opening
Rambler All Models	3/16"

Choke Setting: 1 point lean.

SERVICE PART: **Gasket Set** - Carter No. 276 (2349S). **Repair Pkg.** - Carter No. 1816A.

CARTER "YH" HORIZONTAL

CARTER "YH" HORIZONTAL

NASH	Carter Carburetor No.
1956 Amb.6 Super Jetfire	2368S
1956 Amb.6 Lemans Dual Jetfire	Two 2369S

►CHANGES, CAUTIONS, CORRECTIONS

►*NASH DUAL JETFIRE CAUTION:* TWO carburetors used per engine with interconnected throttle linkage. CARBURETORS MUST BE ADJUSTED AS SHOWN BELOW.

DESCRIPTION: "YH" type horizontal carburetors are similar to "YF" models with modifications as required for horizontal operation.

ADJUSTMENT: ***Make all adjustments exactly as follows:***

►*IDLING ADJUSTMENT CAUTION: Models with TWO carburetors must be adjusted exactly as detailed below for proper synchronization and correct performance.*

Idle Setting: Set idle mixture and idle speed as follows:

Idle Mixture Setting

Car & Carb.	Idle Mixture Setting
Nash (All Models)	¼ - 1¾ turns

Idle Speed Setting

Car Model	S-M & O.D.	Automatic Trans.
Nash (All Models)	500 RPM	Ⓒ 475 RPM

Ⓒ – 500 RPM with Air Conditioning turned on. In Neutral.

►***NASH DUAL JETFIRE IDLE ADJUSTMENT (Two-carburetor installation):***

1) Remove air cleaner boots and "Tee" from carburetor air horns.

2) Adjust throttle stopscrew on rear carburetor as follows: Hold choke valve open, back off throttle stopscrew until throttle valve is just closed, then turn screw in approximately 2 turns to crank throttle valve slightly. Adjust front carburetor similarly.

3) Start engine and allow it to idle until normal temperature reached. Attach Tachometer.

4) Adjust rear carburetor stopscrew for minimum idle speed (see above).

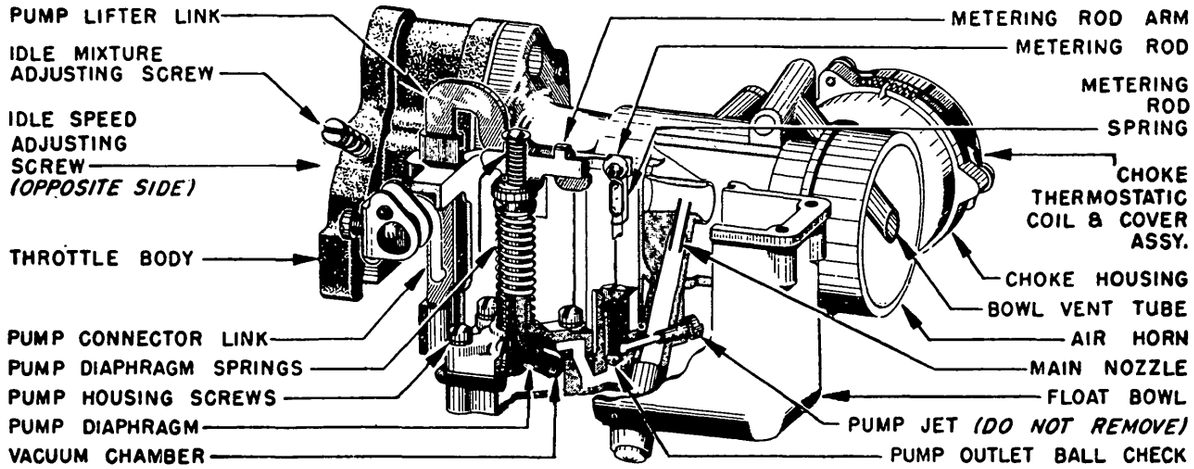
5) While noting idle speed, synchronize front carburetor by adjusting connecting throttle linkage between carburetors, opening front carburetor throttle just to the point where a further opening begins to increase engine speed. At this point, air suction noise in both carburetors should be identical.

6) Replace air cleaner boots and "Tee" connections.

7) Adjust idle mixture on rear carburetor by turning adjusting screw in (to lean mixture) until engine begins to be rough, then turn screw out ¼ turn. Adjust idle mixture for front carburetor similarly.

8) Recheck idle speed. If not within limits (see above), repeat throttle synchronization (1 thru 5).

Metering Rod Setting: ***CAUTION—Gauge required for this setting.*** Back off throttle stopscrew so that throttle valve fully seated, remove bowl cover assembly, unhook metering rod spring from rod and **remove metering rod,** insert correct gauge in place of rod and make certain tapered end is seated in metering rod jet (hold gauge vertical to insure correct seating in jet). Press down on diaphragm shaft until metering rod arm contacts lifter link at diaphragm stem. At this point, metering rod pin should rest lightly on metering rod gauge. Adjust by bending metering rod arm at undercut point using bending tool T109-22. Make certain that metering rod arm contacts lifter **at diaphragm shaft and at outer end of lifter link.** Remove gauge and re-install metering rod. Reset idle speed.



CARTER "YH" HORIZONTAL CARBURETOR

Metering Rod Setting

Car Model	Checking Gauge & Length
Nash (All Models)	T109-104 (2.312")

Float Level: Remove bowl cover and float assembly and remove cover gasket. Invert cover so that float hangs freely. Check float height at highest point on float by inserting gauge between float and cover. Adjust by bending float lever.

CAUTION—Do not compress spring in intake needle which would cause incorrect setting.

Float Drop—Check by holding bowl cover assembly in upright position so that float drops to limit of travel. Distance from float seam at free end of float to underside of bowl cover should be 2⅜". Adjust by bending stop tab on float arm.

Float Setting

Car & Carb.	Float Setting	Checking Gauge
Nash Amb. 2368S	5/16"	T109-107
Nash Amb. 2369S	7/16"	T109-81

Fast Idle Setting: Remove coil housing gasket, and baffle plate (for access to fast idle cam located within choke housing). Open throttle valve partially (to free fast idle linkage), close choke valve fully, close throttle valve. Hold choke valve tightly closed, apply slight tension to throttle lever to remove play from linkage, check throttle valve opening (clearance between edge of valve and carburetor bore on side opposite idle port). If clearance not correct, adjust by bending throttle connector link at lower angle using tool T109-213. Check Unloader.

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Nash Amb. 2368S	T109-29	.030"
Nash Amb. 2369S	T109-44	.018"

Unloader: After making fast idle adjustment (above), hold throttle valve in wide open position and close choke valve as far as possible ***(CAUTION—do not*** force valve beyond point where it is held open by unloader arm). Check choke valve opening (clearance between lower edge of wall and air horn wall). If clearance not correct, adjust by bending choke shaft unloader arm using tool T109-105.

Unloader Setting

Car & Carb.	Checking Gauge	Check Opening
Nash Amb. 2368S	T109-83	1/2"
Nash Amb. 2369S	T109-85	5/8"

CHOKE SETTING

Choke Setting

Car & Carb.	Check Setting
Nash Amb. 2368S	1 Point Rich
Nash Amb. 2369S	2 Points Lean

THROTTLE VALVE SETTING: ***See OVERHAUL data for throttle valve installation.*** With valve correctly installed, Idle Port Height (top of port above top edge of valve) and Vacuum Spark Port (bottom of horizontal port above top edge of valve) with throttle valve tightly closed should be:

Throttle Valve Setting

Car & Carb.	Ⓒ Idle Port	Vacuum Spark Port
Nash (All Models)	.124-.128"	② .026-.036"

Ⓒ – Top of Port above top edge of valve.

② – Bottom of port above top edge of valve.

OVERHAUL (With Carburetor removed from engine):

Disassembly: Remove bowl strainer nut and gasket, take out inlet screen. Remove bowl cover assembly (bowl cover, float, intake needle and seat). Remove choke connector rod, throttle shaft arm assembly, and pump connector link. Take out throttle valve screws, remove valve, remove throttle shaft by carefully tapping it through shaft retaining ring. Take out attaching screws and remove body flange assembly (throttle body) and gasket. Unscrew idle mixture adjusting screw and spring. Use tool T109-210 to remove idle passage rivet plug. Take out four diaphragm housing attaching screws, lift out entire diaphragm and metering rod assembly, disassemble this unit. Remove pump intake passage plug and ball check from diaphragm housing. Remove meter-

CONTINUED ON NEXT PAGE

CARTER "YH" (Cont.)

ing rod jet, pump discharge check plug, spring, ball, and low speed jet. Take out attaching screws and remove climatic control and housing assembly, remove gasket, baffle plate, and fast idle link. Take out choke valve attaching screws, remove choke valve, revolve choke shaft counter-clockwise until piston clears cylinder, remove choke shaft, fast idle cam, and piston as an assembly. Take out attaching screw and remove choke piston housing assembly and gasket. Remove all passage plugs.

▷*CAUTION—DO NOT remove Nozzle, Bowl Vent, Tube, Economizer, Passage Bushings, or Pump Jet.*

Cleaning & Inspection: Wash all parts except climatic control coil and housing assembly in cleaning solution. Remove all carbon from flange bore, blow out all passages with compressed air. If choke piston is not free in cylinder, remove welch plug from bottom of housing and clean out all carbon and dirt from cylinder walls and grooves. Install NEW welch plug air tight. Inspect all parts for wear or damage.

Reassembly: Use all NEW gaskets. Reassemble parts by reversing order of disassembly procedure (above) and note the following points:

Throttle Valve & Shaft Installation—After throttle valve shaft installed in body, back off throttle stopscrew, install throttle valve with trademark (c in circle) toward idle port when viewed from manifold side of body, insert screws loosely, tap valve lightly to center it in bore before tightening screws. *See Throttle Valve Setting (above).* Install throttle centering washer (prongs outward) while pressing on shaft at lever end, press washer tight against casting (use drive end of ⅜" drive ½" socket to press washer in place). Check throttle shaft for free operation after centering washer installed.

Pump Diaphragm Installation—Make certain that discharge hole in diaphragm is aligned with passage in diaphragm housing, install the four attaching screws through housing holes and diaphragm so that it is held smoothly against housing. After baffle plate installed in fuel bowl, install diaphragm assembly in the bowl and tighten the attaching screws evenly. Check for free operation.

Climatic Control Installation—After choke piston housing and gasket installed on body, install choke shaft, fast idle cam, and piston assembly in air horn and check for free operation (if shaft binds loosen housing attaching screws and align housing). Install choke valve so that trademark (c in circle) is visible when valve closed, use new attaching screws, tap valve lightly before tightening screws.

SERVICE PARTS: Gasket Sets – Carter No. 284 (2368S). 284A (2369S).
Repair Pkg. (With Std. Metering Rod) – Carter No. 1830 (2368S).

CARTER YF

WILLYS — Carter Carburetor No.
1956 Jeep Dispatcher (4 Cyl. "L" Hd.) 2392S
1956 Universal Jeep (4 Cyl. "F" Hd.) 938SA
1956 Others (4 Cyl. "F" Hd.) 951S
1956 Others (6 Cyl. L6-226) Later 2467S

▷*1956 JEEP ACCELERATION (OFF-IDLE) STUMBLE (Carter 938SA Carburetor Code-dated before E6):* If acceleration stumble (just off idle) not corrected by complete Tune-Up including check for correct opening of Cooling Thermostat, make changes listed below. *NOTE - Carburetors c de dated E6 and later have the enlarged (.031") pump jet and do not require this modification.* 1) Enlarge Pump Jet - Increase size of original Pump Jet (No. 72 drill or .025") to .031" using a No. 68 drill. Pump jet is pressed-in part and cannot be removed. 2) Adjust Carburetor - Make certain that Pump Discharge Ball Check seats properly. Float Level and Metering Rod Settings are critical and must be made carefully. 3) Metering Rod Change - In unusual operating conditions, 1 Step Rich Metering Rod, No. 75-913, may be helpful in improving performance.

DESCRIPTION: Single barrel downdraft type of same design as used on previous models.

ADJUSTMENT: *Set to following specifications:*

Idle Setting: Adjust only with engine warmed up so that choke valve is wide open and fast idle inoperative. See table for screw settings. Turn screw out for richer mixture. See Car Model pages for complete tune-up data.

Car & Carb.	Idle Screw Opening	Idle Speed
	Idle Setting	
Willys 938SA, 951S	3/4-1 3/4 turns	600 RPM
Willys 2392S	1/2-2 turns	600 RPM
Willys 2467S	1-2 1/2 turns	600 RPM

Float Setting: Invert air horn and float cover assembly allowing float to hang freely, and measure from top of float at free end to bowl cover (gasket removed). Adjust by bending lip which contacts intake needle - do not bend float arm.

▷*CAUTION: On models with spring-loaded intake needle, do not compress this spring when checking float level (will result in false reading and incorrect float setting).*

Car & Carb.	Checking Gauge	Float Setting
	Float Setting	
Willys 951S, 938SA	T109-107	5/16"
Willys 2392S, 2467S	T109-126	9/32"

Accelerating Pump: Diaphragm type pump with ball check discharge valve (except 2467S), discharge needle (2467S). On 2467S only, check pump adjustment whenever carburetor disassembled or pump linkage disturbed before checking and adjusting Metering Rod.

Pump Adjustment (2467S) - With idle speed screw backed off so that throttle valves fully seated, press down on on upper end of diaphragm shaft until it is bottomed in diaphragm housing (Tool T109-212 may be used to hold diaphragm shaft down in this position). In this position, metering rod arm should contact pump lifter link at outer end nearest the springs. Adjust by bending pump connector link at lower angle using bending tool T109-213. *CAUTION - Bending link at any other point may cause binding of pump lifter link.*

Metering Rod Adjustment: *No gauge required.* Air horn and bowl cover must be removed for access to metering rod. Back off throttle lever stopscrew so that throttle valve completely closed. Press down on upper end of diaphragm stem until diaphragm bottoms in vacuum chamber (tool T109-212 can be used to hold diaphragm down). Metering rod arm must contact lifter link flat surface between springs and at supporting lug under metering rod pin spring (see note below for first carburetors without this lug) and the metering rod should contact the bottom of the metering rod well at the same instant. Adjust by bending lip of metering rod arm to which metering rod is attached up or down.

Fast Idle: To check fast idle, hold choke valve in wide open position and check to see that lip on fast idle arm is in contact with boss on carburetor body casting. To adjust, bend fast idle arm rod at lower offset.

Car & Carb.	Throttle Valve Setting ① Idle Port	① Vac. Spark Port
Willys, 951S, 938SA, 2392S	.168-.172"	.035-.045"
Willys, 2467S	.143-.147"	.019-.029"

① - Top edge of port above top edge of throttle valve.

OVERHAUL (With Carburetor removed from engine): Disassemble in the sequence given and group all related parts before reassembly.

Disassembly: 1) Remove pin springs and fast idle connecting rod springs, remove fast idle connector rod. Take out air horn and bowl cover attaching screws, remove choke tube clamp, lift off air horn and gasket.

2) Take out pump disc check valve retainer ring (when used), lift out retainer and pump check valve disc or pump discharge needle. Then remove throttle shaft arm assembly from end of throttle shaft (pump connector link, shaft seal spring, dust seal washer, felt dust seal). Unscrew four pump diaphragm housing attaching screws, lift out entire pump and metering rod assembly.

3) Disassemble pump by removing attaching screws, pin spring, metering rod, upper pump spring retainer, upper pump spring, metering rod arm, pump lifter link, diaphragm spring retainer, diaphragm spring, and diaphragm housing. Remove intake strainer from housing (use knife tip to lift flat type strainer out of housing recess). On carburetors with disc type intake check valve, remove valve plug assembly.

4) Remove metering rod jet from body casting. Remove Low Speed Jet assembly.

▷*CAUTION: Do not attempt to remove pressed-in parts such as Nozzle, Pump Jet and Anti-percolator Air Bleed.*

5) Take out three body flange (throttle body) attaching screws, remove throttle body from main body.

CONTINUED ON NEXT PAGE

CARTER YF (C nt.)

6) Remove idle adjustment screw and spring, idle port rivet plug, throttle lever assembly and washer, fast idle arm. Take out throttle valve attaching screws, lift valve out, remove throttle shaft, remove shaft seal by prying out seal retainer.

►*CAUTION Do not attempt to remove vacuum passage orifice restriction which is pressed in.*

7) Remove float pin, lift out float, remove needle and seat assembly from air horn casting.

8) Take out choke valve screws, lift choke valve out, unhook choke spring, slide choke shaft out of housing. If necessary to replace choke lever assembly, pry off choke lever retainer ring (in end of shaft), remove lever assembly from shaft.

►*CAUTION· Do not attempt to remove balance vent tube.*

Cleaning & Inspection: Wash all parts in carburetor cleaning solution. *(CAUTION*–do not immerse diaphragm assembly, pump check disc, or seals in the solution). Inspect all parts for wear or damage, replace if necessary. Blow out all passages with compressed air.

Reassembly: Use all new gaskets. Assemble by reversing the disassembly order as given above and note the following important points.

Throttle Valve Installation–Install valve with trademark (c) toward idle port when viewed from manifold side of flange. Install screws loosely, tap valve and then hold with fingers to insure it being centralized in bore, tighten screws securely.

Metering Rod Jet Installation–DO NOT use a gasket with this jet.

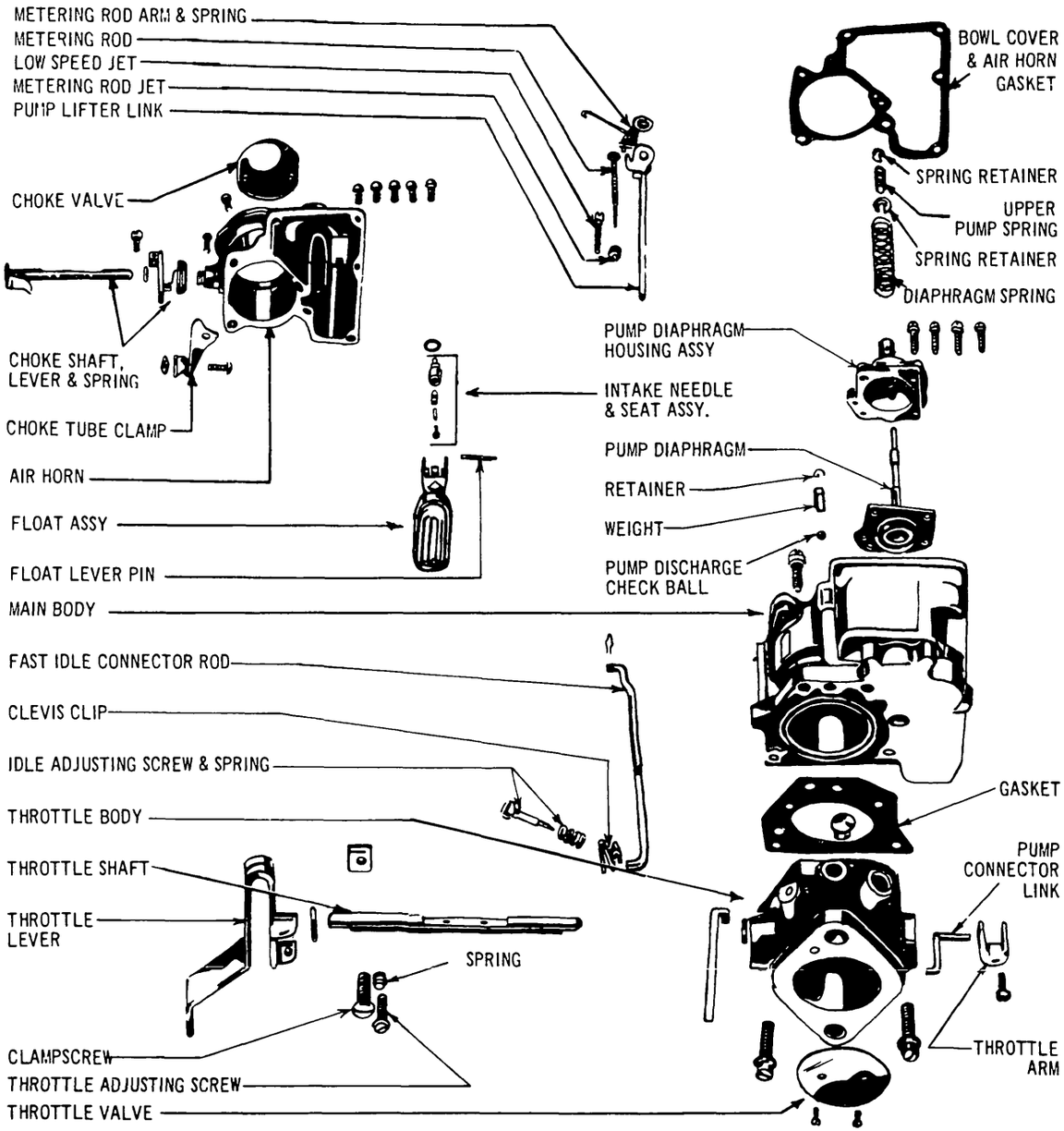
Pump Diaphragm Assembly Installation–Make certain that intake check valve (when used) is properly installed in diaphragm housing. **Disc** type check valve is an assembly screwed in the underside of the housing (may have strainer screen on bottom end of valve assembly). **Ball** type check valve fits in intake passage in housing with a retainer below the ball. Before tightening housing attaching screws, make certain that diaphragm is flat and that edges are not wrinkled, then tighten screws securely.

Pump Linkage–Check pump linkage to make certain that it does not bind in any position. If binding noted, loosen throttle arm clampscrew and adjust throttle arm, retighten clamp screw.

Float Intake Needle & Seat Assembly–Soak new gasket in 90 proof alcohol for 15 minutes, install and let dry on needle seat before installing this part. When installing float, make certain that shoulder on float pin is on side away from carburetor bore.

Choke Valve Installation–Install the attaching screws loosely, center valve by tapping on valve lightly and hold in this position with fingers while tightening screws securely.

Fast Idl Linkag -Install connector rod with offset end upward, and with pin spring on outside.



CARTER "YF" DOWNDRAFT CARBURETOR

►*CARBURETOR INSTALLATION CAUTION:* Special slotted type flange gasket must be used to install carburetor on engine. Diaphragm type metering rod and accelerating pump control will not function if this gasket not used.

SERVICE PARTS: Gasket Set - Carter No. 206A (938SA, 951S), 200 (2392S), 241 (2467S).

R pair Pkg. (With Std. M tering R d) - Carter No. 1599C (951S, 938SA), 1546B (2392S), 1849 (2467S).

CARTER "WE"

STUDEBAKER — **Carter Carburetor No.**

1956 Champion (Early) 2108S
1956 Champion (Later) 2417S

DESCRIPTION: Single barrel downdraft type with automatic choke and fast idle. Similar to design used on previous Champion models.

ADJUSTMENT: *Set these carburetors to the following specifications:*

IDLING ADJUSTMENT

Idle Screw Setting - ½-1½ turns open. Turn screw out for richer mixture. Adjust only with air cleaner in place and with engine at normal operating temperature (choke valve open, fast idle inoperative).

Idle Speed – 550 RPM (With selector lever in "N" or "P" position on "Flightomatic" or "Automatic Transmission" cars).

ACCELERATING PUMP SETTING

Pump Stroke Setting - Check pump travel after carburetor has been reassembled. Back off throttle stopscrew so that throttle valve tightly closed, remove dust cover. Install Pump Gauge T109-117S on bowl cover with lip of gauge extending over plunger shaft and gauge held vertically, turn nut on gauge until lip contacts top of plunger shaft, note gauge reading. Open throttle wide and again note gauge reading. Difference in two readings should be 14/64". Adjust by bending throttle connector rod at lower angle using T109-213 bending tool.

METERING ROD SETTING

Checking & Adjustment - Remove metering rod and install Metering Rod Gauge No. T109-102 (2.468") in place of the rod making certain that gauge seated in metering rod jet. With throttle stopscrew backed off so that throttle valve tightly closed, press down lightly on metering rod arm so that upper lip of arm contacts pin in pump arm. At this point, clearance between metering rod pin and shoulder of notch in gauge should be less than .005"and gauge should not contact pin Adjust by bending upper lip of metering rod arm using bending tool T109-105. *Then check and adjust lower (economy) lip as follows:-* Remove gauge,press down on metering rod arm until upper lip contacts pump arm pin. Clearance between pin and upper surface of lower lip should be 3/16" (Float Level Gauge T109-28 can be used). Adjust by bending the lower lip.

ANTI-PERCOLATOR SETTING

Checking & Adjustment - Crack throttle valve open .030" by placing **large** end of Gauge T109-29 between edge of valve and carburetor wall on side opposite idle port. Clearance between rocker arm lip and pump arm should be .025" (Gauge T109-189 can be used to check this clearance). Adjust by bending rocker arm using bending tool T109-105.

FLOAT LEVEL

Checking & Adjustment - Remove and invert bowl cover assembly so that float in closed position. Measure distance from top of projection on bowl cover to top edge of soldered seam on float using gauge T109-80 (3/8"). Adjust by bending lip on float lever which contacts intake needle.

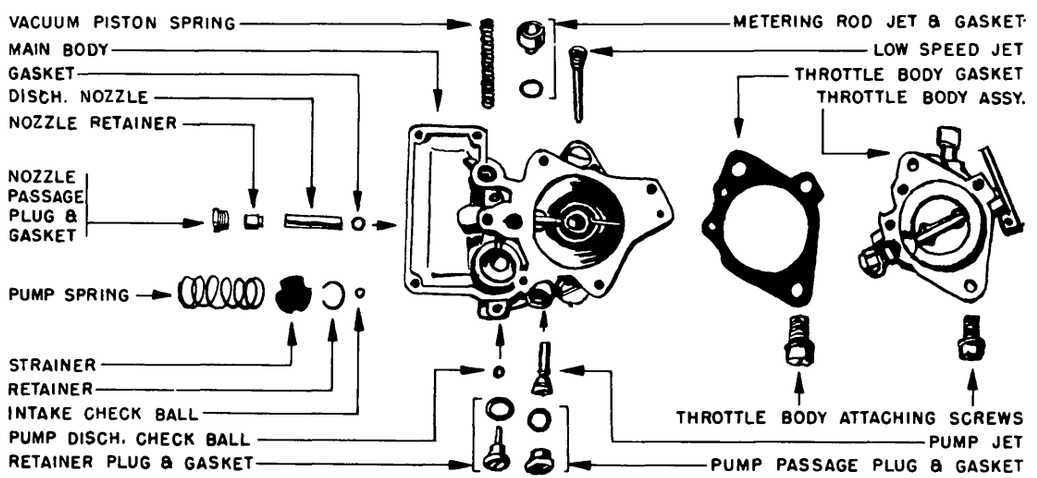
THROTTLE VALVE SETTING

Idle Port Opening - Top of lower idle port should be .112-.116" above upper edge of throttle valve.

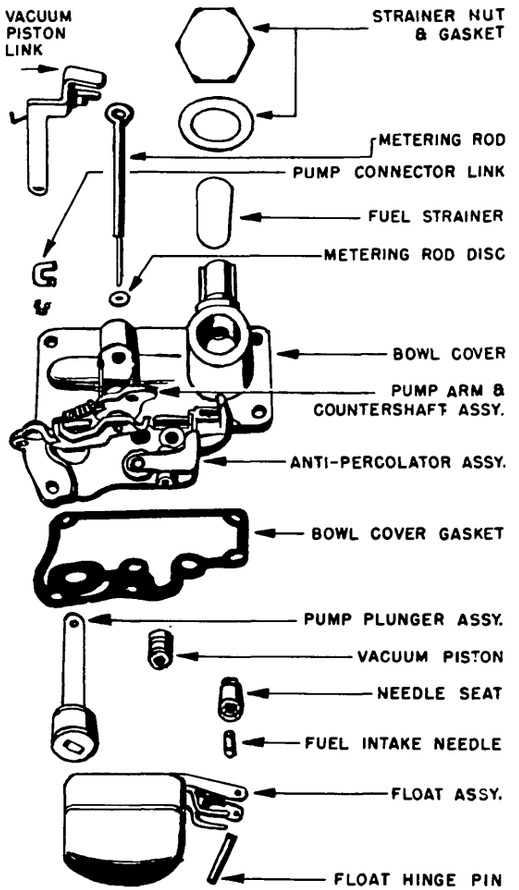
Vacuum Spark Port - Top of port should be .060-.070" above upper edge of throttle valve.

FAST IDLE SETTING

Checking & Adjustment - With thermostatic coil housing, gasket, and baffle plate removed, crack throttle valve to allow choke valve to close, close choke valve, move throttle valve toward closed position as far as possible. Check remaining throttle valve opening which should be .046" (.045" end of gauge T109-158 may be used). If opening not correct, adjust by bending choke connector rod at lower angle using bending tool T109-213. Then adjust Unloader.



"WE" MAIN BODY & THROTTLE BODY ASSEMBLY



"WE" BOWL COVER ASSEMBLY

UNLOADER SETTING

Checking & Adjustment - After fast idle adjustment completed, open throttle valve fully, close choke valve as far as possible without forcing. Check remaining choke valve opening using gauge T109-28 (3/16"). If opening not correct, bend arm on choke trip lever (within choke housing) using bending tool T109-214.

AUTOMATIC CHOKE SETTING

Setting (All Carburetors) ..... 1 Point Lean

Adjustment - Loosen retainer screws around rim of cover, rotate cover and thermostatic coil assembly clockwise (for leaner setting) or counter-clockwise (for richer setting).

OVERHAUL: *See "Carter WE" carburetors in 1955 Annual Data or later Manual edition.*

SERVICE PARTS

Gasket Sets - Carter No. 235.
Repair Pkg. (With Std. Metering Rod) – Carter No. 1746 (2108S), 1837 (2417S).

CARTER WA1

HUDSON	Carter Carburetor No.
1956 Wasp (Hi-Torque)	2009SA
1956 Wasp (Twin H-Power)	Two 2013S
1956 Hornet 6 (Twin H-Power)	Two 2113S

DESCRIPTION: Single barrel downdraft carburetors of same design used on previous models.

ADJUSTMENT: ***CAUTION—See special "Twin Carburetor" adjustment procedure below.***

IDLING ADJUSTMENT

Single Carburetor—*See special Twin Carburetor adjustment procedure below.* Adjust only with engine warmed up to normal operating temperature with choke valve wide open and fast idle inoperative. Set throttle stopscrew for correct idle speed, then adjust idle mixture screw for smooth idle (turn screw out for richer mixture), recheck idle speed.

►*TWIN CARBURETOR ADJUSTMENT:* **Hudson**—Remove clevis pins from throttle shaft-to-carburetor rod clevises. Connect vacuum gauge and tachometer. Hold fast idle cam in normal idle position, adjust idle screws to just seat valves in closed position. "Crack" rear throttle valve and adjust idle mixture screws (Wasp ½-1½ turns out, Hornet 1¼-2¼ turns out). Warm up engine to normal operating temperature. With front carburetor throttle valve closed, adjust rear carburetor idle speed 25 to 40 RPM less than specified below. Adjust rear carburetor mixture for best operation Adjust front carburetor idle speed to point of 10 to 15 RPM increased idle speed, and adjust idle mixtures Readjust rear carburetor to bring idle speed to specifications and then adjust front carburetor until a slight increase in speed is noted Readjust idle mixture for best mixture and manifold vacuum. Adjust throttle shaft to carburetor rod clevis, retaining throttle valves in idle position and accelerator linkage in released position. Reinstall the clevis pins

Idle Screw Setting—(2009SA) ½-1½ turns open, (2113S) 1¼-2¼ turns open, (2013S, 780S) ¾-1¾ turns open

Idle Speed (Hudson)—540-560 RPM (Std. Trans.), 575 RPM (Overdrive), 490-510 RPM (Hydra-Matic with selector lever in Neutral). *NOTE*—On Air-conditioned Cars, compressor should be running.

ACCELERATING PUMP

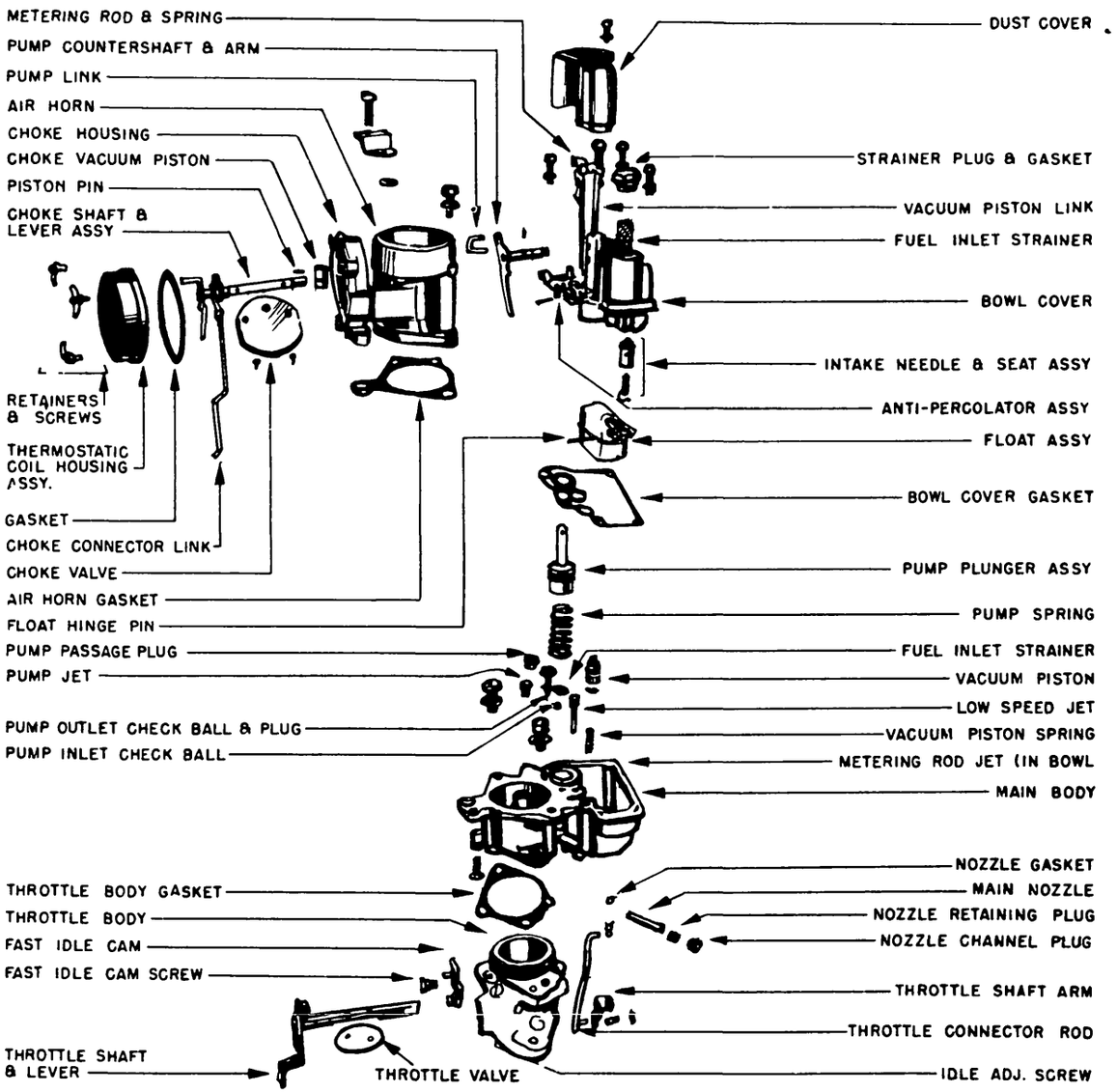
Pump Stroke Adjustment—Use Pump Gauge T109-117S to measure travel of plunger stem from closed to open position with pump link connected in correct hole of countershaft arm (see table). Place base of gauge on ridged portion of bowl cover with projecting portion resting on top surface of connector link at pump plunger shaft, read gauge at closed throttle, and again at open throttle position).

Accelerating Pump Stroke

Car Model	Pump Stroke	Pump Setting
Hudson (All)	16 (16/64")	Medium Stroke

METERING ROD SETTING

Carb.	Checking Gauge
2009SA	T109-241
2013S	(2.468") T109-102
2113S	(2.468") T109-102



CARTER WA1 DOWNDRAFT CARBURETOR

Checking & Adjustment— Insert gauge in place of metering rod, seating tapered end in metering rod jet and holding gauge vertical. Back off throttle stopscrew so valve seated, press down on vacuum piston link until it contacts pump arm. Clearance between metering rod pin and notch in gauge should be less than .005" at this point and gauge must not drag on pin.

ANTI-PERCOLATOR

Carb.	Checking Gauge	Throttle Opening
2009SA	T109-29	②.030"
2013S. 2113S	T109-44	016"

②—Use LARGE end of gauge.

Crack throttle valve open by placing correct gauge for each model (see table above) between the edge of valve and carburetor wall on side opposite idle ports. Clearance between lip on rocker arm and pump arm should be .010". Adjust by bending rocker arm.

FLOAT LEVEL

Carb.	Checking Gauge	Float Setting
2009SA	T109-81	7/16"
2013S	T109-31	¼"

CONTINUED ON NEXT PAGE

CARTER WA1 (C nt.)

Checking & Adjustment—With bowl cover and float assembly removed, invert assembly so that float holds intake needle in closed position, place correct gauge (see table) on upper edge of raised projection on cover. Upper edge of soldered seam on free end of float should be even with top edge of gauge. Adjust by bending lip on float arm which contacts intake needle.

THROTTLE VALVE SETTING

Carb	①Idle Port	Vacuum Spark Port
2009SA	120-.124"	②.005-.015"
2013S	.103-.107"	③.010-.020"
2113S	178-.182"	③.049"

①—Port opening above top edge of valve.
②—Bottom of port above top edge of valve.
③—Top of port above top edge of valve.

CLIMATIC CONTROL (CHOKE) SETTING

Carb.	Choke Setting
2009SA	Centered (At Index)
2013S, 2113S	1 Point Lean

FAST IDLE

Carb.	Checking Gauge	Choke Opening
2009SA, 2113S	T109-85	5/8"
2013S	T109-83	1/2"

Checking & Adjustment—Use correct gauge (see table). Check with fast idle cam in normal (slow) idle position. With throttle lever stopscrew against cam, hold throttle valve closed, rotate fast idle cam until screw is against (not on) first step of cam. Use gauge to check choke valve opening or clearance between lower edge of valve and air horn wall.

UNLOADER

Carb.	Checking Gauge	Choke Opening
2009SA	T109-84	9/16"
2113S	T109-84	9/16"

Checking & Adjustment—Use correct gauge for each model. Open throttle valve wide, use gauge to check choke valve opening or clearance between lower edge of valve and air horn wall. Adjust by bending cam on throttle lever using tool T109-41.

OVERHAUL: *See "Carter WA1" carburetors in 1955 Annual Data or later Manual edition.*

1956 CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Metering Rod No. Standard	1 Size Lean	2 Size Lean	Metering Rod Jet Size	Part No.	Main Nozzle Size	Part No.	Low Speed Jet Size	Part No.	Pump Jet Size	Part N .
BUICK													
40 Synchro-mesh	1956	2378S	75-1239	75-1245	75-1246	.086"	120-165		⑩	.028"	11-181S	#70	⑤1 48-249
40 Dynaflow	1956	2400S	75-1238	75-1246	75-1234	.086"	120-165		⑩	.028"	11-181S	#70	⑤1 48-249
HUDSON													
Wasp Std.	1956	2009SA	75-914	75-920	75-921 ③2	.1015"	120-191S	⑪	12-280S	#65	11-206S	#68	48-87
Wasp ⑳	1956	2013S	75-878	75-904	75-905 ⑰	.096"	120-17S	⑪	12-280S	#68	11-169S	#68	48-87
Hornet 6	1956	2252S	75-1169	75-1193	75-1194	.086"	120-165		⑩	#67	11-211S	#70	48-157S
Hornet 6 ⑳	1956	2113S	75-955	75-974	75-975 ③4	.1015"	120-15S	⑪	12-280S	#66	11-258S	#74	48-74
Hornet Spec. V8	1956	2352S	75-1285 ⑤2	75-1310	75-1311	.086"	120-165		⑩	#66	11-198S	#72	48-234S
Hornet V8	1956	2231S, SA	75-1166	75-1191	75-1192	.089"	120-159		⑩	#69	11-238S	#72	48-234S
NASH													
Statesman	1956	2350S	75-1243	75-1290	75-1291 ⑤3	.089"	120-159		⑩	#71	11-293S	#67	48-247S
Amb. 6	1956	2368S	75-1244	75-1294	75-1295	.089"	120-159		⑩	#69		#70	
Amb. 6 ⑤4	1956	2369S	75-1250			.089"	120-159		⑩	#65		#76	
Amb. Spec. V8	1956	2352S	75-1285 ⑤2	75-1310	75-1311	.086"	120-165		⑩	#66	11-198S	#72	48-234S
Amb. V8	1956	2231S, SA	75-1166	75-1191	75-1192	.089"	120-159		⑩	#69	11-238S	#72	48-234S
PACKARD 5640	1956	2393S	75-1223			.086"	120-165		⑩	.032"	11-211S	#72	48-195S
RAMBLER	1956	2349S	75-1319 ⑤5	⑤6	⑤7	⑤8			⑩	#70	11-290S	#70	
STUDEBAKER													
Champion Early	1956	2108S	75-902	75-917	75-918	.095"	120-17S	#30	12-263	#65	11-165S	#74	48-202
Champion Late	1956	2417S	75-902	75-917	75-919	.095"	120-17S	#30	12-263	#68	11-242S	#74	48-202
WILLYS													
Jeep	1956	938SA	75-996	75-1114		.091"	120-155		⑩	#70	11-163S	#68 ⑤9	
Jeep Disp.	1956	2392S	75-708	75-720		.096"	120-160		⑩	#68	11-160S	#72	
4 Cyl. "F" Head	1956	951S	75-806	75-808		.096"	120-160		⑩	#70	11-161S	#72	
6 Cyl. "L" Head	1956	2204S	75-1129	75-1142	75-1190	.086"	120-165		⑩	#68	11-183S	#72	48-171S
6 Cyl. "L" Head	1956	2467S	75-1279	75-1339	75-1340	.098"	120-163		⑩	#70	11-256S	#70	

⑩ – Nozzle installed permanently. **Do not remove.**
⑪ – Nozzle Assy. Inner Nozzle #31 (.120"), Outer Nozzle .110".
⑰ – Three Sizes Lean No. 75-906.
⑳ – Twin H-Power (2 Carburetors).
③2 – Three Sizes Lean No. 75-922.
③4 – Three Sizes Lean No. 75-976.
⑤1 – Supersedes No. 48-236 (#72).
⑤2 – Supersedes No. 75-1265.
⑤3 – Three Sizes Lean No. 75-1292.
⑤4 – Ambassador Dual Jet Fire (2 Carburetors).
⑤5 – Supersedes No. 75-1215S.
⑤6 – One Size Lean Pkg. 75-1308U (Metering Rod 75-1304S & Power Jet Rod 16-13).
⑤7 – Two Sizes Lean Pkg. 75-1309U (Metering Rod 75-1305S & Power Jet Rod 16-13).
⑤8 – Metering Rod Jet 120-163 (.098"), & Power Jet 230-10 (.076") used with Power Jet Rod 16-12.
⑤9 – Supersedes #72 (to correct Off-idle Stumble).

CARTER "BBS"

PLYMOUTH	Carter Carburetor No.
1956 6 Cyl. Synchro-mesh	2063SA Ⓒ or 2293S
1956 6 Cyl. Overdrive	2062SA Ⓒ or 2294S
1956 6 Cyl. PowerFlite	2116SA Ⓒ or 2295S
1956 6 Cyl. Taxicab	2410S
1956 6 Cyl. City Traffic	2403S
1956 6 Cyl. Repl. Carb.	2380S

Ⓒ - Temporary production.

► *REPLACEMENT NOTE:* When installing 2380S carburetor, use Pkg. 192-33U (to replace 2294S), Pkg. 202-80U (to replace 2295S).

► *1954-56 PLYMOUTH 6 TAXICAB CARBURETOR IMPROVED ECONOMY (Carter BBS 2062S,SA, 2063S,SA carburetors):* Improved gasoline economy can be secured by installing all parts furnished in Unitized Pkg. Carter No. 195-67U as listed below. Spark plug gap should be set at .040" when this modification made. *CAUTION* - If this change made on cars operated in normal highway use, high speed performance may be affected.

Part	Unitized Pkg. 195-67U	Part No.
Main Metering Jet		120-215S
Step-up Rod		75-1125
Idle Tube & Plug Assy		123-65S
Body Gasket		121-225

DESCRIPTION: Single barrel downdraft type with automatic choke. Carburetors are similar to previous "BBS" models

ADJUSTMENT: Make adjustments in order as listed below

Idle Setting: Adjust only with engine warmed up to normal operating temperature with choke valve wide open and fast idle inoperative Use tachometer to set engine idle speed, adjust idle mixture screw for smooth engine operation and highest vacuum reading. See car model page for complete tune-up data.

Idle Mixture Setting

Carb.	Idle Mixture Setting
2293S, 2294S, 2295S, 2403S	1/2 - 1 3/4 turns
2063SA, 2062SA, 2116SA	1/2 - 1 1/2 turns
2410S	1 - 2 turns

Idle Speed Setting

Carb.	S-M & O.D.	PowerFlite
All Models	450-500 RPM	Ⓒ 475-500 RPM

Ⓒ - In Neutral.

Accelerating Pump Setting: Check Pump Stroke when overhauling carburetor, change Seasonal Setting as required for best performance

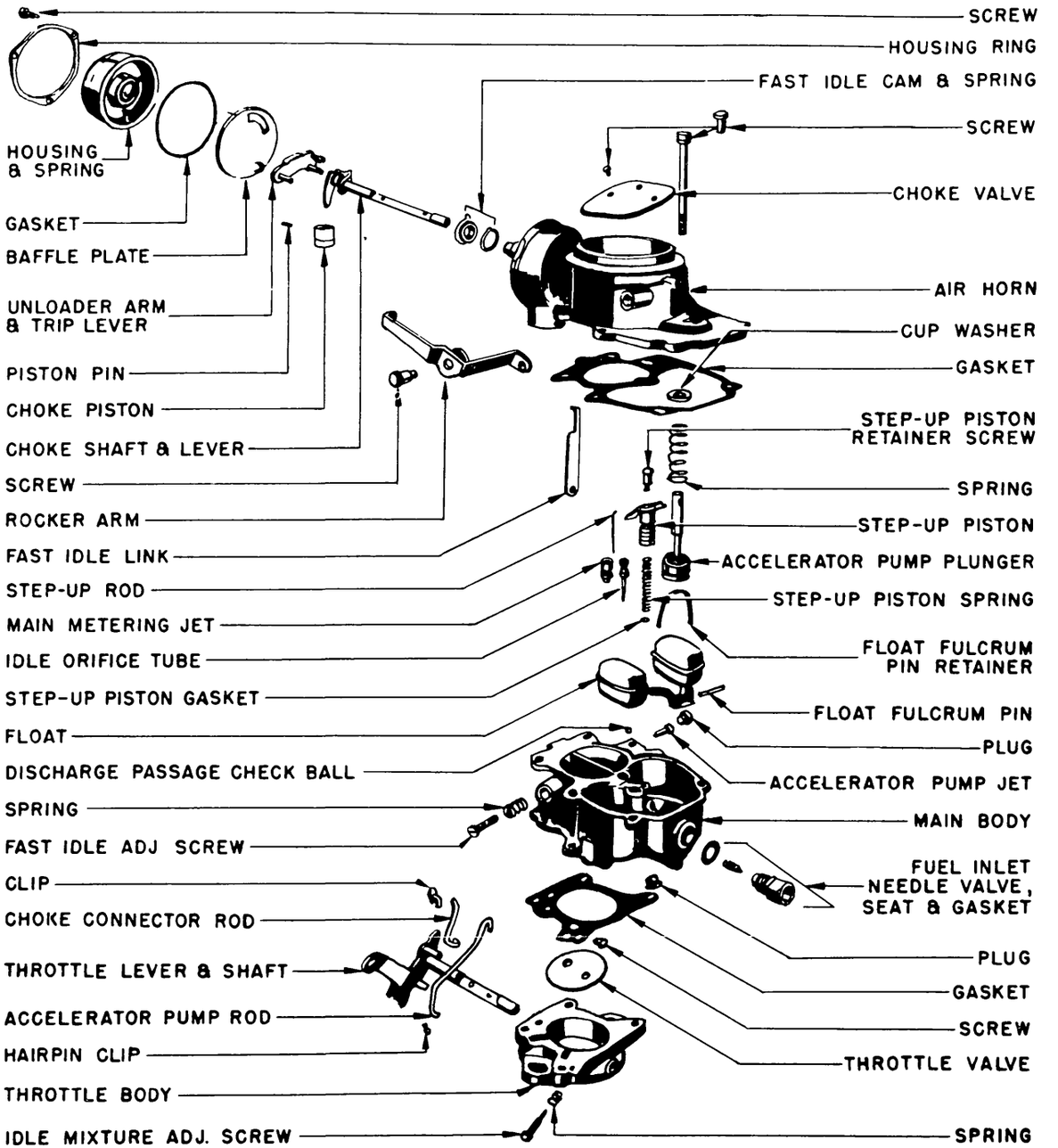
Seasonal Setting—Three holes provided in throttle lever for connector rod engagement Provides varied pump stroke as follows:

Center Hole —Medium stroke and normal setting

Upper Hole —Minimum stroke (less fuel delivery)

Lower Hole —Maximum stroke (more fuel delivery).

Pump Stroke Setting—Connect pump rod in correct hole of throttle lever (see table below), back off throttle stopscrew and make certain that throttle valve fully closed (choke valve must be open) Use scale placed on bowl cover adjacent to pump plunger to measure height of top edge of plunger (not pump arm) If height not correct, adjust by bending connector rod at lower angle near throttle lever, using bending tool T109-213



CARTER "BBS" SINGLE CARBURETOR

Pump Stroke Setting

Car & Carb.	Plunger Height	Connector Rod
Plymouth (All)	54/64"	Center Hole

Fast Idle Setting: Remove thermostatic coil assembly, gasket, and baffle plate for access to fast idle mechanism (within choke housing) Back out throttle stopscrew Crack throttle valve open, hold choke valve in fully closed position, then close throttle valve This will place fast idle cam in fast

CONTINUED ON NEXT PAGE

CARTER "BBS" (C nt.)

idle position. Measure throttle valve opening by inserting gauge (see table below) between throttle valve edge and bore on side opposite idle ports. If the throttle opening is not correct, adjust by bending choke connector rod at lower angle, using bending tool T109-213. ***Adjust Unloader before reassembling choke.***

►*CAUTION:* Be sure cam trip lever is all the way in piston housing with lug contacting cam.

Fast Idle Setting

Carb.	Checking Gauge	Throttle Opening
2062S, 63S, 2116S	T109-29	.022-.026"
2293S, 94S, 95S, 2380S	T109-44	.016-.020"
2410S, 2403S	T109-44	.016-.020"

Unloader Setting: After fast idle adjusted (above), hold throttle valve wide open, close choke valve as far as possible without forcing. Measure choke valve opening by inserting gauge (see table below) between upper edge of choke valve and air horn wall. If choke valve opening not correct, adjust by bending arm on choke trip lever (within choke housing) using bending tool T109-214. Then reassemble and adjust automatic choke.

Unloader Setting

Car & Carb.	Clearance & Checking Gauge
Plymouth (All)	9/64" T109-34

Automatic Choke Setting: After unloader adjusted (above), install baffle plate, gasket, and thermostatic coil housing assembly. Make certain that hook on coil picks up choke shaft lever, rotate cover until mark is in line with longer center graduation of scale on housing (centered setting), tighten retainer screws.

Automatic Choke Setting

Car & Carb.	Setting
Plymouth (All)	Centered (At Index)

Slow-closing Throttle Dashpot (PowerFlite equipped cars): To check the setting, close throttle valve fully, measure distance dashpot plunger can be moved inward (hold plunger in and measure clearance between end of plunger and throttle lever with a feeler gauge). This clearance should be 3/32" for maximum dashpot action. Adjust by loosening locknut and turning dashpot in or out of mounting bracket.

Kickdown Switch Adjustment (Cars with Overdrive): Hold throttle valve in wide-open position, check clearance between kickdown lever on throttle shaft and end of switch stem guide (after switch plunger has moved inward to kickdown position). This clearance should be 1/64-3/64": Adjust by moving switch up or down on bracket (loosen one mounting nut, tighten opposite nut).

Float Level: Float level must be checked with bowl cover gasket and float pin retainer removed. To check float level, remove air horn and bowl cover assembly, remove gasket. Remove float pin retainer. Hold lip on float arm against seated intake needle and see that **float pin is at bottom of guide slots.** Place checking gauge squarely on top edge of bowl with gauging lugs directly over centers of floats. Gauge lugs should just touch tops of floats. Adjust by bending float arm to equalize floats, bend lip on float arm if both floats require same adjustment.

►***CAUTION***—Floats must not rub against inner wall of float bowl. Bend float arm as required to provide clearance on all sides of floats.

Float Level Setting

Carb.	Checking Gauge	Float Setting
2062SA, 63SA, 2116SA	T109-239	Ⓒ 7/32"
2293S, 94S, 95S, 2380S	T109-239	Ⓒ 7/32"
2410S, 2403S	T109-239	Ⓒ 9/32"

Ⓒ - Gauge used for both 7/32" & 9/32" settings.

OVERHAUL: BBS carburetors are overhauled in same manner as BBD models except that they are single barrel rather than dual carburetors.

SERVICE PARTS: Gasket Sets - Carter No. 252 (2062SA, 63SA, 2116SA, 2293S, 94S, 95S, 2403S, 2410S).
Repair Pkg. - Carter No. 1766 (2062SA, 63SA, 2116SA), 1817 (2293S, 94S, 95S, 2380S), 1838 (2403S, 2410S).

1956 CARTER BBS CARBURETOR JET SPECIFICATIONS

Car Mod l	Year	Carburetor Model	Metering Rod Jet Standard Size	Standard Part No.	1 Size Lean Part No.	2 Size Lean Part No.	Main Vent Tube Size	Main Vent Tube Part No.	Step-Up Rod Size	Step-Up Rod Part No.	Idle Orifice Tube Size	Idle Orifice Tube Part No.	Pump Jet Assy. Size	Pump Jet Assy. Part N .
PLYMOUTH P-28														
Synchro-mesh	1956	2063SA	453cc.	120-199S	120-205S	120-206S	.0315"	145-91	.027"	75- 998	.0354"	123-67S	.0276"	48-194
		2293S	406cc.	120-206S	120-215S	120-214S	.0236"	145-136	.022"	75-1225	.0315"	123-74S	.0276"	48-194
Overdrive	1956	2062SA	453cc.	120-199S	120-205S	120-206S	.0315"	145- 91	.027"	75- 998	.0354"	123-67S	.0276"	48-194
		2294S	406cc.	120-206S	120-215S	120-214S	.0236"	145-136	.022"	75-1225	.0315"	123-74S	.0276"	48-194
PowerFlite	1956	2116SA	453cc.	120-199S	120-205S	120-206S	.0315"	145-91	.029"	75- 999	.0354"	123-67S	.0276"	48-194
		2295S	406cc.	120-206S	120-215S	120-214S	.0236"	145-136	.024"	75- 943	.0315"	123-74S	.0276"	48-194
City Traffic	1956	2403S	382cc.	120-215S	120-214S	120-213S	.0236"	145-136	.021"	75-1207	.028"	123-76S	.0276"	48-194
Taxicab	1956	2410S	382cc.	120-215S	120-214S	120-213S	.0236"	145-136	.020"	75-1248	.028"	123-76S	.0276"	48-194
Repl. Carb. Ⓒ	1956	2380S	382cc.	120-206S	120-215S	120-214S	.0236"	145-136	.022"	75-1225	.0315"	123-74S	.0276"	48-194

Ⓒ — Replaces 2293S; 2294S (with Kickdown Switch 192-33U); 2295S (with Dashpot Assy. 202-80U).

CARTER BBD DUAL

	Carter Carburetor N.
CHRYSLER	
1956 C71 S-M	2312S
1956 C71 PowerFlite	2313S
DE SOTO	
1956 S-23 S-M	2308S
1956 S-23 O D	2309S
1956 S-23 PowerFlite	2310S
1952 54 Repl.	2250S
1952-53 Repl	2216S
PLYMOUTH	
1956 V8 277 Cu. In. S-M	2299S, 2407S
1956 V8 277 Cu. In. O D	2300S, 2408S
1956 V8 277 Cu. In. PowerFlite	2301S, 2409S, SA
1956 V8 270 Cu. In. S-M	2259SB, 2422S
1956 V8 270 Cu. In. O D	2260SB, 2423S
1956 V8 270 Cu. In. PowerFlite	2261SB, 2424S
1956 V8 270 Cu. In Repl.	2274SA

NOTE - 2250S less Dashpot for Synchro-mesh Trans., 2250S plus 192-34U less Dashpot for Overdrive Trans, 2216S for Fluid Drive or Torque Converter and M6 Trans.

DESCRIPTION: Dual or double barrel downdraft type with automatic choke control.

Venturi Cluster (Main Nozzle) Assembly—This assembly consists of the secondary venturis, main nozzles, main vent tubes, and idle tubes which are mounted as a unit in the main body (attaching screws are hollow with calibrated restriction at upper end and serve as Idle Air Bleeds).

Metering Jets & Step-up Mechanism—Metering jets are fixed type located in bottom of bowl. Each jet has a metering wire (step-up rod) in the jet which is controlled by the vacuum step-up piston. For normal operation, when manifold vacuum holds vacuum piston down, fuel flow through the jets is restricted by the metering wire. For full power or acceleration, when manifold vacuum drops off, the vacuum piston is moved upward by the step-up piston spring and lifts the metering wires out of the jets allowing increased fuel flow to the nozzles.

Accelerating Pump—Similar to other pumps except that pump plunger is operated through idler lever or walking beam mounted on side of air horn. Pump discharge jets are vented to carburetor bowl through passage in air horn to prevent fuel being discharged through these jets during high speed operation when a vacuum exists at the jets.

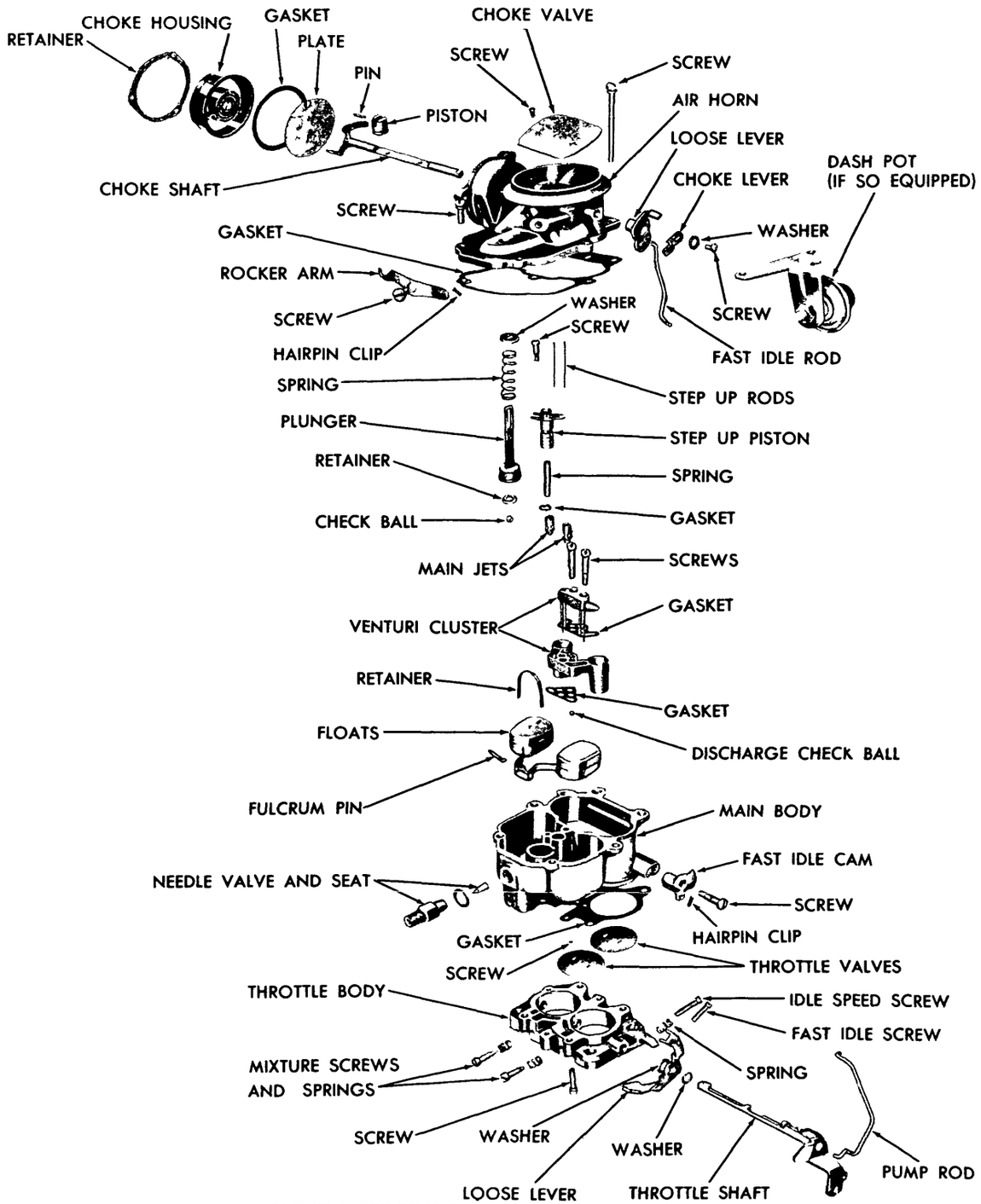
Automatic Choke—Same design as used on previous Chrysler and DeSoto cars

ADJUSTMENT: Make adjustments in order as listed below (except for Idling and Pump settings).

IDLE ADJUSTMENT

Idle Screw Setting—Adjust only with engine warmed up to normal operating temperature so that choke valve wide open and fast idle inoperative. Make a preliminary setting by turning both idle screws out 1 turn from inner seated position. Set idle speed at 475-500 RPM. (use tachometer). Then turn both idle screws in or clockwise 1/8 turn for leaner mixture, if engine speed increases and engine is smoother, turn both screws in an additional 1/8 turn, reset idle speed and adjust each screw separately in or out not more than 1/8 turn for smoothest performance and highest RPM. If

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CARTER "BBD" DUAL D WNDRAFT CARBURETOR

CARTER BBD DUAL (C nt.)

first leaning of the mixture (when both screws turned in 1/8 turn) causes engine speed to drop off or engine is rougher, reverse the above procedure by turning the screws out or counter-clockwise for richer mixture.

Idle Speed - 500 RPM (Chrysler), 450-500 RPM (DeSoto), 450-500 (S-M), 475-500 RPM (PowerFlite) Plymouth Shift lever in Neutral.

ACCELERATING PUMP

Pump Str ke Setting - Seat throttle valves in bores, open choke valve, connect pump connector rod in correct hole (see table) of throttle lever and pump arm pin in top hole of plunger shaft. Distance from top of bowl cover to top of plunger shaft should be as indicated in table To correct bend throttle connecting rod.

Pump Stroke Setting

Carburetor	Scale	Throttle Lever Hole
2216S,50S,59SB	1"	Outer
2260SB,61SB,74SA	1"	Outer
2422S,23S,24S	1"	Outer
2312S, 13S	31/32"	Outer
2299S	1 1/32"	Center
2300S,01S,08S	1 1/32"	Center
2309S,SA,10S	1 1/32"	Center
2407S,08S,09S	1 1/32"	Center

FLOAT LEVEL

Carburetor	Checking Gauge	① Float Level
2307S,8S,9S,SA,12S,13S	T109-282	1/4"
All Others	1109-239	7/32"

① - Top of float to top of body casting.

Float Level Setting—Take off air horn and bowl cover, remove bowl cover gasket. Remove float pin retainer. Hold lip of float arm firmly against intake needle with the needle seated and make certain that float pin is at the bottom of its guide slots. Place correct gauge (see table) squarely on top edges of float bowl with gauging legs directly above center of each float. Each float should just touch gauge. If float heights not equal, adjust by bending one float arm, then adjust float height by bending lip on float arm.

Float Clearance Setting—Floats must not rub on inner walls of float bowl at any point throughout their entire travel. Adjust by bending float arms slightly for clearance on all sides of floats.

CAUTION—Both floats must be set alike and floats must b adjusted vertically (for correct float level) and laterally for clearance in bowl (to prevent floats dragging on sides of bowl).

►***AIR HORN INSTALLATION CAUTION*—When air horn removed for float level setting, spring will lift step-up piston so that step-up rods will pull out of metering jets. Install air horn exactly as follows: Press step-up piston down and guide rods into metering jets, place thin steel rule across bowl to hold piston down. AFTER air horn replaced, slide rule out.**

FAST IDLE

Carb. No.	Throttle Opening	Checking Gauge
All Models	.015"	T109-44

Checking & Adjusting - (Models with fast idle cam in choke housing). Remove thermostatic coil housing assembly, gasket, and baffle plate. Crack throttle valve to allow fast idle mechanism to operate, close choke valve fully, then close throttle valve. Check throttle valve opening or clearance between edge of valve and bore on side opposite idle ports using Gauge T109-44 (double end Gauge, 015" & .018") Adjust by bending choke connector rod at lower angle using bending Tool T109-213. Then check and adjust unloader.

Fast Idle Cam Clearance - (Models with fast idle cam on throttle body) Adjust by bending lip on inner choke shaft lever to obtain .020" (Gauge T109-29) between lip on fast idle cam and boss on casting with choke valve closed and lip on inner choke shaft lever contacting lug on outer lever. *NOTE* - On late carburetors, align index mark on cam with adjusting screw

Fast Idle Throttle Clearance - (Models with fast idle cam on throttle body) Same as other models after making Fast Idle Cam Clearance, adjustment.

UNLOADER

Carburetor	Choke Opening	Checking Gauge
①	1/4"	T109-28
②	3/16"	T109-31

① - Models with fast idle cam in choke housing.
② - Models with fast idle cam on throttle body

Checking & Adjusting - (Models with fast idle cam in choke housing) After fast idle adjusted (above), hold throttle valves wide open, close choke valve as far as possible (*CAUTION* - do not force valve closed). Check choke valve opening or clearance between upper edge of valve and air horn wall using correct gauge (see table above). If choke opening not correct, adjust by bending arm on choke trip lever, using Tool T109-214. Assemble thermostatic housing, gasket, and baffle plate, adjust automatic choke

Checking & Adjusting - (Models with fast idle cam on throttle body). Hold throttle valves wide open. Close choke valve as far as possible. Do NOT use force. Measure distance or clearance between top edge of choke valve and inner wall of air horn. Adjust by bending choke unloader arm on throttle lever. (Use Tool T109-213).

AUTOMATIC CHOKE

Setting - Mark on choke cover and proper line of scale on choke housing as follows

Car & Carb.	Setting
2310S,13S	One Point Rich
All Others	Set On Index

***SETTING CAUTION*—Heat tube connection on cover must be loosened to remove or adjust choke cover. When tightening heat tube coupling, hold connection on cover with second wrench to prevent rotating or distorting cover.**

SLOW-CLOSING THROTTLE DASHPOT

►*1956 PLYMOUTH "POWERFLITE" V8 DASHPOT CHANGE:* Installation of dashpots on PowerFlite equipped V8 cars has been discontinued. Dashpots will still be installed on PowerFlite cars with 6 Cylinder engines.

(PowerFlite Cars)

Checking & Adjustment—Check dashpot action with engine running by shifting to Driving Range (use brakes to hold car) and rapidly depressing and releasing accelerator pedal. If engine stalls, increase dashpot action by turning adjusting screw on end of dashpot plunger. Maximum dashpot action is secured with adjusting screw set so that dashpot plunger can be moved inward approximately 3/32" after engine has returned to normal idle speed. If correct action cannot be secured by adjusting dashpot, tune up engine and recheck performance.

KICK-DOWN SWITCH

(Overdrive Cars)

Adjustment—Place throttle valves in wide open position and adjust hex nuts on switch to have 1/64"-3/64" clearance between kickdown lever and switch stem guide

THROTTLE VALVE SETTING

Carburetor	① Idle Port	② Vacuum P rt
2216S,50S	.102-.106'	.030-.040"
2308S,09S, 10S, 2422S, 23S, 24S	.148-.152"	.035-.045"
All Others	.144-.148"	.035-.045"

① - Opening above upper edge of valve.
② - Top of Port above upper edge of valve.

Disassembly, Cleaning and Inspection, Reassembly: Carburetors with fast idle cam in choke housing. *See 1955 Annual Data or later Manual edition.*

Carburetors with fast idle cam on throttle body. Same as above except for **Choke Shaft Disassembly and Reassembly,** which follows Remove screws that attach thermostatic coil spring housing to air horn. Remove coil spring housing, spring, gasket and baffle plate. Use file or suitable tool to remove staking portion of screws, that attach valve to choke shaft and remove screws, sliding choke valve out of air horn. *CAUTION* - DO NOT break screws off in shaft. Remove screw that attaches choke lever to choke shaft. Hold choke shaft lever firmly with fingers to avoid jamming choke piston in its well. Slide choke lever, loose lever and washer off end of shaft Turn shaft clockwise until choke piston clears top of its cylinder, and withdraw choke piston link and shaft from air horn.

Choke Shaft Reassembly. Slide choke shaft and piston into air horn Turn choke shaft clockwise until piston clears choke well, then turn counter-clockwise allowing piston to enter well. Slide choke valve into position and start new screws. Holding valve in closed position, tap gently with screwdriver handle to center and locate valve. Tighten and stake screws securely Hold air horn in upright position and close choke valve. Choke valve should open freely of its own weight. *DO NOT lubricate the choke operating parts* Install choke baffle plate and gasket. Place coil housing retaining ring over housing, and with index mark in down position, install the coil housing. Turn housing clockwise until index on the rim is in line with center index mark on air horn. Install screws and tighten securely. Slide choke shaft loose lever and sleeve on choke shaft, and install choke shaft lever washer and screw

SERVICE PARTS

Gasket Sets - Carter No. 265 (2259SB, 60SB, 61SB, 74SA) No. 278 (2299S, 2300S, 01S, 08S, 09S, 10S, 12S, 13S, 2407S, 08S, 09S, SA).

Repair Pkg. - Carter No. 1795 (with 156-29) (2299SB, 60SB, 61SB, 74SA, 2422S, 23S, 24S), No. 1820 (2312S, 13S,), No. 1825A (2299S, 2300S, 01S, 2407S, 08S, 09S, SA)

1956 CARTER BBD CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carbur tor No.	Main Metering Jet Standard Part No.	Main Metering Jet 1 Size Lean Part No.	Main Metering Jet 2 Size Lean Part No.	Step Up Rod Size	Step Up Rod Part No.	Venturi Cover Assy. Main Vent Tube Size	Venturi Cover Assy. Idle Tube Size	Venturi Cover Assy. Pump Jet Size	Venturi Cover Assy. Part No.	Venturi Cov r Screw Idle Air Bleed	Venturi Cov r Screw Idle Re-striction	Venturi Cov r Screw Part No.
CHRYSLER C71														
All Cars ③	1956	2312S, 13S	120-213S	120-212S	120-209S	024"	①75-990	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364
DE SOTO S23														
All Cars ④	1956	2308S, 9S, 10S	120-221S	120-212S	120-209S	023"	②75-1145	.0196"	.035"	.0295"	118-123S	.063"	.0472"	101-364
DE SOTO REPL.														
Repl. Carb.	1952-53	2216S	120-213S			.024"	75-990	.0275"	.0334"	.0295"	118-117S	.0629"	.0472"	101-364
Repl. Carb.	1 952-54	2250S	120-214S	120-213S	120-212S	024"	75-990	.0275"	.0334"	.0295"	118-117S	.063"	.0472"	101-364
PLYMOUTH V8 270"														
Synchro-mesh	1956	2259SB, 2422S	120-212S	120-209S	120-211S	.018"	75-1168	.0256"	.035"	.0275"	118-108S	.059"	.0472"	101-350⑤
Overdrive	1956	2260SB, 2423S	120-212S	120-209S	120-211S	.018"	75-1168	.0256"	.035"	.0275"	118-108S	.059"	.0472"	101-350⑤
PowerFlite	1956	2261SB, 2424S	120-212S	120-209S	120-211S	.018"	75-1168	.0256"	.035"	.0275"	118-108S	.059"	.0472"	101-350⑤
Repl. Carb.	1956	2274SA	120-212S	120-209S	120-211S	018"	75-1168	.0256"	.035"	.0275"	118-108S	.059"	.0472"	101-350⑤
PLYMOUTH V8 277"														
Synchro-mesh	1956	2299S, 2407S	120-212S	120-209S	120-211S	.018"	75-1168	.0256"	.035"	.0275"	118-108S	.0629"	.0472"	101-364
Overdrive	1956	2300S, 2408S	120-212S	120-209S	120-211S	.018"	75-1168	.0256"	.035"	.0275"	118-108S	.0629"	.0472"	101-364
PowerFlite	1956	2301S, 2409S, SA	120-212S	120-209S	120-211S	.020"	75-1217	.0256"	.035"	.0275"	118-108S	.0669"	.0472"	101-411

① — Supersedes No. 75-1177.
② — Supersedes No. 75-1140.
③ — 2312S Synchro-mesh, 2313S PowerFlite.
④ — 2308S Synchro-mesh, 2309S Overdrive, 2310S PowerFlite.
⑤ — Supersedes No. 101-364 .0629" Idle Air Bleed, .0472" Idle Restriction on 2259SB, 2260SB, 2261SB, 2274SA.

1956 CARTER BB UPDRAFT CARBURETORS

CARTER BB UPDRAFT

CHEVROLET FORWARD CONTROL — **Carter Model**
All Series Trucks — 871SB

►**ACCESS TO CARBURETOR (for Adjustment or Removal):** **Forward Control Models**—Remove toe pan attaching screws, disconnect wires at stop light switch, disconnect accelerator pedal rod from throttle control rod, remove toe pan.

DESCRIPTION: Plain tube, updraft type of same design as used on previous Chevrolet models

ADJUSTMENT & SERVICING: *See complete "Carter (BB) Updraft Type" carburetor in Carburetor Section of Manual and set this carburetor to the following specifications*

IDLING ADJUSTMENT

Idle Screw Setting—½-1½ turns open (turn screw out for richer mixture).
Idle Speed—450-500 RPM (Std Trans.), 400-450 RPM (Auto Trans in Neutral)

FLOAT LEVEL SETTING

Float Level—0-1/32" (Carter Gauge T109-49 or Chevrolet J-818-13A) from top of float to top edge of bowl with needle valve seated.
CAUTION—Use 1/32" side of gauge (other side used for 1/16" settings).
Intake Needle & Seat Assembly—Carter No. 25-44S

ACCELERATING PUMP

Pump Seasonal Setting—Short Stroke—Summer, Long Stroke—Winter.
Pump Stroke—9/16" (Short Stroke) with connecting screw in holes in throttle lever and pump link nearest throttle shaft, 1" (Long Stroke) with screw in holes farthest from shaft.

THROTTLE VALVE SETTING

Idle Port—.005-.009" from top of lower idle port to lower edge of throttle valve
Vacuum Spark Port—.000-.004" top of port below lower edge of throttle valve
NOTE—Above specifications apply with throttle valve tightly closed.

SERVICE PARTS

Gasket Set—Carter No. 202 (871SB),
Repair Pkg. (with Std. Met ring Jet)—Carter No. 1539A (871SB).

1956 CARTER BB UPDRAFT CARBURETOR JET SPECIFICATIONS

Car Model	Yr.	Carb. No.	Main Metering Screw Standard Flow	Main Metering Screw Standard Part No.	Main Metering Screw 1 Size Lean Part No.	Main Metering Screw 2 Sizes Lean Part No.	Main Nozzle Size	Main Nozzle Part No.	Step Up Jet Power Orifice Size	Step Up Jet Power Orifice Part No.	Idle Orifice Tube Size	Idle Orifice Tube Part No.	Idle Passage Tube	Pump Valve Size	Pump Valve Part N .
CHEVROLET Trk. Forward Control	1956	871SB	339-343cc	159-100	159-129	159-35	①	12-344	.036"	162-27	031"	123-58	123-45	0635".	149-65S

①—Discharge Jet Size .150-.152"

FORD, LINCOLN, MERCURY 4-BARREL CENTRI-QUAD

CONTINENTAL	Carburetor No.
1956 Mark II	ECU-9510-B, C, D, E
FORD V8 & THUNDERBIRD ①	
1956 All (Synchro-mesh) ②	B6A-9510-L
1956 All (Fordomatic) ②	B6A-9510-M
1956 Late (All Models) ③	B6A-9510-N, Q
FORD TRUCKS	
1956 All (With 272" Engine)	B6T-9510-B
LINCOLN	
1956 (All Models)	ECU-9510-B, C, D, E
MERCURY	
1956 (Synchro-mesh & Overdrive)	B6A-9510-L
1956 Early (Mercomatic)	B6A-9510-M
1956 Late (All Models) ③	B6A-9510-N, Q

①—And Police Interceptor.

②—292 & 312 cu.in. Engines.

③ — When B6A-9510-N, Q, used on Fordomatic or Mercomatic cars, a dashpot and attaching parts also are required.

►CHANGES, CAUTIONS, CORRECTIONS

►*ROUGH IDLE CORRECTION (FORD PASS. CARS):* If engine rough idle cannot be eliminated by idle mixture screw adjustment, check for fuel being discharged from secondary transfer holes, or secondary discharge nozzles. Correct this condition by cleaning out secondary high speed bleeds which if plugged will cause a siphoning action.

►*1956 FORD HARD COLD STARTING CORRECTION (CARS WITH B6A-9510-L, M CARBURETORS):* Install Choke Kit, Part No. B6A-9849-D which contains all parts used on the later B6A-9510-N, Q carburetor choke assemblies. The complete kit must be installed as the individual parts are not interchangeable with the earlier parts. Install kit as follows: Disconnect choke outlet tube and remove the bi-metal spring cover, gasket and plate. Remove choke housing as an assembly (the fast idle cam will be loose and can also be removed). Remove choke plate nearest to choke housing. Check for any binding in linkage after plate removed. Install new plate, but do not tighten. Align choke plate by placing a ¼" wide strip of paper between choke plate and air horn. Close choke plate and tighten the screws (check for any binding before screws are tightened). Position new fast idle cam and bearing assembly. Use a new gasket and install the new choke housing as a complete unit. *(NOTE* - On early cars where the fast idle cam swings on a boss which is an integral part of the main body, it will be necessary to use the original cam plus the new spacer). Check operation, then open choke plates fully by means of the bi-metal arm. Position template (part of choke kit) on choke housing so that bi-metal operating arm protrudes through hole in template. Rotate template clockwise to close the choke completely. Scribe a mark on the choke housing at position where point of arrow on template indicates (this will be the central point of the bi-metal spring adjustment). Remove template and install gasket, plate and bi-metal spring cover. Set the cover on the line scribed on housing (disregard notches cast in choke housing). Connect the choke control outlet tube to choke housing, and place accelerator pump link in the hole giving the longest stroke. Adjust carburetor.

►*1956 CHOKE BINDING NOTE:* This condition may be caused by front portion of the aluminum heat baffle being bent toward the rear causing it to bind on choke linkage.

►*1956 FORD ACCELERATING PUMP PISTON ROD REPLACEMENT (ON B6A-9510-N CARBURETOR) NOTE:* The later type piston rod with an additional hole in the top end, Part No. B6A-9531-C, can be used as a replacement when used with later Main Body Cover, Part No. B6A-9984-D.

►*1956 FORD CARBURETOR DRY FLOAT LEVEL CAUTION:* B6A-9510-Q carburetor float level is 7/32". Float level of other carburetors is 1/4".

►*1956 LINCOLN & CONTINENTAL HARD COLD STARTING CORRECTION:* If after depressing the accelerator, the choke plates do not set themselves, the cause may be that too much stock has been removed from upper tip of cam at the point where cam contacts the choke link roller. Correct by replacing the choke cam assembly. Check the choke by operating the choke plates by hand with the throttle plates held open, to determine if the bi-metal spring in the assembly is imparting a closing action to the choke plates. If there is no closing tension, check the following: Choke link must be in place and held in its position by tab of thermostat lever. If link is found to be disengaged, reinstall choke link and bend tab of choke thermostat lever toward link sufficiently to prevent link from becoming disengaged, allowing sufficient clearance between tab of thermostat lever and choke link to permit operation without binding or sticking. Eye on thermostat spring must fit over tang on thermostat lever. Adjust choke setting.

►*1956 LINCOLN ECU-9510-D & MERCURY B6A-9510-N CARBURETOR PRODUCTION CHANGE:* A sleeve spacer, Part No. B6A-9644-A designed to provide a bearing surface for the fast idle cam assembly on these carburetors is available for service replacement, and should be installed between the integral choke housing and throttle body.

►*1956 LINCOLN VAPOR LOCK NOTE:* This condition may be caused by the fuel pump-to-fuel tank tube hose assembly being too small. The correct hose is Part No. LE-9288-A and an inside diameter of .310".

►*1956 LINCOLN & MERCURY AUTOMATIC CHOKE MALFUNCTION NOTE & AIR HEATER TUBE PRODUCTION CHANGE:* Improper choke action may be caused by a broken or leaking air heater tube which would be indicated by carbon deposits in choke housing. If this is the case, replace the early type air heater tube with Part No. ECU-9890-S (Lincoln), B6A-9890-A (Mercury) as follows: Remove intake manifold and inspect both ends of tube for leakage or insufficient clearance, particularly the small end (right side of manifold), which may be constricted or not properly entering hole in manifold. In this case it will be necessary to ream the small hole using a 5/16" Keystone expansion reamer with the adjusting screw removed. Turn reamer into manifold until 1/2" of cutting surface is sticking out. *(NOTE* - Later manifolds having an "X" stamped on right exhaust leg just below choke, have the manifold reamed slightly larger in production and do not require additional reaming). Install the new heat tube by inserting the small end of tube into large hole in manifold and guide it through heat riser until the end is started into small opening. Drive tube the rest of the way with a punch large enough to contact full diameter of tube.

►*1956 LINCOLN & MERCURY FLOAT & FLOAT SPRING PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE (To Maintain a Steady Fuel Level):* A new float Part No. B6A-9550-B, and float spring, Part No. B6A-9958-A is being used in production and can be used for service replacement on earlier 1956 carburetors. Carburetors having the later type float and spring assembly are identified by an "S" stamped on carburetor mounting flange adjacent to the idle adjusting screws. With the use of the later type float and spring, the dry float level has been changed to 7/32" in order to maintain a fuel level of 1/2".

►*1956 MERCURY HARD STARTING CORRECTION (ON A FEW EARLY CARS):* On carburetors built before the third week in September, identified by a date code on accelerator pump tower of the float bowl cover (Example: 5-9-3 means 1955, September, 3rd week), turn the automatic choke cover clockwise three additional notches.

►*1956 FORD, LINCOLN, MERCURY BOWL EXTERNAL VENT SEASONAL SETTING CHANGE:* For winter operation, close vent for temperatures below 30° F, and open vent for temperatures above 30° F.

DESCRIPTION: Four barrel downdraft type with integral automatic choke. Design is similar to that used on 1955 carburetors. Automatic choke thermostatic coil housing is mounted on air horn and directly connected to choke shaft.

ADJUSTMENTS: *Make all adjustments exactly as follows:*

Idle Setting: First set BOTH primary idle mixture adjusting screws (see table below) for initial adjustment. Start engine and operate it until normal operating temperature is reached with choke valve wide open and fast idle cam in slow idle position. Back off fast idle screw so it clears the fast idle cam. Set engine idle speed to correct hot or slow idle (see table below) by turning slow idle speed adjusting screw. Turn one idle mixture screw in until engine begins to run rough (lean), then back off screw until engine begins to roll (rich), then turn screw inward just enough to provide smoothest engine idle. Fuel mixture should favor the rich side. Repeat this procedure on other mixture screw. Recheck idle speed and if not within limits, readjust to correct specifications.

Initial Idle Screw Setting

Model	Turns Out
Ford (All Models)	5/8
Continental-Lincoln-Mercury	1 1/2

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY CENTRI-QUAD (Cont.)

Idle Speed

Model	Idle Speed
Continental	①475-500 RPM
Ford (Synchro-mesh & Overdrive)	475-500 RPM
Ford (Fordomatic)	②475-500 RPM
Lincoln	①475-500 RPM
Mercury (Synchro-mesh & Overdrive)	475-500 RPM
Mercury (Mercomatic)	②475-500 RPM

①—With transmission in "N" (Neutral).
②—With transmission in "N" (Neutral). Recheck with transmission in "Dr" (Drive), and adjust to 425-450 RPM, if necessary.

Fast Idle Setting: After making idle speed adjustment and with engine at normal operating temperature, turn fast idle speed adjusting screw until it just touches lowest step of fast idle cam. *NOTE*—If this setting is unnecessarily high, the idle speed may be reduced by backing off the adjusting screw not to exceed one full turn.

D popper Adjustment (Trucks): *(NOTE*—Depopper adjusting screws are located on underside of throttle body and carburetor must be removed for adjustment. Turn each screw in until spring is completely compressed, then back off screw 2 7/8 turns (adjustment must be held as close to this specification as possible). If engine popping is evident after idle adjustment and depopper ball adjustment is correct, back off depopper adjusting screws 1/8 turn at a time until popping is eliminated.

Dashpot Setting (All Auto. Transmissions): After idle adjustment completed, turn ignition off, see that fast idle cam in slow idle position, hold throttle lever in closed position, turn dashpot adjusting screw out (counter-clockwise) until dashpot rod is pushed in to the limit of its travel, then turn adjusting screw in (clockwise) 1½-2 turns which will provide correct clearance of .045-.064".

Accelerating Pump Setting: Set pump link in hole closest to throttle shaft (shortest stroke) for average or hot weather operation, outer hole for cold weather operation.

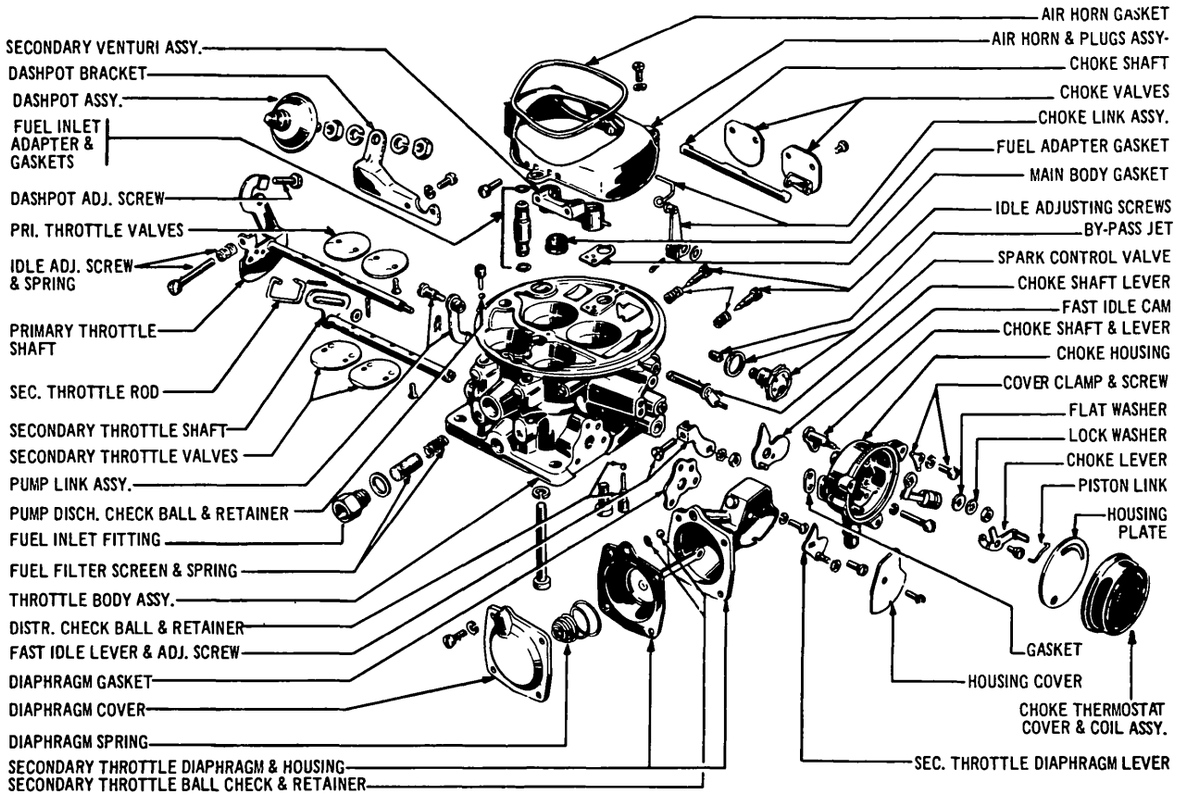
B wl External Vent Seasonal Setting: Adjust clip on lower end of accelerator pump rod to open or close vent hole for best operation as follows:

Winter Operation (Temperatures below 30° F) – Slide clip down on lower end of accelerator pump rod so that vent hole is CLOSED.

Summer Operation (Temperatures above 30° F) – Slide clip upward on accelerator pump rod so that full diameter of vent hole is OPEN.

► *NOTE – The above vent settings sup rs d the previous 50° F. setting.*

S c ndary Throttle Op rating Diaphragm Ch ck: Remove carburetor from engine, remove main body and choke housing from throttle body. Fully open (at the linkage) both primary and secondary throttle. Block off the secondary vacuum openings in the right primary and secondary venturi with the fingers. Release secondary throttle linkage while holding primary throttle linkage open. If no leak exists secondary throttle plates should remain partially open. To check diaphragm unit, remove complete diaphragm and housing assembly from carburetor. Pull diaphragm rod in a direction to compress spring. Cover slot located in housing to carburetor mounting face with finger. Release diaphragm rod. If no leaks exist spring should remain partially compressed.



FORD, LINCOLN, MERCURY CENTRI-QUAD CARBURETOR THROTTLE B DY ASSY.

Fu l L vel (All Mod ls): Remove air cleaner, anchor screw and main body cover from carburetor. Connect a jumper wire from distributor primary terminal to ground. Crank engine until fuel bowl fills to operating level. Check fuel level with Gauge T54L-9550-C (Ford Pass. Car & Truck), Gauge 9550-AH (Continental, Lincoln, & Mercury) squarely on top edge of main body so that gauging pins extend down into bowl. Fuel should be at least as high as the longer "GO" pin, but must not touch the shorter "NO GO" pin. Adjust by bending float tab. *CAUTION—Both sid s of float must be the same height and must not touch side walls of float bowl.*

► *FLOAT LEVEL PRODUCTION CHANGE (CONTINENTAL, FORD, LINCOLN & MERCURY): See "Changes, Cautions, Corrections" above.*

Float Level: (Ford) 1/4" (Exc. B6A-9510-Q), 7/32" (B6A-9510-Q). **(Continental, Lincoln & Mercury)** 1/4" (Except carburetors marked "S" on mounting flange), 7/32" (Carburetors marked "S" on mounting flange). *See "Changes, Cautions, Corrections" above.*

► *FUEL LEVEL NOTE (ALL MODELS): Fuel level should be 1/2" ± 1/32".*

Automatic Choke Setting: *(NOTE—Automatic choke thermostatic coil housing is now located on air horn and directly connected to choke valv shaft, eliminating the necessity of choke rod adjustment).* Mark on cover should be in line with center mark of scale on choke housing. Adjust by loosening three cover retaining screws and rotating cover assembly.

Spark C ntr l Valv : No adjustment required. If operation not satisfactory, remove and inspect valve for free movement of stem and inspect passage in adapter screw.

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY CENTRI-QUAD (Cont.)

OVERHAUL: Check Secondary Throttle Operating Diaphragm before disassembling carburetor (see below). Then disassemble and overhaul carburetor as follows:

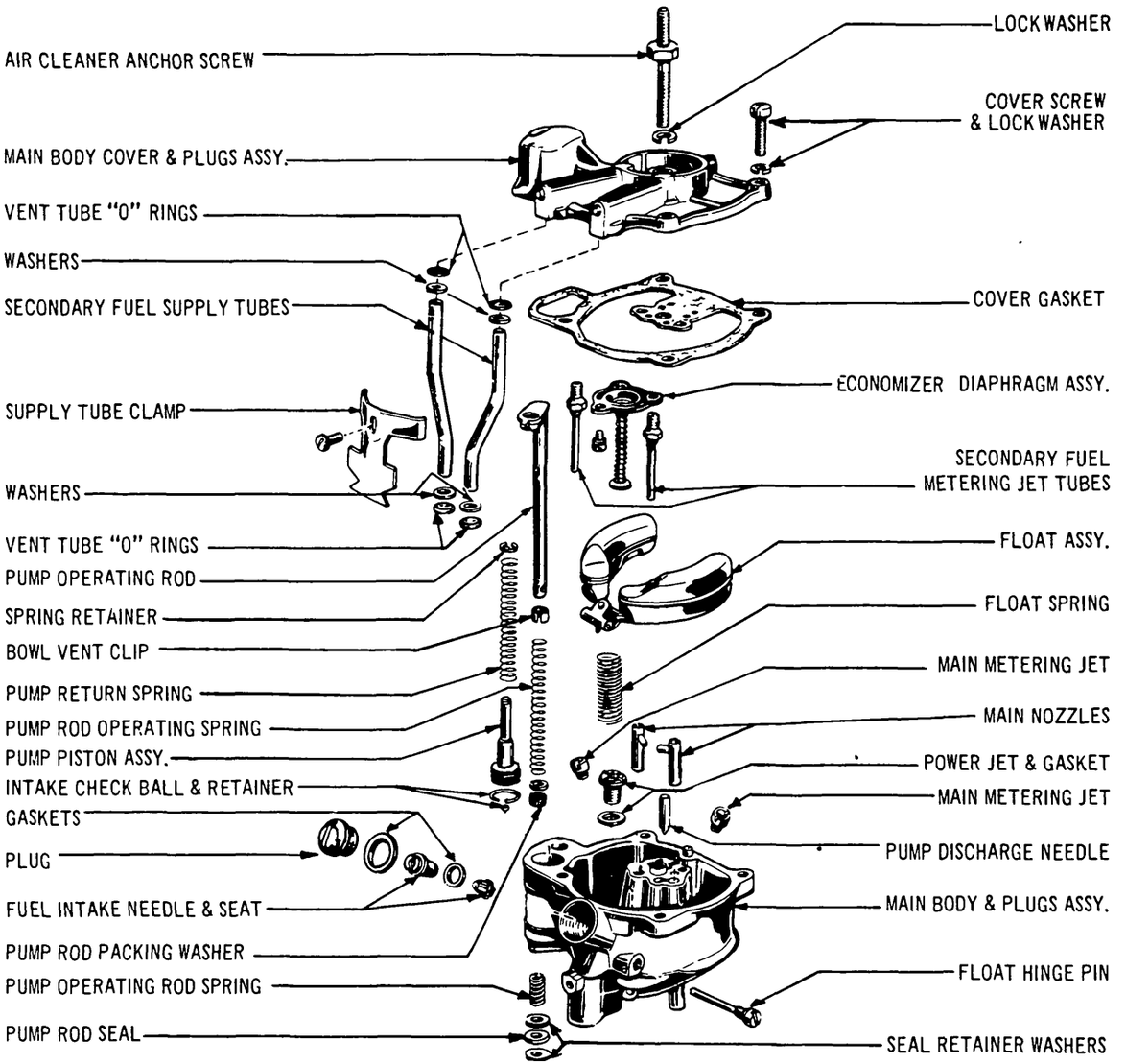
►*SECONDARY THROTTLE OPERATING DIAPHRAGM CHECK (Before disassembling carburetor):* Fully open secondary throttle valves and block off diaphragm passage at opening in primary stage venturi (use eraser end of a pencil) BEFORE releasing secondary throttle valves. Valves should remain open as long as venturi opening is blocked off. If valves do not remain open, diaphragm or gasket seal between diaphragm assembly and throttle body may be defective. Remove assembly from carburetor, disassemble, and inspect. Also inspect ball check valve located in diaphragm cover.

Disassembly (Secondary Throttle Operating Diaphragm): Take out attaching screw and remove vacuum diaphragm assembly cover plate. Remove retainer securing diaphragm rod to pin on lever and screw holding diaphragm lever on secondary throttle shaft, remove lever. Take out three screws retaining diaphragm housing on carburetor throttle body, remove diaphragm assembly and gasket.

Main Body Disassembly: Remove center stud, and lockwasher. Remove cover retaining screws, then lift cover off main body. Remove screw and bracket retaining secondary fuel tubes. Remove secondary fuel tubes by gently pulling them from throttle body *(CAUTION* - Do not bend secondary fuel tubes). Remove accelerator pump link from operating rod and throttle lever. Remove stud and vent clip from lower end of pump operating rod, then lift pump assembly out of main body. Remove pump rod dust seal, washer and spring. Remove pump rod upper seal and washer. Lift main discharge nozzles out of main body with a pair of needle nose pliers. Use care not to damage nozzles. Invert carburetor and catch pump discharge needle as it falls out. Remove float inlet needle seat spring and seat. Unscrew float hinge pin and lift float assembly out of main body. Remove float damper spring. Remove main jets, then remove power valve. Make a small hook on a suitably sized wire, then lift accelerator pump inlet check ball retainer out of pump well. Invert carburetor and catch inlet check ball as it falls out. Remove secondary jets from main body cover, remove power valve diaphragm retaining screw, then remove diaphragm and stem assembly. If necessary, disassemble accelerator pump assembly. Slip piston cup off end of piston stem. Compress stem spring, pry off stem retainer; then remove the stem and spring from operating rod. Remove air horn to throttle body screw. Invert carburetor and remove two throttle body to main body screws. Lift off the main body and remove main body gasket. Lift air horn off throttle body, and disengage choke actuating lever from choke plate.

Throttle Body Disassembly: Remove idle fuel adjustment needles and springs. Remove the three choke retaining screws, then remove cover and gasket. Remove choke heat shield. Remove thermostatic spring lever, and the small wire connecting rod. Remove three choke housing retaining screws and remove choke housing and gasket. Remove nut, lockwasher and spacer, then slip choke piston assembly out of housing. Remove lever from back side of choke housing. Remove fast idle cam. Remove spark control valve and gasket. Remove fuel inlet fitting, gasket, filter screen, and spring. Remove secondary fuel system check ball retainers, then invert throttle body and catch the two balls as they fall out. Remove vacuum passage check ball retainer from bottom of throttle body, and shake out the check ball. If so equipped, remove dashpot and bracket assembly. *NOTE* - If it is necessary to remove throttle plates for cleaning or repair, each plate must be identified as to bore from which it was removed (left or right) so that plates can be installed in their original positions.

Air Horn Disassembly: Remove choke plate screws, and choke plates. Slide choke plate shaft out of air horn. Remove lock wire from booster venturi screws, then remove the screws.



FORD, LINCOLN, MERCURY CENTRI-QUAD CARBURETOR MAIN BODY ASSY.

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY CENTRI-QUAD (Cont.)

Cl aning & Inspection: Wash all parts except those noted below in clean solvent *(CAUTION*–Do not use solvent on pump piston leather, power valve diaphragm, spark control valve, nylon fuel inlet needle valve, nylon distributor passage ball, dashpot assembly, or secondary throttle operating diaphragm). Blow out passages in castings with air, dry all parts with air. Inspect all parts for wear and damage with particular attention to the following: Inspect castings and main body cover for cracks or leaks, inspect main well tubes, metering jet, and idle tubes for wear or clogged passages *(CAUTION*–clean with air, do not use drills to clean out calibrated openings). Replace all worn or damaged parts.

R assembly: Use all NEW gaskets. Install parts in reverse order of disassembly procedure (above) and note the following important points:

Throttle Plate Installation–In addition to replacing each plate in its original position, place a .004" piece of shim stock 1/8-3/16" wide between the upper side (viewed from top) of each secondary throttle plate and the throat. Hold throttle plates closed against shim stock and tighten throttle plate screws. This assures maximum manifold vacuum for smooth efficient engine idle.

Acc l rating Pump–Drop check ball into cylinder bore and tap lightly, using brass rod and mallet, to seat ball. Ball spring retainer projection must be placed over ball, and spring must bottom in cylinder bore groove.

Float Installation–Float spring must seat over boss in main body. Clip must hook the under side of float tab.

Main Body Cover Gasket–Make sure all holes have been punched in new gasket and that no foreign material has adhered to it. Never use any gasket sealer or any form of sealing compound on carburetor gaskets.

Power Valve Diaphragm Installation–Place new assembly on main body cover, position clamp, install the screw and secondary supply jets finger tight. Compress power valve stem to full limit of its travel, then tighten retaining screw and secondary supply jets. *NOTE*–Screw and tubes must be tightened while stem is in the compressed position to insure full travel of the power valve stem.

►*AIR CLEANER ANCHOR SCREW TIGHTENING CAUTION:* Over tightening may cause distortion of the carburetor main body and affect calibration of the metering passages.

Carburetor Adjustments–Make all adjustments listed in ADJUSTMENTS above.

CARBURETOR INSTALLATION ON ENGINE: Install carburetor exactly as follows:

►*CAUTION: DO NOT use gasket sealer or compound on carburetor mounting gaskets.*

1) Position carburetor over choke fresh air tube and and manifold studs. Start fuel and vacuum lines. Install carburetor to manifold attaching nuts and alternately tighten each pair of nuts in a crisscross pattern to a torque of 12-15 ft. lbs.

2) Attach throttle rod to carburetor lever and secure with a clip. Tighten choke inlet tube fitting, distributor vacuum lines and fuel line connection at carburetor. Install air cleaner.

SERVICE PARTS: *CAUTION–Metering jets furnished in repair kits listed below are STANDARD (for 0 to 5000 ft. Altitude).*

Gasket Set – Ford No. B6A-9502-C (Ford Carb.). Continental, Lincoln, Mercury No. MGK-9502-A (All carburetors).

Repair Kit (With Std. Metering Rods) – Ford No. B6A-9590-C (Ford Carbs.). Mercury No. MGK-9590-A (Mercury Carbs.). Lincoln & Continental No. HGK-9590-A (Lincoln & Continental Carbs.).

1956 HOLLEY (FORD) SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Model	Main Metering Jet Size	Main Metering Jet Part No.	Main Discharge Nozzle Part No. Left Hand	Main Discharge Nozzle Part No. Right Hand	Economizer Assembly Part No.	Power Jet Part No.	Idle Tube Part No.	Pump Nozzle Part No.
FORD 6 Cyl. Cars										
Synchro-mesh	1956	B6A-9510-H	.066" ①	8MB-9533-A	.....	.....	EAA-9904-A	B6A-9594-A	.....	.....⑤.....
Fordomatic	1956	B6A-9510-G	.066" ①	8MB-9533-A	.....	.....	EAA-9904-A	B6A-9594-A	.....	.....⑤.....
Taxicab (Econ.)	1956	B5A-9510-S, V	.047" ②	59A-9533-A	.....	.....	.....	B5A-9594-D	.....	.....⑤.....
FORD V8 Cars										
Synchro-mesh	1956	B6A-9510-J	.052" ③	59A-9533-A	B6A-9921-B	B6A-9920-C	78-9904	.....	B6A-9542-A	B5A-9577-A
Fordomatic	1956	B6A-9510-K	.052" ③	59A-9533-A	B6A-9921-B	B6A-9920-C	78-9904	.....	B6A-9542-A	B5A-9577-A
FORD 6 Cyl. Trucks										
Synchro-mesh	1956	B6C-9510-A	.070"	B6C-9533-A	.....	.....	EAA-9904-A	B6C-9594-A	.....	.....⑤.....
Fordomatic	1956	B6A-9510-G	.066" ①	8MB-9533-A	.....	.....	EAA-9904-A	B6A-9594-A	.....	.....⑤.....
Spec. Econ.	1956	B5A-9510-S, V	.047" ②	59A-9533-A	.....	.....	.....	B5A-9594-D	.....	.....⑤.....
FORD V8 Trucks										
Synchro-mesh	1956	B6Y-9510-A	.055"	B4T-9533-A	B6A-9921-B	B6A-9920-C	78-9904	.....	B6A-9542-A	EAB-9577-A
Fordomatic	1956	B6C-9510-C	.055"	B4T-9533-A	B6A-9921-B	B6A-9920-C	78-9904	.....	B6A-9542-A	EAB-9577-A
H. D. Engine	1956	B6T-9510-A	.060" ④	1GA-9533-C	.....	.....	EAM-9904-A	B6T-9594-A	.....	B6T-9577-A

① – Use No. 1GA-9533-A (.064") for 5000 - 10000 ft. Alt.
Use No. 1GA-9533-B (.062") for 10000 - 15000 ft. Alt.
② – Use No. 59A-9533-D (.045") for 5000 - 10000 ft. alt.
③ – Use No. 78-9533-A (.050") for 5000 - 10000 ft. Alt.
Use No. 78-9533-B (.048") for 10000 - 15000 ft. Alt.
④ – Supersedes No. B4Q-9533-A (.061").
⑤ – Nozzle pressed in (Replace Main Body).

1956 HOLLEY (FORD, LINCOLN, MERCURY) 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor	Primary Metering Jet Size	Primary Metering Jet Part No.	Secondary Metering Jet Size	Secondary Metering Jet Part No.	Primary Disch. Nozzles	Primary Venturi Assembly	Power Jet Assembly	Economizer Assembly
FORD V8 Cars & Thunderbird										
Synchro-mesh	1956	B6A-9510-L	.050".....	① 78-9533-A	.073"...	② B5A-9648-F	B6A-9577-A	B5A-9641-A	B4T-9594-A ③	B5A-9904-A
Fordomatic	1956	B6A-9510-M	.050"....	① 78-9533-A	.073"....	② B5A-9648-F	B6A-9577-A	B5A-9641-A	B4T-9594-A ③	B5A-9904-A
All (Repl.)	1956	B6A-9510-N, Q	.050"....	① 78-9533-A	.073"....	② B5A-9648-F	B6A-9577-A	B5A-9641-A	B4T-9594-A ③	B5A-9904-A
FORD V8 Truck										
272" Engine	1956	B6T-9510-B	.051".....	59A-9533-A	.055".....	B6T-9648-B	B6T-9577-A	B5A-9641-A	B6T-9594-C	B6T-9904-A
LINCOLN										
Lincoln & Continental	1956	ECU-9510-B,C,D,E	.060".....	1GA-9533-C	.120".....	EBJ-9993B-A	B5A-9577-D	B5A-9641-A	8EQ-9594 ④	B5A-9904-A
MERCURY										
Synchro-mesh	1956	B6A-9510-L	.050"	78-9533-A	.055".....	B6A-9648-A	B6A-9577-A	B5A-9641-A	B4T-9594-A ③	B5A-9904-A
Mercomatic	1956	B6A-9510-M	.050".....	78-9533-A	.055".....	B6A-9648-A	B6A-9577-A	B5A-9641-A	B4T-9594-A ③	B5A-9904-A
All (Repl.)	1956	B6A-9510-N, Q	.050".....	78-9533-A	.055".....	B6A-9648-A	B6A-9577-A	B5A-9641-A	B4T-9594-A ③	B5A-9904-A

① – Use 59A-9533-B (.049") for 5000 - 10000 ft. Alt.
Use 78-9533-B (.048") for 10000 - 15000 ft. Alt.
② – Use B5A-9648-C (.063") for 5000 - 10000 ft. Alt.
Use B6A-9648-A (.055") for 10000 - 15000 ft. Alt.
③ – Stamped "28".
④ – Stamped "52".

FORD V8 DUAL DOWNDRAFT

FORD V8 PASS. CARS	Ford Carburetor No.
1956 Synchro-mesh	B6A-9510-J
1956 Fordomatic	B6A-9510-K
FORD V8 TRUCKS	
1956 (272 ECY-W, Exc. Fordomatic)	B6Y-9510-A
1956 (272 ECY-W, Fordomatic)	B6C-9510-C

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 HARD STARTING (272 Pass. Car Eng.):* New choke thermostat with new bi-metal spring, Ford No. B6A-9848-D (identification mark "56F1"), can be installed to replace choke thermostats with identification "56F" or "56D".

►*1956 ACCELERATOR PUMP PISTON ROD STICKING CORRECTION (272 Eng.):* When this rod sticks or binds, install new rod Ford No. B6A-9531-A, identified by deep blue color. Old rod was zinc plated. Free carburetor of burrs or foreign material when installing new rod.

►*HARD STARTING WHEN ENGINE HOT NOTE:* Move pump link to shortest stroke position in throttle shaft plate.

►*HARD STARTING (Due to choke bind):* To correct binding condition check for bent choke shaft or shaft misaligned with choke plate on the choke shaft. If either condition found, replace air horn assembly. When choke plate operates hard manually and no binding exists, check automatic choke piston gasket. Slot must be properly aligned to permit choke plate to completely close.

►*1956 NOZZLE BAR CLEANING CAUTION:* Use only a solvent that will not affect rubber seals when cleaning bar assemblies.

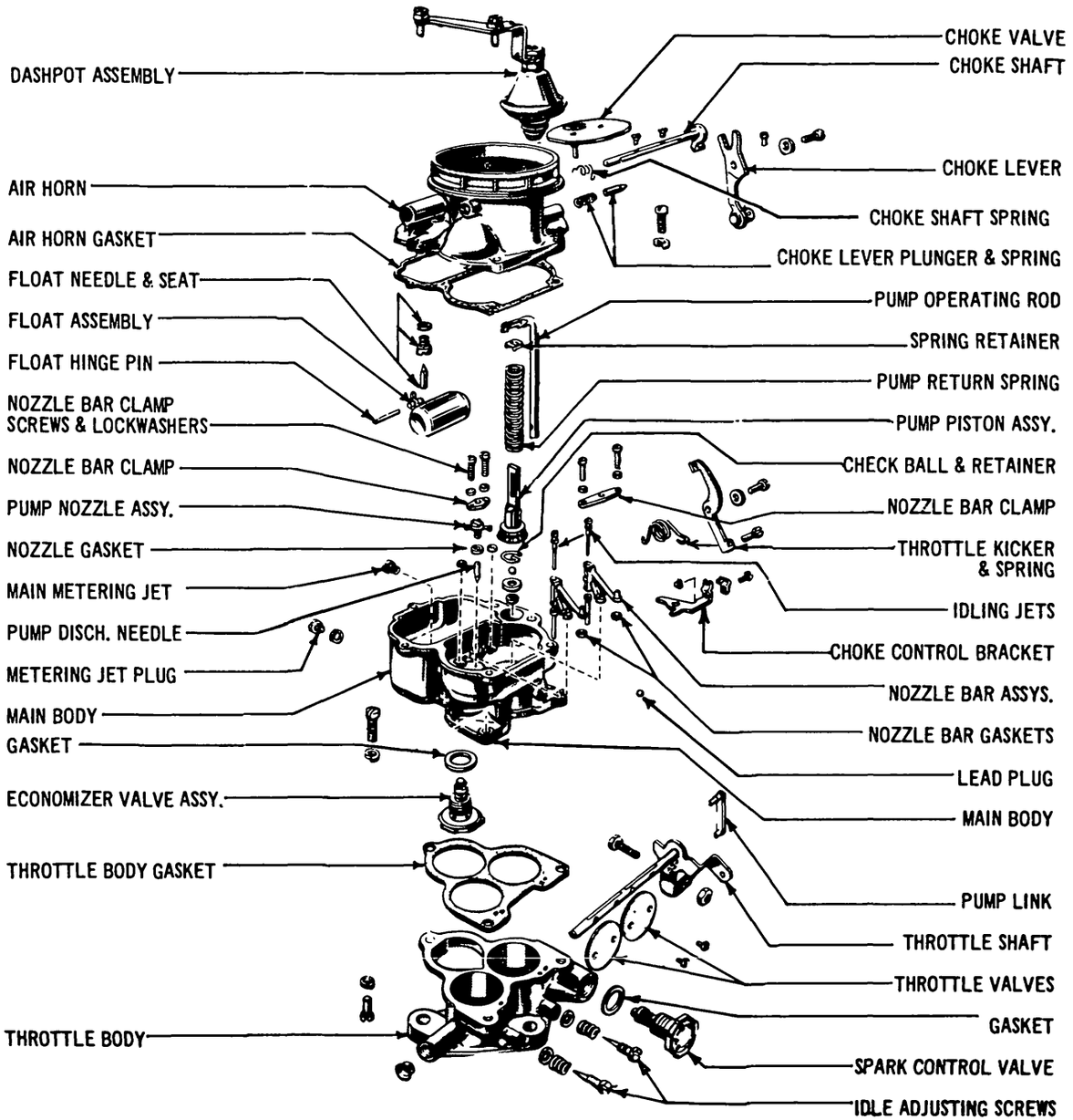
DESCRIPTION: Dual or double barrel downdraft type of same design used on previous models with distributor control vacuum connection and anti-stall dashpot (with Fordomatic Transmission only). These carburetors have Spark Control Valve in Carburetor throttle body.

ADJUSTMENT: Set these carburetors to following specifications:

IDLING ADJUSTMENT

Idle Mixture - To start engine, turn screws in to bottom lightly, then turn screws out 1 turn. Run engine for 20 minutes at fast idle speed to bring it to normal operating temperature. Make sure fast idle cam is in slow position. Turn each screw in equally until engine begins to run rough from lean mixture, then turn each screw out equally until engine begins to "roll" from rich mixture. Then turn each screw in an equal amount until engine runs smoothly. Always favor a rich mixture rather than a lean setting. *NOTE* - It may be necessary to reset idle speed after idle mixture adjusted.

Idle Speed - 475-500 RPM (Synchro-mesh Cars & Trucks), 475-500 RPM (Fordomatic in Neutral). *NOTE* - Adjust idle speed in Neutral to obtain 425-450 RPM in DR (drive) range on all Fordomatic Cars & Trucks. *CAUTION* - If anti-stall Dashpot adjusting screw holds throttle open and prevents proper idle adjustment, loosen locknut, turn Dashpot adjusting screw clockwise until idle speed can be adjusted, then readjust Dashpot setting, see below.



HOLLEY (FORD) V8 DUAL DOWNDRAFT CARBURETOR

ANTI-STALL DASHPOT

Setting - After idle speed adjusted (above), turn off ignition, loosen locknut on dashpot adjusting screw stud, turn screw out or counter-clockwise until screw pushes dashpot rod up to the end of its travel, then turn screw in or clockwise 1½-2 turns and tighten locknut. This will provide correct clearance of .045-.064" between dashpot rod and adjusting screw (when rod bottomed in dashpot).

VACUUM SPARK CONTROL VALVE

No adjustment required. Calibrating spring in valve is set to allow the valve to operate at 7-8" of manifold vacuum. If operation not satisfactory, remove and inspect valve for free movement of the valve stem and inspect passage in adapter screw.

CONTINUED ON NEXT PAGE

FORD V8 DOWNDRAFT (C nt.)

ACCELERATING PUMP

Setting - Engage pump link in throttle plate as follows: Shortest stroke for hot weather, medium stroke for average conditions, and long stroke for cold weather operation.

ECONOMIZER (POWER VALVE)

Opens at 7.9-9.0" of manifold vacuum. No adjustment.

FLOAT LEVEL

Fu l L v l - Install Tool T56L-9562-A in one of main jet plug holes. Operate engine at idle speed. Fuel level should be at "LO" pins in gauge cap. If not correct, remove carburetor air horn and set float level.

Float Level - Invert air horn assembly so float will be in closed position. Distance from flanged surface of air horn to edge of soldered seam on bottom side of float should be 1.437-1.500" and equal on both sides of float. To correct, bend float lever arm.

OVERHAUL: *See 1955 Annual Data or later Manual edition.*

SERVICE PARTS: Gasket Set - Ford No. B6A-9502-B (B6A-9510-J,K; B6Y-9510-A, B6C-9510-C).
Repair Kit - Ford No. B6A-9590-B (B6A-9510-J,K; B6Y-9510-A, B6C-9510-C).

FORD 6 "VISI-FLO"

FORD 6 CYL. CARS	Carburetor No.
1956 Synchro-mesh	B6A-9510-H
1956 Fordomatic	B6A-9510-G
1956 Taxi Cab (Special Economy)	B5A-9510-S,V
FORD 6 CYL. TRUCKS	
1956 Synchro-mesh	B6C-9510-A
1956 Fordomatic	B6C-9510-G
1956 Economy Special	B5A-9510-S,V

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 MAIN METERING JET PRODUCTION CHANGE:* Main metering jets changed approximately June 1, 1956. *See Jet Specification Table.*

► *1956 ACCELERATOR PUMP DISCHARGE NOZZLE DESIGN CHANGE & CAUTION:* Accelerator pump discharge nozzle pressed into main body recess and is locked in place with a pin. If nozzle becomes loose, replace the main body.

► *1956 HARD STARTING, ENGINE STUMBLING OR HESITATION DURING WARM WEATHER CAUTION:* During warm weather, the accelerator pump link should be placed in the hole in throttle shaft plate (hole nearest throttle shaft) giving the shorter stroke.

DESCRIPTION: "Viso-flo" Carburetor. Of same design as used on previous models.

ADJUSTMENT: For tune-up on the car, adjust as follows:

Idle Mixture - To start engine, turn screw in to bottom lightly, then turn screw out 1½ turns. Run engine for 20 minutes at fast idle speed to bring it to normal operating temperature. Make sure fast idle cam is in slow position. Turn screw in until engine runs rough from lean mixture, then turn screw out until engine begins to "roll" from rich mixture. Finally turn screw in until engine runs smoothly. Always favor a rich mixture rather than a lean setting. *NOTE* - It may be necessary to reset idle speed after idle mixture adjusted.

Idle Speed - 475-500 RPM (Synchro-mesh Cars & Trucks), 475-500 RPM (Fordomatic in Neutral). *NOTE* - Adjust idle speed in Neutral to obtain 425-450 RPM in DR (drive) range on all Fordomatic Cars & Trucks. *CAUTION* - If Anti-stall Dashpot adjusting screw holds throttle open and prevents proper idle adjustment, loosen locknut, turn Dashpot adjusting screw clockwise until idle speed can be adjusted, then readjust Dashpot setting, see below.

Accelerating Pump: Inner hole for normal or hot weather, outer hole for cold weather operation.

Fuel Level - 11/16"±1/32" below power valve mounting surface. To adjust, remove fuel bowl cover, bend float tab which contacts float needle spring.

Float Level—Can be checked with Gauge No. T52L-9550-AEE (Gauge, Bending Tool, and Dummy Fuel Bowl), or with cardboard gauge (furnished in repair package) as follows:

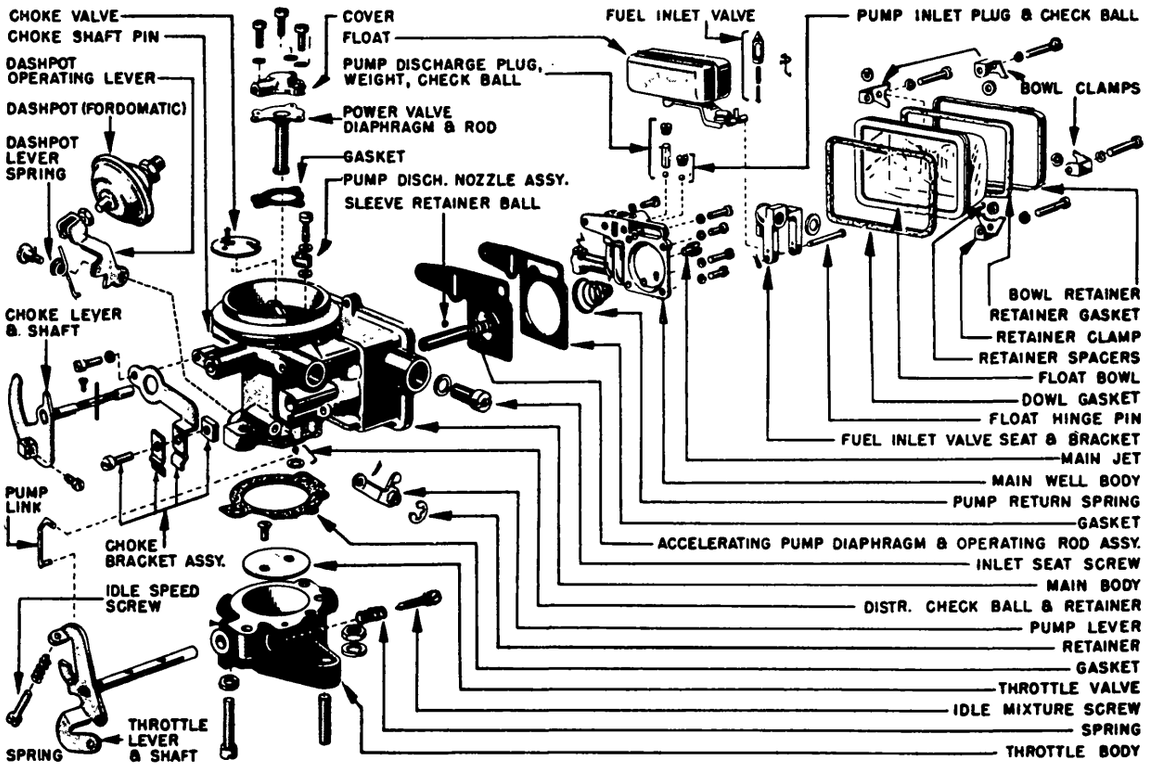
Using Gauge 9550-AEE—Remove regular carburetor fuel bowl, install dummy fuel bowl (with open top) using regular fuel bowl gasket and three of the retaining screws. Remove power valve cover and diaphragm assembly, install fuel gauge No. T52L-9550-AEE in this opening. Fuel in bowl should touch tip of "LOW" gauge pin, but should not touch tip of "HIGH" gauge pin. Adjust by bending float arm tab using special slotted bending tool.

Dashpot (Fordomatic Cars & Trucks): After engine idle speed adjustment completed, turn ignition off, loosen dashpot adjusting screw locknut (on dashpot operating lever), hold throttle in closed position and turn adjusting screw out or counter-clockwise until the head of the screw pushes the dashpot rod up to the limit of its travel, then turn adjusting screw in or clockwise 1½-2 turns, tighten locknut. This will provide correct clearance of .045-.064" between dashpot rod and adjusting screw (apparent only when rod bottomed in dashpot).

OVERHAUL: *See 1955 Annual Data or later Manual edition and note the following:*

Acc l rating Pump Discharg N zzl - Do not remove. If loose, replace the main body. *See "Caution" above.*

SERVICE PARTS: Gask t Kits - Ford No. B6A-9502-A.
R pair Kit - Ford No. B6A-9590-A.



FORD 6 "VISI-FLO" CARBURETOR

FORD V8 TRUCK DUAL CONCENTRIC)

FORD V8 TRUCKS — **Carburetor No.**
1956 272 (ECR) — B6T-9510-A

DESCRIPTION: Concentric, dual, downdraft carburetor with main body enclosed within air cleaner on all models except Cab Forward. On Cab Forward models main body enclosed in carburetor air cleaner horn. Choke plates mounted in air horn and booster venturis used in main body.

Governor Assembly—Governor unit is mounted on throttle body and linked directly to end of throttle valve shaft. Throttle body is modified for governor mounting and throttle valve shaft is special type for governor connection

Depopper Valve—Consists of a spring-loaded piston type valve built in the throttle body This valve controls a by-pass through which part of the idle air supply passes around the closed throttle valves (a conventional idle system with idle mixture adjusting screws is used to supply the engine idling fuel supply in the usual manner). Valve is normally open during engine operation but closes when manifold vacuum rises to 22" (when throttle is closed). Closing of the valve enriches the idle fuel mixture to the point where it will not support combustion in the engine or exhaust system thus eliminating any "popping." An adjusting screw is provided for Depopper adjustment See ADJUSTMENTS below.

Choke Control—Convention manual type (automatic choke not used).

ADJUSTMENTS: Make all adjustments as follows

Idle Setting - Turn adjusting screws in to lightly seat and back off each screw ½ turn. Run engine until operating temperature is obtained, then turn mixture screws in until engine begins to run rough from lean mixture. Turn screws out until engine begins to "Roll" from rich mixture. Turn screws in until engine runs smoothly. Always favor a rich mixture rather than a lean setting. Reset idle speed after an idle mixture setting. See Depopper valve adjustment below.

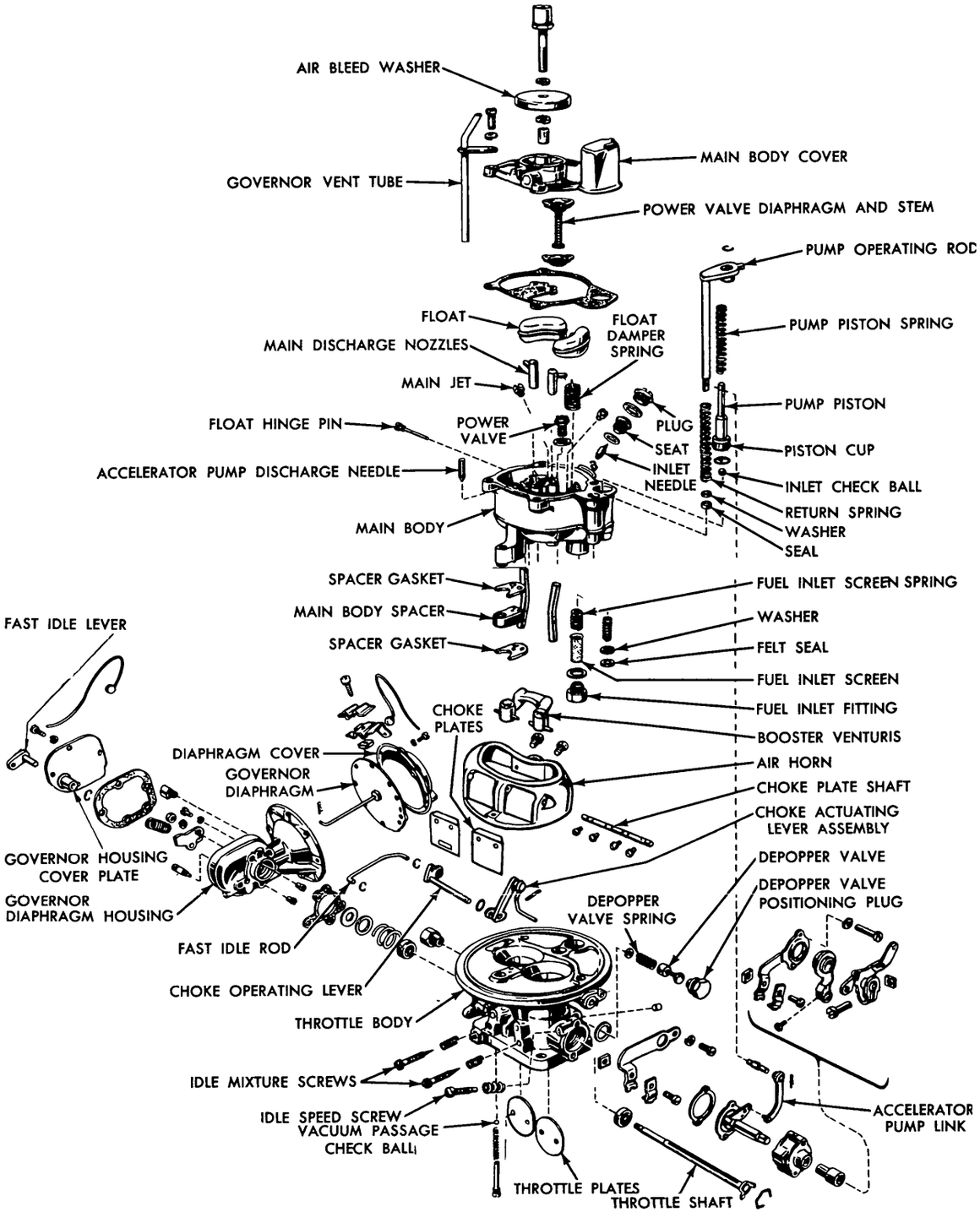
Idle Speed Setting - 475-500 RPM (Synchro-mesh), 475-500 RPM (Fordomatic in Neutral). *NOTE* - Adjust idle speed in Neutral to obtain 425-450 RPM in DR (drive) range on all Fordomatic Trucks

► *CAUTION:* If Anti-stall Dashpot adjusting screw holds throttle open and prevents proper idle adjustment, loosen locknut, turn Dashpot adjusting screw clockwise until idle speed can be adjusted, then readjust Dashpot setting, see below.

Accelerating Pump Adjustment—Fuel discharge controlled by position of pump link in throttle lever holes (two). Closest hole for hot weather, longer hole for cold weather

Fuel Level Setting—Use Gauge T54L-9950-C. Remove air cleaner, main body cover plate and gasket, run engine to secure normal fuel level, check fuel level with tool. Distance from fuel to top of machine casting of bowl should be ½" ± 1/32" To correct level setting bend float lever tab up or down to bring level within limits.

CONTINUED ON NEXT PAGE



FORD V8 TRUCK DUAL CONCENTRIC CARBURETOR

FORD V8 TRUCK DUAL CONCENTRIC) (Cont.)

Depopper Valve Adjustment—Adjust throttle screw to close throttle plates to where they will not bind in bores. Turn depopper valve adjusting screw inward (clockwise) until valve seated (closed). CAUTION—Do not force valve against seat. Turn depopper valve adjusting screw outward (counter clockwise) ⅜-½ turn. Make **Idle Setting & Idle Speed Adjustment** as given above. If engine fails to run when throttle released, increase idle speed sufficently (Idle stop screw) to maintain operation of engine. If popping is evident after high road speed or maximum engine RPM, upon deceleration without brake action, check depopper valve piston actuating spring as follows:

Depopper Piston Spring Test—Use Tool No. T54T-9976-A to check calibration of spring and proceed as follows: Remove air cleaner, depopper retainer and valve adjusting screw from throttle body. Install screw adapter in throttle body, install sleeve on screw adapter until pointer reads approximately 16 ounces. Pull back runner (rod protruding from gauge) and release gently. Then push runner forward. NOTE—The pointer will move indicating that valve is not seated. Screw sleeve in until pointer reads 16½ ounces. Repeat step of pulling runner back, releasing runner gently and pushing runner forward in ½ ounces increments until pointer will not move when pushed forward. The pointer should then read within 21.0-21.5 ounces. NOTE—If reading is not within specifications of 21.0-21.5 ounces, adjust depopper piston spring tension adjusting screw and repeat above procedure. Turn adjusting screw clockwise to increase tension and counter clockwise to decrease tension.

Alternate Method (Tool not available)—This will give approximate adjustment for emergency operation. Connect vacuum gauge to intake manifold. Increase engine speed manually to approximately 2000 RPM. Close throttle quickly and notice vacuum reading when hissing sound of air is first heard in carburetor. This is point when depopper valve opened. If vaccum reading was not between 22.5-23.5 inches of mercury, the piston spring tension adjusting screw should be turned until correct vacuum reading is obtained.

►*DEPOPPER CLEANING NOTE:* If necessary to clean depopper valve with carburetor on engine apply light grease to center section of spring tension washer to hold it in place on end of tension adjusting screw during assembly. Add light application of grease to end of spring to hold it in valve recess so valve and spring can be installed together without dislodging washer from end of adjusting screw.

DISASSEMBLY: Divided into three sections as follows:

►*DISASSEMBLY CAUTION:* Use separate container for component parts: throttle body and main body. DO NOT remove throttle plates and choke plates (unless necessary) to prevent difficulty in correct positioning. Remove booster venturis only when damage makes replacement necessary.

Main Body Disassembly - Remove center stud, two lockwashers, and air bleed washer, cover retaining screws, lift out governor vent tube from air horn, remove cover and gasket. Remove accelerator pump link from operating rod, lift pump assembly from well. Remove pump rod dust seal, washers, and spring. Lift out main discharge nozzles carefully, invert carburetor and catch pump discharge needle. Remove float inlet needle plug, inlet needle seat spring, and seat. Unscrew float hinge pin, lift float assembly out and remove float damper spring. Remove main jets and power valve. Lift accelerator pump inlet check ball retainer out of pump well with hooked wire. Invert carburetor and catch inlet check ball. Remove three power valve diaphragm retainer screws from main body cover, and remove power valve diaphragm assembly. To disassemble accelerator pump assembly when necessary, slip pump piston cup off end of piston stem, compress stem spring, pry off stem retainer, then remove stem and spring from operating rod.

Main Body, Air Horn & Throttle Body Separation - Invert carburetor, remove fuel inlet fitting, two screws retaining main body to throttle body, lift main body off air horn removing main body spacer and two gaskets at the same time. Remove air horn to throttle body retaining screw, lift air horn off throttle body. Disengage choke actuating lever from choke plate using care not to bend lever.

Throttle Body Disassembly - Remove idle fuel adjusting needles and springs, disconnect fast idle rod from choke lever, and remove governor cover plate and gasket. If necessary, pry off fast idle shaft retainer and remove shaft from cover plate. Remove governor spring and cotter pin from vacuum rod, push rod out of governor lever. Remove governor lever nut, lockwasher, and lever. Remove three retaining screws, then remove governor housing and diaphragm. Remove throttle shaft seal, retainer, and spring, throttle lever and throttle pick-up lever. Remove hand throttle control wire bracket screws, then remove bracket, throttle shaft housing, operating shaft assembly, and gasket. Throttle plates and shaft should not be removed from throttle body. To remove choke lever assembly, when necessary due to binding or damage, remove cotter pin from choke shaft and actuating lever assembly, slide choke shaft out of throttle body, remove actuating lever assembly and washer. Remove depopper valve positioning plug, depopper valve, tension spring, and tension spring washer. DO NOT REMOVE spring tension adjusting screw from throttle body.

Air Horn Disassembly - Remove choke plate screws, choke plates, slide choke plate shaft out of air horn. Remove lock wire from booster venturi screws, remove screws.

REASSEMBLY: Assemble by reversing disassembly procedure and following sequence below:

1) Assemble all parts of Air Horn.
2) Assemble all parts of Throttle Body.
3) Assemble the Main Body with the Air Horn and Throttle Body.
4) Assemble all parts of Main Body.

Reassembly Notes - 1) Chokeplates must be free of any bind in Air Horn.
2) Be sure fast idle lever is properly positioned in choke lever and fast idle lever.
3) Use light application of grease to hold main body spacer (with gasket on each side) to boss on main body while installing main body on air horn.
4) Hold float in closed position and measure distance from gasket surface on main body to toe of float. Bend float lever tab to obtain 1/4" float level. Float toes must be at same level.
5) Be sure main discharge nozzle tips are pointing away from each other after installation.

SERVICE PARTS: Gasket Set - Ford No. B6A-9502-B. **Repair Kit** - Ford No. B6T-9590-A.

ROCHESTER 4GC 4-BARREL CARBURETORS

	Rochester Carb. No.
BUICK	
Series 50, 60, 70	7009200
CADILLAC	
See SEPARATE "Cadillac (Carter & Rochester)" data.	
CHEVROLET	
V8 (Power Pack)	7008737
OLDSMOBILE	
Super 88 & 98 (Synchro-mesh)	7007222
Super 88 & 98 (Hydra-Matic)	7007221
PACKARD	
5680 (290 H P Engine)	7008610
5688 (310 H P Engine) (Rear)	7009600
(Front)	7009601
PONTIAC	
27 & 28 (Synchro-mesh)	7007900
27 & 28 (Hydra-Matic)	7008697
Strato-Streak (285 H P Engine) (Two)	7009820

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 BUICK PRIMARY MAIN METERING JET CHANGE (To Improve Performance in Part Throttle Range)* Leaner jets, Part No. 7001860 are used in later production carburetors having a "D" stamped on identification tag. If new jets are installed on early carburetors, use the later type jets.

►*1956 BUICK STUMBLE CORRECTION (ON EARLY CARS):* This condition is noticeable on light acceleration under cold operating conditions and may be caused by the accelerating pump spring being too light. Correct by installing Accelerating Pump Spring, Part No. 7009651 having a .042" diameter wire. Production carburetors having the later type spring are identified by C6, D6, etc., date stamp following the carburetor part number

►*1956 BUICK PRIMARY MAIN METERING JET PRODUCTION CHANGE (For Increased Fuel Economy):* In later production, Rochester Primary Main Metering Jet, Part No. 7001860, (size .055") is being used and can be used for service replacement. Carburetors having the later type jet can be identified by the letter "D" stamped on the carburetor identification tag.

►*1956 BUICK ACCELERATING PUMP ASSEMBLY CHANGE (To Correct Hesitation on Light Acceleration):* Install Pump Assembly, Part No. 7009129, replacing Part No. 7009279.

►*1956 BUICK COLD ENGINE STALLING & LOADING UP (First Cars):* This condition can be eliminated by installing all parts furnished in special kit, Buick No 7009948 (Choke Housing, Thermostat Cover & Gasket, Choke Housing Gasket, Choke Piston, Pin, and Lever & Link Assy). When these parts installed, set carburetor to following specifications.

1) Choke Setting—Centered (At Index)

2) Fast Idle Setting—1700 Engine RPM (hot engine with fast idle screw on high step of fast idle cam)

3) Unl ad r S tting—Unloader must operate correctly. See Choke Rod & Unloader Adjustment below.

NOTE—When above changes made, stamp letter "C" in lower left hand corner of brass identification tag. Production carburetors on which this change made will also be stamped "C"

►*1956 OLDSMOBILE ENGINE STALLING (In Warm Weather Immediately after Starting or is Hard To Start):* Adjust choke to one notch lean (from index). Adjust fast idle to 1500 RPM. Adjust throttle return check clearance to .020". Readjust throttle downshift screw so that screw is turned in 1½ to 2 turns after it just contacts tang of downshift lever. Make sure .020" clearance exists on the car between fast idle cam and top side of secondary throttle lockout tang to be sure choke valve is free to close. *CAUTION - Do not bend tang too far so that interference exists between bottom side of tang and fast idle cam.*

►*1956 PACKARD CARBURETOR HIGH ALTITUDE ADJUSTMENT NOTE* Leaner jets are not required for operation above 5000 ft. The choke should be set to three notches lean, and the secondary contour clearance should be set at .020" rather than .015".

►*PACKARD CARIBBEAN ENGINE ADJUSTMENT CAUTION:* Two carburetors used and special adjustment procedure required for balanced operation. *See Packard car model pages in 1955 Annual Data or later Manual edition.*

►*PONTIAC 285 HP ENGINE ADJUSTMENT CAUTION:* Two carburetors used and special adjustment procedure required for balanced operation. *See Pontiac car model data on Page 63.*

►*1956 PONTIAC COLD ENGINE STALLING CORRECTION & WARMING UP IMPROVEMENT (First Cars with No. 7008697 & 7007900 Carbs.):* Install new choke piston, No. 7009710 (can be identified by single bleed hole on side of piston—first type had two diametrically opposite holes) and set automatic choke 1 Notch Rich (supersedes Centered setting). *NOTE—Carburetors on which this change made in production are stamped "F" on identification tag*

►*1956 PONTIAC CARBURETOR LOADING-UP (DURING WARM UP) CORRECTION & CHOKE PISTON LINK PRODUCTION CHANGE:* On later production cars, the choke piston link contour has been changed to give an increased opening on cold idle. This change can be make on earlier carburetors by bending the choke link (using a pair of pliers) so that the choke piston protrudes 1/16" from the cylinder and the piston pin is one-half exposed when choke valve is fully closed Make sure no bind exists after bending link.

►*1956 PONTIAC (EXC. 285 H.P. ENGINE) HARD STARTING CORRECTION (With Partially Warmed-up Engine):* Change choke setting from one notch rich to center index. If hard starting is not eliminated completely with this change, set choke to one point lean.

►*1956 PONTIAC 285 H.P. ENGINE CARBURETOR CHANGE (To Improve Hot Starting Characteristics):* Install a new throttle body-to-bowl gasket, Part No. 7009256. The later gasket is identified by each venturi hole in gasket having an elongated section, and is being used in production beginning approximately March 1, 1956.

►*1956 PONTIAC 285 H.P. ENGINE STALLING (AFTER A FAST STOP) CORRECTION:* This condition can be corrected by removing the air horn assemblies from both carburetors and drilling out one internal vent on each side of each carburetor with a 1/8" drill as follows On automatic choke side of carburetor, drill out the internal vent hole located toward rear of air horn partition. On opposite side of carburetor, drill out the vent located on forward side of air horn partition.

►*1956 PONTIAC CARBURETOR FLOODING CORRECTION (Early Cars):* Install fuel filter, Part No. 854345 which is precipitation type filter having an impregnated fibre element

DESCRIPTION: Four barrel downdraft type with automatic choke. Carburetors are same general design used on 1955 car models except that Auxiliary Secondary Throttle Valves have been incorporated in all models except Buick. New settings and specifications are given below.

ADJUSTMENTS: *Make all adjustments in sequence given below (except for Idle Mixture and Idle Speed Tune-Up adjustments).*

►*PONTIAC IDLE ADJUSTING SCREW (THROTTLE STOP SCREW) NOTE:* The throttle stop screw (slow idle screw) as such, has been eliminated and replaced by a flat spring for positive closing. The screw which was formerly the fast idle screw is now both fast and slow idle screw The low step of the fast idle cam is used as the base for slow idle adjustment

Idle Setting: *Adjust only with engine at normal operating temperature with automatic choke not operating* (choke valve wide open, fast idle inoperative so that engine idles at hot or slow idle speed) With engine warm, set idle speed adjusting screw (throttle stopscrew) for correct idling speed as shown in table below (use tachometer), then adjust each idle mixture adjusting screw (one screw for each primary carburetor barrel —two screws only) until engine idles smoothly and RPM is at maximum (see Oldsmobile note following) Recheck idle speed

►*OLDSMOBILE NOTE* Manufacturer recommends that after setting idle as above (for highest vacuum reading and engine RPM), each screw should be turned out (rich) ¼ turn which will provide desired idling performance Check this setting by opening throttle to 1000 RPM point and then snapping throttle closed If engine rolls from richness, turn each screw in (lean) 1/8 turn

NOTE—Change in Idle Speed affects throttle linkage adjustment on all cars except Oldsmobile. Oldsmobile split throttle lever design insures throttle linkage remaining as set when idle speed readjusted.

Idle Speed Setting

Car Model	Synchr -mesh	Aut . Trans.
Buick ①	450 RPM	② 450 RPM
Chevrolet ①	450-500 RPM	③ 400-425 RPM
Oldsmobile ①	425 RPM	③ 400 RPM
Packard ①	450-500 RPM	④ 450 RPM
Pontiac (Exc. 285" Eng.) ⑤	450-470 RPM	②450-470 RPM
Pontiac (285" Eng.) ⑤	650 RPM	② 650 RPM

①—Air Conditioner turned "ON" if car so equipped
②—Transmission in "N" (Neutral)
③—Transmission in "D" (Drive Range)
④—Transmission in "High" range
⑤—On air conditioned cars, adjust idle speed to 510-530 RPM with air conditioner turned "OFF"

CONTINUED ON NEXT PAGE

ROCHESTER 4GC 4-BARREL CARBURETORS (Cont.)

►*OLDSMOBILE THROTTLE LINKAGE ADJUSTMENT NOTE.* Carburetors have "Split Throttle Lever" and linkage adjustment will not be disturned by Idle Speed Adjustment

►*1956 PACKARD 5688 (310 H.P. ENGINE) THROTTLE LINKAGE ADJUSTMENT* See *CARBURETOR on Car Model pages*

►*1956 PONTIAC 285 H P. ENGINE THROTTLE LINKAGE ADJUSTMENT* See *CARBURETOR on Car Model pages*

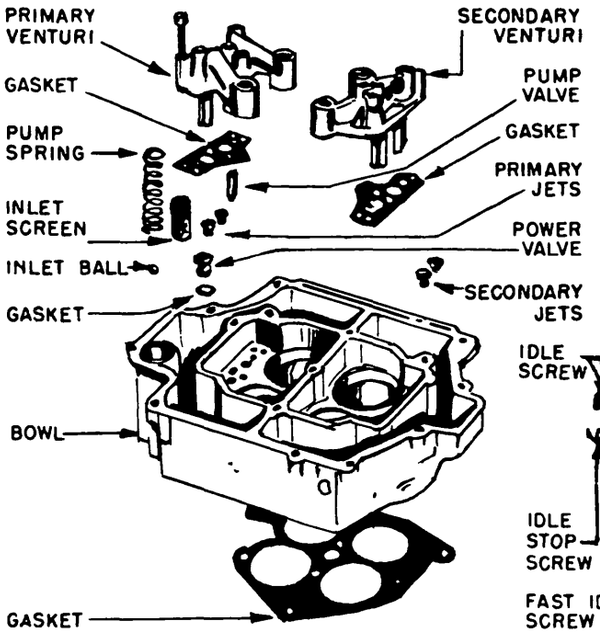
Float S tting *CAUTION–Both Primary and Secondary Float Assemblies must be checked and adjusted separately and both FLOAT LEVEL & FLOAT DROP must be checked for each assembly* Remove bowl cover and float assembly from carburetor but DO NOT remove bowl cover gasket for following checks

Float L vel–*CAUTION–Do not remove bowl cover gask t.* Invert bowl cover install float gauge on cover and against curvature in air horn bore, or use scale to measure distance from gasket on cover to highest point on each float If floats do not just touch top portion of gauge between gauge legs, or if scale distance not correct, adjust by bending float arms at rear of float assembly (*CAUTION*–all floats must be set alike) Bend float arms horizontally until each float is centered between the gauge legs and check this setting by tilting bowl cover assembly 90° to each side to make certain that floats do not touch gauge legs under these conditions (*CAUTION*–this adjustment important to prevent floats touching sides of bowl and hanging up in service)

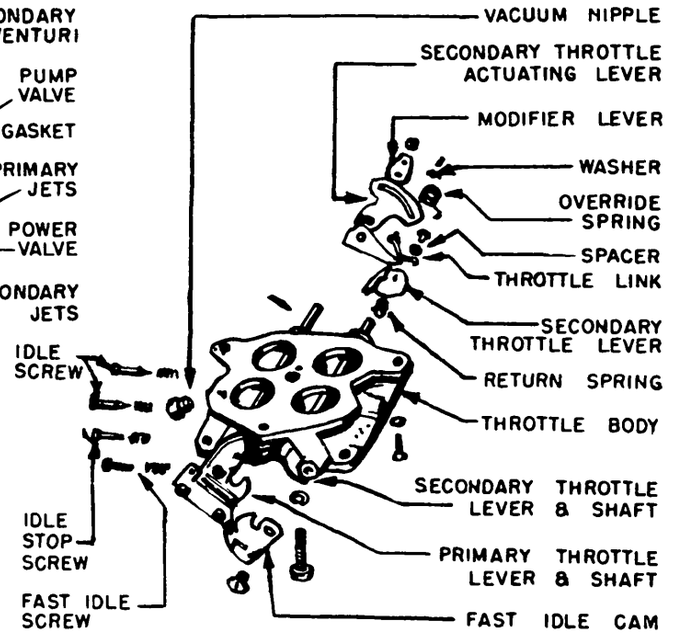
Float Level Setting
(Primary & Secondary Floats)

Car M d l	Float Height	Gauge No.
Buick	1 35/64"	BT 117
Chevrolet	1 5/8	BT 89
Oldsmobile (All)	1 5/8"	BT 89
Packard (All)	1 5/8"	BT 89
Pontiac (All)	1 19/32"	BT 101

Fl at Drop–*CAUTION–Do not remove bowl cover gasket.* Hold bowl cover assembly in upright position so that floats are free to hang down Use scale to measure distance from bottom face of gasket on bowl cover to bottom of floats If this distance or float travel (see table below) not correct adjust by bending tang at rear of float assembly toward needle seat to decrease drop or away from needle seat to increase drop All floats must be set alike



MAIN BODY ASSEMBLY



THROTTLE BODY ASSEMBLY

Float Drop Setting
(Primary & Secondary Floats)

Car Model	Flcat Drop
Buick	2¼"
Chevrolet	2 1/4"
Oldsmobile	2¼"
Packard	2¼"
Pontiac (All)	2¼"

Accelerating Pump Stroke· *CAUTION–This is a linkage adjustment and not a seasonal change recommendation.* Back off idle speed stopscrew and fast idle screw so that primary throttle valves are fully seated hold throttle lever in this position, use scale to measure height of pump plunger rod (from top surface of bowl cover to bottom edge of pump plunger rod) If height not correct (see table below), adjust by bending pump rod as required

Pump Rod Setting

Car Model	Pump Rod Height
Buick	1 1/32"
Chevrolet	1 1/16"
Oldsmobile	1 1/16"
Packard	1 1/16"
Pontiac (exc 285 HP Eng)	61/64"
Pontiac (285 H P Eng)	1'

Atmospheric Idle Vent Adjustment *NOTE–Idle Vent eliminated on Packard carburetors A "Vented" gasket is used between throttle body and float bowl to allow escape of hot vapors from above throttle valves)* Adjust other car models as follows

Oldsmobil –*(NOTE–Adjust Idle Vent after Fast idle Setting is made)* While holding throttle so fast idle screw is on highest step of fast idle cam check opening of idle vent valve which should be approximately 1/32" To adjust bend tang on pump arm with tool BT-67

►*OLDSMOBILE THROTTLE BODY GASKET NOTE·* A special "Vented" throttle body gasket is used to supplement the Idle Vent Valve and allow better escape of hot gases from above throttle valves

Pontiac (Exc. 285 HP Eng. Carb)–With vent valve closed and operating tang against face of valve there should be 054" (Tool KMO-480-A) clearance between lower edge of primary throttle valve and inner wall of bore opposite idle adjusting screws

Automatic Choke Setting· To adjust, loosen heat suction tube connection on cover, loosen three cover retainer screws (*CAUTION*–On Oldsmobile with one toothed retainer engaging serrations in cover, this retainer must be freed from cover serrations), rotate cover until index mark on cover is aligned with center graduation of scale on housing (Centered setting only-see table for recommended settings), tighten all cover retainer screws, tighten heat tube connection

Automatic Choke Setting

Buick	Centered (At Index)
Chevrolet	1 Notch Lean
Oldsmobile (Synchro-mesh)	2 Notches Lean
Oldsmobile (Hydra-Matic)	1 Notch Lean
Packard	Centered (At Index)
Pontiac (exc 285 HP Eng)	①1 Notch Rich
Pontiac (285 HP Eng)	Centered (At Index)

①—Supersedes Centered setting (see changes above)

CONTINUED ON NEXT PAGE

ROCHESTER 4GC 4-BARREL CARBURETORS (Cont.)

Choke Rod Adjustment: *Rod should be adjusted before adjusting Fast Idle, Unloader, and Secondary Throttle Linkage.* Rotate choke valve and fast idle cam until fast idle screw is in contact with SECOND step of fast idle cam, close choke valve until screw is against side of highest step on cam making certain that choke trip lever is in contact with choke counterweight lever. Measure choke valve opening or clearance between top edge of valve and dividing wall in air horn (see table below for gauge and clearance specification) Adjust by bending choke rod at lower angle using BT-18 bending tool.

Choke Rod Setting

Car Model	Gauge & Choke Opening
Buick	①② BT-115 (.140")
Chevrolet	③ BT-102 (.040")
Oldsmobile	③ BT-68 (.053")
Packard	③ BT-68 (.053")
Pontiac (All)	③ BT-68 (.053")

①—Large end of gauge. ②—Buick No. J-6152.
③—Small end of gauge.

Unloader Setting: *After choke rod adjusted (above),* move throttle lever to wide open position, make certain that choke trip lever is in contact with choke counterweight. Measure choke valve opening or clearance between upper edge of valve and dividing wall in air horn (see table below for gauge and clearance specification). Adjust by bending tang on fast idle cam using BT-69 bending tool

Unloader Setting

Car Model	Gauge & Choke Opening
Buick	①② BT-90 (.115")
Chevrolet	② BT-90 (.115")
Oldsmobile	② BT-90 (.115")
Packard	②③ BT-90 (.115")
Pontiac (All)	②⑪ BT-90 (.115")

①—Buick Gauge J-6152. ②—Use small end of gauge.
③—Packard Gauge J-6057. ⑪—Pontiac Gauge J-6178.

Secondary Throttle Lockout Setting: Close choke valve completely. Bend lockout lever to obtain .015" clearance between cam and widest surface of lockout lever.

Secondary Throttle Contour Setting. Hold choke valve completely closed. Bend lockout lever to obtain clearance (see table below) between cam and narrowest surface of lockout lever.

Secondary Throttle Contour Setting

Car & Model	Contour Setting
Buick	.030"
Chevrolet	.015"
Oldsmobile	.035"
Packard	.015"
Pontiac (All)	.015"

Car Starter Switch Setting (Buick): Back off throttle stop screw to close throttle valves completely. Make pencil mark on switch end of primary throttle shaft to line up with longest of three indicator marks on casting. With test light across switch terminals, slowly open throttle valves. Light should come on when pencil mark is between the two small marks on casting. Adjust by changing shims (Maximum .066"). Reset idle RPM to specifications.

Dampener Valve Setting (Buick): Remove fast idle cam and replace retaining screw. Adjust lever tang (Tool J-6058A) to give measurement of 51/64" (Tool J-6153 No. 1 end) from cam screw shoulder vertical to top of counterweight lever. Hold lever in this position, seat damper valves against outside of bore and tighten in place. Readjust tang to give 53/64" (Tool J-6153 No. 2 end) from cam screw shoulder vertically to top of lever. Proper adjustment prevents valve edge striking bore when in closed position.

►*AUXILIARY SECONDARY THROTTLE VALVE CAUTION (EXCEPT BUICK): Auxiliary secondary throttle valves are calibrated at the factory and field adjustments are not required.*

Fast Idle Setting: *NOTE—When fast idle setting is made "Off Engine", fast idle should be checked "On Engine" to insure proper warm-up performance. Adjust fast idle after Choke Rod adjusted (above).*

"Off Engine" Adjustment—With choke valve and throttle valves fully closed so that fast idle adjusting screw resting on high step of fast idle cam, adjust fast idle screw for correct primary throttle valve opening or clearance between edge of valve and wall on side opposite idle adjusting screws (see table below for gauge and clearance specification).

Fast Idle Setting "Off Engine"

Car Model	Gauge & Throttle Opening
Buick	J-1388 (.020")
Chevrolet	⑪
Oldsmobile	① BT-90 (.024")
Packard	①② BT-90 (.024")
Pontiac (exc. 285 HP Eng.)	③

①—Use small end of gauge. ②—Packard Gauge J-6057.
③—See "Pontiac Idle Adjusting Screw Note" above. Fast idle setting will be correct when "slow idle" speed properly set.

⑪ - No fast idle adjustment provided. Fast idle will be correct when low idle speed and choke rod adjustments properly made.

"On Engine" Adjustment—After Idle completed with carburetor on engine, and with engine and transmission at normal operating temperature, rotate fast idle cam so that fast idle screw rests on high step of cam, adjust fast idle screw for correct engine RPM as follows:

Fast Idle Setting "On Engine"

Car Model	Engine RPM
Buick	1700
Oldsmobile	① 1400-1500
Packard	① 1500

①—With transmission selector lever in "N" (Neutral).

Throttle Return Check Adjustment (Oldsmobile): *(NOTE—Make sure that normal idle speed and fast idle speed adjustments are correct).* With engine at normal operating temperature and running, rotate the fast idle cam so the fast idle screw is on highest step of fast idle cam. Measure clearance between contact screw of throttle return check and contact on throttle lever. Clearance should be .020". If adjustment necessary, loosen contact screw locknut and adjust. Use two wrenches when adjusting locknut to prevent turning the plunger.

OVERHAUL: *CAUTION—When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor assembled.*

Disassembly: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Carburetor Bowl, and Throttle Body) which can be overhauled separately as follows:

Air Horn & Bowl Cover—On Cadillac, disconnect and remove choke modifier rod. On all models, disconnect and remove pump connector rod. Remove trip lever retaining screw from end of choke shaft, remove trip lever and spacing washer from shaft. Take out fast idle cam pivot screw, remove choke rod with lever and cam as an assembly. Take out all air horn retaining screws (*CAUTION*—there are 13 screws—3 inner and 10 outer— with **one screw in center rib dividing wall just inside edge of air horn**). Lift air horn and bowl cover assembly straight up using extreme care not to damage float assemblies (*CAUTION*—break cover loose from bowl with finger pressure only, DO NOT pry on cover flange). Disassemble as follows: Invert the cover assembly, take out float hinge pins and remove floats and intake needles, remove needle seats and gaskets (*CAUTION*—Keep each float assembly, intake needle, and seat together, DO NOT mix primary and secondary side parts). Remove power piston by rotating retaining washer until flat side allows piston to pass, remove piston spring. Remove idle vent valve, spring, and retainer by pressing on retainer with a screwdriver and sliding assembly up out of well in bowl cover. Remove pump plunger and rubber seal as an assembly by disengaging plunger shaft from pump lever and pulling assembly out of cover (seal, retainer, washer, and spring can be removed from plunger for cleaning). Remove pump inner lever from countershaft by removing nut and washer, then slide countershaft out of cover boss. Remove fuel inlet fitting, gasket and strainer. If choke to be disassembled, proceed as follows: On Cadillac, remove retaining screw and lift off choke modifier lever. Remove cover attaching screws and retainers, lift off thermostat cover and coil assembly (*CAUTION*—On Cadillac, do not remove metal pointer or coil from shaft in cover), remove gasket and baffle plate. Remove choke valve (remove staking burrs from valve screws before taking screws out). Rotate choke shaft counter-clockwise until choke piston clears cylinder, slide shaft out and remove shaft and piston as an assembly (piston can be disconnected by using a wire to push piston pin out of piston and link). Remove choke housing by taking out two attaching screws, remove and discard choke housing gasket.

Carburetor Bowl—Take out three attaching screws and lockwashers in each venturi cluster, carefully remove clusters by lifting them straight up to avoid damaging

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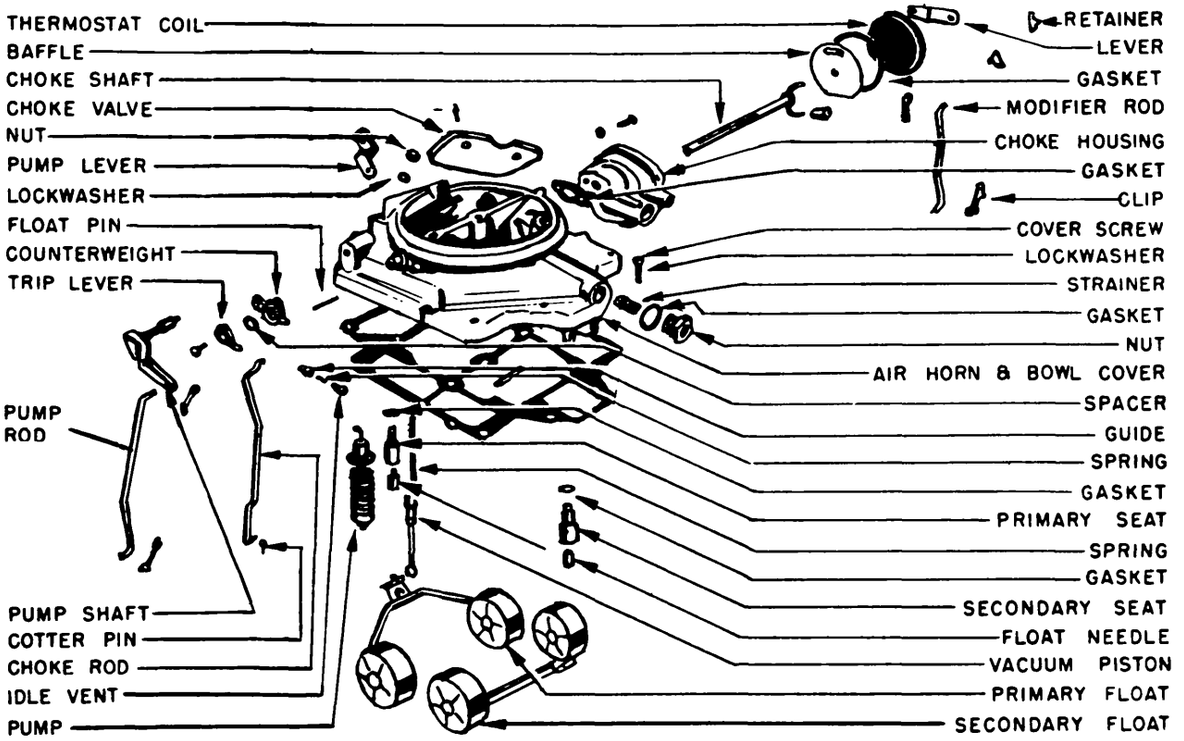
ROCHESTER 4GC 4-BARREL CARBURETORS (C nt.)

idle tubes and main well tubes (*CAUTION*–Clusters are serviced as an assembly and should not be disassembled further). Keep primary and secondary side clusters separate (primary cluster has pump discharge nozzles). Remove all main metering jets (located in bowl adjacent to venturi cluster support). *CAUTION*–Primary and secondary side metering jets are different size and must not be interchanged. Remove power valve and gasket (located in bowl adjacent to primary metering jets). Remove pump return spring from pump cylinder, then invert bowl casting to remove aluminum pump inlet ball (from bottom of pump cylinder) and brass pump outlet check needle (from passage under primary venturi cluster mounting face). *CAUTION*–Do not lose these parts and NEVER substitute a steel ball for the aluminum inlet ball. Remove pump inlet screen from intake passage at side of cylinder.

Throttl Body–Remove large screw and washer from counterbore in center of throttle body (visible when bowl and throttle body inverted), remove three smaller screws and lockwashers from flange, carefully separate throttle body from bowl, remove and discard gasket. On all cars except Buick & Cadillac, remove the secondary auxiliary throttle valve assembly from carburetor body by lifting it out of the secondary throttle bores. Remove both idle adjusting screws and springs, idle stop screw and spring, and fast idle screw and spring. *(CAUTICN - Keep each screw and its proper spring together).* On Cadillac, remove choke modifier lever and retaining screw from primary throttle shaft. Free secondary throttle actuating link by taking out cotter pin in each end, unhook inner end of primary throttle shaft override spring from lever using long nose pliers, remove override spring retaining screw from primary throttle shaft, remove secondary throttle lever retaining screw and washer, then slide secondary throttle actuating lever and override spring off primary shaft, remove link. Slide secondary throttle lever and return spring from secondary throttle shaft. This completes throttle body disassembly.

► *CAUTION: Sec ndary Auxiliary Throttle Body and Main Throttl Body ar furnish d as an assembly with throttle valves and shafts and n attempt should be made to remov throttl valv s (disturbing valves will upset low spe d m t ring p rformance).*

Cl aning & Inspecti n: Wash all parts thoroughly in carburetor cleaning solvent **except** following parts which should be cleaned in clean gasoline: Choke cover and coil assembly, pump plunger, primary venturi cluster (with pump discharge nozzles). Blow out all passages in castings with air, remove all gum and carbon deposits (*CAUTION*–do not use drills to clean out jets and passages). Inspect strainer screens and replace if distorted or plugged. Check floats for dents, leaks, or wear at hinge pin holes. Inspect fast idle cam for wear on steps. Inspect throttle body carefully for wear at throttle valves and bore and shaft wear in bore



ROCHESTER 4GC 4-BARREL CARBURETOR AIR HORN & BOWL COVER ASSEMBLY

(replace as an assembly if worn excessively). Inspect all parts for wear or damage and replace as required.

Reassembly: Use new gaskets. Install all parts in reverse order of disassembly procedure (above) and pay particular attention to the following:

Auxiliary Secondary Throttle Valve Assembly - Install the auxiliary secondary throttle valve assembly into base of carburetor body from bottom side (make sure the calibrated spring, nylon bushing and operating pin are in position in throttle body assembly).

Secondary Throttle Lever & Spring Installation: Install return spring on secondary throttle shaft with bent end of spring in hole in throttle body, wind up spring one complete turn, then install secondary lever on shaft over straight end of spring (bent portion of lever should be above shaft), install spacer and retaining screw in end of shaft. Install secondary throttle actuating link (insert plain end through lever hole, install cotter pin on shaft side to clear return spring).

Primary Throttle Lever & Spring–Start secondary throttle actuating lever on primary throttle shaft with curved slot portion outward and toward the rear. With inner portion of lever on shaft, start override spring on shaft with long end inward, then slide lever and spring on shaft and engage washer end of secondary throttle actuating link in slot in lever. Install override spring retaining screw through loop end of spring and into primary throttle shaft from upper side. Hook inner end of override spring over top edge of secondary throttle actuating lever. Install washer and cotter pin on end of secondary throttle actuating link. On Cadillac, install choke modifier lever and retaining screw on end of primary throttle shaft (lever must point upward when throttle closed and marking "RP" must be outward).

Throttle Body-to-Bowl Assembly Caution–Install new gasket on bottom surface of bowl with largest projecting tab on primary side and surrounding vacuum passage to power valve piston (*CAUTION*–gasket is not reversible). Install all throttle body attaching screws loosely (including large screw in center of throttle body), then tighten all screws evenly.

Venturi Cluster Installation Caution–Make certain that brass pump discharge needle installed in pump passage in bowl before installing primary venturi cluster. Use new gaskets and install each venturi cluster in correct position making certain that clusters correctly aligned by the tangs on the cluster. *CAUTION*–Primary and Secondary clusters not interchangeable and can be identified by brass pump discharge nozzles used on primary cluster only.

Metering Jet Installation Caution–Primary and secondary side metering jets are DIFFERENT sizes (in general, secondary jets are larger size than primary jets) and must be installed in correct positions. *NOTE*–On later Cadillac carburetors, primary jets are brass finished, secondary jets are copper plated.

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ROCHESTER 4GC 4-BARREL CARBURETORS (C nt.)

Accelerating Pump Plunger Assembly–When installing rubber seal on plunger stem, slide seal on shaft with larger end toward the piston, see that upper end engaged in groove in plunger stem. Insert assembly through bowl cover from below and pull seal through cover so that cover edge engages groove in seal. When installing cover, guide pump plunger into cylinder. **Floats and Intake Valve Assembly**–Make certain that parts installed in correct position (primary and secondary parts not interchangeable). On Cadillac, make certain that float hinge pins installed in holes farthest from bowl cover. On Oldsmobile, see that tang on float arm is back of float balance spring (balance springs not used on later Cadillac carburetors and should be removed and discarded on earlier carburetors–see Changes & Corrections above). Adjust float level and float drop or travel (see Adjustment data above). **Air Horn & Bowl Cover Installation**–Use new gasket, carefully align all holes in gasket and cover. When installing cover, use care in guiding pump plunger into pump cylinder and power valve piston into its bore, and see that floats not bent by striking on edge of bowl. Install all bowl cover attaching screws, tighten inner screws first, then outer screws, evenly and securely. **Choke Valve Installation**–After choke shaft and piston assembly installed in air horn, slide choke valve through shaft with letters "RP" upward, use new screws and install screws loosely, then tighten screws as follows: **Cadillac**-Press firmly on choke housing end of shaft and hold valve tightly closed, tighten screws securely and stake ends of screws lightly taking care not to bend choke shaft. **Oldsmobile**–First install counterweight, spacing washer, and trip lever on end of choke shaft, press lightly on end of choke shaft to obtain minimum clearance of .020" between spacing washer and counterweight, tighten choke valve attaching screws with shaft in this position, stake screws lightly taking care not to bend choke shaft. Install choke baffle plate with curved slot over tang on choke lever.

Thermostatic Housing & Coil Installation–With retainer screws loose, rotate cover counter-clockwise until coil hook picks up choke lever tang, then position cover for correct choke setting (see Adjustment data) and tighten retaining screws. On Cadillac, install choke modifier lever loosely (lever should be forward and slightly down when metal pointer is at scribed line), tighten lever screw as part of Choke Modifier adjustment (see Adjustment data).

SERVICE PARTS

Gasket Sets - Rochester No. 7009941 (7008750, 7008751, 7009750, 7009751). No. 7009943 (7009200). No. 7009944 (7007900, 7008697). No. 7009946 (7007221, 7007222). No. 7009947 (7008610, 7009600, 7009601). No. 7009952 (7009820). No. 7009953 (7008737).

Repair Packages - Rochester No. 7009921 (7008750, 7008751, 7009750, 7009751). No. 7009923 (7009200). No. 7009924 (7008697, 7007900). No. 7009926 (7007221, 7007222). No. 7009927 (7008610). No. 7009931 (7009600, 7009601). No. 7009932 (7009820). No. 7009933 (7008737).

1956 ROCHESTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Model	Main Metering Jet Standard Size	Main Metering Jet Standard Part No.	Main Metering Jet 1 Size Lean Size	Main Metering Jet 1 Size Lean Part No.	Main Well Support	Venturi Cluster	Power Valve	Float Needle & Seat
CHEVROLET 6 Cyl. Cars										
Synchro-mesh	1956	BC 7009255	.058"	⑤ 7002958	.057"	⑥ 7002957	7007165	.....	7006121	7002359
Powerglide	1956	BC 7009254	.058"	⑤ 7002958	.057"	⑥ 7002957	7007165	.....	7006121	7002359
CHEVROLET V8 Cars										
Synchro-mesh	1956	2GC 7008387	.052"	7002952	.051"	7002951	.....	7009493	7006331	7009458
Powerglide	1956	2GC 7008388	.052"	⑦ 7002952	.051"	⑧ 7002951	.....	7009215	7006331	7009458
CHEVROLET 6 Cyl. Trucks										
235" Engine	1956	B 7004468	.058"	7002958	.057"	7002957	7005428	.....	7002360	7002359
261" Engine	1956	B 7005140	.065"	7002965	.064"	7002964	7005597	.....	7002360	7002359
Automatic Trans.	1956	BC 7009255	.058"	7002958	.057"	7002957	7007165	.....	7006121	7002359
CHEVROLET V8 Trucks										
Synchro-mesh	1956	2G 7008389	.053"	7002953	.052"	7002952		7009218	7006331	7009458
Overdrive	1956	2G 7008383	.053"	7002953	.052"	7002952	.....	7009218	7006331	7009458
With Governor	1956	2G 7008393	.052"	7002652	.....	.....	.....	7009376	7006331	7009458
OLDSMOBILE										
88 (Dual Range H.D.)	1956	2GC 7007223	.062"	7002662	.061"	7002661	.....	7009772 ⑨	7009349 ②	7006998
88 (Jetaway H.D.)	1956	2GC 7008800	.062"	7002662	.061"	7002661	.....	7009772	7009349	7006998
PONTIAC										
Synchro-mesh	1956	2GC 7008696	.058"	7002658	.057"	7002657	.....	7009096	7006331	7006998
Hydra-Matic	1956	2GC 7008695	.058"	7002658	.057"	7002657	.....	7009239	7006331	7006998

② – Supersedes No. 7006331
⑤ – Supersedes No. 7002957 for better Part Throttle Performance.
⑥ – Supersedes No. 7002656.
⑦ – Supersedes No. 7002951.
⑧ – Supersedes No. 7002950.
⑨ – Supersedes No. 7008888.

1956 ROCHESTER 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor	Main Metering Jet Standard Size	Main Metering Jet Standard Part No.	Main Metering Jet 1 Size Lean Size	Main Metering Jet 1 Size Lean Part No.	Venturi Cluster	Power Valve	Power Piston & Spring	Float Needle & Seat
BUICK										
50, 60, 70	1956	7009200 Pri.	.055"	①7001860	.054"	7001607	7009493	7009349	7000204	7006134
		7009200 Sec.	.078"	7008678			7009425			7006134
CADILLAC Std. Engine										
Early Cars (No A.C.)	1956	7008750 Pri.	.051"	②7002651	.050"	③7002650	7009104	7008614	7008612	7006376
		7008750 Sec.	.068"	7008668			7009105			7006376
Early Cars (With A.C.)	1956	7008751 Pri.	.051"	②7002651	.050"	③7002650	7009104	7008614	7008612	7006376
		7008751 Sec.	.068"	7008668			7009105			7006376
Later Cars (No A.C.)	1956	7009750 Pri.	.051"	7002651	.050"	7002650	7009104	7008614	7008612	7006376
		7009750 Sec.	.068"	7008668			7009105			7006376
Later Cars (With A.C.)	1956	7009751 Sec.	.051"	7002651	.050"	7002650	7009104	7008614	7008612	7006376
		7009751 Sec.	.068"	7008668			7009105			7006376
CHEVROLET										
V8 Pass. Cars (Powerpack)	1956	7008737 Pri.	.048"	7002648	.047"	7002647	7009697	7009349	7000204	7006134
		7008737 Sec.	.046"	7002646			7009699			7006134
OLDSMOBILE										
88, 98 (Synchro-mesh)	1956	7007222 Pri.	.055"	7001860	.054"	7001607	7009497	7009349	7000204	7006134
		7007222 Sec.	.067"	7008667			7008955			7006134
88, 98 (Hydra-Matic)	1956	7007221 Pri.	.055"	7001860	.054"	7001607	7009497	7009349	7000204	7006134
		7007221 Sec.	.067"	7008667			7008955			7006134
PACKARD										
5680	1956	7008610 Pri.	.052"	7002652	.051"	7002651	7009179	7009349	7007522	7006134
		7008610 Sec.	.064"	④7008666			7009182			7006134
5688 (Frt. Carb.)	1956	7009600 Pri.	.047"	7002647	.046"	7002646	7009582	7006331	7009054	7006134
		7009600 Sec.	.054"	7001607			7008955			7006134
5688 (Rear Carb.)	1956	7009601 Pri.	.047"	7002647	.046"	7002646	7009582	7006331	7009054	7006134
		7009601 Sec.	.054"	7001607			7008955			7006134
PONTIAC										
V8 Synchro-mesh (Powerpack)	1956	7007900 Pri.	.056"	7002656	.055"	7001860	7009247	7009349	7000204	7006134
		7007900 Sec.	.067"	7008667			7009112			7006134
V8 Hydra-Matic (Powerpack)	1956	7008697 Pri.	.056"	7002656	.055"	7001860	7008548	7009349	7000204	7006134
		7008697 Sec.	.067"	7008667			7009112			7006134
V8 285 H.P. (Frt. & Rear Carb.)	1956	7009820 Pri.	.050"	7002650	.049"	7002649	7010026	7009349	7000204	7006134
		7009820 Sec.	.069"	7008669			7009112			7006134

① — Supersedes No. 7002656 (7001860 was 1 Size Lean).
② — Supersedes No. 7002649.
③ — Supersedes No. 7002648.
④ — Supersedes No. 7008664.

ROCHESTER "B" & "BC"

CHEVROLET PASS. CARS	Rochester Model No.
1956 6 Cyl. (Synchro-mesh)	BC 7009255
1956 6 Cyl. (Powerglide)	BC 7009254
CHEVROLET TRUCKS	
1956 235" Eng. (Std. Trans.)	B 7004468
1956 261" Eng.	BC 7005140
1956 Auto. Trans.	BC 7009255

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 MODEL BC METERING PRODUCTION JET CHANGE (To Improve Part Throttle Performance):* One step rich Main Metering Jet No. 7002958 (No. 58) replaced No. 7002957 (No. 57) used in early carburetors. When new jet to be installed, use No. 7002958 (No. 58) for replacement.

DESCRIPTION: Single barrel downdraft carburetors with manual choke control (B) or automatic choke (BC). Carburetors are same design as used on previous models, with Two-Step Power System.

ADJUSTMENT: Set these carburetors to the following specifications:

IDLING ADJUSTMENT

Idle Screw Setting—Adjust only with engine warmed up to normal operating temperature so that choke valve is wide open and fast idle inoperative (carburetors with automatic choke). Turn idle screw in or out from initial setting (see table below) until engine fires smoothly. Recheck engine idling speed.

Idle Mixture Setting

Model	No. Turns Open
Pass Cars (All)	2½ turns
Trucks (BC Carb.)	2½ turns
Trucks (B Carb.)	1½-2½ turns

Idle Speed Setting

Pass. Cars (Synchro-mesh)	475 RPM
Pass. Cars (Powerglide)	①425 RPM
Trucks (Std. Trans)	450-500 RPM
Trucks (Auto. Trans.)	②400-450 RPM

①—With transmission selector lever in "Dr".
②—With transmission selector lever in "N".

ACCELERATING PUMP

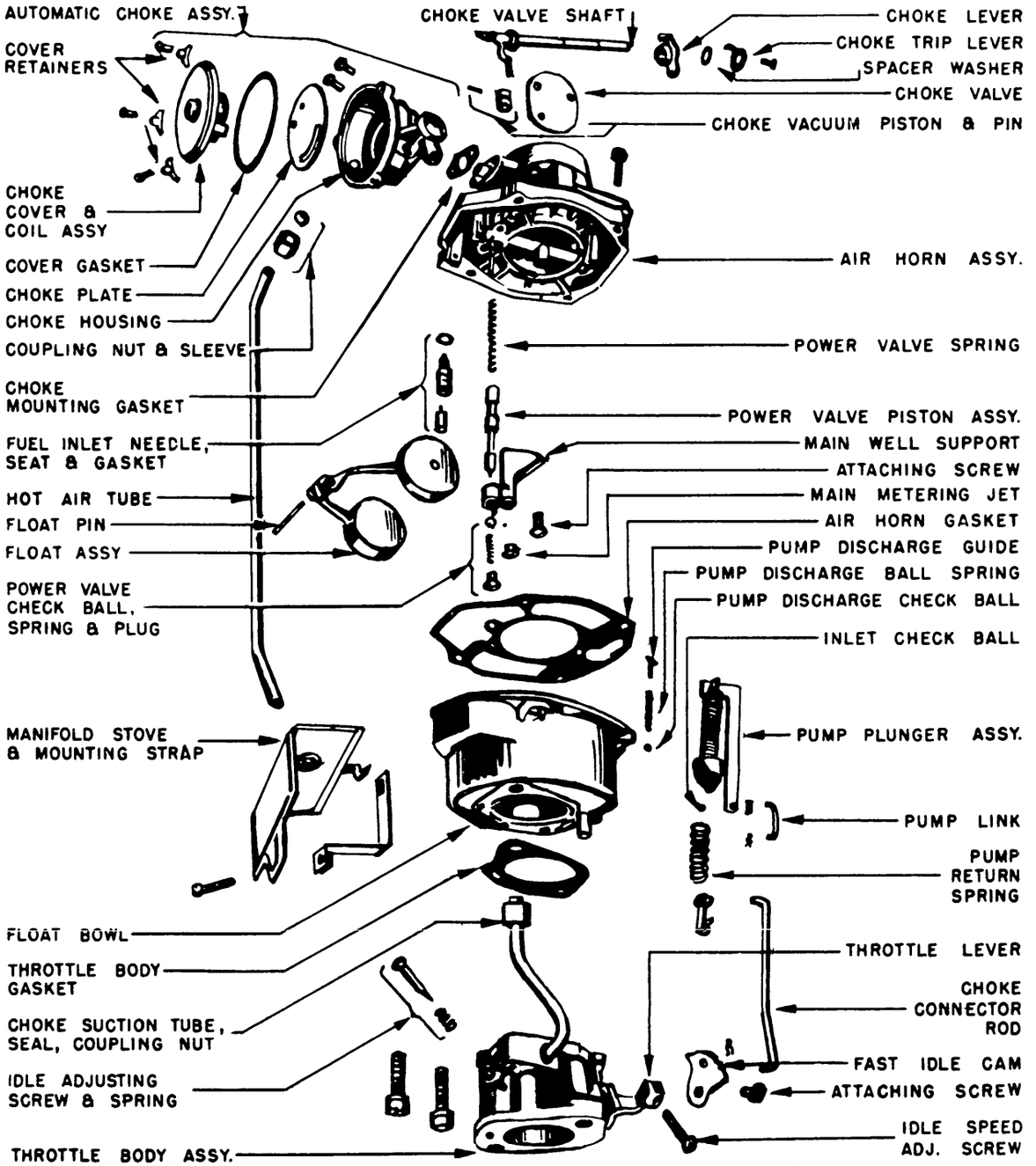
No seasonal adjustment provided.

FLOAT LEVEL

CAUTION—Two separate adjustments required:

1). Float Level Setting—***CAUTION—When removing air horn and bowl cover on "BC" automatic choke models, disconnect heat suction tube at upper coupling nut and use care not to disturb seal at lower end of tube.*** Invert bowl cover and float assembly but DO NOT remove cover gasket, install gauge (see table below) over floats (on Chevrolet, center tang on gauge enters main discharge nozzle), bend float arms vertically so that both floats are same height, then bend button on float arm which contacts intake needle until both floats just touch top of cut-out in gauge. On Chevrolet, bend float arms horizontally so that each float is centered in gauge cut-out, then tilt assembly 90° to each side to make certain that floats do not touch gauge.

2) Float Travel or Drop Setting—1¾" from face of cover gasekt to **bottom** of each float with floats in extreme lower position. To check, hold assembly in upright position so that floats drop to bottom of travel, measure from gasket to bottom of each float at center (use Float Drop Setting Gauge BT-93). Adjust by bending drop tang at rear of float assembly.



ROCHESTER MODEL BC CARBURETOR (WITH AUTOMATIC CHOKE)

Carburetor	Float Level Setting Float Level	Checking Gauge
All Models	1 9/32"	①3696192

①—Rochester Gauge No. M-250.

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ROCHESTER "B" & "BC" (C ntinued)

FAST IDLE
(Chevrolet Model BC Carburetors)

Adjustment—With choke cover properly set (see Automatic Choke Setting below), rotate fast idle cam until throttle stopscrew is on second step of cam and against shoulder of first step. Hold cam and throttle lever in this position, measure choke valve opening or clearance between lower edge of valve and air horn wall. See table below for clearance and checking gauge. If clearance not correct, adjust by bending connector rod at lower dog leg using bending tool BT-18 (Chevrolet No. J-4552).

Fast Idle Setting

Carburetor	Choke Opening	Checking Gauge
All "BC" Models	076"	①BT-99

①—Use SMALL end of gauge (Rochester No)

UNLOADER
(Chevrolet Model BC Carburetors)

Adjustment—To check setting, open throttle valve wide and check choke valve opening or clearance between lower edge of valve and air horn wall. See table below for clearance and checking gauge. If clearance not correct, adjust by bending tang on throttle lever using bending tool BT-18 (Chevrolet No. J-4552).

Unloader Setting

Carburetor	Choke Opening	Checking Gauge
All "BC" Models	230"	①BT-99

①—Use LARGE end of gauge (Rochester No)

AUTOMATIC CHOKE
(Chevrolet Model BC Carburetors)

Choke Setting—Adjust by loosening three retainer screws and rotating choke cover until scribed mark on cover is in line with longer center mark of scale on housing (Centered Setting) Choke valve should be lightly closed at 85°F

OVERHAUL: *See 1955 Annual Data or later Manual dition.*

SERVICE PARTS

Gasket Sets - Rochester No. 7004085 (7009254,55), No. 7004595 (7004468), No. 7006126 (7005140).

Repair Kit - Rochester No. 7004363 (7004468,5140), No. 7009311 (7009254,55).

ROCHESTER DUAL 2G & 2GC

CHEVROLET PASS. CARS	Rochester Carb. No.
1956 V8 Synchro-mesh	2GC 7008387
1956 V8 Powerglide	2GC 7008388
CHEVROLET TRUCKS	
1956 V8 Synchro-mesh	2G 7008389
1956 V8 Overdrive	2G 7008383
1956 V8 With Governor	2G 7008393
OLDSMOBILE	
1956 88 (Dual Range Hydra-Matic)	2GC 7007223
1956 88 (Jetaway Hydra-Matic)	2GC 7008800
PONTIAC	
1956 27 Synchro-mesh	① 2GC 7008696
1956 27 Hydra-Matic	② 2GC 7008695

① - Use 7009908 for replacement.
② - Use 7009907 for replacement.

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 CHEVROLET V8 TRUCK ENGINE CARBURETOR-TO-MANIFOLD GASKET PRODUCTION CHANGE (To Eliminate Hard Hot Starting):* New intake manifold-to-carburetor gasket, Part No. 3733281, with better insulation characteristics, is now being used in production and should be used on all 2-barrel carburetor V8 Truck installations when replacement required. Former gasket, Part No. 3704952, will continue to be used on passenger cars.

► *1956 OLDSMOBILE STALLING DURING WARM-UP CORRECTION:* Carburetors with letter "B", "C" or higher stamped in carburetor identification tag incorporate changes in piston and thermostat housing to provide proper "pull off" of choke valve, and permit choke valve to remain at proper "pull off" position until engine is warm On earlier carburetors, drill 3/64" hole in end of choke piston which will reduce the amount of vacuum behind choke piston and eliminate the stalling condition. *NOTE* - When removing choke valve from choke shaft it will be necessary to file the staked choke valve screws. Use a small amount of grease on file to collect any brass chips that might fall into carburetor

► *1956 OLDSMOBILE SLOW IDLE SCREW PRODUCTION CHANGE & INSTALLATION*· Slow idle screw spring has been replaced by locknut on later carburetors to obtain a more positive setting. TO INSTALL locknut on early carburetors, back off idle adjusting screw to remove spring (only), spin locknut No. 7010819 on screw, turn screw in 6 turns and tighten locknut. Hold choke wide open, idle screw off fast idle cam, throttle closed, then turn idle screw in until throttle valves just begin to open. Turn screw in an additional turn, tighten locknut against throttle lever. Readjust idle speed with engine warm.

► *FUEL FILTER PRODUCTION CHANGE (To Correct Carburetor Flooding Conditions).* New glass bowl, impregnated fiber element, precipitation type, fuel filter is now being used in production and is available for installation on earlier cars. Filter Package, Part No. 854345, can be installed using one 90° elbow, Part No. 504500 or 114920.

► *1956 PONTIAC UNLOADING CORRECTION (To Relieve Flooding):* Interference between accelerator pedal and floor mat at "Hump" above transmission, prohibits opening of choke, necessary to relieve flooding condition. To correct, move top of pedal to left to obtain clearance for full pedal travel.

► *1956 PONTIAC UNLOADER ADJUSTMENT CHANGE:* For complete "Unloader" adjustment, *see "Unloader Setting" below.*

DESCRIPTION· Dual downdraft type with Automatic Choke (2GC), or Manual Choke (2G) Standard Trans Truck These carburetors have Rochester Calibrated Cluster design "Venturi Cluster Assembly", vacuum controlled Power System, throttle operated accelerating pump with double-spring pump plunger All carburetors have an internal vent in the air horn and an external vent on the bowl cover (On Oldsmobile, this vent is controlled by a tang on the pump lever and is opened at low idle only). The new (Concentric Bowl) carburetor used on Oldsmobile is similar in design to the (Side Bowl) carburetor used on previous models, the principal difference being the concentric bowl design and the relocation of the metering jets toward the center of carburetor, and vacuum operated throttle return check.

ADJUSTMENTS· Make all adjustments exactly as follows

Idl Setting· If preliminary adjustment required to warm up engine, set both idle adjusting screws 1½ turns open from inner seated position (all models) With engine at operating temperature (choke valve wide open, fast idle inoperative), adjust throttle stopscrew for correct idle speed (see table below), then turn each idle adjusting screw in or out to secure smoothest possible idle performance (highest manifold vacuum and RPM) See Oldsmobile Note following Readjust idle speed and recheck idle setting

►*OLDSMOBILE NOTE*· After setting idle adjusting screws as above, turn each screw out (inch) ¼ turn which will provide desired idle performance (manifold vacuum and RPM will drop off slightly) Check performance by opening throttle to 1000 RPM point and then snapping throttle closed If engine rolls due to richness, turn each screw in (lean) not more than 1/8 turn

Idle Speed Setting

Car Model	Synchro-mesh Cars	Automatic Trans.
Chevrolet V8	475 RPM	425 RPM in "D"
Chevrolet Trucks	475 RPM	425 RPM in "N"
Oldsmobile	425 RPM	400 RPM in "Dr"
Pontiac	① 450-470 RPM	① 450-470 RPM

① - 510-530 RPM (With Air Conditioning turned on).

►*AUTOMATIC TRANSMISSION THROTTLE LINKAGE ADJUSTMENT* See Car Model pages for necessary adjustment following idle speed adjustment *OLDSMOBILE NOTE*—Carburetor has "Split-Throttle Lever" and linkage will not be disturbed by idle speed setting

Throttle Return Check Adjustment (Oldsmobil): *CAUTIONS* - **1)** The following adjustment must be repeated after any change in slow idle adjustment. **2)** Always hold the plunger with a wrench while adjusting the screw to avoid damage to the diaphragm.

Adjustment - With engine at operating temperature, and slow idle set at 400 RPM in "Drive", remove air cleaner, manually close choke valve to locate fast idle screw on correct point of high step of cam. Mark fast idle cam at contact point of fast idle screw, so that correct position can be rechecked with air cleaner in place. With cleaner in place, adjust fast idle speed to 1700 RPM in Neutral. With engine off and fast idle cam in the closed choke position, adjust plunger screw on throttle return check to obtain.050" clearance between the screw head and throttle lever.

CONTINUED ON NEXT PAGE

ROCHESTER 2G & 2GC (C nt.)

Atmospheric Idle Vent (Oldsmobile)· *Not used on Chevrolet & Pontiac.* Consists of a vent opening in the bowl cover with a vent cap actuated by a tang on the pump lever Vent is opened at low idle but must be closed at all other throttle positions

Idle Vent Checking & Adjustment - *NOTE* - Be sure fast idle adjustment is set so engine is operating between 1400 and 1500 RPM, then proceed as follows Hold throttle so fast idle screw is on top of highest step of fast idle cam then check opening of atmospheric idle vent in air horn. Valve should be opened approximately 1/32" To correct, use Tool BT-67 to bend tang on pump arm.

Accelerating Pump Rod Setting: *This is a linkage adjustment (Pump does not have Seasonal setting).* With throttle stopscrew backed off so that throttle valves completely closed, place combination Float & Pump Gauge (see table below) in inverted position on pump housing on bowl cover Leg on gauge should just contact top of pump rod Adjust by bending lower end of pump rod using bending tool BT-18

Pump Rod Setting

Car Model	Checking Gauge & Distance
Chevrolet V8 (Pass & Trk)	① BT-129 (57/64")
Oldsmobile	② BT-126 (3/16")
Pontiac	③ BT-130 (57/64")

① - Chevrolet No. J-6326. ② - Oldsmobile No. J-6336.
③ Pontiac No. J-5916.

Fl at Setting· *Both Float Level and Float Drop must be correct. Check and adjust as follows*

Float Level–Remove bowl cover and float assembly but DO NOT remove bowl cover gasket Invert assembly, place combination Float & Pump Gauge (see table below) over float and against pump side of power piston shaft so that outer gauge leg is in line with center of float Bottom of float should just contact bottom edge of gauge Adjust by bending float arm using bending tool BT-69

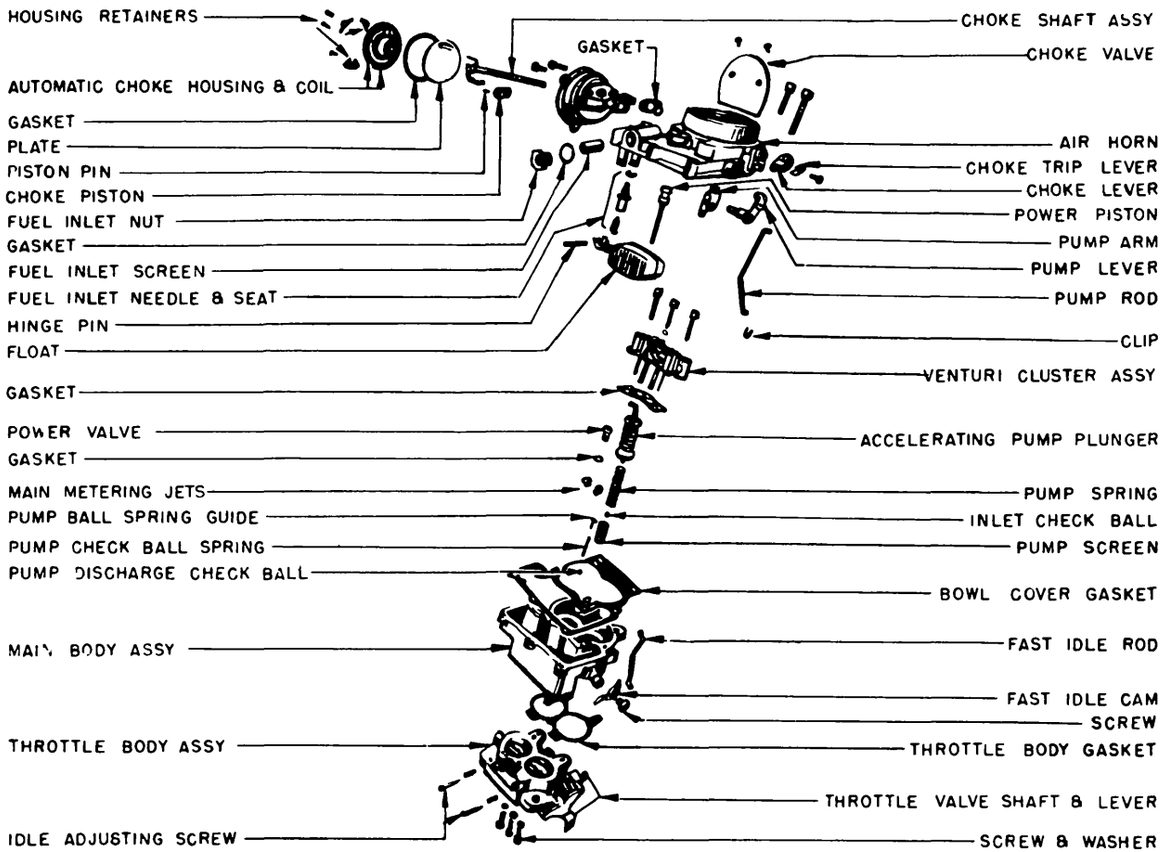
Float Level Setting

Car Model	Checking Gauge & Height
Chevrolet V8	① BT-129 (1 1/4")
Oldsmobile	② BT-126 (1 7/16")
Pontiac	③ BT-130 (1 15/64")

① - Chevrolet No. J-6326. ② - Oldsmobile No. J-6337.
③ - Pontiac No J 5916.

Fl at Drop–Hold bowl cover and float assembly upright so that float drops down to limit of travel Place combination Float & Pump Gauge against gasket on cover at free end of float (see Float Level Setting table above for gauge number) so that single leg of gauge extends downward Bottom of float at free end should be even with scribed line on gauge (1 29/32' on all carburetors except Oldsmobile, 2" Oldsmobile. Adjust by bending float arm tang (behind needle seat) toward needle seat to decrease drop or away from needle seat to increase drop.

Fast Idl Setting· *On Ch vrol t & Pontiac, Choke Rod S tting automatically provid s corr ct fast idle s tting (no s parat Fast Idl Scr w) On Oldsmobil (with separate Fast Idle Screw), an additional Fast Idle Adjustment is required*



ROCHESTER 2GC DUAL CARBURETOR (2G SIMILAR EXC. MANUAL CHOKE)

Choke Rod Checking & Adjustment (All Models)–Turn throttle stopscrew (Chevrolet & Pontiac), Fast Idle Screw (Oldsmobile) in until it just contacts second step of fast idle cam, close choke valve until screw rests against shoulder of high step on cam Check choke valve opening or clearance between upper edge of choke valve and air horn wall by inserting SMALL end of gauge (see table below) vertically Adjust by bending tang on choke lever counterweight using bending tool BT-69

Choke Rod (Fast Idle) Setting

Car Model	Checking Gauge & Choke Opening
Chevrolet V8	④ BT-108 (.089")
Oldsmobile	⑤ BT-127 (.073")
Pontiac	⑥ BT-128 (.061")

④ - Chevrolet No. J-5921. ⑤ - Oldsmobile No. J-6338.
⑥ - Pontiac 1/16" drill rod.

Fast Idl ·Scr w S tting (Oldsm bil nly)–*Manufacturer r comm nds that this adjustment be made ON THE ENGINE as outlined b low.*

Checking & Adjusting (Off th Engin) - Back off fast idle screw. Place LARGE end of gauge BT-90 (.024") between edge of throttle valve and bore on side opposite idle adjusting screw, close throttle against gauge and apply tension to throttle lever to hold gauge in place Close choke valve so that high step of fast idle cam is in line with fast idle screw turn fast idle screw in until gauge just drops out

Checking & Adjustment (On th Engin)–With engine and transmission at normal operating temperature and selector lever in Neutral, rotate fast idle cam so that high step in line with fast idle screw, turn fast idle screw in until engine speed is 1600-1700 RPM. This will provide correct warm-up speed and prevent stalling.

Unloader Setting· Place throttle lever in wide open position (see Oldsmobile Note below), check choke valve opening or clearance between upper edge of valve and air horn wall using LARGE end of correct gauge (see table below) inserted vertically Adjust by bending tang on throttle lever using bending tool BT 69

CONTINUED ON NEXT PAGE

ROCHESTER 2G & 2GC (C nt.)

►*1956 FONTIAC UNLOADER ADJUSTMENT:* Proceed as follows

1) Loosen top trunnion nut on intermediate throttle rod and push down on rod until it bottoms.

2) With rod in this position, tighten nut finger tight plus three full turns.

3) Remove carburetor air cleaner assembly. Depress accelerator pedal forcibly to floor. Check to see that accelerator pedal is not hitting "Hump" over transmission. If so, move upper end of pedal to left, by enlarging left hand hole in accelerator pedal bracket, and rotating bracket counterclockwise.

4) With accelerator pedal depressed as in step 3, bend unloader tang on carburetor to give correct opening between edge of choke valve and air horn.

►*OLDSMOBILE NOTE:* Before making above adjustment, the throttle stopscrew (slow idle speed screw) must first be turned IN one turn from point where throttle valves are completely closed.

Car Model	Unloader Setting Checking Gauge & Choke Opening
Chevrolet V8	..... ⓓ BT-108 (23/64")
Oldsmobile	..... ⓞ BT-127 (.155")
Pontiac	..... ⓟ BT-128 (.163")

ⓓ - Chevrolet No. J-5921. ⓞ - Oldsmobile No. J-6338.
ⓟ - Pontiac No. J-5920.

Automatic Choke Setting: Centered at index for all carburetors except Oldsmobile. One Point Rich for Oldsmobile. To adjust, loosen heat tube connection on cover, loosen three cover retaining screws. *CAUTION* - If one retainer has "toothed" type engagement notches in cover, screw must be backed off sufficiently so that retainer can be disengaged from cover notches. Rotate cover to align marks.

NOTE–With above setting, choke valve should be lightly closed at 75°F.

OVERHAUL: Adjustments may be made and various parts be serviced without completely disassembling the entire unit.

Disassembly: Major units of carburetor consist of Air Horn Assembly, Main Body, and Throttle Body.

Air Horn Assembly–Consists of Automatic Choke & Fuel Bowl Cover.

Automatic Choke–Remove three choke cover screws and retainers, choke cover and coil assembly, cover gasket and baffle plate. Remove choke trip lever, fast idle link and lever (rotate lever until slot in lever will pass over tang on link). Remove two choke valve screws and choke valve. Rotate choke shaft counterclockwise to free choke piston from housing, then pull piston and choke shaft from carburetor. Remove two choke housing attaching screws and remove choke housing and gasket from Air Horn.

Fuel Bowl Cover–Disconnect pump link from throttle lever by rotating it until it clears pump lever. Remove eight cover screws and remove cover. Invert cover on flat surface, remove float hinge pin, float assembly and float needle. Remove float needle seat and gasket and remove filter screw. Depress power piston shaft allowing spring to snap, which forces piston from casting. Remove retainer on pump plunger shaft and plunger assembly from pump arm. Remove pump lever and shaft by loosening setscrew on inner arm and removing outer lever and shaft. Remove cover gasket.

Main Body–Remove pump plunger return spring from pump well main metering jets, and power valve. Remove three screws from top of cluster and remove cluster and gasket. With long nose pliers, remove pump discharge spring retainer, then the spring and check ball. Invert Main Body and remove three large bowl to throttle body attaching screws, remove throttle body and gasket.

Throttle Body–Remove fast idle cam, idle adjusting needles and springs. Throttle body should be replaced as an assembly to insure proper relation of valves to vacuum advance and idle discharge orifices.

►*1956 OLDSMOBILE CLEANING CAUTION: Use only a Cold Immersion type cleaner.* Hot type cleaners may affect sealing properties of dichromatic coating. DO NOT soak air horn as an assembly in cleaner or solvent.

Cleaning & Inspection: Thoroughly clean carburetor castings and metal parts in clean solvent. *CAUTION*–Choke coil and housing and pump plunger should not be immersed in solvent. Clean pump plunger in clean gasoline only. *DO NOT SOAK AIR HORN ASSEMBLY IN CLEANER OR SOLVENT FOR MORE THAN ONE HALF HOUR IF CHOKE PISTON HOUSING HAS NOT BEEN REMOVED.* Blow out all passages in casting until dry. *CAUTION*–Do not pass drills or wires through calibrated jets or passages as they may enlarge orifice and seriously affect carburetor calibration. Inspect all parts for wear damage, burrs or ridges. Inspect gaskets for being hard or brittle, pump leather for damage. Replace all parts as inspection justifies or if parts loose or damaged in cluster.

Reassembly: Throttle Body to Main Body–Install idling adjusting screws and springs in throttle body until finger tight and then back off 1½ turns for temporary adjustment, add throttle body gasket and attach throttle body to bowl. Install fast idle cam, drop pump discharge ball into discharge hole and replace spring and retainer. Install cluster with new gasket, tighten screws evenly, (center screw takes red fibre gasket). Replace main metering jets and power valve with new gasket. Install pump return spring by pressing with finger to center in pump well.

Fuel Bowl Cover (Air Horn)–Replace pump lever assembly, install filter screen float needle seat and gasket. Replace power piston in vacuum cavity (check to see that piston travels freely). Lightly stake retainer in place. Attach plunger shaft with retainer shaft end pointing inward. Install cover gasket. Attach needle to float, position it carefully and insert float hinge pin. Adjust float (see table above for setting). Place cover in position making certain that accelerator pump plunger is positioned and will move freely. Raise cover and lower straight down to insure proper installation. Install eight screws, pump link and retainer.

Choke–Place new gasket in position, attach choke housing to cover and tighten screws securely. Place choke shaft in choke housing and rotate clockwise so that piston rides in bore in housing. Install choke valve on shaft with letters "RP" facing upward, center choke valve before tightening screws. Place baffle plate and choke housing gasket into position and install choke coil and cover. Rotate cover clockwise until index marks on cover and housing are aligned. Attach retaining screws and tighten securely. Replace link in fast idle cam and choke lever, place choke lever on cover with the tang facing outward and toward the pump lever. Install trip lever so that tang of trip lever is under tang of choke lever.

SERVICE PARTS

Gasket Sets - Rochester No. 7008534 (7008388), No. 7009942 (7007223,8800), No. 7009945 (7008695,8696), No. 7009949 (7008387), No. 7009950 (7008383,8389), No. 7009951 (7008393).

Repair Kits - Rochester No. 7009928 (7008388), No. 7009925 (7008695,8696), No. 7009929 (7008387), No. 7009930 (7008383,8389), No. 7009934 (7008393), No. 7009936 (7007223,8800).

STROMBERG WW (BUICK) CARBURETORS

BUICK	Stromberg Code No.
1955 Series 40	WW 7-104
1956 Series 40	WW 7-105, 5A

►CHANGES, CAUTIONS, CORRECTIONS

►*LEAN MIXTURE ON MODERATE ACCELERATION CORRECTION:* To eliminate this condition, install repair kit, Buick Part No. 1392722, consisting of idle tubes, main metering jets and main discharge jets. After installation completed, scribe letter "A" changing carburetor Code (found on air horn directly above float chamber) from 7-105 to 7-105A. *Carburetors with Code 7-105A have these new changes made*

DESCRIPTION: These carburetors are dual barrel type with each barrel having its own idle system, main metering system and throttle valve. Automatic choke housing with fast idle cam is located on throttle body on opposite side from throttle lever. Two holes drilled in intake manifold into exhaust gas cross-over permit exhaust gas heat to enter passages around throttles to prevent ice formation around throttle area.

ADJUSTMENTS: *Make all adjustments exactly as follows:*

Idle Setting—1¾ turns open. Turn each adjusting screw in until it bottoms lightly then back off 1¾ turns.

Idle Speed—450 RPM Hot Engine idle, with brakes applied and selector lever in neutral.

Pump Seasonal Setting—One hole in pump lever, three holes in throttle lever. **(1955)** Set pump rod in long stroke hole for normal setting. **(1956)** Set Pump rod in middle hole (medium) for normal setting.

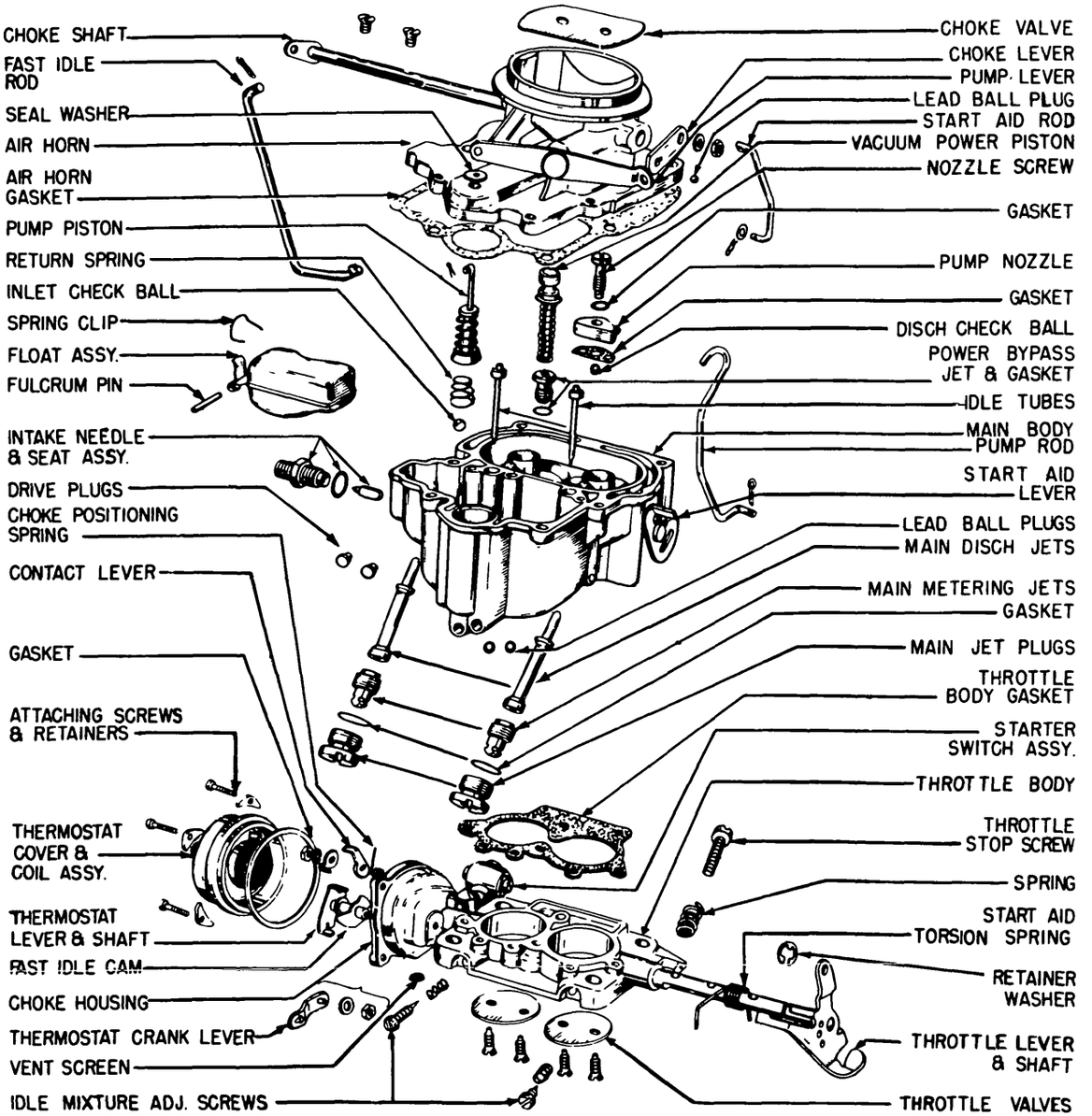
Pump Stroke Setting—**(1955)** 1" from top of plunger offset to bowl cover with pump rod in long stroke hole. **(1956)** 7/8" from top of plunger offset to bowl cover with pump rod in middle (medium) stroke hole.

Float Level—3/16" distance from center of float with lip held firmly against needle valve, to top of bowl casting (gasket removed). Use Tool T-25569 placed at center of float and resting on bowl casting (gasket removed). Use Tool T-24733 to bend lever next to float as necessary.

►*CAUTION: Make the following adjustments in the same sequence as given.*

Fast Idle Setting: Remove air cleaner, thermostat cover, throttle stop screw and spring; replace screw without spring. With throttle valves held closed, turn throttle stop screw in, just to point of contact with throttle lever, then turn screw in 5 additional turns. With choke valve closed, throttle lever against stop screw, distance between fast idle lever and high step of fast idle cam should be .0550" (No. 55 drill). To adjust, bend fast idle lever with Tool J-5197. *NOTE* - Fast idle lever must be parallel to carburetor mounting surface after bending.

Choke Positioning Period: Turn throttle stop screw in 6½ to 7 turns from fully closed throttle position. At this position, the spring pick-up lever should be at the point of contact with the choke positioning spring. If pick-up lever does not contact spring or if pick-up lever has moved spring away from choke housing, adjust by bending ear on pick-up lever with long nose pliers.



STROMBERG "WW" (BUICK) DOWNDRAFT CARBURETOR

Cam Position Setting: Remove throttle stop screw, open throttle just enough to clear fast idle cam, fully close choke valve by pushing up on thermostat spring lever. Close throttle until fast idle lever rests on high step of fast idle cam. Side of fast idle lever should just clear the upper index lug on fast idle cam. Use Gauge J-1388 (.020" feeler) to check clearance. To adjust use Tool J-5197 to bend choke rod as required.

Start Aid Setting: With No. 53 drill (.0595") between choke valve and wall of air horn, hold choke valve closed against rod, make certain that start aid rod is at top of slot in start aid lever, then rotate throttle valves toward open position. Start aid torsion spring should just clear the ear on the start aid lock lever as throttle is opened. To adjust, bend start aid rod as required.

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STROMBERG WW (BUICK) CARBURETORS (Cont.)

Wide Open Kick Setting: Open throttle valve while holding choke valve closed lightly. Choke valve should open just enough to insert No. 27 drill gauge (.1440") between the choke valve and wall of air horn. Adjust by bending ear on throttle lever. *NOTE*–Start aid rod must be at top of slot in start aid lever.

Choke Positi ning Spring: Close choke valve with light pressure upward on thermostat spring lever until positioning spring lever just contacts choke positioning spring. Distance between upper edge of choke valve and wall of air horn should be .159" (No. 21 drill). To adjust use needle nose pliers to bend choke positioning lever.

Starting Switch Setting (On Car): With transmission in neutral and parking brake applied, back off throttle stop screw, rotate fast idle cam to slow idle position, and fully close throttle valve. *NOTE* - On Dynaflow cars, make certain Dashpot will not prevent full closing of throttle valve. Remove left oil filler cap, hold straight edge against rear face of lower arm of throttle lever which contacts Dashpot, so that scale rests on rocker arm cover. With throttle valve fully closed, mark cover at front edge of scale. Turn ignition switch on, slowly open throttle while holding scale in position against throttle lever, mark point on rocker arm cover at which cranking motor is energized. Distance between pencil marks or rocker arm cover should be 3/4-1 1/8". To adjust switch timing, add or remove shims.

OVERHAUL: *NOTE* - Throttle valves and shaft should not be disassembled for normal cleaning and inspection. Remove choke rod, unloader link, unloader arm. Remove choke valves and shaft. *NOTE* - Choke valve has slight bend, DO NOT straighten. Remove pump rod, and pump plunger cotter pin.

Air Horn Disass mbly: Remove air horn, and gasket, pump plunger assembly and washer, power piston assembly, by pushing down and applying pliers to outer end of piston stem. Then with use of a 1" block, pry piston straight up to avoid damaging stem.

Main 3 dy Disassembly: Remove pump nozzle with screw, washer, and gasket, and idle jet tubes. Remove float needle seat elbow fitting, together with gasket and float needle. Remove float retainer, float, and hinge pin. Remove power valve and gasket, invert carburetor and catch large pump inlet check ball and small outlet check ball. Remove main metering well plugs and gaskets. Use wrench T-24924 to remove main metering jets. Remove main discharge nozzles by screwing Remover T-24967 (R.H. thread) into nozzle, then pulling nozzle from main body. *NOTE* - There are no lead gaskets under nozzles in this carburetor.

Throttle Body Disassembly: Remove throttle body screws, throttle body, and gasket from main body. Remove starter switch screw and clip, terminal cap, return spring, and guide block assembly. Tilt throttle body and catch plunger and ball. *NOTE* - Do not remove starter switch unless visibly damaged, or plugged. Remove choke cover, gasket, screws, and retainers. Use wrench T-25047 to remove choke housing shaft outside nut, then remove lockwasher, arm, choke housing shaft and lever assembly, spacer washer, and fast idle cam. Remove idle needles, idle stop screw, and springs.

Cleaning & Inspection: Use Bendix Metalclene or comparable cleaner to soak all parts for cleaning, and follow cleaning operation by rinsing in kerosene, distillate or white gasoline to remove all gummy deposits that have been loosened by cleaner. Remove lead plugs, if necessary, to clean passages in main body. Remove plugs with Remover T-25052 and replace with T-25054 to save damaging plug seats. Inspect all parts for excessive wear or damage which might affect their usage and replace all parts that are questionable. Check all passages for possible restriction from normal size using correct drill, blow through or suck on nozzles to check that they are clear, replace small parts too small to detect their imperfections. Maximum allowance for throttle stem bearing is .006", replace throttle valves if bent, or damaged. Clean and inspect parts of accelerator vacuum switch.

Throttle Body Reassembly: Install stop screw and spring, hold throttle valves fully closed, turn stop screw in just to point of contact with throttle lever, turn screw in one turn for initial speed setting. Install needles and springs, seating needles lightly then backing off each needle 1 3/4 turns from seat for initial mixture adjustment setting. Install fast idle cam, spacer washer, choke housing shaft and lever assembly arm, lockwasher and nut. Install starter switch ball, plunger, guide block assembly, return spring, terminal cap, clip and screw.

Main B dy R ass mbly: Install main discharge nozzles using Tool T-24967, and position so that flat surface is parallel with direction of flow. Install metering jets with wrench T-24924, metering well plugs with new copper gaskets, if available, with T-19099. Install power valve with new gasket, float and hinge pin, float retainer clip, needle seat and elbow fitting together with gasket and float needle. Hold float arm tang against needle, check float with gauge J-5475. Distance from top of float to top edge of float bowl should be 3/16". To adjust bend float arm tang. Float must not rub on walls of bowl. Install idle jet tubes, accelerator pump check balls (new balls if available), large ball in plunger well small ball in discharge well. Install pump discharge nozzle and screw with new washer and gasket.

Air Horn Reassembly: Install choke shaft in air horn, with lever end toward choke housing, choke valve with identification mark up. Install new choke valve screws loosely, then center valve by pressing up and endwise on choke shaft lever. Tighten screws and check for uniform clearance and freedom of operation. Choke valve should drop freely of its own weight. Stake screw heads. Install power piston assembly and carefully stake in two places, piston must operate freely in cylinder without lubricant. Install pump plunger assembly with washer on top side of air horn hole. Install air horn assembly with new gasket, making certain that pump plunger leather does not have a curled edge. Install air horn screws and washers, accelerating pump rod with lower end in medium stroke hole, cotter pins in pump plunger and rod. Back out throttle screw and completely close throttle valves. Bend pump rod to obtain 7/8" measurement from upperside of pump plunger offset to air horn casting. Open throttle, pump arm must clear air horn at least 1/32". Install choke unloader arm, lockwasher, and nut with arm in horizontal position pointing toward float bowl with choke closed. Install unloader link, washer, and clip. Install choke rod, adjust fast idle, low speed choke positioning, and choke unloader adjustments, install choke cover and gasket, rotate counterclockwise until index marks align and choke valve closes partially, tighten screws and retainers.

SERVICE PARTS: Gasket Sets - Buick No. 1172374. **Repair Kit** - Buick No. 1173056.

STROMBERG "WW" DODGE & PLYMOUTH

DODGE 1956	Stromberg Code No.
D62-1,2 S-M	WW3-124
D62-1,2 O.D.	WW3-125
D62-1,2 PowerFlite	WW3-126
D63-1 S-M	WW3-135
D63-1 O.D.	WW3-136
D63-1 PowerFlite	WW3-137
D63-2,3 S-M	WW3-138
D63-2,3 O.D.	WW3-139
D63-2,3 PowerFlite	WW3-140
PLYMOUTH (Power Pack)	
6 Cyl. S-M	WW3-124
6 Cyl. O.D.	WW3-125
6 Cyl. PowerFlite	WW3-126

DESCRIPTION: These carburetors are dual barrel, downdraft type of new design with vertical air intake. Automatic choke housing with fast idle cam is located on throttle body on opposite side from throttle lever. Choke valve operated by connecting link. Fuel system is similar to other Stromberg carburetors with usual Float System (single float), Idle System, Main Metering System, Power System, (with vacuum piston operated power by-pass jet), and Accelerating System (pump operated by horizontal fulcrum lever with duration spring type pump piston). All models are alike except for added units for each type service as listed above.

ADJUSTMENTS: *CAUTION—Make all adjustments exactly as listed below. Kickdown switches used only on Overdrive equipped cars. Dashpot only on PowerFlite equipped cars. See table above.*

IDLE SETTING

Idle Setting—Turn both idle adjusting screws in until they bottom lightly then back off 1 turn. Start engine, turn each adjusting screw in equally until engine starts to reduce speed then back off screws to obtain smooth operation and highest vacuum.

Idle Speed—Turn throttle stop screw in or out to obtain 450-500 RPM Std. Trans., 475-500 RPM PowerFlite (selector lever in Neutral).

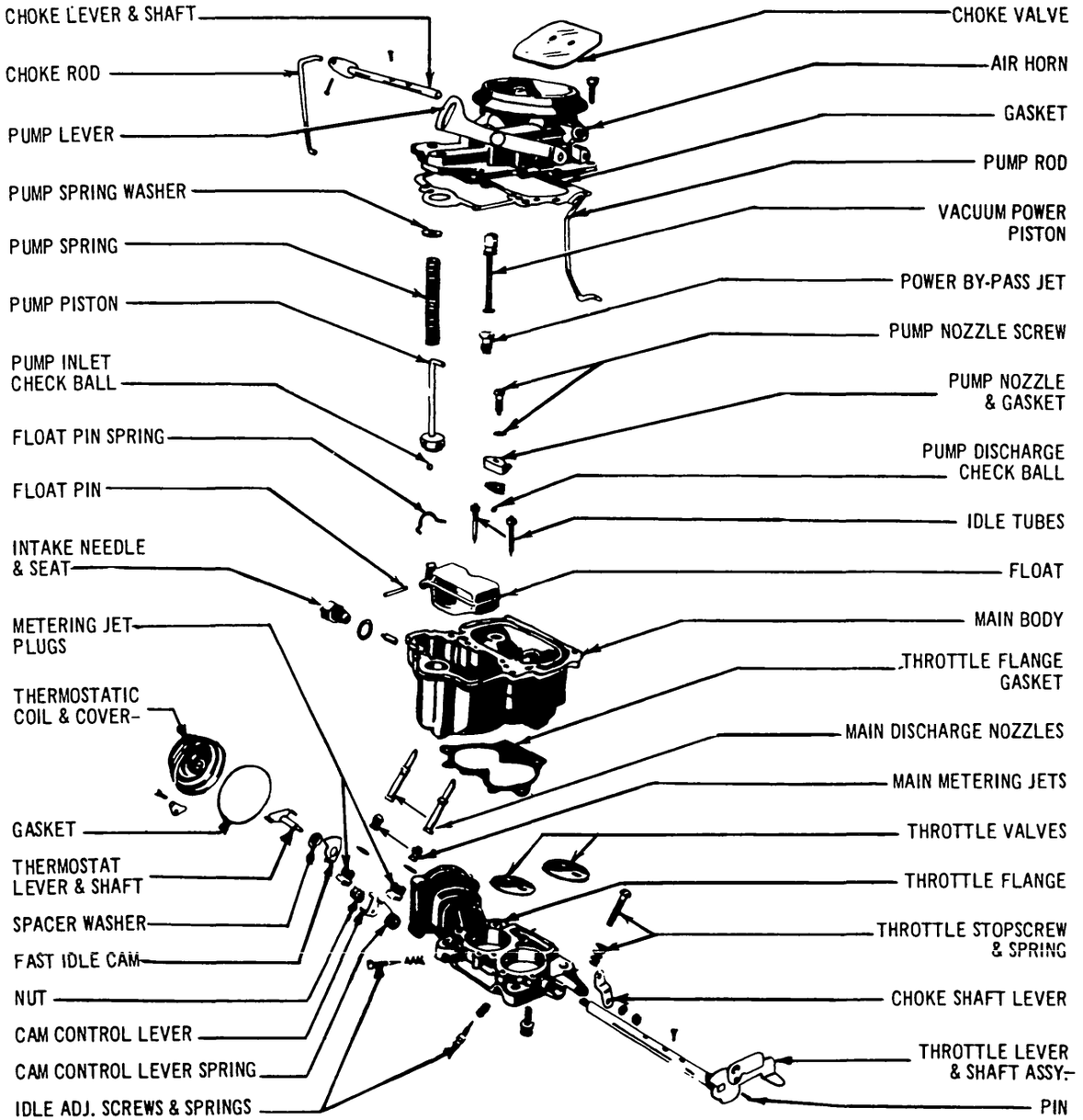
ACCELERATING PUMP

Pump Seasonal Setting—Setting can be changed as required. Centered hole for Normal operation, Inner hole for minimum stroke for less discharge, Outer hole for maximum stroke and greater discharge.

Pump Stroke Setting—Hold carburetor in vertical position to properly seat pump check ball. With pump rod in center hole of throttle lever, hold choke valve wide open, travel of accelerator pump, as throttle valves are moved from open to fully closed, should be 13/64-15/64" (6 cyl. carb.), 7/32-1/4" (V8 carb.).

ECONOMIZER SETTING

No adjustment required. Valve opens when manifold vacuum drops to 4-6" (65-70 MPH).



STROMBERG "WW" (DODGE, PLYMOUTH) DOWNDRAFT CARBURETOR

FLOAT LEVEL

3/16" distance from center of float with lip held firmly against needle valve, to top of bowl casting (gasket removed). Use Tool T-25569 placed at center of float and resting on bowl casting (gasket removed). Use Tool T-24733 to bend lever next to float as necessary.

FAST IDLE

►*CAUTION: All Fast Idle Adjustm nts including Unloader Adjustment must be made in the sequence given below.*

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STROMBERG "WW" DODGE & PLYMOUTH (Cont.)

1) Fast Idl Speed—With choke cover removed, place one cover screw through Spring Tool T-25906 and attach Tool to housing above choke lever. Hook other end of spring to choke lever. Remove spring from throttle stop screw and replace screw only. Close throttle valves, turn stop screw in until it contacts lever, then continue to turn screw in 4½ turns (V8 Carb.), 5 1/8 turns (6 Cyl. Carb.). Hold choke valve closed and bend cam contact ear so that No. 48 drill rod will just go between ear end of contact lever and first step of fast idle cam. *NOTE*—Ear must be parallel to throttle shaft after bending. Replace throttle stop screw spring

2) Fast Idle Cam Position—Open throttle valve to clear fast idle cam, close choke valve tightly. Force throttle closed against tension of cam positioning spring Ear on cam contact lever should just clear high step of fast idle cam. (Max. .020"). Bend fast idle rod as necessary.

3) Chok P sitioning Spring (Dodge & Plymouth 6 Cyl. Carbur t rs nly). With Spring Tool T-25906 in position, attach weight tool T-25864 on choke lever between rod and end of shaft. Hold carburetor vertical, close throttle making sure cam contact lever ear rests on high step of fast idle cam (If necessary rotate fast idle cam to get this position) Apply light closing pressure on throttle valve which should open choke valves against choke positioning spring tension (see Spring Color Caution below), just enough to insert correct size drill rod (see table below), between choke valve and wall of air horn Adjust by bending ear of choke lever as required.

►*CHOKE POSITIONING SPRING CAUTION Make sure correct colored spring is used and use correct drill rod specified for that carburetor.*

Ch k P sitioning Spring Setting

Carb. Cod N .	Drill R d	Spring C l r
WW3-120	#30	Copper
WW3-120 A,B	#24	Copper
WW3-121	#30	Copper
WW3-121A,B	#24	Copper
WW3-122	#28	Silver
WW3-122A,B,C	#24	Copper
WW3-124, 125	#31	Black
WW3-126	#37	Copper
WW3-131,A	#24	Copper
WW3-132,A	#24	Copper
WW3-133	#24	Silver
WW3-133 A, B	#24	Copper

UNLOADER SETTING

Apply light closing pressure to choke valve and open throttle valve to wide open position. Choke valve should open .180-.150" (Distance between choke valve and wall of air horn) Adjust by bending ear of cam lever as necessary.

AUTOMATIC CHOKE SETTING

Car & Carb.	Setting
Dodge 6 Cyl. & V8	Centered (At Index)
Plymouth	Centered (At Index)

DASHPOT SETTING

Push plunger in to end of its stroke. With throttle stop screw set at normal idle speed, there should be 1/16-3/32" clearance between end of dashpot plunger and ear on throttle lever. Adjust by loosening locknut and turning dashpot in bracket

OVERDRIVE KICKDOWN SWITCH

Clearance between ear of throttle lever and threaded end of switch housing should be 1/64-1/32" with throttle valves held in wide open position. Adjust by loosening locknuts and repositioning switch.

OVERHAUL: *NOTE*—Throttle valves in open position extend below the throttle flange, making it of vital importance to handle the throttle flange unit with extreme care to prevent damage to valves.

Disassembly: Consists of separating the three units Air Horn, Throttle Flange and Main Body and removing component parts of each unit separately. Release upper end of choke rod and lower end of pump rod and remove rods. Remove Overdrive Unit & Dashpot Control if so equipped Remove Air Horn attaching screws, Air Horn & gasket. Remove idle tubes, invert carburetor and catch pump inlet check ball. While inverted, remove four throttle body attaching screws, remove Throttle Flange & gasket from Main Body.

Air Horn—Remove accelerating pump piston, and remove washer and spring from pump piston. Remove vacuum power piston with small block of wood and open end wrench as a pry Remove choke valve screws, choke valve, and choke shaft.

Main Body—Remove pump discharge nozzle, screw and gasket, float needle valve seat, gasket and needle valve. Remove fulcrum pin spring clip, float and fulcrum pin, power by-pass jet and gasket. Invert body and remove accelerating pump and check ball, metering jet plugs and gaskets, (Tool T-19099), main metering jets (Tool T-24924) and main discharge jets (Tool T-24967). Remove lead ball and drive plugs.

Throttle Body—Remove thermostat cover attaching screws, lug washers, thermostat cover assembly, and gasket. Remove nut, lockwasher, and crank lever from end of thermostat lever and shaft. Remove thermostat lever and shaft, spacer washer, and fast idle cam. Remove nut, lockwasher, cam control lever, and spring from end of throttle shaft. *NOTE*—Nut and shaft have left hand thread, and nut is colored black for identification. Remove idle needle valves and springs. Scribe mark on throttle valves along throttle shaft as well as throttle body to assure assembly in same position in same barrel, **particularly on notched throttle valves.** Remove throttle valve screws, valves, throttle shaft and lever.

Cleaning & Inspection· Clean all metal parts in Bendix Metalclene, blow out all tubes and channels with compressed air DO NOT CLEAN NON METALIC PARTS IN BENDIX METALCLENE

Reassembly· Use Repair Kit for Code Number stamped on air horn cover Reverse disassembly after noting the items that follow

Throttle Valve Installation - 'Dash' stamped on valves must be toward idle port and visible from top of throttle body when valves are installed

STROMBERG "WW" STUDEBAKER

STUDEBAKER	Stromberg Code No.
1956 V8 Comm. (Early)	WW 6-115
1956 V8 Comm. (Later)	WW 6 117, A
1956 V8 Pres.	WW 6-117, A

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 CARBURETOR INSTALLATION CAUTION.* Use only Manifold to Carburetor Gasket Part No 684059 for WW6-115 or No. 154006 for WW6-117 carburetors. DO NOT USE Gasket No. 684059 on WW6-117 Carburetors as choke vacuum passage will be shut off by gasket.

►*1956 CHOKE THERMOSTAT COVER (Code WW6-117) PRODUCTION CHANGE (To Improve Cover Seal):* Inner gasket was eliminated and air horn housing revised to offset use of only one gasket. Revised carburetors (Using only one gasket) are identified by Stromberg Model No. WW6-117A *See "Carburetor Installation Caution"* above for correct Manifold-to-Carburetor Gasket for proper choke operation

DESCRIPTION: Dual barrel, downdraft type as same design as "WW" carburetors used on previous Studebaker models (see Production Changes above)

CARBURETOR ADJUSTMENT: ***Make all adjustments exactly as follows:***

Idle Setting: Turn both idle mixture adjusting screws in until they are lightly seated, then back each screw out exactly 1¾ turns. Start engine and allow it to run until normal operating temperature is reached. With engine at normal operating temperature (choke valve wide open, fast idle inoperative) and with air cleaner in place, adjust idle speed and mixture as follows:

Idle Mixture—First check and adjust idle speed. Turn BOTH idle mixture adjusting screws in evenly and slowly until engine begins to run unevenly, then turn screws out evenly and slowly until engine again runs unevenly, finally set both screws approximately halfway between these two points where smoothest idling performance is secured. Recheck engine idle speed. *CAUTION*—BOTH adjusting screws must be turned equally and in the same direction when making above adjustment.

Idle Speed—With engine at normal operating temperature and fast idle cam in slow idle position so that idle adjusting button contacts lowest step of cam, adjust screw for correct idle speed:

CONTINUED ON NEXT PAGE

STROMBERG "WW" STUDEBAKER (Con..)

Idle Speed

All Transmissions ①550-600 RPM

① - With selector lever in neutral.

Accelerating Pump: Three holes provided in throttle lever for pump connector rod engagement:
Center Hole—Normal operating conditions.
Inner Hole—Shorter stroke, less fuel discharge.
Outer Hole—Longer stroke, more fuel discharge.

Float Level: To check float setting, remove air horn and bowl cover and gasket, hold float lever lip firmly against intake needle valve to place float in closed-valve position. Measure float height by placing Float Level Gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool T-24733 (Studebaker KMO-269-S5).

FLOAT SETTING

Studebaker WW ....3/16"①

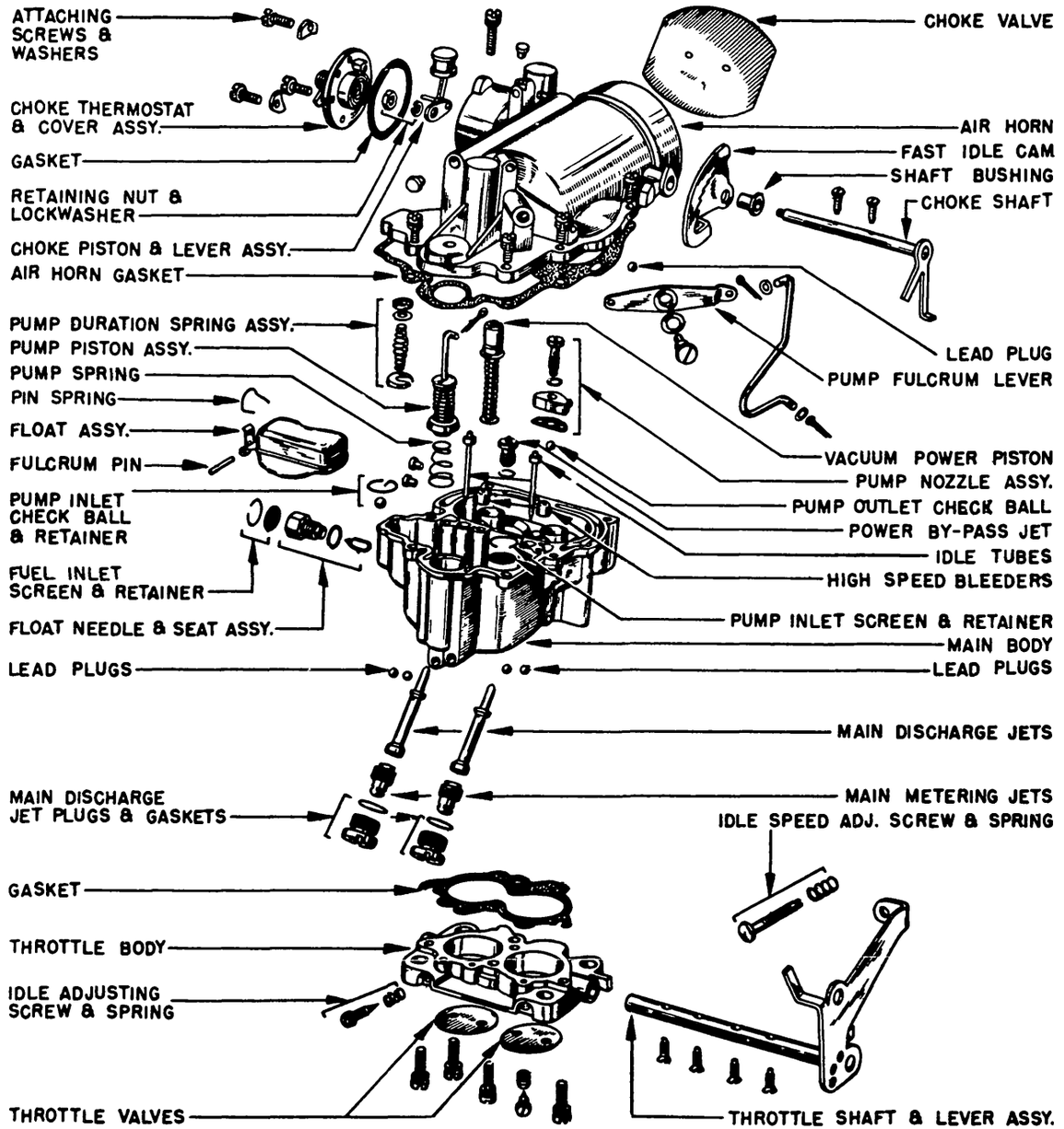
①—Top of float below top edge of bowl.

Fast Idle Cam Setting: Check with fast idle cam in fast idle position with choke valve fully closed. In this position, one-half of diameter of button on throttle stopscrew should rest on highest step of fast idle cam (button should hang over so that half-diameter travel of fast idle cam will cause screw to drop down on to next-lowest step of cam). *NOTE*—Fast Idle setting can also be checked as follows: With slow idle adjusting screw button resting on high step of fast idle cam, apply light closing pressure to choke valve, check remaining opening by inserting a #31 drill rod between lower edge of choke valve and air horn wall (choke opening should be .105-.135"). Adjust by bending ear on choke lever which contacts fast idle cam up or down, as required, using bending tool KMO-478.

Unloader (Dechoke) Setting: To check setting, hold choke valve closed tightly, open throttle valves to point where stop on throttle lever rests against stop on carburetor throttle body and choke valve is opened slightly. Check choke valve opening by inserting #1 drill rod (.228") between lower edge of choke valve and air horn wall. If opening not correct (.203-.265"), adjust by bending ear on choke lever which contacts throttle lever using bending tool KMO-478.

Automatic Choke Setting: (WW6-115) Centered with arrow on cover aligned with boss on housing. (WW6-117, A) 1 Point Lean with arrow on cover one notch lean from boss on housing.

Throttle Return Check (Cars with Automatic Transmission): Consists of a dashpot unit mounted on the carburetor with the dashpot plunger contacting the throttle lever during the last 3/16" of throttle movement toward closed throttle position. Dashpot will prevent too-rapid closing of throttle and keep engine from stalling. *See Throttle Linkage Adjustment under CARBURETOR on car model page.*



STROMBERG "WW" (STUDEBAKER) DOWNDRAFT CARBURETOR

OVERHAUL: See 1955 *Annual Data or later Manual edition.*

1956 STROMBERG CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Code No.	Main Metering Jet Size	Main Metering Jet Part No.	By-pass Jet Size	By-pass Jet Part No.	Main Disch. Jet Size	Main Disch. Jet Part No.	High Speed Bleed Size	High Speed Bleed Part No.	Idle Tube Size	Idle Tube Part No.	Idle Air Bleed Size	Idle Air Bleed Part No.	Pump Disch. Nozzle Size	Pump Disch. Nozzle Part No.
BUICK																
40	Late 1955	WW 7-104	.053"	386208	1 #55	P-23676		386207	#70	P-23985	#69	386985	⑨		#66	386416
40	Early 1956	WW 7-105	.053"	P-19442	2 #57	387237	#28-36	387265	#70	P-23985	#69	386985	⑨		#66	386416
40	Late 1956	WW 7-105A	.054" ①	P-19442	2 #57	387237	#28-36	387265	#70	P-23985	#66	386197	⑨		#66	386416
DODGE SIX D-62-1, 2																
Synchro-mesh	1956	WW 3-124	.045" ②	386208	#62	③ 386951		386943	#70	P-23985	#64	386924	⑥		#68	P-24594
Overdrive	1956	WW 3-125	.045" ②	386208	#62	③ 386951		386943	#70	P-23985	#60	386924	⑥		#68	P-24594
PowerFlite	1956	WW 3-126	.045" ②	386208	#62	③ 386951		386943	#70	P-23985	#64	386924	⑥		#68	P-24594
DODGE V8 D-63-1																
Synchro-mesh	1956	WW 3-135	.052"	386208	1 #62	P-23361		386207	#70	P-23985	#60	386939	⑦		#68	P-24594
Overdrive	1956	WW 3-136	.052"	386208	1 #62	P-23361		386207	#70	P-23985	#60	386939	⑦		#68	P-24594
PowerFlite	1956	WW 3-137	.052"	386208	1 #62	P-23361		386207	#70	P-23985	#68	386414	⑦		#68	P-24594
DODGE V8 D-63-2, 3																
Synchro-mesh	1956	WW 3-138	.051"	386208	2 #61	382675		386949	#70	P-23985	#66	386197	⑦		#68	P-24594
Overdrive	1956	WW 3-139	.051"	386208	2 #61	382675		386949	#70	P-23985	#66	386197	⑦		#68	P-24594
PowerFlite	1956	WW 3-140	.051"	386208	2 #61	382675		386949	#70	P-23985	#70	387183	⑦		#68	P-24594
PLYMOUTH SIX																
Synchro-mesh (Pwrpk)	1956	WW 3-124	.045" ②	386208	#62	③ 386951		386943	#70	P-23985	#64	386924	⑥		#68	P-24594
Overdrive (Pwrpk)	1956	WW 3-125	.045" ②	386208	#62	③ 386951		386943	#70	P-23985	#60	386924	⑥		#68	P-24594
PowerFlite (Pwrpk)	1956	WW 3-126	.045" ②	386208	#62	③ 386951		386943	#70	P-23985	#64	386924	⑥		#68	P-24594
STUDEBAKER																
Comm. 56B	Early 1956	WW 6-115	.050"	386272	1 #60	P-24674		386839	#68	P-24315	#68	386414	⑩		#66	386416
Comm. 56B	Late 1956	WW 6-117, A	.055"	386272	1 #56	P-21657		387198	#68	P-24315	#70	387183	⑬		#70	385923
Pres. 56H	1956	WW 6-117, A	.055"	386272	1 #56	P-21657		387198	#68	P-24315	#70	387183	⑬		#70	385923

① — Use P-19442 (.052") above 3000 ft.
② — 1 Size Lean 386208 (.044"), 2 Sizes Lean 386208 (.043").
③ — Power Restriction in Main Body.
⑥ — #48 in Main Body, #60 in Air Horn.
⑦ — #45 in Main Body, #60 in Air Horn.
⑨ — #36 in Main Body, #42 in Air Horn.
⑩ — #60 in Air Horn, #48 Secondary.
⑬ — #50 in Air Horn, #40 Secondary.

ZENITH DOWNDRAFT

METROPOLITAN — **Zenith Model**
1956 Nash & Hudson Model 30 VIG-10

DESCRIPTION: The Zenith Model 30 carburetor is a single barrel downdraft type with manual choke control and inter-connected fast idle device. Same design as used on 1955 Metropolitan.

ADJUSTMENTS: Adjust carburetor as follows:

Idle Adjustment: Adjust only with engine at operating temperature with choke valve wide open and fast idle inoperative. If preliminary adjustment required to warm up engine, turn idle mixture adjusting screw until lightly seated, then back off screw ½ turn. With engine warmed up, turn screw in or out for smooth idling performance. *CAUTION– Screw controls idle air bleed and should be turned IN for richer mixture.*

Idle Mixture Setting—0 to 1 turn open.

Idle Speed Setting—500 RPM. at normal operating temperatures.

Accelerating Pump Setting: Two holes provided in throttle lever for pump link. Connect link as follows: **Upper Hole**—Maximum stroke (Winter or cold weather operation), **Lower Hole**—Minimum stroke (Summer or warm weather operation).

Float Level: Non-Adjustable. Float is free type (guided by sides of bowl) and acts directly on fuel intake needle valve in bowl cover.

Fast Idle: Consists of an inter-connected linkage between choke valve lever and throttle valve lever which opens the throttle valve 1/32" when choke closed for cold starting. To adjust fast idle, remove cotter pin from grooved nut controlling the choke spring, turn nut clockwise until spring tension is just relieved, then **with choke valve closed,** turn nut ½ turn counter-clockwise and secure setting with cotter pin. This will provide correct throttle valve opening.

Choke Valve Linkage: Adjust so that choke valve is fully closed when button on instrument panel is pulled out.

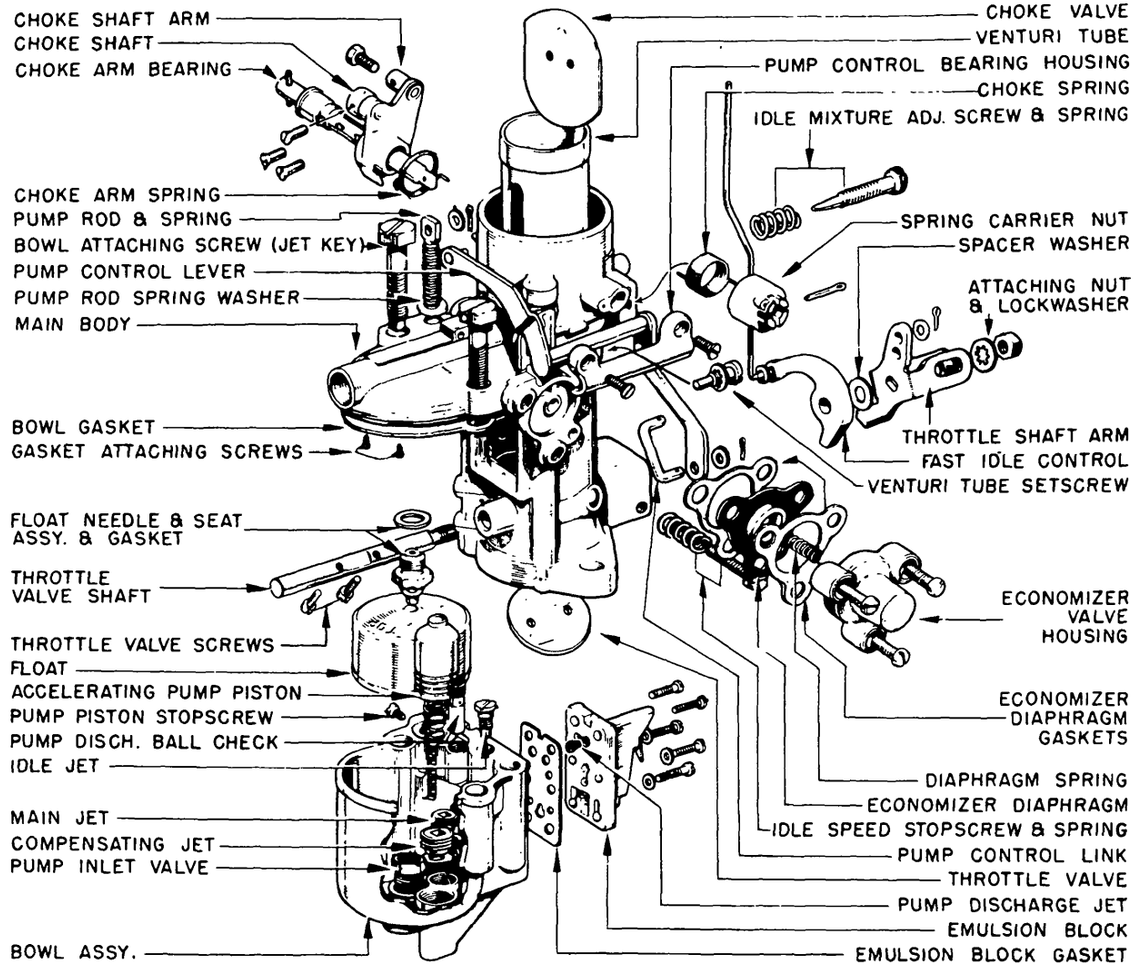
OVERHAUL: With carburetor off engine, separate bowl assembly from main body by removing two bowl attaching screws, and sliding bowl downward carefully to avoid damage to emulsion block and main nozzle. Then disassemble as follows:

Bowl Disassembly–Lift float out. Use one of bowl attaching screws ("Jet Key" screw with square end) to remove main jet and compensating jet from bottom of bowl. Remove idle jet from top of bowl casting (jet is slotted for screwdriver blade). Remove emulsion block from side of bowl. (*CAUTION*–Loosen lower center screw first, remove the other four screws, finally remove this lower center screw, which acts as a puller for the block). Remove pump inlet check valve from bottom of bowl and discharge ball check valve from top of bowl casting. Remove pump piston locating stopscrew, remove pump piston and spring. Remove air inlet orifice plug from top of capacity well. *NOTE*– It is not necessary to remove pump discharge jet from emulsion block (can be cleaned from rear of block).

Main Body Disassembly–Remove three screws retaining economizer diaphragm housing on main body, carefully remove housing, diaphragm, diaphragm spring, and gaskets. Remove fuel intake needle and seat assembly from bowl cover. Remove idle adjusting screw and spring. Remove bowl gasket from cover by using pliers to remove the gasket retaining drive screws.

Cleaning & Inspection–Clean all parts thoroughly, clean and blow out all passages in carburetor castings. Inspect all parts for wear or damage.

Reassembly–Install all parts and assemble carburetor by reversing disassembly procedure above. Use all new gaskets and install gaskets without any sealing compounds.



ZENITH DOWNDRAFT CARBURETOR

►*BOWL COVER GASKET NOTE:* If care is used to locate gasket properly when installing bowl on main body casting, it will not be necessary to use the locating drive screws which are installed in production to hold the gasket in place.

SERVICE PARTS: Repair Kit - Metropolitan No. 8112215 (add 8112037 for major repair).

ZENITH JET SPECIFICATIONS

Part — Model 30 VIG-10	Size
Main Jet	#72
Compensating Jet	#97
Idle Speed Jet	#55
Pump Discharge Jet	#60
Full Throttle Bleed	1.4 mm
Part Throttle Bleed	2.0 mm
Progression Jet	1.6 mm

DELCO-REMY "WINDOW" DISTRIBUTORS

CADILLAC	Delco-Remy Distr. No.
1956 Series (Std Engine)	1110858
1956 Series (Eldorado Engine)	1110859
OLDSMOBILE	
1956 All Series	1110857

DESCRIPTION: The Delco-Remy "External Adjustment" (Window) Distributor is a completely new unit with the distributor cap forming the housing enclosing all of the mechanism Adjustments on the car are made through a slot in the side of the cap after the window has been raised and it is not necessary to remove the cap in service The Contact Point Assembly has been designed to make this type of adjustment possible through use of a horizontal spring-loaded adjusting screw accessible through the window slot (turning screw clockwise decreases breaker gap, counter-clockwise increases gap) The entire automatic (centrifugal) advance mechanism is located above the breaker cam and is enclosed within the large circular rotor *See illustration for design details*

ADJUSTMENTS: *Cam Angle can be adjusted on the car without removing distributor cap Inspection or replacement of contacts points and setting of breaker gap r quires removal of cap or distributor removal from engine*

Cam Angl Setting (On Car): Operate engine at idle speed Lift adjustment window on side of adjustment cap Use Allen wrench (or special tool—see Note below) to turn contact point adjusting screw Turn screw in or clockwise to increase cam angle, out or counter-clockwise to decrease cam angle Use dwell meter and set cam angle to 29° (limits 26-33°) *NOTE*—If dwell meter not used, approximate setting can be secured by turning adjusting screw in until engine begins to misfire and then turning screw out or counter-clockwise ½ turn (180°)

Adjusting T I N t—Special extension wrench, Oldsmobile Tool No J-6296, will simplify cam angle adjustment on the car

Breaker Gap & Cam Angle Setting (On Bench): Distributor cap can be removed for access to contact point assembly by releasing two latches as follows: Engage screwdriver in slotted head of latch, press down, turn screwdriver ¼ turn in either direction

Breaker Gap Setting—Use Allen wrench to turn adjusting screw in or out for gap of 016" *NOTE*-Adjusting screws is spring-loaded and nolocking screws are used to position the stationary contact mounting plate

Cam Angl S tting—Operate the distributor on a Testing Machine, use dwell meter to set cam angle at 29° (limits 26-33°) in same manner as in setting cam angle on the car (above) *NOTE*—If testing machine and dwell meter not used, approximate setting can be secured by mounting distributor in vise and connecting a test lamp and battery across the contact points Turn adjusting screw in or clockwise until the test lamp lights (points opening), then turn adjusting screw out or counter-clockwise ½ turn (180°)

DISTRIBUTOR PARTS REPLACEMENT: Remove distributor cap by releasing latches as follows: Engage screwdriver in slotted head of latch, press down, turn screwdriver ¼ turn in either direction

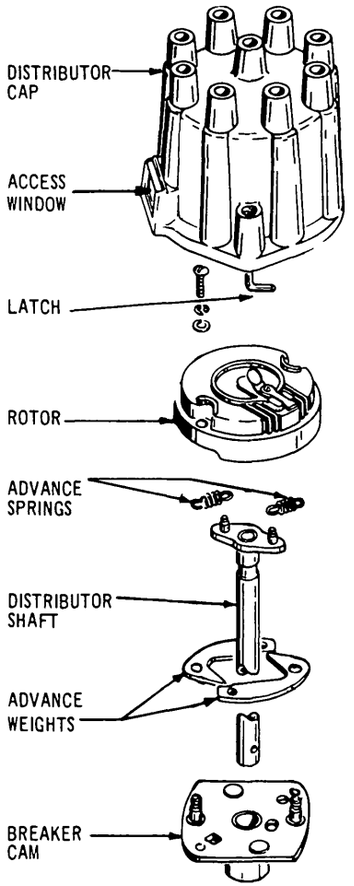
Rotor Removal & Installation: Rotor can be removed by taking out two screws attaching rotor to cam plate

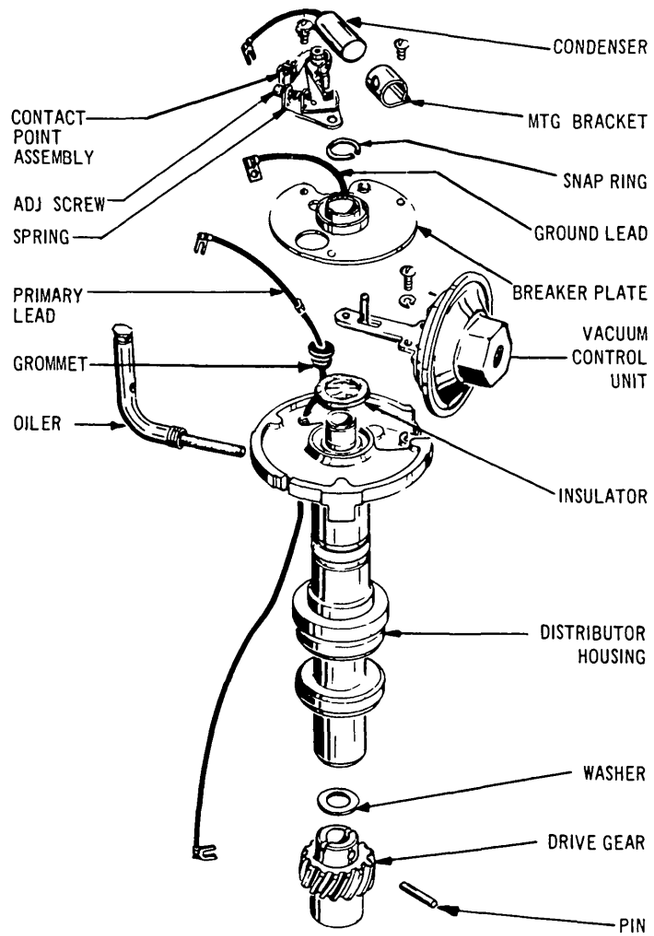
►*ROTOR INSTALLATION CAUTION·* Rotor can be installed in only one position (located by one square nib and one round nib on underside which must fit into corresponding holes in base plate). **Any attempt to install rotor in any other position will result in breaking rotor when attaching screws tightened.**

Contact Point Replacement: Loosen terminal screw on contact plate post and remove condenser and primary leads Take out two screws in contact set base and lift old contact set out Install new contact set When connecting leads, primary lead should be inside condenser lead and then looped over condenser lead and fastened in outer position on terminal screw (spade type lead terminals should be placed back-to-back on screw) Make certain that leads do not interfere with cap, advance weight base, or breaker advance plate Apply trace of Delco-Remy Cam & Ball Bearing Lubricant to face of breaker cam Adjust breaker gap *NOTE*—On Replacement Contact Sets, breaker arm spring tension and contact alignment are pre-set at factory and do not require adjustment

Condenser Replacement: Remove condenser from breaker plate by disconnecting lead from contact set terminal post and taking out mounting screw in condenser bracket When installing condenser, make certain that bracket is properly located over protrusions on breaker plate and that terminal lead does not interfere with cap, advance weight base, or breaker advance plate

DISTRIBUTOR SPECIFICATIONS: Breaker Gap—.016"
Cam Angle or Dwell—29° (26-33°)
Breaker Arm Spring Tension—19-23 ozs
Automatic & Vacuum Advance—*See individual car model data pages*





DELCO-REMY "WINDOW" DISTRIBUTOR ASSEMBLY

FORD, LINCOLN, MERCURY DISTRIBUTORS

Car Model	Distributor No.
FORD & THUNDERBIRD	
1956 V8 (4-Bbl. Carb.)	B6A-12127-B
1956 Thunderbird	B6S-12127-B
LINCOLN	
1956 Lincoln	FDU-12127-B
1956 Continental	FEC-12127-A
MERCURY	
1956 All Models	B6A-12127-D

►CHANGES & CORRECTIONS

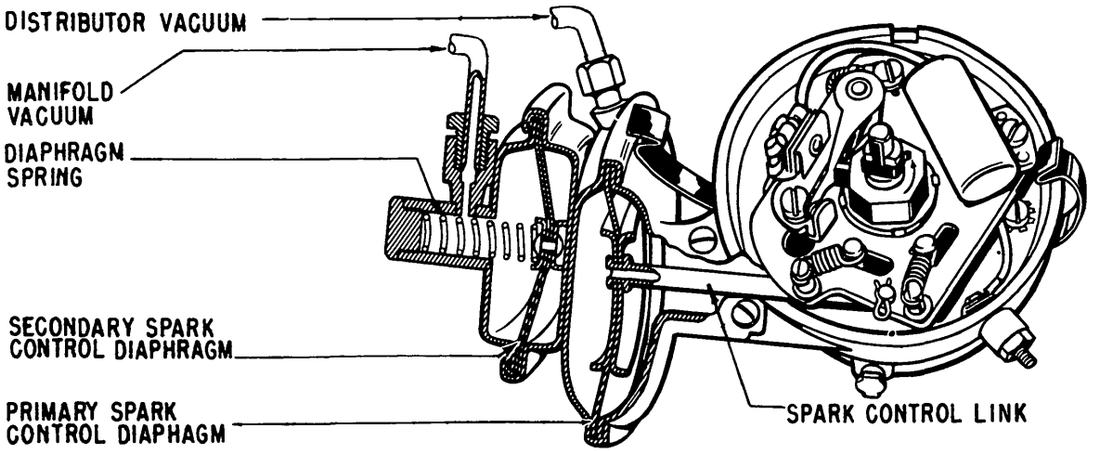
►*SUDDEN ENGINE STOPPING (Ignition Interruption):* May be caused by defective weld at either terminal of distributor primary lead. Examine lead for good weld at terminal lug.

►*DISTRIBUTOR PRIMARY LEAD GROUND:* May be caused by end of distributor identification plate fastening screw extending through case and penetrating primary lead insulation. Correct by replacing damaged lead and filing off sharp point of screw.

►*DISTRIBUTOR DIAPHRAGM UNIT PRODUCTION CHANGE & REPLACEMENT NOTE:* New Distributor Diaphragm Unit, No. B6A-12370-B, used on later cars and can be installed on all cars as replacement. This unit has stronger diaphragm and can be identified by diecast end cover (previous type No. B6A-12370-A had stamped cover).

►*ENGINE DETONATION CORRECTION: If caused by rupture or leakage of secondary diaphragm (allowing primary diaphragm to advance spark excessively), see Distributor Diaphragm Unit Change above.*

DESCRIPTION: This "Loadomatic" type distributor is a full automatic advance type in which the spark advance is regulated entirely by vacuum differential at the carburetor. Spark advance characteristics are controlled by two breaker plate springs, working against the distributor spark control diaphragms. A secondary diaphragm is provided (farthest from distributor body) to give a rapid spark retard at the acceleration "tip-in" point. The primary diaphragm (closest to distributor body) operates in same manner as the single diaphragm type.



FORD, LINCOLN, MERCURY DISTRIBUTOR ASSEMBLY

OPERATION: (Distributor Double Diaphragm) - The secondary spark control diaphragm forces a quick, momentary spark retard while distributor vacuun line, carburetor vacuum passages, and primary spark control diaphragm are normalizing to new pressure conditions which develop when spark control valve closes the manifold vacuum passage in the carburetor. The secondary spark control diaphragm is not connected either to the breaker plate or the primary spark control diaphragm. There is merely an air chamber between the two diaphragms. The secondary spark control diaphragm is held in an outward position by straight intake manifold vacuum working against a calibrated spring (this spring is located under the hex head plug in center of secondary diaphragm housing). Vacuum is taken from base of carburetor throttle body above the throttle valves. When throttle is opened suddenly for rapid acceleration, manifold vacuum drops quickly, and the spring loaded secondary spark control diaphragm moves toward primary spark control diaphragm. The resulting air pressure between the two diaphragms pushes the primary diaphragm inward providing a quick spark retard.

ADJUSTMENT: *See "Ignition" on Car Mod I pages.*

TESTING: (Distributor Double Diaphragm) - Disconnect distributor and manifold fittings at diaphragm and attach a screw-in adaptor, for use with distributor tester vacuum pump, to primary diaphragm fitting (large fitting). Adjust vacuum pump to a steady reading of 20 inches of vacuum. Connect hose to primary fitting. If reading is less than 20 inches, one or both diaphragms are leaking and should be replaced. Disconnect vacuum hose and reset vacuum pump to 3 to 5 inches of vacuum. Connect hose to diaphragm fitting and check for a steady reading of 3 to 5 inches. Replace unit if reading not steady. *NOTE - New diaphragm assemblies should be checked at both vacuum settings before installation.*

DISTRIBUTOR OVERHAUL: *See "Ford, Lincoln, Mercury Distributors" in 1954 Annual Data or later Manual editions and note the following:*

Distributor Shaft Endplay: .022-.030" (supersedes previous specification of .020-.024").

AUTO-LITE 12-VOLT REGULATORS

DESCRIPTION: Auto-Lite "VAT" and "VRX" Regulators are 12-volt types of similar design to previous Auto-Lite 6-volt regulators except for use of a third "R3" resistor on some "VAT" regulators. *See wiring diagram.*

►*CHECKING & ADJUSTMENT CAUTION:* Removal of cover (for regulator adjustments) requires breaking of seal. Regulator can be checked to determine if it is operating satisfactorily without breaking the seal or removing the cover as directed below.

CHECKING REGULATOR (Without breaking seal): Connect ammeter in charging line at regulator "BAT" terminal (in series with battery), connect voltmeter between regulator "BAT" terminal and ground. Then check as follows:

V ltage Regulat r—Operate generator at speed corresponding to 30 MPH. Adjust charging rate to 10 amperes (.25 ohm resistor can be used connected in charging line). Continue operation for 15 minutes to "normalize" or bring the regulator up to operating temperature (temperature can be checked by placing accurate thermometer 2" from the regulator cover). Note voltmeter reading. If this does not agree with with Voltage Regulator Setting given below, regulator is defective or requires adjustment.

Current Regulat r—Operate generator at speed corresponding to 30 MPH. Add load in excess of rated capacity shown on regulator cover (turn on car lights and accessories, add additional load such as carbon pile or lamp bank at point between ammeter and battery, or use variable resistance across battery) to insure current regulator operating. Continue operation for 15 minutes to "normalize" or bring the regulator up to operating temperature (temperature can be checked by placing accurate thermometer 2" from the regulator cover). Note ammeter reading. If this does not agree with "Test A" figure in Current Regulator Setting below, regulator is defective or requires adjustment.

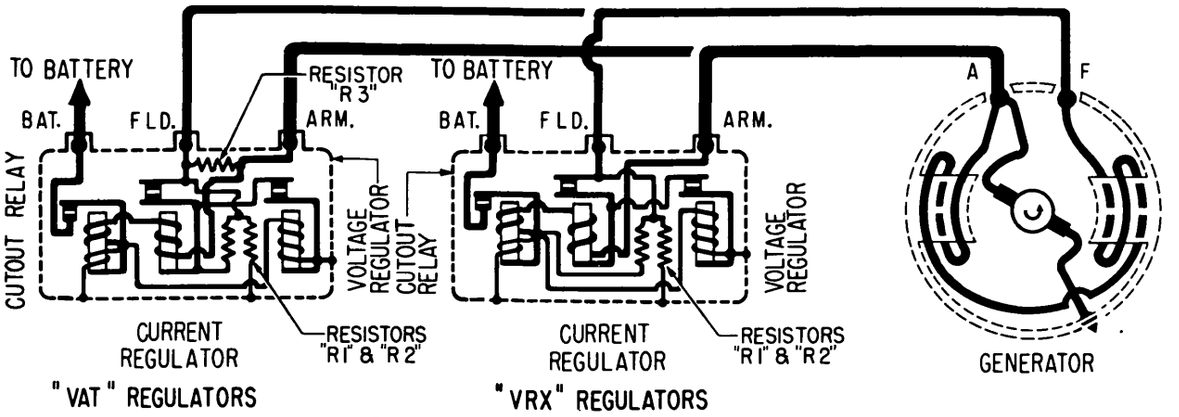
CHECKING & ADJUSTMENT (Requiring Cover Removal): Connect ammeter in charging line at regulator "BAT" terminal (in series with battery), connect voltmeter between regulator "BAT" terminal and ground (except for Cutout Relay cut-in voltage test when voltmeter should be connected between regulator "ARM" terminal and ground). Make tests as follows:

VOLTAGE REGULATOR

►*NORMALIZING THE REGULATOR:* Before checking voltage setting, bring regulator to operating temperature as follows: Operate generator at speed of 1500 RPM., adjust charging rate to 10 amperes (connect .25 ohm resistor in charging line or use variable resistance connected across battery). Continue operation for 15 minutes to "normalize" the regulator or bring it up to operating temperature (temperature can be checked by placing accurate thermometer 2" from regulator cover).

Air Gap: .048-.052". Check with wire gauge placed between armature and core at contact side of stop pin. Contacts should be closed with .052" gauge and should just open when armature pressed down against .048" gauge. Adjust by loosening stationary contact support screw and raising or lowering the contact support.

Voltage Setting: After regulator normalized (see above), and with generator charging at 10 ampere rate, note voltmeter reading and regulator temperature. If voltage setting not within range shown in Voltage Regulator Setting specifications below, adjust regulator as follows:



AUTO-LITE 12-VOLT REGULATOR WIRING DIAGRAM

VOLTAGE REGULATOR SETTINGS

Model	Voltage Setting Table
VAT 4001A	No. 1
VAT 4002A, AX	No. 2
VAT 4003A	No. 1
VAT 4004AX	No. 2
VAT 4101 AM	No. 1
VAT 6001A, 6002A, 6201A	No. 1
VRX 4001A	No. 1
VRX 4001B, BX	No. 2
VRX 4002A, B, 4003A	No. 1
VRX 4003AX, B, BX, C, CX	No. 2
VRX 4003D, DT, E	No. 1
VRX 4004A, 4005A, AX	No. 2
VRX 4006A, 4401A	No. 1
VRX 5003CX	No. 2
VRX 6001A, 6002AT, BT	No. 1
VRX 6003A, B, C	No. 1
VRX 6004A, AT, 6005AT	No. 1
VRX 6006A, 6007A	No. 1
VRX 6008A, 6009A	No. 1
VRX 6201A, B	No. 1
VRX 6202A	No. 1
VRX 7005AT	No. 1

VAT, VRX Voltage Regulator Setting

Table No. 1 Temp.	① Volts	Table No. 2 Temp.	② Volts
50° F.	14.7	50° F.	14.3
80° F.	14.5	80° F.	14.2
110° F.	14.3	110° F.	14.0
140° F.	14.1	140° F.	13.9

① - Plus or minus .3 volt.
② - Plus or minus .2 volt.

Adjustment—Decrease generator speed to slow idle, remove regulator cover, adjust voltage regulator by bending armature spring lower hanger down (increase spring tension) to increase voltage setting, or up (decrease spring tension) to lower voltage setting. After each adjustment, check setting by first cycling regulator (decrease speed until cutout relay contacts open, then increase generator speed to 1500 RPM) and then rechecking voltmeter reading and temperature with 10 ampere charging rate.

CURRENT REGULATOR

►*NORMALIZING THE REGULATOR:* Before checking current setting, bring the regulator up to operating temperature by following steps (1) and (2) below.

(1)—Follow same procedure given above for Normalizing the Regulator for Voltage Setting checking. *If Current Regulator being checked immediately after checking and adjusting the Voltage Regulator, this step can be omitted. NOTE*—At end of this 15 minute operation, current setting should agree with "Test A" specifications in Current Regulator Setting given below.

(2)—Operate generator at speed of 2000 RPM., add load sufficient to cause current regulator to operate (turn on car lights and accessories, add additional load such as lamp bank or carbon pile, or use variable resistance across battery) with voltage of 13.7-13.9 volts (VAT Regulators), 13.6-13.8 volts (VRX Regulators). Continue operation for 15 minutes to "normalize" the regulator by bringing it up to operating temperature (temperature can be checked by placing an accurate thermometer 2" from the regulator cover). *NOTE*—At end of this total 30 minute operation (steps 1 & 2), current setting should agree with "Test B" specifications in Current Regulator Setting given below.

Air Gap: .048-.052". Check and adjust in same manner as Voltage Regulator (above).

Current Setting: After regulator normalized (see above), and with generator charging at full capacity, note ammeter reading. If charging rate not within range shown in "Test B" column of Current Regulator Setting below, adjust as follows:

CONTINUED ON NEXT PAGE

AUTO-LITE REGULATORS (C nt.)

Curr nt R gulat r Setting

VAT-6201A

Temp. (°F)	Test "A" Amperes	Test "B"
50°	48 max.	40-44
70°	46 max.	38-42
90°	44 max.	36-40
110°	42 max.	34-38
130°	40 max.	32-36

VRX-4008A, 4009A, 6201A

Temp. (°F)	Test "A" Amperes	Test "B"
50°	38 max	30-34
70°	36 max	28-32
90°	34 max.	26-30
110°	32 max.	24-28
130°	30 max.	22-26

CUTOUT RELAY

►*NORMALIZING THE REGULATOR* If regulator is cold, first bring it up to operating temperature as directed under Voltage Regulator above *If Cutout Relay checked immediately after checking Voltage & Current Regulator, no further normalizing will be required.*

Air Gap. .031-.034" with contacts open. Check with feeler gauge between lower face of armature and core as close to armature hinge as possible. The .031" gauge should be "GO" 034" gauge "NO GO". Adjust by bending armature upper stop up or down as required

Contact Gap: .015" minimum. Check with feeler gauge. Adjust by expanding or contracting the stationary contact support to lower or raise the contact.

Cut-in (Closing) Voltage: Connect ammeter in charging line at regulator "BAT" terminal (in series with battery), connect voltmeter between regulator "ARM" terminal and ground. Connect a variable resistance in the line between the regulator "FLD" and generator "F" terminal. With the regulator normalized (see above), operate the generator at the engine slow idle speed, set resistor so that full resistance is in the field circuit. Slowly turn resistance out of field circuit and note voltmeter reading at instant relay contacts close (needle will jump slightly). If cut-in voltage does not agree with settings shown below, adjustment is required. Adjust by bending armature spring lower hanger down (increase spring tension) to increase cut-in voltage, or up (decrease spring tension) to decrease cut-in voltage. Then check cut-out voltage.

Cut-out (Opening) Voltage: After checking cut-in voltage (above), turn resistance completely out of field circuit and note ammeter reading. If ammeter does not indicate charging current of 10 amperes, increase generator speed until 10 ampere reading secured Turn resistance in the field circuit slowly and note voltmeter reading at point where ammeter indicates maximum DISCHARGE current (ammeter pointer will drop to zero, then go beyond the zero point, and finally return to zero). This voltmeter reading is the cut-out voltage and should agree with settings shown below Adjust by varying the contact gap.

Cutout Relay Settings

Regulator	Cut-in – Voltag	– Cut-out
VAT-6201A	13.0-13.75	8.2-9.3
VRX-6008A, 6009A	13.0-13.7	①8.2-9.3
VRX-6201A	13.0-13.7	①8.2-9.3

①—With approximately 3-5 amperes discharge current.

LINCOLN & MERCURY AUTOMATIC HEADLIGHT DIMMER

Lincoln & Mercury (1956)

DESCRIPTION: Similar in design and operation to previous model.

SERVICE PARTS: *NOTE* - Both six and twelve volt dimmers use a standard six volt radio vibrator.

Part	Part No.
Control Tube Assembly	FDK-13691-A
Ballast Tube Assembly	FDK-13692 B
Cover Assembly, Switch	FDK-13694-B
Gasket, Switch Cover	FDK-13695-A
Vibrator Assembly	FDK-18885-A
Switch Assembly	FDU-13532-A

ADJUSTMENTS: Three adjustments are possible on the 1956 Headlight Dimmer Switch Assembly. Adjustments are as follows

Fine Sensitivity: Accessible by removing rubber plug in the cover. It varies "Dim" and "Hold" distances simultaneously through a limited range. To increase, turn adjustment screw clockwise.

Course Sensitivity: Located close to edge of chassis under cover. It varies "Dim" and "Hold" distances simultaneously over a broad range and must be used when fine sensitivity control will not provide desired results. Turn adjustment screw clockwise to increase range

Hold Control: Located in center of chassis under cover. It varies the "Hold" distance independent of the "Dim" distance. To increase the "Hold", turn adjustment screw clockwise.

LEVELING CONTROL HEAD: To level 1956 control head, release locking screw with 1/8" Allen wrench and adjust phototube unit by hand until bubble is centered in spirit level

►*OTHER DATA See "Lincoln & Mercury Automatic Headlight Dimmer" in 1955 Annual Data or later Manual edition*

AUTRONIC EYE

DESCRIPTION: Similar in design and operation to previous models.

ADJUSTMENTS: *See "Autronic Eye" in 1955 Annual Data or later Manual edition. Follow procedures outlined for LATER UNITS (1955).*

►*OTHER DATA. See "Autronic Eye" (Later Units) in 1955 Annual Data or later Manual edition.*

OLDSMOBILE TEMPERATURE INDICATOR

Oldsmobile (1956)

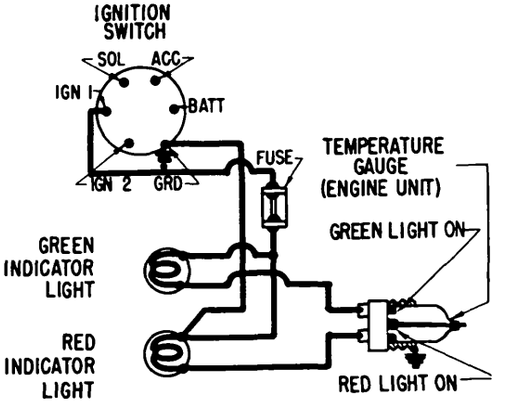
DESCRIPTION: The unit consists of one green and one red indicator light in instrument cluster and a thermal unit at rear of left hand cylinder head. The thermal unit contains a bi-metal strip which is actuated between two terminals within the unit The thermal unit has three basic positions - cold, normal, and hot.

OPERATION: When the ignition switch key is turned to the start position, a test circuit is closed to determine if red light is functioning properly. When a cold engine is started, the bi-metal strip closes the circuit to the green light, causing the green light to burn indicating that the engine is not up to operating temperature and remains on until the engine reaches operating temperature If the engine reaches an abnormally high temperature, the bi-metal strip closes the circuit to the red light, causing the red light to burn indicating that the engine temperature is abnormally high.

SPECIFICATIONS: Green light burns until engine temperature, at rear of cylinder block, reaches 111-115° F, at which time the light turns off automatically. Red light comes on when engine temperature reaches 218-222°F.

SERVICE PARTS: **Thermal Unit (Engine)** - Oldsmobile No 1998140

Indicator Lamps - Oldsmobile No. 1583988 (Red), No. 1583989 (Green)



OLDSMOBILE TEMPERATURE INDICATOR

DELCO-REMY 12-VOLT REGULATORS

►*"1118825" & "1118900" SERIES REGULATOR NOTE:* Regulators of these series **with Letter "B" following Model Number** are similar to "1119000" Series and all data below applies to these models also.

DESCRIPTION: These regulators differ from preceding "1118825" and "1118900" series **without Letter "B" following the model number** in that the direction of current flow through the Current Regulator contacts has been reversed (see Wiring Diagram and Contact Mounting illustrations).

►*ADJUSTMENT CAUTION* When checking Current Regulator on these 1119000 series regulators, DO NOT use the "Quick Check Method" outlined for previous 1118825 series regulators. Using a screwdriver inserted in hole in regulator base to short out Voltage Regulator will short out BOTH the Voltage and Current Regulators and allow generator to operate without control.

CHECKING & ADJUSTMENT: Make all checks and adjustments in following sequence Voltage Regulation, Cutout Relay Operation, and Current Regulation AFTER regulator has been brought up to normal operating temperature as directed below. Generator must be repolarized each time leads are reconnected and before operating.

►*GENERATOR REPOLARIZING* After generator and regulator leads reconnected, connect jumper lead between regulator "GEN" and "BAT" terminals momentarily to allow a quick current surge through generator winding. This will prevent damage to equipment caused by reversed polarity (vibration, arcing, and burning of relay contact points).

VOLTAGE REGULATOR

►*NORMALIZING THE REGULATOR* Before checking voltage setting, bring regulator to operating temperature as follows. Connect 1/4 ohm resistance in series with battery, see that regulator cover in place, operate regulator for 15 minutes continuously with no other load than ignition (*NOTE*–If variable resistor used in place of fixed 1/4 ohm resistor, set resistor for 1-10 ampere charging rate).

Air Gap: .075" (except 1119004), .063" (1119004) with contacts just touching. Check by pressing down on armature until contacts are just touching. Adjust by loosening upper contact mounting screws and raising or lowering contact bracket. Align contacts and tighten bracket mounting screws.

Voltage Setting: Setting can be checked using either Fixed Resistance or Variable Resistance Method:

Fixed 1/4 Ohm Resistance Method

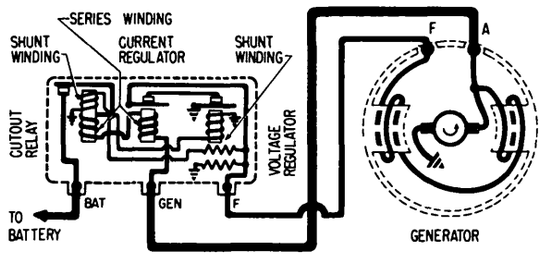
1)–Connect 1/4 ohm fixed resistor (not less than 25 watts) in charging circuit at regulator "BAT" terminal (in series with battery), connect voltmeter between between regulator "BAT" terminal and ground.

2)–Cycle the generator using either of the following methods. **(A)** Move voltmeter lead from regulator "BAT" terminal to "GEN" terminal. Reduce generator speed until voltmeter reading is 2 volts (6 volt types), 4 volts (12 volt types), then move voltmeter lead back to "BAT" terminal. **(B)** Connect variable resistance in field circuit (in line between generator and regulator "F" terminals), turn out all resistance, operate generator at 3500 RPM and turn in resistance until generator voltage reduced to 6 volts (6 volt types), 12 volts (12 volt types), then turn out all resistance and remove variable resistor.

3)–Operate generator at 3500 RPM (cars & trucks), note voltmeter reading with regulator cover in place. This is the voltage setting (see data below). Adjust by turning adjusting screw at voltage regulator armature spring lower bracket clockwise to increase setting, or counter-clockwise to decrease setting.

Variable Resistance Method

1)–Connect variable resistance (not less than 25 watts) and ammeter in charging circuit at regulator "BAT" terminal (in series with battery), connect voltmeter between regulator "BAT" terminal & ground.



DELCO-REMY 12-VOLT REGULATORS WIRING DIAGRAM

2)–Cycle the generator (use either method outlined in step 2 of Fixed 1/4 Ohm Resistance Method above).

3)–Check and adjust voltage setting as outlined in step 3 of Fixed 1/4 Ohm Resistance Method above.

Voltage Setting Specifications

Setting–13.8-14.8 volts with regulator ambient temperature of 125° F. Regulator settings can be "tailored" to keep the battery in a satisfactory state under the operating conditions of the particular car as directed below.

►*AMBIENT TEMPERATURE NOTE.* "Ambient Temperature" is the temperature of the air surrounding the regulator approximately 1/4" from the regulator cover when the regulator is at operating temperature ("Normalizing" procedure as given above should result in an ambient temperature of 125° F.) and can be measured by placing a thermometer 1/4" from the regulator cover. For ambient temperatures other than 125° F., regulator settings are as follows.

Ambient Temp.	Voltage Setting Range (For "Normal" settings of 13.8-14.8 volts)					
165°	13.2	13.4	13.6	13.8	14.0	14.2
145°	13.5	13.7	13.9	14.1	14.3	14.5
125°	13.8	14.0	14.2	14.4	14.6	14.8
105°	14.1	14.3	14.5	14.7	14.9	15.1
85°	14.4	14.6	14.8	15.0	15.2	15.4
65°	14.7	14.9	15.1	15.3	15.5	15.7
45°	15.0	15.2	15.4	15.6	15.8	16.0

"Tailoring" Voltage Regulator Setting

If battery is consistently undercharged or overcharged (using too much water), adjust the voltage regulator setting (within range of 13.8-14.8 volts at ambient temperature of 125° F.) as directed below. *CAUTION* Regulator setting above 14.8 volts (at 125° F.) may cause damage to lights and other voltage-sensitive equipment and should be avoided.

1)–**Battery uses too much water.** If voltage regulator setting **above** normal range listed above, reduce setting to within upper portion of normal range and check battery condition over a period of time. If voltage regulator setting **within** normal range listed above, reduce voltage setting 0.1 or 0.2 volts and check battery condition over period of time. This should be continued until battery remains charged with minimum use of water.

2)–**Battery is consistently undercharged**–If voltage regulator setting is **below** normal range listed above, increase setting to within lower portion of normal range and check battery condition over a period of time. If voltage regulator setting is **within** normal range listed above, increase voltage setting 0.1 volt and check battery condition over period of time. This should be continued until battery remains charged with minimum use of water.

CUTOUT RELAY

►*ADJUSTMENT CAUTION. Disconnect battery lead before making Air Gap and Contact Gap adjustments.*

Air Gap: .020" with contacts just touching. To check, press down on armature until points just close (use finger pressure on armature directly above contacts), measure gap between armature and center of core. To adjust, loosen two screws at armature hinge on back of relay, raise or lower armature as necessary. *CAUTION*–Make certain that both sets of contact points close simultaneously.

Contact Gap: .020" with armature up against upper stop (*CAUTION*–Gap must be same for both sets of contacts to insure simultaneous closing). Use feeler gauge to check gap. To adjust, bend upper armature stop up or down as necessary.

Cut-in (Closing) Voltage: 11.8-13.5 volts (exc. 1119004), 11.5-13.0 volts (1119004). To check with regulator properly connected to generator and battery, connect voltmeter between regulator "GEN" terminal and ground. Use either of the following methods to check cut-in voltage:

1)–Slowly increase generator speed and note voltmeter reading at instant contacts close, then decrease generator speed and make certain that relay contacts open. See item (3) for adjustment.

2)–Connect a variable resistor in the field circuit between regulator "F" terminal and generator "F" terminal (use 15 ohm-25 watt resistor for 6 volt systems, 25 ohm-25 watt resistor for 12 volt systems). Operate generator at medium speed with all resistance turned in, slowly turn out resistance and note voltmeter reading at instant relay contacts close. Slowly turn in resistance and make certain that relay contacts open. Adjust as follows:

CONTINUED ON NEXT PAGE

DELCO-REMY 12-VOLT REGULATORS (Cont.)

3)–Turn adjusting screw under armature spring (adjacent to contacts) in or clockwise to increase cut-in voltage, out or counter-clockwise to decrease cut-in voltage.

CURRENT REGULATOR

►*CHECKING & ADJUSTMENT CAUTION:* Temperature Compensated Current Regulators should be checked by the "Load Method" which provides for bringing the regulator up to operating temperature. Regulators which are not temperature compensated can be checked by the "Jumper Lead" Method.

Air Gap: .075" with contacts just touching. Check and adjust air gap in same manner as Voltage Regulator (above).

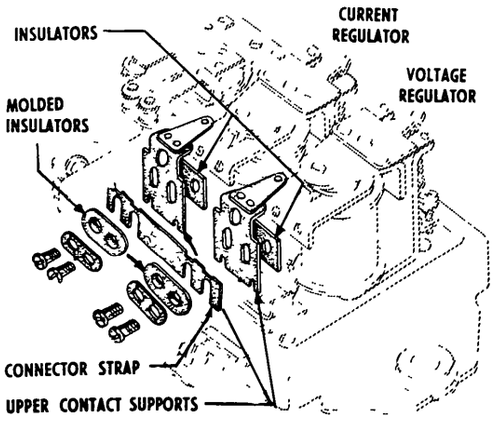
Current Setting: Use correct method for each type as listed below. *CAUTION–Do not attempt to short out voltage regulator by inserting screwdriver through hole in base (will short out both voltage and current regulators and cause generator to operate without control).*

Load Method
(For Temperature Compensated Regulators)

1)–Connect ammeter in charging circuit at regulator "BAT" terminal (in series with battery).

2)–Turn on all accessory load (lights, radio, etc.) and connect additional load (carbon pile rheostat or bank of lights) to reduce voltage to approximately 1.0 volt below voltage regulator setting.

3)–Operate generator at 3500 RPM (cars & trucks) for 15 minutes with regulator cover in place. This will bring regulator up to operating temperature.



DELCO-REMY 12-VOLT REGULATORS CONTACT ASSEMBLY

4)–Cycle the generator by using either of the following methods: **(A)** Connect voltmeter between regulator "GEN" terminal and ground, reduce generator speed until voltmeter reading is 2 volts (6 volt systems), 4 volts (12 volt systems), then increase generator speed to 3500 RPM. **(B)** Connect variable resistance in field circuit (in line between regulator and generator "F" terminals), operate generator at 3500 RPM with all resistance turned out, turn in resistance until generator voltage reduced to 6 volts (6 volt systems), 12 volts (12 volt systems), then turn out all resistance.

5)–Operate generator at 3500 RPM and note ammeter reading which is the current setting. Adjust by turning the adjusting screw at the current regulator armature spring lower bracket clockwise to increase setting, or counter-clockwise to decrease setting.

Jumper Lead Method
(For Non-Temperature Compensated Regulators)

1)–Connect ammeter in charging circuit at regulator "BAT" terminal (in series with battery).

2)–Connect short jumper lead across voltage regulator points (from upper contact bracket to armature).

3)–Turn on all lights and accessories or connect additional load (see step 3 under Load Method above) to cause current regulator to operate.

4)–Operate generator at 3500 RPM (cars & trucks) and note ammeter reading which is the current setting. Adjust as directed in step (5) under Load Method above.

Current Regulator Setting

Regulator No.	Setting (Amps)
1119000,	23-27
1119002	32-37
1119001, 3	27-33
1119004	37-42
1119122	23-27
1119123	27-33
1119145	33-37
1119148	9-11
1119150, 51	32-37
1119152, 53	15.5-18.5
1119155	23-27
1119156	48-52
1119162	32-37

FORD, LINCOLN, MERCURY 12-VOLT REGULATORS

DESCRIPTION: These 12-volt regulators are similar in design to previously used 6-volt units and are intended for use with the 1956 12-volt electrical systems.

CHECKING & ADJUSTMENT: *CAUTION*—Regulators are temperature-compensated and must be brought up to normal operating temperature before checks are made. This normal temperature is that existing adjacent to the regulator cover after 1/2 hour of operation in the car or after the regulator has been heated until the temperature is stabilized (standard normal temperature is 70-80° F.

►*NORMALIZING THE REGULATOR:* **On the Car**—Clip special thermometer T56L-10505-A on regulator cover (see Note below). Operate engine with generator charging at 10 ampere rate for 30 minutes or until regulator temperature is stabilized.

On the Bench—Procedure is same as on the car except that a small fan should be mounted 12-15" from the regulator so as to circulate air over the regulator cover while it is being warmed up.

Thermometer T56L-10505-A Note—This thermometer is calibrated in 10° F. increments and has additional Voltage scales indicating the correct voltage regulator setting for each temperature reading (both 6 volt and 12 volt scales provided).

►*TEST METER CONNECTIONS:* If special Test Sets used, make all connections in accordance with manufacturer's instructions. If individual meters used, make connections as follows: Connect test ammeter and 1-1/2 ohm fixed resistor in series in charging line at regulator "BAT" terminal (in series with battery). Connect voltmeter between regulator "ARM" terminal and ground (regulator base or battery grounded terminal). Connect a 50 ohm variable field rheostat (2 amp. rating) in generator field circuit (disconnect field lead at regulator "FIELD" terminal, connect rheostat between this lead and regulator "FIELD" terminal).

CUTOUT RELAY

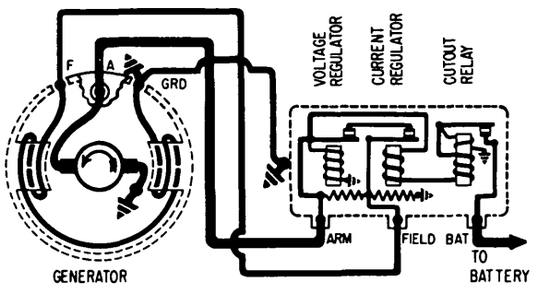
Cut-in (Closing) Voltag : After regulator normalized and with test meters connected (see above), check cut-in voltage by either of the following methods: **(1)**—With resistance turned out of field circuit, slowly increase generator speed and note voltmeter reading at instant relay contacts close (pointer will drop back slightly). Repeat this check several times by decreasing generator speed until contacts open and then increasing speed until contacts close. If closing voltage not correct as shown in setting table below, adjustment is required. **(2)**—With field resistance completely turned in the field circuit, operate generator at 1500 RPM., slowly turn resistance out of field circuit and note voltmeter reading when relay contacts close (pointer will drop back slightly). Repeat this check several times by turning resistance in and out of field circuit.

Adjustment—Bend adjusting arm under armature spring (to left of relay contacts) upward to increase cut-in voltage, or downward to decrease cut-in voltage. Replace regulator cover and recheck the setting.

Cut-in (Closing) Voltage Setting

All Models—12.0-12.8 volts.

Cut-out (Opening) Discharge Current: This can be checked after checking cut-in voltage by increasing generator speed (or turning out field resistance) until charging current is approximately 10 amperes, then slowly decrease generator speed (or turn in field resistance) until maximum **discharge** current indicated on ammeter (ammeter will return to zero as contacts open). Discharge current should be approximately 2-6 amperes.



FORD, LINCOLN, MERCURY 12-VOLT REGULATOR WIRING DIAGRAM

VOLTAGE REGULATOR

Voltage Setting: After Cutout Relay checked (above), cycle regulator by decreasing generator speed until cutout relay contacts open and then increase speed to 1500 RPM. Clip special thermometer on regulator cover to establish regulator ambient temperature and corresponding voltage setting (see Voltage Regulator Settings for various ambient temperatures below). Turn resistance completely out of field circuit (charging rate should be approximately 10 amperes). Note voltmeter reading. This is the voltage setting and should agree with setting listed below.

Adjustment—Bend adjusting arm under armature spring (to left of regulator contacts) upward to increase voltage setting, or downward to decrease voltage setting. Replace regulator cover and recheck the setting after each adjustment.

Voltage Setting

All Models—14.6-15.4 volts with ambient air temperature of 70-80° F. *See table below.*

Ford Voltage Regulator Settings
(Ambient Temperature Correction)

Ambient Temp. (° F)	Std. 30 Amp. Reg. (Volts)	H.D. 40 Amp. Reg. (Volts)
45°	14.9-15.7	14.3-15.1
55°	14.8-15.6	14.3-15.0
65°	14.7-15.5	14.3-14.9
75°	14.6-15.4	14.2-14.9
85°	14.5-15.3	14.1-14.8
95°	14.3-15.1	14.1-14.7
105°	14.2-15.0	14.0-14.7
115°	14.1-14.9	14.0-14.6
125°	13.9-14.7	13.9-14.5
135°	13.8-14.6	13.8-14.4

CURRENT REGULATOR

Current Setting: This check requires that a load be added, or that the generator voltage be dropped to approximately 13 volts, to cause current regulator to operate. It is recommended that a heavy duty variable resistance (carbon pile) be connected across the 1-1/2 ohm fixed resistor in the charging line (connect resistance from ammeter lead terminal of fixed resistor to ground—see Test Meter Connections above). After Voltage Regulator checked (above), and with all resistance turned out of the field circuit, operate generator at 1500 RPM (Ford), 2000 RPM (Continental, Lincoln, Mercury), decrease the resistance of the carbon pile resistance until voltage drops to approximately 13 volts and ammeter reading is at maximum. This ammeter reading is the current setting. If not correct (see table below), adjust as follows:

Adjustment—Bend adjusting arm under armature spring (to left of regulator contacts) upward to increase current setting, or downward to decrease current setting. Replace regulator cover and recheck setting.

Current Setting

Std. 30 Amp. Regulator—28-32 amperes (all models).
H.D. 40 Amp. Regulator—38-42 amperes (all models).

1956 BRAKE INDEX

BUICK Pag
Bendix Single Anchor 315
Moraine Power Unit 307
Hydrovac Power Unit 305
Hydraulic Brake Master Cylinder 317

CADILLAC
Bendix Single Anchor 315
Bendix Power Unit 301
Moraine Power Unit 307

CHEVROLET PASS. CARS
Bendix (Chevrolet) 319
Bendix Power Unit 301

CHEVROLET TRUCKS
Twinplex 320
Bendix (Chevrolet) 319
Hydrovac Power Unit 305

CHRYSLER & IMPERIAL
Chrysler "Center-Plane" 314
"Bellows Type" Power Unit 310
"Piston Type" Power Unit 311
Power Brake Pedal Adjustment 313

DE SOTO
DeSoto "Center-Plane" 314
"Bellows Type" Power Unit 310
"Piston Type" Power Unit 311
Power Brake Pedal Adjustment 313

DODGE
Dodge 500 "Center-Plane" 314
Lockheed "Safeguard" 313
"Integral Type" Power Unit . . . . Pg. 304 in 1955 Annual Data or later Manual edition
"Bellows Type" Power Unit 310
Power Brake Pedal Adjustment 313

FORD PASS. CARS Page
Bendix (Ford) 321
Midland Power Unit 309

FORD TRUCKS
Bendix (Ford) 321
Bendix (Uni-Servo) 323
Self-Centering 322
Hydrovac Power Unit 305
Midland Power Unit 309

HUDSON
Bendix Single Anchor 315
Bendix Power Unit 301

LINCOLN
Bendix (Lincoln) 321
Bendix Power Unit 301

MERCURY
Bendix (Mercury) 321
Bendix Power Unit 301

METROPOLITAN
Girling . . . . Pg. 301 in 1954 Annual Data or later Manual edition

NASH
Bendix Single Anchor 315
Bendix Power Unit 301

OLDSMOBILE
Bendix Single Anchor 315
Bendix Power Unit 301
Moraine Power Unit 307

PACKARD Pag
Bendix Single Anchor 315
Bendix Power Unit 301

PLYMOUTH
Lockheed "Safeguard" 313
"Bellows Type" Power Unit 310
"Integral Type" Power Unit . . . . Pg. 304 in 1955 Annual Data or later Manual edition
Power Brake Pedal Adjustment 313

PONTIAC
Bendix Single Anchor 315
Bendix Power Unit 301
Moraine Power Unit 307

RAMBLER
Bendix (Lockheed) Self-Centering 317
Bendix Power Unit 301

STUDEBAKER
Wagner (Lockheed) Self-Centering 318
Hydrovac Power Unit 305

WILLYS
Bendix (Lockheed) Self-Centering 317

POWER BRAKES (BOOSTERS)
Bendix Power Unit 301
Chrysler, DeSoto, Dodge, Plymouth "Integral Type" Power Unit . . . . Pg. 304 in 1955 Annual Data or later Manual edition
"Bellows Type" Power Unit 310
"Piston Type" Power Unit 311
Hydrovac Power Unit 305
Midland Power Unit 309
Moraine Power Unit 307

1956 POWER BRAKES

BENDIX POWER UNIT

Cadillac (1956) ①
Chevrolet Pass. Cars (1956)
Hudson (1956)
Lincoln (1956)
Mercury (1956)
Nash (1956)
Oldsmobile (1956) ①
Packard (1956)
Pontiac (1956) ①
Rambler (1956)
① - Moraine Power Unit also used.

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 CADILLAC BRAKE PEDAL LINKAGE BIND CAUSING BRAKE DRAG:* Binding can exist at brake rod-to-relay connection, pedal rod at toe-board hole, and pedal rod to felt air seal retainer. *NOTE* - Check level of pedal for correct horizontal position in car as viewed from seat before making repairs to eliminate binding. Correct by shimming between attaching bracket and steering column.

DESCRIPTION: Self-contained hydraulic vacuum power braking device utilizing engine intake manifold vacuum and atmospheric pressure for its power. It consists of three separate units as follows:

Power Unit: Three elements are combined to make up this single unit, namely:

(1) Vacuum Power Cylinder comprising a cylinder power piston, and piston return spring.

(2) Hydraulic Master Cylinder containing an hydraulic plunger, compensating valve, residual check valve, and fluid reservoir.

(3) Control Valve, mechanically actuated, which controls degree of brake application or release in accordance with foot pressure applied to pedal.

Vacuum Reserve Tank provides vacuum assist for a limited time when engine stalls.

Manifold Check Valve, in vacuum source line, maintains vacuum in unit should engine stall.

OPERATION: With engine running, brakes unapplied, both sides of power piston are open to atomspheric pressure. Application of the brake pedal causes vacuum port to open, thus connecting the forward side of vacuum power piston and rear side of reaction diaphragm to engine vacuum. This pressure differential causes power piston to move forward, thereby exerting a thrust on the hydraulic plunger. This increases line pressure to the four wheels. Release of the brake pedal restores the pressure balance in the power cylinder.

CHECKING & ADJUSTMENT: Check all parts of the power brake system before disassembling the Power Brake Unit whenever brake trouble experienced.

Adjustments: None required. If unit becomes faulty, manufacturer recommends that unit be overhauled using Power Brake Repair Kit. *NOTE*–Use all parts in kit. *DISCARD ALL OLD RUBBER PARTS.*

Bleeding Brakes: Bleed in same manner as standard brake system. Do not use vacuum assist while bleeding. Engine should not be running and vacuum reserve should be reduced to zero by applying the brake several times before starting bleeding.

Air Cleaner: Clean twice a year. To clean, remove air cleaner and thoroughly wash in cleaning solvent. Allow cleaner to dry before reinstalling.

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BENDIX POWER UNIT (C ntinued)

R filling Fluid R s rv ir: Maintain fluid level at ¾" from top (Cadillac), ¼" from filler plug opening (Lincoln & Mercury), at "L" mark on dipstick (Oldsmobile), ½" from filler opening (Others).

Vacuum & Hydraulic Lin Inspection: Every 5000 miles, check hose, tubing and connections. Replace deteriorated hose or damaged tubing.

TESTING: Road test brakes by making a brake application at about 20 MPH to determine if vehicle stops evenly and quickly. If pedal has a spongy feel when applying brakes, air may be present in hydraulic system. Bleed system as described above. When engine is stopped and transmission is in neutral, apply brakes several times to remove all vacuum in system. Depress brake pedal, hold light foot pressure on pedal and start engine. If vacuum system is operating, pedal will tend to fall away under foot pressure, and less pressure will be required to hold pedal in applied position. If no action is felt, vacuum system is not functioning. Stop engine and again remove all vacuum in system. Depress brake pedal and hold foot pressure on pedal. If pedal gradually falls away under foot pressure, hydraulic system is leaking. If brake pedal travels to within 1" of toeboard, brake shoes require adjustment or relining.

LUBRICATION: Piston packing seal is lubricated at time of assembly and requires no further lubrication *CAUTION–NEVER lubricate vacuum valve.*

TROUBLE SHOOTING: The following conditions apply to Power Brake operation. Be sure brake shoes, drums, linkage, and adjustments correct before repair of Power Brake System.

Hard P dal: Vacuum failure due to faulty vacuum check valve, collapsed vacuum hose, plugged vacuum hose or fittings, leaking vacuum reservoir or vacuum hose and pipe connections; bound up pedal mechanism; glazed linings; grease, brake fluid, or water on linings; vacuum leak in unit between piston plates, past leather piston packing, between vacuum cylinder and master cylinder, or around hydraulic plunger seal; restricted air cleaner; jammed pushrod and valve plunger; broken counter-reaction spring; leak past atmospheric poppet; vacuum hose on piston loose or restricted.

"Grabby" r S v r Brak s: Grease or brake fluid on linings; scored drums; anchor pins loose; vacuum leak in the reaction diaphragm; sticking pushrod and valve plunger; faulty pivot arm and vacuum poppet action; restricted diaphragm passage.

P dal Goes T Fl r (Or Alm st T Flo r): Brakes require adjustment; air in hydraulic system; hydraulic leak in lines or at wheel cylinders; fluid reservoir needs replenishing; cracked drums or broken linings; hydraulic leakage at compensating valve, hydraulic plunger seal, compensating seal or outlet fitting seals.

Brak s Fail T R l as (Or Sl w R l as): Anchor pins loose; bound up brake pedal linkage; brakes improperly adjusted; faulty residual check valve; excessive hydraulic plunger seal friction; faulty compensating valve; excessive piston packing friction; restricted air passage in piston plate; restricted air cleaner; sticky pushrod and valve plunger; broken piston return spring.

REMOVAL (CADILLAC): Disconnect relay to unit rod at clevis. Disconnect relay rod from pushrod. Disconnect both vacuum hoses from power unit. Disconnect hydraulic line at outlet fitting. Remove four screws, lockwashers and nuts from cylinder mounting bracket and remove power brake assembly from car.

REMOVAL (CHEVROLET): From engine side of dash panel remove vacuum lines from vacuum inlet tube on intake manifold (top of engine on V8, left side center on 6 Cyl.). Remove vacuum line to vacuum reservoir. Remove stop light wire connection. Remove hydraulic line from hydraulic cylinder. From inside body remove lever to pushrod retaining bolt washer, lockwasher and nut and disengage pushrod from pushrod lever. Remove bolts and lockwashers retaining power brake unit to dash unit and remove unit from vehicle.

REMOVAL (LINCOLN & MERCURY): Disconnect pushrod from brake pedal. Remove master cylinder outlet fitting bolt (NOTE–It is not necessary to remove stop light switch wire or hose assembly from outlet fitting). Do not disturb outlet fitting in master cylinder. Loosen manifold hose clamp at check valve, remove hose from valve. Loosen vacuum reserve tank hose clamp at check valve and remove hose from valve. Remove bolts securing power brake assembly to bracket on dash panel, remove assembly.

REMOVAL (OLDSMOBILE): Disconnect hydraulic line at power brake master cylinder. Use care to prevent dirt entering hydraulic line and secure hose so that open end is above level of junction assembly to prevent loss of fluid. Plug master cylinder outlet with rubber stopper. Disconnect leads from stoplight switch and fold back floor mat. Remove three brake pedal bracket attaching bolts. Remove bracket and pedal assembly. Remove mast jacket grommet retainer clip and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws. Loosen speedometer cable hold down clip and slip cable from under clip, then remove speedometer cable and grommet from mast jacket cover plate. Remove two cover plate to power cylinder bolts, and remove cover plate while positioning power brake unit so it rests on edge of opening in toe pan. Disconnect vacuum hoses and remove power brake unit through toe pan opening.

►*INSTALLATION NOTE:* When reinstalling hoses, position clamps so screw heads may be reached from below car. Place 5/16" bead of 3M Sealer around entire toe pan groove.

REMOVAL (PACKARD): Disconnect vacuum, atmospheric, and hydraulic lines and stoplight wires from power unit (raise hydraulic line above level of junction assembly to prevent fluid leakage). Disconnect and remove brake and accelerator pedals. Remove steering column grommet retainers, slide grommet up out of way. Remove carpet retainers and fold back carpet. Remove cover plate screws, then remove power brake and cover as an assembly, take out mounting screws and remove power brake from cover.

REMOVAL (PONTIAC): Disconnect vacuum hose from vacuum pipe leading to vacuum tee connector. Raise car and remove engine side apron from left side. Remove electrical cables from behind cable guide on reservoir cover of brake unit. Remove coiled hydraulic pipe from outlet fitting on hydraulic cylinder and from tee connector. Disconnect pushrod from pedal and wires from stoplight switch. Remove nuts from U-bolt retaining pedal pivot bracket to steering column; remove pedal and pivot bracket (with stoplight switch assembly attached). Remove accelerator pedal. Push rubber grommet up on steering column and move floor mat out of way. On Synchro-mesh cars, remove clutch pedal seal retainer and steering column seal retainer and remove seals. On Hydra-Matic equipped cars, remove screws retaining mounting plate to floor pan and remove mounting plate with power brake unit attached. On Synchro-mesh cars, remove screws retaining power brake unit to mounting plate (brake will rest on frame). Remove screws retaining mounting plate to floor pan and remove mounting plate, "jockeying" as necessary to clear clutch pedal. Remove power brake unit. *(CAUTION–Do not support or carry brake unit by pushrod since pushrod may be pulled out of plunger).* Remove mounting plate from brake unit, if not previously removed, and remove vacuum hose from vacuum cylinder inlet tube.

DISASSEMBLY: *CAUTION–Use extreme care to prevent hydraulic system parts coming in contact with mineral oil or grease.* Clean all dirt from outside of unit, using care not to allow dirt or solvent to enter unit. Remove fluid filler cap or dipstick and gasket then empty fluid out of reservoir. On Lincoln, remove screw that secures heat shield to booster body, remove shield by sliding it off hydraulic cylinder.

►*CAUTION: Before further disassembly, scratch alignment marks at the following points: (1) Vacuum cylinder shell and vacuum cylinder end plate. (2) Vacuum cylinder shell and hydraulic cylinder casting. (3) Reservoir cover and hydraulic cylinder casting. (4) Tube fitting and hydraulic cylinder casting.*

Hydraulic Unit: Place hydraulic unit in vise (lead jaws) at its normal mounting angle and remove the six cover screws, cover and gasket. Using a 1 1/8" (thin-wall) socket wrench, unscrew and remove compensator port and valve assembly. Remove rubber seal ring from port fitting. Unscrew hydraulic output fitting and remove fitting and take off rubber seal ring. Remove check valve assembly and valve spring. Separate check valve rubber cup and cup retainer. Remove unit from vise and empty remaining fluid. *NOTE*–Master cylinder piston assembly will be removed after vacuum cylinder is removed from hydraulic cylinder casting.

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BENDIX POWER UNIT (C ntinu d)

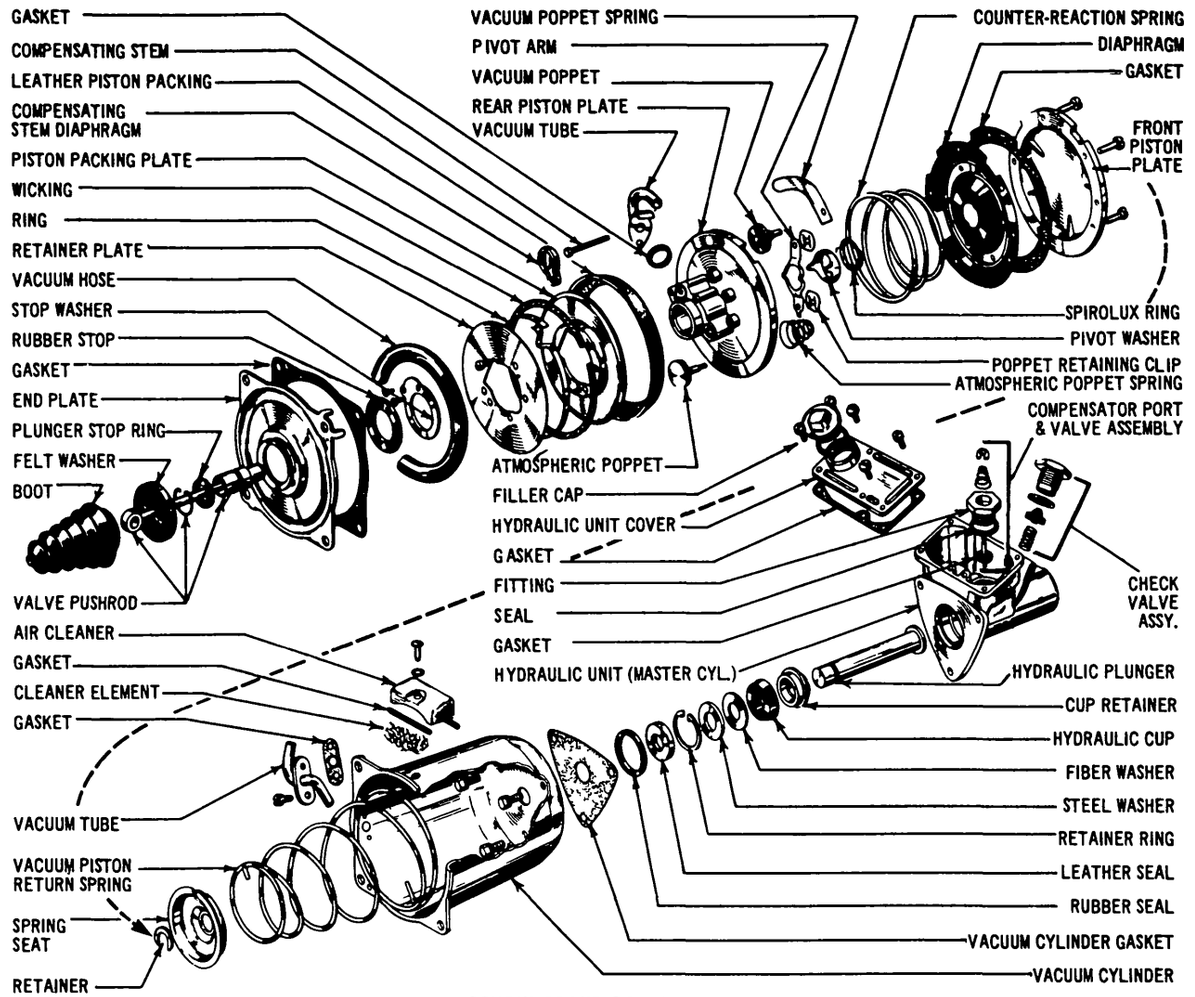
Vacuum Unit: 1) Replace unit in vise. Release lip of valve rod boot from cylinder end plate and slip boot and felt off over end of rod. Bend up two tabs on end plate and separate end plate and end plate gasket from cylinder. Slide vacuum hose off vacuum tube attached to vacuum cylinder. Remove air cleaner screw and separate screw gasket, shell, hair and rubber seals from vacuum cylinder. Remove two vacuum tube attaching screws, vacuum tube and gasket. *(CAUTION–* Inspect inner surface of vacuum cylinder under holes for burring from attaching screws. Remove burrs to prevent damage to power piston assembly). Pull out piston assembly from vacuum cylinder.

2) Compress piston return spring about ½" and remove the return spring seat retainer, spring seat and return spring. Remove the three vacuum cylinder mounting bolts and lockwashers. Remove vacuum cylinder, gasket rubber seal ring and metal encased leather seal from hydraulic cylinder casting. Using special pliers, next remove master cylinder piston cup washer retainer ring and lift the master cylinder piston and seal parts as a unit from the hydraulic cylinder. *(CAUTION–* Protect polished surfaces of master cylinder piston). Remove the steel backup washer, phenolic guide washer, cylinder piston seal and seal retainer from the master cylinder piston.

Vacuum Piston Stop, Compensating Stem & Vacuum H se: Remove vacuum hose from piston tube. Remove tube screw and separate tube and rubber seal from piston assembly. Visually inspect condition of rubber stop. If there is no evidence of wear or damage, remove screws and remove steel stop washer with rubber stop attached. If rubber stop warrants replacing, separate stop from steel washer before removing steel washer Remove compensating stem diaphragm and compensating stem.

Vacuum Piston, Valve Pushrod & Plunger: Hold rear piston plate assembly in vise using care not to damage surface at vacuum tube port Loosen five piston plate screws and separate front piston plate, gasket, diaphragm assembly and counter-reaction spring from rear piston plate assembly Remove vacuum poppet spring screw, spring from rear piston plate. Using pliers, remove atmosphere poppet retaining clip. Break clip, if necessary, to remove from poppet stem Separate atmosphere poppet spring and atmosphere poppet from piston plate. Remove pushrod and plunger, and vacuum poppet assembly from piston plate From groove in bore of piston plate, remove plunger stop ring. Using sharp tool under end of Spirolox ring, remove ring from groove at end of plunger Separate pivot washer and pivot arm from plunger. Remove clip and separate vacuum poppet from pivot arm From recess around plunger remove flat rubber seal.

Rear Pist n Plat Packing & Plates–Place rear piston plate on bench, with packing and plates facing upward. Remove six retainer plate attaching screws, retainer plate, ring wicking, piston packing plate and leather piston packing.



BENDIX BRAKE POWER UNIT

CLEANING & INSPECTION: Thoroughly wash all parts in diacetone alcohol. Use air hose to blow dirt and cleaning fluid out of recesses and internal passages. Remove rust or corrosion from bore of vacuum cylinder shell with fine emery cloth. Place all cleaned parts on clean paper or cloth to prevent possibility of dirt being assembled into power brake. Inspect all parts for wear or damage and replace as necessary. Particular attention should be given to following items:

Vacuum Cylinder Shell: Inspect shell for scores, pits, dents or nicks, or damaged threads in nuts or in mounting flanges

Hydraulic Cylind r Casting: Examine bore down one inch from open end. For the hydraulic cup to seal properly, this portion of bore must be free from scores, deep scratches or corrosion. The sealing surfaces at the reservoir cover, compensating port, and hydraulic outlet port must be free of scoring, pitting, dents and nicked edges. Also check casting for cracks and damaged threads

Hydraulic Port Fitting: The surface at the small end of the fitting must be free from scoring or corrosion which might prevent sealing with rubber cup of residual check valve.

Compensating Port Fitting: Inspect surface around port opening, inside threaded end of fitting, for scoring or corrosion which might prevent proper seating of compensating valve.

Valve Supply Tub : Make sure tube braze is secure and that tube plate is not distorted.

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BENDIX POWER UNIT (C ntinu d)

Pist n Plates· Examine plates for cracks and damaged threads Inspect plunger bore in rear piston plate and poppet seats for scratches and nicks **Do not** attempt to refinish bore Replace with new plate, if necessary

Hydraulic Plunger & Washer Assembly Inspect polished surface for scores, pits, or dents **Do not** attempt to refinish plunger surface Replace with new assembly, if necessary

Pushrod & Plung r Assembly Rod must pivot freely in plunger without any noticeable end play Inspect plunger for scores, pits, or dents on outside diameter of polished surfaces **Do not** attempt to refinish plunger surface Replace with new assembly, if necessary

Vacuum Cylinder End Plate Examine for distortion

REASSEMBLY· Before reassembly, make sure working area, parts, and tools are free of dirt, grease and oil

Comp nsating Valv Insert stem of valve poppet assembly through hole in threaded end of fitting Assemble large coil of poppet spring to fitting over end of poppet Hold poppet on seat, compress spring, and insert "C" washer retainer in groove at end of stem Crimp ends of "C" washer together to retain in place Coat rubber seal with brake fluid and assemble over threads of fitting

Mast r Cylinder 1) Coat residual check valve rubber seal with brake fluid and place over threads of hydraulic outlet fitting in inverted position, and insert cone end of cup and retainer assembly in end of fitting Center check valve spring in recess of rubber cup Hold master cylinder casting upside down and thread outlet fitting into hydraulic cylinder Tighten to 50 ft lbs

2) Insert washer end of plunger into cylinder Place cup retainer on plunger so that smaller inside diameter of retainer is toward plunger washer Coat hydraulic cup with brake fluid and place over plunger, lip on cup must be toward cup retainer Place Spauldite guide washer against cup Place steel washer against guide washer Slide all parts into bore of cylinder *CAUTION*–Use care so as not to cut cup when placing on plunger and when inserting cup into bore of cylinder It will be necessary to use a small screwdriver or similar tool having a smooth edge to start lip into bore

3) Press parts into cylinder bore and insert snap ring using snap ring pliers Be sure snap ring is engaged in recess Push in on hydraulic plunger and then install compensating valve assembly into master cylinder Pull back on plunger **to be sure** plunger washer tilts compensator valve Tighten fitting to 15 ft lbs Place cover gasket on reservoir of cylinder Align cover scribe marks and replace cover screws, with exception of rearmost screw on right hand side Re-place filler cap or dipstick gasket, screw filler cap into cover or replace dipstick

Rear Pist n Plate Packing & Plates· Place piston assembly flat on work bench inside of piston assembly ring Place leather packing against piston with lip up Place packing plate inside leather packing, with beveled edge of plate down against packing, so that "cutouts" and holes in plate are aligned with piston Coil wicking inside lip of leather packing. Cut wicking to required size Remove wicking and dip in vacuum cylinder oil, let excess drip off and reinstall wicking Coil expander ring inside wicking with barbs pointing upward into wicking Engage notch at loop end of ring with hook at opposite end Replace and align wicking retainer plate Replace screws and tighten evenly

Vacuum Piston, Valve Pushrod & Plunger· 1) Place stem of vacuum poppet in hole at rounded end of pivot arm and install two retaining clips making sure that clips are pushed down against pivot arm A piece of bar stock with 1/8′ hole in end, or piece of brake pipe with flared end, facilitates installation Place rubber seal in recess of pushrod plunger with lip of seal toward pushrod Coat plunger with Lubriplate, place into bore of rear piston plate and engage snap ring in recess in bore of piston plate Place pivot arm vacuum poppet sub-assembly over end of plunger, insert pivot washer and engage Spirolux ring into groove at end of plunger (Engage end of ring in groove and then screw into place) Place vacuum poppet spring into recess of piston plate and with end of spring over end of vacuum poppet stem, insert screw Place atmospheric poppet spring between pivot arm and piston plate with large coil of spring towards atmospheric port From opposite side of piston plate, place atmospheric poppet so that stem passes through plate, spring, and hole in pivot arm Install retainer clips on stem of poppet in same manner as before A length of round rod with a flat end can be used to back up atmosphere poppet when installing clips

2) Clamp rear piston plate assembly in vise and screw guide pins into place Place large end of counter-reaction spring in piston plate Place diaphragm over guide pins so that by-pass holes and notches in diaphragm and plate are aligned *NOTE*–When by-pass holes and notches are aligned, correct side of diaphragm will be toward piston plate

3) Move diaphragm downward until it seats on spring When properly seated, flange of metal ring will be within counter-reaction spring Place gasket and front piston plate over guide pins, making sure by-pass holes and notches are properly aligned

4) Apply force on front piston plate to compress counter-reaction spring until front piston plate rests on rear piston plate Loosely install two screws Remove guide pins, one at a time, and install remaining three screws, Tighten all screws evenly

Vacuum Piston Stop, Compensating Stem & Vacuum Hose Place vacuum poppet compensating stem into hole in recess in hub of piston plate Place compensating stem diaphragm in recess with "by-pass" slot of diaphragm outward and tab to left (when slot is toward you) Place steel stop washer over pushrod, align washer with hub of piston, replace two screws and tighten securely Soften coating of rubber stop (if stop was removed) with gasoline and cement to steel washer Position rubber seal in recess of piston, hook plate of tube to piston plate and replace screw, tighten screw securely. Attach vacuum hose to tube and coil hose around hub of piston

Vacuum Cylinder· 1) Pull out hydraulic plunger, place Plunger Seal Installer (J-5405) over end of plunger, and assemble leather seal over seal tool with lip of seal toward master cylinder. Press seal into recess of master cylinder and then remove tool from plunger Place rubber seal into master cylinder recess around leather seal. Align vacuum cylinder to master cylinder, and with gasket in place, insert three capscrews (and lockwashers), tighten to 6 ft. lbs

2) Place larger end of vacuum piston return spring in vacuum cylinder making certain hook on spring is between a screw head and a raised projection on end of cylinder Assemble retainer plate over end of spring, aligning notch with hook on spring Compress spring, and with retainer plate over end of plunger, insert "C" washer into groove of plunger.

3) Apply thin film of vacuum cylinder oil to bore of vacuum cylinder and to lip of leather packing, insert piston into cylinder so that free end of vacuum hose is in line with center of hole. Push piston into cylinder, adjusting position slightly until hook seats between two web sections of front piston plate. Move piston 20-25° in both directions in cylinder and stroke piston against spring several times by hand, to allow piston to find its normal operating position. Check location of end of hose with respect to center of hole in cylinder. Install tube and gasket and replace two screws. Slide end of hose onto vacuum tube approximately 5/8". Operate piston by hand through its full stroke several times to make certain that hose does not rub against cylinder or piston. Should interference occur, remove and rotate piston to a new web position where interference does not occur.

Air Cleaner & End Plate· Place two rubber seals on bottom edges of air cleaner shell. Place hair in shell. Replace screw and gasket and attach air cleaner shell to vacuum cylinder. Be sure hair is under shell, a small steel scale or similar tool can be used to push hair under ends of shell. Align end plate gasket and end plate and place against vacuum cylinder. Bend over two tabs of end plate to secure plate to cylinder. Install rod guard felt in large end of boot. Dip small end of boot in brake fluid and place boot and felt over pushrod. Attach lip of boot to scallops at center of end plate.

INSTALLATION: To install power brake assembly reverse removal procedure and note the following

Hudson & Nash: To prevent any contact during operation, a minimum of ¾" clearance must be maintained between centerline of pushrod-to-bell crank clevis pin and outer surface of front adjusting link locknut.

Pontiac: There should be approximately 1/8" clearance between pushrod and bore of plunger at top or 12 o'clock position with brake pedal released If improper clearance noted, loosen brake pedal pivot bracket and shift slightly to obtain clearance. *NOTE*–If clearance cannot be obtained, check for bent pushrod or bent mounting plate.

HYDROVAC POWER UNIT

Buick (1956 Opt.)
Chevrolet Trucks (1956)
Ford Trucks (1956)
Studebaker (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 CHEVROLET TRUCK HYDROVAC POPPET VALVE PRODUCTION CHANGE:* Repair Kit No. 2214318 consisting of large poppet valve, small poppet valve, lead gasket and screw, when installed, eliminates the need to replace Hydrovac control cover and poppet valve as an assembly, when poppet valve failure is encountered.

Removal & Installation – 1) Remove poppet valve by inserting an offset open end wrench or small pry bar behind the large poppet valve to pry out rivet retaining smaller valve, or support valve body on two wood blocks and drive out poppet shaft with punch.

2) Assemble above parts, being sure lead gasket is behind small poppet, before starting screw into large poppet.

3) Hold shaft with pair of thin offset pliers and tighten screw securely.

DESCRIPTION: Bendix HYDROVAC Power Unit is connected in hydraulic brake line between master cylinder and wheel cylinders (no mechanical connection).

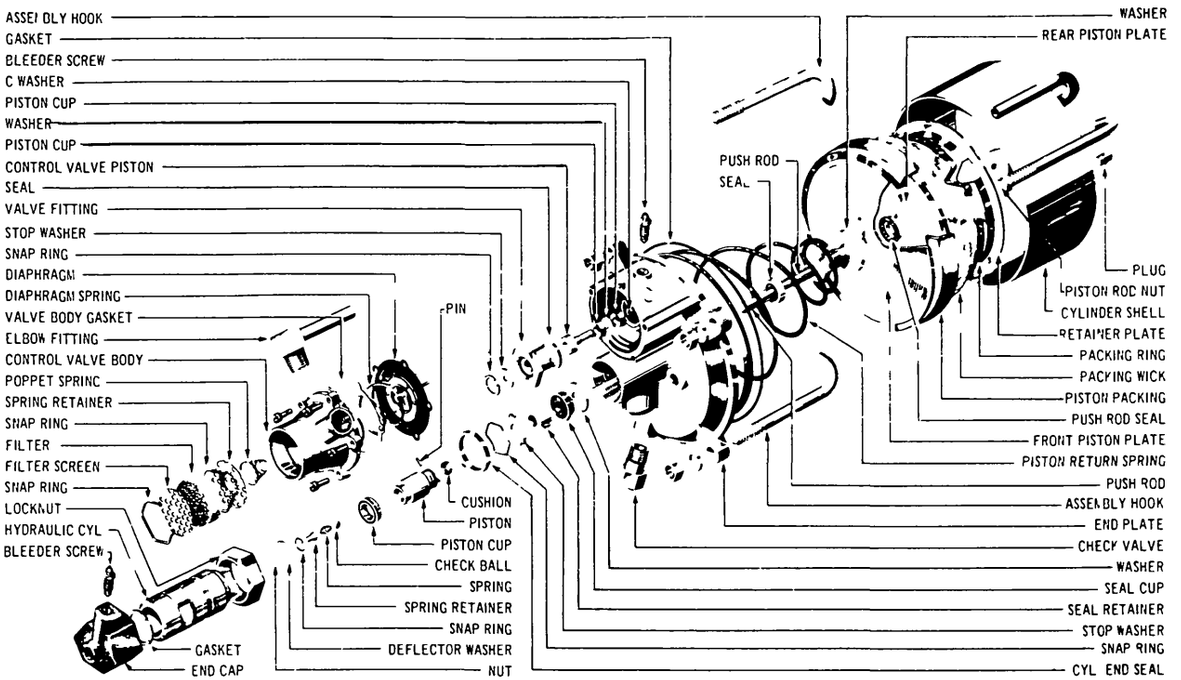
OPERATION: As brake pedal is depressed, hydraulic pressure developed in master cylinder is transmitted to power brake hydraulic cylinder and to hydraulic piston in vacuum control valve. As hydraulic piston in power brake hydraulic cylinder is against stop washer when pedal is first depressed, check ball in piston is held off its seat by piston yoke. This allows fluid from master cylinder to pass through piston directly to wheel cylinders. This feature permits normal operation of brakes when engine is not running. Fluid under pressure is also directed to hydraulic piston in vacuum control valve. As fluid pressure moves this piston, it actuates vacuum diaphragm control shaft and forces diaphragm against vacuum poppet valve sealing off atmospheric side of diaphragm from manifold vacuum. Continued movement of piston and diaphragm forces atmospheric poppet valve off its seat and admits air under atmospheric pressure to vacuum piston.

BLEEDING BRAKES *(CAUTION – This operation must be done with engine stopped and no vacuum in the power brake system).* Attach bleeder hose to bleeder valve on control body, keep end of drain hose below surface of fluid in drain jar. Loosen bleeder valve ½-¾ turn. Depress brake pedal slowly by hand to expel air. When pedal has reached toe board, close bleeder valve before returning pedal to released position. Repeat this procedure until air bubbles cease to appear at the end of the bleeder drain hose in the jar and the stream is a solid fluid mass, then tighten bleeder valve and remove drain hose. *(NOTE* - **During the operation the brake master cylinder must be filled with fluid).** Following above procedure, bleed at bleeder valve on end cap of hydraulic cylinder, then proceed to bleed wheel cylinders in the usual manner.

LUBRICATION: Remove screw plug on front end of vacuum cylinder and fill cylinder to level of hole (Studebaker 1 oz.) with Delco Shock Absorber Fluid or Bendix Hydraulic Cylinder Fluid as follows:

Chevrolet– Every 10,000 miles, or each 6 month period, especially just ahead of cold weather.

Ford & Studebaker– Once yearly or every 20,000 miles.



HYDROVAC BRAKE POWER UNIT

TROUBLE SHOOTING· Before trying to determine cause of trouble, make certain that master cylinder reservoir is full, that brake system is free of air, that there are no binds in the brake linkage, that there are no air or fluid leaks to the master and wheel cylinders Then proceed as follows

Hissing Sound (Engine Running), Brakes Either On or Off: Caused by external leak on vacuum side of control diaphragm. Check and correct leak at control valve body, diaphragm, and gasket to end plate. Check and correct leak between vacuum cylinder and end plate

Hissing Sound (Engine Running), Greater When Brakes Off: Caused by external leak on atmospheric side of control valve diaphragm. Check and correct leak at atmospheric poppet, external pipe and rubber tubing, and valve body screws

Hissing Sound (Engine Running), Brakes On: Caused by internal vacuum leak, air entering through breather. Overhaul unit and check for leak at vacuum poppet, control diaphragm, or vacuum power piston.

Little or No Boost From Power Brake (May be Accompanied by a Hissing Sound or Loss of Brake Fluid):

1) Internal vacuum leak between atmospheric and vacuum side of power piston Overhaul unit, and check for leak at vacuum poppet, control diaphragm, or vacuum power piston

2) Internal hydraulic leak Check for low brake fluid level. Overhaul unit and check for presence of brake fluid in inner side of vacuum cylinder, or inner side of control diaphragm Check and correct leaks at control valve cup, control valve fitting "O" ring seal, vacuum piston push rod seals, or hydraulic power piston cup or ball check

3) External hydraulic leak Check and correct leak at point of origin

4) Internal friction Check and correct shock absorber fluid level in vacuum cylinder. If necessary, overhaul unit and check for rusty, dirty, or distorted vacuum cylinder wall, dry or worn vacuum piston leather packing swollen rubber cups due to heat or wrong brake fluid, worn or damaged rubber cups, or dirt, rust, sludge, or foreign matter in power piston or control valve regions.

Booster Loses Effectiveness Whil Stopping (Pedal dr ps und r f t. May sh w up as slow op ration f p w r brak): Caused by internal hydraulic leak or internal or external vacuum leak. Overhaul unit and check for leaks at control valve, valve fitting, power piston, vacuum poppet, control diaphragm, or vacuum power piston Check for sticking power piston, or restricted air cleaner (if so equipped)

Tendency To Over-Brake (Pedal dr ps und r f t. May sh w up as slow op ration f p w r brak): Restriction in atmospheric passage or sticky control valve. Clean air filter for restriction in atmospheric passage. If necessary, overhaul unit and check for misalignment of control valve assembly Check for dirty or sticky

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HYDROVAC POWER UNIT (C ntinued)

vacuum or atmospheric poppet, as well as sticky control valve. NOTE—Above condition may also be caused by internal hydraulic leakage or internal friction. To correct, overhaul unit and check for leak at hydraulic power piston cup or ball check. Check for binding in power piston assembly. Check level of lubricant in vacuum cylinder.

Brak s Sl w t R l as (r fail to release completely): May be caused by sluggish control valve action or internal friction. Overhaul unit and check for weak vacuum power piston return spring or atmospheric poppet return spring. Check for dirty or sticky control valve. Check for power cylinder lubricant level. If necessary overhaul unit and check for binding in power piston assembly.

N P w r Assist (n first application after engine shut ff): Caused by an external vacuum leak or an internal vacuum leak in the check valve. Check and correct external leaks at valve body, external pipe, vacuum cylinder, and atmospheric poppet. For the internal leakage, overhaul or replace check valve assembly.

Brak s Apply Wh n Engin Started: Caused by broken or improperly assembled atmospheric valve return spring or control valve diaphragm return spring, sticking control valve piston.

Air in Hydraulic System: Caused by an improperly assembled, defective or missing control valve piston secondary cup.

Grabbing Brakes: Caused by sticking control valve piston or sticking power piston.

L ss f Fluid fr m Brak System: Caused by defective hydraulic cylinder cup or seal, defective or damaged control valve piston cup (crack or split in lip at center of cup), dirt chips or other foreign matter under lip of piston cups, improperly tightened or defective gaskets or rubber seals.

Power Unit Fails t Op rate: Low or no vacuum due to clogged or restricted lines, defective check valve, clogged air filter (if so equipped).

REMOVAL OF POWER BRAKE UNIT: Disconnect brake lines at cylinder end plate. Loosen vacuum line hose clamp at check valve and slide hose off. Remove three nuts and lockwashers from cylinder mounting bracket and remove unit from car. *NOTE*—Ford and Studebaker have stop light wires that must be disconnected before unit is removed.

DISASSEMBLY OF POWER BRAKE UNIT: When disassembling Power Brake use care in handling parts to prevent their coming in contact with mineral oil or greases. Do not handle hydraulic cups and seals with greasy hands.

Hydraulic Cyl. Assembly 1) Loosen hydraulic cylinder nut and unscrew hydraulic cylinder assembly from end plate. Hold end cap in a vise and remove hydraulic cylinder from cap using an open end wrench on the flat part of cylinder. Remove gasket and bleeder fitting from end cap.

2) **On Ch vrol t Trucks and Stud bak r,** remove bolt holding hydraulic line end connection to end cap and remove fitting and copper gaskets. Scribe line on cylinder shell and end plate so these parts can be reassembled in their original positions. Loosen hook bolts and remove cylinder shell, sliding tube out of rubber hose.

3) **On Chevrolet Trucks and Ford,** remove residual check valve snap ring. Remove spring seat, spring and residual check valve. Loosen hook bolts and remove cylinder shell, sliding connector out of rubber hose.

4) **On all cars,** compress piston spring by pressing down on end plate. Hold piston in position with Vacuum Piston Retaining Strap, Tool J-5650 (two wire hooks and a plate can readily be made to hold piston in position). Remove hydraulic piston assembly from pushrod by holding retaining spring back and removing small pin. Remove hydraulic piston cup from piston, remove snap ring, retainer, spring, and ball. Remove hydraulic cylinder and seal. Remove snap ring, then remove pushrod seal cup parts. Drive out pushrod leather retainer with a flat end rod or drift.

Vacuum Control Valve Assembly: 1) Scribe control valve body and end plate to insure proper location on reassembly. Remove control valve body screws and remove control valve assembly with diaphragm and gasket. Remove diaphragm from control valve body.

2) **On Studebaker,** remove air intake filter snap ring, screen and filter, and take out lower snap ring and screen.

3) **On Chevrolet and Ford,** remove snap ring which retains cover on control valve and poppet assembly and remove cover, valve spring and gasket,

4) **On all cars,** remove hydraulic control valve fitting from end plate. Push piston out of fitting and remove cups from piston (washer between cups on Chevrolet and Studebaker). Remove seal, retainer ring, and stop washer from fitting.

Vacuum Piston: Remove nut from threaded end of push rod, retainer plate, packing, and expander ring. Remove small diameter piston plate with rubber seal ring. Remove leather packing, larger diameter piston plate, and washer from push rod.

Vacuum Piston Pushrod Assembly (Ford): Remove pushrod lock ring from groove in piston guide. Remove spring washer, then lift out pushrod, spring, bottom spring washer, and bottom lock ring.

Vacuum Piston Pushrod Guide (Ford): Clamp hexagonal section of guide sleeve in a vise. Remove guide sleeve to body gasket, washer, and nut. Loosen outer locknut, then remove assembly from vise. Remove locknut, gasket, and guide sleeve. Remove piston guide by drawing it into cylinder shell.

Check Valve (Studebaker): Remove assembly, from elbow in end plate. Remove plug from bushing and bushing from check valve assembly. Remove snap ring, spring retainer, and spring with check ball. Remove spring from check ball.

REASSEMBLY OF POWER BRAKE UNIT: Before reassembling unit, clean all parts thoroughly, and after cleaning, wash all parts for hydraulic system in alcohol. Be careful not to get grease or oil on hydraulic parts. Use new rubber seals and cups when reassembling.

Vacuum Piston: (*NOTE*—An assembly ring can be made by cutting a 1" section from end of a power cylinder). Place front (larger) piston plate in assembly ring with lip down. Place new leather packing on plate with lip up, place new rubber seal in center of plate. Install rear (smaller) piston plate with lip down. Coil new wick inside lip of packing and cut it to proper size. Soak wick in cylinder oil (not ordinary oil) and allow it to drain thoroughly. Install wick. Place packing ring inside wick with gripper points up, and engage notch at loop end of ring with hook at opposite end. Install wick retainer plate with cutout portion over loop of expander ring. Place flat washer over threaded end of pushrod (guide rod on Ford), insert pushrod (guide rod) through assembled piston parts, being careful not to damage inner seal ring. Large piston plate should rest against flat washer. Clamp hex on pushrod (guide rod) in a vise, being careful not to damage polished surfaces. Install nut and tighten securely, being careful not to allow either piston plate to rotate while nut is being tightened. Remove assembly ring. Stake nut with center punch.

Pushrod Assembly (Ford)—Clamp hexagonal section of guide rod firmly in a vise. Assemble pushrod attaching parts over beveled end of pushrod in following order: Lock ring, one spring retainer, spring (large end first), second spring retainer, snap ring (smaller). Use care in assembling smaller diameter snap ring in groove at lower end of pushrod, to avoid distorting ring. Insert end of pushrod in recess at end of guide rod. To attach pushrod to guide rod, compress spring and assemble to lock ring in groove of guide rod. Be sure lock ring is firmly seated in groove of guide rod.

Vacuum Control Valve Assembly: 1) Install stop washer and retainer ring in hydraulic control valve fitting.

2) **On Chevrolet and Studebaker,** dip piston cups in brake fluid and install on piston with washer between cups. Install C-washer. Lips of both cups must point away from end of piston with hole in it.

3) **On Ford,** install new rubber cups on piston with lip of cups toward small end of piston.

4) **On All Cars,** install piston in fitting with hole in end of piston next to stop washer. Install a new rubber seal gasket in groove in fitting. Install fitting in end plate and tighten securely.

5) **On Studebaker,** install poppet return spring with small end down, retainer and snap ring in control body. Install new filter, screen and outer snap ring.

6) **On Chevrolet and Ford,** install poppet return spring with small end down, gasket, end cover with air inlet tube, and secure in place with snap ring.

7) **On all cars,** place guide pins in control valve body screw holes in end plate (Guide pins can be made by cutting heads off three 8-32 x 2½" machine screws). Install gasket diaphragm, diaphragm spring (if so equipped), and control body on guide pins allowing cylinder tube to slide into connecting hose. (*CAUTION*—When assembling diaphragm, spring, and control valve body, extreme care should be taken not to distort the diaphragm when compressing the spring). Remove guide pins one at a time and install screws and lockwashers. Install hose clamps.

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HYDROVAC POWER UNIT (Con.inued)

Hydraulic Cylinder Assembly: 1) Install new pushrod leather seal into end plate with lip of seal toward hydraulic cylinder side of end plate. Place end plate on bench and install stop washer with chamfered side down. Install seal cup, with lip up and seal retainer with counterbored side next to cup (Studebaker); flat side next to cup (Chevrolet & Ford). **On Ford and Chevrolet,** next install spring with small end toward bore end of plate. (No spring on Studebaker). **On All Cars,** next install stop washer and install snap ring in groove.

2) Place vacuum piston return spring over pushrod with small end of spring next to piston, carefully guide pushrod through seat in end plate. Compress spring. Use vacuum piston retaining strap or hook clamps to hold end plate and the cylinder together. Install ball, spring, retainer and snap ring in piston. **On Studebaker,** install deflector washer and nut.

3) Dip hydraulic piston cup in brake fluid and install in groove with lip of cup toward check valve end of piston. Dip hydraulic piston in brake fluid and assemble piston on pushrod. Install retaining pin in hole in piston and rod. When pin is in position, retaining spring will hold it in position. Place end cap in vise and install bleeder screw, end cap gasket, hydraulic line connector with copper gaskets and retaining bolt.

4) **On Chevrolet Trucks and Ford,** install residual check valve spring, spring seat, and snap ring.

5) Thread hydraulic cylinder into end cap with milled flats next to end cap, and securely tighten cylinder. Thread check nut on cylinder to limit of threads. Install hydraulic cylinder end seal against shoulder in end plate. Guide lip of piston cup into cylinder carefully, and threaded cylinder into end plate until cylinder bottoms firmly against end seal. Tighten cylinder until bleed screw on end cap is aligned with bleed screw in end plate and tighten check nut securely.

6) Remove piston retaining strap or clamps. Place rubber gasket in groove on end plate. Saturate cotton wicking by dipping vacuum piston in Shock Absorber Fluid, and allow excess oil to drain off. In addition, coat inside of cylinder shell lightly with shock absorber fluid. Insert piston into shell by tipping piston and gradually working it down into shell. Align scribe marks on shell and end plate (if made) and attach hook bolts. Tighten each bolt evenly until all bolts are uniformly tight.

Check Valve (Studebaker): Install end of spring over check valve ball. Install spring retainer plate with depression in plate in end of spring, install snap ring. Install plug in check valve body. Install fitting in bushing and install valve assembly in elbow on end plate.

INSTALLATION OF POWER BRAKE UNIT: Position power brake unit on mounting bracket and install lockwashers and nuts. Connect vacuum hose to check valve on power brake and tighten hose clamp. Connect brake line fittings to end plate. **On F rd and Stud baker,** connect stop light wires. **On all cars,** bleed system (see above).

MORAINE POWER UNIT

Buick (1956) ①
Cadillac (1956) ②
Oldsmobile (1956) ②
Pontiac (1956) ②

① - Hydrovac Power Unit also used.
② - Bendix Power Unit also used.

►CHANGES, CAUTIONS, CORRECTIONS

►*1955-56 BUICK SLOW PEDAL RETURN OR FAILS TO RETURN TO NORMAL POSITION:* This is caused by vacuum leaks in power brake cylinder, that are the result of any one of three conditions that follow.

1) Broken Air Valve. To check for broken air valve, push in on pushrod to separate valve and piston assembly from power piston, and gently move end of air valve (covered with rubber boot), sideways. Excessive movement indicates broken valve. *CAUTION* - Excessive pressure sideways will break a good valve.

2) Punctured Vacuum Hose. Replace with new hose.

3) Weak Inner Piston Return Spring. Valve & Piston assembly (small piston) not returning to unapplied position completely, causing vacuum leaks between valve reaction plate to piston seal and power piston (large piston). To correct install new inner piston return spring Buick No. 5455800. *NOTE* - New spring has greater length with larger coil diameter than first type spring. To install, remove power brake cylinder from car, mount it in vise (do not crack cylinder by overtightening vise), with hydraulic cylinder down. Remove pushrod boot and retainer from cover, air cleaner assembly, two housing cover screws, cover and gasket. Hold power piston down, disconnect vacuum hose from tee, remove tee and gasket from housing. Slowly release power piston. *NOTE* - Make sure lip of leather piston does not catch in holes in housing. Remove center return spring (valve and piston return spring) and replace it with new spring No. 5455800. Center new piston return spring in cylinder housing, then large return spring around it with its smaller end down. Locate bent end of spring wire between one of bolt heads and adjacent dimple in housing. Place power piston with attaching parts on large return spring so bent end of spring wire rests between two round bosses on piston guide. Locate piston so side of boss opposite vacuum hose clears vacuum tee hole in housing by ¾". Push power piston down in cylinder entering hydraulic piston in hydraulic cylinder and hold piston down while installing vacuum tee with gasket and two screws. Push vacuum hose on tee 5/8". Push power piston down to check for free operation and proper location of springs, then install gasket and cover on cylinder housing with two screws. Install filter assembly and rubber boot, and install power unit on car.

►*1956 CADILLAC BRAKE PEDAL LINKAGE BIND CAUSING BRAKE DRAG:* Binding can exist at brake rod to relay connection, pedal rod at toe-board hole, and pedal rod-to-felt air seal retainer. *NOTE* - Check level of pedal for correct horizontal position in car as viewed from seat, before making repairs to eliminate rod binding. Correct by shimming between attaching bracket and steering column support.

Pedal R d t To -board Hol - Secure 1/8" clearance on rod with pedal in applied position, by moving pedal attaching bracket at support mount, laterally or by enlarging hole in toe-board.

Pedal Rod at Felt Air Seal - Centralize seal around rod by removing one screw from retainer and rotating entire seal and retainer around other screw, and relocating first screw.

Brake Rod to Relay Connection - With brakes fully released, clevis pin should fit easily into clevis pin hole. Remove stock on upper edge of lower relay arm until clevis pin will enter freely.

DESCRIPTION· Self contained vacuum and hydraulic unit of same design as used on previous models beginning with 1955

CHECKING & ADJUSTMENT: Check all parts of power brake system before disassembling Power Brake Unit whenever brake trouble experienced.

Adjustments: No special adjustments required. Anytime brake pedal goes to within 1". from floor (floor mat to underside of pedal pad), brakes should be adjusted. At time brakes adjusted, make following inspections:

1) Check vacuum lines and connections between intake manifold, check valve, vacuum reserve tank, and vacuum power cylinder for possible vacuum leaks.

2) Check fluid level in master cylinder reservoir. See Lubrication below.

3) Check condition of air cleaner element and insert clean element, if necessary.

4) Check steering column pedal plate for loose screws. Check for free operation of brake pedal. If binding exists, check for misalignment between pedal and vacuum cylinder pushrod.

5) Check stop light switch for proper operation.

Bleeding Brakes: Bleed in same manner as for standard brakes. Do not use vacuum assist while bleeding. Engine should not be running and vacuum reserve should be reduced to zero by applying brake several times before starting bleeding procedure. *NOTE* - On Cadillac bleed master cylinder first by attaching bleeder hose to bleeder fitting on end of master cylinder and backing off fitting ¾ turn, and bleeding until brake fluid runs clear and free of bubbles Then proceed to each wheel cylinder.

LUBRICATION· Check fluid level in brake reservoir every 1,000 miles Refill to ½-1" from top of filler plug opening (Buick), within ¾" of top only (Cadillac), high enough to register on dipstick (Oldsmobile), ½" from top of filler plug opening (Pontiac).

PERIODIC SERVICE: Intake manifold tee connector should be removed and cleaned Spring and Fall or every 10,000 miles.

TROUBLE SHOOTING: Before checking Power Brake Unit for source of trouble check remainder of brake system.

Hard Pedal: 1) Vacuum failure due to faulty vacuum check valve, collapsed vacuum hose, plugged vacuum fittings, hose or pipes, leak between vacuum power cylinder and hydraulic master cylinder.

2) Bound up pedal mechanism.

3) Power Brake unit trouble—internal vacuum hose loose or restricted, jammed sliding valve, vacuum

CONTINUED ON NEXT PAGE

MORAINE POWER UNIT (C nt.)

leaks in unit caused by loose piston plate screws, loose piston packing, faulty master cylinder piston, vacuum seal, or leak between hydraulic master cylinder and vacuum power cylinder; defective diaphragm; restricted air cleaner.

Grabbing Brak s (Apparent Off-and-On Condition): Power Brake unit valve trouble—reaction diaphragm leakage, faulty rubber bumper pad in reaction diaphragm; sticking sliding valve reaction; restricted diaphragm passage; master cylinder piston binding in power piston guide.

P dal Goes t Fl or (Or Almost to Floor): Brake adjustment; fluid reservoir needs replenishing, power brake hydraulic leakage—defective primary or secondary cup, defective vacuum seal, defective head nut or head nut gasket, cracked master cylinder casting, leaks at wheel cylinders or in pipes, or in connections, defective "O" rings on cylinder plug.

Brak s Fail t R l as (Or Slow Release): 1) Bound up brake pedal linkage.

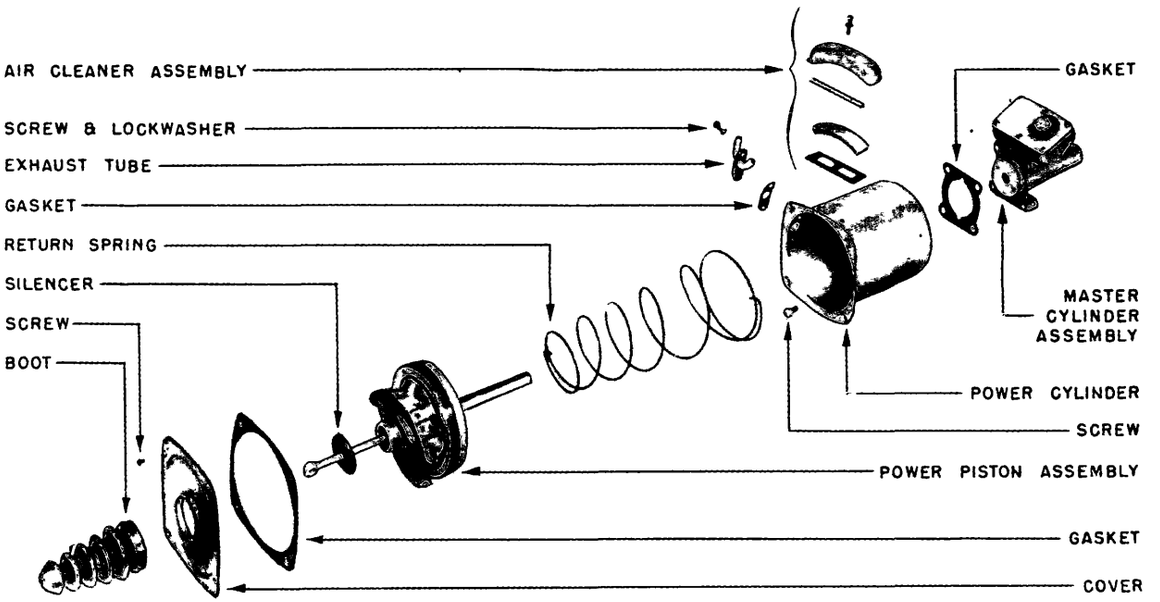
2) Weak brake shoe return springs, or rusty bosses on backing plate.

3) Faulty residual check valve, excessive hydraulic plunger seal friction, excessive piston packing friction, restricted air passage in vacuum piston, restricted air cleaner, sticky air valve, broken piston return spring, broken air valve return spring.

REMOVAL & INSTALLATION: Buick - Disconnect brake pipe from master cylinder, vacuum hoses from power cylinder, stop light wires from stop light switch. Place drip pan under reservoir and remove reservoir. Disconnect pushrod from brake pedal and remove pedal. Remove dash insulator retainer from pedal plate, remove retainer and push steering column seal up steering column jacket. Pull floor mat away, remove pedal plate to toe-pan screws, remove pedal plate and power brake unit from car together. To install reverse removal procedure, adjust brake pedal and bleed system.

Cadillac: Disconnect relay to unit rod at clevis. Disconnect relay rod from pushrod. Disconnect both vacuum hoses from power unit. Disconnect hydraulic line at outlet fitting. Remove four screws, lockwashers and nuts from cylinder mounting bracket and remove power brake assembly from car. To install, position power brake assembly on mounting bracket, install screws, lockwashers and nuts. Connect hydraulic line at outlet fitting, both vacuum hoses to check valve and tighten hose clamp. Connect relay rod to power piston pushrod and clevis and bleed lines.

Oldsm bil : Disconnect positive battery cable at junction block on right fender filler plate, solenoid lead wire (purple) from wiring harness, then pull cable through sleeve on power brake. Disconnect flex line at power brake master cylinder, disconnect leads from stoplight switch and fold back floor mat. Remove three brake pedal bracket attaching bolts, and remove bracket and pedal assembly. Remove mast jacket grommet retainer clip and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws, loosen speedometer cable hold-down clip and slip cable from under clip, then remove speedometer cable and grommet from mast jacket cover plate. Remove two cover plate to power cylinder bolts, and remove cover plate, while positioning power unit so it rests on edge of opening in toe-pan. Disconnect vacuum hose and remove power brake unit through toe-pan opening. *NOTE* - When reinstalling hose, position the clamp so screw head may be reached from below car. To replace, scrape off old sealing compound, then place 5/16" bead of medium bodied sealer around entire toe-pan groove and reverse sequence of operations. Fill master cylinder and bleed brakes.



MORAINE POWER BRAKE ASSEMBLY

Pontiac: Removal - Disconnect vacuum hose from vacuum pipe leading to vacuum tee connector. Raise car and remove engine side apron from left side. Remove coiled hydraulic pipe from outlet fitting on hydraulic cylinder and from tee connection. Disconnect pushrod from pedal, disconnect wires from stoplight switch. Remove nuts from U-bolt which retains pedal pivot bracket to steering column, remove pedal and pivot bracket (with stoplight switch attached). Remove accelerator pedal, and push rubber grommet up on steering column and move floor mat out of way. Then proceed as follows:

Synchro-mesh Cars - Remove clutch pedal seal retainer and remove seals. Remove screws which retain Power Brake Unit to mounting plate, (Brake will rest on frame). Remove screws which retain power unit to mounting plate to floor pan and remove mounting plate, "jockeying" as necessary to clear clutch pedal. Remove power brake unit.

Hydra-Matic Cars - Remove screws which retain mounting plate to floor pan and remove mounting plate with power unit attached. *CAUTION* - Do not support or carry brake unit by pushrod, since pushrod may be pulled out of plunger.

Synchro-mesh Installati n - With aid of an assistant to support and align brake unit from underside of car or under hood, position brake unit in car, place mounting plate over clutch pedal, position it against floor pan and install mounting screws. Align brake unit with mounting plate and install mounting screws. Replace clutch pedal and steering column seals and seal retainers. Complete installation as given under **Hydra-Matic** below.

Hydra-Matic Installation - Install mounting plate. Place mounting plate with bracket attached in position and install screws which retain mounting plate to floor pan. Replace steering column seal and retainer, brake pedal pivot bracket (with pedal and stoplight switch attached). *NOTE* - Brake pedal pivot bracket has tang which must fit in a hole in steering column. Install pushrod in pedal, fastening pin with hair-pin retainer. Attach anti-rattle spring around pushrod and connect to hole in brake pedal. Pull rubber boot back from vacuum cylinder so that pushrod can be observed when it enters vacuum cylinder. There should be 1/8" clearance between pushrod and bore of plunger at top 12 O'clock position. To correct clearance, loosen brake pedal pivot bracket and shift slightly. *NOTE* - If clearance cannot be obtained, check for bent pushrod. Connect stoplight switch wires and check for proper operation. Connect hydraulic pump and vacuum hoses. Fill hydraulic cylinder and bleed brakes.

OVERHAUL: *See "Moraine Power Unit" in 1955 Annual Data or later Manual edition and note the following.*

Bleeding Brakes: Cadillac has bleeder fitting at end of hydraulic cylinder. Bleed master cylinder first by opening bleeder valve ¾ turn and bleed until fluid runs clear and free of bubbles, then proceed to wheel cylinders.

Disass mbly, Cl aning & Insp cti n (Cadillac): Same as Buick.

R ass mbly (Cadillac): Same as Buick.

MIDLAND POWER UNIT

F rd Pass. Cars & Trucks (1956)
Thunderbird (1956)
NOTE - Hydrovac Power Unit also used on Trucks.

DESCRIPTION: Consists of a vacuum power chamber, hydraulically actuated vacuum control valve, and an hydraulic slave cylinder, all in a single sealed unit. Unit is mounted on left side of engine compartment and connected in hydraulic brake line between master cylinder and wheel cylinders. There is no mechanical connection and no adjustments are required

OPERATION: With engine running, brakes released, power diaphragm is vacuum suspended. Depressing pedal causes fluid to pass from master to slave cylinder, moving control valve piston, which admits atmospheric pressure to front of diaphragm. As pushrod moves, check valve seals fluid in slave cylinder and hydraulic line pressure builds up to operate brakes

REMOVAL & INSTALLATION: Depress pedal a few times to relieve vacuum. Remove lines and attaching bolts. To install, reverse removal procedure.

TROUBLE SHOOTING: Brake Pedal Kicks Back–Engine Running–Slave piston cups leaking, hydraulic check valve leak, intermittent vacuum leak in unit.

Loss of Fluid: Loose connections, master or wheel cylinders leaking, broken hydraulic lines

Brakes Do Not Release–Engine Running: Control valve piston sticking, hydraulic (slave piston) sticking, broken or weak control valve spring, dented or leaky diaphragm body.

Vacuum Leak With Brakes Released–Engine Idles Normally: Defective "O" ring seal or body-to-slave cylinder gasket, dirt or worn atmospheric valve seal, defective or dirty vacuum check valve.

Vacuum Leak With Brakes Released–Rough Engine Idle: Leaking diaphragm in vacuum chamber, leaking control valve piston or diaphragm, leaking control valve vacuum valve seal.

Hard Pedal–Indicating Inoperative or Weak Booster: Clogged air cleaner element, sticking hydraulic (slave) cylinder piston, air leak at atmospheric valve seal, control valve diaphragm, control valve piston, or power chamber diaphragm.

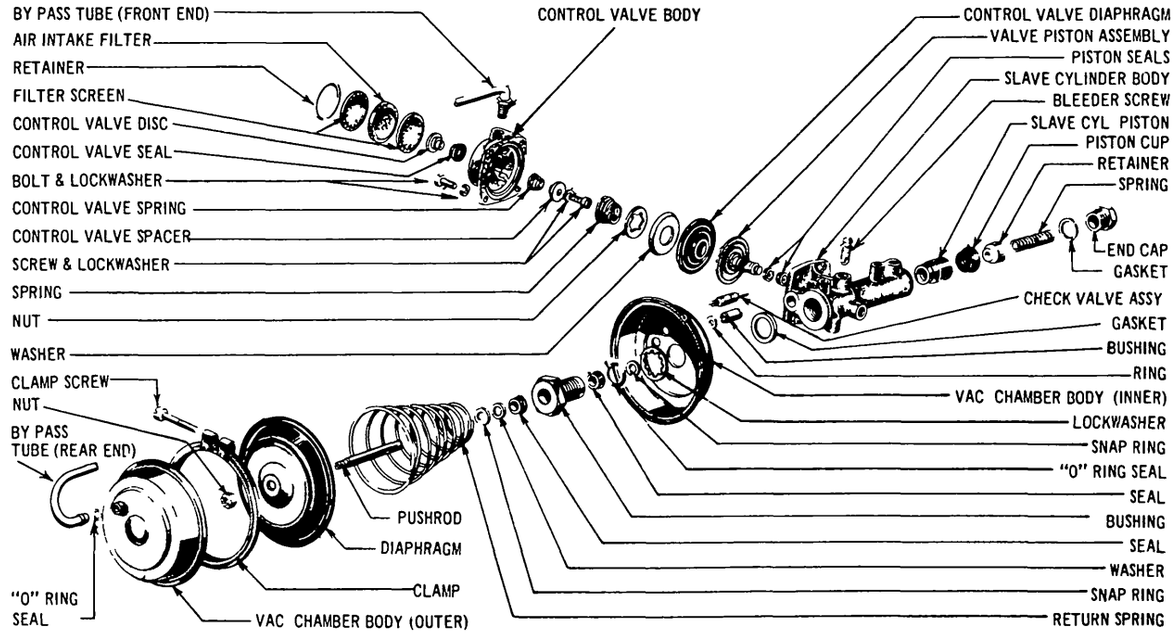
OVERHAUL: *TRUCK NOTE*–Do not remove breather in cab or controls mounted in engine compartment unless operating conditions indicate repairs are necessary.

Disassembly: 1) Remove control valve bypass tube from control valve and the body. Remove stop light switch. Mark both halves of body with a scriber, then mark flanges of control valve and slave cylinder so parts can be assembled in their original positions.

2) Remove clamp then remove outer body and the diaphragm and pressure plate assembly with return spring. Remove vacuum check valve from inner body.

3) Remove retainer and air intake hose fitting (or snap ring, screens, and filter) from control valve body. Remove control valve to slave cylinder attaching bolts and lockwashers. Lift the control valve body, diaphragm spring, and the control valve piston and diaphragm assembly from slave cylinder body.

4) Remove pushrod bushing, lockwasher, inner body, and gasket from slave cylinder body. Remove transfer bushing and "O" ring seal from cylinder body.



MIDLAND BRAKE POWER UNIT

5) Remove end plug or cap, gasket, return spring and retainer, from end of slave cylinder. Remove slave cylinder piston cup and piston from cylinder. Remove inner and outer pushrod bushing seals.

6) Remove inner and outer seals from control valve piston. Remove control valve diaphragm plate and retaining nut by prying inner tangs of nut away from piston shaft. Separate the control valve disc and spacer by removing attaching screw and lockwasher. Then remove disc, seal, spring, and spacer from control valve body Remove check valve retainer, check valve and return spring as an assembly from slave cylinder piston. Remove pushrod from diaphragm and disassemble check valve.

Inspection: Wash all metal parts in brake fluid and dry thoroughly Use air to dry all internal passages. Replace all worn or damaged parts and if slave cylinder bores or control valve plunger show wear or evidence of corrosion, the slave cylinder body should be replaced. Replace pushrod if rough or damaged. If control valve seat is worn or damaged, replace control valve body.

Reassembly: 1) Assemble diaphragm on pushrod. After nut is tightened, coat threads with shellac to prevent leakage. Assemble control valve disc, seal, spring, and spacer in the control valve body with screw and lockwasher. Position control valve diaphragm and plate on control valve, and secure diaphragm and plate solidly in place with nut. Install control valve piston seals on piston.

2) Insert check valve spring and valve and retainer in slave cylinder piston. Be sure check valve floats freely and does not bind in bore. Install the inner and outer pushrod bushing seals, and secure them in place with the retainers.

3) Coat the piston bores in slave cylinder body with hydraulic fluid. Dip slave cylinder piston, seal, retainer, and spring in fluid. Install piston in bore with recessed end toward pushrod bushing end of body. Carefully position seal and retainer on top of piston. Insert spring in retainer, and secure it in place with end plug or cap, using new gasket.

4) Place new gasket and inner body of vacuum power chamber on slave cylinder body. Make certain transfer bushing and "O" ring are in place before inner body is installed on cylinder body. Install pushrod bushing lockwasher over end of bushing. Thread bushing in place, be sure inner body seats squarely on cylinder body, then tighten bushing securely.

5) Dip control valve piston in hydraulic fluid, then install control valve. Position control valve spring on control valve diaphragm with small end of spring on diaphragm plate. Position control valve body over spring, align the scribe marks, then install control valve body-to-slave cylinder body attaching bolts and lockwashers. Tighten bolts solidly. Install air intake hose fitting (or screens, filter, and snap ring) on control valve body.

6) Place small end of diaphragm return spring on top of pushrod bushing. Carefully insert end of pushrod into bushing. Align diaphragm plate on large end of spring. Place outer body of vacuum power chamber on top of diaphragm with marks in alignment. Install clamp, making certain diaphragm head is properly positioned between two halves of chamber, then tighten clamp screw firmly.

7) Assemble check valve, then install it in inner body of chamber. Install a new seal on slip end of bypass tube, then install tube in outer body of chamber and control valve. Tighten nut on control valve body firmly.

CHRYSLER, DE SOTO, DODGE PLYMOUTH "BELLOWS TYPE" POWER BRAKE

Chrysler & Imperial, All Models (1956)
D Soto, Dodge, Plymouth, All Models (1956)

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 BRAKE PEDAL RETURN SPRING & CONTROL VALVE SPRING PRODUCTION CHANGE (To Improve Low Temperature Operation):* New "Kelsey-Hayes" Power Brake Unit No. 1731216 replaces Unit No. 1637814. New Unit identified by daub of green paint on front outer bellows cover plate. It includes a New Control Valve Spring No. 1676486 and requires the use of New Pedal Return Spring No. 1730077. Both springs are painted green and must be used together. Use Pedal Return Spring painted black with power units not daubed with green paint.

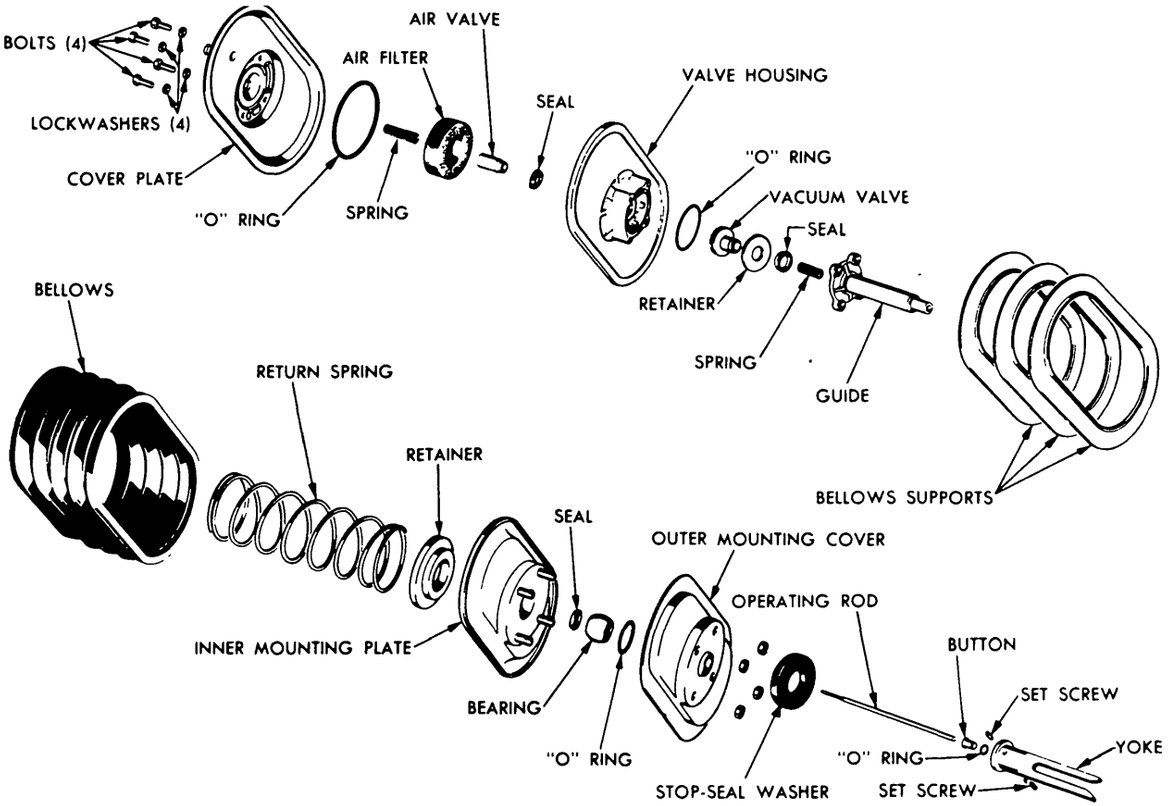
DESCRIPTION: This "Assist Type" power brake unit consists of an oval shaped air-vacuum bellows, control valve, and push rod. A control valve operating rod extends through the push rod and actuates the brake unit control valve. The unit is mounted on the engine side of the dash panel and is connected mechanically to the brake pedal linkage. A trigger arm on brake lever operates the control valve through the valve operating rod. In the event of power failure, normal manual brake action is assured as the brake pedal lever pin is free to slide in slot of power piston rod yoke when brake pedal is depressed.

OPERATION: Vacuum from the intake manifold is applied to unit, and air is evacuated from the air-vacuum bellows through the vacuum valve during brake application. When brakes are released, air (atmosphere) enters the unit through the built in air cleaner and is regulated by the air valve. The valve operating rod, which is controlled by the pedal, overcomes the spring pressure of the air valve and keeps atmospheric pressure inside the air-vacuum bellows. The return spring extends the bellows completely whenever brakes are not applied.

ADJUSTMENT & TROUBLE SHOOTING: *See "Power Brake Pedal Linkage Adjustment (following).*

REMOVAL: *(CAUTION – Before removing brake unit, place a wood wedge between brake power lever and the forward edge of triangular opening in brake pedal lever bracket to prevent trigger arm from extending through hole in dash panel which would cause damage to trigger arm).* Remove the nuts and lockwashers mounting unit to dash panel. Pull unit and mounting plate straight out and away from panel, using care not to lose the nylon bushings on pedal linkage pin which engage power unit yoke.

DISASSEMBLY: 1) Remove nuts attaching mounting plate to power unit and remove plate. Remove and discard "O" ring on mounting plate. With an Allan wrench loosen the two setscrews and remove yoke from power unit shaft. Discard the valve operating rod bottom seal.
2) Remove nuts attaching outer mounting plate. Using a screwdriver, gently pry up plate to loosen, and remove plate. Discard "O" ring seal. Compress bellows by hand sufficiently to remove the guide bearing. Remove and discard seal from inside bearing. Peel back outer lip of bearing completely around inner mounting plate (keep one hand on inner plate to keep it from snapping up). Remove plate and lift out return spring and retainer.
3) Place unit on its side and remove bolts and lockwashers attaching valve cover to valve. Lift off valve cover (if necessary, use a flat blade to separate cover plate from bellows flange). *(CAUTION – Use extreme care to avoid marking or scratching inner face of plate where it contacts bellows flange).* Remove "O" ring from valve cover and discard it. Remove air valve spring from center of valve, then remove the air filter. Slide air valve out of valve housing *(NOTE* – It may be necessary to make a small hook from a paper clip to remove valve).
4) Place valve housing end down on bench, then remove bellows from valve, by peeling back the outer lip of bellows. If a new bellows is to be installed, remove the three bellows supports. Remove bolts and lockwashers attaching guide to valve body. Lift out guide to expose vacuum valve, valve spring and seals. Discard seals. Remove vacuum valve and retainer and discard housing to guide seal. Invert valve housing and remove valve seal from its groove in valve body. *(CAUTION – If using a sharp instrument or point d pliers, be very careful not to mark or scratch inside diameter bore of valve housing).*



"BELLOWS TYPE" POWER BRAKE ASSEMBLY

REASSEMBLY: Clean all parts except bearing, bellows, and filter and blow dry with air. Bellows may be cleaned with mild soap and water if necessary. Inspect all parts for damage and replace all defective parts. During reassembly, use new "O" and seal rings.
1) Insert a new air valve seal into bore of valve housing (lips of seal facing out when installed). Carefully position a new vacuum valve in retainer. Invert valve housing and install valve and retainer. Press down firmly on retainer to snap in place. Position a new valve housing to guide seal in groove provided. Install a new vacuum valve seal in bore of guide, with lips of seal toward bottom of bore.
2) Install the vacuum valve spring in center of valve (smallest). Position guide over vacuum valve, lining up bolt holes in guide with bolt holes in valve body. Carefully lower guide down against valve body, making sure that tapered portion of vacuum valve enters seal evenly. Press down on guide to seat, then install bolts and lockwashers. Tighten evenly and securely. *(CAUTION – Be sur that count rsunk holes at end of guide line up with th long centerline of valve housing).*

CONTINUED ON NEXT PAGE

CHRYSLER, DE SOTO, DODGE, PLYMOUTH "BELLOWS TYPE" POWER BRAKE (C nt.)

3) If a new bellows is being installed, position the supports in bellows (bellows supports must be centered in the three center accordian folds and aligned with bellows and each other). Using holding fixture (made from a piece of four inch pipe) to support the guide and valve assembly, install the bellows. *(CAUTION – Be sure the arrows on edge of bellows and housing are aligned).*

4) With the bellows in the holding fixture, lightly coat the outside surface of the air valve with silicone grease (do not use any other kind), then insert the **small end first** into bore of valve housing. Use finger pressure to test for free movement of valve against vacuum valve spring. Install air valve spring in recess in air valve and filter. Install a new valve housing cover "O" ring on shoulder of valve body hub. Position valve cover over housing, with notch in edge of cover matching arrow on bellows. Be sure that air valve spring nestles on dimple in center of cover. Press cover down evenly over valve housing to seat cover "O" ring. Install bolts and tighten securely.

5) Remove assembly from holding fixture and invert unit. Coat guide lightly with silicone grease, then install return spring. Position the spring evenly around hub of valve housing and guide. Place spring retainer and inner mounting plate over spring, being sure that arrow stamped on plate is in line with arrow on edge of bellows. Compress return spring, then fold edge of bellows over edge of plate so it fits evenly around plate.

6) Install a new guide bearing seal in groove inside bearing bore (seal must seat snugly in bearing). Using silicone grease, lubricate inside of bearing, then slide over guide while compressing bellows, (bearing must be installed with lip of seal facing out). Push bearing down over guide and into pocket of plate. Release bellows (bearing will ride up guide with plate into position. Install the bearing to mounting plate "O" ring, then lower outer mounting plate down onto assembly (the notch in edge of plate must be in line with arrows on bellows). Install nuts and draw down finger tight.

7) Slide a new valve operating rod seal ring over nylon bumper on end of rod and into groove, then install rod in center of guide. Press on end of guide to test for free operation of air and vacuum valves (a "two-step" movement should be felt when rod depressed and released fully). Place a new stop seal washer in position and install yoke on end of guide. Compress bellows slightly, then alternately tighten set screws (hub of yoke must be down snug against shoulder of guide, with the setscrews aligned with tapered holes in guide). Tighten mounting plate nuts securely. Place mounting bracket in position, with long center line of bracket at right angles to long centerline of power unit. The off set of the bracket must be so that when installed in car, the axis of the unit will be inclined down toward front of car. Install lockwashers, nuts and tighten securely.

INSTALLATION: Be sure that unit is so placed that its axis inclines down toward **fr nt** of car and that vacuum inlet connection is toward engine. As the yoke passes through dash panel, be sure that it engages pedal linkage correctly by sliding over nylon bushings on power brake lever cross pin. Install mounting plate nuts and tighten securely.

CHRYSLER, DE SOTO "PISTON TYPE" POWER BRAKE

Chrysler & Imperial, All Models (1956)
DeSoto, All Models (1956)

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 VALVE ROD & PEDAL RETURN SPRINGS PRODUCTION CHANGE (To provide more positive action):* New "Bendix" Power Brake Unit No. 1731217 replaces former Unit No. 1671546 and contains a new Valve Rod Spring No. 1676487, and requires the use of new Pedal Return Spring No. 1730077. Both new springs are painted green and must be used together. *NOTE - This new Unit No. is stamped on Air Cleaner Cover but is not the Air Cleaner Cover No.*

► *1956 INTERMITTANT BOOSTER ACTION CORRECTION:* Inspect booster valve rod at point where it contacts trigger arm. Wipe off all lubriplate, check to see that rubber dust shield is properly placed with 1/8" clearance between shield and nylon button. If sticking condition not corrected, replace Valve Rod Spring with Spring No. 1676487 (painted green) and Pedal Return Spring with Spring No. 1730077 (painted green). Both springs must be used together.

DESCRIPTION: The "Assist Type" power unit consists of a vacuum cylinder, piston operated push rod, and control valve assembly which is integral with piston assembly. The unit is mounted on the engine side of the dash panel and connected mechanically to brake pedal linkage through the power brake unit push rod. A valve operating rod within the piston rod is operated by a trigger arm on upper end of brake pedal lever. In the event of power failure, normal manual brake action is assured as the brake pedal lever pin is free to slide in slot of power piston yoke when brake pedal depressed.

OPERATION: With brake pedal released, both sides of vacuum cylinder piston are open to the atmosphere. Application of brake pedal causes vacuum port to open, forcing piston toward rear and exerting a thrust on power lever of brake pedal lever assembly which causes master cylinder to be applied. The amount of pressure exerted on master cylinder push rod is in proportion to distance brake pedal is depressed.

ADJUSTMENT & TROUBLE SHOOTING: *See "Power Brake Pedal Linkage Adjustment (following).*

REMOVAL: *(CAUTION – Before removing brake unit, place a wood wedge between power brake lever and the forward edge of triangular opening in brake pedal lever bracket to prevent trigger arm from extending through hole in dash panel which would cause damage to trigger arm).* Disconnect vacuum hose at power unit and remove complete power unit and bracket after removing the four nuts and lockwashers attaching it to dash panel.

INSTALLATION: Position power unit on dash panel so that its axis inclines down toward front of car. As yoke passes through dash panel, be sure that it engages the pedal linkage correctly by sliding over the nylon bushings on power brake lever cross pin. Replace the attaching bolts and nuts and tighten securely. Remove wedge from pedal bracket.

DISASSEMBLY: *(CAUTION – Do not clamp piston rod or yoke in vise during service perations).* During disassembly of the power unit, scribe lines on all component parts before removing to insure correct reassembly.

1) Remove air cleaner cover screws, cover, and filter material. Remove tube plate screws and separate tube plate and gasket from cylinder. Slide end of hose from vacuum tube. Remove the four bolts and nuts from end plate and remove cylinder shell and rubber ring gasket. Remove hose from vacuum plate and rubber diaphragm from end of tube fitting. Using thin nose pliers, pull out diaphragm balancing pin. Remove tube and plate attaching screws, separate tube and valve poppet parts from piston plate. Separate plate, poppet spring, and diaphragm from poppet. From opposite end of assembly remove valve rod rubber seal. Remove snap ring, retainer washer, spring and friction collar. Remove valve rod from piston rod.

2) Drive out piston retaining pin from piston (part way) and note if piston is free on piston rod. If piston is free on rod, hold spring compressed while removing retainer pin from piston. If piston is tight on rod after retaining pin removed, use a 5/8" diameter brass rod with squared end to drive piston rod out of piston .

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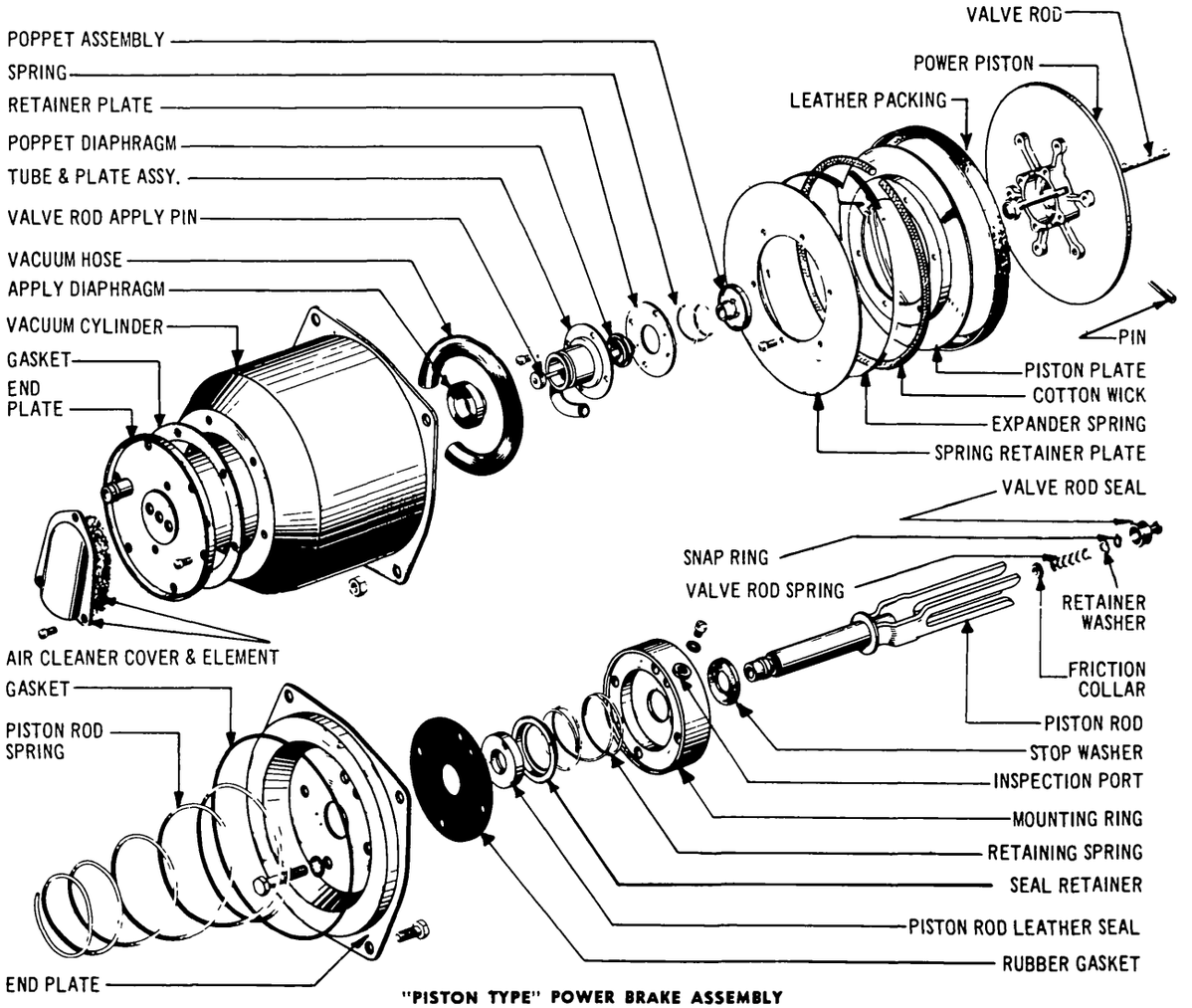
CHRYSLER, DE SOTO "PISTON TYPE" POWER BRAKE (C nt.)

3) Separate piston rod, end plate and spring from piston, and remove rubber stop washer from piston rod. Remove bolts and lockwashers and separate mounting ring, seal retaining spring, washer, piston rod leather seal, plate, expander spring, wick, packing plate, and leather packing from piston plate.

REASSEMBLY: Wash all metal parts in Bendix Metaclene and all rubber parts in alcohol. Use air to blow out all passages. Inspect piston rod, valve seat at end of valve rod, or valve seat at center of piston plate and replace if scratched or nicked. Replace piston rod leather seal or piston leather packing if these parts worn excessively.

1) Assemble piston plate with threaded hole side up. Assemble leather packing on piston with lip side up. Place packing retainer plate on packing, with raised side up, and align holes in piston. Coil cotton wick inside of packing lip and cut wick to required length. Remove and dip wick in Bendix Vacuum Cylinder Oil. Let excess oil drip off, and again coil wicking inside lip of packing. Install expander ring inside of wicking, with gripper points next to wicking. Engage notch at loop end of spring with hook at opposite end of spring. Align holes in expander spring retainer plate with threaded holes in piston plate. Install screws and tighten securely.

2) Install inspection port screw and gasket, if screw was removed. Insert bolts and lockwashers through holes in end plate and assemble mounting ring rubber gasket over bolts. *NOTE*–Align gasket inspection hole with holes in mounting ring and end plate.



"PISTON TYPE" POWER BRAKE ASSEMBLY

3) Assemble new piston rod leather seal on gasket, with lip away from gasket, and center seal over hole in gasket. Place seal retainer over seal and install retaining spring. Coat bearing surface of mounting ring with silicone grease and assemble mounting ring on end plate, making certain inspection port hole in mounting ring lines up with hole in gasket. Thread bolts into mounting ring and tighten bolts. When bolts tight, outer rim of mounting ring should be in contact with end plate.

4) Slide rubber stop washer over piston rod up against steel washer on piston rod and insert rod through seal in end plate. Assemble piston return spring on end plate with large diameter end next to plate. Align slot in piston rod and vacuum test port in end plate. Align piston so that two of four threaded bolt holes in valve side of piston are in line with slot in piston rod. Press piston on piston rod up against shoulder of rod and install retaining pin.

5) Insert valve rod in piston until end of rod protrudes at opposite end of plate. Assemble friction collar, valve rod spring, and spring retainer washer over valve rod. Compress spring and install snap ring in groove in valve rod. *NOTE*–To aid in seal installation, turn seal partially inside out. Assemble small diameter end of seal over valve rod and assemble large diameter over end of piston rod.

6) Assemble small diameter of poppet diaphragm in recess of poppet assembly. Assemble poppet spring over diaphragm with small diameter end next to poppet plate. Assemble retainer plate over large diameter of diameter of diaphragm and center poppet on piston plate. Align holes in retainer plate with holes in piston plate. Place vacuum tube and plate on retainer plate and align. *CAUTION–Vacuum tube must be in lower left quadrant. Insert when the slot in pushrod is horizontal and vacuum test port is upward and approximately 22½° to right of end plate centerline, regardless of the scribe marks on tube plate and piston.*

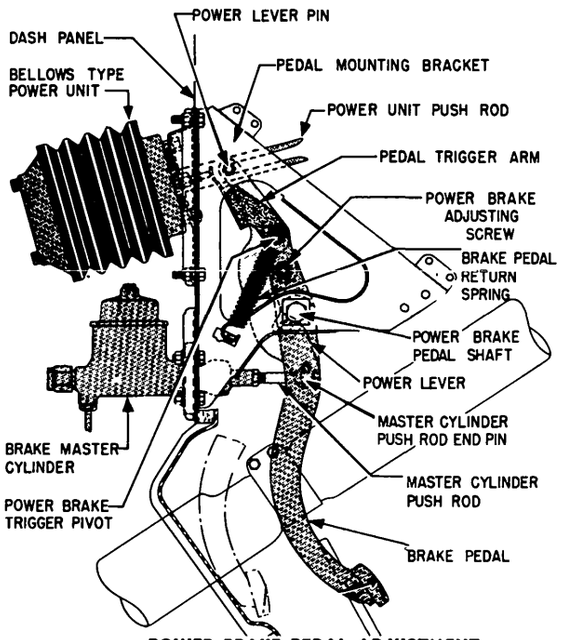
7) Make certain that bead at outer diameter of diameter of diaphragm is in annular groove of tube and plate assembly. Replace tube and plate attaching screws and tighten securely and uniformly. Assemble valve rod applying diaphragm over end of tube and plate assembly. Slide vacuum hose on tube approximately 5/8", and coil hose so it is parallel to piston plate. Place new rubber gasket on end plate. Align vacuum cylinder and end plate to scribe marks. Install bolts and nuts (insert bolts through end plate and into cylinder flange) and tighten securely.

8) Place new gasket on end of vacuum cylinder. Align tube plate and vacuum cylinder scribe marks, and slide vacuum hose on vacuum tube approximately 5/8". Assemble four plate attaching screws. Align cleaner cover with tube plate and install screws. Tighten uniformly. Insert air cleaner material into opening at bottom of air cleaner cover.

CHRYSLER, DE SOTO, DODGE, PLYMOUTH POWER BRAKE PEDAL ADJUSTMENT

ADJUSTMENT: Pedal Trigger –(*NOTE* – This adjustment is made with the brake pedal assembly removed from car). Install Gauge C-3508 (plastic material with scribed lines) over power lever pin, positioning center lines of gauge on center line of power brake lever. Position power brake adjusting screw so arrow on head of screw is pointing toward trigger pivot pin. Using a screwdriver, wedge the power brake pedal pivot to rear side of hole in power lever until the adjusting screw collar is compressed and metal to metal contact is made. With gauge installed and adjusting screw collar compressed, the outer curved surface of trigger arm must contact the inner circle scribed on gauge (distance between center line of power brake lever cross pin and outer curved surface of power brake pedal trigger arm must be .640" ± .005". If position of trigger arm not correct, adjust by turning power brake adjusting screw until trigger arm outer surface is aligned with inner circle of gauge. Tighten adjusting screw securely after correct adjustment made.

Arc of Trigger Arm - Install gauge, Tool C-3508 on power lever cross pin. With wedge removed and trigger arm-to-power brake lever cross dimension adjusted correctly, outer surface of trigger arm must contact outer circle of gauge within the angle scribed on gauge. NOTE - With pedal assembly clamped in vise, it will be necessary to move power lever (by hand) to locate trigger arm on outer circle of gauge. Carefully bend trigger arm to specifications or replace arm assembly. New trigger arm must be checked for correct arc.



POWER BRAKE PEDAL ADJUSTMENT

Pedal Free Play: Check adjustment as follows: Remove vacuum hose from power brake unit and press brake pedal several times to eliminate all vacuum in unit. Insert a screwdriver blade between rubber collar of power brake trigger pivot and rear side of elongated hole in power brake lever, forcing them apart *(NOTE – If brake pedal lever and power brake lever are not held apart, a false free play setting will be obtained).* Check the free play with linkage in this position by pushing lightly at pad end of brake pedal. Pedal free play should be between 1/16" & 1/8" (Dodge & Plymouth), 1/32" & 1/8" (Chrysler & DeSoto). Adjust as necessary by shortening or lengthening the master cylinder pushrod.

TROUBLE SHOOTING: If operation not satisfactory, correct by turning adjusting screw not more than 90° either way from original setting as follows:

Slow Pedal Release: Rotate adjusting screw counterclockwise.

Time Delay During Fast Application: Rotate adjusting clockwise.

Pedal Vibrates (Unit Chatter): Rotate adjusting screw counterclockwise.

CAUTION - Adjusting screw should not be turned more than 90° from vertical (arrow up).

DODGE & PLYMOUTH "SAFEGUARD"

Dodge, 6 Cyl. D-62-1, 2 (1956)
Dodge, V8 D-63-1, 2, 3 (1956)
Plymouth, All 6 Cyl. & V8 (1956)

►CHANGES & CORRECTIONS

► *1956 PLYMOUTH MASTER CYLINDER COVER BOLT CAUTION:* New replacement covers use ¼" shorter bolt with less body length. New bolt Part No. 1671571. DO NOT use original type cover bolt with new replacement covers (Bolt will bottom before cover tight).

DESCRIPTION: Two-cylinder (front wheels), single double-acting cylinder (rear wheels), hydraulic type of same design as used on previous models.

ADJUSTING & SERVICING: *See "Chrysler-Lockheed Safeguard" in Manual.*

Brake Pedal Adjustment: Adjust master cylinder pushrod to obtain 3/32" to 3/16" free play with master cylinder piston against stop. On Plymouth, distance between brake pedal and pedal stop should be .015-.030", which will result in approximately 1/8" free play at pedal pad. *See Power Brake Note below.*

► *POWER BRAKE NOTE (Integral Power Unit):* Power Brake Unit has built-in pedal return spring and a pedal return stop, and **requires no free play adjustment.**

Minor Wear Adjustment: Turn adjusting cams(pull down on wrench handle) until shoe is locked against drum (Dodge), light drag (Plymouth). Back off cam just enough to remove all drag. Repeat adjustment for each shoe in all four wheels.

Major Brake Adjustment: Use adjusting gauge MT-19-K or feeler gauges and cutaway drum and adjust eccentric and anchor pin for each shoe to obtain .006" clearance at both toe and heel for all models.

► *CAUTION:* After adjusting brakes on one wheel, do not use same gauge setting for brakes on another wheel. Gauge must be set according to diameter of brake drum on **each** wheel.

Hand Brake Adjustment: Hand Brake is independent type mounted on drive shaft at rear of transmission. *See Car Model Pages and individual model Spec. Data Pages.*

BLEEDING BRAKES (With Integral P w r Unit): With outlet line to wheel cylinders connected loosely, attach pressure bleeder to reservoir, open bleeder screw on top of master cylinder, bleed unit until free of air, close bleeder screw, continue bleeding until no bubbles appear at outlet connection, tighten connection. If pedal not firm, bleed all wheel cylinders as on standard manual brakes.

BLEEDING BRAKES (Manual Brakes & with "B llows" or "Piston" Power Units): *See "Hydraulic Brake Servicing" in Manual.*

OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing" in Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Manual.*

CHRYSLER, DE SOTO, DODGE "CENTER PLANE" BRAKES

Chrysler & Imperial, All Models (1956)
DeSoto, All Mod ls (1956)
Dodge "500" (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 BRAKE "SQUEAK" CORRECTION:* To correct brake squeaks or other brake noises proceed as follows:
1) Torque axle housing to rear spring U-bolt nuts to a specified torque of 65-80 ft. lbs.
2) Inspect for out of round drums, distorted support plates, or loose anchor pins. To correct loose anchor pins, remove support plates, check alignment, place support plate with the pin resting in vise, repeen end of pin until it is tight.
3) Torque the five rear wheel brake support to axle bolt nuts to 35 ft. lbs. The four front wheel brake support bolt nuts must be torqued to 55 ft. lbs.
4) Brake shoe guide spring, Part No. 1484680, which is held in place by the retainer, Part No. 1486945, must be very tight against brake shoe and support. Loose guide springs should be bent to restore their tension. The retainer must not exceed specifications of 15/32", measured between inside ends.

►*REAR WHEEL REMOVAL CAUTION:* **Do not apply s rvice brakes to hold shoes against drum while using whe l puller.** To hold hub and drum from turning while using wheel puller back off brake shoes from drum with adjusting cams. Apply hand brake and allow one rear wheel to remain on floor, or block wheel in suitable manner.

DESCRIPTION: "Center Plane" brakes have two floating shoes mounted between two plates located on the center plane of the lining. On front wheel brakes, two single piston cylinders (single action) are attached to the support plate assembly, the upper cylinder actuating the front shoe, and the lower cylinder actuating the rear shoe. On rear wheel brakes, one double piston cylinder (double action) is attached to the top of the support plate assembly and actuates both brake shoes. An anchor pin in support plate assembly holds spring link in a fixed position at one end. The other end of link is positioned by brake shoe adjusting cam, providing a constant-loaded spring length. Side rattle and twisting of shoe is controlled by spring guide, which maintains a constant pressure against side of web of shoe holding shoe against support plate.

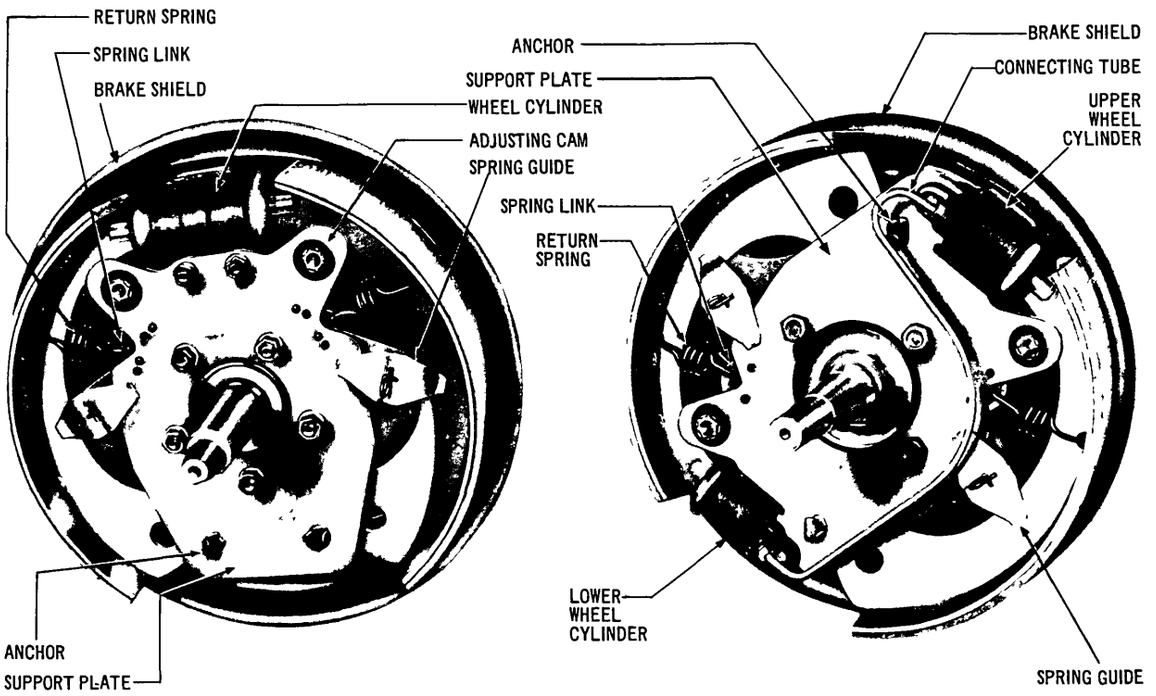
ADJUSTMENTS: Place car on stands, so that all four wheels are free. Check master cylinder and see that fluid level is not over ½" below top of cylinder. Place parking brake lever in fully released position.
Brake Pedal Adjustment: Release locknut on brake pedal to master cylinder pushrod and rotate rod to obtain 1/32-1/8" free travel, tighten locknut.

Front Wheel Adjustment: Turn each adjusting cam on both front shoes in the direction of FORWARD wheel rotation until lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction (each cam a little at a time) until no drag is felt.
Rear Wheel Adjustment: Turn front shoe adjusting cam in direction of **forward** wheel rotation and rear shoe adjusting cam in direction of **reverse** wheel rotation until lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction until no drag is felt.
►*RELINED OR NEW SHOE ADJUSTMENT NOTE* – Apply brake pedal prior to adjusting brakes to properly center shoes in brake drum and to assist in adjustment.
Hand Brake Adjustment: Hand Brake is independent type mounted on drive shaft at rear of transmission. *See Car Model Pages and individual model Special Data Pages.*

BLEEDING BRAKE SYSTEM: Use compressed air refiller, Tool C-3496 attached to master cylinder to keep master cylinder filled. Back off adjusting cams all the way, then starting with right rear wheel cylinder, attach bleeder hose, Tool C-650 to valve, with other end in jar partially filled with brake fluid. Bleed intermittently, opening and closing valve (at wheel cylinder) until fluid runs out of bleeder hose in a solid stream without bubbles. Repeat this operation on left rear wheel, right front wheel and finally left front wheel. At front wheels (with two cylinders), bleed lower cylinder first to force air out of connecting line to upper cylinder, then bleed upper cylinder. Repeat bleeding operation if brake action indicates air still in lines. Readjust cams after completing bleeding operation.

BRAKE SHOE REPLACEMENT: Removal – 1) Remove wheel, hub and drum assembly using puller C-845 to remove drum assembly.
2) Insert wrench C-3462, in the inner support plate hole, with tool cam slot engaging the spring hook. Turn tool handle to disengage spring from spring link, and turn handle in opposite direction to release the spring. Remove both springs in this manner. *CAUTION* - Do not use brake spring pliers or damage to lining will result.
3) Turn brake shoe guide spring retainer 1/4 turn and remove (the lip on end of spring is for correct positioning on outer support assembly). Slide shoes from support assembly.
Installation: 1) Position brake shoe in support plate, (make sure that wheel cylinder pushrods properly engage toe end of shoes and that shoes are in alignment).
2) Check tension of springs which should be 70 lbs. plus or minus 5 lbs., installed length. This can be checked by hooking a scale at toe end of shoe and pulling shoe away from wheel cylinder. Scale should read 35-45 lbs., before contact is broken between web of shoe and wheel cylinder.

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Manual.*



REAR WHEEL BRAKE **FRONT WHEEL BRAKE**

CENTER PLANE BRAKE ASSEMBLIES

BENDIX HYDRAULIC SINGLE ANCHOR (WITHOUT ECCENTRIC)

Buick, All Series (1956)
Cadillac, All Series (1956)
Hudson, All Models (1956)
Nash, All Models (1956)
Oldsmobile, All Series (1956)
Packard & Clipper, All Models (1956)
P ntiac, All Models (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 BUICK BRAKE SQUEAK CORRECTION:* A new brake anti-squeak spring Part No. 1178586 replaces early spring Part No. 1345469. It is more effective in eliminating brake squeak due to increased tension. To install, remove wheel and tire assembly, hook spring ends together, place spring over upper edge of drum and hold in place while prying spring over balance of drum. Center punch drum at five equal distance points so that point of spring retainer clip will rest in depression. *NOTE* - Sand linings and true up drums as necessary.

►*1956 BUICK BRAKE PEDAL TWISTING CORRECTION (DYNAFLOW MODELS WITH MANUAL BRAKES):* On early 1956 Dynaflow models a bending or twisting of the brake pedal plate can be corrected by removing the brake pedal pivot locknut, bolt and pedal as well as the dash insulator retainer. Drill a 9/32" hole through the cowl using the unused hole in brake pedal bracket as a guide. Install a ¼" x 20 x ¾" bolt, washer and locknut and tighten to cowl panel.

►*1956 BUICK BRAKE DRUM REBORE CAUTION:* If brake drum does not clean up when rebored to diameter of 12.083" it must be replaced. Excess reboring will affect dissipation of heat and may cause distortion of drum.

►*1956 CADILLAC BRAKE (SQUEAL) PRODUCTION CHANGE:* Effective at Eng. No. 021493, paint eliminated from brake drum silence springs and from brake drum in vicinity of springs to reduce possibility of brake squeal.

►*1956 HUDSON WASP & HORNET 6 REAR WHEEL BRAKE CYLINDER PRODUCTION CHANGE:* Beginning with Serial No. W-9403 (Wasp), No. X-9204 (Hornet), the diameter of the rear wheel brake cylinder was decreased to 7/8" from 15/16" to improve brake distribution.

DESCRIPTION: Single anchor, "No-Eccentric", hydraulic type of same design used on corresponding previous models.

ADJUSTMENTS: Before attempting any adjustment, car should be placed on stands with all wheels free. Brake pedal should operate freely and there should be no bind in hand brake lever or cables.

Brake P dal Adjustment: This adjustment should conform with recommendations before any other adjustment is made. See car model below.

Buick - No pedal adjustment necessary. Pedal must return freely to fully released position (piston guide contacting bumper washer).

Cadillac - With power brake pushrod in fully released position, distance between front edge of groove in pedal-to-relay rod and toe-board should be 7/8"±1/16". Screw relay rod into or out of trunnion relay to obtain this distance.

Hudson & Nash–Pedal free travel should be ¼-½" with master cylinder piston against stop. Adjust at master cylinder pushrod.

Oldsmobile–Adjust the master cylinder pushrod to obtain a minimum of 3/16" free travel. Pedal rubber bumper should be slightly compressed.

Packard–Brake pedal should have ¼" free play with master cylinder piston against stop. Adjust at master cylinder pushrod.

Pontiac–Brake pedal should have 4 3/8-4 5/8" clearance (distance from lower side of pedal pad to floor mat) with master cylinder piston against stop. Adjust at master cylinder pushrod.

Minor Wear Adjustment: Check and adjust brake pedal clearance (see Brake Pedal Adjustment), release hand brake lever, and see that cables are free and are not holding brake shoes against drum. At each wheel, expand brake shoes by turning adjusting screw up until wheel can just be turned by hand, adjust hand brake (cars where hand brake adjusted with shoes "expanded"-see Hand Brake Adjustment), then back off adjusting screw the number of notches or "clicks" as shown in table below. Check wheel for freedom of drag. If drag noted, tap backing plate to assist centralization of shoes, then recheck. If drag still exis ts, anchor pin adjustment may be in order. See Major adjustment.

Adjusting Scr w S tting

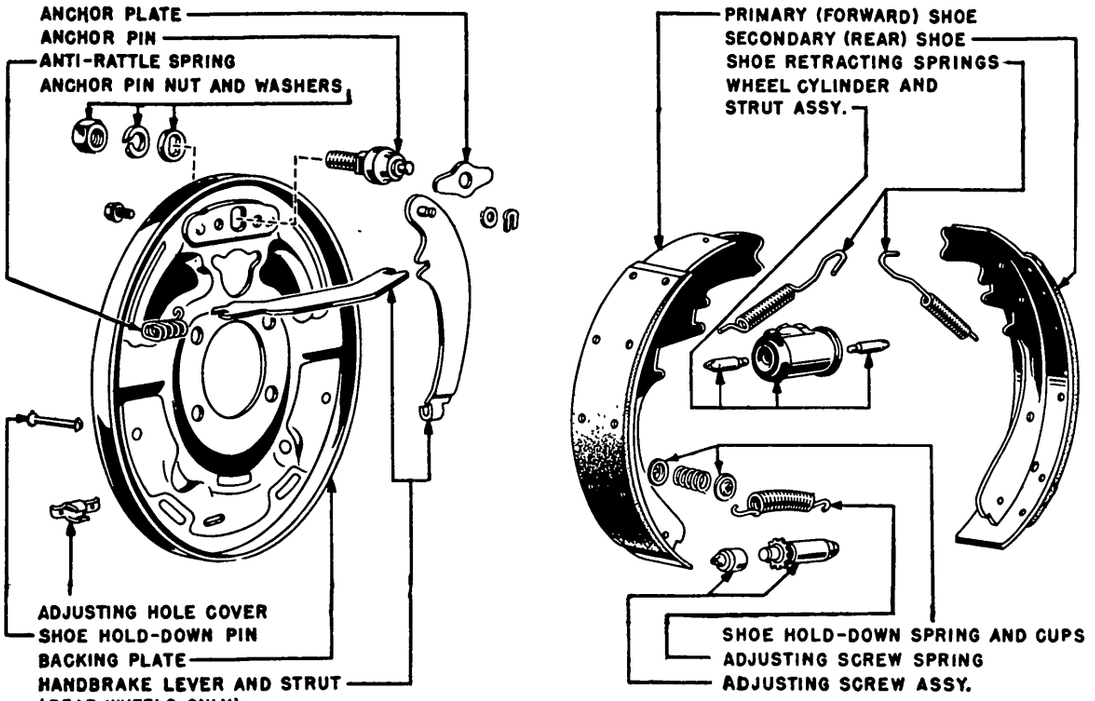
Buick	① 15 Notches
Cadillac	14 Notches
Hudson	14 Notches
Nash	14 Notches
Oldsmobile	16 Notches
Packard	②
Pontiac	14 Notches

①–17 Notches maximum.

②–Turn brake adjusting screw up until wheel can just be turned by hand, then back off screw until wheel turns free.

Hudson Mechanical Follow-up Cabl Adjustment: Disconnect cable from brake pedal and master cylinder piston pushrod from brake pedal. Place a 3½" spacer block between brake pedal rod pad and floor mat. Depress pedal rod until pad contacts spacer block; retain in that position and adjust the mechanical follow-up cable length at the clevis end so that the clevis pin can be installed freely with no slack in cable.

CONTINUED N NEXT PA E



BENDIX HYDRAULIC SINGLE ANCHOR BRAKE ASSEMBLY

BENDIX HYDRAULIC (Cont.)

Maj r Adjustm nt (For N w Shoes, Relined Brakes or when Minor adjustm nt not satisfactory): Jack up all four wheels, loosen or disconnect parking brake cables at equalizer or intermediate lever, remove adjusting hole covers on backing plate and inspection hole cover on drums (remove wheels for access). Check Pedal Clearance (see Brake Pedal Adjustment) Adjust each wheel brake as specified by car manufacturer, given below.

CAUTION–If hand brake cables not disconnected or loosened, shoes may be held "ON" by cables.

Buick–Turn adjusting screw up to expand shoes until wheel can just be turned with both hands (if wheel off, drum should just turn with long bar). Back off 15 notches. (Max. 17 notches). Wheels should be free at approximately 6 notches. If not it indicates need for anchor pin adjustment or tight parking brake cables

Anch r Pin Adjustment–Loosen the anchor pin nut just enough to permit anchor pin to slide in the slotted hole, *(CAUTION*–Loosening anchor pin nut too much will allow brake shoe spring to tilt pin), rap backing plate with hammer adjacent to anchor pin to insure anchor pin assuming central position between shoes, tighten anchor pin nut securely, then recheck drag. (If this has changed recheck anchor pin adjustment). Check and adjust hand brake (see Hand Brake Adjustment). Wheels should be free of any drag.

Cadillac–Loosen anchor pin lock nut ½ turn and tap anchor pin up with a hammer, then all the way down to bottom of its slot. Turn adjusting star wheel to expand brakes until wheel can just be turned with two hands Tap backing plate near anchor pin to raise it to a central position between shoes. Check brake drag If centering of anchor pin has released brakes, increase expansion of shoes and reset anchor pin again. Repeat until there is no change in drag with change in anchor pin setting, then tighten anchor pin to 80-120 ft lb. torque. Loosen star wheel 14 notches, place .015" feeler through drum slot at bottom and rotate wheel until feeler is wedged between secondary shoe and drum. Primary shoe will be tight against drum for measuring secondary clearance Reverse wheel rotation until 015" feeler is again at bottom and adjust star wheel to obtain .015" clearance. The clearance at top of shoe should now be .010". If upper clearance is greater or less than .010". loosen anchor pin locknut and reset anchor pin, tapping it up to increase clearance and down to decrease clearance. Reset clearance at lower end with star wheel and recheck upper clearance.

Oldsm bil - Expand shoes until heavy drag is felt on brake. Release all adjusting screws approximately 16 notches (until brake drums are free of drag) and replace adjusting screw hole covers. Move adjusting screw end at primary shoe against drum by inserting screw driver into slot provided in drum, then turn drum backward to force end of primary shoe against drum. Check clearance at anchor and adjusting ends of secondary shoes with .015" feeler inserted in brake drum slot. Clearance should be equal to within .002". If not adjust anchor and adjusting screw as required. *NOTE* - Clearance at anchor end should not be more than at adjusting screw end.

Pontiac - Insert a .015" feeler between lining and drum 1½" from adjusting screw end of secondary (rear) lining and expand shoes with adjusting screws until feeler gauge cannot be withdrawn. Back off adjusting screw until only a slight drag is felt on feeler gauge. *NOTE* - this ensures that shoes are against anchor pin and primary shoe is against drum. Withdraw feeler gauge and insert it between lining and drum about 1½" from anchor pin end of secondary lining. This should give slightly heavier drag than near adjusting screw. Adjust anchor pin to get this adjustment. Tighten anchor pin to 75 ft. lbs. Complete adjustment as shown in minor adjustment above, and hand brake adjustment below.

Eccentric Anchor Pin–Pin has square end and can be turned with a wrench after nut has been loosened. Turn pin in direction of forward wheel rotation to decrease clearance. End of anchor pin is beveled and high point indicates high side of eccentric cam. Hold pin with wrench while tightening nut.

Packard–Insert a .015" feeler gauge through inspection hole in drum at point 1½" above lower end of secondary shoe. Expand the adjusting screw (star wheel) until a slight drag is felt on the feeler. Remove feeler and insert a .010" feeler through inspection hole in drum at a point 1½" from upper end of secondary shoe. If clearance not within limits, loosen anchor pin locknut and adjust anchor pin. Turn anchor in direction of forward wheel rotation to decrease clearance. At the same time readjust the adjusting screw to maintain 015" clearance at lower end of shoe. Hold anchor in set position and tighten locknut Turn clearance adjusting screw (star wheel) until drum can just be turned with both hands, then back off screw until drum turns free

Hand (Parking) Brake Adjustment: *CAUTION–Brake shoes must be expanded on some cars when adjusting hand brake cables.* Adjust each car as follows

Buick - *CAUTION* - Do not attempt to adjust parking brakes by simply tightening adjusting nut at brake cable sheave. Pull on both ends of rear brake cable to make sure cables operate rear brake shoes freely and do not bind in conduits. Cable must be free in sheave and spring must return lever to fully released position. Adjust brakes at anchor and adjustment screw as described in minor or major brake adjustment. *NOTE* - When brake lever is in fully released position, signal switch plunger must be depressed 3/16". Adjust by loosening mounting screws and relocating switch.

Cadillac–Adjust the locknut on the equalizer link to obtain 1/8" clearance between the rear edge of the rear relay lever and end of slot in the frame X-member. **D n t expand r ar brak sh s.** Adjust the equalizer lock nut until the rear brake cables are taut. Attach spring scale to hand brake lever and apply a pull of 50 lbs. Measure the distance the hand brake lever has moved from its fully released position. This should be 2 1/8-2 3/8" or 7 notches. Readjust cable tension, if necessary to obtain this amount of movement with 50 lb. pull. Recheck front cable for equalizer 1/8" clearance described above.

Hudson & Nash–Withdraw hand brake lever to rear to provide a 3½' clearance between hand brake lever handle and bracket face With lever in this position, tighten hand brake cable at equalizer to a point where rear brakes are fully applied. This will prevent possible brake drag To release parking brake, apply brake pedal pressure, turn the parking brake handle counterclockwise 70°, and push it into released position.

Oldsmobile - Release parking brake, and make minor brake adjustment if there is excessive brake pedal travel. Adjust front cable so that the intermediate lever is held from seating itself on end of the seat in left hand "X" member by ½". Adjust rear brake cables to remove all possible slack without moving brake shoes from released position. Distribute the adjustment between cables so that equalizer link is 90° to the propellor shaft when clevis pin installed. Lock clevis jam nuts and install cotter pins. Install clevis pins with head at top.

Packard–Tighten adjusting screws until wheel can just be turned by hand. Pull hand lever to first notch on ratchet Adjust clevis on hand brake cable so that the clevis pin can be easily installed without any slack in the cable. Release hand brake lever. Back off adjusting screw at each wheel until wheel turns freely. Apply hand brake and check equalization by turning each wheel by hand. If not equal loosen adjusting screw on the tighter brake. Replace hole covers and road test.

Pontiac–Apply hand brake to first notch and check equalization. Loosen adjusting screw of tightest brake if not equal. If more than a few notches are required, loosen clamp screws on spreader and pull downward on the tight side of cable. This should equalize cable. Tighten spreader clamp screws while hand brake lever is still in the applied position. Brake cables are sufficiently tight if rear wheels can barely be turned by hand with lever in the first notch. When lever fully released, wheels should turn freely with cable pulled down approximately 1½" by gripping cable midway between conduit and clearance hole through frame X-member. When adjusting rear end of front cable for close adjustment for tension, be sure to turn clevis on or off cable end but do not twist cable. Coarse adjustment is secured by selecting the correct hole in the spreader.

BLEEDING BRAKE SYSTEM & OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing" in Brake Section of Manual.*

► *BLEEDING POWER BRAKE NOTE* Bleed power brake master cylinder first by attaching bleeder drain hose to fitting on end of master cylinder, backing off fitting ¾ of a turn and bleed fluid into a partially full bottle of clean brake fluid until bubbles cease. Then proceed as for standard master cylinder.

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

BUICK HYDRAULIC BRAKE MASTER CYLINDER

Buick, All Models (1956)

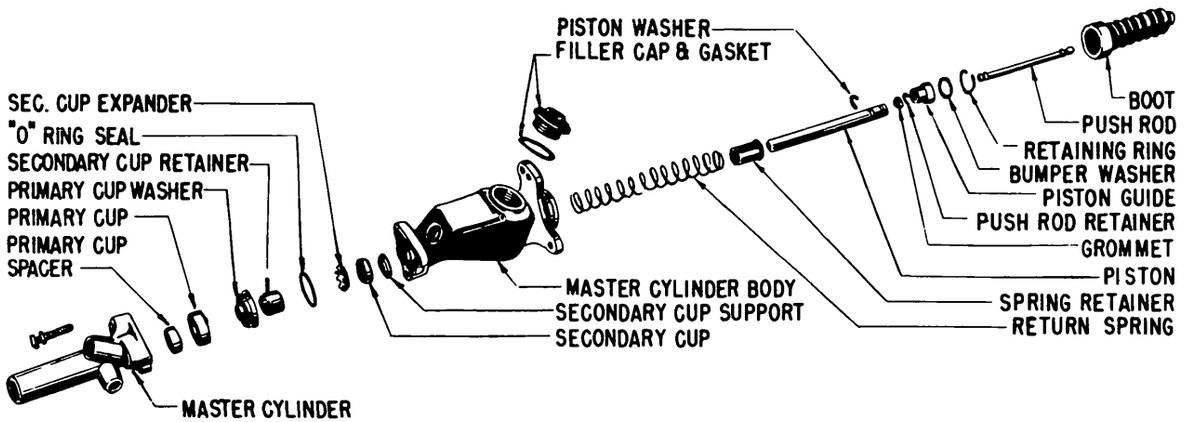
DESCRIPTION: This new master cylinder is a displacement type and is connected directly to the brake pedal by a pushrod. Pedal linkage adjustment is not required. The hydraulic check valve has been removed from the master cylinder to the junction block which is located inside of the front center cross member just behind the pitman shaft. The stop light switch is located on the left side of the master cylinder.

OPERATION: The operation of the displacement type master cylinder is similar to conventional master cylinders except that the piston travel is longer (4"), and the hydraulic brake fluid check valve is located in the brake line junction block. Fluid replenishment is provided in the usual manner from the master cylinder reservoir, which is integral with the master cylinder.

REMOVAL: Disconnect brake pipe from master cylinder and tape end of pipe to prevent entrance of dirt. Disconnect stop light wires from stop light switch and disconnect pushrod from brake pedal. Remove brake pedal. Remove screws holding steering column jacket rubber seal retainer to firewall and push it up on steering column jacket Pull floor mat away from toe pan and remove the toe pan Remove master cylinder attaching bolts and remove master cylinder

DISASSEMBLY: Remove toe pan from master cylinder (if car is equipped with synchro-mesh transmission, remove heat shield). Clean outside of master cylinder, remove filler cap and drain hydraulic fluid from reservoir. Place master cylinder in vise in vertical position with pushrod up. Remove boot from pushrod and using Truarc Ring Pliers, J-4245, remove retaining ring and guide bumper washer. Remove pushrod and piston from body. Remove return spring, retainer and piston washer. To disassemble pushrod from piston, insert piston into a 9/16" I.D. washer and support washer on jaws of vise. *(CAUTION–Protect piston with a cloth. Do not clamp piston in vise).* Hold piston and strike the pushrod with a soft mallet to drive piston out of guide. Remove grommet and pushrod retainer from end of pushrod. Turn cylinder with opposite end up and remove the bolts holding cylinder to body. Remove primary cup insert, cup, and spacer from cylinder. Remove primary cup washer, "O" ring, bearing, secondary cup retainer, expander, cup and cup support from assembly body. Discard primary cup, washer, "O" ring, bearing, secondary cup, expander, piston guide, grommet, retaining ring, boot, and filler cap gasket.

INSPECTION: Wash all parts in "Declene" or a good grade of clean alcohol *(CAUTION–Do not use gasoline, kerosene or mineral base oil).* Inspect all parts and replace any that are defective. Inspect pushrod bore and counterbore for pits, scoring, rust or dirt. Make sure that bore from reservoir to cylinder bore is clean and open. *NOTE–Bores of master cylinder body and nose piece may be cleaned and reconditioned with fine crocus cloth if not too deeply scratched. The piston is chrome plated and sand paper or emery cloth should never be used on its surface.*



BUICK HYDRAULIC BRAKE MASTER CYLINDER

REASSEMBLY: Place piston guide on pushrod and move to a position so that pushrod retainer and grommet can be installed on end of pushrod. Install piston guide on piston so that land of piston guide engages groove of piston. Install piston washer, spring retainer, and return spring on piston. Place pushrod and piston assembly in body and insert guide bumper washer and retaining ring. Replace boot on pushrod and turn cylinder so opposite end is up. Place secondary cup support, cup, expander, retainer, bearing, "O" ring, primary cup washer and insert in body assembly. Install primary cup spacer and primary cup in hydraulic cylinder. Bolt hydraulic cylinder to body and check filler cap vent holes to make sure they are clean, then install cap nut and gasket.

INSTALLATION: Reverse removal procedure, and bleed brake system.

BENDIX (LOCKHEED) SELF-CENTERING

Rambler (1956)
Willys, All Models (1956)

DESCRIPTION: "Self-centering" hydraulic type with non-adjustable anchor ramps for each shoe.

ADJUSTMENT: Before making adjustments, jack up all four wheels, check brake pedal clearance or free travel (see below), fully release hand brake and make certain that rear wheels are free, then adjust each wheel as follows

Brake Shoe Adjustment (For Wear or New Linings):
► *CAUTION Brake shoes must be "centralized" by several hard brake applications before adjusting.*

Eccentric Adjustment - Adjust eccentric for each brake shoe by turning eccentric out until brake shoe firmly applied and wheel is locked, then back eccentric off until wheel just rotates freely without drag. Shoe clearance will then be approximately .010".

Anchor Lip Adjustment - Pressure required to pull shoe outward from support plate should be 15 lbs. Measure with spring scale hooked in end of shoe. Adjust by bending anchor lip slightly toward brake support plate to obtain this 15 lb. coil spring pressure to hold shoes on support plate ledges.

Hand Brake Adjustment: Remove all slack from rear wheel brake cables as follows

Rambler - Withdraw hand brake lever to rear to provide a 3½" clearance between hand brake lever handle and bracket face. With lever in this position, tighten the hand brake cable at equalizer to a point where rear brakes are fully applied. This will prevent possible brake drag.

Willys (Except Jeep) - Pull hand lever "on" three notches, loosen front nut on connecting link between intermediate lever on frame cross-member and rear cable equalizer, tighten rear nut on link until slight drag noted at each rear wheel, then tighten front nut to lock adjustment. Release hand lever and check rear wheels for freedom from drag.

CJ5, 6 & 3B Jeep - Hand brake is independent type.

Brake Pedal Adjustment: Adjust master cylinder pushrod by loosening locknut and turning rod for following pedal free travel with master cylinder piston and pushrod back against stop

Brake Pedal Free Travel	
Rambler	¼-½"
Willys	½" min.

BLEEDING BRAKE SYSTEM & OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing" in Brake Section of Manual for complete data.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

WAGNER-LOCKHEED SELF-CENTERING

Stud baker, All Models (1956)

►CHANGES & CORRECTIONS

►*FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary lining is ¼" thick (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeal. This lining is applied to the full length of the shoe, and is marked "Secondary" and "Top" and should be installed as marked.

DESCRIPTION: Wagner Lockheed Hydraulic self-centering and self-energizing type (with Bendix type brake shoe assemblies). Brakes are not self adjusting, and new adjustment procedure is required. New self-centering device used.

Self-centering Device—The upper anchor pin end of each brake shoe rests against a wedge-shaped anchor block which is mounted on fixed brake anchor pin (shoes do not contact anchor pin directly) so that the shoes are free to move radially. The wide edge of the anchor block is toward the top. When the brakes are applied, the lining surface pressure tends to force the shoe to adjust its position on the block and center itself in the drum. This centering action takes place on light, or heavy brake application and is continuous with drum expansion. The anchor plate aids in keeping the shoes properly aligned at the self-centering block.

Adjusting Device—Consists of a "star wheel" adjusting screw and stud assembly mounted between the lower ends of the two brake shoes (similar to Bendix Duo-servo brake shoe assemblies). Adjusting screw spring serves a dual purpose, holding the shoes against notches of adjusting screw, and binding against ratchet on screw to serve as a screw lock.

ADJUSTMENTS: Place car on stands so that all four wheels are free. Check master cylinder and see that fluid level is ½" below top of cylinder. Place parking brake handle in fully released position. Adjust as follows:

Brake Pedal Free Travel Adjustment: Loosen locknut on brake pedal-to-master cylinder rod, turn master cylinder rod until free travel is ¼-3/8" (Manual brakes), or 1/8-¼" (Power brakes).

Brake Shoe Adjustment: Remove adjusting hole cover from backing plate, insert screwdriver or special adjusting tool through adjusting hole and turn adjusting screw to expand shoes until drum is just locked (pivot tool on edge of slot, move handle upward to expand shoes). Then back off the adjusting screw 8 notches or "clicks" (more if necessary) until drum is free of any drag. Replace adjusting hole cover, adjust parking brake.

Parking Brake Adjustment: Set control handle four notches from the fully released position. Adjust rear wheel cables at equalizer on frame side rail by backing off front nut and tightening rear nut until all slack is removed from cables and a heavy drag noted when rotating rear wheels by hand, tighten front adjusting nut. Release control handle fully and see that wheels are free of any drag.

BRAKE SHOE REMOVAL & INSTALLATION:

Front Brake Shoe Removal: Place wheel cylinder clamp across cylinder boots. Remove adjusting screw spring and assembly. Hold guide pin against backing plate and remove clip. (Clip on the shoe whose return spring is on top at the anchor pin). Pull shoe out at end away from cylinder to release shoe from cylinder push rod. Move shoe away from backing plate off anchor block to relieve spring tension. Remove spring and shoe. Repeat this operation for other shoe. If Tool J-1681 Remover and Replacer available, remove springs first, then clips, and spread shoes out of wheel cylinder push rods. Slip adjusting screw off shoes and remove adjusting screw spring.

Front Brake Shoe Installation: Lubriplate wear surfaces by backing plate. Check anchor block installation. The curved side must contact primary shoe and arrow must point toward primary shoe. Hook return spring on shoe table, with outer other end of spring on anchor block pin and shoe against anchor block. Move shoe down to pivot on anchor block and pin, start web into cylinder push rod, push shoe toward backing plate, stretching spring. Align guide pin holes and install pin and clips, with pin seated in clip. Hook other spring on other shoe and anchor pin, placing shoe web above cylinder push rod. Pull lower end of shoe away from spindle and slide shoe down on anchor block behind anchor block guide, inserting web in cylinder push rod at the same time. Install guide pin and clip. Spread shoes and install adjusting screw assembly and install spring. If Tool J-1681 Remover and Replacer available, hook adjusting screw spring and adjusting screw in position. Place shoes on backing plate, engage webs in cylinder push rods, install guide pins and clips. Install anchor block and guide and use tool to install springs. Remove Cylinder clamps. Rotate adjusting screw to fully released position, center shoes to aid in brake drum installation. Install drum and adjust wheel bearings. Adjust clearance as shown in ADJUSTMENTS above.

Rear Brake Shoe Removal: Install cylinder clamps, pull parking brake lever toward axle shaft and unhook cable. Spread shoes, disengage parking brake link, remove link and anti-rattle spring. Then follow procedure listed above for front brake removal. To remove parking brake lever from hole, remove spring clip and slip lever pin out of web. *NOTE*—The lever is mounted on outer side of web (Champion & Flighthawk) and inner side all other models.

Rear Brake Shoe Installation: Install parking brake lever with clip securely in place. Then install shoes as described for front shoes, above. Place anti-rattle spring in actuating link. *NOTE* - On Champion and Flighthawk, spring installed on end of link with largest offset. Insert link between shoes engaging front shoe with end having anti-rattle spring. Connect cable, remove clamps, install drums and adjust clearance as shown in ADJUSTMENTS above.

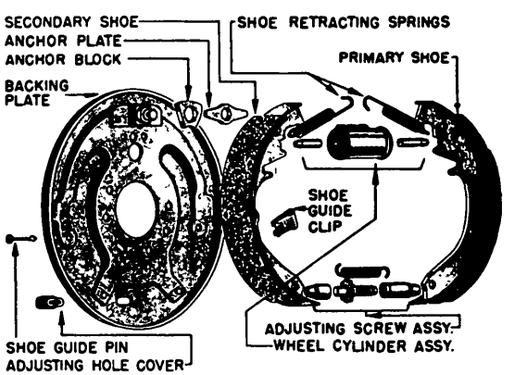
BLEEDING POWER BRAKE: *CAUTION* - This operation must be done with engine stopped and no vacuum in power brake system.

1) Fill master cylinder, open bleed screw at control body on power unit, depress pedal to expel air. Close screw before pedal reaches toe-board on final cycle. Repeat this procedure until solid fluid, free of bubbles comes from bleed screw. Keep master cylinder supplied during operation.

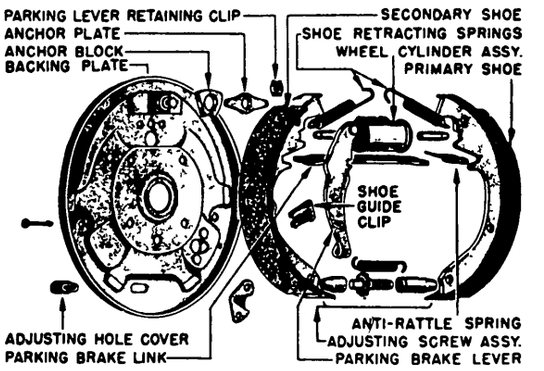
2) Using same method bleed at bleed screw located on hydraulic end cap of power unit, then proceed to wheel cylinders.

BLEEDING BRAKE SYSTEM & OVERHAULING OF MASTER CYLINDER & WHEEL CYLINDERS: *See "Hydraulic Brake Servicing" in Brake Section of Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*



REAR BRAKE ASSEMBLY



FRONT BRAKE ASSEMBLY

WAGNER-LOCKHEED SELF-CENTERING BRAKES

CHEVROLET-BENDIX HYDRAULIC

Chevrolet Pass. Cars, All Models (1956)
Chevrolet Corvette (1956)
Chevrolet Trucks, All Models except 1½ & 2 Ton
Rear Brakes (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*PASS. CARS & HALF TON BRAKE SHOE GRINDING CAUTION*· If bench type grinder used, grind shoes to 057- 087" smaller diameter than drum size If spindle type grinder used, grind shoe to drum diameter

►*POWER BRAKE NOTE* Bendix Power Unit optional on passenger cars. Hydrovac Power Unit optional on trucks. *See "Bendix Power Unit" or "Hydrovac Power Unit" under Power Brakes.*

DESCRIPTION: Duo-Servo, single anchor, hydraulic type without eccentric adjustment

ADJUSTMENT: Adjustments are made differently for wear (Minor Adjustment) and for new lining or shoe assemblies (Major Adjustment). Major adjustment should also be made whenever a minor adjustment is not satisfactory.

Brake Pedal Adjustment: Before adjustments made, make sure pedal returns to fully released position freely, with no binding, and that pedal retracting spring has not lost its tension

Passenger Cars–1/16' pedal movement before contact of pushrod and main cylinder piston. To adjust, loosen check nut on clevis. Turn pushrod in proper direction to secure adjustment. Tighten check nut on clevis

Trucks (Forward Control)–¾' clearance between top of pedal arm and toe board. To adjust, loosen check nut at rear of clevis on main cylinder pushrod. Turn main cylinder pushrod by knurled portion ahead of boot, in proper direction to secure desired clearance. Tighten check nut.

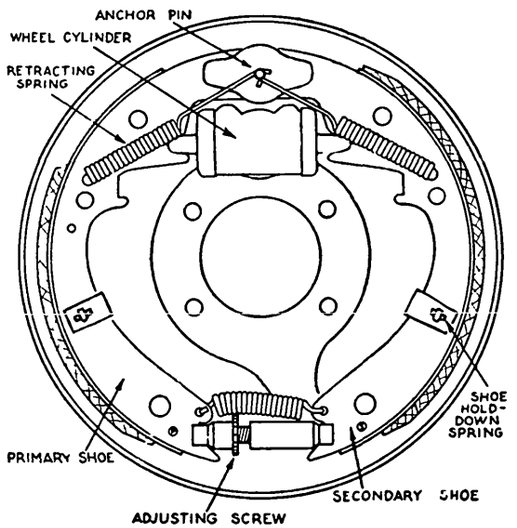
Trucks (Others)– 1¾' (Low Cab Forward), 11/16" (Others except Fwd. Control), clearance between upper corner of lower pedal arm and seal around upper pedal arm in toe board. To adjust, remove cotter pin and loosen castle nut on adjusting bolt, then rotate adjusting bolt in required direction to obtain desired clearance, tighten adjusting bolt nut, recheck clearance, reinstall cotter pin in adjusting bolt nut.

Minor Adjustment (For Wear): Jack all wheels clear of floor. On passenger cars, loosen check nut at brake cable equalizer to remove tension from brake cable. On trucks, disassemble clevis of parking brake pull rod. On all cars and trucks, remove adjusting hole covers from flange plates. Expand brake shoes by turning adjusting screw with Tool J-4707 until a light uniform drag is felt on brake drum (move outer end of tool toward center of wheel to expand shoes). On passenger cars and ½ Ton truck, turn adjusting screw in opposite direction 7 notches to relieve brake drag. On all other truck models, back off adjusting screw just enough to eliminate drum drag (not to exceed 7 notches). *(NOTE*– If more than 7 notches required to eliminate drag, a Major Adjustment is required). Replace adjusting hole covers. Reconnect and adjust parking brake (see Hand (Parking) Brake below). Check brake pedal clearance (see above).

Major Adjustment (New or Relined Shoes)· Pass. Cars & ½ Ton Trucks and Trucks (other than ½ Ton) adjusted differently *See "Pass Cars & ½ Ton Brake Shoe Grinding Caution" above*

Pass. Cars & ½ Ton Trucks - Same as Minor Adjustment above *See "Pass Cars & ½ Ton Truck Caution" above*

¾ & 1 Ton (All Brakes), 1¼ & 2 Ton (Front Brakes): Loosen anchor pin nut just enough so that pin can be rotated (*CAUTION*–if nut loosened too much, brake springs will tilt anchor pin). With tool J-4707, turn brake adjusting screw to expand brake shoes until a heavy drag is felt on the drum. Tap brake flange plate and turn eccentric pin in direction tending to reduce drag by allowing shoes to center in drum. If drag on drum is reduced, expand shoes by tightening adjusting screw several more notches and again turn eccentric anchor pin while tapping brake flange plate Repeat this operation until drag remains constant. Then tighten anchor pin nut to 60-85 ft. lbs. torque (¾ Ton Front & Rear Brakes, 1 Ton Front Brakes), 125-150 ft. lbs. torque (1 Ton Rear Brakes, 1½ & 2 Ton Front Brakes). Back off adjusting screw just enough to eliminate drag but **not more than 7 notches.** If more than 7 notches required to eliminate drag, repeat adjustment procedure. Adjust parking brake (below). *NOTE*–If heavy intermittent drag noted, brake drums should be rebored and new linings installed.



FRONT BRAKE ASSEMBLY

HAND (PARKING) BRAKE· Passenger Cars and ½ & ¾ Ton Trucks adjusted differently 1, 1½, 2 and some ¾ Ton Trucks have propeller shaft mounted parking brakes *CAUTION*–Service brakes must be properly adjusted before making parking brake adjustment.

Adjustment (Pass. Cars): Jack up both rear wheels. Check clearance between idler lever and mounting bracket at equalizer (approximately ¼"). To correct, disconnect equalizer, tighten check nuts on forward cable. Pull hand brake out 7 "clicks" (not same as notches) Loosen forward check nuts on equalizer and tighten rear one until there is a slight drag on both rear wheels when rotating drums. Tighten check nuts securely Set parking lever back to 2 clicks from full release position, at which point no brake shoe drag should be felt

Adjustment (½ & ¾ Ton Trucks using cable connected to rear wheel service brakes) Jack up both rear wheels. If clevis of parking brake disassembled, place parking brake lever in fully released position, then install clevis to brake pull rod to obtain a dimension of 1 7/16' from end of pull rod to centerline of clevis. With parking brake lever in fully released position and pull back spring in place, adjust parking brake cable at idler lever to obtain a clearance of ¼" between idler lever and rear end of slot in guide. Pull hand brake lever back four notches from fully released position. Pull cables out of conduits by hand as far as possible and assemble cables into idler lever links Tighten nuts and locknuts. Pull back hand lever until heavy drag is felt at one wheel. Check other wheel for drag, and if any difference is noted, loosen tight wheel until equal drag is obtained. With hand lever pulled out nine notches both rear wheels should be locked so that they cannot be turned by hand. *NOTE*–If more than nine notches are required to lock brakes, check service brake adjustment

Adjustment (¾ & 1 Ton Trucks using propeller shaft mounted parking brakes) Place the hand brake lever in fully released notch of ratchet sector Loosen locknut on brake pull rod Remove cotter pin from clevis pin holding brake rod to brake cam (leave loose) Set brake cam rest flat on upper brake band bracket Back off adjusting nuts (at lower end of spring) and adjusting nut at top of adjusting bolt (bolt joins lower part of band to bracket) *(CAUTION*–Do not remove nuts, loosen only) Remove lock wire from anchor screw Adjust anchor screw until there is 010- 015"clearance between lining and drum at anchor screw Tighten adjusting bolt (bolt without spring) until there is 020" clearance between drum and lower end of brake band Tighten locknut Tighten adjusting nut at lower end of spring until there is 020" clearance between drum and upper end of brake band Tighten locknut Adjust brake pull rod so clevis pin can be installed while brake cam rests flat on upper brake band bracket Install cotter pin in clevis pin of brake pull rod and tighten locknut on brake pull rod Install lock wire on anchor screw Recheck all points of facing for correct clearances

Adjustment (1½ & 2 Ton Trucks): Use independent type *See "Chevrolet Twinplex" for data.*

BLEEDING BRAKE SYSTEM: *See "Hydraulic Brake Servicing" in Manual*

TROUBLE SHOOTING· *See "Hydraulic Brake Trouble Shooting" in Manual.*

BRAKE SHOE REPLACEMENT: *See "Chevrolet-Bendix Hydraulic" in 1954 Annual Data or later Manual edition.*

CHEVROLET TRUCK TWINPLEX

Ch vr l t Trucks, 1½ & 2 Ton (1956)- Rear Wheels Only.

►*BRAKE BOOSTER NOTE:* Hydrovac Power Unit Standard on 2 Ton and 1½ Ton Special Models, Optional on others.

DESCRIPTION: Two cylinder, four anchor type (each shoe anchored at each end and linked to wheel cylinder at each end). Brakes are radially self-centering.

ADJUSTMENT: Each shoe has one adjustment (adjusting screw at adjustable anchor end). Adjustment is same for both wear and for new or relined shoe clearance.

Brak P dal Adjustm nt: *See "Chevrolet-Bendix Hydraulic" for data.*

Brak Sho Adjustm nt: Jack up both rear wheels, remove adjusting hole covers from backing plates (two holes at each wheel—one for each shoe). Use tool J-4707 or screwdriver inserted through rear (lower shoe) adjusting hole and turn adjusting screw up (move outer end of tool toward center of wheel) until light brake drag is felt on wheel, then back off adjusting screw 3 notches for correct running clearance. Adjust upper shoe similarly by inserting tool through front adjusting hole.

Parking (Hand Brak) Adjustment: Parking brake is independent type mounted on propeller shaft at rear of transmission.

1½ & 2 Ton—Fully release brake lever. Loosen locknut on outer shoe adjusting screw then tighten to secure a clearance of .010" to .015" measured at point directly above screw. Tighten locknut. Loosen locknut on link between hand brake lever and shoe actuating lever. Tighten adjusting nut on link to secure a clearance of .010" to .015" between inner shoe and drum. Tighten locknut.

BLEEDING BRAKE SYSTEM: Pressure or manual methods can be used.

Pr ssure Bl ding: 1) Back off adjusting screw all the way on upper shoes of both rear wheels. Fill master cylinder reservoir to top of filler plug opening. Connect pressure bleeder to master cylinder and open valve in bleeder tank line. (*NOTE*—Bleeder tank should be charged with 25-35 lbs. air pressure and kept at approximately this pressure during bleeding operation. End of bleeder tube must be in a bleeder jar or bottle and covered with fluid while performing all bleeding operations).

2) Connect bleeder tube to bleeder valves in following sequence, open bleeder valve and bleed until all air bubbles disappear, then close bleeder valve. Sequence as follows:

a) Hydrovac slave cylinder (No. 2 bleeder valve on end cap). *NOTE*—Will take approximately ½ pt. of fluid.
b) Hydrovac valve (No. 1 bleeder valve on top of control valve).
c) Front, rear wheel cylinder on left side.
d) Front, rear wheel cylinder on right side.
e) Left front wheel cylinder (one only).
f) Right front wheel cylinder (one only).

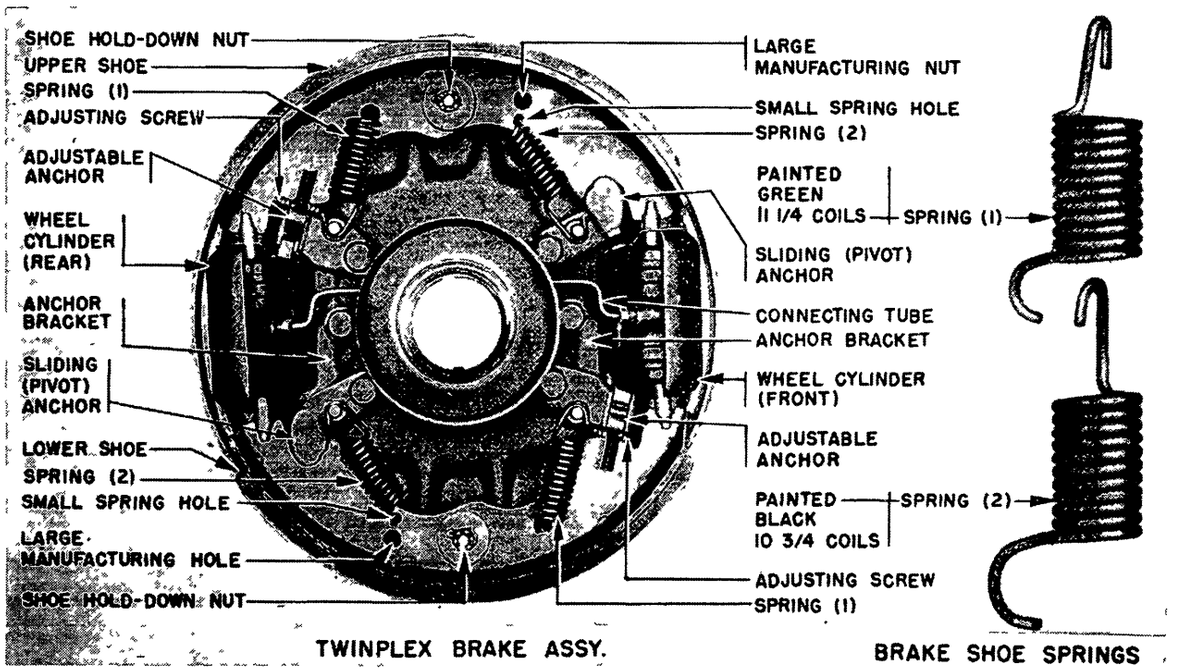
3) Adjust upper shoe on each rear wheel with pressure tank still connected. Push down hard on brake pedal several times to centralize shoes. Disconnect pressure tank and readjust all brake shoes..

4) Apply approximately 75 lbs. pressure on brake pedal and check pedal clearance from toe board to forward edge of pedal pad. Clearance should be a minimum of 5" with floor mat removed. If reserve less than 5", rebleed Hydrovac and rear brakes in sequence outlined above.

Manual Bleeding: 1) Install adapter and automatic filler J-713. Connect bleeder tube to Hydrovac bleeder valve No. 2 (on end cap). Place end of tube in container having sufficient fluid to cover end of tube.

2) Open bleeder valve approximately ¾ of a turn, depress brake pedal a full stroke and allow it to return slowly, making sure end of tube is under surface of liquid in container. Continue operating pedal, refilling jar at master cylinder when necessary, until liquid emerging from bleeder tube is air bubble free. Close bleeder valve. Proceed to bleed system as outlined in steps **2) b)** through **f), 3) and 4)** under "Pressure Bleeding" above, using automatic filler in place of pressure tank.

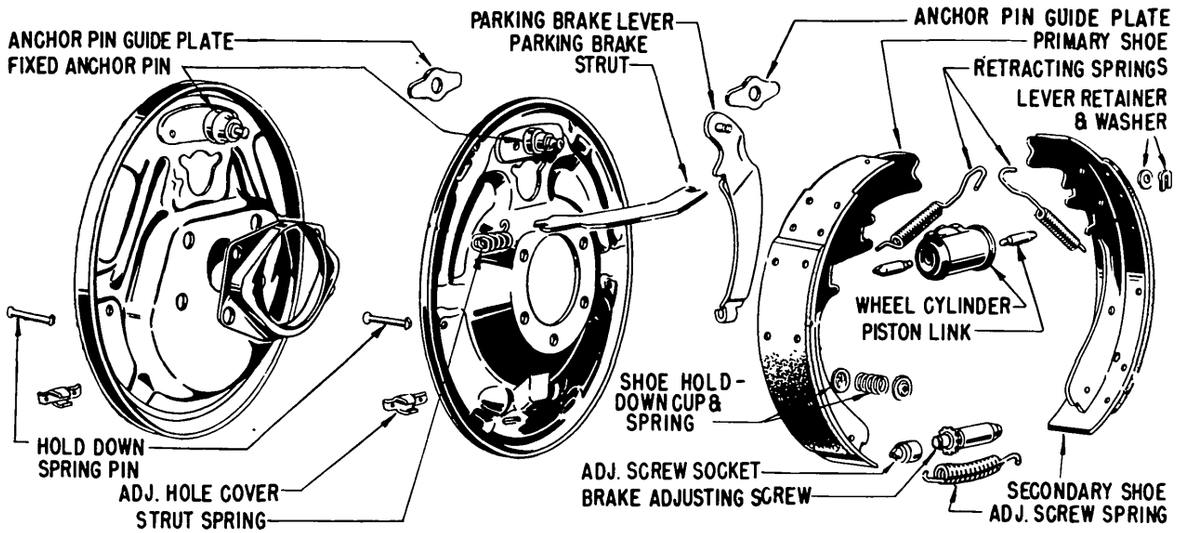
TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Manual.*



CHEVROLET TWINPLEX BRAKE ASSY.

Continental Mark II (1956)
Ford 6 Cyl. & V8 Pass. Cars (1956)
Ford Trucks, F-100 (1956)
Ford Trucks, F-250; F,P-350 (1956) Rear Wheels Only.
Lincoln, All Models (1956)
Mercury, All Models (1956)
Thunderbird (1956)

FORD, LINCOLN, MERCURY (BENDIX)



FORD, LINCOLN, MERCURY (BENDIX) BRAKE ASSEMBLY

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 LINCOLN & CONTINENTAL BRAKE SQUEAL CORRECTION:* An anti-squeal spring, Part No. 51A-1140, is available for installation on outside of brake drum. Spring should be installed on a clean drum only.

► *BINDING BRAKE PEDAL CORRECTION:* Brake pedal spacer, Part No. LD-22483-A, is manufactured with large chamfers on the ends. If brake pedal shaft nut is over-tightened, ends of spacer tend to score side walls of the support, reducing side wall spacing and causing interference with brake pedal hub. Paint in this area can also be a contributing factor to interference. Replace worn or damaged parts. Reduce length of hub to provide fit but do not remove more than .020" or a rattle may develop.

► *1949-56 MERCURY BRAKE SHOE RETRACTING SPRING PRODUCTION CHANGE:* New oil-tempered spring (painted brown) Part No. B5A-2035-A released to improve spring action.

► *1955 FORD & THUNDERBIRD BRAKE LINING CHANGE & REPLACEMENT CAUTION:* Later cars have "shorter" Primary Shoe Brake Lining and modified brake shoes to reduce any tendency toward pulling or diving when brakes applied. This new primary lining should be installed only as sets and must not be mixed with previous longer lining. If new lining installed on old shoes, shorter end of lining must be toward anchor end of shoe and it will be necessary to drill two additional holes for rivets at anchor end of lining (use new lining as template in drilling holes). *NOTE* - Previous type lining can also be used on new shoes but also requires drilling of two holes. *Install first type (longer) or later type (shorter) Primary Linings only in sets and DO NOT mix linings.*

DESCRIPTION: Duo-Servo, single anchor, hydraulic type without eccentric (Front Wheel eccentrics used on 1955 cars have been discontinued). Anchor Pins on all models except Ford Trucks are FIXED and no Major Adjustment is required on these models.

ADJUSTMENTS: Before making any adjustments, jack up all four wheels, check brake pedal clearance (see below), fully release hand brake lever and make certain that all wheels turn free. Then adjust as directed below.

Brake Pedal Adjustment: Pedal must have more than 5/16" but less than 7/16" free travel (Ford Pass. Cars, Lincoln, Mercury); or more than 3/16" but less than 3/8" free travel (Ford Trucks), before master cylinder piston begins to move.

All Pass. Cars and Trucks - Loosen locknut on eccentric bolt attaching brake pedal to master cylinder push-rod and turn bolt for desired free play.

Minor (Wear) Adjustment: Remove adjustment hole cover, rotate adjusting screw until shoe begins to drag (Ford Pass. Cars & Trucks), or tight against drum (Lincoln & Mercury). Then back off adjusting screw until drum runs free (Ford Trucks), 10 to 12 notches (Ford Pass. Cars), 12 to 14 clicks (Lincoln & Mercury).

Major Adjustment (Ford Trucks with Adjustable Anchor Pin): Rotate drum until feeler slot is at lower end of Secondary (rear) shoe, then insert .010" feeler between brake shoe and drum, and rotate drum, moving feeler gauge up along secondary shoe until shoe assembly is wedged forward as much as possible. Turn adjusting screw until primary shoe contacts drum securely and secondary shoe is snug against feeler. Back off, adjusting screw to obtain .010" clearance 1½" from each end of secondary shoe. If .010" clearance cannot be obtained at both ends of secondary shoe, an anchor pin adjustment is needed.

Anchor Pin Adjustment - Loosen anchor pin nut just enough to permit moving pin up or down by tapping nut with soft hammer. *NOTE - DO NOT BACK NUT OFF TOO FAR AS SHOES WILL MOVE OUT OF POSITION WHEN NUT IS TIGHTENED.* Move anchor pin up or away from center of drum to reduce clearance at anchor end of secondary shoe, and down to increase clearance. Tighten anchor pin nut securely and recheck secondary shoe clearance.

Hand Brake Adjustment: All Pass. Cars & F-100 Truck - Adjust service brakes. With service brakes fully released, place parking brake lever in fully applied position. Equalizer should not touch frame crossmember. Adjust cable from control handle to equalizer lever as necessary. There should be no slack in parking brake cables with control lever in fully released position. To adjust, loosen locknut on equalizer rod, tighten adjusting nut to remove slack. Pull cables alternately to equalize tension on each through yoke, tighten locknut. *CAUTION* - Overtightening cables will pull rear brake shoes off their anchors.

Ford F-250, F-350, P-350 Trucks - These models have independent parking brake on propeller shaft at rear of transmission. *See "Ford Truck Self-Centering" Brake for adjustment data.*

BLEEDING BRAKE SYSTEM & OVERHAUL OF BRAKE UNITS: *See "Hydraulic Brake Servicing" in Brake Section of Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

FORD TRUCK SELF-CENTERING

Ford Trucks - B,C,F,P-500; B,C,F-600 (1956) Rear Brakes Only.

►CHANGES, CAUTIONS, CORRECTIONS

►*FRONT WHEEL BRAKE CAUTION: Ford-Bendix "Uni-Servo" type brakes used on front wheels of these models.*

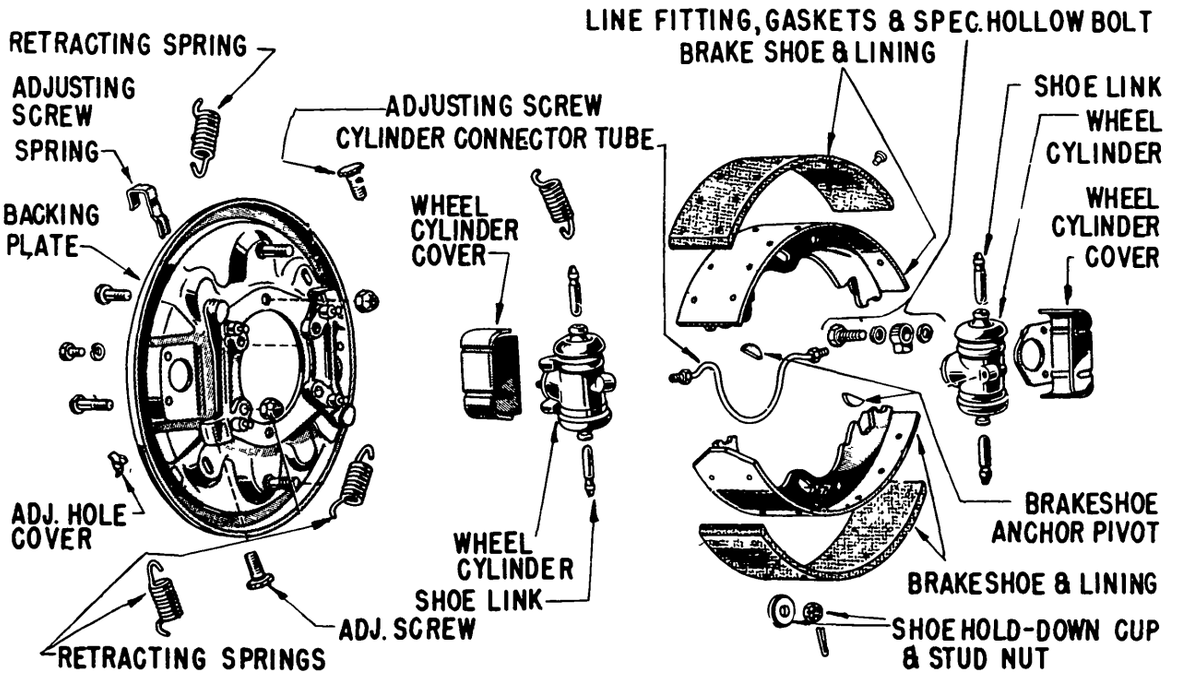
►*POWER BRAKE NOTE: "Hydrovac" or "Midland Hi-Power" Standard or Optional on these trucks. See "Hydrovac" or "Midland Hi-Power" under Power Brakes.*

DESCRIPTION: Two-cylinder, two-shoe, four-anchor type hydraulic brakes. Each shoe is anchored at each end and linked to wheel cylinder at each end so that all shoes are self energizing for both forward and reverse motion. All shoes are radially self-centering.

ADJUSTMENT: Make adjustments with brake drums at normal temperature and with wheels either jacked up or contacting road (if wheels on road so they cannot be turned to check for drag, make this check by striking drum with a hammer - sound will be deadened if shoes contacting drum). Remove two adjusting hole covers on backing plate (adjacent to right hand anchor bolt at each wheel cylinder), insert tool through slot and turn notched adjusting screw "star wheel" until linings drag on drum, then back off adjusting screw until wheel is free of drag. Depress pedal to centralize shoes and recheck wheels. Adjust each shoe in each wheel in this manner. *NOTE* - When brake linings are replaced, an additional adjustment is required. Adjust shoe hold-down bolt until a clearance of .025" is obtained (measure from brake shoe to gauge surface on brake plate). Gauge surface is machined boss on brake plate which is in line with hold-down bolt.

Brak P dal Adjustment: Pedal must have at least 3/16" but not more than 3/8", free travel measured at pedal pad before master cylinder piston begins to move. To adjust, loosen locknut on brake pedal to master cylinder pushrod, rotate rod until free travel within limits, tighten locknut.

Parking Brake Adjustm nt: On cable controlled parking brakes, move parking brake lever to fully released position. On transmission mounted parking brake levers set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, then adjust clevis rod to allow flat portion of cam to rest on brake band bracket. Install clevis pin and cotter pin. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until clearance of .010" is established between brake lining and brake drum at anchor bracket. Loosen lock nut on adjusting screw for lower half of brake band, adjust screw to establish .010" between brake lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting nut until .010" clearance established between upper half of band and drum. Be sure to install lock wire in anchor adjusting screw.



FORD TRUCK SELF-CENTERING BRAKE ASSEMBLY

DISASSEMBLY: *NOTE* - Brakes can be serviced without removing hubs or disturbing wheel bearings. Remove wheels, then screws holding drum to hub (mark drum and hub to insure correct assembly). *(CAUTION - If wheel cylinder connecting tubes and bleeder screws removed, mark ports to which tubes attached to assure correct reassembly).* Disassemble brakes as follows: Remove retracting springs with Tool 2035-N. Remove brake shoe hold-down screw, then brake shoes.

REASSEMBLY: *(NOTE* - For best results, new shoe and lining assemblies should have the lining of correct thickness ground to proper radius concentric with brake drum. If linings are not ground, it may be necessary to readjust the linings after the linings have been "worn in". Make sure no nicks or burrs are on shoe edge at point of contact with brake plate). Place light film of Lubriplate on primary (sliding pivot) anchor and shoe bearing surfaces on brake plate. Position brake shoes in anchors and in slotted ends of wheel cylinder. Apply light film of Lubriplate to hold-down screw, then install hold-down screw, washer and nut. Tighten hold-down nut until there is a clearance of .025" between center (of three) machined bosses on plate and edge of shoe. This clearance necessary to hold shoe parallel to drum or prevent shoe from binding against outer machined bosses. Install retracting springs (Tool 2035-N), wheel cylinder brake pipe, drum assembly, wheel. Adjust brakes.

BLEEDING BRAKE SYSTEM: Bleed **top** wheel cylinder **first,** then lower. If power unit used, unit must be bled before wheel cylinders, with engine off and no vacuum in power unit system. *See "Hydraulic Brake Servicing" in Brake Section of Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

FORD TRUCK BENDIX UNI-SERVO

Ford Trucks—F-250; F, P-350; B, C, F, P-500; B, C, F-600 (1956) Front Brakes Only.

►*REAR BRAKE CAUTION: Different type brakes used on rear wheels as follows:*
F-250; F, P-350—"Ford-Bendix" Hydraulic, Duo-Servo type. *See "Ford, Lincoln, Mercury Bendix".*
B, C, F, P-500; B, C, F-600—Ford "Self-Centering" type. *See "Ford Truck Self-Centering".*

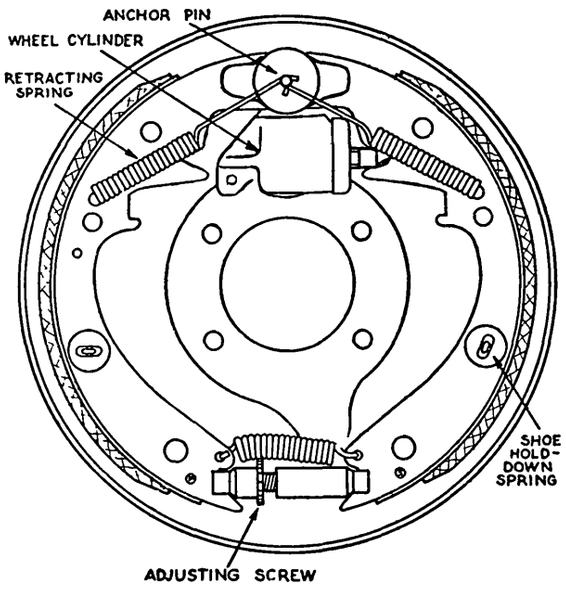
►*POWER BRAKE NOTE: "Hydrovac" or "Midland Hi-Power" Standard or Optional on these trucks. See "Hydrovac" or "Midland Hi-Power" under Power Brakes.*

DESCRIPTION: Bendix "Uni-Servo" single anchor, hydraulic type with single-acting wheel cylinder mounted on the backing plate and actuating the primary shoe through a strut (no direct connection to secondary shoe). Brake shoes are conventional Bendix type (joined by adjusting screw at lower end, single anchor between shoes at upper end with retracting springs hooked to each shoe and anchor pin). Wheel cylinder has single piston and cup with a return spring seated in the end of the cylinder.

ADJUSTMENTS: Make adjustments with brake drums at normal temperature and with wheels either jacked up or contacting road (if wheels on road so they cannot be checked for drag, make this check by striking drum with a hammer—sound will be deadened if shoes contacting drum).

Minor Adjustment: Remove adjustment hole cover from brake carrier plate. Rotate adjusting screw, with a suitable tool, until shoe begins to drag, then back off shoe until drum can be turned without drag.

Major Adjustment: Wedge primary shoe against the drum by inserting a .010" feeler gauge through slot in drum at center of secondary shoe and expand shoes by turning adjusting screw. Then adjust adjusting screw and anchor pin (slotted type) for .010" clearance at each end of secondary shoe (measure 1½" from each end of shoe).



UNI-SERVO BRAKE ASSEMBLY

Brake Pedal Adjustment: Brake pedal free travel should not be less than 3/16" nor more than 3/8" before push-rod touches master cylinder piston. Adjustable at master cylinder pushrod.

Parking Brake Adjustment: Set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, then adjust clevis rod to allow flat portion of cam to rest on brake band bracket. Install clevis pin and cotter pin. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until clearance of .010" is established between brake lining and brake drum at anchor bracket. Loosen locknut on adjusting screw for lower half of brake band, adjust screw to establish .010" between brake lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting nut until .010" clearance established between upper half of band and drum. Be sure to install lock wire in anchor adjusting screw.

BLEEDING BRAKE SYSTEM & OVERHAUL OF BRAKE UNITS: *See "Hydraulic Brak S rvicing" in Brak Section of Manual.*

TROUBLE SHOOTING: *Se "Hydraulic Brake Tr ubl Shooting" in Brake Section of Manual.*

1956 CLUTCH INDEX

BUICK Pag
Series 40 Own 326

CHEVROLET
Own..... 326
Borg & Beck 325

CHRYSLER & DE SOTO
Borg & Beck 325

DODGE
Borg & Beck 325
Auburn 326

FORD
Long 324

HUDSON Pag
Borg & Beck 325

MERCURY
Borg & Beck 325

METROPOLITAN
Borg & Beck 325

NASH
Borg & Beck 325

OLDSMOBILE
Long 324

PACKARD
Long 324

PLYMOUTH Pag
Borg & Beck 325
Auburn 326

PONTIAC
Inland 326

RAMBLER
Borg & Beck 325

STUDEBAKER
Borg & Beck 325
Long 324

WILLYS
Borg &Beck 325
Auburn 326
Rockford 326

1956 CLUTCHES

LONG "CF"

FORD PASS. CARS	Long Model Nos. Model	Assy. No.
6 Cyl. (S-M)	9½CF	268594
8 Cyl. (S-M)	10CF	265125
Thunderbird (S-M)	11CF	265126
Pol. & Taxi (Interceptor) (S-M)	11CF	265126
Heavy Duty (S-M)	11CF	265126
FORD TRUCKS		
See Ford & Long Clutch Part Nos. on Truck Model page.		
OLDSMOBILE		
All (S-M)	11CF	262832
PACKARD		
All (S-M)	11CF	268349
STUDEBAKER		
Goldenhawk (Overdrive)	11CF	ℂ 403502

ℂ - Studebaker No.

S-M - Cars with synchro-mesh transmission.

DESCRIPTION: Single plate, dry disc type. Release levers formed with weight on outer ends which increases pressure on driven member as engine speed increases. Levers pivoted on pressure plate on needle bearings with fulcrum located in yoke support on cover plate. Hardened-steel screw contact provided on lever tips.

REMOVAL OF CLUTCH: *See "Clutch" on car model page.*

DISASSEMBLY, REASSEMBLY & ADJUSTMENT: *See complete "Long 9CF, 9½CF, 10CF, 11CF" Clutch in Manual and note following specifications*

Pressure Plate: Pressure plate refacing by grinding or turning down on lathe will throw release levers out of adjustment. If pressure plate being refinished remove .020" from face and install spacer washer .015" thick on release lever yoke under cover. *NOTE*–If washers are found on release lever yokes under cover when clutch disassembled, replace these washers (if old pressure plate used) or discard washers (if new pressure plate installed).

Release Lever Height (Front): Height should be within .031" of each other. Replace cover and pressure plate if not.

Clutch Springs: Pressure springs should check with table below. Replace springs if weak or burned or if clutch has been subjected to excessive heat.

Clutch Spring Specifications

Cover Assy.	Spring, No. & Color	Lbs. Pressure
L1478	9 - Brown	ℂ 145-153
L5222, 265125	9 - Bronze	② 137-147
262832	9 - Orange	ℂ 170-180
264300, 265126	9 - Br. & Wh.	③ 154-164
268349	3 - Aluminum	④ 200-210
	6 - Pea Green	⑤ 170-180
268594	6 - Aluminum	⑩ 200-210
403502 ℄	9 -	

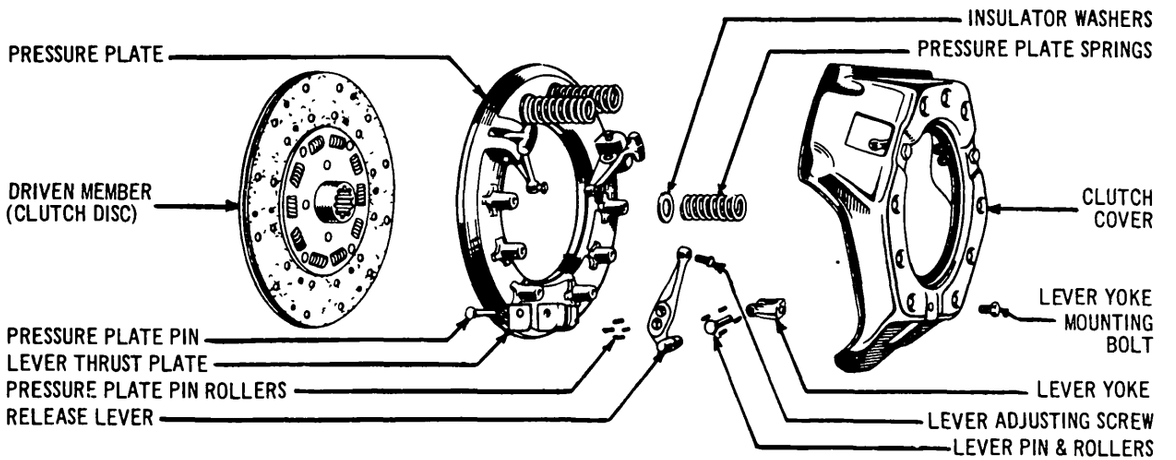
ℂ - Pressure at height of 1 9/16".
② - Pressure at height of 1.747".
③ - Pressure at height of 1.736".
④ - Pressure at height of 1.751".
⑤ - Pressure at height of 1.762".
℄ - Studebaker No.

►*RELEASE LEVER SETTING CAUTION:* Lever settings below supersede previous specifications for these clutches.

Release Lever Settings
(Borg-Warner Fixture No. UF-300 & 400)

Clutch Assembly	Lever Height
L1478	2 7/32"
L5222	1 13/16"
262832	1 7/8"
264300	
265125	
265126	
268349	1 15/16"
268594	2 5/16"
403502	

DRIVEN MEMBER: *See Car Model Pages for Part Nos.*
►*LONG DRIVEN MEMBER (Pontiac): Used with clutch of another make.*



LONG "CF" CLUTCH ASSEMBLY

BORG & BECK TYPE "A"

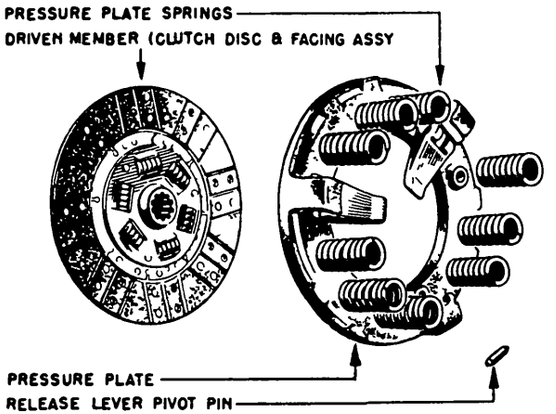
	Mdl	Assy.
CHEVROLET PASS. CARS		
V8 (Std. & Overdrive) Pow Pack	10A9	361404
Corvette	10 5A9	361402
CHEVROLET TRUCKS		
3000, 4000 Series Std (V8)	10 5A9	361402
5000, 6000 Series Std. (V8)	11A9	361403
3000, 4000 Series Hvy Duty (V8)	11A9	361403
CHRYSLER		
C71 Windsor	10A7	361376
DESOTO		
S23 Firedome	10A7	361376
S23 Firedome Hvy Duty	11A6	361382
DODGE		
D62 6 Cyl Std	9A7	361373
D62 6 Cyl Sta. Wgn	10A7	361368
D62 6 Cyl. O D	9A7	951
D63 V8 Std.	10A7	361376
D63 V8 Hvy Duty	11A6	361382
HUDSON		
Wasp, Std. & O D	9A7	361361
Wasp Hvy Duty	9A7	361362
Hornet, Std & O D	10A6	361385
MERCURY		
All Models	10A6	361354
METROPOLITAN		
All Models		① 8112097
NASH		
Statesman	8 5A7	361391
Ambassador	10A7	950
PLYMOUTH		
P28 Six Cyl.	9A7	361373
P29 V8	10A7	361368
P28 Six Cyl Hvy. Duty	10A7	361368
P29 V8 Hvy. Duty	11A6	929
RAMBLER		
All Models Std.	8 5A7	361391
Heavy Duty	9A7	361362
STUDEBAKER		
Champion	9A7	361365
Commander	10A7	361371
President	10A6	361386
WILLYS		
6 Cyl Utility (4x2) ②	9A7	951
6 Cyl. Utility & Truck (4x4 & 4WD) ②	10A7	360982

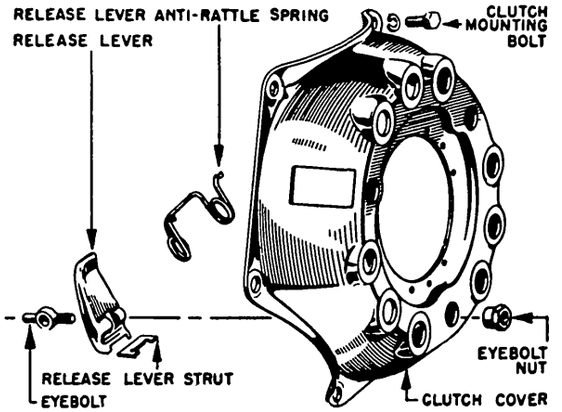
① - Metropolitan Part No.
② - Auburn & Rockford Clutches used on 4 Cyl. models.

►CHANGES & CORRECTIONS

►*NASH & HUDSON SPECIAL V8 CLUTCH SLIPPAGE CORRECTION* When slippage condition is encountered, install Clutch Spring Set, Part No. 3200026 (three light green & six light blue springs) in original cover and adjust lever height flush with hub with Gauge Plate J-1507 or J 5490. See Spring Specifications below

DESCRIPTION Single plate, dry disc Three release levers mounted on bolts piloted in pressure plate and held in clutch cover, actuate clutch through struts which provide 'knife-edge' action





BORG & BECK CLUTCH

REMOVAL OF CLUTCH: *See "Clutch" on car model page*

DISASSEMBLY, REASSEMBLY & ADJUSTMENT: *See complete "Borg & Beck Models 8A7, 9A7, 10A7, 11A6" Clutch in Manual and note following specifications.*

Clutch Springs: Note spring color and install in same relative position (groups of two different springs used on some clutch models) Springs should check with table below Replace springs if weak or burned or if clutch has been subjected to excessive heat

Clutch Spring Specifications

Clutch Assy.	Springs–No. & Color	Pressure
929	6–Purple	①⑤ 135 lbs
	6–No Color	①⑤ 155 lbs
950	9–No Color	①⑤ 155 lbs
950 ⑧	9 - No Color	① ⑤ 155 lbs.
950 ⑨	6 - Lt. Blue	① ⑤ 165 lbs.
	3 - Lt. Green	① ⑤ 175 lbs.
951	9 - Tan	① ⑩ 160 lbs
361354	6–Dark Blue	③⑤ 190 lbs
	6–Green	①⑤ 110 lbs
361361	3–Red	②⑩ 195 lbs
	3–Black	③⑩ 230 lbs
361362 & 361391	6 - Black	③ ⑩ 230 lbs.
361365	3–Orange	①⑩ 170 lbs
	3–Black	③⑩ 230 lbs
361368	9–Dark Blue	③⑤ 190 lbs
361371 & 360982	9–Light Green	①⑤ 175 lbs
361373	3–Black	③⑩ 230 lbs
	3–White	②⑩ 245 lbs
361376	9–Brown	②⑤ 230 lbs
361382	6 - Lt. Green	① ⑤ 175 lbs.
	6 - Dk. Blue	③ ⑤ 190 lbs.
361385 ⑩ & 361386	6 - Brown	② ⑤ 230 lbs.
	3 - Purple	① ⑨ 135 lbs.
361402	6 - Tan	① ⑩ 160 lbs
	6 - Yellow	① ⑨ 140 lbs.
361403	6 - Black	③ ⑩ 230 lbs
	3 - Orange	① ⑩ 170 lbs.
361404	6 Red or No Color	② ⑩ 195 lbs.
	3 - Tan	① ⑩ 160 lbs
8112097 ①	9 -	① ⑥ 135 lbs

①–Plus or Minus 5 lbs ②–Plus or Minus 6 lbs. ③–Plus or Minus 7 lbs ④–Working Height 1½" ⑤–Working Height 1 11/16" ⑥–Working Height 1 13/32" ⑦–Metropolitan Part No. ⑧– Except "Special V8" with Spring Set No 320026 (3 Lt Green & 6 Lt. Blue springs) ⑨ - 'Special V8" with Spring Set No. 3200026. ⑩ - Except "Special V8" with Spring Set No 3200026. For spring specifications with Spring Set No. 3200026, see 950 ⑨ Clutch Assy above.

Release Lever Setting
(Borg-Warner Fixture No. UF-300 & 400)

Clutch Assy.	Lever Height
929	① 2 1/8"
950	2 5/32"
951, 361361, 361362	2 3/16"
360982	2 1/16"
361354	2 1/4"

① - Setting with baffle 1/16" higher.

(For use with Chrysler Fixture C-585-A)

Clutch Assy.	Spacer No.
929, 3613382	19 or 21
950	20
361368, 361376	44
361373	20

Release Lever Setting (Using Gauge Plate)

Clutch Assembly	Gauge Plate
950, 361361, 361362, 361391	① J-1507 or J-5490
361365, 361371, 361386	② J-4708
361385	① J-1507 or J-5490
361402, 361403, 361404	③ J-6546
8112097	⑨ J-5567

① - Set release levers flush with bottom of gauge with offset of gauge 1/32" above hub (361362, 85, 91), 1/16" below hub (361361), flush with hub (950).
② - Set release levers flush with bottom of gauge using 3/16" step (361865), 1/8" step (361371), 1/16" step (361386).
③ - Set release levers flush with bottom of gauge using step marked 10" (361404), 10½" or 11" (361402, 3)
⑨ Set release levers flush with bottom of gauge
Setting - *See "Release Lever Adjustment (Without Fixture)" under "Borg & Beck Type A" Clutches in Manual.*

DRIVEN MEMBER: *See Car Model pages for Part Nos.*

BUICK (OWN)

►CHANGES, CAUTIONS, CORRECTIONS

1939-55 REPLACEMENT CLUTCH ASSEMBLY (Series 40 & 50): New "finger type" Clutch Assembly, No. 1392653, similar to 1956 Series 40 Clutch is furnished for service to replace previous "Crown Spring" Clutch No. 1393485 (used on 1939-55 Series 40 and 1940-52 Series 50). Individual parts are still furnished for Crown Spring Clutches. New Release Bearing should be used with this replacement clutch as follows

Replacement Clutch Release Bearing – When "finger type" clutch installed, it is recommended that new type Clutch Release Bearing, Buick Part No. 1310983, be used with this clutch. This bearing has flat face for release lever contact (previous type release bearing has rounded face).

►*CLUTCH EQUALIZER INTERFERENCE CORRECTION (Early Cars)* To correct, grind approximately 1/8" off end of equalizer and remove 1/4" off each end of reinforcement ridge. Correction has been made in later production cars.

►*CLUTCH RELEASE LEVER PRODUCTION CHANGE (Elimination of Release Lever Adjustment After 1st 5000 Cars)* First 5000 cars had release lever adjustment and can be identified by buttons threaded into inner ends of release levers. All later release levers have buttons welded into release levers and are not adjustable

DESCRIPTION: Single plate, dry disc type.

RELEASE LEVER ADJUSTMENT (1st 5000 Cars): Mount dial indicator on Support J-1013, set support on flat surface, press indicator stem down against surface until indicator hand has made one revolution, then tighten indicator to support and set indicator at zero. Place adjusting gauge, J 1036 on spare flywheel, then place clutch assembly on gauge so release levers are directly above machined bosses of gauge. Install cover bolts and tighten each one several turns at a time until all are uniformly tight Place support and indicator on machined hub of gauge so that indicator bears on adjustable button Indicator should read plus or minus .031" and release levers should read within .031" of each other. Adjust buttons to bring levers within limits. Stake buttons to release levers and recheck settings.

RELEASE LEVER CHECK (After 1st 5000 Cars - Non-Adjustable Levers): Proceed as in "Release Lever Adjustment" above. If variation between levers exceeds .031" or any part of clutch assembly is defective, clutch pressure plate and cover assembly must be replaced as a unit.

REMOVAL: *See "Clutch" on Car Model pages.*

OVERHAUL: Clutch cover and pressure plate serviced by replacement.

INSPECTION: Wash all metal parts of clutch, except release bearing and driven plate, in suitable cleaning solution.

Flywheel & Pressure Plate - Examine friction surface for scoring or roughness. Smooth with fine emery cloth, but if deeply scored or grooved, replace part.

Clutch Cover - Inspect cover for cracks or distortion. Check clearance between pressure plate driving lugs and edges of slots in cover with feeler gauges. Clearance should be .005- 008" (excessive clearance may cause rattle when engine intermittently accelerated with clutch disengaged)

Driven Plate - Inspect condition of facings, for loose rivets, broken or very loose torsional springs, and flattened cushion springs. Replace as required.

Driven Plate Run-Out Check - Slide driven plate, **front side first,** over transmission main drive gear until it is tight on spline, then set up dial indicator to bear against plate facing. While holding firmly against front end of main drive gear to take up play in main drive gear bearing, slowly rotate driven plate and observe amount of run-out. If run-out exceeds .025", replace driven plate. **Bearings** - Inspect for scoring or excessive wear on front contact face. Test for roughness of balls and races by pressing and turning front race slowly. Inspect main drive gear pilot bearing in crankshaft. Replace if rough or worn, using Puller J-164 for removal.

DRIVEN MEMBER: Long No CD873. Buick No. 1391632

CHEVROLET (OWN)

CHEVROLET MODEL	Clutch Assy. No.
Pass. Car, 6 Cyl	3836715
Pass Car V8	3836723
Pass. Car, All (Heavy Duty)	3836719
Commercial (6 Cyl. Exc. Fwd. Control)	3836715
Commercial (6 Cyl. Heavy Duty)	3836719

DESCRIPTION: Single plate "Diaphragm Spring" type of same design used on previous models.

Clutch Plate

Car Model	Part No.
Pass. Car 6 & V8, Comm. 6	3704776
Pass. Car 6 & V8, Comm. 6 Hvy. Duty	3702402

REMOVAL: *See "Clutch" on car and truck model pages.*

OVERHAUL: *See "Chevrolet (Own)" Clutch in Manual.*

INLAND

Pontiac V8 (1956)

DESCRIPTION: Single plate, dry disc type. Clutch cover and spring assembly is made up of the cover, pressure plate, drive release straps, and clutch spring (diaphragm disc type). Same design as previous models.

Clutch Cover & Spring Assembly: Pontiac No. 758513.

Clutch Driven Member: Pontiac No 518130. Long No. 284585

OVERHAUL: Clutch cover and spring assembly is of riveted construction. Manufacturer recommends replacement of clutch driven plate assembly and cover and spring assembly when servicing required.

ROCKFORD

Model 8½ RM

Model	Rockford No.
Willys, 4 Cyl. (1956) ①	165317

① - Auburn Clutch also used.

DESCRIPTION: Single plate, three-lever type with six springs positioned in pairs adjacent to levers

REMOVAL: *See "Clutch" on car model pages.*

DISASSEMBLY: *NOTE*–Clutch cover and pressure plate assembly need not be disassembled when replacing driven member unless springs are to be replaced or other work performed. To disassemble, place cover assembly in arbor press, compress cover sufficiently to relieve clutch spring pressure, remove release lever pivot pins, unhook lever springs, remove levers Release pressure slowly, lift off cover

REASSEMBLY: Reverse disassembly procedure, make certain that pressure plate springs seated in pressure plate and cover and that lever springs correctly installed Check lever heights after assembly completed.

Clutch Springs: Check springs and replace if weak or burned. **Spring Pressure** - 170-180 lbs. at 1 3/32".

Spring Part No.–Rockford 105348.

Release Lever Setting: Manufacturer recommends use of Borg-Warner UF-300 or UF-400 Universal Fixture for lever adjustment. **Setting**–(165317) 2 5/16".

DRIVEN MEMBER: Borg & Beck "Borglite" type with spring dampener hub Borg & Beck No. 382298.

AUBURN

Car Model	Auburn No.
Dodge, 6 Cyl. (1956) ①	100052-2
Plymouth, 6 Cyl. (1956) ①	100052-2
Willys, 4 Cyl. (1956) ②	8501-39

①–Borg & Beck Clutch also used.
②–Rockford Clutch also used.

DESCRIPTION: Single plate, dry disc type of same design used on corresponding previous models

REMOVAL OF CLUTCH: *See "Clutch" on car model page.*

DISASSEMBLY & REASSEMBLY: *See complete "Auburn (Atwood)" Clutch in Manual and note following specifications:*

Willys Return Clip Spring Installation–Engage slot on flat end of spring under head of release lever adjusting screw, engage loop on curved end of spring over ridge on outer end of release lever

Clutch Spring Specifications

Car Model	Spring Pressure & Length
Dodge 6 Cyl.	254-280 lbs. at 1 1/16"
Plymouth 6 Cyl.	254-280 lbs. at 1 1/16"
Willys (8501-39)	220-230 lbs. at 1 9/16"

Release Lever Settings (C-585-A Fixture)

Car Model	Spacer No.
All (Exc. Willys 8501-39)	20
Willys 8501-39	17

DRIVEN MEMBER: *See Car Model pages for Part Nos.*

1956 REAR AXLE INDEX

BUICK Page
All Models 331
Rear Suspension . ..... See Suspension Index on Pg. 339 and also 1955 Annual Data, Pg. 339 or later Manual edition.

CADILLAC
All Models .. .. Pg. 322 in 1954 Annual Data or later Manual edition.

CHEVROLET
Pass. Cars, Sed. Del., ½-Ton Truck 334
¾, 1, 1½, 2-Ton Trucks . . .Pg. 297 in 1953 Annual Data or later Manual edition.
Truck, Heavy Duty .....Pg. 341 in 1955 Annual Data or later Manual edition.
Truck, 2-Speed. .... . .Pg. 342 in 1955 Annual Data or later Manual edition.

CHRYSLER, DESOTO, DODGE
All Models 327

FORD PASS. CARS
Pass. Cars, Separate Carrier... 336
Others, Integral Carrier. 337

FORD TRUCKS Page
Truck, Integral Carrier. . . Pg. 348 in 1955 Annual Data or later Manual edition.
Truck, Banjo Housing 337
Truck, 2-Speed..... ... Pg. 347 in 1955 Annual Data or later Manual edition.

HUDSON
Series 40, 60, 80.... 335
Series 50 (Spicer)..... 328
Rear Suspensions ..... See "Nash" on Pg. 325 in 1954 Annual Data or "Nash and Hudson" in later Manual edition.

LINCOLN
All Models.. 337

MERCURY
All Models... 337

METROPOLITAN
All Models ..... Pg. 326 in 1954 Annual Data or later Manual edition.

NASH
Series 40, 60, 80 335
Series 50 (Spicer) 328
Rear Suspension ....Pg. 325 in 1954 Annual Data or later Manual edition.

OLDSMOBILE Page
All Models ..... Pg. 351 in 1955 Annual Data or later Manual edition.

PACKARD
All Models 328
Twin Traction Differential 330

PLYMOUTH
All Models 327

PONTIAC
All Models 327

RAMBLER
All Models..... 335
Rear Suspension ..... See "Nash" on Pg. 325 in 1954 Annual Data or "Nash and Hudson" in later Manual edition.

STUDEBAKER
All Models..... 328

WILLYS
All Models (Spicer) 328
4-Wheel Drive (Timken).. Pg. 323 in 1954 Annual Data or later Manual edition.

1956 REAR AXLES

CHRYSLER, DE SOTO, DODGE, PLYMOUTH HYPOID

"BARREL" TYPE REAR AXLE

Chrysler C-71 (Exc. T & C Wgn. & Power Pkg. Cars) ① ③
Chrysler C-71 Town & Country & Power Pkg. Cars ② ③
Chrysler C-72 & C-73 All Models ② ③
Chrysler C-70 All Models & 300B ② ③ ④
DeSoto S-23 with Powerflite (Exc. Sta. Wgn.) ①
DeSoto S-23 Station Wagon ②
DeSoto S-24 All Models ②
Dodge V8 with Powerflite ①

① - Pinion bearings adjusted by shims located between bearing spacer and front bearing cone. No shoulder on pinion shaft.
② - Pinion bearing adjusted by a spacer washer located between shoulder on pinion shaft and front bearing cone.
③ - "Bolted" Barrel type.
④ - "Screwed" Barrel type.

► *BARREL TYPE DIFFERENTIAL CASE NOTE: "Bolted" type and "Screwed" type require different disassembly & reassembly procedures.*

DESCRIPTION: Hypoid gear, semi-floating type with either "Screwed" or "Bolted" type differential case. Pinion bearing pre-load is controlled with either shims or spacer washers as noted above.

REMOVAL OF REAR AXLE: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Chrysler, DeSoto, Dodge & Plymouth (Barrel Type)" in 1953 Annual Data or later Manual editions.*

"CAGE" TYPE REAR AXLE

DeSoto S-23 (Synchro-mesh Trans.) Exc. Sta. Wgn.
Dodge 6 Cyl. All Models
Dodge V8 (Synchro-mesh Trans.).
Plymouth, All Models

► *REAR WHEEL BEARING GREASE PLUG DISCONTINUED:* Bearings are packed at factory and additional lubrication is not required. If bearings are removed for any reason, they should be cleaned and repacked for reassembly.

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss drive.

REMOVAL OF AXLE: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Chrysler, DeSoto, Dodge, Plymouth (Cage Type)" in 1953 Annual Data or later Manual editions.*

PONTIAC HYPOID

All Models (1956)

► *PINION BEARING PRE-LOAD COMPRESSIBLE SPACER NOTE:* In production, a one-piece spacer is used for adjusting pinion bearing pre-load. A two-piece type spacer is furnished for service replacement, which replaces either a one-piece type or a two-piece type spacer.

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss drive, of the same design as used on previous models.

REMOVAL OF REAR AXLE ASSEMBLY: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Pontiac Hypoid" in 1950-51 Annual Data or later Manual editions.*

METROPOLITAN HYPOID

1500 Series (1956)

► *PINION BEARING PRE-LOAD ADJUSTMENT NOTE:* A compressible spacer is used in place of shims for adjusting pinion bearing pre-load. *CAUTION* - Whenever the rear universal joint companion flange nut is loosened for any reason, the pinion bearing pre-load must be readjusted. See "Overhaul" below.

DESCRIPTION: Three quarter floating, hypoid gear, with Hotchkiss drive. Rear axle assembly is the same design as used on previous models.

REMOVAL: *See "Rear Axle" on Car Model page.*

OVERHAUL: Service procedures are the same as for previous models. *See "Metropolitan (Hudson & Nash) Hypoid" in 1954 Annual Data or later Manual edition and note the following:*

Pinion Bearing Pre-Load Adjustment: A pinion shaft crushable spacer, Part No. 8112309 is used in place of the former shims located behind front bearing. With differential assembly removed from carrier, install pinion gear and shaft assembly (pinion gear, bearings, spacer, seal, dust cover, companion flange, washer and nut) and tighten companion flange nut until a torque of 12-17 inch-pounds is required to rotate pinion shaft assembly.

(CAUTION - After the new spacer has been used once, it cannot be used again to adjust pinion bearing pre-load).

SPICER HYPOID

Hudson Hornet Special V8 (1956)
Nash Ambassador Sp cial V8 (1956)
Packard, All M d ls (1956)
Studebak r, All Models (1956)
Willys Utility Mod ls (1956) ① ②
① - Timken Spiral Bevel, Semi-floating rear axle is used alternately on L6-226 4WD Jeep Truck.
② - Willys 4WD Front Axle overhaul procedures are the same as for rear axles (Spicer).

DESCRIPTION: Hypoid gear, semi-floating type. A torque tube drive is used on Nash & Hudson. Other models have Hotchkiss drive.

REAR AXLE ASSEMBLY REMOVAL: *See "Rear Axle" on Car Model pages.*

AXLE SHAFT REPLACEMENT: *(NOTE* - Wheel bearing adjustment can be made without removing axle shafts, see below). Remove wheel, take off axle shaft nut and washer and use a puller to remove hub and brake drum assembly. Disconnect brake line at wheel cylinder and brake cable at backing plate. Take out bolts mounting oil seal assembly and backing plate on axle housing flange and remove backing plate *(CAUTION* - Be careful not to lose axle shaft endplay shims located between backing plate and axle housing flange). Remove axle shaft and wheel bearing assembly.

AXLE SHAFT ENDPLAY (WHEEL BEARING) ADJUSTMENT: Total endplay for both shafts should be as noted below. Endplay is controlled by shims located between backing plate and axle housing flange (right side only). *(NOTE* - A permanent shim pack may be found on left side of housing on some cars (.060"). On cars without shim pack on left side, the axle housing has been machined .060" longer for inside centering of axle shaft in spacer block). Adjust endplay to correct specification (see table below) by adding or removing shims from right side of axle only. Shims are available in .003", .005", .010", .030" thicknesses.

Axle Shaft Endplay

Mod l	Endplay
Hudson & Nash	.001-.004"
Packard	.001-.006"
Studebaker	.001-.006"
Willys	.001-.006"

► *HUDSON & NASH SERVICE REPLACEMENT TORQUE TUBE TRUNNION INSTALLATION: See "Hudson, Nash & Rambler" Rear Axle.*

TORQUE TUBE & PROPELLER SHAFT (HUDSON & NASH): Removal - Raise and support rear end of body. Disconnect hand brake cable at equalizer and remove hand brake bellcrank assembly from torque tube. Disconnect rear stabilizer bar at rear axle tube. Remove truss rods at axle tubes and at center bracket on torque tube. Disconnect torque tube from transmission adapter and move axle assembly and tube to rear to disengage propeller shaft from transmission. Disconnect rear of torque tube from rear axle housing and move tube forward sufficiently to expose coupling. On Hydra-Matic Drive cars, disconnect coupling flange and remove torque tube and propeller shaft. On synchro-mesh transmission cars, the coupling is a slip fit on pinion shaft and a press fit on propeller shaft. On Hydra-Matic Drive cars, remove pinion flange with Puller J-2984.

Installation: Reverse removal procedure, and note the following: Support pinion from rear while pressing companion flange on pinion shaft (Hydra-Matic Drive cars). On synchro-mesh transmission cars, install propeller shaft oil seal and retainer on propeller shaft. Butt propeller shaft at front end against a wood block and drive coupling on shaft with a lead hammer. *(CAUTION* - Do not install the seal and retainer on coupling prior to its installation on propeller shaft). Coupling must be driven on shaft to shoulder on splined area inside coupling. Install spacer, lubricate ground surface on coupling and the torque tube rear oil seal with rear axle lubricant. The propeller shaft with coupling can now be installed on pinion shaft (do not crimp lip of oil seal). Make sure that torque tube seal contacts coupling on the ground surface of coupling.

DISASSEMBLY: Rear Axle Housing - Drain lubricant from housing and remove axle shafts (see above). Check ring gear runout with a dial indicator placed against rear face of ring gear. If runout exceeds .003", check for cause of runout. Excessive runout may be due to warped ring gear, sprung differential case, carrier bores not parallel, or loose differential bearings. If differential case is sprung, it must be replaced. Remove differential caps, noting that each is marked and that a corresponding mark is located on rear cover gasket surface of housing. Pry differential case out of housing (do not pry on ring gear). Remove pinion shaft companion flange with a suitable puller and drive pinion shaft out of forward bearing using a brass drift. Remove pinion assembly from housing. Drive front bearing and oil seal out of front of housing, then drive rear bearing cup out of rear of housing. When removing rear bearing cup, retain the pinion gear depth shims located between cup and bore in housing, as the thickness of this shim pack must be known for correct setting of pinion at reassembly.

Differential Case: Remove differential side bearings with a suitable puller (J-2497, Hudson & Nash, J-986-A, Studebaker. W-104, Willys). *(NOTE* - Recesses are cast in differential case to allow puller to bear on bearing cone). Remove screws attaching ring gear to differential case and tap ring gear from differential case with a brass drift. Do not nick ring gear face of case or drop the assembly. Use a suitable punch to drive out lock pin which holds pinion shaft in place. Drive out pinion shaft and remove thrust block through differential side gear opening. Roll differential pinions around on side gears until they can be lifted out through holes in case. Remove side gears and thrust washers.

REASSEMBLY: Differential Case - Install thrust washers on side gears and install gears in bores of differential case. Install thrust washers behind the differential pinion gears and mesh gears with side gears so that holes are opposite and in line with each other. Roll gears around until gear holes are aligned with differential pinion shaft hole in case. Install pinion gear shaft with the lock pin hole in line with lock pin hole in differential case. Install thrust block through a side gear, aligning hole in block with differential pinion shaft. Press differential pinion shaft in place and measure the clearance between differential side gear and case. This clearance should not exceed .008" (the side gears should not fit tight enough to require more than eight ft. lbs. torque to turn differential gears. This may be checked by installing an axle shaft and using a torque wrench to turn shaft). Drive lock pin into place and upset end of pin to retain it in place. Place ring gear on differential case and bolt it in place with cap screws using two cap screws installed at opposite sides to pull gear into position. Tighten capscrews to 50-55 ft. lbs. (Hudson & Nash); 45-55 ft. lbs. (Studebaker); 40-50 ft. lbs. (Willys). Be sure that ring gear is pulled down evenly on differential case. Press differential side bearings on differential case (without shims behind bearings). Install case assembly in housing and install bearing caps, making sure that bearing cap identification marks correspond to marks on gasket surface of housing. Tighten bearing cap bolts finger tight. Mount a dial indicator with contact button against back face of ring gear. Insert two screw drivers between bearing cup and housing. Force differential assembly to one side as far as possible. Set dial indicator to zero and shift differential as far as possible to opposite side; note and record reading (this reading denotes shim requirements to be installed later between differential assembly and bearing cones). Remove side bearing caps and remove differential assembly.

PINION DEPTH SETTING: (Hudson & Nash) - The amount of shims used is determined by the amount of shims removed at disassembly and by the plus or minus figure etched on pinion. For example, if original pinion was marked + 2 and had a shim pack of .035" behind rear bearing cup and the new pinion to be installed is marked −1, the shim pack must be increased by .003" to bring the new pinion to its correct position. Install the pinion front bearing cup with Replacer J-2534 or J-5367. Insert pinion in position and install front bearing cone and cup. Check pinion setting as follows: Mount discs J-2499-2 on Arbor Gauge J-6482-1 or discs J-5223-5 on Arbor Gauge J-5223. Install gauge seated squarely in housing bores. Place bearing caps in position and tighten bolts finger tight. Install Gauge Block J-5223-16 in position against end of pinion gear and clamp in place with Clamp Bar and Screw J-5223-6 and J-5223-14. Loosen thumb screw in end of gauge block and move plunger out until head contacts gauge arbor. Lock plunger in

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SPICER HYPOID (Cont.)

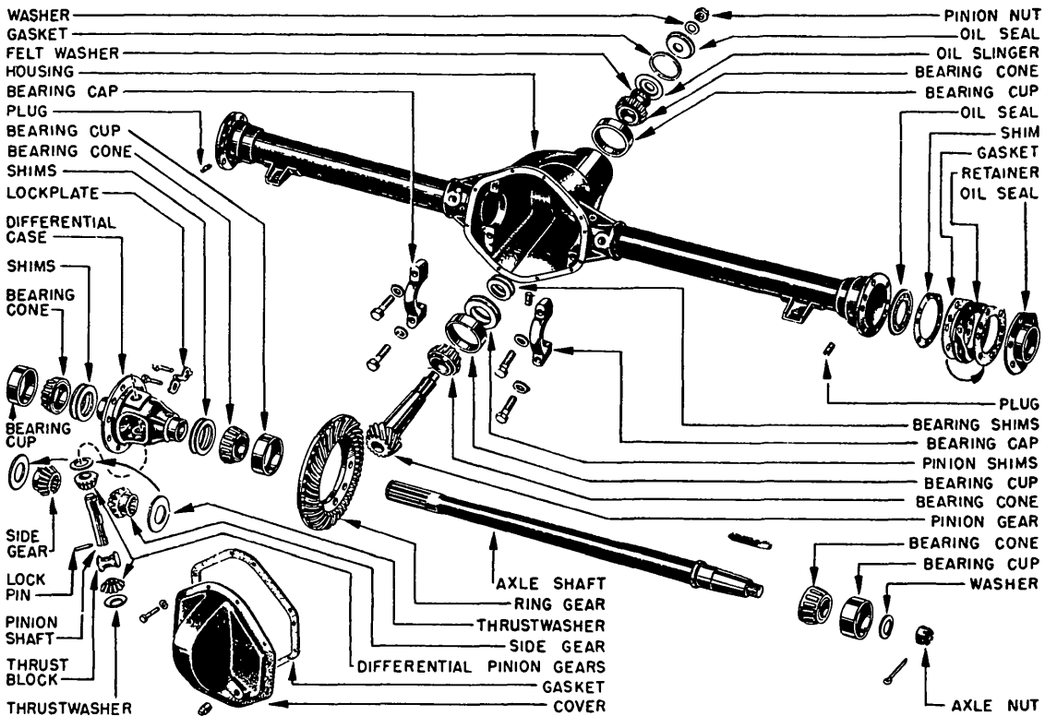
place with thumb screw, being careful not to disturb position of plunger. Loosen screw in clamp holding gauge block against pinion and remove gauge block. Measure distance from end of anvil to top of plunger head with a two to three inch micrometer. This measurement represents the distance from rear face of drive pinion to centerline of rear axle, and should be 2 625". This measurement applies only to correctly adjusted pinions marked "0". On a pinion marked +2, the reading should be .002" less than this figure and with a pinion marked −3, the reading should be .003" greater. If micrometer reading shows pinion setting is incorrect by more than .002" plus or minus from the given figure, shims equal to that amount must either be added or removed from shim pack between rear bearing cup and housing.

Studebaker & Packard: Fasten the bar of Gauge J-589-D to axle housing, using two rear cover screws, so that hold down bolt in bar holds Step Plate J-589-10-2 tightly against ground surface of pinion gear (make sure Step Plate is flat on pinion). Place the two large discs on ends of gauge bar which has the micrometer, and place this fixture in differential side bearing bores of housing. Adjust micrometer until it contacts step plate, and record reading. The etched number on ground surface at end of pinion indicates the correct setting for that pinion (in the proper axle housing). These marks are referred to a "zero setting" which is standard for all housings of the same type. See "Studebaker-Packard Zero Settings" below For example, if the pinion setting is being checked in a Champion axle having a 4 56-1 ratio, and if the pinion is marked "0", the correct micrometer reading, using Gauge J-589-D would be .719". If pinion was marked +2, the correct setting would give a micrometer reading of .717", and if the pinion was marked −4, the correct setting would give a micrometer reading of .723". If the micrometer reading is not the one indicated in "Zero Setting" table (below), plus or minus the mark on pinion, add or remove shims between the rear bearing cup and housing as required to obtain as close a setting as possible.

Studebaker-Packard Pinion Zero Setting

Model & Ratio	Pinion Setting
Champion (3 54-1)	.625"
Champion (Other Ratios)	.719"
Comm. & Pres. (All Ratios)	.344"
Packard (All Ratios)	.344"

Willys: Use Pinion Setting Gauge W-99 which consists of a dial indicator and mounting fixture to be mounted on rear face of pinion (held in place with "C" clamp which is part of gauge). Before using this gauge, dial indicator must be set to "0" through use of a master gauge block, supplied with the equipment. Set dial indicator at "0" with gauge pin resting on correct lobe of master gauge (see "Pinion Gauge Setting" table below), and with one-half turn tension on the gauge pin. With pinion installed in axle housing (spacer W-126-6 can be installed on shaft in place of universal joint yoke), and with



SPICER SEMI-FLOATING HYPOID AXLE

pinion setting gauge in place, dial reading should be "0" for pinions marked "0", or **minus** for pinions marked "−", and should read **plus** for pinions marked "+", by an amount equal to the amount equal to the figure following the "+" or "−" sign on the pinion. Adjust by adding or removing shims from behind rear bearing cup in housing. Repeat test until correct dial reading is obtained.

Pinion Gauge Zero Setting

Model	Master Gauge Block
475 4WD Truck	"F"
6-226 4WD Truck	"F"
CJ-3B	"E"
CJ-5	"E"
CJ-6	"E"
DJ-3A	"D"
6-226 2X4 SW	"E"
475 2WD	"D"
4X475 SW	"E"
6-226 4X4 SW	"E"

PINION BEARING PRE-LOAD ADJUSTMENT: After pinion depth setting has been completed, remove pinion shaft and bearing assembly from housing and install shims (removed at disassembly) between front bearing and shoulder on shaft. Reinstall pinion shaft assembly in housing. Proceed as follows

Hudson & Nash: Install oil slinger, companion flange and nut (do not install oil seal). Check pre-load by attaching a spring scale to a "T" handle and socket, and rotate the pinion shaft on a horizontal plane. Add or remove shims from between front bearing and shoulder on shaft to obtain a pre-load of 25-35 inch-pounds required to rotate pinion shaft.

Studebaker, Packard & Willys: Adjust pinion by adding or removing shims between front bearing and shoulder on shaft so there is no endplay and there is a slight drag or resistance to turning.

DIFFERENTIAL SIDE BEARING & GEAR BACKLASH ADJUSTMENT: (Hudson & Nash) - Install differential case assembly in housing. Replace bearing caps in their proper position and tighten the cap screws finger tight. Insert two screw drivers between bearing cup and housing on the side opposite the ring and move differential assembly and ring gear away from pinion until opposite bearing cup is seated firmly against housing. Move screw drivers to ring gear side and move assembly over until ring gear teeth contact teeth of pinion Refer to recording of shim thickness required (taken at time differential case disassembled), and install the shims between

CONTINUED ON NEXT PAGE

SPICER HYPOID (C nt.)

bearing cups and housing. Divide total amount of shims between sides in such a manner that all ring gear and pinion backlash is eliminated. Remove bearing caps and take out differential case assembly. Keep each shim pack separate. Remove side bearings from differential and install shim packs on their respective hubs. Install an additional .015" thickness of shims behind the differential bearing on the tooth side of ring gear to provide proper backlash between gear and pinion and proper pre-load. Install bearings. Place axle housing spreader J-5231 in position and spread housing .020" maximum to permit installation of differential assembly. Install bearing caps and use sealing compound on bolt threads. Remove housing spreader and tighten bearing caps to 70-90 ft. lbs. Install dial indicator on housing with contact button resting against edge of ring gear tooth and check backlash between ring gear and pinion which should be .002-.006", and should not vary more than .002" between positions checked; check at four positions on ring gear.

Stud bak r & Packard: Place differential case in housing (without shims behind side bearings). Install a dial indicator on housing with contact tip against ring gear back face. Insert two large screw drivers between housing and cup on opposite side from ring gear and move ring gear away from pinion until bearing cone on ring gear side is seated firmly in its cup and against the housing. Set indicator at zero. Move assembly back toward pinion until ring gear meshes lightly with pinion (no backlash or clearance). This reading, less .003" is the thickness of shims required between differential case and side bearing on ring gear side of differential. To find thickness of shims required under other side bearing, subtract the thickness of shims just used from the total side movement obtained earlier (at reassembly of differential). To the figure thus obtained, add .008" shim thickness for pre-load. To facilitate installation of differential assembly in housing, cock the bearing cups and tap them lightly with a lead hammer. When reinstalling bearing caps, be sure numerals on caps and housing correspond. Tighten bearing cap bolts to 70-80 ft. lbs. Mount a dial indicator on axle housing with contact button against one ring gear tooth. Move ring gear by hand to check backlash which should be .003-.006". If backlash is not in the specified range, move shims from one side of carrier to the other to obtain desired setting.

Willys: Refer to shim pack required for differential assembly (at reassembly of differential carrier). Add .008" to the total shim pack, then divide the total shim pack in equal amounts and install between each side bearing and carrier. Use Tool W-128 to spread the rear axle housing and install differential case. Install bearing caps in their proper position and tighten bearing cap bolts to 38-42 ft. lbs. Check backlash by mounting dial indicator on rear axle housing in line with gear and with contact point on the corner of a gear tooth. Move gear by hand and check amount of backlash which should be .004-.007". If backlash is not correct, change shims from one side of carrier to the other to obtain desired setting.

PACKARD TWIN-TRACTION DIFFERENTIAL

Packard, Caribbean (1956). Standard.
Packard, Other Models (1956). Optional.

DESCRIPTION: Partial locking type differential. The unit consists of a two-piece case, with each piece having two V-shaped ramps or cam surfaces diametrically opposite. When assembled, the V-shaped ramps of one piece are at a 90° angle to the ramps of the other piece, with the V's facing away from each other. The conventional mounting of pinions is replaced by two individual cross pins with a slidable joint at the center, permitting each one to move independently, although continuously engaged. Ends of the pins are machined in the form of a "V" and ride on the V-shaped ramps. Two internally splined clutch rings are fitted over each of the side gears and mate with tapered surfaces in the case halves. Two internally splined differential gears, as well as the clutch rings, are splined to the axle shaft at each end. Four pinions, carried by the cross pins, mesh with the differential gears. Pinions incorporate shoulders which contact the clutch rings. The unit is interchangeable with the standard Spicer differential.

OPERATION: *NOTE* - The unit is operationally designed to avoid sudden transfer of full engine torque to one axle under unequal rear wheel traction conditions. As a torque divider, sufficient traction torque is supplied to the non-spinning wheel and always a certain percentage of torque is transferred to the wheel with poor traction. Percentage of transfer is dependent upon operating conditions.

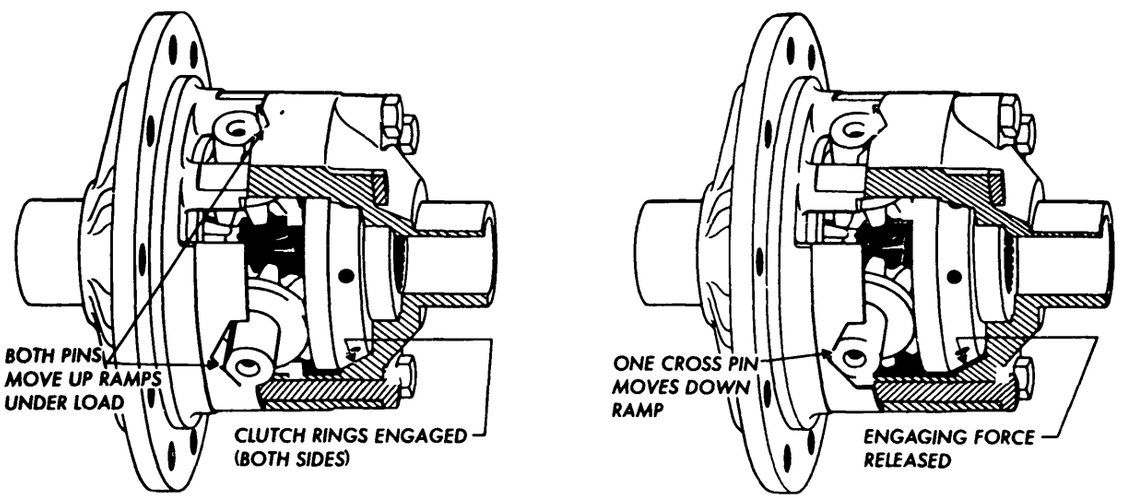
Straight-Ahead Driving: With full traction on both rear wheels, both cross pins move up on the ramp of the cam (a very slight amount), applying a load to and locking the clutch rings and restricting turning of the differential through the friction clutches. This provides a torque ratio between the axle shafts, based on the amount of friction in the differential and the amount of load that is being applied to the differential.

Turning: When turning a corner, the process outlined in "Straight-Ahead Driving" above is, in effect, partially reversed. The differential gears become a planetary gear set, with the gear on the inside of the curve becoming the fixed gear of the planetary. The outer gear of the planetary overruns as the outside wheel has a greater distance to travel. With the outer gear overrunning and the inner gear fixed, the pinions are caused to rotate. Since they are restricted by the fixed gear, they cause the cross pins to move down the ramps, thus relieving the thrust loads on the cone clutches. This permits the outer wheel to turn faster as in the conventional differential.

Unequal Traction Conditions Under Rear Wheels: When traction conditions under the rear wheels are unequal due to snow, slippery pavement, or rough roads, planetary action, similar to that in turning, takes place. In each case, there is a movement of a cross pin along the ramp to relieve pressure on the cone clutch on the side where less torque is needed. The wheel with traction gets the greater percentage of wheel torque while the wheel with poorer traction receives torque commensurate with that which it can use.

OVERHAUL: Serviced in same manner as conventional Spicer differential. Since replacement parts are not available, the differential must be replaced as an assembly. Ring and pinion gear sets are available for replacement.

LUBRICATION: Differential replacement units are furnished with two quarts of break-in lubricant. Do not attempt to break in a new unit with any fluid other than the recommended lubricant. Break-in period is 10,000 miles. If it is necessary to add or change the lubricant after the break-in period, use a standard brand of Multi-Purpose lubricant.



PACKARD TWIN TRACTION DIFFERENTIAL

BUICK HYPOID

All Series (1956)

►*REAR WHEEL BEARING OIL LEAKAGE CORRECTION & PRODUCTION CHANGE:* An "O" ring seal, Part No. 1466050 is being used in later production cars and can be used on early cars to correct oil leakage. The new seal is installed in groove on outer diameter of the rear wheel bearing.

►*1956 SERIES 70 DIFFERENTIAL OIL PUMP ELIMINATED:* The oil pump is no longer used in production and whenever the rear axle assembly is disassembled, the oil pump should be removed.

►*1956 REAR AXLE "CLUNK" CORRECTION & PRODUCTION CHANGE:* Differential cases are made of a harder material and the axle shafts have been machined with a bearing surface adjacent to splines for use with new bearing supports. The supports are equipped with aluminum bronze bushings and will pilot the axle shaft and carry the load at inner end instead of differential side gears. The new parts are available for service replacement on early cars in complete packages, Part No. 1392883 (Series 40 & 60); Part No. 1392919 (Series 50 & 70) which include differential case, thrust washers, oil baffles, felt washers, differential supports, axle shafts and wheel bearing retaining rings. The differential side gears are not included in the package, as the old ones may be used if in good condition. *NOTE* - All parts are interchangeable with early models except that the oil pump used on Series 70 models must be discarded when installing the new type shaft.

►*1956 DIFFERENTIAL SIDE GEAR CHANGE:* The length of the differential side gear hub has been increased from .460" to .520". Bearing Puller J-6199 must be changed as indicated below, for use with the later side gears. Either the early or later type side gears are satisfactory for use.

►*SUPPORT BEARING PULLER, TOOL J-6199 CHANGE FOR USE WITH LATER TYPE SIDE GEARS:* Grind off 1/8" from shoulder end of tool for necessary clearance with the later type gears. *CAUTION - When grinding the tool, do not overheat.*

►*1953-55 REPLACEMENT "FLOATING TYPE" PROPELLER SHAFT (To reduce rear axle noise):* A new "floating type" propeller shaft, Part No. 1173801 (1953 Series 52 & 72, 1954-55 Series 50 & 70); No. 1173841 (1953-54 other models) is available for service replacement. Install as follows: Check new propeller shaft for straightness (see "Overhaul" below). *(NOTE* - A new gear set and bearing should be used with new propeller shaft). Pack cavity at end of pinion spline with wheel bearing lubricant and slide propeller shaft over pinion spline, but do not install coupling pin. Complete reassembly of rear axle *(See "Buick Hypoid" in Rear Axle Section of 1955 Annual Data or later Manual edition.*

DESCRIPTION: Hypoid gear, semi-floating type with torque tube drive. The pinion gear and shaft are supported in carrier by two tapered roller bearings.

REMOVAL OF AXLE: *See "Rear Axle" on Car Model pages.*

AXLE SHAFT REPLACEMENT: Place car on stands under rear axle housing with wheels clear of floor. Remove rear wheel and brake drum. Remove nuts holding wheel bearing retainer plate to brake backing plate, leaving bolts in place to support backing plate. Pull axle assembly using Puller J-6176 with a slide hammer. Be careful not to disturb backing plate. Replace two opposite nuts finger tight to hold backing plate in position. To install axle (if wheel bearing or seal are the only new parts used), reverse removal procedure and install the old wheel bearing retainer gaskets with same number and thickness of new gaskets. If new rear axle housing or new brake backing plate are used, install axle shaft and bearing assembly without retainer gaskets. Using slide hammer and Puller J-6176, drive axle shaft and bearing into place until bearing is fully seated. To hold retainer plate snug against face of the bearing, install four nuts finger tight. With backing plate pushed tight against housing flange, measure clearance between retainer and backing plate with feelers (use two feelers at same time at opposite sides of retainer and average the two readings so obtained and select the number of new gaskets as required to give .005-.020" **less** thickness than average of the two measurements). Replace nuts holding wheel bearing retainer plate to brake backing plate and tighten to 65-75 ft. lbs. Then check with a .001" feeler gauge under retainer plate between two lower bolts. If gap exists, remove plate and apply non-hardening Permatex on both sides of gasket to prevent leakage. Replace brake drum and wheel. *NOTE* - The above method will provide the necessary crush on the gasket to prevent oil leakage at this point.

Wheel Bearing & Seal Replacement: After removal of axle shaft, nick the wheel bearing retainer ring (the ring need not be completely split, but nicked deep enough in 3 or 4 places to spread it). Retaining ring will then slip off with light pressure. Press wheel bearing off using Plate J-6191 in a press. If seal only is defective, pry old seal out of bearing and install new seal using Guide J-6213. Push seal in carefully with fingers until lip is over bearing inner race; then remove installing guide and drive seal in flush with a flat wood block. Press bearing and seal assembly against shoulder on shaft using Installer J-6257 in a press *(CAUTION - Bearing retainer must be on shaft before bearing is installed).* Press retainer ring against bearing with chamfer toward bearing.

OVERHAUL

DISASSEMBLY: 1) Remove rear axle assembly from car and place on suitable stands. Disconnect torque tube brake line from tee fitting located on axle housing. Disconnect strut rods from torque tube bracket. Fasten the two struts to each other loosely, keeping all parts in their original positions. Remove torque tube to carrier bolts and slide torque tube and propeller shaft from carrier. *(CAUTION - Strut rods are easily bent when disconnected from torque tube).*

2) Remove brake line from housing and remove both axle shaft assemblies (see "Axle Shaft Replacement" above). Remove carrier to axle housing nuts and lift carrier from housing, using Sling J-6247 and a chain hoist.

3) Place carrier assembly in a suitable mounting fixture. Check existing gear lash with a dial indicator positioned against tooth of ring gear (this will indicate gear or bearing wear and will also enable used gears to be installed at original lash setting to avoid changing gear tooth contact). On Series 70 with an oil pump, remove oil lines and pump. Remove differential bearing pedestal clamp bolts and open pedestal by tapping a wedge in each pedestal slot *(CAUTION - Do not use excessive force on wedges or distortion will result).*

4) Pull differential bearing supports using Puller J-6199 and a slide hammer (see "J-6199 Tool Modification" below). Install Spreader J-6185 and tighten spreader bolt just enough to free case assembly *(CAUTION - Do not spread pedestals more than is necessary to free case).* Lift case straight out until side bearings are half-way clear of pedestals. Then take hold of bearings with both hands to keep them from falling and lift case assembly out *(CAUTION - Keep right and left bearings, shims and supports in a set so they may be reinstalled in the same order).* Remove spreader tool. Mark ring gear and case so they may be reinstalled in same position. Remove ring gear from case.

5) Drive pinion shaft pin from pinion shaft and then drive shaft from case. Remove pinion shaft shield from case. Mark side gears, pinions and washers so they may be reinstalled on same side. Remove side gears, pinions and washers.

6) If differential bearing is to be replaced, pull bearing outer race from case using Differential Bearing Remover J-6552. Check pinion bearing pre-load (see "Pinion Bearing Pre-load Adjustment" below). It is also advisable to check pinion depth setting (see "Pinion Depth Setting" below). This will indicate any error in existing setting and will also enable used parts to be reinstalled at original setting to avoid changing gear tooth contact.

7) Cut out and drive up staked section of pinion bearing locknut with a cape chisel, being careful not to damage threads on pinion. Hold pinion nut to carrier with Holder J-6245 and turn pinion clockwise through nut using socket J-6192 and Handle J-6246. As pinion nut is removed, hold hand under pinion to catch it, as it may fall through. If necessary, tap pinion with a soft hammer, being careful to guide pinion with hand to avoid damage to bearing outer races.

8) If pinion bearing is to be replaced or pinion depth setting is to be changed, remove rear bearing from pinion shaft using Remover J-6184 and Holder J-6274 in a press. Pry pinion oil seal from carrier, being careful not to damage front pinion bearing. If front pinion bearing is to be replaced, drive outer race from carrier, using Remover J-6198 and Handle J-872-5 *(NOTE* - The remover must be inserted in carrier before drive handle is screwed into it).

REASSEMBLY: *(NOTE* - Before installation of pinion and bearings, make certain that interior of carrier housing is clean and dry. Also make certain that parts to be assembled are clean and that pinion bearing shims are not burred. Bearings and oil seals should be lightly lubricated with rear axle lubricant just before assembly).

►*PROPELLER SHAFT NOTE: Propeller shaft should be checked for straightness (and straightened or replaced) before installation in rear axle assembly. See "Propeller Shaft Checking & Straightening" below.*

BUICK HYPOID (C nt.)

1) Drive front pinion bearing outer race against shoulder in carrier using Replacer J-7197 with driver handle. Drive rear pinion bearing against shoulder in carrier using Replacer J-6255 with driver handle.

2) Whenever a new carrier, a new pinion, or a new pinion bearing is used, a trial assembly must be made in order to determine correct pinion depth setting and pinion bearing pre-load *(see "Pinion Bearing Pre-load Adjustment" and "Pinion Depth Setting" below).*

► *CAUTION – Whenever a new pinion is to be installed, its depth setting must be gauged. Even though the new pinion has the same depth marking, it may require a different thickness shim because the dimension from the gauging surface to bearing shoulder varies in different pinions.*

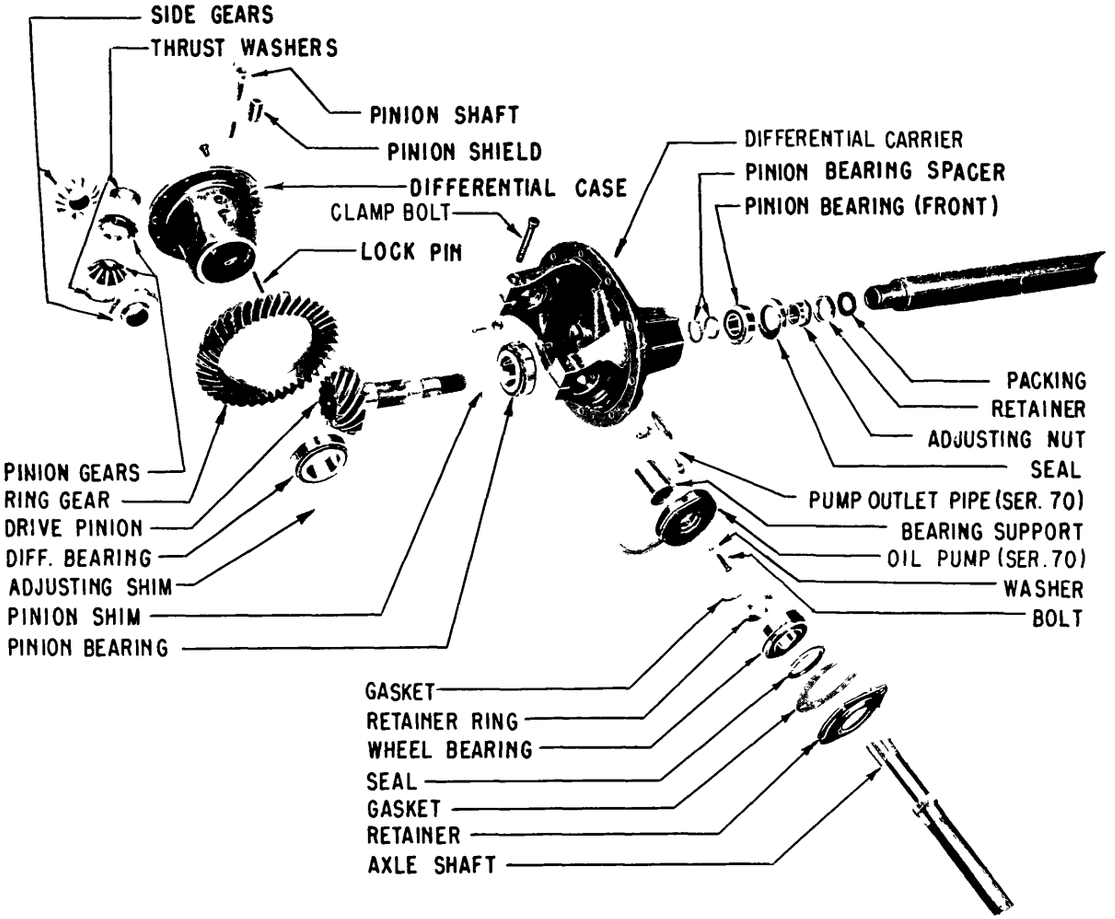
3) After pinion setting and pinion bearing pre-load have been correctly adjusted (if necessary) and front and rear bearings have been installed on pinion, lubricate new pinion seal with rear axle lubricant and install with lip toward bearing, using Installer J-6200. Reinstall pinions and bearings carefully into carrier with new thickness pre-load spacers. Install pinion nut and tighten to 80 ft. lbs. Recheck pinion setting with gauge. Recheck pinion bearing pre-load, which must not exceed 40 inch pounds including drag of lubricated new seal. Stake pinion nut securely.

4) Drive differential outer races into case, using Replacer J-6263. Install side gears, pinions and spherical washers in case *(CAUTION* - There are no flat washers behind side gears). If same parts are used, replace in original sides. Install pinion shield and pinion shaft. Drive spring pin through hole in pinion shaft until flush with case. Bolt ring gear to case, making sure mating surfaces are clean and free of burrs and that matching numbers on ring gear and pinion are the same. *(NOTE* - Use three Studs, J-6251 to align parts. If same ring gear and case are used, line up marks so that parts are assembled in same relative position **(do not use lockwashers or any substitute bolts).** Tighten bolts alternately on opposite sides of case to 25-30 ft.lbs., then tighten in same manner to 65-75 ft. lbs.

5) Before installation of ring gear and case assembly make sure that differential bearings and bearing support surfaces in carrier pedestal are clean and free of burrs. Remove any burrs which might prevent proper seating. Place case assembly and differential bearings in position in carrier. If original bearings are used, replace in original positions. Insert Support Tools, J-6194 through pedestal bores into bearing inner races. Press tools toward each other to seat them, using hand pressure. If support tools are loose, install pedestal clamp bolts and nuts and tighten lightly until support tools can just be moved by twisting them. If support tools are too tight, loosen them by wedging pedestals open with chisels.

6) Rotate differential assembly three or four times to seat bearing rollers, then manually adjust the whole assembly sideways to get a .008" gear backlash. The assembly tools may be tapped lightly with a hammer to seat them. Check backlash as follows: Mount dial indicator so contact button bears against heel end of tooth on ring gear, and as nearly as possible in line with gear rotation and perpendicular to tooth surface. Check backlash at three or four points around ring gear. Lash must not vary more than .003" around ring gear. If lash varies more than .003", check for burrs, uneven bolting conditions or distorted case flange, and make necessary corrections. *(CAUTION* - Gear backlash check must be made with pinion locked to carrier to be sure it cannot turn). Adjust gear backlash at the point of minimum lash to .008" for all new gears. If original gear set is being installed, the original backlash should be maintained.

7) Measure with a shim between each bearing and its pedestal. Do not remove support tools for measuring. Select shim that measures .002" thicker than largest shim that can be inserted for each side, (this should pre-load each differential bearing .002"). The shims are furnished to be used singly in thicknesses ranging from .040" to .082" by two thousandths. Service shims are marked with their thickness in thousandths.



BUICK HYPOID REAR AXLE

8) Remove support tool farthest from ring gear, insert shim for that side, and replace support tool. Place other shim in position for insertion. While keeping a heavy hand pressure on shim, spread carrier pedestals just enough to start shim, using Spreader J-6185 *(CAUTION - Do not spread pedestals any further apart than is absolutely necessary to push shim into position).* Leave support tool in position until after shim is started to keep case assembly from dropping out of line.

9) Remove left assembly tool and push shim into final position. Center it first with fingers through pedestal bore, then with a support tool. Remove spreader tool and pedestal wedges. Drive each differential bearing support into its pedestal until seated solidly in bearing, using Support Tool J-6194. Then seat one support solidly and tighten the clamp bolt and nut on that side to 50-60 ft. lbs. before proceeding to other side. This is to prevent shock caused when second support is

CONTINUED ON NEXT PAGE

BUICK HYPOID (C nt.)

seated from dislodging the first support. Secure nuts with cotter pins. Recheck backlash which must be .007-.009" at point of minimum lash, with not more than .003" variation around gear.

►*1956 SERIES 70 NOTE:* Rear axle oil pump has been discontinued in production and it is recommended that it not be reinstalled after rear axle has been disassembled for any purpose.

10) Before installing carrier assembly, make sure housing mounting surfaces are free of old gasket material, nicks, and burrs. Rotate axle housing so carrier mounting surface is upward and install a new carrier gasket. Install carrier in housing using Sling J-6247. Install nuts and tighten them evenly and alternately to 50-60 ft. lbs. Install brake line on housing and install both axle assemblies.

11) Check propeller shaft and pinion splines for excessive wear and remove any nicks or burrs. Replace propeller shaft seal sleeve if scored or grooved. Inspect propeller shaft rear packing and retainer and replace if worn or damaged. Pack rear propeller shaft coupling with heavy wheel bearing lubricant, bringing level to inner end of splines. Slide propeller shaft on splines of pinion.

12) Before installing torque tube, flanges on both ends must be free of burrs or nicks. Also, check torque tube mounting surface on carrier. Slide torque tube over propeller shaft being careful to keep torque tube centered on propeller shaft to avoid side thrust *(CAUTION - Propeller shaft will bend easily if side pressure is put on it).*

13) Position torque tube with strut rod bracket downward, being careful not to damage brake line. Install torque tube to carrier bolts and tighten alternately to 50-60 ft. lbs. *(NOTE -* There is no gasket used between torque tube and carrier). Connect brake line at tee on rear axle housing. Connect strut rods and tighten bolt to 85-100 ft. lbs. Install rear axle assembly in car.

INSTALLATION: Reverse removal procedure. *See "Rear Axle" on Car Model pages.*

PINION BEARING PRE-LOAD ADJUSTMENT

►*NOTE: Whenever a new carrier, a new pinion, or a new pinion bearing is to be used, a trial assembly must be made in order to determine correct pinion depth setting and correct pinion bearing pre-load. Spacers used for pinion bearing pre-load and shims used for pinion setting will have to be changed for final adjustment in relation to the marking on the pinion being used, and the pinion setting gauge reading.*

1) For a starting pinion depth setting, use a pinion setting shim with a nominal thickness of .048". Place this shim against head of pinion and install rear pinion bearing using Replacer J-6377 in a press.

2) For a starting pinion bearing pre-load adjustment use a pair of spacers with a nominal thickness of .435". Place spacers in position on pinion and hold pinion in position in carrier. Install front pinion bearing and pinion nut. Hold nut to carrier with Holder J-6246 (Do not install seal at this time). Torque pinion nut to 80 ft. lbs. Rotate pinion three or four times to seat bearings. Turn pinion slowly with an inch-pound torque wrench. It should require 10 to 30 inch-pounds to rotate pinion, which will be the pinion bearing pre-load. If pre-load is under 10 inch-pounds a thinner spacer must be installed under front pinion bearing. If pre-load is over 30 inch-pounds a thicker spacer must be installed under front pinion bearing *(NOTE - Pinion Bearing pre-load spacers are furnished to be used in pairs so that possible thicknesses range from .400" to .470" by thousandths. See table below).*

Pinion Bearing Pre-Load Spacers

Part No.	Ⓒ Thickness	Part No.	Ⓒ Thickness
1169194	.200"	1169386	.208"
1169105	.201"	1169387	.209"
1169106	.202"	1169388	.210"
1169107	.203"	1169389	.220"
1169108	.204"	1170158	.230"
1169109	.205"	1170159	.240"
1169110	.206"	1170160	.250"
1169385	.207"	1170161	.260"

Ⓒ — Spacer thickness is marked on spacers.

3) *After pinion setting adjustment is completed (see below)* change preload spacers by same amount that pinion setting shims were changed from the nominal setting. If thickness of pinion setting shims was **decreased** .002", use pre-load spacers with .002" **less** thickness. If thickness of shim was **increased,** use pre-load spacers measuring .002" **thicker.**

4) Lubricate new pinion seal with rear axle lubricant and install with lip toward bearing, using Installer J-6200. Reinstall pinion and bearings carefully in carrier with "adjusted" thickness pre-load spacers, Install pinion nut and tighten to 80 ft. lbs. Recheck pinion setting with gauge. Setting for new pinion must be within .001" of setting marked on pinion. Setting for used pinion should be within .001" of original setting (as checked before disassembly). Recheck pinion bearing pre-load with an inch-pound torque wrench. Pre-load must not exceed 40 inch-pounds including drag of lubricated new seal. When pinion setting and pre-load are correct, stake pinion nut securely.

PINION DEPTH SETTING

►*NEW PINION INSTALLATION CAUTION: Whenever a new pinion is to be installed, its depth setting must be gauged with Pinion Setting Gauge J-5647. Even though the new pinion has the same depth marking, it may require a different thickness shim because the dimension from the gauging face to the bearing shoulder varies in in different pinions.*

CHECKING PINION DEPTH SETTING: After pinion bearing pre-load has been established (10-30 inch-pounds, without pinion seal installed) see above. Proceed as follows:

1) Use Pinion Setting Gauge J-5647 consisting of a "master gauge" and "indicator gauge" upon which a dial indicator is mounted. Make certain that gauge parts are clean, particularly the center and discs of indicator gauge, the centering holes, indicator pads, disc pads on the master gauge, and the adapter holes and outer surfaces.

2) Install discs on indicator gauge and install the small contact button on stem of dial indicator. Mount dial indicator on indicator gauge. Place indicator gauge on on master gauge so that spring loaded center is engaged in centering hole corresponding to the indicator pad "B", which is used for any of the following gear ratios stamped on pinion: 43-11; 43-12; 47-14; 42-13 (Pad "A" is used for certain prior model gear ratios).

3) Center indicator contact button on specified indicator pad and lock indicator by tightening the thumb screw. Hold yoke firmly with both discs contacting the horizontal and vertical pads on master gauge, and set dial indicator at zero (make sure that differential bearing support bores are free of burrs and that center of pinion is clean).

4) Rotate pinion until blank tooth between the matching number and the pinion setting mark is slightly counterclockwise of the center (at about 11 o'clock). This tooth is called the gauging tooth because it is used for located and gauging during production and should be used for gauging in service.

5) Drive a wedge into each pedestal split and spread them just enough so that an Adapter J-5647-17 will slip in. Then place the indicator gauge in carrier as follows: Remove discs from indicator gauge and hold it in position in carrier with pins centered in pedestal bores. Slide long adapter through pedestal bore farthest from pinion and over gauge pin. Then slide short adapter in place on other side. Be sure that gauge center is engaged in pinion center and that adapters are against shoulders of gauge. Then remove pedestal wedges. Turn pinion if necessary so that indicator contact button has a good contact with gauging tooth of pinion.

6) *(NOTE -* There are two methods of taking a reading on the pinion setting gauge as follows:) When using the first method, the indicator gauge is zeroed in the master gauge by pressing down firmly on the indicator gauge yoke with the thumbs. It is important when using this method, that equal pressure is applied when taking the actual reading in the carrier. When using the second method, the indicator is zeroed in by pressing the discs into the angle formed by the master gauge. No pressure is applied to the indicator gauge yoke. Since the gauge is zeroed in with no pressure on the yoke, the actual reading is also taken with no pressure on the yoke. However, the adapters must be tight in the pedestal bores; if they are not held solidly in place after the wedges are removed, the pedestal bolts must be installed and tightened to specified torque, (50-60 ft. lbs.).

7) Take dial reading, noting whether it is plus (+) or minus (—) as indicated by arrows on surface of yoke. *(CAUTION - This reading does not indicate thickness of the shim to be used, but only indicates the variation from the nominal setting of the gauging face of pinion).* Recheck indicator "zero setting" on master gauge with discs to make sure it was not changed in handling.

8) If the old ring gear and pinion set is to be reinstalled and it has been in use long enough to establish a wear

CONTINUED ON NEXT PAGE

BUICK HYPOID (C nt.)

pattern on teeth, the original pinion setting found before removal should be maintained to avoid changing tooth contact. If ring and pinion set is new, or has not been used long enough to establish a wear pattern on teeth, the dial indicator reading should be within .001" of the pinion setting marked on pinion. If pinion is not as specified, adjust as follows:

PINION SETTING ADJUSTMENT: The pinion setting is adjusted by changing thickness of shim which is located between rear pinion bearing inner race and head of pinion. Shims are furnished as indicated in table below.

Pini n Setting Shims

Part No.	① Thickness	Part No.	① Thickness
1171083	.040"	1171093	.050"
1171084	.041"	1171094	.051"
1171085	.042"	1171095	.052"
1171086	.043"	1171096	.053"
1171087	.044"	1171097	.054"
1171088	.045"	1171098	.055"
1171089	.046"	1171099	.056"
1171090	.047"	1173482	.058"
1171091	.048"	1173483	.060"
1171092	.049"		

① – Thickness is marked on shim.

1) Remove pinion assembly and press off rear pinion bearing using Remover J-6184 and Holder J-6274. Remove shim from pinion and wipe dry. Check thickness of shim to make sure it is correctly marked. Increase or decrease thickness of shim as required to proper pinion proper setting. If pinion is marked "+8" but gauge reads "+6", **decrease** thickness of shim by .002". If gauge reads "+10", **increas** thickness of shim by .002". If pinion is marked "–8" but gauge reads "–6", **increase** thickness of shim by .002". If gauge reads "–10", **decrease** thickness of shim by .002".

2) Change pinion bearing pre-load spacers by same amount the pinion setting shims were changed, and finally install pinion assembly in carrier. *See "Pinion Bearing Pre-load Adjustment" above.*

CHECKING & STRAIGHTENING PROPELLER SHAFT (Using V-bl cks): Support shaft assembly on V-blocks at each end (forward block just to rear of splines at forward end of shaft, rear block under splined coupling). Use a dial indicator to measure run-out at points 3" from each end of shaft tube (*CAUTION* - Do not allow unevenness of tube surface to cause indicator to bounce indicating wrong reading). If run-out not within .006" at these two points, straighten tube by pressing on center of tube (support tube at same point at front end and under splined coupling at rear as used for checking straightness). Then check run-out at center of shaft tube. If run-out exceeds .010" at this point, straighten tube while supporting it on blocks at tube weld point at each end. Then check run-out at pinion coupling. If run-out exceeds .001", support shaft at forward end and at splined coupling at rear end, and exert pressure at weld points on rear end of tube. Recheck all run-out points, then check runout at extreme forward end of shaft (must be less than .002").

CHEVROLET HYPOID (HOTCHKISS DRIVE)

Pass. Cars & Sed. D l. (1956)
1/2-Ton Trucks (1956)

►CHANGES & CORRECTIONS

►*1956 REAR WHEEL BEARING NOTE:* Bearing and axle shaft seal are serviced as an assembly. The bearing is permanently lubricated and no further lubrication is required. Install with spring loaded lip toward axle shaft retainer.

►*1956 PINION MARKING & PINION SETTING TOOL CHANGE:* The number marked on pinion will indicate, in thousandths, the pinion mounting distance. A new Rear Axle Pinion Gauge, J-6266 is used with the new pinion markings to obtain a more accurate adjustment. The new gauge is not used on earlier models.

DESCRIPTION: Semi-floating hypoid gear type with Hotchkiss drive. Design is similar to 1955 models, and the new wider ring gear and pinion sets may be used on 1955 models for service replacement.

REMOVAL: *See "Rear Axle" on Car Model pages.*

OVERHAUL: Service procedures are the same as for 1955 rear axles. *See "Chevrolet Hypoid (Hotchkiss Drive)" in 1955 Annual Data or later Manual edition, and note the following:*

Rear Wheel Bearing: Permanently lubricated type integral with seal. Install bearing and seal assembly with spring loaded seal toward axle shaft retainer.

►*PINION SHAFT REMOVAL NOTE:* Interference may be encountered on some models while pinion shaft is being removed. If pinion shaft will not clear ring gear, ring gear must be removed to avoid damaging teeth while pinion shaft is being removed.

Ring Gear & Pinion Backlash Adjustment: .006" to .008" backlash is preferred on all 1956 models.

Pinion Depth Setting Adjustment: If original ring gear and pinion, pinion rear bearing assembly and differential carrier will all be reinstalled, the original shim or one of the same thickness may be used. If the ring gear and pinion, pinion rear bearing assembly or differential carrier are to be replaced, the correct thickness of the pinion depth shim may be determined as follows:

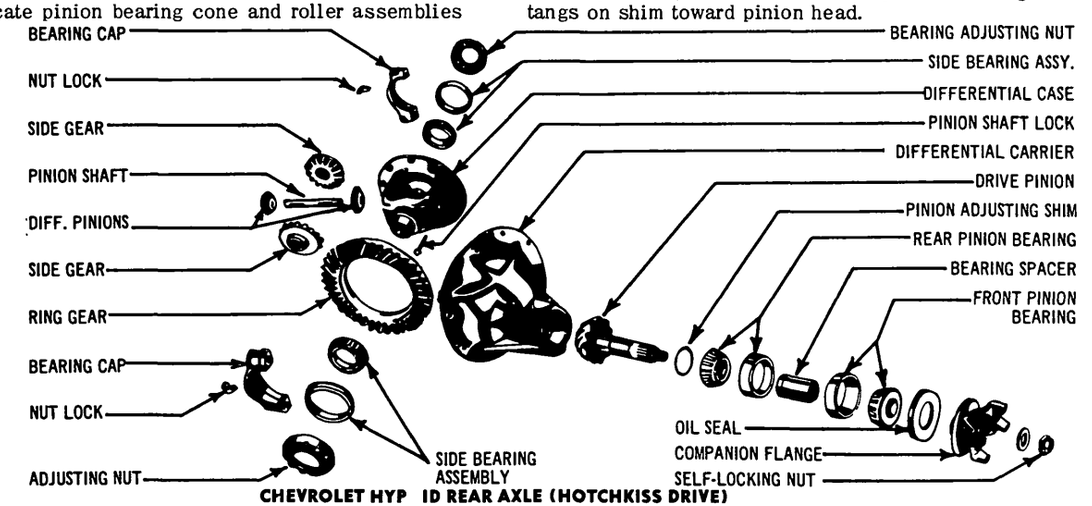
1) Lubricate pinion bearing cone and roller assemblies with rear axle lubricant. Position rear bearing in its cup in carrier. Rotate bearing several times to make sure it is seated. Position gauge plate (part of Tool J-6266) on bearing so that the chamfered corner is toward pinion side and top of differential as installed in car.

2) While holding front cone and roller assembly in its cup with the clamp plate, insert the clamp screw (part of Tool J-6266) through the gauge plate, both bearings and clamp plate. Tighten only a sufficient amount to center bearings in cup. Check to see that neither gauge block nor clamp plate touch the housing. Oscillate gauge plate and bearings several times to be sure bearings are seated and then draw up hex nut until 20 inch-pounds of torque are required to oscillate plate and bearings. (*NOTE* - A torque of 60 ft. lbs. may be required to tighten nut on clamp bolt in order to obtain simulated preload of bearings after assembly. After tightening clamp bolt nut, measure turning torque with an "inch-pound" torque wrench).

3) Install Tool J-6266 body assembly across differential bores. Plunger on body must point inward toward center of pinion rear bearing. Mount a dial indicator, KMO-30 on tool body post with indicator button on top of tool plunger. Swing body so that plunger **does not** touch gauge plate, and set dial indicator at zero.

4) Slowly swing inner end of tool plunger across gauge plate until highest indicator reading is obtained. Record this measurement and recheck to see that it is correct. Record factory marking on pinion. **Subtract** the measurement obtained with the tool from marking on pinion. The **difference** between these two figures determines thickness of pinion depth shim to be installed with the particular pinion and ring gear, and rear bearing and carrier being checked. Shims are available in six different thicknesses: .021", .024", .027", .030", .033" and .036". Use the shim which is closest to the difference in measurement.

5) Remove indicator, tool, and pinion rear bearing cone assembly from carrier. Position the shim selected, between pinion gear head and rear pinion bearing with tangs on shim toward pinion head.



CHEVROLET HYP ID REAR AXLE (HOTCHKISS DRIVE)

HUDSON NASH, RAMBLER HYPOID (TORQUE TUBE DRIVE)

Hudson Wasp (1956)
Hudson Hornet (Exc. Spec. V8) (1956)
Nash Statesman (1956)
Nash Ambassador (Exc. Spec. V8) (1956)
Rambler (1956)

► *HUDSON HORNET & NASH AMBASSADOR SPECIAL V8 REAR AXLE NOTE: A "Spicer" rear axle is used on this model. See "Spicer Hypoid Semi-Floating" Rear Axle, below.*

► *1956 PINION DEPTH SHIMS LOCATION CHANGE & DEPTH ADJUSTMENT PROCEDURE CHANGE:* In early production cars, the pinion depth adjusting shims were located between pinion gear head and bearing cone. In later cars, the pinion depth adjusting shims are located in bore of rear axle housing behind rear pinion bearing cup. The rear face of the pinion is now machine ground and the depth adjusting procedure has been changed on later cars having the pinion depth adjusting shim located between housing and bearing cup. *See "Pinion Setting (Later Cars)" under "Overhaul" below.*

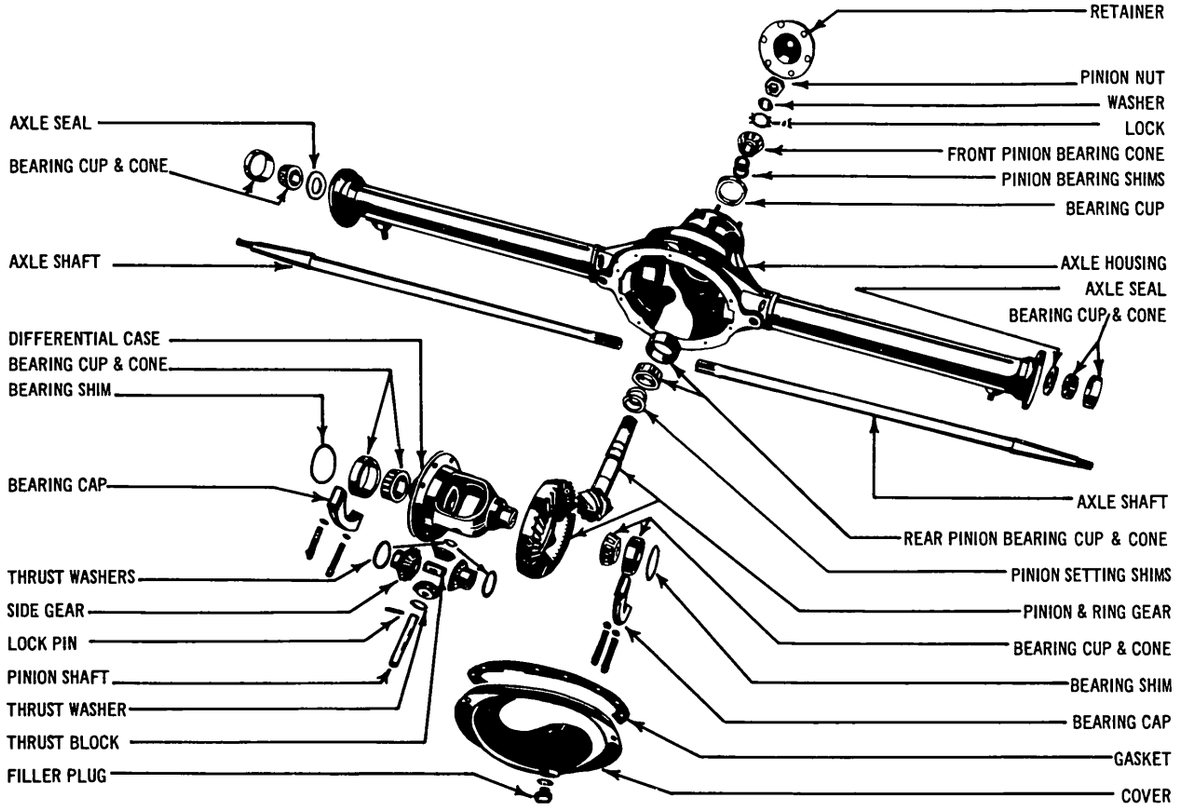
► *1956 & EARLIER SERIES 50, 60, 80 TORQUE TUBE TRUNNION ASSEMBLY SERVICE REPLACEMENT:* Torque Tube Trunnion Kit, Part No. 3117235, containing a trunnion and six rivets is available for service replacement. For installation procedures, see "Overhaul".

DESCRIPTION: Semi-floating, hypoid gear type with torque tube drive and coil springs, of same design as used on corresponding previous models.

REMOVAL OF REAR AXLE ASSEMBLY: *See "Rear Axle" on Car Model pages.*

OVERHAUL: Service procedures are the same as for previous models except as noted below. *See "Changes, Cautions, Corrections" above, and "Hudson & Nash Hypoid" in 1955 Annual Data or later Manual edition.*

Pinion Depth Setting Adjustment (Later cars with pinion depth adjusting shims located between rear pinion bearing cup and bore in rear axle housing): The amount of shims used is determined by the amount of shims removed at disassembly and by the plus or minus figure etched on pinion. For example, if original pinion was marked + 2 and had a shim pack of .035" behind rear bearing cup and the new pinion to be installed is marked − 1, the shim pack must be increased by .003" to bring the new pinion to its correct position. Install the pinion front bearing cup with Replacer J-2534 or J-5367. Insert pinion in position and install front bearing cone and cup. Check pinion setting as follows: Mount discs J-2499-2 on Gauge Arbor J-6482-1 or discs J-5223-5 on Arbor Gauge J-5223. Install gauge seated squarely in housing bores. Place bearing caps in position and tighten bolts finger tight. Install Gauge Block J-5223-16 in position against end of pinion gear and clamp in place with Clamp Bar and Screw J-5223-6 and J-5223-14. Loosen thumb screw in end of gauge block and move plunger out until head contacts gauge arbor. Lock plunger in place with thumb screw, being careful not to disturb position of plunger. Loosen screw in clamp holding gauge block against pinion and remove gauge block.



HUDSON, NASH, RAMBLER HYPOID REAR AXLE

Measure distance from end of anvil to top of plunger head with a two to three inch micrometer. This measurement represents the distance from rear face of drive pinion to centerline of the rear axle and should be as follows: 2.095" (Rambler); 2.094" (Statesman & Wasp); 2.547" (Hudson Hornet & Nash Ambassador). This measurement applies only to correctly adjusted pinions marked "0". On a pinion marked + 2, the reading should be .002" less than this figure and with a pinion marked − 3, the reading should be .003" greater. If the micrometer reading shows pinion setting is incorrect by more than .002" plus or minus from the given figure, shims equal to that amount must either be added or removed from shim pack between rear bearing cup and housing.

Service Replacement Torque Tube Trunnion Installation (Series 50, 60, & 80, 1956 & Earlier): *(NOTE* - On models prior to 1956, the trunnion assembly is riveted to torque tube. On 1956 models, it is welded). On 1956 models, remove original trunnion by making a hack saw cut through one thickness of metal adjacent to weld. Strike trunnion a sharp blow with a hammer to break away portions that may not have been cut all the way through. Remove trunnion and grind off remaining portion of weld on torque tube. On earlier models, remove rivets, then remove trunnion. Place new trunnion on torque tube, then place trunnion and torque tube assembly on bench and block tube at truss rod brackets or studs and position trunnion so that distance from front face of trunnion flange to rear face of rear torque tube flange is correct for the model being worked on (see "Torque Tube Lengths" below). *(NOTE* - Trunnion must be installed on torque tube so that the wider flat surface on trunnion flange is upward. When properly installed, the lower narrow flat surface on trunnion flange will be parallel to truss rod bracket (Series 50); truss rod studs (Series 60 & 80). Weld trunnion to torque tube (1956 models), or rivet to torque tube (earlier models). *NOTE* - If desired, the trunnion may be riveted to torque tube on 1956 models. Use trunnion as a template and mark the six holes located on torque tube. Drill 21/64" diameter holes and install trunnion with rivets supplied in kit. Rivet heads are installed to inside of torque tube.

Series	Torque Tube Lengths	① Length
50 (Std. & Overdrive)		61 1/32"
50 (Hydra-Matic)		63 31/32"
60 (Std. & Overdrive)		62 3/8"
60 (Hydra-Matic)		65 7/32"
80 (Ultramatic)		65 7/32"

① - Front flange face to rear flange face.

Torqu Tube & Propeller Shaft Removal, Installation & Adjustment (Rambler Models): Procedures are the same as for 1955 Statesman & Wasp models except that on Rambler models with Hydra-Matic Transmission, the rear coupling is integral with the propeller shaft.

FORD PASS. CAR HYPOID (SEPARATE CARRIER TYPE)

Ford Pass. Cars (Exc. Sta. Wgn., Sed. Del., Thunderbird & Police Interceptor) (1956)

►*NOTE: "Integral Housing" Hypoid Rear Axle is standard equipment on Thunderbird, Police Interceptor, Station Wagons, Sedan Delivery, & Courier Models. See "Ford, Lincoln, Mercury (Integral Carrier) Hypoid".*

►*1956 PINION BEARING SPACER PRODUCTION CHANGE:* A new pinion bearing spacer, Part No. B6A-4662-A with indentations on the inner surface has replaced the earlier type paper lined spacer. The later type spacer will center correctly on pinion and prevent cocking of spacer. Do not use the paper liner with later type spacer.

►*1956 3.22-1 RATIO REAR AXLE RING GEAR CHANGE (CARS WITH 312" THUNDERBIRD ENGINE):* The ring gear diameter has been increased from 8 1/4" to 8 1/2" and the attaching bolts have been increased from 3/8" to 7/16". A limited number of ring gears and pinions were released with 3/8" bolts. If failure is encountered with this ring gear, and the B6A-4209-J gear set is not available, it will be necessary to use the B6A-4209-K gear set and replace the differential gear case with a B6A-4205-D gear case.

►*1956 DRIVE PINION OIL SLINGER PRODUCTION CHANGE (Also a service replacement change on all 1950-56 Models):* To prevent losing pinion bearing preload due to wear of drive pinion oil slinger, a new slinger, Part No. B6A-4670-A which is made of harder material, is being used in production and for service replacement. Install the later type slinger whenever disassembly of the rear axle is necessary.

►*1955-56 DIFFERENTIAL GEAR CASE REPLACEMENT CAUTION:* To prevent installation of the wrong differential case, the attaching flange thickness should be measured before installation. It is important that the proper length ring gear bolts be used with the differential case. When using differential gear case, Part No. B5A-4205-B (7/16" flange), the 43018-S (7/8" long) attaching bolts must be used. If differential gear case, Part No. B6A-4205-B (23/64" flange) is used, the 46027-S (3/4" long) attaching bolts must be used.

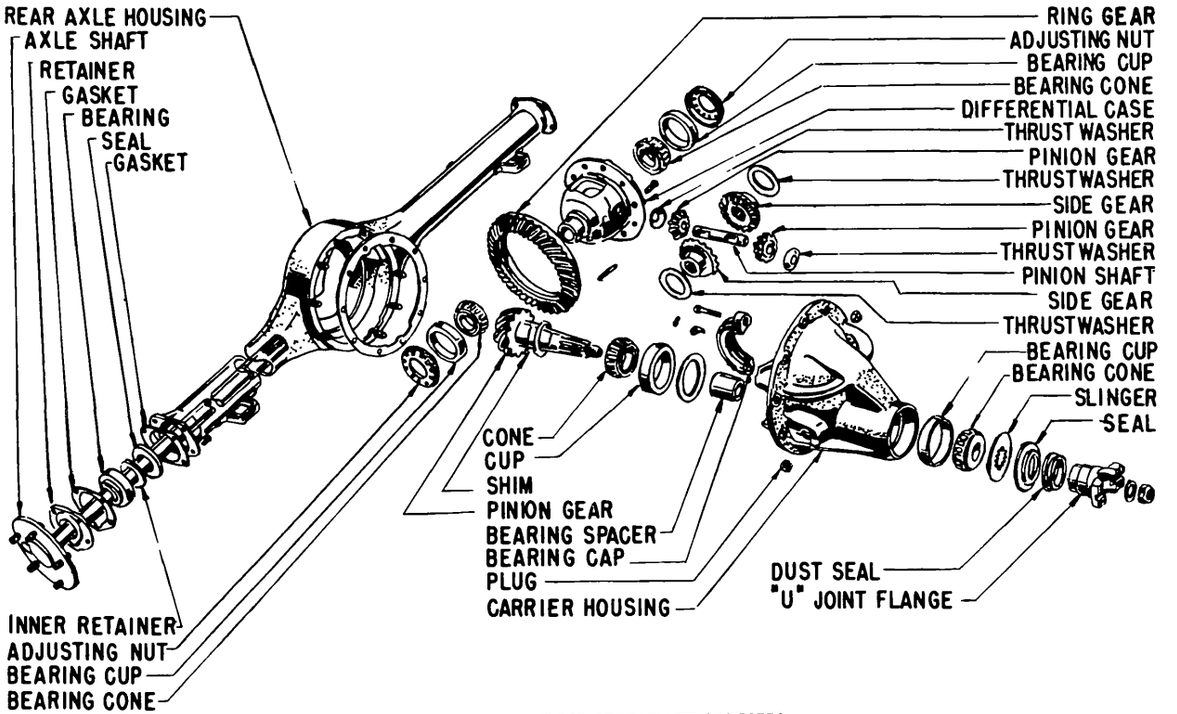
►*1955-56 RING GEAR TO DIFFERENTIAL CASE ATTACHING BOLT TIGHTENING SPECIFICATION CHANGE:* Tightening specifications for the 3/8" diameter bolts have been changed from 35-40 ft. lbs. to 45-50 ft. lbs. Assemblies using the 7/16" diameter bolt (see 3.22-1 Ratio Rear Axle Change above) must be tightened to 75-85 ft. lbs.

DESCRIPTION: Semi-floating, hypoid gear, with Hotchkiss drive. A separate differential carrier unit is used which can be removed for overhaul.

REMOVAL: *See "Rear Axle" on Car Model pages.*

OVERHAUL: Service procedures are the same as for 1955 models except as noted below. *See "Changes, Cautions, Corrections" above and "Ford Pass. Car Hypoid (Separate Carrier)" in 1955 Annual Data or later Manual edition.*

Drive Pinion Adjustment (Master Pinion Tool Method): Make sure bores in carrier are free of burrs and metal chips, then install drive pinion bearing cups in carrier



FORD PASS. CAR HYPOID (SEPARATE CARRIER)

using Tool T55P-4616-A. *(NOTE* - The same depth gauges are used on 1956 axles as used on earlier models, but the following cautions must be observed: Adapter rings must be used with depth gauges because differential bearing pocket diameters are 1/8" larger than earlier models. A spacer (approximately 1/8") must be inserted between universal joint flange and front pinion bearing when master pinion is installed in carrier housing). Place pinion bearing cone which will be used in final assembly, on master pinion Tool 4610-P or 4610-A. Place master pinion in housing. Install bearing, 1/8" spacer, universal joint flanges, washer, and nut. Hold flange and tighten nut to pre-load bearings to 15-20 inch-pounds. Check pre-load with Tool 4610-N. Alternately turn the drive pinion while tightening nut to seat bearing properly. Install pinion depth gauge in differential side bearing bores and measure distance between depth gauge and master pinion with a micrometer. Remove pinion depth gauge and master pinion from carrier. With the number painted on face of pinion to be installed, and the micrometer reading, select the total shim thickness required for pinion from Pinion Setting Shim Table. (For example: a reading of 2.135" from Tool 4610-P, with a pinion marked "17" requires .017" shim). Shims are available in 12 sizes from .010" to .021" in increments of .001". Install proper shim on pinion shaft, then press rear bearing on pinion until it is seated against shim. Install pinion assembly in carrier, then install a new bearing spacer, and the front bearing. Place oil slinger and seal on pinion shaft. Brush a thin coating of sealer on outer diameter of seal, then drive seal into place with Tool T55P-4676-A. Install washer and nut and alternately turn pinion while tightening nut until bearing pre-load is 18-24 inch-pounds (new bearings) or 13-18 inch-pounds (used bearings).

►*DRIVE PINION ADJUSTMENT (TOOTH PATTERN METHOD) NOTE:* Adjustment of pinion using this method is the same as for previous models, except that a starting shim pack of .015" should be used instead of a .030-.032" shim pack. *See "Ford Pass. Car Hypoid (Separate Carrier)" in 1955 Annual Data or later Manual edition.*

PINION SETTING TABLE

Micrometer Reading Tool 4610-P	Micrometer Reading Tool 4610-A	PINION MARKING						
		12	13	14	15	16	17	18
2.131	2.631	.008	.009	.010	.011	.012	.013	.014
2.132	2.632	.009	.010	.011	.012	.013	.014	.015
2.133	2.633	.010	.011	.012	.013	.014	.015	.016
2.134	2.634	.011	.012	.013	.014	.015	.016	.017
2.135	2.635	.012	.013	.014	.015	.016	.017	.018
2.136	2.636	.013	.014	.015	.016	.017	.018	.019
2.137	2.637	.014	.015	.016	.017	.018	.019	.020
2.138	2.638	.015	.016	.017	.018	.019	.020	.021
2.139	2.639	.016	.017	.018	.019	.020	.021	.022
2.140	2.640	.017	.018	.019	.020	.021	.022	.023
2.141	2.641	.018	.019	.020	.021	.022	.023	.024
2.142	2.642	.019	.020	.021	.022	.023	.024	.025
2.143	2.643	.020	.021	.022	.023	.024	.025	.026

FORD, LINCOLN, MERCURY HYPOID (INTEGRAL CARRIER)

F rd Sta. Wgn., Sed. Del., Thunderbird, Police Interceptor & F-100 Trucks, (1956)
Continental (1956)
Lincoln (1956)
Mercury (1956)

►CHANGES, CAUTIONS, CORRECTIONS

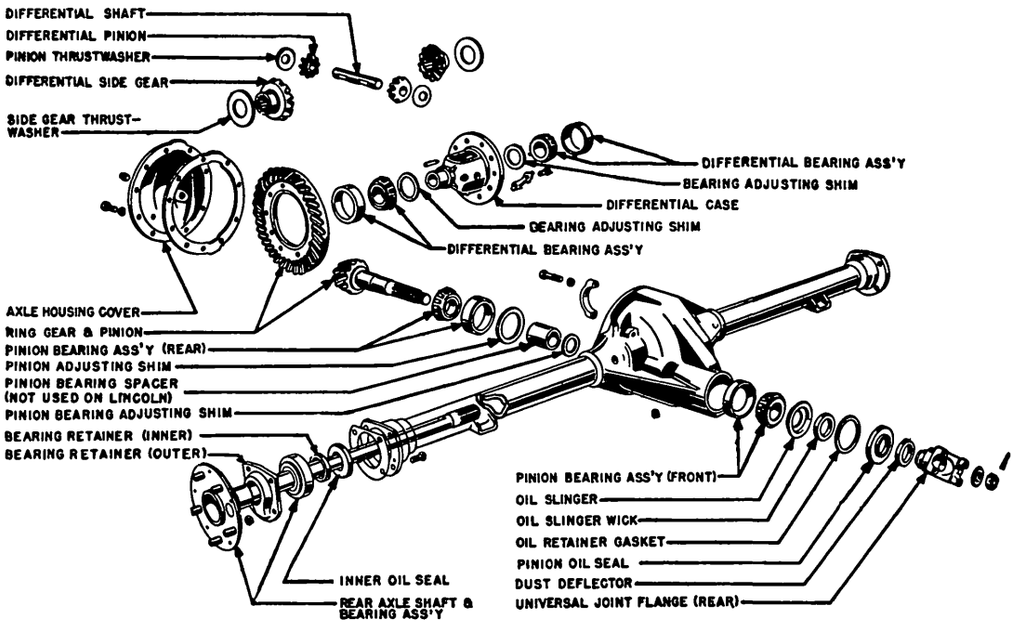
►*1956 LINCOLN & MERCURY REAR AXLE PINION SEAL SQUEAL CORRECTION:* A new seal, Part No. MC-4676-A having two sealing lips may be used to replace the old seal. Coat lips of seal with Lubriplate before installation.

►*1949-56 MERCURY REAR AXLE SHAFT ENDPLAY CORRECTION:* A "Clunking" sound on rough roads or sharp turns caused by excessive axle shaft endplay can be eliminated by installing shims between rear axle bearing and shoulder in axle housing tube. Measure axle shaft endplay with a dial indicator. If endplay is over .030" add shims as required to reduce the endplay to not less than .019". Make shims of steel or brass in thicknesses of .010" & .015". Inside diameter should be 2 9/16", outside diameter should be 3 1/8".

DESCRIPTION: Semi-floating, hypoid gear type with Hotchkiss drive. **This axle does not have a separate differential carrier assembly.**

REMOVAL OF AXLE ASSEMBLY: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Ford, Lincoln, Mercury (Integral Carrier)" in 1955 Annual Data or later Manual edition.*



LINCOLN, MERCURY, FORD "INTEGRAL CARRIER" HYPOID AXLE

FORD TRUCK HYPOID (BANJO HOUSING)

F-350, F-500, C-500, B-500, P-500, F-600, C-600, B-600 (1956)

DESCRIPTION: Full-floating, hypoid gear type with Hotchkiss drive.

►*REAR AXLE NOTE:* Different axle assemblies are used for the different series trucks. Except for minor structural differences and variations in size and shape of parts, the various axle assemblies are similar. Service procedures apply to all assemblies unless otherwise noted.

REMOVAL OF AXLE ASSEMBLY: *See "Rear Axle" on Truck Model pages.*

AXLE SHAFT REPLACEMENT: Drain lubricant from housing, then remove axle shaft stud nuts and washers. Tap center of axle shaft flange to loosen tapered dowels, and remove the dowels. Remove axle shaft and gasket from housing. To install, place new gasket on hub and install axle shaft in housing, rotating axle to line up axle splines with splines in gears. Install tapered dowels, lockwashers and nuts on studs and tighten to 50-70 ft. lbs.

WHEEL BEARING ADJUSTMENT: Remove axle shaft (see above), bearing locknut and washer. Tighten wheel bearing adjusting nut while rotating wheel back and forth, until a noticeable drag is felt, then back off adjusting nut 1/8 turn. Install bearing lockwasher and locknut and bend one tab of lockwasher over adjusting nut and one tab over locknut. Install axle shafts.

OVERHAUL: The following service procedures apply to all series trucks.

Differential Carrier Removal: Remove axle shafts (see above). Support carrier assembly properly with a roller jack, then remove carrier to housing bolts and lockwashers. Tighten the puller screws, when provided in carrier, until carrier is loosened from housing. Carefully withdraw carrier assembly from axle housing, then back off puller screws. Remove and discard axle housing gasket.

Differential Carrier Disassembly: Adjust differential bearing pre-load (if bearings are in good condition) then check runout of drive gear with a dial indicator. Make a note of runout for reference during reassembly. On 500 Series trucks, loosen the thrust block locknut, then back out the thrust screw and block to provide clearance for drive gear. On all models, mark differential bearing caps and carrier legs with a punch as a guide when reinstalling bearing caps. Remove adjuster locks. Remove bearing caps and remove differential assembly from carrier. Remove thrust block on 500 Series trucks.

Differential Disassembly: Clamp assembly in a vise with soft jaws, then remove differential side bearings with a suitable puller. Mark differential case halves with a punch before disassembling, and remove bolts or cap screws. Separate case halves, using a brass hammer if necessary, then remove side gears, spider, pinions and thrust washers. Center punch the drive gear rivet heads on drive gear end of rivets. Drill through the rivet heads using a drill 1/32" smaller than rivet body. Press out rivets, then tap drive gear off case with a soft hammer.

Pinion Removal & Disassembly: Hold universal joint flange, then remove cotter pin, nut and washer from drive pinion shaft. Remove flange using Tool T53T-4851-A. Remove bolts which attach oil seal retainer and pinion

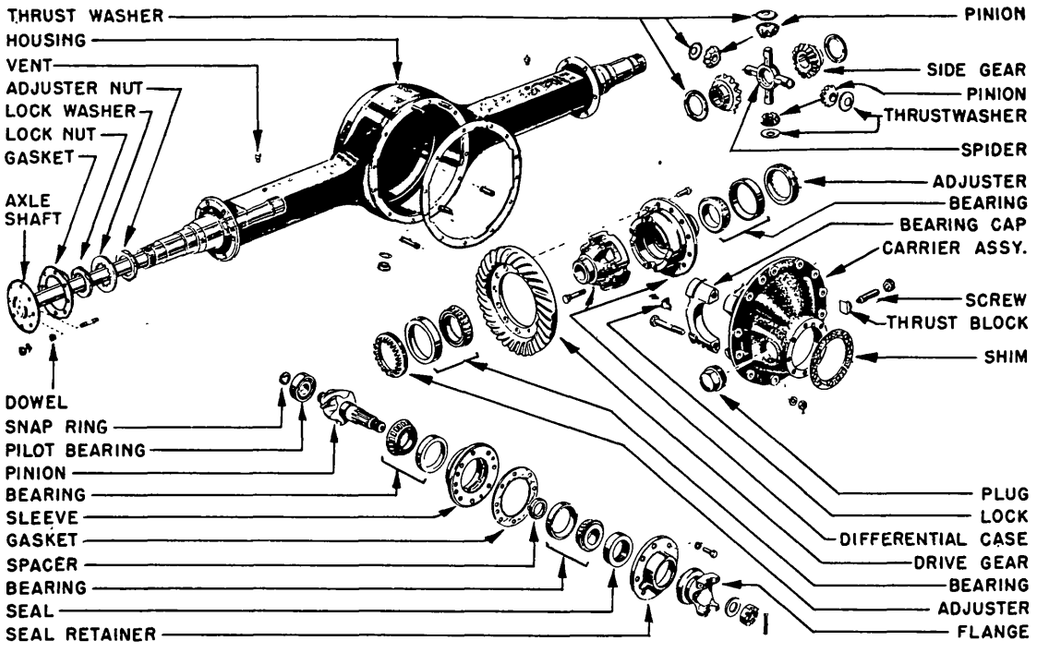
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FORD TRUCK HYPOID "BANJO HOUSING" (C nt.)

bearing sleeve to carrier. Remove oil seal retainer then on 600 Series trucks, remove the universal joint flange spacer washer. Drive the drive pinion and sleeve assembly out of carrier, or remove it with puller screws. Remove pinion bearing sleeve shims, noting the number and thickness of shims used. Tie shim pack together and retain for future use. Tap or press drive pinion out of the front pinion bearing and sleeve, then press the drive pinion out of spacer and rear pinion bearing. Remove pilot bearing snap ring, then remove pilot bearing with Tool T56T-4625-A (F-350); T53T-4625-A (F-500 & F-600). Remove pilot bearing snap ring and remove pilot bearing.

Pinion Reassembly & Adjustment: Press drive pinion pilot bearing on drive pinion, then install snap ring. Press rear bearing on shaft until seated against back face of pinion gear. Press pilot bearing cups in sleeve. Insert drive pinion into pinion bearing sleeve, then install old pinion bearing spacer for a trial build-up. Install front bearing in sleeve. On 350 Series trucks, install universal joint flange and tighten flange nut to 175-250 ft. lbs. Wrap a strong cord or soft wire around the bearing cage and attach a pound-pull scale to cord. Measure the torque required to keep cage rotating (disregard torque required to start cage rotating). If torque required to keep cage rotating is not between 12-18 inch pounds, install a thinner spacer to increase or a thicker spacer to decrease the pre-load. This same procedure is used on 500 & 600 Series trucks, except that the universal joint flange nut is tightened to 300-400 ft. lbs. After pre-load is properly set, install a new oil seal in drive pinion seal in drive pinion seal retainer with Tool T53T-4676-B (350 & 500 Series); T53T-4676-C (600 Series). On 600 Series trucks, place the universal joint flange thrust washer on top of drive pinion outer bearing. Install oil seal retainer assembly, universal joint flange, washer and nut on drive pinion. Hold flange and tighten nut to 300-350 ft. lbs., then install cotter pin. Place original bearing cage shims on differential carrier, then place drive pinion and sleeve assembly into carrier and tap it into place with a soft hammer. Install cap screws and lockwashers, then tighten screws to 23-31 ft. lbs.

Differential Ass mbly: If the drive gear runout check during disassembly exceeded .008", the condition may be caused by a warped gear, defective case, or by excessively worn differential bearings. To determine cause of excessive runout, before riveting gear to case, press the differential side bearings in place on case hubs until seated against shoulders of case. Assemble the two halves of case, aligning marks made at disassembly. Tighten differential case capscrews or nuts to 23-31 ft. lbs. (350 Series); 50-70 ft. lbs. (500 Series); 80-105 ft. lbs. (600 Series). Install case in differential carrier, then check runout of case flange with a dial indicator. If runout exceeds .005", the drive gear is true and the condition is due to either a defective case or differential side bearings. Install new bearings on case hubs, and install case in carrier, then check runout again. If runout is still excessive, the differential case is defective and must be replaced. After the condition has been corrected, disassemble differential case. Position drive gear on case flange, then attach drive gear to case with rivets. *(CAUTION - Be sure drive gear and case are clean, and the drive gear is not cocked before riveting gear to case. Cold rivets must be used to attach gear to case).* Apply a thin coating of lubricant on spider, side gears and thrust washer, then assemble them in drive gear half of case. Install cap screws or bolts and nuts, and tighten to correct torque. Install lock wire.



FORD TRUCK "BANJO HOUSING" HYPOID AXLE

Drive Gear Adjustment: Place side gear bearing cups over side bearings, and position differential assembly in carrier. Position bearing adjusters in carrier, making sure the adjuster threads mesh with threads in carrier. Install bearing caps in their original position using the aligning marks made at disassembly, as a guide. Install bearing cap bolts and tighten to 81-106 ft. lbs. (350 Series); 80-100 ft lbs. (500 Series); 110-145 ft. lbs. (600 Series). *(NOTE - The bearing adjusters and bearing cups can be moved with the bearing cap bolts at normal torque).* Tighten bearing adjusters hand tight against side bearing cups. Turn left hand adjuster until drive gear is loosely meshed with pinion gear. Mount a dial indicator on carrier flange with the contact button bearing against back of gear or differential carrier, then loosen the right hand adjusting nut just enough to notice endplay on indicator. Tighten this adjuster until zero endplay is obtained. Tighten each adjuster one notch from the zero endplay position to pre-load differential bearings. Mount the dial indicator on the carrier so contact button bears against rear face of ring gear tooth, then adjust drive gear to obtain .006-.012" backlash. To reduce backlash, loosen right hand adjuster and tighten left hand adjuster equally. To increase backlash, perform the same operation in reverse. Check gear tooth contact for correct pattern. If tooth contact adjustment is necessary, the drive pinion position may be changed by varying the thickness of shim pack between pinion case and carrier. Adjust drive gear position by bearing adjusters.

Differential Carrier Installation: Place a new carrier to housing gasket on axle housing making sure the puller bolt holes in gasket are aligned with holes in housing. Place differential carrier assembly on a roller jack, then roll carrier into position. Start carrier into housing with four cap screws equally spaced. Tighten cap screws alternately to draw carrier squarely into housing. Install remaining carrier to housing screws, lockwashers and tighten to 53-59 ft. lbs.

INSTALLATION OF REAR AXLE ASSEMBLY: *See "Rear Axle" on Truck Model page.*

1956 SUSPENSION & WHEEL ALIGNMENT INDEX

	Pag
BUICK	
All Series	339
CADILLAC	
All Series	340
CHEVROLET	
Pass Cars (Exc. Corvette)	340
Corvette	341
CHRYSLER, DESOTO, DODGE	
All Series	341
FORD	
Pass. Cars, Sta. Wgn., Sed. Del	343

	Pag
HUDSON	
All Series	343
LINCOLN & MERCURY	
All Models	343
METROPOLITAN	
All Models	Pg. 316 in 1954 Annual Data or later Manual edition
NASH	
All Series	343
OLDSMOBILE	
All Series	344

	Page
PACKARD	
5640 Series, Conventional	344
5660, 70, 80, 88 Series, Torsion Level	344
PLYMOUTH	
All Series	341
PONTIAC	
All Series	344
RAMBLER	
All Models	343
STUDEBAKER	
All Series	345
WILLYS	
All Models	Suspensions Section in Manual

1956 SUSPENSION & WHEEL ALIGNMENT

BUICK

All Series (1956)

►*FRONT TIRE RUBBING ON FRAME CORRECTION (Turning Angle Too Great):* To correct, install a 1/32" thick plain washer under bolt head of rear steering arm bolt on both right and left sides. In order to install washer, it will be necessary to remove hub and drum assembly to gain access to nut on rear steering arm bolt.

►*1956 CASTER CHANGE:* Caster now specified is 0° to Neg. 2°, with Neg. 1° desired. This supersedes previous specification of Pos. ½° to Neg. 1½°

DESCRIPTION: Same design as used on previous models.

ADJUSTMENT & PARTS REPLACEMENT: *See "Buick" in 1955 Annual Data or later Manual edition and note the following:*

Trim Dimension (Front Springs): Before measuring, bounce both ends of car up and down several times to make sure there is no bind in suspension members, and to let springs take a natural position. When car is at rest, measure the trim height between top side of lower control arm and underside of frame cross-member (at bumper bracket). Trim dimension should be within limits shown in table below and lower control arm heights should be same on both sides of car.

►**Trim Dimension Correction–**If trim dimension is less than specified, or additional height is required to prevent "bottoming", install additional spring insulators, divided between upper and lower ends of spring. If more than three additional shims required, replace the spring. NOTE–New springs should not increase the trim dimension more than 1" over specified maximum limit.

Front Trim Dimensions

46C. 56C, 76C	3½-4"
All Other Models	3¾-4¼"

NOTE - When checking NEW car add ¼".

Trim Dimensi n (Rear Springs): Proceed as for front springs. Measure distance from pivot bolt to raised portion on forward end of bumper bracket.

Rear Trim Dimensions

46, 56, 66, 76C, R	4¼-5¼"
All Other Models	5½-6¼"

NOTE - When checking NEW car add 3/8".

Kingpin Inclination: 7° at 7/8° camber.

Caster: 0° to Neg. 2° (Neg. 1° desired). *NOTE* - Supersedes previous specification of Pos. ½° to Neg. 1½°.

Camber: Pos. 3/8° desired (Limits Pos. 7/8° to Neg. 5/8°). Both sides of car should be equal within 3/4°.

Toe-In: 1/16-1/8".

Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be 22½°±¾°.

FRONT SPRING REPLACEMENT (Removal): Place jack under lower control arm and raise sufficiently to remove wheel. Disconnect stabilizer link from lower control arm and outer end of tie rod from steering arm. Remove shock absorber and remove lower pivot pin nut, pivot pin nut, pivot pin, lock washer, and dust seals. Support car frame with another jack, then slowly lower jack under lower control arm, and remove spring.

Installation: Before installing front spring, check the spring part number to make sure it is the correct spring (See "Front Spring" Table above). Make sure that rubberized fabric spring insulator is around spring centering flange on frame and is in good condition. Place one end of spring over centering flange, and as lower control arm is raised, position lower end of spring so that end coil seats in recess in spring seat. Support lower control arm on a jack. Slip lower pivot pin dirt seals over outer ends of lower control arm. Centralize lower end of knuckle support between outer ends of lower control arm, then install lower pivot pin and lock washer from front side and tighten securely. Install and tighten nut. Snap dirt seals into place over pivot pin. Connect tie rod outer end to steering arm, and connect stabilizer link to lower control arm (NOTE–When stabilizer rod nut is tightened, the overall length of each grommet assembly should be 1 11/16". Adjust nut as necessary to obtain this dimension) Reinstall shock absorber and wheel. Adjust front end alignment.

Front Spring Application

Synchro-mesh Trans.

Series	Std.	Air Conditioned
40	1171037 ①	1165048

① - 1171038 200 lb. overload.

Dynaflow Cars

Series	Std.	Air Conditi n d
40, 60	1171038	1165049
50, 70	1165049	1165050

REAR SPRING REPLACEMENT (R m val): Disconnect both rear shock absorber lower ends. Hoist rear end of car until all load is off rear springs, place floor stands under frame for safety. Remove spring clamps at lower and upper ends and remove spring.

Installation: Be sure spring insulator in upper seat is in good condition, then attach upper end of spring using clamp, bolt insulator, flat washer, lockwasher and bolt in order named. Attach lower end of spring with clamp, lockwasher and nut. Lower car and attack lower ends of shock absorbers. *NOTE* - Car weight must be on rear wheels when tightening shock absorber ends to clamp rubber bushings in a neutral position.

Rear Spring Application

Series	R ar Spring Part No.
41, 43, 48, 63, 63D	1341972
46C, R, 66C, R ①	1341972
46C, R, 66C, R	1174150
49, 69	1315231
40, 60 Exc. 49 & 69 ②	1315231
40, 60 Exc. 49 & 69 ①	1165116
52, 53, 72, 73	1165116
56C, R, 76C, R ③	1165116
50, 70 ①	1334701
56C, R, 76C, R	1168767
50, 70 ②	1315233
49, 69 ①	1315233

① - 200 lb. overload.
② - 500 lb. overload.
③ - 100 lb. overload.

►*UPPER SUPPORT ARM TORQUE NOTE:* Turn bushing until head is tight against arm, then torque to a minimum of 150 ft. lbs.

CADILLAC

All Series (1956)

DESCRIPTION: Same design used beginning 1950.

ADJUSTMENT & PARTS REPLACEMENT: *See 1950 Annual Data or later Manual editions and note the following:*

Front Spring Height: Measure distance from top of lower control arm to center of rubber bumper bracket front lower rivet on frame. Spring height should be equal on both sides of car within 3/8". If heights unequal, low side may be adjusted by addition of shims between bottom of spring and spring seat on lower suspension arm.

Front Spring Heights

Car Model	Spring Height
All Models (Exc. 75 & 86)	4½-5¼"
75	5 3/8-6 1/8"
86 (Commercial)	5½-6¼"

Rear Spring Height: Measure distance from top of spring U-bolt to a hole in frame side bar directly above U-bolt. Rear spring height should be equal within ½" on both sides of car.

Rear Spring Heights

Car Model	Spring Height
All Models (Exc. 86)	8¾-9½"
86 (Commercial)	10¼-11"

Kingpin Inclination: 5°51' crosswise.

Caster: 0° to Neg. 1° and equal within ½°.

Camber: Neg. 3/8° to Pos. 3/8° with ¼-½° more positive camber on left wheel.

Toe-In: 5/32-7/32" at rest. Loosen clamp bolts and turn adjusters at outer end of each tie rod equally. *NOTE* - Be sure open side of clamp is over open side of adjuster before tightening clamp.

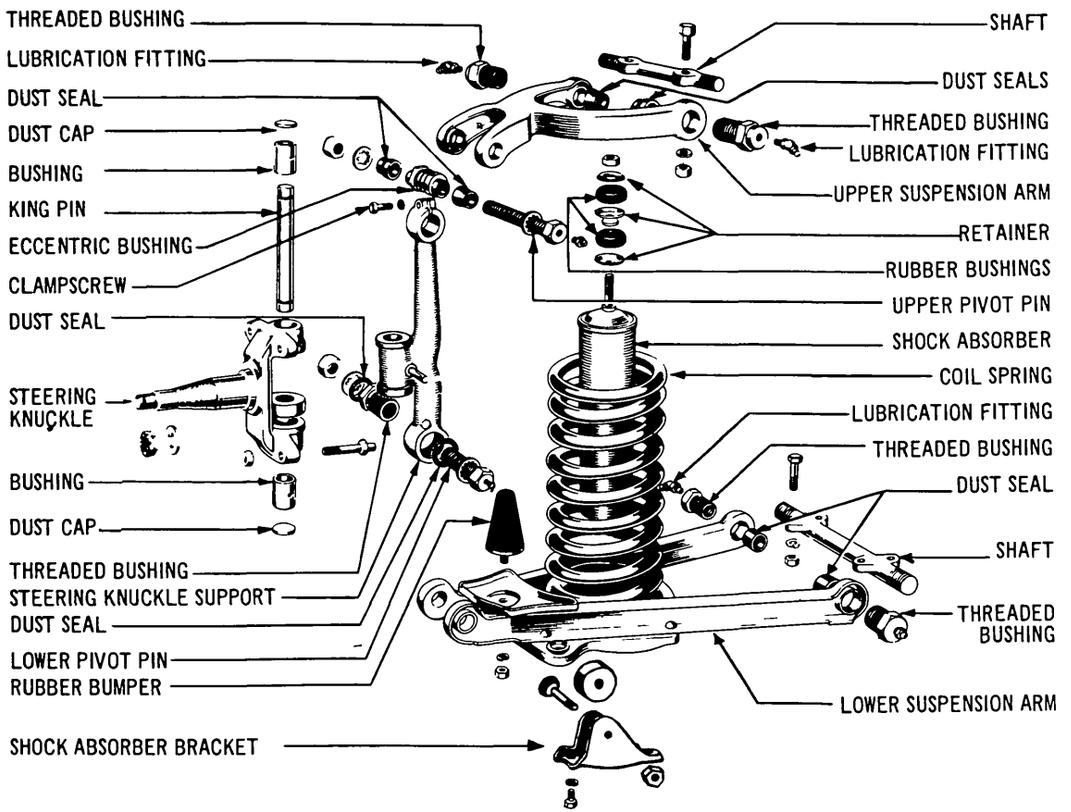
Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be 22°40'.

1956 Front Spring Identification ©

Car Model	Part No.
62 (Exc. 6267X, SX) with A C	1461002
62 (Exc. 6267X, SX) without A.C	1461000
6267X, SX & 6019X with A C .	1461009
6267X, SX & 6019X without A C	1461002
60S, 62 Heavy Duty	1461007
75 with A C	1461005
75 without A C	1461003
86 Standard	1461004
86 Heavy Duty	1461006

© - Spring part number is stamped on an end coil.

► *FRONT SPRING INSTALLATION NOTE: Lower insulator no longer used.*



CADILLAC FRONT SUSPENSION ASSEMBLY

CHEVROLET PASS. CARS

Chevrolet Pass. Cars (Exc. Corvette) (1956)

►CHANGES, CAUTIONS, CORRECTIONS

► *1955 CAMBER ADJUSTMENT CORRECTION:* If it is found that proper camber cannot be obtained even after removal of all shims, it will be necessary to reposition lower control arm 1/8" inward. New position provides over 1° camber which in turn can be adjusted through addition of shims. Added shims can be moved forward or backward to obtain proper caster. To reposition lower control arm, remove lower control arm shaft. Scribe mark on forward and rear edge of front crossmember, corresponding to present centers of forward and rear inner lower control arm bolt holes in front crossmember. Weld both inner holes shut and redrill new inner holes 1/8" inward from marks scribed above. Weld both outer holes shut and reinstall lower control arm shaft on new inner holes. Using lower control arm shaft as a template, drill two new outer holes and secure with bolts. Recheck camber and add shims as required. Adjust caster by moving shims (see below).

DESCRIPTION: Front suspension utilizes short and long arms with spherical type joints connecting control arms and steering knuckles Coil springs and direct acting shock absorbers are mounted between spring seats on lower control arms and spring pockets in front cross member Inner ends of upper and lower control arms are mounted on rubber torsion bushings which, in turn, are on forged steel shafts bolted to front cross member (no lubrication required). System uses a forged steering knuckle that is connected directly to upper and lower control arms at spherical joints. This knuckle has brake backing plate, anchor pin, and steering arms bolted to it.

ADJUSTMENT & PARTS REPLACEMENT: *See "Chevrolet Suspension" in 1955 Annual Data or later Manual edition and note the following:*

Steering Axis Inclination: Pos. 3½° ±½°.

Caster: Pos. 1° ±½°.

Camber: Pos. ½° ± ½°.

Toe-In: 1/16-1/8" (per wheel), 1/8-1/4" (total). *NOTE* - Supersedes previous specification of 1/8-3/16".

Toe-Out on Turns: With inside wheel at 20°, outside wheel should be 18° 10".

Front Spring Height: Bounce and rock car several times on smooth level floor. Measure from lower face of knuckle lower spherical joint boss to floor and center of lower control arm inner front bushing to floor. Difference should be 2½-3". To correct, replace springs.

FRONT SPRING REPLACEMENT: Remove front shock absorber on side spring to be replaced (see above). Raise front end of car off floor and place stand jacks under frame side rails. Lower car on jacks. Remove tire and wheel assembly (*NOTE*–To avoid damage to spherical joints during spring operations). Remove four lower control arm cross shaft bushing bolts. Install

CONTINUED ON NEXT PAGE

CHEVROLET CARS (Cont.)

Spring Compressor J-6318 through shock absorber mounting hole in front crossmember and through spring. Install nut washer and thrust bearing on Compressor shaft to keep Compressor from falling back through. Index Cross Shaft of Tool J-6318 through eye in Tool. Attach Cross Shaft to shock absorber pivot bar bolt holes in bottom of lower control arm. Use bolts from pivot bar, tighten securely. Tighten upper Compressor nut to slightly compress spring. Remove lower spherical joint cotter pin and nut. Loosen stud by hammering on side of steering knuckle joint boss, backing up the steering knuckle with a heavy hammer. Remove upper spherical joint stud from knuckle in similar manner, and hang drum and knuckle assembly without loading brake hose. Remove four lower control arm inner shaft-to-crossmember nuts and bolts. Unscrew spring compressor nut and remove spring and lower control arm. (NOTE - On some models generator may have to be loosened, then raised in order to compress spring compressor). To install, reverse removal procedure. Rotate spring to make certain it fits helical seats in lower control arm and crossmember.

Front Spring Application

Model	Spring Part No.
Sta. Wgn. (Exc. Powerglide)	3721371
Sta. Wgn. (Powerglide)	3721372
Convertible (Exc. Powerglide)	3721372
Convertible (Powerglide)	3721373
Sed. Del. (Without A C)	3713966
Sed. Del., Conv. (Powerglide & A C)	3714506
Taxi (Exc. Powerglide)	3719736
V8 Sport Cpe. (Without A C)	3723902
6 Cyl. Sport Cpe. (Exc. Powerglide)	3723903
Other Pass. (Powerglide & A C)	3722423
Other Pass. (A C Exc. Powerglide)	3714506
Other Pass. (Powerglide)	3723903

CHEVROLET CORVETTE

Chevrolet Corvette (1956)

DESCRIPTION: Independent, linked parallelogram type with direct acting shock absorbers, coil springs. "Threaded Bushing" type pivot points used on upper and lower control arms.

ADJUSTMENT & PARTS REPLACEMENT: *See 1949 or later Manual editions and note the following:*

Kingpin Inclination:- 3½-4½° crosswise.
Caster: 0° to Pos. 1°.
Camber: 0° to Pos. 1°.
Toe-In: 0-1/8"
Toe-Out on Turns: With outside wheel at 20°, inside wheel should be 23°.
FRONT SPRINGS: Chevrolet No. 3709497.
Front Spring Height: Bounce and rock car several times on smooth level floor. Measure from center of lower control arm outer pivot bolt to floor and center of lower control arm inner front bushing to floor. Difference should be 1 5/8" ±1/4". To correct, replace springs.

CHRYSLER, DE SOTO, DODGE & PLYMOUTH

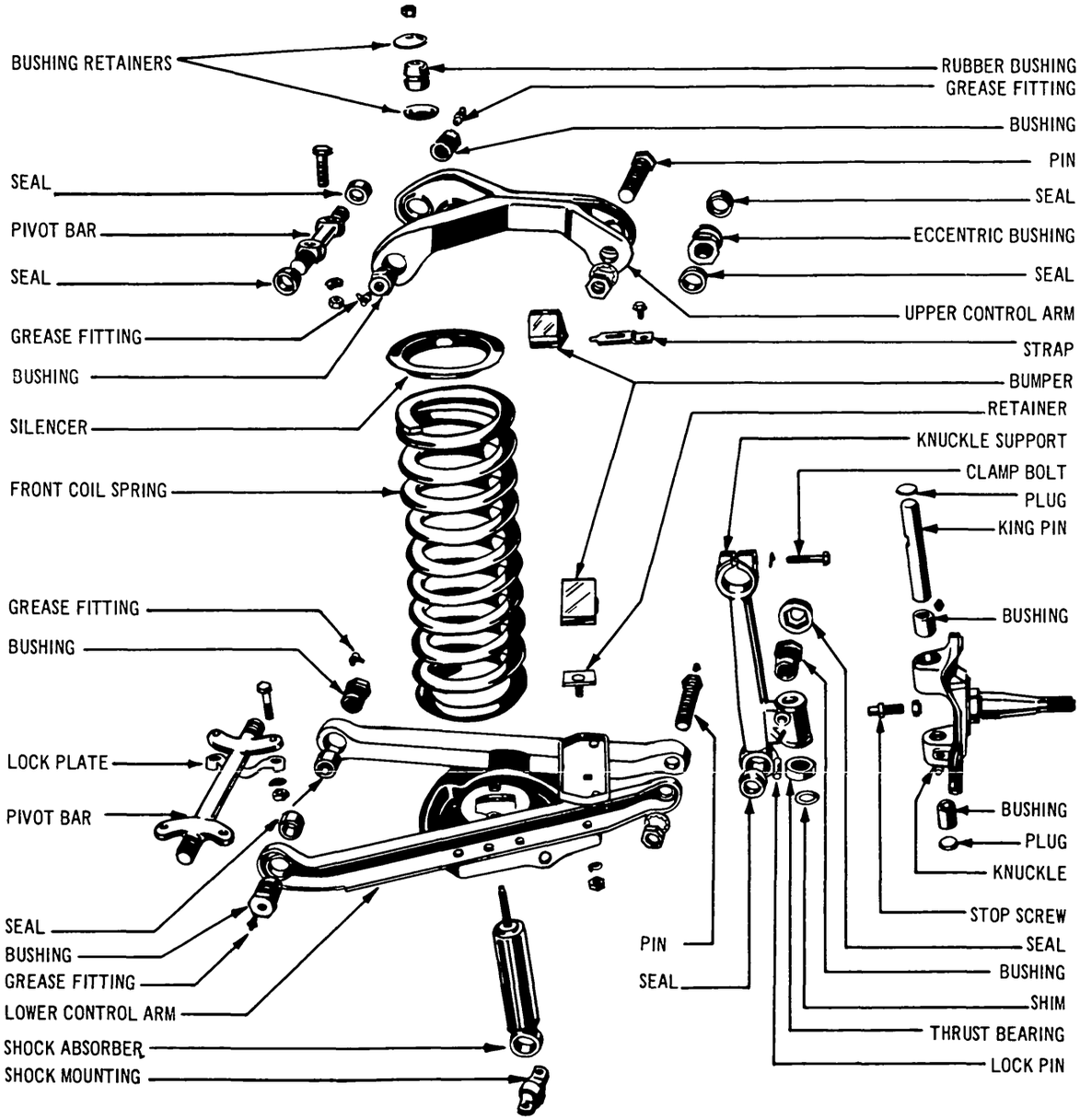
Chrysler, DeSoto, Dodge, Plymouth (1956)

DESCRIPTION: Same design as used on previous models. Shock absorbers are mounted within front springs.

ADJUSTMENT & PARTS REPLACEMENT: *See "Chrysler, DeSoto, Dodge, Plymouth" in 1953 Annual Data or later Manual edition and note the following:*

Kingpin Inclination: **Chrysler** – 7° (C70), 5.5° (Others) at 0° Camber.
DeSoto & Plymouth – 5-6½° at 0° Camber
Dodge – 5½° at 0° Camber.
Caster (All Cars): Neg. 2° to 0° (Neg. 2° with Manual

CONTINUED ON NEXT PAGE



CHRYSLER, DE S T , D DGE, PLYM UTH FR NT SUSPENSI N (TYPICAL)

CHRYSLER, DE SOTO, DODGE & PLYMOUTH (C ntinu d)

Steering, 0° with Power Steering preferred), with left side 0-¾° more negative than right side.

Camber: Chrysler, D S t , Dodge – Pos. ¼° ± 3/8° (Pos. ½° on left, 0° on right preferred).
Plymouth – Neg. 1/8° to Pos. 5/8° (Neg. ½° on left, 0° on right preferred).

Toe-In: 3/32-5/32" (3/32" preferred on Dodge, 1/8" preferred on others).

To -Out on Turns: Chrysler, DeSoto, Dodge – With inside wheel at 21½° ± 1°, outside wheel should be 20°.
Plym uth – With inside wheel at 20°, outside wheel should be 17½ - 19°.

Front Spring Height: With car on level floor, tires inflated to recommended pressure, measure vertical distance from inner and outer ends of lower control arm to floor (center of control arm pin at outer end, center of grease fitting in control arm pivot bar on inner end). See table below for allowable variations between the two measured points on each side of car (Exc. Plymouth). Make measurements at right and left sides of car and compare. If measurements differ more than ¼" from one side of car to the other, check each front spring for correct installation at top and bottom. If springs are correctly installed and measurements made at right and left sides still differ by more than ¼", insert spacers at top of spring between seat and silencer or replace spring (*NOTE* - If more than two spacers required to make correction for a spring, replace spring). If measurements taken above for allowable difference of ¼" from one side of car to other, check rear spring heights.

R ar Spring Height: Measure distance from spring plate to frame on each side. Front spring height will be affected if rear spring heights differ more than ¾".

► *NOTE:* In following table, a plus sign (+) indicates the inner end of lower arm is higher than outer end and a minus sign (–) indicates that it is lower.

CHRYSLER	Allowable Variation
C70 (All)	+1¼" to –¼"
C71, 72, 73 Sedans & Coupes	+1" to – 0"
C71 Town & Country	+1¼" to +¼"
C72 Town & Country	+1¼" to –0"
DESOTO	
All (Exc. S23 Sta. Wgn.)	+1" to –0"
S23 Sta. Wgn.	+1¼" to +¼"
DODGE	
All (Exc. Suburban)	+0" to –1"
Suburban	–¼" to –1¼"
PLYMOUTH	
All Models	℄

℄ – No allowable variation given for each spring on each side. Follow procedures given above except for single spring variations.

Front Spring Application

Chrysler C-70

Model	Right	Left
Standard	1611795	1611795
Heavy Duty	1534008	1534008
Air Conditioning	1611798	1611798

Chrysler C-71

Model	Right	Left
Std. (Exc. Conv. Cpe. & Est. Wgn.)	1611575	1611576
Std. (Conv. Cpe.)	1611576	1611577
Std. (Est. Wgn.)	1557865	1557865
Hvy. Duty (Exc. Est. Wgn.)	1618083	1618084
Hvy. Duty (Est. Wgn.)	1618085	1618086
Air Conditioning	1611577	1611577

Chrysler C-72

Model	Right	Left
C-72-300 (Std.)	1634613	1634613
Std. (Exc. Conv. Cpe. & Est. Wgn.)	1611576	1611577
Std. (Conv. Cpe.)	1611577	1611578
Std. (Est. Wgn.)	1557866	1557867
Hvy. Duty (Exc. Est. Wgn.)	1618084	1618085
Hvy. Duty (Est. Wgn.)	1618087	1618087
Air Conditioning	1611578	1611578

Chrysler C-73

Model	Right	Left
Standard	1557866	1557867
Heavy Duty	1618087	1618087
Air Conditioning	1557868	1557868

DeSoto S-23, S-24

Model	Right	Left
Std. (Exc. Est. Wgn.)	1611575	
Std. (Exc. Est. Wgn. & Conv. Cpe.)	1611575	
Std. (Conv. Cpe.)	1611576	
Std. (Est. Wgn.)	1557865	1557865
S-24 Adventurer (Std.)	1618081	1618081
Heavy Duty (Exc. Est. Wgn.)	1618082	1618083
Heavy Duty (Est. Wgn.)	1618085	1618086
Air Conditioning	1611576	1611576

Dodge, 6 & 8 Cyl.

Model	Right	Left
6 Cyl. Std.	1618753	1618753
6 Cyl. Heavy Duty	1617014	1617014
8 Cyl. Std.	1615194	
8 Cyl. Std. (Exc. Conv. Cpe.)	1615194	
8 Cyl. Std. (Conv. Cpe.)	1615195	
8 Cyl. D-500 Std.	1630161	1630161
8 Cyl. Heavy Duty	1634574	1634574
8 Cyl. Air Conditioning	1615195	1615195

Plymouth 6 & 8 Cyl.

Model	Right	L ft
6 Cyl. Std. (Exc. 3-Pass. Cpe. & Sub.)	1618525	1618526
6 Cyl. Std. (3-Pass. Cpe. & Sub.)	1618524	1618525
6 Cyl. Heavy Duty	1618043	1618043
8 Cyl. Std. (Exc. Cpes. & Sub.)	1618754	1618755
8 Cyl. Std. (Conv. Cpe.)	1618755	1618756
8 Cyl. Std. (3-Pass. Cpe. & Sub.)	1618753	1618754
8 Cyl. P-29 Fury (Std.)	1630160	1630160
8 Cyl. Heavy Duty	1617015	1617015
8 Cyl. Air Conditioning	1618756	1618756

FRONT SPRING: Removal – Raise front of car and place stands under frame side members behind suspension arm. Remove shock absorbers (see below) and place jack under lower control arm pivot bar where it is attached to frame crossmember. Raise jack and relieve pressure on pivot bar bolts and remove bolts (place tapered drift in each hole to keep pivot bar lined up until bolts are removed). Lower jack slowly allowing lower control arm to come down, and remove front spring.
Installation – Position lower spring silencer and spring in seat and rotate spring until it indexes with ramp. Install upper spring silencer and position jack and wood block under pivot bar. Make sure spring is seated properly at upper end. Raise jack to align pivot bar and frame bolt holes and attach bar to frame. Tighten nuts to 60 ft. lbs.

FRONT SHOCK ABSORBER: Removal–Disconnect upper end of shock absorber pushrod, and lower mounting. Pull assembly, with lower bushing washer, out through lower control arm. To remove mounting assembly from lower shock absorber eye, place mounting assembly in Tool C-3413, and using a vise, press out the assembly-*NOTE* – The mounting assembly is serviced as a complete unit.
Installation – If it is necessary to install a new upper rod mounting bushing, wet the bushing, press it into place and install spacer. To install lower mounting assembly in shock absorber eye, position assembly so that mounting holes are at right angles with shock absorber. With Tool C-3413, and a vise, press assembly into eye until centered (*CAUTION - To avoid damaging the assembly, always press against steel sleeve).* Place lower mounting washer on rod of shock absorber and push shock into position from lower side. Install upper washer and nut, and tighten down to spacer. Install lower mounting screws and tighten to 35 ft. lbs.

FORD, LINCOLN, MERCURY

Continental (1956)
Ford Pass. Cars, Sta. Wgn. & Sed. Del. (1956)
Lincoln, All Models (1956)
Mercury (1956)
Thunderbird (1956)

► *1955-56 FORD LOOSE UPPER SUSPENSION ARM CORRECTION:* When loose upper suspension arm bolts are found, remove old lockwashers and install reverse keystone lockwashers (Part No. 357626-S7) Tighten bolts to 65-90 ft. lbs

► *1955 FORD UPPER BALL JOINT STUD TIGHTENING CORRECTION (Due to Too Short Ball Joint Stud):* To correct, use Lockwasher, Part No. 34850-S7, as a spacer between nut and spindle. Tighten nut to 60-80 ft. lbs.

► *1952-56 LINCOLN REBOUND "THUMP" CORRECTION:* New Bumper, Part No. LD-3025-A, is available for service replacement on 1952-56 Lincoln. New bumper is shorter and has flat surface on top and is designed to correct above condition. Replacement should be made in pairs only.

DESCRIPTION: "Ball Joint" type of same design as used on previous models.

ADJUSTMENT & PARTS REPLACEMENT: *See "Ford, Lincoln, Mercury" in 1954 Annual Data or later Manual edition and note the following:*

► *THUNDERBIRD CASTER & CAMBER ADJUSTMENT: Addition or removal of shims for caster and camber adjustment on Thunderbird cars produces effect reverse to that on other Ford cars.*

Kingpin Inclination: 6-7° (Ford & Thunderbird). 7°10" (Lincoln), 7° (Continental & Mercury) with Pos. ¾° camber.

Caster: Pos 1°±¼° within ½° from one side of car to other (Continental) 0-Neg. 1½° (Lincoln & Mercury), Pos. ½-Pos. 1½° (Ford) within ¼° from one side of car to other.

Camber: Pos. ¾° ±¼° (Continental), 0-Pos. ¾° (Lincoln & Mercury), Pos. ¼-1¼° (Ford) within ¼° from one side of car to the other,

Toe-In: 3/32-5/32" (Continental & Mercury), 1/8-3/16" (Lincoln. See Note below), 1/16-1/8" (Ford).

► *LINCOLN TOE-IN NOTE:* Supersedes previous specification of 1/32-3/32".

► *1953-56 MERCURY POWER STEERING CONTROL VALVE INTERFERENCE CAUTION:* Use caution when installing the left hand drag link adjusting sleeve. Clamps should be installed with the bolts in a vertical position and forward of the steering link. If clamps are installed with bolts to the rear, or horizontal, it is possible for them to interfere with the power steering valve assembly.

Toe-Out on Turns (Lincoln & Continental): With wheels at maximum turning angle, outer wheel is at 26° and inner wheel is at 36°.

Toe-Out on Turns (Mercury): With wheels at maximum turning angle, outer wheel is at 27°40' (Exc. Conv.), 26°50' (Conv.) and inner wheel is at 38° (Exc. Conv.), 36° (Conv.).

Front Spring Heights: Spring Height at normal load should be
Continental - 9.87".
Lincoln - 10.00".
Mercury (Conv., Sta. Wgn., Hvy. Duty) - 9.56".
Mercury (Others) - 9 59".

Front Spring Application

Ford 6 Cyl.

Model	Spring No.	Color Mark
2 Dr. & 4 Dr. Ⓒ	AD-5310-E	
2 Dr. & 4 Dr. Ⓐ	AD-5310-F	Red
Sunliner, Victoria, Skyliner Ⓒ	AD-5310-F	Red
Sunliner, Victoria, Skyliner Ⓐ	AD-5310-G	Alum.
Ranch Wgn. & Sed. Del.	AD-5310-H	Blue
2 Dr. & 4 Dr., Heavy Duty	AD-5310-J	Orange
Country Sedan & Squire	AD-5310-J	Orange

Ford V8

Model	Spring No.	Color Mark
2 Dr. & 4 Dr. Ⓒ	AD-5310-F	Red
Sunliner, Victoria, Skyliner Ⓒ	AD-5310-G	Alum.
2 Dr. & 4 Dr. Ⓐ	AD-5310-G	Alum.
Sedan Delivery	AD-5310-H	Blue
Ranch Wagon	AD-5310-J	Orange
Sunliner, Victoria, Skyliner Ⓐ	B5A-5310-C	
2 Dr., 4 Dr., Pol. Int. H D	B5A-5310-D	

Thunderbird

All	B5S-5310-B	

Lincoln

All (Exc. Conv.)	LD-5310-G	
Conv. & Air Cond	LD-5310-H	
Heavy Duty	LD-5310-J	

Continental

All	4048042	Red

Mercury

All (Exc. Conv. & Sta. Wgn.)	AD-5310-G	
Convertible	MB-5310-E	Orange
Sta. Wgn.	MB-5310-F	Bronze
Heavy Duty (Exc. Sta. Wgn.)	MB-5310-F	Bronze
Hvy. Duty (Exc. Conv. & Sta. Wgn.)	MB-5310-E	Orange

Ⓒ - Manual Shift. Ⓐ - Fordomatic.

HUDSON, NASH & RAMBLER

Hudson, Wasp & Hornet (1956)
Nash, Statesman & Ambassador (1956)
Rambler (1956)

► *RAMBLER CASTER & CAMBER ADJUSTMENT NOTE:* Lower control arm attaching bolts are provided with eccentric washers (one attached to bolt and the other keyed to the threaded end of the bolt). Loosening attaching bolt nut will permit turning the bolt and the eccentrics to provide adjustment for caster and camber. *NOTE - Supersedes previous Rambler procedures.*

► *POWER STEERING TOE-IN ADJUSTMENT CAUTION:* When adjusting toe-in on power steering equipped cars, operate engine. This will permit oil pressure supplied by power steering pump to center valve spool in power cylinder control valve. Steering wheel spoke may then be readily adjusted to desired center position.

► *FRONT TIRE RUBBING ON TURNS.* Inside wheel on right or left turns should be adjusted to a maximum turn angle of 38° (Rambler), 36° (Others) to avoid possibility of damaging front wheel tires as a result of contacting brake hose bracket on tight right or left turns. In addition, it is recommended that rear corner of brake hose brackets be trimmed 1/8" to prevent possible tire damage under abnormal turning conditions such as steep driveways. Effective April 11, 1956 brackets have been reworked in production.

DESCRIPTION: Similar to previous Hudson & Nash models. Eccentric bolts on lower control arm inner pivot controls the caster and camber adjustment on all models.

ADJUSTMENT & PARTS REPLACEMENT: *See "Nash Front Suspension" in 1952 Annual Data or later Manual edition. NOTE* - Rambler Caster & Camber procedures same as Nash & Hudson in 1956.

Kingpin Inclination: 3°36" (Hornet & Wasp), 6½° (Others).
Caster (With Pow. St.): Pos. ½-1° (Pos. 1° desired).
Caster (Without Pow. St.): 0-Pos. ½° (Pos. ½° desired).
Camber: Neg. ¼° - Pos. ¼° (0° desired).
Toe-In: 1/16 - 3/16".

Toe-Out on Turns:	Inside Wheel	Outside Wheel
Ambassador (Exc. V8 with P.S.)	25°	20¼°
Ambassador (V8 with P.S.)	25°	21¾°
Statesman	25°	20¾°
Hornet	26°	20°
Wasp	24°	20°
Rambler	25°	22°

Front Suspension Tightening Specifications: *NOTE*–It is very important that tightness of front suspension system be maintained The following torque values will insure correct tightness

	Ft. Lbs
Pivot Bar Bushing Retaining Nut	50-55
Lower Shock Mounting	90-95
Upper Control Arm Spacer Nut Screw	50-55
Lower Mounting Stud to Sill	75-85
Upper Mounting Stud to Sill	35-45
Upper Pivot Bar to Mounting Stud Nut	75-80
Lower Pivot Bar to Mounting Stud Nut	75-85

Spring Application

Rambler

Application	Spring Part No.
Right Spring	3144874
Left Spring	3147585
Right & Left Springs (With A.C.)	3147585

Hudson & Nash

Series	Spring Part No.
40	3133526
50, 60 (With A.C.)	3145947
50, 60 (Without A.C.)	3133545
80 (With A.C.)	3143889
80 (Without A.C.)	3145947

PONTIAC

Pontiac, All Series (1956)

►*PIVOT PIN INSTALLATION NOTE:* Effective 1956 production, upper and lower pivot pins are installed from rear **on right hand side.** This makes it necessary to lubricate pivot pins on right hand side from rear.

►*REAR SPRING ASSEMBLY CAUTION:* Effective early production new rear spring assembly, with Butyl rubber liners, was used on Catalinas, sedans, and convertibles **at P ntiac Assembly Plant only.** They are not being released for service. Rear spring U-Bolt torque has been reduced to 45-55 ft. lbs. and it is especially important that these torque limits be observed on springs with Butyl liners.

DESCRIPTION: Same design as used on previous models.

ADJUSTMENT & PARTS REPLACEMENT: *See 1954 Annual Data or later Manual edition and note the following:*

Kingpin Inclinati n: 1°20'.
Cast r: Neg. 1°±½°.
Camber: Pos. ½°±½°.
Toe-In: 0-1/16" measured 9" from floor.
To -Out on Turns: With inner wheel turned 20°, outer wheel should be 18° to 19°.

Front Spring Application
Synchr -mesh Trans. Cars

Model	Color Mark	Part No.
27 Sta. Wgns.(Exc. A.C.)	Gr. & Br.	516434
27 (Exc.Sta.Wgns.)	Grey	516433
27 Taxi & Pol. (Exc. A.C.)		520925
All Taxi & Pol. (Exc. A.C.)	Gr. & Br.	520926
Heavy Duty (Exc. A.C.)		522106

Hydra-Matic Trans. Cars

Model	Color Mark	Part No.
Air Conditioned Cars	Yel. & Orange	518776
28 Convertible		520925
Others (Exc. A.C.)	Gr. & Br.	516434
Heavy Duty (Exc. A.C.)		522106

COIL SPRING REPLACEMENT: Disconnect lower end of stabilizer link and remove shock absorber on side on which spring being removed. Lift front end of car with chain hoist, or with jacks placed under frame side rails. Place additional jack under lower spring seat on control arm. Disconnect lower control arm from knuckle support by removing locknut and unscrewing lower pivot bolt. Lift car slowly (or lower jack under control arm) to relieve spring tension, lift spring out.

►*FRONT SWAY BAR INSTALLATION CAUTION:* Sway bar must be installed with the proper side up or grommets may be damaged due to improper contact with eye in bar.

OLDSMOBILE

All Series (1956)

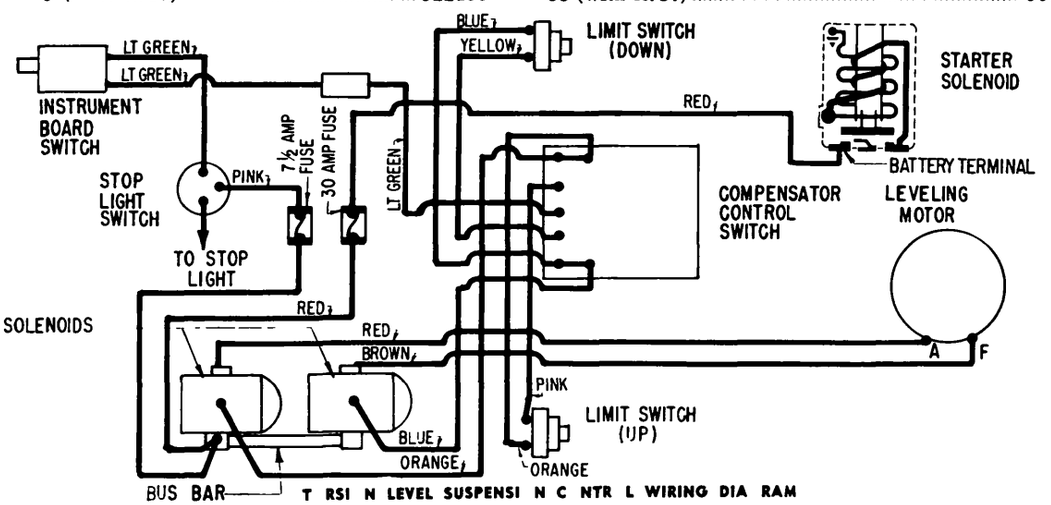
DESCRIPTION: Independent "parallelogram" type with shock absorbers mounted within front coil springs.

ADJUSTMENT & PARTS REPLACEMENT: *See "Oldsmobile" in 1955 Annual Data or later Manual edition and note the following:*

Kingpi n Inclination: 5°51'10" at 0° camber.
Caster: 0° to Neg. ¾°. Variation between wheels should not exceed ½°.
Camber: Neg. ¾° to Pos. ¾°. Variation between wheels should not exceed ½°.
Toe-In: 1/16 - 1/8".
Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be 23° ± ½°.

Front Spring Application

Series	Spring Part No.
88, S88 Std. Trans.(Without A.C.) Exc. Conv.	566125
88, S88 Hydra-Matic(Without A.C.) Exc.Conv.	566126
88, S88 (With A.C.)	566127
S88, 98 Convertible	566127
98 (Without A.C.) Exc. Conv.	566126
98 (With A.C.)	566559



PACKARD (CONVENTIONAL)

5640 Series (Clipper) (1956)

DESCRIPTION: Same design as used on previous models.

►*SERIES 5660, 70, 80, 88 NOTE: "Torsion Level" Suspension used on these models. Front end alignment (as indicated below) is the same for both types of suspensions.*

ADJUSTMENT & PARTS REPLACEMENT: *See 1950-51 Annual Data or later Manual editions and note the following:*

Kingpin Inclination: Not adjustable.
Caster: Neg. 1°±½°.
Camber: 0° preferred (limits Pos. ¾° to Neg. ¼°).
Toe-In: 0" (plus 1/16", minus 0"). Adjust by turning adjuster at outer end of each tie rod equally.
Toe-Out on Turns: With outer wheel at 20°, inner wheel should be 23¾°.

PACKARD "TORSION LEVEL"

5660 Series (Clipper Custom) 1956
5670 Series (Packard Executive) 1956
5680, 5688 Series (Packard) 1956

►*1956 RAISING &LOWERING OF CAR CAUTION (To Perform Service Functions on "Torsion Level" Suspension):* Due to complete change in wiring and new type limit switches method of raising and lowering car by grounding at each side of limit switches or the "A" and "B" terminals of the control switch can no longer be used. To raise or lower car with later type switches proceed as follows: Remove four small screws from small cover plate on bottom of control switch. Lower plate slightly to expose wire terminals in control switch. The two outer terminals of the center group of three can be grounded with a screwdriver or jumper wire to raise or lower the car. *CAUTION* - Do not raise or lower the car by grounding wires on solenoids as limit switches will be by-passed and compensator gears may be damaged.

►*FUSE NOTE:* Control Circuit Fuse (AGW-7½ amps.) and Compensator Motor Feed Fuse (AGC-30 amps.) are located under hood on left side of engine compartment.

►*TROUBLE SHOOTING NOTE (Electrical System):* Procedure outlined in 1955 Annual Data & Manual edition are not applicable to 1956 "Torsion Level" Suspension. See "1956 Raising & Lowering of Car Caution" above for 1956 procedure.

DESCRIPTION: Same design as used in 1955.

ADJUSTMENTS & PARTS REPLACEMENT: *See "Packard 'Torsion Lev l' Suspension" in 1955 Annual Data or later Manual edition.*

STUDEBAKER

All Models (1956)

► *CONTROL ARM BUSHING RETAINER PRODUCTION CHANGE:* Plain washers formerly installed on the control arm in shaft bushing retainer are no longer used in production. It is necessary and important that bushing retainer be torqued to proper specification 60-65 ft. lbs.

► *FRONT SUSPENSION NOISE CORRECTION (When Due to Looseness at Upper Control Arm Inner Shaft):* Can be caused by retaining screw having backed out, bushing retainer being worn and not holding inner sleeve of bushing, or bushing itself being worn. Inner side of retainer should have six serrations in good condition. Outside of retainer should not have pronounced galled spots from lockwasher. If retaining screw has worked loose, install a "Nylok" self-locking screw (Part No. 1541700). Also a plain washer, Part No. G446211, has been released to replace original lockwasher used in production. Tighten new screw to 35 ft. lbs. *CAUTION* - Under no circumstances should any lubricant be applied to bushing or retainer to eliminate a noise condition.

DESCRIPTION: Same design as used on previous models.

ADJUSTMENTS & PARTS REPLACEMENT: *See "Studebaker" in 1950-51 Annual Data or later Manual edition and note the following:*

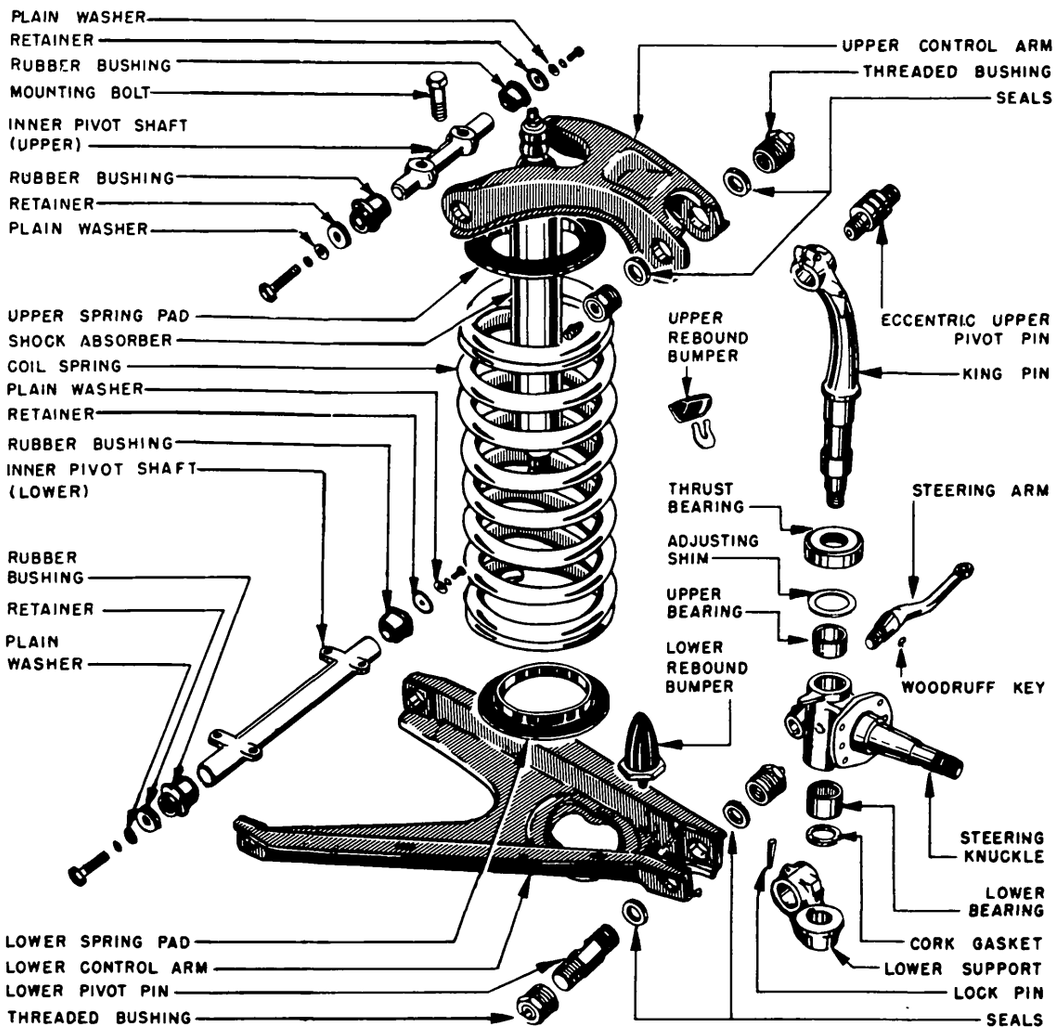
Kingpin Inclination: 5¼°. Not adjustable.
Caster: Neg. 1° to Neg. 2½°. Not more than ¾° variation between wheels.
Camber: 0° to Pos. 1° (with ½° more camber on drivers side).
Toe-In: 1/16-1/8".
T e-Out on Turns: With inner wheel at 20°, outer wheel should be 17-18°.

Front Spring Application

Champion

Car Model	① Part No.
Coupe & 2-Dr. Std. ②	526128
All (Exc. Sta. Wgn.) Std. ③	1539500
Sta. Wgn. Std.	526133
Heavy Duty (Exc. Sta. Wgn.)	526129
Commander & President	
Cmmdr. (Coupe) Std. ④	526127
Cmmdr. (Coupe) Std. ⑤	1539501
Cmmdr. 2 & 4-Dr. Sedan Std. ⑥	526134
Cmmdr. (Others Exc. Sta. Wgn. & Cpe.)	1539501
Cmmdr. Sta. Wgn.	526130
Pres. (Exc. Sta. Wgn.)	1539501
Pres. Sta. Wgn.	526130
Goldenhawk	
Standard	526124
Heavy Duty	526125

① – Spring part number stamped on one of end coils.
② – Before Serial No. G-1,359,504.
③ – Beginning Serial No. G-1,359,504 (Coupe & 2-Dr.).
④ – Before Serial No. 8,430,316.
⑤ – Beginning Serial No. 8,430,316.
⑥ – First 150 cars.



STUDEBAKER FRONT SUSPENSION ASSEMBLY

PIVOT SHAFT INSTALLATION (In Lower Control Arm): Insert one end of pivot shaft in member of control arm and push it as far as possible into member so opposite end of shaft can be swung into position and inserted in other member of control arm. Place J-5472-6 (Large Spacer) in position between ends of control arm. Start rubber bushings in holes at either end of control arm, then place J-5472-1 (Large Installer) in position on each bushing and, using an arbor press, force bushings into place until shoulder on outer sleeve of bushing is seated against control arm (*CAUTION*– Do not attempt to seat flange of bushing on control arm). Install bushing cap, flat washer, lockwasher, and capscrew. After control arm has been installed in car and with weight of car on springs, tighten the capscrews to 65 ft. lbs.

PIVOT SHAFT INSTALLATION (In Upper C ntr l Arm): Insert one end of pivot shaft in member of the control arm and push it as far as possible into member so opposite end of shaft can be swung into position and inserted in other member of control arm. Place J-5472-5 (Small Spacer) in position between ends of control arm.

Start rubber bushings in holes at either end of control arm then place J-5472-2 (Small Installer) in position on each bushing and, using an arbor press, force bushings into place until shoulder on outer sleeve of bushing is seated against control arm (*CAUTION*–Do not attempt to seat flange of bushing on control arm). Install bushing cap, flat washer, lockwasher, and capscrew. After control arm has been installed in car and with weight of car on springs, tighten the capscrews to 35 ft. lbs.

1956 STEERING GEAR & LINKAGE INDEX

	Page
BUICK	
Manual Steering (Saginaw)	366
Power Steering (Saginaw)	356
CADILLAC	
Power Steering (Saginaw)	356
CHEVROLET PASS. CARS (EXC. CORVETTE)	
Manual Steering (Saginaw)	366
Power Steering (Own)	Pg. 356 of 1955 Annual Data or later Manual edition.
CHEVROLET CORVETTE	
Manual Steering	Pg. 359 of 1954 Annual Data or later Manual edition.
CHEVROLET TRUCKS	
Manual Steering (Saginaw)	366
Power Steering (Bendix)	363
CHRYSLER, DESOTO, DODGE	
Manual Steering (Gemmer))	365
Power Steering (Co-Axial)	350
FORD PASS. CARS	
Manual Steering (Gemmer)	365
Power Steering (Bendix)	364
FORD TRUCKS	
Manual Steering	365
HUDSON	
Manual Steering (Gemmer)	365
Power Steering (Monroe)	364

	Page
LINCOLN	
Power Steering (Saginaw)	356
METROPOLITAN	
Manual Steering (Ross)	Pg. 372 of 1955 Annual Data or later Manual edition.
MERCURY	
Manual Steering (Gemmer) Early	365
Manual Steering (Saginaw) Late	366
Power Steering (Bendix)	364
NASH	
Manual Steering (Gemmer)	365
Power Steering (Monroe) Exc. Amb. 6 Cyl.	364
Power Steering (Bendix) Amb. 6 Cyl.	364
OLDSMOBILE	
Manual Steering (Saginaw)	366
Power Steering (Saginaw)	356
PACKARD	
Manual Steering (Gemmer)	365
Power Steering (Bendix)	364
Power Steering (Monroe)	364
PLYMOUTH	
Manual Steering (Gemmer)	365
Power Steering (Co-Axial)	350
PONTIAC	
Manual Steering (Saginaw)	366
Power Steering (Saginaw)	356

	Pag
RAMBLER	
Manual Steering (Gemmer)	365
Power Steering (Monroe)	364
STUDEBAKER	
Manual Steering (Ross)	Pg. 372 of 1955 Annual Data or later Manual edition.
Manual Steering (Saginaw)	Pg. 363 of 1954 Data or later Manual edition.
Power Steering (Saginaw)	364
WILLYS	
Manual Steering (Ross)	Pg. 372 of 1955 Data or later Manual edition.
STEERING LINKAGE	
Manual Steering	346
Power Steering	349
POWER STEERING HYDRAULIC PUMPS	
Chevrolet	Pg. 356 of 1955 Annual Data or later Manual edition.
Chrysler, DeSoto	354
Dodge, Plymouth	354
Saginaw	361
Vickers	Pg. 363 of 1955 Annual Data or later Manual edition.
Eaton	Pg. 363 of 1955 Annual Data or later Manual edition.

STEERING LINKAGE (MANUAL STEERING GEARS)

STEERING LINKAGE & ADJUSTMENT: Special linkage and adjustment on cars and trucks as follows:

Buick: Linkag –Consists of an intermediate rod between steering gear pitman arm and idler lever on right side of frame, and individual tie rods between intermediate rod and each wheel. Adjustable sleeves provided at end of each tie rod for toe-in adjustment.

Toe-In Adjustm nt–Turn steering wheel until lower spoke is vertical, with front wheels in straight-ahead position. Measure horizontal distance from near edge of front boss of lower control arm shaft to front edge of brake backing plate, on each side. Adjust tie rods, if necessary, to make measurements equal on both sides. To adjust toe-in, loosen clamp bolts and turn adjusting sleeves at tie rod ends as required. Decrease toe-in by turning left sleeve in same direction as wheel rotation when moving forward and turn right sleeve in opposite direction. To increase toe-in reverse direction of sleeve movement given above. *CAUTION*–Right and left sleeves must be turned equal amounts but in opposite directions when changing toe-in, in order not to disturb straight-ahead position of front wheels. Before tightening sleeve clamps, have slots in sleeve and clamps aligned.

Idl r L v r & Supp rt Adjustm nt–In order that idler lever ball stud is kept level with pitman arm ball stud, thread support into idler arm bushing until distance from center of support lower bolt hole to nearest face of idler lever is 2 21/32" to 2 3/4".

1956 STEERING LINKAGE

Intermediate Rod End Plug Adjustment–On idler lever end of rod, turn end plug up tight then back off 1/4-1/2 turn (1/2 turn preferred) and install cotter pin. On pitman arm end of rod, tighten end plug to 20-25 ft. lbs. torque, then back off 1 7/8–2 1/8 turns and install cotter pin.

Cadillac: Linkage–Consists of a drag link between steering gear pitman arm and idler arm mounted on right frame side rail, and individual tie rods between drag link and each wheel. Adjustable sleeves provided at outside ends of tie rods for toe-in adjustment.

Toe-In Adjustment–Loosen clamp screws on adjusting sleeves. Turning adjusting sleeves in direction of forward wheel rotation decreases toe-in. Turn sleeves equal amounts so that relation of steering gear high spot to straight-ahead position of front wheels will not be changed. When tightening clamp screws, be sure open side of clamp is over open side of adjusting sleeve.

Drag Link Adjustment–Place straight bar across two adjustable jacks, directly below drag link. Adjust height of jacks so that distance from top of bar to flat spot on frame is equal on both sides (Adjusting jacks to even number of inches will facilitate measurements). Measure distance from top of bar to bottom of drag link on both sides. Difference in measurement between 1st measurement (top of bar to flat spot on frame) and 2nd measurement (top of bar to bottom of drag link) should be 4 7/8" and equal at both ends of drag link within 1/8" (DRAG LINK MUST BE PARALLEL TO FRAME WITHIN 1/8"). If idler arm end of drag link not within limits, remove idler arm support mounting screws on frame side bar, and screw idler arm in or out of bushing until correct height obtained. (*CAUTION*–When turning idler arm into bushing to raise drag link, be sure idler arm is at least 1/2 turn off base to prevent interference on turns. When turning idler arm out of bushing, do not unscrew more than 2 1/2 turns from base or excessive play will result). If proper height cannot be obtained with this adjustment, replace idler arm. If pitman arm end of drag link is not within limits, pitman arm must be removed and bent as required.

Drag Link Adjustment - Install end plug in pitman arm end of drag link and adjust by turning down tight and backing off plug ¼ to ½ turn. Install cotter pin. Install right end plug and adjust by turning down tight and backing off ¼ to ½ turn. Install cotter pin.

Idler Arm Support Adjustment–Turn idler arm support with seal into idler arm bushing until it bottoms, and then back off 1/2 to 1 1/2 turns depending on position of bushing in idler arm.

Chevrolet Passenger Cars: Linkage–Consists of steering connecting rod between pitman arm and idler arm, bracketed on right frame side rail, and individual adjustable tie rods between steering connecting rod and each front wheel. Tie rods have adjusting sleeves at outer ends for making toe-in adjustment.

To -In Adjustm nt–Set steering gear on high point of worm, with mark on top end of steering mainshaft in

CONTINUED ON NEXT PAGE

(MANUAL STEERING GEARS) (Continued)

vertical position and steering wheel positioned for straight ahead driving Loosen clamp bolt at each end of each tie rod and adjust them individually for desired toe-in Position tie-rod clamp bosses below the tie rod to avoid frame interference and tighten clamps securely

Steering Connecting Rod Adjustment–If wheels not in straight-ahead position with steering gear on high point, set front wheels in straight-ahead position (can be checked by measuring distance between lubrication fitting on lower control arm shaft and the wheel fellow on each side). Remove ornamental cap or horn button and check position of mark on end of worm shaft designating gear high point (mark should be at top of shaft). If gear has been moved off high point when setting wheels in straight-ahead position, loosen steering connecting rod adjuster clamps and adjust as necessary to bring gear back on high point.

Idler & Third Arm Pivot Pin Bushings Replacement–Drive out old bushings using K-318 steering knuckle bushing driver. Press new bushings in bracket using Tool K-318. Ream bushings to 922- 923 using J-3189 bushing reamer. (*NOTE*–Reamer must be long enough to pilot one bushing while reaming the other to maintain alignment).

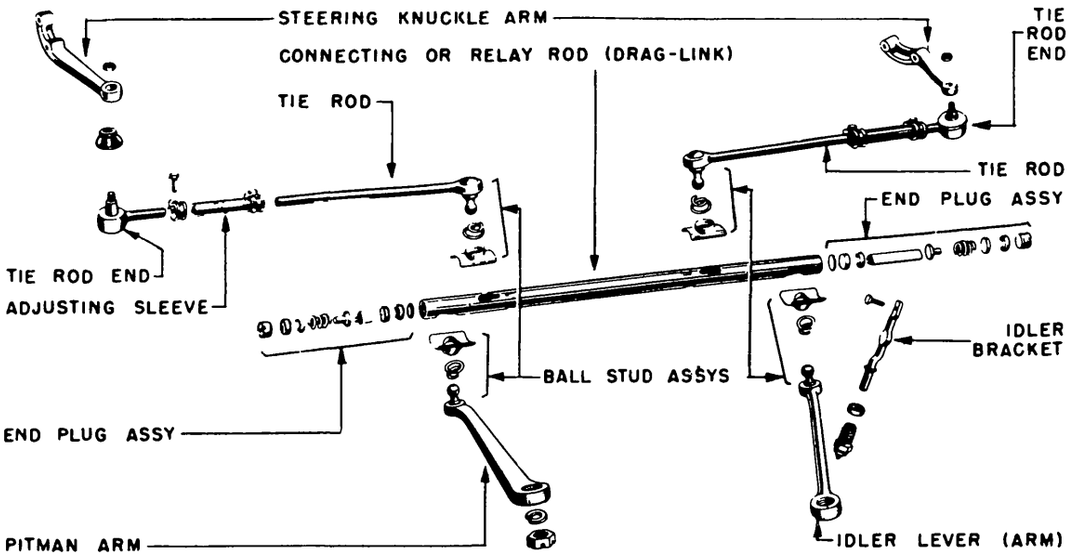
Idler & Third Arm Clearance Adjustment–If clearance between idler and third arm and bracket exceeds 006", when measured with a feeler gauge, install shim, Part No. 3687657, between bracket and lower face of idler and third arm assembly. If clearance between front suspension cross member and bracket at upper mounting hole exceeds .008", when measured with feeler gauge, add shims as necessary to bring space within allowable limits (.010" shims available).

Ch vrolet Trucks Linkage–Consists of three-piece tie rod (rod and two tie rod end assemblies) between front wheels. Tie rod end assemblies have right and left hand threads to facilitate toe-in adjustment. A connecting rod, between steering third arm (on left wheel) and pitman arm, has permanently installed studs in ends. Ends of studs are threaded and are attached to steering third arm and pitman arm with a nut and cotter pin

Toe-In Adjustment–Loosen clamp at each end of tie rod and turn tie rod to increase or decrease its length until proper toe-in is secured. Before locking clamps, be sure tie rod ends are in alignment with studs.

D dge 6 & Plymouth 6 Linkage–Consists of long and short tie rods (both adjustable) attached directly to steering gear arm

Toe-In Adjustment–Place front wheels in a straight-ahead position, loosen clamps on ends of tie rods, adjust tie rods an equal amount in opposite directions until desired toe-in is obtained. If steering wheel center spoke does not point straight downward, adjust both tie rods an equal amount in same direction until steering wheel centered When adjustment correct, pivot ends of tie rods on ball studs so they are both against front or back sides of studs, then tighten



CADILLAC, CHEVROLET, OLDSMOBILE, PONTIAC STEERING LINKAGE—TYPICAL OF BUICK

clamp bolts with clamping bolt on left end of long tie rod beneath tie rod to prevent interference on turns. *NOTE*–Steering wheel hub, steering gear arm, steering tube and steering gear sector shaft are machined with master serrations for a definite location. No attempt should be made to change relative position of these parts by altering master serrations. Improper positioning of steering wheel should be corrected only by adjustment of tie rods.

Chrysler, DeSoto, Dodge V8, Plymouth V8 Linkage–Consists of idler arm bracketed to right frame side side member and connected to right end of drag link Pitman arm is connected to left end of drag link Individual tie rods connected to drag link near its center have sleeve adjustment for toe-in at outside ends

Toe-In Adjustment–Loosen clamp bolts at each end of adjusting sleeves. Ends should be threaded evenly into tube sleeves to have a nominal length (center to center) of 21-3/8". When tightening sleeve clamps, make sure bolts are beneath tie rods to prevent interference on turns. *NOTE*–Steering wheel hub, steering gear arm, steering tube and steering gear sector shaft are machined with master serrations for a definite location. No attempt should be made to change relative position of these parts by altering master serrations. Improper steering wheel positioning should be corrected only by adjustment of tie rods.

Idler Arm Clearance Adjustment–Screw idler arm support bracket into bushing until it bottoms. Then back off approximately one full turn of idler arm or, until a clearance of 1 7/16" plus or minus 1/16" has been obtained between shoulder of bracket and flat surface of arm.

Idl r Arm Bushing R placem nt–If idler arm bushing play exceeds 1/8" when idler arm is moved up or down or, if noise has developed in steering linkage a new idler arm bushing, support bracket or both should be installed as follows Remove cotter pin, nut and spacer that holds drag link end ball stud to idler arm. Insert pry bar between idler arm and drag link. Jar drag link ball stud loose by driving on end of link. Separate link and arm, then remove seal. Remove two bolts and lockwashers that attach idler arm support bracket to frame side rail. Remove support bracket, idler arm and bushing as a unit. Unscrew idler arm support bracket from idler arm bushing, then remove seal. Clamp end of idler arm bushing in a vise and remove locknut. Now, unscrew idler arm from bushing. (NOTE—Before removing idler arm from bushing, mark flat of arm to indicate up or down side. Arm has tapered hole for ball stud and can only be installed in one position). To install, reverse removal procedure, noting "Idler Arm Clearance Adjustment" above. If straight fitting (lubrication) found on end of bushing replace with a 60° or 90° fitting for ease in lubrication.

Ford Passenger Cars: Linkag –Consists of steering arm-to-idler arm rod which transmits motion from steering gear through steering arm, attached to left end of steering arm-to-idler arm rod, to front wheels through spindle connecting rods (tie rods). Spindle connecting rods have adjustable sleeves on outside ends for toe-in adjustment. Idler arm attached to right frame side rail and to right end of steering arm-to-idler arm rod.

Toe-In Adjustment– (*NOTE*–Steering arm (pitman arm) should be pointing straight-ahead when steering wheel spokes are in horizontal position and steering gear worm is at mid-point of travel). To adjust toe-in, adjust sleeves equally. When tightening clamp bolts, make sure bolts are below top of tie rods.

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(MANUAL STEERING GEARS) (Con.inued)

Idl r Arm & Brack t Adjustments—Steering idler designed to operate with 1/8" vertical free play. To reduce, proceed as follows (same procedure used when replacing idler arm or bushings): Remove bracket from frame side rail. Thread bracket and bushing off idler arm, then remove idler arm from steering arm-to-idler arm rod. Remove bushings from idler arm bracket and steering arm-to-idler arm rod, remove lubrication fittings from bushings. Check face of side rail for squareness by placing car on level floor, then measure distance from each side rail to floor. If distances unequal, jack up lower side rail until even with other rail. Place spirit level against inside surface of right hand side rail, adjacent to idler arm position, then establish true perpendicular. Measure distance between edge of level and side rail. Distance represents amount of spacing washers that must be installed between bracket and side rail to correctly position idler arm bracket. Check idler arm bracket for 92° included angle (between inside faces of bracket) and correct if necessary. Replace bushings in bracket and in steering arm-to-idler arm rod. Tighten bushings to 85-100 ft. lbs. torque. Reinstall grease fittings. Place new seals on idler arm. Thread idler arm into idler arm rod bushing until shoulder on arm is 11/16" plus or minus 3/64" from top face of rod when arm is in straight-ahead position. Thread bracket and bushing assembly onto idler arm until shoulder on arm is 19/32" plus or minus 3/64" below bottom side of bracket when bracket is parallel to frame side rail. Mount bracket on frame side rail, installing necessary number of washers between bracket and frame. Tighten attaching bolts to 30-35 ft. lbs. torque.

Ball S ck t Adjustm nt—Whenever steering arm ball stud found to have play in socket, remove cotter pin from end of rod, tighten threaded plug in end of socket until all ball stud end play removed, then back off plug approximately 1 1/2 turns, install new cotter pin. Test adjustment by turning steering arm-to-idler arm rod by hand. Rod must move freely, but there should be no end play at ball stud.

F rd Trucks: Linkag—Consists of a connecting rod between front wheels. Rod has adjustable features at both ends. Spindle arm, attached to connecting rod at its left end, is in turn attached to a one-piece drag link with manual adjustment features at both ends. Rear of drag link is attached to sector shaft arm (pitman arm).

T -In Adjustm nt—Loosen clamp nut at each end of connecting rod, turn connecting rod to lengthen or shorten to obtain desired toe-in.

Drag Link Adjustm nt—Remove cotter pins from each end of drag link. Tighten each drag link plug until drag link ball springs are fully compressed. Back off each plug to first cotter pin hole, then install new cotter pins.

Linc In & Mercury: Linkag—Consists of steering connecting link between steering gear arm (pitman arm) and idler arm, mounted on right frame side rail, and adjustable tie rods between connecting link and each front wheel. Adjustable sleeves provided at outside ends of tie rods for toe-in adjustment.

Toe-In Adjustment—Loosen clamp bolts on adjustable sleeves. Adjust sleeves equally until proper toe-in obtained.

Connecting Link Plug Adjustment—Screw plug in left end of connecting link until it bottoms, back off 1-1/2 turns, align cotter pin holes, install cotter pin.

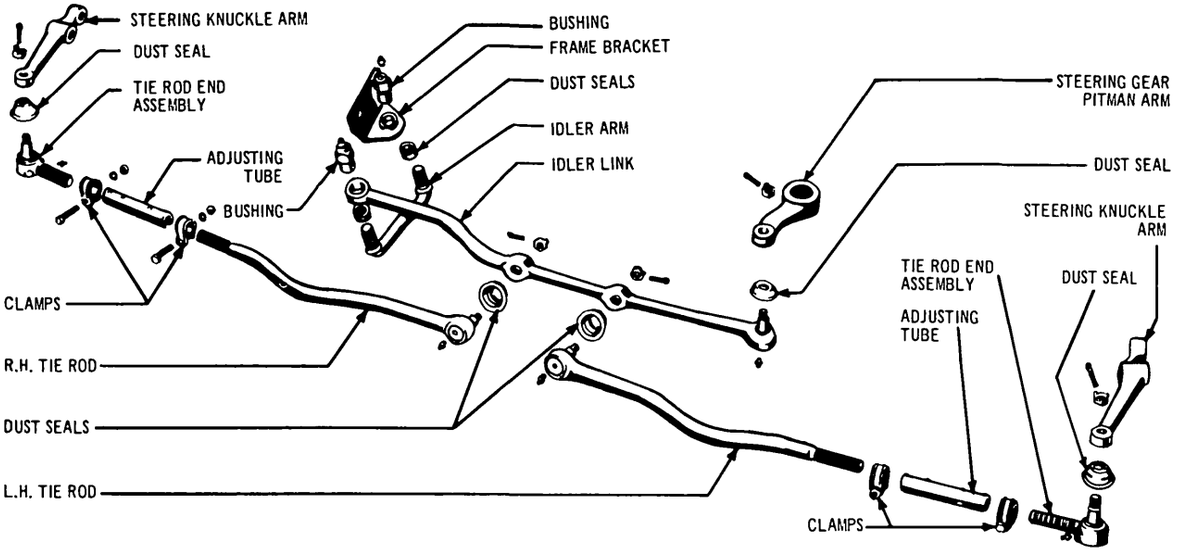
Metropolitan, Hudson & Nash Models: Linkage—Consists of adjustable cross tube (for toe-in adjustment). Idler assembly is attached to body sill at right of car and has a double arm, with front arm attached to cross tube and rear arm attached to right tie rod. Steering gear pitman arm is double-levered, with front lever attached to left of cross tube and rear lever attached to left tie rod. Idler assembly is not adjustable.

Toe-In Adjustment—Loosen lock nuts on ends of cross tube, lengthen or shorten cross tube until proper toe-in secured. Tighten lock nuts.

Cross Tube Plug Adjustment—Remove cotter pin, lightly screw plug in as far as it will go, back off to first cotter pin hole in alignment with castellation.

Hudson, Nash & Rambler (Exc. Metropolitan): Consists of steering linkage cross tube between steering arm and idler arm, bracketed on frame right side rail. Individual adjustable tie rods are attached to ends of cross tube. Adjusting tubes at outer ends of tie rods provide for toe-in adjustment.

T -In Adjustment—Loosen clamps on ends of tubes on tie rods. Turn tubes equally in opposite directions until desired toe-in obtained. Before tightening clamps on adjusting tubes, square ball joints on their studs to prevent excessive steering linkage friction or wear.



CHRYSLER, DE SOTO, DODGE V8, PLYMOUTH V8 STEERING LINKAGE

Oldsmobile: Linkage—Consists of steering relay rod between pitman arm and idler arm, bracketed to right frame side rail. Individual, adjustable tie rods are attached to center portion of steering relay rod and are provided with adjustable sleeves for toe-in adjustment.

Toe-In Adjustment—Loosen clamp bolts at each end of steering tie rod adjustable sleeves. With steering wheel in straight-ahead position turn tie rod adjusting sleeves to obtain proper toe-in adjustment. Insure that tie rod end ball seats are riding squarely in their seats, then position tie rod to relay rod ball studs to bottom of slot in relay rod. Position clamps on adjusting sleeves so that bolts are below upper surface of adjusting sleeves with edges of clamp **out of slot**, tighten clamp bolts.

Relay Rod Plug Adjustment—Draw nut tight, then back off 1/4-3/4 turn, install cotter pin.

Idler Lever & Support Adjustment—Whenever idler arm is disassembled from idler arm support, reassemble so that there is a dimension of 23/32" between upper face of idler arm and shoulder on support.

Packard: Linkage—Consists of steering connecting rod between pitman arm and idler lever, bracketed to right frame side member, and individual tie rods (steering cross tubes) between steering connecting rod and each wheel. Adjusting sleeves at outer ends of cross tubes provide means for toe-in adjustment.

Toe-In Adjustment—Loosen clamps on adjusting sleeves at ends of tie rods. Turn sleeves equally until desired toe-in obtained. Before tightening clamps on sleeves, check each cross tube outer ball socket for being properly centralized.

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(MANUAL STEERING GEARS) (Continued)

Connecting Rod End Plug Adjustment–Draw plugs up tight, then back up 1/4-1/2 turn to align slot with cotter pin hole.

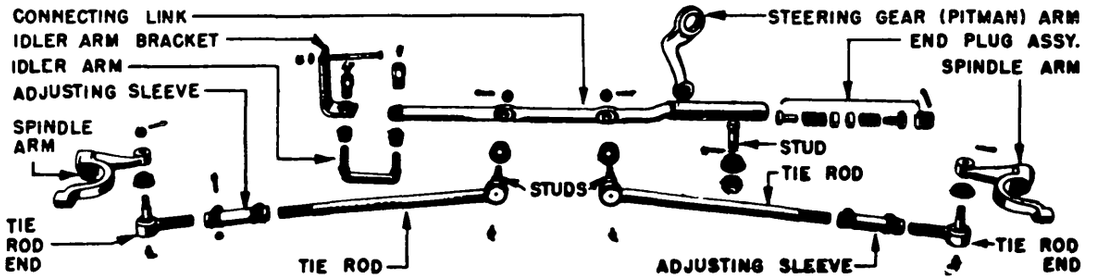
Pontiac: Linkage–Consists of steering connecting rod between pitman arm and idler arm, bracketed on right frame side rail, and individual, adjustable tie rods between steering connecting rod and each front wheel. Tie rods have adjusting sleeves at outer ends for making toe-in adjustment.

T e-In Adjustment–Remove horn button and set gear on high point of worm by turning steering wheel until mark on shaft is exactly at top. Loosen tie rod end clamp bolts and turn tie rod adjusting sleeves equally until desired toe-in is obtained. Turn right tie rod in direction of rotation of wheels to increase toe-in, turn left tie rod in opposite direction to increase toe-in. If front wheels not in straight-ahead position turn both tie rods in same direction (so as not to change toe-in) until error corrected. Tighten clamps on adjusting sleeves with slots in sleeve toward bolts in clamp.

Idler Lever & Support Adjustment–With lever and support off car, thread idle lever support into bushing until distance between upper face of lever and shoulder on support is approximately 23/32".

St ering Connecting Rod Plug Adjustment–Screw end plugs in until tight, then back off to nearest cotter pin hole alignment and insert new cotter pins.

Studebaker· Linkage–Consists of two adjustable tie rods attached to bell crank mounted at center of frame cross member. Bell crank is attached to steering gear pitman arm by a reach rod (drag link).



LINCOLN & MERCURY STEERING LINKAGE—TYPICAL OF FORD

Toe-In Adjustment–If tie rods disassembled, count number of turns when unscrewing tie rod ends from rod to facilitate reassembly. To adjust toe-in, adjust **right** tie rod (left tie rod on right-hand control cars) When tightened, inner tie rod bolts should be at bottom and horizontal.

Bell Crank Bearing Adjustment–Insert shims between lower thrust washer and shaft until there is no end play. Shaft should, however, turn freely in bearings. Lock nut securely with cotter pin.

Willys Utility: Linkage–Bell crank on frame cross member, linked to each front wheel by adjustable tie rods and to steering gear pitman arm by a steering connecting rod (drag link).

Toe-In Adjustment–Set tie rod end of steering bell crank at right angles to front axle, place straightedge or line against left rear wheel and left front wheel to determine if wheels in straight-ahead position. If front wheel tire does not touch straightedge both at front and rear, adjust left tie rod by loosening clamps on each end and turning tie rod until tire touches straightedge. Check right side in same manner and adjust right tie rod. Adjust toe-in by shortening each tie rod 1/2 turn.

STEERING LINKAGE (POWER STEERING)

Steering linkage on cars equipped with power steering is essentially the same as for manual steering except as noted for "linkage" types below

Bendix Linkage Type (Ford & Mercury): Steering pitman-to-idler arm rod has been revised to accomodate the power cylinder. One end of power cylinder is bracketed to right frame side rail and the other to the steering pitman-to-idler arm rod. Control valve is mounted on right end of steering pitman arm-to-idler arm rod. Rubber bushing assemblies are used at each pivot point.

Monroe Linkage Type (Huds n Horn t & Wasp; Nash Statesman & Ambassador V8; Packard & Rambler): Power cylinder replaces conventional cross tube.

Bendix Linkage Type (Nash Ambassad r 6 Cyl. & Packard): Power cylinder replaces cross tube and is bracketed at right side body sill (Nash) Power cylinder is bracketed at left frame side rail and attached to connecting rod at center between tie rod studs (Packard).

Chevrolet Linkage Type (Pass. Cars): Power cylinder is connected to steering relay rod and piston rod is connected to bracket on right frame side rail

Chevrolet Linkage Type (Trucks): Power cylinder is anchored to front axle and piston rod is attached to steering cross rod

CHRYSLER, DE SOTO, DODGE, PLYMOUTH "CO-AXIAL"

Chrysler (1956)
DeSoto (1956)
Dodge (1956)
Imperial (1956)
Plymouth (1956)

►CHANGES, CAUTIONS, CORRECTIONS

► *1956 POWER STEERING GEAR WORM NUT PRODUCTION CHANGE:* A new worm nut, Part No 1673971 having a hexagonal shape and a built in staking collar is being used on steering gears identified by the date 12-15-55 or later stenciled on housing side of flange, where upper housing bolts to lower housing. The present tool, C-3320 can be modified to accomodate both early and later type nuts by removing the two opposing lugs

DESCRIPTION

DESCRIPTION: Same design as used on 1955 models with power steering.

Hydraulic Power Mechanism—Consists of a double-acting piston, a spool valve (which fits inside the piston), and an hydraulic reaction chamber (which gives the driver the "feel" of the road). Axial positioning of the valve directs high pressure oil to one side or the other of the double-acting piston. At the same time, valve movement opens an oil return line which carries oil from low pressure side of the piston to the oil reservoir. The direction of oil flow (which depends on direction of steering wheel rotation) is such that hydraulic force is added to the driver's effort and is transmitted through the rack and sector gear to the steering gear arm.

Pump and Reservoir Assembly—Consists of generator driven oil pump with pressure relief valve and flow control valve, and a filter with oil reservoir. Flow control valve limits oil flow to a predetermined maximum (2 gallons per minute) and thus holds the horsepower required to drive the oil pump to a minimum.

ADJUSTMENTS

SELECTOR LEVER & TRANSMISSION SHAFT LINKAGE: Loosen gear shift rod lever clamp bolt. Position selector lever in low or reverse, then holding the gear shift rod lever and spacer flush against gear housing, tighten nut. Place selector lever pointer lever in neutral position on indicator dial at top of steering column. Disconnect gearshift control rod at bellcrank on transmission. Make sure manual control lever (at the transmission) is in neutral position (second detent position from rear of vehicle). With selector lever pointer still in neutral position, adjust the gearshift control rod to the required length for a free fit in the lever of the bellcrank, then reinstall rod. Operate selector lever through all indicator positions. Road test vehicle.

GEARSHAFT ADJUSTMENT (1956 Cars): Center the steering tube coupling or steering wheel to the overall travel of the steering gear With gear in center position, loosen adjustment screw in end of shaft opposite pitman arm until there is some backlash Slowly turn adjusting screw in until the backlash disappears **Turn the adjusting screw in ⅛ of a turn and lock in position** *(CAUTION—Use a very light touch on steering wheel when checking for backlash).*

Installing Coupling at Center: Install steering tube coupling with slot in coupling in the vertical plane There are no master serrations on either worm shaft or the coupling. A mark is scribed on the coupling which must be set at 12 o'clock when the steering worm shaft is at center so that the steering tube master serration will be in position to allow for proper installation of steering wheel

MANUAL CONTROL VALVE NEUTRAL POSITION ADJUSTMENT (Power Steering Unit Removed): With unit secured in a vise or suitable fixture, connect test hoses to hydraulic pump on car and to steering assembly. Remove oil reservoir cover Start engine and operate at idle Fill reservoir to level mark and allow system to warm up *(CAUTION—Oil level must be maintained above filter while hydraulically centering valve)* Insert manual control valve centering tool C-3445 (slotted end first) into worm shaft and engage slot in tool with tang on control valve operating rod (tool can be rotated by using a tap wrench) *If pitman arm moves to one extreme or the other and stays there, rotate tool in either direction until arm starts to move Slightly rotate tool in opposite direction until arm stops moving.* Install a 1 7/16" socket on a torque wrench and place on pitman arm retaining nut Rotate gear shaft in both directions from one extreme to the other The torque required should be the same in both directions Where torque is higher in one direction than in the opposite, rotate the valve adjusting tool slightly in the opposite direction to the direction in which the pitman arm has the highest torque reading *(Change valve position in slight variations to prevent over adjusting).* When torque is the same in both directions, remove tool

MANUAL CONTROL VALVE NEUTRAL POSITION ADJUSTMENT (Power Steering Unit in Car): *(NOTE—The following procedure can be used when it is difficult to rotate the steering wheel in one direction but not in the other, or where the wheels turn of their own accord Before proceeding with the adjustment, make sure that unequal tire pressure is not the cause of steering wheel turning hard in one direction).* Remove all parts, as necessary to gain access to steering tube coupling Remove coupling retaining screw, lockwasher and plain washer from worn shaft Insert manual control valve centering tool C-3445, slotted end first into worm shaft and engage tool with tang on control valve operating rod *(NOTE—Two men are required to center the valve)* Move pitman arm through its travel from one direction to the other with a torque wrench and a 1 7/16" socket, observing the torque reading The torque should be the same in both directions Turn adjusting rod as required until an equal torque reading is obtained *(NOTE—Where gearshaft requires more than 40 ft lbs to rotate it, or where torque is uneven at any point through the full shaft travel, check for cocked gear shaft cover, dirt in unit or recirculating balls are defective or improperly installed)*

PUMP DRIVE BELT ADJUSTMENT: Sufficiently tight to prevent slippage

STEERING WHEEL & HORN BUTTON REMOVAL & INSTALLATION

STEERING WHEEL & HORN BUTTON REMOVAL: Chrysler & Imperial - Disconnect battery and center steering wheel in the straight-ahead position. Press down on horn blowing ring ornament and turn counter-clockwise Lift out ornament retainer spring and pad Disconnect horn wire from terminal on travel plate and insulator assembly Remove bushing, travel plate, horn blowing contact ring spring and triangular ground plate Curl and push horn wire into steering gear tube to make room for steering wheel puller pilot Remove steering wheel nut Attach puller and remove steering wheel

DeSoto: Disconnect battery ground cable at battery. Press down and turn horn blowing ring ornament counter-clockwise to remove Disconnect horn wire at stationary plate Remove the three Phillips head screws, washers, and horn blowing ring rubber bushings attaching horn ring and stationary plate to horn blowing ring mounting base Remove screws attaching horn ring mounting base Loosen steering wheel nut three turns and attach Steering Wheel Puller C 3428 When steering wheel has been released from serrations, remove puller, nut and steering wheel

Dodge: Disconnect battery Center steering wheel in the straight ahead position and remove two screws on under side of medallion and remove medallion Disconnect horn wire from terminal on travel plate and insulator Remove horn ring, travel plate and insulator assembly, contact spring plate and ground plate Push horn wire aside to make room for steering wheel puller pilot. Remove steering wheel nut then attach Puller C-612 and remove steering wheel

Plymouth: Remove steering wheel ornament and contact plate by depressing the center and rotating it counter-clockwise until it pops up Remove horn ring by loosening the three retaining screws. Install puller C-612 and pull steering wheel off the tube. If horn wire has been left in tube push it down into end of tube to avoid damage when using puller

Installation (All Models): When installing steering wheel, be sure the master serrations are in alignment and the direction signal cancelling cam on bottom of the wheel is inserted between switch levers

HYDRAULIC PRESSURE TEST

Connect Gauge C-3309 in pressure line between pump and hose Refill reservoir to proper level Open valve on gauge start engine, and run until power steering oil pump reaches operating temperature With engine at normal operating speed, turn shut-off valve on gauge to its closed position *(CAUTION—Do not keep valve closed more than a few seconds or accelerate engine with valve closed)* If pressure does not gradually increase to 700 lbs pressure (Chrysler & DeSoto), 600 lbs pressure (Dodge), 750-800 lbs pressure (Plymouth), it is possibly due to fan belt slipping, or flow control valve stuck in the open position or a broken drive coupling

PUMP CHECK: Remove cover from reservoir start engine and turn steering wheel If oil does not flow through filter, a stuck flow control valve is indicated Shut off engine Remove high pressure hose at pump fitting

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinu d)

and insert a ½" blunt probe against valve plunger If plunger moves inward 3/16-1/4", plunger was stuck and will probably function properly next time Recheck pressure and if found to be below normal (see above), remove flow control valve and clean thoroughly If this does not correct the condition, remove and repair pump assembly If oil does not flow through reservoir filter in above test, check for broken filter or slipping fan belt Check shaft rotation by hand if coupling found to be broken If shaft turns freely, install new couplings on both pump and generator shaft If pump shaft binds when turned by hand, replace both pump and couplings If armature shaft is damaged, replace necessary parts

TROUBLE SHOOTING

HARD STEERING IN BOTH DIRECTIONS: 1) Leak in steering system, pump belt slipping or broken, fluid level low.
2) Steering gear linkage not lubricated, tire pressure too low, bind in steering column or gear, improper front end alignment.
3) Low pump pressure (see Hydraulic Pressure Test above) with particular attention to following Relief and flow control valve, rotors (not turning or worn), pump body or cover worn.
4) Loss of pressure in power unit (see Hydraulic Pressure Test above).

SMALLER TURNING RADIUS IN ONE DIRECTION: 1) Wheel stops not adjusted properly.

HYDRAULIC LEAKS: 1) Check for leaks at hose adapters, pump body, between gear and worm housings, and gear shaft oil seal.

HARD STEERING IN ONE DIRECTION ONLY: 1) Tire pressure too low.
2) Control valve maladjusted.
3) Bind in steering column or gear, improper front end alignment.

VEHICLE ATTEMPTS TO TURN UNLESS FORCE APPLIED TO HOLD STEERING WHEEL: 1) Tire pressure uneven.
2) Control valve maladjusted.

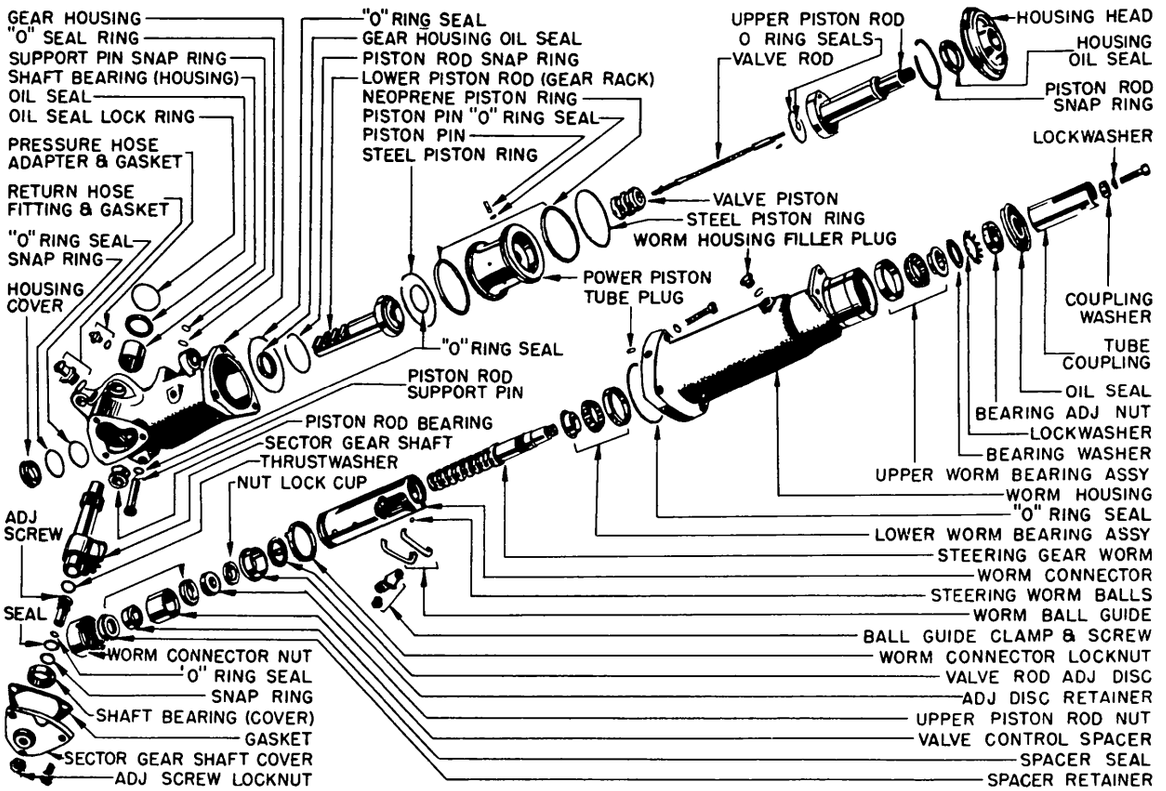
POOR RECOVERY ON TURNS: 1) Tire pressure too low improper front end alignment.
2) Gear shaft adjustment too tight, worm bearing adjustment too tight.
3) Balls in worm connector binding, fit too tight.
4) Bind in steering column or gear, bind in steering knuckles.

NOISE IN CHUCK ASSEMBLY: Check belt adjustment Check for vibrating condition set up by control shaft rod Remove unit and install a new valve rod adjusting disc

HISSING NOISE (NO LOAD): Caused by low oil pressure or improper operation of back pressure valve

HISSING NOISE (RIGHT TURN ONLY): Caused by oil leaking past lower piston rod gear housing seal

HISSING NOISE & LOSS OF OIL THROUGH UPPER HOUSING VENT (LEFT TURN ONLY): Caused by oil leaking past upper piston rod housing head oil seal



CHRYSLER, DESOTO, DODGE, PLYMOUTH "CO-AXIAL" POWER STEERING GEAR

CREAKING NOISE ON TURNS: Check for loose gear-to-frame mounting bolts If noise persists after tightening gear-to-frame bolts install a new equal tooth sector or gear shaft

SNAPPING NOISE: Tighten gear-to-frame mounting bolts Check coupling screw for tightness Check lower piston rod bushing dowel pin for being too high Check bushing for seating properly Check lower piston rod for tight fit at piston

CHUCKLE NOISE: Check as follows Steering arm nut loose on gearshaft Loose front wheel bearing Gearshaft adjustment too loose Excessive kingpin endplay Steering tube coupling screw loose Worm bearing preload adjustment too loose Excessive worm shaft endplay

WANDER (STEERING WHEEL FREEPLAY): Check steering wheel freeplay which should not exceed 5/8" If freeplay excessive (without moving steering linkage), check in same manner as for "Chuckle" above, and also check steering linkage and front wheel alignment

POOR RETURNABILITY (BOTH DIRECTIONS): Check torque required to turn gearshaft from one extreme to the other with torque wrench on steering gear arm nut (linkage disconnected from steering arm) Torque should not exceed 40 ft lbs , ± 10 lbs. If torque reading not excessive, check wheel alignment and steering linkage. If torque excessive, check steering column jacket bearing. Check gearshaft adjustment. Check worm shaft bearing preload. Check wormshaft for binding in connector

POOR RETURNABILITY (ONE DIRECTION ONLY): Check tire pressure. Center control valve (see Adjustment). Check gearshaft adjustment

UNEOUAL STEERING EFFORT: Check control valve adjustment. Check for upper piston rod movement in piston. Check worm shaft connector nut for tightness Check control valve rod for looseness in valve Check upper piston rod nut for looseness. Check upper piston rod for being scored at reaction seal retainer. If the above fails to correct unequal steering effort, replace all reaction parts

UNABLE TO MAINTAIN CONTROL VALVE ADJUSTMENT: This may be caused by reaction spacer being too short or too long, or by burrs or out of squareness Check valve control rod for looseness in disc, or control valve looseness on rod. Upper piston rod nut may be loose, or upper piston rod may be loose in piston

LACK OF ASSIST(ONE DIRECTION): Check for damaged neoprene piston ring Check for damaged or improperly seated housing head oil seal. Valve rod lower "O" ring may be damaged, or piston rod "O" rings may be damaged.

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinu d)

LACK OF ASSIST (BOTH DIRECTIONS): Check the following: Low tire pressure. Drive belts slipping. Low oil pressure

LUBRICATION

Since there is no hydraulic connection between the worm and gear housing, the Power Steering has two separate fluid levels. Lubricate as follows

R s rv ir—Check every 1000 miles or every 30 days. Reservoir is mounted at rear of generator. Make sure top of reservoir is absolutely clean. Then, remove cover or filler cap and check oil level. Oil level should be 1/2" above filter element (if reservoir is tilted, oil level should be 1/2" above highest point of filter element). (NOTE—An oil level mark is stamped on the inside of the reservoir or on the dipstick on type using a filler cap). Replenish as necessary with SAE-10W engine oil. When temperatures are constantly below minus (-) 10° F., drain hydraulic system and refill with SAE-5W engine oil (see Draining and Refilling Hydraulic System below). When temperatures are consistently above minus (-) 10° F., drain the lighter lubricant which may have been added and replace with SAE-10W engine oil. Should the vehicle be operated at extremely high temperatures, it may be necessary to drain and replace the SAE-10W oil with SAE-30 oil for the time it is being operated in these extremely high temperatures. NOTE—When temperature is below minus (-) 10° F. run engine for at least three minutes before putting car in motion or turning steering wheel. Capacity is approximately 2 quarts.

W rm H using—*(NOTE*—It is not necessary to change oil in worm housing due to temperature). Worm housing does not require periodic checks (unless leakage occurs). However, should the steering gear assembly be removed for any reason, it is recommended it be checked at that time. The oil should be level with the filler plug opening when the gear assembly is in an installed position. Replenish as necessary with SAE-10W engine oil.

DRAINING HYDRAULIC SYSTEM: *(CAUTION—Extreme care should be taken to prevent dirt from entering reservoir while cover or filler cap is removed. To prevent damage to filter element, do not insert sharp objects into reversoir. Do not disturb filter element as periodic changes of this unit are not required).* Disconnect high pressure (small) hose at the gear housing and jack up front end of car sufficiently to raise wheels off floor. Place hose in suitable container. While holding hose in container start engine and allow to idle, turn steering wheel from one extreme to the other until all fluid is forced from unit. *(CAUTION—Do not run engine above idle speed. As soon as fluid starts to show great quantities of air bubbles, stop engine).* Reconnect high pressure hose and refill.

REFILLING HYDRAULIC SYSTEM: Bleed steering gear as follows Fill reservoir slightly higher than normal. Start engine and run for a short time to circulate oil through hoses. With engine running at idle speed, turn steering wheel back and forth several times from extreme right to left to bleed any remaining air out of system. Check oil level in reservoir. Add oil to reach level mark. Capacity is approximately 2 quarts.

REMOVAL & INSTALLATION

REMOVAL: Remove horn ring and ornament from steering wheel. Disconnect horn wire and remove horn ring. Remove steering wheel with puller C-612, and remove signal lever and plate. Loosen steering column to instrument panel bracket. Loosen steering column jacket clamp screws and raise front of car. Disengage drag link from pitman arm and pull pitman arm with Tool C-3402. Loosen three gear housing to frame attaching bolts. Remove floor mat retaining plate and rubber dust pad. Disconnect pressure and return hoses and drain gear assembly by slowly rotating steering wheel until all oil is expelled from unit. Fasten disconnected ends of hoses above oil level in reservoir to prevent loss of oil and cap hose ends to prevent dirt entering. Remove gear housing to frame bolts and alignment wedge and remove gear assembly from lower side of car.

INSTALLATION & ALIGNMENT: Install steering gear assembly from under the car and up through the dash panel into the jacket. Install housing to frame attaching bolts, flat washers, swivel washers and nuts, but do not tighten (swivel washers permit alignment to dash). Slide steering column jacket down over worm housing. Install turn signal lever, being sure column jacket does not restrict lever. Tighten jacket to steering gear housing clamp. Connect turn signal wires. Install steering column to instrument panel bracket and install steering wheel. If clearance between steering column jacket and steering wheel is less than 1/8", adjust steering column jacket to provide proper clearance. Install dust pads and retaining plates. Tighten front upper and lower gear housing to frame attaching bolts to 20 ft. lbs. Install wedge over rear bolt between housing and frame, so that tapered surfaces match, tapping it lightly in place. Tighten three attaching bolts to 70 ft. lbs. Install horn ring and horn wire in steering wheel and install horn ring ornament Connect hoses from steering gear to hydraulic pump.

STEERING GEAR OVERHAUL

►*CAUTION* Cleanliness in executing all overhaul procedures cannot be over-emphasized. Unit should be thoroughly cleaned in a suitable solvent when removed from vehicle. When disassembling, each p rt should be placed in the solvent, washed, then dried with compressed air. Careful handling of parts is necessary to avoid occurrence of nicks and burrs. Crocus cloth may be used to remove small nicks and burrs provided it is used carefully. When used on valve spool, use extreme care not to round off sharp edge portion. (NOTE—Sharp edge portion helps prevent dirt and foreign matter from getting between the valve and bore, thus reducing possibilities of sticking). Remove and discard all "O" ring seals, and seals, using new ones lubricated with Lubriplate when reassembling.

DISASSEMBLY & INSPECTION: Proceed as follows:

Removal of Worm Housing from Gear Housing: 1) Drain lower portion of steering gear through pressure and return connections, by turning steering tube coupling from one extreme of travel to the other. Using a 3/16" allen wrench, remove worm housing filler plug and drain worm (upper) housing.

2) Attach holding fixture C-3323 to unit and place in vise.

3) Remove tube coupling screw, lockwasher, and washer from center of coupling. Using tool C-3392, remove coupling from worm shaft. (NOTE—Tool C-3112 may also be used to remove coupling. However, to accomplish this, it will be necessary to cut one adapter plate SP-1409 in half and using these two parts instead of the two plates).

4) Using extreme care and a screwdriver, remove worm housing oil seal from housing and worm shaft.

5) Unlock bearing adjusting nut by bending tang of lockwasher. (NOTE—Only one tang locks nut in position). Place tool C-3320 over worm shaft followed by C-3319. Holding the worm stationary remove worm bearing adjusting nut, lockwasher, and thrust washer (NOTE—Worm bearing adjusting nut tapered on one side).

6) Remove worm outer bearing race and bearing roller from worm. Inspect bearing roller for wear or pitting.

7) Remove three worm to gear housing screws and belleville washers (Note installed position of washers on screws. Concave side of washers fit against housing). Remove worm housing. (NOTE—It may be necessary to tap housing lightly due to interference of "O" ring seal between housing head and housing

8) Remove inner bearing race from worm shaft and inspect for wear or pits.

9) Remove lower bearing roller from housing. Inspect bearing roller and the upper and lower bearing cups in housing. **Do not remove bearing cups unless inspection reveals it is necessary to do so.** To remove upper and lower bearing cups use tool C-3322.

Removal of Worm Connector: 1) Remove housing head "O" ring and discard (Use new rings when assembling). Unlock worm connector nut lock and slide lock back sufficiently to loosen worm connector nut.

2) With tool C-3321 attached to worm connector, remove connector nut using tool C-3326 (NOTE—It may be necessary to rotate steering gear shaft to raise worm connector and permit installation of tool C-3326).

3) Slide worm connector assembly from valve control spacer.

Disassembly of Worm Connector—*(CAUTION—Do not bottom worm shaft in the outward direction upon disassembly or assembly. Bottoming the worm shaft may damage the ball guides and cause a tight and rough operating worm).*

1) Remove the two worm connector ball guide clamp screws and lockwashers. Remove guide clamp.

2) Using care not to lose any of the worm balls, carefully remove the ball guide from the worm connector.

CONTINUED ON NEXT PAGE

"CO-AXIAL" (Continu d)

CAUTION—Worm balls are a select fit with each other. If any of them are damaged and require replacing, it is recommended that a complete set (40) be installed.
3) Turn worm connector over and carefully thread the remaining worm balls out of the worm connector by turning worm in and out. Count the worm balls which were removed so that the same number can be installed. There should be (40).
4) Remove worm from connector, slide connector nut lock from connector.
5) Inspect guide rails on connector for nicks and burrs.

R moval of Piston & Rods from Gear Housing: 1) Remove pressure and return hose adapters and copper gaskets.
2) Remove steering gear shaft oil seal lock ring (circular section), then, using tool C-3350, remove steering gear shaft oil seal.
3) Remove lock nut from shaft adjusting screw.
4) Remove three cover screws, belleville washers, and neoprene seals.
5) Remove steering gear shaft cover from housing by turning adjusting screw in. Remove cover gasket and discard (use new gasket when reassembling).
6) Using steering arm (if necessary) align steering gear shaft with cover opening in housing. Remove steering gear shaft assembly from gear housing by using a fiber hammer and tapping lightly.
7) Using tool C-3229, remove adjusting screw retaining snap ring. Remove adjusting screw, thrust washer and washer from steering gear shaft. Remove adjusting screw "O" ring.
8) Inspect needle bearings in cover for broken needles and inspect bearing surface on shaft for scoring or pitting. *CAUTION—Do not remove bearing from cover as bearing and cover are serviced as an assembly. Inspect condition of teeth on shaft.*
9) Using C-760 pliers remove gear housing cover snap ring (tapered) at bottom of housing, remove housing cover. Remove "O" ring from housing and discard (use new ring on reassembly).
10) Place a suitable container under the assembly (to catch trapped oil), then slide piston assembly and rods from gear housing. *CAUTION—Use extreme care in handling so as not to damage the sealing surfaces on housing head.*

Disassembly of Piston & Rods— 1) Remove valve rod adjusting disc from valve rod, slide valve rod adjusting disc retainer from upper piston rod, remove upper piston rod nut lock cap.
2) Using tool C-3328, remove upper piston rod nut. *CAUTION—Support upper piston rod on block of wood to help prevent damaging housing head when removing nut. Assembly may also be supported by wrapping several layers of masking tape around the rack teeth and sealing surfaces of lower piston rod and clamping it in a vise equipped with protective jaws.*
3) Slide valve control spacer, seal assembly, upper and lower valve control spacer seal retainers from upper piston rod. Remove spacer retainers from spacer, slide seal assembly from valve control spacer.
4) Remove worm connector nut from upper piston rod, slide housing head off upper piston rod. Remove housing head "O" ring and discard (use new ring on reassembly).
5) Using suitable drift, remove upper piston rod seal (lip type) from housing head.
6) Remove two backup (steel) and "D" type (neoprene) piston rings from piston.
7) Using C-760 pliers, remove lower piston rod snap ring and slide lower piston rod from piston.
8) Using care not to bend valve adjusting rod, slide valve assembly from piston assembly.
9) Using a 1/4" punch, drive piston pin into upper piston rod, then using C-760 pliers, remove upper piston rod snap ring. **Note position and construction of snap ring.**
10) Remove upper piston rod from piston. Using a wire hook, remove piston pin and "O" ring from piston rod, discard "O" ring (use new ring on reassembly). Make sure oil passage is open. Inspect sealing surface on piston rod for scoring. Remove the two valve rod "O" rings (one in each end of upper piston rod) remove upper piston rod "O" ring (discard rings, use new rings on reassembly).
11) Remove lower piston rod "O" ring (discard and use new ring on reassembly). Inspect rack teeth and sealing surfaces on lower piston rod. Make sure oil return hole is open.
12) Inspect piston for nicks and burrs. Make sure all oil passages are open and free of dirt.

Removal of Relief Valve Assembly: Thread a ¼"-28 bolt into threads provided in plug. Clamp bolt in vise and pull on lower piston rod to remove plug. If end plug is seized in rod, tap on retaining flange at lower end of piston with a fibre hammer. Inspect piston for nicks and burrs. Make sure all passages are open and free from dirt.

Disassembly of Steering Gear Housing: 1) Using C-3128 pliers, remove piston rod bearing support pin snap ring. Slide bearing support pin out of gear housing and remove roller support assembly. Inspect roller and needle bearings. Inspect bearing support pin for wear or scoring. Remove two bearing support pin "O" rings located in each side of gear housing and discard (use new rings on reassembly).
2) Inspect steering gear shaft needle bearing in gear housing for broken or rough needles. **Do not remove bearing unless inspection reveals it is necessary to do so.**
3) Using driver C-3333, drive steering gear housing shaft needle bearing from inside gear housing. Remove lower piston rod seal (lip type) from housing.

REASSEMBLY & ADJUSTMENT: Proceed as follows:

St ring Gear H using: 1) Remove garter spring from a n w piston rod seal (to prevent being damaged by tool when installing) and position seal over driver C-3331 (position seal so lip will be facing up or to inside of cylinder when installed). Insert seal aligning pilot of tool in end of driver and drive lower piston rod seal into position in gear housing. *CAUTION—Replace garter spring in piston rod seal.*
2) Using driver C-3333, install housing shaft needle bearing assembly into gear housing until driver marking on driver is even with side of housing. *CAUTION—Always drive on letter sid of b aring, oth rwise damage to bearing may result.*
3) Lubricate the two **new** piston rod bearing support pin "O" rings with Lubriplate and install into gear housing at outer edge of bearing support pin holes. Make sure they are properly seated in housing.
4) Start piston rod bearing support pin through hole in cover side of housing. Place roller support assembly into position in housing and push support pin through roller assembly until it protrudes sufficiently on opposite side of housing to install snap ring. Using C-3128 pliers, install snap ring, making sure it is properly seated.

Piston & Rods 1) Insert relief valve spring followed by plunger into valve body and insert assembly (milled end first) into lower piston rod. Press end plug into lower piston sufficiently to seat against relief valve body (*NOTE*—A suitable adapter will be required to press end plug into place. Otherwise, damage to rod will result. If plug is not pressed in far enough to properly seat against the valve body, it will produce a rattling or clattering sound when hydraulic pressure is applied. If the plug is pressed in too tightly, it will cause relief valve ports in valve body to collapse, restricting the plunger and creating high back pressure, resulting in lack of steering assistance). Lubricate the two **new** valve rod "O" rings with Lubriplate and install one in each end of piston rod. Make sure the rings are seated properly.
2) Lubricate the two **new** large "O" rings with Lubriplate and install one on each upper and lower piston rod. Make sure rings seat properly in ring grooves.
3) Install lower piston rod (with rack) into end of piston assembly opposite piston pin hole and using C-760 pliers, install snap ring. *CAUTION—When installing snap ring, minimum gap opening of 25/64" is specified. Care should be exercised to locate the gap at the middle port of the fiv ports without obstructing the middle port or adjacent ports with snap ring ends. Make sure snap ring is seated properly.*
4) Lubricate valve assembly with Lubriplate and slide into piston assembly. Using care not to damage "O" rings, slide upper piston rod over valve rod, aligning piston pin hole in the piston assembly with the hole in the upper piston rod.
5) Lubricate **new** piston pin "O" ring with Lubriplate and install on piston pin. With piston pin holes aligned in both the piston and upper piston rod, position piston pin (tapered end first) in piston. Using a 1/4" punch and hammer, tap lightly until piston pin is flush with bottom of piston pin groove. Using C-760 pliers, install upper piston rod snap ring. S *CAUTION und r 3) above.*

CONTINUED ON NEXT PAGE

"CO-AXIAL" (Continu d)

6) Remove garter spring from a **new** upper piston rod seal (to prevent being damaged when installing seal) and position seal on driver C-3331 (lip of seal facing tool). Insert seal aligning pilot of tool in end of driver. Drive upper piston rod seal (lip of seal out) into position in housing head. Replace garter spring and lubricate seal with Lubriplate. Install housing head assembly (sealing lip first) onto upper piston rod. *CAUTION– Use extreme care to protect sealing surfaces on housing head.*

7) Slide connector nut onto upper piston rod with open threaded end away from piston.

8) Lubricate the valve control spacer seal (new) with Lubriplate and install in center of valve control spacer. *CAUTION–Should it be necessary to replace the valve control spacer or upper piston rod for any reason, always select a spacer to match. The length of the valve control spacer selected, must be identical to the distance between the seat of the valve control spacer seal retainer and the seated upper piston rod nut.*

9) Slide one of the valve control spacer retainers (large diameter first) on upper piston rod. Lubricate with Lubriplate. Place tool C-3329 over threaded end of upper piston rod. Lubricate the valve control spacer retainer with Lubriplate and place into position (small diameter first) so it nests in valve control spacer. Slide spacer, seal and retainer over tool C-3329 and into position on piston rod, remove tool.

10) Install upper piston rod nut and using tool C-3328, tighten securely (25-30 ft. lbs. torque). Lock in place using piston rod nut lock by tapping outer diameter of lock into nut recess.

11) Slide valve rod adjusting disc retainer (largest diameter first) over end of upper piston rod. Thread valve rod disc (extended lock thread section being outward) onto valve rod until approximately three threads show (for aid in later adjustment).

12) Place lock ring on worm connector (tang of ring toward threaded end). Slide worm connector (less ball bearings and worm shaft) over valve control spacer, then screw worm connector nut onto connector. Hold worm connector with tool C-3321, then using tool C-3326, tighten nut. Stake ring with punch.

13) Lubricate the two "D" type (neoprene) piston rings with Lubriplate and install on piston. To aid in installation of rings, first slide rings over ring lands and to center of piston with lips facing away from each other. Next, slide rings into position in ring lands. Install backup (steel) rings one on each end of the piston, in extreme position from the center of the piston.

Installation of Piston & Rod Assembly into Gear Housing: 1) Lubricate lower piston rod, teeth of rack and tool C-3391 with Lubriplate, then position tool in teeth of rack.

2) Place ring compressing tool C-3344 on gear housing. Position piston and rod assembly so teeth on rack are 180° from roller support assembly and install into gear housing. *CAUTION–Use extreme care when performing this operation so as not to damage gear housing oil seal or piston rings. Do not use screwdriver to compress piston rings. To further aid in installation, piston and cylinder may be lubricated with Lubriplate. If rack is not positioned properly when it is installed, it may be corrected by rotating the lower piston rod with a screwdriver through opening in end of gear housing.* Remove ring compressing tool C-3344, and tool C-3391 from teeth of rack through opening in gear housing.

3) Lubricate large **new** "O" ring with Lubriplate and install on the side of housing head which faces piston assembly.

4) Carefully slide tool C-3324 (dummy housing) over worm connector and secure housing head to gear housing, tighten the three screws to 25-30 ft. lbs torque.

5) Install thrust washer on gear shaft adjusting screw and position tool C-3401 over thread of screw. Lubricate adjusting screw "O" ring with Lubriplate and slide over tool and into position on adjusting screw. Remove tool and insert adjusting screw thrust washer into gear end of steering gear shaft. Insert adjusting screw assembly into gear shaft and lock into position by inserting internal snap ring. Use C-3229 pliers and make sure snap ring is properly seated. Screw shaft adjusting screw with gear attached into the gear shaft cover assembly as far as possible.

6) Center the second tooth of the rack over center line of piston rod bearing support pin.

7) Lubricate a **new** gear shaft cover gasket with Lubriplate (to help hold it in place) and position it on cover of housing.

8) Center the center line of the middle tooth on gear shaft with second tooth **space** from end of rack. Insert gear shaft assembly with cover attached into gear housing, tap lightly into position. Place belleville washers and new seals on screws and secure cover to gear housing. Draw down evenly and tighten to 25-30 ft. lbs. torque.

9) Lubricate **n w** gear housing cover "O" ring with Lubriplate and install on housing cover. Push assembly (seal end first) into housing and install snap ring.

10) Before attempting to install a **new** seal, thoroughly clean sealing surface on the gear shaft and counterbore of steering gear housing. Lubricate a **new** steering gear shaft oil seal with Lubriplate and place (lip of seal down) on a piece of clean paper. **Carefully** install tapered end of sleeve (part of tool C-3350) in seal and slide seal back approximately 1/4" on sleeve. Install this assembly (lip of seal toward housing) over steering gear shaft until seal contacts counterbore in housing. Push seal into position by installing adapter over sleeve, and installing coupling nut on shaft threads until shoulder of adapter contacts housing. Remove nut and adapter. Wrap a new piece of friction tape around sleeve to provide a firm grip and with a turning motion, remove sleeve from seal and gear shaft. Seal is then positioned properly. Install oil seal lock ring (circular section) and make sure it is properly seated. Install gear shaft adjusting screw lock nut, but do not tighten.

11) Secure steering gear arm from stock or remove one from vehicle. Install steering gear arm, lockwasher and nut, and tighten nut from 30-40 ft. lbs. torque (low torque reading for checking purposes only). Work steering arm back and forth forcing piston to its full length of travel. Adjust gear, if necessary, into a backlash position, then tighten lock nut. *CAUTION–This adjustment necessary before hydraulically centering gear assembly and is not to be considered a final adjustment.*

12) Proceed as indicated under steps **7)** through **13),** Centering Control Valve, and Required Re-Assembly Operations After Adjusting Control Valve, outlined under "Control Valve" in ADJUSTMENT section above.

13) For final gear adjustment proceed as outlined under "Centering Steering Tube Coupling & Adjusting Backlash Between Gear Shaft & Rack Teeth" in ADJUSTMENT section above.

HYDRAULIC PUMP

►*PUMP COUPLING NOTE:* Two different types of pump drive coupling have been used and special Pump and Generator must be used with each type coupling (special shaft used with each coupling).

1) Rubber Insulated Coupling–Oilite coupling flanges are pressed on generator and pump shafts and retained by special "thread locking" type capscrew and **plain** washer (lockwashers should not be used with these screws). A rubber insulator and insulator sleeve are installed between the coupling flanges to transmit the drive.

2) Metal Tongue Coupling–Tongue-and-slot type metal coupling. Coupling members are retained on shaft ends by a retaining ring and slide off after ring removed.

HYDRAULIC PUMP REMOVAL: Disconnect the two hoses from pump reservoir assembly and catch oil from pump in a drain pan. Tie the loose ends of hoses out of the way above steering gear assembly to prevent loss of oil. Cover the ends of both hoses. Remove the three pump-to-generator screws and remove pump (*CAUTION*–do not lose coupling insulator and sleeve on pumps with rubber coupling).

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinued)

R moval of Reservoir From Pump:
1) Remove cover assembly from reservoir, lift out filter element and drain oil from reservoir.
2) Install the small tapered plug Tool C-3117 and the large tapered plug Tool C-3118, into the two holes that permit passage of oil to pump (this will prevent dirt entering pump).
3) Remove the four reservoir-to-pump attaching screws and lift reservoir from pump, being sure not to lose one large rubber "O" ring and five small rubber "O" rings which are used as gaskets between pump and reservoir.

OVERHAUL OF PUMP: *CAUTION*–Cleanliness is extremely important when working on hydraulic pump. Pump should be thoroughly cleaned before disassembling, work bench should be covered with clean paper, and all parts should be kept in clean kerosene until reassembled to protect them from dirt and corrosion.

Disassembly ("Single Rotor" type): Remove coupling lock screw, then remove coupling. Install pump in vise with protective copper jaws. Remove five body-to-cover attaching bolts, then remove cover. Remove shaft and rotor assembly, then "O" ring seal and "oilite" thrust washer in bottom of pump shaft hole.

Bushing & Seal Replacement–*NOTE*–New seal should always be installed whenever bushing replaced. Replace bushing and seals as follows:

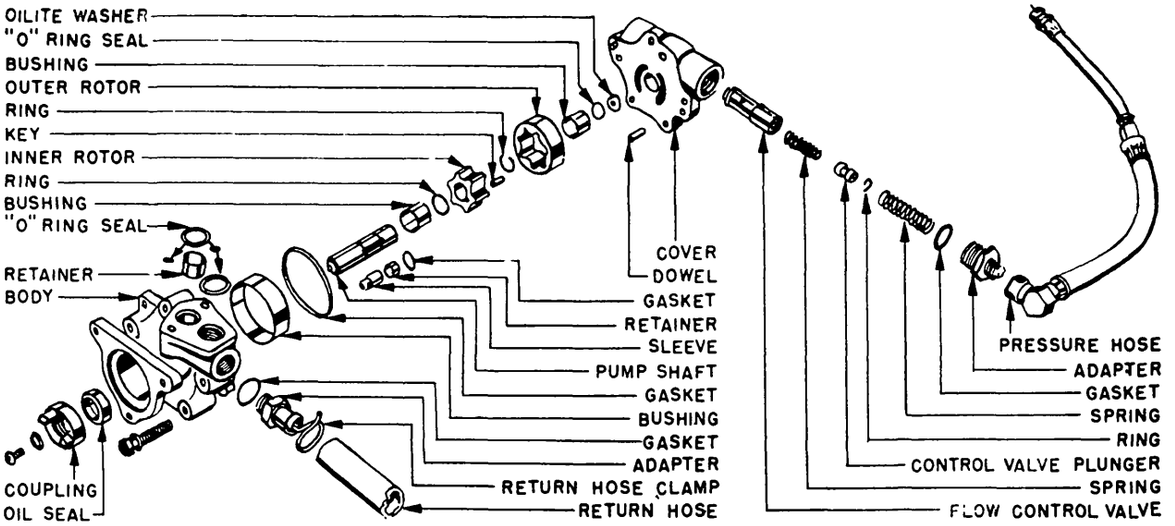
Pump Cover Shaft Bushing–Place pump body in vise with protective copper jaws, install Tool C-3185, tap threads into bushing with outer section of tool, using an open end or adjustable wrench. After tool threaded into bushing sufficiently, screw T handle section of tool into hole until tool bottoms in cover, remove bushing. To install, drift bushing into place with Tool C-3233.

Pump Body Shaft Bushing–Place pump body in vise with protective copper jaws, mount pump cover to pump cover to pump body, install attaching bolts. Install Tool C-3185 in cover bushing hole, thread tool into housing bushing, remove bushing and seal. To install, mount bushing to Tool C-3235 and drift bushing into place.

Outer Rotor Babbitt Bushing–Remove pump cover from pump body. Thread Tool C-3214 into pump body using adapter Tool C-3234, remove bushing. To install, drift bushing into place with Tool C-3251.

Pump Shaft Oil Seal Replacement–With pump body securely clamped in vise with protective copper jaws, mount seal to Tool C-3230, drive seal into place.

Cl aning & Inspection: Clean all parts thoroughly in solvent and blow dry with compressed air. Wash bearings in clean kerosene and dry by blowing air through bearing (*CAUTION*–do not spin bearing with air).



HYDRAULIC PUMP (SINGLE ROTOR TYPE)

Inspect bearings for wear or roughness and replace if they do not rotate freely. Inspect babbitt rings in pump body for wear or scoring. Inspect rotors and pump shaft for wear, scoring, or burrs (remove burrs with a fine stone or crocus cloth). Check end clearance of rotors by installing them in pump body and using a feeler gauge to measure clearance from rotor to straightedge placed on face of body. End clearance limits are .001-.0017". Check valve plunger.

►*NOTE:* If rotors badly scored, or worn beyond limits given above, install complete new pump assembly.

Reassembly ("Single Rotor" type): Use NEW "O" ring seals and gaskets. Lubricate all parts with clean SAE 10W engine oil, coat "O" ring seals with Lubriplate. Assemble pump as follows: Install flow divider valve (ported end first) into pump body. Insert small spring plunger and ring, using Tool C-3229. Install large spring, gasket and adapter. Tighten adapter to 45-50 ft. lbs. torque. Install shaft protector thimble Tool C-3228 in pump body until tool bottoms, install rotor shaft assembly, using care not to damage babbitt bushings when installing rotor. Position "O" ring seal in body. Place cover in position, installing attaching bolts and washers. Tighten bolts to 15-20 ft. lbs. torque. Install coupling flange on pump shaft, then special lock screw and washer. Hold coupling with Tool C-3227 and tighten to 10-12 ft. lbs. torque.

Installation of Reservoir on Pump: Install one large circular section "O" ring, and five (5) small "O" rings which are used as gaskets between reservoir and pump. Install small tapered plug, Tool C-3117 and large tapered plug, Tool C-3118, into the two passage holes in bottom of reservoir. Insert the two pilots, Tool C-3116, into matching screw holes of reservoir and pump and install reservoir to pump. Install the four attaching screws and tighten to 7-12 ft. lbs. torque.

HYDRAULIC PUMP INSTALLATION:

►*PUMP DRIVE COUPLING CAUTION:* Make certain that pump and generator have same type drive coupling. Couplings are not interchangeable and SAME TYPE PUMP AND GENERATOR MUST BE USED TOGETHER. When installing pump with rubber type coupling, make certain that rubber insulator and sleeve installed in generator drive flange.

1) Attach pump and reservoir assembly to generator, using care to index pump shaft tongue into groove of generator coupling. Tighten three pump-to-generator mounting screws to 12-17 ft. lbs. torque.

2) Attach the two hoses, using 3/8-5/8 of a turn after initial finger tightening. The constant section hose is the return line and connects to the reservoir fitting. The dual diameter hose is the pressure line and connects to the pump body fitting. If the hose connectors are ever removed, they should be tightened to 25-30 ft. lbs. torque.

3) Clean out reservoir with lint free, clean cloth before removing tapered plugs, Tools C-3117 & 3118. Install filter element in reservoir, and fill with SAE 10-W engine oil to 1½" below gasket seat. See *BLEEDING* above.

4) AFTER bleeding of the system completed and reservoir refilled to correct level, install reservoir cover and gasket and tighten cover bolt to 5-8 ft. lbs.

NOTE–If relief valve assembly cap removed, tighten to 5-8 ft. lbs. torque.

SAGINAW "IN LINE" POWER STEERING

Buick (1956)
Cadillac (1956)
Continental (1956)
Lincoln (1956)
Oldsmobile (1956)
Pontiac (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 END COVER, ADAPTER AND VALVE MOUNTING SEAL PRODUCTION CHANGE:* On later cars, the "O" ring seal has been increased in size and its position on the adapter has been changed slightly. Both the early and late type adapters are interchangeable provided the correct "O" ring seal is used.

►*POWER STEERING GEAR SEAL INSTALLATION CAUTION:* Particular care must be exercised when installing seals in the 1956 gear housing because fluid under pressure exists throughout housing whenever steering effort is applied. Extreme care must be exercised when installing the pitman shaft oil seal.

►*1956 BUICK POWER STEERING PUMP RESERVOIR VENT NOTE:* Aluminum and steel vent washers have both been used under the reservoir cover bolt. To prevent plugging the vent, the aluminum washer must be installed with the vent groove downward. The steel washer must be installed with the vent groove upward.

►*1956 BUICK PITMAN SHAFT LASH ADJUSTING SCREW LOCK NUT CHANGE (To eliminate leakage at this point):* A new lock seal nut, Part No. 5684554 having a nylon seal embedded at crimped end of nut, is available for service replacement.

►*CADILLAC PUMP SHAFT SEAL PRODUCTION CHANGE:* A new seal with same part number (5683898) has been released and is used in production beginning after Engine No. 021850. New seal has 30° angle on vacuum seal lip which reduces the possibility of the lip being torn, causing air leakage and a noisy pump. Extreme care should be used when installing seal. After lubricating with Hydra-Matic fluid or approved hydraulic fluid, shaft should be inserted slowly into seal with a rotary motion.

►*1956 CADILLAC POWER STEERING PUMP PRESSURE REDUCTION (To eliminate a squealing noise):* Pressure has been reduced to 875-975 lbs. Pump pressure can be reduced in the field by installing a shim, Part No. 5683875 under the screw head on control valve. Each shim used will reduce the pressure approximately 100 lbs. Two shims may be used if necessary, however, check the pressure before and after installation to make sure that cut-out pressure remains above 750 lbs.

►*1956 CADILLAC POWER STEERING SQUEAK CORRECTION (This squeak is noticed during a turn to left or right):* The squeak is caused by a dry needle bearing in gear assembly end cover. Apply 10W oil to felt washers under worm shaft flange. A small hole is provided in the felt protector on upper worm flange.

►*1956 CADILLAC STEERING GEAR "CLUNKING" NOISE CORRECTION:* This noise is heard on hard turns and when steering wheel is turned while car is standing still with engine running. This condition may be corrected by properly positioning the lower steering column seal seat between bearing and seal at lower end of steering shaft. Check to make sure a washer is located under the spring at lower end of steering shaft.

►*1956 CADILLAC POWER STEERING GEAR SIDE COVER & LASH ADJUSTER SCREW CHANGE (Air bleed screw has been eliminated):* This is a change in partial production and affects cars between Serial No. 139856 to 140136 and 140277 to 140557. Provision has been made for automatic bleed of trapped air in upper area of housing. Bleeding of air from system is accomplished in the same manner as in the past.

►*1956 CADILLAC STEERING KNUCKLE ARM CHANGE:* Starting at Engine No. 127270, steering knuckle arms, Part No. 1456119 (right hand), and 1456118 (left hand) are used on all models. When replacing a steering arm, make sure the correct type is installed to match the opposite arm.

►*1956 LINCOLN POWER STEERING HOSE INTERFERENCE WITH UPPER FRONT SUSPENSION CONTROL ARM:* If interference is found at this point, rotate the "Banjo" pressure hose fitting to between 8 and 9 o'clock positions as view from left side of car.

►*1956 LINCOLN POWER STEERING CONTROL VALVE PRODUCTION CHANGE:* Control valve assembly, Part No. LD-33577-A was used on approximately 9000 early cars. Part No. LD-33577-B is used in later production. Some of the detail parts of the assemblies are not interchangeable. The early type valve is identified by a brush mark of yellow paint across valve housing.

►*1956 STEERING COLUMN RATTLE CORRECTION:* Install a new nylon upper steering column bushing, Part No. FDT-3517-A. Before replacing the bushing, Polish all burrs from the shaft.

DESCRIPTION: Hydraulically operated in-line power steering gear, which combines the recirculating ball type gear with a concentric hydraulic booster. Hydraulic fluid is supplied to the steering gear by a constant displacement, belt driven type pump. System is designed to give hydraulic assistance when effort required to turn wheels exceeds 2½ lbs. at the rim of the steering wheel. Maximum effort required to turn wheels, even under most difficult turning conditions, is limited to 5½ lbs. at rim of steering wheel. Manual steering is available at all times when engine is not running, or when turning effort at steering wheel is less than that required for power assistance.

Control Valve Assembly: Located in valve housing directly above steering gear housing. Control valve assembly is an open center, three way valve containing a control valve mechanically connected by an actuator lever to the thrust bearing assembly on the worm shaft. Control valve has two annular grooves which, as the valve is moved fore or aft, open or close connecting passages between valve body and gear housing. In the neutral or straight-ahead position fluid flows from the pump, through open center of valve and back to the pump reservoir. When steering wheel is turned, resistance between roadbed and wheels must be overcome at the point where the power rack cylinder and pitman gear mesh. When the steering wheel is turned, this resistance, if higher than the preload which is built in the gear, will allow the wormshaft to move downward (right turn) or upward (left turn) causing thrust bearing to move downward (right turn) or upward (left turn), causing valve actuating lever to shift the control valve. As the valve moves, the connecting fluid passage between valve body and lower end (right turn) or upper end (left turn) is opened more fully to fluid from the pump, and the connecting passages between valve body and the upper end (right turn) or lower end (left turn) of the cylinder is more fully closed. Fluid from pump is then restricted in its flow back to pump reservoir and builds up pressure, forcing piston rack upward (right turn) or down (left turn) and providing power assist for the turn. Fluid in upper end (right turn) or lower end (left turn) of gear housing is forced back to pump reservoir through return line. The greater the resistance between roadbed and wheels, the more the control valve is displaced. "Feel of the road" is maintained through a reaction chamber built into the valve body. A ball check valve in the valve body allows steering gear to be operated manually when engine is not running or pump is inoperative (fluid circulates within valve body and gear housing. Return line to pump reservoir is open to assure a continuous flow of fluid).

Pump & Reservoir Assembly: Hydraulic pump is belt driven from engine crankshaft and supplies oil pressure for hydraulic assist. Pump operates continuously when engine is running but a flow control valve recirculates oil within the pump when it is not needed for hydraulic assist. A relief valve is provided to limit pump pressure. Reservoir is mounted directly above pump and supplies oil as needed.

ADJUSTMENT

PUMP BELT ADJUSTMENT: Buick – Tension should be set so that pulley will slip in belt when 40-45 lbs. (new belt), 30-35 lbs. (old belt) torque is applied to pulley nut.

Cadillac – Loosen pump to mounting bracket screws. Move pump outward until belt is tight, tighten bracket to pump mounting screws. With shift lever in "N", race engine while turning steering wheel. If belt squeals, it is too loose and must be retightened.

Continental & Lincoln – Depress belt at center. Deflection should be 1/4" approximately with a 5-7 lb. force.

Oldsmobile – Loosen pump to bracket attaching bolts. Place Tool J-5398 under pump body and over pivot cap screw. With a 0-50 lb. torque wrench adjust drive belt tension to 30 ft. lbs. This corresponds to a belt deflection of 7/8" with a 25 lb. pull applied midway between pump pulley and fan.

Pontiac – Loosen pump to bracket bolts two full turns so pump falls of own weight. Using Tool J-5574 over head of hinge bolt and torque wrench perpendicular to tool, tighten belt to 58-65 ft. lbs. (new belt), 51-53 ft. lbs. (old belt).

STEERING GEAR ADJUSTMENTS: Pitman Shaft Endplay Adjustment is the only adjustment that can be made on

CONTINUED ON NEXT PAGE

SAGINAW "IN LINE" (C ntinu d)

car. However, Ball Nut Preload and Thrust Bearing Preload should be checked before Pitman Shaft Endplay Adjustment is made. Disconnect pitman arm from pitman shaft or drag link, then proceed as follows

►*CONTINENTAL & LINCOLN ADJUSTMENT NOTE: Adjustments on car are not recommended, and should be performed when steering gear is removed for overhaul and during reassembly.*

Thrust Bearing Preload Check: Buick – Turn steering wheel to extreme right or left position. Attach spring scale to spoke of wheel at rim. While pulling at 90° angle to spoke, pull required to turn wheel through range where lash normally exists (1/8 turn of steering wheel from either extreme position) should be ¼ - ½ lb.

Cadillac – Turn steering wheel two turns off-center. Attach spring scale to spoke of wheel at rim. While pulling at 90° angle to spoke, pull required to turn wheel through 1" arc should be 8-14 ozs.

Oldsmobile – Turn steering wheel 2¼ turns off-center. Attach spring scale to spoke of wheel at rim. While pulling at 90° angle to spoke, pull required to turn wheel through a 6" arc should be ¼ - 1¼ lbs.

Ball Nut Preload Check: Loosen pitman shaft adjusting screw lock nut and turn adjusting screw counter clockwise a few turns. With spring scale attached as for Thrust Bearing Preload Check, preload should be as follows:

Buick – Pull through "high point" or no lash range (on-center) should be ¼ - ¾ lb. higher than for thrust bearing preload.

Cadillac – Pull through an arc of 1", ¾ - 1 turn off-center should be no greater than 9 ozs. in excess of thrust bearing preload.

Oldsmobile – Same as for thrust bearing preload.

Pitman Shaft Endplay Adjustment: Adjust pitman lash adjuster screw so that pull through center is as follows:

Buick – ½ - 1 lb. higher than for ball nut preload but reading should be 1¼ - 1¾ lbs.

Cadillac – 8-15 ozs. higher than for ball nut preload but not to exceed 28 ozs.

Oldsmobile – Total over center preload must not exceed 1¾ lbs

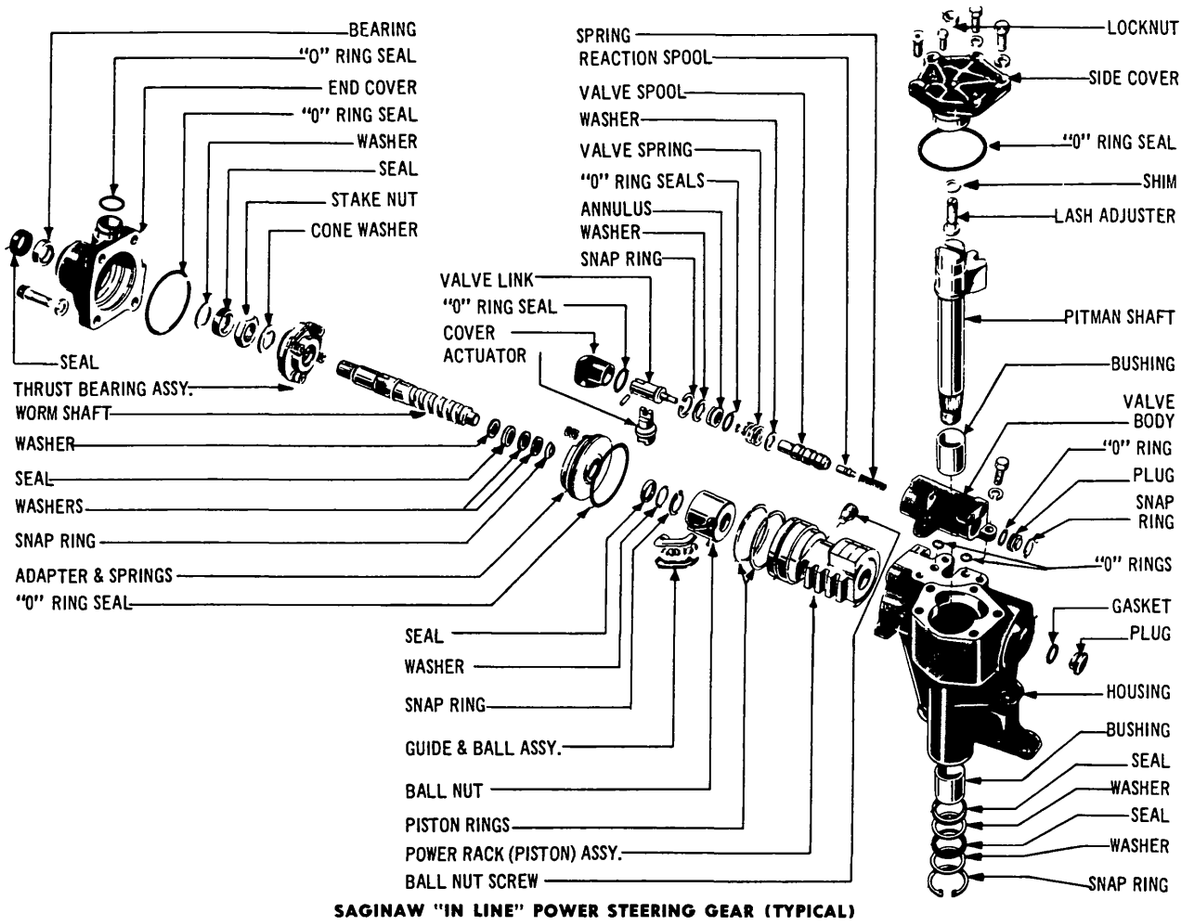
Pontiac – Total over center preload should be 1¼ - 1¾ lbs.

LUBRICATION

LUBRICATION: Check level of fluid in reservoir every 2000 miles. Use Automatic Transmission Fluid "Type A" (marked AQ-ATF on container).

Checking Fluid Level: Buick, Oldsmobile, Pontiac – *(NOTE* – Reservoir is vented at cover bolt). Remove cover bolt, washer, and cover and gasket. Fill to full mark on side of reservoir. Bleed system if oil level low. Replace cover with new gasket, washer and cover bolt. Torque to 8-10 ft. lbs.

Cadillac – Remove cover bolt, washer, cover and gasket. Fill to full mark on side of cover. Reinstall cover, using new gasket. Torque bolt to 10-15 ft. lbs. Start engine, idle for three minutes, then check for leaks at cover. Bleed system if oil level low.



SAGINAW "IN LINE" POWER STEERING GEAR (TYPICAL)

Continental – Remove star nut and vented breather washer, cover and gasket. Fill to full mark on side of reservoir. Replace cover using new gasket. Tighten star nut securely.

Lincoln – Remove filler tube cap and fill to full mark on oil level indicator.

BLEEDING

BLEEDING SYSTEM: Buick, Oldsmobile, Pontiac – Remove cover, fill to full mark on side of reservoir. With front wheels off ground, engine running, and bleed screw in side cover loosened, turn steering wheel through its entire range two or three times until there is no evidence of air in system. Recheck oil level. Tighten bleed screw, replace cover with new gasket, and torque bolt to 8-10 ft. lbs.

►*1956 CADILLAC STEERING SYSTEM BLEEDING NOTE: See "Cadillac Power Steering Gear Side Cover & Lash Adjuster Screw Change" under "Changes, Cautions, Corrections" above.*

Cadillac – Remove cover, fill to full mark on side of reservoir. Allow fluid to remain undisturbed for about two minutes. Crack open air bleed screw on housing side cover. Crank engine (coil wire disconnected) and maintain fluid level in tank. Turn wheels (off ground) at same time to eliminate air pockets in system Start engine and run at idle for two minutes. Recheck fluid level and inspect gear, pump, hoses and connections for leaks. Increase engine speed to 1500 RPM and continue running at this speed until air bubbles cease to appear. Turn wheels (off ground) from right to left. Do not hit stops. Lower car and turn wheels on ground, recheck for leaks. Check fluid level, refill as required, and install cover using new gasket. Torque cover bolt to 10 - 15 ft. lbs. Tighten bleed screw.

Continental – Remove star nut, washer, cover and gasket. Fill reservoir to full mark on side of reservoir Replace star nut and washer **without cover.** Loosen bleed screw in side cover. Start engine. With wheels off ground, turn steering wheel through its entire travel two or three times. Tighten bleed screw, recheck oil level. Replace cover.

Lincoln – Fill reservoir to full mark on dipstick. Loosen bleed screw in side cover. Start engine and turn steer-

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SAGINAW "IN LINE" (C ntinued)

ing wheels through its entire travel several times (wheels off ground). Tighten bleed screw, recheck oil level. Replace dipstick.

TESTING

HYDRAULIC PRESSURE TEST: Buick, Cadillac, Oldsmobil , P ntiac – Disconnect pressure line at oil pump, attach Gauge J-5176 to pump, and connect hose to end of gauge where valve is located. With engine at warm idle and gauge valve open, note oil pressure while turning steering wheel from one extreme position to the other. Especially note the maximum pressure which can be built up with the wheel held in either right or left extreme position. *(CAUTION – Do not hold wheel in extreme position for more than 15 seconds because it will drastically increase the oil temperature and cause undue wear on the oil pump).* With oil temperature between 150° F. and 170° F., as measured with a thermometer in the reservoir, the maximum pressure should not be less than 875 PSI (850 PSI on Pontiac) for satisfactory power steering operation. If less than specified, it indicates trouble in the pump, hoses, steer ing gear, or a combination of these parts.

► *1956 CADILLAC POWER STEERING PUMP PRESSURE REDUCTION (to eliminate a squealing noise): See "Changes, Cautions, Corrections" above.*

Contin ntal & Lincoln – Remove pressure hose from pump and connect Gauge No. 3500 with adapter No. 3500-C between pressure fitting on pump and pressure hose that leads from pump to power unit. Let engine idle and turn wheel for a full right or full left turn. The gauge should read between 800 and 1000 lbs. If pressure is less than 800 lbs., close the valve at gauge and note pump pressure. If it is low with valve closed, it indicates that pump is not operating properly. If pump pressure goes up with valve closed, it indicates that the low pressure in system must be due to internal leakage in power unit, providing all connections are tight.

TROUBLE SHOOTING

TROUBLE SHOOTING: Hard Steering While Driving – Steering adjustment tight; linkage binding.

Hard Steering (Car rec ives more assist in one direction than the oth r): This condition may be caused by either of the following: Internal leaks at one or both of the white teflon seals. Correct by replacing seals. If this condition is not corrected by the above, align the valve body as follows: Loosen the three attaching bolts and allow the valve to seek its own location. Tighten the end bolt finger tight; then the two side bolts. Repeat bolt tightening sequence applying a final torque of 15-20 ft. lbs.

Poor Return of Steering Gear to Center: Tires not properly inflated; incorrect caster or toe-in; tight steering linkage; steering gear misalignment; tight sector to rack piston adjustment; sticky or faulty control valve; control valve improperly positioned on steering gear; ball nut and worm preload too tight; worm thrust bearing adjustment too tight; sticky valve actuating lever.

Car L ads to On Side or the Other: Due to front end alignment and not to steering gear.

Mom ntary Increase in Effort When Turning Wheel Fast to Right: Air in system.

External Oil Leaks (Wipe Gear Thoroughly and Make Sure Source of Leakage is Determined): Loose hose connection, damaged hose; housing end cover seal; housing end cover "O" ring seal; adapter "O" ring seal; side cover "O" ring seal; linkage cover "O" ring seals; valve to gear housing "O" ring seals; pitman shaft seal; valve end plug "O" ring seal.

Gear Noise (Rattle or Chuckle): Loose over-center adjustment. *NOTE* – A slight rattle may occur on turns because of the increased lash off "high point". This is normal, and the lash must not be reduced below specified limits to eliminate this slight rattle.

Gear Noise (Hissing Sound): *NOTE* – There is some noise in nearly all power steering systems. One of the most common is a "hissing" sound most evident when at stand-still parking. There is no relationship between this noise and performance of the steering. Hissing may be expected when wheel at end of travel.

Excessive Wheel Kick-back or Loose Steering: Lash in steering linkage; air in system; excessive lash between pitman shaft sector and rack piston; loose worm thrust bearing adjustment

Hard Steering When Turning or Parking: Loose pump belt; low oil level in reservoir; lack of lubrication in linkage or front suspension; tires not properly inflated; steering gear adjustments tight; insufficient oil pressure; low oil pressure due to steering gear seal leakage.

Buick: Horn Button Removal (Series 40 Std.)–Pry cap out with thin bladed tool, then remove contact cup and other parts by removing attaching screws and insulating spacer bushings. To install, reverse removal procedure.

Horn Button & Ring Removal (DeLuxe Steering Wheel)–Pry out monogram which is held by prongs of a retain-contact plate and spring with insulators, remove operating ring with cushion and contact spacer. To install, reverse removal procedure. *NOTE*–When contact adjusting nut is being installed, turn it down until contact is made and horns blow, then back nut off ½ turn to provide proper clearance between contact plate and spacer.

Steering Wheel Removal–Remove horn button or operating ring (see above), then re-install steering wheel nut, leaving it backed off several turns. Set direction signal switch in "Off" position to avoid damage to switch operating mechanism. Apply puller J-3274 and pull wheel back to nut *(NOTE*–If wheel hub very tight on shaft, apply a moderate strain with puller then tap end of puller screw to break hub loose from shaft without distorting wheel hub). Remove puller, nut, and steering wheel.

Steering Wheel Installation–Set signal switch in "Off" position. Location marks for proper installation are provided to insure vertical position of steering wheel lower spoke when front wheels are in straight-ahead position. Upper end of steering shaft has a small location notch, solid spoke wheel has a keyway, and flexible wheel has mark on hub. Location must be in line. With wheel properly located on shaft, install self-locking nut and tighten securely. *(NOTE*–Nut with nylon insert may be installed either way, but the optional type with locking feature in the threads must be installed with the score marked side UPWARD. Shaft must project above nut at least one thread). Install horn button or operating ring and connect wire to horn cable connector on steering column.

Steering Wheel Height–Clearance between column bracket and lower surface of instrument panel for normal steering height is 5/8-3/4" (Series 40 & 60), 3/8-1/2" (Series 50 & 70). Height of steering wheel may be set as much as 3/4" above or below normal height to suit drivers needs.

Cadillac: Horn Ring Removal–Disconnect horn wire from terminal underneath instrument panel on steering column. Loosen Allen head screws on underside of horn ring, one on each side of direction signal carrier, remove horn ring assembly. To install, reverse removal procedure.

Steering Wheel Removal–Remove steering wheel hub nut. Remove steering wheel using Steering Wheel Puller J-1859. To install, reverse removal procedure, tighten nut to 45-50 ft. lbs. Stake nut to steering wheel.

Continental & Lincoln: Horn Ring Removal – After removal of steering wheel (see below) remove screws from underside of steering wheel and remove horn ring. To install, reverse removal procedure.

Steering Wheel Removal–Pull cap and emblem outward from steering wheel hub. Remove steering wheel using Puller 3600-D (Lincoln), 3600-AA (Continental). To install, reverse removal procedure. Torque nut to 60-70 ft. lbs. (Lincoln), 40-50 ft. lbs. (Continental).

Oldsmobile: Horn Button Removal (Std. Wheel)–Insert sharp instrument under edge of horn button and pry upward. Remove steering wheel nut, then contact assembly.

Horn Ring Removal (Deluxe Wheel)–Two spring clips on ends of horn button engage horn ring hub and are accessible from underside of wheel. To remove horn button, use a small screwdriver to relieve spring tension on one end and lift button from its seat. Remove steering wheel nut to remove contact plate and horn ring.

►*NOTE:* To prevent horn from blowing during above operations, horn wire should be disconnected.

Steering Wheel Removal–Remove nut. With Puller J-1262, remove wheel. When installing, torque nut to 25 ft. lbs. minimum and stake to steering wheel.

Pontiac: Horn Button Removal (Std. Wheel)–Press down on button on one side, insert screwdriver underneath opposite edge, pry upward to remove button.

Horn Ring Removal (Deluxe Wheel)–Remove button by turning clockwise. Remove locknut, nut, washer, horn ring, horn insulator and contact assembly. To install, reverse removal procedure.

Steering Wheel Removal–Install Puller J-3044 after removing horn button and steering wheel nut or horn ring and allied parts. To install, reverse removal procedure, torque nut to 25-30 ft. lbs. and locknut finger tight plus ¼ turn. *NOTE*–Steering wheel spokes must not vary more than 5° from horizontal when front wheels are in straight-ahead position.

CONTINUED ON NEXT PAGE

SAGINAW "IN LINE" (C ntinu d)

REMOVAL & INSTALLATION

Buick. Place fender cover over left front fender. Disconnect pressure and return line hoses at steering gear and elevate ends of hoses higher than pump to prevent oil from draining out of pump. Disconnect flexible coupling by removing two bolts which attach flexible coupling to steering shaft. Jack up car and remove pitman shaft nut, then remove pitman arm. Remove four steering gear-to-frame bolts at outside of left frame rail. Remove steering gear. To install, reverse removal procedure. Check toe-in.

Cadillac: Remove reservoir cover, syphon all fluid from reservoir. Disconnect pressure and return line hoses at reservoir and pump, cap ends to prevent fluid drainage. Raise front of car and place stands near outer ends of lower suspension arms. Disconnect pitman arm from drag link. Remove upper flange-to-upper shaft retaining screw. Remove gear housing-to-frame side side bar screws, remove gear assembly. To install, reverse removal procedure. Torque upper flange-to-shaft retaining screw to 25-30 ft. lbs. *NOTE*–After installing gear, check flexible coupling for distortion. Coupling must rest in flat plane with no visible bend or twist. If distorted, remove lower steering column cover and lower clamp-to-jacket screw. Then loosen steering jacket clamp screws at instrument panel and slide complete steering jacket assembly up or down as required.

Continental: Working in engine compartment, remove ground cable from battery. Remove screws that retain steering column opening upper and lower cover plates to dash panel. Remove cover plates and insulator. Remove lock pin that retains shift rod to shift arm and remove shift rod from pin on shift arm. Remove spring from pin on shift arm. Working inside passenger compartment, cover front seat and back to protect upholstery. Remove steering wheel (see above). Remove two screws that retain dash panel trim pad to dash panel and remove trim pad. Remove sheet metal screws that secure instrument panel trim and remove trim panel. Disconnect turn signal wires at junction block. Disconnect neutral safety switch and back-up light wires attached to terminal block on steering column. Remove two Phillips head screws that secure upper steering column tube to instrument panel. Slide steering column tube from steering shaft. Raise car, using hoist or suitable jack. Remove nut that secures pitman arm to steering sector shaft. Remove pitman arm from shaft with Tool 3590-AA. Lower car to complete operation in engine compartment. Working in engine compartment, remove air cleaner and air duct as an assembly. Remove two nuts that secure exhaust flange pipe to exhaust manifold. Remove manifold capscrews and remove manifold. Remove number 7 & 8 spark plugs. Remove as much fluid as possible from reservoir with a suction gun. Place oil drain pan under car to catch oil drained from system. Disconnect hoses at power steering gear. Drain steering gear by turning from stop to stop several times. Remove capscrews that secure housing to frame. Mark position of any shims found under screws to assure reassembly in same location. *(CAUTION*–Do not attempt to remove rolled pin out of steering shaft coupling at this time). Working in engine compartment, rotate steering shaft so that coupling slot is in a vertical position to facilitate removal of gear assembly. Tilt gear housing down and rearward so that sector shaft is facing up. Lift gear assembly up between fender apron and engine and remove from engine compartment. To install, reverse removal procedure. Secure gear assembly to frame torquing three capscrews to 40-50 ft. lbs., steering wheel to 40-50 ft. lbs., pitman shaft nut to 120-130 ft. lbs. Before attaching pitman arm, count number of steering wheel turns from one extreme to the other and turn wheel back one-half number of turns. With steering wheel and front wheels in straight-ahead position, install pitman arm.

Lincoln: Working inside passenger compartment, remove battery ground cable from battery and cover front seat and back to protect upholstery. Pull speaker lead out of receiver and remove two screws that retain speaker to dash panel. Remove radio speaker. Remove steering wheel (see above). Disconnect speedometer cable at speedometer head. Disconnect accelerator rod at clevis pin connection. Remove brake pedal pad. Remove front carpet retaining screws and roll carpet away from steering column opening in dash. Remove clamp from steering column supports. Remove screws that retain supports to floor pan, and remove supports. Remove screws that secure access covers to floor pan and remove access covers. Remove lock pin that retains shift rod to shift arm and remove shift rod from pin on shift arm. Disconnect turn signal wires at junction block. Disconnect neutral safety switch and back-up light wires at terminal block. Remove two Phillips head screws that secure steering column clamp and steering column-to-brake pedal support, and remove steering column from steering shaft. Working through floor pan opening, remove rear manifold cap screw. Raise car using hoist or suitable jack. Remove nut that secures pitman arm to steering sector shaft. Remove pitman arm from shaft with Tool 3590-AA. Remove two nuts that secure muffler inlet to manifold. Remove two forward capscrews that secure steering gear to frame side rail. Leave remaining capscrew intact so that remaining operations can be performed. Lower car to complete operation in engine compartment. Remove manifold capscrews, remove manifold. Remove numbers 6, 7, and 8 spark plugs. Remove as much fluid as possible from reservoir with suction gun. Place drain pan under car to catch oil drained from system. Disconnect pressure and return line hoses at power steering gear. Drain steering gear by turning from stop to stop several times. Remove remaining bolt that secures steering gear to frame. Place steering gear with coupling slot in a vertical position to facilitate removal. Remove gear by tilting gear housing down and rearward until sector shaft can be removed first. To install, reverse removal procedure. Torque gear-to frame attaching capscrews to 40-50 ft. lbs. Torque steering wheel nut to 60-70 ft. lbs. Torque pitman arm-to-sector shaft nut to 120-130 ft. lbs. When installing steering column tube clearance between upper face of shifter dial and lower edge of horn rim hub should be approximately .18". Tighten steering column upper support-to-brake pedal support screws to 12-15 ft. lbs. Before attaching pitman arm, count number of steering wheel turns from one extreme position to the other and turn wheel back one-half number of turns.

Oldsmobile: Scribe alignment marks on coupling flange and steering shaft flange. Disconnect hoses from power steering pump and cap pump and hose fittings. Hoist car and remove engine filler plate. Remove the two flexible coupling-to-coupling flange attaching nuts and lockwashers. Remove the three assembly-to-frame bolts, then remove gear assembly with hoses attached from car. To install, reverse removal procedure. Torque frame-to-gear assembly bolts to 40-50 ft. lbs. and pitman arm nut to 90-120 ft. lbs.

Pontiac: Remove power brake (if so equipped). Hook front suspension in five passenger load position using Tool J-5571 front suspension hold-down hook. Remove steering wheel (see above). Remove direction signal switch handle and gearshift lever. Remove steering column-to-instrument panel bracket cap. Slide rubber grommet up steering column jacket. Roll back floor mat and remove pedal plates from floor. Remove neutral safety and back-up light switch on Hydra-Matic equipped cars. Disconnect gearshift and selector rods. Disconnect direction signal wires. Disconnect pressure and return line hoses at gear and secure lines so ends are higher than reservoir to prevent leaking. Install plastic plugs or tape to cover gear and line openings. Protect all finished surfaces on steering column with masking tape. Raise car on hoist. Remove starter, pitman arm and left side tie rod end, drop linkage. Remove engine left side apron. Remove brake pedal hair pin spring retainer. Slide pedal to right as far as it will go. If car is on twin post hoist it will be necessary to place stands under both front frame ends and lower front post approximately three feet to allow steering assembly to clear hoist. Push steering connecting linkage down and toward rear of car, remove steering assembly-to-frame attaching bolts, removing upper front bolt last. Lower assembly between lower control arm and steering connecting linkage. *(NOTE*–Check number of shims and avoid loss of shims that are between steering gear housing and frame). Thoroughly clean exterior of steering gear. Steering gear oil can be drained into a container by turning control valve down and turning the worm through steering range several times, To install, reverse removal procedure. Torque pitman arm nut to 100-125 ft. lbs.

OVERHAUL

STEERING GEAR DISASSEMBLY: 1) Mark alignment of coupling flange and worm shaft. Drive out coupling flange retaining pin *(CAUTION* - Coupling must be supported to prevent damage to bearing in end cover. 2) With the valve body facing down, remove plugs from hydraulic hoses, then turn coupling flange 2 or 3 times through its full travel to drain oil from gear. Remove hoses from valve body. Turn unit so valve body faces upward and remove three valve body capscrews. Remove valve body and linkage cover by pulling straight out from the housing. Remove two valve body to housing "O" rings from housing.

CONTINUED ON NEXT PAGE

SAGINAW "IN LINE" (C ntinu d)

3) Loosen pitman shaft adjusting screw locknut and remove the five side cover capscrews and rotate the cover ½ turn. Align pitman shaft gear with opening in housing. Tap pitman shaft with a plastic hammer and pull pitman shaft out of housing. Pull coupling flange.
4) Pull actuator from end of housing cover. Remove the four end cover attaching screws and pull end cover from housing. Pull out the worm shaft until centering ring springs are exposed, then remove the four centering springs from adapter. Pull rack-piston and worm assembly out of housing.

CONTROL VALVE: Disassembly – Pull linkage cover from valve body and remove "O" ring. Remove the large snap ring and pull valve assembly and washer from valve body. Remove washer and "O" ring from valve assembly. Remove valve body snap ring; then, using a wooden dowel, push plug from end of valve body. If disassembly of valve assembly is necessary, clamp end of spool valve in Tool J-6293, and using Tool J-6224 remove the valve link. Remove annulus, valve centering spring, and thrust washer from spool valve. Remove reaction control valve and spring from bore in spool valve. Remove inner "O" ring from annulus. If hose connections were leaking at connector seats, remove one or both connectors as follows: Thread a nut and place a washer over a 10-24 tap (for the small connector) or a 5/16" - 18 tap (for a large connector). Coat end of tap with petrolatum to prevent chips from falling into passage while tapping the connector. With valve body in a horizontal position, thread tap into connector not more than three turns. Tighten nut to remove connector by jacking tap and connector out of bore.

Cl aning & Insp ction: Wash all parts in clean solvent, blow out all passages, and dry parts with compressed air. Check control valve body for scores, chips or other damage. Control valve must be free to move back and forth in control valve body. Any minor nicks or scratches may be removed with a fine hone.

Reassembly: Install new "O" ring seal on valve body plug, coat "O" ring with Hydra-Matic oil, and install plug and snap ring in end of valve body. Clamp end of spool valve in Tool J-6293. Install reaction control spring and reaction control valve (open end out) into valve spool. Install inner and outer "O" rings on the annulus and coat with Hydra-Matic oil. Install thrust washer (bevel side down), valve centering spring, and annulus (narrow land next to spring) on spool valve. Thread link into spool valve and torque to 8-10 ft. lbs. To install new connectors, use Tool J-6217 to seat them in valve body. Carefully insert spool assembly into valve body (*CAUTION* - The spool and valve body are selective fits and have very little clearance. Spool must be properly started into valve body. Do not attempt to force it in). Place steel w a s h e r over link (chamfered side down), then install snap ring (with beveled side out) to retain valve assembly. Install new "O" ring on linkage cover and coat with Hydra-Matic oil. Install linkage cover and align valve link and linkage so that linkage slot is perpendicular with bottom of valve.

PITMAN SHAFT & COVER: Disassembly – Remove pitman shaft adjusting screw locknut. Thread adjusting screw through pitman shaft cover, then remove cover, adjusting screw and selective shim. Remove "O" ring from cover.

Cleaning & Inspection: Wash all parts in clean solvent, blow out all passages, and dry parts with compressed air. Check pitman shaft upper and lower bushings for scoring or damage. Make sure that bearing surfaces of shaft are not nicked or rough. Check sealing surfaces of worm shaft and pitman shaft. Make sure they are free from roughness, nicks or d a m a g e. Minor nicks and scratches may be cleaned up with crocus cloth. Check teeth on pitman shaft and rack-piston for nicks, burrs, or other damage. The pitman shaft adjusting screw has a small nylon plug imbedded in the threaded area which prevents oil from working up threads. This screw with proper shim must be replaced upon reassembly.

Reassembly: Check the endplay of a new adjusting screw in slot of pitman shaft. The screw should rotate freely but not have more than .002" end clearance. Check endplay with a feeler gauge inserted between head of adjusting screw and slot in shaft. If endplay exceeds .002", select the proper shim to give desired endplay. Shims are available in .063", .065", .067", and .069" thicknesses. Thread the adjusting screw through side cover until side cover bottoms on pitman shaft. Install locknut, but do not tighten. Install a new "O" ring into recess in side cover and retain with petrolatum.

END COVER: Disassembly – Remove the two "O" rings. If necessary to replace needle bearing, drive out needle bearing washer and seal. If bearing removal is not necessary, remove seal and washer by driving them out with a screw driver and hammer.

Cleaning & Inspection: Wash all parts in clean solvent, blow out all passages, and dry parts with compressed air. All mating surfaces must be free from nicks and burrs. Remove irregularities with crocus cloth. Inspect actuating lever bore in end cover for wear. If badly worn, the end cover should be replaced.

Reassembly: If needle bearing and seal were removed: Install washer in oil seal recess in cover. Place a new seal over large end of Tool J-5254 with the lip facing shoulder of tool. Install seal so it sits against washer. Coat lip of seal with seal lubricant. Place a new needle bearing over large end of tool J-5254 with the markings against shoulder of tool and drive bearing into end cover until tool bottoms on cover. Make sure needle bearings are free. If seal only was removed, install in same manner as indicated above. Pack needle bearing with a fine fibre grease. Install "O" ring in end cover flange and in "O" ring groove on side of cover. Coat both "O" rings with Hydra-Matic oil.

STEERING GEAR HOUSING: Disassembly – Remove pitman shaft seal by removing snap ring, steel washer, dust seal, and steel washer; then pry out oil seal. If pitman shaft bushing replacement is necessary, drive bushing out with Tool J-6278. If the housing plug shows evidence of leakage, remove the staking with a hack saw, remove any burrs that could score the housing and drive plug into housing to remove it.

Cleaning & Inspecti n: Wash all parts in solvent, blow out all passages, and dry parts with compressed air. Check housing for scores and undue wear. All mating surfaces must be free from nicks and burrs. Any irregularities may be removed with a crocus cloth. Check housing cylinder for a shoulder condition at either end of ring travel. If shoulder exists due to excessive wear, replace the housing.

Reassembly: If pitman shaft bushing was removed: Place Tool J-6278-2 over Tool J-6278, slide new bushing on tool and drive bushing into housing. With Tool J-6278-2 over Tool J-6278, slide seal on tool with lip of seal facing away from tool, and drive seal into housing. Coat lip of seal with seal lubricant. Install steel washer, dust seal, and steel washer, then install snap ring. If housing plug was removed, i n s t a l l a new "O" ring coated with Hydra-Matic oil on a new plug and tap plug into housing. Back up plug with another tool, and stake in 4 places, 90° apart.

RACK-PISTON, WORM SHAFT & BALL NUT ASSEMBLY: Disassembly – 1) Clamp assembly in vise and remove set screw with Tool J-6223. Turn ball nut 180° and pull worm shaft and ball nut assembly from rack-piston. Exercise care so that ball guides do not fall out of ball nut. Tape the end of a three-foot length of string onto the ball nut so that tape also retains ball guides. Tie other end of string to spring scale J-5178, then wrap string around ball nut 3 or 4 times. Slowly pull on spring scale and check over-center pre-load. Pre-load should be 1-6 lbs. (*NOTE* - If over-center pre-load is not within limits, a new set of balls must be installed upon reassembly. Note the size of ball which is stamped on end of the ball nut).
2) Remove the ball return guides. Rotate worm back and forth until all balls have dropped out of nut. Remove ball nut and adapter from worm. Remove adapter "O" ring. Remove Spiralox ring and push washer and seal assembly from the adapter. Cut and remove the worm shaft seal assembly, then remove the snap ring, retaining ring, bronze washer, and steel washer.
3) Tie a three-foot length of string on a thrust bearing centering spring and to spring scale J-544-A. Support the assembly in a vise, wrap string around center race two or three turns, and check pre-load by pulling slowly on string. Pre-load should be ¾-3 lbs. (*NOTE* - The above check will indicate one of three conditions: With the pre-load within tolerance and bearing not rough, further disassembly is not necessary. If bearing is not rough but pre-load is outside tolerance, it will be necessary to remove the adjusting nut, install a new one and adjust pre-load to 1½ lbs. If pre-load reading is erratic, indicating a rough bearing, it will be necessary to remove bearing).
4) If bearing replacement is necessary, remove oil rings from rack-piston. Check plug in end of rack-piston. If loose, restake, or replace plug.

Cleaning & Inspection: Wash all parts in solvent, blow out all passages, and dry parts with compressed air. Check bearing assembly for excessive wear or brinnelling of the races. Check sealing surfaces of worm shaft and pitman shaft. Make sure they are not rough and have no nicks or other damage. Clean up minor nicks and burrs with crocus cloth. All mating surfaces must be free of nicks and burrs. Inspect worm and ball nut

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SAGINAW "IN LINE" (Continued)

grooves and all the balls for wear or scoring. If either the worm or ball nut need replacing, both must be replaced as a matched assembly. Make sure that ends of ball return guides are not damaged.

R assembly: 1) If removed, install oil rings on a rack-piston. If thrust bearing was removed, oil a new bearing assembly and install over worm shaft with springs facing away from splined end of shaft.

2) Install washer with tang in keyway and facing splined end of shaft. Install a new nut and adjust pre-load to 1½ lbs., as outlined under "Disassembly" above. Stake nut into keyway of shaft and recheck pre-load. Install new adapter oil seal assembly, then install steel washer and Spiralox ring.

3) Install a new "O" ring on adapter, then slide adapter over worm with holes in adapter facing bearing centering springs. Slide ball nut over worm with beveled side of ball facing the seal end of worm shaft.

4) Install 17 balls into ball nut and lubricate with Hydra-Matic oil (*NOTE* - Worm shaft is cam ground (thicker at the center), and the balls can be installed more easily if ball nut is positioned near one end of worm). Install 6 balls into return guide and retain in place with petrolatum, then install assembly into ball nut. Recheck pre-load as outlined under "Disassembly" above. Place tape over ball guides to retain them in place.

5) If over-center pre-load was not correct (1-6 lbs. pull required to rotate ball nut), as determined at disassembly, install the next larger size balls (if less than specification), or next smaller size balls (if more than specification). Balls are furnished for service replacement in 13 sizes (Exc. Cadillac). On Cadillac, if the pre-load is not correct, a complete worm and ball nut assembly must be installed.

6) Install the steel washer, seal assembly, (neoprene next to steel washer), bronze washer and retainer ring. While holding assembled parts, press worm shaft into snap ring, then force snap ring into groove. Remove tape from ball nut assembly and install worm and ball nut assembly into rack-piston with set screw holes aligned. Clamp rack-piston in a vise and install a new set screw using Tool J-6223. Tighten screw to 20-25 ft. lbs., then stake set screw so that rack-piston metal enters both ends of screw slot.

STEERING GEAR REASSEMBLY: 1) Thread worm out of ball nut as far as possible, position ring gaps opposite each other, and coat oil rings and adapter "O" ring with Hydra-Matic oil. Turn housing so that valve body side is facing up, then place ring compressor Tool J-6216 in recess in housing.

2) With rack-piston teeth facing the pitman shaft area, push rack-piston through ring compressor so that oil rings are just inside housing, then remove ring compressor. With notch in adapter facing machined side of housing, push adapter into housing recess. Install the four centering springs into shallow bores of the adapter.

3) With dowel hole in bearing assembly aligned with adapter dowel, push bearing assembly against the adapter. Place Tool J-6222 over splines of worm shaft, then install end cover and torque capscrews to 25-30 ft. lbs., remove Tool J-6222.

4) Saturate coupling flange wick with Hydra-Matic oil and place over worm shaft. Position coupling flange over worm shaft with alignment marks indexed, but do not install retaining pin. Turn coupling flange so that rack-piston teeth are centered in pitman shaft cover opening in housing. Make sure that rack-piston teeth are square with center-line of pitman shaft bushing.

5) Wrap a piece of masking tape around pitman shaft spline one turn so that tape starts and ends at same wide serration. Install pitman shaft and side cover assembly. The center tooth of pitman shaft must engage the center groove of rack. Install side cover capscrews and tighten the four 3/8" screws to 25-30 ft.lbs. Tighten the 5/16" screw to 15-20 ft. lbs.

6) Install actuator lever in end cover and engage lever with the "flat" on bearing assembly. Install the two "O" rings in housing. With actuator lever engaged with valve link pin, install valve body and torque capscrews to 15-20 ft. lbs. Make sure pitman shaft adjusting screw is backed all the way out.

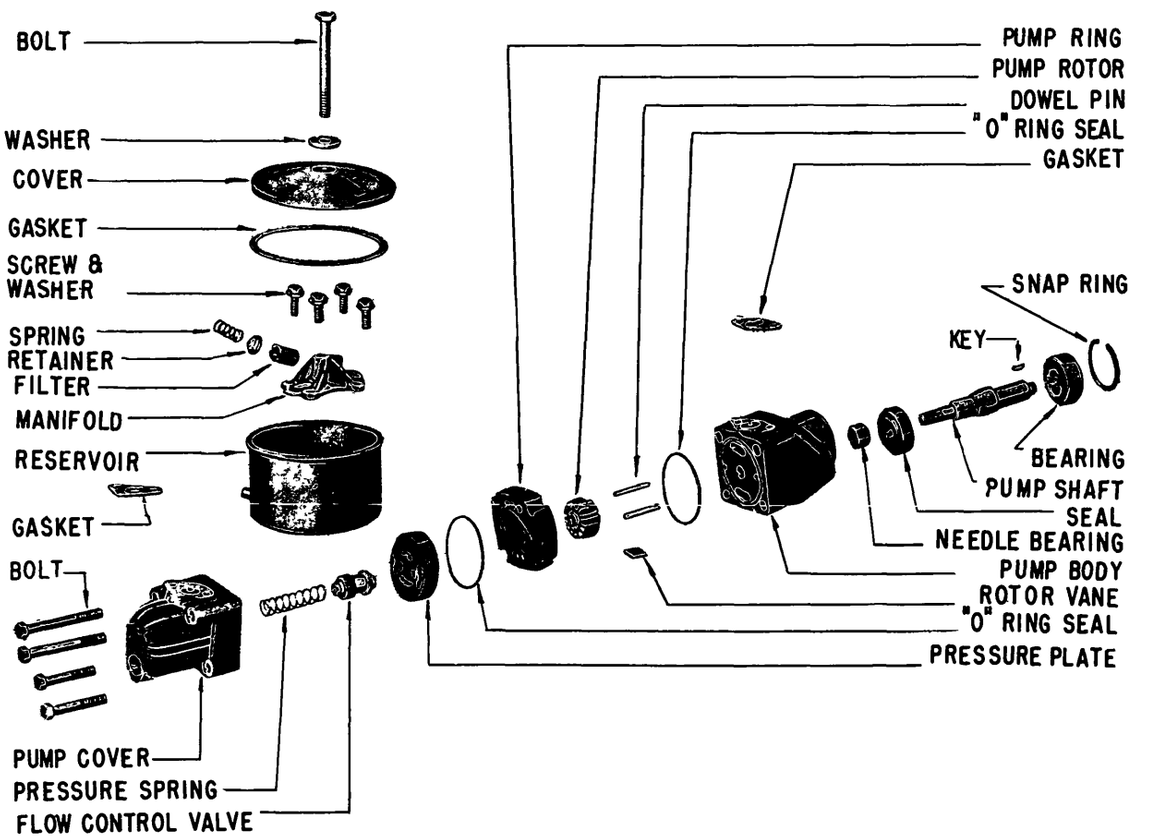
7) Using Tool J-6281 and spring Scale J-544-A, check and record the combined ball nut and bearing pre-load with gear on center (2¼ turns from either end of travel) and not moving end of Tool J-6281 more than in a 6" arc. Thread pitman shaft adjusting screw in until pitman shaft gear touches rack-piston. While checking combined ball nut and bearing pre-load, adjust pitman shaft screw so that ½ to 1 lb. in excess of ball nut and bearing pre-load recorded above, is obtained. Tighten adjusting nut and recheck over-center pre-load.

8) Install oil hoses and drive in coupling flange pin while supporting worm shaft and flange. Make sure housing alignment pin extends approximately 5/8" from housing.

HYDRAULIC PUMP

►*CONTINENTAL & LINCOLN HYDRAULIC PUMP NOTE:* An Eaton (Rotor Type) hydraulic pump is used on these cars. *See "Vickers and Eaton Hydraulic Power Pumps" in 1955 Annual Data or later Manual edition for overhaul data.*

CONTINUED ON NEXT PAGE



SAGINAW HYDRAULIC PUMP ASSEMBLY

SAGINAW "IN LINE" (C ntinu d)

REMOVAL: Buick, Cadillac, Oldsmobile & Pontiac - Disconnect hoses at unions on pump and secure ends in a raised position, or cap the ends to prevent drainage of oil. Install two caps at pump fittings. Remove drive pulley attaching nut and loosen bracket-to-pump mounting bolts. Remove pump belt. Slide pulley from shaft *(NOTE* - Do not hammer pulley off the shaft).

Contin ntal & Lincoln: Remove washer seal, cover, and cover gasket and syphon or pump out as much oil as possible from reservoir. Loosen and move rearward, the clamp securing return hose to reservoir and remove hose from tube. Disconnect pressure hose at fitting on pump assembly and place in a raised position to prevent draining. Loosen pump adjustment capscrew and remove pump belt. Remove two pump adjusting bracket-to-pump support screws. Remove reservoir, pump and pump adjusting bracket as an assembly.

DISASSEMBLY (Saginaw): Remove reservoir cover bolt, flat washer, and reservoir cover with gasket. Remove filter screen, filter retainer and filter spring by pushing retainer back against spring. Remove four reservoir-to-pump bolts and remove reservoir and cork gaskets. Remove four pump cover-to-pump body attaching screws *(NOTE* - Do not clamp on front hub of pump as this may damage bearing housing). Lift pump cover with flow control valve assembly and spring from assembly (be careful that pump flow control assembly does not drop out). Mark position of pressure plate and remove plate from dowel pins. Mark position of pump ring in relation to pump body and remove ring from dowel pins *(NOTE* - Arrows on outer edge of pump ring point in direction of pump rotation). Remove ten pump vanes and remove pump rotor. Remove dowel pins from pump body. *(NOTE* - Any further disassembly should be avoided unless parts are dirty or repair operations are necessary on any of the remaining parts). Remove shaft bearing retainer snap ring from front hub of pump body using Tool J-4245. Remove drive shaft with large sealed bearing by lightly tapping on splined end. Remove oil seal from body with a long punch inserted through large hole in machined face of body. If it is to be replaced, remove inner needle bearing from pump body using Tool J-6279. Remove key from shaft. If outer bearing is to replaced, remove by pressing it from pump shaft.

CLEANING & INSPECTION: Wash all parts, except the drive shaft bearing (lubricant seal in bearing) in a solvent. Inspect "O" ring seals and gaskets. Replace seals if cut, or distorted. Inspect pump cover flow control valve bore for scores and wear. Inspect flow control valve for free movement in its bore. Inspect all passages in cover and body for obstructions or dirt. Inspect pressure plate for scoring. Inspect contour surface of pump ring for scoring and inspect rotor faces for metal pick-up or scoring. Check vanes for bind in slots of rotor. Inspect face of pump body for scoring or wear. Inspect drive shaft seal surface for scratches and wear. Inspect drive shaft inner and outer bearings for roughness or noisy operation.

► *FLOW CONTROL SERVICING NOTE:* If flow control valve is stuck, dislodge by jarring front of pump cover. If pump cover control valve bore is worn or scored, replace pump cover. If necessary to clean or repair pressure relief valve, grip flow control valve by small hub on end of valve and remove orifice screw, shims, ball, plunger and spring. If internal parts are found to be worn or scored, replace assembly. *NOTE* - The flow control valve assembly is calibrated at the factory and components of assembly cannot be serviced.

► *PUMP INTERNAL GROUND SURFACE NOTE:* If pressure plate, pump body, rotor or pump ring is scored, the following corrections can be made. Using a flat surface and lapping compound, lap the scored surfaces until they are smooth. *NOTE* - Thoroughly clean in solvent after lapping.

REASSEMBLY: *(NOTE - Before reassembling, make sure all parts are clean. Lubricate "O" rings and all moving parts as assembled).* Press large sealed bearing over threaded end of drive shaft with stamped face of inner race toward front of pump. Install key into shaft keyway, supporting shaft on opposite side when installing key. Install needle bearing into pump body with the stamped face toward front of pump using Tool J-6280. Make sure needles are free to turn after installation. Install shaft seal into pump body using Tool J-6348. Install seal with word "outside" toward front of pump. With pump body in a vise, drive shaft and bearing assembly into pump body. Install shaft bearing retainer snap ring. Install "O" ring in groove of pump body and install dowel pins. Tap lightly if necessary. Install rotor over splined end of drive shaft (Assemble rotor with countersunk side toward front of pump and be sure rotor is free on splines). Install vanes in rotor slots with radius edge toward outside. Install pump ring on dowels and position correctly according to scribed marks *(NOTE* - Arrow on outer edge of pump ring points to rotation of pump). Install pressure plate on dowel pins *(NOTE* - Pressure plate must be free with no binding on dowel pins). Install "O" ring around pressure plate. Install flow control valve and spring in pump cover. Be sure that end with screw goes into bore first *(CAUTION - If valve is installed backwards, the pressure regulator valve inside of the flow control valve will not operate and pump will build up an increasingly higher pressure which would result in breakage of the adapter in gear housing or failure at some other point in the system).* Position pump cover assembly over pressure plate being careful not to pinch "O" ring. Install four cover-to-body attaching screws and tighten alternately to 25-30 ft. lbs. Install gaskets on pump body and cover. Position reservoir on pump assembly with extrusions in reservoir bottom inside the smaller gasket holes and install four bolts. Tighten to 8-10 ft. lbs. Install filter spring, filter retainer, and filter. Be sure flared end of filter retainer is toward filter. Install reservoir cover with gasket, bolt and washer. Tighten cover bolt to 7-9 ft. lbs.

INSTALLATION: Buick, Cadillac, Oldsmobile & Pontiac - Position pump assembly on mounting bracket with holes lined up, and install bolts loosely. Slide pulley on shaft *(NOTE* - Do not hammer on pulley). Install pulley nut finger tight against pulley. Fill reservoir and bleed pump by turning pulley backward (counter-clockwise as viewed from front) until air bubbles cease to appear. Install pump belt over pulley. Move pump outward until belt is properly tensioned (See "Pump Belt Adjustment" above). Tighten pulley nut to 35-45 ft. lbs.

STEERING LINKAGE: *See "Steering Linkage" on Pg. 349.*

BENDIX LINKAGE TYPE (CHEVROLET TRUCK)

Chevrolet Trucks (1956)

DESCRIPTION: Hydraulic power cylinder assembly is mounted on front axle, at one end, and to tie rod at the other. Hydraulic control valve is attached to tie rod between pitman arm and steering arm (replaces pitman arm tie rod). The control valve regulates the flow of fluid under pressure from pump to either anchor end or rod end of cylinder, and the return fluid from either end is directed to fluid reservoir.

Hydraulic Pump & Reservoir Assembly: Vane type oil pump is mounted on end frame of generator and driven by a splined extension of the special generator armature shaft. Pump contains a combination overload relief valve which opens at 750-lbs., and a flow control valve which circulates oil within pump as required to regulate output volume.

BELT ADJUSTMENT: Loosen outer bracket-to-generator bolt on generator rear brace, and move generator to obtain correct belt tension. Tighten the retaining bolts. Push in on belt midway between water pump and generator pulleys with light pressure. If tension is correct, there will be 5/16" deflection (6 Cyl.), 13/16" (V8).

LUBRICATION: Checking Fluid Level - Check oil level in reservoir by removing dipstick, and fill to indicated level using Automatic Transmission Fluid Type "A" bearing an "AQ-ATF" number.

Refilling System (After Units Removed or Disconnected): Fill oil reservoir to proper level and let oil remain undisturbed for about two minutes. Raise front end of vehicle so that wheels are off ground. Start engine and run at idle speed for two minutes. Increase engine speed to approximately 1500 RPM. Turn wheels (off ground) right and left, lightly contacting stops. Lower vehicle and turn wheels right and left on ground. Recheck for leaks. Check oil level and refill as required.

Ch cking Pump Pressure: Disconnect pressure line at pump connection (smallest, top line). *(CAUTION* - Some fluid will leak out when line is disconnected so provision must be made to collect this drainage). Install checking gauge, Tool J-5176, with gauge valve closed on pump and hose connection *(NOTE* - Adapter Kit J-5900 must be used to adapt pressure gauge to pump). Open gauge valve and run engine at idle. Turn wheels (on ground) against stops. Pressure should not be less than 750 lbs. If pressure is less, slowly close gauge valve observing pressure increase. (Will increase as valve is closed if pump is good). *(CAUTION* - Do not leave valve closed for more than 15 seconds). If pressure does not increase when valve is closed, difficulty is in pump, which must be removed for service. Shut engine off, remove gauge and valve and reconnect hose to pump, if pressure satisfactory. Bleed hydraulic system.

HYDRAULIC PUMP: Removal - Loosen bracket-to-generator retaining bolts and remove fan belt. Pull generator away from engine. Place a container under the pump and disconnect hydraulic lines from pump allowing oil to drain out of reservoir. Remove retaining bolts from pump-to-generator and generator rear brace on 8 cylinder models and remove pump from vehicle. Drain remaining oil from reservoir.

Disassembly: Remove retaining bolts and sealing washers from pump reservoir-to-pump cover assembly, and remove reservoir. Remove oil filter spring retainer from pump cover assembly. Remove cover plate spring and cover plate and then remove plug and "0" ring, flow spring and pressure relief valve assembly from pump cover. Remove three retaining bolts from pump cover assembly and remove pump cover from pump body. Remove oil filter and retainer. Remove cam ring, pump rotor and vanes. Remove and discard "0" rings from pump body, cover, and cam ring. Remove and discard generator shaft oil seal from pump body.

Inspection: Wash all parts in solvent and dry with a lint free cloth. Check fit of vanes in rotor. Vanes must slide freely, but snugly in slots. Inspect flat face of pressure plate, cam ring, cover, rotor and pump body. If necessary, lap these parts for a good fit. Check surface of pressure relief valve and check fit of valve in pump cover. Correct slight irregularities by polishing.

Reassembly: Coat new "0" rings with Lubriplate and install in pump cover, cam ring and pump body. Install rotor and vanes in pump body with wear pattern or beveled edge of vanes against cam ring inner diameter. Install alignment sleeve in cam ring and install cam ring in pump body *(CAUTION - Wider edge of cam ring should be installed toward pump body. Be certain to align holes in cam ring to body bolt holes. Install rotor with rounded side of splines toward generator end of pump).* Install pressure plate in pump cover and install filter retainer and oil filter. Install cover assembly to pump body, then install plunger and flow control spring. Install plug and "0" ring assembly, cover plate and retainer spring. Install filter retainer spring in cover assembly and install reservoir, retaining bolts and sealing washers.

► *BRASS FITTING NOTE:* Brass fitting seats are of the pressed in type and are replaceable by tapping threads in hole in the seat and then pulling the seat by using a bolt threaded into tapped out seat and a flat washer and nut as an extractor. Install new seats by aligning seat in bore and pressing it into place using the correct hose or tube fitting as a pressing tool.

CONTROL VALVE: Disassembly - Remove three bolts and lockwashers from valve housing and separate drag link from valve housing. Remove ball stud and then remove outer sleeve and flange. Remove Huglock nut and remove inner sleeve with stop screw, and spool bolt as a group. Remove bushing plate. Drive out lock pin, thread stop screw out of inner sleeve, and remove spring seat, spring, and ball stud seats from inner sleeve. Remove spacer from spool bolt and remove spool bolt from stop screw. To remove spool from valve housing, press alternately on the spool end projections by hand sufficiently to expose the "U" cup seals. Remove spool seal bushings and "U" cup seals and spool. Remove control valve plug with a rod having a bent end, and pry against plug. Remove check valve with a screw driver. *NOTE* - The plug and check valve should only be removed to correct a faulty check valve.

Cleaning & Inspection: Wash all parts in solvent and dry then with lint free cloth. Inspect all parts for scratches, burrs, distortion, evidence of wear, and replace all parts where necessary. Replace all seals, gaskets, and covers.

Reassembly: Carefully assemble spool into bore of valve housing with the large diameter projection end of spool next to sliding sleeve end. Assemble large bore and small bore "U" cup seals over large and small diameter projections of spool with lips of seals facing each other. Assemble bushing plates on their respective ends of spool. Insert spool bolt through screw stop from side having the large diameter, and assemble spacer on bolt. Assemble lock pin in hole of screw stop and through slot in bolt head to secure bolt to screw stop. Place inner (sliding) sleeve in outer sleeve and flange assembly and then assemble the following parts in sliding sleeve: Ball seat, ball stud, ball seat, spring and spring seat. Assemble screw stop with bolt to sleeve assembly by threading screw stop into inner (Sliding) sleeve, and tighten securely. Assemble bushing plate over bolt and on shoulder of outer sleeve flange. Insert spool bolt through hole in spool and assemble Huglock nut and secure as follows: draw up nut tight then back off nut (less than ¼ turn) until the spool can be rotated with a minimum of endplay. Position drag link flange on valve housing so ball stud is on side opposite the valve ports. Align holes and assemble three bolts and lockwashers. Securely tighten bolts.

POWER CYLINDER: Disassembly - *(NOTE - The only repair to make in the field on the power cylinder is the replacement of piston rod seals).* Before removing piston rod seal parts from rod bearing end of power cylinder, clean the exposed portion of seal cavity with clean solvent, brush and compressed air. Remove snap ring. To dislodge scraper, washer, dust seal, seal back-up washer and "U" cup seal, use air hose and apply pressure to cylinder port (right hand port, looking down), and seal the left hand port. Remove seal parts from rod.

Cleaning and Inspection: Clean all parts in solvent and dry with compressed air. *(CAUTION* - Do not use waste to wipe off spool or inside bore of valve housing). Protect spool edges and bore of valve housing from damage during disassembly and reassembly. Inspect parts for nicks and burrs and excessive wear. Check cylinder scraper washer for fit on piston rod, which should be .001-.0035". Replace if worn.

Reassembly: Assemble open side of "U" cup seal over the rod and into bearing cavity, seal back-up washer, dust seal (with side away from seal cavity), and scraper washer. Slide parts in place on rod and lock in place with snap ring.

HYDRAULIC PUMP: Same as used on passenger cars. *See "Chevrolet Linkage Type" in 1955 Annual Data or later Manual edition.*

STEERING LINKAGE: *See "Steering Linkage" on Pg. 349.*

BENDIX LINKAGE TYPE (NASH & PACKARD)

Nash, Ambassad r 6 Cyl. (1956)
Packard, All M d ls (1956). See note below.

►*NOTE:* Monroe Linkage Type also used.

DESCRIPTION: Same design as used on corresponding previous models.

HYDRAULIC PUMP OVERHAUL: *See "Vickers & Eaton Hydraulic Power Units" in 1955 Annual Data or later Manual dition.*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemmer Worm & Roll r" on Page 365.*

STEERING LINKAGE: *See "Steering Linkage" on Pg. 349.*

►*OTHER DATA: See "B ndix Linkage Type" in 1953 Annual Data or lat r Manual edition.*

MONROE LINKAGE TYPE

Huds n, H rn t 6 Cyl. & V8 (1956)
Huds n, Wasp (1956)
Nash, Ambassad r V8 & Special V8 (1956)
Nash, Statesman (1956)
Rambl r (1956)
Packard, All M d ls (1956). See note below.

►*NOTE:* Bendix Linkage Type also used.

DESCRIPTION: Same design as used on corresponding previous models.

HYDRAULIC PUMP OVERHAUL: *See "Vickers & Eaton Hydraulic Power Units" in 1955 Annual Data or later Manual edition.*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemm r Worm & Roller" on Page 365.*

STEERING LINKAGE: *S "Steering Linkage" on Pg. 349.*

►*OTHER DATA: S "Monroe Linkage Type" in 1954 Annual Data or lat r Manual edition and note the following:*

FRONT SUSPENSION ALIGNMENT: Adjustment is different for some models with power steering. *See "Susp nsions & Wh l Alignm nt on Page 339.*

BENDIX LINKAGE TYPE (FORD & MERCURY)

Ford Pass. Cars (1956)
Mercury (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 FORD POWER STEERING SQUEAL CORRECTION & PUMP PULLEY PRODUCTION CHANGE:* A new pump pulley, Part No. B6A-3356-A and a new solid-type pump belt is used in production and may be used for service replacement to correct pump belt squeal. The early type belt, with serrations, can be used with either early or late type pulleys.

►*1956 FORD STEERING ARM & LINKAGE INTERFERENCE WITH POWER STEERING CONTROL VALVE CORRECTION:* Check the steering arm-to-idler arm rod and replace it if it is bent. If interference exists after new arm is installed, replace the spindle connecting rod assembly (Part No. AD-3280-B). If the two above corrections do not eliminate the interference, it may be necessary to replace the lubricant fitting or grind off the boss of the oil pressure line on power steering cylinder. *CAUTION* - A wall thickness of 3/32" must remain after grinding is completed.

►*1956 MERCURY POWER STEERING CONTROL VALVE INTERFERENCE CORRECTION & DRAG LINK ADJUSTING CAUTION:* When installing the left hand drag link adjusting sleeve, the clamps should be installed with bolts in a vertical position and forward of the steering link to prevent interference with the control valve.

DESCRIPTION: Same design as used on previous models.

HYDRAULIC PUMP OVERHAUL: *See "Vickers & Eaton Hydraulic Power Pumps" in 1955 Annual Data or lat r Manual edition.*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemmer Worm & Roller" on Page 365.*

STEERING LINKAGE: *See "Steering Linkage" on Pg. 349.*

►*OTHER POWER STEERING DATA: See "Ford & M rcury Bendix" in 1953 Annual Data or later Manual edition and note the following:*

►*1956 FORD POWER STEERING CONTROL VALVE TORQUE SPECIFICATION CHANGE:* Tighten Control Valve Sleeve-to-Body Bolts to 17-22 ft. lbs. Tighten Centering Spring Cap-to-Valve Body Bolts to 4-6.5 ft. lbs.

SAGINAW POWER STEERING GEAR (NOT IN LINE)

Studebaker (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 POWER STEERING GEAR NOISE CORRECTION:* If excessive gear "chuckle" is evident, check to see if the "T" mark on steering gear flange is properly located in relation to the mid-position or "high-spot" of gear. If this condition exists, the pitman arm will not be centered and the left tie rod will be short with the right tie rod longer than normal and the steering gear will be operating off the "high-spot" position. Check length of tie rods as unequal length will indicate an off-center steering gear. To correct, center front wheels, remove steering wheel and reposition it 90° clockwise in relation to existing mark. Install retaining nut and horn ring. Turn steering wheel back to normal horizontal position which should place gear on "high-spot". This should also center the steering bell crank. Readjust tie rods to obtain a straight ahead front wheel setting and adjust toe-in.

►*1956 POWER STEERING PUMP PRODUCTION CHANGE:* A new type power steering pump (vane type) is being used in production, replacing the earlier "Vickers Vane Type" unit. *See "Hydraulic Pump" in "Saginaw (In-Line) Power Steering" on Page 361.*

DESCRIPTION: Same design as used on previous models.

HYDRAULIC PUMP OVERHAUL: See production change above. *On early type units, See "Vickers & Eaton Hydraulic Power Pump" in 1955 Annual Data or later Manual edition. On later type pumps, See "Saginaw (In-Lin) Power Steering" on Page 361.*

STEERING GEAR ADJUSTMENT & OVERHAUL: *S "Saginaw (G.M.) Power Steering" in 1955 Annual Data or later Manual edition.*

STEERING LINKAGE: *See "Steering Linkage" on Pg. 349.*

GEMMER WORM & ROLLER

Chrysler (1956)
DeSoto (1956)
D dge (1956)
F rd Pass. Cars & Trucks (1956)
Hudson (Exc. Metropolitan) (1956)
Mercury (Early 1956) ①
Nash (Exc. Metropolitan) (1956)
Packard (1956)
Plymouth (1956)
Rambler (1956)

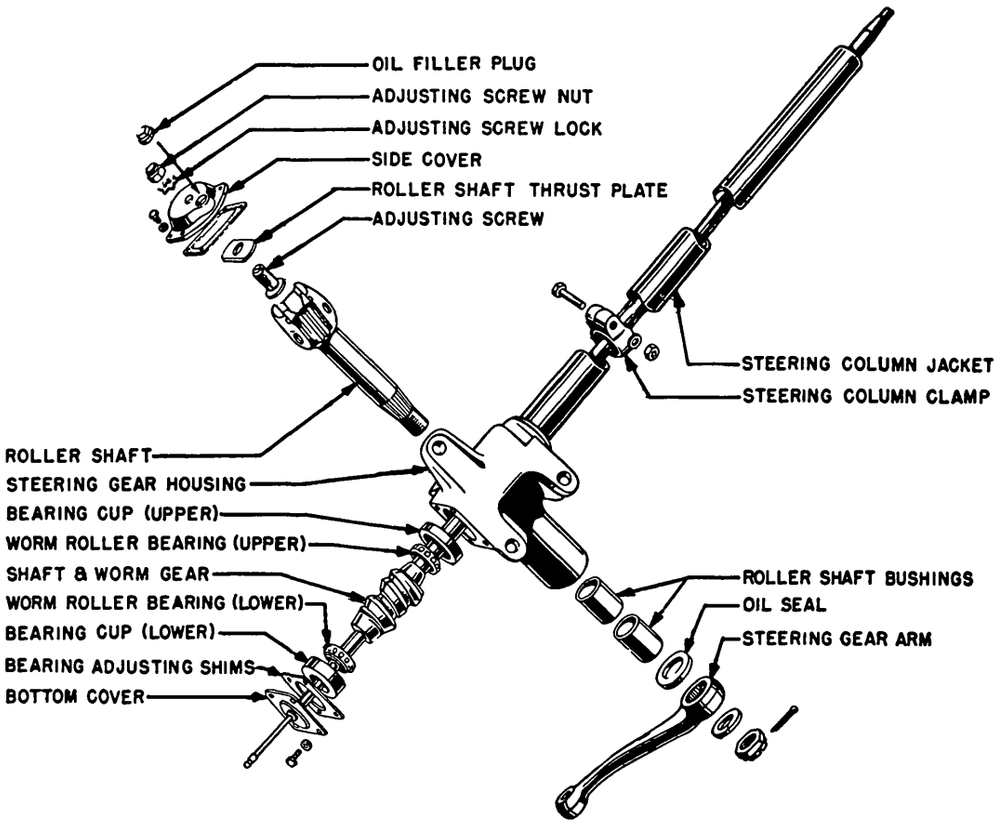
① - Saginaw Worm & Nut used in late 1956.

► *1956 FORD & MERCURY STEERING GEAR PRODUCTION CHANGE:* In later production cars a steering gear having a three tooth roller supported on ball bearings is used. Service procedures are the same as for previous models.

► *1956 FORD STEERING COLUMN CLAMP BREAKAGE CORRECTION* To prevent possible breakage of the steering column clamp, the tightening torque of the attaching bolt has been changed from 35-40 ft. lbs. to 25-30 ft. lbs.

► *1956 MERCURY STEERING GEAR PRODUCTION CHANGE* Later production cars have a Saginaw Worm & Nut type steering gear. *See "Saginaw Ball Bearing Worm & Nut" Steering Gear.*

► *1956 NASH AMBASSADOR SPECIAL V8 STEERING GEAR FILLER PLUG REMOVAL:* Because of the lack of clearance, the following suggested procedure is recommended With car on hoist, a 5/8" socket and ratchet can be used to remove plug. Add lubricant with a hand gun having a long flexible nozzle.



GEMMER MODEL 305 & 335 STEERING GEAR

DESCRIPTION: Similar to previous Gemmer Worm & Roller types (push pull adjustment).

HORN RING & STEERING WHEEL REMOVAL: *See "Gemmer Worm & Roller" in 1955 Annual Data or later Manual edition.*

STEERING GEAR REMOVAL & INSTALLATION: *See "Gemmer Worm & Roller" in 1955 Annual Data or later Manual edition.*

STEERING LINKAGE: *See "Steering Linkag " on Pg. 346.*

STEERING GEAR OVERHAUL: *See "Gemmer Worm & Roller" in 1955 Annual Data or later Manual edition*

SAGINAW WORM & NUT

Buick (1956)
Chevr let Pass. Cars (1956)
Chevrolet Trucks (1956)
Mercury (Late 1956) ©
Oldsm bile (1956)
Pontiac (1956)

© - Gemmer Worm & Roller used in early 1956.

► *1956 MERCURY STEERING GEAR RATTLE CORRECTION:* May be caused by low lubricant level. Turn wheels to full left position and check lubricant, add lubricant and turn wheels to full right, then back to center. Recheck level to make sure it is up to proper level. If there is still a rattle, check steering sector adjustment, steering linkage & idler arm, ball nut preload or for play between sector shaft and sector adjusting screw.

DESCRIPTION: Recirculating ball nut type of same design as used in previous models.

ADJUSTMENT: *See "Saginaw Ball Bearing Worm & Nut" in 1955 Annual Data or later Manual edition and note the following:*

Worm Bearing Setting

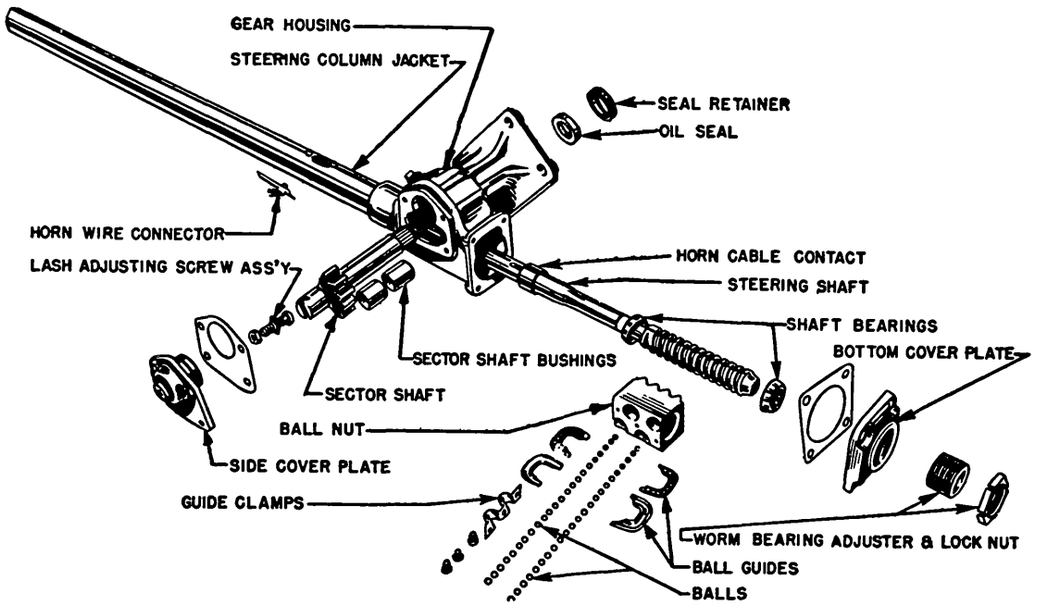
Model	Setting
Buick	7/8-1 1/8 lbs.
Chevrolet Pass. Cars	3/8-5/8 lbs.
Chevrolet Trucks	1-1 1/2 lbs.
Mercury	1/4-3/4 lbs.
Oldsmobile	1/2-7/8 lbs.
Pontiac	3/8-7/8 lbs.

Backlash Setting

M del	Setting
Buick	2-2 1/4 lbs.
Chevrolet Pass. Cars	7/8-1 1/2 lbs.
Chevrolet Trucks	2-2 1/2 lbs.
Mercury	7/8-1 1/2 lbs.
Oldsmobile	1 1/2-2 lbs.
Pontiac	1-2 lbs.

STEERING WHEEL POSITION: *See "Saginaw Ball Bearing Worm & Nut" in 1955 Annual Data or later Manual edition and note the following:*

Buick St ering Wh l Height: Clearance between column bracket and lower surface of panel can be adjusted to change height of steering wheel by loosening steering gear to frame bolts and the two steering column upper bracket to dash bolts.



SAGINAW BALL BEARING WORM & NUT STEERING GEAR

Oldsmobile Steering Column & Mast Jacket Clearance: Clearance between lower edge of steering wheel and direction signal housing should be 1/8-3/16".

STEERING GEAR REMOVAL & INSTALLATION: *See "Saginaw Ball Bearing Worm & Nut" in 1955 Annual Data or later Manual edition and note the following:*

Buick: (Removal) - Remove battery. Disconnect shift rod from control shaft lower lever. On synchro-mesh cars, remove selector lever from jacket clamp by removing retainer and spring washer. Loosen bolt in clamp which secures column jacket to short tube in gear housing. Move front seal all the way back and cover seat and back. Disconnect and remove horn cable connector from steering column jacket. Remove screws holding fuse block and lower fuse block. Cover steering column jacket with masking tape to prevent damage to finish. Remove steering wheel (see above) and the upper bearing spring and spring seats. Cover horn contact and threaded end of steering shaft with masking tape. Measure vertical clearance between column jacket and lower surface of instrument panel and record this dimension so that column can be installed in same position. Remove bolts holding cap to steering column bracket, disconnect bracket from panel and move it upward on column jacket to free it from steering gear. Remove cranking motor splash pan from car frame. Remove steering gear to lower frame bolts and clamps, then loosen upper bolts enough so gear can be tilted sideways to provide room for pitman arm puller. Remove nut and lockwasher and pull pitman arm from shaft with Puller J-5504-B. With another man inside car to guide column, carefully lift steering gear assembly up and forward out of engine compartment, leaving column jacket assembly in the body. *NOTE* - As assembly is removed be careful not to lose the control shaft return spring, which will be either on end of control shaft or loose on steering shaft.

Installation - Reverse removal procedure.

STEERING LINKAGE: *See "Steering Linkage" on Pg. 346.*

STEERING GEAR OVERHAUL: *See "Saginaw Ball Bearing Worm & Nut" in 1955 Annual Data or later Manual edition.*

1956 TRANSMISSION INDEX

BUICK	Page
Dynaflow Drive	369
S-M (Series 40)	367
CADILLAC	
Hydra-Matic Drive	438
CHEVROLET PASS. CARS & CORVETTE	
Powerglide	373
S-M	Ⓐ Pg. 376 of '55 Data
Overdrive	Ⓐ Pg. 378 of '55 Data
O.D. Control	Transmission Section of Manual
CHEVROLET TRUCKS	
Hydra-Matic Drive	429
3-Speed S-M (L.D.)	Ⓐ Pg. 376 of '53 Data
3-Speed S-M (H.D.)	Ⓐ Pg. 371 of '54 Data
4-Speed S-M	Transmission Section of Manual
Overdrive	Ⓐ Pg. 378 of '55 Data
O.D. Control	Transmission Section of Manual
CHRYSLER	
PowerFlite	384
TorqueFlite	398
S-M	367
DESOTO	
PowerFlite	384
S-M	367
O.D. (Warner R10)	Ⓐ Pg. 385 of '53 Data
O.D. Control	Transmission Section of Manual
DODGE	
PowerFlite	384
S-M	367
O.D. (Warner R10)	Ⓐ Pg. 385 of '53 Data
O.D. Control	Transmission Section of Manual
FORD PASS. CARS & THUNDERBIRD	
Fordomatic	415
S-M	367
Overdrive	Ⓐ Pg. 399 of '53 Data
O.D. Control	Transmission Section of Manual

FORD TRUCKS	Page
Fordomatic	415
3-Speed S-M (L.D.)	368
3-Speed S-M (M.D.)	368
3-Speed S-M (H.D.)	368
4-Speed	Transmission Section of Manual
Overdrive	Ⓐ Pg. 399 of '53 Data
O.D. Control	Transmission Section of Manual
HUDSON	
Dual-Range Hydra-Matic Drive	429
Dual-Coupling Hydra-Matic Drive	438
Twin Ultramatic	455
S-M (Hornet) Ⓒ	Ⓐ Pg. 343 of '53 Data
S-M (Wasp)	368
O.D. (Warner R 10)	Ⓐ Pg. 345 of '53 Data
O.D. Control	Transmission Section of Manual
LINCOLN	
Turbo-Drive	415
MERCURY	
Mercomatic	415
S-M	367
Overdrive	Ⓐ Pg. 399 of '53 Data
O.D. Control	Transmission Dection of Manual
METROPOLITAN (HUDSON & NASH)	
S-M	Ⓐ Pg. 375 of '54 Data
NASH	
Dual-Range Hydra-Matic Drive	429
Dual-Coupling Hydra-Matic Drive	438
Twin Ultramatic	455
S-M (Ambassador) Ⓒ	Ⓐ Pg. 343 of '53 Data
S-M (Statesman)	368
O.D. (Warner R10)	Ⓐ Pg. 345 of '53 Data
O.D. Control	Transmission Section of Manual
OLDSMOBILE	
Dual-Range Hydra-Matic	429
Dual-Coupling Hydra-Matic	438
S-M	367

PACKARD	Pag
Twin Ultramatic	455
S-M	Transmission Section of Manual
O.D. (Warner R11)	Ⓐ Pg. 345 of '53 Data
O.D. Control	Transmission Section of Manual
PLYMOUTH	
PowerFlite	384
S-M	367
O.D. (Warner R10)	Ⓐ Pg. 385 of '53 Data
O.D. Control	Transmission Section of Manual
PONTIAC	
Dual-Range Hydra-Matic	429
Dual-Coupling Hydra-Matic	438
S-M	367
RAMBLER	
Dual-Range Hydra-Matic	429
S-M	368
O.D. (Warner R10)	Ⓐ Pg. 345 of '53 Data
O.D. Control	Transmission Section of Manual
STUDEBAKER	
Studebaker Automatic	Ⓐ Pg. 458 of '55 Data
Flightomatic	464
Twin Ultramatic	455
S-M (Warner)	Ⓐ Pg. 343 of '53 Data
O.D. (Warner R10)	Ⓐ Pg. 345 of '53 Data
O.D. Control	Transmission Section of Manual
WILLYS	
S-M (Warner)	Ⓐ Pg. 343 of '53 Data
Transfer Case	Transmission Section of Manual
O.D. (Warner R10)	Ⓐ Pg. 345 of '53 Data
O.D. Control	Transmission Section of Manual

Ⓒ - Warner Transmission.
Ⓐ - Transmission Section of Manual.
S-M - Synchro-mesh Transmission.
O.D. - Overdrive. H.D. - Heavy Duty.
M.D. - Medium Duty. L.D. - Light Duty.

1956 SYNCHRO-MESH TRANSMISSIONS

BUICK, OLDSMOBILE, PONTIAC

Buick, Series 40 (1956), Standard
Oldsmobile, Series 88 (1956), Standard
Pontiac, All Models (1956), Standard

DESCRIPTION: All helical gear type. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Transmission is of same design as used on 1955 Buick, Series 50 & Oldsmobile, Series 88. *See "Buick 50 & Oldsmobile Synchro-mesh" in 1953 Annual Data or later Manual editions.*

REMOVAL: *See "Synchro-mesh Transmission" on Car Model pages.*

OVERHAUL: *See "Buick 50 & Oldsmobile, Synchro-mesh" in 1953 Annual Data or later Manual editions.*

CHRYSLER, DE SOTO, DODGE, PLYMOUTH

Chrysler, DeSoto, Dodge & Plymouth (1956)

► *1956 PLYMOUTH LOW & REVERSE SLIDING GEAR PRODUCTION CHANGE* A new Low & Reverse Sliding Gear, Part No. 1672299 is being used in partial production. The later type gear has hardened splines for increased gear life. Transmissions having the later type gears are identified by stamped letters next to the date on the transmission case, as follows CK-A (Std. Clutch), CK-ODA or CK-OD2-A (Overdrive), CK-10-A (10" or 11" Clutch). If gear replacement is required on cars built before Jan. 4, 1956, it is suggested that the later type gear be used.

DESCRIPTION: Synchro-mesh transmission of same design used on previous models.

REMOVAL: *See "Synchro-mesh Transmission" on Car Model pages*

OVERHAUL: *See "Chrysler, DeSoto, Dodge, & Plymouth Synchro-mesh Transmission" in 1953 Annual Data or later Manual editions.*

FORD & MERCURY PASS. CARS

Ford Pass. Cars (1956)
Mercury (1956)
Thunderbird (1956)

DESCRIPTION: Three speed all helical gear type with constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Transmission is the same design as used on previous models except that two different design transmission cases are used. On one type, the

CONTINUED ON NEXT PAGE

FORD & MERCURY PASS. CARS (Continu d)

shift lever assembly is integral with the transmission side cover, and on the other type, the shift levers are located in side of transmission case and a top cover is provided.

REMOVAL: *See "Synchro-mesh Transmission" on Car Model pages.*

OVERHAUL: Service procedures are the same for both transmissions excepı as noted below. *See "Ford & Mercury 3-Speed Synchro-mesh" in 1953 Annual Data or later Manual editions and note the following:*

►*1956 FORD TRANSMISSIONS WITH SHIFT LEVERS IN SIDE OF CASE (NOT IN SIDE COVER) OVERHAUL NOTE:* Shift forks are disengaged from shift levers by removing the pin located in shift lever boss of housing and pulling out on shift shaft. After disassembly of transmission, the shift shafts and interlock assembly can be removed from inside of transmission case.

►*1956 MERCURY SYNCHRO-MESH TRANSMISSION NOTE:* Mercury transmissions differ from Ford transmissions as follows: Four rows of needle bearings around the countershaft. Countershaft and reverse idler shaft are retained in housing with woodruff keys at extension housing end(retaining pin has been eliminated).

►*1956 FORD TRANSMISSION GEAR REPLACEMENT CAUTION:* The gears in 1956 models are"shot-peened" and may be used as service replacement on earlier transmissions. *Do not use earlier type gears in the 1956 transmission.*

FORD TRUCK (HEAVY DUTY)

F-100 (1956), Opti nal
F-250 (1956), Standard. Se note below.
F-350 (1956), Standard
P-350 (1956), Standard
P-500 (1956), Standard

►*F-250 TRUCK NOTE:* This transmission replaced in production on March 15, 1956, with 3-Speed (Medium Duty). *See "Ford Truck 3-Speed (Medium Duty)".*

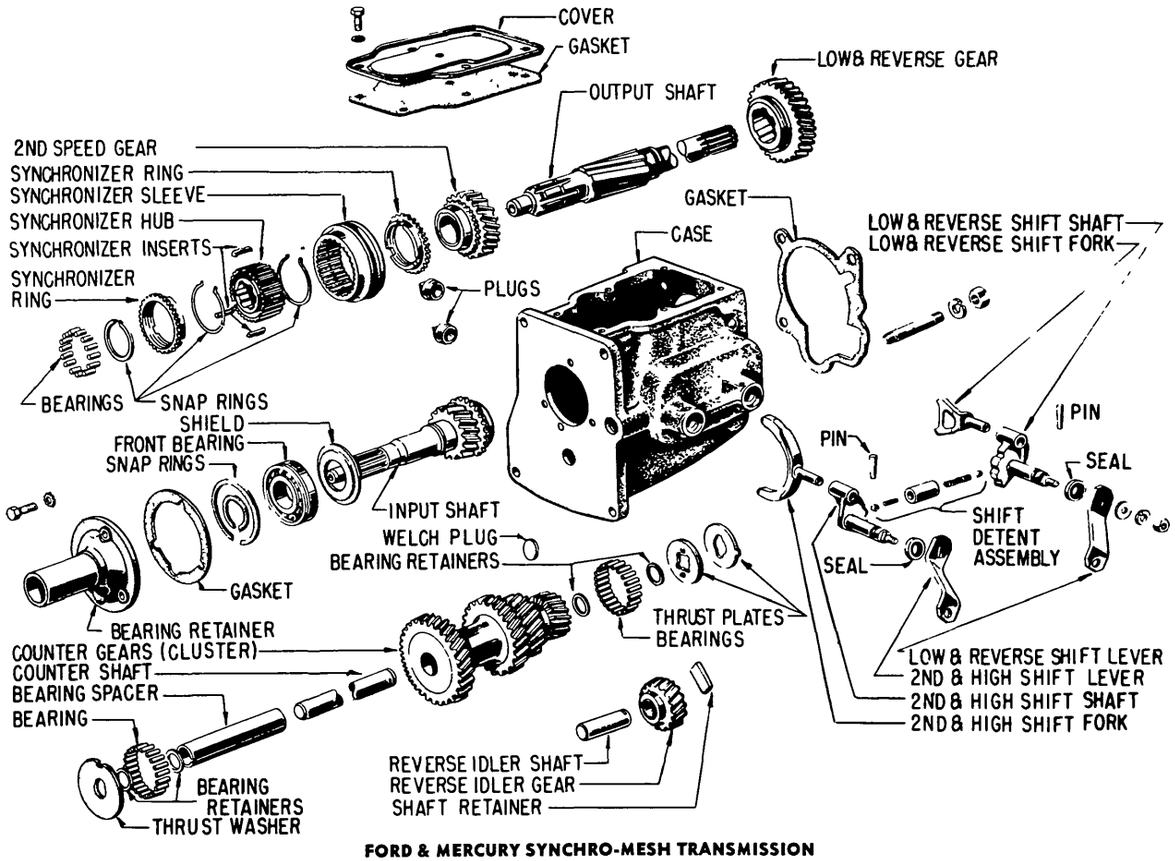
►*1956 HARD SHIFTING CORRECTION:* On "F" Series Trucks, install revised shift rods, Part No. B6Y-7326-B and B6Y-7328-B. On "P" Series Trucks, install revised shift rods, Part No. B6J-7325-C and B6J-7327-C. Adjust length of rods to assure full transmission lever travel into the detent with a properly aligned cross-over. This control rod change can be made on 1953 to 1955 models also.

►*1956 SHIFT SHAFT NUT BREAKING OFF CORRECTION:* Remove transmission cover assembly and remove high and intermediate lever and the low and reverse lever assemblies. Replace these levers with the revised levers, Part No. B6Y-7285-A and B6Y-7290-A

DESCRIPTION: Constant mesh, synchro-mesh (second & high). sliding gear (low & reverse).

REMOVAL: *See "Transmission" on Truck Model pages.*

OVERHAUL: *See "Ford Truck 3-Speed (Heavy Duty)" in 1953 Annual Data or later Manual editions.*



FORD & MERCURY SYNCHRO-MESH TRANSMISSION

FORD TRUCK 3-SPEED

F-100 (1956)
F-250 (1956) See note below.

►*F-250 TRUCK NOTE:* The 3-Speed (Medium Duty) transmission replaced the 3-Speed (heavy Duty) on these models beginning March 15, 1956.

DESCRIPTION: 3-Speed synchro-mesh. Constant mesh (second & high), sliding gear (low & reverse). Helical gear type. The design of both transmissions are similar and the service procedures are the same except as noted below.

REMOVAL: *See "Transmission" on Truck Model pages.*

OVERHAUL: *See "Ford Truck 3-Speed (Light Duty)" in 1953 Annual Data or later Manual editions and note the following:*

►*3-SPEED (MEDIUM DUTY) TRANSMISSION NOTE:* The counter-shaft and reverse idler shaft are retained in transmission case with woodruff keys located at rear of case (light duty reverse idler shaft is retained by a pin).

HUDSON, NASH & RAMBLER

Hudson Wasp (1956)
Nash Statesman (1956)
Rambler (1956)

►*1956 TRANSMISSION REAR BEARING SNAP RING FAILURE CORRECTION:* This condition may be caused by heavy duty operation or maladjustment of the torque tube trunnion. Correct by installing sleeve, Part No. 3149883, which is supplied for service only, as follows: Remove rear extension housing, three snap rings and speedometer drive gear. Install sleeve against bearing and replace the woodruff key and speedometer drive gear. Select fit one snap ring in the groove at rear of speedometer drive gear to provide zero end clearance (*NOTE* - When sleeve is installed, only one snap ring is required).

DESCRIPTION: Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

REMOVAL: *See "Synchro-mesh Transmission" on Car Model pages.*

OVERHAUL: *See "Nash Synchro-mesh Transmission" in Manual.*

BUICK "VARIABLE PITCH" DYNAFLOW DRIVE

Buick, Series 40 (1956) Optional.
Buick, Series 50, 60, 70 (1956) Standard.

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR:* Place shift control lever in "N" (Neutral) position until car reaches a speed of 15 MPH, then move control lever to "L" (Low) position and continue to increase speed until engine starts at approximately 25 MPH. After engine starts, return lever to "N" (Neutral) position for engine warm-up.

►*1956 TORQUE CONVERTER PUMP PRODUCTION CHANGE & SERVICE CAUTION:* Late 1956 cars will have two types of converter pump assemblies used interchangeably in production. The new converter pump is a steel stamping and is identified by an orange "X" on converter pump and also on top of bellhousing. The earlier conventional aluminum pump will also be used. When removing and replacing torque converter-to-flywheel and cover bolts the square head bolt, Part No. 1171053 must be used with the steel converter pump and the "D" shaped bolt head must be used with the aluminum casting pump. Transmission equipped with the steel torque converter pump will require one more pint of transmission oil than transmissions having the aluminum pump.

►*1956 DYNAFLOW TRANSMISSION OIL LEAKAGE CORRECTION (OIL BLOWING OUT OF BREATHER PIPE):* *See "Overhaul" below.*

►*1956 DYNAFLOW FRONT PUMP SEAL SERVICE REPLACEMENT (NEW TYPE SPRING LOADED CARBON SEAL FOR USE WITH TRANSMISSIONS HAVING ALUMINUM PRIMARY PUMP):* The new carbon seal is designed to seat against flat face of primary pump hub, making it possible to use the seal on pumps which would normally be replaced because of scored hub in area of the present seal. It is suggested the new seal be installed in transmissions having primary pump which would ordinarily be replaced because of sealing difficulties. *See "Overhaul" below, for installation procedures.*

►*TOOL MODIFICATION NOTE (REACTION SHAFT BUSHING INSTALLER TOOL J-5816):* Shoulder of tool must be ground off sufficiently to allow reaction shaft bushing to be driven deep enough so that it is located between the two snap ring grooves inside reaction shaft.

DESCRIPTION

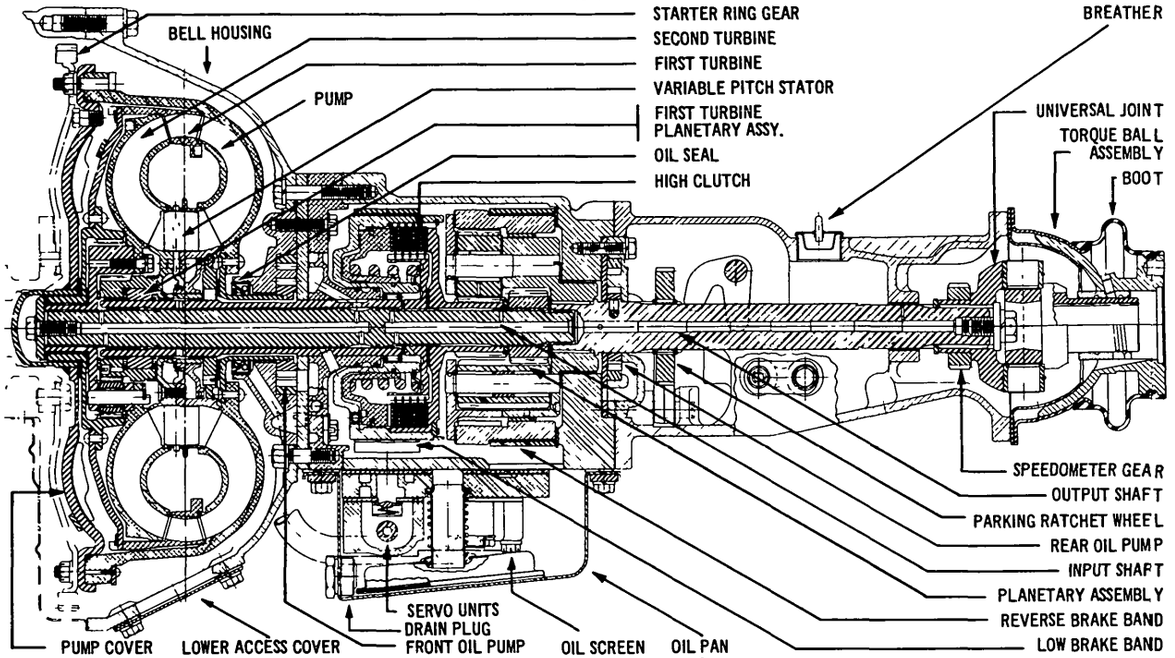
"Variable Pitch" twin-turbine torque converter and a hydraulically operated planetary transmission similar in design to 1955 models. *See "Buick Dynaflow Drive" in 1955 Annual Data or later Manual edition.*

OPERATION

Planetary units and controls operate in same manner as on 1955 models. *See "Buick Dynaflow Drive" in 1955 Annual Data or later Manual edition.*

LUBRICATION

Check oil level at 1000 miles intervals and add oil as required. Drain and refill at 25,000 mile intervals.



BUICK VARIABLE PITCH DYNAFLOW DRIVE (SECTIONAL VIEW)

►*CAUTION: Oil must be warm and engine must be idling when checking oil level. Warm up engine before draining.*

Checking Oil Level: With oil warm and engine idling with control lever in "P" (Parking), position, check oil level as indicated on dipstick in filler tube in engine compartment (on right side between battery and engine). If level is more than 1" below FULL mark on rod, add recommended oil to bring level up to FULL mark *(CAUTION - Do not fill above FULL mark).* Distance between ADD OIL and FULL marks on dipstick is equal to approximately 1 pint of oil.

►*CAUTION: If oil level is consistently low when checked (indicating loss of 1 pint or more per 1000 miles), check transmission thoroughly for oil leaks.*

Draining & Refilling: With oil warm, drain transmission case by removing drain plug in oil pan, drain torque converter, after removing bellhousing cover for access to drain plug, by loosening one plug and turning converter until second plug is downward, and removing this plug. Re-install and tighten all drain plugs. Install three quarts of recommended oil through filler opening in case. Start engine and allow it to idle with control lever in "P" (Parking) position, add additional oil to bring level up to point 1 3/4" below FULL mark on dipstick. Recheck oil level after transmission warmed up. Oil level should be at FULL mark on rod. *NOTE* - Transmissions with steel torque converter require 1 pint more fluid than transmissions with aluminum converter. See Production Change above.

►*CAUTION: DO NOT FLUSH transmission when changing oil.*

Capacity - 10 qts. (refilling after draining); 11 3/4 qts. (after overhaul). *NOTE* - Transmission with steel torque converter requires 1 pint more oil than transmission with aluminum torque converter. See Production Change above.

Recommended Oil - Use only "Special Buick Oil for Dynaflow Drive" or Automatic Transmission Fluid, Type "A", with AQ-ATF number embossed on can.

LINKAGE ADJUSTMENT

Throttle Linkage Adjustment: *See "Carburetor" on Car Model pages.*

Manual Shift Control Linkage Adjustment: Warm transmission to normal operating temperature and make sure transmission oil is at proper level. With lower shift rod disconnected from idler lever and manual control lever on steering column in "D" (Drive) position, adjust the stop screw at lower end of steering column into slot of spring until the spring is deflected .030-.035". Carefully move lower shift rod forward and backward to determine when it is in center of slotted hole in transmission shift lever (approximately .060" movement is possible). Adjust clevis until pin enters hole in idler lever without moving rod in slotted hole in transmission shift lever. Remove pin and assemble anti-rattle washers, clevis pin and cotter pin. Park car on ramp or other grade with control lever in "P" (Parking) position to determine whether parking lock holds securely. Then let car roll with control lever in neutral position and listen for a clicking or ratchet noise which would indicate that parking lock pawl is contacting parking lock ratchet

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

wheel. If parking lock fails to hold or ratchet noise exists, jack up car so a wheel may be turned to rotate propeller shaft. Loosen linkage adjusting lever lock bolt on side of transmission rear bearing retainer. With transmission in neutral, tap rear end of lever upward until a slight ratchet noise is heard when propeller shaft is turned, then tap lever down just enough to eliminate the noise. Tighten lock bolt securely. With engine idling at 600 RPM (engine warm), slowly move control lever from "N" (Neutral) position to "D" (Drive) position. The clutch should engage, as indicated by an immediate decrease in engine speed when the center of dial pointer is midway between "N" and "D" on speed ratio dial. Slowly move control lever from "D" (Drive) position to "N" (Neutral) position. Clutch should disengage, as indicated by an immediate increase in engine speed, when center of speed ratio pointer is midway between "D" and "N" on speed ratio dial. If points of clutch engagement and disengagement are not as specified, and all preceding linkage adjustments have been made correctly, it will be necessary to remove transmission oil pan and adjust position of the shift control valve. *See "Valve & Servo Body Reassembly" in 1955 Annual Data or later Manual edition.*

N utral Safety Switch Adjustment: With manual control linkage properly adjusted, ground primary terminal of distributor so that engine can be cranked without firing. Fully apply parking brake and place transmission control in "N" (Neutral) position. Place a narrow strip of masking tape on speed ratio dial so that ends of letters "D" and "N" are visible. With transmission control firmly engaged in neutral detent, make pencil mark on masking tape at **right edge** of pointer, then make two marks on tape at 1/8" and 3/16" to right of first mark. Move control lever to "D" position, turn ignition on and depress accelerator pedal to close accelerator vacuum switch. Slowly move dial pointer from "D" to "N" and note position of **right edge** of pointer at instant the cranking motor just starts to operate. Release accelerator pedal. The **right dg** of pointer should be between the two marks made on masking tape at 1/8" and 3/16" out of neutral. If neutral safety switch does not cut in within specified limits, move it sideways on column jacket as required to obtain proper timing. Tighten mounting screws.

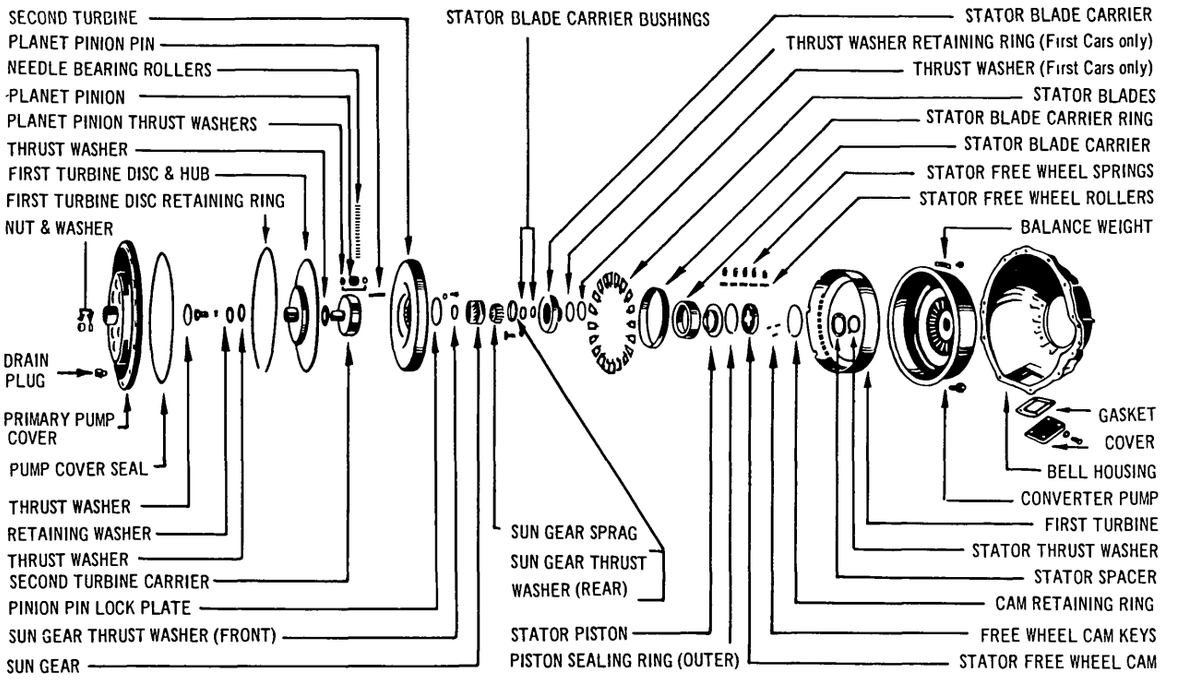
BAND ADJUSTMENT

► *BAND ADJUSTMENT CAUTION: Bands cannot be adjusted with transmission in car and adjustment ordinarily required only when transmission overhauled. BANDS MUST BE CORRECTLY ADJUSTED BEFORE TRANSMISSION INSTALLED IN CAR. See "Band Adjustment" in 1955 Annual Data or later Manual edition.*

TESTING

If performance not satisfactory, make following tests **with transmission thoroughly warmed up and at operating t mp ratur :**

Oil L vel: Check oil level, add fluid as necessary to bring level up to FULL mark on dipstick, recheck performance with correct oil level. If car has been losing oil at rate of 1 pint or more each 1000 miles, make thorough check for oil leaks.



BUICK VARIABLE PITCH DYNAFLOW DRIVE TORQUE CONVERTER & BELL HOUSING

Manual Control Linkage: Check and adjust manual control linkage. See Linkage Adjustment.

Hydraulic Control System Pressures: Use Transmission Oil Pressure Gauge J-2575. Support rear end of car solidly with wheels off floor so that transmission can be operated. Remove transmission cover in floor pan for access to pressure take-off points.

Connect gauge and make tests as follows:

Front Oil Pump - Connect pressure gauge at pipe plug opening on left side of transmission case. Run engine at 500 RPM, check pressure with selector lever in **Low, Drive, and Reverse ranges.** Repeat tests at 1000 RPM, and at 1800 RPM **in Low and Reverse only.** See table below for correct pressures. Low or erratic pump pressures indicate air leaks in suction lines, improper pressure regulator valve action. or excessive pump clearances.

Front Oil Pump Pressures

Selector Lever–	Low	Drive	Reverse
500 RPM	120 lbs.	90 lbs.	120 lbs.
1000 RPM	180 lbs.	90 lbs.	
1800 RPM	180 lbs.	90 lbs.	

Rear Oil Pump - Connect pressure gauge at pipe plug opening in lower flange at front end of rear bearing retainer. Run engine at 500 RPM, check pressure with selector lever in **Low & Drive Range.** Repeat test 1000 RPM and 1800 RPM. See table below for correct pressures. Low or erratic pump pressures indicate air leaks in suction line (this will affect both pumps), improper pressure regulator valve action, excessive pump clearances or leaks in valve and servo body passages between pump and regulator valve.

Rear Oil Pump Pressures

Selector Lever–	Low	Driv
500 RPM	90 lbs.	90 lbs.
1000 RPM	180 lbs.	90 lbs.
1800 RPM	180 lbs.	90 lbs.

High & Low Accumulator - Connect pressure gauge at pipe plug opening on top of accumulator body (**High**–left side of car); (**Low**–right side of car). Place selector lever in **Drive Range** (High Accumulator Test); **Low Range** (Low Accumulator Test). Run engine and check pressures at speeds indicated in tables below. Low accumulator pressure may be caused by leakage past accumulator body gasket. If accumulator pressure more than 10 lbs. lower than front pump pressure, check for leakage between accumulator and multiple disc clutch and for restricted or plugged metering orifice in accumulator dump valve.

Accumulator Pressures

Selector Lever–	Low	Drive
500 RPM	115 lbs.	80 lbs.
1000 RPM	175 lbs.	85 lbs.
1800 RPM	175 lbs.	85 lbs.

Stator - Connect pressure gauge at pipe plug opening on left end of reaction shaft flange. Test pressure in **Drive Range** at 500 RPM, 1000 RPM, and 1800 RPM.

Stator Pressures

Selector Lever–	Low	Reverse	Drive
500 RPM	10 lbs.	10 lbs.	10 lbs.
1000 RPM	20 lbs.		70 lbs.
1800 RPM	100 lbs.		75 lbs.

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (Cont.)

TROUBLE SHOOTING

▷*EXCESSIVE DYNAFLOW WHINE CORRECTION: (This condition is usually the result of excessive clearance between input shaft and bearing in the reaction shaft).* If transmission is to be disassembled to correct whine, perform the following:

1) Remove converter cover, twin turbine assembly, and sun gear, then mount dial indicator on end of input shaft with indicator button contacting reaction shaft. Position indicator button 90° to left of top center (facing end of shaft) then move input shaft away from and toward indicator while noting the gauge reading. Repeat this check at 45° to left of top center. If dial reading exceeds .005", excessive clearance exists between input shaft and bearing in reaction flange.
2) Before replacing bearing, remove reaction flange assembly and input shaft and observe the following: (a) Inspect bearing surface on input shaft. If surface appears abnormally rough or scored, replace input shaft; if not, polish journal area with crocus cloth. (b) Inspect the two oil seal rings toward rear of input shaft and the mating surface in the reaction shaft for scoring or other damage. If reaction shaft or input shaft shows evidence of scoring or other damage, replace worn or damaged parts.
3) If inspection reveals that condition of reaction shaft and input shaft are satisfactory, replace only the input shaft bearing (see Overhaul data).
4) If input shaft, reaction flange, or the bearing requires replacement, it will be necessary to replace the converter sun gear and planet pinions. *NOTE*—When installing reaction flange service bushing, be sure the assembly is supported on rear end of reaction shaft to prevent distortion of aluminum reaction flange.

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With selector in any Range (rear wheels free). If car will not move for 1-3 minutes after standing over night—Check front pump oil pressure (see Testing) after allowing car to stand for several hours. If zero pressure noted, check pump for excessive clearances allowing pump to lose its prime. Check alignment of bell housing and converter primary pump hub.

▷*CAUTION—If this condition found, inspect Clutch and Bands for excessive wear due to slippage caused by low oil pressure.*

If car will not move after extended operation in Reverse—Check for air leaks in pump suction line (at rear oil pump gaskets), or excessive clearance in front pump (at pump gears and covers). Check alignment of bell housing and converter primary pump hub.
2) With selector in any Range (rear wheels locked). Parking lock engaged. Broken parts in transmission or rear axle. Parking brake applied.
3) With selector in Drive Range. Check front oil pump pressure and High Accumulator pressure. If OK, check for sticking Low Band Anchor Piston, remove and inspect Clutch for worn or sticking clutch plates, leaking clutch seal rings. If High Accumulator pressure low, also check rear pump Check Valve for correct installation and proper seating, check for leaks at accumulator body gasket, reaction flange gasket, clutch piston outer seal and clutch ball check valve, and leaks at sealing rings on reaction shaft flange and low drum.
4) With selector in Reverse Range. Check reverse band for displaced operating strut caused by too loose adjustment, improper installation, or broken band anchor (indicated by free up and down movement of band operating lever). If band assembly OK (no free movement of lever), check servo operation by running engine and shifting into Reverse. Remove Valve & Servo Body and check for reverse servo piston seal leaks.

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, or poor acceleration).
1) In all Speed Ranges. Low oil level. Incorrect manual control linkage adjustment. Air leak in oil pump suction pipe at oil screen sealing ring. Low front oil pump pressure caused by wear or excessive clearances in pump. Leaks at front pump cover or reaction shaft flange, pressure regulator valve, Valve & Servo Body gasket. Pressure regulator valve defective.
2) In Drive Range. Incorrect manual control linkage adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, check for leaking clutch sealing rings, sticking clutch piston, worn or sticking clutch plates.
3) In Low Range. Incorrect manual control linkage adjustment. Incorrect low band adjustment. Low band and drum worn or scored. If Low Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, remove Valve & Servo Body and check for gasket leaks or leaks at low servo piston seal.
4) In Reverse Range. Incorrect manual control linkage adjustment. Reverse band out of adjustment, strut out of place, or anchor broken. If front oil pump pressure low, remove Valve & Servo Body and check for gasket leaks and leaking reverse servo piston seal.

CAR CREEPS (Forward or Backward).
1) Creeps forward with selector in Neutral. Incorrect manual control linkage adjustment. Sticking low servo piston (check by removing low band adjustment cover). Sticking clutch caused by warped, binding, or incorrectly assembled clutch plates (not stacked properly with "dish" in same direction). *If Car Creeps only when engine accelerated to 2500 RPM*—Check clutch vent ball checks in clutch piston and reaction shaft flange.
2) Creeps forward with selector in Reverse or backward with selector in Low. Incorrect manual control linkage adjustment.

SHIFTS ARE ROUGH.
1) Low-to-Drive Shift. Incorrect Low Band adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket and for dump valve or accumulator piston sticking down (top land of piston should be visible through top port in body). Sticking low band anchor piston (remove Valve & Servo Body to check), or incorrect piston location (see piston shimming data in Valve & Servo Body Reassembly). Valve & Servo Body gasket leaks. Clutch plates worn or binding.

EXCESSIVE CHATTER OR CLUNK WHEN STARTING

▷*CAUTION—Slight "clunk" when shifting into Low or Reverse is normal, and slight chatter when car starting to move in reverse (disappearing as soon as car in motion) is also normal.*

1) In Low & Reverse Range. Incorrect Low or Reverse Band adjustment. Engine and transmission mountings loose or incorrectly adjusted, thrust pad at transmission mounting broken (see Engine Mountings in Buick Special Data). Clutch plates warped, sticking, or incorrectly assembled (not stacked properly with "dish" in same direction). Reverse ring gear bushing worn. Planet pinion needle bearing rough.

NOISE IN TRANSMISSION.

▷*CAUTION—Hum or low whine in Neutral or Parking is normal (due to free rotation of all planetary gears) and slight hum in Low and Reverse may be expected.*

1) Buzzing Noise. Low oil level. Front pump check valve hanging up on edge of gasket between valve and servo bodies. If noise noticed in Parking or Neutral, pressure regulator valve clearance in body may be excessive or orifice in valve land oversize (correct by replacing valve and body).
2) Clicking Noise. If noticed in all ranges, may be caused by foreign material in converter. If noticed only when car in motion, may be caused by parking lock pawl contacting ratchet wheel due to incorrect manual control linkage adjustment.

3) Abnormal Hum or Whine (see Caution above). If noted in all ranges, may be caused by worn parts or excessive front pump clearances (front pump noise will increase in Low and decrease at car speeds above 45 MPH. in Direct Drive). Check front pump for excessive clearances by testing for low pump pressure. If noise noted in all ranges except Direct Drive, may be caused by trouble in planetary gears (gears locked out in Direct Drive).
4) Squealing or Screeching following installation of Front Oil Pump. Pump driving gear installed backward.

▷*CAUTION—Above condition must be corrected WITHOUT FURTHER OPERATION OF TRANSMISSION or severe damage will result.*

REMOVAL FROM CAR

Transmission and torque converter are removed as an assembly as follows:

1) Raise car so that frame side rail is at least 20" off floor and place stands at front and rear to support car.
2) Disconnect torque tube from torque ball and move rear axle back to disengage propeller shaft from universal joint. Remove cranking motor splash pan, bell housing cover and bell housing hand hole cover.
3) Drain converter and transmission. Mark position of converter on flywheel to assure installation in same position and remove bolts attaching converter to the flywheel. Disconnect and remove all pipes from oil cooler. Remove the cooler. Disconnect oil filler pipe at rubber hose and disconnect exhaust pipe hanger at right accumulator. Disconnect shift rod and speedometer cable at transmission.

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DYNAFLOW DRIVE (Cont.)

4) Support transmission with a jack or hoist and remove four bolts attaching thrust plate to rear bearing retainer, then remove two nuts and plate which attach mounting pad to transmission support.
5) Raise engine and transmission just enough to relieve load on transmission support Remove bolts attaching both ends of support to frame, then remove support and thrust plate as an assembly *CAUTION*—If shims are found at this point, note their number and location so they can be reinstalled in the same position
6) Support engine at rear end of lower crankcase so it will be supported while transmission is removed. *CAUTION—Do not use bar with hooks placed over frame side rail. Brake lines will be damaged.*
7) On cars with air-conditioning, disconnect discharge and suction lines at compressor This will avoid damaging flexible couplings when engine is raised and lowered
8) Lower the transmission just enough so that bell housing bolts can be reached, then remove bell housing to crankcase bolts Move transmission rearward to disengage hub of converter pump from crankshaft, lower transmission and remove it from beneath car

TRANSMISSION OVERHAUL: Service procedures are the same as for 1955 models. *See "Changes, Cautions, Corrections" (above, and 1955 Annual Data or later Manual edition). Note the following*

▷*1956 DYNAFLOW TRANSMISSION OIL LEAKAGE CORRECTION (OIL BLOWING OUT OF BREATHER OPENING)* On transmissions having numbers "0-1" to "0-93", the above condition is caused by a 1/16" hole in output shaft (formerly used to lubricate rear bearing retainer) being uncovered by open end of horseshoe washer which is located in groove directly ahead of rear bearing retainer ball bearing *(NOTE- An unused groove will be found directly forward of the groove in which the 1/16" hole is located, and serves to identify shafts requiring correction This unused groove can be observed through breather hole when transmission is removed)* To correct this condition with transmission in car, remove the rear axle assembly, torque ball assembly and universal joint Flare one end of a 4" piece of 1/4" soft copper tubing until it fits snugly in the .290" diameter hole in end of output shaft. Cut off tube approximately 2" from flared end, then flare cut-off end to obtain a press fit in the 297" section of hole *(NOTE -* File flare outside diameter to obtain a suitable fit) Lightly tap copper tube in end of output shaft with suitable punch or 1/4" diameter rod, making certain that copper tube is fully seated with a snug fit *(CAUTION - Excessive or hard blows may collapse copper tube and restrict oil passage through tube)* Reinstall torque ball, universal joint, and rear axle assembly *(NOTE - The above procedure may also be used when transmission is removed from car for servic not requiring removal of rear bearing retainer).* When transmission is removed and removal of rear bearing retainer is required, proceed as follows Insert a 1/16" diameter welding rod approximately 1" long into oil hole until it bottoms, then insert a 1/4" diameter rod or punch in end of output shaft and tap with hammer to bend end of welding rod Leave punch in place in shaft and snip off end of welding rod flush with output shaft outside diameter, upset this end with a cold chisel to lock plug in place Install horseshoe washer on shaft so that welding rod plug is at open end of washer (this will allow washer to seat in groove). *NOTE - To indicate that the output shaft has been modified, as indicated above, use a chisel and make a dash (–) in front of the "0" of transmission code number*

▷*1956 DYNAFLOW FRONT PUMP SEAL SERVICE REPLACEMENT (NEW TYPE SPRING LOADED CARBON SEAL FOR USE WITH TRANSMISSIONS HAVING ALUMINUM PRIMARY PUMPS)* The new carbon seal is designed to seat against flat face of primary pump hub, making it possible to use seal on pumps which would normally be replaced because of scored hub in area of present seal. It is suggested that new seal be installed in transmission having primary pump which would ordinarily be replaced because of sealing difficulties. Install seal as follows After removal of old seal, inspect bore for burrs or damage. Correct any defects to be sure of a good press fit on seal outer diameter (leading edge of bore in pump body should have a slight radius). Clean up face of hub on primary pump with crocus cloth and inspect for burrs, dents or gouges. If deep marks are found, replace pump and install regular production seal. Coat outside diameter of seal with Permatex No. 3, then using crankshaft oil seal installer J-5250-1, press seal into pump body using an arbor press, drill press, or tap evenly into place with a mallet until flange of seal is down against face of pump body *(CAUTION - Do not mar or press on carbon face, and do not cock seal during installation as damage to seal will result. Also, under no circumstances should the carbon face seal be used with a steel primary pump).* Wipe both seal face and hub face on primary pump with a clean cloth to remove all traces of grit and other foreign material, then coat both faces with clean Dynaflow oil before assembling. When installing primary pump on transmission, use extreme care not to mar the carbon seal face with end of hub sleeve. When transmission is installed in car, the seal will automatically position itself and is constructed so as to compensate for normal play, deflection, and eccentricity.

INSTALLATION IN CAR

After transmission and torque converter completely assembled, install unit in reverse order of removal procedure and note following important points:
Alignment of Parts—See that flywheel, converter primary pump, and converter cover positioned so that paint marks (as made for removal) will be aligned when transmission installed.
▷*CAUTION—This alignment necessary to maintain converter assembly balance.*
Bell Housing Mounting Bolt Installation—Adjust lifting equipment so that bell housing meets engine crankcase squarely and engages the two dowels, then install all bell housing bolts with lockwashers. Tighten all bolts to 45-55 ft. lbs. torque.
Transmission Support & Thrust Pad Installation & Adjustment—*See ENGINE MOUNTING in Buick Special Data.*
Converter Mounting Bolt Installation—Use the shank of a 11/32" drill to align bolt holes in flywheel and converter, install bolts and tighten to 25-30 ft. lbs torque.
Shift Rod Installation—Check and adjust linkage when installing shift rod. *See LINKAGE ADJUSTMENT.*
Filling Transmission—*See LUBRICATION.*
Final Road Test—After transmission installed and all adjustments made, road test car by driving approximately 20 miles with frequent starts and stops to duplicate heavy traffic conditions. After transmission thoroughly warmed up, check transmission and all oil lines and connections for leaks. If vibration noted due to unbalance of replacement parts, correct this condition as follows:

ENGINE BALANCING

▷*IF VIBRATION NOTED AFTER INSTALLATION OF CRANKSHAFT, FLYWHEEL, AND OTHER ROTATING PARTS, CORRECT THIS UNBALANCED CONDITION AS FOLLOWS:*
▷*CAUTION:* Procedure below will correct minor unbalance caused by replacement of individually balanced parts Extreme vibration caused by parts abnormally out of balance, or different in weight from corresponding parts, should be corrected by replacement of these parts
Critical Speed of Vibration—Determine speed at which vibration is most evident (use tachometer) and operate engine at this speed to check results from the following corrective procedures
1)—Remove bell housing cover and bell housing hand hole cover for access to flywheel
2)—Install one 060" balance weight of correct type (see Balance Weight Note following step 5 below) under the head of one of the primary pump cover bolts, tighten bolt to 25-30 ft lbs torque
▷*CAUTION—DO NOT install weight at flywheel-to-converter driving bolt (bolts are too short for addition of weights).*
3)—Operate engine and check for vibration Mark location of balance weight on converter pump, then remove weight and tighten cover bolt to 25-30 ft lbs torque
4)—Repeat steps (2) and (3) at other converter pump cover bolts and compare engine vibration noted at each location
5)—At point where balance weight results in smoothest engine operation, vary weight thickness (see Balance Weight Note following), until vibration has been eliminated After balance weights selected and installed, tighten cover bolts to 25-30 ft lbs torque, attach weights permanently as follows Use 5/32" drill to spot center of both holes in weights, then drill pump flange with #32 (116") drill to depth of 3/8", use correct length drive screws 3/8" long (No 145067) or 1/2" long (No 450543) depending on the weight thickness to permanently attach weights to pump cover
Balance Weight Note—Balance weights furnished in three thicknesses for each type transmission as listed below *CAUTION—Use correct weights for first and later type transmissions as follows:*

Balance Weight Part Nos.

Thickness	Part No.
0345"	1166600
.060"	1166601
.120"	1166602

CHEVROLET POWERGLIDE

Chevrolet Pass. Cars (1956)
Chevrolet Corvette (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR (Pushing recommended rather than towing):* Place selector lever in Neutral "N" position. When car reaches speed of approximately 16 MPH. (20 MPH if road wet or icy with resultant poor traction), move selector lever to Low "L" position to crank engine. After engine is started, move lever to "N" for engine warm-up.

DESCRIPTION

The 1956 Powerglide Transmission is similar to 1955 design, consisting of a torque converter and a hydraulically operated planetary transmission.

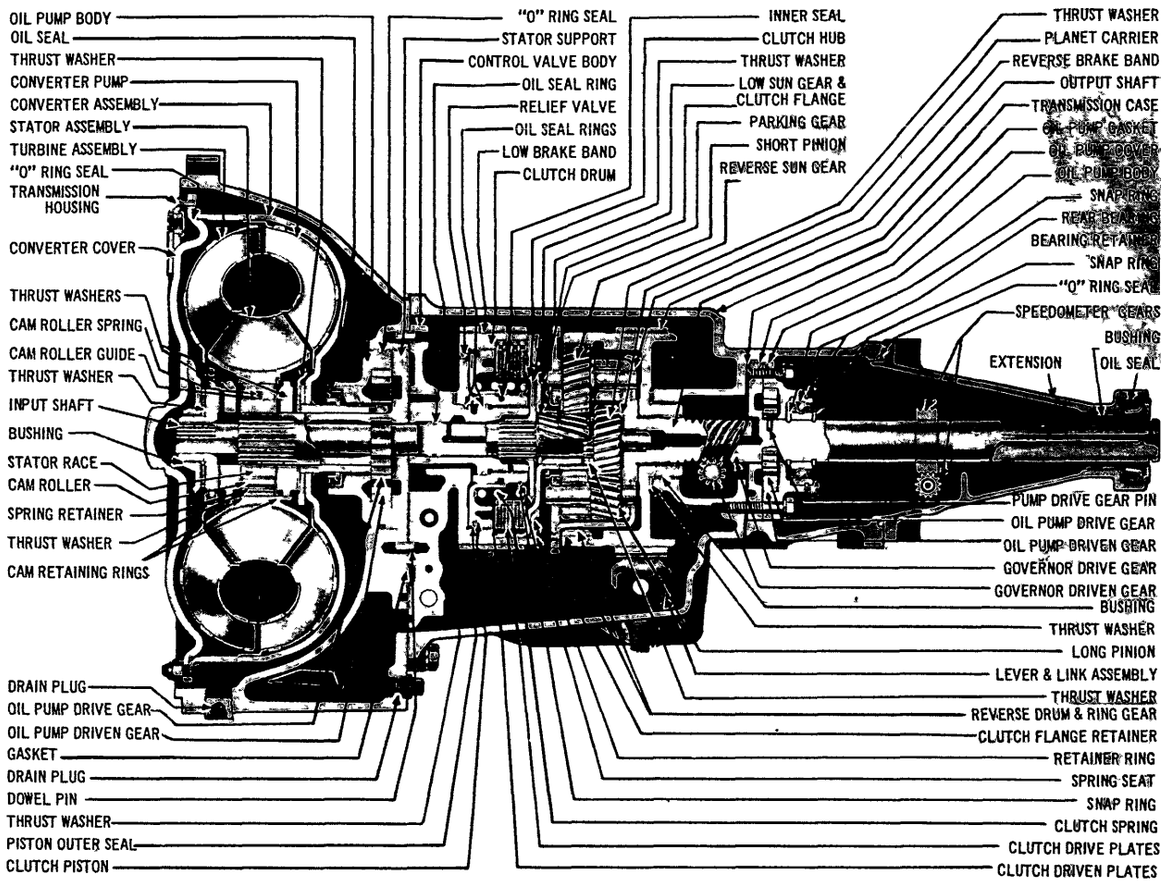
OPERATION

Operation of the Torque Converter and Transmission is similar to the previous type except for automatic shifting in "Drive Range" as follows.

Starting in Drive Range—With the selector lever in Drive "D" position, the manual valve is positioned to direct oil pressure to apply side of the Low Servo and to the Low Drive Valve Body so that the car starts out in low range (torque converter plus planetary gear) providing an equivalent gear reduction of 2.2-1 (torque converter) plus 1.82-1 (gears). Depressing the accelerator pedal applies throttle valve pressure behind the shifter valve in the low drive valve body which assists the spring in keeping the shifter valve closed and the transmission in low range. As soon as the car begins to move, the rear pump begins to operate and to supply oil pressure to the governor which controls the upshift as follows:

Normal Upshift—When the rear pump pressure balances the force of the centrifugal weights in the governor, the governor valve directs oil pressure to the Shifter Valve in the low drive valve body and moves the valve to the drive position. This directs main line pressure to the clutch assembly and to the release side of the low servo piston (balancing of low servo pressures allows spring to release band). Application of the clutch and release of the band places the transmission in Drive Range (converter drops out independently when reversal of pressure on stator vanes causes stator to "free-wheel" so that torque converter acts merely as a fluid coupling). Upshift can be delayed by greater throttle opening as follows:

Delayed Upshift—The shift from Low to Drive Range is dependent on the extent to which the accelerator pedal is depressed and will occur at a higher car speed with greater throttle opening. In addition, if the accelerator pedal is depressed beyond the "detent point" (this point reached just before throttle is wide open and will be noted as a definite resistance to further movement of the accelerator pedal), this movement of the pedal compresses the detent spring in the low drive valve body and moves the Detent Valve which then directs throttle valve pressure to the large plunger which assists in holding the shifter valve in the low range position (see Forced Downshift operation below). This delays the upshift to drive range until the car speed reaches 42 MPH. when the governor pressure becomes great enough to move the shifter valve to the high position regardless of the accelerator pedal position (governor pressure increases with car speed until it equals main line pressure).



POWERGLIDE TRANSMISSION SECTIONAL VIEW

Forced Downshift—At car speeds below 37 MPH., the transmission can be downshifted from drive to low range for rapid acceleration by depressing the accelerator pedal. The amount of pedal movement required, and the resulting action of the transmission control depends on car speed.

LUBRICATION

Check oil level at 1000 mile intervals, drain and refill transmission at 25,000 mile intervals.

►*CONVERTER DRAIN NOTE:* There is no drain plug on converter unit. Oil trapped in converter need only be replaced when transmission disassembled for overhaul.

Recommended Oil - Use only Automatic Transmission Fluid Type "A" (as furnished in containers bearing "AQ-ATF" number).

Capacity - Approximately 5 qts (refill after transmission case drained), 11 qts. (after overhaul with transmission and converter dry).

►**Warming Up Transmission (For Checking or Draining)**—Drive car approximately 5 miles with frequent starts and stops OR warm up transmission in shop as follows: Run engine for 15 minutes at 750 RPM with selector lever in "Dr" position. ***CAUTION*** —Set hand brake tightly to prevent car moving.

Checking Oil Level—Check only with transmission warm and engine idling with selector lever in Neutral "N" position. Remove dipstick from filler tube in engine compartment on right side. Add oil only if level down to "ADD ONE QUART" mark on stick, fill only to "FULL" mark on stick. ***CAUTION—High oil level (above "FULL" mark) will cause foaming and loss of fluid.***

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POWERGLIDE (Continued)

▷*OIL FILLER NOTE*—Use of Oil Filler Tube & Funnel No. J-4264 recommended to facilitate filling. This assembly is vented (transmission not vented and may blow back causing oil spillage if vented filler not used).

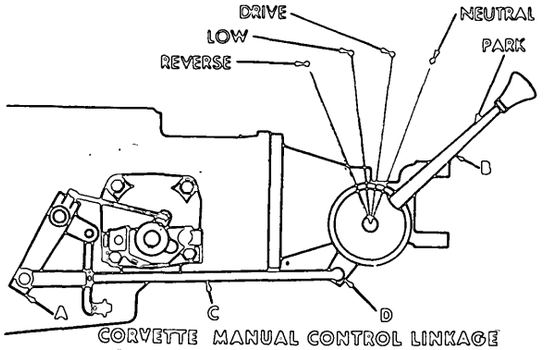
▷*LOW OIL LEVEL CAUTION—If oil level in transmission found consistently low, check for internal and external oil leaks. See "OIL LEAKAGE OR HIGH OIL CONSUMPTION" in TROUBLE SHOOTING.*

Draining & Refilling—Transmission must be warm. Remove drain plug in rear face of transmission housing under the case to drain the transmission. *NOTE*—It is not necessary to drain converter. Replace and tighten drain plug. Install 5 qts. of new fluid through filler tube on right side of engine (see Oil Filler Notes above). Idle engine with selector lever in "N" until transmission warm, check fluid level and add additional fluid, as required, to bring level up to "Full" mark on dipstick. *CAUTION—Do not overfill (will cause foaming).*

Filling (After Overhaul)—Install 3 qts. of fluid through filler tube, start engine and allow it to idle with selector lever in "N", install additional 8 qts. of fluid. Run engine until transmission warm and check fluid level.

LINKAGE ADJUSTMENT

▷*THROTTLE LINKAGE ADJUSTMENT NOTE: See CARBURETOR on car model pages.*



CORVETTE MANUAL CONTROL LINKAGE

Manual Control Linkage (Except Corvette): Loosen shifter tube lever clamp nut sufficiently to allow upper control rod to move freely in the swivel. Push control rod bellcrank (on left side of transmission case) toward front of car as far as it will go, placing transmission in "Park" position. Place shift control lever on steering column in "P" (Park) position. With both the control rod bellcrank and selector lever held in the "P" (Park) position, tighten shifter tube lever clamp nut securely.

Manual Control Linkage (Corvette): Set control rod bell crank (A) on transmission to reverse position (extreme rearward position). Place transmission selector lever (B) in reverse position (extreme forward position). Adjust rod (C) connecting lower end of selector lever with control rod bell crank so that rod will enter hole in lower end of selector lever (D) freely.

Neutral Safety Switch: Located on bracket on lower end of lower support assembly on steering column. To adjust, loosen two switch assembly mounting screws. Place selector lever in neutral, make certain that switch clip is over flats on end of shifter shaft. Insert locating pin through holes in switch mounting bracket and locating plate. Tighten switch mounting screws, remove locating pin.

BAND ADJUSTMENT

▷*BAND ADJUSTING NOTE: Band adjustment not ordinarily required in service (bands adjusted when reassembling transmission). Reverse band adjustment requires removal of Servo Cover Assembly (see Disassembly data).*

Low Servo Band - Adjusting screw located on left side of transmission case (under cover). To adjust band, remove adjusting screw cover. Use Tool J-4277 (see "Tool Modification Note" below), loosen adjusting screw locknut and tighten low band adjusting screw to 5-7 ft. lbs. *(NOTE - This procedure is new and supersedes the previous instructions which required that the screw be tightened firmly).* Back screw out four complete turns, and tighten locknut, taking care not to allow screw to turn. Replace adjusting cover.

▷Tool J-4277 Modification (for Low Servo Band Adjustment)—Adjusting screw has recessed head for ¼" Allen wrench. To use tool, remove screwdriver retainer and special screwdriver from tool, use ¼" Allen Wrench in place of the screwdriver in the tool.

Reverse Servo Band—Adjusting screw located on right side of case under servo cover. With servo cover removed, install tool J-4277 on adjusting screw, loosen locknut. Rotate reverse drum to center it in the reverse band. Tighten adjusting screw until all endplay between linkage and band is removed without compressing the band. The reverse drum must be free to rotate after this adjustment. If reverse drum is not free to rotate, back the adjusting screw ¼ turn at a time until drum is free to rotate. *(CAUTION—This is a sensitive adjustment and must be done carefully).* Tighten locknut taking care not to allow adjusting screw to turn.

TROUBLE SHOOTING

SEVERE CLOSED THROTTLE DOWNSHIFT "CLUNK": May be caused by a broken closed throttle cushion valve spring retainer. Check this condition by removing right hand side cover and inspecting retainer. *See "Closed & Forced Throttle Valve Spring Retainer Production Change" above.*

MOMENTARY RUN AWAY IN LOW UP TO 30 MPH (WIDE OPEN THROTTLE ACCELERATION): May be caused by a broken forced throttle cushion valve spring retainer. Check mainline pressure which will be lower just prior to shift, and the stall pressure will be low if the faulty transmission operation is caused by a broken retainer. *See "Closed & Forced Throttle Valve Spring Retainer Production Change" above.*

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, poor acceleration, or engine runs away on turns).

1) In all Speed Ranges—Low oil level. Incorrect control linkage adjustment. Air leak in oil pump suction pipe. Low front oil pump pressure.

2) In Drive Range—Incorrect control linkage adjustment. Damaged or leaking clutch piston seal (worn or burned clutch plates resulting from partially engaged clutch).

3) In Low Range—Incorrect control linkage adjustment. Low Band out of adjustment. Sticking accumulator valve, modulator lever, or modulator valve. Damaged or worn Low Servo Piston Ring resulting in poor band application or excessive oil leakage into clutch apply circuit causing partial clutch application and possibly burned clutch plates (check by connecting pressure gauges to Low Servo Apply and to High Clutch test points—there should be no pressure indicated at High Clutch point with selector lever in "L").

CAR CREEPS (Forward or Backward).

1) With Control Lever in Neutral—Incorrect control linkage adjustment. Clutch piston vent valve stuck closed. Clutch plates sticking or incorrectly assembled (not "stacked" in correct order).

2) Creeps forward with Control Lever in Reverse or backward with Lever in Low—Incorrect control linkage adjustment.

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With Control Lever in any range (rear wheels free). If this occurs at other times than after reversing car, see causes listed under EXCESSIVE SLIPPAGE above. If this occurs only after reversing car (indicating loss of front pump pressure) check: Rear pump air leakage into front pump suction line (causing front pump to lose its prime). Rear pump gasket leakage. Front pump clearance excessive.

2) With Control Lever in any range (rear wheels locked). Parking pawl lock engaged. Broken parts in transmission. Parking brake applied.

3) With Control Lever in Drive Range (rear wheels free). If engine runs away and transmission is hot, check for: Low radiator water level, clogged oil cooler, sticking thermostatic valve, or dragging Low Range Band (causing over-expansion of clutch parts due to excessive heat).

SHIFTS ARE ROUGH.

1) Low-to-Drive Shift (car in motion). Incorrect Low Band adjustment. Clutch plates worn or binding. Modulator control lever or piston sticking (will cause excessive pressures). Accumulator dump valve orifice plugged.

If engine speeds up during this shift—Check for incorrect low band adjustment and worn or binding clutch plates.

2) Drive-to-Low Shift. Incorrect Low Band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

3) Neutral-to-Reverse. Incorrect reverse band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

CHATTERS WHEN STARTING.

1) In Low Range. Incorrect Low Band adjustment. Worn or rough band, scored drum. Clutch not disengaging properly due to distorted or binding plates, sticking clutch piston, sticking piston vent valve, or damaged or worn Low Servo Piston Ring allowing oil leakage into clutch apply circuit and causing partial clutch application (see tests for Excessive Slippage in Low Range above).

2) In Drive Range. Incorrect Low Band or Reverse Band Adjustment. Bands worn or rough, drums scored.

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POWERGLIDE (Continued)

3) In Reverse Range. Incorrect Reverse Band adjustment. Worn or rough band, scored drum. Reverse ring gear and drum bushing worn or damaged.

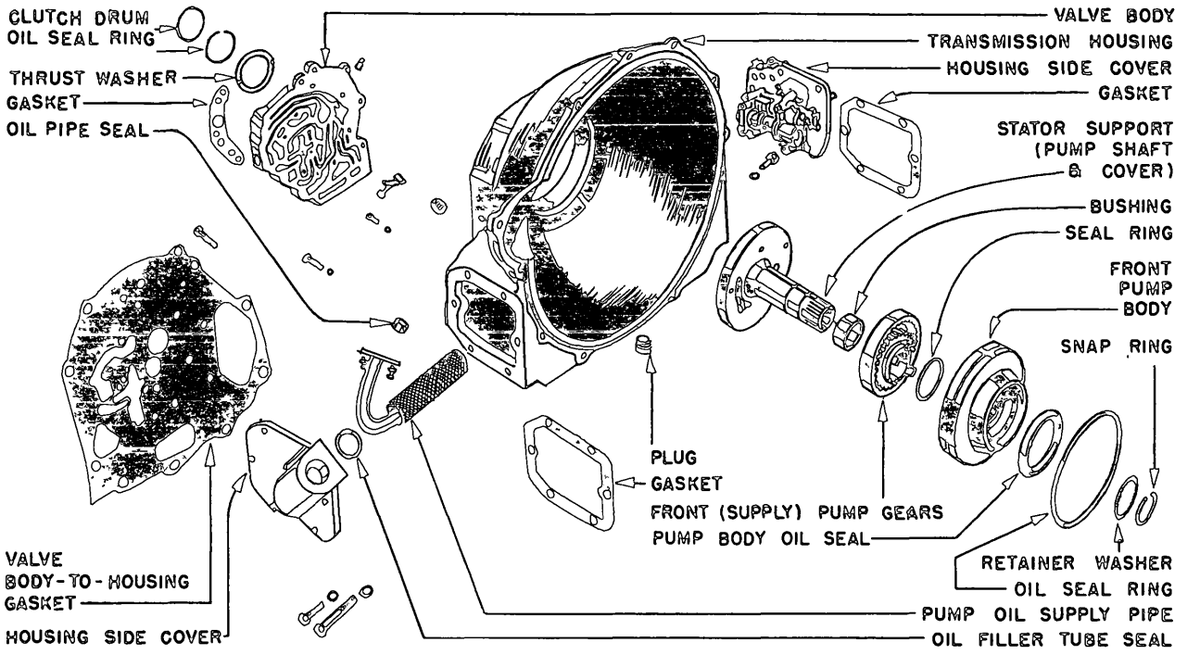
REVERSE OPERATION JERKY OR DRAGGING.
1) Clutch plates are incorrectly assembled (not "stacked" properly) or sticking. Clutch piston vent valve stuck closed.

REVERSE CAN NOT BE ENGAGED WITH ENGINE RUNNING: If reverse can only be engaged when engine not running, check for accumulator snap ring being out of place (allowing accumulator valve and body to be forced against clamp nut on parking lock lever shaft and apply spring assembly, blocking shift into reverse). *NOTE*—Above condition will not prevent shift into Low Range).

DRIVE-TO-LOW or LOW-TO-DRIVE SHIFT DIFFICULT: May be caused by improperly drilled high clutch feed orifice in valve body resulting in slow clutch application in Drive Range and slow clutch release when shifting from Drive to Low (restricted orifice will cause slow oil flow). Check by connecting pressure gauges to Low Servo Apply and to High Clutch (low servo release side) and noting pressures as follows:
1) Move selector from Neutral to Drive with engine idling. If pressure builds up much more rapidly on Low Servo Apply gauge than on High Clutch gauge, a restriction in the passage (undersized orifice) is indicated.
2) Move selector from Drive to Low. Pressure in High Clutch gauge drops slowly, oil drainage from clutch is restricted. NOTE—This will result in slow Low Band application and clutch drag (may cause burned clutch plates).

HIGH CLUTCH PLATES BURNED OR CLUTCH FAIL
▷*CAUTION—When High Clutch failure noted, following tests should be made before transmission removed, and transmission should also be carefully examined after removal and disassembly.*
1) Connect pressure gauges to Low Servo Apply, High Clutch (low servo release side), and to Reverse Servo points. Operate engine to supply oil pressure.
2) Place selector lever in Drive position and note pressure build-up in High Clutch gauge. Slow build-up indicates restriction in high clutch apply orifice resulting in clutch slippage and burned plates.
3) Place selector lever in Low position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage past Low Servo Piston Ring resulting in partial clutch application and burned clutch plates.
4) Place selector lever in Reverse position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage between the converter "out" and low servo "release" channels in valve body or damaged Housing-to-Valve Body gasket. This condition will cause partial clutch application and burned clutch plates.

NOISE IN TRANSMISSION.
1) Buzzing Noise (All Ranges). Low oil level. Pump gear interference with crescent in pump. Pump check valve not seating.
2) Ringing Noise in Converter. Low oil level. Air leak in pump suction line (pump not seated properly) resulting in low oil level in converter. Pressure regulator valve stuck (closing converter inlet port). Leakage in oil line between front pump and regulator valve.
3) Clicking Noise. Incorrect manual linkage adjustment (causing interference between parking lock pawl and gear).
4) Whining Noise. Transmission gear teeth worn. Pump gear clearance excessive or pump gear bushings worn.



POWERGLIDE TURBINE HOUSING & FRONT OIL PUMP

FUEL CONSUMPTION EXCESSIVE.
1) Transmission Causes. Converter stator freewheeling cams and roller incorrectly assembled. Clutch piston vent valve stuck open.

TRANSMISSION OIL BEING FORCED OUT OF FILLER PIPE: Caused by aeration and foaming of the oil due to one or more of the following:

NOTE—This condition may also cause Loss of Power and Lower Stall Speed (due to converter turbulence and lower pressures in control circuits).

1) Oil level too high allowing planet carrier to revolve in oil and aerate it. Correct by lowering oil level to correct point (see LUBRICATION) and driving car for 5 miles to work out air bubbles.
2) Oil suction pipe split, seal damaged, bore for suction pipe in housing too deep, or suction pipe retainer ears bent (preventing proper compression of the seal) resulting in air leaks in oil suction line.
3) Sand hole in suction bore of transmission case or housing or in suction cavity in valve body resulting in air leaks in oil suction line.

TESTING

▷*TESTING CAUTION*—Transmission oil level must be checked and corrected (see LUBRICATION) and *transmission must be warmed up before tests made.*

Warming Up Transmission: Transmission must be warmed up by road driving or in the shop exactly as follows before checking for oil leaks or trouble.

Road Warm-Up—Drive car for approximately 5 miles with frequent starts and stops to approximate heavy-traffic conditions.

Shop Warm-Up—Set hand brake tight to hold car, place selector lever in "D" range, start engine and run for 15 minutes at 750 RPM. At end of 15 minutes, transmission will be warmed up sufficiently for testing regardless of initial temperature.

▷*CAUTION—Recheck oil level after warm-up and before making following tests.*

ROAD TEST: Road test car when endeavoring to determine the reasons for the following difficulties:

Clutch Slippage: Connect gauges to the test points of the low servo apply and high clutch (release side of low servo). Position selector lever in "D" range and when car starts to move on acceleration, carefully check the pressure readings. Before the upshift takes place, the gauge connected to the low servo apply test point should record between 85 and 95 lbs. After a normal upshift takes place and the high clutch has time to become fully engaged, both gauges should record 85-95 lbs. If on this type of shift, the gauge on the high clutch (release side of

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POWERGLIDE (C ntinu d)

low servo) test point records 85-95 lbs., and the clutch slips or does not fully engage, it indicates a mechanical fault in the clutch. If the gauges do not record between 50-60 lbs. with engine idling at 425 RPM, or from 85 to 95 lbs. upon acceleration, the following items will require checking as it indicates leakage in the oil circuits. (a) Pressure regulator valve stuck, (b) Leak at low servo piston ring (between bore and ring), (c) Leak at low servo piston rod (between bore and rod), (d) Leak at valve body to case gasket, (e) Leak between valve body and housing, (f) Front pump clearances not correct, (g) Leak at low drive valve body (check gaskets and shifter valve), (h) Check passages in transmission housing for porosity, (i) Loose suction screen connection.

Closed Throttle Downshift "Clunk": High engine idle speed, or Closed Throttle Downshift Cushion Valve stuck.

Harsh Abrupt Upshift Above 25 MPH: Forced downshift cushion valve stuck closed.

Improper Upshifts and Downshifts: Refer to "Shift Patterns" below. Connect gauges to throttle valve and governor test points *(NOTE—See "Governor Pressure Test Plug Production Change" above).* Throttle valve pressure ranges from 0 to 62 lbs , depending to what extent the accelerator is depressed. Governor pressure is governed by road speed. If difficulty is experienced with the "Shift Patterns" it is recommended that the governor pressure be checked first to determine whether the pressure is within proper range, for if not, it will effect the "Shift Patterns" and the governor assembly is the first thing that should receive attention. Throttle valve pressure is another thing that effects "Shift Patterns" and if governor pressure is correct it is indicative that trouble is in the low drive valve body, provided the positive linkage and throttle valve linkage is in proper adjustment

SHIFT PATTERNS
Drive Range—Automatic

Throttle Position	①Upshift	②Downshift
Light Throttle③	12-14 MPH	④10-13 MPH
To Detent	30-45 MPH	14-18 MPH
Through Detent	48-53 MPH	45-50 MPH

①—From Low to Drive Range.
②—From Drive to Low Range.
③—Light Throttle on Upshift.
④—Closed Throttle on Downshift.

STALL TEST: Check coolant level in radiator as a safety precaution. With tachometer connected to engine and service brakes securely locked, open throttle wide, with transmission in "D" (Drive) range, then in "L" (Low) range, and then in "R" (Reverse) range. Note maximum speed attained in each range and record. Speed should be almost identical in all ranges and be between 1560 and 1610 (6 Cyl.), 1600 and 1700 (V8). ***(CAUTION—Do not maintain stall condition longer than 10 seconds at one time to avoid overheating transmission fluid).*** If engine fails to attain minimum stall speed by several hundred RPM, it is likely that the stator is not locking up on the stator hub. If stall speed varies much between ranges or exceeds the maximum in all ranges, there is slippage which may be due to insufficient oil pressure or to a mechanical fault of clutch or bands.

PRESSURE TESTS: Connect pressure gauges at the following points and make the tests listed below.

►***TEST GAUGE NOTE:*** Five gauges are required. The four-gauge panel, No. J-4872, can be modified for use by installing an additional gauge furnished in conversion package No. J-5491 (reverse original gauges on panel, drilling additional hole to mount new gauge on lower edge of panel).

Gauge Connections—Connect gauge at each of the following points:

1) Low Servo Apply Pressure—Plug on lower front of servo cover on right side of transmission. ***CAUTION—Do not confuse this plug with Modulator Pivot Pin Retaining Plug which is slightly to rear of this Low Servo Apply Plug.***

2) Clutch Apply Pressure (Low Servo Release)—On bottom of transmission case at center and adjacent to servo mounting flange.

3) Reverse Servo Apply Pressure—On bottom of transmission case at rear and adjacent to servo mounting flange.

4) Throttle Valve Pressure—At hex-head plug in center of Low and Drive Valve Body Cover on left side of converter housing.

►***GOVERNOR PRESSURE TEST PLUG PRODUCTION CHANGE: Test plug on side of left hand side cover has been eliminated beginning in production with Trans. Serial No. C-428-D. Earlier model side covers will retain this plug.***

5) Governor Pressure—At plug on side or at upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (upper plug is between second and third top cover screws (counting from top front corner of cover).

6) Main Line Pressure—At plug on upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (plug is between third and fourth top cover screws (counting from top front corner of cover).

7) Clutch Apply or Main Line Pressure—At plug at outer end of channel in Low and Drive Valve Body Cover on left side of converter housing (this plug is at lower rear corner of cover).

Test Pressures—***CAUTION—Representative pressures listed below may vary 5% (higher or lower).***

FRONT PUMP PRESSURE

	Pressure
Idle (425 RPM)	50-60 lbs.
Above Idle	85-95 lbs.
Reverse (Idle 425 RPM)	50-60 lbs.
Reverse (Above Idle)	165-195 lbs

DRIVE (AUTOMATIC)
Transmission in Low Range

	Light Throttle (10 MPH)	Through Detent (45 MPH)
Low Apply	85-95 lbs	85-95 lbs.
Clutch Apply	0 lbs.	0 lbs.
Governor	8-13 lbs.	72½-76½ lbs.
Throttle Valve	①	①

Transmission in High Range

	Light Throttle (30 MPH)	To Detent (45 MPH)
Low Apply	85-95 lbs.	85-95 lbs
Clutch Apply	85-95 lbs.	85-95 lbs.
Governor	52-56 lbs.	72½-76½ lbs
Throttle Valve	①	①

①—Throttle valve pressure will vary from 0 to 62 lbs., depending on throttle position. At wide open throttle (through detent) pressure should read 61 to 63 lbs., on acceleration.

REMOVAL FROM CAR (EXCEPT CORVETTE)

Transmission & Torque Converter are removed as an assembly. ***CAUTION—Torque converter is not retained in housing as on previous transmission and special holding tool must be used to prevent converter falling out when transmission assembly removed.***

TRANSMISSION ASSEMBLY REMOVAL: (1) Raise car and install jack stands front and rear. Turn back floor mat and remove toe pan plate.
2) Remove spark plug wires on all models. Disconnect ground strap from battery and wires from starting motor solenoid on eight cyl models only Disconnect oil cooler lines retaining clip bolt from right side cover and disengage lines from retaining clip on engine. Move lines away from transmission and tie to right frame side rail.
3) Disconnect throttle valve control rod from throttle valve control outer lever and manual shift control rod (long rod) from bellcrank. Split rear universal joint. Then remove propeller shaft and front universal joint as an assembly by sliding it rearward until front joint is free of transmission output shaft.
4) Remove drain plug from rear of converter housing and drain transmission. Clean dirt from around filler tube, dipstick and transmission cover and remove side cover bolt retaining filler tube in position. Remove filler tube and dipstick. ***(CAUTION—Use masking tape or rubber stopper to cover filler tube opening.***
5) On V8 cars only, remove starter, and disconnect exhaust pipe from crossover pipe. On 6 Cyl. cars disconnect exhaust pipe from exhaust manifold.
6) Disconnect muffler from muffler support bracket and move the exhaust pipe and bracket as an assembly to the left and tie it to left frame side member.
7) Remove flywheel inspection hole cover and remove the three flywheel to converter attaching bolts through the opening that is adjacent to the starting motor, (opening on six cylinder cars is on left side of engine).
8) Remove all converter housing to flywheel housing attaching bolts except the top three. Install engine support bar or cradle to support engine Position jack under transmission (using a suitable transmission handling device). Remove both rear engine mountings making sure that engine is properly supported before removing mountings
9) Remove the three upper converter housing to flywheel housing attaching bolts through opening in toe pan. Move transmission to rear slightly and install converter holding tool J-5384. Lower transmission on jack and remove from under car.

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POWERGLIDE (C ntinu d)

DISASSEMBLY—TRANSMISSION

►**DISASSEMBLY & REASSEMBLY CAUTION:** ***CLEANLINESS IS EXTREMELY IMPORTANT when opening up transmission. Thoroughly CLEAN exterior of case first, CLEAN each part as removed with cleaning solvent or gasoline and dry with air—do not use wiping cloths which will leave lint on parts. Store all parts in clean storage bins.***

DISASSEMBLY OF TRANSMISSION (Into Major Units): 1) Place transmission on bench (use holding fixture J-3361) and remove all units as indicated below.

2) Remove converter assembly holding tool J-5384 from housing, remove converter assembly by pulling it straight out of housing.

3) Take out right side cover attaching bolts, remove side cover, gasket, and oil pump suction screen.

4) Take out Low & Drive Valve Body attaching screws on left side of transmission, remove valve drive body assembly and gasket. CAUTION—Do not remove outer lever assembly from valve body (this retains inner lever assembly in body).

5) Loosen all servo cover bolts slightly and break servo cover loose if it sticks to case (reverse servo spring and pressure regulator spring bear against cover) using care not to allow cover to tip which may damage or break tip of pressure regulator valve. Use guide bolts to maintain cover alignment or turn all cover bolts out evenly while exerting pressure on cover, then lift cover and gasket straight off until cover clears tip of pressure regulator valve. Remove reverse servo spring and pressure regulator springs, lift regulator valve out.

►***CAUTION—Handle valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.***

6) Remove low band adjusting screw cover, loosen low band adjusting screw locknut using tool J-4277 (see Tool Modification below), and tighten low band adjusting screw to hold clutch assembly in place.

►*CAUTION—Make sure low piston assembly does not fall out of bore and become damaged.*

►**Tool J-4277 Modification Note**—Low band adjusting screw has recessed head for Allen wrench. To use tool, remove screwdriver retainer and special screwdriver from tool, use ¼" Allen wrench in place of screwdriver in tool.

7) Working from inside of converter housing, remove the converter housing-to-transmission case self locking bolt. Remove the converter housing-to-transmission bolts and lockwashers and install two ⅜"—16 x 3¾" guide pins (part of Pilot Stud Set J-3387). Shift transmission into Reverse and then carefully separate transmission from converter housing. Remove valve body to transmission case gasket.

8) Remove manual valve from valve body on rear of converter housing, remove manual valve lever from housing, remove bronze thrustwasher from valve body oil delivery sleeve.

►***CAUTION—Handle manual valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.***

9) Take out all bolts and lockwashers attaching valve body to converter housing and front pump to valve body. Remove valve body and gasket.

►***CAUTION—Handle valve body and valves carefully to protect them from damage.***

10) Use Front Pump Driver Tool J-4263-5 to remove pump assembly from converter housing.

11) Loosen low servo band adjusting screw to free clutch assembly, remove input shaft, clutch assembly, and low sun gear thrustwasher from transmission case.

12) Remove low servo band, strut assembly, low servo piston and piston return spring from transmission case.

13) Remove speedometer driven gear assembly. Take out universal joint retainer bolt and lockwasher on rear end of output shaft, slide universal joint yoke off end of shaft.

14) Take out attaching bolts and remove governor cover on left side of transmission case, remove gasket. Remove governor assembly (allow governor to turn in clockwise direction while withdrawing it from case).

15) Use tool J-3383 to rotate parking lock pawl spring until end unhooked from case, remove spring and parking lock pawl. Remove parking lock lever and steel washer, parking lock lever shaft assembly, and oil seal from case.

16) Remove transmission oil seal using tool J-5859 and remove transmission assembly and "O" ring seal. Remove speedometer drive gear from output shaft with tool J-5814.

►*CAUTION—Do not attempt to remove planet carrier assembly until transmission rear bearing locating snap rings, retainer and bearing are removed.*

17) Remove the three bearing retainer screws and lockwashers and remove rear bearing retainer. Remove rear bearing locating snap ring from output shaft. Remove rear bearing from output shaft with tool J-5814, then remove bearing locating front snap ring from output shaft.

18) Working from front of transmission case, position the arrow on face of external gear of the planet carrier assembly at top center (this aligns the drive pin in output shaft with the eyebrow opening in the rear oil pump cover). Planet carrier assembly can now be removed through front of case. Do not lose rear oil pump drive pin.

►*CAUTION—Do not drive on end of output shaft.*

19) Remove reverse drum and thrust washer. Using tool J-4277, loosen reverse servo adjusting screw locknut, back off adjusting screw and remove reverse brake band assembly and reverse servo piston. Remove rear pump attaching bolts and lockwashers and remove rear pump assembly and gasket. Remove lubrication pressure relief valve from transmission case.

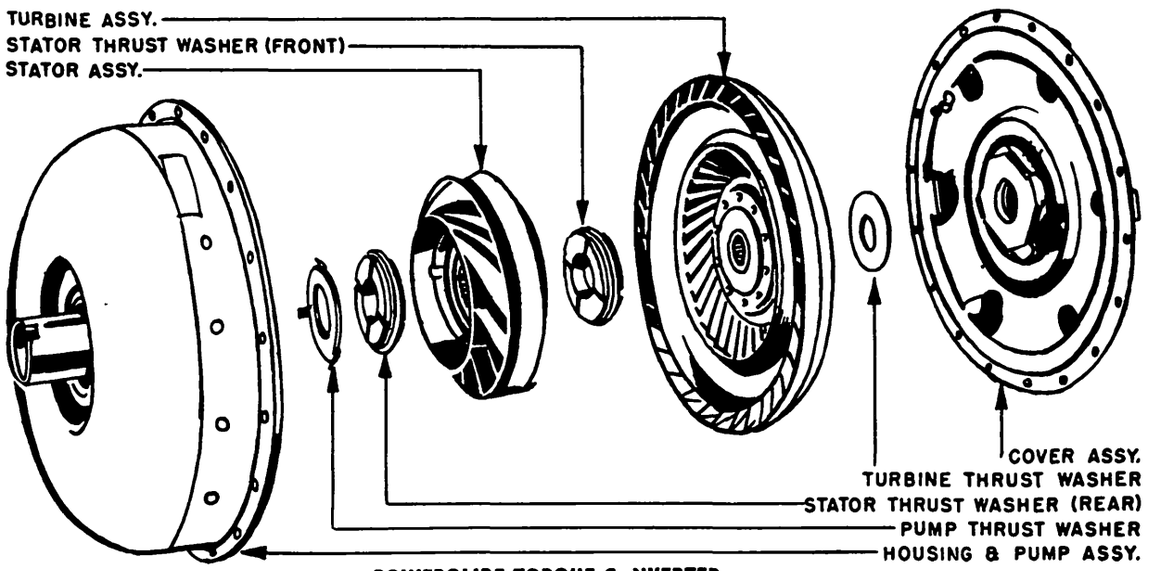
►***For DISASSEMBLY of above units, see OVERHAUL data following.***

OVERHAUL

►**"O" RING SEAL CAUTION:** ***These seals must be discarded when removed and a new seal installed exactly as directed below.*** "O" ring rubber seals are special design and are installed with side clearance in ring groove so that oil pressure on seal deforms the rubber and extrudes a portion of the rubber into the clearance space between the mating parts to provide a positive seal against loss of oil pressure. Seals **must not be re-used.**

"O" Ring Seal Installation—Make certain that parts are clean and that burrs and sharp edges are removed. Seal must be free of any twists (place ring on flat surface and allow it to assume natural position) and **must not be twisted during installation.** Engage one side of ring in groove, pull other side straight back until it can be fitted in groove

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POWERGLIDE TORQUE C NVERTER

POWERGLIDE (Continued)

without twisting. Work ring against trailing edge of groove (last side to enter when parts assembled) using flat tool entered between ring and leading edge of groove to move ring without twisting. Lubricate "O" ring and parts with transmission oil.

CONVERTER OVERHAUL (Unit on bench—after removal from transmission):

Disassembly: 1) Remove all converter cover attaching bolts and locknuts, use small punch to drive out split dowel pin in cover, lift cover off.

2) Remove turbine assembly, stator assembly, stator thrustwashers, and pump thrustwasher. Remove thrustwasher from turbine hub. Remove "O" ring seal from converter cover.

3) Remove stator race from stator assembly, remove snap ring and over-run cam retaining thrustwasher, remove cam rollers, springs, and guides (8 each).

▷*CAUTION—Use care when separating parts so that cam rollers, springs, and guides do not fall out and become lost.*

4) Remove snap ring on opposite end of stator and remove over-run cam roller and spring retainer.

▷*CAUTION—Use care to prevent damage to over-run cam and see that cam does not become disengaged from stator hub.*

Inspection: Wash all parts in cleaning solvent and dry with air. Inspect converter pump hub, turbine hub, and converter cover bushing for galling, scoring, or excessive wear. Inspect all thrustwashers for galling, scoring, or excessive wear. Check turbine vanes and stator vanes for looseness or damage. Inspect stator race and cam rollers for galling or scoring. Inspect cam springs for distortion. Check spring guides for wear or damage. Inspect over-run cam roller and spring retainer for wear or damage. If bushing in converter cover worn or damaged, install new bushing as follows:

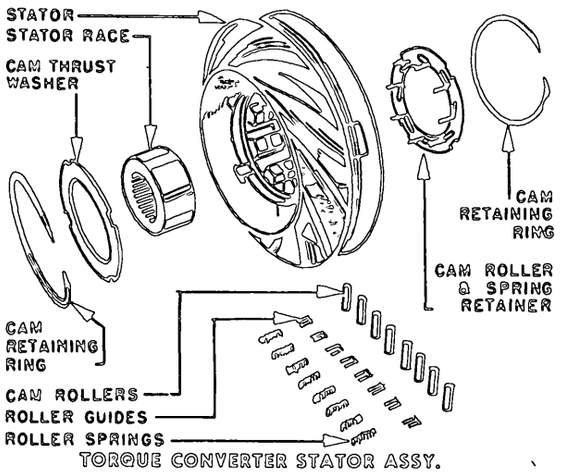
Converter Cover Bushing Replacement: Precision type bushing, No. 3702079, furnished for field installation. Use bushing remover tool J-5381 to remove old bushing from cover. Place new bushing on pilot end of Bushing Replacer Tool J-5382 and press bushing into place in cover using an arbor press. *NOTE—Bushing is finished to size and does not require reaming.*

Reassembly: 1) Install over-run cam roller and spring retainer in stator with retainer prongs pointing toward rear of stator. *NOTE*—Stator has word "Front" cast in and stator vanes are thicker at front end.

2) Assemble cam rollers, springs, and guides in cam pockets *(CAUTION*—Guides are curved and this curvature must follow curvature of cam). Install over-run cam thrustwasher and retaining snap ring.

3) Coat stator race and loading tool J-5930 with light film of oil, place stator race on pilot end of loading tool and carefully rotate the stator over the tapered end of the loading tool and the stator race *(CAUTION*—rotate stator in clockwise or freewheeling direction and use great care not to dislodge cam rollers). Check operation of stator. Stator should turn freely in clockwise direction viewed from front end.

4) Place converter pump on bench, open end up Install thrustwasher on converter pump hub making certain that tabs are engaged in the hub flange notches. Assemble both thrustwashers on stator and install stator assembly on converter pump.



TORQUE CONVERTER STATOR ASSY.

▷*CAUTION—Make certain that cut-outs in over-run cam roller and spring retainer are facing upward or toward converter turbine.*

5) Install thrustwasher on turbine hub and assemble turbine on converter pump.

6) Install NEW "O" ring seal on converter cover, align dowel pin holes in cover with dowel pins in converter pump, install cover assembly. Install all cover attaching bolts and lockwashers and tighten evenly to 15-20 ft. lbs.

TRANSMISSION OVERHAUL: *After removal from case, overhaul sub-assemblies or units as follows:*

Planetary Unit Clutch: Place unit on bench with clutch flange upward.

Disassembly—1) Remove clutch flange retainer ring, lift out clutch flange retainer. Remove clutch flange assembly from clutch drum. Remove clutch hub thrustwasher, hub, and all clutch plates from clutch drum.

2) Place clutch drum in bench press, install spring compresion tool J-5133 and compress spring enough to remove snap ring, use KMO-410 pliers to remove snap ring. Relieve spring pressure, remove tool, lift out clutch spring seat and spring.

3) Rap clutch drum face down on a wood block to dislodge clutch piston, lift piston out, remove outer seal ring from piston and inner seal ring from clutch drum hub.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect drum brake band surface for scoring or burning, check drum bushing for scoring or excessive wear. See that clutch flange does not have any appreciable play in drum slots. Check all clutch plates for burning or galling, see that composition plates are free fit on clutch hub and that steel plates are free fit in clutch flange. Check low sun gear for nicked or burred teeth. Inspect relief valve steel ball in clutch piston and make certain that ball is free to move in hole and that orifice to rear of piston is open. If necessary, replace ball as follows:

Relief Valve Check Ball Replacement—Remove staking and remove ball. Inspect hole and ball seat and make certain it is free from burrs or nicks, see that new ball seats perfectly. Insert ball and carefully stake around edges of hole so that ball cannot fall out. *CAUTION—Ball must be free to move in hole after staking completed.*

▷*REPLACEMENT PARTS CAUTION: See Chevrolet Changes, Cautions, Corrections for clutch production changes and latest type replacement parts.*

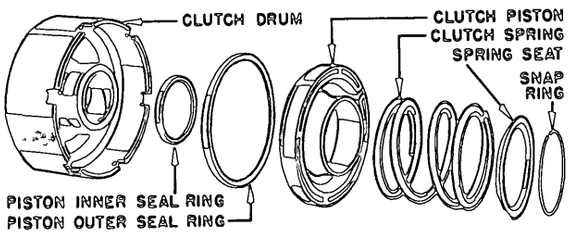
Reassembly—1) Install new outer seal ring on clutch piston with lip of seal toward pressure side of piston *(CAUTION*—use care not to stretch seal). Install new inner seal ring on inner hub of clutch drum with lip of seal toward bottom of clutch pocket.

2) Lubricate inner diameter of clutch drum and both seals with transmission oil, carefully install piston in clutch drum using a piece of feeler stock to insure seating of outer seal ring in clutch drum.

3) Install clutch spring and spring seat, use tool J-5133 in an arbor press to compress spring *(CAUTION*—Make certain spring does not hang up in snap ring groove which would damage spring seat and groove), install snap ring. Release pressure, remove tool.

4) Install thrustwasher on clutch hub *(CAUTION*—see that four tabs on washer fit into slots in clutch hub), install clutch hub and thrustwasher on clutch flange with open side up. Install five steel and four composition clutch plates, starting with a steel plate and alternating plates *(NOTE*—Steel plates are "waved" and can be installed either side up). Install clutch drum assembly on clutch flange assembly, then invert entire unit, install clutch flange retainer and flange retainer ring.

5) Check endplay using a feeler gauge inserted between clutch flange drive lug and drive slot in



POWERGLIDE CLUTCH PISTON ASSY.

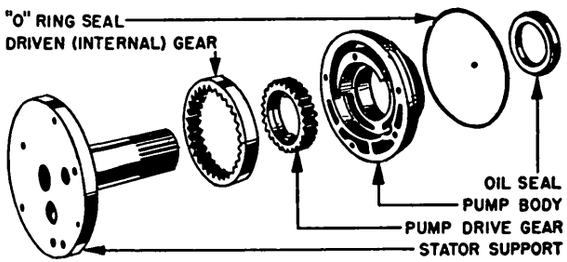
drum. This endplay must not exceed .013". Adjust by installing retainer ring of correct thickness to provide correct endplay. *NOTE*—Retainer ring furnished .055", .064", .073" thick.

Servo Cover: Disassembly—Remove pressure regulator reverse booster valve and booster valve guide and seal assembly by holding servo cover in a stationary position and pulling on protruding end of booster valve. Remove booster valve spring and booster valve spring and seat.

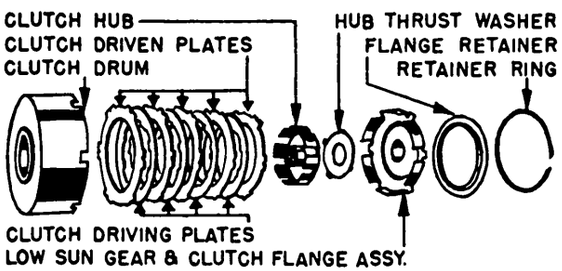
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POWERGLIDE (C ntinu d)

Inspection—Inspect cover for nicks or cracks. Using a small punch or similar tool, and working through the opening in the by-pass disc seat, exert pressure on the disc to make sure disc and spring are free and that disc is seating properly *(NOTE*—Do not remove disc seat unless there is evidence of damage). Inspect pressure regulator reverse booster valve springs for distortion or damage. Inspect pressure regulator reverse booster valve for galling or scoring and make sure it operates freely in bore in guide. Inspect snap ring for loose fit in groove. Inspect bore in valve guide for galling or scoring and check seal for distortion or damage. Check valve guide bore in servo cover for roughness or burrs and make sure that valve spring and guide spring and seat will seat properly in bottom of bore.

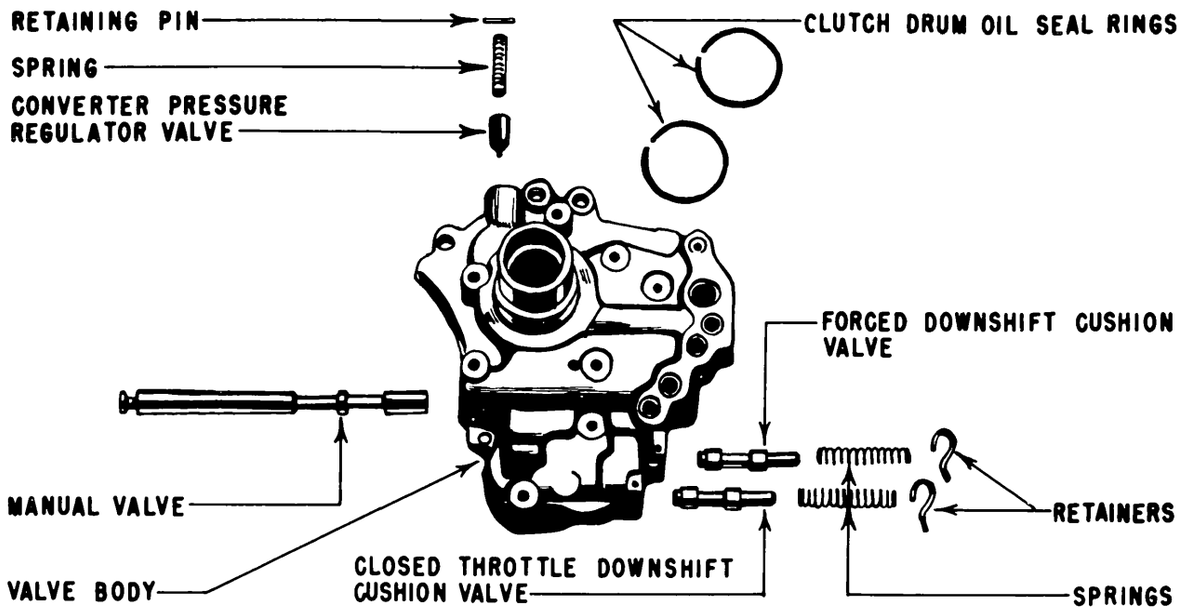


POWERGLIDE FRONT OIL PUMP



POWERGLIDE MULTIPLE DISC CLUTCH

Lubrication By-Pass Valve Assembly Replacement—If during inspection it is evident that the lubrication by-pass valve assembly is not functioning properly, correct as follows: Using a suitable tool remove the nylon by-pass disc seat, then remove disc and spring. Inspect disc for burrs, and spring for distortion. Inspect wall of by-pass valve cavity for roughness, nicks or burrs. Insert by-pass disc in its cavity to make sure its movement is not restricted. Remove disc from cavity. Replace any part that is defective. Install by-pass spring in its cavity in servo cover and install by-pass disc. With servo cover inner surface facing upward, position a new disc seat over its opening in cavity and press into place using a socket of proper size. It should be flush to .005" below inner surface of servo cover. *CAUTION—Under no circumstances should the by-pass disc seat that was removed be re-installed.*



POWERGLIDE CONTROL VALVE ASSEMBLY

Reassembly—Install pressure regulator reverse booster valve spring seat in bottom of bore in servo cover, then install valve and valve guide springs. Assemble booster valve and valve guide with the double seat of guide toward special snap ring on valve. Place valve and guide into bore in servo cover, then with thumb and finger, press valve guide and seal into bore until guide is flush with surface of cover or slightly below. *(CAUTION—Do not press booster valve guide too far below surface of servo cover as this would place heavy spring pressure on guide).*

Front Pump: Disassembly—Slide stator support out of pump body, lift out pump gears (CAUTION—use extreme care not to drop or nick gears), remove and discard "O" ring seal.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect pump gears for wear, nicks, or other damage. Inspect pump body and pump face of stator support for nicks and scoring. Inspect pump body oil seal for excessive wear, damage, or evidence of leaking (see Oil Seal Replacement below). Inspect pump body bushing for galling or scoring, check bushing wear or clearance as directed below. Check pump gear clearances as follows:

1) Pump Gear Clearances—Install clean, dry gears in pump body, check clearances with feeler gauge:

Driven Gear Clearance—.0025-.0055" clearance between outer diameter of gear and pump body.

Driving Gear Clearance—.003-.009" clearance between end of gear teeth and crescent.

Gear End Clearance—Place scale across face of pump body, measure clearance between scale and face of gears. This clearance should be .0005-.0015".

2) Pump Body Bushing Clearance—Temporarily install pump body on converter pump hub, measure bushing-and-hub clearance with a feeler gauge. This clearance should be .0005-.0015".

3) Oil Seal Replacement—Pry out old seal, use special driver J-5386 to press new seal in place in pump body.

Reassembly—Install new "O" ring seal in pump body, oil pump gears thoroughly with transmission oil and install in pump body, install stator support through pump body and driving gear and line up attaching bolt holes.

Rear Pump: Disassembly—Take out two screws and remove pump body plate, lift out pump gears.

Inspection—Wash all parts in cleaning solvent, blow out all oil delivery holes, dry with air. Inspect pump body for nicks and scoring, inspect gears for wear, nicks, or other damage. Check gear clearances (clearances are same as for front pump—see Pump Gear Clearances above). Inspect rear bearing for roughness but do not remove bearing unless replacement required (see Bearing Installation below).

Pump Bearing Replacement—Remove tnree retaining capscrews, lockwashers, and lockplate. Drive old bearing out. Press new bearing in place, install lockplate and retaining screws and lockwashers, tighten screws securely.

Reassembly—Oil pump gears thoroughly with transmission oil and install in pump body. Install pump body plate and two slotted attaching screws, tighten screws to 3½-5 ft.lbs. torque.

Valve Body: ***CAUTION—Handle all valves with care to avoid damage, keep valve and spring assemblies separate to avoid confusing or interchanging parts.***

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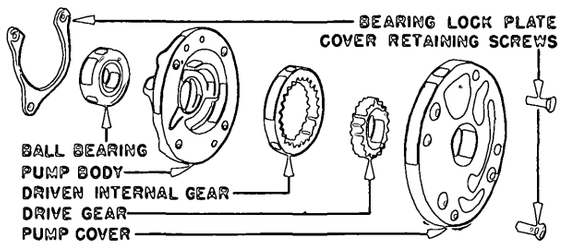
POWERGLIDE (Continued)

▷*VALVE BODY PRODUCTION CHANGES: See production and service replacement changes above.*

Disassembly—Using needle nose pliers remove the forced downshift cushion valve retainer from valve body and take cushion valve and spring from bore. Remove closed throttle downshift cushion valve in the same manner. Place valve body assembly, face down, on two wooden blocks of equal thickness and with a small pin punch drive out the converter pressure regulator valve retaining pin and remove spring and valve from bore. Remove the two clutch drum oil seal rings from oil delivery sleeve. Remove front and rear oil pump check valve from valve body.

Inspection—Wash all parts in clean solvent and blow dry with air. Do not use a rag to dry these parts. Check all springs for distortion or damage, and all valves for nicks, scores, burrs or galling, and for free movement of valves in their respective bores. Check oil seal rings for nicks or burrs and make sure that they are free in the ring grooves. Install rings in clutch drum and make sure that hooked ring ends have clearance.

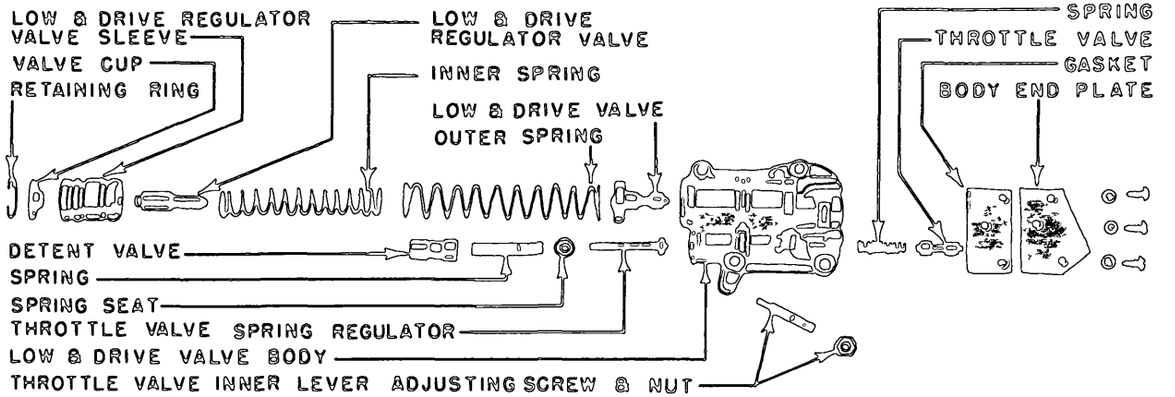
Assembly—Place valve body, face down, on wood blocks. Assemble converter pressure regulator valve spring in valve and then, as an assembly, install in valve body bore. Install retaining pin. Assemble forced downshift cushion valve spring to valve and then as an assembly, install in valve body *(CAUTION*—Do not confuse the forced downshift cushion valve spring with the closed throttle downshift cushion valve spring. *The forced downshift cushion valve spring is the shorter of the two and is made of heavier gauge wire).* Assemble and install closed throttle downshift cushion valve spring in the same manner. Install front and rear oil pump check valve in valve body making sure it is flush with or below valve body face. Install the two clutch drum oil seal rings in grooves of oil delivery sleeve.



POWERGLIDE REAR OIL PUMP

Low-and-Drive Valve Body: *CAUTION—Do not disturb Throttle Valve Adjustments (two adjusting screws—one in boss on valve body and one in throttle valve inner lever) unless required by installation of new parts. THROTTLE VALVE MUST BE ADJUSTED IF THESE SETTINGS DISTURBED (see Throttle Valve Inner Lever Adjustment).*

Disassembly—1) Remove valve body-to-side cover attaching bolts and lockwashers. While holding detent valve in place, use soft hammer to carefully tap inner face of side cover until it is free of the locating pins *(CAUTION*—Use care to keep parts from falling out and being lost or damaged while performing this operation).



POWERGLIDE LOW & DRIVE VALVE ASSEMBLY

2) Withdraw detent valve, spring, spring seat, and throttle valve spring regulator assembly from valve body. Remove throttle valve spring and throttle valve.

3) Use Pliers J-5403 to remove special snap ring retaining low-and-drive regulator valve cap, then remove the valve parts as follows: Valve Cap, Sleeve and Valve (as an assembly), Inner and Outer Springs, and Valve.

4) Take out two attaching screws and remove clutch exhaust cover plate ("L" shaped strip) from the side of the valve body.

5) Take out three attaching screws and lockwashers in end plate (CAUTION—exert pressure on plate while removing screws to prevent parts flying out), remove plate, remove valve parts as follows: Clutch Exhaust Secondary Control Valve, Spring, Stop (from upper valve bore), Clutch Exhaust Primary Control Valve Spring, Stop, Valve (from center valve bore), and throttle valve and spring (NOTE—some early cars used two springs, one inside the other).

6) Remove throttle valve outer lever assembly, shield, and inner lever assembly (CAUTION—do not disturb adjusting screw in inner lever unless required by parts replacement). Remove throttle valve lever shaft seal.

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Inspect all valves for nicks, burrs, scoring, or galling. Check all valves for free operation in their respective bores. Inspect all valve springs for distortion or damage. Inspect throttle lever assembly shaft for wear, scoring, or galling, see that shaft operates freely in side cover and that inner lever is tight on shaft. Inspect detent valve stop in side cover for distortion or damage, install new stop if necessary. Inspect locating pins in valve body and side cover for distortion or damage (one pin should be in side cover, other pin in valve body), replace pins if necessary. Inspect mating surfaces of valve body and side cover and make certain they are free of nicks or burrs.

Reassembly—1) Install low-and-drive valve in body bore (CAUTION—valve must be guided to prevent damage to the bore—use a piece of brake tubing inserted in valve shank bore at rear of valve body, engage nib on valve in end of tubing, move valve into position slowly). Install remaining low-and-drive valve parts in reverse order of disassembly (install regulator valve and cap on valve sleeve first and then install in valve bore as an assembly making certain inner spring is seated on sleeve). Compress assembly in valve bore while installing special snap ring, make certain ring properly seated in groove in valve body.

2) Install clutch exhaust secondary and primary valve assemblies (CAUTION—use care not to confuse these valve parts—primary control valve stop is the longer of the two stops, and primary control valve spring is the shorter of the two springs). Install throttle valve spring and valve in valve body, then install end plate and hold plate in position while tightening end plate attaching screws, tighten these screws to 2½-3½ ft.lbs. torque.

3) Install throttle valve spring regulator assembly in valve body and see that it is seated on throttle valve spring. Install detent valve spring seat, valve spring, and valve (thread pin of the throttle valve spring regulator assembly through the opening in the spring seat and valve).

4) Clamp side cover in a vise (face upward), align locating pin in side cover with hole in valve body, exert pressure on valve body to keep locating pin in the hole and at the same time compress detent valve in valve body bore and rotate valve body counter-clockwise until the locating pin in the valve body enters the locating hole in the side cover (CAUTION—make certain face of detent valve is resting against stop pin in side cover). Install attaching bolts and lockwashers, tighten bolts evenly to 3½-5 ft.lbs. torque.

5) Install throttle valve inner lever assembly in side cover, install new seal on shaft and into counterbore in cover, install shield. Install outer lever assembly on inner lever shaft, install outer lever attaching bolt from underside, tighten nut securely.

If lever adjustments disturbed during overhaul, readjust throttle valve as follows:

Throttle Valve Inner Lever Adjustment: Rotate throttle valve inner lever until it just contacts face of the detent valve. Hold lever in this position and turn adjusting screw until it just contacts flat surface of

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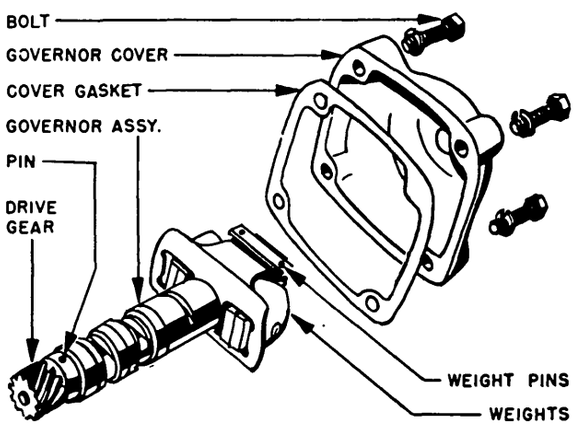
POWERGLIDE (C ntinu d)

the step in the lever. Back off one complete turn and lock in this position by tightening adjusting screw lock nut securely.

Governor: ***CAUTION—The only parts serviced for replacement are the governor assembly (complete), and driven gear. Governor should not require disassembly except for cleaning and removal of foreign material causing improper operation. See "Governor Driven Gear Replacement" below for disassembly & reassembly.***

Governor Driven Gear Replacement: A unit package containing a governor driven gear and pin, and two governor weight pins is available for service replacement. ***(CAUTION—The 1955 driven gear is not interchangeable with gears on previous models).*** Install new gear and pins in the following manner:

Installation—Cut off ends of governor weight pins and remove weights and governor valve. ***(NOTE***—Carefully protect governor valve to prevent damage. Weights are interchangeable from side to side). Drive out governor gear retainer split pin using a small punch. Support governor on 3/16" plates installed in exhaust slots of governor sleeve, place in arbor press and with a long punch, press gear out of sleeve. Carefully clean governor sleeve of chips and reinstall in arbor press. Position new gear in sleeve and with a suitable socket, press gear into sleeve until nearly seated. Then remove any chips that may have shaved off the gear hub and press gear in until it bottoms on shoulder. ***(CAUTION—It is important that a socket be used to prevent damage to thrust button on end of gear).*** Drill a new hole through sleeve and gear locating it 90° from existing hole, using a No. 24 (.152") drill. Install split pin retainer. Wash governor assembly thoroughly. Install governor valve and make sure that it operates freely. Install governor valve in bore of governor sleeve. Align governor weight pin holes in the governor thrust cap, governor weight assemblies and governor sleeve and install new pins. Crimp both pins to prevent them becoming dislodged. Check governor weight assemblies for free operation on pins.



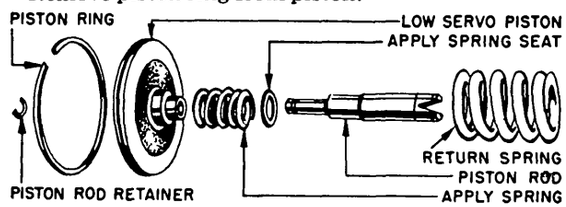
GOVERNOR ASSEMBLY

Low Servo Piston: Disassembly—Place piston assembly in bench press supporting notched end of shaft on wooden block, install tool J-3377 (same tool used for Reverse Servo) on top of piston, compress spring sufficiently to enable rod retainer "C" washer to be removed from end of rod, relieve spring pressure, remove piston, spring, and washer from piston rod. Remove piston ring from piston.

Inspection—Wash all parts in cleaning solvent, dry with air. Inspect all parts for wear or damage. Install piston ring in low piston bore and check ring gap with feeler gauge. Gap should be .005-.010".

Reassembly—Assemble all parts on piston rod, compress spring in bench press and install piston rod retainer making certain that it is properly seated in groove. ***CAUTION—Spring pressure is 150 lbs. and assembly must be handled carefully.***

Reverse Servo Piston: Disassembly—Place assembly in bench press with spring end up, install tool J-3377 on spring retainer, compress spring sufficiently to enable retainer key locks to be removed, relieve spring pressure, lift off retainer, springs, and piston. Remove piston ring from piston.



POWERGLIDE LOW SERVO ASSY.

Inspection—Wash all parts in cleaning solvent, dry with air. Inspect all parts for wear or damage. Install piston ring in reverse piston bore and check ring gap with feeler gauge. Gap should be .005-.010".

Reassembly—Assemble all parts on piston rod, compress spring in bench press and install retainer locks, make certain locks seated properly in rod groove.

Planet Carrier Assembly: ***Should not be disassembled unless inspection below indicates overhaul required. See Planet Carrier Overhaul below.***

►*PLANET REVERSE RING GEAR AND DRUM ASSEMBLY PRODUCTION CHANGE (to accommodate a new .020" steel thrust washer):* Beginning with transmission serial number C-128-D, a new steel thrust washer is used between planet carrier and reverse gear and drum to prevent galling of thrust surfaces. A service package, Part No. 3721564, consisting of a Planet Reverse Ring & Drum Assembly, Part No. 3720472, and an Output Shaft Thrust Washer, Part No. 3720474, is available for service replacement on 1953-54 & Early 1955 cars.

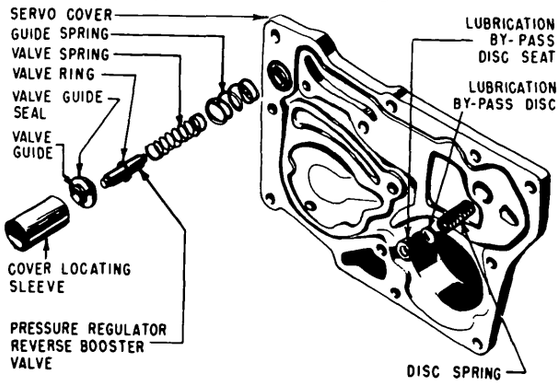
Inspection—Wash in cleaning solvent, blow out all passages, dry with air. Inspect all gear teeth for nicks, scoring, or other damage. Check end clearance of planetary pinions with feeler gauge inserted between ends of pinion and thrustwasher. This clearance should be .006-.030". Check reverse sun gear rear thrustwasher for wear or damage. Inspect drum bushing for wear, scoring, or damage; inspect outer diameter of drum for scoring or burning. Check output shaft bearing surfaces for wear, nicks, or scoring. Check input pilot bushing for wear or scoring.

Planet Carrier Overhaul: ***If inspection (above) indicates that parts require replacement, proceed as follows:***

Disassembly—Place assembly in holding fixture or clamp in a vise with front end upward. Mark each pinion shaft and also mark planet carrier (use prick punch or other means) so that shafts can be re-installed in same position ***(CAUTION***—pinion shafts are selective fit in carrier and location must not be changed). Then proceed as follows:

1) Remove pinion shaft lockplate screws, rotate plate counter-clockwise until it is free and remove the plate.

2) Starting with one short planet pinion, use a soft steel drift to drive on lower end of pinion shaft until shaft raised above the press-fit area of the output shaft flange, then insert tool J-4599 (one piece only —second piece of tool set used for reassembly) into short planet pinion from lower end and push shaft out until tool is centered in the pinion and shaft is removed. Remove short planet pinion from assembly. Remove tool from pinion, remove needle bearings and needle bearing spacer ***(CAUTION***—use care not to lose any of the needle bearings).



POWERGLIDE SERVO COVER ASSEMBLY

3) Remove **adjacent** long planet pinion (paired to the just-removed short pinion by using same thrustwashers) by repeating procedure in step (2) above. Then remove the pinion upper and lower thrustwashers.

4) Remove all remaining planet pinions **in pairs** (short pinion first, followed by long pinion) by following procedures in steps (2) and (3) above.

5) Remove reverse sun gear and sun gear thrustwasher.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect all pinion gears and reverse sun gear for nicked or otherwise damaged teeth, inspect all thrustwashers for wear, nicks, or scores. Inspect needle bearings for wear and replace **all** needle bearings if worn excessively.

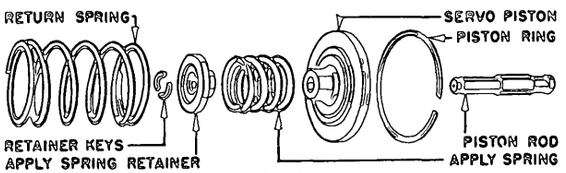
Reassembly—***CAUTION—Pinion shafts must be reinstalled in accordance with marks made before disassembly (shaft is selective fit in particular hole in carrier).*** Assemble and install parts as follows:

1) Install tool J-4599 in one long planet pinion, assemble needle bearing spacer and needle bearings in pinion (20 at each end) using cup grease to hold needle bearings in position.

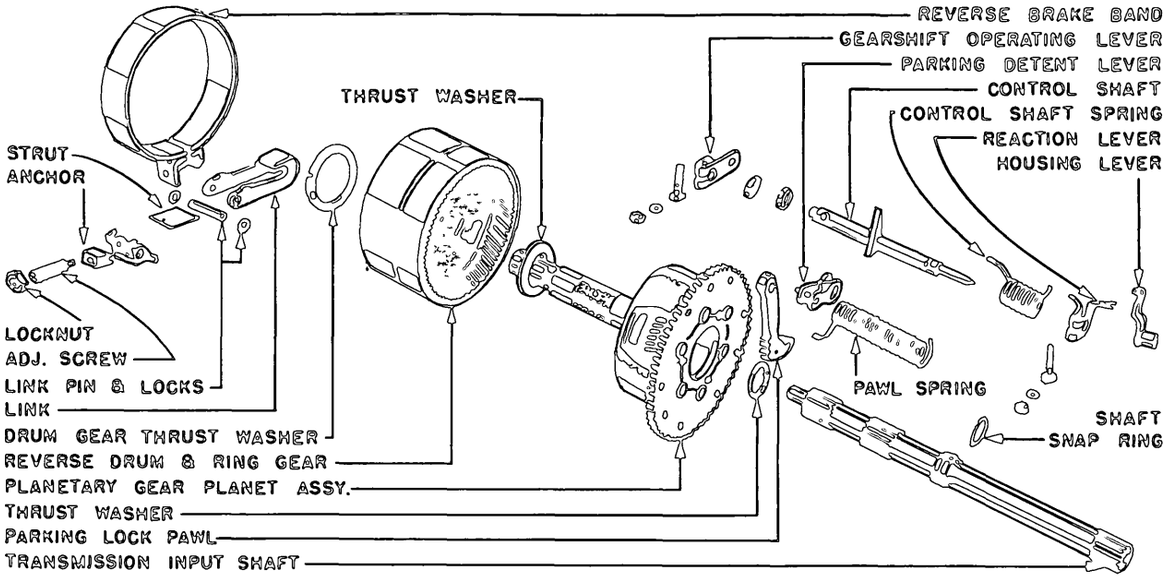
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POWERGLIDE (Continued)

2) Install pinion assembly in planet carrier with tool centered in assembly and with thrustwasher at each end of pinion. *NOTE*—Long pinions are located opposite closed portion of carrier, short pinions are located opposite carrier openings. Feed the second part of tool J-4599 in from the top of the planet carrier *(CAUTION*—make certain tool picks up thrustwasher) and push first part of tool down and out at the lower end *(CAUTION*—make certain this tool picks up thrustwasher as it is pushed down). Lubricate correct pinion shaft (see Reassembly Caution above) and install it from top pushing the assembling tools out ahead of it. Turn shaft so that slot in upper end faces toward center of assembly, tap shaft down with a brass or soft steel drift until lower end is flush with lower face of carrier.



POWERGLIDE REVERSE SERVO ASSY.



POWERGLIDE PLANET CARRIER, REVERSE BAND, & PARKING LOCK

3) Assemble and install adjacent short planet pinion (paired with just-installed long planet pinion by using same thrustwashers) by repeating procedure in steps (1) and (2) above.
4) Install reverse sun gear thrustwasher and reverse sun gear.
5) Install all remaining planet pinions in pairs (long pinion first, followed by short pinion) by following the procedure in steps (1), (2), (3) above.
6) Check end clearance of planet pinions using feeler gauge inserted between end of pinion and thrustwasher. This clearance should be .006-.030".
7) Install pinion shaft lock plate with extended portions in line with pinion shaft slots, rotate plate clockwise until plate locks all pinion shafts and attaching screw holes line up. Install lock plate attaching screws and tighten to 2½-3 ft.lbs.

Imput Shaft: Inspect shaft splines for wear, nicks, or other damage. Check spline fit in clutch hub, reverse sun gear, and converter hub. Inspect oil seal ring for wear and free fit in groove, remove ring (compress one end, push other end outward to free locked ends) and install ring in valve body bore to make certain hooked ends have clearance, then reinstall ring on shaft. Check snap ring in groove at forward end of shaft (this ring first used in 1953 transmissions and prevents shaft floating forward), replace if worn or damaged using snap ring pliers KMO-410.

Transmission Case & Rear Bushing: Check case for cracks, inspect rear bushing for wear or damage and replace if necessary.

Bushing Replacement—Place transmission case in an arbor press with rear end up. Using a cape chisel, cut bushing and remove from bore in case. Install rear bearing in its bore in rear oil pump assembly and install rear oil pump in case to serve as a pilot when installing new bushing. Place transmission case in an arbor press with front end up. Place new bushing on bushing installer J-4276, with the square end of bushing against shoulder of installer. Insert in case, entering pilot of tool into rear bearing, and press bushing into place. Bushing is precision type and does not require reaming.

Low & Reverse Brake Bands: Inspect bands for wear, cracks, and scored or burnt lining. Lining is bonded to band. Inspect linkage for wear.

REASSEMBLY

AFTER ALL MAJOR UNITS REASSEMBLED (See Overhaul above), install units as directed below using ALL NEW GASKETS AND SEALS and tightening all parts evenly to SPECIFIED TORQUES.

CONVERTER HOUSING ASSEMBLY: *Install units:*

Valve Body: First install suction screen in oil sump *(CAUTION*—screen must be thoroughly cleaned), see that sealing ring is in place. Install two ¼—20 x 3½" guide pins (part of Pilot Stud Set J-3387) in two valve body attaching bolt holes, place new valve body gasket in position over guide pins, install valve body assembly. Install all attaching bolts *(CAUTION*—lower left bolt over accumulator bore is special self-locking type and must be installed in this position), tighten all bolts evenly in a criss-cross pattern to 7½-10 ft.lbs. torque. Check manual valve and pressure regulator valve for free operation after all bolts tightened.

Front Pump: Align holes in stator support with mounting holes in pump body, install two ¼—20 x 3½" guide pins (part of Pilot Stud Set J-3387) in pump mounting holes, use Driver J-4263-5 to install pump in converter housing *(CAUTION*—line up suction and oil delivery holes on left side of pump). Install five self-locking bolts through valve body and into pump, tighten all bolts evenly to 7½-10 ft.lbs. torque. *CAUTION—Check pressure regulator valve for free operation after bolts tightened and make certain that pump operates freely.*

Low-and-Drive Valve Body: Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in two valve body mounting bolt holes on left side of converter housing, place new gasket in position over guide pins, install valve body assembly. Install attaching bolts and lockwashers, tighten bolts evenly to 12½-15 ft.lbs. torque.

TRANSMISSION CASE ASSEMBLY: Install units:

Rear Pump: Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in pump attaching bolt holes, place new gasket in position over guide pins, install pump *(CAUTION*—align oil suction and delivery holes), tighten pump mounting bolts evenly to 12½-15 ft.lbs. torque.

Lubrication Pressure Relief Valve: Make certain that valve is clean and openings free from obstructions, see that valve disc and spring operate freely. Install relief valve in mounting hole in rear of transmission case and tighten securely.

Reverse Servo Piston, Band, & Drum: Compress piston ring with Ring Compressor J-3365, install servo piston in case with notch in shaft toward front of case. Install reverse brake band and strut assembly with thin end of band away from piston, thread adjusting screw in until it indexes with hole in anchor. Install bronze thrustwasher on reverse drum hub, install drum in case and into brake band. *DO NOT adjust band at this point.*

Planet Carrier Assembly: Rotate rear pump drive slot to top of pump. Fill drive pin hole in output shaft of planet carrier with cup grease and install drive pin. *(CAUTION—Make sure that drive pin does not fall out of shaft during assembly).* Install planet carrier assembly in drum positioning the arrow on face

CONTINUED ON NEXT PAGE

POWERGLIDE (Continued)

of the external gear of planet carrier assembly at top center *(NOTE*—On late 1955 transmissions a steel thrust washer is used between planet carrier and reverse ring gear & drum. *See "Planet Reverse Ring Gear and Drum Assembly Production Change" above).* Install rear bearing locating front snap ring in its groove in output shaft and install rear bearing using tool J-5814 *(NOTE*—Groove in outer diameter of rear bearing should be to rear of transmission). Install rear bearing retainer in groove in outer diameter of rear bearing and attach to rear oil pump with screws and lockwashers. Tighten to 7-8½ lbs. Install rear bearing rear locating snap ring in its groove in output shaft. Using tool J-5814, install speedometer gear on output shaft. Center raised ground surface of output shaft so that it will mesh properly with the speedometer driven gear. Install new "O" ring seal on speedometer driven gear fitting. Assemble driven gear in fitting and then install as an assembly in bore in extension. Install retainer, attaching screw and lockwasher. Tighten to 3½-5 ft. lbs.

Reverse Band Adjustment: Adjust band at this point. *See BAND ADJUSTMENT.*

Transmission Endplay Check & Adjustment: After planet carrier assembly installed in case, the correct thickness of the low sun gear-to-reverse sun gear thrustwasher must be determined for the correct transmission endplay of .007-.035" as follows:

(1) Use Tool J-4260 to measure distance from face of transmission case flange to face of reverse sun gear in planetary unit (place tool bar against case flange, extend tool stem until it contacts gear face), tighten thumbscrew to retain this tool setting.
(2) Install bronze thrustwasher and clutch assembly temporarily on oil delivery sleeve.
(3) Without disturbing tool setting obtained in step 1 (above), place .120" steel washer over tool pilot (short plug on tool bar), install tool over clutch assembly with tool pilot entered in low sun gear and tool stem against gasket on rear face of housing. Use feeler gauge to measure clearance between face of low sun gear and steel washer on tool pilot. If clearance not within .007-.035", repeat this procedure with .095" or .145" steel washer on tool pilot.
(4) When correct clearance of .007-.035" secured in step 3 (above), note thickness of steel washer used on tool and select bronze thrustwasher of same thickness for installation on input shaft splines at final installation (below). Remove clutch assembly and thrustwasher from oil delivery tube.

▷**Thrustwasher Note**—This bronze thrustwasher furnished in three thicknesses as follows: Part No. 3694467—.095", No. 3694468—.120", No. 3694469—.145".

Parking Lock Mechanism: Install parking lock lever shaft assembly in case, install seal over end of parking lock lever shaft and into counterbore in case with lip seal toward inside of case. Install flat washer and parking lock lever on end of shaft, push lever on shaft for clearance of .000-.010" between lever and washer, tighten clampscrew to 8-12 ft.lbs. Install parking lock pawl over pawl support rod, install parking lock pawl spring, wind up pawl spring (tool J-3383) until spring catches on case.

Input Shaft & Clutch Assembly: Install input shaft in clutch unit. Install bronze thrustwasher selected in "Transmission Endplay Check & Adjustment" (above) on reverse sun gear splines of input shaft *(CAUTION*—flat side of washer must be toward reverse sun gear). Install assembly in case indexing input shaft pilot with pilot in output shaft and mesh low sun gear with short planetary pinions.

Low Servo Piston & Band Assembly: Install release spring on servo piston rod, use Ring Compressor J-3365 to compress piston ring and install assembly in transmission case. Install low brake band over the drum. Install apply strut guide spring over piston rod, engage apply strut in piston rod slot and engage opposite end of strut in the band. Engage anchor strut assembly in band groove and locate opposite end of anchor over the adjusting screw. *DO NOT adjust the band at this point.*

Governor: Install governor assembly in bore in transmission case *(CAUTION*—Governor must be allowed to rotate counter-clockwise as gear teeth mesh and care must be taken not to damage gear teeth). Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in governor cover mounting holes, place new gasket in position over guide pins, install governor cover, attaching bolts and lockwashers. Tighten cover bolts evenly to 6½-8½ ft.lbs. torque.

Extension Housing: Position new "O" ring seal on transmission extension. Then carefully install extension on transmission case. Install attaching capscrews and lockwashers and tighten to 12-15 ft. lbs. Install transmission extension oil seal using tool J-5154.

TRANSMISSION & CONVERTER HOUSING ASSEMBLY:
1) Install manual valve in valve body and manual valve inner lever in converter housing. Index lever pin with pick-up slot in valve, set manual valve so that it protrudes 1 11/16" out from face of valve body. This places valve in Reverse position.
2) Install new valve body-to-transmission case gasket.

▷*CAUTION:* Two different valve body-to-case gaskets are used with the early and late type valve bodies. THESE GASKETS ARE NOT INTERCHANGEABLE. *See "Control Valve & Gasket Production Change and Service Replacement Note" above for control valve identification and gasket differences.*

3) Place transmission manual valve lever in top detent position *(NOTE*—this is Reverse position and will align reaction lever so that it will index with manual drive inner lever in converter housing).
4) Place clutch drum thrustwaher in position on oil delivery sleeve.
5) Install two ⅜—16 x 3¾" guide pins (part of Pilot Stud Set J-3387) in two opposite converter housing mounting bolt holes, carefully bring transmission case and converter housing together making certain that reaction lever indexes properly with manual valve inner lever. Install all case-to-housing bolts and tighten evenly to 25-30 ft.lbs. Install special self-locking bolt through front face of converter housing and tighten this bolt to 25-30 ft.lbs.
6) Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in two servo cover attaching bolt holes, place new gasket in position over guide pins. Install pressure regulator valve and inner and outer valve springs (see Note below) through servo and into case, install reverse servo return spring. Install servo cover over guide pins *(CAUTION*—see that pressure regulator springs and reverse servo spring seat properly in pockets in cover), maintain pressure on cover while installing and tightening cover bolts, tighten bolts evenly to 12½-15 ft.lbs.
7) Adjust Low Servo Band. *See Band Adjustment.*
8) Install converter assembly in converter housing making certain that front pump drive lugs aligned with slots in converter pump hub. Install converter holding tool J-5384 using one housing bolt to hold tool (tool will prevent converter falling out while being installed on engine).
9) Check and adjust position of throttle valve outer lever. *See Throttle Linkage Adjustment.*

INSTALLATION IN CAR

TRANSMISSION ASSEMBLY INSTALLATION: 1) Install assembly in handling fixture on hydraulic jack and roll into position under car. Raise transmission until converter housing is in approximate alignment with flywheel housing.
2) Remove converter assembly holding tool from converter housing. Then carefully align "X" mark on converter cover with "X" mark on flywheel.

▷*CAUTION—After removing converter holding tool be careful that converter does not move forward causing disengagement of the pump hub drive slots from lugs of the front pump drive gear.*

3) Install one 5/16"—24 guide pin in converter cover. Rotate converter assembly until guide pin is in alignment with opening in flywheel housing. Maneuver transmission assembly until converter housing-to-flywheel housing bolt holes are in alignment and the flywheel pilot enters flywheel.
4) Install all but the uppermost three converter housing-to-flywheel housing attaching bolts. Through the opening in flywheel housing, remove guide pin from converter cover and install three flywheel-to-converter bolts, rotating flywheel as necessary. Tighten bolts to 25-30 ft. lbs.
5) Install filler tube and measuring dipstick. Install flywheel inspection hole cover. Install rear engine mountings (both sides). Remove engine support bar or cradle. Disconnect hydraulic jack handling fixture from transmission and remove jack.
6) On V8 cars, install starting motor. On all models, connect oil cooler lines and engage them in retaining clip on right side cover. Connect throttle valve control rod to throttle valve control outer lever and manual shift control rod (long rod) to bellcrank. On V8 cars, install breather pipe in cylinder block.
7) Engage internal splines of front yoke of front universal joint with external splines of transmission output shaft. Then slide front universal joint and propeller shaft as an assembly forward enough to connect rear universal joint.
8) Connect speedometer cable to transmission. On V8 cars, connect exhaust pipe to exhaust crossover pipe. On 6 Cyl. cars, connect exhaust pipe to exhaust manifold. Connect muffler to muffler support.
9) Lower car to floor and install the three remaining upper converter housing-to-flywheel housing attaching bolts through opening in toe-pan. Restore floor mat to its original position. Install spark plugs on all models. On V8 cars, connect battery ground strap and wires to starter solenoid.
10) Fill transmission with Automatic Transmission Fluid Type A. *See "Lubrication" above.*

POWERFLITE (CHRYSLER DE SOTO, DODGE, PLYMOUTH)

Chrysler, Desoto, Dodge, Plymouth (1956).

►CHANGES, CAUTIONS, CORRECTIONS

►*PUSHING CAR TO START ENGINE:* Pushing is recommended rather than towing. With the "N" (Neutral) button pushed in, turn the key to "ON" position. When car reaches a speed of approximately 25 MPH, push in the "L" (Low) button. This will allow the transmission to crank the engine.

►*TOWING POWERFLITE CARS:* Following procedure recommended.

Transmission Inoperative – Disconnect propeller shaft or tow car with rear end raised.

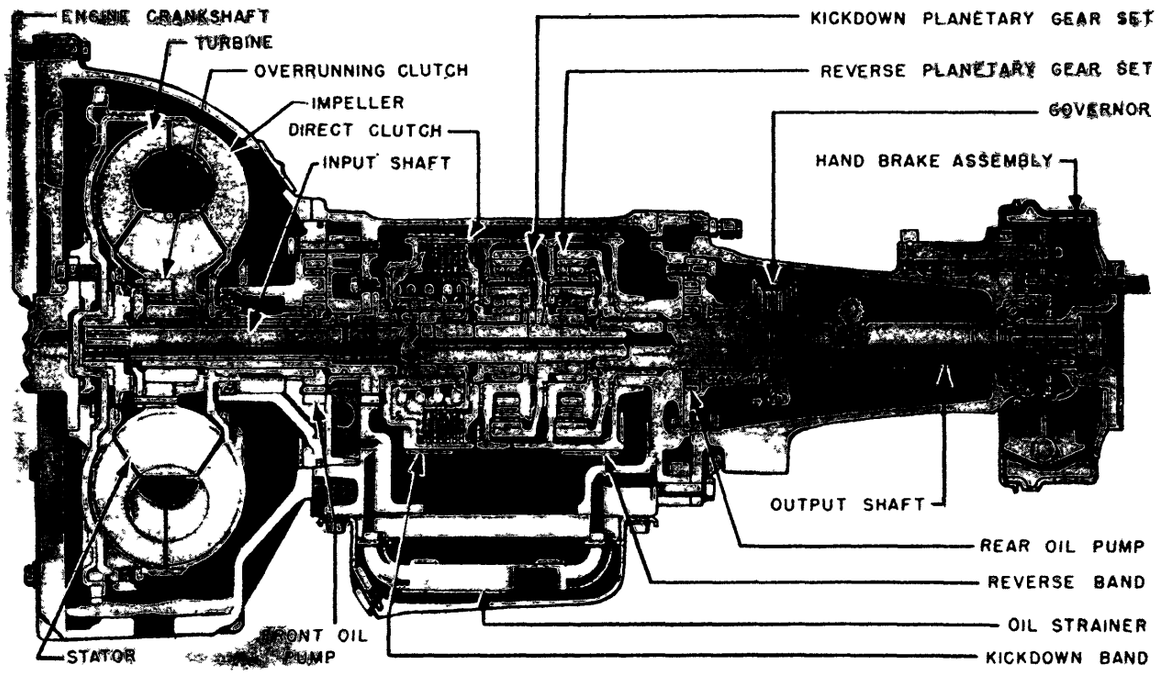
Transmission Operating – The car may be safely towed at moderate speeds with the "N" (Neutral) button pushed in. For long distance towing (over 100 miles), the propeller shaft should be removed.

►*1956 NEUTRAL STARTER SWITCH PRODUCTION CHANGE:* On later production cars, the neutral starter switch contact plunger spring tension has been reduced (the effort required to depress spring on the new switch is 8 ozs., at .030" depression). To determine if switch is later type, check with finger pressure. An "O" ring seal and cupped washer is used with the new switch and the transmission case has been changed by having a 60° (included angle) countersink in switch assembly hole. The later type switch must be used only on transmission cases having the angle countersink in switch hole. *NOTE* – The "O" ring seal and washer may be used on early type switches in transmission case not having the countersink provided the tolerance stack-up permits proper adjustment of the switch without exceeding 75 ft. lbs. torque, in which case the original washer should be used. *See "Neutral Starter Switch Adjustment" under "Manual Cable Adjustment" below.*

►*1956 POWERFLITE TRANSMISSION DRAIN PLUG ELIMINATED:* On later production cars, the drain plug has been eliminated. When necessary to drain the transmission, remove the filler tube connector at the oil pan.

►*1956 POWERFLITE DATE CODE NOTE:* Transmission building date is indicated by a code stamped on lower right side of case immediately after the transmission part number. Months are indicated by letters beginning with "A" (January), date and year by number.

►*1956 POWERFLITE PLANET PINION CARRIER (AND RELATED PARTS) PRODUCTION CHANGE:* On transmissions having a date code C-7-56 and later, aluminum planet pinion carriers are being used. The following parts are not interchangeable with previous transmissions: Kick-down Planet Pinion Carrier, Reverse Planet Pinion Carrier, Kick-down Annulus Gear, Reverse Annulus Gear, and Planet Pinion Carrier Housing. The Kick-down Annulus Gear used with aluminum pinion carriers can be identified by ¼" letters "A-L" stamped on flange. The later type Planet Pinion Carrier Housing is identified by a flat rear surface on housing (early type had a ridge machined on the rear, outer large diameter of the assembly). Dimensions of Reverse Annulus Gear are different from early type, and there are no special identifying marks on gear.



POWERFLITE TRANSMISSION (SECTIONAL VIEW)

►*1956 PLYMOUTH POWERFLITE TORQUE CONVERTER HOUSING & ADAPTER PLATE PRODUCTION CHANGE:* Dimensions have been changed on torque converter housings and adapter plates starting with Engine No. P-28-56973 and P-29-151148. Early and late type housings and adapters are not interchangeable The following table indicates dimensions for early and late types.

Part	Early	Late
Adapter Plate	① 3/4" thick	② 1 1/8" thick
Housing	③ 7 19/64"	③ 6 15/16"

① – Part No. 1613713 (P-28); 1613712 (P-29).
② – Part No. 1630850 (P-28); 1630841 (P-29).
③ – Measured from face-to-face.

►*1956 POWERFLITE THROTTLE VALVE AND SPRING PRODUCTION CHANGE (To Eliminate Valve Buzz or Flutter on Downshift):* A new throttle valve and spring (Service Pkg. No. 1752242) is being used in production and is available for service replacement. A chamfer on the reaction surface of valve, with a heavier valve spring eliminates valve buzz or flutter on downshift.

►*1956 POWERFLITE FRONT PUMP DRIVE SLEEVE & SEAL PRODUCTION CHANGE AND SERVICE REPLACEMENT NOTE:* A new front pump drive sleeve, Part No. 1630808, and drive sleeve seal, Part No. 1630809 is being used in production on transmission having a date code of A-23-57 and later (a letter "E" after the transmission part number also identifies this change). The later type "O" ring seal replaces the former metallic seal ring, and must be used in conjunction with the later type sleeve. It is preferable to use the early type drive sleeve and seal on transmissions built before the above date code.

►*1956 DESOTO ENGINE VALVE BENDING IN SERVICE (On cars having transmissions with date codes before B-9-56):* Valve bending results when the transmission downshifts at high speeds (above approximately 75 MPH). At the instant the downshift occurs, engine RPM is momentarily increased to a point where valve "pump-up" is encountered with consequent valve bending. To correct this condition, remove the rear pump housing and enlarge the .090" governor oil feed hole to 5/32" (governor oil feed hole is located in the smaller of the two depressions at ends of baffle under the pump gears). Check governor weight and valve for scoring and make sure governor has free movement after assembly. Adjust and correct push button control and manual shift lever. Check engine valve spring tension and replace springs not within specifications.

►*1956 POWERFLITE CLUTCH PLATE REPLACEMENT CAUTION:* The number of clutch plates and discs have been changed on some models. When replacing plates and discs, the same number should be used for replacement as those originally installed in transmission.

►*1956 DESOTO HISSING OR WHISTLING NOISE CORRECTION (In neutral or in forward driving ranges up to approximately 30 MPH):* Remove and disassemble

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POWERFLITE (C nt.)

valve body and transfer plate assembly. Remove rear pump check valve (one with small orifice in center) and discard the valve. Replace with a FRONT PUMP check valve in which a .030" square notch has been filed in the ridge on face of valve (a 32 tooth hacksaw blade can also be used to cut the notch). Use extreme care that only one notch is cut in the valve.

►*PUSH BUTTON CONTROL ASSEMBLY PRODUCTION CHANGE:* Early type control with locking pawl replaced in production with a new type having slide locks attached to slides, and no locking pawl. The new control unit prevents the possibility of releasing any one button until a newly selected gear range push button is completely engaged. The later type unit is identified by the absence of the locking pawl, and the slide locks attached to slides. Both units are interchangeable and have the same part number.

DESCRIPTION

DESCRIPTION: PowerFlite transmission consists of a torque converter and a two-speed hydraulically controlled planetary gear type automatic transmission of the same design as used on 1955 models. *See "PowerFlite Transmission" in 1955 Annual Data or later Manual edition.*

OPERATION

OPERATION: The PowerFlite transmission operates in the same manner as in 1955 models. *See "PowerFlite Transmission in 1955 Annual Data or later Manual edition.*

LUBRICATION

►*1956 POWERFLITE OIL LEVEL CHANGE:* With transmission cold (room temperature 70° F), oil level should be between the "low" mark and bottom of oil level indicator. With transmission hot (after normal highway driving), oil level should be 1/2" below full mark. These oil level specifications supersede previous specifications.

Checking Fluid Level (Engine Cold) – Start engine, set parking brake, and move selector buttons through all ranges. Allow engine to run approximately two minutes. Push in "N" (Neutral) button. Check oil level with engine idling. The oil level should be not higher than ½" above "low" mark on dipstick, and it should not be below the "low" mark.

Checking Fluid Level (Engine Hot) – With engine idling, the oil level should not be above the "full" mark on dipstick, after car has been driven sufficiently to bring engine and transmission up to operating temperature. If oil is slightly below desired level indicated in the above instructions, add a little oil at a time and recheck. Do not add a full quart unless checks indicate that it is needed.

Draining & Refilling (Every 20,000 Miles) – Remove transmission oil drain plug (If oil pan does not have a drain plug, remove connector at bottom of filler tube), and allow transmission to drain. Remove access plate from bottom of torque converter housing and rotate torque converter until drain plug is accessible. Drain torque converter. Install drain plugs (reconnect connector at bottom of filler tube) and tighten securely. Install access plate on housing. Apply parking brake. Add five quarts of Automatic Transmission Fluid Type "A", through transmission oil pan filler tube. Start engine and add approximately four quarts more while engine is running. Allow engine to idle for two minutes. Move push buttons through all ranges. Push in "N" (Neutral) button and add sufficient fluid to bring level to "low" mark on dipstick (all cars except DeSoto), to a point between "low" mark and bottom of dipstick (DeSoto), to a point between "low" mark and bottom of dipstick (DeSoto, See "Production Changes" above). Do not overfill transmission.

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE: See "Carburetor" on car model pages.*

►*PUSH BUTTON CONTROL ASSEMBLY PRODUCTION CHANGE: Two types of control units have been used in production. See "Push Button Control Assembly Production Change" above.*

OPERATION (Early Type): When operating slide is pushed in, the slide contacts cable actuator, and when limit of travel is reached, a relieved portion on the slide passes under slide lock pawl. This action allows spring loaded pawl to lock push button in engaged position. When operator pushes another button to select a different range, the edge of the detent on slide strikes lock pawl during its initial movement, which allows the first push button to return to its normal position.

Later Type: After push button reaches its limit of travel, a lock spring (on push button operating slide) engages actuator bar shaft. This action allows the spring lock to hold push button in the engaged position. When operator selects a different driving range, the top or bottom portion of operating slide (depending which button was pushed) contacts the actuator bar, releasing first push button from lock spring.

Manual Control Cable Adjustment: Remove neutral safety starting switch from side of transmission. Loosen adjustable mounting bracket capscrew and move cable and bracket assembly (manually) as required, to position the manual valve lever in neutral position. Hold the "N" (Neutral) button tightly in at full travel (the neutral starting switch cam should then be practically centered in neutral starting switch mounting hole). Use a free fitting flat-faced shaft inserted through the neutral mounting switch hole, and apply very light pressure against the manual valve lever to maintain the neutral detent position of lever. *(NOTE - If tool is not available, lever may be held by finger pressure).* Carefully move cable assembly "in" and "out" **with ut moving** the manual lever, to determine total free-play travel of cable. Locate the cable midway in the free-play range, release pressure against the manual lever and tighten mounting bracket securely. *Do not allow cable to move when tightening the bracket.* Install neutral starting switch and check transmission fluid level.

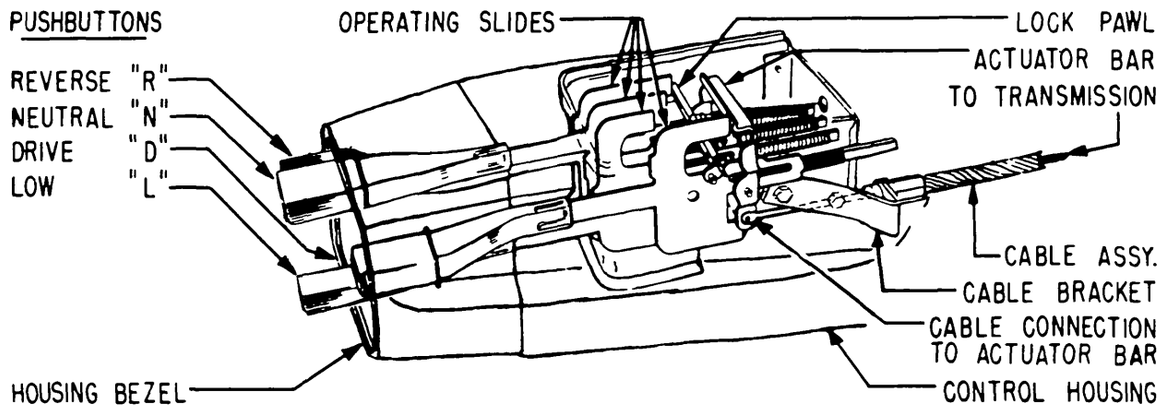
Neutral Starter Switch Adjustm nt: *(NOTE - See "Neutral Starter Switch Production Change" above).* The early type switch can be adjusted by using an extra washer, Part No. 1113113, and reducing its thickness as required to secure proper switch contact. On the later type switch (having an "O" ring seal and dished washer) attach an electrical contact indicator to switch outer terminal and to transmission case, tighten switch until initial electrical contact is made, then tighten switch an additional 1/3 to 1/2 turn.

BAND ADJUSTMENT

BAND ADJUSTMENT: *Kick-down (front) band can be adjusted externally. Reverse (rear) band adjustment requires removal of transmission case oil pan.*

Kick-Down (Front) Band: Working from beneath car, loosen kick-down band locknut (located on left side of transmission case) 4 turns (Plymouth), 9 turns (Dodge). Check freeness of adjusting screw in transmission case. If it is free, set the click device on the small inch-pound torque wrench, Tool C-3380, for 72 lbs. (Chrysler & DeSoto), 60-72 lbs. (Dodge & Plymouth). Install a 3/8" 12 point socket (3/8" drive) on wrench. Tighten adjusting screw to specified torque. With chalk, mark a reference point on adjusting screw and transmission case. Using extreme care, **back off adjusting scr w exactly 2¼ turns** (Chrysler & DeSoto); **3 turns** (Dodge & Plymouth). Hold adjusting screw stationary and tighten the locknut securely.

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POWERFLITE "PUSH BUTT N" CONTROL ASSY. (FIRST TYPE SH WN)

POWERFLITE (C nt.)

Revers (Rear) Band: Drain transmission and remove oil pan. Remove reverse band adjusting screw locknut and tighten adjusting screw to 20-25 inch lbs. torque using Tool C-3380. Mark a reference point and **back off the adjusting screw 10 turns.** Hold adjusting screw, replace locknut and tighten to 30-35 ft. lbs. Replace oil pan and refill transmission with Automatic Transmission Fluid Type "A".

TESTING

Transmissi n Shift Speeds (MPH)

Chrysler C-71

Throttle P siti n	Upshift	Downshift
Wide Open	51-61	10-17
Closed	13-16	10-12
Kickdown Limit		42-58

Chrysler C-72

Throttle Position	Upshift	Downshift
Wide Open	55-65	10-19
Closed	15-18	10-12
Kickdown Limit		45-62

Chrysler C-73

Throttle Position	Upshift	Downshift
Wide Open	53-63	10-19
Closed	14-17	10-12
Kickdown Limit		43-60

Chrysler C-70

Throttl P sition	Upshift	Downshift
Wide Open	55-65	10-19
Closed	15-18	10-12
Kickdown Limit		45-63

DeSoto S-23

Throttl Position	Upshift	Downshift
Wide Open	49-58	9-16
Light	17-20	9-11
Kickdown Limit		40-56

DeSoto S-24

Throttle Positi n	Upshift	Downshift
Wide Open	51-61	10-17
Light	17-20	9-11
Kickdown Limit		42-58

Dodge 6 Cyl.

Throttle Position	Upshift	Downshift
Wide Open	41-46	9-16
Light	13-18	9-11
Kickdown Limit		34-44

Dodge V8

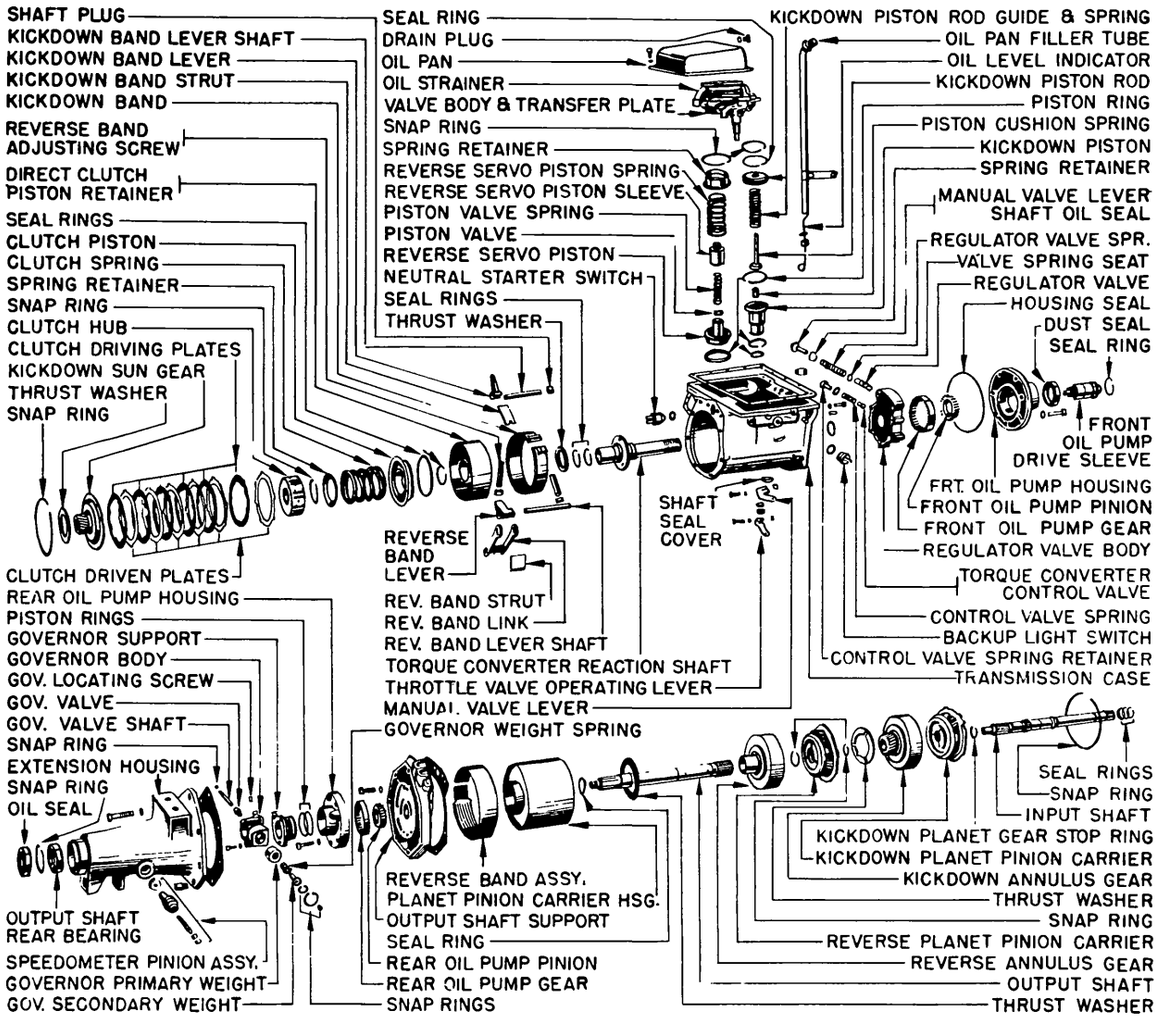
Throttl Position	Upshift	Downshift
Wide Open	51-61	9-17
Light	14-19	9-11
Kickdown Limit		41-57

Plymouth 6 Cyl.

Throttle Position	Upshift	Downshift
Wide Open	41-46	9-16
Closed	12-15	9-11
Kickdown Limit		41-46

Plymouth V8

Throttle Position	Upshift	Downshift
Wide Open	50-59	9-17
Closed	13-16	9-11
Kickdown Limit		50-59



POWERFLITE TRANSMISSION (EXPLODED VIEW)

ROAD TESTING TRANSMISSION: If transmission operation not satisfactory, following complete procedure is recommended to check performance and diagnose trouble.

1) Move selector push buttons through their positions. Check for binding or hanging, or insufficient travel. Do not operate engine in reverse at wide open throttle.

2) Attach an electric tachometer to engine. Push in "D" (Drive) selector button. Check speed and smoothness of engagement. Apply both hand brake and foot brake and check for band slippage at wide open throttle *(CAUTION - Do not hold throttle wide open more than a few seconds).* See "Stall Speed Table" below. Check for kickdown band adjustment before proceeding with road test.

3) Accelerate engine at very light throttle. The transmission should upshift at speeds given in "Shift Speed Table" above. Check quality of shift.

4) Slow car to 15 MPH, and go quickly to wide open throttle (without going into kickdown). Check for possible clutch slippage. The transmission should not downshift at this time.

5) Make a kickdown at 15 to 20 MPH and check quality of shift. Release accelerator to approximately half throttle so that transmission upshifts at 25 to 30 MPH. Check quality of shift.

6) Make a kickdown, between kickdown limits as indicated in "Shift Speed Table" above, and check the quality of shift. Release accelerator to closed throttle and check quality of "lift foot" shift.

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

7) Make a kickdown at 45 MPH and check quality of shift. Accelerate in kickdown, at wide open throttle, until transmission upshifts. The shift should occur at speeds indicated in "Shift Speed Table" above. Check quality of shift.

8) Slow down to 40 to 50 MPH and push in "L" (Low) selector button. The transmission should downshift. Push in "D" (Drive) button at approximately 20 MPH. The transmission will upshift. Coast to a stop. The transmission should downshift as indicated in "Shift Speed Table" above. Check for smoothness of shifts.

STALL TEST: Use an accurate tachometer to check engine speed. With engine idling, push in the "D" (Drive) selector button and note smoothness of shift. Set hand brake firmly and apply foot brakes to hold car. Accelerate engine to wide open throttle and check engine speed. Speed in excess of maximum RPM as indicated below may be caused by band slippage. *Do not hold engine at wide open throttle more than a few seconds.*

Stall Speed Test ℄

Car Model	Engine RPM
Chrysler C-71 (With Power Pack)	1920-2020
Chrysler C-71 (Std.) & C-73	1580-1680
Chrysler C-73 & C-70	1585-1685
DeSoto (All Models)	1400-1500
Dodge (All Models)	1400-1500
Plymouth V8 (180 HP)	1620-1720
Plymouth V8 (187 HP)	1640-1740
Plymouth V8 (200 HP, Power Pack)	1675-1775
Plymouth 6 (125 HP)	1280-1380
Plymouth 6 (131 HP, Power Pack)	1280-1380

℄ — Wide open throttle, "D" (Drive) selector button pushed in.

► *CAUTION — When making stall test, do not hold throttle wide open for more than a few seconds.* If engine speed excessive and is not corrected by band adjustment, make additional checks as follows: Check for incorrect manual control cable adjustment; leakage at valve body mating surfaces; defective throttle valve; defective shuttle valve or valve body and cover plug; defective kickdown servo parts.

HYDRAULIC PRESSURE TESTS: *CAUTION* - Pressure differences from 15 lbs. to 250 lbs. will be found in making following tests and correct pressure gauge must be used.

Gauge No. C-3292 (100 lbs.) — Use for throttle pressure, governor pressure, and lubrication pressure checks.
Gauge No. C-3293 (300 lbs.) — Use for line pressure check.

Line Pressure: Remove 1/8" pipe plug from line pressure take-off hole (front left side of transmission case), install C-3293 (300 lb.) pressure gauge at this point. Check reverse oil pressure first (brakes off), then apply brakes to hold car and check the other points. Run engine at speed indicated in table below, check line pressure for each selector button position.

Line Pressur

Selector Butt n Engag d	Eng. RPM	Pr ssure
"R"	1600 ℄	225-275 lbs.
"N"	800	85-95 lbs.
"D"	800	85-95 lbs.
"L"	800	85-95 lbs.

℄ — 1400 RPM on Dodge models.

► *NOTE:* If line pressure not correct, check for: Low oil level or clogged strainer; defective regulator valve and spring; manual valve and lever; throttle valve, cam and spring; oil leakage at valve body, or regulator body mating surfaces; defective kickdown piston and related parts; worn front pump or defective front pump drive sleeve or pinion.

Throttle Pressure: Remove 1/8" pipe plug from throttle pressure take-off hole (right center of transmission case between the servos), install C-3292 (100 lb.) gauge at this point. Apply brakes to hold car, push in the "D" (Drive) selector button, run engine at speed indicated in table below and note throttle pressure at each speed.

Throttle Pressure

Throttle Opening	Eng. RPM	Pressure
Closed	Idle	13-15 lbs.
Wide Open	℄	80-90 lbs.

℄ — See engine RPM for various models in "Stall Speed Test Table" above.

► *CAUTION: When making the above test, do not hold throttle wide open for more than a few seconds. If engine speed exceeds maximum as indicated in "Stall Speed Table" above (indicating band slippage), check the cause in the same manner as for "Stall Test".*

► *NOTE:* If throttle pressure not correct, check line pressure (above) and also check the following points: Incorrect throttle linkage adjustment; leakage at valve body mating surfaces; defective throttle valve, cam & spring; defective throttle pressure check ball or kickdown valve ball and rod; defective kickdown piston or related parts.

Governor Pressure: Remove 1/8" pipe plug from governor pressure take-off hole on lower left side of output shaft support (plate between transmission case and extension housing), install C-3292 (100 lb.) gauge at this point. Support car securely with rear wheels off floor so that they are free to turn, push in the "D" (Drive) selector button and run engine at speed indicated (as noted on speedometer). Note governor pressure in each speed range.

Governor Pressure Table

Car Model	℄ Governor Pressures 15 PSI	45 PSI	60 PSI
Chrysler C-71	13-15	23-31	51-58
Chrysler (Exc.C-71)	14-16	25-33	56-64
DeSoto S-23	12-14	22-29	48-55
DeSoto S-24	13-15	23-31	51-58
Dodge (All Models)	13-16	23-26	55-62
Plymouth 6 Cyl.	12-14	19-23	41-48
Plymouth V8	13-16	23-26	55-62

℄ — Governor pressure at indicated MPH.

► *NOTE:* If governor pressure not correct, check for leakat valve body mating surfaces or output shaft support gaskets; defective governor assembly, or defective rear pump.

Lubrication Pr ssure: Check only when there is reason to believe that it is incorrect. Remove pipe plug fitting at upper left side of output shaft support (Exc. Chrysler C-70, C-72, C-73; DeSoto S-24) and install a 1/8" flared tube connector. On Chrysler C-70, C-72, C-73; DeSoto S-24, disconnect oil cooler line at this point and install 1/8" flared tube connector. Connect gauge, C-3292. With engine running at 800 RPM, in "N" (Neutral) position, lubrication pressure should read 35 to 50 lbs.

► *NOTE:* If lubrication pressure is not correct, check for leakage at regulator body mating surfaces or at output shaft support gasket; defective converter control valve, defective front pump drive sleeve; defective reaction shaft bore; defective input shaft seal rings; plugged lubrication holes.

Clutch Pressure: Remove the 1/8" pipe plug fitting from pressure take-off hole tapped in kickdown servo (clutch pressure take-off plug on forward right hand side of transmission case) and install gauge C-3292. With rear wheels free to turn, accelerate the engine slowly until an upshift occurs. During the upshift, the pressure gauge attached to the kickdown servo should show a very rapid rise from 0 to final clutch or line pressure (see "Line Pressure Table" above). This rise should not take more than 1½-2 seconds. With engine speed not less than 650 RPM (trans. upshifted), the direct clutch pressure should not read lower than 10 lbs. below line pressure. Should a slow rise in clutch pressure be observed or a clutch pressure of more than 10 lbs. lower than line pressure be obtained, it is an indication of abnormal leakage.

► *NOTE* — If clutch pressure not correct, check oil level; throttle linkage adjustment; converter control valve; valve body mating surfaces; throttle valve, cam and spring; kickdown piston and guide; regulator valve body mating surfaces; front pump drive sleeve; clutch retainer bushing and reaction shaft seal rings; clutch discs and plates; clutch piston, seal rings and eheck valve ball.

1956 POWERFLITE DIFFICULT SHIFTING TO REVERSE RANGE CORRECTION: Remove valve body and inspect reverse lockout valve, valve port and spring. Valve and valve ports must be free burrs, and spring action must be checked to make sure it does not take a set when compressed. If spring is faulty, replace with spring, Part No. 1672079. Check operation of governor valve (if valve is not operating freely, it may apply reverse blocker valve when in neutral and prevent manual shift lever from going into reverse). With engine off, attempt to place transmission in reverse through use of push buttons. If transmission will go into reverse with the engine off, it is evident that a "no reverse" with engine running is due to a sticking governor valve holding the blocker valve open. Remove governor pressure checking plug and try to free-up the governor by applying short blasts of air into governor circuit. If governor cannot be freed up in this manner, remove governor assembly and clean it. Inspect governor support seal rings for score or gap (ring must have no gap when compressed). The governor oil passage in rear pump housing must be located between the wear pattern

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POWERFLITE (Cont.)

caused by governor support seal rings (the forward seal ring prevents line pressure entering governor outlet passage located between the two seal rings). Check governor for looseness, excessive output shaft endplay, or improperly drilled rear pump housing and correct as necessary. Check to see that seal rings seal on each side of governor pressure outlet passage in pump housing. If not, measure from center line of governor pressure hole-to-inside face of pump housing. If the specification of .443" ± 1/32" are exceeded, replace the pump housing. Check governor body pressure relief holes for obstructions. Make sure all assemblies are clean before reassembly.

TROUBLE SHOOTING & DIAGNOSIS

EXCESSIVE SLIPPAGE:

All Ranges—Inspect oil level. Adjust gearshift linkage. Check oil pressure; if low, inspect regulator valve and torque converter control valve for sticking. Inspect valve body in transmission case mating surfaces for evidence of oil leakage.

Kickdown—Readjust throttle linkage and kickdown band. Inspect valve body to transmission case mating surfaces for evidence of oil leakage. Check operation of throttle valve and note wear of valve bore and cam. Check spring. Check valve body end cover for oil leakage. Check shuttle valve for free movement. Inspect kickdown piston and guide for binding. Inspect spring. Inspect band lining for wear and band lever for free movement.

Kickdown (Over 25 MPH)—Inspect valve body end cover for oil leakage. Inspect shuttle valve and plug for free movement. Inspect spring.

Direct—Inspect valve body to transmission case mating surfaces for evidence of oil pressure leakage. Check kickdown piston for binding. Check shaft seal rings and clutch retainer bushing for wear. Check clutch discs, piston and clutch check valve.

Reverse—Check reverse band adjustment. Inspect transmission case to valve body mating surfaces for evidence of oil pressure leakage. Inspect reverse servo assembly for wear or binding. Inspect reverse lever and linkage for free movement.

Hill Climbing—Insufficient oil will result in low pressures to kickdown servo or direct clutch if oil level is low.

SHIFT PATTERN:

No Upshift—Check oil level and gearshift linkage adjustment. Check governor and throttle pressure. If there is no pressure rise when accelerating engine in direct drive, governor valve may be stuck closed. Check valve body to transmission case for parallelism. Check manual valve and lever for correct detent engagement. Check shift valve for free operation and shift valve spring for breakage. Check kickdown piston assembly. Check rear pump drive pinion. Drive pinion ball may be cracked or broken, permitting pinion gear to slip. Inspect clutch ball check for proper operation. Ball check valve must operate freely and seat properly.

No Shift in "D" (Drive) Range and an Upshift In Low Range—The cause is the governor valve sticking open. This can be verified by checking governor pressure (see "Governor Pressure Test" above). If governor pressure exceeds the pressures indicated in table, governor valve is possibly stuck and in most cases can be corrected in the following manner. Clean off area around governor pressure take-off plug and remove plug. Cover oil filler tube with a cloth or plug and hold firmly to prevent air from forcing transmission oil out through filler tube. Screw a piece of ⅛" pipe into hole to help direct air into unit. Apply clean filtered air to pipe in short blasts, tapping parking brake drum at same time with a rubber hammer just enough to jar governor. After applying air pressure, recheck governor pressure and see if valve has been freed up. In cases where governor pressure is still to high, it will be necessary to remove transmission extension case for further inspection.

Low Upshift Pattern—Readjust throttle linkage. Check governor pressure. Governor valve may be binding or sticking. Inspect the rear pump assembly. Check valve body to transmission case for parallelism. Check operation of throttle valve and inspect cam and spring. Check shift valve for free operation and spring for breakage.

Low Upshift Pattern at Heavy Throttle—Inspect regulator valve, throttle valve, and governor for burrs or dirt which may cause binding or sticking. Inspect the regulator spring.

High Upshift Pattern—Readjust throttle linkage and check both throttle and governor pressures. Adjust throttle pressure if necessary. If throttle pressure does not rise according to speeds on chart (see "Throttle Pressure" above), throttle valve may be sticking. Inspect for dirt or burrs. Inspect throttle cam for wear. Check valve body to transmission case for parallelism. Check shift valve spring. If governor pressure does not correspond to pressures indicated in "Governor Pressure" table above, remove governor and inspect valve for sticking. Check rear pump gears for wear, broken teeth or excessive clearance. Inspect pump drive pinion ball.

All Upshifts Below 14 MPH—Inspect throttle valve, cam and spring. Check throttle pressure check ball. Check governor valve for sticking.

Erratic Shifting—Check oil level. Inspect valve body to transmission case for parallelism. Check action of shift valve. Inspect governor support gaskets for oil leakage.

No Downshift—Check governor pressure. High initial pressure indicates valve is stuck open. Remove governor and inspect. Inspect shift valve action, check spring.

Low Downshift Speed—Governor valve is stuck open. Remove and clean and check for burrs and dirt.

High Downshift Speed—Readjust gearshift linkage. Inspect valve body to transmission case for parallelism. Inspect manual valve and lever. Inspect kickdown valve and ball.

No Kickdown—Adjust throttle linkage. Inspect valve body to transmission case for parallelism. Inspect throttle valve, cam and spring. Also inspect kickdown valve and shift valve components.

Low Kickdown Limit—Check governor pressure Governor valve may be sticking due to dirt. Inspect regulator valve and spring for proper operation. Inspect rear pump gears and drive pinion ball. Check valve body cover plate for parallelism.

SHIFT QUALITY:

Harsh Shift from Neutral to Reverse—Adjust engine idle speed. Readjust rear band. Inspect condition of the reverse band, strut and linkage. Inspect the reverse servo piston, spring valve and rings.

Harsh Shift from Neutral to Drive—Adjust engine idle speed. Adjust throttle linkage. Inspect kickdown servo pistons, springs, guide, rod and piston rings.

Delayed Shift from Neutral to Drive—Adjust kickdown band. Inspect condition of band, strut, lever and lever shaft.

Excessive Engine Speed Increase on Upshifts—Check oil level and adjust throttle linkage. Inspect regulator valve and spring and check operation of valve in regulator body. Check valve body mating surface for parallelism. Inspect throttle valve, cam and spring. Check operation of valve in valve body. Inspect kickdown piston components. Check mating surfaces of regulator valve body and transmission for parallelism. Inspect reaction shaft seal ring for deterioration. Inspect input shaft oil seal rings for wear or breakage and condition of reaction shaft bore. Inspect clutch retainer bronze bushing. If worn below bronze surface, replace retainer. Inspect condition of reaction shaft oil seal rings for wear or broken ends. Inspect condition of clutch plate and condition of friction material on seal ring. Check clutch check valve ball.

Excessive Engine Speed Increase on Upshifts at Light Throttle—Check line pressure. Inspect front oil pump gears for wear and excessive clearance.

Harsh Upshift—Adjust throttle linkage. Inspect regulator valve and spring. Check for sticking shuttle valve. Check valve body mating surfaces for parallelism. Inspect throttle valve, cam and spring. Inspect kickdown piston components. Check regulator valve body mating surfaces for parallelism. Inspect direct clutch spring, spring retainer, and snap ring.

Harsh Lift Foot Shift—Adjust throttle linkage. Check valve body mating surface. Check operation of throttle valve. Inspect valve, valve bore, cam and spring. Inspect servo pressure bleed valve for dirt. Check operation of shuttle valve. Inspect shuttle valve, plug, inner and outer springs, and guide pin.

Excessive Engine Speed Increase on Downshift at Part Throttle—Check oil level and adjust throttle and gearshift linkage. Check valve body mating surface. Check operation of manual valve and valve lever. Inspect servo restrictor valve and operating plug. Check plug for free operation. Check valve spring for distortion or looseness.

Harsh Downshift—Adjust engine idle speed and throttle linkage. Inspect valve body mating surface. Inspect throttle valve, cam and spring for proper operation. Inspect for dirt, burrs or wear, or breakage. Inspect servo restrictor valve for proper operation. Inspect clutch plates and disc friction material. Inspect the piston for wear or scoring. Check seal for wear or deterioration which would result in leakage. Inspect thrust washers for excessive wear.

Excessive Increase in Engine Speed on Kickdown—Readjust kickdown band. Check regulator valve and spring for proper operation. Inspect for dirt, wear, or breakage. Check valve body mating surface for nicks, burrs and trueness, which would cause leakage. Check operation of servo restrictor valve and shuttle valve. Inspect valve and plug for dirt,

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POWERFLITE (C nt.)

burrs or wear. Inspect all parts of kickdown piston assembly. Inspect piston rings for excessive wear or broken ends. Check governor valve for wear, dirt, binding or sticking. Inspect rear pump gears for excessive wear or broken teeth. Check pump clearance, drive pinion gear and pinion ball.

Harsh Kickdown—Adjust kickdown band. Inspect regulator valve and spring. Inspect for dirt, burrs or breakage. Inspect servo pressure bleed valve for dirt. Check operation of shuttle valve. Check valve and plug for burrs, dirt or excessive wear. Inspect all parts of kickdown piston assembly. Inspect piston rings for scoring, wear or broken ends. Inspect regulator valve body mating surface for nicks, burrs and trueness which would cause leakage. Inspect reaction shaft neoprene seal for deterioration. Inspect governor valve for free operation. Check for dirt which would cause sticking. Inspect rear pump gears for excessive clearance, worn or chipped teeth. Inspect drive pinion gear and drive pinion ball. Inspect the input shaft seal rings for excessive wear or broken ends, and reaction shaft bore for scoring. Inspect all parts of the direct clutch assembly.

OIL PRESSURE:

No Governor Pressure—Governor valve may be stuck in closed position due to dirt. To free valve, apply a short spurt of high air pressure (90 lbs.) to governor pressure take-off hole and at same time tap transmission extension housing with a rubber mallet. Before applying air pressure, cover filler tube with a cloth. In addition, drain two or three quarts of oil from transmission oil pan. After air is applied, reinstall governor pressure take-off plug and run transmission in Reverse a few seconds. Recheck governor pressure. This corrective procedure may not be permanent. If valve becomes stuck again, remove governor for servicing. If pressures do not correspond to those indicated in "Governor Pressure" table above, the governor may need service. However, before servicing governor, check the other points in the transmission that could cause low pressure as follows: Check the valve body mating surface for trueness, nicks or burrs. These could cause oil leakage. Check both output shaft support gaskets for evidence of internal leakage. Check operation of governor valve and inspect for foreign matter. Check the rear pump gears for broken teeth, wear, and excessive clearance. Check the mating surface of output shaft for trueness, burrs or nicks.

High Initial Governor Pressure—High governor pressure at low engine speeds is due to the governor valve being stuck in the open position, usually caused by dirt *(see "No Governor Pressure" above)*, for clearing with air pressure.

Line Pressure—If line pressure does not correspond to pressures indicated in "Line Pressure" table above, it will be necessary to investigate and make the following adjustments or corrections: Check transmission oil level. Inspect regulator valve for free operation, dirt or burrs, and condition of valve spring. Check valve body mating surface for trueness, nicks or burrs. Check operation of manual valve and lever. Inspect front pump gears for worn or chipped gears. Check clearance between gears and face of housing.

Throttle Pressure—If throttle pressures do not correspond to pressures indicated in "Throttle Pressure" table above, check line pressure and make the following adjustments and corrections: Adjust throttle linkage. Inspect operation and condition of regulator valve and spring. Check valve body mating surfaces for nicks, burrs and trueness. Check operation and condition of throttle valve, cam and spring. Check throttle pressure check valve ball for nicks and dirt. Inspect condition of kickdown rod and ball.

Direct Clutch Pressure—Direct clutch pressure should be approximately 10 lbs. lower than line pressure with transmission upshifted and engine speed not lower than 650 RPM. If not, refer to "Excessive Engine Speed on Upshifts" above. A pressure drop between line pressure and direct clutch pressure as high as 25 lbs. may be due to broken or damaged seal rings in the direct clutch circuit. These are: three interlocking type input shaft seal rings; the direct clutch piston retainer seal ring, direct clutch piston neoprene seal ring, the neoprene reaction shaft seal ring, and the two interlocking type reaction shaft seal rings.

Lubrication Pressure—Lubrication pressure is checked at the upper left side of the output shaft support, Remove the ⅛" pipe plug and use 100 lbs., pressure gauge C-3292 to check pressure. Lubrication pressure should be 35 to 50 lbs. pressure with transmission in neutral and engine speed at fast idle. If pressure readings are incorrect, check line pressure and inspect torque converter control valve. Low pressures may be due to internal oil leakage at the following points: drive sleeve seal ring, regulator valve body mating surface, reaction shaft seal ring, output shaft support gaskets, input shaft seal rings, and reaction shaft bore. Low oil pressure may also be caused by plugged lubrication lines.

IMPROPER RESPONSE TO GEARSHIFT SELECTOR LEVER POSITIONS:

Moves Forward in "N" (Neutral)—Adjust gearshift linkage. Adjust kickdown band. Inspect manual valve lever assembly. Check valve body mating surface for nicks, burrs and trueness which would cause leakage. Check operation of manual valve. Inspect all parts of kickdown piston. Check regulator body mating surface for nicks, burrs and trueness. Check clutch discs and plates for warpage which would cause dragging. Inspect clutch ball check.

Car Moves Forward in "N" (Neutral) at High Engine Speed—Clutch check valve ball bleed hole may be plugged causing centrifugal oil pressure to partially engage the direct clutch. A slight surge which is not continuous is normal.

Car Moves Backward in "N" (Neutral)—Readjust gearshift linkage and inspect manual valve and valve lever for proper engagement. Adjust reverse band, levers, strut, and shaft. Check for binding, dirt, excessive wear.

MISCELLANEOUS DIAGNOSIS PROCEDURES:

Starter Will Not Energize—Adjust gearshift linkage. Test neutral starter switch. Inspect manual valve lever for proper engagement.

Hard Shifting Into "N" (Neutral)—Check operation of neutral starter switch and inspect manual valve lever.

Hard Shifting Into "R" (Rev rse)—Check operation of backup light switch and manual valve lever.

Oil Foams From Filler Tube—Check fluid level in transmission. Inspect transmission breather vent.

GEARSHIFT CONTROL UNIT REMOVAL & INSTALLATION

MANUAL CABLE ADJUSTMENT: *See "Manual Cable Adjustment" above.*

► *PUSHBUTTON CONTROL ASSEMBLY PRODUCTION CHANGE: Two types used in production. See "Chang s, Cautions, Corrections" above.*

CABLE ASSEMBLY: Rem val (Transmissi n End) – Drain transmission fluid and remove oil pan. Remove neutral safety switch to provide access to cable lock spring and remove cable bracket and screw. Insert screwdriver through neutral safety switch hole and push gently against vertical projecting portion of cable lock spring and pull outward on cable. *(CAUTION – Move spring only a sufficient amount to permit removal of cable as undue pressure will dislocate spring).*

Installation: (Transmission End) – Move manual valve lever into reverse position which will place the cable adapter in close proximity with cable entrance hole in transmission case. Push in the "L" button on transmission control. Place "O" ring seal on cable ferrule *(NOTE* – Inspect "O" ring seal for cuts, abrasions, brittleness or cracking. If any of these conditions are present, replace "O" ring seal. Hold cable parallel to hole centerline in transmission case and push control cable in until spring lock engages groove in cable end. Position cable bracket and install bracket capscrew. Measure and adjust cable free play (See "Free Play Adjustment" below), being careful not to move manual lever *(NOTE* – Rubber sheath on cable must be pressed onto cable ferrule in order to prevent any possible leakage of oil at this point. On later model cable assemblies, the ferrule will be double grooved and the rubber sheath will be held to the ferrule by the crimped connector). Tighten cable bracket screw. Operate push buttons to check cable adjustment. Adjust as necessary *(CAUTION* – Make sure cable housing is not forced in or out during tightening procedure as backlash will be disturbed). Replace neutral safety switch and transmission oil pan. Refill transmission to correct level using Automatic Transmission Fluid Type "A".

Cable Backlash Adjustment: *See Manual Control Linkage Adjustment under LINKAGE ADJUSTMENT.*

PUSH BUTTON CONTROL UNIT: (R m val) – Remove three bezel retaining screws (one screw is located on underside of unit receiver), and remove bezel and push buttons. Remove the two hex head nuts and lockwashers holding push button control unit to instrument panel. Pull push button control unit from rear of instrument panel, down and toward front of car. Remove the two screws holding cable assembly bracket to control unit. Remove hairpin clip securing cable end to actuator bar and remove cable. (After cable is removed from transmission, see "Cable Assembly" above, pull cable through rubber grommet, or remove grommet on dash panel).

CONTINUED ON NEXT PAGE

POWERFLITE (Cont.)

Installation: Reverse removal operations and adjust cable free play.

Control Unit Light Bulb Replacement: Remove the three bezel retaining screws (one screw is located on underside of unit receiver) and remove bezel and "D" push button. Install light bulb, replace push button, reinstall bezel and test operation of unit.

PARTS REMOVAL & INSTALLATION (TRANSMISSION IN CAR)

▷*NOTE: Transmission must be removed from vehicle for the removal and replacement of parts other than those listed below.*

Oil Pan: Remove oil pan filler tube, drain transmission and remove oil pan attaching screws and oil pan. When installing pan, tighten screws evenly and torque to 12-17 ft. lbs.

Governor Servicing: *NOTE—It is necessary to remove transmission extension to remove governor assembly. See "Transmission Overhaul" below for Extension Housing Removal, Governor Removal, Overhaul & Installation.*

Valve Body & Transfer Plate Assembly (Removal): Remove oil pan and disconnect throttle and manual control lever linkage from levers. Loosen throttle and manual control lever assembly locking screws. Slide throttle valve operating lever assembly off shaft and remove throttle valve camshaft felt retainer and felt. Slide manual valve lever assembly off shaft and remove valve lever shaft seal cover. Remove the two oil strainer support screws and washers and take the strainer assembly off valve body and plate assembly. Remove transfer plate screws and lock washers and remove valve body and transfer plate assembly. For overhaul. *See "Valve Body Overhaul" below.*

Installation—Clean mating surfaces and check for burrs on both transmission case and valve body transfer plate. Place valve body and transfer plate assembly into position and install plate screws and lockwashers *(CAUTION—The two 1⅝" screws go through transfer plate cover on valve body. The three 1⅛" are used in the other holes).* Tighten evenly to 12-17 ft. lbs. torque. Make sure the two oil strainer tube seals are in position over oil strainer and place oil strainer assembly into position on transfer plate. *(CAUTION—Check to see that oil tubes on strainer properly enter valve body).* Install the two oil strainer support screws and torque to 12-17 ft. lbs. Place manual lever shaft seal cover over manual valve lever shaft and slide into position on transmission case. Install manual lever (arm side of lever against cover) on manual valve lever shaft, and tighten locking screw. Place throttle valve camshaft felt and retainer over throttle valve shaft. Install throttle valve lever assembly on throttle camshaft and tighten locking screw. Check operation of control by shifting into all positions. Check kickdown operation and manual lever contact on neutral safety and back-up light switches. Install oil pan and adjust throttle linkage and gearshift linkage.

Manual Control Valve Lever Shaft Oil Seal Removal & Installation: Remove oil pan, valve body and transfer plate assembly. Using a suitable brass drift, drive seal out of transmission case from below. To install, use tool C-3277. Start seal squarely into bore and tighten tool C-3277 until it is flush with the case. This properly positions seal. Install valve body and plate assembly and oil pan.

Kickdown Piston (Removal): Remove oil pan, valve body and transfer plate assembly. Loosen kickdown band adjusting screw locknut and back adjusting screw out sufficiently to permit kickdown band strut to be removed by compressing band ends. With kickdown band lever hanging down, install tool C-3289 on transmission case. Apply sufficient pressure on kickdown rod guide to permit easy removal of the snap ring. Loosen compressing portion of tool and remove piston rod guide, piston spring and kickdown piston rod assembly (the kickdown piston cushion spring will fall out of piston when rod assembly is removed). Using snap ring pliers, inserted inside of kickdown piston, remove piston from transmission case. *See "Overhaul" below, for disassembly and inspection.*

Installation—Make sure the two interlocking seals are locked in position and all seals are coated with Lubriplate, then place kickdown piston into transmission case. With one hand apply pressure to piston and at the same time carefully compress bottom seal and push piston into case. *(CAUTION—*After bottom seal has entered, piston will seem to hang at two different locations while being pushed into case. This is due to seals entering cylinder, do not use extreme force. If any rings should be broken when piston assembly is being installed, transmission will not operate properly.) Slide piston spring over kickdown piston rod assembly then balance piston cushion spring on rod assembly (Lubriplate may be used to help hold cushion spring in position on rod assembly), and install in piston. Holding it in this position, install kickdown piston rod guide assembly on piston rod assembly. Using tool C-3289, and extreme care, compress the kickdown piston spring to the point that piston guide seal slightly binds on transmission case. Work seal into position and gradually compress spring until seal enters case and snap ring can be installed. Install kickdown piston rod guide snap ring, making sure it is properly seated. Loosen compression portion of tool and remove tool from transmission case. With one end of band fit over adjusting screw, compress the other end sufficiently to install the kickdown band strut between kickdown band and band lever *(CAUTION—*Make sure band strut slot engages with kickdown band strut pin in band end). Install valve body, plate assembly and oil pan. Adjust kickdown band.

Reverse Servo (Removal): Remove oil pan, valve body and transfer plate assembly. Loosen reverse servo adjusting screw locknut and back adjusting screw out sufficiently to permit reverse band strut to be removed by compressing band ends. Remove reverse servo piston sleeve. Mount tool C-3289 on transmission case and compress reverse piston spring retainer. Using a screwdriver, remove the reverse servo piston and valve assembly spring retainer snap ring and loosen compressing part of tool (Spring retainer may require guiding out of transmission case). Remove spring retainer, spring, reverse servo piston and valve assembly from transmission case. Using C-3229 pliers, remove the reverse servo piston valve spring snap ring, and remove spring and valve from piston. *See "Overhaul" below, for disassembly and inspection.*

Installation—Place reverse servo piston valve and spring in reverse servo piston (shaft on valve protruding through hole in bottom of piston). Using snap ring pliers C-3229, install reverse servo piston valve spring snap ring, making sure it is properly seated. Coat reverse servo piston ring (neoprene) with Lubriplate. Insert reverse servo piston and valve assembly into transmission case in a cocked position, then by rotating piston, the ring will enter case without being damaged. Place reverse servo piston spring over piston and position spring retainer over spring. Using tool C-3289, compress spring sufficiently to install snap ring. Make sure retainer is correctly installed, and snap ring seated. Remove tool C-3289 from transmission case and install reverse servo piston sleeve. Make sure piston sleeve slides freely on piston by working it up and down. Hook one end of reverse band assembly in reverse link assembly, compress other end sufficiently to install reverse strut in slots of reverse band assembly and reverse band lever assembly. Adjust reverse band. Install valve body, transfer plate and oil pan.

Speedometer Pinion (Removal & Installation): Disconnect speedometer cable and housing from sleeve assembly on transmission, and remove speedometer pinion and sleeve. When installing sleeve and pinion assembly, torque it to 40-45 ft. lbs.

Neutral Safety and Back-Up Light Switch Removal & Installation Note: It is not necessary to drain transmission to remove these switches. A small amount of lubricant will drain from transmission when these switches are removed. When installing, tighten switches to 15-20 ft. lbs.

Transmission Output Shaft Rear Bearing Oil Seal (Removal): Disconnect the front universal joint and secure shaft to frame out of the way. Apply hand brake and remove propeller shaft flange nut and washers. Release hand brake and install puller C-452. Remove propeller shaft flange and drum assembly. Remove transmission support grease shield spring (small one). Remove brake support grease shield from extension housing *(CAUTION—If screwdriver or sharp instrument used to remove shield, do not damage the neoprene sealing surface at bottom of shield).* Install puller C-748 and remove rear bearing oil seal.

Installation—Install rear bearing oil seal with tool C-3205. Install brake support grease shield on extension housing *(CAUTION—Indent on grease shield must match groove in housing for correct positioning. Install grease shield far enough on housing to permit installation of spring).* Install brake support grease shield spring with opening in spring toward adjusting sleeve. Make sure spring is properly seated in groove. Make sure brake adjustment is backed off and install drum assembly (In some instances it may be necessary to use tool C-496 to press drum assembly on output shaft). Install propeller shaft flange washer, shakeproof washer and nut. Adjust hand brake. Apply hand brake and torque propeller shaft flange nut to 140-160 ft. lbs. Connect front universal joint.

Transmission Regulator Valve Assembly (Removal): Remove transmission regulator valve spring retainer, gasket, and spring. Using a mechanical retriever or a piece of welding rod inserted in end of valve, remove valve.

CONTINUED ON NEXT PAGE

POWERFLITE (Cont.)

Installation—Place valve in position in valve body. Install regulator valve spring, gasket, and retainer and tighten to 45-50 ft. lbs. torque.

Torque Converter Control Valve Assembly (Removal): Remove control valve spring retainer, gasket, and spring. Using a mechanical retriever or a piece of welding rod inserted in end of valve, remove valve.

Installation—Reverse removal procedure.

Oil Cooler (Removal): Drain radiator, remove battery and battery pan. Remove lower radiator-to-cooler hose. Remove inlet and outlet oil tubes. Remove oil cooler to water pump flange bolts.

Installation—Clean mating flanges thoroughly and install new flange gasket. Install cooler to water pump and tighten flange bolts. Install inlet and outlet oil tubes. Install lower radiator-to-cooler water hose. Install battery and battery pan. Refill radiator and start engine. Check carefully for water and oil leaks.

TRANSMISSION REMOVAL

REMOVAL: Drain transmission and torque converter, (see "Draining & Refilling" above). When fluid drained, replace drain plugs and tighten. *NOTE - If transmission oil pan is not equipped with a drain plug, remove filler tube connected at oil pan).* Disconnect oil pan filler tube from oil pan. Disconnect front universal joint and secure to frame. Remove hand brake adjusting screw cover plate and cable bolt from hand brake support. Disengage ball end of cable from operating lever and remove cable from brake support. Disconnect speedometer cable housing from drive pinion. Disconnect neutral starter switch and back-up light wires from switches *(NOTE* - To avoid damage to switches, remove from transmission before removing transmission from car). Disconnect throttle linkage from lever at transmission. Remove push button control cable (see "Gearshift Control Unit" above). Remove oil cooler lines (if so equipped). Remove nuts and lockwashers from rear engine mount. Install engine support fixture, C-3487. Adjust fixture to support weight of engine and raise engine slightly. Remove cross member to frame bolts and remove cross member, leaving engine support adapter attached to transmission. Work carefully when removing cross member to avoid damaging brake line. *(CAUTION* - When using fixture, Tool C-3487, do not lower engine more than three inches from floor pan to avoid moving the set position of water hose and other engine attachments). Remove two upper transmission case to converter housing screws and lockwashers and install guide studs, Tool C-3276. Remove two lower transmission case to converter housing screws and lockwashers. Slide transmission straight back to avoid damaging front pump drive sleeve, and remove from under car.

TRANSMISSION INSTALLATION

INSTALLATION: Install guide studs, Tool C-3276, in the two upper transmission case to converter housing bolt holes. Lubricate front oil pump drive sleeve ring and bearing surface with transmission fluid. Install drive sleeve in front pump housing (if not previously installed), making sure that driving lugs are properly engaged in front pump pinion gear. Note position of driving lugs on front pump drive sleeve, and position accordingly, to aid in proper engagement with torque converter when transmission is installed. Slide transmission over guide studs and into position. To avoid damage to front oil pump, the transmission must be properly aligned. Do not attempt to use transmission to converter housing bolts to bring transmission and converter housings together. If oil pump drive sleeve and input shaft have been properly aligned, transmission should slide easily into position. *(CAUTION - Do not force it into position).* Install two lower transmission case to converter housing bolts and lockwashers, but do not tighten. Remove guide studs and install two upper transmission case to converter housing bolts and lockwashers. Draw all bolts down evenly and tighten to 45-50 ft. lbs. Complete installation by reversing removal procedure.

TORQUE CONVERTER REMOVAL

1) With transmission removed, turn front wheels to extreme right and remove starter motor. Remove the transmission case adapter screws and lockwashers and remove transmission from car. Remove lower half of flywheel housing.

▷*NOTE*: If torque converter being removed because of excessive runout damage, check by using dial indicator on hub and mark the highest point of runout on both converter and crankshaft flange. The reason for this is so it may be determined later if runout was caused by the converter or crankshaft.

2) Using tool C-811, remove the eight torque converter stud nuts and lockwashers from crankshaft flange. Remove torque converter from crankshaft.

▷*NOTE*—Check crankshaft flange runout. Maximum is .002".

STARTER RING GEAR REPLACEMENT (REMOVAL): Support torque converter assembly in a vise and carefully remove staking lugs, retaining ring gear to torque converter, with a file *(CAUTION*—Be careful when supporting torque converter in vise to avoid distortion). Place torque converter on blocks of wood, and using a blunt chisel or drift, tap around ring gear until it comes off converter.

Installation of Ring Gear—Remove burrs or raised spots on torque converter with a file, being careful not to remove more metal than is necessary. Any of the following methods for expanding the ring gear can be used in the manner outlined.

Oven—Set temperature at 150° and allow ring gear to remain for 15 to 20 minutes.

Boiling Water—Place ring gear in shallow container, add water and heat for approximately two minutes.

Flame—Place ring gear on a flat surface. Using a medium size tip, direct a slow flame around inner rim of gear, being careful not to direct flame onto teeth of ring gear. Place a few drops of water on face of gear at short intervals during heating process. When gear is hot enough to boil the drops of water, installation of gear can be made.

When gear properly expanded, proceed as follows: Place starter ring gear over flange surface of torque converter, making sure that rear face of gear contacts flange on torque converter evenly around the entire diameter. Reweld ring gear to torque converter, *using extreme care to place as nearly as possible the same amount of metal in exactly the same locations as original assembly.* This is necessary to maintain proper balance of the unit. Place weld alternately on opposite sides of the converter to mimimize distortion. Clean thoroughly before installing in car.

▷*RING GEAR WELDING NOTE:* Use a welding current of 200 amps. and 5/32" Fleet-Weld No. 27, or General Electric No. W28 rod, or their equivalent.

▷*WELDING CAUTION:* To prevent burning through the torque converter, the arc should be directed at the intersection of gear and housing from an angle of approximately 45° from the face of the gear. DO NOT GAS WELD.

TORQUE CONVERTER INSTALLATION

▷*TORQUE CONVERTER HUB RUNOUT NOTE:* When torque converter assembly is removed for any reason from crankshaft drive flange, the converter assembly runout should be checked when reinstalled. There are two methods for adjusting the hub runout. *See "Torque Converter Hub Runout Adjustment"*

1) Inspect mating surfaces of torque converter and crankshaft flange for burrs and dirt. Install torque converter on crankshaft flange. Install eight torque converter stud nuts and draw down evenly and tighten. Install lower half of flywheel housing and starter motor.

2) Install transmission case adapter on flywheel housing and tighten to 25-30 ft. lbs. torque. Install transmission (see above).

3) Fill transmission with Automatic Transmission Fluid (Type A) to "full" mark on dipstick. This will take approximately 5 qts. Run engine at idle speed in neutral for approximately two minutes, then add 8 qts. of fluid to bring oil level to "full" mark on dipstick. Allow engine to run until normal operating temperature is reached. Set handbrake and shift selector lever through all ranges and return it to "N", recheck level and bring level to "full" mark.

TORQUE CONVERTER RUN-OUT ADJUSTMENT

Heat Method: *(CAUTION—When using this method, extreme caution must be used to prevent burning the metal and causing irreparable damage. Sufficient heating of this unit, to cause the necessary drawing of metal required, is accomplished in just a few seconds. DO NOT OVERHEAT).* Remove transmission, torque converter housing and dust shield. Mount Torque Converter Hub Alignment Indicator C-430 on adapter plate. Rotate converter through 360° and mark high point on converter with chalk, then rotate converter to move the high point to the top. Apply heat 180° from the high point at opposite side of converter shell at high point of radius. Use a No. 3 acetylene torch burner, moving the flames at all times in a circular motion about the size of a dime. When the spot begins to change color remove the flame and quench the converter with a water soaked rag. Change rags several times (the more quickly converter is cooled, the greater the drawing on the metal). Before checking hub runout make certain that both sides of the converter are the same temperature. If runout exceeds .004" at the same point, repeat operation. *(CAUTION*—It is possible to draw the metal excessively, thus causing runout at opposite side.

Shim Method: Determine hub runout in the same manner as for "Heat Method" above. Loosen converter drive flange nuts sufficiently to insert shims of proper thickness 180° from indicated high point.

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POWERFLITE (Cont.)

The thickness of shims used should equal half the total indicator reading, shim thickness not exceeding .008". New shims are furnished in the following sizes. Part No. 1610442 (.002"), 1610443 (.003), No. 1610444 (.005").

TRANSMISSION OVERHAUL

DISASSEMBLY

1) Place transmission assembly in stand C-3280 and turn upside down. Remove oil pan and gasket. Loosen throttle and manual control lever locking screws and slide levers off shafts. Remove throttle valve camshaft felt retainer and felt and manual valve lever shaft seal cover. Inspect these parts for wear.
2) Remove oil strainer support screws and remove oil strainer assembly. Inspect ring seals located at both outlet sides of strainer. Remove transfer plate screws and take off valve body and transfer plate assembly. *See "Valve Body & Transfer Plate Overhaul" below.*

▷*CAUTION: Mating surfaces are machined and extreme care must be used to avoid damage to these parts.*

3) Remove neutral safety switch and back-up light switch and gaskets.
4) Check transmission end clearance with a dial indicator or feeler gauge by prying direct clutch assembly toward rear and measuring the distance between direct clutch and carrier housing. Pry direct clutch forward and again measure the distance between direct clutch and carrier housing. Clearance should be .043-.069". If not within limits, record the measurement for reference at reassembly.

Hand Brake Assembly: Using tool C-3281 to hold transmission to flange, remove transmission flange nut and washers. Attach puller C-452 and remove brake drum assembly. Inspect oil sealing surfaces, and lining surfaces on drum for scoring or wear. Remove transmission brake support grease shield spring (NOTE—this spring acts as a guide for the brake shoes and retains the brake support grease shield to transmission extension housing). Place a rubber band around brake shoes to hold them in position and remove brake shoe return spring. Remove brake anchor shoe washer and brake shoe guide. Remove both brake shoe assemblies, adjusting sleeve, nut, screw and brake shoe operating lever link. Remove brake support grease shield from extension housing. *(CAUTION—*If a screwdriver or sharp instrument is used to remove the shield, care must be taken not to damage neoprene sealing surface at bottom of shield). Slide brake support assembly from rear extension housing and anchor. Inspect neoprene spacer for deterioration and note the steel sleeve used between spacer and extension housing.

Transmission Extension: Remove speedometer drive pinion. *(CAUTION—Nylon gear can be damaged if extension housing is removed without first removing the speedometer drive pinion).* Using puller C-748, remove the output shaft rear bearing oil seal and remove any burrs from counterbore of extension housing. Remove the transmission-to-extension screws and lockwashers. Install guide studs C-3283 and attach puller C-3282. Pull extension housing from output shaft support assembly and remove extension gasket. *(CAUTION—*Use care when removing extension housing to prevent damage to governor housing). Inspect extension housing for cracks in casting and remove burrs from gasket surface. Clean output shaft rear bearing and dry with compressed air. Check bearing for rough spots but do not remove from housing unless it is found to be defective. Using a pair of long nose pliers, remove output shaft rear bearing snap ring. Using driver C-3275, drive output shaft rear bearing out rear of extension housing. Remove vent from top of extension housing and make sure it is clear of foreign matter and is open.

Governor: Using a sharp instrument, remove either of the governor valve snap rings. Remove governor valve shaft and valve from governor body. With snap ring-pliers, remove governor weight assembly snap ring (large), and remove governor weight assembly from governor body. Using C-3229 pliers, remove governor secondary weight snap ring. *(CAUTION—*Keep thumb pressure against secondary weight when removing snap ring as it is spring loaded). Remove secondary weight and spring. Inspect all parts for burrs or wear. Check secondary weight for free movement in primary weight by placing secondary weight in primary weight without spring. Primary weight should fall freely when both parts are clean and dry. Check spring for distortion. Remove governor locating screw from governor body and output shaft *(make sure that screwdriver used fits slot in screw perfectly to avoid damage to governor body).* Slide governor body and support from output shaft. Remove the two governor support piston rings and inspect closely. *(CAUTION—*Governor support has pressed in steel sleeve which routes oil through the support. Make sure these passages are open. Do not attempt to replace sleeve if damaged, replace support). Clean passages with air and inspect valve and governor body for slight scores. Remove the four governor body-to-support screws and lockwashers and separate body from support.

Rear Oil Pump: Remove oil pump housing-to-output shaft support screws and lockwashers and remove housing and oil pump gear. Use prussian blue to mark front side of gear in housing *(DO NOT USE A SCRIBE).* Inspect machined surfaces for nicks and burrs, oil pump gear and housing for being scored or pitted, and pump housing plug for leaks. Remove rear oil pump pinion from output shaft and mark front side with prussian blue *(CAUTION—*Oil pump pinion keyed to shaft by a small ball. Use care when removing pinion not to lose ball). Check pinion keyway and ball pocket for pitting or scoring. Using tool C-3335 and feeler gauge, check clearance between pump housing face and face of gears. Clearance limits are from .001-.003".

Center Assembly (Output Shaft Support, Planet Pinion Carriers, and Direct Clutch Assemblies): Remove output shaft support-to-transmission case screw and washer. With one hand, work output shaft up and down, and at the same time apply pressure with the other hand to the input shaft. Slide output shaft rear support assembly, planet gear housing assembly and gasket from rear of transmission case. If rear support is stuck to transmission case and cannot be removed as just described, then proceed as follows: Install one of the oil pan screws into transmission case and with the aid of a pry bar, pry against support sufficiently to separate support from case. Remove direct clutch piston retainer assembly from torque converter reaction shaft. Remove direct clutch piston retainer thrust washer from torque converter reaction shaft. This washer is a select fit and controls end clearance between direct clutch assembly and carrier housing. Inspect washer for cracks, burrs and wear.

▷*INPUT SHAFT PRODUCTION CHANGE: Seal rings not used in late production. See Production Change above.*

Planet Pinion Carrier Removal from Housing Assembly: Place unit in an upright position in tool C-3285. Using a feeler gauge, check clearance between kickdown planet pinion carrier housing snap ring and kickdown planet pinion carrier assembly. This clearance should be .012-.038". If within these limits, then identify each thrust washer as it is removed. Using a screwdriver, remove transmission kickdown planet pinion carrier housing snap ring. Identify snap ring to aid in assembly (ring is not a selective fit). Proceed as follows:
1) Remove input shaft, kickdown planet pinion carrier assembly and kickdown annulus gear from carrier housing. Remove reverse planet pinion carrier thrust washer and inspect for cracks, burrs and wear. Remove kickdown annulus gear snap ring. Remove kickdown annulus gear from input shaft and inspect for worn, cracked or broken teeth.
2) Remove kickdown planet pinion carrier assembly from input shaft and carefully inspect stop ring on end of shaft which controls position of annulus gear on input shaft. Check all oil passages in both gear and shaft for obstructions. Inspect splines and bearing surfaces for burrs and wear. On early cars, inspect the three seal rings on input shaft for broken ends and make sure they are free to rotate in grooves.
3) Inspect planet pinion carrier for scores on thrust surfaces, broken and worn teeth. Using a feeler gauge, check end clearance on individual planet gears, clearance should be .006-.017". Inspect pinion shafts for tight fit in carrier and make sure pinions are free to rotate on shafts. Check oil holes in gears and shafts for obstructions. Inspect oil holes in the thrust washer of the kickdown carrier to make certain they are open *(NOTE—Do not replace planet pinion carrier assembly unless the above inspection indicates that it is necessary. This assembly is serviced only as a complete unit).*
4) Remove reverse planet pinion carrier assembly from planet pinion carrier housing. Inspect in the same manner as for planet pinion carrier (3 above). Remove output shaft and reverse annulus gear assembly from carrier housing and output shaft support. Remove reverse annulus gear snap ring and remove annulus gear from shaft. Inspect thrust surfaces, journals and inner bushings for scores. Check annulus gear for worn or broken teeth. Inspect ring grooves for burrs and ring for broken ends. Inspect splines on both shaft and gear for burrs and wear. Check speedometer pinion gear and gear output shaft, and shaft bushing for burrs, wear and scoring.
5) Remove planet pinion carrier housing thrust washer and check for cracks or wear. Remove planet pinion carrier housing from output shaft support and inspect driving lug slots inside of housing for wear. Inspect bearing and thrust surfaces for scores and burrs. Closely inspect band contacting surface for burned spots and scoring, especially if lining has worn excessively. Inspect all oil passages in output

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POWERFLITE (Cont.)

shaft and support for obstructions. Check rear oil pump mating surface for burrs and scores, and check for stripped threads in support.

Direct Clutch Piston Retainer: 1) Using a screwdriver remove kickdown sun gear snap ring. Identify this ring so it can be returned to the same position (selective fit). Lift out sun gear assembly. Check for clutch material obstructing oil passages and slinger and remove any metal pickup which might have accumulated on front side. Inspect for cracked or broken teeth.

2) Lift out direct clutch hub from center of direct clutch piston retainer. Inspect driving lugs for wear and remove any metal pickup accumulated on either side of hub. Invert the direct clutch piston retainer and remove clutch plates (steel) and driving disc assemblies (five or six of each used, depending on car model), noting position in which these parts were assembled. *(CAUTION*—If assembly was started with cork portion on outer top, the same sequence will follow all through the assembly and when unit is reassembled the same sequence should be followed to assure smooth operation). Inspect driving discs for evidence of wear, burning, glazing, and flaking off of facing material. Check discs by scratching with finger nail and if material collects under nail, replace discs. Inspect splines in discs, replacing any that are damaged. Inspect steel plates for burning, scoring, or damaged splines.

3) Using tool C-3302, compress direct clutch spring sufficiently to unseat clutch spring retainer snap ring. Release tool C-3302, and remove direct clutch spring retainer snap ring, spring retainer and spring from direct clutch piston retainer. Using a twisting motion remove direct clutch piston assembly from clutch retainer. Air pressure may be used to blow piston out if it is tight.

4) Inspect ball check in clutch retainer housing to make sure it is free. The bearing used in direct clutch piston retainer is a steel back bronze type and is not replaceable. If torque converter reaction shaft seal rings have worn or grooved the bearing so that bronze is no longer visible at that point replace the direct clutch piston retainer. Inspect band contacting surfaces for deep scores and burns, especially if band lining is worn to point where steel band has been contacting direct clutch piston retainer. *(CAUTION—Do not turn clutch piston retainer in lathe to remove score marks).* Inspect steel clutch plate contacting surfaces for deep scores, replace as needed. Make sure clutch driving lugs will slide freely into retainer. Inspect inside bore for score marks, and if light, remove with crocus cloth, if heavy, replace piston.

5) With tool C-3286, unlock direct clutch piston retainer seal ring and remove from retainer. Inspect for wear and broken ends. Remove direct clutch piston seal ring (neoprene) from piston. Inspect for deterioration and hardness.

Reverse & Kickdown Band Assemblies: Mark reverse band for installation purposes, then compress ends of band sufficiently to remove reverse band strut. Unhook reverse band assembly from link assembly and remove by rotating band ends through rear opening in transmission case. Repeat with kickdown band, noting that strut is grooved to act as a guide to strut pin on band end. Remove from case in same manner as for reverse band. Inspect linings for wear and bonding to metal band. If lining is worn to point where grooves are no longer visible, replace band. *(CAUTION—Do not attempt to reline bands.)* Check bands for distortion and cracked ends.

Reverse & Kickdown Band Lever Assemblies: *(CAUTION—Inspect these link assemblies and levers for cracks or wear, making sure they have side clearance and are free to turn on shafts. Do not remove these assemblies unless inspection reveals that it is necessary).* If necessary to remove, proceed as follows: Insert finger in back of reverse band and link assembly lever shaft, and holding the reverse band lever and link assembly with the other hand, push shaft out rear opening in transmission case. Remove kickdown band lever shaft plug in front of transmission case and remove kickdown band lever in same manner as for reverse band, except that shaft is removed from front of transmission case.

Front Oil Pump: 1) Remove transmission regulator valve spring retainer, spring, gasket and valve. Remove torque converter control valve spring retainer, spring, gasket and valve.

2) Remove front oil pump-to-transmission case screws and washers (discard aluminum or copper sealing washers, new ones must be used at reassembly). Remove housing by tapping gently with a fibre hammer (if front pump housing has two threaded holes, attach puller C-3287 and guide studs C-3288 and pull housing and gears from transmission case). Use prussian blue to mark front side of gears *(CAUTION—Do not scribe gears for identification).*

3) Remove front oil pump housing seal (large neoprene) from housing, and inspect for deterioration and hardness. Using a brass drift, drive housing dust seal out front of housing. Inspect housing bushing for scores. Remove light scores with crocus cloth and if bushing scored heavily, replace housing (bushing is not replaceable). Check housing and gears for scores.

4) Using tool C-3335 and feeler gauge, check clearance between pump housing face and face of gears. Clearance limits are from .001" to .003". Make sure all oil passages are clear by blowing out with compressed air.

Regulator Valve Body: Using the two holes provided in regulator valve body, attach puller C-3287, and install guide pins C-3288. Pull regulator body off torque converter reaction shaft. Place body and both valves in pan containing clean solvent, wash thoroughly and dry with compressed air. Check valves for free movement in body, these valves should fall in and out of bores when both valves and body are dry. *(CAUTION*—If crocus cloth is used to polish valves, care must be taken not to round off the sharp edges of valve.) Check for all passages for obstructions and all mating surfaces for burrs or distortion. If body has a slight nick or raised portion on a mating surface, it can be removed with a surface plate and crocus cloth. Check regulator valve spring seat (snap ring) for proper seating. Wrap valves and body in separate cloths until ready for installation.

Reverse Servo Piston: Lift out reverse servo piston sleeve. Inspect inside bore, lever, and contacting surface on piston sleeve for scores and wear. Make sure the two bleeder holes are open. Install tool C-3289 on transmission case and compress reverse piston spring retainer. Using a screwdriver, remove the reverse servo piston and valve assembly spring retainer snap ring, and loosen compressing portion of tool. Remove spring retainer, spring, servo piston and valve assembly. Remove servo piston ring (lip type neoprene) from piston and inspect for distortion and hardness. Remove reverse servo piston valve snap ring. Remove spring and valve from piston. Inspect servo bore for scores and remove light scores with crocus cloth.

Kickdown Piston: Using tool C-3289, apply sufficient pressure on kickdown piston rod guide and remove the snap ring. Loosen compressing portion of tool and remove tool from transmission case. Remove piston rod guide, piston spring, kickdown piston rod assembly, and kickdown piston cushion spring. Inspect riveting of kickdown piston rod to kickdown piston spring retainer. Remove seal ring from guide and inspect for light scores and wear on piston rod and guide. Using C-484 pliers, remove kickdown from transmission case. Remove the three snap rings (two locking and one open type) from kickdown piston. Inspect rings for scores or broken ends, and piston for wear.

Torque Converter Reaction Shaft: *(CAUTION—Inspect shaft seal rings (interlocking type) for broken ends and make sure they are free to rotate in grooves. Inspect inside of shaft for burrs, and splines for burrs and wear. Check thrust surfaces for wear and slight scores. Do not remove reaction shaft from case unless inspection reveals that it is necessary).* If shaft must be removed, proceed as follows: Remove shaft seal (neoprene). Using a suitable brass drift, remove shaft dowel pin from shaft flange and transmission case. Remove transmission case-to-reaction shaft screws and using tool C-3297, press shaft out of transmission case. Remove the two shaft seals (interlocking).

Manual Control Valve Lever Shaft Oil Seal: Drive seal out of case with a suitable drift.

Kickdown Band Adjusting Screw: Loosen locking nut and remove kickdown band adjusting screw and locknut. *CAUTION—When locknut is loosened, the adjusting screw must be finger free. If not, inspect screw and nut for pulled threads or foreign material on threads. Freeness of this screw is very important to adjustment.*

Transmission Case Inspection: Inspect case for cracks, sand holes and stripped threads. Check for burrs on mating surfaces. Blow compressed air through all passages to make sure they are open. Check oil hole plugs for tightness.

REASSEMBLY

Kickdown Band Adjusting Screw: Install adjusting screw in transmission case until there is approximately 1" of screw left outside case. Do not lock screw into position at this time.

Manual Control Valve Lever: Using tool C-3277, start seal squarely and tighten until seal is flush with case.

Torque Converter Reaction Shaft: *(NOTE—Reaction shaft should only be removed if inspection indicates that it is faulty).* Heat front face of transmission case to 170-190°, using sun lamps for the purpose.

1) Coat the two shaft interlocking seal rings with Lubriplate and install on shaft and lock in place.

CONTINUED ON NEXT PAGE

POWERFLITE (Cont.)

Make sure the rings are free to rotate in lands. Coat the portion of shaft that presses into case with Lubriplate and position shaft into front of transmission so holes in shaft line up with screw holes in case.

2) Place a 5/16" (.308-.311" outside diameter in unthreaded section), 2¼" long bolt through dowel guide pin holes in case and reaction shaft to act as guide, install nut. Using tool C-3297 press shaft into place. Do not remove 5/16" bolt at this time. Start the three transmission case-to-reaction shaft screws and washers and tighten slightly, but do not torque.

3) Remove 5/16" bolt from dowel hole and install the reaction shaft dowel from inside case. Torque the case-to-reaction shaft screws to 10-15 ft. lbs. Coat neoprene reaction shaft seal and install on shaft.

Kickdown Piston: 1) Coat the three kickdown piston rings (two locking and one open type) with Lubriplate and install on piston. Lock into position and make sure they are free to rotate in lands. Place kickdown piston assembly into transmission case, compress bottom ring with a brass rod (flatten end), and push piston into place.

▷*CAUTION: After bottom ring has entered, piston will seem to hang at two different locations while being pushed into case. This is due to rings entering cylinder. If any of the rings should be broken when piston assembly is being installed, transmission will not operate properly.*

2) Place cushion spring in piston and install tool C3289 on transmission case. Place piston rod assembly in piston and slide piston spring over piston rod assembly. Coat piston rod guide seal ring with Lubriplate and install on rod guide. Make sure ring rotates in groove.

3) Place piston rod guide assembly on piston rod assembly and using extreme care, compress the kickdown piston spring to the point where piston guide seal ring slightly binds on case. Using a piece of brass rod (flattened on end), work seal into position, gradually compressing spring until seal ring enters case and snap ring can be installed. Install snap ring, making sure it is properly seated.

Reverse Servo Piston: 1) Place reverse servo piston valve and spring in reverse servo piston, with shaft protruding through hole in bottom of piston. Using pliers C-3229, install reverse servo piston valve spring snap ring and make sure it is seated.

2) Coat servo piston ring with Lubriplate and install on piston. Insert piston and valve assembly into transmission case in a cocked position, then by rotating piston, the piston ring will enter case without damage.

3) Place servo piston spring over piston and position spring retainer over spring. Compress spring with tool C-3289 sufficiently to install snap ring, making sure it is seated. Inspect interior of servo sleeve for burrs, then place sleeve over piston, making sure sleeve slides freely on piston by working it up and down. Remove installing tool from transmission.

Regulator Valve Body: 1) Inspect regulator valve body and valves to make sure that no damage has occurred since disassembly and blow out passages with air.

2) Coat reaction shaft seal (neoprene) with Lubriplate if not already done, and place regulator valve and torque converter control valve in regulator valve body. Install guide studs C-3288 in front transmission case.

3) Place regulator valve body assembly, with oil passages to rear, over reaction shaft and onto guide studs *(CAUTION—When reaction shaft seal enters regulator body use care to prevent shaft screws damaging passages on regulator body)*, seat firmly to front of transmission case.

Front Oil Pump: 1) Position front oil pump housing dust seal in oil pump housing with metal portion of seal down. Using driver C-3278, bottom seal in housing. Coat housing seal (large neoprene seal) with Lubriplate and install on housing.

2) Place front oil pump gear and pinion (driving lugs on pinion facing up, and prussian blue marks made at time of disassembly toward front) in pump housing. *(CAUTION—Oil pump pinion must be installed correctly or damage will result when installed in transmission.)* Lubricate pump gears with transmission fluid.

3) Place pump housing assembly over reaction shaft and slide into position over guide studs until pump housing seal is flush with transmission case. Using new aluminum or copper washers on screws, start five of the screws and draw housing down evenly until it is seated into transmission case. Remove guide studs and install two remaining screws and washers. Torque all screws to 12-17 ft. lbs. *NOTE—After all screws have been installed and torqued, engage driving lugs of oil pump pinion to determine if pinion turns freely. Use the oil pump drive sleeve for this check. If not free, remove pump and check for foreign matter between gears and housing.*

4) Using a new gasket, install torque converter control valve spring and retainer. Torque to 35-40 ft. lbs. Install regulator valve spring and retainer, using a new gasket, and torque to 45-50 ft. lbs.

Reverse Band, Kickdown Band & Lever Assemblies: *NOTE—If lever assemblies were not removed, omit the operations covering their installation.*

1) Place kickdown band lever assembly in transmission case and slide band lever shaft into position from front of case, making sure it operates freely. Install band lever shaft plug and torque to 30-35 ft. lbs. Place kickdown band assembly into transmission case by rotating ends of band through opening in case. Fit proper end of band over adjusting screw and compress band sufficently to install band strut between other band end and band lever. *CAUTION—Make sure band strut slot engages with kickdown band strut pin in band end.*

2) Place reverse band lever assembly in reverse band link assembly and position into transmission case, aligning holes in lever and link assemblies to holes in transmission case. Slide band lever shaft into position from rear of transmission case. Shaft is held in position by rear output shaft support.

3) *(NOTE—If new reverse band is to be installed, back adjusting screw out until approximately 1" of screw is above lever on locknut side.)* Place reverse band assembly into transmission case by rotating ends of band through rear opening in case. Hook correct end of band (previously identified when band removed) in link assembly. Compress band sufficiently to install band strut in slots of reverse band and band lever assembly.

Direct Clutch Piston Retainer: 1) Coat direct clutch seal ring with Lubriplate and install on piston, with lip of ring facing away from the flange. Coat clutch piston retainer seal ring with Lubriplate and install on retainer hub. Using tool C-3286, lock seal into position and make sure it is free to rotate in lands. Place piston assembly in clutch retainer, and with a twisting motion, seat piston in bottom of retainer, being careful not to damage lip of seal.

2) Seat clutch spring into piston retainer and position spring retainer and snap ring on spring. Using tool C-3302, compress clutch spring sufficiently to seat the snap ring. *NOTE*—Piston spring retainer may require guiding past the snap ring grooves. Make sure snap ring properly seated.

3) Place clutch hub in center of clutch piston retainer. Lubricate all clutch plates and driving discs with automatic transmission fluid and assemble by placing one of the clutch plates in clutch piston retainer, followed by a driving disc. *(NOTE—Install discs in the same manner they were removed. If first driving disc was installed with cork portion on outer top, then the remaining discs must be installed in the same manner, or vice versa. Repeat this procedure until all six discs and plates have been installed.)*

4) Place kickdown sun gear assembly in direct clutch piston retainer and install snap ring (this ring is a selective fit and must be checked as follows): Using a feeler gauge, check clearance under kickdown sun gear snap ring. Clearance limits should be as close to zero as possible. Rings are furnished in three sizes for selective fitting. Part No. 1327729 (.059-.061"), No. 1327730 (.062-.064"), No. 1327731 (.065-.067").

Planet Pinion Carriers: 1) Place output shaft support in tool C-3285 with bearing surface up. Lubricate bearing surface of planet pinion housing and place bearing surface of housing over output shaft support bearing surface. Place reverse annulus gear on output shaft and install snap ring. (Output shaft may be placed in vise, providing vise is clean and equipped with brass jaws). *(CAUTION—Reverse annulus gear must be tight fit on shaft. End clearance is controlled by various snap rings which are furnished in the following three thicknesses: Part No. 1329608 (.078-.080"), No. 1329609 (.082-.084"), No. 1329610 (.086-.088"). Make sure that snap ring is properly seated.)*

2) Coat output shaft seal ring with Lubriplate and install on shaft. Lock into position and make sure ring rotates freely in groove. Coat planet pinion carrier housing thrust washer with Lubriplate, slide over output shaft and into position in reverse annular gear. Place output shaft and reverse annulus gear in position in carrier housing and through output shaft support, being careful not to damage shaft seal ring as it enters shaft support. *Check to see that planet pinion carrier thrust washer seats properly between annular gear and carrier housing.*

3) Lubricate thrust surfaces and gear teeth of reverse planet pinion gear and carrier assembly, and place carrier assembly in reverse annulus gear. *(CAUTION—Make sure driving lugs on carrier assembly properly engage slots in planet pinion housing.)*

4) On early cars, coat input shaft seal rings with Lubriplate and lock into position, making sure rings rotate freely in lands. (Later cars have a large bearing area (bushing) on shaft replacing the three

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

seal rings. *See "Input Shaft Production Change" above for installation of later type shaft in early cars). (CAUTION—Inspect stop ring for proper position in input shaft groove).* Lubricate thrust surfaces and gear teeth on kickdown planet pinion gear and carrier assembly. Slide assembly with collector ring up, carefully down on rear end of input shaft and over stop ring. Lubricate teeth and thrust surfaces and install kickdown annular gear onto input shaft, down to stop ring. Install kickdown annulus gear snap ring and make sure it is seated (Input shaft can be installed in vise providing it is clean and equipped with brass jaws).

5) Engage teeth of kickdown planet pinion gears with teeth on kickdown annulus gear. Slide pinion gear and carrier assembly into position in kickdown annulus gear. Coat reverse planet pinion carrier thrust washer with Lubriplate and install on kickdown annulus.

6) Place kickdown planet pinion carrier assembly, annulus gear and input shaft into position in planet carrier housing. Make sure planet pinion carrier thrust washer remains on annulus, and driving lugs on carrier assembly properly engage slots in planet pinion housing. Install planet pinion housing snap ring (not selective fit), making sure it is positioned and seated properly. Lubricate gears and splines.

7) Using a feeler gauge, check clearance between kickdown planet pinion carrier housing snap ring and the kickdown planet pinion carrier assembly. Limits are .012-.038". If not within these limits disassemble and recheck reverse planet pinion carrier and planet pinion carrier housing thrust washers.

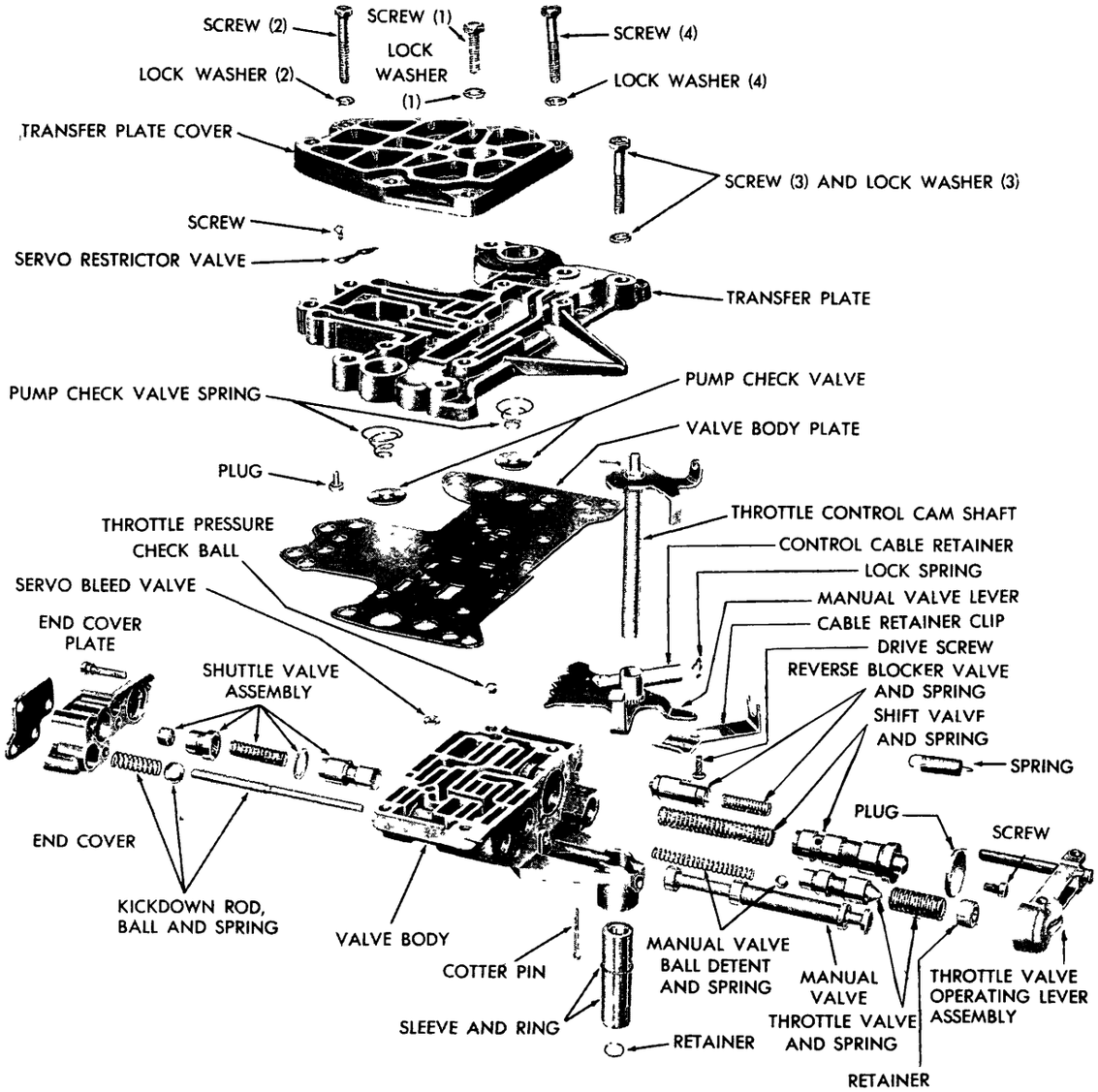
Center Assembly (Output Shaft Support, Planet Pinion Carriers, and Direct Clutch Assemblies): 1) Coat kickdown planet pinion thrust washer with Lubriplate, place over kickdown sun gear and on to thrust surface of direct clutch piston retainer assembly. Place direct clutch piston retainer assembly over input shaft, engaging sun gear with kickdown planet pinion gears and engaging splines of input shaft with direct clutch hub. Make sure kickdown planet pinion carrier thrust washer remains in position.

►***DIRECT CLUTCH PISTON RETAINER THRUST WASHER CAUTION:*** This thrust washer controls transmission endplay clearance and is a selective fit. After transmission is reassembled, except for hand brake assembly, the endplay clearance must be checked and corrections made in the washer thickness as necessary. *See "Checking Transmission Endplay" below.*

2) Coat direct clutch piston retainer thrust washer with Lubriplate and install on torque converter reaction shaft inside transmission case. Use care when sliding washer over rings to prevent damage.

3) Install guide studs C-3283 in rear of transmission case, position new output shaft support gasket over guide studs and on to case. Place tool C-3306 over splines on front of input shaft.

4) Insert input shaft, with direct clutch assembly, planet pinion carrier housing, output shaft support and output shaft attached, through rear of transmission case and through transmission reaction shaft. Then guide assembly through bands and over guide studs into position in transmission case. Remove tool C-3306 from front of input shaft.



1956 POWERFLITE VALVE BODY & TRANSFER PLATE ASSEMBLY

►***CAUTION: Do not force assembly into case. Avoid damage to seal rings on torque converter reaction shaft.***

5) Install one output shaft support-to-transmission case screw and lockwasher finger tight.

Rear Oil Pump: 1) Coat oil pump pinion ball with Lubriplate and insert in ball pocket in output shaft. Lubriplate oil pump drive pinion, place over shaft and slide into position, aligning keyway in pinion with ball in shaft. ***Make sure pinion is installed with side marked with prussian blue at disassembly, is toward front.***

2) Slide pump housing assembly over output shaft and into position against output shaft support. Install five rear oil pump housing-to-output shaft support screws and lockwashers ***(CAUTION—There are two extra holes in housing which are used for vents. Make sure screws are not installed in these holes. Check each screw hole before installing screws).*** Draw screws down evenly and tighten to 15-20 ft. lbs. torque. When screws have been properly tightened, check output shaft for free rotation of pump gears. If not free, disassemble pump to determine cause.

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POWERFLITE (Cont.)

Governor: 1) Coat the two governor support piston rings with Lubriplate and install on governor support. Stagger rings and make sure they are free. Position governor body on support, install the four screws and lockwashers *but do not tighten at this point.*

2) Slide governor support and body assembly over output shaft and into position in rear pump housing, compressing governor support piston rings with fingers as support enters oil pump housing.

3) Align locating hole in output shaft to locating screw hole in governor body and install governor locating screw, tighten to 3½-4 ft. lbs. torque. *NOTE —Holes can be easily aligned by turning output shaft and holding governor body. Make sure screw driver attachment fits the screw slot when tightening locating screw.*

4) Tighten the four governor body screws to 5-10 ft. lbs. torque.

5) Dry governor parts with compressed air but do not lubricate when assembling. Place governor weight spring over secondary weight and position both in primary weight, making sure springs seat properly. Guide secondary weight, and compress governor weight spring sufficiently to install snap ring. Make sure ring is properly seated. Place governor weight assembly, with secondary weight snap ring up, into governor body and install snap ring, making sure it is seated.

6) Slide governor valve, with small end up, over governor valve shaft. Slide governor shaft into governor body through output shaft and governor weight assembly, at same time positioning valve into body. Install governor shaft snap ring and make sure it is securely locked to shaft. Check operation of governor weight assembly and valve by turning output shaft. Both should fall freely in body.

Transmission Extension: *NOTE—If output shaft rear bearing was not removed, omit operation covering its installation.*

1) Using driver C-3204, install output shaft rear bearing in extension housing. Make sure it is properly seated then lubricate with automatic transmission fluid. Install output shaft bearing snap ring, bevel side up, making sure it is properly seated.
2) Replace extension breather and tighten to 10-12 ft. lbs. torque. Install new transmission extension gasket over guide studs and into position against output shaft support. *Do not use sealing material on gasket.* Using care not to damage governor housing, place extension housing over output shaft and onto guide studs. Using tool C-496 with adapter C3284, press extension housing into position against output shaft support.
3) Start the seven transmission extension-to-case screws and lockwashers, then draw down evenly and tighten to 25-30 ft. lbs. torque. Tighten output shaft support-to-case screw to 25-30 ft. lbs. torque. *Check to see that output shaft turns freely.*
4) Coat nylon gear and threads on speedometer drive pinion with Lubriplate and install in extension. Tighten to 40-45 ft. lbs. torque.

Checking Transmission Endplay: Using dial indicator C-430 or feeler gauge, measure the distance between direct clutch assembly and carrier housing when clutch is in rearward position. Using a screwdriver inserted between the direct clutch assembly and carrier housing, carefully pry direct clutch forward. Remove screwdriver and measure again. The difference in measurements is the end clearance and must be .043-.069". If it does not fall within these limits, proceed as follows:
1) Remove the seven screws and lockwashers from transmission extension and install guide studs C-3283. Then remove the one output shaft support-to-case screw and washer, and remove extension housing, output shaft, support, and planet pinion carrier housing assembly as a unit.
2) Slide direct clutch piston retainer from torque converter reaction shaft and remove direct clutch piston thrust washer. Using a micrometer, measure thickness of the washer and then select a washer to give correct clearance. These washers are available in the following five thicknesses: Part No. 1406442 (.125-.130"), No. 1406443 (.135-.140"), No. 1406444 (.145-.150"), No. 1406445 (.155-.160"), No. 1406446 .164-.170").
3) To install, reverse removal procedure. Using driver C-3205, install output shaft rear bearing oil seal.

Hand Brake Assembly: 1) With brake support spacer in position on back of brake support and spacer sleeve in center of support, slide brake assembly over rear extension housing and anchor pin. Make sure spacer sleeve remains in center of support. Install brake support grease shield on extension housing. *NOTE—Indent in shield for correct positioning on extension housing. Shield must be located on housing far enough to permit installation of spring later.*
2) Place both anchor brake washers on brake shoe anchor and install locking washer. Place both shoe assemblies with adjusting sleeve nut and screw into position on anchor. Make sure brake shoes are between the anchor washers. Use a rubber band around shoes to help hold them in position.

3) Install operating link (marked for correct installation), and brake shoe support grease shield spring (with opening in spring toward adjusting sleeve). Make sure spring is properly seated in groove. Slide brake shoe return spring behind grease shield spring and hook into position in holes in brake shoes.
4) Make sure adjustment is loose enough and install brake drum assembly. If necessary, use tool C-496 to press brake drum on output shaft. Install transmission flange washer, shakeproof washer and nut, and tighten to 140-160 ft. lbs. torque.

Kickdown Band Adjustment: Turn transmission on side and using tool C-3291, loosen locknut and tighten kickdown adjusting band adjusting screw to 60-72 inch lbs. torque. With the counter on C-3291, back adjusting screw out 3 turns, then holding adjusting screw stationary with short handle, tighten locknut securely. *Use extreme care to assure correct adjustment.*

Reverse Band Adjustment: Remove reverse band adjusting screw locknut and tighten adjusting screw to 20-25 inch lbs. torque, then back out adjusting screw 10 turns. Holding adjusting screw in this position, replace adjusting screw locknut and tighten to 30-35 ft. lbs.

Valve Body & Transfer Plate: 1) Install neutral safety switch, back-up light switch and gasket, and tighten to 15-20 ft. lbs. torque. Clean mating surfaces and check for burrs on transmission case and valve body. Place valve body and transfer plate into position on transmission case and install five transfer plate screws and lock washers *(Install the two 1⅝" long screws through transfer plate cover on valve body)*, tighten to 12-17 ft. lbs. torque. Make certain the two oil strainer tube seals are in position on oil strainer, and place oil strainer in position on valve body. Install oil strainer support screws and lock washers and tighten to 12-17 ft. lbs.
2) Place manual valve lever shaft seal cover over manual shaft and install manual control lever with arm side of lever against cover, on manual valve shaft. Tighten locking screw. Place throttle valve camshaft felt and retainer over throttle valve shaft. Install lever assembly on throttle camshaft, and tighten locking screw. Check operation of controls by shifting manual control into the four operating positions.
3) Check throttle cam position in throttle operating lever assembly and throttle camshaft assembly for kickdown operation. Visually check manual lever contact on neutral safety and back-up light switches.
4) Install oil pan, using a new gasket, and tighten attaching screws to 12-17 ft. lbs., drawing screws down evenly. Tighten drain plug to 20-25 ft. lbs. torque.

VALVE BODY OVERHAUL

Control Valve Assembly: A reverse blocker valve has been added to the control valve assembly. Remove the reverse blocker valve by removing the cotter pin and spring, then rotate valve out of its bore. Donot remove push button unit control adapter, lock spring, or cable adapter clip unless inspection indicates that it is necessary. See "Control Valve" illustration for removal and installation of valve components.

Valve Body & Transfer Plate Disassembly: Place valve body and transfer plate assembly in holding fixture C-3294. DO NOT USE VISE TO HOLD TRANSFER PLATE ON VALVE BODY.
1) Remove two of the long transfer plate cover screws and lock washers and install guide studs C-3295. Keeping finger tight pressure against transfer plate, remove the three remaining transfer plate cover screws, (two long & one short), and remove transfer plate cover. Using care not to lose the servo restrictor valve operating plug from transfer plate, remove transfer plate from valve body plate. *NOTE—Rear pump check valve has metering hole in it. Note position of this valve in relation to the front pump check valve (without metering hole).*
2) Remove valve body plate from valve body, noting position of throttle pressure check valve ball, and servo bleed valve (servo bleed valve may stick to valve body plate). Remove these parts and place in clean container. Remove throttle valve cam spring from cam and operating lever. Compressing the throttle valve operating lever assembly against throttle valve spring, slide throttle valve cam assembly from manual lever assembly *(CAUTION— Remove any burrs from throttle valve camshaft and*

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

manual valve lever shaft before sliding them from valve body).

3) Swing throttle valve operating lever out of way and remove throttle valve spring and retainer from throttle valve. Remove throttle valve from valve body core. Check distance from valve body to end of throttle valve operating lever adjusting screw. This distance should be 1 11/16". Using tool C-3279, remove throttle valve adjusting screw, lock nut and throttle valve operating assembly. ***NOTE—It is not necessary to remove throttle valve operating assembly unless parts are to be replaced.***

4) Remove the four (three long and one short) valve body end cover plate screws and lock washers and remove valve body end cover plate. Remove valve body and cover screw, keeping pressure against cover to avoid losing the three springs behind it. Carefully remove valve body cover so as not to lose any of the springs or kickdown valve ball. Remove shuttle valve plug *(CAUTION—This plug has an adjustment, but do not disturb this setting as it is adjusted during manufacture).* Remove kickdown valve ball from body. Remove shuttle valve by using shuttle valve spring (shuttle valve stop ring will come out with valve).

5) Remove direct clutch shift valve spring from valve body. Mark the direct clutch shift valve plug with prussian blue (in order to reinstall with right side out), then loosen plug screws sufficiently to allow removal of plug by pushing on open end of shift valve with finger. Remove shift valve, and remove valve body from tool C-3294. Place valve body on clean paper. Remove kickdown rod from cover end of valve body.

►***MANUAL VALVE AND LEVER ASSEMBLY NOTE—It is not necessary to remove this assembly unless damaged parts are to be replaced. If assembly must be removed, proceed as follows:***

6) Place manual control valve lever on lever assembly and turn it counter-clockwise until manual control valve is in low range position (last detent). Using a screwdriver, compress detent plunger and spring and continue to turn manual valve lever assembly until manual valve becomes disengaged from manual valve lever assembly. Remove manual valve from valve body bore. Remove manual control lever and slide manual lever assembly from valve body. Remove manual valve lever detent plunger and spring from valve body.

Valve Body & Transfer Plate Inspection: Wash all parts in clean solvent and dry with compressed air. Check all passages for obstructions and check for porous coating. Inspect all mating surfaces for burrs and scratches. Light scratches and burrs can be removed with crocus cloth. With a light, check bores in valve body for pits and scores. Check springs for distortion and collapse. Check mating surfaces on a surface plate for distortion. Check all moving parts for free operation, and valves for freeness in body bores. Inspect servo restrictor valve in transfer plate to make sure it is seating properly. If valve is defective, carefully remove drive screw. Install new valve and new drive screw, making sure drive screw is tight, and being very careful not to distort transfer plate when installing drive screw. Check all points in valve for wear and replace defective parts.

Valve Body & Transfer Plate Reassembly: ***CAUTION—When assembling valve body and transfer plate assemblies, handle parts carefully to avoid damage, such as nicks, etc., to mating surfaces. Use a twisting motion when placing valves in their respective bores.***

1) Place manual valve lever detent plunger spring and plunger into place in valve body. Slide manual valve lever assembly into valve body. Using a twisting motion place manual valve into valve body sufficiently to engage manual valve with manual valve lever pin. Then using valve lever assembly, turn slowly in clockwise direction and at the same time using a twisting motion, guide manual valve into valve body to low range position. Make sure detent plunger is seated.

2) Place kickdown rod (small end toward end cover) into valve body, making sure it is properly seated. Place valve body in tool C-3294 and install direct clutch shift valve. Place direct clutch shift valve into position (same as when removed, and with marks made at disassembly in correct position) in valve body. Draw the two screws down evenly and torque to 24-30 inch lbs. Install direct clutch shift valve spring in valve.

3) Install shuttle valve in valve body. Coat stop ring lightly with Lubriplate and place into recess in valve body. Place shuttle valve spring in valve. Place kickdown valve ball into valve body.

4) Place valve body end cover plate on end cover. Install one short screw and lock washer. Tighten securely. Place shuttle valve plug into position in end cover, and install kickdown valve spring. Install valve body end cover onto valve body. ***CAUTION—*** Make sure direct clutch shift valve, shuttle valve and kickdown valve spring are in correct position and properly seated when cover is being installed. Install valve body end cover screw and lock washer, but do not tighten.

5) Install the three (long) valve body end cover plate screws and lock washers. Draw down evenly and tighten to 24-30 inch lbs. Tighten valve body end cover screw and the remaining end cover plate screw to 24-30 inch lbs.

6) Using tool C-3279, install throttle valve adjusting screw, locknut and throttle valve lever assembly. Adjust to where there is approximately 1 11/16" distance between valve body and end of throttle valve operating adjusting screw. Install throttle valve (point outward) in valve body. Place throttle valve spring and retainer over throttle valves. Swing throttle valve operating lever over spring and retainer. Compressing the throttle valve lever assembly against throttle valve spring, slide throttle valve cam assembly into manual lever assembly, indexing cam portion on throttle valve in slot of operating lever. Install throttle valve cam spring to cam and operating lever.

7) Install servo bleed valve and throttle pressure check valve ball into position in valve body and install guide studs. Position transfer plate cover on transfer plate and install the center screw (short) and lock washer finger tight. Install the servo restrictor valve operating plug (long end first) into transfer plate.

8) Make sure pump check valves and springs are properly positioned in transfer plate. The pump check valve with the metering hole should be toward the rear of transmission. Place valve body plate flush into position on transfer plate by compressing pump check valve springs. ***CAUTION—Be sure pump check valves enter transfer plate, otherwise valve body plate will be damaged when assembly is later drawn down onto valve body.***

9) Keep sufficient pressure on transfer plate and valve body to hold them together. Place over guide studs and into position on valve body, and install two of the transfer plate cover screws and lockwashers (one on each side) finger tight. Recheck to see that pump check valves remained in position in valve body plate. Remove guide studs and install two remaining transfer plate cover screws and lock washers. Draw transfer plate down evenly and torque all five screws to 45-50 inch lbs. torque.

CAUTION—Avoid over tightening as this will cause valve body to warp which will result in sticky valves. Check operation of pump check valves to make sure they can be unseated by pressing down on them.

TORQUEFLITE (CHRYSLER)

Chrysler Imperial (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR: (Towing car to start is not recommended because of sudden surge of power wh n engine starts).* Turn ignition switch on, then push the "1" (Low) button in and depress accelerator pedal slightly. After car attains a speed of 15 MPH, the transmission will start engine.

►*TOWING TORQUE-FLITE CARS: Following procedure is recommended:*

Transmission Operating Properly—Car may be towed safely in "N" (Neutral) position at moderate speeds. For long distance towing (over 100 miles), the propeller shaft should be disconnected.

Transmission In perative—Tow car with rear end raised or remove the propeller shaft.

DESCRIPTION

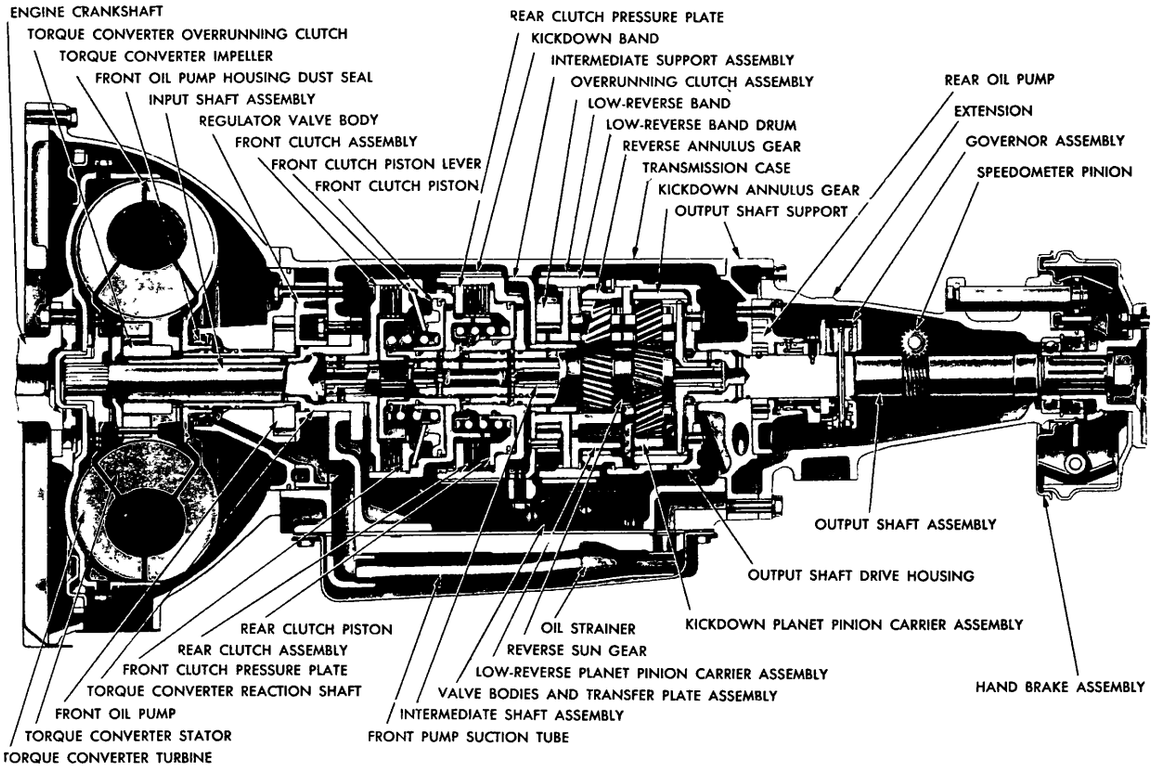
DESCRIPTION: Torque-Flite Transmission consists of a wide range torque converter and a hydraulically controlled automatic planetary transmission. Two multiple disc clutches, an overrunning clutch, two bands and two planetary gear sets provide three forward ratios and one reverse ratio. The oiling system consists of two pumps (front & rear) which circulate oil through transmission, torque converter and oil cooler (where oil cooler is used), with oil supply carried in transmission case oil pan. Transmission speed range selection is controlled by a five button (push button) control located to left of steering wheel in drivers compartment.

OPERATION

OPERATION: Transmission operation in each position of the push button control is outlined below. In "D" (Drive) position (normal driving position), operation varies in accordance with car speed and operating conditions. *See "Shift Speed Tables" below.*

"D" (Drive) Position—Breakaway: Power flow is from converter turbine through input shaft and front clutch retainer. Front clutch is applied and the drive continues through clutch hub to intermediate shaft and kickdown annulus gear. Kickdown annulus gear drives the kickdown planet gears, rotating them in the same direction. Kickdown planet gears are meshed with kickdown sun gear which is integral with the reverse sun gear. Both sun gears are forced to rotate in a reverse direction by reaction of the kickdown planet pinion carrier together with the reverse annulus gear, both of which are splined to the output shaft drive housing. The reverse planet pinion carrier is attached to and prevented from turning backward by an overrun clutch and becomes stationary in forward drive (overruns on coast). Therefore, the reverse carrier pinions are forced to rotate in a forward direction and force the reverse annulus to rotate in the same direction transmitting power flow to output shaft with the combined ratio of the kickdown and reverse planetary gear sets of 2.45-1.

"D" (Drive) — 2nd Speed, and "2" (Second) Positi n — 2nd Speed: Power flow is from torque converter turbine through output shaft to front clutch (which is applied). From front clutch through intermediate shaft to the annulus gear of the kickdown (rear) planetary gear set. Kickdown band is applied which holds the sun gear stationary. The annulus gear drives the kickdown planet pinions which rotate in the same direction as input and intermediate shafts. Kickdown planet pinions are meshed with the sun gear, therefore, they walk around this gear and exert force through kickdown planet pinion shafts to rotate the kickdown planet pinion carrier. The carrier, which is splined to output shaft drive housing, moves at a slower speed than the annulus gear, thus providing a gear ratio of 1.45-1.



TORQUEFLITE TRANSMISSION (SECTIONAL VIEW)

"D" (Drive) Position — Direct: Power flow from converter goes directly through transmission because the planetary elements of the gear train are locked up by two multiple disc clutches and both bands are released. The torque converter provides all the torque multiplication. Gear ratio is 1.00-1.

Kickdown (Forced Downshift) in "D" (Drive) Position Below 25 MPH: This will force transmission to downshift and the power flow will be the same as "D" (Drive) Position — Breakaway.

"1" (Low) Position — Low Speed: In "1" (Low) position, the power flow is the same as "D" (Drive) position — Breakaway or "2" (Second) Position — Breakaway, with one exception, the low-reverse band is applied, locking the overrun clutch to provide engine braking.

"R" (Reverse) Position: Rear clutch and low-reverse band are applied; all other friction elements are released. The power flow is from torque converter turbine through input shaft to rear clutch hub (part of front clutch retainer). The rear clutch is splined to reverse sun gear. The carrier of reverse (front) planetary gear set is held stationary by the low-reverse band; therefore, the set acts as a simple reverse train through reverse planet pinions to reverse annulus (which is splined to output shaft drive housing) and provides a reverse ratio of 2.20-1.

LUBRICATION

Checking Fluid Level: With transmission in "N" (Neutral) position and engine idling, oil level on dipstick located at rear of engine on right side, should be at the "L" mark for cold (room temperature) transmission and at "F" mark for a hot (normal operating temperature) transmission. Add Automatic Transmission Fluid Type "A" to bring fluid to correct mark on dipstick.

Draining & Refilling: Remove transmission drain plug. Remove plate from bottom of torque converter housing and rotate converter until converter drain plug is accessible. Drain oil from both units. Install drain plug. Tighten converter plug to 10-12 ft. lbs., and transmission drain plug to 15-17 ft. lbs. Install plate on

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

torque converter housing. Pour approximately 5 quarts of Automatic Transmission Fluid Type "A" through oil pan filler tube. With engine idling in neutral, add enough fluid to bring fluid level to "L" mark on dipstick (approximately 3 quarts). Shift transmission through all ranges and recheck. Add fluid to bring level to "L" mark on dipstick. *CAUTION*–Make sure oil level indicator seats on filler tube to prevent dirt entering transmission.

►*WINTER DRIVING NOTE:* During extreme cold weather (for which 5W oil is recommended for the engine) should slow engine turn-over be experienced on starting, it is permissable to drain one quart of fluid from transmission and replace with one quart of kerosene. If additional lubricant is required, Automatic Transmission Fluid Type "A" should be used to make up the difference. *It is not necessary to drain and refill transmission with regular fluid as the weather warms up, as the increased operating temperatures will gradually drive off the kerosene.*

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE: See "Carburetor" on car model pages.*

Manual Control Cable Adjustment: **1)** Push the "R" (Reverse) button in. Drain approximately two quarts of fluid from transmission. Remove control cable adjusting clip, flat washer and lockwasher, and screw. Remove neutral starting switch. Place point of a screwdriver through neutral starting switch opening in transmission case and against neutral starting switch operating portion of manual control lever.

2) While holding manual lever in reverse position, adjust control cable for free play by pushing in until cable stops. Mark position on cable in relation to adapter housing. Withdraw control cable to stop, and measure travel. Push control cable in adapter housing one-half of total travel. With cable in this position, install control cable adjusting clip, flat washer, lockwasher, screw, and tighten. Install neutral starter switch and wires.

3) To check for proper adjustment, push the various push buttons, return to neutral each time and check starter operation. A test light attached to starter neutral switch may be used instead of the starter for checking proper operation and adjustment. Refill transmission to proper level.

BAND ADJUSTMENT

Kickdown (Front) Band: Kickdown band adjusting screw is located on left side of transmission case. Using a ¾" wrench, loosen locknut and back off approximately 5 turns. Check freeness of adjusting screw in transmission case. Tighten the adjusting screws to **70-75 inch pounds,** using wrench C-3380. Using a reference mark of chalk or colored pencil on the corner of adjusting screw square and the transmission case, back the adjusting screw out **exactly two turns.** While holding adjusting screw stationary, tighten locknut to 35-40 ft. lbs.

Low-Reverse (Rear) Band: Low-reverse band adjusting screw is located on right side of transmission case. Using a ¾" wrench, loosen locknut and back off 9 turns. Check freeness of adjusting screw in transmission case. If free, set the click device on the small inch-pound torque wrench C-3380 for **70-75 inch pounds** and tighten the adjusting screw. Using a reference mark of chalk or colored pencil on the corner of adjusting screw square and the transmission case, back the adjusting screw **exactly two turns.** While holding adjusting screw stationary, tighten locknut to 35-40 ft. lbs.

TESTING

TRANSMISSION SHIFT SPEEDS (MPH)

UPSHIFTS

Throttle Position	1-2	2-3
Light	10	15
To Detent	25	60
Wide Open	40	75

DOWNSHIFTS

Throttle Position	2-1	3-2	3-1
Closed	8	①	8
To Detent	8	8-12	
Kickdown Limit	8-25	25-70	8-25

① —Not possible.

ROAD TESTING TRANSMISSION: If transmission operation not satisfactory, the following complete procedure is recommended to check performance and diagnose trouble.

►*ROAD TESTING NOTE:* Before road testing, engine must be properly tuned. Adjust idle speed to 400-450 RPM (Single 4-Barrel Carb. Cars); 650 RPM (Two 4-Barrel Carb. Cars), with engine and transmission at normal operating temperature and with transmission in "N" (Neutral) position. Bring transmission fluid level to correct mark on dipstick. If throttle linkage has been disturbed in tuning engine, linkage must be adjusted before making tests.

►*STALL TESTING CAUTION: DO NOT stall test the torque converter. To prevent damage to transmission, wide open throttle stall operation is not recommended.*

1) Push in "N" (Neutral) button and check for dragging up to an engine speed of 800 RPM.

2) Push in "R" (Reverse) button and note shift time and smoothness of the shift.

3) Push in "D" (Drive) button and note shift time and smoothness of engagement.

4) Accelerate car at very light throttle. The transmission should upshift into second at approximately 8-10 MPH and into direct speed at approximately 15-17 MPH. Check quality of the shifts.

5) Slow the car to approximately 15 MPH, then depress accelerator pedal quickly to wide open throttle (without going into kickdown). Check for slippage of front and rear clutches. The transmission should not downshift at this time.

6) At a car speed of approximately 20-22 MPH, depress accelerator pedal fully. The transmission should downshift to breakaway gear. Check quality of shift.

7) Release accelerator pedal and allow transmission to upshift. Accelerate car to 40 MPH. Depress accelerator pedal fully. The transmission should downshift to second gear. Check quality of shift.

8) Release accelerator pedal to closed throttle. Check quality of the "lift-foot" upshift.

9) Accelerate car to 60 MPH and depress accelerator pedal fully. The transmission should downshift to second gear. Check quality of the shift.

10) Accelerate car to kickdown (second gear) at wide open throttle until the transmission upshifts. The shift should occur at approximately 70 MPH. Check quality of the shift.

11) Slow car down to 30-40 MPH and engage the "2" (Second) button. The transmission should downshift to second gear. Check for gear noise.

12) Slow car to 15 MPH and depress accelerator pedal quickly to wide open throttle without going into kickdown. Check for kickdown band or front clutch slippage. The transmission should not downshift at this time.

13) Release accelerator pedal and push the "1" (Low) button. The transmission should downshift at approximately 25 MPH.

14) With accelerator pedal at light throttle, push the "D" (Drive) button at approximately 20 MPH (the transmission will upshift), coast to a stop. The transmission should downshift at approximately 8 MPH. Check quality of downshift.

HYDRAULIC CONTROL PRESSURE TESTS: *NOTE–Use Pressure Gauge C-3293 (300#) for all the following tests.*

Line Pressure: Remove the 1/8" pipe plug from line pressure take-off hole located on left side of transmission case (lower plug forward of control lever and cable connection). Install pressure gauge at this point and make the following tests:

Line Pressure Tests

Push Button Position	Rear Wheels	Engin Speed (RPM)	Pressure
R	Free	1600	225
N		800	90
D	Locked	800	90
2	Locked	800	90
1	Locked	800	90

►*NOTE: If line pressure not correct, see "Trouble Shooting & Diagnosis" below.*

Governor Pressure: Remove 1/8" pipe plug from governor pressure take-off hole located on lower left side of transmission case (at rear of case in output shaft support). Install pressure gauge at this point and make the following tests:

Governor Pressure Tests

Push Button Position	Rear Wheels	Car Speed (RPM)	Pressure
D	Free	8	2-3
D	Free	27	27-32
D	Free	38	44-47
D	Free	75	75-82

►*NOTE: If governor pressure n t correct, and does not correspond to car speed, see "Trouble Shooting & Diagnosis" below.*

Lubrication Pressure: Remove 1/8" pipe plug from lubrication pressure take-off hole located on left side of transmission case (middle plug forward of control lever and cable connection). Install pressure gauge at this point and proceed as follows: With engine running at 800 RPM in "N" (Neutral), lubrication pressure should be approximately 10-30 lbs. If pres-

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TORQUEFLITE (Cont.)

sure is incorrect, check line pressure and see "Trouble Shooting & Diagnosis" below. If pressure is extremely high (above 50 lbs.) it is an indication of a restriction due to dirt or foreign matter in lubrication passages.

Front Servo Release & Rear Clutch Apply Pressure: The front servo release and rear clutch apply pressure can be checked simultaneously with line pressure or immediately after line pressure has been determined. Remove the 1/8" pipe plug from front servo release and rear clutch apply pressure take-off hole located on lower right side of transmission (in servo boss just above transmission lower flange). Install the pressure gauge at this point. The pressure should not be less than 15 lbs. lower than line pressure in the "D" (Drive) position – **in direct only.**

AIR PRESSURE TESTS: The front clutch, rear clutch, kickdown servo, and low and reverse servo may be checked by applying air pressure to their respective passages when valve body is removed *(CAUTION – Air supply must be free of all dirt and moisture).* Refer to "Oil Passages in Transmission Case" illustration for location of air passages.

1) Raise car on hoist, drain transmission fluid and remove transmission oil pan.

2) Front Clutch–Remove accumulator cover. Apply pressure to front clutch passage. Listen for a dull thud which indicates that front clutch is operating. Hold air pressure on for a few seconds and check for excessive oil leaks in system.

3) Rear Clutch–Remove valve body assembly and apply air pressure to rear clutch passage. Listen for a dull thud which indicates that rear clutch is operating. Check for excessive oil leaks.

4) Kickdown Servo–Apply air pressure to kickdown "apply" (line)) pressure passage. Observe operation of kickdown servo, lever and band when air pressure is applied. Apply air pressure to "apply" (compensated throttle) pressure passage and observe operation of kickdown servo.

5) Low & Reverse Servo–Apply air pressure to low & reverse servo passage and observe operation of servo, lever, and band.

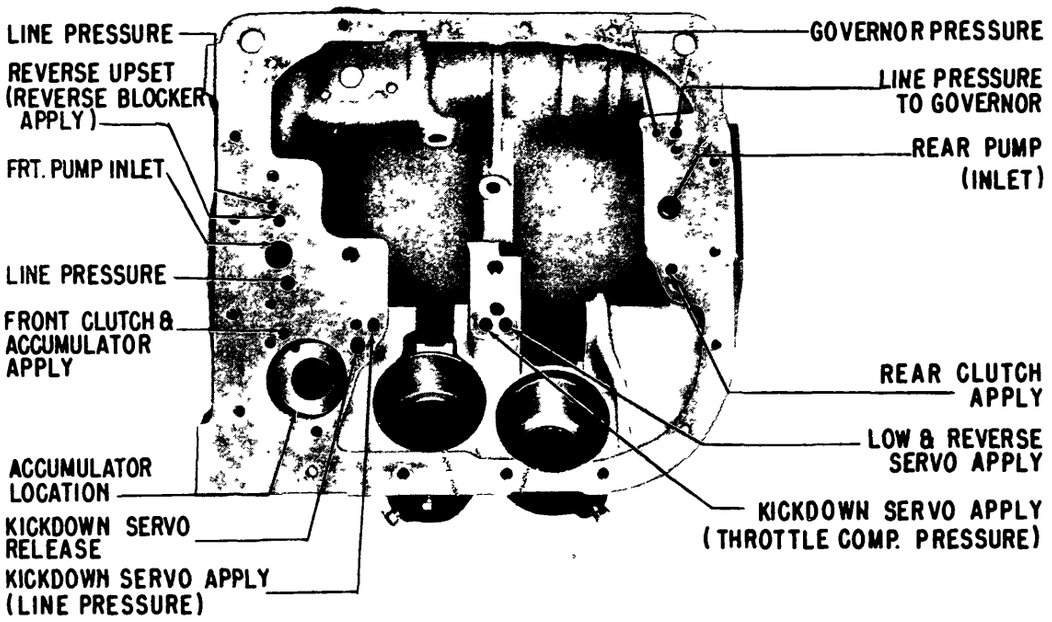
6) Governor–Apply air pressure to "line pressure-to-governor" passage. Rotate propeller shaft slightly to bring governor flyweight down while applying the pressure. Operation of the governor will be indicated by a sharp click when air pressure is applied.

►*AIR PRESSURE TEST NOTE: If all the above units operate properly, "no drive", "erratic" and "no upshift" conditions are caused by trouble in the control valve assembly.*

TROUBLE SHOOTING & DIAGNOSIS

►*TROUBLE SHOOTING & DIAGNOSIS NOTE: Except where noted, the following operations can be performed without removing the transmission from the car.*

LINE PRESSURE INCORRECT: Oil level incorrect. Check for stuck or scratched regulator valve or buckled spring. Check kickdown servo for broken seal rings, stuck piston or broken linkage. Check low & reverse servo for torn seal, stuck piston sleeve, broken band or linkage. Check for possible leak at front pump suction tube, tube elbow or rear pump suction tube. Check for loose bolts, burrs or scratches on mating surfaces of valve body. Clean valve assembly and check for stuck valves, dirt, scratched valve or body, and burrs on valves. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Check regulator valve body for scratches and scoring on valve bores and face which bears against front pump housing. Examine regulator valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.



TORQUEFLITE OIL PASSAGES IN TRANSMISSION CASE

GOVERNOR PRESSURE INCORRECT (Does not correspond to car speeds): Clean governor assembly, and check weight assembly and valve for burrs, scratches or sticky operation. Examine governor valve shaft, shaft snap rings and seal rings. Clean and inspect rear pump assembly for side or diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring.

LUBRICATION PRESSURE INCORRECT: Check for stuck or scratched regulator valve or buckled spring. Check for stuck or scratched converter control valve or buckled spring. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Flush out converter and check converter-to-housing runout.

HARSH NEUTRAL-TO-DRIVE OR NEUTRAL-TO-REVERSE SHIFT: Check hydraulic control pressures. Adjust low and reverse band. Adjust engine idle speed. Check Low & Reverse servo for torn seal, stuck piston sleeve, broken band or broken linkage. Check accumulator cover screw torque and piston for broken rings. *Transmission must be removed for the following:* Clean and inspect front clutch discs, plates, drive hub, return spring and piston. Check front clutch circuit for leakage. Clean and inspect rear discs, plates, return spring and piston. Check rear clutch circuit for leakage.

DELAYED NEUTRAL-TO-DRIVE SHIFT: Check transmission oil level. Check hydraulic control pressures. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side or diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect front clutch discs, plates, drive hub, return spring and piston. Check front clutch circuit for leakage.

RUNAWAY ON UPSHIFT & 3-2 KICKDOWN: Check transmission oil level. Adjust throttle linkage *(see "Carburetor" on car model pages).* Check hydraulic control pressures. Adjust kickdown band. Check kickdown

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TORQUEFLITE (C nt.)

servo for broken seal rings, stuck servo piston or broken linkage. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage.

HARSH UPSHIFT & 3-2 KICKDOWN: Adjust throttle linkage *(see "Carburetor" on car model pages).* Check hydraulic control pressures. Adjust kickdown band. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. *Transmission must be removed for the following:* Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage.

NO UPSHIFT: Proceed as for "Runaway on Upshift & 3-2 Kickdown" above, and clean governor assembly and check weight assembly and valves for burrs, scratches and sticky operation. Examine governor valve shaft, shaft snap rings and seal rings.

NO KICKDOWN OR NORMAL DOWNSHIFT: Proceed as for "Runaway on Upshift & 3-2 Kickdown" above. Check control cable adjustment. Adjust low and reverse band. *Transmission must be removed for the following:* Clean and inspect overrunning clutch assembly for brinnelled rollers and cam, and improperly assembled rollers and springs.

SHIFTS ERRATICALLY: Check transmission oil level. Adjust throttle linkage *(see "Carburetor" on car model pages).* Check control cable adjustment. Check hydraulic control pressures. Check for stuck or scratched regulator valve or buckled spring. Check output shaft rear bearing for roughness or an unseated snap ring. Check for possible air leakage at front pump suction tube, tube elbow or rear pump suction tube. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Test transmission units with air pressure (see above). Clean governor assembly and check weight assembly and valve for burrs, scratches and sticky operation. Examine governor valve shaft, shaft snap rings and seal rings. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side or diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings.

SLIPS IN FORWARD DRIVE POSITIONS: Check transmission oil level. Check hydraulic control pressures. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure. *Transmission must be removed for the following:* Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage. Clean and inspect the overrunning clutch assembly for brinnelled rollers or cam, and improperly assembled rollers and springs.

SLIPS IN LOW-REVERSE ONLY: Check hydraulic control pressures. Adjust low-reverse band. Check low-reverse servo for torn oil seal, stuck piston sleeve, broken band or linkage. Check control valve body for loose bolts, burrs, scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Test transmission units with air pressure. *Transmission must be removed for the following:* Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump. Examine valve body to determine if the secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

SLIPS IN ALL POSITIONS: Check transmission oil level. Check hydraulic control pressures. Check for a stuck or scratched regulator valve or buckled valve spring. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump. Examine valve body to determine if the secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

NO DRIVE IN ANY POSITION: Proceed as for "Slips in all Positions" above, and in addition, check for possible air leakage at front pump suction tube, tube elbow or rear pump suction tube.

NO DRIVE IN FORWARD RANGES: Check hydraulic control pressures. Adjust kickdown band. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect front clutch discs, plates, drive hub, return spring and piston. Check front clutch circuit for leakage. Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage. Clean and inspect overrunning clutch assembly for brinnelled rollers or cam, and improperly assembled rollers and springs.

NO DRIVE IN REVERSE: Check hydraulic control pressures. Adjust low-reverse band. Check low-reverse servo for torn seal, stuck piston sleeve, broken band or linkage. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect rear clutch disc, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage.

DRIVES IN NEUTRAL: Adjust gearshift control cable. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. *Transmission must be removed for the following:* Clean and inspect front clutch disc, plates, drive hub, return spring and piston. Check front clutch circuits for leakage.

DRAGS OR LOCKS: Adjust kickdown band and the low-reverse band. Check handbrake for excessive drag. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check low-reverse servo for torn oil seal, stuck piston sleeve, broken band or linkage. *Transmission must be removed for the following:* Clean and inspect discs, plates, drive hub, return spring and piston of both front and rear clutches. Check front and rear clutch circuits for leakage. Clean and inspect planetary gear set for worn thrust washers, nicked or rough gear teeth, and excessive pinion clearance. Clean and inspect overrunning clutch assembly for brinnelled rollers and cam and improperly assembled rollers and spring.

GRATING & SCRAPING NOISES: Check handbrake for excessive drag. Check output shaft rear bearing for roughness or an unseated snap ring. Clean governor assembly, and check weight assembly and valves for burrs, scratches, or sticky operation. Examine governor valve shaft, shaft snap rings and seal rings. Clean and inspect rear pump assembly for side or diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support for scoring. *Transmission must be removed for the following:* Clean and inspect front pump assembly for side or diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect front and rear clutch discs, plate, drive hubs, return spring and pistons. Check front and rear clutch circuits for leakage. Clean and inspect planetary gear set for worn thrust washers, nicked or rough gear teeth, and excessive pinion clearance.

BUZZING NOISES: Check transmission oil level. Check for stuck or scratched regulator valve or buckled spring. Check for stuck or scratched converter valve or buckled spring. *Transmission must be removed for the following:* Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump housing. Examine valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

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TORQUEFLITE (Cont.)

TRANSMISSION HARD TO FILL (Oil blow out filler tube): Check transmission oil level. Check for stuck or scratched regulator valve or buckled spring. Check for stuck or scratched converter valve or buckled spring. Check to determine whether tube is free of dirt. Check for possible air leakage at front pump suction tube, tube elbow or rear pump suction tube. *Transmission must b removed for the following:* Clean and inspect front pump assembly for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against front pump housing. Examine valve body to determine if secondary reaction orifice if free of dirt. Check gasket for uniformness of compression by valve body.

TRANSMISSION OVERHEATS: Check transmission oil level. Adjust kickdown band and low-reverse band. Check handbrake for excessive drag. Check regulator and converter valves for stuck or scratched valves or buckled springs. Check for mud, dirt, or other foreign material on screens or torque converter cooling fins. Clean and inspect rear pump assembly for side and diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side and diametral appearance. Examine oil pump inner and outer rotor for scoring. Check drive sleeve seal rings. Check and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump housing. Examine the valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body. Clean and inspect front and rear clutch discs, plate, drive hubs, return spring and piston. Check front and rear clutch circuits for leakage.

IMPOSSIBLE TO PUSH CAR: Check hydraulic control pressures. Adjust low-reverse band. Check low-reverse servo for torn seal, stuck piston sleeve, broken band or linkage. Check valve body for loose bolts, burrs or scratches on mating surfaces. Clean valve body assembly, check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Clean and inspect rear pump assembly for side and diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring.

STARTER WILL NOT ENERGIZE: Adjust gearshift control cable. Adjust engine idle speed.

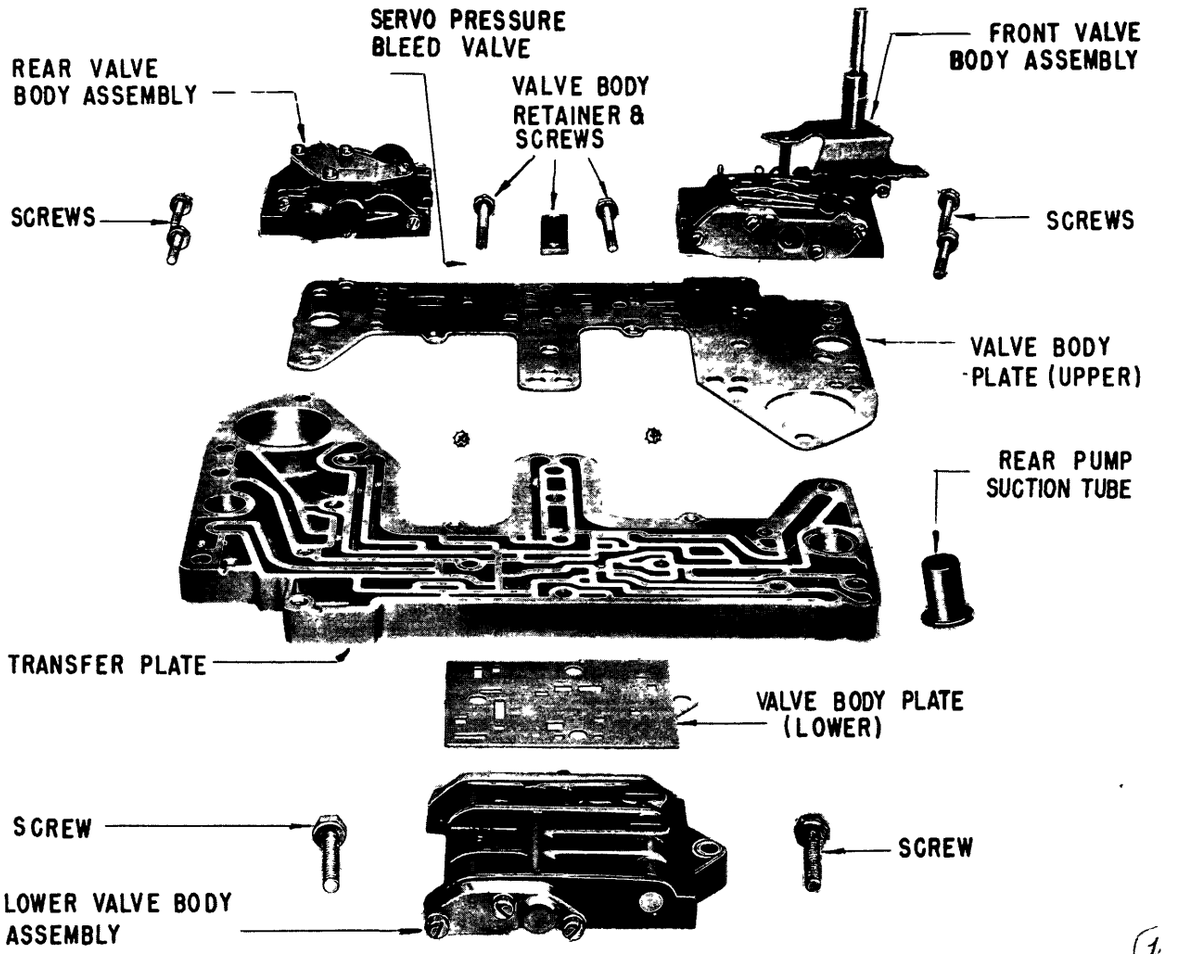
GEARSHIFT CONTROL UNIT

OPERATION: Mechanical connection between gearshift control unit on instrument panel and the transmission manual control valve is by a single push-pull cable. One end of wire cable is secured to cable actuator in push button control unit while other end enters control cable adapter housing on transmission case to engage manual control valve lever assembly. When button is pushed in, the operating slide contacts the cable actuator, causing it to pivot, and movement of actuator about its axis moves that attached wire cable. When push button reaches its limit of travel, a spring lock on the operating slide engages actuator shaft, holding the push button in an engaged position. When another button is pushed to select a different range, the top or bottom portion (depending on which button was pushed) of the slide contacts the actuator which releases the first push button from restraint of spring lock and allows it to return to the original position.

► *NOTE:* The back-up light switch is located on the push button control unit and is operated by the "R" (Reverse) push button slide.

GEARSHIFT CONTROL UNIT (Removal): Remove three bezel retaining screws (one screw is located on underside of unit) and remove bezel and push buttons. Remove two hex nuts and lockwashers holding control unit to instrument panel casting. Pull gearshift control unit from rear of instrument panel, down and toward front of car. Remove two screws holding cable assembly bracket to control unit. Remove hairpin clip securing cable end to actuator bar and remove cable from control unit. Remove wires from back-up light switch.

Installation: Install end of control cable on actuator and install hairpin clip. Place cable bracket in position on control cable, install two screws and tighten securely. Connect wires to back-up light switch. Position control unit in instrument panel (with lamp socket assembly wire over top of upper stud and between control unit and mounting plate). Place lamp socket bracket over upper studs, install two nuts and lockwashers and tighten securely. Install push buttons in their respective operating slides (fingers of slide may be compressed slightly to aid in retaining button on slide). Center the bezel on buttons and install retaining screws. Adjust manual control cable.



TORQUEFLITE VALVE BODY & TRANSFER PLATE ASSEMBLY

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TORQUEFLITE (C nt.)

MANUAL CONTROL CABLE (Removal): Remove gearshift control unit from instrument panel. Remove control cable clip screw, lockwasher and clip on transmission. Remove control cable adaptor housing plug, insert screwdriver through hole and release the control cable spring lock. While releasing the spring lock, remove cable. Using the same screwdriver, insert through hole in adaptor housing and push lever rearward to last detent. Reinstall housing plug and tighten. From inside of car pull assembly through rubber grommet (or remove grommet) in dash panel.

Installation: From inside car, install transmission end of cable through rubber grommet in dash panel. Install gearshift control unit. Install control cable at transmission making sure spring lock engages cable. Adjust manual control cable. *(See "Manual Cable Adjustment" above).*

GEARSHIFT UNIT LAMP BULB REPLACEMENT: Remove the three bezel retaining screws (one screw is located on under-side of unit) and remove bezel and "D" (Drive) push button. Replace defective bulb. Replace push button, install bezel, and test operation of unit.

BACK-UP LIGHT SWITCH REPLACEMENT: Remove push button control unit. Back-up light switch is fastened to control unit by four tabs (straighten tabs to remove switch). Install by reversing removal procedure.

TROUBLE SHOOTING & DIAGNOSIS

LOW & REVERSE BUTTONS REQUIRE HEAVY PRESSURE TO LOCK: Adjust manual control cable. *See "Manual Control Cable Adjustment" above.*

"CLUNKING" NOISE WHEN BUTTON RETURNS: Remove control unit and replace rubber bumper if missing or damaged.

PUSH BUTTON WILL NOT RETURN: Remove control unit and replace broken or defective return spring.

PUSH BUTTON WILL NOT LOCK: Replace operating slide.

PUSH BUTTON BINDS: Replace operating slides if warped. Align bezel so push buttons are centered. Position light lead wire as outlined under "Gearshift Control Unit Installation" above. Carefully relieve area where push button contacts felt. This can be done by inserting a .005" feeler gauge between push button cover and the felt mask. Gently moving the gauge in and out in this area will usually relieve the binding condition. Should it become necessary to replace or reglue the mask, use a suitable adhesive and place glue in an area where it will not interfere with operation of the push buttons.

LOOSE PUSH BUTTON COVER: Remove bezel to expose push button. Using a small screwdriver, exert sufficient pressure to force tang into plastic recess on push button.

TRANSMISSION UNIT REMOVAL (TRANSMISSION IN CAR)

►*NOTE: When units are removed from transmission, each unit must be inspected before assembly as outlined under "Transmission Overhaul".*

NEUTRAL STARTER SWITCH (Removal): Drain approximately two quarts of fluid from transmission and reinstall drain plug. Remove wire from switch and remove switch and gasket.

Installation: Reverse removal procedure and tighten switch to 15-20 ft. lbs.

REGULATOR VALVE ASSEMBLY (Removal): Remove regulator valve spring retainer, gasket and spring. Using a mechanical retriever or a piece of welding rod (5/32") inserted in end of valve, remove valve.

Installation: Reverse removal procedure and tighten spring retainer to 45-50 ft. lbs.

TORQUE CONVERTER CONTROL VALVE (Removal): Remove torque converter control valve spring retainer, gasket and spring. Using a mechanical retriever or a piece of welding rod (1/8") inserted in valve, remove valve.

Installation: Reverse removal procedure and tighten retainer to 35-40 ft. lbs.

OIL PAN (Removal): Drain transmission, install drain plug and tighten. Remove oil pan filler tube from pan and loosen support bracket screw. Remove oil pan.

Installation: Reverse removal procedure. Tighten pan screws to 12-17 ft. lbs. Tighten filler tube nut to 35-40 ft. lbs.

VALVE BODIES & TRANSFER PLATE (Removal): Place gearshift control in "L" (Low) position (it is necessary that control adaptor be in this position when removing cable). Remove oil pan. Disconnect throttle linkage from throttle lever on transmission. Remove all dirt and foreign material from around cable control housing. Loosen throttle control lever screw and remove lever assembly. Remove flat washer and seal from throttle lever shaft. Remove control cable clip screw, lockwasher and clip. Remove control cable (see "Gearshift Control Unit" above). Loosen manual valve control lever screw and slide lever off shaft. Remove the two oil strainer elbow screws (with Belleville washers) and remove oil strainer assembly. Loosen (to relieve load) and remove the three accumulator cover screws (with Belleville washers). Remove cover and spring from transfer plate. Remove the five transfer plate screws (with Belleville washers) and remove valve bodies and transfer plate assembly from transmission case.

Installation: Reverse the removal procedure and note the following: Clean mating surfaces on both the transmission case and valve body transfer plate. Install transfer plate screws and tighten to 14-16 ft. lbs., evenly. *(NOTE - Dished portion of Belleville washers should face away from head).* Check position of front pump elbow (opening in suction tube should be facing oil pan). Tighten accumulator cover screws evenly to 14-16 ft. lbs. Install manual lever with locking screw to rear, on manual valve lever shaft. Position lever on shaft so there is 7/32" clearance (without gasket) between lever and transmission case. Adjust throttle linkage.

KICKDOWN PISTON (Removal): After removal of valve bodies and transfer plate (see above), loosen kickdown band adjusting screw locknut and back adjusting screw out sufficiently to remove anchor. Remove kickdown band strut. Install Tool C-3529 or C-3289 (modified), apply sufficient pressure on kickdown piston rod guide, and remove snap ring. (Oil will drain from servo when compression portion of tool is loosened). Loosen compression portion of tool and remove piston rod guide, piston spring and piston rod. Using pliers, Tool C-484, remove kickdown piston from transmission case.

Installation: Lubricate piston rings and place kickdown piston assembly into position, compress outer ring, and start assembly into case. With piston properly centered (so not to damage rings) tap lightly and bottom piston into transmission case. Slide piston spring over kickdown piston rod assembly and install in piston. While holding in this position, install the kickdown piston rod guide assembly on kickdown piston rod. Using Tool C-3529 or C-3289 compress the kickdown piston spring to the point that piston guide seal ring slightly binds on transmission case. Work seal ring into position and gradually compress spring until seal ring enters case and snap ring can be installed. Install kickdown piston rod guide snap ring, making sure it is properly seated. Loosen compressing portion of tool and remove tool from transmission. Place kickdown band strut in position in band and lever and compress band end sufficiently to install anchor over adjusting screw. Adjust kickdown band. Install valve bodies and transfer plate assembly.

ACCUMULATOR PISTON (Removal): Remove valve bodies and transfer plate (see above). Using pliers, Tool C-484, remove accumulator piston from transmission case.

Installation: Lubricate seal rings and place accumulator piston into position. Compress outer seal ring and tap lightly into transmission case. Install valve bodies and transfer plate assemblies.

OUTPUT SHAFT REAR BEARING OIL SEAL (Removal): Disconnect front universal joint. Apply hand brake and remove propeller shaft flange nut and Belleville washer. Release hand brake and install puller, Tool C-452 (if necessary). Remove propeller shaft flange and brake drum assembly. Remove transmission brake support grease shield spring (small one). Remove brake support grease shield from extension *(CAUTION* - If screwdriver or sharp instrument is used in performing this operation, care must be taken to prevent damage to neoprene sealing surface at bottom of shield), Install puller, Tool C-748, and remove transmission output shaft rear bearing oil seal.

Installation: Using driver, Tool C-3205, install output shaft rear bearing oil seal (metal portion of oil seal facing in) until driver bottoms on extension. *(CAUTION* - Indent on grease shield must match groove in extension for correct positioning. Also, shield must be located on extension far enough to permit installation of spring). Install brake support grease shield spring (opening in spring toward adjusting sleeve). Make sure spring is properly seated in groove. Install propeller shaft flange,

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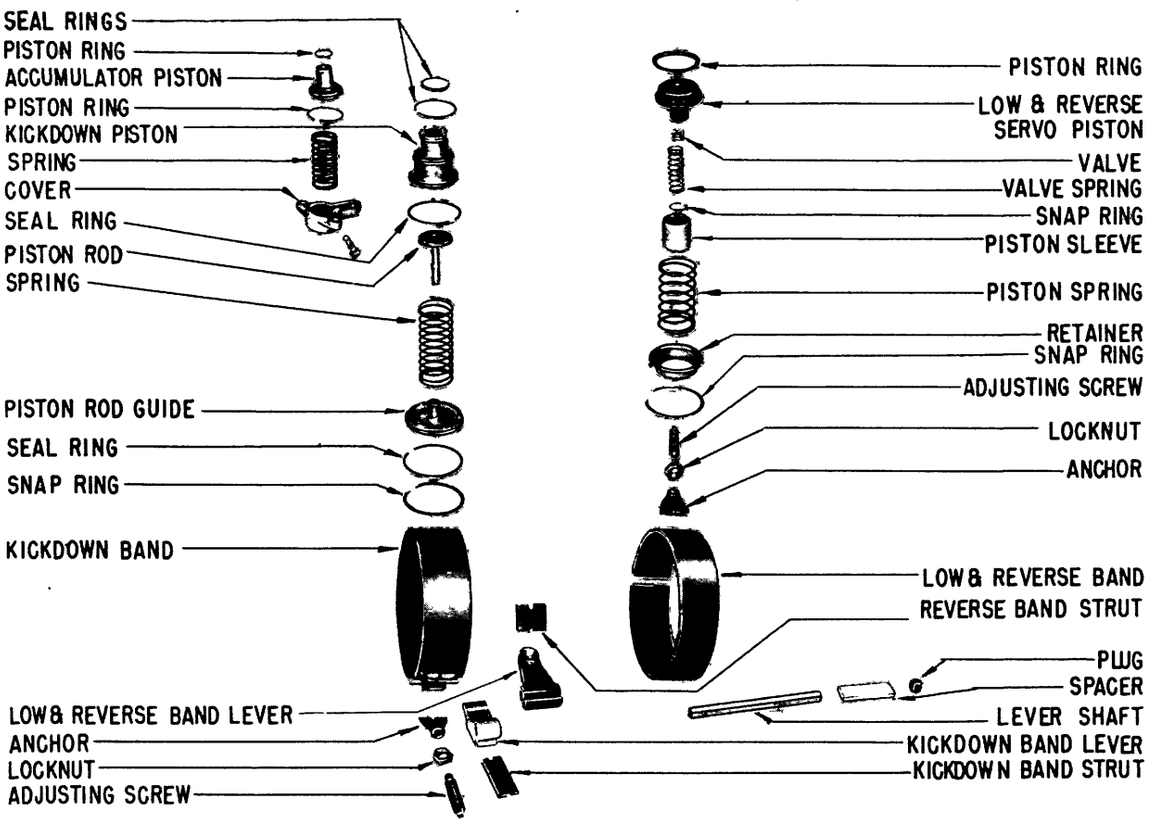
TORQUEFLITE (C nt.)

Belleville washer, and nut. Apply hand brake and tighten propeller shaft flange nut to 200 ft. lbs. Connect front universal joint and torque nuts to 33-37 ft. lbs. Refill transmission (if necessary).

EXTENSION HOUSING (Removal): Drain approximately two quarts of fluid from transmission. Disconnect front universal joint. Apply hand brake and remove propeller shaft flange nut and Belleville washer. Release hand brake, and using puller, Tool C-452 remove propeller shaft flange and drum assembly. Remove brake adjusting screw cover plate and loosen cable clamp bolt on hand brake support. Disengage the ball end of cable from operating lever and remove cable from brake support. Disconnect speedometer cable and housing at transmission extension and remove speedometer drive pinion and sleeve assembly. Remove nuts and lockwashers holding engine rear support insulator to crossmember, leaving insulator attached to extension. Remove the two top extension to case screws and lockwashers. Using a suitable jack and extreme care to prevent damage to oil pan, raise transmission sufficiently for insulator on extension to clear crossmember. Remove four of the remaining extension to case screws and lockwashers and install guide studs, Tool C-3283. *(NOTE* - Due to interference of the insulator, it will be necessary to remove the bottom extension to case screw with the extension, that is, back out the screw as far as possible and slide extension back and continue loosening screw). *(CAUTION - Do not remove the one output shaft support to transmission case screw).* Remove extension and hand brake as one assembly. Remove extension gasket. *NOTE* - If care is used, it is not necessary to remove hand brake support and shoe assemblies from extension to replace output shaft rear bearing.

Installati n: Reverse removal procedure and note the following: Start bottom extension to case screw as the extension is pushed into position against support. *(CAUTION - Do not attempt to pull extension in with aid of the scr ws; damage to extension may result).* Tighten extension to case screws to 25-30 ft. lbs. Tighten propeller shaft flange nut to 200 ft. lbs. Tighten universal joint nuts to 33-37 ft. lbs. Tighten speedometer pinion and sleeve assembly to 40-45 ft. lbs.

GOVERNOR (R m val): Remove extension housing, see above. Remove governor valve shaft and valve from governor body assembly. Using pliers, Tool C-3229, remove governor weight assembly snap ring (large) and remove weight assembly. *(NOTE* - The primary cause of governor operating failure is usually due to improper operation of governor valve which may be sticking in housing or travel restricted by chips or other foreign matter. If inspection indicates complete removal, proceed as follows): Remove governor support locating screw and remove governor and support assembly from rear oil pump housing. Normal servicing does not require removal of governor body from support. If condition warrants removal of governor body from support, when reassembling, do not tighten governor body screws until governor body support is located on output shaft.



TORQUEFLITE SERVO & BAND ASSEMBLIES

Installation: Slide governor body and support assembly into position in rear oil pump housing, using extreme care, compress governor support seal rings as support enters oil pump housing. DO NOT FORCE. Align locating hole in output shaft to locating screw hole in governor support and install screw. Tighten to 5-7 ft. lbs. Holes can be aligned by turning output shaft and holding governor body. If governor body has been removed and reinstalled, tighten the four governor body screws to 6-8 ft. lbs. Place governor weight assembly (secondary weight snap ring facing out) into governor body; and using pliers, Tool C-3229, install snap ring. Make sure snap ring seats properly. With governor valve (small end up) on governor valve shaft, slide shaft into governor body through the output shaft and governor weight assembly; at the same time position valve into body. Install governor valve shaft snap ring. Make sure it is locked securely to shaft. Replace snap ring if distorted *(NOTE* - After snap ring installation, apply sufficient pressure to both ends of valve shaft to force snap ring to outer portion of snap ring grooves). Check operation of governor weight assembly and valve by turning output shaft. Both should fall freely in valve body. Install extension housing.

REAR OIL PUMP (Removal): Remove extension housing, see above. Using a screw driver, remove governor valve shaft snap ring from weight assembly end. Remove governor valve shaft and valve from governor body assembly. Using pliers, Tool C-229, remove governor weight snap ring (large) and remove governor weight assembly from governor body. Remove governor locating screw from governor support. Remove oil pump-to-output shaft support screws and Belleville washers, and install guide studs, Tool C-3288. Remove pump housing, gear, and governor assembly from output shaft.[1] Use prussian blue and mark pump gears in relation to pump housing face *(CAUTION - Do not scribe).* When removing oil pump pinion, use care so as not to lose the small ball used as a key. Remove rear oil pump pinion from output shaft and mark in same manner. Remove governor assembly from oil pump housing.

Installation: Install governor support and body assembly into position in rear pump housing. Compress governor support seal rings as support enters oil pump housing. DO NOT FORCE. Place rear oil pump pinion ball in ball socket in output shaft. Place rear oil pump pinion (as marked when removed) over output shaft and into

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TORQUEFLITE (Cont.)

position aligning keyway in pinion with ball in shaft. With rear oil pump properly positioned in pump housing (check marking), slide rear oil pump and governor assemblies over output shaft and guide studs into position against support. *(CAUTION - There are two extra holes in housing which are used for vents. Make definitely sure no attempt is made to install screws in these holes).* Remove guide studs and install pump housing-to-output shaft support screws and Belleville washers (install washers with dished portion facing away from head). Tighten screws evenly to 10-12 ft. lbs. Rotate output shaft to make sure pump gears are free to rotate. If not, remove pump to determine cause. Align locating hole in output shaft-locating screw hole in governor support. Install locating screw and tighten to 5-7 ft. lbs. Complete installation by following governor installation procedure outlined above.

REMOVAL & INSTALLATION

REMOVAL: 1) Disconnect battery. Push in the "1" (Low) button and raise car off floor *(NOTE -* Push button must be in the "1" position to remove cable from adaptor housing on transmission). Drain transmission and torque converter (see "Draining & Refilling" above). Disconnect oil pan filler tube assembly from oil pan and loosen support bracket screw.

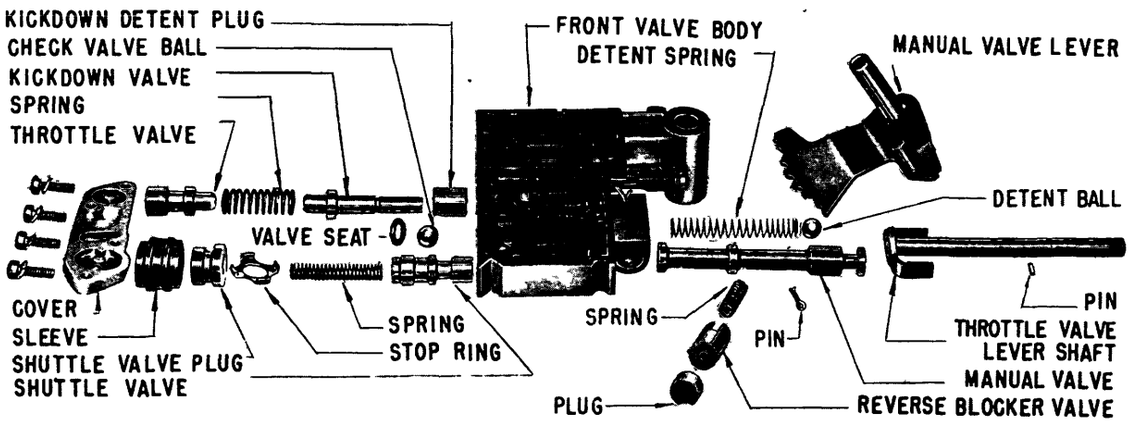
2) Disconnect the front universal joint and secure propeller shaft out of the way. Remove brake adjusting screw cover plate and loosen cable clamp bolt on hand brake support. Disengage the ball end of cable from operating lever and remove cable from brake support. Disconnect speedometer cable and housing at transmission extension. Disconnect neutral starter wire at switch. Unclip wires from crossmember.

3) Disconnect throttle control linkage from throttle lever on transmission. Remove gearshift control cable clip screw, lockwasher, and clip. Remove control cable adaptor housing plug, insert screwdriver through hole, and release control cable spring lock. While releasing control cable spring lock, remove cable from adapter housing. Using the same screwdriver, insert through cable opening in adaptor housing and push lever rearward to last detent. Reinstall housing plug and tighten.

4) Disconnect the two oil cooler lines from transmission (if so equipped). Remove nuts and lockwashers holding engine rear support insulator to crossmember, leaving insulator attached to extension. Remove starter.

5) Install engine support fixture, Tool C-3487. Insert hooks of fixture firmly into holes in side of frame member with support ends up against underside of oil pan flange. Adjust fixture to support weight of engine. Raise engine slightly, remove crossmember-to-frame bolts and remove crossmember. *(CAUTION - Do not lower engine more than three inches from floor pan).*

6) Remove the two transmission case-to-torque converter housing screws and lockwashers from right side and install guide studs, Tool C-3276. With transmission supported, remove the two transmission case-to-converter housing screws and lockwashers from left side. Slide transmission straight back to avoid damage to front oil pump driving sleeve, then lower to floor.



TORQUEFLITE FRONT VALVE BODY ASSEMBLY

INSTALLATION: 1) Install guide studs, Tool C-3276, in the two transmission mounting holes in right side of torque converter housing. With front oil pump drive sleeve lubricated, install, making sure driving lugs are properly engaged with oil pump pinion. *(NOTE -* Main portion of drive sleeve will be flush with front of pump housing when properly installed). Note position of driving lugs inside torque converter hub, then position front oil pump drive sleeve on transmission accordingly, to aid on proper engagement when transmission installed. Slide transmission over guide studs and into position against converter housing. Make sure driving lugs on front oil pump drive sleeve properly engage torque converter.

► *CAUTION - To avoid damage to front oil pump, do not attempt to use torque converter housing screws to bring transmission and housing together. If oil pump drive sleeve and input shaft have been properly aligned, the transmission should slide into position relatively easy. DO NOT FORCE.*

2) Install the two transmission-to-torque converter housing screws and lockwashers in left side (do not tighten). Remove guide studs and install the two transmission-to-housing screws and lockwashers in right side, then draw the four down evenly and tighten to 45-50 ft. lbs. Place crossmember into position and install crossmember-to-frame bolts. Tighten to 50-55 ft. lbs.

3) Lower engine and at the same time align mounting studs in insulator with holes in crossmember. Install the two nuts and lockwashers holding engine rear support and insulator to crossmember and tighten to 30-35 ft. lbs. Remove support fixture from side of frame member.

4) Install bracket holding oil cooler lines to cylinder block (if so equipped) on transmission case and tighten. Connect neutral starter-to-switch wire. Install oil pan filler tube and tighten filler tube nut to 35-40 ft. lbs. Tighten support bracket screw.

5) Connect speedometer cable and housing at extension. Engage ball end of hand brake cable in operating lever and tighten cable clamp bolt. Install adjusting brake screw cover plate on hand brake support. Connect front universal joint and tighten nuts to 33-37 ft.lbs.

6) Connect throttle control linkage to throttle lever on transmission. Install gearshift control cable in adapter making sure spring lock engages cable. Install starter, connect battery, refill transmission and adjust throttle linkage and gearshift control cable.

TORQUE CONVERTER REMOVAL

REMOVAL: Remove transmission, see above. Remove torque converter housing-to-adaptor screws and lockwashers. Remove torque converter housing. *(NOTE -* If torque converter is being removed because of excessive runout damage, check runout by using a dial indicator on hub, and mark the highest point of runout on both converter and crankshaft flange. This will aid later in determining if runout is due to converter or crankshaft). Using wrench, Tool C-589, remove the stud nuts and lockwashers from crankshaft flange. Remove converter from crankshaft. Check crankshaft flange runout which should be a maximum of .002".

CORRECTING HUB RUNOUT: Permissible converter hub runout, when mounted on the crankshaft is .004" total indicator reading. When mounting a new torque converter, make sure all foreign matter, raised metal around studs, burrs, chips and dirt are removed from converter and crankshaft drive flanges. Check crankshaft runout (maximum .002").

1) Check converter runout by mounting a dial indicator to adaptor plate or some other unit which is mounted rigidly to the engine block. Rotate converter 360° and determine converter hub, outside diameter, runout. If this exceeds .004" total indicator reading, then correct by using heat in the following manner: Mark position of hub low spot as accurately as possible on the impeller shell. Rotate converter so this mark is downward. Remove dust shield from front of adaptor plate. Using a piece of chalk, mark front cover radius directly opposite the hub low spot previously marked on impeller shell. The subsequent heating operation can now be done through the opening in adaptor plate. *(CAUTION - Drain converter housing before heating).* The size of

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TORQUEFLITE (Cont.)

the spot to be heated is governed by amount of hub runout and is usually 1/2" diameter for .008" total indicator reading. Using an acetylene torch having a No. 3 tip (set to maximum heat) apply to selected spot until it becomes a dull red. Rapid heating of the local area is essential and if the torch is adjusted properly, the spot will become red within a few seconds *(CAUTION - If sparks are noted, it is an indication that torch is too close and metal is starting to burn; move torch back slightly. Care should be taken to remove torch the instant the selected spot becomes a dull red to avoid overcorrection or damage to the unit).* The area is then quenched as rapidly as possible with cold water (hose or wet rags). It is suggested this be done by starting around the heated area and working in toward the spot. This prevents heat from spreading. *(NOTE* - The hub runout should not be rechecked until the converter has returned to a uniform room temperature). If the converter hub runout exceeds .016" total indicator reading, remove converter and recheck drive flanges for chips, burrs, etc. Check crankshaft flange runout (max. .002"). If runout remains in excess of .016", install a new converter.

STARTER RING GEAR (Removal): Support torque converter assembly in a vise and with a file carefully remove the staking lugs which retain ring gear to converter. *(CAUTION - Be careful when supporting converter in the vise to avoid distortion).* Place converter on blocks of wood for support while removing. Using a blunt chisel or drift, tap around ring gear until it comes off torque converter.

Installation: Remove burrs or raised spots (left on gear contact surface of converter), with a file, being careful not to remove more metal from converter than is required to remove burrs and rough surfaces. Any of the following methods may be used to heat starter ring gear for installation on converter:

Oven - When available, use oven C-794 and set temperature at 150° F. Allow ring gear to remain in oven approximately 15-20 minutes.

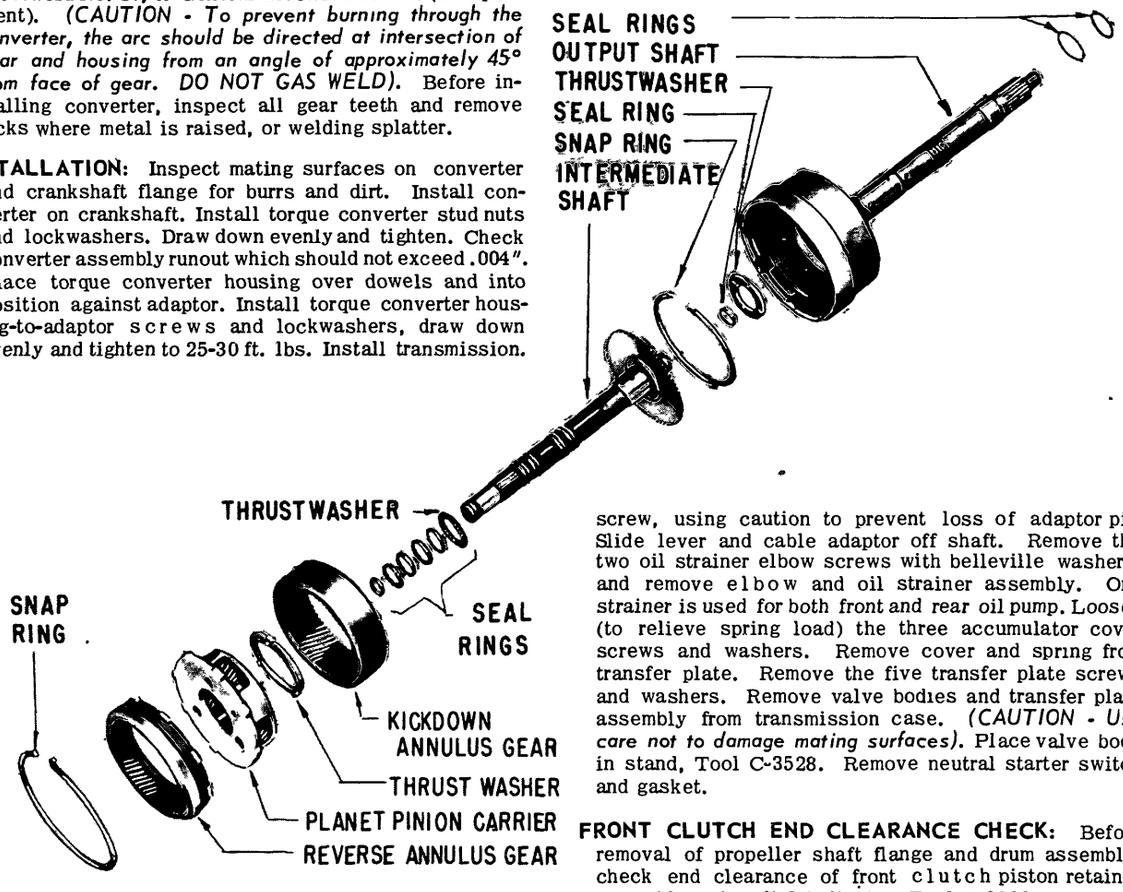
Boiling Water – Place ring gear in a shallow pan, add water, and heat approximately 8 minutes after water has come to a boil.

Steam – Place ring gear on a flat surface and direct steam flow around gear for approximately two minutes.

Flame – Place ring gear squarely on a flat surface. Using a medium tip, direct a low flame around inner rim of gear, being careful not to direct flame onto teeth of ring gear. Place a few drops of water on face of gear at short intervals during the heating process. When gear is hot enough to boil the drops of water, installation of gear on converter can be made.

Reweld ring gear to converter using extreme care to place as nearly as possible the same amount of metal in exactly the same location as original assembly. This is necessary in order to maintain proper balance of unit. Place welds alternately on opposite sides of converter to minimize distortion. In making the weld, use a welding current of 200 amps. Use a D.C. welder that is set at straight polarity or an A.C. welder. Use a 5/32" dia. Fleetweld No. 47, or General Electric No. W28 (or equivalent). *(CAUTION - To prevent burning through the converter, the arc should be directed at intersection of gear and housing from an angle of approximately 45° from face of gear. DO NOT GAS WELD).* Before installing converter, inspect all gear teeth and remove nicks where metal is raised, or welding splatter.

INSTALLATION: Inspect mating surfaces on converter and crankshaft flange for burrs and dirt. Install converter on crankshaft. Install torque converter stud nuts and lockwashers. Draw down evenly and tighten. Check converter assembly runout which should not exceed .004". Place torque converter housing over dowels and into position against adaptor. Install torque converter housing-to-adaptor screws and lockwashers, draw down evenly and tighten to 25-30 ft. lbs. Install transmission.



TRANSMISSION UNIT NO. 1

TRANSMISSION DISASSEMBLY

DRIVE SLEEVE & OIL PAN (Removal): Place transmission in stand, Tool C-3280 and invert. Remove drive sleeve and inspect front seal ring (neoprene) for nicks, deterioration and hardness. Inspect the interlocking seal ring for wear or broken locks, and make sure it turns freely in the groove. (It is not necessary to remove rings unless condition warrants). Inspect driving lugs for excessive wear, and bearing surface on outer diameter for nicks, burrs, or scratches. Remove oil pan and gasket.

VALVE BODY & TRANSFER PLATE ASSEMBLY (Removal): Remove throttle control lever, flat washer, and felt washer. Remove control cable adaptor housing screws and Belleville washers, and remove housing and gasket from transmission. *(NOTE* - Manual valve lever must be moved to the reverse position before housing can be removed). Loosen manual valve control lever screw, using caution to prevent loss of adaptor pin. Slide lever and cable adaptor off shaft. Remove the two oil strainer elbow screws with belleville washers, and remove elbow and oil strainer assembly. One strainer is used for both front and rear oil pump. Loosen (to relieve spring load) the three accumulator cover screws and washers. Remove cover and spring from transfer plate. Remove the five transfer plate screws and washers. Remove valve bodies and transfer plate assembly from transmission case. *(CAUTION - Use care not to damage mating surfaces).* Place valve body in stand, Tool C-3528. Remove neutral starter switch and gasket.

FRONT CLUTCH END CLEARANCE CHECK: Before removal of propeller shaft flange and drum assembly, check end clearance of front clutch piston retainer assembly using dial indicator, Tool C-3339 mounted on case in such a manner as to have dial indicator plunger bearing against rear side of front clutch piston retainer assembly. Pry front clutch forward by inserting screwdriver between front and rear clutch. Remove screwdriver and with dial indicator point contacting edge of front clutch retainer, set dial to zero. Pry clutch assembly rearward against rear clutch, remove screwdriver and take indicator reading. This clearance should be .020-.050". *NOTE - If clearance exceeds the specified limits, particular attention should be paid to the condition of input shaft thrust washer when disassembling transmission.*

HAND BRAKE ASSEMBLY (Removal): Remove transmission flange nut and Belleville washer. Attach puller, C-452 (if necessary) and remove propeller shaft flange and drum assembly. Remove transmission brake support grease shield spring (spring acts as a guide for brake shoes and retains brake support grease shield to transmission extension). Place a rubber band around brake shoes to hold them in position and remove brake

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TORQUEFLITE (Cont.)

shoe return spring. Remove brake anchor washer and brake shoe guide. Remove both brake shoe assemblies, adjusting sleeve, nut, screw, and brake shoe operating lever link. *(NOTE* - Operating link is marked for installation purposes). Make sure adjusting nut turns freely on screw. Remove the other brake shoe guide from anchor pin. Remove brake support grease shield from extension being careful not to damage neoprene sealing surface at bottom of shield. Slide brake support assembly from rear extension and anchor. Inspect neoprene spacer on back of support plate for deterioration and note the steel sleeve used between neoprene spacer and extension.

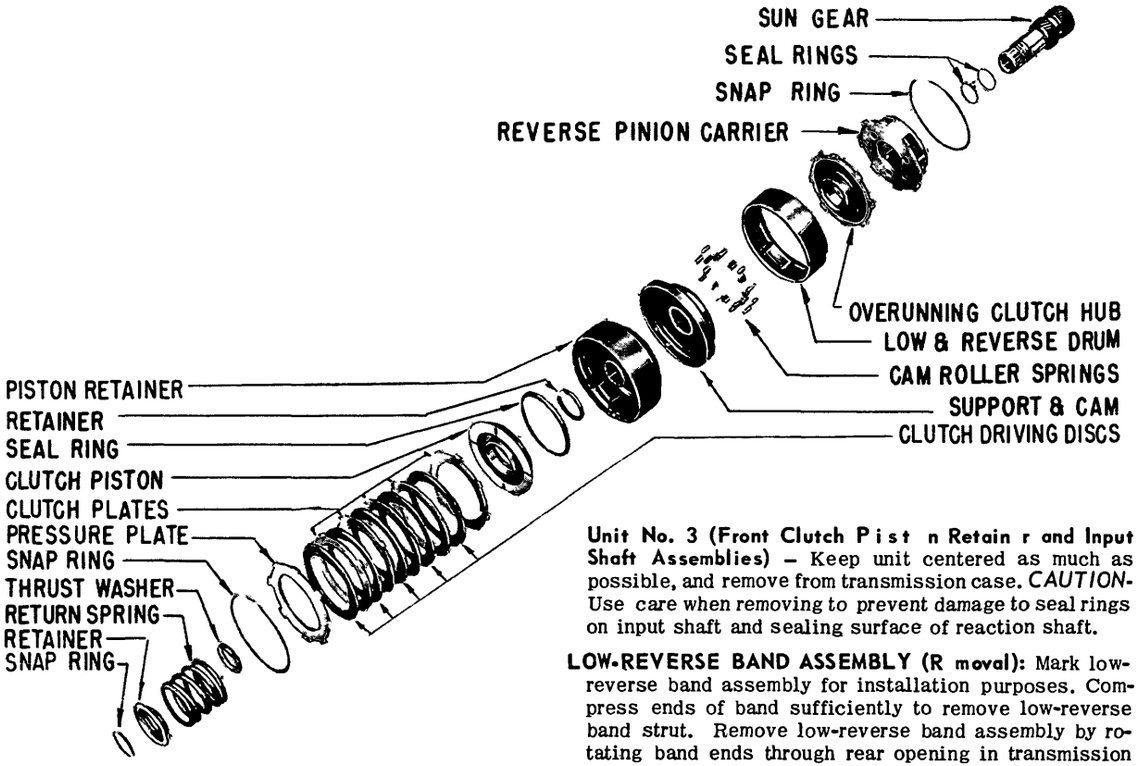
EXTENSION HOUSING: Remove speedometer drive pinion and sleeve assembly (damage to nylon gear will result if drive pinion and sleeve assembly is not removed first). Inspect output shaft, rear bearing oil seal, and remove if necessary, using puller, Tool C-748. Remove transmission extension-to-case screws and lockwashers. Install guide studs, Tool C-3283, and remove extension from output shaft support assembly by tapping housing lightly with a soft hammer. Housing may be separated from support by using a pry bar between support screw and housing bracket. Remove gasket.

Inspection: Inspect extension housing for cracks in casting and remove burrs from gasket surfaces. Inspect vent in top of housing and make sure it is free of dirt. Clean output shaft rear bearing and dry with compressed air. Inspect bearing for rough spots. Do not remove from housing unless it is necessary to replace.

GOVERNOR & REAR OIL PUMP HOUSING (Removal): Using a screwdriver, remove governor valve shaft snap ring from weight assembly end. Remove governor valve shaft and valve from governor body assembly. Using pliers, C-3229, remove governor weight assembly snap ring (large) and remove governor weight assembly from body. Using a 5/16" socket, remove governor locating screw from governor support. Remove five rear oil pump-to-output shaft support screws (with Belleville washers). Remove pump housing, gear, and governor assembly from output shaft. Use prussian blue and mark face of pump gears in relation to pump housing. *(CAUTION* - Do not use scribe). Remove oil pump pinion, being careful not to lose ball used to key pinion to output shaft, from output shaft, and mark in same manner as for gears.

Inspection: Inspect pump housing plug for leaks and machined surfaces for nicks and burrs. Inspect gears for scoring or pitting. With gears cleaned and installed in housing (as marked) and using straightedge, Tool C-3335 and feeler gauge, check clearance between pump housing face and face of gears. Clearance should be .001-.0025".

OUTPUT SHAFT SUPPORT (Removal): Remove output shaft support-to-transmission case screw and washer. Slide output shaft rear support assembly and gasket from transmission case. If rear support is stuck to case, it can be loosened by tapping with a soft hammer. Remove guide stud from transmission case.



TRANSMISSION UNIT NO. 2

Inspection: Inspect all oil passages in support for obstructions. Remove pressure take-off plugs (governor and rear clutch supply) and clean passages with compressed air. Check rear oil pump mating surfaces for burrs and score marks. Check for stripped threads in support. Inspect gasket surfaces for burrs and score marks. Inspect inside bearing surface for wear or scoring.

POWER TRAIN UNITS (Removal): Unit No. 1 (Output Shaft, Kickdown Planet Pinion Carrier, and Intermediate Shaft Assemblies) – Remove by sliding unit out rear of transmission case being careful to support unit as much as possible to prevent damage to seal rings on intermediate shaft.

Unit No. 2 (Sun Gear, Reverse Planet Pinion Carrier, Overrunning Clutch, and Rear Clutch Assemblies) – Loosen locknuts on low-reverse and kickdown band adjusting screws, and back adjusting screws out 2 to 3 turns. Remove the three intermediate support locating screws and lockwashers (two outside of case and one inside). *(CAUTION - When removing unit, identify locating hole in intermediate support to correspond with the threaded locating hole inside of case, for installation purposes).* Keep unit centered as much as possible to prevent binding of intermediate support, and remove assembly from transmission case. *CAUTION - Make sure front clutch and sun gear thrust washers remain in position in front of unit.*

Unit No. 3 (Front Clutch Piston Retainer and Input Shaft Assemblies) – Keep unit centered as much as possible, and remove from transmission case. *CAUTION-* Use care when removing to prevent damage to seal rings on input shaft and sealing surface of reaction shaft.

LOW-REVERSE BAND ASSEMBLY (Removal): Mark low-reverse band assembly for installation purposes. Compress ends of band sufficiently to remove low-reverse band strut. Remove low-reverse band assembly by rotating band ends through rear opening in transmission case. Remove low-reverse band anchor from adjusting screw.

KICKDOWN BAND ASSEMBLY (Removal): Compress kickdown band ends sufficiently to remove band strut (note that strut is grooved to act as a guide). Remove kickdown band anchor from adjusting screw. Remove kickdown band assembly by rotating band ends over center support in transmission case, using care not to damage lining on edges of transmission case. *NOTE* - Both bands have bonded lining and no attempt should be made to reline them. Different material is used on kickdown and low-reverse bands.

BAND INSPECTION: Check for wear and bond to metal. If lining is worn to point where grooves are no longer visible, band assemblies must be replaced. Inspect bands for distortion or cracked ends. The low-reverse band is narrower than kickdown band. Mark for proper installation.

LOW-REVERSE & KICKDOWN BAND ADJUSTING SCREWS (Removal): Remove both band adjusting screws locknuts and remove adjusting screws. *CAUTION* -It is very important that adjusting screws fit freely into transmission case. When locknuts are loose, adjusting screws must be finger free. If not, inspect screws and nuts for pulled threads or foreign material in threads.

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TORQUEFLITE (C nt.)

LOW-REVERSE AND KICKDOWN BAND LEVER ASSEMBLIES (R moval): Remove kickdown and low-reverse lever shaft stop plug at rear of transmission case. Using a pair of long nosed pliers, remove kickdown and low-reverse shaft lever spacer (flat). Thread guide stud, Tool C-3288 into shaft, and remove shaft from case. Remove kickdown and low-reverse servo levers.

Inspection: Inspect levers for being cracked or worn and make sure they are free to turn on shaft and have side clearance when installed. Inspect lever shaft for excessive wear.

LOW-REVERSE SERVO (R moval): Lift out low-reverse servo sleeve and install Tool C-3529, on transmission case and compress piston spring retainer. Using a screwdriver, remove low-reverse servo piston spring retainer snap ring. Loosen compression portion of tool and remove. Remove spring retainer, spring, servo piston, and valve assembly.

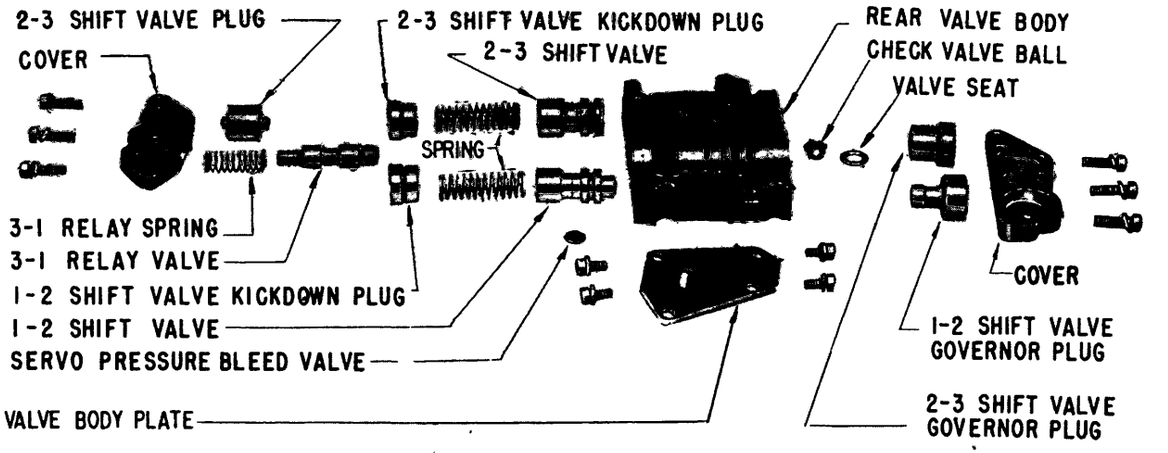
Inspection: Inspect inside bore of piston sleeve for burrs, scores and wear. Inspect bleeder hole in sleeve and make sure it is free of foreign matter. Inspect lever contact surface on sleeve for excessive wear. Remove and inspect piston seal ring for deterioration and hardness. Inspect seal ring groove for nicks or burrs. Inspect sleeve contacting surface for nicks, burrs and scoring (light scores may be removed with crocus cloth). Inspect servo piston valve for proper installation and operation. Long end of valve should protrude through bottom of piston. Valve should operate freely when compressed by hand. Make sure valve spring snap ring is properly seated in piston. Inspect servo piston return spring, retainer, and snap ring for distortion.

KICKDOWN SERVO (R m val): Install Tool C-3529. Apply pressure on the kickdown piston rod guide, and remove snap ring. Loosen compressing portion of tool and remove from transmission case. Remove piston rod guide, piston spring, and piston rod. Using pliers, Tool C-484, remove the kickdown piston from transmission case. Remove accumulator piston from case.

Inspection: (Kickd wn Piston Assembly) – Inspect riveting of kickdown piston rod. Inspect guide contacting surface for nicks or burrs. Inspect seal ring on guide for wear and make sure it turns freely in groove. Check fit of guide on piston rod. Inspect the three rings (two interlocking) on piston for wear or broken locks. Make sure they turn freely in groove. *(NOTE* - It is not necessary to remove rings unless condition warrants. When replacing new rings, use care to avoid damaging interlocking portion of ring). Inspect piston for light scores and wear. Inspect piston spring and rod guide snap ring for distortion.

Insp ction: (Accumulator Piston Assembly) – Inspect both piston seal rings (one interlocking) for wear or broken locks and make sure they turn freely in grooves. *(NOTE* - It is not necessary to remove rings unless condition warrants). Inspect accumulator piston for nicks, burrs, and excessive wear. Inspect accumulator spring for distortion.

FRONT OIL PUMP (R moval): Remove transmission regulator valve spring retainer, spring, gasket, and valve.



TORQUEFLITE RELIEF VALVE BODY ASSEMBLY

Remove torque converter control valve spring retainer, spring, gasket and valve (these valves can be removed with a mechanical retriever or a piece of welding rod, 5/32" for regulator, and 1/8" for torque converter, inserted in end of valve). Remove the front pump housing-to-transmission case screws and washers (sealing washers used under bolts are aluminum; discard if damaged). Remove oil pump housing assembly from transmission case by tapping with a soft hammer. Mark face of gears in relation with face of pump housing using prussian blue. DO NOT SCRIBE.

► *FRONT PUMP DUST SEAL NOTE:* Do not remove dust seal from housing unless inspection indicates that it is necessary. To remove dust seal, use a brass drift and drive seal out front of housing. To replace, position seal in housing (metal portion of seal down) and use driver, Tool C-3278. Drive seal in until tool bottoms on face of housing.

Inspection: Inspect drive sleeve seal ring contacting surface in housing for wear and scratches. Inspect steel back bronze bushing in hub for scratches or scoring and excessive wear, (bushing and housing is serviced as an assembly). Remove oil pump gears and inspect contacting surfaces for scratches, burrs or grooving. Inspect regulator body casting surface on pump housing face for nicks or burrs. Inspect housing passages and make sure they are free of dirt or other material. Clean and replace oil pump gears in housing noting marks made at disassembly. Using straightedge, Tool C-3335, and feeler gauge, check clearance between housing face and face of gears. Clearance limits are .001-.0025". Measure tip clearance between rotor lobes. Replace rotors if clearance exceeds .010". Measure clearance between outer rotor and pump housing bore. Replace rotors or pump housing if clearance exceeds .010". After checking clearance, lubricate with Automatic Transmission Fluid.

REGULATOR VALVE BODY (Removal): Install guide studs, Tool C-3288, and using two threaded holes provided in valve body, install guide studs and pull regulator valve body off torque converter reaction shaft and remove gasket. *CAUTION - Valve body is aluminum and should be handled with care to avoid damage.*

Inspection: Clean body and valves and dry with compressed air. Inspect reaction shaft seal ring surface in bore for scratches, nicks or burrs. Inspect both valves for free movement in valve body (they should fall in and out of bores when valves and body are dry). Crocus cloth may be used to polish valve (do not round the sharp edges of valve). Check all fluid passages for obstruction and inspect mating surfaces for burrs and distortion. If regulator valve has a slight nick or raised portion on mating surfaces, it may be removed by using a flat surface plate and crocus cloth. Inspect front and rear pump check valve for proper seating on both surfaces. If necessary to remove valve, use a pair of long nosed pliers.

TORQUE CONVERTER REACTION SHAFT (Removal): If inspection indicates necessity of removing torque converter reaction shaft, proceed as follows: Remove reaction shaft seal ring (neoprene). Remove the three transmission case-to-reaction shaft screws and washers. Using Tool C-3531, press reaction shaft out of case.

Inspection: Inspect inside of reaction shaft for burrs and inspect splines on shaft for burrs and wear. Inspect seal ring for deterioration and hardness. Inspect thrust surface for wear and slight scores.

TRANSMISSION CASE (Inspection): Inspect case for cracks, sand holes and stripped threads. Check for burrs on mating surfaces. Blow compressed air through all passages to make sure they are open. Check pressure takeoff plugs for tightness. Using a straightedge, Tool C-3335, inspect valve body mating surfaces on case for any burrs or irregularity in surface. Surface should be smooth and flat. Inspect servo and accumulator bores for any scores or scratches. Light scratches may be removed with crocus cloth. Check regulator valve body mating surface in front of case for any irregularities. *NOTE* - Disregard any scratches which may have been made by torque converter reaction shaft screw lockwashers.

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TORQUEFLITE (Cont.)

OVERHAUL OF UNITS

VALVE BODY & TRANSFER PLATE DISASSEMBLY: Place valve body and transfer plate assembly in stand, Tool C-3528.

► *CAUTION: Never clamp any portion of this assembly in vise or use force when removing or installing valves and plugs.*

► *CLEANING & INSPECTION NOTE:* After disassembly and each part has been cleaned and inspected, place on clean paper until ready for reassembly.

1) Wash all parts in clean solvent and dry with compressed air. Make sure all passages are free from obstructions. Check for porous castings.

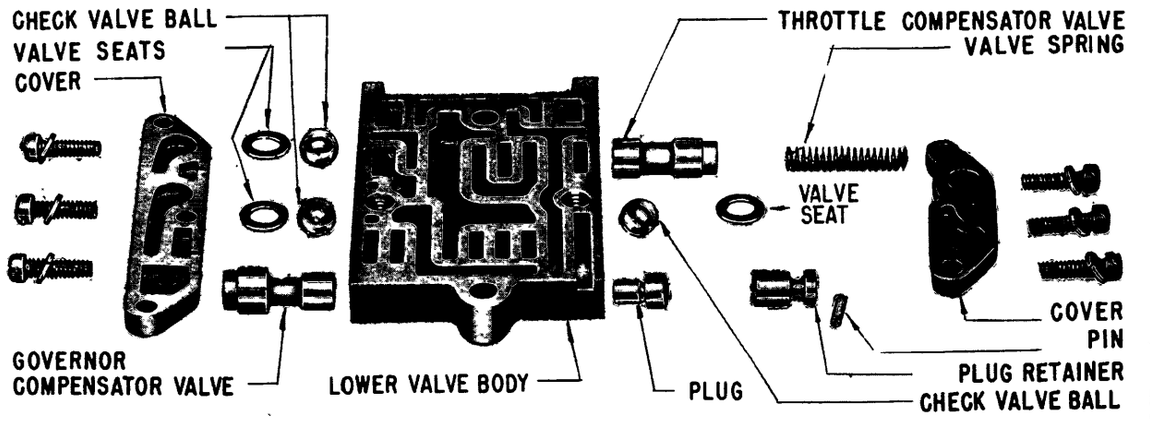
2) Inspect all mating surfaces for burrs, nicks, or grooves. Small ones may be removed with crocus cloth; otherwise damaged parts must be replaced. Using a straightedge, check all mating surfaces for distortion. Using a light, inspect bores in valve body for scoring marks, pits and irregularities. Inspect all springs for distortion and collapsed coils.

3) Inspect all valves and plugs for burrs, nicks, or scores. Small ones may be removed with crocus cloth providing extreme care is used not to round off the sharp edge portion of valve. Check valves and plugs for free operation in bores; they must fall freely in bores when valves, plugs, and bores are clean and dry.

Lower Valve Body (Removal): Remove the two valve body screws from retainer plate located between front and rear valve bodies, and remove plate. Invert valve bodies and remove the two lower valve body screws and lockwashers. Remove lower valve body and plate from transfer plate *(CAUTION - Use extreme care to prevent loss of governor compensator valve plug retaining pin).*

Disassembly - Remove governor compensator valve plug retaining pin, retainer, and compensator plug. Remove the three screws from governor compensator cover (larger cover on valve body). Use care to prevent loss of the two check valve balls and seats, and remove cover. Invert valve body and remove governor compensator valve. While holding throttle compensator valve cover in place (spring loaded), remove the three screws and lockwashers. Use care when removing cover to prevent loss of check valve ball and seat. Remove throttle compensator valve spring and valve. *NOTE* - Inspect ball contacting surface in valve seats and valve body for nicks and burrs. Inspect cover for flatness and porosity.

Reassembly – Place valve body in an upright position and install throttle compensator valve and spring. Make sure spring is properly seated in valve. Place ball and ball seat in position in valve body. Place throttle compensator valve cover in position over spring and body and install three screws and lockwashers. Draw down evenly and tighten. Install governor compensator valve into valve body (small end first). Place two check valve balls and seats in position in valve body, and install governor compensator valve cover, screws and lockwashers. Draw down evenly and tighten. Install governor compensator valve plug (small end first) in valve body, and install plug retainer and pin.



TORQUEFLITE LOWER VALVE BODY ASSEMBLY

Rear Valve Body (Removal): Remove the two rear valve body screws and lockwashers, and remove rear valve body from transfer plate assembly. Remove the servo pressure bleed valve to prevent loss. Invert valve bodies and transfer plate assembly and place on stand, Tool C-3528.

Disassembly – Keeping thumb pressure against kickdown plug cover (spring loaded) remove the three screws and lockwashers. *(CAUTION - When removing cover be careful not to lose internal parts).* Remove cover and take out the following: 1-2 shift valve spring and valve, 3-1 relay valve, 2-3 shift valve spring and valve. Remove the three governor plug cover screws and lockwashers. Use care when removing cover to prevent loss of check valve ball seat and ball. Remove the 1-2 shift valve governor plug from valve body. Remove 2-3 shift valve governor plug from valve body. Rear valve body plate can be removed for cleaning by removing the four screws and lockwashers.

Reassembly – With valve body setting in an upright position, install the 1-2 shift valve (small end first) into valve body. Place the 2-3 shift valve (spring pilot facing out) into position in valve body. Position the 1-2 and 2-3 shift valve springs in valves. Place the 2-3 shift valve kickdown plug (identified by large pilot) over 2-3 shift valve spring. Compress spring sufficiently to seat plug in valve body and secure by placing a thin piece of metal (6" scale) behind plug. Install the 3-1 relay valve (large end first) into valve body and place spring on pilot. Place the 1-2 shift valve kickdown plug over the 1-2 shift valve spring. Position 2-3 shift valve throttle plug in kickdown plug cover. While holding plug in cover, place cover over 3-1 relay valve spring and 1-2 kickdown plug. Compress springs and guide the 1-2 kickdown plug into valve body. Install three cover screws and lockwashers and draw down evenly and tighten. Remove piece of metal or 6" scale. Install rear valve body plate (if removed). Place the 1-2 shift valve governor plug (small end first) in position in valve body. Place the 2-3 shift valve governor plug (small end first) in position in valve body. Install check valve ball and seat. Place governor plug cover in position on valve body and install the three screws and lockwashers. Draw down evenly and tighten.

Front Valve Body (Removal): Remove two front valve body to transfer plate screws and lockwashers and separate front valve body from transfer plate assembly. *(CAUTION – Do not disturb throttle valve stop screw setting).*

Disassembly – Keep thumb pressure against shuttle valve cover (spring loaded) and remove the four screws and lockwashers. Use caution when removing cover to prevent loss of front check valve ball seat and ball. While holding thumb over throttle valve, invert valve body and remove shuttle valve sleeve, plug, stop ring, spring and valve. Remove throttle valve, spring, kickdown valve, and detent plug, (it is not necessary to remove detent plug retaining screw and lockwasher). Remove cotter pin from valve body in outer end of reverse blocker valve. Remove reverse blocker valve plug, blocker valve, and spring. *NOTE* - Normally it is not necessary to remove the throttle valve lever shaft, manual valve lever assembly, or manual valve. However, if condition warrants, proceed as follows: Support throttle lever shaft on block of wood. Using a small punch and hammer with care, remove the throttle valve lever shaft pin (a rubber band may be used to hold manual lever in place while removing pin). Remove any burrs from throttle valve and manual valve lever shafts, and slide them from valve body. Slide throttle valve lever shaft out of manual lever assembly. Using caution to prevent loss of detent ball and spring, slide manual valve lever assembly out of valve body. Using a twisting motion, remove manual valve.

► *FRONT VALVE BODY INSPECTION NOTE:* Inspect manual valve detent ball and make sure it slides freely into valve body. Inspect riveting and wear on manual valve lever pin in lever assembly. Inspect the staking of manual lever and throttle cam to their respective

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

shafts. Inspect the kickdown valve detent plug to make sure it slides freely on valve. Inspect check valve ball seat in valve body for faulty casting. Inspect manual valve lever needle bearing in valve body *(CAUTION - Do not remove, as body and bearing are serviced as an assembly).*

R ass mbly – Place valve body on clean paper in an upright position, and using a twisting motion, install manual valve until it bottoms on paper. Place manual valve lever detent ball spring and ball in position in valve body. While compressing detent ball in position with right index finger, install manual valve control lever by sliding over detent ball and engage pin on lever with manual valve (hold this assembly in position with a rubber band). While holding manual lever assembly in position against valve body, install throttle valve lever assembly with flat portion on end of shaft facing away from valve body to allow maximum travel of lever. While holding levers in position in valve body with rubber band, support throttle lever on wooden block. Install shaft pin using a small punch and hammer. Remove rubber band. With reverse blocker valve spring in position in valve and with slots in valve aligned with pin, install reverse blocker valve in valve body. Install reverse blocker valve plug and compress spring sufficiently to install pin. Lock pin in positi on. Check kickdown detent plug stop screws for being tight, and install detent plug (large inner diameter first) on kickdown valve, and position kickdown valve (detent plug first) into valve body. Install throttle valve spring and throttle valve into valve body. Install shuttle valve and spring (small end of valve first) in valve body. Install shuttle valve stop ring (tangs out) into valve body. Install small end of shuttle valve plug into large end of sleeve, and seat plug properly in sleeve. Install plug and sleeve assembly over shuttle valve spring and into position in valve body. Place front check valve ball and seat in position in valve body. Place shuttle valve cover in position on valve body and install the four screws and lockwashers. Draw down evenly.

VALVE BODIES & TRANSFER PLATE REASSEMBLY: Place valve body transfer plate in an upright position on stand, Tool 3528. Place rear pump suction tube (flange portion up) into counterbore hole in transfer plate. Place steel plate (upper) over pilot on stand, and into position on transfer plate. Install two screws with lockwashers and tighten to secure steel plate to transfer plate.

Front Valv Body: Position front valve body on steel plate (upper) and install two screws and lockwashers in outer end of valve body and draw down finger tight.

Rear Valve Body: Invert transfer plate and replace on stand. With servo pressure bleed valve in place, hold rear valve body up in position against steel plate and install the two outer screws (short) with lockwashers through the transfer plate and into lower valve body. Draw up finger tight.

Lower Valv Body: To prevent loss of governor compensator valve retainer pin, position steel plate (lower) on lower valve body. Place valve body and steel plate into position on transfer plate. Install the two screws (intermediate length) and lockwashers. Tighten the two lower valve body and rear valve body screws to 50-60 inch lbs. Invert valve bodies and transfer plate and replace on stand. Install valve bodies retainer plate and two screws (long) with lockwasher and tighten retainer plate and front body screws to 50-60 inch lbs. Check manual valve to make sure it operates freely.

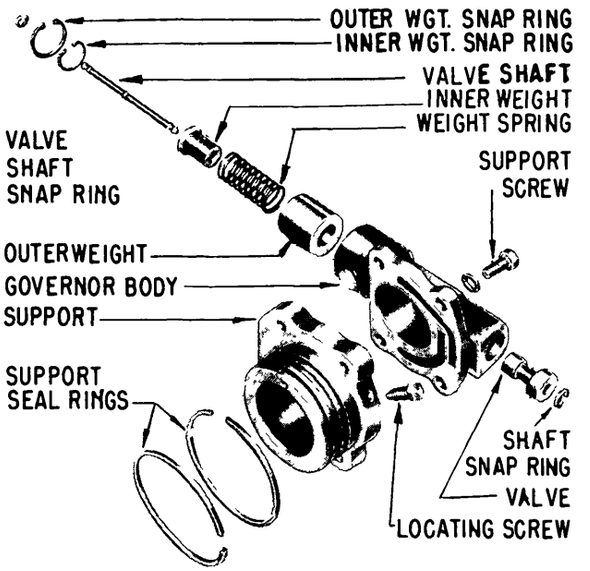
OUTPUT SHAFT REAR BEARING & SEAL (Removal): Remove rear bearing seal. Using pliers, Tool C-760, remove rear bearing snap ring (note that snap ring has a beveled edge). Inspect ring for distortion. Using driver, Tool C-3275, drive output shaft rear bearing out of rear extension.

Installation: Using driver, Tool C-3204, install bearing in extension making sure it is properly seated. Lubricate with automatic transmission fluid. Using pliers, C-760, install rear bearing snap ring with beveled side out. Make sure snap ring seats properly. Using driver, Tool C-3205, install shaft bearing seal with metal portion of seal facing in until tool bottoms on extension.

GOVERNOR (Disassembly): Using pliers, Tool C-3229, remove snap ring from governor weight assembly (keep thumb pressure against secondary weight when removing snap ring). Remove governor secondary weight and spring. Inspect all parts for burrs and wear. Check secondary weight for free movement in primary weight by placing secondary weight in primary weight without spring. Primary weight should fall free when both parts are dry. Place secondary weight and spring in primary weight, compress spring and install snap ring. Slide governor body and support from rear oil pump housing. Remove the two governor support seal rings. Remove the four governor body-to-support screws and lockwashers and separate body from support. Inspect oil passages and make sure they are free from dirt or other material. Clean passages with compressed air. Inspect governor body for slight scores. Valve should travel freely in governor body.

Reassembly: Lubricate the two governor support seal rings with automatic transmission fluid and install on governor support. Make sure seal rings are free to rotate in grooves. Position governor body on support and install the four screws and lockwashers (do not tighten screws at this time). Slide governor support and body assembly into position in rear pump housing. Compress governor support seal rings with fingers as support enters oil pump housing. DO NOT FORCE.

POWER TRAIN UNITS (Disassembly): Unit No. 1 (Output Shaft, Kickdown Planet Pinion Carrier, and Intermediate Shaft Assemblies) – *NOTE - Unit may be placed in the propeller shaft flange and hand brake drum assembly to aid in disassembly.* Using a screwdriver, remove output shaft drive housing snap ring. Remove reverse annulus gear from output shaft assembly. Remove intermediate shaft and kickdown shaft and kickdown carrier assemblies from output shaft assembly. Remove output shaft thrust washer located inside of housing. Remove kickdown planet pinion carrier assembly from intermediate shaft assembly *(NOTE - The kickdown planet pinion carrier assembly used in this unit is the same as th low-reverse planet pinion carrier assembly used in Unit No. 2. No attempt should be made to interchange thes units).* Remove kickdown carrier thrust washer from



TORQUEFLITE GOVERNOR ASSEMBLY

carrier assembly. Remove sun gear roller thrust washer from intermediate shaft assembly. With a screwdriver, remove kickdown annulus gear snap ring and separate gear from intermediate shaft assembly.

Inspection (Output Shaft): Inspect all bearing and thrust surfaces for scoring or scratches. Blow compressed air through all oil passages: make sure they are open and free of dirt. Inspect the four large and two small interlocking seal rings for excessive wear, broken ends, and make sure they rotate freely in grooves. Intermediate shaft and clutch feed tubes are serviced as an assembly.

Inspection (Kickdown Planet Pinion Carrier): Inspect planet carrier for cracks and pinions for broken or worn gear teeth. Using a feeler gauge, check clearance on individual planet pinion gears (clearance should be .006-.017"). Inspect pinion shafts for fit in carrier and make sure pinions are free to rotate on shafts. Make sure shaft lock pins are installed. Inspect oil holes in carrier to make sure they are open. *(NOTE* - Do not replace carrier unless this inspection indicates it is necessary. The planet pinion carrier and pinions are serviced only as a complete assembly). Inspect kickdown thrust washer for scratches or excessive wear.

Inspection (Reverse and Kickdown Annulus Gears): Inspect for worn, cracked or broken gear teeth. Check contacting surfaces of teeth for indications of binding. This condition will usually be evidenced by a brinelling condition. If "brinelling" is noticed, check thrust washer contacting surfaces and alignment of annulus gear on shaft. (Annulus gear teeth having slight cracks, or what appear to be cracks, should provide sufficient evidence to warrant replacement of gear). While burrs

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

or slight obstructions on gear teeth can be safely removed with a hone, under no circumstances should broken areas of gear teeth be filed or ground. In this case the annulus gear should be replaced. Wash annulus gear and be sure to remove all metal pick-up from teeth.

Reassembly (Unit No. 1): *(NOTE* - To aid in reassembly, position output shaft in the propeller shaft flange and brake drum assembly for use as a holding fixture). With output shaft in an upright position, lubricate output shaft thrust washer with automatic transmission fluid and place into position in housing. Place kickdown annulus gear in position on intermediate shaft assembly and install snap ring (select fit). Using a feeler gauge, check clearance under kickdown annulus gear snap ring. Hold clearance as close as possible to .000". Snap rings are available in the following two thicknesses: .060-.062" (Part No. 1636357), .064-.066" (Part No. 1636358). *(NOTE* - When checking clearance, support annulus gear on edge of bench so intermediate shaft will seat properly in gear). Make sure snap ring seats properly. Place intermediate shaft assembly in output shaft housing. Lubricate kickdown carrier thrust washer with automatic transmission fluid and place in position in kickdown annulus gear (make sure thrust washer remains in position). Place reverse annular gear in position in housing and install output shaft drive housing snap ring, making sure it seats properly in housing. Lubricate and install sun gear thrust washer (roller type) over intermediate shaft and into position in carrier assembly.

Disassembly: Unit No. 2 (Sun Gear, Reverse Planet Pinion Carrier, Overrun Clutch, and Rear Clutch Piston Retainer Assemblies) – With unit in upright position, remove sun gear and front clutch thrust washer. Using two screwdrivers inserted between clutch and intermediate support, remove rear clutch retainer assembly from sun gear. Remove two clutch neoprene seal rings from sun gear. Remove reverse sun gear from overrun clutch and reverse planet pinion carrier assemblies. Install Tool C-3527, in intermediate support and cam assembly from overrun clutch hub. Using a screwdriver, remove snap ring from low-reverse band drum. Remove overrun clutch hub assembly from low-reverse band drum. Remove overrun clutch cam roller springs and rollers (ten of each) by removing Tool C-3527 from intermediate support and cam assembly *(CAUTION* - Place assembly over bench when removing tool so springs and rollers will not be lost).

Rear Clutch Piston Retainer Disassembly – Using screwdriver, remove snap ring (large) from rear clutch piston retainer assembly. Remove rear clutch pressure plate from retainer assembly. *(NOTE* - Rear clutch plates (steel) are dished and identified by a notch in one of the driving lugs. When removing the steel plates from clutch retainer, note that dished side of these plates is facing out. Check for dished side by using a straightedge across plate). Invert clutch piston retainer assembly and remove clutch plates and driving disc assemblies (five each). Using Tool C-3533, slightly compress the rear clutch piston return spring retainer, being careful not to damage retainer by compressing spring too far. Using pliers Tool C-3301, remove piston return spring snap ring. Release Tool C-3533 and remove clutch return spring retainer and spring from clutch piston retainer assembly (spring retainer may require guiding past snap ring groove as tool is released). Using a twisting motion, remove clutch piston assembly from retainer. Remove rear clutch piston inner and outer seal rings.

Inspection (Clutch Driving Disc & Plate) – Inspect driving discs and plates for evidence of burning, glazing and flaking off of facing material. Check disc by scratching facings with finger nail. If material collects under nail, replace all driving discs. Replace driving discs if splines have become damaged. Inspect the steel clutch plates and pressure surface for evidence of burning, scoring, and damaged driving lugs. Replace if necessary.

Inspection (Piston & Seal Rings) – Inspect seal ring surfaces in piston retainer for nicks and deep scratches. Light scratches will not interfere with sealing of neoprene rings. Inspect inner and outer piston seal rings (neoprene) for deterioration, wear, and hardness. Inspect seal ring groove in piston for nicks or burrs. Inspect inside bore of piston for score marks; if light, remove with crocus cloth; if heavy, replace piston. Inspect piston spring, retainer and snap ring for distortion.

Inspection (Clutch Piston Retainer) – Note ball check in clutch retainer. Make sure ball operates freely. Inspect the band contacting surface for deep scores and burns, especially if the band lining is worn to point where steel band has been contacting rear clutch piston retainer. *(CAUTION – Do not machine the piston retainer in an engine lathe to remove score marks).* Inspect steel clutch plate contacting surfaces for burrs or brinelling. Make sure clutch driving lugs on steel clutch plates travel freely into retainer. Remove any metal pick-up on hub of retainer.

Rear Clutch Piston Retainer Reassembly – Lubricate and install inner piston seal ring on hub of clutch retainer (seal lip must be facing down, and seal must be properly seated in groove). Lubricate and install outer seal ring on clutch piston (lip of seal facing away from flange). Place piston assembly in clutch retainer, and with a twisting motion, seat piston in bottom of retainer. Install piston return spring on hub and position spring retainer snap ring on spring. Using Tool C-3533, compress clutch spring sufficiently to seat the snap ring. Make sure snap ring is properly seated. Remove Tool C-3533. Lubricate all clutch plates and discs with automatic transmission fluid. Assemble by placing one rear clutch steel plate (identified by a notch on one of the lugs) with the dished side facing out, in the clutch retainer, followed by a driving disc. Repeat this procedure until all five discs and five plates have been installed *(CAUTION – All steel driving plates must be installed with dished sides facing same direction for proper travel of clutch pressure plate).* Install rear clutch pressure plate. Select and install snap ring making sure it is seated properly in clutch retainer. Using feeler gauge, check the clearance between snap ring and pressure plate. Clearance limits are as close to .000" as possible. Snap rings are available in the following sizes: .060-.062" (Part No. 1636315); .064-.066" (Part No. 1636316).

Inspection (Reverse Sun Gear Assembly): Inspect gears for cracked or broken teeth. Inspect steel back bronze bushing for scoring or excessive wear. Bushing and reverse sun gear are serviced as an assembly. Inspect intermediate support bearing surface of gear for wear and slight scores. Inspect rear clutch seal ring grooves on gear for nicks or burrs. Inspect inner ring sealing surface in bore of sun gear for grooves or scratches. Inspect thrust area of sun gear for nicks, scratches, or burrs. Inspect neoprene seal rings for deterioration, wear, nicks, or hardness. Inspect front clutch and sun gear thrust washers for scratches or excessive wear.

Inspection (Support & Cam Assembly): Inspect riveting of cam to intermediate support. Inspect cam roller surface for brinelling. Inspect roller spring retaining tabs for being bent or distorted. Inspect bearing surface on hub for scoring. Inspect steel backed bronze bushing in hub for scratches or scoring and excessive wear. Bushing and intermediate support are serviced as an assembly. Inspect overrunning clutch cam rollers for being pitted or scored. Inspect overrunning cam roller springs for distortion. Replace if necessary.

Inspection (Low-Reverse Planet Pinion Carrier): Inspect carrier for cracks and pinion for broken or worn gear teeth. Using a feeler gauge, check end clearance on individual planet pinion gears, clearance should be .006-.017". Inspect pinion shaft for fit in carrier and and make sure pinions are free to rotate on shafts. Make sure shaft lock pins are installed. *(NOTE* - Do not replace carrier assembly unless inspection indicates that it is necessary. The planet carrier and pinions are serviced as an assembly).

Inspection (LO2-Reverse Band Drum): Inspect band contacting surface for deep scratches and burrs, especially if band lining is worn to point where steel band has been contacting drum *(CAUTION - Do not attempt to machine drum in an engine lathe to improve score marks).* Inspect driving lugs inside drum for excessive wear.

Inspection (Overrunning Clutch Hub): Inspect cam roller contacting surface for brinelling. Inspect steel back bronze bushing in hub for scratching or scoring and excessive wear. Bushing and hub are serviced as an assembly. Inspect lubricating hole and make sure it is free from foreign matter by cleaning with compressed air. Inspect reverse drum snap ring for distortion.

Reassembly (Unit No. 2): Install overrunning clutch hub assembly (hub first) into snap ring side of the low-reverse band drum. Place low-reverse planet pinion carrier assembly in position in low-reverse band drum. With drum supported, select snap ring to give minimum clearance. Snap rings are available in the following thicknesses: .060-.062" (Part No. 1636315); .064-.066" (Part No. 1636316); .068-.070" (Part No. 1636317). Place tool C-3527, in position in intermediate support and cam assembly and install cam springs and rollers. *(CAUTION - Make sure that cam springs and rollers are properly seated against cam; otherwise, damage to springs will result when overrunning clutch hub is installed).* With intermediate support and cam assembly resting on bench, lubricate bushing and install low-reverse band drum assembly over hub. While holding the

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

two assemblies together, remove Tool C-3527. Lubricate bearing surface on reverse sun gear and install intermediate support and planet pinion carrier assembly. Lubricate the two sun gear rear clutch seal rings (neoprene) with automatic transmission fluid, and install on reverse sun gear. Install rear clutch piston retainer assembly on reverse sun gear. *(CAUTION - To prevent injury, do not place fingers under clutch retainer assembly when installing).* Install front clutch and sun gear thrust washer (Lubriplate may be used to hold thrust washer in position).

Disass mbly: Unit N . 3 (Input Shaft & Front Clutch Pist n R tain r Ass mbli s) - Remove input shaft fibre thrust washer (select fit). Using a screwdriver, remove front clutch snap ring. Remove input shaft assembly from clutch piston retainer, and mark the top driving disc (select fit) for identification at assembly. Invert front clutch piston retainer, and remove driving discs (five), and clutch plates (four). Remove clutch plate and clutch hub. Install Tool C-3533 and compress front clutch piston return spring retainer. Using pliers, Tool C-3301, remove piston return spring snap ring. Release and remove tool. Remove clutch piston return spring retainer and spring. Remove lever retainer and levers from front clutch piston retainer. Using a twisting motion, remove piston assembly from retainer.

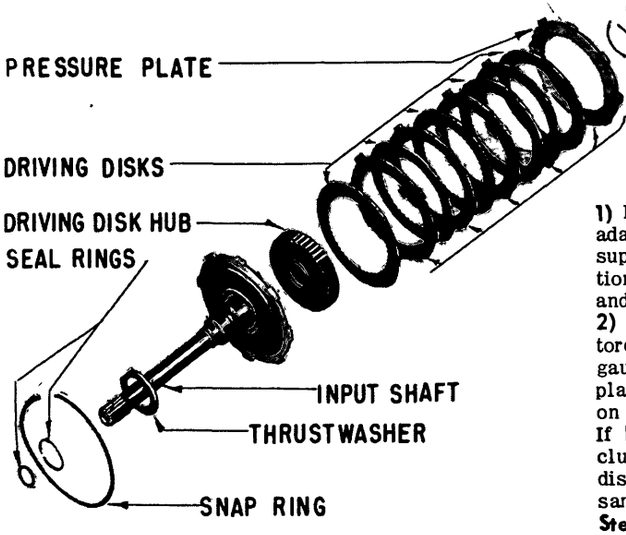
Insp cti n (Input Shaft): Inspect thrust washers for cracks or excessive wear. Inspect front clutch snap ring for distortion. Inspect interlocking seal rings for wear or broken locks. Make sure they turn freely in grooves. *(NOTE* - When replacing rings, use extreme care not to damage interlock portion). Make sure all passages are open by blowing air through them. Check splines and lugs for nicks or burrs. Inspect bearing and thrust surfaces for nicks or scratches. Inspect steel back bronze bushing for scratches, scoring or excessive wear (bushing and input shaft are serviced as an assembly).

Insp cti n (Clutch Driving Discs, Plates, and Hub): Inspect driving discs for evidence of burning or glazing, and flaking off of facing material. Check discs by scratching facings with finger nail; if material collects under nail, replace all driving discs. Replace driving discs if splines have become damaged. Inspect steel clutch plates and pressure plate surface for evidence of burning, scoring, and damaged lugs; replace if necessary. Inspect lever contacting surface on pressure plate for evidence of wear (oil passages in hub are to lubricate clutch plates). Make sure they are free of foreign matter.

Insp cti n (Fr nt Clutch Piston, Seal & Levers): Inspect levers for wear or distortion. Remove and inspect inner and outer piston seal rings (neoprene) for deterioration, wear, and hardness. Inspect seal ring groove in piston for nicks or burrs. Inspect inside portion of piston hub for score marks. If light, remove with crocus cloth, if heavy, replace piston. Inspect lever ring for seating properly in groove on piston. Inspect lever retainer, return spring, spring retainer, and snap ring for distortion.

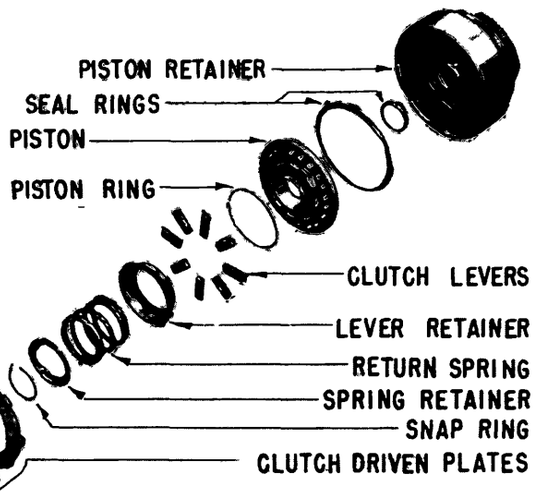
Insp cti n (Fr nt Clutch R tainer): Make sure check ball operates freely. Inspect seal ring surfaces in hub; if intermediate shaft seal rings have excessively worn or grooved this surface, replace the clutch piston retainer. Remove any metal pick-up on hub of retainer, and inspect seal ring groove for nicks or burrs. Inspect steel clutch plate contacting surfaces for scores or brinelling. Inspect thrust surface on rear of retainer for scratches or scoring. Make sure all clutch feed and lubricating passages are open and free of dirt.

Reassembly (Unit No. 3): Lubricate and install neoprene oil seal ring on hub of clutch retainer (seat seal properly in groove with lip of seal facing down). Lubricate and install outer seal ring on clutch piston with lip of seal facing away from flange. With piston lever ring seated in piston, place piston assembly in clutch retainer, and with a twisting motion, seat piston in bottom of retainer. Place lever retainer in piston and install the lever (eight), making sure they are free and properly seated in slots of piston. Install clutch return spring over hub of clutch retainer, and position spring retainer and snap ring on spring. Using Tool C-3533, compress the clutch return spring sufficiently to seat snap ring with pliers, Tool C-3301. Check to make sure snap ring is properly seated. Remove spring compressing portion of tool. Install pressure plate (smooth side up) in retainer. Install discs and plates by placing one of the driving discs in clutch retainer followed by a steel plate. Repeat this procedure until all five driving plates and four steel plates have been installed.



TRANSMISSION UNIT NO. 3

Front Clutch Pressure Plate Travel Check & Adjustment: To properly control travel of clutch plate assembly, the top driving disc is a selective fit and is available in the following sizes: .060-.063" (Part No. 1636260, Std. Size); .073-.076" (Part No. 1636372); .087-.090" (Part No. 1636373). To select the correct top driving disc, proceed as follows:



1) Remove top driving disc from clutch retainer. Install adaptor, SP-2872 over screw portion of Tool C-3533, and support ends of adaptor on input shaft flange stop portion of clutch retainer. Install spring washer, SP-2881 and plate compressing adaptor SP-2876.

2) Install thrust washer (ball type) SP-100 and nut; torque to 10 inch lbs. Using Tool SP-2873 (checking gauge) check distance between surface of top clutch plate (steel) and end of adaptor SP-2872 which is resting on output shaft flange stop portion of clutch retainer. If **First Step** of checking gauge will slide between top clutch plate (steel) and end of adaptor, use standard disc, Part No. 1636260. If **Second Step** will slide into same position, use disc, Part No. 1636372. If **Third Step** will slide into same position, use disc, Part No. 1636373. *NOTE - If there is excessive clearance between third step of checking gauge and end of adaptor due to wear on disc facings, correct as follows:*

3) Remove adaptor, SP-2872 (checking portion of tool) from clutch retainer assembly. Remove top clutch plate and second disc. Install oversize driving disc, Part No. 1636373 (oversize disc) in second disc position. Reinstall top clutch plate (steel) and checking tool. Recheck clearance as indicated above. *(NOTE* - in the event the first stop on checking gauge will not slide between top clutch plate and tool, disassemble clutch to determine cause. Inspect for dirt, location of levers, distorted or improperly installed plates or tool.

4) Lubricate clutch disc and plate assembly with automatic transmission fluid and position clutch hub in plate and disc assemblies. *(CAUTION - To prevent damage to discs when installing input shaft, make sure hub engages splines in each disc).* Install input shaft assembly in clutch retainer. Select snap ring for minimum clearance and install. Snap rings are available in two thicknesses: .060-.062" (Part No. 1636315); .064-.066" (Part No. 1636316). Make sure snap ring seats properly. Install input shaft thrust washer.

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

TRANSMISSION REASSEMBLY & INSTALLATION

TORQUE CONVERTER REACTION SHAFT (Installati n): Using sun lamps, heat front of transmission case to approximately 170-190°F. Install guide studs, Tool C-3283, in front face of reaction shaft flange. Lubricate portion of reaction shaft flange (that presses into case) with automatic transmission fluid. Position torque converter reaction shaft into front of transmission case so that guide studs in shaft align with threaded holes in case. Using Tool C-3531, press reaction shaft into place. Remove guide studs and start the three transmission case-to-reaction shaft screws and washers. Draw down evenly and tighten to 10-15 ft. lbs. Coat torque converter reaction shaft seal with automatic transmission fluid, and install on shaft.

REGULATOR VALVE BODY (Installation): Install guide studs, Tool C-3288 in transmission case. Install valve body gasket over guide studs and into position on transmission case. With seal ring (neoprene) in position on reaction shaft, install regulator valve body and valves over guide studs and into position *(CAUTION* - Hold valves in place to prevent damage while installing valve body).

FRONT OIL PUMP (Installation): With inner and outer seals lubricated and pump gears in position in housing (counterbore in pinion gear facing down as identified when removed), place oil pump housing over studs and slide into position. Start five of the screws (with aluminum washers) and draw housing down evenly until it is seated in transmission case. Remove guide studs and install the two remaining screws and washers. Tighten the two long screws and five short screws to 14-16 ft. lbs. *(CAUTION - Improper tightening of these screws may cause pump gears to bind).* Lubricate and install front pump drive sleeve (bearing surface first), and engage the driving lugs of oil pump pinion to determine if oil pump gears turn freely (main body of driving sleeve should be flush with oil pump housing when properly installed). If gears do not turn freely, remove pump and check for foreign matter between pump gears and housing. Install torque converter control valve spring, retainer and gasket. Tighten to 35-40 ft. lbs. Install transmission regulator valve spring, retainer and gasket. Tighten to 45-50 ft. lbs.

ACCUMULATOR PISTON (Installation): Lubricate seal rings and place accumulator piston into position. Compress outer seal ring and tap lightly in transmission case.

KICKDOWN PISTON (Installation): Lubricate piston seal rings and place kickdown piston assembly into position, compress outer ring, and start assembly into case. With piston properly centered so as not to damage rings, tap lightly and bottom piston into case. Place kickdown piston rod assembly in piston and slide piston spring over kickdown piston rod. Install Tool C-3529, for kickdown piston installation. Compress spring sufficiently to install snap ring. Loosen compressing portion of tool and remove from transmission case. Place servo piston sleeve over piston. Make sure sleeve slides freely on piston by working it up and down.

KICKDOWN BAND (Installation): Install kickdown band assembly by rotating band ends over center support in transmission case *(CAUTION - Use care when installing bands so not to damage lining on edges of transmission case).* Install anchor on kickdown band adjusting screw.

LOW-REVERSE BAND (Installation): Install anchor on reverse band adjusting screw. Install band by rotating band ends through rear opening in transmission case.

LOW-REVERSE & KICKDOWN BAND LEVER ASSEMBLIES AND STRUTS (Installation): Place levers in position in case and slide shaft through levers from rear of transmission case. Remove guide stud, Tool C-3288, from threaded end of shaft and install shaft lever spacer (flat) and plug. Tighten plug to 30-35 ft. lbs. Position kickdown band over anchor and compress band sufficiently to install kickdown band strut. Place reverse band into position on anchor and compress band end; and with aid of a screwdriver, install strut.

POWER TRAIN UNITS (Installation): Unit No. 3 (Front Clutch Piston Retainer and Input Shaft Assemblies) - If when transmission was disassembled, the end clearance was found to be incorrect, correction can be made at this time by selection of proper input shaft thrust washer. To accomplish this, use a micrometer and measure thickness of thrust washer which was removed. Select a thicker or thinner washer to give proper clearance *(NOTE - Front clutch end clearance should be .020-.050" with transmission fully assembled).* Thrust washers are available in the following sizes: .115-.117" (Natural color, Part No. 1637669); .097-.099" (Black, Part No. 1638670); .078-.080" (Red, Part No. 1638671). With input shaft thrust washer in position and input shaft seals lubricated, start unit through rear of transmission case. By supporting and keeping unit centered as much as possible, guide through bands and reaction shaft into position.

Unit No. 2 (Sun Gear, Reverse Planet Pinion Carrier, Overrunning Clutch, and Rear Clutch Assemblies) - Start unit through rear of transmission case. Align identified locating hole in intermediate support with threaded locating hole inside of transmission case. By supporting and keeping unit centered as much as possible, guide through bands until it contacts hub on front clutch. While pushing in on assembly, rock sun gear to engage clutch plates of rear clutch on hub of front clutch *(CAUTION* - While rocking sun gear, make sure unit does not bind on bands or in intermediate support. Do not use excessive force when installing this unit so as to prevent damage to clutch discs in rear clutch). Use a drift punch to assist in alignment of intermediate support locating holes. Install the three intermediate support locating screws, lockwashers, and tighten to 25-30 ft. lbs. Use great care when installing the locating screw to prevent loss of lockwasher. Check input shaft and sun gear for turning freely.

Unit N . 1 (Output Shaft, Kickd wn Plan t Pini n Carrier, and Intermediate Shaft Ass mbli s) - Be sure reverse sun gear thrust washer (roller type) is in position in planet pinion carrier assembly. Lubricate seal rings and bearing surface on intermediate shaft, with automatic transmission fluid. Install unit by placing intermediate shaft in sun gear. Keeping unit centered as much as possible and slowly turning output shaft, slide into position (large seal ring on output shaft flush with rear of transmission case). *CAUTION* - Use care when installing to prevent damage to seal rings on intermediate shaft.

OUTPUT SHAFT SUPPORT (Installati n): With guide studs, Tool C-3283 in rear of transmission case, place output shaft support gasket over guide studs and into position on rear of case. Lubricate output shaft seal rings. Install support over shaft and guide studs, and position against transmission case *(CAUTION* - Use care when installing support so not to damage ring sealing surfaces). Install the one (short) output shaft support-to-transmission case screw and lockwasher, and tighten finger tight.

REAR OIL PUMP & GOVERNOR ASSEMBLIES (Installation): Place rear oil pump pinion ball in ball pocket in output shaft. Lubricate rear oul pump drive pinion. Place over output shaft and slide into position aligning key-way in pinion with ball in shaft. *(CAUTION - Pinion was marked at disassembly. Make sure it is installed correctly).* Lubricate rear oil pump gear and position in pump housing. Make sure gear is installed correctly; check marking. Slide rear oil pump and governor assemblies over output shaft and into position against support. *(CAUTION* - There are two extra holes in housing which are used for vents. Make sure no attempt is made to install screws in these holes. Check each threaded hole before installing screws). Install the five oil pump housing-to-output shaft support screws. Draw screws down evenly and tighten to 10-12 ft. lbs. After screws have been tightened, turn output shaft to make sure pump gears are free to rotate. If not, disassemble pump to determine cause.

GOVERNOR WEIGHTS & VALVE ASSEMBLY (Installation): Align locating hole in output shaft to locating screw hole in governor support and install locating screw. Tighten to 5-7 ft. lbs. If governor body had been removed, and installed, tighten the four body screws to 6-8 ft. lbs. Dry governor weight assembly and valve with compressed air, but do not lubricate when assembling. Place governor weight assembly (secondary weight snap ring facing out) into governor body, and using pliers, Tool C-3229, install snap ring, making sure it is properly seated in groove. With the governor valve (small end up) on governor valve shaft, slide shaft into governor body through output shaft and governor weight assembly; at the same time position valve

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

into body. Install governor valve shaft snap ring (from weight assembly end). Make sure it is properly locked to shaft. After snap ring installation, apply sufficient pressure to both ends of valve shaft to force snap rings to outer portion of snap ring grooves. Check operation of governor weight assembly and valve by turning output shaft. • Both should fall free in governor body.

EXTENSION HOUSING (Installation): Install new extension housing gasket over guide studs and into position against output shaft support. *(CAUTION - Do not use sealing material on gasket).* Place extension over output shaft and guide studs and into position against support *(NOTE* - Propeller shaft flange and drum assembly can be used, if necessary, to draw extension output shaft support). Install extension housing-to-case screws and tighten to 25-30 ft. lbs. Tighten output shaft-to-case screw to 25-30 ft. lbs. (Check output shaft to make sure it turns freely). Install speedometer drive pinion and sleeve assembly in extension housing and tighten to 40-56 ft. lbs.

HAND BRAKE (Installati n): Make sure brake support spacer (neoprene) is in position on back of brake support and spacer sleeve is in center of support. Slide brake support assembly over rear of extension and anchor pin. Make sure spacer sleeve remains in center of support. Install brake support grease shield on extension housing(indent on shield is for correct positioning on extension, also, the shield must be located on extension far enough to permit installation of spring). Place both brake anchor washers on brake shoe anchor and install locking anchor washer. Place both shoe assemblies with adjusting sleeve nut and screw into position on anchor. Make sure brake shoes are between anchor washers. Use rubber bands around shoes to hold them in position. Install operating link. Note that link is marked for correct installation. Install the brake support grease shield spring (opening in spring toward adjusting sleeve). Make sure spring is properly seated in groove. Slide brake shoe return spring behind grease shield spring and hook into position. Install propeller shaft flange and drum assembly. Install shaft flange washer and nut. Tighten to 200 ft. lbs.

►*FRONT CLUTCH END CLEARANCE CAUTION.* Recheck end clearance *(See "Front Clutch End Clearance Check" under "Removal & Inspection of Transmission Units" above).* If clearance not correct (.020-.050"), input shaft washer of proper thickness can be installed by removing the seven screws and lockwashers from extension housing. Install guide studs, Tool C-3233. Remove the one output shaft support-to-transmission case screw and washer, and remove the hand brake assembly, extension, output shaft support, and No. 1 unit as an assembly.

BAND ADJUSTMENT: Rotate hand brake drum in both directions to center bands on retainers prior to making band adjustment. *See "Band Adjustment" above, for adjustment procedure.*

VALVE BODIES & TRANSFER PLATE ASSEMBLY (Installation): Clean mating surfaces of valve body assembly and place into position on transmission case. Install five (short) transfer plate screws, with Belleville washers. Draw down evenly and tighten to 14-16 ft. lbs. Install accumulator spring through transfer plate and position in piston. Install accumulator cover, three screws with Belleville washers and draw down evenly. Place oil strainer in position over rear pump suction tube in transfer plate assembly. Check position of front pump suction tube in elbow (opening in suction tube should be facing oil pan). Slide front pump suction tube into strainer and position elbow on transfer plate. Install the two screws (with Belleville washers), draw down evenly and tighten elbow and accumulator cover screws to 14-16 ft. lbs. Install neutral starter switch and visually check manual valve lever contact with switch.

OIL PAN (Installation): Install pan, using new gasket. Tighten screws evenly to 10-12 ft. lbs. Tighten oil drain plug.

MANUAL CONTROL VALVE LEVER AND CONTROL CABLE ADAPTOR HOUSING (Installation): Install manual control lever (locking screw to rear) on manual valve lever shaft. Position lever so there is 7/32" clearance (without gasket) between bottom of lever and transmission case. Tighten locking screw securely. Place control cable adaptor (with spring lock in position) in lever and install pin. Place manual valve control lever in reverse position and install gasket, control cable housing, and three screws (with Belleville washers). Tighten evenly to 14-16 ft. lbs. Install felt washer, flat washer, and throttle valve lever assembly over shaft. Tighten clamp bolt.

FORDOMATIC, MERCOMATIC & TURBO-DRIVE TRANSMISSION

F rd Pass. Cars, All Models (1956)
Ford Trucks F-100, F-250, F-350, P-350, P-500 (1956)
Continental (1956)
Lincoln (1956)
Mercury (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 FORDOMATIC CONTROL VALVE ASSEMBLY IDENTIFICATION: Three different control valve assemblies used which are identified by a letter located on lower valve body as follows:*

Model	Identification Letter
6 Cyl. Cars & Trucks	"S"
8 Cyl. Cars (272" Eng. & 2-Barrel Carb.)	"S"
8 Cyl. Cars (272" Eng. & 4-Barrel Carb.)	"E"
8 Cyl. Trucks	"E"
8 Cyl. Pass. Cars (292" Eng.)	"E"
Thunderbird & Police Interceptor	"T"

►*PRESSURE TAKE-OFF LOCATION CHANGE (THUNDERBIRD & INTERCEPTOR): These models now have the pressure take-off plug located at left rear of transmission case, just above oil pan.*

►*LOCK-UP CONDITION (BELOW 18 MPH IN INTERMEDIATE RANGE) CORRECTION:* This condition is caused by a cross leakage in the front servo piston. Check the front servo piston carefully for radial cracks that might cause leakage.

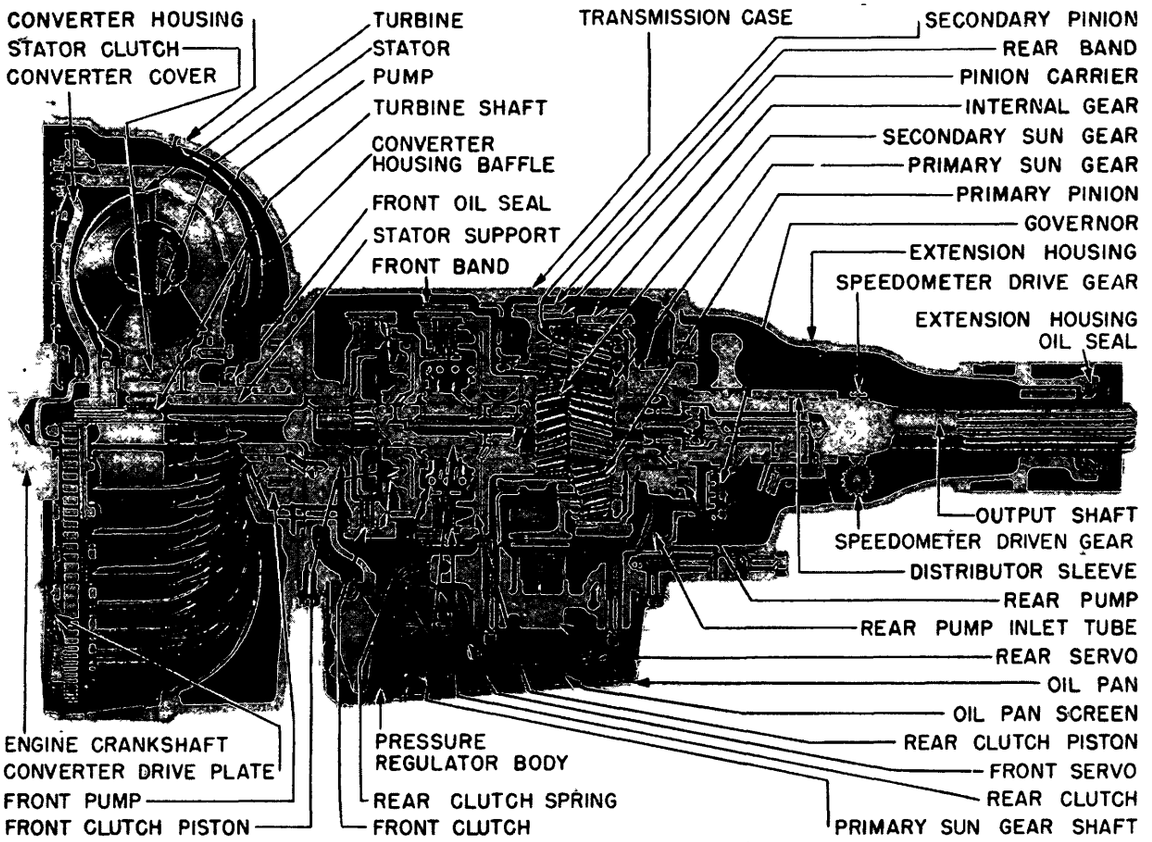
►*FORDOMATIC REAR CLUTCH PLATE NOTE:* The driven rear clutch plates can be installed facing either the front or rear of transmission; however, the coned surfaces of the plates must all face the same direction.

►*1956 FORDOMATIC CONVERTER STATOR CLUTCH PRODUCTION CHANGE:* A new 16 sprag stator clutch, Part No. B6A-7940-A, replaces the former 20 sprag clutch. When installing the later type clutch, the flanged edges must face front of transmission.

►*TRANSMISSION FAILURE CAUTION (Cars with Air Cooled Torque Converter):* In the event of band failure or transmission failure where there is a possibility of foreign material circulating in the cooling system, it is recommended that the cooler and lines be back-flushed with automatic transmission fluid and air prior to installation. *CAUTION - Do not use pressure greater than 100 lbs.*

►*1956 FORDOMATIC TORQUE CONVERTER ASSEMBLY PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION (8 CYL. MODELS):* Beginning approximately Jan. 15, 1956 a new water cooled torque converter is being used on 8 cylinder models. A steel impeller housing and a redesigned turbine is used. *NOTE* - The later type turbine, Part No. B6A-7920-A can be used to replace the earlier turbine; however, the earlier turbine, Part No. B5A-7920-A must not be used with the steel type impeller.

►*1956 FORDOMATIC PRESSURE REGULATOR ASSEMBLY PRODUCTION CHANGE (On cars with the new steel impeller):* Pressure Regulator, Part No. B6A-7440-E is used on 8 Cyl. models (except Thunderbird and Interceptor) and is identified by a white colored main regulator spring. Pressure Regulator, Part No. B6A-7440-F is used on Thunderbird & Interceptor, and is identified by a red main regulator spring.



FORDOMATIC & MERCOMATIC TRANSMISSION (SECTIONAL VIEW)

►*1956 FORDOMATIC & MERCOMATIC REGULATOR REPLACEMENT CAUTION (Cars with aluminum type impeller):* The later type regulator used with the steel impeller converter, must not be used on cars having an aluminum impeller housing as serious damage would result. The converter for use with the steel impeller converter can be identified by the omission of the .280" diameter hole under the intake regulator body cover.

►*1956 FORDOMATIC "RAPPING" OR "THUMPING" NOISE CORRECTION (Cars with steel converter):* Correct by installing a low pressure regulator valve, Part No. B6A-77464-A (converter pressure). The new valve can be identified by either a "flat" or "groove" in center land of valve. All transmissions that are equipped with the steel torque converter and have the later type valve installed, are identified by a daub of white paint adjacent to name plate. *CAUTION - Do not attempt to machine the earlier type valve as the short intermediate land would prevent transmission lubricating system from receiving proper amount of lubricant.*

►*1956 FORDOMATIC & MERCOMATIC TRANSMISSION SERVICE REPLACEMENT CASE NOTE:* The transmission case, Part No. B6A-7005-A, used for service replacement has two tapped holes for attachment of fluid cooler lines. When this case is installed on cars not having the fluid cooler, the holes should be plugged with 1/8" pipe plugs.

►*1956 FORDOMATIC STEEL TORQUE CONVERTER UNBALANCE CORRECTION:* This unbalance occurs when converter is filled with fluid and will appear as engine vibration during a standing engine run-up between 900-1000 RPM; 1500-1700 RPM; and 2000 RPM and over. Correct by removing converter and rotating its mounting position 180°.

►*1956 FORDOMATIC & MERCOMATIC REAR CLUTCH PLATE NOTE:* Ford Thunderbird & Interceptor models and all Mercury models have five bronze and five steel clutch plates in rear clutch assembly. A thinner clutch piston is also used with these assemblies which must not be used on models having the four bronze and four steel clutch plate assemblies.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

►*1956 FORDOMATIC TORQUE CONVERTER BOLT INTERFERENCE CORRECTION:* On early transmissions with steel torque converter, interference between converter bolts and starter seal can be eliminated by using the shorter converter bolts, Part No. B6A-7964-B.

►*1956 TURBO-DRIVE & MERCOMATIC THROTTLE CONTROL INNER LEVER ENDPLAY CORRECTION & PRODUCTION CHANGE:* A new inner lever, Part No. B5A-77283-A has been released for service replacement to correct excessive endplay. The lever is stamped with the letter "O" and should be installed with the "O" toward inside of transmission.

►*1956 TURBO-DRIVE & MERCOMATIC PRESSURE TAKE-OFF PLUG LOCATION NOTE:* The take-off hole is located in rear wall of transmission case, and oil pressure is directed from control valve assembly through a hole in bottom gasket surface, near rear of case on name plate side, to the take-off hole. If the 1956 type case is used with a 1955 main control assembly, Part No. PMB-77700-A, B, C, D, it will be necessary to use PMB-77715-D separator plate, or drill a hole in the existing plate comparable to the hole in PMB-77715-D plate.

►*1956 TURBO-DRIVE & MERCOMATIC FRONT SERVO CAUTION:* The front servo is redesigned and the parts are not interchangeable with 1955 parts.

►*1956 MERCOMATIC CONVERTER HUB FAILURE CAUTION:* In case of converter hub driving lug failure, check and make sure the engine-to-converter housing locating dowels are present. If these dowels are missing, the resulting misalignment could cause additional lug failure.

►*1956 MERCOMATIC TORQUE CONVERTER ASSEMBLY PRODUCTION CHANGE:* A new water cooled torque converter having a steel impeller housing and a redesigned turbine are now being used in production. This later torque converter is identified by the omission of openings for air intake, baffles and exhaust.

►*1956 MERCOMATIC "THUMPING" NOISE CORRECTION (Cars with steel converter):* Install Pressure Regulator Assembly, Part No. B6A-77440-F having the later type converter pressure regulator valve. The later type valve is identified by either a machined "flat" or "groove" in the intermediate land.

►*TORQUE CONVERTER REASSEMBLY (STEEL CONVERTER) CAUTION:* When the impeller is attached to converter cover, with the new square head bolts, it is important that the balance marks stamped "O" on cover and etched "O" on impeller housing be in alignment.

►*TRANSMISSION IDENTIFICATION NOTE:* Transmission Model No. and Serial No. on name plate on left side of transmission case must be used to identify individual units for parts replacement etc.

►*STARTING ENGINE BY TOWING OR PUSHING CAR:* Pushing is recommended. Place selector lever in Neutral "N" position. When car reaches 20 MPH speed, turn on ignition, move selector lever to "LO", depress accelerator pedal to half throttle position until engine begins to run. *NOTE–On ice or snow where traction not good, move selector lever to "DR" position to crank engine.*

►*TOWING CAR CAUTIONS: Do not tow at speed greater than 40 MPH and observe following precautions:*

If Transmission Operating Properly–Place selector lever in Neutral "N" position. Car can be towed normally for distances not to exceed 12 miles. **For greater distances, use same procedure as for inoperative transmission.**

If Transmission Inoperative–Tow car with rear wheels lifted off road, or disconnect and remove propeller shaft and protect rear end of transmission from entry of dirt (U-joint Knuckle, Part No. 1M-4841 can be installed and wired in place for this purpose).

DESCRIPTION

Fordomatic, Mercomatic, & Turbo-Drive Automatic Transmissions consist of a hydraulic torque converter and an automatic transmission which provides automatic operation in "DR" range, and additional "LO", "R", & "P" ranges which are controlled manually.

See "Fordomatic, Mercomatic & Turbo-Drive Transmissions" in 1955 Annual Data or later Manual edition.

OPERATION

Torque converter automatically provides a torque multiplication ranging from 2.1-1 (maximum for starting and acceleration) to 1.0-1 (normal driving range with torque converter acting as a fluid coupling). This torque multiplication is supplemented by the planetary gears when selector lever placed in "DR", "LO", and "R" ranges.

Drive Range–Car starts in Intermediate Gear (except when accelerator pedal depressed to floor when car will start in Low Gear) with a gear ratio of 1.467-1 (Ford), 1.46-1 (Lincoln & Mercury), with Front Clutch applied locking the Primary Gear to the Turbine Shaft, and the Front Band applied, holding Secondary Sun Gear stationary. The power flow at this point is from Turbine Shaft through Front Clutch to Primary Pinion, to Secondary Pinion, to Internal Gear, to Output Shaft. As car speed increases (depending on throttle pressure) to a certain point, the Front Band is released and the Rear Clutch is applied, automatically causing transmission to change to direct (1.0-1) drive. The power flow in "High" gear is from the Turbine Shaft through the Front and Rear Clutches to the Planetary Gears which are locked together and rotate as a unit, causing the Output Shaft to rotate at engine speed.

Low Range–Front Clutch applied, locking the Turbine Shaft to Primary Sun Gear, and the Rear Band applied, holding Pinion Carrier stationary. The flow of power is from the Turbine Shaft through the Front Clutch., to Primary Pinions. to Secondary Pinions, to Internal Gear and out the Output Shaft at a ratio of 2.40-1. *See "Fordomatic, Mercomatic & Turbo-Drive Transmissions" in 1955 Annual Data or later Manual dition.*

LUBRICATION

►*FLUID CAPACITY NOTE (Cars with Water Cool d Torque Convert r): The approximate fluid capacity is th same as for air-cooled type.*

►*CAUTION: Transmission oil level should be checked at 1000 mile intervals and should be changed at 15,000 mile intervals.*

Recommended Oil–Automatic Transmission Fluid Type "A" only.

Capacity–Approximate capacities are as follows:
Ford (6 Cyl. Pass. Car & All Trucks)–9 qts.
Ford (8 Cyl. Pass. Cars exc. those listed below)–9½ qts.
Ford (Thunderbird & Police Interceptor)–10½ qts.
Lincoln (All Models)–10 qts.
Mercury (All Models)–10½ qts.

Checking Fluid Level–Apply hand brake, place selector lever in Neutral "N" position, run engine at idle speed for approximately four minutes, then move selector lever to Park "P" position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission, return lever to "P" position. Raise engine hood, clean all dirt from around filler cap at right rear corner of engine. Check fluid level on dipstick in filler tube *(CAUTION–* make certain dipstick pushed all the way down in the filler tube when checking fluid level). Add fluid as necessary to bring level up to "F" full mark on dipstick.

Drainage and Refilling–Remove converter housing lower plate and drain converter by removing one drain plug, then rotate the engine 180° and remove the second drain plug. Disconnect filler tube from transmission oil pan to drain fluid from transmission. Tighten converter drain plugs to 7-10 ft. lbs. Tighten filler tube connection. Install 5 quarts of automatic transmission fluid, start engine and allow to idle four minutes. Add 4 qts, of fluid and bring transmission to to operating temperature. Place selector lever in parking (P) position and check oil level. If level is not up to dip stick level mark, add additional fluid as required.

►*CAUTION–Correct fluid level should be determined by dipstick reading rather than actual number of qts. installed.*

LINKAGE ADJUSTMENT

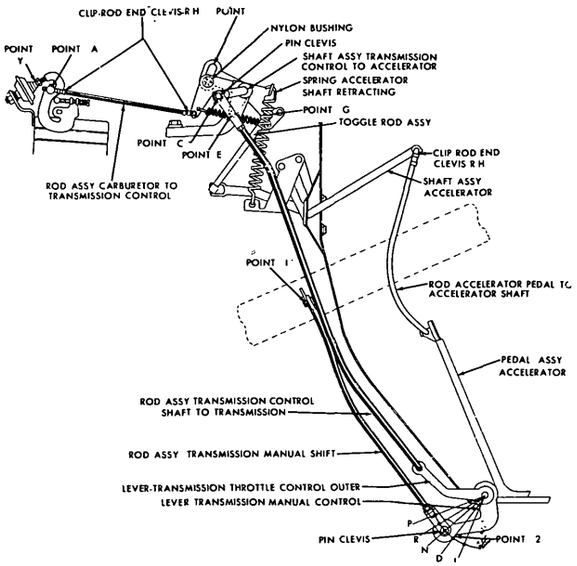
►*THROTTLE LINKAGE ADJUSTMENT NOTE: See CARBURETOR on Car Model pages.*

Manual Linkage Adjustment (All Models): Disconnect upper end of manual shift rod from selector arm. Position selector lever, with the indicator in the quadrant down against its stop in the "DR" position. Place manual lever at transmission in the drive "DR" detent (second from bottom). Rotate manual shift rod clevis until clevis pin fits freely into holes in clevis and selector arm. Lengthen rod assembly 2 complete turns (Ford, All Models), 1 complete turn (Lincoln & Mercury), counter-clockwise. Install clevis pin and check pointer alignment in all positions.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

STARTER NEUTRAL SAFETY SWITCH: *(NOTE–Neutral Safety Switch is located at lower end of steering column (Ford, All Models), on steering column, inside passenger compartment (Lincoln & Mercury).*



TURBO-DRIVE THROTTLE LINKAGE

►*1956 FORD ACCIDENTAL STARTING (Cars with Back-Up Lights):* This condition may occur with ignition switch off and headlight switch on, and is caused by foreign material closing the circuit between back-up light switch and solenoid terminal in neutral safety switch, causing the engine to start. Correct by connecting the longest lead (beyond taped portion of harness) to the neutral safety switch "A" terminal. Connect shorter lead to "B" terminal. When replacing neutral safety switch, connect as indicated above.

►*1956 LINCOLN SELF-CRANKING & CONTINUOUS OPERATION OF BACK-UP LIGHTS CORRECTION:* Install later type insulator assembly, Part No. FDK-15827-B which is identified by two ridges approximately .020" high on each side, and parallel to brass strip.

BAND ADJUSTMENT

►*Band Adjustment is recommended to be made at 15000 mile intervals when transmission fluid is changed (pan should be removed and cleaned at this time).*

FRONT BAND ADJUSTMENT: Drain fluid from pan using a drain can with a fine mesh screen, remove pan. Remove fluid screen from transmission and loosen the front servo adjusting screw locknut TWO FULL TURNS, using a 9/16" wrench. Using front band adjusting tool No. 7225, insert gauge block between servo piston and adjusting screw and tighten adjusting screw until wrench overruns. Back off adjusting screw exactly ONE COMPLETE TURN and remove gauge block. While holding adjusting screw stationary, tighten locknut clockwise (20-25 ft. lbs.). Install fluid screen and install pan using new gasket. Install the drain plug and refill transmission to "Full" mark using fluid drained from transmission unless fluid being changed. Check fluid level (see LUBRICATION).

►*CAUTION–Severe damage may result if adjusting screw not backed off exactly 1 full turn.*

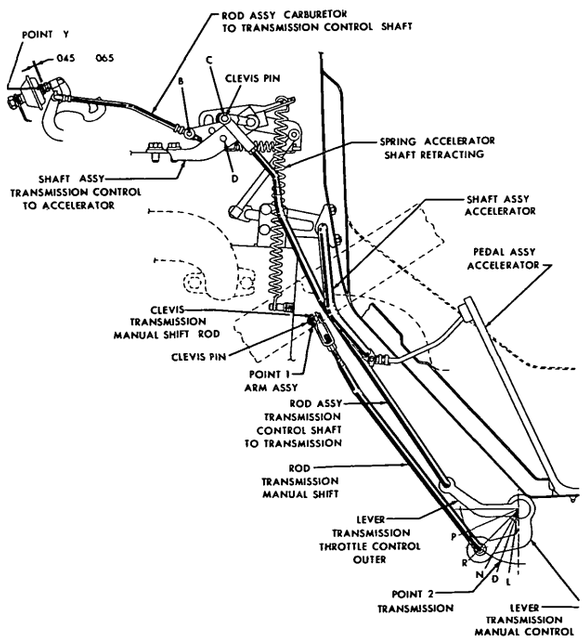
REAR BAND ADJUSTMENT: Fold back floor mat to expose right side of floor pan and remove access hole cover on right side of transmission floor pan. Using rear band adjusting tool No. 7195, loosen rear band adjusting screw locknut. Using "T" handle of tool No. 7195, tighten rear band adjusting screw until wrench overruns. (If screw was found to be tighter than wrench capacity (10 ft. lbs.), loosen several turns and retighten until wrench overruns). Back off adjusting screw exactly 1½ COMPLETE TURNS. While holding adjusting screw stationary, tighten adjusting screw locknut to 35-40 ft. lbs.

►*CAUTION–Severe damage may result if adjusting screw not backed off exactly 1½ turns.*

TESTING

►*CAUTION: While making the Stall Test never hold the throttle open longer than 5 seconds.*

STALL TEST: The stall test is made in "D", "LO" & "R" ranges to determine if bands or clutches are slipping. Connect a tachometer to engine and set it to read on the "high" scale. Make sure engine is idling properly at normal operating temperatures. Start engine, then firmly apply parking brake and service brake. Place selector lever in "D" range, then press accelerator slowly all the way to the floor without going into "low gear" kickdown. The engine speed should be as indicated in the "Stall Speed Table" below. If engine speed is below minimum limit, tune the engine and repeat test. If engine speed exceeds maximum limit, release accelerator immediately because front band or clutch slippage is evident. To determine whether the front band or front clutch is causing slippage, move lever to "LO" range and repeat the test. If slippage is evident in "LO" range also, the front clutch is slipping. If slippage is found in "DR" range, but not in "LO" or "R" ranges, the front band is causing the the slippage. If engine exceeds the maximum limit with selector lever in "R" range, the rear band or rear clutch is slipping. To determine which of the two is faulty, move selector lever to "LO" range. If slippage is evident in "LO" and "R" ranges, but not in "D" range, the rear band is slipping. When slipping is noted in "R" range but not in "LO" or "D", the rear clutch is causing the slippage.



MERC-O-MATIC THROTTLE LINKAGE

ENGINE STALL SPEEDS

CAR & MODEL	Low Limit	ENGINE RPM	High Limit
Ford 6 Cyl. (223" Eng.)	1380		1580
Ford V8 (272" Eng.)	1460		1660
Ford V8 (292" Eng.)	1440		1740
Ford V8 (312" Eng.)	1590		1790
Continental	1550		1750
Lincoln	1550		1750
Mercury (Exc. Montclair)	1590		1790
Mercury Montclair	1610		1810

SHIFT TESTS: Select a smooth road for the tests. Make test as outlined below and see "Shift Point Table" for correct speed where shifts should occur.

2-3 Upshift (Minimum Throttle): Place selector lever in "DR" range, and starting from a standstill, apply accelerator lightly but steadily.

3-2 Downshift (Minimum Throttle): Permit car to decelerate (from speed attained in above test) until downshift occurs from high to intermediate.

3-2 Downshift (Forced): Reduce car speed below 45 MPH (Ford), 50 MPH (Mercury & Lincoln). Press accelerator pedal to floor. Transmission should shift from high to intermediate. This shift should occur only with car in high gear.

2-3 Upshift (Maximum Throttl): Place selector lever in "DR" range, and starting from a standstill, press accelerator to the floor. Full throttle upshift should occur as indicated.

2-1 Downshift (Forced): With selector lever in "DR" range and car speed below 18 MPH (Ford), 19 MPH (Mercury & Lincoln), quickly press accelerator fully to the floor. This action shifts transmission from high, to intermediate, or low.

1-2 Upshift (Maximum Throttle): With accelerator fully pressed to floor for above test (2-1 Downshift, Forced), transmission should upshift from low to intermediate when car speed indicated in table is reached. The 2-3

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

Upshift will occur at same speed as for 2-3 Upshift (Maximum Throttle).

"DR" to "LO" Manual Shift: With car speed between 40-45 MPH (Ford), 45-50 MPH (Mercury & Lincoln), Manually shift selector lever from "DR" to "LO". Instead of shifting to low gear, the transmission should shift from high to intermediate. When car speed is reduced within the range indicated in table, the transmission should shift into low range.

"R" Shift: Bring car to a stop and place selector lever in "R" range. The car should move in reverse direction smoothly, upon light throttle pressure.

OPERATING PRESSURE TEST: Set parking brake firmly and raise rear wheels off floor. Disconnect throttle at outer throttle lever on transmission.

Pressure Gauge Installation: Remove pipe plug in transmission case (located either near throttle lever or at rear of case. See Production Changes above for location), then connect pressure gauge No. 77820 so it can be read from under car.

▷ *1956 LINCOLN PROTRACTOR GAUGE 77270-D MODIFICATION:* To eliminate interference between manual lever and protractor pointer when making an operating pressure test, a small notch can be filed or ground into the pointer arm at point of contact with manual lever so the gauge will read at "zero" (this point will be in upper bend of pointer adjacent to pivot point). The forward end of the pointer arm locating slot can also be opened which will eliminate the necessity of disconnecting throttle control rod at transmission. When using the gauge with this modification, the control rod will enter the locating slot and take the place of the locating pin. It will be necessary to disconnect throttle control rod at upper end in order to set pointer at "zero" reading.

Throttle Lever Protractor Gauge Installation: Position gauge T55L-77270-C (Ford), 77270-C (Mercury) & 77270-D (Lincoln) over throttle lever shaft. Rotate gauge on shaft until gauge pin passes through hole in oil pan flange and contacts bottom machined surface of transmission case. Tighten gauge setscrew to hold gauge firmly on throttle lever shaft. Rotate throttle lever up against its internal stop in transmission, then insert gauge pin through small elongated hole in gauge and hole in throttle lever. Check position of protractor gauge pointer. If pointer is at zero, the throttle mechanism is not distorted. If throttle lever distorted, replace it with a new one.

Pressure Rise Point ("R" Reverse Range): With throttle lever pin through the elongated hole in gauge and hole in throttle lever, advance the throttle lever fully (down). The lever should travel 28° to 33°. Connect a tachometer and set engine idle speed at 600 RPM with selector lever in "R" (reverse) range. Observe pressure at 3° (Ford Cars & Trucks); 0° (Lincoln & Mercury) throttle lever position. The pressure should be 49-62 lbs., (Ford 6 Cyl. Pass. Cars); 51-69 lbs., (V8 Pass. Cars & All Trucks, except Thunderbird & Interceptor); 55-68 lbs., (Thunderbird & Interceptor); 50-63 lbs., (Lincoln & Mercury). From beneath car, advance throttle lever slowly and note angular reading at moment pressure begins to rise (3½-4½°). Continue to advance throttle lever slowly until maximum pressure is indicated on gauge. This pressure should be 173-190 lbs. (Ford 6 Cyl. Pass. Cars); 181-199 lbs., (V8 Pass Cars & All Trucks, except Thunderbird & Interceptor); 194-212 lbs. (Thunderbird & Interceptor); 175-190 lbs., (Lincoln & Mercury). Maximum pressure should occur at 9½° to 12° (Ford Cars & Trucks); 9½° to 11½° (Lincoln & Mercury) throttle lever advance.

Pressure Rise Point ("DR" Drive Range): Move selector lever to "DR" (Drive) range and repeat the above procedure. Maximum pressure should occur at 12° to 15° (All cars except Thunderbird & Interceptor) 14½° to 17½° (Thunderbird & Interceptor) throttle advance. Maximum pressure should be 124-144 lbs., (Ford 6 Cyl. Pass. Cars); 133-153 lbs., (V8 Pass. Cars & All Trucks, except Thunderbird & Interceptor); 130-150 lbs., (Lincoln & Mercury). On Thunderbird & Interceptor the maximum pressure should occur at 14½° to 17½° and be 147-168 lbs.

▷ *NOTE—If pressure regulation is not within above specifications, leave gauges attached (for a recheck after repairs) and adjust pressure as indicated below.*

Throttle Valve Stop Adjustment: This adjustment requires draining transmission and removing oil pan. Use bending tool No. 77763 to bend the throttle valve stop within transmission case as follows:

If pressure Rise Start is Over 4½° (in Reverse Range)—Hold throttle outer lever against its stop, clamp protractor gauge on lever and set to read 0°, then advance lever to maximum travel. Install bending tool over throttle valve stop, bend stop toward valve body to advance the stop position the number of degrees to bring the pressure rise to 4° in "R" range. Check by returning the lever to stop position and reading protractor gauge (reading will indicate change in stop position).

▷ *CAUTION: Do not attempt to correct the stop setting if the pressure rise point is more than 4° out of limits, since extreme bending of the stop can distort valve body plate and result in leakage. Replace stop plate (upper valve body front plate).*

If Pressure Rise Point is Under 3½° (in Reverse Range)—Hold throttle lever against its stop and note protractor gauge reading. Advance throttle lever to maximum travel and place throttle valve stop bending tool over stop. Bend stop away from valve body far enough to bring pressure rise to 4° in "R" range. (For example: If pressure rise point was 2°, the required correction is 2°. To make this correction, bend the stop an estimated amount, then remove tool and move throttle lever against its stop. Subtract previously noted protractor gauge reading from present reading to determine amount of change). Repeat procedure as necessary to bring pressure rise to 4°. Install oil pan and fill transmission with Automatic Transmission Fluid type A.

CONTINUED ON NEXT PAGE

TRANSMISSION SHIFT SPEEDS

	AXLE RATIO	SHIFT SPEED (MPH)						Ⓒ MAN. SHIFT (MPH)	
SHIFT		2 - 3		3 - 2		2 - 1	1 - 2	2 - 1	2 - 1
THROTTLE		MIN.	MAX.	MIN.	FORCED	FORCED	MAX.	MAX.	MIN.
Ford 6 Cyl. Pass. Cars	3.55-1	13-15	52-60	12-8	16-58	17-15	28-33	28-24	23-20
	3.22-1	14-16	55-64	13-9	17-62	19-16	30-35	29-25	25-21
Ford V8 Pass. Cars	3.55-1	13-15	54-62	12-8	16-61	17-15	29-34	28-24	24-20
272" & 292" Engines	3.22-1	14-16	58-66	13-8	17-65	19-16	32-36	30-26	26-21
Thunderbird & Interceptor	3.54	14-16	55-62	13-8	20-61	16-15	34-39	28-24	24-19
	3.30	15-17	58-66	14-9	22-65	17-16	36-42	30-26	25-21
Ford F-100 Truck	3.92	12-15	49-59	12-7	15-58	17-14	27-33	27-22	23-18
Ford F-250 Truck	4.88	8-11	34-45	9-5	10-44	13-9	18-25	20-15	17-12
Ford F-350 Truck	5.14	9-11	37-43	8-6	11-42	12-10	20-23	19-16	16-13
Ford P-350 Truck	4.88	8-11	36-45	9-5	11-44	13-10	20-25	20-16	17-13
Ford P-500 Truck	6.8	7-9	29-35	4-7	9-35	10-8	16-19	16-13	14-11
Lincoln & Continental	All	15-20	61-75	16-10	23-74	0-20	38-48	—	22-29
Mercury	All	14-19	55-71	15-8	20-69	0-18	29-41	—	19-28

Ⓒ If manual shift made above speed indicated, transmission will shift from high to intermediate; if made below these speeds, transmission will shift from intermediate to low.

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

AIR PRESSURE TESTS (WITH TRANSMISSION IN CAR): Raise car on hoist and remove transmission oil pan, and control valve assembly Proceed as follows

Front Clutch: Apply pressure to front clutch and governor input passage (see illustration) Listen for dull thud which indicates that clutch is operating Keep air pressure in passage for several seconds to check for leaks in this part of system

G vernor Valve: Remove governor inspection cover Apply air pressure to the same passage as for front clutch (above) Listen for a click and also watch valve snap inward

R ar Clutch: Apply air pressure to rear clutch oil passage (see illustration). Listen for a dull thud to indicate clutch is operating Check for leaks in same manner as for front clutch (above)

R ar Band & Servo: Apply pressure to rear servo oil passage (see illustration), and observe band application

Front Band & Servo: Apply pressure to front servo apply tube (rear tube), and observe band application

►*TESTING NOTE: If servos, bands, clutches, and governor operate with air pressure, then the no drive problems, erratic shift, or no upshift conditions indicate that the control valve assembly is the cause of the trouble. See "Control Valve" in OVERHAUL BELOW.*

TROUBLE SHOOTING & DIAGNOSIS

HIGH UPSHIFT (Intermediate-to-High): Throttle linkage is too short or throttle lever is bent. Valves sticking in governor or improper valve travel (check with air pressure). Governor oil delivery pipe leaking at connections (air pressure will indicate leak). Valve sticking in control valve assembly.

LOW UPSHIFT (Intermediate-to-High): Throttle linkage too long or throttle lever bent. Valves sticking in control valve assembly. Internal leak in control valve assembly (possible loose screws or mating surfaces require lapping).

ROUGH UPSHIFT (Intermediate-to-High): Throttle linkage not correct length or throttle lever bent Bands require adjusting to factory specifications Hydraulic operating pressures not correct Valve sticking in control valve assembly Internal leak in control valve assembly (possible loose screws or mating surfaces require lapping)

SLIPS (Light Throttle Upshifts): Throttle linkage too long, or bands out of adjustment

SLIPS (Heavy Throttle Upshifts): Throttle linkage too long or throttle lever bent Bands out of adjustment Hydraulic operating pressure not correct Valves sticking in control valve assembly Internal leak in control valve (possible loose screws or mating surfaces require lapping)

SLIPS (2-3 Upshift): Same possible conditions as for "SLIPS (Heavy Throttle Upshifts)" above

ROUGH 3-2 DOWNSHIFT (Cl sed Throttl): Same possible conditions as for "SLIPS (Heavy Throttle Upshifts)" above

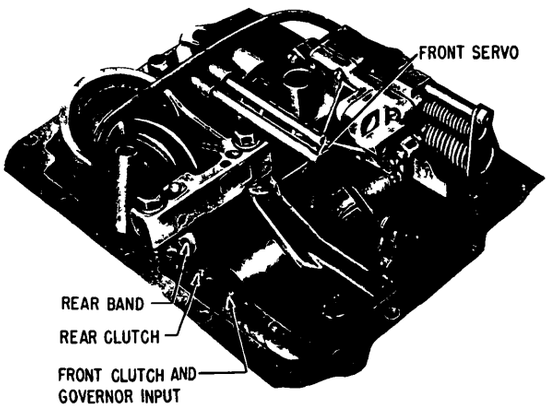
NO FORCE DOWNSHIFT: Throttle linkage too long, or throttle lever bent Accelerator pedal height not correct Valves sticking in control assembly

NO 2-1 KICKDOWN SHIFT: Throttle linkage too short. Throttle lever bent Valves sticking in control valve assembly

SLIPS 3-2 FORCED DOWNSHIFT: Bands out of adjustment

NO 2-3 UPSHIFT: Valve sticking governor (check with air pressure) Governor oil delivery pipe leaking at connections (check with air pressure) Valves sticking in control valve assembly Rear clutch inoperative (check with air pressure)

ROUGH REVERSE START· Engine idle incorrect Throttle linkage not of correct length or throttle lever bent Bands out of adjustment Hydraulic operating pressures not correct Valve sticking in control valve assembly Internal leak in control assembly (possible loose screws or mating surfaces require lapping)



TRANSMISSION TEST POINTS

NO DRIVE IN ANY RANGE: Fluid level incorrect Shift linkage not adjusted correctly Hydraulic pressure not correct A broken or improperly assembled front clutch will cause loss of drive in all positions except Reverse Improperly assembled control valve assembly

LOCKS UP IN REVERSE: Front clutch not releasing (check with air pressure) Shift linkage not adjusted correctly or not operating properly Leak in rear servo apply passage (check with air pressure and make certain servo applies and releases freely without tendency to stick or chatter)

LOCKS UP IN "LO" OR "DR": Rear clutch is applied and not releasing (check with air pressure)

UNABLE TO START ENGINE BY PUSHING: Rear pump inoperative or a defective pressure regulator valve

ROUGH 2-1 FORCED DOWNSHIFT: Rear servo sticking Rear servo accumulator sticking or broken spring Valve in valve body sticking

ROUGH 1-2 UPSHIFT (THROUGH DETENT): Engine idle incorrect Throttle linkage too short. Rear servo accumulator sticking or broken spring Valves in valve body sticking

MINOR REPAIRS (TRANSMISSION IN CAR)

The following transmission units can be removed for repair without removing transmission assembly from car Raise car on hoist for these operations, then drain fluid from transmission and remove oil pan

►*NOTE: For Disassembly & Overhaul of the following units, see OVERHAUL (TRANSMISSION UNITS) below.*

Governor Removal: Remove governor inspection cover from extension housing Rotate the drive shaft to bring governor body in line with inspection hole Remove the two screws that secure governor body to sleeve Remove governor

►*CAUTION· Use care not to drop bolts or governor valve into housing.*

Installation–Lubricate governor valve with transmission fluid and install valve in governor body (*CAUTION*–valve must move freely in body) Install governor body on counterweight with the **side plate forward** (*CAUTION*–fluid passages in governor body and counterweight must be aligned), install governor body attaching screws Install inspection cover with NEW gasket tighten cover screws to 4-6 ft lbs torque.

►**NOTE:** For the following operations, remove transmission fluid level indicator Remove transmission filler tube and drain the fluid into clean container using a fine mesh wire screen for straining (Fluid may be re-used) Then remove transmission oil pan and screen

Front Servo Removal: Loosen lubrication tube from pressure regulator and rear pump and remove (NOTE–If necessary tap tube with soft hammer to remove. *CAUTICN*–Do not bend or distort tube) Loosen control valve body attaching bolts Remove servo attaching bolt and while holding servo strut with fingers, remove servo assembly

Installation–Position servo band forward in case with band ends down Position servo strut with large end indexing with servo actuating lever and small end indexing with band end Rotate band, strut and servo into position, indexing tubes from valve body to servo, and anchor end of band with anchor in case Install attaching bolt, tightening to 30-35 ft lbs Tighten control valve attaching bolts to 8-10 ft lbs Install lubrication tube and adjust servo band See "Front Band Adjustment" Install screen, install oil pan using NEW gasket, tighten oil pan screws to 10-13 ft lbs Connect filler tube Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature

Rear Servo Removal: Remove lubrication tube from rear pump and regulator.(*NOTE*–If necessary tap tube with soft hammer to remove) Remove rear pump intake tube Remove front servo (see above) Take out rear servo attaching bolts, hold actuating and anchor struts with the fingers, remove rear servo assembly

Installation–Position servo anchor strut and rotate servo band to engage strut Hold in position with fingers Position actuating lever strut and install

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

servo, install servo attaching bolts(*CAUTION*–Longer attaching bolt must be installed in forward bolt hole), tighten attaching bolts to 40-45 ft. lbs. torque. Install front servo (see above). Install rear pump intake tube and lubrication tube. Adjust rear band (see BAND ADJUSTMENT). Install oil pan with NEW gasket, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

C ntrol Valv B dy R m val: Remove two "U" tubes from pressure regulator and control valve body. Loosen front servo attaching bolt three turns. Take out three valve body attaching bolts, lower the valve body and pull it off the servo tubes.

►*CAUTION–Use extreme care when removing valve body to pr v nt damage to body and attached parts.*

Installati n–Align servo tubes with holes in control valve body, position manual lever in neutral, position inner throttle lever between stop and downshift valve and at the same time push the throttle valve in to clear the transmission case **making certain that manual valve ngages actuating pin manual detent lever.** Install control valve body attaching bolts but do not tighten the bolts. Install two "U" tubes in pressure regulator and control valve body. Tighten control valve body attaching bolts to 8-10 ft. lbs. torque. Tighten front servo attaching bolt to 35-40 ft. lbs. torque. Adjust front and rear bands (see BAND ADJUSTMENT). Install oil screen, install oil pan using NEW gaskets, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used) recheck fluid level with transmission at normal operating temperature.

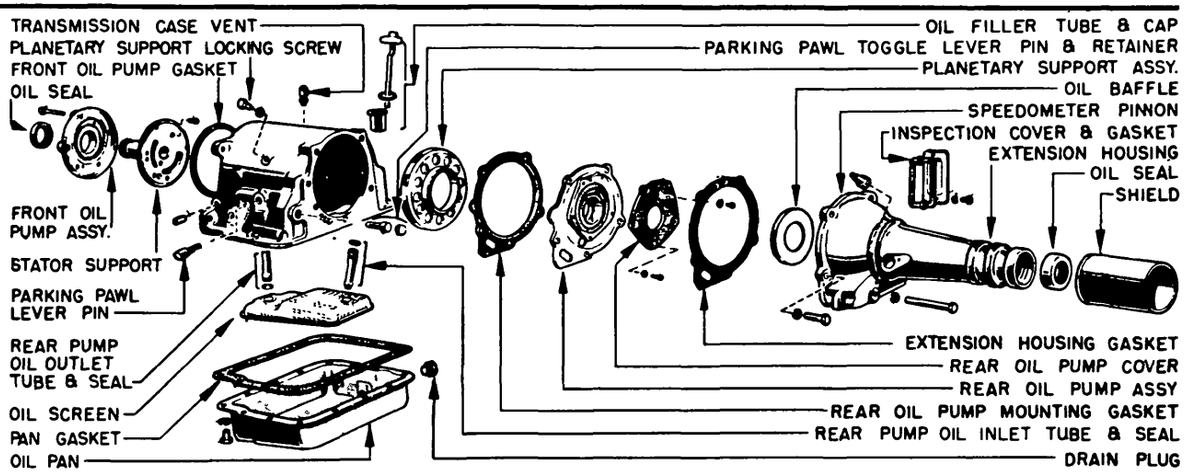
Pressur Regulator R m val: Remove lubrication tube. Remove control pressure tube and compensator tube from valve body and regulator. Remove pressure regulator spring retainer. (*CAUTION*–Maintain pressure on retainer to prevent springs flying out). Remove the control pressure and converter pressure valves. Take out pressure regulator attaching bolts and washers, remove regulator.

►*MAIN OIL PRESSURE REGULATOR VALVE INSTALLATION CAUTION:* If regulator removed to correct transmission "buzzing" noise, examine valve for undersize bleed flats and rotate valve 90° in bore from original position when re-installing it. This should correct the noise.

Installation–Install regulator body and attaching bolts and tighten to 17-22 ft. lbs. Install converter pressure and control pressure valves and make certain valves operate freely in bore, then install valve springs and retainer. Install large control pressure tube, small compensator tube, and lubrication tube. Install oil screen, install oil pan using NEW gaskets, tighten pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used), recheck fluid level with transmission at normal operating temperature.

Manual & Throttle Lever Seal Replacement: Remove control valve body (see above), disconnect manual and throttle linkage rods at transmission levers. Remove nut on inner throttle lever shaft and remove inner throttle lever. Remove outer throttle lever and shaft, remove throttle shaft seal from counterbore in manual lever shaft. Take out cotter pin in each end of parking pawl torsion lever rod and remove the rod, rotate manual lever shaft until detent lever clears detent ball (*CAUTION*–do not allow detent ball to fly out), remove detent ball and spring. Remove manual lever shaft nut, remove detent lever, remove outer manual lever and shaft assembly. Remove manual shaft seal.

Installation–Coat outer diameter of new seal with Permatex No. 3, install seal in case using tool No. 77288. Install outer manual lever and shaft, rotate shaft until manual lever points downward, place detent lever on inner end of shaft, install attaching nut and tighten nut to 35-40 ft. lbs. torque. Place detent spring and ball in hole in case (use piece of thin wall tubing to depress ball and spring), rotate detent lever until detent ball is held in place. Install parking pawl torsion lever rod and cotter pins. Install new throttle shaft seal, outer throttle lever and shaft, inner throttle lever and attaching nut, tighten nut to 25-28 ft. lbs. Connect manual and throttle rods to outer levers. Check linkage for free movement. Install control valve assembly and other parts. *See Control Valve Assembly Installation (above).*



TRANSMISSION CASE & EXTENSION HOUSING ASSEMBLY

TRANSMISSION & CONVERTER REMOVAL
FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD)

►*TRANSMISSION OR CONVERTER REMOVAL NOTE: Transmission and converter can be removed as an assembly, or transmission can be removed separately (without disturbing converter) as follows:*

1) Place car on hoist. On truck models, drain radiator, fold front of floor mat back and remove covers from converter housing access bolt holes. Loosen water inlet and outlet hose clamps at oil cooler and pull hoses off cooler. On all cars and trucks, remove the two upper converter-to-engine bolts and lockwashers then raise vehicle with the hoist.

2) Disconnect oil filler tube at oil pan and drain transmission. Remove converter housing front plates (8 Cyl.) or the access plate (6 Cyl.). Remove one of the converter housing drain plugs. Rotate converter 180°, then remove second drain plug. Drain converter.

►*NOTE: Converter may be drained after it is removed from car.*

3) Disconnect drive shaft at rear axle and remove shaft. On F-250, F-350, P-350 or P-500 trucks, remove the four bolts attaching drive shaft coupling yoke at parking brake assembly.

4) Remove the six flywheel-to-converter drive plate bolts. Position the drive plate horizontally, and install the lower converter housing front plate (8 Cyl.), or wedge the converter from sliding out of housing when transmission is removed.

5) Disconnect starter cable at starter, then disconnect transmission-to-frame ground cable at transmission remove starter. On truck models, remove bolts attaching oil cooler to support brackets, on all models with oil cooler, disconnect oil cooler inlet and outlet hoses at transmission. On truck models, remove oil cooler. On air cooled models, remove converter air duct and linkage dust shield, (cars), or the exhaust duct shield (trucks).

6) Disconnect manual and throttle linkages at transmission. Disconnect speedometer cable at transmission. On Pass. Cars, remove the two engine rear support-to-transmission bolts. Position a transmission jack under transmission and raise it slightly to take weight off crossmember. On trucks, with the transmission jack in place remove the converter housing crossmember bolts. On all vehicles, then remove the two lower converter housing-to-engine bolts.

7) Tilt rear of converter and transmission assembly upward slightly, then move assembly toward rear of vehicle sufficiently to remove the six engine crankshaft flange-to-flywheel attaching bolts. Remove flywheel to provide sufficient clearance, then lower converter and transmission assembly.

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

THUNDERBIRD

►*NOTE: The converter and transmission assembly cannot be removed with engine in the car. Either the engine can be removed first, or transmission, converter and engine can be removed as an assembly.*

1) Remove engine *(see "Engine Removal" in Ford Special Data).* If converter and transmission have been removed with the engine, they can be removed from the engine by removing the six converter-to-flywheel drive plate bolts, then removing the four converter housing to engine attaching bolts.

2) To remove converter and transmission after the engine has been removed separately, remove the two transmission extension housing-to-rear engine support attaching bolts. Remove speedometer cable at transmission. Disconnect the manual shift control lever at transmission. Move transmission forward and remove forward drive shaft, then remove converter and transmission from car.

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

LINCOLN & MERCURY

1) Remove ground strap from battery. Remove bolts and nuts securing throttle linkage bar bracket to engine and body. Place car on support stands with all four wheels approximately 12" off ground. On Mercury models with single exhaust pipe, remove nuts securing muffler inlet and cross over pipe to exhaust manifolds. Remove manifold outlet pipe from mounting bracket at rear of manifold and move exhaust system away from working area.

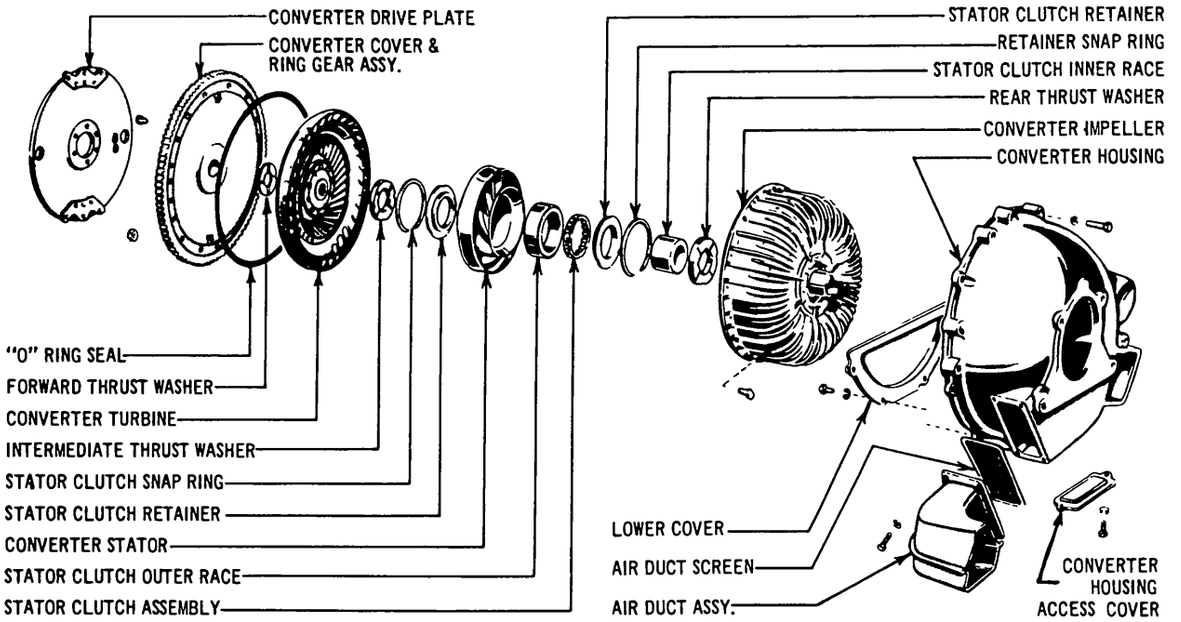
2) Disconnect manual linkage and throttle linkage at transmission. Disconnect speedometer cable at extension housing. Disconnect drive shaft at rear universal joint and remove drive shaft from transmission output shaft. On models with water cooled torque converter, remove inlet and outlet hoses at transmission. On models with air cooled torque converter, remove air duct from torque converter housing.

3) Remove splash deflector, and converter housing lower plate. Drain converter by removing one drain plug, then rotate engine 180° and remove second drain plug. Drain fluid from transmission.

4) Remove engine rear mount-to-frame crossmember bolts. Position transmission lift under transmission and raise engine and transmission sufficiently to install support tool. Remove rear engine mount from transmission. On Lincoln, remove the detachable frame crossmember from frame "X" member (the Mercury models have a tubular crossmember with brackets welded to the crossmember). Lower lift under transmission to allow engine to rest on support tool. Reposition transmission lift under transmission assembly and raise lift just enough to relieve weight of transmission on engine.

5) Remove starter and upper converter housing plate with seal. Remove six bolts securing converter to flexible drive plate. Remove the bolts securing converter housing to engine block.

6) Remove transmission and converter assembly by sliding assembly toward rear of car sufficiently to disengage converter housing dowels and converter cover pilot. Secure converter to converter housing to prevent damage to converter. Lower the assembly and remove from under car.



TORQUE CONVERTER ASSEMBLY

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

TRANSMISSION REMOVAL (WITHOUT CONVERTER)

FORD PASS. CARS & TRUCKS

►*NOTE: On most cars and trucks, the transmission can be removed without removing the converter assembly.*

1) Raise vehicle with a hoist and drain fluid from transmission. Disconnect drive shaft at rear axle and remove drive shaft.

2) On trucks, disconnect oil cooler-to-transmission fluid inlet and outlet lines at transmission. Remove bolts holding oil cooler on support brackets, then move cooler to one side.

3) Remove converter air duct from pass. cars, and remove exhaust duct splash shield from trucks.

4) Disconnect manual control and throttle linkage at transmission. Disconnect speedometer cable at extension housing. On pass. cars, remove the two rear support-to-transmission bolts. Position a transmission jack under transmission and raise it slightly to take weight off crossmember. Remove crossmember bolts and crossmember.

5) On all vehicles, with transmission jack in place, remove the four transmission-to-converter housing attaching bolts. On trucks, remove oil cooler from front support bracket. Tilt rear of transmission slightly upward and move assembly toward rear, with a jack, until clear of turbine shaft. Lower assembly and move it from under vehicle.

LINCOLN & MERCURY

1) Place car on support stands with all four wheels approximately 12" off floor. On Mercury models with single exhaust pipe, disconnect muffler pipes at exhaust manifold and the outlet pipe at support bracket, and move complete exhaust system away from work area.

2) Drain fluid from transmission and disconnect manual and throttle linkage at transmission. Disconnect speedometer cable at extension housing. Disconnect drive shaft at rear universal joint and remove drive drive shaft from transmission output shaft.

3) Remove rear engine mount to frame crossmember bolts. (Mercury models have a tubular crossmember with brackets welded to crossmember). Position lift under transmission and raise engine and transmission and raise engine and transmission sufficiently to install engine support tool. Remove rear engine mount from transmission. On Lincoln, remove the detachable crossmember from frame "X" member.

4) Lower lift under transmission and allow engine to rest on support tool. Reposition transmission lift to relieve the weight of transmission. Remove four bolts securing transmission to converter housing.

5) Remove transmission by sliding assembly toward rear of car sufficiently to disengage the turbine shaft. Lower the assembly and remove from under car.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

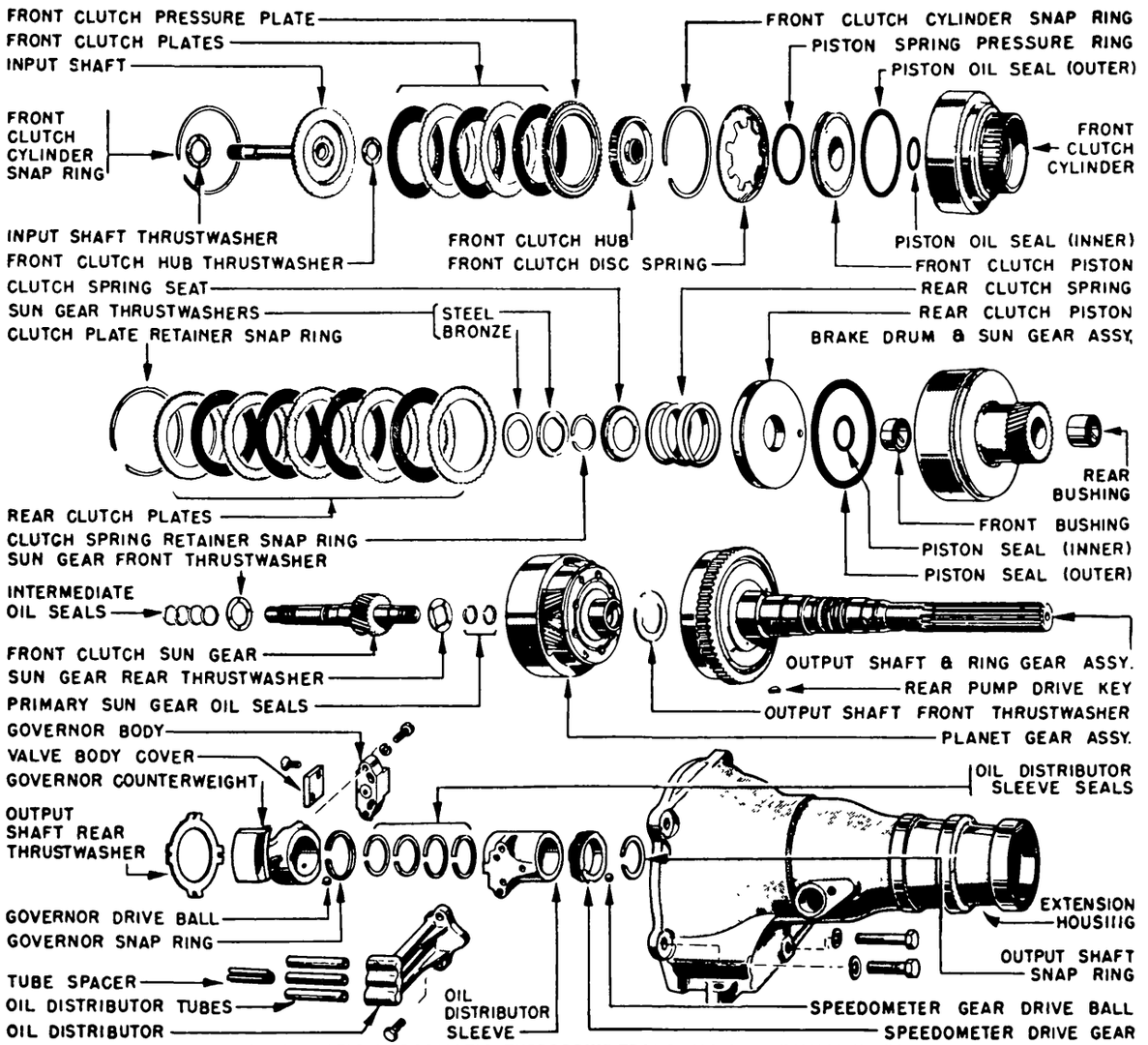
TORQUE CONVERTER OVERHAUL

►*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first, clean each part as removed.*

TORQUE CONVERTER REMOVAL (From Transmission): Grasp converter cover with both hands and pull straight out. *(CAUTION–*To prevent damage to front seals, do not rock assembly from side to side). Remove converter housing attaching bolts and remove housing from transmission.

DISASSEMBLY: Remove converter cover attaching bolts and nuts. Remove cover and "O" ring seal. Remove bronze thrust washer from turbine and remove turbine. Remove stator from pump housing *(CAUTION–Check and locate the balancing marks on cover and stator so they may be replaced in the exact same position).* Remove thrust washer from pump hub and from turbine hub. Remove sprag clutch inner race and remove snap ring retaining outer hub to stator *(CAUTION–Do not burr snap ring groove).* Remove outer hub, sprag assembly, outer race and inner hub as an assembly. Separate hubs and sprag assembly from outer race. Remove snap ring retaining inner hub to stator.

INSPECTION: Inspect converter blades for looseness, and check thrust surfaces for scores and splines for burrs and wear. Inspect seal surfaces and front pump driving lugs for wear. Inspect sprag assembly for worn or broken sprags or broken or distorted spring. Inspect bushings for wear or scoring (if bushings worn, polish bearing surface of journal with crocus cloth to eliminate possibility of wear having been caused by rough bearing surface).



FORDOMATIC, MERCOMATIC, TURBODRIVE TRANSMISSION INTERNAL UNITS

REASSEMBLY: Install stator inner hub and snap ring. Turn assembly over, install outer race in stator. Install sprag assembly in outer race making sure that sprags are pointed in the right direction. Install outer hub and outer hub snap ring. Insert Tool No. 7946, tapered side first, into sprag assembly while rotating tool counter-clockwise to position sprags. Install inner race with spline section up. Guide tool No. 7946 with hand while pushing inner race into position. Check stator for clockwise rotation while holding the inner race. Install new seal in pump hub and install hub in pump. Tighten hub capscrews to 8-10 ft. lbs. Install thrust washer into hub of converter pump and install stator with the word "front" (stamped into face of stator) upward. Install thrust washer in hub of turbine and install turbine. Install bronze thrust washer on turbine hub. Position converter cover on pump housing with new "O" ring seal and properly align balance marks on cover and housing *(CAUTION–Cover and housing must be installed in the same position not d when these parts disassembled).* Install all converter bolts and tighten to 25-28 ft. lbs. in the sequence indicated below. Install converter housing on transmission case and tighten attaching bolts to 40-45 ft. lbs. Install converter assembly and press it firmly into position on turbine shaft. *(CAUTION–Do not "rock" converter assembly while installing it on shaft (will damage oil seals).*

►*COVER BOLT TIGHTENING SEQUENCE (To prevent leaks):* Tighten two nuts directly opposite each other just snug, tighten two nuts 90° from first two similarly, tighten two nuts 45° from first four nuts similarly, Continue this sequence until all nuts have been tightened **just snug,** then torque all nuts in same sequence to 25-28 ft. lbs. torque.

TRANSMISSION DISASSEMBLY

►*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first. CLEAN each part as removed with cleaning fluid or gasoline and dry with air–wiping cloths will leave lint on parts.*

DISASSEMBLY OF TRANSMISSION (Into Major Units): With transmission on bench fixture, (tool No. 7000-C-D recommended for holding transmission), remove all transmission units as follows:

1) Remove pan and gasket and take out fluid screen.
2) Remove pressure regulator spring retainer, regulator springs, control pressure and converter pressure regulator valves.

►*CAUTION: Maintain pressure on retainer to prevent valve springs from flying out.*

3) Loosen pressure regulator and valve body attaching bolts, and remove lubrication tube from pressure

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

regulator and rear pump. NOTE—If necessary tap tube with soft hammer. *CAUTION—do not bend or distort tube.*

4) Remove rear pump intake tube, being careful not to bend or distort it.

5) Remove compensator pressure tube (small) and control pressure tube (large) from pressure regulator and valve body. NOTE—If necessary, tap tube with a soft hammer. *CAUTION—do not bend or distort tube.*

6) Remove pressure regulator spring retainer, pressing it inward toward regulator to release. Remove pressure regulator springs, control pressure and converter pressure regulator valve. Remove regulator body attaching bolts and washers and remove body from case. NOTE—After removing regulator body from case, replace valve in body to protect them.

7) Loosen front and rear servo band adjusting screws five turns and loosen front servo attaching bolts three turns. Remove valve body attaching bolts and raise valve body to clear case and disengage valve body to clear case and disengage valve body to servo tubes and remove valve body.

8) Remove front servo apply and release tubes by twisting and pulling tubes. Take out front servo attaching bolt, hold front servo strut with fingers, lift servo out.

9) Remove rear servo attaching bolts and while holding actuating and anchor struts with fingers, lift servo from case *(CAUTION—Do not allow struts to drop into case).*

10) *CHECK TRANSMISSION ENDPLAY before proceeding with disassembly, as follows:* Remove one front pump attaching bolt and mount Dial Indicator & Support Tool No. 77067 in this bolt hole so that contact button rests on end of turbine shaft. Install Extension Housing Seal Replacer Tool No. 7657-D on output shaft to provide support for shaft. Pry front clutch cylinder toward rear of transmission using a large screwdriver, and set dial indicator to zero while maintaining a slight pressure on clutch cylinder. Remove screwdriver and pry units forward (toward front of transmission) by inserting screwdriver between large internal gear and case. Record indicator reading (endplay) for use in step 17 (below). This endplay should be .010-.029". Remove dial indicator and support and remove tool from output shaft.

11) Remove front pump attaching bolts and remove front pump assembly. (NOTE—If pump is tight in case, use soft hammer to loosen pump). Remove pump to case gasket. *CAUTION—Pull pump off shaft carefully to avoid damaging oil seal.*

12) Remove five extension housing-to-transmission bolts (these bolts also hold rear oil pump on case), withdraw extension housing carefully while holding rear pump in place. *CAUTION—Pull housing off output shaft carefully to avoid damaging rear oil seal.*

13) Remove speedometer drive gear snap ring from output shaft and take off the speedometer drive gear. *(CAUTION—Do not lose drive ball).*

14) Remove fluid distributor attaching bolts and slide distributor and tube from transmission. Remove distributor sleeve from output shaft. Carefully remove the four seal rings from the output shaft with the fingers *(CAUTION—use care not to damage these rings).*

15) Remove governor snap ring from shaft and slide governor assembly from output shaft. *(CAUTION—Use care so as not to damage seal rings on output shaft. Do not lose governor drive ball).*

16) Remove rear pump discharge tube using tool 77869 and remove pump from case. Remove extension housing and pump gaskets. Remove rear pump drive key from output shaft. Remove bronze thrust washer from output shaft. (NOTE—Washer may come off with pump). Hold rear drum forward and remove the output shaft.

17) Remove selective thrust washer from rear of pinion carrier. If endplay as recorded in step 10 (above) was not within limits of .010-.029", replace this washer with one of proper thickness to give desired endplay. This washer furnished in following sizes: .063-.061", .069-.067", .076-.074", .083-.081".

18) Remove two seal rings from primary sun gear shaft. *CAUTION—use care not to distort rings.*

19) Remove pinion carrier from case and remove bronze thrust washer.

20) Mark rear band position so that it can be assembled in the same position. Remove band by squeezing ends together and tilting band forward.

21) Remove two center support bolts (on outside of case-one on each side). Press on end of turbine shaft to force clutch units toward rear of transmission and remove center support from case.

22) Remove rear and front clutch assemblies from transmission case as a unit. Install clutch assembly into bench fixture, tool No. IP-77530 and remove thrust washer from front of turbine shaft. Remove the front band from case. Lift front clutch assembly from primary gear shaft. *(CAUTION—Do not rock assembly while lifting to prevent damage to seal rings).*

23) Remove bronze and steel thrust washers from primary sun gear shaft and then remove the front clutch seal rings from primary sun gear shaft. Lift rear clutch assembly from shaft. *(CAUTION—Do not rock assembly while lifting to prevent damage to seal rings).* Remove rear clutch seal rings and thrust washers from shaft.

TRANSMISSION OVERHAUL (TRANSMISSION UNITS)

►*DISASSEMBLY & CLEANING CAUTION:* Handle all parts with care to avoid nicking or burring bearing surfaces and mounting faces. Clean all parts with clean solvent and dry with air. DO NOT use wiping cloths which might deposit lint and interfere with proper operation of transmission. Minor scores or burrs may be removed with crocus cloth. *CAUTION—When polishing valves use extreme care not to round edges of valve lands.*

►*REASSEMBLY CAUTION: Use all new gaskets when assembling or installing units in transmission. Lubricate all internal parts with Automatic Transmission Fluid Type "A" (vaseline may be used to retain gaskets and thrust washers). Tighten all bolts, nuts, and screws to correct torque.*

PRIMARY SUN GEAR SHAFT (Disassembly): Remove rear clutch seal rings by applying pressure on one end and at back of ring forcing ring into groove at these two points. Other end will spring out and free the hook. Remove thrust washer from thrust face of primary gear.

Inspection: Inspect all thrust surfaces and journals for wear or scores. Inspect sun gear for broken, chipped, or worn teeth. Inspect shaft splines and ring grooves for wear or burrs. Check all fluid passages for evidence of leakage and make certain passages are clean and free from obstructions. Check seal rings for wear by installing rings in bore and measuring end gap which should be .002-.009", check rings for free fit in groove (must not bind). If front clutch lubrication valve not operating properly, repair it by installing a new kit.

Reassembly: Install bronze thrust washer against thrust face of primary sun gear, install seal rings in shaft grooves. Seals can be installed in the same manner in which they were removed (see Disassembly above).

REAR CLUTCH (Disassembly): Using arbor press and tool No. 77515, remove clutch release spring snap ring *(CAUTION—Guide spring retainer while releasing press to prevent retainer interfering with snap ring groove.* Remove retainer, release spring, pressure plate snap ring, and pressure plate. Remove the four bronze and four steel clutch plates (Ford & Mercury), Five bronze and Five steel plates (Lincoln), from the drum. Place splined end of primary sun gear shaft in clutch piston bore, entering it as far as it will go, apply air pressure to hole in end of shaft which will force clutch piston out of cylinder *(CAUTION—Hold* hand over piston to prevent it flying out and being damaged). Remove outer seal ring from groove in piston and inner seal ring from clutch drum. Discard these seals (do not re-use).

Inspection: Inspect drum band surface, the bushing, and thrust surfaces for scores. Remove minor scores with crocus cloth. Replace badly scored parts. Inspect needle bearings for worn or loose rollers. Inspect gear teeth for burrs or wear. Inspect clutch piston bore and piston inner and outer bearing surfaces for scores. Check fluid passages for obstructions, making sure that they are free and clear. Inspect clutch plates for scores, and check plates for fit on clutch hub serrations. Replace all plates that are worn or do not fit properly *(CAUTION—Front clutch plates differ from rear clutch* plates and are not interchangeable). Check coning of the steel plates. Position plates on a flat surface, then check coning with a feeler gauge. Plates are coned to .010" clearance and should be checked on the inside diameter. Inspect clutch pressure plate for scores on clutch plate bearing surface. Replace plate if deeply scored. Check clutch release spring for distortion and discard if badly bent.

Reassembly: Lubricate all parts with Automatic Transmission Fluid Type "A". Install clutch piston inner seal ring in groove in drum. Install a new outer seal ring on piston and install piston in clutch drum. Install four steel and four bronze clutch plates (Ford & Mercury), five steel and five bronze (Lincoln), alternately, starting with a steel plate, convex side up (Ford),

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

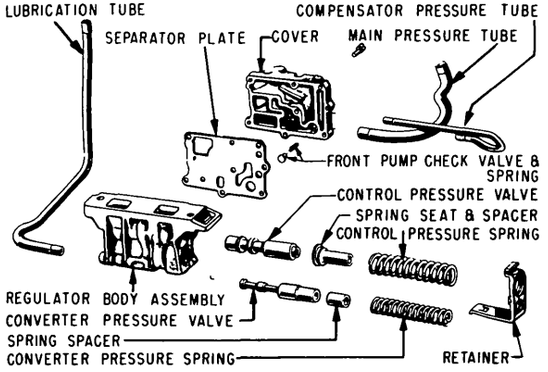
concave side up (Lincoln & Mercury). Install clutch pressure plate with bearing surface down, and install snap ring. Make sure snap ring is fully seated in groove. Install clutch release spring, then position retainer on spring. Position the clutch assembly in an arbor press using tool No. 77515 positioned on spring retainer, and compress clutch spring. Install snap ring *(CAUTION–While compressing the spring, guide retainer to avoid interference of retainer with snap ring groove. Make sure snap ring is fully seated in groove).*

FRONT CLUTCH: Disassembly–Remove clutch cover snap ring and remove turbine shaft (input shaft) from clutch drum. Remove thrust washer and clutch hub. Remove four bronze and three steel clutch plates and pressure plates. Using arbor press and tool No. 77565 depress clutch release spring and remove snap ring. Release spring pressure, remove clutch release disc spring from drum. Using air pressure and a piece of 3/16" tubing (bend at the end for entry into hole in clutch bore) force clutch piston out of cylinder. *(CAUTION–Hold hand over piston to prevent damage).* Remove piston inner seal from clutch cylinder and remove piston outer seal from groove in piston.

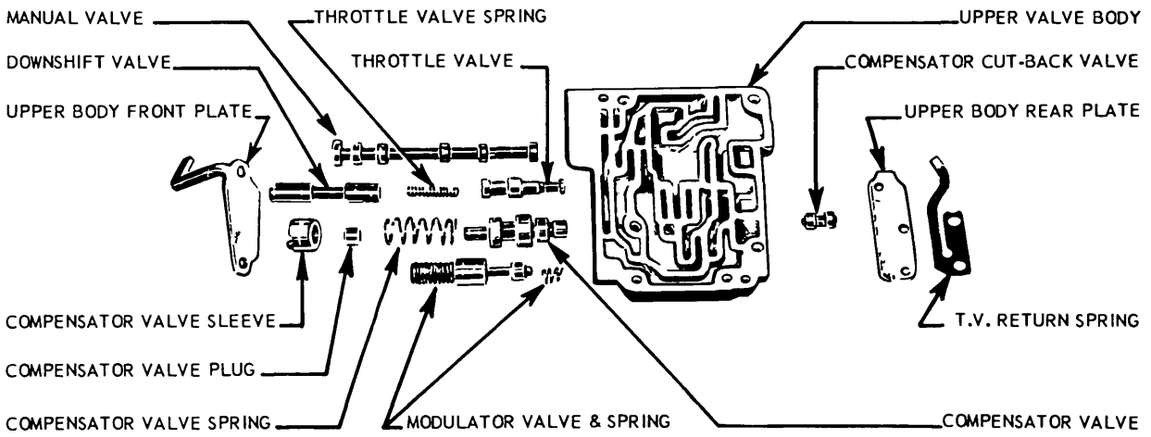
Inspection: See "Rear Clutch Inspection" above and follow the same procedure except that all front clutch plates are flat. *CAUTION–Front and rear clutch plates are not interchangeable.*

►*FRONT CLUTCH ASSEMBLY PRODUCTION CHANGE (ALL TRANSMISSION):* To prevent gear noise or clutch "roll over" during manual shift from "D" to "N", Front Clutch Plate (bronze). Part No. B5A-77519-A is used to replace two of the original four bronze plates. Install one later type plate identified by additional parallel grooves on both sides, next to clutch pressure plate, and the other installed on top of the balance of the plates. These later type plates can be used to correct the above condition in early 1955 transmissions

Reassembly: Install a new piston inner seal ring in clutch cylinder and a new outer seal ring in piston groove. Install piston in clutch housing. *(CAUTION–Make certain that steel bearing ring is in place on piston).* Position release spring in cylinder with **con-**



PRESSURE REGULATOR ASSEMBLY



CONTROL VALVE UPPER BODY ASSY.

cave side up, place spring compressor tool on spring and compress spring in an arbor press to enable installation of snap ring, make sure that snap ring is fully seated in groove. *NOTE–Complete reassembly of front clutch after rear clutch assembly has been installed on primary sun gear shaft as indicated below.*

PRIMARY SUN GEAR SHAFT & CLUTCH (Reassembly): After individual units assembled (Shaft and Front & Rear Clutches), place primary sun gear shaft assembly in bench fixture and install rear clutch assembly on sun gear shaft *(CAUTION–Center seal rings on shaft to prevent breakage as clutch assembly installed).* Install steel and bronze thrust washers on shaft in that order. Install two seal rings in shaft grooves. Install two seal rings in shaft grooves. Install front clutch housing on primary gear shaft while rotating clutch units to mesh rear clutch plates with serrations on clutch hub being careful not to damage seal rings as clutch assembly being installed. Install clutch hub in clutch cylinder with deep counterbore down. Install bronze thrust washer on clutch hub. Install pressure plate in clutch cylinder with bearing surface up then install four bronze and three steel clutch plates alternately, starting with a bronze plate, *(CAUTION–*Lubricate all plates with Automatic Transmission Fluid Type "A" as they are installed. Install turbine shaft in clutch cylinder and install snap ring in groove, making sure that it is fully seated. Install bronze thrust washer on turbine shaft. Assembly is now ready for installation in transmission case. *See "Transmission Reassembly" below.*

FRONT PUMP (Disassembly): Remove pump cover attaching screws and remove cover with stator support. Mark the driven gear with Prussian Blue to assure correct assembly and remove drive and driven gears from pump body. To remove seal from pump body, mount the pump body on transmission case, use tool No. 1175-AB to remove seal

►*CAUTION· Extreme care must be taken not to scratch or mar pump gears or bearing surfaces*

Inspection: Inspect bushing, gear pockets and crescent for scores. Inspect front cover, pump body, gear teeth and stator support splines for burrs. Check pump for evidence of contact between outside diameter of drive gear and crescent. REPLACE PUMP if such contact noted. Check bushing for wear and scoring

Reassembly: Use tool No. 77837 to install new seal in pump body *(CAUTION–*coat outside diameter of seal with Permatex No. 3 before installation to prevent fluid seepage). Install pump driven gear in pump body in accordance with marks made before disassembly, install drive gear. Install pump cover, attaching screws, lockwashers, and tighten cover screws evenly to 1-3 ft. lbs. Check pump for free movement.

REAR PUMP: (Disassembly): Remove screws and lockwashers securing pump cover to pump body and remove cover. Using Prussian Blue, mark pump drive and driven gears to assure correct assembly, and remove gears from body.

►*CAUTION–Handle pump parts with care to avoid scratching or marring*

Inspection: Inspect all pump parts for excessive wear, score, or burrs. Check fluid passages for obstructions. Check pump for evidence of contact between outside diameter of drive gear and crescent. REPLACE PUMP if such contact noted. Check bushing for wear or scoring.

Reassembly: Install pump driven gear into pump body, positioning gears as marked on disassembly. Install drive gear into position as marked. Install pump cover, install cover screws with lockwashers, tighten screws evenly to 50-60 inch lbs. (¼"), 20-30 inch lbs.,(10-24 screws). Check pump for free movement of gears.

PRESSURE REGULATOR BODY (Disassembly): Remove valves from body. Take out cover attaching screws, remove cover and separator plate

Inspection: Inspect regulator body and cover mating surfaces. Check fluid passages in body and fluid passages in separator plate for obstructions. Inspect valves and valve bores for scoring and check freedom of valves in valve bores. Check regulator valve springs for distortion. Wash thoroughly in clean solvent and blow dry with air.

Reassembly: Install check valve spring in regulator cover and position valve on spring *(see "Pressure*

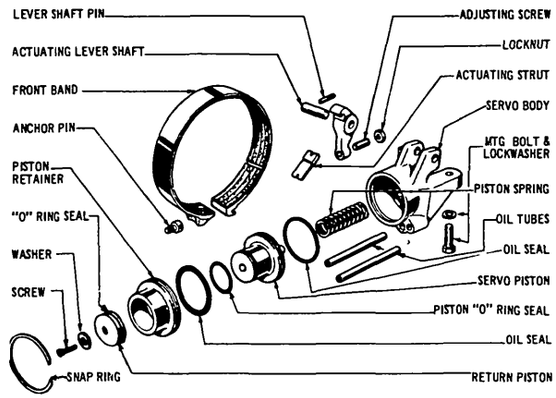
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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

Valve Installation Caution" below) Position separator plate on regulator cover. Hold regulator and cover together and check for free movement of valve. Place regulator body in position on separator plate and install attaching screws. *NOTE–Do not install valves at this time as they should be installed after regulator assembly is installed in transmission. See "Transmission Reassembly" below.*

►*MERCOMATIC & TURBO-DRIVE PRESSURE REGULATOR VALVE SPRING & SPACER INSTALLATION CAUTION.* It is extremely important that the spring seat and spacer be installed so that the cupped end fits over the end of the control pressure valve, and the stem fits down through the control pressure spring. Two types of spacers are used in production, one having the small diameter end closed, and the other with the end open. Install either spacer as indicated above.

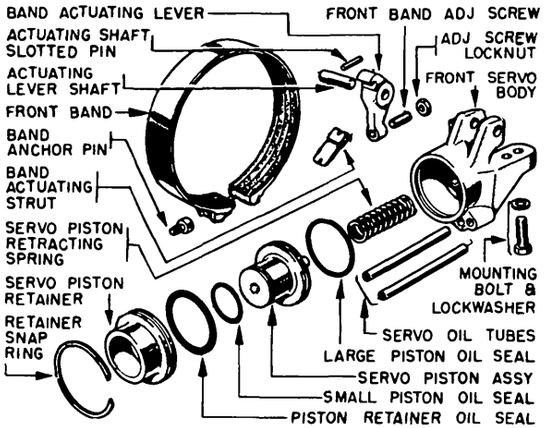
CONTROL VALVE (Disassembly): During disassembly of the control valve avoid damage to valve parts and keep valve parts clean. Place valve assembly on a clean cloth while performing the disassembly operation. *(NOTE–Do not separate the valve bodies until after valves have been removed).* Remove manual valve and remove one screw attaching separator plate to lower valve body. Remove upper body front plate *(NOTE–The plate is spring loaded. Apply pressure to plate while removing the attaching screws).* Remove compensator spring and plug, remove valve spring and valve. Remove modulator valve retainer, both large and small springs and valve. Remove downshift valve and spring. Remove two screws attaching throttle valve return spring to upper body, then remove spring. Remove the remaining screw attaching upper valve body rear plate to valve body, then remove plate. Remove throttle valve, then the compensator cut back valve. Remove lower body side plate *(apply pressure to plate while removing as it is spring loaded).* Remove the 2-1 shift valve spring and valve, low inhibitor valve and spring, then remove the 2-3 shift valve and governor plug. Remove the end body *(End body is spring loaded. Apply pressure while removing attaching screws).* Remove orifice control valve plug and 2-3 shift valve plug from end body and remove end body plate. Remove 2-3 shift valve outer and inner springs, then remove shift valve. Remove orifice control valve and transition valve and spring. Remove attaching bolts and screws and separate bodies. Remove separator plate from upper body and remove check valve seat, valve and spring from lower body



TURBODRIVE FRONT SERVO & BAND ASSY.

Inspection: *(CAUTION–Handle all parts carefully to avoid scoring, burrs and distortion).* Clean all parts thoroughly in clean solvent and blow dry with air. DO NOT USE CLOTH FOR WIPING PARTS (lint left by a cloth may cause poor valve operation). Inspect all mating surfaces for burrs, scratches, and flatness. Check all passages for obstructions. Inspect all valves and valve bores for scoring and check valves for free movement in bores (valves should slide in bore of own weight). Valves can be polished with crocus cloth.

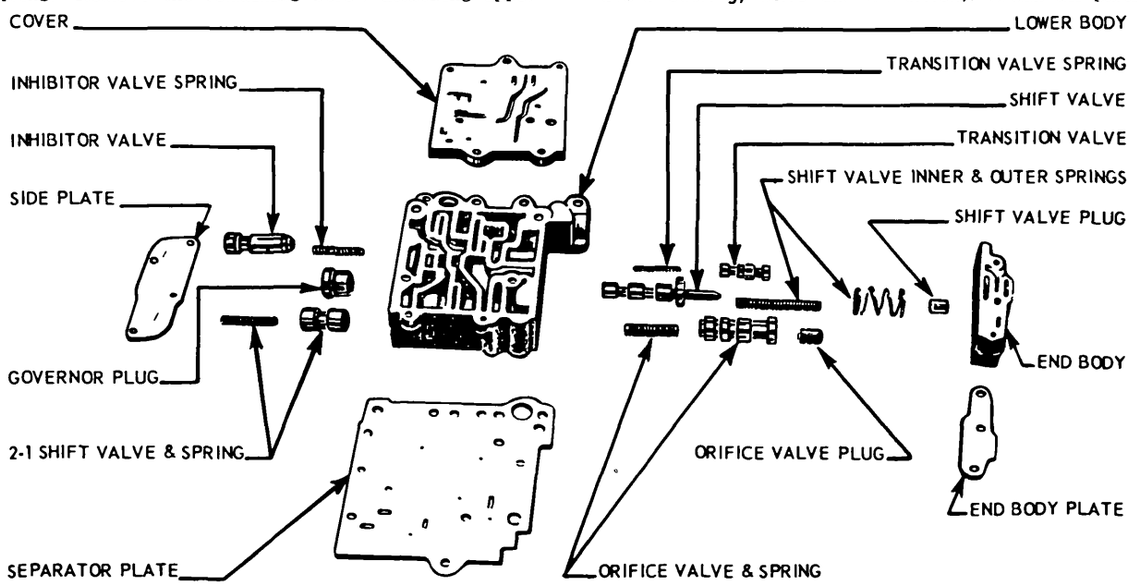
►*CAUTION–Do not round the sharp edges of valv s and plugs*



FORDOMATIC & MERCOMATIC FRONT SERVO & BAND ASSEMBLY

Reassembly: *(NOTE–Arrange all parts in their correct position. Rotate valves and plugs when inserting them in their bores, to avoid shearing of soft body castings).* Install separator plate on upper body (do not tighten screws). Install check valve spring, valve, and seat in lower body Position lower body on upper body. Install lower body cover and tighten attaching bolts finger tight. Align the valve body attaching bolt holes in the separator plate and lower body. Tighten the four valve body bolts to 4-6 ft. lbs. *(CAUTION–Excessive tightening of these bolts may distort valve bodies, causing valves or plugs to stick).* Install the three lower cover to lower body screws and tighten to 20-30 inch lbs. Install the plate on lower end body and tighten attaching screws. Install orifice control and shift valve plugs in end body. Install transition valve and spring, the orifice control valve and spring, 2-3 shift valve in lower body. Install shift valve inner and outer springs, and install end body on lower body, *(CAUTION–Make sure that inner spring is piloted on shift valve regulator plug).* Install governor plug in lower body Install low inhibitor valve spring in valve, and install spring and valve. Install 2-1 shift valve spring in valve, and install valve and spring Install lower body side plate Install compensator cut-back valve in upper body. Install throttle valve and position upper body rear plate on upper body with the plate between end lands of throttle valve. Install one plate to body screw in hole next to throttle valve Position throt-

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CONTROL VALVE LOWER BODY ASSY.

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

tle valve return spring on plate, and secure plate in place with the remaining plate to valve body screws. Install compensator valve and spring and downshift spring and valve. Install modulator small spring, valve, spring, and retainer as an assembly. Install the plug in the compensator valve sleeve, castellated end out, and install assembly in body, with smooth end toward body. Install upper body front plate. Install separator plate to lower body screw and install manual valve.

GOVERNOR (Disassembly): Remove governor body side plate attaching screws, remove plate. Remove governor body attaching screws and remove body from counterweight. Remove governor valve from body.

Inspection: Inspect valve and valve bore for scores and check free movement of valve in bore. Inspect all fluid passages for obstructions. Inspect mating surfaces for burrs and distortion

Reassembly: Install governor valve in bore of governor body and install body cover plate and attaching screws Mount governor body on counterweight, making sure that fluid passages line up with passages in counterweight. Install body attaching screws. Tighten body-to-counterweight screws

FRONT SERVO (Disassembly—Ford & Mercury): Remove piston retainer snap ring *(CAUTION—Servo piston is spring loaded. Apply pressure to piston when removing snap ring).* Remove servo piston and retainer from servo body (NOTE—If necessary, tap servo piston guide lightly with soft hammer to remove from servo body). Remove servo spring, and remove retainer from piston and seal from retainer

Disassembly (Linc In): Proceed as with Ford & Mercury (above), then loosen to one half its length the screw that secures servo piston release piston to servo piston stem. Tap screw head with soft hammer until stem is forced from release piston. Separate release piston, piston retainer and piston. Remove seal from release piston. Remove "O" ring seals from piston.

Inspecti n: Inspect servo body for cracks. Inspect piston and piston bore for scores. Check fluid passages for obstructions. Check actuating lever for free movement and inspect for wear. (NOTE—If necessary to replace actuating lever or shaft, remove retaining pin and push shaft out of bracket). Inspect threads in lever and on adjusting screw. Check servo spring and servo band for distortion. Inspect servo band lining for excessive wear and bond to metal band. (NOTE—Band should be replaced if worn to a point where grooves are not evident). Inspect bands for cracks and distortion.

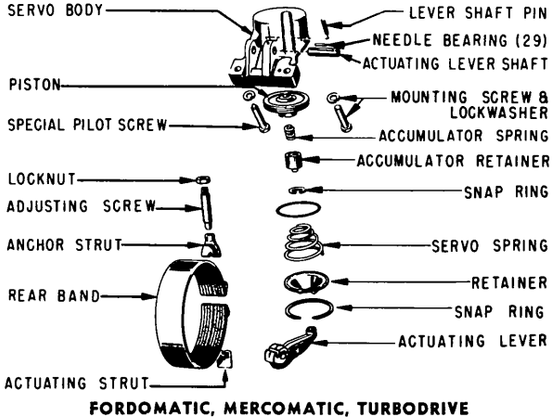
Reassembly (Ford & Mercury): Install new "O" ring seals on piston, and new oil seal on piston retainer. Lubricate seals and install retainer on piston. Position servo spring in servo body. Lubricate and install piston and retainer assembly in servo body. Press retainer into servo body and install snap ring. *(CAUTION—Make sure snap ring is fully seated in groove).* Install adjusting screw and locknut in actuating lever if previously removed. Check operation by applying air pressure to apply hole.

Reassembly (Lincoln): Install new "O" ring seals on piston, and install new seal on piston retainer. Lubricate seals and install retainer on piston. Install new oil seal on release piston and retainer piston and piston retainer. Install new "O" ring seals on piston. Install piston in retainer and move piston to full release position in retainer. Place piston release piston in position, concave side toward stem and press into place. Install screw retaining release piston to piston stem. Complete reassembly in same manner as for Ford & Mercury (above).

REAR SERVO (Disassembly): *(NOTE—Ford & Mercury Rear Servo is smaller in diameter than that used on Lincoln).* With a 1/8" pin punch, remove servo actuating lever shaft retaining pin, and remove shaft and operating lever *(CAUTION—Use care when removing actuating lever to avoid losing needle bearings).* While pressing down on servo spring retainer, remove snap ring (release pressure on retainer slowly). Remove retainer and servo spring Hold hand over piston to prevent damage and force piston from servo body with air pressure. Press down on accumulator piston and hold in this position while removing "cir-clip" type lock ring with lock ring pliers. With lock ring removed, gradually release accumulator piston until all tension has gone from spring. Remove piston seal ring from servo piston.

Inspection: Inspect servo body for cracks, and piston bore for scores. Inspect servo body-to-transmission case mating surface for burrs. Check fluid passages for obstruction and passage plugs for tightness in body. Inspect piston stem for scores. Inspect accumulator bore and piston for scores and wear, and accumulator spring for distortion. Inspect actuating lever, socket, and shaft for scores and wear. Check needle bearings for wear and distortion. Inspect servo spring for distortion. Inspect servo band lining for excessive wear and bond to metal band. (Band should be replaced if worn to point where grooves are not clearly evident). Inspect band and struts for distortion and band ends for wear.

Reassembly: Install new seal ring in servo piston. Install accumulator spring and piston in servo piston and retain with lock ring. Install piston in servo body (lubricate parts to facilitate assembly). Install servo



FORDOMATIC, MERCOMATIC, TURBODRIVE REAR SERVO & BAND ASSEMBLY

spring with small end against servo piston and install retainer. Compress spring and install snap ring, making sure that snap ring is fully seated in groove. Place needle bearings in actuating lever shaft hole. With a pencil, position needle bearings around hole. Lock bearings in place by placing thumb over bearings and rotating clockwise. Install actuating lever with socket in lever bearing on piston stem. Needle bearing retainers at each side of actuating lever shaft hole must be installed with actuating lever. Install actuating lever, aligning the retaining pin holes and bearing retainers, and install pin. Check lever for free movement and then check operation of servo by applying air pressure to apply hole.

DISTRIBUTOR SLEEVE (Inspection): Inspect all passages for obstructions. Inspect sleeve bore for scores or excessive ring wear. Inspect mating surfaces for burrs and flatness. Check fit of fluid tubes. *NOTE*—Make sure spacer is on center tube.

PINION CARRIER (Inspection): Inspect servo band surfaces for scores. Inspect inner bushing for scores. Check free movement of pinions on pins and inspect for worn or broken teeth. Check pinion endplay (.010-.020"). Pinion pins must be a tight fit in carrier. Check all fluid passages. Check journal bushing for scores. *NOTE*—Planet carrier is serviced only as an assembly.

OUTPUT SHAFT (Inspection): Inspect thrust surfaces and journals for scores. Inspect internal gear for broken or worn teeth. Inspect aluminum sleeve for scores and check ring grooves for burrs. Inspect keyway and drive ball socket for wear. Inspect splines for burrs or wear. Inspect external parking gear teeth for damage and speedometer drive gear for burrs

EXTENSION HOUSING (Inspection): Inspect housing for cracks and drive shaft slip yoke bearing surface for scores. Inspect gasket surface for burrs. If inspection reveals it necessary to remove rear seal, use tool No. 1175-AB. (NOTE—Rear seal may be replaced without removing transmission from car). Use tool No. 7657-D and install new seal in extension housing. Remove inspection cover and gasket and check fluid baffle for tight fit in housing.

TRANSMISSION CASE LINKAGE (Disassembly): Remove throttle lever nut and take off inner and outer throttle levers. Remove throttle lever shaft seal from counterbore in manual lever shaft. Remove parking mechanism actuating rod, detent ball and spring. Remove manual lever shaft nut, detent and outer manual lever and shaft. Remove torsion lever retainer clip and take off torsion lever assembly. Disassemble torsion lever assembly by rotating lever while holding spring. Disengage pawl return spring from toggle link pin and remove pin. Remove pawl pin by working pawl fore and aft until pin protrudes from case. Remove toggle pin retainer clip, toggle pin, pawl return spring, spring retainer and link. Remove toggle lever pin by tapping lever toward rear of case, then remove plug, toggle lever pin and lever (NOTE—toggle lever pin is held in place by the plug). Remove manual shaft seal and transmission vent from case.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

Inspection: Inspect each part of parking mechanism for wear, distortion or other damage.

Reassembly: Assemble toggle lever, link, pawl return spring and pawl and install assembly in transmission case. Install toggle lever and pawl pins. Install torsion lever assembly. (NOTE—Use screwdriver to position spring on torsion lever). Install washer and retainer clip. Coat outer diameter of new manual shaft seal with Permatex No. 3 and use Tool 77288 to install seal in case. Install manual lever and shaft in case, mount detent lever and tighten attaching nut to 35-40 ft. lbs. torque. Install detent spring and ball *(NOTE—use a piece of thin tubing to depress ball and spring while rotating detent).* Position ends of parking pawl torsion lever rod in detent lever and torsion lever and secure with cotter pins. Install new seal on throttle lever shaft, install outer throttle lever and shaft in case, install lever on inner end of shaft and tighten attaching nut to 35-40 ft. lbs. Check linkage for free operation without binding.

TRANSMISSION CASE (Inspection): Inspect case for cracks and stripped threads. Inspect all gasket and mating surfaces for burrs. Inspect all bearing surfaces for wear, scores, and burrs.

TRANSMISSION REASSEMBLY

►*REASSEMBLY CAUTION. Use Automatic Transmission Fluid Type "A" only to lubricate parts for assembly. DO NOT use any other form of lubricant. Use all new gaskets and tighten all bolts and screws to correct torque specifications. DO NOT USE FORCE WHEN ASSEMBLING PARTS. If parts do not assemble freely, examine parts for cause of difficulty*

CLUTCH ASSEMBLIES: Install front band in transmission case so that anchor end aligned with anchor in case. Install clutch assemblies into transmission case from the rear *(CAUTION—Do not allow clutches to separate),* while positioning servo band on drum. Hold units together while making installation. Position center support in case, aligning hole in center support with hole in right hand side of case. Install right and left hand center support outer bolts and external tooth lockwashers *(CAUTION—Lockwashers must be installed with the rolled edge toward transmission case to insure tight seal).*

PINION CARRIER & OUTPUT SHAFT: Position rear servo band in transmission case, with the strut ends up. Place anchor end (identified by a depression in center of strut retainer), toward adjusting screw. Install a bronze thrust washer on thrust face inside pinion carrier. To install pinion carrier assembly, position rear band over drum while meshing the planet pinions. Install two seal rings on primary sun gear shaft, and check rings for free movement in grooves. Install selective thrust washer on rear of planet carrier, retaining it in place with the transmission fluid. *(NOTE—If endplay was not within specifications, when checked prior to disassembly, replace washer with one of prop r thickness).* Install output shaft, carefully meshing internal gear with pinions.

REAR PUMP: Position rear pump drive key in keyway on output shaft. Position new front and rear gaskets on pump body, retaining gaskets with transmission fluid. Install thrust washer on pump body with the bronze side up. Align thrust washer tangs with bosses on pump body, then install the rear pump *(CAUTION—Be sure drive key is aligned with keyway in pump drive gear).*

GOVERNOR: Position governor drive ball in the pocket in output shaft. Retain ball with transmission fluid Install governor assembly aligning groove with ball in output shaft. Install governor snap ring. *NOTE—Install governor with the governor body plate toward front of transmission.*

DISTRIBUTOR: Place the four seal rings in distributor sleeve, and check ring gap. Check fit of seal rings in grooves of output shaft. Install distributor sleeve on output shaft, chamfer forward (lubricate parts to aid assembly). Install distributor and tubes on sleeve, making sure passages in sleeve and distributor are aligned. Install attaching bolts and lockwashers. Tighten bolts finger tight. Insert distributor tubes in transmission case, until spacer on center tube is against case, then tighten distributor attaching bolts to 8-10 ft. lbs. Install a new seal on rear pump outlet tube and install tube in transmission case and rear pump body.

EXTENSION HOUSING: Position speedometer drive gear ball in pocket in output shaft, retaining it with fluid Install speedometer drive gear, and gear snap ring. Insert extension housing oil seal replacer and pilot in housing, then install extension housing on transmission case Install attaching bolts and external tooth washers. *(CAUTION—Washers must be installed with rolled edge toward transmission case to insure a tight seal).* Tighten extension housing attaching bolts to 28-30 ft. lbs. Install governor inspection cover and a new gasket on housing.

FRONT PUMP: Position a new front pump gasket in counterbore of transmission case. Install front pump, aligning pump bolt holes with holes in case. Install three of the pump attaching bolts and tighten them to 17-22 ft. lbs.

TRANSMISSION ENDPLAY (Checking): Mount a dial indicator support on front pump bolt hole. Mount dial indicator on support so that contact rests on end of turbine shaft. Use a large screw driver to pry front clutch drum toward rear of transmission. Set dial indicator to zero. Remove screw driver and pry units toward front of transmission case by inserting the screw driver between large internal gear and transmission case. Note indicator reading. Endplay should be .010-.029". Remove indicator and remove tool from extension housing. Install the one remaining front pump attaching bolt and tighten it to 17-22 ft. lbs

FRONT SERVO: Position front band forward in case with band ends up. Position servo strut with the slotted end aligned with servo actuating lever and the small end aligned with band end. Rotate band, strut, and servo into position engaging anchor end of band with anchor end in case. Locate servo on dowel in case, then install attaching bolt (or bolts), tightening them only two or three turns. Install servo tubes

REAR SERVO: Position servo anchor strut, then rotate rear band to engage the strut. Position servo actuating lever strut with a finger, then install servo and attaching bolts. Tighten bolts to 40-45 ft. lbs

PRESSURE REGULATOR BODY: Install pressure regulator body and attaching bolts and tighten bolts to 17-22 ft. lbs. Install control and converter valve guides and springs and install spring retainer. Install a new seal ring on rear pump intake tube, then install tube in case. *NOTE—When installing spring retainer be sure that both tangs attach at the same time*

CONTROL VALVE BODY: Install control valve assembly, using care to align servo tubes with control valve. Align the inner throttle lever between throttle lever stop and downshift valve, and at the same time push the throttle valve in to clear transmission case. *(CAUTION—Align manual valve with actuating pin in the manual detent lever. Do not tighten attaching bolts).* Install the large control pressure tube in valve body and regulator. Install small control pressure compensator tube in valve body and regulator. Install lubrication tube in rear pump and regulator body. Tighten control valve body attaching bolts to 8-10 ft. lbs. Tighten front servo attaching bolts or bolt to 30-35 ft. lbs.

ADJUSTMENT (Front Servo): Loosen front servo adjusting screw locknut, then back nut off three turns. Loosen adjusting screw five complete turns. Using the front band adjusting wrench, tool No. 7225, insert a ¼" spacer between lever and stem, then tighten the screw until ratchet overruns. **Back th adjusting screw one complete turn,** then tighten locknut to 20-25 ft. lbs.

ADJUSTMENT (Rear Serv): Loosen adjusting screw locknut three turns with a ¾" socket of the rear band adjusting wrench. Back off the adjusting screw until free travel is obtained. Using tool No. 7195, tighten adjusting screw until ratchet overruns, then back off the adjusting screw 1½ turns. Hold rear servo adjusting screw stationary, and tighten the locknut to approximately 40 ft. lbs.

FLUID SCREEN & PAN: Position fluid screen over rear pump inlet tube then over front pump inlet tube. Press screen down firmly and install screen retaining clip. In trucks, position the oil cooler to sump discharge tube in case. Place a new gasket on transmission case, then install the pan. Install attaching bolts and lockwashers and tighten to 10-13 ft lbs.

TRANSMISSION & CONVERTER INSTALLATION

FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD & SUNLINER)

1) If converter has been removed from converter housing, position converter in housing, then install converter housing lower cover plate (8 Cyl.), or wedge converter in places (6 Cyl.) to prevent converter slipping out of housing. Rotate converter until drive plate bolt holes are in horizontal position (8 Cyl), or in the vertical position (6 Cyl.). Position flywheel on crankshaft flange, then install attaching bolts

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

2) Move converter and transmission assembly forward into position, using care not to damage converter drive plate and converter pilot. Install lower converter housing to engine bolts and tighten them to 40-45 ft lbs. Install crossmember on pass. cars. Lower transmission until extension housing rests on crossmember and install extension housing to crossmember bolts.
3) On trucks, install converter housing to crossmember bolts. On all vehicles position flywheel drive plates, and install drive plate attaching bolts. Tighten drive plate bolts to 28 ft. lbs. Install converter drain plugs and access plates. On trucks, position the oil cooler on support brackets, then install cooler. Connect oil inlet and outlet lines to transmission.
4) Coat universal joint knuckle with transmission fluid, then install drive shaft. Connect speedometer cable at transmission. Connect manual linkage at transmission manual lever. Install converter air duct and the linkage splash shield (pass. cars), exhaust duct shield (trucks).
5) Install starter motor and connect transmission-to-frame ground strap at transmission. Connect fluid filler tube to oil pan. Lower hoist, on trucks, position water inlet and outlet lines on oil cooler. Tighten hose clamps securely. Install the two upper converter housing-to-engine bolts and tighten to 40-45 ft. lbs. Replace covers on converter housing access holes, and floor mat. Fill radiator with water.
6) Fill transmission with Automatic Transmission Fluid Type "A" *(see "Lubrication" above)*. Check transmission and converter assembly for fluid leaks, adjust manual and throttle linkages *(see "Linkage Adjustment" above)*

THUNDERBIRD

►*INSTALLATION NOTE: Converter and transmission assembly must be installed before engine installed in chassis. The converter and transmission assembly can be install d in the chassis separately before engine is installed, or converter, transmission, and engine may be installed together as a unit*
1) To attach converter and transmission to engine before assembly into chassis as a unit, first align converter pilot, housing dowel holes, and drive plate holes. Remove all foreign material from converter pilot bore in crankshaft. Apply a heavy film of lubricant evenly on converter pilot bearing surface. *(CAUTION–Excessive lubricant in pilot bore will prevent proper entry of converter pilot into bore, forcing converter rearward and scoring front pump)*
2) Install pilot studs in two of the converter housing to engine bolt holes. Remove converter housing lower front cover plate. Move converter and transmission forward into position using care not to damage converter drive plate and converter pilot. Install four converter housing to engine bolts, remove pilot studs, then tighten bolts to 40-45 ft. lbs
3) If engine has been removed separate from converter and transmission assembly, mount transmission on a transmission floor jack and position assembly in car. Connect drive shaft to transmission output shaft. Install the two extension housing to rear engine support bolts. Connect speedometer cable and manual linkage at transmission. Install engine lifting sling and lower engine carefully into engine compartment, starting converter pilot into crankshaft. Make sure studs on manifold are aligned with holes in muffler inlet pipe, and dowels in block engage holes in converter housing. Raise car and position jack stands. Install engine front insulator bolt, and right and left hand insulator support bolts. Connect exhaust pipe to manifold and lower car to floor
4) Install two lower converter housing to engine bolts and tighten them to 40-45 ft. lbs. (Tighten bolts slowly and evenly to avoid binding on dowel pins). Install converter housing to engine bolts, and tighten them to 40-45 ft. lbs. Align flywheel and drive plate bolts with converter. Install the six bolts and tighten them to 25-28 ft. lbs. Complete engine installation.

LINCOLN & MERCURY

1) Position transmission and converter assembly under car, raise it into position and move it forward to engage converter pilot with hole in crankshaft *(CAUTION–Guide assembly carefully to avoid damage to flexible drive plate and converter pilot)*.
2) Install converter housing attaching bolts and tighten to 40-45 ft. lbs. Install six bolts securing converter to drive plate and tighten to 25-28 ft. lbs. (On Lincoln, install detachable frame crossmember to "X" member). Install engine rear mount to transmission. Remove engine support tool, lower engine and install rear engine mount to crossmember bolts and remove lift. Connect speedometer cable at extension housing.
3) Connect throttle and transmission manual linkage to transmission levers. Adjust linkage (see "Linkage Adjustment" above). Install converter housing upper plate with new seal. Install starter, converter drain plugs, and place fluid filler tube on pan and tighten filler hex nut to 40-50 ft. lbs.
4) Install converter housing lower plate. On air cooled torque converters install duct on converter housing and deflector between frame and housing. On water cooled torque converters, install inlet and outlet hoses. Install drive shaft (lubricate front universal slip yoke to aid installation). On Mercury models with single exhaust, install exhaust system. Check operation of neutral switch. Install throttle linkage brackets to engine and body using original nuts and bolts. Install battery ground cable. Fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above).

TRANSMISSION OVERHAUL: *See 1955 Annual Data or later Manual edition and note "Changes, Cautions, Corrections" above.*

TRANSMISSION INSTALLATION (WITHOUT CONVERTER)

FORD PASS. CARS & TRUCKS

►*NOTE: On Thunderbird and Sunliner it is not possible to remove the transmission (without converter) due to limited clearance.*
1) Install guide pins in the two top transmission to converter housing bolt holes. Mount transmission on jack and position it under vehicle. Rotate engine to position the front pump drive lugs on converter impeller housing in a vertical position. Rotate front pump to position slots in front pump drive gear in a vertical position. Apply lubriplate to seal the surface on the converter impeller cover hub. (If a new transmission is being installed, position a new rubber extension housing duct shield over end of housing)
2) Raise transmission and move it toward front of vehicle *(CAUTION–Be sure to align the turbine shaft splines with turbine hub splines and the converter impeller lugs with slots in front pump drive gear)*
3) On trucks, position the oil cooler front support bracket on case. On all vehicles, install the lower transmission to converter housing attaching bolts. Remove the two guide pins and install the two upper attaching bolts. Tighten bolts to 40-45 ft. lbs.
4) On cars, install the frame crossmember and bolts. Lower transmission onto crossmember and then install engine rear support to transmission bolts. On trucks, position the oil cooler on the support bracket and install attaching bolts. Connect oil cooler to transmission oil lines at transmission. Tighten fittings securely. Install universal joint yoke onto transmission output shaft and connect drive shaft
5) On F-250, F-350 & P-350 trucks, coat universal joint knuckle with transmission fluid. Install the four bolts attaching drive shaft coupling yoke at the parking brake assembly, then connect drive shaft at rear axle. Connect speedometer cable at extension housing.
6) Connect manual linkage and throttle linkage to transmission levers and adjust the linkage (see "Linkage Adjustment" above). Connect fluid filler tube to oil pan and tighten fitting securely. Lower vehicle to floor and fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above).

LINCOLN & MERCURY

1) Install guide pins, tool No. ST-0711 into top transmission to converter housing attaching bolt holes. Mount transmission on lift and position under car. Rotate engine to position front pump drive lugs on converter pump housing in a vertical position. Rotate transmission front pump to position slots in pump drive gear in a vertical position. Apply lubriplate to seal surface on converter pump cover hub.
2) Raise transmission and move toward front of car *(CAUTION–Use care to index turbine shaft splines with turbine hub, and lugs on converter pump with slots in front pump drive gear)*. Install two lower transmission to converter housing attaching bolts. Remove the two guide pins and install two upper attaching bolts and tighten to 40-45 ft. lbs.
3) On 1955 Lincoln, install detachable crossmember in "X" member. Install rear engine mount to transmission
4) Raise engine and transmission sufficiently to remove engine support fixture. Lower unit to crossmember and install rear engine mount to crossmember bolts. Install drive shaft. (Lubricate front universal joint yoke with transmission fluid to aid assembly).
5) Connect speedometer cable at extension housing. Connect manual and throttle linkage to transmission levers. Adjust linkage (see "Linkage Adjustment").
6) On 1955 Mercury with single exhaust system, install exhaust system. Place fluid filler tube in position on pan and tighten filler tube hex nut to 40-50 ft. lbs. Remove support stands and lower car to floor. Fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above). Road test car.

DUAL-RANGE HYDRA-MATIC

Chevrolet Trucks, Series 3100, 3200, 3600, 4000 (1956)
Hudson, Series 40 & 60 (1956)
Nash, Series 40 & 60 (1956)
Oldsmobile, Series 88, (Early 1956)
Pontiac, Series 860 & 870 (Early 1956)
Rambler, Series 5610 (1956)

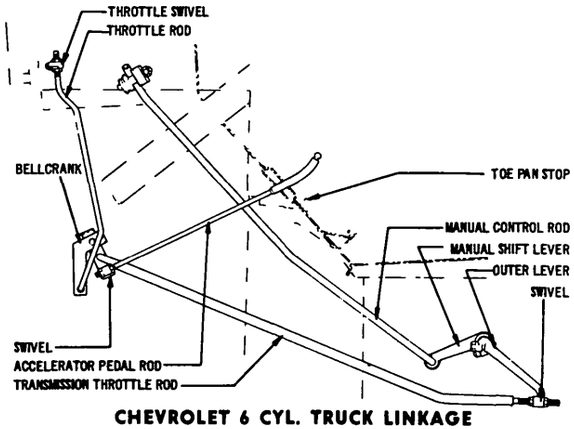
►CHANGES, CAUTIONS, CORRECTIONS

►*HUDSON, NASH & RAMBLER REAR BEARING RETAINER OIL SEAL INSTALLATION CAUTION:* Two types of oil seals are furnished for service replacement. While the construction of the seals is slightly different, both types must be installed in transmission so the felt portion of seal is toward rear of transmission.

►*1956 HUDSON & NASH JUMPING OUT OF REVERSE CORRECTION:* This condition may be caused by improper manual control linkage adjustment, or back-up light switch (if so equipped). On cars with back-up lights, do not adjust control linkage until switch adjustment is checked. Loosen or disconnect the switch at manual control lever on side of transmission. Operate car in reverse several times to determine condition. If loosening up or disconnecting the back-up light switch corrects the condition, readjust switch to proper spring tension as follows: Place control lever in reverse and adjust switch cable just enough to allow spring to pull switch rod to the contact position.

►*1956 RAMBLER JUMPING OUT OF REVERSE CORRECTION:* This condition may be caused by improper adjustment of back-up light switch (see above), or a binding condition at clevis to throttle valve lever while in a reverse position. If clevis is binding, remove clevis and increase the slot 1/16" by filing both sides. If the condition continues to exist, proceed as follows: Remove transmission side pan. Remove detent plunger retainer and reverse oil delivery pipe *(NOTE* - Place finger over detent plunger while removing it and the oil delivery pipe). Install a 3/16" ball bearing, Part No. G-169067, in detent plunger retainer and replace the spring and plunger (this will increase spring tension holding inside detent control lever in reverse position). Reinstall plunger, retainer plate, and reverse oil delivery pipe. Install side pan and levers. Position shift lever on transmission in "D-3" position and adjust the clevis with steering gear shift operating lever against stop on starter switch housing. Remove clevis pin and **lengthen rod by turning clevis two full turns.** Install Hydra-Matic fluid.

►*1956 RAMBLER 3-4 DELAYED (LIGHT THROTTLE) UPSHIFT (Cars before Serial No. D-331043 having the "E-56" Hydra-Matic Transmission):* Replace accelerator shaft, Part No. 3145969, with Part No. 3149854 on which the throttle valve bellcrank rod lever has been relocated from 7° below center line of shaft to 33° above center line. Replace throttle valve bellcrank adjusting upper rod, Part No. 3146947, with Part No. 3149922 which is a straight rod with a 90° bend on one end. Replace accelerator rod, Part No. 3146821, with Part No. 3149851. Replace accelerator rod clip, Part No. 3131561, with Part No. 3131562. Install accelerator rod, with clip so upper end of rod enters accelerator shaft lever from the rear. Adjust throttle valve linkage (see "Carburetor" on Car Model pages). *NOTE* - The above parts are furnished as a kit, Part No. 3200110, and are also furnished separately.



CHEVROLET 6 CYL. TRUCK LINKAGE (EXCEPT FORWARD CONTROL)

DESCRIPTION

DESCRIPTION: Fluid coupling and hydraulically controlled planetary transmission of same design as used on previous models. *See "Dual-Range Hydra-Matic" in 1955 Annual Data or later Manual edition.*

OPERATION

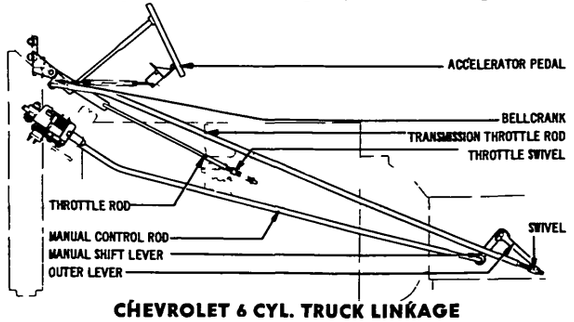
Planetary units and controls operate in same manner as on previous models. *See "Dual-Range Hydra-Matic" in 1955 Annual Data or later Manual edition.*

LUBRICATION

Lubrication Intervals: Check fluid every 1000 miles (Hudson, Nash, Oldsmobile, Rambler). 2000 miles (Pontiac), every day (Chev. Truck). Drain and refill every 25,000 miles.

Oil Level Indicator at Vent Air Cleaner – Clean the mesh type air cleaner (in cap on right top side of transmission case) every 10,000 miles or twice each year.

Checking Fluid Level: Check fluid level with engine warm and idling at slow idle speed (choke valve open, fast idle inoperative). With transmission oil hot, run engine for at least two minutes with selector lever in "N" (Neutral) position (to insure fluid coupling being filled). Check fluid level on dipstick located under hood on right hand side of engine, all cars except Chevrolet truck. On Chevrolet truck the oil filler and dipstick are located under access opening in center floor pan. Add fluid as required to bring level up to "F" mark on dipstick. *NOTE* - Approximately 1½ to 2 pints required to raise level from "L" to "F".

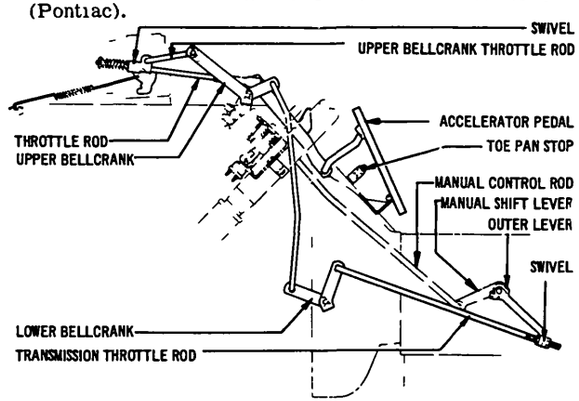


CHEVROLET 6 CYL. TRUCK LINKAGE (FORWARD CONTROL)

►*CAUTION Do not fill above "F" mark on dipstick (may cause foaming when oil is hot).*

Draining & Refilling: Drain oil only when transmission is warm (after normal operation). Remove flywheel housing lower cover (or hand hole cover) turn fluid coupling until drain plug in torus cover points downward. Remove plug and drain coupling. Remove drain plug at rear of transmission oil pan and drain transmission case. Replace both drain plugs and tighten securely. Install 8 qts. (Oldsmobile), 5 qts. (Chev. Truck); 5 to 7 qts. (Hudson, Nash & Rambler), 9½ qts. (Pontiac), of Automatic Transmission Fluid Type "A", bearing an AQ-ATF number on container. Start engine and run it at a speed equivalent to 20 MPH for at least 1½ minutes with selector lever in "N" to fill fluid coupling. Return engine speed to slow idle and recheck transmission fluid level. Add sufficient fluid to bring fluid level up to "F" mark on dipstick.

Fluid Capacity (Refill): 8½ qts. (Chev Truck, without cooler), 9½ qts. (with cooler), 11 qts. (Hudson Hornet & Nash Ambassador), 8½ qts. (Other Hudson & Nash models, and Rambler), 9¾ qts. (Oldsmobile), 9½ qts. (Pontiac).



CHEVROLET V8 TRUCK LINKAGE

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE: See CARBURETOR on Car Model pages.*

CHEVROLET TRUCKS

Manual Control Linkage: (All Models)—Move shift control lever from "N" position to first detent that is felt In this position indicator should line up with symbol "1-4" Check control lever in each of the other positions for indicator alignment If adjustment is not satisfactory, proceed as follows: If gearshift control shaft upper support bracket is loose, tighten the clamp screw while holding control lever firmly against stop between "1-3" position and "1-2" While holding lever in "1-3" against the

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DUAL-RANGE HYDRA-MATIC (C n.inued)

stop which prevents accidental shift into "1-2," loosen gearshift control rod swivel. Make sure transmission outer lever is in the three speed drive position "1-3" (third position from front or rear). With control lever in "1-3" position and held against stop, and with transmission outer lever in the three speed drive position, tighten gearshift control rod swivel.

Neutral Safety Switch Adjustment: Place control lever in "1-4" position. With ignition off, operate starter control. Starter **should not operate.** If it does, check the other positions in the same manner. If starter operates in any position except "N," adjust as follows: Loosen two switch assembly mounting screws. Place selector lever in "N," and with clip over flats on end of shifter shaft, insert pin into mounting bracket of switch and locating plate. Tighten screws to secure switch in this position and remove locating screws.

HUDSON (EXCEPT RAMBLER)

Manual Control Linkage: (All Models)—Place selector lever in "D-3" position and set operating lever against the stop on housing bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever. Place transmission lever in "D-3" position and adjust clevis so pin passes freely through hole in clevis and in lever *(NOTE*—Be sure that operating lever is against stop on housing bracket). After adjustment has been completed, lengthen the control rod two full turns and replace clevis and cotter pin.

NASH (EXCEPT RAMBLER)

Manual Control Linkage: (All Models)—Place selector lever in "D-3" position and set lever against stop on starting switch bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever. Place transmission shift lever in the "D-3" position and adjust clevis so pin passes freely through hole in clevis and in lever. *(NOTE*—Be sure that operating lever is against stop on housing bracket). After adjustment has been completed, lengthen the control rod two full turns and replace clevis and cotter pin.

OLDSMOBILE

Manual Control Linkage (All Models): Loosen jam nut on shift rod clevis and neutral safety switch. Remove clevis pin from shift rod. Move manual control lever at side of transmission all the way forward into "N" position. Then raise and hold shift lever beyond "N" position against side of opening in jacket. Adjust shift rod clevis so that end of clevis contacts outside diameter of bushing in lower shift lever. Return lower shift lever to "N" position, insert clevis pin through clevis and bushing, assemble cotter pin to clevis pin.

Neutral Safety Switch Adjustment: Set transmission in "N" detent. With switch assembled to steering column and link connected to shift lever, insert .090" pin through switch lever and bracket. Tighten mounting bolt and withdraw .090" pin. Check setting by applying hand brake firmly, placing shift lever in "DR" position, and turning ignition switch to "Start." While holding switch on "Start," slowly move shift lever toward "N" until engine cranks and starts. Without moving shift lever after engine starts, accelerate to determine whether transmission is in gear. If switch properly adjusted transmission will not be in gear and car will not move.

PONTIAC

Manual Control Linkage: Place selector lever in "D" (right) position against stop which prevents accidental shift into low range. Loosen both front and rear trunnion locknuts and remove trunnion from transmission outer shift lever. Make sure that transmission outer shift lever is in "D" (right), which is second detent from front. Install trunnion (with locknuts loose) in outer shift lever, tighten front locknut against trunnion finger tight to remove clearance in linkage, tighten front locknut **one** complete turn to lengthen rod. Tighten rear locknut.

Neutral Safety Switch Adjustment: Place selector lever in "D" (left) position. Loosen switch mounting screw and adjust switch bracket to a position where starter will not operate when ignition key is turned to the start position. Place manual control lever in "N" position. Make certain that switch arm does not touch stop on switch bracket. Tighten mounting screw.

RAMBLER

Manual Throttle Linkage: Place selector lever in "D-3" position and set lever against stop on starting switch bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever. Place transmission shift lever in "D-3" position and adjust clevis so pin passes freely through hole in clevis and in lever. *(NOTE*—Be sure that operating lever is against stop on housing bracket). After adjustment has been completed, lengthen the control rod two full turns and replace clevis and cotter pin.

BAND ADJUSTMENT

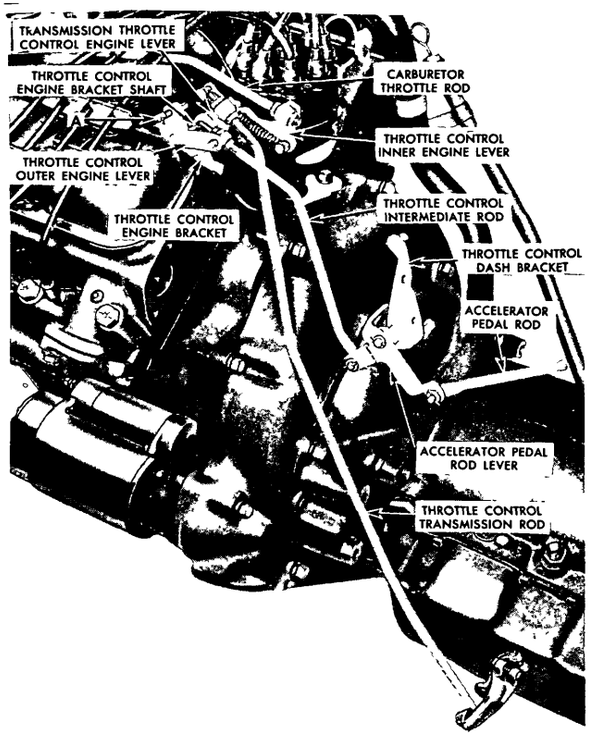
► *OLDSMOBILE & PONTIAC FRONT & REAR BAND ADJUSTMENT CAUTION: Do not adjust bands externally. Internal adjustment must be made in all instances. See procedure below.*

EXTERNAL BAND ADJUSTMENT (Not used on Oldsmobile & Pontiac); Adjusting tools and an accurate tachometer as indicated below, must be used.

► *BAND ADJUSTMENT CAUTION:* Do not attempt to adjust bands externally (without removing oil pan) unless adjusting tool J-2681 (Hudson No. J-2681A) and an accurate tachometer are used. Otherwise, remove oil pan and use special servo gauges.

1) Block front wheels securely and set hand brake firmly to prevent car moving while adjusting. Remove floor mat and adjusting hole cover over adjusting screws on left side of transmission. Run engine until temperature is normal and engine is at normal idle speed. Connect and adjust tachometer for accurate recording of engine speed.

2) Place selector lever in "Dr" position. ("Dr 4"). Adjust carburetor throttle stopscrew so that engine idles at exactly 700 RPM. Adjust front band as follows: Install adjusting tool on front band adjusting screw,



PONTIAC HYDRA-MATIC LINKAGE

loosen adjusting screw locknut (turn long handle while holding short handle stationary). Loosen band adjusting screw (turn short handle) until engine speed increases to 900-1000 RPM *(NOTE* - If no increase in speed is noted when adjusting screw loosened, band has probably been slipping in service. Remove oil pan and inspect band and drum. With pan off, adjust bands as directed in "Adjustment - With Pan Off" below and disregard following steps).

3) Tighten band adjusting screw slowly until engine speed drops to 700 RPM (front drum now stopped). Loosen band adjusting screw until engine speed increases and tighten again slowly until engine speed returns to 700 RPM *(NOTE* - The object in loosening and retightening the screw is to locate exact point at which the band stops the drum from spinning). At this point wait 30 seconds. If engine speed increases, tighten screw 1/10 turn. Wait 30 seconds and if engine speed again increases, tighten screw 1/10 turn more. Repeat this procedure until engine speed remains at 700 RPM for at least 30 seconds.

4) Set counter on tool to 00. While holding locknut stationary with long handle of tool, tighten adjusting screw exactly 7.7 turns (Exc. Chev. Truck); 6.5 turns (Chev. Truck) as indicated on counter. Hold adjusting screw from turning and tighten locknut.

CONTINUED ON NEXT PAGE

DUAL-RANGE HYDRA-MATIC (Continued)

5) Adjust rear band as follows: Install the adjusting tool on rear band adjusting screw and loosen locknut. Loosen band adjusting screw until engine speed increases to 900-1000 RPM *(NOTE* - If no increase in engine speed noted when band adjusting screw loosened, band has probably been slipping in service. Remove oil pan and inspect band and drum. With pan off, adjust bands as directed in "Adjustment - With Pan Off" below, and disregard following steps).

6) Tighten band adjusting screw until engine speed drops to 700 RPM, loosen adjusting screw until engine speed increases, then tighten adjusting screw until engine speed again drops to exactly 700 RPM, wait 30 seconds and if engine speed increases, tighten adjusting screw 1/10 turn. Repeat this procedure until engine speed remains at 700 RPM for at least 30 seconds.

7) Place selector lever in "N" position. Set counter on adjusting tool to 00. Hold locknut stationary, tighten band adjusting screw **exactly 2 turns** as indicated on tool counter. Return selector lever to "Dr" position. Hold band adjusting screw from turning and tighten locknut securely. After both bands adjusted, reset engine to correct idle speed as indicated below.

Idle Speed Setting

Car Model	Idle Speed	Selector Lever
Chev. Truck	425 RPM	"N"
Hudson	490-510 RPM ①	"N"
Nash	450 RPM ②	"N"
Oldsmobile	400 RPM ①	"DR"
Pontiac	450-470 RPM ①	"N"
Rambler	475 RPM ②	"N"

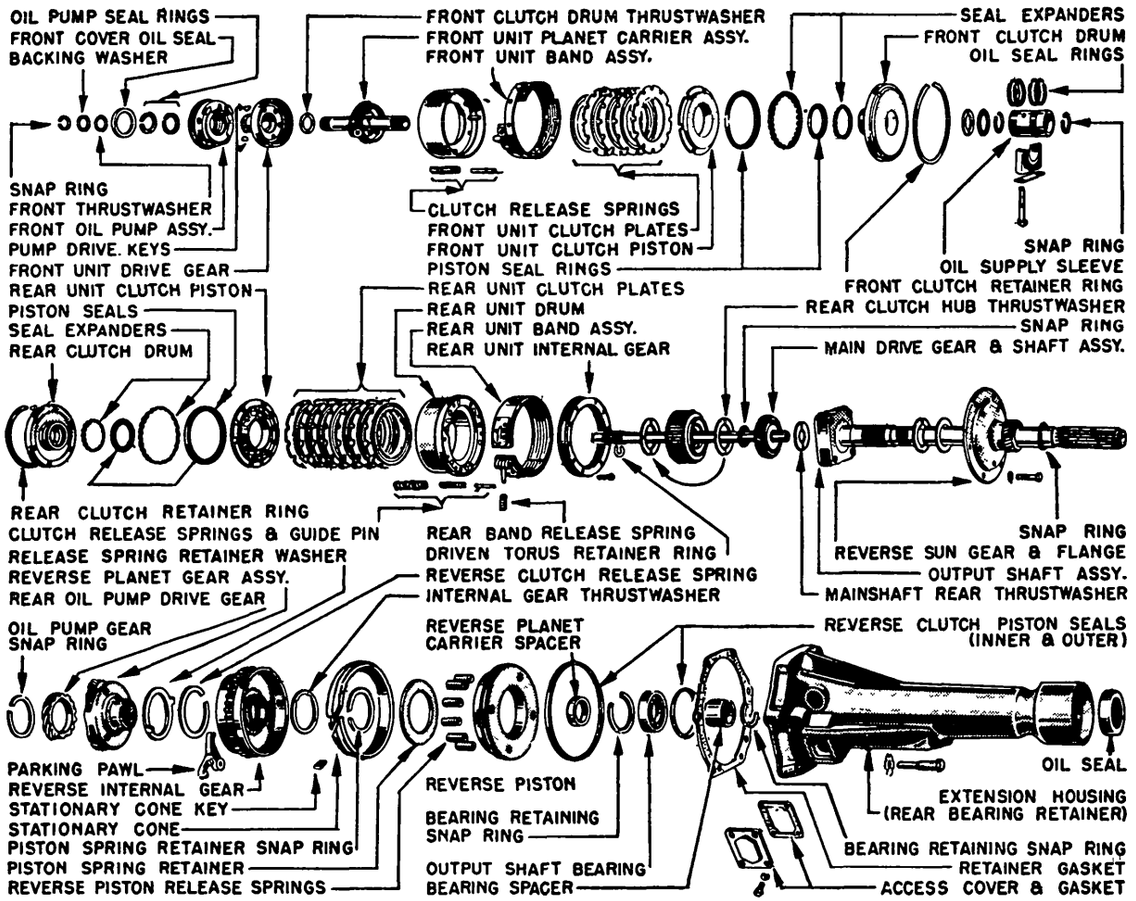
① — Compressor must be running on cars with air conditioning.

② — 500 RPM, with compressor running on cars with air conditioning.

INTERNAL BAND ADJUSTMENT (Use on Oldsmobile and Pontiac at all times, and on other cars when pan r moved for other work): *Use adjusting tools and gauges specified.* Drain transmission oil pan and remove pan. Remove floor mat and floor hole cover over band adjusting screws.

Front Band (Gauge J-1693): Loosen locknut and back off front band adjusting screw approximately 5 turns. Make certain that band is centered on drum. Remove pipe plug from bottom of front servo. Loosen hexagonal headed adjusting screw on gauge by hand until approximately 1/8" of adjusting screw threads are exposed above gauge body. Screw gauge into pipe plug hole in front servo by hand. Tighten hexagonal adjusting screw on gauge by hand until gauge stem is felt to just touch piston in servo, then continue to tighten adjusting screw with a wrench **exactly five full turns** from point where stem first contacted piston. Tighten front band adjusting screw until knurled washer on gauge (at upper end of hexagonal adjusting screw) is just free to turn. Hold band adjusting screw from turning and securely tighten adjusting screw locknut. Loosen gauge adjusting screw at least six turns, remove gauge from servo. Install pipe plug in servo and tighten securely.

Rear Band (Gauge J-5071): With band centered on drum, tighten band adjusting screw until actuating lever contacts face of gauge (gauge positioned on servo with short leg gauge hooked over accumulator body and long leg resting on servo piston stem). *(CAUTION* - If adjusting screw is accidentally turned beyond adjustment, loosen two or three turns and repeat adjustment). Hold band adjusting screw and tighten adjusting screw locknut to 40-50 ft. lbs.



DUAL-RANGE HYDRA-MATIC TRANSMISSION INTERNAL UNITS

TESTING

►***"DUAL-RANGE" HYDRA-MATIC TESTING NOTE:*** **These transmissions have MODULATED PRESSURE and HYDRAULIC REVERSE and following test procedure will apply to all transmissions:**

ROAD TEST: Operate the car over a test route and note performance and shift speeds. Select a test route that will provide for all types of operation: Hilly section to check full-throttle upshifts, slippage, and throttle downshifts; a level section to check closed throttle upshifts; and a quiet section to check for noise. ***See Hydra-Matic Shift Point table for correct shift speeds.***

STALL TEST: Can be used to check engine and transmission performance. Connect accurate electric tachometer to check engine speed. Start engine and warm up engine and transmission to operating temperature. Apply foot brake firmly and set hand brake tight. Set selector lever in "Dr. 4" position. Depress accelerator pedal to the floor and NOTE ENGINE RPM. If engine speed not within limits shown in table, make further tests as indicated below.

►***CAUTION—Use extreme care in making this test and NEVER HOLD THROTTLE OPEN MORE THAN ONE MINUTE (15-20 seconds preferably). If engine speed exceeds maximum figure shown in table, CLOSE THROTTLE IMMEDIATELY to avoid possible damage to transmission.***

If engine speed below minimum—Engine requires tune-up, or front unit is locked up.

CONTINUED ON NEXT PAGE

DUAL-RANGE HYDRA-MATIC (C ntinued)

If ngine speed above maximum—Bands are slipping, Torus check valve leaking or missing, or torus members damaged. Localize the trouble by making the following tests before adjusting the bands:

Check to determine which band slipping—Repeat the stall test (above) with selector lever in Revere "R" position. If engine speed still excessive, Front Band or Front and Rear Bands are slipping. If engine speed within limits, Rear Band only is slipping. Adjust bands.

Check for Missing or Leaking Torus Check Valve: Set hand brake lever securely, start engine and run at speed of 20 MPH. for approximately 1½ minutes. Reduce engine speed to normal idle speed, check fluid level and make certain that it is at "Full" mark on dipstick. Shut off engine and allow car to stand for 10 minutes. Recheck fluid level without starting engine. If level has not raised more than ½", torus check valve is operating satisfactorily and slipping bands or damaged torus members are indicated.

STALL TEST LIMITS

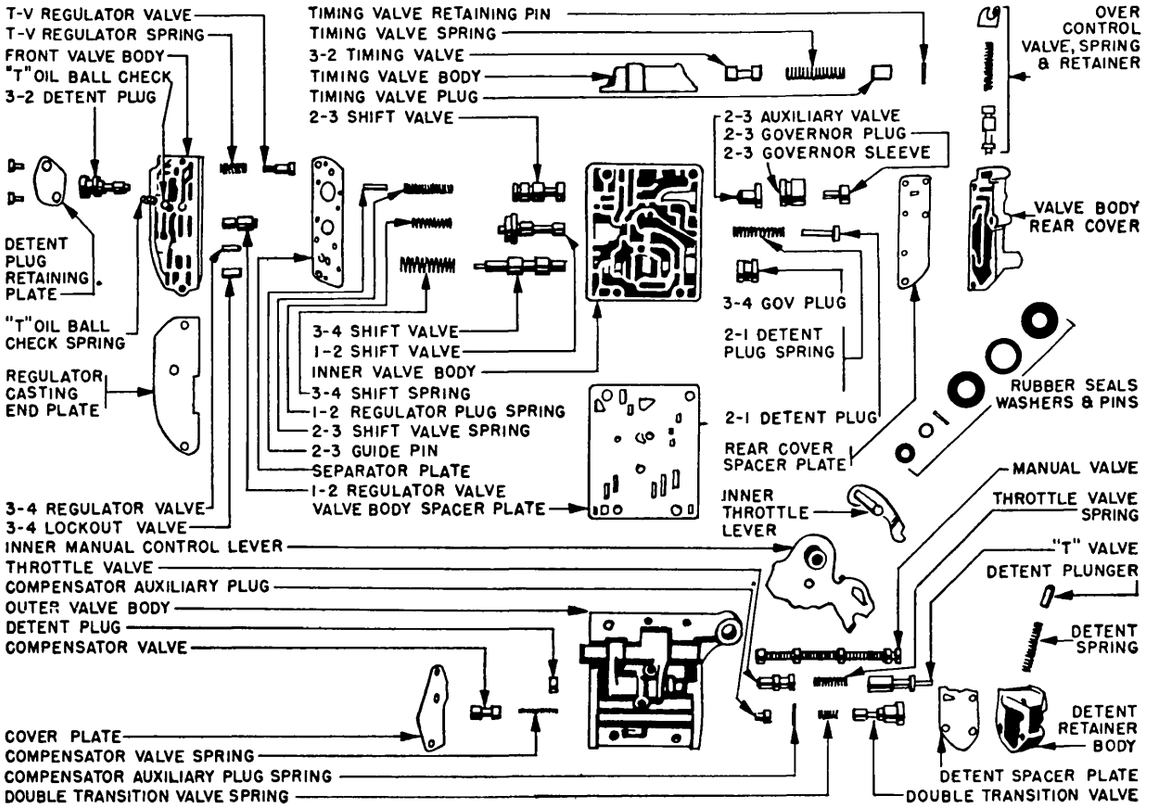
Car Mod l	Minimum RPM	Maximum RPM
Chev. Truck	1400	1600
Hudson Hornet	1700	1900
Hudson Wasp	1600	1800
Nash Ambassador	1550	1650
Nash Statesman	1600	1800
Oldsmobile	1750	1875
Pontiac	1800	2000
Rambler	1600	1800

MAIN LINE OIL PRESSURE: *PRESSURE GAUGE NOTE*– It is recommended that a 300 lb. gauge (J-2540-A) be used for making pressure tests.

Ch cking Main Lin Oil Pressure – Connect gauge at main line oil plug hole on top of case between band adjusting screws (accessible by lifting floor mat and removing metal plate over band adjusting screw hole). Make the following tests on the road (or with car up on jacks so that engine can be run to simulate road performance) after engine has been run sufficiently so that engine and transmission are at operatingtemperature.

Idling Oil Pr ssur – With engine running at normal idle speed, note gauge pressure with selector lever in each position. In general, pressure should be equal in "N", "Dr4", "Dr3", and "Lo" (10 lbs. maximum variation), and higher in "R". *See table below for specified pressures.*

Zer Thrott Pressure – With selector lever in "Dr4" position, operate car at speed higher than 30 MPH (Exc. Chev. Truck), 19-22 MPH (Chev. Truck), close throttle, note gauge reading just as car speed drops to 30 MPH (Exc. Chev. Truck), 19-22 MPH (Chev. Truck). *See pressure table.*



DUAL-RANGE HYDRA-MATIC CONTROL VALVE (TYPICAL)

Full Throttle Pressure—With selector lever in "Dr4" position, operate car at approximately 25 MPH (Exc. Chev. Truck), 17 MPH (Chev. Truck), depress accelerator pedal to point where detent resistance is felt but DO NOT go through the detent (this would result in forced 4-3 downshift), note gauge reading just as car speed reaches 30 MPH (Exc. Chev. Truck), 17 MPH (Chev. Truck). *See table below for specified pressures.*

► *SHOP TEST NOTE* If above test being made in the shop (with car on stands), this full throttle position of the control valve can be obtained by disconnecting throttle control rod at lever on side of transmission case and moving lever to the full throttle position (DO NOT move lever through detent), then note gauge reading.

R v rs Pressur – With car standing, place selector lever in "R", apply foot brake firmly to hold car stationary, accelerate engine to half throttle position, note gauge reading. *See table below for specified pressures.*

Main Line Oil Pressures

Car Model	① Idling	Zero Thtl.	Full Thtl.	Rev.
Chev. Truck		60-68	85-93	135 Min.
Hudson	50 ②	60 Min.	80 Min.	125 Min.
Nash	50 ②	60 Min.	80 Min.	125 Min.
Oldsmobile	50 ③	60 Min.	85 Min.	④ 150 Min.
Pontiac	50	64-72	101-109	145-185
Rambler	50	60 Min.	80 Min.	125 Min.

① – Minimum pressure.
② – 60 lbs. maximum in all ranges.
③ – Idling at 400 RPM
④ – Idling at 600 RPM.

► *CHECKING REAR OIL PUMP* Operation of rear pump alone can be checked by the following procedure (Idling test above will check operation of front pump alone, road test involves both front and rear pumps). Operate car on road in 4th speed (selector lever in "Dr4") at 30-45 MPH, move selector lever to "N", turn ignition "off" (this will stop front pump operating so that all

CONTINUED ON NEXT PAGE

DUAL-RANGE HYDRA-MATIC (Con.inued)

pressure will be supplied by rear pump). Gauge reading should be 60-75 lbs. *(CAUTION - If rear pump not working (no pressure) stop road test immediately).* If low oil pressure indicated when testing both pumps, oil leak in system is indicated. If one pump alone has low pressure, trouble in this pump is indicated.

TESTING HYDRA-MATIC OPERATION WITH AIR PRESSURE: ***Following procedure can be used to check operation before disassembling transmission and can also be used after overhaul to insure proper operation before transmission installed in car.*** Drain transmission, remove oil pan and screen. Remove side cover, control valve assembly, and reverse oil pipe. Use air line fitted with special air nozzle (Tool J-4353-1 etc.) so that air can be applied to oil passage holes on side of transmission case. Use approximately 80 lbs air pressure and make test listed below Refer to illustration for location of test points

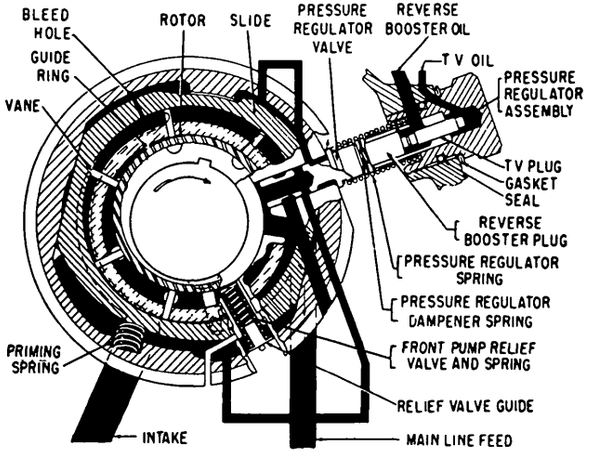
1) Front Clutch. Pressure at this point should actuate front clutch (piston movement will be audible if air applied intermittently, or can be felt if front drum held firmly by hand). *NOTE*—If large amount of air escapes around oil delivery sleeve area, recheck after servos removed to note point of leakage. If oil fog and large amount of air emitted from inside front end of front drum, faulty front clutch seal is indicated. Leakage from any other drilled passages inside case is indication of defective case or oil delivery sleeve.

2) Front Band Apply. Pressure at this point should actuate servo and apply front band. No appreciable air escape should be noted at servo mounting face on case (small amount of leakage at 4-3 valve exhaust hole and also front band release hole is permissible) (front band release hole leakage should only be leakage past ring gap, not blow-by).

3) Front Band Release. Pressure at this point will not actuate servo (piston held in released position by retracting spring) but air escape between servo body and case, or around band release cylinder should only be normal leakage past piston ring gap.

4) Governor Pressure (G1 to 4-3 Valve). Pressure at this point will leak around 4-3 valve retainer wire. No air should be noted between servo body and transmission case or from any other passage (small amount of air from Front Band Apply and Compensator passages).

5) Rear Band Release. Pressure at this point will release rear servo and band with no large escape of air (small amount will escape through piston ring gaps but should not impede normal servo operation) and no appreciable amount of air should escape between servo mounting face and transmission case. No air escape should be noted from any other passage hole (except slight amount at Compensator hole—see item 7).

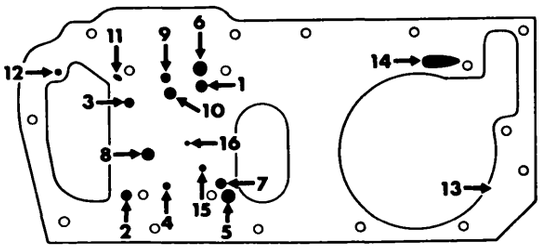


DUAL-RANGE HYDRA-MATIC FRONT PUMP & PRESSURE REGULATOR

6) Rear Clutch. Pressure at this point should actuate rear clutch (piston movement will be audible if air applied intermittently, or can be felt if rear drum held firmly by hand). *NOTE*—If large amount of air escapes around oil delivery sleeve area, recheck after servos removed to note point of leakage. If oil fog and large amount of air emitted from inside rear drum assembly, faulty rear clutch seal or oil delivery sleeve rear ring is indicated Leakage of air from any other passage hole on side of case indicates interconnected passages (defective case) or damaged oil delivery sleeve.

7) Compensator (to Front & Rear Servos). Pressure at this point should actuate rear servo to tighten rear band (band applied by spring) and to actuate front servo to apply band. No appreciable air escape should be noted (other than normal leakage through piston ring gaps) and no air should be noted at any other passage hole on side of case.

8) **Main Line (Pump Feed):** Pressure at this point should be an open blow-by due to fact that main line exhaust valve is in exhaust position



PRESSURE TEST POINTS (SIDE OF TRANSMISSION CASE)

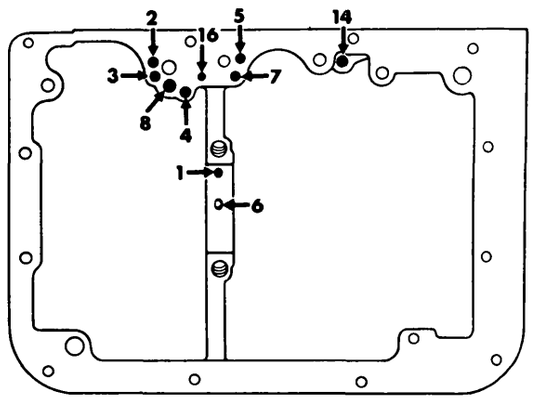
9) Pressure Gauge Hole to Top of Case. Pressure at this point should produce NO evidence of air escape if pressure line plug (on top of case between band adjusting screw) is tight.

10) Exhaust (Port for Valve Body). Pressure at this point should blow freely through to inside of case. Make visual inspection of this hole to see that it is completely open for entire length (***CAUTION***—any obstruction of this hole will cause poor shifting).

11) T.V. Pressure to Regulator. Not necessary to check this passage (this is modulating pressure line to T.V. pressure plug in pressure regulator).

12) Reverse Booster to Pressure Regulator. Not necessary to check this passage (this is booster pressure line to reverse booster plug in regulator).

13) Reverse Pressure. Pressure at this point should actuate reverse cone clutch piston (piston movement should be audible if air applied intermittently, or can be felt if reverse internal gear grasped with the hand). If large amount of air escapes around cone clutch piston, outer and inner oil seal leakage in reverse cone assembly is indicated



PRESSURE TEST POINTS (BOTTOM OF TRANSMISSION CASE)

14) Governor Feed Not necessary to check this passage (directs main line pressure to governor).

15) Line Exhaust Not necessary to check this passage (passage exhausts main line pressure when engine is turned off and car is standing).

16) Low Range (Manual Low Oil). Not necessary to check this passage (passage directs main line pressure oil to fast dump valve in rear servo).

CONTINUED ON NEXT PAGE

DUAL-RANGE HYDRA-MATIC SHIFT POINTS

CHEVROLET TRUCK

HALF-TON—3.09-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-7	8-10	16-18
(At Detent)	10-13	22-25	43-48
"Dr 3" (Min Throttle)	5-7	8-10	
(At Detent)	10-13	22-25	
"Lo" (Forced)	12-16		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	11-13	6-8	3-5
(At Detent)	19-22	5-7	4-6
(Forced)	45-49	16-18	5-7
"Dr 3" (Min Throttle)		6-8	3-5
(At Detent)		5-7	4-6
(Forced)		16-18	5-7

CHEVROLET TRUCK

¼ & 1-TON—4.5-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	4-6	8-10	15-17
(At Detent)	8-11	20-23	39-44
"Dr 3" (Min Throttle)	4-6	8-10	
(At Detent)	8-11	11-13	
"Lo" (Forced)	11-13		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min Throttle)	7-10	5-7	2-4
(At Detent)	18-21	5-7	3-5
(Forced)	41-25	15-17	4-6
"Dr 3" (Min Throttle)		5-7	2-4
(At Detent)		5-7	3-5
(Forced)		15-17	4-6

CHEVROLET TRUCK

¼ & 1-TON—5.1-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	3-5	7-9	13-15
(At Detent)	7-10	18-21	35-40
"Dr 3" (Min Throttle)	3-5	7-9	
(At Detent)	7-10	18-21	
"Lo" (Forced)	10-18		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	6-9	4-6	1-3
(At Detent)	16-19	4-6	3-5
(Forced)	36-40	13-15	3-5
"Dr 3" (Min Throttle)		4-6	1-3
(At Detent)		4-6	3-5
(Forced)		13-15	3-5

HUDSON HORNET

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	6-9	12-17	21-34
(Full Throttle)	21-25	36-39	66-76
"Dr 3" (Min Throttle)	6-9	12-17	
(Full Throttle)	21-25	36-39	76-81
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr. 4" (Closed Throttle)	17-14	10-17	6-3
(Part Throttle)	31-15		
(Full Throttle)	31-28	10-7	5-3
(Forced)	66-15	24-8	
"Dr 3" (Closed Throttle)	80-75	10-7	6-3

HUDSON WASP

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	3-7	10-13	18-21
(Full Throttle)	17-21	30-35	61-65
"Dr 3" (Min Throttle)	3-7	10-13	
(Full Throttle)	17-21	30-37	65-70
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	14-11	9-6	4-2
(Part Throttle)	25-11		
(Full Throttle)	55-21	9-7	4-2
(Forced)	55-12	21-7	
"Dr 3" (Closed Throttle)	68-63	9-6	4-2

NASH AMBASSADOR

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	6-9	11-15	19-24
(Full Throttle)	20-23	32-33	70-78
"Dr 3" (Min Throttle)	6-9	11-15	
(Full Throttle)	20-23	32-38	80-85
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr. 4" (Closed Throttle)	17-13	11-7	6-3
(Part Throttle)	28-17		
(Forced)	63-17	23-19	
"Dr 3" (Closed Throttle)	71-73	11-7	6-3
(Forced)		23-19	
"Lo" (Full Throttle)			11-7

Lockout in "Lo"—4-2 shift, 53-49 MPH.

NASH STATESMAN

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	5-9	9-13	18-22
(Full Throttle)	13-17	27-32	55-63
"Dr 3" (Min Throttle)	5-9	9-13	
(Full Throttle)	13-17	27-32	68-73
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	12-8	8-4	5-3
(Part Throttle)	27-12		
(Forced)	55-15	19-15	
"Dr 3" (Closed Throttle)	67-71	8-4	5-3
(Forced)		19-15	
"Lo" (Full Throttle)			9-6

Lockout in "Lo"—4-2 shift, 50-41 MPH.

OLDSMOBILE

UPSHIFTS:	1-2	2-3	3-4
"Dr."③	④5-19	13-38	21-75
"S"	5-21	13-18	⑧
"Lo"	5-21		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr" (Closed Throttle)	15-13	10-8	6-4
(Full Throttle)	21-19	12-9	10-8
(Forced)⑤	65-18	18-8	10-8
"S" (Closed Throttle)	⑧	10-8	6-4
(Full Throttle)	⑧	12-9	10-8
(Forced)⑤		18-8	10-8
"Lo" (Closed Throttle)			6-4
(Full Throttle)			10-8

PONTIAC

UPSHIFTS:	1-2	2-3	3-4
Left "Dr" (Min Throttle)	7-10	12-15	21-25
(Full Throttle)	20-23	36-40	68-73
Right "Dr" (Min Throttle)	7-10	12-15	71-76
(Full Throttle)	20-23	36-40	70-75
"Lo" (Full Throttle)	19-23		41-45
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
Left "Dr" (Closed Throttle)	20-17	13-10	8-6
(Full Throttle)	31-17	13-10	13-10
(Forced)	70-31	26-13	13-10
Right "Dr" (Closed Throttle)	72-67	13-10	8-6
(Full Throttle)	78-73	13-10	13-10
(Forced)	78-73	26-13	13-10
"Lo" (Full Throttle)	59-54	53-48	
(Forced)			11-0

RAMBLER

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-9	9-13	18-22
(Full Throttle)	13-17	27-32	55-63
"Dr. 3" (Min Throttle)	5-9	9-13	
(Full Throttle)	13-17	27-32	68-73
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	12-8	8-4	5-3
(Part Throttle)	27-12		
(Forced)	55-15	19-15	
"Dr 3" (Closed Throttle)	67-71	8-4	5-3
(Forced)		19-15	
"Lo" (Full Throttle)			9-6

Lockout in "Lo"—4-2 shift, 50-41 MPH

DUAL-RANGE HYDRA-MATIC (Continued)

►*NOTE—Most Hydra-Matic troubles can be corrected by external adjustments and correct oil level. See following table for trouble and possibe causes. See also "HYDRA-MATIC OVERHAUL."*

LIGHT THROTTLE SHIFT POINTS HIGH: (With Full Throttle Shift point normal)—Throttle linkage adjusted incorrectly. Adjust throttle linkage and check for worn or loose control rods.

FULL THROTTLE SHIFT POINTS: (Either too high or too low or do not occur)—Governor valves not operating properly, leakage at governor assembly, broken oil rings. Governor ring lands might be worn. Correct by freeing valves, check for warped surfaces. Replace parts as necessary.

NO THROTTLE DOWNSHIFT IN "Dr" RANGE: (From 4th to 3rd above 20 M.P.H.)—Insufficient accelerator travel due to interference of throttle linkage or at floor carpet. Throttle controls improperly adjusted or lever bent or loose on shaft. Spring lock in downshift valve may be missing.

TRANSMISSION DOES NOT RESPOND TO SHIFT LEVER POSITION: Pin which picks up manual valve in valve body is not operating in groove in manual valve. To check, shift selector lever into reverse. If severe clashing results or if lever goes into reverse but car locks up and fails to move backwards, pickup pin is not operating manual valve. Remove side cover and engage pin.

TRANSMISSION FAILS TO DRIVE CAR: Usually caused by failure of one or both bands to be applied. Check for low oil pressure. Front or rear band adjustment incorrect. Manual valve mispositioned, or torus check valve sticking. Front oil pump inoperative. See Oil Pressure Tests.

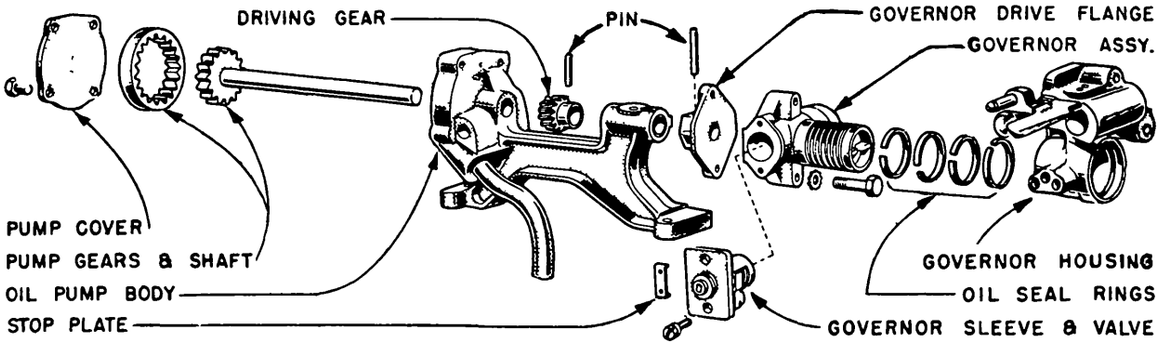
NO 3RD. OR 4TH. SPEED DRIVE (Drive normally in 1st. & 2nd. Speed): Rear clutch not applying due to: Leakage in line to clutch or in valve body, hole in transmission case to oil delivery sleeve or sleeve passage clogged, oil delivery sleeve incorrectly installed or oil rings broken, clutch oil seal leaking or clutch piston sticking.

SLIPS IN 1ST. 3RD, & REVERSE (Operation normal in 2nd. & 4th. Speed): Front band slipping due to: Leakage in valve body, passages in case, or in servo. Servo pistons sticking. Band incorrectly adjusted. Valves in valve body sticking. Throttle linkage incorrectly adjusted or not operating correctly.

SLIPS IN 1ST. OR 2ND. SPEED (Operation normal in 3rd. 4th., & Reverse): Rear band slipping due to: Leakage in valve body, passages in case, or in servo. Servo piston sticking. Band incorrectly adjusted. Valves in valve body sticking. Throttle linkage incorrectly adjusted or not operating correctly.

SLIPS IN "LO" RANGE (Operation normal in Reverse): Rear band slipping or not operating (see causes in 1st. & 2nd. Speed Slip above).

SLIPS OR CHATTERS ON 3-2 DOWNSHIFT: Rear band slipping or not operating (see causes in 1st. & 2nd. Speed Slip above). Rear servo operation incorrect due to: weak or broken servo springs or accumulator check valve stuck closed. Insufficient compensator pressure due to: Throttle linkage operating incorrectly or compensator valve stuck.



DUAL-RANGE HYDRA-MATIC REAR OIL PUMP & GOVERNOR

THROTTLE DOWNSHIFT FROM 3RD. SPEED DELAYED OR REQUIRES EXCESSIVE THROTTLE OPENING (May not occur until car stopped, usually occurs when transmission cold): Governor or valves in valve body sticking.

CLOSED THROTTLE 3-2 DOWNSHIFT OCCURS AT EXCESSIVELY HIGH SPEED (with severe "clunk"): Rear servo check valve not operatng correctly, accumulator piston rings stuck or broken, valves in valve body sticking, rear clutch piston binding on its pilot, governor operation incorrect, governor oil seal rings broken, or oil leak at governor assembly.

LIGHT THROTTLE DOWNSHIFT TO 3RD. SPEED OCCURS ABOVE 20 MPH. IN DRIVE RANGE (Or transmission "hunts" between 4th. & 3rd. Speeds): Throttle linkage adjustment incorrect or valves in valve body sticking.

UPSHIFTS ERRATIC OR MISSING (Starts in 3rd. or 4th. Speed in "Dr" Range, Starts in 2nd. Speed in "Lo" Range, May shift to 3rd. Speed in "Lo" Range or miss 3rd. Speed in "Dr" Range, May operate only in 2nd. Speed or only in 3rd. & 4th. Speeds in "Dr" Range): Governor valves sticking or valves in valve body sticking.

NO 4TH. SPEED UPSHIFT (2nd. & 3rd. Speed Upshifts normal): Governor valves sticking or valves in valve body sticking.

LIGHT THROTTLE UPSHIFT SPEEDS EXCESSIVELY HIGH (with violent band application when shifting from "N" to "Dr" when car standing): Governor valves sticking or valves in valve body sticking.

TRANSMISSION JUMPS OUT OF REVERSE: Manual control linkage rod adjusted too short.

SHIFT OUT OF REVERSE DIFFICULT: Inside manual cam lever surface rough or detent plunger rough.

ERRATIC RESPONSE TO SHIFT LEVER: Inner manual control valve lever loose on shaft. Replace lever assembly.

HUNTING: Adjust throttle linkage, check valve assembly and clean thoroughly and reface.

ALL SHIFTS ROUGH: Adjust throttle linkage and servo bands. Clean and reface valve assembly. Check transmission passages for leaks. Check oil pressure.

CREEPS FORWARD WHEN IN "R" POSITION: Rear unit not operating correctly. Excessive drag in rear clutch.

NO DRIVE WHEN ENGINE IS FIRST STARTED: Check fluid coupling and front pump. Test oil pressure.

CREEPS EXCESSIVELY IN "Dr": Engine idle speed too high.

CAR WILL NOT BACK UP: (Unless throttle is opened excessively)—Rear band not released due to low oil pressure caused by leakage or compensator valve auxiliary plug pin missing.

BANDS APPLIED VIOLENTLY, ENGINE SPEEDS UP: Low oil pressure or level. Pressure regulating valve sticking. Front pump may not be operating properly or there is a bad oil leak in the system. Check oil pressure and oil level. Free up pressure regulator valve or install new valve.

NO DRIVE IN REVERSE: This condition will occur if front servo exhaust body spacer is installed in reverse. Under this condition oil pressure does not increase when selector lever is placed in Reverse position. Pressure will increase to 150-170 lbs. when transmission shifts from 1 to 2.

SLIPPING IN REVERSE ONLY: Check for Low Oil Pressure in Reverse, Inoperative Front Servo Exhaust Valve, Key missing or defective in stationary cone, Stationary Cone or Cone Clutch Piston worn excessively, Front Servo & Band operation not operating properly, Valve Body Assembly dirty (sticking valves or oil leaks), Stationary cone distorted by handling when disassembled.

SELECTOR LEVER WILL NOT GO INTO REVERSE: Check for: Governor G-1 weight stuck wide open or broken governor ring (separating main lin pressure from G-1 pressure to reverse blocker piston),

CONTINUED ON NEXT PAGE

DUAL-RANGE HYDRA-MATIC (C ntinued)

Governor ring groove or gap clearances incorrect, Governor sleeve defective, Parking Pawl Crank bent, Detent Plunger in inner control lever stuck, Reverse Blocker Piston sticking or piston spring weak or broken.

EXCESSIVE SQUAWK IN REVERSE (May occur when selector lever out of Reverse if reverse unit not fully disengaged): Check for low oil pressure and galling of stationary cone and cone clutch piston. If reverse not fully disengaged also check for: Check Valve in detent plunger retainer in valve body plugged, Reverse Clutch Spring inoperative or weak, High spot or galling of stationary cone and cone clutch piston, cone clutch piston release springs defective or weak, Rear Bearing Dowels too high.

LOW OIL PRESSURE, SLIPPAGE, DELAYED AND ERRATIC UPSHIFTS: These conditions will exist when one or the other of the two ¼" cup shaped plugs are missing from the parking bracket. (CAUTION—These plugs are not service parts and should never be removed). If plugs are loose or missing, replace assembly.

REVERSE CONE ENGAGES WHEN IN DRIVE: This condition can occur when there is excessive leakage into the reverse apply circuit. Check for leakage as follows:

1) Check front servo exhaust valve for proper fit in exhaust body. Clearance should be .002".

2) Inspect detent retainer spacer and valve body surfaces that contact spacer. Replace control valve if necessary.

3) Check Throttle Valve plug in Pressure Regulator for excessive clearance. If greater than .002" replace Regulator plug assembly.

4) Neoprene seal on Pressure Regulator Plug defective. Use extreme caution when installing plug not to damage seal (remove all sharp corners or burrs in transmission case with round hone, place small amount of grease on seal before installing assembly, DO NOT use wrench to start pressure regulator plug in housing).

REMOVAL & INSTALLATION
HUDSON, NASH & RAMBLER

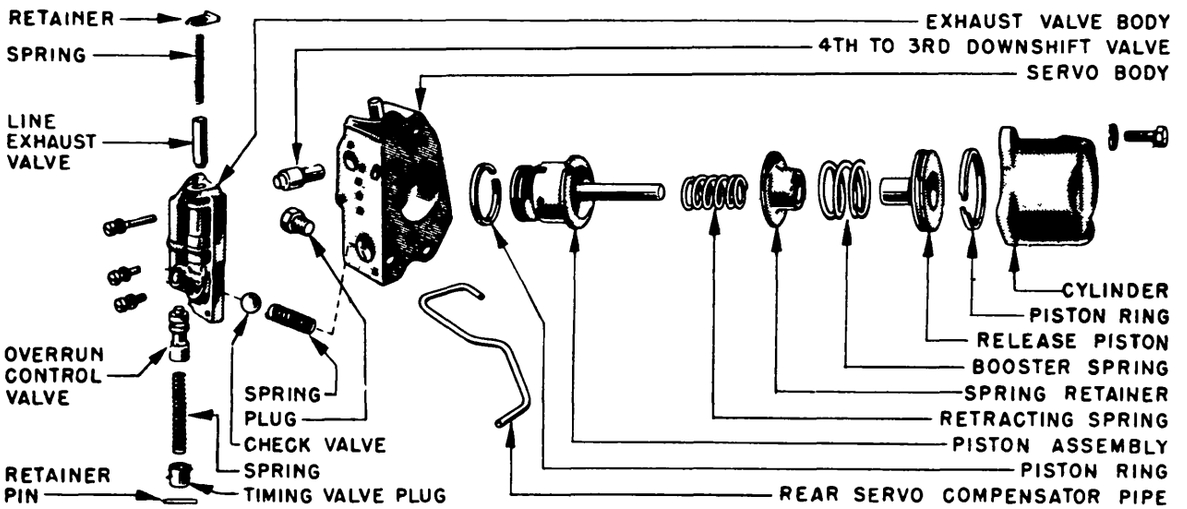
REMOVAL: Raise car and place on jack stands, supporting rear of car at body side sills. Support rear axle assembly with a hydraulic jack. Drain fluid from transmission (see "Draining & Refilling" above) and remove oil pan. Disconnect hand brake cable at bellcrank and brake cable housing at bellcrank bracket. Disconnect speedometer cable and housing at transmission adapter. Disconnect throttle rod and manual control rod assemblies at levers on transmission. Remove rear brake hose bracket from floor pan to prevent damage to hose. Disconnect torque tube from rear bearing retainer; then move rear axle and torque tube assembly to rear and separate by sliding universal joint to rear, off splines of output shaft. Support rear end of engine to take weight off support crossmember. Remove support crossmember, cushion and bracket assembly. Remove plate from flywheel housing and drain fluid from torus cover. Remove throttle control lever from transmission to prevent bending it while removing and replacing transmission. Remove torus cover-to-flywheel attaching bolts and lockwashers (30). Lower engine slightly to remove flywheel housing attaching bolts. Place hydraulic jack, with tool J-2808 under transmission (jack handle toward rear), and lift transmission slightly to take strain off flywheel housing bolts (*CAUTION* - Tool J-2808 must be fastened securely to jack pad to prevent it slipping). Remove flywheel housing attaching bolts, nuts and lockwashers. Remove transmission assembly by moving transmission to rear of car and lower assembly after mainshaft has been withdrawn from crankshaft pilot bushing. *NOTE* - To prevent end of mainshaft striking flywheel-to-crankshaft bolts when lowering transmission, turn flywheel so end of mainshaft will pass between two bolts.

INSTALLATION: Reverse removal procedure and note the following: Guide sleeves of flywheel housing into corresponding holes in rear engine plate and dowels of flywheel in corresponding holes in torus cover. Install flywheel housing attaching bolts, lockwashers and nuts. Install torus cover-to-flywheel bolts with lockwashers and tighten finger tight. Finally tighten as follows: Tighten two bolts adjacent to dowels to 12-15 ft. lbs. Tighten two bolts located 90° from dowels to 12-15 ft. lbs. Tighten all bolts in rotation to 20-25 ft. lbs. Re-tighten all bolts in rotation to 30-35 ft. lbs.

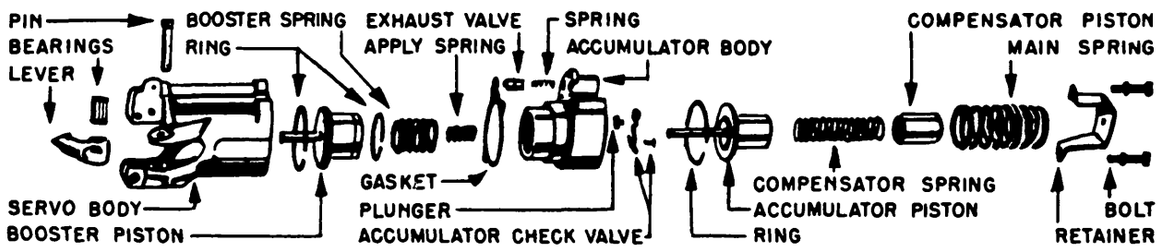
OLDSMOBILE

REMOVAL: Disconnect lower starter cable assembly from junction block, then disconnect purple lead from neutral safety switch, and black lead from main wiring harness. Loosen safety switch mounting bracket. Raise car on two-post hoist and drain transmission (see "Draining & Refilling" above). Remove left engine filler plate and remove starter with cable assembly attached. Remove crankcase ventilator. Support engine with unit-lift, raising it far enough to relieve weight from rear mounts, then remove capscrews from rear mounts-to-flywheel housing. Remove three bolts from each end of crossmember-to-frame and remove crossmember. Remove lower flywheel housing and install rear engine support bar BT-28, with pilots on support screws entering lower housing front attaching screw holes. (*NOTE* - Locate bar forward so it will not inter-

CONTINUED ON NEXT PAGE



DUAL RANGE HYDRA-MATIC FRONT SERVO UNIT (TYPICAL)



DUAL-RANGE HYDRA-MATIC REAR SERVO ASSEMBLY (TYPICAL)

DUAL-RANGE HYDRA-MATIC (Continued)

fere with torus cover when lowering transmission). Remove unit-lift. Disconnect speedometer cable at transmission. Disconnect manual control rod from transmission lever. Remove throttle control rod lever. Disconnect propeller shaft from companion flange and slide rearward away from transmission Remove torus cover-to-flywheel attaching screws (30). Lower engine, not to exceed 1½", enough to permit removal of the two upper bellhousing-to-block capscrews. Again support transmission with unit-lift and secure with chain (if so equipped). Remove two remaining flywheel housing-to-block bolts. Remove transmission assembly toward rear of car, lower it at the same time. *NOTE* - To prevent end of mainshaft striking flywheel-to-crankshaft bolts when lowering transmission, turn flywheel so end of mainshaft passes between two bolts.

INSTALLATION: Reverse removal procedure and note the following Use a new gasket and do not use shellac or sealer. Tighten torus cover-to-flywheel capscrews to 35-40 ft. lbs.

PONTIAC

REMOVAL: Raise car on hoist and drain transmission (see "Draining & Refilling" above). Disconnect filler pipe. Disconnect speedometer cable at transmission. Disconnect propeller shaft at differential flange and slide propeller shaft from transmission output shaft. Loosen exhaust pipe at crossover pipe flange. Remove flywheel housing lower cover. Drain oil from cover by removing pipe plug. Remove throttle control lever (outer) from shaft at side of transmission. Disconnect gear shift control rod assembly from shift lever at transmission. Remove torus-to-flywheel cover attaching bolts (30). Disconnect two rear engine mounting insulators at crossmember. Using Tool J-4732, raise back of engine until rear engine mountings are approximately ¼" above crossmember *(CAUTION - Do not raise engine more than necessary to remove crossmember).* Remove six crossmember-to-frame side rail bolts and remove crossmember by tapping both ends of crossmember down until right end is resting on exhaust pipe. Then tap left end down until it clears frame side rail. Lift right end over exhaust pipe and remove *(NOTE* - Mark crossmembers so left side can be distinguished from right when installing). Lower engine below its normal position so rear flywheel housing upper attaching bolts are accessible with an 18" to 22" socket extension and universal socket. Position special transmission jack under transmission and lift transmission slightly to take strain off rear flywheel housing attaching bolts. Remove six rear housing-to-front flywheel attaching bolts and lockwashers. Remove transmission assembly by moving transmission toward rear of car and at same time lowering assembly to floor.

INSTALLATION: Reverse removal procedure and note the following Position torus cover so that grind marks, punch marks, or blue markings on flywheel dowel and torus cover correspond. To position frame crossmember, raise engine approximately ½" above its normal height. Tap crossmember into place between frame side rails, making sure it is installed in correct position (rear edge of crossmember is cut away slightly along bottom edge to give ample clearance for transmission oil pan).

TRANSMISSION OVERHAUL

OVERHAUL: Disassembly, reassembly and overhaul procedures are the same as for 1955 model transmissions. *See "Dual-Range Hydra-Matic Transmission" in 1955 Annual Data or later Manual edition, and note the "Changes, Cautions, Corrections" above.*

DUAL-COUPLING HYDRA-MATIC

Cadillac (1956)
Nash Ambassador Special V8 (1956)
Hudson Hornet Special V8 (1956)
Oldsmobile (1956) ①
Pontiac (1956) ①

①—Dual-Range Hydra-Matic also used on some models.

▷CHANGES, CAUTIONS, CORRECTIONS

▷*STARTING ENGINE BY PUSHING CAR:* Move selector lever to "N" (Neutral) position and turn on ignition switch. When car reaches speed of 25 MPH (Exc. Cadillac); 30-35 MPH (Cadillac), move selector lever to either "D" (Drive) position on Cadillac, Hudson, Nash & Pontiac; or to "D" or "S" position on Oldsmobile.

▷*TOWING HYDRA-MATIC DRIVE CARS:* Drive shaft must be removed or car must be towed with the rear wheels off the ground. Damage to transmission will result if these precautions not taken.

▷*TRANSMISSION OIL COOLER NOTE (ALL MODELS):* In the event of serious damage to transmission, the oil cooler should be replaced as it is not possible to properly clean cooler in the field.

▷*TRANSMISSION OIL FOAMING NOTE (ALL MODELS):* This condition may be caused by water leaking into transmission at the oil cooler. Check oil cooler for leaks as follows: Remove cooler and apply air pressure not exceeding 25 lbs., to either of the two cooler water pipes (plug other pipe). Submerge end of oil pipes in water and check for air bubbles in water. If bubbles appear, oil cooler is leaking and must be replaced. Before installing new cooler, remove transmission oil pan and clean thoroughly. Install clean transmission oil.

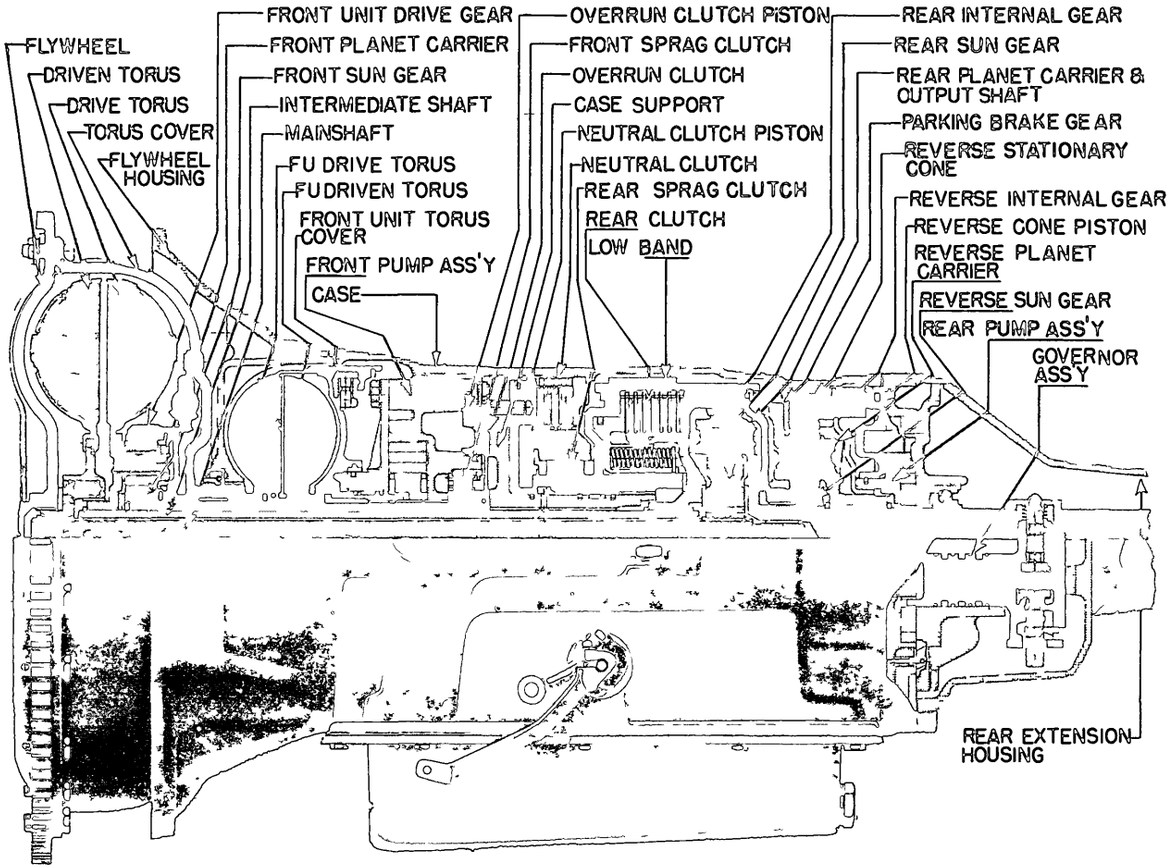
▷*1956 CADILLAC & PONTIAC TRANSMISSION OIL FILLER PIPE LEAKAGE CORRECTION:* Remove filler pipe and install Service Package, Part No. 861956 as follows: Install new "O" ring seal and new sleeve, tapping sleeve gently into case until snug against "O" ring seal. Lubricate filler pipe and insert into sleeve and through "O" ring seal (it may be necessary to remove pipe and drive sleeve down against seal to properly compress it for a tight fit). Make sure "O" ring seal is not damaged during installation.

▷*TRANSMISSION PRESSURE POINT CHANGE:* On later transmissions, a pipe plug will be found on the right side of the transmission just above and to rear of oil cooler pipe adapter, which will be used for checking Throttle Valve Pressure.

▷*1956 CADILLAC TRANSMISSION "SQUEAK" CORRECTION:* A high shrill squeak, similar to a dry water pump squeak may occur in first and reverse gears, and in "Dr3" under full throttle. Correct by installing thrust washer, Part No. 8616526, between driving torus of front unit coupling and bushing of flywheel.

▷*1956 CADILLAC ERRATIC SHIFT CORRECTION:* See *"Overhaul" below.*

▷*1956 CADILLAC 1-2 OR 2-3 LATE SHIFT CORRECTION:* May be caused by improper throttle valve adjustment, dirt in control valve assembly, or interchanged valve springs. See *"Overhaul" below.*



DUAL-COUPLING HYDRA-MATIC TRANSMISSION (SECTIONAL VIEW)

▷*1956 CADILLAC SLIPPING SHIFT CORRECTION:* If slipping or long drawn out 2-3 shifts cannot be corrected by throttle valve rod adjustment or cleaning control valve and governor, install an inner accumulator spring, Part No. 8617469. See *"Overhaul" below.*

▷*EARLY 1956 CADILLAC GOVERNOR CLICK CORRECTION:* See *"Overhaul" below.*

▷*1956 PONTIAC 285 HORSEPOWER ENGINE TRANSMISSION THROTTLE VALVE CONTROL ROD & LEVER CHANGE:* This correction made to reduce the tendency of bunching the 1-2 and 2-3 shifts, and to improve the 2-3 shift. The later type throttle valve outer lever, Part No. 521523 is identified by its right angle shape (earlier type has a reverse curve). On the later type, the distance between centerline of throttle shaft hole and centerline of hole for throttle rod ball is 2-31/32" (3-7/8" on early type). A new throttle rod, Part No. 522789 is used with the new lever and is identified by a 4-5/32" length from rear ball stud to first bend (earlier rod is 3-1/16" at this location).

▷*1956 PONTIAC 285 HORSEPOWER ENGINE TRANSMISSION SOFT OR SLIPPING 2-3 SHIFT CORRECTION:* If there is a soft or slipping 2-3 shift after installation of the later type throttle valve outer lever and throttle rod (see above), transmission accumulator springs can be changed. See *"Overhaul" below.*

▷*1956 PONTIAC PRODUCTION CHANGE (TO IMPROVE 2-3 SHIFT) AND CENTER BEARING SUPPORT PRODUCTION CHANGE:* See *"Overhaul" below.*

▷*1956 PONTIAC LOW SPEED "CLICKING" NOISE CORRECTION:* See *"Overhaul" below.*

▷*1956 PONTIAC TRANSMISSION LOCKUP CORRECTION (When Shifting From Drive To Reverse):* See *"Overhaul" below.*

DESCRIPTION

The Dual-Coupling Hydra-Matic is a four speed hydraulically controlled planetary type transmission

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC (C ntinu d)

which is connected to the engine crankshaft through a fluid coupling, and is composed of the following control assembly, parking assembly, and drive units.

Control Valve Assembly–The control valve assembly consists of four individual assemblies connected to one main assembly Coupling Valve Body Assembly, Shift Valve Body, Reverse Blocker Body, and Manual Control Valve Body Assembly.

Parking Assembly–A pawl actuated by linkage of manual control lever drops into teeth on outer diameter of the reverse planet carrier which is splined to output shaft of transmission and which prevents the output shaft from turning.

Front Unit–Drive parts of the front unit are the controlled fluid coupling, planetary gear set, and front sprag clutch.

Rear Unit–Drive parts of the rear unit are the planetary gear set, multiple disc rear clutch, rear sprag clutch, and the neutral clutch.

Reverse Unit–Drive parts of the reverse unit are the planetary gear set, reverse stationary cone, and reverse apply piston.

Overrun Clutch (Front Unit)–The overrun clutch is a single disc clutch connected to the front sprag clutch and is used to prevent the sun gear from rotating. This unit operates only when overrun braking is required in Dr. 3 range (1st & 3rd speed), Lo range (1st speed), and Reverse.

Lo Band (Rear Unit)–The Lo band is servo operated and is engaged only when transmission is in Lo range. Adjustment of this band is not required.

OPERATION

Transmission operation in each selector lever position is outlined below. In either "D" (Drive) position, operation varies with car speed and operating conditions.

N utral Position: Front unit is in reduction (controlled coupling empty and sprag clutch holding). Rear unit is in neutral (neutral clutch released, rear clutch released and Lo band released). Reverse unit is in neutral (reverse cone clutch released)

Drive Left (Pointer to left of "D" on Cadillac & Pontiac. "Dr" on Oldsmobile. "Dr4" on Nash & Hudson).

First Speed–Front unit is in reduction (controlled coupling empty, sprag clutch holding). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 3.97-1.

Second Speed–Front unit is in direct drive (controlled coupling is filled and sprag clutch released). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released) Reverse unit is in neutral (reverse cone clutch released). Total reduction is 2.55-1.

Third Speed–Front unit is in reduction (controlled coupling empty, sprag clutch holding). Rear unit is in direct drive (neutral clutch applied, rear clutch applied, sprag clutch released and Lo band released). Reverse unit is in neutral (cone clutch released). Total reduction is 1.55-1.

Fourth Spe d–Front unit is in direct drive (controlled coupling is filled, sprag clutch released). Rear unit is in direct drive (neutral clutch applied, rear clutch applied, sprag clutch released and Lo band released). Reverse unit is in neutral (cone clutch released). No reduction 1.00-1.(Direct Drive).

Drive Right (Pointer to right of "D" on Cadillac & Pontiac. "S" on Oldsmobile. "Dr3" Nash & Hudson).

First Speed–Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released) Total reduction is 3.97-1.

Second Speed–Front unit is in direct drive (controlled coupling filled, sprag clutch released, overrun clutch released). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 2.55-1.

Third Speed–Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is in direct drive (neutral clutch applied, rear clutch applied, sprag clutch released and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 1.55-1.

Lo Range (All Models):

First Speed–Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band applied). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 3.97-1.

Second Speed–Front unit is in direct drive (controlled coupling filled, sprag clutch released, overrun clutch released). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band applied). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 2.55-1.

Reverse Range: Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is acting as reverse idler (neutral clutch released, rear clutch released, sprag clutch released). Reverse unit is in reduction (reverse cone clutch applied). Total reduction is 4.31-1.

LUBRICATION

LUBRICATION INTERVALS: Check fluid level every 1000 miles (Hudson, Nash & Oldsmobile), 2000 miles (Cadillac & Pontiac). Drain & refill every 25,000 miles.

Recommended Lubricant: Use only GM Hydra-Matic Fluid or an Automatic Transmission Fluid Type "A" with "AQ-ATF" embossed on top of fluid container.

CHECKING FLUID LEVEL: With selector lever in "N" or "P" position, run engine at normal idle speed (except Cadillac), approx. 20 MPH (Cadillac), for 1½ minutes and check fluid level on dipstick. With engine still running, add fluid to bring level up to within ¼" of "F" (full) mark on dipstick. *CAUTION–do not fill above "F" mark on dipstick as this will cause foaming when transmission oil is hot.*

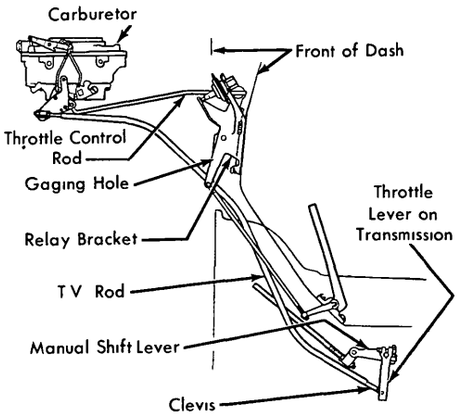
►*NOTE Fluid level should be ¼" below "F" mark when cold and at the "F" mark when hot.*

DRAINING & REFILLING: Remove transmission oil pan drain plug and drain plug from flywheel or torus cover (*NOTE*–To gain access to flywheel or torus cover drain plug, remove flywheel housing front cover (Cadillac, Hudson & Nash), flywheel inspection plate (Oldsmobile), flywheel housing lower plate (Pontiac). Allow old fluid to drain completely and then reinstall plugs. *(CAUTION–Care must be taken not to damage flywheel or torus drain plug).* Pour 11 qts. (Oldsmobile), 8 qts. (all others) of Automatic Transmission Fluid Type "A" into transmission through filler tube on right side of transmission (tube is located under hood and also houses the dipstick). Run engine at 800 RPM (Cadillac), normal idle speed (all others) for 1½ minutes with selector lever in "N" (neutral). On Cadillac, reduce engine to idle speed and add fluid as required to bring level up to within ¼" of "F" (full) mark on dipstick.

►*NOTE*–Transmission oil capacity is approximately 12 qts. (Cadillac), 10½ qts. (Hudson & Nash), 11 qts. (Oldsmobile), 9½ qts. (Pontiac).

LINKAGE ADJUSTMENT

►*THROTTLE VALVE LINKAGE ADJUSTMENT NOTE: See "Carburetor" on individual car model pages for throttle valve linkage adjustment.*



CADILLAC MANUAL LINKAGE

CADILLAC

MANUAL LEVER LINKAGE ADJUSTMENT: Loosen the adjusting nuts on transmission manual rod and back off approximately 1". Place manual lever on transmission fully forward to "P" (Park) position. Place selector lever on steering column in "P" (Park) position Slide clevis of manual lever along manual rod in direction of steering column until all slack in linkage is taken up (*NOTE*–If clevis contacts upper adjusting nut before all slack is taken up, nut should

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC (Continu d)

be backed off an additional amount). Tighten lower adjusting nut with fingers against clevis to further remove slack. Bring upper adjusting nut down to contact clevis and tighten with wrench. Check manual selector lever in car. It should be free to enter the "P" (Park) position and the "DR4" stop in the steering column should correspond to the "DR4" detent position in the transmission. Readjust if necessary. Check indicator pointer to see that it indexes to the "DR4" position when selector lever is at the "DR4" stop.

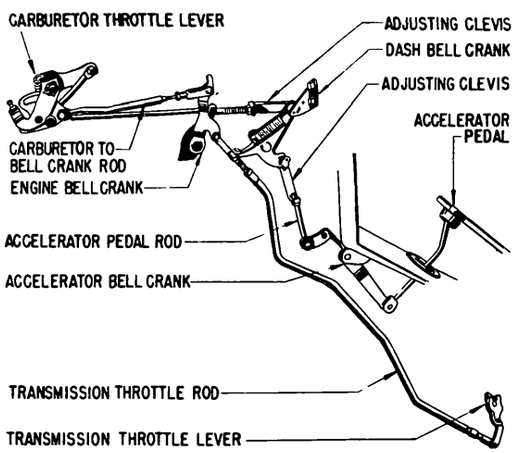
N utral Saf ty Switch Adjustment (Combination Neutral Saf ty Switch, Back-up Light Switch): Located on steering column forward of instrument panel. Loosen attaching screw on switch and position it on jacket so starter is not operative in any position except "N" (Neutral) or "P" (Park).

NASH & HUDSON

MANUAL LEVER LINKAGE ADJUSTMENT: Place selector lever in the "D-3" position and set operating lever against stop on starter switch bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever. Place transmission outer shift lever in "D-3" position. Adjust clevis so that clevis pin passes freely through hole in lever with the operating lever against stop on starter switch bracket, then remove clevis and **l ngthen the contr l rod two full turns** and replace clevis and pin.

OLDSMOBILE

MANUAL LEVER LINKAGE ADJUSTMENT: Place transmission manual lever in neutral detent position. Disconnect manual rod from lower shift lever. Hold lower shift lever upward so selector lever is positioned against stop in upper steering column. Adjust manual rod clevis so pin will enter approximately 1/8" into lower shift lever bushing with selector lever against stop. Tighten clevis locknut and connect manual rod to lower shift lever.



OLDSM BILE MANUAL LINKAGE

Neutral Saf ty Switch Adjustment: Located on steering column forward of instrument panel. Loosen attaching screws on mast jacket, and with selector lever in "N" (neutral) position, position the switch so that a .090" pin can be inserted through hole in switch arm and into hole in face of switch. Tighten switch attaching screws and remove pins. Check to see that starter will operate only in "P" (Park) and "N" (Neutral) positions, and that transmission is not in gear.

PONTIAC

MANUAL LEVER LINKAGE ADJUSTMENT: Place gear shift selector in "Drive Right" position against stop which prevents accidental shift into low range. Loosen both front and rear trunnion lock nuts and remove trunnion from outer shift lever. Make sure that transmission outer shift lever is in "Drive Right" position (third detent from front). Install trunnion with locknuts loose, in outer shift lever. Tighten front locknut against trunnion finger tight to remove clearance in in linkage. Tighten rear locknut against trunnion.

Neutral Safety Switch Adjustment: Located at lower end of steering column in engine compartment. Loosen switch mounting screw and adjust switch bracket to a position where starter will not operate when ignition key is turned to start position. Place manual control lever in "P" (Park) position. Make certain that switch arm does not touch stop on switch bracket. Check to see that engine starts when selector lever is in "P" (Park), or "N" (Neutral) positions. Tighten mounting screw securely.

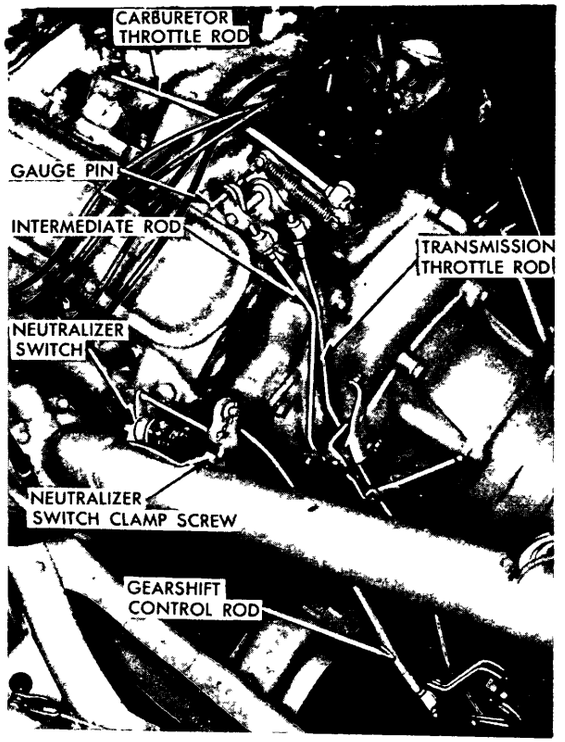
TESTING

ROAD TEST: Operate car over a test route and note performance and shift speeds. Select a test route that will provide for all types of operation. *See "Dual-Coupling Hydra-Matic" Shift Point Table for correct shift speeds.*

►*1ST SPEED & REVERSE TEST NOTE: See "Stall Test" below.*

2nd Speed Test: With selector lever in "Lo" range, make a full throttle start from a complete stop. The shift to 2nd speed should occur as indicated in "Shift Table" below, accompanied by a drop in engine RPM which then increases in second speed as full throttle opening is maintained. If a definite change from first to second speed is not noticed and engine speed does not drop but increases steadily, a malfunctioning front unit coupling is indicated. When the car is in second speed, permit the car to coast at zero throttle opening. If a definite engine braking effort is noticed, a malfunctioning overrun band is indicated. If transmission slips in second or misses second speed, the front unit coupling is not operating properly. If transmission slips in first and second on coast in "Lo" range, the overrun band is not operating properly.

3rd & 4th Speed Test: Using the "Dr4" (Drive Left) range to obtain 40 MPH, move the selector lever to "Dr3" (Drive Right) range, forcing a downshift to third speed. Decrease car speed by use of the brakes while throttle is maintained in the open position and car speed is above 25 MPH. If engine RPM increases and the transmission has been satisfactory in reverse,



PONTIAC MANUAL LINKAGE

first & second speeds, the rear unit clutch is slipping. If no excessive slip is felt, the rear unit clutch is operating correctly. The operation of the front unit clutch can be checked by bringing the car speed up to 30 MPH in "Dr4" range. With the car coasting in "Dr4" range, manually shift to "Dr3" range. If an immediate shift is felt which results in more braking effect on the car, then the overrun clutch is operating properly. If the manual lever is shifted from "Dr3" to "Dr4" range above 22 MPH with the car coasting and an immediate reduction of braking effort is obtained, then the clutch is releasing properly.

►*1956 PONTIAC STALL TEST CHANGE: Stall testing to be discontinued.*

STALL TEST (EXCEPT 1956 PONTIAC): Use this test to check engine and transmission performance. Connect a tachometer to check engine speed, and bring engine and transmission to operating temperature. Apply foot brake and set hand brake tightly. Place selector lever in "Dr4" position. Depress accelerator pedal to the floor and note engine RPM *(CAUTION—Use extreme care when making this test and DO NOT HOLD THROTTLE OPEN MORE THAN ONE MINUTE, 15-20 seconds preferably. If engine speed exceeds maximum RPM, as noted below, CLOSE THROTTLE IMMEDIATELY to avoid possible damage to transmission). If engine speed not correct make further tests as indicated below.*

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC (C ntinued)

If Engine Speed Above Maximum: If engine speed continues above 1825 RPM (Hudson & Nash), 2100 RPM (Cadillac with single carburetor), 2500 RPM (Cadillac with dual carburetor) it indicates that sprags are not holding properly or that there is slippage in the fluid coupling, damaged torus members, or defective front pump.

Check To Determine Which is Slipping—After above test, place selector lever in "R" position and test again. If slippage still occurs, fault is with front unit (or both front and rear units). If slippage does not occur, then all slippage is in the rear unit.

OIL PRESSURE TEST: Connect Oil Pressure Gauge J-2540 (Cadillac), J-2540-A (Hudson & Nash), J-4268-1 (Pontiac) to take-off hole at bottom of rear pump using a hose and fitting. Drive car until transmission oil has reached normal operating temperature.

Zero Throttle Pressure (Hudson, Nash, Pontiac): Check pressure in all ranges. Pressure should be 50 lbs. minimum in all ranges with a maximum variation of 10 lbs., (may be higher in reverse).

Zero Throttle Pressure (Cadillac): With transmission in 4th speed, and car above 20 MPH, oil line pressure should be 60 to 70 lbs.

Drive Right Pressure (Hudson, Nash, Pontiac): With transmission selector lever in "Drive Right" position and car speed at approximately 25 MPH, pressure should be 90-100 lbs. *NOTE*—Pressure at any speed is constant regardless of throttle pressure as throttle valve pressure is not used to modulate line pressure.

Drive Left Pressure (Hudson, Nash, Pontiac): While driving at 25 MPH, move selector lever back to "Drive Left" position so that transmission will shift into 4th speed. Oil pressure should drop to 60-70 lbs., in 4th.

Full Throttle Pressure Test (Cadillac): In any drive range pressure should be at least 20 lbs. higher than zero throttle pressure test reading (see above).

Rear Pump Pressure Test (Cadillac): Drive car at 40-45 MPH in 4th speed, then shift to neutral and turn engine off. Pressure should be at least 60 lbs.

Reverse Pressure Test (Cadillac, Huds n, Nash, P ntiac): Place selector lever in "R" (Reverse) and

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC SHIFT POINTS

CADILLAC
3.07-1 AXLE
(60S, 62 Series – Single Carb.)

UPSHIFTS:	1-2	2-3	3-4
"Dr4" (Min. Throttle)	7-10	14-18	20-24
(At Detent)	20-24	40-43	68-75
(Full Throttle)	20-24	39-44	68-75
"Dr3" (Min. Throttle)	7-10	14-18	68-75
(At Detent)	20-24	40-43	68-75
(Full Throttle)	20-24	39-44	68-75
"Lo" (Min. Throttle)	7-10	52-58	68-75
(At Detent)	20-24	52-58	68-75
(Full Throttle)	20-24	52-58	68-75

DOWNSHIFTS:	4-3	3-2	2-1
"Dr4" (Min. Throttle)	14-18	11-15	6-9
(At Detent)	36-41	11-15	6-9
(Full Throttle)	61-68	23-27	6-9
"Dr3" (Min. Throttle)	61-68	11-15	6-9
(At Detent)	61-68	11-15	6-9
(Full Throttle)	61-68	23-27	6-9
"Lo" (Min. Throttle)	61-68	41-47	6-9
(At Detent)	61-68	41-47	6-9
(Full Throttle)	61-68	41-47	6-9

3.36-1 AXLE
(60S, 62 Series – Dual Carbs.)

UPSHIFTS:	1-2	2-3	3-4
"Dr4" (Min. Throttle)	7-10	15-18	18-22
(At Detent)	19-22	37-40	62-69
(Full Throttle)	18-22	37-40	62-69
"Dr3" (Min. Throttle)	7-10	15-18	62-69
(At Detent)	19-22	37-40	62-69
(Full Throttle)	18-22	37-40	62-69
"Lo" (Min. Throttle)	7-10	47-53	62-68
(At Detent)	19-22	47-53	62-69
(Full Throttle)	18-22	47-53	62-69

DOWNSHIFTS:	4-3	3-2	2-1
"Dr4" (Min. Throttle)	12-16	12-15	6-9
(At Detent)	33-38	12-15	6-9
(Full Throttle)	56-62	22-25	6-9
"Dr3" (Min. Throttle)	56-62	12-15	6-9
(At Detent)	56-62	12-15	6-9
(Full Throttle)	56-62	22-25	6-9
"Lo" (Min. Throttle)	56-64	37-43	6-9
(At Detent)	56-62	37-43	6-9
(Full Throttle)	56-62	37-43	6-9

CADILLAC
3.36-1 AXLE
(75 Series. Optl. on 60S, 62 Series – Single Carb.)

UPSHIFTS:	1-2	2-3	3-4
"Dr4" (Min. Throttle)	7-10	13-17	18-22
(At Detent)	19-22	36-39	62-69
(Full Throttle)	18-22	35-40	62-69
"Dr3" (Min. Throttle)	7-10	13-17	62-69
(At Detent)	19-22	36-39	62-69
(Full Throttle)	18-22	35-40	62-69
"Lo" (Min. Throttle)	7-10	47-53	62-68
(At Detent)	19-22	47-53	62-69
(Full Throttle)	18-22	47-53	62-69

DOWNSHIFTS:	4-3	3-2	2-1
"Dr4" (Min. Throttle)	12-16	10-18	6-9
(At Detent)	33-38	10-14	6-9
(Full Throttle)	56-62	21-25	6-9
"Dr3" (Min. Throttle)	56-62	10-18	6-9
(At Detent)	56-62	10-14	6-9
(Full Throttle)	56-62	21-25	6-9
"Lo" (Min. Throttle)	56-64	37-43	6-9
(At Detent)	56-62	37-43	6-9
(Full Throttle)	56-62	37-43	6-9

3.77-1 AXLE
(86 Series)

UPSHIFTS:	1-2	2-3	3-4
"Dr4" (Min. Throttle)	6-8	12-15	16-19
(At Detent)	16-19	32-35	55-61
(Full Throttle)	16-20	31-36	55-61
"Dr3" (Min. Throttle)	6-8	12-15	55-61
(At Detent)	16-19	32-35	55-61
(Full Throttle)	16-20	31-36	55-61
"Lo" (Min. Throttle)	6-8	42-47	56-62
(At Detent)	16-19	42-47	55-61
(Full Throttle)	16-20	42-47	55-61

DOWNSHIFTS:	4-3	3-2	2-1
"Dr4" (Min. Throttle)	11-14	9-12	5-8
(At Detent)	29-33	9-12	5-8
(Full Throttle)	50-56	18-22	5-8
"Dr3" (Min. Throttle)	50-56	9-12	5-8
(At Detent)	50-56	9-12	5-8
(Full Throttle)	50-56	18-22	5-8
"Lo" (Min. Throttle)	50-56	33-38	5-8
(At Detent)	50-56	33-38	5-8
(Full Throttle)	50-56	33-38	5-8

HUDSON & NASH

UPSHIFTS:	1-2	2-3	3-4
"Dr4" (Light Throttle)	5-9	11-15	18-22
(Full Throttle)	21-25	41-45	71-75
"Dr3" (Light Throttle)	5-9	11-15	
(Full Throttle)	21-25	41-45	70-74
"Lo" (Light Throttle)	7-9		
(Full Throttle)		45-49	70-74

DOWNSHIFTS:	4-3	3-2	2-1
"Dr4" (Max. Part Throttle)	34-31		
(Max. Full Throttle)	67-63	22-18	10-6
(Closed Throttle)	13-9		4-2
"Dr3" (Max. Full Throttle)		22-18	10-6
(Closed Throttle)			4-2
"Lo" (Closed Throttle)			4-2

PONTIAC

UPSHIFTS:	1-2	2-3	3-4
1 "Dr4" (Min. Throttle)	7-9	14-16	19-22
(Full Throttle)	19-23	37-40	70-74
2 "Dr3" (Min. Throttle)	7-9	14-16	
(Full Throttle)	19-23	37-40	70-74
"Lo" (Min. Throttle)	7-9		
(Full Throttle)	19-23	49-53	70-74

DOWNSHIFTS:	4-3	3-2	2-1
1 "Dr4" (Closed Throttle)	17-15	13-10	8-6
(Full Throttle)	38-17	13-10	8-6
(Forced)	68-36	36-10	8-6
2 "Dr3" (Closed Throttle)	68-64	13-10	8-6
(Full Throttle)	68-64	13-10	8-6
(Forced)	68-64	26-10	8-6
"Lo" (Closed Throttle)	68-64	43-40	8-6
(Full Throttle)	68-64	43-40	8-6
(Forced)	68-64	43-10	8-6

DUAL-COUPLING HYDRA-MATIC (C ntinu d)

apply foot brake firmly. Increase engine speed to half throttle. The pressure range under these conditions should be 160-200 lbs. (Cadillac); 145-190 lbs. (Hudson, Nash, Pontiac).

TROUBLE SHOOTING & DIAGNOSIS

FORWARD DRIVE IN NEUTRAL: Manual linkage not adjusted correctly. Neutral clutch not releasing properly. Rear unit clutch not releasing properly. Overrun band not fully released.

REVERSE DRIVE IN NEUTRAL: Stationary cone sticking. Reverse piston not fully released.

NO DRIVE (R sulting in Neutral Condition): Front sprag clutch slipping. Front sprag clutch incorrectly installed. Rear sprag clutch slipping. Rear sprag clutch incorrectly installed. Neutral clutch apply restricted or leaking. Manual linkage incorrectly installed. Manual valve not engaged with valve pin. Low oil pressure.

NO DRIVE (R sulting in Stall Condition): Stationary cone sticking. Reverse piston not fully released. Front sprag clutch broken. Rear sprag clutch broken.

LOCKED-UP CONDITION IN REVERSE RANGE: Neutral clutch not releasing properly. Rear unit clutch not releasing properly. Overrun band not fully released. Rear sprag clutch incorrectly installed.

NEUTRAL CONDITION IN REVERSE RANGE: Reverse piston apply restricted or leakage. Stationary cone key missing.

NO REVERSE (Driv Slips): Reverse piston apply restricted or leaking. Low oil pressure. Manual linkage not adjusted correctly. Manual valve not engaged with valve pin. Front sprag clutch slipping or broken.

SELECTOR LEVER WILL NOT GO INTO REVERSE RANGE: Governor valves sticking or broken govenor oil seal rings. Reverse blocker piston stuck open.

SLIPS IN 1ST & 3RD IN "DR4" RANGE: Front sprag clutch slipping or broken.

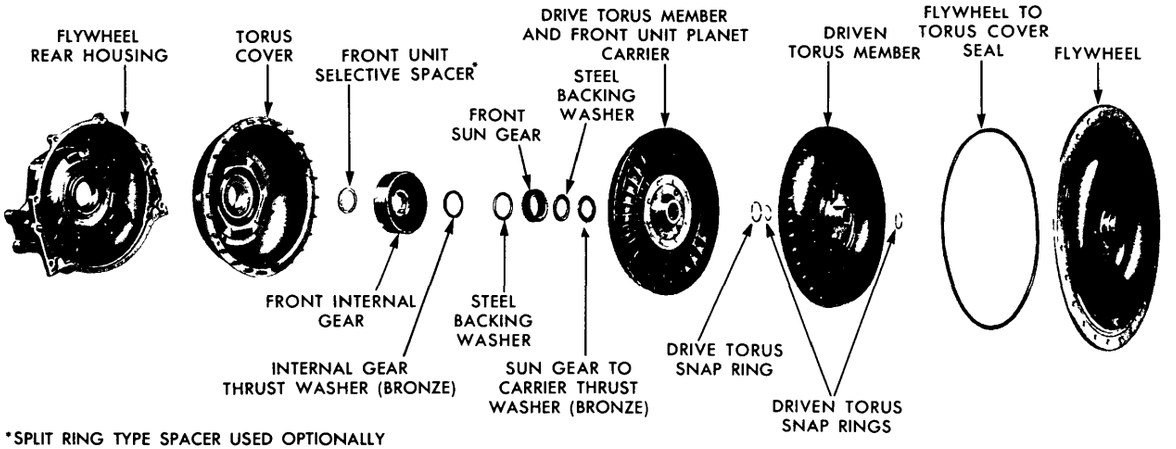
SLIPS IN OR MISSES 2ND & 4TH: Front unit coupling cover seals leaking. Front unit coupling cover exhaust valves sticking or missing. Front unit coupling cover feed restriction or leak. Front unit coupling cover signal restriction or leak. Low oil pressure. Coupling valve sticking. Sticking valve or dirt in valve body.

SLIPS IN 1ST & 2ND (All Drive Ranges): Neutral clutch slipping or burned. Neutral clutch apply restricted or leaking. Incorrect number of clutch plates. Rear sprag clutch slipping or broken. Low oil pressure.

SLIPS IN 3RD & 4TH (In Both "Dr4" & "Dr3"): Rear clutch unit slipping or burned. Rear unit clutch apply restricted or leaking. Incorrect number of clutch plates.

SLIPS IN 3RD (In "Dr3" on C ast): Overrun clutch slipping or burned. Overrun clutch apply restricted or leaking. Sticking valve or dirt in valve body.

SLIPS IN 1ST & 2ND (In "L " on C ast): Servo apply restricted or leaking. Overrun clutch not anchored to case or broken. Servo piston binding in case or in servo and accumulator body. Overrun band facing worn or loose.



*SPLIT RING TYPE SPACER USED OPTIONALLY

DUAL-COUPLING HYDRA-MATIC FLYWHEEL REAR HOUSING & TORUS ASSEMBLY

SLIPS IN 1ST (In all Drive Ranges): Front sprag clutch slipping or broken. Front sprag clutch incorrectly installed. Rear sprag clutch slipping or broken. Rear sprag clutch incorrectly installed. Neutral clutch slipping or burned. Neutral clutch apply restricted or leaking. Incorrect number of neutral clutch plates.

NO UPSHIFTS: Governor valves sticking. Broken governor oil seal rings. Sticking valve or dirt in valve body.

MISSES 2ND SPEED: Amplifier valve sticking. Transition valve sticking. Sticking valve or dirt in valve body.

MISSES 3RD SPEED: Transition valve sticking. Sticking valve or dirt in valve body.

ROUGH 2-3 UPSHIFT: Trimmer valve stuck. Accumulator piston stuck. Accumulator gasket broken or leaking. Restricted or leaking oil passages. Broken accumulator spring. Broken or leaking accumulator piston oil seal ring.

LOCKS UP IN 3RD & 4TH: Rear sprag clutch broken.

LOCKS UP IN 2ND & 4TH: Front sprag clutch broken.

UPSHIFTS HIGH: Governor valves sticking. Leaking or restricted main line feed to governor. Broken governor oil seal rings.

UPSHIFTS LOW: Governor valves sticking. Broken governor oil seal rings. Sticking valve or dirt in valve body.

REMOVAL & INSTALLATION

CADILLAC

REMOVAL: Place car on jack stands with all four wheels approximately 12" above floor.

1) Disconnect propeller shaft at the rear universal joint flange and remove shaft with front universal joint and yoke. Disconnect battery and remove starter.

2) Remove flywheel housing front cover and drain transmission at oil pan and flywheel *(see "Draining & Refilling" above).* Remove hoses from oil cooler and plug hose ends to prevent coolant leaking and entry of dirt *(CAUTION–Exercise care when removing hoses to prevent burns).*

3) Remove four nuts attaching flywheel drive plate to flywheel and torus cover assembly. Place a jack or other suitable device under rear of engine oil pan, using a wood block if necessary to prevent damage to oil pan. Remove transmission fluid filler tube from transmission case, being careful to first clean dirt from around flange at transmission.

4) Disconnect throttle rod and manual shift rod from levers on side of transmission. Remove throttle control and manual control levers from shafts. Disconnect speedometer cable from extension housing. Place transmission jack under transmission and raise it just enough to take strain off rear engine support. Disconnect engine rear support at transmission extension housing. Remove bracket cross member that carries support.

5) Pull back carpet in front compartment at center of floor pan and remove two upper flywheel housing screws, through openings in floor pan. From below car, remove four screws holding flywheel housing to engine crankcase.

6) Remove transmission and flywheel housing as a unit by moving back toward rear of car, disengaging flywheel housing from dowels locating it to engine crankcase. Tilt transmission and at the same time lower it to floor.

INSTALLATION: *NOTE–Before installing transmission, make sure that engine crankshaft-to-drive plate bolts are properly torqued to 75-80 ft. lbs.*

1) Slide transmission under car and raise into position carefully with a transmission jack, making sure that flywheel drive plate fits over four of the torus cover bolts and that dowel pins in crankcase enter holes in flywheel housing without cocking.

2) Install the screws holding flywheel housing to crankcase and tighten screws securely. Tighten flywheel and oil pan drain plugs.

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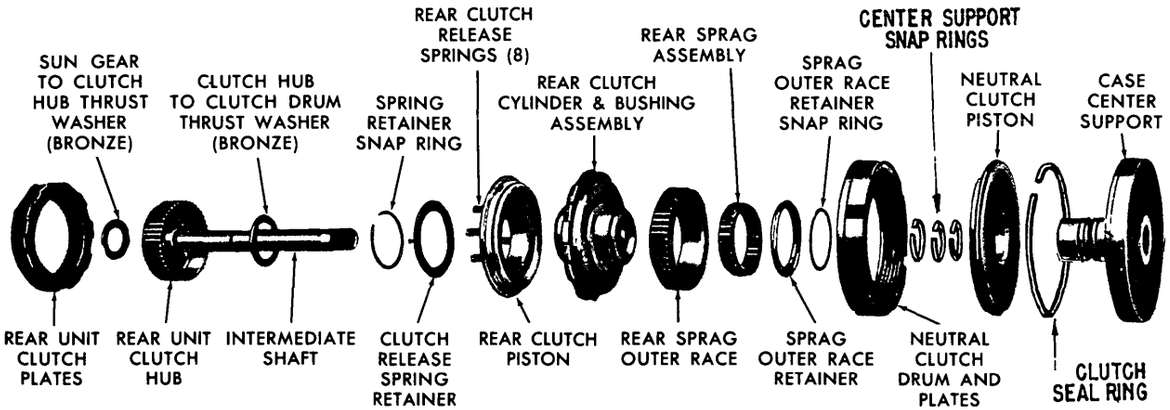
DUAL-COUPLING HYDRA-MATIC (Continued)

3) Install four nuts attaching flywheel drive plate to flywheel and torus cover assembly and tighten to 15-25 ft. lbs.
4) Install flywheel housing front cover. Lift engine and transmission to about one inch above its normal height, using a jack with wooden block under the engine (when transmission jack is of sufficient capacity to lift weight of entire engine). Install bracket that carries engine rear support, lower engine and connect support.
5) Install front universal joint and sliding yoke with propeller shaft on transmission output shaft and connect rear universal joint, using new lock plates. Connect speedometer cable. Install throttle and manual levers, making sure serrations in lever line up with serrations on their respective shafts and are tightened securely. Adjust manual linkage *(see "Linkage Adjustment" above).*
6) Install starter motor. Connect hoses to oil cooler and tighten securely. Lower car to floor and connect battery. Fill transmission. *(see "Draining & Refilling" above).* Adjust throttle control and throttle valve linkage *(see "Carburetor" on car model pages).*

HUDSON & NASH

REMOVAL: Raise car sufficiently on car stands, supporting rear of car at side sills. Support rear axle with a hydraulic jack.
1) Drain flywheel and transmission oil pan *(see "Draining & Refilling"* above). Remove oil filler tube from oil pan. Disconnect oil cooler tubes at right side of transmission.
2) Disconnect hand brake cable at bell crank brake cable housing at bell crank bracket. Remove brake hose bracket from floor pan to prevent damage to hose. Disconnect speedometer cable and housing at transmission adapter.
3) Disconnect throttle rod assembly from throttle lever at transmission and bellcrank at bell housing. Disconnect manual control rod from lever at transmission.
4) Disconnect torque tube from rear bearing retainer, then move rear axle and torque tube assembly to the rear and separate by sliding universal joint to rear off splines of output shaft.
5) Support rear of engine to remove weight from rear engine support cross member. Remove plate from flywheel housing and remove six nuts retaining flywheel and torus assembly to engine flex plate, Place a hydraulic jack, with Tool J-6130 under transmission. Disconnect flywheel housing-to-engine attaching bolts.
6) Disconnect the cross member from rear engine supports and from body side sills. With jack handle toward rear of car, raise the jack slightly to remove strain or bind from bolts fastened to flex plate. Move transmission assembly to rear and lower assembly after six bolts have been withdrawn from engine flex plate.

INSTALLATION: Line up crankshaft flex plate in relation to the six bolts on transmission torus cover.
1) Lift transmission into place with a hydraulic floor jack and align transmission to engage bolts in flex plate. Install the six nuts and tighten to 25-30 ft. lbs.
2) Install flywheel housing-to-engine bolts. Install cross member and connect torque tube to rear transmission housing. Replace speedometer cable, and manual and throttle valve linkage. Connect oil cooler tubes and replace oil filler tube.
3) Connect brake hose bracket. Install lower flywheel housing-to-engine cover. Remove engine support. Complete installation by reversing procedure. Fill Transmission *(see "Draining & Refilling" above).* Adjust manual and throttle linkage *(see "Linkage Adjustment" above).*



CENTER BEARING SUPPORT, NEUTRAL CLUTCH, & REAR UNIT CLUTCH (TYPICAL)

OLDSMOBILE

REMOVAL: 1) Disconnect battery and remove transmission oil filler tube. Raise car with all four wheels off floor. Drain transmission and flywheel *(see "Draining & Refilling" above).* Disconnect speedometer cable at transmission.
2) Disconnect manual and throttle valve linkage and remove both levers from side of transmission. Remove crankcase breather outlet tube. Remove propeller shaft, and on cars with dual exhaust, remove left hand exhaust pipe. Remove starter motor.
3) Support transmission with unit lift and adapter (that will accomodate this transmission). Raise engine enough to relieve weight from rear engine mounts. Remove engine mount-to-cross member bolts. Remove cross bar to frame attaching bolts, then remove cross member.
4) Remove lower flywheel housing. Remove torus oil drain plug and drain torus. Reinstall plug and tighten to 6-7 ft. lbs.
5) Install engine support bar, Tool BT-28, with support screw pilots seated into lower flywheel housing front attaching screw holes. *(NOTE–Locate support bar forward on frame so it will not interfere when lowering transmission).* Lower unit lift until it is free of transmission oil pan.
6) Lower engine (using support bar adjusting screws) NOT TO EXCEED 1½" to permit removal of the two upper bell housing-to-block bolts. Disconnect oil cooler hoses from lines and cap lines immediately to prevent entrance of foreign material.
7) Remove the four flex plate-to-flywheel attaching nuts and remove the flywheel housing-to-block bolts. Move transmission rearward approximately 3/4" to clear dowels (3/8" standard thread holes are provided adjacent to dowels for installing bolts to push flywheel housing off dowels). Lower transmission from car.

INSTALLATION: Reverse the removal procedure and note the following: Torque flex plate-to-flywheel attaching nuts to 20-25 ft. lbs. Torque oil pan drain plug to 35-45 ft. lbs. Torque throttle lever to 10-12 ft. lbs.

PONTIAC

REMOVAL: 1) Drain cooling system and remove transmission oil level indicator. Drain transmission oil pan (torus assembly can be drained at same time or it can be drained after transmission removed).
2) Disconnect rear universal joint from differential companion flange and slide propeller shaft from transmission output shaft. Disconnect speedometer cable from driven gear.
3) Remove flywheel housing bottom cover and crankcase ventilator outlet filter. If car is equipped with dual exhaust system, the right hand exhaust pipe must be removed (it is not necessary to disturb the exhaust system on cars with single exhaust).
4) Disconnect rear engine insulators from rear engine support cross member. Using Engine Fixture J-4732, raise rear of engine until insulators are about 1/2" above cross member *(CAUTION–Do not raise engine more than necessary to remove cross member).*
5) Loosen transmission filler pipe to cylinder head clamp. Remove transmission throttle control lever and disconnect manual control rod from transmission lever. Remove engine rear support cross member.
6) Remove nuts from six torus cover and flywheel-to-flex plate attaching bolts. Disconnect water hoses from oil cooler. Push transmission filler pipe upward out of transmission.
7) Lower engine about 1½" below its normal position and position special automatic transmission jack under transmission and raise transmission slightly to

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DUAL-COUPLING HYDRA-MATIC (C ntinu d)

take load off rear flywheel housing attaching screws. Using 18" to 22" socket extension, remove screws attaching flywheel housing. Work transmission rearward to disengage dowels from front flywheel housing, then lower transmission from car.

►*FLYWHEEL & TORUS COVER ASSEMBLY PRODUCTION CHANGE:* A new torus cover using 12 attaching bolts will be used with a new flywheel having 12 bolt holes. Service replacement parts numbers will remain the same and both early and late types will be interchangeable. When using a 24 bolt type cover on a 12 hole flywheel, it is necessary to remove the 12 alternate bolts.

INSTALLATION: 1) With transmission on special automatic transmission jack, raise it under car until engine flex plate and transmission flywheel and torus cover are at the same level. Rotate torus cover until dowels in cover and flywheel are aligned with holes in flex plate (torus cover and flex plate can be fastened at either of two positions). Move transmission into position engaging flywheel dowels into flex plate and rear flywheel housing dowels into front flywheel housing.

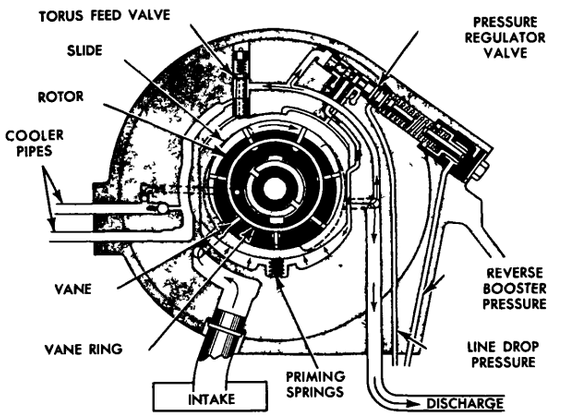
2) Install rear flywheel housing attaching screws (NOTE—Check to see that flywheel and torus cover are free to move back and forth slightly. If pilot on flywheel entered end of crankshaft properly, some movement should be possible). Remove special transmission jack.

3) Raise engine (using Support Fixture J-4732) until transmission touches floor pan. Install engine rear support cross member and install bolts, lockwashers, and nuts and tighten securely. Lower engine into position and fasten insulators to cross member.

4) Install nuts retaining flex plate to flywheel plate torus cover and tighten to 20 ft. lbs. torque. Install crankcase ventilator outlet filter and flywheel housing bottom cover. Slide filler piper into place in transmission (*see "1956 Cadillac & Pontiac Transmission Oil Filler Pipe Leakage Correction" above*). Make sure shoulder on filler pipe is seated against sleeve which extends out of transmission case.

5) Connect cooler hoses to cooler water inlet and outlet pipes. On cars with dual exhaust, replace right hand exhaust pipe. Connect manual shift control rod to lever on transmission case and install transmission throttle control lever. Connect speedometer cable to driven gear. Install propeller shaft and lower car to floor.

6) Fasten transmission filler pipe clamp to cylinder head after making sure pipe is fully seated in transmission. Fill engine cooling system. Fill transmission with automatic transmission fluid (*see "Draining & Refilling" above*). Adjust transmission throttle valve and manual control linkage (*see "Linkage Adjustment" above*).



FR NT PUMP & REGULATOR VALVE (TYPICAL)

TRANSMISSION OVERHAUL

►CHANGES, CAUTIONS, CORRECTIONS

►*TRANSMISSION PISTON SEALS (AND COMPONENT PARTS) PRODUCTION CHANGE:* Metal seal rings have been replaced by composition rubber seals at the following indicated points. Rubber type seals are not interchangeable with metal seals as the grooves in hubs and pistons have been redesigned and have a "step" to accomodate the seal lip (Reverse Clutch seal grooves for early and late types are similar and can be identified as noted below).

Overrun Clutch—In conjunction with the new seals, a new front pump assembly and overrun clutch piston assembly is used.

Reverse Clutch—A new clutch piston and rear pump assembly are used to accomodate the new seals. The ring grooves in early and late type reverse clutch pistons are similar and can be identified by a .040" chamfer (for rubber seals), and a .180" chamfer (for metal seals) on the inside diameter of the piston. *NOTE—Rubber and metal seals are not interchangeable.*

Neutral Clutch—A new neutral clutch piston and case center bearing support are used with the rubber seal rings. Grooves in piston are "stepped" for the rubber type seals. Also required is a new neutral clutch drum. (*CAUTION*—Clutch parts must be of the same type). If a late type front pump having the step type groove for rubber seals is installed in an early transmission, the late type overrun clutch piston and rubber type seal must be used. If a late type center bearing support is installed on an early transmission it is necessary to install a late type neutral clutch drum as well as the new piston and seals. *NOTE*—The later type neutral clutch drum can be identified by a small notch in rear face of drum, and the reinforcing bosses in rear face have been eliminated.

►*1956 CADILLAC 1-2 OR 2-3 LATE SHIFT CORRECTION:* This condition may be caused by improper throttle valve rod adjustment. If readjustment of valve rod does not correct the condition, check to see that the amplifier valve and the 1-2 & 2-3 shift valves are clean and free.

►*1956 CADILLAC ERRATIC SHIFT CORRECTION (Single Carburetor Cars before Engine No. 034367, Series 60S & 62; Engine No. 038764, Series 75 & 86):* If cleaning the governor or control valve assembly and properly adjusting the throttle valve control rod does not correct the condition, install kit, Part No. 3630753, containing an accumulator body, trimmer valve, manual valve body assembly, and carburetor throttle lever adapter plate. *NOTE*—Cars equipped with transmission beginning with Serial No. C56-32200 or CA56-2539 do not require the kit as the latest parts have been installed in production. Whenever the kit is installed, the Throttle Valve Rod Adjustment should be changed from **three** turns to **four** turns and a daub of paint added to carburetor end of rod for identification.

►*EARLY 1956 CADILLAC GOVERNOR "CLICK" CORRECTION:* A kit, Part No. 8616949 containing a bumper plate and orifice plug for the coupling valve, and an "O" ring seal for front pump intake pipe is available to aid in eliminating a low speed governor click on early cars. Install the orifice plug in the oil hole adjacent to the coupling valve in coupling valve body (this hole is located in the depression in coupling valve body, next to coupling valve). The bumper plate should be installed between coupling valve body and coupling valve front end plate. This correction is not required on transmission after Serial Nos. CE-7630 and A-3651.

►*1956 CADILLAC REVERSE INTERNAL GEAR PRODUCTION CHANGE:* A new reverse internal gear, Part No. 8616843, and reverse carrier assembly, Part No. 8616845 are used in production beginning with Transmission Serial No. C56-2100, A56-1002, and CE56-1003. When replacement of either part is necessary on transmissions before the above serial numbers, both carrier and internal gear must be installed. The early and late type parts are not interchangeable except as an assembly.

►*1956 PONTIAC PRODUCTION CHANGE (TO IMPROVE 2-3 SHIFT), AND CASE CENTER BEARING SUPPORT REPLACEMENT NOTE:* On later cars, the clutch apply passage in case center support has been enlarged to obtain an improved 2-3 shift. Whenever the center support is removed, the rear clutch apply oil passage located in the wide groove between the two seal rings on support hub should be checked (this passage is drilled at right angles to the oil hole in groove and it will be necessary to bend a piece of wire having a diameter of .068" to check the hole diameter). If the wire will not enter passage, the center support is the early type and should be replaced.

►*1956 PONTIAC REAR SPRAG OUTER RACE AND REAR CLUTCH CYLINDER AND BUSHING ASSEMBLY PRODUCTION CHANGE & SERVICE REPLACEMENT CAUTION:* A pilot bushing has been added to the rear clutch cylinder and bushing assembly and a new rear sprag outer race and bronze rear sprag outer race retainer is used. *CAUTION*—The early type retainer must not be used with the later type outer race. The later type retainer, however, can be used with the early type outer race.

►*1956 PONTIAC (285 HP ENGINE) SOFT OR SLIPPING 2-3 SHIFT CORRECTION:* If there is a soft or slipping

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DUAL-COUPLING HYDRA-MATIC (Continu d)

2-3 shift after installation of the new throttle valve outer lever and throttle rod (see below), it may be improved by replacing the three accumulator springs with two accumulator springs, Part Nos. 8616833 and 8616834. *(NOTE–These springs are not used in production and should not be used except to correct a soft 2-3 shift).* If the above modification is made to a transmission the letter "A" should be stamped in front of the "P" in the transmission serial number.

►*1956 PONTIAC (285 HP ENGINE) TRANSMISSION THROTTLE VALVE CONTROL ROD & LEVER CHANGE (To Reduce Tendency of Bunching the 1-2 and 2-3 Shifts, and to Improve the 2-3 Shift):* The later type throttle valve outer lever, Part No. 521523 is identified by its right angle shape (early type has a reverse curve). The distance between centerline of throttle shaft hole and centerline of hole for throttle rod ball stud is 3-31/32" (3-7/8" on early type lever). A new throttle rod, Part No. 522789 is used with the new lever, and is identified by a 4-5/32" length from rear ball stud to first bend (early rod is 2-1/16" at this location).

►*1956 PONTIAC CONTROL VALVE ASSEMBLY PRODUCTION CHANGES:* Various changes made in production as follows:

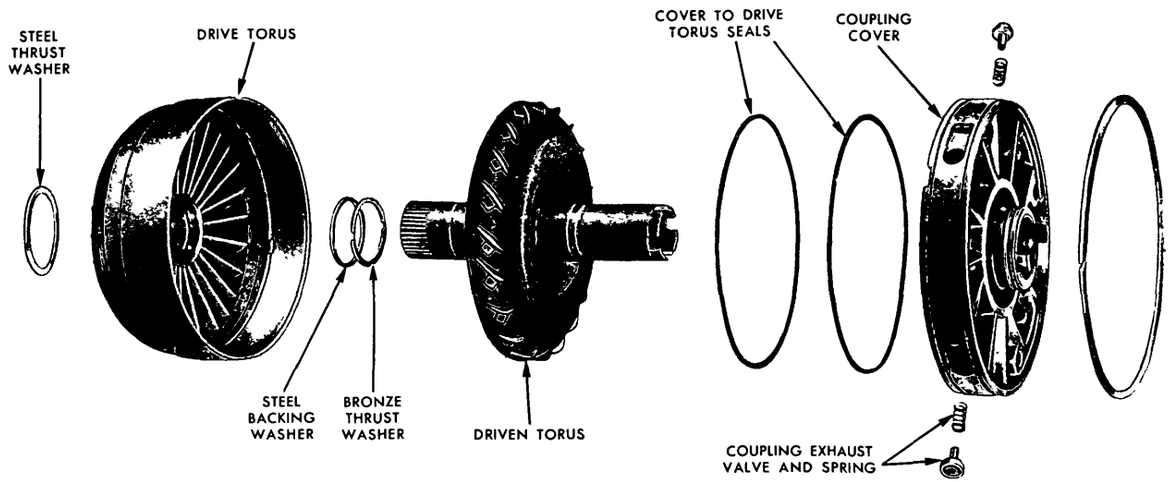
Overrun Clutch Valve Body (First Change)–The original one-piece coupling valve has been replaced by two separate valves (Coupling Signal Valve & Coupling Valve) operating in the same valve bore.

Overrun Clutch Valve Body (Second Change)–Beginning with Transmission Serial No. P56-170202, two coupling valve springs are used and the plug diameter has been increased. *NOTE–When the second type Overrun Clutch Valve Body is installed in place of the first type, the second type Shift Valve Body must also be installed.*

Shift Valve Body (First Change)–The Governor Boost Valve has been modified and an orifice has been added in the passage carrying governor boost oil to end of coupling valve. Governor boost pressure exhaust has been changed to exhaust directly to outside of valve through slot in valve body (slot is located directly over governor boost valve and identifies the later Shift Valve Body). *NOTE–When the later type Shift Valve Body is installed on early cars, the later type spacer plate must also be used.*

Shift Valve Body (Second Change)–Beginning with Transmission Serial No. P56-170202, a spring has been added in front of Governor Boost Valve which improves operation of the valve and assists in preventing 1-2 delayed shifts with cold oil. *NOTE–If the second type Shift Valve Body is installed on an assembly having the first type Overrun Clutch Valve Body, the spring must be removed from Governor Boost Valve so that proper pressure is obtained to operate the early type coupling valves.*

►*1956 PONTIAC LOW SPEED "CLICKING" NOISE CORRECTION:* Install Transmission Control Valve Body Repair Kit, Part No. 8616949 which consists of an orificed plug and a bumper plate. Orifice plug should be installed in governor boost passage in Overrun Clutch Valve Body. Remove end plate and install plug in passage located in depression to the left of coupling valve. Install bumper plate under the front plate of Overrun Clutch Valve Body so coupling valve will strike it instead of plate.



DUAL-COUPLING HYDRA-MATIC FRONT UNIT COUPLING (TYPICAL)

►*1956 PONTIAC TRANSMISSION LOCKUP CORRECTION (When shifting from drive to reverse):* Remove control valve assembly and check for nicks or burrs on the passage lands of transmission case. Remove nicks or burrs by stoning. Check spacer plate and replace if it has been damaged.

TRANSMISSION UNIT REMOVAL (TRANSMISSION IN CAR)

►*REMOVAL OF TRANSMISSION UNITS NOTE: The following transmission units may be removed without removing transmission assembly fron car. Note the following points and see "Disassembly" below, for removal procedure.*

MAIN CONTROL VALVE BODY (ALL MODELS): Remove in usual manner after removal of oil pan.

EXTENSION HOUSING (HUDSON, NASH & PONTIAC): *OLDSMOBILE NOTE*–While the extension housing cannot be removed from transmission, it can be moved rearward far enough to gain access to the following indicated units that would normally require extension housing removal.

GOVERNOR ASSEMBLY (EXCEPT CADILLAC): Remove extension housing. See Oldsmobile Note above.

REAR OIL PUMP (HUDSON, NASH & PONTIAC): On Oldsmobile, the rear oil pump can be moved rearward and rotated sufficiently to remove parking brake pawl bolt.

REVERSE PARTS (HUDSON, NASH & PONTIAC): After removing rear extension housing, reverse parts can be removed.

PARKING BRAKE LINKAGE (ALL MODELS): On Oldsmobile, see "Rear Oil Pump" above.

INSIDE DETENT & THROTTLE LEVERS: Requires removal of outside throttle control and manual levers and also of oil pan, oil screen and intake pipes.

REAR SEAL IN EXTENSION HOUSING (EXCEPT CADILLAC): On Pontiac, the slide hammer used for seal removal must be inserted through shaft tunnel in frame. When installing the seal, use an extension on the installing tool so it can be used through frame shaft tunnel.

ACCUMULATOR & SERVO (ALL MODELS): Can be removed without disturbing the main control valve assembly.

TRANSMISSION DISASSEMBLY

►*TRANSMISSION DISASSEMBLY NOTE: Instructions below cover removal of sub-assemblies from transmission case. See "OVERHAUL OF UNITS" for disassembly, inspection, and reassembly of these sub-assemblies.*

OIL COOLER, TORUS ASSEMBLY & FLYWHEEL REAR HOUSING: Disconnect oil cooler pipes from transmission cooler adapter plate, remove two bottom extension housing attaching screws and remove oil cooler.

1) Mark flywheel and torus cover so flywheel can be reinstalled in same position and remove torus cover to flywheel attaching nuts and remove flywheel. Remove and discard the "O" ring seal from flywheel.

2) Remove snap ring retaining driven torus to mainshaft, and remove driven torus member with check valve and spring. *NOTE*–If torus member sticks, tap end of mainshaft with soft hammer and at same time pull out torus member.

3) Remove inner snap ring locating driven torus member to mainshaft. Remove snap ring retaining drive torus member to intermediate shaft, and remove drive torus member. *CAUTION–Do not attempt to remove torus cover and driving torus member together.*

4) Remove front unit sun gear to drive torus hub bronze thrust washer and steel backing washer. Re-

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DUAL-COUPLING HYDRA-MATIC (Continued)

move front unit sun gear from shaft of front unit coupling driven torus member. Remove sun gear to internal gear steel backing washer. Leave staked bronze thrust washer in internal gear. Remove internal gear.

5) Remove torus cover assembly *(CAUTION–*Do not attempt to remove torus cover by pulling or pushing in a rough manner as this may result in a damaged oil seal. Work hub of torus cover back through oil seal, pulling torus cover out with even pressure).

6) Remove selective spacer washer from front unit drive torus hub (spacer may have remained in internal gear). Spacer may be either a solid or split ring.

7) Install Front Seal Protector J-6119 to protect front oil seal and bushing when removing flywheel housing. Remove flywheel housing from front of transmission case. *NOTE–*On Pontiac models, leave engine insulators attached to flywheel housing.

►*1956 PONTIAC FLYWHEEL HOUSING BUSHING NOTE:* Inspect flywheel housing bushing for grooves running between the four normal staking marks in bushing and the circular lubrication channel. This condition is caused by over-staking of the bushing, and if found the flywheel housing assembly should be replaced.

8) Remove Front Seal Protector and remove housing-to-case "O" ring seal.

MAINSHAFT ENDPLAY CHECK: *NOTE–Check and record the mainshaft endplay as it is necessary for the selection of proper selective washer at reassembly.*

1) Install collar of Endplay Checking Fixture J-6127 on intermediate shaft and secure in position by installing snap ring on mainshaft. Install Dial Indicator Support J-6126 and a dial indicator.

2) Move mainshaft back and forth th check endplay of mainshaft. Record the amount of endplay.

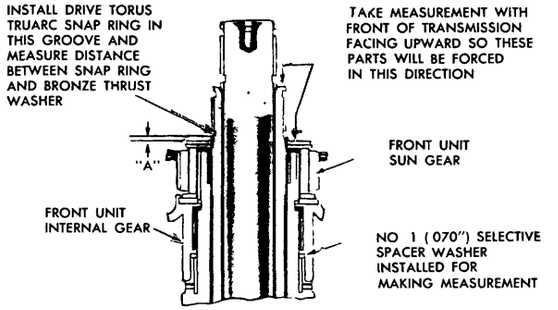
►*NOTE:* In order to find the actual endplay of the rear unit, it will be necessary to measure endplay of sun gear on mainshaft after transmission has been disassembled. This dimension must then be subtracted from mainshaft endplay to determine proper selective washer to be used.

3) Remove dial indicator and endplay checking fixture.

FRONT UNIT ENDPLAY CLEARANCE: *(NOTE–This measurement must be made with transmission in vertical position with front end upward).* **1)** Install a No. 1 (.0695–.0705") selective spacer washer over front unit driven torus hub in place of the washer removed at disassembly *(NOTE–The No. 1 washer must be used for gauging purposes).* Install front unit internal gear over front unit driven torus shaft against spacer washer.

2) Install bronze thrust washer and steel backing washer in front unit internal gear (steel washer has splines which engage splines of driven torus shaft). Install front unit sun gear and install steel and bronze thrust washers over intermediate shaft against sun gear. Install drive torus Truarc snap ring in groove on intermediate shaft nearest to bronze thrust washer.

3) Push intermediate shaft and sun gear firmly to rear of transmission to make sure all end play is taken up. Push snap ring down against bottom of groove



MAINSHAFT ENDPLAY CHECK PROCEDURE

and very carefully measure clearance between snap ring and bronze thrust washer using a set of feeler gauges. *CAUTION–Feeler gauge must be flat against the thrust washer to obtain an accurate reading.*

4) Compare measurement with feeler gauge with spacer washer chart (below) to determine the correct selective spacer washer to use. (For example: If measurement is found to be .067", a number "6" selective spacer washer should be used when transmission is reassembled). Check number on original spacer which was removed from transmission. It should be the same as the number found on the chart. If not, a new spacer washer must be used at reassembly. Record identification number of required spacer for use at reassembly.

Selective Spacer Washer Chart

Spacer No.	Dimension "A" ①	Thickness
1	.024-.031"	.0695-.0705"
2	.032-.039"	.077-.079"
3	.040-.047"	.085-.087"
4	.048-.055"	.093-.095"
5	.056-.063"	.101-.103"
6	.064-.071"	.109-.111"
7	.072-.079"	.117-.119"
8	.080-.087"	.125-.127"
9	.088-.095"	.133-.135"
10	.096-.103"	.141-.143"
11	.104-.111"	.149-.151"
12	.112-.119"	.157-.159"
13	.120-.127"	.165-.167"
14	.128-.135"	.173-.175"

① - See feeler gauge (Dim. "A") in illustration.

5) Remove Truarc snap ring, sun gear with bronze and steel thrust washers, internal gear with bronze and steel thrust washers, and .070" selective space washer.

FRONT UNIT COUPLING, PRESSURE REGULATOR & COOLER ADAPTER: 1) Rotate transmission to horizontal position with oil pan upward. Remove front coupling assembly from transmission case. Remove pressure regulator assembly from side of transmission.

2) Remove oil cooler adapter, with gasket, from side of transmission case. Remove two oil cooler sleeves and seals by pulling from case.

OIL PAN, OIL SCREWS & INTAKE PIPES: Remove oil pan and gasket. Remove screw holding front pump intake pipe clamp and remove pipe and clamp from pump screen. Remove "O" ring seal from pump. Remove oil screen and rear pump intake pipe and "O" ring seal.

CONTROL VALVE, SERVO & ACCUMULATOR: Remove screws holding servo and accumulator assembly to case *(NOTE–Servo piston is spring loaded),* and remove servo and accumulator assembly and servo spring. Remove five remaining control valve assembly screws and remove control valve assembly. *CAUTION –Do not drop manual control valve.*

FRONT PUMP & OVERRUN CLUTCH: 1) Remove front pump locking screw and lockwasher located under control valve assembly.

►*FRONT PUMP LOCK SCREW PRODUCTION CHANGE:* Lock washer has been eliminated and a new "washer head" screw is being used in production. Whenever a lock screw is found with a lockwasher, replace it with the later type screw, Part No. 8617869.

►*FRONT PUMP CLEARANCE CAUTION:* When front pump is removed, check clearance between pump bushing and front unit driven torus shaft. This clearance must not exceed .003", using a 1/2" wide feeler. If a .004" feeler can be inserted, the front unit driven torus member and the front pump should be replaced. If the inner sprag race is not the late type which can be identified by an "O" or "S" in the recess in tang end, it should be replaced.

2) Remove the two front pump cover-to-body screws and the three front pump-to-case support attaching screws. Install two Slide Hammers J-6125 into two opposite cover-to-body screw holes in front pump and remove front pump assembly from case. *NOTE–*Front sprag inner race may stick in pump. Be careful not to drop it when pump is removed.

3) Remove overrun clutch release spring and front sprag inner race if it did not come out with pump. Remove clutch overrun plate and clutch thrust washer. Install Rear Unit Clutch Retainer J-6135 with set screw end toward front and lock securely.

CENTER BEARING SUPPORT, NEUTRAL CLUTCH & REAR UNIT ASSEMBLY: 1) Remove speedometer driven gear from rear extension housing. Remove large snap ring retaining center bearing support. Position transmission horizontally, bottom side up.

2) Remove extension housing and gasket. If housing sticks, tap lightly with a soft hammer. Remove governor assembly by pulling governor out of rear housing (Governor drive key may not remain with governor).

3) Remove breather pipe clamp screw from rear of transmission case and carefully pry breather pipe out of pump body. Remove rear pump locating screw (located to right of pump cover, facing pump, and is inset into pump body). Remove pump attaching screw (This screw is located to left of governor bore and is the center screw of the three in that area).

4) Remove rear bearing snap ring from output shaft. If necessary, remove two opposite rear pump cover screws and install Slide Hammers J-6125 and remove rear pump, and reverse clutch piston assembly and gasket. Remove special tools.

5) Remove large wave-type reverse piston release spring, reverse internal gear and tang-type reverse clutch release spring *(NOTE–*Tangs on reverse clutch release spring point outward toward rear of transmission.

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DUAL-COUPLING HYDRA-MATIC (C ntinu d)

6) Remove reserse planet carrier outer snap ring from output shaft. Remove reverse stationary cone (take care to prevent binding), and remove cone key from case. Remove reverse planet carrier while lifting up on output shaft.

7) Remove center bearing support locking screw from side of transmission case. Remove center bearing support, neutral clutch and rear unit as an assembly by sliding complete assembly toward front of transmission. If assembly is tight in case, use Slide Hammers J-6125 with adapters, to insert into center bearing support and pull entire assembly forward. Remove entire assembly and position into Clutch Unit Holding Fixture J-6116, with output shaft down.

PARKING BRAKE ASSEMBLY, OVERRUN BAND, NEUTRAL CLUTCH DRUM STATIONARY STOP KEY AND INSIDE DETENT AND THROTTLE CONTROL ASSEMBLY: 1) Remove stationary stop key from case. Unhook overrun band end from anchor inside of case and rotate band to horizontal position with band ends facing rear of case. Remove band through front of case.

2) Remove inside detent control and inside throttle control lever assembly as follows: Remove snap ring retaining detent control lever to case. Remove lever assembly and outer and inner washers. Remove "O" ring seal from case counterbore.

3) Disconnect parking brake lever spring and remove bracket and spring. Install 3/8" bolt into parking brake pawl pin and remove pin and spacer. Remove spacer, lever and pawl as an assembly.

OVERHAUL OF UNITS

PRESSURE REGULATOR: Disassembly–Remove pressure regulator valve stop pin from reverse booster plug and remove booster plug from regulator plug. Remove "O" ring seal from pressure regulator plug.

Insp ction: Inspect all passages for dirt or metal chips and all parts for burrs or other damage. Burrs can be removed with crocus cloth and oil. Replace all damaged parts.

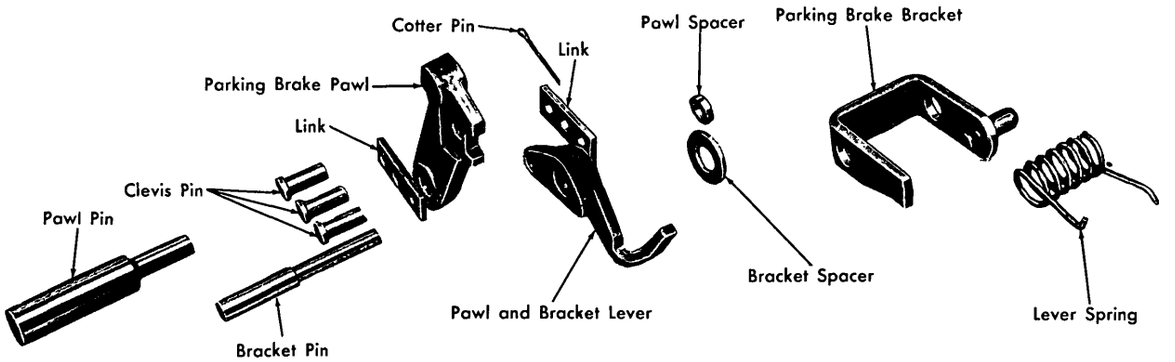
Reassembly: Install new "O" ring seal and reverse disassembly procedure.

FRONT PUMP: Disassembly–1) Remove front sprag inner race if still in pump and remove pump cover from body. Remove retaining pin, torus feed valve, spring and retainer.

2) Remove front pump rotor along with top vane ring. Remove 7 vanes and bottom vane ring (vanes may remain in rotor). Remove slide by pushing slide toward priming springs, then lift out of body at opposite end. Note position. Remove inner and outer priming springs.

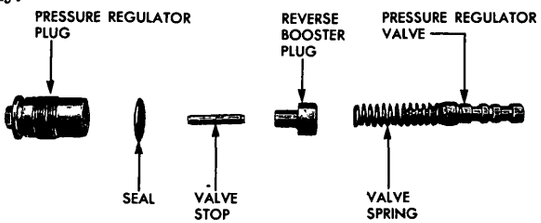
3) Turn pump body over and remove spiral type snap ring retaining front sprag to pump body and remove sprag assembly. *(NOTE*–If outer sprag is damaged, the oil pump assembly must be replaced). Mark overrun clutch piston and pump body for proper reassembly, and remove clutch piston from pump body. If piston sticks, use a soft hammer and tap around outer rear edge of pump body.

4) Remove interlocking oil seal ring from front pump cover.



DUAL-COUPLING HYDRA-MATIC PARKING BRAKE ASSEMBLY

Inspection: Using a small diameter wire, inspect all passages for dirt or restrictions. Check slide for excessive wear or scoring and make sure that it moves freely in pump body. Check freeness of vanes in rotor slots (pump vanes will have a tendency to show a polished surface on the side bearing against the front pump slide, if not excessive, this is a normal condition). Check torus slide valve priming springs for free movement in bores. Check bushing for scores or flaking (a normal wear can be noticed on bushing surface which if not excessive is a normal condition). Examine pump body and pump cover slide surface contacts for smoothness. Clean all parts thoroughly before assembly.

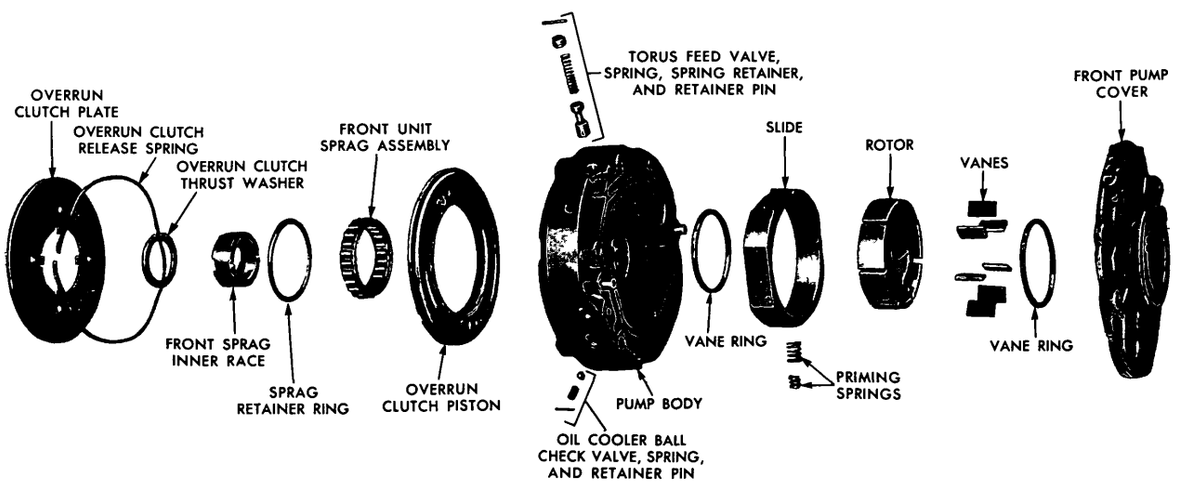


PRESSURE REGULATOR VALVE

►*FRONT SPRAG CLUTCH FAILURE CORRECTION:* In the event of front sprag clutch failure it is recommended that in all cases the following parts should be replaced: Front Pump, Front Sprag Assembly, Front Sprag Inner Race, Front Unit Driven Torus Member Assembly. Inspect all other adjacent parts and replace where needed.

Reassembly: 1) Check location mark on pump body and overrun clutch piston, align and install piston into pump body (insert one side of oil seal ring and position in cavity). At same time, work around ring, compressing and seating it in pump cavity. Do not force clutch piston into cavity. If sticking occurs, dowels and holes are not correctly aligned.

2) Install sprag assembly into rear body with rim of sprag facing up, and check rotation of sprag by inserting inner race. Then remove inner race. Install spiral type snap ring retaining sprag assembly to body. Install interlocking oil seal ring on front pump cover.



FRONT PUMP AND OVERRUN CLUTCH ASSEMBLY (TYPICAL)

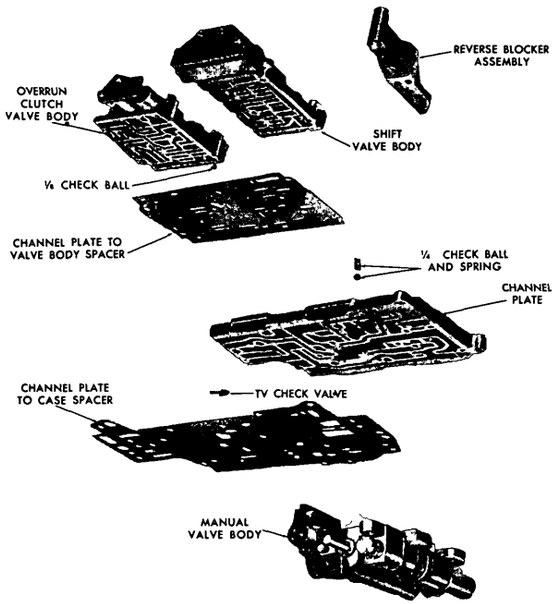
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DUAL-COUPLING HYDRA-MATIC (C ntinu d)

3) Insert inner and outer priming springs in pump body. Position pump slide into pump body toward priming spring. Compress priming springs with slide and drop slide into cavity of pump.

4) Insert bottom vane ring, locating it concentrically with slide bore. Install rotor with drive slots up and install 7 vanes in rotor slots (make certain vanes fit between bottom vane ring and slide). *NOTE*–Check edges of vanes for wear pattern. One edge of vane will be polished full length. This edge should face the slide.

5) Install top vane ring on rotor, centering it between vanes. Install torus feed valve, spring, retainer and retainer pin. Make sure that valve moves freely. Check for free rotation of rotor and that all parts in pump are positioned correctly. Install check valve ball, spring and retaining pin and install cover to pump body. *NOTE*–Leave two opposite cover screws out for later insertion of slide hammers.



C NTR L VALVE ASSEMBLY (TYPICAL)

CONTROL VALVE: The control valve assembly consists of four individual assemblies connected to one main body. In the disassembly and reassembly, each individual part should be disassembled and reassembled separately to avoid confusion of component parts.

C upling Valv B dy: Rem val & Disassembly– Remove coupling valve body making sure not to lose transition check ball. *(NOTE*–Support valve assembly to prevent damage to channel plate case spacer). Remove coupling valve rear end plate being careful of limit valve spring tension. Remove inner and outer limit valve springs, coupling valve spring and plug, and limit valve and washer. Remove coupling valve front plate and remove transition valve and spring, coupling valve (some assemblies may have two separate valves within the one bore) and overrun control valve. *See "Pontiac Control Valve Assembly Production Changes" above.*

►*INSPECTION NOTE: See "Control Valve Inspection" below.*

Reassembly & Installation–Insert overrun clutch valve into large bore in body. Insert transition valve and spring into valve body. Install coupling valve (two valves and additional valve springs may be used on some cars). Install coupling valve front end plate and install coupling valve spring, or springs. Install limit valve and washer and inner and outer limit valve springs. Position coupling valve plug on spring and install coupling valve rear end plate *(NOTE*–Make certain limit valve springs are aligned properly after tightening screws). Install coupling valve body to channel plate using petrolatum to hold transition ball check in place.

Shift Valve Body: Removal & Disassembly–*(NOTE–See Production changes above).* Remove shift valve body. If coupling valve body has been removed, remove spacer plate *(NOTE*–When removing plate, be sure not to lose check ball and spring). Remove shift valve body end plate, 3-4 governor valve, 2-3 governor valve and amplifier valve. Remove regulator valve body plate and body *(NOTE*–Be careful when removing plate because a great amount of spring load is present on plate). Remove 3-4 throttle valve regulator valve and 2-3 throttle valve regulator valve. Remove regulator valve body cover. Remove the throttle valve (inner) and shift valve (outer) springs and remove 2-3 shift valve. Remove the 3-4 throttle valve regulator valve spring and remove 3-4 shift valve.

►*INSPECTION NOTE: See "Control Valve Inspection" below.*

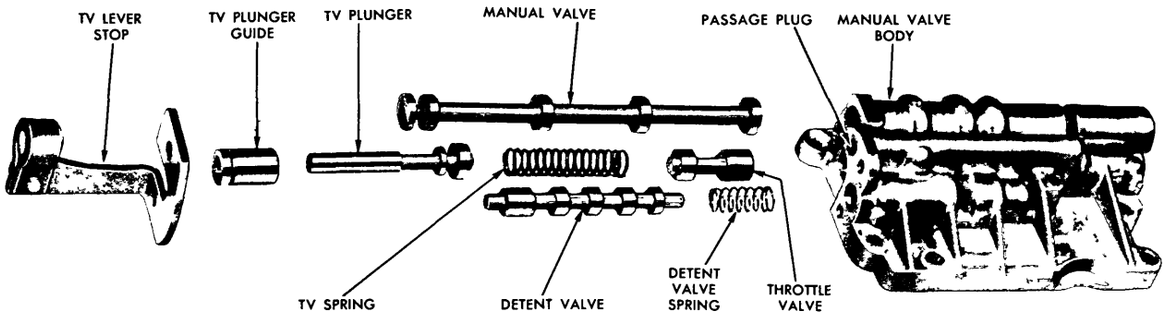
Reassembly & Installation–Install 2-3 shift valve and 2-3 throttle valve (inner) and shift valve (outer) springs. Install 3-4 shift valve and 3-4 throttle valve regulator valve spring. Install regulator valve body cover. Install 3-4 throttle valve regulator valve, and 2-3 throttle valve regulator valve. Position regulator valve body on on shift valve body as follows: Insert two attaching screws in regulator valve body plate and position on regulator valve body. Install regulator valve body to shift valve body and install remaining screws. Install 3-4 governor valve and 2-3 governor valve. Install amplifier valve. Install shift valve body end plate. Install shift valve body assembly to control valve assembly. If outer separator plate has been removed, be sure to install check ball and spring to channel body before installing outer separator plate and shift valve body.

Reverse Blocker Body: Removal & Disassembly–Remove reverse blocker body from manual valve body. Remove hairpin clip retaining detent plunger and remove detent plunger and spring from body. Remove reverse blocker retaining pin (pin is peened and requires filing to remove). Remove reverse blocker spring and piston.

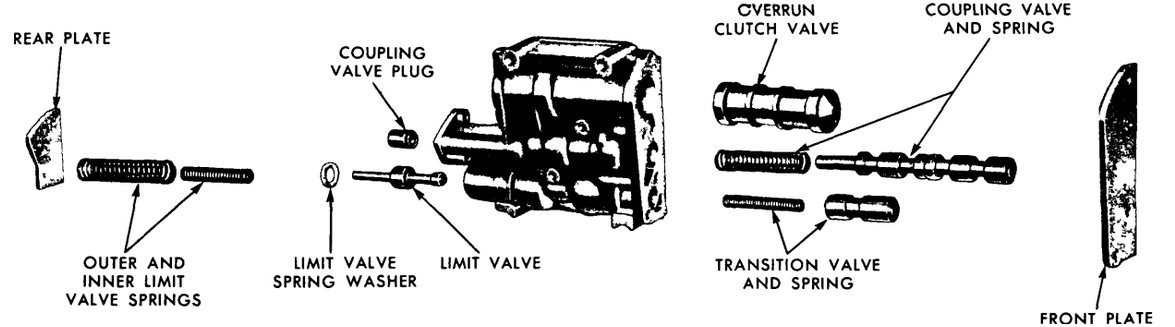
►*INSPECTION NOTE–See "Control Valve Inspection" below.*

Reassembly & Installation–Install reverse blocker piston and spring into body. Install reverse blocker

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DUAL-COUPLING HYDRA-MATIC MANUAL VALVE BODY (TYPICAL)



FIRST TYPE OVERRUN CLUTCH VALVE BODY (TYPICAL)

DUAL-COUPLING HYDRA-MATIC (C ntinu d)

retaining pin and peen in place. Install detent plunger and spring. Install hairpin clip to retain detent plunger and install reverse blocker body to manual valve body.

Manual Valve Body: Removal & Disassembly–Remove reverse blocker body from manual valve body if not already done. Remove manual valve body from channel body. Remove manual valve. Remove throttle valve lever stop from body and remove throttle valve plunger and guide. Remove detent valve, pressure drop signal valve and spring. Remove throttle valve spring and throttle valve. Remove throttle valve plug retainer pin and remove plug.

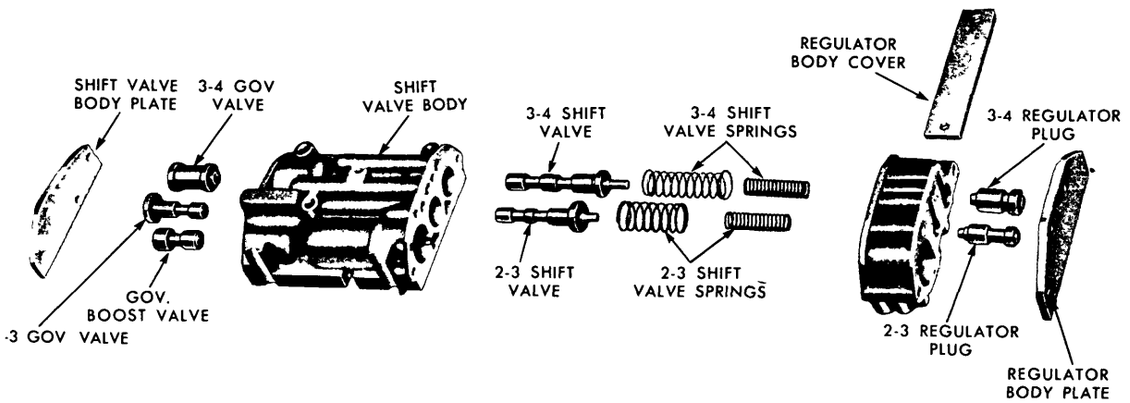
►*INSPECTION NOTE–See "Control Valve Inspection" below.*

Reassembly & Installation–Install throttle valve plug and retainer pin. Swedge over edge of retainer pin hole to keep pin in place. Install throttle valve, making sure valve is seated against plug and install throttle valve spring. Install throttle valve plunger guide on throttle valve plunger and install unit. Install pressure drop signal valve spring and valve, lining up spring to be sure it is fully positioned on bottom of bore. Install detent valve. Install throttle valve lever stop on manual valve body and install manual valve body to channel body. Install reverse blocker to manual valve body and install manual valve.

C ntrol Valve Inspection: Clean all parts thoroughly and do not allow valves to bump together, as this may cause nicks and burrs. Inspect all valves carefully to make sure they are free from dirt and are not damaged in any respect. If burrs are present, they should be removed with a fine stone or crocus cloth and light oil. All valves and plugs should be tested in their individual bores to make certain that free movement can be obtained. All valves should fall free of their own weight with a slight tapping action on the body. The manual valve is the only valve which may be serviced separately. If other valves are defective or damaged beyond repair, an individual assembly should be installed.

►*CONTROL VALVE ASSEMBLY NOTE:* If all the individual assemblies were removed at one time, proceed as follows: Position channel body separator plate on channel body. Install manual valve to channel body and install reverse blocker body to manual valve body, positioning one dowel pin. Install ball check and and spring in channel body (ball first, then spring). Install and align separator plate on channel body. Install shift valve body on channel body. Install coupling valve on channel body using petrolatum to hold transition ball check in place. Install manual valve in manual valve body.

FRONT UNIT COUPLING: Disassembly–*(CAUTION–The front unit coupling is balanced at the factory and any change in positioning of the cover will affect the balance. On early transmissions without an indexing point on driving torus shell, punch marks should be made on both cover and shell in line with the snap ring gap (using a very fine punch). On later transmissions the No. 1 exhaust valve is lined up with the snap ring gap and mark on driving torus cover).*



FIRST TYPE SHIFT VALVE BODY (TYPICAL)

1) Remove steel thrust washer from recess at front of front unit drive torus if it did not come off with flywheel housing. Install front unit coupling assembly into Clutch Holding Fixture J-6116 with splined shaft down.

2) Remove large snap ring retaining coupling cover to drive torus shell (make sure that all parts are marked for correct reassembly). Install two Coupling Valve Retainers J-6122 to hold exhaust valve in position when removing cover.

3) Remove coupling cover from coupling using Front Unit Coupling Cover Remover J-6121 as follows: Place cross piece of remover on end of torus shaft with end of shaft indexed in counterbore on underside of tool. Screw stud at end of each leg into holes in coupling cover until they bottom (nuts on studs should be backed off so they will not contact cross piece). Insert long stud of tool J-6121 through coupling and cross piece. Index bottom end with hole in holding fixture so it cannot turn. Install washer and nut on upper end and tighten securely. Tighten nuts on four studs evenly and only a small amount at a time to pull cover out of unit.

4) Remove tool J-6121 and remove coupling cover from unit. Hold fingers over valve so they will not be ejected and remove Coupling Valve Retainers and exhaust valves and springs from cover. Remove rubber seal rings from outer diameter of cover.

5) Remove driven torus member by pulling up on shaft, and remove steel and bronze thrust washers *(NOTE-* It may be necessary to cut the bronze thrust washer). Remove drive torus member from holding fixture.

Inspection: Check for burrs and scratches. Remove burrs with crocus cloth and oil.

Reassembly: 1) Install driving torus into Rear Unit Holding Fixture J-6116. Install interlocking oil seal rings to hub and shaft of driven torus member. Install bronze and steel thrust washers into driving torus member, install one interlocking oil seal ring on driven torus member and install driven torus member into driving torus member.

2) Install two springs and exhaust valves in coupling cover and hold in place, using Front Unit Coupling Valve Retainers J-6122. Install two oil seal rings on cover hub. Install two square rubber ring seals on coupling cover, making sure that seals are square in their respective grooves and apply petrolatum to circumference of seals.

3) Install studs from Front Unit Coupling Cover Remover J-6121, into coupling cover and position cover in driving torus member, lining up marks made during disassembly *(CAUTION–*Cover must be inserted evenly to prevent cocking in drive torus member and damaging seals).

4) Install large snap ring retaining coupling cover to driving torus member. Remove studs from coupling cover and remove coupling assembly from fixture.

ACCUMULATOR & SERVO ASSEMBLY: Disass mbly– Remove servo apply piston from assembly. Remove two opposite accumulator cover screws and install Accumulator Cover Remover & Installer J-6124. Remove remaining three cover to accumulator body attaching screws. Using extreme care remove cover, gasket and special tool. Discard gasket and remove accumulator piston assembly. Remove accumulator spring (more than one spring may be found at this location. See Production Changes & Corrections above). Remove pin retaining trimmer valve assembly in accumulator body. Remove plug, trimmer valve and spring.

Inspection: Inspect servo piston assembly for damaged oil seal ring, scores or burrs in ring land grooves. Inspect accumulator spring for collapsed or distorted coils. *(NOTE–*Slight wear "bright spots" on side of spring are permissable). Inspect accumulator body for restricted passages, scores or burrs. Inspect servo piston assembly for distorted pin, damaged oil seal ring lands or broken oil seal ring.

Reassembly: *(NOTE–Various changes have been made in the number of springs used under piston. See Production Changes & Corrections above).* Install trimmer valve spring, valve and plug in accumulator body. Install pin retaining trimmer valve assembly. Install accumulator spring (or springs) in accumulator body and install piston on outer accumulator spring. Align new gasket to accumulator cover and install Accumulator Cover Remover & Installer J-6124. Compress accumulator spring and install piston into body, making certain that aluminum piston ring is not binding to cause possible breakage. Install three screws retaining

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DUAL-COUPLING HYDRA-MATIC (C ntinued)

accumulator cover to body. Remove tool and install remaining screws. Tighten all attaching screws. Install servo piston into body.

REAR PUMP: Disassembly–1) Remove vent pipe from rear pump body by carefully prying out of bore with screwdriver. Remove reserse piston from back of rear pump and remove oil seal ring. Remove rear pump cover by tapping pump body with plastic hammer.

2) Remove governor drive key from driven gear in rear pump. Mark top of drive and driven gears to insure correct reassembly, and then remove gears. Remove snap ring retaining rear bearing to rear pump body and remove rear bearing.

3) Remove reverse piston inner oil seal ring from pump body hub.

Inspection: Inspect all parts to make sure they are free of dirt, burrs, scoring or other damage. Remove burrs with crocus cloth and oil. Check oil seal ring grooves. Make sure vent pipe is not damaged and is free from restrictions.

Reassembly: 1) Install rear pump bearing into pump body and install snap ring retaining rear bearing. Install pump gears, noting the locating marks made at disassembly.

2) Install governor drive key into driven gear, making certain key is properly seated. Install pump cover to body, positioning governor hole over drive gear in pump, indexing properly with dowels.

3) Install reverse servo piston in back of rear pump as follows: Install oil seal rings on pump body hub and on reverse piston. Insert piston into bore of rear pump, positioning on top of dowels. Compress large oil seal ring on piston with fingers at one end of gap. After the end is seated in the cavity, gradually work oil seal around, at the same time applying light pressure, forcing piston into cavity.

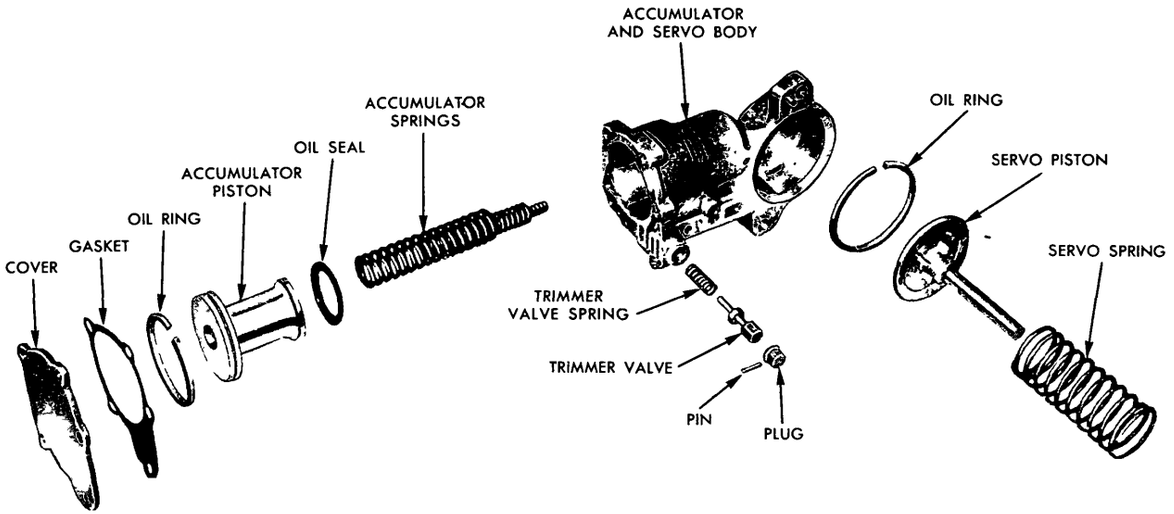
GOVERNOR: Disassembly–Remove four oil seal rings and remove cover. Remove end cover plate retaining G-2 valve assembly. Remove valve and bushing assembly and remove valve from bushing.

Inspecti n: Inspect all parts to make sure they are free from dirt, burrs and other damage. Remove burrs with crocus cloth and oil. Test all valves in their respective bores for free movement. Inspect governor ring lands and oil seal rings for freedom in grooves. If lands are damaged or worn, replace complete governor assembly.

R assembly: Insert G-2 governor valve into bushing and install assembly in governor body. Install cover plate retaining G-2 valve assembly, making sure dowel in cover plate enters recess in governor body and governor valve bushing. Install governor cover to body. Install four oil seal rings in grooves which do not contain oil holes.

TORUS CHECK VALVE (Main Drive): Disassembly–Remove cotter key retaining check valve in fluid coupling driven torus member, and remove torus check valve and spring.

Insp ction: Inspect parts for nicks, burrs and for collapsed spring.



SERVO & ACCUMULATOR ASSEMBLY (TYPICAL)

Reassembly: Install spring into check valve and install check valve and spring into driven torus member. Make sure spring seats properly and valve fits evenly. Install cotter key retaining check valve and spring. Make sure check valve can move freely.

PARKING BRAKE: Disassembly–Remove cotter pin retaining three clevis pins and parking brake links and separate pins, links, parking pawl and pawl lever.

Inspection: Inspect parking pawl for cracks or signs of unusual wear. Check pawl pivot pin and linkage for wear.

Reassembly: Assemble parking brake links, clevis pins, pawl and pawl lever and insert cotter pin.

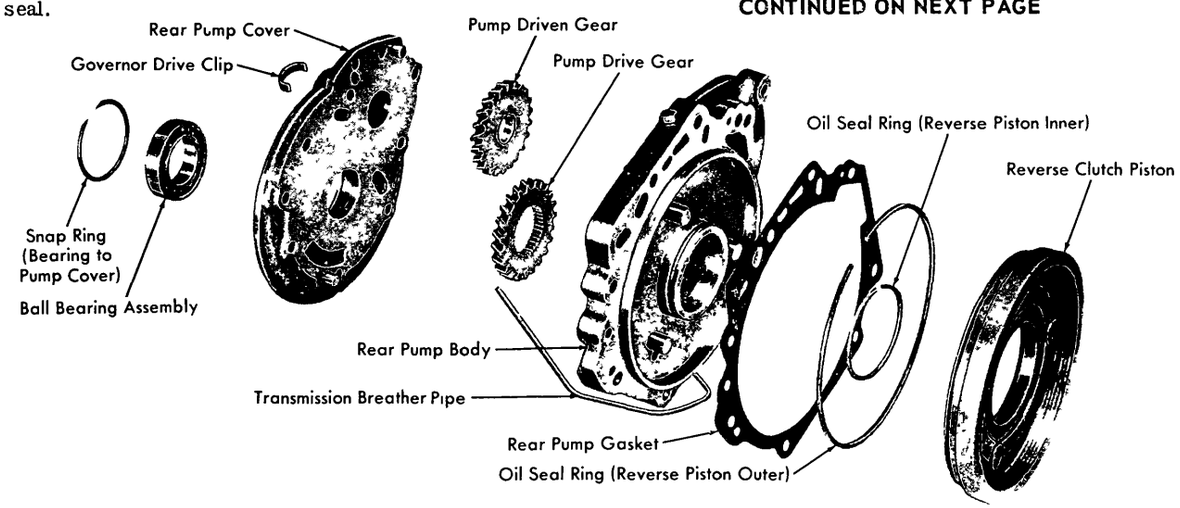
INSIDE CONTROL LEVER: Disassembly–Remove pin retaining throttle control shaft to inside detent control shaft and separate levers, washers and "O" ring oil seal.

Inspection: Check fit of inside throttle control shaft in shaft of inside detent control shaft. If shaft binds, is excessively worn, or if splines are damaged, replace the defective parts.

Reassembly: Install new "O" ring seal, washers, and throttle control shaft in manual control hub and insert retaining pin.

CENTER BEARING SUPPORT, NEUTRAL CLUTCH & REAR UNIT: Disassembly–1) Remove Rear Unit Clutch Retainer J-6135 *(CAUTION–Be sure to back off screw far enough to prevent damage to machined surface at front of intermediate shaft).* Remove hook-type oil seal ring from intermediate shaft by pushing one end toward center of shaft and other way from shaft. Remove case support and neutral clutch piston assembly.

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DUAL-COUPLING HYDRA-MATIC REAR PUMP ASSEMBLY

DUAL-COUPLING HYDRA-MATIC (Continued)

►*PONTIAC CENTER BEARING SUPPORT NOTE: See "1956 Pontiac Production Change (To improve 2-3 shift) and Case Center Bearing Support Replacement Note" above.*

►*SEAL PRODUCTION CHANGE NOTE: See "Transmission Seal Production Changes" above.*

2) Remove oil seal rings from support hub and remove neutral clutch piston. Turn support over and bump on bench to remove piston (*NOTE*–On late type assemblies with rubber lip seals, remove seals from piston hub and hub of support. Leave rings in place on piston and support of early type.

3) Remove neutral clutch drum assembly which contains five composition clutch plates, four steel clutch plates and five release springs. Remove large snap ring from rear drum assembly with screwdriver.

4) Remove rear clutch cylinder and sprag assembly by lifting over intermediate shaft. Remove intermediate shaft and clutch hub, along with front clutch hub washer from rear unit assembly. (*NOTE*–Intermediate shaft and clutch hub may be disassembled if parts replacement necessary). Remove clutch hub front thrust washer from clutch hub.

5) Remove mainshaft assembly and rear unit sun gear from rear unit. Remove clutch hub thrust washer from sun gear.

►*REAR UNIT SUN GEAR CAUTION: Make sure the sun gear is marked properly for reassembly. On later type units, a drill mark is made on rear side of gear. Early type gears were not marked and it is very important that a mark be placed on the rear side to indicate side of gear facing rear of transmission.*

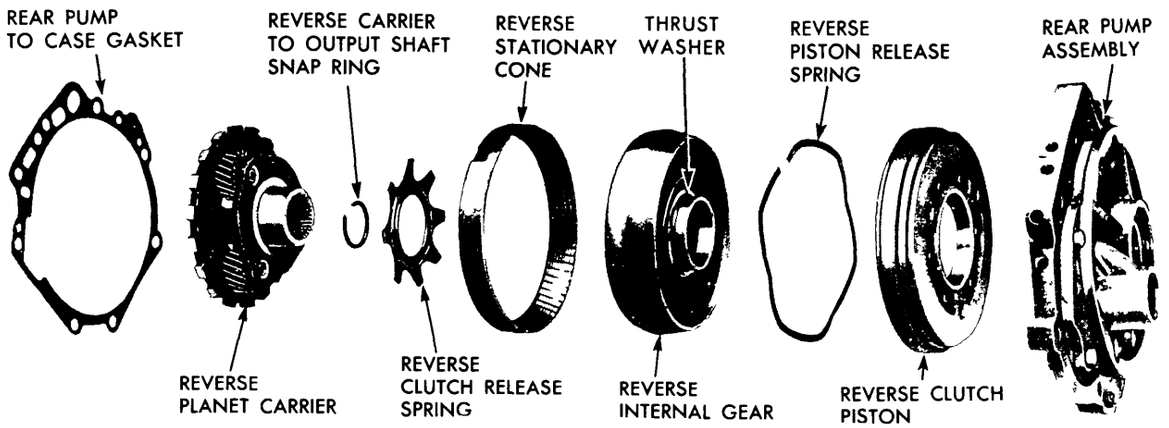
6) Remove seven steel clutch plates and seven composition plates. Remove bronze thrust washer from rear unit carrier. Remove rear unit drum and output shaft assembly from holding fixture and set on bench with output shaft end up.

7) Remove large snap ring holding reverse drive flange to rear unit drum. Lift output shaft and reverse drive flange assembly out of rear unit drum.

8) If parts replacement is necessary, mark internal gear so it can be installed with the same side up. Remove internal gear and rear unit clutch backing plate from rear unit drum assembly together by tapping backing plate with soft hammer. Remove reverse planet carrier locating snap ring from output shaft and remove reverse drive flange and sun gear assembly from output shaft. Remove selective washer from reverse drive flange assembly or output shaft.

9) Remove spiral snap ring from rear unit sprag outer race, using small needle nose pliers or small screw driver. Insert tool into small hole in end of spiral ring and pull upward. Remove outer race, sprag and retainer by rotating counterclockwise and pulling upward (*NOTE–Do not attempt to disassemble sprag assembly).* Remove rear unit sprag retainer and sprag from neutral clutch hub.

10) Disassemble rear unit clutch piston assembly as follows: Place cylinder and piston assembly over tool J-6129 with spring end up. Set spring compressor J-4670 on top of spring retainer and start nut on stud of J-6129. (*NOTE*–On models of J-4670 without hole in center, drill at 7/16" hole so J-6129 can be inserted through it). Turn nut down to compress clutch springs until snap ring is free. Remove snap ring and compressor tool and release spring retainer from rear clutch springs. Remove eight clutch release springs. Remove rear clutch piston from cylinder by rapping piston end of cylinder assembly on wood block. Remove seals from piston and hub.



DUAL-COUPLING HYDRA-MATIC REVERSE ASSEMBLY

►*1956 PONTIAC NEUTRAL CLUTCH CAUTION:* On transmissions below serial number P-15234, neutral clutch should be checked to see if it has a 5/32-3/16" chamfer on inside leading edge of drum. If chamfer is less than 5/32", drum must be replaced.

Inspection: **1)** Inspect center bearing support for burrs, damaged oil seal grooves, worn or damaged bushing or damaged threads. Check to see that all passages are open and are not interconnected, using either a fine wire or air pressure.

2) Inspect neutral clutch piston for scoring, burrs, or damaged oil seal groove. On early type remove oil ring from neutral piston groove, insert it in bore in center bearing support and square it up. Check ring gap with feeler gauge. Gap should be .002-.007". If a new ring is installed, gap must be checked and ends of ring must be filed, if necessary to provide proper gap (*NOTE*–In early production, the neutral clutch piston was sealed by an inner and outer ring. In later production, rubber lip seals are used in place of rings and a corresponding groove is used in piston and hub. When new parts are installed (center bearing support, piston or seals), they all must be of the same type, (See Production Change above). If the late type center bearing support is used to replace the early type, late type piston and rubber lip seals must also be used. A redesigned neutral clutch drum must be used with the late type piston and center bearing support. (The late type drum is notched for identification).

3) Inspect five composition faced neutral clutch drive plates for damaged surfaces or worn teeth. Plates should be flat and have four equally spaced grooves across facing on each side. (*NOTE*–Undamaged clutch drive plates can be reused and durability increased by slotting, later plates are slotted in production. Cut four radial, equally spaced, sharp edged grooves on each side of cork facing on drive plate. Grooves must be 1/8-5/32" wide and .020" deep. Grooves on one face should be spaced between grooves on other face. Use a square cornered mill file to cut the grooves). If flakes of facing material can be removed by scratching surfaced with thumb nail, plate should be replaced. Discoloration is not an indication of failure. Inspect release springs to see that they have eight equally spaced waves 1/8" deep.

4) Inspect four neutral clutch driven plates (steel) for scored surfaces or damaged lugs. Also make sure they have six equally spaced waves (approx. .010" deep). Inspect neutral clutch drum for scored or damaged surfaces. Clutch drums used with neutral clutch piston which have metal seal rings should have a 5/32" chamfer at front inner edge to insure proper clutch action. Inspect spiral snap ring for distortion or damage. Inspect rear unit sprag assembly for damaged shoulder, broken springs, or scored sprags. Inspect rear unit sprag outer race for damaged splines or scored sprag race.

5) Inspect rear clutch cylinder and bushing assembly for scoring, burrs, or damaged lugs. See that snap ring and oil seal grooves are clean and smooth. Inspect drilled passage in cylinder with wire and compressed air to see that they are unobstructed. Inspect rear unit clutch piston for scores, burrs, or damaged seal groove. Inspect either rear clutch release springs for distortion or collapsed coils. Spring should be 1.58" long, .440" in diameter and have 14 coils. Inspect spring retainer for cracks or damage. Six raised spots on retainer keep snap ring in place. Inspect rear unit clutch cylinder-to-clutch hub thrust washer.

6) Inspect intermediate shaft and rear unit clutch hub. Clutch hub and shaft can be separated if either needs replacement. Inspect rear unit sun gear-to-clutch hub bronze thrust washer. Inspect seven rear unit composition faced clutch drive plates for damaged surfaces. Plates should be flat. Check in same manner as for neutral clutch plates. Inspect seven driven plates (steel) for scored surfaces or damaged lugs. Driven

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DUAL-COUPLING HYDRA-MATIC (C ntinued)

plates must have six equally spaced waves (approx. .010" deep).

7) Inspect main shaft and rear unit sun gear for damaged splines, teeth or bearing surfaces. Gear and shaft can be separated for replacement if necessary. If shaft, only is to be replaced, put old gear on new shaft with same side toward front.

8) Measure endplay of rear unit sun gear on mainshaft and determine correct selective washer to use in rear unit as follows: Clamp sun gear and mainshaft assembly in Holding Fixture J-6116 using "C" clamp and dial indicator. Be sure gear is firmly clamped on both sides so it cannot give. Set dial indicator to contact end of mainshaft. Move mainshaft straight up and down to measure endplay and record endplay. Subtract this endplay from the mainshaft endplay recorded before transmission was disassembled. The difference will be the actual endplay of the rear unit and should be .004-.018". If endplay is outside the limits of .004-.018", select the reverse drive flange-to-rear unit planet carrier thrust washer which will give the proper endplay. Selective washers are furnished in the following nine sizes and are stamped with an identification number:

Id ntificati n N .	Siz	Identification No.	Size
1	.055-.059"	6	.080-.084"
2	.060-.064"	7	.085-.089"
3	.065-.069"	8	.090-.094"
4	.070-.074"	9	.095-.099"
5	.075-.079"		

9) Inspect rear unit internal gear for tooth damage *(NOTE*–Internal gear and clutch backing plate can be separated from drum if replacement is necessary). If drum or backing plate is replaced, the gear should be reinstalled with the same side toward the front (the edges of the gear teeth are chamfered on the side which goes against the backing plate). Inspect output shaft to rear unit sun gear bronze thrust washer. Inspect output shaft for damaged pinions, splines, bearing surfaces or speedometer gear teeth.

10) Inspect reverse drive flange and sun gear assembly *(NOTE*–Reverse drive flange and sun gear are serviced as an assembly and should not be separated). Inspect rear unit selective washer for wear and damage.

R ass mbly: **1)** Holding reverse drive flange and sun gear in left hand with drive flange up, install proper selective washer *(as determined by rear unit endplay check, see "Inspection" above)* in recess of drive flange with locating lugs indexed in flange. Use petrolatum to hold washer in place. Still holding reverse drive flange and sun gear in left hand, insert output shaft through the assembly until carrier bottoms on selective thrust washer. Hold unit tightly together and place on bench on carrier end. Install reverse planet carrier front ring on output shaft.

2) Insert Reverse Drive Flange Retainer J-6120 between snap ring and flange snug against rear unit carrier to prevent selective washer from dropping out of position *(NOTE*–When the selective washer used between reverse drive flange and planet carrier is at or near the upper limit of thickness, Retainer Tool J-6120 cannot be inserted between snap ring and flange. In this case, it is not necessary to use the retainer since there is not enough clearance to allow the thrust washer to drop out of place. Set rear unit drum on bench with long undercuts on lugs upward (or with internal gear up if it was not removed). Install clutch backing plate with flat surface down if it was removed (it may be necessary to tap plate into place with a soft hammer).

3) Install rear unit internal gear with mark upward (drill mark in rear face of gear or mark made at disassembly) if it was removed (gear teeth are beveled on side which goes against backing plate). Position gear against clutch backing plate. Install output shaft and reverse drive flange assembly into rear unit drum and secure with large snap ring. Set rear unit assembly into Holding Fixture J-6116 with shaft end down. As unit is lowered into fixture, lift up on drum and remove Drive Flange Retainer *(CAUTION–Do not lift on output shaft after retainer is removed).* Position thrust washer in counterbore of output shaft and retain with petrolatum.

4) Apply Hydra-Matic Oil to faces of seven drive and seven driven plates and alternately install them in rear unit drum. Start with a drive (composition) plate and finish with a driven (steel) plate. Install all drive plates with same side upward. Assemble driven plates with lugs in rear unit drum slots so notches in lugs are all in line *(NOTE*–Indexing the notches will nest the plates together so waves are all in the same direction, and with no gaps between plates). Install mainshaft and sun gear assembly into output shaft in rear unit, meshing sun gear with planet pinions of output shaft.

5) Assemble rear unit clutch hub to rear end of intermediate shaft if it was removed (open side of hub toward front of shaft. End with longest spline and longest machined surface will be toward rear). Install two bronze thrust washers on rear unit clutch hub, one on each side and retain with petrolatum. Install intermediate shaft and rear unit clutch hub and thrust washers into rear drum *(NOTE*–Pick up clutch drive plates by rotating intermediate shaft). Do not drive or force rear unit clutch hub into rear unit drum.

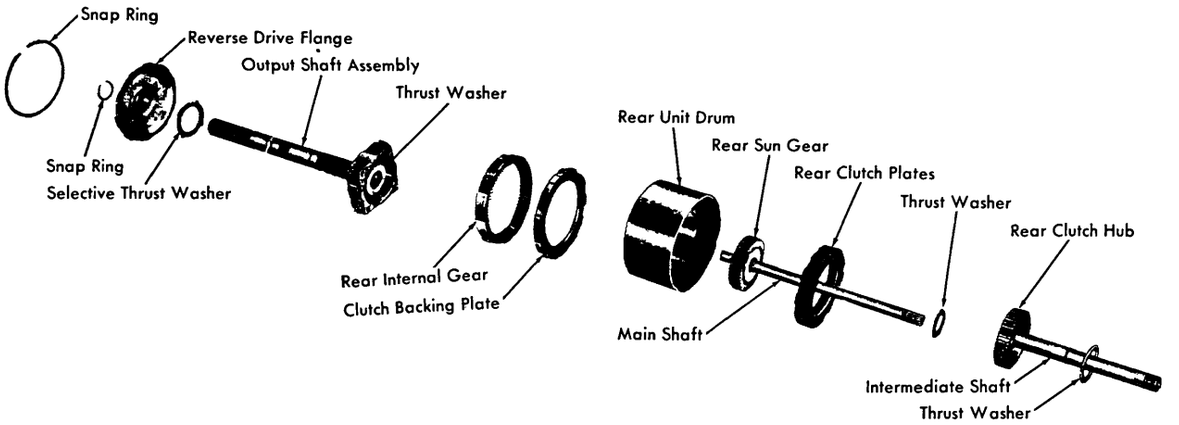
6) Assemble rear clutch piston into rear clutch cylinder as follows: Install new inner seal on hub of clutch cylinder with lip down. Install new outer seal on piston with lip facing away from spring bore side. Install piston into cylinder using flat edge of screwdriver to start seal into cylinder. Install eight clutch release springs into bores in piston. Place spring retainers on springs with tangs facing upward. Compress springs using tool J-4670-B and J-6129. Install snap ring which holds release spring retainer. Remove compressor tools.

7) Install rear unit sprag assembly in rear unit outer race with shoulder side of sprag on counterbored side of outer race. Install sprag and outer race of rear unit inner race (push sprag part way down through outer race then rotate sprag counterclockwise to assemble). Install rear unit sprag retainer in outer race with large outer diameter upward. Push retainer down to expose snap ring groove. Install spiral snap ring on rear unit clutch hub. Install rear unit cylinder and sprag assembly into rear clutch drum with sprag side up. Secure cylinder and sprag assembly into rear clutch drum with large snap ring.

8) Install neutral clutch drum on rear unit with driven clutch plate lug slots upward. Apply Hydra-Matic Oil to five clutch drive plates (composition) and four driven plates (steel). Install plates alternately using a release spring between steel plates (start with a composition plate, release spring, then steel plate, and end up with composition plate and spring).

9) Install seal on second type neutral clutch piston with lip side facing side with dowel holes, or install ring on first type. Install seal on hub of second type center bearing support with lip facing bottom of piston cavity, or install oil ring on first type center bearing support. Install neutral clutch piston into center bearing support aligning notch in edge of piston with lockscrew hole in side of center bearing support. This alignment assures that dowels will enter dowel holes (seal or piston ring can be installed by compressing with fingers). Install two oil rings in grooves of center bearing support hub. Center rings around hub and install center bearing support assembly into neutral clutch drum in rear unit using care not to damage bushing when lowering support over intermediate shaft. If properly centered, oil rings

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REAR UNIT DRUM, MAINSHAFT, & OUTPUT SHAFT ASSEMBLY (TYPICAL)

DUAL-COUPLING HYDRA-MATIC (C ntinu d)

on support hub will be compressed by taper on hub of rear clutch cylinder. Install hook type oil seal ring on intermediate shaft.

FLYWHEEL HOUSING SEAL INSTALLATION: Start seal into bore in flywheel housing with lip facing toward bushing *(NOTE–Do not use sealer).* Drive seal into place using Flywheel Housing Oil Seal Installer J-6118. Stake housing against seal in three places.

TRANSMISSION REASSEMBLY

PARKING BRAKE ASSEMBLY, OVERRUN BAND, NEUTRAL CLUTCH DRUM STATIONARY STOP KEY AND INSIDE DETENT AND THROTTLE CONTROL ASSEMBLY: 1) Install overrun band through front of case with the band ends facing rearward in a horizontal position (anchor support hole should face right hand side). When band is approximately halfway through transmission case, with band still horizontal, rotate band so that ends are in cavity in case above anchor pin and rotate band into position. Position band end on anchor in case.

2) Place parking brake pivot shaft spacer in recess in case. Position parking brake pawl and lever assembly in case with upper lever on pivot in case. Locate parking pawl at pivot shaft hole and insert parking pawl pivot shaft through case, pawl and spacer until end of shaft is flush with rear of case. Slide spacer washer onto pivot shaft against parking brake lever. Position parking brake lever spring in bracket with long end toward rear. Slide bracket and spring assembly onto pivot shaft with end of spring under parking brake lever. Hook other end of spring over pin at front of bracket.

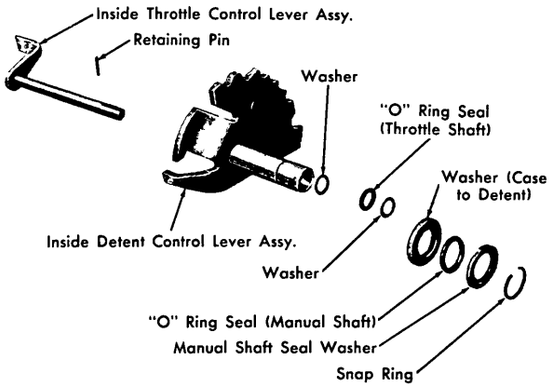
3) With throttle and detent levers assembled, place spacer washer over detent shaft against detent lever. Insert lever and shaft assembly through hole in case from inside with parking brake tang below pin in parking brake bracket. Install "O" ring seal and special washer which fits into bore on outside of case over detent lever shaft. Install snap ring to retain seal and washer.

4) Install neutral clutch stop key in case using petrolatum to hold it in place. Position rounded side toward front to provide lead for guiding neutral clutch drum over key.

CENTER BEARING SUPPORT, NEUTRAL CLUTCH & REAR UNIT ASSEMBLY: 1) Install rear unit, neutral clutch, and center bearing support assembly into case as follows: Insert output shaft end of assembly part way into front of case and then rest rear unit drum on case, while holding intermediate shaft. Rotate neutral clutch drum until groove for neutral clutch key is up.

2) Holding neutral clutch drum in this position, rotate center bearing support so that set screw hole in support is aligned with the second clutch plate slot counterclockwise from key slot in neutral clutch drum.

3) With parts aligned, slide assembly into case, engaging neutral clutch drum key with slot in clutch drum. Alignment can be checked by looking through lockscrew hole in side of case and observing that clutch plate slot in neutral clutch drum is aligned with set screw hole. This will properly align both the setscrew hole

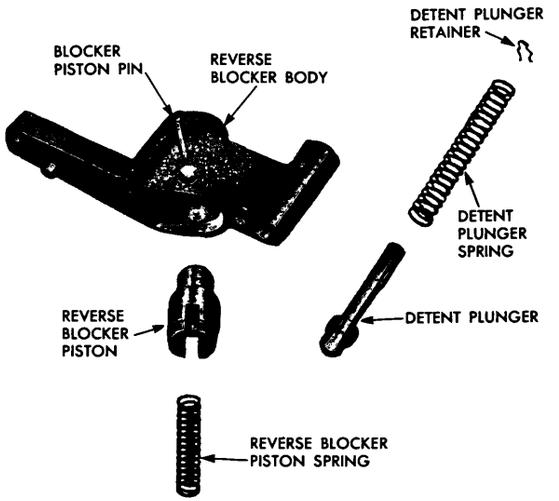


INNER CONTROL LEVER ASSEMBLY

in support and locking key groove in neutral clutch drum. When properly installed, snap ring groove in case will be visible at front edge of case support. *NOTE–* If unit fits tightly in case, assembly may be aided by pulling on output shaft. Also make sure low band does not cock on rear unit drum and hold unit.

4) Make sure case support locking screw hole is aligned and install snap ring which positions center bearing support in case. Tap snap ring as necessary with screwdriver and hammer to make sure it seats fully in groove. *(NOTE–*If necessary to align center bearing support after installation, install Slide Hammers J-6125 to act as handles). Install center bearing support locking screw from outside of transmission case.

REVERSE ASSEMBLY, REAR PUMP & GOVERNOR: 1) Install reverse planet carrier on output shaft, aligning splines and pinions. Install reverse planet carrier to to output shaft snap ring. Install reverse stationary cone key in case with rounded side toward rear and retain with petrolatum. Install stationary cone key making certain that cone aligns with key. If cone sticks, tap gently with plastic hammer until seated.



REVERSE BL CKER ASSEMBLY

2) Install reverse clutch release spring on carrier. Tangs should be positioned away from carrier. Install reverse internal gear on carrier. Position reverse internal gear-to-pump hub thrust washer against internal gear. Install reverse clutch piston release spring over internal gear against shoulder in case and stationary cone.

3) Install new gasket on rear pump, and install the reverse piston and rear pump as an assembly into case aligning splines of pump drive gear and output shaft by rotating shaft. Install locking screw and rear pump-to-case attaching screw. Tighten attaching screw to 25 ft. lbs. and locating screw to approximately 6-8 ft. lbs.

4) Remove Rear Unit Clutch Retainer J-6135 from intermediate shaft. Install rear bearing over output shaft into pump cover. *(NOTE–*If rear bearing is tight on shaft, it will be necessary to tap bearing into place using Rear Bearing Installer J-6133. While tapping bearing into place hold a block of wood aginst front of the mainshaft to hold output shaft to rear until groove for snap ring can be seen behind the rear bearing). If bearing is a slip fit on output shaft install snap ring on shaft against bearing, then pull shaft rearward and push snap ring into groove.

5) Install rear bearing snap rings on output shaft, if not previously installed, and in rear pump cover. Check mainshaft endplay as follows: Install Dial Indicator Support J-6126. Install collar of Endplay Checking Fixture J-6127 and secure in position by installing Truarc snap ring on mainshaft. Attach fixture to collar by threading collar securely into fixture. Install dial indicator. Move mainshaft back and forth to check endplay of mainshaft. Be sure to get free mainshaft endplay. Forcing mainshaft will not give accurate reading. Subtract endplay of rear unit sun gear on mainshaft from mainshaft endplay. Difference will be actual endplay of rear unit and should be .004-.018". If outside these limits it will be necessary to remove and disassemble the clutch unit so that correct selective washer can be installed between rear unit planet carrier and the reverse drive flange. *See "Center Bearing Support, N utral Clutch & Rear Unit" under "Disassembly & R - assembly of Units" above.*

6) Remove endplay checking tool. Install governor into rear pump as follows: Align snap rings so gaps will be upward when governor sleeve is aligned with drive key. Compress rings by hand and work governor into bore in rear pump. Rock governor back and forth to engage drive key. Check to see that governor turns when output shaft is turned.

7) Install new extension housing gasket on rear pump with petrolatum, and install extension housing on case with six attaching screws and washers. Tighten to 25 ft. lbs. torque. Leave out bottom two screws which are used to fasten oil cooler. Install speedometer driven gear in extension housing. Insert vent pipe into hole in top of rear pump and clamp pipe to case.

8) If rear oil seal was removed, coat new seal with Permatex and drive seal into housing using seal Installer J-5154-A. Felt portion of seal must be toward rear. Seal should be driven in until it bottoms in housing.

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DUAL-COUPLING HYDRA-MATIC (C ntinu d)

FRONT PUMP & OVERRUN CLUTCH: 1) Install front pump and overrun clutch plate assembly over intermediate shaft and at the same time align intake pipe holes in front pump and case. These should be indexed properly before any attempt is made to install pump into transmission.

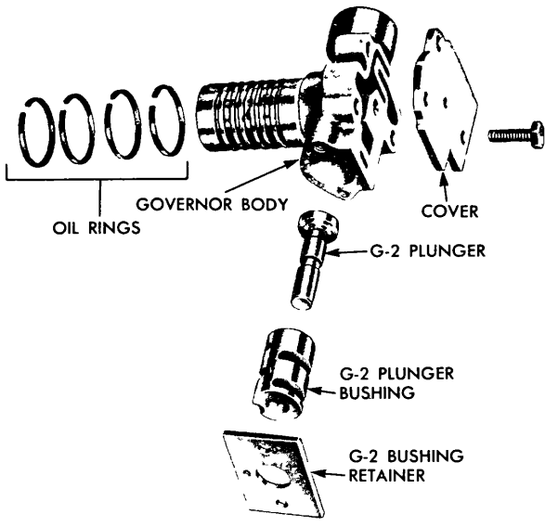
2) Install front pump into transmission case and tighten the three front pump-to-center bearing support bolts, then back off 1/4 turn. Apply air in the neutral clutch hole of transmission case to position center bearing support against snap ring. With air still applied, tighten case to front pump lock screw to 22-27 ft. lbs. Tighten pump-to-center bearing support screws to 25-30 ft. lbs.

►*FRONT PUMP LOCK SCREW PRODUCTION CHANGE:* Lock washer has been eliminated and a new "Washer Head" screw is being used in production. Whenever a lock screw is found with a lockwasher, replace it with the later type screw, Part No. 8617869.

FRONT UNIT COUPLING, PRESSURE REGULATOR & COOLER ADAPTER: 1) Make sure seals are in place on ends of oil cooler sleeves and insert sleeves in case with seal end first. Place oil cooler adapter with gasket on case over oil cooler sleeves, install two attaching screws with copper washers, and tighten securely.

2) With spring in place on regulator valve install valve and spring into case. Install pressure regulator plug assembly and tighten to 5 ft. lbs. *CAUTION–Overtightening of pressure regulator may push pump away from side of case causing an oil leak between passages in pump and case.*

3) Install front unit coupling cover first (with transmission vertical, and front end up), into transmission case. Rock drive torus shell to make sure drive hub engages front pump rotor and rock driven torus shaft to make sure lugs on shaft engages front unit sprag inner race. Driven torus shaft should turn clockwise freely, but should not turn counterclockwise as viewed from front.



GOVERNOR ASSEMBLY

CONTROL VALVE, SERVO & ACCUMULATOR: 1) Rotate transmission to horizontal position. Attach control valve assembly to transmission with five attaching screws, leaving out screw which will position front pump intake pipe retainer. *(NOTE–*The four outer screws have star washers and the center two have flat washers). Position detent lever so it will engage detent plunger and manual valve.

2) Install new front pump "O" ring seal in intake pipe at front of case. Install servo and accumulator assembly and servo spring. Install front intake pipe into case and secure with clip and valve body attaching screw.

3) Install rear pump "O" ring seal on rear pump intake pipe. Install oil screen on front pump intake pipe. Install rear pump intake pipe into screen and case. Install oil pan with new gasket and tighten attaching screws securely.

FLYWHEEL REAR HOUSING, TORUS ASSEMBLY & OIL COOLER: 1) Remove transmission from holding fixture and position on bench in a horizontal position, with pan down. Install steel thrust washer in recess in front unit drive torus shell. Position Flywheel Housing Bushing and Seal Protector J-6119 over intermediate shaft.

2) Install rear flywheel housing-to-case "O" ring seal on flywheel housing. Install rear flywheel housing on case and attach with six screws. Tighten securely. Remove Bushing and Seal Protector.

3) Install proper selective washer on drive shaft of front unit as determined when checking front unit end clearance at disassembly. Install torus cover and push cover on evenly, without rocking, to prevent damage to seal and bushing.

4) Install internal gear assembly into cover, indexing with torus cover and front unit drive torus hub. Install bronze thrust washer then steel backing washer in internal gear. Steel backing washer must be indexed with splines of front unit drive torus shaft.

5) Install sun gear over front unit driven torus shaft, chamfered side first. Install steel backing washer and bronze thrust washer against sun gear. Install drive torus member on intermediate shaft indexing front unit planet carrier with sun gear and internal gear. Secure drive torus to intermediate shaft with Truarc snap ring.

6) Install driven torus rear Truarc snap ring on mainshaft. Install driven torus front Truarc snap ring on mainshaft to secure torus member.

7) Install flywheel "O" ring seal on flywheel and position flywheel against torus cover, indexing with dowels (flywheel can be installed in only one position since dowels are of different sizes). Install and tighten flywheel-to-torus cover nuts leaving the nuts off bolts required for attaching flywheel and torus cover to flex plate *NOTE–24 attaching bolts used in early production. 12 bolts in later production. When using a 24 bolt cover on a 12 bolt flywheel, remove the 12 alternate bolts. A 24 bolt flywheel can be used on a 12 bolt cover without any changes).* Tighten nuts to 20 ft. lbs.

8) Place oil cooler in position against bottom of rear extension housing and install attaching screws. Connect oil cooler pipes to adapter on side of transmission case.

PACKARD TWIN ULTRAMATIC

Huds n, Hornet V8 (1956)
Nash, Ambassador V8 (1956)
Packard, All Models (1956)
Studebaker, Golden Hawk (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 HUDSON & NASH ULTRAMATIC REAR CIL PUMP PROD. CHANGE·* A new rear pump driver, Part No. 6489292, which pilots in both the rear pump rotor and on the planetary shaft (to prevent brinnelling of the shaft) was used in production starting with transmission serial No P-6492. *NOTE* - The brinnelling marks found on the planetary shaft will not affect its operation. It is therefore not necessary to change the rear planetary assembly when the new driver is installed as it will prevent contact of the rotor drive lugs and shaft.

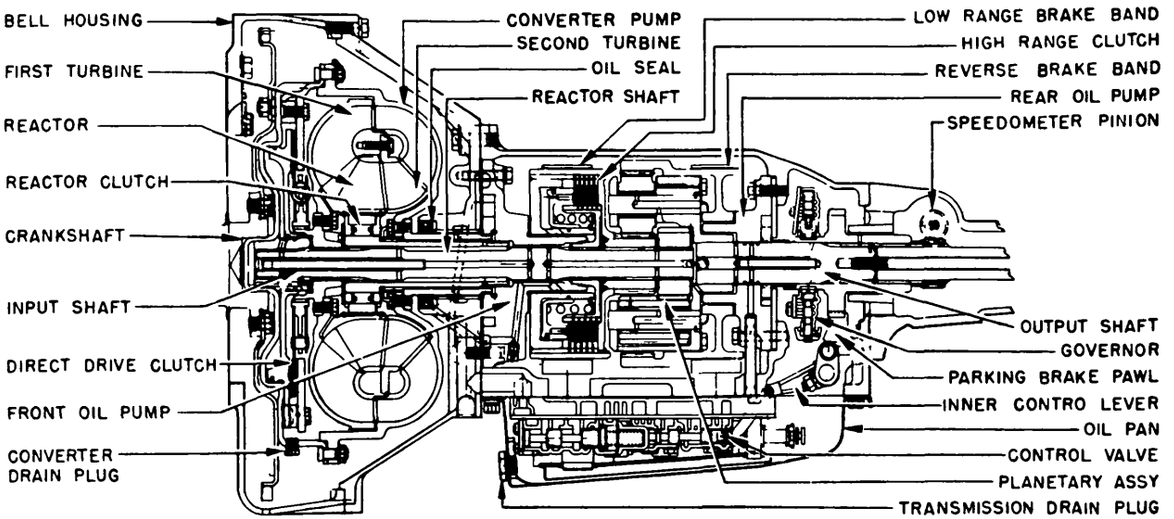
►*1956 ULTRAMATIC CONTROL VALVE BODY AIR LEAKAGE CORRECTION* This condition can cause erratic shifting and a high pitch whine from either or both oil pumps Correct as follows Lap the mating surfaces using crocus cloth laid on a surface plate or plate glass. When installing control valve assembly in transmission, tighten the bolts as indicated in "Transmission Reassembly" in 1955 Annual Data or later Manual edition.

►*1956 STUDEBAKER ULTRAMATIC LOW RANGE BRAKE PRODUCTION CHANGES* Starting with Transmission Serial No. S-2463, the inner spring was eliminated and a new separator plate, Part No 6489478 entered production. This change was made to overcome possible occurrences of engine "flare-up" or "runaway" during transmission upshift from low range converter to high range converter. To correct this condition on cars before Serial No S-2463, install the later type separator

►*1956 STUDEBAKER ULTRAMATIC HARSH BAND APPLICATION (On Transmission between Serial Nos. S-2463 and S-4028)* If this condition is apparent on transmissions between these serial numbers, install the low range brake inner spring, Part No. 470183).

►*LATE 1956 STUDEBAKER ULTRAMATIC LCW RANGE PRODUCTION CHANGE* Beginning with Transmission Serial No. S-4028, the inner low range brake spring was reinstated, and is used with the later type separator plate. See Production Changes above

►*1956 STUDEBAKER ULTRAMATIC TRANSMISSION FRONT FUMF CHECKING CAUTION* In cases where the high range clutch burns out prematurely, or there is an engine "runaway" on low range converter to high range converter upshift, check the front pump for restrictions, as follows Place complete pump assembly in a shallow pan with pump plate upward. Use a small funnel with the end reworked to fit the high range oil circuit hole of the pump plate (this hole is the fourth hole to left of pump plate screw having the five closely spaced holes adjacent to it. The other plate screw has only two closely spaced holes adjacent to it). Using automatic transmission fluid (temp 65° to 75°F), pour enough fluid in funnel to fill the high range passage in the pump. Allow fluid to drain down to a level slightly above the funnel spout. At this time, pour an additional ½ pint of fluid in the funnel and observe the time required for fluid to reach the predetermined level. If more than 2 minutes and 15 seconds is required for the level to come up, the passage is restricted and the pump should be replaced.



TWIN ULTRAMATIC DRIVE SECTIONAL VIEW

►*1956 STUDEBAKER ULTRAMATIC DIRECT CLUTCH PRESSURE PLATE ASSEMBLY PRODUCTION CHANGE* Flat washers, No 338405 are being installed under the heads of the direct clutch pressure plate bolts to prevent steel shavings (caused by bolt head digging into pressure plate) from falling into transmission. Install these washers at this location whenever work is performed on the direct clutch pressure plate assembly.

►*1956 STUDEBAKER ULTRAMATIC CONVERTER PUMP SHAFT AND TRANSMISSION FRONT PUMP ROTOR PRODUCTION CHANGE* Beginning with Transmission Serial No S-2463, a new converter pump shaft, (with splines controlled to provide an improved spline fit), and a new front pump rotor (with 40 splines instead of 20) were used. (*NOTE* - The early pump shaft had 40 splines, however, only 20 were used as the rotor had only 20 splines). When necessary to replace the early type front pump or a converter pump shaft, use Rotor Assembly and Pump Shaft Kit, Part No. 6484523, or Pump Assembly and Pump Shaft Kit, Part No. 6484524. On cars prior to Transmission Serial No. S-2463, use Converter, Part No. 6479085 when replacing only the converter.

►**TOWING TWIN ULTRAMATIC TRANSMISSION CARS:** Cars can be towed with selector lever in Neutral "N" position providing the Twin Ultramatic unit is not damaged and oil level in unit is normal. **Do not tow car at a speed gr ater than 30 MPH., or for any great distance.** If selector lever cannot be placed in Neutral, or if transmission oil level low, disconnect drive shaft at rear end and securely fasten to frame so it cannot move to the rear (*CAUTION*–Rearward movement will allow front end to slip off transmission main shaft splines and drop down).

►**STARTING ENGINE BY PUSHING CAR:** If this procedure required for Twin Ultramatic Cars, place selector lever in Neutral "N" position and turn on ignition. When car has attained a speed of 25 MPH., move selector lever to LEFT HAND "D" position. Engine will then crank.

DESCRIPTION

Twin Ultramatic Transmission is the same general design as used on 1955 Models. *See 1955 Annual Data or later Manual edition.*

►*1956 PACKARD ELECTRIC FUSH-BUTTON CONTROL NOTE* This unit is standard equipment on Packard Carribean and optional equipment on other Packard models. *See "Packard Twin Ultramatic "Push-Button" Control" for service procedures and wiring diagram.*

The torque converter assembly automatically provides a torque multiplication ranging from approximately 2-1/3 to 1 (for starting and heavy loads) to a 1 to 1 ratio (for steady driving and light loads) and is locked out by the Direct Speed Clutch at speeds above 15 MPH in High Range operation under normal driving conditions (can be "Kicked down" at car speeds under 60 MPH). Planetary unit is manually controlled and provides definite gear ratios (in addition to the varying ratios of the Torque Converter) depending on selector lever position. This control is effected through the hydraulic control system by means of oil pressure supplied by front and rear oil pumps in transmission case.

CONTINUED ON NEXT PAGE

TWIN ULTRAMATIC (C nt.)

LUBRICATION

Check transmission fluid level every 1000 miles and add fluid as required to maintain level at FULL mark on dipstick. Drain and replace fluid at 25,000 mile intervals.

►*CAUTION: Fluid must only be checked at normal op rating temperatures after 1 minute operation at 800 RPM with selector lever in "N" position.*

Ch cking Fluid L vel—With fluid at normal operating temperature, place selector lever in "N" position, idle engine at 800 RPM to fill system, then run engine at low idle while level is being checked, using dipstick in engine compartment on left side.

►*NOTE:* If fluid level doubtful due to bent or distorted dipstick tube, check actual fluid level in transmission as follows: Place car on level floor and allow engine to run at idle speed for five minutes in "N" (Neutral). Place a pan under rear of transmission and remove plug in rear of transmission case. If no oil runs out of opening, add oil until it begins to run out, install plug, then ADD ONE QT. If oil does run out when plug removed at rear of transmission, allow to drain to level of hole, then ADD ONE QT.

Draining & R filling—Remove flywheel housing lower cover and turn flywheel to bring a converter drain plug to the bottom. Place a container under converter and transmission oil pan and then loosen but do not remove converter drain plug. Rotate flywheel to bring the other drain plug to the bottom and remove this drain plug and also the oil pan drain plug and drain fluid. Remove oil filler tube, oil pan, and strainer and thoroughly clean and dry these parts (use compressed air to dry). Reinstall strainer, pan, and tube using new gaskets. Reinstall and tighten converter and oil pan drain plugs (make sure that the drain plug previously loosened is also tightened securely). Install flywheel housing lower cover and tighten retaining screws to 15-18 ft. lbs. (1954 cars), 25-30 ft. lbs. (1955 cars). Pour seven qts. of Automatic Transmission Fluid Type A through filler tube in engine compartment. Start engine and allow to run at HIGH IDLE speed for five minutes with transmission selector lever in "N" (Neutral) position. Bring engine to slow idle speed and add approximately two to three qts. of fluid, and then continue to add only enough to bring level to FULL mark on dipstick.

►*CAUTION: Determine amount of fluid installed by mark on dipstick rather than by number of qts. installed.*

Recommend d Fluid—Packard Twin Ultramatic Transmission Fluid or any Automatic Transmission Fluid Type "A" having an AQ-ATF number and symbol embossed on the container.

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE: See "Throttle Linkage" under "Carburetor" on Car Model pages.*

HUDSON & NASH

S l ctor C ntr l Linkage Adjustm nt (Hudson & Nash V8): Place selector lever in "R" (Reverse). Disconnect transmission control lever from control rod at rear of transmission. Move transmission control lever to rear as far as it will go (do not force lever as it may bend stop plate within transmission). Adjust clevis on transmission control rod so that clevis pin fits freely in hole of clevis and transmission lever. Replace cotter key and tighten locknuts on control rod. *NOTE*—If necessary to align selector lever point on steering column, place selector lever in "N" (Neutral) position (noting position of pointer). Remove shroud from jacket tube by removing retaining screw at lower end of shroud and sliding shroud downward and turning upper end toward the right. Lift out of jacket tube. Hold pointer shaft with pliers and move pointer toward right or left on shaft to line it up directly under center of letter "N".

Neutral Safety Switch Adjustment: Adjust switch so starter is operative only in "N" and "P" position.

PACKARD

Selector Control Linkage Adjustment (All Packard): Disconnect forward end of transmission control rod at bellcrank (attached to frame side rail). Pull control rod to its full forward limit which will place the control manual valve in the reverse position. Pull lever at lower end of selector shaft downward to its full limit of travel so it contacts stop on lever bracket. Adjust turnbuckle in lower lever to bellcrank link so that the forward end of the control rod will enter bellcrank, and secure in this position.

Neutral Safety Switch Adjustment: Adjust switch so starter is operative only in "N" and "P" position.

STUDEBAKER GOLDENHAWK

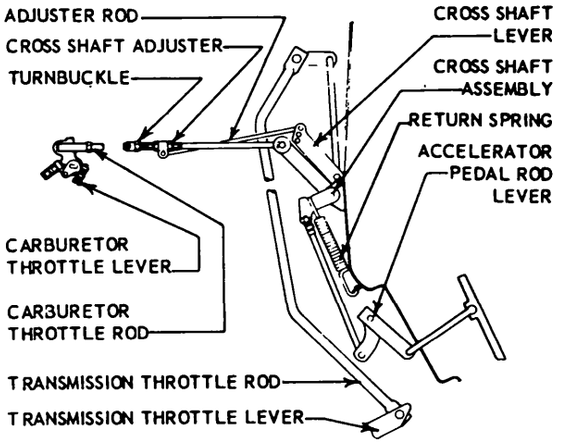
Selector Control Linkage Adjustment: Disconnect clevis from forward end of control rod at bellcrank. Pull transmission rod to its full forward limit of travel by means of the bellcrank which will place manual valve in the reverse position. Pull control rod down to its full limit of travel. Adjust the clevis so the pin will freely enter clevis and bellcrank arm. Tighten clevis locknut and install cotter pin.

Neutral Safety Switch Adjustment: Switch is located at lower end of steering post jacket. Remove hand control-to-switch rod. Loosen screws attaching switch to jacket. Align pin hole in switch lever with corresponding hole in switch body. Install pin through holes to maintain alignment. Tighten attaching screws and install hand control-to-switch rod.

BAND ADJUSTMENT

►*ADJUSTMENT NOTE:* Adjusting screw and locknut for each band are located on left side of transmission case (Low Range Band), right side (Reverse Band). Both bands are adjusted alike as follows:

Adjustm nt: Loosen locknut on band adjusting screw and use a torque wrench to tighten adjusting screw (clockwise) to 20 ft. lbs. torque, then **back ff adjusting scr w 1-3/4 turns.** Tighten locknut.



PACKARD THROTTLE LINKAGE

TROUBLE SHOOTING & DIAGNOSIS

CAR FAILS TO MOVE (Under conditions indicat d below):

1) Car fails to move regardless of selector lever positi n.
(a) Insufficient oil or clogged inlet screen.
(b) Converter valve stuck or pump valve stuck.
(c) Selector control linkage disconnected.
(d) Transmission output shaft broken loose from planetary cage.
(e) Parking gear lever broken which may allow pawl to remain engaged in parking gear.
(f) Low and reverse bands adjusted too tight.
(g) Bushings or bearings seized in the transmission. Noise may or may not be present.

2) Car fails to move in "D" (Drive) range with select r lever in the gear starting position.
(a) Insufficient oil or clogged inlet screen. Loss of pressure to apply side of low range brake.
(b) Selector control linkage disconnected or out of adjustment.
(c) Low range brake band strut out of position or low range brake band badly worn.

3) Car fails to move in "D" (Drive) range with select r lever in high range clutch start position.
(a) Rubber lip seal on high range clutch piston out of position causing piston to leak.
(b) Shift regulator valve stuck or clutch plates worn or burned.
(c) Selector control linkage disconnected or out of adjustment.

4) Car fails to move with selector lever in "L" (L w) position.
(a) Selector control linkage disconnected or out of adjustment.
(b) Worn low range band or band strut out of position.
(c) Low range brake piston jammed or insufficient oil supply to apply side of low range brake.

5) Car fails t m v with s l ct r l v r in "R" (R v rs) p siti n.
(a) Selector control linkage disconnected or out of adjustment.

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TWIN ULTRAMATIC (C nt.)

(b) Worn reverse brake band or strut out of position.
(c) Manual valve stop inside transmission not adjusted properly allowing the manual valve to over-travel.
(d) Lack of oil to apply side of reverse brake piston caused by a stuck reverse shuttle valve.
( ) Reverse brake piston stuck in housing.

6) Excessive slippage in all driving ranges.
(a) Insufficient oil or low front pump pressure due to sticking pump valve.
(b) Low front oil pump pressure due to ball plugs being out of low range and reverse brake housings, or worn or badly scored pump rotors.
(c) Low oil pressure to the converter caused by a stuck converter valve.

7) Excessive drag in "D" (Drive) range using high range clutch start. Also drags in reverse but is all right on "L" (Low) range.
(a) Low range brake band too tight, or low range brake piston stuck and holding brake partly applied.
(b) Transfer tube to release side of low range brake out of position.

8) Excessive drag in both "D" (Drive) ranges. All right in "R" (Reverse) range.
(a) Reverse brake band too tight, or reverse brake piston stuck holding brake partly applied.

9) Car creeps forward in "N" (Neutral).
(a) Low range brake band too tight, or High range clutch plates sticking on splines.
(b) High range clutch piston rubber lip seal out of position causing piston to stick and partly engage clutch.
(c) Low range brake piston stuck holding brake partly applied.

10) Car creeps excessively in any driving range with the ngine idling.
(a) Engine idling too fast.

11) Car creeps forward when selector lever is in "R" (Reverse).
(a) Manual valve linkage out of adjustment.

12) Car does not move with the selector lever in "R" (Reverse) position.
(a) Reverse shuttle valve stuck preventing the oil above the reverse brake piston from venting.
(b) Reverse brake band strut out of position.

13) Chatter when starting in "D" (Drive) range using high clutch start.
(a) Low range band dragging, or reverse band dragging.
(b) Worn, burned, or distorted high range clutch plates. Could also be caused by sticking plates or piston.

14) Chatter when starting in "L" (Low) range.
(a) Low range brake band out of adjustment, or reverse range band dragging.
(b) Sticking high range clutch plates or pistons.

15) Chatter when starting in "R" (Reverse) range.
(a) Reverse brake band out of adjustment, or low range band dragging.
(b) Reverse drum (ring gear) bushing badly worn.

16) Driv Clutch fails t ngag .
(a) Sticking high speed governor valve, low speed governor valve or direct shift valve. Could also be caused by direct shift throttle valve sticking.
(b) Direct drive clutch piston sticking.

17) Direct drive clutch "hangs on" or fails to release on deceleration.
(a) Sticking direct shift valve or low speed governor valve.

18) Direct drive clutch engages late and disengages early.
(a) Direct shift valve spring "cocked" in valve bore.
(b) Direct shift throttle valve sticking open.

19) Direct drive clutch slips.
(a) Excessive slippage in direct drive clutch circuit.
(b) Sticking converter valve resulting in high converter pressure while in direct drive.

20) Transmission remains in low range using gear start "D" (Drive) position. Will not upshift from low range converter to high range converter.
(a) Sticking low-high shift valve or sticking governor valves.
(b) Sticking throttle valve.

21) Incorrect front oil pump pressure.
(a) Low oil level or sticking pump valve.
(b) Ball plugs missing in reverse brake housing.
(c) Sticking pump check valves, or incorrect valve spring. Sticking modulator valve.

22) Incorrect high range clutch pressure.
(a) Sticking shift regulator valve, or sticking low-high shift valve. Incorrect pump pressure.

23) Incorrect low range brake top pressure.
(a) Ball plug missing in low range brake housing.
(b) Sticking low-high shift valve, or incorrect pump pressure.
(c) Threaded plug missing in low range brake housing.

24) Incorrect converter "IN" pressure.
(a) Incorrect front pump pressure.
(b) Sticking converter valve.
(c) Loss of pressure in the converter circuit caused by loose or worn bushings.

25) Incorrect direct drive clutch pressure.
(a) Sticking low or high speed governor valves.
(b) Worn or leaking direct drive clutch piston rings.
(c) Loss of pressure through direct drive clutch circuit caused by loose or worn bushings.

26) Incorrect governor pressure.
(a) Sticking low or high speed governor valves.
(b) Governor plate not properly installed.

27) Incorrect throttle pressure.
(a) Throttle pressure adjusting screw not properly set.
(b) Throttle linkage not properly set or is binding.
(c) Throttle valve sticking.

HYDRAULIC PRESSURE TESTS

►*NOTE:* Before making following tests, check fluid level in transmission. Road test car by driving under conditions simulating heavy traffic and highway operation (frequent stops and starts, low speed, medium speed, and accelerating). If transmission does not operate satisfactorily after engine and transmission thoroughly warmed up, make hydraulic tests as outlined below.

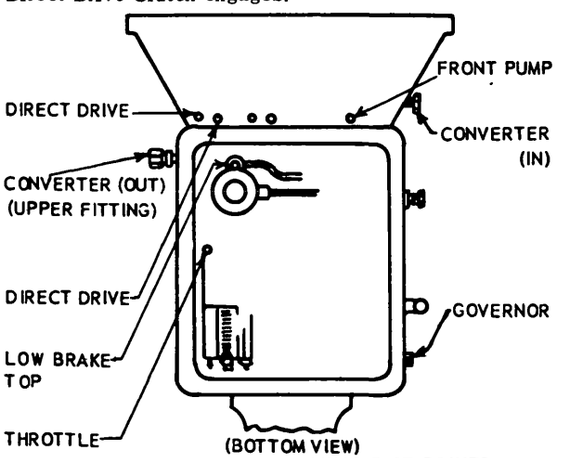
►*SPECIAL HYDRAULIC TESTING TOOL NOTE:* For Nash & Hudson, use Tool Set J-5975. For Packard models, use Tool Set PU-300, and Pan Adapter PK-23. These tool sets are comprised of gauges, fittings, flexible tubing, and special pan adapters.

TEST GAUGE INSTALLATION (HUDSON & NASH): Fold floor mat away from left side of front seat to uncover floor hole cover. Remove cover and insert flexible pressure gauge lines supplied with Tool J-5875 to the transmission. Remove plug in transmission and connect line fitting to correct passage for desired hydraulic test (see Test Plug Location in illustration).

TEST GAUGE INSTALLATION (PACKARD): Remove flexible tubing from left hand fresh air duct and thread gauges through the fresh air grille, out of air duct and down to transmission. Attach hoses to desired points on transmission (see Test Plug Location in illustration).

FRONT PUMP PRESSURE: Connect gauge to front pump test point at front of transmission case (left side). On all models, operate engine at 400 RPM. Normal oil pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others), with selector lever in all positions.

With Selector Lever in •D Range—Drive car at 15-20 MPH. Maximum pressure should be 150-160 lbs. (1954 Packard). 150-170 lbs. (Others), at full throttle before Direct Drive Clutch engages.



TWIN ULTRAMATIC HYDRAULIC TEST POINTS

With Selector Lever in D• Rang —Maximum pressure should be 140-150 lbs. (1954 Packard). 80-120 lbs. (1955 Packard). 140-160 lbs. (Nash & Hudson), at full throttle before Direct Drive Clutch engages.

With Selector Lever in L Range (1955 Packard): Drive car at 25 MPH. Pressure should be 120-130 lbs., at full throttle.

HIGH RANGE CLUTCH PRESSURE: *(NOTE—Leave gauge connected for "Front Pump Pressure" test above).* Connect another gauge to high range clutch pressure point at front of transmission (right side). In the following tests, High Range Clutch Pressure should be the same or not more than 10 lbs. under Front Pump Pressure.

With Selector Lever in •D Range: Operate engine at 400 RPM. High Range Clutch Pressure should be 75-90 lbs. (1954 Packard). 70-100 lbs. (1955 Packard). 70-110 lbs. (Hudson & Nash). Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others).

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TWIN ULTRAMATIC (C nt.)

With S l ctor Lever in "D Range: Drive car at 15-20 MPH (Converter Drive). High Range Clutch Pressure should be 145-155 lbs. (1954 Packard). 145-165 lbs. (Others). Front Pump Pressure should be 150-160 lbs. (1954 Packard). 150-170 lbs. (Others).

With Sel ct r Lev r in D• Range: Operate engine at 400 RPM. High Range Clutch Pressure should be at Zero pressure. Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others).

With Selector L ver in D• Range: Drive car at 20 MPH (Direct Drive) with a steady throttle. High Range Clutch Pressure should be 55-65 lbs. (All Models).

LOW BRAKE TOP PRESSURE: *(NOTE–The pressure point for this test and for Throttle Pressure is located on the control valve assembly. A special oil pan adapt r is used and a special procedure is required. Connections for both tests should be made at the same time. S e "Low Brake Top Pressure & Throttle Pressure Test Connection Note" below).* Pressure should be the same or not more than 10 lbs. under Front Pump Pressure.

With Sel ctor L v r in "D Range: Operate engine at 400 RPM. Low Brake Top Pressure should be 75-90 lbs. (1954 Packard). 70-100 lbs. (Others). Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 (Others).

With S l ctor L ver in D• Range: Operate engine at 400 RPM. Low Brake Top Pressure should be at Zero pressure. Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others).

With Selector L ver in D Range: Immediately after upshift, Low Brake Top Pressure should be 40-65 lbs. (All Models). Front Pump Pressure should be 50-70 lbs. (All Models).

CONVERTER "IN" PRESSURE: Connect gauge to converter "in" test point at left side of converter housing.

With Sel ctor L ver in D• Range: Operate engine at 400 RPM. Pressure should be 60-70 lbs. (1954 Packard). 30-50 lbs. (Others).

With Sel ctor L v r in D• Range: Drive car at 15 MPH., (before Direct Drive). Pressure should be 70-80 lbs. (1954 Packard). 55-80 lbs. (Others).

With S lector L v r in D• Range: Drive car at a speed to engage Direct Speed Clutch. Pressure should be 15-25 lbs. (All Models) with Direct Drive engaged.

With Select r L v r in D• Range: In "kickdown" position, converter pressure should be 70-80 lbs. (1954 Packard). 70-85 lbs. (Others).

CONVERTER "OUT" PRESSURE: To check converter "out" pressure a special tee connection is required (install and braze a 1/8" nipple into one end of the 1/8" tee). Remove upper oil cooler tube adapter from side of bell housing. Install oil cooler tube adapter in the tee and reconnect cooler tube. Connect gauge to tee connection.

With S l ctor Lever in D• Range: Drive car at 15-18 MPH. In "Converter Drive" pressure should be 30-40 lbs. (1954 Packard). 25-40 lbs. (Others). In "Direct Drive" pressure should be 10-20 lbs. (All Models).

DIRECT DRIVE PRESSURE: Connect gauge to direct drive test point at front of transmission (right side), and another gauge to front pump test point at front of transmission (left side). Direct drive pressure should be the same or not more than 10 lbs. under front pump pressure.

With Selector Lever in D• Range: Drive car at 15-18 MPH. Front Pump Pressure should be at Zero pressure (All Models), before Direct Drive Clutch engagement. Front Pump Pressure should be 80-95 lbs. (1954 Packard). 70-100 lbs. (Others). After Direct Drive Clutch engagement, pressure should be 55-65 lbs. (All Models). After "kickdown", Direct Drive Pressure should be at Zero pressure. Front Pump Pressure should be 140-160 lbs. (All Models).

GOVERNOR PRESSURE: Connect gauge to governor pressure test point on left side of transmission case (rear). Pressures should be as follows:

1954 Packard, Hudson & Nash–15-20 lbs. at 13 MPH. 30-35 lbs. at 28 MPH. 55-65 lbs. at 56 MPH.

1955 Packard–15-18 lbs. at 13 MPH. 35-40 lbs. at 28 MPH. 62-69 lbs. at 56 MPH.

THROTTLE PRESSURE: *(NOTE–The pressure point for this test and for Low Brake Top Pressure is located on the control valve assembly. A special pan adapter is used and a special procedure is required. Connections for both tests should be made at the same time. See "Low Brake Top Pressure & Throttle Pressure Test Connection Note" below).* Operate engine at 400 RPM. Throttle pressure should be 20-25 lbs. (1954 Packard). 23-26 lbs. (Others). At Full Throttle, pressure should be 65-72 lbs. In "kickdown" (before downshift), pressure should be 80-95 lbs. (All Models).

Throttle Pressure Adjustment: Before adjusting throttle pressure, check all of the throttle linkage adjustments (see "Throttle Linkage Adjustment" above). The throttle pressure adjusting screw can be reached from the right side of the transmission case with the Oil Pan Adapter, PK-23 (Packard), or Oil Pan Adapter, J-5975 (Nash & Hudson) in place as described in "Low Brake Top Pressure & Throttle Pressure Test Connection Note" below. Use two wrenches through opening. Loosen locknut and turn adjusting screw to obtain correct throttle pressure (see "Throttle Pressure" above). Be sure to recheck throttle pressure after locknut is tightened.

►*LOW BRAKE TOP PRESSURE & THROTTLE PRESSURE TEST CONNECTION NOTE:* These two connections are located on the throttle control valve assembly within the transmission oil pan. Drain transmission fluid and remove transmission oil pan and screen. Install special test pan adapter, PK-23 (Packard), J-5975 (Nash & Hudson), with the adapter tube on the left side and toward front of car. Thread two of the gauge hoses through elbow tube on the adapter. Remove the 1/8" pipe plug from bottom of low brake housing and install a 1/8" elbow. Connect gauge hose. Remove 1/8" pipe plug from throttle valve body, install a 1/8" elbow and connect other gauge hose. On Packard, install the two oil suction tube extensions to suction tubes, install oil pan and gasket and replace transmission fluid.

TRANSMISSION REMOVAL

HUDSON & NASH

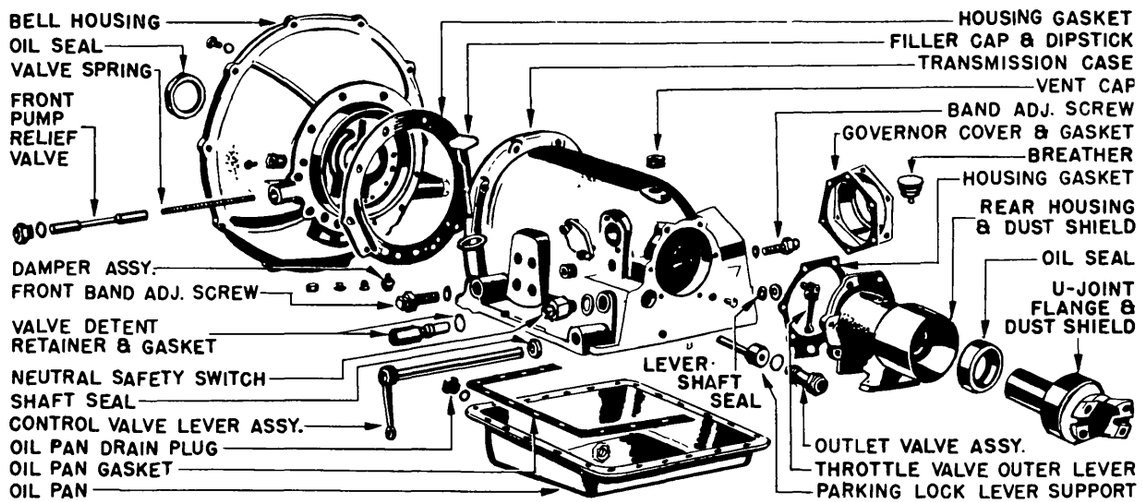
►*NOTE: The transmission and converter are removed from the chassis as an assembly.*

1) Raise car on lift or raise car at both ends and support it with jack stands under side sills. Drain fluid from transmission and converter assembly *(see "Draining & Refilling" above).*

2) Disconnect torque tube and propeller shaft from transmission. Disconnect throttle valve linkage and selector control linkage at transmission. Disconnect speedometer cable and cooler lines at transmission.

3) Support engine at rear using a support beam across frame channels or with a large block and hydraulic

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TWIN ULTRAMATIC TRANSMISSION CASE ASSEMBLY

TWIN ULTRAMATIC (C nt.)

jack under rear end of engine oil pan. Raise engine and transmission just enough to take load off rear support under transmission rear housing. Remove the insulator to support nuts and washers and then remove the support to cross member bolts and remove support.
4) Place a transmission lift under transmission with the lift adapter properly positioned around oil pan. Pick up transmission load by slightly raising the lift.
5) Remove direct drive clutch housing to flywheel retaining nuts and slide converter assembly toward transmission. Remove the bell housing to flywheel capscrews and then move transmission rearward until the direct drive housing is clear of the flywheel. Wire converter assembly to bell housing so that it cannot accidentally slide off the input shaft.
6) Lower transmission lift and pull it from under car. Transfer transmission assembly to a reconditioning stand.

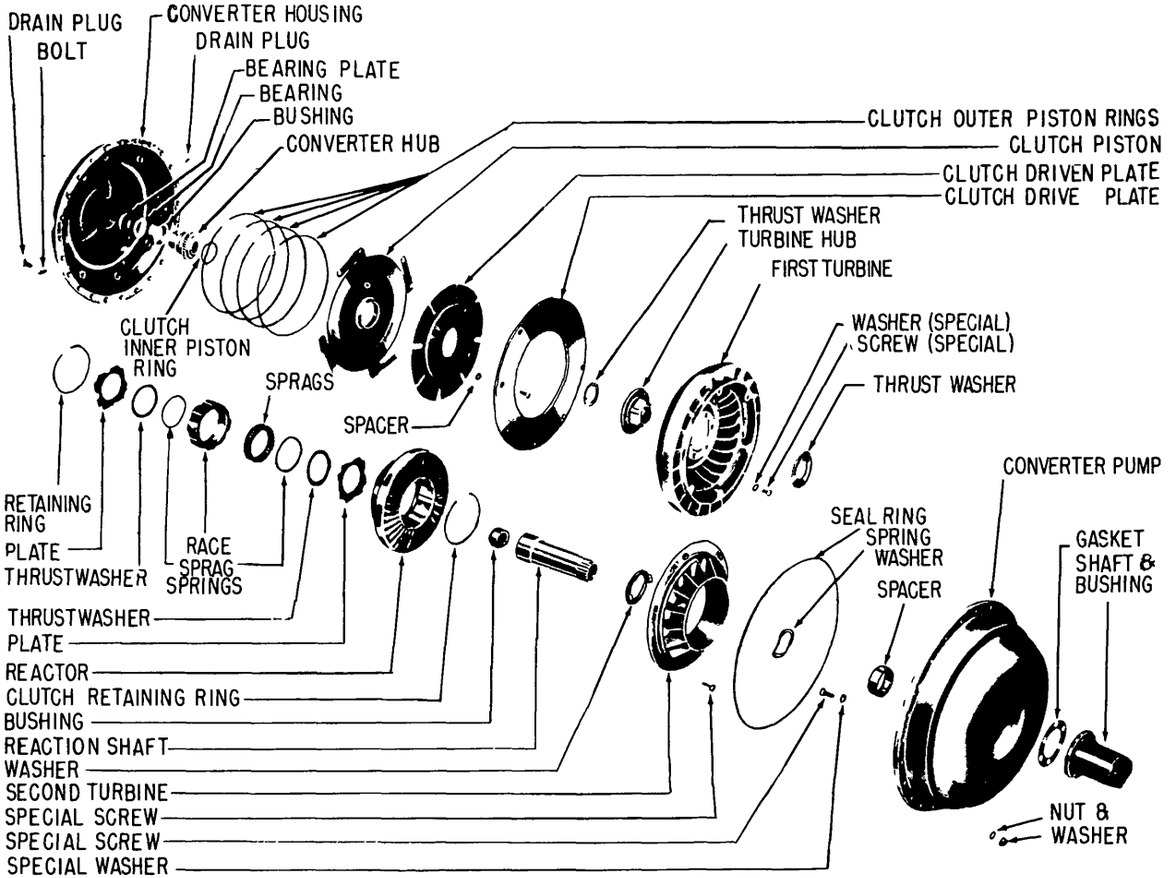
PACKARD

►*NOTE: Transmission and converter are removed from chassis as an assembly.*

1) Raise car on lift or raise car at both ends and support with jack stands under side sills. *(CAUTION– Do not place jack or other lifting device under rear load arms or any other part of Torsion Level Suspension assembly).*
2) Disconnect propeller shaft at both ends and remove shaft. Disconnect throttle valve linkage and selector control linkage at transmission. Disconnect speedometer cable and cooler lines at transmission.
3) Support engine at rear using a support beam across frame channels or with a large block under rear of engine oil pan and a hydraulic jack. Raise engine and transmission just enough to take the load off rear support under transmission rear housing. Remove insulator to support nuts and washers and then remove the support to "X" member bolts and remove the support.
4) Place a transmission lift under transmission with lift adapter properly positioned around the oil pan. Pick up the transmission load by slightly raising the lift. Remove direct drive clutch housing to flywheel retaining nuts and slide converter assembly toward transmission.
5) Remove the bell housing to flywheel housing capscrews and then move transmission rearward until the direct drive clutch housing is clear of flywheel. Wire the converter assembly to bell housing so it cannot accidentally slide off input shaft.
6) Lower transmission lift and pull it from under the car.

STUDEBAKER GOLDENHAWK

1) Remove cable from positive battery terminal. Raise car on hoist to provide working clearance and remove left exhaust pipe. Disconnect wires from starter motor. Remove flywheel housing lower cover retaining capscrews and remove lower cover.
2) Rotate engine flywheel until one converter drain plug is at bottom and loosen, but do not remove the drain plug. Rotate flywheel 180° and remove other drain plug. Remove transmission drain plug. Replace and tighten all plugs after converter and transmission drained.
3) Disconnect front propeller shaft at transmission companion flange and tie to right side of frame out of the way. Disconnect throttle valve and manual valve linkage at transmission. Disconnect selector to bellcrank linkage by removing the cotter pin from clevis at bellcrank. Remove bolts and nuts holding bellcrank to transmission bracket, and to frame bracket and remove bellcrank. Disconnect speedometer cable and transmission cooler lines. Remove dipstick tube.
4) Support engine at rear using a support beam across frame channels or with a large block under rear end of engine oil pan and a hydraulic jack. Raise engine and transmission enough to take load off rear engine support cross member under the transmission rear housing. Remove cross member retaining bolts and slide cross member to rear.
5) Remove body front pillar support cross member. Place transmission jack under transmission with saddle adapter J-6316, properly positioned around oil pan. Take up transmission load slightly by raising jack. Remove direct drive clutch housing-to-flywheel retaining nuts and slide converter assembly toward transmission. Remove bell housing-to-flywhe el housing capscrews and then move transmission rearward until direct drive clutch housing is clear of flywheel. Wire converter assembly to bellhousing so that it cannot slide off the input shaft.
6) Lower transmission on jack and pull jack and transmission from under car. Remove bellcrank bracket from transmission. Remove converter and place on bench.



TWIN ULTRAMATIC TORQUE CONVERTER ASSEMBLY

TRANSMISSION INSTALLATION

HUDSON & NASH

1) Wire converter assembly to bell housing to prevent it from slipping off input shaft while moving transmission. Install transmission on lift or jack. Place under car and raise it until pilot at front of direct drive clutch housing is in a line with bore in crank-

CONTINUED ON NEXT PAGE

TWIN ULTRAMATIC (C nt.)

shaft. Move transmission forward so that pilot enters crankshaft while at the same time the four studs on clutch housing enter holes in flywheel. Start two of the converter to flywheel retaining nuts and remove wire holding converter to bell housing.
2) Raise transmission until pilot around top of bell housing flange is right to top of flywheel housing. Install the lower flywheel housing cover and starting motor. Install all bell housing to flywheel housing retaining bolts and tighten to 25-30 ft. lbs. Install the other two converter to flywheel nuts and tighten to 25-30 ft. lbs.
3) Attach rear cross member to the engine supports and side sills. Connect torque tube and universal joint to rear transmission housing and output shaft. Remove the support from under engine and lower the jack from under transmission.

PACKARD

1) Wire converter assembly to bell housing to prevent it from slipping off input shaft while moving transmission. Using a jack or other lifting device, place transmission under car and raise it until the pilot on front of direct drive clutch housing is in direct line with bore in crankshaft. Move transmission forward so pilot enters the crankshaft while at the same time the four studs on clutch housing enter holes in flywheel. Start two of the converter to flywheel retaining nuts and remove wire holding converter to bell housing.
2) Raise transmission until the pilot around top of bell housing flange is tight to the top. The dowel in the flywheel housing positions the bell housing properly in relation to flywheel housing. Install all bell housing to flywheel housing retaining bolts and tighten to 25-30 ft. lbs. Install the two remaining converter to flywheel retaining nuts and tighten to 25-30 ft. lbs.
3) Assemble flywheel housing lower cover to flywheel housing and tighten the bolts to 15-18 ft. lbs. Attach rear support to "X" members. Lower transmission lift and the jack supporting the engine and then install transmission rear housing insulator to support nuts and washers. Remove jack from under engine and the lift from under transmission.

STUDEBAKER GOLDENHAWK

1) Install converter on input shaft of transmission and wire to bell housing to prevent it sliding off during installation. Place transmission on jack and adapter. Install bellcrank bracket on transmission. Move transmission under car and raise until pilot on front of direct drive clutch housing is in line with bore in crankshaft. Move transmission forward so that pilot enters hole in crankshaft while at same time, the four studs on converter housing enter holes in flywheel. Start two of the converter-to-flywheel retaining nuts and remove wire holding converter to transmission.
3) Install all bellhousing-to-flywheel housing retaining capscrews and tighten to 25-30 ft. lbs. Install two remaining converter-to-flywheel retaining nuts and tighten all retaining nuts to 25-30 ft. lbs. Install oil filler tube on transmission and connect speedometer cable and cooler lines to transmission.
4) Install body front pillar support cross member and install engine support cross member. Lower engine and transmission and install rear engine support nuts and washers. Lower transmission jack and remove from car.
5) Connect front propeller shaft to transmission companion flange. Position selector bellcrank on transmission bracket and on frame bracket and install retaining nuts and bolts. Connect selector and throttle control linkage to transmission levers. Assemble flywheel front cover to flywheel housing and install capscrews. Tighten to 25-30 ft. lbs. Install left exhaust pipe. Lower car and fill transmission with Automatic Transmission Fluid. Adjust manual and throttle control linkage.

TRANSMISSION OVERHAUL

OVERHAUL: Procedures are the same as for 1955 Models. *See 1955 Annual Data or later Manual edition and see "Changes, Cautions, Corrections" above.*

PUSH BUTTON CONTROL

Clipper (1956), Optional
Packard, Exc. Carribean (1956), Optional
Packard Carribean (1956), Standard

►CHANGES, CAUTIONS, CORRECTIONS

►*1956 ELECTRIC PUSH BUTTON CONTROL PRODUCTION CHANGE:* In later production, the Battery Relay is eliminated (see wiring diagrams).

►*MOVING CAR WITH ENGINE NOT RUNNING CAUTION:* With ignition off, transmission will be in "Park" position and rear wheels will be locked (Transmission goes into "Park" automatically when ignition turned off). To move car without starting engine, turn ignition ON, press "N" button, **leave ignition on while moving car.**

DESCRIPTION

A "Six Button" control panel mounted on the steering column controls a reversible type motor and gear assembly which is mounted on the transmission and connected to the manual valve lever shaft. When a control panel button is depressed, the electric motor on the transmission automatically positions the manual valve in the transmission to the selected position. When ignition switch is turned off, transmission will automatically be in "Park" position and rear wheels will be locked. The engine cannot be started until "N" or "P" button is depressed.

ADJUSTMENT

The only adjustment required on the unit is the "Anti-hunt" feature. A rapid series of clicks, as the unit completes a shift will indicate necessity of adjustment. Adjusting screw located in end of actuator housing.

Adjustment: Back off armature thrust screw (small center screw) several turns (unit should hunt in any one of several positions). If hunting does not occur back off the outer adjusting screw (large) slightly and tap side of motor with a soft hammer while moving from "R" to "P" and "P" to "R". Continue to back out adjusting screw until hunting occurs. Gradually tighten the outer adjusting screw ¼ turn at a time until unit no longer hunts *(NOTE - Do not allow motor to hunt for long periods as it will become hot enough to affect the adjustment).* As proper adjustment is neared, unit will not hunt continuously out will make several oscillations at one or more positions. This is the proper adjustment on the bench. If unit is on the transmission, the proper adjustment is ¼ turn beyond point where unit does not oscillate. *(CAUTION - Do not over-adjust as an unnecessary load will be placed on the motor).* Lock jam nut firmly. Adjust armature endplay by screwing the center screw in until it is firmly against shaft, **then back screw out one full turn.**

TROUBLE SHOOTING

FAILURE TO START: With ignition on, connect test lamp between terminal No. 3 (red lead) of starter relay and ground. If lamp does not light, the lead from push button, or push button contact is open. Connect test lamp to No. 2 terminal (brown lead) and operate starter switch. If lamp does not light, the ignition switch or lead from ignition switch to relay is open. Connect test lamp to No. 1 terminal (brown lead) and operate starter switch. If lamp does not light, the relay is defective. If lamp lights, the starter switch or its lead is defective.

FAILURE OF BACK-UP LIGHTS: Check lamps and line fuse. Connect test lamp from dark green lead to ground and press "R" button. If lamp does not light, the dark green lead has an open circuit, loose connection or a poor contact in push button. If lamp lights, the wiring to back-up lights or their sockets is at fault.

FAILURE TO SHIFT TO "R", "N", OR "P": Pressure switch is open. Pull orange wires with Douglas terminals from pressure switch mounted on side of transmission near actuator. Connect these together (protect from ground). If the actuator performs normally, replace the pressure switch. If there is an open circuit in the orange lead, inspect for open or broken lead. This is most likely to occur at the cable connector near driver's side of firewall. Be certain that all terminals are pushed into the connector. Use a small screw driver to force any exposed brass terminal ends into place.

FAILURE TO SHIFT TO "H", "L" OR "D": Check the red wire with a white tracer. If there is an open circuit in this wire, check in the same manner as for orange wire (above).

OVERHAUL

PUSH BUTTON CONTROL UNIT & WIRING HARNESS:

Removal – Disconnect connector at rear side of firewall *(CAUTION - Mark location of wire terminals to insure installation in same location),* and remove wires and terminals from connector by pressing in on lip of the terminal with a small screwdriver and pulling wire and terminal through the connector. Remove all wires and terminals. Disconnect dark green, red, and black wires at steering column from individual bullet type connectors. Remove the four bolts clamping control housing to column and remove the two halves. Guide wires into lower openings in column and carefully pull them (one at a time) through the column.

Installation: Install wires through opening in steering column one at a time after lubricating each wire with lubriplate. A piece of stove pipe wire can be used to pull the individual wires through steering column and out through the opening. Be extremely careful when installing the halves of the switch housing on steering column so as not to pinch the wires when the four bolts are tightened. Install the wires in the connector at the same locations from which they were removed. Make sure the open side of the crimp on the connector terminal is next to the wide flat in the connector (the crimp section of the terminal is the part that crimps over the insulated part of the wire). Push the connector on the firewall connector. Connect the dark green, red, and black wires (at steering column) to their individual bullet type connectors. *NOTE* – To remove wires from the front half of the fire wall connector, release the terminal lock by inserting a small thin-bladed screw driver into connector and press down on lock while pulling on the wire. Make sure that wires are marked for installation in the same location in connector.

TRANSMISSION SHIFT ACTUATOR UNIT: Removal – 1) Disconnect tan and yellow leads from parking relay (this will prevent automatic shifting to "Park" when ignition is turned off). Turn on ignition and press the "R" button (this will position sector with the setscrew pointing downward). Turn off ignition. *(NOTE* - If setscrew cannot be positioned downward because of faulty wiring, or other causes, it will be necessary to remove the shift control motor and turn worm gear shaft with a suitable tool). *(CAUTION - When removing the motor, be careful and not allow the worm shaft to come out with the motor as the brake plates and thrust ball bearings will fall out of place).*

2) Remove wiring harness connector from forward side of firewall and disconnect leads from motor reversing relay. Disconnect green lead, orange lead, and red with white tracer lead from battery relay (if early production); from circuit breaker (if later production). Disconnect the two wires from pressure switch on side of transmission.

3) Remove plate from lower side of actuator gear housing. Loosen setscrew locknut and remove setscrew. Disconnect the front universal joint. Jack up rear of engine and remove transmission tail shaft and housing. Disconnect speedometer cable. Using a pry bar or jack, move rear of engine to the right as far as possible. Remove the capscrew holding actuator unit to side of transmission and slide assembly outward off valve lever shaft.

Disassembly & Inspection: Motor – Remove two through bolts and tap motor housing to free it from casting. Withdraw motor housing with care to prevent the slip joint coupling at end of motor shaft from sliding the worm gear shaft out of the gear box. Inspect inside of motor for signs of overheating such as excessive discoloration of the insulation or heavy deposits of varnish on metallic parts. Inspect brushes and commutator for wear and discoloration. Clean commutator and clean brushes as necessary. Connect an ammeter and voltmeter to the green and brown motor leads to measure amperage draw of right field coil. Repeat test on left coil by connecting green and grey motor leads. Replace field coils if draw is not within specifications or if they test grounded (see "Motor Test Specifications" below). Inspect armature for signs of open coils or damage *(NOTE - Do not test for shorts on growler as connections in the armature will cause it to show shorts on the usual growler test).*

Gear Box Unit – 1) Remove external cover plate. Fit the armature and its coupling on worm gear shaft and rotate shaft by hand. The shaft should turn freely and smoothly except at each end of segment stroke. A torque in excess of two inch-pounds or a feeling of stickiness is abnormal and the cause should be corrected. *(CAUTION - Do not turn armature far enough to allow contact fingers to leave end of contact segment).*

2) Inspect electrical switch assembly for signs of excessive wear or damage to contact fingers. Check for looseness of contact fingers and make sure insulation on wires is in good condition. If necessary to disassemble switch, remove screws retaining contact finger assembly. Fingers should be smooth and clean and all have the same shape. All fingers should be properly aligned in their slots.

3) To remove contact segment, remove snap ring and slide segment from shaft. The surface of outer rim of

CONTINUED ON NEXT PAGE

PUSH BUTTON CONTROL (C nt.)

contacts should be smooth and clean. The gap between segments should not exceed .078" and the radius of segment corners should not exceed .040".

4) Remove base plate with or without switch installed. If contact plate has been removed the sector gear will be left in the housing and can be inspected in the assembled position. The worm and sector should be coated with lubricant. There should be at least .010" backlash at worm. Turn sector gear to the right which should cause free motion against the spring. Rotation of the worm shaft should cause a limited motion of the fibre brake plate. Remove sector gear and wash in solvent.

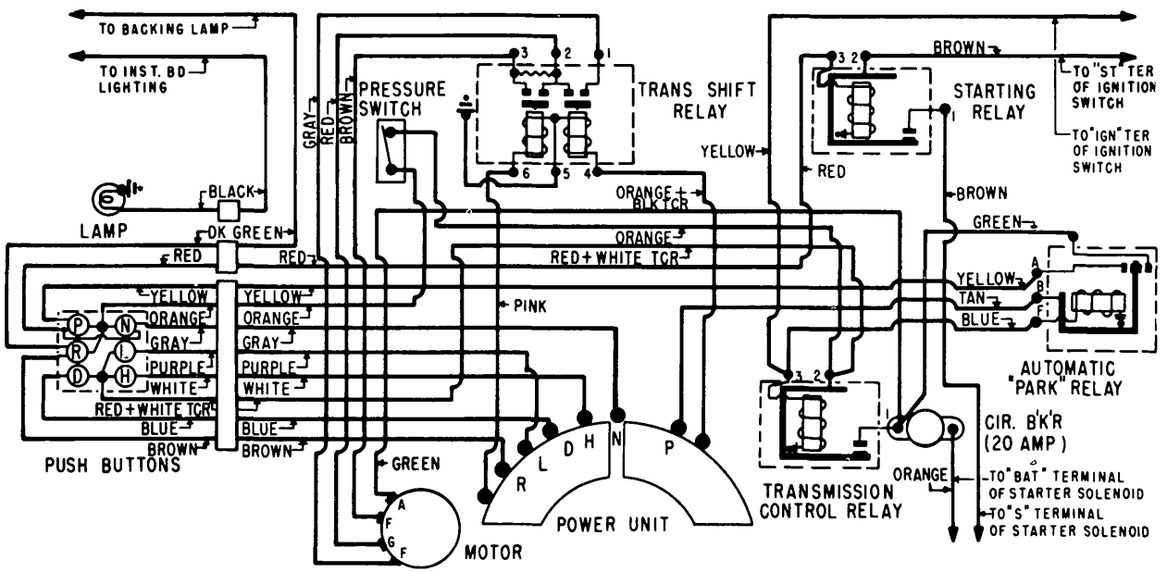
5) Remove worm shaft slowly being careful not to cause any damage to coupling end. This will allow the various components of "anti-hunt" system and worm to be removed. Wash parts in solvent. Inspect fibre brake plate for abnormal wear or scuffing. Examine the notch for broken ears or edges. Check for a free sliding fit on worm shaft. Place fibre in a cup of clean SAE 20 oil to allow to soak until ready for reassembly.

6) Inspect the steel brake washers. These should have a smooth polished surface. The internal lug should be free of burrs and the whole unit should slide freely on the worm shaft. Inspect worm, ball thrust bearing, thrust plates, and spring for wear or damage.

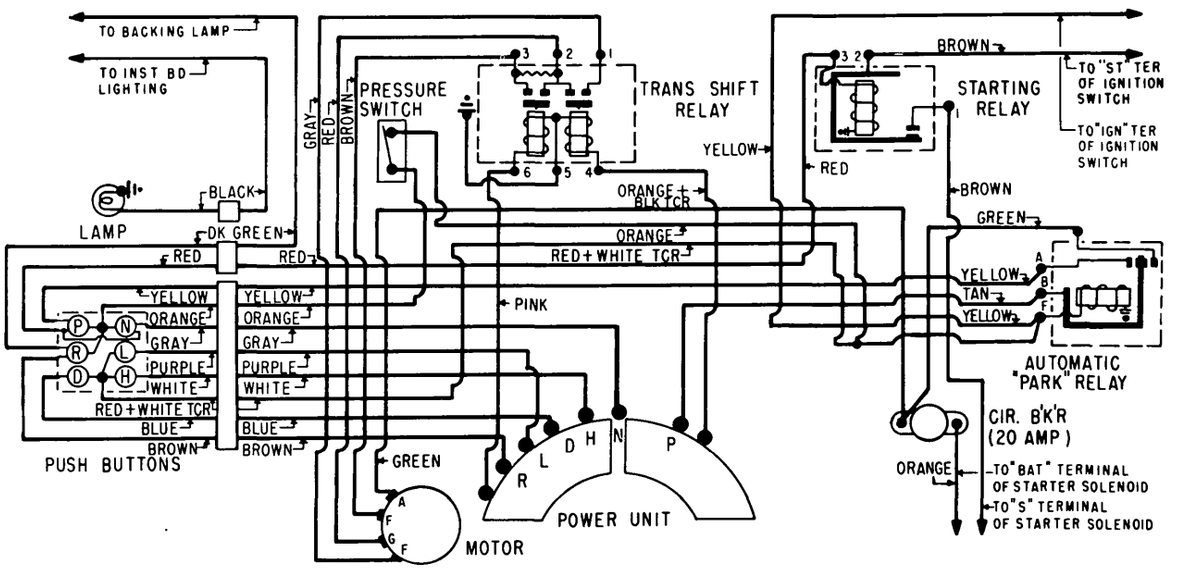
Reassembly & Testing: Brake Assembly – Loosen jam nut and back out the outer adjusting screw at end of worm shaft until the end is about even with inside of housing. Insert the worm shaft partly into left bearing of casting. As the end is gradually moved into place, install the various components in the following order: Place spacer on shaft with its narrow diameter next to casting wall. Remove brake plate from oil and shake off excess oil. Place plate on shaft with notched end engaged on boss of casting. Install one of the 1/16" steel brake discs or two 1/32" discs on worm shaft so that lug engages keyway. Install the worm and its key. Slide thrust ball bearing, consisting of ball assembly between two thrust plates, in position on shaft. Place spring and its thrust washer on shaft and slide shaft into position.

Motor Unit – Place gasket in position on commutator end head. Install brushes in their holders and insert armature into commutator end bearing. Release brushes and inspect to see that they seat properly on commutator. Place commutator end head in position on frame. With gasket in place on shoulder of gear housing, move motor into position engaging first the armature coupling with worm shaft, then locating pin in the motor frame with slot in casting. Install through bolts and tighten securely. As the bolts are tightened, strike motor frame several sharp blows with a soft hammer to align motor and bearings.

Motor Testing – Screw armature thrust screw firmly against shaft, then back out one full turn. Do not screw the outer adjustment screw in as this will place tension on the brake. Connect motor for a no load test with an ammeter in series between green lead and a 12 volt battery, and ground brown and red leads. Connect a voltmeter from green lead to ground. The motor should operate clockwise at the drive end and its current and speed should be within specifications. Change hookup so that grey and red leads are grounded. The motor should turn counter-clockwise and be within specifications. If motor does not operate according to specifications it indicates faulty fields, armature, brushes, hookup, or drag on armature.



TWIN ULTRAMATIC PUSH BUTTON CONTROL WIRING DIAGRAM (FIRST TYPE)



TWIN ULTRAMATIC PUSH BUTTON CONTROL WIRING DIAGRAM (LATER TYPE)

Motor Test Specifications
(Auto-Lite EPR-4001)

Field Coil Draw – 3.5-3.8 amps. at 10 volts (each coil) at 70° F.

No Load Draw – 12.0 volts, 45 amps., 1020 RPM (Min.).

Test with sector gear removed and with brake adjustment backed off to relieve tension. Test in both directions.

Stall Test – 12.0 volts, 65 amps. (Max.), 23 Oz. Ft. Torque (Min).

Motor Lubrication – Soak armature shaft bearings and felts in SAE 10 motor oil at overhaul. Pack gear chamber with 1½ ozs. clutch lubricant. Coat sector shaft and bearing with clutch lubricant.

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PUSH BUTTON CONTROL (C nt.)

Switch Assembly – Install sector gear with notched end of hub up and with approximate center of gear engaged with the worm. Rotate worm shaft to check for freedom of movement. Lubricate worm and sector gears with 1½ ozs. clutch lubricant. Install base plate and its gasket, holding it in place with the two topmost screws. Check for proper engagement with locating dowel pin. Use care to insure a good gasket seal. Mount contact segment on hub and lock in place with the snap ring. Carefully install contact finger assembly by inserting three screws through assembly. Slide assembly toward contact sector until contact fingers touch the sector. Cautiously align screws with holes and hold firmly while screws are tightened. Inspect carefully that the contact fingers are all lying across contact rim and that none have slipped out of place. Carefully tuck each wire under contact assembly so that none will rub against back of contact finger or be pinched by cover. Mount cover plate and gasket and tighten all screws evenly and securely. Make sure grommet fits into cover plate properly, and that base plate is correctly located on the dowel pins and that gasket is in place. Connect wires to connector and in correct positions.

Installation: Be sure actuator is in reverse position. Connect the leads as indicated in wiring diagrams, except leave the tan lead disconnected from parking relay. Turn on ignition and press the "R" button. Turn off ignition. Manually turn transmission shifter valve to the reverse position. Slide actuator unit into position and tighten the dog point screw. Be careful to set this screw as tightly as possible. Remove jam nut as necessary to secure full purchase on setscrew slot. When tight, lock securely with jam nut. Fasten inspection plate and gasket firmly in place. Engage the mounting stud with actuator and install mounting nuts. Before tightening the mounting nuts, turn on ignition and press "D" button. Rotate the actuator by hand until the center of "D" detent is felt then tighten and lock mounting nuts. Connect tan lead to parking relay. Check operation of actuator by pressing the various buttons at random, paying particular attention to any signs of laboring or hunting. Check angular adjustment of actuator by starting engine and operating at a fast idle. With the brake on press the various buttons and feel for correct shift. Shift "L", "H", "D", "H", "L". A distinct shift should be felt when actuator is correctly located with respect to detent.

Transmission Shift Relay Test Specifications
(Auto-Lite No. RAD-4004)

Contacts Close – 3.0-6.0 volts. Seals at 8.0 volts (max.).
Contacts Open – 1.0 volts (min.).
Resistor – .5-.6 ohms. (resistance of windings).

Pressure Switch Test Specifications
(Auto-Lite No. 14176A)

Contacts Open – 10 lbs. ± 2 lbs. per sq. in.

STUDEBAKER FLIGHTOMATIC

Stud baker Champion (1956)
Stud baker Commander (1956)
Studebaker President (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR:* Move selector lever to "N" (Neutral) position. When car speed reaches 20 MPH, turn the ignition switch on and move transmission selector lever to the "L" (Low) position. It is recommended that the car be pushed to start it rather than be towed.

►*TOWING CAR CAUTION:* Car can be towed for very short distances with the transmission selector lever in the "N" position. Prolonged towing will result in damage to the transmission unless the drive shaft is disconnected or the rear wheels are off the ground.

►*INTERMEDIATE GEAR START (COMMANDER & PRESIDENT MODELS) PRODUCTION CHANGE:* Beginning with Transmission Serial Nos. 19001 (Commander); 24001 (President), the control valve assembly has been modified to provide an intermediate gear start (rather than a "low" gear start) in all throttle positions. *NOTE–Transmissions prior to the above serial numbers having the letter "B" as a suffix to the serial number, have the modification made to the control valve assembly.*

►*LOW SPEED GEAR NOISE & IMPROVED SHIFT IN "D" RANGE CORRECTION (COMMANDER & PRESIDENT):* The control valve assembly can be modified to correct this condition and also to provide an intermediate gear start on transmissions prior to Nos. 19001 (Commander); 24001 (President), or transmissions not having the letter "B" suffix or transmission serial number. *See "Control Valve Disassembly & Reassembly" below.*

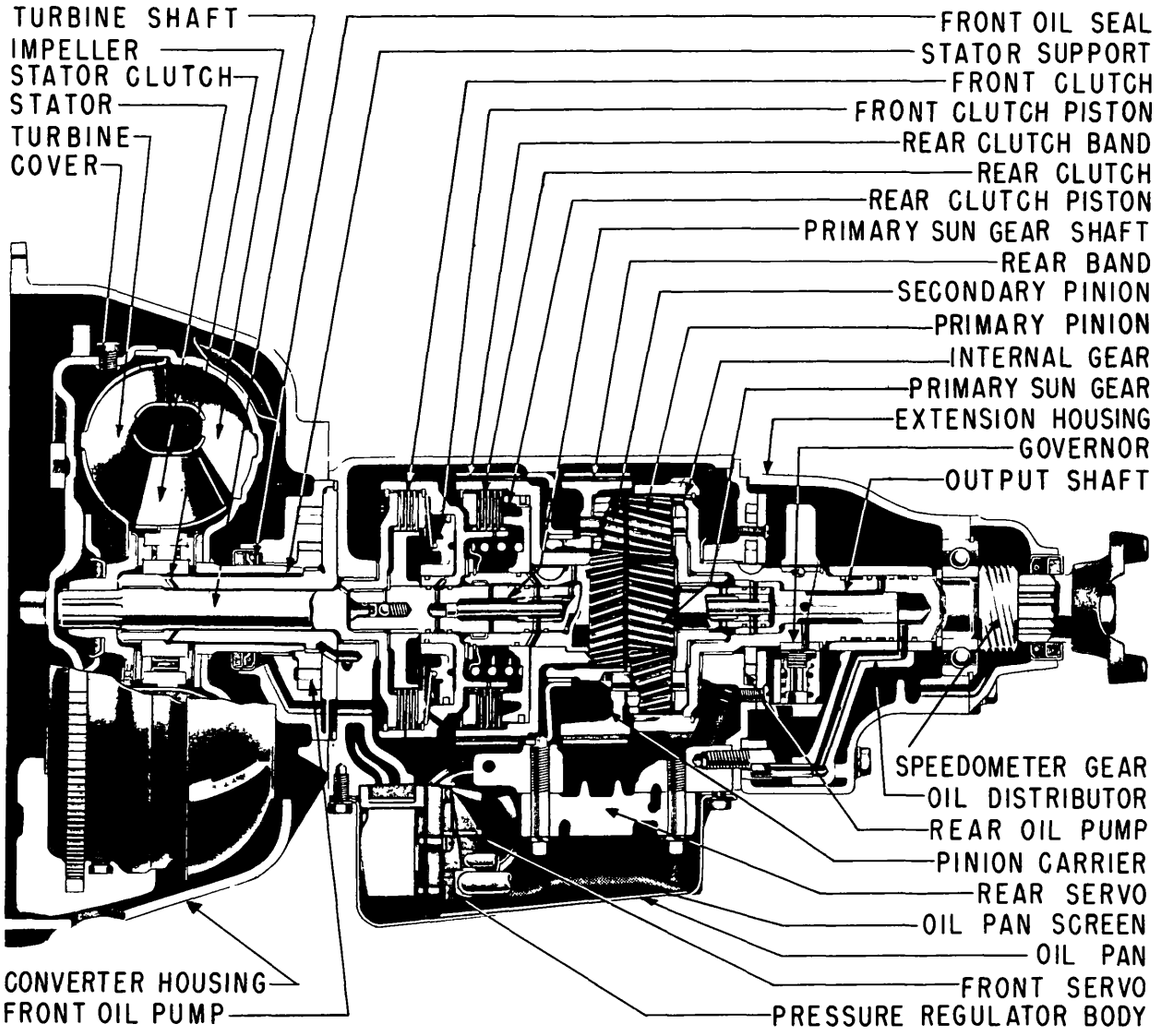
►*TORQUE CONVERTER ASSEMBLY PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE (CHAMPION MODELS):* A new converter assembly, Part No. 1541550, identified by a daub of orange paint, and a Serial Number 1001CD, and up, is being used in production and for service replacement. Stall speeds, with the later type converter are reduced to 1400-1500 RPM.

►*FRONT CLUTCH FRICTION DISC PARTIAL PRODUCTION CHANGE & SERVICE REPLACEMENT CAUTION:* Sintered metal type (copper base) friction discs are being used in partial production and may be released for service replacement. Composition and sintered type discs are interchangeable in complete sets only and must not be mixed in the same clutch assembly.

►*FRONT SERVO SPRING NOTE:* A front servo spring having closed coils and a flat ground seating surface at one end (other end is not closed or flat ground, but has an abrasive cut-off) is being used in partial production. While this spring may appear to be broken, it is entirely serviceable and is interchangeable with the original type spring.

DESCRIPTION

Flightomatic transmission consists of a hydraulic torque converter and a hydraulically controlled automatic 3-speed planetary type transmission which provides automatic operation in "D" (Drive) range, and additional "Lo" (Low), "R" (Reverse), and "P" (Park) ranges which are controlled manually. In "D" position, the car starts in low gear (on all Champion Models, and on Commander & President models having transmissions prior to serial numbers 19001 (Commander); 24001 (President), progressing to intermediate and high. On later model Commander & President, the car starts in intermediate and progresses to high, as speed increases. *See "Intermediate Gear Start" Production Change above.*



STUDEBAKER FLIGHTOMATIC TRANSMISSION (SECTIONAL VIEW)

LUBRICATION

►*CAUTION: Check fluid level at 1000 mile intervals. Drain and refill at 15,000 mile intervals, using Automatic Transmission Fluid Type "A".*

Capacity–9 qts. (approximately).

Checking Fluid Level–Place transmission selector lever in "P" (Park) position and operate engine for approximately four minutes, or until engine and transmission have reached normal operating temperature. Roll up the floor mat from right side until oil level inspection hole cover in floor pan is accessible, and remove cover. Clean all dirt and foreign material from around transmission fluid dipstick. Apply the parking brake and foot brake and move selector lever slowly from "P" position to "R" position and then back to "D" position. Remove dipstick and wipe clean, then install it in transmission and **turn cl ckwise t th lock p sition.** Remove dipstick and check fluid level.

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STUDEBAKER FLIGHTOMATIC (C ntinu d)

Add fluid through dipstick hole to raise level to the "F" mark on dipstick. *NOTE*–The amount of fluid required to raise the level from "L" mark on dipstick to "F" mark is approximately 1½ pints.

Draining & Refilling–Place transmission selector lever in "P" (Park) position and operate engine for approximately four minutes, or until engine and transmission are at normal operating temperature. Stop engine and raise car on hoist. Remove transmission dipstick *(see "Checking Fluid Level" above)*. Remove transmission drain plug. Rotate the converter until one of the drain plugs is visible through hole in converter housing, remove drain plug and quickly rotate converter 180°, and remove the other converter drain plug. After fluid has drained from transmission and converter, install transmission drain plug using a new gasket, and the two converter drain plugs. Lower the car to floor and install three quarts of Automatic Transmission Fluid Type "A" through dipstick hole. Apply parking brake and foot brake; start the engine and operate it with the selector lever in "N" (Neutral) position. Slowly pour four additional quarts of fluid into transmission. Move selector lever through all ranges. Check oil level on dipstick *(see "Checking Fluid Level" above)*. Add sufficient oil to bring level up to "F" mark on dipstick.

LINKAGE ADJUSTMENT

Throttle Linkage Adjustment: *See CARBURETOR on Car Model Pages.*

Manual Linkage Adjustment: Disconnect shift lever-to-transmission manual valve lever rod at transmission manual valve lever by removing the ball joint assembly. Place selector lever in "D" (Drive) position and place the manual lever on transmission in the "D" (Drive) position (this is center of manual valve lever travel). Adjust the shift lever-to-manual valve lever rod until the ball joint stud will slip freely through the hole in the manual valve lever. Install ball joint stud locknut and lock to rod.

BAND ADJUSTMENT

Front Band: Remove transmission oil pan, gasket and screen. Loosen the front servo adjusting screw locknut two full turns with a 9/16" wrench. Check the adjusting nut for free rotation in the actuating lever and free the adjusting screw if necessary. Install the gauge block of the adjusting tool (J-5880) between the servo piston rod and the adjusting screw. Place the Front Band Adjusting Tool J-5880, on the adjusting screw and tighten until the tool overruns. **Back off the adjusting screw one full turn,** and tighten locknut to 20-25 ft. lbs. Place the screen over the rear pump inlet first then over the front pump inlet, and install the screen retaining clip. Position a new oil pan gasket on transmission oil pan flange and hold it in place with petroleum jelly. Align oil pan on transmission flange and install capscrews and lockwashers. Tighten to 10-13 ft. lbs. Install drain plug and fill transmission *(see "Lubrication" above)*.

Rear Band: Roll up floor mat from the right side until the oil level inspection hole cover in the floor is visible, and remove the cover. Clean dirt and all foreign material from around rear band adjusting screw and locknut, and oil the adjusting screw threads. Using Rear Band Adjusting Tool J-5883, tighten the screw until wrench overruns, **back off adjusting screw 1½ turns,** and tighten the locknut to approximately 35-40 ft. lbs. torque. *CAUTION–It is very important the adjusting screw be backed off 1½ turns to avoid damage to band and servo.*

TESTING

STALL TEST: Connect tachometer to the engine and place it where it can be easily read from the drivers seat. Set the hand brake and start the engine. Place selector lever in "D" (Drive) position, apply service brakes and operate the engine at full throttle. Note tachometer reading. Repeat this procedure with selector lever in "L" and "R" positions. *(CAUTION–Do not operate the engine at high speed while the selector lever is in one of the driving ranges, with the rear wheels held stationary, for more than 10 seconds at a time or for a total time greater than one minute in any half-hour period).* Normal stall speeds are 1500-1600 RPM (Champion with first type converter. See "Production Change" above); 1400-1500 (Champion with later type converter. See "Production Change" above). 1550-1650 (Commander). 1750-1850 (President). If stall speed is greater than normal, slippage in transmission is indicated. If stall speed is between 900-1000 RPM (if engine is normal) slippage is indicated in torque converter stator free wheel unit.

ROAD TEST: A thorough test must be made to determine the shift speeds and transmission performance. The initial application of the various bands and clutches should be checked in all driving ranges by stopping the car and moving the selector lever to "D", "L" & "R" ranges. A driving test should be made in the "D" range to check the shift speeds. *See Shift Speeds below.*

FLIGHTOMATIC SHIFT SPEEDS

Light Throttle Upshift

Shift	Champion	①Comm. & Pres.	②Comm. & Pres.
1-2	5-11	5-11	
2-3	16-22	17-23	14-19

Maximum Throttle Upshift

Shift	Champion	① Comm. & Pres.	②Comm. & Pres.
1-2	30-40	33-43	35-41
2-3	53-63	57-67	56-69

Maximum Kickdown

Shift	Champion	① Comm. & Pres.	②Comm. & Pres.
3-2	48-58	52-62	56-63
2-1	16-24	18-26	8-12

Closed Throttle Downshift

Shift	Champion	① Comm. & Pres.	② Comm. & Pres.
3-2	8-17	9-18	8-12
2-1	4-7	4-7	

① - Cars with "Low" gear start.
② - Cars with "Intermediate" gear start.

FLUID PRESSURE TESTS: Fluid pressure tests should be made to ascertain whether or not the pressure regulator system is functioning correctly and to determine if there is fluid leakage in the clutch circuits. Remove the 1/8" pipe plug located near throttle lever and manual lever, and install pressure gauge hose (pressure gauge should be in drivers compartment). Connect a tachometer to engine and position it so it can be read from drivers compartment. Make the following tests:

1) Idle Pressure Test–With engine and transmission at normal operating temperature, and with engine at normal idle speed, move selector lever to the "D", "L", & "R" positions. The pressure gauge should read approximately 50-80 lbs. in all ranges. If pressure is low in any one range, a fluid leak in that range circuit is indicated. If pressure is high, the throttle linkage should be checked and adjusted (see "Carburetor" on Car Model pages).

2) Pressure Regulation Ch ck–Move selector lever to "D" range and firmly set hand brake and foot brake. Run engine at 1000 RPM and read the pressure gauge Pressure should be approximately 80-85 lbs. If the pressure is less, it indicates the throttle valve linkage is too long and must be readjusted. If pressure is greater, it indicates throttle valve linkage is too short and must be readjusted.

3) Stall Pressure Test–Firmly set hand brake and foot brake and operate engine at full kickdown position. Move selector lever to "D", "L" & "R" ranges and read the pressure. The pressure in "D" & "L" positions should be 130-175 lbs.; and in the "R" range, 170-190 lbs. If pressure is less or greater than the above pressures, malfunctioning of throttle valve, modulator valve, compensator valve, or pressure regulator assembly is indicated, and it will be necessary to remove and clean the control valve assembly and pressure regulator valve assembly.

AIR PRESSURE TEST (With Transmissi n in Car): Raise car on hoist and remove transmission oil pan and control valve assembly. Proceed as follows:

Front Clutch: Apply pressure to front clutch and governor input passage (case rear flange). Listen for dull thud which indicates that clutch is operating. Keep air pressure in passage for several seconds to check for leaks in this part of the system.

Governor Valve: Remove governor inspection cover. Apply air pressure to the same passage as for front clutch (above). Listen for a click and also watch valve snap inward.

Rear Clutch; Apply air pressure to rear clutch oil passage (case rear flange). Listen for a dull thud to indicate clutch is operating. Check for leaks in same manner as for front clutch (above).

Rear Band & Servo: Apply pressure to rear servo oil passage (case rear flange), observe band application.

Front Band & Servo: Apply pressure to front servo apply tube (rear tube), and observe band application.

►*TESTING NOTE: If servos, bands, clutches and governor operate with air pressure, then the no drive problems, erratic shift, or no upshift conditions indicate that the control valve assembly is the cause of the trouble. See "Control Valve" below.*

CONTINUED ON NEXT PAGE

STUDEBAKER FLIGHTOMATIC (C ntinu d)

TROUBLE SHOOTING

INITIAL ENGAGEMENT TOO ROUGH: Idle speed may be too high. Control pressure may be too high caused by improper throttle valve linkage or dirt in control valve assembly or regulator valve assembly. Check throttle valve stop and reset if necessary.

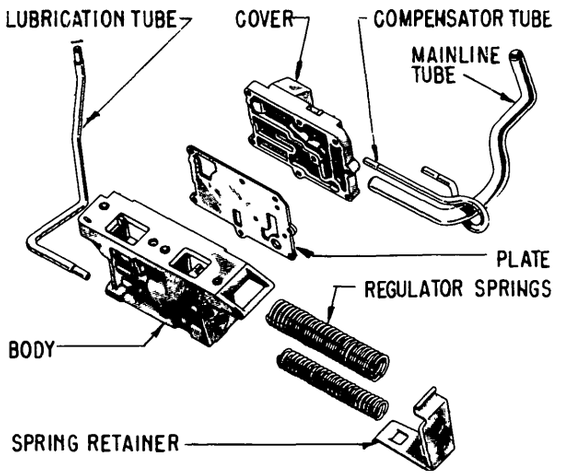
INITIAL ENGAGEMENT DELAYED: Check fluid level. Adjust rear band as it may be loose. Control pressure may be too low at idle speed. Clean control valve assembly and pressure regulator assembly. Check front pump for wear. Check fluid circuits for leaks and correct as necessary.

INOPERATIVE IN ALL RANGES: Check fluid level. Manual linkage may be disconnected. No control pressure which may be caused by trouble at front pump. Check rear band adjustment. Check rear servo action with air pressure. Inspect and clean control valve assembly. Check engine stall speed, as converter may not be operating properly.

NO DRIVE IN "D" OR "L" POSITION: Check fluid level. Manual linkage may be disconnected. Control pressure may be low. Adjust throttle valve linkage. Clean control valve and pressure regulator valve assemblies. Check front clutch action with air pressure. Check rear servo and band with air pressure. Check transition valve in control valve assembly as it may be stuck.

NO DRIVE IN "R" POSITION: Check fluid level. Check and adjust manual linkage. Control pressure may be low. Check and adjust throttle valve linkage, and clean control valve and regulator valve assemblies. Check rear clutch action with air pressure. Check rear servo action with air pressure. Check transition valve in control valve assembly.

LOCKS UP IN "D" POSITION: Rear clutch or front band may be applied. Clean control valve and governor valve assemblies. Check rear clutch and front band and servo for mechanical failures.



FLIGHTOMATIC REGULATOR VALVE

LOCKS UP IN "D" POSITION (2ND GEAR): Check rear band and servo, and rear clutch for mechanical failure.

LOCKS UP IN "D" POSITION (3RD GEAR): Front or rear band may be applied. Check bands and servo for mechanical failure. Clean control valve assembly.

LOCKS UP IN "R" POSITION: Check front clutch and band and front band servo for mechanical failure. Clean control valve assembly.

SLIPS IN "D" OR "L" POSITION: Check fluid level. Control pressure may be low. Check throttle valve linkage. Clean control valve and pressure regulator valve assemblies. Rear servo travel may be limited; check for mechanical failure of band or servo. Check front clutch for mechanical failure. Rear pump check valve may be stuck open.

SLIPS IN "R" POSITION: Check fluid level. Check and adjust throttle control linkage. Clean control valve and regulator valve assemblies. Check rear servo for limited travel. Check front clutch for mechanical failure as it may be slipping. Rear pump check valve may be stuck open.

1-2 UPSHIFT ROUGH: Check and correct throttle control linkage as control pressure may be too high. Clean and adjust bands. Governor valve may be stuck.

1-2 UPSHIFT SLIPS: Check and adjust throttle control as control pressure may be too high. Adjust bands. Check for stuck governor valve. Check front servo piston for limited travel with air pressure. Check for fluid leakage.

NO 1-2 UPSHIFT: Check for stuck governor valve or 1-2 shift valve.

1-2 UPSHIFT TOO EARLY: Check for stuck governor valve.

1-2 UPSHIFT TOO LATE: Check for stuck governor valve or leak in governor circuit. Check and adjust throttle control linkage. Clean control valve assembly.

2-3 UPSHIFT ROUGH: Control pressure may be too high; adjust throttle control linkage and clean control valve assembly. Adjust front band. Check for stuck governor valve.

2-3 UPSHIFT SLIPS: Control pressure may be too low; adjust throttle control linkage and clean control valve assembly. Adjust front band. Check for internal leaks and for stuck governor valve.

NO UPSHIFT 2-3: Governor valve or 2-3 shift valve may be stuck.

2-3 UPSHIFT EARLY: Check for stuck governor valve.

2-3 UPSHIFT LATE: Check for stuck governor valve or leak in governor circuit. Adjust throttle control linkage.

3-2 DOWNSHIFT ROUGH (CLOSED THROTTLE): Adjust throttle control linkage. Orifice control valve stuck.

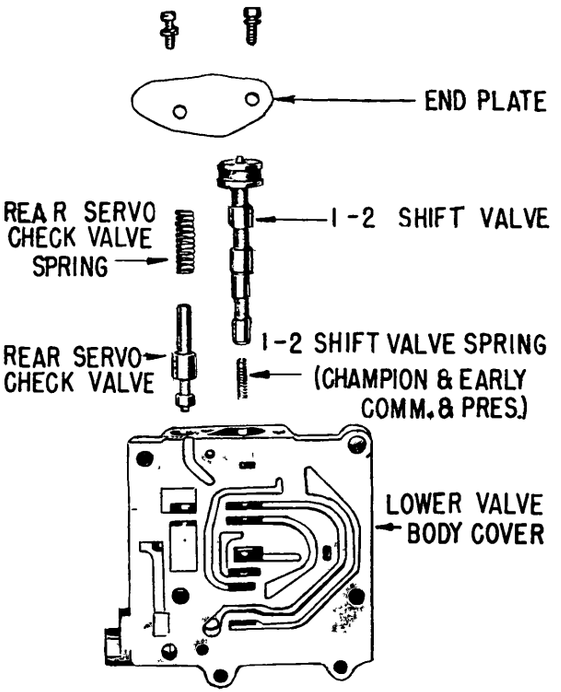
3-2 KICKDOWN (EARLY): Adjust throttle control linkage.

NO KICKDOWN: Adjust throttle control linkage.

2-1 DOWNSHIFT ROUGH (CLOSED THROTTLE): Adjust throttle control linkage. Rear servo check valve may be stuck.

WILL NOT START BY PUSHING: Rear pump not operating. Pressure regulator valve may be stuck.

NO PARK POSITION: Adjust throttle control linkage. Check for damaged internal linkage or pawl.



FLIGHTOMATIC LOWER VALVE BODY COVER

TRANSMISSION REMOVAL & INSTALLATION

REMOVAL: Raise car on hoist, and remove transmission drain plug and converter drain plug. On coupe and hardtop models, remove body front pillar support crossmember. On cars with dual exhaust system, remove the left hand exhaust system. Remove complete propeller shaft assembly. Disconnect shift lever-to-transmission manual valve lever rod from manual valve lever. Disconnect bellcrank-to-throttle valve lever rod at throttle valve lever. Remove speedometer cable retaining screw and remove pinion and cable. Place transmission lift with the saddle as far forward in the tracks as possible, in position on transmission oil pan flange and align saddle on oil pan flange. Remove the four transmission-to-converter bell housing capscrews. Install transmission-to-converter housing guide pins, Tool J-4284, into upper capscrew holes. Remove transmission assembly by sliding it rearward on saddle out of converter bell housing and converter.

INSTALLATION: Position front pump drive tangs on converter hub in horizontal position. Using a thin screwdriver, position the front pump external tooth gear drive lugs in vertical position. Install transmission-to-converter housing guide pins, Tool J-4284 (if they were removed). Raise transmission to proper height and angle and carefully slide transmission assembly into torque converter and bell housing, using the pilot studs

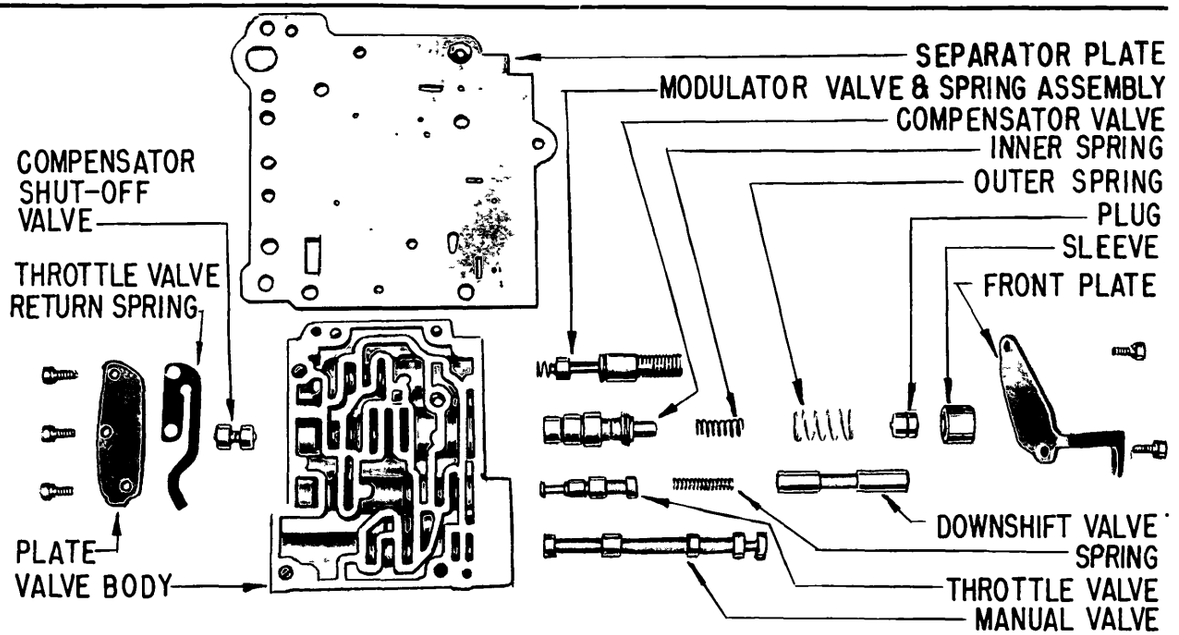
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STUDEBAKER FLIGHTOMATIC (C ntinued)

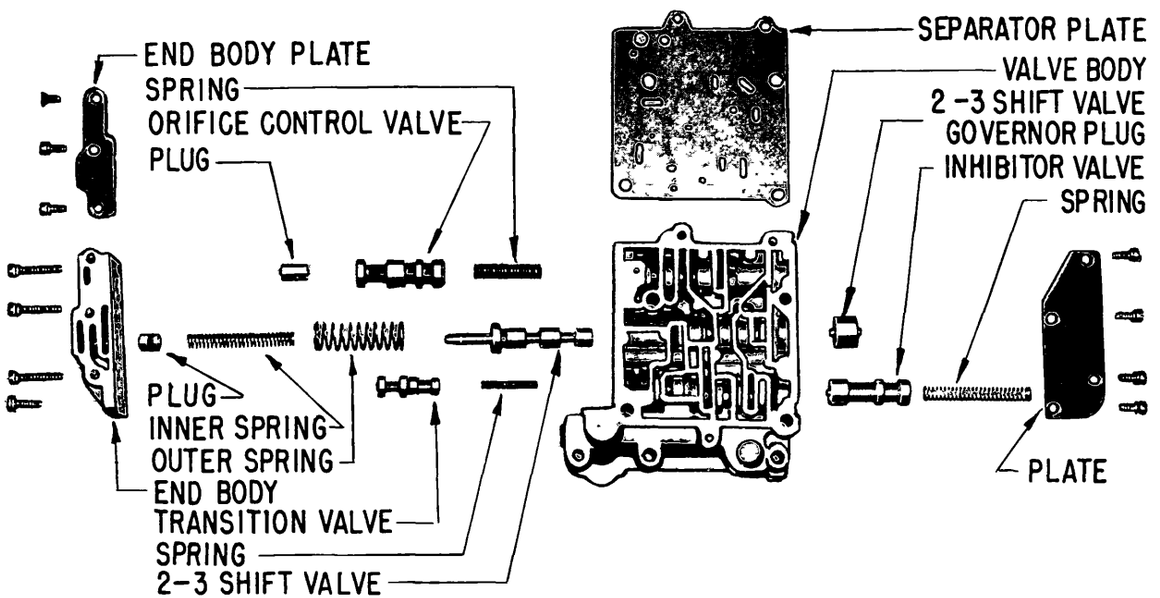
as guides. Do not force transmission into converter by using transmission retaining screws to draw transmission into position, as this may damage converter or front pump. Make sure transmission fits snugly against converter bell housing. When transmission is in contact with bell housing, install the two lower transmission to-bell housing retainer capscrew and lockwashers. Remove guide pins and install remaining capscrews and lockwashers. Tighten capscrews to 40-45 ft. lbs. Remove transmission hoist and saddle. Install speedometer pinion and cable and install retaining screw. Install shift lever-to-transmission manual valve lever rod. Install bellcrank-to-transmission throttle valve lever rod. On coupes and hardtops, install the body front pillar support cross-member. On cars with dual exhaust, install left exhaust pipe. Install propeller shaft assembly. Fill transmission to proper level (see "Draining & Refilling" above).

TORQUE CONVERTER REMOVAL & INSTALLATION

REMOVAL: Remove transmission (see above), and starter. Disconnect tail pipe support and remove the "U" bolt from exhaust pipe support at converter housing. Disconnect rear exhaust pipe from front exhaust pipe and pull muffler and pipe assembly rearward. Move assembly to one side out of the way. Using a suitable support for engine (support must be shaped to support weight of engine at oil pan flanges and not under oil pan) and a hydraulic jack, remove rear insulator studs and raise engine just enough to have a separation between insulators and crossmember. Remove rear engine support crossmember. Remove converter bell housing-to-engine capscrews and remove bell housing, being careful not to damage dowels or distort converter blower. Lower rear of engine, being careful not to pull off water outlet hose (if additional clearance is required) drain cooling system and disconnect water outlet hose). Remove capscrews and washer holding converter assembly to the crankshaft-to-converter drive plate, and remove converter assembly.



FLIGHTOMATIC LOWER VALVE BODY



FLIGHTOMATIC UPPER VALVE BODY

INSTALLATION: Install converter assembly on the crankshaft-to-converter drive plate and loosely install retaining screws and lockwashers. Clean engine rear plate and mating surface on bell housing and install bell housing, taking care not to damage dowels or converter blower. Be sure bell housing is installed on dowels. Install bell housing retaining capscrews and tighten to 23-28 ft. lbs. If engine has been lowered, raise it to normal position. Position converter aligning tool, J-6310, into bore of bell housing and over pump drive fingers on torque converter assembly. Install the two upper transmission capscrews to hold aligning flange in position, and rotate converter assembly through two complete revolutions to center the torque converter assembly. Tighten converter-to-drive plate capscrews to 23-28 ft. lbs. Remove aligning tool. Install rear engine support crossmember. Install exhaust pipe, muffler and tail pipe assembly, making sure that proper alignment exists between assembly and the supports. Install transmission (see above), and starter.

TRANSMISSION OVERHAUL

TRANSMISSION OVERHAUL: Transmission overhaul procedures are the same as for Fordomatic, Mercomatic & Turbo-Drive transmissions. *See "Fordomatic, Mercomatic, & Turbo-Drive Transmissions" Ov rhaul beginning on Page 422.*

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STUDEBAKER FLIGHTOMATIC (Continued)

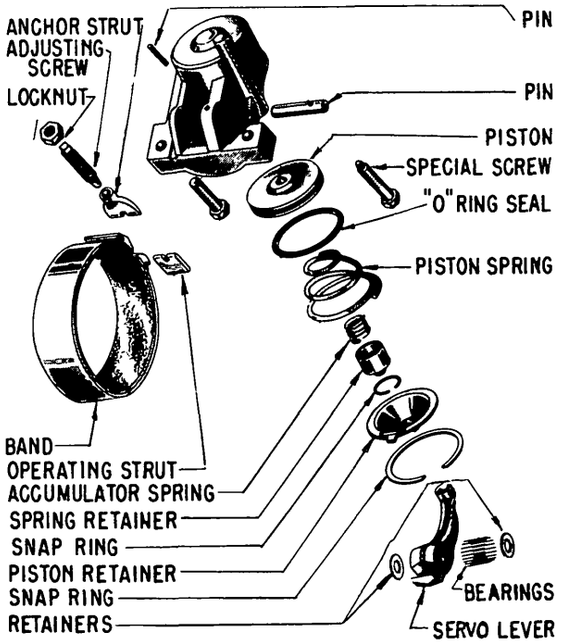
CONTROL VALVE DISASSEMBLY & REASSEMBLY

LOW SPEED GEAR NOISE & IMPROVED SHIFT IN "D" RANGE CORRECTION (COMMANDER & PRESIDENT MODELS): The control valve can be modified, as directed below, and also to provide an intermediate gear start, on transmissions prior to Transmission Serial Nos. 19001 (Commander); 24001 (President), or transmissions not having the letter "B" suffix on serial number. To modify the control valve assembly, install Shift Valve Spring Kit, Part No. 1541549 as follows:

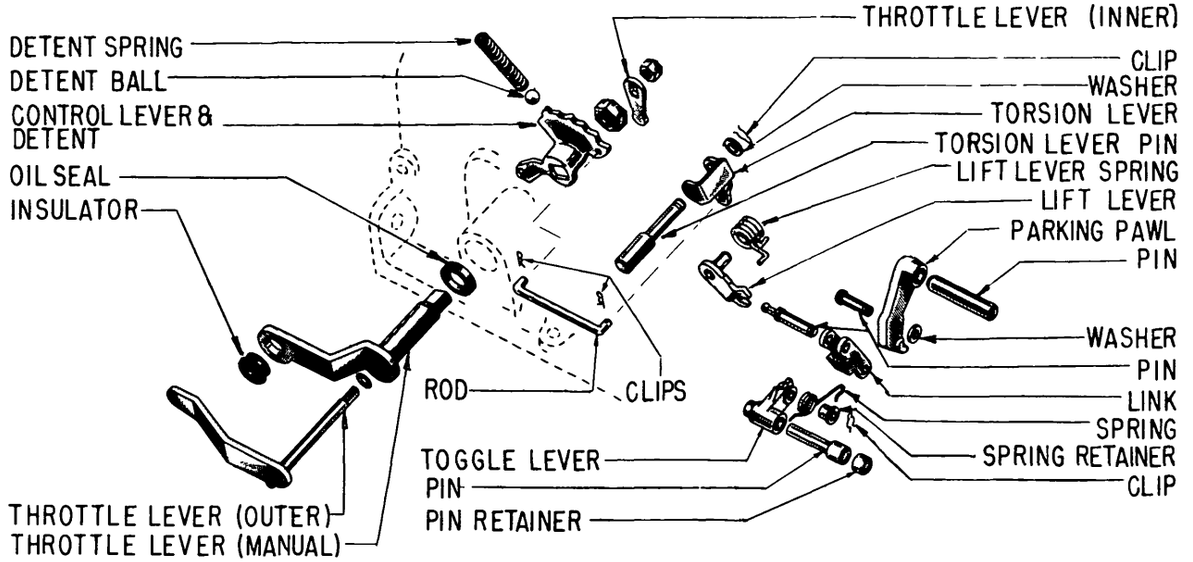
1) Remove control valve assembly from transmission case. Remove the two screws from lower valve body cover end plate and remove end plate. Remove the 1-2 shift valve and shift valve spring. Discard spring.

2) Install the 1-2 shift valve in its bore in lower valve body cover. Install the conical spring from kit on the 1-2 shift valve with small end of spring piloting on stop shoulder of valve. Hold conical spring in shift valve bore with a piece of .020" feeler stock 1/2" wide, being certain that conical spring is completely in valve bore. Install end plate and end plate screws and tighten finger tight. Remove feeler stock by sliding from under end plate and tighten end plate screws securely.

3) Remove screws from end body assembly on lower valve body assembly and remove end body assembly.



FLIGHTOMATIC REAR SERVO & BAND ASSEMBLY

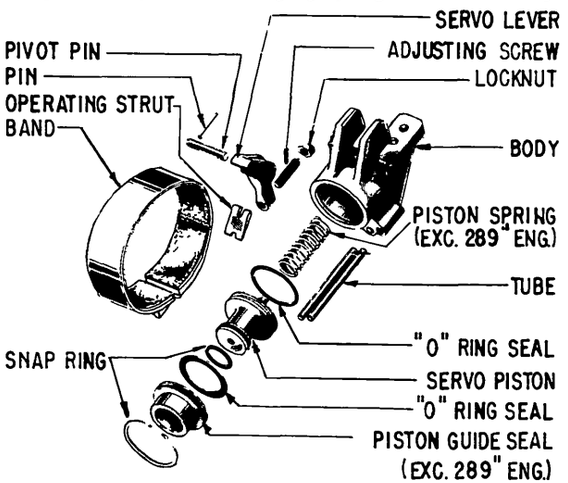


FLIGHTOMATIC TRANSMISSION INNER CONTROL LEVER ASSEMBLY

Remove the 2-3 shift valve inner and outer springs. Discard the springs. Install the 2-3 shift valve springs from kit on the 2-3 shift valve (springs from kit are shorter than springs removed from valve body).

4) Install the end body assembly on lower valve body, being certain the 2-3 shift valve inner spring enters shift valve plug bore. Install and tighten screws. Install control valve assembly on transmission.

►*CONTROL VALVE DISASSEMBLY NOTE:* Each valve body of the assembly should be disassembled, cleaned and inspected, and reassembled at one time to reduce the possibility of interchanging springs in the assembly.



FLIGHT MATIC FR NT SERVO & BAND ASSEMBLY

Clean all parts in solvent and dry with compressed air. Inspect all valves for burrs, scores or scratches. Check fluid passages for obstructions. Inspect mating surfaces for nicks and burrs. Check springs for distortion.

DISASSEMBLY: (Upper Valve Body)—Remove four capscrews and lockwashers that attach lower valve body cover to control valve assembly. Invert assembly and remove the screw attaching separator plate to lower valve body. Remove upper valve body and separator plate. Remove the two separator plate attaching screws and remove separator plate (note that one of the screws is countersunk). Remove throttle valve return spring screws and remove spring. Remove the remaining screw and rear plate. Remove compensator cut-off valve and remove manual valve. Remove front plate retaining screws and lockwashers, and remove plate. Remove downshift valve, throttle valve spring and throttle valve. Remove compensator valve sleeve, valve plug, valve inner and outer springs and the compensator valve. Remove modulator valve and spring assembly. *NOTE*—Do not separate modulator valve and spring assembly.

Reassembly: After cleaning and inspection install modulator valve and spring assembly, compensator valve, inner and outer springs, valve plug and sleeve; throttle valve, valve spring, and downshift valve in their respective bores and install front plate and attaching screws. Tighten screws to 20-30 inch lbs. Install compensator cut-off valve in its bore and install rear plate and screw. *NOTE*—When installing rear plate the throttle valve must protrude from the valve body to provide clearance for the stop on the rear plate. Po-

STUDEBAKER FLIGHTOMATIC (Continued)

sition throttle valve return spring on rear plate and install screws. Tighten screws to 20-30 inch lbs. Position separator plate on upper valve body and install the screw. Tighten screws to 20-30 inch lbs. Install manual valve in its bore.

DISASSEMBLY: (Lower Valve Body)–Remove rear pump check valve seat, valve and spring. Remove screws and washers attaching cover to lower valve body and remove cover. Remove separator plate. Remove retainer facer screws and lock washers and remove the side plate. Remove inhibitor valve spring and valve, and 2-3 shift valve governor plug from their respective bores. Remove the four remaining screws and lockwashers and remove the end body. Remove transition valve and spring, 2-3 shift valve inner and outer springs and 2-3 shift valve, and orifice control valve and spring. Remove the 2-3 shift valve plug and the orifice control valve plug from the end body. Remove retaining screws and remove end body plates

Reassembly· Position end body plate on end body and install retaining screws and lockwashers. Tighten screws 20-30 inch lbs. Install orifice control valve plug and the 2-3 shift valve plug in their respective bores. Install orifice control valve spring and valve, the 2-3 shift valve and inner and outer springs, the transition valve spring and valve in their respective bores Position the end body on lower valve body and install retaining screws and lockwashers. Tighten screws to 20-30 inch lbs. Install the 2-3 shift valve governor plug, and the inhibitor valve and spring in their respective bores. Position side plate on lower valve body and install retaining screws and lockwashers. Tighten to 20-30 inch lbs. Install rear pump check valve spring, valve, and seat.

DISASSEMBLY: (Lower Valve Body Cover)–Remove end plate retaining screws and lockwashers and remove end plate. Remove rear servo check valve spring and check valve from its bore. Remove the 1-2 shift valve and spring from its bore. *NOTE*–Models with "intermediate gear start" (later Commander & President models, and early Commander & President having a modified control valve assembly) have the 1-2 shift valve spring, which is conical, installed between end plate and valve. All Champion models, and early Commander & President models have the spring located at opposite end of valve.

Reassembly: After cleaning and inspection, install the 1-2 shift valve and spring (see "Disassembly" above for spring location), and the rear servo check valve and spring in their respective bores. Position end plate on lower valve body cover and install retaining screws and lockwashers. Tighten screws to 20-30 inch lbs.

►*CONTROL VALVE REASSEMBLY NOTE*· Position the upper valve body and separator plate on lower valve body and install retaining screw and lockwasher, do not tighten screw. Position separator plate and lower valve body cover on lower valve body and install retaining screws and lockwashers, do not tighten screws. Install four capscrews and lockwashers that attach lower valve cover to control valve assembly. Tighten capscrew to 4-6 ft. lbs. Tighten all retaining screws to 20-30 inch lbs.

AIR CONDITIONING SERVICE CAUTIONS

HANDLING FREON: Though considered the safest and best refrigerant for use in Air Conditioning systems, the following precautions must be observed to avoid serious accidents or damage to the system.

Drum: 1) Do not leave drum uncapped (metal cap furnished with drum is for protection of valve and safety plug). It should be replaced after each use of drum.
2) Do not carry drum in passenger compartment of car. Place drum in luggage compartment or, if in an open truck, cover drum to protect it from radiant sun heat. If precaution not taken, resultant increase in pressure may cause safety plug to release or drum to burst.
3) When charging system, do not subject drum to high heat. Use water no warmer than 125°F (Hot rags will suffice). *Never place drum on radiator, stove, or use torches for heating during charging.* Keep drums upright.
4) Never permit a drum to be dropped or strike another drum violently.
5) Do not fill drum completely (when filling one drum from another). Leave space above liquid for expansion.

P rsonal: 1) Do not discharge Freon into room with exposed flame because concentrations of this gas in contact with open flame will produce a toxic gas.
2) Do not expose eyes to liquid, *USE GLASSES OR GOGGLES. Liquid Freon will freeze anything with which it comes in contact.* If Freon should strike eyeballs, splash water to area of eye to gradually get temperature above freezing point, apply a few drops of sterile mineral oil to eyes as an irrigator. If irritation continues, wash eyes with a weak solution of boric acid. *DO NOT RUB EYES. See an eye specialist at once.*
3) Do not inhale large quantities of Freon vapor as it will act an an anesthetic.
4) If Freon comes in contact with skin, injury should be treated for frostbite.

HANDLING REFRIGERANT LINES: 1) Keep refrigerant lines dry and clean. Whenever a connection or joint is broken, clean all dirt from joint or connection.
2) Parts from stock are capped and dehydrated. Caps should only be removed just prior to installation. Lines removed from system to be used again, should be capped immediately, to prevent dirt and moisture from entering lines.
3) Lines should be free of kinks, and should be carefully stored to avoid crushing or bending.
4) Proper size wrenches should be used when tightening fittings. Always use two wrenches to prevent twisting copper tubing.
5) Tubing that is left free to vibrate will harden and crystallize the area of the tubing at flare sections so that it may become brittle and break.
6) When using paint drying lamps, ovens, steam cleaners, or other heat producing devices, avoid heating any part of system. If sufficient heat applied, pressure will increase to a point where some part of system will rupture.
7) When undercoating, use care to see that undercoating does not plug evaporator drain. Do not coat air conditioning joints and connections.
8) Keep gauge set and lines free of moisture.
9) Compressor lubricant container must not be left open longer than necessary as the special oil is moisture free and will absorb moisture from air if left uncapped.

AIR CONDITIONING LEAK TESTS

LEAK TESTING CONFINED AREAS: For leak testing confined areas, such as sections of evaporator and condenser, a torch or flame type detector must be used. Two types are available. One type uses anhydrous methyl alcohol, under pressure, for producing the testing flame. The cylinder is refillable, and must be preheated to pressurize cylinder. The other type uses propane gas, under pressure, to produce the testing flame. The cylinder is replaceable and comes already pressurized, making it unnecessary to pre-heat cylinder in order to produce testing flame. Instructions for use of the detectors are furnished with the detector.

Leak Testing: With flame adjusted, explore for leaks by moving end of hose or sampling tube around all points where a leak may be. Especially check around bottom of connections, since Freon is heavier than air and will be more apparent at bottom of fitting. Color of flame will turn to a yellow-green when a small leak is detected. Large leaks will be indicated by a change in color to bright or brilliant blue or purple. When hose or tube is moved away from leak, flame will clear to an almost colorless pale-blue or green. *CAUTION*–Do not use lighted detector in any place where combustible or explosive gases, dust or vapors may be present. Do not breathe fumes and black smoke that are produced if leak is a big one. Before leak testing, be sure car is thoroughly aired (particularly if Freon tank used or if system opened for any reason) and moved to a Freon-free area in order that false readings may be prevented.

PIN-POINTING LEAKS: There are a number of fittings and places throughout the air conditioning unit where a leak detector solution or detergent may be used to pin-point leaks. Apply solution to suspected area with with swab that is attached to bottle cap. Bubbles will will form, within seconds, if there is a leak.

AIR CONDITIONING TROUBLE SHOOTING

►*CAUTION: Do not disconnect refrigerant lines, replace parts, or attempt adjustments without complete instructions. See "Air Conditioning Service Cautions".*

POOR COOLING: 1) Blowers Not Operating–Fuse blown or faulty circuit breaker; switch in "Off" position; defective switch; switch resistors or blower rheostats inoperative; broken wire or loose connections; blower motor defective; blower fans or motor improperly installed.
2) Restricted Air Flow–Filters clogged; dirt or other obstructions in air ducts; evaporator fins or coils clogged or restricted with frost or ice.
3) Refrigerant Flow to Cooling Coils or Fins Incorrect–Expansion valve improperly adjusted or defective; power element or temperature bulb does not contact pressure line properly; restriction in liquid line between receiver and cooling coils or fins; power element or temperature bulb discharged; insufficient refrigerant; by-pass valve, thermostatic switch or solenoid (if so equipped) not properly set or inoperative; modulator valve (if so equipped) defective; break in any part of closed refrigeration system.
4) Refrigerant Not Condensing Properly–Air flow through condenser, restricted, high engine operating temperatures; air or excess refrigerant in system; restriction in high pressure side of compressor and condenser.
5) Clutch (If So Equipped) Does Not Engage–Defective coil or relay; clutch plate lining worn or saturated with oil causing slippage; air conditioning "On" switch defective; thermostat inoperative; clutch adjustment incorrect.
6) C mpressor - Belts not adjusted properly, worn, or broken; operating above normal pressures; valves faulty; service valves not fully open.
7) El ctrical–Loose connections or broken wires between electrical units, blown fuses or faulty circuit breakers.

TOO COLD: 1) Clutch (If So Equipped) Does Not Disengage–Thermostat inoperative; relay stuck closed; air conditioning "On" switch inoperative.
2) Blower Speed Cannot be Reduced–Defective blower switch.

VIBRATION–NOISE: 1) Blowers–Loose on shaft; striking housing; foreign material; motor bearings or mounts loose or worn.
2) Compressor–Mounting brackets loose; loose internal parts; insufficient oil; too much refrigerant.
3) Air Flow–Foreign material in air system; small slits or openings in ducts.

INCORRECT OPERATING PRESSURE: 1) Excessive Pressure on High Pressure Side–Air or excess refrigerant in system; air flow through condenser core restricted; kinks or restrictions in line on high pressure side; high engine temperature; shut-off valve on high pressure side of compressor not fully open; insufficient air flow through cooling coil; defective expansion valve or incorrect adjustment.
2) Insufficient Pressure on High Pressure Side–Shortage of refrigerant; defective expansion valve or incorrect adjustment; leaky or broken compressor valves.
3) Excessive Pressure on Low Pressure Side–Power element or temperature bulb not making correct contact with pressure line; expansion valve needle stuck open or leaking.
4) Insufficient Pressure on Low Pressure Side–Restriction in lines, shortage of refrigerant; expansion valve needle stuck shut; expansion valve not open far enough, plugged, or defective; dehydrator-filter (strainer-drier) plugged; power element or temperature bulb charge lost or line plugged; compressor valves faulty; blower fans inoperative; temperature control thermostat does not cut out; moisture or freeze-up.

HUDSON & NASH

Hudson (1956)
Nash (1956)
Rambler (1956)

►CHANGES & CORRECTIONS

►*FREON-12 CHARGE CHANGE:* New specifications require that 3 lbs. (Rambler), 3½ lbs. (Others) maximum be charged into system. Two ounces of anhydrous methanol for each lb. of Freon is still required. *NOTE* - Above specifications supersede 3½ & 4 lb. charge previously required.

►*CONDENSATION LEAKS & SPILL-OVER CORRECTION (Rambler).* Effective at car serial number D-329995 a shedder, Part No. 3149919, has been incorporated to an existing baffle on the evaporator retainer backplate. This shedder prevents any condensation held between evaporator fins from being spilled out through forced hot air opening when applying brakes. Part Nos. for service installation are as follows (Shedder) 3149919, (Wire Clip) 3108634, (Two Tinnerman Speed Nuts) 3131-524. Kit No. including all above components is 3209503. Three 1/8" holes must be drilled in the evaporator aluminum endplate at 45° angle toward the shroud. Purpose of holes is to allow water to drain off into shroud.

DESCRIPTION: Similar in design and operation to previous models. *See "Nash & Hudson" in 1955 Annual Data or later Manual edition.*

PRECAUTIONS: *Before disconnecting any part of air conditioning system or lines, see "Air Conditioning Service Cautions".*

MAINTENANCE & INSPECTION: *See "Nash All Weather Eye" in 1954 Annual Data or "Nash & Hudson" in later Manual edition.*

ADJUSTMENTS: Compressor Belt - The idler shaft or power steering pump (if so equipped) is adjustable by a slotted link to engine. Some models require that compressor mounting bracket be adjusted in addition to idler shaft. Belts require a tight adjustment. Reduce "flex" to a minimum.

Magnetic Clutch: Shims are available (.010" thick) to adjust air gap between clutch plate and pulley to .010-.040". Clutch plates have three adjusting screws and locknuts to accomplish this adjustment. Torque clutch plate capscrew to 18-22 ft. lbs. and lock in place with lock plate.

COMPRESSOR REMOVAL & INSTALLATION (T Work on Engine): *See "Nash All Weather Eye" in 1954 Annual Data or later Manual edition.*

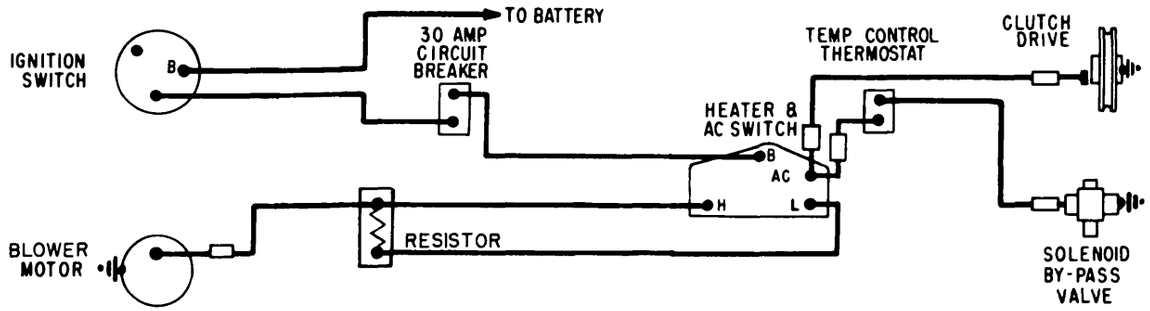
TROUBLE SHOOTING: *See "Air Conditioning Trouble Shooting".*

LEAK TESTING: *See "Leak Testing Air Conditioning System".*

CHECKING, ADDING REFRIGERANT & ADDING OIL TO COMPRESSOR: *See "Nash All Weather Eye" in 1954 Annual Data or "Nash & Hudson" in later Manual edition.*

CAPACITY: *See "Freon-12 Charge Change" above.*

►*OTHER "NASH-HUDSON" AIR CONDITIONING DATA: See "Nash All Weather Eye" in 1954 Annual Data or "Hudson & Nash" in later Manual edition.*



HUDSON, NASH & RAMBLER AIR CONDITIONING CONTROL DIAGRAM

CHRYSLER, DESOTO, DODGE PLYMOUTH "AIRTEMP"

Chrysler & Imperial (1956)
DeSoto (1956)
Dodge V8 (1956)
Plymouth (1956)

DESCRIPTION & OPERATION: Compression process cycle type, now using Freon-12 or Genetron-12 as a refrigerant. Similar in design and operation to previous models. *See "Airtemp" Air Conditioning in 1953 Annual Data or later Manual edition*

Design Changes: *See "Airtemp" in 1954-55 Annual Data or later Manual edition*

PRECAUTIONS: *Before disconnecting any part of air conditioning equipment or lines, see "Air Conditioning Service Cautions".*

ADJUSTMENTS: Compressor Belt - Adjust as follows
Chrysler, Imperial, DeSoto, Plymouth - Adjust tension of **each** compressor belt so that a pull of 9-12 lbs. at center of longest span will provide a 1/4" deflection at that point.
Dodge - Adjust compressor drive belt tension to 15 ft. lbs. with Tools C-3379 and C-3005. Generator mounting bolts must be loosened and tension held to 15 ft. lbs. when bolts are retightened.

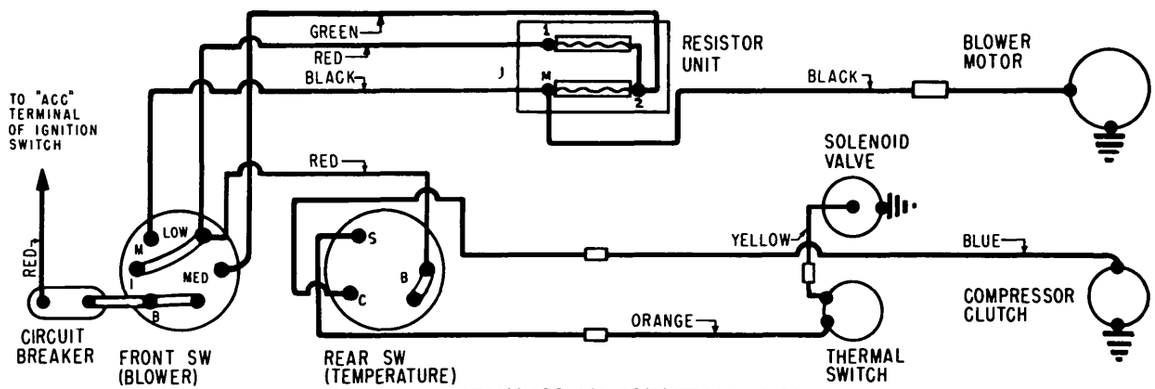
Fast Idle Device (If Equipped): Back off round adjusting nut on diaphragm shaft away from pawl. Start engine, attach tachometer, and with transmission control lever in "Neutral" position and engine at operating temperature, adjust engine idle to 475-500 RPM. Turn blower control switch to first position, and temperature control switch to second position. Adjust round adjusting nut on fast idle diaphragm shaft to increase engine RPM to 700-800 RPM. With hand brake on, move transmission control lever to "Drive" range and then back to neutral. Readjust fast idle if necessary. Lock round nut with hex nut.

Expansion Valve: No adjustment. Replace as necessary.

Magnetic Clutch (Warner - Used on some Chrysler Models With Copeland Compressor): Clearance between field coil housing and driven member should be a minimum of .010 015". When clearance is less than specified, it is probably due to misalignment of coil assembly, or from pulley being cocked on compressor shaft. Align pulley and/or coil assembly, and recheck for proper clearance.

Magnetic Clutch (Tecumseh Compressor): Measure gap between drive plate electromagnet and drive plate. Air gap should measure .025"-.035". To adjust,turn screws located in center of three hexagon headed nuts on front face of drive plate. Adjust all three screws to obtain

CONTINUED ON NEXT PAGE



DES T , DODGE, PLYMOUTH STANDARD AIR CONDITIONING CONTROL DIAGRAM

"AIRTEMP" (C ntinued)

evenly spaced air gap, Measure air gap with long feeler that will reach into gap at hub.

COMPRESSOR REMOVAL (To Work on Engine): *(NOTE–* Split muffler bracket as required with hacksaw). Start engine, operate at fast idle until compressor is warm. Remove valve stem protective caps from discharge and suction service valves. Close both valves (clockwise) with Tool C-3361. Loosen port caps on both service valves about two turns to gradually release Freon gas pressure from compressor. Loosen oil filler plug a few turns. Remove drive belts and belt tension adjusting strap from compressor. Disconnect magnetic clutch electrical lead (if so equipped). Disconnect discharge tube flared connection at discharge (lower) muffler and cap tube nut and male connector. Remove Allen screws from suction service valve. Remove upper muffler bracket-to-compressor attaching bolt and gently lay the suction valve, muffler and tube assembly to one side. Do not bend vibration eliminator excessively or it may become damaged. Cover suction port in compressor and suction valve with masking tape. Remove compressor-to-mounting bracket and support bracket bolts, remove compressor.

COMPRESSOR INSTALLATION: **1)** Place compressor on mounting bracket and start bolts, tightening them finger tight. Remove masking tape from suction service valve and compressor port, being sure surfaces are clean. Coat a new suction service valve gasket with refrigerant oil and place over valve port. Install suction service valve and tighten Allen screws to 15-20 ft. lbs. Install muffler bracket bolt and tighten bolt to 15-20 ft. lbs. Tighten compressor mounting bracket-to-compressor and support bracket attaching bolts to 20-25 ft. lbs.

2) Remove caps from discharge tube nut and muffler connector. Insert new copper washer and connect flared connection, tightening securely. Install compressor drive belts and belt tension adjusting strap. Adjust belts (see ADJUSTMENTS above). Install magnetic clutch electrical lead (if so equipped).

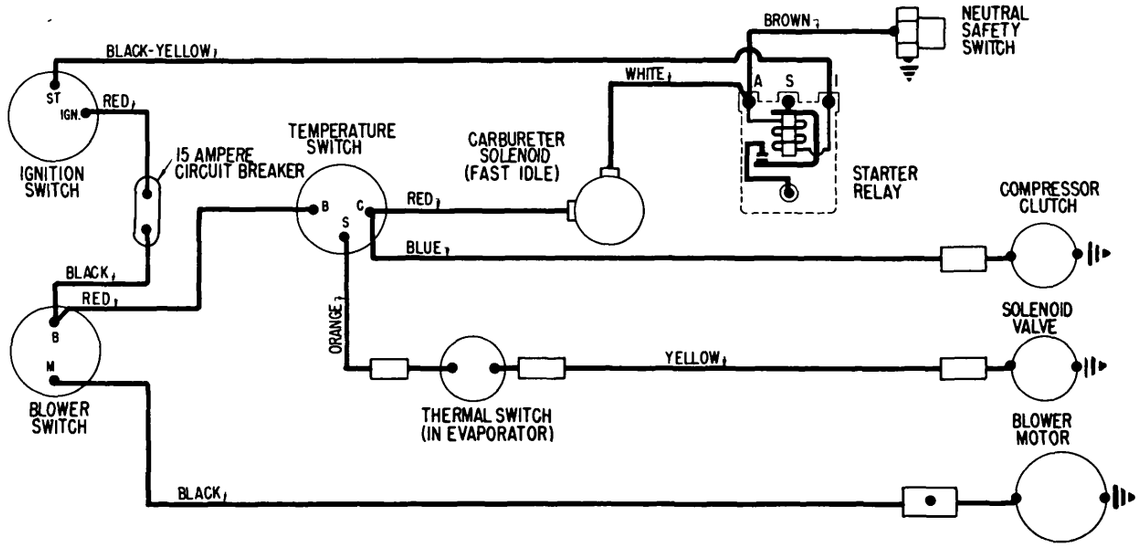
3) Install manifold gauge set (Tool C-3354). First remove valve stem protective caps from compressor discharge and suction service valves. Using Tool C-3361, make sure both valves are completely back-seated (counter-clockwise). Remove protective caps from discharge and suction service port caps. Install 4-ft. test hose from 600 lb. gauge fitting to discharge service valve port fitting. Install other 4-ft. test hose from 300 lb. gauge fitting to suction service valve port fitting. Turn both handles of manifold gauge clockwise as far as they will go. Crack suction service valve open (counter-clockwise) and tighten oil filler plug. Crack suction gauge hand valve f r an instant to purge air from compressor and suction tube. Close suction gauge hand valve and open discharge service valve (counter-clockwise) slightly. Crack discharge gauge hand valve f r an instant to purge air from discharge side of compressor. Rotate both gauge set hand valves (clockwise) until they are fully seated. Rotate both discharge and suction service valve stems until they are fully back-seated.

4) Start engine and turn blower and temperature controls to "High" and "Cold". Operate engine for 5 minutes, stop engine, and test for leaks. Test system for operation. If satisfactory, remove gauge set and replace protective caps.

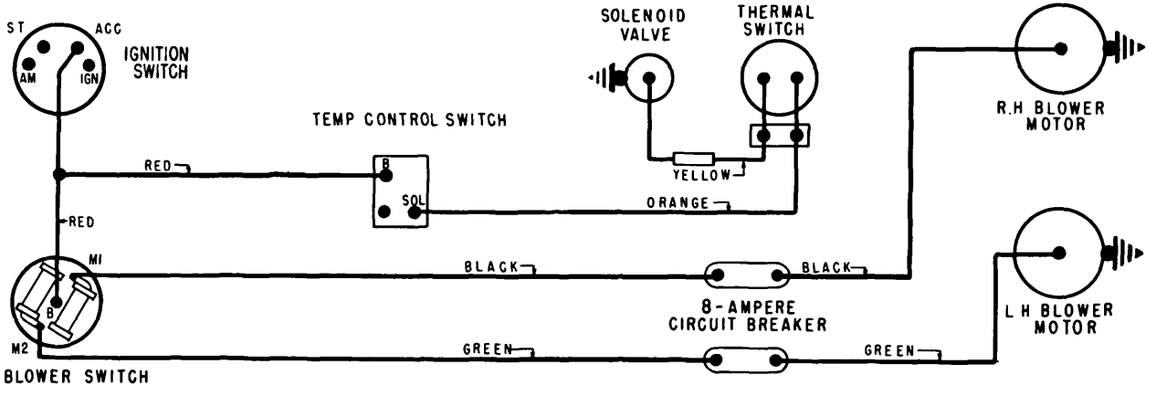
TROUBLE SHOOTING: *See "Air Conditioning Trouble Shooting".*

LEAK TESTING: *See "Leak Testing Air Conditioning System".*

CHECKING, ADDING OIL TO COMPRESSOR OR ADDING PARTIAL CHARGE OF REFRIGERANT: *See "Airtemp" in 1955 Annual Data or later Manual edition. NOTE* - Oil level in Chrysler & DeSoto Compressors should be 3/4-7/8", and in Dodge & Plymouth Compressors 3/4-1".



CHRYSLER & DESOTO DELUXE AIR CONDITIONING CONTROL DIAGRAM



DODGE DELUXE AIR CONDITIONING CONTR L DIAGRAM

FORD "SELECTAIRE"

Ford V8 (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*ENGINE OVERHEATING CORRECTION:* **1956 Cars With 1956 Air Conditioning Unit Installed -** Discharge system, remove upper air deflector, grille, and parking lights. Locate and weld or braze the two upper (FDS-19157-A) mounting brackets and two lower (FDS-19158-A) mounting brackets to condenser flanges so short legs of brackets are upward and in position so that mounting bolts can be inserted through flange and bracket holes for mounting to radiator and side deflector flange. Clean welded area thoroughly with wire brush and paint with air dry enamel. Install modified condenser with four bolts, flatwashers, and lockwashers. After installation of other parts evacuate, recharge, pressure test and test system for leaks.

1956 Cars With 1955 Air Conditioning Unit Installed - Remove upper air deflector, grille, and parking lights. Cut two 1 3/8" spacers from a ½" steel pipe for use between condenser and radiator at lower mounting holes. To secure condenser, use two 5/16"-24 x 2" bolts, four 5/16" x 1" O D thick flatwashers and two 5/16" lockwashers. Disregard center mounting bolts and use existing bolts for upper mounting holes. Center bolts should be used to mount radiator only. Install parking lights, grille, and upper air deflector.

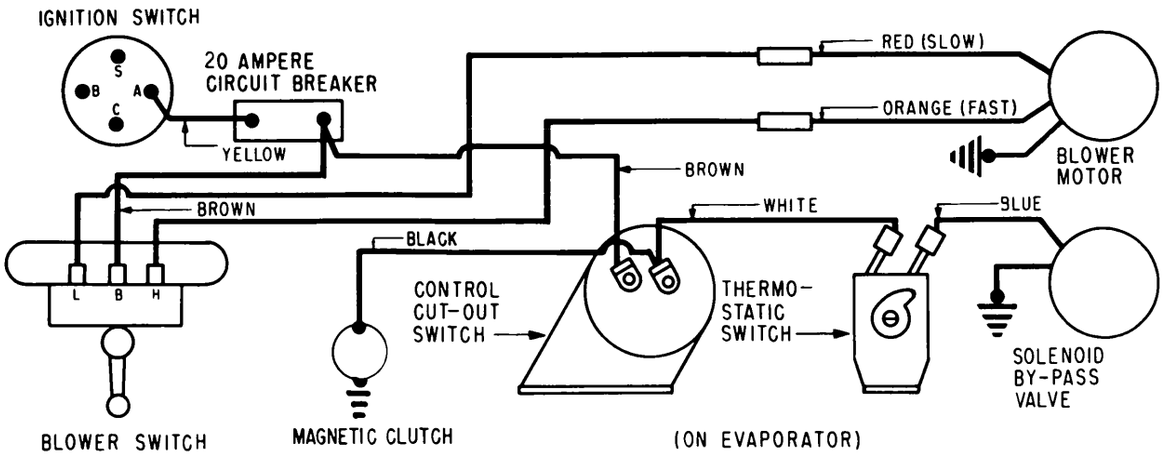
►*CLUTCH ASSEMBLY INSTALLATION CAUTION.* When installing clutch assembly to compressor shaft, special self-locking capscrew with nylon insert in threads, 5/16"-24 x 1", Part No. 358606-S, and a flatwasher, Part No. 358605-S, must be used, otherwise retention of clutch assembly to shaft cannot be assured. Torque to 18-22 ft. lbs.

►*GASKET PRODUCTION CHANGE:* Copper gaskets previously used at all connections were discontinued during 1956 production. Once a connection is opened, or a leak developes, copper gaskets must be used to prevent leaks. Overtightening to stop leaks should not be attempted.

DESCRIPTION: Similar in design and operation to previous model. Evaporator unit and allied parts are mounted on dash. System uses Freon-12 as refrigerant. For functioning of various components of the system, see *"Ford, Lincoln, Mercury" in 1955 Annual Data or "Ford SelectAire" in later Manual edition, and note the following design changes:*

►*DESIGN CHANGES·* Magnetic clutch is used (disconnect pulleys discontinued), electrical control similar to previous model except that wire has been added from control cutout switch to supply battery current to magnetic clutch, dehydrator and receiver are combined into a single unit with no shut-off valves at the receiver (pump-down of the system is no longer possible), Freon capacity is 4½ lbs., 1956 Compressors are not interchangeable with 1955 Compressors due to tapered shaft designed to accommodate the magnetic clutch, oil separator is used with factory installed systems.

►*OIL SEPARATOR RELOCATION CAUTION·* Oil Separator is located in low pressure side of refrigerant circuit between evaporator and low pressure service valve. Whenever a refrigerant line is broken for compressor service, it will be necessary to discharge entire system of refrigerant.



FORD AIR CONDITIONING CONTROL DIAGRAM

PRECAUTIONS: *Before disconnecting any part of air conditioning equipment or lines, see "Air Conditioning Service Cautions".*

ADJUSTMENTS: Loosen generator-to-bracket bolt. Pull out generator so there is approximately ½" deflection midway between water pump and compressor pulleys with normal thumb pressure.

Control Cable Adjustments: Air Duct Valve - Set the temperature control lever at its extreme left position. With lever in this position, adjust cable leading to right air duct valve so that valve is in the completely closed position (maximum counter-clockwise).

Louvre–Adjust evaporator louvre cable so that the louvres are completely closed when the temperature control lever is in center position (directly under the dot) If evaporator unit has been removed, it will be easier to adjust cable at the evaporator end before installing the evaporator. Only a slight adjustment of the louvre cable is possible at the control unit.

Heater Thermostat–With temperature control lever at the center position, adjust heater thermostat cable until heater thermostat is in the closed position (thermostat lever all the way to right).

Evaporator Thermostatic Switch Adjustment: *(NOTE -* The switch is adjusted at time of installation and generally requires no further adjustment. However, in very dry climates such as the Death Valley area, the switch can be set to its very lowest temperature position. In higher humidity areas, set switch at index lines to prevent evaporator from icing and clogging air passages. Factory setting of control is at scribe mark on control, representing a temperature setting of 28°F. Control may be adjusted to maintain an evaporator temperature of 24-45°F. The thermostatic switch operating differential is 6°F. at any one setting). To adjust control, remove glove box to gain access to the adjusting screw. Turn thermostatic switch adjusting screw clockwise to lower temperature and counter-clockwise to raise it.

COMPRESSOR REMOVAL (To Work in Engine): Isolate compressor by turning both high and low pressure service valves to extreme clockwise position, then loosen cap on high pressure service valve gauge port, and allow gas to escape until compressor and attaching hoses are relieved of refrigerant pressure. *(CAUTION–* Loosen cap a small amount only, and do not remove it until pressure is completely relieved) Raise car on hoist or jacks and remove splash pan. From underneath car, remove generator adjusting bracket bolt. Loosen generator-to-compressor mounting bolts, swing generator inward, and disengage the two belts from generator and compressor pulleys. Disconnect generator leads, remove generator mounting bolts and remove generator from car. Remove generator-to-cylinder block bolt and compressor-to-lower bracket bolt. Lower car and complete operation in engine compartment. Disconnect high and low pressure hoses from compressor. Remove compressor mounting bolts. Loosen angle bracket bolt and remove compressor from engine.

COMPRESSOR INSTALLATION: Reverse removal procedure. Adjust compressor belts (see ADJUSTMENTS above). Connect high and low pressure hoses *(NOTE–* Be sure to replace metal gaskets in hose connections). Evacuate compressor and attaching hoses (see "Evacuating Compressor & Adding Partial Charge of Refrigerant" below).

TROUBLE SHOOTING: *See "Air Conditioning Trouble Shooting".*

LEAK TESTING: *See "Leak Testing Air Conditioning System".*

CHECKING, ADDING OIL TO COMPRESSOR, EVACUATING & ADDING PARTIAL CHARGE OF REFRIGERANT: *See "Ford, Lincoln, Mercury" in 1955 Annual Data or "Ford SelectAire" in later Manual edition*

LINCOLN & MERCURY

Lincoln & Continental (1956)
Mercury (1956)

►CHANGES, CAUTIONS, CORRECTIONS

► *CLUTCH ASSEMBLY INSTALLATION CAUTION*· When installing clutch assembly to compressor shaft, special self-locking capscrew with nylon insert in threads, 5/16" -24 x 1", Part No. 358606-S, and a flat washer, Part No. 358605-S, must be used, otherwise retention of clutch assembly to shaft cannot be assured. Torque to 18-22 ft. lbs.

► *CIRCUIT BREAKER CAUTION & REPLACEMENT* If vehicle is allowed to stand in hot sun for extended periods, interior temperature can become extremely high, causing 15 ampere circuit breaker in blower circuit to cycle as soon as blowers are turned on. To correct this condition, 15 ampere circuit breaker can be replaced with a 20 ampere circuit breaker, Part No. B6A-14526-G. If 20 ampere circuit breaker is used it will be necessary to replace 18 gauge blower switch feed wire with a 16 gauge wire.

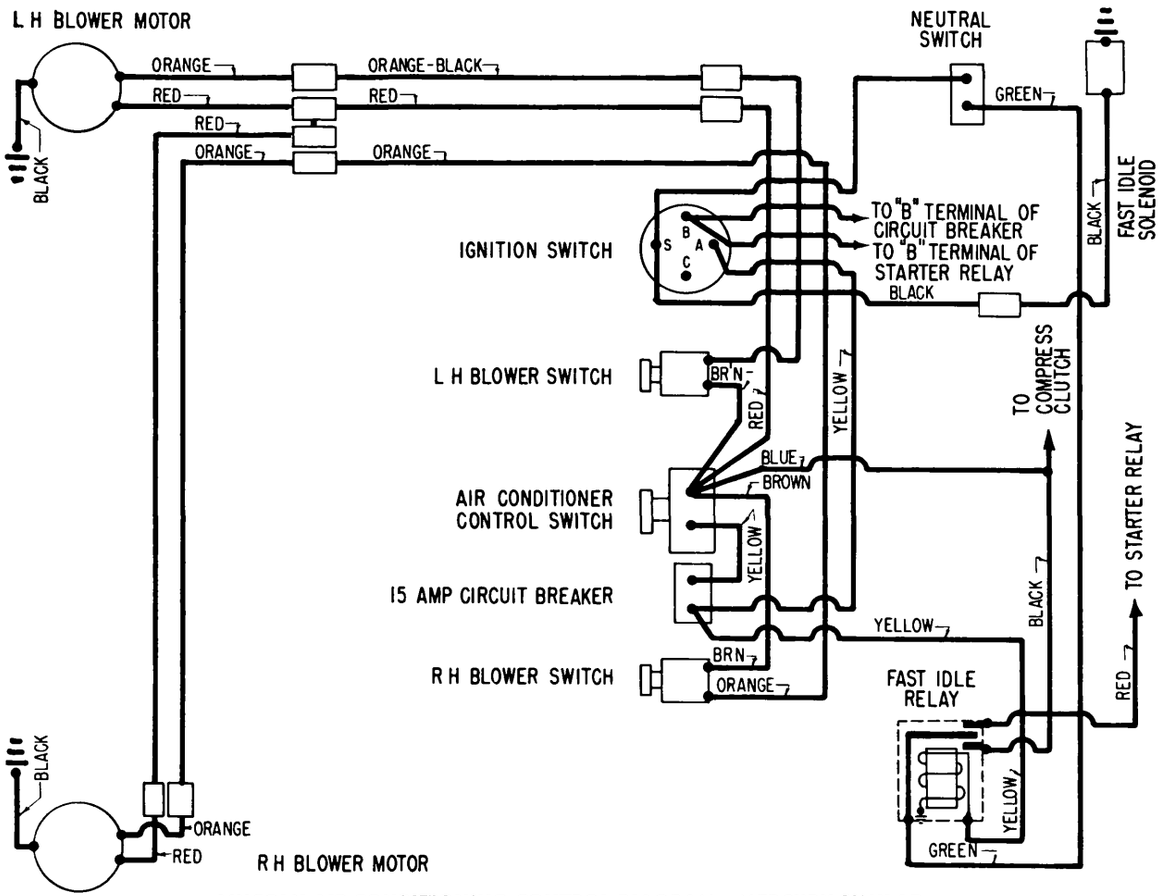
► *GASKET PRODUCTION CHANGE* Copper gaskets previously used at all connections were discontinued during 1956 production except for gasket between high pressure tube and evaporator. With the one exception connections are between parts made of different metal. **Once a connection is opened, copper gaskets must be used to prevent leaks.** Part Nos. of gaskets required are 354076-S, 77-S, 78-S & 354981-S.

DESCRIPTION: Similar in design and operation to previous models. Evaporator unit and allied parts are mounted in trunk compartment of car. System uses Freon-12 as refrigerant. A modulator valve performs same functions as bypass control valve used on other systems, in addition to providing a means for temperature control through a control lever on dash. For functioning of the various components of the system, *See "Lincoln Air Conditioning" in 1954 Annual Data or "Lincoln & Mercury" in later Manual dition and note the following design changes*

► *DESIGN CHANGES* Magnetic clutch is used (disconnect pulleys discontinued), electrical control similar to previous models except that wire has been added from control cutout switch to supply battery current to magnetic clutch, dehydrator and receiver are combined into a single unit with no shut-off valves at the receiver (pump down of system no longer possible), Freon capacity is 6½ lbs., 1956 Compressors are identical in interior construction with those of 1955 but are not interchangeable due to tapered shaft designed to accommodate the magnetic clutch, oil separator is available on factory installed models. In 1955 high pressure service valve was inverted. For this reason, direction the valve must be turned during service operations must be reversed.

OPERATION: *See "Lincoln Air Conditioning" in 1954 Annual Data or "Lincoln & Mercury" in lat r Manual edition.*

PRECAUTIONS: *Before disconnecting any part of air conditioning equipment or lines, see "Air Conditioning Service Cautions".*



LINCOLN AIR CONDITIONING CONTROL DIAGRAM—MERCURY SIMILAR

ADJUSTMENT: Compressor Belt - Loosen generator-to-bracket bolt. Pull out generator so there is approximately ½" deflection midway between water pump and compressor pulleys with normal thumb pressure.

Automatic Throttle Control: With engine warm, air conditioning system operating, and transmission in neutral, adjust knurled nut at end of operating rod of the control assembly to obtain an idle speed of 800 RPM, tighten locknut. Check idle to make sure that it returns to normal whenever air conditioning is turned off or the transmission is shifted out of neutral.

COMPRESSOR REMOVAL (To Work on Engine): Isolate compressor by turning both high and low pressure service valves to extreme clockwise position, then loosen cap on high pressure service valve gauge port, and allow gas to escape until compressor and attaching hoses are relieved of refrigerant pressure. *(CAUTION–* Loosen cap a small amount only, and do not remove it until pressure is completely relieved). Raise car on hoist or jacks and remove splash pan. From underneath car, remove generator adjusting bracket bolt. Loosen generator-to-compressor mounting bolts, swing generator inward, and disengage the two belts from generator and compressor pulleys. Disconnect generator leads, remove generator mounting bolts and remove generator from car. Remove generator-to-cylinder block bolt and compressor-to-lower bracket bolt. Lower car and complete operation in engine compartment. Disconnect high and low pressure hoses from compressor. Remove compressor mounting bolts. Loosen angle bracket bolt and remove compressor from engine.

COMPRESSOR INSTALLATION: Reverse removal procedure. Adjust compressor belts (see ADJUSTMENTS above). Connect high and low pressure hoses *(NOTE–* Be sure to replace metal gaskets in hose connections). Evacuate compressor and attaching hoses (see "Evacuating Compressor & Adding Partial Charge of Refrigerant" below).

TROUBLE SHOOTING: *See "Air Conditioning Trouble Shooting".*

LEAK TESTING: *See "Leak Testing Air Conditioning System".*

CHECKING, ADDING OIL TO COMPRESSOR, EVACUATING & ADDING PARTIAL CHARGE OF REFRIGERANT: *See "Ford, Lincoln, Mercury" in 1955 Annual Data or "Lincoln & Mercury" in later Manual edition.*

FRIGIDAIRE & HARRISON

Buick (1956)
Cadillac (1956)
Chevrolet V8 (1956)
Oldsmobile (1956)
Packard (1956)
P ntiac (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*CLUTCH COVER INSTALLATION CAUTION:* To avoid distortion of clutch cover, capscrews should be tightened to 3-5 ft. lbs. only instead of 5-7 ft. lbs. previously specified.

►*BUICK CLUTCH SWITCH CAUTION:* Some early clutch switches were incorrectly assembled during manufacture in that switch terminals were inadvertently reversed causing connection terminal to be improperly color coded. In event this has happened, the feed line (brown wire) will be connected to ground, causing 5 ampere fuse to burn out with air conditioner turned off. It is not necessary to replace switch unless contacts are burned. Reverse wires so they are opposite to the color markings on the case.

►*CADILLAC CONTROL SWITCH "SHORTING" CORRECTION:* If shorting occurs when toggle switch on control panel is turned "ON", check positioning of dark green wire connector on the terminal post of the temperature control lever. Connector must be installed with flat side of connector up to avoid possibility of its contacting the temperature control lever causing 25 ampere fuse to blow.

►*CADILLAC POOR COOLING OR ENGINE OVERHEATING CORRECTION:* May be due to excessive refrigerant in system. To correct, purge Freon from high pressure side of compressor with system operating at 1500 RPM engine speed, until bubbles appear in sight glass. Then add 1 lb. of Freon-12. Check oil level in compressor, add oil as necessary.

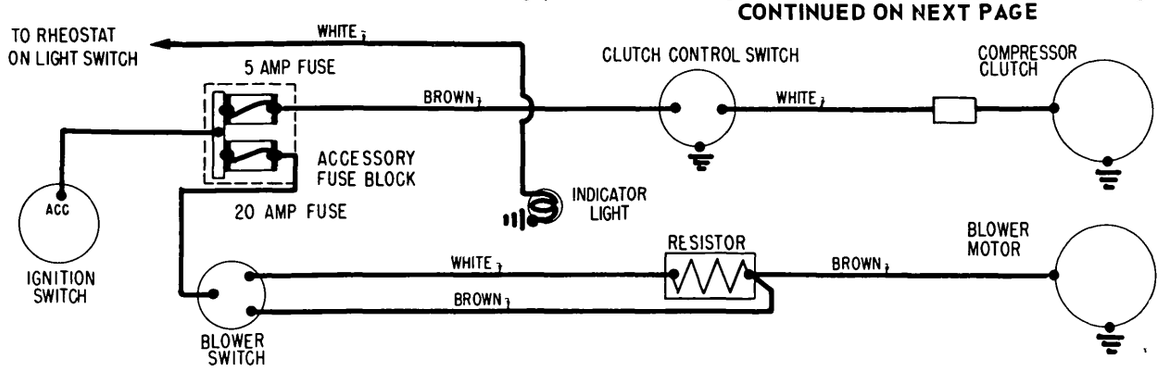
►*CLUTCH AIR GAP SHIM CAUTION:* There are two sets of shims in the clutch assembly; one set forward and one set to rear of the clutch plate. To adjust air gap, **shims should be added or removed from the rear set only.** Front set of shims controls spacing of the front clutch plate friction facing to its mating surface on the pulley (this spacing should be .010").

►*CADILLAC COMPRESSOR WHINING NOISE CORRECTION:* Remove clamp holding liquid and discharge lines, just to rear of radiator shroud. Straighten and align suction and discharge lines (leak test to assure that bending of lines has not caused leaks). Loosen four screws that attach compressor to its front and rear supports. Loosen bolt on block and nut on intake manifold that attach rear support to engine. Loosen compressor belts. Center compressor as much as possible between front and rear brackets, tighten two screws attaching compressor to front support. Tighten bolt and nut that attach rear support to engine. Finally, tighten the two screws that attach compressor to the rear support. Re-tighten compressor belts.

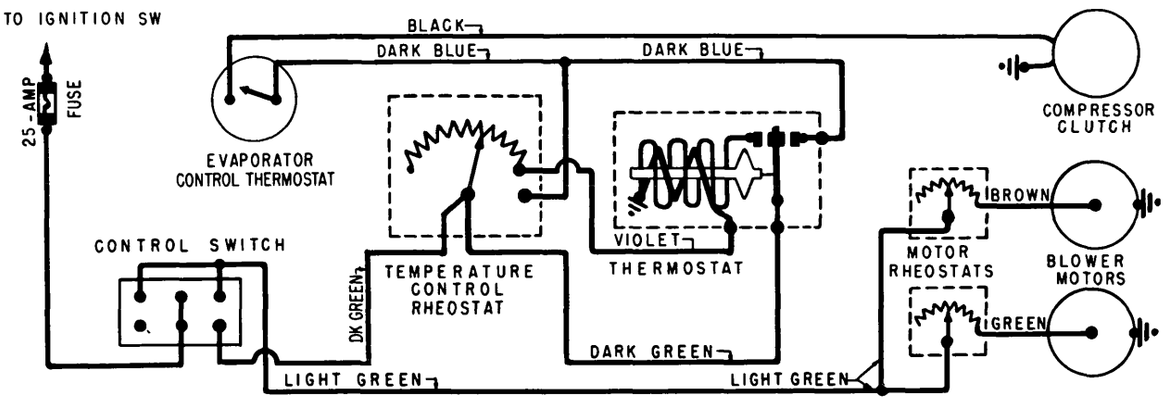
►*CLUTCH SLIPPAGE CORRECTIONS:* Check clutch air gap to see that it is within limits of .025-.035". If head pressures are high due to excessive refrigerant in system, proceed as for "Poor Cooling or Engine Overheating Correction" above. Check for oil or grease on clutch friction facings, worn clutch friction facings, and pulley wobble. Check nylon actuating balls for flat spots or distortion.

►*PONTIAC COMPRESSOR NOISE CORRECTION:* Move doughnut type rubber spacer which is around discharge

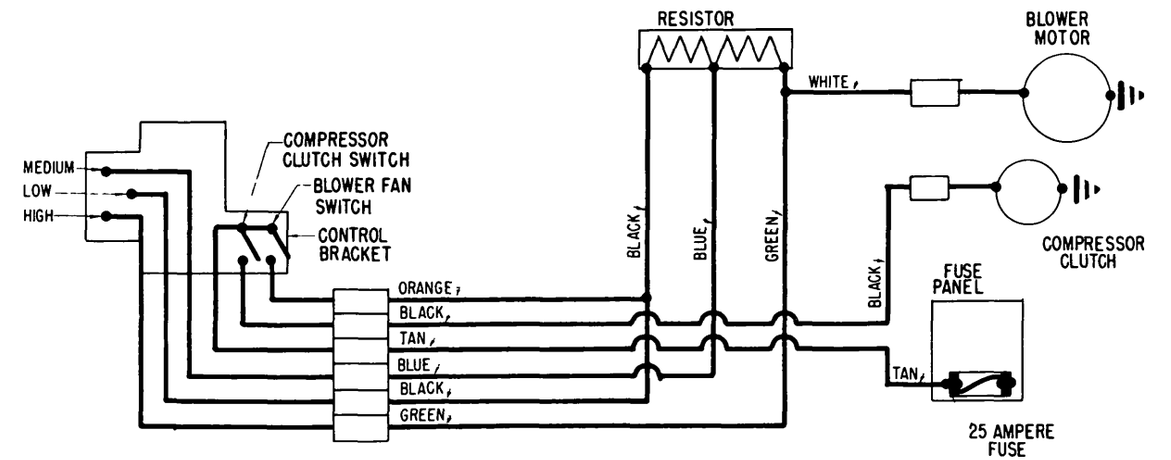
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BUICK AIR CONDITIONING CONTROL DIAGRAM



CADILLAC AIR CONDITIONING CONTROL DIAGRAM



CHEVR LET AIR CONDITI NING CONTR L DIAGRAM

FRIGIDAIRE & HARRISON (C ntinued)

hose (just behind radiator-to-fender upper brace) back towards fire wall about 9". This will prevent discharge hose from vibrating against fender skirt. After repositioning this spacer, make sure that screws protruding through the fender skirt just behind the radiator-to-fender taining screws as necessary to protect from chafing discharge hose. Later production cars have two spacers, one as indicated above and one just behind the radiator-to-fender upper brace.

► *CADILLAC 305 HP SHORT CIRCUITING AT FAST IDLE CONTROL CORRECTION:* Bend terminals on fast idle solenoid away from possible contact with throttle rod. Jumper wire terminals should be taped.

DESCRIPTION: Similar in design and operation to previous models. *See "Frigidaire (G.M.)", "Chevrolet", or "Pontiac" in 1955 Annual Data or "Frigidaire & Harrison" in later Manual edition.*

PRECAUTIONS: *Before disconnecting any part of air conditioning system or lines, see "Air Conditioning Service Cautions".*

MAINTENANCE & INSPECTION: *See "Frigidaire (G.M.)", "Chevrolet", or "Pontiac" in 1955 Annual data or "Frigidaire & Harrison" in later Manual edition.*

ADJUSTMENTS: Compressor Belt – Adjust as follows:

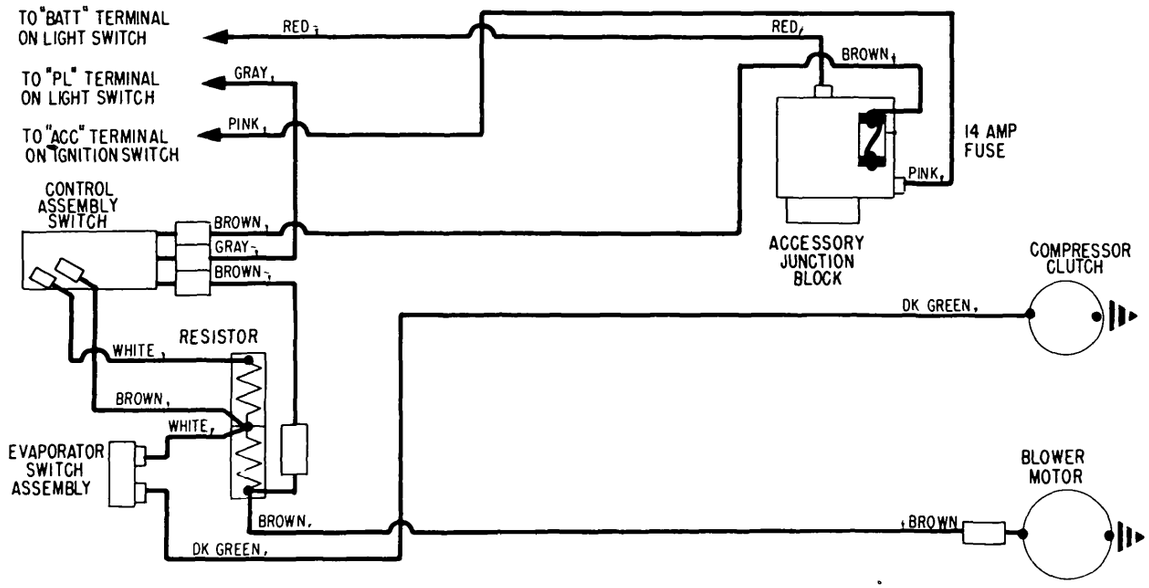
Buick – With torque wrench at generator pulley, tighten belts until 25-30 ft. lbs. torque slips generator pulley on belts. *NOTE* - This specification supersedes previous specification of ½" deflection midway between fan and compressor pulleys.

Cadillac – Loosen two generator mounting bolts approximately four turns. Loosen generator adjusting strap screw. Place Fan Belt Adjusting Tool, No. J-3046, over head of front mounting bolt and rotate until arm on tool contacts edge of generator drive end plate. Place a 7/8" socket over the tool and place a 50 ft. lb. torque wrench in socket. Pull outward on torque wrench until 27 ft. lbs. torque is indicated on scale. Tighten generator adjusting strap screw. Remove tool and tighten mounting bolts to 15-18 ft. lbs.

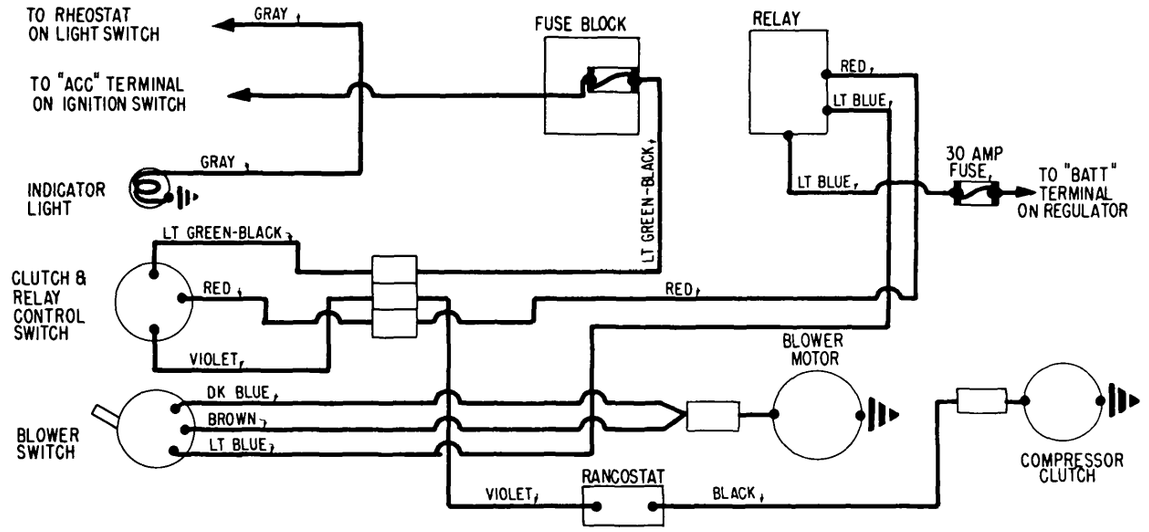
Chevrolet V8 – Loosen compressor brace bolt and compressor bracket pivot bolt. Check to see that lower brace bolt and compressor bracket-to-engine mounting bolts are drawn up tight. Assemble belt tensioning tool J-4435 or similar 50 ft. lb. torque wrench. Position tool on seal and coil housing with lug on tool facing toward rear of car and inserted into unused hole in compressor mounting flange on battery side of electrical connector *(NOTE* - It may be necessary to shift connector in clip slightly to obtain clearance for proper engagement of tool). Apply 30-40 ft. lbs. torque to compressor, tighten brace and bracket pivot bolts.

Oldsmobil – Loosen generator attaching bolts. Place Tool J-4170 under generator between bracket and generator housing. Attach torque wrench to tool and apply torque of 20 ft. lbs. Tighten attaching bolts while holding tension on belt.

Packard – Using Tool J-5577 and a torque wrench, tighten belts to 58 ft. lbs. Tighten compressor-to-mounting bracket bolts while maintaining this 58 ft. lb. torque.



OLDSMOBILE AIR CONDITIONING CONTROL DIAGRAM



PONTIAC AIR CONDITIONING CONTROL DIAGRAM

Pontiac – Loosen three bolts retaining idler pulley to mounting bracket (pump support bracket on power steering equipped cars - heads of bolts are behind pulley). Insert torque wrench in square hole at end of power steering pump (or idler pulley) bracket. Apply 60 ft. lbs. torque if new belt is being installed, 53-57 ft. lbs. if used belt is re-installed.

Magnetic Clutch: Energize clutch coil from battery and check clearance between clutch plate armature (not rear pulley cover ring) and coil housing at three different positions. The clearance should be .025-.035". If clearance not correct, it will be necessary to remove pulley and add or remove shims accordingly. Shims are available in the following sizes: .010", .015", .020", .025". By proper selection of shims .005" variance in clearance can be obtained.

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FRIGIDAIRE & HARRISON (C ntinu d)

Expansion Valve (Buick, Cadillac, Oldsmobile): Remove cap from expansion valve, turn adjusting screw fully clockwise, then counter-clockwise 5 complete turns (Cadillac), 4½ turns (Buick & Oldsmobile). *NOTE* - This supersedes setting of 5 complete turns on Buick. If this does not eliminate ineffective cooling condition, replace expansion valve, assuming that remainder of system is in good operating condition.

Expansion Valve (Chevrolet & Pontiac): If refrigerant is flooding through valve in abnormal quantity (heavy sweating or frosting may occur), close valve adjusting stem ½ turn clockwise. If insufficient refrigerant being supplied to cooling coils, open valve ½ turn counter-clockwise. If necessary, repeat above operation by turning valve in ½ turn increments at a time. *NOTE* - Allow system to balance out before attempting further adjustments. Be sure evaporator is completely de-iced before attempting any adjustment.

Thermostatic Switch (Chevrolet): *(NOTE* - In full off position, REFR control should be full "UP" and the switch actuating lever fully toward driver's side of car. Adjustment should be made to engage compressor when REFR control is depressed 1/8-1/4"). If icing or frosting condition exists in evaporator (results in poor or no cooling) thermostatic switch is probably set too cold. To adjust remove fiber cover from end of switch assembly and turn adjusting screw one turn clockwise (raises temperature 3° F.). Test operation of unit and check for icing, repeating adjustment as required. Reinstall fiber cover.

"Hot Gas" By-Pass Valve (Buick): Disconnect valve control cable, remove valve control lever and counter-balance spring. Remove nylon cam follower. Connect suction and pressure gauges to compressor. Set engine speed as outlined in table below. Turn slotted screw in valve spring sleeve in or out to give 28-30 lbs. pressure on suction pressure gauge. Reassemble and adjust control cable. *NOTE* - Occasionally a thermostatic expansion valve will stick during long periods of disuse. Rapping sharply on valve housing will usually free needle and place valve in operation.

Ambient Temp.	Eng. RPM	Ambient Temp.	Eng. RPM
60	575	100	1300
70	740	110	1550
80	915	120	1800
90	1100		

"Hot Gas" By-Pass Valve (Oldsmobile): Remove cap from gauge fitting on low pressure line near evaporator assembly *(NOTE* - Gauge fitting has Schrader valve). Install Adapter, Tool J-5420, on the low pressure gauge line and connect the adapter to the gauge fitting on the low pressure line. Purge the gauge and hose by openi ng the low pressure gauge valve for a few seconds. Start engine and allow to run at 2000 RPM, move refrigeration control lever against the detent, and turn blower speed on "Low". Observe pressure gauge and adjust only if it is not 29-30 psi. If necessary to adjust pressure setting, control cable and lever and cam will have to be disconnected from the by-pass valve in order to insert Tool J-6389 into valve. After valve pressure has been adjusted to 29.5 psi. control cable adjustment will have to be made as indicated below. Turn adjusting scre w clockwise to increase pressure; counter-clockwise to decrease pressure.

Control Cable Adjustment (Oldsmobile) – Check to insure cable is not kinked and operates freely, then disconnect return spring. Place control lever in extreme right position. Disconnect control cable from lever and loosen control cable clamp on the by-pass valve bracket. Loosen lock screw on lever assembly. With lever against stop, position cam so that it just touches the nylon plunger. Tighten lock screw in this position. Install control wire coil over the lever pin and while pushing the cable conduit toward the lever, tighten the cable clamp. Install return spring. Move control to the left and back to the extreme right position. Again check to make sure that cam is against nylon plunger.

Thermostat Control Cable (Pontiac): Place control lever to "Outside" position. Loosen thermostat control cable clamp (on top of air distributor housing on right side of instrument panel). Hold cable and housing assembly so housing cannot move and slide cable assembly toward right side of car to position temperature valve lever to extreme right position. While holding in this position, tighten cable clamp.

Compressor Clutch & Blower Switch Adjustment (Oldsmobile): Pull air hoses from manifold, remove two air manifold attaching screws, and move manifold towards steering column. From under glove box, loosen two switch capscrews on control assembly. Turn ignition switch to accessory position. Position control lever to "Blower" position. Pivot switch assembly in or out until blower just turns on, then tighten screws. To check adjustment, move control to "OFF" position. Move control lever to right and compare control lever position when blower starts and compressor clutch engages. Blower motor should go on when lever is 7/8" from extreme left position. Clutch should engage when lever is 1¼" from extreme left or "OFF" position.

Clutch & Relay Control Switch Adjustment (Pontiac): Remove radio tuner assembly if car is so equipped. Position air conditioning control lever to "VENT" position and blower switch down for high speed. Loosen two clutch and relay control switch locating bracket screws and pull switch and bracket assembly towards rear of car. Set hand brake and start car. Move switch and locating bracket assembly towards front of car slowly until blower motor operates; hold this position. Tighten clutch and relay control switch locating bracket screws. Move A.C. control switch to "ON" position and check air conditioning operation (compressor clutch coil will energize and operate compressor). Turn off ignition, replace tuner assembly.

Fast Idle Adjustment (Chevrolet): Adjust hand throttle wire guide stop to limit engine speed to 900 RPM with control pulled out and transmission in neutral. Check to see that fast idle control linkage does not interfere with normal operation of carburetor linkage when fast idle is not in operation. *CAUTION* - Place parking brake "ON" when necessary to run engine while servicing air conditioning system. Use extreme care to avoid shifting Powerglide equipped vehicles into "D", "L", or "R" positions while fast idle is operating and car is standing still.

COMPRESSOR REMOVAL & INSTALLATION (T W rk on Engine): *(CAUTION - See "Air Conditioning Service Cautions" before disconnecting compressor).* Proceed as follows:

Removal (Standard Method): Remove protective caps from gauge fittings of high and low pressure valves on rear end of compressor. Connect charging lines of Pressure Gauge Set to gauge fittings of both valves, with both valves of manifold closed. Remove protective caps and firmly close both valves on rear of compressor by turning valve stems clockwise. Open valves on manifold to discharge all pressure from compressor. Remove any brackets mounted to compressor head flange and mounting bracket. Remove retaining bolt and lockwasher to disconnect valve and mounting plate assembly from rear of compressor. Cover openings in valves and compressor with tape to exclude dirt. Disconnect clutch solenoid wire, then loosen belts and remove compressor from mounting on engine.

Installation (Standard Method): Reverse removal procedures and note the following: (See "Clutch Slippage Corrections" above. If new compressor is installed see note below). Operate compressor for 10 minutes at fast idle, leak test around valve mounting plate. Check system for sufficient Freon charge.

Removal (Optional Method): *See "Pontiac" in 1955 Annual Data or "Frigidaire & Harrison" in later Manual edition.*

Installation (Optional Method): *Same as "Removal" above.*

► *NEW COMPRESSOR INSTALLATION CAUTION:* Oil from old compressor should be drained and oil measured. Oil in new compressor should be drained completely and an amount of oil equal to that drained from original compressor should be replaced. **Aft r new compressor is installed, but befor it is op rated,** purge it of air by loosening pressure relief valve (at top of compressor) until a slight hiss of escaping gas is noted. Bleed for one or two seconds, then tighten pressure relief valve. Operate compressor at fast idle for a few minutes to build up head pressure, then repeat purge. *CAUTION* - Do not loosen relief valve too far or fast, because if it pops out, the whole charge will be lost.

LEAK TESTING: *See "Leak Testing Air Conditioning System".*

TROUBLE SHOOTING: *See "Air Conditioning Trouble Shooting".*

CHECKING, ADDING OIL TO COMPRESSOR, & ADDING PARTIAL CHARGE OF REFRIGERANT: *See "Pontiac", "Chevrolet", or "Frigidaire" in 1955 Annual Data or "Frigidaire & Harrison" in later Manual edition.*

CAPACITIES: (Buick) 5.5 lbs. (Cadillac) 5 lbs. (Chevrolet) 2.5 lbs. (Oldsmobile) 3¾ lbs. (Pontiac) 5 lbs.

FORD, LINCOLN, MERCURY

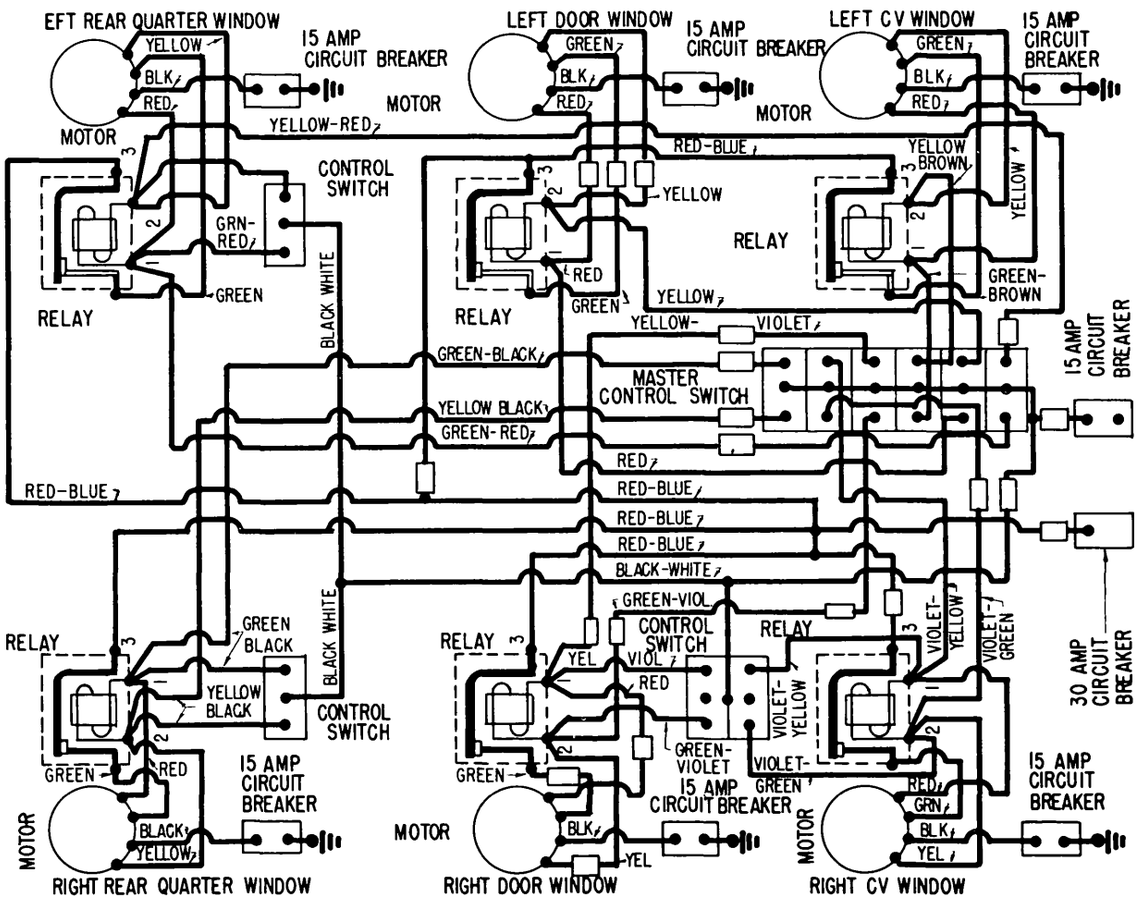
Continental (1956)
Ford (1956)
Lincoln (1956)
Mercury (1956)
Thunderbird (1956)

► *SAFETY RELAY CAUTION* If windows can be operated with ignition switch "OFF", check wire connection to relay. Red wire should go to "Bat" terminal on light switch, Black wire should go to "Bat" terminal on starter relay, and Yellow wire should go to circuit breaker. If relay is not found to be by-passed because of improper wire connection, proceed as follows Bend safety relay to a vertical position, tap relay slightly to open points. With ignition switch turned "ON", operate window a few times. Then turn off ignition switch and attempt operation of windows. If windows can still be operated and further tapping of the relay will not open the points, safety relay is defective and should be replaced.

DESCRIPTION: Similar in design and operation to previous electric types.

REMOVAL & INSTALLATION: Continental – Disconnect battery ground. Remove door lock control rod knob, garnish moulding and moulding caps from inner door panel. Loosen set screw securing door handle to arm. Unscrew handle from arm. Remove upper moulding from arm rest panel assembly by prying moulding from retainer. Remove screws securing arm rest panel assembly to bottom of door inner panel and one screw at hinge side panel. Working through access holes, remove screws securing arm rest panel to door inner panel. Remove arm rest panel from door by lowering outer end of panel and raising front end to clear mounting bracket. Remove upper trim panel. Remove water seal from door inner panel. With window in half closed position, remove access hole cover plate, and lower window stop. Lower window glass and remove two spring type retainers that secure glass channel rollers to window regulator arms. Remove rollers from arms. Raise window to full up position and place rubber wedge between window glass and door inner panel to hold window in up position. Disconnect wires from motor to relay at bullet connectors. Remove capscrews securing regulator assembly to inner door panel, remove window regulator assembly through access hole. To install, reverse removal procedure.

Ford & Thunderbird: (Except Victoria Quarter Window). Disconnect motor wires at bullet connectors (on Convertible quarter assemblies, disconnect ground wire from circuit breaker on floor pan). Remove motor-to-panel brace on all door assemblies. On rear doors, remove screw that attaches circuit breaker to regulator support bracket and regulator assembly, remove the screws that attach support bracket to the inner door panel, then remove regulator support bracket and circuit breaker. On both door and quarter assemblies partially remove the spring retainers from the roller assemblies in glass channels, and disengage regulator arms from rollers (only one arm and roller on Convertible quarter assembly). On door assemblies, work through the door access hole. Raise window glass manually, wrap several strips of adhesive material over top of door, stick ends to each side of glass. Remove mounting screws that secure regulator assembly to inner door or quarter panel. Slide regulator assembly forward to release roller from guide on inner panel. Remove assembly through access hole. To install, reverse removal procedure.



CONTINENTAL WINDOW CONTROL WIRING DIAGRAM

Ford (Victoria Quarter Window): Disconnect motor ground wire at circuit breaker on floor pah, and other motor wires at bullet connectors. Remove entire glass and regulator panel assembly from body, remove glass from panel. Remove arm link and bushing assemblies in order to disengage the regulator arm from the front track. Remove the four regulator attaching screws from outer side of panel, then remove regulator assembly from panel. To install, reverse removal procedure.

Lincoln (Front Windows) Disconnect battery ground. Remove door locking control rod knob and garnish moulding. Disconnect courtesy light wires at bullet connectors. Remove inside door handle, escutcheon plate, screw attaching arm rest to inner panel bracket, trim panel. Remove access hole cover plate, window glass stop bracket with stop attached, two spring type retainers that connect glass channel rollers to window regulator arms, remove rollers. Raise window to full up position and tape glass securely with masking tape to door glass channel and frame assembly. *(NOTE* - On models without channel and frame assembly, use a rubber wedge to hold window glass in up position). Remove four capscrews that secure regulator assembly to inner door panel. Disconnect motor-to-relay wires at bullet connectors, remove window regulator assembly. To install, reverse removal procedure.

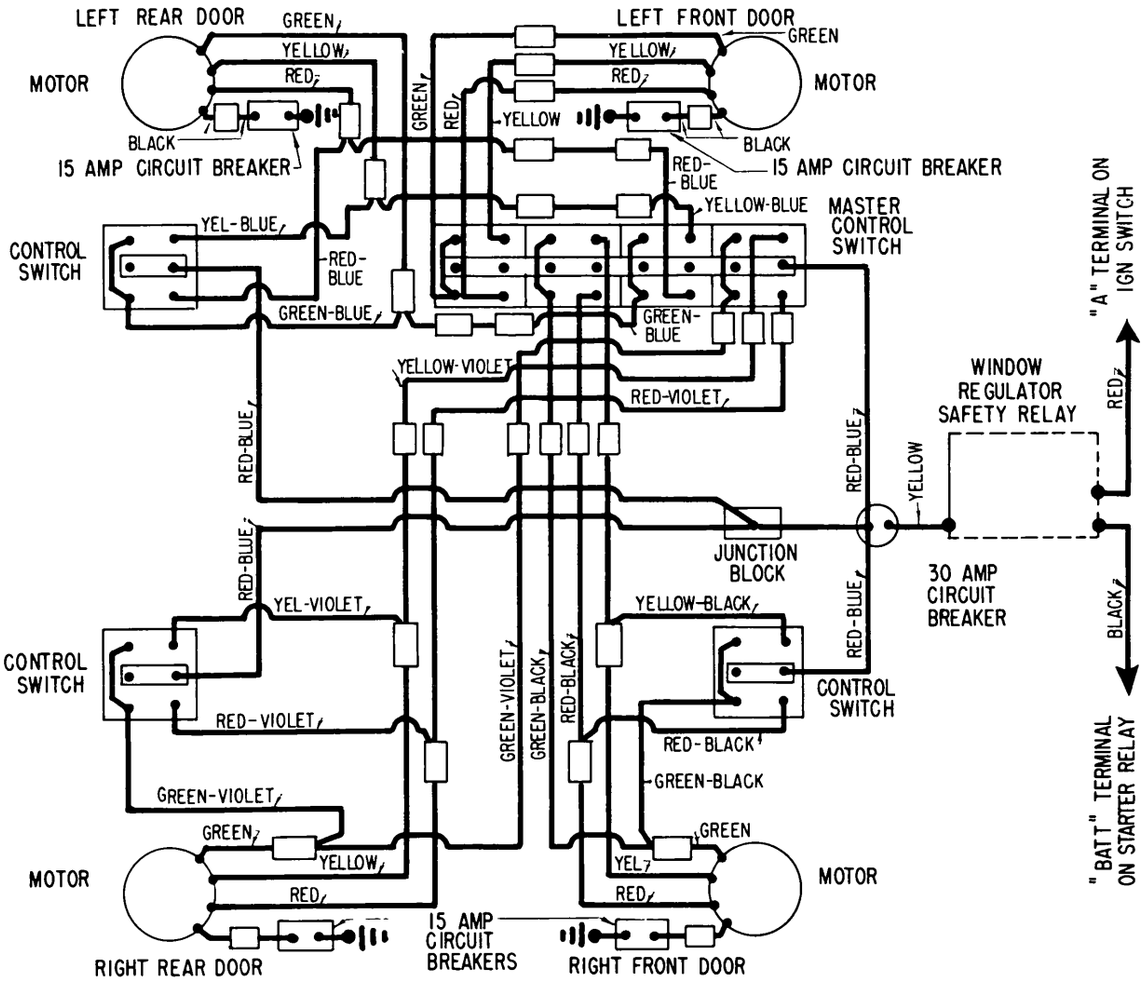
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FORD, LINCOLN, MERCURY (C ntinu d)

Lincoln (Rear Windows): Lower window to full down position. Disconnect battery ground. Remove door locking control rob knob and garnish moulding, inside door handle, and screw attaching arm rest to inner panel bracket. Pry off trim panel. Disconnect window switch wires from switch. Remove access hole cover plate and window glass stop. Remove two spring type retainers that connect glass channel rollers to window regulator arms, remove rollers. Raise window to full up position and tape glass securely with masking tape to door glass channel and frame assembly. Remove four capscrews that secure regulator to inner door panel. Disconnect wires from motor to relay at bullet connectors. Remove window regulator assembly. To install, reverse removal procedure.

Lincoln (Quarter Windows): Lower quarter window to full down position. Disconnect battery ground. Remove rear seat cushion and rear seat back cushion. Remove sheet metal screws that secure trim panel to quarter panel and remove trim panel. Disconnect wires at bullet connectors from window switch and cigar lighter ground. Remove positive wire from cigar lighter. Remove quarter trim water shield. Disconnect wires from motor to relay at bullet connectors. Remove seven capscrews securing quarter window and panel assembly to quarter panel. Move quarter window and panel assembly to rear and lift front end upward to remove. Remove two nuts securing window glass to glass channel rollers. Remove window glass. Remove four capscrews securing window regulator assembly to regulator panel assembly, remove window regulator assembly. To install, reverse removal procedure.

Mercury (Front Windows): Disconnect battery ground. Remove door locking control rod knob and garnish moulding. Remove inside door handle, door handle escutcheon plate, screws attaching arm rest to inner panel. Remove trim panel from door. Remove wires from switch. Remove vinyl shield, window glass stop, two spring type retainers that connect glass channel rollers to regulator arms, remove rollers. Raise window to full up position and tape glass securely with masking tape to door glass channel and frame assembly. *(NOTE* - Cn models without channel and frame assembly, use a rubber wedge to hold window glass in up position). Remove four capscrews that secure regulator assembly. Disconnect wires from motor to relay at bullet connectors. Remove motor support bracket and relay from inner door panel. Remove regulator assembly through access hole. To install, reverse removal procedure.



FORD WINDOW CONTROL WIRING DIAGRAM

Mercury (Rear Windows): Lower window to full down position. Disconnect battery ground. Remove door locking control rod knob and garnish moulding, inside door handle, and arm rest to inner panel attaching screws. Pry off trim panel. Disconnect window switch wires from switch. Remove vinyl shield and window glass stop. Remove two spring type retainers that connect glass channel rollers to window regulator arms, remove rollers. Raise window to full up position and tape glass securely with masking tape to door glass channel and frame assembly. Remove three capscrews that secure regulator assembly to inner door panel. Disconnect wires from motor to relay at bullet connectors. Remove regulator assembly through access hole. To install, reverse removal procedure.

Mercury (Quarter Windows): Lower window to full down position. Disconnect battery ground. Remove rear cushion and rear seat back cushion. Remove sheet metal screws that secure window garnish moulding, remove moulding. Remove sheet metal screws that secure trim panel to quarter panel and remove trim panel. Disconnect wires at bullet connectors from window switch. Remove vinyl shield. Disconnect wires from motor to relay at bullet connectors. Remove capscrews securing quarter window and regulator panel assembly to quarter panel. Move quarter window and regulator panel assembly to rear and lift front end upward to remove. Remove two nuts securing window glass to glass

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY (C ntinu d)

channel rollers, remove window glass. Remove four capscrews securing window regulator assembly to regulator panel assembly and remove window regulator assembly. To install, reverse removal procedure.

TROUBLE SHOOTING: *See "Ford, Lincoln, Mercury" in 1955 Annual Data or later Manual edition.*

SERVICE PARTS: Replacement electrical units as follows:

Wind w Lift Motor

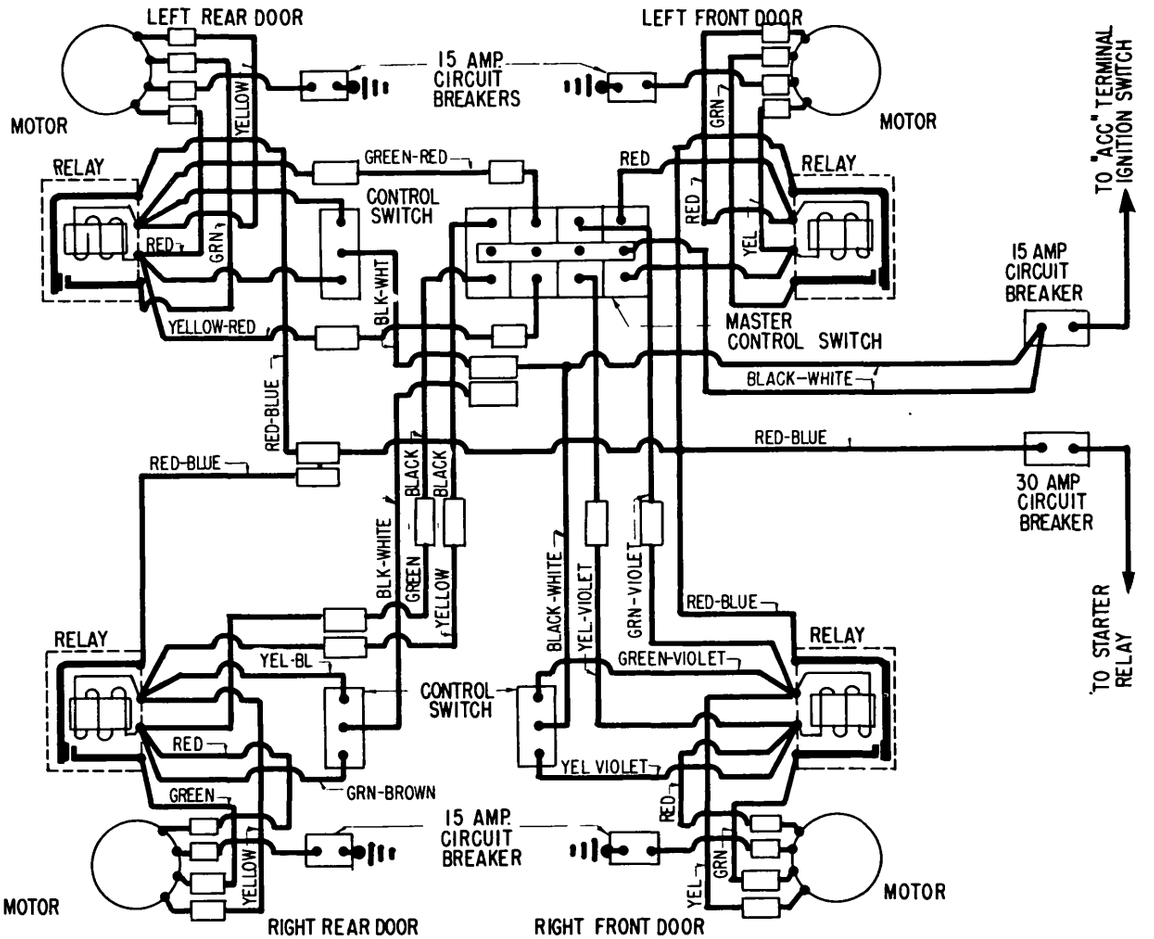
	Part No.
Mercury	FDT-14553-A
Except Mercury	B6A-14553-A

Wind w Contr l Switches

Continental (Single)	4047664, 4047442
Ford (Single)	B5A, B6A-14529-A
Lincold (Single)	FDU-14529-B
Mercury (Single)	B6A-14529-A
Thunderbird (Single)	FAA, B5A, B6A-14529-A
Continental (Multiple)	4048110, 4048111
Ford (Multiple)	B5A-14540-A, B5A-14545-A
Lincoln (Multiple)	FDU-14540-A
Mercury (Multiple)	B5A-14540-A, B5A-14545-A
Thunderbird (Multiple)	B5A-14540-A, B5A-14545-A

Wind w C ntr l Relay

All	B6A-14512-A



LINCOLN & MERCURY WINDOW CONTROL WIRING DIAGRAM

Buick (1956)
Cadillac (1956)
Chevrolet (1956)
Oldsmobile (1956)
Pontiac (1956)

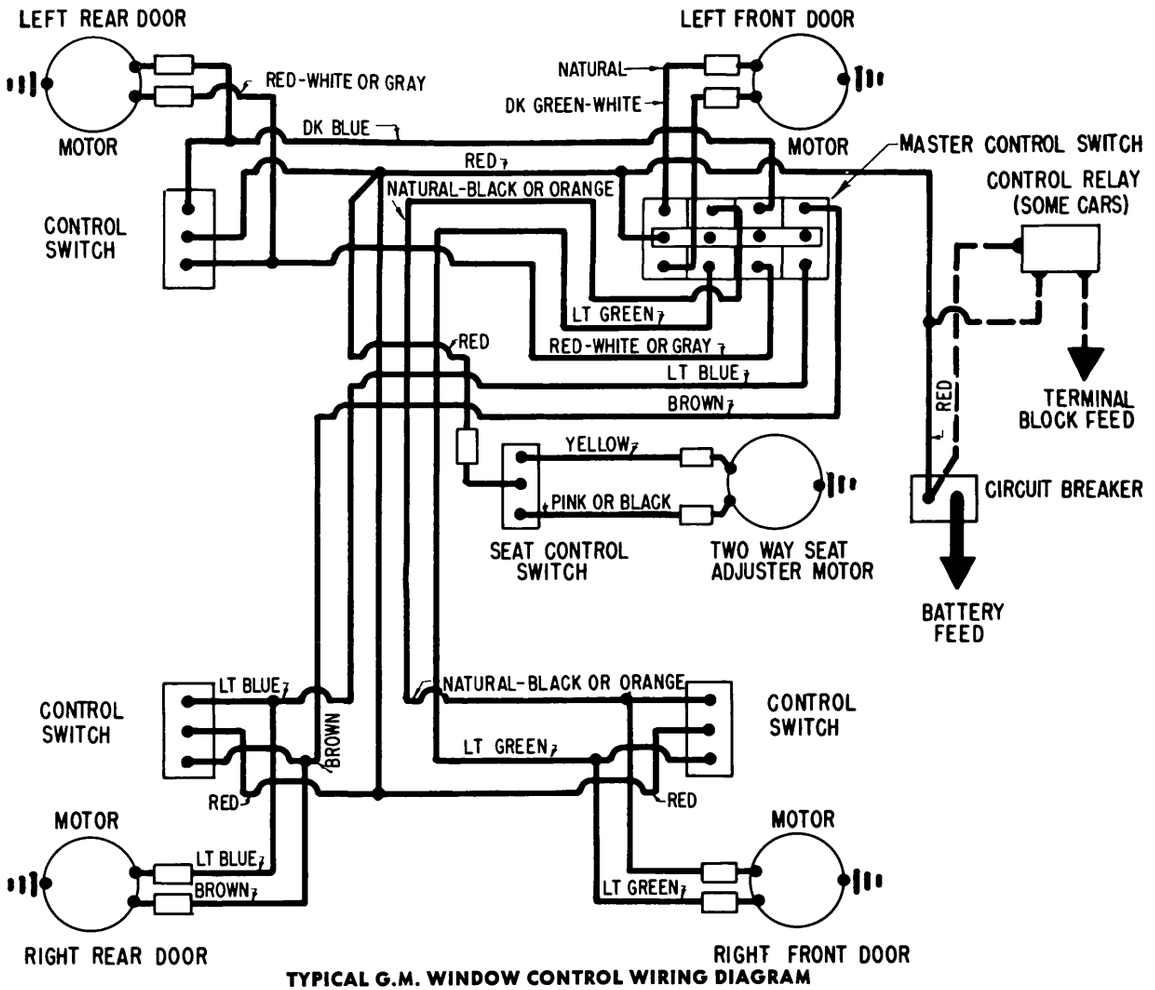
DESCRIPTION: Similar in design and operation to those used on previous models.

FRONT DOOR WINDOW REGULATOR REMOVAL: Lower window, remove door trim pad (and heater duct on some cars), access hole covers, and tape that covers access hole. Disconnect motor leads from wiring harness. Remove screws securing window assembly to regulator cam. *(NOTE - On most models it will be necessary to remove window assembly. On others, after disengaging window assembly from regulator cam channel, glass can be propped up in position). (CAUTION - After window regulator assembly is disengaged from regulator DO NOT OPERATE REGULATOR MOTOR).* Remove ventilator division channel lower adjusting stud and nut. Remove stationary cam attaching screw and cam. Disengage cam from regulator and remove from door. Remove regulator attaching screws and remove regulator from door. To install, reverse removal procedures. Seal inner door panel. *NOTE* - Regulator lift arm should be in the "down" position when installing regulator.

REAR DOOR WINDOW REGULATOR REMOVAL: Lower window, remove door trim assembly and inner panel access hole cover. Insert a screwdriver through access hole which is located in inner panel forward of large inner panel access hole, and carefully spread spring clip on regulator balance arm. At same time insert another screw-driver behind upper edge at front of large inner panel access hole and carefully pry regulator balance arm from window frame pin. Through access hole located above and slightly to the rear of the center of the large inner panel access hole remove window sash channel upper screw, then remove lower screw. Detach cam from regulator lift arm and remove from door. *(CAUTION - After window regulator assembly is disengaged from regulator DO NOT OPERATE REGULATOR MOTOR).* Lift window to up position, engage female wedge plate with male wedge plate (located on hinge pillar), then prop rear of window in up position Remove inner panel cam screws, detach cam from regulator balance arm and remove from door. Loosen center guide shoe jam nut, unscrew guide shoe from support and remove shoe from guide Swing center guide upward to provide clearance for removing regulator. Detach regulator motor lead wires, and regulator attaching screws. Position regulator balance arms in line with lift arm to facilitate removal of regulator through access hole. To install, reverse removal procedures. Make sure regulator balance arm spring clip is properly installed on balance arm

REAR QUARTER WINDOW REGULATOR REMOVAL: Remove rear quarter window *(CAUTION - After window regulator assembly is disengaged from regulator DO NOT OPERATE REGULATOR MOTOR).* Disconnect motor leads from wire harness, remove regulator attaching screws Remove regulator and motor assembly through access hole. To install, reverse removal procedure. Apply medium-bodied sealer around attaching holes on quarter inner panel side of regulator.

G.M. ELECTRIC



TYPICAL G.M. WINDOW CONTROL WIRING DIAGRAM

REGULATOR MOTOR REMOVAL (WITH REGULATOR ASSEMBLY REMOVED FROM CAR): *(CAUTION - The regulator arm which is under tension from the counter-balance spring can cause serious injury if motor assembly is removed without locking sector in position).* Clamp regulator assembly securely in a vise so that arm is free and motor is in an upward position. Drill a ¼" hole through regulator backplate and sector at a point which will miss motor housing and teeth in sector (Not closer than ¾" on front doors, nor closer than ½" on rear doors to edge of backplate or sector). Insert a 3/16" bolt through holes in backplate and sector and install nut to bolt (DO NOT TIGHTEN BOLT). Remove three motor attaching bolts, remove motor assembly from regulator. To install, reverse removal procedure. Regulator motor rubber pad should be cemented to inner panel side of motor. Be sure to remove temporary nut and bolt after motor is installed

► *NOTE: Motor is a sealed unit and is serviced only as an assembly and should not be disassembled.*

DOOR SWITCH ASSEMBLY REMOVAL: Remove garnish or belt finishing molding and door inside handles Disconnect terminal block with attached wires from switch assembly by carefully pulling block to disengage it from switch studs. With a suitable tool, pry open the retaining tabs at each end of switch and remove complete switch assembly from trim pad Remove switch from escutcheon by depressing the four tabs with a sharp pointed tool inserted through holes in end of escutcheon and prying them free.

QUARTER WINDOW SWITCH ASSEMBLY REMOVAL: Remove garnish molding and pull trim panel out slightly, then proceed as outlined for "Door Switch Assembly Removal" above.

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G.M. ELECTRIC (C nt.)

TROUBLE SHOOTING (ELECTRICAL):

Window Will Not Operate From Immediate Control Switch, But Will Operate From Master Control Switch: Check as follows
1) Feed wire to immediate switch
2) Immediate control switch
3) Motor leads from intermediate switch to motor

Window Will Not Operate From Master Switch But Will Operate From Intermediate Switch: Check as follows
1) Operation of master switch
2) Motor leads from master switch to motor

Window Will Not Operate From Intermediate Nor Master Switch. Operation of Other Windows Is Satisfactory: Check as follows
1) Operation of intermediate and master switches
2) Motor leads from each switch to motor
3) Operation of motor.

Windows Will Not Operate From Master Switch But Will Operate From Intermediate Switches: Check as follows
1) Feed wire from circuit breaker to master switch
2) Operation of master switch.

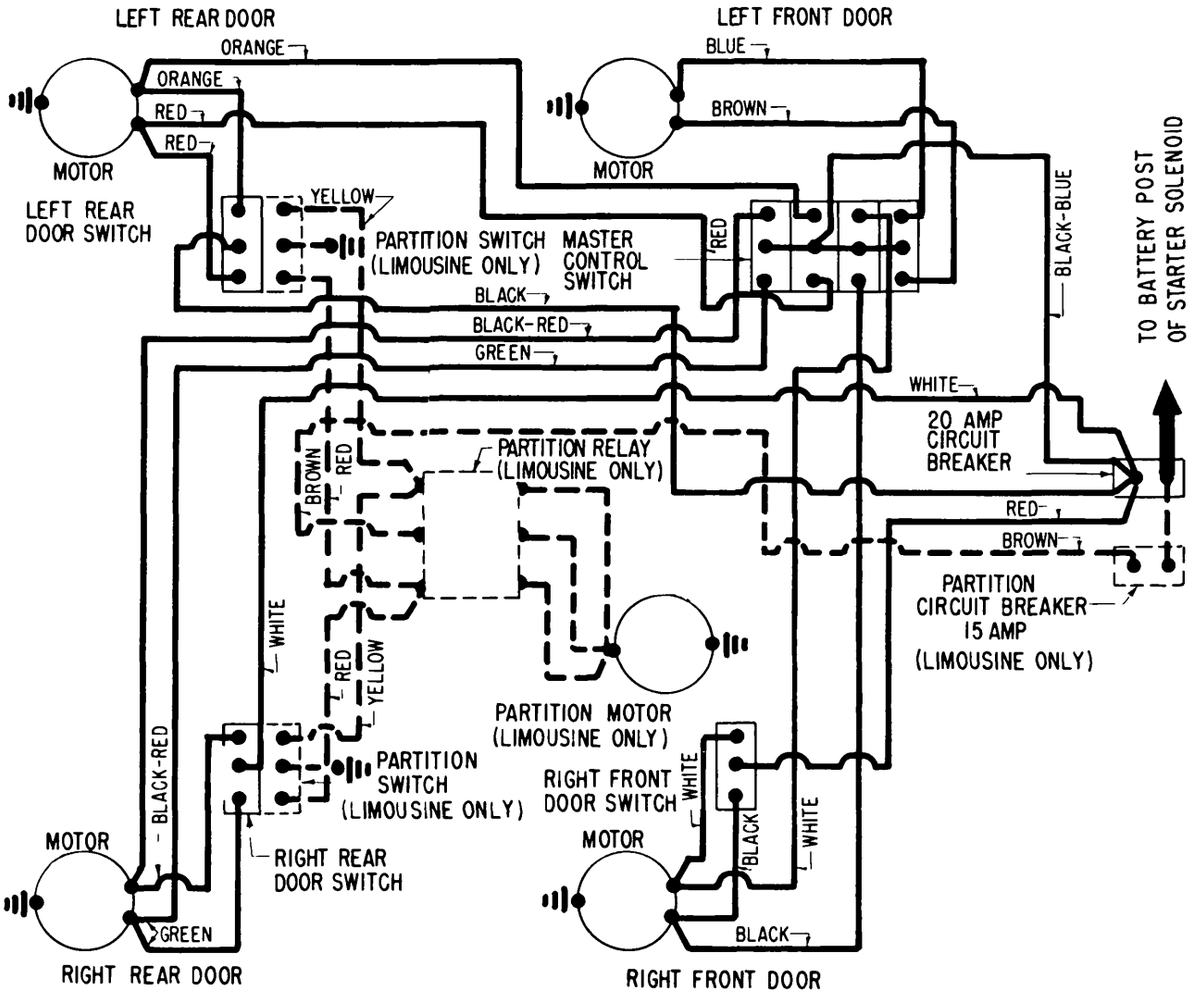
Windows Will Not Operate: Check as follows
1) Battery
2) Circuit from battery to circuit breaker.
3) Circuit breaker.
4) Feed wire from circuit breaker to switches
5) Operation of all switches

TROUBLE SHOOTING (MECHANICAL) & CORRECTIVE MEASURES: Diagnose trouble and correct as follows

Evidence of Pinion Gear Overtravel on Sector Gear: If check of regulator assembly reveals that motor pinion gear jammed at end of regulator sector gear, extra teeth may be filed at end of sector gear *CAUTION*—It is important that extra teeth conform to rest of teeth to prevent recurrence of condition Carefully check added teeth for proper fit with pinion gear teeth

Extreme Sideplay of Sector Gear: If backplate or side of sector gear next to backplate shows that surfaces are contacting on any portion of travel of sector gear, assembly should be replaced (paint will be scraped off at areas of contact)

Lift Arm Pins Too Loose: If any of the lift pins (studs which retain nylon roller to regulator assembly) are loose, they should be tightened to prevent pins from falling off and disengaging window from regulator during operation Tighten by using normal riveting procedure If they cannot be tightened satisfactorily, replace regulator



CHRYSLER, DESOTO, DODGE, PLYMOUTH WINDOW CONTROL WIRING DIAGRAM

Nylon Rollers Binding in Channels: If rollers do not slide easily in their channels, greater clearance can be obtained by filing edge of channel or aligning channel to roller with pliers

Bent or Distorted Regulator Backplate: Replace regulator assembly

Lubrication: If operation noisy due to lack of lubrication between coils of counter-balance spring, lubricate between coils with a graphite grease Lubricate all studs with a medium grade oil

SERVICE PARTS: **Window Lift Motor** - No 4900218 or 4900219
Relay - (Oldsmobile & Buick) No. 1116895.

Chrysler & Imperial (1956)
DeSoto (1956)
Dodge (1956)
Packard (1956)
Plymouth (1956)
Studebaker (1956)

DESCRIPTION: Similar in design and operation to type used on previous models except that relays are no longer used on door windows but are used on some models in conjunction with partition and rear quarter windows.

REMOVAL & INSTALLATION: Proceed as follows:

Window Lift Motor (Except Studebaker): Remove door handle, escutcheon plate, garnish molding, arm rest and trim panel. Disconnect wires from motor. Remove attaching nuts that hold motor to gear box, pull motor down and away from drive shaft. To reinstall, reverse removal procedure.

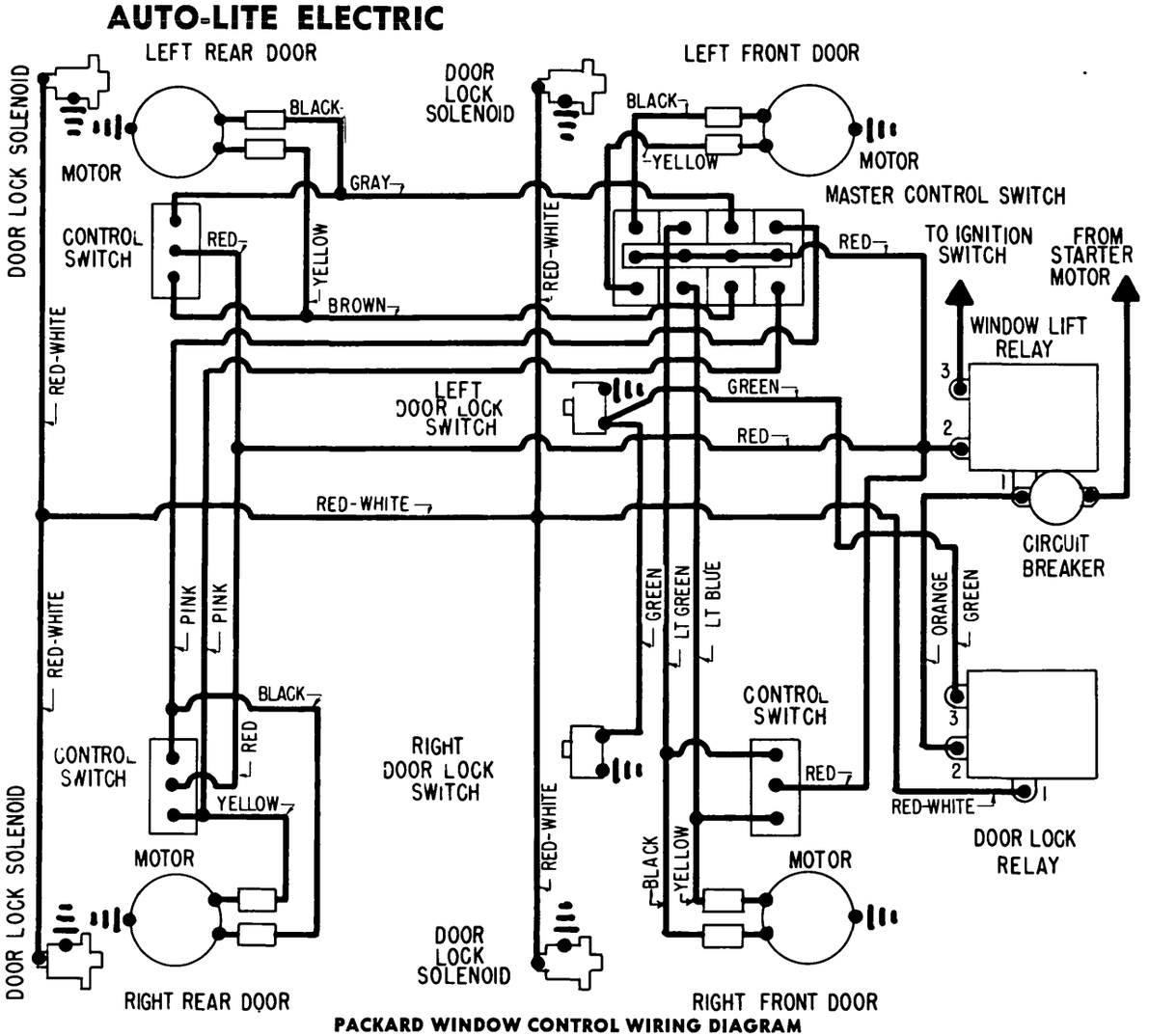
Studebaker–Remove regulator assembly (see below). Remove motor-to-regulator bracket capscrews. Slip motor off bracket and disengage motor shaft from coupling. To install, make sure coupling fully engages gear shaft. Then align motor shaft and coupling, slip motor into position. Install retaining capscrews. Install regulator (see below).

Window Lift Assembly (Except Studebaker): Removal– Disconnect battery, remove garnish molding, door handle and escutcheon plate. Remove arm rest and window lift control switch, then door trim panel. Remove wires from motor. Remove clips from regulator pins holding lower glass channel. Raise glass manually and prop the glass. Raise glass before loosening capscrews so that it is out of working area. Remove four regulator-to-door attaching screws. Remove pivot guide retaining pin. Lower motor and regulator assembly out through opening in door.

►*CAUTION:* If gear box is to be replaced, remove regulator counter balance spring before removing. Counter balance spring has 220° of wrap. Use large pliers when removing. Failure to remove spring before disassembly can result in personal injury.

Installation–Place motor and regulator assembly through opening in door, insert intermediate pivot arm pin into guide inside door shell **(there is no clip)**. Install four regulator attaching screws finger tight. *(NOTE*–After regulator screws installed, check to see that intermediate pivot arm did not slip out of guide during installation). Remove window prop, lower window and insert control arms into glass channel, using leather washer on each side of channel, secure with clip. Connect motor wires and battery cable, operate window up and down several times to help align glass in channel. Stop window half way and tighten regulator attaching screws. Check glass for alignment. Replace trim panel and other parts in reverse order of removal.

Wind w Lift Ass mbly (Stud bak r): R m val–Raise window, remove door handle and arm rest. Remove trim panel, disconnect wires from switch, then remove trim strip from door. Remove sealing tape from inspection holes and tape edges of large inspection hole with masking or friction tape. Remove window stop bracket bolts, turn bracket as required and remove from door. Remove relay bolts, and remove relay, leaving wires attached. If window is in up position, turn ignition switch on and lower window by holding ground wire to dark green wire at relay terminal. Lower window just enough to expose regulator arms and window lift channel. Turn ignition switch off. On all doors, except President Classic rear doors, remove hairpin clip and plain washer from each regulator arm guide pin, then disengage lift channel from guide pins. Lift glass all the way manually and insert a punch or small screwdriver through one of trim strip retainer holes to hold glass in up position. On the President Classic rear door, remove ventilator assembly. Remove window glass from door to provide clearance within door for regulator removal. Disconnect motor-to-relay wires at relay, remove relay. Loosen idler track rear screw just enough to keep it snug. With a hand inside door, hold idler track or end of regulator arm. *(NOTE*–Because regulator arm which engages idler track is springloaded make certain idler track or end of regulator arm is well supported). Remove idler track front screw and carefully lower arm and track until pivot point can be seen through access hole. Then, while holding end of track, remove track rear screw and lower track until it rests against regulator sector. Remove four regulator-to-door panel screws and lower regulator. Then, by revolving drive coupling, move sector to provide clearance required to permit tipping regulator for removal. On front door regulator, move sector to approximately the center



PACKARD WINDOW CONTROL WIRING DIAGRAM

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AUTO-LITE ELECTRIC (C nt.)

position. Shift regulator assembly forward on all doors except President Classic rear door (to rear). Keep the motor end down. Turn and tip assembly and start regulator arms out through inspection hole Continue to turn and, at same time, lower ends of regulator arms and lift assembly out of door

Installati n—Apply Lubriplate or high melting point grease to sector gears, idler track, arm guide pins, and balance spring Place sector in approximately same position as for removal (center position for front doors 1/3 of its travel from down position for rear doors) Insert motor end through inspection hole Keep ends of regulator arms down, move assembly into door As mounting bracket clears edge of inspection hole lower motor and move assembly forward (rearward on rear door of President Classic). Turn assembly, insert regulator arms in door. On front door, be sure sector clears window front guide channel Sector must be positioned between guide channel and door inner panel Position regulator on door panel and install retaining capscrews Swing idler track into position with arms nearly vertical but with front track screw clear, install but do not tighten front track screw Lift idler track using front screw as a pivot align the bracket with hole in panel install track rear screw Tighten both front and rear track screws securely Connect motor wires to relay Turn ignition switch on and lower sector and regulator arms by touching ground wire to dark green wire relay terminal. On President Classic rear door, place glass in door. Install rear ventilator frame assembly. On all models (exc. President Classic) remove screwdriver and lower glass carefully Engage lift channel with regulator guide pins and install plain washers and retaining clips Hold ground wire on upper terminal of relay and raise window Position window stop bracket within door and install retaining bolts Loosen bolts and move stop and bumper down Lower glass until top of glass is flush with bottom of window opening on all front doors and approximately 2" above bottom of opening on rear door of 4-Door models Then raise stop until stop bumper contacts lift channel, tighten bolts Make sure all connections on relay are tight and install relay within door Install door panel trim strip, connect wires to switch in trim panel, and install trim panel

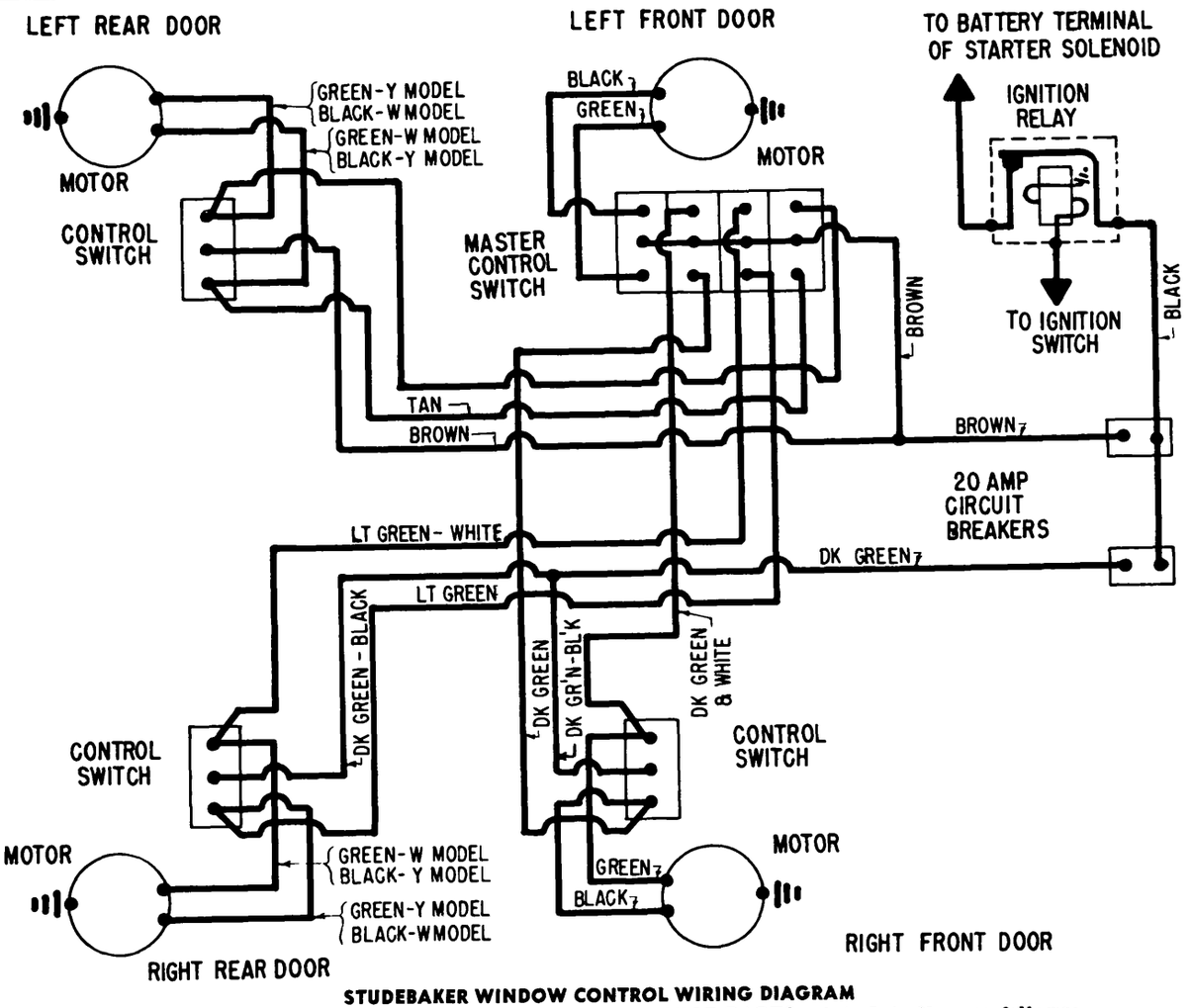
OPERATIONAL TEST: Connect ammeter in electrical circuit and operate window Ammeter reading should be constant and without fluctuation If reading fluctuates, there is a bind in either glass or linkage

TROUBLE SHOOTING: Diagnose trouble as follows

All Windows Inop rativ : Loose connection or break in wires from power source, defective ignition switch relay (Studebaker), all circuit breakers defective.

Both Right Windows or Both Left Windows Inoperative (Studebaker 4-D or Models), B th Front Windows Or Both R ar Windows In perative (Oth rs): Faulty circuit breaker or circuit breaker wire

On Window Inoperative: Faulty relay (if so equipped) or operating switch, bind in regulator linkage or window glass, motor burned out



STUDEBAKER WINDOW CONTROL WIRING DIAGRAM

Window Operable In One Direction Only: Faulty relay (if so equipped) or operating switch, broken wire or loose connection, faulty motor

Window Operates In Wrong Direction From Master Or Door Switch: Field wires from motor reversed at relay (if so equipped)

Window Operates In Wrong Direction From Either Master Or Door Switch, Correctly From Other Switch: Operating wires reversed at switch

Window Operates From One Switch Only: Defective switch, broken or grounded wire or loose connection

Circuit Breaker Cuts In & Out Continuously—Window Will N t Operate: Grounded wires, relay (if so equipped) points stuck, faulty switch

Window Operat s Sluggishly Or Circuit Breaker Cuts In & Out When Window Is Operated: Bind in regulator assembly or window channel, broken wire, loose connection, or partial ground, defective motor

SERVICE PARTS: Auto-Lite Nos. as follows·

WINDOW LIFT MOTOR

Chrysler & Imperial, DeSoto, Dodge, Plymouth

Left Front Door (All)	EPJ-4002
Right Front Door (All)	EPJ-4001
Left Rear Door (Exc. Hardtop)	EPJ-4002
Left Rear Door (Hardtop)	EPK-4003
Right Rear Door (Exc. Hardtop)	EPJ-4001
Right Rear Door (Hardtop)	EPK-4002
Quarters (Exc. Dodge & Plymouth)	EPJ-4003
Left Qtr., Club Coupe (Dodge & Plymouth)	EPJ-4001
Left Qtr., Spec. Coupe (Dodge & Plymouth)	EPJ-4003
Left Qtr., Conv. (Dodge & Plymouth)	EPJ-4003
Right Qtr., Club Coupe (Dodge & Plymouth)	EPJ-4002
Right Qtr., Spec. Coupe (Dodge & Plymouth)	EPJ-4003
Right Qtr., Conv. (Dodge & Plymouth)	EPJ-4003
Stud baker	
Front & Rear Doors	EPJ-4101

Hudson Hornet & Wasp (1956)
Nash Ambassador & Statesman (1956)

DESCRIPTION: Similar in design and operation to previous electric types except that relays are no longer used.

REMOVAL & INSTALLATION: *See "Hudson & Nash" in 1955 Annual Data or later Manual edition and note the following.*

Front Door Window Regulator: Ignition must be in "OFF" position. Remove door trim panel. Disconnect regulator arm from cross arm assembly by removing the key slotted retainer from grooved stud riveted in cross arm assembly. Move glass to fully raised position. Disconnect motor-to-switch wires. Remove regulator-to-door screws, then remove assembly through large opening in panel. Before reinstalling regulator, glass should be raised and lowered by hand to insure free operation. All cross arm and regulator moving parts should be lubricated with Lubriplate. Two spacers must be reinstalled between regulator and inner door panel at upper mounting bolts when installing regulator to panel. Move door glass down to align hole in end of regulator arm with stud on cross arm assembly. Install spring washer, then fiber washer to stud. Install arm on stud and fasten with the retainer.

Master Multiple Control Switch: Insert putty knife between switch ends and mounting plate to compress springs which will release switch. Before removing wire harness (single assembly), disconnect battery. *NOTE* - Shortest pair of wires are connected to forward terminals of switch. Red wires are connected to the center terminals with the shortest connected to the front center terminal and the remaining red wire to the rear center terminal.

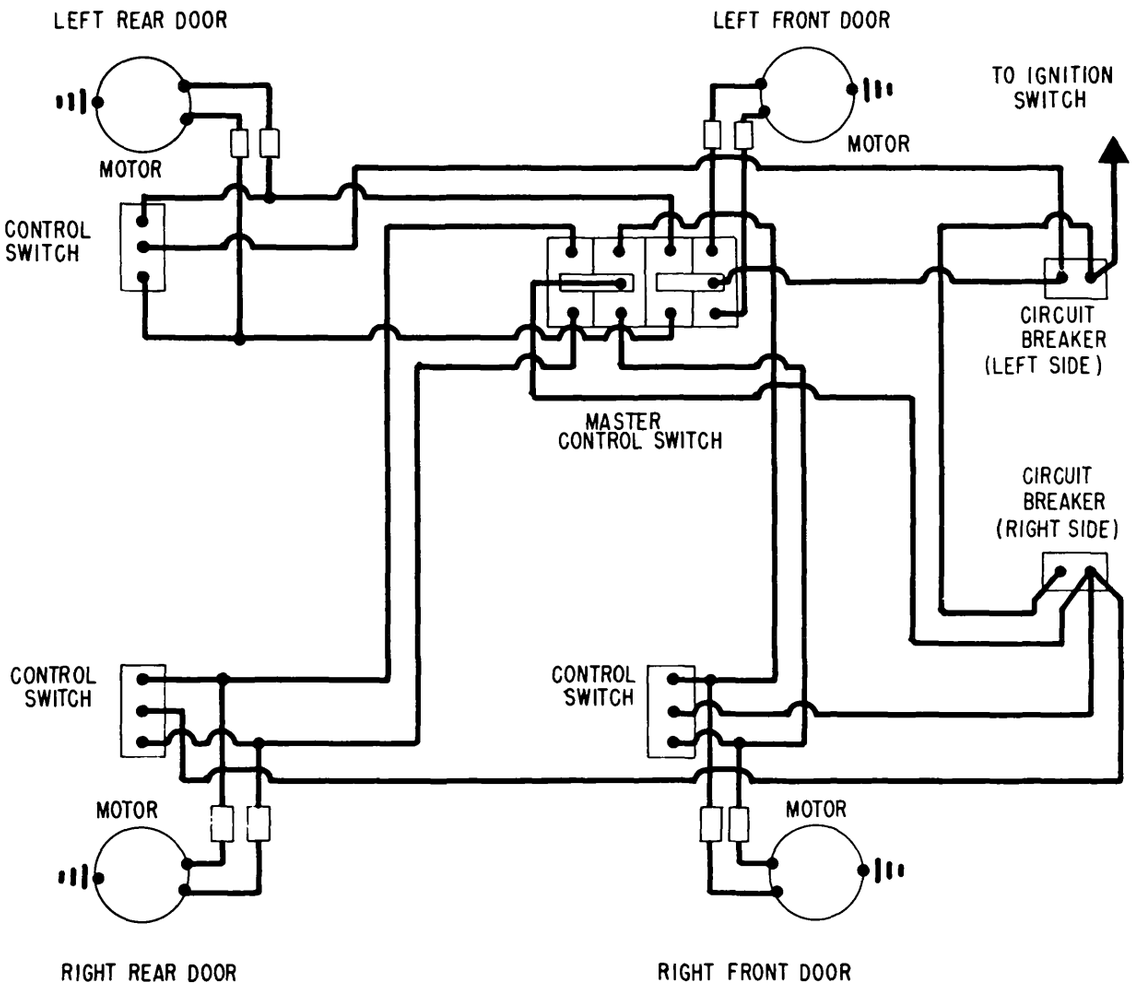
TROUBLE SHOOTING: All Windows Fail to Operate in Either Direction or Operate Slowly – Battery dead or too low to operate motor; circuit breaker inoperative; battery ground loose or terminal in control circuit loose or corroded.

One Window Fails to Operate: Motor loose in mounting causing poor ground; break in wire.

Windows Operate Intermittently on One Side of Car: Loose connections; defective circuit breaker.

SERVICE PARTS: Motor – No. 4477319 (Hudson), No. 4477318 (Nash).

HUDSON & NASH



HUDSON, & NASH WINDOW CONTROL WIRING DIAGRAM

FORD, LINCOLN, MERCURY

Contin ntal (1956)
Ford (1956)
Lincoln (1956)
Mercury (1956)
Thunderbird (1956)

► *LINCOLN SEAT SWITCH PRODUCTION CHANGE & INSTALLATION CAUTION:* New switch, Part No. FDU-14545-D, has been released for production and service. Switch is designed to provide positive positioning in the fore-aft and up-down positions, eliminating possibility of moving toggle into an intermediate dead spot causing intermittent operation. When installing switch, make sure seat trim panel is properly installed. Attaching bracket must be installed so that attaching wings angle downward, to avoid pinching fingers when the seat moves to the pull-up position. In event fore-aft or up-down of seat switch causes only clutch solenoid or motor to operate, check position of switch. Switch is properly positioned when flat on threaded shank of switch is parallel with flat of hole in seat cushion shield.

► *FOUR-WAY SEAT BINDING CORRECTION (FORD & MERCURY):* Check both sides of the horizontal equalizing bar gear for rough or raised areas; file smooth. Carefully remove any burrs on the equalizing bar bearing face. Adequately lubricate all moving parts and contact surfaces. Add ¼" flat washers between seat track and retainer.

DESCRIPTION: (Except Lincoln) - Similar in design and operation to previous electric types.

Lincoln - Single motor provides horizontal and vertical movement. The adjusters are operated by an actuator assembly consisting of a reversible motor (12 Volt), relay and a gear box and jackscrew. The regulator motor is controlled by a toggle type switch. Two spinning nut and solenoid assemblies, located on regulator jackscrew, transmit movement to the seat adjusters by means of a torque tube assembly and links. In each of the spinning nut assemblies is a free-wheeling spinning nut which is mounted in ball bearings and free-wheels with the jackscrew unless locked out of free-wheeling by the solenoid located on top of the spinning nut. When spinning nut is locked out of free-wheeling, spinning nut moves forward or rearward on jackscrew, thereby transmitting movement to seat adjusters by means of connecting links and torque tube assembly.

REMOVAL & INSTALLATION (Ford, Mercury, Thunderbird): *NOTE* - It is not necessary to remove seat assembly from car in order to replace either the horizontal or vertical regulator assembly, motor, or relay. These parts can be removed from behind and underneath front seat. To replace either seat frame or track assembly requires removal of entire power seat assembly from car.

Pow r Seat Assembly: Run seat to extreme forward position in order to expose Phillips head mounting screws at forward ends of upper tracks. Disconnect battery ground cable. At each regulator motor, disconnect motor ground wire at bullet connector and disconnect cable-to relay wires from relay. Remove front seat shields. Remove control switch from left hand shield. Loosen and remove seat track mounting bracket stud bolts and nuts from underside of floor pan. Remove seat track assembly (with seat frame attached). To install, reverse removal procedure.

Seat Tracks: With power seat assembly removed from car (see above) remove rolled pin attaching horizontal regulator jack to bracket on seat frame. At both right and left seat tracks, remove the Phillips head screw and stud nut attaching upper track to seat frame. Remove seat frame from track assembly. To install, reverse removal procedure.

Regulator Assemblies: When replacing horizontal regulator, remove left seat side shield, remove nut and bezel that retain control switch or switches to side shield and remove switch from shield. If vertical regulator is to be replaced, remove right seat side shield. Disconnect the assist spring (left for horizontal regulator, right for vertical regulator) using a stiff wire with loop on end. Hook loop of wire to rear loop of spring and pull spring back so as to disengage it from the arm and link assembly. Disconnect motor ground wire at bullet connector and disconnect cable-to-relay wires. Drive rolled attaching pin from each end of regulator assembly with a ¼"x12" drill rod. Remove regulator, motor, and relay as an assembly. To install, reverse removal procedure.

Relays: Remove regulator and motor assembly to which relay is attached. Disconnect motor-to-relay wires and remove relay from motor. To install, reverse removal procedure.

Motors: Remove regulator assembly to which motor is attached. Remove nuts that retain motor to regulator assembly, remove motor. Remove the rubber regulator drive coupling and relay from motor. To install, reverse removal procedure.

Regulator Shaft, Gear, or Housing Assembly: Remove regulator assembly from seat and remove motor and relay assembly from regulator. Place regulator assembly in a bench vise having soft jaws to retain the jackscrew. Remove regulator gear housing assembly. Remove shaft gear retaining nut from shaft. Place assembly in a press, and press shaft assembly from gear and housing assembly. Remove spacer assembly from shaft, and remove gear and key from housing. To install, reverse removal procedure.

SERVICE PART NUMBERS: As follows:

Seat Control Switch

Continental - 4047442. 4047664, or 4048110.
Ford - B5A-14545-A, B.
Lincoln - ED-FDU-14545-B; FDU-14545-D (Repl.)
Mercury - FDT-14545-A.
Thunderbird - B5A-14545-A.

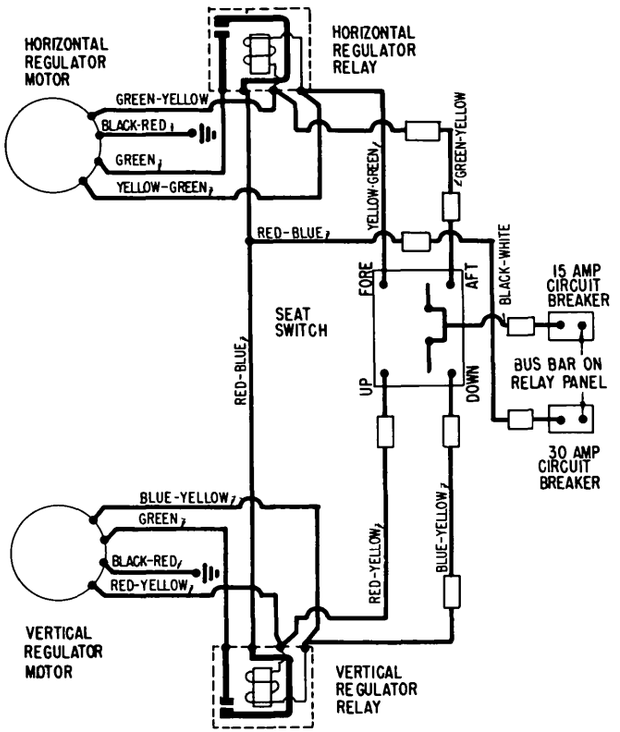
Seat Control Motor

Continental - FDT-14547-A (1 for each Horiz. & Vert.)
Ford - B6A-14547-B (1 for each Horiz. & Vert.)
Lincoln - ED-FDU-14547-D (1 only for Horiz. & Vert.)
Mercury - FDT-14547-A (Horiz.), FDT-14547-B (Vert.)
Thunderbird - B6A-14547-B (1 for each Horiz. & Vert.)

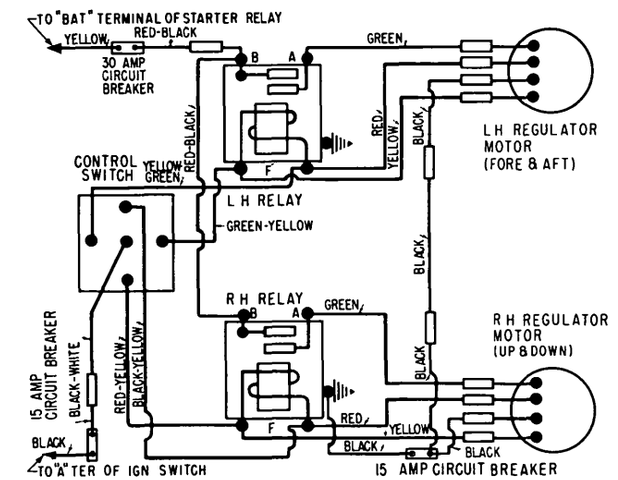
Seat Control Relay

Continental - B6A-14512-A ①.
Ford - B6A-14512-A.
Lincoln - ED-FDU-14546-B or B6A-14512-A ①.
Mercury - B6A-14512-A.
Thunderbird - B6A-14512-A.

① - Remove 45188-S8 Spring and reverse positions of adjacent terminals.



CONTINENTAL SEAT CONTROL WIRING DIAGRAM



F RD, LINC LN, MERCURY SEAT CONTROL WIRING DIAGRAM

Buick (1956)
Cadillac (1956)
Oldsmobile (1956)
Pontiac (1956)

► *CADILLAC SEAT "CHUCK" CORRECTION:* Remove left seat side panel. Remove outer rear hold-down bolt which is ¾" long. Add two .12" thick washers, Part No. 4588818, between floor pan and adjuster assembly. Replace old bolt with new 1¼" long bolt, Part No. 4676744. Correction is made on left seat adjuster assembly only.

► *ACTUATOR ROLL PIN INSTALLATION CAUTION:* When replacing an actuator spinning nut assembly or an actuator assembly (less spinning nuts) roll pins should be installed so that center of protruding portion of pin is located **between** threads of the jackscrew. If pin installed in center of a thread there is a possibility pin may shear or cause assembly to jam. When installing roll pins in jackscrew, install pin so that 1/16" of pin protrudes above jackscrew threads.

G.M. SIX-WAY SEAT CONTROL

DESCRIPTION: The new 6-Way Seat Adjusters provide horizontal and vertical movement, and forward and rearward tilt. The adjusters are operated by an actuator assembly consisting of a reversible motor (12 Volt), relay, and a gear box and jack screw. The regulator motor is controlled by single bar type or three button type type switch (see below) located on front seat left side panel. Three spinning nut-and-solenoid assemblies, located on regulator jackscrew, transmit movement to the seat adjusters by means of a torque tube assembly and links. In each of the spinning nut assemblies is a free-wheeling spinning nut which is mounted in ball bearings and free-wheels with the jackscrew unless locked out of free-wheeling by the solenoid located on top of the spinning nut. When spinning nut is locked out of free-wheeling, spinning nut assembly moves forward or rearward on jackscrew, thereby transmitting movement to seat adjusters by means of connecting links and torque tube assembly.

Single Bar Type Switch Operation: To move seat fore or aft, switch bar is moved fore or aft; to move front of seat up or down, move front of bar up or down; to move rear of seat up or down, move rear of bar up or down.

► *BAR TYPE SWITCH CAUTION:* To avoid damage to motor or solenoids, front and rear of switch bar should not be operated simultaneously in different directions - motor will not operate with switch in this position.

Three Button Switch Operation: To move front of seat up or down, move front button up or down; to move seat fore or aft, move center button fore or aft; to move rear of seat up or down, move rear button up or down.

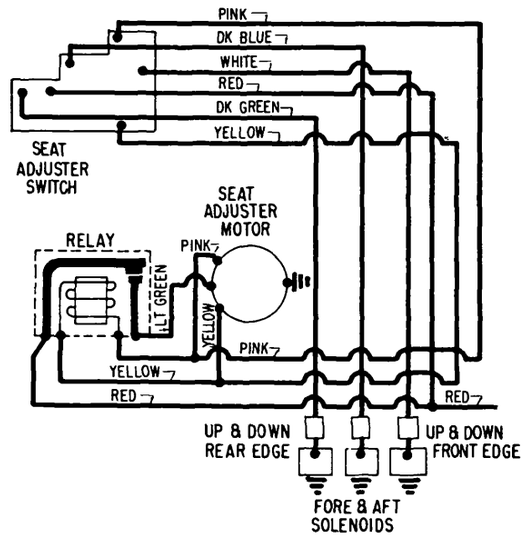
► *OLDSMOBILE SERIES 98 COUPE SEAT CONTROL NOTE:* In addition to control by bar type control switch, seat operates rearward when either door is opened, and forward when either of the seat backs is tilted forward. This feature effective only when ignition switch is "OFF".

REMOVAL & INSTALLATION: Front Seat Assembly (Including Seat Adjusters & Actuator Assembly): Operate seat to raised position. Under front of seat disconnect adjuster control wire harness from adjuster feed wire harness and detach control harness from clip on floor pan. Disconnect lighter feed wire (where applicable) and detach wire from clip on floor pan. On Cadillac, remove screws securing rear floor carpet to right and left adjusters. On all cars, remove seat adjuster to floor pan bolts, then with aid of helper lift seat assembly, with adjusters and actuator assembly attached, from body. To install, reverse removal procedure. Make sure ground wire is secured under seat adjuster floor pan bolt. When installing seat assembly to body, carefully align seat adjuster attaching holes with attaching holes in floor pan to avoid possible binding of seat adjuster linkages. Seat adjusters should be parallel when properly aligned. Check operation of seat to extreme limit of each position. On Oldsmobile 98 Coupes, check operation of automatic feature.

Front Seat Assembly (Less Seat Adjusters & Actuator Assembly): Operate seat to fully raised position and midway between full forward and rearward horizontal positions. Remove both right and left seat side panels. Under front of seat disconnect control wire harness from adjuster feed wire harness. Detach lighter feed wire and detach wire from clip on floor pan; remove ground wire from under seat adjuster bolt. At both adjusters remove front and rear seat adjuster-to-seat frame attaching bolts. Tilt seat assembly rearward and remove control wire harness from spring clips along front of seat bottom frame. With aid of helper carefully lift seat assembly (less seat adjusters and actuator assembly) from body. To install, reverse removal procedure. Make sure ground wire is secured under seat adjuster floor pan bolt. Check operation of seat to extreme limit in each position. On Oldsmobile 98 Coupes, check operation of automatic feature.

Front Seat Adjuster: Remove seat assembly including seat adjusters and actuator assembly (see above). Place seat assembly upside down on a covered bench. Remove seat side panel and counterbalance spring from adjuster being removed. Support torque tube assembly with board between torque tube and seat front and rear rails on side of seat from which adjuster is being removed. Remove cotter keys and washers securing adjuster links to torque tube assembly and cotter key and washer securing torque tube link to adjuster. Remove both front and rear seat adjuster-to-seat frame attaching bolts. Lift adjuster slightly, then carefully work adjuster outboard to disengage it from torque tube. Disengage link from adjuster. If removing right adjuster, remove cotter key and washer and disengage actuator assembly from support pin. To install, reverse removal procedure.

Adjuster Actuator Assembly: Operate seat midway between forward and rearward horizontal positions. Operate front of seat to up position and rear of seat midway between up and down positions. Remove seat assembly including seat adjusters and actuator assembly. Place assembly upside down on covered bench. Remove both right and left seat adjuster counterbalance springs. Check to see that all spinning nut attaching screws are accessible for removal. If screws not accessible, hook up control harness feed wire to power and ground seat frame; hook up control switch, then operate actuator to position spinning nuts so that all screws are accessible. Disconnect the three spinning nut solenoid feed wires at connectors. Disconnect control harness feed wires from motor relay. Remove anti-creep spring from center spinning nut. Remove shoulder screws securing spinning nuts to mounting supports. Remove cotter key and washer securing actuator to support pin. Raise spinning nut mounting supports to vertical position. Raise front of actuator sufficiently to allow unit to be removed from support pin, then remove actuator assembly from seat. To install, reverse removal procedure. Connect relay and solenoid wires.



G.M. SIX-WAY SEAT CONTROL WIRING DIAGRAM

Adjuster Actuator Spinning Nut Assembly (Including Solenoids): Remove seat adjuster actuator assembly (see above). Carefully drive roll pins out of jackscrew. Insert drift punch or suitable tool into spinning nut frame mounting hole, rotate spinning nut frame slowly until drift punch engages in locking nut of spinning nut, then unscrew complete spinning nut assembly from jackscrew. To install, reverse removal procedures. *CAUTION - See "Actuator Roll Pin Installation Caution" above.*

CONTINUED ON NEXT PAGE

G.M. SIX-WAY SEAT CONTROL (C ntinued)

Adjuster Actuat r Spinning Nut Solenoids: Remove seat assembly (less seat adjusters and actuator assembly). Disconnect solenoid feed wire at connector. Remove solenoid cover carefully bending down tabs at bottom of cap and pulling upward. Remove solenoid plunger, plunger shunt, and shunt spring. Remove nut and washer securing solenoid ground wire to spinning nut frame. Carefully push solenoid forward or rearward and remove from retainer on spinning nut assembly. To install, reverse removal procedure. Solenoid plunger should move up or down freely; if necessary, move solenoid slightly forward or rearward to allow free movement of plunger. Before installing seat assembly, hook up feed wire with control harness and check operation of solenoid.

C ntr l Switch: Remove switch and escutcheon assembly from seat side panel. Depress clips at sides of switch with pointed tool inserted through holes, remove clips. On button type switch, remove switch from switch escutcheon. Cn bartype switch, remove switch, insulating cover retaining plate, two (2) anti-rattle springs and actuating bar from switch escutcheon. To install, reverse removal procedures. Cn bar type switch, make sure springs are properly positioned when installing the actuating bar.

LUBRICATION: Jackscr w – Thoroughly wipe off old lubrication. Apply Lubriplate No. 630 AA-W (winter grade). Operate adjuster to all positions and to extreme limit. Wipe off excess lubricant.

TROUBLE SHOOTING: S at Adjuster Motor Does Not Op rate – Short or open circuit between power source and motor; defective motor.

Seat Adjuster M tor Op rates, But Seat Adjusters Are N t Actuat d: Short or open circuit between switch and affected solenoid; defective solenoid.

Seat Adjust r M t r Op rat s, Rear Edge of Seat Cannot b Adjust d (Oth r Op rations Normal): Short or open circuit between switch and affected solenoid.

Seat Adjust r M t r Op rat s, Front & Rear Edge of Seat M v Up & R arward, But Will Not Move Seat Down & F rward: Short or open circuit between one of motor field wires and seat control switch; defective field coil in motor.

Seat Adjust r M t r Op rat s, Front & Rear Edge of Seat M v Down & F rward, But Will Not Move Seat Up & R arward: Short or open circuit between one of motor field wires and seat control switch; defective field coil in motor.

SERVICE PARTS: Adjust r Actuat r Ass mbly (With Mot r, L ss Spinning Nuts & R lay) – No. 5047871.

R lay – (Exc. Oldsmobile) No. 4231339, (Oldsmobile) No. 1116876 (On floor), No. 5945189 (On cowl).

Control Switch – (Buick & Pontiac) No. 4683840, (Cadillac & Oldsmobile) No. 4683843.

Escutcheon – (Buick & Pontiac) No. 4683841, (Cadillac & Oldsmobile) No. 4683845.

Operating Bar (Cadillac & Oldsmobile) – No. 4683844.

Adjuster Assembly –	Right	Left
Buick 40, 60	4231554	4231555
Buick 50, 70	4231528	4231529
Cadillac	4231562	4231563
Oldsmobile	4231544	4231545
Pontiac	4231390	4231391

G.M. TWO-WAY SEAT CONTROL

Buick (1956)
Cadillac (1956)
Chevrolet (1956)
Oldsmobile (1956)

DESCRIPTION: Similar in design and operation to previous two-way electric types.

REMOVAL & INSTALLATION: Remove front seat side panels. Where applicable, disconnect lighter feed wire and remove wire from clips on floor pan. Remove seat adjuster-to-floor pan screws, disconnect terminal block and wire connectors from adjuster control switches, remove seat assembly from car. To install, reverse removal procedures.

OTHER DATA: *See "G. M. Window Regulators" for Two-way seat control wiring diagram. Note the following:*

Motor: (Buick & Cadillac) No. 5047858, (Chevrolet No. 4651467, (Oldsmobile) No. 5047861.

Control Switch: (Buick) No. 4641842, (Cadillac) No. 4683843, (Chevrolet) 4634122, (Oldsmobile) No. 4641904.

Adjuster Assembly:	Right	Left
Buick 50, 70	4666309	4666310
Buick 60	4671212	4671213
Cadillac 60	4682560	4682561
Cadillac 75	4631214	4631215
Chevrolet Pass.	4683743	4683744
Corvette (Inner)	3723416	(Inner) 3723422
(Outer)	3723415	(Outer) 3723421
Oldsmobile	4672166	4672167

TROUBLE SHOOTING: Horizontal Seat Regulator Will Not Operate, Electric Door Windows Operate – Mechanical stoppage of front seat assembly; defective feed wire between circuit breaker and seat adjuster switch; defective switch; defective wires between seat adjuster switch and seat adjuster motor leads; defective motor.

H riz ntal S at R gulat r & El ctric Door Wind ws D N t Op rat : Defective battery; defective circuit from battery to circuit breaker; defective circuit breaker; defective wire from circuit breaker to window and seat adjusting switches; defective switches.

AUTO-LITE ELECTRIC

Chrysler & Imperial (1956)
DeSoto, Dodge, Plymouth (1956)
Packard (1956)

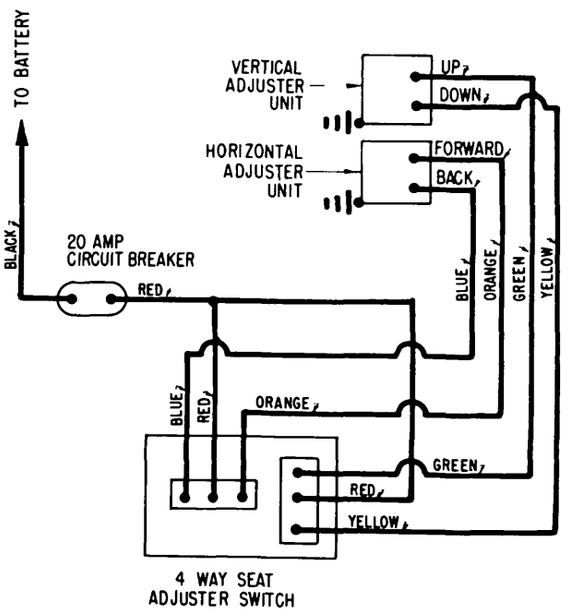
DESCRIPTION: Seat adjusting mechanism is electrically operated, using reversible type motors. Motors operate worm shaft and sleeve through a worm head. Fore-aft and up-down movements are controlled individually, each having a separate but similar system, including a switch, motor, and regulator.

REMOVAL & INSTALLATION: Proceed as follows:

Front Seat Assembly: Remove front cushion, disconnect battery. Disconnect seat adjuster control wires. Remove floor pan-to-seat guide attaching capscrews, remove guide from seat assembly. To install, reverse removal procedure.

Left Seat Guide & Vertical Power Unit: Remove front seat cushion. Disconnect battery and seat adjuster control wires to motor (*CAUTION* - To facilitate removal of vertical bar clevis pin, the front seat assembly should be elevated to highest position of travel and blocked before attempting removal of pin). Remove vertical bar pins attaching vertical power unit shaft and sleeve to front seat frame. Remove power link pin, floor pan-to-seat guide attaching capscrews and guide from seat assembly. To reinstall, adjust power unit to the two pins (adjustment made by turning unit coupling). Install rear of unit on rear pin and secure. Raise seat manually, install front end of unit into torque bar, attach clevis pin, and secure(*NOTE*–Length

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CHRYSLER & DESOTO 4-WAY SEAT CONTROL

AUTO-LITE ELECTRIC (C nt.)

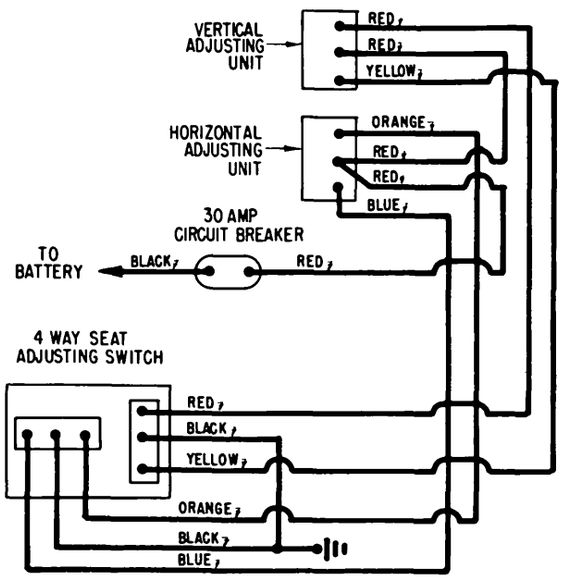
of unit may be varied by turning coupling manually) Reinstall wires and reconnect battery Check operation of seat and replace seat cushion

H rizontal Power Unit & Shaft Assembly: Remove front seat cushion, disconnect battery and seat adjuster wires to motor. Remove power unit retaining snap rings and the horizontal power unit assembly *NOTE* - To facilitate removal of horizontal bar clevis pins, lower seat to lowest point before attempting to remove unit To reinstall, reverse removal procedure.

S at Tracks: Remove jack assemblies and the two rear and front retaining bolts that hold seat track to floor pan Slide seat track outward, causing it to disengage from two horizontal torque rods When removing right track, it will be necessary to disengage one connecting link from a pivot pin. To reinstall, engage torque rods in track assembly Install rear seat track retaining screws, but do not tighten Install jacks, operate seat in all directions to properly align seat tracks and torque rods. Tighten front seat track retaining screws, raise seat, and tighten rear seat track retaining screws

NOTE–Do not lubricate vertical power unit shaft ball and nut.

SERVICE PART NOS· Motor - (Chrysler, DeSoto, Dodge, Plymouth) Auto-Lite No EPK-4001 *NOTE* - Horizontal & Vertical Motors are the same



DODGE 4-WAY SEAT CONTROL

STUDEBAKER SEAT CONTROL

Studebaker (1956)

DESCRIPTION: Seat adjusting mechanism is electrically operated, using reversible type motor which turns screw jack. Control of system is through a switch and relay. Seat adjuster provides fore-and-aft movement.

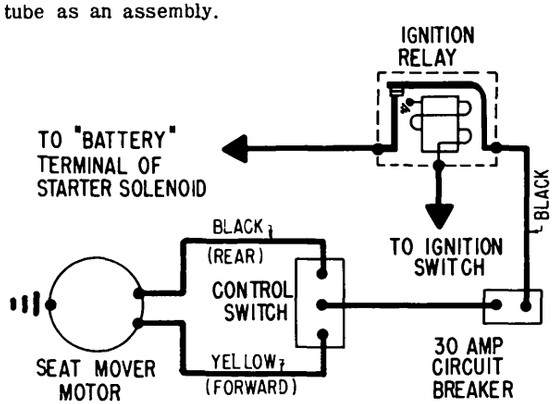
REMOVAL : Proceed as follows:

Torque Tube Assembly: Remove seat cushion. Remove cotter pins and take out clevis pins connecting torque tube arms with torque tube links. Remove torque tube clamps and remove torque tube.

Motor: Remove seat cushion and two motor operating wires at switch Remove motor-to-adjuster bracket nuts and ground wire. Remove motor by sliding it out of adjuster bracket and flexible connector.

Seat Track: Remove seat cushion. Take out shoulder bolt fastening torque tube link to seat track support. Remove capscrews and washers holding seat track to floor pan. Support seat frame on wooden blocks, take out two seat frame-to-seat track screws, remove track.

Seat Frame: Remove seat cushion. Remove cotter pins and take out clevis pins connecting torque tube arms to torque tube links. Take out frame-to-seat track capscrews and flat washers, remove seat frame and torque tube as an assembly.



STUDEBAKER SEAT CONTROL

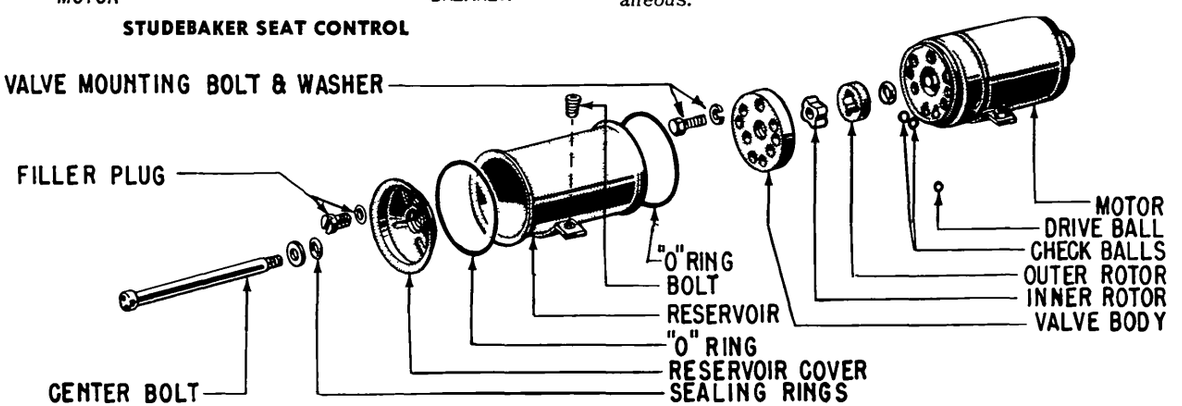
SERVICE PARTS: Mot r–Studebaker No. 310448.
Relay (Motor)–Studebaker No. 310217.
Relay (Ignition Switch)–Studebaker No. 310216.

POWER OPERATED TOP MOTOR & PUMP (ROTOR TYPE)

DESCRIPTION: Motor - 12 Volt, direct current, reversible type. Serviced by replacement

Pump - Rotor type. Pump housing is attached to motor frame by two through bolts from end cover The outer rotor fits into the pump housing and the inner rotor revolves, within the outer rotor. The pump is connected to the motor armature shaft by means of a drive ball located in a hole in end of armature shaft. The drive ball fits into a groove in the inner rotor. The valve body is mounted to the pump body by five mounting bolts. The reservoir is attached to the valve body by a center bolt which engages threads in center of valve body. Reservoir is sealed at each end with a neoprene "O" ring.

OPERATION: Hydraulic pressure is created by the rotation of the inner rotor gears, and is exhausted through one of two ports in the pump housing. Since motor is reversible, either port may be on the vacuum or pressure side of the pump, depending on direction of pump rotation When pump rotors turn, hydraulic pressure is created through one side of the pump while the other side of the pump becomes the vacuum side. Two small check valves are seated in the valve housing and are held in place by a fulcrum and lever-type retainer. The vacuum created on the inlet side of the pump pulls the ball against its seat and thus cuts off the reservoir from the inlet side of the pump. This seating action of the ball at the inlet side permits the ball on the other end of the fulcrum to raise off its seat in the outlet side of the pump. At the beginning of pump rotation, fluid from the reservoir can pass into the pressure side of the pump but is prevented from entering the vacuum side. During rotation, excess fluid can pass from pressure side back to the reservoir. When pump rotation is reversed, pressure and vacuum sides are reversed, and the check balls and fulcrum act to make the pressure reversal almost instantaneous.



TYPICAL P WER TOP MOTOR & PUMP (ROTOR TYPE)

G.M. HYDRO-LECTRIC

Buick (1956)
Cadillac (1956)
Chevr l t (1956)
Oldsmobile (1956)
P ntiac (1956)

DESCRIPTION: Similar in design and operation to models previously used. System is a sealed unit and is not vented to the atmosphere, making it unnecessary to replace hydraulic fluid periodically. System is "self-air bleeding". Should air become trapped in lines due to replacement of hydraulic units, a few operational cycles of the top will expel trapped air into reservoir.

CHECKING FLUID LEVEL: With top in raised position, disconnect positive or negative battery cable. Remove pump and motor shield, in rear compartment, and place absorbent material below reservoir. Remove filler plug from reservoir. On motor and pump assemblies installed horizontally, fluid should be at lower edge of filler cap hole. On motor and pump assemblies mounted vertically, fluid level should be 2" from top of reservoir. If fluid low, add hydraulic fluid Delco No. 11 (G.M. Hydraulic Brake Fluid Super No. 11).

REPLACING FLUID (Aft r Repairs): Cylinders and hydraulic system contains more fluid than one filling of reservoir will supply. Check reservoir frequently during refilling of system. Air in system will automatically bleed out with a few operations of top.

CHECKING HYDRAULIC PRESSURES: Remove motor and pump assembly. Install plug in one port and pressure gauge in port to be checked. Actuate motor with an applied terminal voltage of 9.5-11.0 volts. Gauge should show a pressure between 240 and 280 PSI. Check pressure in other port. *NOTE*–A difference in pressure readings may exist between pressure port for top of cylinders and for bottom of cylinders. This condition is acceptable if both readings are within the limits of 240-280 PSI. If pressure not within specified limits, unit is defective and should be repaired or replaced.

CHECKING OPERATION OF LIFT CYLINDERS: Remove rear seat cushion and folding top compartment side panel assembly. Operate folding top control switch and observe lift cylinders during up and down cycles for these conditions;

1) If movement of cylinder rods is not coordinated or sluggish when motor is actuated, check hydraulic hoses from the motor and pump to cylinders for kinks.
2) If one cylinder rod moves slower than other, cylinder with slow moving rod is defective and should be replaced.
3) If both cylinder rods move slowly, or do not move at all, check pressure of pump. See "Checking Hydraulic Pressures" above.

MOTOR & PUMP ASSEMBLY: *See "Power Operated Top Motor & Fump (Rotor Type)".*

SERVICE PARTS: **Motor** - (Chevrolet & Pontiac) No. 4683708, ('3uick, Cadillac, Oldsmobile) No. 4683710. *NOTE* - Motor replaced as an assembly only.

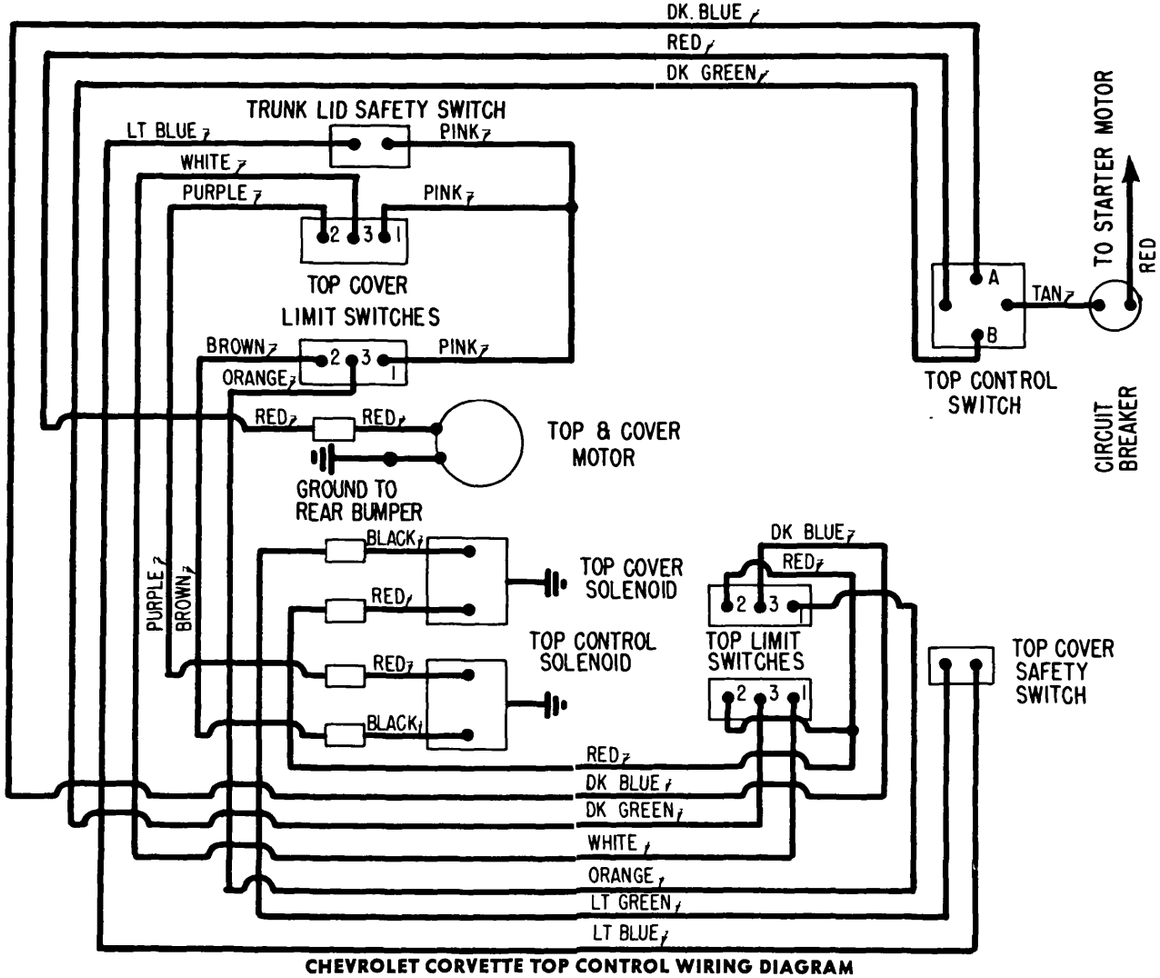
CHEVROLET CORVETTE

Chevrolet Corvette (1956)

DESCRIPTION: Power operated folding top and folding compartment cover. A safety switch in the rear compartment breaks the folding top circuit and prevents top mechanism from operating while rear compartment lid is open. This prevents damage to finish of either rear compartment or folding top compartment lids. A second safety switch, in the top compartment, prevents operation of the top compartment cover or folding top operating mechanism unless cover is unlatched. Hydraulic motor will run but a by-pass prevents pressure build-up in the system. Raising and lowering operations require about 20 seconds each.

OPERATION: **Raising The Top** - Unsnap top compartment end straps at outer edge of each seat back. Push button located on seat separator panel. This unlatches the folding top compartment and at the same time completes the folding top electrical circuit. *(CAUTION* - Do not attempt to operate top without first unlatching the top compartment cover). **Push** folding top control and hold it in until the folding top compartment-cover opens, the top lifts out, and the cover closes. Push top compartment cover down until it latches. Unhook snap fasteners and allow rear bow to drop. Latch rear bow to the body. Latch header to windshield. Snap both top compartment end straps.

Lowering The Top: Unlatch header and rear bow. Double check to see that all latches are completely free and not caught in any way. Unsnap both top compartment end straps. Hook rear bow with straps provided. Push button to unlatch top compartment cover. **Pull** the folding top control and hold until top compartment cover opens, the top folds into the compartment, and the cover closes. Push cover to close on latch. Snap top compartment end straps.



CHEVROLET CORVETTE TOP CONTROL WIRING DIAGRAM

Lincoln (1956)

► *SLOW RAISING & LOWERING OF TOP CORRECTION:* If raising or lowering of top takes more than 14 seconds, it may be due to collapse of hoses under rear seat. Hoses are secured by two clamps and when tightened can collapse hoses and restrict flow of fluid to and from right hydraulic lift cylinder. To correct, insert flat washer, ¼" inside diameter and 3/16" thick, between clamp and floor pan. When reinstalling clamps make sure there is sufficient sealer around holes in floor pan.

DESCRIPTION: Power Top Control – Hydraulic-electric type. System consists of an electric motor, hydraulic pump, and two hydraulic cylinders. A valve and port assembly directs flow of fluid in the system. The elec-motor is controlled through a circuit breaker, limit switches, control switch, and relay.

Top Locking Mechanism – Consists of an electric motor and two transmission assemblies which are connected to and driven by the motor through two casing and cable assemblies. These two components are located in the No. 1 top bow and engage and lock into two lock nut housing assemblies which are attached to the inside of the windshield header bar. Locking mechanism is controlled automatically by a limit switch mounted in the left rear top linkage stack compartment.

ADJUSTMENTS: The following adjustments should only be made after top stack adjustment is correct. *Do not overheat motor while making adjustments.*

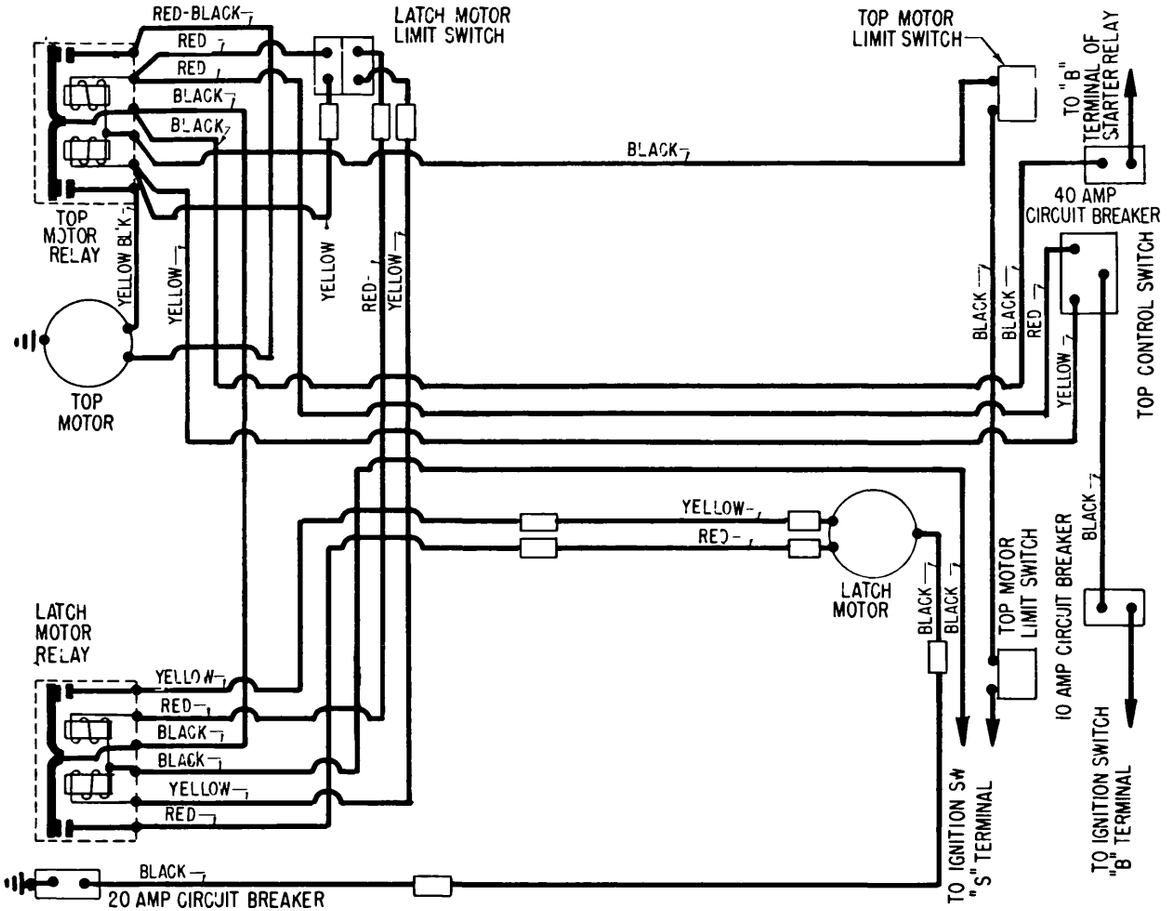
Locking Mechanism Limit Switch: Adjust limit switch, located in left rear quarter, so locking motor will start just before the No. 1 bow contacts the windshield header bar. Make sure it will operate the motor in the up direction, too.

Locking Mechanism Nut Housing: Nut housing can be adjusted up and down and slightly from side to side with respect to windshield header bar. In addition, it can be given a certain amount of tilt to rear by installing caster shims between windshield header bar and locknut boss on the nut housing. Locknuts should free-wheel or ratchet.

Locking Mechanism Transmission Assembly: Transmission assembly can be moved fore and aft with respect to No. 1 top bow because of floating tapping plate installation and slotted holes. *See Note below.*

Locking Mechanism Locking Screw: Can be adjusted for length by first loosening Allen setscrew in hex head and then turning screw transmission shaft until desired length is obtained. *CAUTION* - Do not attempt any trial locking of top unless Allen setscrew is properly tightened.

LINCOLN POWER TOP & LATCH CONTROL



LINCOLN POWER TOP & LATCH CONTROL WIRING DIAGRAM

► *LOCKING MECHANISM TRANSMISSION ASSEMBLY NOTE:* A new "Floating" type transmission assembly, transmission cover plates, and folding top No. 1 bow are being used on some cars. These parts have been designed so that the transmission assemblies will be able to "float" in the No. 1 bow and center themselves in the locknut assemblies. This will assist to avoid misalignment and binding of lockscrews in locknut assemblies. *CAUTION* - During adjustments of this assembly it is suggested that motor cover assembly be off to permit checking motor temperature. Do not permit motor to become too warm to touch. Allow it to cool.

MOTOR & PUMP ASSEMBLY (POWER TOP): *See "Power Operated Top Motor & Pump (Rotor Type)".*

CHECKING FLUID LEVEL: *See "Auto-Lite Electric Top Control".*

SERVICE PARTS: Power Top Mtr – Lincoln No. B6A-15667-A.
Locking Mechanism Motor – Lincoln No. B6A-7653508-A.

AUTO-LITE POWER TOP CONTROL

Chrysler, DeSoto, Dodge (1956)
Ford, Mercury (1956)
Packard (1956)
Plymouth (1956)

DESCRIPTION: Hydraulic-electric type. System consists of an electric motor, hydraulic pump and two hydraulic cylinders. A valve and port assembly directs flow of fluid in the system. The electric motor is controlled through a circuit breaker, switch, and on some cars, a relay.

► *FORD & MERCURY SLOW RAISING OR LOWERING OF TOP CORRECTION:* If raising or lowering of top takes more than 14 seconds, it may be due to collapse of hoses under rear seat. Hoses are secured by two clamps and when tightened can collapse hoses and restrict flow of fluid to and from right hydraulic lift cylinder. To correct, insert flat washer, 1/4" inside diameter and 3/16" thick, between clamp and floor pan. When reinstalling clamps make sure there is sufficient sealer around holes in floor pan.

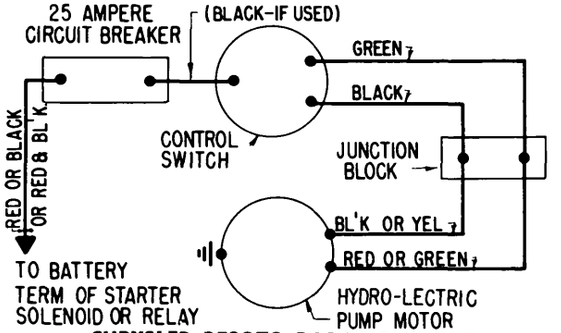
MOTOR & PUMP ASSEMBLY: *See "Power Operated Top Motor & Pump (Rotor Type)".*

CHECKING FLUID LEVEL: Remove rear seat cushion, then proceed as follows.

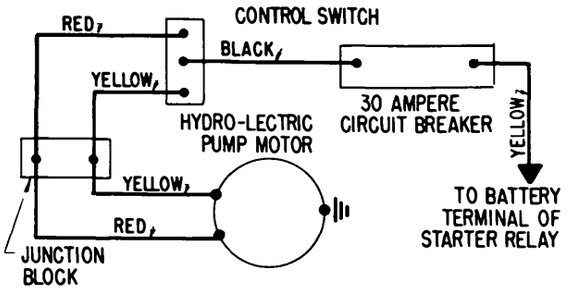
Ford, Lincoln, Mercury: Loosen filler plug in end of reservoir. Operate top three times to remove all air from system. With top in "UP" position, remove filler plug and check oil level. If hydraulic fluid does not run from filler hole, add enough hydraulic brake fluid to raise level to edge of filler plug hole.

Others: Check fluid level in reservoir. If low, check for a leak due to a broken line or loose connection. Fill reservoir until fluid runs out of filler hole. Use hydraulic brake fluid such as MoPar Super Brake Fluid After filling reservoir, raise and lower top several times to force out air in system. Always check fluid level when top is "DOWN".

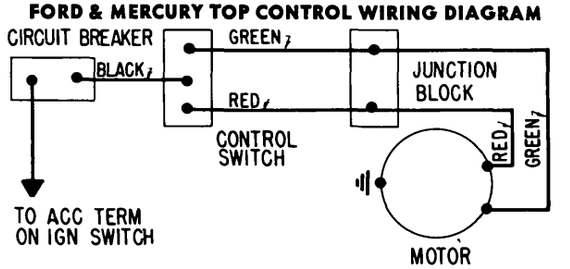
SERVICE PARTS: Motor - (Chrysler, DeSoto, Dodge Plymouth) Auto-Lite No. EMJ-4104, (Ford, Mercury) Ford or Mercury No. B6A-15667-A. *NOTE* - Motor replaced as an assembly only.



CHRYSLER, DESOTO, DODGE, PLYMOUTH TOP CONTROL WIRING DIAGRAM



FORD & MERCURY TOP CONTROL WIRING DIAGRAM



PACKARD TOP CONTROL WIRING DIAGRAM

CADILLAC REAR COMPARTMENT LID LOCK

Cadillac (1956). Optional.

DESCRIPTION: Trunk Lid Lock Unit consists of a power-operated closing unit and a solenoid-operated lock assembly. Closing unit fastens to inside of rear end panel at lid lock position. Its 12-Volt motor operates a jackscrew mechanism which retracts and extends trunk lid striker approximately 1". This action creates a pressurized seal between lowered lid and trunk opening. The solenoid operated lock assembly fastens to rear compartment lid at the normal lid lock position and operates like past model lid locks in that it can be unlocked from the outside with a key. In addition, a remote unlocking solenoid permits unlocking the lid from inside body by means of a switch located in glove compartment.

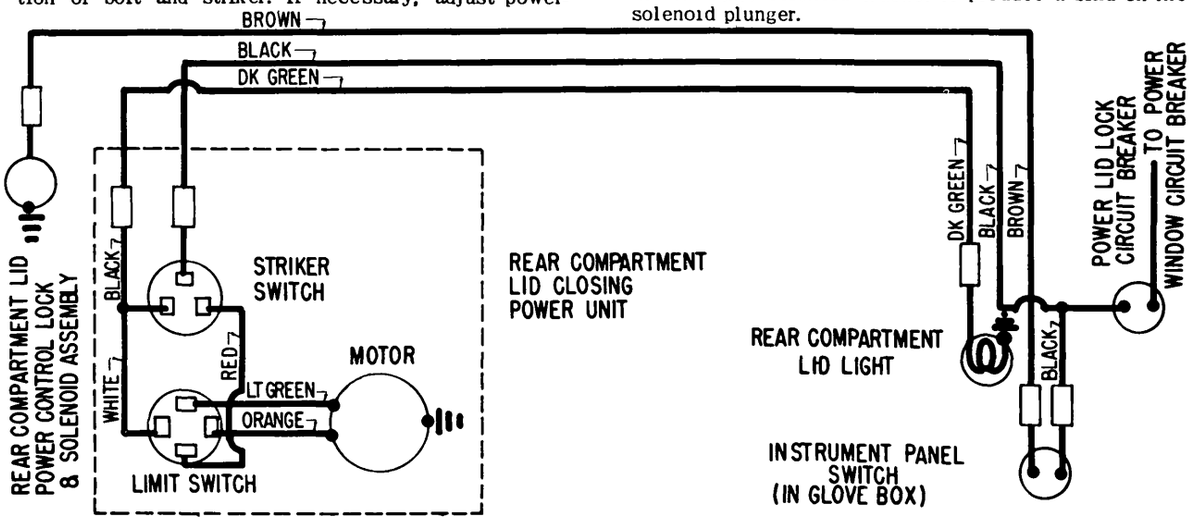
OPERATION: Locking - When trunk lid is lowered manually to a position approximately 1" above closed position, lid lock bolt engages the lock striker and depresses the striker switch, actuating closing unit motor, causing jackscrew to retract striker, pulling lid shut until proper closing pressure seal is reached. At this pressure a spring-loaded limit switch breaks the circuit and stops motor. Lid remains locked until lock assembly is again actuated.

Unlocking - When trunk lid is unlocked by either key or switch, lock bolt is disengaged from the striker, releasing striker switch and completing circuit to reverse action of power closing motor. The motor raises the striker and lid upward approximately 1" to a counterbalanced position. From this position lid may be raised manually. A light on instrument panel signals when lid is unlocked.

REMOVAL & INSTALLATION: Remove four bolts and lockwashers securing power closing unit within trunk compartment, remove unit. *NOTE* - Mark position of tab flanges to insure accurate replacement of unit. To install, reverse removal procedures.

ADJUSTMENTS: Striker & Lock Bolt - Place modeling clay over striker and lower lid until lock bolt makes an impression in the clay. Observe relative lateral position of bolt and striker. If necessary, adjust power-closing unit horizontally by loosening the four bolts and lockwashers retaining power-closing unit within trunk compartment and sliding unit to right or left in slotted holes.

Solenoid - Solenoid-to-lock attaching screws are slotted to permit fore and aft adjustment of solenoid to insure free release of lock bolt. If adjusting solenoid, be sure not to rotate solenoid bracket to produce a bind on the solenoid plunger.



CADILLAC REAR COMPARTMENT LID LOCK C NTR L DIAGRAM

VACUUM WINDSHIELD WIPERS (CABLE OPERATED)

Buick (1956)
Cadillac (1956)
Chevrolet (1956)
Continental (1956)
Lincoln (1956)
Oldsmobile (1956)
Packard (1956)
Pontiac (1956)

►CHANGES, CAUTIONS, CORRECTIONS

►*CADILLAC BLADE OVERTRAVEL CORRECTION:* May be caused by mispositioning of equalizer spring assembly on serrated shaft of transmission pulley. Assembly should be installed so that surface of rubber guard over tang end of spring is 1/8-1/4" from the stop tab. If gap is incorrect, remove lock ring, remove and install spring assembly in specified position. This condition may occur on either or both transmission pulleys.

►*CADILLAC BLADE FAILURE TO RETURN TO PARK POSITION CORRECTION:* Condition is usually due to interference between coupler shaft and coupler retainer plate. To correct, remove coupler retainer plate and file contacting surfaces between plate and shaft.

►*CADILLAC BINDING OR NOISY OPERATION (Due To Bent Equalizer Spring Guard or Endplay Between Equalizing Spring Retainer & Serrated Pulley Shaft):* To correct, bend equalizer spring guard outward to provide clearance between it and the pulley stop tab, or upward to clear equalizer spring rubber guard. To eliminate the endplay, pack a ribbon of high melting point, fibrous grease such as wheel bearing or water pump grease around inside of equalizer spring. This condition was eliminated in production on cars beginning with engine No. 015829 by the installation of an inertia spring tension washer.

►*CADILLAC FAILURE OF WIPER MOTOR TO SHUT OFF:* If wiper blades continue to operate with wiper switch in "OFF" position or if they begin to operate when the ignition switch is turned "ON", Windshield Washer Pump, Part No. 1464887, must be replaced. This condition is caused by the vacuum by-passing through the hydrostatic valve.

DESCRIPTION: Drive is through auxiliary pulleys and cable to windshield wiper transmission at each side of windshield (Chevrolet uses two drums, and Lincoln uses a lever as auxiliary drives). Tensioners are located within each wiper transmission (Buick, Cadillac, Chevrolet, Oldsmobile & Pontiac), in auxiliary drive (Continental), in pulley brackets (Others).

CABLE ADJUSTMENT: Buick, Cadillac, Chevrolet, Oldsmobile & Pontiac (Except CAM-O-MATIC Equipped Cars) - Push in on end of transmission shaft. Spring-loaded pulleys will unlock and tension cables.

Cam-O-Matic Equipped Cars - Remove arm and blade assembly by raising upper section of wiper arm to disengage cam follower from cam. With wiper arm in raised position, carefully pull or pry arm from transmission shaft. Push in on end of transmission shaft. Spring-loaded pulleys will unlock and tension cables.

Continental: Loosen wing nut on auxiliary drive. Adjust cable tension. Tighten wing nut.

Lincoln: No adjustment except to see that tensioners are free to operate.

REMOVAL & INSTALLATION: Wiper Motor - Remove screws securing motor to auxiliary drive, detach control cable and vacuum hose from motor, remove motor. To install, reverse removal procedure.

Auxiliary Drive Assembly: Buick & Cadillac - Remove upper section of instrument panel. Remove arm and blade assemblies (Cam-O-Matic). (See ADJUSTMENT for Cam-O-Matic removal). Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of transmission cables at auxiliary drive pulleys to assure proper reassembly, disconnect cables from auxiliary drive pulleys. Remove screws securing auxiliary drive, remove auxiliary drive assembly. To install, reverse removal procedure.

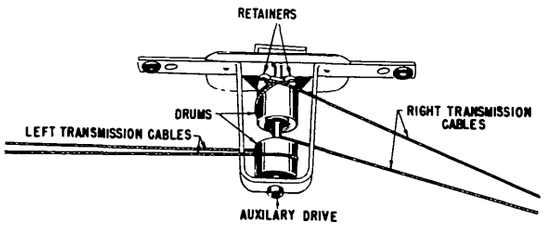
Chevrolet, Oldsmobile & Pontiac - Remove instrument panel compartment box. Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of cables to auxiliary drive, then detach cables from pulleys or drums. Remove screws securing wiper motor, remove motor. Remove screws securing drive to dash, remove auxiliary drive. To install, reverse removal procedure.

Continental - Remove lower insulator panels and carpet. Remove two screws securing control tower to tunnel brackets. Remove glove box liner and screws from check straps. Remove screws securing glove box hinge to brace. Disconnect spring at firewall. Slide check arms from glove box door. Remove glove box. Remove screws securing control tower to firewall and screws on right hand side securing control tower to instrument panel brace. Remove screws securing speaker frame to lower control panel. Lower control tower using care not to kink bowden wires. Remove antenna lead, hot wires and two speaker leads, remove radio. Loosen wing nut on idler puller and retract tension on cables, disconnect cables. Remove capscrews securing auxiliary drive to firewall, remove auxiliary drive. To install, reverse removal procedure.

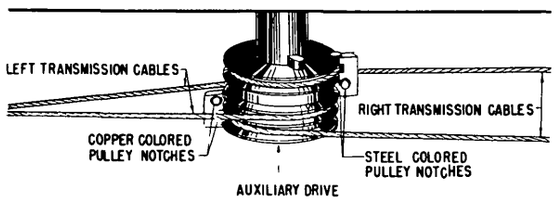
Lincoln - Remove screws securing auxiliary drive to cowl, remove auxiliary drive. To install, reverse removal procedure.

Wiper Transmissions: Buick & Cadillac - Remove wiper blade and arm assembly (see ADJUSTMENT for Cam-O-Matic removal). Remove upper section of instrument panel. Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of transmission cables at auxiliary drive pulleys to assure proper installation, then disconnect cables from auxiliary drive pulleys. Remove transmission spanner nut, escutcheon, cam, and reveal molding clip. Remove transmission support bolts, rubber gasket and retainer nuts. Disconnect windshield washer hose, and carefully pull transmission down through shroud panel and remove from body. To install, reverse removal procedure. *NOTE* - Copper-colored cable ends must be installed to copper-colored pulley notches and steel-colored cable ends to steel-colored pulley notches.

Chevrolet, Oldsmobile & P ntiac - Remove wiper blade and arm assemblies. Remove instrument panel glove box. Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of transmission cables to auxiliary drive, then disconnect cables from pulleys or drums. Remove escutcheon spanner nut. Lift esctucheon from body, disconnect washer hose and remove escutcheons. Remove transmission spacer spanner nut. On inside of body pull each transmission down through shroud panel, remove from body. To install, reverse removal procedure. *NOTE* - Right transmission cables are crossed.



CHEVROLET AUXILIARY DRIVE



AUXILIARY DRIVE (BUICK, CADILLAC, OLDSMOBILE, PONTIAC)

Continental (Right Hand) - Remove wiper arm, nut, and gasket. Remove cowl trim panel, glove box liner, defroster nozzle and windshield washer hose. Remove capscrew securing transmission to brace, remove transmission. Remove capscrew and special bolt securing spacer to cowl top, remove spacer. To install, reverse removal procedure.

Continental (Left Hand) - Remove three screws securing wiper switch plate to underside of instrument panel, and eight screws securing courtesy light switch plate to instrument panel. Remove wiper arm, nut and gasket. Remove washer hose. Remove capscrew securing transmission to brace, remove transmission. Remove capscrew and special bolt securing spacer to cowl top, remove spacer. To install, reverse removal procedure.

Lincoln - Remove wiper arm and blade. Remove nut, spacer and gasket that secure transmission to cowl top. On right side, remove defroster outlet. Remove glove

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VACUUM WINDSHIELD WIPERS (CABLE OPERATED) (C ntinu d)

compartment box. Pull cable tensioner toward center of car and lock in this position with drift pin through hole provided. Remove drive cable from auxiliary drive, remove transmission. To install, reverse removal procedure. When installing, be sure to rig cables properly on pulleys before connecting to auxiliary drive. Take drift pin out of cable tensioner and allow pulleys to take up slack.

Cable Tensioner (Lincoln): Remove defroster outlet from right side. Remove glove compartment box. Pull cable tensioner toward center of car, and lock in this position with a drift pin through hole provided. Remove drive cable from auxiliary drive. Remove two capscrews that secure tensioner to cowl panel, remove tensioner. To install, reverse removal procedure.

WINDSHIELD WIPERS (LINK & CRANK ARM)

Chevrol t, Truck Mod ls (1956)
Ford, Cars & Light Trucks (1956)
Hudson, All Models (1956)
Mercury (1956)
Nash, All Models (1956)
Rambl r (1956)
Studebaker, Champion (1956)
Thund rbird (1956)
Willys, All M dels (1956)

DESCRIPTION: Wiper consists of single motor unit connected to right and left hand wiper arm shafts by flat or round metal links. Motor control valve is either integral with motor or is a separate remote control depending on car application.

REMOVAL & INSTALLATION: Wiper Motor - (Except Rambler) Remove radio. On Hudson & Nash models, remove wiper motor access hole cover. Disconnect vacuum hose and control cable. Remove link retainers and disconnect links. Remove motor mounting screws and lower wiper motor assembly. To install, reverse removal procedure.

Rambler - Open heater control valve. Drain approximately two quarts of liquid from radiator to lower coolant level. Disconnect heater hoses and remove heater core. Remove rain baffle below motor. Remove link retainers. Disconnect control conduit and vacuum hose from motor. Remove motor mounting screws and lower wiper motor assembly. To install, reverse removal procedure.

Pivot Shaft: Remove wiper arm and blade. Remove link from pivot shaft. Remove nut, spacer and gaskets as required, remove pivot shaft. To install, reverse removal procedure. *NOTE* - On Hudson, Nash & Rambler models it will be necessary to remove cowl air intake for access to retaining nuts.

CHEVROLET & PONTIAC ELECTRIC

Chevrolet, Trucks & Pass. Cars (1956)
Pontiac (1956)

DESCRIPTION & OPERATION: Similar in design and operation to previous model. *See "Chevrolet Electric Windshield Wiper" in 1955 Annual Data or later Manual edition and note the following design changes:*

► *1956 DESIGN CHANGES:* On 1956 models, a wire spring and pawl replaces coil spring used to load drive assembly disc on 1955 models. 1956 drive assembly does not include ear used on 1955 models. Instead spring loaded pawl projects from periphery of disc. Switch assembly mounting screw sizes have been changed from No. 6-32 x ½" to No. 8-32 x 3/8", thereby limiting the amount of switch adjustment possible.

ADJUSTMENT: Three adjustments are required as follows:

Switch Adjustment: Remove switch housing cover. Move latch assembly switch arm against fiber cam until switch contacts snap to low speed position. Further lateral movement of latch switch arm should separate contacts Nos. 1 and 2 and hold contacts Nos. 3 and 4 closed, thus forming high speed circuit. If latch assembly switch arm travel is insufficient to perform above functions, move contacts into their low and high speed positions, loosen two switch mounting screws and shift switch assembly as required. When unit is stopped, breaker arm should contact fiber cam and move it sufficiently to snap switch contacts into their parked position. If motor does not stop when dash control is turned to "OFF" position, switch assembly mounting screws should be loosened again and switch shifted toward breaker arm. *(NOTE* - On later models using No. 8-32 x 3/8" switch mounting screws, amount switch assembly can be moved is very limited. If necessary, breaker arm may be bent toward fiber cam). Minimum clearance between arm and cam guide should be 1/32".

Armature Endplay Adjustment: Connect a DC ammeter in the circuit, start wiper, and note ampere draw. Tighten armature endplay adjusting screw located in end of cast motor housing until a rise in current draw is noted, then back off adjusting screw slowly until ampere draw returns to initial reading. Back off screw an additional 1/8 turn as a safety factor. To lock adjustment, either restake or tighten jam nut.

Drive Assembly Endplay Adjustment: Use endplay washers beneath snap ring on drive assembly shaft.

TROUBLE SHOOTING: *CAUTION - Disconnect unit from source of power before removing switch cover.*

Unit Will Not Turn On: No voltage at wiper unit; unit improperly grounded; defective soldering at switch terminals; defective motor; contacts 3 & 4 not making contact when unit turned on, or contacts dirty; circuit breaker contacts dirty, or defective circuit breaker.

Unit Will Not Shut Off: Failure of oscillating arm to trip contacts 3 & 4; poor fit between oscillating arm and oscillating shaft slot allowing excessive circular play of oscillating switch arm; jumper between contacts 2 & 4 shorted to ground.

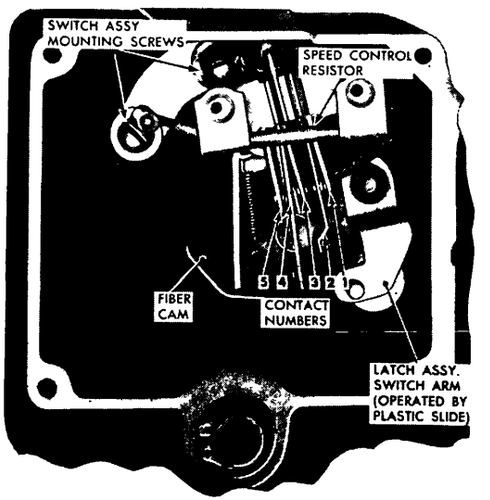
Slow Sp ed Operation in Both Slow & Fast Positions: Switch breaker arm which is operated by external switch slide not opening contacts 1 & 2; short between switch cover and switch assembly; switch fiber cam not seated properly in slot and failing to open contacts 1 & 2.

Normal Fast Operation in Both Slow & Fast Speed P sitions: Speed control contacts 1 & 2 not making contact at low speed position (resistor is in circuit in both slow and fast positions of switch).

Excessive Speed in High Speed Positions, Slow Speed Satisfactory: Switch assembly resistor open.

Excessive Speed in Both Low & High Speed Positions: Defective soldering of black shunt field lead to switch assembly; open shunt field.

REMOVAL & INSTALLATION: Motor - Loosen screw securing Bowden wire to motor and remove cable. Disconnect feed wire from under dash panel. Remove mounting screws. *NOTE* - Ground wire is mounted under one of auxiliary drive mounting screws. To install, reverse removal procedure.



CHEVROLET & PONTIAC ELECTRIC WINDSHIELD WIPER CONTROL

► *INSTALLATION CAUTION:* Shims between motor unit and dash panel hold drive unit in proper alignment. Incorrect number of shims, or no shims at all, cause bind in drive resulting in sluggish operation or complete stoppage. Note number of shims before removing motor.

Auxiliary Drive & Transmission Removal: *See "Vacuum Windshield Wipers (Cable Operated)".*

OVERHAUL: Proceed as follows:

Switch: Removal & Disassembly - Remove switch cover *(CAUTION* - Disconnect unit from source of power before removing switch cover). Remove switch assembly mounting screws and lift out switch to extent of slack in connecting wires. Complete removal of switch assembly by placing a hot soldering iron against three lead connections to switch. Code connection points to insure proper re-installation. Remove switch breaker arm from end of oscillating shaft by removing plastic retainer. *CAUTION* - Do not remove latch assembly switch arm.

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CHEVROLET & PONTIAC ELECTRIC (Continued)

Cleaning & Inspection - Check switch contacts for foreign material or deformation. Clean contacts with cloth dampened with carbon tetrachloride or remove small imperfections with emery paper. Replace switch, if contacts broken. Check for foreign matter bridging insulators at base of switch. Should any insulator be broken or oil soaked, replace by removing the two screws holding contacts and insulators and replacing insulators with like thicknesses of tag board or other non-conducting gasket material. Check to see that breaker arm fiber contact surface is in good condition.

Reassembly & Installation - *(NOTE* - If work is to be done on oscillating and drive section, delay reassembly of switch components until that work is completed). To reinstall and reassemble, reverse removal procedure. Solder green wire to terminal closest to mounting bracket, red wire to center terminal, and black wire to terminal closest to resistor side of switch.

Oscillation & Drive Assembly: Removal & Disassembly - Perform all operations given under "Removal & Disassembly of Switch" except that it is not necessary to unsolder leads. Remove snap ring and any washers from drive assembly shaft. Remove screws and lockwashers securing oscillating and drive section cover. *(CAUTION* - Check to see that latch assembly is not in park position). Carefully tap both the oscillating shaft on which breaker arm (previously removed) was attached and the drive assembly shaft out of housing from switch compartment side with soft drift. To separate oscillating mechanism from connecting rod, remove "E" type retaining ring from drive pin and lift out oscillating mechanism. To complete disassembly of oscillating and drive section, remove snap ring and separate remainder of parts. *NOTE* - Further disassembly of cover and linkage should not be attempted since these parts are furnished only as assemblies for service. Do not attempt to remove latch assembly toggle or arm. If necessary, latch spring can be replaced with toggle installed.

Cleaning & Inspection - Clean all parts except nylon gear with cleaning solvent and dry with air. Check all parts for deformations and repair or replace as necessary. Check nylon gear for worn or broken teeth. Clean cover and connecting rod linkage of all old lubricant and check for bent parts. Replace if defective.

Reassembly & Installation - Connect spring to drive disc as follows

1955 Models - Insert inner tang of coil spring into slot in hub of drive disc and force spring flush with disc. Wrap spring around hub approximately ½ turn and hook behind pin on disc.

1956 Models - Position pawl on pin in drive disc, then place wire spring on pawl and catch hooked end under offset end of pawl. Straight leg of spring should then be forced against side of disc center hub.

Install drive disc and spring on nylon gear. Place cam and drive pin and yoke on disc. Be sure drive pin is cradled in slot on yoke.

1955 Models - Insert cushion in yoke before assembling above parts.

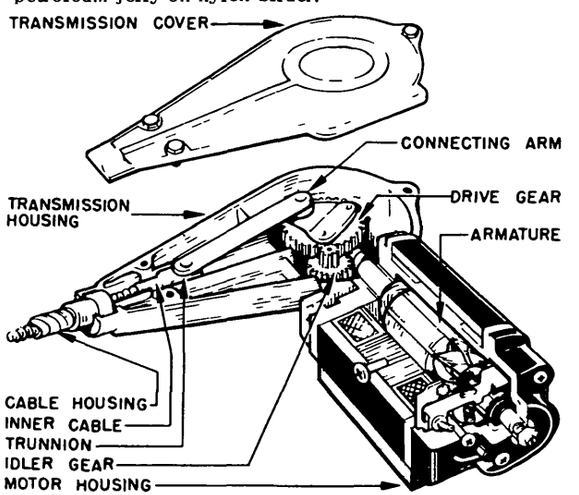
To complete assembly of oscillation components, place endplay washers and retaining washer on lug and secure with snap ring. Measure total endplay within unit with a feeler gauge and add or remove washers until total endplay is .008" or less. Lubricate between yoke, cam and drive pin, disc and at all pivot points on cover linkage with light oil. Then place a light grease coating on armature shaft, nylon gear teeth, and on linkage pivot points previously oiled. DO NOT GREASE TOGGLE OR ARM Insert drive pin through connecting rod and secure with "E" type retainer. Check to see that toggle is **not** in parked position, then insert oscillating shaft and gear shaft through bores in housing. Tap as required to fully seat shafts. Secure cover with screws and lockwashers. Install breaker arm in slot of oscillating shaft and secure with plastic retainer. Re-install switch components as described under "Switch Reassembly & Installation". Place endplay washers as required on end of gear shaft until total endplay is approximately .010", then complete installation by installing snap ring.

Motor: *(NOTE* - For Removal & Installation see above).

Disassembly - Remove two tie bolts securing case to housing. Remove endplay adjusting screw and locknut. Strike steel case lightly with mallet to partially loosen it from motor field and wiper housing. Insert a tool through the armature adjusting screw opening and push against the end of the armature to back off the case. Without breaking electrical connections, separate case from the armature *(CAUTION* - Do not lose thrust ball from commutator end of armature). Once armature is removed, insert brush retainer spring No. 5096576 between ends of brushes to prevent possibility of pulling leads out of brushes. If necessary, remove felt washer and thrust disc from motor disc. Armature may be taken out of field. Should it be necessary to free case assembly from field, unsolder field leads attached to brush holders

Cleaning & Inspection - Inspect field and armature for damage due to overheating. Check to see that brush leads are firmly attached both to brushes and their connections at brush holders. Check brushes for wear. If brushes are worn to within 3/16" of brush lead, or pigtail, they should be replaced. Check circuit breaker contacts, file lightly to remove irregularities. Inspect leads from brush and circuit breaker plate for worn insulation or breaks. Be sure that green lead is held to base insulator by clip to prevent lead chaffing on armature. To replace brush, remove retainers installed during disassembly and remove brush springs. Place hot soldering iron against brush lead connection on brush holders, remove old brushes, install new brushes. Check connections. To reinstall brushes in holders, compress spring within holder and hold fully compressed with a thin instrument inserted through slot in brush holder. Push brush into holder with lead upward to project through slot in holder, hold brush tightly, and remove instrument retaining spring. Hold brush installed, install other brush, then install spring retainer, Part No. 5096576.

Reassembly - To reassemble, reverse removal procedure. Use a 6" to 8" length of string around brush retainer to pull it out after armature commutator is inserted. Use a high melting point grease to stick thrust ball in commutator end of armature. Use light oil on felt washer, petroleum jelly on nylon slider.



METROPOLITAN WINDSHIELD WIPER

METROPOLITAN WINDSHIELD WIPER

Metropolitan (1955-56)

DESCRIPTION: Consists of an electric motor and transmission assembly, armor protected cable with drive shaft and housing assemblies, and control switch assembly. Motor and transmission assembly is mounted behind instrument panel on right wheelhouse panel and operates right and left wiper arm drive shafts by reciprocal action of a serrated cable within the armored cable housing.

REMOVAL & INSTALLATION: ***NOTE—Motor & Transmission Assembly and Wiper and Drive Shaft Assembly can be removed as a unit or separately, as follows:***

Motor & Transmission Assembly—Remove transmission cover, and from inside wheel housing, remove one nut securing assembly to wheelhouse panel, and from under the hood, remove the other nut The nut located inside the wheelhousing is on the top ledge of the wheelhouse panel under the fender, and is not readily visible. Disconnect wire at motor and remove the unit after disconnecting Wiper Drive Shaft Assembly from transmission connecting arm.

Wiper Cable & Drive Shaft Assembly—Remove glove box and the two defroster nozzles. Remove windshield wiper arms, friction nuts and rubber grommets from wiper shafts. From under the instrument panel, remove the screws attaching each drive housing to body and remove housing, and drive shaft & cable assembly.

Installation: Reverse removal procedure and position wiper arms on shafts so that both arms have equal travel.

Motor Specifications

Current Draw—2.0-3.25 amperes①.
Current Draw—7.5-8.5 amperes②.
Field Coil Resistance—8.4-9.0 ohms.
①—With motor cold and driving both blades on a wet windshield.
②—With motor stalled (cold motor).

METROPOLITAN WINDSHIELD WIPER

	Auto-Lit Wiper Motor No.
CHRYSLER & IMPERIAL	
All Models	EPF-4001
DESOTO	
All Models	EPF-4001
DODGE	
D-62, 63-1 Standard	EPH-4101A
Special	EPF-4001A
D-63-2, 3	EPF-4001A
PLYMOUTH	
All Models Standard	EPH-4101
Special	EPF-4001
STUDEBAKER	
Commander, President	EPS-4001
Champion Special	EPS-4001

DESCRIPTION: Similar in design and operation to previous models.

REMOVAL, OVERHAUL & INSTALLATION: *See "Auto-Lite Electric" Windshield Wipers in 1955 Annual Data or later Manual edition. Note the following:*

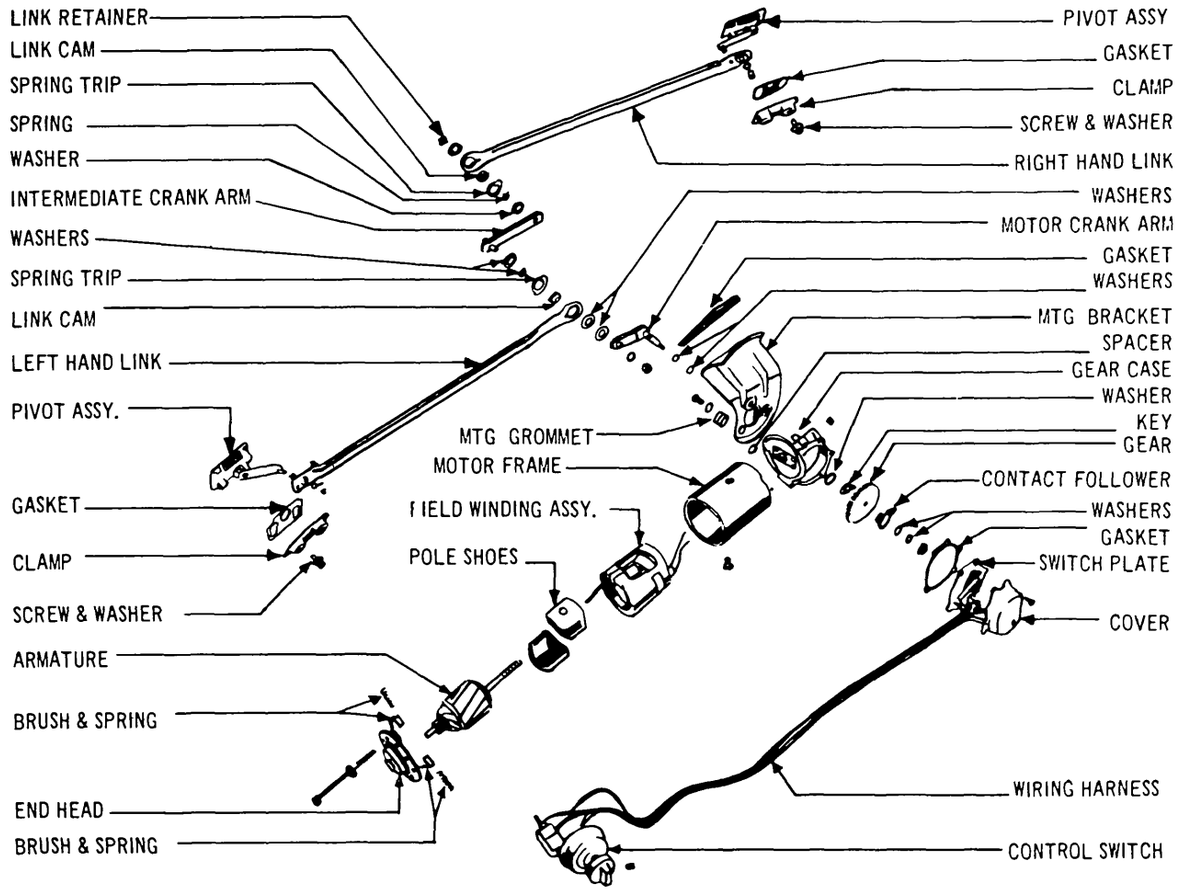
► *WIPER MOTOR REMOVAL CAUTION (Variable Speed Type):* Wiper should be operated and shut off by disconnecting it at circuit breaker, or by turning off ignition key. Damage to motor switch and spring parking cam, upon removal of switch cover, will result if cranks are in parked position.

Wiper Links (Chrysler, DeSoto, Dodge, Plymouth): Springs and spring releases are **not** interchangeable.

Studebaker: Removal - Remove radio. Disconnect wiper motor wires from switch and circuit breaker. Swing cover to one side and remove main link nut, remove main link. Remove nuts and screws that hold motor to cowl panel. Remove nut, shakeproof washer, and screw that fastens motor to cowl panel flange, remove motor. Remove clip from main link pin, remove right connecting link from pin. Remove wiper arms. Unscrew driver retaining nuts on outside of cowl and remove spacers. Slip drivers (transmission) down through cowl panel, remove drivers and connecting link assemblies from car. *NOTE* - Left connecting link cannot be removed from main link

Disassembly - Remove motor through bolts and slip end plate off. The armature may be removed by pulling straight out. Unsolder brush leads and remove brushes and springs. Unscrew retaining screws on parking switch cover. Unsolder wires from parking switch, if it is necessary to replace switch. On Auto-Lite wiper driven gear retaining nut may be removed and the gear and output shaft taken out. Do not disassemble shaft and gear on the American-Bosch wiper as they are pressed together. Armature and output shaft bushings are not serviced.

AUTO-LITE ELECTRIC



AUTO-LITE ELECTRIC WINDSHIELD WIPER

Reassembly - Reverse disassembly procedure. Apply Lubriplate grease to gears.

Installation - To install, reverse removal procedure. To be sure main link will be positioned correctly on main shaft, start motor and then turn switch off. When motor stops it will be in parked position. Place main link on drive shaft so that lugs fit in drive slots. End of left connecting link must be to left of center of main link and pin must be to right of center of main link

Adjustment - Parking position is adjustable by means of lever on front of wiper drive. It may be necessary to allow wiper to operate a few minutes in order to get it warm enough to operate properly. If blades do not park properly, move lever (Auto-Lite) or turn hex head (American-Bosch) as required.

Adjustment (Chrysler, DeSoto, Dodge, Plymouth): Adjust wiper parking position by moving cam adjustment lever which sticks out of switch cover.

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REAR MAIN BEARING OIL SEAL: Wiper seal installed in rear groove in bearing cap and block (oil slinger operates in front groove).

Oil Seal Installation – With crankshaft out of engine (see Crankshaft Removal). and bearing cap off, install length of new packing in groove in block. Use Tool J-6349 and drive seal into place. With tool in place, cut off each end of packing 1 64" above bearing edge. Repeat operation in bearing cap. Use arbor press or vise to press packing into place.

ENGINE BALANCING

ENGINE BALANCE CHECK & UNBALANCE CORRECTION: 1) – Connect a tachometer to engine and run engine at progressively higher speeds (with transmission in neutral). Note degree of vibration at various speeds.

2) – If greatest vibration is noted at approximately 2800 RPM, either the torus cover, flywheel, or flex plate may be out of balance. To correct, add a washer under one of the four flex plate-to-flywheel attaching nuts. Recheck for vibration. If the addition of the washer increases vibration, remove washer and place it under one of the other three attaching nuts until the best over-all balance is obtained. In order to perfect the balance, it may be necessary to add additional washers under other flywheel-to-torus cover attaching nuts in the area of the first washer.

3) – If greatest vibration is noticed at 3500 RPM, the flywheel or flex plate may have excessive lateral runout. Check runout as follows: Remove transmission and inspect flywheel for weld spots which may hold flex plate away from the flywheel.

4) – Mount a dial indicator on rear of engine. Rotate flex plate to check each leg for runout on the surface that contacts the flywheel. The total runout at this point should not exceed .010". If the runout is in excess of .010", use the flex plate leg which is the most rearward as a standard. Then bend back the legs that are too far forward until they are within .005" of standard leg. *NOTE* – Be sure to bend the complete leg.

5) – Install transmission. Tighten flex plate-to-wheel nuts alternately to 5 ft. lbs. Then, tighten to 15-20 ft. lbs. Recheck engine for vibration. If vibration continues to exist at 3800 RPM, the flywheel and torus assembly have excessive runout and should be replaced.

NOTE: The flex plate checking procedure should be followed whenever transmission is removed

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Remove hood lock plate support plate. If car is equipped with air conditioning, remove the condenser (see "Air Conditioning" in Miscellaneous Section). Remove radiator core and remove timing chain and sprockets. Remove valve lifters and slide camshaft slowly forward out of engine. *CAUTION – Do not allow camshaft lobes to score camshaft bushings.*

Camshaft Alignment Check: Check camshaft for proper alignment whenever it is removed from the engine. *See "Camshaft Alignment Check" below.*

Camshaft Bushing Removal & Installation: Use Bearing Remover & Installer Tool J-3063 to pull old bushings out. Install new bushings with same tool and see that oil holes in bushing line up with oil holes in block (check oil leads with piece of wire after tool removed).

Camshaft Installation: Lower camshaft into position between radiator grille and engine and guide it carefully into cylinder block. Be sure distributor is timed correctly when inserting camshaft. Reverse removal procedure.

TIMING CHAIN

TIMING CHAIN REMOVAL: Set engine in firing position for No. 6 cylinder. Remove water pump (see Cooling on car page), oil pan (see Oil Pan Removal), crankshaft pulley and engine front cover. Take out the two camshaft sprocket screws and lockwashers. Remove sprocket with chain from camshaft, remove crankshaft sprocket.

Timing Chain Installation: Reverse removal instructions given above. Timing marks on sprocket must be together and aligned with straightedge across shaft centers.

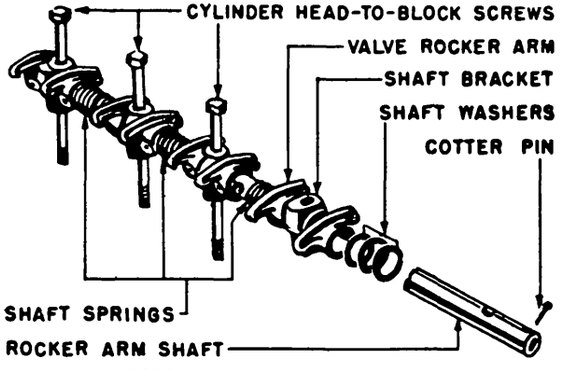
VALVE SYSTEM

VALVE STEM SEALS

VALVE STEM OIL SEALS: Seals are installed in lower groove (nearest valve head) ahead of valve keepers. Check for proper sealing after keepers installed by striking end of valve stems to seat keepers, then using suction cup (similar to type used for grinding valves), compress cup on valve spring retainer. If cup will not stick, seal is broken and a new seal should be installed.

ROCKER ARMS

ROCKER ARM ASSEMBLY: Remove rocker arm covers. Remove secondary wiring and distributor cap as an assembly. Remove four cylinder head cap screws which hold rocker arm assembly to cylinder head and remove rocker arm assembly.



CADILLAC ROCKER ARM ASSY.

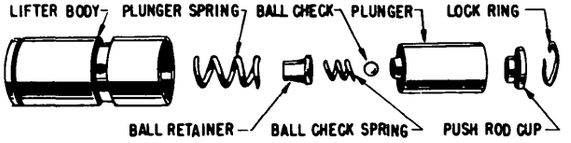
Disassembly & Reassembly: See illustration for correct order of parts. Parts can be removed from shaft by removing cotter pin at end.

Installation: Install rocker arm assembly in position on cylinder head with notches on each end of rocker shaft pointing downward and toward center of engine, and rocker arm brackets with larger machined surface next to head. Install four cylinder head screws and tighten to specifications. Install rocker arm covers and secondary wiring with distributor cap assembly. Tighten cover screws to specifications.

HYDRAULIC LIFTERS

VALVE LIFTERS: Hydraulic, Barrel Type. Consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet or body (See illustration). Oil is introduced to this unit from main oil gallery through hole in side of lifter plunger and body.

Removal: Disconnect power brake vacuum line from intake manifold. Remove heater hoses from clips on rocker arm covers and remove covers. Remove intake manifold. Remove valve compartment cover screws. Loosen engine ventilator pipe clampscrew at flywheel housing, remove long ventilator pipe screw at valve compartment and remove cover. Remove rocker arm assemblies (*NOTE* – When only one or two lifters are to be removed, do not remove rocker arm assembly. Compress valve spring, slide rocker arm over and remove the push rod.) Remove push rods, keeping them in order so they may be replaced in the same location. Using Valve Lifter Remover Tool J-3049, remove lifters from engine. Keep lifters in order so they may be replaced in the same location.



HYDRAULIC VALVE LIFTER

Disassembly: Press down on center of valve lifter push rod cup, and with a pointed tool, remove lockwire from groove. Invert lifter and slide out push rod cup, plunger, ball retainer and spring. *NOTE*— If plunger is stuck in body, place lifter push rod end down, in Valve Lifter Plunger Remover Tool J-4160. Holding tool firmly in hand with thumb over lifter body, strike tool sharply on block of wood until plunger falls out of body.

Cleaning & Inspection: Wash all parts in a suitable carbon solvent and remove all trace of carbon and varnish. Inspect plunger and lifter body for scoring or other damage that would prevent free movement. Inspect lower end of lifter body for nicks or indentations. If any exist, replace complete lifter assembly. Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement. Plunger should drop of own weight into body bore.

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Reass mbly: Place ball on its seat in lower end of plunger while holding plunger upside down. Place small spring on ball. Position ball retainer over ball and end of plunger. Move retainer up and down to be sure spring is in working order. Place spring over ball retainer. Lower lifter body over plunger assembly on an angle to seat spring. If necessary probe with a small wire through oil h le to allow assembly to be seated. Turn assembly right side up and fill plunger with clean engine oil. Jiggle ball with a small piece of wire until oil drains out of plunger into body and trapped air is released from body. Refill plunger with oil and place push rod cup on plunger. Position lock wire over cup. Using Valve Lifter Lock Wire Installer J-2730, press lock wire into groove.

Testing (Leak Down Rate)—Remove distributor cap, coil and rocker arm covers as an assembly. Set timing mark "C" on harmonic balancer to the pointer and observe position of distributor rotor. Check each lifter as outlined in following table, using Valve Lifter Leakdown Tool J-3074:

With rotor at No. 1 firing position (pointing toward rear of engine), check:

No. 1 Intake	No. 3 Exhaust	No. 6 Exhaust
No. 1 Exhaust	No. 4 Exhaust	No. 7 Intake
No. 2 Intake	No. 5 Intake	No. 8 Intake
No. 2 Exhaust	No. 6 Intake	No. 8 Exhaust

With rotor at No. 6 firing position (pointing toward front of engine) check:

No. 3 Intake	No. 5 Exhaust
No. 4 Intake	No. 7 Exhaust

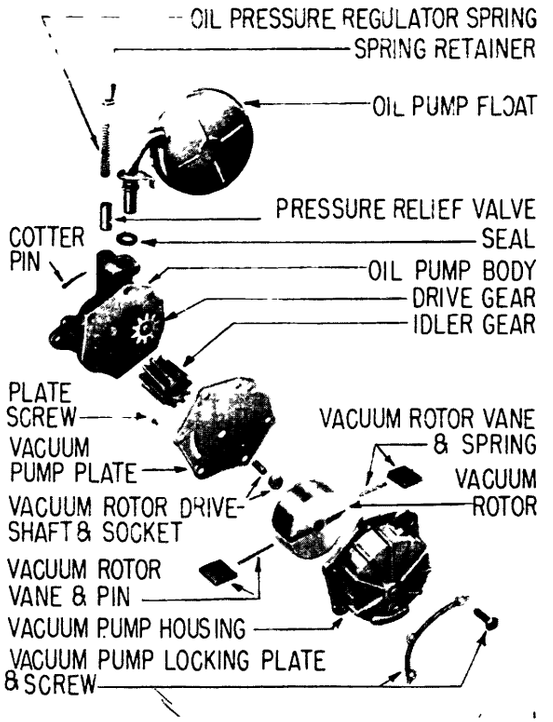
Insert feeler gauge of tool between valve stem and rocker arm, at the same time compressing the tool "pop-out" spring against valve spring *(NOTE*—Tool should be installed as quickly as possible to avoid any unnecessary leakdown of lifter). Note the interval of time during which the tool is held in place by valve spring pressure. It will be found through this test that bad lifters or lifter will have the shortest leakdown time.

OILING SYSTEM

►*AIR IN OILING SYSTEM (Causing oil foaming or noisy Hydraulic Lifter operation): See Oil Pump Reassembly below for sealing of pump intake float tube and Oil Pump Installation for correct positioning of oil pan baffle.*

OIL PUMP

OIL PUMP REMOVAL: Drain engine and remove oil pan (see Oil Pan Removal). Remove oil pan baffle and disconnect vacuum line at engine block. Remove two nuts securing oil pump to rear main bearing cap, and remove oil pump, vacuum pump, oil float and screen assembly. *NOTE* - Oil pump drive shaft is now loose and should be removed.



CADILLAC OIL & VACUUM PUMP ASSY.

Disassembly: Remove float and felt seal. Remove pressure regulator valve, spring and spring retainer. Remove six screws holding vacuum pump to oil pump and remove vacuum pump and line. Slide idler gear off idler shaft and pin from collar on end of drive shaft and press collar off shaft. Slide oil pump drive gear out of body.

Inspection: Inspect strainer screen for dirt, float for leaks and check condition of seal. Inspect oil pressure regulator valve for nicks and burrs, drive gear for nicks and burrs, vacuum pump plate for wear by pressing it down on surface plate.

Oil Pump Specifications-Backlash between drive gears - .008-.012". Clearance drive shaft to pump body - .0010-.0025", wear limit .005". Clearance pump body to gears - .003-.005", wear limits .006". End play in pump gears-.001-.004", wear limit .006".

Pressure Regulator Specifications - Clearance valve plunger and housing - .0020-.0035", wear limits .005". Spring Free Length - 2 21 32". Spring Pressure - 5¼-5¾ lbs. at 1 7 16".

Assembly: Install drive gear in pump body, press collar on shaft and install lock pin. Slide idler gear into pump body, place vacuum pump assembly with hexagonal drive shaft under oil pump and install six screws and locks. Slide oil pump strainer into opening in pump body and install locking pin. Check felt seal to be sure it is located correctly. *CAUTION* - Screen must face cover of oil pump.

Installation: Install oil pump drive shaft, oil pump assembly over studs, guiding vacuum fitting into block. *NOTE* - Position pump so drive shaft does not bind against block. Install two nuts and tighten to specifications.

VACUUM PUMP

VACUUM PUMP (Removal): Drain engine oil and remove oil pan. Remove oil pan baffle and disconnect vacuum line at engine block. Remove six screws holding vacuum pump to oil pump, and remove vacuum pump with the oil pump idler gear. Remove hexagonal drive shaft. ***CAUTION***—Oil pump idler gear may fall when pump removed.

Dissassembly - Remove two cap screws holding plate to vacuum pump and remove plate from dowels. Turn pump upside down and shake out rotor assembly. Remove vanes, pin and spring from rotor.

Vacuum Pump Clearances—Vane to cover plate .002-.005". Rotor to cover plate .004-.007". Socket to cover plate .0144-.0324". Socket to rotor face .0104-.0254". Rotor to shaft .0010-.0023". Rotor to depression in body cavity .0005-.0034"

Installation—Install vacuum lines to pump and replace hexagonal shaft. Install idler gear in oil pump and install vacuum pump below oil pump with six screws. Connect vacuum line to engine block. Install oil pan baffle, then install oil pan.

Reassembly—Inspect inside of body for scores or wear. Inspect plate for wear and dress down on surface plate. (CAUTION—Make sure that all parts are clean and that no foreign material is in housing). Install vanes and spring in rotor. Compress vanes and install rotor in pump body. Position plate on doweled pump body so that hole in plate lines up with hexagonal hole in rotor. Install screws in cover plate.

PROPELLER SHAFT NOTES

PROPELLER SHAFT CENTER BEARING ASSEMBLY: Remove two center-bearing-support-to-support frame bolts (nuts are tack welded, DO NOT REMOVE). Remove "U" bolts and lock at rear axle pinion, slide propeller shaft and front yoke off transmission mainshaft and through frame tunnel section. *NOTE* - Be careful not to nick yoke. Disassemble propeller shafts, remove center bearing support assembly from propeller shaft by tapping on center bearing bracket with soft head hammer. Remove spacer if so equipped. Remove center bearing support bolts and separate bushings, washers, center bearing bracket and center bearing support. To reassemble, reverse disassembly procedure.

MODEL IDENTIFICATION

ENGINE & SERIAL NUMBER: Stamped on upper right corner at front face of right hand block, on right frame side member just to rear of front engine support, and on lubrication plate attached to front face of left door lock pillar.

Series	First 1957 Nos.
60S	5760000001
62	5762000001
75	5775000001
86	5786000001

Identification - First two figures indicate year, third and fourth indicate series (last six figures are numbered consecutively regardless of series).

Engine Unit Number Note: Use for identification. Stamped on top of crankcase to rear of left hand block with a prefix (see below) indicating model.

Series	Engine Unit Prefix
60S, 62 (Standard)	76X-1 and up
60S, 62 (Air Conditioning)	76K-1 and up
75, 86 (Standard)	77X-1 and up
75, 86 (Air Conditioning)	77K-1 and up
62 (Dual Carbs.)	70QX-1 and up
62 (Dual Carbs. & Air Cond.)	70QK-1 and up

► *ENGINE NUMBER NOTE: "L.C." will be added as a suffix to engine unit number on all engines built to low compression specifications.*

► *NOTE:* Mark * preceding Engine Unit Number indicates cylinder bore and pistons are .010" oversize.

TUNE-UP

COMPRESSION PRESSURE: 165 to 185 lbs. (at cranking speed). 212 to 230 lbs. (at 1000 RPM).

VACUUM READING: Not specified.

► *VACUUM CHECKING CAUTION: When checking engine vacuum, shut off engine before removing vacuum hose. Plunger in vacuum operated throttle check will increase engine speed to approximately 900 RPM if hose is removed with engine running. Set hand brake firmly before checking engine vacuum.*

VALVE TAPPET CLEARANCE: None in service (hydraulic lifters).

MANIFOLD HEAT CONTROL: Automatic thermostatic type. This valve diverts exhaust gases of left hand cylinder bank through carburetor heating passages in intake manifold to right hand exhaust system, during warm-up period.

► *MANIFOLD HEAT CONTROL VALVE CAUTION:* Some cars after Engine No. 090000 had "B" type valve which adversely affects engine performance. "B" type should be replaced with "A" type, Part No. 3510508, which has larger bore diameter and 180° counterweight.

► *ENGINE DETONATION (OPERATION IN LOW OCTANE AREAS): See Note under Engine Specifications for recommended changes for foreign travel.*

IGNITION

FIRING ORDER: 1–8–4–3–6–5–7–2.

Cylinders - RIGHT BANK 2–4–6–8. LEFT BANK 1–3–5–7.

SPARK PLUG GAP: .035".

Spark Plugs - AC No. 44 (All Engines), 14 mm. Torque to 20-25 ft. lbs.

► *SPARK PLUG NOTE:* If car consistently operated at above normal speeds, cooler spark plugs, AC No. 43, may be installed.

COIL: Delco-Remy 1115082.

Ignition Current - 1.25 amps. idling. 3 amps. stopped.

Resistor - Delco-Remy No. 1927809. 1.40-1.65 ohms. On coil bracket.

► *COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil.*

DISTRIBUTOR: Delco-Remy 1110876 (Standard), 1110877 (Eldorado Eng. early), 1110898 (Eldorado Eng. later). *See "Delco-Remy Window Distributors" in Electrical Section*

Condenser - Delco-Remy 1932004. **Capacity** .18-.23 mfd.

Contact Point Set - Delco-Remy 1931988.

Breaker Gap - .016" (new & used points).

Cam Angle - 26-33°.

► *BREAKER GAP AND CAM ANGLE NOTE:* Setting cam angle at 30° will provide .016" breaker gap.

Brush Spring Tension - 19-23 ozs.

Rotation - Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	450	1-4	900
6-7.75	1300	12-15	2600
11-13	2075	22-26	4150

Vacuum Spark Control: 1116103 or 1116122 (1110876 & 1110877 Distr.). 1116124 (1110898 Distr.).

Vacuum Advance - 1116103

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	6.8-8.5
15.5	31	13.5-16

Vacuum Advance – 1116122

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	8-10
12	24	13.5-15.5

Vacuum Advance - 1116124

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	6.25-8.25
12	24	12.75-14.50

IGNITION TIMING

Setting - 5° BTDC.

Timing - Disconnect vacuum line to distributor, and with engine idling at 400 RPM, set timing at point "A" on harmonic balancer in line with pointer on cover.

Timing Mark - Timing indicator marked on harmonic balancer with two lines "A" (5° BTDC), "C" (TDC).

CARBURETOR

► *CARBURETOR APPLICATION: One 4-Barrel Carter or Rochester carburetor used on all models except Eldorado. Two Carter 4-Barrel carburetors used on Eldorado.*

► *POOR PERFORMANCE DURING WARM-UP CORRECTION: See MANIFOLD HEAT CONTROL above.*

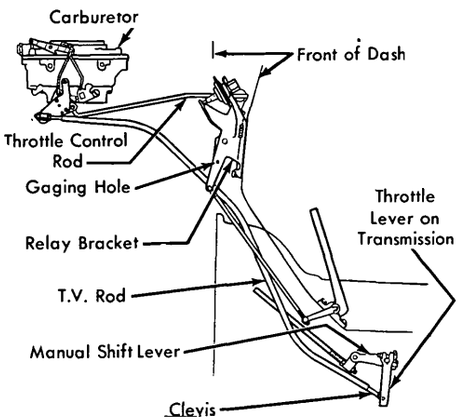
► *IDLE SPEED (AIR CONDITIONED CARS): Summer and Winter Idle Speed Adjustment is different as follows:*

Summer Setting (Air Conditioner in Operation) - With transmission selector lever in either "Dr" range, and with air conditioner "ON" set idle speed at 420 RPM (Cars with Standard Engine). 490-510 RPM (Cars with Eldorado Engine).

Winter Setting (Air Conditioner Not in Operation) - With transmission selector lever in either "Dr" range, and with air conditioner "OFF" set idle speed at 420 RPM (Cars with Standard Engine), 490-510 RPM (Cars with Eldorado Engine).

Idle Speed-Up Control Adjustment (Cars with Air Conditioning): With engine at normal operating temperature and slow idle adjustment completed, turn air conditioner "ON" and place transmission selector lever in "N" position. Adjust engine idle speed to 900 RPM by loosening locknut on diaphragm shaft and turning knurled nut to obtain specified RPM. Tighten locknut.

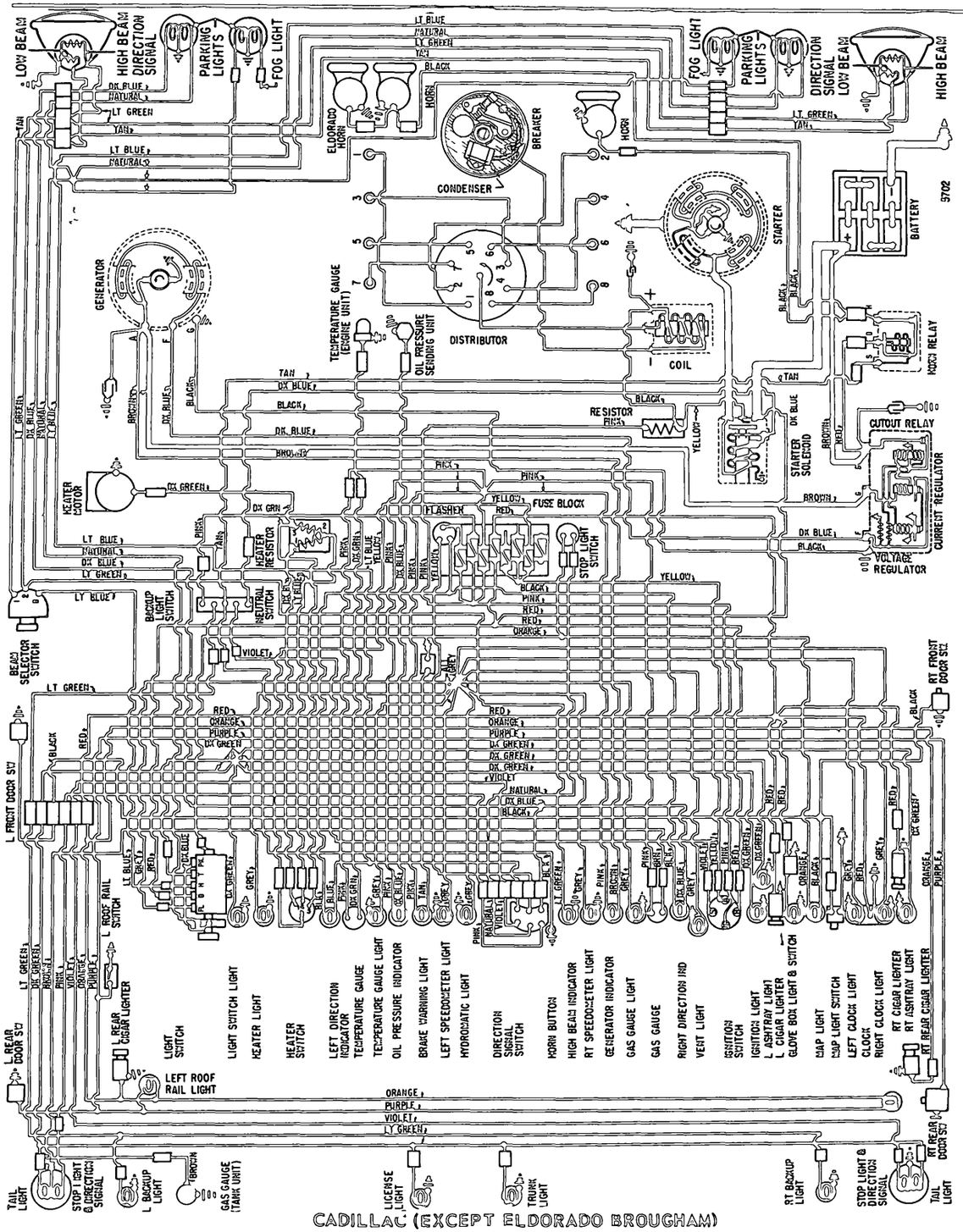
Throttle Check Adjustment: Allow engine to idle and make sure that throttle check plunger is not in contact with throttle relay lever. Open throttle wide momentarily to allow engine manifold vacuum to drop and throttle check plunger to come out. Let throttle snap shut and observe delay caused by throttle check. If engine races throttle check plunger is too long. If engine stalls, plunger is too short. Adjust plunger screw as necessary for correct operation.



CADILLAC HYDRA-MATIC THROTTLE LINKAGE

THROTTLE LINKAGE ADJUSTMENT: Remove clip from carburetor throttle rod trunnion and remove trunnion from relay bracket lever (at front of dash). Place a ¼" drill shank through gauging hole in relay lever and dash relay bracket. With engine running, set throttle lever to hot idle position (Air Conditioner turned "OFF"). Adjust carburetor throttle rod trunnion to allow free entry into dash relay lever and install trunnion and spring clip. Push end of throttle valve rod (rod from carburetor to transmission throttle lever) toward rear of car to position transmission throttle lever against its stop. Bring rear jam nut up against trunnion with throttle in hot idle position. **Back off jam nut three complete turns.** Tighten front jam nut, making certain linkage does not bind in any position. *NOTE:* It will be necessary to check and adjust throttle valve jam nut slightly to obtain smooth shifting. This should be done after completion of all other carburetor adjustments.

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CADILLAC (EXCEPT ELDORADO BROUGHAM)

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▷ *THROTTLE LINKAGE ADJUSTMENT NOTE:* Throttle valve adjustment is set at 1½ turns (instead of 3 turns) at the factory. This setting should be changed to 3 turns after 500 to 2000 miles of operation.

ROCHESTER 4GC
(Standard Engine)

Rochester 4GC. Early - No. 7010100 (without Air Conditioning), No. 7010101 (with Air Conditioning). Later - 7012000 (without Air Conditioning), 7012001 (with Air Conditioning).

▷ *CARBURETOR PRODUCTION CHANGES AND RECOMMENDED PARTS AND SETTING CHANGES FOR IMPROVED PERFORMANCE: See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

▷ *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 2-3-5-8. LEFT barrels 1-4-6-7.*

▷ *IDLE SPEED ADJUSTMENT NOTE: Idle Air By-Pass screw on throttle body is used to adjust idle speed. Throttle valves are normally closed at slow idle.*

Idle Mixture & Speed Setting - Special procedure required to insure correct mixture and speed (idle air) screw settings. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

▷ *OTHER DATA: See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section.*

Hydra-Matic Throttle Linkage Adjustment: *See "CARBURETOR" above.*

Fuel Pump Pressure: 5¼-6½ lbs. at idle speed.

CARTER AFB
(Standard Engine)

Carter AFB 2479S (Without Air Conditioning), No. 2480S (With Air Conditioning).

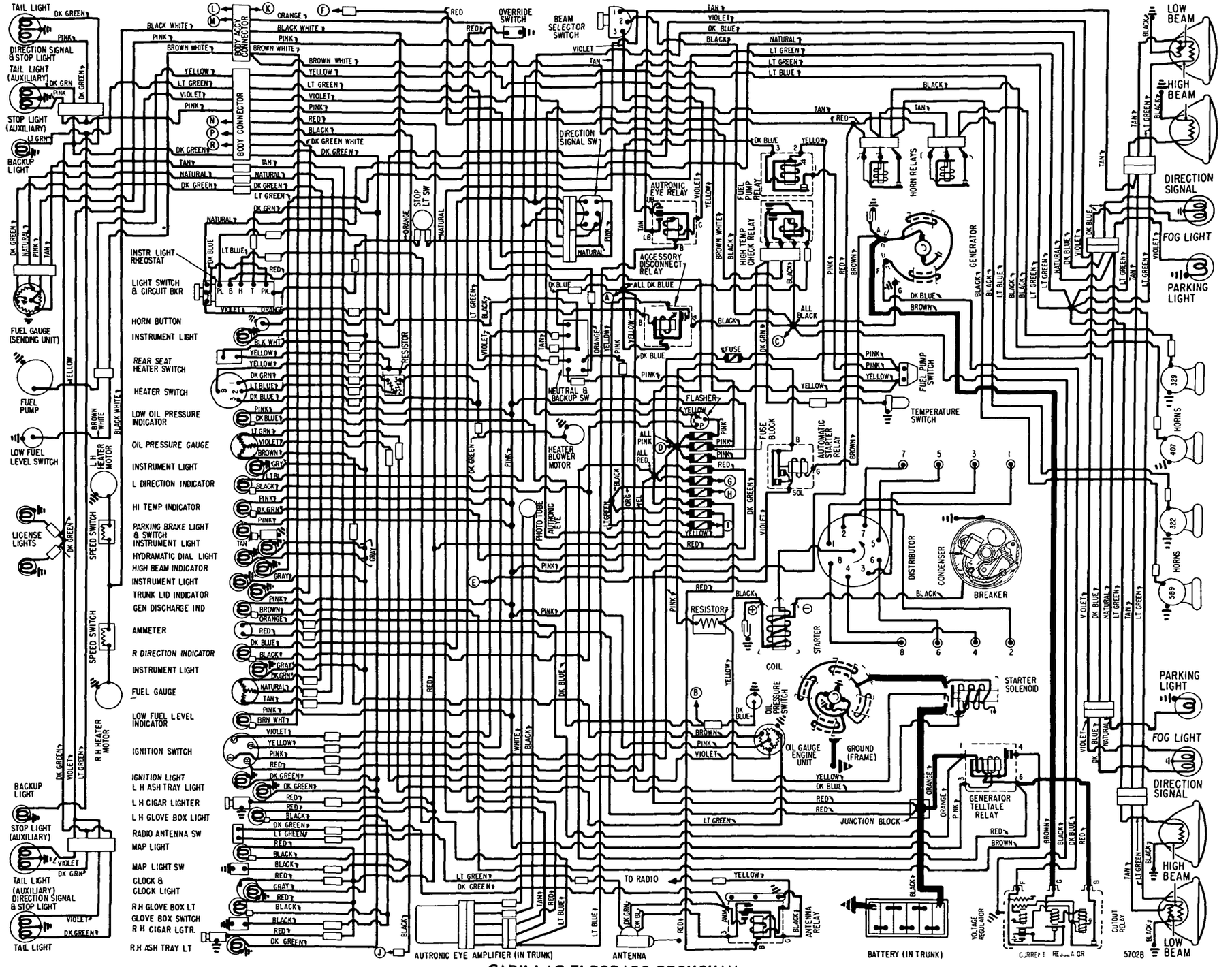
▷ *CARBURETOR REPLACEMENT NOTE:* Use Carburetor No. 2479S with Idle Speed-Up Control, Carter No. 202-114U, to replace Carburetor No. 2480S on air conditioned cars.

▷ *PRODUCTION CHANGE AND APPLICATION NOTE: This carburetor used on some cars after Engine No. 101833.*

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ELDORADO BROUGHAM WIRING DIAGRAM LEGEND

Ⓐ - To Ⓐ in Air Suspension Diagram.
Ⓑ - To Ⓑ in Air Suspension Diagram.
Ⓒ - To Ⓒ in Air Suspension Diagram.
Ⓓ - To Ⓓ in Air Suspension Diagram.
Ⓔ - To Ⓔ in Air Conditioning Diagram.
Ⓕ - To Ⓕ (Power Feed) in Various Accy. Diagrams.
Ⓖ - To Ⓖ in Air Suspension Diagram.
Ⓗ - Radio Feed.
Ⓘ - To Ⓘ (Feed) in Air Conditioning Diagram.
Ⓙ - To Ⓙ in Door Lock Diagram.
Ⓚ - To Ⓚ in Door Lock Diagram.
Ⓛ - To Ⓛ in Door Lock Diagram.
Ⓜ - To Ⓜ in Door Lock Diagram.
Ⓝ - To Ⓝ in (Body Feed) in Various Accy. Diagrams.
Ⓟ - To Ⓟ in Door Lock Diagram.
Ⓡ - To Ⓡ in Trunk Lid Control Diagram.



CADILLAC ELDORADO BROUGHAM

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►*MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyls 2-3-5-8, LEFT barrels 1-4-6-7*

►*IDLE SPEED ADJUSTMENT NOTE Idle Air By-Pass screw on throttle body is used to adjust idle speed Throttle valves are normally closed at slow idle*

Idle Mixture & Speed Setting - Special procedure required to insure correct mixture and speed (idle air) screw settings *See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section*

Hydra-Matic Throttle Linkage Adjustment: *See CARBURETOR above*

►*OTHER DATA· See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section*

CARTER WCFB (2) (Eldorado Engine)

Carter WCFB 4-Barrel is used as follows:

Car Model	Front	Rear
Without Air Conditioning (early)	2582S	2583S
Without Air Conditioning (later)	2690S	2691S
With Air Conditioning (early)	2584S	2583S
With Air Conditioning (later)	2692S	2691S

►*CARBURETOR REPLACEMENT NOTE (EARLY CARS)· Carter WCFB 2582S can be used for service replacement of 2583S & 2584S Unitized Pkg 202-111U must be used when replacing 2584S (Air Conditioned Cars)*

►*CARBURETOR REPLACEMENT NOTE (LATER CARS) Carter WCFB 2690S can be used for service replacement of 2691S & 2692S Unitized Pkg 202-111U must be used when replacing 2692S (Air Conditioned Cars)*

►*CARBURETOR PRODUCTION CHANGES AND RECOMMENDED PARTS AND SETTING CHANGES FOR IMPROVED PERFORMANCE See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section*

►*MANIFOLD FUEL DISTRIBUTION (FRONT CARB.) Right PRIMARY & Left SECONDARY barrels feed Cyl. 2-3-5-8, Left PRIMARY & Right SECONDARY barrels feed 1-4-6-7*

►*MANIFOLD FUEL DISTRIBUTION (REAR CARB.) Left PRIMARY & Right SECONDARY barrels feed Cyl. 2-3-5-8, Right PRIMARY & Left SECONDARY barrels feed 1-4-6-7.*

►*NOTE 2584S has an Idle Speed-Up Control for use with Air Conditioning*

►*IDLE SPEED ADJUSTMENT NOTE Idle Air By-Pass screw on throttle body is used to adjust idle speed Throttle valves are normally closed at slow idle.*

Idle Mixture & Speed Setting - Special procedure required to insure correct mixture and speed (idle air) screw settings. *See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section*

►*OTHER DATA See "Cadillac (Carter & Rochester) Carburetors" in Carburetion Section*

Hydra-Matic Throttle Linkage Adjustment· *See "CARBURETOR" above*

Fuel Pump Pressure· 5¼-6½ lbs. at idle speed.

CARB. EQUIPMENT

Fuel Pump: AC mechanical type (Exc Brougham) Electrical type mounted in gas tank (Brougham) Vacuum pump is part of engine oil pump

Replacement Fuel Pump (Exc. Brougham) - AC No 4362

Pressure - 5¼-6½ lbs at 1800 RPM

See "Fuel Pumps" in Carburetion Section

Gasoline Gauge: AC Electric

	Brougham	Others
Dash Unit (AC No)	1518655	1518739
Tank Unit (AC No)	1518565	1518588

See "Fuel Gauges" in Carburetion Section

Low Fuel Level Indicator (Brougham): Light on instrument panel comes on when fuel level in tank drops to 3 gallons (2 gals usable) *See Wiring Diagram*

BATTERY

Delco 3 FMR70-W (Exc. Brougham). 12 Volt, 11 plate, 70 ampere hour capacity (20 hr rate)

(Brougham) 12 volt, 11 plate, 72 ampere hour capacity (20 hr rate)

Battery Location - Separate compartment in right rear quarter panel accessible from trunk (Brougham) under hood on tray attached to radiator cradle (Others)

Battery Ground - Negative

Engine Ground - Engine to cowl

STARTER

Delco-Remy No 1107668 (Brougham), No. 1107657 (Others)

Armature - Delco-Remy No 1932185 (1107657 Str)

Drive - Overrunning clutch (solenoid pinion shift)

Rotation - Counterclockwise at commutator end

Brush Spring Tension - 35 ozs min

Performance Data - 1107668

Torque	RPM	Volts	② Amperes
0 ft lbs	3600-5100	10 6	65-100
①	Lock	3 5	300-360

Performance Data - 1107657

Torque	RPM	Volts	② Amperes
0 ft lbs	3240	10 6	91
①	Lock	3 5	395

① - Armature locked ② - Includes solenoid

Starting Switch (Exc. Brougham): Delco-Remy Solenoid Switch 1119910 mounted on starter and controlled by Ignition & Starter Switch Delco-Remy 1116536 Turn key full RIGHT against spring tension to start

Starting Switch (Brougham): Delco-Remy Solenoid Switch 1119910 mounted under starter and controlled by Ignition & Starter Switch Delco-Remy 1116536 (turn ignition "ON") and Automatic Starter Relay Delco-Remy 1119924 (Vacuum and Electric controlled) *NOTE* - Should Automatic Starter fail turn Ignition & Starter Switch to full RIGHT against spring tension to start

►*ACCESSORY DISCONNECT RELAY (Brougham) NOTE·* Delco-Remy No 1116927 Relay limits battery load by opening circuits to Air Conditioning Heater and Radio while starter is cranking engine

Neutral Safety & Back-up Light Switch· Delco-Remy 1998170 (Brougham) 1998137 (Others) Located on steering column

Adjustment - *See "Hydra-Matic Drive" in Trans Sect*

GENERATOR

Delco-Remy. Used as follows

Models	Generator No.	Armature No.
60S 62 All,75,86 Early	1102086	1932900
75, 86 Later Std	1102099	1932900
75, 86 Air Cond Early	1102060	1935778
75, 86 Air Cond Later	1102100	1935778
Brougham	1106989	1936778

Performance Data

Generator	Amperes	Volts	RPM
1102086, 99	35	14 0	2510
1102060, 100	40	14 0	2320
1106989	55	13 0	1580

Rotation - Counterclockwise at commutator end

Brush Spring Tension - 20 ozs (1106989), 28 ozs (Others)

Field Current - 1 69-1 79 Amperes (1102086,99), 2 66-2 86 Amperes (1102060,100), 2 14-2 28 Amperes (1106989) at 12 Volts

Generator Charge Indicator: Red light on instrument panel *See Diagram*

Belt Adjustment: Use Belt Tensioner Gauge J-6733 Loosen or tighten belt tension adjusting nuts so Red line on Gauge is even with the shoulder

REGULATOR

Delco-Remy. Used as follows

Model	Regulator	Generator
60S,62 All, 75 86 Early	1119002	1102086
75, 86 Later Std	1119002	1002099
75,86 Air Cond Early	1119163	1102060
75,86 Air Cond Later	1119163	1102100
Brougham	1119175	1106989

►*"DOUBLE CONTACT" REGULATOR NOTE Regulators 1119163 & 1119175 have new Double Contact Voltage Regulator*

Cutout Relay

Cuts In - 11 8-13 5 Volts

Contact Gap - 020"

Air Gap - 020"

Voltage Regulator

Setting (1119002) - 13 8-14 8 Volts at 125°F (ambient Temperature)

Setting (1119163 & 1119175) - 14-14 6 Volts (Operating on lower contacts), 3-5 Volts lower (Operating on upper contacts)

Contact Gap (1119163, 175) - 016"

Air Gap - 075" (1119002) 080" (1119163, 175) With armature pressed down to point where contacts just touch

Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section*

Current Regulator

Setting - 32-37 Amperes (1119002), 37-42 Amperes (1119163), 53-57 Amperes (1119175)

Air Gap - 075" with armature pressed down to point where contacts just touch

Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section*

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MISC. ELECTRICAL

H adlamps: Sealed Beam. Two headlamps standard on all models except Brougham. Four headlamps standard on Brougham. *See "4-Headlight" in Electrical Section.*

Autr nic Eye: *See "Autronic Eye" in Electrical Section.*

Dir ction Signal: *See "Direction Signals" in Electrical Section.*

St p Light Switch (Location): Mechanical type, mounted on brake pedal retaining bar flange.

Adjustment - Rotate cam on pedal bar until stoplights are off, when pedal is in fully released position. Adjust cam until stoplights come on at slightest movement of pedal.

FUSES: Located on fuse panel under instrument panel, except as noted below.

Air Conditioner - 25 amps. (Brougham), 20 amps. (Other).
Air Ride - 6 amps. (Brougham).
Back-up Lights - 9 amps.
Body Feed (Brougham) - 25 amps., protects Cigar Lighter, Clock, Glove Box-Map-Roof Rail lights.
B dy Feed (Others) - 25 amps., protects Cigar Lighters, Clock, Dome or Bow light, Glove Box & Trunk Light.
Fuel Pump - 6 amps. (Brougham). Left side front speaker housing.
H ater - 20 amps.
Instruments - 9 amps. Protects Instruments and all Tell-Tale lights. Instrument lights are protected by Lighting Circuit Breaker.
Direction Signals - 9 amps. *NOTE* - Cut four coils off early 6 amp. fuse holder spring for 9 amp. fuse.

CIRCUIT BREAKERS: (Lighting) - 25 amps. (Brougham), 20 amps. (Other). Located in lighting switch. Protects the following circuits: Ash Tray, Fog, Head, Instrument, Parking and Stop Lights. *NOTE* - Map light protected by circuit breaker on all except Brougham.
Hydro-Lectric System (When used) - 40 amps., located on left inner cowl panel.
S ats & Windows - 40 amps., located on left inner cowl panel. *NOTE* - Protects Brougham Trunk Lid Power Circuit.
Trunk Lock (Electric) - 5 amps., located on left inner cowl panel. Protects Trunk Lid locking circuit.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: V8 Overhead valves. Two engines used. Standard engine has Single 4-barrel Carburetor, Eldorado engine has Two 4-barrel carburetors with special intake manifold.

Bore	Stroke	Displacement	Rated HP
4"	3 5/8"	365 cu. ins.	51.2

Engine	C mpr. Ratio	D velop d HP
Standard	10.0-1	300 at 4800 RPM
Eldorado	10.0-1	325 at 4800 RPM

Compr ssion Pressure - *See TUNE-UP.*

►*OVERSIZE CYLINDER BORE CAUTION:* Engines with mark * preceding Engine Unit No. (on rear of crankcase) have .010" Oversize cylinder bore and pistons. *See "Original Bore & Pistons" in Cadillac Special Data.*

►*ENGINE OPERATION IN LOW OCTANE FUEL AREAS (Foreign Travel):* Standard 1957 engine requires 97 (Research Method), 87 (Motor Method) Octane rating gasoline to prevent detonation. When only lower Octane rating gasoline is available, compression ratio should be lowered. Install special low compression pistons. Part No. (Std.) 3630787 or (.010") No. 3630788, (.020") No. 3630789, (.030") No. 3630790 Oversize. *NOTE* - No changes in Distributor, Carburetor or Timing required.

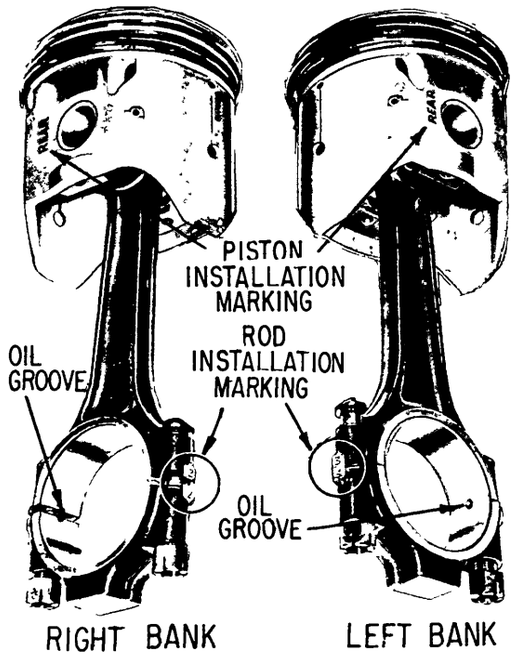
►*LOUD CLICKING NOISE CORRECTION & PISTON PRODUCTION CHANGE:* To correct loud clicking noise (under light load conditions) which stops when spark plug wire is disconnected from noisy cylinder, replace early type cam ground scuff band piston with later round head type. New design pistons entered production with Engine No. 091632 (Air Cond. Cars), No. 091594 (less Air Cond. Cars), No. 094206 (Brougham).

►*CLICKING OR RATTLING NOISE CORRECTION:* To correct, rebend oil filter line where it contacts front engine cover due to vibration. This noise is similar to noise produced by pressure regulator valve.

►*ENGINE BALANCE CHECK & UNBALANCE CORRECTION: See "Engine Balancing" in Cadillac Special Data.*

ENGINE REMOVAL: *See "Engine" in Cadillac Special Data.*

OIL PAN REMOVAL: *See "Oil Pan" in Cadillac Special Data.*



CADILLAC PISTON & ROD ASSY.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Cadillac Special Data.*

TIGHTENING TORQUES: *See "Tightening Sp cifications" in Cadillac Special Data.*

PISTONS

►*ORIGINAL CYLINDER BORE CAUTION:* Engines with mark * preceding Engine Unit No. (on left rear of crankcase) have .010" oversize pistons and cylinder bore. Standard cylinder bore size: 4:0000-4:0020".

Original Bore & Pistons - *See "Original Bore & Pistons" in Cadillac Special Data.*

Pistons - Two types used. Early type had cam ground scuff bands on top and second lands, later type had round top pistons without scuff bands. *See "Clicking Noise Correction" early type piston cars above.*

Weight - 22.72 ozs. (less pin).

Removal - Piston and rod assemblies removed from above. Install connecting rod Guide studs J-3224; on connecting rod bolts to guide rod out through bore without nicking or scratching. *CAUTION - Do not nick lower edge of bore when pushing rod up.*

Fitting New Pistons: Use micrometer or feeler gauge. *See "Pistons" in Cadillac Special Data.*

Replacement Pistons: Standard (Code "L" or "M") and .010", .020", .030" Oversize with rings and pin.

Installing Pistons: Install in cylinder with piston pin boss marked "Rear" toward rear of engine. *See "Connecting Rods" (below) for installation of pistons on rods.*

PISTON PINS

Pin is pressed in connecting rod.

Diameter - 1.000". **Length** - 3 3/32".

Pin Fit in Piston - .00005-.0001" clearance at 70°F. Not fitted in field (replace piston & pin assembly).

Pin Fit in Rod - (NOTE - Special tools required). *See "Piston Pins" in Cadillac Special Data.*

PISTON RINGS

Top compression ring is chrome plated, second compression ring is lubrited. An expander is located behind oil ring.

Ring	Width	End Gap ①	Sid Cl aranc
Compr.(#1&2)	5/64"	.013-.023"	.0017-.0035"
Oil (#3)	3/16"	.013-.023"	.0008-.0026"

① - With Standard 4.0000" cylinder.

Replacement Rings: Standard, .010", .020", .030", oversize.

►*REPLACEMENT RING NOTE:* Use re-ring sets with chrome top compression ring and expander behind oil ring or multi-piece oil rings.

Installing Rings: Chamfered face of both compression rings must be installed toward top of piston.

CONNECTING RODS

Length - 6.625" (center to center).
Weight - 23.49 ozs.
Crankpin Journal Diameter - 2.2488-2.2493".
Out- f-R und Limits - .00025".
Bearings - Durex 400, bearing shell is steel backed aluminum. Bearing halves interchangeable. No shims.
Cl aranc - .0005-.0021" (Service limit .0035").

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Replacement Bearings: Furnished in standard size only.
Installing Rods: Install piston and rod in cylinder bore with "REAR" on piston toward rear of engine and numbers on lower end of rod down. Numbers 1,3,5,7 are in left bank, 2,4,6,8 are in right bank.

CRANKSHAFT

Journal Diameters - 2.625".
Out-of-Round Limits - .0025".
Bearings - Rear, steel backed babbitt, shell type insert. All other bearings are Moraine 400 Aluminum.

►*REAR MAIN BEARING INSTALLATION CAUTION:* For proper alignment of thrust surfaces of rear main bearing proceed as follows: Install upper and lower inserts in block and bearing cap. With rear oil seal in place and mating surfaces clean, install bearing cap and tighten screws to 1-2 ft. lbs. torque. Using a plastic hammer, drive crankshaft forward, then rearward, then forward again (*CAUTION* - Pound on counterweights, not on connecting rods). Tighten bolts evenly to specifications. Check to make sure crankshaft is not binding.

►*MAIN BEARING CAPSCREW NOTE: Lockwashers not used under heads of bearing cap retaining screws.*

Clearance - .0008-.0025" (service limit .002" front, .003" others).
Replacement Bearings: Furnished in standard size only.
End Thrust: Taken by flanged rear main bearing.
End Play - .001-.005" (service limit .010").

►*HARMONIC BALANCER TO CRANKSHAFT SCREW PRODUCTION CHANGE & CAUTION:* Use only new type screw Part No. 1468651 with smaller diameter shank between threaded portion and head of screw and install without lockwasher, but include flatwasher. This replaces old screw Part No. 455012. Tighten screw to specifications.

Crankshaft Removal: *See "Crankshaft & Bearings" in Cadillac Special Data.*
Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Bearings" in Cadillac Special Data.*

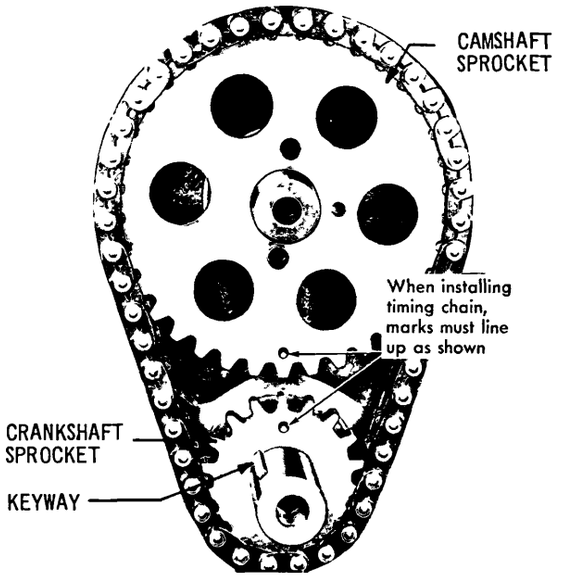
CAMSHAFT

►*CAUTION:* Handle shaft with care to avoid damage or mis-alignment. Check whenever removed.

Removal, Alignment & Installation - *See "Camshaft & Bearings" in Cadillac Special Data.*
Bearings - Steel backed babbitt bushings.
Clearance - .001-.0022" (service limit .004" max.).
Bearing Out-of-Round Limit - .002" max.
Timing Chain: Link-Belt side guide type. **Width** 11/16", **Pitch** .500", **Length** 23" or 46 links.
Installation & Removal - *See "Timing Chain" in Cadillac Special Data.*

Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks adjacent and in line with straightedge across shaft.

►*CAUTION:* Install chain as a unit with camshaft sprocket (sprocket press fit on shaft with locating dowel and two retaining capscrews).



CADILLAC VALVE TIMING MARKS

VALVES

Tappet Clearance: None in service, hydraulic.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.875"	.3415-.3425"	4.688"
Exhaust	1.437"	.3415-.3420"	4.694"

Valve	Seat Angle	Lift	Stem Clearance
Intake	ℂ 44°	.451"	ℚ .0010-.0025"
Exhaust	ℂ 44°	.451"	ℚ .0010-.0025"

ℂ - New Valves (Valves in service can be refaced to 45° if seat width recommendation not exceeded).
ℚ - New valves and guides. Worn limit .005" maximum.

►*NEW VALVE SEAT CAUTION:* Do not lap or grind so that seat width is more than 1/64" (1° difference between valve and seat angle designed to provide "hairline" contact.

Valve Seat Recommendations - 3/64-1/16" (moderate speed or city driving), 1/16-3/32" (high speed driving). Cut seat so that distance from outer edge to edge of flange on valve head not more than 1/32".
Valve Stem Oil Seal - Rubber oil seal installed in lower groove on valve stem (below valve keeper).
Oil Seal Installation - *See "Valve System" in Cadillac Special Data.*
Valve Guides: Pressed in cylinder head from combustion chamber side with longest chamfer end pointing toward rocker arm side of head. Use Remover Tool J-3062 to drive out old guides (toward top of head), and Installer Tool J-3066 to drive new guides in (tool plate serves as stop for driver).
Valve Springs: Free Length 2.25" (Approx.).

Valve Spring Specifications	Pressure	Length
Valve Closed	60-65 lbs.	1.946"
Valve Open	155-165 lbs.	1.496"

►*SPRING INSTALLATION CAUTION:* Lower end of valve spring must be seated in recess in cylinder head.
Valve Lifters: Hydraulic.
See "Valve System" in Cadillac Special Data.
Valve Lifter Removal - *See "Valve System" in Cadillac Special Data.*

►*HYDRAULIC LIFTER PRODUCTION CHANGE & CAUTION:* Beginning with Engine No. 042804, new type Hydraulic Lifter Assembly & Pushrod entered production. DO NOT mix new type Hydraulic Lifter Assembly or Pushrod with earlier type. New type Hydraulic Lifter Part No. 5231740 requires the usage of New Type Pushrod Part No. 1468453. New lifter has wider relieved section with only one oil feed hole. New Pushrod does not have grooves at ends and is .187" shorter than early type.

Rocker Arm Assembly: *See "Valve System" in Cadillac Special Data.*

►*ROCKER ARM COVER PRODUCTION CHANGE:* Gasket contact flange increased to 1/8" width approx. Engine No. 007149. Gasket increased in same manner. Cover with gasket is interchangeable with earlier type when used together. When installing New Type Cover & Gasket, tighten cover attaching screws to new specifications.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE: Specifications are "Without Ramp"*

Intake Valves - Open 25° BTDC Close 78° ALDC.
Exhaust Valves - Open 75° BLDC. Close 28° ATDC.
Valve Timing Check - Not practical to check in field. Manufacturer recommends removing timing chain cover and checking timing gears.

OILING SYSTEM

Crankcase Capacity: 5 qts. Add one qt. when changing filter.
Normal Oil Pressure: 30-35 lbs. min. at 30 MPH. 15 lbs. at idle speed.
Pressure Regulator Valve - On oil pump. Not adjustable.
Oil Pressure Indicator (Exc. Brougham) - Light on instrument panel controlled by pressure switch AC No. 1508648, mounted on engine.
Oil Pressure Indicator (Brougham) - Light on instrument panel controlled by pressure switch AC No. 1508624, mounted on engine.
Oil Pressure Gauge (Brougham) - AC electric in addition to Indicator.
Dash Unit - AC No. 1518655.
Engine Unit - AC No. 1508566.
See "Oil Pressure Gauges" in Miscellaneous Section.
Oil Pump: Helical gear. Mounted on rear main bearing cap.
Oil Pump Removal & Overhaul - *See "Oiling System" in Cadillac Special Data.*
Vacuum Pump: Part of Oil Pump Assembly. *See "Vacuum Pump" in Cadillac Special Data.*
Oil Filter: Full flow (Brougham), Partial flow (Others). Replace element every 6,000 miles or more frequently in dusty areas.

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Crankcase Ventilation: Air intake in oil filler cap (oil wetted type) with outlet connection at rear of valve compartment cover, and outlet pipe extending down below engine at right corner.

COOLING

►*BELT TENSIONER GAUGE NOTE:* Belt Tensioner Gauge Tool No. J-6733 released for field service for more accurate belt adjustments. Place Gauge on belt, loosen belt tension adjusting nuts, and tighten or loosen belt until red line on barrel is in line with shoulder.

Water Capacity: (With Heater) Models 62, 60S, 86-20 qts.; Model 75-21 qts.; Brougham 22½ qts.

(Without Heater) Except Brougham 19 qts.

Pr ssure Valve: AC No. 850800. Radiator filler cap. Opens at 12-15 lbs.

Th rmostat: Dole type. In water outlet at top of pump body.

Standard Setting - Starts to open at 163° to 168°F.

High Temp. - Starts to open at 177° to 182°F.

Water Pump: Packless, sealed ball bearing type.

See "Cadillac" in Water Pump Section.

Pump Removal - Drain cooling system. Remove all belts. Disconnect throttle spring. Detach Power Steering pump and bracket assembly and secure to one side. Remove two remaining thermostat housing screws, housing and thermostat. Disconnect lower radiator hose and upper and lower heater hoses. Loosen clamp on transmission Oil Cooler hose. Remove remaining pump flange to cyl. block screws and remove Oil Cooler hose. On Air Cond. cars, remove two compressor mounting bracket screws from water pump flange. Loosen compressor support screw and move support away. Remove water pump and gaskets.

T mperature Gauges (Exc. Brougham): AC electric.

Dash Unit - AC No. 1513326.

Engine Unit - AC No. 1513130.

T mperature Gauge (Brougham): AC No. 1513301. Mechanical.

High Temperature Indicator (Brougham): Light on instrument panel controlled by thermal switch in left cylinder head. Light comes on when engine temperature reaches approx. 239°F.

HYDRA-MATIC DRIVE

"Jetaway". Four speed hydraulically controlled automatic transmission of same design as used on previous models.

►*WHISTLING AND/OR BUZZING NOISE CORRECTION: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

Lubricati n - Check fluid level avery 2,000 miles, drain and refill every 12,000 miles or once a year. Use only Cadillac Hydra-Matic Fluid.

►*LUBRICATION CHANGE NOTE:* When vehicle is driven under heavy duty conditions (heavy city traffic, continuous mountain driving, prolonged driving during hot weather) it is advisable to drain and refill transmission at 6,000 mile intervals.

Capacity - 12 qts. (approximately). *NOTE* - The correct level is ¼" below the "Full" mark with transmission hot and engine running.

Checking Fluid Level - Run engine with selector lever in "N" (Neutral) or "P" (Park) position at 800 RPM for 1½ minutes to normalize temperature and to be sure coupling is full. Reduce engine speed to slow idle, clean dipstick and check fluid level. With engine running, add fluid through dipstick tube to bring fluid level to ¼" of "FULL" mark on dipstick. *NOTE* - From "LOW" to "FULL" mark on dipstick requires 1 qt. of fluid.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Dual-Coupling Hydra-Matic" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type. Three used with two piece propellor shaft and center bearing.

Propeller Shaft Center Bearing: *See "Propeller Shaft" in Cadillac Special Data.*

REAR AXLE

Own Make. Hypoid gear, semi-floating with Hotchkiss Drive.

See "Cadillac Hypoid" in Rear Axle Section.

►*REAR WHEEL BEARING OIL LEAK CORRECTION:* Check for rubber flashing or nick indicating defective "O" ring located between bearing and housing and replace if found defective.

►*OVERHAUL CAUTION:* Manufacturer recommends that Carrier Assembly be serviced by replacement. DO NOT disassemble this unit or attempt service work other than oil seal and universal joint replacement

Axle Identification - Gear ratio identified by number stamped on front face of carrier assembly at end of oil return passage. *NOTE* - Brougham rear axle assemblies further identified by letter "B" preceeding axle ratio number.

Series	Ratio	Mark
60,62 Exc.Eldorado & AC Cars	3.07-1	3
75,6278,6237S,60&62 With AC Ⓒ	3.36-1	6
86 Ⓒ	3.77-1	7
Brougham	3.36-1	B6

Ⓒ - Optl. on 60 & 62 without AC. Ⓒ - Optl. on 75.

►**Pinion Bearing Pre-Load Caution:** Must be adjusted each time pinion shaft nut loosened. *See "Cadillac Hypoid" in Rear Axle Section.*

Axle Shaft Removal: Remove wheel and take out screws holding brake drum on axle shaft flange and remove drum. Remove nuts and lockwashers from bolts holding bearing retainer and backing plate on axle housing, use Puller J-942-1 and Slide Hammer J-2619 to remove axle shaft.

►*CAUTION:* Use care not to damage axle shaft oil seal when sliding axle shaft out and do not disturb position of backing plate on housing.

C mmercial Cars -Remove wheel, remove nut and washer on end of shaft. Use Puller (Snap-On No. S4567 or similar five jaw type) to remove wheel hub and brake drum. Disconnect brake line. Take out retaining screws and remove dust shield (bearing retainer) and backing plate. Use Puller J-838 to pull axle shaft and bearing assembly out, using care not to damage oil seal in housing.

Differential Carrier Removal: Disconnect rear universal joint and remove lubricant from rear axle housing. Remove axle shafts (see above). Remove nuts and washers holding carrier to axle housing and remove entire assembly with gasket. *See "Overhaul Caution" above.*

Wheel Bearings: Sealed ball-bearing type.

►*CAUTION:* Check bearings for loss of lubricant when shaft removed. If bearings spin freely indicating loss of lubricant, replace bearings.

Pinion Bearing Preload Adjustm nt: Pinion should be adjusted whenever nut on end of pinion shaft disturbed (for universal joint yoke or oil seal replacement).

See "Cadillac Hypoid" in Rear Axle Section.

SHOCK ABSORBERS

Delco. Direct acting permanently sealed airplane type.

(Brougham) - Mounted in tower on frame crossmember (front), lower end attached to bracket at rear edge of lower suspension arm (rear).

(Others) - Located within coil springs (front), "Sea-Leg" type installation (rear).

Shock Abs rbers

Series	Ⓒ Fr nt	Ⓒ Rear
60S, 62	5535529	5535530
75, 86	5535531	5535532

Ⓒ - Cadillac part numbers.

FRONT SUSPENSION
(Exc. Brougham)

Independent type with direct acting shock absorbers within coil springs.

See "Cadillac" in Suspension & Wheel Alignment Section.

Steering Axis Inclination - 4°

Caster - 0° to Neg. 1°. Adjustment must be equal within ½° or less on both sides of car.

Camber - Neg. 3/8° to Pos. 3/8° with ¼-½° more positive camber on left side.

Toe-In - 3/16-1/4" (standing). Loosen clamp bolts, turn adjusters at outer end of each tie rod equally.

►*TIE ROD PRODUCTION CHANGE & CAUTION:* New tie rod entered production with Engine No. 023831 requires accurate positioning of sleeve clamps to eliminate interference with frame. All cars after Engine 023830 should have openings in clamps d wn and clamp bolts parallel with ground.

Toe-Out on Turns - With outer wheel turned 20°, inner wheel should be 22°40'.

FRONT SUSPENSION
(Brougham)

Independent type with direct acting shock aborbers with "Air Suspension" in place of coil springs.

See "Cadillac" in Suspension & Wheel Alignment Section.

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Steering Axis Inclination - 4°.
Caster - 0° to Neg. 1°. Adjustment must be equal within ½° or less on both sides of car.
Camber - Neg. 3/8° to Pos. 3/8° with ¼-½° more positive camber on left side.
Toe-In - 1/8" ± 1/32" (standing). Loosen clamp bolts, turn adjusters at outer end of each tie rod equally.

►*TIE ROD PRODUCTION CHANGE & CAUTION:* New tie rod entered production with Engine No. 023831 and requires accurate positioning of sleeve clamps to eliminate interference with frame. All cars after Engine 023830 should have openings in clamps **down** and clamp bolts parallel with ground.

STEERING

Power Steering: Saginaw (In-Line) Hydraulic. Hydraulically operated in-line power steering gear which combines the recirculating ball type gear with a concentric hydraulic booster.
See "Saginaw (In-Line) Power Steering" in Steering Sect.

►*FRONT TIRE RUB CORRECTION:* Reposition stabilizer bar to center it. If tires still rub stabilizer bar, install new type Steering Knuckle Stop Part No. 1468700 on each side. The stop is "U" shaped metal stamping attached to lower suspension bar by the rear outer spherical joint attaching bolt.

Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Saginaw (In-Line) Power Steering" in Steering Section.*
Steering Gear Removal: *See "Saginaw (In-Line) Power Steering" in Steering Section.*

BRAKES

Bendix (Hydraulic) Single Anchor (Without Eccentric). Conventional two shoe. Parking brake applies rear wheel service brakes.
See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

►*BRAKE SPRING SILENCER NOTE:* Brake Drum Silencer Spring discontinued with Engine No. 012025 as unnecessary with improvements in brake assemblies.

►*BRAKE SQUEAK CORRECTION:* 1) Replace Washer Part No. 5456106 (if perfectly flat). This washer must flex into face of star wheel as brakes are applied. 2) Increase clearance (for adjuster in brake shoe web to eliminate bind) by filing the brake shoe web.

Drums - Diameter 11.995-12.005". **Out-of-Round Limit (I.D.)** - (62,60S) .007" (front & rear), (75,86) .007" front, .006" rear. Regrinding limits 12.060".
Wheel Cylinder Diameter - 1 1/8" front, 1" rear.
Lining: Molded type riveted to shoes. Primary shoe lining has ½" wide circumferential groove 1/8" deep full length.
Replacement Linings - Furnished in Standard size only.

Lining Length & Width

Model	Primary	Secondary
62,60S (front & rear)	10.12" x 2½"	12.98" x 2½"
75,86 (front & rear)	12.98" x 2½"	12.98" x 2½"

Thickness - ¼" All.
Braking Power - (62,60S,75) 55.8% front, 44.2% rear. (86) 52.8% front, 47.2% rear.
Clearance - .010" (top), .015" (bottom). Adjusting screw backed off 14 notches from point where wheel can just be turned by hand.
Standard Master Cylinder: Located on left frame side member.
Checking Fluid - Master cylinder reservoir located on left front fender apron adjacent to Hydrovac Power Unit. Fill to within ¾" of top.
Removal - Remove heat guard. Disconnect outlet fitting and brake filler tube fitting. Disconnect pedal to relay rod from relay by removing snap ring and retainer. Remove screw securing master cylinder to frame and disconnect pedal from actuating arm and remove master cylinder.
Power Brakes: Hydrovac Power Unit. Used with standard master cylinder.
See "Hydrovac Power Unit" in Brake Section.

►*HYDROVAC BRAKE CONTROL VALVE AIR SEAL PRODUCTION CHANGE & CAUTION:* Effective with engine No. 025800 Hydraulic Control Valve Air Seal reversed to assist hydraulic seal in prohibiting brake fluid from being drawn into vacuum side of system and into intake manifold. If above difficulty experienced on early cars, reverse Air Seal as described above.

►*POWER BRAKE BUZZING NOISE CORRECTION:* Air in fluid at control valve assembly causes valve vibration when brakes are released or applied, causing buzzing noise. To correct bleed system, especially at fitting above control valve assembly. Repeat if necessary. If correction NOT permanent, check for air leaks into fluid at master cylinder, wheel cylinders or within power unit itself.

►*HYDROVAC POWER BRAKE HYDRAULIC CYLINDER SEAL NOTE:* Hydraulic cylinder secondary seal Part No. 2248162 (In late repair Kit No. 1467730 or order separately) incorporated in power brake unit on late production cars to eliminate possibility of brake fluid leakage between cylinder and end plate. Seal is located under hydraulic cylinder lock nut. Install this seal on early production cars for correction of leaks in this area.

Removal of Power Unit - Disconnect filler tube, vacuum inlet, hydraulic inlet and outlet fittings and cap lines. Remove four bolts securing unit to cowl and remove unit.

MISC. MECHANICAL

Windshield Wipers: Cable operated - Vacuum type.
See "Windshield Wipers" in Miscellaneous Section.
Trunk Lid Lock: Trunk lid electric lock operated by switch in glove compartment.
See "Cadillac Rear Comprtment Lid Lock" in Misc. Sect
Trunk Lid Control (Brougham): Reversible electric motor operating a jack screw and limit switches which control opening and closing of the trunk lid.
See "Eldorado Brougham Lid Lock" in Miscellaneous Section.
Power Window Regulators: Electric, with reversible motor in each window.
See "Electric Window Regulators" in Miscellaneous Section.
Power Top Control: Hydro-Lectric with "sealed" system which does not require periodic draining and refilling.
See "Top Controls" in Miscellaneous Section.
Door Lock (Eldorado Brougham): Front door lock solenoid controlled by switch in each door. Rear door lock solenoid controlled by neutral switch (that causes inside handle to free wheel), plus a safety interlock switch which controls interlock solenoid which prohibits transmission selector lever from moving into drive position with either rear door open.
See "Eldorado Brougham Door Locks" in Miscellaneous Section.
Power Seat Adjusters (2-Way): Electric type with single reversible type motor for horizontal adjustment.
See "GM 2-Way Seat Regulators" in Miscellaneous Section.
Power Seat Adjusters (6-Way): Electric type with single adjustable motor. *See "GM 6-Way Seat Regulators" or "Eldorado Brougham Seat Regulators" in Misc. Sect.*
Air Conditioning: Frigidaire & Harrison, with magnetic compressor clutch (compressor operates only with switch "ON").
See "Frigidaire & Harrison (GM) Air Conditioning" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

	6 Cyl. Ft. Lbs.	V8 Ft. Lbs.
Cylinder Head	90-95	60-70
Intake Manifold	① 15-20	25-35
Exhaust Manifold	①15-20	25-35
Oil Pan	② 12 1/2-15	②12-15
Main Bearing Caps	100-110	60-70
Flywheel	50-65	55-65
Con Rod Caps	35-45	30-35
Rocker Arm Support Bracket	25-30	
Rocker Arm Cover		2 1/2
Engine Front Cover	6-7 1/2	6-8
Clutch Housing	45-55	25-35

①—Tighten two end clamp bolts to 25-30 ft lbs.
②—Corner bolts Tighten other flange bolts to 6-7½ lbs. (6 Cyl.), 6-9 lbs. (V8).

ENGINE

6 CYL. PASS. CARS

ENGINE REMOVAL: Drain cooling system, crankcase, and transmission and proceed as follows

1) Scribe alignment marks on hood around hood hinges Disconnect right hand headlamp, parking lamp, and horn wires and remove wires from radiator core support brace. Remove both horns. Remove radiator hoses and heater hoses on models so equipped On Powerglide models, remove and plug oil cooler lines.

2) Remove radiator core support to fender bolts, core support to fender side baffle bolts and core support to front cross member bolts. Remove radiator core and core support Remove battery, battery support and battery cables.

3) Disconnect starter and generator wires, engine to body ground strap, oil pressure indicator wire at switch on block and coil primary lead at coil Remove windshield wiper motor Remove temperature indicator element from cylinder head Remove air cleaner

4) Disconnect gasoline feed pipe from fuel pump and disconnect vacuum lines at intake manifold Remove exhaust pipe to manifold bolts. Disconnect carburetor control rod from dash panel bell crank. Remove transmission control rods. Remove clutch control bellcrank and control rods on conventional transmission models On overdrive models, disconnect overdrive wires and cables. On Powerglide models, remove oil filler tube and plug opening

5) Disconnect speedometer cable at transmission Split universal joint Remove propeller shaft. Remove rocker arm cover and install lifting hooks from Kit J-4536 in cylinder head bolt holes. Raise engine slightly and remove all four engine mounts Remove the engine and transmission from chassis as a unit.

V8 PASS. CARS

ENGINE REMOVAL· Drain cooling system, crankcase, and transmission and proceed as follows

1) Scribe alignment marks on hood around hood hinges and remove hood from hinges Remove radiator hoses and heater hoses Remove radiator core support to core bolts and shims On Powerglide & Turboglide cars remove and plug oil cooler lines Remove radiator core

2) Remove battery, battery support and battery cables. Disconnect starter and generator wires, engine to body ground strap, oil pressure indicator wire at switch on block and coil primary lead at coil

3) Remove windshield wiper motor. Remove temperature indicator element from cylinder head. Remove air cleaner, fan blade and pulley Disconnect gasoline feed pipe from carburetor and vacuum lines from intake manifold Remove distributor and coil Disconnect carburetor control rod from dash panel bell crank

4) Disconnect exhaust cross over pipe from exhaust pipe and muffler assembly Remove transmission control rods Remove clutch bell crank and control rods on conventional transmission models On Overdrive models, disconnect overdrive wires and cables On Powerglide & Turboglide cars remove oil filler tube, plug opening and disconnect oil cooler lines Disconnect speedometer cable at transmission

5) Split rear universal joint and remove propeller shaft Remove choke heat tube and rocker arm cover and install two eye bolts and spacers from Kit J-4536-A in cylinder head bolt holes. Raise engine slightly and remove all four engine mounts Remove engine and transmission from chassis as a unit, tilting engine to clear radiator core support

6 CYL. TRUCKS

ENGINE REMOVAL (6 CYL. TRUCKS): Drain cooling system, crankcase, and transmission, then proceed as follows·

1) Disconnect hood springs and hinges, remove hood. Remove radiator support bracket-to-fender bolts, support-to-frame crossmember bolts, then remove radiator and support.

2) Remove battery cable and ammeter wire from starter switch terminal. On vehicles with push-button starter, remove battery cable and ammeter wire from large terminal on solenoid and starter switch wire from small terminal (tape end of battery cable to prevent shorting).

3) Disconnect coil lead from distributor terminal and pull coil high tension wire from center of distributor cap. Remove two coil mounting screws and lay coil with wires attached on dash. Disconnect engine ground strap from frame, gasoline line from fuel pump, generator and field wires from generator.

4) Remove air cleaner and disconnect choke and throttle control cables from carburetor (when used). Remove temperature indicator element from cylinder head and disconnect oil pressure line at cylinder block.

5) Disconnect windshield wiper and Hydrovac vacuum lines (if so equipped). Remove exhaust pipe flange-to-manifold bolts. Remove starter pedal, then remove accelerator pedal from accelerator rod (if so equipped).

6) One ½ and ¾ Ton with conventional transmission, remove control rods from bellcrank on left side of clutch housing. On automatic transmission models, disconnect transmission control and throttle linkage rods from transmission. On 1 Ton models, remove coolant line clips from dash and frame panels. On other models, remove floor mat and transmission floor pan cover.

7) On 1 Ton models, remove cotter key and pin attaching parking brake pull rod assembly to parking lever. On 1½ and 2 Ton models, disconnect parking brake lever return spring from brake operating lever and remove cotter key and pin attaching inner and outer levers to parking brake operating lever.

8) On 1, 1½, and 2 Ton models, remove transmission cover with parking and gearshift lever. Place piece of cardboard on top of transmission to prevent dirt falling in during removal.

9) Disconnect speedometer cable from transmission and clutch link-to-pedal arm (if so equipped). Remove propeller shaft.

10) Remove rocker arm cover, rocker arm attaching bolts, rocker arm, shaft assembly and pushrods.

11) With Lift Kit J-4536-A, raise engine slightly, remove all four engine mounts and raise engine and transmission from chassis as a unit. Remove crankcase ventilator pipe, then remove starting motor, generator and fan belt.

V8 TRUCKS

ENGINE REMOVAL (V8 TRUCKS): Same as V8 Pass. Cars except as follows Remove windshield wiper motor Disconnect Hydra-Matic oil cooler and plug the openings. Remove propeller shaft.

ENGINE MOUNTINGS

PASS. CARS & TRUCKS

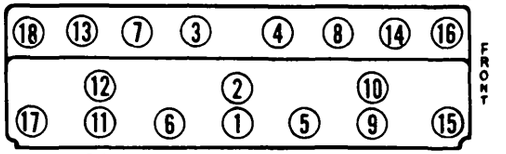
ENGINE MOUNTING REPLACEMENT: (Front Mounts)— Remove top and bottom stud nuts and remove washer and cushion between each nut and the cross member or engine bracket Raise front of engine (On V8 models, remove the distributor cap before raising engine). *CAUTION—Raise engine only far enough for clearance.* Replace necessary cushions

Rear Mounts· Support engine weight to relieve rear mounts Remove mount attaching bolts from frame outrigger and flywheel housing (or Powerglide Transmission) and remove support Install new support and bolts and tighten securely with engine weight resting on mounts

CYLINDER HEAD & MANIFOLD

ALL ENGINES

CYLINDER HEAD INSTALLATION (6 CYL. ENGINES): Use torque indicating wrench to tighten cylinder head capscrews in correct sequence as shown in diagram



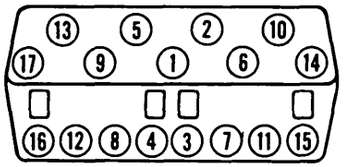
CHEVROLET 6 CYL CYLINDER HEAD

CYLINDER HEAD INSTALLATION (V8 ENGINES): Coat steel head gasket with a good head gasket paste and install gaskets in position on cylinder block Install heads over dowels in block Coat threads of all bolts with Permatex No 3 (head bolts protrude into water passages) Use a torque indicating wrench and tighten bolts a little at a time to 60-70 ft lbs in the sequence shown in diagram

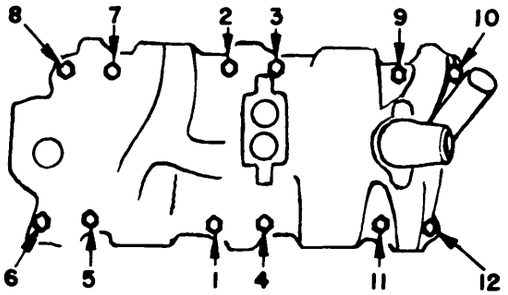
INTAKE MANIFOLD INSTALLATION (V8 ENGINES): Install manifold end gaskets on cylinder block Coat ends of intake manifold side gaskets around water passages with a good sealing compound and install heads Tighten bolts a little at a time to 25-35 ft. lbs torque

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CHEVROLET V8 CYLINDER HEAD



CHEVROLET V8 INTAKE MANIFOLD

PISTON PINS

V8 ENGINES

PISTON PINS (V8 ENGINES): Removal - Install pilot of Tool J-5538 (see alteration note below for 1957 283" Engine), plus adapter tool 5538-9 (265" engine), on puller screw, with pilot, through piston and pin. Install tool support over threaded end of puller screw with small end of support against piston. Install nut loosely on puller screw and place assembly in arbor press so that pin can be pressed out through support.

► *1957 283" ENGINE TOOL J-5538 ALTERATION NOTE:* Tapered end of support must be cut back at smaller angle to centerline of support to avoid breakage of bottom piston ring land.

Installati n: Lubricate pin holes and position connecting rod in its respective piston so that flange or heavy side of rod at bearing end will be toward **front** of piston (cast depression in head of piston and "F" marks on piston struts) on #1-#3-#5-#7 pistons and rod flange to **rear** of piston on #2-#4-#6-#8 pistons. Install piston pin on puller screw and pilot on screw. Install puller screw through piston and rod, indexing pilot through piston and rod. Install support over threaded end of puller screw with small diameter toward piston. Install nut on puller screw and tighten with a torque wrench to start piston pin into connecting rod *(CAUTION–If pin can be started into connecting rod with l ss than 15 ft. lbs. torque, clearance is excessive).* Install in arbor press and press piston pin in until pilot bottoms in support to properly position pin in rod.

CRANKSHAFT & MAIN BEARINGS

ALL ENGINES

6 CYL. & V8 MAIN BEARING REPLACEMENT (With Engin in Car): Upper bearing halves can be "rolled" out for replacement. Proceed as follows:

1) Remove spark plugs and remove engine oil pan. Remove bearing cap and bearing shell.

2) Install main bearing shell removing and installing tool (or use a cotter pin bent as required). Rotate crankshaft in direction of usual rotation and roll upper bearing shell out of engine.

3) Oil new bearing shell and insert plain (un-notched) end of shell between crankshaft and block on the indented or notched side. Rotate bearing into place. Install new bearing shell in bearing cap.

REAR MAIN BEARING OIL SEAL (6 CYLINDER ENGINE): Remove rear main bearing cap and remove old seal from groove. Insert new packing in bearing cap and roll firmly into place with a rounded tool (roll from both ends toward center). Use a round block of wood, same diameter as crankshaft flange, to hold packing in place. Cut off both ends of packing evenly and flush with bearing cap face. Install upper half of seal in crankcase in same manner, with engine out of car.

REAR MAIN BEARING OIL SEAL (V8 ENGINE): Remove rear main bearing cap and remove old seal from groove. Insert new seal in groove with fingers, and then with Tool J-5788 (Oil Seal Installer), and a hammer, pound seal firmly into groove. Cut the small portion of the seal that protrudes from groove flush with surface of bearing cap. Replace upper half of seal in crankcase in same manner, with engine out of car.

VIBRATION DAMPENER

6 CYL. ENGINES

VIBRATION DAMPENER (6 CYL. ENGINE): Removal– Remove radiator. On Powerglide models, remove oil cooler lines and plug outlets, Remove fan belt and install Puller J-1287-B and pull dampener assembly from crankshaft.

Installation: Remove puller and install two 3/8"-16 x 1" (16 thread) capscrews in dampener to support wheel portion during installation. Position dampener on crankshaft with key and keyway on alignment and drive dampener on shaft until it bottoms against crankshaft gear. Use a heavy hammer and bar through the grille, taking care that a straight installation is made. Remove the two capscrews previously installed. Install radiator.

V8 ENGINES

VIBRATION DAMPENER (8 CYL. ENGINE): Removal - Remove radiator hoses, on Powerglide and Turboglide models disconnect cooler lines from radiator core, and remove radiator core. Note spacer shims if any. Remove fan belt, fan and pulley. Install Tool 1287 and remove harmonic balancer.

Installation - Install two 3/8"-16 x 1½" capscrews to hold hub and flywheel portion of dampener together during assembly. Coat cover seal contact on dampener with engine oil and position dampener on crankshaft. Use Tool J-5590 and drive dampener on shaft until hub bottoms on timing sprocket. Remove the two screws installed previously and install pulley, fan, and fan belt. Install radiator.

ENGINE FRONT COVER

ALL ENGINES

FRONT OIL SEAL INSTALLATION: Pry old seal out of front cover. Install new seal so that open end of seal is toward inside of cover and drive it into position with Oil Seal Driver J-996. *CAUTION–Support cover at sealing area while installing seal.*

CAMSHAFT & BEARINGS

6 CYL. ENGINES

CAMSHAFT REMOVAL & INSTALLATION: Remove rocker arm and pushrod covers. Remove rocker shaft assembly, pushrods and valve lifters. Remove timing gear cover attaching screws and two bolts that are installed from back through front main bearing cap, remove cover and gasket. Pull crankshaft gear with Puller T-126-R. Remove two camshaft thrust plate screws by working through holes in camshaft gear. Remove camshaft and gear assembly by pulling it through front of block *(CAUTION-*Support shaft carefully to avoid damage to camshaft bearings). To install camshaft, reverse removal procedures.

6 CYL. CAMSHAFT BEARING REPLACEMENT: Use Bearing Remover & Replacer J-6356. Install No. 1 and No. 2 bearings first, then rear two bearings. *(CAUTION* –Align oil holes in bearings with oil holes in block before pulling into place), Install plug flush to 1/32" deep from clutch housing face of case.

Reaming: Special reamer with four cutters on one bar recommended by car manufacturer (for proper alignment). Insert reamer through #1, #2, & #3 bearings. Start reamer cutter in all four bearings at the same time (wash metal cuttings away with a liberal supply of kerosene while reaming), turn reamer slowly until cutters pass through bearings. Remove reamer by rotating in same direction as when reaming bearings and withdraw from engine. Bearing cuttings must be blown out with compressed air. Install camshaft and check bearing clearances with narrow feeler gauge. Clearance should be .0015-.0035". Install expansion plug to rear of rear bearing.

V8 ENGINES

CAMSHAFT REMOVAL & INSTALLATION: Remove rocker arm covers and intake manifold. Back off rocker arm nuts until arms may be pivoted away from pushrods. Remove pushrods and valve lifters. *NOTE* - Keep pushrods and lifters so that they can be returned to original positions. Remove fuel pump and fuel pump pushrod. Remove grille assembly. Drain radiator and remove oil cooler lines from core (cars with Powerglide or Turboglide). Remove radiator core, note shims if any. Remove fan belt, fan and pulley. Remove harmonic balancer with Tool J-1287-B. Remove water pump and oil pan. Remove front end cover and gasket. Align timing marks on sprockets, remove three camshaft sprocket bolts and remove camshaft sprocket and timing chain together. *NOTE* - Tap sprocket with plastic faced hammer lightly to dislodge sprocket. Install two 5/16"-18 x 4" bolts in two of the camshaft bolt holes and withdraw camshaft from engine. *CAUTION* - Camshaft journals are the same size and care must be exercised to avoid damage to bearings. To install camshaft, reverse removal procedure.

V8 CAMSHAFT BEARING REPLACEMENT: Use Bearing Remover & Replacer J-6356. Remove bearing nearest center of block first, then No. 2 and No. 4 bearings, and finally front and rear bearings (with this sequence

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minimum number of turns are required to locate Remover & Replacer for removal of next bearing). When installing, install No. 1 or front bearing first. This bearing will act as guide for tool and center the No. 2 and No. 3 bearings being pulled into place. *(CAUTION*–Use care when installing rear bearing due to smaller size of oil pressure holes in rear bearing. When installing end plug, install flush to 1/32" deep to maintain level surface on rear of cylinder block).

TIMING GEARS

6 CYL. ENGINES

REPLACEMENT TIMING GEARS: Fibre type camshaft gear and steel crankshaft gear used on passenger cars. Aluminum camshaft gear and steel crankshaft gear used on trucks.

TIMING GEAR INSTALLATION: Gears are press fit on crankshaft and camshaft and must be removed and installed as follows

Crankshaft Gear–To remove gear, attach Puller T126-R by threading puller screws in tapped holes in gear, pull gear off. When installing gear, make certain that two woodruff keys installed in crankshaft keyways, drive gear on shaft until it seats against shoulder on shaft

Camshaft Gear–To remove gear, install Gear Remover J-971 on shaft in back of gear (remover consists of support sleeve), place camshaft assembly in arbor press *(CAUTION*–Thrust plate must be positioned so that it will not be damaged by woodruff key in shaft as shaft pressed out), press shaft out of gear. To install gear, place shaft in arbor press (support shaft securely directly back of front bearing journal), install gear spacer ring and thrust plate over end of shaft, and install woodruff key in shaft keyway. Install camshaft gear and press it on shaft until it bottoms against the gear spacer ring. End clearance of thrust plate should be 001- 003" Install the camshaft assembly in engine block, being careful not to damage bearings or cams. With crankshaft installed turn camshaft and crankshaft so that valve timing marks on gear teeth will line up, then push camshaft into position. Install camshaft thrust plate-to-block screws and tighten securely. Camshaft and crankshaft gear runout should not exceed .004" for camshaft and .003" for crankshaft. Backlash between timing gear teeth should not be less than .004" nor more than .006". *CAUTION*–Press on hub only when installing camshaft gear.

TIMING CHAIN

V8 ENGINE

TIMING CHAIN: Removal–Remove vibration dampener, timing chain cover, and oil slinger. Rotate engine until timing marks on sprockets are in alignment and adjacent Remove three camshaft sprocket screws and remove camshaft sprocket and chain together

Installation: Install chain on camshaft sprocket. Hold sprocket vertical with chain hanging below, and line up 'O' timing marks on both sprockets so they are adjacent and in line with a straight edge across shaft centers. Align dowel in camshaft with dowel hole in sprocket and install sprocket on camshaft. Draw camshaft sprocket onto shaft using the three mounting bolts. Tighten to 15-20 ft. lbs. *CAUTION–Do not attempt to drive sprocket onto shaft as welch plug at rear of engine can be dislodged.*

VALVE SYSTEM

ALL ENGINES

ENGINE NORMALIZING PROCEDURE (For Valve Tappet Clearance Adjustment): Clearance changes while engine is warming up. Adjust only after engine has been 'normalized' as follows· Run engine at 600 RPM and check oil temperature with thermometer at overflow pipe on valve rocker arm shaft connector until no change noted in oil temperature for a period of five minutes (oil temperature will become stabilized at some point between 150° and 225°F). This normalizing period will be from 5 to 30 minutes depending on engine temperature when started.

VALVE TAPPET ADJUSTMENT

6 CYL. & V8 ENGS. WITH HYDRAULIC LIFTERS

NOTE–Required when cylinder head has been removed or when rocker arm or valve assemblies have been replaced.

6 Cylinder Engines: The hydraulic lifters must be at the lowest point of travel when adjusted (piston in firing position). Remove distributor cap and turn engine until rotor is in firing position (points just breaking) for cylinder being set. Starting with #1 cylinder, turn valve adjusting screw down until rocker arm just contacts valve. This can be determined by checking push rod side play at adjusting screw end while turning the adjusting screw. At the point where no side play can be felt, continue turning the adjusting screw down 1-1/2 turns and tighten lock nut securely. Adjust each cylinder following the same sequence as the firing order (1-5-3-6-2-4).

V8 Engines: With No. 1 Cyl. at TDC firing position, adjust Exhaust valves 1-3-4-8, Intake valves 1-2-5-7 by backing off the adjusting nut on rocker arm until there is play in valve push rod, then tighten adjusting nut to just remove all push rod-to-rocker arm clearance, **then tighten adjusting nut an additional 3/4 turn** to place hydraulic lifter in center of its travel. Crank engine one revolution so that #6 cylinder is in firing position, and then proceeding as above, adjust Exhaust valves 2-5-6-7, and Intake valves 3-4-6-8.

VALVE STEM OIL SEALS

6 CYL. ENGINES

VALVE STEM OIL SEAL INSTALLATION: Seal consists of synthetic rubber ring installed in second groove of valve stem directly under valve locks on all valves. When assembling valves, install seal as follows· Install valve spring and spring retainer on valve stem, compress spring until lower groove on valve stem is exposed, install seal in this groove *(CAUTION* - Seal must seat flat in groove and not be twisted). Install valve locks in upper groove in valve stem, relieve spring tension, check to see that seal is properly retained in spring retainer and that locks are engaged.

V8 ENGINES

VALVE STEM OIL SEAL INSTALLATION: Two seals used as follows 1) Cup shaped cap or shield installed over upper end of valve spring (retained by spring retainer) and 2) synthetic rubber ring installed in second groove of valve stem directly under valve locks These seals used on all valves Install as follows

Oil Shield (Exc. Hi-Lift Camshaft Engin s) - Install shield on top of valve spring with cupped side down over spring before installing spring retainer

Oil Stem Seal - Install in same manner as seal on 6 cyl engines (above)

VALVE GUIDES

6 CYL. ENGINES

VALVE GUIDE INSTALLATION (6 CYL. ENGINES): Install guides to proper position in head with the following special tools (see table below for correct height of guide above machined surface of cylinder head). Use Valve Guide Driver J-5599 to install exhaust valve guides and Driver J-5598 to install intake valve guides. After guides installed, ream to .343".

Valve Guide Installati n H ight

Engine	Intak	Exhaust
235" & 261"	1"	15/16"

ROCKER ARMS

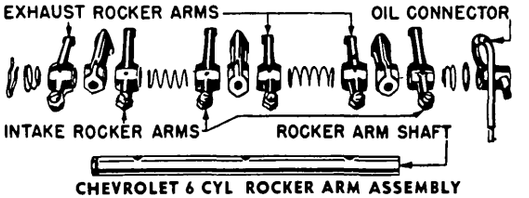
6 CYL. ENGINES

ROCKER ARMS (6 CYL. ENGINES): Diamond bored and "granodized" (no bushings) and fit directly on rocker arm shafts. Different rocker arms used as follows:

Rocker Arm Id ntificati n

Type & No. ©	Cylinder	Part N .
L H Intake (5)	2-4-6	3837029
R H Intake (6)	1-3-5	3837030
L H Exhaust (7)	1-3-5	3837031
R H Exhaust (8)	2-4-6	3837032

© - Indicated identification number cast on arm



CHEVROLET 6 CYL ROCKER ARM ASSEMBLY
(REAR ASSY. SHOWN—FRONT ASSY. SIMILAR)

Installation: Assemble rocker arms as indicated in illustration with open end of shaft toward center, and baffle in rear shaft open end in vertical position.

V8 ENGINES

► *1957 ROCKER STUD REPLACEMENT NOTE:* Replacement Rocker Studs now furnished for service are 2.50" long (shorter than 1956 studs which were 2.70" long) and must be installed with NEW Tool 6880. *CAUTION* - DO NOT attempt to install 1956 type stud (2.70" long) with Tool 6880 as stud will break through cylinder head.

ROCKER ARM STUD REPLACEMENT (V8 ENGINES): *See Note above.* Replacement studs furnished .003" Oversize (No. 3747003) & .013" Oversize (No.3747001). **Rem val** - Remove old stud by placing Spacer J-5802 over stud, adding flat washer and nut, and turning nut down to pull stud out of head.

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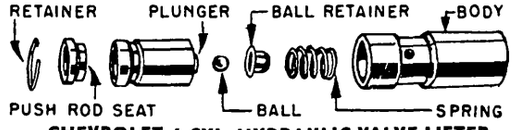
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Installati n - Ream stud hole for correct oversize stud using Reamer J-5715 for .003", J-6 036 for .013" oversize. Coat press-fit area of stud with hypoid lubricant and use NEW Tool 6880 to drive stud in head (tool will position stud to correct height of 1.36"). *CAUTION* - Use Tool 6880 only with 1957 type 2.50" long studs.

HYDRAULIC LIFTERS
6 CYL ENGINES

HYDRAULIC VALVE LIFTERS Barrel type consisting of plunger and valve assembly operating within a cyl inder formed by valve lifter tappet or body (see illustration) Oil is introduced to this unit through oil gal lery in block

R moval Remove rocker arm assemblies pushrod cover pushrods and valve lifters *NOTE* - Keep valve lifters and pushrods in order so they may be returned to original positions



CHEVROLET 6 CYL. HYDRAULIC VALVE LIFTER

Disassembly Hold assembly down with a pushrod and remove plunger retainer pushrod seat plunger ball check valve ball retainer and spring Clean all parts in solvent and inspect each part for nicks or burrs and wear Replace lifter assembly if any parts damaged or show excessive wear

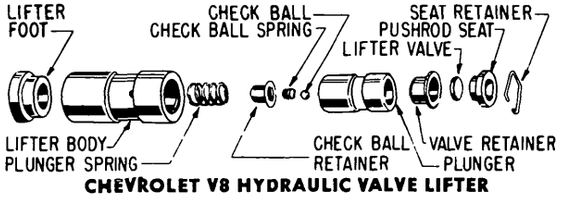
Reass mbly Invert plunger and place spring over it Assemble lifter body over the complete assembly with holes in lifter body and plunger lined up Turn assembly over and fill with SAE 10 oil insert Tool 4274 into plunger and force down to insert pin through lifter body and plunger and remove tool Fill assembly with SAE 10 oil and install pushrod seat and spring retainer Press down on seat and remove pin

V8 ENGINES

HYDRAULIC VALVE LIFTERS: Barrel type consisting of lifter body pushrod seat inertia valve check ball ball retainer pushrod seat retainer plunger and plung er spring Oil is supplied under pressure from main oil gallery line

R moval Remove rocker arm covers intake manifold back off rocker arm nuts until arms may be pivoted away to remove pushrods Remove hydraulic lifters

Disassembly: Hold plunger down and remove retainer Remove pushrod seat inertia valve and valve retainer Remove plunger with check ball check ball spring, check ball retainer and retainer spring from lifter body Invert lifter body and remove lifter body foot



CHEVROLET V8 HYDRAULIC VALVE LIFTER

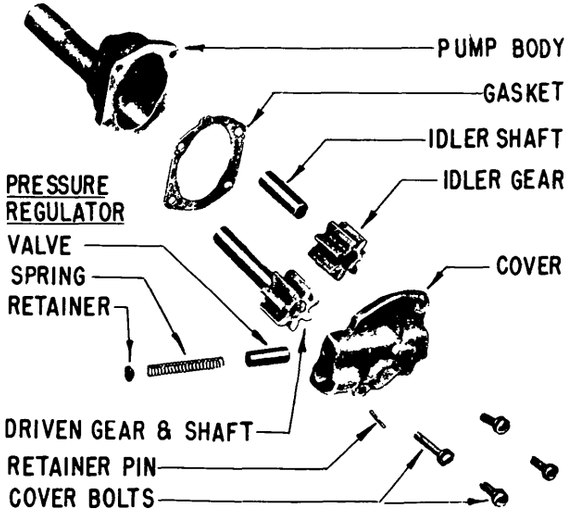
R ass mbly: Insert check ball in plunger with check ball spring retainer and retainer spring While holding in this position install lifter body over plunger assembly and insert lifter body foot in body Turn assembly over and place lifter valve retainer in plunger drop inertia valve in retainer insert pushrod seat in retainer De press plunger in body and insert pushrod seat retainer *NOTE* - Fill lifter body and plunger with SAE 10 oil before installing inertia valve retainer valve and pushrod seat

OILING SYSTEM
6 CYL. ENGINES

OIL LEAD TO VALVE ROCKER ARMS (6 CYL. ENGINES): Rocker arm shaft oil line pipe extends forward to push rod compartment from a fitting in tappet ledge just above rear camshaft bearing, to center of engine then upward to a fitting between the hollow rocker arm shafts To replace this pipe, cut a new pipe to proper length, install new nipples at each end and install pipe to cylinder block fitting, then bend pipe to contour so that clearance is provided for the push rods and push rod cover and so that end of pipe extends straight up for cylinder head lubrication

OIL PUMP
6 CYL. ENGINES

6 CYL. OIL PUMP (Removal & Disassembly): Drain oil, remove oil pan and disconnect oil pump-to-block oil line Remove oil pump retaining sleeve lock screw and remove oil pump and oil pump-to-block oil line Remove pressure oil line from pump and remove pump cover attaching screws, cover, gasket, idler gear and drive gear and shaft Remove regulator valve pin and valve parts. Remove intake pipe and fixed screen as an assembly. Wash all parts in solvent and inspect pump body for cracks or excessive wear. Check shaft for looseness in housing and gear and cover for wear.



CHEVR LET 6 CYL. OIL PUMP

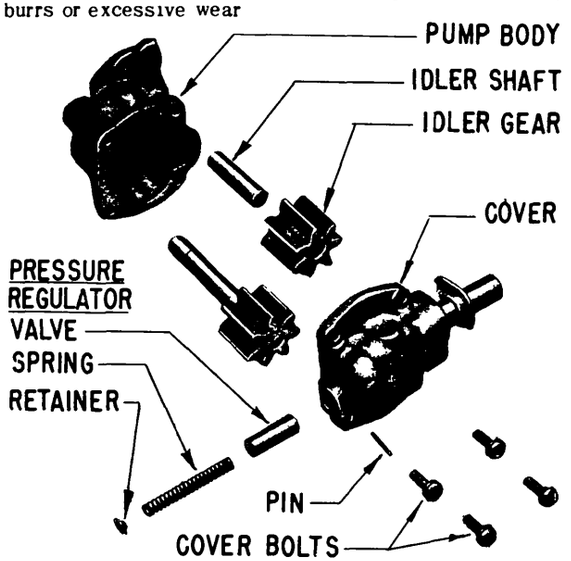
Ass mbly Install drive gear and shaft in body Install idler gear with smooth side toward cover. Install cover and new gasket Tighten screws securely and check to see that shaft turns free Install pump oil line to pump, leaving it loose

Installation Install pump in block and align oil lines and install retaining sleeve lock screw and tighten securely *(CAUTION*–Make sure tapered end of lock screw draws down into hole in oil pump body) Tighten oil pump-to-block oil line and pump-to-screen oil line connector nuts securely. Replace intake pipe and screen.

► *NOTE* Oil pump pickup pipe should be installed with pickup pipe screen horizontal and toward bottom of oil pan

V8 ENGINE

V8 OIL PUMP (Removal): Drain oil remove oil pan pump-to rear main bearing cap bolt and remove pump Remove extension shaft clip and extension shaft and collar Remove pump cover attaching screws cover, idler gear and drive gear and shaft *CAUTION - DO NOT DISTURB PICKUP PIPE IT IS LOCATED AT ASSEMBLY* If removed pickup pipe should be installed with pick-up screen horizontal and toward bottom of oil pan Wash all parts in solvent and inspect all parts for cracks, burrs or excessive wear



CHEVROLET V8 OIL PUMP

Assembly: Place drive gear and shaft in pump body and install idler gear so that smooth side of gear will be toward cover Install cover and attaching screws Tighten screws to 6-9 ft lbs and check to see that shaft turns freely Assemble collar end of extension shaft assembly over pump drive shaft aligning tang on extension shaft with slot in end of pump drive shaft In stall retaining clip with flat end of clip in groove of pump drive shaft

Installation: Assemble pump and extension shaft to rear main bearing cap aligning slot in top end of extension shaft with drive tang on lower end of distributor drive shaft Install pump to rear main bearing cap bolt and tighten to 45-50 ft lbs and install oil pan

MODEL IDENTIFICATION

Series	Model Designation Serial Prefix	Model
1500 ①	A	ONE-FIFTY
2100	B	TWO-TEN
2400	C	BEL-AIR
1508	D	SEDAN DELIVERY

① - Except Sedan Delivery.

SERIAL NUMBER: Stamped on plate attached to left front door hinge pillar post.

Starting Serial Number - 100001 (at each plant) for all models.

► *SERIAL NUMBER NOTE: Serial Number (example B57F100025) includes following identification information in sequence.*

Series ①	Year	Assy. Plant ②	Serial No.
B	57	F	100001

① - See "Serial Prefix" in Model Identification above.
② - See Assembly Plant Designation below.

Car Assembly Plant Designation

A - Atlanta	K - Kansas City	S - St. Louis
B - Baltimore	L - Los Angeles	T - Tarrytown
F - Flint	N - Norwood	W - Willow Run
J - Janesville	O - Oakland	

ENGINE NUMBER: Stamped on right side of engine block to rear of distributor.

► *ENGINE NUMBER NOTE: Engine Number (example T 101 A) includes following identification information in sequence:*

Plant ①	Month ②	Day ③	Engine Type ④
T	1	01	A

① - "F" Flint, "T" Tonawanda.
② - "1" (January) "2" (February), etc.
③ - "01" (First Day), "02" (Second Day), etc.
④ - See Model Type Designation below.

Model Type Designation

Equipment	Engine Number Suffix
3-Speed Trans.	A
Heavy Duty Clutch	AD
Powerglide	B

TUNE-UP

COMPRESSION PRESSURE: 130 lbs. minimum with all cylinders equal within 20 lbs. at cranking speed.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Thermostatic type. Check for free operation. Should require ½ turn from unhooked to hooked position. *Distorted spring should be replaced.*

IGNITION

FIRING ORDER: 1–5–3–6–2–4.

SPARK PLUG GAP: .035".

Spark Plug - AC No. 44 (Std.). No. 45 (Hotter, for continuous City operation). C-43 COM (Colder, for continuous heavy duty service). 14mm. Tighten to 20-25 ft. lbs

COIL: Delco-Remy 1115087.

Ignition Current - 1.8 amps. idling, 4 amps. stopped.
Resistor - Delco-Remy 1931614. 1.40-1.62 Ohms.

► *COIL RESISTOR NOTE:* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when key turned to "Start Engine" position.

DISTRIBUTOR: Delco-Remy 1112403.

Condenser - Delco-Remy 1928111. **Capacity** - .18-.23 mfd.
Contact Point Set - Delco-Remy 1924571.
Breaker Gap - .016-.021" (new points), .0125-.0175" (used points).
Cam Angle - 28-35° with .016" gap.

► *BREAKER GAP CAUTION - Manufacturer recommends final check with feeler gauge or dial indicator if dwell meter used to set points.*

Breaker Arm Spring Tension - 19-23 ozs.
Rotation - Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Octane Selector: Adjustment on distributor provides 10° spark advance or retard from center "0" position.

Vacuum Spark Control: Delco-Remy 1116089.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4-6
7.5	15	7.5-10

IGNITION TIMING

Setting - At TDC *Set timing at IDLE SPEED with vacuum line connected*

► *IGNITION TIMING PROCEDURE CHANGE: Previous recommendation of setting timing at 1000 RPM with vacuum line disconnected has been discontinued*

Timing Mark - Steel ball insert in flywheel lined up with pointer in inspection hole in right front face of housing with Octane Selector set on "0". Then adjust selector as follows:

Octane Selector Setting - Set for slight ping when accelerating with a wide open throttle.

CARBURETOR

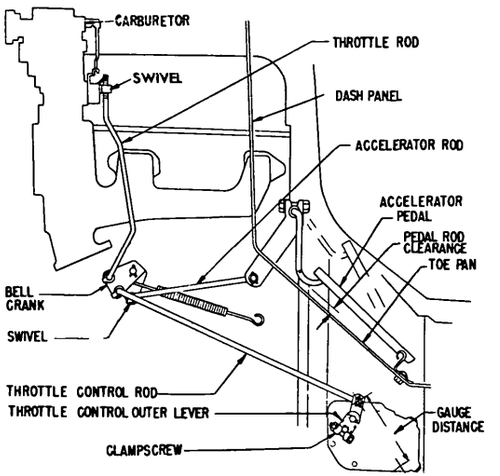
THROTTLE LINKAGE ADJUSTMENT (POWERGLIDE CARS): Engine must be at normal operating temperature and transmission warm (choke valve wide open and fast idle inoperative with throttle stopscrew against low step of fast idle cam) when adjustments made.

1) Adjust engine idle speed to 425 RPM with selector lever in "D" (Drive) range (set hand brake firmly to hold car while making adjustments).

2) Disconnect control rod from throttle lever on transmission cover. Remove lower bolt at rear of transmission side cover. Rotate throttle valve control outer lever assembly counterclockwise to the open throttle position.

3) Hold lever in this position and with throttle valve outer lever gauge J-5806 set at 7.09" measure distance from left side cover lower rear bolt to hole in throttle lever. If pins of gauge will enter holes, adjustment is correct. If necessary to adjust, loosen lever to clamp attaching screw and adjust lever on throttle shaft as necessary. Reconnect throttle rod.

4) Disconnect bellcrank-to-transmission throttle lever rod at throttle valve lever. Disconnect accelerator-to-bellcrank rod at bellcrank.



POWERGLIDE THROTTLE LINKAGE

5) Force bellcrank-to-transmission throttle lever rod forward against its stop in transmission (open throttle position) and adjust bellcrank-to-carburetor throttle rod for free entry of swivel pin in throttle valve lever, with carburetor throttle valve in wide open position.

6) With carburetor throttle valve held in wide open position and accelerator fully depressed, adjust accelerator-to-bellcrank rod for free entry of swivel pin into hole in bellcrank.

THROTTLE RETURN CHECK ADJUSTMENT (POWERGLIDE CARS): With engine idle speed set at 425 RPM, shut off engine, close choke valve and position throttle stopscrew on highest step of fast idle cam. Using a 9/32" wrench on flat section of return check shaft, hold from turning, and turn the adjusting screw until it just contacts throttle contact arm.

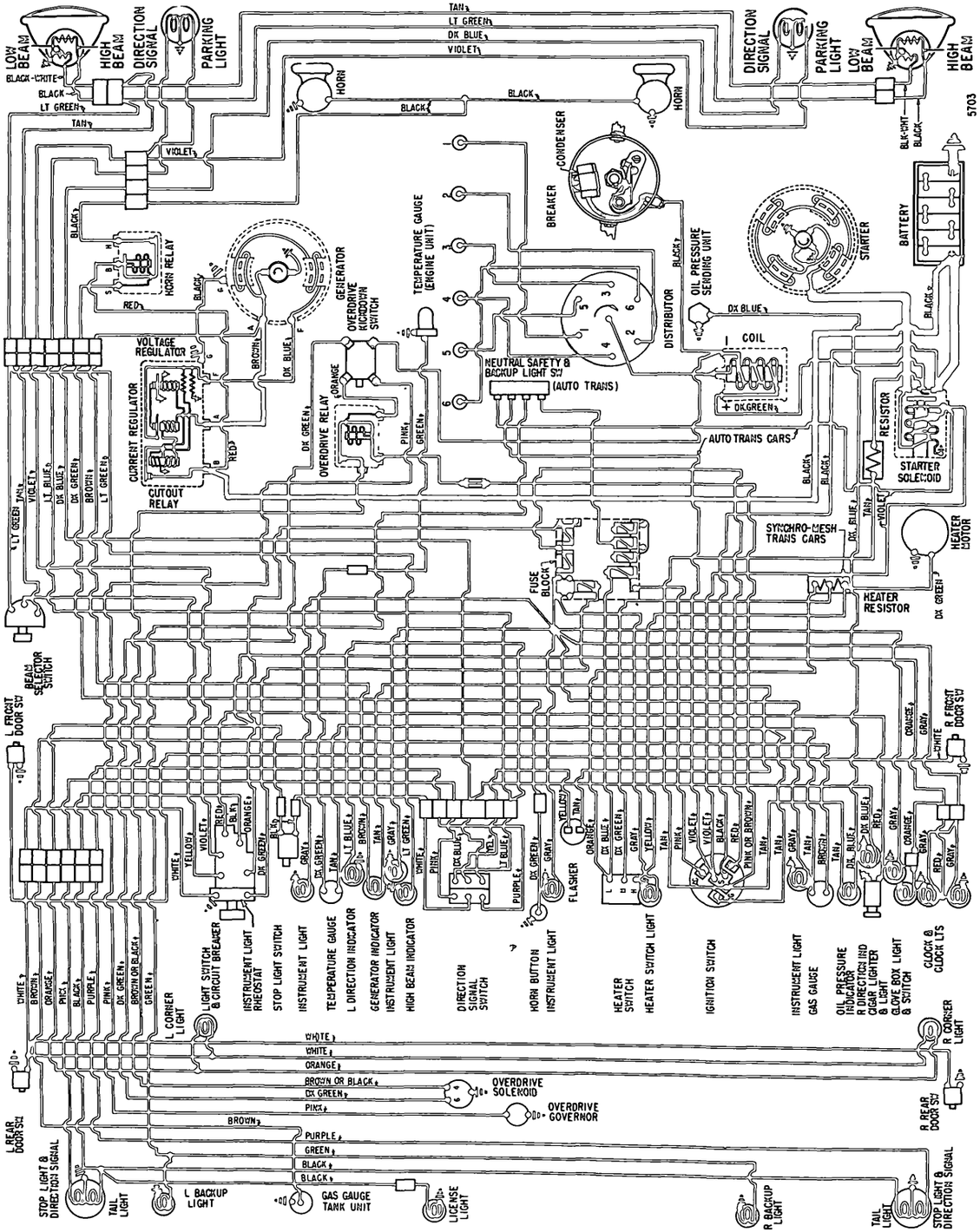
Model ROCHESTER BC	Rochester No.
Std Transmission	7009657
Powerglide	7009656
Governor Controlled Engine	7009784

► *CHOKE SETTING CHANGE FOR IMPROVED PERFORMANCE: See "Choke Adjustment" below*

► *METERING JET CHANGE FOR IMPROVED PART THROTTLE PERFORMANCE. See Rochester Single & Dual Jet Specification Table for latest jets.*

Idle Setting - 1-2½ turns open.
Idle Speed (Synchro-mesh) - 475 RPM.
Idle Speed (Powerglide) - 425 RPM with Powerglide selector lever in "D" (Drive) range.
Float Level - 1 9/32" (Gauge M-250) With air horn inverted and gasket in place, position Gauge M-250 over the floats with the tang inserted in the discharge nozzle. Bend float arms as necessary so that top of each float just touches the gauge and the float is centered between the gauge legs.
Float Drop - Bend float tang as necessary to obtain a distance of 1¾" from the gasket surface to bottom of the float, with the air-horn upright and the float hanging free.

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Choke Adjustment: Three notches lean. *NOTE* - This supersedes previous setting of one notch rich (Synchro-mesh cars), and one notch lean (Powerglide cars).

Fast Idle: With fast idle adjusting screw on next to highest step of fast idle cam, Gauge BT-99 (.076") should just slide between lower edge of choke valve and carburetor bore. To adjust, bend connector rod.

▷ *OTHER DATA: See "Rochester BC Carburetors" in Carburetion Section.*

FUEL PUMP PRESSURE: 3½-4½ lbs.

CARB. EQUIPMENT

Fuel Pump: AC. Diaphragm type.
Replacement Fuel Pump - AC No. 4149 (Fuel only), No. 4138 or 707 (Fuel & Vacuum).
Pressure - 3½-4½ lbs. at 450-1000 RPM.
See "Fuel Pumps" in Carburetion Section

Gasoline Gauge: AC. Electric type.
Dash Unit - AC No. 1518711.
Tank Unit - AC No. 1518775 (Sta. Wgn.), 1518776 (Others). *See "Fuel Gauges" in Carburetion Section.*

BATTERY

Delco 2SMR53W. *12 Volt.* 9 plate, 53 ampere hour capacity (20 hr. rate).
Battery Ground - Negative.
Engine Ground - Engine to cowl at rear head bolt.

STARTER

Delco-Remy 1107652. Armature - 1932185.
Drive - Overrunning clutch (solenoid pinion shift).
Rotation - Counterclockwise at commutator end.
Brush Spring Tension - 35 ozs. minimum.

Performance Data

Torque	RPM	Volts	①Amperes
0 ft. lbs.	6200-9400	10.6	49-76
	Lock	4.25	270-310

① - Includes solenoid.

Starting Switch: Delco-Remy Solenoid Switch 1119781 mounted on starter and controlled by Ignition & Starter Switch 1116535.
See "Delco-Remy Starter Solenoid (Without Relay)" in Electrical Section.

Neutral Safety & Back-up Light Switch: Delco-Remy 1998173 (Powerglide cars only).
Adjustment - *See "Chevrolet Powerglide" in Trans. Sect.*

GENERATOR

Delco-Remy. Used as follows:

Application	Generator No.	Armature No.
6 Cyl. Std.	1100326	1928952
6 Cyl. Pwr. Strg.	1102041	1929640
6 Cyl. Air Cond.	1102083	1932900
6 Cyl. A.C. & P.Strg.	1102084	1938761

Performance Data - Cold

Generator	Amperes	Volts	RPM
1100326	25	14.0	2570
1102041	30	14.0	2210
1102083, 84	35	14.0	2510

Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 28 ozs.

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Field Current - 1.5-1.62 amps. (1100326), 1.48-1.62 amps. (1102041), 1.69-1.79 amps. (1102083,84), at 12 volts.

Belt Adjustment: 5/16" belt deflection midway between water pump and generator pulleys.

REGULATOR

Delco-Remy. Used as follows:

Delco-Remy Regulator No.	Generator No.
1119000	1100326
1119003	1102041
1119168	1102083,84

Cutout Relay

Cuts In - 11.8-13.5 volts.
Contact Gap - .020".
Air Gap - .020" with contacts just closed.

Voltage Regulator

Setting - 13.8-14.8 volts at 125°F.
Air Gap - .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section.*

Current Regulator

Setting (1119000) - 23-27 amperes.
Setting (1119003) - 27-33 amperes.
Setting (1119168) - 33-37 amperes.
Air Gap - .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps. Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Autronic Eye: *See Electrical Section.*
Lighting Switch Removal: Pull handle out to headlamp position. Depress switch shaft retainer (under dash) and remove knob and shaft assembly. Remove retaining ferrule, escutcheon and bezel, then remove switch assembly. Disconnect multi-plug connector. *NOTE* - Use screwdriver inserted in side of switch to pry plug from switch.
Stop Light Switch Location: Mechanical type mounted under dash in contact with brake pedal.
Adjustment - Adjust position of switch so that stop light comes on when brake pedal is depressed 5/8" from fully released position.
LIGHTING CIRCUIT BREAKER: One 13 amp. circuit breaker located on main lighting switch, protects headlamp and parking light circuits.
FUSES: All fuses except as noted below are contained on the accessory junction block located on upper inside of dash panel to left of steering column.
Panel & Accessory Lamps - 3 amps. *See Note below.*
Tail, Dome, Glove Box, Clock & Stop Lamps - 9 amps. *See Note below.*
Heater (Without Air Conditioner) - 10 amps.
Air Conditioner (Includes Heater) - 20 amps.
Backing Light - 9 amps.
Overdrive - 9 amps. Located in feed line to relay.
►*NOTE:* If car not equipped with accessory junction block, these fuses will be found in an in-line fuse holder back of instrument panel.
Horn Relay: Delco-Remy 1116920.
Contact Closes - 5.0-9.5 volts.
Contact Gap - .027".

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 6 Cyl., Valve in head.

►*ENGINE SERVICE NOTE:* Data below applies to all 6 Cyl. Engines: 235" (Pass. Cars), 235" & 261" (Trucks). See Chevrolet Truck for 235" & 261" Truck engine specifications.

Bore	Stroke	Displacement
3 9/16"	3 15/16"	235 cu. ins.

Compr. Ratio	Rated HP	Developed HP
8.0-1	30.4	140 at 4200 RPM

Compression & Vacuum Reading - *See TUNE-UP.*
ENGINE REMOVAL: *See "Engine" in Chevrolet Special Data.*
OIL PAN REMOVAL: Remove bolts attaching steering idler arm bracket to frame side rail, and drop for clearance. Remove pan retaining bolts and drop pan. *NOTE* - Crankshaft may have to be turned so oil pan will clear front cross member.
CYLINDER HEAD: *See "Cylinder Head & Manifolds". in Chevrolet Special Data.*
ENGINE MOUNTINGS: *See "Engine Mountings" in Chevrolet Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Chevrolet Special Data.*

PISTONS

Aluminum alloy, cam ground, tin plated, with pin offset 5/64".
Weight - 1.18 lbs. (235" engine), 1.36 lbs. (261" Engine).
Removal - Pistons and rods removed from above.
Clearance - .005-.0011", Measured 1.29" from top of piston. Selective fit.
Replacement Pistons: Furnished Std. & .001", .020", .030", .040" Oversize. *STANDARD AND .001". PISTON NOTE* - Two sizes pistons furnished for Standard and .001" Oversize as follows:
235" Engine - Std. - Marked **S4** (3.5625-3.5630"), **S5** (3.5630-3.5635"), **.001" Oversize** - Marked **S6** (3.5635-3.5640"), **S7** (3.5640-3.5645").
261" Engine - Std. - Marked **S4** (3.7500-3.7505"), **S5** (3.7505-3.7510"), **.001" Oversize** - Marked **S6** (3.7510-3.7515"), **S7** (3.7515-3.7520").

Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to a point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler must be 7-18 lbs.
Installing Pistons: Install piston with notch in piston and mark "Front" toward front of engine.

PISTON PINS

Locked in rod. No bushing used in piston.
Diameter - 235" Eng. - .8660-.8665". **261" Eng.** - .9270-.9275".
Pin Fit in Piston - .00015-.00025" clearance. With both piston and pin at 70°F., and light film of oil on pin, pin should hold own weight in either piston pin boss. It should be possible to install pin in piston with thumb pressure.
Replacement Pins: Furnished Std & 0015", .003", .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Sid Clearanc
Compr.(1&2)	.0930-.0935"	①	②
Oil(3)	181-.188"	③ .015-.055"	.000-.008"

①- (235" Eng.) .007-.020". (261" Eng.) .010-.020"
②- (235" Eng.) .001-.003". (261" Eng.) .002-.0035"
③- On Rails.

►*RING INSTALLATION CAUTION:* Install Compression rings with side marked "TOP" up.

CONNECTING RODS

Length - 6.81" Center-to-center.
Crankpin Journal Diameter - 2.311-2.312".
Lower Bearing - Replaceable precision type.
Clearance - .001-.003" (New), .001-.004" (Used).
Sideplay - .005-.012".
Replacement Bearings: Std. & .001", .002", .010", .020" Undersize.
Installing Rods: Install rods with piston pin clamp and number on rod lower end toward camshaft.

CRANKSHAFT

Journal Diameters - **(1)** 2.6835-2.6845", **(2)** 2.7145-2.7155", **(3)** 2.7455-2.7465", **(4)** 2.7765-2.7775".
Clearance - .001-.003" (New), .001-.004" (235" Eng. Used), .001-.0045" (261" Eng. - Used).
Bearings - Thin wall babbitt with steel back.
Bearing Adjustment: Precision type. Replace bearings.
End Thrust - Taken by No. 3 (rear intermediate) main bearing.
End Play - .003-.009".
Replacement Bearings: Furnished Std. & .002", .010", .020", .030" Undersize.
Bearing Installation: Can be replaced without removing engine.
See "Crankshaft & Main Bearings". in Chevrolet Special Data.
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings". in Chevrolet Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chevrolet Special Data.*
Vibration Dampener: *See "Vibration Dampener". in Chevrolet Special Data.*

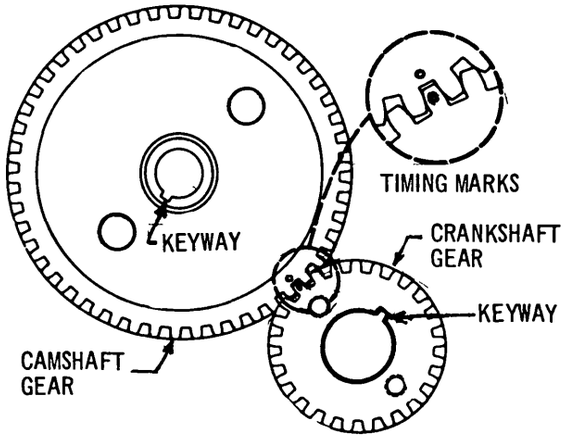
CAMSHAFT

Journal Diameters - **(1)** 2.1537-2.1547", **(2)** 2.0912-2.0922", **(3)** 2.0287-2.0297", **(4)** 1.9662-1.9672".
►*NOTE:* Journal out-of-round limits .001". Run-out limits .002".
Bearing Type - Steel backed babbitt lined bushings, not precision type, require reaming.
Clearance - .0015-.0035".
End Thrust: Controlled by spacer and thrust plate behind camshaft sprocket.

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End Play - .001-.005".
Timing Gear: Fibre camshaft gear, steel crankshaft gear.
Back Lash - .003-.005".
Replacement Timing Gears & Installation: See *"Timing Gears" in Chevrolet Special Data.*
Camshaft Setting: Timing is correct when timing marks on gears are together.



CHEVROLET 6 CYL. VALVE TIMING MARKS

Camshaft Removal & Replacement: See *"Camshaft & Bearings" in Chevrolet Special Data*
Engine Front Cover Oil Seal (Crankshaft Front Seal): See *"Engine Front Cover" in Chevrolet Special Data*

VALVES

Tappet Clearance: (Pass. Cars) - None in service (hydrulic).
(Trucks) - 235" Eng. - .016" Intake, .018" Exhaust Hot. 261" Eng. - .020" Intake & Exhaust, Hot.
See *"Valve System" in Chevrolet Special Data*

Valve	Head Diam.	Stem Diam.	Length
Intake	1 7/8"	.3410-.3417"	6.364-6.394"
Exhaust	1 1/2"	.3410-.3417	①

Valve	②Seat Angle	Lift	Stem Clearance
Intake	30°	.4004"	.001-.0027"
Exhaust	45°	.4004"	.001-.0027"

① - 235" Eng., 4.905-4.930"; 261" Eng., 4.902-4.932"
② - Face Angle 29° Intake, 44° Exhaust.

►*VALVE GRINDING CAUTION:* Replacement valves are furnished with face angles of 30° and 45° When seats are ground to recommendations of 30° and 45°, valves must be faced to recommended angle of 29° (Intake) and 44° (Exhaust).
Valve Seat Width - 3/64-1/16" (Intake), 1/16-3/32" (Exhaust).

Valve Stem Oil Seal Installation: See *"Valve System" in Chevrolet Special Data*
Valve Guids: *Precision type, pressed in head.*
Valve Guide Installation - See *"Valve System" in Chevrolet Special Data*
Valve Springs: *Install springs with closed coil end down*

Spring Specifications

	Pressure	①Length
Valve Open (All)	.194-210 lbs.	1 29/64"

① - Free Length 2 5/32" (Conv.), 2 15/64" (Auto Trans.)

►*VALVE SPRING HEIGHT CAUTION:* Check installed height of valve springs. If distance from spring seat in head to top of valve spring exceeds 1 55/64", install shim approximately 1 16" thick. At no time should shim spring be installed to obtain installed height of less than 1 51/64".
Valve Lifters (Pass Cars): Hydraulic type. See *"Valve System" in Chevrolet Special Data*
Valve Lifters (Trucks): Mechanical type. Removed from above.
Rocker Arm Assembly: See *"Valve System" in Chevrolet Special Data*

VALVE TIMING

See *"Camshaft Setting" under CAMSHAFT above*
►*VALVE TIMING NOTE:* Specifications are for valve timing with Zero valve lash and apply to both 235 & 261" engines. See *Valve Timing Check below*
Intake Valves - Open 10°30' BTDC. Close 53°30' ALDC
Exhaust - Open 49° BLDC Close 15° ATDC
Valve Timing Check - *CAUTION.* It will be necessary to replace the hydraulic valve lifter and pushrod operating No. 1 exhaust valve, with a conventional lifter and pushrod). Remove all tappet clearance from No. 1 exhaust valve Turn engine over until this valve just starts to close and until triangular flywheel mark lines up with pointer on right face of flywheel housing. Mount dial indicator on rocker arm shaft with stem of indicator contacting No. 1 exhaust valve adjusting screw and set dial indicator to .063". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .005". A greater or lesser reading indicates either excessive gear wear or improperly installed timing gears. Reset tappet clearance to specifications.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill), 5½ qts. (dry).
Normal Oil Pressure: 30 lbs. at 1170-1200 RPM
Pressure Regulator Valve - In oil pump body. Not adjustable.
Oil Pressure Indicator - Light located at right side of instrument cluster, controlled by pressure switch, Delco-Remy 1998149 or AC No. 1508425, located in main oil gallery on left side of engine Switch closes when pressure drops to 4-7 lbs
Oil Pump: Gear type. Located in crankcase, driven by distributor gear.
Oil Pump Overhaul—*See "Oiling System" in Chevrolet Special Data.*
Oil Filter Element: AC P-115
Rocker Arm Oil Lead & Overflow Pipe: *See "Oiling System" in Chevrolet Special Data.*
Crankcase Ventilation (Standard): Air intake through valve rocker arm cover, outlet through pipe on right side of engine.
Servicing — On all models with air cleaner mounted on valve rocker arm cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.
Crankcase Ventilation (Optional): Positive Type. Vacuum operated ventilator consisting of a vacuum pipe from oil filler pipe to ventilator valve in fitting on intake manifold. Valve is spring loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling to give proper air-fuel mixture.**
Servicing — Every 10,000 miles (or oftener if required) clean vacuum pipe, valve, and filler pipe thoroughly. Filler cap gasket must seal tightly.
►*VACUUM VALVE CAUTION:* If improper action of spring is suspected due to spring being distorted, or etched from corrosive action, the valve assembly should be replaced.

COOLING

►*RADIATOR REMOVAL CAUTION (POWERGLIDE CARS): Transmission oil cooler is part of radiator lower tank, and must be TIGHTLY SEALED after removal or during repairs to avoid entrance of foreign material.*
Water Capacity: 16 qts (17 qts with heater).
Pressure Valve: AC No. 850795. Radiator filler cap. 7 lb. type. **Replacement Valve** - AC No. RC-1.

Thermostat: Harrison. In cylinder head water outlet.
Standard — No. 3133595 (stamped 151) 151°. Can be used for alcohol anti-freeze.
Optional—No. 3123994 (stamped 160), 160°, No. 3133597 (stamped 170) 170°.

Temperature Gauge: AC electric.
Dash Unit - AC No. 1513317.
Engine Unit - AC No. 1513321.
See *"Temperature Gauges" in Miscellaneous Section*

Water Pump: Packless type with sealed ball-bearing shaft. See *"Chevrolet" in Water Pump Section*

CLUTCH

Own. Diaphragm Spring type. 9½" (Std.), 11" (HD) See *"Chevrolet (Own)" in Clutch Section*

Clutch Disc - (Std. 9½") Chevrolet No. 3737944 (Woven - Hub marked White), No 3737942 (Molded - Hub not paint marked), (Heavy Duty 11") Chevrolet No 38-36906 (Woven - Hub marked Pink).

Pedal Adjustment Pedal free travel ¾-1 Loosen check nut at connecting link at clutch fork Turn adjusting nut to remove all lash at fork, **then back off two turns.** Tighten check nut.
Removal: Remove transmission (see Transmission Removal below). Remove throwout bearing from fork. Remove clutch fork tension spring from fork, disconnect clutch fork pushrod. Remove clutch fork by forcing it forward and toward center of vehicle. Install Clutch Pilot Tool J-5824, to support clutch assembly during removal. Loosen clutch attaching bolts one turn at a time until diaphragm spring is released. Remove Pilot Tool, then remove clutch assembly from car. *CAUTION:* When installing clutch, align "X" mark on clutch cover with "X" mark on flywheel.

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SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh (Std.) three or four speed (close-ratio) optional.
See "Chevrolet 3-Speed" in Transmission Section.

Transmission Control: *See "Transmission Controls" in Transmission Section.*

Removal: Drain Transmission and disconnect speedometer cable and shift rods. Disconnect propeller shaft at rear universal and slide shaft toward rear to disengage from transmission. Remove two top transmission to clutch housing screws and install Guide Pins J-1126. Remove the two lower screws and slide transmission back until clutch spines are disengaged. Remove transmission from below car.

OVERDRIVE

Warner R10. Solenoid operated type with governor control and throttle operated kickdown.
See "Chevrolet Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh transmission (above) after disconnecting control cable and wiring

POWERGLIDE TRANSMISSION

Torque converter and hydraulically operated planetary gear unit with manual controls.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS. See "Chevrolet Powerglide" in Trans. Section.*

►*TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section.*

Lubrication: Check fluid level in transmission every 1000 miles. Oil should be added only when level gets down to "Add One Quart" mark on dipstick. Change oil, remove and clean oil suction screen every 25,000 miles. Use only AUTOMATIC TRANSMISSION FLUID "Type A" bearing an "AQ-ATF" marking on container.
Capacity - 4½ qts. (refill), 10½ qts. (after overhaul).

►*POWERGLIDE DRAINING CAUTION—There is no drain plug on converter. Drain transmission case only, add 4½ qts. of fluid initially, recheck after idling engine.*

Checking Fluid Level—Engine must be idling with the parking brake set, transmission warm, and the control lever in "N" range when taking dipstick readings. Dipstick is located under hood on right side

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER POWERGLIDE SERVICE DATA: See "Powerglide" in Transmission Section.*

UNIVERSALS

Own. Yoke & Spider (trunnion) type.

►*CAUTION* - Rear universal companion flange nut controls rear axle pinion bearing preload. Preload must be adjusted whenever companion flange nut loosened. *See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss Drive. *NOTE* - "POSITRACTION" Limited Slip Differential Optl.
See "Chevrolet Pass. Car (Hotchkiss Drive)" Rear Axle & "Spicer Power-Lock Differential" in Rear Axle Section.

►*PINION BEARING PRELOAD CAUTION:* Rear universal joint companion flange nut controls rear axle pinion bearing preload. Bearing preload must be adjusted whenever companion flange nut is loosened.

Ratios - 3.55-1 (Std.), 4.11-1 (Overdrive), 3.36-1 (Powerglide).

Backlash - .003-.010" (.005-.008" preferred).

Removal: Raise car and support with jack stands under frame side rails. Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cables from clamps at frame. Disconnect hydraulic brake lines at rear axle housing. Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor

Axle Shaft Removal: Raise car and place jack stands under axle housing. Remove tire, wheel and brake drum assembly. Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange). Attach axle Puller J-5748, with slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate. *NOTE*—If bearing retainer and parking brake strut interfere, raise strut slightly with screw driver to obtain clearance.

SHOCK ABSORBERS

Delco. Direct acting non-adjustable.

Replacement Shock Absorbers

Model	Front	Rear
Pass. Exc.Conv.(No AC)	5531202	5531211
Pass. Exc.Conv.(With AC)	5524088	5531211
Conv.	5524088	5524089
Sed.De. Sta.Wag .Taxi	5524088	5524089

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs and new spherical type joints connecting control arms and steering knuckles.
See "Chevrolet (Spherical Joint)" in Suspension and "Wheel Alignment Section.

Steering Axis Inclination - 3-4°

Caster - Pos. 1° preferred. Limits Pos. ½° to Pos. 1½°.

Camber - Pos. ½° preferred. Limits 0° to Pos. 1°.

Toe-In - 1/8-1/4".

Toe-Out on Turns - With inner wheel at 20°, outer wheel should be 18°10'

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section

Power Steering: Own (Linkage Type). *See "Chevrolet Power Steering" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic, without anchor pin adjustment Hand lever applies rear wheel service brakes
See "Chevrolet-Bendix Hydraulic" in Brake Section

►*REPLACEMENT BRAKE SHOE GRINDING CAUTION:* To compensate for lack of brake anchor adjustment, brake shoes are ground to a 057-087" smaller diameter than the drum diameter Grinding shoes to the true drum diameter on bench grinders will cause heel and toe contact, resulting in erratic brake action *NOTE—If spindle mounted type grinder is used, the shoes should be ground to the true drum diameter*

Drums—Diameter 11".

Wheel Cylinder Diameter—Front 1 1/8", Rear 1".

	Brake Lining Width	Thickness
Front Whl	2"	.187-.194"
Rear Whl	1 3/4"	.187-.194"

Length Per Shoe—9.3125" (Primary), 11.6875" (Second-

Braking Power—55.9% (front wheels), 44.1% (rear

Clearance—Single adjusting screw located at bottom of backing plate. Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag

Standard Master Cylinder: Located on engine side of firewall in line with brake pedal.

Checking Fluid—Reservoir is integral with master cylinder. Maintain level in cylinder to lower edge of filler hole

Removal—Disconnect hydraulic line from end of cylinder and remove bolted brass fitting. Remove four retaining nuts and lock washers holding master cylinder to firewall and remove cylinder.

Installation—Reverse removal procedure making sure that push rod clevis is straddling the brake pedal. Refill master cylinder and bleed all brake lines. Adjust push-rod-to-main cylinder clearance as follows: Make sure brake pedal returns to fully released position with no binding, and that pedal retracting spring has not lost its tension, then adjust brake pedal clevis to give a barely perceptible end play between main cylinder piston and brake pushrod (1/8-3/8" pedal movement should be felt).

Power Brakes: Std. Trans. - Hydrovac Power Unit. Used with standard master cylinder.
See "Hydrovac Power Unit" in Brake Section.

Auto. Trans. - Bendix Vacuum Power Unit. Replaces conventional master cylinder.
See "Bendix Power Unit" in Brake Section

Removal - Disconnect vacuum lines and hydraulic brakes line. Remove lever-to-pushrod bolt and disengage pushrod from lever. Take out four mounting bolts and remove unit.

MISC. MECHANICAL

Windshield Wipers: Vacuum, cable operated (Std.), Electric type (Optional).
See "Windshield Wipers" in Miscellaneous Section.

Window Regulators: Electric type with reversible motor operating each door window assembly.
See "Power Window Regulators" in Miscellaneous Section.

Power Top Control: Hydro-Lectric. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjuster: Reversible electric motor controls horizontal front seat movement. *See "Power Seat Adjusters" in Miscellaneous Section.*

Air Conditioning: *See "Chevrolet Air Conditioning" in Miscellaneous Section.*

MODEL IDENTIFICATION

Model Designation

Series	Serial Prefix	Model
1500 ①	VA	ONE-FIFTY
2100	VB	TWO-TEN
2400	VC	BEL-AIR
2934	VE	CORVETTE
1508	VD	SEDAN DELIVERY

① - Except Sedan Delivery.

SERIAL NUMBER: Stamped on plate attached to left front door hinge pillar post.

Starting Serial Number - 100001 (at each plant) for all models except Corvette.

► *SERIAL NUMBER NOTE: Serial Number (example VB57F100025) includes following identification information in sequence.*

Series ①	Year	Assy. Plant ②	Serial No.
VB	57	F	100001

① - See "Serial Prefix" in Model Identification above.
② - See Car Assembly Plant Designation below.

Car Assembly Plant Designation

A - Atlanta	**K** - Kansas City	**S** - St. Louis
B - Baltimore	**L** - Los Angeles	**T** - Tarrytown
F - Flint	**N** - Norwood	**W** - Willow Run
J - Janesville	**O** - Oakland	

ENGINE NUMBER: Stamped on pad at front right hand side of cylinder block behind water pump.

► *ENGINE NUMBER NOTE: Engine Number (example T101 C) includes following identification information in sequence.*

Plant ①	Month ②	Day ③	Engine Type ④
T	1	01	C

① - "F" Flint, "T" Tonawonda.
② - "1" (January), "2" (February), etc.
③ - "01" (First Day), "02" (Second Day) etc.
④ - See Model Type Designation below.

Model Type Designation

Pass. Cars (265 Cu. In. Engine)

Equipment	Engine Number Suffix
3-Speed Transmission	C
Overdrive	CD
Heavy Duty Clutch	CE

Pass. Cars (283 Cu. In. Engine)

Equipment	Engine Number Suffix
4-Barrel Carburetor	E
Fuel Injection	EJ
Fuel Injection & Hi Lift Cam	EK
Overdrive & 4-Barrel Carburetor	EC
Dual 4-Barrel Carburetors	EA
Dual 4-Barrel Carburetors & Hi Lift Cam	EB
Dual 4-Barrel Carburetors & Powerglide	FD
Dual 4-Barrel Carburetors & Turboglide	GD
Powerglide	F
Powerglide & Air Conditioning	FA
Powerglide & 4-Barrel Carburetors	FC
Powerglide & Fuel Injection	FJ
Powerglide, Air. Cond. & 4-Barrel Carbs.	FE
Turboglide	G
Turboglide & 4-Barrel Carburetors	GC
Turboglide & Fuel Injection	GF

Corvette (283 Cu. In. Engine)

Equipment	Engine Number Suffix
3-Speed Trans. & 4-Barrel Carburetors	EF
3-Speed Trans., Fuel Injection & Hi Lift Cam	EL
3-Speed Transmission & Fuel Injection	EM
Dual 4-Barrel Carbs. & Hi Lift Cam	EG
Dual 4-Barrel Carburetors	EH
Dual 4-Barrel Carbs. & Powerglide	FG
Powerglide	FH
Powerglide & Fuel Injection	FK

TUNE-UP

COMPRESSION PRESSURE: 150 lbs. min. (265" & 283" Engines with 2-Bbl. Carb.), 160 lbs. min. (283" Engine with 4-Bbl. Carb.). All cylinders must be equal within 20 lbs.

VACUUM READING: 18-21" steady at idling speed (except Fuel Injection Engines), 13.5" (Fuel Injection Engines).

VALVE TAPPET CLEARANCE: (Corvette Engine with Special Camshaft & Mechanical Lifters) - .012" Intake, .018" Exhaust, HOT. *NOTE* - Intake can be set at .008" for competition. Adjust tappet clearance by turning rocker arm stud nut (self-locking).

► *FUEL INJECTION ENGINE ADJUSTMENT NOTE:* When running engine with rocker covers removed, air cleaner must be installed and a shield should be improvised to prevent oil fumes entering the fuel injection system.

Engines with Hydraulic Lifters - None in service.

MANIFOLD HEAT CONTROL: (Single Exhaust) - Single exhaust pipe with cross over pipe from right exhaust manifold. Heat control valve with thermostatic coil spring located between right exhaust manifold and exhaust pipe. Make sure valve shaft is free to turn. If sticking, free up with kerosene or alcohol containing a small amount of baking soda.

Dual Exhaust - Coil spring and counterweight (same as for single exhaust).

► *DUAL EXHAUST NOTE: With valve closed, most exhaust gases are discharged through left exhaust pipe.*

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders - RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plugs - (Except Corvette Engine) AC No. 44 (Std.), No. 45 (Hotter - for continuous city operation), No. C-43 COM (Colder - for continuous heavy duty operation) **(Corvette Engine)** AC No 46 (Std.), No 44 (Town & Country operation), No C-43COM (Heavy Duty & High Speed operation) *NOTE* - These plugs supersede previous plugs No C-43 (Std.), and No 43-5 COM (continuous high speed) C-42-1 Com. (Road Racing).

COIL: Delco-Remy 1115087 (Std.), 1115091 (Corvette).

Ignition Current - 1.8 amps. idling, 4 amps. stopped.

Resistor - (Std. - 1115087 Coil) Delco-Remy 1931614, 1.40-1.62 ohms. **(Corvette - 1115091 Coil)** Delco-Remy 1931385.

► *COIL RESISTOR NOTE:* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when key turned to "Start Engine" position).

DISTRIBUTOR: Delco-Remy.

Application	Delco-Remy Distr. No.
V8 265" & 283" Eng. (2-Bbl. Carb.)	1110874
V8 283" Engine (4-Bbl. Carb.)	1110890
V8 Corvette Eng. (1 or 2 4-Bbl. Carb.)	1110891
V8 Corvette Eng Fuel Injection (Early)	1110889
V8 Corvette Eng Fuel Injection (Later)	1110905
V8 Corvette Eng Fuel Injection (Later)	1110906

► *DISTRIBUTOR NOTE: Different types used as follows:*

Models 1110874 & 1110890 - New external adjustment "Window" type. *See "Delco-Remy Window Distributors" in Electrical Section*

1110889, 1110891, 1110905 & 1110906 - Double breaker with conventional distributor cap (not window type) Vacuum Spark Control not used (centrifugal weight advance only)

Condenser - Delco-Remy 1932004 (1110874 & 1110890), 1869704 (1110889 & 1110891) **Capacity -** 18-23 mfd

Contact Point Set - Delco-Remy 1931988 (1110874 & 1110890), 1918148 (1110889 & 1110891) 1938330 (1110905 & 1110906)

Breaker Gap (1110874 & 1110890) - *NOTE* - When cam angle properly adjusted (see below), breaker gap opening (.016") will be correct

Breaker Gap (1110889, 1110891, 1110905 & 1110906) - .014-.018" (new points)

Cam Angle (1110874 & 1110890) - 28-32° Set to 30°

Cam Angle (1110889, 1110891, 1110905 & 1110906) - Adjust each set of points to 29° ± 1° with other set of points blocked open with .025" thick insulator Cam angle for both sets of points operating together will be 34° ± 1°

Breaker Arm Spring Tension - 19-23 ozs

Rotation - Clockwise viewed from above.

Automatic Advance - 1110874

Degrees Distr.	RPM	Degrees Eng..	RPM
Start	400	0-4	800
8-10	1150	16-20	2300
15-17	1800	30-34	3600

Automatic Advance - 1110889, 90, 91

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	400	1-5	800
6-8	750	12-16	1500
9.5-11.5	1300	19-23	2600
13-15	1850	26-30	3700

Vacuum Spark Control: Delco-Remy 1116108 (1110874 Distr.), 1116118 (1110890 Distr.). *NOTE* - No vacuum Control used on 1110889 and 1110891.

Automatic Advance - 1110905

Degrees Distr.	RPM	Degrees Eng	RPM
5-25	400	1-5	800
6 5-8 5	775	13-17	1550
9 5-11 5	1600	19-23	3200
13 15	2500	26 30	5000

Vacuum Advance (1110874)

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	5-7
11	22	11.75-13.75

Vacuum Advance (1110890)

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	7-9
7.5	15	15-16

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IGNITION TIMING

Std. Setting - Set timing to setting indicated below.

► *IGNITION TIMING PROCEDURE CHANGE: Previous recommendation of setting timing at 700 RPM has been discontinued.*

Ignition Timing Setting

Engine	Setting
V8 265" & 283" (2-Bbl. Carb.)	4° BTDC
V8 283" (4-Bbl. Carb.)	4° BTDC
Corvette (One 4-Bbl. Carb.)	4° BTDC
Corvette (Dual 4-Bbl. Carb.)	① 12° BTDC
Corvette (Fuel Injection) ②	①③ 12° BTDC
Corvette (Fuel Injection) ④	⑤⑥ 4° BTDC

① - Do not exceed 14° BTDC.
② - Automatic Transmission.
③ - Engine idling at 600 RPM.
④ - Synchro-mesh Transmission.
⑤ - Engine idling at 800-850 RPM.
⑥ - Do not exceed 8° BTDC.

Timing Mark - Mark on vibration dampener and an indicator on left side of engine front cover. Indicator is marked with 8 lines on "advance" side of "0" mark, and two lines on "retard" side. Each line indicates 2°.

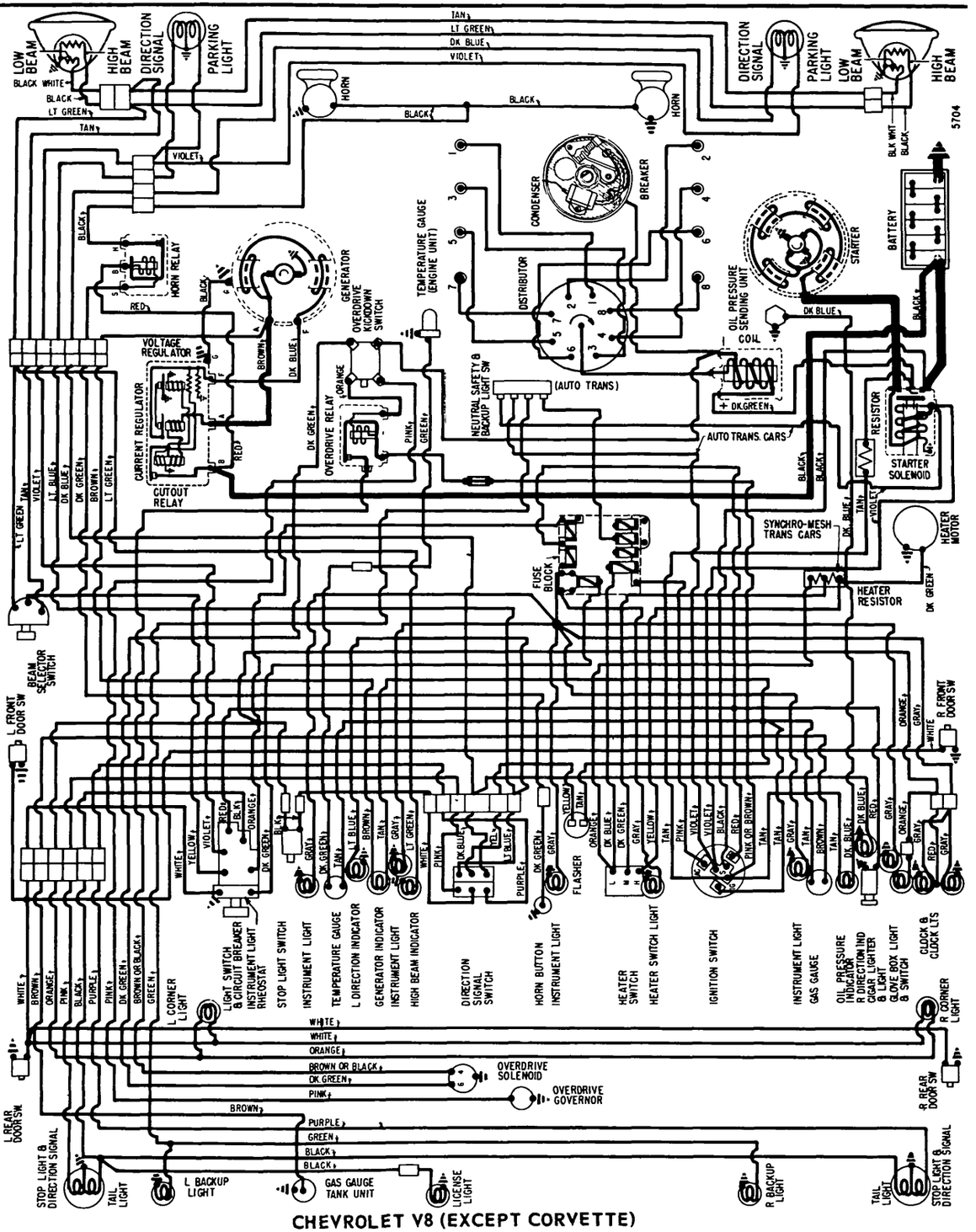
CARBURETOR

► *CARBURETOR APPLICATION NOTE: Rochester 2GC Dual Carburetor is standard on all models (Exc. Corvette). Rochester 4GC and Carter WCFB 4-Barrel Carburetors used on a mixed basis on all models (Exc. Corvette) with Power Package. ONE or TWO Carter WCFB 4-Barrel Carburetors used on Corvette. Rochester "Ramjet" Fuel Injection System is optional on Corvette 283" Engine.*

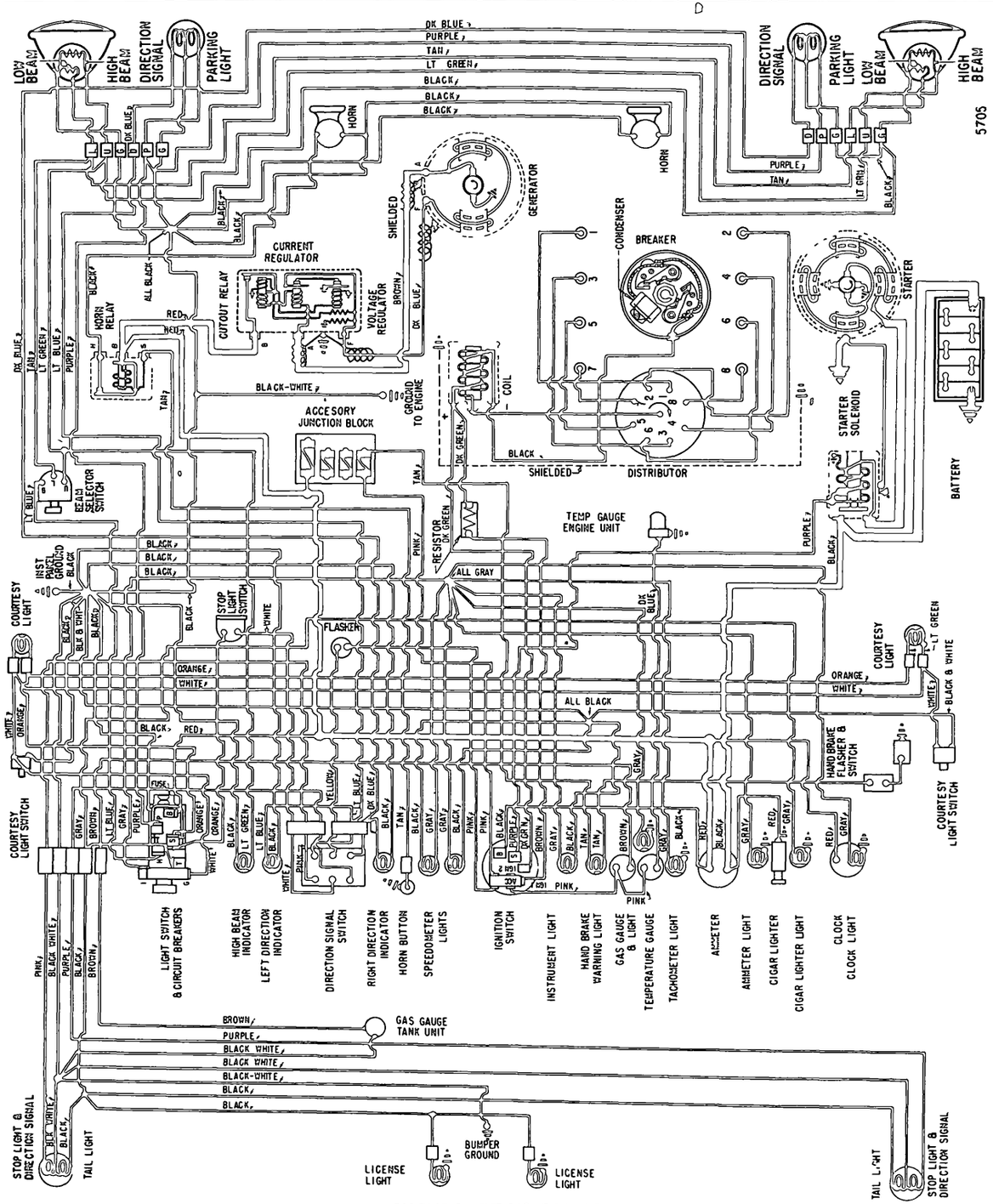
► *FAST IDLE CONTROL CAUTION (AIR CONDITIONED CARS):* Fast idle control is set to provide 900 RPM engine speed when Fast Idle Control Knob is pulled out. Make sure knob is pushed in when making normal fast idle adjustments and that fast idle control linkage does not interfere with normal operation of carburetor linkage when fast idle is not in operation.

THROTTLE LINKAGE ADJUSTMENT: Powerglide Cars - Remove lower control rod and loosen transmission throttle lever clamp screw. Insert Tool J-5906 between transmission left hand side cover lower front bolt and hole in lever. Distance should be 3.60", as indicated on gauge, from centerline of bolt to hole centerline. With gauge in place and holding lever clamp in full detent position (rotated counterclockwise), tighten lever to clamp and remove gauge. Install lower control rod. Disconnect upper control rod from throttle lever on carburetor. Place throttle valve in wide open position and pull upper control rod forward until it is stopped by transmission internal stop. Adjust swivel on end of upper control rod for free entry into throttle lever, then attach swivel to throttle lever. Check adjustment by placing linkage in idle position, then return to wide open throttle by rotating throttle lever on carburetor. Push up on transmission throttle lever and note if lower control rod deflects, which would indicate that transmission is not on

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CHEVROLET V8 (EXCEPT CORVETTE)

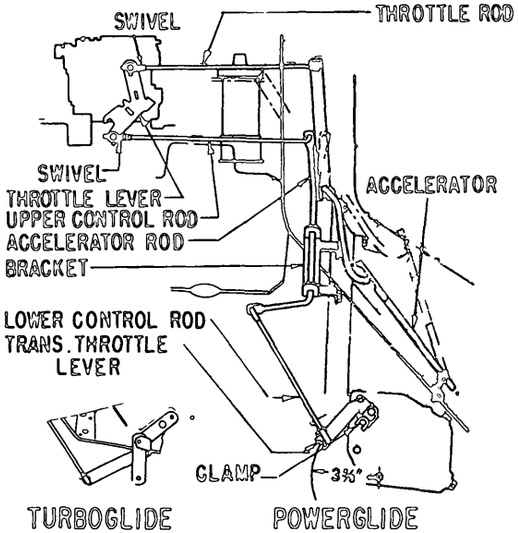


CHEVROLET V8 CORVETTE

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its internal stop. If rod deflects or throttle valve does not reach wide open position, repeat the adjustment. Depress accelerator pedal and place lowest part of accelerator rod 3/4" (Pass. Cars), 3/8" (Corvette) above floor panel. Disconnect throttle rod at carburetor throttle lever and adjust swivel on rod for free entry in hole in lever with throttle valves wide open.

Turboglide Cars: Remove upper control rod from throttle lever. Place throttle lever in wide open position and pull rod forward until stator control valve spring is overcome and lever is bottomed. Adjust swivel on upper control rod for free entry into hole in lever, then attach swivel. Check adjustment by placing linkage in idle position, then return to wide open throttle position by rotating throttle lever. Push upward on transmission throttle lever and note if lower control rod deflects, indicating that stator control valve spring is not fully



CHEVROLET TRANSMISSION THROTTLE LINKAGE

compressed. If rod deflects, or throttle lever will not reach full detent, repeat the adjustment. *CAUTION - Stall tests must not be performed on cars with this transmission.*

ROCHESTER 2GC 2-BARREL

Model	Rochester No.
Standard Transmission (Early)	7010647
Standard Transmission (Later)	7011131
Powerglide & Turboglide (Early)	7010648
Powerglide & Turboglide (Later)	7011124
Governor Equipped Eng. (Early)	7010719
Governor Equipped Eng. (Later)	7011149

▷ *PARTS CHANGES FOR IMPROVED PERFORMANCE*
See "Rochester 2GC Carburetors" in Carburetion Section

▷ *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 2-3-5-8, LEFT barrel 1-4-6-7.*
Idle Setting - After idle speed set to correct specifica-

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tions (see Idle Speed below), turn both idle mixture screws for smooth idle with highest vacuum reading and RPM.

Idle Speed - 450 RPM (Synchro-mesh), 425 RPM (Powerglide & Turboglide, with selector lever in "D").

Float Level - 1¼" (Gauge BT-129). With air horn inverted and gasket in place, position float level gauge over float so it rests against pump side of power piston shaft, with the outer gauge leg in line with center of float. Bend float arm to adjust.

Float Drop - Bend float tang as required to obtain a distance of 1 29/32" from gasket surface to bottom of float, with air horn upright and float hanging free. Use scale or scribed mark on float and pump gauge.

Automatic Choke Setting: Centered at index.

► *OTHER DATA: See "Rochester 2GC Carburetors" in Carburetion Section*

ROCHESTER 4GC 4-BARREL

Rochester 4GC No. 7009846 (Early), No. 7012126 (Later).

► *PRODUCTION AND PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Rochester 4GC Carburetors" in Carburetion Section*

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting - Adjust idle mixture screws for peak vacuum and engine RPM reading.

Idle Speed - 450 RPM (Synchro-mesh), 425 RPM (Powerglide & Turboglide, with selector lever in "D").

► *OTHER DATA: See "Rochester 4GC Carburetors" in Carburetion Section*

CARTER WCFB 4-BARREL

(Power Pkg. & Corvette Eng. With Single Carb.)

Carter WCFB 2555S (Std. Trans.), 2505S (Auto. Trans.), 2655S (All Trans.).

► *CARBURETOR REPLACEMENT NOTE: Carb No 2505S with choke set one point lean can be used to replace No 2555S*

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*

Idle Setting - (2505S & 2555S) ¾-1¾ turns open. (2655S) ½-1½ turns open Adjust both screws alike. Turn screws out for richer mixture

Idle Speed (All Carbs.) - 475 RPM (Synchro-mesh), 425 RPM (Powerglide & Turboglide with selector lever in "D")

► *OTHER DATA: See "Carter WCFB Carburetors" in Carburetion Section*

CARTER WCFB 4-BARREL

No. 2626S (Front), No. 2627S (Rear)

(Corvette Engine with TWO Carbs.)

► *CARBURETOR NOTE: "Idle Air Mixture Screws" have been eliminated on these carburetors and the special procedure formerly required is no longer necessary.*

► *CARBURETOR OPERATION NOTE: Front and rear carburetors operate together at idle speed and at high speed for full power operation. Front carburetor throttle begins to open when rear carburetor throttle valves are approximately at half-throttle position.*

Idle Setting - Set both idle mixture screws on each carburetor 1 turn open. Start and warm up engine. With engine at normal operating temperature, set idle speed to correct RPM (see Idle Speed below). Adjust all idle mixture screws individually (rear carburetor screws first, front carburetor screws last), for best engine idle "feel" and highest engine RPM. Reset idle speed to correct figure, readjust all idle mixture screws, finally reset idle speed.

Idle Speed - 600 RPM (With Std. Camshaft), 800-850 RPM (With "SR" Racing Camshaft).

Synchronizing Carburetors: Adjust accelerator pedal so it is 3/8" above toeboard (carpet removed) with throttle valve of rear carburetor wide open. With rear carburetor on wide open throttle, adjust front carburetor control shaft until throttle on front carburetor is wide open and against throttle stop. Tighten locknut on front control shaft. *NOTE* - When linkage is properly adjusted, front carburetor will begin to open when rear carburetor is at approximately half-throttle.

► *OTHER DATA: See "Carter WCFB Carburetors" in Carburetion Section*

ROCHESTER "RAMJET"

(Optional on Corvette 283" Engine)

► *See "Rochester (Ramjet) Fuel Injection" in Carburetion Section*

FUEL PUMP PRESSURE: 4-5¼ lbs.

CARB. EQUIPMENT

Fuel Pump: AC diaphragm type.

Replacement Pump - (Exc. Corvette) AC No. 4150 Std. (Fuel only), No. 4141S or 708 Optl (Fuel & Vacuum).

(Corvette) - AC No. 4346 (Fuel only)

Pressure - 4-5½ lbs.

See "Fuel Pumps" in Carburetion Section

Gasoline Gauge: AC Electric.

Dash Unit - (Corv) AC 1518244, (Others) 1518711

Tank Unit - Used as follows:

	AC No.
Pass Car (Std.)	1518776
Pass. Car (2 Carb.)	1518784
Sta Wgn. & Sed Del (Exc. 2 Carb.)	1518775
Sta Wgn. (9 Pass.)	1518774
Corvette	1518785

See "Fuel Gauges" in Carburetion Section

BATTERY

Delco 2SMR53W (Std. Pass. Cars), 25M53W (Corvette). 12 Volt, 9 plate, 53 ampere hour capacity (20 hr.rate).

Battery Ground - Negative.

Engine Ground - Engine to cowl at rear head bolt.

STARTER

Delco-Remy 1107664 (Exc. Turboglide), 1107660 (Turboglide).

Armature - Delco-Remy 1935829.

Drive - Overrunning clutch(solenoid pinion shift)

Rotation - Counterclockwise at commutator end.

Brush Spring Tension - 35 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10 3	.75 max.
10 5 ft. lbs.	Lock	5.8	.435 max.

Starting Switch: Delco-Remy Solenoid Switch 1119919 mounted on starter and controlled by Ignition & Starter Switch 1116535 (Exc. Corvette), 1116512 (Corvette) with key starting. NOTE - Separate Relay, Delco-Remy 1116904, used on Corvette with Powerglide. *See "Delco-Remy Starter Solenoid Switch (No Relay)" in Electrical Section*

Neutral Safety & Back-up Light Switch: Delco-Remy No. 1998173 (Powerglide), 1998174 (Turboglide).

Adjustment - *See "Powerglide" or "Turboglide" in Transmission Section*

GENERATOR

Delco-Remy. Application as follows:

Model	Generator No.	Armature No.
Std. 25 Amp.	1100321	1928952
Std. 30 Amp.	1102041	1929640
Corvette	1102043	1929640
Air Cond. 35 Amp	1102083	1932900
A.C. & Pwr. Strg.	1102084	1938761

Performance Data - Cold

Generator	Amperes①	Volts	RPM
1100321	25	14.0	2750
1102041, 3	30	14.0	2210
1102083, 4	35	14.0	2210

① - Not maximum output. See Regulator Data.

Rotation - Counterclockwise at commutator end.

Brush Spring Tension - 28 ozs.

Field Current - 1.5-1 62 amps. (1100321), 1.48-1.62 amps (1102041,3), 1.69-1.79 amps. (1102083,4), all at 12.0 volts.

Belt Adjustment: 13/16" belt deflection midway between fan and generator pulleys with light pressure applied.

REGULATOR

Delco-Remy. Application as follows:

Regulator No.	Generator No.
1119000	1100321
1119003	1102041, 3
1119002 or 1119168	1102083, 4

Cutout Relay

Cuts In - 11 8-13.5 volts.

Contact Gap - .020".

Air Gap - 020" with contacts just closed.

Voltage Regulator

Setting - 13.8-14.8 volts at 125°F.

Air Gap - .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting - *See "Delco-Remy 12 volt Regulators" in Electrical Section.*

Current Regulator

Setting (1119000) - 23-27 amperes.

Setting (1119003) - 27-33 amperes.

Setting (1119002 or 1119168) - 32-37 amperes.

Air Gap - .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting - *See "Delco-Remy 12 volt Regulators" in Electrical Section*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section*

Directional Signals: *See Electrical Section*

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Autr nic Eye: See *Electrical Section*

Lighting Switch Removal: Pull handle out to headlamp position. Depress switch shaft retainer (under dash) and remove knob and shaft assembly. Remove retaining ferrule, escutcheon and bezel, then remove switch assembly. Disconnect multi-plug connector. *NOTE* - Use screwdriver inserted in side of switch to pry plug from switch

Stop Light Switch L cation: Mechanical type mounted under dash in contact with brake pedal

LIGHTING CIRCUIT BREAKER: One 13 amp. circuit breaker located on main light switch, protects headlamp and parking light circuits.

FUSES: All fuses except as noted below are contained on the accessory junction block located on upper inside of dash panel to left of steering column.

NOTE - Corvette has two 13 ampere circuit breakers on light switch.

Panel & Access ry Lamps - 3 amps. *See Note below.*
Tail, D m , Gl v B x, Clock & Stop Lamps - 9 amps. *See Note below.*
Heater (Without Air Conditioning) - 10 amps.
Air C nditioner (Includes Heater) - 20 amps.
Radio - 7½ amps.
Backing Light - 9 amps.
Overdriv - 9 amps. Located in feed line to relay.

Horn Relay: Delco-Remy 1116920.
C ntact Close - 5.0-9.5 volts.
Contact Gap - .027".

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

► *VALVE LIFTER NOTE Hydraulic valve lifter used on all engines with standard camshaft. Mechanical type lifter used on engines with "Hi-Lift" camshaft.*

► *ENGINE NOTE: Specifications for 265" & 283" engines are the same except as noted below.*

ENGINE SPECIFICATIONS: V8. Valve-in-head

Engine	Bore	Str ke	Rated HP	Displacement
265	3 3/ 4"	3"	45.0	265 cu. ins.
283 (All)	3 7/8"	3"	48.0	283 cu. ins

Engine	Compr. Ratio	Developed HP
Turbo-Fire 265 ①	8.0-1	162 at 4400 RPM
Turbo-Fire 283 ②	8.5-1	185 at 4600 RPM
Super Turbo-Fire 283 ③④	9.5-1	220 at 4800 RPM
Corvette ④⑤	9.5-1	245 at 5000 RPM
Corvette ④⑥	9.5-1	250 at 5000 RPM
Corvette ④⑤⑦	9.5-1	270 at 6000 RPM
Corvette ④⑥⑦	10.5-1	283 at 6200 RPM

① - One Single Barrel Carburetor
② - One 2-Barrel Carburetor.
③ - One 4-Barrel Carburetor & Dual Exhaust
④ - Either Standard Pass. Car or Corvette.
⑤ - Two 4-Barrel Carburetors & Dual Exhaust.
⑥ - Fuel Injection & Dual Exhaust.
⑦ - With special "SR" Racing Camshaft.

Compression & Vacuum Reading - See *TUNE-UP*

ENGINE REMOVAL: See *"Engine" in Chevrolet Special Data*

OIL PAN REMOVAL: Disconnect steering idler arm bracket from frame side rail and drop for clearance. Remove retaining bolts and remove pan.

ENGINE MOUNTINGS: See *"Engine Mountings" in Chevrolet Special Data*

CYLINDER HEAD & MANIFOLDS: See *Chevrolet Special Data*

TIGHTENING TORQUES: See *Chevrolet Special Data*

PISTONS

Cast aluminum, slipper skirt, with piston pin offset 5/64".

Removal - Pistons and rods removed from above.

Replacement Pistons: Furnished Std. & .001", .020", .030", .040" oversize. With fitted pins.

► *STANDARD & 001" OVERSIZE PISTON NOTE.* These pistons furnished in TWO sizes as follows:
265" Eng.-Std. - Marked **S4** (3.7500-3.7505"), **S5** (3.7505-3.7510"), **.001" Oversize** - Marked **S6** (3.7510-3.7515"), **S7** (3.7515-3 7520").
283" Eng.-Std. - Marked **S4** (3.8750-3.8755"), **S5** (3 8755-3.8760"), **.001" Oversize** - Marked **S6** (3.8760-3 8765"), **S7** (3 8765-3.8770").

► *283" ENGINE PISTON NOTE* Pistons have four depressions in head to prevent interference with valves at higher engine speeds. "Domed" type pistons are used in 10.5-1 compression ratio engines.

Fitting New Pistons: Use .0015" x ½" feeler (part of Tool J-5513). With piston and cylinder clean and dry, insert feeler and inverted piston into cylinder to point where center of piston pin hole is flush with top surface of block (feeler 90° from pin hole). Pull required to withdraw feeler should be 7-18 lbs.

Installing Pistons: Install pistons with cast depression in head and "F" mark cast in piston strut toward front of block See *Rod Installation*

PISTON PINS

Pin is press fit in connecting rod.

Diameter - 9270- 9273"

Pin Fit in Piston - 00015-.00025" clearance With piston and pin at 60°F., and light film of oil on pin, pin should support own weight in either pin boss.

Pin Fit in Connecting Rod - Pressed in rod *For pin removal and installation, see "Piston Pins" in Chevrolet Special Data*

Replacement Pins: Furnished only in assembly with piston. Replace with new piston and fitted pin assembly

PISTON RINGS

Compression rings are "twist" type (Top ring has **upper** inner edge chamfered, lower ring has **lower** inner edge chamfered) and faces are tapered for correct wiping action Oil ring is 3-piece type (two rails with spacer).

Ring	Width	End Gap	Side Clearance
Compr (1,2)	077- 078"	009-.018"	..0012-.0032"
Oil (3) . .	.181- 188"	① 005- 015" ...	0006- 0084"

① - on rails

R plac ment Rings: Cromflex ring sets furnished Std & .020", .030", 040" oversize

Installing Rings: Install compression rings with mark "TOP" or "G M." upward.

CONNECTING RODS

Length (Center to Center) - 5.7000" **Weight** - 19 02ozs.
Crankpin Journal Diameter - 1.999-2.000".
Lower Bearing - Replaceable precision type. See *"Connecting Rod & Main Bearing Note" under Crankshaft below*
Clearance - .001-.003" (new), .001-.004" (used).
Side Play - .008-.014" (both rods).

Replacement Bearings: Furnished Std., .001", .002", .010", .020" Undersize.

Installing Rods: Install rod in piston so that flange or heavy side of rod at bearing end will be toward **front** of piston (cast depression in head of piston and "F" mark on piston strut) on Nos. 1, 3, 5, and 7 pistons, and rod flange to **rear** of piston on Nos. 2, 4, 6, and 8 pistons. Install rod and piston assembly in cylinder with cast depression in piston head and "F" mark on strut toward front of cylinder block.

CRANKSHAFT

Journal Diameter - 2.2978-2.2988".

► *CONNECTING ROD & MAIN BEARING NOTE (Corvette Engines): Connecting rod bearings and front and intermediate main bearings are special steel backed aluminum alloy with a thin tin-copper overlay*
Clearance - .001-.003" (new), .001-.004" (Used)
End Thrust - Taken by No. 5 (rear) main bearing.
End Play - .002- 006". Check at front end of rear main bearing.

Replacement Bearings: Furnished in 001", .002", .010", .020" Undersize.

Bearing Installation: Not necessary to remove engine or crankshaft from car. See *"Crankshaft & Main Bearings" in Chevrolet Special Data*

Crankshaft Rear Main Bearing Oil Seal: See *"Crankshaft & Main Bearings" in Chevrolet Special Data*

Crankshaft Front Oil Seal: See *"Engine Front Cover" in Chevrolet Special Data*

Vibration Dampener: See *"Vibration Dampener" in Chevrolet Special Data*

CAMSHAFT

► *CAMSHAFT CAUTION.* Different camshafts used as follows:

Model	Chevrolet No.
265" Engine	3704212
283" Engine (Std)	3733431
283" Engine (Hi-Lift Cam)	3736097

Journal Diameters - 1 8682-1 8692" (all journals).
Bearings - Steel backed babbitt lined bushings.
Clearance - .0015- 0035"

Replacement Bearings: "Precision" type (do not require reaming) Use Tool Set J-6098 to remove and install bearings.

Camshaft Setting: Both sprockets marked "O" Install chain with sprocket marks adjacent and in line with straight edge across centers

► *CAUTION.* When installing sprocket on camshaft, line up dowel holes in sprocket and shaft *DO NOT DRIVE SPROCKET ON SHAFT,* use three mounting bolts and DRAW sprocket into place

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Camshaft Removal & Installation: See *"Camshaft & Bearings" in Chevrolet Special Data.*

Timing Chain: Link belt. **Width** - .875". **Pitch** - .500". **Length** - 46 Links.

Engine Front Cover Oil Seal (Crankshaft Front Seal): See *"Engine Front Cover" in Chevrolet Special Data.*

VALVES

Tappet Clearance: (Hi-Lift Cam) - Intake .012" (.008" for competition), Exhaust .018", Hot. **(All Others).** None in service, hydraulic lifters.

►283". *ENGINE VALVE NOTE:* Special lightweight valves used with Hi-Lift Camshaft and mechanical lifters. Identified by swirl polish under head and thin necked stem.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.720"	.3415-.3422"	①4.902-4.922"
Exhaust	1.5"	.3410-.3417"	4.913-4.933"

Valve	②Seat Angle	Lift	Stem Clearance
Intake	45°	③	.001-.0027"
Exhaust	45°	③	.0015-.0032"

①- 4.8799" on cars with "Hi-Lift" camshaft.

②- Face angle 44°.

③- 265" Eng., .3336"; 283" Eng. Std., .3987", Hi-Lift Camshaft, Intake .3938", Exhaust .3998".

Valve Seat Width - .035-.060" (Intake), .062-.093" (Exhaust).

Valve Stem Seal Installation: See *"Valve System" in Chevrolet Special Data.*

Valve Guides: Integral with cylinder head. Ream valve guide holes for oversize valves if valve stem clearance is excessive. Valves with oversize stems furnished .003", .015", .030" Oversize. Use Reamer Set J-5830.

Valve Springs: Install with closed end of coil toward cylinder head, and shield over spring on intake valves.

►*VALVE SPRING NOTE:* Valve spring shield on both intake and exhaust valves on 283" engine.

Spring Specifications

265" Engine

Valve	Spring Pressure	Length
Closed	76-84 lbs.	1.696"
Open	155-165 lbs.	1.366"

283" Engine①

Valve	Spring Pressure	Length
Closed	65-72 lbs.	1.696"
Open	151-165 lbs.	1.306"

①- Except engines with "Hi-Lift" camshaft.

►*VALVE SPRING INSTALLED HEIGHT CAUTION:* Check installed height of valve spring after grinding valves by measuring distance from spring seat in cylinder head to top of valve spring. If this dimension exceeds 1 45/64", install valve spring seat shim furnished 1/32 & 1/16" thick. Installed height of spring must be 1 11/16-1 45-64".

Valve Lifters (Std. V8): Hydraulic type. See *"Valve System" in Chevrolet Special Data.*

Valve Lifters (Corvette): Plain barrel type. Remove in same manner as for hydraulic valve lifters. See *"Valve System" in Chevrolet Section.*

Rocker Arms: Mounted individually on studs pressed into cylinder head.

Rocker Arm Stud Replacement - See *"Valve System" in Chevrolet Special Data.*

VALVE TIMING

See *"Camshaft Setting" under CAMSHAFT above.*

Valve Timing Specifications (265" Engine)

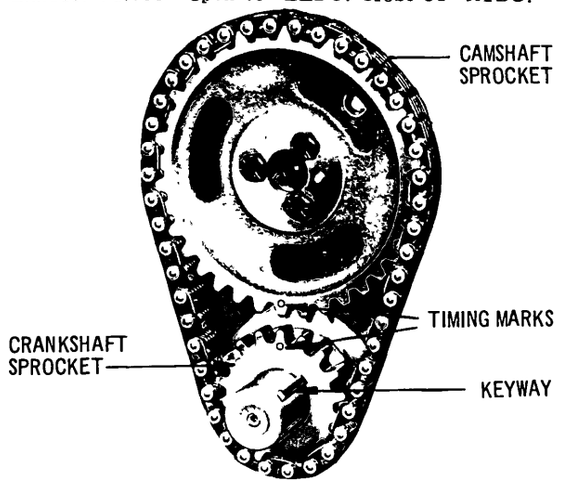
Intake Valves - Open 18° BTDC. Close 72° ALDC.
Exhaust Valves - Open 52° BLDC. Close 20° ATDC.

Valve Timing Specifications (283" Engine) (With Standard Camshaft)

Intake Valves - Open 12°30' BTDC. Close 57°30'ALDC.
Exhaust Valves - Open 54°30' BLDC. Close 15°30' ATDC.

Valve Timing Specifications (283" Engine) (With "Hi-Lift" Camshaft)

Intake Valves - Open 35° BTDC. Close 72° ALDC.
Exhaust Valves - Open 76° BLDC. Close 31° ATDC.



CHEVROLET V8 VALVE TIMING MARKS

OILING SYSTEM

Crankcase Capacity: 4 quarts (refill) 5 qts. (dry)

Normal Oil Pressure: 30 lbs. at 1170-1200 RPM.

Pressure Regulator Valve - In oil pump. Not adjustable.

Oil Pressure Indicator (Std V8) Light located at right side of instrument cluster, controlled by a pressure switch Delco-Remy 1998149 or AC No. 1508425, located in main oil gallery adjacent to distributor. Switch closes when pressure drops to 4-7 lbs.

Oil Pressure Gauge (Corvette) - AC No. 1508131. Not electric.

Oil Filter: Full flow type. Replace element at 6,000 mile intervals. Use new seal, tighten center bolt to 20-25 ft. lbs.

Replacement Filter Element - AC No. PF-131.

Oil Pump: Spur gear type. Located in crankcase, driven by distributor gear.

Oil Pump Overhaul - See *"Oiling System" in Chevrolet Special Data.*

Crankcase Ventilation - Air intake through valve rocker arm cover, outlet through pipe on right side of engine.

COOLING

►*RADIATOR REMOVAL CAUTION (POWERGLIDE OR TURBOGLIDE): Transmission oil cooler is part of radiator lower tank, and must be TIGHTLY SEALED after removal or during repairs to avoid entrance of foreign material.*

Water Capacity: 16 qts. add 1 qt. for heater.

Pressure Valve: AC RC 1, Chevrolet No. 750795. 7 lb. type radiator filler cap.

Thermostat: Harrison. In water outlet on intake manifold.

Standard - No. 3133595 (stamped 151) 151° Can be used for alcohol anti-freeze.

Optl. - No. 3133596 (stamped 160) 160°. No. 3133597 (stamped 170) 170°.

Temperature Gauge: AC electric.

Dash Unit - AC No. 1513317 (Std. V8), 1513198 (Corvette).

Engine Unit - AC No. 1513321.

See *"Temperature Gauges" in Miscellaneous Section.*

Water Pump: Packless type with ball bearing shaft.

See *"Chevrolet" in Water Pump Section.*

CLUTCH

►*CLUTCH NOTE: Both Chevrolet (Own) Diaphragm type & Borg & Beck Coil Spring type Clutches used:*

Chevrolet (Own) Diaphragm Clutch

Car Model	Size	Chevrolet No.
V8 (Std.)	10"	3836723
V8 (Heavy Duty)	11"	3836719

Borg & Beck Clutch

V8 & Corvette (4Bbl. Carb)	①3744753
V8 & Corvette (Two 4 Bbl. Carb)	②3744752

①- Borg & Beck 10A8W Assy. No. 361468.

②- Borg & Beck 10A8 Assy. No. 361466 (use 361468 for service).

See *"Chevrolet (Own)" and "Borg & Beck" Clutches in Clutch Section.*

Clutch Disc (Chevrolet Clutch)

Car Model	Chevrolet No.
Std. 10" (Woven - Blue Hub)	3737946
Std. 10" (Molded - Lt. Brown Hub)	3737948
Overdrive 10" (Woven - Maroon Hub)	3741091
Heavy Duty 11" (Woven - Pink Hub)	3836906

Clutch Disc (Borg & Beck Clutch)

Std. (4 Bbl. Carb) 10" (Black Hub)	③3738227
Overdrive (4 Bbl. Carb) 10" (Lt. Green)	④3738229
Std. (Two 4 Bbl. Carb) 10" (Dark Brown)	⑤3740462

③- Borg & Beck No. 382657.

④- Borg & Beck No. 382653.

⑤- Borg & Beck No. 382657.

Pedal Adjustment: Pedal free travel ¾-1". To adjust, disconnect trunnion on rear end of clutch fork rod from cross shaft (remove cotter pin, washer, and spring), turn trunnion on rod for correct free play (one turn equals approximately 3/16" play), reinstall trunnion.

Removal (Borg & Beck): Remove transmission (see Transmission Removal below). Remove clutch housing pan. Pull out clutch release bearing and sleeve. Mark flywheel, cover, and one pressure plate lug with punch to insure proper reassembly. Loosen holding screws a turn or two at a time to avoid bending rim of cover,

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until cover is free Remove clutch assembly and clutch disc assembly from clutch housing When removing driven disc be sure to mark flywheel side

Removal (Diaphragm Spring Type): Remove Transmission (see Transmission Removal below) Remove clutch throwout bearing from fork, then clutch fork tension spring from fork. Remove clutch fork by forcing it forward and toward center of vehicle. Install Clutch Pilot Tool J-5824 to support clutch assembly Loosen clutch attaching bolts one turn at a time until diaphragm spring is released Remove tool, then clutch assembly from vehicle *NOTE* - When installing clutch, align "X" marks on cover and flywheel.

SYNCHRO-MESH TRANSMISSION

Own. Three speed synchro-mesh (Std.), three or four speed (close-ratio) optional

See "Chevrolet 3-speed" in Transmission Section

Transmission Controls: *See "Transmission Controls" in Transmission Section*

Removal: Drain transmission and disconnect speedometer cable and shift rods. Disconnect propellor shaft at rear universal and slide shaft toward rear, off transmission output shaft. Remove two top transmission to clutch housing screws and install Guide Pins J-1126. Remove the two lower screws and slide transmission back until clutch gear splines disengaged. Remove transmission from below car.

OVERDRIVE

Warner R10. Solenoid operated type with governor control and throttle operated kickdown. Lockout switch not used.

See "Chevrolet Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 &R11 Overdrive Control" in Transmission Section.*

Removal: Same as for synchro-mesh (above) after disconnecting control cable and wiring.

POWERGLIDE TRANSMISSION

Torque converter and hydraulically operated planetary gear unit with manual controls.

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTIONS: See "Chevrolet Powerglide" in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "Chevrolet Powerglide" in Transmission Section*

Lubrication: Check fluid level in transmission every 1,000 miles, drain and refill at 25,000 mile intervals, with Automatic Transmission Fluid type "A" bearing an "AQ-ATF" marking on container.

Capacity - 4½ qts. (refill), 10½ qts. (after overhaul).

► *POWERGLIDE DRAINING CAUTION:* There is no drain plug on converter. Drain transmission case only, add 4½ qts. of fluid initially, recheck after idling engine.

Checking Fluid Level - Engine must be idling with transmission warm, selector lever in "N" range and parking brake applied. Check fluid level on dipstick located in filler tube on right side of engine opposite starter. Fluid level should be at full mark on dipstick. *NOTE - DO NOT OVERFILL*

Throttle Linkage Adjustment: See *CARBURETOR above.*

► *OTHER POWERGLIDE SERVICE DATA: See "Chevrolet Powerglide" in Transmission Section.*

TURBOGLIDE TRANSMISSION

New "non-shifting" hydraulically controlled, planetary type transmission with three unit torque converter.

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Chevrolet Turboglide" Transmission in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "Chevrolet Turboglide" in Transmission Section.*

Lubrication: Check fluid level in transmission every 1000 miles, drain and refill every 25,000 miles. Use Automatic Transmission Fluid Type A (with "AQ-ATF" mark on container).

Capacity - 3½ qts. (refill), 9½ qts. (after overhaul).

► *TURBOGLIDE DRAINING CAUTION:* There is no drain plug on converter. Drain transmission case only, add 3½ qts. of fluid initially, recheck after idling engine.

Checking Fluid Level (Exc. Air Cond. Cars) - With transmission at normal operating temperature, transmission selector lever in "D" (drive) range, and engine idling, check fluid level on dipstick in filler tube on right side of engine. Fluid level should be at full mark on dipstick. *CAUTION - DO NOT OVERFILL.*

Checking Fluid Level (Air Cond. Cars) - *NOTE* - Regular filler tube and dipstick not used. Fluid Level is checked from beneath car (car on hoist) as follows: With transmission at normal operating temperature, selector lever in "N" (neutral) range, and engine idling, check fluid level by removing cap from oil level tube at rear of transmission oil pan under extension housing. Oil level should be at top of tube. If oil level low, remove speedometer drive gear fitting, add oil through fitting hole until fluid level reaches top of oil level tube.

Throttle Linkage Adjustment: See *CARBURETOR above.*

► *OTHER TURBOGLIDE SERVICE DATA: See "Chevrolet Turboglide" in Transmission Section*

UNIVERSALS

Own. Yoke & Spider (Trunnion) type.

► *CAUTION:* Rear universal companion flange nut controls rear axle pinion bearing preload. Preload must be adjusted whenever companion flange nut loosened. *See "Chevrolet Pass. Car (Hotchkiss Drive)" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating hypoid gear type, with Hotchkiss Drive. *NOTE* - "Positraction" Limited Slip Differential optional.

See "Chevrolet Pass Car (Hotchkiss Drive)" Rear Axle & "Spicer Power-Lock Differential" in Rear Axle Section.

► *PINION BEARING PRELOAD CAUTION:* Rear universal joint companion flange nut controls rear axle pinion bearing preload. Bearing preload must be adjusted whenever companion flange nut is loosened.

Ratios - 3.55-1 (Std.), 4.11-1 (Overdrive), 3.36-1 (Powerglide & Turboglide).

Backlash - .003-.010" (.005-.008" preferred).

Removal: Raise car and support with jack stands under frame side rails. Remove rear wheels and remove two trunnion bearing "U" bolts from rear universal yoke and separate the joint (tape bearings to trunnion). Disconnect hand brake cable and equalizer and remove cable from clamps at frame. Disconnect hydraulic brake lines at rear axle housing Disconnect shocks. Support axle assembly on hydraulic jack and remove spring "U" bolts, nuts and anchor plate, and lower axle to floor.

Axle Shaft Removal: Raise car and place jack stands under axle housing. Remove tire, wheel and brake drum assembly. Remove four nuts and lockwashers from bearing retainer bolts (on inside of axle flange). Attach Axle Puller J-5748, with slide hammer, to flange and remove axle shaft and bearing assembly. Be careful not to disturb backing plate. *NOTE*–If bearing retainer and parking brake strut interfere, raise strut slightly with screwdriver to obtain clearance.

SHOCK ABSORBERS

Delco. Direct acting hydraulic, non-adjustable. Serviced by replacement.

Replacement Shock Absorbers

Model	Front	Rear
Pass. exc. Conv. (No A.C.)	5531202	5531211
Pass. exc. Conv.(With A.C.)	5524088	5531211
Convertible	5524088	5524089
Corvette	5531206	5531213
Sedan Del.,Sta.Wgn.,Taxicab	5524088	5524089

FRONT SUSPENSION

Independent type with direct acting shock absorbers within front coil springs and new spherical type joints connecting control arms and steering knuckles.

See "Chevrolet (Spherical Joint)" in Suspension and Wheel Alignment Section.

Steering Axis Inclination - 3-4°.

Caster - Pos. 1° preferred. Limits Pos. ½° to Pos. 1½°.

Camber - Pos. ½° preferred. Limits 0° to Pos. 1°.

Toe-In - 1/8-1/4".

Toe-Out on Turns - With inner wheel at 20°, outer wheel should be 18°10'.

STEERING

Manual: Different type steering systems used as follows: **Corvette - Saginaw Worm & Roller.** Push-pull adjustment.

Others – Saginaw Ball Bearing Worm & Nut. Recirculating ball type.

See Saginaw "Worm & Roller" or "Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw Linkage type. *See "Saginaw (Linkage Type)" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

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BRAKES

Chevrolet-Bendix. Duo-servo, single anchor hydraulic, without anchor pin adjustment Hand lever applies rear wheel service brakes
See "Chevrolet-Bendix Hydraulic" in Brake Section.

►*REPLACEMENT BRAKE SHOE GRINDING CAUTION*
To compensate for lack of brake anchor adjustment, brake shoes are ground to a 057- 087' smaller diameter than the drum diameter Grinding to the true diameter on a bench grinder will cause heel and toe contact, resulting in faulty brake action *NOTE–If spindle mounted type grinder is used, the shoes should be ground to the true drum diameter*

Drums–Diameter 11"
Wheel Cylinder Diameter–Front 1 1/8", Rear 1'

Lining	Width	Thickness
Front Whl	2"	187- 194'
Rear Whl	1¾"	187- 194"

Length Per Shoe–9 3125' (Primary), 11 6875" (Secondary)
Braking Power–55 9% (Front Wheels), 44 1% (Rear Wheels)

Clearance–Single adjusting screw located at bottom of backing plate Back off adjusting screw 7 notches from slight drag position. Brakes must be free of any drag after adjustment

Standard Master Cylinder· Located on engine side of firewall in line with brake pedal

Checking Fluid–Reservoir is integral with master cylinder Maintain level in cylinder to lower edge of filler hole

Removal–Disconnect hydraulic line from end of cylinder and remove bolted brass fitting Remove four retaining nuts and lock washers holding master cylinder to firewall and remove cylinder

Installation–Reverse removal procedure making sure that push rod clevis is straddling the brake pedal Refill master cylinder and bleed all brake lines Adjust push rod-to-main cylinder clearance as follows Make sure brake pedal returns to fully released position with no binding, and that pedal retracting spring has not lost its tension, then adjust brake pedal clevis to give a barely perceptible end play between main cylinder piston and brake pushrod (1 '8-3 '8" pedal movement should be felt)

Power Brakes: Std. Trans. - Hydr vac P wer Unit Used with standard master cylinder
See "Hydrovac Power Unit" in Brake Section
Auto. Trans. - Bendix Vacuum Power Unit Replaces conventional master cylinder. *See Bendix Power Unit" in Brake Section*

MISC. MECHANICAL

Windshield Wipers: Vacuum, cable operated (Std) Electric type (Optional)
See "Windshield Wipers" in Miscellaneous Section

Power Window Regulators: Electric type with reversible motor operating each door window assembly
See "Power Window Regulators" in Miscellan ous Section

Power Top Controls: Hydro-Lectric *See "Power Top Controls" in Miscellaneous Section*

Power Seat Adjuster: Reversible Electric motor controls horizontal front seat movement *See "Power Seat Adjusters" in Miscellaneous Section*
Air Conditioning: *See "Chevrolet Air Conditioning" in Miscellaneous Section*

MODEL IDENTIFICATION

Series	Serial Prefix	Wheelbase	Type
3100	3A	114"	Half-Ton
3200	3B	123"	Half-Ton
3400	3C	104"	① ¾-Ton
3500	3D	125"	① ¾-Ton
3600	3E	123¼"	¾-Ton
3700	3F	137"	① ¾-Ton
3800	3G	135"	1-Ton
4100	4A	132½"	1½-Ton
4400	4B	156½"	1½-Ton
4500	4C	156½"	② 1½-Ton
5100	5A	112 5/8"	② 2-Ton
5400	5B	136 5/8"	③ 2-Ton
5700	5C	160 5/8"	③ 2-Ton
5100S	5D	112 5/8"	④ 1½-Ton
5400S	5E	136 5/8"	④ 1½-Ton
5700S	5F	160 5/8"	④ 1½-Ton
6100	6A	132½"	2-Ton
6200	6J	129 5/8"	2-Ton
6400	6B	156½"	2-Ton
6500	6C	174½"	2-Ton
6600	6K	153 5/8"	2-Ton
6700	6D	196½"	2-Ton
6800	6E	222½"	2-Ton
6100S	6F	132½"	⑤ 1½-Ton
6400S	6G	156½"	⑤ 1½-Ton
6500S	6H	174½"	⑤ 1½-Ton

① - Forward Control. ② - School Bus Chassis.
③ - Low Cab Forward. ④ - Low Cab Forward Special.
⑤ - Conventional Special.

► *SERIAL PREFIX NOTE (MODELS WITH V8 ENGINE): A letter "V" will precede the Serial Prefix, "V3A", etc.*

SERIAL NUMBER: Stamped on metal plate and attached to the body as follows: **Forward Control Models**--On instrument panel support. **Flat Face Cowl Models** - On cowl inner panel. **All Other Models** - Left front door hinge pillar.

Starting Serial Number: 100001, at each assembly plant regardless of series.

► *SERIAL NUMBER NOTE: Serial number (example 3A57K100183) includes following identification data in sequence*

Series ①	Year	Assy. Plant ②	Serial No.
3A	57	K	100183

① - Serial Prefix for each model (Models with V8 engine a regular production option, will have a "V" preceding the "3A").
② - See Truck Assembly Plant Designation below.

Truck Assembly Plant Designation

A - Atlanta	**K** - Kansas City	**S** - St. Louis
B - Baltimore	**L** - Los Angeles	**T** - Tarrytown
F - Flint	**N** - Norwood	**W** - Willow Run
J - Janesville	**O** - Oakland	

ENGINE NUMBER (6 CYL.): Stamped on right side of engine block to rear of distributor.

ENGINE NUMBER (V8): Stamped on pad at front right hand side of cylinder block behind water pump.

► *ENGINE NUMBER NOTE: Engine number (example F 101 P) includes following identification information in sequence.*

Plant ①	Month ②	Day ③	④ Engin & Series
F	1	01	P

① - "F" (Flint), "T" (Tonawanda)
② - "1" (January), "2" (February), etc.
③ - "01" (First Day), "02" (Second Day), etc.
④ - See Model Type Designation below.

Series Type Designation

Series	Engine	Designation
31,32,36,3800	Thriftmaster 235"	H
31,32,36,38,4000	Thriftmaster 235" ①	HD
31,32,36,38,4000	Thriftmaster 235" ②	HE
34,35,3700	Thriftmaster 235" ③	J
34,35,3700	Thriftmaster 235" ① ③	JA
6000	Jobmaster 261"	K
6000	Jobmaster 261" ④	KC
31,32,36,38,4000	V8 Trademaster 265"	L
31,32,36,38,4000	V8 Trademaster 265" ①	LA
31,32,36,38,4000	V8 Trademaster 265" ②	LB
34,35,3700	V8 Trademaster 265"	M
5000	V8 Taskmaster 283"	N
5000	V8 Taskmaster 283" ④	NA
5000	V8 Super Taskmaster 283" ⑤	NC
5000	V8 Super Taskmaster 283" ④ ⑤	ND
6000	V8 Taskmaster 283"	P
6000	V8 Taskmaster 283" ④	PA
6000	V8 Super Taskmaster 283" ⑤	PC
6000	V8 Super Taskmaster 283" ④ ⑤	PD

① - Hydra-Matic Transmission.
② - Heavy Duty Clutch. ④ - Powermatic Transmission.
③ - Updraft Carburetor. ⑤ - 4-Barrel Carburetor.

TUNE-UP

COMPRESSION PRESSURE: (6 Cyl.) 130 lbs. **(V8)** 150 lbs. All cylinders should read alike within 20 lbs.

VACUUM READING:

VALVE TAPPET CLEARANCE: *NOTE - Conventional valve lifters used in 6 Cyl. engine. Hydraulic valve lifters used in V8 engines.*

6 Cyl. Engines - (235") - Intake .016", Exhaust .018". **(261")** .020" All valves.

V8 Engines (With Hydraulic Valve Lifters) - No adjustment required unless cylinder head removed or valve lifters replaced.

MANIFOLD HEAT CONTROL: 6 Cyl. - Thermostatic type. Check for free operation. Should require ½ turn from unhooked to hooked position. Distorted spring should be replaced.

V8 - Thermostatic coil spring type located between right manifold and exhaust pipe.

IGNITION

FIRING ORDER: 6 Cyl. - 1-5-3-6-2-4.
V8 - 1-8-4-3-6-5-7-2.
Cylinders (V8) - RIGHT BANK 2-4-6-8. LEFT 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plug - AC used as follows:

Model	Std.	① Hot	② Cold
½-1½ Ton	AC-44	AC-45 or 46	C-43COM
2 Ton (Early)	C-42COM	C-43COM	
2 Ton (Later)	C-42-1COM	AC-44	C-43COM

① - City type operation.
② - Continuous heavy duty operation.

COIL: Delco-Remy 1115087.
Ignition Current - 1.8 amps. idling, 4 amps. stopped.
Resister - Delco-Remy 1931614.

► *COIL RESISTOR NOTE (6 Cyl. Trucks Exc. Forward Control):* Resistor connected to ignition switch by two leads. Second lead is connected through starter switch and provides a direct connection to coil when starter switch operated.

► *COIL RESISTOR NOTE (6 Cyl. Forward Control & All V8 models):* Resistor connected to ignition switch by two leads and is by-passed during cranking (second lead provides direct connection to coil when key turned to "Start Engine" position).

DISTRIBUTOR: Delco-Remy. Conventional type used on 6 Cyl. models. "Window Type" used on V8 models. *See "Delco-Remy (Window Type) Distributors" in Electrical Section.*

Engine	Delco-Remy No.
Thriftmaster 235"	1112403
Jobmaster 261"	1112403
Trademaster 265" & 283" (Exc. Hydra-Matic)	1110874
Trademaster 265" (With Hydra-Matic)	1110890
Taskmaster 283" (2-Barrel Carb.)	① 1112349
Super Taskmaster 283" (4-Barrel Carb.)	①② 1112350

① - Without Vacuum Spark Control.
② - Use 1112349 for service replacement.

Condenser - Delco-Remy 1928111 (1112403 Distr.), 1932004 (Others). **Capacity** - .18-.23 mfd.
Contact Point Set - Delco-Remy 1924571 (6 Cyl.). 1931988 (V8).
Breaker Gap (6 Cyl.) - .019" (new points). .016" (used points).
Breaker Gap (V8) - *NOTE - When cam dwell is properly adjusted, breaker gap opening (.016") will be correct. See CAM ANGLE below.*
Cam Angle - 28-35° (6 Cyl.), 28-32° (V8). *NOTE - Set V8 distributors to 30°.*
Breaker Arm Spring Tension - 19-23 ozs.

Automatic Advance - 1112403

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	375	0-4	750
4-6	700	8-12	1400
9-11	1350	18-22	2700
12-14	1750	24-28	3500

Automatic Advance - 1110874, 1112349, 50

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
8-10	1150	16-20	2300
15-17	1800	30-34	3600

Automatic Advance - 1110890

Degrees	Distr. RPM	Degrees	Eng. RPM
.5-2.5	400	1-3	800
6-8	750	12-16	1500
9.5-11.5	1300	19-23	2600
13-15	1850	26-30	3700

Vacuum Spark Control: Delco-Remy 1116108 (Distr. 1110874), 1116118 (Distr. 1110890), 1116089 (Distr. 1112403).

Vacuum Advance - 1110874

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	5-7
11	22	11.75-13.75

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Vacuum Advance - 1110890

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	7-9
7 5	15	15-16

Vacuum Advance - 1112403

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	4-6
7.5	15	7.5-10

Setting - 6 Cyl. Engines - At TDC. **All V8 Engines** - 4° BTDC. *Set timing at IDLE SPEED with vacuum line connected*

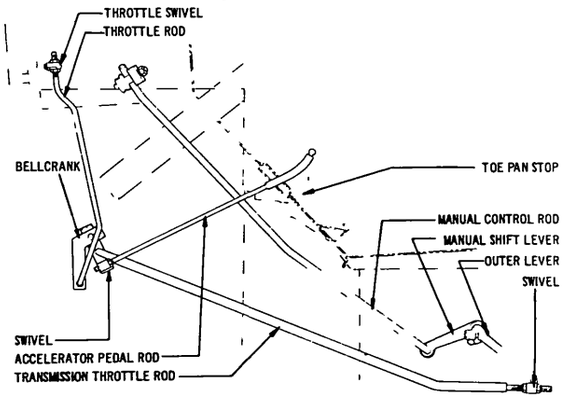
► *IGNITION TIMING PROCEDURE CHANGE: Previous recommendation of setting timing at 1000 RPM with vacuum line disconnected has been discontinued.*

Timing Mark (6 Cyl)) - Steel ball insert in flywheel lined up with pointer in inspection hole in right front faceof housing with Octane Selector set on "0". Adjust Octane Selector as follows: Set for slight ping when accelerating with wide open throttle.

Timing Mark (V8) - Mark on vibration dampener and an indicator on left side of engine front cover. Indicator is marked with 8 lines on "advance" side of "0" mark, and two lines on "retard" side. Each line indicates 2°.

CARBURETOR

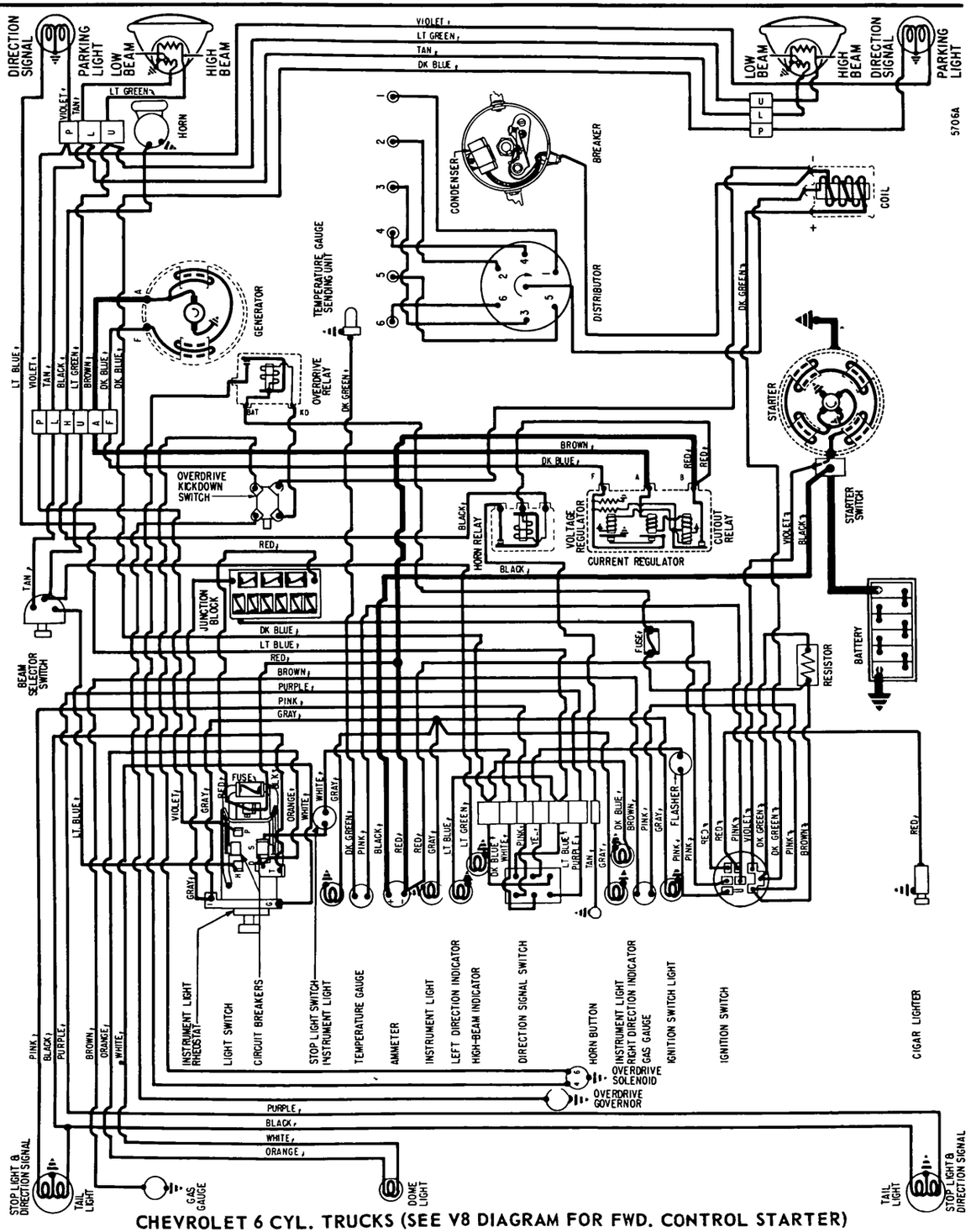
► *CARBURETOR APPLICATION: Rochester "B" & "BC" Carburetors are standard on all 6 Cyl. Models (Exc. Forward Control). Rochester "2G" Carburetor is standard on 265" Trademaster & 283" Taskmaster Engines. Rochester "4G" Carburetor is standard on Super Taskmaster Engines. Carter Updraft Carburetor is standard on Forward Control Models.*



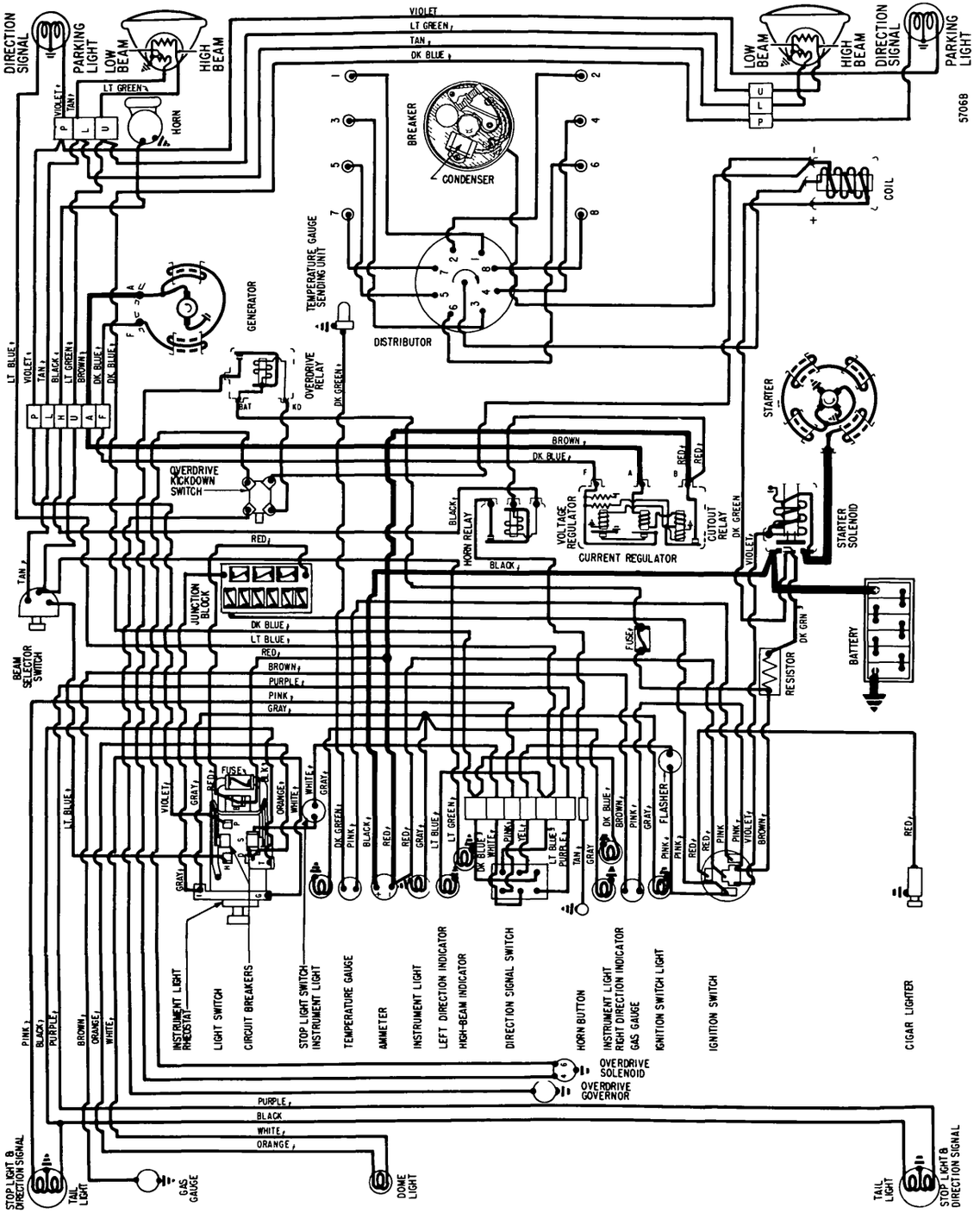
CHEVROLET 6 CYL. HYDRA-MATIC LINKAGE (EXCEPT FORWARD CONTROL)

Throttle Linkage Adjustment (6 Cyl. Hydra-Matic Drive Trucks except Forward Control): With engine at normal operating temperature and idle speed set at 400-450 RPM, remove lower end of carburetor throttle lever-to-bellcrank rod from lever on bellcrank. Install Lever Positioning Gauge J-5609 in hole in lever and gauge hole in pan rail of engine block (hole is located toward rear of bellcrank position), and leave gauge in this position. Remove swivel from bellcrank-to-transmission

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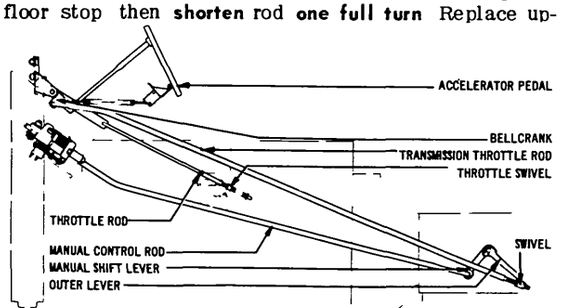
CHEVROLET 6 CYL. TRUCKS (SEE V8 DIAGRAM FOR FWD. CONTROL STARTER)



CHEVROLET V8 TRUCKS (SEE 6 CYL. DIAGRAM FOR PEDAL CONTR. STARTER)

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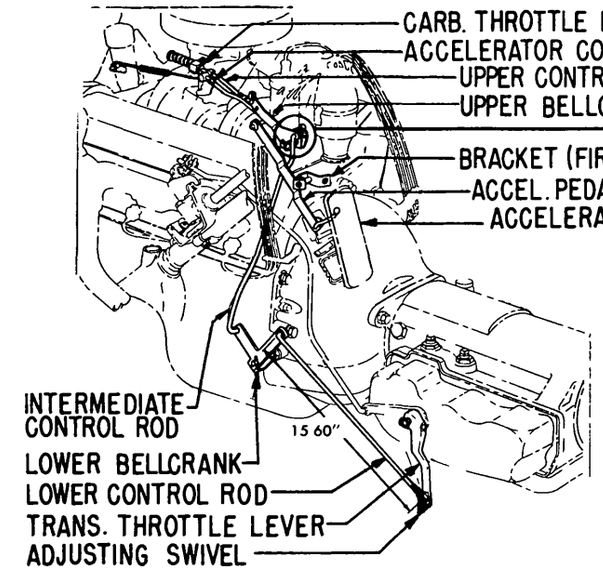
outer lever at transmission and move transmission outer lever back against its stop Check distance from hole in outer lever to back of transmission with Gauge J 2545 C Bend lever as necessary for free entry of gauge in lever hole using Tool J-5260 (*CAUTION - Do not apply force to stops at either end of lever travel)* Hold outer lever back against its stop and adjust swivel position on bellcrank-to transmission rod so it just enters hole in transmission lever Remove Positioning Gauge from bellcrank and reinstall rod Recheck engine idle speed with idle screw against stop on carburetor and adjust carburetor throttle to-bellcrank rod so swivel at upper end freely enters hole in throttle lever At this point **shorten** bellcrank-to-transmission outer lever rod by turning swivel locknuts **three and one-half** turns Remove bellcrank to carburetor throttle rod upper swivel from lever and pull rod upward until linkage is stopped by forward stop in transmission Hold in this position and adjust accelerator-to bellcrank rod swivel until accelerator pedal is against floor stop then **shorten** rod **one full turn** Replace up-

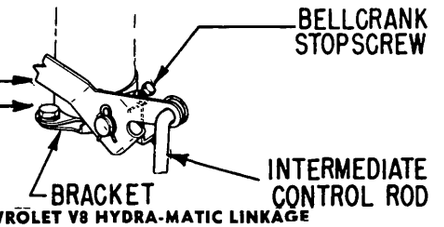


CHEVROLET 6 CYL HYDRA-MATIC LINKAGE (FORWARD CONTROL MODELS)

per end of throttle-to-bellcrank rod in throttle lever **Throttle Linkage Adjustment (Forward Control Mod Is With Hydra-Matic Drive)**· With engine at normal operating temperature and idle speed set at 400 450 RPM insert 1/8" diameter pin into gauge pin hole in mounting bracket of accelerator pedal lever Adjust length of throttle rod so that swivel just enters throttle lever Remove swivel from outer lever and move lever back against transmission stop Check distance from hole in outer lever to rear face of transmission with Checking Gauge J-2545-C bending lever as necessary (Tool J 5260) to allow entry of gauge into hole *CAUTION - Do not apply force against stop at either end of lever travel* Adjust transmission throttle rod so that swivel at transmission case just enters outer lever then **shorten** throttle rod **three and one-half turns** of jam nut Tighten nut Remove pin from hole in accelerator pedal lever back off adjusting screw and depress accelerator pedal until outer lever is tight against forward stop on transmission and then turn adjusting screw against accelerator pedal lever Release accelerator pedal turn adjusting screw down **one full turn,** and secure with jam nut

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CHEVROLET V8 HYDRA-MATIC LINKAGE

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Throttle Linkage Adjustment (V8 Hydra-Matic Drive Trucks): With carburetor at hot idle, remove lower control rod from transmission throttle lever and hold lever back against transmission stop. Check distance from hole in lever to back of transmission case with Lever Checking Gauge J-2545-C, and bend lever as necessary to allow entry of gauge into hole (Tool J-5260). Adjust lower control rod to 15 60" and install in transmission throttle lever, then install intermediate and upper control rods. **Shorten** lower control rod by loosening adjusting swivel **three and one-half turns** and tightening locknuts. Back off bellcrank stopscrew and rotate upper bellcrank until linkage is stopped by full detent stop in transmission, then turn stopscrew until it contacts bracket. Release upper bellcrank and turn stopscrew in **one-half to one full turn** and lock. **On 3100, 3200, 3600 Series Only** install 1/8" gauge pin through hole in accelerator pedal lever and bracket at firewall, then install accelerator control rod to accelerator pedal lever and rotate lever until bellcrank stopscrew contacts bracket. Adjust length of accelerator control rod so swivel just enters lug on upper control rod.

ROCHESTER "B" & "BC"

Downdraft types with manual choke (Rochester Model "B") and automatic choke (Rochester Model "BC").

Model	Rochester No.
235" (exc. Hydra-Matic) ①	B 7004468
235" (with Hydra-Matic) ①	BC 7009255
261" ①	B 7005140

① - Except Forward Control.

Idle Setting - 1½-2½ turns open (7004468 & 7005140), 2½ turns open (7009255) Turns screw out for richer mixture.

Idle Speed - 450-500 RPM (exc. Auto. Trans. models), 425 RPM (Auto. Trans. models with selector lever in "N" position)

Float Level - 1 9/32" from bottom of each float to cover gasket (do not remove gasket). Use Gauge M-250. With assembly inverted, place gauge with projection inserted in discharge nozzle. Carefully bend float lip vertically so that each float just touches top portion of gauge. Bend float arms to bring them into alignment and to center them in gauge. Tilt assembly 90° on each side and check to see that floats do not touch gauge.

Float Drop - Turn cover right side up so float drops down. Distance from gasket on cover to bottom of each float should be 1¾" on all models. Adjust by bending tang at rear of each float assembly.

► *CAUTION: Both floats must be set alike and must not be twisted out of alignment.*

Accelerating Pump - No seasonal adjustment.

Choke Adjustment: Centered on index.

Fast Idle (7009255): With fast idle screw on next to highest step of fast idle cam, Gauge BT-99 (.076") should just slide between lower edge of choke valve and carburetor bore. To adjust, bend connector rod.

Throttle Linkage Adjustment (Hydra-Matic Drive Trucks): *See CARBURETOR above.*

► *OTHER DATA: See "Rochester B & BC Carburetors" in Carburetion Section.*

ROCHESTER "2G"

Dual downdraft type with manual choke.

Model	Rochester No.
V8 Trademaster 265" (Std.Trans.)①(Early)	7010649
V8 Trademaster 265" (Std.Trans.)②(Early)	7010716
V8 Trademaster 265" (Overdrive) (Early)	7010718
V8 Trademaster 265" (Std.Trans.)①(Later)	7011135
V8 Trademaster 265" (Std.Trans.)②(Later)	7012147
V8 Trademaster 265" (Overdrive) (Later)	7011132
V8 Taskmaster 283" ② (Early)	7010717
V8 Taskmaster 283" ② (Later)	7011143

① - Without governor. ② - With governor.

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting - After idle speed set to correct specifications (see Idle Speed below), turn both idle mixture screws for smooth idle with highest vacuum reading and RPM.

Idle Speed - 475 RPM (Synchro-mesh), 425 RPM with transmission in "N" (Automatic Trans.).

Float Level - 1¼" from air horn gasket to top of float with assembly inverted. Use Gauge BT-129 so it rests against power piston shaft with outer leg in line with center of float. Adjust by bending float arm between pivot and float with Tool BT-69.

Throttle Linkage Adjustment (Hydra-Matic Drive Trucks): *See CARBURETOR above.*

► *OTHER DATA: See "Rochester 2G Carburetors" in Carburetion Section.*

ROCHESTER "4G"

Rochester 4G No. 7009661 (early), 7011161 (later). Four barrel downdraft type with manual choke and vacuum operated governor.

Replacement Package - Rochester No. 7015713.

Idle Setting - Adjust idle mixture screws for highest steady vacuum.

Idle Speed - 450 RPM (Synchro-mesh), 425 RPM (Automatic Trans. with selector lever in "D" range).

Throttle Linkage Adjustment (Hydra-Matic Drive Trucks): *See CARBURETOR above.*

► *OTHER DATA: See "Rochester 4G & 4GC Carburetors" Carburetion Section.*

CARTER

Carter (BB) 871SC (Forward Control Models). Single barrel updraft type with manual choke.

Idle Setting - ½-1½ turns open (turn screw out for richer mixture.)

Idle Speed - 450-500 RPM (Synchro-mesh), 400-450 RPM (Hydra-Matic).

Float Level - Top of float (not seam) 0" to 1/32" below top of bowl with needle valve seated. Use Gauge J-818-13A on top edge of bowl (gasket removed). Press float lever lip firmly against needle.

Accelerating Pump - Inner hole (in plunger shaft and throttle lever) Summer. Outer hole, Winter.

Throttle Linkage Adjustment (Hydra-Matic Drive Trucks): *See CARBURETOR above.*

► *OTHER DATA: See "Carter BB Carburetors" in Carburetion Section.*

FUEL PUMP PRESSURE: 3½-4½ lbs.

CARB. EQUIPMENT

Fuel Pump: **(6 Cyl.)** AC No. 4149 (Std. - Fuel only), 4138 or 707 (Optl. - Fuel & Vacuum).
(V8) - AC No. 4150 (Std. - Fuel only), No. 4304 (Optl. - Fuel & Vacuum).
Pressure - 3½-4½ lbs. (6 cyl.), 4-5¼ lbs. (V8).
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: AC Electric.
Dash Unit - AC No. 1518461.
Tank Unit - **Truck Model**
AC No. 1518777 ..... (Utility Cab)
AC No. 1518779 ..... (Utility Exc. Fwd. Cont.)
AC No. 1518780 ..... (Utility Fwd. Cont.)
AC No. 1518778 ..... School Bus
AC No. 1518783 ..... ¾ Ton Fwd. Cont.
See "Fuel Gauges" in Carburetion Section.

BATTERY

Delco 2SMR53W. (Exc. School Bus) - 12 volt, 9 plate, 53 ampere hour capacity (20 hr. rate).
Delco 2SMR72D. (School Bus) - 12 volt, 11 plate, 72 ampere hour capacity (20 hr. rate).
Battery Ground - Negative.
Engine Ground - Engine to frame (6 cyl.). Engine to dash (V8).

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STARTER

Delc -R my. Application as follows

Mod l	Starter	Armature
6 Cyl. (Exc. Fwd. Cont.)	1107634 ①	1926626
6 Cyl. (Fwd. Cont.)	1107652 ②	1932185
6 Cyl. (Hydra-Matic)	1107677 ② ③	1926626
V8 (Exc. Hydra-Matic)	1107664 ②	1935829
V8 (Hydra-Matic)	1107674 ②	1927343

① - Manual Pinion shift. ② - Solenoid pinion shift.
③ - Delco-Remy 1107633 also used.

Drive (6 Cyl. Synchro-mesh Trans., Exc. Fwd. Cont.) - Overrunning clutch with pedal operated manual pinion shift.

Driv (6 Cyl. Fwd. C nt. & Hydra-Matic Trans., All V8 M d ls) - Overrunning clutch with solenoid pinion shift

R tati n - Counterclockwise at commutator end.

Brush Spring Tension - 35 ozs. minimum.

P rformanc Data - 1107634, 74, 77

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10 5 ft. lbs.	Lock	5 8	435

P rf rmance Data - 1107652, 64

Torque	RPM	Volts	① Amperes
0 ft. lbs.	6200-9400	10 6	49-76
	Lock	4 25	270-310

① - Includes solenoid.

Starting Switch (Solenoid Pinion Shift Models): Delco-Remy Solenoid 1119919 (1107652 & 1107664), 1119760 (1107674), 1119793 (1107677). Mounted on starter and controlled by Ignition & Starter Switch 1116537. Turn key full RIGHT against spring tension to start.
See "D lco-Remy Solenoid Starting Switch (Without R lay)" in Electrical Section.

Starting Switch (Manual Pinion Shift Models)· Delco-Remy Switch 1930496. Mounted on starter and actuated by pedal operated lever. Ignition Switch 1116522 is connected to small terminal on side of starter switch to bypass resistor for starting.
See "Delco-Remy Manual Pinion Shift Starter Switches" in Electrical Section.

Hydra-MaticN utral Safety Switch: Delco-Remy 1998110. Mounted on steering column.
Adjustm nt - *See "Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delc -R my. Used as follows

Mod l	Generator	Armature
Std. (25 Amp.)	1100326	1928952
Optl. (30 Amp)	1105947	1928003
Optl. (40 Amp.)	1106981	1929360
Power Strg.	1102041	1929640
Power Strg. (Optl.)	1106982	1932349

Performance Data - Cold

G n rat r	① Amp res	Volts	RPM
1100326	25	14 0	2570
1102041	30	14 0	2210
1105947	32	14 0	1850
1106981, 2	40	13 0	1500

① - Not maximum output. See Current Re gulator

Rotati n - Counterclockwise at commutator end.

Brush Spring T nsi n - 28 ozs.

Field Current - 1.5-1.62 amps. (1100326), 1 48-1 62 amps. (1102041), 1 54-1.67 amps. (1105947), 1.37-1.50 amps. (1106981, 82). All at 12 volts.

Belt Adjustment: 5/16" (6 Cyl.), 13/16" (V8) deflection midway between water pump and generator pulleys with light load applied to belt.

REGULATOR

Delco-Remy. Application as follows

Regulator No.	Generator No.
1119000 (25 Amp.)	1100326
1119001 (30 Amp.)	1105947
1119003 (30 Amp.)	1102041
1119004 (40 Amp.)	1106981, 82

►*NOTE - Specifications below are for "NORMAL" settings.*

Cutout Relay

Cuts In - 11.5-13 0 volts (1119004), 11 8-13.5 volts (Others).
Contact Gap - .020".
Air Gap - .020" (with contacts just closed).

Voltage Regulator

Setting - 13.6-14 3 volts (1119004), 13 8-14.8 volts (Others).
Air Gap - .075" with armature pressed down to point where contacts just touching.
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Se ction.*

Current Regulator

Setting - (1119000) 23-27 Amperes (1119003) 27-33 Amperes, (1119004) 37-42 Amperes.
Air Gap - .075" with armature pressed down to point where contacts just touching
Checking & Adjusting - *See "Delco Remy 12 Volt Regulators" in Electrical Section*

MISC. ELECTRICAL

Headlamps· Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Lighting Switch Removal: Disconnect all wires from switch (tag wires for reinstallation), depress switch shaft retainer (on top of switch) and remove knob and shaft. Remove retaining ferrule, remove switch.
Stop Light Switch Location. Attached to under side of toe pan to left of brake pedal.
LIGHTING CIRCUIT BREAKERS: Two 13 ampere circuit breakers located in main lighting switch. One protects headlamps and parking lamps and the other circuit breaker protects all other light circuits except instrument panel lights.
FUSES: Instrum nt Lights - 3 ampere. On lighting switch.
Ov rdrive - 9 ampere In overdrive relay lead
H rn R lay: Delco-Remy 1116920.
C ntacts Cl se - 5 0-9 5 volts.
C ntact Gap - .027".

ENGINE

Engine	Series
Thriftmaster 235" (6 Cyl.)	① 3000, 4000
Thriftmaster 235" (6 Cyl.)	② 3400, 3500, 3700
Jobmaster 261" (6 Cyl.)	① 6000
Trademaster 265" (V8)	③ 3000, 4000
Taskmaster 283" (V8)	④ 5000
Super Taskmaster 283" (V8)	⑤ 5000

① - Std. Equip., Conventional Models.
② - Std. Equip., Forward Control Models.
③ - Optional Equip., Conventional & Forward Con trol.
④ - Std. Equip. Optional on 6000 Series.
⑤ - Optional Equip.

ENGINE SPECIFICATIONS: Own. 6 Cyl. & V8 Valve-in-head.

Engine	Bore	Stroke	Displacement
Thriftmaster	3 9/16"	3 15/16"	235.5 cu. ins.
Jobmaster	3 3/4"	3 15/16"	261 cu. ins.
Trademaster	3 3/4"	3"	265 cu. ins.
Taskmaster	3 7/8"	3"	283 cu. ins.
Super Taskmaster	3 7/8"	3"	283 cu. ins.

Engine	Compr. Ratio	Rated HP	Dev. HP
Thriftmaster	8.0-1	30.4	① 140
Jobmaster	7.8-1	33.7	② 148
Trademaster	8.0-1	45.0	① 155
Taskmaster	8.0-1	48.0	② 160
Super Taskmaster	8.0-1	48.0	③ 175

① - At 4200 RPM. ② - At 4000 RPM. ③ - At 4400 RPM.
Compression & Vacuum Reading - *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Chevrolet Special Data.*
OIL PAN REMOVAL: (6 Cyl. Engine) - Drain oil and remove flywheel housing under pan, flywheel underpan extension, and oil pan screws. Remove oil pan.
OIL PAN REMOVAL: (V8 Engine) - Drain oil, disconnect steering idler arm bracket from right hand frame side rail and drop for clearance. On 5000 Series truck, remove oil gauge tube attaching bolt and remove gauge and tube. Remove oil pan bolts and screws and remove oil pan.
ENGINE MOUNTINGS: *See "Engine Mountings" in Chevrolet Special Data.*
CYLINDER HEAD & MANIFOLDS: *See "Cylinder Head & Manifold" in Chevrolet Special Data.*
TIGHTENING TORQUES· *See "Tightening Specifications" in Chevrolet Special Data.*
►*OTHER ENGINE DATA See 1957 Passenger Car pages and note the following:*
PISTON RINGS (6 CYL. ENGINES): 235" & 261" Engines have "Chrome Plated" top compression rings. Other compression rings are cast iron, oil rings are three piece steel (2 Chrome-Plated Rails & Spacer).
VALVES (ALL ENGINES): Rotocoil Valve Rotators - Used on exhaust valves of some 6 Cyl. & V8 engines.
VALVE LIFTERS (ALL ENGINES): Mechanical type lifters used on all 6 cyl.truck engines. Hydraulic lifters used on all V8 engines

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VALVE TIMING (ALL ENGINES): As follows

235" Thriftmaster & 261" Jobmaster

Intake Valve - Open 10°30' BTDC. Close 53°30' ALDC.
Exhaust Valve - Open 49° BLDC. Close 15° ATDC.

265" Trademaster

Intake Valve - Open 18° BTDC. Close 72° ALDC.
Exhaust Valve - Open 52° BLDC. Close 20° ATDC.

283" Taskmaster & Super Taskmaster

Intake Valve - Open 12°30' BTDC. Close 57°30' ALDC.
Exhaust Valve - Open 54°30' BLDC. Close 15°30' ATDC.

Valve Timing Check (235" & 261" Engines): Remove all tappet clearance from No. 1 exhaust valve. Turn engine over until this valve opens and just starts to close and until triangular mark on flywheel lines up with pointer in flywheel housing opening. Mount dial indicator on rocker arm shaft support with stem contacting No. 1 exhaust valve adjusting screw, set dial indicator to .063". Turn crankshaft until indicator hand just stops moving. Timing is correct if indicator reading is ZERO plus or minus .004". Reset No. 1 exhaust valve to correct running clearance

OILING SYSTEM

Crankcase Capacity: **(6 Cyl.)** 5 qts. (Thriftmaster), 7 qts. (Jobmaster). **(V8)** 4 qts. (Trademaster), 5 qts. (Taskmaster & Super Taskmaster).

Normal Oil Pressure - 30 lbs. at 1170-1200 RPM.

Pressure Regulator Valve - In pump body, not adjustable.

Oil Pressure Indicator - AC No. 1508246. Not electric.

Oil Pump: Gear type. Located in crankcase, driven by distributor gear.

► *OIL PUMP SCREEN NOTE:* Oil pickup pipe should be installed with pickup pipe screen horizontal and toward bottom of pan.

Oil Pump Overhaul - *See "Oiling System" in Chevrolet Special Data.*

Crankcase Ventilation (Standard): Air intake through valve rocker arm cover, outlet through pipe on right side of engine.

Servicing - On all models with air cleaner mounted on valve rocker arm cover, wash filter element with solvent and re-oil at 2000 mile intervals or more often if required by operating conditions.

Crankcase Ventilation (Optional): Positive Type. Vacuum operated ventilator consisting of a vacuum pipe from oil filler pipe to ventilator valve in fitting on intake manifold. Valve is spring loaded, variable opening type giving constant crankcase ventilation at all speeds. **Valve must close at idling to give proper air-fuel mixture.**

Servicing - Every 10,000 miles (or oftener if required), clean vacuum pipe, valve, and filler pipe thoroughly. Filler cap gasket must seal tightly.

► *VACUUM VALVE CAUTION* If improper action of spring is suspected due to spring being distorted, or etched from corrosive action, the valve assembly should be replaced.

► *TASKMASTER V8 CRANKCASE VENTILATION NOTE:* Positive type crankcase ventilation is Standard.

COOLING

Water Capacity: In quarts for each type engine
½, ¾, 1 Ton (Std.) - 17 (235"), 17½ (265").
½, ¾, 1 Ton (H.D.) - 17½ (235"), 18 (265").
1½ Ton Spec. (Std.) - 17½ (235"), 18 (265").
1½ Ton Spec. (H.D.) - 18 (235"), 18½ (265").
5000 Series - 18 (283" Std.), 18½ (283" Powermatic).
6000 Series (Std.) - 17½ (235"), 17 (261"), 18 (283").
6000 Series (H.D.) - 18 (235"), 18½ (283").
6000 Series (Powermatic) - 21 (261"), 21½ (283").
NOTE - Add 1 qt. for heater.

Pressure Valve: AC No. 850795. Radiator filler cap. 7 lb. type. Replacement Valve - AC No. RC-1.

Thermostat: Harrison. In cylinder head water outlet (6 Cyl.). In water outlet in intake manifold (V8).
Standard - No. 3133595 (stamped 151) 151°. Can be used for alcohol anti-freeze.
Optional - No. 3133596 (stamped 160) 160°. No. 313-3597 (stamped 170), 170°.

Temperature Gauge: AC Electric.
Dash Unit - AC No. 1513138.
Engine Unit - AC No. 1513321.
See "Temperature Gauges" in Miscellaneous Section.

Water Pump: Packless type with sealed ball bearing shaft *See "Water Pumps" in Water Pump Section.*

CLUTCH

Own. (Diaphragm Spring) and Borg & Beck (Coil Spring) types used. Single plate, dry disc type.

Chevrolet (Own) Diaphragm Clutch

Model	Size	Chevrolet No
6 Cyl. (Exc. H.D., Fwd. Contr.)	10"	3836715
6 Cyl. Fwd. Contr. (Exc. 2 ton)	11"	3836719
6 Cyl. ½, ¾, 1, 1½ ton H.D.	11"	3836719
Borg & Beck Clutch		
6 Cyl. 2 ton (261" Eng.)	11"	① 3837155
V8 ½, ¾, 1, 1½ ton	11"	① 3837155
V8 2 ton	11"	3743203

① - Borg & Beck 11A9 No. 361455.
See "Chevrolet (Own)" or "Borg & Beck" in Clutch Section.

Clutch & Clutch Disc Application - As follows

Clutch Disc (Chevrolet Clutch)

Model	Chevrolet No.
Std. 10" (Woven-Red Hub)	3836119
Std. 10" (Molded-Orange Hub)	3836097
H.D. 11" (Woven-Pink Hub)	3836906
Clutch Disc (Borg & Beck)	
Std. 10½" (Dark Green Hub)	③ 3727585
H.D. 11" (Yellow Hub)	④ 3733153

③ - Borg & Beck No. 382528.
④ - Borg & Beck No. 382286.

6 CYL. ENGINES

Pedal Adjustment: Pedal free travel ¾-1" To adjust, loosen checknut and turn adjusting nut on connecting link at clutch throwout fork. *NOTE*—Use finger pressure only when checking clutch free travel.

Removal: Remove transmission (see Transmission Removal). Remove throwout bearing, remove fork by prying fork off ball, remove fork mounting (use ¾" wrench). Install Clutch Pilot Tool K-411 (to support clutch), loosen all six cover bolts evenly, remove assembly from below. *CAUTION*—Do not allow pressure plate to hang on retracting springs (support by hand). When installing clutch align "X" mark on cover with "X" mark on flywheel.

V8 ENGINES

Pedal Adjustment: Adjust clutch pedal until free travel is 1". Make sure that pedal pad contacts toeboard when pedal pressed down.

Removal: Remove transmission (see Transmission Removal). Before removing clutch assembly, punch mark flywheel, clutch cover and one pressure plate lug so these parts may be assembled in their same relative positions. Loosen hold-down screws evenly and remove cover. *NOTE*—Mark flywheel side of driven plate for correct reassembly.

TRANSMISSION

3-SPEED LIGHT DUTY

Own. Three speed, all helical gear type. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See "Chevrolet 3-Speed (Light Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever. *See "Transmission Controls" in Transmission Section.*

Removal (½ & ¾ Ton): Drain transmission. Disconnect speedometer cable at transmission and shift control rods from transmission levers. Remove propeller shaft. Remove the two top transmission to clutch housing capscrews and insert two transmission guide pins, Tool J-1126, in these holes. Remove the two lower transmission to clutch housing capscrews. Slide transmission straight back on guide pins until clutch gear is free of splines in the clutch disc

3-SPEED (HEAVY DUTY)

Own. Three speed, constant mesh (second & high), sliding gear (low & reverse).
See "Chevrolet 3-Speed (Heavy Duty)" in Transmission Section.

Transmission Control: Steering column mounted gearshift lever.
See "Transmission Control" in Transmission Section.

Removal: Same as for "3-Speed (Light Duty)" above.

4-SPEED

Own. Four-speed, constant mesh, synchro-mesh, helical gear (2nd, 3rd, & 4th), sliding spur gear (low & reverse). Floor mounted gearshift.

Transmission Control: Floor mounted gearshift lever.

Removal (½ Ton): *See "3-speed (Light Duty)" abov .*

Removal (Other Trucks): Drain transmission, disconnect parking brake and remove lever. Remove propellor shaft, transmission gearshift lever (use Tool K-353). Remove screws that fasten steering jacket grommet to floor and slide grommet up jacket out of way. Remove accelerator pedal and floor mat. Remove sheet metal screws attaching transmission cover to body floor, remove cover. On Forward Control Models, remove both front and rear floor pans. Disconnect speedometer cable from driven gear fitting at transmission rear bearing retainer. Remove two top attaching screws, insert Guide Pins J-1126, remove flywheel underpan, two lower transmission screws, slide transmission straight back, remove transmission from vehicle.

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OVERDRIVE

Warner R10. Used with Chevrolet Truck 3-Speed (Light Duty) Transmission.

See "Chevrolet Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cables have been disconnected.

HYDRA-MATIC DRIVE

Dual Range. Four speed type with fluid coupling.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication—Check fluid level in transmission every day. Drain & refill every 25,000 miles. Use only "Automatic Transmission Fluid" Type A.

Checking Fluid Level—With selector lever in "N" position, parking brake set, and transmission at normal operating temperature, remove access hole cover plate in floor pan, and **check fluid level with engine at idling speed.** Add sufficient fluid to bring level in transmission to "F" mark on dipstick.

Capacity—8½ qts. (refill), 9 qts. (after overhaul). *NOTE*—1 qt. additional with oil cooler.

Throttle Linkage Adjustment: See *CARBURETOR* above.

►*OTHER HYDRA-MATIC SERVICE DATA*—*See "Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

REAR AXLE

SEMI-FLOATING (HALF-TON)

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE*—Same design as passenger car axle.

See *"Chevrolet Hypoid Semi-Floating" in Rear Axle Section.*

Ratio—**(Synchro-mesh & Hydra-Matic)** 3.90-1 (39.10) **(Overdrive)** 4.11-1 (37:9).

►*AXLE SHAFT NOTE: Shafts unequal length (right shaft longer) and may be identified by mark stamped on shaft, or by length as follows:*

Axle	Part No.	Length
Left	3694769①	29 5/8"
Right	3694770①	30 5/8"

①—Part No. stamped on axle for identification.

Backlash—.005-.008".

Removal of Rear Axle Assembly: Disconnect and remove parking brake pull back spring. Remove cotter pins and clevis pins from each parking brake cable clevis, and remove clevis. Remove springs and retaining clips from cables at frame brackets. Disconnect universal joint trunnion bearing "U" bolts and split rear universal joint. Disconnect shocks from anchor plates. Disconnect hydraulic brake line to connector at rear frame bracket. Remove spring "U" bolts, nuts and anchor plates. Raise rear of truck and roll assembly out toward rear. *CAUTION—Be careful when pulling parking brake cables through openings in frame.*

Axle Shaft Removal: *See "Chevrolet Hypoid Semi-Floating" in Rear Axle Section.*

Axle Shaft Endplay—Free fit to .014" maximum.

FULL-FLOATING (¾, 1, 1½ & 2-TON) (EXC. LCF MODELS)

Own. Full-floating hypoid gear (straddle mounted pinion) with Hotchkiss drive.

►*AXLE ASSEMBLY NOTE, ¾ & 1-Ton axle assemblies are different design than used on 1½ & 2-Ton with standard rear axle assemblies.*

See "Chevrolet Truck Hypoid Full-Floating" in Rear Axle Section.

►*AXLE RATIO IDENTIFICATION NOTE: Axle ratios are identified by prefix letters in rear axle numbers stamped on top of carrier housing between reinforcing ribs. See Axle Ratios following:*

Axle Ratio Identification

Ratio	Prefix Letters
5.14-1 (36:7)	CA, CB, CE, CF
4.57-1 (32:7)	CC, CD
6.17-1 (37:6)	CG, CH, CJ
7.2-1 (36:5)	CM

Backlash—.005-.008". Screw adjustment.

Removal of Differential Carrier: Drain lubricant, remove axle housing cover and axle shafts, see axle shaft removal below. Remove two trunnion bearing "U" bolts from rear yoke and split rear universal joint (hold bearings on trunnion with tape). Remove bolts and lockwashers holding carrier to axle housing, support carrier in floor jack and roll from under truck.

Axle Shaft Removal (¾ & 1-Ton). Remove eight capscrews and lockwashers in axle shaft flange. Install two ½"x13" screws in special threaded holes in flange (between regular mounting screw holes), turn these screws up evenly to loosen the shaft. Withdraw shaft from housing, remove and discard gasket. *Use new gasket when installing shaft.*

►*CAUTION* Thoroughly clean all lubricant from axle shaft flange and end of wheel hub before installing axle shaft. *Grease at this point will cause loosening of axle shaft flange capscrews.*

Axle Shaft Removal (1½ & 2-Ton): Shaft flange is splined in wheel hub (tight fit) and requires special puller for removal. Remove five capscrews and lockwashers in hub cap, remove hub cap and gasket. Assemble special adapter J-1436-8 on Rear Axle Shaft Bearing & Oil Seal Remover J-1436 (remove jaws), thread adapter into hole in axle shaft flange, pull axle shaft. *NOTE*—When reinstalling axle shaft, tap flange splines into engagement with wheel hub splines (if necessary, rotate wheel slightly to align splines on shaft with both wheel hub and differential side gear splines), use new hub gasket.

►**Axle Shaft Note:** Shafts unequal length (right shaft longer than left). Install in correct position.

Wheel Bearing Adjustment: Remove wheels and axle shafts (see above). Bend back lip of lock in locknut notch, remove locknut and adjusting nut lock. Tighten adjusting nut tight, using special wrench J-2222 (¾ & 1-Ton), J-870 (1½ Ton), J-5670 (2-Ton) while turning hub by hand, then back off nut 45°, check for free turning, install adjusting nut lock with lock tangs aligned with slots in adjusting nut. Bend tang down into notch in adjusting nut, install locknut and tighten securely. Bend tang of lock down into notch of locknut.

HEAVY DUTY FULL-FLOATING (2-TON & LCF MODELS)

Own. Full floating, hypoid gear, roller pinion bearings (straddle mounted pinion), with Hotchkiss drive.

See "Chevrolet Truck Heavy Duty Hypoid Full Floating" in Rear Axle Section.

Ratios—Same as for "Standard Full-Floating" above.

Backlash—.005-.008"

Removal Of Rear Axle Assembly: Same as for "Standard Full-Floating" above.

Axle Shaft Removal: Same as for 1½ & 2-Ton "Standard Full-Floating" above.

►**Axle Shaft Note.** Shafts unequal length (right shaft longer than left). Install in correct position.

Wheel Bearing Adjustment: Same as for "Standard Full-Floating" above.

PLANETARY 2-SPEED

Own. Full-floating, two-speed planetary reduction type with hypoid primary pinion and ring gear.

See "Chevrolet Truck Planetary 2-Speed" in Rear Axle Section.

►*NOTE: Two gear ratios available as follows:*

Power Ratio—6.40-1 (high), 8.72-1 (low). 32:5 Primary gears.

Speed Ratio—5.83-1 (high), 7.95-1 (low). 35:6 Primary gears.

Two-Speed Shift Control: Vacuum power type with control on gearshift lever.

Carrier Assembly Removal: *See "Chevrolet Truck Planetary 2-Speed" in Rear Axle Section.*

Axle Shaft Removal & Wheel Bearing Adjustment: Same as for "Standard Full-Floating" above.

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SHOCK ABSORBERS

Delco. Direct Acting (Airplane Type) shock absorbers as follows:

Shock Absorber Nos.	Front	Rear
½, ¾, 1 ton (Exc. Fwd. Contr.)	5532049	5534435
½, ¾, 1 ton Fwd. Contr.	5513193	5513349
1½, 2 ton (Exc. Fwd. Contr., Sch. Bus)	5521698	5534401
1½ ton Sch. Bus	5521698	5320846
2 ton Sch. Bus	5521699	5534401

FRONT SUSPENSION

Conventional "I" Beam section, with Reverse Elliott ends and semi-eliptic springs.

Kingpin Inclination - 7.16°.

Caster - Pos. 1½° (3100, 3200), Pos. 3° (3600), Pos. 2° (3400, 3500, 3700, 4000, 5000), Pos. 2¼° (3800, 6000).

Camber - Pos. ½° to Pos. 1½°.

Toe-In - 1/8" to 7/32" (½ Ton), ¼" to 5/16" (Others).

Toe-Out on Turns - With outer wheel at 20°, inner wheel should be 22.5° to 23.5°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut (recirculating ball).
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Bendix Linkage Type – *See "Chevrolet Truck (Bendix)" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

►*NOTE: Two different type brakes used on trucks as indicated below.*

Chevrolet-Bendix (Except Rear Wheels of 1½ & 2-Ton Models–Duo-servo, single anchor, hydraulic (without eccentric adjustment).
See "Chevrolet-Bendix Hydraulic" in Brake Section.

►*HALF-TON TRUCK BRAKE SHOE GRINDING CAUTION:* If bench type grinder used, grind shoes to .057" to .087" smaller diameter than drum size. If spindle type grinder used, grind shoe to drum diameter.

Chevrolet-Twinplex (Rear Wheels 1½ & 2-Ton Models)– Two-cylinder, four-anchor type hydraulic. Shoes are self-centering and self-energizing.
See "Chevrolet Twinplex" in Brake Section.

Wheel Cylinders– Size stamped on housing under adjusting lock spring.

Drums–Cast iron with steel web.

Drum Diameter

Model	Front	Rear
½-Ton	11"	11"
¾-Ton	12"	12"
1-Ton	12"	14"
1½ & 2-Ton	14"	15"

Lining–Molded type. Riveted on 1½ & 2-Ton Models and bonded on all others.

Thickness & Width

Model	Thickness	Width
½-Ton (Front Whl.)	.202-.222"	2"
½-Ton (Rear Whl.)	.202-.222"	1¾"
¾-Ton (Front & Rear)	.264-.284"	2"
1-Ton (Front Whl.)	.264-.284"	2"
1-Ton (Rear Whl.)	.267-.287"	2½"
1½ & 2-Ton (Front Whl.)	.267-.287"	2½"
1½ & 2-Ton (Rear Whl.)	.392-.412"	4"

Clearance–Adjust for clearance as follows:

All Models (Except 1½ & 2-Ton Rear Brakes)–Remove adjusting hole cover and turn brake adjusting screw until light drag is felt, then back off adjusting screw 7 notches (Half-Ton Models), or just enough to eliminate brake drag (Other Models), but not more than 7 notches.

Rear Wheels (1½ & 2-Ton Models)–Remove adjusting hole covers from flange plate and turn rear adjusting screw until slight drag is felt, then back off 3 notches. Repeat on front adjusting screw (2 adjustments on each wheel).

Parking Brakes: Hand lever applies rear wheel service brakes on Half-Ton & ¾-Ton Models, and an independent brake on propeller shaft on all other models.

Adjustment (½ & ¾-Ton Models)–*See "Chevrolet-Bendix Hydraulic" in Brake Section.*

Adjustment (1, 1½, 2-Ton Models & ¾-Ton with 4-Speed Transmission)–*See "Chevrolet Twinplex" in Brake Section.*

Master Cylinder: Located under floorboard on left hand side of truck.

Checking Fluid–Maintain fluid level to lower edge of filler hole.

Removal–Remove from below. *CAUTION*–On 1½ & 2 Ton Low Cab Forward, spacer between cylinder and body bracket will fall out when mounting bolts removed.

Installation–Reverse removal procedure. On LCF Models make sure the spacers are reinstalled.

Power Brakes: *See "Hydrovac Power Unit" in Brake Sect.*

Removal–Remove vacuum line, brake fluid line to wheel and master cylinders, and air cleaner hose from vacuum unit. Remove nuts and bolt securing unit to its bracket on right side rail of frame.

MISC. MECHANICAL

Windshield Wipers: Linkage type. Vacuum motor (Std. Equip.). Electric motor (Optl. Equip.).
See "Windshield Wipers" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

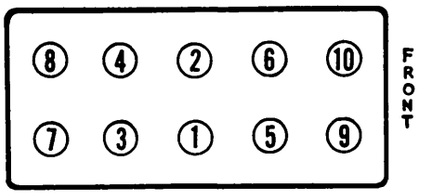
ALL ENGINES	Ft. Lbs
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Exhaust Pipe Flange Bolt Nut	40
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	35
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Cover	2 5
Valve Lifter Cover	4 1 6
Carburetor to Manifold Stud Nut	15
Distributor Clamp Bolt	15
Engine Front Cover	15
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	33
Clutch Housing	50

ENGINE

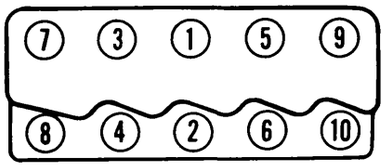
ENGINE ASSEMBLY REMOVAL: Drain cooling system, remove battery Remove fan shroud, radiator, and hood. *(NOTE* - Before removing hood, scribe outline of hinge brackets to insure proper adjustment when reinstalling.) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor. Attach engine lifting Tool C-3466 to carburetor flange studs on intake manifold and attach chain hoist to fixture eyebolt. Raise car and disconnect propeller shaft at transmission Disconnect wires and linkage at transmission. Disconnect wires and linkage at transmission and clutch. Remove exhaust pipe (make sure exhaust system is supported while engine is removed). Drain engine and transmission oil. Remove rear crossmember-to-transmission support attaching bolts. *(NOTE* - Place a roll-away jack under transmission to relieve weight from crossmember. Place a wood block between head of jack and transmission to avoid damaging transmission oil pan. Jack must support weight of rear of engine and must be able to roll with engine as engine is removed). Remove crossmember-to-frame bracket attaching bolts. Remove crossmember and rear engine support Lower car to convenient working height, then remove engine front support mounting bolts With chain hoist, raise engine and, at same time, work engine out of chassis toward left front fender

CYLINDER HEAD & MANIFOLD

Installation: (All models) - Coat new gaskets with sealer install cylinder heads and pushrods Insert cylinder head bolts in rocker arm support brackets *(NOTE* - **SpitFire** engine new secures rocker arm brackets with cylinder head bolts **Fire Power** engine uses all cylinder head bolts to secure rocker arm brackets) Position rocker arm assemblies lining up pushrods with rocker arms Tighten all cylinder head bolts to 60-80 ft lbs in sequence shown in diagram then retighten in same sequence to 85 ft lbs



V8 ENGINES (DOUBLE ROCKER ARM SHAFT)



V8 ENGINES (SINGLE ROCKER ARM SHAFT)

CRANKSHAFT & MAIN BEARINGS

ALL ENGINES

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap Tap seal down in position with Tool C-3511 until tool is seated in bore Hold tool down and cut off protruding ends flush with cap Install bearing insert and both cap seals The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine

ENGINE FRONT COVER

ALL ENGINES

ENGINE FRONT COVER: Removal - Drain cooling system remove radiator *NOTE* - On Air Cond cars remove upper half of fan shroud Loosen power steering pump idler pulley and generator and remove belts Remove fan spacer and pulley *NOTE* - On Air Cond cars remove pulley from water pump fan hub, remove fluid fan drive Remove water pump body to housing bolts and remove pump Pull damper off end of crankshaft (use Puller C-3033) Remove front cover and gasket

Installation: Be sure mating surfaces are clean and free of burrs Use new gaskets reverse removal procedure, tightening chain cover bolts to correct torque specifications

FRONT OIL SEAL: With chain cover removed (see above), use Tool C-3506 to remove old seal *NOTE* - When installing tool for replacing seal have thin shoulder of installing plate up on **stamped** case cover, and thick shoulder up on **cast iron** case cover Have protective recess in installing plate toward lip of seal retainer Seal is properly installed when neoprene is tight against face of cover

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Remove Engine Front Cover see above, remove crankshaft oil slinger, fuel pump eccentric bolt cup washer and eccentric Remove timing chain with crankshaft and camshaft sprockets Remove intake manifold lifter cover pushrods lifters and distributor Lift out distributor drive gear and stub shaft Remove camshaft thrust plate bolts and oil trough Carefully draw camshaft and spacer out through bearings (do not damage bearings with cam lobes)

VALVE SYSTEM

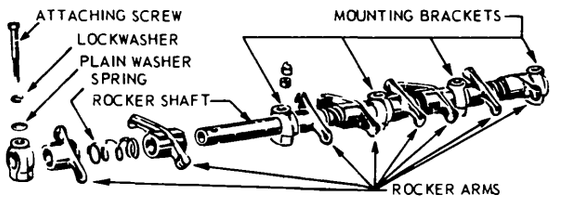
V8 ENGINES – DOUBLE ROCKER SHAFT

EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished 010" O S Use special Tool C-3140 (Double Rocker Shaft Engines) to remove inserts After inserts have been removed from engine, smooth any roughness of seat with a blunt drift Valve seat inserts should be from 002- 004" larger than counterbore to insure correct fit If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert Place inserts in dry ice for approximately 10 minutes Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with Installing Tool C-767

ROCKER ARMS

V8 ENGINES – SINGLE ROCKER SHAFT

ROCKER ARM ASSEMBLY (Single Rocker Arm Shaft): Hold rocker arm shaft and end bracket in a horizontal position with oil grooves facing down Slide an intake rocker arm over shaft and down against bracket, with diagonal slant of arm close to bracket Then slide a spacer spring over shaft



ROCKER ARM ASSEMBLY (SINGLE ROCKER ARM SHAFT)

and down against intake rocker arm Next, slide an exhaust rocker arm over shaft and down against spacer spring, followed by a shaft bracket Continue to slide first an intake rocker arm, then a spacer spring followed by an exhaust rocker arm and bracket, over shaft until last bracket has been installed Slide push rods into push rod holes Be sure that rocker arms are in a horizontal position, then lower rocker shaft assembly down on two locating studs on head Install flatwashers and nuts

V8 ENGINES – DOUBLE ROCKER SHAFT

ROCKER ARM ASSEMBLY (Double Rocker Arm Shaft):

Removal: Remove rocker arm covers Place cotter pins in holes of first and last rocker arm brackets to last rocker arm brackets (if not already there) to prevent springs on rocker from pushing assembly apart when cylinder bolts removed Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block Grasp support bracket at each end of head pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068 ***CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.***

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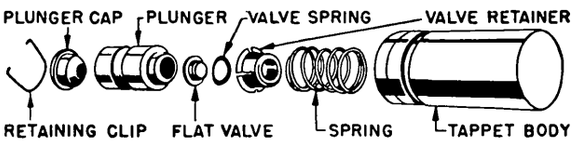
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Installation Insert cylinder head bolts in brackets, with **short** bolts in intake side Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes) Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above ***When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.*** Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly

HYDRAULIC VALVE LIFTER

ALL ENGINES

DESCRIPTION: Barrel type Unit consists of plunger and valve assembly operating within cylinder formed by valve lifter body Oil is introduced to this unit through hole in side of lifter plunger



CHRYSLER V8 HYDRAULIC VALVE LIFTER

R moval (All Lifters)· Remove intake manifold carburetor and coil as an assembly Remove lifter cover and gasket rocker arm assembly (or assemblies) and pushrods Use Tool C-3216 (with twisting motion) to remove lifters *NOTE* - Keep lifters in holder Tool C-3068 so each lifter can be returned to its original bore

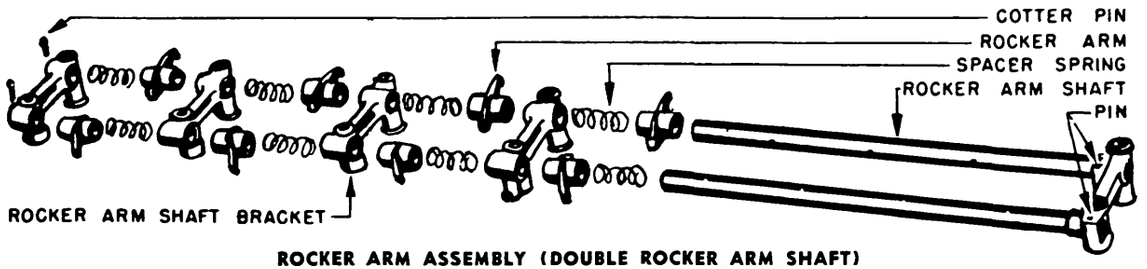
R m val (One Lifter Only): Drain cooling system to point below level of intake manifold Install valve spring compressor Tool C-3024 over rocker arm so heel of tool rests on valve stem side Make certain valve is seated and lifter body is resting on low point of camshaft lobe (see below) Compress valve spring slide rocker arm to one side and remove pushrod *CAUTION* Be sure piston is well below valve travel before compressing spring Remove intake manifold, carburetor and coil as an assembly Remove valve lifter cover and gasket Lift lifter out of bore with hooked end of tool C-3216 or slide puller portion of tool through push-rod hole seat tool in cap of lifter insert pin through lifter and tool and pull lifter out of bore using a twisting motion

Disassembly: ***(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)*** Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting Check to see that valve exerts a slight pressure on valve spring to insure valve seating Clean lifter assembly in clean solvent and remove all traces of varnish and carbon Blow parts dry with air DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY

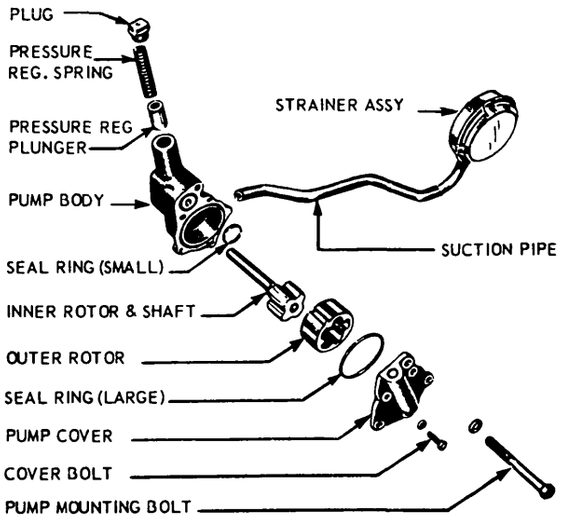
Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene ***(CAUTION***—Container and kerosene must be absolutely clean) Allow lifter to fill with kerosene, then remove and replace the plunger cap Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing This will prevent possible scoring of lifter plunger when engine is first started

Reassembly: Reverse disassembly procedure as noted above.

LOW POINT OF CAMSHAFT LOBE: Remove distributor cap, noting position of rotor for Nos 1 and 6 cylinders Set timing mark "DC" located on crankshaft pulley to pointer With rotor at No 1 firing position, the following lifters will be on the low side of the cam lobe No 2 intake and exhaust, No 4 exhaust, No 7 intake, No 8 intake and exhaust ***(NOTE***—To remove No 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed) With rotor at No 6 position, following lifters will be on low side of cam lobe No 3 intake and exhaust, No 4 intake, No 5 intake and exhaust, No 7 exhaust ***(NOTE***—To remove No 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed)



ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)



V8 OIL PUMP

OILING SYSTEM

OIL PUMP

ROTOR TYPE OIL PUMP· R m val - Drain engine oil remove oil pan Remove pump mounting bolts and lower pump straight down

Disassembly & Inspection: Remove pump cover and oil seal ring pump rotor and shaft oil pressure relief valve plug lift out spring and plunger

Cover - Place straightedge across cover Replace cover when clearance between straightedge and cover is 0015" or greater

Outer Rotor - Measure diameter and thickness of rotor with micrometer If diameter less than 2 244" or thickness less than 998" replace outer rotor

Inner Rotor & Shaft - Measure thickness of rotor with micrometer If thickness is less than 998", replace inner rotor and shaft

Rotor Depth - Slide outer rotor and rotor with shaft into pump body Place straightedge across pump body (between bolt holes) If clearance between straightedge and top of rotors is 004" or greater replace pump body

Outer Rotor to Pump Body Cl arance - Place outer rotor in pump body and hold to one side If clearance at opposite side is 012" or greater replace pump body

Clearance between Rotors - With inner rotor bottomed in outer rotor, clearance between opposite lobes of rotors should not exceed 010" When clearance excessive, replace both inner and outer rotors

Reassembly: Replace relief plunger if scored or not free in bore Relief plunger spring must meet specification for that color spring Change color of original spring only when changing oil pressure up or down Use new oil seal ring between cover and body Tighten cover bolts to 10 lbs

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

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IGNITION NOTES

ALL ENGINES

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block

Installation: Slide new bushing over burnishing end of Tool C-3053 Insert tool and bushing into bore of block. Drive bushing and tool down into position, using a soft hammer As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. ***DO NOT REAM THE BUSHING.***

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase)

PROPELLER SHAFT

PROPELLER SHAFT CENTER BEARING: Removal - Disconnect front and rear universal joints at companion flanges to free propeller shaft assembly, take out center bearing housing-to-frame crossmember mounting bolts remove propeller shaft and center bearing assembly as a unit.

1956-57 IMPERIAL MODELS

►*DRIVE LINE SHUDDER OR VIBRATION AT 15-20 MPH: May occur under certain passenger load conditions and can be corrected by the following procedure:*

1) Engine Tune-Up - Engine must operate smoothly with no hesitation or stumble on acceleration. A rough engine may cause this shudder or add to it

2) Propell r Shaft Alignment - Shaft alignment and "working angle" of center and rear universals must be adjusted and held within limits. *See "Propeller Shaft Alignment" below. CAUTION* - When installing propeller shaft, make certain that letter "O" on front end of spline shaft is aligned with key slot at rear end of front propeller shaft. This is necessary to place all universal joints in correct relationship.

REAR AXLE CONTROL STRUT: This strut consists of a single spring leaf anchored to bracket on rear axle housing and bracket on frame side rail adjacent to front end of rear spring. Strut is designed to control rear axle carrier movement and prevent nose of carrier rising under passenger loading conditions. *See "Propeller Shaft Alignment" below for strut shimming adjustment.*

PROPELLER SHAFT ALIGNMENT: Working angle of rear universal joint must be maintained at 1-3° with correct corresponding working angle of center universal joint as listed below.

Universal Joint Working Angles

Rear Universal	Center Universal
1°	3°
1½°	2¾°
2°	2½°
2½°	2¼°
3°	2°

►*CHECKING CAUTION:* Place car on platform or wheel aligning machine so that car weight resting **on wheels,** fuel tank should be at least ¾ full and car should be empty (no passenger load). Check and adjust as follows:

Checking Universal Joint Working Angle: *NOTE* - Tool Set J-6845 furnished for this purpose has graduations on bubble tube indicating necessary shim adjustment. If spirit level used to check angles, same procedure is used and working angles are determined as follows: **Rear Universal Joint** - Measure angle of front face of pinion shaft companion flange by placing spirit level vertically on flange face (propeller shaft must be disconnected at rear universal joint to make this measurement). Measure angle of rear propeller shaft by placing spirit level lengthwise on underside of shaft. **Add** these two readings which will be working angle of rear universal joint *(NOTE* - Readings should be **added** if rear propeller shaft slopes down toward rear which is normal position; if shaft sloped up toward rear readings should be subtracted). This working angle should be 2° and must be within limits of 1-3°. *See Adjustment below.* **Center Universal Joint** - Measure angles of front and rear propeller shafts by placing spirit level lengthwise on lower side of each shaft **Add** these two readings which will be working angle of center universal joint *(NOTE* - Readings should be **added** if both shafts slope differently up or down when viewed in same direction which is normal position; if shafts slope in same direction readings should be **subtracted**). See table for desired center universal joint working angle in accordance with rear universal joint angle (between 1-3°) *See Adjustment below*

Adjusting Universal Joint Working Angle: If rear universal joint angle is not 1-3°, or if center universal joint angle is not correct for the particular rear joint angle, adjust as follows:

Rear Universal Joint - Install a 2° taper shim between rear axle housing and rear spring (install thick end of shim toward front of car) After installing shim loosen control strut bracket attaching bolts and install shims between frame bracket and frame so that control struts are free and not loaded. This will allow nose of carrier to assume correct angularity.

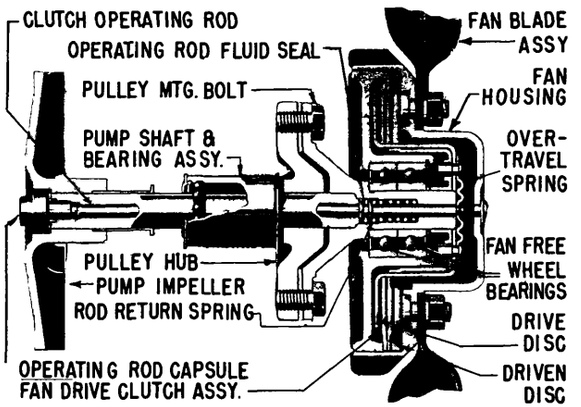
Center Universal Joint - Remove or install shims between center bearing support and frame crossmember (add shim to increase center universal working angle, remove shim to decrease angle). Recheck working angle. A 1 8" thick shim will change working angle approximately ½°. *CAUTION* - If a large adjustment is made at center bearing, recheck rear universal joint working angle to make certain it has not changed too much from desired 2° angle

COOLING NOTES

(AIR COND. CARS)

FLUID FAN DRIVE: Consists of a rotor (enclosed in housing to which fan is bolted) and driven by shaft secured to water pump flange. Housing mounted on shaft through two single row (sealed for life) ball bearings. Rotor has clearance with housing and is free to move along shaft axis. Housing filled with special heavy fluid which provides drive for fan. Drive is designed to provide driving force for cooling at low speeds and to limit top speeds of fan at higher engine speeds.

Checking Drive Unit: Water pump to engine speed ratio is 1 1 to 1 *NOTE* - 1 to 1 ratio (crank pulley to fan) should occur at 1400 RPM or above. Check by marking units with chalk and using timing light. Speed of fan and pulley is the same (1 to 1) when both components stopped by timing light. If this stoppage by timing light occurs at speeds less than 1400 RPM, replace unit DO NOT remove filler plug or add fluid to drive unit. *NOTE* - Fan only, may be rotated with light finger pressure and effort will lessen after turning fan several revolutions.



BRAKE NOTES

HAND BRAKE ADJUSTMENT (External Type): Free play between anchor bracket on center of band and sides of hand brake support should not exceed .005". Correct by compressing bracket in vise or by tapping with hammer before attempting brake adjustment. Adjust anchor screw to obtain .015- 020" clearance between band and drum at anchor. Adjust guide bolt to obtain uniform clearance for upper and lower halves of band. Guide bolt controls position of lower end of band, nut controls position of upper end of band.

HAND BRAKE ADJUSTMENT (Internal Type): Disconnect front end of propeller shaft and remove adjusting screw cover plate. Turn adjusting nut to decrease shoe-to-drum clearance until drum drags then back off nut at least one full notch to give 010" clearance (Using Spanner Tool C-3014) Shoulders on nut must be seated in grooves on adjusting sleeve. Adjust hand brake lever cable so there are 3-5 notches on lever visible beyond face plate when brake applied.

► *CHRYSLER "300C": This model has special "Firepower" engine (Hemispherical combustion chamber and double rocker arm shafts). Special specifications and service data for this model are included below.*

MODEL IDENTIFICATION

Model	Model Identification
Chrysler Windsor	C-75-1
Chrysler Saratoga	C-75-2
Chrysler New Yorker	C-76
Chrysler 300C	C-76-300
Imperial	IM-1
Imperial Crown	IM-2
Imperial LeBaron	IM-4

SERIAL NUMBER: Stamped on metal plate attached to left front body hinge post.

Starting Serial Nos.	Detroit	Los Angeles
Windsor	W571001	W57L1001
Saratoga	L571001	L57L1001
New Yorker	N571001	N57L1001
Imperial	C571001	

ENGINE NUMBER: Stamped on a boss on top side of cylinder block just back of water pump.

Car Model	Starting Engine Nos.
Windsor	WE571001
Saratoga	LE571001
New Yorker	NE571001
Imperial	CE571001

► *ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*
"A" - All Cylinders .020" oversize.
"B" - All Crankshaft Journals .010" undersize.
"AB" - Both above conditions exist.
"MALTESE CROSS" (3/8" high) - ONE OR MORE crankshaft Journals .001" undersize. *See "Connecting Rods" and "Crankshaft" below.*
♦ (3/8" high) - ALL valve lifters .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: (C-75-1, 2) 140-170 lbs., (Others) 150-180 lbs., at idling speed of 150 RPM (plugs removed, throttle wide open). Maximum variation between cylinders 20 lbs.

VALVE TAPPET CLEARANCE: (All exc. 300C). None in service (hydraulic lifters).
C-76-300 (Mechanical Lifters) - .015" Intake, .024" Exhaust, HOT.

MANIFOLD HEAT CONTROL: *NOTE* - Before installing valve on engine, lubricate valve shaft with graphite grease.
(C-75-1 Standard) - Single exhaust on right cylinder block with thermostatically controlled valve. Install valve with counterweight toward front of engine and small anti-rattle spring retaining pin toward rear and adjacent to cylinder block.
(C-75-1 with Power Pack, C-75-2, C-76, C-76-300, IM-1, 2, 4) - Dual exhaust system used. Heat control valve is in right exhaust pipe.
Coil Spring Installation - Position valve shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer end of tongue of spring in upper left hand position. Press inner end of coil into slot of shaft and seat firmly. Move outer end tongue of spring around and hook under pin (left pin when facing coil end of valve).

► *DUAL EXHAUST NOTE:* When valve is closed most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders - RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".
Spark Plugs - Auto-Lite AR-42 (C-75-1, 2), AGR-42 (Others). 14 mm. Torque to 30-32 ft. lbs. *NOTE* - Auto-Lite AGR-32 recommended for High Speed operation on C-76-300

COIL: Auto-Lite CAH-4001B.
Ignition Current - 2.5 amps. idling, 3.1 amps. stopped.
Resistor - Auto-Lite PU-4003. .665-.735 ohms (70-80°F).

► *COIL RESISTOR NOTE:* Connected in circuit between "IGN" terminal of horn relay and positive terminal of coil. *Resistor must be in circuit when testing coil output.*

DISTRIBUTOR: Auto-Lite IBP-4002A (C-75-1, 2), IBK-4304 (Others). *NOTE* - "IBK" Distributor is double breaker.
Condenser - Auto-Lite IAT-2015RA (IBP-4002A), IBB-2015R (IBK-4304). **Capacity** - .25-.285 mfd.
Contact Point Set - Auto-Lite IBP-3028AS (IBP-4002A), IGW-3028KS (IBK-4304).
Breaker Gap - .015-.018".
Cam Angle (IBP Distr.) - 27-32°

► *CAUTION* Cam angle should be checked with vacuum line **disconnected.** Angle may decrease as much as 10° when vacuum line reconnected but must not decrease more than 12°

Cam Angle (IBK Distr.) - 29-32° (single set of points), 36-39° (both sets operating together).
Breaker Arm Spring Tension - 17-20 ozs.
Rotation - Clockwise viewed from above.

Automatic Advance - IBP-4002A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
1		425	2		850
6.5		750	13		1500
12		1835	24		3670
13		2050	26		4100

Automatic Advance - IBK-4304

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		450	2		900
5		875	10		1750
9		2000	18		4000
10		2250	20		4500

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advance - IBP-4002A

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	10
1	2	10 3/8
5	10	12 1/4
9	18	14 7/8
10.5	21	16

Vacuum Advance - IBK-4304

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	8 1/8
1	2	8⅜
6	12	12½
10	20	16¾
11	22	18

IGNITION TIMING

Model	Std. Setting
C-75 1, 2, C-76, IM-1,2,4	6° BTDC at 500 RPM
C-76-300	4° BTDC at 500 RPM

Timing Mark - Vibration dampener marked at TDC point with graduations indicating advance. Align correct mark with pointer on right side of timing chain cover.

CARBURETOR

Model	Carter Carburetor No.
C-75-1	BBD 2527S
C-75-2(Early) Ⓒ	WCFB 2589S
C-75-2 (Later) Ⓒ	AFB 2686S
C-75, IM-1,2 4 (Early)	WCFB 2590S
C-75, IM-1 2,4 (Later)	AFB 2448S
C-76-300	WCFB 2534S(front), 2535S (rear)

Ⓒ Power Pack on C-75-1

► *CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

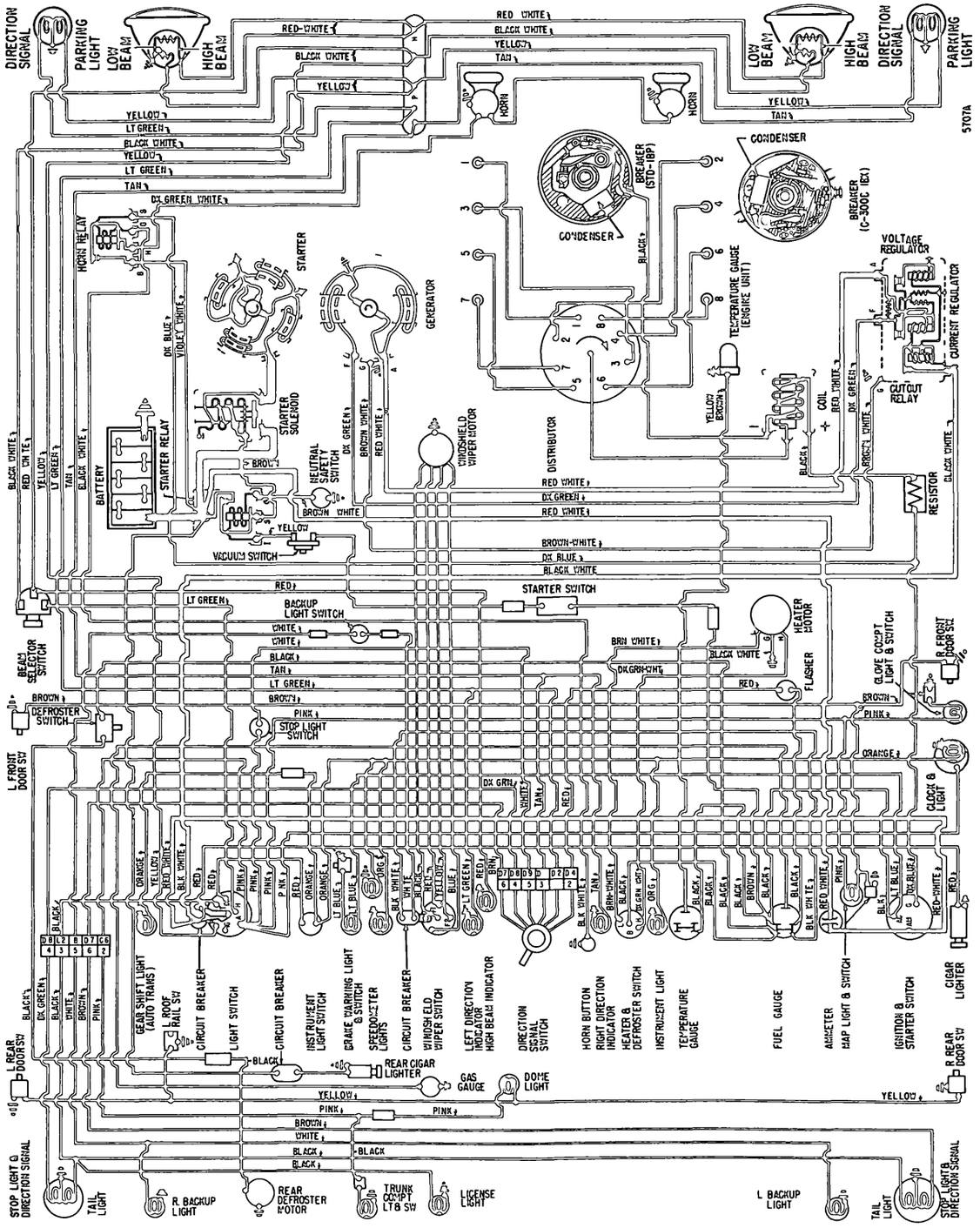
THROTTLE LINKAGE ADJUSTMENT: *NOTE* - Accelerator pedal angle should be 118° to the horizontal in closed throttle position. To adjust, disconnect pedal end of bellcrank-to-pedal rod, adjust rod length by turning swivel end on rod, tighten locknut after adjusting. Then proceed as follows: Make certain engine idle speed correctly set at 475-500 RPM with selector in Neutral and engine at normal operating temperature. On 2-Barrel Carburetor Models, loosen adjusting screw located on accelerator shaft-to-carburetor rod. On 4-Barrel Carburetor models, loosen adjusting screw on accellerator shaft assembly-to-intermediate shaft assembly rod. On all models, move rear portion of rod to rear until it is stopped by idle stop on transmission throttle cam, align rods and tighten adjusting screw to 7-9 ft. lbs. torque. Recheck engine idle speed.

CARTER BBD 2-BARREL

Carter BBD, No. 2527S. Dual downdraft type.

► *CARBURETOR METERING JET CHANGE:* New jet calibration used on later cars as follows. **Main Metering Jet** No. 120-214S (superseding No. 120-213S which is now 1 Size Lean), **Step-up Rod** No. 75-1370 (superseding No. 75-1177).

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CHRYSLER C-75-1,2, C-76 MODELS

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▷ *MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT Barrel feeds Cyl. 2-3-5-8, LEFT Barrel 1-4-6-7.*

Idle Setting - ½-1½ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed - 500 RPM (Synchro-mesh), 475-500 RPM (TorqueFlite in Neutral).

Float Level - 9/32" (Gauge T109-239) between top of each float ridge (at center of float) and top surface of body casting. To adjust, bend lip on float arm.

Accelerating Pump - Install connector rod in center hole (medium stroke) of throttle lever and inner hole of pump arm.

Fast Idle - .015" (Gauge T109-44) between lower edge of valve and bore with adjusting screw on high step of cam.

Fast Idle Cam Clearance With choke valve closed and lip on inner choke shaft lever contacting lug on outer lever, index mark on cam should align with fast idle adjusting screw. Adjust by bending lip on inner choke shaft lever.

Automatic Choke Setting - Set 1 point rich.

Throttle Linkage Adjustment - See *CARBURETOR* above.

▷ *OTHER DATA See "Carter BBD Carburetors" in Carburetion Section*

CARTER WCFB 4-BARREL
(Except C-76-300)

Carter WCFB, 2589S (C-75-2), 2590S (Others).

▷ *MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT Barrels feed Cyl. 2-3-5-8, Left Barrels 1-4-6-7.*

Idle Setting - (2589S) ¾-1¾ turns open, (2590S) 1-2 turns open. For richer mixture, turn screws out.

Idle Speed - 475-500 RPM with TorqueFlite in Neutral.

Throttle Linkage Adjustment - See *CARBURETOR* above.

▷ *OTHER DATA See "Carter WCFB Carburetors" in Carburetion Section*

CARTER AFB 4-BARREL

Carter AFB 2686S (C-75-2), 2448S (Others)

▷ *CARBURETOR FLOODING CORRECTION See "Carter AFB Carburetors" in Carburetion Section*

▷ *MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*

Idle Setting - ¼ 1¾ turns open Turn screw out for richer mixture

Idle Speed - 500 RPM with Neutral button pushed in

Throttle Linkage Adjustment - See *CARBURETOR* above

▷ *OTHER DATA See "Carter AFB Carburetors" in Carburetion Section*

CARTER WCFB 4-BARREL
(C-76-300)

Carter WCFB 2534S (Front), 2535S (Rear) These carburetors have "Idle Air Bypass Screws" used for idle speed adjustment except on reworked carburetors with recommended changes (following)

▷ *POOR IDLE, STUMBLE ON ACCELERATION, STALLING ON STOPS OR SUDDEN TURNS CORRECTION*

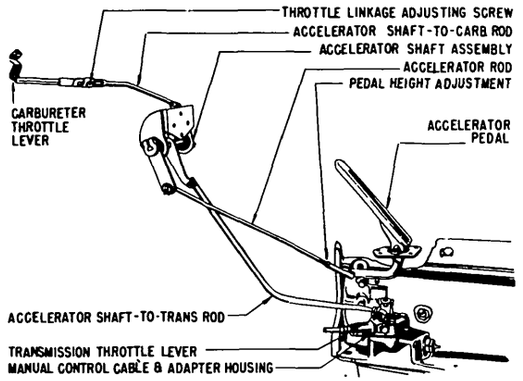
For recommended changes (including New Idle Adjustment Procedure), see "Carter WCFB Carburetors" in Carburetion Section

▷ *MANIFOLD FUEL DISTRIBUTION RIGHT barrels feed right bank cylinders, LEFT barrels feed left bank*

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►*CARBURETOR SYNCHRONIZATION NOTE:* Before adjusting idle mixture and idle speed, the carburetor inter-connecting rod must be adjusted as follows: Hold rear carburetor throttle in wide open position (choke off) and adjust rod at slotted end so front carburetor



TORQUEFLITE THROTTLE LINKAGE

throttle valve will be in wide open position. Tighten locknut and check linkage operation. Make sure rod can rotate slightly on pivots and not bind.

Idl Mixture & Speed Adjustment: *CAUTION - DO NOT use this procedure on carburetors reworked to correct Poor Idle, Stumble, etc. See "Carter WCFB Carburetors" in Carburetion Section for recommended procedure on reworked carburetors. On other carburetors, proceed as follows:* **1)** Set all idle mixture screws (2 per carburetor) 1 turn open, set idle air bypass screws (1 per carburetor) 1 turn open. **2)** With engine at normal operating temperature, connect tachometer for accurate determination of engine idle speed. **3)** Adjust idle speed to approximately 600 RPM by adjusting idle air bypass screw on **both** carburetors equally. **4)** Adjust idle mixture screws on **rear** carburetor for maximum RPM. **5)** Adjust idle mixture screws on **front** carburetor for maximum RPM, readjust rear carburetor if necessary. **6)** Reset idle speed to 600-650 RPM by readjusting idle air bypass screw on **both** carburetors.

FUEL PUMP PRESSURE: 6-7 lbs.

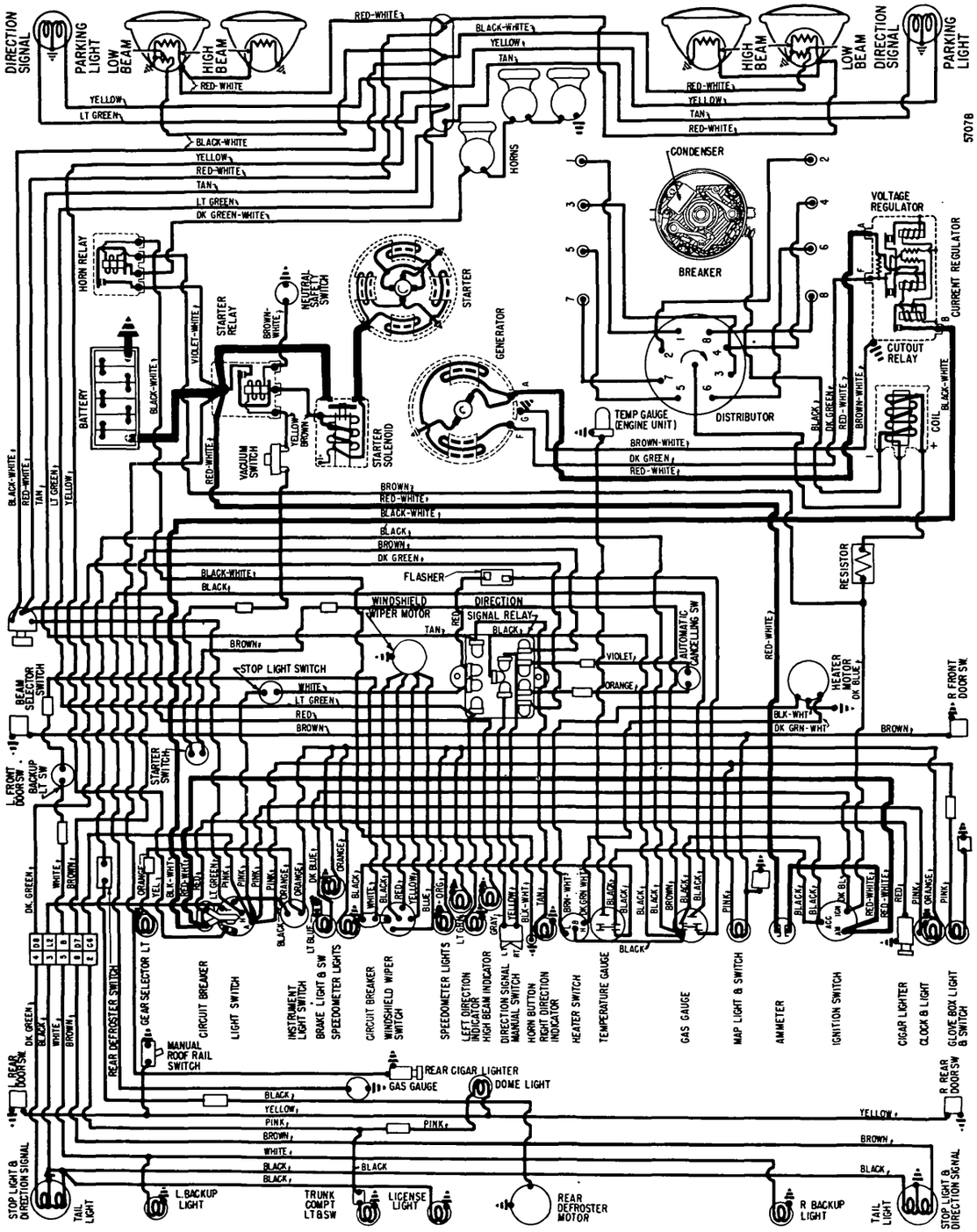
CARB. EQUIPMENT

Fuel Pump: Carter M2503S. Mechanical type.
Pressure – 6 – 7 lbs.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: Auto-Lite Electric Type.
Dash Unit – Auto-Lite 14296A (C75, C76). Auto-Lite 14263A (1M–1, 2, 4).
Tank Unit – Auto-Lite 14380A (Sub. & Est. Wgn.). Auto-Lite 14381A (Others).
See "Fuel Gauges" in Carburetion Section.

AIR CLEANER: DRY FILTER ELEMENT type. Clean every 5000 miles, replace element every 15,000 miles.

►*CLEANING CAUTION:* Clean filter element by tapping

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CHRYSLER IMPERIAL IM-1,2,4 MODELS

CONTINUED FROM PRECEDING PAGE

and shaking to remove dirt particles. *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricat .*

BATTERY

(C–75–1, 2) Auto-Lite 12H–60. 12 volt, 11 plate, 60 ampere hour capacity (20 hr. rate).
(Others) Auto-Lite 12H–70. 12 volt, 13 plate, 70 ampere hour capacity (20 hr. rate).
Grounded T rminal – Negative.
Engine Ground – Engine to body.

STARTER

Aut -Lit MDL–6001. Armature MDL–2006.
NOTE – Auto-Lite MDL–6002 used on first 13000 cars (except C–75–1, 2).
Drive – Overrunning clutch (solenoid pinion shift).
Rotation – Counter-clockwise at commutator end.
Brush Spring Tensi n – 31–47 oz.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10.0	60
6.0 ft. lbs.	Lock	4.0	225

Starting Switch: Auto-Lite Solenoid SAD–4301 with separate Auto-Lite Relay RAJ–4001 (Relay not used on C–75–1 with Synchro-mesh Transmission). Controlled as follows: **Synchro-mesh Cars –** Combination Ignition & Starter Switch. **TorqueFlite Cars –** Neutral pushbutton switch (operated by fully depressing Neutral Button). Vacuum Switch, Auto-Lite 14406A, on Intake Manifold (prevents starter actuation with engine running), and Neutral Switch on transmission case (prevents starter actuation except when transmission in neutral).
S e "Auto-Lite Starter Controls" in Electrical Section.
►*VACUUM SWITCH CORRECTION (Inoperative Starter caused by open circuit in Vacuum Switch):* May be due to pressure build-up in upper cavity of switch. Correct by drilling 1/64" hole on side at top of switch assembly (directly below terminal plate). *CAUTION –* Do not drill beyond thickness of metal or diaphragm may be damaged.
Neutral Safety Switch Adjustment: *See "TorqueFlite Transmission" in Transmission Section.*

GENERATOR

GENERATOR: Auto-Lite. Application as follows:

Mdl	Generator	Armature
All (Exc. 300) Early ..	GJC-7002H	GJC-2030F
C-75-1,2 Later	GJC-7012A	GJC-2030F
C-76, IM1, 2, 4 Later .	GHM-6001E	GHM-2006F
C-76-300 Std.	GHM-6010A	GHM-2006F
C-76-300 Air Cond.	GHM-6011A	GHM-2006F
C-76-300 Special	GGA-6007A	GFY-2101F
C-75-1-2 Special	GHM-6001E	GHM-2006F
All Air Cond. Cars	GHM-6004C	GHM-2059F

Performance Data - GGA (Cold - 70°F)

Amperes	Volts	RPM
4.0	14.6	950 max.
40.0	14.6	1600 max.
40.0	15.0	1600 max.

P rformance Data - GHM (C ld - 70°F)

Amperes	Volts	RPM
5.0	14.0	875 max.
25.0	15.0	1350 max.
30.0	15.0	1500 max.

Performance Data - GJC (Cold - 70°F)

Amperes	Volts	RPM
0.0	12.8	1225-1325
30.0	15.0	2050-2250

Brush Spring Tension - (GGA) 34-41 ozs., (GHM) 35-53 ozs., (GJC) 18-36 ozs., with new brushes.
Field Current - (GGA, GHM) 1.1-1.3 amperes, (GJC) 1.2-1.3 amperes, at 10.0 volts (70°F).
Motoring Current - (GGA) 2.3-2.6 amperes, (GHM) 3.0-3.5 amperes, (GJC) 3.4-3.9 amperes. All at 10.0 volts (70°F).
Rotation - Counter-clockwise at commutator end.
Belt Adjustment: 1/8" deflection midway between generator and water pump pulleys with 5 lbs. pressure (Std.), 3/8" deflection midway between generator and compressor pulleys with 5 lbs. pressure (Air Cond. Cars).

REGULATOR

Auto-Lite - Used with generators as follows:

Auto-Lite Regulator	Generator Type
VRX-6201A	GJC & GHM Gen.
VAT-6201A	GGA Gen.

Cutout Relay

Cuts In - 12.6-13.6 volts (VRX), 13.0-13.75 volts (VAT).
Cuts Out - 8.2-9.3 volts from sealed position (VRX discharge amperage 3-5 amperes).
Contact Gap - .015" minimum.
Air Gap - .031-.034" with contacts open (measure at hinge end of core).

Voltage Regulator

Setting - 14.5 ± .3 volt charging at 10 amperes (80°F) or with .25 ohm resistor in series between regulator and battery.
Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

Regulator	Test A - Operating Amperes -	Test B
VRX-6201A	36	30 (28-32)
VAT-6201A	46	40 (38-42)

Test A - After 15 minutes operation charging at 10 amperes.
Test B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts (VRX), 13.7-13.9 volts (VAT).
Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. **4–Headlight System** Std. on IM–2, 4 and optional on other models. *See "4–Headlights" in Electrical Section.*
Directional Signal: *See Electrical Section.*
Headlight & Pan l Light Switch Rem val: Remove headlight switch knob recessed hex screw, remove knob. Remove hexnut and threaded sleeve holding switch or switches in instrument panel. Slide panel light switch control off lugs of tab plate.
Stop Light Switch L cati n: On forward end of master cylinder.
CIRCUIT BREAKERS: Used as follows:
20 Ampere – Protects headlights and beam indicator. On back of lighting switch.
6 Ampere – Protects Parking, Tail, License plate, Instrument, Ignition and Clock lights. On back of light switch.
6 Ampere – Protects Stop, Map, Dome, Glove Compartment, Courtesy and Trunk Compartment lights. On back light switch.
6 Ampere – Protects Windshield Wiper and Back-up Lights. On back of wiper switch.
8 Ampere – Protects rear cigar lighter. Behind left front kick panel on side cowl.
20 Ampere – Protects window lift circuits. Located behind left front kick panel.
40 Ampere – Protects 6–way seat circuits. Located behind left front kick panel.
Horn Relay: Auto-Lite RAH–4002.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Us extreme care when disconnecting any part of air conditioning equipment or lines. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).
Spitfire (C-75-1, 2) - Single rocker arm shaft.
FirePower (Others) - Hemispherical combustion chamber and Double Rocker Arm Shaft.
►*C-76-300 NOTE:* Special full race camshaft used in connection with mechanical lifters, special pushrods and rocker arms with adjusting screws in pushrod end (for tappet adjustment), and high load inner and outer valve springs.

Model	Bore	Stroke	Displacem nt
C-75-1, 2	3.94"	3.63"	354 cu. ins.
Others	4.00"	3.90"	392 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
C-75-1	9.25-1	49.7	285 at 4600 RPM
C-75-1, 2 ①	9.25-1	49.7	295 at 4600 RPM
C-76	9.25-1	51.2	325 at 4600 RPM
C-76-300 (Std.)	9.25-1	51.2	375 at 5200 RPM
C-76-300(Opt.)	10.0-1	51.2	390 at 5400 RPM
IM -1,2,4	9.25-1	51.2	325 at 4600 RPM

① - 4Bbl. Carb. (Power Pkg. on C-75-1).
Compression & Vacuum Reading - *See TUNE-UP.*
OIL PAN REMOVAL: Drain oil, remove starter, and on cars with single exhaust disconnect cross-over and "Y" pipe at manifold and at extension clamp. Move exhaust out of the way and support in place. Loosen front engine mounts and raise engine ¾". Disconnect steering linkage at idler arm support bracket, then rotate crankshaft so front counterweight is up (timing mark on dampener 180° from pointer), then remove oil pan.
ENGINE REMOVAL: *See "Engine" in Chrysler Special Data.*
CYLINDER HEAD: *See "Cylinder H ad & Manifolds" in Chrysler Special Data.*
TIGHTENING TORQUES: *See "Tight ning Specifications" in Chrysler Sp cial Data.*

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PISTONS

Aluminum Alloy, thermally controlled by steel strut, elliptically turned, tin plated.

►*CYLINDER BORE OVERSIZE CAUTION:* Engines with letter "A" following engine number indicates that cylinder bore is .020" oversize.

Weight – 22.8 ozs. (C75–1, 2; C–76); 24.7 (Others).

Removal – Piston & Rods removed from above.

Clearance – .0005–.0015" measured 1½" from bottom of skirt. Check clearance with .002" ribbon feeler ½" wide. Pull to withdraw feeler should be 8–12 lbs. with feeler. at right angles to piston pin.

Replacement Pistons: Std. and .005", .020", ..040" Oversize. *NOTE* – 060" Oversize also for C–75–1, 2.

Installing Pistons: Install pistons on connecting rods so indent on head of piston is toward front of engine. Indent will be on large chamfer side of connecting rod (1–3–5–7) and opposite side (2–4–6–8). *See Rod Installation.*

PISTON PINS

Floating type with lock ring at each end. *NOTE* – Pin offset in piston toward right side of engine.

Diameter – .9841–.9843". **Length** – 3.140–3.150".

Clearance in Piston – .0005–.0015". Thumb press fit at 70° F.

Clearance in Rod – .0001–.0004". Selective fit.

Replacement Pins: Standard, .003", .008" oversize. *NOTE* – Fitted pins are furnished with new pistons.

PISTON RINGS

C-75-1, 2 Engines

Ring	Width	End Gap	Side Clearance
Compr. (1,2)	.0775-.078"	.010-.020"	.002-.0035"
Oil (3)	.186-.1865"	.010-.020"	.001-.0025"

All Other Engines

Ring	Width	End Gap	Side Clearance
Compr.(1,2)	.0775-.078"	.013-.025"	.002-.0035"
Oil (3)	.186-.1865"	.013-.025"	.001-.0025"

Replacement Rings: Furnished in Sets: Std. and .010", .020", .030", .040" Oversize. *NOTE* – .060" oversize also for C–75–1, 2.

Installing Rings: "Top" mark on each compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length – 6.625" (C–75–1, 2); 6.951" (Others).

Weight – 25.2 oz. (C–75–1, 2); 27.6 oz. (Others).

Crankpin Journal Diameter – 2.2507" (C–75–1, 2). 2.375" (Others).

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals machined (UNDERSIZE). See "Crankshaft" below.*

Bearings (Lower) – Lead Base Babbitt on Steel Exc. C–76–300 which is Tri-Metal (Babbitt on Copper Lead Alloy on Steel Back).

Clearance – .0005–.0015".

End Play – .006–.014" (Two rods).

Replacement Bearings: Std. and .001", .002", .003", .010", .012" undersize.

Installing Rods: Install piston and rod assemblies with indent on piston head toward front of engine (all cylinders) and large chamfer on lower end of rod toward nearest crankshaft journal fillet. Install bearing caps so that "V" groove in cap is in line with similar groove in rod (this is oil spit hole for cylinder wall lubrication).

CRANKSHAFT

Journal Diameter - 2.4995-2.5005" (C-75-1, 2); 2.687-2.688" (Others).

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:* **.010" UNDERSIZE (Main & Connecting Rod Journals)** - Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals) - A "Maltese Cross" (3/8" high) stamped on the machined surface following the engine number indicates that ONE OR MORE crankshaft main and connecting rod journals are machined .001" UNDERSIZE. The position of undersize journals are stamped on the machined surface of the center (No. 3) counterweight in following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following letter indicates main or connecting rod journal number (counting from front of engine).

Bearings – C–75–1, 2; C–76; IM–1,–2,–4. Tin Base Babbitt on Steel (#3), Lead Base Babbitt on Steel (Others). **C–76–300.** Tri-Metal (Babbitt on Lead Alloy on Steel Back).

Clearance – .001–.0025" (C–76–300), .0005–.0015" (Others).

Replacement Bearings: Furnished Standard, .001", .002", .003", .010", .012" undersize. *NOTE* – No. 1, 2, and 4 upper and lower bearings are interchangeable. No. 3 upper and lower are interchangeable. No. 5 upper and lower bearings are **not** interchangeable.

End Thrust – Taken by center (#3) main bearing.

End Play – .002–.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Chrysler Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Chrysler Special Data.*

CAMSHAFT

Journal Diameters – 1.998–1.999" (#1,2,3,4), 1.4355–1.4365" (#5).

Bearings – Removable, steel-backed, Babbitt-lined bushings.

Clearance – .001–.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

End Play – .002–.006".

Timing Chain: **Width** 1 1/8". **Pitch** .375". **Length** 68 links.

Camshaft Setting: Camshaft timing is correct when timing marks on camshaft and crankshaft sprockets are adjacent and in line across shaft centers.

Camshaft Removal: *See "Camshaft & Bearings" in Chrysler Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Chrysler Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engin Front Cover" in Chrysler Special Data.*

VALVES

Tappet Clearance : C–76–300 Intake .015", Exhaust .024" Hot. **Others** Zero lash – hydraulic lifters.

C-75-1, 2 Engines

Valve	Head Diam.	Stem Diam.	Length
Intake	1 15/16"	.372-.373"	4.78"
Exhaust	1½"	.371-.372"	4.74"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	.389"	.001-.003"
Exhaust	45°	.389"	.002-.004"

All Other Engines

Valve	Head Diam.	Stem Diam.	Length
Intake	2"	.372-.373"	5.09"
Exhaust	1¾"	.371-.372"	5.05"

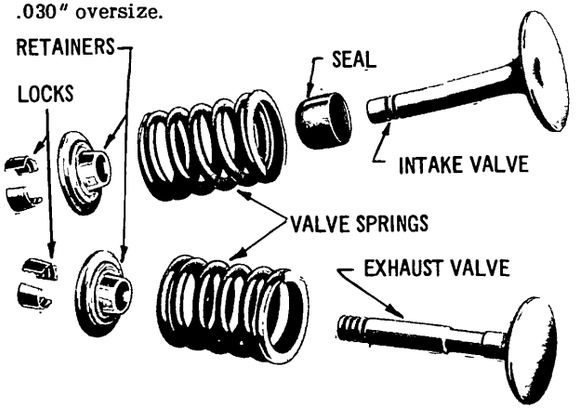
Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	①	.001-.003"
Exhaust	45°	②	.002-.004"

① - .389" (Exc. 300), .444" (C-76-300 - Std. Camshaft), .455" (C-76-300 - Optl. Camshaft.).

② - .389" (Exc. 300), .435" (C-76-300 - Std. Camshaft), .455" (C-76-300 - Optl. Camshaft.).

Valve Seat Width - 1/16-3/32" Int., 3/64-1/16" Exh.

►*C–75–1,2 OVERSIZE VALVE STEM NOTE:* Valves with oversize stems are available in .005", .015", .030" oversize.



CHRYSLER V8 VALVE ASSY.

►*C–76–300 EXHAUST VALVE SEAT INSERT: See "Valv System" in Chrysler Special Data.*

Intake Valve Stem Oil Seal - Cup seal installed on intake valve stem with cup extending down over top of valve guide.

►*VALVE GRINDING CAUTION:* Check valve height in head after grinding valves using Tool C-3436 (C-75-1,2), C-3061 (Others). If valve tip exceeds maximum (end of cylindrical gauge), grind tip down to approach, but do not go below minimum height (slotted area on gauge).

VALVE SPRINGS: (Exc. 300) Single springs. Free Length 2". **(C-76-300)** Double springs. Free Length 1 7/8" (Outer), 1 25/32" (Inner).

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Valve Spring Specifications

	Inner Spring Pressure	Length	C-76-300 Engine Outer Spring Pressure	Length
Closed	28 lbs.	1.53"	60 lbs.	1.66"
Open	66 lbs.	1.09"	158 lbs.	1.22"

All Other Engines

Valve	Lbs. Pressure	Length
Closed	78-88 lbs.	1.69"
Open	170-184 lbs.	1.31"

►*CAUTION: Spring ends must be square within 1/16".*

►*VALVE SPRING INSTALLED HEIGHT:* Check installed height of spring after grinding valves (from face of counterbore in head to bottom face of spring retainer). If height greater than 1 11/16", install 1/16" Spacer to bring spring back to normal height of 1 5/8-1 11/16"

Valve Guides: (C–75–1,2) Cast integral with cylinder head. When valve stem clearance excessive, use reamer tool set to ream guides for next oversize valve as follows: C–3433 (.379–.380" – .005" O.S.), C–3430 (.389–.390" – .015" O.S.), C–3427 (.404–.405" – .030" O.S.).

(Others) – Drive old guides out through top of cylinder head with Tool DD–883. With combustion chamber up, drive new guides into cylinder head until distance from upper edge of valve seat to guide is 31/32" (Intake), 1 3/64" (Exhaust). Ream each guide to .374–.375" with Tool C–741.

Hydraulic Valve Lifters: Integral flat-valve type.

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve lifters used on some engines.* A "Diamond" 3/8" high stamped on engine number indicates that all lifters are .008" oversize.

Diameter – .9040–.9045". **Clearance in Block –** .0005–.0015".

Lifter Overhaul & Testing – *See "Valve System" in Chrysler Special Data.*

►*VALVE GRINDING CAUTION:* See Valves (above).

Rocker Arm Assembly: *See "Valve System" in Chrysler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

C-75-1, 2

Intake Valves - Open 13° BTDC. Close 59° ALDC.
Exhaust Valves - Open 59° BLDC. Close 17° ATDC.

C-76 & IM1-1, 2, 4

Intake Valves - Open 15° BTDC. Close 57° ALDC.
Exhaust Valves - Open 57° BLDC. Close 15° ATDC.

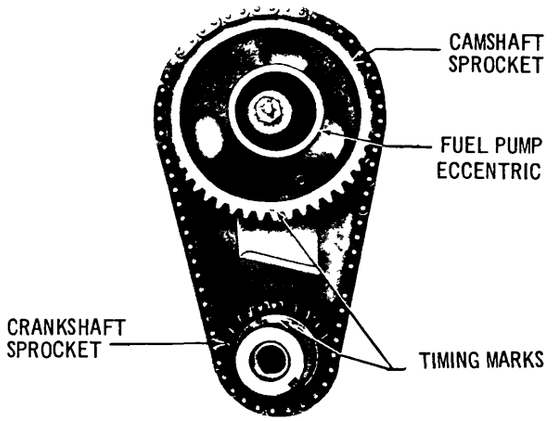
C-76-300 - Std. Camshaft

Intake Valves - Open 35° BTDC. Close 65° ALDC.
Exhaust Valves - Open 65° BLDC. Close 25° ATDC.

C-76-300 - Optional Camshaft

Intake Valves - Open 20° BTDC. Close 55° ALDC.
Exhaust Valves - Open 60° BLDC. Close 20° ATDC.

Valve Timing Check (Exc. C-76-300) - With No. 1 intake valve closed, insert .210" feeler between rocker arm and No. 1 intake valve stem, mount dial indicator directly over this valve with indicator button contacting valve spring retainer. When retainer stops moving (hydraulic lifter plunger bottomed so that lifter is solid), set dial indicator at zero. Turn crankshaft **clockwise** until dial indicator shows valve lifted .020" (C-75-1,2), .024" (Others). Timing mark on vibration dampener should read between 5° BTDC and 7° ATDC. Turn crankshaft **counter-clockwise** until valve back to closed position, remove feeler.



CHRYSLER V8 VALVE TIMING MARKS

►*CAUTION:* Do not turn crankshaft further than indicated above with feeler in place (spring may bottom and damage valve mechanism).

Valve Timing Check (C–76–300): Turn engine to TDC for No. 1 Piston (use dial indicator arm in spark plug hole) with #1 intake valve closed. Check accuracy of TDC mark on vibration dampener. Install dial indicator to read valve spring retainer movement. Adjust rocker arm adjusting screw to zero clearance. Zero indicator, turn crankshaft (clockwise) until dial indicator reads .081" valve lift.

Mark on vibration dampener under pointer should read 5° BTDC to 7° ATDC. If reading incorrect, check gear index marks and timing chain for stretch.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add one quart when filter changed.

Normal Oil Pressure: 40–65 lbs. at 40–50 MPH.

►*OIL PRESSURE CAUTION:* With full flow filter (Optional on C–75–1, Std. all other models), oil pressure will drop 15–20 lbs. when FILTER ELEMENT CLOGGED. Replace element.

Oil Pressure Relief Valve – Mounted in oil pump. Use correct color spring, *see Spring Specification Table below.*

Relief Valve Spring Specifications

Color	Free Height	Load Pressure & Height
Gray (Lt.)	3½"	16.1–17.1 lbs. at 2 1/16"
Red (Std.)	2 27/32"	19.5–20.5 lbs. at 2 1/16"
Brown (Hvy.)	2 31/32"	22.0–23.9 lbs. at 2 1/16"

Oil Pressure Gauge – Auto-Lite 14297A (C–75–1,2; C–76, C–76–300), 14264A (IM–1, 2, 4). Not electric.

Oil Pump: Rotor type. In crankcase at rear end. Driven by lower distributor drive shaft.

Pump Overhaul – *See "Oiling System" in Chrysler Special Data.*

Oil Filter: Full flow (Std. all models exc. C–75–1, Optl. C–75–1). All oil enters lubrication system of engine through filter at full pump pressure. By-pass valve held in place by rear main bearing cap.

►*OIL FILTER REMOVAL (Firepower Engine):* Remove air cleaner and loosen oil filter, raise car and remove oil filter from below car.

Filter Element – Install new filter element at 5000 mile intervals (or earlier if required). Change oil with filter element replacement.

Crankcase Ventilation: Filter Element in oil filler cap and (Export only) air cleaner in crankcase outlet pipe. Clean oil filler pipe element with kerosene at 5,000 mile intervals.

COOLING

Water Capacity: (C–75–1,2) 21 qts., (Others) 24 qts. Add 1 quart with heater installed.

Pressure Valve: 14 lb. radiator filler cap used on all models.

►*AIR CONDITIONER OPERATING CAUTION: Engine cooling system must be protected to a temperature of 20°F (above zero) for summer operation.*

Thermostat: Pellet type. 158–162°F (Std.), 177–182°F (Air Cond.).

Water Pump: Ball bearing type. No lubrication required. *See "Chrysler" in Water Pump Section.*

Pump Removal – Drain cooling system. Loosen generator and power steering pump or idler pulleys, remove all belts. Remove fan, spacer, and pulley (NOTE – On Air Cond. Cars, remove upper half of fan shroud, then remove fan hub pulley, loosen fan, remove fluid fan drive). Remove water pump body to housing bolts and remove water pump.

Fluid Fan Drive: Standard on Air Conditioned Cars and C–76–300. *See "Cooling System" in Chrysler Special Data.*

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit – Auto-Lite 14298A (C–75–1,2; C–76, C–76–300), 14266A (IM–1,2,4).

Engine Unit – Auto-Lite 14405A (All Models).

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck Model 10A8 No. 361417 (C–75–1), 11A8 No. 361447 (C–76–300). Single plate.

See "Borg & Beck" in Clutch Section.

Clutch Disc – Borg & Beck No. 382531 (10A8), 382626 (11A8).

Pedal Adjustment: Turn release fork rod adjusting nut for 5/32" free play at release fork outer end. This will give 1" free pedal movement and 6" pedal travel.

Over-center Spring Adjustment: Release clutch pedal release rod by removing spring washer and back off over-center spring adjusting nut to free "C" link. Depress clutch pedal, turn adjusting nut until nut just contacts "C" link, then tighten nut 7 full turns. Install clutch release rod and retaining washer.

Removal: Remove release fork pull-back spring, fork rod from fork at rear end, dust seal, and clutch release fork. Remove transmission, clutch housing pan, release bearing. *CAUTION* – Do not force bearings and pull-

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back spring off fork prongs. Mark clutch cover and flywheel for reassembly. Loosen retaining bolts evenly to release spring tension, remove clutch cover assembly.

SYNCHRO-MESH TRANSMISSION

Own (C–75–1 & C–76–300). Three-speed synchro-mesh type with new design gearshift mechanism.
See "Chrysler Synchro-mesh" in Transmission Section

Transmission Controls: *See "Transmission Controls" in Transmission Section*

Removal: Disconnect propeller shaft, speedometer cable, and gearshift control rods. Remove speedometer drive pinion and back-up light switch. If transmission to be overhauled, apply hand brake to hold mainshaft and loosen flange nut, remove flange nut and washer, disconnect hand brake cable, remove brake drum and flange assembly (Puller C–452), remove oil seal (Puller C–748) Pull transmission straight back until drive gear shaft clears clutch disc, lower transmission and remove from beneath car *NOTE* – Use pilot studs when reinstalling transmission and use care not to spring clutch disc

TORQUEFLITE TRANSMISSION

Wide range torque converter and automatically operated planetary gear transmission
See "TorqueFlite" Transmission in Transmission Section

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "TorqueFlite" Transmission in Transmission Section*

►*TESTING & TROUBLE SHOOTING: See "TorqueFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1,000 miles, drain and refill every 20,000 miles. Use only Automatic Transmission Fluid type "A"

Checking Fluid Level - *CAUTION - Following procedure and fluid level supersede previous recommendations.* Check transmission COLD if possible. Idle engine with brakes applied, press all pushbuttons in turn, then check fluid level on dipstick with engine idling in "N". Maintain level as follows:

Cold Transmission (After standing and before being driven for several miles) - Level should be between "L" mark and ½" below "L" mark. Add oil if below ½" below "L" mark, remove oil if above "L" mark. Do not add oil if level within above range.

Hot Transmission (After being driven several miles) - Level should be between "F" mark and ½" below "F" mark (on cars with first type dipstick with distance of 1 5/8" between "F" and "L" marks, level should be ½" below "F" mark). Add oil if level below "L" mark to bring level up to ½" above "L" mark, remove oil if level above "F" mark. Do not add oil if level within above range.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "TorqueFlite" Transmission in Transmission Section.*

UNIVERSALS

Drive Universals. (C–75–1,2, C–76, C–76–300) Ball & Trunnion used at front, Cross type used at rear (IM–1,2,4) Cross type used front, center, and rear.

Propeller Shaft Center Bearing: *See "Propellor Shaft" in Chrysler Special Data.*

Rear Axle Control Strut: *See "Propellor Shaft" in Chrysler Special Data.*

REAR AXLE

Own. Semi-floating, hypoid gear, Hotchkiss Drive.
See "Chrysler Cage Type Hypoid" in Rear Axle Section

►*REAR AXLE LUBRICATION LEVEL CAUTION* Recommended lubrication capacity (3½ pints) will bring fluid level to 1" below filler opening DO NOT add to bring level to opening

Axle Ratios

C-75-1, 2	①②3.18-1 (35-11)
C-76	2.93-1 (41-14)
IM1-1, 2, 4	3.18-1 (35-11)
C-76-300	③3.36-1 (37-11)

① - C-75-1 with Synchro-mesh Trans. 3.73-1 (41-11).
② - C-75-2 Optl. Ratio 2.93-1 (41-14).
③ - Optl. Ratios: 2.92 (38-13), 3.18 (35-11), 3.54 (39-11), 3.73 (41-11), 3.91 (43-11), 4.1 (41-10), 4.3 (43-10), 4.56 (41-9), 4.89 (44-9), 5.38 (43-8), 5.83 (35-6), 6.17 (37-6).

Backlash - 006-.008"

Carrier Removal: Disconnect rear universal, remove axle shafts,(see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, hub, and drum assembly (use screw type hub puller - Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-757) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 puller)

Wheel Bearing Adjustment: Shims between backing plate and axle housing With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished 005", 010", 0125", 015" 030" thick) equally at both wheels

Endplay– 003- 008"

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic, non-adjustable. Serviced by replacement.

FRONT SUSPENSION

Independent. New "Torsion-Aire"type with ball joints and torsion bar springing
See "Torsion-Aire" in Front Suspension & Wheel Alignment Section

Steering Axis Inclination - 5-7° at 0° camber.

Caster - (Manual Steering) Neg. ¾° ±¾°. **(Power Steering)** Pos. ¾° ±¾°. *NOTE* - Caster should be equal as nearly as possible on both sides of the car.

Camber - (Left Wheel) Pos. 3/8° preferred (limits Pos. ½° to 0°). **(Right Wheel)** 0° preferred (limits Pos. ¼° to Neg. ¼°).

Toe-In - 1/8" preferred (limits 3/32" to 5/32").

Toe-Out on Turns - With outer wheel 20°, inner wheel should be 21°45'.

STEERING

Manual: Gemmer. Worm and three-tooth roller
See "Gemmer Worm & Roller" in Steering Section

Power Steering: "Coaxial"
See "Coaxial" Power Steering in Steering Section

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" Steering Section.*

BRAKES

Service: Center Plane (Floating Shoe) hydraulic type. *See Chrysler "Center Plane" Brakes in Brake Section.*

Drums–Centrifuse Diameter 12"

Wheel Cylinder Diameter–1 1/8" bore. Single acting (front), double acting (rear wheels)

Lining–Molded asbestos (bonded to shoe) Length– **12.57 per shoe. Width - 2½". Thickness - 13/64".**

Braking Power - 60% front, 40% rear

Clearance - Front Wheels - Turn each adjusting cam in direction of forward wheel rotation until shoe lining is solid against drum and wheel is locked Turn adjusting cams slowly in opposite direction (each cam a little at a time) until no drag is felt.

Rear Wheels - Same as front wheels except that on rear wheels forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe adjusting cams are rotated in direction of revers wheel rotation.

Master Cylinder: On engine side of dash panel opposite base of brake pedal

Checking Fluid–Filler plug at top of master cylinder (on dash panel in engine compartment)

Power Brakes: Bellows Assist type Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder)
See "Chrysler, Desoto, Dodge, Plymouth Bellows Type Power Unit" in Brake Section

Removal of Power Unit – Use Pedal depressor to depress pedal to prevent trigger arm extending beyond end of bracket (to prevent damage to trigger arm). Disconnect vacuum hose Remove nuts on four mounting studs and withdraw unit from firewall *CAUTION* – Do not lose nylon bushing on pedal linkage cross pin.

Parking Brake: Independent type on propellor shaft at rear of transmission. 6" external contracting type (Synchro-mesh Cars), 7" internal expanding type (Automatic Trans Cars)

Adjustment – *See "Hand Brake Notes" in Chrysler Special Data.*

Lining – Width – 2" Thickness – 5/32" Length –

MISC. MECHANICAL

Windshield Wipers: Auto-Lite EPV–4001A (C–75–1,2; C–76, C–76–300), EPV–4001 (IM–1,2,4) Electric type. *See "Auto-Lite Electric Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Heater-Air Conditioning. *See "Air Conditioning" in Miscellaneous Section.*

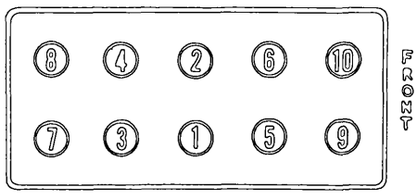
Power Window Regulators: Auto-Lite. Electric type Reversible type motor in each window. Controlled by switch and master control switch. *See "Electric Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Electric, 6–Way type *See "Power Seat Adjusters" in Miscellaneous Section.*

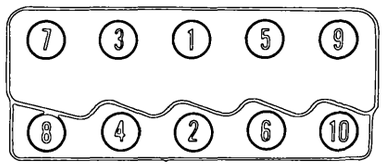
Convertible Top Control: Auto-Lite. Electric-Hydraulic type *See "Chrysler Top Control" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps (Without Lockwashers)	100
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	35
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Support Bracket (Double Shaft)	85
Rocker Arm Cover	2.5
Engine Front Cover	30-35
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Oil Filter	30
Clutch Housing	35



V8 ENGINES (DOUBLE ROCKER ARM SHAFT)



V8 ENGINES (SINGLE ROCKER ARM SHAFT)

ENGINE

ENGINE ASSEMBLY REMOVAL: Drain cooling system, remove battery. Remove fan shroud, radiator, and hood. (*NOTE* - Before removing hood, scribe outline of hinge brackets to insure proper adjustment when reinstalling.) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor. Attach engine lifting Tool C-3466 to carburetor flange studs on intake manifold and attach chain hoist to fixture eyebolt. Raise car and disconnect propeller shaft at transmission. Disconnect wires and linkage at transmission. Disconnect wires and linkage at transmission and clutch. Remove exhaust pipe (make sure exhaust system is supported while engine is removed). Drain engine and transmission oil. Remove rear crossmember-to-transmission support attaching bolts. (*NOTE* - Place a roll-away jack under transmission to relieve weight from crossmember. Place a wood block between head of jack and transmission to avoid damaging transmission oil pan. Jack must support weight of rear of engine and must be able to roll with engine as engine is removed). Remove crossmember-to-frame bracket attaching bolts. Remove crossmember and rear engine support. Lower car to convenient working height, then remove engine front support mounting bolts. With chain hoist, raise engine and, at same time, work engine out of chassis toward left front fender.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

Tightening Torque—See Tightening (Torque Wrench) Specifications above.

CYLINDER HEAD INSTALLATION (Double Rocker Shaft): Use new gaskets when installing head. Insert cylinder head bolts into rocker arm support brackets. Insert pushrods through holes in head (short rods in upper holes - intake, long rods in lower holes - exhaust). Place rocker arm assemblies in position on heads, then position pushrods. Starting at top center, tighten all cylinder head bolts to correct torque (see Tightening Specifications above). Install exhaust manifolds, crankcase breather tube, and intake manifold. *NOTE* - When installing intake manifold, insert short bolts in holes on extreme ends of manifold.

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos. With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap. Tap seal down in position with Tool C-3511 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine.

ENGINE FRONT COVER

ENGINE FRONT COVER (Double Rocker Shaft Engines): Proceed as follows.

Removal: Remove water pump. Remove vibration dampener retainer bolt and washer. Remove two of the vibration dampener pulley bolts and install puller Tool C-3033. Remove crankshaft pulley and vibration dampener as an assembly. Remove felt dust seal and vibration dampener hub key from crankshaft slot Remove left cylinder bank exhaust pipe Disconnect fuel lines at fuel pump Remove fuel pump. Remove oil level indicator. Remove starter using Tool C-455. Drain engine oil and remove oil pan Remove cover bolts and lockwashers Drive chain case cover off the two dowel pins, using soft hammer.

Installation: Be sure mating surfaces of cylinder block and cover are clean Apply moderate coat of sealing compound to block and cover faces, install new gasket. Make sure crankcase oil slinger is in proper position (flange end pointing toward seal). Position cover on two dowel pins and then gently tap cover in place. Install cover bolts and lockwashers and tighten to 30 ft lbs Install other items by reversing removal procedure.

FRONT OIL SEAL: Remove crankshaft pulley and water pump housing. Loosen oil pan bolts sufficiently until pan clears chain case cover. Install Tool C-3506 and remove seal. Discard seal and retainer. Position new seal and retainer assembly in housing and press into place using Tool C-3503. Seal must be tight against seat surface. *CAUTION* - Always have thin shoulder away from front of cover with stamped case cover, thick shoulder away from front of cover with cast iron cover.

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: With intake manifold, tappet cover, pushrods, tappets and timing gears removed, remove distributor. Lift out distributor drive gear and stub shaft. Remove camshaft thrust plate attaching bolts and oil trough. Withdraw camshaft and spacer, being careful not to damage cam bearings with cam lobes.

▷ *CAMSHAFT REPLACEMENT CAUTION:* When replacing camshaft to correct cam lobe wear, observe the following precautions:

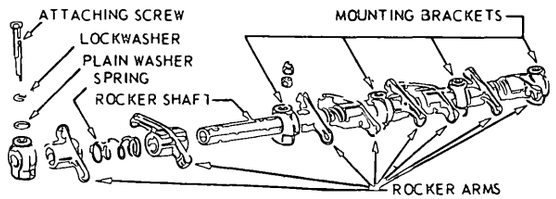
1) Clean and flush engine thoroughly (use mixture of ½ kerosene and ½ No. 10 engine oil) to remove all metal dust and grindings.
2) Replace all hydraulic lifters (check for fit).
3) Check for sticking valves (guide clearance) and valve spring pressure (must be within limits).
4) Inspect new camshaft for lobe roughness, nicks, or scratches. Lubricate cam lobes when installing shaft and add 1 qt. Mopar Anti-Scuff Oil No. 1643234 to engine oil for break-in.
5) Drain oil after first 500 miles of operation and thereafter at regular drain intervals.

VALVE SYSTEM

ROCKER ARMS

ROCKER ARM ASSEMBLY: Removal—Remove rocker arm covers. Place cotter pins in holes of first and last rocker arm brackets (if not already there) to prevent springs on rocker from pushing assembly

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ROCKER ARM ASSEMBLY
(SINGLE ROCKER ARM SHAFT)

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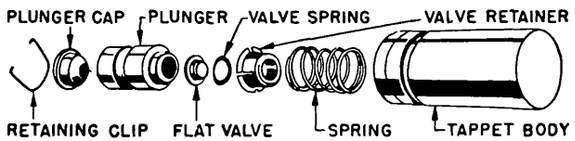
apart when cylinder bolts removed. Completely loosen ten bolts on each bank that attach rocker arm support brackets to cylinder head and block. Grasp support bracket at each end of head, pull rocker assemblies and bolts directly away from heads, then remove push rods and place in respective slots in holder C-3068. ***CAUTION—Use care when removing rocker assemblies in order not to jerk cylinder heads off locating dowels which would allow them to drop and become damaged.***

Installation Insert cylinder head bolts in brackets, with **short** bolts in intake side Insert push rods through push rod holes in heads (short rods in upper intake holes, long rods in lower exhaust holes) Place rocker arm assemblies in position on heads, lining up all push rods to their respective rocker arms Starting at top center tighten all cylinder head bolts to torque indicated in Tightening Specifications above ***When tappets are full, extreme care must be taken when tightening head bolts so that tappets have time to bleed down to their operating length.*** Bulged tappet bodies and permanent noisy operation will result if tappets are forced down too rapidly

HYDRAULIC VALVE LIFTER

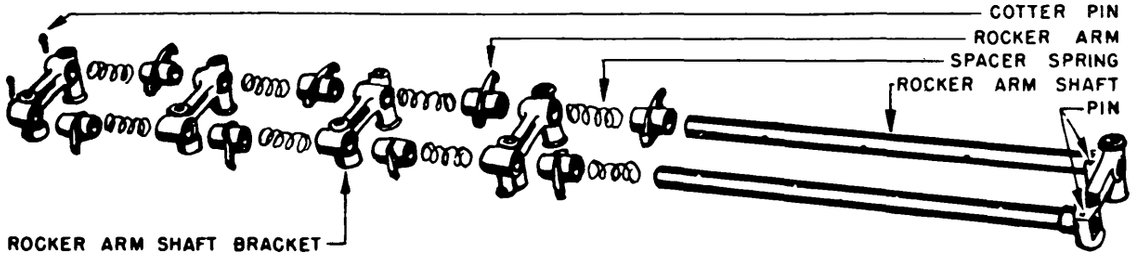
HYDRAULIC VALVE LIFTERS (One-Piece Integral Type)

Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body. Oil is introduced to this unit through hole in side of lifter plunger.



DE SOTO V8 HYDRAULIC VALVE LIFTER

Removal (Double Rocker Arm Shaft Engine): Drain cooling system to a point below level of intake manifold. Install valve spring compression Tool C-3024 over rocker arm so heel of tool rests on valve stem side. Make certain valve is seated and tappet body is resting on low point of camshaft lobe (see below). Using handle of tool for leverage, compress valve springs sufficiently to raise rocker arm above pushrod. While holding rocker arm in this position, slide rocker arm to one side along tube (*CAUTION* - To avoid damage to valves, be sure piston head is well below top of travel before compressing valve springs). Remove carburetor air cleaner, disconnect coil wires and wire from heat indicator sending unit. Disconnect heater hose and carburetor heat tube at integral choke. Remove intake manifold, coil and carburetor as an assembly. Remove tappet chamber cover and gasket. Insert hooked portion of Tool C-3216 into hole in tappet body (this portion of tool can be used to remove tappets without varnish build-up). Lift tappet out of bore. If tappet sticks, slide puller portion of tool C-3316 through cylinder head (pushrod) holes and seat firmly in cap of tappet. Insert puller pin through tappet body and tool shaft in holes provided. Grasp tool handle and pull tappet out of bore with twisting motion.



ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

Disassembly: ***(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged)*** Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting Check to see that valve exerts a slight pressure on valve spring to insure valve seating Clean lifter assembly in clean solvent and remove all traces of varnish and carbon Blow parts dry with air DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene ***(CAUTION***—Container and kerosene must be absolutely clean) Allow lifter to fill with kerosene, then remove and replace the plunger cap Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing This will prevent possible scoring of lifter plunger when engine is first started

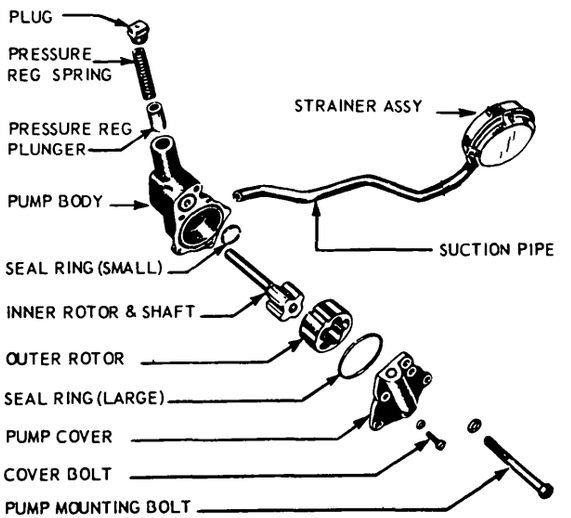
Reassembly: Reverse disassembly procedure as noted above

LOW POINT OF CAMSHAFT LOBE. Remove distributor cap, noting position of rotor for Nos 1 and 6 cylinders Set timing mark "DC" located on crankshaft pulley to pointer With rotor at No 1 firing position, the following lifters will be on the low side of the cam lobe No 2 intake and exhaust, No 4 exhaust, No 7 intake, No 8 intake and exhaust ***(NOTE***—To remove No 1 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed) With rotor at No 6 position, following lifters will be on low side of cam lobe No 3 intake and exhaust, No 4 intake, No 5 intake and exhaust, No 7 exhaust ***(NOTE***—To remove No 6 intake and exhaust lifter, rotate crankshaft ¼ turn clockwise from above position after removing lifters listed)

OILING SYSTEM

OIL PUMP

ROTOR TYPE OIL PUMP Removal—Drain engine oil, remove oil pan Remove oil pump mounting bolts and lower pump straight down



V8 OIL PUMP

Disassembly & Inspection: Remove oil strainer and pump cover, rotor and shaft. Lift out outer rotor. Remove release valve plug, spring and plunger. Wash all parts in suitable solvent, and inspect for damage or excessive wear. Check pump for wear as follows

Outer Rotor - Replace rotor if thickness is less than 988".

Inner Rotor & Shaft - Replace if thickness of rotor is less than 988" and diameter less than 2.244".

Pump Body - Place both inner and outer rotors in pump body. Place straightedge across body between bolt holes. If clearance between rotors and straightedge is 004" or more, replace pump body.

Outer Rotor Clearance - If clearance is more than 012" between outer rotor and pump body, replace pump body.

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Outer Rotor to Inner Rotor Clearance - Place both rotors in pump body. With inner rotor bottomed in outer rotor, if clearance between opposite lobe of inner rotor and lobe of outer rotor is more than .010", replace both rotors.

Oil Pump Cover - Place straightedge across pump cover. If clearance between straightedge and cover is .0015" or more, replace cover.

Reassembly: Use new oil seal ring between cover and body Tighten cover bolts to 10-15 ft lbs Prime pump and then install new oil seal ring in pump mounting face

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

IGNITION NOTES

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block

Installation: Slide new bushing over burnishing end of Tool C-3053 Insert tool and bushing into bore of block Drive bushing and tool down into position, using a soft hammer As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size ***DO NOT REAM THE BUSHING.***

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows. Rotate crankshaft until No 1 cylinder is at TDC (or firing position) When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear Coat shaft of drive gear with engine oil Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase)

PROPELLER SHAFT NOTES

REAR UNIVERSAL JOINT OPERATING ANGLE: Rear universal joint operating angle must be within range of 1-3° (2° preferred). Check and adjust this angle as follows

► *CHECKING CAUTION:* Car weight must be on wheels (use drive-on type hoist or platform) and there must be no extra weight in trunk.

Checking Rear Universal Joint Angle: Measure angle of pinion shaft companion flange by placing spirit level vertically on back face of flange. Measure angle of propeller shaft by placing spirit level parallel to shaft on top or underside of shaft. **Add** these two readings. This is the universal joint angle and should be 2° (limits 1-3°)

Adjusting Rear Universal Joint Angle: If angle exceeds 3°, install wedge shim between the rear spring and spring seat on axle housing. Make sure that shim surface is not burred, install shim with flat side toward spring and thick end toward front of car. Recheck universal joint angle.

BRAKE NOTES

HAND BRAKE ADJUSTMENT (External Type): Free play between anchor bracket on center of band and sides of hand brake support should not exceed .005". Correct by compressing bracket in vise or by tapping with a hammer before attempting brake adjustment. Adjust anchor screw to obtain .015-.020" clearance between band and drum at anchor. Adjust guide bolt to obtain uniform clearance for upper and lower halves of band. Guide bolt controls position of lower end of band, nut controls upper end of band.

HAND BRAKE ADJUSTMENT (Internal Type): Disconnect front end of propeller shaft and remove adjusting screw cover plate. Turn adjusting nut to decrease shoe-to-drum clearance until drum drags, then back off nut at least one full notch to give .010" clearance (use Spanner Tool C-3014). Shoulders on nut must be seated in grooves on adjusting sleeve. Adjust hand brake lever cable so there will be 3-5 notches visible on lever beyond face plate when brake applied.

►*ADVENTURER NOTE:* This model has special Fire-Flite Engine (Larger Bore, Racing Camshaft, Dual Breaker Distributor, Double Valve Springs, and special Carburetors). Complete data is included below.

MODEL IDENTIFICATION

Model	Model Designation
Firedome	S-25
Fireflite	S-26
Adventurer	S-26
Firesweep	S-27

SERIAL NUMBER: Stamped on plate attached to left front door body hinge post.

Starting Serial Numbers

Model	Detroit	Los Angeles
S-25 Firedome	55332001	
S-26 Fireflite	50396001	
S-27 Firesweep	58001001	60014001

ENGINE NUMBER: Stamped on machined boss on top of front side cylinder block just behind water pump.

Starting Engine Numbers

Model	Detroit	Los Angeles
S-25 Firedome	S25-1001	
S-26 Fireflite	S26-1001	
S-26 Adventurer	S26A-1001	
S-27 Firesweep	KDS-1001	KDS-1001

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*
"A" – All cylinders .020" oversize.
"B" – All Main & Connecting Rod Bearings .010" undersize.
"AB" – BOTH above conditions exist.
"MALTESE CROSS" symbol (3/8" high)—ONE OR MORE Crankshaft Journals .001" undersize. *See "Connecting Rods" & "Crankshaft" under ENGINE below.*
"DIAMOND" symbol (3/8" high)—ALL Lifter Bodies are .008" oversize.

TUNE-UP

COMPRESSION PRESSURE: (S-25, S-26) 145-175 lbs., (S-26 Adventurer) 160-190 lbs., (S-27) 90-155 lbs. All at cranking speed of 150 RPM (plugs removed, wide open throttle). Maximum variation between cylinders 20 lbs. (S-26 Adventurer), 15 lbs. (All others).

VALVE TAPPET CLEARANCE: None in service (hydraulic).

MANIFOLD HEAT CONTROL: Automatic thermostatic type located between right hand exhaust manifold and exhaust pipe. *NOTE* – Single exhaust pipe with cross-over Std., Dual Exhaust Optl.
Thermostatic Coil Installation – Outer end of coil should be hooked under right hand stop stud. An anti-rattle spring is hooked between valve shaft and stud on opposite side of valve housing.

►*DUAL EXHAUST NOTE:* When valve is closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders – RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.
SPARK PLUG GAP: .035".
Spark Plugs – Auto-Lite AR-42 (Std.). Resistor type. 14 mm. Torque to 30-32 ft. lbs. *NOTE* – On Adventurer, Auto-Lite AR-32 recommended for sustained high speed.

COIL: Auto-Lite CAH-4001C (S-25, S-26), CAH-4001B (S-27).
Ignition Current – 2.5 amps. idling, 3.1 amps. stopped.
Resistor – Auto-Lite PU-4003, .665-.735 Ohms.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. When testing coil, include resistor with coil.

DISTRIBUTOR: Auto-Lite. Distributors are single breaker type (IBP), double breaker type (IBS).

Car Model	Auto-Lite No.
S-25	IBP-4001
S-26	IBP-4001A
S-26 Adventurer	IBS-4004
S-27 (Std.)	IBP-4002
S-27 (Power Pak)	IBP-4002B

Condenser – Auto-Lite IAT-2015RA. **Capacity** .25-.28 mfd.
Contact Point Set – Auto-Lite IBP-3028AS (IBP Distr.).
Breaker Gap – .015-.018".
Cam Angle - (IBP Distr.) 27-32°, (IBS Distr.) 29-32° for single set of points, 36-39° for both sets of points.

►*CAM ANGLE SETTING CAUTION (IBP DISTR.):* Cam angle should be checked with vacuum line **disconnected.** Cam angle may decrease as much as 10° with maximum vacuum advance, but must not decrease more than 12°

Breaker Arm Spring Tension – 17-20 ozs.
Rotation – Clockwise viewed from above.

Automatic Advance – IBP-4001

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	440	2	880
4.5	750	9	1500
9	1525	18	3050
10	1700	20	3400

Automatic Advance – IBP-4001A

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	435	2	870
5.5	800	11	1600
8	1875	16	3750
9	2300	18	4600

Automatic Advance – IBP-4002

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	450	0	900
1	535	2	1070
4	800	8	1600
6	1200	12	2400
8.5	1700	17	3400

Automatic Advance – IBP-4002B

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	370	2	740
5	450	10	900
7	720	14	1440
8	850	16	1700

Automatic Advance - IBS-4004

Degrees Distr.	RPM	Degrees Eng.	RPM
0	350	0	700
1	400	2	800
4	525	8	1050
7	660	14	1320
8	700	16	1400

Vacuum Spark Control: Auto-Lite. Integral Type.

Vacuum Advance – IBP-4001, 1A

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	10½
1	2	11
8	16	14-1/8
14	28	17-3/8
15	30	18

Vacuum Advance - IBP-4002, 2B.

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	7-1/8
1	2	7-5/8
7	14	11-7/8
12	24	16-3/4
13	26	18

Vacuum Advance - IBS-4004

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	9 1/8
1	2	9 7/8
5	10	12 7/8
9	18	16 1 2
10.25	20.50	18

IGNITION TIMING

Setting – 6° BTDC (All Models). NOTE—Setting should not be varied more than 4° before or after the standard setting of 6° BTDC.
Timing Mark – Vibration marked "DC" with 2° graduations before and after this point. Align correct mark with pointer on chain case cover.

CARBURETOR

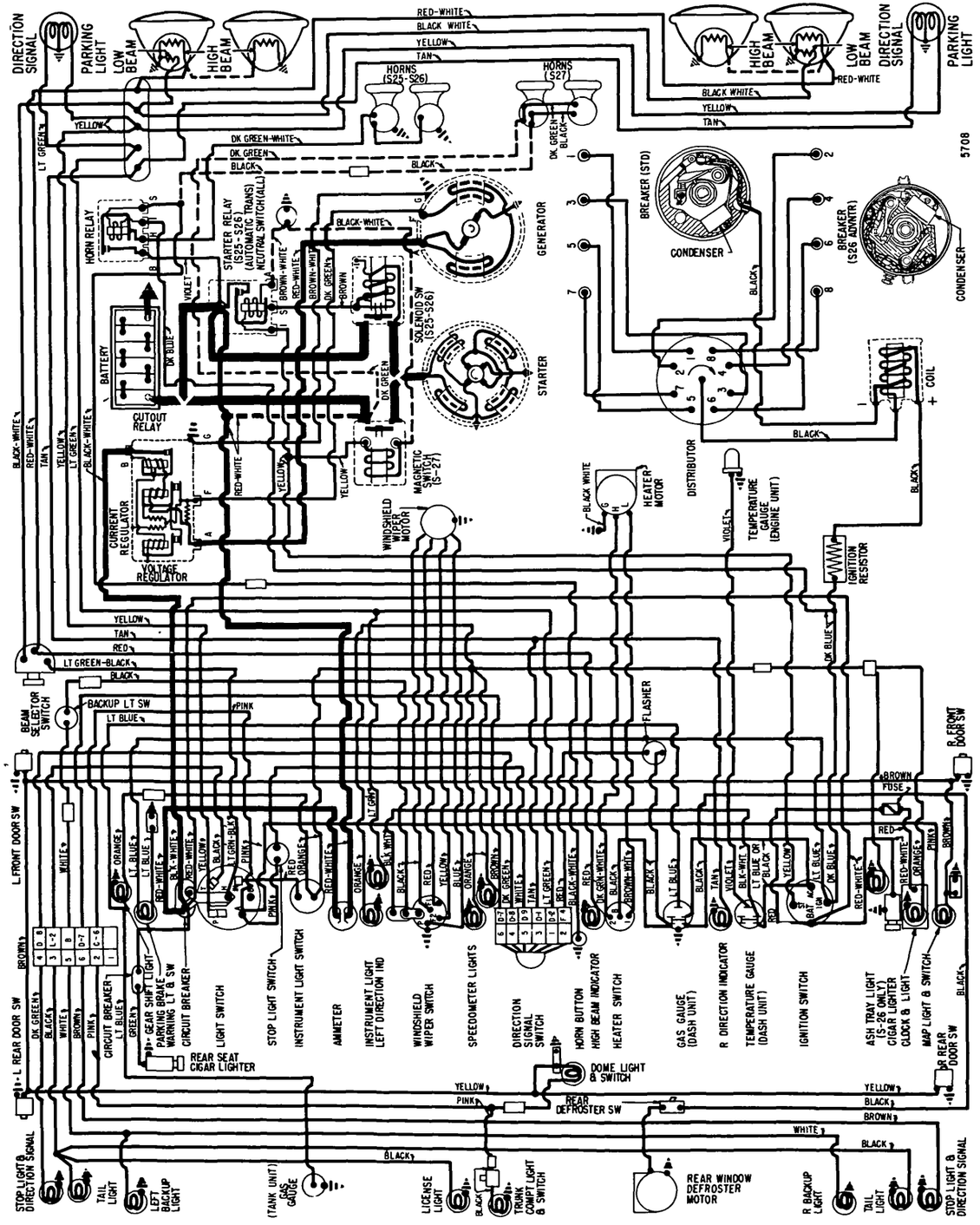
►*CARBURETOR APPLICATION: Carter & Stromberg (2 and 4 barrel types) used as follows:*

Model	Carburetor Type & No.
S-25 (Std.)	Carter BBD 2522S, SA
S-25 (Power Pak)	Carter WCFB 2532S
S-26 (Std.)	Carter WCFB 2588S
S-26 Advntr	Carter WCFB 2635S (Frt), 2636S (Rear)
S-27 (Std.)	Stromberg WW 3-149, 3-150
S-27 (Power Pak)	Carter WCFB 2532S

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

►*S-27 POWERFLITE & TORQUEFLITE LINKAGE ADJUSTMENT CAUTION & NO-KICKDOWN CORRECTION:* Different Bellcrank-to-Transmission Throttle Valve Rods used with each transmission. If TorqueFlite throttle linkage cannot be adjusted, or if kick-down does not operate, make certain correct rod installed. Identify rods as follows:
PowerFlite Rod – No. 1735024. Straight portion of rod (from bellcrank end to center of bend) should be 6½" or 1" shorter than corresponding TorqueFlite rod.

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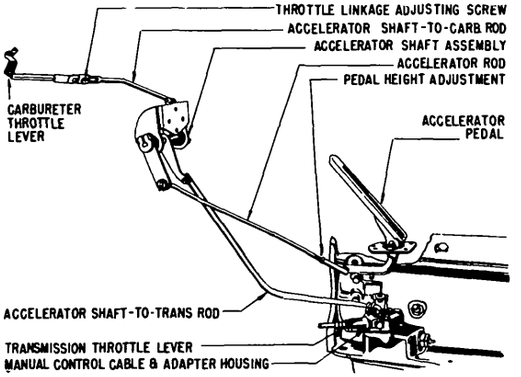
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TorqueFlite Rod – No. 1734979. Straight portion of rod (from bellcrank end to center of bend) should be 7½".

THROTTLE LINKAGE ADJUSTMENT: *NOTE* – Accelerator pedal angle should be 118° to horizontal in closed throttle position. To adjust, disconnect pedal end of bellcrank-to-pedal rod, shorten or lengthen rod by turning swivel end on rod, tighten locknut after adjusting. Then proceed as follows:

1) Make certain engine idle speed correctly set at 475-500 RPM with transmission in neutral and engine at normal operating temperature.

2) On 2-Barrel carburetor models, loosen adjusting screw located on accelerator shaft-to-carburetor rod. On 4-Barrel carburetor models, loosen adjusting screw on accelerator shaft assembly-to-intermediate shaft assembly rod. On all models, move rear portion of rod to rear until it is stopped by idle stop on transmission throttle cam. Align rods and tighten adjusting screw to 7-9 ft.lbs. torque. Recheck engine idle speed.



POWERFLITE & TORQUEFLITE THROTTLE LINKAGE

CARTER BBD

Carter BBD, No. 2522S, SA. Std. on Model S25.

► *FLAT SPOT OR HESITATION (2522S Carburetor):* If this not corrected by complete tune-up (including Ingition Timing, Manifold Heat Control operation check, and Carburetor adjustment including Float Level and Pump Stroke check), check pump valves and make changes in carburetor as detailed below. *NOTE* - These new parts installed in 2522SA carburetors in production.

Accelerating Pump Check Valves - Check for leakage by holding discharge check ball at bottom of pump discharge cluster hole while operating pump (Discharge Cluster removed). If leakage noted at discharge ball check or at intake ball check, reseat balls. Use brass rod to tap ball down if new balls not available.

Venturi Cluster Screws (Main Idle Air Bleed) - Install new screws, No. 101-434 (supersedes 101-433).

St p-up Rods - Install new rods, No. 75-1145 (supersedes 75-1177).

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barr l fe ds Cyl. 2-3-5-8, LEFT barr l 1-4-6-7.*

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Idle Setting – 1-1½ turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idl Speed – 450-500 RPM (Synchro-mesh). 475-500 RPM with transmission in Neutral (TorqueFlite).

Float Level - 5/16" (Gauge T109-220) between top ridge of each float and top edge of bowl casting with needle valve closed (float lip held against needle valve). Adjust by bending lip on float arm.

Accelerating Pump – Install connector rod in center hole of throttle lever and inner hole of pump arm. Pump stroke (travel of pump piston rod) should be 1 1/32" plus or minus 1/64". Adjust by bending throttle connector rod.

Fast Idle: .015" (Gauge T109-44) between lower edge of of throttle valve and bore with fast idle adjusting screw on high step of cam.

Fast Idle Cam Clearance – With choke valve closed and lip on inner choke shaft lever contacting lug on outer lever, index mark on cam should align with fast idle adjusting screw Adjust by bending lip on inner choke shaft lever.

Automatic Choke Setting: 1 Point Rich.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter BBD" Carburetor in Carburetion Section.*

STROMBERG WW

Stromberg WW, Code 3.149 (Synchro-mesh), 3.150 (PowerFlite & TorqueFlite). Std. on Model S-27.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting – 3/4 - 1-3/4 turns open. Adjust both screws alike. Turn screws out for richer mixture.

Idl Speed – 450-500 RPM (Synchro-mesh), 475-500 RPM with transmission in Neutral (PowerFlite & TorqueFlite).

Float Level – 7/32" (Gauge T-26019) from top of float at center to top edge of bowl casting with needle valve seated (hold float arm lip against needle valve). Adjust by bending lip.

Accelerating Pump – Install connector rod in center hole of throttle lever.

Fast Idle: With throttle stopscrew backed out so that throttle valves completely closed, back out fast idle adjusting screw, close choke valve so that fast idle screw in line with first step of fast idle cam, turn fast idle screw in until initial contact is made with cam, then turn screw in additional 5½ turns. With fast idle screw in position, close choke valve against a #12 drill (3-149 Carb.), #24 drill (3-150 Carb.) placing drill between upper edge of valve and air horn wall. If fast idle screw is not on first step and against shoulder on cam, adjust by bending fast idle rod at upper end.

Aut matic Choke Setting: *NOTE* – Choke is "Crossover" type mounted in well in manifold and linked to choke lever by a rod. Adjustment is not required but can be checked by disconnecting rod and removing choke assembly. Index mark on thermostatic coil plate should be midway between "L" and "R" marks.

Throttle Linkage Adjustm nt: *See CARBURETOR above.*

►*OTHER DATA: See "Stromberg "WW" (Dodge & Plymouth) Carburetor" in Carburetion Section.*

CARTER WCFB 4-BARREL

Carter WCFB No. 2588S (S-26), 2532S (S-25 & S-27 Power Pak).

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting – ½-1½ turns open (primary only). Turn screws out for richer mixture.

Idle Speed – 450-500 RPM (Synchro-mesh), 475-500 RPM with transmission in Neutral (PowerFlite & TorqueFlite).

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER DATA: See "Carter WCFB 4-Barrel" Carburetors in Carburetion Section.*

CARTER WCFB 4-BARREL
Two Carburetor Installation
(Adventurer)

Carter WCFB, No. 2635S (Frt), 2636S (Rear).

►*MANIFOLD FUEL DISTRIBUTION: RIGHT barrels feed right bank cylinders, LEFT barrels feed left bank.*

►*CARBURETOR IDLE ADJUSTMENT CHANGE NOTE: The following idle speed & mixture adjustment procedure supersedes previous instructions.*

Linkage Adjustment: Before adjusting idle mixture and idle speed, the carburetor inter-connecting rod must be adjusted as follows: Hold rear carburetor throttle in wide open position (choke off) and adjust rod at slotted end so front carburetor throttle valve will be in wide open position. Make sure rod can rotate slightly on pivots and is not binding. A binding condition can result in a loose throttle lever which may fall off shaft and leave throttle wide open.

►*LOOSE THROTTLE LEVER CORRECTION:* Remove carburetor and place in a vise so that end of throttle shaft away from lever is firmly supported. Place lever on shaft and peen shaft to tighten securely.

Idle Speed & Mixture Adjustment: Screw the "idle by-pass" screw (7/16" slotted hex head screw located on left rear side of each carburetor body flange) against its seat *(NOTE - This "by-pass screw" is no longer used for idle speed adjustment and must remain in the closed position).* Adjust engine idle speed to 650 RPM (transmission in neutral) by screwing in the **idle speed screw** (throttle stop screw at throttle shaft lever) on the front carburetor only. Adjust all four (two on each carburetor) idle mixture screws 1 turn open from a lightly seated position. Obtain the smoothest possible idle speed by further adjusting idle mixture screws on **front** carburetor *(NOTE - It may also be necessary to re-adjust idle mixture screws on rear carburetor if adjustment of front carburetor does not provide proper engine idle speed).*

Throttle Linkage Adjustment (Automatic Transmission Cars): *See CARBURETOR above.*

►*OTHER DATA: Se "Carter WCFB 4-Barrel Carburetor" in Carburetion S ction.*

FUEL PUMP PRESSURE: 6-7 lbs.

CARB. EQUIPMENT

Fuel Pump: **Carter** M2502S (S-27), M2501S (S-25, S-26 Std.), M2504S (S-25, S-26 Air Cond.).
Pressure - 6-7 lbs.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Auto-Lite Electric Type.
Dash Unit - Auto-Lite 14322A.
Tank Unit - Auto-Lite 14380A (Est. Wgn), 14381A(Others)
See "Fuel Gauges" in Carburetion Section.

AIR CLEANER: DRY FILTER ELEMENT type. Clean every 5000 miles, replace element every 15,000 miles.

►*CLEANING CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate.*

BATTERY

(S-25, S-26) Auto-Lite 11-HS-60 r Willard HO-11-60. 12 volt, 11 plate, 60 ampere hour (20 hr. rate).
(S-27) Auto-Lite 11-HS-50 or Willard HO-11-50. 12 volt. 9 plate, 50 ampere hour (20 hr. rate).
Battery Ground - Negative.
Engine Ground - Left front of engine.

STARTER

Auto-Lite Used as follows:

Model	Starter N .	Armatur No.
S-25, S-26	MDL-6001	MDL-2006
S-27	MDL-6003	MDL-2088

►*S-27 NOISY OR ERRATIC STARTER DRIVE CORRECTION:* Check for excessive dust or water on drive shaft. Lubricate with No. 10W oil. In extreme cases, remove starter and lubricate Bendix drive unit.

Drive – (MDL-6001) Overrunning clutch & solenoid pinion shift. (MDL-6003) Bendix "Folo-Thru" No. A3596.

Rotation – Counter-clockwise at commutator end.

Brush Spring Tension – 31-47 ozs. with new brushes.

Performanc Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200 min.	10.0	60 max.
6.0 ft. lbs.	Lock	4.0	225 max.

Starting Switch: **(S-25, 26)** - Auto-Lite SAD-4301 Solenoid Pinion Shift used with separate relay, Auto-Lite RAJ-4001, and Neutral Safety Switch on transmission (Auto. Trans. Cars). Controlled by Ignition and Starting Switch (key starting).
(S-27) - Auto-Lite SAE-4001 (Synchro-mesh), SAE-4002 (Auto. Trans.) magnetic switch used with Neutral Safety Switch on transmission (Auto. Trans.). Controlled by Ignition & Starter Switch (key starting).
See "Auto-Lite Starter Controls" in Electrical Section.

N utral Safety Switch Adjustment: *See "PowerFlite" or "TorqueFlite" Transmission in Transmission S ction.*

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GENERATOR

Auto-Lit . 12 volt. Used as follows:

Generator No.	Armature No.	Application
GJC-7002H	GJC-2030F	S-25,26,27 (Early)
GJC-7012A	GJC-2030F	S-25,26,27 (Later)
GJC-7013A	GJC-2030F	S-26 Advntr.
GJC-7006B		Air Cond.
GHM-6004C	GHM-2059F	① Air Cond.
GHM-6001E	GHM-2006F	② Air Cond.
GGA-6001AC	GFY-2101F	Special

①— With 4-Headlight System.
②— With 4-Headlights and Gasoline Heater.

►*SPECIAL GENERATOR NOTE:* GGA, GHM, and GJC Generators used. Performance specifications apply equally to all generators within group specified.

Performance Data — GGA (Cold)

Amperes	Volts	RPM
4.0	14.6	950 max.
40.0	14.6	1600 max.
40.0	15.0	1600 max.

Performance Data — GHM (Cold)

Amperes	Volts	RPM
5	14.0	875 max.
25	15.0	1350 max.
30	15.0	1500 max.

Performance Data — GJC (Cold)

Amperes	Volts	RPM
0	12.8	1225-1325
30	15.0	2050-2250

Brush Spring Tension — (GGA) 34-41 ozs., (GHM) 35-53 ozd., (GJC) 18-36 ozs., with new brushes.

Field Current — (GGA, GHM) 1.1-1.3 amperes, (GJC) 1.2-1.3 amperes, at 10 volts (70° F.).

Motoring Current — (GGA) 2.3-2.6 amperes, (GHM) 3.0-3.5 amperes, (GJC) 3.4-3.9 amperes. All at 10.0 volts (70° F.).

Belt Adjustment: (Exc. Air Cond. Cars) - 3/16" deflection midway between generator and water pump pulleys. **(Air Cond. Cars)** - 1/8" deflection midway between generator and Air Compressor pulleys. All with 5 lbs. force.

REGULATOR

Auto-Lite VRX-6201A (GJC & GHM Gen.), VAT-6201A (GGA Gen.).

Cut out Relay

Cuts In — (VRX) 12.6-13.6 volts (VAT) 13.0-13.75 volts.
Cuts Out — 8.2-9.3 volts, from sealed position with point opening amperage discharge 3-5 amps. (VRX).
Contact Gap — .015" minimum.
Air Gap — .031-.034" with contacts open (check at hinge end of core).

Vibrating Regulator

Setting — 14.5±.3 volts charging at 10 amperes (80° F.) or with .25 ohm resistor in series between regulator and battery.
Air Gap — .048-.052" with contacts just opening.
Checking & Adjusting — *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

Current Regulator

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70° F.*

	Test A Operating Amp rag	Test B
VRX-6201A	36	30 (28-32)
VAT-6201A	46	40 (38-42)

Test A — After 15 minutes operation charging at 10 amperes.
Test B — After additional 15 minutes operation with current regulator operating (load applied to hold voltage to 13.6-13.8 volts (VRX), 13.7-13.9 volts (VAT).
Air Gap — .048-.052" with contacts just opening.
Checking & Adjusting — *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. 2-Headlights standard, 4-Headlights optional. *See "4-Headlights" in Electrical Section.*

Direction Signals: *See Electrical Section.*

Stop Light Switch Location: On forward end of master cylinder.

CIRCUIT BREAKERS: Used as follows:

20 Ampere — Protects headlights and beam indicator. On back of lighting switch.
6 Ampere — Protects parking lights, tail lights, license plate lights, instrument lights, and clock light. On back of light switch.
6 Ampere — Protects stop light, map light, dome light, glove compartment light, courtesy light and trunk compartment light. On back of light switch.
5 Ampere — Windshield wiper & back-up light. On back of wiper switch. *NOTE* — 6 ampere circuit breaker with variable speed wiper.
8 Ampere — Rear cigar lighter. Behind left front kick panel on side cowl.

FUSES: Clock - 2 ampere in clock lead.

HORN RELAY: Auto-Lite RAH-4002 (S-25, 26 only).

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8, Overhead Valves.

►*ENGINE NOTE:* Three different engines used as follows:

S-25 & S-26 — Overhead lateral valve type with double rocker shaft.
S-26 Adventurer — Larger S-26 engine with increased bore, special racing camshaft, double valve springs, and other special specifications as listed below.
S-27 — Overhead lateral valve type with single rocker shaft.

Engine	Bore	Stroke	Displacement
S-25, S-26	3.78"	3.80"	341 cu. ins.
S-26 Advntr	3.80"	3.80"	345 cu. ins.
S-27	3.69"	3.80"	325 cu. ins.

Engine	Compr. Ratio	Rated HP	Developed HP
S-25	9.25-1	45.7	270 at 4600 RPM
S-26	9.25-1	45.7	295 at 4600 RPM
S-26 Advntr	9.25-1	46.2	345 at 5200 RPM
S-27	8.5-1	42.2	245 at 4400 RPM
S-27 Pwr.Pak	8.5-1	42.2	260 at 4400 RPM

Compression & Vacuum Reading — *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in DeSoto Special Data.*

OIL PAN REMOVAL: (S-27) - Remove negative battery terminal, throttle linkage, distributor cap, oil dip stick and starter. Remove flywheel housing dust shield, steering arm at steering gear cross shaft, idler arm at idler arm bracket, engine front mounts and raise engine 1½". Disconnect exhaust pipe at manifold and front of muffler (Single Exhaust) and tie out of way. Drain engine, remove oil pan screws, lower oil pan, rotate crankshaft to bring No. 1 crank to approximately 8 o'clock position and remove oil pan.

(S-25, 26) - Remove dipstick. (Single Exhaust) remove starter, disconnect exhaust pipe at manifolds and at clamp to exhaust extension and move pipe out of way. (Dual Exhaust) remove starter, disconnect tie rod at idler arm and pull downward and out of way. Lower oil pan and turn crankshaft until No. 1 crankpin is at 8 o'clock position and remove oil pan.

►*CYLINDER HEAD GASKET PRODUCTION CHANGE & CAUTION:* On S-27 models a new cylinder head gasket Part No. 1827891 entered production with engine No. KDS-38504. When replacing head gasket, check depth of cylinder bolt thread in block by chalking cylinder head bolt and screwing it in block without a cylinder head. When bolt bottoms before removing 1" of chalk from bolt, increase depth of threads with ½-13 UNC2B tap. *NOTE* - On S-25 & S-26, cylinder head, Gasket No. 1827703 supersedes No. 1827285.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in DeSoto Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in DeSoto Special Data.*

PISTONS

Aluminum alloy, eliptically turned, tin plated, thermally controlled by steel strut (S-27), by steel belt or band (Other models).

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bores are .020" oversize.*

Weight - 18.6 ozs. (S-27), 20.7 (Others), piston only.
Removal - Piston & rods removed from above.
Fitting New Pistons: Clearance - .0005-.0015" at top of skirt (.00075-.00125" desired). Use .002" X ½" ribbon feeler to check fit. Pull to withdraw feeler should be 8-12 lbs. (S-25 & S-26), 5-10 lbs. (S-27).
Replacement Pistons: Furnished Std., .005", .020" (S-26 Adventurer only), plus .040", .060" oversize (Other models) with pins and retainers.
Installing Pistons: Install pistons in right bank (2, 4, 6, 8) with indent on piston head opposite larger chamfer on connecting rod, left bank (1, 3, 5, 7), with indent on same side as larger chamfer. The indent will be to front of engine on all pistons. *See Connecting Rods.*

PISTON PINS

Floating type with lock ring at each end.
Diameter - .922". **Length** - 3.060-3.070".
NOTE - Piston pin offset .060" toward right side of engine.

Clearance in Piston - .0000-.0005" or tight thumb press fit at 70°F.
Clearance in Rod - .0001-.0004" or tight thumb press fit.

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Replacement Pins: Furnished Std. .003", .008" oversize. *NOTE* - Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	.0780"	.010-.020"	.0015-.003"
Compr. #2	.0780"	.010-.020"	.001-.0025"
Oil #3	.1860-.1865"	.010-.020" ①	.001-.003"

① - .007-.017" on S-27 with Muskegon Rings.

Replacement Rings: Furnished Standard, .010", .020", .030", .060" oversize.

Installing Rings: Install with mark "Top" on compression ring to top of piston.

CONNECTING RODS

Journal Diameter - 2.249-2.250". Maximum out of round limits .001".

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE) - See "CRANKSHAFT" below.*

Length (Center to Center) - 6.621-6.625".

Weight - 22.5 ozs. (S-27), 23.6 ozs. (Others).

Lower Bearings - Removable precision type, bimetallic Copper Lead Grid, Steel backed (S-26 Adventurer), lead based babbit on steel (Others).

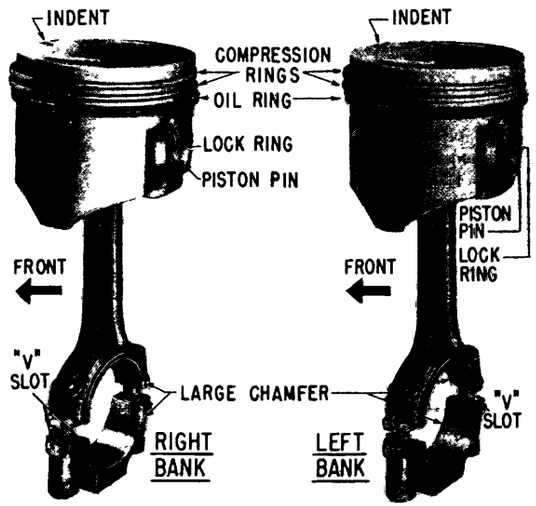
Clearance - .0002-.0022" (.0005-.0015" desired).

Side Clearance - .009-.017" (2 rods).

Bearing Adjustment - None, replace bearings.

Replacement Bearings: Furnished Std. .001",.002",.003", .012" undersize.

Installing Rods: Assemble pistons on rods with indentation on piston head opposite to larger chamfer on lower end of rod (Cyl. 2-4-6-8); on same side as larger chamfer (Cyl. 1-3-5-7). Install assemblies in engine with indentation on piston head toward front of engine (all pistons) and larger chamfer side of rod toward nearest crankshaft journal fillet.



DE S TO V8 PIST N & ROD ASSY.

CRANKSHAFT

J urnal Diam t r - 2.4995-2.5005".

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION: Engines with undersize journals identified as follows:* **.010" UNDERSIZE (Main & Connecting Rod Journals)**—Letter "B" following engine number indicates ALL Main & Connecting Rod Journals .010" Undersize.

.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—A "Maltese" Cross (3/8" high) stamped on machined surface following engine number indicates ONE OR MORE crankshaft main and connecting rod journals .001" Undersize. Position of undersize journals stamped on machined surface of No. 3 (center) counterweight as follows: "R" designates connecting rod journal, "M" designates main bearing journal. The number following this letter indicates the particular journal (numbered from front-to-rear of engine).

Bearings - Removable, precision type, Tin Based Babbitt on Steel (S-26 Adventurer), Lead Based Babbitt on Steel (Others).

Clearance - .0002-.0022" (.0005-.0015" desired).

End Thrust - Taken by center (#3) main bearing.

End Play - .002-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in DeSoto Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in DeSoto Special Data.*

CAMSHAFT

Journal Diameters - (1) 2.000-2.001", (2) 1.984-1.985", (3) 1.969-1.970", (4) 1.953-1.954", (5) 1.4375-1.4385".

Bearings—Removable, steel-backed, babbitt lined bushings.

Clearance—.001-.003"

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Endplay—.002-.006".

Timing Chain: Width—1-1/8". **Pitch**—.375". **Length**—68 links.

Camshaft Setting: Timing Check: Marks on gears should be adjacent and in line with straightedge across shaft centers.

Camshaft Removal: *See "Camshaft & Bearings" in DeSoto Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in DeSoto Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal) *See "Engine Front Cover" in DeSoto Special Data.*

VALVES

Tappet Clearance: None in service (hydraulic).

S-25 & S-26 (Incl. Adventurer)

Valve	Head Diameter	Stem Diameter	Length
Intake	1.94"	.372-.373"	4.90"
Exhaust	1.75"	.371-.372"	4.92"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	①	.001-.003"
Exhaust	45°	②	.002-.004"

①—.389" (S-25 & S-26), .431" (S-26 Adventurer).
②—.389" (S-25 & S-26), .413" (S-26 Adventurer).

S-27 (Firesw p)

Valve	Head Diamet r	St m Diamet r	Length
Intake	1.84"	.372-.373"	4.31"
Exhaust	1.47"	.371-.372"	4.31"

Valv	Seat Angl	Lift	Stem Cl arance
Intake	45°	.389"	.001-.003"
Exhaust	45°	.389"	.002-.004"

►*S-27 OVERSIZE VALVE STEM NOTE:* Valves with oversize stems are available in .005", .015", .030" oversize.

Valve Seat Width—1/16-3/32"(Int.), 3/64-1/16" (Exh.).

Intake Valve Stem Oil Seal—Cup seal installed on valve stem after valve installed in head and before installing springs and retainers.

►*VALVE GRINDING CAUTION:* Check valve height in head after grinding valves using Tool C-3061 (S-25 & S-26), C-3436 (S-27). If valve tip exceeds maximum height (end of cylindrical gauge), grind tip down to approach, but do not go below minimum height (slotted area on gauge).

VALVE SPRINGS: Single springs (S-25, S-26, S-27), Double springs on all valves (S-26 Adventurer).

►*SPRING INSTALLATION (ADVENTURER):* Install all springs with closed-coil end toward head.

Spring Specificati ns
S-25 & S-26 (Exc. Adv ntur r)

	Pr ssure	Length
Valve Closed	68-76 lbs.	1-11/16"
Valve Open	160-172 lbs.	1- 5/16"

S-26 (Adventurer)

	Inner Spring		Outer Spring	
	Pressure	Length	Pr ssur	Length
Closed	26-30 lbs.	1-17/32"	58-63 lbs.	1-21/32"
Open	64-69 lbs.	1- 3/32"	156-161 lbs.	1-7/32"

S-27 (Fir swe p)

	Pressure	L ngth
Valve Closed	49-57 lbs.	1-11/16"
Valve Open	134-146 lbs.	1- 5/16"

►*CAUTION:* Spring ends must be square within 1/16"

►*VALVE SPRING HEIGHT CAUTION:* If valves or seats reground, check installed height of spring (from bottom of counterbore to top surface of spring retainer). If height is 1-23/32" or greater (1-41/64" on S-26 Adventurer), install 1/16" spacer in head counterbore to bring spring height back to normal 1-5/8—1-11/16".

►*VALVE SPRING LOAD CAUTION: Hydraulic lift r "Pumpup" will restrict engin speed and caus valv s to burn if spring loads are not maintain d.*

Valve Guides: (S-25, S-26) - Remove old guides by driving them out through the top of head using Tool C-3150. Install new guides by driving them up through valve port opening. To install INTAKE valve guide, place steel scale across combustion chamber and drive guide in until punch mark on Tool C-3150 is flush with face of cylinder head. To install, EXHAUST guide, drive it in until flush with machined surface of hole. Ream guide to .374-.375" with Tool C-741. *NOTE* - If valve guide Tool C-3150 not available drive guides in; measuring from top of valve seat, as follows: **Intak - 1", Exhaust - 1 3/32".**

(S-27) - Valve guides cast integral with cylinder head. Valves with oversize stems available .005", .015", .030" oversize. Use Reamer Tool C-3433 (.379-.380"), C-3430 (.389-.390"), C-3427 (.404-.405") to ream for next larger oversize.

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Hydraulic Lifters: Integral, flat valve type.

►*VALVE LIFTER OVERSIZE CAUTION: .008" OVERSIZE Valve Lifters used on some engines.* A "DIAMOND" 3/8" high stamped on engine number pad following engine number indicates that all lifters are .008" oversize.

Lifter Overhauling & Testing: *See "Valve System" in DeSoto Special Data.*

Rocker Arm Assembly: *See "Valve System" in DeSoto Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Valve Timing

S-25 & S-26 (Exc. Adventurer)

Intake Valves – Open 15° BTDC. Close 57° ALDC.
Exhaust Valves – Open 57° BLDC. Close 15° ATDC.

S-26 (Adventurer)

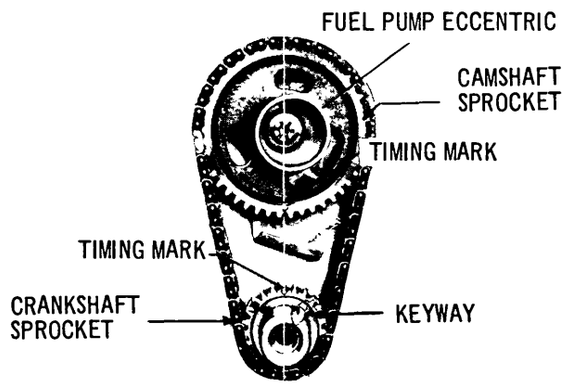
Intake Valves – Open 35° BTDC. Close 65° ALDC.
Exhaust Valves – Open 65° BLDC. Close 25° ATDC.

S-27 (Firesweep)

Intake Valves – Open 10° BTDC. Close 58° ALDC.
Exhaust Valves – Open 56° BLDC. Close 16° ATDC.

Valve Timing Check – With No. 1 Intake Valve closed, insert .210" spacer between rocker arm and stem of No. 1 intake valve. Mount dial indicator directly over valve with contact button on and at right angles to spring seat. Set dial indicator at Zero after seat stops moving indicating all oil bled out of hydraulic lifter and that valve train solid. Turn crankshaft clockwise (normal direction of rotation) until dial indicator shows valve has lifted .016" (S-25 & S-26 exc. Adventurer), .025" (S-27 Firesweep). Pointer on chain case cover should be between 5° BTDC and 7° ATDC mark on vibration dampener. Turn crankshaft **counter-clockwise** until valve is closed, remove spacer from between rocker arm and valve stem.

►*CAUTION – DO NOT turn crankshaft further in clockwise direction than indicated above (spacer may cause valve spring to bottom and damage valve system).*



DE SOTO V8 VALVE TIMING MARKS

OILING SYSTEM

Crankcase Capacity: 5 quarts (refill). Add 1 quart when filter changed.

Normal Oil Pressure: 50-60 lbs. at 1500 RPM.

Oil Pressure Relief Valve - Mounted in oil pump body. Use correct color spring. *See specifications below.*

Relief Valve Spring Specifications

Color	Free Height	Load Height	Lbs. Pressure
Gray (Lt.)	3½"	2 1/16"	16.1-17.1
Red (Std.)	2 27/32"	2 1/16"	19.5-20.5
Brown (Hvy)	2 31/32"	2 1/16"	22.0-23.9

Oil Pressure Gauge - Auto-Lite 14323A. Not electric.

Oil Pump: Rotor type, mounted on rear bearing cap, with oil strainer parallel with surface of cylinder block.

Overhaul - *See "Oiling System" in DeSoto Special Data.*

Oil Filter: Shunt type, replaceable element.

Filter Element - Install new element and cover gasket every 5,000 miles or earlier as required. Change oil with filter element change.

Crankcase Ventilation: Filter element in oil filler cap (clean with kerosene every 5,000 miles), and breather pipe for crankcase ventilation.

COOLING

Water Capacity - 20 quarts. Add 1 quart for heater.

►*AIR CONDITIONED CAR OPERATING CAUTION: Engine cooling system must be protected to a temperature of 20°F (above zero) for summer operation.*

Pressure Valve: 14 lb. radiator filler cap.

Thermostat: Pellet type. Opens 157-162°.

Water Pump: Centrifugal type. *See Water Pump Section.*

Pump Removal: Drain cooling system, remove radiator inlet hose and upper half of fan shroud. Loosen idler pulley and generator adjusting lock bolts, remove drive belts. Remove fan, spacer, and pulley. Remove pump.

►*WATER LEAK CORRECTION:* Correct water leaks at two upper front cover screws (Power Steering Cars) by replacing present lockwasher with copper washer Part No. 446219. On cars not equipped with Power Steering, coat upper left screw with sealer compound Part No. 1057794 and insert copper washer under upper right screw.

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit - Auto-Lite 14308A.

Engine Unit - Auto-Lite 14405A.

See "Temperature Gauges" in Misc. Section.

CLUTCH

Borg & Beck. 10A8 No. 361417 (Std.), 11A8 No. 361428 (H.D.). Disc No. 382531 (Std.), 381850 (H.D.).

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Adjust fork rod to secure 3/16" free movement of clutch fork outer end. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: (*NOTE* - Over-center spring located above brake pedal and attached to pedal mounting bracket). Release clutch rod at clutch pedal. Back off adjusting nut to release over-center spring. Hold clutch pedal fully released, adjust nut until it just touches "C" link of spring, then turn nut 7 full turns for 10" clutch. Reinstall clutch rod to clutch pedal.

Removal: Remove transmission (See Synchro-mesh Transmission). Remove clutch housing pan. Pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove cap screws, which hold clutch cover to flywheel, loosening each cap screw a few turns (in succession) until cover is free. Remove clutch assembly and clutch disc assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "DeSoto Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Jack up front end of car, disconnect front universal (loosen companion flange nut if transmission to be disassembled). Disconnect speedometer cable, hand brake cable, gear shift rods. Remove nuts holding transmission to clutch housing. Then remove transmission by pulling it back, down, and out of car.

POWERFLITE TRANSMISSION

Torque converter and hydraulically operated planetary transmission.

See "PowerFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level - *See TORQUEFLITE below.*

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

TORQUEFLITE TRANSMISSION

Torque converter, and **Three Speed** hydraulically operated planetary transmission.

See "TorqueFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "TorqueFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "TorqueFlite" Transmission in Transmission Section.*

Throttle Linkage Adjustment: *See CARBURETOR above.*

Lubrication: Check the fluid level every 1000 miles, drain and refill every 20,000 miles. Use Automatic Transmission Fluid, Type A.

►*TRANSMISSION DIPSTICK PRODUCTION CHANGE & FLUID LEVEL CHECKING CAUTION:* At Engine Number S-25-11235, S-26-7821, & S-27-34758, "FULL" mark on dipstick was lowered ½" (Distance from "Full" to "Add" mark is 1-5/8" on first type dipstick, 1-1/8" on later type dipstick). When checking fluid level, maintain level on each type dipstick as listed below.

Checking Fluid Level (Transmission Cold) - Check COLD whenever possible. Idle engine and operate transmission in all ranges (press all buttons in turn), then check level with engine idling and transmission

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in Neutral. Fluid level should be between "Low" mark and bottom of dipstick (First & Later type dipsticks—See Production Change & Checking Caution above). Add or drain fluid as necessary to maintain this level.

Ch cking Fluid Level (Transmission Hot): If fluid level must be checked after normal highway driving, proceed as for Cold Check (above) but maintain level on each type dipstick as follows (See Dipstick Production Change & Checking Caution above): **First Type Dipstick**—Level should be between "Full" mark and ½" below this point. **Later Type Dipstick**—Level must not be above "Full" mark. Add or drain fluid as necessary to maintain this level.

►*FLUID LEVEL CAUTION:* Overfilling or too high fluid level in transmission may cause foaming under high speed and high operating temperature conditions (if level reaches gear train as fluid expands). This may result in drop in governor pressure and permit transmission to downshift.

Thr ttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER "TORQUEFLITE" SERVICE DATA: See "TorqueFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universals. Ball & Trunnion type front, Cross type rear.

Rear Universal Operating Angle - *See "Propellor Shaft Notes" in DeSoto Special Data for checking and adjusting.*

REAR AXLE

►*REAR AXLE LUBRICATION LEVEL NOTE:* Recommended lubrication capacity 3½ pints will bring fluid level to ½" below filler opening. DO NOT add to bring level to opening.

Own. Semi-floating Hypoid with Hotchkiss Drive.
S e "DeSoto Hypoid" in Rear Axle Section.

Rear Axle Ratios

Model	Synchro-mesh	Auto. Trans.
S-25	3.91-1 (43-11)	3.36-1 (37-11)
S-26		3.36-1 (37-11)
S-26 Advntr.		① 3.54-1 (39-11)
S-27	3.91-1 (43-11)	3.54-1 (39-11)

① - Optl. ratios available.

Backlash - .006-.008".

Carrier Removal: Drain lubricant. Back off brake adjusting cams (See Brakes) before removing hubs and drums. Remove wheel hub and drum assemblies, using wheel puller C-845. Remove axle shafts (see below). Disconnect rear universal joint and drop propeller shaft. Remove carrier assembly from axle housing.

►*BANJO HOUSING INSTALLATION NOTE:* Check rear universal joint operating angle. *See "Propellor Shaft Notes" in DeSoto Special Data.*

Axle Shaft Removal: Block brake pedal and disconnect brake lines at wheel cylinders. To protect axle bearing outer seal, remove rear axle drive shaft keys and install Tool C-745. Remove axle shaft seals, brake supports and bearing shims. Remove rear axle shaft oil seal from brake support with Tool C-839. *(NOTE* - When removing axle bearing shims from ends of axle housing, keep each set of shims separate to assure proper reassembly). Remove axle drive shaft and bearings with Puller C-499.

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay** - .003-.008".

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. New "Torsion-Aire" type with ball joints and torsion bar springing.
See "Torsion-Aire Suspension" in Front Suspension & Wheel Alignment Section.
Steering Axis Inclination—5½-7°.
Caster—**(Manual Steering)** Neg. 3/4° ± 3/4°. **(Power Steering)** Pos. 3/4° ± 3/4°. *NOTE*—Caster should be equal as nearly as possible on both sides of car.
Camber—**(Left Wheel)** Pos. 3/8° preferred (0° to Pos. 1/2°). **(Right Wheel)** 0° preferred (0° ± 1/4°).
Toe-In—1/8" preferred (1/8" ± 1/32").
Toe-Out on Turns—With outer wheel at 20°, inner wheel should be 21½° ± 1°.

STEERING

Manual Steering Gear: Gemmer. Worm & three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: "Co-Axial". Components encased in tubular housing which is located at bottom of and concentrically around axis of steering column.
See "Co-Axial" Power Steering in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Center Plane (Floating Shoe) hydraulic type.
See "DeSoto Center Plane" Brakes in Brake Section.
Drums - 11" Composite (S-27), 12" Centrifuse (Others).
Wheel Cylinder Diameter - 1 1/8" bore. Single acting (front), double acting (rear wheels).
Replacement Lining & Shoes - Linings or shoes with lining furnished Standard and .030" oversize.
Lining - Molded asbestos (bonded to shoe).
Length - 11.5" (S-27), 12.6" (Other).
Width - 2.5" (All). **Thickness** - .20" (All).
Braking Power - 60% Front, 40% Rear.
Clearance - Front Wheels - Turn each adjusting cam in direction of forward wheel rotation until shoe lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction until no drag is felt.
R ar Wh ls - Same as front wheels except that on rear wheels forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe adjusting cams are rotated in direction of reverse wheel rotation.
Master Cylinder: On engine side of dash panel opposite base of brake pedal.
Checking Fluid - Filler plug at top of master cylinder (on dash panel in engine compartment).
Removal - Disconnect pushrod. Disconnect brake line tube at master cylinder. Disconnect stop light switch leads, remove four stud nuts from studs, remove master cylinder.
Power Brakes: New "Oval Piston" type (S-25, 26, 27), "Bellows" Assist type (S-26 Adventurer).
See "DeSoto, Dodge, Oval Piston" or "Chrysler, D - Soto, Dodge, Plymouth Bellows" Power Units in Brake Section.
►*POWER BRAKE UNIT HISSING OR POPPING NOISE CORRECTION:* Release pushrod from power lever. Press pedal to floor to extend piston rod and yoke, and apply Silcon type lubricant to shaft. Operate shaft and repeat lubrication several times. *CAUTION* - Do not use Lubriplate or Neatsfoot Oil (not temperature lubricants).
Removal of Power Unit - Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket, to prevent trigger arm from extending beyond extremities of bracket *(NOTE* - If pedal linkage is allowed to extend through hole in dash panel, trigger arm may be damaged). Disconnect vacuum hose at power unit. Remove complete power unit and bracket assembly by removing four nuts and lockwashers.
Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans. 7" internal expanding type used with Auto. Trans.
Adjustment - *See "Hand Brake Not s" in D Soto Special Data.*

Lining	Width	Thickness	L ngth
6" Ext. Type	2"	5/32"	15.38"
7" Int. Type	2"	5/32"	13.44"

MISC. MECHANICAL

Windshield Wipers: Auto-Lit EPV-4001A (Std. S-25, S-26. Special Equipment S-27). EPW-5001 (S-27 Std.). Electric type.
See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section.
Air Conditioning: Heater-Air Conditioner unit.
See "Air Conditioning" in Misc. Section.
Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch.
See "Electric Window Regulators" in Misc. Section.
Power Seat Adjusters: Electric 6-Way type. *See "Pow r Seat Adjusters" in Misc. Section.*
Convertible Top Control: Electric-Hydraulic type.
See "Power Top Control" in Misc. S ction.

TIGHTENING SPECIFICATIONS

6 CYL. ENGINES

	Ft. Lbs.
Cylinder Head	70
Intake Manifold	20
Exhaust Manifold	20
Main Bearing Caps	85
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Water Manifold	30
Water Pump Mounting	30
Clutch Housing	30-35
Transmission Mounting	45-50

V8 ENGINES

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	30
Exhaust Manifold	25
Oil Pan	20
Main Bearing Caps	85
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	125
Rocker Support Bracket (Single Shaft)	30
Rocker Support Bracket (Double Shaft)	85
Rocker Arm Cover	2 5
Engine Front Cover	15
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	35
Clutch Housing	30-35
Transmission Mounting	45-50

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

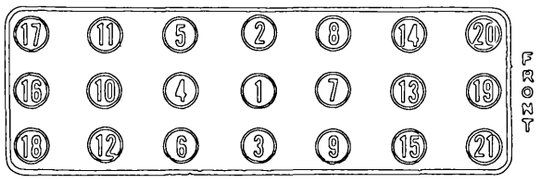
Tightening Torque—See Tightening (Torque Wrench) Specifications above

6 CYL. ENGINES

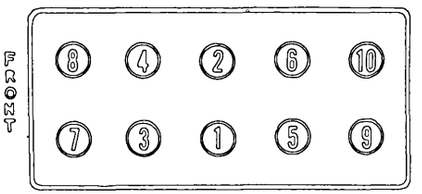
CYLINDER HEAD INSTALLATION: When installing cylinder head, use new gasket Coat threads of capscrews with sealer except the three screws that lead into intake manifold ports If sealer used on these capscrews, there is a possibility that it will be drawn into carburetor or valves Use torque indicating wrench to tighten cylinder head bolt nuts and capscrews Tighten in sequence shown in diagram

6 CYL. ENGINES

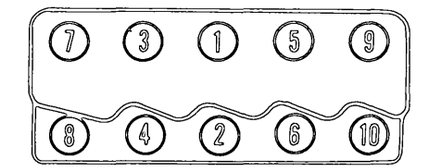
INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install



6 CYL. ENGINE CYLINDER HEAD



V8 ENGINES (DOUBLE ROCKER ARM SHAFT)



V8 ENGINES (SINGLE ROCKER ARM SHAFT)

assembled manifolds While holding manifold and gaskets evenly against engine block, install long center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer) Install remaining washer and nuts *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 20 ft-lbs. torque Tighten the four bolts holding exhaust manifold to intake manifold.

V8 ENGINES - SINGLE ROCKER SHAFT

CYLINDER HEAD INSTALLATION (Single Rocker Shaft): Before cylinder head removed, remove rocker shaft assembly Slide out push rods and place them in sequence in a suitable rack in order that each push rod can be reinstalled in its original position When installing cylinder head, use new gaskets Make sure all holes are punched out Be certain cylinder head enters both dowel guide pins in cylinder block Tighten cylinder head bolts in sequence shown in diagram Slide push rods in position Lower rocker shaft assembly down on two locating studs Install all washers, nuts and bolts *CAUTION*—Extreme caution must be exercised when tightening rocker shaft bolts and nuts so that hydraulic tappets have time to bleed down to their operating length If tappets are forced down too rapidly, damage to push rods, tappet bodies or rocker arms will result

V8 ENGINES - DOUBLE ROCKER SHAFT

CYLINDER HEAD INSTALLATION (Double Rocker Shaft): Use new gaskets when installing head. Insert cylinder head bolts into rocker arm support brackets. Insert pushrods through holes in head (short rods in upper holes - intake, long rods in lower holes - exhaust). Place rocker arm assemblies in position on heads, then position pushrods. Starting at top center, tighten all cylinder head bolts to correct torque (see Tightening Specifications above). Install exhaust manifolds, crankcase breather tube, and intake manifold. *NOTE* - When installing intake manifold, insert short bolts in holes on extreme ends of manifold.

CRANKSHAFT & MAIN BEARINGS

6 CYL. ENGINES

REAR MAIN BEARING SEAL: Neoprene type seal When replacing seal, both upper and lower halves should be replaced Remove oil pan, clutch housing pan, and rear main bearing cap Remove seal from cap, and then remove upper seal by pushing one corner of seal until opposite end protrudes about ⅜" from block. Pull out with long-nosed pliers Install new seal in lower half by carefully inserting lower half of seal into bearing cap Before installing upper seal, coat seal contacting lip with grease Insert one end of seal into block and push it into place with a rolling motion Install main bearing cap, making certain that tabs of cap gasket fit in cap seal channel

V8 ENGINES

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap Tap seal down in position with Tool C-3511 until tool is seated in bore Hold tool down and cut off protruding ends flush with cap Install bearing insert and both cap seals The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine

ENGINE FRONT COVER

6 CYL. ENGINES

FRONT COVER INSTALLATION: Use new gasket and position cover in place. Install screws but do not tighten. Install Tool C-522 over crankshaft with tapered end against seal housing. Install and tighten crankshaft nut. Tighten cover bolts, while tightening crankshaft nut (to hold tension on seal), to proper specifications.

FRONT OIL SEAL: To replace, drive old seal out with suitable drift When installing seal, make sure seal is driven into place evenly to insure a tight fit Use a new gasket and position cover in place

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V8 ENGINES

ENGINE FRONT COVER: Removal - Drain cooling system, remove water hoses, fan belt, generator, radiator, crankshaft pulley and key. Remove fan blades and hub, water pump and housing. Remove oil pan, fuel pump, chain case cover bolts and remove cover from dowels.

Installation - Clean contact surfaces, use new gasket. Crankshaft oil slinger must have flange end toward seal. Position cover on dowels, coat bolts with sealer and tighten to specifications. Reverse removal procedure, and tighten crankshaft pulley bolt and oil pan bolts to specifications. Adjust fan belt, run engine and check for leaks.

FRONT OIL SEAL: Use Tool C-3056 with puller blocks to distort seal retainer lip, and to pull seal out of cover. To install new seal, insert puller screw through installing plate with thin shoulder up. Place seal in cover opening with neoprene facing down, slide seal installing plate into seal with protective recess toward seal retainer. Tighten screw nut while holding screw to force seal tight against stamping. *NOTE* - Seal is properly installed when a .0015" feeler will not enter between seal and cover.

CAMSHAFT & BEARINGS

6 CYL. ENGINES

CAMSHAFT REMOVAL: Remove radiator grille and core. Remove cylinder head, fuel pump, oil pump, valve lifter cover plates, crankshaft pulley. Jack up engine and remove front engine support. Remove front cover, camshaft sprocket and timing chain. If valves and springs are not to be removed, prop valves up by inserting wedges under opposite sides of valve head. Raise tappets and hold out of camshaft lobe contact, while withdrawing camshaft (rotate camshaft to clear any obstructions).

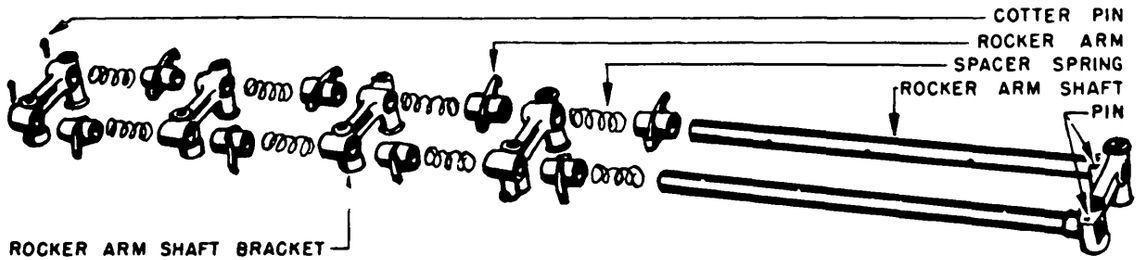
V8 ENGINES

CAMSHAFT REMOVAL: Remove lifter chamber cover, see "Lifter Removal". Remove rocker arms and pushrods, see "Rocker Arms". Remove lifters, ignition distributor, engine oil pan, see "Oil Pan Removal". Remove engine front cover, see "Engine Front Cover". Remove camshaft gear bolt, washer and fuel pump eccentric. Slide crankshaft and camshaft gears with timing chain off shafts. Remove camshaft thrust plate bolts, distributor drive gear and stub shaft (Tool C-484). Remove camshaft.

VALVE SYSTEM

ALL ENGINES

EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished Std. and .010" oversize. Use Tool C-732 (6 Cyl.), C-3140 (V8) to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift. Valve seat insert should be .002-.004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with Tool MH-N-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes. Clean counterbore thoroughly and install a chilled insert with valve seat up, and drive it into place with installing Tool C-768.

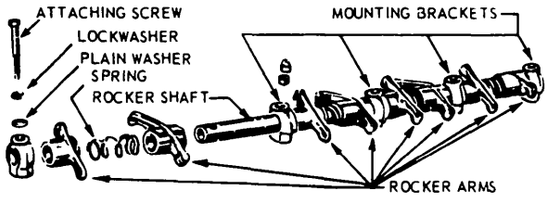


V8 ROCKER ARM ASSEMBLY (DOUBLE ROCKER ARM SHAFT)

V8 ENGINES - SINGLE ROCKER SHAFT

ROCKER ARMS: Mounted on shaft supported by brackets secured to cylinder head independent of cylinder head bolts.

Installation - Assemble in sequence shown in illustration, with oil grooves facing down.



V8 ROCKER ARM ASSEMBLY (SINGLE ROCKER ARM SHAFT)

V8 ENGINES - DOUBLE ROCKER SHAFT

ROCKER ARMS: Removal - Remove cover, install cotter pins in holes of first & last rocker arm bracket (if not already there), to hold assembly intact when removed. Loosen all cylinder head bolts, lift off rocker arm assemblies. *CAUTION* - DO NOT lift cylinder head off dowel pins when removing rocker arm assemblies from cylinder head.

Installation - Assemble in sequence shown in illustration, tighten cylinder head bolts to specifications.

HYDRAULIC VALVE LIFTER

V8 ENGINES

HYDRAULIC VALVE LIFTERS (One-Piece Integral Type) Barrel type. Unit consists of plunger and valve assembly operating within a cylinder formed by valve lifter body. Oil is introduced to this unit through hole in side of lifter plunger.

Removal (Single Rocker Arm Shaft Engin): Remove intake manifold, lifter chamber cover, rocker arm assembly, (see Rocker Arms). Remove pushrods. Remove lifters by hooking Tool C-3158 into hole in lifter body and pulling lifter straight out. *NOTE* - If lifter sticks in bore, use tool as a puller (insert through pushrod hole) and pull lifter out with a twisting motion.

Removal (Double Rocker Arm Shaft Engin): Drain cooling system to below intake manifold level. Remove carburetor air cleaner, disconnect fuel and vacuum lines, accelerator linkage at carburetor, coil wires, heat indicator wire at intake manifold, and heater hose. Remove intake manifold, carburetor, and coil as an assembly (*NOTE* - Cover intake ports with masking tape). Remove crankcase ventilator pipe, lift off cover. Remove rocker arm cover. Turn crankshaft so that lifter is on low side of cam lobe (see Note below), use Tool C-3024 over rocker arm to compress valve spring sufficiently to slide rocker arm sideways off pushrod, remove pushrods. Remove lifters by hooking Tool C-3158 into hole in lifter body and pulling lifter straight out. *NOTE* - If lifter sticks in bore, use tool as a puller (insert through pushrod hole) and pull lifter out with a twisting motion.

Low Side of Cam Lobe Not - To place lifter on low side of cam lobe for pushrod and lifter removal, turn crankshaft to correct position as follows:

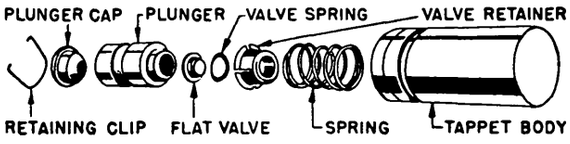
1) - With vibration dampener mark "TDC" at indicator and distributor rotor at **No. 1 cyl.** position, remove #2, 7, 8 Intake Lifters, and #2, 4, 8 Exhaust Lifters.

2) - Turn crankshaft ¼ turn clockwise from above position, remove #1 Intake and #1 Exhaust Lifters.

3) - With vibration dampener mark "TDC" at indicator and distributor rotor at **No. 6 Cyl.** position, remove #3; 4, 5 Intake Lifters, and #3, 5, 7 Exhaust Lifters.

4) - Turn crankshaft ¼ turn clockwise from above position, remove #6 Intake and #6 Exhaust Lifters.

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D D E V8 HYDRAULIC VALVE LIFTER

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Disassembly: ***(CAUTION—Disassemble one lifter at a time to avoid the possibility of mixing lifter parts. It is very important that lifter parts not be interchanged.)*** Depress lifter plunger with a push rod and remove plunger retainer spring clip, plunger cap, plunger ball check (or flat type valve), valve springs, valve retainer, and plunger spring from lifter body. Inspect plunger, lifter body, valves and valve seats for signs of scoring, wear or pitting. Check to see that valve exerts a slight pressure on valve spring to insure valve seating Clean lifter assembly in clean solvent and remove all traces of varnish and carbon. Blow parts dry with air. DO NOT USE A CLOTH AS LINT WILL CAUSE LIFTER TO OPERATE UNSATISFACTORILY.

Testing: Remove plunger cap and immerse lifter assembly in an upright position in a container of kerosene ***(CAUTION***—Container and kerosene must be absolutely clean). Allow lifter to fill with kerosene, then remove and replace the plunger cap. Holding lifter in an upright position and using tool C-3160, compress plunger slightly a few times to fill lifter body. Then compress lifter firmly with testing pliers, and if plunger collapses instantly as pressure is applied, disassemble, inspect and clean again. If second cleaning fails to prevent lifter from collapsing instantly when compressing, replace lifter. When cleaning and testing has been completed, remove kerosene and prime lifter lightly with clean engine oil before installing This will prevent possible scoring of lifter plunger when engine is first started

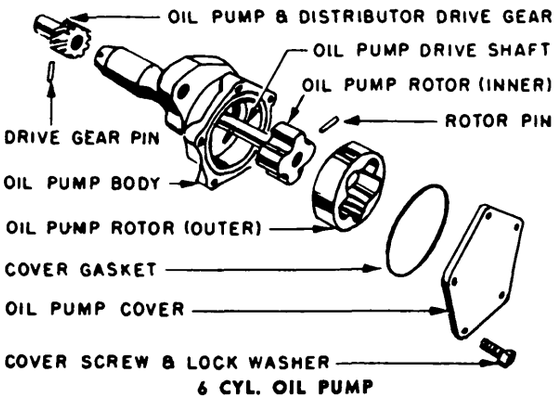
Reassembly: Reverse disassembly procedure as noted above.

OILING SYSTEM

OIL PUMP

6 CYL. ENGINES

ROTOR TYPE OIL PUMP: Removal - Rotate crankshaft to bring distributor to firing position on #1 cylinder (TDC on vibration dampener or pulley hub). DO NOT rotate engine with oil pump removed. Remove two front motor support "U" bolts, loosen two rear support bolts, remove oil pump mounting bolts, pry engine over sufficient amount to remove oil pump.



6 CYL. OIL PUMP

Disassembly & Inspection: Remove the oil pump cover and gasket Hold hand over cover opening and with pump upside down, turn drive shaft until outer rotor slips out Drive out the straight pin holding pump drive gear to shaft Press the shaft out of drive gear and slide shaft and inner rotor assembly out of pump body Wash all parts and dry with air Inspect all parts and replace as necessary, then measure clearance between opposite lobe of inner rotor and outer rotor Clearance should be .010" or less If clearance is greater, replace both rotors Measure thickness and diameter of outer rotor If thickness is .748" or more and diameter is 2.245" or more, rotor is satisfactory Thickness of inner rotor should be .748" or more If either rotor is less than these dimensions, replace BOTH rotors Insert both rotors into pump body and place a straight edge across pump body between bolt holes Clearance between straight-edge and rotor should be .004" maximum If greater, replace pump body Press outer rotor to one side against pump body and measure clearance between rotor and body on opposite side Maximum clearance should be .008' If greater, replace pump body Cover should be smooth and flat If it is scratched or grooved, replace cover Check flatness by placing a straight-edge across inner surface of cover If it is possible to insert a .001" feeler between cover and straight-edge, replace cover

Reassembly: Slide the drive shaft and rotor assembly into pump body Press drive gear on shaft until end play of shaft is from .003" to .010" Press rotor down in body with hand and measure clearance with feeler gauge Install pin and peen over both ends If pin holes do not line up, drill a new pin hole through gear and shaft, using a 5/32" drill Slide outer rotor into place in pump body Install new cover gasket and install cover and tighten screws evenly.

V8 ENGINES

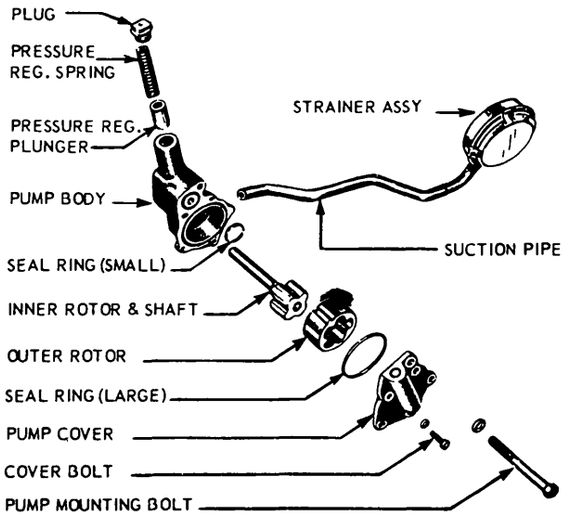
ROTOR TYPE OIL PUMP: Removal - Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.

Disassembly & Inspection: Remove oil suction pipe and strainer (turn counterclockwise). Remove pump cover, discard oil seal rings. Remove Inner Rotor and Shaft, Outer Rotor, Relief Valve Plug, Spring, and Plunger. Wash all parts in solvent and inspect for damage or wear.

Outer Rotor—Measure diameter and thickness of rotor with micro-calipers If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors

Inner Rotor—Measure thickness of inner rotor with micro-calipers If thickness measures less than .998", replace both inner and outer rotors

Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body Use a feeler gauge and measure clearance between top of rotors and straightedge If clearance in excess of .004", replace pump body



V8 OIL PUMP

Cover to Rotor Wear - Place straightedge across cover. If clearance is .0015", replace cover.

Outer Rotor to Body Clearance - Place outer rotor body in pump cavity and hold to one side. If clearance at opposite side is .012", install new pump body.

Inner Rotor to Oute Rotor Clearance - With both inner and outer rotor in pump body, hold inner rotor bottomed against one side of outer rotor and measure clearance between lobes of inner and outer rotor. Replace both inner rotor and outer rotor if clearance exceeds .010"

Reassembly: Use new oil seal ring between cover and body Tighten cover bolts to 10-15 ft lbs Prime pump and then install new oil seal ring in pump mounting face

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

COOLING SYSTEM

6 CYL. ENGINES

WATER DISTRIBUTION TUBE: Replace whenever engine completely overhauled If tube becomes rusted or corroded, overheating of engine may occur due to failure of water to circulate properly through cylinder block To replace tube, remove radiator core and water pump Pull tube out of block with stiff hooked rod. Install tube with slots up and be sure tube is inserted far enough into block so that water pump will seat properly against block

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IGNITION NOTES
V8 ENGINES

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block

Installation. Slide new bushing over burnishing end of Tool C-3053 Insert tool and bushing into bore of block Drive bushing and tool down into position, using a soft hammer As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size ***DO NOT REAM THE BUSHING***

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows Rotate crankshaft until No 1 cylinder is at TDC (or firing position) When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear Coat shaft of drive gear with engine oil Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase)

PROPELLER SHAFT NOTES

REAR UNIVERSAL JOINT OPERATING ANGLE: Rear universal joint operating angle must be within range of 1-3° (2° preferred). Check and adjust this angle as follows

► *CHECKING CAUTION* Car weight must be on wheels (use drive-on type hoist or platform) and there must be no extra weight in trunk.

Checking Rear Universal Joint Angle: Measure angle of pinion shaft companion flange by placing spirit level vertically on back face of flange. Measure angle of propeller shaft by placing spirit level parallel to shaft on top or underside of shaft. **Add** these two readings. This is the universal joint angle and should be 2° (limits 1-3°)

Adjusting Rear Universal Joint Angle: If angle exceeds 3°, install wedge shim between the rear spring and spring seat on axle housing. Make sure that shim surface is not burred, install shim with flat side toward spring and thick end toward front of car. Recheck universal joint angle.

BRAKE NOTES

HAND BRAKE ADJUSTMENT (Internal Type): Shoe Adjustment - Remove adjusting screw cover, turn adjusting nut until slight drag is felt on drum, then back off screw at least 1 full turn (using Spanner Wrench C-3014) or more until drum is free. *NOTE* - Raised shoulders on adjusting nut must be seated in grooves in adjusting sleeve. Hand brake lever (properly adjusted) will have 1½-2 inches of hand brake lever travel.

Cable Adjustment (After Sho Adjustm nt) - Fully release handle, brake should not drag or chatter. There should be free play (with shoes adjusted properly) in brake lever. Position brake cable guide so brake lever is **centered** in its free play arc. Tighten cable guide clamp securely to lock adjustment, then tighten hand brake cable locknut against adjusting nut (while holding cable adjusting nut in position so cable length adjustment is not disturbed)

HAND BRAKE ADJUSTMENT: (External Type): Band Adjustment - Fully release brake lever. *NOTE* - Clearance between anchor bracket on center of band and sides of brake support, must not exceed 005". Compress in vise or tap with hammer to reduce excessive clearance. Remove lockwire, adjust anchor screw to obtain 015- 020" (feeler gauge) clearance between band and drum at anchor. Replace lockwire. Adjust guide bolt (for lower half of band), and adjusting bolt nut (for upper half of band) to obtain uniform clearance with slight drag on drum. *CAUTION* - DO NOT draw lockwire (on anchor bolt) up tight as uneven lining wear will develop and a poor brake.

Cable Adjustment (For stretch) - Loosen locknut, remove clevis pin from yoke, turn yoke to remove slack, tighten locknut.

MODEL IDENTIFICATION

Model	Model Identification
Coronet	D-72-1
Custom Coronet	D-72-2

SERIAL NUMBER: Stamped on plate attached to left front hinge pillar post.
Starting Serial Numbers (Detroit) - 32,255,001.

ENGINE NUMBER: Stamped on boss on left front section of cylinder block.

► *ENGINE NUMBER LETTERS (Following Engine Number): Identified as follows:*
"A" - ALL cylinder bores .020" oversize.
"B" - ALL Main & Connecting Rod Bearings .010" undersize.
"AB" - BOTH above conditions exist.

TUNE-UP

COMPRESSION PRESSURE: 120-150 lbs. at cranking speed (150 RPM min.). Maximum variation between cylinders 15 lbs.

VACUUM READING: Steady 18-20" at idling speed.

VALVE TAPPET CLEARANCE: .010" Intake and Exhaust (Hot and idling). *NOTE* - Tappet screws are self-locking.

► *CONTINUOUS HIGH SPEED TAPPET CLEARANCE:* An additional .002" clearance for **exhaust** tappets is desirable.

MANIFOLD HEAT CONTROL: Thermostatic coil spring type with counterweight. Valve should operate freely. When installing coil, place coil spring in position over shaft slot, with outer end (tongue) of spring in the upper left hand position (10 o'clock). Press inner end of coil into slot and seat firmly. Move outer end of spring down (counter-clockwise), around and up over stop stud.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .035".
Plugs - Auto-Lite Resistor Type AR51. 14 mm. Torque to 30-32 ft. lbs.

COIL: Auto-Lite CAG-4001A.
Ignition Current - 1.8 amps. idling, 2.4 amps. stopped.
Resistor - None used.

DISTRIBUTOR: Auto-Lite IBR-4001.
Condenser - Auto-Lite IAT-2015RA. **Capacity** .250-.285 mfd.
Contact Point Set - Auto-Lite IGW-3028BS.
Breaker Gap - .020". Limits .018-.022".
Cam Angle - 36-42°. DO NOT exceed breaker gap limits to obtain dwell.
Breaker Arm Spring Tension - 17-20 ozs.
Rotation - Clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	460	2	920
6.5	1050	13	2100
7.5	1425	15	2850
8.5	1800	17	3600

Vacuum Spark Control: Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	6
1	2	6 7/8
5	10	10½
8	16	13¾
9.5	19	16

IGNITION TIMING

Setting - 2° BTDC.
Timing Mark - 2° BTDC mark on vibration damper under pointer on front cover.

CARBURETOR

Stromberg WW, Code 3-159 (Synchro-mesh), 3-160 (Auto. Trans.). Dual downdraft type.

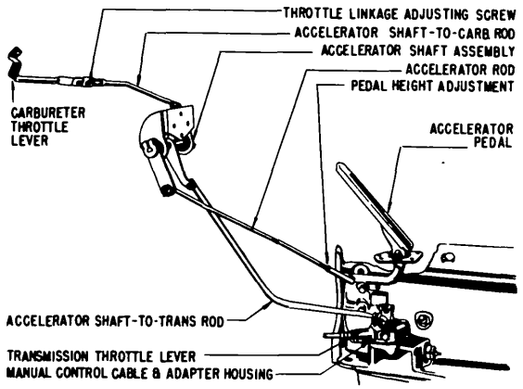
► *CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

► *MANIFOLD FUEL DISTRIBUTION: Each barrel feeds all cylinders.*

Idle Setting - 1 turn open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed - 450-500 RPM with transmission in neutral.
Float Level - 3/16" from top of main body (gasket removed) to top of float, with gauge (Tool T-25569) at center of float and float lip held firmly against fuel inlet needle. To adjust, bend float lip (Tool T-24733).
Accelerating Pump - Normal setting, center hole; for less fuel install rod in inner hole; for more fuel install rod in outer hole.
Fast Idle Speed: With choke cover removed, place one cover screw through Spring Tool T-25906 and attach Tool to housing above choke lever. Hook other end of spring to long tang of Thermostat lever. Remove spring from throttle stopscrew and replace screw only. Close throttle valves, turn stopscrew in until it contacts lever, then continue to turn screw in 5 1/8 turns. Hold choke valve closed and bend cam contact ear so that No. 48 drill rod will just go between ear end of contact lever and first step of fast idle cam. *NOTE* - Ear must be parallel to throttle shaft after bending. Replace throttle stopscrew spring.
Fast Idle Cam Setting: Open throttle valve to clear fast idle cam, close choke valve lightly. Force throttle closed against tension of cam positioning spring. Ear on cam contact lever should just clear high step of fast idle cam (Max. .020"). Bend fast idle rod as necessary.
Choke Positioning Spring Setting: With spring tool T-25906 in position, attach weight tool T-25864 on choke lever between rod and end of shaft, hold carburetor vertical, close throttle, making sure cam contact lever ear rests on high step of fast idle cam (If necessary rotate fast idle cam to get this position). Apply light closing pressure on throttle valve which should open choke valve against choke positioning spring tension just enough to insert correct size drill rod between choke valve and wall of air horn. Adjust by bending ear of choke lever as required.
Automatic Choke Setting: Centered (At Index).
Dashpot Adjustment: Push plunger in to end of its stroke. With throttle stopscrew set at normal idle speed, there should be 1/16-3/32" clearance between end of dashpot plunger and ear of throttle lever. Adjust by loosening locknut and turning dashpot in bracket.

Throttle Linkage Adjustment (PowerFlite Cars): Adjust engine idle to 475-500 RPM with transmission in neutral. Loosen throttle linkage adjusting screw (located on throttle control rod from bellcrank to carburetor). While holding throttle control rod against closed throttle stop, move bellcrank arm just enough to start extending accelerator return spring. **(Do not extend spring more than 1/8" in opposite direction).** With control rods in line and preloaded lightly, lock throttle control rod adjusting screw by applying from 10-15 lbs. torque.

► *OTHER DATA: See "Stromberg WW Carburetors" in Carburetion Section.*



POWERFLITE TRANSMISSION LINKAGE

FUEL PUMP PRESSURE: 4-6 lbs.

CARB. EQUIPMENT

Fuel Pump: Carter M2494S. Mechanical type.
Pressure - 4-6 lbs.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: Auto-Lite. Electric type.
Dash Unit - Auto-Lite 14375A.
Tank Unit - Auto-Lite 14380A (Suburban), 14382A (Others).
See "Fuel Gauges" in Carburetion Section.
Air Cleaner: DRY FILTER ELEMENT type. Clean every 5,000 miles, replace element every 15,000 miles.
► *CLEANING CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. *DO NOT* wash *element in solvent or other liquids and DO NOT oil or lubricate.*

BATTERY

Auto-Lite 11-HS-50 or Willard HO-11-50. 12 volt, 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground - Negative.
Engine Ground. Left front of engine.

STARTER

Auto-Lite MDM-6001 (Std.), MDL-6004 (Auto. Trans.).
Armature - Auto-Lite MDL.2088 (All).
Drive - Bendix "Folo-Thru" No. A3596.
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 31-47 ozs.

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Performanc Data - MDL

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10.0	60
6.0 ft lbs.	Lock	4.0	225

Performance Data - MDM

Torque	RPM	Volts	Amperes
0 ft. lbs.	4400	10.0	50
5.0 ft. lbs	Lock	4 0	210

Starting Switch: Auto-Lite SAE-4001 (Std.), SAE-4002 (Auto. Trans.). Magnetic switch controlled by ignition switch. Neutral safety switch mounted on transmission on Automatic Transmission cars. See *"Starter Controls" in Electrical Section*

Neutral Safety Switch Adjustment: See *"PowerFlite" in Transmission Section*

GENERATOR

Auto-Lite. Used as follows:

Application	Generator	Armature
Standard	GJC-7012A	GJC-2030F
Pwr Strg.	GJC-7003B	GJC-2090F
Spec. Equip.	GGA-6001AC	GFY-2101F
Taxi	GHM-6004A	GHM-2059F
Pwr. Strg.	GHM-6003C	GHM-2071F

► *SPECIAL GENERATOR NOTE:* GJC, GGA, & GHM types generators used. Performance specifications apply equally to all generators within the three groups specified.

Performance Data - GJC (Cold - 70°F)

Amperes	Volts	RPM
0.0	12.8	1225-1325
30.0	15.0	2050-2250

Performance Data - GGA (Cold - 70°F)

Amperes	Volts	RPM
4.0	14.6	950
40.0	14.6	1600
40.0	15.0	1600

Performance Data GHM (Cold - 70°F) -

Amperes	Volts	RPM
5.0	14.0	875
25.0 .	15.0	1350
30.0	15.0	1500

R tation - Counter-clockwise at commutator end.

Brush Spring Tension - 18-36 ozs. (GJC-7000); 34-41 ozs. (GGA); 35-53 ozs. (GHM).

Field Current - 1.2-1.3 Amps. (GJC), 1.1-1.3 Amps. (GGA & GHM), at 10.0 volts (70°F).

M toring Current - 3.4-3.9 Amps. (GJC), 2.3-2.6 Amps. (GGA), 3.0-3.5 Amps. (GHM) at 10 volts (70°F).

Belt Adjustment: ¼" deflection with 10 lbs. pull applied midway of longest belt span.

REGULATOR

Auto-Lite VRX-6201A (GJC & GHM Gen.), VAT-6201A (GGA Gen.).

Cutout Relay

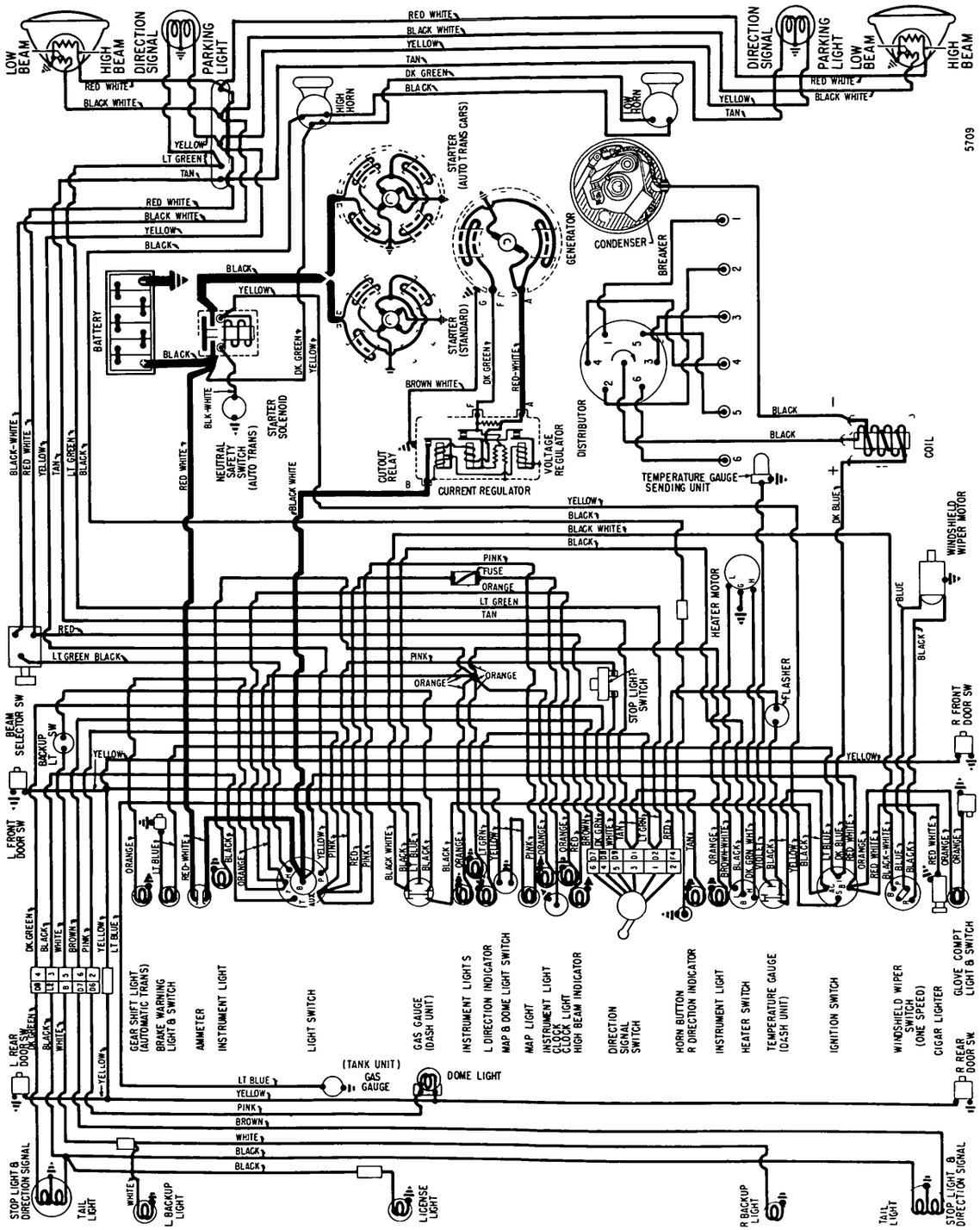
Cuts In - 12.6-13.6 volts (VRX); 13.0-13.75 volts (VAT).

Cuts Out - 8.2-9.3 volts after charge at 10 amps. (VAT). from sealed position.

Contact Gap - .015" minimum.

Air Gap - .031-.034".

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V ltag R gulator

Setting - 14.5 volts charging at 10.0 amperes (80°F) or with .25 Ohm resistor in series between regulator and battery.

Air Gap - .048-.052" (check at brass armature stop pin).

Ch cking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in El ctrical S ction.*

Curr nt Regulator

►*SETTING CAUTION: "Temperature Compensated" typ . Set to following sp cifications at 70°F.*

R gulat r	Test A - Operating Amperes -	Test B
VRX-6201A	36	30 (28-32)
VAT-6201A	46	40 (38-42)

T st A - After 15 minutes operation charging at 10 amps.

T st B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts (VRX), 13.7-13.9 volts (VAT).

Air Gap - .048-.052" (check at brass armature stop pin).

Ch cking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical S ction.*

MISC. ELECTRICAL

H adlamps: Sealed Beam. *See Electrical Section.*

Directi n Signals: *See Electrical Section.*

Lighting & Pan l Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut. Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft. Headlamp knob is held on its shaft by means of a recessed hex screw.

St p Light Switch Locati n: On forward end of master cylinder.

LIGHTING CIRCUIT BREAKERS: Used as follows:

20 Amp r . Protects Headlights, Parking lights, and Ignition light.

15 Amp re. Protects Tail, Stop, License plate, Instrument, Map, Dome, Clock, Glove Compartment and Courtesy lights.

5 Amp r . Protects Windshield Wiper (Std.).

6 Amper . Protects Windshield Wiper (Variable Speed).

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extrem care when disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions". in Misc. Section.*

ENGINE SPECIFI CATIONS: Six Cylinder "L" head.

Bor	Str ke	Displacement
3.25"	4.63"	230.2 Cu. ins.

C mpr. Rati	Rat d HP	Developed HP
8.0-1	25.35	138 at 4000 RPM

C mpr ssi n & Vacuum R ading - *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Dodge Special Data.*

►*MANIFOLD INSTALLATION CAUTION:* Two long capscrews extend into cylinder block water passage. Before installing, apply sealer to these capscrews. It is important that conical washers at flange ends of exhaust manifold be installed to permit expansion and contraction without loosening.

OIL PAN REMOVAL: Drain engine oil. As soon as oil is drained, install drain plug and tighten securely. Remove clutch housing pan to prevent damaging oil pan gaskets on clutch housing pan dust seal. Remove oil level indicator and drop pan on tie rod. Lift up oil strainer so it clears baffle inside pan. With strainer lifted, slide pan to rear and remove. NOTE—New end gaskets should protrude 1/4" to 1/8" above oil pan. *Ends must not be cut off.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Dodge Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Dodge Special Data.*

PISTONS

Aluminum alloy, U-slot, cam ground type.

►*CYLINDER BORE OVERSIZE CAUTION: Engines with letter "A" following engine number indicates that cylinder bore .020" oversize.*

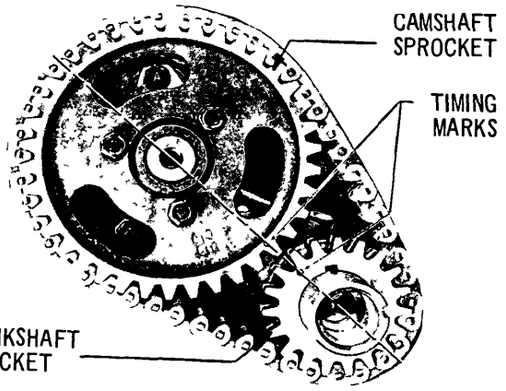
Weight—16 ozs. (stripped).

Removal—Pistons and rods removed from above.

Fitting New Pistons: .0008" clearance, ¼-¾" from bottom of skirt. Pull to withdraw ribbon feeler ½" wide, .002" thick, placed at right angles to piston pin (piston inverted) should be from 6-10 lbs.

Replacement Pistons: Std., .005", .020", .030", .040", .060" oversize.

Installing Pistons: "U" slot away from valves.



DODGE 6 CYL. VALVE TIMING MARKS

PISTON PINS

Full floating type.

Diameter—55/64". **Length**—2-3/4".

Pin Fit in Piston—.0000-.0005". DOUBLE THUMB push fit at room temperature (70° F.)

Pin Fit in Rod Bushing—.0001-.0002". Tight thumb push fit at room temperature (70° F.)

Replacement Pins: Std., .003", .008" oversize.

NOTE—Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Sid Cl aranc
Compr. (#1)	3/32"	.010-.020"	.0025-.004"
Compr. (#2)	3/32"	.010-.020"	.002-.0035"
Oil (#3)	5/32"	.010-.020"	.001-.0025"
Oil (#4)	5/32"	.010-.020"	.001-.003"

R plac m nt Rings: Std., .010", .020", .030", .040", .050", .060" oversize.

Installing Rings: #1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down, if step on outer edge).

CONNECTING RODS

Length (Center to Center)—7-13/16". **Weight**—27.9 ozs.

Crankpin Journal Diameter—2.0625".

Maximum out-of-round and taper limits—.001"

Lower Bearings—Removable, precision type, thin babbitt on steel. No shims.

►*JOURNAL DIAMETER CAUTION: (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*

Clearance—.0005-.0015".

Endplay—.006-.011".

Bearing Adjustment: None. Replace bearings.

Replacement Bearings: Std. and .001", .002", .003", .010", .012", .020", .030", .040" undersize.

Installing Rods: Oil metering hole toward valve side of engine.

CRANKSHAFT

Journal Diameter—2.4995-2.5005". Four bearing.

Bearing Type—Removable, precision type, thin babbitt on steel. No shims.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows: **.010" UNDERSIZE (All Main & Connecting Rod J urnals)**—Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" undersize.

Clearance—.0005-.0015" desired.

Replacement Bearings: Std. and .001", .002", .003", .010", .012", .030", .040" undersize.

End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**—.003-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Dodge Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Dodge Special Data.*

CAMSHAFT

Journal Diameters—(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-1'4".

Bearings—Removable, steel-backed babbitt lined bushings (exc. #4—machined in crankcase).

Clearance—.001-.003". NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width—1". **Pitch**—.500". **Length**—24" or 48 links.

Camshaft R moval: *Se "Camshaft & Bearings". in Dodg Special Data.*

Camshaft S tting: Sprockets marked. Mesh chain with sprockets so that "O" marks on sprockets are adjacent

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and in line with a straightedge across shaft centers.

Engine Front Cover Installation: *See "Engine Front Cover" in Dodge Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Dodge Special Data.*

VALVES

Tappet Clearance: .010" Intake. .010" Exhaust (engine hot and idling). NOTE—.002" additional clearance on exhaust tappets if car driven at continuous high speed.

Valves	Head Diam.	Stem Diam.	Length
Intake	1-17/32"	.340-.341"	4-27/32"
Exhaust	1-13/32"	.340-.341"	4-25/32"

Valves	Seat Angle	Lift	Stem Clearance
Intake	45°	23/64"	.001-.003"
Exhaust	45°	23/64"	.003-.005"

Valve Seat Width—1/16-3/32". Runout .0015" maximum.

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Dodge Special Data.*

Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, finish ream to give correct valve stem clearance (See Valve Stem Clearance above). *CAUTION—Guides must be installed with counterbore end UP on exhaust valves and counterbore end DOWN on intake valves.*

Valve Springs: Install with closely coiled end up.

Free Length - 2".

Valve Spring Specifications

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1 3/4"
Valve Open	110-120 lbs.	1 3/8"

Valve Lifters: Mushroom type (remove from below).

Stem Diameter - 5/8". Ream holes from above (pilot in guide). Furnished .001", .008", .030" Oversize.

Lifter Clearance - .0002-.001".

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE: The following valve opening and closing points are with .014" lifter clearance*

Intake Valves - Open 12° BTDC. Close 44° ALDC.

Exhaust Valves - Open 50° BLDC. Close 6° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 quarts. Add 1 quart when changing filter element.

Normal Oil Pressure: 40-45 lbs. at 1500 RPM.

Oil Pressure Relief Valve - Located on left side of block below starting motor.

►*RELIEF VALVE SPRING NOTE:* Three types of spring available. Replace with correct color spring as follows:

Relief Valve Spring Specifications

Spring Color	Lbs. Pressure	Length
Red	12.4-13.8	1 1/4"
Std. (No color)	14.4-15.8	1 1/4"
Green	16.2-17.8	1 1/4"

Free Length - 1 13/16".

Oil Pressure Gauge: Mechanical.

Oil Pump: Rotor type on right side of crankcase.

Overhaul—*See "Oiling System" in Dodge Special Data.*

Oil Filter: By-pass type. On left side of engine above starter.

Servicing—Install new filter element and cover gasket at 8000 mile intervals (more often in dusty areas). Change oil at same time filter is changed.

Crankcase Ventilation: Filter in oil filler tube and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 13 qts. Add 1 qt. for heater.

►*AIR CONDITIONER OPERATING CAUTION: Engine cooling system must be protected to a temperature of 20°F (above zero) for summer operation.*

Pressure Valve: 14 lb. radiator filler cap (All models).

Thermostat: Pellet type. In water outlet connection on cylinder head. Starts to open at 157-162°F.

Water Pump: Packless type. Ball bearing type. No lubrication required. *See Water Pump Section.*

Pump Removal - Drain cooling system, remove fan belt, disconnect hoses at pump, remove pump mounting studs, remove pump.

Water Distributing Tube: *See "Cooling System" in Dodge Special Data.*

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit - Auto-Lite 14377A.

Engine Unit - Auto-Lite 14405A.

See "Temperature Gauges" in Misc. Section.

CLUTCH

Borg & Beck: 9A7 No. 361384 (Std.), 10A7 No. 361376 (H.D.), Auburn 10031-1 (Optl.).

Clutch Disc - Borg & Beck 362649 (Std.), 381758 (H.D.). *See "Borg & Beck" & "Auburn" Clutches in Clutch Sect.*

Pedal Adjustment: Adjust the fork rod to secure 3/16" free movement of clutch fork outer end. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: *NOTE* - Over-center spring located above brake pedal and attached to pedal mounting bracket. Release clutch rod at clutch pedal. Back off adjusting nut to release over-center spring. Hold clutch pedal fully depressed, adjust nut until it just touches "C" link of spring, then turn nut 7 full turns for 10" clutch, 5 full turns for 9 1/4" clutch. Reinstall clutch rod to clutch pedal.

Removal: Remove transmission, clutch housing pan, pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove clutch cover to flywheel bolts (release each bolt a few turns at a time in succession) to release spring tension until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "Dodge Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Drain lubricant, disconnect propellor shaft, speedometer cable, gear shift control rods. Remove back-up light switch (if so equipped) and speedometer drive pinion. For transmission overhaul or rear seal replacement, apply hand brake, remove flange nut (flange holding Tool C-3281). Disconnect hand brake cable, remove brake drum and flange assembly (puller Tool C-452) and oil seal (puller Tool C-748). Pull transmission straight back until pinion shaft clears clutch disc, then lower transmission.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated planetary transmission.

See "PowerFlite" Transmission in Transmission Section.

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlit" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid (Type A).

Checking Fluid Level - *CAUTION - Following procedur and fluid level supersede previous recomm ndations.* Check transmission COLD if possible. Idle engine with brakes applied, press all pushbuttons in turn, then check fluid level on dipstick with engine idling in "N". Maintain level as follows:

Cold Transmission (After standing and bef r being driven for several miles) - Level should be between "L" mark and ½" below "L" mark. Add oil if below ½" below "L" mark, remove oil if above "L" mark. Do not add oil if level within above range.

Hot Transmission (After being driv n s v ral mil s) - Level should be between "F" mark and ½" below "F" mark (on cars with first type dipstick with distance of 1 5/8" between "F" and "L" marks, level should be ½" below "F" mark). Add oil if level below "L" mark to bring level up to ½" above "L" mark, remove oil if level above "F" mark. Do not add oil if level within above range.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universals. Ball & Trunnion front, Cross rear.

Rear Universal Joint Operating Angl - *See "Propellor Shaft Notes" in Dodge Special Data.*

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss drive.

See "Dodge Hypoid" in Rear Axle Section.

Ratios - 3.9-1 (Synchro-mesh), 3.73-1 (PowerFlite).

Backlash - .006-.010".

►*REAR AXLE LUBRICANT LEVEL CAUTION:* Recommended lubricant capacity of 3½ pints will bring level to ½" below bottom of filler plug opening. DO NOT ADD lubricant to bring level up to filler plug opening.

►*BANJO HOUSING INSTALLATION NOTE: Check rear universal joint operating angle. See "Propellor Shaft Notes" in Dodge Special Data.*

Carrier Removal: Remove axle shafts (see below), disconnect rear universal joint, remove differential carrier cap screws, lift out carrier assembly.

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Axl Shaft Rem val: Jack up car, remove wheels, hub and drum assembly (Tool C-845) Block brake pedal, disconnect brake line at wheel cylinders, remove axle key, brake and dust shield Note number and remove shims from each axle housing, use puller Tool C-499 to remove axle shaft and bearing, remove inner oil seal (Tool C-637)

Wh l Bearing Adjustm nt: Shims between backing plate and axle housing. With wheel hub removed, check end play with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay**—.003-.008".

SH CK ABSORBERS

"Orifl w". Direct acting, hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Indep nd nt. New "Torsion-Aire" suspension, with ball joint mounted steering knuckles and torsion bar front springs

See "Torsion-Aire" in Front Suspension & Wheel Alignment S ction

St ering Axis Inclination - 6½° at 0° Camber

Cast r - (Manual Steering) Neg. ¾° ±¾°, (Power Steering) Pos. ¾° ±¾°. *NOTE* - Both sides should be set at same dimension.

Camb r (Right Wh l) - 0° ±¼°, 0° preferred.

Camber (L ft Wh l) - Pos. ¼° ±¼°, Pos. 3/8° preferred.

T -In - 3/32-5/32". 1/8" preferred.

Toe-Out on Turns - With outer wheel at 20°, Inner wheel should be 21°37'.

STEERING

Manual: G mmer. Worm and three-tooth roller

See "Gemmer Worm & Roller" in Steering Section

P wer Steering: Coaxial. Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column

See "Coaxial" Power Steering in Steering Section

►*JERKY OPERATION OF POWER STEERING GEAR CORRECTION:* Adjust generator drive belt (See Generator), then adjust fan drive belt so that a maximum of ¼" deflection is obtained when applying a 10 lb. pull with spring scale at middle of widest belt span

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: Dodge Total-Contact (Floating Shoe) type

See "Chrysler, De Soto, Dodge, Plymouth Center-Plane & Total Contact" Brakes in Brake Section

Drum Diameter - 11" (All models)

Wheel Cylinder Diameter - 1 1/8" Single acting (front), double acting (rear)

Replacement Linings & Shoes - Linings or shoes with linings are furnished Standard and .030" Oversize

Lining - Molded asbestos (bonded to shoe)

Width - 2½' Front, 2" Rear (2 ½" rear on 4-door Hardtop, Suburban and Convertible)

Length - 11 5" (All) **Thickness** - .200" (All)

Braking Power - 65% front, 35% rear

Clearance - Front Wheels - .006" Turn each adjusting cam in direction of forward wheel rotation until shoe is solid against drum and wheel is locked Turn cams in opposite direction until no drag is felt

Rear Wheels - .006" Same as for front wheels except that forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe cams are rotated in direction of reverse wheel rotation.

Master Cylinder: On engine side of dash panel opposite base of brake pedal

Checking Fluid - Filler plug at top of master cylinder (on dash panel in engine compartment)

Removal - Disconnect pedal return spring, push rod, brake tube, and stop light switch leads Remove master cylinder to dash bolts, slide master cylinder straight out from dash

Power Brakes: New "Oval Piston Assist" type Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder)

See "De Soto, Dodge Oval Piston Type Power Unit" in Brake Section

Removal - Place block or wedge between power lever and bracket (to prevent damage to ramp of trigger arm) Mark across power unit adjacent to vacuum test port and mounting bracket, and beween mounting bracket and firewall Disconnect vacuum hose, remove bolts securing bracket to firewall, slide unit and bracket straight forward

Parking Brake: On shaft at rear of transmission 6" external contracting type used with Synchro-mesh Trans 7" internal expanding type used with Automatic Trans

Adjustment - *See "Brake Notes" in Dodge Special Data*

Lining	Width	Thickness	Length
6" Ext type	2"	5/32"	15 38"
7" Int type	2"	5/32"	13 44"

MISC. MECHANICAL

Windshield Wipers: Auto-Lite electric EPW-4001A (Single speed), EPV-4001B (Variable speed)

See "Auto-Lite" Electric Windshield Wipers in Miscellaneous Section

Air Conditioning: Heater-Air Conditioning *See "Air Conditioning" in Miscellaneous Section*

Power Window Regulators: Electric type Reversible type motor in each window Controlled by door switch and master control switch *See "Electric Window Regulators" in Miscellaneous Section*

Power Seat Adjusters: Electric 6-Way Type

See "Power Seat Adjusters in Misc Section

Convertible Top Control: Electrical-hydraulic type

See "Power Top Controls" in Misc Section

►*DODGE ENGINE & EQUIPMENT NOTE:* "Red Ram" and "Super Red Ram" engines are Std. on all models. Specifications for these engines are alike and listed as "Std. V8" unless otherwise indicated.

►*OPTIONAL "500" & "500-1" ENGINES:* "500" Engine is Optl. on all models, "500-1" Engine is Optl. on Coronet only. Specifications and service data for these engines which differ from standard engines are indicated below.

MODEL IDENTIFICATION

Model	Std. Model	"500" Eng. Model
Coronet	D-66-1,2	D-500
Coronet "501"		D-500-1
Royal	D-67-1	D-500
Custom Royal	D-67-2	D-500
Suburban & Sierra	D-70	D-500
Custom Sierra	D-71	D-500

SERIAL NUMBER: Stamped on plate attached to left front hinge pillar post.

Starting Serial Number - As follows:

Car Model	Detroit	Los Angeles
Coronet & Custom Coronet	35,172,001	42,620,001
Royal & Custom Royal	37,240,001	45,540,001
Sierra 6 Pass.	38,001,001	
Custom Sierra	38,535,001	

ENGINE NUMBER: Stamped on boss at center of cylinder block directly behind water pump and next to oil filler pipe.

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number): Identified as follows:*

"A" - All cylinders .020" Oversize.

"B" - All Main & Connecting Rod Bearings .010" Undersize.

"AB" - BOTH above conditions exist.

"♦" symbol (3/8" high) - All tappet bodies are .008" Oversize.

TUNE-UP

COMPRESSION PRESSURE: 90-155 lbs. at cranking speed of 150 RPM (plugs removed, throttle wide open). Maximum variation between cylinders 15 lbs.

VALVE TAPPET CLEARANCE: **(Std. V8 & D-500)** None in service (hydraulic lifters).

(D-500-1) - .015" Intake, .024" Exhaust, HOT.

MANIFOLD HEAT CONTROL: Thermostatically controlled valve located between right exhaust manifold and "Y" exhaust pipe on right side of engine. Valve must operate freely. To install coil spring, position shaft in extreme counter-clockwise position. Place coil spring in position over shaft slot, with outer end (tongue) of spring in upper left-hand position. Press inner end of coil into slot of shaft and seat firmly. Move outer end (tongue) of spring down around and up and over stop stud.

►*DUAL EXHAUST NOTE:* When valve is closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders - RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plugs - Auto-Lite AR-42 (V8 Std.); AR-32 (D-500); AGR-32 (D-500-1). Resistor type. Torque to 30-32 ft. lbs.

COIL: Auto-Lite CAH-4001B.

Ignition Current - 2.5 amps. idling, 3.1 amps. stopped.

Resistor - Auto-Lite PU-4003. .665-.735 Ohms.

►*COIL RESISTOR NOTE:* Resistor is connected in lead between ignition switch and coil. When testing coil include resistor with coil. Test without resistor will show coil to be defective.

DISTRIBUTOR: Auto-Lite.

	Auto-Lite Distr. No.
V8 Std. (Exc. D-67-2)	IBP-4002
V8 Power Pkg. (Std. D-67-2)	IBP-4002B
D-500 Early	IBK-4301A
D-500 Later	IBP-4002D
D-500 Power Pkg.	IBS-4005
D-500-1	IBS-4005

NOTE - IBS-4005 & IBK-4301A are "Double Breaker" type.

Condenser - Auto-Lite IAT-2015RA (IBP Distr.), IBB-2015R (IBK Distr.). **Capacity** - .25-.285 mfd.

Contact Point Set - Auto-Lite IBP-3028AS (IBP Distr.), IGW-3028KS (IBK Distr.) - two used.

Breaker Gap - .015-.018".

Cam Angle - 27-32°. (IBP Single Breaker), 36-39° (IBK & IBS Double breaker with both sets operating together). Do not set gap outside limits to obtain specified cam dwell.

►*CAM ANGLE SETTING CAUTION (IBP DISTR.):* Cam angle should be checked with vacuum line **disconnected**. Cam angle may decrease as much as 10° with maximum vacuum advance, but must not decrease more than 12°.

Breaker Arm Spring Tension - 17-20 ozs.

Rotation - Clockwise viewed from above.

Automatic Advance - IBP-4002

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	450	0	900
1	535	2	1070
4	800	8	1600
6	1200	12	2400
8.5	1700	17	3400

Automatic Advance - IBP-4002B

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	370	2	740
5	450	10	900
7	720	14	1440
8	850	16	1700

Automatic Advance - IBP-4002D

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	455	2	910
5	900	10	1800
8	2025	16	4050
9	2400	18	4800

Automatic Advance - IBK-4301A

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	0	700
1	430	2	860
5	750	10	1500
8	1850	16	3900
9.5	2400	19	4800

Automatic Advance - IBS-4005

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	400	0	800
1	415	2	830
3.5	450	7	900
7	1025	14	2050
8	1200	16	2400

Vacuum Spark Control: Auto-Lite. Integral type.

Vacuum Advanc - IBP-4002, 2B

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	7 1/8
1	2	7 5/8
7	14	11 7/8
12	24	16 3/4
13	26	18

Vacuum Advanc - IBP-4002D

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	10 1/2
1	2	11
6	12	13 3/8
12	24	16 3/8
13	26	17 1/8

Vacuum Advance - IBK-4301A

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	7 1/2
1	2	8 1/8
5	10	10 7/8
10	20	15 1/8
11.5	23	17

Vacuum Advanc - IBS-4005

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	9 1/8
1	2	9 7/8
5	10	12 7/8
9	18	16 1/2
10.25	20.50	18

Distributor Basic Timing & Driv Shaft Bushing: *See "Ignition Notes" in Dodge Special Data.*

IGNITION TIMING

Model	Std. Ignition Setting
Std. V8 (Exc. D-67-2)	4° BTDC
V8 Power Pkg. (Std. D-67-2)	6° BTDC
D-500 & D-500-1	6° BTDC

Timing Mark - Crankshaft pulley or vibration dampener marked "DC" at TDC point with 2° graduations before and after this mark. Align correct graduation with pointer on chain case cover.

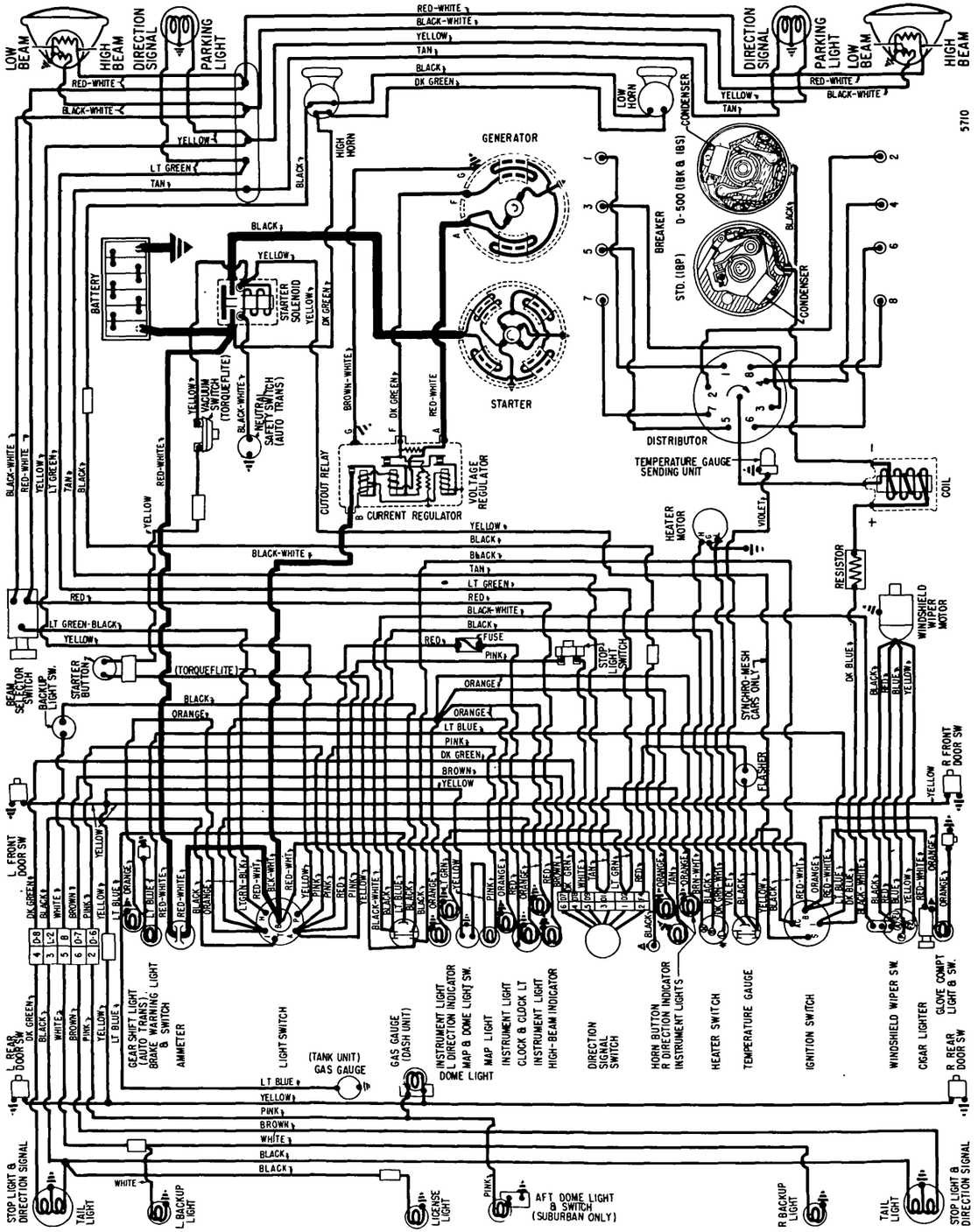
CARBURETOR

►*CARBURETOR APPLICATION: Stromberg WW 2-Barrel Carburetor used as standard equipment on Standard V8 engine, except D-67-2. Carter 4-Barrel Carburetor standard on D-67-2, D-500 and as Power Package on standard V8 engine. Two Carter 4-Barrel Carburetors used on D-500-1 and as Power Package on D-500.*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

THROTTLE LINKAGE ADJUSTMENT (PowerFlite & TorqueFlite Cars): Bring engine to operating temperature and adjust idle speed (in Neutral) to 475-500 RPM. Loosen throttle linkage adjusting screw located on ac-

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celerator shaft-to-carburetor rod (PowerFlite), adjusting nut located on bellcrank to intermediate throttle control (TorqueFlite). Hold rod lightly to rear against transmission stop and tighten screw (7-9 ft. lbs.) or nut. On PowerFlite 4-Barrel Carburetors, remove pedal to accelerator shaft rod at pedal arm, loosen locknut, turn ball and socket end of rod to obtain wide open throttle with pedal just against floor mat. On 2-Barrel Carburetors, adjust bellcrank to carburetor rod in same manner.

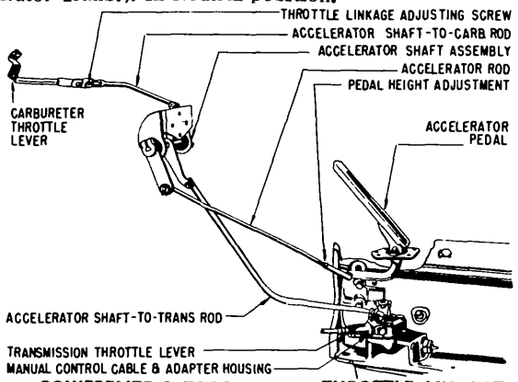
STROMBERG WW 2-BARREL

Model	Stromberg Code No.
Std. V8 (Synchro-mesh)	WW 3-149
Std. V8 (Auto. Trans.)	WW 3-150

► *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*

Idle Setting - 1 turn open. Adjust both screws alike. Turn screws out for richer mixture.

Idle Speed - 450-500 RPM (Std. Trans.), 475-500 RPM (Auto. Trans.). In Neutral position.



POWERFLITE & TORQUEFLITE THROTTLE LINKAGE

Float Level - 7/32" from top of main body (gasket removed) and center of float, with inlet needle seated. Use Gauge T-26019 to check float and T-24733 to bend float lip for correction.

Accelerating Pump - Normal setting, center hole; inner hole for less fuel, outer hole for more fuel.

Fast Idle: Turn throttle stopscrew out so that throttle valves completely closed. Hold throttle valves closed, back out fast idle screw until fast idle cam can be positioned with **first** step in line with fast idle screw, turn screw in until it just contacts cam, then turn screw in additional 5½ turns. Close choke valve as far as possible (fast idle screw against shoulder on cam), measure valve opening by inserting No. 12 drill (3-149), No. 24 drill (3-150) between upper edge of valve and air horn. Adjust by bending fast idle rod.

Automatic Choke Setting: *NOTE* - Choke is "Cross-over" type mounted in manifold and linked to choke valve. Should not require adjustment (must be removed from manifold well for checking). Index mark on disc should be centered on scale on thermostat cover plate.

Throttle Linkage Adjustment: *See CARBURETOR above.*

► *OTHER DATA: See "Stromberg WW (Dodge & Plymouth)" Carburetors in Carburetion Section.*

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CARTER WCFB 4-BARREL

Model	Single Carburetor	Carter Carb. No.
Std. V8 Power Pkg. & D-67-2 (Std.)		2532S
D-500 Early (Std.)		2622S, SA
D-500 Later (Std.)		2532S
D-500 (Police)		2698S

► *STUMBLE & LEANNESS CORRECTION (2532S & 2622S) See "Carter WCFB Carburetor" in Carburetion Section.*

► *MANIFOLD FUEL DISTRIBUTION· Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting - 1 turn open. Turn screws out for richer mixture.

Idle Speed - 450-500 RPM (Synchro-mesh), 475-500 RPM (Auto. Trans.). In Neutral position.

Throttle Linkage Adjustment (TorqueFlite & PowerFlite Cars)· *See CARBURETOR above.*

► *OTHER DATA See "Carter WCFB Carburetors' in Carburetion Section*

CARTER WCFB 4-BARREL

Model	Dual (Two Carburetor)	Carter Carb. No.
D-500 (Power Pkg.)	(Front)	2633S, (Rear) 2634S
D-500-1	(Front)	2534S, (Rear) 2535S

► *CARBURETOR IDLE ADJUSTMENT CHANGE NOTE· The following idle speed & mixture adjustment procedure supersedes previous instructions.*

► *MANIFOLD FUEL DISTRIBUTION RIGHT barrels feed right bank cylinders, LEFT barrels feed left bank*

► *CARBURETOR SYNCHRONIZATION NOTE* Before adjusting idle mixture and idle speed, the carburetor inter-connecting rod must be adjusted as follows Hold rear carburetor throttle in wide open position (choke off) and adjust rod at slotted end so front carburetor throttle valve will be in wide open position. Make sure rod can rotate slightly on pivots and not bind.

Idle Speed & Mixture Adjustment· Screw the "idle by-pass" screw (7/16" slotted hex head screw located on left rear side of each carburetor body flange) against its seat *(NOTE - This "by-pass screw" is no longe used for idle speed adjustment and must remain in the closed position).* Adjust engine idle speed to 650 RPM (transmission in neutral)·by screwing in the **idle speed screw** (throttle stop screw at throttle shaft lever) on the front carburetor only. Adjust all four (two on each carburetor) idle mixture screws 1 turn open from a lightly seated position. Obtain the smoothest possible idle speed by further adjusting idle mixture screws on **front** carburetor *(NOTE - It may also be necessary to re-adjust idle mixture screws on rear carburetor if adjustment of front carburetor does not provide proper idle speed).*

Throttle Linkage Adjustment (Automatic Transmission Cars)· *See CARBURETOR above.*

► *OTHER DATA See "Carter WCFB 4-Barrel Carburetor" in Carburetion Section.*

FUEL PUMP PRESSURE: 6-7 lbs.

CARB. EQUIPMENT

Fuel Pump· Carter M2502S (Std) M2503S (D-500 & Air Conditioned Cars) **Pressure** - 6 7 lbs
See "Fuel Pumps" in Carburetion Section

Gasoline Gauge Auto-Lite. Electric Type
Dash Unit - Auto Lite 14375A
Tank Unit - Auto-Lite 14380A (Suburban), 14382A (Others)
See "Fuel Gauges" in Carburetion Section

Air Cleaner· DRY FILTER ELEMENT type Clean every 5 000 miles replace element every 15 000 miles

► *CLEANING CAUTION* Clean filter element by tapping and shaking to remove dirt particles *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate*

BATTERY

Gould 11-OE-53. 12 volt, 9 plate, 53 ampere hour capacity (at 20 hr rate)
Grounded Terminal - Negative
Engine Ground - Left front of engine

STARTER

Auto-Lite MDL-6001 (D-500-1), MDL-6003 (Others)
Armature - Auto-Lite MDL-2088 (D-500-1), MDL-2006 (Others).
Drive - Solenoid Pinion Shift (D-500-1), Bendix "Folo-Thru" type, No. A3596 (Others).
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 42-53 ozs.

Performance Data - MDL-6001 & 6003

Torque	RPM	Volts	Amperes
0	3200	10 0	60
6.0 ft. lbs.	Lock	4.0	225

Starting Switch· Auto Lite SAE 4001 (Std) SAE-4002 (Auto Trans) **Synchro-mesh & PowerFlite** - Magnetic switch controlled by Ignition & Starter Switch, plus Neutral Safety Switch on transmission (PowerFlite) **TorqueFlite** - Magnetic Switch controlled by pushing In Neutral Button plus Vacuum Switch on Intake Manifold and Neutral Safety switch on outside of transmission
See "Starter Controls' in Electrical Section

Neutral Safety Switch Adjustment· *See 'PowerFlite & TorqueFlite" in Transmission Section*

GENERATOR

Auto-Lite Used as follows

Application	Generator No.	Armature No.
Standard Early	GJC-7001D	GJC-2030F
Standard Later	GJC-7012A	GJC-2030F
Spec. Equip.	GGA-6001AC	GFY-2101F
Taxi	GHM-6004A	GHM-2059F
Air Cond.	GHM-6004C	GHM-2059F

► *SPECIAL GENERATOR NOTE* GJC, GGA, & GHM types generators used. Performance specifications apply equally to all generators within the three groups specified.

Performance Data - GJC (Cold - 70°F)

Amperes	Volts	RPM
0.0	12.8	1225-1325
30.0	15.0	2050-2250

Performance Data - GGA (Cold - 70°F)

Amperes	Volts	RPM
4.0	14.6	950
40.0	14.6	1600
40.0	15.0	1600

Performance Data GHM (Cold - 70°F) -

Amperes	Volts	RPM
5.0	14.0	875
25.0	15.0	1350
30.0	15.0	1500

Rotation - Counter-clockwise at commutator end
Brush Spring Tension - 18-36 ozs. (GJC-7000), 34-41 ozs. (GGA), 35-53 ozs. (GHM).
Field Current - 1.2-1.3 Amps. (GJC), 1.1-1 3 Amps. (GGA & GHM), at 10.0 volts (70°F).
Motoring Current - 3.4-3.9 Amps. (GJC), 2 3-2.6 Amps. (GGA) 3.0-3.5 Amps. (GHM) at 10 volts (70°F).
Belt Adjustment: (Std.) - 1/4" deflection with 10 lb pull applied midway of longest span
(Air Cond) Loosen generator mounting bolts and use Tool C-3379 & Tool C 3005 to apply 15 lbs tension to belt Tighten generator mounting bolts while holding this tension

REGULATOR

Auto-Lite VRX-6201A (GJC & GHM Gen), VAT-6201A (GGA Gen.)

Cutout Relay

Cuts In - 12.6-13.6 volts (VRX), 13.0-13.75 volts (VAT)
Cuts Out - 8.2-9 3 volts after charge at 10 amps. (VAT) from sealed position.
Contact Gap - .015" minimum.
Air Gap - .031-.034'.

Voltage Regulator

Setting - 14.5 volts charging at 10.0 amperes (80°F) or with .25 Ohm resistor in series between regulator and battery.
Air Gap - .048-.052" (check at brass armature stop pin).
Checking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

Current Regulator

► *SETTING CAUTION "Temperature Compensated" type. Set to following specifications at 70°F*

Regulator	Test A - Operating Amperes -	Test B
VRX-6201A	36	30 (28-32)
VAT-6201A	46	40 (38-42)

Test A - After 15 minutes operation charging at 10 amps.
Test B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts (VRX), 13.7-13.9 volts (VAT).
Air Gap - .048-.052" (check at brass armature stop pin).
Checking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps Sealed Beam *See Electrical Section*
Directional Signals *See Electrical Section*
Lighting & Panel Switch Removal: Switches held in instrument panel by a common threaded sleeve and hex nut Panel lamp knob indexes on its switch shaft by means of lugs in knob and slots in shaft Headlamp knob is held on its shaft by means of a recessed hex screw
Stop Light Switch Location On forward end of master cylinder
LIGHTING CIRCUIT BREAKERS· Used as follows
20 Amp r Protects Headlights, Parking lights and

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Ignition light.
15 Amp r . Protects Tail, Stop, License plate, Instrument, Map, Dome, Clock, Glove Compartment and Courtesy lights.
5 Amp r . Protects Windshield Wiper (Std.).
6 Amp r . Protects Windshield Wiper (Variable Speed).

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extr me car wh n disconnecting any part of air conditioning quipment or lin s for access to engine, see "Air Conditi ning S rvice Cautions" in Misc. Sect.*

ENGINE SPECIFICATIONS: 90° V8, Overhead Valves. Different engines used as follows:
"R d Ram" & "Sup r R d Ram" Engines - Std. on all models. These engines have polyspherical combustion chamber and single rocker arm shaft.
"D-500" & "D-500-1" Engines - "D-500" Optl. on all models. "D-500-1" Optl. on Coronet only. These engines have hemispherical combustion chamber and double rocker arm shafts, heavier pistons and connecting rods, different valve timing, and larger brakes.

Mod l	B r	Stroke	Displacement
V8 Std.	3.69"	3.80"	325 cu. ins.
D-500	3.69"	3.80"	325 cu. ins.
D-500-1	3.94"	3.63"	354 cu. ins.

M d l	Compr. Rati	Rated HP	Developed HP
Std. V8 ①	8.5-1	43.6	245 at 4400 RPM
Std. V8 ②	8.5-1	43.6	260 at 4400 RPM
D-500 Std.	9.25-1	43.6	285 at 4800 RPM
D-500 Pwr.Pkg.	9.25-1	43.6	310 at 4800 RPM
D-500-1	10.0-1	49.7	340 at 5200 RPM

① - Except D-67-2.
② - With Power Pkg. (Std. on D-67-2).
C mpr ssion & Vacuum Reading - *See TUNE-UP*

OIL PAN REMOVAL: 1) Disconnect steering linkage at idler arm support bracket. Remove starter, rotate crankshaft to bring timing marks to 5 o'clock position (to place counterweights out of way).
Single Exhaust - Disconnect "Y" pipe at right and left exhaust manifolds and remove heat valve. Loosen tail pipe and rear muffler support clamps and remove clamp from exhaust to "Y" pipe. Break "Y" pipe connection, move "Y" out of way. *NOTE* - To replace "Y" pipe, remove right hand torsion bar. Remove engine front supports at frame, raise front end of engine ½".
2) Remove pan bolts, drop rear of pan and work out over top of crossmember.

ENGINE REMOVAL: *See "Engine" in Dodge Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Dodge Special Data.*

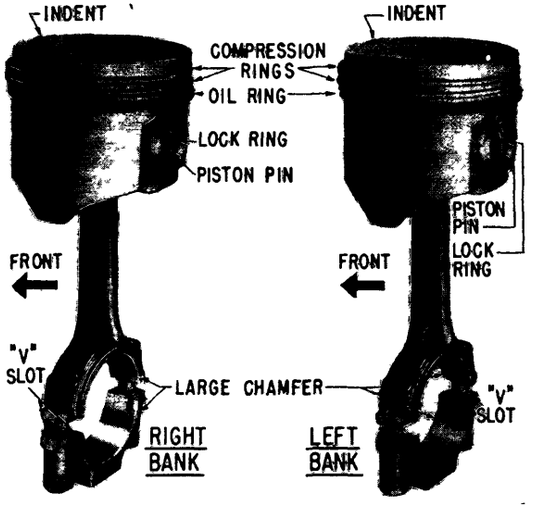
TIGHTENING TORQUES: *See "Tightening Specifications" in Dodge Special Data.*

PISTONS

Aluminum alloy, slipper type, elliptically turned, steel strut, tin plated.

► *CYLINDER BORE OVERSIZE CAUTION: Engin s with letter "A" following engine number indicates that cylinder bores are .020" oversize.*

W ight-19.5 ozs. (D-500), 22.8 ozs. (D-500-1), 18.6 ozs. (All others).
R moval -Pistons and rods removed from above.
Cl aranc - Top of skirt - .00075-.00125".



DODGE V8 PISTON & ROD ASSY.

Fitting New Pistons: Invert piston in cylinder bore with .0015" X ½" feeler stock between thrust face of piston and cylinder wall. Pull required to withdraw feeler should be 5-10 lbs. at 70°F.
Replacement Pistons: Furnished in Std. and .005", .020", .030", .040" and .060" oversize.
Installing Pistons: Notch on piston must be toward front of engine, *See Rod Installation below.*

PISTON PINS

Floating type with lock ring at each end.
Diameter - .984" (D-500-1), .922" (All others).
Length - 3.145" (D-500-1), 3.07" (All others).
Pin Fit in Piston - .0000-.0005". Tight thumb press fit at 70°F.
Pin Fit in Rod Bushing - .0001-.0004". Tight thumb press fit at 70°F. Selective fit.
Replacement Pins: Std. .003", .008" oversize.
NOTE - Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.(1)	.0775-.0780"	.010-.020"	.0015-.0030"
Compr.(2)	.0775-.0780"	.010-.020"	.0010-.0025"
Oil (3)	.1860-.1865"	① 010-.020"	.001-.003"

① - .007-.017" Muskegon rings.

Replacement Rings: Furnished Std. .005", .020", .030", .040", .060" oversize.
Installing Rings: "Top" mark on compression ring is to top of piston when ring is installed.

CONNECTING RODS

Length (Center to Center) - 6.95" (D-500-1), 6.62" (All others).
Weight - 25.2 ozs (D-500-1), 22.5 ozs. (All others).
Crankpin J urnal Diam t r - 2.2495-2.2505". Maximum out-of-round and taper limits .001".
L w r B arings - Tri-Metal Copper lead on Steel Back (D-500-1), Lead base babbitt on Steel (Others). Removable precision type. No shims.

► *JOURNAL DIAMETER CAUTION: ONE OR MORE Journals Machined UNDERSIZE* - *See "CRANKSHAFT" b - low.*
Clearance - .0005-.0015".
End Play - .006-.014" (D-500-1), .009-.017" (All others).
Bearing Adjustment - None, replace bearings.
Replacement Bearings: Std. and .001", .002", .003", .010" .012" undersize.
Installing Rods: Install piston and rod assemblies with indentation in piston head toward front of engine and larger chamfer on lower end of rod toward nearest crankshaft fillet. Oil groove in rod and bearing cap must be be together (for cylinder wall lubrication).
► *CAUTION:* Rods are **interchangeable.** However, when rods are assembled to piston, the assemblies of one engine bank are **not interchangeable** with the other bank.

CRANKSHAFT

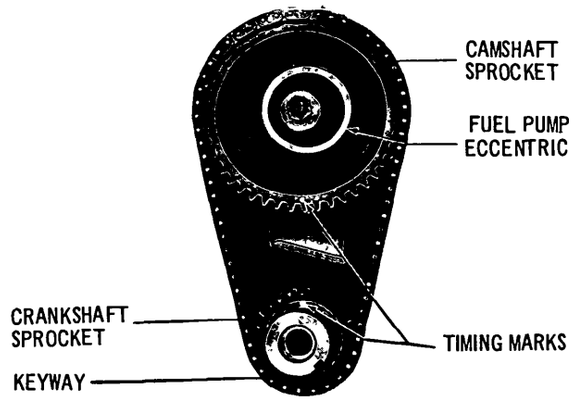
Journal Diameter: 2.2495-2.2505".
► *CRANKSHAFT JOURNAL UNDERSIZE CAUTION:* Engines with undersize journals identified as follows: **.010" UNDERSIZE (All Main & Connecting Rod Journals)** - Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize. **.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)** - Position of undersize journals are stamped on the machined surface of the center (NO.3) counterweight in the following manner: "R" indicates connecting rod journal, "M" indicates main bearing journal. The number following the letter indicates main or connecting rod journal number (counting from front of engine).
Bearing Type - Replaceable, precision type, as follows: **(Exc. D-500-1)** - No. 3 is tin base babbitt on steel, all others are lead base babbitt on steel.
(D-500-1) - Has Tri-metal (Copper Lead on Steel Back).
Clearance - (Exc. D-500-1 Rear Main) - .0005-.0015". (D-500-1 Rear Main) - .0015-.0025".
Replacement Bearings: Std. .001", .002", .003", .010" .012" undersize. Halves of Nos. 1, 2 and 4 bearings are interchangeable with one another (caps are not interchangeable); upper and lower halves of No. 3 bearing interchangeable; No. 5 halves are NOT INTERCHANGEABLE.
End Thrust; Taken by No. 3 main bearing.
End Play - .002-.007".
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Dodge Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" in Dodge Special Data.*

CAMSHAFT

► *CAUTION:* Three camshafts used. One for D-500, one for D-500-1 and one for all other V8 models.
Journal Diameter - (1) 2", (2) 1.984", (3) 1.96875", (4) 1.053125", (5) 1.4375".
Bearings - Removable, lead base babbitt on steel.
Clearance - .001-.003". Maximum .005".
End Thrust: Taken by thrust plate behind camshaft sprocket hub.
End Play - .002-.006". Maximum .010".
Timing Chain - 1 1/8". **Pitch** - .375". **L ngth** - 68 links.
Camshaft Setting: Mark on gears should be adjacent and in line across shaft centers.

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DODGE V8 VALVE TIMING MARKS

Camshaft Removal: *See "Camshaft & Bearings" in Dodge Special Data.*

Engine Front Cover (Removal & Installation): *See "En- Front Cover" in Dodge Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Dodge Special Data.*

VALVES

Tappet Clearance: (D-500-1) - Intake .015", exhaust .024" Hot.

(All Others) - Zero lash, hudraulic lifters.

VALVES: Std. V8 Engines

Valve	Head Diam.	Stem Diam.	Length
Intake	1.84"	.372-.373"	4.31"
Exhaust	1.47"	.371-.372"	4.31"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.389"	.001-.003"
Exhaust	45°	.389"	.002-.004"

D-500 Engine

Valve	Head Diam.	Stem Diam.	Length
Intake	1.87"	.372-.373"	4.83"
Exhaust	1.53"	.371-.372"	4.85"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.388"	.001-.003"
Exhaust	45°	.388"	.002-.004"

D-500-1 Engine

Valve	Head Diam.	Stem Diam.	Length
Intake	1.94"	.371-.372"	5.03"
Exhaust	1.75"	.372-.373"	4.99"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	① .444"	.001-.003"
Exhaust	45°	② .435"	.002-.004"

① - .394" (Optl. Camshaft). ② - .400" (Optl. Camshaft).

► *VALVE SEAT INSERT REPLACEMENT: See "Valve System" in Dodge Special Data.*

► *VALVE STEM OVERSIZE NOTE:* Oversize valve stems are indicated by letter "I" Intake, or "E" Exhaust stamped on rocker arm cover gasket boss. Ream integral guides when installing valves with oversize stems, furnished .005", .015", .030" oversize.

Intake Valv Stem Oil Seal - Cup type seals used on all intake valve stems.

► *VALVE GRINDING CAUTION:* Check valve height in head after grinding valves using Tool C-3436. If valve tip exceeds maximum (end of cylindrical gauge), grind tip down to approach, but do not go below minimum height (slotted area in gauge).

Valve Springs: Double springs used on D-500-1, Single springs used on all other models.

Valve Spring Specifications

(V8 Standard)

Valve	Lbs. Pressure	Length
Closed	72	1.69"
Open	166	1.31"

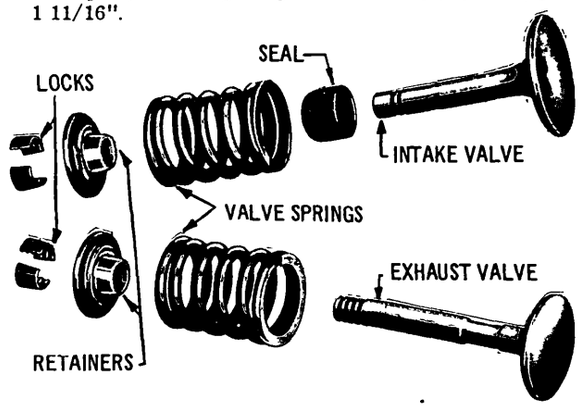
(D-500)

Valve	Lbs. Pressure	Length
Closed	78-88	1.69"
Open	170-184	1.31"

(D-500-1)

	Inner Spring		Outer Spring	
Valve	Lbs. Press.	Length	Lbs. Press.	Length
Closed	28	1.53"	60	1.66"
Open	66	1.09"	158	1.22"

► *VALVE SPRING HEIGHT CAUTION:* If valves or seats are ground, check installed height of spring (from counterbore in head to lower surface of spring retainer). If height exceeds 1 11/16", install 1/16" spacer under spring to bring height within limits of 1 5/8" - 1 11/16".



DODGE V8 VALVE ASSEMBLIES

► *VALVE SPRING LOAD CAUTION!* Hydraulic lifter "pump-up" will restrict engine speed and cause valves to burn if spring loads are not maintained.

Valve Guides; (Std. V8) Valve guides cast integral with cylinder head. When valve stem clearance excessive, use reamer tool set to ream guides for next oversize valve as follows: C-3433 (.379-.380"-.005" O.S.), C-3430 (.389-.390"-.015" O.S.), C-3427 (.404-.405"-.030" O.S.).

(D-500, D-500-1) Drive out old guides with Tool C-3159 through top of cylinder head. Place steel gauge across combustion chamber and drive Intake guide down until punch mark on side of driving tool is flush with face of cylinder head. Drive exhaust guide down until flat end of valve guide is flush with top of valve guide boss. Use Tool C-741 to ream guide to .374-.375". Intake valve guide will measure 15/16" from top of guide to top of valve seat, while Exhaust valve guide will measure 1 3/32".

► *OVERSIZE VALVE STEM IDENTIFICATION NOTE:* Engines with oversize valve stems marked as follows: Letter "E" (Exhaust), "I" (Intake) on rocker arm cover gasket boss indicates that all stems of valves are oversize (depending on the letter).

Hydraulic Valve Lifters: Used on all models except D-500-1.

► *OVERSIZE LIFTER NOTE:* A "DIAMOND" mark on engine serial number pad indicates .008" oversize lifter bores.

Diameter - .9040-.9045". **Clearanc** - .0005-.0015".

Replacement Lifters - Furnished Standard and .001", .008", .030" oversize.

Lifter Overhauling & Testing - *See "Valve Syst m" in Dodge Special Data.*

Rocker Arm Assembly: *See "Valve System" in Dodg Spe- Data.*

VALVE TIMING

See "Camshaft Setting" under Camshaft abov .

℄ V8 Std. & D-500 (Early) Valv Timing

Intake - Open 10° BTDC. Close 58° ALDC.
Exhaust - Open 56° BLDC. Close 16° ATDC.

① D-500 (Later) Valv Timing

Intake - Open 18° BTDC. Close 58° ALDC.
Exhaust - Open 56° BLDC. Close 20° ATDC.

℄ D-500-1 (Std.) Valv Timing

Intake - Open 35° BTDC. Close 65° ALDC.
Exhaust - Open 65° BLDC. Close 25° ATDC.

① D-500-1 (Optl.) Valv Timing

Intake - Op en 33° BTDC. Close 71° ALDC.
Exhaust - Open 68° BLDC. Close 36° ATDC.

① - With valve train solid.

Valve Timing Check: (V8 Std. & D-500 Early) - Rotate engine to close No. 1 intake valve. Insert .210" spacer between rocker arm and valve stem and wait for hydraulic lifter to bleed down so valve train will be solid. Mount dial indicator to register valve spring retainer movement, as valve is opened. Zero indicator, then turn crankshaft until dial indicator reads .024" (valve lift). Pointer on timing case cover should indicate between 5° BTDC and 7° ATFC when timing is correct. Reverse crankshaft rotation until indicator returns to zero and remove spacer. *See "Camshaft Setting" under CAMSHAFT above.*

► *CAUTION:* Do not turn crankshaft further than indicated above. Further movement might bottom spring and damage mechanism.

OILING SYSTEM

Crankcase Capacity: 5 quarts (refill), add 1 quart when filter changed.

Normal Oil Pressure: 50-65 lbs. at 1500 RPM.

Oil Pressure Relief Valve - Mounted in oil pump.

► *RELIEF VALVE SPRING NOTE:* Three types of springs available. Replace with correct color spring. *See "Relief Valve Spring Specifications" below.*

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R lief Valve Spring Specifications

Spring Color	Lbs. Pressure	Length
Gray (Light)	16.1-17 1..	3 1/32"
Red (Standard)	19.5-20.5	.2 27/32"
Brown (Heavy)	.22.9-23.9	2 31/32"

Free Length - 2 1/16".

Oil Pressure Gauge: Mechanical.

Oil Pump: Mounted on rear main bearing cap. Rotor type with strainer mounted on oil pump body. Strainer must be mounted parallel with bottom of cylinder block.

Overhaul - *See "Oiling System" in Dodge Special Data.*

► *OIL PUMP INSTALLATION NOTE:* Prime oil pump before installing on rear main bearing cap.

Oil Filter: Full flow (D-500-1), Shunt type all other models. Shunt type filters only a portion of pump output, balance of output goes directly into engine lubrication system.

Filter Element - Install new filter element and cover gasket at 5,000 miles intervals (or earlier if required) Change oil at same time filter element is changed.

Crankcase V ntilation: Filter element in crankcase filler Cap and breather tube at rear of crankcase. NOTE - Remove air cleaner in ventilator pipe (when so equipped) wash in kerosene and reoil.

COOLING

Water Capacity: 21 quarts (D-500-1), 20 quarts (all other models). Add 1 quart for heater.

► *AIR CONDITIONER OPERATING CAUTION:* Engine cooling system must be protected to a temperature of 20°F (above zero) for summer operation.

Pressure Valve: 14 lb.. radiator filler cap (All models)

Thermostat: Pellet type. In water pump to radiator connector. Starts to open at 157-162°F

Water Pump: Packless type. Sealed ball bearing type. No lubrication required.

Pump Removal - Drain cooling system, remove fan shroud (air conditioned cars), loosen fan belt, loosen idler pulley (air conditioned cars). Remove fan spacer and pulley, remove mounting bolts and water pump.

Ov rhaul - *See Water Fump Section.*

Fan B lt Adjustment (Air Conditioned Cars); 1/8" deflection with 10 lbs. pressure midway between idler and water pump pulleys.

NOTE - For Generator belt adjustment see Generator above.

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit - Auto-Lite 14377A.

Engin Unit - Auto-Lite 14405A.

See "Temperature Gauges" in Misc. Section.

CLUTCH

B rg & Beck. Used as follows:

Model	Borg & Beck No.	Disc No.
D66 70,10A8(Std.)	361417	.382531
D67,71,500-1,11A8	361447	382626
D66,70,11A8(H D)	361428	381850

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Adjust the fork rod to secure 3/16" free movement of clutch fork outer end. This adjustment will provide necessary 1" free play at pedal.

Ov r-Center Spring Adjustment: (NOTE - Over-center spring located above clutch pedal and attached to pedal mounting bracket) Release clutch rod at clutch pedal. Back off adjusting nut to release over-center spring. Hold clutch pedal fully depressed, adjust nut until it just touches "C" link of spring, then turn nut 7 full turns for 10" clutch. Reinstall clutch rod to clutch pedal.

Removal: Remove transmission and clutch housing pan, pull out clutch release bearing and sleeve. Mark clutch cover and flywheel. Remove clutch cover to flywheel bolts (release each bolt a few turns at a time in succession to release spring tension until cover is free). Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. *See "Dodge Synchro-mesh" Transmission in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Drain lubricant, disconnect propellor shaft, speedometer cable, gear shift control rods. Remove back-up light switch (if so equipped), and speedometer drive pinion. For transmission overhaul, or rear seal replacement, apply hand brake, remove flange nut (flange holding Tool C-3281). Disconnect hand brake cable, remove brake drum and flange assembly (puller Tool C-452) and oil seal (puller Tool C-748). Pull transmission straight back until pinion shaft clears clutch disc, then lower transmission.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated two speed transmission.

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubrication: Check fluid every 1,000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid type "A".

Checking Fluid Level - *See "TorqueFlite" below.*

Throttle Linkage Adjustment: *See CARBURETOR above.*

► *OTHER POWERFLITE SERVICE DATA: See "PowerFlite" Transmission in Transmission Section.*

TORQUEFLITE TRANSMISSION

Torque Converter and hydraulically operated three speed transmission.

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "TorqueFlite" Transmission in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "TorqueFlite" transmission in Transmission Section.*

Lubrication: Check fluid every 1,000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid type "A".

Checking Fluid L v l - *CAUTION - Following procedure and fluid level supersede previous recommendations.* Check transmission COL D if possible. Idle engine with brakes applied, press all pushbuttons in turn, then check fluid level on dipstick with engine idling in "N". Maintain level as follows:

Cold Transmission (After standing and before being driven for several miles) - Level should be between "L" mark and ½" below "L" mark. Add oil if below ½" below "L" mark, remove oil if above "L" mark. Do not add oil if level within above range.

Hot Transmission (After being driven several mil s) - Level should be between "F" mark and ½" below "F" mark (on cars with first type dipstick with distance of 1 5/8" between "F" and "L" marks, level should be ½" below "F" mark). Add oil if level below "L" mark to bring level up to ½" above "L" mark, remove oil if level above "F" mark. Do not add oil if level within above range.

Throttle Linkage Adjustment: *See CARBURETOR above.*

► *OTHER TORQUEFLITE SERVICE DATA: See "TorqueFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universals. Ball & Trunnion front, Cross rear.

Rear Universal Joint Operating Angle - *See "Propellor Shaft Notes" in Dodge Special Data.*

REAR AXLE

Own. Semi-floating, hypoid gear type with Hotchkiss drive. *NOTE* 'Two pinion gear type differential used in all models.

See "Dodge Hypoid" in Rear Axle Section.

► *REAR AXLE LUBRICANT LEVEL CAUTION:* Recommended lubricant capacity of 3½ pints will bring lubricant level to ½" below bottom of filler plug opening. DO NOT ADD lubricant to bring level up to bottom of filler plug opening.

Ratios:	Std. Trans.	PowerFlite	TorqueFlit
D-66	3.73 (41-11)	3.36(37-11)	3 18(35-11)
D-67	3 73 (41-11)		3 18(35-11)
D-70,D-71	3 91 (43-11)		3 36(37-11)
D-500	①3 73 (41-11)		②3.18(35-11)
D-500-1	③3.73 (41-11)		②3.18(35-11)

①- 3.54(39-11), 3.91(43-11) Optl.

②- 3 36(37-11), 3 54(39-11) Optl.

③ - 2 92(38-13), 3.18(35-11), 3 36(37-11), 3.54(39-11), 3.73(41-11), 3.91(43-11), 4 1(41-10), 4 3(43-10), 4.56 (41-9), 4.89(44-9), 5 12(41-8), 5.38(43-8), 5 83(35-6), 6.17(37-6).

Backlash - .006- 010".

Carrier Removal: Remove axle shafts (see below), disconnect rear universal joint, remove differential carrier capscrews, lift out carrier assembly.

► *RANJO HOUSING INSTALLATION NOTE:* Check rear universal joint angle. *See "Propellor Shaft Notes" in Dodge Special Data.*

Axle Shaft Removal: Jack up car, remove wheels, hub and drum assembly (Tool C-845). Block brake pedal, disconnect brake line at wheel cylinder, remove axle key, brake and dust shield. Note number of shims removed from axle housing, use puller Tool C-499 to remove axle shaft and bearing, remove inner seal (Tool C-637)

Wheel Bearing Adjustment: Shims between backing plate

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and axle housing. With wheel hub removed, check end play with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .005", .010", .0125", .015", .030" thick) equally at both wheels. **Endplay** - .003-.008"

SHOCK ABSORBERS

"Oriflow". Direct acting, hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. New "Torsion-Aire" type with ball joints and torsion bar springing.

See "Torsion-Aire" in Front Suspension & Wheel Alignment Section.

Steering Axis Inclination - 6 1/2° at 0° Camber.

Caster - (Manual Steering) Neg. ¾° ± ¾°, (Power Steering) Pos. ¾° ± ¾°. *NOTE* - Both sides should be set at same dimension.

Camber (Right Wheel) - 0° ± ¼°, 0° preferred.

Camber (Left Wheel) - Pos. ¼° ± ¼°, Pos. 3/8° preferred.

► *CASTER & CAMBER ADJUSTMENT NOTE: Adjusting shims located between upper control arm support bracket and frame side rail.*

To -In - 3/32-5/32". 1/8" preferred.

To -Out on Turns - With outer wheel at 20°, Inner wheel should be 21°37'.

STEERING

Manual: Gemmer. Worm and three-tooth roller.

See "Gemmer Worm & Roller" in Steering Section.

Power Steering: Co-Axial. Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering wheel.

See "Co-Axial" Power Steering in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service: "Total-Contact" (Floating Shoe) type.

See "Chrysler, De Soto, Dodge, Plymouth Center-Plane" Brakes in Brake Section.

Drum Diameter - 12" (D-500-1), 11" (All Others).

Wheel Cylinder Diameters - 1 1/8". Single acting (front), double acting (rear).

Replacement Lining & Shoes - Linings or shoes with linings furnished Standard and .030" oversize.

Lining - Molded asbestos (bonded to shoe).

Lining Width - (D-500-1) 2.5" All. **(All Others)** 2.5" (Front), 2.0" (Rear with 2.5" used on 4-Door Hardtops and Convertibles).

Length - 16.6" (D-500-1), 11.5" (All others).

Thickness - .20" All models.

Clearance - Front Wheels - .006". Turn each adjusting cam in direction of forward wheel rotation until shoe is solid against drum and wheel is locked. Turn cams in opposite direction until no drag is felt.

Rear Wheels - .006". Same as for front wheels except that forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe cams are rotated in direction of reverse wheel rotation.

Braking Power - D-66, D-67 65% Front, 35% Rear (except 4-Door Hardtops & Convertibles which are 60% Front, and 40% Rear).

All Others - 60% Front, 40% Rear.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid - Filler plug at top of master cylinder (on dash panel in engine compartment).

Removal - Disconnect pedal return spring, pushrod, brake tube and stop light switch leads. Remove master cylinder to dash bolts, slide master cylinder straight out from dash.

Power Brakes: New "Oval Piston Assist" type. Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder).

See "De Soto, Dodge Oval Type Piston Power Unit" in Brake Section.

Removal - Place block or wedge between power lever and bracket (to prevent damage to ramp of trigger arm). Mark across power unit adjacent to vacuum test port and mounting bracket; and between mounting bracket and firewall. Disconnect vacuum hose, remove bolts securing bracket to firewall, slide unit and bracket straight forward.

Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans., internal expanding type used with Automatic Trans.

Adjustment - *See "Brake Notes" in Dodge Special Data.*

Lining	Width	Thickness	Length
6" Ext. type	2"	5/32"	15.38"
7" Int. type	2"	5/32"	13.44"

MISC. MECHANICAL

Windshield Wipers: Auto-Lite electric. EPW-4001A (Single Speed), EPV-4001B (Variable Speed).

Air Conditioning: Heater-Air Conditioning.

See "Air Conditioning" in Miscellaneous Section.

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch.

See "Electric Window Regulators" in Misc. Section.

Power Seat Adjusters: Electric, 6-Way type.

See "Power Seat Adjusters" in Misc. Section.

Convertible Top Control: Electrical-hydraulic type.

See "Power Top Controls" in Misc. Section.

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head (Hot) ℄ All Engs	75
Intake Manifold	23-28
Exhaust Manifold	23-28
Oil Pan	12-15
Main Bearing Caps	95-105
Flywheel	75-85
Rear Bearing Seal Retainer V8	23-28
Vibration Dampener (223, 272, 292 Eng.)	85-95
Vibration Dampener (312 Eng.)	130-145
Con Rod Caps	45-50
Camshaft Sprocket (223 Eng.)	45-50
Camshaft Sprocket (272, 292 Eng.)	35-45
Camshaft Sprocket (312 Eng.)	15-18
Rocker Arm Support Bracket (6 Cyl.)	45-55
Rocker Arm Support Bracket (V8)	12-15
Rocker Arm Cover	2-2.5
Engine Front Cover (6 Cyl.)	6-9
Engine Front Cover (V8) 3/8" Bolt	23-28
Engine Front Cover (V8) 5/16" Bolt	12-15
Water Pump Mounting (223 Eng.)	23-28
Water Pump Mounting (272, 292 Eng.)	12-15
Water Pump Mounting (312 Eng.)	23-28
Oil Pump Mounting (6 Cyl.)	30-35
Oil Pump Mounting (V8)	12-15
Oil Filter	20-25

℄ — See Cylinder Head Installation (below) for head tightening procedure. Three different torque applications must be made.

ENGINE

6 CYL. CARS

ENGINE REMOVAL: (Conv. & Overdrive Trans.): *NOTE* DO NOT remove transmission Drain cooling system and crankcase Remove radiator, air cleaner starter battery and engine grounds and all electric wires Disconnect choke cable rod and bushing at carburetor, accelerator linkage clutch bracket spring, release rod and remove clutch bracket Disconnect wiper hose and flex line at fuel pump Remove flywheel housing upper and lower bolts and remove flywheel housing cover Remove engine insulator bracket bolts Attach lifting hook, raise engine and withdraw it from transmission

Fordomatic: Same as Conventional and Overdrive except as follows Remove converter housing lower access cover plate lower bolts and turn flywheel until one flex plate is in position to remove three flywheel-to-converter bolts then turn flywheel 180° and remove other three bolts Secure converter assembly in housing *CAUTION* - After removing flex plate bolts turn flywheel 90° so flex plates will not catch on converter housing as engine is removed Remove lower housing to engine bolts and rear splash shield and oil cooler lines retaining clip from right engine support bracket Remove filler tube bracket Support transmission on jack raise engine slightly and pull it forward out of converter housing

V8 PASSENGER CARS

ENGINE REMOVAL (Exc. Thunderbird): *NOTE* - DO NOT remove transmission Drain cooling system and crankcase and remove radiator and air cleaner Disconnect accelerator or throttle control rod wiper and fuel lines, engine and battery grounds heater hoses, and electric wires Disconnect Power Steering Pump bracket and secure pump to fender Remove coil screws, secure coil to one side and remove distributor Remove flywheel converter housing bolts, starter and dust shield (Fordomatic filler tube bracket) On Synchro-mesh Cars remove flywheel inspection cover, clutch pedal spring bracket flywheel housing to engine lower bolts and splash shield and oil filter On Fordomatic remove converter housing lower access cover cover assembly and flywheel to converter bolts Secure assembly in housing Remove converter housing to engine lower bolts, engine left splash shield and oil cooler lines retaining clip, from engine right insulator support bracket Disconnect exhaust pipe and left engine insulator at frame and remove right insulator Pull engine from transmission

Thunderbird: Same as for V8 Passenger Cars except as follows: Raise car remove both steady rest brackets from engine

6 CYLINDER TRUCKS

ENGINE REMOVAL: (Courier & Ranchero) - *See Passenger Cars* (Coventional Truck & School Bus) - Remove hood drain cooling system and crankcase Remove radiator and shroud as an assembly Remove air cleaner Disconnect choke cable accelerator or throttle control rod Remove accelerator spring Disconnect exhaust manifold and fuel line Remove all electric wires and ground strap Remove flywheel or converter housing to engine block and engine rear plate retaining bolts Remove belts fan, spacer and pulley Disconnect heater hoses On Conventional & Overdrive trucks remove flywheel housing inspection cover and support transmission on jack On Fordomatic trucks remove converter housing inspection cover and flywheel to converter bolts Secure converter assembly in housing Disconnect transmission oil cooler inlet and outlet tubes at engine attach lifting hooks Remove engine front support to frame bracket bolts and remove engine

Parcel Delivery: Drain cooling system and crankcase and remove drivers seat assembly master cylinder cover and steering column cover plates Disconnect accelerator pedal battery ground cable and electric wires Disconnect flexible fuel lines and remove starter Remove left wheelhouse panel and center floor plate Remove rear engine cover *NOTE* - Wedge right and left frame gussets open so rear flange of cover plate will clear the slots Remove crossmember Remove accelerator bracket assembly spring and carburetor Disconnect exhaust manifold and remove muffler inlet pipe to engine bracket bolt Remove fan and bracket as an assembly and remove radiator Remove engine front support bolts flywheel or converter housing cover Remove flywheel housing or converter housing to engine block and engine rear plate retaining bolts Remove engine rear support cap screws and engine breather tube Support transmission on Jack On Fordomatic Trucks disconnect transmission oil cooler inlet and outlet hoses at engine Drain transmission and remove filler tube Install drain plugs in torque converter Remove engine

V8 TRUCKS

ENGINE REMOVAL: (Courier & Ranchero) - *See Pass Cars* (Conventional Truck & School Bus) - Remove hood drain cooling system and crankcase Remove air cleaner fan spacer belt radiator and shroud assembly Open air reservoir drain cock (if so equipped) Disconnect air line at front of engine place to one side Disconnect heater hoses and electric wires and engine ground strap Remove starter and dust seal Disconnect exhaust manifold and choke control cable Remove engine front support bolts accelerator return spring and disconnect fuel line vacuum brake booster hose On Conventional & Overdrive trucks disconnect accelerator rod assembly throttle control cable and cable clamp at governor (4-barrel carburetor) Remove clutch release lever retracting spring (272 ECR) flywheel housing inspection cover flywheel housing retaining bolts On Fordomatic trucks remove transmission cover plate with accelerator assembly Disconnect oil cooler water hoses Support transmission attach lifting hooks raise engine slightly and pull engine from transmission

Parcel Delivery: Drain cooling system and crankcase Remove drivers seat master cylinder inspection cover steering column cover plates Disconnect accelerator pedal, electric wires and battery ground cable Remove left wheelhouse panel and center floor plate Remove engine cover panel *NOTE* - Wedge right and left hand frame gusset open so that rear flange of engine rear cover plate will clear slots Remove crossmember Disconnect radiator hoses Remove engine front insulator bolts. Disconnect speedometer cable and drive gear and vacuum brake hose Disconnect choke control cable and remove right exhaust manifold to exhaust pipe retaining nuts carburetor air cleaner stud and engine rear support capscrews hand brake cable bracket and cable Disconnect universal joint to transmission output shaft flange, manual control rods at transmission lever (Fordomatic), clutch hydraulic slave cylinder hose (Conventional & Overdrive) attach lifting hooks remove engine and transmission as an assembly

ENGINE MOUNTINGS

THUNDERBIRD

ENGINE FRONT SUPPORT: Removal - Remove insulator nut and bolt, and insulator Remove insulator to bracket bolts and nuts Jack up engine remove insulator assembly and spacer

Installation - Position spacer and insulator assembly and lower engine Install insulator bolt, lower insulator and nut Tighten nut to 85-95 ft lbs Install insulator assembly to bracket bolts flat washer lockwasher and tighten nuts to 45-50 ft lbs

(THUNDERBIRD)

ENGINE STEADY REST: Removal - Remove nut washer and bushing from lower end of steady rest rod Remove upper bracket bolts remove assembly from engine Disassembly - Remove lower bushing and washer, nut, washer and insulator and bracket from top of rod Remove remaining insulator washer and nut from top of

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rod.

Assembly - Install bottom nut, washer, insulator and bracket on upper end of rod. Install top insulator, washer, and nut on upper end of rod. Install top bushing and washer on lower end of rod.

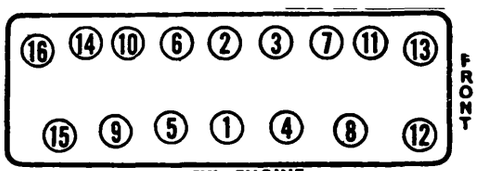
Installation - Install assembly in car, tighten engine bracket bolts to 30-35 ft. lbs. Install bottom washers, bushing and nut on lower end of rod.

Adjustment - With both engine and frame brackets in place and tightened, loosen lower and upper nuts on both steady rests. Let engine seek its own level position, then turn lower nut, washer, and insulator (each side of engine) up against lower (chassis) support bracket, tighten lower nut until distance from washer to washer (at lower end) is 1.29-1.33". Turn lower nut, washer, and insulator (at upper end) up against engine support until distance from lower washer to bracket is 1.08" then turn upper nut, washer and insulator down against bracket until distance from upper washer to bracket is .77". Total distance, washer to washer, (at upper bracket) should be 1.97-2.02".

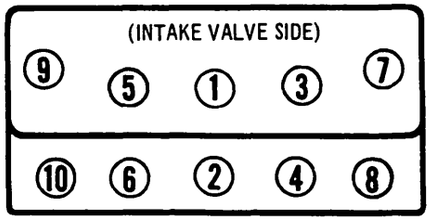
CYLINDER HEAD & MANIFOLD

6 CYL. ENGINE

Installation - Apply coating of cylinder head gasket sealer to both sides of gasket, position gasket over guide studs, place cylinder head over guides and lower carefully. Coat threads of each bolt with small amount of water resistant sealer, install two bolts at opposite ends of head to hold gasket in place and remove guide studs. Install balance of bolts, tighten bolts in sequence as shown in diagram, as follows: Tighten to 50 ft. lbs. (Cold) in proper sequence, then 65 ft. lbs. (Cold) in proper sequence. Install pushrods in proper locations, position rocker arm assembly on head and install oil drain line, clip and retaining screw on No. 1 bracket. Make sure line enters shaft locating hole. Position oil feed line on No. 6 bracket, with lower end of line, "O" ring seal in oil supply counterbore, then install bolt. Tighten all retaining bolts to 45-55 ft. lbs. torque. Make preliminary (Cold) valve lash adjustment. Install manifolds, lines, and wires. Connect wiper hose,



6 CYL. ENGINE



V8 ENGINE

battery cable and fill cooling system. Remove tape from air horn, connect choke wire, start and run engine at 1200 RPM for approximately 30 minutes. Tighten cylinder head bolts in proper sequence to 75 ft. lbs. (Hot), recheck valve lash and engine idle as necessary.

V8 ENGINES

CYLINDER HEAD: Installation - Clean head and block gasket surfaces, coat both sides of gasket with sealer, use water sealer on threads of all head bolts. Install oil drain tube in same end bracket from which it was removed. Tube must enter locating hole in rocker shaft to position shaft. Position tube in right assembly to drain in front (No. 1 Exhaust) pushrod opening, and tube in left assembly to drain in end (No. 8 Exhaust) pushrod opening. Tighten rocker arm bracket retaining nuts to specifications. Tighten cylinder head bolts in three steps as follows: Tighten all head bolts to sequence shown in diagram to 55 ft. lbs. cold, then repeat tightening in sequence to 65 ft. lbs. After completing installation, run engine for 30 minutes at 1200 RPM to normalize block and head and again tighten all cylinder head bolts in proper sequence to 75 ft. lbs.

CRANKSHAFT & MAIN BEARINGS

(ALL ENGINES)

CRANKSHAFT THRUST BEARING ALIGNMENT: Install No. 1, 2 & 4 main bearing caps and torque to specifications. Install No. 3 main bearing cap with bolts finger tight. Pry crankshaft forward against upper half of No. 3 main bearing, pry No. 3 main bearing cap to rear to align thrust surfaces of both halves, and tighten bolts, while holding shaft forward and cap to rear, to torque specifications. Check crankshaft end play.

(ALL ENGINES)

REAR MAIN BEARING OIL SEALS: *NOTE* - Crankshaft seal is installed in groove in block and in bearing cap (6 Cyl.) or in seal retainer directly behind rear main bearing (V8). Bearing cap or retainer is sealed in block by special sealing strips inserted in vertical grooves in sides of bearing cap or retainer after they are installed in block.

Seal Installation: Install new seal in groove in cylinder block using Tool T52L-6701-AGD to drive it in place. Install seal in Bearing cap groove (6 Cyl.), in retainer groove (V8), using Tool as above. Cut surplus seal flush with block, bearing cap or retainer. Coat Bearing cap (6 Cyl.) or retainer (V8) mating surfaces with sealer, install bearing cap (6 Cyl.) or retainer (V8), and tighten bolts to correct torque. Dip side seals in engine oil and quickly install them in vertical grooves. *NOTE*- It may be necessary to drive seals in place the last ½" of travel. DO NOT use sealer on side seals. They will expand when dipped in engine oil.

Testing Seal Installation – To check vertical seal installation for leaks, squirt a few drops of oil into parting lines between cap or retainer and cylinder block from the outside. Blow compressed air against seals from the inside of the block. If air bubbles appear in the oil, it is an indication of oil leakage.

ENGINE FRONT COVER

6 CYL. ENGINES

ENGINE FRONT COVER: Removal – Remove radiator, crankshaft damper, oil pan, and cover retaining screws, cover and gasket. **Installation** – Coat gasket surface of block and cover with sealer. Install cover and tighten screws to specifications. Install oil pan, crankshaft damper and belt. On Power Steering cars, install power steering pump pulley and belt. Install radiator.

V8 ENGINES

ENGINE FRONT COVER: Removal - Remove radiator, fan blades and hub, crankshaft dampener and fuel pump. On Power Steering Cars, disconnect power steering pump bracket from water pump, secure power steering pump to fender apron. On Thunderbird, remove engine front support. On conventional cars with Air Conditioning, remove condenser brackets, and move out of way. Remove generator mounting bracket bolts, move bracket out of way. Disconnect heater hose at water pump, remove remaining bolts (including oil pan to front cover bolts) then remove water pump (and spacer on Thunderbird), with front cover as an assembly.

Installation - Install oil pan with retaining bolts loose. Clean front cover and block gasket surfaces, coat gasket surface of cover, block and bolt threads with sealer. Place gasket and cover in place using pilot assembly over crankshaft to align cover with bolts finger tight. Install generator support and adjusting arm brackets. On Air Conditioned Cars, connect condenser brackets to cylinder front cover. Tighten cover bolts to specifications. Install oil pan to cylinder front cover bolts and tighten oil pan bolts to specifications. Install dampener, fuel pump, power steering pump bracket to water pump. Install fan blades and hub. Adjust belts, connect heater hoses, install radiator, fill cooling system and crankcase and check for leaks.

FRONT COVER OIL SEAL: Drive out old seal with a pin punch, then clean out recess in cover. Coat new seal with grease, then install seal with Tool T52L-6700-BEE. Drive seal in until it is fully seated in recess. Check seal to be sure spring did not come out during installation.

CAMSHAFT & BEARINGS

(6 CYL. ENGINE)

CAMSHAFT REMOVAL: Remove air cleaner, tape air horn closed, remove distributor cap. Disconnect high tension wire from coil and spark plug wires, remove fuel pump. Disconnect primary coil wire from engine clip and remove pushrod cover. Remove rocker arm assemblies, pushrods (in sequence), radiator support bar, radiator, and grille assembly. Remove fan belt, vibration dampener, oil pan to cylinder block two front bolts, engine front cover. Turn crankshaft until timing marks on sprockets are 12 link pins apart on drive side, and remove camshaft sprocket bolt. Mark distributor housing and cylinder block for position of rotor and housing reinstallation, and remove distributor. Remove sprockets and timing chain woodruff key camshaft thrust washer. Turn camshaft and raise lifters off lobes and secure with clips. Draw camshaft out carefully so as not to damage bearings.

(V8 ENGINE)

CAMSHAFT REMOVAL: Drain cooling system and crank-

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case, remove radiator, cylinder front cover oil pan. Remove intake manifold, carburetor and coil as an assembly. Remove rocker arm covers, rocker arm assemblies and valve pushrods in sequence. Remove pushrod chamber cover. Crank engine until timing marks on sprockets and chain are both on drive side of chain and 12 pins between marks. Remove distributor cap, scribe line on distributor housing and cylinder block to mark position of rotor and distributor housing for installation, then remove distributor. Remove camshaft sprocket bolt, fuel pump eccentric and counterweight. Remove sprockets and timing chain as an assembly. Remove camshaft thrust plate, woodruff key and spacer. Turn camshaft until lifters can be raised up, with a magnet or fingers, until clear of cam lobes, and secure them in this position. Carefully remove camshaft.

VALVE SYSTEM

ALL ENGINES

ROTATABLE VALVES: "Rotatable" type valves operate directly in valve guide holes in cylinder head and are removed and installed as follows:

Valve Removal: Use Tool 6513-EE to compress valve springs, remove vaove spring locks, retainer sleeve, retainer, spring, and "umbrella" type oil seal. Discard oil seal.

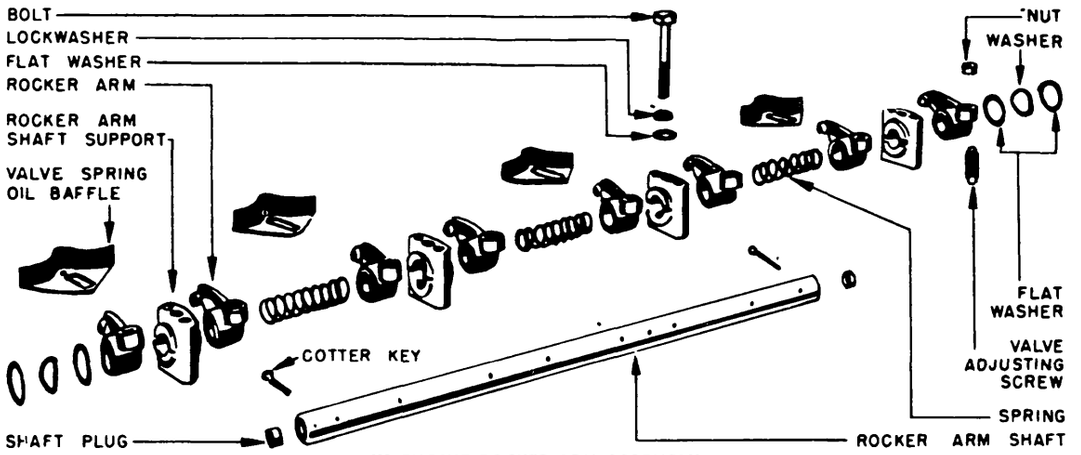
Valve Assembly Installation: Install valve in port from which it was removed. Install valve stem oil seal with cupped side toward valve guide boss. Install valve spring, spring retainer, retainer sleeve, and valve locks.

VALVE SEAT INSERTS

V8 "272" ECR ENGINE

"272 ECR" ENGINE VALVE SEAT INSERT: Removal - Invert head and insert drift through exhaust valve port, drive seat out.

Installati n: Counterbore insert recess to engine specifications. Cut slightly (.001-.002") below old counterbore depth to clean up this face. Clean out chips and all oil from recess. Chill oversize insert and installation tool in dry ice for ½ hour. Position insert on tool with small radius on outer edge facing outward. Pilot the driving tool in valve guide, then drive the insert into counterbore until it is fully seated. Do not peen area around insert. Reface new valve seat insert. *CAUTION*-Installation of insert must be performed immediately on removal of tool and insert from dry ice. Protect hands with gloves when handling chilled insert and tool.



V8 ENGINE ROCKER ARM ASSEMBLY

VALVE GUIDES

ALL ENGINES

VALVE GUIDES (Oversize Valve Stem Installation): Use Tool T52L-6085-AEE Piloted Reamer to ream cylinder head valve guides for oversize stems. Reamers are furnished in .003", .015", .030" oversizes. Pilots are furnished Standard, .003", .015". Use reamers with correct pilots in sequence when reaming from standard to oversize holes. Regrind valve seats AFTER reaming guides.

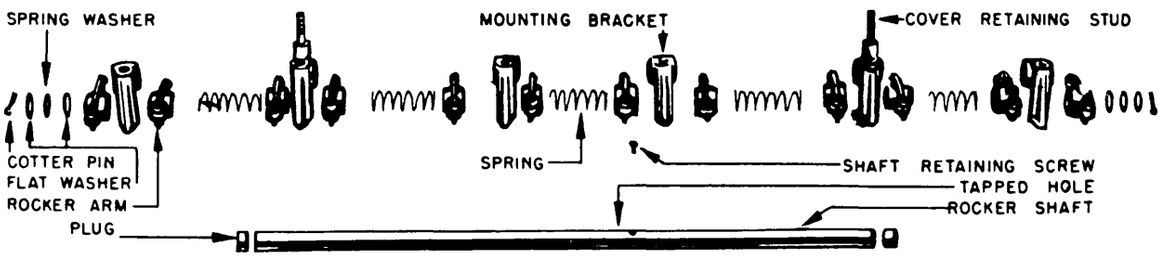
ROCKER ARMS

(6 CYL. ENGINES)

ROCKER ARMS: Removal – Remove rocker arm cover, cap screw and clip from No. 6 rocker arm support bracket, pull oil feed line out of bracket, then pull it out of block with pliers, being careful not to damage line. Loosen rocker arm adjusting screws to remove valve spring load from rocker arms, then remove rocker shaft assembly.

Disassembly – Pull oil drain line and clip out of No. 1 support bracket, remove cotter pins at each end of rocker arm shaft, and remove flat washers and spring washers, and plugs from each end of shaft. *NOTE* - Plugs are interference fit. To remove, drill or pierce plug at one end, then force other end out with steel rod, and repeat on first plug. Slide rocker arms, springs, and brackets off of shaft, being sure to identify parts.

Reassembly – Oil all parts with engine oil. Drive new plugs in each end of shaft with cup side out using a blunt tool, install a flat washer, spring washer, another flat washer, and a cotter pin on end of shaft. Install rocker arms, support brackets, and springs in order shown in diagram, and complete assembly by installing remaining flat washers with spring washer between them and install cotter key.



6 CYL. ENGINE R CKER ARM ASSEMBLY

(V8 ENGINES)

ROCKER ARMS: Removal – Remove rocker arm cover, loosen adjusting screws to release valve spring tension on rocker arms, then remove rocker arm assembly, and baffle plates. Note position of oil tube and bracket for oil drain into No. 1 exhaust (right rocker arm assembly), No. 8 exhaust (left rocker arm assembly). Remove and identify pushrods for correct reassembly.

Disassembly – Remove cotter pin from each end of rocker shaft, remove flat washers and spring washers, slide rocker arms, springs and brackets off shaft. *NOTE* - Oil tubes must go in same bracket from which they were removed. Identify parts for correct reassembly. Remove plugs from each end of shaft. *NOTE* - Plugs are interference fit. To remove, drill or pierce plug at one end, then force out other plug with steel rod, then force out first plug.

Reassembly – Oil all parts with engine oil. Drive new plugs in each end of shaft with cup side out, using a blunt tool. Install a flat washer, spring washer, another flat washer, and a cotter pin on end of shaft. Install rocker arms, support brackets, and springs in order shown in diagram, and complete assembly by installing remaining washers with spring washer between them and install cotter key.

OILING SYSTEM

OIL PUMP

6 CYL. ENGINE

OIL PUMP: Gear type oil pump mounted in crankcase in line with distributor. Pump driven by means of a hex drive shaft. Shaft is pinned in end of distributor drive shaft by a roll pin, and other end seats in end of oil pump drive shaft. Pressure relief valve is incorporated

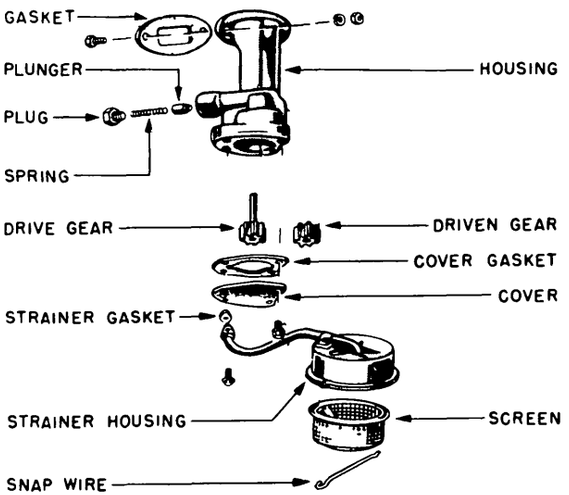
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in oil pump housing.

Removal – Remove distributor, oil level indicator, and oil pan. Remove two nuts and lockwashers retaining pump to cylinder block. Remove pump and gasket.

Disassembly: Remove screen assembly retaining screws, screen assembly, and gaskets Remove cover retaining screws, cover, and gasket. Push pump drive shaft and drive gear assembly from pump housing Remove driven gear Remove oil pressure relief valve plug, spring, and and plunger Remove snap wire retaining pump screen, and remove screen from housing



6 CYL. OIL PUMP

Inspection: Wash all parts in solvent clean inside of pump housing and pressure valve chamber with a brush Check inside of pump housing outer race and rotor and shaft for wear If pump cover mating surface is worn scored or damage it should be replaced

Outer Race Clearance - 006- 009" Check with feeler gauge between race and housing

Outer Race & Rotor Clearance - Place straightedge across housing between bolt holes Clearance between straightedge and rotor and race should be 001 0035" *NOTE* - Outer race shaft and rotor are replaceable as assemblies only

Drive Shaft to Bearing Clearance - 0015- 0029"

Pressure Valve Piston Clearance - 0015- 0029"

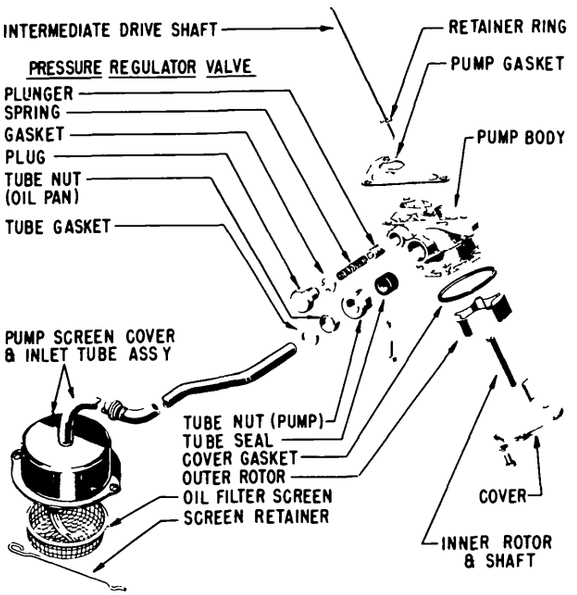
Relief Valve Spring Pressure - 9 2 10 4 lbs at 80"

Reassembly: Apply engine oil to all moving parts Install relief valve plunger spring and plug and tighten to 33 38 ft lbs Slide drive gear and shaft assembly into housing Install drive gear Apply sealer to both sides of gasket Install gasket and cover with screws loose Secure screen in place with retainer and install inlet tube gasket and inlet tube assembly on pump cover Now tighten cover retaining screws to 12 15 ft lbs and check pump for free rotation

Installation: Install new "O" ring seal on pump end of tube, install tube and seal in pump Insert intermediate shaft into oil pump drive shaft position gasket on pump housing and install pump and shaft as an assembly *CAUTION* - Rotate intermediate shaft to permit pump to be seated without pressure Tighten pump retaining screws to 12-15 ft lbs Tighten the jam nut at oil pump 10-12 ft lbs and nut at oil pump 28-32 ft lbs Do Not overtighten inlet tube nuts

V8 ENGINES

OIL PUMP: Rotor type mounted externally on left rear side of engine and driven by distributor through intermediate drive shaft Oil pressure relief valve installed in pump body



V8 ENGINE OIL PUMP

Removal: Disconnect oil inlet tube at pump and remove "O" ring seal Loosen tube at pan Remove pump to block retaining screws remove pump intermediate shaft and gasket

Disassembly: Remove cover screws cover and "O" ring seal Remove inner rotor and shaft then outer race Remove oil pressure relief valve chamber plug gasket spring and plunger

Inspection: Wash all parts in a solvent and dry them thoroughly Use a brush to clean inside of pump housing and pressure relief valve bore Be sure all dirt and chips are removed Remove all old gasket material from pump body and cover Check pump housing for damage or excessive wear Check pump gear teeth for damage or wear Check compression of relief valve spring (9 76-9 84 lbs at 1 56") Check relief valve clearance in relief valve bore Check drive gear to shaft clearance (001- 002" maximum) Pump shaft to housing bearing clearance should be 0015- 0029" Check gear end clearance with Dial Indicator or Plastigage Install drive gear and shaft assembly in housing Install gasket then lay piece of Plastigage on gear and install cover Remove cover and check thickness of Plastigage (0015- 0055" 0015- 003" preferred) with Dial Indicator Place gasket on body and straight edge across gasket Attach Dial Indicator to body with contact button on end of gear to read gear play Subtract 005" from reading for gasket compression

Reassembly: Lubricate all parts install pressure relief valve plunger spring and plug torque plug to 33 38 ft lbs Slide drive gear and shaft assembly into housing install driven gear apply sealer to gasket and install cover Assemble screen cover inlet tube gasket and tube on pump cover tighten cover screws to 12-15 ft lbs Check rotation of pump shaft for freedom of operation

Installation: Place new gasket on retaining bolts slide pump mounting flange over retaining bolts install lock washers and nuts Install oil pan fill crankcase Run engine and check pressure

OIL FILTER

(TRUCK ENGINES)

OIL FILTER: Filter is full-flow type and should be replaced at 4000 mile intervals (or more often if required by operating conditions)

►*REPLACEMENT CAUTION Use Replacement Kit, Part No. B2A-6731-A, which includes correct filter element and NEW GASKETS WHICH MUST BE USED. CAUTION–Use of by-pass filter element would restrict oil flow and might cause failure of engine.*

Filter Installation: Wash all parts in a solvent and dry them thoroughly Make sure all openings in center bolt are clean Install new fibre gasket on center bolt, then place bolt through filter housing Install spring and spring assembly on bolt, making sure seat tangs are engaged in spring Install a new neoprene gasket and new filter element over center bolt *(NOTE–Be sure* two elongated holes in oil filter diaphragm are at top when positioned on block) Install new neoprene gasket in filter housing recess Place filter assembly in position, and thread center bolt into adapter, finger tight Rotate filter assembly slightly, in each direction, to make sure gasket is seated evenly Tighten center bolt ¾-1 complete turn (20-25 ft lbs) With engine at normal operating temperature and operating at fast idle, check for oil leaks past housing gasket or around center bolt gasket If oil leaks past housing gasket, check housing for proper seating If oil leaks past center bolt gasket, check center bolt for proper torque or replace gasket *NOTE*–Pressed paper type element does not use neoprene gasket

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate on left front body pillar.
First Number:- 100001.

►*VEHICLE NUMBER NOTE:* Vehicle number (example *A7FV100501*) includes following identification data in sequence.

Eng. Type ①	Year ②	Assy. Plant	Body Style ③	Serial No.
A	7	See below	See below	100501

① - **A** - 6 Cyl. 223 cu. in. engine.
② - Last digit of model year.
③ - **C** - Conv. (Fairlane "500"). **F** - Ranchero. **G** - Tudor & Fordor (Custom & Custom "300"). **H** - Thunderbird. **R** - Ranch Wagon (Custom "300"). **S** - Sedan Delivery (Courier). **T** - Tudor & Fordor - Concealed Pillar (Fairlane & Fairlane "500"). **V** - Victoria Tudor & Fordor (Fairlane & Fairlane "500"). **W** - Retractable Hardtop (Fairlane "500"). **X** - Country Sedan. **Y** - Country Squire.

Assembly Plant Designation

A - Atlanta	**F** - Dearborn	**N** - Norfolk
B - Buffalo	**G** - Chicago	**P** - St. Paul
C - Chester	**K** - Kansas City	**R** - San Jose
D - Dallas	**L** - Long Beach	**S** - Somerville
E - Mahwah	**M** - Memphis	**U** - Louisville

TUNE-UP

►*POWER POUND CORRECTION:* This condition may be caused by the cylinder head if normal external corrections, such as tune-up, engine alignment, exhaust system grounding, have not eliminated the trouble. Check engine compression and if compression pressure is found to be 170 lbs. or greater, it is recommended that the cylinder head be replaced by a 1956 head, Part No. B6A-6049-D Temperature Indicator Bulb, Part No B7A-10884, must be used with the 1956 head.

►*ENGINE PINGING (AT LOW SPEED UNDER LOAD) CORRECTION: Requires modification of Carburetor (B7A-9510-N), and Distributor (B7A-12127-C) See DISTRIBUTOR and CARBURETOR below*

COMPRESSION PRESSURE: 150 lbs. at cranking speed. Maximum variation between cylinders 10 lbs.

VACUUM READING: Steady 18-20" idling at 475-500 RPM in Neutral.

VALVE TAPPET CLEARANCE: .019" Intake & Exhaust (Hot & Cold). Adjust all tappets to .019" clearance while engine is cold, then again check all tappets for .019" clearance after running engine for 30 minutes to normalize temperature.

►*SELF LOCKING VALVE TAPPET ADJUSTING SCREW NOTE:* Special threads on adjusting screw provide interference fit. 3 ft. lbs. (36 in. lbs.) interference when center section of screw threads are fully engaged with rocker arm threads. Replace screw and/or rocker arm as necessary when interference is below this specification

MANIFOLD HEAT CONTROL· Automatic thermostatic type with counterweight. Valve is closed when engine is at normal temperature and running at slow idle, and opens when operating at high RPM Spring is installed with ¾ turn windup and hooked over stop pin.

IGNITION

FIRING ORDER: 1–5–3–6–2–4.

SPARK PLUG GAP: .032-.036".
Spark Plugs - Champion 870. 18 mm. Torque to 15-20 ft. lbs.

►*SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be torque tightened within range of 15-20 ft.lbs.

COIL: Ford No. B6A-12029-B.
Ignition Current - 2.5 amps. idling, 4 5 amps. stopped.
Resistor - Ford B6A-12250-D. 1.3-1.4 Ohms.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

DISTRIBUTOR: Ford No. B7A-12127-C. "Loadomatic" type of same design used on previous models.

►*DISTRIBUTOR MODIFICATION TO ELIMINATE ENGINE PING:* Replace distributor primary advance spring with Part No. 7RA-12192 and secondary advance spring with Part No. FDE-12225-A. Calibrate distributor to modified advance table below. *See also CARBURETOR below*
Condenser - Ford No. 7RA-12300-C. **Capacity** .21-.25 mfd.
Contact Point Set - Ford No. FAA-12171-A.
Breaker Gap - .024-.026".
Cam Angle - 35-38°.
Breaker Arm Spring Tension - 17-20 ozs.
Rotation - Clockwise viewed from above.

Advance Performance (Unmodified Distributor) ►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of Hg)	Distr. RPM
0±½	0	300
0 ±½	2¼	500
3-4	5	800
7¼-8½	6	1200
9¼-10½	5¾	1500
12-13¼	4¼	2000

Advance Performance (Modified Distributor) ►With Distributor on Test Stand

Distr Degrees	Vacuum (" of Hg)	Distr. RPM
0	29	600
1-2	55	800
6¼-7¼	1 36	1200
10½-11½	2 66	1700
11-12¼	3 38	2000

►*DISTRIBUTOR INSTALLATION CAUTION:* Be sure oil pump intermediate shaft engages the seat in the oil pump. It may be necessary to turn over the engine with starter after distributor drive gear is partially engaged, in order to engage intermediate shaft fully in oil pump.

Initial Distributor Timing: Set engine crankshaft so that No.1 cylinder is at TDC after compression stroke (with timing mark in line with pointer). Install distributor so that rotor points to the No.1 spark plug wire terminal in distributor cap.

IGNITION TIMING

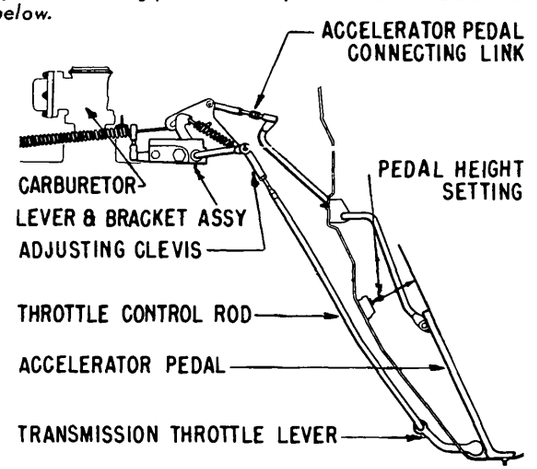
S tting - 4° BTDC (Std.), 6° BTDC (Fordomatic) with engine idling at 475 RPM and vacuum line disconnected *See Initial Distributor Timing above. NOTE* - Maximum initial timing recommended is 6° BTDC (Std.) and 8° BTDC (Fordomatic).
Timing Mark - Vibration damper marked "TDC", and "3", "5", "7", "9" degrees BTDC. Align correct mark with pointer on cylinder front cover.

CARBURETOR

Ford No. B7A-9510-C (Std. Trans.), B7A-9510-D (F rdomatic), B7A-9510-N (Std. & Fordomatic), B7A-9510-Y (Std. & Fordomatic), B7A-9510-M (Special Economy). "Visi-flo" single barrel

►*CARBURETOR MODIFICATION TO ELIMINATE ENGINE PING: See "Ford Visi-flo Carburetors" in Carburetion Section*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE Special cleaning procedure required. See AIR CLEANER below.*



FORDOMATIC TRANSMISSION THROTTLE LINKAGE

Throttle Linkage Adjustment (Fordomatic Cars): Adjust engine idle speed to 475-500 RPM with selector lever in "N" position and engine at normal operating temperature. Adjust anti-stall dashpot (see below). Set hand brake and check idle speed in Dr (Drive) range and adjust if necessary to 425-450 RPM. Pull throttle rod assembly upward firmly so transmission lever is against its internal stop, align hole in throttle rod clevis with hole in accelerator assembly by rotating clevis on throttle rod. Then lengthen throttle control rod 2½ turns counterclockwise. Assemble throttle control rod to accelerator assembly and adjust pedal height to 3.10" by changing length of accelerator assembly connecting link Road test car. If band or clutch slippage is evident, increase rod length to 3 turns but not more than 3½ turns of the clevis

Anti-Stall Dashpot (Fordomatic Cars): After engine idle speed adjusted to 475-500 RPM, turn off engine Loosen dashpot adjusting screw locknut Hold throttle in closed position and depress dashpot plunger with a screwdriver blade Turn dashpot or adjusting nut until 045-064" clearance obtained between dashpot plunger and throttle shaft lever Tighten locknut

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FORD "VISI-FLO"

Idle Setting - Initial setting 1 turn open. Turn adjusting screw in until engine begins to run roughly from lean mixture, then turn screw out until engine begins to roll from rich mixture Turn screw in until engine runs smoothly. Favor a slightly rich mixture, rather than a lean setting

Idle Speed - 475-500 RPM (Std. & O D) 475-500 RPM (Fordomatic) with selector in Neutral and check for 425-450 RPM in Dr (Drive) range Adjust as necessary to get drive range RPM

Fuel Level - 11/16" ± 1/32" below power valve mounting surface (Tool T52L-9550-AEE).

Accelerating Pump: Inner hole for average or hot weather operation, outer hole for cold weather operation.

Fast Idle· Integral type operated by choke valve No adjustment required

Throttle Linkage Adjustment: *See CARBURETOR above*

► *OTHER DATA See "Ford Visi-flo Carburetors" in Carburetion Section*

AIR CLEANER: DRY FILTER ELEMENT type Clean every 5,000 miles, replace element every 20,000 miles

► *CLEANING CAUTION·* Clean filter element by tapping and shaking to remove dirt particles. DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate

FUEL PUMP PRESSURE: 3 5-5.5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fu l Pump: Ford B5A-9350-A Fuel only (Exc Fordomatic & Overdrive Cars), B5A-9350-B Fuel & Vacuum (Fordomatic & Overdrive)

Fuel Pump Pressure - 4-5 lbs at 500 RPM

See "Fuel Fumps" in Carburetion Section

Gasoline Gauge: New King-Seeley Electric "CV" (Constant Voltage) with gauge voltage regulator Ford No B7A-10804-B

Dash Unit - Ford No B7A 9280-A

Tank Unit - Ford No B6A-9278-B

See "Fuel Gauges" in Carburetion Section

Air Cleaner: DRY FILTER ELEMENT Type Clean every 5,000 miles, replace element every 20,000 miles

► *CLEANING CAUTION* Clean filter element by tapping and shaking to remove dirt particles *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate*

BATTERY

Ford B6A-10655-C. 12 volt, 11 plate, 55 ampere hour capacity or **Ford B7A-10665-A,** 12 volt, 11 plate 70 ampere hour capacity (20 hour rate)

Battery Ground - Negative, to engine block

Engine Ground - Cylinder head to dash

STARTER

Ford B6A-11002-A. Armature - B6A-11005-B

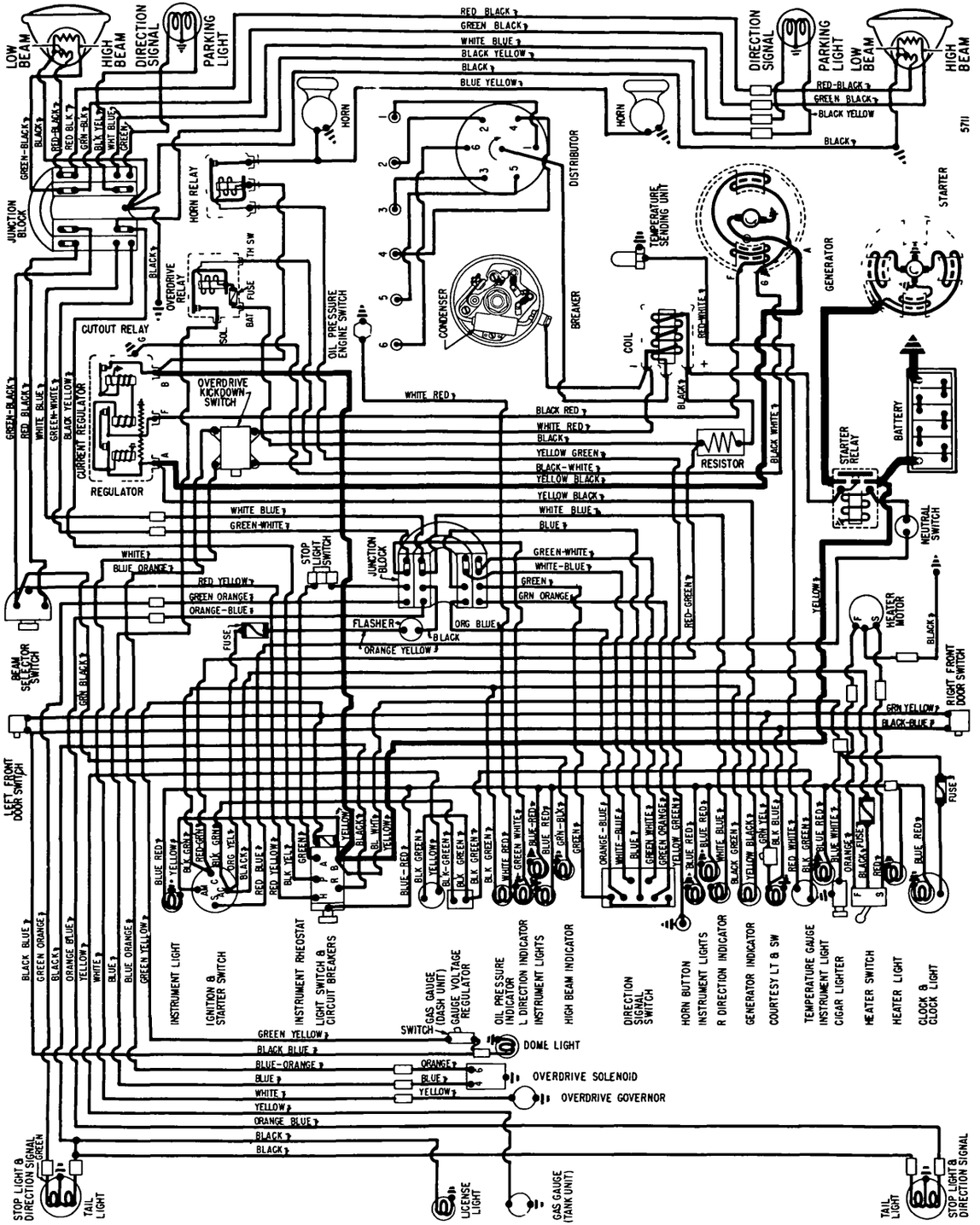
Drive - Ford ICM-11350-C Bendix "Folo-Thru"

Rotation - Counterclockwise at commutator end

Brush Spring Tensi n - 48-56 ozs

Cranking Spe d - 150-180 RPM, 190 amperes max

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Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	12.0	120
15.5 ft. lbs.		5.0	550

①- With starter on engine and engine idling.

Starting Switch: Magnetic type, Ford No. B6A-11450-A. Starter Switch is controlled by ignition switch. *NOTE* - Neutral Safety switch used on Fordomatic Transmissions.

Ford matic Neutral Safety Switch: Ford B7A-15812-A. **Adjustment** - *See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

F rd. Used as follows:

Generat r	Armature	Application
B6A-10002-C	B6C-10005-B	①Std.
B6A-10002-H	B6A-10005-A	②Std.
B6A-10002-F	B6C-10005-C	Special

①- With B6C-10505-B Regulator.
②- With B6A-10505-A Regulator.

►*40 AMPERE GENERATOR INSTALLATION CAUTION:* Install 2 Spacers, Ford No. 10148, to secure proper alignment of generator-to-water pump and fan pulleys. *NOTE* - Shorter or thinner spacer at front end of generator longer spacer at rear end.

Performance Data

Generator	Amperes	Eng. RPM
B6A-10002-C,H	30	1500
B6A-10002-F	40	1500

Brush Spring T nsi n - 26-34 ozs.
Fi ld Current - 1.5-1.6 amperes at 12 volts.
R tati n - Counterclockwise at commutator end.

Belt Adjustment: ¼" deflection midway between generator and water pump pulleys with light thumb pressure.

REGULATOR

Ford B6A-10505-A (B6A-10002-H Gen.), B6C-10505-B (B6A-10002-C Gen.), B6A-10505-B (B6A-10002-F Gen.).

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 75°F, ambient (engine compartment) temperature, after ½ hour operation in vehicle, or after regulator heated and stabilized.*

Cutout Relay

Cuts In - 12.0-12.8 volts.

Voltage Regulator

S tting - 14.6-15.4 volts at 75°F (Ambient).
Checking & Adjusting - *See Electrical Section.*

Current Regulator

S tting - 28-32 amperes (B6A-10505-A & B6C-10505-B), 38-42 amperes (B6A-10505-B).
Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Lighting Switch Removal: With control knob in "OFF" position, press spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut with Tool 17470-N. Remove Switch and disconnect all wires.

St p Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), on top of booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment.

CIRCUIT BREAKERS: On headlight switch. Combination headlight switch, circuit breaker, and fuse assembly used. One circuit breaker protects headlight circuit and second circuit breaker protects instrument, parking, stop and tail light circuits.

FUSES: Size & location as follows:
Back Up Light - SFE 7.5 ampere, in feed wire behind instrument panel.
Cigar Lighter - Sulphur disc in base or reset circuit breaker located on back of lighter socket.
Clock - 1 AG, in feed wire.
Heaters - SFE 14 ampere, in feed wire.
Interior Lamps - SFE 7.5 ampere, on lighting switch.
Overdrive - 15 AGC, on overdrive relay.
Spot Light - SFE 7.5 ampere in feed wire.
Turn Signal - SFE 7.5 ampere, in feed wire.

Horn Relay: Ford No. B7A-13853-H.

►*HORN RELAY REPLACEMENT NOTE:* When replacing a horn relay that has been shorted by water, be sure to spray new relay with a plastic ignition spray (around crimped areas in particular but not on terminals) and install three ¼" flat washers between mounting bracket and fender apron.

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. Valve-in-head.

Bore	Stroke	Displacement
3.62"	3.60"	223 Cu. Ins.

Compr. Ratio	Rated HP	Developed HP
8.6-1	31.54	.144 at 4200 RPM

Compression & Vacuum Reading - *See TUNE-UP.*

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Ford Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Ford Special Data.*

ENGINE REMOVAL: *See "Engine" in Ford Special Data.*

OIL PAN REMOVAL: Drain crankcase, Remove oil level indicator, engine left and right front splash aprons. Remove stabilizer bar, flywheel housing inspection cover, oil pan retaining screws, and pan.

PISTONS

Autothermic type. Solid skirt with three rings above pin.
Removal - Pistons and rods removed from above.

Fitting New Pistons: Clearance - .0009-.0015" at bottom of skirt. Use ½" ribbon feeler inserted between piston and cylinder wall at right angle to pin on thrust side, with piston inverted and end of piston 1½" below top of block. Pull required to remove feeler should be 5-10 lbs. when using feeler gauge thicknesses as follows:
New Piston in New Bore - .0015".
New Piston in Used Bore - .0020".
Used Piston in Used B re - .0025".

Replacem nt Pistons: Furnished with fitted pins in Std. and .020", .030", .040", .060" oversize.

Installing Pistons: Install piston with indentation in head of piston toward front of engine.

PISTON PINS

Floating type with lock ring at each end.
Diameter - .9120-.9123". **Length** - 3.016-3.030".
Pin Fit in Piston - .0001-.0003", wear limit .0008".
Pin Fit in Rod Bushing - .0001-.0003", wear limit .0008".

Replacement Pins: Standard, and .001", .002" oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1,2	3/32"	.010-.027"	.002-.0035"
Oil #3	3/16"	.015-.062"	①

①- Side sealing type ring.

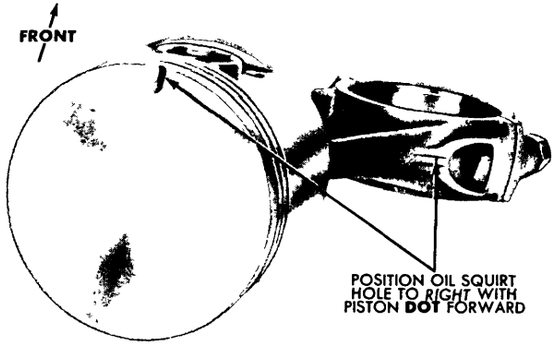
Replacement Rings: Standard, .020", .030", .040", .060" oversize (Expander type).

CONNECTING RODS

Journal Diameter - 2.2980-2.2988".
Clearance - .0004-.0023", wear limit .0033".
Side Clearance - .003-.009", wear limit .012".

Replacement Bearings: Standard size (4 sizes marked **Red** & **Blue** for selective fitting) and .010", .020", .030" Undersize.

Installing Rods: Install rod with squirt hole to right and piston indentation toward front of engine.



FORD 6 CYL. PISTON & ROD ASSY.

CRANKSHAFT

Journal Diameter - 2.4980-2.4988". Four Bearings.
Bearings - Steel backed, copper lead alloy, or lead babbitt.
Clearance - **Copper Lead** - .0005-.0025", wear limit .0035". **Lead Babbitt** - .0005-.0021", wear limit .0031".

Replacement Bearings: Standard size, (4 sizes marked **Red** & **Blue** for selective fitting) and .010", .020", .030" Undersize.

End Thrust: Taken on rear intermediate #3 bearing.
Thrust Bearing Alignment - *See "Crankshaft & Main Bearings" in Ford Special Data.*
End Play - .004-.008", wear limit .012".

Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Ford Special Data.*

Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Ford Special Data.*

►*OIL SLINGER NOTE:* A crankshaft front oil slinger is incorporated on all cars and truck engines to reduce oil leakage at front oil seal. Slinger is held in

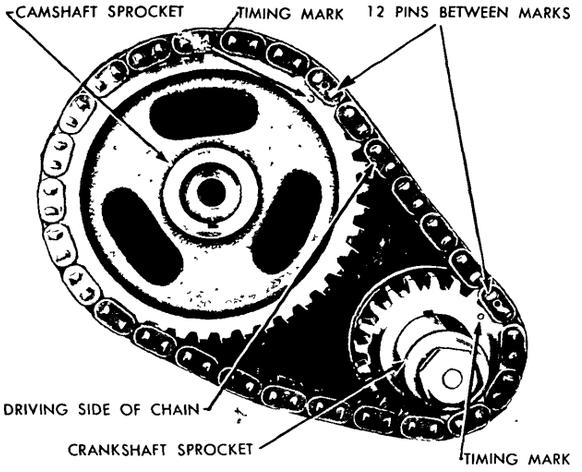
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place by crankshaft pulley and cylinder front cover. To remove slinger, remove cylinder front cover and slide slinger off crankshaft.

CAMSHAFT

Journal Diameter - 1.9255-1.9265".
Clearance - .001-.003", wear limit .006".
End Thrust: Taken by thrust plate and spacer behind camshaft sprocket. *NOTE* - Chamfer on inside of spacer must be toward camshaft journal.
R placement Bearings: Finished bearings furnished Standard, and .015" undersize. *CAUTION* - Rear intermediate (#3) bearing not interchangeable with other bearings.
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Ford Special Data.*
Timing Chain: Side-guide type. 56 links.
► *REPLACEMENT NOTE:* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side and measure on opposite side). Remove and install chain as a unit with both sprockets.
Camshaft Setting: Sprockets marked by "O" at one tooth. Mesh chain so that there are 12 pins between "O" marks on driving side of chain.



FORD 6 CYL. VALVE TIMING MARKS

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Ford Special Data.*
Engine Front Cover Removal: *See "Engine Front Cover" in Ford Special Data*

VALVES

Tappet Clearance: .019" Intake & Exhaust (Hot or Cold).

Valve	Head Diameter	① Stem Diameter
Intake	1.775-1.785"	.3416-.3423"
Exhaust	1.505-1.515"	.3403-.3410"

Valves	Seat Angle	② Lift	③ Stem Clearanc
Intake	45°	.273"	.001-.0024"
Exhaust	45°	.273"	.0023-.0037"

①- Furnished with .003", .015", .030" oversize stems.
②- Cam lobe lift. Wear limit, .268".
③- Wear limit .0045" (Intake), .0065" (Exhaust).

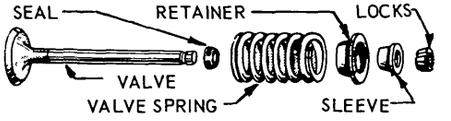
► *ROTATABLE VALVE NOTE: All valves are rotatable type. See "Valve System" in Ford Special Data.*
Valve Stem Seals - Umbrella type seals used on both intake and exhaust valve stems, cupped side down.
Valve Seat Width - .060-.080" (Intake), .070-.090" (Exhaust).
Valve Springs: Free Length - 2.09" approximately.

Valve Spring Specifications

Valve	Spring Pressure	Length
Intake	①71-79 lbs.	1.780"
Exhaust	②161-177 lbs.	1.390"

①- Wear limit 64 lbs. at 1.780".
②- Wear limit 145 lbs. at 1.390".

► *VALVE SPRING INSTALLATION NOTE:* Measure valve spring assembled height from machined surface of cylinder head spring pad to spring retainer contact surface. If assembled height is 1 13/16" or greater, install necessary .030" spacer or spacers between cylinder head valve spring pad and valve spring to bring assembled height to recommended dimension of 1 25/32-1 13/16".
Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (see table above), ream guides and install oversize valves. *See "Valve System" in Ford Special Data.*
Valve Lifters: Mushroom type. Removed from below with camshaft out.
Rocker Arm Assembly: *See "Valve System" in Ford Special Data.*



FORD 6 CYL. VALVE ASSEMBLY

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
► *VALVE TIMING NOTE:* The following valve opening and closing points are with camlift as indicated.
Intake Valves - Open 17° ① BTDC. Close 53° ② ALDC.
Exhaust Valves - Open 61° ① BLDC. Close 9° ② ATDC.
①- Camlift .016". ②- Camlift .019".
Valve Timing Check - Release No. 1 Intake valve adjusting screw, push rocker arm to one side, install dial indicator in pushrod socket. Zero indicator with cam on heel of lobe. Install quadrant on crankshaft pulley, rotate engine to amount of lobe lift shown in table above, then check quadrant and compare reading with degrees shown in table above for that valve.

OILING SYSTEM

Crankcase Capacity: 4 quarts (refill), 5 quarts (when filter element changed).
Normal Oil Pressure: 45-50 lbs. at 2000 RPM.
Pressure Regulator Valve - In pump body, not adjustable.
Oil Pressure Indicator - Indicator light on instrument panel, operated by engine unit, Ford No. B6A-9278-B
Oil Pump: Gear type pump located in crankcase,
Pump Overhaul - *See "Oil Pump" in Ford Special Data.*
Oil Filter: New "Disposable" type. Replace at 4000 mile intervals.
Disposable Filter Replacement - Coat gasket face of filter with oil, thread filter on insert by hand until gasket contacts adapter surface, then tighten filter an additional one-half turn.
Crankcase Ventilation: Filter in oil filler cap (inlet), an outlet pipe in rear of crankcase at left side

COOLING

Water Capacity: 15 quarts, add 1 quart for heater.
Pressure Valve: Ford LA-8100-A Radiator filler cap. Opens 12-15 lbs. *CAUTION* - Use only 12-15 lb. cap. for replacement.
Thermostat: Ford No. EAA-8575-A (157-162°F) standard, Ford No. EAA-8575-B (177-182°F) for use with permanent anti-freeze.
Water Pump: Packless, sealed ball bearing type.
See "Ford 6 Cyl." in Water Pump Section.
Temperature Gauge: New King-Seeley Electric Constant-voltage ("CV") type, with gauge voltage regulator Ford No. B7A-10804-B.
Dash Unit - Ford No. B7A-10883-A.
Engine Unit - Ford No. B7A-10884-A.
► *TEMPERATURE UNIT (CYL. HEAD) CAUTION:* 1957 Unit Ford No. B6A-10884-A will not transmit proper temperature when used with a 1956 Cyl. Head No. B6A-6049-D. Use Unit No. B7A-10884-B
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 9½ CF. No. 268594, 11 CF 266978. Semi-Centrifugal type.
See "Long Clutches" in Clutch Section.
Clutch Disc - Long No. 288824, (9½ CF) 285419 (11CF).
Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper and bracket until travel is within limits. Adjust assist spring link to give assist spring length of 6 5/8" when clutch is fully released.
Pedal Free Travel - 1 1/8-1 3/8". Loosen locknut on clutch pedal release rod, turn adjusting nut until correct travel is obtained. *NOTE* - Check free travel by operating engine at 3000 RPM with transmission in neutral position. There should be a minimum of ½" free travel under these conditions.
Removal: Remove flywheel housing cover, release lever, and retracting spring. Slide release bearing and hub off release lever. Mark clutch cover and flywheel for reinstallation, loosen six cover bolts uniformly to release spring tension, remove cover and pressure plate through opening of flywheel housing.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See "Ford Synchro-mesh" in Transmission Section.
Transmission Control: *See "Transmission Controls" in Transmission Section.*
Removal: With car raised up, disconnect drive shaft at rear universal joint, slide drive shaft off transmission output shaft. Remove speedometer cable and gear. Disconnect shift rods at transmission. Remove rear engine support to extension housing bolts. Disconnect parking brake adjusting rod from equalizer bracket. Support rear of engine and remove rear en-

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gine support, then lower engine for clearance, and remove transmission to flywheel housing bolts. Use guide pins in two lower bolt holes and slide transmission back until input shaft clears flywheel housing, and lower transmission.

OVERDRIVE

Warner R10. Solenoid operated type, with governor control and throttle operated kick-down.
See "Warner R10 Overdrive" in Transmission Section.
Overdrive Control: *See "Overdrive Control" in Transmission Section.*
Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque Converter and three speed automatic transmission with hydraulic control.
See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section.
▷ *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section.*
▷ *TESTING & TROUBLE SHOOTING: See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section.*
Lubrication - Check transmission fluid at 1,000 mile intervals and maintain level at "F" mark on indicator. Drain and refill every 25,000 miles. Use only Automatic Transmission Fluid Type "A".
Checking Fluid Level - Bring transmission to operating temperature by running engine with selector lever in Neutral position. Move selector lever through all ranges to assure fluid distribution, then place lever in "P" (Park) position for checking fluid level. Add Automatic Transmission Fluid Type "A" to bring level to "Full" mark on indicator.
Throttle Linkage Adjustment: *See CARBURETOR above.*
▷ *OTHER FORDOMATIC SERVICE DATA: See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section.*

UNIVERSALS

Mechanics. Needle bearing type.
▷ *CAUTION:* Rear universal joint companion flange nut controls pinion bearing preload (must be adjusted whenever nut is loosened). *See "1957 Ford & Mercury" in Rear Axle Section.*

REAR AXLE

Own. New Separate Carrier type, semi-floating, hypoid with Hotchkiss Drive. *NOTE - Same type used on all models.*
See "1957 Ford & Mercury" in Rear Axle Section.

Model	Axle Ratios Sta. Wgn.	Others
Conventional	3.89-1①	3.70-1 ②3.89-1)
Overdrive	4.11-1	3.89-1 ②3.70-1)
Fordomatic	3.56-1	3.10-1 ②3.56-1)

①- 4.11-1 Optl. ②- Optional.
Backlash - .004-.009".
Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull axle shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.
Carrier Assembly Removal: *NOTE* - Pinion carrier assembly can be removed separately without disturbing differential carrier by disconnecting rear universal joint at companion flange, and removing five bolts that attach pinion carrier assembly to differential carrier housing. With rear universal joint disconnected, axle shafts removed (see above), remove differential carrier housing to rear axle housing bolts and lift out carrier assembly.
Wheel Bearing Adjustment: None required.

SHOCK ABSORBERS

Direct acting, non-adjustable. Service by replacement.

Model	①Front	①Rear
Pass. Cars (Std.)	B7A-18124-A	B7A-18125-A
Pass. Cars (H.D.)	B7A-18124-B	B7A-18125-B
Sta. Wgn. & Sed. Del.	B7A-18125-C	
Tudor Sedan (Hard Top) Std.	B7A-18125-D	
Tudor Sedan (Hard Top) H.D.	B7A-18125-E	

① - Furnished in kits which include shock absorber mounting bushing.
▷ *FRONT SHOCK ABSORBER UPPER BUSHING NOTE:* Install bushing with groove seated in frame hole flange, and do not dislodge when installing shock absorber.

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers mounted within front coil springs.
See "Lincoln, Mercury, Ford (Ball Joint)" in Suspensions & Wheel Alignment Section.
Caster - Pos. ½° to Pos. 1½°. Maximum variation between wheels ½°.
Camber - Pos. ½° to Pos. 1½°. ¼° preferred. Maximum variation between wheels ½°.
Toe-In - 1/16" to 1 8". *NOTE* - When checking toe-in on cars with power steering, engine should be running so that power steering control valve will be properly centered.
Toe-Out on Turns - With Outer wheel at 20°, inner wheel should be 24¼°.

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type.
See "Gemmer Worm & Roller" in Steering Section.
Power Steering: Ford-Mercury Linkage type. Used in conjuction with standard type steering gear.
See "Ford & Mercury Bendix Linkage Type" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller (3-tooth)" in Steering Section.*
Steering Gear Removal: *See "Gemmer Worm & Roller (3-tooth)" in Steering Section.*

BRAKES

Ford-Bendix Hydraulic. Hand lever applies rear wheel service brakes.
▷ *BRAKE DESIGN NOTE:* Front brake anchor pin (fixed anchor type) is mounted on wheel spindle independently of backing plate (wheel cylinder mounted on anchor pin).
See "Ford, Lincoln, Mercury Bendix" in Brake Section.
▷ *BRAKE PULLING CORRECTION:* To correct, loosen anchor pin attaching bolt (See Brake Design Note above) and retighten to 80-100 ft. lbs.
Drum Diameter - 11" front and rear.
Wheel Cylinder Diameter - 1 1/8" (Front-All), 7/8" (Rear-Pass. Cars), 15/16" (Rear - Sta. Wgn.)

Model	(Width & Length) Primary	Secondary
Pass. Car(Front)	2 1/4"x10.62"	2 1/4"x 11.93"
(Rear)	1 3/4"x10.62"	1 3/4"x 11.93"
Sta. Wgn.(Front)	2 1/4"x10.62"	2"x 10.62"
(Rear)	2 1/4"x11.93"	2"x 11.93"

Clearance - Adjusting screw backed off 10-12 notches from point where shoes are tight against drum.
Brake Pedal Free Play Adjustment: 5/16" to 7/16". If play not correct after brake adjustment, loosen locknut on the eccentric bolt that attaches brake pedal assembly to master cylinder pushrod, rotate eccentric bolt for desired clearance, tighten locknut.
Standard Master Cylinder: Located on engine side of firewall.
Checking Fluid - Maintain fluid level to within ½" of top of reservoir.
Removal - Disconnect rubber boot from rear end of master cylinder, brake line at master cylinder fitting, stop light switch from front of cylinder and disconnect wires from switch. Push down brake pedal several times to force as much fluid as possible (into clean container), remove bolts that secure master cylinder to dash panel. Do not disconnect pushrod from brake pedal unless it is to be serviced.
Power Brakes: New "Bellows Type." Pedal assist power unit with vacuum bellows and control valves mounted on drivers side of dash panel and attached direct to brake power lever.
See "Ford Bellows Type" in Brake Section.
Checking Fluid Level - Maintain fluid to within ½" of top of reservoir.
Removal - Remove vacuum hose from top of unit, valve adjusting eccentric with flat washer, spring, and bushing, nylon bushing from power unit valve housing. Remove two mounting screws (bracket-to-dash panel) and remove power unit from car.

MISC. MECHANICAL

Windshield Wipers: New Cable operated type with tension assemblies.
See "Windshield Wipers" in Miscellaneous Section.
Power Window Regulators: Reversible motor in each window. *See "Electric Window Regulators" in Misc. Section.*
Power Top Control: Electric-Hydraulic with reversible pump motor. *See "Power Top Controls" in Misc. Sect.*
Power Seat Adjusters: "4-way" Electric Screw and Jack type with single electric motor driving a screw jack.
See "Power Seat Adjusters" in Miscellaneous Sect.

►*SPECIAL 270 HP (DUAL 4-BARREL CARBURETOR) & 300 HP (SUPERCHARGED) HIGH PERFORMANCE ENGINES:* Special 312" Engines. Specifications and service data on the equipment used on these engines are given below.

MODEL IDENTIFICATION

VEHICLE NUMBER: Stamped on patent plate on left front body pillar (Exc. Thunderbird). On dash panel in engine compartment (Thunderbird).
First Number - 100001 and up.

►*VEHICLE NUMBER NOTE:* Vehicle number (Example *C7FV100501*) includes following identification data in sequence

Eng. Type ①	Year ②	Assy. Plant	Body Style ③	Serial No.
C	7	See below	See below	100501

① Engine Type
B - V8 272 cu. in. Engine (Dual Carb.).
C - V8 292 cu. in. Engine (Dual Carb.).
D - V8 312 cu. in. Engine (4-Barrel Carb.).
E - V8 312 cu. in. Engine (Dual 4-Barrel Carb.).
② - Last digit of model year (1957).
③ Body Styles
C - Conv. (Fairlane 500), **F** - Ranchero.
G - Tudor & Fordor (Custom & Custom 300).
H - Thunderbird, Ranch Wagon (Custom 300).
S - Sedan Delivery (Courier).
T - Tudor & Fordor - Hardtop (Fairlane & 500).
V - Victoria Tudor & Fordor (Fairlane & 500).
W - Retractable Hardtop (Fairlane & 500).
X - Country Sedan. **Y** - Country Squire.

Assembly Plant Designation

A - Atlanta	**F** - Dearborn	**N** - Norfolk
B - Buffalo	**G** - Chicago	**P** - St. Paul
C - Chester	**K** - Kansas City	**R** - San Jose
D - Dallas	**L** - Long Beach	**S** - Somerville
E - Mahwah	**M** - Memphis	**U** - Louisville

TUNE-UP

COMPRESSION PRESSURE: 160-165 lbs. (All Engines except Schgd. 300 HP), 120-130 lbs. (Schgd. 300 HP) at cranking speed.

VACUUM READING: Steady 19-20" idling at 475-500 RPM in Neutral.

VALVE TAPPET CLEARANCE: (All Engines except Schgd. 300 HP with B7A-6250-C Camshaft) - .020" (Intake & Exhaust COLD), .019" (Intake & Exhaust HOT). If tappet clearance set with engine Cold, recheck tappet clearance after engine operated for 30 minutes to normalize temperature and set to HOT figure.
(300 HP Engine with B7A-6250-C Camshaft) - .020" Intake, .025" Exhaust, HOT.

►*SELF LOCKING TAPPET ADJUSTING SCREW NOTE:* Self locking adjustment screws used which have interference thread fit at center portion of threads. Replace adjusting screw or adjusting screw and rocker arm assembly

MANIFOLD HEAT CONTROL: Automatic thermostatic type with counterweight. Valve is closed when engine is at normal temperature and running at idle speed, and is open when operating at high RPM. Spring is installed with ¾ turn wind-up and hooked over stop pin.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders - RIGHT BANK 1-2-3-4, LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .032-.036".
Spark Plugs - Champion No 870 (272 Eng), No 860 (292 & 312 Eng.) - Early F-14Y later production, all engines *NOTE* - Use F-14Y for replacement 18 mm

►*SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be torque tightened within range of 15-20 ft.lbs.

COIL: Ford No. B6A-12029-B.
Ignition Current - 2 5 amps. idling, 4.5 amps stopped.
Resistor - Ford No B6A-12250-D. 1.3-1.4 Ohms.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

►*312" ENGINE COIL RESISTOR INTERFERENCE CORRECTION.* Resistor may ground on intake manifold To correct loosen mounting bracket bolt and rotate resistor assembly 45° counterclockwise Tighten bolt

DISTRIBUTOR: New type with separate mechanical and vacuum spark advance systems Tachometer Drive attachment on Thunderbird Used as follows

Engine	Distributor No.
272" & 292"	B7A-12127-A
312" (Std)	B7A-12127-D
312" (2 Carbs)	B7A-12127-E
312" (Supercharged)	B7A-12127-G
Thunderbird (292" & 312" Std)	B7S-12127-A
Thunderbird (312" 2-Carb)	B7S-12127-B
Thunderbird (312" Schgd)	B7S-12127-C

See "Ford, Lincoln, Mercury Distributors" in Electrical Section

►*SCHGD 300 HP ENGINE DISTRIBUTOR NOTE* This distributor is "Double Breaker" type Set both sets of points to the same gap
Condenser - Ford B7A-12300-B (B7A-12127-G & B7S-12127-C Distr), B7A-12300-A (Others) **Capacity** - 21 25 mfd
Contact Point Set - Ford B7A-12171-B (B7A-12127-G & B7S-12127-C Distr), B7A-12171 A (Others)
Breaker Gap - 014- 016" (All Models) On double breaker distributor set both sets of points alike
Cam Angle - 26-28½° (Single Breaker Distr), 33-36° (Double Breaker Distr)
Breaker Arm Spring Tension - 17-20 ozs (All Models)
Rotation - Counterclockwise viewed from above

Automatic Advance - B7A-12127-A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		375	0		750
¾-1¾		425	1½-3½		850
6-7		600	12-14		1200
11½-12½		1300	23-25		2600
17-18		2000	34-36		4000

Automatic Advance - B7A-12127-D & B7S-12127-A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
½-1½		450	1-3		900
3¼-4¼		550	6½-8½		1100
8-9		1325	16-18		2650
12¼-13¼		2000	24½-26½		4000

Automatic Advance - B7S-12127-B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		250	0-½		500
2¾-3¾		400	5½-7½		800
7-8		550	14-16		1100
9½-10½		725	19-21		1450
13½-15		2000	27-30		4000

Automatic Advance - B7S-12127-C

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0-½		600
2-3		400	4-6		800
8-9		600	16-18		1200
9¾-11		1500	19½-22		3000
10¾-12		2000	21½-24		4000

Vacuum Spark Control: Diaphragm type. Mounted on distributor and linked directly to breaker plate.

Vacuum Advance - B7A-12127-A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0-2	5
5-7	10-14	10
10-12	20-24	14-20

Vacuum Advance - B7A-12127-D & B7S-12127-A

Distr. Degrees	Eng Degrees	Vacuum (" of HG)
Start	0-2	5
5-7	10-14	10
11-13	22-26	15-20

Vacuum Advance - B7S-12127-B

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0-2	5"
5¼-7¼	10½-14½	10"
7-9	14-18	15-20"

Vacuum Advance - B7S-12127-C

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	1"
0-1	0-2	5"
1-3	2-6	7"
9-11	18-22	14-20"

IGNITION TIMING

Engine	Std. Ign. Setting
All exc.300HP (Std. & OD)	3° BTDC (Max. 6° BTDC)
All exc. 300 HP (Fordomatic)	6° BTDC (Max. 8° BTDC)
300 HP Schgd. (All Trans.)	6° BTDC (Max.10°BTDC)

Timing Mark - Vibration damper marked "TDC" and "2 ", "4", "6", "8", "10" degrees BTDC. Align correct mark with pointer (bolted to water pump)

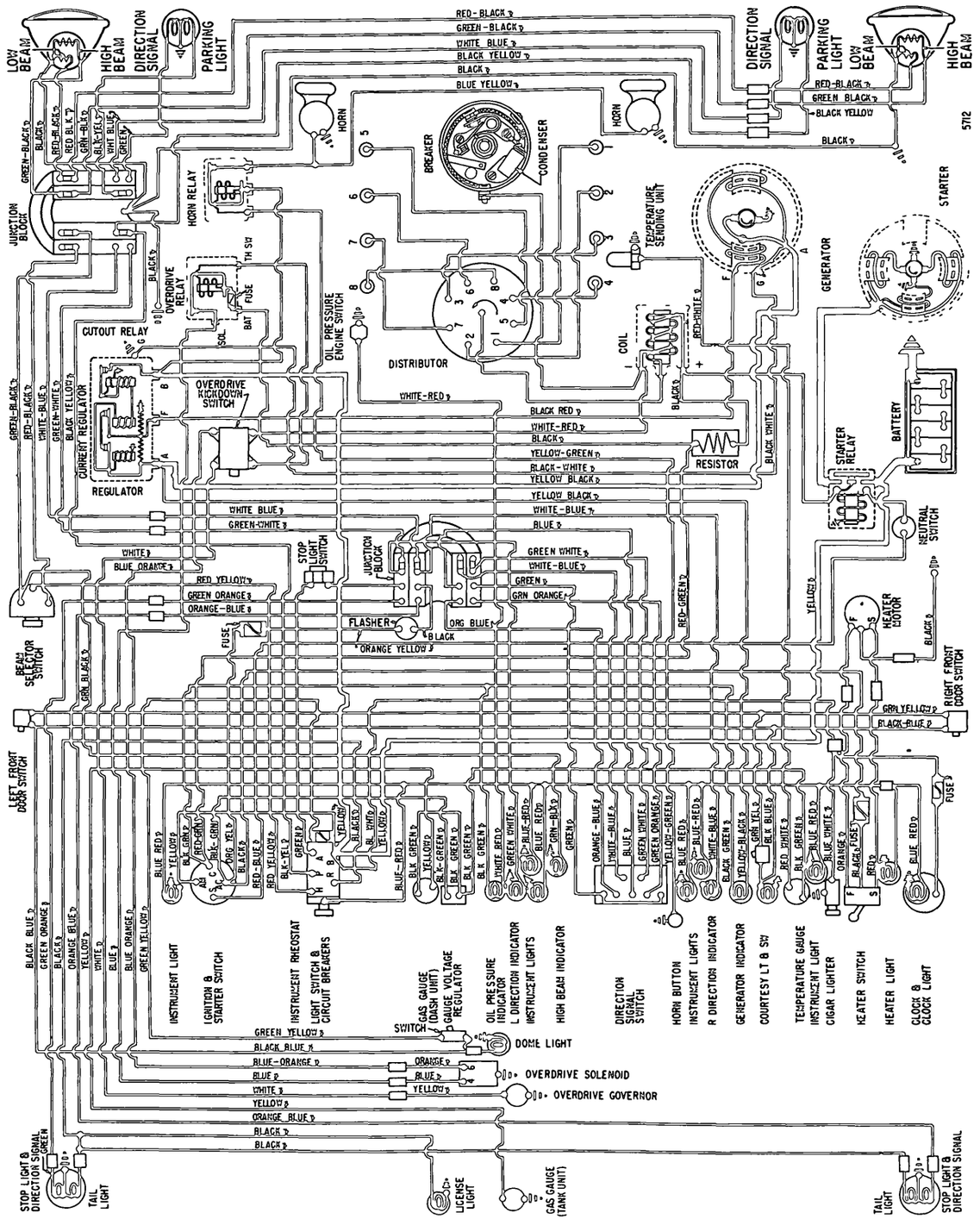
CARBURETOR

►*CARBURETOR APPLICATION Two-barrel carburetors used on 272 & 292 cu. in. engines, 4-barrel carburetors used on 312 cu in. engine. All new typ s*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required See AIR CLEANER below.*

Throttle Linkage Adjustment (Fordomatic Cars)· With engine at normal operating temperature and idle speed

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correctly set at 425-450 RPM with selector lever in "Dr" range, disconnect throttle control rod, lock accelerator shaft assembly by inserting pin (¼" drill rod) in lever and bracket, adjust carburetor connecting link so that throttle valves closed. *NOTE* - Holes should remain aligned with pin removed. Adjust clevis on throttle rod while holding throttle control upward against transmission inner stop so pin will enter freely, then turn clevis counter-clockwise 3 turns. Connect assembly. Adjust pedal height to 3.10" (Thunderbird 4.88") by changing length of accelerator assembly connecting link. Road test car. If band or clutch slippage is evident, increase rod length to 3½ turns, but do not exceed 4 turns of clevis.

Dashpot Adjustment (Holley & Ford Carburetors): With engine idle speed set to specifications and throttle closed, there should be .045-.064" clearance between end of dashpot plunger and throttle lever with dashpot plunger fully depressed. To adjust, loosen dashpot locknut, turn adjustment nut to increase or decrease clearance. Tighten locknut.

Dashpot Adjustment (Carter Carburetors): Hold throttle valves wide open. Distance between top surface of bowl cover and bottom of lever should be 7/16". To adjust, bend dashpot inner arm tang (Tool T109-22).

▷ *CARBURETOR LEAKAGE CORRECTION (2 & 4-barrel Carbs.): Overtightening accelerator pump cover plate may distort cover causing leak. Tighten cover evenly and only enough to stop leaking. Replace cover if distorted.*

FORD 2 & 4-BARREL

Ford 2 & 4-barrel carburetors used as follows:

Model 2-BARREL CARBURETORS	Carburetor No.
Pass. Cars 272" Eng. ① ② (Early)	B7A-9510-A
Pass. Cars 272" Eng ① ② (Later)	B7A-9510-Q
Pass. Cars 272" Eng ① ② (Later)	B7A-9510-Z
Pass Cars 292" Eng ①	B7A-9510-E
Pass Cars 292" Eng ③ (Early)	B7A-9510-L
Pass. Cars 292" Eng ③ (Later)	B7A-9510-W
Model 4-BARREL CARBURETORS	**Carburetor No.**
Pass. Cars 312" Eng. ③ (Early)	B7A-9510-B
Pass. Cars 312" Eng ③ (Later)	B7A-9510-X

① - Synchro-mesh transmission.

② - When used with Fordomatic, dashpot and attaching parts must also be used.

③ - Fordomatic transmission.

▷ *CARBURETOR IDENTIFICATION NOTE: To identify carburetors see "Ford 2 & 4-Barrel Carburetors" in Carburetion Section*

▷ *DISTRIBUTOR VACUUM LINE INTERFERENCE CORRECTION:* Distributor vacuum line may interfere with fast idle adjusting screw at ¾-open throttle. To correct, reposition vacuum line to give proper clearance.

▷ *CARBURETOR-TO-INTAKE MANIFOLD GASKET INSTALLATION NOTE:* Two gaskets, Part No. B7A-9447-A, and 1 spacer, Part No. B7A-9603-C, are required.

▷ *PRODUCTION CHANGES AND RECOMMENDED PARTS AND SETTING CHANGES FOR IMPROVED PERFOR-*

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MANCE: S "Ford 2 & 4-Barrel Carburetors" in Carburetion Section

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl 2-3-5-8, LEFT barrels 1-4-6-7*

Idle Setting - Initial setting 1 turn open. Set both screws alike. Turn adjusting screws in until engine begins to run rough from the lean mixture, then turn screws out until engine begins to roll from rich mixture. Turn screws in until engine runs smoothly. Favor a slightly rich mixture. Turn screws out for richer mixture.

Idle Speed - 475-500 RPM (Std. & O.D.), 475-500 RPM (Fordomatic) with selector lever in Neutral and check for 425-450 RPM in "DR" (Drive) range. Adjust as necessary to get drive range RPM.

Thr ttle Linkage Adjustment (Fordomatic Cars): *See CARBURETOR above.*

►*OTHER DATA: See "Ford 2 & 4-Barrel Carburetors" in Carburetion Section*

HOLLEY 2 & 4-BARREL

Holley 2 & 4-barrel carburetors used as follows:

Model 2-BARREL CARBURETORS	Carburetor No.
Pass. Cars 272" Eng. ① (Early)	B7A-9510-F
Pass. Cars 272" Eng ① (Later)	B7A-9510-R
Pass. Cars 272" Eng. ① ② (Later)	B7A-9510-AA
Pass. Cars 292" Eng. ① (Early)	B7A-9510-G
Pass. Cars 292" Eng. ① (Later)	B7A-9510-S
Pass. Cars 292" Eng. ① (Later)	B7A-9510-AB
Pass. Cars 292" Eng. ③ (Early)	B7A-9510-K
Pass. Cars 292" Eng. ③ ② (Later)	B7A-9510-T
Thunderbird 292" Eng. ① (Early)	B7A-9510-G
Thunderbird 292" Eng. ① (Later)	B7A-9510-T
Model 4-BARREL CARBURETORS	**Carburetor No.**
Pass Cars 312" Eng. ③ ④ (Early)	B7A-9510-H
Pass. Cars 312" Eng. ③ ④ (Later)	B7A-9510-U
Thunderbird 312" Eng. ③ ④ (Early)	B7A-9510-H
Thunderbird 312" Eng. ③ ④ (Later)	B7A-9510-U

① - Synchro-mesh transmission.

② - When used with Fordomatic, dashpot and attaching parts must also be used.

③ - Fordomatic transmission.

④ - When used with synchro-mesh transmission, remove dashpot and attaching parts.

►*CARBURETOR IDENTIFICATION NOTE: To identify carburetors see "Holley 2 & 4-Barrel Carburetors" in Carburetion Section*

►*CARBURETOR-TO-INTAKE MANIFOLD GASKET INSTALLATION NOTE:* Two gaskets, Part No. B7A-9447-B (Neoprene or Asbestos), and 1 spacer, Part No. B7A-9603-D ("Resinoid"), are required. *NOTE* - The "Resinoid" spacer should be used to correct a hard hot starting condition where the aluminum spacer (B7A-9603-B) is found

►*PRODUCTION CHANGES AND RECOMMENDED PARTS AND SETTING CHANGES FOR IMPROVED PERFORMANCE: See "Holley 2 & 4-Barrel Carburetors" in Carbur tion Section*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barr ls feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting - Initial setting 1 turn open. Set both screws alike. Turn adjusting screws in until engine begins to run rough from the lean mixture, then turn screws out until engine begins to roll from rich mixture. Turn screws in until engine runs smoothly. Favor a slightly rich mixture. Turn screws out for richer mixture.

Idle Speed - 475-500 RPM with selector lever in Neutral and check for 425-450 RPM in "DR" (Drive) range. Adjust as necessary to get drive range RPM.

Throttle Linkage Adjustment (Fordomatic Cars): *See CARBURETOR above.*

►*OTHER DATA: See "Holley 2 & 4-Barrel Carburetors" in Carburetion Section*

CARTER AFB 4-BARREL

Carter AFB No. 2441S, SA.

►*SURGE CORRECTION DUE TO LEANNESS:* Install new venturi assemblies, metering rods, and vacuum piston spring. *See "Carter AFB Carburetors" in Carburetion Section*

►*CHOKE SETTING CHANGE:* Changed from 2 notches rich to 1 notch rich. *See "Carter AFB Carburetors" in Carburetion Section*

►*HARD HOT STARTING CORRECTION:* Install carburetor-to-intake manifold "Resinoid" spacer, Part No. B7A-9603-D, in place of aluminum spacer B7A-9603-B

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*

Idle Setting - Initial setting 1 turn open. Set both screws alike. Turn adjusting screws in until engine beginsto run rough from the lean mixture, then turn screws out until engine begins to roll from rich mixture. Turn screws in until engine runs smoothly. Favor a slightly rich mixture. Turn screws out for richer mixture.

Idle Speed - 475-500 RPM with selector lever in Neutral and check for 425-450 RPM in "DR" (Drive) range. Adjust as necessary to get drive range RPM.

Throttle Linkage Adjustment (Fordomatic Cars): *See CARBURETOR above.*

►*OTHER DATA: See "Carter AFB Carburetors" in Carburetion Section*

270 HP ENGINE CARBURETORS
(Dual 4-Barrel)

Two Holley 4-barrel carburetors, **Part No. B7A-9510-P,** used. Similar in design to previous models.

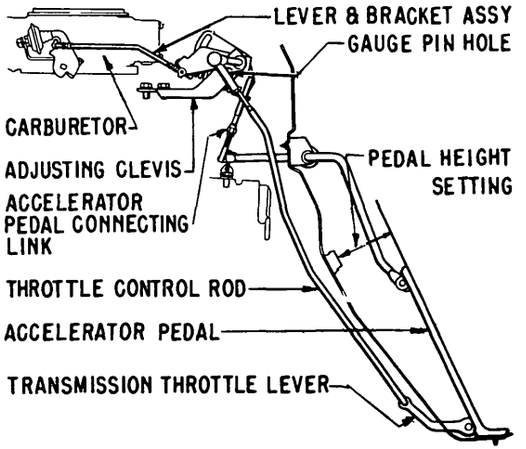
►*CARBURETOR IDENTIFICATION NOTE:* Carburetors stamped ECJ-9510-AA or ECJ-9510-AB on mounting flange

►*ADJUSTMENT NOTE:* Front and rear carburetors linked together by synchronizer rod which must be adjusted for correct synchronized operation of the carburetors (make this adjustment first).

Throttle Linkage Adjustment - 1) Disconnect rear end of throttle synchronizer rod from rear carburetor. 2) Back off throttle stopscrews so that throttle valves of both front and rear carburetors completely closed. 3) Adjust throttle synchronizer rod length so that rod end enters rear carburetor throttle lever freely, connect rod. 4) Set idle speed by adjusting throttle stopscrews. 5) Adjust idle mixture by adjusting both screws on rear carburetor first, and screws on front carburetor last.

Idl Sp d Setting - 500-600 RPM (All Transmissions) with selector lever in Neutral on Fordomatic Cars.

Idle Mixture Setting - Both screws (primary side only) 5/8 turn open. Adjust both screws alike. Turn screws out for richer mixture.



FORDOMATIC TRANSMISSI N THROTTLE LINKAGE

►*OTHER DATA. See "Holley (Ford, Lincoln, Mercury) 4-Barrel Carburetors" in Carburetion Section*

300 HP SCHGD. ENGINE
(Supercharger & Carburetor)

Holley 4-barrel carburetor used as follows:

Model	Carburet r N .
Pass. Car	B7A-9510-AC
Thunderbird (Early)	B7A-9510-V
Thunderbird (Later)	B7A-9510-AC

►*CARBURETOR IDENTIFICATION NOTE:* Model B7A-9510-V stamped EDB-9510-AA on edge of carburetor mounting flange.

SUPERCHARGER

►*SUPERCHARGER CAUTION: Two different McCulloch Superchargers may be found on th se engines:*

1) Conventional Type - This supercharger has variable speed pulley (High & Low Blower) operated by manifold vacuum.

2) Special Type - This supercharger does not have variable speed pulley and is controlled by carburetor linkage and engine oil pressure (special connection to engine oil pressure system). The following operating precautions must be observed with this type supercharger.

►*OPERATING CAUTION (SPECIAL TYPE SUPERCHARGER):* The engine MUST NOT BE OPERATED with the flexible air hose (between supercharger and carburetor) disconnected, or with Flapper Valve in carburetor elbow not properly seated, or with any restriction in air intake (would result in internal oil leak which would drain engine oil system and damage supercharger). If necessary to operate engine under above conditions, remove drive belts, disconnect supercharger oil line at cylinder block, and plug this fitting in block.

Sup rcharg rC ntrol Linkage (Special Type Sup rcharger): 1) Loosen setscrew in swivel clamp on control arm.

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F rm 4-A—5/r

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2) Open carburetor throttle valves to approximately 7/8 open position so that 1/8" drill rod can be inserted between throttle stop pin and throttle lever.
3) Place supercharger control lever in full "on" position (control lever foot should be against housing.
4) With throttle lever and supercharger control lever positioned as above, and control wire ball end against throttle lever swivel, tighten setscrew in control arm swivel securely against control wire cable.
5) Check adjustment to make certain that carburetor throttle valves move from full-closed to full-open positions and that supercharger control lever moves through full arc of travel when carburetor throttle lever moved from half-open to 7/8 open position.

Supercharger Output Check (Special Type Supercharger): Remove 1 8" pipe plug in side of carburetor elbow and connect gauge at this point Supercharger pressure should be 2 4-2 7 P S I (Std Trans), 3 4-3 7 P S I (Fordomatic) at 2500 RPM

Engine Idl Speed: 500-525 RPM (all transmissions) with selector lever in Neutral on Fordomatic Cars

►*OTHER DATA· See "McCulloch Supercharger" and "Holley (Ford, Lincoln, Mercury) 4-Barrel Carburetors" in Carburetion Section*

AIR CLEANER: DRY FILTER ELEMENT type. Clean every 5,000 miles, replace element every 20,000 miles.

►*CLEANING CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. *DO NOT wash lement in solvent or other liquids and DO NOT oil or lubricate.*

FUEL PUMP PRESSURE: 3.5-5.5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: AC Fuel only or Fuel & Vacuum

Mod l	Ford Pump No.
V8 exc Thunderbird (Std)	B5A-9350-C
Overdrive & Fordomatic	B5A-9350-D
Thunderbird (Std)	B5S-9350-A
Overdrive & Fordomatic	B5S-9350-B

Pressur - 3 5-5 5 lbs at 500 RPM
See "Fuel Pumps" in Carburetion Section

Gasolin Gauge: New King-Seeley Electric Constant-voltage ("CV") type with gauge voltage regulator, Ford B7S-10804-A Thunderbird, B7A-10804-B Others
Dash Unit-Ford No B7S-9280-A (Thbrd), B7A-9280-A (Others)
Tank Unit - Ford No B7A-9276-A (All)
See "Fuel Gauges" in Carburetion Section

Air Clean r: DRY FILTER ELEMENT type Clean every 5000 miles, replace element every 20,000 miles

►*CLEANING CAUTION* Clean filter element by tapping and shaking to remove dirt particles *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate*

BATTERY

Ford B6A-10655-C (All). 12 volt, 11 plate, 55 ampere hour capacity **Ford B7A-10655-A (Exc. Thbrd).** 12 volt, 11 plate, 70 ampere hour capacity (20 hr rate)
Battery Ground - Negative to engine block
Engine Gr und - Cylinder head to dash

STARTER

F rd B6A-11002-A. Armature - B6A-11005-B.
Drive - Ford ICM-11350-C Bendix "Folo-Thru"
Rotation - Counterclockwise at commutator end
Brush Spring Tension - 48-56 ozs
Cranking Speed - 150-180 RPM, 190 amperes max

Performance Data

Torque	RPM	Volts	Amperes
0 ft lbs	①	12 0	120
15 5 ft lbs		5 0	550

①- With starter on engine and engine idling
Starting Switch: Magnetic type, Ford No B6A-11450-A Starter Switch is controlled by ignition switch *NOTE* - Neutral safety switch used on Fordomatic Transmission
Fordomatic Neutral Safety Switch: Ford B6S-15812-A (Thbrd), B7A-15812-A (Others)
Adjustment - *See "Fordomatic & Mercomatic" in Transmission Section*

GENERATOR

Ford. Used as follows

Generator	Armature	Application
B6A-10002-C	B6C-10005-B	①Std
B6A-10002-H	B6A-10005-B	②Std
B6A-10002-E	B6C-10005-C	Special

①- Use with B6C-10505-B Regulator
②- Use with B6A-10505-A Regulator

►*40 AMPERE GENERATOR INSTALLATION CAUTION* Install 2 Spacers, Ford No 10148, to secure proper alignment of generator-to-water pump and fan pulleys *NOTE* - Shorter or thinner spacer at front end of generator longer spacer at rear end

Perrormance Data

Generator	Amperes	Eng RPM
B6A-10002-C,H	30	1500
B6A-10002-E	40	1500

Brush Spring Tension - 26-34 ozs
Field Current - 1 5-1 6 amperes at 12 0 volts
Rotation - Counterclockwise at commutator end
Belt Adjustment: Approximately ½" deflection on belts midway between generator and pump pulleys with normal thumb pressure

REGULATOR

Ford No. B6A-10505-A (B6A-10002-H Gen.), B6C-10505-B (B6A-10002-C Gen.), B6A-10505-B (B6A-10002-E Gen.).

►*SETTING CAUTION: "Temperature Compensated" type Set to following specifications at 75°F ambient (engine compartment) temperature, after ½ hour operation in vehicle, or after regulator heated and stabilized*

Cutout Relay
Cuts In - 12 0-12 8 volts

Voltage Regulator
Setting - 14 6-15 4 volts at 75°F (ambient)
Ch cking & Adjusting - *See Electrical Section*

Current Regulator
Setting - 28-32 amperes (B6A-10505-A & B6C-10505-B), 38-42 amperes (B6A-10505-B)
Checking & Adjusting - *See Electrical Section*

MISC. ELECTRICAL

Headlamps: Sealed Beam *See Electrical Section*
Directional Signals: *See Electrical Section*
Lighting Switch Removal: With control knob in the "OFF" position, press spring release button on switch housing, turn shaft slightly and pull it out of switch Unscrew mounting nut with Tool 17470-N
Stop Light Switch Location: On forward end of brake master cylinder (Conventional Brakes), and on top of brake booster assembly (Power Brakes). Master cylinder located on firewall in engine compartment
CIRCUIT BREAKERS: On headlight switch Combination headlight switch circuit breaker, and fuse assembly used One circuit breaker protects headlight circuit and second circuit breaker protects instrument parking, stop and tail light circuits
FUSES: Size and location as follows
Back Up Light - SFE 7 5 ampere in feed wire
Cigar Lighter - Sulphur disc in base or reset circuit breaker, at back of assembly
Clock - 1 AG, in feed wire
Heaters - SFE 14 ampere in feed wire
Interior Lamps - SFE 7 5 ampere, on lighting switch
Overdrive - 15 AGC on overdrive relay
Spot Light - SFE 7 5 ampere in feed wire
Turn Signal - SFE 7 5 ampere in feed wire
Horn Relay: Ford No B7A-13853-H

►*HORN RELAY REPLACEMENT NOTE* When replacing a horn relay that has been shorted by water, be sure to spray new relay with a plastic ignition spray (around crimped areas in particular but not on terminals) and install three ¼" flat washers between mounting bracket and fender apron

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION. Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine See "Air Conditioning Service Cautions" in Misc Sect*

ENGINE SPECIFICATIONS: 90° V8

Engine	Bore	Stroke	Displacement
272	3 62"	3 30"	272 cu ins.
292	3 75"	3 30"	292 cu ins
312	3 80"	3 44"	312 cu ins

Engine	Rated HP	Compr. Ratio	Developed HP
272	42 05	8 6-1	190 at 4500 RPM
292	45 0	9 1-1	①206 at 4500 RPM
312	46 21	9 7-1	245 at 4500 RPM
312" 270 HP②		9 7-1	270 at 4800 RPM
312" 300 HP③		8 3-1	300

① 212 HP at 4500 RPM with Fordomatic
②- High Performance Engine (Two 4-Barrel Carbs)
③- High Performance Engine with Supercharger
Compression & Vacuum Reading - *See TUNE-UP*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Ford Special Data*

►*ENGINE OIL LEAK CORRECTION:* Engine oil leakage may occur at point where crankcase vent tube is brazed to adapter Hold assembly up to light to check for leak If defective at brazing position, replace assembly.

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F rm 4-8—5/57

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►*EXHAUST MANIFOLD BREAKAGE CORRECTION:* Breakage at manifold flange caused by exhaust crossover pipe contacting uneven road surface Fabricate and install a guard (1½" diameter pipe flattened at each end to contact frame) and weld to two 2" strap irons bolted (one bolt each) to frame side rail at existing frame holes Brackets will be back against #1 body bolt outrigger

TIGHTENING TORQUES: *See "Tightening Specifications" in Ford Special Data*

ENGINE REMOVAL: *See "Engine" in Ford Special Data*

ENGINE MOUNTINGS: *See "Engine Mounting" in Ford Special Data*

OIL PAN REMOVAL: On conventional car, remove stabilizer bar, disconnect oil pump inlet tube at oil pump and remove "O" ring seal retainer screws and oil pan

PISTONS

Autothermic type Solid skirt with three rings above pin

Removal - Pistons and rods removed from above

Fitting New Pistons: Use ½" wide feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side Pull should be 5-10 lbs when using feeler gauge thicknesses as follows New piston in new bore 0015", New piston in used bore 002", Used piston in used bore 0025"

Replacement Pistons: Standard, 020", 030", 040" (312 Eng), plus 060" (272 & 292 Eng) Oversize Pistons furnished only with fitted pins

Installing Pistons: Install with small indentation in head of piston toward front of engine *See Rod Installation*

PISTON RINGS

Two compression, one oil ring per piston Oil ring is "Side Sealing" type (two steel rails with spring spacer between them)

272 & 292 Engines

Ring	Width	End Gap	Side Clearance
Compr #1 2	①	010- 027"	② 002- 0035"
Oil #3		015- 062"	③

312 Engine

Ring	Width	End Gap	Side Clearance
Compr #1	0775- 0780"	012- 029"	② 002- 0035"
Compr #2	0930- 0940"	012- 029"	② 001- 003"
Oil #3		015- 062"	③

①- (272 Eng) 0930- 0935" (292) 0775- 0780"
② - Wear Limit 006" ③ - Side sealing type rings

PISTON PINS

Floating type with lock ring at each end
Diameter - 9120- 9123" **Length** - 3 016-3 030"
Pin Fit in Piston - 0001- 0003" Wear limit 0008"
Pin Fit in Rod Bushing - 0001- 0003" Wear limit 0008"

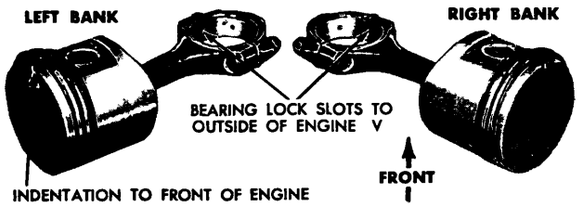
Replacement Pins: Furnished 0001- 0003" oversize Fitted pins furnished with new pistons

Replacement Rings: Furnished in Expander and Steel Section Types in Std 020", 030", 040" (312 Eng), plus 060" (272 & 292 Eng)

CONNECTING RODS

Crankpin Journal Diameter - 2 1880-2 1888"
Lower Bearing - Steel backed, copper lead alloy lined type Upper and lower halves interchangeable
Clearance - 0008- 0027" Wear limit 0037 (272 & 292 Eng), 0007- 0026" Wear limit 0036 (312 Eng)
Side Clearance - 006- 016" Wear limit 019" (2 rods)

Replacement Bearings: Standard (2 sizes marked **Red** and **Blue** for selective fitting) and 010", 020", 030" undersize



FORD V8 PISTON & ROD ASSY.

Installing Rods: Install rod in piston so that rod bearing lock slots in connecting rod are toward outside of engine when indentation on head of piston is toward front of engine Cylinder numbers on bearing caps and rods must be on same side and installed in same numbered cylinder

CRANKSHAFT

Journal Diameter - 2 4980-2 4988" (272, 292 Eng), 2 6235-2 6243" (312 Eng)
Bearings - Copper lead (All Eng), or Lead babbitt (272 Eng), Steel backed

Clearance	Copper Lead	Lead Babbitt
272	① 0006- 0032"	② 0005- 0021"
292	① 0006- 0032"	
312	③ 0008- 0026"	

①- 0042" wear limit ②- 0031" wear limit
③- 0036" wear limit

Replacement Bearings: Standard (2 sizes marked **Red** and **Blue** for selective fitting) and 010", 020" 030" (272 & 292 Eng) plus 040" (312 Eng) Undersize

End Thrust: Taken by No 3 main bearing Replace bearing if endplay excessive

Thrust Bearing Alignment - *See "Crankshaft & Main Bearings" in Ford Special Data*

End Play - 002 006", wear limit 010"

Crankshaft Rear Oil Seal Installation: *See "Crankshaft and Main Bearings" in Ford Special Data*

Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Ford Special Data*

CAMSHAFT

Journal Diameters - 1 9255-1 9265"
Clearance - 001- 003", wear limit 006"

End Thrust: Taken by thrust plate and spacer located between camshaft sprocket and shoulder on camshaft

►*CAMSHAFT THRUST SPACER NOTE* Chamfer on the inside of spacer must be to the rear or face camshaft journal

End Play - 006" max

Replacement Camshaft Bearings: Finished bearings furnished Standard and 015" undersize

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Ford Special Data*

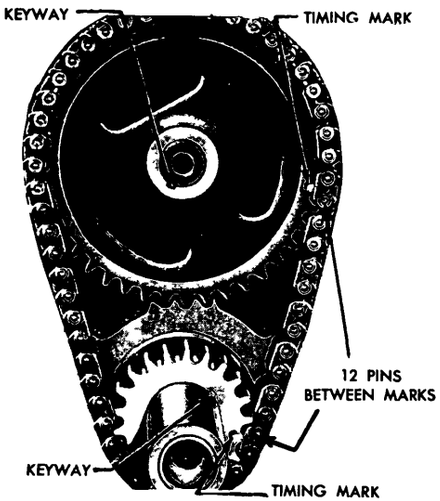
Timing Chain: Side guide type 56 links

►*TIMING CHAIN REPLACEMENT NOTE* Replace chain and sprockets when deflection on slack side exceeds ½" (take up all slack on driving side, measure slack on opposite side) Remove and install chain "endless" as a unit with both sprockets

Camshaft Setting: Sprockets marked by round depression at one tooth Mesh chain so that there are 12 chain link pins between timing marks on sprockets when marks are both on drive side of chain

Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Ford Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Ford Special Data*



FORD V8 VALVE TIMING MARKS

VALVES

Tappet Clearance: 020" (Intake & Exhaust) Cold 019" (Intake & Exhaust) Hot *NOTE* - Valve tappet clearance on truck engines different

Valve	Head Diam.	Stem Diam.①	Length
Intake	1 920-1 930"	3416- 3423"	5 02"
Exhaust	1 505-1 515"	3400- 3410"	5 02"

Valve	Seat Angle	②Lift	Stem Clearance
Intake	45°	272"	③- 0045" wear limit
Exhaust	45°	285"	④- 0065" wear limit

①-Furnished with 003", 015", 030" oversize stems
②- Cam lobe lift 005" wear limit

Valve Seat Width - 060- 080" (Intake) 070- 090" (Exhaust)

►*ROTATABLE VALVE NOTE* All valves are rotatable type *See "Valve System" in Ford Special Data*

Valve Stem Oil Seals: "Umbrella" type seals on intake and exhaust valve stems Install seals with cupped side down to cover guide boss on head Install new seals whenever valves removed or when seals become loose on valve stems

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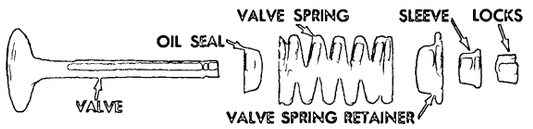
Valve Springs: Install with closed end of coil toward cylinder head.

Spring Specifications

	Spring Pressure	Length
Valve Closed	71-79 lbs.①	1 780"
Valve Open	161-177 lbs.②	1 390"

①- 64 lbs. wear limit at 1 780"
②- 145 lbs. wear limit at 1 390"
Free Length - 2.09".

▷*VALVE SPRING INSTALLATION NOTE:* Measure valve spring assembled height from machined surface of cylinder head spring pad to under side of spring retainer. If assembled height is 1 13 16" or greater, install necessary 030" spacers between cylinder head valve spring pad and valve spring to bring assembled height to recommended 1 25 32-1 13 16" *CAUTION* - Do not install spacers unless necessary.



FORD V8 VALVE ASSEMBLY

Valve Guides: Integral with cylinder head When stem-to-guide clearance exceeds maximum (See table above), ream guides and install oversize valves *See "Valve System" in Ford Special Data.*

Valve Lifters: Mushroom type. Remove from below after camshaft removed from engine.
Clearance - 0026"

Rocker Arm Assembly: *See "Valve System" in Ford Special Data*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above

▷*VALVE TIMING NOTE:* The following valve opening and closing points are with camlift as indicated

Valve Timing
(All Engines with B7A-6250-B Camshaft)

Intake Valves - Open 18° ⓒ BTDC Close 58° ① ALDC
Exhaust Valves - Open 66° ② BLDC Close 10° ③ ATDC.
① - Camlift 015" ② - Camlift 013" ③ Camlift 016"

Valve Timing
(312" Eng. Schgd. with B7A-6250-C Camshaft)

Intake Valves - Open 32° ℂ BTDC. Close 78° ℭ ALDC.
Exhaust Valves - Open 72° ℂ BTDC. Close 38° ℭ ALDC.
ℂ - Camlift .016". ℭ - Camlift .019".

Valve Timing Check: Release No. 1 Intake Valve adjusting screw, push rocker arm to one side, install dial indicator in pushrod socket. Zero indicator with cam on heel of lobe. Install quadrant on crankshaft pulley, rotate engine to amount of lobe lift shown in table above, then check quadrant and compare reading with degrees shown in table above for that valve. If reading not correct, check for bent pointer, worn timing chain or sprocket before replacing camshaft.

OILING SYSTEM

Crankcase Capacity - 5 qts (refill) 6 qts. when filter changed

Normal Oil Pressure: 45-50 lbs. at 2000 RPM.
Pressure Regulator Valve - In oil pump body, not adjustable.
Oil Pressure Indicator - Indicator light on instrument panel operated by Engine Unit, Ford No. B6A-9278-B (stamped No. 7 on Hex) Lights when ignition switch turned on, goes out when engine starts and pump pressure reaches (7 lbs.)

Oil Pump: Rotor type, located on left side of engine crankcase, driven by distributor shaft.
Pump Overhaul - *See "Oiling System" in Ford Special Data.*

Oil Filter: New "Disposable" type.
Disposable Filter Replacement - Coat gasket face of filter with oil, thread filter on insert by hand until gasket contacts adapter surface, then tighten filter an additional one-half turn. *CAUTION* - Do not overtighten Run engine and check for leaks.

Crankcase Ventilation: Filter in oil filler cap (inlet) all models. Road draft outlet pipe for crankcase ventilation all models. *NOTE* - 272 and 292 Engines have filter screen in road draft outlet pipe. Service filler cap by cleaning with solvent and resaturating with engine oil at 4000 mile intervals.

COOLING

Water Capacity: 19 qts (Pass. Cars & Station Wagons), 20 qts. (Thunderbird). Add 1 qt. for heater.

Pressure Valve: Radiator filler cap. Ford No. LA-8100-A, 12-15 lbs. (marked "13" or "14") *CAUTION:* If replacement required, use 12-15 lb. type.

Thermostat: 157-162°F. (Std.), 177-182°F. (High Temp.) for use with permanent type anti-freeze.

Water Pump: Packless, sealed ball bearing type.
See "Ford V8" in Water Pump Section
Pump Removal - (On Thunderbird remove engine left hand splash shield) Drain cooling system, disconnect lower radiator hose and heater hose. Remove fan belt fan fan spacer, and pulley. (On Thunderbird, remove generator support bracket bolt at the water pump housing and bolt at generator, then move bracket out of way, remove remaining bolts, retaining water pump assembly and timing pointer) On other cars, remove four bolts retaining water pump to cover. Remove pump and timing pointer.

Temperature Gauge: New King-Seeley Electric Constant-voltage ("CV") type with gauge voltage regulator, Ford B7S-10804-A (Thunderbird), B7A-10804-B (Others)
Dash Unit - Ford B7S-10883-A (Thunderbird), B6A-10883-A (Others)
Engine Unit - Ford No B7A-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long Model 10CF. Std. (272, 292 Eng.) 11CF Std. (Thbrd. & 312 Eng) 11CF Heavy Duty. (272, 292 Eng.) Single plate semi-centrifugal type.

Cover Assembly	Long No.	Ford No.
10CF	267346	B7A-7563-A
11CF①	266978	B6A-7563-A
11CF②	267350	B7A-7563-B

①- Black & Yellow paint on cover.
②- Green & Lt. Blue paint on cover.

Clutch Disc	Long No.	Ford No.
272,292 Std, & O D	286116 or 287222	B7A-7550-A
272,292 H D; 312	287226	B7A-7550-B
Thbrd (292)	281982	B5S-7550-A
272 H D	284961	B6A-7550-B

See "Long Clutches" in Clutch Section.

▷*THUNDERBIRD DRIVE LINE VIBRATION OR TRANSMISSION GEAR RATLLE CORRECTION:* When above condition exists on conventional or overdrive cars, install Heavy Duty Dlutch Disc Assembly Ford No. B7A-7550-B.

Pedal Adjustment: If total pedal travel is less than 6 3/8" or more than 6 5/8", reposition pedal bumper and bracket until travel is within limits. Adjust assist spring link to give assist spring length of 9 7 8" (eye centers) with clutch fully released.

Pedal Free Travel - 1 1 8-1 3 8". Loosen locknut on clutch pedal release rod, turn adjusting nut until correct travel is reached. *NOTE* - Check free travel by operating engine at 3000 RPM with transmission in Neutral position. There should be a minimum of ½" free travel under these conditions.

Removal: Remove transmission, flywheel housing cover, release lever retracting spring, slide release bearing and hub off release lever. Mark clutch cover and flywheel for reinstallation, loosen six cover bolts uniformely to release spring tension remove cover and pressure plate through opening in flywheel housing. Remove clutch release lever.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse)
See "Ford Synchro-mesh" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal (Exc. Thunderbird): With car raised up, disconnect drive shaft at rear universal joint, slide drive shaft off transmission output shaft. Remove speedometer cable and gear. Disconnect shift rods at transmission. Remove rear engine support to extension housing bolts. Disconnect parking brake adjusting rod from equalizer bracket. Support rear of engine and remove rear engine support, then lower engine for clearance, and remove transmission to flywheel housing bolts. Use guide pins in two lower bolt holes and slide transmission back until input shaft clears flywheel housing, and lower transmission.
Thunderbird - With car raised up, disconnect drive shaft at rear universal joint, slide drive shaft off transmission output shaft. Remove speedometer cable and gear. Disconnect shift rods at transmission. Remove rear engine support to extension housing bolts. Raise engine and remove engine rear support. Lower engine, remove transmission to flywheel housing bolts, move transmission back for clearance. Remove flywheel housing bottom cover and remove starter. Disconnect clutch linkage at release lever, remove release bearing and hub, clutch assembly and disc. Remove flywheel housing to engine bolts. Turn housing upside down and remove from car. Then remove transmission.

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OVERDRIVE

Warner R10. Solenoid operated type, with governor control and throttle operated kickdown No Lock out Switch used

See "Warner R10 Overdrive" in Transmission Section

Overdrive Control: *See "Overdrive Controls" in Transmission Section*

R moval: Same as for synchro-mesh transmission (above) after disconnecting control cable and wiring

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock

See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section*

► *TESTING & TROUBLE SHOOTING· See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section*

Lubrication - Check transmission fluid at 1,000 mile intervals and maintain level at "F" mark on indicator Drain and refill every 25,000 miles **Use only Automatic Transmission Fluid Type "A".**

Checking Fluid Level - Bring transmission to operating temperature by running engine with selector lever in Neutral position Move selector lever through all ranges to assure fluid distribution then place lever in "P" (Park) position for checking fluid level Add Automatic Transmission Fluid Type "A" to bring level to "Full" mark on indicator

Thr ttle Linkage Adjustment: *See CARBURETOR above*

► *OTHER FORDOMATIC SERVICE DATA See "Fordomatic, Merc-O-Matic & Turbo-Drive" in Transmission Section*

UNIVERSALS

M chanics. Needle bearing type

► *CAUTION* Rear universal joint companion flange nut controls pinion bearing preload (must be adjusted whenever nut is loosened) *See "1957 Ford & Mercury" in Rear Axle Section*

REAR AXLE

Own. New Separate Carrier type semi-floating hypoid with Hotchkiss drive *NOTE* - Same type used on all models

See "1957 Ford & Mercury" in Rear Axle Section

	Axle Ratios	
M del	**Sta. Wgns.**	**Others**
Conventional	3 89-1①	3 56-1 ②3 70 1)
Overdrive	4 11-1	3 70-1 ②3 56-1)
Fordomatic	3 56-1	3 10-1 ②3 56-1)

① 4 11-1 Optl ② Optional ratio

Backlash - 004 009"

Axl Shaft Removal: Remove wheel take off drum Remove four axle retainer locking type nuts (work through opening in axle shaft flange) Use Puller No 4235-N and pull axle shaft (do not disturb brake backing plate or damage wheel bearing oil seal) Replace one nut to secure brake backing plate

Carrier Assembly Pemoval: *NOTE* - Pinion carrier assembly can be removed separately without disturbing differential carrier by disconnecting rear universal joint at companion flange, and removing five bolts that attach pinion carrier assembly to differential carrier housing With rear universal joint disconnected axle shafts removed (see above) remove differential carrier housing to rear axle housing bolts and lift out carrier assembly

SHOCK ABSORBERS

Direct acting non-adjustable Service by replacement

Model	①Front	①Rear
Pass Cars (Std)	B7A-18124-A	B7A 18125-A
Pass Cars(H D)	B7A 18124 B	B7A-18125-B
Thunderbird(Std)	B7S-18124-A	B7S-18125-A
Thunderbird(H D)	B7S-18124-B	B7S 18125-B
Sta Wgn & Sed Del		B7A-18125-C
Tudor Sedan (Hd Top) Std		B7A-18125-D
Tudor Sedan (Hd Top) H D		B7A-18125-E

① Furnished in kits which include mounting bushing

► *FRONT SHOCK ABSORBER UPPER BUSHING NOTE:* Install bushing with groove seated in frame hole flange and do not dislodge when installing shock absorber

FRONT SUSPENSION

Independent. "Ball Joint" suspension with direct acting shock absorbers.

See "Ford, Lincoln, Mercury, (Ball Joint)" in Suspensions & Wheel Alignment Section

Caster - Pos ½° to Pos 1½° Maximum variation between wheels ½°

Camber - Pos ½° to Pos 1½° ¼° preferred Maximum variation between wheels ½°

Toe-In - 1/16 to 1 8" *NOTE* - When checking toe-in on cars that have power steering, engine should be running so that power steering control valve will be properly centered

Toe-Out on Turns - With outer wheel at 20° inner wheel should be 24¼° (Pass), 25° (Thunderbird)

STEERING

Manual: Own (Gemmer 305 Design). Worm & Roller type

See "Gemmer Worm & Roller" in Steering Section

Power Steering: Ford-Mercury Linkage type Used in conjuction with standard type steering gear

See "Ford & Mercury Bendix Linkage Type" in Steering Section

Pump Belt Adjustment: Install torque wrench on pump pulley bolt Check torque required to slip pulley against belt friction If torque is not 14-16 ft lbs adjustment is required To adjust, position a heavy duty 2½" "C" clamp with bottom against lower side of pump support bracket and top of clamp resting on pump bracket at its center Loosen four pump attaching bolts until pump body may be positioned by tightening "C" clamp Tighten "C" clamp until torque of 14 16 ft lbs is required to slide pump pulley *NOTE*- Hold final torque as close as possible to upper limit

Steering Linkag : *Se "Steering Linkage" in Steering Section*

Steering Wheel & H rn Butt n R m val: *See "Gemmer Worm and Roll r (3 tooth)" in Steering Section*

St ering Gear R m val· *See "Gemmer Worm & Roller (3-tooth)" in Steering Section*

BRAKES

F rd-B ndix Hydraulic. Hand lever applies rear wheel service brakes

► *BRAKE DESIGN NOTE* Front wheel anchor pin (fixed anchor type) is mounted on wheel spindle independently of backing plate (wheel cylinder mounted on anchor pin)

See "Ford, Lincoln, Mercury Bendix" in Brake Section

► *BRAKE PULLING CORRECTION·* To correct, loosen anchor pin attaching bolt (see Brake Design Note above) and retighten bolt to 80-100 ft lbs

Drum Diameter - 11" front and rear

Wheel Cylinder Diameter - 1 1 8" (Front-All) 7 8" (Rear-Pass Cars), 15 16" (Rear-Sta Wgn & Courier)

Lining Specifications (Width & L ngth)

Model	Primary	S condary
Pass Car(Front)	2 1/4"x10 62"	2 1/4"x 11 93"
(Rear)	1 3 4"x10 62"	1 3/4"x 11 93"
Thunderbird(Front)	2"x10 67"	2 1 2"x 12 13"
(Rear)	1 3/4"x10 67"	2"x 12 00"
Sta. Wgn (Front)	2 1/4"x10 62"	2"x 10 62"
(Rear)	2 1/4"x11 93"	2"x 11 93"

Clearance - Adjusting screw backed off 10-12 notches from point where shoes are tight against drum

Brake Pedal Free Play: 5 16 to 7/16" If play not correct after brake adjustment loosen locknut on eccentric bolt that attaches brake pedal assembly to master cylinder pushrod rotate eccentric bolt

Standard Master Cylinder: On engine side of firewall

Checking Fluid Level - Within ½" of top of reservoir.

Removal - Disconnect rubber boot from rear end of master cylinder brake line at master cylinder fitting stop light switch from front of cylinder and disconnect wires from switch Push down brake pedal several times to force as much fluid as possible (into clean container) remove bolts that secure master cylinder to dash panel Do not disconnect pushrod from brake pedal unless it is to be serviced

Power Brakes: New "Bellows Type" Pedal assist power unit with vacuum bellows and control valves mounted on drivers side of dash panel

See "Ford Bellows Type" in Brake Section

Checking Fluid Level - Within ½" of top of reservoir.

Removal - Remove vacuum hose from top of unit valve adjusting eccentric with flat washer spring and bushing nylon bushing from power unit valve housing Remove two mounting screws (Bracket to dash panel) and remove power unit from car

MISC. MECHANICAL

Windshield Wipers: Cable operated type (exc. Thunderbird), Link & Crank Arm (Thunderbird).

See "Windshield Wipers" in Miscellaneous Section.

Power Window Regulators: Electric type.

See "Electric Window Regulators" in Misc. Section.

Power Top Control: Electric-Hydraulic (Convertible), Electric (Retractable Hard-Top). *See "Power Top Controls" in Miscellaneous S ction.*

Power S at Adjust rs: "4-Way" Electric.

See "Power Seat Adjusters" in Miscellaneous Section.

Air C nditi ning: *See "Polar Air " or "Select Aire" in Miscellaneous S ction.*

MODEL IDENTIFICATION

Truck Model	Model & Serial Code R gular	Light	Heavy
F-100 Conv.	F-10	F-11	
F-250 Conv.	F-25	F-26	
F-350 Conv.	F-35	F-36	
P-350 Par. Del.	P-35	P-36	
P-400 Par. Del.	P-40	P-41	
F-500 Conv.	F-50	F-51	
B-500 School Bus	B-50	B-51	
C-550 Tilt Cab	C-55	C-56	
P-500 Par. Del.	P-50	P-51	
F-600 Conv.	F-60	F-61	F-64
B-600 School Bus	B-60	B-61.	B-64
C-600 Tilt Cab	C-60	C-61	C-64

VEHICLE NUMBER: Stamped in "Serial No." space on Rating Plate attached to left front cab pillar (no separate Engine No.). This number incorporated the following information in sequence shown (Example *F10J7G10001*)

S rial Code ①	Engin Symbol ②	Year ③	Assy. Plant ④	Serial Number
F 10	J	7	G	10001

① — See Model & Serial Code Table (above).
② — See Engine Identification Note (below).
③ — Last digit of model year (1957).
④ — See Assembly Plant Designation(below).

Ass mbly Plant Designation

D — Dallas **K** — Kansas City **P** — Twin City
E — Mahwah **L** — Long Beach (St. Paul)
G — Chicago **M** — Memphis **R** — San Jose
H — Detroit **N** — Norfolk **U** — Louisville

►*ENGINE IDENTIFICATION NOTE.* 6 Cyl. & V8 Engines are used as listed below. For identification in the following Ford Truck data pages, reference is made to these engines by piston displacement, "223 Eng." and "272 Eng.", or as "6 Cyl." and "V8" Engines.

Engine Types

Engin	Mod l	Displ.	Symbol
6 Cyl.		223 cu. in.	J
V8 ⑤	ECW-272	272 cu. in.	K
V8 ⑥	ECY-272	272 cu. in.	L
V8 ⑦	ECR-272	272 cu. in.	U

⑤ — Light Duty Engine with 2-Barrel Carburetor.
⑥ — Heavy Duty Engine with 2-Barrel Carburetor.
⑦ — Heavy Duty Engine with 4-Barrel Carburetor.

First V hicle Numb r: 10 001.

TUNE-UP

COMPRESSION PRESSURE: At cranking speed

Engin	Compr. Ratio	① Compr. Pressure
6 Cyl.	8.3-1	150 lbs.
V8 (ECW & ECY-272)	8.3-1	160 lbs.
V8(ECR-272)	7.6-1	155 lbs.

①—Plus or minus 10 lbs. & uniform within 10 lbs.

VACUUM READING: (6 Cyl.) 18-19", (V8) 19-20", at idling speed.

VALVE TAPPET CLEARANCE: Can be set with engine cold but must be rechecked with engine at operating temperature (30 minutes minimum operation at 1200 RPM) and engine idling.

Tapp t Clearance (Intake & Exhaust)

Engine	Cold	Hot
6 Cyl.	.019"	.019"
V 8 (All)	.020"	.019"

►*TAPPET CLEARANCE ADJUSTING SCREW NOTE:* Screws are "self-locking" and torque required to turn screw (after interference noted) must be 3 ft. lbs., minimum, if less than 3 ft. lbs., replace adjusting screw or adjusting screw and rocker arm assembly.

MANIFOLD HEAT CONTROL (Except ECR-272): Automatic thermostatic type. Located at center of exhaust manifold (6 Cyl.), between cross-over pipe and right exhaust manifold (V8 ECW & ECY-272). Install valve assembly with stop pin at top of valve housing and hook thermostatic spring on stop pin.

►*MANIFOLD VALVE OPERATION CAUTION:* Valve is closed with engine at normal operating temperature and idling (should open with very light finger pressure on counterweight). Valve will open momentarily when engine accelerated, and will be open when engine operated at high RPM.

IGNITION
6 CYL. ENGINE

FIRING ORDER: 1-5-3-6-2-4.

SPARK PLUG GAP: .028-.032"
Plugs – Champion 860. 18 mm.

►*SPARK PLUG CAUTION:* Plugs have tapered seat and no gasket is used. Tighten plugs to 15-20 ft. lbs.

COIL: Ford No. B6A-12029-B.
Ignition Current – 2.5 amps. idling, 4.5 amps. stopped.
Resistor – Ford No. B6A-12250-D. 1 30-1 40 ohms.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil and is by-passed during cranking by lead from started switch to battery terminal of coil.

DISTRIBUTOR: Ford No. B7A-12127-C. "Loadomatic" type (same design as previous models).
Condenser – Ford No. 7RA-12300-C. Capacity .21-.25 mfd.
Contact Point Set – Ford No. FAA-12171-A.
Breaker Gap – .024-.026".
Cam Angle – 35-38° at idling speed.
Breaker Arm Spring Tension – 17-20 ozs.
Rotation – Clockwise viewed from above.

Advance Performance
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0-½	0.22	500
5½-6½	0 96	1000
9¼-10½	2.09	1500
12-13¼	3.38	2000

►*DISTRIBUTOR REMOVAL & INSTALLATION CAUTION.* Scribe mark on distributor to indicate rotor position and housing position on block before removing distributor, align marks when installing distributor. Make certain that oil pump intermediate shaft engages distributor shaft properly.

IGNITION
V8 ENGINES

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders – RIGHT BANK – 1-2-3-4. LEFT BANK 5-6-7-8-

SPARK PLUG GAP: .028-.032" (All Engines).
Plug – Champion 860 (ECW & ECY-272), F-10 (ECR-272).

►*SPARK PLUG CAUTION:* Plugs have tapered seat and no gasket is used. Tighten plugs to 15-20 ft. lbs.

COIL: Ford No. B6A-12029-B.
Ignition Current – 2.5 amps. idling, 4.5 amps. stopped.
Resistor – Ford No. B6A-12250-D (ECW & ECY-272)B 7A -12250-A (ECR-272), 1 30-1 40 ohms at 75°F

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil and is by-passed during cranking by lead from starter switch to battery terminal of coil.

DISTRIBUTOR: Ford (ECW-272) B6A-12127-A, (ECY-272) B7A-12127-A, (ECR-272) B7T-12127-B. Loadomatic type same as used on previous models (ECW & ECR Engs.). New type with separate mechanical and vacuum advance mechanism (ECY Eng.). *For ECY Distributor, see "Ford, Lincoln, Mercury Distributors" in Electrical Section*
Condenser – Ford FAB-12300-A (B6A-12127-A & B7T-12127-B Distr.), B7A-12300-A (B7A-12127-A Distr.).
Capacity .21-.25 mfd.
Contact Point Set – Ford FAB-12171B (B6A-12127-A & B7T-12127-B Distr.), B7A-12171-A (B7A-12127-A Distr.).
Breaker Gap – .014-.016" (All models).
Cam Angle – 26-28½° at idling speed (All).
Breaker Arm Spring Tension – 17-20 ozs.
Rotation – Counter-clockwise viewed from above.

Advance Performance – B6A-12127-A
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0-½	0.15	300
¼-1¼	0 28	400
6½-7½	0 96	800
11½-12¾	2.21	1200
14½-15½	3.41	1600
16-17¼	4 60	2000

Advance Performance – B7T-12127-B
►With Distributor on Test Stand

Distr. Degrees	Vacuum (" of HG)	Distr. RPM
0	.0	200
1½-2½	0.26	400
6½-7½	1.03	700
9½-10½	1.70	1000
10½-11¾	2.00	1300
12¾-14	2.79	2000

Advance Performance – B7A-12127-A
►Centrifugal (Governor Weight) Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
Start –	250	0	500
5½-6½	625	11-13	1250
11-12¼	1050	22-24½	2100
16¾-18	1600	32½-36	3200

Vacuum Spark Control (B7A-12127-A Distr.): Integral type with vacuum diaphragm unit mounted on distributor housing and linked to breaker plate. Operates in conjunction with centrifugal (governor weight) advance mechanism.

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Vacuum Advance – B7A-12127-A

Distr. Degrees	Eng. Degrees	①Vacuum (" of HG)
0-1¾	0-3½	10"
3-5¼	6-10½	13"
6½-8½	13-17	16"
9½-11½	19-23	19"
11-13	22-26	21"

① – At 1000 RPM distributor speed.

►*DISTRIBUTOR REMOVAL & INSTALLATION CAUTION. See 6 Cyl. Caution (above).*

IGNITION TIMING

Engine	Std. Ignition Setting
6 Cyl. (Std. & O.D.)	4° BTDC
6 Cyl. (Fordomatic)	6° BTDC
V8 ECW-272 (Std.)	8° BTDC
V8-ECW-272 (Fordomatic)	10° BTDC
V8 ECY-272 & ECR-272	10° BTDC

►*TIMING CAUTION* – Set timing with engine idling and with vacuum line disconnected. Check advance operation by running engine at 800 RPM before and after connecting vacuum line (spark should advance when vacuum line connected).

Timing Mark (6 Cyl.) – Vibration dampener marked by lines TDC – 3° – 5° – 7° – 9°. Align space between 3° & 5° lines (4° BTDC setting), or space between 5° & 7° lines (6° BTDC setting) with pointer on chain case cover.

Timing Mark (V8) – Vibration dampener marked by lines TDC – 2° – 4° – 6° – 8° – 10°. Align correct line with pointer on chain case cover.

CARBURETOR

CARBURETOR APPLICATION Ford or Holley carburetors used as follows:

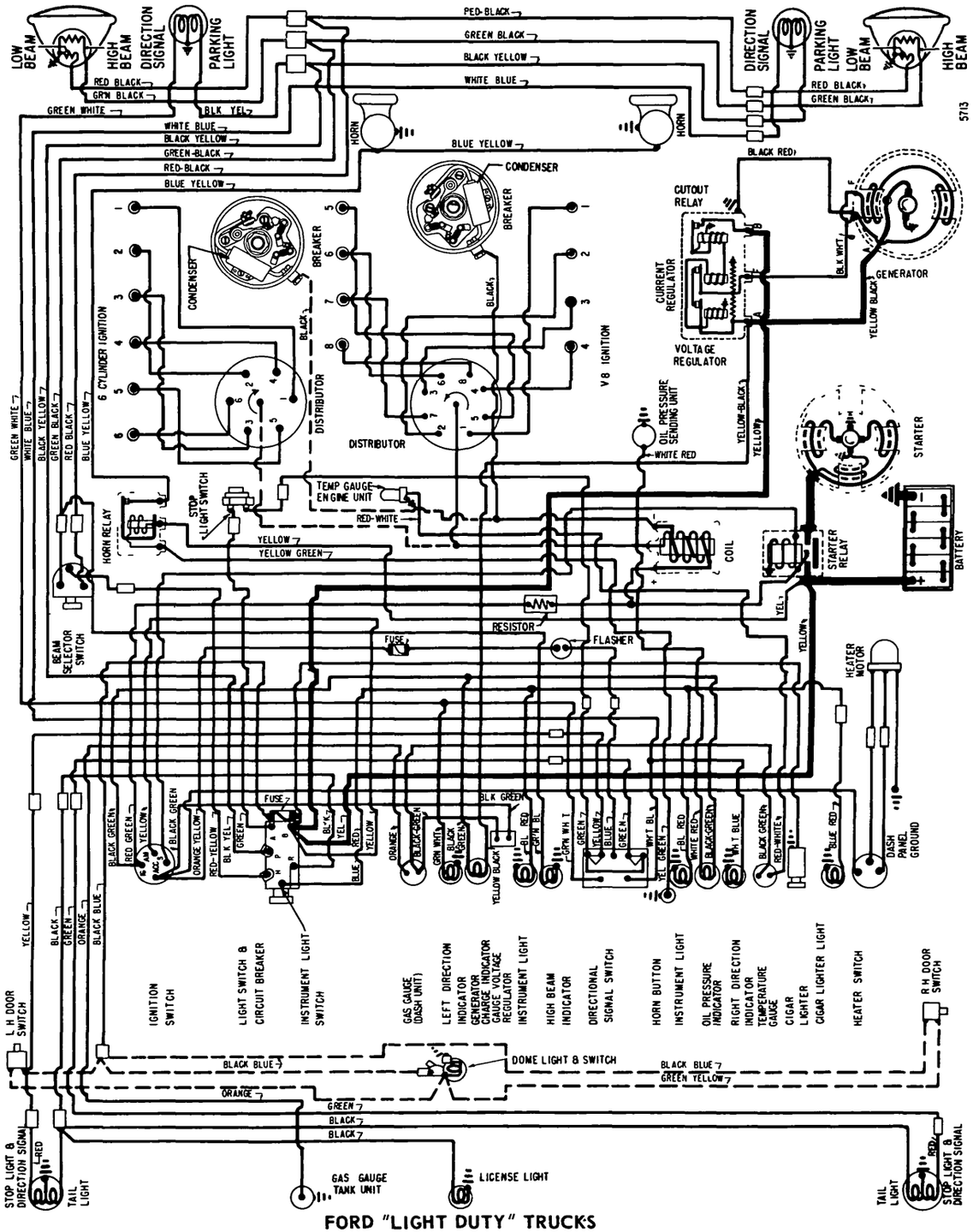
Engine	Carburetor Model
6 Cyl. (Std. & OD)	Holley Single B7C-9510-C
6 Cyl. (Fordomatic)	Holley Single B7A-9510-D
V8 ECW-272(Std &OD)	Holley(Ford)Dual B7C-9510-A
V8 ECW-272(Fordomatic)	Holley(Ford)Dual B7C-9510-B
V8 ECY-272 (Par. Del.)	Holley Dual B7J-9510-A
V8 ECY-272 (Others)	Holley Dual B7T-9510-A
V8 ECR-272	Holley 4-Bbl. B7T-9510-C

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

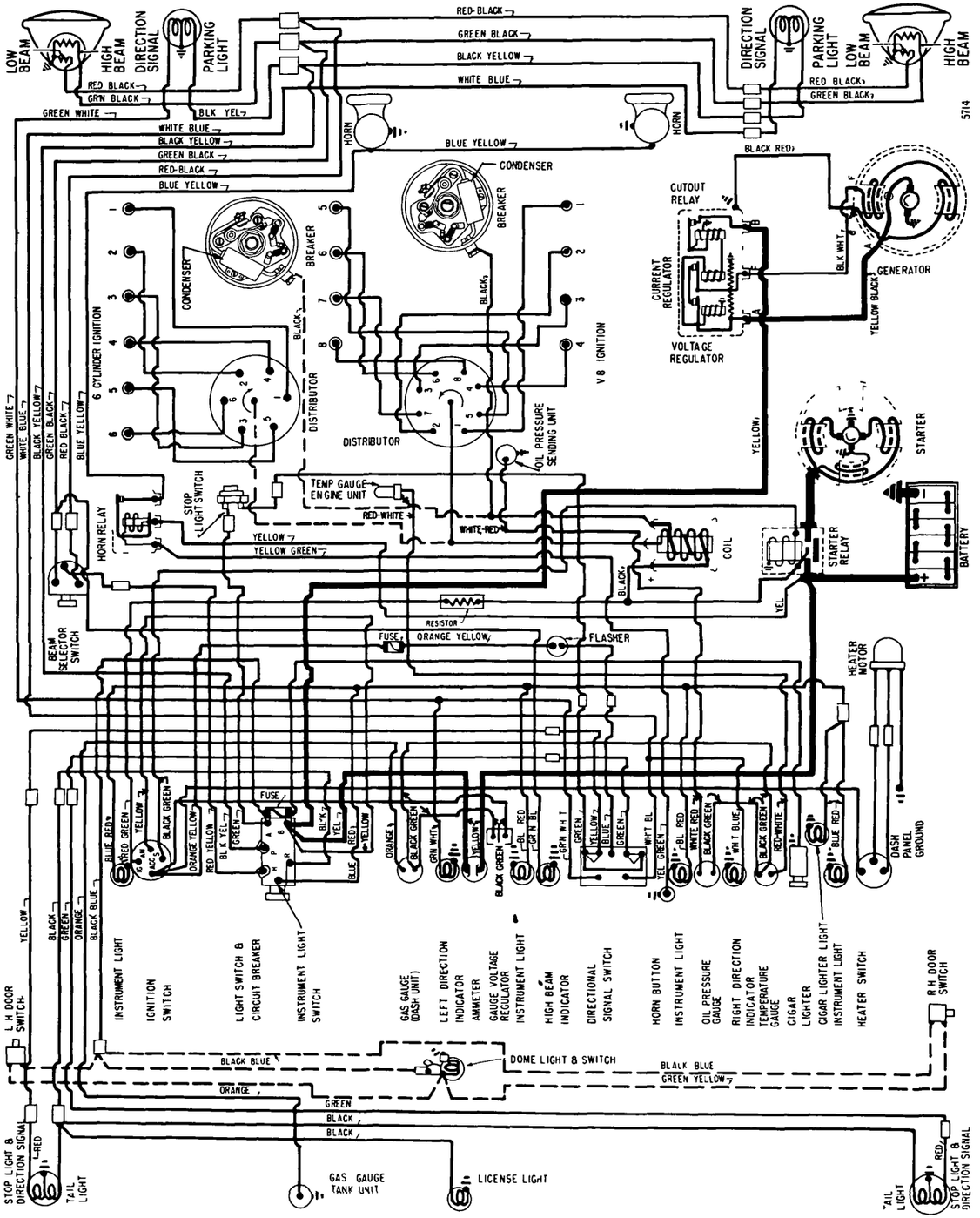
Thr ttle Linkage Adjustment (Fordomatic Models): *Same as for corresponding 6 Cyl. & V8 Passenger Cars. See Passenger Car data and also note the following:*

Accelerator Pedal Height – With gauging pin installed through holes of accelerator assembly, and carburetor connecting link adjusted so that throttle valves closed with throttle lever stopscrew against stop, accelerator pedal height should be 2-3/4" (6 Cyl. & V8 Trucks except Parcel Delivery). Adjust pedal height by changing length of accelerator pedal connecting link. On all truck models, accelerator pedal should just contact detent (on toeboard under pedal) when carburetor lever strikes wide-open stop (this is the only pedal height specification for Parcel Delivery models).

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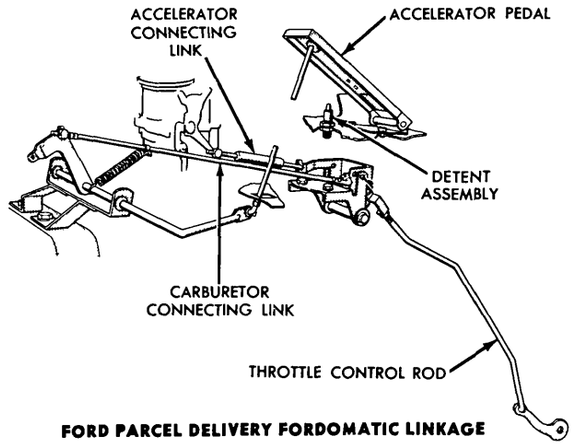
FORD "LIGHT DUTY" TRUCKS



FORD "HEAVY DUTY" TRUCKS

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Dashpot Adjustment (All Fordomatic Models): After engine idle speed correctly set, turn off engine, loosen dashpot adjusting screw locknut, depress dashpot plunger fully, turn dashpot in or out of bracket until clearance between end of dashpot plunger and lug on throttle lever is .045-.064" (with throttle closed and throttle stopscrew against stop), tighten locknut.



FORD PARCEL DELIVERY FORDOMATIC LINKAGE

HOLLEY SINGLE CARBURETOR (6 Cyl. Trucks)

Ford B7C-9510-C (Std. & OD), B7A-9510-D (Fordomatic).

Idle Setting – Initial setting 1½ turns open. With engine at normal operating temperature, turn screw in until engine runs rough, turn screw out until engine begins to roll, finally turn screw in just enough for smooth running (favor slightly rich mixture).

Idle Speed – 475-500 RPM with transmission in neutral. On Fordomatic models, check idle speed with selector lever in Drive "Dr" position. Idle speed in "Dr" must be 425-450 RPM. If not in this range, readjust as necessary.

Float Level: Fuel level in bowl should be 11/16" plus or minus 1/32" below power valve mounting surface on carburetor. Use Gauge T52L-9550-AGE to check fuel level (remove power valve diaphragm cover and power valve assembly, install gauge in this hole). Fuel should touch tip of "Low" pin on gauge but should not touch "High" gauge pin.

Accelerating Pump: Engage pump link in inner hole of throttle lever for average or hot weather operation, outer hole for cold weather operation.

Fast Idle: No adjustment required.

Throttle Linkage & Dashpot Adjustment (Fordomatic Models): *See CARBURETOR above.*

► *OTHER DATA: See "Ford Visi-flo Carburetors" in Carburetion Section*

HOLLEY (FORD) DUAL CARBURETOR (V8 ECW-272 Engine)

Ford B7C-9510-A (Std. & OD), B7C-9510-B (Fordomatic).

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►*CARBURETOR CHOKE VALVE REMAINING CLOSED CORRECTION:* On some early trucks carburetor choke valve may remain closed because fast idle cam and shaft assembly may move sideways. To correct, bend end of choke rod lever contacting fast idle pickup arm approximately 10° away from its original position.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel feeds 1-4-6-7.*
Idle Setting – Initial setting 1 turn open (both screws). With engine at normal operating temperature, turn both idle adjusting needles in until engine runs rough from lean mixture, turn needles out until engine begins to roll, finally turn needles in just enough for smooth running (favor slightly rich mixture).
Idle Speed – 475-500 RPM with transmission in neutral. On Fordomatic models, recheck idle speed with selector lever in Drive "Dr" position. Idle speed in "Dr" must be 425-450 RPM. If not within this range, readjust as necessary.

Fl at Level: 1.437-1.500" from flange surface of air horn to bottom of float (adjacent to soldered seam) and equal for both ends of float with needle valve seated. To check float level, remove air horn and float assembly, invert, place Gauge T56L-9510-A on flange surface of air horn. "Go" leg on gauge (1.500') should slide over bottom of float (not soldered seam), "No Go" leg (1.437") should not clear float.

Accelerating Pump: Three holes provided in throttle lever for pump link engagement: **Inner Hole –** Hot weather or high altitudes, **Center Hole –** Average conditions, **Outer Hole –** Extreme cold weather.

Fast Idle: No adjustment required.

Thr ttle Linkage & Dashpot Adjustment (Fordomatic Models): *See CARBURETOR above.*

►*OTHER DATA: See "Holley (Ford Truck) Dual Carburetor" in Carburetion Section.*

HOLLEY DUAL CARBURETOR
V8 ECY-272 Engines

Ford B7J-9510-A (Par. Del.), B7T-9510-A (Others). New type "Low Silhouette" dual carburetors.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel feeds 1-4-6-7.*
Idl Setting – Initial setting 1-1½ turns open (both screws). With engine at normal operating temperature, turn both idle adjusting needles in until engine runs rough from lean mixture, then turn needles out until engine begins to roll, finally turn needles in just enough for smooth running (favor slightly rich mixture).
Idl Speed – 475-500 RPM with transmission in neutral. On Fordomatic models, recheck idle speed with selector lever in Drive "Dr" position. Idle speed in "Dr" must be 425-450 RPM. If not within this range, readjust as necessary.

Throttle Linkage & Dashpot Adjustment (Fordomatic M dels): *See CARBURETOR above.*

►*OTHER DATA: See "Holley 2 & 4-Barrel Carburetors" in Carburetion Section.*

HOLLEY 4-BARREL CARBURETOR
V8 ECR-272 Engin s

Ford B7T-9510-C. New "Low Silhouette" 4-Barrel carburetor with vacuum diaphragm control of the secondary throttle valves.

►*DEPOPPER VALVE OPERATION NOTE:* All trucks equipped with this carburetor have depopper valve made inoperative by plugging air inlet passage between secondary venturis next to air cleaner stud hole boss to improve idle characteristics. Remove plug if depopper needed and a higher idle RPM can be maintained.
Idle Setting – *NOTE - Idle system provided for all four barrels (primary & secondary). Idle mixture adjusting needles used only on SECONDARY side (one on each side of Fuel Metering Block).* Initial setting 1-1½ turns open (both screws). With engine at operating temperature, turn both screws in until engine runs rough from lean mixture, then turn screws out until engine begins to roll, finally turn screws in just enough for smooth running (favor slightly rich mixture).
Idle Speed – 475-500 RPM with transmission in neutral.
NOTE – Idle speed screw located on Throttle Operating Housing adjacent to throttle lever.

►*OTHER DATA: See "Holley 2 & 4-Barrel Carburetors" in Carburetion Section.*

FUEL PUMP PRESSURE: 3.5-5.5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: AC. Fuel only or Fuel & Vacuum types (Std.). *NOTE* - Electric type Optl.

Model	Ford Pump No.
223 Eng. Fuel only	B5A-9350-A
272 Eng. (TH,WH) 4-Bbl. Carb. Fuel & Vac.	B6T-9350-A
272 Eng. (THZ,WHZ) Fuel only	B7T-9350-A
272 Eng. Others 2-Bbl. Carb.	B6C-9350-A

Pressure - 3.5-5.5 lbs. (mechanical diaphragm types), 3.5-7 lbs. (electric type).
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: New King-Seeley Electric Constant voltage ("CV") type with gauge voltage regulator, Ford No. B7J-10804-A (J,JH,JL), B7A-10804-B (Others).
Dash Unit - Ford No. B7C-9280-A.
Tank Unit - Ford No. B6A-9276-A.
See "Fuel Gauges" in Carburetion Section.

Air Cleaner: DRY FILTER ELEMENT type. Clean every 12,000 miles, replace element every 36,000 miles.

►*CLEANING CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate.*

BATTERY

Ford No. B6A-10655-C. 12 volt, 11 plate, 55 Ampere Hour Capacity. **Ford No. B7A-10655-A.** 12 volt, 11 plate, 70 Ampere Hour Capacity. **Ford No. B6A-10655-E.** 12 volt, 13 plate, 70 Ampere Hour Capacity (20 hr. rate).
Grounded Terminal - Negative to engine block.
Engine Ground - At flywheel housing.

STARTER

Ford B6A-11002-A. Armatur - B6A-11005-B.
Drive - Ford LCM-11350-C. Bendix "Folo-Thru".
Rotation - Counterclockwise at commutator end.
Brush Spring T nsi n - 48-56 ozs.
Cranking Sp d - 150-180 RPM, 190 amps. max.

Perf rmance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	①	12.0	80 max.
15.5 ft. lbs.		5.0	550 max.

① - If starter on engine, engine must be idling.

Starting Switch: Magnetic type, Ford No. B6A-11450-A. Starter switch controlled by ignition switch. *NOTE* - Neutral Safety switch used on Fordomatic transmissions.

Fordomatic Neutral Safety Switch: Ford No. FAC-15812-C. **Adjustment** - *See "Fordomatic & Mercomatic" in Transmission Section.*

GENERATOR

Ford. Used as follows:

Generator No.	Armature No.	Application
B6A-10002-C	B6C-10005-B	6 & 8 (30 Amp)
B6A-10002-F	B6C-10005-C	6 Cyl. (40 Amp)
B6A-10002-E	B6C-10005-C	V8 (40 Amp)

Performance Data

Generator	Amperes	RPM
B6A-10002-C	30	1500
B6A-10002-E, F	40	1500

Brush Spring Tension – 26-34 ozs.
Field Current – 1.4-1.6 amperes at 12.0 volts.
Rotation – Counter-Clockwise at commutator end.

Belt Adjustment: ¼" deflection (6 Cyl.), ½" deflection (V8) midway between generator and water pump pulleys with light thumb pressure.

REGULATOR

Ford B6C-10505-B (B6A-10002-C G n.). B6A-10505-B (B6A-10002-E & F Gen.). *See "Ford, Lincoln, Mercury 12 Volt Regulators" in Electrical Section.*

►*SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 75°F ambient (engine compartment) temperature, after ½ hour operation or after regulator heated and stabilized.*

Cutout R lay
Cuts In - 12.0-12.8 volts.

Voltage R gulator
Setting - 14.6-15.4 volts at 75°F (ambient).
Checking & Adjusting - *See Electrical Section.*

Current R gulat r
Setting - 28-32 amperes (B6C-10505-B), 38-42 amperes (B6A-10505-B).
Checking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

Headlamps - Sealed Beam. *S e Electrical Section.*
Directional Signals: *See Electrical S ction.*

Lighting Switch Removal: With control knob in the "OFF" position, press the spring release button on switch housing, turn shaft slightly and pull it out of switch. Unscrew mounting nut, remove switch.

Stop Light Switch Location: On brake master cylinder, Power Unit Assembly or fitting on frame side rail. Master Cylinder located on firewall (Conventional Trucks), and on bracket attached to left frame member below brake pedal (Other).

LIGHTING CIRCUIT BREAKERS: Two used in lighting switch. One circuit breaker protects headlight circuit, other circuit breaker protects instrument, parking, stop, and tail light circuits.

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FUSES: **Interior lights** - 7.5 amps. On lighting switch.
Directional Signals - 7.5 amps. in flasher lead.
Overdrive - 15 amps. On Overdrive Relay.
Heater - 7.5 amps. In switch lead.
Clock - 3 amps. In clock lead.
Horn Relay: Ford No. B7A-13853-A.

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl. 223" Eng. (EBR, EBS,EBT), and V8 272" Eng. (ECW,ECY, and ECR Heavy Duty). All engines are overhead valve type.

Engin	Bore	Stroke	Displacement
223	3.62"	3.60"	223 Cu. ins.
272	3.62"	3.30"	272 Cu. ins.

Engine	Compr. Ratio	Rated HP	Developed HP
223	8.3-1	31.5	139 at 4200 RPM
ECW-272 ①	8.3-1	41.9	171 at 4400 RPM
ECY-272 ①	8.3-1	41.9	181 at 4400 RPM
ECR-272 ②	7.6-1	41.9	178 at 3800 RPM

① - 2-Bbl. Carb. ② - 4-Bbl. Carb.

CYLINDER HEAD: *See Ford Special Data.*

TIGHTENING TORQUES: *See Ford Special Data.*

ENGINE REMOVAL: *See Ford Special Data.*

OIL PAN REMOVAL (223" Engine): Drain crankcase, remove oil dipstick. Remove left and right front engine splash aprons. Remove flywheel housing inspection cover. Take out oil pan retaining screws and remove oil pan.

OIL PAN REMOVAL (272" Engine): Drain crankcase. On Fordomatic models, remove converter housing dust cover. Disconnect oil pump inlet tube at oil pump and remove "0" ring seal from pump end of tube. On Tilt Cab Trucks, crank engine until No. 1 piston is on TDC. Remove oil pan retaining screws, remove pan.

223" 6 CYL. ENGINES
(See Engin Sp cifications Above)

See 1957 Ford 6 Cyl. Passenger Car Pages. Engine is similar to those used in 1957 Pass. Cars, and all passenger car engine data applies to truck engines.

272" V8 ENGINES
(See Engin Specifications Above)

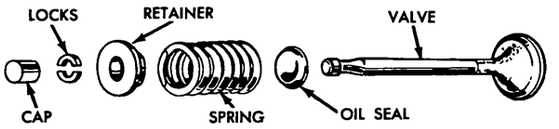
See 1957 Ford V8 Passenger Car Pages. Engine is similar to those used in 1957 Pass. Cars, and all passenger car engine data applies to truck engines EXCEPT AS NOTED BELOW.

CRANKSHAFT: Bearings – Copper lead bearings only used in ECR-272 Engine.

VALVES (ECR-272 ENGINE) Exhaust valves are Sodium Cooled "Free Turning" type with special specifications as follows: Stem Diameter–.4343–.4350". Stem Clearance–.0018"-.0032" (Wear limit .0055"), Valve Seat Width–.070-.090" (Intake), .090-.110" (Exhaust).

Valv Cap Clearance (ECR-272 Exhaust Valves) – .0002-.004" between end of valve stem and inner face of cap (necessary to insure cap carrying valve spring pressure and permit rotating of valve). Measure with Micro Gauge, Tool 6513-CE-2. If clearance greater than .004", reduce clearance by lapping open end of cap on flat surface.

► *EXHAUST VALVE CAUTION (ECR-272 H.D. ENGINE):* Exhaust valves are Sodium cooled and require special disposal handling to prevent possibility of fire or explosion due to chemical reaction. DO NOT DISCARD SODIUM COOLED VALVES with other scrap material. Bury in ground not subjected to excavation or in deep water not subjected to dredging.



FORD V8 ECR-272 VALVE ASSY.

EXHAUST VALVE INSERT (ECR-272 ENGINE): *See "Valve System" in Ford Special Data.*

VALVE TIMING: Cam lift specifications for valve timing points differ from Pass. Car engines. Use Pass. Car Valve Timing Check procedures but note special Cam Lift data following:

Valve Timing (All 272" Engines)

Intake Valves - Open 18° ② BTDC. Close 58° ④ ALDC.
Exhaust Valves - Open 66° ① BLDC. Close 10° ③ ATDC.
Cam Lift - ① .014", ② .015", ③ .017", ④ .018".

OILING SYSTEM

Crankcase Capacity: 6 qts. (ECR-272 Eng.) 5 qts. (Others). Add 1 qt. with filter change.

Normal Oil Pressure: 45-50 lbs. at 2000 RPM (Hot).
Pressure Regulator Valve - In oil pump body. Not adjustable.

Oil Pressure Indicator: Warning Light (F-100, 250, 350, 500, 600). King-Seeley Gauge (P-350, 400, 500; B-500, 600).
Dash Unit - Ford No. B7J-9273-A (Parcel Delivery), B7T-9273-A (Others).
Engine Unit - Ford No. B7T-9275-A.
See "King-Seeley Gauges" in Miscellaneous Section.

Oil Pump: Gear type pump mounted inside crankcase in line with distributor shaft (223 Eng.), rotor type located on left side of crankcase and driven by distributor shaft (272 Eng.).
Pump Removal & Overhaul - *See "Oil Pump" in Ford Special Data.*

Oil Filter: Full-flow (Std. Equip.), with pressure relief valve in center bolt. Replace filter element at 4000 mile intervals or when oil becomes dirty or polluted.
Replacement Filter Element - Ford No. B2A-6731-A (Kit includes new gasket).

► *CAUTION:* This special Full-flow filter element must be used for replacement (use of bypass type element would restrict oil flow and result in insufficient engine lubrication).

► *FILTER INSTALLATION CAUTION & OIL LEAK CORRECTION: See "Oiling System" in Ford Special Data.*

Crankcase Ventilation: Filter in oil filler cap (inlet) all models. Road draft outlet pipe for crankcase ventilation all models. *NOTE* - V8 engine has filter screen in road draft outlet tube. Service filler cap by cleaning with solvent and resaturating with engin oil at 4000 mile intervals, clean screen in road draft outlet tube at same mileage.

COOLING

► *LOSS OF COOLANT CORRECTION:* Lower generator mounting bracket bolt holes are tapped into cylinder water jacket. For loss of coolant at this point or when replacing bolts, apply a good coating or waterproof sealer.

Water Capacity: (6 Cyl. exc. Par. Del.) - 18 qts. (6 Cyl. Par. Del.) - 18½ qts.
(V8 F-100, 250, 350) - 18 qts. (V8 F-350 Dual Rear Whls, F & B-500, F & B-600) - 22 qts.
(V8 P-350 Single Rear Whls.) - 22 or 23 qts., (V8 P-350 Dual Rear Whls. , P-400, 500) - 27 qts.
(V8 C-550, 600) - 28 qts. Add 1 qt. for heater.

Pressure Valve: Ford No. OL-8100-A, radiator filler cap (opens at 7 lbs.).

Thermostat: 223 Eng. - Ford No. EAA-8575-A (157-162°), EAA-8575-B (177-182°).
272 Eng. - Ford No. B4C-8575-A (152-157°), B4C-8575-B (167-172°). Spring and cartridge type.

Water Pump: Packless, sealed ball bearing type. *See "Ford 6" or "Ford V8" in Water Pump Section.*

Temperature Gauge: New King-Seeley Electric Constant-voltage ("CV") type with gauge voltage regulator, Ford No. B7J-10804-A (J,JH,JL), B7A-10804-B (Others).
Dash Unit - Ford No. B7J-10883-A (J,JH,JL), B7C-10883-B (Others).
Engine Unit - Ford No. B7A-10884-A.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Long 10, 10½, & 11CF clutches used. For Truck Model (with type Trans.) application of Cover and Disc. See below.

Model	Long No.-Cover Assy.-Ford No.
6 Cyl. 223" Eng. ①	L5222 — B4A-7563-B
6 Cyl. 223" Eng. ②	267371 — B7C-7563-A
V8 272 Eng. ③	L5222 — B4A-7563-B
V8 272 Eng. ④	267371 — B7C-7563-A
6 Cyl. & V8 (Others) ⑤	267147 — B7Y-7563-A

Model	Long No - Disc - Ford No.
6 Cyl. 223" Eng. ①	CD870 — B7C-7550-A
6 Cyl. 223" Eng. ②	287335 — B7C-7550-B
V8 272" Eng. ③	CD870 — B7C-7550-A
V8 272" Eng. ④	287335 — B7C-7550-B
6 Cyl., V8 (Std.) ⑤	CD607 — 81T-7550-A
6 Cyl., V8 (H.D.) ⑤⑥	CD606 — B6D-7550-A

① - F100, 250, 350; P350 (10CF).
② - F100, 250 (EBR); P350 (10½CF).
③ - F100 3-Speed L.D. Trans.; Overdrive (10CF).
④ - F100, 250 (ECW); P350 (10½ CF).
⑤ - 11CF.
⑥ - All 6 Cyl.; 272" Eng. (F100, 250; P350 with Std. Trans.); 272" Eng. (F100, 250 with 4-Speed Trans.); 272" Eng. (F350).

► *HEAVY DUTY CLUTCH DISC:* Heavy Duty Clutch Disc Ford No. B6D-7550-A entered production Jan. 1957 and identified by gray painted damper springs and yellow paint on hub.

Clutch Pedal Clearanc : Adjust pushrod eccentric bolt on clutch pedal (Conv. Trucks) or extension rod (Par. Del.) for ¼" free travel at pedal pad before pushrod contacts master cylinder piston.

Clutch Release Lever Clearance - Adjust clearance be-

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tween slave cylinder pushrod adjusting nut and release lever to ¼" (six turns of adjusting nut).

Hydraulic Clutch Control: Master cylinder mounted on firewall (Conv. Cab), on bracket on firewall (Tilt Cab), and connected to Slave Cylinder which is attached to flywheel housing and connected to outer end of clutch release lever.

Filling Master Cylinder - Maintain fluid level (H.D. Brake Fluid) to within ½" below top of cylinder reservoir. Change fluid at 15,000 mile intervals.

Removal - Release retracting spring. Remove slave cylinder from flywheel housing, slave cylinder pushrod from release lever. Remove trans. (see Trans. Removal below), dust cover from flywheel housing, release bearing and hub from release lever. Mark pressure plate, cover assembly and flywheel for reassembly. Remove pressure plate and cover assembly to flywheel bolts gradually to reduce spring tension, remove assembly through bottom of clutch housing.

SYNCHRO-MESH TRANSMISSION

3-SPEED (LIGHT DUTY)

Own. 3-speed, all helical gear, constant mesh, synchro-mesh (second and high), sliding gear (low and reverse). Steering column shift standard.

See "Ford Truck 3-Speed (Light Duty)" in Transmission Section.

Removal: Drain lubricant, disconnect speedometer cable and drive shaft and gear shift linkage at transmission. *(NOTE* - On band type parking brake, disconnect brake cable clevis and remove cable support bracket). Remove flywheel housing-to-transmission bolts and nuts, draw transmission to rear to clear flywheel housing and lower transmission.

3-SPEED (MEDIUM DUTY)

Own. 3-speed medium duty with steering column shift standard. *See "Ford Truck 3-Speed (Medium Duty)" in Transmission Section.*

Removal: Same as for 3-Speed (Light Duty) above.

3-SPEED (HEAVY DUTY)

Own. 3-speed, helical gear (second & high), spur gear (low & reverse), constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Steering column shift standard.

See "Ford Truck 3-Speed (Heavy Duty)" Transmission in Transmission Section.

Removal: Same as for 3-Speed (Light Duty).

4-SPEED

Own. 4-Speed, constant mesh, synchro-mesh (second, third, & high). Helical gears used for second, third, & high. Spur gears used for low & reverse. Floor mounted gear shift standard.

See "Ford Truck 4-Speed (Synchro-mesh) Transmission" in Transmission Section.

Removal: Same as 3-Speed (Light Duty) and note following: If hoist not used, it may be necessary to remove gear shift lever assembly (New Process) and lever housing (Others), before transmission can be removed from truck. *(NOTE* - On Tilt-Cab - release lock and tilt cab forward). Disconnect shift linkage at split pin which attaches universal joint to finger socket shaft in rear cross shaft housing. Drain transmission, disconnect drive shaft at parking brake drum. If truck equipped with coupling shaft support, disconnect support bracket, and remove coupling shaft. Disconnect parking brake and speedometer cables. Remove dust cover from bottom of clutch housing, support transmission on jack, remove two top nuts, two bottom bolts, move transmission to rear until input shaft splines clear clutch housing and lower transmission.

OVERDRIVE

Warner Model R10. Solenoid operated with governor control and throttle operated kickdown.

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as 3-Speed Synchro-mesh Transmission (above), after disconnecting control cable and wiring.

FORDOMATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock. *See "Fordomatic & Merc-O-Matic" in Transmission Section.*

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Merc-O-Matic" in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "Fordomatic & Merc-O-Matic" in Transmission Section.*

Lubrication - Check transmission fluid level every 1000 mile intervals, maintain level at "F" (full) mark on dipstick. Drain and refill every 15,000 miles. Use only Automatic Transmission Fluid Type "A".

Checking Fluid Level: Bring transmission to operating temperature by idling engine (operate with selector lever in "N" for 4 minutes, in "P" for remainder of time). With transmission warm, move selector lever through all positions, then check fluid level with selector lever in "P" Add Automatic Transmission Fluid Type "A" to bring level to "F" mark on dipstick.

Throttle Linkage Adjustment (Fordomatic Models): *See CARBURETOR above.*

► *OTHER FORDOMATIC SERVICE DATA: See "Fordomatic & Merc-O-Matic" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

► *UNIVERSAL JOINT INSTALLATION CAUTION:* Make sure that all universal joint yokes in drive line are in same plane to avoid drive line vibration.

Coupling Shaft Center Bearing: Consists or cushion mounted ball bearing bolted to underside of frame intermediate cross member. Bearing is mounted on end of coupling shaft in a sleeve with felt retainer on each end and bearing baffle on front end.

REAR AXLE

SEMI-FLOATING

Own. New Separate Carrier, hypoid gear, with Hotchkiss drive.

See "1957 Ford & Mercury" in Rear Axle Section.

Ratios - 3.70 (37-10), 3.89 (35-9), 4.11 (37-9).
Backlash - .004-.009".

Axle Shaft Removal: Remove wheel, take off drum. Remove four axle retainer locking type nuts (work through opening in axle shaft flange). Use Puller No. 4235-N and pull axle shaft (do not disturb brake backing plate or damage wheel bearing oil seal). Replace one nut to secure brake backing plate.

Carrier Assembly Removal: *NOTE* - Pinion carrier assembly can be removed separately without disturbing differential carrier by disconnecting rear universal joint at companion flange, and removing five bolts that attach pinion carrier assembly to differential carrier housing. With rear universal joint disconnected, axle shafts removed (see above), remove differential carrier housing to rear axle housing bolts and lift out carrier assembly.

Wheel Bearing Adjustment: None required.

FULL FLOATING

Full floating, Hypoid gear, with Hotchkiss drive.

Model	Rear Axle Type
F-250,P-350 (Spicer Model 60)	Integral Housing
350,600 Series	Banjo Housing

See Various types of Ford Rear Axles in Rear Axle Section.

Rear Axle Ratios

Model	Axle Ratios
F-250, P-350	4.56(41-9),4.88(39-8),5.88(47-8) ④
F-350, P-350,400	4.86(34-7),5.14(36-7),5.83(35-6) ⑤
F,P,B-500	6.2(31-5),6.8(34-5) ⑥
F,P,B-500, C-550	5.83(35-6),6.2(31-5),6.8(34-5) ⑥
F,B,C-600	6.2(31-5),6.8(34-5),7.2(36-5) ⑥

Backlash - ④ -.008-.013". ⑤ -.004-.018". ⑥ -.006-.012".

Axle Shaft Replacement: Remove axle shaft stud nuts and lockwashers. Strike center of axle shaft flange with a hammer and drift to loosen tapered dowels, then remove dowels. Pull axle shaft from housing. To reinstall, place gasket in position on housing and install axle shaft. Install tapered dowels, lockwashers and nuts on studs. Tighten nuts to 50-70 ft. lbs.

Axle Assembly Removal (Integral Housing): Loosen wheel and axle shaft stud nuts, disconnect rear shock absorbers, raise rear of frame until weight is off springs. Disconnect flexible hydraulic line at frame, parking cable (if so equipped) at equalizer, remove cables at brackets. Disconnect rear universal joint at flange, remove spring "U" bolts, roll rear axle from under truck and drain lubricant.

Carrier Removal (Banjo Housing): Remove axle shaft stud nuts and lockwashers, strike center of axle shaft flange with hammer and punch to loosen tapered dowels, remove dowels and axle shaft. Disconnect drive shaft at rear universal joint flange, support carrier assembly with roller jack, remove carrier to housing bolts and lockwashers. Tighten puller screws (when provided in carrier) to loosen carrier from housing, roll carrier from truck.

Wheel Bearing Adjustment: Remove axle shafts (see above), use special bearing adjusting wrench and remove bearing locknut (outer nut), and lockwasher Adjust bearings by turning bearing adjusting nut (inner nut) up until tight then backing off 1/8 turn. Install bearing lockwasher. *(NOTE* - If adjusting nut equipped with dowel, make sure lockwasher fits over dowel). Install bearing locknut and draw nut up tight. If flange type lockwasher is used, bend one flange over adjusting nut

CONTINUED ON NEXT PAGE

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and one flange over locknut. Install axle shaft and lower vehicle.

TWO-SPEED

Own. Electrically operated shift, Two-speed, Full-floating spur gear planetary unit (reduction gearing). Spiral bevel gear final drive.

See "Ford Truck Two-Speed" in Rear Axle Section.

Rati - 5.83-1 (Direct Speed), 8.11-1 (Second Speed); 6.33-1 (Direct Speed), 8.81-1 (Second Speed).

Backlash - .006-.016".

Rem val: Same as for standard axle (above) after removal of wiring harness.

SHOCK ABSORBERS

Direct acting hydraulic. Shock absorbers are sealed units and are not adjustable or refillable.

► *REPLACEMENT SHOCK ABSORBER NOTE:* Shocks are supplied for service replacement in kits consisting of shock absorber and necessary bushings.

Replacement Shock Absorbers

Mdl	Front - Ford Nos. - Rear
F-350	B7C-18124-A B3Y-18125-A
F-100,250	B7C-18124-A B7C-18125-A
P-350,400	B7J-18124-B .①B7C-18125-A
P-500	B7J-18124-A..②B7J-18125-A
F,B-500	B7T-18124-A..①B7J-18125-A
P-350	B7J-18124-B..②B3T-18125-A
F,B-500,600	B7T-18124-A..②B3T-18125-A
C-550-600	B7T-18124-B..②B3T-18125-A

① - Single Speed Axle. ② - Two Speed Axle.

FRONT SUSPENSION

Conventional "I" beam section front axle with Reverse-Elliot ends and semi-elliptical springs.

Kingpin Inclination - 5½° - C-550,600; P-500 (154" W.B.). 4° - Others.

Cast r ①	Specification
F-100,250	3° ± ½°
P-350	4° ± 1°
P-400; P-500(137" W.B.), F-500(130" W.B.)	3° ± 1°
C-550,600	3° ± 1°
F-350	3¾° ± 1°
F-500 (154" W.B.), F-600, B-500, B-600	4½° ± 1°
P-500 (154" W.B.)	3½° ± 1°

① - Maximum variation between wheels ½°.

Camber - 0-1°. Maximum variation between wheels ¼°.

Toe-In - 0-1/16". *NOTE* - On Power Steering models, run engine so hydraulic pressure will center power control valve.

STEERING

Own. Gemmer design. Worm-and-roller types with push-pull adjustment. *NOTE* - Tilt Cab steering column has universal joint.

See "G mm r Worm & Roller Types" in Steering Section.

St ring Linkage: *See "Steering Linkag " in Steering Section.*

Ste ring Wh l & Horn Butt n Removal: *S e "Gemmer Worm & Roll r" in St ring S ction.*

St ring Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Brake types are listed in application table below. Hand lever applies rear wheel service brakes on F-100, F-250, and P-350 trucks. Independent transmission mounted drum and contracting band type brake on other models.

Brake Type Application

Model	Front	Rear
F-100	Duo-Servo	Duo-Servo
F-250;F,P-350,400	Uni-Servo	Duo-Servo
C-550,600	Uni-Servo	Two Cyl.
F,B,P-500; F,B-600	Uni-Servo	Two Cyl.

Uni-Servo - Ford-Bendix. Single anchor. Wheel cylinder actuates primary shoe. Ratchet adjusting screw.

See "Ford-Bendix Uni-Servo Hydraulic" in Brake Section.

Duo-Servo - Ford Bendix. Single anchor, self energizing wheel cylinder actuates both shoes. Ratchet adjusting screw.

See "Ford-Bendix Hydraulic" in Brake Section.

Two-Cylinder Type - Two wheel cylinders in each brake assembly.

See "Ford Truck Two-Cylinder" in Brake Section.

Brake Lining

Model		Drum Diam.	Primary Width-Length	Secondary Width-Length
F-100)..	Front....	11"	2"-11.91"	2"-11.91"
6 Cyl.)	Rear	11"	1¾"-11.91"	1¾"-11.91"
F-100)..	Front...	11"	2"-11.91"	2"-11.91"
V8)	Rear	11"	1¾"-11.91"	1¾"-11.91"
F-250)..	Front....	12 1/8"	2"-11.65"	2"-13.12"
P-350)	Rear	12 1/8"	2"-11.65"	2"-13.12"
F-350)..	Front....	12 1/8"	2"-11.65"	2"-13.12"
P-400)	Rear ...	13"	2½"-12.72"	2½"-14.00"
P-500)..	Front....	13"	2¼"-12.70"	2¼"-12.95"
	Rear	14 1/8"	3½"-14.45"	3½"-14.45"
F,B-500)	Front	13"	2¼"-12.70"	2¼"-12.95"
F,B-600)	Rear	15"	4"-15.31"	4"-15.31"
C-550)..	Front....	14"	2½"-13.65"	2½"-15.02"
C-600)	Rear	15"	4"-15.31"	4"-15.31"

Hand Brake: **(F-100,250; P-350)** Eliminate slack in cables after adjusting service brakes. *See "Ford-Bendix Hydraulic" in Brake Section.*

(Except F-100,250; P-350) External contracting type, consisting of a brake drum bolted to transmission main shaft companion flange, and an external contracting band mounted on rear of transmission.

Brake Drum Diameter - 8" (F-350), 9½" (THZ, WHZ 4-Speed Trans.), 7 13/16" (All Others).

Adjustm nt - On cable controlled parking brakes, move lever to full released position. On transmission mounted parking brake levers, set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, adjust clevis rod to allow flat portion to rest on brake band bracket. Install clevis and cotter pins. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until .010" clearance is established between brake lining and drum at anchor bracket. Loosen locknut on adjusting screw from lower half of brake band. Adjust for .010" clearance between lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting rod nut until .010" clearance is established between upper half of band and drum. Reinstall lock-wire in anchor adjusting screw.

Hand Brake Lining

Series	Length	Width	Thickn ss
F-350	24.63"	2.00"	.156"
P-350,400,500;C-550,600	①	2.50"	.250"
F-500,600;B-500,600	24.63"	2.50"	.250"

① - Two 7.89" and one 7.30".

Standard Master Cylinder: Located on engine side of firewall.

Checking Fluid - Maintain fluid level to within ½" of top of reservoir.

Removal - Disconnect rubber boot from rear end of master cylinder, brake line at master cylinder fitting, stop light switch from front of cylinder and disconnect wires from switch. Push down brake pedal several times to force as much fluid as possible (into clean container) remove bolts that secure master cylinder to dash panel. Do not disconnect pushrod from brake pedal unless it is to be serviced.

Power Brakes: Midland (Diaphragm) or Hydrovac (Piston) types used. *See Model Application following:*

Model	Power Brake	Ford N .
C	Midland Diaphragm	AD-2005-A
D,Y	Hydrovac Piston	B7D-2005-A
J,JL	Hydrovac Piston	B4D-2005-A
JH,T,TH,THZ..	Midland Diaphragm	TEAA-2005-B
W,WH,WHZ	Midland Diaphragm	B7T-2005-A

See "Midland" or "Hydrovac" Power Units. in Brake Section.

Checking Fluid - Same as for Manual Brakes above.

Removal of Power Unit - (Hydrovac) - Depress brake pedal several times to remove all vacuum from system. Loosen brake power unit inlet tube clamp and remove tube. Disconnect master cylinder to power unit hydraulic line at power unit. Disconnect vacuum tube at power unit. If stop light switch located on brake power unit, disconnect wires. Remove mounting bracket bolts and power unit.

(Midland) - Depress brake pedal several times to equalize air pressure at both sides of diaphragm in booster unit. Loosen slave cylinder clamp and disconnect the air breather hose from the booster. Disconnect Hydraulic lines at booster and intake manifold to booster vacuum hose at booster. Remove booster. *NOTE* - Do not remove breather in cab or controls mounted in engine compartment unless operating conditions indicate repairs are necessary.

MISC. MECHANICAL

Windshield Wip rs: Vacuum Link and Arm (Exc. H.D. and Tilt Cab models). Electric (H.D. and Tilt Cab models).

See "Windshi ld Wipers" in Miscellaneous Section.

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head Bolts	ℂ 90 (Hot)
Intake & Exhaust Manifolds	23-28
Main Bearing Cap Bolts	120-130
Oil Pan	12-15
Flywheel	75-85
Oil Pump	12-15
Oil Filter	20-25
Engine Front Cover	23-28
Water Outlet Connection	23-28
Camshaft Sprocket	15-18
Crankshaft Damper or Pulley	130-145
Con Rod Nuts	45-50
Rocker Shaft Support	22-25
Rocker Arm Cover	2-2½
Valve Chamber Covers	2-2½
Water Pump Mounting Bolt	23-28
Oil Pump Pick-up Tube Nut	10-12
Oil Pan Pick-up Tube Nut	23-32

ℂ – See Cylinder Head Installation (below) for tightening procedure. Three different torque applications must be made.

ENGINE

LINCOLN

ENGINE REMOVAL (Less Transmission):

1) Disconnect battery, drain radiator and cylinder block, remove hood.

2) Disconnect distributor primary wire at coil, pull secondary coil lead from distributor cap. Disconnect and remove defroster blower motor and duct assembly, loosen two duct clips on firewall and disconnect wires at bullet connectors.

3) Remove capscrew securing transmission oil filler tube bracket to exhaust manifold. Disconnect two right heater hoses at water pump and cylinder block.

4) Disconnect generator wires at generator, remove carburetor air cleaner and air duct as an assembly.

5) Disconnect upper and lower radiator hoses and remove radiator. Remove fan, spacer, water pump pulley, and belts. Disconnect left heater inlet hose at pipe and power brake vacuum line at vacuum pipe.

6) Loosen power steering drive belt and capscrew securing power steering hose bracket to cylinder block. Remove power steering pump. Wire pipe securely to left hood hinge in a position that will prevent oil leakage.

7) Remove accelerator shaft retracting springs. Disconnect carburetor-to-control shaft rod at carburetor. Remove capscrews securing control shaft assembly and accelerator shaft bracket to engine. Wire control shaft assembly and accelerator shaft bracket to dash panel.

8) Disconnect engine ground strap at engine. Disconnect temperature sending unit at sending unit and oil pressure warning light wire at bullet connector. Disconnect wiper at vacuum pipe.

9) Raise vehicle. Remove starter. Disconnect resonator inlet pipes from exhaust manifolds. Remove radiator splash shields. Drain engine oil and remove oil filter.

10) Remove converter housing-to-cylinder block capscrews. Remove converter cover, then bolts securing converter to flex plate. Lower vehicle. Support transmission with floor jack.

11) Disconnect and remove radio speaker. Fold back front center floor carpet and pad. Remove two rubber plugs from access holes in dash panel. Remove two converter housing-to-cylinder block capscrews. Remove two capscrews from each engine front support bracket.

12) Attach Engine Hoisting Sling Tools 6000-B-A and 6000-C. Position sling to lift engine less transmission. Lift engine slightly. Have second mechanic push forward to clear dash panel. Continue to lift engine until clear of engine compartment while second mechanic guides engine.

CONTINENTAL

ENGINE REMOVAL (Less Transmission);

1) Drain radiator and block, remove hood.

2) Disconnect distributor primary wire at distributor. Pull secondary coil lead from distributor cap.

3) Remove capscrew securing transmission oil filler tube bracket to exhaust manifold. Disconnect two right heater hoses at heater control valve and return pipe. Disconnect right heater control valve vacuum hose at valve.

4) Remove nuts and lockwashers securing right front exhaust pipe to exhaust manifold. Slide inlet pipe free of studs (*NOTE* - Hold exhaust control valve with nut).

5) Remove carburetor air cleaner and duct as an assembly. Disconnect upper and lower radiator hoses. Remove capscrews and lockwashers securing radiator to its support. Remove radiator. Remove fan, spacer, water pump pulley, and drive belts.

6) Loosen power steering drive belt and capscrew securing power steering hose bracket to cylinder block. Remove power steering pump. Wire pump securely to left hood hinge in position to prevent oil leakage.

7) Disconnect battery ground cable. Remove converter housing-to-cylinder block capscrews. Remove two accelerator shaft retracting springs. Disconnect carburetor-control shaft rod at carburetor. Remove capscrews securing control shaft assembly to engine, wire control shaft assembly to dash panel.

8) Disconnect temperature sending unit wire at sending unit and oil pressure gauge sending unit at bullet connector. Remove capscrew, lockwasher, and clamp and disconnect tachometer drive cable at distributor (*CAUTION - Remove tachometer drive assembly from cable).* Remove nuts and lockwashers securing left front exhaust pipe to exhaust manifold. Slide pipe free of studs.

9) Disconnect two left heater hoses at heater control valve and return pipe. Disconnect left heater control valve vacuum line at valve and power brake vacuum hose at intake manifold pipe.

10) Raise vehicle. Disconnect generator wires at generator. Disconnect starter cable and engine ground cable at starter. Remove starter. Disconnect antenna and windshield washer vacuum line at connection under generator. Disconnect flex hose at fuel line, plug fuel line. Drain engine and remove oil filter.

11) Remove throttle linkage splash pan and lower left converter housing-to-cylinder block capscrew. Remove converter cover, then remove bolts securing converter to flex plate.

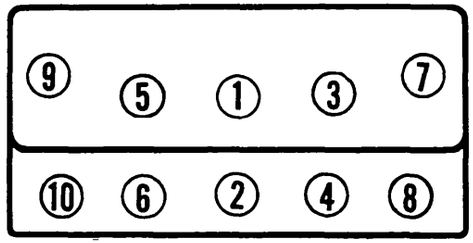
12) Lower vehicle and support transmission with floor jack. Remove capscrews from each engine support bracket. Attach Hoisting Sling Tools 6000-B-A and 6000-C to exhaust manifolds. Position sling to lift engine less transmission. Lift engine slightly. Have another mechanic push engine forward slightly and then guide assembly as it is lifted from engine compartment.

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD REMOVAL: Loosen all pushrod adjusting nuts and screws to relieve tension on pushrods. Remove all rocker arm bracket attaching screws and nuts, remove oil overflow pipe from end support (front end on right bank, rear end on left bank), lift rocker arm assembly up over studs and remove as an assembly (see Rocker Arm data under "Valve System" below). Remove all pushrods, remove oil baffle plates from rocker arm pads. Remove the two end cylinder head capscrews and install Pilot Studs, Part No. 6051-A, in these two holes. Install cylinder head holding fixture 6085-A (CAUTION—this fixture recommended to protect machined surfaces of head while it is off the engine AND SHOULD NOT BE REMOVED FROM HEAD UNTIL IT IS RE-INSTALLED ON ENGINE). Remove remaining cylinder head capscrews, lift head up and off the locating dowels and pilot studs. Remove gasket. ***CAUTION—Never pry between cylinder head and block.***

►***CYLINDER HEAD INTERCHANGEABILITY:*** Heads can be changed from one bank to the other if the rocker arm shafts and supports are changed to properly line up oil feed and drain passages. Water jacket plugs must be installed in hole at rear of the cylinder head. Use Tool 6085-C to install new plugs.

CYLINDER HEAD INSTALLATION: Install pilot studs, Tool 6051-A in two end capscrew holes in block. Coat NEW steel head gasket lightly with 8M-19554 sealer and install gasket over pilot studs and dowels. Install cylinder head assembly over studs and dowels **with plugged water jacket hole to rear of engine.** Install 8 cylinder head capscrews, then remove pilot studs and install remaining two capscrews in these holes. Tighten all capscrews evenly as follows with Cyl. Head Wrench and adapter (Snap-On Tool Nos. S-9513-C & S-9526). ***(CAUTION—Three torque applications must be made as indicated below).*** **Initial** COLD torque should be 70 ft. lbs. **Second** COLD torque should be 80 ft. lbs., **Third** HOT torque should be 90 ft. lbs. after 20 minute fast idle warm up. *NOTE*—After above procedure has been completed, the cylinder head capscrews require no additional torquing and should not be disturbed for installation of engine lifting hooks, etc.



LINCOLN CYLINDER HEAD

►***CYLINDER HEAD GASKET INSTALLATION CAUTION:*** Gaskets are interchangeable from one cyl-

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inder bank to the other but MUST BE INSTALLED WITH MARK "FRONT" TOWARD FRONT OF ENGINE. Make certain that water passage holes in gasket and block line up.

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING OIL SEAL: Install new packing in crankcase and bearing cap using Tool 6701 to seat packing Before removing tool cut off edges flush with surface Make certain there are no ragged edges protruding Install outer "L" shaped neoprene seal on bearing cap and coat with lubricant Install Pilot Studs Tool 6336-A1, and place unit over pilot studs Push bearing cap through tool and into position in block Remove bearing replacing tool and trim vertical seals, leaving approximately 5/64' of seal above cap Remove pilot studs and install the self locking main bearing cap bolts Tighten to 120-130 ft lbs torque

CRANKSHAFT THRUST BEARING ALIGNMENT: After #1, #2, and #4 bearing caps and inserts have been installed and properly torqued, install #3 bearing cap and insert Install capscrews snug, then pry crankshaft toward rear of engine Reverse this action by prying crankshaft forward (toward front of engine) This will align thrust surfaces of both halves of thrust bearing RETAIN THIS FORWARD PRESSURE on the crankshaft and tighten capscrews to 120-130 ft lbs torque Check crankshaft endplay which should be 004- 012".

ENGINE FRONT COVER

CRANKSHAFT FRONT OIL SEAL (In Timing Chain Cover): Coat new seal with engine oil and install on Tool 6700 Center seal and tool over front cover boss and drive in until seated Make sure spring on inside of seal is properly seated

ENGINE FRONT COVER INSTALLATION: Coat new cover gasket with sealer, install gasket and front cover on engine Align cover and oil seal on crankshaft, BEFORE installing capscrews by positioning Tool 6059 on crankshaft Tighten cover capscrews to correct torque (see Tightening Specifications)

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Remove cylinder head covers and rocker arm assemblies from cylinder heads (see Cylinder Head Removal) Remove valve pushrods and hydraulic valve lifters Remove timing chain and sprockets (see Timing Chain) Remove fuel pump drive sleeve from camshaft eccentric and remove timing chain oil deflection plate With Tool 9400-B remove snap ring retainer from fuel pump push rod and remove rod Carefully withdraw camshaft to avoid damaging camshaft bearings

VALVE SYSTEM

OVERSIZE VALVE STEM INSTALLATION. Use Tool 6085 Piloted Reamer to ream cylinder head valve guides for oversize valve stems Reamers are furnished in 003', 015', & 030 oversizes Pilots are furnished Std, 003', & 015 Use reamers in sequence with correct pilots when reaming from standard to oversize Regrind valve seats AFTER reaming guides

INITIAL VALVE CLEARANCE: Self-locking adjusting screws used with a tension of 7-15 ft lbs Replace rocker arm when tension reduced to 3 ft lbs Turn adjusting screw clockwise while moving pushrod up and down **until all slack is removed.** *(CAUTION* - Plunger unit of hydraulic lifter should not be forced down into body of lifter during this operation) With all slack removed turn adjusting screw **an additional 2½ turns.** *NOTE* - If lifter is noisy in operation adjustment can be varied by turning adjusting screw ± ¼ turn from original 2½ turn setting Repeat for all valves

Adjustment Sequence: To insure valve being on the low side of the cam make all adjustments in the following sequence.

No. 1 Piston at TDC (Compression Stroke) - Adjust No 1 Int & Exh No 5 Int & Exh No 7 Int No 4 Exh

No. 6 Piston at TDC (Compression Stroke) - Adjust No 6 Int & Exh No 3 Int & Exh No 7 Exh No 8 Int & Exh No 4 Int

ROCKER ARMS

ROCKER ARM ASSEMBLY: After assembly removed from cylinder head (see Cylinder Head Removal above), disassemble and reassemble the assembly as follows

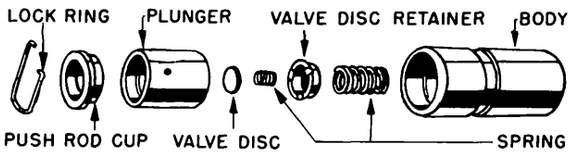
Rocker Arm Disassembly: Remove cotter keys, washers, rocker arms, springs, supports and plugs from shaft ***Keep all parts in order as removed so they may be reinstalled in same position.*** Inspect all parts for wear and replace worn parts If rocker arm radius is scored, replace arm, do not try to regrind radius

Rocker Arm Reassembly: Reverse disassembly procedure Install so valve ends of arms point outward away from support See Illustration

HYDRAULIC LIFTERS

HYDRAULIC VALVE LIFTERS: Lifters are "barrel type," integral units with a flat, disc type check valve Lifter has three holes in outside diameter groove and four holes in plunger Lifters are furnished in unit packs of eight

Removal: Remove cylinder head covers Take out rocker arm assembly support bolts and remove rocker arm assemblies and valve pushrods Remove intake manifold and gasket then remove pushrod chamber cover Valve lifters can then be removed from lifter bores in block

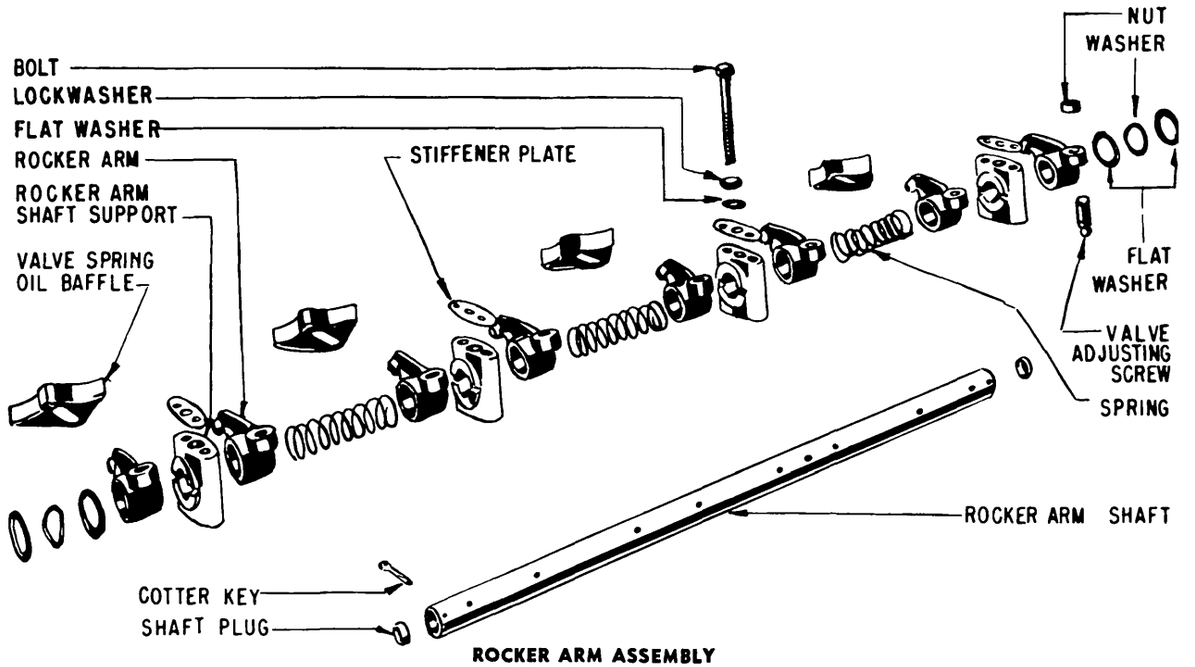


LINCOLN HYDRAULIC VALVE LIFTER

Disassembly: Immerse all lifters in solvent to remove all varnish and carbon deposits. DO NOT CUT OR SCRAPE CARBON FROM LIFTER. With needle nose pliers, remove lock ring from top of body. Remove push rod seat, plunger, valve disc assembly and spring from body. ***(CAUTION—Disassemble one lifter at a time to avoid inter-mixing lifter parts).***

Reassembly: Place push rod seat upside down on bench. Install plunger on push rod seat and place

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ROCKER ARM ASSEMBLY

CONTINUED FROM PRECEDING PAGE

valve disc assembly on plunger and set spring on valve disc retainer. Place body over assemblies and push body down over plunger. Lift assembly and push plunger and push rod seat up into body. Install lock ring using tool 6500-C.

OILING SYSTEM

OIL PUMP

ROTOR TYPE OIL PUMP

Removal: Disconnect external oil line. Remove attaching capscrews (two from bottom, one from above). Remove pump and intermediate shaft.

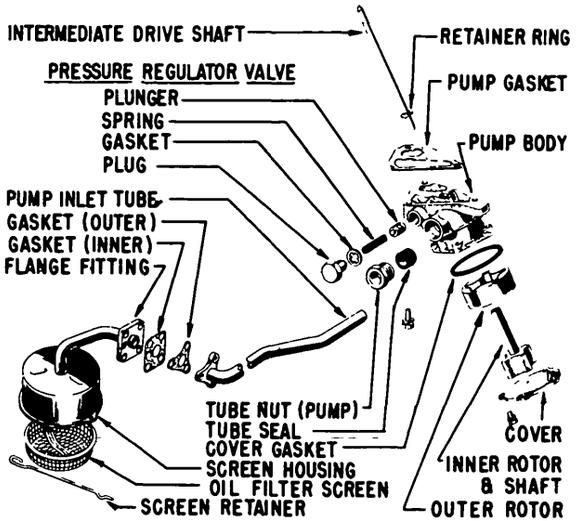
Disassembly: Remove capscrew securing cover to body assembly. Remove cover and "O" ring gasket. Remove rotor and shaft assembly. Remove relief valve nut, spring and relief valve.

Inspection: Clean all parts in suitable solvent. Check pump housing and rotors for damage or excessive wear. Check compression of relief valve spring which should be 6.1-7.3 lbs. at .80". Check relief valve clearance in body assembly. Measure outer rotor race to body clearance. Clearance should be .006-.009". With rotor and shaft assembly installed in housing, place straightedge over rotor assembly and pump body. Measure clearance between straightedge and pump at rotor. Clearance should be .001-.0035". Check cover for wear, and if scored or grooved, replace it. Drive gear shaft length should be 3.36-3.38" from rotor assembly face to shaft end. *NOTE* - Outer rotor and shaft and rotor assembly are replaced as a unit.

R assembly: Reverse disassembly procedures. Check assembled pump to see that it rotates without bind.

OIL FILTER

OIL FILTER SERVICING: Filter is full-flow type and should be replaced at 4000 mile intervals (or more often if required by operating conditions).



ROTOR TYPE OIL PUMP

Disposable Filter Original Installation - Remove and discard original filter. Install Gasket EAA-6838-A (coat gasket with light grease) and Adapter ECG-66391-A, in adapter recess in cylinder block (mark Top on adapter must be upward), install Oil Filter Mounting Bolt Insert No. ECG-6890-A and tighten insert to 70-80 ft. lbs. torgue. *(CAUTION* - DO NOT allow adapter to rotate). Install Disposable Filter Assembly MHK-6714-A as follows:

Disposable Filter Replacement - Coat gasket face of filter with oil, thread filter on insert by hand until gasket contacts adapter face, then tighten filter an additional one-half turn *(CAUTION* - DO NOT overtighten). Run engine and check for leaks.

FUEL SYSTEM NOTES

LINCOLN & CONTINENTAL

CARBURETOR AIR INTAKE DUCT ASSEMBLY (WITH THERMOSTATIC CONTROL): Thermostatically controlled valve in air intake duct assembly should be fully closed at 65° F. (for air intake from rear "heated" opening), and should start to open at 75° F. At temperature of 95° F., valve should be wide open (for air intake from front "cool" opening). If valve does not operate satisfactorily, remove duct assembly and test operation as follows:

Duct Assembly Removal: Loosen clampscrew and slide flexible hose off end of duct. Remove wing nut retaining air cleaner on carburetor, remove nut and washer retaining duct assembly on bracket. Lift air cleaner and duct assembly off engine. Loosen two clampscrews and slide duct assembly from air cleaner.

Testing: Place duct assembly in pan of water at temperature below 65° F. (thermostat must be covered by water). Valve should be in closed "heat on" position. Heat the water slowly. At temperature of 75° F., valve should start to open *(NOTE* - If valve does not start to open, hold water temperature at 75° F. for eight minutes before discarding thermostat as defective). Increase water temperature to 95° F. Valve should now be wide open in "heat off" position *(NOTE* - If valve not wide open, hold water temperature at 95° F. for eight minutes before discarding thermostat as defective). If valve operation not satisfactory, remove thermostat and spring assembly and check valve shaft for binding. If valve moves freely, replace thermostat and duct assembly. If valve does not operate correctly, adjust thermostat rod as follows:

Adjustment: Increase rod length to move valve toward "heat off" position, decrease rod length to move valve toward "heat on" position.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on patent plate attached to left front body pillar between door hinges.

First Number - 3443 (Continental), 5001 (Lincoln).

►*SERIAL NUMBER NOTE (Continental):* Serial number (example *56J3443*) includes following identification data in sequence:

Car	M d l Year	Month	Serial No.
C ①	56	J ②	3443

① - Continental.

② - Model year began in August 1956. Letters used to indicate month of production, (letters began with "A" for Nov. 1955 and alphabetically thereafter).

►*SERIAL NUMBER NOTE (Lincoln):* Serial number (example *57WA5001L*) includes following identification data in sequence:

Year	Assy. Plant	Serial No.	Eng. Type
57	WA ①	5001	L

① - Assembly Plants - **LA** - Los Angeles. **WA** - Wayne.

TUNE-UP

COMPRESSION PRESSURE: 150±10 lbs. at cranking speed.

VACUUM READING: 18-19" at 475-500 RPM in neutral.

VALVE TAPPET CLEARANCE: None in service (hydraulic).

►*VALVE TAPPET CLEARANCE NOTE:* Rocker arms have self-locking adjusting screws for initial tappet clearance adjustment.

MANIFOLD HEAT CONTROL: External valve at right exhaust manifold connection to exhaust pipe. Valve is automatic, requires no adjustment but should operate freely.

►*DUAL EXHAUST NOTE:* When heat control valve closed, all exhaust gases discharge through left hand exhaust pipe and muffler (Lincoln), left hand exhaust pipe and both mufflers (Continental).

►*INTAKE MANIFOLD NOTE:* Production intake manifold has mounting hole (¼" x 18 NPSF) for new constant voltage electric heat indicator bulb sending unit. When replacing a 1957 intake manifold, use a 1956 Lincoln or Continental manifold with 3/8" x 18 NPSF threaded hole and install new constant voltage heat indicator bulb sending unit released for this manifold.

IGNITION

FIRING ORDER: 1–5–4–8–6–3–7–2.

Cylinders - RIGHT BANK 1-2-3-4. LEFT BANK 5-6-7-8.

SPARK PLUG GAP: .032-.036".

Spark Plug - Champion F-14Y. 18 mm. Torque to 15-20 ft. lbs. *NOTE* - Supersedes No. 860 previously used and should be used to replace Nos. 860 & 870 in 1955-57 Lincolns.

►*SPARK PLUG WIRE CAUTION:* New "Hypalon" insulated high temperature wires must be used on engines without heat shields. *NOTE* - Retain heat shields on Nos. 3 & 4 spark plugs. Use for replacement on 1952-1957 Lincolns.

►*SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be tightened within limits of 15-20 ft. lbs.

COIL: Linc ln B6A-12029-B.

Ignition Curr nt -2.5 amps. idling, 4.5 stopped.

R sist r - Lincoln B6A-12250-D. 1.30-1.40 Ohms.

►*COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

DISTRIBUTOR: Lincoln FEL-12127-A, Continental FES-12127-A. New type with mechanical (centrifugal) advance and separate Vacuum Spark Control. *See "Ford, Lincoln, Mercury Distributors" in Electrical Section.*

►*CONTINENTAL DISTRIBUTOR NOTE: This distributor has a tachometer drive.*

►*DISTRIBUTOR PRIMARY WIRE PRODUCTION CHANGE:* New Primary wire with improved insulation, Part No. B7A-12216-B, with shiny black vinyl covering, used in production. Use this wire in place of cloth covered wire previously used.

Condenser - Lincoln B7A-12300-A. **Capacity** .21-.25 mfd.

Contact Point Set - Lincoln B7A-12171-A.

Breaker Gap - .014-.016".

Cam Angle - 26-28.5°.

Breaker Arm Spring Tension - 17-20 ozs.

Rotation - Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		300	0		600
1½-2½		400	3-5		800
4-5		500	8-10		1000
5½-6½		800	11-13		1600
9-10		1325	18-20		2650
13-14		2000	26-28		4000

Vacuum Spark Control: On distributor housing. Linked to breaker plate.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
0-1	0-2	5
4-6	8-16	10
7-9	14-18	13
7-9	14-18	20

IGNITION TIMING

Setting - 5° BTDC. with engine idling at 475 RPM. *NOTE* - Maximum initial ignition timing is 8° BTDC.

►*CAUTION:* DO NOT advance timing beyond these specifications.

Timing Mark - Crankshaft pulley marked at TDC, 10° BTDC, and 20° BTDC with marks at 2° increments between. Pointer should be half way between the second (4°) and third (6°) marks.

CARBURETOR

Carter WCFB 2404S. 4-barrel with integral Automatic Choke.

►*AIR CLEANER BODY AND ACCELERATOR BELLCRANK INTERFERENCE CORRECTION:* Rear side depression of air cleaner body may interfere with bellcrank on some early cars. To correct, reform air cleaner body to provide 3/16" clearance.

►*CUTTING OUT ON LEFT TURN CORRECTION: See "Carter WCFB Carburetors" in Carburetion Section.*

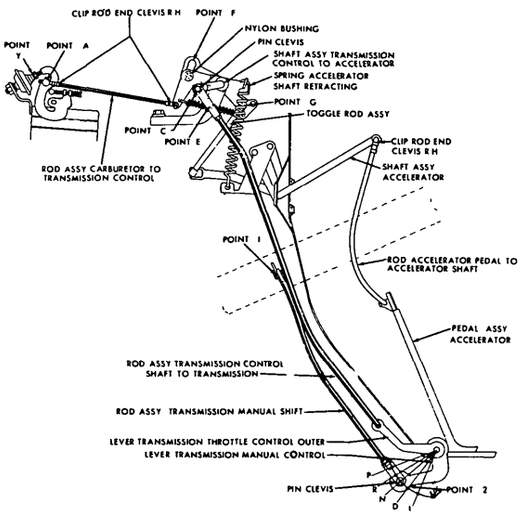
►*1956-57 HARD STARTING, STALLING OR ENGINE BACKFIRE CORRECTION:* New Choke Heat Tube Part No. ECU-9890-B with larger center section radius and larger runout radius at each end of tube is available for service to correct above conditions. *NOTE* - Service Intake Manifolds ECU-9424-A and C must have original type heat tube replaced by this new type before installation.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2–3–5–8. LEFT barrels 1–4–6–7.*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

Idle Setting - 1¼ turns open (set both screws alike). **Idle Speed Setting** - 475-500 RPM with selector lever in Neutral, 425-450 RPM with selector lever in Drive.

Idle Speed-Up Control Adjustment (Optl. & Air Conditioned Cars): With engine at normal operating temperature, transmission in "N" (Neutral) position, and fast idle control switch in "ON" position, loosen locknut on control assembly shaft and adjust knurled nut to obtain engine idle speed of 800 RPM. Tighten locknut securely. *NOTE* - Interference between Automatic Throttle Control Lever and Control Assembly may be caused by cut-out on end of lever being off center, or burrs on edge of lever. Mounting bracket may twist



TURBO-DRIVE THROTTLE LINKAGE

out of alignment. To correct, replace bolts and nuts with the following: Bolt, Part No. 20326-S7; Nut, Part No. 33797-S7; Split Lockwasher, Part No. 34781-S7.

Throttle Linkage Adjustment (Turbo-Drive): With engine at normal operating temperature and idle speed set at 425-450 RPM with selector lever in "DR" position, adjust Anti-stall Dashpot (see below), then proceed as follows: Remove clevis pin connecting transmission control rod to control shaft (on engine bracket), insert gauge pin, Tool 77230-MB, through control shaft and bracket. Adjust carburetor-to-control shaft rod so that it freely enters hole in carburetor throttle lever. Remove gauge pin. With carburetor throttle lever in slow idle position, hold transmission control rod up so that transmission lever is against stop, adjust clevis on rod so that clevis pin enters hole in control shaft freely, then l ngth n rod by turning clevis 2½ full turns, connect rod.

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Dashpot Adjustment: After making Idle Mixture, Hot Idle, and Fast Idle Adjustments, hold dashpot plunger in to limit of travel. Loosen locknut securing dashpot to dashpot bracket, insert .067" Gauge (Tool T109-234) between dashpot plunger and primary throttle operating lever, rotate dashpot to obtain proper clearance between plunger and lever. *CAUTION* - Improper dashpot adjustment may cause excessive rear axle differential backlash

► *OTHER DATA: See "Carter WCFB Carburetors" in Carburetion Section*

FUEL PUMP PRESSURE: 4-6 lbs. at 500 RPM.

CARB. EQUIPMENT

Fu l Pump: Lincoln No. ECU-9350-B (Early), -C (Later), Continental No. ECV-9350-A. Fuel & Vacuum.
Pressure - 4-6 lbs. (Early pump), 4½-6½ (later pump) Lincoln & Continental.
See "Fuel Gauges" in Carburetion Section.

Gasoline Gauge (Lincoln): King-Seeley Electric "CV" (Constant Voltage) type with voltage regulator No. FEL-10804-A.
Dash Unit - Ford No. FEL-9280-B.
Tank Unit - Ford No. FEG-9275-E (Exc. Sta. Wgn.), FEG-9275-D (Sta. Wgn.).
See "Fuel Gauges" in Carburetion Section.

Gasoline Gauge (Continental): Included in Cluster, Lincoln No. 4049792, which includes Ammeter, Fuel, Oil, and Temperature Gauges.
See "Fuel Gauges" in Carburetion Section.

Low Level Fuel Indicator: Light on instrument panel in circuit with Ignition Switch & S.I.P. relay. Replace light bulb when inoperative.

Air Cleaner: DRY FILTER ELEMENT type. Clean every 4,000 miles and replace element every 20,000 miles.
► *CLEANING CAUTION:* Clean element by tapping or shaking to remove particles of dirt. *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate.*

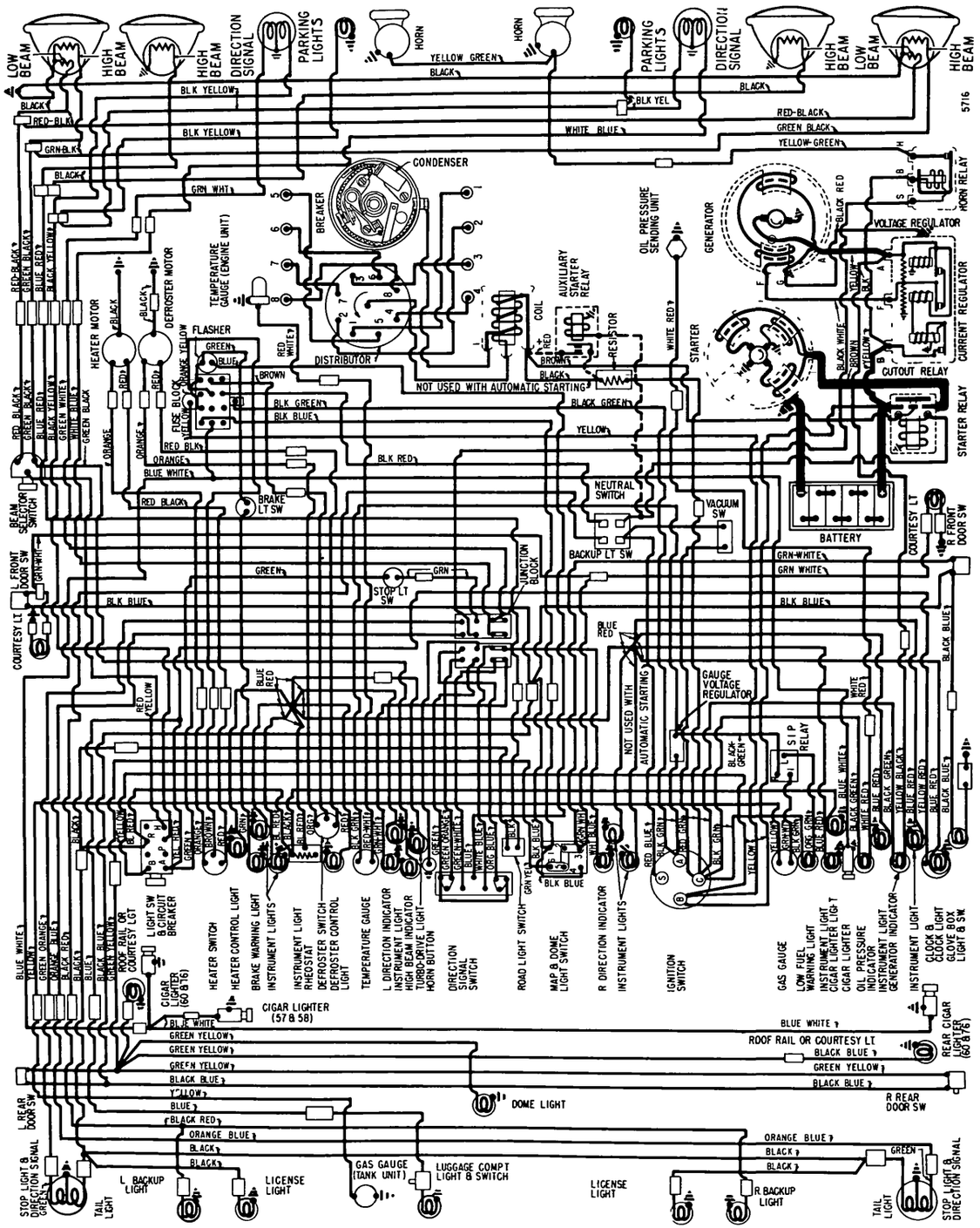
BATTERY

Lincoln FDU-10655-H, Continental 4050251. 12 Volt. 13 plate, 70 ampere hour capacity (20 hr. rate). Located in right front floor pan (Lincoln), Cowl panel (Engine Side) Continental.
Battery Ground - Negative. Battery to starter.
Engine Ground - Cylinder head to dash.
► *BATTERY NOTE:* Late type battery can be used to replace 1956 Lincoln battery.

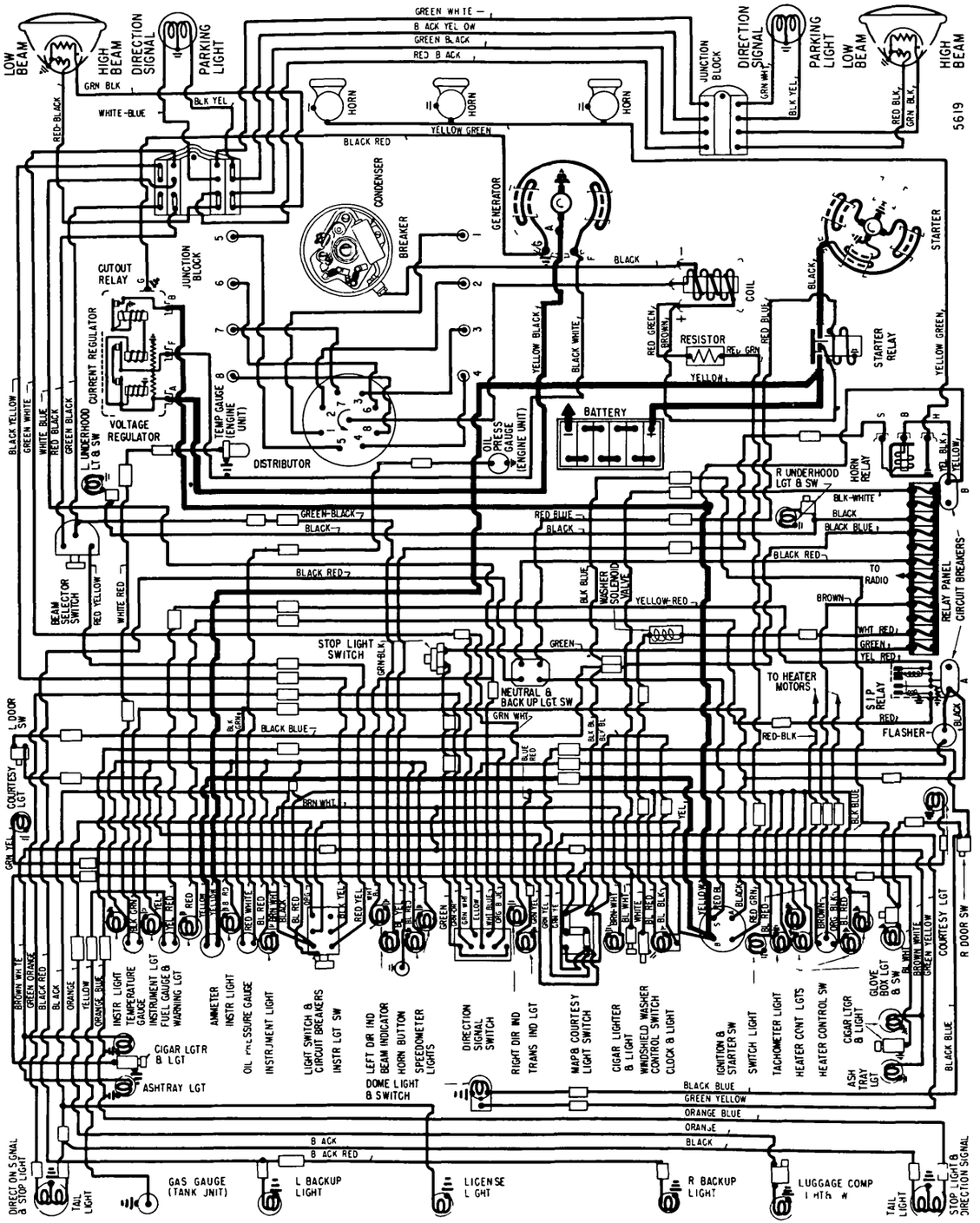
STARTER

Lincoln FAR-11002-B. Armature - FAC-11005-B.
► *STARTER GEAR NOISE CORRECTION* Caused by bottoming of starter pinion in converter cover ring gear. To correct, remove starter as described below, leaving three attaching bolts loose. Tighten center (outer flange) bolt to light snug fit, pry starter lower attach-

CONTINUED ON NEXT PAGE



LINCOLN MODELS



CONTINENTAL MODELS

CONTINUED FROM PRECEDING PAGE

ing flange at engine block rear outrigger away from engine block. Hold starter in this position while tightening the three attaching bolts.

Drive - Bendix "Folo-Thru".

Rotation - Counterclockwise at commutator end.

Brush Spring Tension - 48-56 ozs.

Cranking Speed - 150-180 RPM with engine warm.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4500	12.0	80

Removal· Remove from below by bending gang ignition wires away from top capscrew, removing transmission cooler line clamp below starter so lines can be held away and removing three starter capscrews. Pull out and down or up until starter drive gear clears housing.

Installation· Tape dust seal lip (use masking tape) to inner circumference of housing to hold seal in place, and reverse removal procedure.

Starting Switch: Relay, Lincoln No. B6A-11450-A, controlled by Ignition & Starter Switch, Lincoln No. 11572-A, and Turbo-Drive Neutral Safety Switch, located on steering column.

Automatic Starting (Optl.) - Vacuum Switch No. FEL 11504-B, Auxiliary Starter Relay FDT-11505-A. Provides automatic starting when ignition switch turned on. *See wiring diagram.*

Turbo-Drive Neutral Safety Switch Adjustment: *See "Turbo-Drive" in Transmission Section.*

GENERATOR

Lincoln No. FGP-10002-A. Armature - FGP-10027-A.

Performance Data

Amperes	Volts	Gen. RPM
40	15	2390

Brush Spring Tension - 26-34 ozs.

Field Current - 1.5-1.6 amps. at 15 volts (Hot).

Rotation - Counterclockwise at commutator end.

Belt Adjustment: Approximately ½" deflection on belts midway between generator and pump pulleys at right side.

REGULATOR

Lincoln FBF-10505-A.

► *SETTING NOTE*· Settings are for regulator at NORMAL OPERATING TEMPERATURE (after running engine for 20 minutes at 1500 RPM if started cold, or until temperature gauge is steady for 5 minutes if engine previously warmed up) with room temperature at 75°F.

Cutout Relay

Cuts In - 12.0-12.8 Volts.

Cuts Out - 2.0-6.0 amps. (reverse current).

Voltage Regulator

Setting - 14.6-15.4 Volts.

Checking & Adjusting - *See "Ford, Lincoln, Mercury 12 Volt Regulators" in Electrical Section.*

Current Regulator

Setting - 38-42 ozs.

Checking & Adjusting - *See "Ford, Lincoln, Mercury 12 Volt Regulators" in Electrical Section.*

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MISC. ELECTRICAL

Headlamps: Dual Headlights (4-Light System with Regular Headlights and auxiliary Roadlights). *See "4-Headlight System" in Electrical Section.*

Directional Signals: *See Electrical Section.*

Automatic Headlight Dimmer: *See Electrical Section.*

Lighting Switch Removal: *(NOTE* - Toggle type used on Lincoln, push-pull type used on Continental). Remove anti-rattle bezel from switch, then remove switch from rear of dash panel.

Stop Light Switch Location: On forward end of brake master cylinder (integral with power unit). Master cylinder or power unit located on firewall in engine compartment.

CIRCUIT BREAKERS: Lighting - Two 12 Ampere circuit breakers (one for headlights, one for auxiliary lights) located on headlight switch.

Air Conditioning (Lincoln) - 15 Ampere.

Power Top (Lincoln) - 30 Ampere in Motor Lift circuit, 20 Ampere in Motor Latch circuit, 10 Ampere in Motor Relay circuit.

4 or 6-Way Seat Regulator - 30 Ampere in Battery lead, 20 Ampere in each seat motor ground lead.

Window Regulators - 30 Ampere in Battery lead, 15 Ampere in each motor ground lead.

Electric Door Locks - 30 Ampere (4-Door), 15 Ampere (2-Door) in starter terminal lead, 10 Ampere in Ignition Switch lead.

FUSES: Fuse panel mounted on brake pedal support behind instrument panel with holders marked for size of fuse and circuit.

Directional Signals - SFE 7.5 amps.

Interior lamps (Glove Box, Dome, & Courtesy) - SFE 7.5 Amp.

Heater Blowers - Two SFE 14 Amp.

Radio - SFE 7.5 Amp.

Radio Antenna - SFE 14 Amp.

Cigarette Lighter - 1 Sulphur Disc (Lincoln), SFE 20 Amp. (Continental).

Back-up Lamps - SFE 7.5 Amp.

H rn Relay: Lincoln - Lincoln No. B7A-13853-A, with bracket, **Continental** - Lincoln No. 4050519 without bracket.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use xtreme care when disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section.*

►*ENGINE COOLANT LEAKAGE CORRECTION:* Coolant leakage at generator bracket rear mounting bolt can be eliminated by installation of new self-locking type bolt and lockwasher. New bolt has nylon pellet which gives increased thread tension with improved sealing qualities.

ENGINE SPECIFICATIONS: 90° V8.

B r	Str k	Displacem nt
4.00"	3.66"	368 Cu. Ins.
Rated HP	**C mpr. Rati**	**Dev l p d HP**
51.2	10.0-1	300 at 4800 RPM

C mpr ssi n & Vacuum R ading - *S Tun -Up.*

►*COMPRESSION RATIO NOTE:* Compression ratio increased by revising combustion chamber and increasing length of piston (center of piston pin bore to top of piston) .010".

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Lincoln Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Lincoln Special Data.*

ENGINE REMOVAL: *See "Engine" in Lincoln Special Data.*

OIL PAN REMOVAL: Remove oil inlet pipe hex fittings at oil pump and side of oil pan and remove pipe. Remove oil pan capscrews, then remove oil pan and gasket. *NOTE*–When this operation is performed, turn crankshaft until rear counterweights of crank are up. The oil pan can then be removed from front of engine.

PISTONS

Aluminum alloy, autothermic, slipper type with three rings above pin. Tin-plated.

►*PISTON INTERCHANGEABILITY CAUTION:* 1957 pistons are .010" higher (piston pin bore to top of piston) and STD. SIZE 1956 & 1957 PISTONS ARE NOT INTERCHANGEABLE. However, 1956 Oversize Pistons (.020", .030", .040") can be used in 1957 engines.

►*ORIGINAL BORE & PISTON SIZES:* Std. cylinder bore limits are 4.0000-4.0024" and TWO Standard Pistons are used for selective fitting as follows: 3.9993-3.9996" Diameter (marked "2" on dome), 4.0005-4.0008" Diameter (marked "6" on dome). *NOTE* - Std. piston furnished for service in these two sizes.

Removal – Rod and piston assembly removed from above.

Fitting New Pistons: Using 1/2" wide feeler gauge inserted between piston and cylinder wall at right angle to pin on thrust side, pull should be 6-12 lbs. when using feeler gauge thicknesses as follows: New Piston in New Bore - .0015". New piston in Used Bore - .002". Used Piston in Used Bore - .003".

Replacement Pistons: Standard (Two sizes - see Original Bore & Piston Sizes above), and .020", .030", .040" Oversize.

Installing Pistons: Install all pistons with indentation on head toward front of engine. *See Rod Installation*

PISTON PINS

Floating type with lock rings at each end.

Di ameter – .9120-.9123". **Length** - 3.162-3.176".

Clearance in Piston – .0008" maximum.

Clearance in Rod – .0008" maximum. Select for light thumb press fit at 70° F.

Replacement Pins: Standard (marked Green), and .001" (marked Blue), .002" (marked Yellow) oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr.(1)	.0775-.0780"	.013-.030"	.006" max.
Compr.(2)	.0925-.0935"	.013-.030"	.006" max.
Oil (3)	.1860-.1865"	.010-.027"	Ⓒ

Ⓒ - Side sealing type ring.

Replacem nt Rings: Standard size and .020", .030", .040" oversize.

►*SPACING NOTE:* Ring gaps should be spaced 120° apart, with oil ring gap to the side opposite spark plug side of cylinder bores.

CONNECTING RODS

L ngth – 7.064-7.066". **W ight** - 28.36 ozs.

Journal Diameter – 2.2482-2.2486" (Color coded BLUE), 2.2486-2.2490" (Color coded RED). Use with bearing of same color.

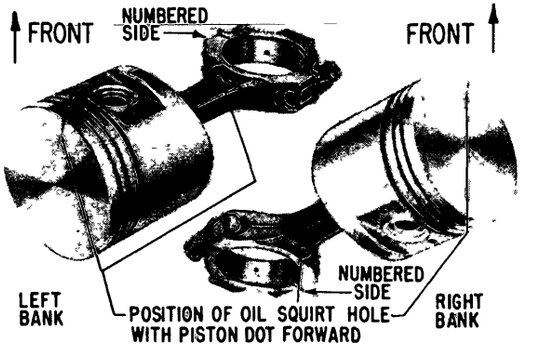
Lower Bearing – Steel-backed, copper lead alloy lined.

Clearance – .0007-.0036".

Side Clearance – .006-.014". .017" Service max.

Replacement Bearings – Standard (2 sizes marked RED & BLUE for selective fitting) and .010", .020", .030", .040" undersize.

Installing Rods – Assemble rods to piston so indentation embossed on piston head will face front of engine. Numbered side of rods on the right bank should face right side of engine and rods for left bank will face left side of engine. Place caps on connecting rods so numbered sides match and install in same numbered cylinders.



PISTON & ROD ASSY.

CRANKSHAFT

Journal Diameter – 2.6235-2.6239" (Color coded BLUE), 2.6239-2.6243" (Color coded RED).

Out-of-Round Limits – .0005" max. **Tap r Limits** - .001".

Bearings – Steel-backed copper-lead alloy lined.

Clearance - .0008-.0036".

►*NOTE:* Any combination of Red or Blue bearing inserts may be used to obtain desired clearance. If desired clearance cannot be obtained, it will be necessary to regrind journals and install undersize bearing inserts.

Replacement Bearings: Std. (2 sizes color coded RED & BLUE for selective fitting) and .010", .020", .030", undersize.

►*MAIN BEARING INTERCHANGEABILITY NOTE:* 1957 rear main bearings have 9/16" oil hole (previous bearings had 11/32" oil hole). DO NOT use previous type bearings on 1957 engines (1957 bearings can be used on past models).

End Thrust: Taken by No. 3 main bearing.

Thrust Bearing Alignment – *S "Crankshaft & Main Bearings" in Lincoln Special Data.*

Endplay – .012" maximum.

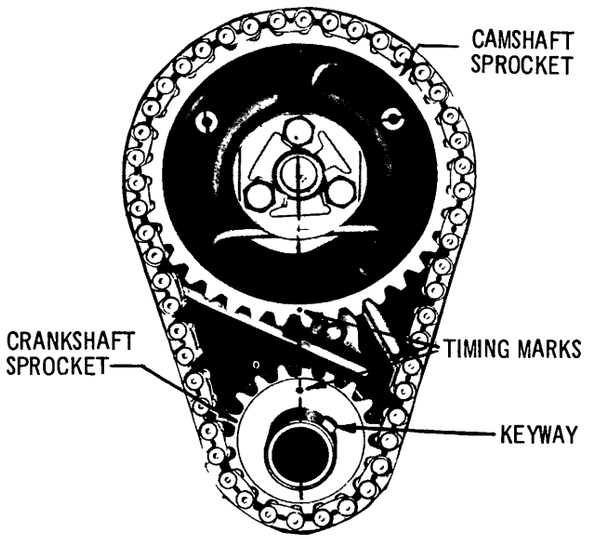
Crankshaft R ar Oil S al Installati n: *Se "Crankshaft & Main Bearings " In Lincoln Special Data.*

Crankshaft Fr nt Seal Installati n: *See "Engine Front Cov r" in Lincoln Special Data.*

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Journal Diameter – 2.1240-2.1247". **Out-of-Round Limit** - .001".
Bearings – Steel-backed babbit lined bushings.
Clearance – .006" maximum. **Endplay** - .003" (restrained by thrust spring and plunger).
Replacement Bearings: Std. & .015" undersize.
Camshaft Removal: *See "Camshaft & Bearings" in Lincoln Special Data.*
Timing Chain: Width 1.25". Pitch .5". Length 25".
Deflection – 1/2".
Camshaft Setting: Timing marks on camshaft and crankshaft sprockets adjacent and in line with straightedge across shaft centers.
Timing Chain Cover Seal Installation (Crankshaft Front Seal): *See "Engine Front Cover" in Lincoln Spec. Data.*



VALVE TIMING MARKS

VALVES

Valve Tappet Clearance: None in service (hydraulic). Adjustment required only when servicing valves or hydraulic lifters.
Initial Valve Tappet Clearance Adjustment–*See "Valve System" in Lincoln Special Data.*

Valve	Head Diam.	Stem Diameter Ⓘ
Intake	2.000-2.010"	Ⓔ.3415-.3420" or Ⓢ.3420-.3425"
Exhaust	1.630-1.640"	Ⓔ.3400-.3405" or Ⓢ.3405-.3410"

Valve	Seat Angle	Lift④	Stem Clearance
Intake	45°	256" min.	.001-.004" max.
Exhaust	45°	256" min.	.002-.005" max

Ⓘ – Furnished with .003", .015", .030" oversize stems
Ⓔ – Color coded RED. Use with RED valve guide.
Ⓢ – Color coded GREEN. Use with GREEN valve guide.
④ – Cam lobe lift (service limit).
Valve Seat Width – 1/16-5/64" (Intake), 5/64-3/32" (Exhaust).
Valve Stem Seal. Valve stem seals used on both intake and exhaust valve stems. Install seal over valve stem before installing valve spring.
Oversize Valve Stem Installation: *See "Valve System" in Lincoln Special Data.*
Valve Springs: Free Length – 2-1/8".

Spring Specifications	Pressure	Length
Valve Closed	60 lbs.	1.80"
Valve Open	165 lbs.	1.38"

►*SPRING HEIGHT CORRECTION:* Measure valve spring assembled height from point where spring contacts cylinder head to point where it contacts retainer. Assembled height of spring should be 1 25/32-1 13/16". Spacers are available in steps of .030" & .060" to bring assembled height within these limits or as near to this measurement as possible.
►*SPRING SQUARENESS CAUTION:* If springs more than 1/16" out of square, with spring closed coil end on surface plate and measured with steel square, they should be replaced.
Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" intake, .005" exhaust), ream guides and install oversize valves. *See "Valve System" in Lincoln Special Data.*
Valve Lifters: Hydraulic, barrel type. Lifters can be removed from above with camshaft in engine.
Diameter–.8740-.8745". **Clearance in Block** .0025" max.
Initial Valve Clearance – *See "Valve System" in Lincoln Special Data.*
Lifter Overhaul – *See "Valve System" in Lincoln Special Data.*
Rocker Arm Assembly: *See "Valve System" in Lincoln Special Data.*
►*ROCKER ARM COVER LEAK CORRECTION (Early Cars):* Grind away approximately 1/16" of inner flange for a length of 1½" at rear of cover.
►*VALVE ROCKER ARM PRODUCTION CHANGE (Self-locking Valve Adjusting Screws). See "Valve System" in Lincoln Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.
►*VALVE TIMING NOTE: The following valve opening and closing points are with a camlift as indicated.*
Intake Valves – Open 18° Ⓘ BTDC, Close 72° Ⓔ ALDC.
Exhaust Valves– Open 59° Ⓘ BLDC, Close 31° Ⓔ ATDC.
Ⓘ – Camlift .002". Ⓔ – Camlift .004".
Valve Timing Check – With rocker cover removed, loosen adjusting locknut and screw of valve to be tested. Slide rocker arm to one side in order to have pushrod in the clear. With pushrod in tappet socket install a dial indicator in such a manner as to have actuating arm of indicator in the pushrod socket, in the same plane of pushrod movement (dial indicator used should have at least a total movement of .300" or more). Place a quadrant on the crankshaft pulley. If intake valve opening is being checked, engine is rotated slowly until dial indicator shows .002" camlift. At this point the actual opening reading in degrees is taken(18° BTDC). The engine is further rotated to check the valve closing. Dial indicator should read .004" camlift (72° ALDC)

OILING SYSTEM

►*OIL LEVEL INDICATOR CAUTION:* Two types used as follows: **With Air Conditioning** - Lincoln No. ECU-6750-C, with 23 3/32" from top of tube cover to "Full" mark on dipstick.
With Air Conditioning - Lincoln No. ECU-6750-D with measurement of 23 13/16" between same two points.
Crankcase Capacity: 5 qts. (refill), 6 qts. (with filter change).
Normal Oil Pressure: 45-50 lbs. at 2000 RPM (hot).
Pressure Regulator Valve -In pump body, not adjustable.
Oil Pressure Indicator (Lincoln): Light on instrument panel. Light is on when oil pressure is low.
Oil Pressure Switch - Lincoln No. B6A-9278-B.
Oil Pressure Gauge (Continental): Included in Cluster, Lincoln No. 4049792, which includes Ammeter, Fuel, Oil and Temperature Gauges.
Engine Unit - Lincoln No. FEM-9278-A.
See "Oil Pressure Gauges" in Miscellaneous Section.
Oil Pump: Rotor type, located on left side of engine crankcase driven by distributor drive gear.
Pump Overhaul - *See "Oiling System" in Lincoln Special Data.*
Oil Filter: Full-flow type (early), Disposable type (later).
►*OIL FILTER PRODUCTION CHANGE:* Disposable oil filter used on later cars and can be installed to replace previous full-flow type filter on earlier cars. *See "Oiling System" in Lincoln Special Data.*
Crankcase Ventilation: Combination oil filler and road draft tube and air filter cap, located on front of valve pushrod cover. Clean and oil the oil filler cap filter every 2,000 miles.

COOLING

►*HIGH OPERATING TEMPERATURE CORRECTION:* High operating temperatures resulting from continuous low speeds or extreme load conditions may be improved as follows:
Cars Without Air Cond. - Replace present 4-blade fan with 5-blade fan No. LA-8600-A and install radiator No. LD-8005-D.
Cars With Air Cond. - Replace present 5-blade fan with 6-blade fan No. LA-8600-B.
Water Capacity: 22 qts. Add 3.2 qts. for heater units (Lincoln), 3.4 qts. (Continental).
Pressure Valve: Lincoln No. LA-8100-A (Lincoln), 4048840 (Continental). 12-15 lbs. operating pressure, radiator filler cap.
Thermostat: Lincoln No. EAD-8575-D (157-162°) Std. Lincoln, No. B4Q-8575-B (168-173°) Std. Continental, Optional Lincoln.
Water Pump: Packless, sealed ball bearing type.
See "Lincoln" in Water Pump Section.
Temperature Gauge (Lincoln): King-Seeley Electric "CV" (Constant Voltage) type with voltage regulator No. FEL-10804-A.
Dash Unit - Lincoln No. FEL-10883-B.
Engine Unit - Lincoln No. FEK-10884-A.
Temperature Gauge (Continental): Included in Clusters, Lincoln No. 4049792, which includes Ammeter, Fuel, Oil, and Temperature Gauges.
See "Temperature Gauges" in Miscellaneous Section.

TURBO-DRIVE TRANSMISSION

Torque converter and three-speed automatic transmission with hydraulic control and mechanical parking lock.
See "Turbo-Drive" Transmission in Transmission Section.

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▷*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Turbo-Drive" Transmission in Transmission Section.*

▷*TESTING & TROUBLE SHOOTING: See "Turbo-Drive" Transmission in Transmission Section.*

Lubrication – Check transmission oil level every 2000 miles and maintain oil level at "Full" mark on dipstick. Drain and refill every 16,000 miles. Use only Automatic Transmission Fluid Type A.

Checking Fluid Level: Bring transmission to operating temperature by running engine with selector lever in Neutral position. Move shift lever through all ranges to assure fluid distribution, then place lever in "P" (Park) position for checking fluid level. Add Automatic Transmission Fluid Type "A" to bring level to the "Full" mark on indicator.

▷*TURBO-DRIVE TRANSMISSION FLUID CAPACITY NOTE:* With the addition of a fluid cooler located ahead of radiator the capacity has been increased to 11.3 qts. When draining and refilling Turbo-Drive Transmission after overhaul, reverse flush cooler and lines with air pressure not to exceed 100 PSI to remove foreign material that will bypass transmission oil screen.

▷*AUTOMATIC TRANSMISSION FLUID COLOR NOTE:* Transmissions with serial number 114-29265 or later will have a red dye added to transmission fluid to assist in locating fluid leaks. New colored fluid may be mixed with old type fluid.

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷*OTHER "TURBO-DRIVE" SERVICE DATA: See "Turbo-Drive Transmission" in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing type.

REAR AXLE

Own. Semi-floating, hypoid gear, with Hotchkiss drive.

▷*POWER-LOCK DIFFERENTIAL NOTE:* Optional equipment, and identified by Decal on left front door "Directed Power Differential", plus metal tag with stamped letter "T" under cover bolt, and cover marked a daub of yellow paint. Provides maximum rear wheel drive at all times, by directing drive line or ring gear torque to either or both rear wheels depending on road conditions. Interchangeable with Standard Differential Case. Serviced by replacement.
See "Lincoln (Integral Carrier)" & "Spicer Power-Lock Differential" in Rear Axle Section.

▷*REAR AXLE SHAFT & BEARING REPLACEMENT CAUTION:* Rear axle shaft and bearing Lincoln No. LD-4234-B (1/16" shorter than former type) only, should be used with Power-Lock Differential. This axle shaft and bearing available for usage on all other rear axles.

▷*REAR WHEEL BALANCE (POWER-LOCK DIFFERENTIAL) CAUTION:* Do not attempt to balance rear wheels on the car when car equipped with "Power-Lock" differential.

Ratios – 3.07-1 (Std.), 3.31-1 (Optl. on Lincoln).
Backlash–.003-.008" with .002" maximum variation per gear set.

Axle Shaft Removal: Remove rear wheels and take out screws holding brake drum to axle shaft flange. Remove hydraulic brake lines from brake backing plate. Take out axle retainer nuts (working through opening in axle shaft flange). Use Tool 4235-C2 to remove axle shaft and bearing assembly from axle housing. Take off backing plate and gasket and remove axle being careful not to damage oil seal.

Axle Assembly Removal: Raise rear of car and remove axle shafts and drive shaft. Take off hydraulic line clips from axle housing and free line from differential housing clip. Disconnect shock absorbers and spring U-bolts. Remove axle housing assembly from car.

Wheel Bearing Adjustment: None required.

FRONT SUSPENSION

Independent. "Ball-Joint" suspension with direct acting shock absorbers mounted within front coil springs.
See "Lincoln (Ball Joint)" in Suspension and Wheel Alignment Section.

Alignment Specifications	Lincoln	Continental
Kingpin Inclination	① 7°	① 7°
Caster	② 0°-Neg.1½°	③ Pos. 1°±¼°
Camber	③ 0°-Pos. ¾°	③ Pos. ¾°±¼°
Toe-In	1/8" to 3/16"	3/32" to 5/32"

① - With Pos. ¾° Camber.
② - Within ½° from one side of car to other.
③ - Within ¼° from one side of car to other

Toe-Out on Turns - With wheels at maximum turning angle, outer wheel is at 26° and inner wheel is at 36°.

Direct acting, non-adjustable. Service by replacement.

SHOCK ABSORBERS

Shock Absorber Nos.	Front	Rear
Lincoln (Std.)	LD-18045-J	LD-18080-J
Lincoln (Hvy. Duty) Std.	LD-18045-K	LD-18080-K
Lincoln (Hvy. Duty) Adj.	I-500938	I-500941
Continental	4048114	4048113

▷*HEAVY DUTY ADJUSTABLE SHOCK ABSORBER NOTE:* Use Continental mounting bracket No. 4049673 and spacer No. 4049677 when installing the front adjustable shock absorbers. To adjust shock absorbers proceed as follows:

Adjustment (Front) - Remove shock absorber, fully compress it until internal couplings are mated, then turn upper shaft to align arrow on inner washer with arrow on shock absorber body to obtain desired ride control.

Adjustment (Rear) - Remove only the lower end of rear shock absorber, compress unit until internal couplings are mated, then turn lower shaft until desired ride control is obtained.

STEERING

Power Steering: Saginaw In-Line. *See "Saginaw In-Line" Power Steering in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Saginaw In-Line" Power Steering in Steering Section.*

Steering Gear Removal: *See "Saginaw In-Line" Power Steering in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Sect.*

BRAKES

Bendix Hydraulic. Duo-servo with fixed anchor pins. No eccentric adjustment. Parking lever applies rear wheel service brakes.
See "Ford, Lincoln, Mercury Bendix" in Brake Section.

▷*BRAKE FLUID REPLACEMENT NOTE:* Use heavy duty brake fluid HACA-19542 with SAE specification 70 R1 for most efficient brake operation. DO NOT MIX HEAVY DUTY BRAKE FLUID WITH ANY OTHER TYPE.

▷*BRAKE "SQUEAL" CORRECTION:* An anti-squeal spring, Part No. 51A-1140, is available for installation on outside of brake drum.

Drums – Diameter 12"front and rear.
Wheel Cylinder Diameter – 1 3/32". (front), .15/16" (rear).
Lining – Molded type riveted to shoe.
Width – 2.5" (front), 2" (rear). Thickness – 7/32".
Braking Power – 55.5% (front), 44.5% (rear).
Clearance – Tighten adjusting screw about 5 or 6 clicks after wheel stops turning (shoes tight against drum), then back adjusting screw off 12 to 14 clicks.

Brake Pedal Adjustment: Adjust eccentric bolt attaching brake pedal to master cylinder pushrod to give 1/4-7/16" free movement of pedal pad before rod moves master cylinder.

Standard Master Cylinder: Located on engine side of firewall.
Checking Fluid – Maintain fluid level to within ¼" of top of reservoir.
Removal–Disconnect brake line from brake master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch and remove eccentric bolt attaching master cylinder pushrod to brake pedal. Remove capscrews and lock washers attaching master cylinder to fire wall.

Power Brakes: Bendix Vacuum Power Unit (combination vacuum power unit and master cylinder). Unit mounted on engine side of fire wall and replaces regular master cylinder.
See "Bendix Power Unit" in Brake Section.
Checking Fluid–Same as for regular master cylinder.
Removal of Power Unit–Disconnect valve pushrod from brake pedal assembly in drivers compartment. Remove master cylinder outlet fitting bolt from master cylinder. (NOTE–It is not necessary to remove stop light switch, wires or hose assembly from outlet fitting. Do not disturb outlet fitting in master cylinder). Loosen clamp securing manifold vacuum hose to check valve on power unit. Remove hose from valve. Loosen clamp securing vacuum reserve tank hose to fitting on check valve. Remove four capscrews securing power brake assembly to bracket on dash panel and remove power brake assembly.

MISC. MECHANICAL

Windshield Wipers: Cable operated vacuum type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Own. *See "Lincoln Air-Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch. *See "Power Window Regulators" in Miscellaneous Section.*

Power Top Control: Hydraulic-electric type with power operated latch mechanism. *See "Power Top Controls" in Miscellaneous Section.*

Power Seat Adjusters: "4-Way" & "6-Way" electric type. Single motor with solenoid clutches. *See "Power Seat Adjusters" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head (312")	Ⓒ 75
Cylinder Head (368")	Ⓒ 90
Main Bearing Bolts (312")	95 105
Main Bearing Bolts (368")	120-130
Oil Pan	12-15
Flywheel	75-85
Int & Exh Manifolds	23-28
Oil Pump	12-15
Oil Filter (Disposible Type)	Hand Tight
Engine Front Cover (3 8")	23-28
Engine Front Cover (5 16")	12-15
Water Outlet (312")	12-15
Water Outlet (368")	23-28
Rocker Arm Cover	2-2½
Camshaft Sprocket (312")	35-45
Camshaft Sprocket (368")	15 18
Crankshaft Damper or Pulley	130-145
Con Rod Nuts	45-50
Rocker Shaft Support (312")	12-15
Rocker Shaft Support (368")	22-25
Valve Chamber Covers	2-2½
Water Pump	12-15
Oil Pump Pick-up Tube	10-12
Oil Pan Pick-up Tube	28-32
Fuel Pump	23-28

Ⓒ - See Cylinder Head Installation (below) for tightening procedures Three different troque applications must be made

ENGINE

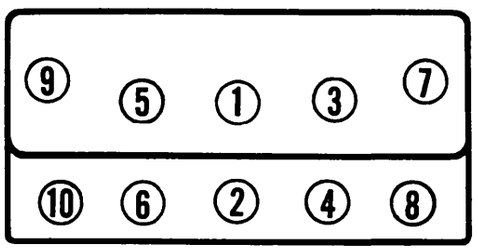
ENGINE REMOVAL (LESS TRANSMISSION): 1) Mask edge of hood, fender and cowl, place fender covers on fenders Remove capscrews that retain hinge assembly to hood, remove hood
2) Remove carburetor air cleaner, disconnect and remove battery
3) Drain cooling system and oil pan (Drain cocks in engine assembly are located on each side and to front of cylinder block)
4) Disconnect both upper and lower radiator hoses, then remove radiator (Radiator is retained by three bolts, nuts and lockwashers at each side) Remove fan assembly
5) Disconnect heater hoses at water control valve and water pump Disconnect and remove heater blower and duct assembly
6) Disconnect starter cable at starter motor (On Merc-O-Matic disconnect transmission fill tube bracket at exhaust manifold) Disconnect primary ignition wire to coil, water temperature gauge sending unit and oil pressure sender unit wires
7) Disconnect flexible fuel line at fuel pump and windshield wiper vacuum hose from vacuum booster pump If car equipped with windshield washer, disconnect and remove windshield washer
8) **On Standard or Overdrive Transmissions,** disconnect clutch pedal retracting spring and release rod from clutch release lever Disengage equalizer bar tension spring and remove equalizer bracket assembly from flywheel housing Let equalizer bar and clutch release rod hang from frame
9) **On Merc-O-Matic Transmissions,** disconnect accelerator linkage (Z-bar) at firewall and throttle valve rod at clevis (linkage remains on engine)
10) Disconnect engine ground strap at firewall
NOTE—If vehicle equipped with power brake or power steering, remove these units at this time
11) From underneath car, remove splash shield in front of linkage and the end and lower converter access covers from transmission bell housing
12) Disconnect accelerator pedal linkage at accelerator shaft
13) Remove starter assembly To remove starter, turn wheels to extreme left turn position and pull starter down between tie rods and tubular engine support crossmember
14) Disconnect generator field and ground wires from generator
15) Disconnect exhaust manifold-to-muffler inlet pipe
16) Remove hex bolts (6) and nuts securing flex plate to converter (Merc-O-Matic only)
17) Remove capscrews (2) securing engine assembly to flywheel housing
18) Position transmission lift under transmission to support transmission while engine is out of vehicle
19) Remove capscrews (2), each side, securing engine to front engine mounts, and loosen self-locking nuts retaining engine mounts to engine front cover support
20) Inside of vehicle, pull front carpet and insulation away from floor pan and remove rubber grommets (2) covering openings to two upper capscrews securing engine assembly to flywheel housing and remove capscrews
21) Attach hoisting sling to engine, positioning sling to properly lift engine without transmission, and take up load of engine with hoist Adjust transmission lift and gently pull engine away from transmission Raise engine, carefully pull it forward and lift out of engine compartment *CAUTION*—When removing engine, be sure oil pump pickup tube and oil filter are clear of engine mount

Installation: Reverse removal procedure above

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION· Install pilot studs coat NEW gasket with Sealer 8M-19554-A and place over studs Install cylinder head assembly over studs with plugged water jacket to rear of block Install cylinder head capscrews make three torque applications as shown in table below Before third torque application bring engine to operating temperature (run engine at fast idle for 20 minutes) Use Tool S-8663 A (ECZ Eng), Tools S-9513-C S-9526 and thin walled socket (ECU Eng)

	ECZ Eng	ECU Eng
1st troque application (cold)	55 lbs	70 lbs
2nd torque application (cold)	65 lbs	80 lbs
3rd torque application (hot)	75 lbs	90 lbs



"ECZ" & "ECU" ENGINE CYLINDER HEAD

CRANKSHAFT & MAIN BEARINGS

"ECZ" ENGINE

REAR MAIN BEARING OIL SEALS: *NOTE*—Crankshaft seal is installed in groove in block and in Seal Retainer (directly behind rear main bearing) Retainer is sealed in block by special sealing strips inserted in grooves in sides of retainer after it is installed in the block

Seal Installation: With crankshaft out, install new packing in groove in block and in groove in retainer using Tool 6701-A to seat packing Cut packing off flush with surface before removing tool *(CAUTION* —do not leave frayed edges which may prevent proper seating of retainer in block) After crankshaft installed, coat retainer-to-block mating surface lightly with oil resisting sealing compound install retainer **without** side seals, tighten retainer screws securely (see Seal Retainer Production Change above) Dip side seal strips in engine oil and install immediately (seals are special graphite coated rubber asbestos composition and will swell immediately on contact with engine oil) Side seals may be tapped in place with a mallet but should project approximately 050- 070' below oil pan gasket surface after installation DO NOT cut off this excess length

Testing Seal Installation—Squirt engine oil along seal retainer-to-block parting line, direct compressed air nozzle at inner upper corners of retainer If air bubbles noted, remove and clean retainer thoroughly, install new side seals

"ECU" ENGINE

REAR MAIN BEARING OIL SEAL: Install new packing in crankcase and bearing cap using Tool 6701 to seat packing Before removing tool cut off edges flush with surface Make certain there are no ragged edges protruding Install outer 'L" shaped neoprene seal on bearing cap and coat with lubricant Install Pilot Studs Tool 6336-A1, and place unit over pilot studs Push bearing cap through tool and into position in block Remove bearing replacing tool and trim vertical seals, leaving approximately 5/64' of seal above cap Remove pilot studs and install the self locking main bearing cap bolts Tighten to 120-130 ft lbs torque

ALL ENGINES

CRANKSHAFT THRUST BEARING ALIGNMENT: After #1, #2, and #4 bearing caps and inserts have been installed and properly torqued, install #3 bearing cap and insert Install capscrews snug, then pry crankshaft toward rear of engine Reverse this action by prying crankshaft forward (toward front of engine) This will align thrust surfaces of both halves of thrust bearing RETAIN THIS FORWARD PRESSURE on the crankshaft, and tighten capscrews to 95-105 ft lbs Check crankshaft endplay which should be 002- 010"

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ENGINE FRONT COVER

CRANKSHAFT FRONT OIL SEAL INSTALLATION: Coat seal with engine oil, place seal on Tool 6700-B. Center tool and seal over inner end of bore in front cover, drive seal in until it is seated.

►*FRONT OIL SLINGER CAUTION:* Make certain that front oil slinger, Part No. B6A-6310-B (ECZ), No. B6Q-6310-B (ECU), is installed on forward end of crankshaft (in front of crankshaft sprocket) before installing Engine Front Cover.

ENGINE FRONT COVER INSTALLATION: Use new gasket and position Tool 6059 on crankshaft to align cover with block before installing cover capscrews. Tighten screws to correct torque (see Tightening Specifications).

CAMSHAFT & BEARINGS

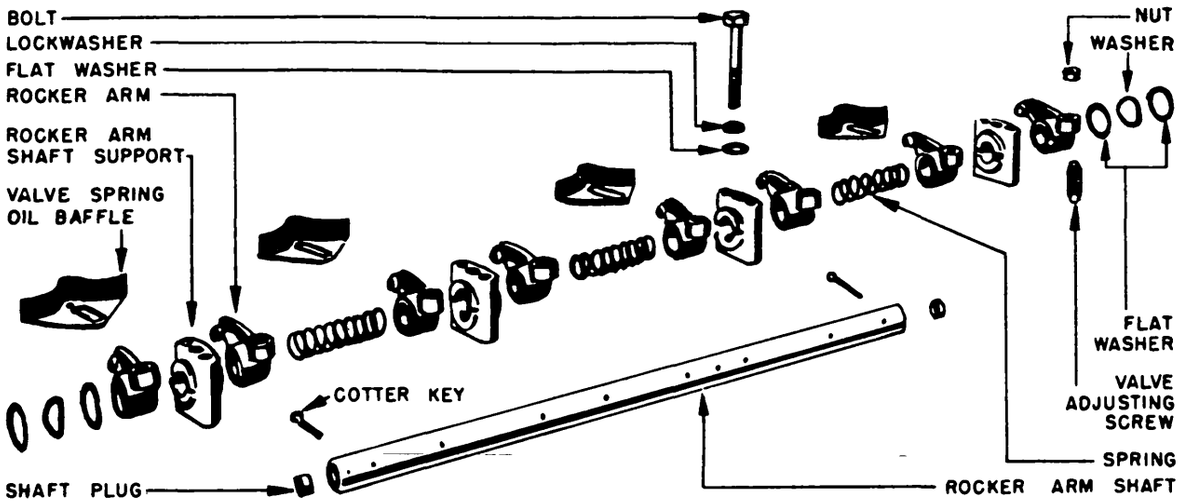
CAMSHAFT REMOVAL: Drain cooling system, remove radiator. Remove coil, disconnect all vacuum lines remove accelerator shaft retracting springs, carburetor control shaft at carburetor. Remove control shaft assembly and accelerator shaft bracket capscrew and secure them to dash panel. Remove intake manifold rocker arm and pushrod covers. Loosen rocker arm adjusting screws to slide arms to one side while removing pushrods. Remove all belts, fan assembly and spacer, water pump pulley, power steering pump and reservoir (with hoses intact) and secure them to one side. Disconnect heater outlet hose at water pump. Remove power steering pulley and crankshaft damper (Tool 6316), water pump and timing indicator, fuel pump, oil pan, generator and brackets, cylinder front cover. Remove spacer, fuel pump eccentric and counterweight (later cars have spacer in place of counterweight). Remove camshaft and crankshaft sprockets with timing chain as an assembly. Remove distributor, hood lock dowel support, front fender apron and radiator support tie bar. Secure tappets UP out of way of camshaft, remove camshaft thrust plate, key, spacer and camshaft.

CAMSHAFT BEARING REMOVAL & INSTALLATION:
Removal—Remove camshaft and drill a ½" hole through plug at rear bearing bore and remove plug. Remove bearings from block with Camshaft Bearing Remover & Installer 6261-C and adapter pilots 6261-F.

Installation—Install bearings with same tool used for removal making sure that oil holes in bearings are in line with holes in cylinder block web. Notch on edge of bearing should face front of engine at bottom of bore. *(CAUTION—#1* camshaft bearing must be at least .005" and not more than .020" below front face of bearing bore in cylinder block. Install bearings with oil hole in line with oil hole in cylinder block web and notch on edge of bearing facing front of engine at bottom of bore

VALVE SYSTEM

OVERSIZE VALVE STEM INSTALLATION: Use Tool 6085 Piloted Reamer to ream cylinder head valve guides for oversize valve stems. Reamers are furnished in .003", .015", .030" oversizes. Pilots are Std., .003", .015". Use reamers in sequence with correct pilot when reaming from standard to oversize. Regrind valve seats after reaming guides.



MERCURY ROCKER ARM ASSEMBLY

"ECZ" ENGINE.

INITIAL VALVE CLEARANCE: To insure valve being on low side of the cam, make all adjustments in the following sequence and with No. 1, 3, & 4 pistons in the indicated position:

No. 1 Piston at TDC (Compression Stroke)—Adjust No. 1 Intake & Exhaust, No. 2 Intake, No. 4 Exhaust, No. 5 Exhaust, and No. 7 Intake.

No. 4 Piston at TDC (Compression Stroke)—*(NOTE —Rotate engine 180° from the point where No. 1 piston is at TDC).* Adjust No. 6 Exhaust, No. 4 Intake, No. 8 Exhaust, No. 5 Intake.

No. 3 Piston at TDC (Compression Stroke)—*(NOTE —Rotate engine 270° from the point where No. 4 piston is at TDC).* Adjust No. 2 Exhaust, No. 3 Intake & Exhaust, No. 6 Intake, No. 7 Exhaust, No. 8 Intake.

►*CAUTION*—Final tappet adjustment is made after engine assembly is completed and with engine at normal operating temperature. The final setting is .019".

"ECU" ENGINE

INITIAL VALVE CLEARANCE: Self-locking adjusting screws used with a tension of 7-15 ft. lbs. Replace rocker arm when tension reduced to 3 ft. lbs. Turn adjusting screw clockwise, while moving pushrod up and down, **until all slack is removed.** *(CAUTION* - Plunger unit of hydraulic lifter should not be forced down into body of lifter during this operation). With all slack removed, turn adjusting screw **an additional 2½ turns.** *NOTE* - If lifter is noisy in operation, adjustment can be varied by turning adjusting screw ± ¼ turn from original 2½ turn setting. Repeat for all valves.

Adjustm nt S qu nc : To insure valve being on the low side of the cam, make all adjustments in the following sequence:

N . 1 Pist n at TDC (C mpr ssi n Str k) - Adjust No. 1 Int. & Exh., No. 5 Int. & Exh., No. 7 Int., No. 4 Exh.

No. 6 Piston at TDC (Compr ssi n Str k) - Adjust No. 6 Int. & Exh., No. 3 Int. & Exh., No. 7 Exh., No. 8 Int. & Exh., No. 4 Int.

VALVE SERVICING: Valves are "Rotatable" type operating directly in valve guide holes in cylinder head and are removed and installed as follows:

Valve Removal—Use Tool 6513-EE to compress valve springs, remove valve spring locks, retainer sleeve, retainer, spring, and "umbrella" type oil seal. Discard oil seal.

Valve Assembly Installation—Install valve in port from which it was removed. Install valve stem oil seal with cupped side toward valve guide boss. Install valve spring, spring retainer, retainer sleeve, and valve locks.

ROCKER ARMS

ROCKER ARM SERVICING: Disassembly—Remove assembly from head by taking out rocker arm shaft bracket retaining screws. Remove cotter pins at each end of rocker arm shaft and remove flat washers and spring washers. Slide rocker arms, springs, and washers off shaft *(Be sure to identify each part for assembly in same position).* Pull oil tube out of end rocker arm support to remove shaft from support.

Rocker Arm Shaft Assembly—Oil moving parts with engine oil. Install a plug at each end of shaft. **Do not peen plugs to make them tight.** Assemble rocker arm shaft parts in order shown in illustration. Install oil outlet tube in end of rocker arm support and make certain end of tube enters hole in shaft. Tighten rocker arm shaft support-to-cylinder head bolts to the correct torque. Install rocker arm covers and tighten hold down bolts finger tight after making preliminary valve adjustment. Make final adjustment after engine warmed up to normal operating temperature. Install new gaskets (cement to cover only), install cover, and tighten hold down bolts to 2-2½ ft. lbs. torque.

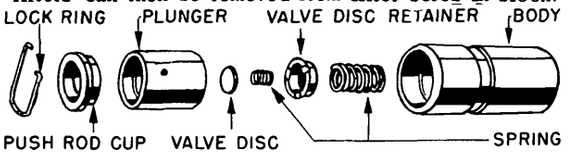
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HYDRAULIC LIFTERS

HYDRAULIC VALVE LIFTERS: Lifters are "barrel type," integral units with a flat, disc type check valve. Lifter has three holes in outside diameter groove and four holes in plunger. Lifters are furnished in unit packs of eight.

Removal: Remove cylinder head covers. Take out rocker arm assembly support bolts and remove rocker arm assemblies, and valve pushrods. Remove intake manifold and gasket then remove pushrod chamber cover. Valve lifters can then be removed from lifter bores in block.



"ECU" ENGINE HYDRAULIC VALVE LIFTER

Disassembly: Immerse all lifters in solvent to remove all varnish and carbon deposits. DO NOT CUT OR SCRAPE CARBON FROM LIFTER. With needle nose pliers, remove lock ring from top of body. Remove push rod seat, plunger, valve disc assembly and spring from body. ***(CAUTION—Disassemble one lifter at a time to avoid inter-mixing lifter parts).***

Reassembly: Place push rod seat upside down on bench. Install plunger on push rod seat and place valve disc assembly on plunger and set spring on valve disc retainer. Place body over assemblies and push body down over plunger. Lift assembly and push plunger and push rod seat up into body. Install lock ring using tool 6500-C.

OILING SYSTEM

OIL PUMP

ROTOR TYPE OIL PUMP

Removal: Disconnect external oil line. Remove attaching capscrews (two from bottom, one from above). Remove pump and intermediate shaft.

Disassembly: Remove capscrew securing cover to body assembly. Remove cover and "O" ring gasket. Remove rotor and shaft assembly. Remove relief valve nut, spring and relief valve.

Inspection: Clean all parts in suitable solvent. Check pump housing and rotors for damage and excessive wear. Check compression of relief valve spring which should be 9.2-10.4 lbs. at .80". Check relief valve clearance in body assembly. Measure outer rotor race to body clearance. Clearance should be .006-.009". With rotor and shaft assembly installed in housing, place straightedge over rotor assembly and pump body. Measure clearance between straightedge and pump at rotor. Clearance should be .001-.0035". Check cover for wear, and if scored or grooved, replace it. Drive gear shaft length should be 3.36-3.38" from rotor assembly face to shaft end. *NOTE* - Outer rotor and shaft and rotor assembly are replaced as a unit.

Reassembly: Reverse disassembly procedures. Check assembled pump to see that it rotates without bind.

OIL FILTER

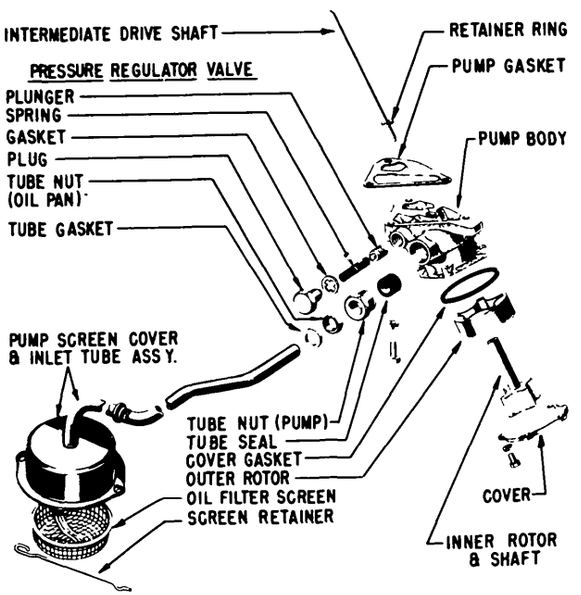
Disposable Filter Original Installation - Remove and discard original filter. Install Gasket EAA-6838-A (coat gasket with light grease) and Adapter ECG-66391-A, in adapter recess in cylinder block (mark Top on adapter must be upward), install Oil Filter Mounting Bolt Insert No. ECG-6890-A and tighten insert to 70-80 ft. lbs. torgue. *(CAUTION* - DO NOT allow adapter to rotate). Install Disposable Filter Assembly MHK-6714-A as follows:

Disposable Filter Replacement - Coat gasket face of filter with oil, thread filter on insert by hand until gasket contacts adapter face, then tighten filter an additional one-half turn *(CAUTION* - DO NOT overtighten). Run engine and check for leaks.

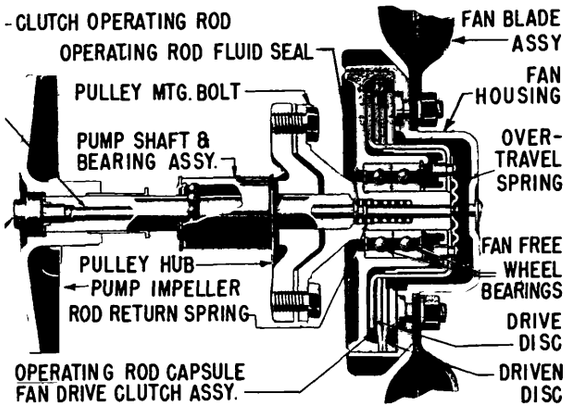
COOLING

POWER BOOSTER FAN

DESCRIPTION & OPERATION: This "Power Surge" Fan is a completely automatic unit built-in the fan hub and water pump shaft. The fan blade and hub assembly is mounted on two ball bearings on the pulley hub which allow the fan to "free-wheel" when the clutch is disengaged. The clutch assembly consists of a drive disc (on the end of the pulley hub) and a driven disc (in the fan hub). Clutch is engaged by an operating rod extending through the pump shaft which is actuated by a capsule in the center of the pump impeller. As the water temperature increases, the capsule extends to engage the fan drive clutch causing the fan to be positively driven by the engine. Whenever the engine is at normal



ROTOR TYPE OIL PUMP



MERCURY AUTOMATIC FAN

temperature or below (with the operating capsule not extended), the rod return spring moves the rod toward the impeller and disengages the clutch so that the fan free-wheels.

FUEL SYSTEM NOTES

CARBURETOR AIR INTAKE DUCT ASSEMBLY (WITH THERMOSTAT CONTROL): Thermostatically controlled valve in air intake duct assembly should be fully closed at temperatures below 75°F (for air intake from rear "heated" opening) and should start to open at 85°F. Valve should be wide open at 105°F (for air intake from outside through left radiator side air deflector) If valve does not operate satisfactorily, remove duct assembly and test operation as follows:

Duct Assembly Removal: Loosen clampscrew and slide flexible hose off end of duct. Remove wing nut retaining air cleaner on carburetor remove nut and washer retaining duct assembly on bracket. Lift air cleaner and duct assembly off engine. Loosen two clampscrews and slide duct assembly from air cleaner.

Testing: Place duct assembly in pan of water at temperature below 65°F. (thermostat must be covered by water). Valve should be in closed "heat on" position. Heat the water slowly. At temperature of 75°F. valve should start to open *(NOTE* - If valve does not start to open, hold water temperature at 75°F. for eight minutes before discarding thermostat as defective). Increase water temperature to 105°F. Valve should now be wide open in "heat off" position *(NOTE* - If valve not wide open, hold water temperature at 105°F. for eight minutes before discarding thermostat as defective). If valve operation not satisfactory, remove thermostat and spring assembly and check valve shaft for binding. If valve moves freely replace thermostat and duct assembly. If valve does not operate correctly, adjust thermostat rod as follows:

Adjustment: Increase rod length to move valve toward "heat off" position, decrease rod length to move valve toward "heat on" position.

MODEL IDENTIFICATION

SERIAL NUMBER: Stamped on patent plate attached to left front body pillar extension.
First Number - 10001 up.

► *SERIAL NUMBER NOTE: The serial number (example *57LA10001M*) includes following identification data in sequence.*

Year	Assembly Plant	Serial No.	Vehicle Name
57	See below	10001	ⓜM

ⓜ - "M" indicates Mercury.
Assembly Plants - Indicated in serial number by following code **LA** - Los Angeles. **ME** - Metuchen. **SL** - St. Louis. **WA** - Wayne.

► *ENGINE IDENTIFICATION·* Two different engines used "ECZ" Safety-Surge 312 cu. ins., and "ECU" Jato-Thrust 368 cu. ins. Specifications below are marked "ECZ" or "ECU" for each particular engine.

TUNE-UP

► *INTERMITTENT ENGINE MISS:* May be caused by distributor primary lead shorting out through nylon insulation. Correct by taping lead with rubberized tape.

COMPRESSION PRESSURE: (ECZ) 170 lbs , **(ECU)** 160 lbs at cranking speed of 150-180 RPM *NOTE* - Supersedes previous specification of 165 and 160 lbs

VACUUM READING: (ECZ) 19-20", **(ECU)** 18-19" with engine idling at 475 RPM in neutral.

VALVE TAPPET CLEARANCE: (ECZ) .020" (Intake & Exhaust COLD), .019" (Intake & Exhaust HOT). If adjusted while engine Cold, recheck with engine Hot (after 30 minutes operation to normalize temperature). **(ECU)** - None in service (Hydraulic Lifters).

MANIFOLD HEAT CONTROL: Butterfly type valve mounted between right hand manifold and exhaust pipe (Single & Dual exhaust systems). When installing, make certain counterweight is toward right front.

► *DUAL EXHAUST NOTE:* When valve closed, all exhaust gases are discharged through left hand exhaust pipe.

IGNITION

FIRING ORDER: 1-5-4-8-6-3-7-2.
Cylinders - RIGHT BANK 1-2-3-4, LEFT BANK 5-6-7-8.

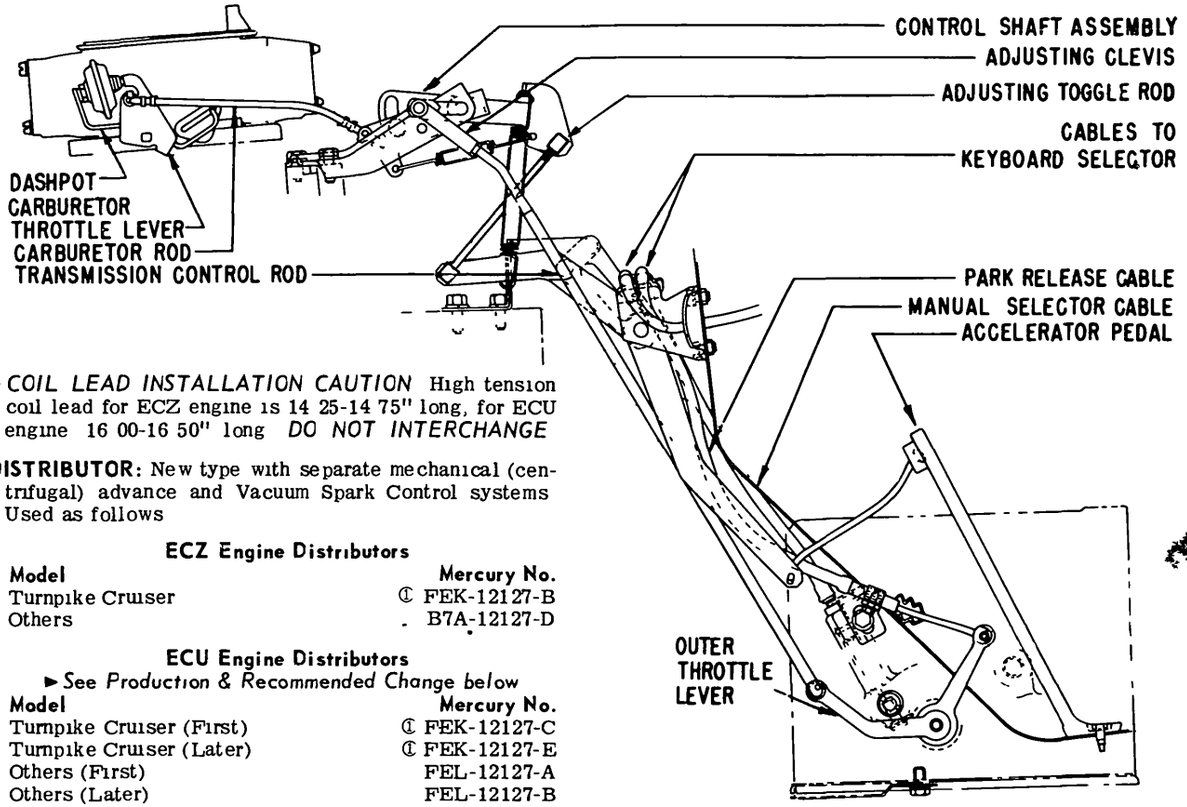
SPARK PLUG GAP: .032-.036"
Spark Plug - Champion 860 (early) F-14Y (later) Use F 14Y for replacement

► *SPARK PLUG CAUTION:* Spark plug has tapered seat and does not require a sealing gasket. It is important that plugs be tightened to 15-20 ft. lbs

COIL: Mercury B6A-12029-B.
Ignition Current - 2.5 amps. idling, 4.5 amps. stopped.
Resistor - Mercury B6A-12250-D. 1.30-1.40 ohms at 75°F.

► *COIL RESISTOR NOTE:* Resistor is connected in lead from ignition switch to coil. Resistor is by-passed during cranking by a lead from starter solenoid to battery terminal of coil.

► *COIL RESISTOR GROUNDING CORRECTION.* Resistor may ground on intake manifold To correct, bend resistor on its mounting bracket in direction of coil to give proper clearance



MERCOMATIC TRANSMISSION THROTTLE LINKAGE

► *COIL LEAD INSTALLATION CAUTION* High tension coil lead for ECZ engine is 14 25-14 75" long, for ECU engine 16 00-16 50" long *DO NOT INTERCHANGE*

DISTRIBUTOR: New type with separate mechanical (centrifugal) advance and Vacuum Spark Control systems Used as follows

ECZ Engine Distributors

Model	Mercury No.
Turnpike Cruiser	ⓒ FEK-12127-B
Others	B7A-12127-D

ECU Engine Distributors

► *See Production & Recommended Change below*

Model	Mercury No.
Turnpike Cruiser (First)	ⓒ FEK-12127-C
Turnpike Cruiser (Later)	ⓒ FEK-12127-E
Others (First)	FEL-12127-A
Others (Later)	FEL-12127-B

ⓒ - With Tachometer Drive
See "Ford, Lincoln, Mercury Distributors" in Electrical Section

Condenser - Mercury No B7A-12300-A **Capacity** - 21-25 mfd
Contact Point Set - Mercury No B7A-12171-A
Breaker Gap - 014-016"
Cam Angle - 26 28½°
Breaker Arm Spring Tension - 17 20 ozs
Rotation - Counterclockwise viewed from above

► *ECU ENGINE DISTRIBUTOR ADVANCE PRODUCTION & RECOMMENDED CHANGES (FEK-12127-C & FEL-12127-A Distributors)* These distributors can be reworked for improved performance by installing later type Distributor Weight Springs and calibrating Automatic & Vacuum Advance to "Later Production" specifications listed below *For complete adjustment procedure, see "Ford, Lincoln, Mercury Distributors" in Electrical Section NOTE* - Later type Distributors FEK-12127-E & FEL-12127-B have new type weight springs and "Later Production" advance specifications apply

Distributor Advance Springs

	Original Part No.	New Part No.
Primary Spring	B7A-12192-A	FEL-12192-A-UP
Secondary Spring	FEK-12191-A	B7A-12191-B

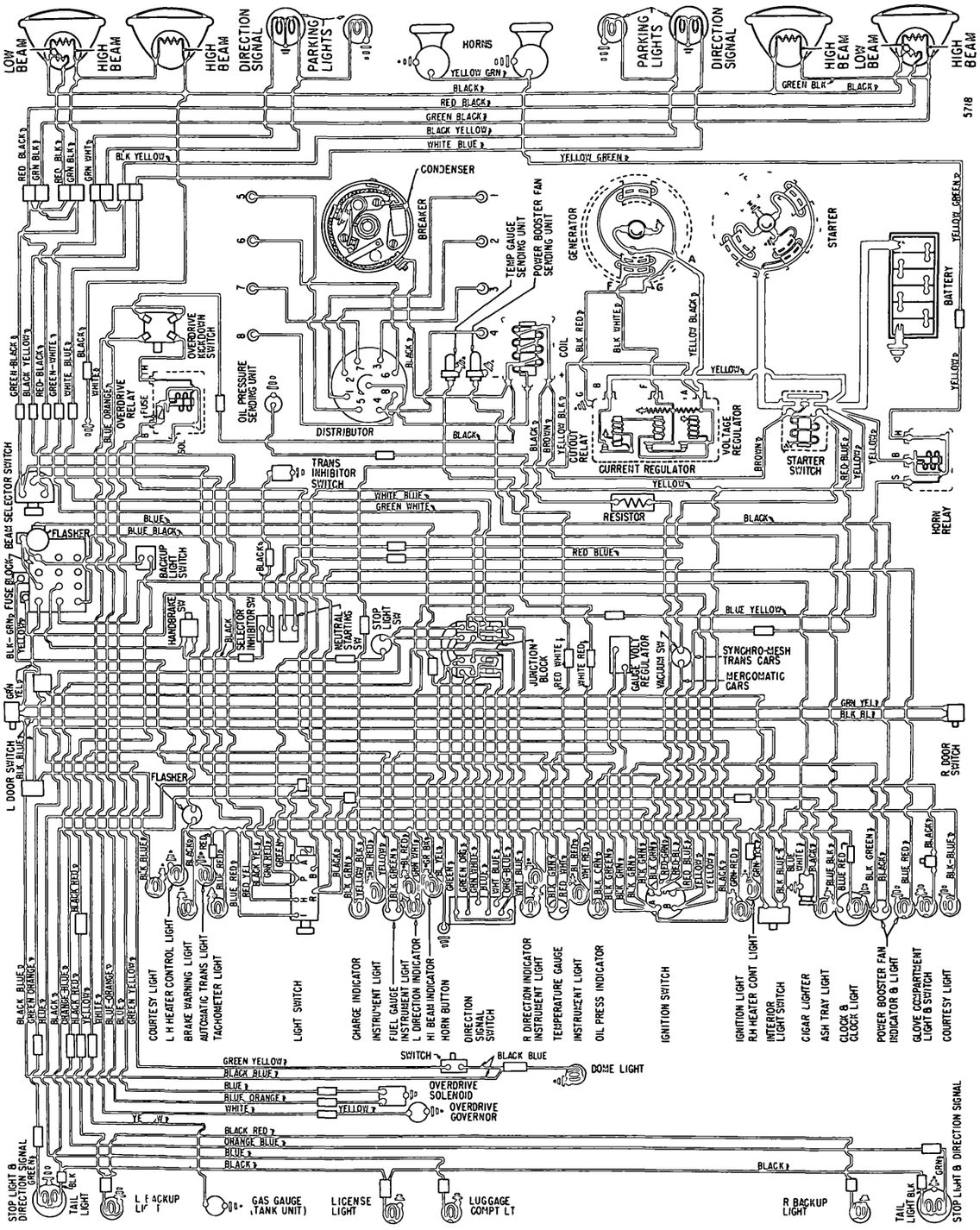
Automatic Advance (ECZ Eng.)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
½-1½		450	1-3		900
3-4		550	6-8		1100
5-6		850	10-12		1700
8-9		1325	16-18		2650
12-13		2000	24-26		4000

Automatic Advance (ECU Eng.)
(Early Production)

Degrees	Distr.	RPM	Degrees	Eng.	RPM
0-½		300	0-1		600
1½-2½		400	3-5		800
4-5		500	8-10		1000
6-7		875	12-14		1750
8-9½		1325	16 19		2650
12-13		2000	24-26		4000

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Automatic Advance (ECU Eng.)
Ⓒ (Later Production)

Degrees Distr.	RPM	Degrees Eng.	RPM
0-½	300	0-1	600
3-4	500	6-8	1000
7-8	875	14-16	1750
9-10	1325	18-20	2650
12-13	2000	24-26	4000

Ⓒ - With modified advance *See Change Note above*

Vacuum Spark Control: Integral type mounted on distributor housing and linked directly to breaker plate

Vacuum Advance (ECZ Eng.)

Distr Degrees	Eng Degrees	Vacuum (" of Hg)
0-1	0-2	5
5-7	10-14	10
11-13	22-26	15-20

Vacuum Advance (ECU Eng.)
(Early Production)

Distr Degrees	Eng Degrees	Vacuum (" of Hg)
0-1	0-2	5
4-6	8-12	10
7-9	14-18	13-20

Vacuum Advance (ECU Eng.)
Ⓒ (Later Production)

Distr Degrees	Eng Degrees	Vacuum (" of Hg)
0-½	0-1	5
1-3	2-6	10
4-6	8-12	13 20

Ⓒ With modified advance *See Change Note above*

IGNITION TIMING

Engine	Std. Setting
ECZ (Std. & O.D.)	3° BTDC (6° BTDC Max.)
ECZ (Mercomatic)	6° BTDC
ECU	5° BTDC (8° BTDC Max.)

Timing Mark - Crankshaft pulley marked "TDC", "10° BTDC", and "20° BTDC" with 2° graduations between these marks. Align correct mark with pointer on timing chain cover.

CARBURETOR

▷ *CARBURETOR APPLICATION: ECZ Engines equipped with Carter AFB or Holley 4-Barrel Carburetors, ECU Engine equipped with Carter WCFB 4-Barrel Carburetor.*

▷ *CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

Carburetor Air Intake Duct Assembly (Thermostatic Control): Carburetor air intake duct to air cleaner has thermostatically controlled valve which provides warm air for cold engine (air taken in through muff or shroud around exhaust manifold) or cool air for warm engine (air taken in from the left radiator side air deflector) Valve should be closed at temperatures below 75°F (for air intake from rear "heated" opening) and should start to open at 85°F Valve should be fully open at 105°F (for air intake from outside through left radiator side air deflector) *See "Fuel System Notes" in Mercury Special Data*

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Accel rator Pedal Adjustment: Adjust toggle rod linking accelerator pedal bellcrank on firewall to bellcrank on cylinder head for shortest overall length Attach one end of rod to accelerator shaft and other end to transmission control shaft Distance between bottom surface of accelerator pedal and bare floor pan should be 4" Lengthen rod to raise pedal shorten to lower *CAUTION* - Adjust pedal height by **toggle rod only.** Shortest rod length possible must be used

Throttle Linkage Adjustment (Mercomatic Cars): With engine at normal operating temperature and idle speed set at 425-450 RPM with selector button in "D", adjust Anti-stall Dashpot (see below), then proceed as follows Remove clevis pin connecting transmission control rod to control shaft (on engine bracket), insert gauge pin, Tool 77230-MB, through control shaft and bracket. Adjust carburetor-to-control shaft rod so that it freely enters hole in carburetor throttle lever. Then **lengthen 2 full turns** and install rod Remove gauge pin With carburetor throttle lever in slow idle position hold transmission control rod up so that transmission lever is against its stop adjust clevis on rod so that clevis pin enters hole in control shaft freely then **lengthen** rod by turning clevis **3 full turns**, connect rod

Dashpot Adjustment (Holley & Carter WCFB Carbs.): Hold dashpot plunger in to limit of travel, loosen dashpot mounting locknut, rotate dashpot in or out on bracket until .067" feeler (Tool T109-234) can just be inserted between dashpot plunger and carburetor throttle lever (throttle closed and throttle stopscrew against stop). Tighten locknut and recheck clearance.

Dashpot Adjustment (Carter AFB Carburetor): This model has dashpot built-in carburetor. Hold primary throttle valves in wide-open position, measure distance from top surface of bowl cover to bottom of dashpot arm lever (at dashpot plunger). This distance should be 7/16". Adjust by bending inner tang on dashpot arm.

HOLLEY 4-BARREL

Mercury No. B7A-9510-U Auto. Trans. (replaces ECZ-9510-V), ECZ-9510-AD Std. & O.D. (replaces ECZ-9510-Y). *NOTE* - Carburetor ECZ-9510-AD is B7A-9510-U with dashpot and attaching parts removed New type 4-barrel carburetor with automatic choke

► *POOR OR HESITANT ACCELERATION CORRECTION* *See "Holley 2 & 4-Barrel Carburetors" in Carburetion Section*

► *MALFUNCTIONING CAUSED BY IMPROPER GASKET INSTALLATION CORRECTION* Throttle body-to-main body gasket may block vacuum passage from carburetor to distributor vacuum diaphragm To correct install gasket **on throttle body** and make sure **all** holes are aligned correctly

Idl Setting - Both screws (primary side only) ½-1½ turns open Adjust each screw in sequence, turn screw in until engine begins to run rough, then turn screw out until engine begins to roll, finally turn screw in just enough for smoothest idling (favor rich side of adjustment range). Readjust both screws after rechecking idle speed, turn screws 1/8 turn in either direction for smoothest idle (screws must be within ½ turn of each other)

Idle Speed - 475-500 RPM in Neutral. On Mercomatic cars, recheck idle speed in "D" and readjust as necessary to 425-450 RPM.

Throttle Linkage Adjustment: *See CARBURETOR above.*

► *OTHER DATA See "Holley 2 & 4-Barrel Carburetors" in Carburetion Section*

CARTER AFB 4-BARREL

Carter AFB No. 2441S,SA. New type 4-Barrel carburetor with automatic choke

► *RICH OPERATION AT HIGH ALTITUDE CORRECTION*· Install new metering rods or jets *See "Carter AFB 4-Barrel Carburetors" in Carburetion Section*

► *ACCELERATOR PUMP SPECIFICATION CHANGE* Changed from 27 64" to 15/32" from top of pump plunger to top of air horn

► *CHOKE SETTING SPECIFICATION CHANGE* Changed from 2 notches to 1 notch rich from center index

Idle Mixture & Idle Speed Setting - *Same as for Holley 4-Barrel above*

Throttle Linkage Adjustment: *See CARBURETOR above*

► *OTHER DATA*· *See "Carter AFB 4-Barrel Carburetors" in Carburetion Section*

CARTER WCFB 4-BARREL

Carter WCFB No. 2404S,SA. 4-barrel carburetor with automatic choke

► *STUMBLE OR CUTTING OUT ON TURNS CORRECTION* May be caused by poor seal between carburetor body and air horn *See "Carter WCFB 4-Barrel Carburetors" in Carburetion Section*

Idle Mixture & Idle Speed Setting - *Same as for Holley 4-Barrel above*

Throttle Linkage Adjustment: *See CARBURETOR above*

► *OTHER DATA See "Carter WCFB 4-Barrel Carburetors" in Carburetion Section*

FUEL PUMP PRESSURE: 3.5-5.5 lbs. at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Mercury No ECZ-9350-B (ECZ Eng), No ECU-9350-D (ECU Eng) Fuel & Vacuum

Pressure - 3½-5½ lbs (ECZ Eng), 4½-6½ lbs (ECU Eng)

See "Fuel Pumps" in Carburetion Section

Gasoline Gauge: King-Seeley Electric "CV" (Constant Voltage) type with voltage regulator No FEL-10804 A

Dash Unit - (Std) Mercury No FEK-9280-A (Turnpike Cruiser) FEK-9280 D

Tank Unit -(Std) Mercury No FEG-9275-E (Sta Wgn) FEG-9275-D (Turnpike Cruiser) FEG-9275-E

See "Fuel Gauges" in Carburetion Section

Air Cleaner: DRY FILTER ELEMENT type Clean every 4,000 miles replace element every 30,000 miles

► *CLEANING CAUTION*· Clean filter element by tapping or shaking to remove dirt particles *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate*

► *AIR CLEANER AIR LEAK CORRECTION (ECZ Eng).* Install Air Cleaner Element Seat Part No ECZ-9610-A beneath air cleaner element and body

► *HEAVY DUTY AIR CLEANER NOTE*· Heavy Duty Air Cleaner Part No EDB-9601 B available for replacement of standard Cleaners No EDB-9601-A1 & EDB 9601-A2 for use in dusty areas

BATTERY

ECZ Eng. - Mercury Kit No. MGK-10655-A. 12 volt, 11 plate, 55 ampere hour capacity

ECU Eng. - Mercury Kit No. MHK-10655-A. 12 volt, 13 plate 70 ampere hour capacity

Battery Ground - Negative to engine block

Engine Ground - Cylinder head to dash

STARTER

Mercury No. B6A-11002-A. Armatur - FAC-11005-B. Drive - Mercury No 1CM-11350-C Bendix "Folo-Thru"

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 48-56 ozs.

Cranking Speed - 150-180 RPM., 155-190 amps.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	4500	12.0	80 max.

Starting Switch· (Synchro-mesh Trans.) - Relay No B6A-11450-A controlled by Ignition & Starter Switch No B5A-11572-A

(Auto. Trans.) - Relay Part No B6A-11450-A controlled by Neutral & Starter Switch Vacuum Starter Cutout Switch FEK-11516-A and Neutral Starter & Back-up Light Switch FEK-15812-B

Starter Removal· Disconnect battery ground cable, raise front end of car, turn wheels to full right, disconnect starter cable. Remove ignition cable mounting bracket bolt, bracket and wires. Remove starter drive end plate screws, pull starter out and upward until drive assembly clears housing, hold in vertical position, with drive end down, then rotate and lower housing between tie rod and idle arm.

Installation: Tape dust seal lip (use masking tape) to inner circumference of housing to hold it in place, and reverse removal procedure. *NOTE* - Tighten outer cap-screw first, then top and bottom capscrews to maintain alignment of starting motor with flywheel housing.

Mercomatic Neutral Safety Switch Adjustm nt: *See "Ford-omatic & Mercomatic" in Transmission Section*

GENERATOR

GENERATOR: As follows:

Generator No.	Armature N .
B6A-10002-H (Std.)	FGT-10027-A
FGP-10002-B (Special)	FGP 10027 A

Performance Data

Generator	Amperes	Volts	GEN RPM
B6A 10002-H	30	15	2450
FGP 10002-B	40	15	2390

Brush Spring Tension - 26-34 ozs

Field Current - 1 5-1 6 amps at 15 volts (Hot)

Rotation - Counterclockwise at commutator end

Belt Adjustment: Approximately ½" deflection on belts midway between generator and water pump pulleys with normal thumb pressure

REGULATOR

REGULATOR: Used with generator as follows

Regulator No.	G nerat r No.
B6A-10505-A	B6A-10002 H
FBF-10505-A	FGP-10002 B

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►*SETTING NOTE:* Settings are for regulator at NORMAL OPERATING TEMPERATURE (after running engine for 20 minutes at 1500 RPM if started cold or until temperature gauge is steady for 5 minutes if engine previously warmed up) with room temperature at 75°F

Cutout Relay

Cuts In - 12 0 12 8 volts
Cuts Out - 2 0-6 0 amps (reverse current)

Voltage Regulator

Setting - 14 6-15 4 volts
Checking & Adjusting - *See "Ford, Lincoln, Mercury 12 Volt Regulators" in Electrical Section*

Current Regulator

Setting - 28-32 amps (B6A-10505-A) 38-42 amps (FBF-10505-A)
Checking & Adjusting - *See "Ford, Lincoln, Mercury 12 Volt Regulators" in Electrical Section*

MISC. ELECTRICAL

Headlamps: Sealed Beam 2-Headlights Std (Exc Turnpike Cruiser), 4-Headlights Std (Turnpike Cruiser) *See "4-Headlights" in Electrical Section*

Directional Signals: *See Electrical Section*

Lighting Switch Removal: Disconnect battery ground cable Depress spring and pin retainer located on top of switch pull knob and shaft assembly from switch Use wide blade screwdriver to remove switch retainer nut from face of instrument panel and remove switch

Stop Light Switch Location: On forward end of brake master cylinder (integral with power brake unit) Master cylinder or power brake unit located on firewall in engine compartment

CIRCUIT BREAKERS: 12 ampere used with dual headlights 20 ampere used with Air Conditioner Protects headlights

FUSES: Located in fuse panel behind instrument panel
Interior Lights - SFE 7 5 ampere
Turn Signals - SFE 7 5 ampere
Heaters Blowers - SFE 14 ampere
Radio - SFE 7 5 ampere
Clock - Electric wind 1 AG-1
Overdrive - AGC 15 ampere
Windshield Wipers - SFE 7 5 ampere
Back-Up Lights - 7 5 ampere
Spotlight - SFE 7 5 ampere
Underhood Lamps - SFE 7 5 ampere
Power Lubrication - SFE 7 5 ampere
Horn Relay: Mercury No B7A-13853-A

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning system for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 90° V8, Overhead Valves. "Safety Surge" (ECZ) & "Jato-Thrust" (ECU) engines.

Model	Bore	Stroke	Displacement
ECZ	3.80"	3.44"	312 cu. ins.
ECU	4.0"	3.66"	368 cu. ins.

Model	Rated HP	Compr. Ratio	Developed HP
ECZ	46.2	9.7-1	255 at 4600 RPM
ECU	51.2	10-1	290 at 4600 RPM

Compression & Vacuum Reading - *See TUNE-UP.*

►*POWER BOOSTER FAN NOTE* Power Booster Fan is standard on some ECZ engines *See "POWER BOOSTER FAN" under "Cooling" in Mercury Special Data*

►*ENGINE OR GEAR NOISE NOTE:* Objectional engine and gear noise can be caused by metallic contact between rear engine mount retainer bracket contacting frame To correct, loosen two mounting bolts align retainer bracket hold drift between retainer and crossmember while tightening mounting bolts to 22-28 ft lbs

►*MANIFOLD HEAT VALVE STICKING CORRECTION:* Chamfer lower edge of valve plate to eliminate contact with aligning dimple of muffler inlet pipe

►*IGNITION TIMING CAUTION:* Setting Ignition Timing in advance of specifications will burn spark plug electrodes shorten valve life and cause excessive detonation with burned pistons *See IGNITION TIMING above*

►*CRANKCASE VENTILATION TUBE OIL LEAK CORRECTION (ECZ Eng):* When screen in tube is longer than 1 820" cover will not contact gasket causing oil leak To correct cut either end of screen to reduce length to 1 820"

►*ENGINE OPERATION IN LOW OCTANE AREAS (FOREIGN TRAVEL):* Low octane fuel Kit No I-501769 (ECZ) No ECU-99025 A (ECU) available for service to lower compression ratio

►*AIR CLEANER NOISE CORRECTION* To eliminate noise due to air cleaner duct contacting exhaust manifold remove duct cut out "U" section at lower end to give 1/8" clearance and reinstall air duct and cleaner.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Mercury Special Data*

►*"ECU" CYLINDER HEAD BOLT & TORQUE SPECIFICATION CHANGE:* New high tension steel cylinder head bolts Part Nos B4Q-6065 A & B4Q 6066-A permit higher torque specification and reduce possibility of water and combustion chamber leaks *See "Torque Specifications" in Mercury Special Data*

TIGHTENING TORQUES: *See "Tightening Specifications" in Mercury Special Data*

ENGINE REMOVAL: *See "Engine" in Mercury Special Data*

OIL PAN REMOVAL: On early cars with front Engine Steady Rest Support, turn crankshaft so No. 1 piston is at 12° ATDC, raise car, drain oil, remove radiator splash shield, stabilizer bar mounting bolt. *NOTE* - With Automatic transmission, remove cooler line clip oil pan screw, loosen cooler outlet pipe at left hand side of radiator and right hand side of transmission. Remove steady rest bracket to frame crossmember bolt, engine front support nuts and retainers, rear engine support crossmember, raise engine 4½" ONLY, drop oil pan down, position stabilizer between oil pan and cylinder block and remove oil pan.

PISTONS

Aluminum alloy Autothermic, solid skirt type with three rings above pin *NOTE* - Pin is offset in piston

►*ORIGINAL BORE & PISTON SIZES* Original bore range is (ECZ) 3 8000 3 8024", (ECU) 4 0000-4 0024" and TWO standard size pistons are used as noted below Piston "Grade" is marked on dome

Std. Piston Sizes

Engine	Grade "2"	Grade "6"
ECZ	3 7993 3 7996"	3 8005-3 8008"
ECU	3 9991-3 9994"	4 0003-4 0006"

Removal - Pistons and rods removed from above

Fitting New Pistons: Use ½" wide feeler gauge inserted between piston and cylinder wall at right angles to pin on thrust side Feeler thickness as follows.

New Piston in New Bore - 002" feeler 5-10 lbs pull
New Piston in Used Bore - 0025" feeler 5-10 lbs pull
Used Piston in New or Used Bore - 003" feeler 5-10 lbs pull

NOTE - Specifications cover both ECZ & ECU engines and supersede previous specifications

Replacement Pistons: (ECZ) standard 0225", 0325", 0425" oversize
(ECU) Standard 020" 030", 040" oversize

►*NOTE* - Standard furnished in two sizes *See "Original Bore & Piston Sizes" above*

Installing Pistons: Indentation or notch on top of piston must face front of engine *See Rod Installation*

PISTON PINS

Floating type with lock ring at each end

Diameter - (All) 9120 9123" **Length** - (ECZ) 3 016-3 030", (ECU) 3 162 3 176"
Clearance in Piston - 0001- 0003" Service max 0008"
Clearance in Rod - 0001- 0003" (ECZ) 0002- 0004" (ECU) Service max 0008"
Replacement Pins - (All) Std (Green), 001" (Blue) 002" (Yellow) Oversize

PISTON RINGS

ECZ Engine

Ring	End Gap	Side Clearance
Compr. (1)	012-.022"	Ⓒ 0035"
Compr. (2)	.012-.022"	Ⓒ.003"
Oil Contr.	.015-.062"②	-

ECU Engine

Ring	End Gap	Side Clearance
Compr. (1 & 2)	.013-.030"	Ⓒ 003"
Oil Contr.	.015-.062"②	-

Ⓒ - Service maximum ② - On rails.

Replacement Rings: Standard and 020", 030" 040" oversize

CONNECTING RODS

Journal Diameter - Two (Standard) sizes as follows

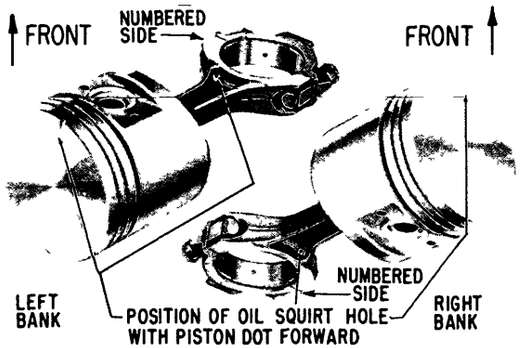
Engine Ⓒ	Code Blue	Cod Red
ECZ	2 1880-2 1884"	2 1884-2 1888"
ECU	2 2482-2 2486"	2 2486 2 2490"

Ⓒ - Use bearing with same Code Color

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Bearings - Copper Lead Alloy with Steel back. Upper and lower halves interchangeable.
Clearance - .0007-.0036".
Side Clearance - .019" (ECZ), .017" (ECU).
Replacement Bearings: Two Standard Sizes (Coded Blue or Red), and .010", .020", .030" (ECZ & ECU) plus .040" (ECU) undersize.
Installing Rods: Assemble rods to piston so indentation embossed on piston head will face front of engine with numbered side of rod to right side of engine (right bank), or to left side of engine (left bank). When installing assemblies in engine, numbers on rods and caps must be together and toward outside of block.



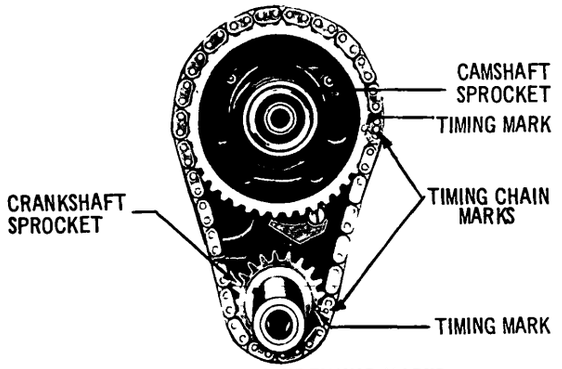
PISTON & ROD ASSEMBLIES

CRANKSHAFT

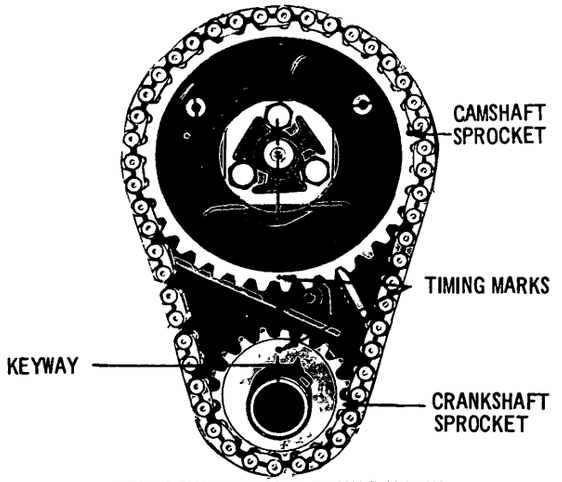
Journal Diameters: 2.6235-2.6239" (Color Coded Blue), 2.6239-2.6243" (Color Coded Red).
Bearings - Copper Lead Alloy, with steel back.
Clearance - .0008-.0026". Service max. .0036".
Replacement Bearings: Two Standard Sizes (Coded Blue or Red), and .010", .020" .030" (ECZ & ECU) plus .040" (ECU) undersize. *NOTE* - Bearings are different on the two engines.
End Thrust: Taken by No. 3 main bearing.
Thrust Bearing Alignment - *See "Crankshaft & Main Bearings" in Mercury Special Data.*
End Play - .010" (ECZ), .012" (ECU).
Crankshaft Front Oil Seal Installation: *See "Engine Front Cover" in Mercury Special Data.*
Crankshaft Rear Oil Seal Installation: *See "Crankshaft & Main Bearings" in Mercury Special Data.*

CAMSHAFT

Journal Diameter - (ECZ) 1.9255-1.9265". (ECU) 2.1240-2.1247".
Clearance - .006" maximum (ECZ). .003" (ECU).
End Thrust (ECZ): Taken by thrust plate between camshaft sprocket and shoulder of block.
End Thrust (ECU): Restrained by spring and piston located in front end of camshaft.
Replacement Camshaft Bearings: Reamed bearings furnished in Standard and .015" oversize. *NOTE* - ECZ and ECU bearings are different.
Camshaft Bearing Removal & Installation: *See "Camshaft & Bearings" in Mercury Special Data.*
Camshaft Setting (ECZ): Timing is correct when timing marks on sprockets correspond with marks on chain when on drive side of chain.
Camshaft Setting (ECU): Timing is correct when timing marks on sprockets are adjacent and in line across shaft centers.



"ECZ" ENGINE VALVE TIMING MARKS



"ECU" ENGINE VALVE TIMING MARKS

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Mercury Special Data.*
Timing Chain Cover Seal Installation (Crankshaft Front Oil Seal): *See "Engine Front Cover" in Mercury Special Data.*

VALVES

Tappet Clearance: (ECZ) - .020" Intake & Exhaust (Cold), .019" Intake & Exhaust (Hot). Recheck Cold setting after engine warmed up.
(ECU) - None in service, hydraulic lifters.
Initial Valve Clearance Adjustment - *See "Valve System" in Mercury Special Data.*

ECZ Engine

Valve	Head Diameter	① Stem Diameter
Intake	1.920-1.930"	.3416-.3423"
Exhaust	1.505-1.515"	.3403-.3410"

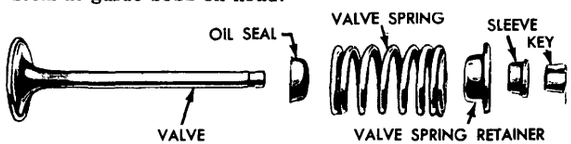
Valve	Seat Angle	② Lift	Stem Clearance
Intake	45°	.272"	③ .001-.002"
Exhaust	45°	.267"	④ .0023-.0037"

ECU Engine

Valve	Head Diameter	① Stem Diameter
Intake	2.000-2.010"	.3416-.3423"
Exhaust	1.630-1.640"	.3403-.3410"

Valve	Seat Angle	② Lift	Stem Clearance
Intake	45°	.261"	③ .001-.002"
Exhaust	45°	.256"	④ .0023-.0037"

① - Furnished with .003", .015", .030" OS stems.
② - Cam Lift (Service Minimum).
③ - Service maximum: .004" (ECZ), .0045" (ECU).
④ - Service maximum: .006" (ECZ), .0065" (ECU).
Valve Seat Width - 1/16-5/64" (Int.), 5/64-3/32"(Exh.).
Oversize Valve Stem Installation - *See "Valve System" in Mercury Special Data.*
Valve Servicing - *See "Valve System" in Mercury Special Data.*
Valve Stem Seals - "Umbrella" type seals used on all valves. Install seals with cupped side down on valve stem at guide boss on head.



VALVE ASSEMBLY

Valve Springs: Free Length - 2.09" (ECZ), 2.12" (ECU).

Valve Spring Specifications

ECZ Engine

	Pressure	Length
Closed	64 lbs.	1.780"
Open	145 lbs.	1.390"

ECU Engine

	Pressure	Length
Closed	60 lbs.	1.800"
Open	165 lbs.	1.380"

►*HIGH PERFORMANCE INNER VALVE SPRING (ECU):* Inner valve spring Part No. ECU-66515-A available for high speed operation, and requires use of Valve Spring Retainer No. ECZ-6514-A. Outside of valve guide is machined for usage of inner valve spring. *NOTE* - Free length 1.875". **Specifications** - 28-32 lbs. pressure at 1.62", 78-82 lbs. pressure at 1.17".
Valve Guides: Integral with cylinder head. When stem-to-guide clearance exceeds maximum (.004" Intake, .005" Exhaust), ream guides and install oversize valves. *See "Valve System" in Mercury Special Data.*
Valve Lifters: (ECZ) Mushroom type. Removed from below with camshaft removed.
Diameter - .4989-.4995".
Valve Lifters: (ECU) Hydraulic, barrel type. Lifters can be removed from above with camshaft in engine.
Diameter - .8740-.8745". **Clearance in Block** - .0025" maximum.
Lifter Overhaul (ECU) - *See "Valve System" in Mercury Special Data.*

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Rocker Arm Assembly: See *"Valve System" in Mercury Special Data.*

▷ *ROCKER ARM COVER INTERFERENCE CORRECTION (ECZ Eng.): See "Valve System" in Mercury Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

▷ *VALVE TIMING NOTE:* Following valve opening and closing points are with cam lift as indicated.

Valve Timing (ECZ)

Intake Valve - Open 18° ① BTDC. Close 58° ① ALDC.
Exhaust Valve - Open 66° ② BLDC. Close 10° ③ ATDC.

Valve Timing (ECU)

Intake Valve - Open 18° ④ BTDC. Close 72° ⑤ ALDC.
Exhaust Valve - Open 59° ④ BLDC. Close 31° ⑤ ATDC.
Camlift - ① .015", ② .013", ③ .016", ④ .002", ⑤ .004".
Valve Timing Check - With No. 1 piston in firing position (No. 1 intake valve closed), back off adjusting screw and push rocker arm to one side. Mount dial indicator directly above No. 1 intake valve pushrod with indicating button in pushrod socket, set dial indicator at zero. Place a quadrant on crankshaft pulley. Rotate engine to point where dial indicator registers camlift as listed in Valve Timing table above. Quadrant reading should agree with valve timing figure in table.

OILING SYSTEM

Crankcase Capacity: 5 qts. (refill). Add 1 quart when filter changed.
Normal Oil Pressure: 45-50 lbs. at 2000 RPM (Hot).
Oil Pressure Indicator: Light on instrument panel. Light is on when oil pressure is low.
Oil Pressure Switch - Mercury No. FDA-9278-A.
See "Oil Pressure Gauges" in Miscellaneous Section.
Oil Pump: Rotor type. Located at left side of engine crankcase and driven by distributor drive gear.
Pump Overhaul - *See "Oiling System" in Mercury Special Data.*
Oil Filter: Full-flow type early cars, disposable type late.

▷ *OIL FILTER PRODUCTION CHANGE:* Disposable oil filter used on later cars and can be installed to replace previous type full-flow filter on earlier cars. For disposable filter installation *see "Oiling System" in Mercury Special Data.*

Crankcase Ventilation: Filter in oil filler cap (Inlet), filter screen in road draft tube (Outlet). Clean and oil every 2,000 miles or more often in dusty areas.

COOLING

Water Capacity: 19 quarts. Add 1 quart with heater.
Pressure Valve: Mercury No. LA-8100-A (12-15 lbs.). Radiator filler cap.
Thermostat: (ECZ) Mercury No. B4A-8575-A (157-162°F) Std.; B4A-8575-B (177-182°F) High Temperature.
(ECU) Mercury No. B7Q-8575-A (157-162°F) Std.; B4Q-8575-B (168-173°F) High Temperature.

▷ *THERMOSTAT INSTALLATION NOTE:* Install thermostat with the word "TOP" up and toward front of engine to prevent a retarding of flow of coolant.

▷ *RADIATOR NOTE:* Two types of radiator used, Standard and Extra Cooling. All air conditioned cars use Extra Cooling. *NOTE* - Minimum clearance between fan and radiator core is 13/16" or 17/32" between fan and top tank.

▷ *POWER BOOSTER FAN NOTE:* Power Booster Fan is standard on some ECZ engines. *See "POWER BOOSTER FAN" under "Cooling" in Mercury Special Data.*

Water Pump: Packless, sealed ball bearing type.
See "Mercury" in Water Pump Section.
Temperature Gauge: King-Seeley Electric "CV" (Constant Voltage) type with voltage regulator No. FEL-10304-A.
Dash Unit - Ford No. FEK-10883-E.
Engine Unit - Mercury No. FEG-10884-B.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck Model 10.5A6 (Std.), Long Model 11CF (Heavy Duty). Single plate, dry disc type.

Cover Assembly	Mercury No.
Borg & Beck No. 361378	B7C-7563-A
Long No. 265126	B6A-7563-A

See "Borg & Beck" and "Long" in Clutch Section.

Clutch Disc	Mercury No.
Borg & Beck No. 382374	B7C-7550-B
Long No. 287226	81T-7550-A

▷ *CLUTCH PEDAL AREA NOISE CORRECTION:* Install pedal assist spring with hook (on long stem of spring opening) attached to rivet of clutch pedal lever with opening upward. This position will eliminate spring to cowl panel interference.

Pedal Adjustment: If pedal free travel is not 1 to 1¼", loosen clutch pedal release rod locknut (lower end) and turn adjusting nut for correct free travel, tighten locknut.
Removal: Remove transmission (see Transmission Removal below), and disengage clutch pedal retracting spring and release rod from clutch release lever. Disengage equalizer bar tension spring and remove two capscrews retaining equalizer bracket assembly to flywheel housing. Remove flywheel housing. Mark position of flywheel and pressure plate so parts may be installed in original position. Compress clutch pressure plate assembly with Tool 7563. Remove capscrews, pressure plate and disc.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second and high), sliding gear (low and reverse).
See "Mercury Synchro-mesh" in Transmission Section.
Transmission Control: *See "Transmission Controls" in Transmission Section.*
Removal: If equipped with overdrive, remove kickdown switch retainer nut and push switch through floor. Raise car and drain transmission. On overdrive cars remove governor, solenoid, and control cable. Disconnect speedometer cable and remove speedometer drive gear. Remove transmission shift rods at transmission. Remove bolts retaining rear universal joint to companion flange and remove drive shaft. Support rear of engine and remove the detachable cross-member of the frame. Remove two top capscrews retaining transmission to flywheel housing and install a couple of studs to act as guide pins. Remove lower capscrews and slide transmission to rear as far as possible and lower front end. Remove from below car.

▷ *SINGLE EXHAUST SYSTEM NOTE:* When removing transmission, it will be necessary to remove nuts that secure muffler inlet and exhaust pipes to exhaust manifold, and to remove manifold outlet pipe from mounting bracket at rear of manifold and move exhaust system away from working area.

OVERDRIVE

Warner Model AS1-R10F. Solenoid operated type, with governor control and throttle operated kickdown. Lockout Switch not used on this model.
See "Warner R10 Overdrive" in Transmission Section.
Removal: Same as for Synchro-mesh Transmission (above) after disconnecting control cable and wiring.

MERC-O-MATIC TRANSMISSION

Torque converter and three speed automatic transmission with hydraulic control and mechanical parking lock.
See "Fordomatic & Mercomatic" in Transmission Section.

▷ *NO FORCED DOWNSHIFT CORRECTION (Early Cars):* Install new adjustable type accelerator rod No. MG-9784-B which entered production Nov. 1956. For adjustment, *See "Fordomatic & Mercomatic" in Transmission Section.*

▷ *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Fordomatic & Mercomatic" in Transmission Section.*

▷ *TESTING & TROUBLE SHOOTING: See "Fordomatic & Mercomatic" in Transmission Section.*

Lubrication - Check fluid level every 2,000 miles, drain and refill every 16,000 miles. Use only Automatic Transmission Fluid Type "A".
Checking Fluid Level - Bring transmission to operating temperature by running engine with selector lever in Neutral position. Move selector lever through all ranges to assure fluid distribution, then place in (P) "Park" position for checking fluid level. Maintain level at "Full" mark on dipstck.
Throttle Linkage Adjustment: *See CARBURETOR above.*
Manual Selecter & Park Release Cable Adjustment: *See "Mercury Mercomatic Transmission Keyboard Control" in Transmission Section.*

▷ *OTHER MERCOMATIC DATA: See "Fordomatic & Mercomatic Transmission" in Transmission Section.*

UNIVERSALS

Spicer. One used at each end of drive shaft.

REAR AXLE

Own. New separate carrier type with straddle-mounted pinion, hypoid gear and Hotchkiss drive.
See "1957 Ford & Mercury" in Rear Axle Section.

▷ *REAR AXLE LUBRICANT LEAK CORRECTION:* Install axle carrier lower studs using non-hardening (light gray aviation type) sealer on threads as necessary. *NOTE* - Check and clean axle housing vent.

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Axl Rati s

Model	Standard	Optional
S-M (Exc Sta Wgn)	3 70-1(37 10)	3 89-1(35 - 9)
S-M(Sta Wgn)	3 89-1(35 - 9)	3 70-1(37-10)
O D (Exc Sta Wgn)	3 89-1(35 - 9)	
O D (Sta Wgn)	3 89-1(35 - 9)	3 70-1(37-10)
Mercomatic	2 91-1(32-11)	
Mercomatic(Sta Wgn)	3 22-1(29 - 9)	2 91-1(32-11)

NOTE - 2 91-1(32-11) supersedes 3 22-1(29-9) with ECU Engine

Backlash - 004- 009"

Axle Shaft Removal: Remove wheel and brake drum Remove axle shaft retainer locking type nuts (work through opening in axle shaft flange) Use Puller and pull shaft (do not disturb brake backing plate or damage wheel bearing oil seal) Replace one nut to secure brake backing plate

Carrier Assembly Removal. *NOTE* - Pinion carrier assembly can be removed separately without disturbing differential carrier by disconnecting rear universal joint at companion flange, and removing five bolts that attach pinion carrier assembly to differential carrier housing With rear universal joint disconnected, axle shafts removed (see above) remove differential carrier housing to rear axle housing bolts and lift out carrier assembly

Wheel Bearing Adjustment: None required

SHOCK ABSORBERS

Direct acting, non-adjustable Service by replacement.

Front Shock Absorber

Model	Standard	Heavy Duty
All(Exc Sta Wgn)	MG 18077-R	MG 18077-Y
Sta Wgn	MG 18077-S	MG 18077-AA

Rear Shock Absorber

Model	Standard	Heavy Duty
All(Exc Sta Wgn)	MG 18097-K	MG 18097-R
Sta Wgn	MG 18097-M	MG 18097-N

FRONT SUSPENSION

Independent. "Ball-Joint" suspension with direct acting shock absorbers mounted within front coil springs *See "Ford & Mercury (Ball-Joint)" in Suspension & Wheel Alignment Section*

Steering Axis Inclination: 7° at 0 Camber Not adjustable

► *CASTER & CAMBER ADJUSTMENT NOTE* New mounting of upper control arm inner shaft (bolted to outer surface of frame bracket) changes suspension alignment procedure as follows

Caster - Adding 1 '16" shim at front bolt changes caster Pos ½°, adding 1 16" shim at rear bolt changes caster Neg ½°

Camber - Adding 1 16" shim at both front and rear bolts will change camber Pos ¼°, removing 1/16" shim at both bolts will change camber Neg ¼°

Caster - 0° to Neg 1½° Maximum variation between wheels ½°

Camber - 0° to Pos ¾° Maximum variation between wheels ¼°

Toe-In - 1/16 to 3/16"

Toe-Out on Turns - With outer wheel turned 26½°, inner wheel should be 38°(maximum turning angle)

STEERING

► *STEERING GEAR BIND CORRECTION (Early Cars)* Install Steering Gear to Frame Spacers, Part No MG-3566-A, as necessary to eliminate any bind in worm shaft and steering column

Manual: Saginaw Recirculating Ball Nut type *See "Saginaw Worm & Nut" in Steering Section*

Power Steering: Bendix (Ford & Mercury) Linkage type Used in conjunction with standard type steering gear *See "Bendix Linkage Type (Ford & Mercury)" in Steering Section*

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Saginaw Worm & Nut" in Steering Section*

Steering Gear Removal· *See "Saginaw Worm & Nut" in Steering Section*

BRAKES

► *BRAKE DESIGN NOTE.* Front brake anchor pin (fixed anchor type) is mounted on wheel spindle independently of backing plate (wheel cylinder mounted on anchor pin)

► *REAR WHEEL BRAKE TUBE FITTING CAUTION.* Use new brake tube fitting Part No MG-2074-B (Exc Sta Wgn), MG-2074-A (Sta Wgn) to provide clearance between rear wheel brake hose and shock absorber

Bendix Hydraulic, Single Anchor (Without eccentric and with fixed anchor pins) **Early type** requires hand adjustment, **Later type** has automatic adjustment *See "Ford, Lincoln, Mercury Bendix" or "Mercury Bendix (With Automatic Adjuster)" in Brake Section*

Drum Diameter - 11" front and rear

Wheel Cylinder Diameter - 1 1/8" Front 15 16" Rear

Lining - Molded type, riveted to shoe

Width - 3 0" (ECU) 2 5" (ECZ) front and rear

Braking Power - 55 5% front 44 5% rear

Clearance - **(Hand Adjusted)** Expand shoes until wheel is locked Back off adjusting screw 12-14 clicks until wheel turns free

(Automatic Adjusted) For initial adjustment use Tool No 2081 to expand shoes until wheel is locked Hold adjusting lever away from adjusting screw (use narrow screwdriver through hole in backing plate) and back off adjusting screw until wheel turns free, then one more stroke of tool (Approximately 13 strokes total) Wheel should turn free

Brake Pedal Free Play Adjustm nt: 1/4-7/16" If play not correct after adjustment, loosen locknut on the eccentric bolt attaching brake pedal to master cylinder pushrod and rotate eccentric bolt for desired clearance

Standard Master Cylinder: Located on engine side of firewall

Checking Fluid - Maintain fluid level to within ¼" of top of reservoir

Removal - Disconnect brake line from master cylinder and depress brake pedal a few times to force out fluid. Disconnect wires leading to stop light switch, and remove eccentric bolt attaching master cylinder push rod to brake pedal Remove capscrews and lock washers attaching master cylinder to firewall

Power Brakes: Bendix Power Unit (new type with hydraulic reaction valve rod) Combination vacuum power unit and master cylinder Unit mounted on engine side of firewall and replaces regular master cylinder *See "Bendix Power Unit" in Brake Section*

Checking Fluid Level - Same as for regular master cylinder

Removal of Power Unit - Release pushrod from lever assembly master cylinder outlet fitting bolt from master cylinder *NOTE* - DO NOT remove stop light switch or hose assembly from outlet fitting Leave outlet fitting in master cylinder Remove manifold vacuum hose from unit and reserve tank hose from valve fitting Remove mounting screws and unit from bracket on dash panel

MISC. MECHANICAL

Windshield Wipers: Vacuum Cable & Tensioner type *See "Windshield Wipers" in Miscellaneous Section*

Power Window Regulators: Electric Reversible motor in each window Controlled by door switch and master control switch *NOTE* -Rear Window on Turnpike Cruiser and Tall Gate Window on some Station Wagons also power operated *See "Power Window Regulators" in Miscellaneous Section*

Power Top Control· Electric-Hydraulic with reversible pump motor *See "Power Top Controls" in Misc Section*

Power Seat Adjusters· "4-Way" Electric Screw and Jack type with single electric motor driving screw jack *See "Power Seat Adjusters" in Miscellaneous Section*

Seat-O-Matic Control - Automatic position adjustment controlled by switch on instrument panel *See "Seat-O-Matic Power Seat Adjusters" in Miscellaneous Section*

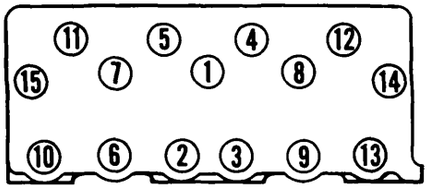
Air Conditioning: Combination Air Conditioning-Heater System, *See "Mercury Air Conditioning" in Misc Sect*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	60-65
Main Bearing Cap (Rear)	50-55
Main Bearing Cap (Others)	80-85
Con Rod Caps	46-50

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Cylinder block has two sleeve locating dowels to assist in lining up cylinder head and gasket during installation. Coat gasket with non-hardening gasket paste, install gasket with marks "AM" and "TOP" upward. Install cylinder head, pushrods, and rocker arm assembly *(CAUTION* - Special drilled capscrew must be installed in rear rocker arm support bracket to provide lubrication for rocker arms). Tighten head bolts in sequence shown in diagram to correct torque. See Tightening Specifications.



HUDSON HORNET & NASH AMB. V8 CYLINDER HEAD

PISTON PINS

PISTON PIN: Pin is press fit in connecting rod and no clamp bolt or locking rings are used to retain the pin. Piston pin must be removed and installed as detailed below to prevent distortion or damage to piston.

Removal - Remove pins with special Piston Pin Remover J-6360 and an arbor press. Place piston in remover support so pin will enter support when pressed out with piloted driver.

Installation - Place piston pin pilot in support, insert piston and connecting rod. This aligns piston and connecting rod piston pin bores. Press piston pin into connecting rod and piston assembly until lower pilot bottoms in support which will properly center rod on pin.

► *CAUTION:* Pin must be tight press fit in connecting rod.

CRANKSHAFT & MAIN BEARINGS

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Install hemp packing in block and in bearing cap using Tool J-3048-A to seat packing in groove Trim excess packing off flush with face of cap. Rubber seals are installed in side grooves of bearing cap.

VIBRATION DAMPENER

REMOVAL: *(NOTE* - Vibration damper can be removed without removing radiator core) Remove fan blade assembly and pull vibration damper with a suitable puller A puller may be fabricated in the shop by threading a 1" x 5" (N C Thread) jack screw into a steel plate ½" thick, with a 13/32" wide slot in each end of plate. Use two screws 3½" long with 2" of 3/8 x 16 U N C 2B-T thread in the slots. Stake a ½" ball bearing in end of jack screw to prevent damage to crankshaft.

INSTALLATION: To install hub assembly, install large lockwasher with notches on inner edge, cork seal ring rubber seal ring and hub retainer in recess in hub Install hex head lockscrew with helical lockwasher under it, in screw hole in end of crankshaft and tighten screw securely. Rubber block retaining bolt nuts on front face of damper hub are drawn up until shoulders bottom on hub (30-35 ft lbs. torque) *CAUTION* - When installing vibration damper on hub, timing marks must be aligned with hub key-way and on same side.

ENGINE FRONT COVER

ENGINE FRONT COVER: Removal - Remove water pump, fuel pump assembly and vibration damper Remove cover-to-cylinder block screws and remove cover.

Installation - Locate dowels in cylinder block and leave cover screws loose until vibration damper is partially installed. This prevents damage to oil seal and aligns cover properly. Then tighten cover screws and install fuel and water pumps.

CRANKSHAFT FRONT OIL SEAL: Oil seal is installed in timing chain cover at vibration damper hub. To replace seal, remove cover (see above), old seal, and install new seal.

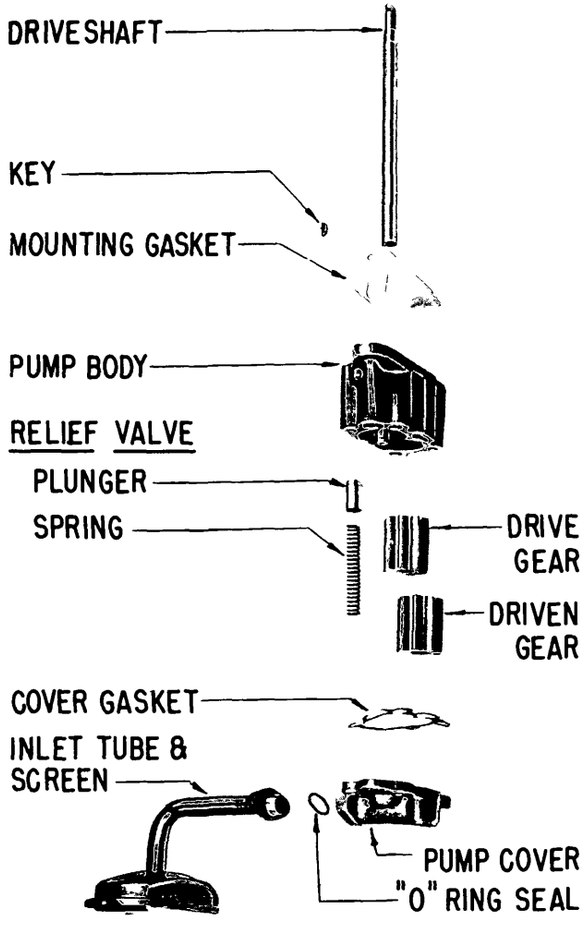
CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL: Remove spark plug wires, cylinder head covers, and rocker arm assemblies. Remove intake manifold and carburetor. Remove all pushrods and hydraulic valve lifters *(CAUTION* - Keep these parts in order so they can be installed in same relative positions). Remove fuel pump. Remove vibration dampener and timing chain cover. Remove water pump and cylinder head water distribution manifold. Crank engine until timing marks on chain sprockets line up on vertical line through shaft centers. Remove fuel pump eccentric, remove both sprockets and timing chain as an assembly. Remove camshaft retainer thrust plate and thrust spacer. Carefully withdraw camshaft through front of engine.

VALVE SYSTEM

ROCKER ARM ASSEMBLY: Complete assembly mounted on cylinder head by four long cylinder head retaining capscrews *(CAUTION* - Rear bolt is special hollow type for rocker arm lubrication). Assembly can be removed by taking out the retaining screws.

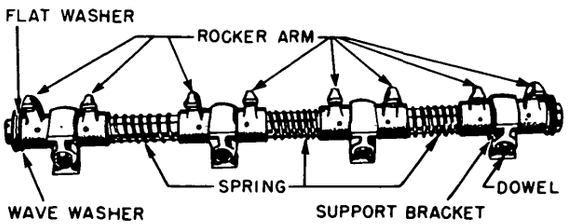
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OIL PUMP

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Disassembly & Inspection: Remove snap ring on end of shaft and slide all parts off shaft. Keep all parts in order so they can be reassembled in same relative positions. Clean and inspect all parts for wear. Inspect rocker arm radius at valve stem end for wear and replace worn rocker arms. Make certain that plugs are tight in ends of shaft.



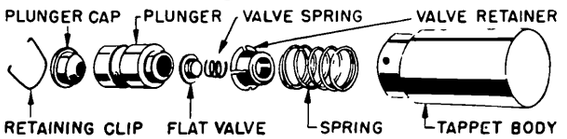
ROCKER ARM ASSEMBLY

R assembly & Installation: Install all parts in same relative positions *(CAUTION* - Rocker arms are "Right" and "Left" and will not contact valve stem properly if interchanged). When installing assembly, make certain that special hollow bolt installed in rear support bracket (necessary for correct rocker arm lubrication).

HYDRAULIC LIFTERS

HYDRAULIC VALVE LIFTERS: Removal–Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm assembly. Remove upper valve tappet cover and breather tube and then remove lower tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in same relative position.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. *(CAUTION–Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove all varnish and gum deposits.



HYDRAULIC VALVE LIFTER ASSY.

Inspection: Inspect the plunger and wall of body for scratches (if plunger or body is scratched, replace complete unit). Try the plunger for fit in body. If check valve removed from plunger, inspect flat disc valve, spring and seat.

R ass mbly: Reverse disassembly procedure. See illustration for correct sequence.

Testing: Fill body with kerosene and install plunger return spring, plunger assembly, and pushrod socket (do not install snap ring). Place lifter between jaws of Checking Tool J-5978 and check leak-down by depressing tool. A decided resistance should be felt. If lifter leaks down rapidly or collapses immediately, it must be rechecked and/or replaced with a complete new lifter assembly. Normal lifter will take 10-45 seconds to leak down with kerosene (.125" travel with 50 lb. load).

Installation: Lifters should be pre-lubricated and assembled in engine without a charge. They will normally charge themselves in 3 to 8 minutes of engine operation.

OILING SYSTEM

OIL PUMP

Removal - Remove oil pan and screws retaining oil pump to rear main bearing cap, remove oil pump.

NOTE - Oil pump is driven by distributor drive shaft so removal of oil pump does not affect ignition timing.

Disassembly - Remove inlet tube and screen assembly from pump cover. Remove cover retaining screws, cover, pump gears, relief valve spring and plunger.

Inspection - Check gear to cover clearance by placing straight edge across pump body with gears in operational cavity. Clearance should not exceed .004". A clearance of .008" maximum should exist between gears and walls of gear cavity opposite point of gear mesh.

Reassembly & Installation - Reverse disassembly procedure. Before installing pump on engine, check for free operation.

MODEL IDENTIFICATION

Mdl	Model Designation
Hudson Hornet	35780
Nash Ambassador	5780

SERIAL NUMBER: Stamped on plate attached to center of dash under hood

Starting Serial No. - V-16501 (Amb. V8), Y-10501 (Hornet V8).

ENGINE NUMBER: Stamped in block at lower right front corner of engine

Starting Engine No. - N-1001 (Amb. & Hornet V8).

TUNE-UP

COMPRESSION PRESSURE: 140 lbs min at cranking speed of 315 RPM, throttle wide open

VACUUM READING: 18-21" at idling speed

VALVE TAPPET CLEARANCE: None in service (hydraulic)

MANIFOLD HEAT CONTROL: Automatic thermostatic type Located between left bank exhaust manifold and exhaust cross-over pipe (exhaust gases diverted through heat passages in manifold when valve closed)

IGNITION

FIRING ORDER: 1–8–4–3–6–5–7–2

Cylinders - RIGHT BANK 2–4–6–8 LEFT BANK 1–3–5–7

SPARK PLUG GAP: 035"

Spark Plug - Auto-Lite AL-7 or Champion H-10 14 mm Torque to 30 ft lbs

COIL: Delco-Remy 1115087.

Resistor - Delco-Remy 1927809. 1.4-1.65 Ohms.

►*COIL RESISTOR NOTE* Connected in series between battery and coil Resistor is by-passed during cranking by solenoid or magnetic starter switch, making direct lead from battery to coil

DISTRIBUTOR: Delco-Remy 1110887. 12 Volt "Window Type" with external adjustment. *See "Delco-Remy Window Distributor in Electrical Section*

Condenser - Delco-Remy 1932004. **Capacity** .18-.23 mfd.

Contact Point Set - Delco-Remy 1931988.

Breaker Gap - 016"

Cam Angle - 28-32° (set to 30°)

►*BREAKER GAP AND CAM ANGLE NOTE* Setting cam angle at 30° will provide 016" breaker gap

Breaker Arm Spring Tension - 19-23 ozs

Rotation - Counter-clockwise viewed from above

Automatic Advance

Degrees	Distr	RPM	Degrees	Eng	RPM
Start		350	0-4		700
7 5 9 5		775	15-19		1550
12-14		1300	24-28		2600
17-19		1900	34-38		3800

Vacuum Spark Control: Delco-Remy 1116117

Vacuum Advance

Distr Degrees	Eng Degrees	Vacuum (" of Hg)
Start	0	5-7
10	20	14 25-15 75

IGNITION TIMING

Setting - 5° BTDC *NOTE* - 10° BTDC optional with Automatic Transmission or where local fuel octane permits

Timing Mark - Timing indicator on front cover and 5° mark on vibration damper

CARBURETOR

CARTER WCFB 2593S, SA

►*VAPOR LOCK OR LOW PRESSURE CORRECTION (Early Cars)* Carburetor-to-fuel tank return tube elbow, Part No 3152259, on some cars prior to Car Serial Number V-18114 (Nash), Y-11786 (Hudson) did not conform to specifications Affected part must have No 65 drill (.034-.036") diameter hole drilled from male end to provide a correct metered opening If hole not drilled through, vapor lock may result If drilled to 3/16", low fuel pressure may result To correct, install new fitting, Part No 3152259, with correct .034-.036" restriction

►*ROUGH ENGINE IDLE* May be caused by air leak in left primary throttle bore *See 'Carter WCFB Carburetors" in Carburetion Section*

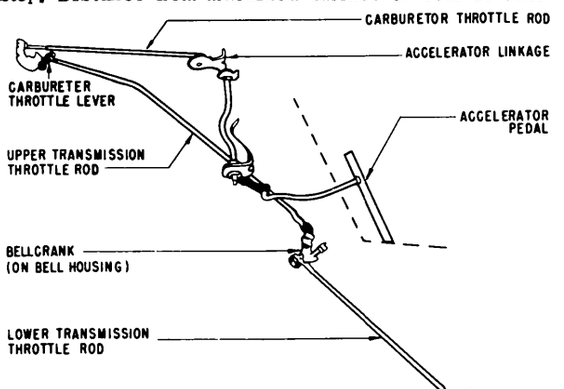
►*MANIFOLD FUEL DISTRIBUTION Carburetor RIGHT barrels feed Cyl 2–3–5–8, LEFT barrels Cyl 1–4–6–7*

Idle Setting - ¼-1¼ turns open Turn screws out for richer mixture

Idle Speed - 550 RPM (Std & O D), 425 RPM (Auto Trans in Neutral), 475 RPM (Auto Trans & A C "ON")

THROTTLE LINKAGE ADJUSTMENT (HYDRA-MATIC CARS): Make adjustments in the following order

1) - Disconnect throttle valve rod from throttle valve lever on transmission case, disconnect vent pipe at lower left of case. Hold throttle lever to rear against stop. Distance from machined surface on rear of case



1957 HUDSON & NASH AMBASSADOR THROTTLE LINKAGE

to center of pin on throttle lever should be 5 9/16". Bend lever to correct position.

2) - Measure length of lower throttle valve rod from center of lower hole to outer surface of upper end. Length should be 16 1/8" (plus 0", minus 1/32"). Adjust by bending rod.

3) - Set carburetor throttle at slow idle (closed throttle). Adjust upper throttle rod at carburetor throttle rod bracket so that rod enters hole in bracket freely, then lengthen rod by turning adjusting end one full turn to left, tighten locknut and connect rod.

►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetors" in Carburetion Section*

FUEL PUMP PRESSURE: 4-5½ lbs Max

CARB. EQUIPMENT

Fuel Pump: Fuel and vacuum Carter No M2433SA, Nash No 3152318

Pressure - 4-5½ lbs maximum

See "Fuel Pumps" in Carburetion Section

Gasoline Gauge: Stewart Warner (Hudson) or Auto-Lite (Nash) Electric type

Dash Unit - Hudson No 3119655 (Stewart Warner No 441168) Nash No 3200136 (Auto Lite No 14420A)

Tank Unit - Hudson & Nash No 3146814 (Auto-Lite No 14165A)

See "Fuel Gauges" in Carburetion Section

BATTERY

Auto-Lite 11-HS-60 12 Volt 11 plate 60 ampere hour capacity (20 hour rate)

Battery Ground - Negative

Engine Ground - Transmission case to rear engine crossmember

STARTER

Delco-Remy 1107648 Armature 1926626

Drive - Overrunning clutch (solenoid pinion shift)

Rotation - Counterclockwise at commutator end

Brush Spring Tension - 35 ozs

Performance Data

Torque	RPM	Volts	Amperes
0 ft lbs	6900	10 3	75
10 5 ft lbs	Lock	5 8	435

Starter Switch: Delco Remy No 1119760 solenoid switch, located on starter, actuated by combination ignition and starter switch (Std and Overdrive cars) by Delco Remy No 1996085 Switch operated by raising shift lever upward in "P" or "N" positions (Hydra Matic)

GENERATOR

Delco-Remy 1102018 (Std), 1102070 (Air Cond Cars).

Armature - Delco Remy 1923535 (1102018 Gen) 1932900 (1102070 Gen)

Performance Data

Generator	Amperes	Volts	RPM
1102018	30	14 0	2210
1102070	35	14 0	2510

Rotation - Counterclockwise at commutator end

Brush Spring Tension - 28 ozs

Field Current - 1 48 1 62 amperes (1102018) 1 69 1 79 amperes (1102070) 12 volts at 80°F

Belt Adjustment: ½" deflection with 25 lbs pressure applied midway between fan and generator pulleys

REGULATOR

Delco-Remy 1119003 (1102018 Gen), 1119168 (1102070 Gen) *NOTE - Specifications are "Normal" settings*

Cut-Out Relay

Cuts-In 11 8 13 5 volts

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C ntact Gap - .020".
Air Gap - .020" with contacts just closed.

Voltage Regulator

Setting - 13.8-14 8 volts (Hot).
Air Gap - .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section.*

Current Regulator

Setting (1119003) - 27-33 amperes (Hot)
Setting (1119168) - 32-37 amperes (Hot)
Air Gap - 075" with armature pressed down to point where contacts just touch.
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Hudson - Sealed Beam.
Nash - 4-Headlight System Std. *See "4-Headlights" in Electrical Section.*
Directional Signals: *See Electrical Section.*
Light Switch Removal: Disconnect battery. With switch in "OFF" position, press release on top of light switch assembly, and pull knob and shaft clear of switch. Remove slotted nut, pull switch out to rear of instrument panel.
Stop Light Switch: Located in tee fitting in line to left front brake.
FUSES: Dome, Map, Glove Box Lights - 7 5 amperes. On back of light switch.
Overdrive - 15 amperes. On overdrive relay under hood.
CIRCUIT BREAKERS: Headlights (Hudson) 12 amperes, (Nash) 18 amperes. In Light Switch.
Park, Tail, License, & Instrument Lights - 12 amperes. In Light Switch.
Stop & Directional Lights - 30 ampere. Auxiliary Circuit Breaker on dash behind instrument panel.
Horn Relay: Nash No. 3145684.

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Section.*

► *1957 EXHAUST RUMBLE CORRECTION:* On cars prior to Serial No. Y-11460 (Hudson), V-17650 (Nash), reversed front tail pipe supports may cause an exhaust rumble. Correct by installing both supports with fabric side toward **front** of car.

ENGINE SPECIFICATIONS: Own V8. Valve in head.

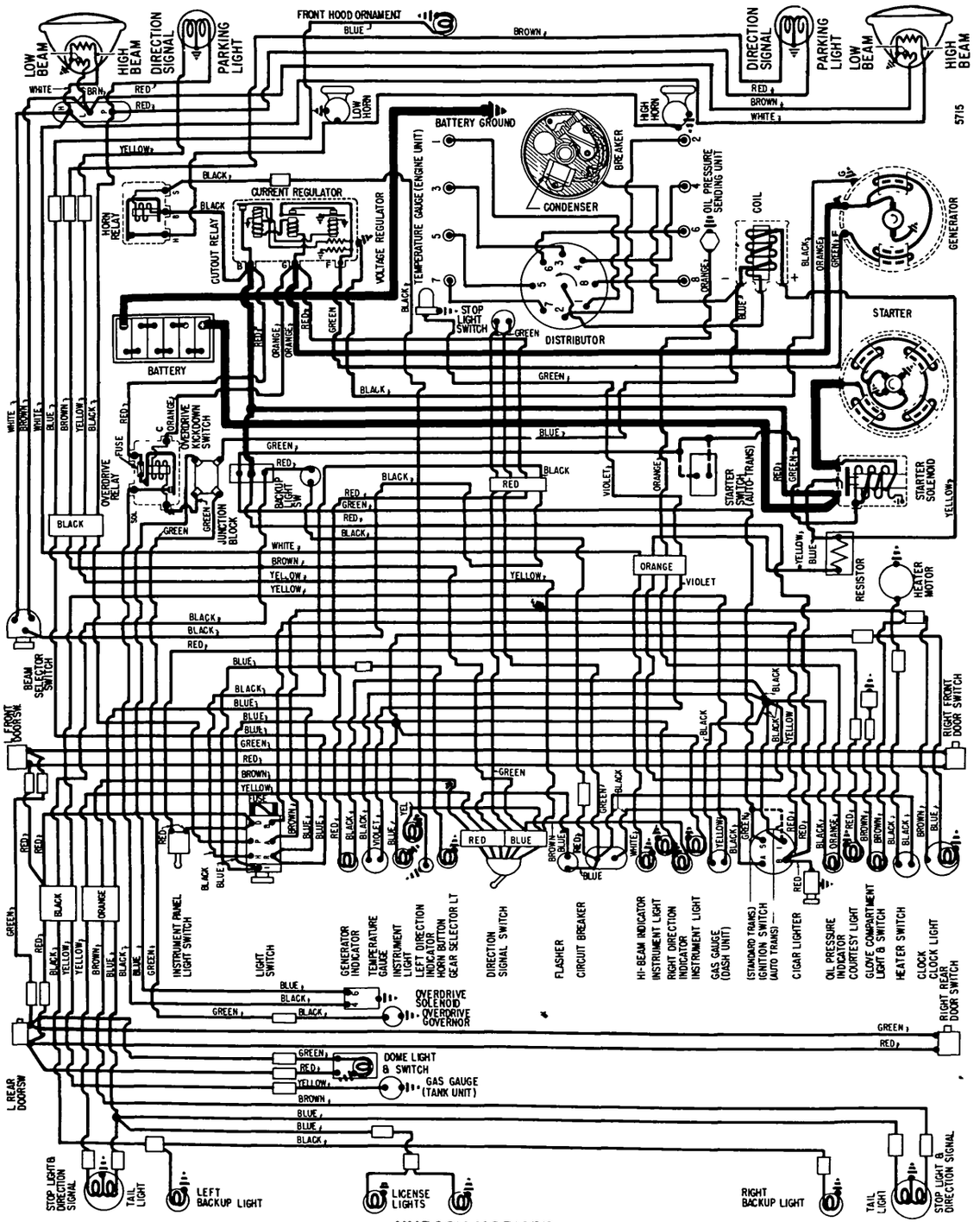
Bore	Stroke	Displacement
4"	3¼"	327 Cu. Ins.
Compression Ratio	**Rated HP**	**Developed HP**
9 00-1	51 2	255 at 4700 RPM

Compression & Vacuum Reading - *See TUNE-UP.*

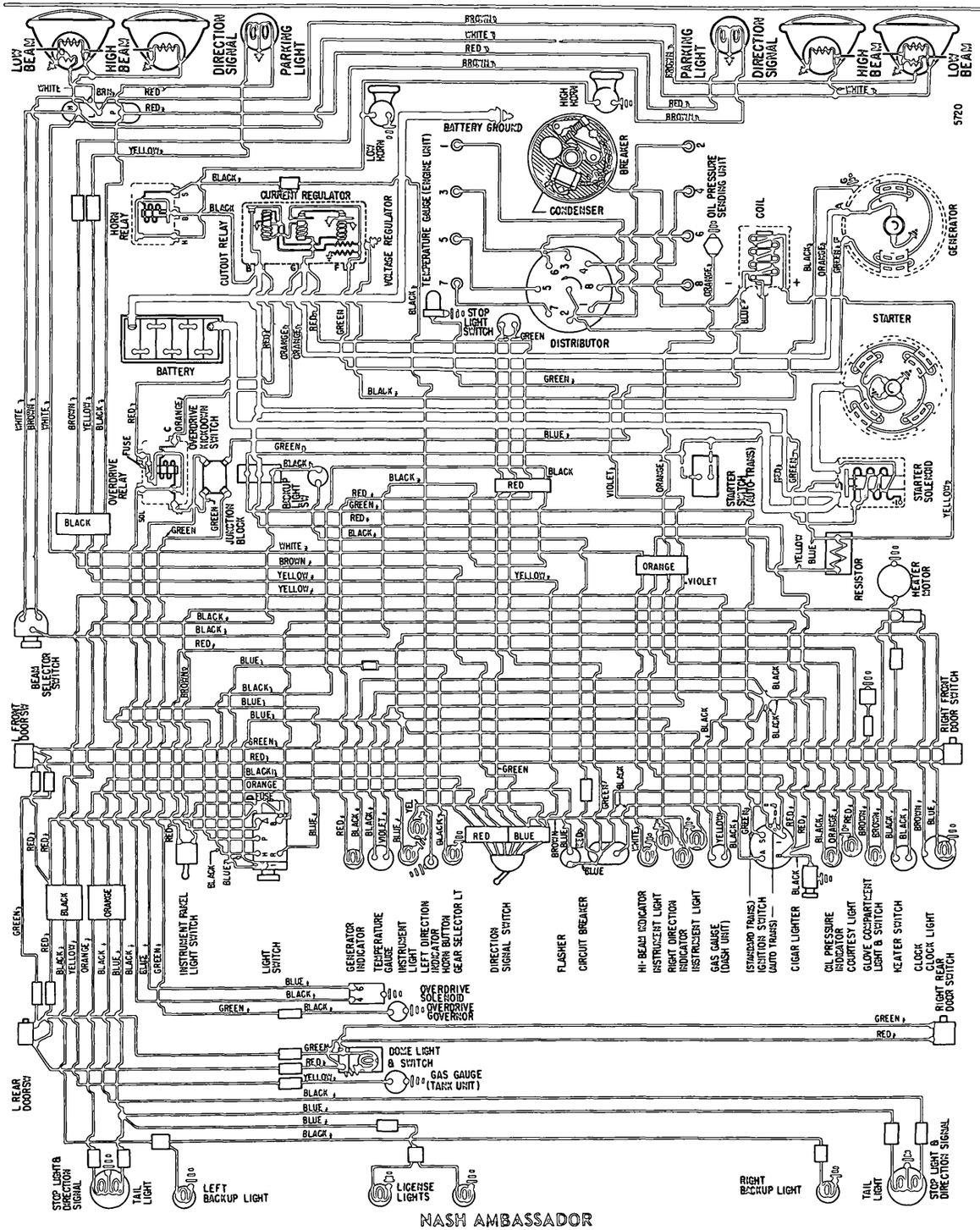
CYLINDER HEAD INSTALLATION: *S "Cylinder Head & Manifolds" in Nash Special Data.*

TIGHTENING TORQUES: *See "Tightening Specificati ns" in Nash Sp cial Data.*

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HUDSON HORNET



NASH AMBASSADOR

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PISTONS

Aluminum alloy, slipper type, tapered skirt, cam ground with steel reinforcement. Piston pin offset toward thrust side of piston.

Weight - 23 45 ozs.

Removal - Piston and rods removed from above.

Clearance . 0009- 0025" (Skirt Top), 0009- 0015" (Skirt Bottom)

Replacement of Pistons: Std., .002", .005", .010", .020", .030", .040" Oversize.

Installing Pistons: Install with "F" cast in piston strut and notch in piston head toward front of engine.

PISTON PINS

Press fit in connecting rod. No locking device.

Diameter - 9307". Length - 3 1870"

Pin Fit in Piston – Palm press fit at room temperature.

Pin Removal & Installation – *See "Piston Pins" in Nash Special Data.*

Replacement Pins: Std., .003", .005" Oversize.

PISTON RINGS

Three rings (two compression & one oil) used. Upper ring is chrome plated. Oil control ring is three piece type (two oil control wiper rails with a segmented steel spacer between them).

Ring	Width	End Gap	Side Clearance
Compr. #1	.0778"	010- 020"	002 - 006"
Compr #2	0778"	010- 020"	002 006"
Oil #3	0245"	015- 055"	0001- 0079"

Replacement Rings: Sets of Std., 020" & 030" oversize.

Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

Crankpin Journal Diameter – 2.2483-2.2490".

Length - 6 3750" center-to-center Weight - 27 6 ozs

Lower Bearing – Precision, steel-backed, babbitt.

Clearance – .0007-.0028". Side Clearance –.004-.012"

Replacement Bearings: Std., .001", .002", .010", .012" Undersize

Installing Rods: Assemble connecting rod with notch in piston and connecting rod identification mark to front of engine. Cylinder numbers on connecting rod should be toward outside of bank in which they are installed.

CRANKSHAFT

Journal Diameter – 2.4983" - 2.4990". Five bearings.

Bearings – Precision, steel-backed, babbitt.

Clearance – .0006"-.0032".

Replacement Bearings: Std., .001", .002", .010", .012" Undersize.

End Thrust: Taken by No. 1 flanged bearing.

Endplay – .003-.007".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Nash Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Nash Special Data.*

VIBRATION DAMPER REMOVAL & INSTALLATION: *See "Vibration Damper" in Nash Special Data*

CAMSHAFT

▷ *1957 CAMSHAFT REPLACEMENT CAUTION:* Camshafts designed for use with mechanical lifters not

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interchangeable with those designed for hydraulic lifters. Mechanical lifter shafts identified by white paint on area ahead of oil pump and distributor drive gear. Hydraulic lifter shafts have no identifying marks.

Bearings - Five, steel-backed, babbitt lined bushings pressed in block and line reamed.

Clearance - .001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket.

End Play - .003-.006".

Timing Chain: Morse non-adjustable type. **Width** .875", **Pitch** .375", **Length** 23¼" or 62 links.

Camshaft Setting: Both sprockets marked "O". Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers. To check assembly, rotate crankshaft until timing mark on camshaft sprocket is on horizontal line at either 3 or 9 o'clock position. There should be 10 links or 20 pins between timing marks.

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Nash Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Nash Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Nash Special Data.*

VALVES

Tappet Clearance – None in service (Hydraulic).

Valve	Head Diameter	Stem Diameter
Intake	1.787"	.3412-.3417"
Exhaust	1.406"	.3407-.3412"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30° ①	.375"	.0013-.0028"
Exhaust	45° ②	.375"	.0018-.0033"

Valve Seat Width – .078-.093" (Intake), .093-.104" (Exhaust).

Valve Stem Seals – Rubber deflector installed on valve stem and over top of guide on all valves.

Valve Springs: Install springs with closed coil end against cylinder head. **Free Length** - 2.20".

Valve Spring Specifications

Valves	Spring Pressure	Spring Length
Closed	85 - 91 lbs.	1 13/16"
Open	150 -160 lbs.	1 7/16"

Valve Guides: Drive old guides out, drive new guides in to height of ¾" ± 1/64" above cylinder head (measure from top of guide to flat machined surface of lower spring retainer on head). Ream all guides to I.D. of .3430-.3440" after installation.

Valve Lifters: Hydraulic type.

Hydraulic Valve Lifter Removal, Overhaul & Testing – *See "Valve System" in Nash Special Data.*

Rocker Arm Assembly: *See "Valve System" in Nash Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 12°30' BTDC. Close 51°30' ALDC.

Exhaust Valves– Open 53°30' BLDC. Close 10°30' ATDC.

Valve Timing Check: Remove valve compartment cover and spark plugs. Crank engine until #6 piston in right bank is on TDC of compression stroke (#1 piston will be on TDC of exhaust stroke in overlap position). Rotate crankshaft 90° counter-clockwise. Install dial indicator on #1 intake rocker arm pushrod end. Crank engine in a clockwise direction until dial indicator dicates pushrod movement, (hydraulic lifter should be fully charged for this check). At time indicator moves, ignition timing pointer on front cover should align with a point approximately 25/32" before TDC position on vibration damper. *NOTE* – If more than ½" variance in either direction, remove timing chain cover and inspect installation. Replace if deflection exceeds 1/2".

OILING SYSTEM

Crankcase Capacity: 5 qts. refill, 1 qt. addt'l with filter change.

Normal Oil Pressure: 10 lbs. minimum at 600 RPM.

Pressure Regulator - In oil pump. Opens at 55-60 lbs. Not adjustable.

Oil Pressure Indicator: Light on instrument panel goes on when ignition switch is turned on, goes out as oil pressure reaches pressure of gauge. Sending unit Nash No. 3142826 (6½ lbs.) or No. 3200422 (4 lbs.), located on left rear side of engine block.

Oil Pump: Gear type. Mounted on rear main bearing cap and driven by distributor drive shaft. *NOTE* - Removal of oil pump does not disturb ignition timing.

Oil Pump Removal, Overhaul & Installation - *See "Oiling System" in Nash Special Data.*

Oil Filter: Partial Flow type. Replace element every 4000 miles or sooner as needed.

Replacement Filter Element - Nash No. 8990346, or No. 8990050.

Crankcase Ventilation: Filter element in oil filler cap (air inlet) and outlet pipe in valve tappet cover.

COOLING

Water Capacity: 19 quarts, add 1 quart for heater.

Pressure Valve: Radiator filler cap. 7 lbs. (Std.) 13 lbs. (Air Cond.).

Thermostat: Choke type. Nash No. 3132708 (150°), No. 3131817 (167°-173°). *NOTE* - No. 3131985 (177°-182°) for use with permanent anti-freeze only.

Water Pump: Centrifugal, double row ball bearing type. Requires no lubrication. Serviced as an assembly. *See "Nash & Hudson V8" in Water Pump Section.*

Temperature Gauge: Stewart Warner (Hudson) or Auto-Lite (Nash). Electric type.

Dash Unit - Hudson No. 3119681, Nash No. 3119504 (Auto-Lite No. 14158A).

Engine Unit - Hudson & Nash, No. 3144585 (Auto-Lite No. 13550A).

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 10.5A6. Assy. No. 361442 (Std.), No. 361449 (Heavy Duty). Single plate.

See "Borg & Beck" in Clutch Section.

Clutch Disc No. - Borg & Beck No. 382574. Nash No. 3150449.

Pedal Adjustment: Pedal free travel ½-¾". Adjust by loosening locknut and turning adjusting nut on control link at clutch fork. *CAUTION - The pedal to beam rod should never be disturbed in service.* With pedal against floor board, outer end of beam lever should project 5/16" forward of the rear edge of beam bracket to provide proper leverage.

Removal: Remove transmission (see below), disconnect clutch pedal linkage, remove clutch housing and pan. Punch mark flywheel clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner. Three speed, helical gear type.

See "Warner Transmissions" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect hydraulic brake tube bracket on underside of body, torque tube at rear of transmission, hand brake cable and housing, speedometer cable, and shifter rods. Disconnect overdrive control cable and electrical control wires from solenoid and governor where so equipped. Move rear axle to rear to separate universal joint. Remove two upper transmission-to-bell housing bolts and install special guide pins (Tool J-1434) in their place. Remove lower bolts, slide transmission out.

OVERDRIVE

Warner R10. *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Control: *See "Warner R10 & R11 Overdrive Control" in Transmission Section.*

HYDRA-MATIC DRIVE

"Flashaway" Hydra-Matic. New four speed, hydraulically controlled transmission with two fluid couplings. *See "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

Lubrication – Check fluid every 1,000 miles. Drain and refill every 25,000 miles (remove oil pan and clean oil screen). Use Automatic Transmission Fluid type "A" ("AQ-ATF").

Checking Fluid Level – Bring transmission to normal operating temperature. Idle engine to 425 RPM, with selector lever in "P" (Park) position, with car on level floor. Remove fluid level indicator, wipe clean, reinsert it, then remove it again and note reading.

Throttle Linkage Adjustment: *See CARBURETOR above.*

► *OTHER HYDRA-MATIC SERVICE DATA: See "Dual-Coupling Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Detroit or Mechanics. One universal used at front end of propeller shaft.

REAR AXLE

Spicer. Semifloating, hypoid gear with torque tube drive. *See "Spicer Hypoid" in Rear Axle Section.*

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Axle Ratios - Std. & Overdrive 4 1-1 (10-41), **Hydra-Matic** 3 2-1 (13-41)
Backlash – .002-.006".

Axle Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims, and replace same amount when reassembling). Withdraw shaft using Puller J-2498; do not drag on inner seal.

Rear Axle Assembly Removal: Raise and support rear end of car. Disconnect rear brake cables at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at axle end (let hang from body). Roll axle free.

Wheel Bearing Adjustment: Shims behind brake backing plate. *NOTE* – Adjust axle shaft end play on **Right Hand Side Only.**

Rear Suspension: *See "Nash" in Suspensions & Wheel Alignment Section.*

SHOCK ABSORBERS

Manufacturer. Direct acting type. Service by replacement.
Front - Nash No. 3200285. **Rear** - Nash No. 3119751.

FRONT SUSPENSION

Independent. With coil springs located between upper ends of steering knuckle pin and seat in outer wheelhouse panel.
See "Nash" in Suspensions & Wheel Alignment Section.
King Pin Inclination – 3°36' (Hudson), 6½° (Nash).
Caster – (Std.) ½° Pos. desired. Limits 0-½° Pos. **(Power Steering)** 1° desired. Limits ½° - 1° Pos.
Camber – 0° desired. Limits ¼° Neg. to ¼° Pos.
Toe-In – 1/16" to 3/16". *CAUTION* – When adjusting toe-in on Power Steering Cars, operate engine so that pump will supply oil pressure to center spool in power cylinder valve.
Toe-Out on Turns - (Std.) Outer wheel 20¼°, inner wheel 25° **(Power Steering)** Outer wheel 21¾°, inner wheel 25°

STEERING

Manual: Gemmer Model 305. Worm & Roller with "push-pull" adjustment.
See "Gemmer Steering Gears" in Steering Section.
Power Steering: Monroe Power Guide. Linkage type.
See "Monroe Power Guide" in Steering Section.
Steering Linkage: *See "Steering Linkage" in Steering Section.*
Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*
Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix Hydraulic, Single Anchor. Hand lever applies rear wheel service brakes.
See "Bendix Hydraulic, Single Anchor" in Brake Sect.
Drums – Diameter 10". (Front and Rear).
Wheel Cylinder Diameter – 1 1/8"(Front), 7/8" (Rear).
Replacement Lining & Shoes: Linings and shoes with linings furnished standard size only.

Lining Width & Length

	Front Wheel	Rear Wheel
Primary Shoes	2" x 8 7/8"	1¾" x 8 7/16"
Secondary Shoes	2½" x 10 31/32"	1¾" x 10 25/32"

Clearance – .015" heel and toe of secondary shoe with primary shoe out against drum, or adjusting screw backed off 14 notches from point where wheel can just be turned by hand.
Standard Master Cylinder: Mounted on support under floor pan.
Checking Fluid – Roll back floor mat, remove access cover. Maintain fluid level ½ - 1" below top of filler opening.
Removal – Remove from below without disturbing other units.
Power Brakes: Bendix Power Unit, Hydraulic Reaction Type. Replaces standard master cylinder.
See "Bendix Power Unit" in Brake Section.
Checking Fluid -Same as for standard master cylinder.
Removal - Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit.
See "Nash-Hudson Air Conditioning" in Misc. Sect.

Window Regulators: Electric with reversible motor. *See "Nash Window Regulators" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs
Cylinder Head	60-70
Intake Manifold (Bolts & Nuts)	25-35
Exhaust Manifold (Bolts & Nuts)	19-25
Oil Pan	9-11
Main Bearing Caps (except Rear)	100
Main Bearing Caps (Rear)	140
Flywheel	85-95
Crankshaft Pulley	100
Con Rod Caps	45-50
Camshaft Sprocket & Pump Eccentric	15-20
Rocker Arm Support Brackets	14-17
Engine Front Cover (3 8" & 7/16" Bolts)	30-35
Oil Pump Mounting	10-15
Oil Filter to Cylinder Block	30-35
Oil Filter to Housing Base	40-45
Flywheel Lower Housing	50-55
Transmission Mounting	60-70

OIL PAN

OIL PAN REMOVAL: Remove starter and exhaust cross-over pipe Disconnect idler arm from frame and drop steering relay rod Remove oil pan cap-screws and withdraw pan.

Installation. Cement new cork gaskets to pan, assemble front and rear synthetic seals to pan Place coat of graphite grease on exposed surface of seals to insure that seal maintain their proper position in pan and do not nang up on front cover and main bearing sealing surfaces during oil pan installation

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD REMOVAL: Drain radiator and cylinder block Remove intake manifold and generator, disconnect exhaust pipes Remove valve cover and rocker arm shaft assembly Rock rods to break oil seal between rod and lifter seat to avoid pulling lifter from bore, remove pushrods, then remove remaining cylinder head bolts Remove cylinder head with exhaust manifold attached

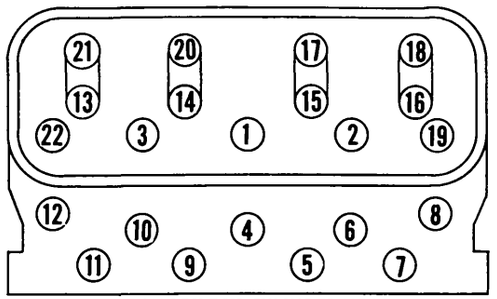
CYLINDER HEAD INSTALLATION: Rocker shaft bracket bolts (Nos 13, 14, 15, 16 in illustration) should be tightened in sequence and as part of cylinder head installation as follows With head in place and all bolts finger-tight, tighten all cylinder head attaching bolts (excluding 13, 14, 15, 16) to 50-60 ft lbs and tighten rocker shaft bracket attaching bolts (Nos 13, 14, 15, 16) to 14-17 ft lbs in sequence shown in head diagram Then retighten all cylinder head attaching bolts (excluding 13, 14, 15, 16) to 60-70 ft lbs in sequence shown

Intake Manifold Installation - After head installed, install manifold with new graphite coated metal gaskets and apply Permatex No 3 or equivalent sealer around gasket water holes Dip threads of intake manifold in C P No 9 sealer, tighten bolts to 25-35 ft lbs torque in sequence shown in diagram

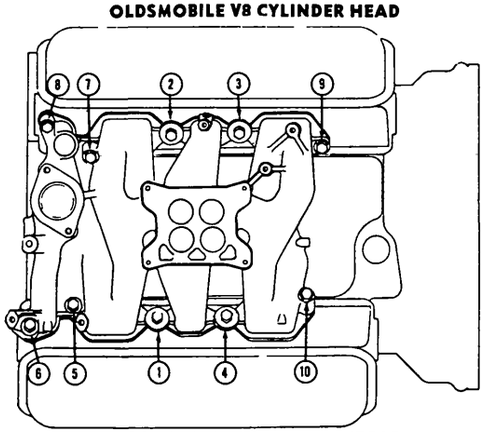
CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING OIL SEAL: Asbestos covered wiper seal installed in rear groove in bearing cap and block (oil slinger operates in front groove)

Oil Seal Installation - With crankshaft out of engine and bearing cap off use new seal coated with graphite grease, crowd seal by hand into rear groove in



OLDSMOBILE V8 CYLINDER HEAD



OLDSMOBILE INTAKE MANIFOLD

cap and block Drive seal tightly into place by tapping Tool 23-14 with a hammer With tool resting on seal cut ends flush with parting line between upper and lower bearing Ends of seal must be cut clean so no frayed ends will be clamped between block and cap Seal must entirely fill groove

ENGINE FRONT COVER

ENGINE FRONT COVER (Removal) · Disconnect lower radiator hose and heater hose from front cover and disconnect generator link at generator Remove oil pan and remove the two bolts attaching front engine mount to frame Support engine with Special Tool BT-29 (engine must clear front cross member) Remove radiator assembly, fan blades and pulley and crankshaft pulley Remove fuel and vacuum pump assembly Remove front cover attaching bolts and front cover Reverse removal sequence to install cover, using a new gasket coated on one side with gasket cement Lubricate sealing surface of front oil seal and fuel pump operating arm Dip attaching cover bolts in POB No 3 sealer

Engine Front Cover Oil Seal (Crankshaft Front Oil Seal) Replacement. *(NOTE—Front cover oil seal can be replaced without removing front cover by using Tool J-4176)* Remove crankshaft pulley and replace large capscrew in crankshaft end Place fingers of Tool J-4176 over end of crankshaft and turn tool fingers so that hooks will pass through clearance between crankshaft end and inner diameter of front oil seal, (some light taps on tool center screw will force fingers behind rubber ring of oil seal) Use an end wrench on fixed nuts below puller plate and rotate each finger outward 90° to engage the finger hooks with ring of oil seal, then tighten nuts on upper plate for puller to hold fingers in position Rotate puller center screw against crankshaft screw and remove seal

Installation—Use Tool J-4177 to replace seal in cover by first placing seal in cover and then assembling adapter ring and driver so slot in driver will clear crankshaft key Drive seal into place until adapter bottoms on cover face

VALVE SYSTEM

ROCKER ARMS

ROCKER ARM SHAFT ASSEMBLIES: Identical hollow steel shafts used (end plugged). Six brackets used on each shaft as follows One type used for RH Front or LH Rear, one type for LH Front or RH Rear, one type for pin hole, and one type for all other positions. Drive pin is flush with top of bracket Rocker arms are all one type.

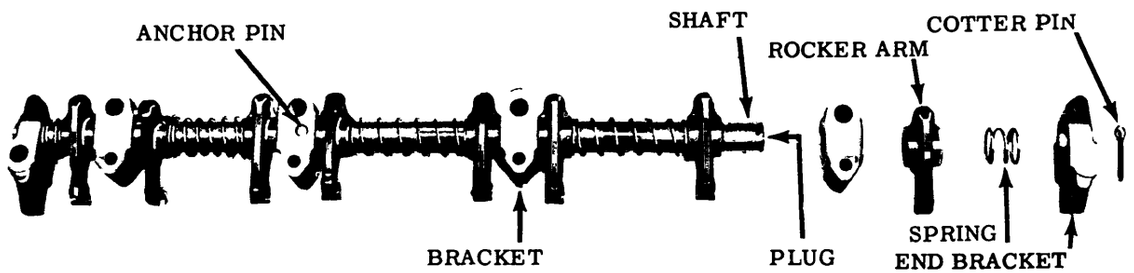
Disassembly: Remove cotter pins from ends of shafts and remove brackets, springs, and arms. *NOTE* - If necessary to remove bracket that is pinned to shaft, drill hole in shaft end plug and pry plug out. Use drift in hollow shaft to drive out pin. Drive replacement plug in end of shaft until it seats against shoulder in shaft or approximately 9/16" in from end of shaft.

Reassembly: Reverse disassembly and follow diagram for position of each type of bracket in respect to cylinder head bolt holes and sequence of assembly.

HYDRAULIC LIFTERS

VALVE LIFTERS. Hydraulic, Barrel Type Consisting of plunger and valve assembly operating within a cylinder formed by valve lifter tappet body (See

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OLDSMOBILE ROCKER ARM ASSEMBLY

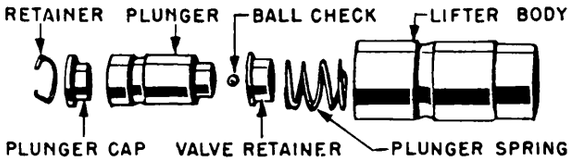
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illustration). Oil is introduced to this unit from main oil gallery through hole in side of lifter plunger and body

Removal: Remove intake manifold, cylinder block cover, valve covers, rocker arm shaft assemblies, push rods and valve lifters

►*CAUTION*—Valve lifters must be installed in same bores from which they were removed

Disassembly: Remove plunger retainer with Lock Spring Tool BT-31. Remove push rod seat, plunger, ball check valve, ball retainer and spring. If plunger is stuck tight, allow lifter to soak in "D-Carb" solvent for approximately five minutes. Tool 23-16 may be used if plunger does not fall out.



OLDSMOBILE HYDRAULIC VALVE LIFTER

Cleaning & Inspection: Wash all parts in a suitable cargon solvent and remove all trace of carbon and varnish Inspect plunger and lifter body for scoring or other damage that would prevent free movement Inspect lower end of lifter body for nicks or indentations If any exist, replace complete lifter assembly Dry lifter parts with air, then install plunger in lifter body without other parts and check for free movement Plunger should drop of own weight into body bore

Reassembly: *(NOTE—Body and plunger are selectively fit and must not be interchanged, or replaced individually).* Place plunger over push rod seat and then turn plunger over holding push rod seat in place, and install ball on its seat in plunger Place ball check valve retainer over ball and then place valve retainer spring over retainer Carefully assemble valve lifter body over complete assembly Turn assembly over and while holding push rod seat down, install retaining lock spring, using Tool BT-31

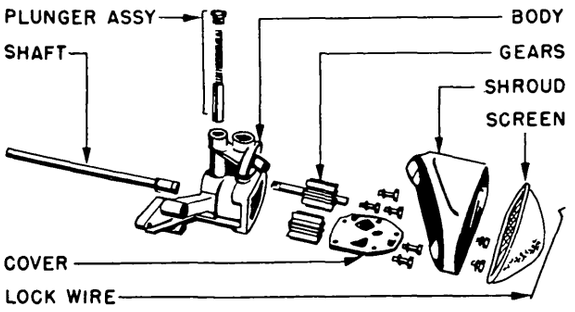
Identification Note—It is important when replacing lifters that the correct oversize lifter be used An identification number is etched on all lifter bodies except standard Lifters are furnished in Std., size and the following oversizes .001", .002", .003", .005". The cylinder block is marked 1, 2, 3, or 5 for lifter size on rail under engine top cover

OILING SYSTEM

OIL PUMP

OIL PUMP: Removal & Disassembly—Remove oil pan, then remove pump Remove oil screen lock wire and screen, and oil screen shroud Remove extension shaft and coupling by removing lower snap ring from coupling Remove oil pump cover, oil pump gears and pressure regulator nut, spring and valve

Reassembly & Installation: Reverse removal & disassembly procedures outlined above



OLDSMOBILE OIL PUMP

COOLING

►*LOSS OF COOLANT & HEATING CORRECTIONS:* When check of thermostat, water pump and hoses, Ranco valve, does not reveal cause for poor heater operation, loss of coolant or for engine overheating, look for restrictions (core flashing) in engine front cover at the following locations:

1) When heater operation is unsatisfactory, remove heater hose from cover connection and look for restriction at cover connection, and if found remove with long bladed screwdriver.

2) Loss of coolant and overheating can be caused by similar restriction in cover where water from pump passes into right cylinder block. This type restriction will cause water to back up in radiator upper tank when engine is decelerated quickly. Remove restriction as described in item #1.

NOTE - When restriction is too heavy to break out, replace engine front cover.

PROPELLER SHAFT NOTES

►*DRIVE LINE VIBRATION CORRECTION (Saginaw Universal Joint):* To correct this vibration, check for condition and position of bearing retaining straps, which hold bearing during shipment and which fit into groove in companion flange when universal joint is assembled. Broken or damaged straps should be removed completely. File strap flush with end of companion flange groove should it extend beyond groove. *NOTE* - New specification for drive shaft "U" bolt torque is 14-18 ft. lbs.

PROPELLER SHAFT: Shaft assembly consists of two sections, a center bearing support, and three universal joints. The rear propeller shaft or center support can be removed independently of the front shaft. Whenever it is necessary to remove the front shaft, the complete shaft assembly must be removed.

►*CAUTION:* When removing center bearing support, scribe a line from center of support to frame member attaching bolts on frame member to facilitate lateral alignment on reassembly. Keep shims grouped so they can be reinstalled in same location.

PROPELLER SHAFT ALIGNMENT: Shaft aligned vertically and laterally as follows:

Vertical Alignment: Position Aligning Gauge 6514 against right side flange of transmission oil pan (Hydra-Matic), or right side of engine oil pan (Synchro-mesh) so the contact surfaces of gauge seat squarely against pan with level adjusting screw toward front of car. Adjust leveling bubble until bubble is centered in gauge level. Position gauge against front propeller shaft so contact surfaces of gauge seat squarely against bottom side of propeller shaft with level adjusting screw toward front of car. If bubble is not within 1/16" from center of level, it will be necessary to align the front propeller shaft as follows: Scribe a line from center of support to frame member attaching bolts on frame member to facilitate lateral alignment on reassembly. Add or subtract shims between frame member and support as required (see "Shim Part Numbers" below) until bubble in gauge level is centered (or within 1/16" from center of level).

Shim Part Numbers		
Size	Convertibles	Other Models
.060"	570380	570378
.120"	570053	570052
.180"	570381	570379

►*NOTE: A .060" shim will change level bubble approximately one graduation of level.*

Lateral Alignment: Attach three plumb lines using string 18" to 24" long to underside of car in such a position that the strings touch side of propeller shaft. Position one string at front of front propeller shaft, between front weld and balance weights. Put second string at rear of front shaft ahead of center bearing, between the end weld and balance weights, and the third plumb line at rear of rear shaft in a similar position. Sight along the three plumb lines. If center line does not line up with front and rear strings, loosen support-to-frame member bolts and slide center bearing assembly laterally in the elongated holes until alignment is obtained. Tighten bolts to 45-55 ft. lbs.

CENTER BEARING OVERHAUL: Disassembly - Pry crimped area of slip yoke nut retainer away from nut, unscrew nut, pull propeller shafts apart and remove nut retainer and rear slinger. Remove center bearing support assembly with Puller TR-278-R and Adapter TR-278-R-2. Remove bearing retainer-to-mounting plate bolts and separate parts

Reassembly - Assemble center bearing support assembly. Apply a bead of No. 4 cup grease around dished area of front slinger and Permatex #2 between bearing retainer and mounting plate. *(NOTE* - High side of mounting plate must be on right side and bearing retainer must face rearward on car) Place bearing assembly over front shaft, install and tighten slip yoke nut to force assembly into place. Remove slip yoke nut. Apply 1 oz. special lubricant (Part No. 571035) to splines of propeller shaft Place rear slinger against center bearing on front shaft and nut retainer on front shaft with tang in slot and cupped side rearward. Align slip yoke index clip with wide serration in front shaft and install yoke. Tighten slip yoke, crimp nut retainer against nut. Align propeller shaft assembly (see above)

MODEL IDENTIFICATION

SERIAL NUMBERS: On left body pillar post.
Starting Serial Number - 1001.

► *SERIAL NUMBER NOTE: Complete serial number (example 577M 1001) includes following identification data in sequence:*

Year	Series ①	Assy. Plant ②	Serial No.
57	7	M	1001

① - Series Designation: 7 - (88 Series).8 - (Super 88 Series) 9 - (98 Series).
② - See Assembly Plant Designation following.

Assembly Plant Designation

M - Lansing	**L** - Linden
A - Atlanta	**C** - South Gate
B - Framingham	**W** - Wilmington
K - Kansas City	**T** - Arlington

ENGINE NUMBER: Stamped on machined pad located on top of left hand cylinder bank of block between the center and rear exhaust manifold ports.
Starting Engine Number - A001001. *NOTE* - Export engines are identified by an "E" after the serial number.

TUNE-UP

COMPRESSION PRESSURE: 100 lbs. minimum at cranking speed. Reading on low cylinders should not be less than 80% of high cylinder.

VALVE TAPPET CLEARANCE: None in service (hydraulic lifters).

MANIFOLD HEAT CONTROL: Thermostatic coil type located on left side between exhaust manifold and exhaust pipe. Install with inner end of coil pointing toward spring pin.

IGNITION

FIRING ORDER: 1–8–7–3–6–5–4–2.
Cylinders - RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .030".
Spark Plugs - AC No. 44. 14mm. Torque to 23-28 ft. lbs

COIL: Delco-Remy 1115087.
Ignition Current - 2.0 amps. idling, 4.5 stopped.
Resistor - Delco-Remy 1928016. 1 40-1 62 ohms.

► *COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil. This resistor is by-passed during cranking by a lead from starter solenoid-to-coil.*

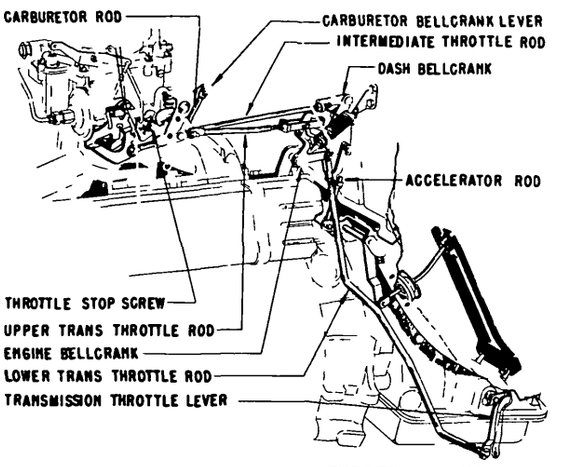
DISTRIBUTOR: Delco-Remy 1110883. "Window" type with external adjustments. *See "Delco-Remy (Window Type) Distributor" in Electrical Section*

► *CONTACT POINT REPLACEMENT CAUTION:* Mounting plate is slotted (old points can be removed by loosening screws and turning plate out) When installing new point set, center hole in mounting plate over dowel in distributor plate when tightening screws.

Condenser - Delco-Remy 1932004. **Capacity** .18-.23 mfd
Contact Point Set - Delco-Remy 1931988.
Breaker Gap - .016"
Cam Angle - 28-32° (set at 30°).

► *BREAKER GAP & CAM ANGLE NOTE.* Setting cam angle at 30° will provide 016" breaker gap.

Br ak r Arm Spring Tensi n - 19-23 ozs.
Rotation - Counter-clockwise viewed from above.



HYDRA-MATIC TRANSMISSION THROTTLE LINKAGE

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0-4		800
6.5-8.5		975	13-17		1950
8-10		1200	16-20		2400
11-13		2200	22-26		4400

Vacuum Spark Control: Delco-Remy 1116096
Plunger Travel - 7/32-15/64".

Vacuum Advance

Distr Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	4 5-6 5
10	20	15 25-16 0

IGNITION TIMING

Setting - 5° BTDC, with engine idling at 850 RPM and vacuum line to distributor disconnected and carburetor opening taped closed

► *DETONATION NOTE: If engine detonates (due to low octane fuel or carbon build-up) set timing to 2½° BTDC For high altitude operation, timing can be adjusted to 7½° BTDC, if detonation does not occur.*

Timing Mark (Early Cars) - Slot in rim of crankshaft balancer and pointer on front cover. Leading edge of slot is 5° BTDC. Trailing edge is TDC Midway between these points is 2½° BTDC

Timing Mark (Later Cars) - Three slots in rim of crankshaft balancer and pointer on front cover Center slot is 5° BTDC Facing rear of car, left hand slot is TDC. Right hand slot is 10° BTDC

CARBURETOR

► *CARBURETOR APPLICATION: Rochester 4GC 4-Barrel Std. on all Series, Rochester 2GC Triple Two-barrel Compound Installation Optl on J-2 Engines*

► *IDLE SPEED ADJUSTMENT NOTE: "Slow" idle speed adjustments can be made after Hydra-Matic Throttle Linkage Adjustment completed without affecting relationship between carburetor and transmission.*

Throttle Return Check Adjustment: With transmission in "N" (Neutral) and engine at normal operating temperature, set carburetor on fast idle and adjust to 1500 RPM. Flash the throttle and allow to return to slow idle, then turn off the ignition switch. Set carburetor on fast idle and check clearance between throttle return check plunger and throttle lever. Adjust to .020" using two wrenches so that diaphragm is not permitted to turn.

THROTTLE LINKAGE ADJUSTMENT (HYDRA-MATIC DRIVE CARS): Install Throttle Return Check Holding Tool J-6342 to hold plunger away from throttle lever. Proceed as follows:

1) Remove throttle rod from transmission throttle lever and move throttle lever to rear against its stop, and with Throttle Lever Gauge J-6344 placed flat against rear face of transmission case, rod on gauge should just enter hole in throttle lever. Adjust throttle lever by bending with Tool J-6373-01 (*NOTE* - This tool may be revised by cutting 5/8" from top of tool). Attach throttle rod to lever

2) Back out slow idle adjusting screw until carburetor throttle valves are completely closed. Remove clips from carburetor throttle lever and carburetor bellcrank lever (do not remove carburetor rod). Place Gauge No. 33-67 against rod with hole in gauge over pin on carburetor throttle lever With gauge held up against bellcrank pivot pin, the open end of the tool should fit over pin on bellcrank lever freely without rotation of the bellcrank. If pin does not enter hole freely, remove rod and place in a vise and increase or decrease the bend.

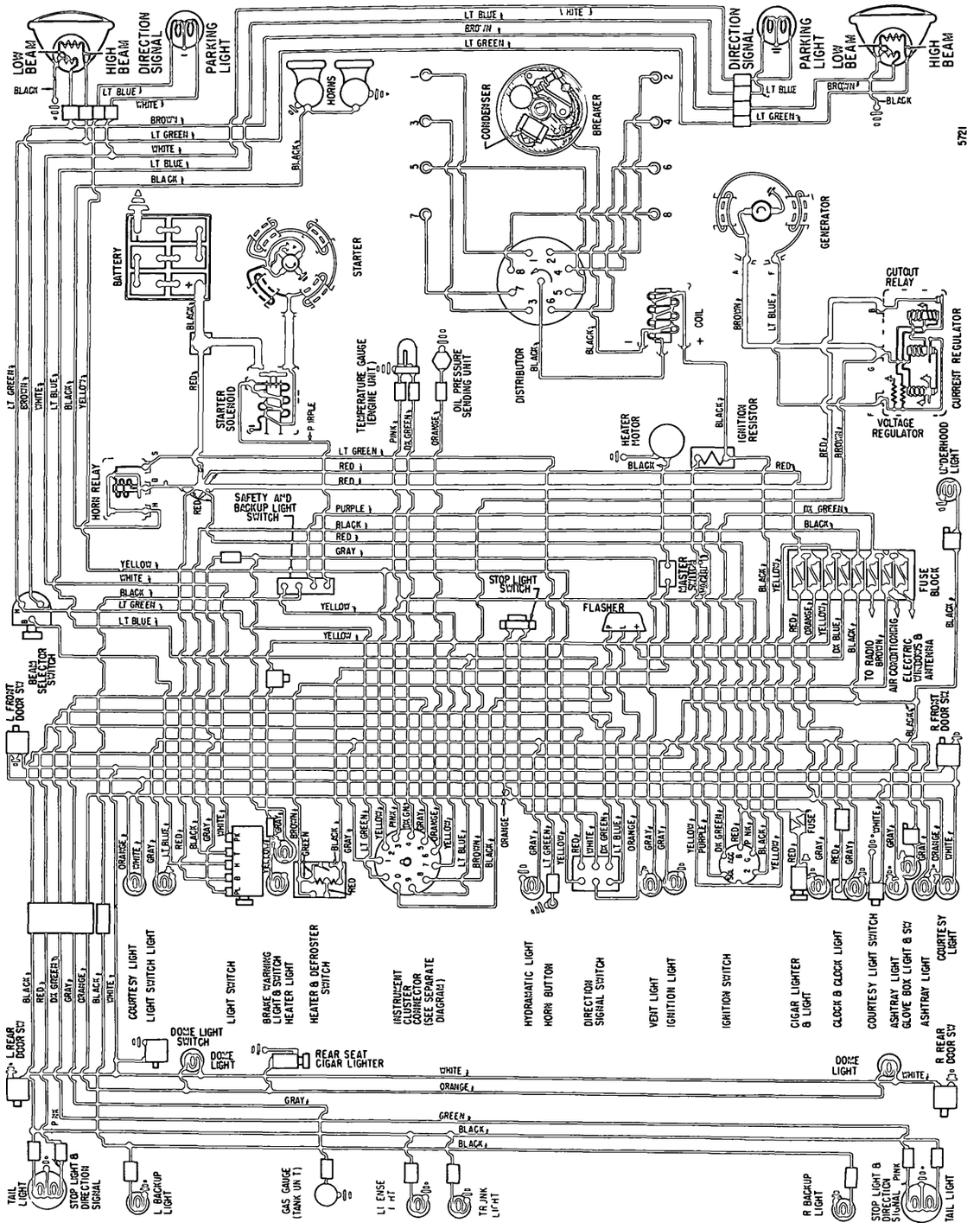
3) Loosen jam nut on transmission throttle rod at bellcrank and remove clevis pin. Remove clevis pin from end of upper transmission throttle rod at bellcrank. With both bellcrank and transmission lower throttle rod held against their rearward stops, adjust lower throttle rod clevis so that pin will enter freely into holes in clevis and the bellcrank Install cotter pin and tighten jam nut.

► *"J-2 ENGINE" CAUTION:* On first cars (with Throttle Valve Bellcrank Assy. 571315 & Lower Control Rod 571318), it may be necessary to **lengthen** rod when making above adjustment as much as 3½ turns to obtain correct throttle valve oil pressure for correct shift pattern. On cars after Engine No. A-198511, new parts used (Throttle Valve Bellcrank Assy. 572496 & Lower Control Rod 569544) and above setting procedure should be used. *NOTE* - If either throttle valve bellcrank or lower control rod require replacement on cars before Engine No. A-198511, install both new parts and use standard setting procedure.

4) With engine bellcrank against its stop and upper transmission throttle rod pulled lightly toward rear of engine to take up slack, adjust clevis on upper transmission throttle rod so that pin enters freely into holes in clevis and bellcrank Install cotter pin and tighten jam nut. Set carburetor slow idle at 460 RPM with transmission selector lever in "D" (Drive) position, this will pull engine bellcrank forward from stop and provide proper throttle valve adjustment) *CAUTION - On air conditioned cars, slow idle speed must be set with compressor running*

5) Loosen jam nut and back out throttle stop screw several turns. Hold choke wide open and pull forward on dash bellcrank until throttle valves are wide open, then go beyond to point of maximum transmission throttle lever travel *(CAUTION - This point is a matter of*

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feel and care should be taken to not bend or stretch linkage beyond this point) With throttle held in this position, adjust throttle stop screw to just touch tang on downshift lever Allow throttle valves to return to a closed position, then turn throttle stop screw in 1½ to 2 turns and tighten jam nut

6) If clearance between dash bellcrank and dash is not 3/8" ± 1/32" adjust as follows Loosen jam nut on intermediate throttle rod, remove pin and clevis from dash bellcrank, adjust throttle rod so there is 3/8" clearance between dash bellcrank and front of dash Install rod end and clip with open side of rod toward outside of car, and tighten jam nut

7) Adjust accelerator pedal height as follows Position a 3 7/8" wooden block between bottom of accelerator pedal and top of floor mat retainer Remove clip and accelerator rod assembly from dash bellcrank Loosen jam nut and adjust accelerator rod so that hole just slides over pin on bellcrank with accelerator pedal touching gauge block Install rod end on bellcrank with open side toward left side of car Tighten jam nut and remove gauge block

ROCHESTER 4GC

Rochester 4GC 4-Barrel type similar to design used on previous models except for addition of Choke Modifier. Used as follows

	First Cars	Later Cars
Synchro-mesh Cars	7009471	7010926
Hydra-Matic Cars	7009470	7010925

Replacement Carburetor Pkg. - Rochester 7015704

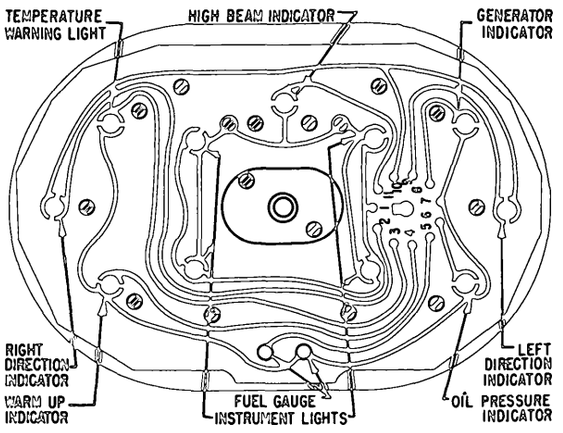
▷ *CARBURETOR PRODUCTION CHANGES & RECOMMENDED SETTING CHANGES See 'Rochester 4GC 4-Barrel" in Carburetion Section*

▷ *MANIFOLD FUEL DISTRIBUTION. Carburetor RIGHT barrels feed Cyls 1-4-6-7, LEFT barrels 2-3-5-8*

▷ *IDLE ADJUSTMENT-CAUTION* It is recommended that idle adjustments be made with Air Cleaner in place (Use of Tool BT-1000-S will make this possible)

Idle Setting: With engine warm and operating at correct idle speed, adjust each idle adjusting screw for smooth

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INSTRUMENT CLUSTER PRINTED CIRCUITS

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idle and highest RPM and vacuum, then turn each screw out (rich) ¼ turn. *NOTE* - If engine rolls from richness when throttle snapped closed, turn each screw in (lean) 1/8 turn

Idle Speed - 460 RPM (All Cars) with selector lever in "DR" on Hydra-Matic cars On Air-conditioned cars set control in "Maximum Cooling" position *NOTE* - This setting supersedes previous recommendation of 450 RPM (Synchro-mesh) & 425 RPM (Hydra-Matic)

► *AIR CONDITIONED CAR NOTE: On cars with air conditioning, the compressor must be operating when idle speed adjusted*

► *OTHER DATA: See "Rochester 4GC 4-Barrel Carburetors" in Carburetion Section*

Throttle Return Check Adjustment (Hydra-Matic Drive Cars): *See CARBURETOR above*

Hydra-Matic Throttle Linkag Adjustment: *See CARBURETOR above.*

ROCHESTER 2GC
(Triple Two-barrel Compound)

Rochester 2GC. "Triple Two-Barrel Compound" installation as follows:

	Rochester No.
Front	7010960
Center	7010959
Rear	7010958

For complete adjustment data on these carburetors (including linkage adjustment to insure correct synchronization), see "Oldsmobile Triple Two-Barrel Compound" Carburetors in Carburetion Section

FUEL PUMP PRESSURE: 4-5½ lbs at 450-1000 RPM (1st type with glass filter bowl), 5-6 lbs. at 1800 RPM (later type with pulsator dome)

CARB. EQUIPMENT

Fuel Pump: AC No 4317 (Early cars), No 4397 (Later cars) Fuel and vacuum

Pressure - 4-5¼ lbs at 450-1000 RPM (No 4317), 5-6 lbs at 1800 RPM (No 4397)

See "Fuel Pumps" in Carburetion Section

Gasoline Gauge: AC Electric type

Dash Unit - AC No 1518721

Tank Unit - AC No 1518730

See "Fuel Gauges" in Carburetion Section

Air Cleaner: (Cars with 4-Barrel Carb.) Oil-wetted type (Std.) Oil-bath type (Optl),

(Cars with Triple Compound Carb.) - AC No 1553292 DRY TYPE with paper filter element Clean at 4000 mile intervals (or at engine oil change intervals). Replace element at 10,000 mile intervals or more often under severe conditions Use AC Type A-59C Replacement Element

► *DRY TYPE FILTER CLEANING CAUTION:* Remove filter element from air cleaner and clean by shaking and tapping end plates on a flat surface *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate*

BATTERY

Delco-Remy 3KMR70. *12 Volt,* 11 plate 70 ampere hour capacity (20 hr rate)

Battery Ground - Negative

Engine Ground - From engine to forward side of firewall.

STARTER

Delco-Remy No. 1107665. Armature No 1932185

Drive - Overrunning clutch (solenoid pinion shift)

Rotation - Counterclockwise at commutator end

Brush Spring Tension - 35 ozs minimum

Performance Data

Torque	RPM	Volts	①Amperes
0 ft lbs	3600-5100	10 6	65-100
	Lock	3 5	300-360

① - Includes Solenoid Switch

Starter Switch: Solenoid switch, Delco-Remy No. 1119798 mounted on starter and controlled by combination Starter & Ignition switch Delco-Remy No 1116534 and Neutral Safety and Back-up Switch (see below)

Hydra-Matic Neutral Safety Switch: Oldsmobile No 570386. Neutral Safety and Back-up Light Switch

Adjustment - *See "Dual-Coupling Hydra-Matic" in Transmission Section*

GENERATOR

Delco-Remy No. 1102085 (Std.), No. 1102067 (Air Cond.). Armature - No 1923535 (1102085 Gen), No 1932900 (1102067 Gen)

Performance Data (Cold)

	Amperes	Volts	RPM
Standard	30	14 0	2210
Air Cond	35	14 0	2400

Rotation - Counterclockwise at commutator end

Brush Spring Tension - 28 ozs

Field Current - 1 48-1 62 amperes at 12 volts (1102085) 1 62-1 82 amperes at 12 volts (1102067)

Belt Adjustment: Place Tool 33-70 on belt Loosen generator adjusting link bolt and then tighten belt until line on gauge is even with pointers of gauge Tighten adjusting link bolt

REGULATOR

Delco-Remy No. 1119001 (1102085 Gen.), No. 1119002 (1102067 Gen.). *NOTE - Specifications are "Normal" Settings*

► *REGULATOR IDENTIFICATION:* Std (1119001) regulator marked by daub of red paint, Optl. (1119002) regulator by daub of yellow paint on mounting lug

Cut-Out Relay

Cuts In - 11 8-13 5 volts

Contact Gap - 020"

Air Gap - 020" (with contacts just closed)

Voltage Regulator

Setting - 13 8-14 8 volts

Air Gap - 075" with armature pressed down to point where contacts just touch.

Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section*

Current Regulator

Setting - 27-33 amperes (1119001), 32-37 amperes (1119002)

Air Gap - 075" with armature pressed down to point where contacts just touch.

Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section*

MISC. ELECTRICAL

► *INSTRUMENT PANEL PRINTED CIRCUIT NOTE:* Entire instrument cluster served by a printed circuit All units in cluster are connected by a multiple contact plug which is keyed to prevent improper assembly Service of printed circuit is by **replacement nly.**

► *FUSE BLOWING CORRECTION:* If caused by loose fuse clips, replace Fuse Panel Check fuse clips to make certain rivets are staked and clips have sufficient tension to grip fuse ends securely

Headlamps: Sealed Beam *See Electrical Section*

Direction Signal: *See Electrical Section*

Autronic Eye: *See Electrical Section*

Light Switch Removal: Disconnect battery cable and disconnect wires from lighting switch Pull switch knob out to last notch then depress spring loaded latch button on switch body while pulling rod and knob assembly out of switch Remove switch mounting nut and remove switch and escutcheon from panel

Stop Light Switch Location (Std. Brak s): Mechanical type on toe board near brake pedal

Stop Light Switch Location (Power Brak s): Directly above brake pedal on firewall Adjust so lights come on within free travel of brake pedal

FUSES: All fuses (exc Instrument Panel and Cigar Lighter fuses) are located on a combination fuse and junction block under instrument panel A color code is used on fuse panel corresponding to color code of circuits protected by each fuse The following fuses will be found on this panel

(1) Clock (Std. on 98 Series only). 1 ampere

(2) Courtesy, Dome & Stop Lights; Rear Cigar Lighter. 25 amperes

(3) Temp., Generator, Oil Pressur Lights; Fuel Gauge, Back-up Lights, Hand Brake Signal Light. 9 amperes

(4) Turn Signal. 9 amperes

(5) Glove Box, Underhood, Keyh le, Tail, Trunk, Stop Lights. 9 amperes

(6) Radio. 7 5 amperes

(7) Heater & Air Conditioner. 20 amperes (25 amperes with Air Conditioning)

(8) Electric Windows & Antenna. 20 amperes

Instrument Panel Lights - 3 amperes located on headlight switch

Cigar Lighter - 20 amperes, located behind lighter

CIRCUIT BREAKER: 25 amperes, located in switch

Horn Relay: Delco-Remy No 1116781

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Service Cautions" in Miscellaneous Section*

ENGINE SPECIFICATIONS: Own 90°V8 with overhead valves TWO engines used **T-400** (Std Engine with 4-Barrel Carb), J-2 (Optl Engine with Triple Two-Barrel Compound Carbs)

Eng.	Bore	Stroke	Rat d HP	Displac ment
All	4"	3 11/16"	51	371 cu. ins

Engine	Compr. Ratio	Dev l p d HP
T-400	9 5-1	277 at 4400 RPM
J-2	10 0-1	300 at 4600 RPM

Compressi n & Vacuum R ading - *See TUNE-UP*

► *ENGINE COMPRESSION RATIO NOTE* Std Engine (9 5-1 Ratio) has 050" thick cylinder head gasket

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Special (10.0-1 Ratio) engine has .025" thick gasket. Same cylinder head used on all engines. *NOTE* - Head gasket for Export (Low Octane Gas) Engine is .085" thick.

►*ENGINE OVERHEATING & LOSS OF COOLANT IN NORMAL DRIVING, OR POOR CAR HEATER PERFORMANCE: See "Cooling" in Oldsmobile Special Data*

CYLINDER HEAD INSTALLATION: *See "Cylinder Heads & Manifolds" in Oldsmobile Special Data.*

INTAKE MANIFOLD INSTALLATION: *See "Cylinder Head & Manifold" in Oldsmobile Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Oldsmobile Special Data.*

OIL PAN REMOVAL: *See "Oil Pan" in Oldsmobile Special Data.*

PISTONS

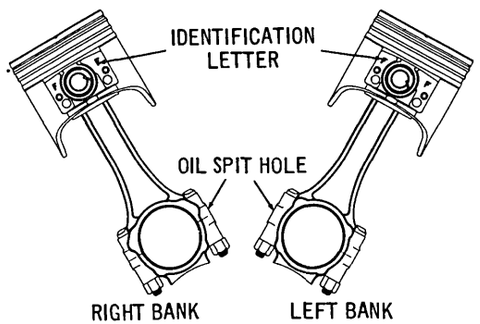
Aluminum alloy, three ring, autothermic, steel strut, slipper skirt, cam ground, tin plated.

Length - 4.05". **Weight** - 25.22 ozs. (less rings & pin).

Removal - Pistons & rods removed from above only.

►*CAUTION:* Mark piston, rods, and bearing caps with cylinder number before removal to insure correct reinstallation.

Clearance - .00075-.00125" Selective fit at thrust surface.



OLDSMOBILE PISTON & ROD ASSY.

Fitting New Pistons: With piston inverted and pin removed, insert piston into bore. Pull required to withdraw a .0015" x ½" feeler placed at 90° to normal position of pin and piston at center of normal travel, should be 1-6 lbs.

►*CAUTION: Allow rebored cylinders to cool to normal room temperature before fitting pistons.*

Replacement Pistons: Std., .010", .020" & .030" Oversize. Furnished with fitted pins.

Installing Pistons: Install pistons 1,3,5,7 in left bank, and 2,4,6,8 in right bank with letter "F" cast on each side of piston pin hole, and notch in piston head, toward front of engine.

PISTON PINS

Floating type with lock rings at each end.

►*CAUTION:* Discard old lock rings and install new service type lock rings when installing pins.

Diameter - .9803-.9807". **Length** - 3.126".

Pin Fit in Piston - .0000-.0002" loose. Pin should not fall through piston of own weight when using the low limit (.0000" fit). Pin can be tapped into place using brass drift.

Pin Fit in Rod Bushing - .0003-.0005" loose.

Replacement Pins: Std., .001" & .003" Oversize (in sets).

PISTON RINGS

Two compression and one oil ring used.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0775-.078"	.013-.023"	.001 - .003"
Compr. #2	.0925-.0935"	.013-.023"	.001 - .003"
Oil	.188" (Max.)	①	.0023-.0039"

① Sealed Power .013-.033", Perfect Circle .015-.055".

Replacement Rings: Std. & .010" Oversize, not in sets.

Installing Rings: Install upper chrome and lower black compression rings with side marked "T" or "Top" up.

CONNECTING RODS

Length - 6.625" center-to-center. **Weight** - 29.53 ozs.

Crankpin Journal Diameter - 2.2488-2.2498".

Out of Round Limit - .0045".

Lower Bearing - Aluminum with babbitt overlay, steel backed, both halves interchangeable.

Clearance - .0009-.0030" (vertical), .0019-.0040" (horizontal).

Sideplay - .002-.011" (total for both rods).

Replacement Bearings: Std., .002", .010" & .020" Undersize.

Installing Rods: Bearing index notches on rods and caps, and pads for numbering caps and rods should be to outside of engine. Spit hole for lubrication should be to inside of engine.

►*CAUTION: Use Guide Tool BT-22 over rod bolts to prevent damaging crankpin journals when removing and installing piston and rod assemblies.*

CRANKSHAFT

Journal Diameter - 2.748-2.749". Five bearings.

Bearings - Steel backed aluminum. Rear bearing flanged, upper and lower inserts **not** interchangeable.

Clearance - *Front & Rear bearing clearances are selective fit - See Notes below. CAUTION - Front bearing clearance has been reduced and specification below supersedes previous recommendations.*

Crankshaft Bearing Clearance

Front Bearing (see Note)	.0003-.0015"
Intermediates (2, 3, 4)	.0005-.0031"
Rear Bearing (see Note)	.0020-.0035"

►*FRONT MAIN BEARING NOTE:* Bearings are selective fit during manufacture. Standard size **Upper** bearing insert furnished with standard wall thickness only, **Lower** bearing insert furnished in FOUR wall thicknesses and marked by letter stamped on back of tang as follows: "B" .0006" thicker wall, "D" .0012" thicker wall, "E" .002" thicker wall, "F" .003" thicker wall. These bearings are in addition to regular Undersize Bearings listed below. *When correcting excessive front main bearing clearance, it will only be necessary to replace lower half of bearing insert with one of the selective fit thicker wall inserts listed above.*

►*REAR BEARING NOTE:* Bearings are selective fit during manufacture. Standard size furnished with Thin, Medium and Heavy wall (marked "T", "M", & "H" on tang). These are in addition to regular replacement Undersize Bearings listed below. *Use same thickness bearing (as indicated by letter on tang) unless undersize bearings being installed to correct wear.*

Replacement Bearings: Std. (Front & Rear furnished in special thicknesses - see Notes above), and .002", .010", .020" Undersize.

End Thrust: Taken by rear (#5) flanged bearing.

Endplay - .004-.008".

Crankshaft Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Oldsmobile Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Oldsmobile Special Data.*

CAMSHAFT

Bearings - Steel backed babbitt or copper, lead, bronze.

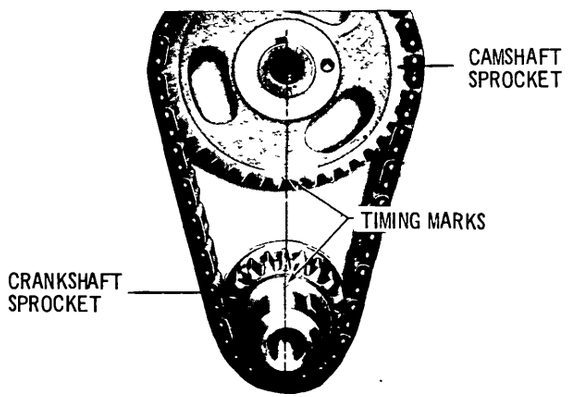
Journal Diameter - 1.9977-1.9985".

Clearance - .001-.0033".

End Thrust: Forward thrust taken by plunger and spring at front end of camshaft.

Timing Chain: Link Belt or Morse. *NOTE - Both chains are completely interchangeable (may be used with either type crankshaft and camshaft sprockets).* **Width** - 27/32". **Pitch** - .50". **Length** - 24" or 48 links.

Camshaft Setting: Mesh chain with sprocket marks adjacent and in line with a straight edge across shaft centers (or use Tool BT-11).



OLDSMOBILE VALVE TIMING MARKS

►*FUEL PUMP ECCENTRIC NOTE:* Fuel pump eccentric bolted to front of camshaft ahead of sprocket. Assemble with cupped side out.

►*CAMSHAFT REPLACEMENT CAUTION:* For initial lubrication of NEW camshaft, it should be liberally coated with mixture of G.M. Concentrate No. 567725 and engine oil before installation (2 Pints of concentrate in 4 qts. of oil) and balance of concentrate should be added to crankcase oil for run-in purposes.

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Engine Front Cover Removal & Installation; *See "Engine Front Cover" in Oldsmobile Special Data*

Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Oldsmobile Special Data*

VALVES

Tappet Clearance· None in service, hydraulic

Valve	Head Diam.	Stem Diam.	Length
Intake	1 745-1 755"	3417- 3425"	4 989-5 009"
Exhaust	1 557-1 567"	3930- 3938"	4 989-5 009"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	419"	0017- 0035"
Exhaust	45°	435"	0022- 0040"

Valve Seat Width - 037- 075" all valves

Valve Stem Seals - A "Top Hat" type oil seal (deflector) is installed on valve stem below valve spring retainer

Valve Springs: Intake and exhaust valve springs are alike Dampers used on lower end of all springs

►*VALVE SPRING PRODUCTION CHANGE* Beginning Engine No A-176654, larger diameter valve spring (wire diameter size 1/64" larger) with different pressures used Valve spring counterbore in cylinder head was increased 043" in diameter to accommodate this larger spring *NOTE* - First & Later Valve Springs (in Sets) and Cylinder Heads are interchangeable (tolerance limits may cause snug fit if second type spring used with first type head)

Valve Spring Specifications

	First Type		Later Type	
Valve	Pressure	Length	Pressure	Length
Closed	100 lbs	1 880"	90 lbs	1 880"
Open	190 lbs	1 480"	220 lbs	1 480"

Fr e Length - 2 40"

►*CAUTION* Lower end of damper and spring must seat in recess in head Install closely wound spring coils toward cylinder head

Valve Guides: Remove guides with Remover Tool J 3062 Drive new guides into top of cylinder head as follows Lay Gauge Washer J-5158 on valve spring seat, then install guide into cylinder head (with grooved end of guide up) by driving on Tool J-5158 2 until tool seats against gauge washer Guides should extend 25/32" above face of valve spring seat Inside diameter of guide is 3442- 3452" (Intake), 3960- 3970" (Exhaust) *NOTE* - Service guides are Parco-Lubrited and finished to size **DO NOT** ream Guides furnished Std and 010" oversize Oversize guides identified by a groove on O D of guide

Hydraulic Valve Lifters: Barrel type larger in length and diameter than previous models

►*HYDRAULIC LIFTER INSTALLATION CAUTION:* FIVE different sizes used in production as follows (marked as indicated)· Standard (unmarked) 001" O S (marked "1"), 002" O S (marked "2"), 003" O S (marked "3"), 005' O S (marked "5") **Lifters** marked by etched number on lifter body **Cylinder Block** marked by number on rail under engine top cover *Reinstall lifter in same hole or replace with proper size*

Diameter - 9210- 9215" (Std) **Length** - 2 125"

Cl arance in Block - 0005- 0020" (Selective)

Replacement Lifters· Std , 001", 002", 003" & 005" Oversize

Hydraulic Lifter Removal, Overhaul & Testing - *See "Valve System" in Oldsmobile Special Data*

Rocker Arm Assembly: *See "Valve System" in Oldsmobile Special Data*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above

Intake Valves - Open 13°30' BTDC Close 54°30' ALDC

Exhaust Valves - Open 51°30' BLDC Close 20°30' ATDC

Valve Timing Check: Remove left hand cylinder head rocker arm assembly and rotate engine so that #1 piston is on top dead center (firing stroke) Trailing edge of notch in crankshaft pulley will be aligned with pointer on timing chain cover Install Tool J-5374 in place of rear rocker shaft bracket with step plunger over #7 cylinder exhaust pushrod The 7 16" diameter pilot at bottom of tool will fit into cylinder head bolt hole Screw main body of gauge down so step plunger contacts pushrod and small diameter of step plunger is flush with top of main body Tighten clamp bolt Rotate engine one complete revolution so that #1 piston is again at TDC (intake stroke) Distributor rotor should now be pointing toward rear of engine If timing chain is installed properly top of tool plunger will rise so the top of main body of tool is flush with the third step If camshaft is retarded one tooth the third step will rise above top of main body and if advanced on tooth second step will be below main body

OILING SYSTEM

Crankcase Capacity: 5 quarts refill Add 1 quart with filter change

Normal Oil Pressure· 35 45 lbs at 50 MPH

Pressure Regulator - In pump body Not adjustable Valve starts to open at 45 lbs Maximum pump pressure is 45-55 lbs

Oil Pressure Indicator - Oil pressure warning light on instrument panel and oil pressure switch in engine block or oil filter Lights when pressure below 3 lbs

Engine Unit - AC No 1508319

Oil Pump· Gear type In crankcase at rear end

Oil Pump Removal, Overhaul & Installation - *See "Oil Pump" in Oldsmobile Special Data*

Oil Filter: Full flow type Replace every 5000 miles or sooner if needed Located on lower right side of crankcase at rear

Replacement Filter Element - AC No PF 122

Crankcase Ventilation: Air intake in oil filler cap has oil-wetted cleaner AC No 1552233 (Std), No 1551509 (Heavy Duty) Outlet is connected to ventilating baffle at rear of block above right bank Outlet pipe is push fit at ventilator and extends down below right rear corner of engine

►*NOTE* Air cleaner also used in lower section of ventilator outlet tube on cars with heavy duty inlet breather in filler cap and oil bath air cleaner

COOLING

Water Capacity: 19½ qts (without heater), 21 qts (with heater)

Pressure Valve: Radiator filler cap AC No RC-6, 13 lbs (Std), AC No RC-15, 15 lbs (Air Cond Cars)

Thermostat: Choke type Dole or Harrison

Type	Dole	Harrison
160°①	563219	3126289
180°②	563311	3626290

①Use with alcohol base anti freeze

②Use with permanent type anti-freeze

Water Pump: Packless, sealed ball bearing type

See "Oldsmobile" in Water Pump Section

Pump Removal - Remove fan and fan pulley Remove six mounting bolts (4 to engine cover, 2 to engine block) Remove Pump

Temperature Indicator: Two light system (Red & Green) with temperature switch in engine block GREEN light is lighted when engine running cold and goes off when engine temperature reaches 111-115°F RED light remains off during normal engine operation but comes on when engine temperature reaches 230-234°F *NOTE*- Red light will come on when ignition key turned to "Start" position but should go out when key returned to running position (this tests bulb and circuit each time engine started)

Engine Unit - Delco-Remy No 1998181 (Std), No 1998189 (Air Cond Cars)

See "Oldsmobile Temperature Indicator" in Electrical Section

CLUTCH

Long 11CF Assy. No. L5167, Oldsm bile No. 570035. Semi-centrifugal single plate type

See "Long Clutches" in Clutch Section

Clutch Disc - Long No 282687 Oldsmobile No 565059

Pedal Adjustment: Pedal free travel 1-1¼" Adjust by turning adjusting nut on clutch connector link at throw out yoke

Removal: Remove transmission (see below) Remove left engine filler plate engine breather pipe and right and left rear lower flywheel housing bolts Remove return spring and disconnect adjusting rod at yoke Install Engine Rear Support Tool BT-28 entering pilot supports into lower housing bolt holes Remove engine rear mount bolts at clutch housing and remove frame crossmember by removing three bolts at each end Remove clutch housing by removing eight bolts holding housing to flywheel housing Remove clutch assembly from flywheel

SYNCHRO-MESH TRANSMISSION

Own. Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear type

See "Oldsmobile Synchro-mesh" in Transmission Section

Transmission Controls: *See "Transmission Controls" in Transmission Section*

Rem val· Drain transmission and disconnect manual control rods and speedometer cable at transmission Mark location of center bearing support on frame to facilitate lateral alignment Disconnect front and rear companion flanges and center bearing support to frame

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attaching bolts (*NOTE* - Keep shims grouped so they can be reinstalled in same location) Slide propeller shaft assembly out of frame Remove bolts holding transmission to clutch housing, and remove transmission by moving rearward until main drive gear clears clutch assembly

HYDRA-MATIC DRIVE

"J taway" Dual-C upling Hydra-Matic. Four speed automatic transmission and fluid coupling

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual-Coupling Hydra-Matic" in Transmission Section*

► *TESTING & TROUBLE SHOOTING: See "Dual-Coupling Hydra-Matic" in Transmission Section*

Lubrication - Check fluid level every 1000 miles Drain and refill every 25,000 miles Use GM Hydra-Matic Drive Fluid Type "A" (marked AQ-ATF)

Ch cking Fluid L v l - Check with transmission at normal operating temperature, engine idling, and selector lever in "P" (Park) position Add Hydra-Matic Fluid Type "A" to bring level to "FULL" mark on dipstick *CAUTION* - Do not fill above "FULL" mark

Thr ttl Linkag Adjustm nt: *See CARBURETOR above*

► *OTHER HYDRA-MATIC SERVICE DATA: See "Dual-Coupling Hydra-Matic" in Transmission Section*

UNIVERSALS

Saginaw r Spicer. Cross type three used, one each at front and rear and one at center

► *UNIVERSAL JOINT INSTALLATION CAUTION TO PREVENT DRIVE LINE VIBRATION. See "Propeller Shaft Notes" in Oldsmobile Special Data*

► *CAUTION:* Rear universal companion flange nut controls rear axle pinion bearing preload (must be ad justed whenever nut loosened) *See "Oldsmobile Hypoid" in Rear Axle Section*

Prop ller Shaft Center Bearing Overhaul: *See "Propeller Shaft Notes" in Oldsmobile Special Data*

Prop ll r Shaft Alignm nt: *See "Propeller Shaft Notes" in Oldsmobile Special Data*

REAR AXLE

Own. Hypoid gear semi-floating type with Hotchkiss drive

See "Oldsmobile Hypoid" in Rear Axle Section

Car Model	Axl Ratios Ratio	①Code
88 & S88 S M Std	3 64-1 (40-11)	6
88 H M Std	3 23-1 (42-13)	9
88 H M With Air Cond	3 42-1 (41-12)	8
88 H M Optl	3 08-1 (40-13)	0
S88 H M Std	3 42-1 (41 12)	8
S88 H M Optl	3 08-1 (40-13)	0
98 H M Std (exc Conv)	3 42-1 (41-12)	8
98 H M Std (Conv)	3 64-1 (40-11)	6
98 H M Optl	3 64-1 (40-11)	6
98 H M Optl	3 23-1 (42-13)	9

S M - Synchro-mesh H M - Hydra-Matic

① - Rear axle ratio code number stamped on lower locating boss on forward side of carrier

Backlash - 007- 008" (Limits 003- 012")

Axl Shaft Removal: Remove wheel and take off brake drum by removing two Tinnerman nuts from wheel studs (if nuts removed by turning off threads they can be reused, if nuts damaged, new nuts must be used) Remove backing plate mounting nuts and static collector Loosen bearing retainer (do not move backing plate or brake line may be damaged) Pull shaft and bearing with Puller J-942 (do not allow shaft to drag on oil seal), replace one nut to hold backing plate in position

Differential Carrier Assembly Removal: Remove axle shafts (see above) Clean differential carrier and axle housing around carrier to prevent dirt entering housing Disconnect propeller shaft at rear universal joint after having wired trunnion blocks together to avoid loss of rollers Mark universal joint so it can be replaced in the same position Drain oil by removing nuts from carrier mounting studs and moving carrier away from housing

Wheel Bearing Adjustment: None required

SHOCK ABSORBERS

Delco. Direct acting front and rear Service by replacement

Shock Absorbers (Oldsmobile No.)

Model	Front	Rear
88 & S88 (Exc Sta Wgn)	5329177	5531044
98 All	5536671	5531046
All Station Wagons	5532424	5531045

FRONT SUSPENSION

Independent. New "Spherical" joint type, with ball joints connecting upper and lower control arms to steering knuckle

See "Oldsmobile" in Suspensions & Wheel Alignment Section

Steering Axis Inclination - 6° at 0° camber

Caster - 0° to Pos ¾° Maximum variation between either side of car should not exceed ½°

Camber - Neg ¾° to Pos ¾° Maximum variation between either side of car should not exceed ½°

Toe-In - 1/16" to 1 8"

Toe-Out on Turns - With outer wheel at 20°, inner wheel should be 23°±½°

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm & nut

See "Saginaw Ball Bearing Worm & Nut" in Steering Section

Power Steering: Saginaw (In Line). *See "Saginaw In Line Power Steering" in Steering Section*

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section*

Steering Gear Removal: *See "Saginaw Ball Bearing Worm & Nut" in Steering Section*

BRAKES

Bendix Hydraulic (Single Anch r). Conventional two shoe with short molded lining front (Primary) and long molded lining rear (Secondary) Parking brake applies rear wheel service brakes

See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section

Drum Diamet r - 11"

Wh el Cylind r Diam t r - 1 1/32" (Front), 31/32" (Rear)

Replacement Linings & Shoes - Shoes and linings furnished in half sets of Std and 030" Oversize

Lining Width & Length

	Front Wheel	Rear Wh l
Primary Shoes	2½" x 9 3/8"	2" x 9 3/8"
Secondary Shoes	2½" x 12 1/32"	2" x 12 1/32"

Lining Thickness - 7/32"

Clearance - Adjusting screw backed off 16 notches from point where wheels can just be turned by hand

Braking Power - 56% Front, 44% Rear

Standard Master Cylinder: On left chassis frame front extension under hood

Checking Fluid - Maintain fluid level to within ½" of top of master cylinder gasket surface

Removal - Remove from above Not necessary to disturb other parts

Power Brakes: Bendix or Moraine. Combination vacuum power unit and hydraulic master cylinder Unit is mounted on underside of toe board and replaces regular master cylinder *See "Bendix Power Unit" or "Moraine Power Unit" in Brake Section*

► *1957 BENDIX POWER UNIT PRODUCTION CHANGE:* Two types Bendix Power Unit used Early production cars have vacuum reaction type Later cars have hydraulic reaction type

Checking Fluid -Same as for standard master cylinder

Removal of Power Unit - Disconnect positive battery cable at junction block on right fender filler plate disconnect purple solenoid lead wire from wiring harness, then pull cable through sleeve on power brake Disconnect hydraulic line at master cylinder and secure hose so end is above level of junction assembly Disconnect vacuum hoses at power cylinder , and remove dipstick Disconnect leads from stop light switch and fold back floor mat Remove three brake pedal bracket attaching bolts and remove pedal and bracket Remove mast jacket grommet retainer and slide grommet up mast jacket Remove mast jacket cover plate attaching screws, cover plate and power cylinder assembly Remove two cover plate-to-power cylinder bolts and remove cover plate Remove power unit through toe pan opening

MISC. MECHANICAL

Windshield Wipers: Cable operated, vacuum type *See "Windshield Wipers" in Miscellaneous Section*

Air Conditioning: *See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section*

Power Window Regulators: Electric type with individual motors in each window and master control switch on left front cowl *See "Power Window Regulators" in Miscellaneous Section*

Power Top Control: Hydro-Lectric *See "Power Top Controls" in Miscellaneous Section*

Power S at Adjuster 4-Way: Electric type with single reversible type motor *See "GM 4-Way Seat Controls" in Miscellaneous Section*

Power Seat Adjuster 6-Way: Electric type with single reversible type motor *See "GM 6-Way Seat Controls" in Miscellaneous Section*

TIGHTENING SPECIFICATIONS

6 CYL. ENGINES

	Ft. Lbs.
Cylinder Head	70
Manifolds	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Crankshaft Pulley	135
Con Rod Caps	45
Engine Front Cover	15
Water Manifold	30
Water Pump Mounting	30
Oil Pump Mounting	25
Oil Filter	25
Clutch Housing	30-35

V8 ENGINES

	Ft. Lbs.
Cylinder Head	85
Intake Manifold	25
Exhaust Manifold	25
Oil Pan	15
Main Bearing Caps	85
Flywheel	60
Vibration Dampener	135
Crankshaft Pulley	135
Con Rod Caps	45
Camshaft Sprocket	20
Camshaft Sprocket Hub Thrust Plate	15
Rocker Arm Cover	3.0
Engine Front Cover	35
Fuel Pump Mounting	30
Water Manifold	30
Water Pump Mounting	30
Oil Pump Body Bolt	25
Oil Filter	25
Clutch Housing	30-35

ENGINE MOUNTINGS

V8 ENGINES

ENGINE FRONT MOUNT (V8 ENGINES): Front engine mounts are spool type with rubber insulator to absorb normal engine torque impulses. The mounting stud is off center. When installing late type mounting the larger section of insulator should be positioned next to engine. On late type mount assembly the rib on insulator must be in line with engine bracket having one mounting hole.

► *ENGINE VIBRATION CORRECTION:* Use only late type engine mount consisting of Insulator Part No. 1828237 and Bracket Assembly Part No. 1828233 (right), No. 1828234 (left) and install as described above to eliminate excessive engine impulse vibration.

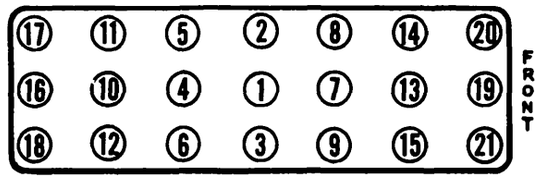
CYLINDER HEAD & MANIFOLD

CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head bolt nuts and capscrews, tighten in correct sequence as shown in diagram for each car.

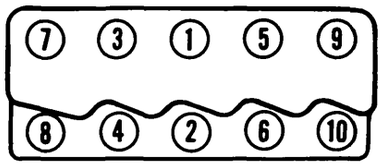
Tight ning Torque—See Tightening (Torque Wrench) Specifications above.

6 CYL. ENGINES

CYLINDER HEAD INSTALLATION: When installing cylinder head, use new gasket. Coat threads of capscrews with sealer except the three screws that lead into intake manifold ports. If sealer used on these capscrews, there is a possibility that it will be drawn into carburetor or valves. Use torque indicating wrench to tighten cylinder head bolt nuts and capscrews. Tighten in sequence shown in diagram.



6 CYL. CYLINDER HEAD



V8 CYLINDER HEAD

INTAKE & EXHAUST MANIFOLD INSTALLATION: Install the new gasket between intake and exhaust manifold (make sure that heat valve is free and operates freely), and insert the four bolts through exhaust manifold and into intake manifold. Draw bolts down snug but DO NOT TIGHTEN. Install thermostatic coil spring and counter-weight. Install manifold-to-engine block gaskets and install assembled manifolds. While holding manifold and gaskets evenly against engine block, install long center bolts and draw down snugly. (If bolts show signs of water leakage, coat threads with suitable sealer). Install remaining washer and nuts. *(CAUTION*—Be sure to install the four conical, brass washers and nuts on the extreme ends of exhaust manifold). Tighten manifold nuts and bolts, starting from center and working out towards ends, to 15-20 ft. lbs. torque. Tighten the four bolts holding exhaust manifold to intake manifold.

V8 ENGINES

CYLINDER HEAD REMOVAL & INSTALLATION: Removal - Drain cooling system, remove intake manifold and rocker arm cover. Back off all tappet adjusting screws, slide rocker arm to one side and lift out pushrod. *NOTE* - Keep pushrods separate in order to reinstall in original locations. Remove cylinder head bolts and lift head off dowel guide pins in cylinder block. **Installation** - Use new gasket and reverse removal procedure. Tighten cylinder head bolts to specifications, following sequence shown in diagram.

CRANKSHAFT & MAIN BEARINGS

6 CYL. ENGINES

REAR MAIN BEARING SEAL: Neoprene type seal. When replacing seal, both upper and lower halves should be replaced. Remove oil pan, clutch housing pan, and rear main bearing cap. Remove seal from cap, and then remove upper seal by pushing one corner of seal until opposite end protrudes about ⅜" from block. Pull out with long-nosed pliers. Install new seal in lower half by carefully inserting lower half of seal into bearing cap. Before installing upper seal, coat seal contacting lip with grease. Insert one end of seal into block and push it into place with a rolling motion. Install cap seals in main bearing cap, making certain that cap seals fit in channel.

V8 ENGINES

REAR MAIN BEARING SEAL: Rope type seal of braided asbestos. With bearing cap, bearing and seal removed, install a new seal in position in cap so that both ends of seal protrude above cap. Tap seal down in position with Tool C-3511 until tool is seated in bore. Hold tool down and cut off protruding ends flush with cap. Install bearing insert and both cap seals. The long cap seal should be installed so that when cap is in position, seal is on the oil filter side of engine.

ENGINE FRONT COVER

6 CYL. ENGINES

FRONT OIL SEAL: To replace, drive old seal out with suitable drift. When installing seal, make sure seal is driven into place evenly to insure a tight fit. Use a new gasket and position cover in place.

FRONT COVER INSTALLATION: Use new gasket and position cover in place. Install screws but do not tighten. Install pulley and hub on crankshaft far enough so that seal can be evenly positioned on crankshaft. Tighten two screws on right side lightly. Then tighten remainder of screws in like manner. Repeat tightening procedure and torque screws to 15 ft. lbs.

V8 ENGINES

ENGINE FRONT COVER (Single Rocker Shaft Engines): Proceed as follows:

Removal: Drain and remove radiator. Disengage fan belt and remove generator. Install Tool C-3033 over pulley and force pulley off end of crankshaft. Support engine with suitable chain hoist fastened to intake manifold. Remove motor support "U" bolts and nuts. Remove fan blades and hub, then remove bolts that hold water pump housing to cylinder block and heads. Lift water pump housing, water pump, front motor support and insulator up and away from front of engine. Discard gaskets. Loosen bolts that hold oil pan to cylinder block. Drop pan slightly to clear chain case cover. Disconnect inlet and outlet fuel lines at fuel pump. Remove bolts that hold pump to chain case cover. Slide pump out and away from engine. Discard gasket. Remove bolts and washers from cover. Disengage cover from locating dowels, remove from engine. Discard gasket.

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Installation: Be sure mating surfaces of cover and cylinder block are clean and free of burrs. Install new gasket and position cover locating dowels. Coat screws with suitable sealer and tighten to 15 ft. lbs. *NOTE*—Coat four center screws with sealer suitable for water. Coat other screws (upper and lower) with sealer suitable for oil.

FRONT OIL SEAL: Remove crankshaft pulley and water pump housing. Loosen oil pan bolts sufficiently until pan clears chain case cover. Install Tool C-3506 and remove seal. Discard seal and retainer. Position new seal and retainer assembly in housing and press into place using Tool C-3506. Seal must be tight against seat surface. *CAUTION* - Always have thin shoulder away from front of cover with stamped case cover, thick shoulder away from front of cover with cast iron cover.

CAMSHAFT & BEARINGS

6 CYL. ENGINES

CAMSHAFT REMOVAL: Drain coolant, remove radiator, cylinder head, wheel and splash shield. Remove front engine support, timing chain cover, camshaft sprocket and timing chain. Hold lifters off camshaft lobes by blocking valves open and supporting lifters with spring type clothes pins. Remove thrust plate bolts and camshaft.

V8 ENGINES

CAMSHAFT REMOVAL: Drain and remove radiator, crankshaft pulley, fan, water pump, water pump housing assembly. Lower oil pan sufficiently to clear chain case cover. Remove fuel pump, chain case cover, camshaft hub screw and fuel pump eccentric. Remove camshaft gear and timing chain. Remove intake manifold, distributor, distributor drive gear, rocker cover, and pushrods. Remove lifters and carefully remove camshaft.

VALVE SYSTEM

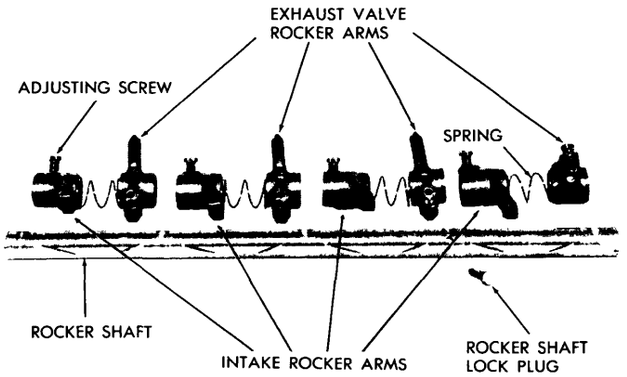
6 CYL. ENGINES

EXHAUST VALVE SEAT INSERT REPLACEMENT: Furnished .010" oversize. Use Tool C-732 to remove inserts. After inserts have been removed from engine, smooth any roughness of seat with a blunt drift Valve seat inserts should be from 002- 004" larger than counterbore to insure correct fit. If inserts are found to be loose, enlarge counterbore with Tool MH-M-1 and install oversize insert. Place inserts in dry ice for approximately 10 minutes Clean counterbore thoroughly and install a chilled insert with valve side up, and drive it into place with Installing Tool C-767

ROCKER ARMS

V8 ENGINES

ROCKER ARM ASSEMBLY: Slide rocker arm shaft into bore of strut, engage intake rocker arm. Install spring and engage exhaust rocker arm. Repeat this operation until all intake and exhaust rocker arms are installed. Make sure that rocker shaft bolt grooves align with head bolt holes in rocker shaft struts. *NOTE* - The plug hole in strut must align with hole in rocker shaft. Install new rocker shaft plug.



V8 ROCKER ARM ASSEMBLY

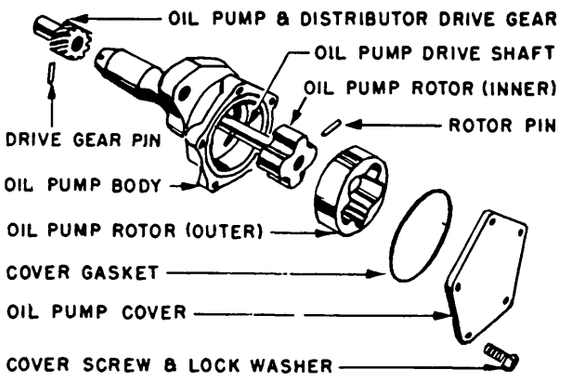
OILING SYSTEM

OIL PUMP

6 CYL. ENGINES

ROTOR TYPE OIL PUMP: Removal—Before removing oil pump, rotate crankshaft and make sure "DC" mark on crankshaft pulley lines up with pointer on timing chain case cover Do not rotate engine with oil pump removed Remove the attaching screws and remove pump from engine *NOTE*—On some models it will be necessary to remove the two upper cover capscrews to obtain sufficient clearance to remove oil pump

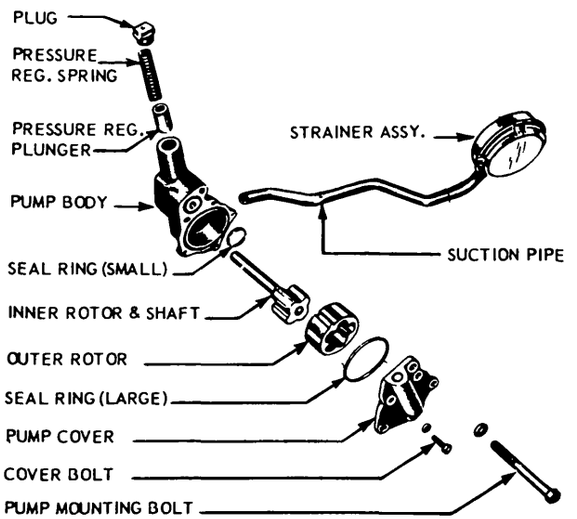
Disassembly & Inspection: Remove the oil pump cover and gasket Hold hand over cover opening and with pump upside down, turn drive shaft until outer rotor slips out Drive out the straight pin holding pump drive gear to shaft Press the shaft out of drive gear and slide shaft and inner rotor assembly out of pump body Wash all parts and dry with air Inspect all parts and replace as necessary, then measure clearance between opposite lobe of inner rotor and outer rotor Clearance should be .010" or less If clearance is greater replace both rotors Measure thickness and diameter of outer rotor If thickness is 748" or more and diameter is 2 245" or more, rotor is satisfactory Thickness of inner rotor should be 748 or more If either rotor is less than these dimensions, replace BOTH rotors



6 CYL. OIL PUMP

Insert both rotors into pump body and place a straight edge across pump body between bolt holes Clearance between straight-edge and rotor should be 004" maximum If greater, replace pump body Press outer rotor to one side against pump body and measure clearance between rotor and body on opposite side Maximum clearance should be 008' If greater, replace pump body Cover should be smooth and flat If it is scratched or grooved replace cover Check flatness by placing a straight-edge across inner surface of cover If it is possible to insert a 001" feeler between cover and straight-edge, replace cover

Reassembly: Slide the drive shaft and rotor assembly into pump body Press drive gear on shaft until end play of shaft is from 003" to 010" Press rotor down in body with hand and measure clearance with feeler gauge Install pin and peen over both ends If pin holes do not line up, drill a new pin hole through gear and shaft, using a 5/32" drill Slide outer rotor into place in pump body Install new cover gasket and install cover and tighten screws evenly.



V8 OIL PUMP

V8 ENGINES

ROTOR TYPE OIL PUMP: Removal—Drain engine oil, remove oil pan. Remove oil pump mounting bolts and lower pump straight down.

Disassembly & Inspection: Remove cotter pin holding oil strainer to oil pump suction pipe, then remove pipe Remove cover bolts and cover. Discard oil seal ring Remove pump rotor shaft and lift out pump outer rotor Remove oil pressure relief valve plug and lift out spring and plunger. Wash all parts in a suitable solvent and inspect for damage or excessive wear. Check all pump parts as follows·

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Outer Rotor—Measure diameter and thickness of rotor with micro-calipers. If diameter less than 2.244" or thickness less than .998", replace both inner and outer rotors.

Inner Rotor—Measure thickness of inner rotor with micro-calipers. If thickness measures less than .998", replace both inner and outer rotors.

Rotor Depth—Slide rotors in pump body. Place a straightedge across pump body. Use a feeler gauge and measure clearance between top of rotors and straightedge. If clearance in excess of .004", replace pump body.

Outer Rotor to Inner Rotor Clearance - To check rotors for excessive wear, measure clearance between lobes of inner and outer rotors. If clearance in excess of .010", replace both inner and outer rotors.

Outer Rotor to Body Clearance - Insert outer rotor in body and hold to one side. If clearance between rotor and opposite side of body is more than .012" replace pump body.

Pump Cover Clearance - Place straightedge across inner face of pump cover. If clearance between straightedge and cover at rotor positions is more than .0015", replace cover.

Reassembly: Use new oil seal ring between cover and body. Tighten cover bolts to 10-15 ft. lbs. Prime pump and then install new oil seal ring in pump mounting face.

Distributor-Oil Pump Drive Shaft Bushing: *See "Ignition Notes" below.*

IGNITION NOTES

V8 ENGINES

DISTRIBUTOR BASIC TIMING: Before installing distributor-oil pump drive shaft it will be necessary to time engine as follows: Rotate crankshaft until No. 1 cylinder is at TDC (or firing position). When cylinder is in this position, the pointer on chain case cover should be over "DC" on vibration dampener. Using Tool C-3027, position oil pump shaft so that it lines up with slot in drive gear. Coat shaft of drive gear with engine oil. Install it so that, after the gear spirals into place, it will index with oil pump shaft (slot in top of drive gear will be parallel with centerline of crankcase).

DISTRIBUTOR-OIL PUMP DRIVE SHAFT BUSHING: Removal—Insert Tool C-3052 and thread it into bushing. Holding puller head with wrench, tighten puller bolt and pull bushing out of bore in block.

Installation: Slide new bushing over burnishing end of Tool C-3053. Insert tool and bushing into bore of block. Drive bushing and tool down into position, using a soft hammer. As the burnisher is pulled through the bushing by pressure applied to puller nut, tool will wedge bushing tight in its bore and will burnish bore to correct size. ***DO NOT REAM THE BUSHING.***

COOLING SYSTEM

6 CYL. ENGINES

WATER DISTRIBUTION TUBE: Replace whenever engine completely overhauled. If tube becomes rusted or corroded, overheating of engine may occur due to failure of water to circulate properly through cylinder block. To replace tube, remove radiator core and water pump. Pull tube out of block with stiff hooked rod. Install tube with slots up and be sure tube is inserted far enough into block so that water pump will seat properly against block.

PROPELLER SHAFT NOTES

REAR UNIVERSAL JOINT OPERATING ANGLE: Rear universal joint operating angle must be within range of 1-3° (2° preferred). Check and adjust this angle as follows:

► *CHECKING CAUTION:* Car weight must be on wheels (use drive-on type hoist or platform) and there must be no extra weight in trunk.

Checking Rear Universal Joint Angle : Measure angle of pinion shaft companion flange by placing spirit level vertically on back face of flange. Measure angle of propeller shaft by placing spirit level parallel to shaft on top or underside of shaft. Add these two readings. This is the universal joint angle and should be 2° (limits 1-3°).

Adjusting Rear Universal Joint Angle : If angle exceeds 3°, install wedge shim between the rear spring and spring seat on axle housing. Make sure that shim surface is not burred, install shim with flat side toward spring and thick end toward front of car. Recheck universal joint angle.

BRAKE NOTES

HAND BRAKE ADJUSTMENT (Internal Type): Place transmission shifting lever in neutral and be sure the hand brake is released. Disconnect front end of propeller shaft and remove adjusting screw cover plate. Loosen brake cable guide clamping screw and back off cable adjusting nut. Turn brake shoe adjusting nut to decrease shoe-to-drum clearance until a slight drag is felt on drum. Back off adjusting nut one full notch (using spanner wrench C-3014) to give approx. .010" clearance. (NOTE—be sure the two raised shoulders on the adjusting nut are seated in the grooves on adjusting sleeve). The cable length adjusting nut should be positioned against cable housing so there is at least .005" (but not more than .010") clearance between operating lever and brake shoe cable. To lock the adjustment, tighten cable housing clamp securely and then tighten cable adjusting nut against housing. Test hand brake lever for travel. When properly adjusted, 4 to 6 clicks of ratchet should be obtained to hold car. Install adjusting screw cover plate and connect propeller shaft.

HAND BRAKE ADJUSTMENT (External Type): Adjust anchor screw to obtain .015" clearance between drum and lining at anchor bracket, and lock anchor screw. Turn guide bolt adjusting nut to obtain .015" clearance between band and bottom of drum, then lock guide bolt securely. Turn adjusting bolt nut to obtain .015" clearance between drum and upper half of band. *NOTE* - Do not draw wire which retains anchor bolt up tight or uneven wear on linings will take place. Take up slack in hand brake cable by turning yoke with actuating cam flat against end bracket on the band. Hand brake should lock when lever is pulled back 4-6 notches.

MODEL IDENTIFICATION

Series	Model Identification
Plaza	P-30-1
Savoy	P-30-2
Belvedere	P-30-3

SERIAL NUMBER: On plate attached to left front hinge pillar post.

First Serial No. - 14.280,001 (Detroit), 20,860,001 (Evansville). 25,215,001 (Los Angeles).

ENGINE NUMBER: Stamped on boss located on left front section of cylinder block

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number) indicates the following:*

"A" - All cylinders .020" oversize.

"B" - All Main & Connecting Rod Journals .010" undersize.

"AB" - Both above conditions exist.

TUNE-UP

►*HARD COLD ENGINE STARTING (1956-57 Cars):* On cars with oil-filled coil (Auto-Lite CAG-4001), change the coil position as follows: Remove coil from bracket, cut off angular flange at top of bracket leaving vertical section intact, position coil against vertical face of bracket with terminals upward and mark coil strap mounting hole location, drill holes with ¼" drill (elongate holes horizontally to facilitate coil mounting). Mount coil on bracket vertically with terminals up. Make up new longer high tension lead to connect coil to distributor.

COMPRESSION PRESSURE: 125-155 lbs. at cranking speed (150 RPM). Maximum allowable variation between cylinders 10 lbs.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: .010" (Intake & Exhaust) with engine hot and idling.

►*CONTINUOUS HIGH SPEED TAPPET CLEARANCE:* An additional .002" clearance for exhaust tappets is desirable.

MANIFOLD HEAT CONTROL: Thermostatic coil type See that valve operates freely. When installing coil, spring should be installed so that about one full turn (355° wrap) is required to hook outer end around stop stud.

IGNITION

FIRING ORDER: 1–5–3–6–2–4.

SPARK PLUG GAP: .035".

Plugs - Auto-Lite Resistor AR-51. 14 mm. Tighten to 30-32 ft. lbs.

COIL: Auto-Lite CAG-4001A.

►*COIL MOUNTING CHANGE (To Correct Hard Cold Starting). See Hard Cold Starting under TUNE-UP (above).*

Ignition Current - 1.8 amps. idling, 2.4 stopped.

Resistor - None used.

DISTRIBUTOR: Auto-Lite IAT-4101B (First Cars), IBR-4001 (Later Cars), IBR-4002 (Canada).

Condenser - Auto-Lite IAT-3076RA (IAT-4101B), IAT-2015RA (IBR-4001, 2) **Capacity -** 25-28 mfd. (All)

Contact Point Set - Auto-Lite IGW-3028BS (All)

Breaker Gap - .020". Limits .018-.022".

Cam Angle - 39° plus or minus 3°.

Breaker Arm Spring Tension - 17-20 ozs.

Rotation - Clockwise viewed from above.

Automatic Advance - IAT-4101B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		400	0		800
1		525	2		1050
4		875	8		1750
7		1225	14		2450
8		1350	16		2700

Automatic Advance - IBR-4001

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		460	2		920
3.5		1050	13		2100
7 5		1425	15		2850
8.5		1800	17		3600

Automatic Advance - IBR-4002

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		440	2		880
5		800	10		1600
7		1300	14		2600
8		1550	16		3100

Vacuum Spark Control: Integral type.

Vacuum Advance - IAT-4101B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4 3/4
1	2	5 7/8
4	8	9 3/8
7	14	12 7/8
8	16	14

Vacuum Advance - IBR-4001

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	6
1	2	6 7/8
5	10	10 1/2
8	16	13 3/4
9 5	19	16

Vacuum Advance - IBR-4002

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4 1/2
1	2	5 3/8
5	10	8 7/8
10	20	14 1/2
11	22	16

►*DISTRIBUTOR INSTALLATION NOTE Make certain that No. 1 piston is at TDC on compression stroke and that distributor rotor is at No. 1 firing position.*

IGNITION TIMING

Setting - 2° BTDC *NOTE -* This supersedes previous setting of TDC to provide better performance and economy

Timing Mark - "DC" mark on fan pulley or vibration dampener aligned with pointer on chain case cover.

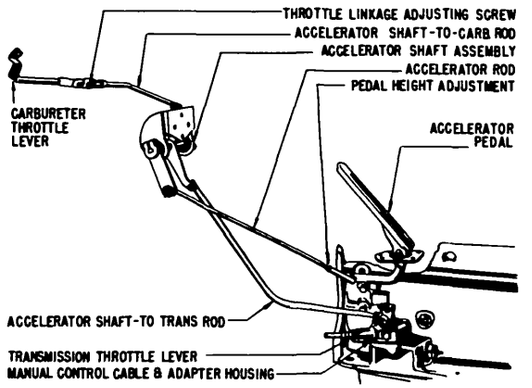
CARBURETOR

►*CARBURETOR APPLICATION Carter single barrel carburetors used on all models.*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE Special cleaning procedure required. See AIR CLEANER below.*

THROTTLE LINKAGE ADJUSTMENT (PowerFlite): Loosen vertical clamp rod and adjust the carburetor throttle lever rod to provide a 5 7/16" distance between the anchor points of the throttle return spring. Then with engine idling (off fast idle), take up slack at the vertical rod and tighten the clamp nut.

Throttle Pressure Adjustment (PowerFlite): *See "PowerFlite Transmission" in Transmission Section*



POWERFLITE THROTTLE LINKAGE

CARTER BBS (SINGLE)

Transmission	Carter Carb. No.
Synchro-mesh	BBS 2567S
Overdrive	BBS 2568S
PowerFlite	BBS 2569S
Replacement	① BBS 2604S
City Traffic	② BBS 2403S
Taxi	BBS 2410S

① - Replacement for 2567S. Use with kickdown switch (192-33U) to replace 2568S. Use with dashpot (202-80U) to replace 2569S. ② - With throttle restrictor.

Idle Setting - ½-1¾ turns open (2567S, 2568S, 2569S & 2403S), 1-2 turns open (2410S). Turn screw out for richer mixture.

Idle Speed - 450-500 RPM (Synchro-mesh & Overdrive). 475-500 RPM (PowerFlite - in Neutral).

Float Level - 7/32" (Exc. 2403S, 2410S), 9/32" (2403S, 2410S) from top of each float to top surface of body casting with float pin retainer removed and float pin at bottom of guide slots.

Accelerating Pump - Install connector rod in center hole of throttle lever (medium stroke).

Fast Idle: .016-.020" clearance between lower edge of throttle valve and carburetor bore with fast idle cam in fast idle position. Adjust by bending connector rod at lower angle (Tool T109-213).

Automatic Choke: Centered at index (all models).

Slow Closing Throttle Dashpot (PowerFlite): Loosen locknut and adjust dashpot unit so that dashpot plunger shaft can be moved inward approximately 3/32" with throttle valve fully closed.

Overdrive Kickdown Switch: With throttle valve in wide open position, adjust hex nuts on switch to have 1/64-3/64" clearance between kickdown lever and switch stem guide.

Throttle Linkage Adjustment (PowerFlite): *See CARBURETOR above.*

►*OTHER DATA. See "Carter BBS Carburetors in Carburetion Section*

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FUEL PUMP PRESSURE: 4-6 lbs. at 2000 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter No M2494S (Fuel only) M7506 (Fuel & Vacuum)
Pressure - 3½-6 lbs at 500 RPM
See "Fuel Pumps" in Carburetion Section
Gasoline Gauge: Auto-Lite Electric type
Dash Unit - Auto-Lite 14332A (All)
Tank Unit - Auto-Lite 14382A (P30), 14380A (Sub)
See "Fuel Gauges" in Carburetion Section
Air Cleaner: DRY FILTER ELEMENT type Clean every 5000 miles, replace element every 15,000 miles
► *CLEANING CAUTION* Clean filter element by tapping and shaking to remove dirt particles *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate*

BATTERY

Auto-Lite 11-HS-50 or Willard HP-11-50. 12 Volt, 9 plate, 50 ampere hour capacity (20 hr rate)
Grounded Terminal - Negative

STARTER

Auto-LiteMDM-6001 (Synchro-mesh), MDL-6004 (PowerFlite), MDL-6003 (Canada).
Armature - Auto-Lite MDL-2088 (All).
Drive - Bendix "Folo-Thru", No A3596.
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 31-47 ozs.

Performance Data - MDL

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10 0	60
6 0 ft. lbs.	Lock	4 0	225

Performance Data - MDM

Torque	RPM	Volts	Amperes
0 ft. lbs.	4400	10 0	50
5.0 ft. lbs.	Lock	4.0	210

Starting Switch: Auto-Lite SAE-4001 (Std.), SAE-4002 (PowerFlite). Magnetic type switch controlled by ignition switch Neutral safety switch mounted on transmission on Automatic Transmission cars *See "Starter Controls" in Electrical Section*

Neutral Safety Switch Adjustment: *See "PowerFlite & TorqueFlite" in Transmission Section*

GENERATOR

Auto-Lite. Used as follows:

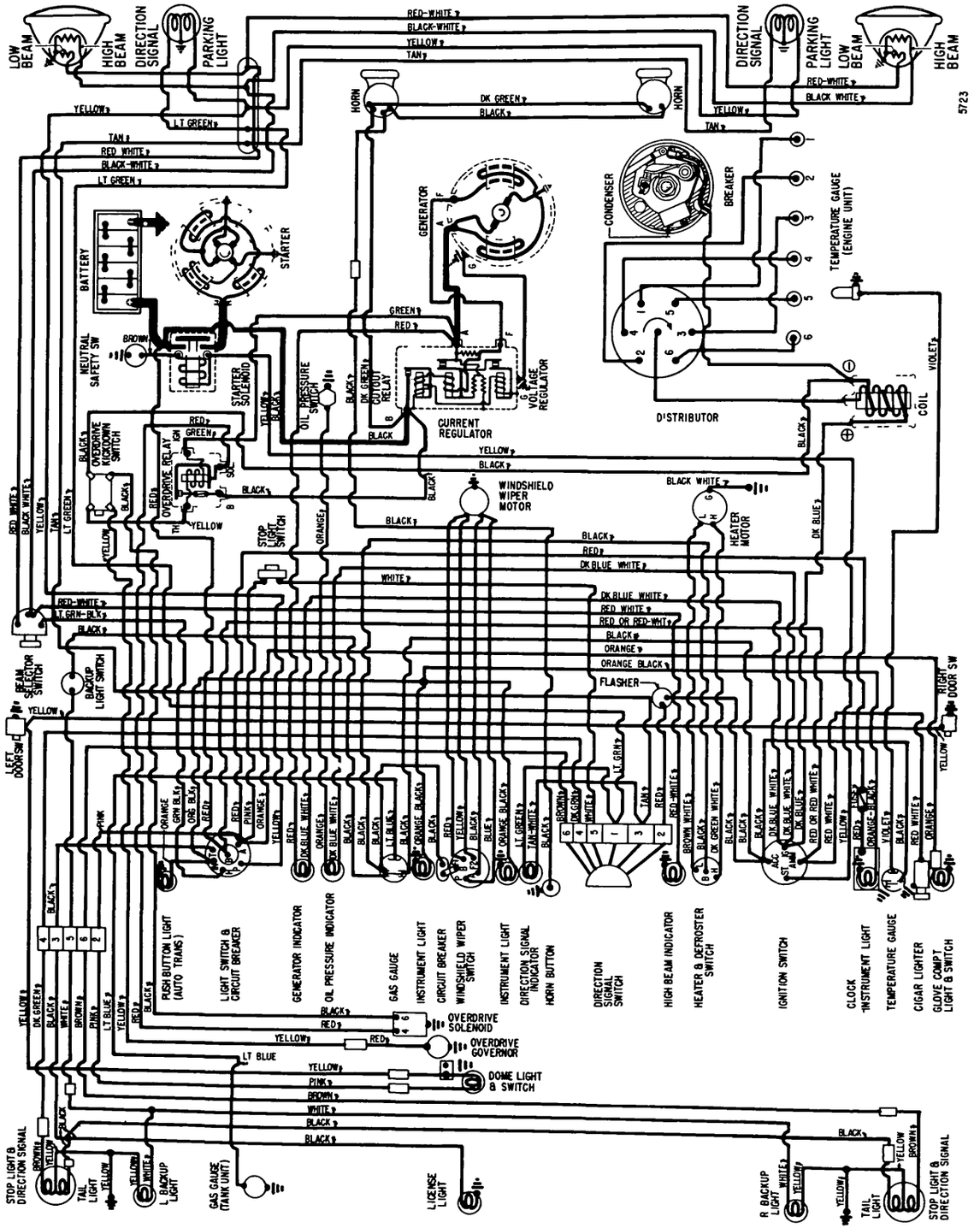
Generator No.	Armature No.	Application
GJC-7002H	GJC-2030F	Std (Early)
GJC-7012A	GJC-2030F	Std (Later)
GJC-7001C		Std ①
GGA-6001AC	GFY-2101F	Special ②
GJC-7003B	GJC-2090F	Std (Pwr Strg)
GHM-6003C	GHM-2071F	Spec (Pwr Strg)
GHM-6004A	GHM-2059F	Taxicab

① Limited Production ② Except Pwr Strg

P rformanc Data - GJC

Amperes	Volts	RPM
0.0	12 8	1225-1325
30 0	15 0	2050-2250

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Performance Data - GGA (Cold - 70°F)

Amperes	Volts	RPM
4.0	14.6	950
40.0	14.6	1600
40.0	15.0	1600

Performanc Data GHM (Cold - 70°F) -

Amperes	Volts	RPM
5.0	14.0	875
25.0	15.0	1350
30.0	15.0	1500

Rotation - Counter-clockwise at commutator end

Brush Spring Tension - 18-36 ozs. (GJC-7000), 34-41 ozs. (GGA), 35-53 ozs. (GHM).

Field Current - 1.2-1.3 Amps. (GJC), 1.1-1.3 Amps. (GGA & GHM), at 10.0 volts (70°F).

Motoring Current - 3.4-3.9 Amps. (GJC), 2 3-2.6 Amps. (GGA), 3.0-3.5 Amps. (GHM) at 10 volts (70°F).

B lt Adjustment: ¼" deflection with 5 lbs pull applied midway of longest belt span

REGULATOR

Aut -Lit . Used with generators as follows.

Auto-Lit R gulat r N .	Generator
VAT-6201A	GGA
VRX-6201A	GJC & GHM

Cut ut Relay

Cuts In - 12.6-13 6 volts (VRX), 13 0-13 7 volts (VAT)

Cuts Out - 8.2-9 3 volts.

Contact Gap - .015".

Air Gap - .031-.034" with contacts open.

V ltag Regulator

Setting - 14 5 volts at 80°F while charging at 10 amps. or with .25 ohm resistor in series between regulator and battery.

Air Gap - 048-.052" with contacts just opening

Ch cking & Adjusting - *See "Auto-Lite 12 Volt Reg ulators" in El ctrical S ction*

Curr nt Regulator

►*SETTING CAUTION "Temperature Compensated" typ . Set to following sp cifications at 70°F*

R gulator	Test A - Operating Amperes -	Test B
VRX	36 Max.	30 (28-32)
VAT	46 Max	40 (38-42)

T st A - After 15 minutes operation charging at 10 amperes

T st B - After additional 15 minutes operation on current regulator (load applied to hold voltage at 13 7-13 9 volts (VAT), 13 6-13 8 volts (VRX).

Air Gap - 048-.052" with contacts just opening

Ch cking & Adjusting - *See Auto-Lite 12 Volt Regulators" in El ctrical S ction*

MISC. ELECTRICAL

H adlamps: Sealed Beam *See Electrical Section*

Dir cti nal Signal: *Se Electrical Section*

Lighting & Pan l Switch Removal: Remove headlight switch knob recessed hex screw, remove knob Remove hex nut and threaded sleeve holding switch or switches in instrument panel Slide panel light switch control off lugs of tab plate

St p Light Switch (L cati n): On forward end of master cylinder

CIRCUIT BREAKERS: Used as follows

20 Amp r - Located on headlight switch, protects headlight, beam indicator, parking and ignition lights

15 Ampere - Protects all other lighting circuits

5 Ampere (Single Speed), 6 Ampere (Variable Speed) - Located on windshield wiper switch Protects windshield wiper circuit

FUSES: Clock - 2 ampere In clock lead

Overdrive - 14 amps. On Overdrive Relay.

ENGINE

ENGINE SPECIFICATIONS: 6 Cyl , "L" head

Bore	Stroke	Displacement
3 1/4"	4 5/8"	230 cu ins.
Compr. Ratio	**Rated HP**	**Developed HP**
8 0-1①	25 4	132 at 3600 RPM

① - Std with No 1731545 Head (Casting No 1676337) 8 2-1 on Taxicab with No 1821845 Head (Casting No 1821682)

Compression & Vacuum Reading - *See TUNE-UP*

OIL PAN REMOVAL: Drain engine oil, disconnect pitman arm from cross shaft and idler arm from idler arm bracket Remove dust shield and remove starter Disconnect front motor mounts and raise front of engine approximately 2" Install small wooden block under motor mounts and remove oil pan

►*OIL PAN INTERFERENCE NOTE.* If the oil pan contacts right hand frame cross member, install a 1/8" shim under right motor mount

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Plymouth Special Data*

TIGHTENING TORQUES - *See "Tightening Specifications" in Plymouth Special Data*

PISTONS

Aluminum alloy, U-slot, cam ground type.

►*CYLINDER BORE OVERSIZE CAUTION. Engines with letter "A" following engine number indicates that cylinder bore .020" Oversize.*

Weight—16 ozs. (stripped).

Removal—Pistons and rods removed from above.

Fitting New Pistons: 0007' measured ¾' from the bottom on thrust face. With piston pin and rings removed, cylinder wall and piston dry and clean, insert piston, upside down, into cylinder bore, with feeler stock, .002" x 1/2", inserted between cylinder wall and piston, on high spot of piston contour. Pull to withdraw feeler should be 6-10 lbs.

Replacement Pistons Std., .005", .020", .030", .040," .060" Oversize.

Installing Pistons "U" slot away from valves.

PISTON PINS

Full floating type.

Diameter—55/64". **L ngth**— 2-3/4".

Pin Fit in Pist n— 0000-.0005". DOUBLE THUMB push fit at room temperature (70° F.).

Pin Fit in R d Bushing—.0001-.0002". Tight thumb push fit at room temperature (70° F.).

R plac m nt Pins Std., .003", .008" Oversize.

NOTE—Fitted pins furnished with new pistons.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (#1)	3/32"	.010-.020"	.0025-.004"
Compr. (#2)	3/32"	.010-.020"	.002-.0035"
Oil (#3)	5/32"	.010-.020"	.001-.0025"
Oil (#4)	5/32"	.010-.020"	001- 0025'

Replacement Rings Std., .010", .020", .030", .040", .050", .060" Oversize.

Installing Rings #1 Compression, with step on inner edge up. #2 Compression with step on inner edge up (step down, if step on outer edge).

CONNECTING RODS

Length (Center.to.Center)—7 13/16

Weight—27 9 ozs

►*THICKER WALL-BEARING & JOURNAL DIAMETER CAUTION (One or more Journals Machined Undersize). "See "CRANKSHAFT" below.*

Crankpin Journal Diameter—2.0625".

Maximum out-of-round and taper limits—.001".

Lower Bearings—Removable, precision type, thin babbitt on steel No shims.

►***LOWER BEARING NOTE (Taxi Cab)*** - Starting with Engine No P-30 7563 NEW BI-METAL GRID bearings were installed in production Use new type bearing when servicing Taxi Cabs

►*JOURNAL DIAMETER CAUTION (ONE OR MORE Journals Machined UNDERSIZE)—See "CRANKSHAFT" below.*

Clearance—.0005-.0015".

Endplay—.006-.011"

Bearing Adjustment None. Replace bearings.

Replacement Bearings - Std., .001", .002", .003", .010", .012", .020" Undersize.

Installing Rods Oil metering hole toward valve side of engine.

CRANKSHAFT

Journal Diameter —.2.4995-2.5005". Four bearing.

Bearing Type—Removable, precision type, thin babbitt on steel. No shims.

►*CRANKSHAFT JOURNAL UNDERSIZE CAUTION.* Engines with undersize journals identified as follows

.010" UNDERSIZE (All Main & Connecting Rod Journals)—Letter "B" stamped with engine serial number indicates that ALL Main & Connecting Rod Journals are .010" Undersize.

001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals)—When replacing bearings, look for stamped number on middle throw arm of crankshaft. An "M" or "R" followed by a number indicates that a main or connecting rod bearing has a thicker-wall bearing. For example "M2" and "R1" means that .001" thicker-wall bearing inserts are used on the No. 2 main bearing and the No. 1 connecting rod bearing.

Cl arance —.0005-.0015".

Replac ment Bearings: Std., .001", .002", .003", .010", .012", .020", .030", .040" Undersize.

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Crankshaft Rear Oil Seals: *See "Crankshaft & Main Bearings" in Plymouth Special Data*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Plymouth Special Data*

End Thrust: Taken by flanged faces on rear (#4) main bearing. **Endplay**—.003-.007".

CAMSHAFT

Journal Diameters—(1) 2", (2) 1-31/32", (3) 1-15/16", (4) 1-1/4".

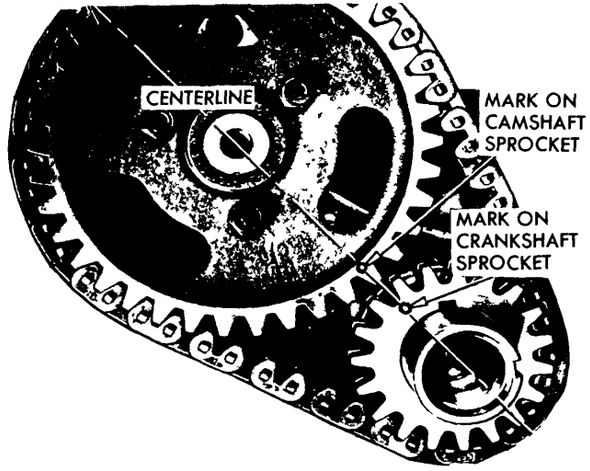
Bearings—Removable, steel-backed babbitt lined bushings (exc. #4—machined in crankcase).

Clearance—.001-.003" NOTE—If clearance exceeds .005" (measure with dial indicator placed against cam lobe and pry toward indicator), install new camshaft for test and if clearance is greater than .0035", replace bearings.

Removal & Installation: *See "Camshaft & Bearings" in Plymouth Special Data.*

End Thrust: Taken by thrust plate behind camshaft sprocket hub. **Endplay**—.002-.006".

Timing Chain: Width—1". **Pitch**—.500". **Length**—24" or 48 links.



PLYMOUTH 6 CYL. VALVE TIMING MARKS

Camshaft Setting: Sprockets marked. Mesh chain in sprockets with "0" marks on sprockets adjacent and in line with straightedge across shaft centers.

Engine Front Cover Installation: *See "Engine Front Cover" in Plymouth Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Plymouth Special Data.*

VALVES

Tappet Clearance: .010" Intake, .010" Exhaust. Engine hot and idling. NOTE—.002" additional clearance on exhaust tappets if car driven at continuous high speed.

Valves	Head Diam.	Stem Diam.	Length
Intake	1 17/32"	.340-.341"	4.84"
Exhaust	1 13/32"	.340-.341"	4.89"

Valves	Seat Angle	Lift	Stem-Clearance
Intake	45°	.365"	.001-.003"
Exhaust	45°	.365"	.003-.005"

Valve Seat Width—1/16-3/32". Runout .0015" maximum.

►*VALVE SEAT INSERT CAUTION: See "Valve System" in Plymouth Special Data.*

Valve Guides: Remove from above. Press new guides in with upper end 7/8" below top of block, ream guides to inside diameter of .342-.343" (Intake), .344-.345" (Exhaust). *CAUTION—Guides must be installed with counterbore end UP on exhaust valves and counterbore end DOWN on intake valves.*

Valve Springs: Can be installed with closely coiled end at either top or bottom. *NOTE—Springs are available in several colors. Colors do not refer to spring tension but merely identify the manufacturer.*

Free Length—2".

Valve Spring Specifications

	Spring Pressure	Length
Valve Closed	40-45 lbs.	1-3/4"
Valve Open	110-120 lbs.	1-3/8"

Valve Lifters: Mushroom type (remove from below).

Stem Diameter—5/8". Ream holes from above (pilot in guide). Oversizes .001", .008", .030".

Lifter Clearance in Block—.002" maximum.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE:* The following valve opening and closing points are with tappet clearance of .014". Reset to operating specifications after checking valve timing.

Intake Valve - Open 12° BTDC Close 44° ALDC

Exhaust Valve - Open 50° BLDC. Close 6° ATDC

OILING SYSTEM

►*OIL PUMP OUTLET PIPE INTERFERENCE CORRECTION:* To correct noise caused by outlet pipe interfering with oil pan, bend outlet pipe to provide clearance.

Crankcase Capacity: 5 quarts (refill). Add one quart with filter change.

Normal Oil Pressure - 40-50 lbs. at 25-30 MPH

Oil Pressure Relief Valve-Located on left side of cylinder block below starter.

Oil Pressure Relief Valve Spring: Color black. Free Length 1 7/8", Pressure 14:25-15.75 lbs. when compressed to length of 1¼".

Oil Pressure Indicator Switch: Located on left side of cylinder block at rear. When oil pressure exceeds 8-12 lbs. switch opens, indicator lamp goes out.

Oil Pump: Rotor type. On right side of crankcase.

Overhaul - *See "Oiling System" in Plymouth Special Data.*

Oil Filter: By-pass type with shunt type oil circuits. When pressure relief valve close, it blocks oil return from filter. As valve opens oil is permitted to flow through filter and excess oil returns to crankcase.

Filter Element - Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe.

COOLING

Water Capacity: 13 quarts. Add one quart for heater.

Pressure Valve - Radiator filler cap. Opens at 14 lbs.

Thermostat: Pellet type located in cylinder head water outlet. Opens at 157-162°F.

Water Pump: Ball bearing type. No lubrication required.

Water Distribution Tube: *See "Cooling System" in Plymouth Special Data.*

Temperature Gauge: Auto-Lite Electric.

Dash Unit - Auto-Lite 14333A.

Engine Unit - Auto-Lite 14405A.

See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck 9A7 No. 361384 (Std & Overdrive), **Auburn No. 100131-1** optional without overdrive.

Disc No. - Borg & Beck 382649.

See "Borg & Beck" or "Auburn" Clutches in Clutch Section.

Pedal Adjustment: Turn clutch release fork rod adjusting nut until 3/16" free movement of clutch fork outer end is obtained. This adjustment will provide necessary 1" free play at pedal.

Over-Center Spring Adjustment: Tighten eyebolt sleeve on clutch pedal overcenter spring bolt finger tight with pedal in depressed position, then tighten four complete turns.

Removal: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods. Remove transmission (See Synchro-mesh Transmission). Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

See "Plymouth Synchro-mesh" in Transmission Section.

►*LOW & REVERSE GEAR BINDING CORRECTION: See "Synchro-mesh Transmission" in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

►*CAR TOWING CAUTION:* If car is to be towed long distances, disconnect propeller shaft at rear axle carrier.

Removal: Disconnect propeller shaft, speedometer, cable, hand brake cable, and control rods. If transmission is to be disassembled, apply hand brake to hold mainshaft while loosening flange nut. This method will also prevent possible brinelling of bearings, or other damage caused by pounding on wrench. Remove transmission by pulling it straight back until pinion shaft clears clutch disc before lowering transmission. This precaution will avoid bending clutch disc.

OVERDRIVE

Warner Type R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.

See "Warner R10" Overdrive in Transmission Section.

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

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Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated two speed planetary transmission.

See "PowerFlite" Transmission in Transmission Section

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "PowerFlite" Transmission in Transmission Section*

►*TESTING & TROUBLE SHOOTING. See "PowerFlite" Transmission in Transmission Section*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles Use only Automatic Transmission Fluid Type "A"

Checking Fluid Level - See TORQUEFLITE below

Throttle Linkage Adjustment: See CARBURETOR above

►*OTHER "POWERFLITE" SERVICE DATA: See "PowerFlite" Transmission in Transmission Section*

TORQUEFLITE TRANSMISSION

Torque Converter and hydraulically operated three speed planetary transmission.

See "TorqueFlite" Transmission in Transmission Section

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "TorqueFlite" Transmission in Transmission Section*

►*TESTING & TROUBLE SHOOTING: See "TorqueFlite" Transmission in Transmission Section*

LUBRICATION: Check fluid level every 1000 miles, drain and refill every 20,000 miles. Use only Automatic Transmission Fluid Type "A".

Checking Fluid Level - CAUTION - *Following procedure and fluid level I superseded previous recommendations.* Check transmission COLD if possible. Idle engine with brakes applied, press all pushbuttons in turn, then check fluid level on dipstick with engine idling in "N". Maintain level as follows:

Cold Transmission (After standing and before being driven for several miles) - Level should be between "L" mark and ½" below "L" mark. Add oil if below ½" below "L" mark, remove oil if above "L" mark. Do not add oil if level within above range.

Hot Transmission (After being driven several miles) - Level should be between "F" mark and ½" below "F" mark (on cars with first type dipstick with distance of 1 5/8" between "F" and "L" marks, level should be ½" below "F" mark). Add oil if level below "L" mark to bring level up to ½" above "L" mark, remove oil if level above "F" mark. Do not add oil if level within above range.

Throttle Linkage Adjustment: See CARBURETOR above.

►*OTHER "TORQUEFLITE" SERVICE DATA: See "TorqueFlite" Transmission in Transmission Section*

UNIVERSALS

Driveshaft Universal - Ball & Trunnion type front, Gross type rear.

Rear Universal Joint Operating Angle - See "Propellor Shaft Notes" in Plymouth Special Data.

REAR AXLE

Own. Semi-floating with separate carrier and Hotchkiss drive *See "Plymouth Hypoid" in Rear Axle Section*

►*REAR AXLE LUBRICATION LEVEL NOTE:* Recommended capacity (3¼ pints) will bring fluid level to 1" below filler opening DO NOT add to bring level to opening

►*BANJO HOUSING INSTALLATION NOTE: Check rear universal joint angle See "Propellor Shaft Notes" in Plymouth Special Data*

Rear Axle Ratios	Standard	①Optional
Conventional	3.73-1(41-11)	4.1-1(41-10)
Overdrive	4.1-1(41-10)	
Auto Trans.	3.73-1(41-11)	3.9-1(43-11)

①Mountains and Hilly country.

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly

Axle Shaft Removal: Remove wheel, drum, and hub assembly (use screw type hub puller-Tool C-845), block brake pedal disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 Puller)

Wheel Bearing Adjustment: Shims between backing plate and axle housing With wheel and hub removed Check endplay with dial indicator To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick (equally at both wheels) **End Play** - .013-.018"

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic type Serviced by replacement

FRONT SUSPENSION

Independent. New "Torsion-Aire" Suspension with ball joint mounted steering knuckles and torsion bar front springs

See "Torsion-Aire" in Front Suspension and Wheel Alignment Section

►*UPPER BALL JOINT LUBRICANT LOSS CORRECTION: See "Torsion-Aire" in Front Suspension and Wheel Alignment Section*

Steering Axis Inclination - 6½° with correct camber.

Camber - Left Wheel 3/8° preferred, limits Pos. ½°-0°. Right Wheel 0° preferred, limits 0°±¼°.

Caster - 0 to Neg. 1½° (Manual Strg.), Pos. 1½° to 0° (Pwr. Strg.) *NOTE* - Set both sides the same.

Toe-In - 1/8" preferred, limits 3/32-5/32".

Toe-Out on Turns - Inner wheel 20°, outer wheel 17½-19°.

STEERING

Manual: Gemmer. Worm and three-tooth roller

See "Gemmer Worm & Roller" in Steering Section

Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column

See "Coaxial" Power Steering in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section*

Steering Gear Removal *See "Gemmer Worm & Roller" in Steering Section*

BRAKES

►*BRAKE LINING PRODUCTION CHANGE & PARTS REPLACEMENT CAUTION:* Improved brake lining (identified by one white and one blue spot on side) used in production beginning approx April 15, 1957. This lining recommended for severe braking conditions and can be installed on **all four wheels.** Furnished in Service Pkg. No. 1843349 (8 Linings), and No. 1674067 (Shoe & Bonded Lining).

►*FRONT WHEEL DUST SHIELD SEALING CAUTION:* Dust shields are sealed with heavy body sealer to prevent entrance of dust and water. Whenever wheel cylinder seal disturbed, reseal wheel cylinder openings when servicing brakes.

Service. Plymouth "Total-Contact" (Floating Shoe) type.

See "Chrysler, De Soto, Dodge, Plymouth Center-Plane & Total-Contact" Brakes in Brake Section

Drum Diameter - 11" front and rear.

Wheel Cylinder Diameter - 1 1/8".

Lining - Molded asbestos (bonded to shoe).

Length - 11½". **Width** - 2". **Thickness** - .20".

Braking Power - 60% front, 40% rear.

Clearance - Front Wheels - Turn each adjusting cam in direction of forward wheel rotation until shoe is solid against drum and wheel locked. Turn cams in opposite direction until wheel turns free.

Rear Wheels - Same as for front wheels except that forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe cams are rotated in direction of reverse wheel rotation.

Master Cylinder: On engine side of dash panel

Checking Fluid - Filler plug on top of master cylinder (on dash panel in engine compartment).

Removal - Disconnect pedal return spring, push rod and brake tube at master cylinder Disconnect stop light wires from switch and remove nuts and bolts that secure master cylinder to dash panel. Pull master cylinder straight out from dash panel

Power Brakes: "Bellows Assist" type. Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder).

See "Chrysler, Plymouth Bellows Type Power Unit" in Brake Section

Removal of Power Unit - *See Plymouth V8 data.*

Parking Brake: On shaft at rear of transmission 6" external contracting type used with Synchro-mesh Trans., 7" internal expanding type used with Automatic Trans.

Adjustment - *See "Brake Notes" in Plymouth Special Data*

Lining	Width	Thickness	Length
6" Ext.	2"	5/32"	15.38"
7" Int.	2"	5/32"	13.44"

►*PARKING BRAKE CAM LEVER INTERFERENCE CORRECTION:* Install 1/8" steel shim between rear engine mount and crossmember when interference prevents brake from releasing.

MISC. MECHANICAL

See Plymouth V8 data for all miscellaneous Mechanical specifications.

MODEL IDENTIFICATION

Series	Model Identification
Plaza	P-31-1
Savoy	P-31-2
Belvedere	P-31-3
Fury	P-31

SERIAL NUMBER: On plate attached to left front hinge pillar post.

First Serial No. - 16,083,001 (Detroit), 22,330,001 (Evansville), 26,595,001 (Los Angeles).

ENGINE NUMBER: Stamped on boss at center of cylinder block directly beneath and behind water pump and below battery ground wire attaching point at block.

►*ENGINE NUMBER LETTERS & MARKS (Following Engine Number). Indicates as follows*

"A" - All cylinders .020" oversize.

"B" - All Main & Connecting Rod Journals .010" undersize.

"AB" - Both above conditions exist.

♦ (3/8" High) - .008" oversize tappets used.

TUNE-UP

COMPRESSION PRESSURE: 125-165 lbs (exc "Fury"), 145-180 lbs ("Fury") Maximum variation between cylinders 15 lbs

VALVE TAPPET CLEARANCE: All Engines - .008" Intake, .018" Exhaust, HOT.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Located at right exhaust manifold (between manifold and exhaust pipe).

IGNITION

FIRING ORDER: 1–8–4–3–6–5–7–2.

Cylinders - RIGHT BANK 2–4–6–8. LEFT BANK 1–3–5–7.

SPARK PLUG GAP: 035" (All)

Spark Plugs - Auto-Lite Resistor AR-52 (277" & 301" Engines), AR-32 (Fury). 14 mm. Tighten to 30-32 ft. lbs. *torque.*

COIL: Auto-Lite CAH-4001B. All Engines.

Ignition Current - 2.5 amperes idling, 3.1 stopped.

Resistor - Auto-Lite PU-4003. .665-.735 ohms. Resistor is permanently connected in primary circuit between coil and breaker terminal on distributor (no by-pass for starting). Test coil and resistor separately.

DISTRIBUTOR: Auto-Lite.

Engine	Auto-Lite Distr. No.
277" (Early)	IBJ-4301B
277" (Late)	IBP-4003C
301" (Exc. Power Pak)	IBP-4003
301" (Power Pak)	IBP-4003A
318" (Fury)	IBS-4003

►*NOTE:* IBS-4003 is "Double Breaker" type.

Condenser & Contact Point Sets

Distributor	Condenser No.	Contact Point Set
IBJ-4301B	IBB-2015R	IGW-3028MS
IBP-4003, 3A, 3C	IAT-2015RA	IBP-3028AS

Condenser Capacity - .25-.28 mfd.

Breaker Gap - .017" (.015-.018").

Cam Angle - (IBJ & IBP Single Breaker) 27-32° (IBS Double Breaker) 36-39° for both sets of contacts operating together

►*CAM ANGLE SETTING CAUTION (IBP DISTR.).* Cam angle should be checked with vacuum line **disconnected.** Cam angle may decrease as much as 10° with maximum vacuum advance but must not decrease more than 12°

Breaker Arm Spring Tension - 17-20 ozs.

Rotation - Clockwise viewed from above.

Automatic Advance - IBJ-4301B

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		385	2		770
9.5		700	19		1400
15		1800	30		3600
16		2000	32		4000

Automatic Advance - IBP-4003

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		500	0		1000
1		575	2		1150
5		850	10		1700
8		1750	16		3500
9 5		2200	19		4400

Automatic Advance - IBP-4003A

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		370	2		740
6		450	12		900
10		850	20		1700
11		950	22		1900

Automatic Advance - IBP-4003C

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		400	2		800
6.5		700	13		1400
14		1975	28		3950
15		2150	30		4300

Automatic Advance - IBS-4003

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		350	0		700
1		375	2		750
4		450	8		900
7		875	14		1750
8		1000	16		2000

Vacuum Spark Control: Integral type.

Vacuum Advance - IBJ-4301B

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5 1/2
1	2	6
5	10	8 1/2
10	20	13
11.5	23	15

Vacuum Advance - IBP-4003

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7 1/8
1	2	7 5/8
7	14	11 7/8
12	24	16 3/4
13	26	18

Vacuum Advance - IBP-4003A

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	7 1/8
1	2	7 3/4
5	10	10 1/2
8	16	12 3/4
9.5	19	13 1/2

Vacuum Advance - IBP-4003C

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	5 1/2
1	2	6 1/8
6	12	9 3/8
11	22	13 5/8
12.5	25	15 1/2

Vacuum Advance - IBS-4003

Distr. Degrees	Eng Degrees	Vacuum (" of Hg)
Start	0	9 1 8
1	2	9 7/8
5	10	12 7/8
9	18	16 1/2
10 25	20 50	18

IGNITION TIMING

Engine	Distr. No.	Std. Setting
277" (Early)	IBJ-4301B	At TDC
277" (Later)	IBP-4003C	4° BTDC
301" (Exc.Pwr.Pak)	IBP-4003	10° BTDC
301" (Pwr.Pak)	IBP-4003A	4° BTDC
318" (Fury)	IBS-4003	8° BTDC

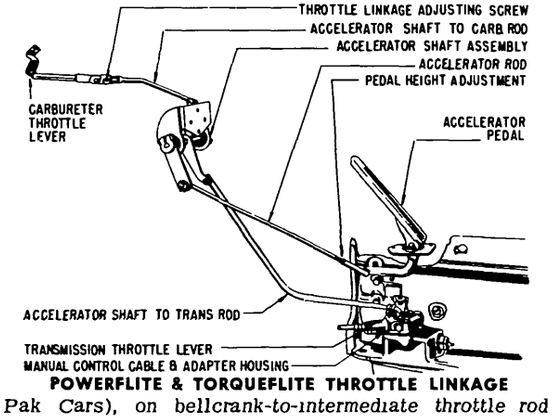
Timing Mark - Vibration dampener marked "DC" with 2° graduations before and after this point for a total of 10° (10° point marked "10"). Align correct mark with pointer on chain case cover.

CARBURETOR

►*CARBURETOR APPLICATION NOTE: Carter and Stromberg Carburetors standard on 277" & 301" engines. A single Carter 4-Barr l Carburetor is optional on the 301" engine. Two Carter 4-Barr l Carburetors are standard on the 318" (Fury) engine.*

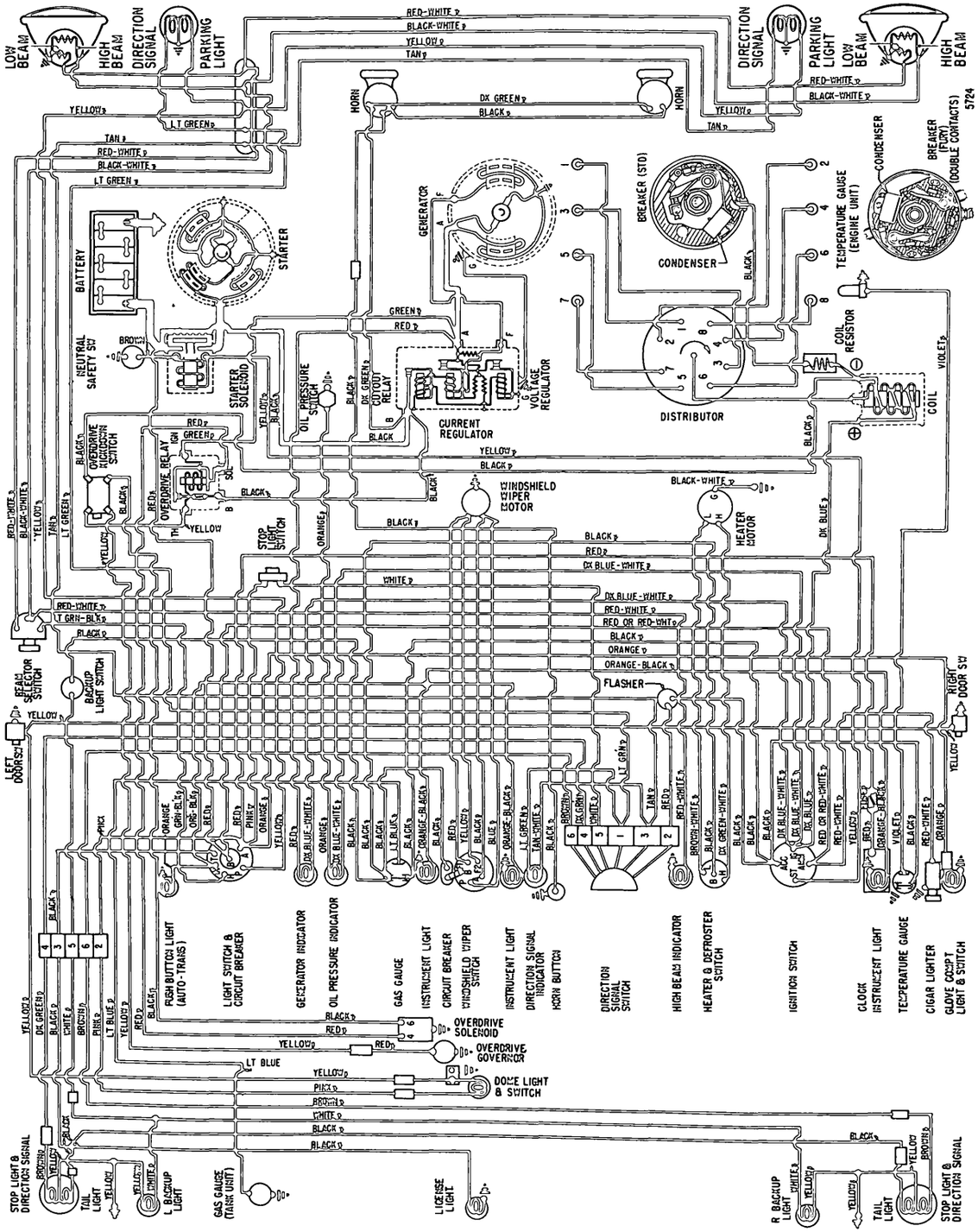
►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedures required. See AIR CLEANER below*

THROTTLE LINKAGE ADJUSTMENT (PowerFlite & TorqueFlite): With engine at normal operating temperature, idle speed adjusted to 475-500 RPM and transmission in "N" (Neutral), loosen the throttle linkage adjusting nut on bellcrank-to-carburetor rod (Exc. Power Pak Cars), on *bellcrank-to-intermediate throttle rod* (Power Pak Cars). Hold light preload rearward on rod so throttle valve lever on transmission is against its stop, then tighten throttle adjusting nut. Adjust accelerator pedal rod so that wide open throttle is obtained when pedal depressed just down to the floor mat with-



POWERFLITE & TORQUEFLITE THROTTLE LINKAGE

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out compressing it. Make this adjustment by disconnecting pedal rod at pedal arm and turning ball and socket end on rod.

Throttle Pressure Adjustment (PowerFlite): *See "PowerFlite Transmission" in Transmission Section.*

CARTER BBD (Dual)
277" & 301" Engines

Transmission	Carter Carb. No.
Synchro-mesh	Ⓒ BBD 2512S,SA,SB,SC
Overdrive	Ⓒ BBD 2513S,SA,SB,SC
PowerFlite & TorqueFlite	Ⓒ BBD 2514S,SA,SB,SC

Ⓒ - Cross-Over type choke.

▷ *CARBURETOR LIMITED PRODUCTION NOTE (Plaza Models with 277" Engine): Carter BBD No. 2407S & 2409S used on some cars. For data on these models, see 1956 Plymouth V8 data.*

▷ *PRODUCTION CHANGES AND RECOMMENDED PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Carter BBD Carburetors" in Carburetion Section.*

Idle Setting - ¼-1¼ turns open. Turn both screws out equally for richer mixture.

Idle Speed - 450-500 RPM (Synchro-mesh & Overdrive). 475-500 RPM (PowerFlite & TorqueFlite).

Float Level - 9/32" (Gauge T109-239) between top of each float ridge (at center of float) and top surface of body casting. Adjust by bending lip on float arm.

Accelerating Pump - Install throttle connector in center hole (medium stroke) of throttle lever and inner hole of pump arm.

Fast Idle Cam Clearance: With choke valve closed and lip on inner choke shaft lever contacting lug on outer lever, align index mark with adjusting screw. Adjust by bending lip on inner choke shaft lever.

Fast Idle Throttle Clearance: .020" (Gauge T109-29) between lower edge of throttle valve and bore with adjusting screw on high step of cam. This supersedes previous setting of .015".

Automatic Choke (Cross-over Type): *(NOTE - One-piece and Two-piece assemblies used. Adjustment is the same for both types).* Set at index as follows: Remove choke assembly from manifold and loosen mounting post locknut and turn mounting post with a screwdriver until index mark on disc is aligned with center mark on scale. Hold in this position and tighten locknut. *(NOTE - If connector rod does not clear sides of hole in housing cover without binding, replace the unit. Do not bend connector rod.*

Overdrive Kickdown Switch: With throttle valves wide open there should be 1/64-3/64" between kickdown lever and switch stem guide.

Throttle Linkage Adjustment (PowerFlite & TorqueFlite): *See CARBURETOR above.*

▷ *OTHER DATA: See "Carter BBD Carburetors" in Carburetion Section.*

STROMBERG WW (Dual)
277" & 301" Engine

Transmission	Stromberg Code No.
Synchro-mesh	WW 15-23
Overdrive	WW 15-24
PowerFlite & TorqueFlite	WW 15-25

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►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2-3-5-8, LEFT barrel 1-4-6-7.*
Idle Setting - 1-2 turns open. Adjust both screws alike. Turn screws out for richer mixture.
Idle Speed - 450-500 RPM (Synchro-mesh & Overdrive), 475-500 RPM (PowerFlite & TorqueFlite).
Float Level - Top of float at center should be 7/32" below top edge of float bowl with needle valve seated. Check with Tool T-25569 placed on top of bowl and float lip held firmly against fuel inlet needle. Adjust by bending float lip.
Accelerating Pump - Normal setting, pump rod connected in center hole of throttle lever. Inner hole for less fuel, outer hole for more fuel.
Fast Idle: Turn throttle stopscrew out so that throttle valves completely closed. Hold throttle valves closed, back out fast idle screw until fast idle cam can be positioned with **first** step in line with fast idle screw, turn screw in until it just contacts cam, then turn screw in additional 5½ turns. With the fast idle cam held in this position, close choke valve until fast idle screw is against shoulder on cam, measure choke valve opening by inserting No. 12 drill between upper edge of valve and air horn wall. If opening not correct, bend fast idle rod as required.
Automatic Choke Setting: *NOTE* - Choke is "Cross-over" type mounted in manifold and linked to choke valve. Should not require adjustment (must be removed from manifold well for checking). Index mark on disc should be centered on scale on thermostat cover plate.
Throttle Linkage Adjustment (PowerFlite & TorqueFlite): *See CARBURETOR above.*
►*OTHER DATA: See "Stromberg WW (DeSoto, Dodge, Plymouth) Carburetors" in Carburetion Section*

CARTER WCFB (4-Barrel)
301" Engine (Power Pak)

Carter WCFB 2530S, SA (All Transmissions). 4-Barrel downdraft type of same design as used on previous models.
►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels 1-4-6-7.*
Idle Setting - 1-2 turns open. Turn screws out equally for richer mixture.
Idle Speed - 450-500 RPM (Synchro-mesh & Overdrive), 475-500 RPM (PowerFlite & TorqueFlite).
Throttle Linkage Adjustment (PowerFlite & TorqueFlite): *See CARBURETOR above.*
►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetors" in Carburetion Section*

CARTER WCFB (4-Bbl.) DUAL
318" Engine Fury Models

Carter WCFB, 2631S (Front). 2632S (Rear).
►*PRODUCTION CHANGES AND RECOMMENDED PARTS CHANGES FOR IMPROVED PERFORMANCE: See "Carter WCFB 4-Barrel Carburetors" in Carburetion Section*

►*MANIFOLD FUEL DISTRIBUTION: RIGHT barrels feed right bank cylinders, LEFT barrels feed left bank*
►*CARBURETOR IDLE ADJUSTMENT CHANGE NOTE: The following idle speed & mixture adjustment procedure supersedes previous instructions.*
►*CARBURETOR SYNCHRONIZATION NOTE:* Before adjusting idle mixture and idle speed, the carburetor inter-connecting rod must be adjusted as follows: Hold rear carburetor throttle in wide open position (choke off) and adjust rod at slotted end so front carburetor throttle valve will be in wide open position. Make sure rod can rotate slightly on pivots and not bind.
Idle Speed & Mixture Adjustment: Screw the "idle by-pass" screw (7/16" slotted hex head screw located on left rear side of each carburetor body flange) against its seat *(NOTE - This "by-pass screw" is no longer used for idle speed adjustment and must remain in the closed position).* Adjust engine idle speed to 650 RPM (transmission in neutral) by screwing in the **idle speed screw** (throttle stop screw at throttle shaft lever) on the front carburetor only. Adjust all four (two on each carburetor) idle mixture screws 1 turn open from a lightly seated position. Obtain the smoothest possible idle speed by further adjusting idle mixture screws on **front** carburetor *(NOTE - It may also be necessary to re-adjust idle mixture screws on rear carburetor if adjustment of front carburetor does not provide proper engine idle speed).*
Throttle Linkage Adjustment (Automatic Transmission Cars): *See CARBURETOR above.*
►*OTHER DATA: See "Carter WCFB 4-Barrel Carburetor" in Carburetion Section.*
FUEL PUMP PRESSURE: 6-7 lbs. at 2000 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter M2501S (Exc. Air Cond.), M2504S (Air Cond.)
Pressure - 5-7 lbs. at 500 RPM.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: Auto-Lite Electric type.
Dash Unit - Auto-Lite 14332A (All).
Tank Unit - Auto-Lite 14382A (P31), 14380A (Sub.).
See "Fuel Gauges" in Carburetion Section.
Air Cleaner: DRY FILTER ELEMENT type. Clean every 5000 miles, replace element every 15,000 miles.
►*CLEANING CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate.*

BATTERY

Auto-Lite 11-HS-50 or Willard HO-11-50. 12 Volt, 9 plate, 50 ampere hour capacity (20 hr. rate).
Grounded Terminal - Negative.

STARTER

Auto-Lite MDM-6001 (Synchro-mesh), MDM-6002 (Auto. Trans.), MDL-6003 (Canada).
Armature - Auto-Lite MDL-2088 (All).
Drive - Bendix "Folo-Thru", No. A3596.
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension - 31-47 ozs.

Performance Data - MDL

Torque	RPM	Volts	Amperes
0 ft. lbs.	3200	10.0	60
6.0 ft. lbs.	Lock	4.0	225

Performance Data - MDM

Torque	RPM	Volts	Amperes
0 ft. lbs.	4400	10.0	50
5.0 ft. lbs.	Lock	4.0	210

Starting Switch: Auto-Lite SAE-4001 (Std.), SAE-4002 (Auto. Trans.). Magnetic switch controlled by ignition switch. Neutral safety switch mounted on transmission on Automatic Transmission cars.
See "Starter Controls" in Electrical Section.
Neutral Safety Switch Adjustment: *See "PowerFlite & TorqueFlite" in Transmission Section.*

GENERATOR

Auto-Lite. Used as follows:

Generator No.	Armature No.	Application
GJC-7001D	GJC-2030F	Std. (Early)
GJC-7012A	GJC-2030F	Std. (Later)
GJC-7001C		Std. Ⓒ
GGA-6001AC	GFY-2101F	Special ②
GHM-6004C	GHM-2059F	Air Cond.
GHM-6004A	GHM-2059F	Taxicab

Ⓒ - Limited Prod. ② - Except Power Steering.

Performance Data - GJC

Amperes	Volts	RPM
0.0	12.8	1225-1325
30.0	15.0	2050-2250

Performance Data - GGA

Amperes	Volts	RPM
4.0	14.6	950 Max.
40.0	14.6	1600 Max.
40.0	15.0	1600 Max.

Performance Data - GHM

Amperes	Volts	RPM
5.0	14.0	875 Max.
25.0	15.0	1350 Max.
30.0	15.0	1500 Max.

Field Current - 1.2-1.3 amps. (GJC), 1.1-1.3 amps. (GGA & GHM) all at 10.0 volts at 70°F
Motoring Current - 3.4-3.9 amps. (GJC), 2.3-2.6 amps. (GGA), 3.0-3.5 amps. (GHM) all at 10.0 volts.
Brush Spring Tension - 18-36 ozs. (GJC), 34-41 ozs. (GGA), 35-53 ozs. (GHM).
Rotation - Counter-clockwise at commutator end.
Belt Adjustment: **(Std.)** - ¼' deflection with 10 lb. pull midway of longest span.
(Air Cond.) - Loosen generator mounting bolts and use Tool C-3379 & Tool C-3005 to apply 15 lbs. tension on belt. Tighten generator mounting bolts while holding this tension.

REGULATOR

Auto-Lite VAT-6201A (GGA Gen.), VRX-6201A (GJC & GHM Gen.). Current Regulator
►*SETTING CAUTION. "Temperature Compensated" type. Set to following specifications at 70°F.*

Regulator	Test A - Operating Amperes -	Test B
VRX	36 Max.	30 (28-32)
VAT	46 Max.	40 (38-42)

Test A - After 15 minutes operation charging at 10 amperes.
Test B - After additional 15 minutes operation on current regulator (load applied to hold voltage at 13.7-13.9 volts (VAT). 13.6-13.8 volts (VRX).

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Air Gap - .048-.052" with contacts just opening.
Ch cking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

Cutout Relay

Cuts In - 12.6-13.6 volts (VRX), 13.0-13.7 volts (VAT).
Cuts Out - 8.2-9.3 volts.
Contact Gap - .015".
Air Gap - .031-.034" with contacts open.

Voltag Regulator

Setting - 14.5 volts at 80°F while charging at 10 amps. or with .25 ohm resistor in series between regulator and battery.
Air Gap - .048-.052" with contacts just opening.
Ch cking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Se aled Beam. *See Electrical Section.*
Dir ctional Signals: *See Electrical Section.*
Lighting & Panel Switch Removal: Remove headlight switch knob recessed hex screw, remove knob. Remove hexnut and threaded sleeve holding switch or switches in instrument panel. Slide panel light switch control off lugs of tab plate.
St p Light Switch L cation: On forward end of master cylinder.
CIRCUIT BREAKERS: Used as follows:
20 Amper - Located on headlight switch, protects headlight, beam indicator, parking and ignition lights.
15 Amper - Protects all other lighting circuits.
5 Amp r (Singl Sp d), 6 Ampere (Variable Speed). Located on windshield wiper switch. Protects windshield wiper circuits.
FUSES: Cl ck - SFE 2 in clock lead.
Ov rdriv - 14 am ps. Located on overdrive relay.

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Before disconnecting any part of air conditioning equipment or lines for access to engine, see "Air Conditioning Servic Cautions" in Miscellaneous Section.*
► *ENGINE NOTE: Three engines used. All have polysph rical combustion chambers with lateral valves and single rocker arm shaft. Bores and stroke differ in engines as indicated in Specifications below.*

ENGINE SPECIFICATIONS: 90° V8 (All Models).

Engine	Bore	Stroke	Displacement
P-31-1 (Std.) ①	3.75"	3.13"	277 cu. ins.
P-31-2,3 (Std.)	3.91"	3.13"	301 cu. ins.
Fury	3.91"	3.31"	318 cu. ins.

① - 301" Engine is standard on Suburban models and optional on other models.

Engine	C mpr. Ratio	Rated HP	Developed HP
277"	8.0-1	45.0	197 at 4400 RPM
301"	8.5-1	48.9	② 215 at 4400 RPM
318"	9.25-1	48.9	290 at 5400 RPM

② - 235 at 4400 RPM with Power Pak.

C mpr ssi n & Vacuum Reading - *See TUNE-UP.*
ENGINE REMOVAL: *See "Engine" in Plymouth Special Data.*
ENGINE MOUNTS: *See "Engine Mountings" in Plymouth Special Data.*
► *ENGINE IMPULSE NOISE CORRECTION:* See "Engine Mountings" in Plymouth Special Data for installation of latest type engine front mount insulator.

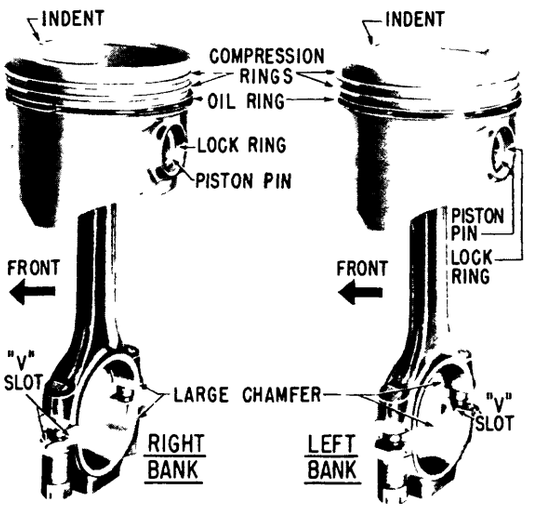
OIL PAN REMOVAL: Remove distributor cap and rotor. Drain engine oil. Disconnect pitman arm from cross-shaft and idler arm from idler arm bracket. Remove starter motor. Remove exhaust cross-over pipe, and dust shield. Disconnect front engine mounts and raise front of engine approximately 2". Install small blocks under mounts to support engine and remove oil pan bolts and pan.

► *OIL PAN INTERFERENCE NOTE: If the oil pan touches right hand frame member, install a 1/8" shim under right motor mount.*

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Plymouth Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Plymouth Special Data.*

PISTONS

Aluminum alloy, elliptically turned, horizontal slot, tin-plated, thermally controlled by steel band.
Clearance - .005-.0015" at top of skirt. Pull to withdraw .0015 X ½" feeler should be 5-10 lbs. at 70°F.
► *CYLINDER BORE OVERSIZE CAUTION:* Engines with letter "A" following engine number will have .020" oversize cylinder bore.
Removal: Pistons and rods removed from above.
Replacement Pistons: Std., .005", .020", .030", .040", and .060" oversize.



V8 ENGINE PISTON & ROD ASSYS.

Installing Pistons: Assemble pistons to connecting rod on right hand cylinder bank (2-4-6-8) with indent on top of piston on side opposite to large chamfer at insert end of connecting rod. On left bank (1-3-5-7) assemble with detent on same side as large chamfer at insert end of connecting rod. *See Rod Installation.*

PISTON PINS

Floating type with lock ring at each end.
Diameter - .9841-.9843".
Clearance in Piston - .0000-.0005". Tight double thumb press fit at 70°F.
Clearance in Rod - .0001-.0004". Tight thumb press fit at 70°F.
Replacement Pins: Std. .003" and .008" oversize.

PISTON RINGS

Ring	Widtn	End Gap	Side Clearanc
Compr. (1)	.0775-.0780"	.010-.020"	.0015-.003"
Compr. (2)	.0775-.0780"	.010-.020"	.001-.0025"
Oil (3)	.1860-.1865"	.010-.020"	.001-.003"

Replacement Rings: Std. .010", .020", .030", .040", .050", .060" oversize.
Installing Rings: Install compression rings with step on inner edge up.

CONNECTING RODS

Length - 6.12" (Center to Center).
Crankpin Journal Diameter - 2.12".
► *JOURNAL DIAMETER CAUTION (ONE OR MORE Journals Machined UNDERSIZE): See CRANKSHAFT below.*
Lower Bearing - Replaceable, precision type.
Clearance - .0007-.0022" (P-31-1), .0005-.0015" (Others).
Side Play -,006-.014" (two rods).
Installing Rods: Install in cylinder with indent on piston to front of engine. The large chamfer on connecting rod must be toward crankshaft journal fillet.
Bearing Adjustment: None, replace bearings.
Replacement Bearings: Std., .001", .002", .003", .010", and .012" undersize.
► *BEARING INSERT CAUTION:* When installing lower bearing insert, make sure that "V" groove in insert is in line with "V" groove in cap for proper lubrication.

CRANKSHAFT

Journal Diameter - 2.50".
► *CRANKSHAFT JOURNAL DIAMETER CAUTION:* Engines with undersize journals identified as follows:
.010" UNDERSIZE (Main & Connecting Rod Journals) - Letter "B" following engine number indicates that ALL Main & Connecting Rod Journals are .010" undersize.
.001" UNDERSIZE (ONE OR MORE Main & Connecting Rod Journals) - When replacing bearings, look for stamped number on middle throw arm of crankshaft. An "M" or "R" followed by a number indicates that a main or connecting rod bearing has a thicker wall bearing. For example, "M2" and "R1" means that .001" thicker wall bearing inserts are used on the No. 2 main bearing and the No. 1 connecting rod bearing.
Clearance - .0005-.0015".
Replacement Bearings: Std., .001", .002", .003", .012", undersize.
Crankshaft Rear Oil Seals: *See "Crankshaft & Main Bearings" in Plymouth Special Data.*
Crankshaft Front Oil S al: *See "Engine Front Cover" in Plymouth Special Data.*
End Thrust: Taken by center (No. 3) main bearing.
End Play - .002-.007".

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CAMSHAFT

Journal Diameters - (1) 2", (2) 1 63/64", (3) 1 31/64", (4) 1 61/64", (5) 1 9/16".

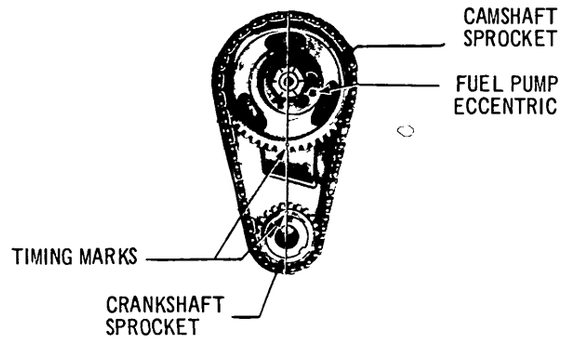
Bearings - Removable, steel backed babbitt.

Clearance - .001-.003".

End Thrust: Taken by thrust plate behind camshaft sprocket hub.

Timing Chain: **Width** - 1.02". **Pitch** - .38. **Length** - 68 links.

Camshaft Setting: Valve timing is correct when timing marks on camshaft and crankshaft sprockets are adjacent and in line across shaft centers.



V8 ENGINE VALVE TIMING MARKS

Removal & Installation: *See "Camshaft & Bearings" in Plymouth Special Data.*

Engine Front Cover (Removal & Installation): *See "Engine Front Cover" in Plymouth Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Plymouth Special Data.*

VALVES

Tappet Clearance: .008" Intake, .018" Exhaust, Hot and idling.

Valve	Head Diam.	Stem Diam.	Length
Intake	1.84"	.372-.373"	4.60"
Exhaust	1.56"	.371-.372"	4.58"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	①	.001-.003"
Exhaust	45°	②	.002-.004"

① - .387" (277" & 301" Engines), .405" (Fury).
② - .387" (277" & 301" Engines), .405" (Fury).

Valve Seat Width - .060-.085" (Intake), .040-.060" (Exhaust).

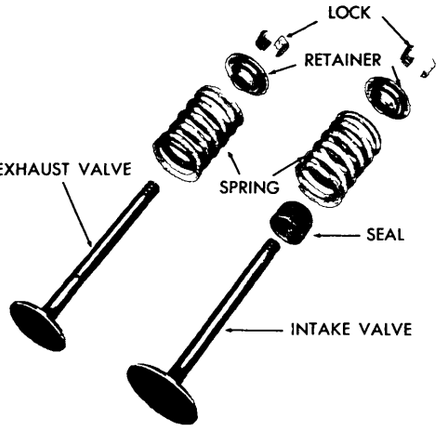
►*VALVE OVERSIZE NOTE:* "I" or "E" stamped on head at rocker arm cover gasket boss, indicates that all intake or all exhaust valves are oversize in that head, depending upon letter stamped on boss.

Valve Springs: Same spring used on intake and exhaust.

Free Length - 1 15/16" (277"), 2" (Others).

Valve Spring Specifications (277" & 301" Engines)

Valve	Spring Pressure	Length
Closed	72 lbs.	1.69"
Open	166 lbs.	1.31"



V8 ENGINE VALVE ASSY.

Fury Engine

Valve	Spring Pressure	Length
Closed	90 lbs.	1.66"
Open	185 lbs.	1.28"

►*VALVE SPRING HEIGHT CAUTION:* If installed height of spring is greater than 1 11/16", install a 1/16" spacer (Part No. 1400482) in head counterbore to bring spring height back to normal 1 5/8-1 11/16".

Valve Guides: Cast integral with cylinder head. Service as follows When valve stem clearance excessive, use Reamer Tool Set to ream guides to NEXT OVERSIZE Valve as follows Tool C-3433 (.005" O.S.), Tool C-3430 (.015" O.S.), Tool C-3427 (.030" O.S.). Valves furnished Std., and .005", .0015". .030" oversize.

Valve Lifters: **(All)** - Barrel type mechanical lifters. Remove from above.

►*LIFTER PRODUCTION CHANGE:* Lifters used in later engines have a shorter overall length (2" early, 1 25/32" later), but are of same weight and are interchangeable.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

►*VALVE TIMING NOTE* Valve timing specifications are with valve train solid.

277" Engine

Intake Valves - Open 14° BTDC. Close 50° ALDC.
Exhaust Valves - Open 52" BLDC. Close 12° ATDC.

301" Engine

Intake Valves - Open 8° BTDC. Close 52° ALDC.
Exhaust Valves - Open 52° BLDC. Close 8° ATDC.

Fury Engine

Intake Valves - Open 17° BTDC. Close 59° ALDC.
Exhaust Valves - Open 55° BLDC. Close 21° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 qts refill Add 1 qt with filter change.

Normal Oil Pressure - 50-65 lbs at 1500 RPM

Oil Pressure Relief Valve - In oil pump body, Adjustable by replacing spring

►*OIL PRESSURE RELIEF VALVE SPRING NOTE:* Springs identified as follows

Color	Free Height	Spring Pressure & Checking Height
Gray (Lt.)	3 1/32"	16 1-17 1 lbs at 2 1/16"
Red (Std)	2 27/32"	19 5-20 5 lbs. at 2 1/16"
Brown (Hvy.)	2 31/32"	22 9-23 9 lbs at 2 1/16"

Oil Pressure Indicator: Lamp on Instrument panel. Light comes on when ignition switch turned on, goes out when oil pressure reaches 8-12 lbs. Operated by oil pressure switch located at the rear of cylinder block at the top

Oil Pump: Rotor type Located at rear of engine on rear main bearing cap.

Priming Oil Pump (After Overhaul) - Prime oil pump before installation of pump and strainer to rear main bearing cap

Overhaul - *See "Oiling System" in Plymouth Special Data*

Oil Filter: Shunt type. A portion of oil from oil pump is directed through filter and remainder flows into engine lubrication system

►*ENGINE OILING SYSTEM PRODUCTION CHANGE:* Early production cars had oil by-pass valve in lead from oil pump to main oil galley, later cars have sleeve with 9/64" orifice replacing bypass valve

Filter Element - Install new filter element and cover gasket at 5000 mile intervals (or earlier if required). Change oil at same time filter element is changed.

Crankcase Ventilation: Filter element in oil filler cap and air cleaner in crankcase ventilation outlet pipe (if so equipped).

COOLING

Water Capacity: 20 qts. Add 1 qt. for heater.

►*AIR CONDITIONER OPERATING CAUTION:* Engine cooling system must be protected to a temperature of 20°F (above zero) for summer operation.

Pressure Valve: Radiator filler cap. Opens at 14 lbs.

Thermostat: Pellet type. Located under water outlet elbow. Opens at 157-162°F.

Water Pump: Sealed ball bearing type. No lubrication required.

Overhaul - *See "Plymouth" in Water Pump Section.*

Fan Belt Adjustment (Air Conditioned Cars): 1/8" deflection with 10 lbs. pressure midway between idler and water pump pulleys. *NOTE - For generator belt adjustment, see Generator above.*

Temperature Gauge: Auto-Lite. Electric type.

Dash Unit - Auto-Lite 14333A.

Engine Unit - Auto-Lite 14405A.

See "Temperature Gauges" in Misc. Section.

CLUTCH

Borg & Beck. 10A7 No. 361376 (Std. V8), 10.5A8 No. 361418 (Fury).

Disc No. - Borg & Beck 382358 (10A7), 382621 (10.5A8).

See "Borg & Beck" Clutches in Clutch Section.

Pedal Adjustment: Turn clutch release fork rod adjusting nut until 3/16" free movement of clutch fork outer end is obtained This adjustment will provide necessary 1" freeplay at pedal

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Ov r-Cent r Spring Adjustment: Tighten eyebolt sleeve on clutch pedal overcenter spring bolt finger tight with pedal in depressed position, then tighten four complete turns.

R m val: Disconnect propeller shaft, speedometer cable, parking brake cable, and gearshift control rods. Remove transmission (See Synchro-mesh Transmission). Mark clutch cover and flywheel. Remove bolts that hold clutch cover to flywheel; loosening each bolt a few turns (in succession) until cover is free. Remove clutch disc and pressure plate assembly from clutch housing.

SYNCHRO-MESH TRANSMISSION

Own. Helical gear, constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).
See "Plymouth Synchro-mesh" in Transmission Section.

Trans mission C ntr ls: *See "Transmission Controls" in Transmission Section.*

►*CAR TOWING CAUTION:* If car is to be towed long distances, disconnect propeller shaft at rear axle carrier.

R m val: Disconnect propeller shaft, speedometer cable, hand brake cable, and control rods. If transmission is to be disassembled, apply hand brake to hold mainshaft while loosening flange nut. This method will also prevent possible brinelling of bearings, or other damage caused by pounding on wrench. Remove transmission by pulling it straight back until pinion shaft clears clutch disc before lowering transmission. This precaution will avoid bending clutch disc.

OVERDRIVE

Warn r Typ R10. Planetary gear type with solenoid operation and accelerator pedal controlled kick-down.
Se "Warner R10" Overdrive in Transmission Section.

Overdriv C ntrols: *See "Overdrive Controls" in Transmission Section.*

R m val: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

POWERFLITE TRANSMISSION

Torque Converter and hydraulically operated two speed planetary transmission.
S "P w rFlit " Transmission in Transmission Sect n.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: S "PowerFlite" Transmission in Transmission S ction.*

►*TESTING & TROUBLE SHOOTING: See "PowerFlite" Transmission in Transmission Section.*

Lubricati n: Check fluid level every 1000 miles, drain and refill every 20,000 miles. Use only Automatic Transmission Fluid Type "A".

Ch cking Fluid L v l - *Se TORQUEFLITE below.*

Thr ttl Linkag Adjustm nt: *See CARBURETOR abov .*

►*OTHER POWERFLITE SERVICE DATA: S "Pow r-Flit " in Transmission S ction.*

TORQUEFLITE TRANSMISSION

Torque Converter and hydraulically operated three speed planetary transmission.
See "TorqueFlite" Transmission in Transmission Section.

►*NO REVERSE CORRECTION: See "TorqueFlite" Transmission in Transmission Section.*

►*HARSH SHIFTING OR SLIPPAGE IN 1-2 UPSHIFT CORRECTION: See "TorqueFlite" Transmission in Transmission Section.*

►*DOWNSHIFT "RUNAWAY" CORRECTION: See "TorqueFlite" Transmission in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "TorqueFlite" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "TorqueFlite" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 20,000 miles with Automatic Transmission Fluid Type "A"

Checking Fluid Level - *CAUTION - Following procedure and fluid level supersede previous recommendations.* Check transmission COLD if possible. Idle engine with brakes applied, press all pushbuttons in turn, then check fluid level on dipstick with engine idling in "N". Maintain level as follows:

Cold Transmission (After standing and before being driven for several miles) - Level should be between "L" mark and ½" below "L" mark. Add oil if below ½" below "L" mark, remove oil if above "L" mark. Do not add oil if level within above range.

Hot Transmission (After being driven several miles) - Level should be between "F" mark and ½" below "F" mark (on cars with first type dipstick with distance of 1 5/8" between "F" and "L" marks, level should be ½" below "F" mark). Add oil if level below "L" mark to bring level up to ½" above "L" mark, remove oil if level above "F" mark. Do not add oil if level within above range.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER "TORQUEFLITE" SERVICE DATA: See "TorqueFlite" Transmission in Transmission Section.*

UNIVERSALS

Detroit Universal. Ball & Trunnion type front, Cross type rear.

Rear Universal Joint Operating Angle - *See "Propellor Shaft Notes" in Plymouth Special Data.*

REAR AXLE

Own. Semi-floating with separate carrier and Hotchkiss drive.
Se "Plymouth Hypoid" in Rear Axle Section.

►*REAR AXLE LUBRICATION LEVEL NOTE:* Recommended lubrication capacity (3½ pints) will bring fluid level to 1" below filler opening. DO NOT add to bring level to opening.

►*BANJO HOUSING INSTALLATION NOTE: Check rear universal joint angle. See "Propellor Shaft Notes" in Plymouth Special Data.*

Rear Axle Ratios

Transmission	Exc. Fury	Fury
Synchro-mesh	3.54-1(39-11)	① 3.73-1(41-11)
Overdrive	3.91-1(43-11)	
PowerFlite	3.36-1(37-11)	
TorqueFlite	3.18-1(35-11)	② 3.36-1(37-11)

① - Optional Ratios - 3.36-1(37-11); 3.54-1(39-11); 3.91-1(43-11); 4.1-1(41-10); 4.3-1(43-10).
② - Optional Ratios - 2.92-1(38-13); 2.93-1(41-14); 3.18-1(35-11); 3.54-1(39-11); 3.73-1(41-11); 3.91-1(43-11); 4.1-1(41-10); 4.3-1(43-10); 4.56-1(41-9); 4.89-1(44-9).

Backlash - .006-.010".

Carrier Removal: Disconnect rear universal, remove axle shafts (see below), take out carrier capscrews, lift off carrier assembly.

Axle Shaft Removal: Remove wheel, drum, and hub assembly (use screw type hub puller—Tool C-845), block brake pedal, disconnect brake line at wheel cylinder, remove axle shaft key, install sleeve (Tool C-745) in oil seal, remove brake support (oil seal mounted in support), pull shaft and bearing (use C-499 Puller).

Wheel Bearing Adjustment: Shims between backing plate and axle housing. With wheel and hub removed, check endplay with dial indicator. To adjust, remove backing plate (see above), add or remove shims (furnished .010", .0125", .015", .030" thick equally at both wheels). **End Play -** .013-.018".

SHOCK ABSORBERS

"Oriflow". Direct-acting, hydraulic type. Serviced by replacement.

FRONT SUSPENSION

Independent. New "Torsion-Aire" suspension, with ball joint mounted steering knuckles and torsion bar front spring.
See "Torsion-Aire" in Front Suspension & Wheel Alignment Section.

►*UPPER BALL JOINT LUBRICATION LOSS CORRECTION: See "Plymouth" in Suspension & Wheel Alignment Section.*

Steering Axis Inclination - 6½° with correct camber.
Camber - Left wheel 3/8° preferred, limits Pos. ½°-0°. Right wheel 0° preferred, limits 0° ± ¼°.
Cast r - 0° to Neg. 1½° (Manual Strg.), Pos. 1½° to 0° (Pwr. Strg.). *NOTE -* Set both sides the same.
T -In - 1/8" preferred, limits Pos. 3/32-5/32".
T -Out n Turns - Inner wheel 20°, outer wheel 17½-19°.

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STEERING

Manual: Gemmer. Worm and three-tooth roller.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering: "Coaxial". Components encased in tubular housing which is located at bottom of, and concentrically around axis of steering column.
See "Coaxial" Power Steering in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Worm & Roller" in Steering Section.*

Steering Gear Removal: *See "Gemmer Worm & Roller" in Steering Section.*

BRAKES

Service. Plymouth "Total-Contact" (Floating shoe) type.
See "Chrysler, DeSoto, Dodge, Plymouth Center-Plane & Total-Contact" Brakes in Brake Section.
Drum Diameter - 11" front and rear.
Wheel Cylinder Diameter - 1 1/8".
Lining - Molded asbestos (bonded to shoe).
Length - 11½". **Width** - 2". **Thickness** - .20".

►*BRAKE LINING PRODUCTION CHANGE AND PARTS REPLACEMENT NOTE:* Improved brake lining (identified by one white spot and one blue spot on side of lining) used in production on front wheel brakes approximately April 15th, 1957. They are recommended for use for severe braking conditions and can be installed on both front and rear wheels. Part No. 1738920 consists of 8 linings. Part No. 1674067 consists of one shoe with bonded lining.

Braking Power - 60% front, 40% rear.

Clearance - Front Wheels - Turn each adjusting cam in direction of forward wheel rotation until shoe is solid against drum and wheel locked. Turn cams in opposite direction until wheel turns free.

Rear Wheels - Same as for front wheels except that forward shoe adjusting cams are rotated in direction of forward wheel rotation and rear shoe adjusting cams are rotated in direction of reverse wheel rotation.

►*DUST SHIELDS (Front Wheels) SEALING CAUTION:* Wheel shields are sealed with heavy body sealer to prevent dust and water entering braking area. Reseal wheel cylinder openings as necessary, when servicing brakes.

Master Cylinder: On engine side of dash panel opposite base of brake pedal.

Checking Fluid - Filler plug on top of master cylinder (on dash panel in engine compartment). Maintain level to within ½" of top of reservoir.

Removal - Disconnect pedal return spring, pushrod and brake tube at master cylinder. Disconnect stop light wires from switch and remove nuts and bolts that secure master cylinder to dash panel. Pull master cylinder straight out from dash panel.

Power Brakes: Bellows Assist type. Mounted on firewall and linked to upper end of brake pedal (used with standard master cylinder).

See "Chrysler, Plymouth Bellows Type Power Unit" in Brake Section.

Removal of Power Unit - Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket, to prevent trigger arm from extending beyond bracket. Remove attaching nuts, slide reinforcement plate off studs and remove unit from dash.

Parking Brake: On shaft at rear of transmission. 6" external contracting type used with Synchro-mesh Trans., 7" internal expanding type used with Automatic Trans.
Adjustment - *See "Brakes" in Plymouth Special Data.*

Lining	Width	Thickness	Length
6" Ext.	2"	5/32"	15.38"
7" Int.	2"	5/32"	13.44"

►*PARKING BRAKE CAM LEVER INTERFERENCE CORRECTION:* Install 1/8" steel shim between rear engine mount and crossmember when interference prevents brake from releasing.

MISC. MECHANICAL

Windshield Wipers: Auto-Lite Electric. EPW-4001 (Single Speed), EPV-4001A (Variable Speed).
See "Auto-Lite Electric Windshield Wipers" in Misc. Section.

Air Conditioning: Heater-Air Conditioning. *See "Air Conditioning" in Miscellaneous Section.*

Power Window Regulators: Electric type. Reversible type motor in each window. Controlled by door switch and master control switch.
See "Electric Window Regulators" in Misc. Section.

Power Seat Adjusters: Electric, 2-Way type.
See "Power Seat Adjusters" in Misc. Section.

Convertible Top Control: Electric-hydraulic type. *See "Power Top Controls" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

	Ft. Lbs.
Cylinder Head	95
Exhaust Manifold	25
Flywheel	95
Harmonic Balancer	160
Intake Manifold	40
Con Rod Caps	45
Main Bearing Caps(Exc rear)	95
Main Bearing Cap(Rear)	120
Oil Pan	18
Pushrod Cover	5
Rocker Arm Cover	5
Water Pump Mounting	18

ENGINE

ENGINE REMOVAL: *NOTE–The engine may be removed with the transmission attached, however if it is desired to remove transmission before removing engine, see "Transmission Removal" on Car Page.*

1) Drain engine oil, water, and transmission lubricant With hood raised, remove hinge to cowl attaching screws and hinge to hood attaching screws, and remove hood

2) Remove battery Remove carburetor air cleaner and disconnect throttle linkage On cars with power steering, remove power steering pump belt and pump with mounting bracket, leaving hoses connected Place pump in position where it will not become damaged Remove upper and lower radiator hoses and disconnect heater line from intake manifold and bottom of radiator On Hydra-Matic cars remove oil cooler inlet and outlet lines from radiator

3) Disconnect flex fuel line at fuel pump, oil pressure gauge line at connector near dash, and windshield wiper vacuum hose at rear of engine Disconnect power brake vacuum hose at check valve to carburetor pipe Remove thermo gauge unit from fitting in intake manifold Disconnect coil primary lead at coil Disconnect generator to regulator wires from generator (release from clips retaining to valve cover and pull clear of engine)

4) Disconnect wire loom running to right headlight across radiator at junction block on right side of radiator support to fender brace and release loom from clips retaining it to radiator Remove fan, fan shroud, and radiator

5) Remove engine right side apron and crankcase ventilator outlet pipe Disconnect exhaust pipe from exhaust cross over pipe Disconnect solenoid wire loom from junction block on fender skirt Remove gearshift linkage at transmission Disconnect linkage from clutch control countershaft bracket from flywheel housing (synchro-mesh cars) Remove propellor shaft

6) Hook a chain fall to intake manifold by means of a strong chain threaded through the openings in manifold just behind carburetor Raise engine just enough to take weight off engine insulators Remove screws holding front and rear insulators to frame crossmembers

7) On Hydra-Matic Cars, support bottom of transmission with a jack and jack adapter J-2808 and remove frame crossmember to which engine rear insulators were fastened *CAUTION*–Use care to prevent transmission swinging down when crossmember is removed

8) Carefully hoist engine and transmission out of car checking frequently to see that sufficient clearance exists to prevent bending any parts

CYLINDER HEAD & MANIFOLD

CYLINDER HEAD: Removal–Remove intake manifold and push rod cover Remove rocker arm covers (On left bank, remove spark plug wires and wire support). Remove battery and engine ground straps, Hydra-Matic level indicator tube bracket and indicator. Loosen all rocker arm adjusting nuts and move rocker arms off pushrods Remove pushrods and place in order so they can be reinstalled in the same position (*NOTE*–The rearmost pushrod on left bank (cars with defroster) cannot be removed withdraw rod part way and tie to head Remove exhaust crossover pipe to manifold attaching screws and remove screws from cylinder head water outlet fitting Remove cylinder head (dowel pins will hold head in place) and remove head with exhaust manifold attached (*NOTE*–When left head being removed, raise head off dowels, move it forward and "jockey" the the head in order to clear defroster, power steering, and power brake equipment)

Installation: *(NOTE–Right and left cylinder heads are interchangeable except for water passage plug in end of water passage which must be installed in correct position if new head installed).* To install, reverse removal procedure and note the following Head screws are three different lengths and when properly installed, all screws will project an equal distance from head. Do not use sealer of any kind on threads.

CONNECTING ROD & BEARINGS

CONNECTING ROD BUSHING REPLACEMENT: Press out old bushing using Bushing Remover & Installer J-5753-3 and Block J-5753, (*NOTE*–For removal of bushing, the smallest diameter or third shoulder on tool is inserted in bushing). Press new bushing into place using same tools as for removal, but using opposite end of Bushing Remover & Installer This tool must be used since the thin wall bushing will distort when pressed into rod unless supported by shank of tool. Drill a 5/32' hole in bushing through oil hole in top of rod, using care to prevent end of tool damaging opposite side of bushing Swage or expand bushing into connecting rod using Burnisher Tool J-5753-1 and Block J-5753, pressing Burnisher Tool through bushing with connecting rod assembly supported on Block Hone bushing to fit piston pin

CRANKSHAFT & MAIN BEARINGS

REAR MAIN BEARING OIL SEAL REPLACEMENT:

1) Drain oil and remove oil pan, oil pump, and oil pump drive shaft Remove oil baffle and cylinder block to oil baffle tube (lower oil level indicator tube). Remove transmission (See Synchro-mesh Transmission Removal on Car Page or Hydra-Matic Drive in Transmission Section)

2) Remove rear center main bearing cap and upper half of rear center main bearing shell to allow crankshaft to be lowered and to prevent damage to thrust surfaces of bearing. Remove rear main bearing cap and loosen remaining bearing caps sufficiently to allow crankshaft to be lowered approximately 3/8" at rear.

3) With crankshaft lowered to provide clearance, remove upper half of rear main bearing oil seal and bearing shell.

4) Install seal in cap with one end flush with cap and compress seal using hammer and Seal Compressor J-6528 *Do not pack seal into locking recess in cap.* Remove seal from cap and install in groove in block by slipping over crankshaft into cavity of block Insert end which was flush with cap first Install rear center main bearing cap with bearing shell and tighten to 95 ft lbs to pull crankshaft up into place against seal Carefully trim both ends of seal flush with block

5) Install a new seal in cap, as above, *except that Seal must be packed into locking recess in cap.* Trim seal flush with cap. Install cap with shell and tighten to 120 ft lbs Remove rear main bearing cap again and inspect split line to be certain that none of seal material has been compressed between cap and block. Make sure mating surfaces are clean.

6) Next, apply a bead of sealer (Permatex No. 3) approx. 1/16" in diameter to mating surface of cap extending from packing seal groove outward to the groove for oil pan cork rear gasket Install rear main bearing cap and tighten to 120 ft lbs. torque

7) Remove rear center main bearing cap and reinstall upper half of bearing shell. Install cap and tighten to 95 ft. lbs. Tighten remaining bearing caps to 95 ft. lbs. Replace transmission, oil pump, oil pump drive shaft, oil baffle, oil pan and flywheel lower cover and shield.

►*CAUTION:* Seal must be installed exactly as detailed above to prevent oil leaks at rear bearing Make certain that seals not cut too short and that mating surfaces of bearing cap and block are free of any packing material, dirt or oiliness (except for Permatex bead on cap) and that they are not scratched or burred

VIBRATION DAMPENER

VIBRATION DAMPENER: Removal–Loosen generator at adjusting strap and remove fan belt from vibration dampener. On card equipped with power steering, also remove power steering pump belt. Position fan so wide angles will be at top and bottom allowing access to dampener Remove dampener attaching screw (15/16" socket) and retaining washer, and slide dampener off shaft

Installation: Reverse the removal procedure.

ENGINE FRONT COVER

ENGINE FRONT COVER: Removal–1) Drain radiator. On cars with power steering, remove pump with mounting bracket from pad on top of engine front cover and lay it back on fender skirt where it will be out of the way. *(CAUTION–Disconn ct batt ry ground strap).*

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2) Disconnect wires from generator and remove generator and mounting bracket and adjusting strap. Remove fan belt, power steering pump belt, and fan and pulley. Disconnect upper and lower radiator hoses, remove fan shroud, and remove radiator. Remove water inlet elbows from cylinder heads (leave hose attached). Remove fuel pump and remove vibration dampener.
3) Take weight off engine front insulator using suitable engine lifting equipment. *(CAUTION–Do not use jack under oil pan).* Remove screws and lockwashers attaching front insulator to engine front cover. Remove four front oil pan-to-engine front cover screws. Remove engine front cover-to-block attaching screws and nuts. Pull cover forward to clear studs and remove.

Installation: See Crankshaft Oil Seal (below), install new front oil pan gasket (cement gasket to oil pan), Position new front cover gasket over studs on front of block, position front cover on engine, install all capscrews and nuts with lockwashers and tighten securely. Install four oil pan-to-front cover capscrews and lockwashers then tighten these screws to 18 ft lbs. Install front engine support-to-front cover screws loosely, then lower engine and tighten screws to correct torque of 60 ft. lbs. Reassemble engine by reversing removal procedure (above).

CRANKSHAFT FRONT OIL SEAL REPLACEMENT: After front cover removed (above), slide old seal off end of crankshaft. Coat face of new seal with graphite lubricant and install on crankshaft before installing front cover.

CAMSHAFT & BEARINGS

CAMSHAFT REMOVAL & INSTALLATION: Drain radiator. Remove intake manifold, crankcase ventilator outlet pipe, pushrod cover and rocker arm covers. Disconnect and move spark plug wires out of way. Loosen rocker arm ball nuts so rocker arms can be disengaged from pushrods and turned sideways. Remove pushrods and hydraulic lifters. Mark or store pushrods and lifters so they can be installed in original positions *(NOTE* - Exhaust valve pushrod of No.7 cylinder cannot be removed because of interference with defroster core. It should be blocked up so that it will not interfere with removal of camshaft. Use spring-loaded clothes pin). Remove radiator and timing chain cover. Remove timing chain cover seal and fuel pump eccentric. Slide timing chain and sprockets off ends of crankshaft and camshaft. Remove camshaft thrust plate attaching screws and remove thrust plate. Slide camshaft out of engine carefully, making sure not to damage bearings in block. Front of engine should be raised as necessary to permit shaft to slide between grille and hood catch support plate. To install camshaft, reverse removal procedure.

TIMING CHAIN

▷*TIMING CHAIN REMOVAL CAUTION: Do not rotate crankshaft with timing chain out of engine.* Damage to valves, pistons, or both will result due to piston striking valve. To rotate camshaft with timing chain off, crankshaft must be positioned so pistons are 45° before or after TDC, to avoid damage to valves.

TIMING CHAIN: Removal–Remove engine front cover (See Engine Front Cover above). Remove fuel pump eccentric. Align timing marks on sprockets. Slide timing chain and sprockets off camshaft and crankshaft.

Installation: Install new timing chain and sprockets making sure that marks on sprockets are aligned exactly on a straight line passing through shaft centers. Install fuel pump eccentric indexing pin on eccentricwith hole in sprocket. Install retainer screw and retainer washer and tighten securely. Install engine front cover.

VALVE SYSTEM

CHECKING VALVE STEM LENGTH: Position rocker arm on stud and hold in place using Rocker Arm Stud Installer J-6301. Slip valve into place and hold it against valve seat. While holding rocker arm and valve in position securely, insert Valve Train Gauge J-6324 through pushrod hole and seat snugly in pushrod seat of rocker arm. With all parts seated, step end of gauge should be at least flush with gasket face of head, but should not project past step on gauge. If gauge projects too far (indicating valve stem too long), grind off tip of valve stem as necessary. *CAUTION*–When grinding end of valve stem be careful not to overheat it which will soften the hardened stem.

ROCKER ARMS

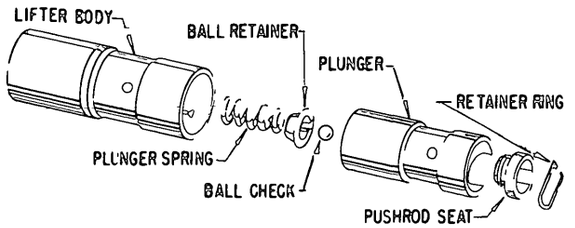
ROCKER ARM STUD REPLACEMENT: *NOTE–Use oversize stud (.003") only when original stud is found to be loose in cylinder head. Use Std. size stud for replacement when original stud threads are damaged .*

Removal: 1) Remove cylinder head from engine. With rocker arm removed, file two slots 3/32" to 1/8" deep on opposite sides of rocker arm stud. Top of slots should be 1/4-3/8" below thread travel. Place washer J-6392-3 at bottom of rocker arm stud. Position Rocker Arm Stud Remover J-6392-1 on rocker arm stud and tighten screws securely with 5/32" allen wrench. Place spacer J-6392-2 over stud remover. Thread 7/8" standard nut on stud remover and turn nut until rocker arm stud is out of cylinder head. If oversize stud being installed, ream out stud hole with Reamer J-5715.
2) Remove plugs from ends of cylinder head oil gallery and thoroughly clean out metal deposits and foreign matter from cylinder head (head must be right side up so metal or foreign material will not lodge around studs).

Installation: 1) Position rocker arm on new rocker arm stud and place Rocker Arm Stud Installer J-6301 on stud in place of rocker arm ball. Carefully press stud into head using a 2-Ton press, until it is installed about half-way (7/16").
2) Position Valve Train Gauge J-6324 in pushrod hole so that it seats properly in the rocker arm. With valve seated, slowly press rocker arm stud into cylinder head until gauge projects about midway between end of gauge and step with respect to gasket surface of cylinder head.
3) Remove Rocker Arm Stud Installer, rocker arm and ball. Blow air through hole in new stud to insure that passage is not restricted, and blow air through oil gallery. Replace plugs in ends of oil gallery. Check oil passages from oil gallery to all studs. Install rocker arm and ball and install nut loosely. Replace cylinder head.

HYDRAULIC LIFTERS

HYDRAULIC VALVE LIFTER OVERHAUL: Rem val– Remove intake manifold, pushrod cover and rocker arm cover. Loosen rocker arm ball nut and move rocker arm off pushrod. Remove pushrods (rear lifter on left bank cannot be removed if car is equipped with defroster, but must be raised and moved out of way for removal of lifter). Remove lifter from bore in cylinder block.



V8 HYDRAULIC VALVE LIFTER

Disassembly: Remove pushrod seat retaining ring by holding down seat with pushrod while dislodging spring from lifter body with pointed tool (*NOTE*–it may be necessary to unseat lifter ball, using plunger unloader J-5097, before plunger can be pushed down). Invert lifter and allow plunger to slide out of body. If plunger sticks, place lifter in large end of Hydraulic Valve Lifter Plunger Remover J-4160-A, with pushrod end of lifter downward. Hold tool firmly in hand with thumb over lifter body and strike sharply against a block of wood until plunger falls out (it may be necessary to soak a lifter with a stuck plunger in cleaning solvent to loosen plunger in body). *CAUTION–If more than one lifter is being disassembled at a time make very sure that parts for each individual lifter be kept together so that parts are not intermixed.*

Inspection: Wash individual lifters separately, keeping parts for each lifter together. If necessary, soak lifter in suitable carbon solvent to dissolve varnish and carbon. Using a lint free cloth, clean each part with a hard wiping action. Use a bristle brush if required. Do not use a wire brush or sandpaper. Inspect lifter body for scoring, and check cam surface at end of lifter for wear. Check plunger, and using a magnifying glass, inspect check ball seat for defects, and outer surface of plunger for scratches or scores. Inspect pushrod seat for roughness and make sure hole in seat is open. Inspect lifter ball for nicks or scoring. If any part of lifter is found defective, replace entire unit.

Assembly: Rinse all parts in clean kerosene before assembly and assemble without drying. Rinse plunger spring and ball retainer and position retainer in spring.

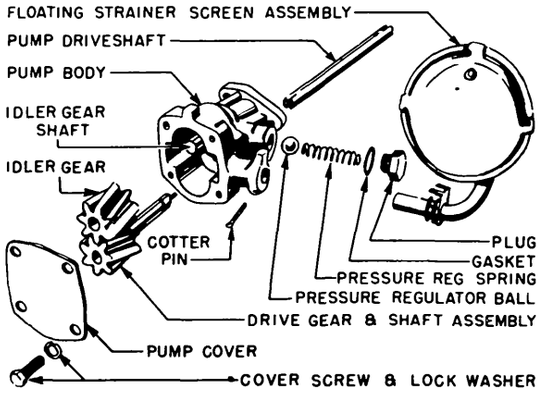
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Install ball in retainer Rinse plunger and place on retainer so seat on plunger mates with ball Invert plunger with parts assembled thus far and after rinsing body install body over spring and plunger Place lifter body on clean paper, rinse and install pushrod seat and retainer ring

Checking Leakdown Rat · Fill tester cup in Valve Lifter Leakdown Tester J-5790, to approximately 1 inch from top with special testing fluid Swing weight arm up out of way, raise ram, and position lifter into boss in center of tester cup Place 7 32" steel ball in pushrod seat of lifter and lower ram onto ball Adjust ram (with weight arm clear of ram) so that pointer is positioned on set line (marked "S") Tighten jam nut to maintain setting Operate lifter through full travel of plunger by pumping weight arm to fill lifter with test fluid and force out air, (Lifter must be completely submerged at all times) Continue pumping for several strokes after definite resistance is felt (*NOTE*–If noticeably weak resistance is felt during any one of last few strokes (of hard pumping), replace ball in lifter and repeat test to this point Raise weight arm to allow plunger spring to expand fully, lower arm onto ram and commence turning crank slowly (1 revolution every 2 seconds) Time indicator travel from lower line (first line above set line) to line marked .125" or 1/8", while still rotating cup with crank. Lifter is satisfactory if rate is between 12 and 40 seconds Check a questionable lifter 3-4 times before discarding

Installati n· *(CAUTION–If new lifter is to be installed, remove sealer coating from new lifter, making sure that hole in pushrod seat is not plugged with sealer coating. Check leakdown rate).* Place new lifter in lifter boss and replace pushrod exactly as removed (same end against rocker arm). Tighten rocker arm ball retaining nuts to 15 ft. lbs. Replace rocker arm cover, pushrod cover and intake manifold.



V8 OIL PUMP

OILING SYSTEM

OIL PUMP

OIL PUMP OVERHAUL: Removal–Remove oil pan and remove oil pump attaching screws while holding pump in place Carefully lower oil pump away from block with one hand while removing oil pump drive shaft with the other hand

Disassembly: Remove cotter pin which retains floating screen to pump inlet and remove screen Remove pressure regulator and spring retainer, spring and pressure regulator ball Remove screws retaining cover to oil pump body and remove cover. Remove driven gear and drive gear with shaft

Cleaning & Inspection: Clean all parts thoroughly (clean screen with Bendix Cleaner) Inspect pressure regulator spring for distortion, cracks, and wear on sides Inspect pressure regulator ball for nicks or other damage Inspect oil pump drive shaft (distributor to pump shaft) for wear or cracks Inspect all other pump parts for wear Replace parts as necessary.

Assembly· Install drive and driven gears Install cover and turn drive shaft by hand to insure that it turns freely and has a slight amount of endplay Install pressure regulator ball, spring and retainer using a new gasket on retainer *(CAUTION–Do not attempt to chang oil pressure by varying length of pressure regulator spring).* Install screen assembly on oil pump and install new cotter pin retainer

Installation: To install pump, position drive shaft into position in distributor and oil pump drive gear, then position oil pump in place on block, indexing drive shaft with pump drive gear shaft Install two attaching screws with lockwashers and tighten securely *(NOTE–* Removal and installation of pump does not disturb distributor timing) Install oil pan

FUEL SYSTEM NOTES

FUEL FILTER: On cars with AC glass bowl type filter at carburetor remove and clean glass bowl Replace filter element if it is becoming plugged *See car model page for filter element production change NOTE* - Additional filters located in fuel tank and in fuel pump (screen located in fuel passage directly below inlet valve)

EXCESSIVE FUEL PUMP PRESSURE (Causing Carburetor Flooding)· If fuel pump pressure in excess of 5 lbs., check pump for incorrect diaphragm installation (insufficient slack) before replacing pump

1) Mount pump in vise with fuel side up, loosen fuel pump cover screws two turns to free diaphragm.

2) Flex diaphragm by moving rocker arm up and down several times (use short piece of pipe fitted over rocker arm to provide leverage)

3) Hold rocker arm in extreme upper position while tightening all cover screws securely This will provide slack in diaphragm

4) Reinstall pump and check pressure. If pressure still in excess of 5 lbs . replace pump

► *"TRIPLE CARBURETOR" & "EXTRA HORSEPOWER" ENGINE NOTE:* Specifications for special equipment used on these engines (Carburetors, Distributors, Camshaft, etc.) are included in data below.

MODEL IDENTIFICATION

Model	Model Designation
Chieftain	57-27
Super Chief	57-27
Star Chief ①	57-27
Star Chief	57-28

① - 2-Seat Station Wagons only (2 Dr. & 4 Dr.).

SERIAL & ENGINE NUMBER: Numbers are the same. Located on left front hinge pillar post and on machined pad on front of R.H. Cyl. bank. *NOTE* - Production Engine No. located on front of block near R.H. edge of timing chain cover, for factory usage.

► *ENGINE COMPRESSION RATIO NOTE:* Compression ratio indicated by mark stamped on Serial No. pad as follows: "L" in circle - 8.5-1. No mark 10-1.

► *SERIAL NUMBER NOTE:* Engine and serial number (Example P757H 1001) includes following identification data in sequence:

Assembly Plant	Model ①	Model Year	Trans. Type ②	Serial No.
See below	7	57	H	1001

① - **7** - (27 Series). **8** - (28 Series).
② - **H** - (Hydra-Matic). **S** - (Synchro-mesh).

Assembly Plant Designations

P - Pontiac	**K** - Kansas City
C - South Gate	**L** - Linden
W - Wilmington	**A** - Atlanta
F - Framingham	**T** - Arlington

TUNE-UP

COMPRESSION PRESSURE: (8.5-1 Hd.) 140-150 lbs., (10.0-1 Hd.) 155-165 lbs. at cranking speed of 155-165 RPM. Lowest cylinder must not be less than 80% of highest cylinder.

VALVE TAPPET CLEARANCE: All Engines with Hydraulic Lifters - None in service.
Extra HP. Engine with Mechanical Lifters - .018" COLD, All Valves.

MANIFOLD HEAT CONTROL: Thermostatic coil type in right hand exhaust manifold outlet. Valve must operate freely.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders - RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAPS: .035" (.033-.038").
Spark Plugs - AC No. 45 Std. (AC No. 44 Extra HP Engines). 14 mm. Torque to 25 ft. lbs.

COIL: Delco-Remy 1115087 (Std.), 1115099 (Extra HP Engines with Synchro-mesh Trans.).
Ignition Current - (1115087) 1.2 amps. idling, 3.5 amps. stopped; (1115099) 1.8 amps. idling, 4 amps. stopped.
Resistor - Delco-Remy (1115087 Coil) 1935134, 1.40-1.62 Ohms. (1115099 Coil) 1931385, .27-.29 Ohms.

► *COIL RESISTOR NOTE:* Resistor is connected in lead between ignition switch and coil. Resistor is by-passed during cranking by second lead from ignition switch to coil side of resistor.

DISTRIBUTOR: Delco-Remy.

Application	Delco-Remy No.
Std. Engine	1110871
Triple Carb. Eng.	1110871
Extra HP Eng. (Hydra-Matic)	1110871
Extra HP Eng. (Synchro-mesh)(Early)	1110888
Extra HP Eng. (Synchro-mesh)(Later)	1110897
Fuel Injection Eng.	1110894

► *DISTRIBUTOR NOTE: Different types used as follows:*
Models 1110871 & 1110894 - External adjustment "window" type.
See "Delco-Remy Window Distributor" in Electrical Section.
Models 1110888 & 1110897 - Double breaker type with conventional distributor cap (not window type). Vacuum spark control not used (centrifugal weight advance only).
Condenser - Delco-Remy 1932004 (All Distributors).
Capacity - .18-.23 mfd.
Contact Point Set - Delco-Remy 1931988 (1110871 & 1110894 Distr.), No. 1918148 (1110888 & 1110897 Distr., Two used.).
Breaker Gap (1110871 & 1110894) - *NOTE* - When cam angle correctly set (see below), breaker gap will be correct (.016").
Breaker Gap (1110888 & 1110897) - .014-.018".
Cam Angle (1110871 & 1110894) - 28-32°. Set to 30°.

► *BREAKER GAP AND CAM ANGLE NOTE:* Setting cam angle at 30° will provide .016" breaker gap.
Cam Angle (1110888 & 1110897) - Adjust each set of points to 29°±1° with other set of points blocked open with .025" thick insulator. Cam angle for both sets of points operating together will be 34°± 1°.
Breaker Arm Spring Tension - 19-23 ozs.
Rotation - Counterclockwise viewed from above.

Automatic Advance (1110871 & 1110894)

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	400	0-4	800
7.5-9.5	1000	15-19	2000
12-14	2125	24-28	4250

Automatic Advance (1110888)

Degrees	Distr. RPM	Degrees	Eng. RPM
0-2	500	0-4	1000
5-7	1000	10-14	2000
6-8	1325	12-16	2650

Automatic Advance (1110897)

Degrees	Distr. RPM	Degrees	Eng. RPM
.5-2.5	525	1-5	1050
7-9	1050	14-18	2100
8-10	1400	16-20	2800
9-11	1800	18-22	3600

Vacuum Spark Control: Delco-Remy 1116126 (1110871 & 1110894). *NOTE* - No vacuum control used on 1110888 or 1110897.

Vacuum Advance (1110871 & 1110894)

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	6-8
10-12	20-24	14-15¾

IGNITION TIMING

► *TRIPLE CARBURETOR & EXTRA HP ENGINE HARMONIC BALANCER NOTE:* These cars **and early production air conditioned cars with standard engine** have three timing marks on harmonic balancer as follows: 10° BTDC, 6° BTDC and TDC.

Engine	Std. Ign. Setting
Std. Eng. (Std. & A.C.)	6° BTDC at 430-450 RPM
Triple Carb. Eng. Ⓒ	6° BTDC at 430-450 RPM
Extra HP Engine ②	10° BTDC at 630-670 RPM

Ⓒ - Hydra-Matic Drive Cars.
② - Synchro-mesh Cars only. (Hydra-Matic same as Triple Carb. Engine).

► *TIMING CAUTION:* Set timing with engine at operating temperature and idling at indicated RPM **with vacuum line disconnected.**
Timing Marks (All Std. Engines & All Late Production Std. Engines with Air Conditioning) - Two marks on harmonic balancer, TDC and 6° BTDC. Pointer on timing sprocket cover aligned with correct mark on harmonic balancer.
Timing Marks (All Triple Carb. and Extra HP Engines and Early Production Std. Engines with Air Conditioning) - Three marks on harmonic balancer, TDC, 6° BTDC and 10° BTDC. Pointer on timing sprocket cover aligned with correct mark on harmonic balancer.

CARBURETOR

► *CARBURETOR APPLICATION: Used as follows:*

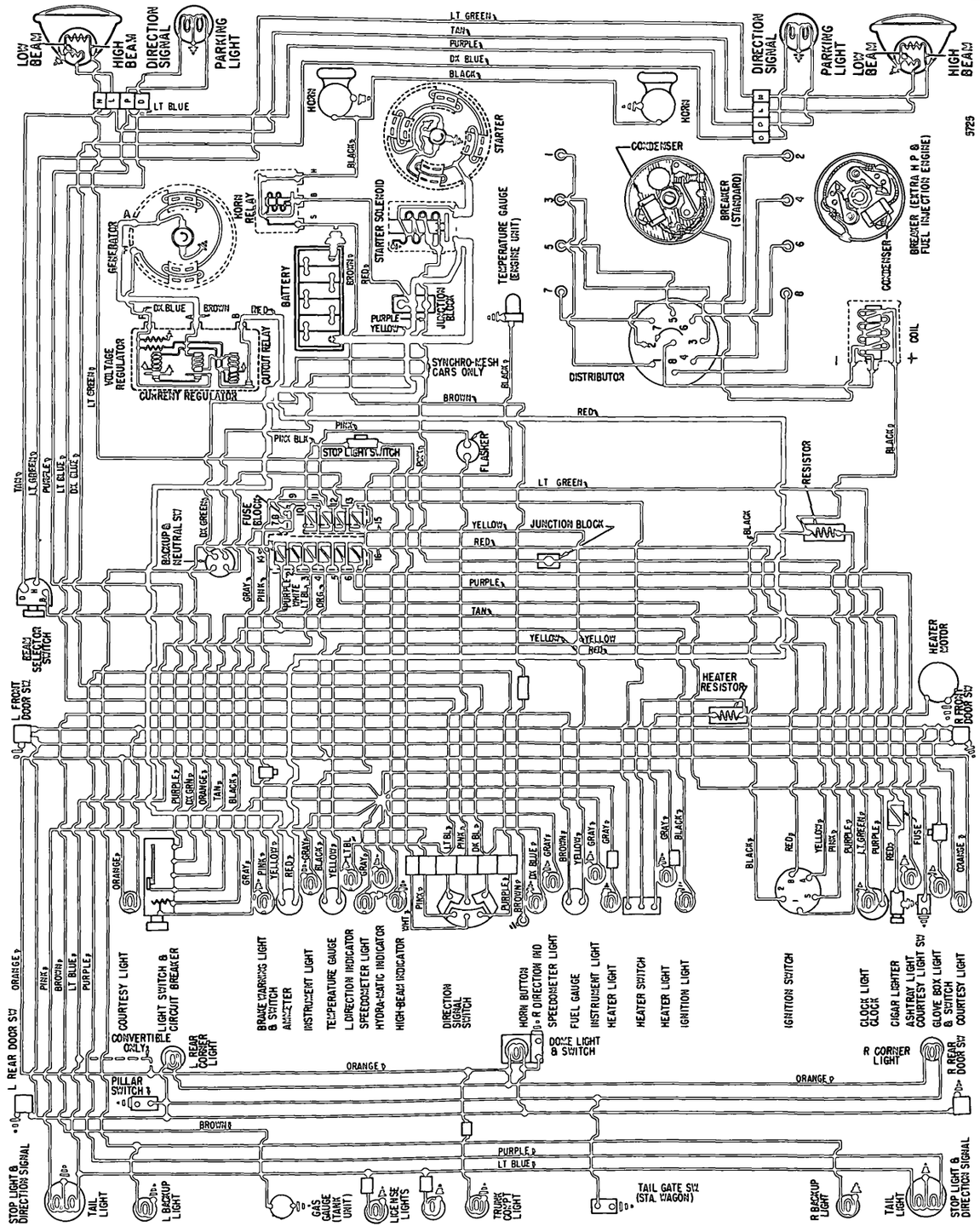
Model	Carb. Type
Chieftain	Rochester 2-Barrel
Super & Star Chief	Carter or Rochester 4-Barrel
Triple Carb. Option	Three Rochester 2-Barrel
Extra HP Engines	Three Rochester 2-Barrel
Special	Rochester Fuel Injection

► *AIR CLEANER NOTE: Replaceable Paper Element type used with Triple Carburetor Option and Extra Horsepower models. See AIR CLEANER below.*

► *FLOODING CORRECTION NOTE (ALL CARBS.): See individual carburetor stories in Carburetion Section.*

THROTTLE LINKAGE ADJUSTMENT (DUAL-RANGE HYDRA-MATIC DRIVE CARS): With the engine at normal operating temperature, idle speed set at 450-470 RPM, and with transmission selector lever in "N" (neutral), install linkage adjustment pin J-2544 through holes in lever and bracket at rear of left head. Pin should fit freely in holes without lever movement. If free fit not obtained, adjust trunnion nuts on carburetor throttle valve rod until pin is free then tighten nuts securely. Leave gauge pin in hole. Loosen trunnion nuts on transmission throttle control rod and push rod downward until control outer lever is felt to touch end of its travel (top nut must not be touching trunnion). **Shorten throttle control rod two turns** by loosening lower nut two turns and tightening upper nut two turns. Remove gauge pin. With carburetor throttle in full open position and Downshift Return Spring fully extended, adjust throttle control intermediate rod trunnion (at lever on engine bracket) so

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that accelerator pedal clears floor mat by approximately 1/4" at closest point, tighten trunnion locknuts.

ROCHESTER 2GC 2-BARREL

Rochester 2GC 7009832 (S.M.), 7009831 (Hydra-Matic).

▷ *ROUGH IDLE AND SURGE CORRECTION:* Install new venturi cluster No. 7011561 (replaces 7010503) on Synchro-mesh cars, and modified venturi cluster 7010575 on Hydra-Matic cars. *NOTE* - Letter "A" on carburetor tag of Hydra-Matic and "D" on Synchro-mesh cars indicates modification has been made in production.

▷ *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 2-3-5-8, LEFT barrel feeds 1-4-6-7.*

Idle Setting - 1½ turns open from lightly seated position. Turn screws out for richer mixture.

Idle Speed - 450-470 RPM in Neutral (Synchro-mesh), 430-450 RPM in Drive Range (Hydra-Matic), 500-520 RPM (Air Conditioned Cars - with compressor OFF).

Float Level - 1 15/64" ± 1/32" (Gauge J-6629) from bottom of float to gasket on cover with needle valve seated (invert bowl cover assembly and place gauge over float).

Float Drop - 1 29/32" ± 1/8" from gasket on cover to bottom of float at free end with float hanging freely below bowl cover.

Fast Idle: No separate adjustment required (will be correct if hot or slow idle speed correct).

Automatic Choke Setting: Centered (at Index).

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷ *OTHER DATA: See "Rochester 2GC Carburetor" in in Carburetion Section.*

ROCHESTER 4GC 4-BARREL

Rochester 4GC 7009829 (S.M.), 7009830 (Hydra-Matic).

▷ *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 4-3-5-8, LEFT barrels feed 1-4-6-7.*

Idle Mixture & Idle Speed Setting - Same as for Rochester 2GC (above). Idle mixture screws on primary side

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷ *OTHER DATA: See "Rochester 4GC-4-Barrel" Carburetors in Carburetion Section.*

CARTER AFB 4-BARREL

Carter AFB, No. 2506S. New design 4-barrel downdraft type with automatic choke.

▷ *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyls. 2-3-5-8, LEFT barrels feed 1-4-6-7.*

Idle Mixture & Idle Speed Setting - Same as for Rochester 2GC (above). Idle mixture screws on primary side

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷ *OTHER DATA: See "Carter AFB 4-Barrel" Carburetors in Carburetion Section.*

"TRIPLE CARBURETORS"
(Rochester 2GC)

Engine	Rochester Carburetor No. Front	Center	Rear
Hydra-Matic Optl.	7011351	7011350	7011352
Extra HP Engine ©	7011351	7011500	7011352

© - Synchro-mesh cars only. Hydra-Matic cars use same carburetors as listed for "Hydra-Matic Optl.".

For complete adjustment data on these carburetors (including linkage adjustment to insure correct synchro-

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nization), se "Pontiac Triple Carburetors" in Carburetion Section.

ROCHESTER "RAMJET" (Optional)

S e "Rochester Ramjet Fuel Injection" in Carburetion S ction.

AIR CLEANER: Oil-wetted type (Std.), Heavy Duty Oil-bath type (Optl.), Replaceable Paper Element type (Triple Carb. & Extra HP. Engines).

►*PAPER ELEMENT TYPE AIR CLEANER CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. *DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate.*

FUEL PUMP PRESSURE: 4-5 lbs. at 450-1000 RPM.

►*FUEL PUMP DRIVE NOTE:* Pump drive eccentric on forward end of camshaft has bushing (.010" clearance on eccentric) for pump drive. Bushing must be installed with flanged end toward camshaft sprocket.

CARB. EQUIPMENT

Fu l Pump: AC No. 4123 (Early), No. 4417 (Later). Fuel & Vacuum (With Vacuum Wipers). No. 4328, Fuel only (With Electric Wipers).

►*FUEL PUMP PRODUCTION CHANGE:* Two types of Fuel & Vacuum pumps used. Early type has 5/16" pipe fittings. later type has 3/8" fittings.

►*FUEL PUMP DRIVE NOTE:* Pump drive eccentric on forward end of camshaft has bushing (.010" clearance on eccentric) for pump drive. Bushing must be installed with flanged end toward camshaft sprocket.

Pressure - 4-5 lbs. at 450-1000 RPM.

Fuel Filter: Two used, one as part of Fuel Gauge Tank Unit, the other at inlet side of carburetor.

See "Fuel System Notes" in Pontiac Special Data.

Gas line Gauge: AC Electric type.

Dash Unit - AC No. 1518594.

Tank Unit - AC No. 1518394 (Exc. Sta. Wgn.), No. 1518812 (2-door Sta. Wgn.), No. 1518813 (4-door Sta. Wgn.).

See "Fuel Gauges" in Carburetion Section.

BATTERY

Synchro-mesh Cars - Delco No. 2SMR53. 12 volt, 9 plate, 53 ampere hour capacity (20 hr. rate).

Hydra-Matic Cars - Delco No. 558. 12 volt, 9 plate, 60 ampere hour capacity (20 hr. rate).

Heavy Duty - Delco No. 3SMR72. 12 volt, 11 plate, 72 ampere hour capacity (20 hr. rate).

Battery Ground - Negative.

Engine Ground - Battery ground extends from fender to engine block.

STARTER

Delco-Remy 1107661. Armature - 1932185.

Drive - Overrunning clutch (solenoid pinion shift).

Rotation - Counterclockwise at commutator end.

Brush Spring Tension - 35 ozs. minimum.

P rformanc Data

Torque	RPM	Volts	① Amperes
0 ft. lbs.	3600-5100	10.6	65-100
	Lock	3.5	300-360

① - Includes Solenoid.

Starting Switch: Delco-Remy Solenoid No. 1119798 (no relay) mounted on starter and controlled by Ignition & Starter Switch, Delco-Remy No. 1116533. Neutral Safety & Back-up Switch Delco-Remy No. 1998129 used with Hydra-Matic Trans.

Neutral Safety & Back-up Light Switch: Delco-Remy No. 1998129 located at lower end of steering column. Connected in starter circuit so that starter operates only when selector lever is in "N" Neutral or "P" park positions.

Adjustment - *See "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

GENERATOR

Delco-Remy. Application as follows:

Model	Generator No.	Armature No.
Standard 25 Amp.	1100304	1928952
Special 25 Amp.	1100333	1928952
Air Cond. 35 Amp.	1102073	1932900
A.C. Special 35 Amp.	1102071	1932900
Heavy Duty 35 Amp.	1102070	1932900
H.D. Special 35 Amp.	1102079	1932900
Heavy Duty 40 Amp.	1102074	1935778
H.D. Special 40 Amp.	1102077	1935778

Performance Data

Generator	Amperes	Volts	RPM
1100304, 333	25	14.0	2570
1102070,71,73,79	35	14.0	2510
1102074, 77	40	14.0	2320

Rotation - Counterclockwise at commutator end.

Brush Spring Tension - 28 ozs.

Field Current - 1.5-1.62 Amps. (1100304,333); 1.69-1.79 Amps. (1102070,71,73,79); 2.66-2.86 Amps. (1102074, 77), at 12 volts (80°F).

Belt Adjustment: ¼" deflection with approximately 8 lbs. (Std.), 14 lbs. (Air Cond.), pressure midway between generator and fan pulleys

REGULATOR

Delco-Remy No.	Used with Generator
1119000	1100304,333
1119002	1102070,71,73,79
1119163	1102074,77

►*1119163 REGULATOR NOTE:* This type regulator has double contacts for voltage regulation.

►*NOTE - Specifications below are "Normal Settings".*

Cutout Relay

Cuts In - 11.8-13.5 volts (hot).

Contact Gap - .020".

Air Gap - .020" (with contacts just closed).

Voltage Regulator

Setting (1119000 & 1119002) - 13.8-14.8 volts at 125° (ambient temperature).

Setting (1119163) - 14.0-14.6 volts (operating on lower contacts). .3-.5 volts Lower (operating on upper contacts).

Contact Gap (1119163) - .016".

Air Gap - .080" (1119163) .075" (Others) with armature pressed down to point where contacts just touching.

Checking & Adjusting - *See "Delco-Remy 12 volt Regulators" in Electrical Section.*

Curr nt Regulator

S tting (1119000) - 23-27 amps. (hot).

Setting (1119002) - 32-37 amps. (hot).

S tting (1119163) - 37-42 amps. (hot).

Air Gap - .075" with armature pressed down to point where contacts just touching.

Ch cking & Adjusting - *See "Delco-Remy 12 volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Directional Signals: *See Electrical Section.*

Autronic Eye: *See Electrical Section.*

Lighting Switch Removal: Remove one battery cable from battery. Pull headlight switch knob to "on" position, push latch button on side of switch assembly and pull out switch knob assembly. Screw bushing from switch assembly allowing switch assembly to be removed from instrument panel.

Stop Light Switch Location: Mechanical type switch located on bracket attached to steering column behind instrument panel.

Back-Up Light Switch: Located on steering column and actuated by gearshift lower lever.

FUSES: Fuses listed below (except as noted) are located on a fuse block behind instrument panel on dash to left of steering column. Circuits numbered on wiring diagram and fused as follows:

1) 4 Ampere. Ignition & Instrument Panel lights.
2) 7.5 Ampere. Ash Tray & Fender Ornament lights.
3) 7.5 Ampere. Tail & License Plate lights.
4) 7.5 Ampere. Dome, Courtesy & Trunk lights.
5) 7.5 Ampere. Glove Compt. & Underhood lights.
6) 7.5 Ampere. Clock Motor & Spot light.
7) 7.5 Ampere. Air Cond. & Compass lights.
10) 7.5 Ampere. Stop Light & Air Cond.
11) 7.5 Ampere. Directional Signal & Brake light.
12) 7.5 Ampere. Radio & Back-Up light.
13) 7.5 Ampere. Heater & Rear Defroster.

Electric Antenna - 14 Ampere. Located in fuse holder above fuse block.

Air Conditioner - 30 Ampere. In addition to Stop Light fuse. Located in holder in lead between BAT terminal of Voltage Re gulator and Air Conditioner relay.

LIGHTING THERMOSTATIC CIRCUIT BREAKER: 22 Ampere, located in lighting switch.

Horn Relay: Delco-Remy 1116920.

Air Gap - .014". **Point Opening** - .027".

Closing Voltage - 5.0-9.5 volts.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditioning equipment or lines for Access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: Own. V8, Valve-in-head. All engines are basically the same with modifications as indicated.

Engine	Bore	Stroke	Displac m nt	Rated HP
All	3.94"	3.56"	347 cu. ins.	49.6

Engine	Compr. Rati	D vel ped HP
Chieftain ①	8.5-1	227 at 4600 RPM
Chieftain ②	10.0-1	252 at 4600 RPM
Super & Star Chief ①	8.5-1	244 at 4800 RPM
Super & Star Chief ②	10.0-1	270 at 4800 RPM
Triple Carb. Optl. ②	10.0-1	290 at 5000 RPM
Extra HP Engine	10.0-1	317 at 5200 RPM

① - Synchro-mesh Cars. ② - Hydra-Matic Cars.

Compr ssi n & Vacuum R ading - *See TUNE-UP.*

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►*ENGINE OPERATION IN LOW OCTANE AREAS (Foreign Travel):* Two compression ratios used. 10.0-1 (Hydra-Matic), 8.5-1 (Synchro-mesh). Use 97 octane ratio (Research Method), with 10.0-1 compression ratio. Use 90 octane ratio with 8.5-1 compression ratio. *NOTE* - 10.0-1 compression ratio can be reduced to 7.8-1 by installing recessed piston & pin assembly. Standard piston furnished in three sizes - 3.936" part No. 524154, 3.937" No. 524155, 3.938" No. 524156. Choose piston to obtain .0007-.0017" clearance between skirt of piston and cylinder bore.

ENGINE REMOVAL: *See "Engine" in Pontiac Special Data.*

OIL PAN REMOVAL: Remove right and left engine side aprons. Remove two idler lever support screws and lower the steering linkage. Disconnect exhaust crossover pipe at left exhaust manifold and from exhaust pipe at right exhaust manifold connector, remove crossover pipe by jockeying it out. Remove flywheel housing front shield and housing lower cover. Loosen crankcase ventilator outlet pipe and swing brace out of the way.

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Pontiac Special Data.*

►*CYLINDER HEAD REMOVAL NOTE:* On cars with defroster No. 7 pushrod cannot be removed. Raise pushrod and tape it in place, then remove pushrod with cylinder head.

TIGHTENING TORQUES: *See "Tightening Specifications" in Pontiac Special Data.*

PISTONS

Aluminum alloy, tin plated, with steel band for added strength and to control expansion. Pin is offset to right side of engine 1/16".

►*PISTON NON-INTERCHANGEABILITY CAUTION:* Different pistons used in Low (8.5-1) & High (10.0-1) compression engines identified as follows: Low Compression-Piston heads dished or recessed and pistons marked "L" on rear side near pin boss (do not confuse this mark with two "F" marks on opposite pin boss indicating front side of piston). High Compression - Pistons have flat head.

Removal - Pistons and rods removed from above.

Replac ment Pistons: Furnished Std. (3.936", 3.937", 3.938"), and .005", .010", .020", .030" Oversize in both Flat Top or Recessed Head.

Fitting New Pistons: Clearance is .0007-.0017" at bottom of skirt. Fit pistons with .0015" X ½" feeler. Pull to withdraw feeler should be 8-15 lbs.

Installing Pistons: Install pistons with notch in piston head and "F" mark at piston boss toward front of engine. *See Rod Installation.*

PISTON PINS

Floating type, with lock ring at each end.

Diam ter - .9803-.9807". **Length** - 3.13".

Pin Fit in Pist n - .0000-.0004" loose with pin and bosses clean and dry. When clearance is at mean limit (.0002") pin can be inserted with light hand pressure, when at low limit (.0000") considerable pressure will be required (pin can be tapped into place with brass drift).

Pin Fit in R d - .0001-.0006" loose, with pin and bushing dry.

Replacement pins: Furnished in Std. and .001", .003" Oversize.

PISTON RINGS

Upper compression ring is chrome plated, lower compression ring is lubrited. Both compression rings are taper faced and have either a chamfer or a step on inside diameter of top side.

Ring	Width	End Gap	Side Clearance
Compr. (1)	.078"	.010-.020"	.0015-.003"
Compr. (2)	.078"	.008-.020"	.0015-.0035"
Oil	.181-.188"	.015-.055"	.0025-.0095"

Installing Rings: Step or chamfer on inside diameter of compression rings must be upward.

Replacement Rings: Std. and .005", .010", .020", .030" Oversize.

CONNECTING RODS

Length - 6.623-6.627" (center-to-center).

Crankpin Journal Diameter - 2.2488-2.2498".

Connecting Rod Upper Bushing (Piston Pin) Removal & Installation - *See "Connecting Rods & Bearings" in Pontiac Special Data.*

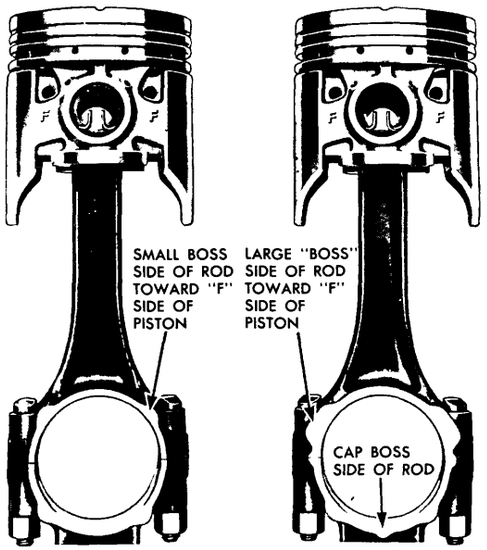
Lower Bearing - Replaceable precision type.

Clearance - .0009-.0029" (new).

Sideplay - .006-.011".

Replacement Bearings: Std. size, .001", .002" Undersize.

Installing Rods: Install rods **2-4-6-8 (right bank)** with machined boss at lower end of rod toward the **rear.** Install rods **1-3-5-7 (left bank)** with boss toward the **front** of engine. When installed, machined bosses on rods will face each other. *See Pistons above.*



PONTIAC PISTON & R D ASSY.

CRANKSHAFT

Journal Diam t r - 2.623-2.624". Five bearings.

Bearings - Durex, steel backed inserts. No shims.

Clearance - .0005-.003" (Exc. rear), .0008-.0033" (rear).

End Thrust: Taken by No. 4 (rear center) main bearing.

End Play - .0035-.0085".

Replacement Bearings: Furnished Std. and .001", .002" Undersize.

Crankshaft Rear Main Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Pontiac Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Pontiac Special Data.*

Vibration Dampener Removal & Installation: *See "Vibration Dampener" in Pontiac Special Data.*

CAMSHAFT

►*STANDARD ENGINE NOTE:* Different camshafts used on Synchro-mesh (8.5-1) & Hydra-Matic (10.0-1). Engines identified by figure stamped on forward end of camshaft, Synchro-mesh - 0, Hydra-Matic - 2.

Journal Diameter - 1.8987-1.8997". Five bearings.

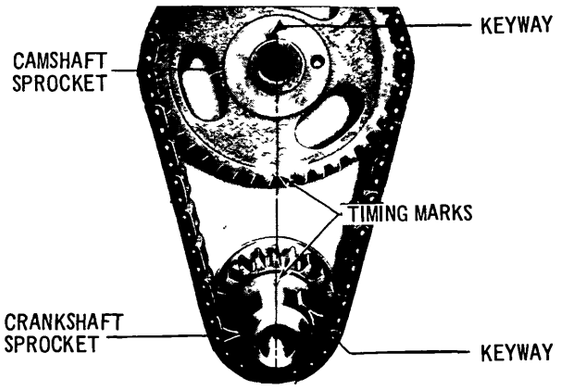
Clearance - .0015-.0030". **Endplay** - .003-.007".

End Thrust - Taken by thrust plate behind camshaft sprocket. Replace if worn or grooved.

Timing Chain: Length - 60 links.

Timing Chain Installation - *See "Timing Chain" in Pontiac Special Data.*

Camshaft Setting: Both sprockets marked "0". Mesh chain with sprockets turned so that marks are adjacent and in line across shaft centers.



PONTIAC VALVE TIMING MARKS

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Pontiac Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal) Installation: *See "Engine Front Cover" in Pontiac Special Data.*

VALVES

►*VALVE ADJUSTMENT NOTE: Because of design, it is no longer necessary to initially adjust the tapp t cl arance when cylinder head or valve system is disturbed. Se "Rocker Arms" below.*

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Tappet Clearance: .018" Int. & Exh. Cold (Extra HP Eng. with mechanical lifters). None in service (Hydraulic Lifters) Others.

Valves:	Head Diam.	Stem Diam. ①	Length
Intake	1.88"	.3415-.3422"	5.35"
Exhaust	1.60"	.3410-.3417"	5.34"

Valves	Seat Angle	Lift	Stem Clearance
Intake	30° ②	③	.001-.0027"
Exhaust	45° ②	③	.0015-.0032"

① - Std. See "Replacement Valves" below.
② - Valve Face Angle: Intake 29°, Exhaust 44°.

③ Valve Lift

Engine	Intake Lift	Exhaust Lift
Synchro-mesh (8.5-1)	.373"	.373"
Hydra-Matic (10.0-1)	.373"	.409"
Extra HP (Hydr. Lifters)	.411"	.411"
Extra HP (Mech. Lifters)	.435"	.435".

Valve Seat Width - Intake 3/64-1/16", Exhaust 1/16".

Replacement Valves: Furnished Std. and .001" (Yellow), .003" (Red), .005" (White) Oversize. Color inked on top of valve head.

Valve Stem Oil Seal: Neoprene seal installed in second groove on valve stems (under valve locks).

Valve Spring Shields: Cup shaped shield used over upper end of valve spring on all cars except late Extra HP engines. *NOTE* - This shield not necessary for high speed operation on these engines.

Checking Valve Stem Length: *See "Valve System" in Pontiac Special Data.*

Valve Springs: Inner and outer springs used.

Standard & Triple Carb. Optl. Engine			
Inner Spring		Outer Spring	
Pressure	Length	Pressure	Length
23-29 lbs.	1.483"	55-61 lbs.	1.533"
54-60 lbs.	1.153"	98-106 lbs.	1.203"
Extra HP Engine (Hyd. Lifters)			
32 lbs.	1.48"	60 lbs.	1.52"
96 lbs.	1.08"	128 lbs.	1.11"
Extra HP Engine (Mech. Lifters)			
55 lbs.	1.48"	60 lbs.	1.52"
120 lbs.	1.06"	131 lbs.	1.10"

Valve Guides: Cast integral with cylinder head. When valve stem clearance excessive, ream guides using Valve Guide Reamer J-5830-1 (.003"), J-6621 (.005"). *NOTE* - When installing .005" oversize valves, use .003" reamer first then follow with .005" reamer and always reface valve and valve seat after reaming valve guide.

Valve Clearance in Guide - .001-.0027" (Intake), .0015-.0032" (Exhaust). Oversize reamers ream guide to provide these clearances.

► *VENTED INTAKE VALVE GUIDE:* Intake valve guide vented to atmosphere near upper end by hole drilled through head. Valve stem is relieved at this point.

Valve Lifters: Hydraulic lifters standard all models, Mechanical lifters optional on Extra HP engine.

Hydraulic Lifter: Diameter - .8424-.8427". **Length** - 2.000". **Clearance (In Lifter Boss)** - .0013-.0028".

Hydraulic Lifter Overhaul - *See "Valve System" in Pontiac Special Data.*

Rocker Arms: Mounted individually on studs pressed into cylinder head.

Installation of Rocker Arm to Stud - Tighten rocker arm stud nut to 15 ft. lbs. torque. This will insure correct position of rocker arm in respect to pushrod and valve stem.

Rocker Arm Stud Replacement - *See "Valve System" in Pontiac Special Data.*

Rocker Arm Lubrication: Oil from cylinder head oil galleries flows through hollow rocker arm studs to 1/16" hole at upper end of stud to lubricate ball seat and flows through groove in ball to fill rocker arm. Oil flows from hydraulic lifter boss through hollow pushrods for pushrod end lubrication.

Oil Passage Plug Removal & Installation - With rocker arm cover removed, insert easy-out in hole in plug, turn counterclockwise and pull out. Coat plug with gasket paste and drive in place with flat piece of metal or hard wood until plug is flush with outer surrounding surface.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

► *VALVE TIMING NOTE:* Valve timing below is correct with lifter on end of ramps on cam (Hydraulic Lifters), or with .023" tappet clearance (Mechanical Lifters).

Synchro-mesh (8.5-1) Engine

Intake - Opens 22° BTDC. Close 67° ALDC.
Exhaust - Opens 63° BLDC. Close 27° ATDC.

Hydra-Matic (10.0-1) Engine

Intake - Opens 22° BTDC. Close 67° ALDC.
Exhaust - Opens 69° BLDC. Close 31° ATDC.

Extra HP (Hyd. Lifters)

Intake - Opens 29° BTDC. Close 74° ALDC.
Exhaust - Opens 82° BLDC. Close 31° ATDC.

Extra HP (Mech. Lifters)

Intake - Opens 27° BTDC. Close 63° ALDC.
Exhaust - Opens 59° BLDC. Close 31° ATDC.

OILING SYSTEM

Crankcase Capacity: 5 qts. refill. Add 1 qt. when changing filter element.

Normal Oil Pressure: 35-45 lbs. above 40 MPH.

Pressure Regulator - In oil pump body. Not adjustable.

Oil Pump: Gear type, located on right rear bottom of cylinder crankcase and driven by distributor drive gear. Distributor timing is not affected by removal and installation of pump.

Pump Overhaul - *See "Oiling System" in Pontiac Special Data.*

Oil Filter: Full Flow type. Replace element every 15,000 miles or once a year. Use only AC PF-122 filter element.

Crankcase Ventilation: Filter element in oil filler caps in each rocker arm cover, and ventilator pipe at rear of engine. Clean filter elements every 2,000 miles by plunging in gasoline or kerosene. *NOTE* - Filter element for outlet pipe available as an accessory.

► *VENTILATOR OUTLET PIPE CAUTION:* If pipe is removed from pushrod cover, make sure that when it is installed, it is not pushed down into cover beyond the two locating points on pipe. Excessive oil consumption at high speeds will result.

Oil Pressure Gauge: AC No. 1508548. Not electric.

COOLING

Water Capacity: With ut Heater - 21½ qts.
With Underseat Heater - 23 qts.
With Air Conditioning - 22½ qts.
With Underseat Heater & Air Cond. - 23¾ qts.

Pressure Valve: AC No. RC-6 (13 lbs. less Air Cond.), AC No. RC-15 (15 lbs. with Air Cond.). Radiator filler cap.

Thermostat: Pellet type 170° thermostat in water outlet passage in intake manifold.

Water Pump: Packless, sealed ball bearing shaft. *See "Pontiac" in Water Pump Section.*

Temperature Gauge: AC Thermo-gauge. Electric type.
Dash Unit - AC No. 1513276.
Engine Unit - AC No. 1513130.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck. Model 10.5A9. Assembly No. 361423 (Std.), No. 361452 (Bonneville). Single plate.
See "Borg & Beck" in Clutch Section.
Clutch Disc - Borg & Beck No. 284814 (All Models).

Pedal Adjustment: Adjust stop screw on pedal to provide 4 3/8-4 5/8" between bottom of pedal and floor mat. Set clutch fork to countershaft rod to provide ¾-1 1/8" free movement of clutch pedal.

Overcenter Spring Adjustment - Remove overcenter spring, spring extension, and pushrod. Loosen lock screw which clamps spring lever to countershaft. Install Gauge J-5819, inserting pins which are closest together into holes in overcenter spring link and lever from which pushrod was removed. Then, while applying rotation to clutch countershaft to hold clutch pedal against stop, rotate overcenter spring lever until third pin in gauge can be inserted into overcenter spring lever. Tighten lockscrew securely, and replace spring, spring extension, and pushrod.

Removal: Remove transmission (see Transmission Removal below), remove clutch bearing support spring washer (in rear face of clutch housing) and remove clutch housing bottom cover and control shaft inner bracket. Remove release bearing support and release bearing. Tap bearing support from inside clutch housing to aid removal *(CAUTION* - Avoid striking tubular portion of support). Mark flywheel and clutch cover (to insure installation in same manner to maintain balance), remove clutch cover bolts evenly, move clutch assembly away from flywheel at bottom and withdraw driven member. Lower clutch assembly out of car.

Clutch Installation Note - Position clutch disc so that long end of hub is in flywheel and cover assembly marks line up with marks on flywheel. Use spare transmission main drive gear in spline of driven disc to insure proper alignment and tighten cover bolts one turn at a time until tight. Coat entire outer diameter of release bearing support with high melting point wheel bearing grease. Do not overlubricate. Confine grease to inner diameter only of release bearing. Use new gasket and install support and bearing. Install bearing support spring washer. Coat release fork fingers and release fork ball fulcrum with same type grease and install fork. Lockwasher must be under screw fastening fork ball fulcrum to clutch housing.

CONTINUED ON NEXT PAGE

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SYNCHRO-MESH TRANSMISSION

Own. All helical gear type.
See "Pontiac Synchro-mesh" in Transmission Section.

Transmissi n C ntr ls: *See "Transmission Controls" in Transmission S ction.*

R m val: 1) Disconnect speedometer cable, gearshift selector rod, and control rod.
2) Disconnect rear universal joint (use wire or rubber band to keep trunnions from slipping off spider). Pull propellor shaft off transmission.
3) Remove shift lever spring yoke and extension to remove upper transmission capscrew. Remove shift lever screw (lever in neutral) and remove lever.
4) Remove transmission outer lever to remove lower transmission capscrew. Remove other upper capscrew and install guide pins in upper capscrew positions. Remove lower capscrew, slide transmission back on guide pins with rear bearing support in frame "X" member until main drive gear is free and lower transmission to floor.

Installati n N t : Use guide pins in two upper transmission capscrew positions to avoid damage to clutch release bearing tubular support when sliding transmission into position.

HYDRA-MATIC DRIVE

"Strat -Flight" Dual Coupling. Four speed automatic transmission and fluid coupling.

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: S "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

► *TESTING & TROUBLE SHOOTING: See "Dual Coupling Hydra-Matic Driv " in Transmission Section.*

Lubrication - Check fluid level every 2000 miles, drain and refill every 25,000 miles. Use only Automatic Transmission Fluid Type "A".

Ch cking Fluid L v l - Check level with transmission warm and engine idling with selector lever in "P" or "N" position. Maintain level at "Full" mark on dipstick.

Capacity - 9 qts. refill, 11½ qts. after overhaul.

Thr ttl Linkag Adjustment: *See CARBURETOR above.*

► *OTHER HYDRA-MATIC SERVICE DATA: See "Dual Coupling Hydra-Matic Drive" in Transmission Section.*

UNIVERSALS

Saginaw. Needle bearing type.

► *CAUTION:* Rear universal joint companion flange nut controls rear axle pinion bearing preload (must be readjusted after nut is loosened). *See "Pontiac Hypoid" in Rear Axle S ction.*

R plac m nt Univ rsal Joints - Propellor shafts will only be furnished with front and rear universal joints as an assembly.

REAR AXLE

Own. Hypoid gear, semi-floating with Hotchkiss Drive.
S "Pontiac Hyp id" in R ar Axl S ction.

Axl Id ntificati n - Ratio can be identified by color marking on ends of axle shaft or a code number stamped on pad on differential carrier. *See Code No. & Color Markings in table below.*

Axle Ratios & Code Markings

Model	Ratio	Code No.	Color
S-M (Std.) All	3.42-1(41-12)	8	Gray
(Hills) All	3.64-1(40-11)	6	Blue
(H.D.) S-28	3.90-1(39-10)	4	Red
H-M (Std.)	3.23-1(42-13)	9	Brown
(Plains) ①	3.08-1(40-13)	0	Yellow

① - Sedans & Catalina Coupes.

Backlash - .003-.012" (new), .012" (used).

Axle Shaft Removal: Remove wheel, brake drum, four brake backing plate bolt nuts, static collector, and loosen bearing retainer (do not move backing plate or brake line may be damaged). Pull shaft with Puller J-942 (do not drag axle shaft on seal).

Wheel Bearing Adjustment: None.

Differential Carrier Assembly Removal: Disconnect rear universal and wire trunnion in place (do not disengage spline joint at transmission), remove axle shafts and carrier flange capscrews. Withdraw carrier assembly from housing.

► *CAUTION: Rear universal joint companion flange nut controls rear axle pinion bearing preload. Readjust whenever nut loosened.*

SHOCK ABSORBERS

Delco. Direct acting, non-adjustable, sealed (not refillable). Service by replacement.

Model	Front	Rear
Standard	5522515	5524031
Taxi, Police, H.D.	5352226	5513346

FRONT SUSPENSION

Independent. Shock absorber mounted within front coil spring.
See "Pontiac" in Suspension & Wheel Alignment Section.

Kingpin Inclination - 1°20' at 0° camber.

Caster - Neg. 1°±½°.

Camber - Pos. ½°±½°.

Toe-In - 0 to 1/16".

Toe-Out on Turns - Outer wheel 20°, Inner wheel should be 22.5°.

STEERING

Manual: Saginaw Ball Bearing Worm & Nut. Recirculating ball worm and nut.
See "Saginaw Ball Bearing Worm & Nut" in Steering Section.

Power Steering: Saginaw (In Line). *See 'Saginaw (In Line)" Power Steering in Steering Section.*

St ering Linkag : *S e "Ste ring Linkag " in St ering S ction.*

St ering Wh l & H rn Butt n R m val: *S "Saginaw Ball B aring Worm & Nut" in Steering Section.*

St ring G ar R m val: *S e "Saginaw Ball Bearing Worm & Nut" in Steering Section.*

BRAKES

Bendix Hydraulic. Duo-servo, single anchor (without eccentric adjustment). Hand brake applies rear wheel service brakes

See "Bendix Hydraulic Single Anchor (Without Eccentric)" in Brake Section.

Drum Diameter - 12" (front), 11" (rear).

Wheel Cyl. Diameter - 1 1/16" (front), 15/16" (rear).

Lining Width & Length

	Front Wheel	Rear Wh l
Primary	2.25" X 10.05"	1.75" X 9.29"
Secondary	2.25" X 12.92"	1.75" X 11.93"

Lining Thickness - 13/64".

Clearance - Adjusting screw backed off 14 notches from point where wheel can just be turned by hand.

Standard Master Cylinder: Forward of brake pedal on engine side of fire wall.

Checking Fluid Level—Maintain fluid level in master cylinder reservoir to 7/8" from gasket surface of filler neck.

Power Brakes: Moraine or Bendix Vacuum Power Unit.
Moraine - *See "Moraine Power Unit" in Brake Secti n.*
Bendix - *See "Bendix Power Unit (Hydraulic Reacti n Control)" in Brake Section.*

Checking Fluid Level—Maintain fluid level in master cylinder reservoir to within ½" of top of filler cap opening.

Removal of Power Unit—Disconnect upper end of vacuum hose attached to inlet at vacuum cylinder, and hydraulic lines at master cylinder. Disconnect pushrod from pedal and wires from stop light switch. Remove nuts from U-bolt retaining pedal pivot bracket to steering column and remove pedal and bracket (with stop light switch assembly attached). Remove clutch pedal and steering column seals at floorboard. On Hydra-Matic cars, remove screws retaining power brake unit to floor pan and remove mounting plate with power unit attached. On Synchro-mesh cars, remove screws retaining power unit to mounting plate (power unit will rest on frame). Remove screws attaching mounting plate to floor pan and remove mounting plate, "jockeying" it as necessary to clear clutch pedal. Remove power unit. *CAUTION*—Do not carry or support brake unit by pushrod as pushrod may be pulled out of cylinder.

MISC. MECHANICAL

Windshield Wiper: Vacuum or electric type.
See "Windshield Wipers" in Miscellaneous Section.

Air Conditioning: Harrison. *See "Frigidaire & Harrison" Air Conditioning in Miscellaneous Section.*

Power Top Control: Hydro-Lectric with reversible pump motor. *See 'Power Top Controls" in Miscellaneous Section.*

Power Window Regulators: Electric type with individual motors in each window. *S "Power Window Regulators" in Miscellaneous Section.*

P w r S at Adjust rs: Six-way electric type. Fore & Aft, Up & Down, and Tilting movement provided through three switches and two motors. *See "Power Seat Adjusters" in Miscellaneous Section.*

TIGHTENING SPECIFICATIONS

6 CYL. ENGINE

	Ft Lbs
Cylinder Head	60-65
Main Bearing Caps	66-70
Flywheel	50-55
Vibration Damper	70-80
Con Rod Caps	27-30

V8 ENGINE

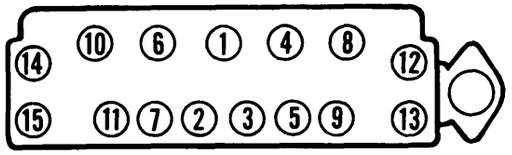
Cylinder Head	60-65
Main Bearing Cap (Rear)	50-55
Main Bearing Cap (Others)	80-85
Con Rod Caps	46-50

CYLINDER HEAD & MANIFOLD

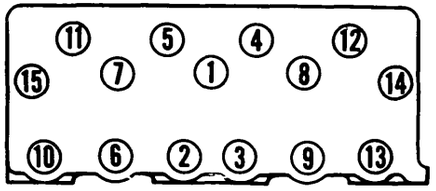
6 CYL. ENGINE

CYLINDER HEAD INSTALLATION: Use torque indicating wrench to tighten cylinder head studs in sequence shown in cylinder head diagram. Torque specifications are for engine at operating temperature.

Cylinder Head Gasket - Always use new gasket Coat gasket with non-hardening gasket paste to insure tight seal between cylinder head and block.



6 CYL. ENGINE CYLINDER HEAD



V8 ENGINE CYLINDER HEAD

V8 ENGINE

CYLINDER HEAD INSTALLATION: Cylinder block has two sleeve locating dowels to assist in lining up cylinder head and gasket during installation. Coat gasket with non-hardening gasket paste, install gasket with marks "AM" and "TOP" upward. Install cylinder head, pushrods, and rocker arm assembly *(CAUTION* - Special drilled capscrew must be installed in rear rocker arm support bracket to provide lubrication for rocker arms). Tighten head bolts in sequence shown in diagram to correct torque. See Tightening Specifications.

ORIGINAL BORE & PISTONS

6 CYL. ENGINE

ORIGINAL BORE LETTER CODE· A three letter code stamped adjacent to engine number indicates as follows

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	010 Undersize
Letter "C"	010 Oversize
Letter "D"	001 Undersize

ENGINES UNMARKED ARE STANDARD SIZE.

PISTON PINS

ALL ENGINES

PISTON PIN: Pin is press fit in connecting rod and no clamp bolt or locking rings are used to retain the pin Piston pin must be removed and installed as detailed below to prevent distortion or damage to piston.

Removal - Remove pins with special Piston Pin Remover J-6360 and an arbor press. Place piston in remover support so pin will enter support when pressed out with piloted driver.

Installation - Place piston pin pilot in support, insert piston and connecting rod. This aligns piston and connecting rod piston pin bores Press piston pin into connecting rod and piston assembly until lower pilot bottoms in support which will properly center rod on pin

► *CAUTION* Pin must be tight press fit in connecting rod.

ORIGINAL BEARING SIZES

6 CYL. ENGINE

ORIGINAL BEARING LETTER CODE· A three letter code stamped adjacent to engine number indicates as follows

Letter Sequence Code

First letter	Size of Bore
Second letter	Size of Main Bearings
Third letter	Size of Con Rod Bearings

Letter Size Code

Letter "A"	Standard
Letter "B"	010 ' Undersize
Letter "C"	010 Oversize
Letter "D"	001 Undersize

ENGINES UNMARKED ARE STANDARD SIZE.

CRANKSHAFT & MAIN BEARINGS

6 CYL. ENGINE

CRANKSHAFT END THRUST WASHER: Crankshaft end thrust taken by flanged edges of front bearing A steel thrust washer is assembled between rear face of timing chain sprocket and flanged face of front bearing Washer keyed to shaft by Woodruff key which also secures sprocket on shaft When washer installed, chamfered edge on inner diameter should face toward rear for tight fit against bearing journal

6 CYL. ENGINE

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Packing in groove in block and cap behind oil slinger on crankshaft Cap sealed with rubber plugs in groove on each side where cap fitted in recess in block Use Tool J-1610 to install packing in groove in block and cap Place packing in groove (with bearing shell removed), place small diameter of tool over packing, hit end of tool with lead hammer to seat packing, cut ends of packing flush with bearing cap seat, remove tool Repeat operation for groove in block Install rubber seal plugs on each side of bearing cap (where angle seal used, make certain that seal also seated in horizontal groove in block)

V8 ENGINE

CRANKSHAFT REAR MAIN BEARING OIL SEAL: Install hemp packing in block and in bearing cap using Tool J-3048-A to seat packing in groove Trim excess packing off flush with face of cap Rubber seals are installed in side grooves of bearing cap

VIBRATION DAMPENER

6 CYL. ENGINE

REMOVAL: Remove fan blade assembly and pull vibration damper with a suitable puller

INSTALLATION: To install hub assembly, install large lockwasher with notches on inner edge, cork seal ring, rubber seal ring and hub retainer in recess in hub Install hex head lockscrew with helical lockwasher under it, in screw hole in end of crankshaft and tighten screw securely Rubber block retaining bolt nuts on front face of damper hub are drawn up until shoulders bottom on hub (30-35 ft lbs torque) *CAUTION* - When installing vibration damper on hub, timing marks must be aligned with hub key-way and on same side

V8 ENGINE

REMOVAL: *(NOTE* - Vibration damper can be removed without removing radiator core) Remove fan blade assembly and pull vibration damper with a suitable puller A puller may be fabricated in the shop by threading a 1" x 5" (N C Thread) jack screw into a steel plate ½" thick, with a 13/32" wide slot in each end of plate Use two screws 3½" long with 2" of 3/8 x 16 U N C 2B-T thread in the slots Stake a ½" ball bearing in end of jack screw to prevent damage to crankshaft

INSTALLATION: Installation procedures are the same as for 6 cyl engine (above)

ENGINE FRONT COVER

6 CYL. ENGINE

ENGINE FRONT COVER: Removal - Remove fan blade assembly, vibration damper (see above), and screws holding cover to block Remove cover

Installation - *See "Crankshaft Front Oil Seal" b l w*

CRANKSHAFT FRONT OIL SEAL: Drive old seal out from rear A felt oil seal is fitted in the timing chain cover which bears against vibration damper hub Seal seat in hub has inner edge turned up to form a shedder on inside of cover An oil slinger is assembled behind vibration damper hub which extends over outer edge of oil shedder To prevent damage to seal, cover must be properly aligned Do this by leaving cover to block screws loose until vibration damper has been partially installed, then tighten cover screws Install new seal and retainer from front

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

V8 ENGINE

ENGINE FRONT COVER: Removal - Remove water pump, fuel pump assembly and vibration damper. Remove cover-to-cylinder block screws and remove cover.

Installation - Locate dowels in cylinder block and leave cover screws loose until vibration damper is partially installed. This prevents damage to oil seal and aligns cover properly. Then tighten cover screws and install fuel and water pumps.

CRANKSHAFT FRONT OIL SEAL: Oil seal is installed in timing chain cover at vibration damper hub. To replace seal, remove cover (see above), old seal, and install new seal

CAMSHAFT & BEARINGS

6 CYL. ENGINE

CAMSHAFT REMOVAL: Camshaft bearings are "step-bored", being larger at front bearing than at rear, to permit easy removal and installation of camshaft. To simplify camshaft removal, remove radiator and grille assemblies. Then raise front of engine slightly.

V8 ENGINE

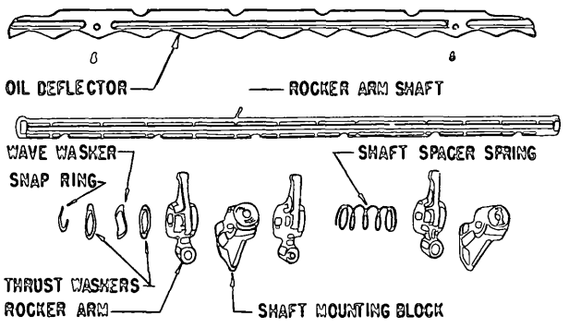
CAMSHAFT REMOVAL: Remove spark plug wires, cylinder head covers, and rocker arm assemblies. Remove intake manifold and carburetor. Remove all pushrods and hydraulic valve lifters (*CAUTION* - Keep these parts in order so they can be installed in same relative positions). Remove fuel pump. Remove vibration dampener and timing chain cover. Remove water pump and cylinder head water distribution manifold. Crank engine until timing marks on chain sprockets line up on vertical line through shaft centers. Remove fuel pump eccentric, remove both sprockets and timing chain as an assembly. Remove camshaft retainer thrust plate and thrust spacer. Carefully withdraw camshaft through front of engine.

VALVE SYSTEM

ROCKER ARMS

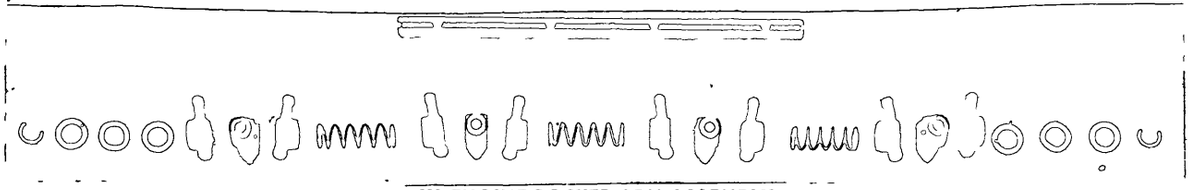
6 CYL. ENGINE

ROCKER ARM ASSEMBLY: Rocker arm shaft is one piece type and entire rocker arm assembly can be removed after taking out mounting bolts in shaft brackets.



6 CYL. ROCKER ARM ASSEMBLY

Disassembly & Inspection: Remove snap ring on end of shaft, slide thrustwashers, wave washer, rocker arms, mounting brackets, and springs off shaft. Inspect all parts for wear, see that end plugs are tight in shaft.



V8 ENGINE ROCKER ARM ASSEMBLY

Reassembly & Installation: Install all parts in same relative positions (*CAUTION* - Rocker arms are "Right" and "Left" and must not be interchanged). Install assembly with rocker arm lubricating holes in shaft down or toward cylinder head. Make certain that baffle installed on rocker shaft supports does not interfere with rocker arm.

V8 ENGINE

ROCKER ARM ASSEMBLY: Complete assembly mounted on cylinder head by four long cylinder head retaining capscrews (*CAUTION* - Rear bolt is special hollowtype for rocker arm lubrication). Assembly can be removed by taking out the retaining screws.

Disassembly & Inspection: Remove snap ring on end of shaft and slide all parts off shaft. Keep all parts in order so they can be reassembled in same relative positions. Clean and inspect all parts for wear. Inspect rocker arm radius at valve stem end for wear and replace worn rocker arms. Make certain that plugs are tight in ends of shaft.

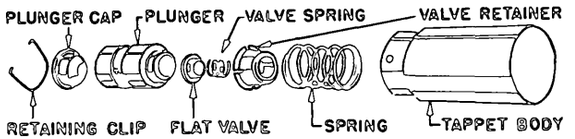
Reassembly & Installation: Install all parts in same relative positions (*CAUTION* - Rocker arms are "Right" and "Left" and will not contact valve stem properly if interchanged). When installing assembly, make certain that special hollow bolt installed in rear support bracket (necessary for correct rocker arm lubrication).

HYDRAULIC LIFTERS

V8 ENGINE

HYDRAULIC VALVE LIFTERS: Removal-Remove valve rocker covers and rocker arm shaft mounting bracket bolts and lift off rocker arm assembly. Remove upper valve tappet cover and breather tube and then remove lower tappet cover. Remove pushrods and hydraulic valve lifters keeping pushrods and lifters in sequence so they can be replaced in same relative position.

Disassembly: Press down on valve pushrod socket and use a pair of needle nose pliers to remove the lock ring. Remove pushrod socket, plunger, and plunger spring. Remove check valve assembly from plunger being careful not to lose the small flat valve and coil spring. (*CAUTION-Disassemble one lifter at a time to avoid mixing plungers and bodies. These parts are selectively fitted and must not be interchanged).* Use clean solvent and thoroughly wash all parts. Remove all varnish and gum deposits.



V8 HYDRAULIC VALVE LIFTER

Inspection: Inspect the plunger and wall of body for scratches (if plunger or body is scratched, replace complete unit). Try the plunger for fit in body. If check valve removed from plunger, inspect flat disc valve, spring and seat.

Reassembly: Reverse disassembly procedure. See illustration for correct sequence.

Testing: Fill body with kerosene and install plunger return spring, plunger assembly, and pushrod socket (do not install snap ring). Place lifter between jaws of Checking Tool J-5978 and check leak-down by depressing tool. A decided resistance should be felt. If lifter leaks down rapidly, or collapses immediately, it should be rechecked and/or replaced with a complete new lifter assembly. Normal lifter should require 10-45 seconds to leak down when filled with kerosene (.125" travel with 50 lb. load).

Installation: Lifters should be pre-lubricated and installed in engine WITHOUT being filled with oil. They will normally charge themselves in 3 to 8 minutes of engine operation.

OILING SYSTEM

OIL PUMP

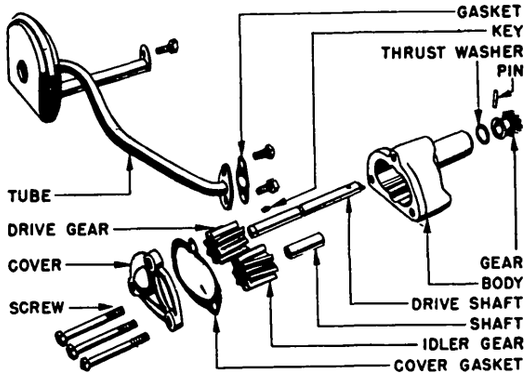
6 CYL. ENGINE

OIL PUMP: Removal - Pump mounted externally on right side of engine. Remove pump by taking out three capscrews in pump cover.

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Overhaul: Remove pump cover and gasket. Lift out pump drive gear, idler gear, and idler gear shaft. Remove key from keyway in shaft. Remove shaft and driving gear assembly through upper end of pump body (*NOTE* - Driving gear is held on shaft by a pin). Remove thrustwasher from shaft. Reassemble pump by reversing this disassembly procedure.



6 CYL. ENGINE OIL PUMP

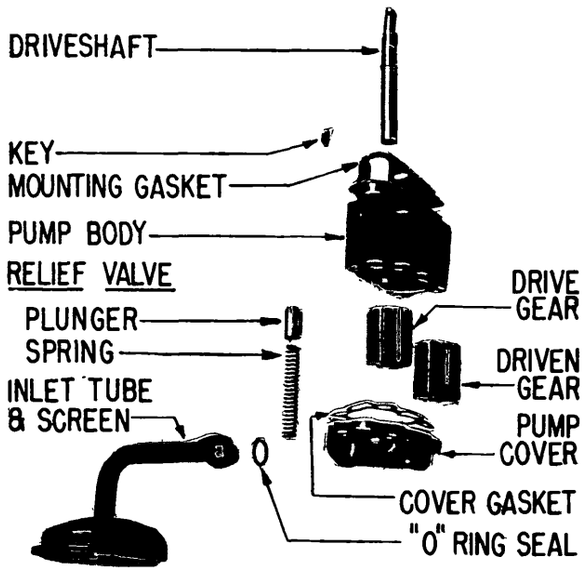
V8 ENGINE

OIL PUMP: Removal - Remove oil pan and screws retaining oil pump to rear main bearing cap, remove oil pump. *NOTE* - Oil pump is driven by distributor drive shaft so removal of oil pump does not affect ignition timing.

Disassembly - Remove inlet tube and screen assembly from pump cover. Remove cover retaining screws, cover, pump gears, relief valve spring and plunger.

Inspection - Check gear to cover clearance by placing straight edge across pump body with gears in operational cavity. Clearance should not exceed .004". A clearance of .008" maximum should exist between gears and walls of gear cavity opposite point of gear mesh.

Reassembly & Installation - Reverse disassembly procedure. Before installing pump on engine, check for free operation.



V8 ENGINE OIL PUMP

MODEL IDENTIFICATION

Mdl	Mod I Identification
6 Cyl.	5710

SERIAL NUMBER: Stamped on plate attached to right side of dash under hood.
Starting Serial No.- D-341001 (U.S.), DT-8501 (Canada).

ENGINE NUMBER: (Exc. with A.C.) Right side, front of block. (With A.C.) Left side, front of block.
Starting Engine No. - B-73001 (Single Throat Carb.), CB-2001 (Dual Throat Carb.).
►*ENGINE NUMBER LETTERS (Following Engine Number): Identified as follows:* First letter is size of bore, second letter is size of main bearings, and third letter is size of connecting rod bearings. Engines not so marked are standard in all respects.
"A" - Standard. "C" - .010" Oversize.
"B" - .010" Undersize. "D" - .001" Undersize.

TUNE-UP

COMPRESSION PRESSURE: 120 lbs. at cranking speed.
VACUUM READING: 18-21" at idling speed.
VALVE TAPPET CLEARANCE: .012" Int., .016" Exh., hot and running.
MANIFOLD HEAT CONTROL: None used.

IGNITION

FIRING ORDER: 1–5–3–6–2–4.
SPARK PLUG GAP: .035".
Spark Plug - Auto-Lite AL-7 or Champion H-10 14 mm Torque to 30 ft lbs
COIL: Delc -Remy 1115087.
Resistor - Delco-Remy 1927809. 1.4-1.65 Ohms at 75°F.
►*COIL RESISTOR NOTE.* Connected in series between battery and coil. Resistor is by-passed during cranking by solenoid, making direct lead from battery to coil.
►*RESISTOR SHORTING CORRECTION:* Beginning Serial No D-371199, reinforcement and friction washer Part No 8000165, added to primary resistor mounting to prevent shorting to ground Screw No 8000103 also used
DISTRIBUTOR: Delco-Remy No. 1110244.
Condenser - Delco-Remy 1879604. **Capacity** - .18-.23 mfd.
Contact Point Set - Delco-Remy 1918148.
Breaker Gap - 016".
Cam Angle - 28-35° (Set to 30°).
Breaker Arm Spring Tension - 19-23 ozs.
Rotation - Counter-clockwise viewed from above.

Automatic Advance

Degrees	Distr.	RPM	Degrees	Eng.	RPM
Start		425	0-4		850
9-11		1000	18-22		2000
12-14		1700	24-28		3400

Vacuum Spark Cntrl - Delco-Remy No. 1116121.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg.)
Start	0	6-8
7.5	15	16¾

IGNITION TIMING

Setting - TDC. *NOTE* - 5° BTDC optional with Automatic Transmission or where local fuel octane permits.
Timing Mark - On vibration damper.

CARBURETOR

►*CARBURETOR APPLICATION: Carter AS Single Barrel Carburetor is Standard, Carter WCD Dual Barrel Carburetor is Optional.*
Throttle Linkage Adjustment (Hydra-Matic Cars): Adjust engine idle speed to 475 RPM (500 RPM on Air Conditioned Cars with compressor operating) With engine temperature at 150-160°F, transmission warm, and selector lever in Neutral, adjust as follows.
1) Disconnect throttle rod at throttle lever on side of transmission case Clean back face of transmission case, place Gauge J-2545-D flush against machined surface of case with edge of gauge against transmission side cover Throttle lever stud should fit freely in notch in gauge Adjust by using Bending Tool J-3310 to bend lever as necessary Remove gauge reconnect throttle rod (install wave washer flat washer, and cotter pin)
2) Disconnect transmission throttle rod at bellcrank on bracket on cylinder head disconnect carburetor-to-bellcrank rod at bellcrank Install aligning pin through hole in bellcrank and bracket (Pin can be made from piece of 3/16" diameter rod)
3) Adjust carburetor-to-bellcrank rod so that rod can be connected with carburetor throttle valve closed to hot or slow idle speed position Connect rod
4) Adjust transmission throttle rod so that forward end fits freely in hole in bellcrank, then **shorten rod 3 full turns,** connect rod to bellcrank remove aligning pin Road test car and check test patterns *NOTE* - Shifting points can be changed by further adjustment of transmission throttle rod (shorten rod if shift points too low, lengthen rod if shift points too high)
Throttle Linkage Adjustment (Flash-O-Matic Cars): None required Transmission shift points controlled by Vacuum & Solenoid Unit on transmission case

CARTER AS

Carter AS No. 2580S or 2665S (Std. & O.D. Trans.), No. 2564S or 2664S (Auto. Trans.). Single barrel, downdraft type *NOTE* - Only 2564S & 2664S furnished for replacement
►*ENGINE SURGE CORRECTION (AS-2580S CARB.)* Surge condition may be encountered at steady throttle speed of 25-60 MPH., on cars equipped with above carburetor date coded "J-6" or prior. To alleviate condition, install metering rod, Part No. 3200432 (Carter No. 75-1366). Rods must just bottom in the jet wells with throttle valve wide open.
Idle Setting - ¼-1¼ turns open. Turn screw out for richer mixture.
Idle Speed - 550 RPM (Std. & O.D.), 475 RPM (Auto. Trans. in Neutral), 500 RPM (With Air Conditioning turned "ON").
Float Level - ¼" (Gauge T109-282) from top of each float (at free end) to top of casting. To adjust, bend float lip. There should be .010-.015" clearance between overlapping tangs on float levers. To adjust, bend long tang on left hand float.
Accel rating Pump - No seasonal adjustment.
Fast Idle· 030" (Gauge T109-29) between lower edge of valve and bore with fast idle link on high step of cam, To adjust bend choke connector rod.
Automatic Chok : Set 2 points rich.
►*OTHER DATA: See "Carter AS Carburetors" in Carburetion Section*

CARTER WCD

Carter WCD No. 2350S (Power Pack, Std. & O.D. Trans.), 2586S (Power Pack, Auto. Trans.). Dual, downdraft type
►*MANIFOLD FUEL DISTRIBUTION: Both barrels feed all cylinders.*
Idle Setting - ½-1½ turns open. Turn screws out for richer mixture.
Idle Speed - 550 RPM (Std. & O.D.), 475 RPM (Auto. Trans. in Neutral), 500 RPM (With Air Conditioning turned "ON").
Float Level - 5/32" (Gauge T109-196). Distance from top of each float and machined surface of casting.
Accelerating Pump - No seasonal adjustment.
Fast Idle: .020" (Gauge T109-29) between throttle valve and bore (side opposite idle port) with choke fully closed.
Automatic Choke: Centered (at Index).
►*OTHER DATA: See "Carter WCD Carburetors" in Carburetion Section*
FUEL PUMP PRESSURE: 3½-5¼ lbs at 500 RPM.

CARB. EQUIPMENT

Fuel Pump: Carter M2379SA Fuel & Vacuum
Pressure - 3½-5¼ lbs at 500 RPM
See "Fuel Pumps" in Carburetion Section
Gasoline Gauge: King-Seeley Electric Constant-voltage ("CV") type with gauge voltage regulator, King-Seeley No 46439
Dash Unit - King-Seeley No 49474
Tank Unit - King-Seeley No 44606
See "Fuel Gauges" in Carburetion Section

BATTERY

Standard - Auto-Lite. 11-HS-45. 12 Volt 11 plate 45 ampere hour capacity (20 hr rate)
Air Conditioned Cars - Auto-Lite 11-HS-60. 12 Volt, 11 plate 60 ampere hour capacity (20 hr rate)
Battery Ground - Negative
Engine Ground - Transmission case to rear engine crossmember right side

STARTER

Delco-Remy No. 1107647. Armature 1926626.
Drive - Overrunning clutch (solenoid pinion shift)
Rotation - Counterclockwise at commutator end
Brush Spring Tension - 35 ozs

Performance Data

Torque	RPM	Volts	Amperes
0 ft lbs	6900	10 3	75
10 5 ft lbs	Lock	5 8	435

Starter Switch: Delco-Remy Solenoid Switch 1119793 mounted on starter and controlled by combination Ignition & Starter Switch (Std & Overdrive Cars), or by Delco-Remy Switch 1996085 mounted on lower end of steering column and actuated by raising selector lever upward in "Neutral" (Hydra-Matic Cars), in "Neutral" or "Park" (Flash-O-Matic Cars)

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GENERATOR

Delco-Remy 1100304 (Std.), 1102018 (Air Cond.Cars).
Armature - Delco-Remy 1928952 (1100304 Gen.), 1923535 (1102018 Gen.).

Performance Data (Cold)

Generator	Amperes	Volts	RPM
1100304	25	14.0	2570
1102018	30	14.0	2210

Rotation - Counterclockwise at commutator end.
Brush Spring Tension - 28 ozs.
Field Current - 1.50-1.62 amperes (1100304), 1.48-1.62 amperes (1102018), 12 volts at 80°F.
Belt Adjustment: ½" deflection with 25 lbs. pressure applied midway between fan and generator pulleys.

REGULATOR

Delco-Remy No. 1119122 (1100304 Gen.), 1119003 (1102018 Gen.). *NOTE - Specifications are "Normal" settings.*

Cut-Out Relay

Cuts In - 11.8-13.5 volts.
Contact Gap - .020".
Air Gap - .020" with contacts just closed.

Voltage Regulator

Setting - 13.8-14.8 volts (hot).
Air Gap - .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section.*

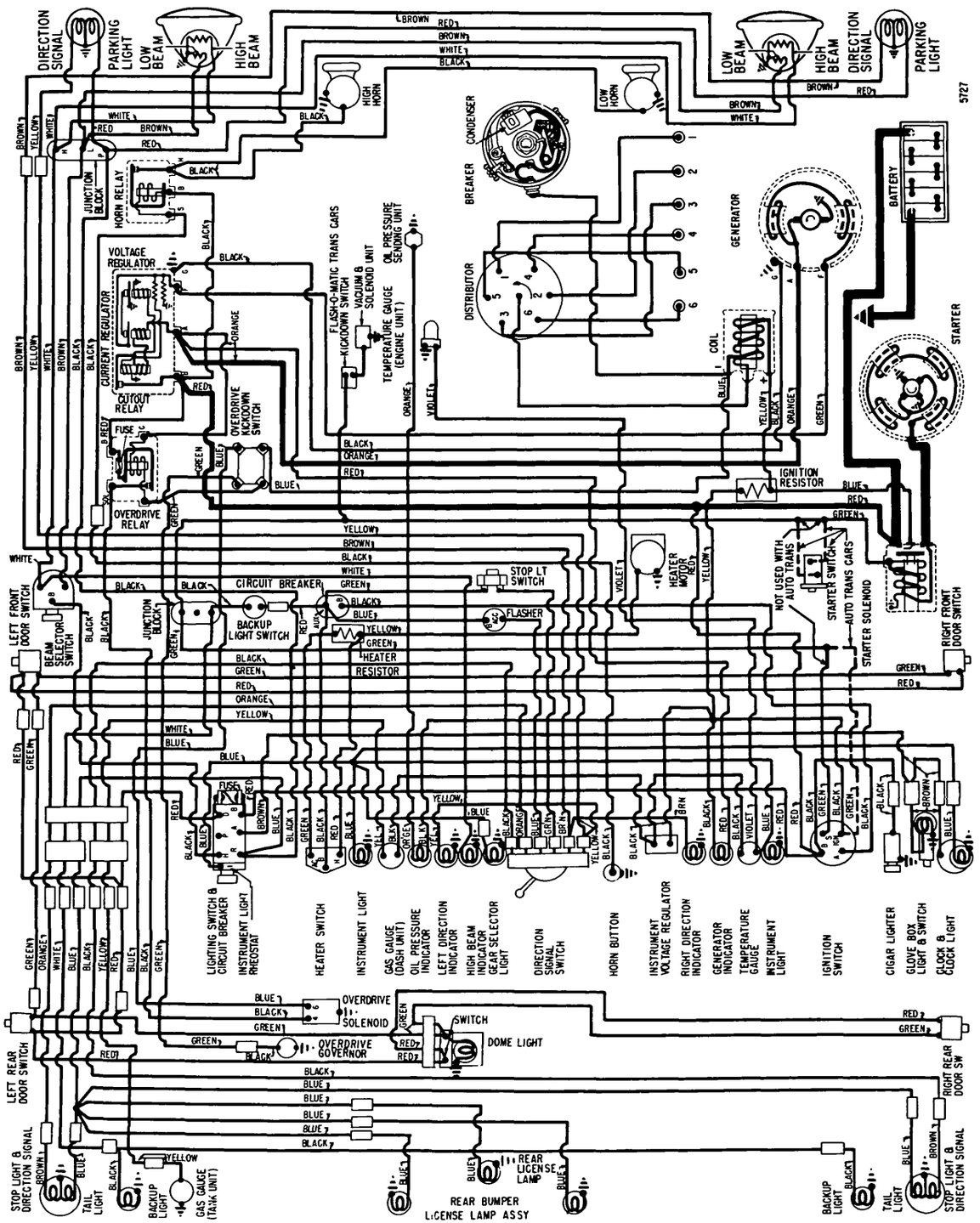
Current Regulator

Setting (1119122) - 23-27 amperes (Hot).
Setting (1119003) - 27-33 amperes (Hot).
Air Gap - .075" with armature pressed down to point where contacts just touch
Checking & Adjusting - *See "Delco-Remy 12 Volt Regulators" in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signals: *See Electrical Section.*
Light Switch Removal: Disconnect battery. With switch in "OFF" position, press button release on top of light switch assembly, and pull knob and shaft clear of switch. Remove slotted nut, pull switch to rear of instrument panel.
Stop Light Switch: Located at tee fitting in line to left front brake.
FUSES: Overdrive, 15 ampere, on Overdrive Relay.
Dome, Glove Box, Courtesy Lights, 7.5 amperes, on rear of headlight switch.
CIRCUIT BREAKERS: Three used as follows:
Headlights - 12 ampere. Part of headlight switch.
Park, Tail, License & Instrument Lights - 12 ampere. Part of headlight switch.
Stop, Turn Signals, Map, Oil Pressure, & Generator Charge Indicator - 30 ampere. Auxiliary circuit breaker inside body cowl on left side.
Horn Relay: Rambler No. 3145684.

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ENGINE

▷*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting any part of air conditi ning system or lines for access to engine. See "Air Conditioning Service Cautions" in Miscellaneous Section.*

ENGINE SPECIFICATIONS: 6 Cyl. valve-in-head.

Bore	Stroke	Displacement
3 1/8"	4¼"	195.6 cu. ins.
Compr Ratio	**Rated HP**	**Developed HP**
7.47-1	23.44	120 at 4200 RPM

Compression & Vacuum Reading—*See TUNE-UP.*

OIL PAN REMOVAL: Remove steering linkage cross tie rod before removing pan.

TIGHTENING TORQUES: *See "Tightening Specifications" in Rambler Special Data.*

CYLINDER HEAD & MANIFOLD: *See "Cylinder Head & Manifold" in Rambler Special Data.*

PISTONS

Aluminum alloy, solid skirt, tin plated type with contoured top. *NOTE* - Pistons are new three-rmg type.

Original Bore & Piston Sizes - *See "Original Bore & Pistons" in Rambler Special Data.*

Removal - Pistons & rods removed from above.

Fitting New Pistons: Piston to bore clearance .0006-.0017" (Skirt Top), .0006-.0012" (Skirt Bottom). Piston properly fitted should support its own weight with piston and bore dry.

Replacement Pistons: Standard, .002", .005" and .010" oversize. Furnished with fitted pins.

Installing Pistons: Notch in perimeter must be to front of engine.

PISTON PINS

Press fit in connecting rod. No locking device.

Diameter - .8597". Length - 2¾".

Clearance in Piston - Palm press fit in piston at room temperature.

Pin Removal & Installation - *See "Piston Pins" in Rambler Special Data.*

NOTE - Fitted pins furnished with new pistons.

PISTON RINGS

NOTE - Two compression rings and one three-piece oil control ring used. Supersedes four rings previously used.

Ring	Width	End Gap	Side Clearance
Compr. #1	.0933"	.010-.020"	.003-.005"
Compr. #2	.0930"	.010-.020"	.003-.005"
Oil #3 ①	.0245"	.015-.055"	.0001-.0084"

① Three-piece steel rail.

Replacement Rings: Sets of Standard & .020" oversize.

Installing Rings: Stepped inner edges of both compression rings must be up.

CONNECTING RODS

Length—6.625" center-to-center. Weight—25 ozs.

Crankpin Journal Diameter—2.0948"-2.0955".

Original Bearing Sizes—*See "Original Bearing Sizes" in Rambler Special Data.*

Bearings—Steel-backed babbitt. No shims.

Clearance—.001"-.0015". Side Play—.005"-.015".

Replacement Bearings: Std., .001", .002", .010", .012" Undersize.

Installing Rods: Identification marks (raised surface on center of rod and cap) toward front of engine.

CRANKSHAFT

Journal Diameter—2.4791"-2.4798". Four Bearing.

Original Bearing Sizes—*See "Original Bearing Sizes" in Rambler Special Data.*

Bearings—Steel backed babbitt. No shims.

Clearance—.001"-.0015".

Replacement Bearings: Std., .002", .010", .012" Undersize.

End Thrust: Taken by flanged front main bearing.

End Play—.003"-.008".

Rear Bearing Oil Seal Installation: *See "Crankshaft & Main Bearings" in Rambler Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Rambler Special Data.*

VIBRATION DAMPENER REMOVAL & INSTALLATION: *See "Vibration Dampener" in Rambler Special Data.*

CAMSHAFT

Bearings - Steel-backed babbit bushings.

Clearance - .001"-.003".

End Thrust: Thrust plate on front face of engine between No. 1 bearing and camshaft sprocket.

Endplay - .004-.008".

Timing Chain: Morse non-adjustable type. Width 1", Pitch 3/8", Length 22½" or 60 links.

Camshaft Setting: Install chain with punch mark on camshaft sprocket and mark on crankshaft sprocket adjacent and in line with each other across centerline of sprockets.

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Rambler Special Data.*

Engine Front Cover Removal: *See "Engine Front Cover" in Rambler Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Rambler Special Data.*

VALVES

Tappet Clearance: Intake .012", Exhaust .016" (Running Hot).

Valve	Head Diam.	Stem Diam.	Length
Intake	1.594"	.3412-.3417"	4.759"
Exhaust	1.343"	.3407-.3412"	4.759"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45° ①	.372"	.002-.0035"
Exhaust	45° ①	.369"	.0025-.004"

① Valve face angle 44°.

▷*VALVE GRINDING CAUTION:* Replace valves when refacing reduces distance from top of valve face to top of valve to less than 1/32".

Valve Seat Width - 5/64-3/32".

Valve Stem Oil Seal - Rubber deflectors mounted on all valve stems at upper end of guide.

Valve Springs: Free Length - 2 3/8".

Valve Spring Specifications

Valve	Lbs. Pressure	Length
Closed	65-70	1.13/16"
Open	115-125	1 7/16"

Valve Guides: Use Tool J-1429-A to remove and replace guides. Guides should extend ⅜" above cylinder head.

Rocker Arm Assembly: *See "Valve System" in Rambler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valve - Open 12°30' BTDC, Close 51°30'ALDC.

Exhaust Valve - Open 53°30' BLDC, Close 10°30'ATDC.

Valve Timing Check - Set valves on No. 1 cylinder at .003" lash. With No. 6 piston at TDC in firing position, timing will be correct if exhaust valve opens the same amount before DC on vibration dampener as intake valve opens after DC as engine is rocked back and forth over DC.

OILING SYSTEM

Crankcase Capacity: 4 qts. refill, 1 qt. addt'l with filter change.

Normal Oil Pressure: 30 lbs. at 20 MPH. 12 lbs. minimum at 600 RPM.

Pressure Regulator Valve - Non-adjustable spring loaded valve located in cylinder block where oil enters oil distribution channel.

Oil Pressure Indicator: Light on instrument panel goes on when ignition switch is turned on, goes out as oil pressure reaches pressure of gauge. Sending unit Rambler No. 3142826 (6½ lbs.), or No. 3200422 (4 lbs.), located on right rear side of engine block.

Oil Pump: Gear type. Mounted on right side of engine. *See "Oiling System" in Rambler Special Data.*

Oil Filter: Partial Flow type. Replace element every 5000 miles or sooner as needed.

Replacement Filter Element - Rambler No. 8990068.

Crankcase Ventilation: Filter in crankcase filler cap, and vent in rocker arm cover.

COOLING

Water Capacity: 10 qts., with heater 11 qts.

Pressure Valve: 7 lb. Radiator Filler Cap Rambler No. 3142965 (less Air Conditioning), 13 lb. No. 3141371 (with Air Conditioning).

Thermostat: Choke type. 170° (Std.) Rambler No. 3131817. 180° (Optl.) No. 3131985 for use with permanent antifreeze.

Water Pump: Centrifugal, double row ball bearing type. Requires no lubrication. Serviced as an assembly.

Temperature Gauge: King-Seeley "CV" electric type.

Dash Unit - K-S No. 49476 (Rambler No. 3119193).

Engine Unit - K-S No. 44200 (Rambler No. 5304502).

NOTE - Rambler No. 3200032 used on Air Cond. Cars. *See "Temperature Gauges" in Miscellaneous Section.*

CLUTCH

Borg & Beck 8.5A7. Assy No. 361416. Single Plate. *See "Borg & Beck" in Clutch Section.*

Clutch Disc No.	Borg & Beck	Rambler No.
Standard	382394	3144937
Overdrive	382490	3147133

▷*1957 CLUTCH BEAM INNER PIVOT CAUTION:* High pressure lubrication of clutch beam inner pivot may force fabrica insulated bearing support off inner pivot. To correct, remove inner pivot from clutch beam and grind a flat on outside diameter of pivot. Diameter should be .462-.465". This condition corrected at Serial No. D-342820.

Pedal Adjustment: Freeplay should be 1½-¾". Adjust at connecting link between throwout lever and release idler shaft assembly.

Removal: Remove transmission (see below), disconnect linkage, remove clutch housing and pan. Punch mark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

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SYNCHRO-MESH TRANSMISSION

►*LIMITED PRODUCTION TRANSMISSION CHANGE NOTE:* Effective Serial No. D-354549 through Serial No. D-356529, 1956 transmission Part No. 3145434 and propeller shaft Part No. 3119151 were used in **Warner.** 3 speed, helical gear type.

See "Warner Transmissions" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect brake tube at bracket underside of body, torque tube at rear of transmission, hand brake cable at bell crank and brake cable housing at the rear brake cable bracket. Move rear axle to rear to remove universal joint from transmission shaft. Disconnect speedometer cable and shifter rods. On overdrive cars, disconnect wires at solenoid, governor and overdrive cable at lever. Use two guide pins in place of two upper capscrews to guide transmission back to clear pilot bearing and clutch disc.

OVERDRIVE

Warner R10—*See "Warner R10" in Transmission Section.*

Overdrive Control: *See "Warner R10-R11 Overdrive Controls" in Transmission Section.*

HYDRA-MATIC DRIVE

Dual Range four speed automatic transmission with fluid coupling.

See "Hydra-Matic Drive" in Transmission Section.

►*1957 APPLICATION & MODIFICATION NOTE:* Hydra-Matic transmission used through Serial No. D-367710. Modified units identified by letter "V" after transmission serial number used between Serial Nos. D-362700 and D-367485.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Hydra-Matic Drive" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Hydra-Matic Drive" in Transmission Section.*

Lubrication - Check fluid every 1000 miles, drain and refill at 25,000 mile intervals, using Automatic Transmission Fluid Type "A".

Checking Fluid Level - Set hand brake, place selector lever in "N" position, start engine and idle for a minimum of 2 minutes after transmission has reached normal operating temperature. With selector lever in "N" position, remove dipstick and check fluid level (dipstick located at right side of engine). Add fluid to bring level to "F" mark.

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Hydra-Matic Drive" in Transmission Section.*

FLASH-O-MATIC TRANSMISSION

Warner Automatic Transmission with torque converter, 3-speed planetary gear system, and dual forward driving range. **Throttle linkage** adjustment controlled by vacuum and solenoid unit at rear of transmission.

►*1957 APPLICATION NOTE:* Effective Serial No. D-367711 this transmission supersedes Hydra-Matic Drive.

►*PRODUCTION CHANGES AND REPLACEMENT PARTS CAUTION: See "Flash-O-Matic Transmission" in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Flash-O-Matic Transmission" in Transmission Section.*

Lubrication - Check fluid every 1000 miles, drain and refill at 15,000 mile intervals, using Automatic Transmission Fluid Type "A".

Capacity - 8½ quarts.

Checking Fluid Level - Place selector lever in "P" position and set hand brake. Start engine and operate until engine and transmission reach operating temperature. Move selector lever from "P" to "R" and then to "D-2" positions. Check fluid level with dipstick (located at right side of engine). Add fluid to bring level to "F" mark. (Approximately 1½ pints fluid required between "L" and "F" marks).

►*OTHER FLASH-O-MATIC SERVICE DATA: See "Flash-O-Matic Transmission" in Transmission Section.*

UNIVERSALS

Detroit or Mechanics - One used at transmission end.

Torque Tube Bracket Adjustment (Std. & O.D. Transmission Cars Only) - *See "Hudson & Nash Hypoid" in Rear Axle Section.*

REAR AXLE

Own. Semi-floating, hypoid type with torque tube drive.

See "Hudson & Nash Hypoid" in Rear Axle Section.

Axle Ratio - Std. 3.8-1 (9-34), **Overdrive** 4.4-1 (8-35), **Auto. Trans.** 3.3-1 (13-43).

Backlash - .002-.006". Shim Adjustment.

Axle Shaft Removal: Remove wheel, pull drum (use hub puller J-1644-B or J-736-B). Remove brake support plate, slide plate, oil seal, and shims off axle. Attach special puller J-2498-A to axle shaft and remove shaft from housing.

Rear Suspension: *See "Hudson & Nash" in Suspensions & Wheel Alignment Section.*

Rear Axle Assembly Removal: Drain lubricant, raise and support rear of body. Disconnect hand brake cable at bellcrank, and hand brake cable housing at bracket. Disconnect torque tube from transmission, rear brake hose at bracket on body floor pan, shock absorbers from brackets and rear axle stabilizer bar at rear axle tube. Roll axle free from car.

Wheel Bearing Adjustment: Shims behind brake backing plate.

SHOCK ABSORBERS

Delco. Direct acting type. Serviced by replacement.

Front - Rambler 3119821. **Rear** - Rambler 3119822.

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs located between upper end of steering knuckle pin and seat in outer wheel house panel.

See "Rambler" in Suspensions & Wheel Alignment Sect.

►*FRONT SUSPENSION SPRING NOTE:* Heavier spring used for Air Conditioned cars. *See "Rambler" in Suspension & Wheel Alignment Section.*

King Pin Inclination - 6½°.

Caster (Std.) - ½° desired. Limits 0° to ½°.

(Pwr. Strg.) - 1° desired. Limits ½° to 1°.

Camber - 0° desired. Limits ¼° Neg. to ¼° Pos.

Toe-In - 1/16" to 3/16". *CAUTION* - When adjusting toe-in on Power Steering Cars, operate engine to supply oil pressure which will center spool in power cylinder valve.

Toe-Out on Turns - Outer wheel 22°, inner wheel 25°.

STEERING

Manual: Gemmer. Worm & Roller with push pull adjustments.

See "Gemmer Worm & Roller" in Steering Section.

Power Steering: Monroe "Power Guide". Linkage type.

See "Monroe Power Guide" in Steering Section.

Steering Linkage: *See "Steering Linkage" in Steering Section.*

Steering Wheel & Horn Button Removal: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Bendix (Lockheed) Self-Centering (prior to Serial No. D-360492). Self-centering type with non-adjustable anchor ramps for each shoe. Hand lever applies rear wheel service brakes.

See "Bendix (Lockheed) Self-Centering" in Brake Sect.

Drum Diameter - 9".

Wheel Cylinder Diameter - 1 1/16" (Front), 7/8" (Rear).

Replacement Linings & Shoes - Linings and shoes with linings furnished in standard size only.

Lining Width & Length	Front Wheel	Rear Wheel
Primary Shoes	2½" x 9 7/8"	2" x 9 7/8"
Secondary Shoes	2¼" x 9 21/32"	1¾" x 7 21/32"

Clearance - All shoes just free of drag with brakes centralized (with slight drag on shoes rotate wheel in both directions). Eccentric adjustment for each shoe.

Wagner-Lockheed Self-Centering (Effective Serial No. D-360492). Self-centering type with Bendix type shoes. Star wheel adjusting screw for each wheel. Hand lever applies rear wheel service brakes.

See "Wagner-Lockheed Self-Centering" in Brake Sect.

Drum Diameter - 9".

Wheel Cylinder Diameter - 1" (Front), 13/16" (Rear).

Replacement Linings & Shoes - Linings and shoes with linings furnished in standard size only.

Lining Width & Length	Front Wheel	Rear Wheel
Primary Shoes	2¼" x 6 31/32"	2" x 7¼"
Secondary Shoes	2½" x 9 1/16"	2" x 9 11/32"

Clearance - Adjusting screw backed off 8 notches from shoes locked against drum until free of drag.

Standard Master Cylinder: In engine compartment under steering column.

Checking Fluid - Fill from engine compartment. Check at 1000 mile intervals.

Removal - Remove from beneath car. Not necessary to disturb other parts.

Power Brakes: Bendix Power Unit, Hydraulic Reaction Type. *See "Bendix Power Unit" in Brake Section.*

Checking Fluid - Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning. Thermostatic control with magnetic clutch on compressor unit. *See "Nash-Hudson Air Conditioning" in Misc. Section.*

MODEL IDENTIFICATION

Model	Model Identification
V8	5720
Rebel	5730

SERIAL NUMBER: Stamped on plate attached to right side of cowl under hood.

Starting Serial No. - V8 - A-1001 (U.S.), AT-1001 (Canada); **Rebel** - F-1001 (U.S.), FT-1001 (Canada).

ENGINE NUMBER: Stamped on lower right front corner of block.

Starting Engine No. - V8 (2-Bbl. Carb.) - G-7501, **V8 (4-Bbl. Carb.)** - CG-1001, **Rebel** - CN-1001.

TUNE-UP

COMPRESSION PRESSURE: 140 lbs. at cranking speed,
VACUUM READING: 18-21" at idling speed.
VALVE TAPPET CLEARANCE: .012" Intake, .014" Exhaust, hot and running.

MANIFOLD HEAT CONTROL: Automatic thermostatic type. Located between left bank exhaust manifold and exhaust cross-over pipe (exhaust gases diverted through heat passages in manifold when valve closed).

IGNITION

►*V8 DISTRIBUTOR PRODUCTION CHANGE: Delco-Remy Distributor No. 1110884, external adjustment "Window" type replaced No. 1110863 effective at Eng. No. G-11925, EXCEPT between Eng. Nos. G-17522 and G-17842.*

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders - RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .035".

Spark Plug - Auto-Lite AL-7 or Champion H-10. 14 mm. Torque to 30 ft. lbs.

COIL: Delco-Remy 1115087.

Resistor - Delco-Remy 1927809.

►*COIL RESISTOR NOTE:* Connected in series between battery and coil. Resistor is by-passed during cranking by solenoid, making direct lead from battery to coil.

►*RESISTOR SHORTING CORRECTION:* Effective Serial Nos. A-12537 and F-1062, reinforcement and friction washer, Part No. 8000165, added to primary resistor mounting to prevent shorting to ground. Screw, Part No. 8000103, also required.

DISTRIBUTOR: Delco-Remy No. 1110863 (Before Eng. No. G-11925 & between Eng. Nos. G-17522 & G-17842), No. 1110884 (Effective Eng. No. G-11925) - V8; No. 1110887 - Rebel. *NOTE* - Nos. 1110884 and 1110887 are "window type" with external adjustment. *See "Delco-Remy Window Distributor" in Electrical Section.*

Condenser - Delco-Remy 1869704 (1110863 Distr.), 1932004 (1110884 & 1110887 Distr.). **Capacity** - .18-.23 mfd.

Contact Point Set - Delco-Remy 1918148 (1110863 Distr.), 1931988 (1110884 & 1110887 Distr.).

Cam Angle - (1110863) 28-35°, (1110884 & 1110887) 28-32°. Set to 30°.

►*BREAKER GAP AND CAM ANGLE NOTE (WINDOW DISTRIBUTORS): Setting cam angle at 30° will provide .016" breaker gap.*

Breaker Arm Spring Tension - 19-23 ozs.

Rotation - Counterclockwise viewed from above.

Automatic Advance - 1110863

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	350	1-5	700
2-4	400	4-8	800
7-9	800	14-18	1600
11-13	1125	22-26	2250

Automatic Advance - 1110884

Start	375	0-4	750
2-4	450	4-8	900
9-11	1000	18-22	2000
18-20	1700	36-40	3400

Automatic Advance - 1110887

Start	350	0-4	700
7.5-9.5	775	15-19	1550
12-14	1300	24-26	2600
17-19	1900	34-38	3800

Vacuum Spark Control: Delco-Remy No. 1116095 (1110863 Distr.), No. 1116113 (1110884 Distr.), No. 1116117 (1110887 Distr.).

Vacuum Advance - 1116095

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	5-7
10	20	11.5-13.5

Vacuum Advance - 1116113

Start	0	5.5-7.5
12	24	13.25-15.50

Vacuum Advance - 1116117

Start	0	5-7
10	20	14.25-15.75

IGNITION TIMING

Setting - 5° BTDC. *NOTE* - 7° BTDC with overdrive, 10° BTDC with automatic transmission or where fuel octane permits.

Timing Mark - Timing indicator on front cover and 5° mark on vibration damper.

CARBURETOR

►*CARBURETOR APPLICATION: Carter 2 and 4-barrel used as follows:*

Model	Carburetor
V8	WGD 2352S,SA
V8 (Power Pack)	WCFB 2593S,SA
"Rebel" (Std.)	WCFB 2593S,SA
"Rebel" (Optional)	Bendix Electrojector

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

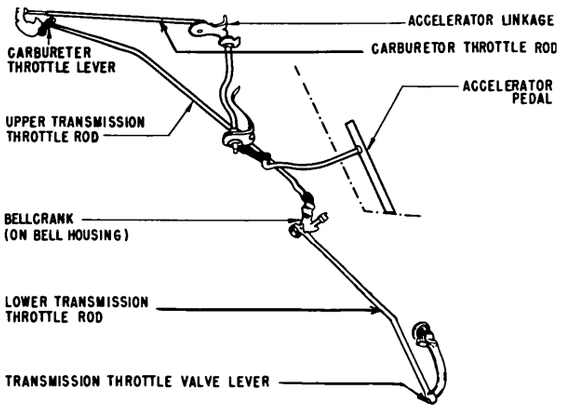
THROTTLE LINKAGE ADJUSTMENT (HYDRA-MATIC CARS):

Make adjustments in the following order:

1) – Disconnect throttle valve rod from throttle valve lever on transmission case, disconnect vent pipe at lower left of case. Hold throttle lever to rear against stop. Distance from machined surface on rear of case to center of pin on throttle lever should be 5 9/16". Bend lever to correct position.

2) – Measure length of lower throttle valve rod from center of lower hole to outer surface of upper end. Length should be 16 1/8" (plus 0", minus 1/32"). Adjust by bending rod.

3) – Set carburetor throttle at slow idle (closed throttle). Adjust upper throttle rod at carburetor throttle rod bracket so that rod enters hole in bracket freely; then



FLASHAWAY HYDRA-MATIC THROTTLE LINKAGE

lengthen rod by turning adjusting end one full turn to left, tighten locknut and connect rod.

CARTER WGD

Carter WGD 2352S, SA. Dual downdraft type

►*CARBURETOR PRODUCTION CHANGE: Carburetor 2352SA has the following new parts: Metering Rod No. 75-1285; Pump Plunger Rod & Check Assy. No. 64-181S; Upper Pump Spring No. 61-413.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 2–3–5–8, LEFT barrel 1–4–6–7.*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

Idle Setting - ½-1½ turns open. Turn screws out for richer mixture.

Idle Speed - (Std. & O.D.) 550 RPM, (Auto. Trans.) 425 RPM in Neutral, 450 RPM (With Air Conditioning "ON").

Float Level - 7/32" (Gauge T109-106) between top of float and bowl cover, gasket removed, cover inverted and needle seated. Adjust by bending float arm.

Fast Idle: .023" between throttle valve and bore (side opposite idle port), with choke valve fully closed (Gauge T109-189). Adjust by bending choke connector rod at lower angle. *NOTE* - This fast idle setting will provide 1700-1800 RPM engine fast idle speed.

Automatic Choke: Centered (at index).

►*OTHER DATA: See "Carter WGD Dual Carburetors" in Carburetion Section.*

CARTER WCFB

Carter WCFB 2593S,SA. 4-barrel carburetor with automatic choke.

►*ROUGH ENGINE IDLE:* May be caused by air leak in left primary throttle bore. *See "Carter WCFB Carburetors" in Carburetion Section.*

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 2-3-5-8, LEFT barrels Cyl. 1-4-6-7.*

Idle Setting - ¼-1¼ turns open. Turn screws out for richer mixture.

Idle Speed - 550 RPM (Std. & O.D.), 425 RPM (Auto. Trans. in Neutral), 475 RPM (Auto. Trans. & A.C "ON").

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► *OTHER DATA: See "Carter WCFB Carburetors" in Carburetion Section.*

BENDIX "ELECTROJECTER" (Optional)

See "Bendix Electrojecter" in Carburetion Section.

FUEL PUMP PRESSURE: 4-5½ lbs.

CARB. EQUIPMENT

Fuel Pump: Fuel and vacuum.
Replacement Pump - Carter No. M2433SA.
Pressure - 4-5½ lbs. maximum.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: King-Seeley Electric Constant-voltage ("CV") type with gauge voltage regulator, King-Seeley No. 46439
Dash Unit - King-Seeley No. 49474.
Tank Unit - King-Seeley No. 44606
See "Fuel Gauges" in Carburetion Section

BATTERY

V8 Standard - Auto-Lite 11-HS-50. 12 Volt. 11 plate, 50 ampere hour capacity (20 hr. rate).
V8 Air Conditioned & "Rebel" - Auto-Lite 11-HS-60. 12 Volte. 11 plate, 60 ampere hour capacity (20 hr. rate)
Battery Ground - Negative.
Engine Ground - Transmission case to rear engine crossmember, right side.

STARTER

Delco-Remy No. 1107648 Armature 1926626.
Drive - Overrunning clutch (solenoid pinion shift)
Rotation - Counterclockwise at commutator end
Brush Spring Tension - 35 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.. .	6900	10 3	75
10 5 ft. lbs.	Lock	5 8	435

Starter Switch: Delco-Remy Solenoid Switch 1119760 mounted on starter and controlled by combination Ignition & Starter Switch (Std. & Overdrive Cars), or by Delco-Remy Switch 1996085 mounted on lower end of steering column and actuated by raising selector lever upward in "Neutral" (Hydra-Matic Cars), in "Neutral" or "Park" (Flash-O-Matic Cars)

GENERATOR

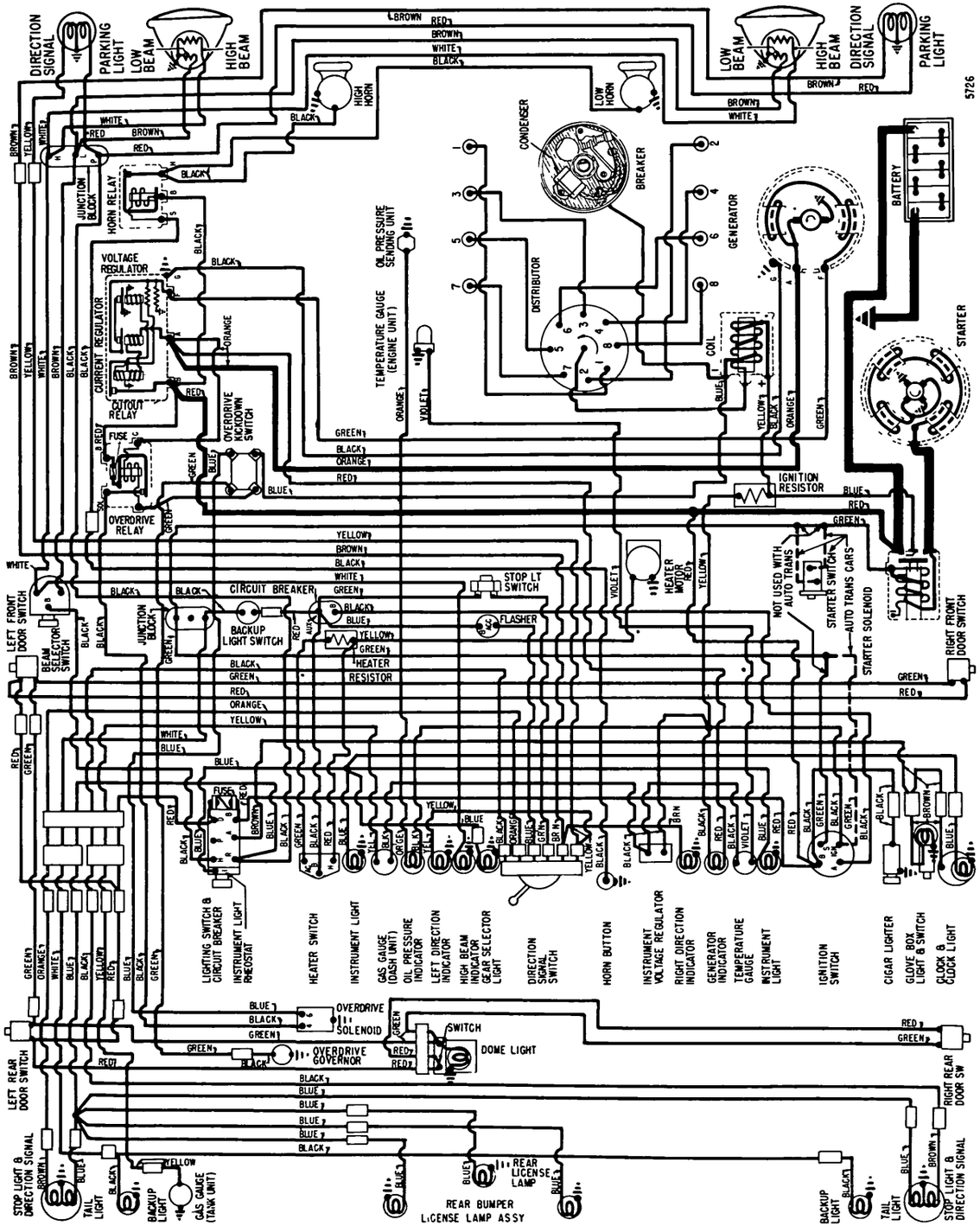
Delco-Remy 1100304 (V8 Std.), 1102018 (Rebel & V8 Air Cond. Cars).
Armature - Delco-Remy 1928952 (1100304 Gen.), 1923535 (1102018 Gen.)

Performance Data (Cold)

Generator	Amperes	Volts	RPM
1100304	25	14.0	2570
1102018	30	14 0	2210

Rotation - Counterclockwise at commutator end
Brush Spring T nsi n - 28 ozs.
Fi ld Curr nt - 1 50-1 62 amperes (1100304), 1 48-1 62 amperes (1102018), 12 volts at 80°F
B lt Adjustm nt: ½" deflection with 25 lbs. pressure applied midway between fan and generator pulleys.

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REGULATOR

D lc -R my N . 1119122 (1100304 Gen.), 1119003 (1102018 G n.). *NOTE - Specifications are "Normal" s ttings*

Cut-Out Relay

Cuts In - 11 8-13 5 volts
Contact Gap - 020"
Air Gap - 020" with contacts just closed

V ltage Regulator

S tting - 13 8-14 8 volts (hot)
Air Gap - 075" with armature pressed down to point where contacts just touch
Ch cking & Adjusting - *S "Delco-Remy 12 Volt Regulat rs" in Electrical S ction*

Curr nt Regulator

S tting (1119122) - 23-27 amperes (Hot)
S tting (1119003) - 27-33 amperes (Hot)
Air Gap - 075" with armature pressed down to point where contacts just touch
Ch cking & Adjusting - *See "Delco-Remy 12 Volt Regulat rs" in El ctrical S ction*

MISC. ELECTRICAL

H adlamps: Sealed Beam *Se Electrical Section*
Dir cti nal Signals: *S Electrical Section*
Light Switch R moval: Disconnect battery With switch in "OFF" position, press button release on top of light switch assembly, and pull knob and shaft clear of switch Remove slotted nut pull switch to rear of instrument panel
St p Light Switch: Located at tee fitting in line to left front brake
FUSES: Ov rdriv , 15 ampere, on Overdrive Relay
Dom , Glov B x, C urt sy Lights, 7 5 amperes, on rear of headlight switch
CIRCUIT BREAKERS: Three used as follows·
H adlights - 12 ampere Part of headlight switch
Park, Tail, Lic ns & Instrument Lights - 12 ampere Part of headlight switch
St p, Turn Signals, Map, Oil Pressure, & Generator Charg Indicator - 30 ampere Auxiliary circuit breaker inside body cowl on left side
H rn R lay: Rambler No 3145684

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION Use extreme care when disconnecting any part of air conditioning system or lines for access to engine See "Air Conditioning Service Cautions" in Miscellaneous Section*

ENGINE SPECIFICATIONS: Own V8 Valve in head

M d l	B r	Stroke	Displacement
V8	3½"	3¼"	250 cu ins
"Rebel"	4"	3¼"	327 cu ins

M d l	C mpr. Rati	Rated HP	Developed HP
V8 Std	8 0-1	39 2	190 at 4900 RPM
V8 Pwr Pk	8 0-1	39 2	203 at 4900 RPM
Rebel①	9 5-1	51 2	255 at 4700 RPM
Rebel②	9 5-1	51 2	288 at 4700 RPM

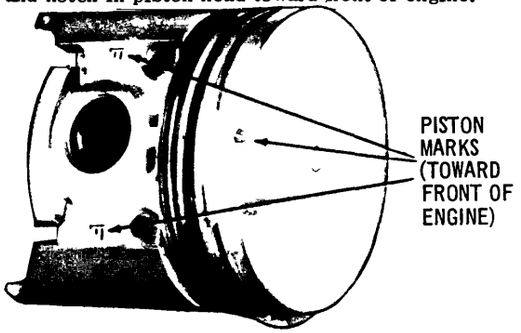
①Standard ②Fuel Injection

C mpression & Vacuum Reading - *See TUNE-UP*

CYLINDER HEAD INSTALLATION: *S "Cylind r H ad & Manifolds" in Rambl r Special Data.*
TIGHTENING TORQUES: *See "Tightening Specifications" in Rambler Special Data.*

PISTONS

Aluminum alloy, slipper type, tapered skirt, cam ground with steel reinforcement. Piston pin offset toward thrust side of piston.
Weight - 18 ozs (V8), 23 45 ozs ("Rebel")
Removal - Piston and rods removed from above
Clearance . 0009- 0025" (Skirt Top), 0009- 0015" (Skirt Bottom)
Replacement of Pistons: Std., .002", .005", .010", .020", .030", .040" Oversize.
Installing Pistons: Install with "F" cast in piston strut and notch in piston head toward front of engine.



PISTON PINS

Press fit in connecting rod. No locking device.
Diameter - 9307" **Length** - 3 1870"
Pin Fit in Piston – Palm press fit at room temperature.
Pin Removal & Installation – *See "Piston Pins" in Rambler Special Data.*
Replacement Pins: Std., .003", .005" Oversize.

PISTON RINGS

Three rings (two compression & one oil) used. Upper ring is chrome plated. Oil control ring is three piece type (two oil control wiper rails with a segmented steel spacer between them).

Ring	Width	End Gap	Side Clearance
Compr #1	0778"	010- 020"	002 - 006"
Compr #2	0778"	010- 020"	002 006"
Oil #3	0245"	015- 055"	0001- 0079"

Replacement Rings: Sets of Std , 020" & 030" oversize
Installing Rings: Stepped inner edges of both compression rings must be up

CONNECTING RODS

Crankpin Journal Diameter – 2.2483-2.2490".
Length - 6 3750" center-to-center **Weight** - 27 6 ozs
Lower Bearing – Precision, steel-backed, babbitt.
Clearance – .0007-.0028". Side Clearance – 004-.012".
Replacement Bearings: Std , 001", 002", 010" & 012" Undersize
Installing R ds: Assemble connecting rod with notch in piston and connecting rod identification mark to front of engine. Cylinder numbers on connecting rod should be toward outside of bank in which they are installed.

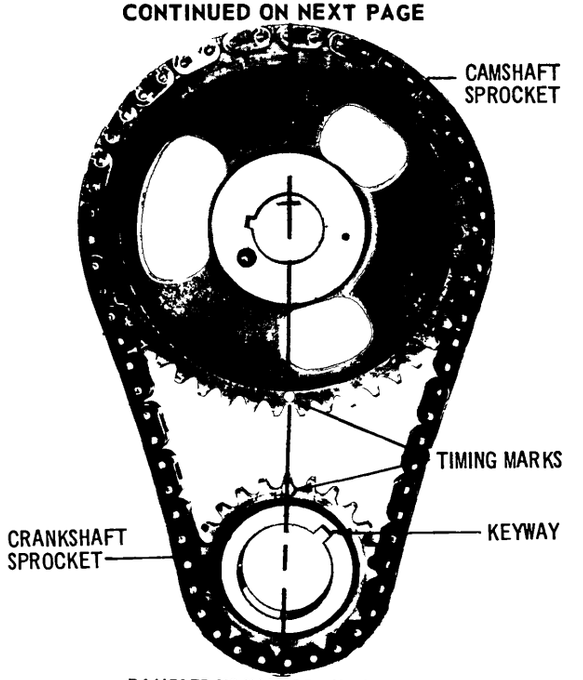
CRANKSHAFT

J urnal Diamet r – 2.4983" - 2.4990". Five bearings.
Bearings – Precision, steel-backed, babbitt.
Clearance – .0006"-.0032".
Replacement Bearings: Std,, 001", 002", 010" & 012" Undersize
End Thrust: Taken by No. 1 flanged bearing.
Endplay – .003-.007".
Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Rambler Special Data.*
Crankshaft Front Oil Seal: *See "Engine Front Cover" Rambler Special Data.*
VIBRATION DAMPER REMOVAL & INSTALLATION: *See "Vibration Damper" in Rambler Special Data*

CAMSHAFT

►*1957 CAMSHAFT REPLACEMENT CAUTION* Camshafts designed for use with mechanical lifters not interchangeable with those designed for hydraulic lifters Mechanical lifter shafts identified by white paint on area ahead of oil pump and distributor drive gear Hydraulic lifter shafts have no identifying marks
Bearings - Five steel-backed babbitt lined bushings pressed in block and line reamed
Clearance - 001- 003"
End Thrust: Taken by thrust plate behind camshaft sprocket
End Play - 003- 006"
Timing Chain: Morse non-adjustable type **Width** 875", **Pitch** 375", **Length** 23¼" or 62 links
Camshaft Setting: Both sprockets marked "O" Mesh chain with sprockets turned so that marks are adjacent and in line with straight edge across shaft centers To check assembly, rotate crankshaft until tim-

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RAMBLER V8 VALVE TIMING MARKS

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ing mark on camshaft sprocket is on horizontal line at either 3 or 9 o'clock position. There should be 10 links or 20 pins between timing marks

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Rambler Special Data*

Engine Front Cover Removal: *See "Engine Front Cover" in Rambler Special Data*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Rambler Special Data*

VALVES

Tappet Clearance: 012" (Intake), 014" (Exhaust) Hot.

►*1957 RAMBLER V8 TAPPET NOTE: Either mechanical or hydraulic valve lifters used on cars between Engine Serial Nos. G-9401 and G-9550.*

Valve	Head Diameter	Stem Diameter
Intake	1 787"	3412"- 3417"
Exhaust	1 406"	3407"- 3412"

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°①	③	0013"- 0028"
Exhaust	45°②	④	0018"- 0033"

①- Face Angle 29°. ②- Face Angle 44°.
③- 381" (V8), 375" (Rebel)
④- 380" (V8), 375" (Rebel)

Valve Seat Width – .078-.093" (Intake), **.093-.104"** (Exhaust).

Valve Stem Seals – Rubber deflector installed on valve stem and over top of guide on all valves.

Valve Springs: Install springs with closed coil end against cylinder head. **Free Length - 2.20".**

Valve Spring Specifications

Valves	Spring Pressure	Spring Length
Closed	85 - 91 lbs.	1 13/16"
Open	150 -160 lbs.	1 7/16"

Valve Guides: Drive old guides out, drive new guides in to height of ¾" ± 1/64" above cylinder head (measure from top of guide to flat machined surface of lower spring retainer on head). Ream all guides to I.D. of .3430-.3440" after installation.

Valve Lifters: Mechanical. Barrel type. *NOTE - Either mechanical or hydraulic lifters used between Engine Serial Nos. G-9401 and G-9550 on V8*

Valve Lifters: Hydraulic type.

Hydraulic Valve Lifter Removal, Overhaul & Testing – *See "Valve System" in Rambler Special Data.*

Rocker Arm Assembly: *See "Valve System" in Rambler Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 12°30' BTDC. Close 51°30' ALDC.

Exhaust Valves– Open 53°30' BLDC. Close 10°30' ATDC.

Valve Timing Check: Remove valve compartment cover and spark plugs. Crank engine until #6 piston in right bank is on TDC of compression stroke (#1 piston will be on TDC of exhaust stroke in overlap position). Rotate crankshaft 90° counter-clockwise. Install dial indicator on #1 intake rocker arm pushrod end. Crank engine in a clockwise direction until dial indicator dicates pushrod movement, (hydraulic lifter should be fully charged for this check). At time indicator moves, ignition timing pointer on front cover should align with a point approximately 25/32" before TDC position on vibration damper. *NOTE* – If more than ½" variance in either direction, remove timing chain cover and inspect installation. Replace if deflection exceeds 1/2".

OILING SYSTEM

Crankcase Capacity: 5 qts. refill, 1 qt. addt'l with filter change.

Crankcase Capacity: 5 qts. refill, 1 qt. addt'l with filter change.

Normal Oil Pressure: 10 lbs. minimum at 600 RPM

Pressure Regulator - In oil pump. Opens at 55-60 lbs. Not adjustable.

Oil Pressure Indicator: Light on instrument panel goes on when ignition switch is turned on, goes out as oil pressure reaches pressure of gauge Sending unit Nash No 3142826 (6½ lbs.) or No. 3200422 (4 lbs.), located on left rear side of engine block.

Oil Pump: Gear type Mounted on rear main bearing cap and driven by distributor drive shaft. *NOTE* - Removal of oil pump does not disturb ignition timing

Oil Pump Removal, Overhaul & Installation - *See "Oiling System" in Rambler Special Data.*

Oil Filter: Partial Flow type. Replace element every 4000 miles or sooner as needed.

Replacement Filter Element - Rambler No. 8990050 or No. 8990346.

Crankcase Ventilation: Filter element in oil filler cap (air inlet) and outlet pipe in valve tappet cover.

COOLING

Water Capacity: 20 quarts, add 1 quart for heater (V8)

Pressure Valve: Radiator filler cap. 7 lbs. (Std.) 13 lbs. (Air Cond.)

Thermostat: Choke type. Rambler No. 3132708 (150°), No. 3131817 (167°-173°) *NOTE* - No. 3131985 (177°-182°) for use with permanent anti-freeze only.

Water Pump: Centrifugal, double row ball bearing type. Requires no lubrication. Serviced as an assembly.

Temperature Gauge: King-Seeley "CV". Electric type.

Dash Unit - K-S No. 49476 (Rambler No. 3119196)

Engine Unit - K-S No. 44200 (Rambler No. 5304502)

NOTE - Rambler No. 3200062 used on Air Cond. Cars.

See "Temperature Gauges" in Miscellaneous Section

CLUTCH

Borg & Beck. Single plate. Used as follows:

Car Model	Clutch Model	Assy. No.
V8 (Std.)	10A7	361436
V8 (Heavy Duty)	10A7	361407
"Rebel" (Std)	10 5A6	361442
"Rebel" (Hvy. Dty.)	... 10 5A6	361449

See "Borg & Beck" in Clutch Section.

Clutch Disc No.	Borg & Beck	Rambler No.
V8 (Std.)	CD752	3125822
V8 (Heavy Duty)	381806	3147552
"Rebel" (All)	382574	3150449

►*1957 CLUTCH BEAM INNER PIVOT CAUTION:* High pressure lubrication of clutch beam inner pivot may force fabrica insulated bearing support off inner pivot. To correct, remove inner pivot from clutch beam and grind a flat on outside diameter of pivot. Diameter should be .462- 465" This condition corrected at Serial No. D-342820

Pedal Adjustment: Freeplay should be ½-¾". Adjust at connecting link between throwout lever and release idler shaft assembly. Lengthening link reduces freeplay.

Removal: Remove transmission (see below), disconnect linkage, remove clutch housing and pan. Punch mark flywheel, clutch cover and pressure plate (reassemble to same marks), take out clutch fork and mounting screws in cover flange.

SYNCHRO-MESH TRANSMISSION

Warner. Three-speed, helical gear type.

See "Warner Transmission" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Disconnect hydraulic brake tube bracket on underside of body, torque tube at rear of transmission, hand brake cable and housing, speedometer cable, and shifter rods Disconnect overdrive control cable and electrical control wires from solenoid and governor where so equipped. Move rear axle to rear to separate universal joint Remove two upper transmission-to-bell housing bolts and install special guide pins (Tool J-1434) in their place. Remove lower bolts, slide transmission out.

OVERDRIVE

Warner R10. *See "Warner R10 Ov rdriv " in Transmission Section.*

Overdrive Control: *See "Warner R10 & R11 Ov rdriv Control" in Transmission S ction.*

HYDRA-MATIC DRIVE

"Flashaway" Hydra-Matic. New four speed, hydraulically controlled transmission with two fluid couplings. *See "Dual Coupling Hydra-Matic Driv " in Transmissi n Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Dual C upling Hydra-Matic Driv " in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: Se "Dual Coupling Hydra-Matic Drive" in Transmission S cti n.*

Lubrication – Check fluid every 1,000 miles. Drain and refill every 25,000 miles (remove oil pan and clean oil screen). Use Automatic Transmission Fluid type "A" ("AQ-ATF").

Checking Fluid Level – Bring transmission to normal operating temperature. Idle engine to 425 RPM, with selector lever in "P" (Park) position, with car on level floor. Remove fluid level indicator, wipe clean, reinsert it, then remove it again and note reading.

Throttle Linkage Adjustment: *See CARBURETOR abov*

►*OTHER HYDRA-MATIC SERVICE DATA: See "Dual-Coupling Hydra-Matic Drive" in Transmission Section*

UNIVERSALS

Detroit r Mechanics. One universal used at front end of propeller shaft

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REAR AXLE

Own. Semi-floating, hypoid gear with torque tube drive.

►*1957 REAR AXLE PRODUCTION CHANGE NOTE:* Spicer type rear axles used beginning Serial No. A-11296. Cutoff point Serial No. A-12139 (Standard Transmission), Serial No. A-11429 (Overdrive Transmission). Identified by number "44" cast on housing.
See "Hudson & Nash Hypoid" and "Spicer Hypoid" in Rear Axl Section.

V8	Spicer - Axle Ratios - Own
Standard	4.1-1 (11-45) 4.1-1 (10-41)
Overdrive	4.5-1 (11-50) 4.4-1 (9-40)
Hydra-Matic	3.5-1 (13-46) 3.5-1 (11-39)
"R b l"	
Standard	4.1-1 (10-41)
Overdrive	4.1-1 (10-41)
Hydra-Matic	3.15-1 (13-41)

Axl Shaft Removal: Remove wheel, pull drum (use Hub Puller J-1644). Disconnect brake line and cable. Remove backing plate mounting bolt nuts, take off oil seal retainer, backing plate and wheel bearing adjusting shims (check thickness of shims, and replace same amount when reassembling). Withdraw shaft using Puller J-2498; do not drag on inner seal.

R ar Axle Assembly R m val: Raise and support rear end of car. Disconnect rear brake cables at center equalizer. Disconnect torque tube at rear of transmission. Disconnect brake hose and shock absorbers at axle end (let hang from body). Roll axle free.

Wh l B aring Adjustm nt: Shims behind brake backing plate. *NOTE* - Adjust axle shaft endplay on **Right Hand Sid Only.**

SHOCK ABSORBERS

V8 - D lc . Direct acting type Serviced by replacement.
Fr nt - Rambler 3119821. **Rear** - Rambler 3119822.
"Reb l" - Gabri l Adjust matic type. Serviced by replacement. **Fr nt** - Rambler No. 3152754. **Rear** - Rambler No. 3152753.

Sh ck Abs rber Adjustm nt ("R b l") - Disconnect shock absorber. Compress by hand completely and rotate until internal couplings are mated. Match arrow of cylinder with desired arrow of dust cover. Extend shock absorber and reconnect.

FRONT SUSPENSION

Independent. Linked parallelogram type with coil springs located between upper end of steering knuckle pin and seat in outer wheel house panel.
See "Rambler" in Suspensions & Wheel Alignment Section.

►*FRONT SUSPENSION SPRING NOTE:* Heavier springs used for Air Conditioned cars. *See "Rambler" in Suspensions & Wheel Alignment Section.*

King Pin Inclination - 6½°.

Caster (Std.) - ½° desired. Limits ½° Pos. to 0°.

Caster (Power Steering) - 1° desired. Limits ½° Pos. to 1° Pos.

Camber - 0° desired. Limits ¼° Neg. to ¼° Pos.

Toe-In - 1/16" to 3/16". *CAUTION* - When adjusting toe-in on Power Steering Cars, operate engine to supply oil pressure which will center spool in power cylinder valve.

Toe-Out on Turns - Outer wheel 22°, inner wheel 25°.

STEERING

Manual: Gemmer. Worm & Roller with push pull adjustments.
See "Gemmer Worm & Roller" in Steering Section.

Power Steering: Monroe "Power Guide". Linkage type.
See "Monroe Power Guide" in Steering Section.

►*1957 STEERING GEAR PRODUCTION CHANGE:* Effective Serial No. A-9035 cross shaft needle bearings and thrust bearings on either side of cross-shaft roller were incorporated.

►*POWER STEERING NOISE CORRECTION: See "Monroe Power Guide" in Steering Section.*

Steering Linkage: *See "Steering Linkage" in Steering Section.*

St ring Wh l & H rn Butt n R m val: *See "Gemmer Steering Gears" in Steering Section.*

Steering Gear Removal: *See "Gemmer Steering Gears" in Steering Section.*

BRAKES

Wagner-Lockheed Self-Centering. Self-centering type with Bendix type shoes. Star wheel adjusting screw for each wheel. Hand lever applies rear wheel service brakes.
See "Wagner-Lockheed Self-Centering" in Brake Section.

Drum Diameter - 9". *NOTE* - "Rebel" has special flanged drums for increased heat dissipation.

Wheel Cylinder Diameter - 1" (Front), 13/16" (Rear).

Replacement Linings & Shoes - Linings and shoes with linings furnished in standard size only.

Lining Width & Length	Front Wheel	Rear Whe l
Primary Shoes	2¼" x 6 31/32"	2" x 7¼"
Secondary Shoes	2½" x 9 1/16"	2" x 9 11/32"

Clearance - Adjusting screw backed off 8 notches from shoes locked against drum until free of drag.

Standard Master Cylinder: In engine compartment under steering column.

Checking Fluid - Fill from engine compartment. Check at 1000 mile intervals.

Removal - Remove from beneath car. Not necessary to disturb other parts.

Power Brakes: Bendix Power Unit, Hydraulic Reacti n Type. *See "Bendix Power Unit" in Brake Section.*

Checking Fluid - Same as for standard master cylinder.

Removal - Same as for standard master cylinder.

MISC. MECHANICAL

Windshield Wipers: Vacuum Link & Arm type. *See "Windshield Wipers" in Miscellaneous Section.*

Air Conditioning: Nash-Hudson Air Conditioning: Thermostatic control with magnetic clutch on compressor unit. *See "Nash-Hudson Air Conditioning" in Misc. Section.*

TIGHTENING SPECIFICATIONS

ALL MODELS

	Champion 6 Cyl.	All V8
Cylinder Head	46-50	55-65
Intake Manifold		26-30
Exhaust Manifold	25-30	25-30
Oil Pan	13-17	13-17
Main Bearing Caps	85-95	85-95
Flywheel	33-35	33-35
Vibration Damper	130-140	130-140
Con Rod Caps	28-32	52-54
Piston Pin Clamp Bolt	20-25	20-25
Camshaft Gear	20-22	20-22
Rocker Arm Support Bracket		13-17
Rocker Arm Cover		8-10
Engine Front Cover	13-17	13-17
Water Manifold		13-17
Oil Pump Mounting	13-17	13-17
Oil Filter Cover	20-25	20-25
Clutch Housing ①	28-32	28-32
Clutch Housing ②	13-17	
Transmission Mounting	60-70	70-80

①-To Cylinder Block
②-To Engine plate Plate dowel bolt nut 28-32 ft lbs

ENGINE

CHAMPION

ENGINE REMOVAL *NOTE*-If same engine block is to be reinstalled, engine should be disconnected at junction of clutch housing or torque converter housing (torque converter should be disconnected from engine drive plate so that converter will remain on transmission splines when engine removed). If new block to be installed, clutch housing or converter housing can be removed with engine, after removing transmission (this will allow housing alignment to be checked before engine reinstalled).

1) Remove hood and upper air deflector. On sedans and station wagons, remove radiator core Disconnect Climatizer hoses (if so equipped) from water pump and cylinder head elbows. On coupe models, remove fan blade assembly and shroud (see Cooling System below). Disconnect and remove battery, remove carburetor air cleaner.

2) Disconnect windshield wiper hose and oil pressure gauge line from the flexible coupling Disconnect cables from generator, starter solenoid, ignition coil, and heat indicator engine unit

3) Remove cotter key and take out clevis pin connecting accelerator cross shaft to bellcrank rod. Remove lower stud nut from engine front support insulators and disconnect engine ground strap from right front engine support bracket

4) Remove exhaust pipe flange to manifold nuts, remove U-clamp at clutch or converter housing bracket, and lower exhaust pipe off manifold studs. Remove the starter motor. On coupe models, turn front wheels all the way to the right. On sedans and station wagons, disconnect one end of the front tie rod, remove shaft from steering bellcrank and remove bellcrank out of way to provide clearance for oil pan. Disconnect gas tank to fuel pump line at flexible coupling.

5) Remove center (No. 1) cylinder head capscrew and replace it with an engine lifting eyebolt. Attach lifting device and raise engine just enough to take weight off front supports.

6) On automatic transmission models, disconnect accelerator bellcrank-to-transmission rod. Remove converter housing lower plate, and disconnect torque converter from converter drive plate *(see "Automatic" or "Flightomatic" Transmission in Transmission Section).*

7) Remove clutch housing to engine bolts and drive out clutch housing dowel pins. Raise engine slightly and move it forward sharply to break it loose from clutch housing. Continue to push engine forward until transmission spline clears clutch assembly, then lift engine out of car.

ALL V8 CARS

ENGINE REMOVAL *NOTE*-If same engine block is to be reinstalled, engine should be disconnected at junction of clutch housing or torque converter housing (torque converter should be disconnected from engine drive plate so that converter will remain on transmission splines when engine removed). If new block to be installed, clutch housing should be removed with the engine for checking alignment. On cars with air conditioning, remove compressor mounting bracket and compressor as an assembly without disconnecting refrigerant lines (see Compressor Removal under "Studebaker Air Conditioning" in Miscellaneous Section). Move assembly to position on front of right fender, being careful to keep compressor crankcase lower than compressor cylinder head, so that oil will not leak into chamber above compressor pistons.

1) Remove hood, upper air deflector and fan shroud. Disconnect and remove battery On sedan and station wagon models, remove radiator core and water pump manifold. On coupe and hardtop models, remove fan blade assembly. Disconnect Climatizer hoses (if so equipped) from water manifold. Remove generator and fan belt

2) Remove starter and remove exhaust crossover pipe. On sedan and station wagon models, remove steering bellcrank shaft. On coupe and hardtop models, turn steering gear all the way to left to provide clearance.

3) Remove carburetor air cleaner, fuel pump to carburetor pipe, and the spark modifier pipe. Unhook spark plug wires, remove spark plug cable support brackets from rocker arm cover, remove distributor clamp screw and remove distributor. Disconnect fuel pump inlet line at flexible coupling, and disconnect any vacuum connections at intake manifold

4) Disconnect oil pressure gauge line at flexible coupling and disconnect wires at heat indicator gauge and ignition coil. Disconnect accelerator pushrod at throttle control bellcrank. On cars equipped with overdrive, disconnect wire at kick-down switch. On cars with Automatic Drive, disconnect the wire at anti-creep switch and disconnect accelerator bellcrank to transmission rod at bellcrank. Remove converter drive plate to torque converter bolts *(see "Studebaker "Flight matic" Transmissi n in Trans. S cti n.*

5) Remove upper stud nuts from engine front support insulators and disconnect engine ground strap. Place a sling under intake manifold, attach hoist and raise engine just enough to take weight off engine supports. Remove clutch housing to engine bolts and take off the clutch housing front cover plate.

6) If clutch housing to be removed with engine, remove transmission. Remove the two capscrews holding clutch operating shaft, bracket, and bearing assembly to transmission case. Remove cotter key and clevis pin from inner end of clutch operating shaft sleeve and move clutch operating shaft away from clutch release shaft.

7) On cars equipped with Flightomatic Transmission remove the four engine rear support insulator capscrews which hold insulators to converter housing. On models equipped with overdrive or standard transmission, remove the two bolts which hold insulator and cage assembly to engine rear support crossmember.

8) On coupe and hardtop models, turn wheels to right to move steering bellcrank off to the side to provide additional clearance for oil pan. Push engine sharply forward to disengage clutch housing dowels. Continue to push engine forward until transmission spline is clear, then raise engine out of car.

OIL PAN

ALL MODELS

OIL PAN REMOVAL (CHAMPION): Remove oil level gauge. Raise car and support it with stands, drain oil. On long wheelbase models, swing wheels to right to move steering bellcrank out of way. On short wheelbase models, disconnect tie rods and reach rod from steering bellcrank, remove retaining pinch bolt, and remove bellcrank from shaft. On all models, remove oil pan capscrews and remove pan.

OIL PAN REMOVAL (COMMANDER & PRESIDENT): Remove oil level gauge and adapter tube. Disconnect one battery cable. Raise car, drain oil and remove starter. On coupe and hardtop models, swing wheels to right to move steering bellcrank out of way On sedans and station wagons, remove steering bellcrank assembly. Remove exhaust crossover pipe. Remove oil pan cap screws and remove pan.

INSTALLATION (ALL MODELS): For installation of oil pan, the filler block must be removed. Remove the four screws holding filler block to engine front cover (V8), or to engine front plate (6 Cyl.). With a thin spatula or putty knife, carefully separate filler block from engine front cover gasket (V8) or engine front plate gasket (6 Cyl.). If this gasket is damaged, cut away the exposed portion of the gasket. Then cut the required amount from a new gasket and fit it in place as necessary using Perfect Seal or its equivalent to secure gasket in place. Apply a sealer to threads of the four front cover or front plate to filler block cap screws. Install filler block with a screw in one of the upper holes. Using a hardwood stick, pry upward against filler block and install a screw in the opposite upper hole. Install two remaining screws and tighten all four screws until heads just contact lockwasher.

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With all gaskets in position, install the oil pan and tighten the screws evenly. Then tighten the four filler block screws. Complete the installation by reversing removal procedure.

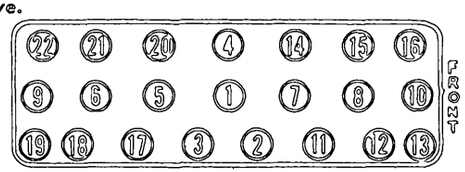
CYLINDER HEAD & MANIFOLD

ALL MODELS

CYLINDER HEAD GASKET: Coat lower face of gasket and face of cylinder head with Perfect Seal gasket cement before installing (use sparingly and see that it does not enter screw holes and water passage openings).

CHAMPION

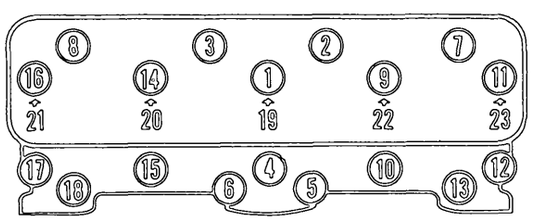
CYLINDER HEAD INSTALLATION: Use Torque Indicating Wrench to tighten cylinder head capscrews, tighten in correct sequence as shown in diagram. With engine cold, tighten all nuts evenly to correct tension. Then run engine until it is thoroughly warmed up and recheck all capscrews (additional tightening may be necessary for correct tension).
Tightening Torques–*See "Tightening Specifications" above.*



CHAMPION CYLINDER HEAD

ALL V8 CARS

CYLINDER HEAD INTERCHANGEABILITY (RIGHT TO LEFT BANK): Both cylinder heads are identical (water pump ports are provided at front and rear of all heads). It is necessary to block off the rear port not in use with a dummy plate and gasket. *NOTE*–Heat indicator engine unit must be mounted in the water outlet opening cover plate at rear of the left bank cylinder head.



ALL V8 ENGINES CYLINDER HEAD

ALL V8 CARS

CYLINDER HEAD INSTALLATION: Clean all threads using a tap and die. Check head for warping (*NOTE*–If necessary, head can be planed .015". Apply gasket compound to gasket and install. (*CAUTION–Be sure main oil gallery-to-rocker arm assembly oil passage at rear of the right bank (on front of left bank) is not blocked by gasket).* Install cylinder head on the hollow dowel. Dip capscrews in engine oil and install the nine short screws in the two outer rows of holes and the five medium length screws in the center row of holes and tighten finger tight. Install rocker arm assembly (see "Rocker Arm Assembly"). Install and tighten long head screws finger tight. Insert rocker arm assembly capscrews through rocker arm brackets. Tighten all cylinder head capscrews in correct sequence as shown in diagram. Tighten water pump manifold screws alternately until they are tight.
Tightening Torques–*See "Tightening Specifications".*

ORIGINAL BORE & PISTONS

ALL MODELS

ORIGINAL BORE & PISTON SIZES: Cylinder bore sizes are marked by a figure stamped on top face of cylinder block next to each cylinder bore as indicated below. Replacement pistons corresponding to these sizes are available under the part number for standard size pistons. The oversize is marked on the top of each piston. *NOTE–When replacing pistons in an engine which has been in use, the cylinder bore markings can no longer be used as a guide. It is important that pistons be selected to fit the cylinder bore. See "Fitting Pistons" on car model page.*

Cylinder & Piston Markings: Cylinder bores may vary in size from Standard to .0025" oversize in increments of .0005". Champion bore sizes vary from 3.000" (stamped "0"), to 3.0025" (stamped "25"). V8 engine bore sizes vary from 3.5625" (stamped "25"), to 3.5645" (stamped "45").

PISTON PINS

ALL MODELS

PISTON PIN REMOVAL & INSTALLATION: Use Tool J-1293-A (Champion), J-1293-C (V8 Engines).
Removal–Place rod and piston assembly on assembling fixture. Remove lock nut and star washer from clamp screw, and by tightening lock nut on other end of clamp screw, remove clamp screw, remove the screw from connecting rod. Then slide piston and connecting rod off piston pin.
Installation–Place piston pin on assembling fixture, slide piston and connecting rod into position. (Oil squirt hole and number on connecting rod should be on the solid side of the piston). Insert piston pin clamp screw in connecting rod, install star washer and locknut, and tighten nut securely.

6 Cylinder Engines – On connecting rods Nos. 1, 3, and 5 the clampscrew nut is installed on the T-slot side of the piston. On Nos. 2, 4, and 6 the nut is installed on the solid side of the piston. When installing the screw regardless of the number of the rod, if the rod is held with the offset of the rod to the left and the screw is inserted from the front the nut will be located on the correct side in relation to the piston. Be sure to align the flat surface on the piston pin with the flat surface on the clamp screw.

V8 Engines – If connecting rod is new and has not been marked, it should be checked to see if it is a left or a right bank rod. Hold rod so oil holes face you. All rods are offset at crankpin end. When held as above, left bank rods have offset or widest part of rod to the right; a right bank rod would have offset to left. Stamp correct number on rod and rod cap on oil hole side if even numbered or right bank rod, and on side away from oil hole if odd numbered or left bank rod. Be sure that when pin is inserted nut will be installed on slotted side of piston and that flat surface of clampscrew mates properly with flat surface of piston pin.

PISTON RINGS

ALL MODELS

Replacement Rings: Three types of Perfect Circle piston rings available for service replacement:
Standard Production Type Sets–Plain iron rings without chrome plating. To be used on relatively new engines. Furnished Std. and .020", .030", .040" Oversize.
Chrome Top Ring Sets–Same as standard ring set except that top ring is solid chrome-plated to increase ring life and oil control. Used on relatively new engines or after a rebore job, especially where heavy duty service is anticipated. Furnished Std. and .020", .030", .040" O.S.
"2 in 1" Chrome Sets–Set contains solid chrome-plated top ring and, in addition, an oil ring assembly made up of two chrome-plated steel rails, one cast iron separator or spacer and two complete sets of expander rings, one "Normal Pressure" set and one "Hi-Pressure" set. "Normal Pressure" set used where taper of bore does not exceed .006". "Hi-Pressure" set used where taper exceeds this limit. In general, use "2 in 1" set for all except new and rebored engines. Furnished Std. & .020", .030" O.S.
"2 IN 1" CHROME RING SET INSTALLATION CAUTION: Distribute oil control ring expander, separator, and ring rail gaps as follows: Place expander spring in ring groove with gap positioned above end of piston pin. Install one steel section with gap approximately 90° from spring gap. Install cast iron separator with gap approximately 90° from steel rail gap. Install remaining steel section with gap approximately 180° from gap of first steel rail. *NOTE*–Gap in rails and separator must not straddle humps on expander spring.

CRANKSHAFT & MAIN BEARINGS

ALL MODELS

REAR MAIN BEARING OIL SEAL INSTALLATION: *NOTE*–Seal assembly consists of three types used together: (1) Cork Seals between sides of bearing cap and block, (2) Neoprene seals in groove in face of bearing cap, (3) "Brummer" type seal on crankshaft journal (installed in block and bearing cap). Install seals as follows:
Neoprene Seals–Place new seals in cross grooves of bearing cap with inner end of seal not more than 1/16" from inner end of groove, press seals firmly and uniformly into grooves and trim outer ends flush with sides of bearing cap. *CAUTION*–Seals must not be more than 1/16" from inner edge of bearing cap and must not be so long as to interfere with Brummer seal.
"Brummer" Type Seal–Remove old seal, thoroughly clean seal channel just forward of rear flange by using a swab saturated with alcohol or similar solvent, dry channel thoroughly. Blunt the sharp edge of the flange on which the seal is mounted using the flat

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side of a screwdriver blade or similar tool (this will prevent scuffing inner edge of seal during installation). Install seal DRY as follows: Insert upper half between crankshaft and block at the rear flange with the wiping lip of the seal pointing forward or away from the flywheel, work seal around crankshaft until ends are horizontal and in line with the bearing cap face (see V8 Engine Note below), use great care to avoid scuffing the soft center sealing cushion at the bottom of the seal groove. Install lower half of seal on bearing cap flange, oil wiping edge of seal and crankshaft journal, install bearing cap and tighten bearing cap bolts to correct torque.

Cork Seals—After bearing cap installed, drive new cork seals down into grooves between sides of bearing cap and block (use drift and light hammer). *CAUTION*—Use care not to split or damage these seals.

Oil Leak Check—After installing new seals, run engine for approximately 45 minutes, then check for oil leaks.

▷*V8 ENGINE NOTE:* To facilitate installation of the upper half of the Brummer seal, the three intermediate bearing cap screws can be loosened two turns. *CAUTION*—Do not loosen these intermediate bearing caps more than indicated or front bearing may be damaged.

ENGINE FRONT COVER

CHAMPION

ENGINE FRONT COVER: Removal—Remove fan shroud, radiator core, and vibration dampener. Using Puller Set HM-925, remove the crankshaft pulley (use HM-925-12 to prevent damage to crankshaft threads). Take out cover retaining screws and bolts and remove the cover.

Engine Front Cover Seal (Crankshaft Front Seal) Installation: Install new felt oil seal in cover, using hub of crankshaft pulley to seat it in recess in cover.

Engine Front Cover Installation: Install cover on engine using a new gasket. Install all the retaining bolts, leaving them finger tight so cover can center itself as the crankshaft pulley is installed. Using Pusher Set J-4704, press crankshaft pulley into position. Tighten cover bolts and screws securely and install vibration dampener, radiator core and shroud.

ALL V8 CARS

ENGINE FRONT COVER: Removal—Drain cooling system and remove fan shroud and radiator core. Remove fan belt and power steering belt (if so equipped). Remove fan blade assembly and take off the water manifold. Remove fuel pump to carburetor pipe and remove fuel pump. Remove vibration dampener and fan pulley hub (on Power Steering cars a second pulley is used). Remove cover screws and remove cover.

Engine Front Cover Seal (Crankshaft Front Seal) Installation: Remove felt oil seal with an ice pick and clean out the recess in cover before installing new seal *(NOTE—Do not remove the four self tapping screws h lding the seal retainer plate in position).* Install a new seal and wet it with clean engine oil. Insert crankshaft pulley hub to locate seal in center position.

Engine Front Cover Installation: Install cover on engine, using a new gasket, and install cover screws, but do not tighten. Using Pusher Set J-4704, install crankshaft pulley hub to locate hub and center cover properly. Tighten cover screws. Install fuel pump and the fuel pump to carburetor pipe. Assemble and install vibration dampener and tighten retaining screws to proper torque. Install water manifold assembly using new gaskets, and replace fan blade assembly. Install fan belt and adjust it to proper tension. Install power steering belt (if so equipped) and adjust it to proper tension. Install radiator core and fan shroud.

CAMSHAFT & BEARINGS

CHAMPION

CAMSHAFT REMOVAL (Champion): *NOTE—Camshaft can be removed with the engine in the chassis by removing fender, grille, and radiator core as an assembly.* Remove cylinder head, manifold assembly and valve cover plates. Take out valve locks, valves and valve spring retainers. Turn cylinder block over so that valve lifters will fall free of camshaft. If engine not removed from car, tie or block valve lifters so they will not interfere with cam lobes during removal. Remove oil pan, oil pump, and oil pump drive shaft. Remove vibration dampener, fan drive pulley and engine front cover. Unless camshaft is to be replaced, it is not necessary to remove camshaft gear. Turn crankshaft until camshaft thrust plate cap screws are visible through spokes of timing gear. Remove capscrews and lockwashers retaining thrust plate and carefully slide camshaft and gear out of cylinder block, being careful not to nick or scratch camshaft journals, lobes, or bearings.

ALL V8 CARS

CAMSHAFT REMOVAL (Engine in Car): As follows: Turn crankshaft until timing mark shows directly under pointer on engine front cover and distributor rotor is in the No. 6 firing position (in this position the timing mark on the camshaft gear is aligned between the marks on the crankshaft gear). On coupe and hardtop models, remove the fan shroud. On all models remove the radiator core, fan blade assembly and water manifold. Remove rocker arm covers, rocker arm assemblies and pushrods. Remove carburetor and intake manifold assembly. Remove breather pipe, valve lifter cover, and take out the valve lifters. Remove fuel pump and take off engine front cover (see "Engine Front Cover" above). Turn camshaft just enough to expose thrust plate retaining screws and remove screws. Turn gear back to align timing marks of the two gears. Remove camshaft and gear as an assembly, being careful not to damage camshaft bearings. *CAUTION—With camshaft removed, do not move crankshaft or disturb position of distributor rotor.*

TIMING GEARS

ALL MODELS

TIMING GEAR REMOVAL: Remove engine front cover (see above). Remove gear retaining screw, lockand flatwashers. On V8 engines remove fuel pump cam and lockplate. With Puller HM-925 remove camshaft gear. Remove crankshaft pulley key and oil slinger and then crankshaft gear with same tool. Use Adapter Plug HM-925-12 to protect crankshaft threads.

VALVE SYSTEM

VALVE GUIDES

ALL V8 CARS

VALVE GUIDE REMOVAL AND INSTALLATION: Valve guide tool J-4673 is used to remove and install the valve guides. Drive guide out of cylinder head from the combustion chamber side.

▷*NOTE:* Intake and exhaust valve guides not interchangeable. Intake guides are longer.

Installation—Coat valve guide lightly with white lead and start chamfered end into cylinder head from the combustion chamber side. Place the installing plate on the face of the head so that the long side of the plate is paralliel to the end of the head and the bore of the plate centered over the guide bore. The plate is marked "Intake" on one side and "Exhaust" on the other side. Be sure that the exposed mark of the plate corresponds to the valve guide being installed so that the depth of the counterbore of the plate will control the depth to which the guide is driven into the head. Insert the driver through the plate and into the guide. Drive the guide into the head until the shoulder of the driver contacts the bottom of the counterbore in the plate.

ROCKER ARMS

ALL V8 CARS

ROCKER ARM ASSEMBLY: Two identical hollow steel shafts (ends plugged) are used. Four removable supports doweled to each shaft with cylinder head capscrews. Three springs used to position rocker arms against supports. Lubrication is supplied by oil from the main oil galleys to a passage in the cylinder head which leads the oil up around the relieved capscrew shank in the rocker arm front support on the left bank and the rocker arm rear support on the right bank. The bracket is drilled to connect the capscrew hole with the rocker arm shaft hole. The oil flows under pressure to the rocker arms and through holes drilled in the rocker arms to the adjusting screws and through the center of the adjusting screws to the push rods.

▷*DISASSEMBLY CAUTION:* Mark rocker arms, brackets, and the rocker arm shaft so that they can be reassembled in their original position.

Reassembly—Make certain the oil holes and grooves in the rocker arm shaft and the oil holes in the brackets rocker arms and adjusting screws are clean. Check rocker arms and shaft clearance which should be .0005" to .0025". Test springs. It should require 9-1/2 to 10-1/2 lbs. to compress springs to 2-1/32". If not within these limits, replace spring. Place a spring washer between two flat washers and install on one end of the rocker arm shaft and install a new cotter pin in the shaft. Place a rocker arm on the shaft next to the inner flat washer. (*CAUTION*—The oil groove

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side of the shaft must be at the bottom of the rocker arm and the adjusting screw end of the rocker arm be on the same side of the shaft as the cylinder head capscrew groove in the shaft). Place a shaft bracket on the shaft so that the bottom of the bracket is on the oil groove side of the shaft and align the cylinder head capscrew hole in the bracket with the capscrew groove in the shaft. Insert a capscrew through the bracket. Clamp the bracket in a vise. and install the second rocker arm on the shaft, positioning it in the same way as the first rocker arm. Slide a spacer spring on the shaft and, holding the spring compressed, slide the third rocker arm and the second bracket on the shaft and position it in the same way as the first bracket. Align the screw hole in the bracket with the groove in the shaft, insert a capscrew and release the spring. Install the rest of the rocker arms, springs and brackets in the same manner. Slip the two flat washers with the spring washer between them, on the end of the shaft and install a new cotter pin in the shaft. If correctly assembled, when installed on the engine, the flat side on the end of the rocker arm shaft will be at the rear on the right bank and at the front on the left bank.

VALVE LIFTER

ALL MODELS

VALVE LIFTER INSTALLATION: Thoroughly clean lifter bores in cylinder block and inspect for smoothness. With lifter and bore clean and dry, check lifter fit and select correct lifter size. Lifters furnished Std., .001", .005" oversize. See ".005" Oversize Lifter Installation" below.

Ch cking Lifter Fit in B re—When properly fitted, the valve lifter should just slide into place from its own weight. If .001" oversize lifter does not restore proper clearance, bore must be reamed to .005" oversize, and .005" oversize lifters installed.

.005" OVERSIZE VALVE LIFTER INSTALLATION: Special reamers are required for reaming engine block lifter bores as follows: 32L-STB (Champion 6 Cyl.), 1352-STB (All V8 engines).

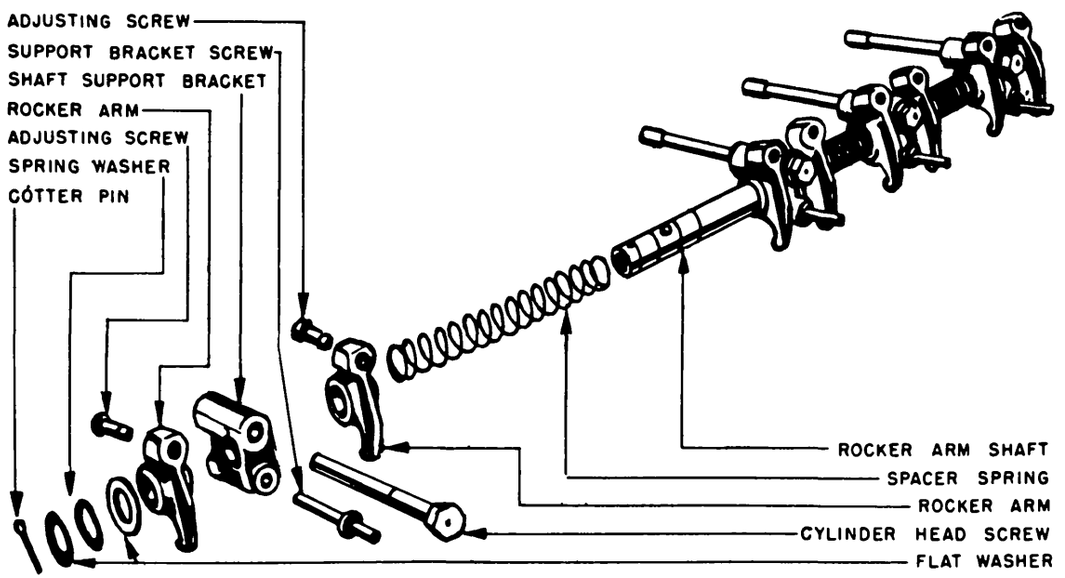
OILING SYSTEM

OIL PUMP

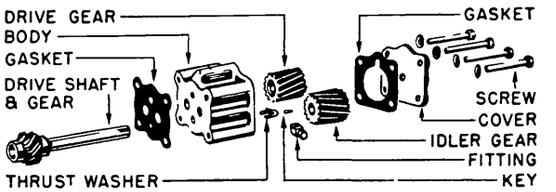
CHAMPION

OIL PUMP: Removal & Disassembly—Disconnect oil pressure pipe. After removing four cover screws and washers, remove pump body cover, gasket and idler gear. Remove drive gear using tool J-2959. Remove Woodruff key and horseshoe shaped thrust washer to permit removal of oil pump body and gasket. If it is necessary to remove pump drive shaft and gear, the oil pan must be removed. Turn crankshaft away from No. 1 TDC position (to provide clearance between counterweight and engine block). Remove distributor and push oil pump drive shaft inward, and remove it from the crankcase. To remove gear from oil pump drive shaft, press out the gear-to-shaft pin and then press shaft out of gear.

Inspection: Inspect pump cover for flatness and deep scratches or score marks. Check clearance between oil pump gears and pump body by placing a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. The pump should be locked tight. The total clearance should not exceed .010". If pump gears can be rotated with the two .005" feelers in place, the pump body is worn and should be replaced. Check gears for smoothness, deep scratches and score marks. Replace all defective parts. Clearance between end of gears and cover plate must not exceed .007". To check this clearance, the lower ends of the gears should be exactly flush with the lower surface of pump body when gears are resting against the upper part of pump body. A new gasket .004-.006" thick, when compressed will provide proper clearance.



V8 ENGINE ROCKER ARM ASSEMBLY



CHAMPION OIL PUMP

Installation & Reassembly: *(CAUTION—If oil pump drive shaft removed, install EXACTLY as described below to obtain correct ignition timing).*

Oil Pump Drive Shaft Installation - Install drive shaft, temporarily engaging camshaft gear and oil pump drive gear with crankshaft turned away from No. 1 TDC position (necessary to provide clearance at crankshaft center counterweight). Then turn the crankshaft until No. 1 piston is on compression stroke and "UDC 1-6" mark on vibration dampener is directly under pointer on engine front cover. Slide the oil pump drive shaft away from camshaft to disengage the camshaft gear and turn drive shaft until keyway is pointing directly upward when the two gears start to engage. Pull the shaft into position so that the two gears fully mesh (the drive shaft will rotate so that the keyway is toward rear of engine). Install distributor to hold oil pump drive shaft in position while installing remainder of pump assembly (with slot in end of distributor shaft engaged, rotor should line up with No. 1 terminal in distributor cap).

Oil Pump Assembly—Dip each part of pump in clean engine oil before assembly. Place a new gasket and oil pump body over pump shaft and install horseshoe washer, woodruff key, and drive gear. Install idler gear, new cover gasket, and pump body cover. Secure entire assembly in place with the four cover screws Remove oil pressure pipe fitting from pump body and prime pump with clean engine oil. Install fitting and oil pressure pipe.

ALL V8 CARS

OIL PUMP: Removal—Remove oil pan and take out the two oil pump retaining nuts and lockwashers. Slip pump assembly off mounting pad studs and remove gasket.

Disassembly: If necessary to replace strainer, straighten tab, and slip strainer off pipe. If floating strainer is to be cleaned, remove pump and strainer assembly. Do not remove the strainer by bending retaining tab. *(NOTE—the floating oil strainer is serviced only as an assembly and should not be disassembled).* Remove cover screws and pump body cover. Remove idler

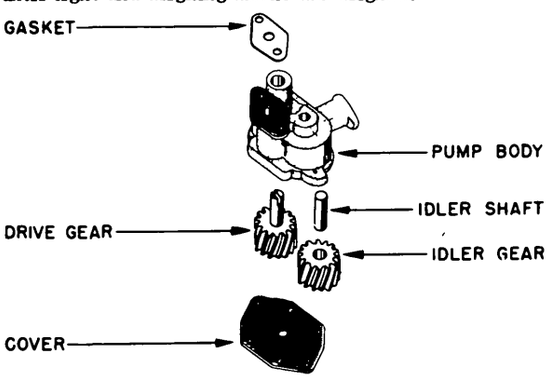
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gear, drive gear and shaft (do not disassemble drive gear and shaft). Clean oil strainer with solvent and dry it thoroughly.

Inspection: Inspect pump cover for deep scratches or scores and for flatness. Check clearance between oil pump gears and pump body by placing a .005" feeler gauge between teeth of oil pump gear and body on each side of pump. If pump gears can be rotated with the two .005" feelers in place, the pump body is worn and should be replaced. Check gears for smoothness, deep scratches and score marks. Replace all defective parts. With weight of gears resting against upper part of pump body, place a straightedge across face of pump body and measure distance between gear face and straightedge. This clearance should not exceed .007".

Reassembly: Place drive gear and shaft assembly in pump body. Install idler gear on idler shaft. Install pump body cover and cover screws (no gasket is used between body and cover). Insert pipe of floating oil strainer in cover inlet finger tight and set up strainer to get its proper position. While holding assembly so strainer is up against upper stop, lower surface of strainer should be parallel with pump cover and 1 7/8" below cover. Scribe aligning marks on pump body and pipe. Then, using suitable pipe wrench, tighten pipe until tight and aligning marks are aligned.



V8 ENGINE OIL PUMP

Installation: Clean all traces of old gasket off pump mounting flange and rear bearing cap pad. Install a new gasket and position slot in pump drive gear shaft so it will mate with tongue of the oil pump drive shaft and coupling, and install pump on mounting studs. Install nuts and lockwashers and tighten securely to 13-17 ft. lbs.

COOLING SYSTEM

RADIATOR & FAN SHROUD REMOVAL & INSTALLATION: Shroud (Coupe & Hardtop) - Drain radiator and remove inlet hose. Remove wiring junction block from fan shroud. Pry open wiring harness clips and move harness out of way. Remove fan-to-hub screws and remove fan blades. Remove four capscrews holding shroud to radiator core support and remove fan shroud. To install, reverse removal procedures.

Radiator (All Models) - Drain cooling system disconnect battery and tie up hood. Remove horn relay and headlamp junction block screws, and free wires across top of shroud from clips. Except on Champion models, remove gasoline pipe clip screw. If car has power steering, free upper hose from hose support. Remove fan blade assembly. Disconnect upper and lower hoses from radiator. Remove screws and remove radiator core. To reinstall, reverse removal procedure.

IGNITION NOTES

ALL V8 CARS

DISTRIBUTOR DRIVE SHAFT ASSEMBLY: Removal—Turn crankshaft until "IGN" mark on vibration dampener is directly under pointer on engine front cover and distributor rotor is in line with No. 1 spark plug terminal of cap. Remove cap from distributor housing and carburetor air cleaner from carburetor. Disconnect coil-to-distributor secondary cable at coil. Remove spark plug cables, cable brackets and distributor cap as a unit. Disconnect coil-to-distributor primary wire at distributor. Disconnect spark modifier pipe. Remove distributor clamp capscrew and lift distributor out of cylinder block.

Installation: The "IGN" mark on vibration dampener must be directly beneath pointer. Position distributor so that spark modifier is to front and pointing slightly toward right. Turn rotor approximately 30° clockwise and insert the oil pump drive shaft and coupling into cylinder block opening. When the teeth on the distributor shaft gear contact the teeth on the camshaft gear, the rotor will turn counter-clockwise, and as the teeth mesh, the distributor assembly will seat on the cylinder block. At the same time the tongue of the oil pump drive shaft will enter the groove of the oil pump shaft. The rotor will now point directly forward and be in line with the No. 1 terminal of the distributor cap. (NOTE—Very slight misalignment may cause difficulty in engaging the oil pump drive shaft tongue with the groove of the oil pump shaft). After the distributor gear is in mesh with the camshaft gear, the engine may be cranked to give proper alignment. Maintain a light pressure on the distributor while cranking the engine to facilitate the engagement. Install distributor clamp and capscrew. Connect the coil-to-distributor cable. Connect spark modifier pipe. Install spark plug cables, cable brackets and secure cap with retainer springs. Connect coil-to-distributor secondary cable. Install carburetor air cleaner. Check timing.

PROPELLER SHAFT

ALL MODELS

PROPELLER SHAFT & SUPPORT BEARING ASSEMBLY: Propeller shaft is a two unit type (separate front & rear shafts) with intermediate bearing in Support Assembly on frame crossmember.

Rear Shaft Removal: Straighten ear of lockplate, loosen grease washer nut and unscrew it from shaft. Mark universal joint flange and rear axle companion flange to assure original position and balance at reassembly. Remove U-bolts holding rear joint bearing cups and cross to rear axle flange. Shift shaft forward and separate joint by prying with a suitable bar between companion flange and universal cross. Hold bearing cups on the cross while separating joint to avoid dropping cups and spilling bearings. Then remove bearing cups and bearings or tape them securely in place on cross. Slide shaft rearward, slipping end of slip yoke out of splines of front shaft. To remove grease washer nut from slip yoke, first remove cork grease washer and washer retainer from within the nut and slide nut off slip yoke. Cork grease washer and washer retainer are split to facilitate removal.

Installation—Reverse removal procedure. Tighten U-bolts and nuts to 14-17 ft. lbs.

Front Shaft Removal: Remove rear shaft and shaft support assembly. Mark front shaft universal joint flange and transmission companion flange. Remove U-bolts holding joint bearing cups and cross to transmission companion flange. Separate joint by prying with suitable bar between companion flange and universal cross. Hold bearing cups on cross while separating joint to avoid spilling bearings. Remove bearing cups and bearings or tape them in place on the cross. Then slide rear end of shaft out of crossmember and remove from chassis.

Installation—Reverse removal procedure. Tighten U-bolts and nuts to 14-17 ft. lbs.

Support Bearing Servicing: Bearing is sealed type (prepacked with lubricant) **and must never be washed in gasoline or other solvents.**

►*CAUTION: Do not re-install support bearing which has been washed in gasoline or solvent.*

Support Bearing Removal: Remove rear shaft. Remove lock plate and spacer from projecting end of front shaft, and remove shield. Remove shaft support stud nuts, lockwashers, and plain washers. Slide bearing and support assembly off front shaft and support cushions. Remove dust shields from front shaft. To remove support bearing from support use a suitable tube which will fit the outer race of the bearing and, with an arbor press, remove the bearing. NOTE—Use care not to damage bearing seal.

Installation—Reverse removal procedure. NOTE—Press bearing into support so that it is laterally centered in the support. Install dust shields on front shaft with concave side of shield against shoulder on shaft. If shaft support cushions removed, be sure to install studs in same holes from which removed.

MODEL IDENTIFICATION

Model	Model Designation
Champion Cus. & Deluxe	57G(F & W)
Champion Pelham	57G(D)
Champion Silver Hawk	57G(C)

SERIAL NUMBER: Located on left front door pillar post.

Assembly Plant	Starting Numbers
South Bend	G-1379201
Canada	G-769101

ENGINE NUMBER: Stamped on pad on upper front left corner of block.
Starting Engine Number – 1202101 (South Bend), C-71401 (Canada).

TUNE-UP

COMPRESSION PRESSURE: 130-150 lbs. at 150 RPM. Variation limit (between cylinders) 10 lbs.
VACUUM READING: 17-18" at idle speed.
VALVE TAPPET CLEARANCE: .016" cold. Intake & Exhaust.
MANIFOLD HEAT CONTROL: Automatic thermostatic type.
Checking Thermostatic Coil Spring – With outer end of coil free from anchor, and valve closed (counter-weight up), hooked end of coil should be 90° clockwise from anchor post at 70°F.

IGNITION

FIRING ORDER: 1-5-3-6-2-4.
SPARK PLUG GAP: .030". Limits .028-.033".
Spark Plug – Champion J7.14 mm. Torque to 25-30 ft. lbs.
COIL: Aut-Lit CAG-4003A (early), CAF-4004 (later).
Ignition Current – 4 Amps. (Idling).
►*IGNITION RESISTOR NOTE: Resistor not used.*
DISTRIBUTOR: Auto-Lit 1AT-4201.
Condenser – Auto-Lite 1AT-2015L. **Capacity** .21-.25 mfg.
Contact Point Set – Auto-Lite 1GW-3028AS.
Breaker Gap – .020".
Cam Angle – 38-40°.
Breaker Arm Spring Tension – 17-20 ozs.
Rotation – Counter-clockwise viewed from above.
►*DISTRIBUTOR SETTING & TIMING NOTE: See "Oil Pump Removal & Installation" under ENGINE below.*

Automatic Advance

Degrees	Distr. RPM	Degrees	Eng. RPM
Start	400	0	800
2	680	4	1360
4	975	8	1950
6	1265	12	2530
7	1400	14	2800

Vacuum Spark Control: Aut-Lite, Integral type.

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of HG)
Start	0	4
1	2	4-7/8
4	8	7-1/2
8	16	11-1/8
9	18	12

IGNITION TIMING

Setting – 2° BTDC.
Timing Mark – On vibration damper. "IGN" mark in line with pointer (left side of timing cover).
Timing – Disconnect vacuum advance pipe at carburetor. Install plug in carburetor. With engine at idling speed, timing light should show index mark nearest IGN mark, directly under pointer.

CARBURETOR

►*APPLICATION:* Carter BBR1-2724S (Scotsman), Carter WE-2417S (Others)
FLIGHTOMATIC THROTTLE LINKAGE ADJUSTMENT: With transmission selector lever in "N" (Neutral) or "P" (Park) position, engine at normal operating temperature, choke wide open, proceed as follows:
1) Disconnect rod which connects accelerator bracket on firewall to auxiliary bellcrank on side of engine.
2) Connect a tachometer to engine and set engine idle speed at 550 RPM by adjusting the carburetor idle speed screw. Disconnect the rod which connects the main bellcrank on firewall to auxiliary bellcrank on engine by removing the main bellcrank ball joint stud from main bellcrank lever. Adjust the screw on main bellcrank to provide a 5/16" clearance between bellcrank and pad (use a 5/16" drill as a guage).
3) Adjust the ball joint on main bellcrank-to-auxiliary bellcrank rod until ball joint freely enters hole in main bellcrank lever. During this adjustment the carburetor idle speed screw must be against its stop and the 5/16" gap at the bellcrank must be maintained.
4) Stop engine and remove the 1/8" pipe plug located near throttle lever on side of transmission and install a pressure gauge. Place selector lever in "D" (Drive) position and run engine at 1000 RPM with rear wheels held stationary by the foot brake. Adjust length of the main bellcrank-to-transmission throttle valve outer lever rod to obtain 80-85 lbs. pressure on gauge. Stop the engine, remove gauge and install the pipe plug in side of transmission. Hold the accelerator bracket arm (on firewall) approximately 3 7/8" from face of firewall and adjust the accelerator-to-auxiliary bellcrank rod clevis until clevis pin freely enters clevis and bracket arm.

CARTER WE No. 2417S

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*
Idle Setting – ½-1½ turns open. Turn screw out for richer mixture.
Idle Speed – 550 RPM. (With selector lever in "N" or "P" position.
Float Level – 3/8" measured from top of projection on bowl cover to top of soldered seam on free end of float with needle valve seated and bowl cover inverted.
Accelerating Pump – No seasonal adjustment.
Fast Idle: .046" Throttle valve opening with choke valve closed. To check, crack throttle valve, hold choke closed, measure on side opposite idle ports (Gauge T109-188). Adjust by bending connector rod.
Automatic Choke Setting: 1 Point Lean.
►*OTHER DATA: See "Carter WE Carburetors" in Carburetion Section*

CARTER BBR1-2724S

Idle Setting - ½ to 1½ turns open. Turn screw out for richer mixture.
Idle Speed - 550-600 RPM
Float Level - 5/64" ± 1/64" below top surface of body casting.
Accelerating Pump - Seasonal setting. Inner hole for summer, outer hole for winter.
Fast Idle: Cam rotated to fast idle position when choke valve closed. No adjustment.
Choke Setting: Manual type.
►*OTHER DATA. See "Carter BBR1 Carburetors" in Carburetion Section.*
FUEL PUMP PRESSURE: 3½-5½ lbs.

CARB. EQUIPMENT

Fuel Pump: AC No. 4156. Fuel only.
Fuel Pump Pressure: 3½-5 lbs.
See "Fuel Pumps" in Carburetion Section.
Gasoline Gauge: Electric type.
Dash Unit - Studebaker No. 1542342 (Sedans & Sta. Wgn.), No. 1539880 (Hard Top "Hawk").
Tank Unit - Studebaker No. 1540262 (Sedans), No. 1540263 (Hard Top "Hawk" & Sta. Wgn.).
See "Fuel Gauges" in Carburetion Section.
Air Cleaner: Oil Wetted type (Scotsman), Dry type (Others - Std.) Oil Bath type (Others - Optl.)
►*CLEANING CAUTION:* Clean filter element by tapping and shaking to remove dirt particles. DO NOT wash element in solvent or other liquids and DO NOT oil or lubricate.

BATTERY

Willard HDW-2SM-50. *12 Volt,* 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground - Negative.
►*CAUTION: This is reversed from previous models.*
Engine Ground - Left front of engine.

STARTER

Auto-Lite MBG-4103. *12 Volt.* **Armature** MZ-2367.
Drive - Bendix A-3519. Barrel-Anchor Plate type.
Rotation - Counter-clockwise at commutator end.
Brush Spring Tension – 42-53 ozs.

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.0	.50 max.
5.2 ft. lbs. min.	Lock	4.0	235 max.

Starter Switch; Magnetic Switch mounted on starter and controlled by combination Starter & Ignition Switch. *NOTE* - Automatic drive cars have Neutral Safety and Back-up Light Switch.
Automatic Transmission Neutral Safety Switch: Delco-Remy 1998038 (without Power Steering), No. 1998059 (with Power Steering). Mounted on lower end of steering column. Starter will operate only when selector lever is in "N" or "P" position.
Adjustment - See "Flightomatic Transmission" in Transmission Section.

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GENERATOR

Aut -Lite GJC-7002-F. Armature GJC-2030-F.

Performance Data

Amperes	Volts	RPM
0.0	12.8	1225-1325
30.0	15.0	2050-2250
35.0	15.0	2250-2650

Brush Spring Tension - 18-36 ozs.
Fi ld Current - 1.2-1.3 amps. at 10.0 volts (70°F.).
M t ring Current - 3.4-3.9 amps. at 10.0 volts (70°F.).
R tation - Counter-clockwise at commutator end.
Belt Adjustment: 3/8-1/2" deflection midway between generator and fan pulleys.

REGULATOR

Auto-Lite VRX-6008A.

Cutout Relay

Cuts In - 13.0-13.7 volts.
Cuts Out - 8.2-9.3 volts.
C ntact Gap - .015" minimum.
Air Gap - .031-.034".

Voltage Regulator

Setting - 14.2-14.8 volts at 80°F., unit operating normally while charging at 10 amperes or with a .25 ohm resister between regulator and battery.
Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).
Checking & Adjusting - *See Electrical Section.*

Current Regulator

► *SETTING CAUTION: "Temperature Compensated" type. Set to following specifications at 70°F.*

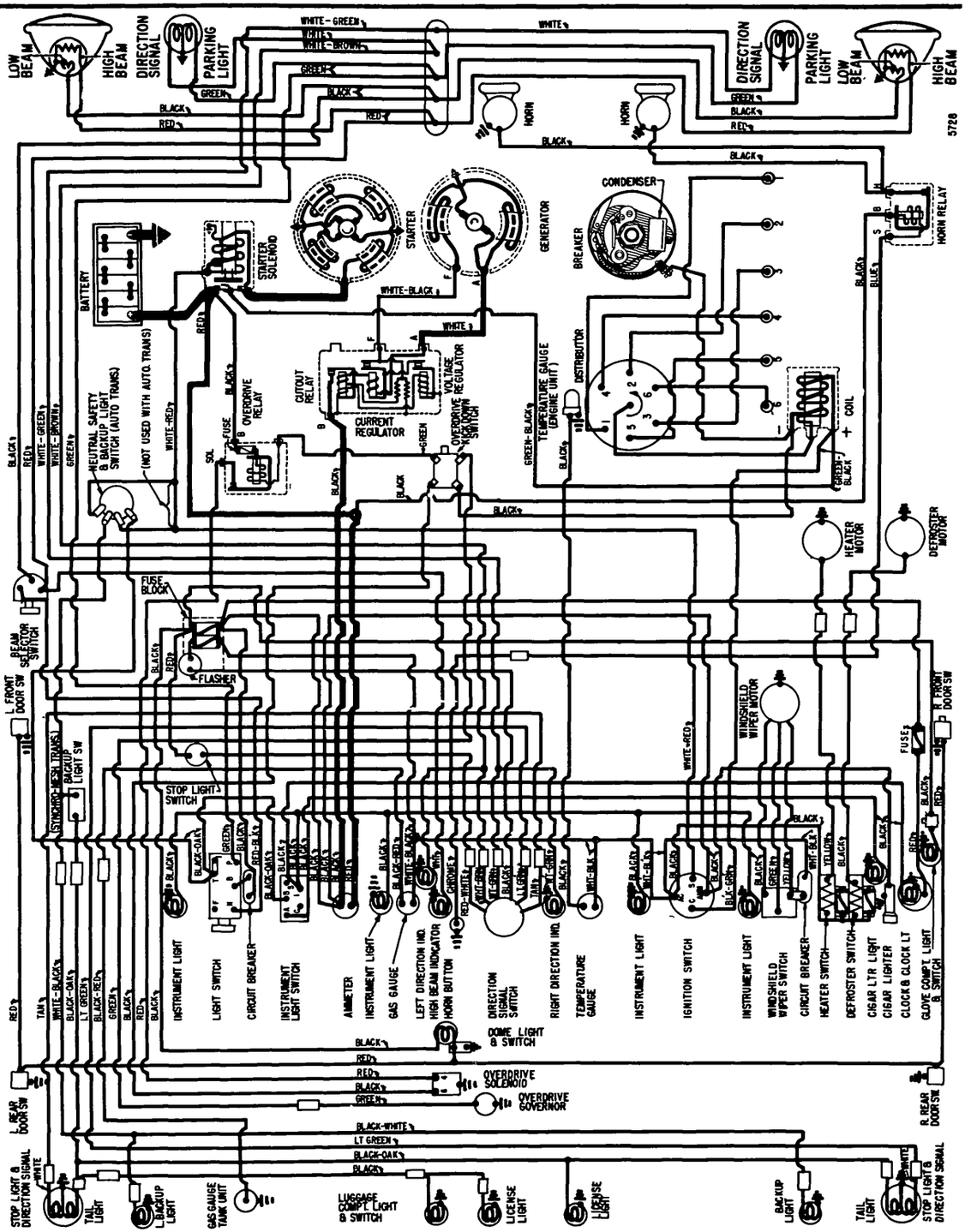
Test A Operating Amperes	Test B
36 amps	30 (28-32) amps.

T st A - After 15 minutes operation charging at 10 amps.
T st B - After additional 15 minutes operation with current regulator operating (load applied to hold voltage down to 13.6-13.8 volts).
Air Gap - .048-.052" with contacts just opening (check at brass armature stop pin).
Ch cking & Adjusting - *See Electrical Section.*

MISC. ELECTRICAL

H adlamps: Sealed Beam. *See Electrical Section.*
Dir ction Signal: *See Electrical Section.*
Light Switch Removal: Remove retaining nut. Remove lower panel cover screws and covers. Slide toggle switch back through panel and disconnect wires.
Stop Light Switch: Located on inner side of left frame rail just forward of steering gear housing; except on Power Brake equipped cars, where it is screwed into rear end of power unit, located under hood on left front fender apron.
Fus s: Body & Stop Lights 15 amps. in block in bracket behind instrument panel.
Direction Signal 15 amps. in block in bracket behind instrument panel.
Ov rdriv 15 amps. in relay on dash panel.
Cl ck 1 amp in lead behind instrument panel.
CIRCUIT BREAKERS: Head, Parking, Tail & Instrum nt Lights 18 amps. on headlight switch.

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CHAMPION HAWK (SEE V8 DIAGRAM FOR OTHER MODELS)

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Windshield Wiper 5 amps. in wiper switch.
Horn Relay: Delco-Remy No. 1116781.

ENGINE

ENGINE SPECIFICATIONS: "Sweepstakes 185". 6 Cyl. "L" head.

Bore	Stroke	Displacement
3"	4-3/8"	185.6 cu. ins.
Compr. Ratio	**Rated HP**	**Developed HP**
7.5-1 ©	21.6	101 at 4000 RPM

© – 8.0-1 Optl. compression ratio.

Compression & Vacuum Reading–*See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Studebaker Special Data.*

OIL PAN REMOVAL: *See "Oiling System" in Studebaker Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifold" in Studebaker Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

"T" slotted, cam ground, tin plated aluminum alloy. Three ring type.

Original Bore & Pistons–*See "Original Bore & Pistons" in Studebaker Special Data.*

Removal–Pistons and rods removed from above.

Fitting New Pistons: Clearance–Selective feeler fit. Use feeler 1" wide, .002" thick, and 12" long inserted on camshaft side of cylinder bore. Insert inverted piston in bore with slotted side away from camshaft, and bottom edge 1" below top of cylinder bore. Pull required to remove feeler with properly fit piston should be 11 to 16 lbs.

Replacement Pistons: Std. .010", .020", .030" and .040" Oversize.

Installing Pistons: Install piston in cylinder bore with "T" slot away from camshaft side. *See Rod Installation.*

PISTON PINS

Pin is locked in rod by tapered pin and locknut.

Diamter–.7491-.7495". **Length** 2.625".

Clearance in Piston–.0001-.0003" (selective fit). Light thumb push fit at 70°F.

Piston Pin Removal & Installation–*See "Piston Pins" in Studebaker Special Data.*

Replacement Pins: Std. & .0025", .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.002-.005"
Compr. #2	1/8"	.007-.017"	.002-.005"
Oil	5/32"	.007-.017"	.0015-.004"

Replacement Rings: Std., .020", .030", & .040" Oversize, in sets.

See "Piston Rings" in Studebaker Special Data.

Installing Rings: Top compression ring has step at the inside which must be installed up. Second compression ring has step at outside which must be installed down. Inner and outer oil ring end gaps must not come at the same point.

CONNECTING RODS

Length–(Center-to-center) 6 3/8". **Weight** – 19.04 ozs.

Crankpin Journal Diameter–1.81175-1.81275"

Bearings–Steel backed, Microbabbitt lined, no shims.

Clearance–.0005-.002".

Side Play–.005-.009".

Replacement Bearings: Standard & .001", .005", .010", .020" Undersize.

Installing Rods: Assemble piston and pin on rod so "T" slot of piston on side opposite oil hole in lower end of rod. Insert tapered end of clamp screw toward heavy boss on rod. With "T" slot of piston away from camshaft side, the narrow part of rod offset will be to right on odd numbered rods, to left on even numbered rods. Rods (#1, 3, 5) cannot be interchanged with rods (#2, 4, 6).

►*REPLACEMENT ROD NOTE:* (Unnumbered Rods)–With spit hole toward you, narrow part of offset will be to the right for odd numbered cylinders, and to the left for even numbered cylinders.

CRANKSHAFT

Journal Diameter–3.0623-3.0628". Four bearings.

►*FRONT MAIN BEARING CAP REMOVAL NOTE:* Turn crankshaft until No. 3 and No. 4 pistons are at top of their travel. Remove bearing cap bolts, then remove cap by twisting end away from camshaft toward rear of engine.

Clearance–.0005-.0025".

Replacement Bearings: Std., .001", .010", .020", and .030" Undersize.

End Thrust: Taken by thrust washer assembled between front main bearing and crankshaft gear. Controlled by shims between thrust washer and main bearing journal.

End Play–.003-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

Journal Diameters – (1) 1.7475-1.7480", (2) 1.7162-1.7170", (3) 1.6857-1.6865", (4) 1.6232-1.6240".

Bearings–Steel backed babbitt lined bushings.

Clearance–No. 1–.0007-.0022", Nos. 2, 3, 4–.0010-.0027".

End Thrust: Taken by thrust plate assembled on front face of engine block behind camshaft gear (spacer assembled on shaft behind gear hub). Tighten capscrews alternately a few turns at a time to prevent distortion of plate.

End Play–.003-.006".

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

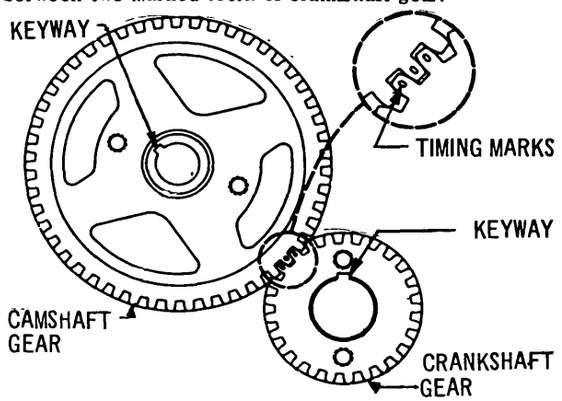
Timing Gears: Crankshaft gear is Cast Iron, Camshaft gear is Celeron with steel hub.

Timing Gear Removal & Installation–*See "Timing Gears" in Studebaker Special Data.*

Backlash–.001-.003".

Replacement Gears–Camshaft gear furnished in two sizes: Standard & High limit. Crankshaft gear furnished standard size only.

Camshaft Setting: Mesh marked tooth on camshaft gear between two marked teeth of crankshaft gear.



CHAMPION VALVE TIMING MARKS

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

Tappet Clearance: .016" cold. Intake & exhaust.

Valve	Head Diameter	Stem Diameter	Length
Intake	1 11/32"	5/16"	4 11/32"
Exhaust	1 9/32"	5/16"	4 11/32"

Valve	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.0035"
Exhaust	45°	11/32"	.0015-.0035"

Valve Seat Width– 1/16-3/32".

►*RECONDITIONING VALVE CAUTION:* If reconditioning results in knife edge at top of valve, valve must be replaced.

Valve Springs: Install springs so that flanged edge of retainer fits over flat surface of lower coil spring. Tongue on lower side of retainer must fit in groove in spring retainer lock.

Valve Spring Specifications–93-103 lbs. ± 10% when compressed to a length of 1 5/16".

Valve Guides: Use Tool No. J-2034 and drive old guide down and out from top of block into valve spring chamber. Use Collar J-2034-5, guide pilot J-2034-2 on driver J-2034-1 and drive new guide down until driver bottoms against spacing collar.

Valve Lifters: Mushroom type. Remove from below with camshaft out of engine.

Valve Lifter Installation & Fitting–*See "Valve System" in Studebaker Special Data.*

Replacement Lifters–Std., .001" & .005" Oversize.

►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore):* See *"Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 15° BTDC. Closes 49° ALDC.

Exhaust Valves–Open 54° BLDC. Closes 10° ATDC.

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Valve Timing Check—Adjust No. 1 Intake valve at .020" cold. Rotate engine until No. 6 piston is on compression stroke (the IN-OP 1-6 marking on dampener should be several inches from pointer), then while moving lifter up and down continue to rotate crankshaft. Valve timing will be correct if lifter stops moving as above marking is directly below pointer.

OILING SYSTEM

Crankcase Capacity: 5 quarts refill, 1 quart additional with filter change.

Normal Oil Pressure: 40 lbs. at 1400-1600 RPM.

Pressure Regulator Valve: On lower right front corner of engine. For access, remove engine front cover bolt. If spring is weak, replace it (do not stretch spring).

Oil Pressure Indicators: Coupe & Hardtop Models – Direct reading, non-electric type gauge.

Other Than Coupe & Hardtop Models – Red indicator light on instrument panel. If light on at highway speeds, after warm-up, low oil level or other difficulty is indicated.

Oil Pressure Switch – Studebaker No. 1539898.

Oil Pump: Helical gear type. Mounted on right side of crankcase.

Pump Removal, Overhaul & Installation: *See "Oiling System" in Studebaker Special Data.*

Oil Filter: Partial Flow. Either replaceable element or disposable type used. Replace filter or element at 5000 mile intervals or sooner if needed.

Replacement Filter Element: Replaceable element Studebaker No. SP 50090 (Filcron) or No. 50053 (Waste).

Disposable Unit Studebaker No. 1542739.

Crankcase Ventilation: Filter element in oil filler cap (air intake) and in breather pipe at left rear of engine (air outlet). Filter element in breather pipe replaceable.

COOLING

Water Capacity: 11 quarts. 12½ quarts with heater.

Pressure Valve: Radiator filler cap. 13 lb. type.

Thermostat: Choke type. Studebaker No. 440066 (170°) Std., No. 531470 (160°) and No. 532017 (180°) Optional.

Water Pump: Packless, sealed ball bearing type.

See "Studebaker" in Water Pump Section.

Pump Removal - Remove shroud. *See "Cooling System" in Studebaker Special Data.* Loosen generator and remove belt. Remove fan-to-hub capscrews and remove fan blades and pulley. Disconnect Climatizer hose, and generator adjusting arm. Disconnect outlet hose and remove mounting capscrews.

Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data.*

Temperature Indicators: Coupe & Hardtop Models - Direct reading, electric type gauge.

Sedans & Station Wagons - Red-green indicator on instrument panel. Electric type. When indicator shows any green, engine is operating at normal temperature. If it turns red through entire range, engine operating temperature is above normal.

Dash Unit - Studebaker No. 1542343 (Sedans & Station Wagons), No. 1539879 (Coupes & Hard Tops).

Engine Unit - Studebaker No. 1539876 (All Models). *See "Temperature Gauges" in Miscellaneous Section.*

CLUTCH

Borg & Beck 9A7. Assy. No. 361365 (U.S.), No. 361379 (Canada). Single plate, dry disc type.

Clutch Disc. No.—Borg & Beck No. 382276.

Pedal Adjustment: Free Travel ½-1". To adjust, unhook pull-back spring on outside of frame rail, loosen locknut at adjusting clevis and remove clevis pin at inner end of pedal shaft, turn clevis on rear end of pedal shaft-to-operating shaft rod for correct clearance, reassemble linkage.

►*HILL-HOLDER NOTE:* Check setting whenever clutch pedal adjusted and adjust Hill-holder to release just as clutch engages. Make sure Hill-holder operating rod installed with rod to inside (toward center of car) of clutch release shaft lever.

Housing Removal: Remove oil level gauge and tube. Remove starter mounting screws (only) and tie starter and cables up out of the way. Remove floor plate and clutch housing top capscrews. Remove transmission. *See "Transmission Removal" under Transmission.* Disconnect pedal rod at operating shaft-to-release sleeve, pull operating shaft out, remove sleeve. Remove two bolts holding rear engine support insulator cage to crossmember. Support engine at rear of oil pan (use block of wood on jack to protect oil pan). Remove crossmember. Remove two clutch housing bolts releasing exhaust pipe support bracket. Loosen clamp bolt and swing bracket out of way. Remove remaining housing bolts and remove housing. *NOTE*—Remove dowel bolts first.

►*INSTALLATION CAUTION:* Align clutch housing to rear engine plate with two tapered drifts, then install the dowel bolts. Draw dowel bolts in place by tightening the nuts—**do not drive them into place.**

Clutch Removal: Remove clutch housing (above), remove six screws evenly to relieve spring pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model T96 (Std.) or T96 with R10 Type Overdrive.

See "Warner Synchro-mesh Transmission" in Transmission Section.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission case. Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines. Move end of shaft to one side as far as possible and tie it in position. Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion. Remove capscrews which hold transmission case to clutch housing. Remove clutch operating shaft, bracket, and bearing from the transmission case. Then move case rearward until main drive pinion clears clutch pressure plate and remove unit from car.

NOTE—On Coupes and Hardtops, it will be necessary to remove additional frame crossmember before removing transmission.

OVERDRIVE

Warner R10. Governor controlled, solenoid operation with throttle controlled "kick-down".

See "Warner R10 Overdrive" in Transmission Section.

Overdrive Control: *See "Warner R10 Overdrive Control" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

FLIGHTOMATIC TRANSMISSION

Hydraulic torque converter and a hydraulically controlled automatic three-speed planetary type transmission which provides automatic operation in "D" range, and additional "Lo", "R", and "P" ranges which are controlled manually. In "D" position, the car starts in low gear and progresses to intermediate and high as car speed is increased.

See "Flightomatic" Transmission in Transmission Sect.

►*"NO REVERSE" CORRECTION: See "Flightomatic" Transmission in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Flightomatic" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Flightomatic" Transmission in Transmission Section.*

Lubrication: Check fluid every 1000 miles, drain and refill every 15,000 miles. Use Automatic Transmission Fluid Type "A" (container marked AQ-ATF).

Checking Fluid Level – Place selector lever in "P" position. Start engine and operate it for approximately four minutes or until engine and transmission have reached operating temperature. Remove floor mat from right side and remove oil inspection hole cover. Clean all dirt and foreign material from dipstick. Apply parking brake and foot brake, and move selector lever slowly from "P" position to "R" position, then back to "D" position. Remove dipstick, wipe clean, and install in transmission and **turn clockwise to lock position.** Remove dipstick and read fluid level. Add fluid to bring level to "FULL" mark on dipstick (1½ pints between "LOW" and "FULL" marks on dipstick).

Capacity – 9 qts. Use Automatic Transmission Fluid Type "A" (container marked AQ-ATF).

Throttle Linkage Adjustment: *See CARBURETOR above.*

►*OTHER FLIGHTOMATIC DATA: See "Flightomatic" Transmission in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing cross type. Three used with intermediate universal at propeller shaft support bearing on crossmember (see Propeller Shaft).

Propeller Shaft & Support Bearing: Two shafts used:

1) Front shaft with intermediate universal yoke bolted on rear end (no slip-joint).

2) Rear shaft with slip-joint on forward end at intermediate universal.

Propeller Shaft & Support Bearing Removal & Servicing—*See "Propeller Shaft" in Studebaker Special Data.*

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REAR AXLE

Spic r. Semi-floating, hypoid gear, with Hotchkiss Drive

See "Spicer Hypoid" in Rear Axle Section

Transmission	Axl Ratios Standard	Optional
Standard	4 10-1	4 56-1
Overdrive	4 56-1	4 10, 4 88-1
Automatic	3 54-1	4.10-1

NOTE–Rear axle ratio stamped on plate attached to axle by cover capscrew and also on ring and pinion gears

Backlash– 003-.006". Shim adjustment

Axle Shaft R m val: Remove wheel, remove wheel hub (use puller J-1644-B) Take out backing plate retaining bolts, remove outer oil seal Pull backing plate out over end of axle shaft and wire plate to frame (*CAUTION*–Do not lose adjusting shims located between backing plate and axle housing flange), pull axle shaft with puller HM-931

R ar Axle Ass mbly R moval: Remove hub caps,take out cotter pin from axle nut, loosen rear wheel nuts. Place car on stands on frame just ahead of rear springs, Remove wheels, hubs and drums. Disconnect hand brake cable, take out backing plate bolts from backing plates free hydraulic brake line from axle housing clips (do not disconnect brake line from wheel cylinders) Disconnect rear universal (wire caps or use clamp to prevent losing rollers) Remove rear spring "U" bolts, disconnect lower shock absorber links, remove rear axle assembly from car

Wh l B aring Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims .003", 005", .010", 030" thick).

End Play – .001-.006".

SHOCK ABSORBERS

M nroe or Gabri l. Direct acting, hydraulic type. Serviced by replacement. *NOTE* - Heavy Duty shocks are Gabriel.

Monroe Shocks (Studebaker No.)

	Front	Rear
Station Wagon	1541904	1541913
Others	1541904	1541911

Gabri l Sh cks (Stud bak r N .)

	Fr nt	R ar
Heavy Duty (Non-Adj)	1541958	1541959
Heavy Duty (Adj.)	1541901	1541910

FRONT SUSPENSION

Independent. Coil spring suspension with front shock absorbers located within coil springs *NOTE* - Sedan models have variable rate front springs These have coils closer together at one end and must be installed toward top.

See "Studebaker" in Suspensions & Wheel Alignment Section

Kingpin Inclination - 6° at 0° camber

Caster - Neg 1° to Neg 2½° Not more than ¾° variation between wheels.

Camber - 0° to Pos. 1° ½° more camber favored on driver's side

Toe-In - 1/16"-1/8".

Toe-Out on Turns - With outer wheel at 20°, inner wheel should be turned 22½° - 23½°

STEERING

►*POWER LOSS ON LEFT TURN CORRECTION. See "Saginaw Power Steering (Not In Line)" in Steering Section*

Manual: Ross Cam & Twin Lever Type. *See "Ross Cam & Twin Lever" in Steering Section*

Power Steering: Saginaw (Not In Line). Integral type. *See 'Saginaw Power Steering (Not In Line)" in Steering Section*

Steering Linkage: *See "Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" in Steering Section*

Steering Gear Removal: *See "Ross Cam & Twin Lever" in Steering Section*

BRAKES

Wagner Lockheed Hydraulic Self-centering (With Bendix type shoes) Parking lever applies rear wheel service brakes.

See "Wagner Lockheed Self-centering" in Brake Section.

Drums–Diameter (Front) 10", (Rear) 9"

Wheel Cylinder Diameter–(Front) 1", (Rear) 13/16"

►*PRIMARY BRAKE SHOE LINING LENGTH PRODUCTION CHANGE:* Primary shoe lining length has been changed to: 8 5/32" (Front) and 7¼" (Rear) on later cars.

►*FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary is ¼" thick, (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeal. This lining is applied to the full length of the shoe, and is marked "secondary" and "top" and should be installed as marked.

Braking Power – 62% (front wheels), 38% (rear wheels).

Lining, Width & L ngth

	Fr nt Wh l	R ar Wh l
Primary Shoes ①	2" x 10 29/32"	2" x 9 27/32"
Secondary Shoes	2" x 10 29/32"	2" x 9 27/32"

① Early Cars. For later cars See *"Production Change" above*

Thickness–3/16" (all except front wheel secondary), ¼" front wheel secondary

Clearance–Lock shoes against drum then turn adjusting screw back eight notches or more as required to free drum

Hill Holder: Used on Synchro-mesh Trans. Cars. *See "Hill-holder" in Brake Section for data*

Standard Master Cylinder: On frame left side rail at base of brake pedal

Checking Fluid–Access hole in front floor pan at left corner of drivers' seat. Fluid should be maintained at level ½" below top of filler opening

Removal–Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from frame bracket and then from spring clip which is attached to master cylinder-to-pedal rod Disconnect fluid line or lines at rear of master cylinder (*NOTE*–On cars equipped with Hill-holder, only one line is connected to master cylinder). Remove brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder Insert forward mounting bolt ing bolt to hold Hill-holder while master cylinder is off car.

Power Brakes: Hydrovac Power Unit. Used in conjunction with standard master cylinder and located under hood on left front fender apron.

See "Hydrovac Power Unit" in Brake Section.

Removal–Disconnect vacuum and brake lines, stop light wires, remove power unit-to-bracket mounting bolts

MISC. MECHANICAL

Windshield Wipers: Auto-Lite or Bosch. Electric type. *See "Windshield Wipers" in Miscellaneous Section.*

Power Window Regulators: Electrical, with reversible motors in each window. Individual switches at each door and master switch on left front door. *See "P wer Window Regulators" in Miscellaneous Section.*

Power Seat Adjusters: Two-way electric type with curved seat tracks for seat adjustment.

See "Power Seat Adjusters" in Miscellanious Section.

MODEL IDENTIFICATION

Model	Model Designation
Comm. Cust. & Deluxe	57B(F & W)
Comm. Parkview	57B(D)
Comm. Provincial	57B(P)
President	57H(F & W)
Pres. Classic	57H(Y)
Pres. Broadmoor	57H(P)
Pres. Silverhawk	57H(C)

SERIAL NUMBER: Stamped on plate on left front door hinge post.

Starting Serial Numbers - As follows:

Assembly Plant	Commander	President
South Bend	8454101	7188901
Canada	8962601	7901501

ENGINE NUMBER: Stamped on cylinder block to left and in front of oil filler pipe.

Starting Engine Numbers — As follows:

Assembly Plant	Commander	President
South Bend	V-390001	P-39601
Canada	VC-10701	PC-1501

TUNE-UP

COMPRESSION PRESSURE: 130-150 lbs. (approximately) at cranking speed (150 RPM).

VACUUM READING: Steady 18-20" at idling.

VALVE TAPPET CLEARANCE: .023-.025" engine hot and idling, .025-.027" engine cold.

MANIFOLD HEAT CONTROL: Automatic Thermostatic type located in right bank exhaust manifold outlet.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.

Cylinders — RIGHT BANK 2-4-6-8, LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033-.038".

Spark Plug - Champion H-11. Torque to 30 ft. lbs. or seat spark plug on new gasket finger tight, then tighten an additional ½ turn.

COIL: Delco-Remy 1115087 or 1115096.

Ignition Current - 3.8 amps. (idling).

Resistor - Delco-Remy 1931614 (1115087 Coil), 1927809 (1115096 Coil). 1.4-1.65 ohms at 75°F.

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch-to-coil. Resistor is bypassed during cranking by lead from starter-solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110864.

Condenser — Delco-Remy 1869704. **Capacity** .18-.23 mfd.

Contact Point Set — Delco-Remy 1918148.

Breaker Gap — .013-.018".

Cam Angle - 26-33° with .016" gap.

Breaker Arm Spring Tension — 19-23 ozs.

Rotation — Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0.5-2.5	350	1-3	700
2-4	400	4-8	800
7-9	800	14-18	1600
11-13	1125	22-26	2250

Vacuum Spark Control: Delco-Remy 1116058. Integral type.

Plunger Travel — 11/64-3/16".

Vacuum Advance

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	4-6
8	16	10.25-11.50

Distributor Removal & Installation: *See "Ignition Notes" in Studebaker Special Data.*

IGNITION TIMING

Setting — 4° BTDC with vacuum line to distributor disconnected and opening in carburetor plugged. Engine at normal idle speed.

Timing Mark — "IGN" line on vibration dampener aligned with pointer on timing gear cover.

►*IGNITION TIMING CAUTION:* The manufacturer recommends that no attempt be made to time the engine except with a suitable timing light and that timing mark on vibration dampener be directly under pointer. *DO NOT SET TIMING BY THE "PING" METHOD.*

CARBURETOR

►*CARBURETOR APPLICATION: Stromberg 2-barrel and Carter 4-barrel used as follows:*

Model	Optional	Standard
Comm. (All)	Carter	Stromberg
Pres. & Broadmoor	Carter	Stromberg
Pres. (Classic & Silver Streak)		Carter

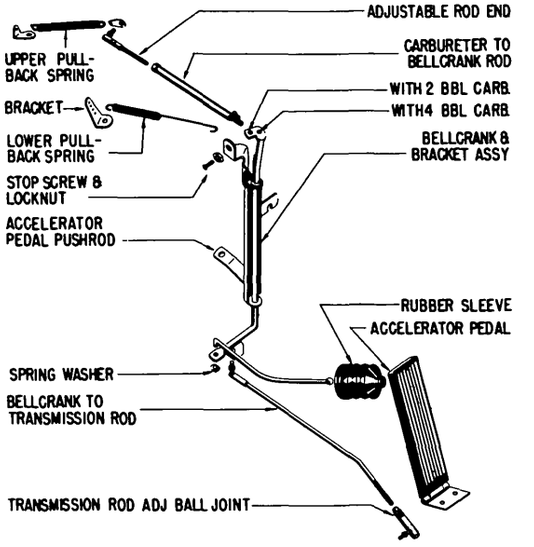
►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

FLIGHTOMATIC THROTTLE LINKAGE ADJUSTMENT: With engine at normal operating temperature, choke valve wide open and throttle return check operating correctly, proceed as follows:

1) Adjust engine idle speed to 550 RPM with transmission selector lever in "N" (Neutral) position. Set the stop on the bellcrank (at rear of engine) to provide a 17/64" gap between bellcrank pads (use a 17/64" drill as a gauge). After stop is adjusted, hold in this position. Make sure that the carburetor-to-bellcrank rod ball joint is in the outer hole of the bellcrank pad (away from centerline of engine), and that the ball joint is on the underneath side of the lever.

2) Adjust the carburetor-to-bellcrank rod until the idle speed adjusting screw just begins to leave its stop.

3) After stop is adjusted, hold in this position. *(NOTE - Make sure that carburetor-to-bellcrank rod ball joint is in the inner hole of bellcrank pad on cars with 2-barrel carburetors, and in the outer hole on cars with 4-barrel carburetors. In both cases, the ball joint must be located on the underneath side of bellcrank).* Adjust the carburetor-to-bellcrank rod until the idle speed screw on carburetor throttle lever just begins to leave the stop. Stop the engine and remove the 1/8" pipe plug located near throttle lever on side of transmission and install a pressure gauge. Place selector lever in "D" (Drive) position and run engine at 1000 RPM with rear wheels held stationary by the foot brake. Adjust length of the main bellcrank-to-transmission throttle valve



FLIGHTOMATIC TRANSMISSION THROTTLE LINKAGE

outer lever rod to obtain 80-85 lbs. pressure on gauge (95-100 lbs. pressure on cars with heavy duty transmissions such as used on police cars). Stop the engine, remove gauge, and install the pipe plug in side of transmission.

THROTTLE RETURN CHECK (4-BARREL CARBURETOR) ADJUSTMENT: Loosen throttle return check assembly screw locknut and adjust the return check in the bracket until plunger just breaks contact with with tab on throttle lever. Mark position of check assembly relative to bracket, then turn check assembly **1¾ to 2 turns toward l v r.** Tighten locknut.

THROTTLE RETURN CHECK (2-BARREL CARBURETOR) ADJUSTMENT: Place idle speed adjusting screw on fourth step of fast idle cam (lowest step being No. 1). Adjust throttle return check screw until it just contacts the pad on throttle shaft lever.

STROMBERG WW

Stromberg Series WW, Code 6-117A. Throttle return Check used on all models with Flightomatic Transmissions.

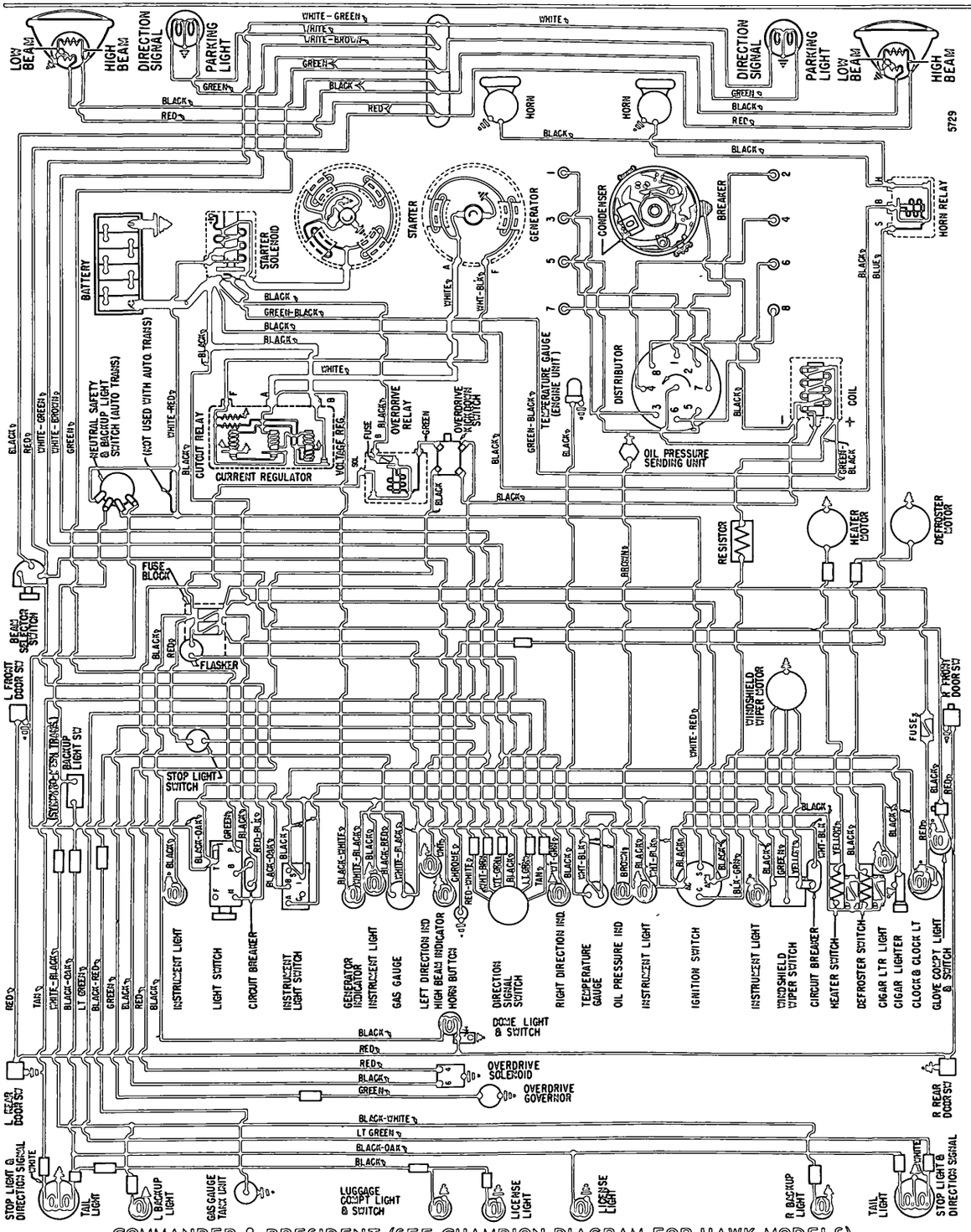
►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyls. 1-4-6-7, LEFT barrel 2-3-5-8.*

Idle Setting — Initial setting, 1¾ turns open, final setting approximately midway between missing and rolling points. Set both screws alike, turn screws out for richer mixture.

Idle Speed — 550-600 RPM (with selector lever in neutral "N" position on Flightomatic).

Float Level — 3/16" from top edge of bowl to top of float with needle valve seated. To check, remove air horn and bowl cover, remove gasket, place float lever gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool

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COMMANDER & PRESIDENT (SEE CHAMPION DIAGRAM FOR HAWK MODELS)

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T-24733 (Studebaker No. KMO-269-S5).

Accelerating Pump – Center hole – Normal Setting. For less fuel install rod in inner hole, for more fuel install rod in outer hole.

Fast Idle Setting: With choke valve closed and fast idle cam in fast idle position, one-half diameter of button at end of throttle stop screw should rest against step of fast idle cam. If contact between button and cam not as indicated, bend choke ear up or down as required.

Automatic Choke Setting: 1 point lean with arrow on cover one notch lean from boss on housing.

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷ *OTHER DATA: See "Stromberg WW Carburetors" in Carburetion Section.*

CARTER WCFB

Carter WCFB 2219SB (Std. & O.D.), 2214SB (Auto. Trans.).

▷ *MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrels feed Cyl. 1-4-6-7, LEFT barrels 2-3-5-8.*

Idle Setting - ½-1½ turns open. Turn screws out for richer mixture.

Idle Speed - 550-600 RPM (all models).

Throttle Linkage Adjustment: *See CARBURETOR above.*

▷ *OTHER DATA: See "Carter WCFB Carburetors" in Carburetion Section.*

CARB. EQUIPMENT

Fuel Pump: Carter No. M2211S or M2573S. Fuel Only

Pressure - 3½-5½ lbs. (All models).

See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge: Electric type.

Dash Unit - Studebaker No. 1542342 (Sedans & Sta. Wgn.), No. 1539880 (Hard Top "Hawk").

Tank Unit - Studebaker No. 1540262 (Sedans), No. 1540263 (Coupes, Hard Tops & Sta. Wgns).

See "Fuel Gauges" in Carburetion Section.

Air Cleaner: DRY TYPE (Plasticized Paper) standard on all Commander Models, President & Broadmoor OIL BATH TYPE Sandard on President Classis & Silver Hawk, Optional on all other models.

▷ *DRY TYPE FILTER CAUTION:* Remove filter element every 1000 miles and shake thoroughly to remove dirt. DO NOT wash element or blow out with compressd air. Replace filter every six months or 10,000 miles

BATTERY

Willard HDW-2SM-50. *12 Volt,* 9 plate, 50 ampere hour capacity (20 hr. rate).

Battery Ground – Negative.

▷ *CAUTION: This is reversed from previous models.*

Engine Ground – Right front of engine.

STARTER

Dolce-Romy 1107650 (Synchro-mosh & Ovardrive), 1107651 (Flightomatic). *12 Volt.* Armature 1933789.

Drive – Bendix "Polo-thru" type.

Rotation – Counter-clockwise at commutator end.

Brush Spring Tension – 35 ozs. minimum

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Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: Magnetic type switch, controlled by combination Ignition & Starting Switch. Turn key full right to start engine.

Automatic Transmission Neutral Safety Switch: Delco-Remy 1998038 (without Power Steering), No. 1998059 (with Power Steering). Mounted on lower end of steering column. Starter will operate only when selector lever is in "N" or "P" position.

Adjustment: *See "Flightomatic" Transmission in Transmission Section.*

GENERATOR

Delco-Remy 1102003. *12 Volt.* **Armature 1923535.**
Maximum Charging Rate – *See Voltage Regulator.*

Performance Data—Cold

Amperes	Volts	RPM
30	14.0	2150

Brush Spring Tension – 28 ozs.
Field Current – 1.48-1.62 amps. at 12.0 volts.
Rotation – Counter-clockwise at commutator end.
Belt Adjustment: Hook a spring scale to belt midway between generator and fan pulleys, then adjust belt tension so that pull of 14 lbs. on scale will lift belt ½".

REGULATOR

Delco-Remy 1119123. *12 Volt. NOTE - Regulator is "1119000 Series". Specifications below are for "Normal" Settings.*

Cutout Relay

Cuts In – 11.8-13.5 volts (hot).
Contact Gap – .020"
Air Gap – .020" with contacts just closed.

Voltage Regulator

Setting – 13.8-14.8 volts (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting – *See "1119000 Series" Regulator in Electrical Section.*

Current Regulator

Setting – 27-33 amps. (hot).
Air Gap – .075" with armature pressed down to point where contacts just touch.
Checking & Adjusting – *See "1119000 Series" Regulator in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*
Directional Signal: *See Electrical Section.*
Light Switch Removal: Remove switch retaining nut. Push switch sleeve back into panel and disconnect wires from switch.
Stop Light Switch: Located on inner side of left frame rail just forward of steering gear housing. On models with power brakes, switch is screwed into hydraulic cylinder of power brake unit.
FUSES: Body & Stop Lights 15 amps. in block in bracket behind instrument panel.
Direction Signal - 15 amps. in block in bracket behind instrument panel.
Overdrive - 15 amps. in relay on dash panel.
Clock - 1 amp. in lead behind instrument panel
CIRCUIT BREAKERS: Head, Parking, Tail & Instrument Lights - 18 amps. on headlight switch.
Windshield Wiper - 5 amps. in wiper switch.
Horn Relay: Delco-Remy No. 1116781.

ENGINE

►*AIR CONDITIONED CAR SERVICE CAUTION: Use extreme care when disconnecting and part of air conditioning equipment or lines for access to engine. See "Air Conditioning Service Cautions" in Misc. Sect.*

ENGINE SPECIFICATIONS: "Sweepstakes 259" & "Sweepstakes 289". V8, valve-in-head.

Engine	Bore	Stroke	Displacement
259	3-9/16"	3-1/4"	259.2 cu. ins.
289	3-9/16"	3-5/8"	289 cu. ins.

Engine	Compr. Ratio	Rated HP	Dev. HP
259	8.0-1 ①	40.6	②
289	8.0-1 ①	40.6	③

① – 7.5-1 Optional
② – 180 HP at 4500 RPM with 2-Barrel Carburetor, 195 HP at 4500 RPM with 4-Barrel Carburetor.
③ – 210 HP at 4500 RPM with 2-Barrel Carburetor, 225 HP at 4500 RPM with 4-Barrel Carburetor.

Compression & Vacuum Reading – *See TUNE-UP.*

ENGINE REMOVAL: *See "Engine" in Studebaker Special Data.*

OIL PAN REMOVAL: *See "Oiling System" in Studebaker Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Studebaker Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

Aluminum alloy, cam ground, T-slot, three ring type. *See "Original Bore & Pistons" in Studebaker Special Data.*

►*PISTON REPLACEMENT CAUTION: "259" & "289" Engine pistons are NOT INTERCHANGEABLE. "Flat Head" piston used on 259" Engine. "Concave Head" Piston used on 289" Engine.*

Weight - 16.2 ozs.
Removal - Pistons & rods remove from above.
Fitting New Pistons: Clearance - Selective feeler fit. Use feeler 1" wide, .002" thick, and 12" long inserted on camshaft side of cylinder bore. Insert inverted piston in bore with slotted side away from camshaft, and bottom edge 1" below top of cylinder bore. Pull required to remove feeler with properly fit piston should be 8-13 lbs.
Replacement Pistons: Std. size & .010", .020", .030", .040" oversize. Pistons furnished with fitted pins.
Installing Pistons: Install piston on rod so that solid side of piston is on same side as oil hole in bearing bore. Install piston in cylinder with the slot toward the left side of engine. *See Rod Installation.*

PISTON PINS

Locked in rod by tapered pin and locknut.
Diameter – .8741-.8745". **Length** – 3 1/16".
Clearance in Piston – .0001-.0003" (selective fit). Light finger push fit at 70° F.
Replacement Pins: Std. size & .0025", .005" oversize.
Removal & Installation: *See "Piston Pins" in Studebaker Special Data.*

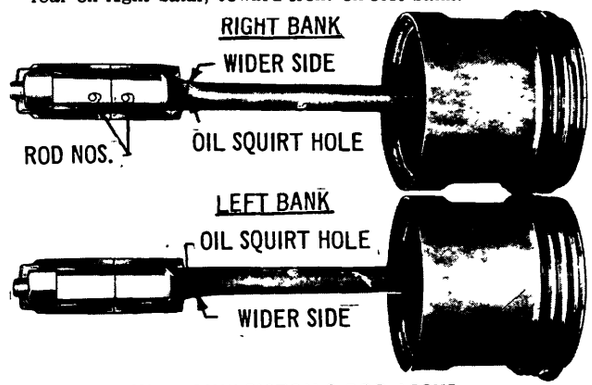
PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compression	.077-.078"	.008-.016"	.002-.005"
Oil	.1855-.1865"	.088-.016"	.0015-.005"

Replacement Rings: Sets of Std., .020", .030" and .040" Oversize.
See "Piston Rings" in Studebaker Special Data.
Installing Rings: Install compression rings with chamfered side of ring upward. Gaps of inner and outer oil rings must not come at same point.

CONNECTING RODS

Length - 6 5 8" center-to-center. **Weight** - 23.71 ozs.
Crankpin Journal Diameter - 1.99925-2.00025".
Lower Bearing - Interchangeable. Steel backed, micro-babbitt lined type. No shims.
Clearance - .0005-.002". **Side play** - .008-.013".
Replacement Bearings: Std., .001", .002", .010" and .020" Undersize.
Installing Rods: Number on rod and bearing cap must be on same side. Rod is installed in same numbered cylinder with numbers down toward oil pan (toward right on right bank rods, toward left on left bank rods), and oil squirt hole on all rods toward right of engine. Rods are offset with widest half of bearing toward rear on right bank, toward front on left bank.



V8 ENGINE PISTON & ROD ASSYS.

►*CAUTION:* Install piston and pin on rod so that T-slot of piston is on side opposite oil hole in bearing bore. Insert tapered end of clamp screw so it will be toward heavy boss. Be careful to align flat surface of screw with flat on piston pin. Bearing cap must be assembled on rod with groove in cap and rod on same side.

►*REPLACEMENT ROD IDENTIFICATION NOTE:* Replacement rods are unnumbered. To identify, hold rod upright with oil hole toward you. Wide part of offset will be to right on left bank rods, to left on right bank rods.

CRANKSHAFT

Journal Diameter–2.4995-2.5000".
Clearance–.0005-.0025".
Replacement Bearings: Std. size, .001", .010", .020", .030" undersize.
End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by

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shims between thrust plate and face of main bearing journal. **Endplay**—.003-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

Journal Diameters—(1) 1.86975-1.87075", (2) 1.85375-1.85475", (3) 1.83875-1.83975", (4) 1.82275-1.82375", (5) 1.24475-1.24575".

Bearings—Precision type, steel backed babbitt lined.

Clearance – .00075-.00225" (No. 1), .001-.00275" (Others).

End Thrust: Taken by thrust plate located between front camshaft bearing and camshaft gear.

Endplay—.003-.006".

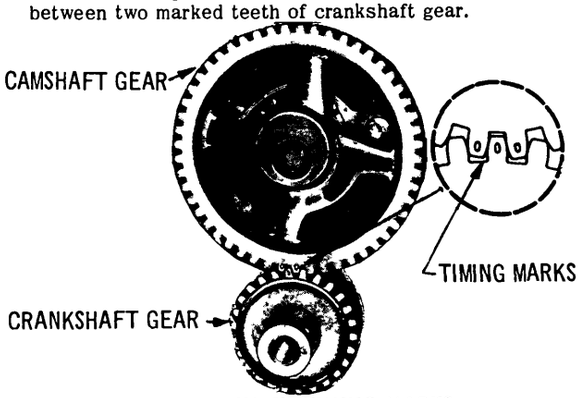
Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Cast iron crankshaft gear and "Celeron" camshaft gear.

Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*

Backlash—.001-.003".

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.



V8 ENGINE VALVE TIMING MARKS

Engine Front Cover Removal: *See "Engine Front Cover" in Studebaker Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

►*ROCKER ARM ADJUSTING SCREW PRODUCTION CHANGE:* Effective Engine No V-396500 (259") and No P-45703 (289") new rocker arm adjusting screw, Part No 1541806, entered production Screw has recessed head to prevent push rod from slipping out of socket if a valve sticks, and to prevent bent push rods

Tappet Clearance: 023-025" (Hot) 025-027" (Cold)

Valve	Head Diam.	Stem Diam.	Stem Clearance
Intake	1-21/32"	11/32"	.0015-.0035"
Exhaust	1-17/32"	11/32"	.0015-.0035"

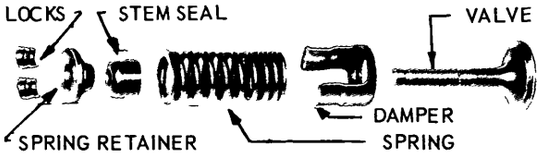
Seat Angle—45° (all valves). **Lift**—23/64" (all valves).

Valve Seat Width—1/16-3/32".

Valve Stem Oil Seal: "Umbrella" type, rubber seals installed on all exhaust and intake valve stems (with cupped side down toward top of valve guide) within valve spring below spring retainer.

Valve Springs: Single spring used. Replace spring if 10% weaker than pressure given in specifications below. *NOTE* - Damper installed on lower (close-coiled) end of all springs.

Valve Spring Specifications - 106-112 lbs when compressed to 1 43/64"



V8 ENGINE VALVE ASSY.

Valve Guides: Pressed in head from underside.

Guide Removal & Installation—*See "Valve System" in Studebaker Special Data.*

Valve Lifters: Straight barrel type. Remove from above. Not necessary to remove camshaft.

►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore): See "Valve System" in Studebaker Special Data.*

Valve Lifter Installation & Fitting—*See "Valve System" in Studebaker Special Data.*

Replacement Lifters—Std. size, .001", .005" oversize.

►*CAUTION—When lifters removed, make sure they are installed in original positions.*

Rocker Arms: *See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves—Open 11° BTDC. Close 54°36' ALDC.

Exhaust Valves—Open 51°36' BLDC. Close 14° ATDC.

Valve Timing Check—Set tappet clearance of No. 1 intake valve at .030". Turn crankshaft until No. 6 piston is on compression stroke and vibration dampener mark "IN.OP.1" is approaching pointer on timing gear cover, continue to turn crankshaft slowly while working No. 1 intake rocker arm up and down to determine point at which all clearance is taken up. Dampener mark "IN.OP.1" should be directly under pointer.

OILING SYSTEM

Crankcase Capacity: 5 qts. (add one quart when filter changed).

Normal Oil Pressure: 40 lbs. at 1400-1600 RPM.

Pressure Regulator Valve – Located on right side at front of engine block slightly above crankcase flange.

Oil Pressure Indicator: Coupe & Hardtop Models - Direct reading, non-electric type gauge

Sedans & Station Wagons - Indicator light on instrument panel

Oil Pressure Switch - Studebaker No 1539898

Oil Pump: Spur gear type Mounted on rear main bearing cap and driven by camshaft gear

Pump Removal, Overhaul & Installation: *See "Oiling System" in Studebaker Special Data*

Oil Filter: Partial Flow Either replaceable element or disposable type used Replace filter or element at 5000 mile intervals or sooner if needed

Replacement Filter Element: Replaceable Element Studebaker No SP 50090 (Filcron) or No 50053 (Waste)

Disposable Unit Studebaker No 1542739

Crankcase Ventilation: Filter element in oil filler cap (air intake) and breather tube at rear of engine (air outlet)

COOLING

Water Capacity: 17 qts (18 5 with heater)

Pressure Valve: Radiator filler cap 13 lb type

Thermostat: Choke type Studebaker No 1540787 (170°) Std , No 533247 (160°) and No 533257 (180°) Optl

Water Pump: Packless sealed ball bearing type *See "Studebaker" in Water Pump Section*

Pump Removal: Drain cooling system Loosen generator remove belt Remove fan-to-hub screws and remove fan and pulley On Coupe and Hardtop models, remove shroud Remove four capscrews retaining pump cover to water pump manifold Remove pump.

Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data*

Temperature Indicators: Coupe & Hardtop Models - Direct reading electric type gauge

Sedans & Station Wagons - Red-green indicator on instrument panel Electric type When indicator shows any green engine is operating at normal temperature If it turns red through entire range engine operating temperature is above normal

Dash Unit - Studebaker No 1542343 (Sedans & Station Wagons), No 1539879 (Coupes & Hardtops)

Engine Unit - Studebaker No 1539876 (All Models) *See "Temperature Gauges" in Miscellaneous Section*

CLUTCH

Borg & Beck. Single plate, dry disc type

Series	Clutch Model	Assy No.	Disc No.
Commander	10A7	361454	382650
Pres "Classic"	10A6	361456	382389
Pres (Others)	10A6	361386	382389

See "Borg & Beck" in Clutch Section

Pedal Adjustment: Pedal free travel 1/2-1". To make adjustment, loosen locknut securing clevis to rod connecting release shaft lever to clutch operating shaft lever and remove the clevis pin. Turn clevis to shorten or lengthen rod as necessary for correct pedal free travel. *NOTE—If car is equipped with "Hill-Holder", adjust "Hill-Holder" operating rod as outlined in Brake Section.*

Clutch Housing Removal: Remove starter. Remove floor plate and clutch housing top capscrews. Remove clutch operating shaft. Remove transmission (see Synchro-mesh Transmission Removal below). Remove two bolts holding engine rear support insulator cage to crossmember. Place a small hydraulic jack at rear of oil pan and insert a block between jack pad and oil pan to prevent damage to pan. Raise engine just enough to take weight of engine off crossmember. Remove support crossmember-to-frame bolts and remove cross member. Remove the two clutch housing bolts retaining exhaust pipe support bracket. Loosen clamp bolt and swing support bracket out of way. Remove clutch housing cover plate. Remove remaining housing mounting bolts or capscrews and remove clutch housing.

Clutch Removal: Remove clutch housing (above), remove

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six screws evenly to release pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model T86 (Commander), T86E (President). *See "Warner Synchro-mesh Transmission" in Transmission Section.*

Transmission Controls *See "Transmission Controls" in Transmission Section.*

Removal Drain transmission case Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines Move end of shaft to one side as far as possible and tie it in position Disconnect shift rods from shift levers and remove speedometer cable from transmission case Remove speedometer pinion. Remove capscrews which hold transmission case to clutch housing. Remove clutch operating shaft bracket, and bearing from transmission case. Move case rearward until the main drive pinion clears clutch pressure plate and remove unit from car.

OVERDRIVE

Warner R10 Type (part of T86E Transmission). Governor controlled, with electric solenoid operation and throttle controlled "kickdown"

See "Warner R10" Overdrive in Transmission Section.

Overdrive Controls *See "Overdrive Controls" in Transmission Section.*

Removal Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected

FLIGHTOMATIC TRANSMISSION

Hydraulic torque converter and hydraulically controlled three-speed planetary type transmission which provides automatic operation in "D" range and additional "Lo", "R", and "P" ranges which are controlled manually. In "D" position, the car starts in low gear and progresses to intermediate and high as car speed is increased.

► *See "Flightomatic" Transmission in Transmission Sect.*

► *"NO REVERSE" CORRECTION See "Flightomatic" Transmission in Transmission Section.*

► *PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION See "Flightomatic" Transmission in Transmission Section.*

► *TESTING & TROUBLE SHOOTING See "Flightomatic" Transmission in Transmission Section.*

Lubrication Check fluid level every 1000 miles, drain and refill every 15,000 miles. Use only Automatic Transmission Fluid Type "A" (marked AQ-ATF on container).

Checking Fluid Level – Place selector lever in 'P" position. Start engine and operate it for approximately four minutes or until engine and transmission have reached operating temperature. Remove floor mat from right side and remove oil inspection hole cover. Apply parking brake and foot brake, move selector lever slowly from "P" position to "R" position, then back to "D' position. Remove dipstick and read fluid level. Add fluid to bring level to 'FULL" mark on dipstick (1½ pints between "LOW" and "FULL' marks on dipstick)

Capacity - 9 qts Use Automatic Transmission Fluid Type "A" (marked AQ-ATF on container)

Throttle Linkage Adjustment: *See CARBURETOR above*

► *OTHER FLIGHTOMATIC DATA See "Flightomatic" Transmission in Transmission Section.*

UNIVERSALS

Spicer. Needle bearing cross type. Three used, with intermediate universal at propeller shaft support bearing on crossmember.

Propeller Shaft & Support Bearings· Two shafts used.

1) Front shaft with intermediate universal yoke bolted to rear end (no slip-joint).

2) Rear shaft with slip-joint on forward end at intermediate universal

Propeller Shaft & Support Bearing Removal· *See "Propeller Shaft Notes" in Studebaker Special Data.*

REAR AXLE

Spicer. Semi-floating, hypoid gear with Hotchkiss Drive *See "Spicer-Hypoid" in Rear Axle Section*

► *TWIN-TRACTION DIFFERENTIAL NOTE* Twin-Traction differential is optional with same gear ratios as conventional differential For Service Information *See "Spicer Power-Lock Differential" in Rear Axle Section*

► *TWIN-TRACTION REAR AXLE IDENTIFICATION NOTE* Cars with Twin-Traction Differential will have a Red Sticker on front door rear face just above door lock and small tag attached to differential cover screw with the letter "T" stamped on it

Rear Axle Ratio: Rear axle ratio stamped on plate attached to axle by cover cap screw and also on ring and pinion gears

Standard Ratios

Series	Std.	O.D.	Auto.
Commander	3 54-1	3 92-1	3 31-1
Pres (Exc 4-Dr Classic)	3 54-1	3 92-1	3 31-1
Pres (4-Dr Classic)	3 54-1	4 09-1	3 31-1

Optional Ratios

Series	Std.	O.D.	Auto.
Commander	3 92-1	①	3 07-1
Pres (Exc 4-Dr Classic)	3 92-1	②	3 07-1
Pres (4-Dr Classic)	3 92-1	③	3 07-1

① - 3 54-1, 4 27-1
② - 3 54-1, 4 27-1, 3 73-1, 4 09-1
③ - 3 54-1 4 27-1 3 73-1

Backlash–.003-.006".

Axle Shaft Removal· Remove wheel and wheel hub (use Puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire to frame out of the way *(CAUTION*–Do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft with Puller HM-931.

Rear Axle Assembly Removal Remove hub caps and axle shaft cotter pin. Loosen wheel nuts. Place car on stands (stands under frame just ahead of rear springs) and remove wheels, hubs, and drums. Disconnect brake pipes at wheel cylinders, remove backing plate bolts from both backing plates. Remove brake pipe clamps and capscrew which holds brake pipe tee to housing, remove brake pipe from housing. Remove backing plate and shims (suspend from frame). Remove rear universal joint U-bolts and nuts, disconnect rear propeller shaft and move to one side. Remove rear spring U-bolts and disconnect shock absorbers from spring plate. On President models, disconnect stabilizer shaft from spring plates. Remove rear axle assembly.

Wheel Bearing Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange (shims furnished .003" .005" .010" .030" thick). **Endplay** – .001-.006".

SHOCK ABSORBERS

Monroe, Delco or Gabriel. Direct acting hydraulic type Serviced by replacement *NOTE* - Heavy Duty shocks are Gabriel

Monroe Shocks (Stud bak r No.)

	Front	Rear
Sedans	1541903	1541911
Station Wagons	1541904	1541913
Coupes & Hardtops	1539526	1539544

Delco Shocks (Stud bak r No.)

	Front	Rear
Coupes & Hardtops	1539986	1539996

Gabriel Shocks (Stud bak r No.)

	Front	Rear
Non-Adjustable	1541958	1541959
Adjustable	1541901	1541910

FRONT SUSPENSION

Independent. Coil spring suspension with shock absorbers mounted within coil springs

See "Studebaker" in Suspensions & Wheel Alignment Section

► *"VARIABLE RATE" FRONT SPRING INSTALLATION CAUTION*· This type used on sedan models Install with closed coils at the top and the coil ends toward the inside (centerline) of car

Kingpin Inclination - 6° at 0° camber

Caster - Neg 1° to Neg 2½° Not more than ¾° variation between wheels

Camber - 0° to Pos 1° ½° more camber favored on driver's side

Toe-In - 1 16-1/8" **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel

RHD Car Note - Make toe-in adjustments at left hand tie rod

Toe-Out on Turns - With outer wheel at 20°, inner wheel should be 22½°-23½°

STEERING

► *POWER LOSS ON LEFT TURN CORRECTION See "Saginaw Power Steering (Nut In Line)" in Steering Section*

Manual: Ross Model SL-54 Cam & Single Lever Roller Stud. Roller stud mounted on tapered roller bearings *See "Ross Cam & Single Lever" in Steering Section*

Power Steering: Saginaw (Nut In Line). *See "Saginaw Power Steering (Nut In Line)" in Steering Section*

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Form 7-A—57F

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Steering Linkage: S *"Steering Linkag " in Steering Section*
Steering Wheel & Horn Button Removal: *See "Ross Cam & Single L v r" in Steering Section*
Steering Gear R m val: *See "Ross Cam & Single Lever" in St ering S ction*

BRAKES

Wagn r L ckh ed Hydraulic. Self-centering (with Bendix type shoes) Parking brake applies rear wheel service brakes
See "Wagner Lockheed Self-Centering" in Bra ke Section
Drum Diam t r - 11" (Front) 10" (Rear)
Whe l Cylinder Diam ter - 1 1 16" (Front), 7 8" (Rear)
Braking P wer - 62% (Front), 38% (Rear)

►*PRIMARY BRAKE SHOE LINING LENGTH PRODUCTION CHANGE* Primary shoe lining length has been changed to 8 5 32" (Front), and 7¼" (Rear) on later cars

►*FRONT WHEEL SECONDARY LINING NOTE* Front wheel secondary lining is 7/32" thick (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeak This lining is applied to the full length of the shoe and is marked "secondary" and "top" and should be installed as marked

Lining Width & L ngth

	Front Wh ls	R ar Wh ls
Primary Shoes 1	2¼" x 12"	2" x 10 29/32"
Secondary Shoes	2¼" x 12"	2" x 10 29 32"

1 - Early cars For later cars *See "Production Change" above*
Thickness - 3 16" (all except front wheel secondary) 7/32" (front wheel secondary)

Clearance—Lock shoes against drum with adjusting screw, then back off adjusting screw 8 notches, or more notches as required to free drum.
Standard Master Cylinder: On frame left side rail at base of brake pedal.
Checking Fluid—Access hole in front floor pan at left corner of drivers seat. Fluid should be maintained 1/2" below top of filler opening.

Removal—Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap. Remove brake pedal pullback spring by unhooking it first from its frame bracket and then from spring clip attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder.

(*NOTE* - One line with Hill-holder). Remove the brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder. Insert forward mounting bolt to Hill-holder while master cylinder is off car.

P wer Brak s: Hydr vac Power Unit. Used with standard master cylinder.
See "Hydrovac Power Unit" in Brake Section.

►*POWER BRAKE NOISE CORRECTION. See "Hydrovac Power Unit" in Brake Section*

Checking Fluid—Same as for Manual Brakes (same master cylinder used).
Removal of Power Unit—Disconnect manifold vacuum supply hose at the power unit and disconnect stop light switch wires Disconnect hydraulic lines from power unit (lines leading to master cylinder and to wheel cylinders). Remove power unit-to-bracket mounting bolts and remove unit from car.

Hill Holder: Used on Synchro-mesh and Overdrive Transmission cars *See "Hill-Holder" in Brake Section*

MISC. MECHANICAL

Windshield Wipers: Auto-Lite or Bosch. Electric type *See "Windshield Wipers" in Miscellaneous Section*
Air Conditioning: *See "Studebaker Air Conditioning" in Miscellaneous Section*
Power Window Regulators: Electrical with individual reversible motors in each window Control switches at each door with a master control switch located on left front door *See "Power Window Regulators" in Miscellaneous Section*
Power Seat Adjusters: Two-way electric type with curved seat tracks for seat adjustment (seat raises and lowers with a tilting action) *See "Power Seat Adjusters" in Miscellaneous Section*

MODEL IDENTIFICATION

Model	Model Identification
Packard Clipper, Town Sedan	57L-Y8
Packard Clipper, Country Sedan	57L-P8
Studebaker Golden Hawk	57H-K7

SERIAL NUMBER: Stamped on plate attached to left front hinge pillar post.
Starting Serial Number – (Packard) 57L-1001, (Studebaker) 6,100,001.

ENGINE NUMBER: Stamped on machined pad at left of oil filler tube mounting on top of cylinder block.
Starting Engine Number – (Packard) LS-101, (Studebaker) PS-1001.

TUNE-UP

COMPRESSION PRESSURE: 130-150 lbs. at 150 RPM.

VACUUM READING: Steady 18-21" at idling speed.

VALVE TAPPET CLEARANCE: .023-.025" (Hot), .025-.027" (Cold).

MANIFOLD HEAT CONTROL: Dual exhaust used. Automatic thermostatic type control valve located in right bank exhaust manifold outlet. When control valve is closed, most exhaust gases are discharged through left exhaust pipe.

IGNITION

FIRING ORDER: 1-8-4-3-6-5-7-2.
Cylinders – RIGHT BANK 2-4-6-8. LEFT BANK 1-3-5-7.

SPARK PLUG GAP: .033-.038".
Spark Plug – Champion H-10. 14 mm. Torque to 25-30 ft. lbs.

►*PACKARD AIR CONDITIONED CAR SPARK PLUG REMOVAL:* On RIGHT bank, remove air cleaner, then remove inner rear bolt retaining compressor base to support bracket. This bolt is directly above No. 1 plug. Remove plug with a deep 3/8" drive - 13/16" socket. Then remove remaining three plugs. On LEFT bank, remove battery, then remove plugs.

COIL: Delco-Remy 1115087 or 1115096.
Ignition Current - 3.8 amps. (idling).
Resistor - Delco-Remy 1931614 (1115087 Coil), 1927809 (1115096 Coil). 1.4-1.65 ohms at 75°F

►*COIL RESISTOR NOTE: Resistor is connected in lead from ignition switch to coil Resistor is by-passed during cranking by lead from starter solenoid-to-coil.*

DISTRIBUTOR: Delco-Remy 1110864.
Condenser – Delco-Remy 1869704. **Capacity** .18-.23 mfd.
Contact Point Set – Delco-Remy 1918148.
Breaker Gap – .013-.018".
Cam Angle – 28-34°.
Breaker Arm Spring Tension – 19-23 ozs.
Rotation – Counter-clockwise viewed from above.

Automatic Advance

Degrees Distr.	RPM	Degrees Eng.	RPM
0.5-2.5	350	1-5	700
2-4	400	4-8	800
7-9	800	14-18	1600
11-13	1125	22-26	2250

Vacuum Spark Control: Delco-Remy 1116058. integral type.
Plunger Travel – 11/64-3/16".

Vacuum Advanc

Distr. Degrees	Eng. Degrees	Vacuum (" of Hg)
Start	0	4-6
8	16	10.25-11.50

Distributor Removal & Installation: *See "Ignition Notes" in Studebaker Special Data.*

IGNITION TIMING

Setting – 4° BTDC with distributor vacuum line disconnected and carburetor connection plugged. Engine should be idled at 600 RPM. *NOTE* – Reset idling speed to 550 RPM after timing completed.
Timing Mark – "IGN" line on vibration dampener aligned with pointer on timing gear cover.

CARBURETOR

Stromberg WW 6-121. Dual downdraft type.

►*MANIFOLD FUEL DISTRIBUTION: Carburetor RIGHT barrel feeds Cyl. 1-4-6-7, LEFT barrel 2-3-5-8.*

►*CARBURETOR AIR CLEANER (DRY TYPE) NOTE: Special cleaning procedure required. See AIR CLEANER below.*

►*FUEL PUMP NOTE:* Carter M2573-S Pump used but is modified to accommodate a supercharger. Pump is provided with fitting in cover to permit supercharger pressure to act on diaphragm to increase fuel pressure as required. Pump does not have vent hole and uses a different diaphragm spring.

►*EARLY CARBURETOR "IDLE SETTING" & "IDLE SPEED" NOTE:* To reach adjusting screws on early model carburetors, remove two pipe plugs in forward side of air chamber base (IDLE SETTING), left rear of air chamber cover (IDLE SPEED). Use flexible screwdriver through plug openings. Later model carburetor has extensions for adjusting Idle Setting and Idle Speed. Adjusting screw is outside cover.

►*ENGINE STALLING (Left Turn) CORRECTION & CHANGES TO IMPROVE PERFORMANCE & ECONOMY:* Install New Type Air Horn Gasket No. 1543362 and Baffle No. 1543363 (Baffle between float and float needle valve), to correct left turn stalling. To improve Performance and Economy a 1/4" hole placed in choke butterfly, Choke Stove-to-Carburetor pipe shortened 1-1/4" and choke setting changed to Center on Index Mark. Change in tension of Vacuum Power Piston assembly spring improves economy.

►*HOT ENGINE HARD STARTING CORRECTION: See "Stromberg WW Carburetors" in Carburetion Section.*

Idle Setting – Initial setting, 3/4-1 turn open. Final setting approximately midway between missing and rolling points. Set both screwx alike, turn screws out for richer mixture.

Idle Speed - 575 RPM with transmission in neutral. *NOTE* - This supersedes previous setting of 550 RPM and is to correct hard starting when engine hot.

Float Level – 7/32" from top edge of bowl to top of float with needle valve seated (Guage J-6646).

Accelerating Pump – Center hole – normal setting. For less fuel install rod in inner hole, for more fuel install rod in outer hole.

Fast Idle Setting: Set engine idle speed at 550 RPM. Stop engine. Close choke valve, back off fast idle screw until Idle Speed screw just contacts stop, the turn fast idle screw in 7½ turns. This will give a .030-.031" throttle valve opening.

Automatic Choke Setting: One point lean with arrow on cover one notch lean from boss on housing (Early Cars), Centered on Index (Later Cars with new type choke).

Throttle Return Check Adjustment: Remove carburetor air chamber cover. Loosen return check assembly screw locknut. Adjust assembly in bracket until plunger just breaks contact with tab on throttle lever. Mark position of check assembly with relation to bracket, then turn check assembly 1¾-2 turns toward lever. Tighten locknut, install cover.

Throttle Linkage Adjustment: With engine at normal operating temperature, choke valve wide open and throttle return check operating correctly, proceed as follows:
1) Adjust engine idle speed to 550 RPM with transmission selector lever in "N" (Neutral) position. Set the stop on the bellcrank (at rear of engine) to provide a 17/64" gap between bellcrank pads (use a 17/64" drill as a gauge. After stop is adjusted, hold in this position. Make sure that carburetor-to-bellcrank rod is in the outer hole of bellcrank pad (away from centerline of engine), and that ball joint is on the upper side of bellcrank lever.
2) Adjust carburetor-to-bellcrank rod until idle speed screw on carburetor throttle lever just begins to leave the stop. Stop the engine and remove the 1/8" pipe plug located near throttle lever on side of transmission and install a pressure gauge. Place selector lever in "D" (Drive) position and run engine at 1000 RPM with rear wheels held stationary by the foot brake. Adjust length of the main bellcrank-to-transmission throttle valve outer lever rod to obtain 95-100 lbs. pressure on gauge. Stop the engine, remove gauge, and install the pipe plug in side of transmission.

►*OTHER DATA: See "Stromberg WW Carburetors" in Carburetion Section.*

FUEL PUMP PRESSURE: 6-7 lbs.

SUPERCHARGER

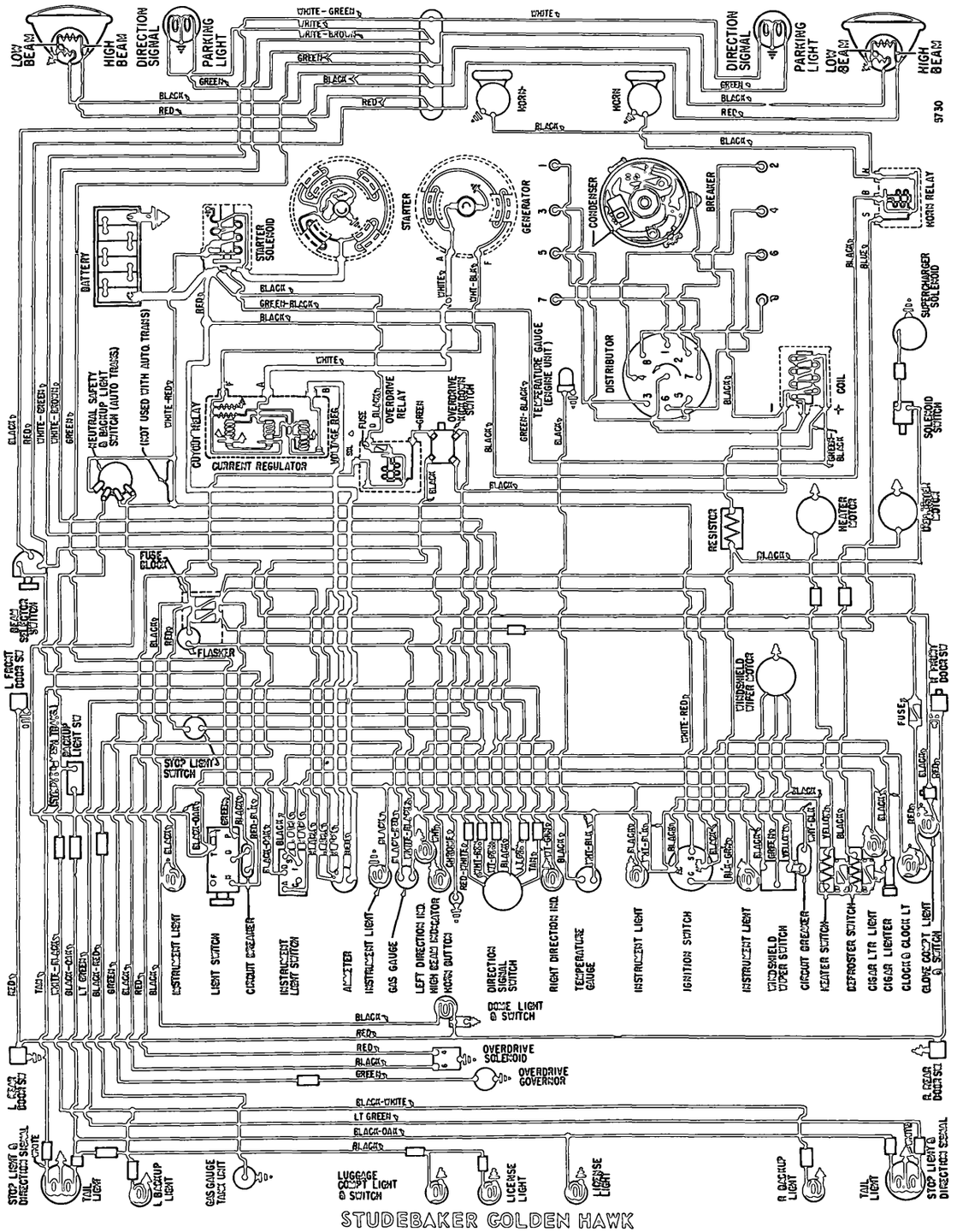
McCulloch VS-575. Variable ratio type. Mounted on bracket located on top of engine water pump manifold at water outlet opening.

►*SUPERCHARGER AIR CHAMBER BASE AND COVER PRODUCTION CHANGE:* Vent valves removed and Idle Mixture Adjusting Screw Extensions Part No. 1542985 (Right), 1542986 (Left) added starting with Engine No. PS-2197 and Serial No. 6101154. Drain Pipe added in base now serves as drain and vent, and used starting with Engine No. PS-2375 and Serial No. 6101368. To replace Base Assembly No. 1542839 on engines prior to No. PS-2375, add Base Drain Pipe Assembly No. 1543107, Pipe Nipple base End No. 1543108 and Drain Pipe-to-Timing Gear Cover Clip No. 182317.

►*AIR CHAMBER VENT VALVE "FLUTTER" AT IDLE SPEED:* When "Flutter" not caused by insufficient supercharger output or too slow an engine idle, check "REST" position of Vent Valve. Distance from top of valve to base or cover should be 1/4". To adjust, bend Vent Valve Flat Spring.

Kick-down Switch Adjustment: Loosen locknuts on each side of switch bracket. With wide open throttle, switch

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STUDEBAKER GOLDEN HAWK

CONTINUED FROM PRECEDING PAGE

plunger should be depressed and auxiliary throttle outer lever should rest against threaded sleeve of the kick-down switch.

Belt Tensioning Check: With engine at rest or idling, belt should be in bottom of groove (high blower position). With engine running at approximately 1500 RPM, belt should start to leave bottom of groove and begin to climb up. With engine at 3500 RPM (no load), belt should be running near top of pulley (low blower position). With engine at 3500 RPM, manually operate kick-down switch. Belt should go immediately to bottom of pulley groove (high blower position). Releasing kick-down switch should allow belt to return immediately to top (low blower position).

Lubrication: Capacity – 8 ozs. of "Type A" automatic transmission fluid.

Checking Fluid Level – Check oil level every 1000 miles. Maintain oil level between two punch marks on dipstick. Drain and refill every 15,000 miles.

▷ *OTHER DATA. See "McCulloch Supercharger" in Carburetion Section.*

CARB. EQUIPMENT

Fuel Pump: Carter No. M2623S. Fuel Only.
Pressure - 5-7 lbs.
See "Fuel Pumps" in Carburetion Section.

Gasoline Gauge (Studebaker Golden Hawk): Direct reading electric type.
Dash Unit - Studebaker No. 1539880.
Tank Unit - Studebaker No. 1542895.
See "Fuel Gauges" in Carburetion Section.

Gasoline Gauge (Packard): King-Seeley "CV" electric type with Gauge Voltage Regulator.
Dash Unit - K-S No. 49546 (Studebaker No. 6484332).
Tank Unit - Studebaker No. 1543524 (Sedans), 1543616 (Station Wagon).
See "Fuel Gauges" in Carburetion Section.

Air Cleaner: DRY TYPE (Plasticized paper).

▷ *DRY TYPE FILTER CAUTION:* Remove filter element every 1000 miles and shake thoroughly to remove dirt. DO NOT wash element or blow out with compressed air. Replace filter every six months or 10,000 miles.

BATTERY

Willard HDW-2SM-50. *12 Volt,* 9 plate, 50 ampere hour capacity (20 hr. rate).
Battery Ground – Negative.
Engine Ground - Rear of engine to dash.

STARTER

Delco-Remy 1107650 (Synchro-mesh & Overdrive), 1107651 (Flightomatic). *12 Volt.* Armature 1933789.
Drive – Bendix "Folo-thru" type.
Rotation – Counter-clockwise at commutator end.
Brush Spring Tension – 35 ozs. minimum

Performance Data

Torque	RPM	Volts	Amperes
0 ft. lbs.	6900	10.3	75
10.5 ft. lbs.	Lock	5.8	435

Starting Switch: Magnetic type switch, controlled by combination Ignition & Starting Switch. Turn key full right to start engine.

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Aut matic Transmissi n N utral Safety Switch: Delco-Remy 1998038 (without Power Steering), No. 1998059 (with Power Steering). Mounted on lower end of steering column. Starter will operate only when selector lever is in "N" or "P" position.

Adjustment: *See "Flightomatic" Transmission in Transmission Section.*

GENERATOR

Delco-Remy 1102003. *12 Volt.* **Armature 1923535.**

Maximum Charging Rate – *See Voltage Regulator.*

Performance Data –Cold

Amperes	Volts	RPM
30	14.0	2150

Brush Spring Tension – 28 ozs.

Field Current – 1.48-1.62 amps. at 12.0 volts.

Rotation – Counter-clockwise at commutator end.

B lt Adjustment: Hook a spring scale to belt midway between generator and fan pulleys, then adjust belt tension so that pull of 14 lbs. on scale will lift belt ½".

REGULATOR

Delco-Remy 1119123. *12 Volt. NOTE - Regulator is "1119000 Series". Specifications below are for "Normal" Settings.*

Cutout Relay

Cuts In – 11.8-13.5 volts (hot).

Contact Gap – .020"

Air Gap – .020" with contacts just closed.

Voltage Regulator

Setting – 13.8-14.8 volts (hot).

Air Gap – .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting – *See "1119000 Series" Regulator in Electrical Section.*

Current Regulator

Setting – 27-33 amps. (hot).

Air Gap – .075" with armature pressed down to point where contacts just touch.

Checking & Adjusting – *See "1119000 Series" Regulator in Electrical Section.*

MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section.*

Directional Signal: *See Electrical Section.*

Light Switch Removal: Packard Clipper - Insert small screwdriver into notch at back edge of knob and press inward toward shaft, at same time pull off knob. Insert special wrench Tool No. J-5986 over light switch shaft. Hex of tool will fit into a concealed nut in bezel which holds switch in place. Turn wrench counterclockwise, remove bezel. Move switch back from panel and remove **Studebaker "Golden Hawk"** - Remove switch retaining nut. Push switch sleeve back into panel and disconnect wires from switch.

FUSES: Body & Stop Lights 15 amps. in block in bracket behind instrument panel.

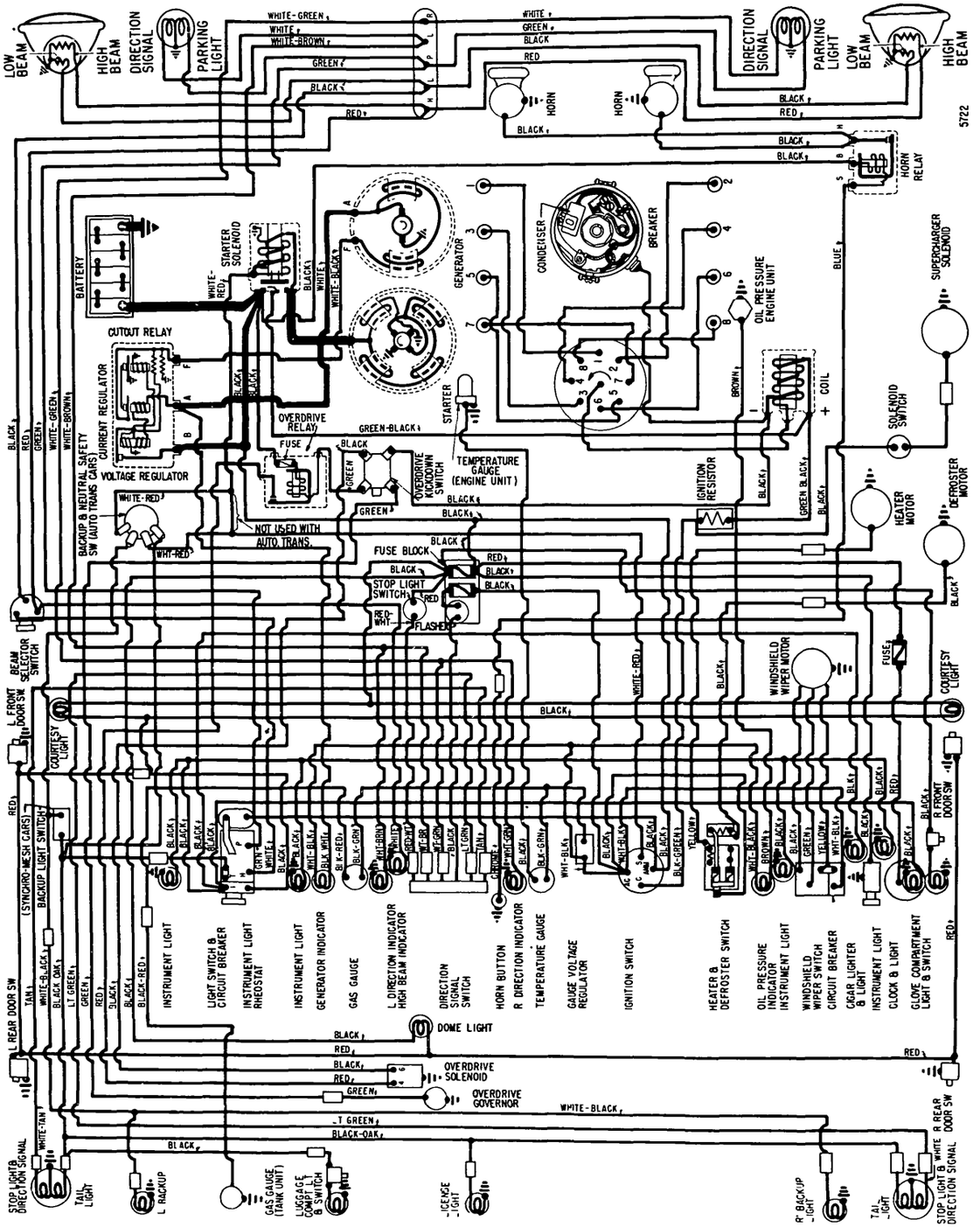
Direction Signal - 15 amps. in block in bracket behind instrument panel.

Ov rdriv - 15 amps. in relay on dash panel.

Cl ck - 1 amp. in lead behind instrument panel.

CIRCUIT BREAKERS: H ad, Parking, Tail & Instrum nt Lights - 18 amps. on headlight switch.

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PACKARD CLIPPER

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Windshield Wiper - 5 amps. in wiper switch.
H rn R lay: Delco-Remy No. 1116781.

ENGINE

► *AIR CONDITIONED CAR SERVICE CAUTION: Before disconn cting any part of air conditioning equipment or lines f r acc ss t ngine, see "Air Conditioning S rvic Cautions" in Misc llaneous Section.*

ENGINE SPECIFICATIONS: "Sweepstakes 289". V8, valve-in-head, supercharged.

B r	Str k	Displacement
3 9/16"	3 5/8"	289 cu. ins.

C mpr. Rati	Rat d HP	De veloped HP
7.5-1 Ⓒ	40.6	Ⓢ 275 at 4800 RPM

Ⓒ - 7.0-1 Optional. Ⓢ - Supercharged.

C mpr ssi n & Vacuum R ading – *See TUNE-UP.*

ENGINE REMOVAL: *S e "Engine" in Studebaker Special Data.*

OIL PAN REMOVAL: *S "Oiling System" in Studebaker Special Data.*

CYLINDER HEAD: *See "Cylinder Head & Manifolds" in Studebaker Special Data.*

TIGHTENING TORQUES: *See "Tightening Specifications" in Studebaker Special Data.*

PISTONS

Aluminum alloy, cam ground, T-slot, three ring type. *See "Original Bore & Pistons" in Studebaker Special Data.*

► *PISTON REPLACEMENT CAUTION: "259" & "289" Engine pistons are NOT INTERCHANGEABLE. "Flat H ad" piston used n 259" Engine. "Concave Head" Piston us d on 289" Engine.*

Weight - 16.2 ozs.

R m val - Pistons & rods remove from above.

Fitting N w Pist ns: Clearance - Selective feeler fit. Use feeler 1" wide, .002" thick, and 12" long inserted on camshaft side of cylinder bore. Insert inverted piston in bore with slotted side away from camshaft, and bottom edge 1" below top of cylinder bore. Pull required to remove feeler with properly fit piston should be 8-13 lbs.

R plac m nt Pist ns: Std. size & .010", .020", .030", .040" oversize. Pistons furnished with fitted pins.

Installing Pist ns: Install piston on rod so that solid side of piston is on same side as oil hole in bearing bore. Install piston in cylinder with the slot toward the left side of engine. *Se Rod Installation.*

PISTON PINS

Locked in rod by tapered pin and locknut.

Diameter – .8741-.8745". **Length** – 3 1/16".

Cl aranc in Pist n – .0001-.0003" (selective fit). Light finger push fit at 70° F.

R placem nt Pins: Std. size & .0025", .005" oversize.

Removal & Installati n: *See "Piston Pins" in Studebaker Special Data*

PISTON RINGS

Ring	Width	End Gap	Sid Clearanc
Compression	.077-.078"	.008-.016"	.002-.005"
Oil	1855-.1865"	.088-.016"	.0015-.005"

R plac ment Rings: Sets of Std., .020", .030" and .040" Oversize.
See "Piston Rings" in Stud baker Special Data.

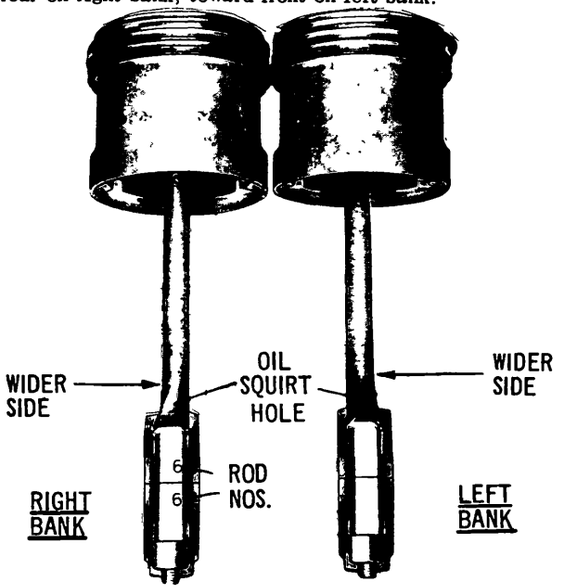
Installing Rings: Install compression rings with chamfered side of ring upward. Gaps of inner and outer oil rings must not come at same point.

CONNECTING RODS

Length - 6 5 8" center-to-center. **Weight** - 23.71 ozs.
Crankpin J ournal Diameter - 1.99925-2.00025".
Lower Bearing - Interchangeable. Steel backed, micro-babbitt lined type. No shims.
Clearance - .0005-.002". **Sideplay** - .008-.013".

Replacement Bearings: Std., .001", .002", .010" and .020" Undersize.

Installing Rods: Number on rod and bearing cap must be on same side. Rod is installed in same numbered cylinder with numbers down toward oil pan (toward right on right bank rods, toward left on left bank rods), and oil squirt hole on all rods toward right of engine. Rods are offset with widest half of bearing toward rear on right bank, toward front on left bank.



PISTON & ROD ASSEMBLIES

► *CAUTION:* Install piston and pin on rod so that T-slot of piston is on side opposite oil hole in bearing bore. Insert tapered end of clamp screw so it will be toward heavy boss. Be careful to align flat surface of screw with flat on piston pin. Bearing cap must be assembled on rod with groove in cap and rod on same side.

► *REPLACEMENT ROD IDENTIFICATION NOTE:* Replacement rods are unnumbered. To identify, hold rod upright with oil hole toward you. Wide part of offset will be to right on left bank rods, to left on right bank rods.

CRANKSHAFT

J urnal Diam t r—2.4995-2.5000".

Cl aranc –.0005-.0025".

R placement Bearings: Std. size, .001", .010", .020", .030" undersize.

End Thrust: Taken by thrust plate assembled between front main bearing and crankshaft gear. Controlled by shims between thrust plate and face of main bearing journal.
Endplay—.003-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Studebaker Special Data.*

Crankshaft Front Oil Seal: *See "Engine Front Cover" in Studebaker Special Data.*

CAMSHAFT

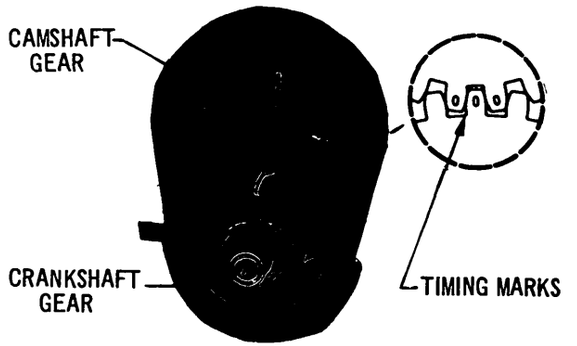
Journal Diameters—(1) 1.86975-1.87075", (2) 1.85375-1.85475", (3) 1.83875-1.83975", (4) 1.82275-1.82375", (5) 1.24475-1.24575".
Bearings—Precision type, steel backed babbitt lined.
Clearance – .00075-.00225" (No. 1), .001-.00275" (Others).

End Thrust: Taken by thrust plate located between front camshaft bearing and camshaft gear.
Endplay—.003-.006".

Camshaft Removal & Installation: *See "Camshaft & Bearings" in Studebaker Special Data.*

Timing Gears: Cast iron crankshaft gear and "Celeron" camshaft gear.
Timing Gear Removal & Installation—*See "Timing Gears" in Studebaker Special Data.*
Backlash—.001-.003".

Camshaft Setting: Mesh marked tooth of camshaft gear between two marked teeth of crankshaft gear.



ENGINE VALVE TIMING MARKS

Engine Front Cover Removal: *See "Engine Front Cover" in Studebaker Special Data.*

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Studebaker Special Data.*

VALVES

► *ROCKER ARM ADJUSTING SCREW PRODUCTION CHANGE:* Effective Engine No. PS-2415 (Studebaker "Golden Hawk") new rocker arm adjusting screw, Part No. 1541806, entered production. Screw has recessed head to prevent push rod from slipping out of socket if a valve sticks, and to prevent bent push rods.

Tappet Clearance: .023-.025" (Hot), .025-.027" (Cold).

Valve	H ad Diam.	Stem Diam.	St m Cl aranc
Intake	1-21/32"	11/32"	.0015-.0035"
Exhaust	1-17/32"	11/32"	.0015-.0035"

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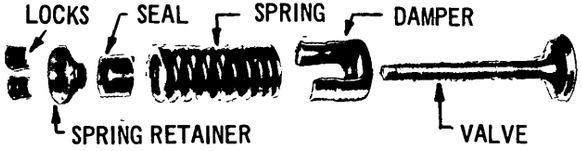
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Seat Angle–45° (all valves). **Lift**–23/64" (all valves).
Valve Seat Width–1/16-3/32".

Valve Stem Oil Seal: "Umbrella" type, rubber seals installed on all exhaust and intake valve stems (with cupped side down toward top of valve guide) within valve spring below spring retainer.

Valve Springs: Single spring used. Replace spring if 10% weaker than pressure given in specifications below. *NOTE* - Damper installed on lower (close-coiled) end of all springs.

Valve Spring Specifications - 106-112 lbs. when compressed to 1 43/64".



V8 ENGINE VALVE ASSY.

Valve Guides: Pressed in head from underside.
Guide Removal & Installation–*See "Valve System" in Studebaker Special Data.*

Valve Lifters: Straight barrel type. Remove from above. Not necessary to remove camshaft.

►*OVERSIZE VALVE LIFTER INSTALLATION (.005" oversize lifters requiring reaming of lifter bore): See "Valve System" in Studebaker Special Data.*

Valve Lifter Installation & Fitting–*See "Valve System" in Studebaker Special Data.*
Replacement Lifters–Std. size, .001", .005" oversize.

►*CAUTION–When lifters removed, make sure they are installed in original positions.*

Rocker Arms: *See "Valve System" in Studebaker Special Data.*

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above.

Intake Valves–Open 11° BTDC. Close 54°36' ALDC.
Exhaust Valves–Open 51°36' BLDC. Close 14° ATDC.

Valve Timing Check–Set tappet clearance of No. 1 intake valve at .030". Turn crankshaft until No. 6 piston is on compression stroke and vibration dampener mark "IN.OP.1" is approaching pointer on timing gear cover, continue to turn crankshaft slowly while working No. 1 intake rocker arm up and down to determine point at which all clearance is taken up. Dampener mark "IN.OP.1" should be directly under pointer.

OILING SYSTEM

Crankcase Capacity: 5 quarts refill, 1 quart additional with filter change.

Normal Oil Pressure: 40 lbs. at 1400-1600 RPM.

Pressure Regulator Valve: Located on right side at front of engine block slightly above crankcase flange.

Oil Pressure Indicator: **Studebaker "Golden Hawk"** - Direct reading, non-electric type gauge.
Packard Clipper - Indicator light on instrument panel.
Oil Pressure Switch - Studebaker No. 1539898.

Oil Pump: Spur gear type. Mounted on rear main bearing cap and driven by camshaft gear.

Pump Removal, Overhaul & Installation: *See "Oiling System" in Studebaker Special Data.*

Oil Filter: Partial flow. New disposable type. Replace entire unit at 5000 mile intervals or sooner if needed.
Replacement Filter - Studebaker No. 1542739.

Crankcase Ventilation: Filter element in oil filler cap (air intake) and breather tube at rear of engine (air outlet).

COOLING

Water Capacity: 17 qts. (18.5 with heater).

Pressure Valve: Radiator filler cap. 13 lb. type.

Thermostat: Choke type. Studebaker No. 1540787 (170°) Std., No. 533247 (160°) and No. 533257 (180°) Optional.

Water Pump: Packless, sealed ball bearing type.
See "Studebaker" in Water Pump Section.
Pump Removal - Drain cooling system. Loosen generator, remove belt. Remove fan-to-hub screws and remove fan and pulley. On Studebaker "Golden Hawk" remove fan shroud. Remove four capscrews retaining pump cover to water pump manifold. Remove pump from manifold.

Radiator & Fan Shroud Removal: *See "Cooling System" in Studebaker Special Data.*

Temperature Indicators: **Studebaker "Golden Hawk"** - Direct reading, electric type gauge.
Packard Clipper - King-Seeley "CV" electric type with Gauge Voltage Regulator.
Dash Unit - Studebaker "Golden Hawk" - Studebaker No. 1539879. **Packard Clipper** - King-Seeley No. 49550 (Studebaker No. 6484335).
Engine Unit - Studebaker "Golden Hawk" - Studebaker No. 1542895. **Packard Clipper Sedans** - Studebaker No. 1543524, **Packard Clipper Station Wagons** - Studebaker No. 1543616.
See "Temperature Gauges" in Miscellaneous Section.

CLUTCH

Borg & Beck. Single plate, dry disc type.

Car Models	Clutch Model	Assy. No.	Disc No.
All Models	10.5A8	361451	382643

See "Borg & Beck" in Clutch Section.

Pedal Adjustment: Pedal free travel 1/2-1". To make adjustment, loosen locknut securing clevis to rod connecting release shaft lever to clutch operating shaft lever and remove the clevis pin. Turn clevis to shorten or lengthen rod as necessary for correct pedal free travel. *NOTE–If car is equipped with "Hill-Holder", adjust "Hill-Holder" operating rod as outlined in Brake Section.*

Clutch Housing Removal: Remove starter. Remove floor plate and clutch housing top capscrews. Remove clutch operating shaft. Remove transmission (see Synchro-mesh Transmission Removal below). Remove two bolts holding engine rear support insulator cage to crossmember. Place a small hydraulic jack at rear of oil pan and insert a block between jack pad and oil pan to prevent damage to pan. Raise engine just enough to take weight of engine off crossmember. Remove support crossmember-to-frame bolts and remove cross member. Remove the two clutch housing bolts retaining exhaust pipe support bracket. Loosen clamp bolt and swing support bracket out of way. Remove clutch housing cover plate. Remove remaining housing mounting bolts or capscrews and remove clutch housing.

Clutch Removal: Remove clutch housing (above), remove six screws evenly to release pressure, lift off clutch assembly and driven member.

SYNCHRO-MESH TRANSMISSION

Warner Model T85 with Overdrive, All Models. *See "Warner Synchro-mesh Transmission" in Transmission Section.*

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: Drain transmission case. Disconnect universal joint from transmission companion flange and remove propeller shaft support stud nuts and plain washer. Move front propeller shaft and support assembly rearward on slip yoke splines. Move end of shaft to one side as far as possible and tie it in position. Disconnect shift rods from shift levers and remove speedometer cable from transmission case. Remove speedometer pinion. Remove capscrews which hold transmission case to clutch housing. Remove clutch operating shaft, bracket, and bearing from transmission case. Move case rearward until the main drive pinion clears clutch pressure plate and remove unit from car.

OVERDRIVE

Warner R10 Type (part of T85 Transmission Assembly). Governor controlled, with electric solenoid operation and throttle controlled "kickdown". *See "Warner R10 Overdrive" in Transmission Section.*

Overdrive Controls: *See "Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (above) after control wiring and cable have been disconnected.

FLIGHTOMATIC TRANSMISSION

Hydraulic torque converter and hydraulically controlled three-speed planetary type transmission which provides automatic operation in "D" range and additional "Lo", "R", and "P" ranges which are controlled manually.

►*"NO REVERSE" CORRECTION: See "Flightomatic" Transmission in Transmission Section.*

►*PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: See "Flightomatic" Transmission in Transmission Section.*

►*TESTING & TROUBLE SHOOTING: See "Flightomatic" Transmission in Transmission Section.*

Lubrication: Check fluid level every 1000 miles, drain and refill every 15,000 miles. Use only Automatic Transmission Fluid Type "A"

Checking Fluid Level – Place selector lever in "P" position. Start engine and operate it for approximately four minutes or until engine and transmission have reached operating temperature. Remove floor mat from right side and remove oil inspection hole cover. Apply parking brake and foot brake, move selector lever slowly from "P" position to "R" position. then back to "D" position. Remove dipstick and read fluid level. Add fluid to bring level to "FULL" mark on dipstick (1½ pints between "LOW" and "FULL" marks on dipstick).

Capacity - 9 qts. Use Automatic Transmission Fluid Type "A" (marked AQ-ATF on container).

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Throttle Linkag Adjustm nt: See *CARBURETOR above*

►*OTHER FLIGHTOMATIC DATA* See *"Flightomatic' Transmissi on in Transmission Section.*

UNIVERSALS

Spic r. Needle bearing cross type. Three used, with intermediate universal at propeller shaft support bearing on crossmember.

Propeller Shaft & Support Bearings. Two shafts used.

1) Front shaft with intermediate universal yoke bolted to rear end (no slip-joint).

2) Rear shaft with slip-joint on forward end at intermediate universal.

Pr p ller Shaft & Support Bearing Removal: See *"Propeller Shaft Notes" in Studebaker Special Data.*

REAR AXLE

Spic r. Semi-floating hypoid gear with Hotchkiss Drive S *"Spic r-Hypoid" in Rear Axle Section*

►*TWIN-TRACTION DIFFERENTIAL NOTE* Twin-Traction differential is optional with same gear ratios as conventional differential For Service Information See *"Spic r Pow r-Lock Differential" in Rear Axle Section*

►*TWIN-TRACTION REAR AXLE IDENTIFICATION NOTE* Cars with Twin-Traction Differential will have a Red Sticker on front door rear face just above door lock and small tag attached to differential cover screw with the letter "T" stamped on it

R ar Axl Rati : Rear axle ratio stamped on plate attached to axle by cover cap screw and also on ring and pinion gears

	Standard		Optional	
Car Mod l	**O.D.**	**Auto.**	**O.D.**	**Auto.**
Packard Clipper	4.27-1	3.31-1	3.92-1	3.07-1
			4.55-1	3.54-1
"Golden Hawk"	4.27-1	3.31-1	①	

① - 3 54-1, 3.92-1, 3.73-1, 4.09-1, 4 55-1.

Backlash—.003-.006".

Axle Shaft Rem val: Remove wheel and wheel hub (use Puller J-1644-B). Take out backing plate retaining bolts, remove outer oil seal. Pull backing plate out over end of axle shaft and wire to frame out of the way (*CAUTION*—Do not lose adjusting shims located between backing plate and axle housing flange). Pull axle shaft with Puller HM-931.

R ar Axle Assembly Removal: Remove hub caps and axle shaft cotter pin. Loosen wheel nuts. Place car on stands (stands under frame just ahead of rear springs) and remove wheels, hubs, and drums. Disconnect brake pipes at wheel cylinders, remove backing plate bolts from both backing plates. Remove brake pipe clamps and capscrew which holds brake pipe tee to housing, remove brake pipe from housing. Remove backing plate and shims (suspend from frame). Remove rear universal joint U-bolts and nuts, disconnect rear propeller shaft and move to one side. Remove rear spring U-bolts and disconnect shock absorbers from spring plate. Remove rear axle assembly.

Wh l B aring Adjustment: Use dial indicator to check axle shaft endplay. Adjust by removing backing plate (see Axle Shaft Removal above), and adding or removing shims located between backing plate and axle housing flange. **Endplay** — .001-.006".

SHOCK ABSORBERS

Monro , Delco, r Gabri l. Direct acting, hydraulic type. Serviced by replacement. *NOTE* - Heavy Duty shocks are Gabriel.

Monroe Shocks (Studebaker No.)

	Front	Rear
Packard Clipper Sedans	1543702	1543704
Packard Station Wagons	1541904	1541913
Studebaker "Golden Hawk"	1539526	1539544

Delco Shocks (Studebaker No.)

	Front	Rear
Studebaker "Golden Hawk"	1539986	1539996

Gabriel Shocks (Studebaker No.)

	Front	Rear
Non-Adjustable	1541958	1541959
Adjustable	1541901	1541910

FRONT SUSPENSION

Independent. Coil spring suspension with shock absorbers mounted within coil springs

See *"Studebaker" in Suspensions & Wheel Alignment Section*

►*"VARIABLE RATE" FRONT SPRING INSTALLATION CAUTION* This type used on sedan models Install with closed coils at the top and the coil ends toward the inside (centerline) of car

Kingpin Inclination - 6° at 0° camber

Caster - Neg 1° to Neg 2½° Not more than ¾° variation between wheels

Camber - 0° to Pos 1° ½° more camber favored on driver's side

Toe-In 1/16-1/8" **Adjust right hand tie rod only** for toe-in after left hand tie rod has been adjusted for straight-ahead position (with steering wheel centered) and center auxiliary tie rod has been adjusted so that steering gear arm and auxiliary steering arm parallel

Toe-Out on Turns - With outer wheel at 20° inner wheel should be 22½°-23½°

STEERING

Manual: Ross Model SL-54 Cam & Single Lever Roller Stud. Roller stud mounted on tapered roller bearings See *"Ross Cam & Single Lever" in Steering Section*

Power Steering: Saginaw (Not I n Line). See *"Saginaw Power Steering (Not In Line)" in Steering Section*

►*POWER LOSS ON LEFT TURN CORRECTION* See *"Saginaw Power Steering (Not in Line)" in Steering Section*

Steering Linkage: See *"Steering Linkage" in Steering Section*

Steering Wheel & Horn Button Removal: See *'Ross Cam & Single Lever" in Steering Section*

Steering Gear Removal: See *"Ross Cam & Single Lever" in Steering Section*

BRAKES

Wagner Lockheed Hydraulic. Self-centering (with Bendix type shoes) Parking brake applies rear wheel service brakes

See *"Wagn r Lockh ed S lf-C ntering" in Brake S ction*

Drum Diam t r - 11" (Front), 10" (Rear)

Wh l Cylind r Diam t r - 1 1/16" (Front), 7 8" (Rear)

Braking P w r - 62% (Front), 38% (Rear)

►*PRIMARY BRAKE SHOE LINING LENGTH PRODUCTION CHANGE:* Primary shoe lining length has been changed to· 8 5/32" (Front), and 7¼" (Rear).

►*FRONT WHEEL SECONDARY LINING NOTE* Front wheel secondary lining is 7/32" thick (3/16" on all other shoes), and is pre-ground off-center at the factory to eliminate brake squeak This lining is applied to the full length of the shoe and is marked "secondary" and "top" and should be installed as marked

Lining Width & Length

	Front Wheels	Rear Wheels
Primary Shoes ①	2¼" x 12"	2" x 10 29/32"
Secondary Shoes	2¼" x 12"	2" x 10 29/32"

①- Early cars For later cars See *"Production Chang "*

Thickness - 3/16" (all except front wheel secondary) 7/32" (front wheel secondary)

Clearance—Lock shoes against drum with adjusting screw, then back off adjusting screw 8 notches, or more notches as required to free drum.

Standard Master Cylinder: On frame left side rail at base of brake pedal.

Checking Fluid—Access hole in front floor pan at left corner of drivers seat Fluid should be maintained 1/2" below top of filler opening.

Removal—Remove from beneath car. Disconnect clutch pedal pullback spring from master cylinder support strap Remove brake pedal pullback spring by unhooking it first from its frame bracket and then from spring clip attached to master cylinder-to-pedal rod. Disconnect fluid line or lines at rear of master cylinder (*NOTE* - One line with Hill-holder). Remove the brake pedal clevis pin and disconnect brake pedal-to-master cylinder rod at brake pedal. Remove mounting nut bolts and washers, swing support strap down out of position, remove master cylinder.

Power Brakes· Hydrovac Power Unit. Used with standard master cylinder.

See *"Hydrovac Power Unit" in Brake Section.*

►*POWER BRAKE NOISE CORRECTION:* See *"Hydr vac Power Unit" in Brake Section*

Checking Fluid—Same as for Manual Brakes (same master cylinder used)

Removal of Power Unit—Disconnect manifold vacuum supply hose at the power unit and disconnect stop light switch wires Disconnect hydraulic lines from power unit (lines leading to master cylinder and to wheel cylinders). Remove power unit-to-bracket mounting bolts and remove unit from car.

MISC. MECHANICAL

Windshield Wipers: Auto-Lite or Bosch. Electric type See *"Windshield Wipers" in Miscellaneous Section*

Air Conditioning: See *"Studebaker Air Conditioning" in Miscellaneous Section*

Power Window Regulators: Electrical with individual reversible motors in each window Control switches at each door with a master control switch located on left front door S *"Pow r Window R gulators" in Misc llan ous Section*

P w r S at Adjust rs: Two-way electric type with curved seat tracks for seat adjustment (seat raises and lowers with a tilting action) S e *"Pow r Seat Adjusters" in Misc llaneous S cti n*

TIGHTENING SPECIFICATIONS
ALL MODELS

TIGHTENING TORQUES: When tightening capscrews or bolt nuts retaining the parts listed below, use a torque indicating wrench and tighten to tensions listed

4 CYL. ENGINES

	Ft. Lbs.
Cylinder Head Stud Nuts or Screws	60-70
Main Bearing Cap Bolts	65-75
Con Rod Cap Bolt Nut 3 8"	35-40
Con Rod Cap Bolt Nut 7/16"	50-55
Flywheel to Crankshaft Bolts	36-40
Engine Mounting(at frame crossmember)	38-42

6 CYL. ENGINES

	Ft. Lbs.
Cylinder Head Bolts	30-35
Spark Plugs	30
Con Rod Cap Bolts	40-45
Main Bearing Cap Bolts	85-95
Camshaft Thrust Plate Bolts	12-15
Camshaft Sprocket Nut	35-40
Chain Cover Screws	12 15
Flywheel Mounting Bolts	35-40
Intake & Exhaust Manifolds	30-35
Vibration Dampener Bolt	100 130

CAUTION - Torque figures are for clean and dry threads

CYLINDER HEAD & MANIFOLD
ALL MODELS

►*"F" HEAD CYLINDER HEAD BOLT CAUTION* One head bolt is located under carburetor in intake manifold.

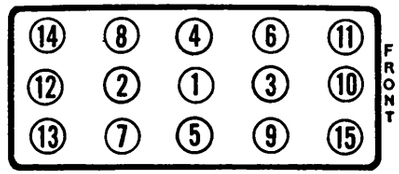
CYLINDER HEAD. Installation—Use a torque indicating wrench to tighten cylinder head stud nuts and capscrews; tighten in correct sequence as shown Recheck with engine water at 150°F

Tightening Torque—See Tightening (Torque Wrench) Specifications.

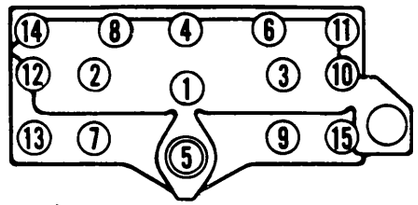
CRANKSHAFT & MAIN BEARINGS
4 CYL. ENGINES

CRANKSHAFT SERVICING: Bearing Replacement – Engine must be removed from car for bearing replacement (bearings "doweled" in case and crankshaft must be taken out to remove and install bearings). Make certain that oil holes in bearings line up with oil holes in crankcase, and that bearings fit snugly on dowel pins in crankcase and bearing caps.

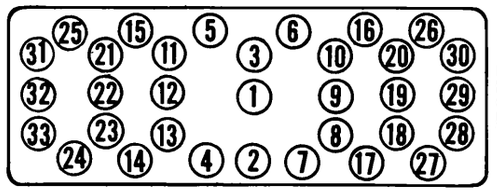
Rear Bearing Oil Seal (Neoprene Type—*NOTE Upper and lower halves of seal can be replaced without removing crankshaft from engine.* Seal is neoprene with a steel back Upper half of seal can be removed by using a suitable piece of strap steel (hack saw blade with teeth ground off) Rotate upper half of seal around shaft with steel strap until opposite end protrudes far enough to grasp end and remove To install, coat both parts of seal with grease and install upper half by rotating it around crankshaft until it is in position with ends even at the engine block Coat both ends of lower seal with Permatex before installing to insure good seal with upper half



4 CYL. "L" HEAD ENGINES



4 CYL. "F-HEAD" ENGINE



6 CYL. 6226 "L" HEAD ENGINE

Rear Bearing Cap Seal—Bearing cap sealed by cylindrical rubber packing strips inserted in holes between cap and case When installing bearing cap, coat upper face lightly with sealing compound, insert new packing strips after cap is in place. Packing strips should protrude ¼" to provide proper compression when oil pan installed. CAUTION—Do not cut off this protruding portion of the packing.

6 CYL. ENGINES

OIL PAN TO FILLER BLOCK GASKET INSTALLATION: Install Neoprene Rubber gasket in each filler block (use Gasket Cement in grooves) with each end extending an equal amount (1/16") above faces of filler blocks ends Allow cement to dry

FRONT & REAR FILLER BLOCKS: Lower filler blocks (front and rear) are bolted on lower face of crankcase to close oil pan opening (filler blocks must be removed to replace pan gasket) Rear filler blocks (additional **upper filler block guard** in crankcase) are grooved for cork oil seals which bear on polished surface of crankshaft directly behind oil slinger Filler blocks can be removed and replaced without disturbing crankshaft as follows

Front Filler Block (Lower) Servicing: Remove by taking out mounting capscrews and timing gear cover capscrews which enter the filler block When installing filler block, first install oil pan side gaskets (No 200266), install filler block (use Perma-tex), install new end gasket on block.

Rear Filler Block (Lower) Servicing: Same as for the lower front block (above) except for crankshaft oil seal (square cork gasket or graphite impregnated seal) Remove and discard old gasket or seal Install new seal (no 204654) in same manner as described below for Rear Filler Block (Upper) Guard Install lower filler block after upper filler block guard has been installed

Rear Filler Block (Upper) Guard Servicing: Guard is seated in groove in crankcase and can be "rotated" out without disturbing crankshaft after lower filler block removed Remove and discard old gasket or seal, clean out seal groove Install new graphite impregnated seal (no 204654), flatten seal slightly and use mandrel or rod to seat seal in groove by rolling from ends toward the center (ends must extend slightly above flat surface of guard). **Do not use shellac or sealing compound in groove.**

►*CAUTION*—Oil seal in both Upper Filler Block Guard and Rear Filler Block must be centered with crankshaft If necessary, seal can be built up using 1/32" thick gasket material, 3/16" wide, as shims shellacked to groove in block or guard behind seal

ENGINE FRONT COVER
4 CYL. ENGINES

FRONT COVER OIL SEAL: Cover has double metal baffle and spring-loaded leather seal which contacts polished surface of crankshaft pulley hub When installing seal, make certain that seal lip is inward or toward rear of engine.

6 CYL. ENGINES

FRONT COVER OIL SEAL: Drive out old seal using Oil Seal Driver KF-44 Place cover with opening flange on flat surface Coat outer edge of new seal with sealing compound place seal in opening with seal lip toward rear and drive seal in place

CAMSHAFT & BEARINGS
4 CYL. ENGINES

CAMSHAFT SERVICING: Rem val—Drain radiator and cylinder block, remove radiator and grille, cylinder head, manifold, valves, and valve springs Remove oil pump, fuel pump, oil pan, crankshaft pulley (use puller), fan and governor drive belts, and fan assembly Remove nuts on front engine support rubber insulators (Jeep only). Remove timing gear cover, remove camshaft gear and thrust plate, block up all valve lifters (can be tied up with string to manifold studs) On Jeep only, place jack under crankcase (use block of wood on jack to avoid damage to oil pan), raise front end of engine to provide clearance for camshaft. Remove camshaft through front of engine

Camshaft Front Bearing - Consists of steel backed babbitt lined bushing, staked in place to prevent rotation or endwise movement with oil hole in bushing lined up with oil hole in crankcase

Camshaft Thrust Plate - Thrust plate assembled behind camshaft gear with a spacer to control endplay Add shim behind spacer to increase clearance dress down spacer to reduce clearance Beveled edge of spacer must be to rear.

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6 CYL. ENGINES

CAMSHAFT SERVICING: Removal - Drain cooling system, remove radiator, vibration dampener timing chain cover timing gear and chain Remove fuel pump cylinder head oil pan and oil pump Remove valve cover valves and spring Hold lifters up (use spring type clothes pins) while carefully removing camshaft

VALVE SYSTEM

VALVE TAPPET ADJUSTMENT

6 CYL. ENGINES

TAPPET CLEARANCE ADJUSTMENT PROCEDURE: Car manufacturer recommends valves be adjusted in order listed (see table below) Remove right front wheel and access cover in fender splash shield for access to valve compartment Remove spark plugs so that engine can be turned over by moving fan or fan belt By setting valves in fully raised position (left hand column), **valves in right hand column** will be on "low" side of cam **in position for tappet adjustment**

Fully Raise Valve	Then ADJUST Valve:
Nos 1 and 3	Nos 10 and 12
Nos. 8 and 9	Nos. 4 and 5
Nos 2 and 6	Nos. 7 and 11
Nos 10 and 12	Nos. 1 and 3
Nos 4 and 5	Nos 8 and 9
Nos 7 and 11	Nos. 2 and 6

ROCKER ARMS

4 CYL. "F" HEAD ENGINES

ROCKER ARM ASSEMBLY REMOVAL: Lock rocker arms, shaft, brackets and springs together as a unit by removing cover studs in front and rear rocker arm shaft brackets and installing 5/16'-24 thread set screws in the front and rear brackets in same manner set screws are installed in center brackets. Remove nuts on bracket studs and lift entire assembly off studs as a unit.

Installation: Check push rods, straighten or replace any that are bent. Place push rods in holes in head and block, being sure that they are properly seated in intake valve tappets. Place rocker arm assembly on its studs, seat intake valve adjusting screws in tops of push rods before installing nuts on bracket studs. Torque nuts to 30-36 ft. lbs. Remove extra set screws from front and rear rocker arm shaft brackets, install cover studs in front and rear brackets with short end of stud down.

OILING SYSTEM

OIL PUMP

4 CYL. ENGINE OIL PUMP

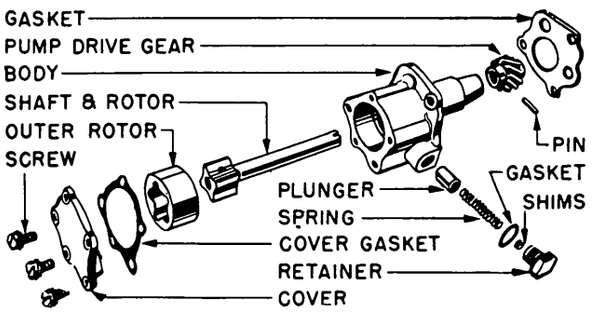
OIL PUMP REMOVAL & OVERHAUL: (Removal)— Rotate engine until distributor rotor points to No 1 firing position and timing mark on flywheel or vibration dampener is directly under pointer (do not remove distributor, pump must be installed so gears mesh without moving rotor for correct engine timing) *CAUTION*—Crankshaft must not be rotated with oil pump removed) Remove pump mounting bolts and pull pump out as far as possible Place a short jack between front suspension support and front lower edge of block and push engine to right until pump is free (Note—It may be necessary to loosen engine support bolts for more movement) Check pump shaft for wear before disassembling pump by mounting it in a vise with a dial indicator bearing against shoulder on gear, at right angles to relief valve housing Move gear toward, then away from indicator and note total reading If this play exceeds 010', replace complete pump

Disassembly Remove cover screws cover and gasket and shake outer rotor from housing Remove relief valve retainer, gasket, shims, spring, and plunger If rotor is to be replaced file off one end of gear retaining pin pull gear off shaft and remove shaft and inner rotor from housing Clean all parts in solvent and check for wear pits and scoring

Inspection: Measure clearance between outer rotor and pump body Replace body if clearance exceeds 012" Check body to make certain inner surface is not rough or scored and that lower face is flat within 001" Rotors must be within 001" thickness of each other With gear installed on pump shaft, clearance between gear and pump body should be 003- 010"

Checking Rotor Clearance Position inner rotor with one lobe engaged between two lobes of outer rotor, then measure clearance of opposite inner rotor lobe and lobe of outer rotor This clearance should not exceed 010 To check end clearance place a small piece of 010 shim stock on inner rotor so that it does not overhang edge of rotor at any point Install cover and gasket and tighten screws If shaft can be turned by hand, end clearance is excessive Install new cover and repeat test If rotors still not tight, replace rotors

Reassembly: Install relief valve, spring, gasket and retainer If shims were removed, install them between spring and retainer If new rotors installed, slide gear on shaft after installing shaft and rotor in housing Position gear so there is not over 010' clearance between gear and pump housing and drill a 5/32' hole through pump shaft for retaining pin Install pin and peen ends Install cover and gasket and tighten screws



4 CYL. ENGINE OIL PUMP

Installation (4 Cyl. Models): Check to see that timing marks on flywheel or vibration dampener are directly under pointer and distributor rotor is pointed toward No 1 firing position Insert pump in block with pump gear positioned so that it will engage camshaft gear and the distributor shaft drive key without moving distributor rotor Installation can be made only in one position without moving distributor rotor as slot in drive gear and key on distributor shaft is machined off-center

6 CYL. ENGINE OIL PUMP

OIL PUMP SERVICING Pump can be removed from engine (with oil pan off) by taking off retaining nut on stud on #3 main bearing cap and pulling pump straight down to disengage drive gear and distributor drive coupling Service pump as follows

Disassembly—Take out cotter pin and remove screen float assembly Remove cover and gasket Drive out pin holding upper drive gear on shaft (pin peened in place), drive out shaft from gear remove idler gear (remove idler shaft if required) Take off lower drive gear (press fit and keyed to shaft)

Oil Pump Clearances—Check as follows

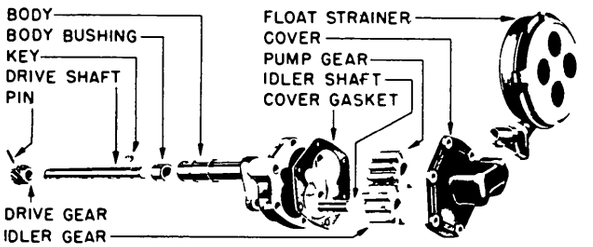
1)—Pump Body Bushing if over 005" clearance between pump body and ends of lower drive gear teeth, replace bushing and ream to 500- 501"

2)—Pump Shaft shaft diameter 4990- 4985"

3)—Lower Drive Gear end of gear should be 001- 004" beyond gasket seat on pump body

4)—Upper Drive Gear 002- 004" clearance between underside of gear and upper end of pump body Controlled by pressing lower drive gear on shaft until this clearance obtained

NOTE—Cover plate should be replaced if worn from contact with gears, or if cracked



6226 ENGINE OIL PUMP

Oil Pump Bushing (in Cylinder Block)—Replace if worn or loose (can restrict oil gallery if loose) Replace by using drift inserted in distributor drive shaft bore from top of block Install new bushing from below (must be flush with bottom of block)

Reassembly—Press upper drive gear on shaft. Insert new pin and peen ends flush with gear Install shaft and gear in pump body Press lower drive gear on shaft (with key in place) until 002- 004" clearance obtained between upper drive gear and upper end of pump body Press idler gear shaft in body, install idler gear Install cover using new gasket and pin oil screen float assembly on cover Check shaft and gears—must rotate freely when turned by hand

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Oil Pump Installation—Set #1 piston at top dead center. Insert distributor main drive shaft from top of block. Install pump with pump drive shaft tongue engaging slot in lower end of distributor main drive shaft and in such a position that when installed, slot in upper end of distributor main drive shaft will be approx. parallel to side of block (slot pointing fore-and-aft), install lock washer, tighten mounting nut. Remove distributor shaft for cyl. head installation.

FRONT AXLE

STEERING LINKAGE (Checks & Adjustments) CJ-5 & FC-150: To correct shimmy, check all items listed as follows:

1) Remove both steering knuckles and inspect the upper and lower kingpin bearings (cups for brinnelling, pitting, or fretting) and replace if they show slightest imperfection.

2) Adjust kingpin bearing preload (add or remove shims), with axle shafts removed, to 12-16 pounds load (maximum preferred). *NOTE* - Hook scale in hole in arm for tie rod socket. Read scale after knuckle has been started.

3) Replace original Steering Knuckle Oil Seals with Kit Part No. 915-664 if seals show wear.

4) Steering bell crank and/or double tie rod socket should be replaced when slightest rocking action or looseness observed when turning wheels under normal load.

5) Adjust drag link to maximum safe tightening at both ends and adjust steering gear.

6) See "Steering Arm", "Leaning Correction", "Tie Rod & Spring Shackle" and "Shimmy Due To Loose Steering Arm" below.

VEHICLE LEANS TO LEFT (FC-150): Install Axle Shim Part No. 915858 with Spring Clip Front No. 808460 and Clip No. 808461, placing shim between spring and spring saddle on right front side of vehicle. Locate shim in saddle and torque to 50-55 ft. lbs.

SHIMMY DUE TO LOOSE STEERING ARM: Permanently correct condition by replacing two bolts in steering arm with two additional dowel studs and taper face nuts. Ream holes in steering arm to 60° taper for proper seating of taper face nuts.

TIE BAR INSTALLATION (FC-150): Installing Tie Bar will stabilize frame and reduce possibility of shimmy developing. Secure 29½" length of 2" x ½" hot or cold rolled #11 steel channel and proceed as follows:

1) Remove radiator guard screen and place Tie Bar up against front spring hanger brackets.

2) Set front wheels in straight ahead position, hold Tie Bar level and provide 3/8" clearance between Tie Bar and steering connecting rod.

3) Arc weld Tie Bar to hanger brackets at outside and inside rear edges of both brackets.

SILENT BLOC BUSHING TYPE SPRING SHACKLE: Silent-bloc bushing type shackle replaces U-type. Service Kit Part No. 916646 (2 silent bloc bushings and new type shackle) will replace one shackle only. When replacing threaded shackle, ream out frame bracket to .875" and press silent bloc bushing into bracket and spring eye. *NOTE* - Lockwasher included for spacer at the spring.

TRANSMISSION NOTES

TROUBLE SHOOTING AND ADJUSTING: For correcting "Hard Shifting", "Shifting into Two Gears" or "Slipping out of Gear", proceed as follows:

L6-226 (4x2) & DJ-3A Models - 1) Disconnect transmission shift rods from remote control levers and check for binding of remote control shaft on steering column and correct as necessary.

2) Check operation of remote control levers and clutches and reconnect shift levers.

3) Disconnect rods from levers at transmission, insert ¼" pin through remote control levers and bracket on steering gear housing Place transmission in neutral, adjust rods so clevis pin will enter clevis and lever freely.

4) If lever sticks in first gear or is hard to shift from first to second gear, shorten low and reverse shift rod one turn at a time (3 turns usually required) until improvement is obtained.

FC-150 Models - 1) Disconnect control rods from shift lever at cab and check free operation of shift lever. Correct as necessary.

2) Adjust shift rods with transmission in neutral.

3) Check clutch pedal adjustment.

All Models (with Two Wh l Driv) - When minimum clearance (.001-.007") between end of interlock sleeve and transmission shift levers (with longest sleeve Part No. 641310), cannot be obtained, remove original interlock pin from shift lever poppet spring and replace it with a Transfer Case Intermediate Gear Needle Bearing Roller Part No. 809294 which has been ground down to a length of .780". Assemble transmission so shift action can be checked. If pin is too long causing a bind, reduce length of pin from .780" until smooth ball and detent engagement is obtained.

FC-150 TRANSFER CASE OPERATING LEVER VIBRATION: To correct vibration noise caused by operating lever vibrating against, or transmitting vibration to body panel, proceed as follows:

1) Install sound deadening material between the two transfer case lever shaft brackets and body panel. Use Dust Cover material Part No. A-622 or a piece of rubber 3" square, 1/16" thick.

2) File body opening to obtain clearance for transfer lever when in "2WD High" and working lever to right and left.

3) Install Grommet Part No. 670543 on lever at body opening as dust seal and possible vibration dampener.

FC-150 TRANSFER CASE REMOTE CONTROL LINKAGE ADJUSTMENT: Linkage pins must be in end holes in both shift rods. To adjust position of remote control rod nuts proceed as follows:

1) Loosen jam nuts at transfer case and remove connecting link pin.

2) Place gear levers in Neutral position (both front rear) and insert connecting link pin without changing position of controls. *NOTE* - When control lever is in extreme rear position, linkage should be in 2-wheel drive (HIGH GEAR) or as far **forward** as rods permit linkage to go. When lever in 4-wheel drive (LOW GEAR) linkage should be as far **backward** as shift rods will permit.

MODEL IDENTIFICATION

Model	Series Symbol
F4-134 4x2 & 4x4 Jeep Utility	54
L6-226 4x2 & 4x4 Jeep Utility	54
F4-134 & L6-226 4WD Truck	55
DJ-3A Jeep Dispatcher	56
CJ-3B, CJ-5, CJ-6 Universal Jeep	57
FC-150 Forward Control	65
FC-170 Forward Control	61

SERIAL NUMBER: On metal plate attached to top of front wheel housing inside cab beside drivers seat (Series 61 65), at drivers seat (Series 54), on dash (Others)

►*SERIAL NUMBER NOTE:* Serial number (example 54548-10001), lists the following data in sequence:

Serial①	Body Style ②	Engine③	Drive④	⑤
54	5	4	8	10001

① - See "Series Symbol" in Model Table above.
② - See "Body Style" in Body Style Table below.
③ - See "Engine Symbol" in Engine Designation Table.
④ - 2 Whl. Dr. - 1 or 7 (LHD), 5(RHD).
4 Whl. Dr. - 2 or 8 (LHD), 6(RHD).
⑤ - Factory Unit Production Number.

Engin D signation Table

Engine Typ	Engine Symbol
4 Cyl. 134 Cu. in. "L" Head	3
4 Cyl. 134 Cu. in. "F" Head	4
6 Cyl. 226 Cu. in. "L" Head	6

Body Style Table

Body Style	Series - 54	55	56	57	61	65
Utility Wagon	①					6
Utility Delivery	②					7
F F Cowl	4	4			2	2
Cowl & Windshield	5	5	5		3	3
Stripped Chassis	6	6		③	1	1
All	9	9		9		
Special Jobs	0	0		0		
Cab & Chassis		1				
Pickup Truck		2			⑤	⑤
Stake Truck		3				
Open Body			3	④		

① - 1 (2Door), 7 (2 Door Plan).
② - 2 (2 Door), 8 (2 Door Plan).
③ - 4 (CJ-3B), 6 (CJ-5), 8 (CJ-6).
④ - 3 (CJ-3B), 5 (CJ-5), 7 (CJ-6).
⑤ - 4 (Open Cab), 5 (Closed Cab).

ENGINE NUMBER: Located as follows

4 Cyl. Engin s - Stamped on top of water pump boss at front of engine.

6 Cyl. Engin - Stamped on boss on left front corner of engine block above generator.

TUNE-UP

COMPRESSION PRESSURE:	Pressure & Speed
4 Cyl "L" head	90-110 lbs at 185 RPM
4 Cyl "F" head	130-140 lbs at 185 RPM
6-226 "L" head	120-130 lbs at 185 RPM

VACUUM READING: 17-21" at idling speed

VALVE TAPPET CLEARANCE:	Intak	Exhaust
4 Cyl "L" Hd	016"①	① 016"
4 Cyl "F" Hd	018"①	①.016
6-226 "L" Hd	014"②	② 014"

①—Hot or Cold ②—Cold

MANIFOLD HEAT CONTROL: Used as follows—
4 Cyl. "L" H ad. Thermostatic coil on manifold.
4 Cyl. "F" Head. Water jacketed intake manifold
6-226 "L" Head Exhaust heat from No. 3 & No 4 cylinders enters heat chamber under intake manifold

IGNITION

FIRING ORDER: 1-3-4-2 (4 cyl.), 1-5-3-6-2-4 (6 Cyl).

SPARK PLUG GAP: 030".

Spark Plug - Auto-Lite A7 or Champion J8. 14 mm. Torque to 28-30 ft. lbs.

COIL· Auto-Lite CR-6009.

Ignition Current - 2.5 amperes idling, 5 amperes at 6.3 volts stopped.

DISTRIBUTOR:	Auto-Lite No.
4 Cyl "L" Jeep	IAY-4012
4 Cyl. "F" Univ. Jeep	IAD-4041
4 Cy. "F" Others	IAT-4204A
6-226 "L" All	IAT-4206

Condenser—Auto-Lite (IAY Distr.) IAT-3076LA, (IAD Distr) IGW-3139, (IAT Distr.) IAT-2015L.

Capacity—(IAT-3076LA) .25-.28 mfd. (IGW 3139) .23-.26 mfd. (IAT-2015L) .21-.25 mfd.

Contact Point Set—Auto-Lite (IAY Distr) IGW-3028DS, (IAD Distr.) IGP-3028FS, (IAT Distr) IGW-3028AS

Breaker Gap—.020".

Cam Angle—37-43° (IAY-4012, IAD-4041, IAT-4204A), 36-42° (IAT-4206).

Breaker Arm Spring Tension—17-20 ozs.

Rotation—Counter-clockwise viewed from above

Automatic Advance
(IAY-4012, IAD-4041, IAT-4204A)

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	300	0	600
1	425	2	850
6	1050	12	2100
10	1575	20	3150
11	1700	22	3400

Automatic Advance - IAT-4206

Degrees Distr.	RPM	Degrees Eng.	RPM
Start	325	0	650
1	450	2	900
6 5	1200	13	2400
8	1475	16	2950
9	1675	18	3350

Vacuum Spark Control: None used on IAY, IAD Distr

Vacuum Advance—IAT-4204A

Distr Degrees	Eng Degrees	Vacuum (" of Hg)
Start	0	5 1/8
3	6	9 5/8
6	12	14

Vacuum Advance—IAT-4206

Start	0	10
3	6	13
5	10	15

IGNITION TIMING

Setting - 5° BTDC (All 4 & 6 Cyl)

Timing Mark - (All 4 Cyl Eng). Notch on rim of fan pulley to align with 5° mark on timing gear cover Cover has two marks 5° and T (Top dead Center)

(6 Cyl Eng.) Align correct graduation with pointer on timing gear cover Damper marked "O" at TDC with 1° graduations before and after this point

CARBURETOR

►*AIR CLEANER TO CARBURETOR HOSE PRODUCTION CHANGE & CAUTION (FC-150)* To prevent hose from collapsing under high temperature conditions install Reinforcing Spring Part No 914965 in hose FC-150 vehicles produced after Serial No 65548 11274 have this spring installed

Model	Carter Carb. No.
4 Cyl "L" Jeep Dispatcher	YF 2392S
4 Cyl. "F" Univ Jeep	YF 938SA
4 Cyl "F" 4X2, 4X4, 4WD	YF 951S
4 Cyl. "F" Fwd. Control	YF 938SA
6 Cyl. 6-226 "L" All	YF 2467S

Idle Setting ¾-1¾ turns open (938SA, 951S). ½-2 turns open (2392S), 1-2½ turns open (2467S). Turn screw out for richer mixture.

Idle Speed - 600 RPM (4 Cyl) 550 RPM (6 Cyl)

Float Level - (2392S, 2467S) 9/32" - Gauge T109-126, (938SA, 951S) 5/16" - Gauge T109-107. From top of float at free end to gasket seat on cover with assembly inverted and float resting freely on intake needle.

Fast Idle: With choke held in wide open position, lip on fast idle arm should contact boss on body casting.

►*OTHER DATA See "Carter YF Carburetor" in Carburetion Section*

FUEL PUMP PRESSURE: (4 Cyl.) 2½-3¾ lbs. at 1800 RPM. (6 Cyl.) 3½-5½ lbs. at 1800 RPM.

CARB. EQUIPMENT

Fuel Pump (4 Cyl) Carter M2195S Fuel only (6 Cyl) Carter M957S Fuel & Vacuum

Pressure - (4 Cyl) 2½-3¾ lbs at 1800 RPM (6 Cyl) 3½-5½ lbs at 1800 RPM
See "Fuel Pumps" in Carburetion Section

Gasoline Gauge King Seeley "CV" (Constant Voltage) type with Voltage Regulator contained within Gauge (FC 170) separate Regulator (Others)
See "Fuel Gauges" in Carburetion Section

CRANKCASE VENTILATOR

Sealed Positive Ventilation (4 Cyl.). Clean air is drawn into oil filler tube and rocker arm cover through a hose to the air cleaner All connections and gasket on filler tube must be air tight The crankcase is ventilated by a sealed system from air cleaner tube to intake manifold A valve is attached to valve spring cover in the line to air cleaner This valve must be free of carbon and operate freely at all times to obtain smooth idle Remove and clean valve every 5000 miles or more often if engine must run at idle speed excessively or is used for stationary power

BATTERY

Auto-Lite or Willard Type 1-M-100. 6 volt 15 plate 100 ampere hour capacity (20 hr rate)

Battery Ground - Negative

Engine Ground - Left front engine support (6 226) right front engine support (Others)

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STARTER

Auto-Lite. Used as follows

Model	Starter	Armature
4 Cyl (All)	MCH-6203 or 6207	MCH-2088
6 Cyl	MCH-6210	MCH-2088

Drive - Bendix "Folo-Thru" type
Rotation - Counterclockwise at commutator end
Brush Spring Tension - 42-53 ozs

Performance Data

Torque	RPM	Volts	Amperes
0	4300	5 0	65
6 0	Lock	2 0	335

Starting Switch: Auto-Lite SST-4012 (MCH 6203), Key starting (Magnetic switch controlled by turning key past "Ignition On" position) Auto-Lite SW-4015A (MCH-6207), Foot operated

GENERATOR

Auto-Lite GGW-4801D (4 Cyl.), GGW-4801EN (6 Cyl.).
Armature - Auto-Lite GGW-2006F (All Cars)

Performance Data

Amperes	Volts	Cold	RPM	Hot
0	6.4	870-970		950-1050
40.0	8.0	1800-2000		2150-2350
45.0	8.0	1925-2125		2350-2550

Brush Spring Tension—35-53 ozs.
Field Current—1.4-1.5 amperes at 5.0 volts.
Rotation—Counter-clockwise at commutator end.
Belt Adjustment: ½-5/8" deflection with thumb pressure midway between generator and pump pulleys.

REGULATOR

Auto-Lite VBE-6105A. Voltage & Current type with "Temperature Compensated" Current Regulator.

Cutout Relay

Cuts In—6.3-6.8 Volts (set to 6.4-6 6 volts).
Cuts Out—4.1-4.8 Volts (4.6 amps. discharge).
Contact Gap—.015" minimum.
Air Gap—.031-.034" with contacts open (check at hinge end of core).

Voltage Regulator

Setting—7.2-7.5 volts at 70°F *after 15 minutes operation charging at ½ maximum rate.*
Air Gap—.048-.052" with contacts just touching.
Checking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

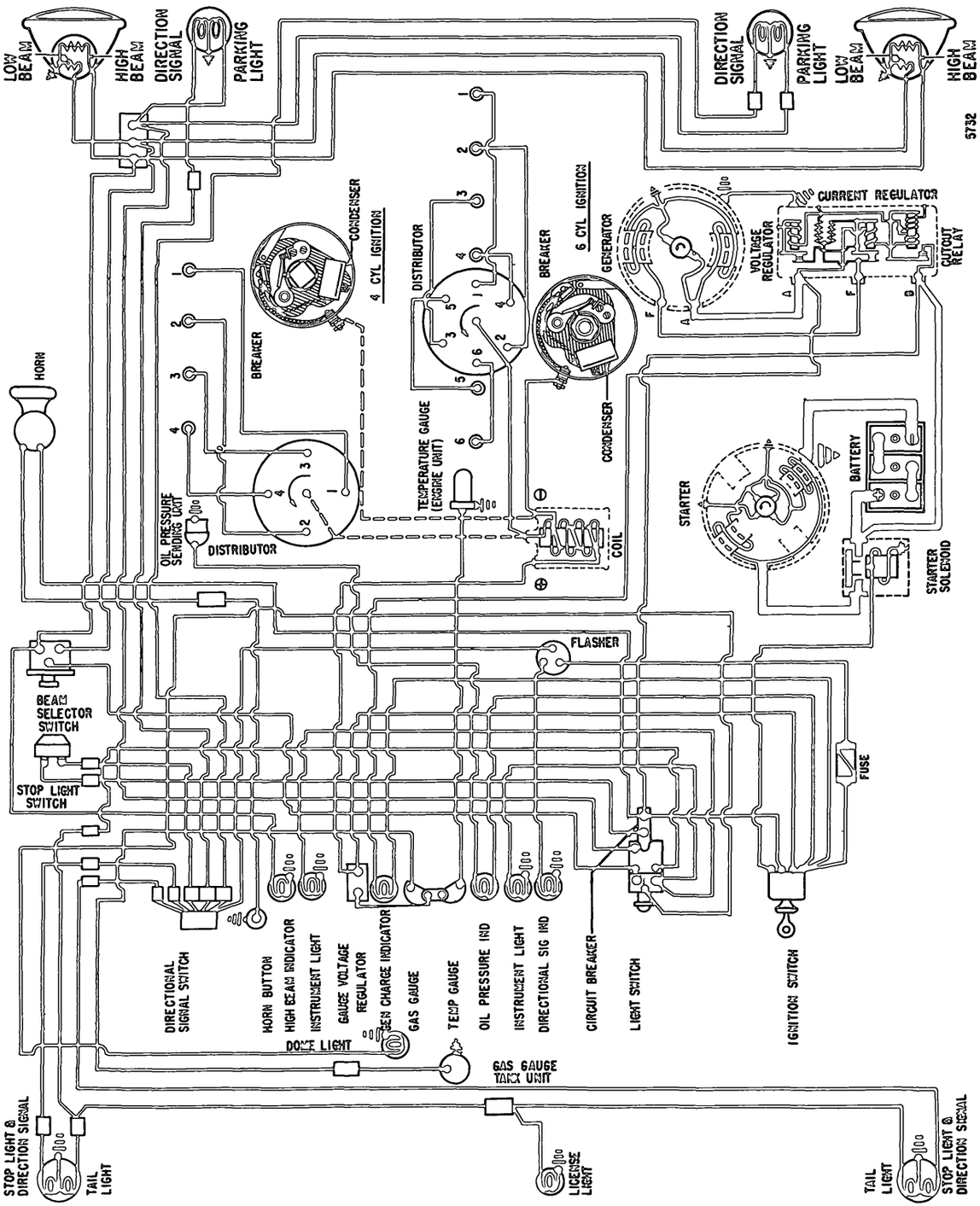
Current Regulator

▷*SETTING CAUTION: "Temperature Compensated" type Set to following specifications at 70°F.*

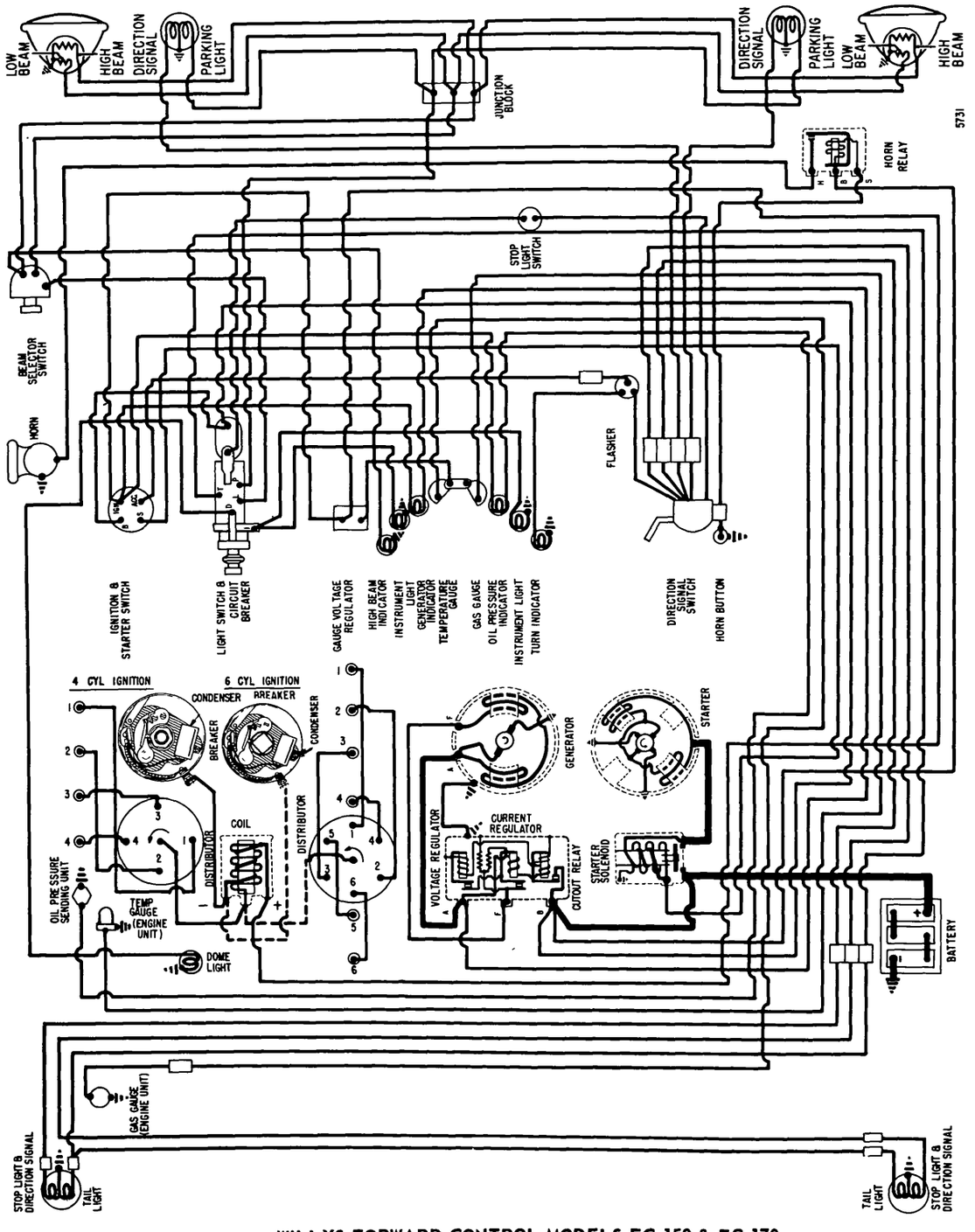
	Test A—Operating Amperes	Test B
VBE-6105A	52	45 (43-47)

Test A—After 15 minutes operation with current at ½ maximum rate.
Test B—After 15 minutes additional operation with current regulator operating.
Air Gap—.048-.052" with contacts just touching.
Checking & Adjusting - *See "Auto-Lite 12 Volt Regulators" in Electrical Section.*

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WILLYS UTILITY MODELS (EXC. FORWARD CONTROL)



WILLYS FORWARD CONTROL MODELS FC-150 & FC-170

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MISC. ELECTRICAL

Headlamps: Sealed Beam. *See Electrical Section*

Directional Signal: *See Electrical Section.*

Lighting Switch Removal: Loosen set screw on side of control knob and remove knob. Remove retaining nut and push switch through panel.

Stop Light Switch Location: On brake master cylinder.

CIRCUIT BREAKER: 30 ampere. Thermal type on light switch.

FUSES: Directional Indicator - SFE-14 ampere in flasher lead.
Radio - SFE-9A ampere in lead to radio.
Heater - SFE-10 (FC-150,170), SFE-14 (Others).
Overdrive - SFE-20 at overdrive relay.

ENGINE

►*THREE DIFFERENT ENGINES USED: See "Model Identification" for application.*

4 CYL. "F" HEAD

Model	Bore	Stroke	Displacem nt
F4-134 (All)	3.125"	4.375"	134.2 cu. ins.

Model	Compr. Ratio	Rated HP	Developed HP
F4-134 4x2	7.4-1①	15.63	75 at 4000 RPM
F4-134Others	6.9-1②	15.63	72 at 4000 RPM

① - 7.8-1 Optl. ② - 7.4-1 Optl.

Compression & Vacuum Reading–See *"TUNE-UP" above.*

►*ENGINE NUMBER NOTE:* Letters following engine number denote the following:
"A" .010" main & connecting rod journals Undersize.
"B" .010" cylinder bore and pistons Oversize.
"AB" both above conditions exist.

CYLINDER HEAD & GASKET INSTALLATION: *See Willys Special Data.*

TIGHTENING TORQUES: *See Willys Special Data.*

PISTONS

Aluminum alloy, cam ground, T slot, Tin or Brass plated.

►*PISTON OVERSIZE NOTE:* Letter "B" or "AB" following engine number indicates that cylinder bore and pistons are .010" Oversize.
Weight–13.5 ozs.
Removal–Pistons & Rods removed from above.

Fitting New Pistons: Place .003" x 1/2" ribbon feeler between thrust side of piston and cylinder wall. Pull required to remove ribbon feeler should be 5 to 10 lbs.

Replacement Pistons: Std. and .010", .020", .030" and .040" Oversize.

Installing Pistons: "T" slot toward valve (left side) of engine (opposite side from oil spray hole in connecting rod lower end).

PISTON PINS

Locked in rod with clamp screw.
Diameter– .8118-.8120". **Length**–2-25/32".
Clearanc in Piston–.0002-.0004". Thumb push fit at 70° F.

Replacement Pins: No oversizes available.

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PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. #1	3/32"	.007-.017"	.002-.004"
Compr #2	3/32"	.007-.017"	.0015-.0035"
Oil	3/16"	.007-.017"	.001-.0025"

Replacement Rings: (For rebored cylinders)—Furnished .010", .020", .030" and .040" Oversize.

Service Type Rings—(For Cylinders not Rebored)—Furnished Std. (.000-.009"), .010" (.010-.019"), .020" (.020-.029"), .030" (.030-.039"), .040" (.040-.049") Oversize.

Installing Rings: Install compression rings with mark "Top" (on side) toward top. Rings have tapered face and must be installed correctly. Top ring inner bevel edge must be up.

CONNECTING RODS

Length (Center to Center) - 9.1845-9.1905. **Weight** - 32 ozs.

Crankpin Journal Diameter - 1.9375".

►*JOURNAL DIAMETER UNDERSIZE NOTE.* The letter "A" or "AB" following the engine number indicates that main and connecting rod journals are .010" Undersize.

Bearings—Steel backed babbitt.

Clearance - .0001-.0025"

Side Play - .004-.010"

Replacement Bearings: Std and .001", .002", .010", .012", .020", Undersize

Installing Rods: Lower bearing offset. Install rods with short side of bearing toward nearest main bearing or toward front of engine (#1, 3), and toward rear (#2, 4). Oil spray hole in lower rod bearing toward right of engine (away from camshaft) on all rods.

CRANKSHAFT

Journal Diameter—2.3341-2.3331". All main bearings.

►*JOURNAL DIAMETER UNDERSIZE NOTE.* The letter "A" or "AB" following engine number indicates that main and connecting rod journals are .010" Undersize.

Bearings—Steel backed babbitt.

Clearance—.0003-.0029".

Replacement Bearings: Std and .001", .002", .010", .012", .020", .030" Undersize

Crankshaft Servicing: *See "Crankshaft & Main Bearings" in Willys Special Data.*

End Thrust: Taken at #1 main bearing. Shims between crankshaft thrust washer and shoulder on the crank.

Endplay—.004-.006".

Crankshaft Rear Main Bearing Oil Seal: *See "Crankshaft & Main Bearings" in Willys Special Data.*

CAMSHAFT

Journal Diameters - (1) 2.1860-2.1855", (2) 2.1225-2.1215", (3) 2.0600-2.0590", (4) 1.6230-1.6225".

Journal Diameters—(1) 2.188" (2) 2-1/4", (3) 2-3/16", (4) 1-3/4".

Bearings—#1 steel backed babbitt. #2, 3 & 4 cast iron.

Clearance—.001-.0025".

End Thrust: Taken by thrust plate assembled behind gear. To reduce clearance, add shim behind spacer. To increase clearance, reduce thickness of spacer.

End Play—.004-.007".

Camshaft Servicing: *See "Camshaft & Bearings" in Willys Special Data.*

Timing Gears: Crankshaft gear, steel. Camshaft gear, fibre with steel hub.

Camshaft Setting: Mesh marked tooth of camshaft with marked space (between teeth).

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Willys Special Data.*

VALVES

Tappet Clearance: Intake .018", Exhaust .016" Cold.

Valve	Head Diameter	Stem Diameter	Length
Intake	2"	.3733-.3738"	4.781"
Exhaust	1-15/32"	.371-.372"	5.909"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	.260"	.0007-.0022"
Exhaust	45°	.351"	.0025-.0045"

►*EXHAUST VALVE NOTE* Thompson Valve Rotators used.

Valve Seat Width—3/64".

Valve Springs: Install with closed coil upward toward block (Exhaust), down towards head (Intake).

Free Length—1 31/32' (Intake), 2½" (Exhaust)

Valve Spring Specifications

Valve	Intake	Exhaust
Closed	73 lbs at 1 21/32"	53 lbs at 2 7/64"
Open	153 lbs at 1 13/32"	20 lbs at 1 3/4"

Valve Guides Use Tool W-177 to remove and install guides. Drive Exhaust guide down into valve compartment to remove. Drive new Exhaust guide to 1" below surface of cylinder block and new Intake guide flush with bottom of valve guide bore in cylinder head.

Rocker Arm Assembly Removal. *See "Valve System" in Willys Special Data.*

Valve Lifters Mushroom type operating in reamed holes in block. Serviced by installing oversize lifters. Lifters furnished .004" Oversize.

Diameter—.6240-.6245". **Clearance**—.0005-.002".

►*NOTE:* Camshaft must be removed for lifter removal.

VALVE TIMING

See "Camshaft Setting" under "CAMSHAFT" above.

Intake Valves—Open 9° BTDC. Close 50° ALDC.

Exhaust Valves—Open 47° BLDC. Close 12° ATDC.

Valve Timing Check—Set Intake valve clearance at .026". Rotate engine clockwise until No. 1 cylinder is ready for intake stroke. Intake opens 9° BTDC. Note the distance between TDC and the 5° mark and estimate 9° from this distance. With the crankshaft in this position timing is correct if lifter is just tight against valve stem.

ENGINE

4 CYL. "L" HEAD

Model	Bore	Stroke	Displacement
L4-134	3.125"	4.375"	134.2 cu. ins.
Model	**Compr. Ratio**	**Rated HP**	**Developed HP**
L4-134	6.48-1	15.63	60 at 4000 RPM

►*OTHER ENGINE DATA See "4 Cyl. "F" Head" above and note the following differences*

►*ENGINE NUMBER NOTE Letters stamped after engine number denote the following*

"A" - .010" undersize main & connecting rod bearings.
"B" - .010" oversize cylinder bore.
"AB" - Both above conditions exist.
"C" - .002" undersize piston pin.
"D" - .010" undersize main bearing journals only.
"E" - .010" undersize connecting rod bearing journals only

VALVES: Tappet Clearance - .016" Cold (Intake & Exhaust).

Valve	Head Diam.	Stem Diam.	Length
Intake	1 17/32"	.373"	5 51/64"
Exhaust	1 15/32"	.3715"	5 51/64"
Valve	**Seat Angle**	**Lift**	**Stem Clearance**
Intake	45°	3 51"	.0007-.0022"
Exhaust	45°	3 51"	.0025-.0045"

Valve Seat Width - 3/64".

Valve Springs: Free Length - 2½"

Valve Spring Specifications

Valve	Intake	Exhaust
Closed	53 lbs. at 2 7/64"	53 lbs. at 2 7/64"
Open	120 lbs. at 1 3/4"	120 lbs. at 1 3/4"

Valve Guides: Use W-177 to remove and install guides. Drive guides into valve compartment to remove. Drive new exhaust guide to 1" below surface of cylinder block and new intake guide 1 5/16" below surface of cylinder block.

Valve Timing Check: Set No. 1 cylinder intake valve tappet clearance to .020" for check. After check made, reset No. 1 cylinder intake valve tappet clearance to a running clearance of .016".

ENGINE

6 CYL. "L" HEAD

Model	Bore	Stroke	Displacement
L6-226	3.3125"	4.375"	226.2 cu. ins.
Model	**Compr. Ratio**	**Rated HP**	**Developed HP**
L6-226	6.86-1③	26.33	105 at 3600 RPM

③ - 7.3-1 Optl.

Compression & Vacuum Reading—*See TUNE-UP above.*

►*ENGINE NUMBER NOTE.* Letters following engine number denote the following

"A" .010" Undersize main and connecting rod journals.
"B" .010" Oversize cylinder bore and pistons.
"AB" Both above conditions exist.

CYLINDER HEAD & GASKET INSTALLATION: *See "Cylinder Head & Manifolds" in Willys Special Data*

TIGHTENING TORQUES: *See "Tightening Specifications" in Willys Special Data*

►*FILLER BLOCK-OIL PAN OIL SEAL PRODUCTION CHANGE (To Prevent Oil Leakage Between Filler Block & Oil Pan)* Neoprene oil seal, Part No. 910220, was placed in early production and is available for installation on earlier models. Replaces earlier type cork seal. To install new seal, coat inner surfaces of filler block grooves with gasket cement. Install gaskets in grooves evenly centered so each end extends 1/16" above faces of filler block ends. Do not trim off ends. Install filler blocks, dust gaskets with graphite and install oil pan.

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PISTONS

Aluminum alloy, steel band, T-slot Cam Ground. Tin Plated.

►*PISTON OVERSIZE NOTE* Letter "B" or "AB" following engine number indicates that cylinder bore and pistons are .010" Oversize.

Weight–15.312 ozs. Less rings and pin.

Removal–Pistons and rods removed from above.

Fitting New Pistons Place .0015" x 2" ribbon feeler between thrust side of piston and cylinder wall. Pull required to remove feeler should be 5 to 10 lbs.

Piston Replacement–Std., .010", .020", .025 .030", 040", 050", and 060" Oversize

Installing Pistons Slot in skirt toward left or away from camshaft.

PISTON PINS

Floating type with lock ring at each end.

Diameter - 8591-.8593". **Length** - 2 779"

Clearance in Piston - 0002" Selective fit. Push fit at 160°F.

Clearance in Rod - 0002-.0006". Press fit.

Replacement Pins Std., .003" and .005" Oversize.

PISTON RINGS

Ring	Width	End Gap	Side Clearance
Compr. (Upper)	.0930- 0935"	.008-.016"	.002-.004"
Compr. (Lower)	.0930- 0935"	.008-.016"	.003-.007"
Oil (Top ring)	1545- 1550"	.008-.016"	.006-.010"
Oil (Bottom ring	1545-.1550"	.008-.016"	.0025-.004"

Replacement Rings. Ring sets and single rings furnished in following sizes for oversize ranges indicated Std. (Std.-.009"), .020" (.010-.029"), .030" (.030-.039"), .040" (.040-.049"), .060" (.050-.069").

Installing Rings Side marked "Top" (compression rings) upward. Chrome plated ring must be installed in top (#1) ring groove.

CONNECTING RODS

Length–6.998"- 7.002" (Center to center).

Crankpin Journal Diameter–2.0619- 2.0627".

►*JOURNAL DIAMETER UNDERSIZE NOTE* The letter "A" or "AB" following engine number indicates that the main and connecting rod journals are .010" Undersize.

Bearings–Steel Backed Babbitt.

Clearance - .0018" maximum. **Sideplay** - .006- 011".

Replacement Bearings Std. and .001", .002", .010" and .012" Undersize.

Installing Rods Mark rods and bearing caps. Install with marks together and toward camshaft in same order as when removed. Oil spray hole in lower end of rod toward camshaft. *NOTE*–Lower bearings offset with narrow side of rod toward nearest main bearing (#1, 3, 5 forward), (#2, 4, 6 toward rear).

CRANKSHAFT

Journal Diameter–2.3744-2.3752".

►*JOURNAL DIAMETER UNDERSIZE NOTE* The letter "A" or "AB" following the engine number indicates that the main and connecting rod journals are .010" Undersize.

Bearings–Steel Backed Babbitt.

Clearance - 0007- 0020"

Replacement Bearings Std. and .001", .002", 010" and .012" Undersize.

End Thrust Taken by #4 rear main bearing which is flanged type.

End Play– 002-.006".

Rear Bearing Oil Seal Installation *See "Crankshaft and Main Bearings" in Willys Special Data.*

CAMSHAFT

Journal Diameters–(1) 1.8725-1.8735". (2) 1.8095-1.8105". (3) 1.7472-1.7485". (4) 1.2475-1.2485".

Bearings–Steel Backed Babbitt.

Clearance–.001-.003".

End Thrust Taken by thrust plate on front of engine (between front bearing journal and hub of sprocket)

End Play–.003-.007".

Camshaft Servicing: *See "Camshaft & Bearings" in Willys Special Data*

Timing Chain Non-adjustable type. Width 1". Pitch .500". Length 23" or 46 links.

►*TIMING CHAIN CAUTION Morse and Link Belt chains used. Chains and sprocket interchangeable only in COMPLETE SETS*

Camshaft Setting Mesh chain with 9 links (or 10 link pins inclusive of pins opposite marks) between marks on sprockets with #6 piston at top dead center on compression stroke.

Engine Front Cover Oil Seal (Crankshaft Front Seal): *See "Engine Front Cover" in Willys Special Data*

VALVES

Tappet Clearance: Intake and Exhaust .014" Cold.

►*TAPPET CLEARANCE ADJUSTMENT PROCEDURE: See "Valve System" in Willys Special Data*

Valve	Head Diam.	Stem Diam.	Length
Intake	1 520"	3402-.3410"	5.187"
Exhaust	1.328"	.3382- 3390"	5 205 '

Valve	Seat Angle	Lift	Stem Clearance
Intake	30°	284"	001- 003"
Exhaust	45°	284"	0032- 0050"

Valve Seat Width- 5/64-3/32" (intake), 3/32-7/64" (exhaust).

NOTE–Rotators used on Exhaust valves.

Valve Guides: Pressed in block. Replace when stem clearance exceeds maximum (above). Ream new guides to inside diameter of 3432-3422".

Replacement Guides–Std., .0005" (marked "A"), .0055" (marked "L") to insure .0005-.003" press fit.

Guide Installation–Place guide (tapered end of guide toward top) in position in bore and drive in to correct position of 1-7/32" below top face of cylinder block.

Valve Springs: Intake & Exhaust valve spring interchangeable

Free Length–1-31/32".

Valve Spring Specifications

Valve	Lbs. Press.	Length
Closed	51	1.672'
Open	118	1.312

Valve Lifters: Mushroom type with self locking adjusting screws.

Diameter–.6855-.6860".

Clearance–Selective fit. Lifter should rotate in bore with slight drag. Service by installing oversize lifter.

Replacement Lifters–Furnished in Std. and the following oversizes marked as indicated "B" is .001", "D" is .002", and "K" is .005" O.S.

VALVE TIMING

See "Camshaft Setting" under CAMSHAFT above

►*VALVE TIMING NOTE:* Specifications are with tappet clearance as follows Intake 018", Exhaust 020"

Intake Valves - Open 2° BTDC Close 42° ALDC

Exhaust Valves - Open 42° BLDC Close 8° ATDC

OILING SYSTEM

Crankcase Capacity: (4 Cyl) 4 qts, (6 Cyl) 5 qts (refill)

Normal Oil Pressure: 35 lbs at 2000 RPM (4 Cyl), 1700 RPM (6 Cyl)

Pressure Regulator - In pump housing (4 Cyl), right side of cylinder block below valve chamber to rear of engine (6 Cyl)

Oil Pressure Indicator: Red telltale light in Instrument Cluster operated by Oil Pressure Switch Light comes on when Ignition Switch turned on and goes out when oil pressure reaches 6 lbs

Oil Pump: Rotor type on left side of engine (4 Cyl), gear type attached to rear intermediate main bearing (6 Cyl)

Pump Overhaul - *See "Oiling System" in Willys Special Data*

Oil Filter: Located on bracket attached to cylinder head (4 Cyl) On bracket on left side of cylinder head (6 Cyl)

Crankcase Ventilation: (4 Cyl) See Crankcase Ventilator above (Others) Filter in oil filler cap and outlet tube from crankcase ventilator baffle on valve side cover

COOLING

Water Capacity: (FC-150) 10 qts (FC-170) 11 qts (Other 4 Cyl) 11 qts (Other 6 Cyl) 12 qts Add 1 qt for heater

Pressure Valve: (FC-150 170) 9 lbs (Other 4 & 6 Cyl) 7 lbs Radiator filler cap

Thermostat: Harrison In water outlet elbow in cylinder head Opens at 163-168°F

Water Pump: Centrifugal packless ball bearing type *See "Willys" in Water Pump Section*

►*FC-150 FAN PULLEY NOTE.* Install fan pulleys on both water pump and fan shaft assemblies with offset to front of engine to eliminate interference with generator pulley Adjust fan belt to ¼-½" deflection with light thumb pressure by pulling shaft housing to right side of frame

Temperature Gauge: King-Seeley "CV" (Constant Voltage) type FC-170 has Voltage Regulation contained within Gauge Other models have separate Voltage Regulator

See "Temperature Gauges" in Miscellaneous Section

CLUTCH

Auburn 8501-39, Rockford 8½ RM, Borg & Beck 9A7 & 10A7. Single plate types Used as follows

4 Cyl. (All) - Auburn 8501-39 or Rockford 8½ RM 8½"

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6 Cyl. Utility (4x2) - Borg & Beck 9A7, Assy No 951
6 Cyl. Utility (4x4) & Trucks (4WD) - Borg & Beck 10A7, Assy No 360982
See Clutch Section for complete data
Clutch Disc - (4 Cyl) B & B No 382298, (6 Cyl 4x2) B & B No 381929, (6 Cyl 4x4 & 4WD) B & B No 381806
Pedal Adjustment: 4 Cyl. (Exc. Trks. & Sta. Wgns.). 1½" pedal freeplay To adjust freeplay, loosen yoke locknut on cable between throwout lever and cross shaft lever and turn cable
4 Cyl. (Trks. & Sta. Wgns. exc. FC-150) - 1½" pedal freeplay To adjust, loosen locknut on adjusting rod (between clutch control lever and clutch control tube lever) and turn adjusting nut to increase or decrease rod length
6-226 Models (Exc. 4x2 and FC-170) - 1" pedal freeplay To adjust, loosen locknuts on pedal adjusting rod, turn nuts forward to increase or backward to decrease freeplay
6-226 (4x2) - 5/8-3/4" pedal freeplay Adjustment same as other 6-226 models
FC-150 & FC-170 - ½" pedal freeplay To adjust loosen locknut on cable between clutch pedal and cross shaft lever and adjust length of cable

► *FC-150 CLUTCH PEDAL MODIFICATION:* Late model FC-150 clutch pedals have approximately ¼" stock at extreme upper end which contacts pedal stop On pedals with ½" stock at this point grind off ¼" of stock to give pedal longer stroke to insure adequate clutch plate separation Reset cable length to obtain correct pedal freeplay *NOTE* - To remove lever, loosen left headlight and move forward Separate heater blower wire if necessary Remove lever assembly from bracket and cable from lever

SYNCHRO-MESH TRANSMISSION

4 WHEEL DRIVE

Warner. Three speed type Constant mesh synchro-mesh, helical gears (second and high), sliding spur gear (low and reverse) Used as follows

Model	Warner No.
Jeep	T90C
F4-134	T90C
6-226	T90J
FC-150 (3-speed)	T90A
FC-170 (3-speed)	T90J

NOTE - 4-speed Optional on FC-150 & FC-170

See "Warner Transmission" in Transmission Section

► *TRANSFER CASE SHIFT LINKAGE CAUTION (FC-150).* Attach linkage lever to outer hole (two in shift rod nearest transmission), to eliminate hard transfer case shifting For correct linkage adjustment, *See "Transfer Case" in Transmission Section*

► *TRANSFER CASE OPERATING LEVER VIBRATION ON ACCELERATION OR DECELERATION CORRECTION:* When light hand pressure (either forward or backward) minimizes vibration, insulate transfer case lever shaft brackets from body panel *See "Transmission Notes" in Willys Special Data*

► *TRANSFER CASE OUTFUT SHAFT OIL LEAKAGE CORRECTION.* Install additional seal Part No 811687 on both ends of output shaft in addition to standard seal, seal guard, and seal retainer New seal goes between seal retainer and seal guard

► *FOUR SPEED TRANSMISSION LUBRICATION CAUTION.* Since there is no passage between 4-speed transmission and transfer case it is necessary to check fluid level at both transmission and transfer case fill points Fluid capacity is 4-Speed Transmission - 6¾ pints Transfer Case - 3½ pints

Transfer Case: Spicer Model 18. Two speed auxiliary transmission and front wheel drive unit mounted on rear of transmission case. Separate control levers provided for Low-High range (right hand lever), and front wheel drive engagement (left hand lever).

See Transmission Section for complete data.

Transmission Controls: *See "Transmission Controls" in Transmission Section.*

Removal: (4 Whl. Drive) Transmission and transfer case are removed as an assembly. Disconnect front and rear propeller shafts at universal joints *(NOTE*–If equipped with Power Take-off drive, remove front end of power take-off propeller shaft assembly). Disconnect speedometer cable at transfer case, brake cable, and clutch release cable at cross shaft bell crank (Jeep), Place support jacks under engine and transmission, remove transfer case rubber snubber bolt nut (on right side) and rear mounting bolt nuts at cross member under transmission case. Remove floor board inspection plate. Drain radiator and loosen upper radiator hose. Remove transfer case shift lever pivot pin screw, remove pin and shift levers *(NOTE*–If Power Take-off used, remove power take-off shift lever plate screws and lift lever out). Remove bolts holding center cross-member at frame side rails and remove cross-member *(CAUTION* -With cross-member removed, engine and transmission weight will rest on support jacks). Remove bolts holding transmission on bell housing, force transmission to right until ball stud end can be disengaged from end of clutch control cross shaft. Lower support jacks under engine and transmission and slide transmission and transfer case assembly to rear until clutch shaft clears bell housing, remove assembly from beneath car.

2 WHEEL DRIVE

Warner. Three speed type Constant mesh synchro-mesh, helical gear (second & high) sliding spur gear (low & reverse) Used as follows

Model	Warner Type
Jeep Dispatcher	T90
F4-134	T96
6-226	T86

See "Warner Transmissions" in Transmission Section

► *HARD SHIFTING, SHIFTING INTO TWO GEARS OR JUMPING OUT OF GEAR CORRECTIONS* For trouble shooting above difficulties on 2-wheel drive models *See "Transmission Notes" in Willys Special Data*

Transmission Control: Remote control type with gear-shift lever on steering column. *See "Transmission Controls" in Transmission Section.*

Removal: (2 Whl. Drive) Remove floor boards, take off bell housing inspection cover, disconnect clutch throw-out bearing retracting spring. Disconnect transmission control rods and speedometer cable at transmission case. Disconnect propeller shaft at universal joints and remove shaft. Support engine with jack placed under bell housing, remove rear engine support bolts from cross-member under transmission case, raise rear end of engine so transmission clears cross-member *(CAUTION* –Use care that fan blades do not damage radiator). Remove transmission bell housing bolts, pull transmission straight back to clear clutch shaft, remove from car.

OVERDRIVE

Warner R10. *See "Warner R10" in Transmission Section.*

Overdrive Control: *See "Warner R10 & R11 Overdrive Controls" in Transmission Section.*

Removal: Same as for Synchro-mesh Transmission (2 Wheel Drive above) after disconnecting control cable and wiring.

UNIVERSALS

2 WHEEL DRIVE

Spicer. Cross type. One at each end of propeller shaft.

4 WHEEL DRIVE

Drive Shaft Joints - Spicer. Cross type. One used at front and rear of both front and rear propeller shafts.
Front Axle Shaft Joints - Rzppa. Constant velocity type. One joint used at outer end of each shaft (within steering knuckle housing).
Power Take-off Shaft Joints - Detroit Ball-and-Trunnion type. Two used (one at each end of shaft - no splined joint used).

FRONT AXLE

4 WHEEL DRIVE

Spicer Model 44(FC-170), Model 25(All Others). Full floating Hypoid gear type Differential assembly (ring and pinion gear assembly) is serviced in same manner as Spicer Rear Axles
See "Spicer" in Rear Axle Section
Ratio - (F-134, FC-150) 5 38-1, 6-226 (4x4) 4 27-1, (4WD & FC-170) 4 88-1 *NOTE* - FC-170 Optional Ratios - 4 27-1, 5 38-1

Removal: Support front end of car securely with a chain hoist, remove front wheels. Disconnect front shock absorbers, front brake line (at frame connection), and steering linkage (at idler lever on frame front cross member). Disconnect propeller shaft by removing universal joint "U" bolts at axle end of shaft. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring center clip "U" bolts, remove bolts at rear end of springs and lower springs, remove axle assembly from beneath car.

Axle Shaft & Universal Joint Assy. Removal: Remove wheel, hub cap, axle shaft nut and washer. Take out drive flange cap screws and remove flange with puller, *(CAUTION*–do not lose shim pack under drive flange). Bend lip of bearing adjusting nut lockwasher out, remove locknut, lockwasher, adjusting nut, and bearing locking washer. Remove wheel hub and bearing assembly.(*(CAUTION*–use care not to damage oil seal). Disconnect brake tube, take out mounting screws on

CONTINUED ON NEXT PAGE

CONTINUED FROM PRECEDING PAGE

backing plate, remove backing plate and wheel spindle. Pull axle shaft and universal joint assembly out of housing.

►*INSTALLATION CAUTION:* Adjust front wheel bearings and bleed brakes after installation completed.

Wheel Bearing Adjustment: Tighten inner adjusting nut until wheel binds (turn wheel while adjusting), then back nut off 1/6 turn, install lockwasher, locknut, and make certain nut locked by turning lockwasher ear up.

Axle Shaft End Play—No adjustment. Shims (.060") between driving flange and wheel hub establish correct endplay.

REAR AXLE

Spicer. Hypoid Semi-floating with Hotchkiss drive For Model application see below.

Model	Spicer No.
DJ-3A	25
F4-134 & 6-226 (4x4), FC-170	53
All Other Models	44

See "Spicer Hypoid Semi-floating" in Rear Axle Section

►*"POWER-LOK" DIFFERENTIAL.* Optl equipment Can be installed on vehicles not so equipped (Axle shafts must be replaced if they do not have involute splines) *See "Spicer Power-Lock Differential" in Rear Axle Section.*

►*POWER-LOK DIFFERENTIAL CAUTION DO NOT use the engine to spin a rear wheel with one wheel raised off the ground Always remove rear wheels when balancing them*

►*AXLE SHAFT GREASE RETAINER PRODUCTION CHANGE* Use only new axle shaft grease retainer Part No 914802 to correct grease leaks at axle shaft grease retainer

►*RING GEAR BOLT LOCKING STRAP NOTE.* Replace drive gear screws and install locking straps when overhauling early production ring gear assemblies Late type have locking straps

	Axle Ratios	
Model	Std.	Optl.
F-134 (4x4,4WD)	5 38-1	
F-134 (4x2)	4 89-1	5 38-1
DJ-3A	4 56-1	
FC-150	5 38-1	
6-226 (4x4, 4x2) Ⓒ	4 27-1	4 89-1 or 5 38-1
6-226 (4WD), FC-170	4 88-1	4 27-1 or 5 38-1

Ⓒ - With Overdrive 4 89-1 (Std) 5 38-1 (Optl)

Rear Axle Assembly Removal: Support rear end of car securely, remove rear wheels, disconnect rear shock absorbers, rear brake line (at frame connection on right side), rear brake cables, and propeller shaft at rear universal joint. Place support jacks under axle housing so that springs relieved of weight, remove nuts on spring "U" bolts, remove pivot bolt at front end of springs, lower springs. Remove axle assembly from beneath car.

Wheel Bearing Adjustment: End Play .003-.007". Adjust by adding or removing shims between backing plate and axle housing flange at each wheel. See "Axle Shaft Removal" above.

SHOCK ABSORBERS

Monroe or Gabriel. Direct acting type.

FRONT SUSPENSION

2 WHEEL DRIVE

Conventional I-Beam with Reverse-Elliot ends and semi-elliptical springs
Kingpin Inclination - 7°30'
Caster - 3° **Camber** - 1°
Toe-In - 047- 094"
Toe-Out on Turns -Outer wheel 20°, Inner wheel should be 21°45'

4 WHEEL DRIVE

Special front wheel drive unit with semi-elliptical springs Steering knuckle mounted on taper roller bearings carried on two stub shafts
End Play - 001- 003"
Kingpin Inclination - 7½°
Caster - 3° **Camber** - 1½°
Toe-In - 047- 094"
Toe-Out on Turns -Outer wheel 20° Inner wheel should be 20° (Exc Jeep), Jeep 19½°

►*OTHER DATA See "Front Axle" in Willys Special Data*

STEERING

Ross. Cam and Twin Lever type
See "Ross Cam & Twin Lever" in Steering Section
Steering Linkage: *See "Steering Linkage" in Steering Section*
Steering Wheel & Horn Button Removal: *See "Ross Cam & Twin Lever" in Steering Section*
Steering Gear Removal: *See "Ross Cam & Twin Lever" in Steering Section*

BRAKES

Bendix-Lockheed (Self-Centering). Hand brake applies rear service brakes (Exc Univ Jeep) Independent brake on drive shaft at rear of transfer case (Univ Jeep)
NOTE - Drive shaft brake optional on FC-150
See "Bendix-Lockheed (Self-Centering)" in Brake Section

►*FC-150 HAND BRAKE BRACKET BREAKAGE CORRECTION* Reweld bracket to Rail Reinforcement Assembly then weld an additional reinforcement bracket between top of mounting bracket and Rail Reinforcement Assembly

Drums - 9" (CJ-3B 5,6; DJ-3A), 11" (Others) front and rear
Wheel Cyl. Diameter - Application as follows:

Model	Front	Rear
CJ-3B 5,6,	1"	3/4"
DJ-3A	1 1/8"	13/16"
Others	1 1/8"	1"

Lining Length & Width

Model	Primary	Secondary
CJ-3B 5 6	10 7 32" x 1 3/4"	6 39 64" x 1 3/4"
DJ-3A	9 7 8" x 2"	7 11/16" x 1 3/4"
Others	12 1/4" x 2"	10 1/32" x 2"

Thickness - 206- 216" (CJ-3B 5 6); 214" (DJ-3A); 212" (Others)
Braking Power - Front 65% Rear 35% (CJ-3B 5,6,DJ-3A); Front 57% Rear 43% (Others)
Clearance - Turn eccentric until shoe contacts drum then back off until wheel turns freely
Power Brake: Hydrovac Power Unit Used with standard master cylinder
See "Hydrovac Power Unit" in Brake Section
Parking Brake (Independent Type): Be certain hand brake cable and linkage operate freely Lubricate if sticking or binding is evident Place brake handle on instrument panel to "OFF" position Rotate brake drum until one pair of adjusting holes (three pairs located on back face of drum) is opposite the adjusting screws (notched wheels) within the brake Insert a screwdriver or adjusting tool through hole and turn each adjusting screw equally until the brake shoes are snug against drum (*NOTE* - With tool against edge of hole as a fulcrum, move outer end of tool out away from center of drive-shaft to expand shoes) **Back off each adjusting screw 7 notches** to provide correct shoe clearance

MISC. MECHANICAL

Windshield Wipers: Vacuum type
(Univ. Jeep) - Individual motors operate wiper arms direct
(Other Models) - Single motor operates wiper arms by cable control
See "Windshield Wipers" in Miscellaneous Section

1957 CARBURETOR CAR APPLICATION INDEX

Car Model		Carbur tor & Mod l	Page
BUICK			
1957	Series 40	Stromberg WW (2-barrel)	270
		Carter WGD (2-barrel)	235
1957	Series 50, 60, 70	Rochester 4GC (4-barrel)	260
		Carter AFB (4-barrel)	229
CADILLAC			
1957	Std. Engine	Rochester 4GC (4-barrel)	216
		Carter WCFB (4-barrel)	216
		Carter AFB (4-barrel)	216
1957	Eldorado Engine	Carter WCFB (2 Carbs.)	216
CHEVROLET CARS			
1957	6 Cyl.	Rochester BC (1-barrel)	266
1957	V8 (Std. Engine)	Rochester 2GC (2-barrel)	264
1957	V8 (Corvette Engine)	Rochester 4GC (4-barrel)	260
		Carter WCFB (4-barrel)	221
1957	Corvette	Carter WCFB (2 Carbs.)	221
		Rochester "Ramjet" Fuel Inj.	212
CHEVROLET TRUCKS			
1957	6 Cyl. (Exc.Fwd.Cont.)	Rochester B & BC (1-barrel)	266
1957	6 Cyl. (Forward Control)	Carter BB (Updraft)	240
1957	V8	Rochester 2G (2-barrel)	264
		Rochester 4G (4-barrel)	260
CHRYSLER & IMPERIAL			
1957	C-75-1	Carter BBD (2-barrel)	245
1957	C-75-2,C-76,IM-1,2,4	Carter WCFB (4-barrel)	221
		Carter AFB (4-barrel)	229
1957	C-76-300	Carter WCFB (2 Carbs.)	221
DE SOTO			
1957	S-25	Carter BBD (2-barrel)	245
		Carter WCFB (4-barrel)	221
1957	S-26	Carter WCFB (4-barrel)	221
1957	S-26 (Adventurer)	Carter WCFB (2 Carbs.)	221
1957	S-27	Stromberg WW (2-barrel)	272
		Carter WCFB (4-barrel)	221
1957	"Cross-Over" Choke		244
DODGE			
1957	6 Cyl.	Stromberg WW (2-barrel)	272
1957	V8	Stromberg WW (2-barrel)	272
		Carter WCFB (4-barrel)	221
1957	V8 (D-500-1)	Carter WCFB (2 Carbs.)	221
1957	"Cross-Over" Choke		244
FORD CARS			
1957	6 Cyl.	Holley "Visi-Flo" (1-barrel)	248
1957	V8	Ford 2 & 4-Barrel	252
		Holley 2 & 4-Barrel	256
		Carter AFB (4-barrel)	229
		Holley (Ford) 4-Bbl. (Schgd.) Pg. 268 in 1956 Annual Data	
		McCulloch Supercharger	279
		Holley (Ford) 4-Bbl. (2 Carbs.) Pg. 268 in 1956 Annual Data	
FORD TRUCKS			
1957	6 Cyl.	Holley "Visi-Flo" (1-barrel)	248
1957	V8	Holley (Ford) 2-Barrel	250
		Holley 2 & 4-Barrel	256
HUDSON			
1957	Hornet V8	Carter WCFB (4-barrel)	221
LINCOLN & CONTINENTAL			
1957	All	Carter WCFB (4-barrel)	221
MERCURY			
1957	312" Engine	Holley 4-Barrel	256
		Carter AFB (4-barrel)	229
1957	368" Engine	Carter WCFB (4-barrel)	221

Car Model		Carburetor & Model	Page
METROPOLITAN			
1957	All	Zenith (1-barrel) Pg. 293 in 1956 Annual Data	
NASH			
1957	Ambassador V8	Carter WCFB (4-barrel)	221
OLDSMOBILE			
1957	All Series	Rochester 4GC (4-barrel)	260
1957	Triple Carburetors	Rochester 2G & 2GC (2-barrel)	219
PACKARD			
1957	Clipper	Stromberg WW (2-barrel,Schgd.)	277
		McCulloch Supercharger	279
PLYMOUTH			
1957	6 Cyl.	Carter BBS (1-barrel)	242
1957	V8	Carter BBD (2-barrel)	245
		Stromberg WW (2-barrel)	272
		Carter WCFB (4-barrel)	221
1957	V8 "Fury"	Carter WCFB (2 Carbs.)	221
1957	"Cross-Over" Choke		244
PONTIAC			
1957	Chieftain	Rochester 2GC (2-barrel)	264
1957	Super & Star Chief	Rochester 4GC (4-barrel)	260
		Carter AFB (4-barrel)	229
1957	Triple Carburetors	Rochester 2G & 2GC (2-barrel)	220
1957	Fuel Injection	Rochester "Ramjet"	212
RAMBLER			
1957	6 Cyl.	Carter AS (1-barrel)	239
		Carter WCD (2-barrel)	233
1957	V8	Carter WGD (2-barrel)	235
		Carter WCFB (4-barrel)	221
1957	V8 "Rebel"	Carter WCFB (4-barrel)	221
		Bendix "Electrojecter"(Fuel Inj.)	214
STUDEBAKER			
1957	Champion	Carter WE (1-barrel)	237
1957	Scotsman	Carter BBR1 (1-barrel)	241
1957	Commander & President	Stromberg WW (2-barrel)	276
		Carter WCFB (4-barrel)	221
1957	Golden Hawk	Stromberg WW (2-barrel,Schgd.)	277
		McCulloch Supercharger	279
WILLYS			
1957	All Models	Carter YF (1-barrel)	238

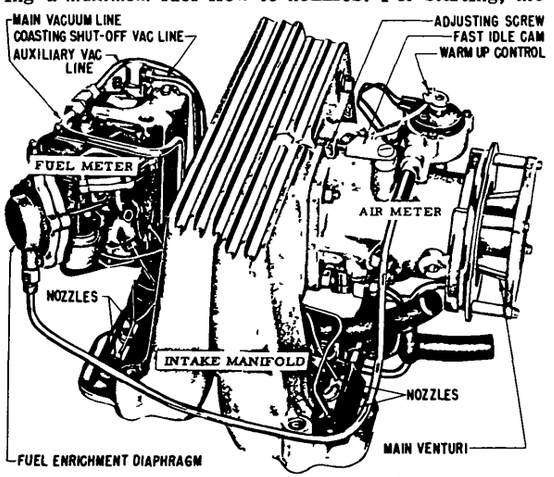
Carburetor	CARBURETOR JET SPECIFICATIONS	Page
CARTER Single & Dual Carburetor Jets		240
CARTER AFB 4-Barrel Carburetor Jets		233
CARTER WCFB 4-Barrel Carburetor Jets		227,8
CARTER BB Updraft Carburetor Jets		240
CARTER BBD Carburetor Jets		247
CARTER BBS Carburetor Jets		244
CARTER BBR1 Carburetor Jets		241
FORD 2 & 4-Barrel Carburetor Jets		251
HOLLEY (FORD) Single & Dual Carburetor Jets		249
HOLLEY 2 & 4-Barrel Carburetor Jets		255
HOLLEY (FORD) 4-Barrel Carbur tor Jets		259
ROCHESTER Single & Dual Carbur tor Jets		269
ROCHESTER 4-Barr l Carbur t r J ts		268
STROMBERG WW Carbur tor Jets		275
ZENITH Carburetor J ts	See Pg. 293 in 1956 Annual Data	

ROCHESTER "RAMJET" FUEL INJECTION

Ch vr l t C rv tte & Pontiac Bonneville (1957)

DESCRIPTION: This fuel injection system is the "continuous flow" type in which fuel is sprayed through calibrated nozzles adjacent to each intake port. At this point it is combined with air (in proper ratio) from intake manifold. An "air meter" containing a throttle valve and a venturi controls the amount of air admitted to the intake manifold and provides the necessary vacuum for fuel control under various operating conditions. A "fuel meter" containing a fuel reservoir, high pressure pump, and fuel controls, governs the amount of fuel required according to load and speed. Auxiliary controls for fuel cut-off during deceleration and for engine starting are also contained in the fuel meter.

Fuel Supply & R gulation: Fuel is supplied to reservoir in fuel meter by a conventional type fuel pump, and fuel level is maintained in reservoir by a float system similar to that used in conventional carburetors. The high pressure pump is externally driven by a cable from ignition distributor, and feeds fuel under high pressure to the fuel control valve. Incoming fuel passes through a filter screen and passes upward through center of fuel control valve where it lifts a ball check and passes through a series of small holes into main metering chamber. At this point the fuel passes through small holes into fuel distributor tubes or it flows upward and out the spill ports, depending on engine requirements. The position of the spill plunger determines how much fuel is spilled back to the reservoir or diverted to fuel nozzles. The spill plunger position is determined by fuel pressure from below balanced against the force of the control lever from above. For low fuel flow, the spill plunger is in its raised position so that all spill ports are uncovered allowing a **minimum** fuel flow to nozzles. For high fuel flow, the plunger is in its lowest position which shuts off all spill and raises pressure in metering chamber, allowing a **maximum** fuel flow to nozzles. For starting, the fuel valve is mechanically forced off its seat so that fuel can by-pass the ball check and flow directly to nozzles. With valve off its seat, a fuel by-pass passage is uncovered which admits fuel from fuel inlet at supply pump pressure to help supply sufficient fuel for engine at cranking speed.



R CHESTER "RAMJET" FUEL INJECTION INSTALLATION N ENGINE

Fuel Control Linkage: The correct metering of fuel for a given air flow is accomplished by the main control diaphragm and linkage as follows: A fuel control diaphragm operating on venturi vacuum and linked to the fuel control linkage moves upward with increased vacuum and acts on the linkage to force the spill plunger downward. As the plunger is forced down, the amount of spill is reduced and the fuel flow to nozzles is increased (the spill plunger will come to rest at a point where fuel pressure and lever force are in balance). The system is calibrated so that for a given air flow, venturi vacuum will move diaphragm and linkage so the right amount of spill is allowed for proper fuel pressure and flow to nozzles.

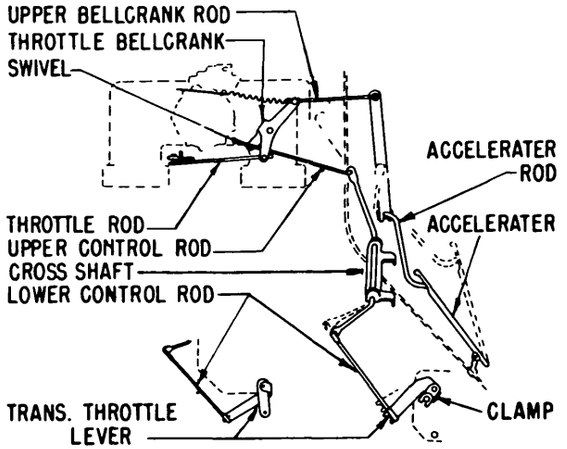
Mixture Control: For starting, warmup, and power, mixture control is accomplished by changing the pivot point of the fuel control lever which in turn changes the effect of the main control diaphragm on the spill plunger. A ratio lever located between main control diaphragm link and spill plunger can be rotated by the enrichment diaphragm to change the pivot point. With ratio lever moved to extreme left side (no vacuum in enrichment diaphragm), the main control diaphragm will depress spill plunger and allow maximum fuel to be delivered to nozzles. As vacuum in the venturi increases, the ratio lever moves to right side allowing spill plunger to rise and uncover spill ports resulting in less fuel to nozzles. For normal driving, the ratio lever is maintained in its extreme right position.

Nozzle Operation: Fuel is fed from fuel meter through fuel distributors to eight nozzles which are a factory matched set. Fuel is metered by the nozzle orifice and is sprayed across an air duct through a larger hole directly into intake manifold just outside the intake valve. An air duct in the nozzle allows fuel to be discharged to atmospheric pressure which allows better fuel control. Fuel is delivered continuously so that a full charge is ready whenever intake valve is open.

Air Flow & Control Syste: Air flow is controlled by the accelerator which opens and closes a throttle valve located in the air meter assembly which is attached to intake manifold. A cone shaped diffuser fits in place in main bore of air meter, forming a venturi at the point where air enters air meter. Air flow at the venturi creates a vacuum that is used to control the main control diaphragm and the fuel meter so that a proper amount of fuel can be fed in correct ratio to the air which is flowing.

OPERATION: The fuel injection system operates under various engine conditions as follows:

Idle Air Flow: During idle operation, the throttle valve is completely closed against bore of air meter and air is introduced to intake manifold through a by-pass system. Air taken into the by-pass system above the throttle valve is directed through a passage to a point below the throttle valve. An idle air screw at this point regulates the amount of air allowed through the by-pass system and controls engine idle speed. In addition to idle air taken in through the air meter, a portion of air for idle is also taken in through each of the eight fuel nozzles air ducts.



TURBOGLIDE POWERGLIDE
CHEVROLET TRANSMISSION THROTTLE LINKAGE WITH FUEL INJECTION

Idle Fuel Control: Since the venturi vacuum is light at idle speed and a higher vacuum is required to provide a richer mixture, the venturi vacuum is strengthened by the addition of a regulated amount of manifold vacuum. Vacuum is supplied to this system at idle needle valve hole and can be controlled by the idle needle. This auxiliary vacuum is transmitted to a "T" at the main control diaphragm where it passes a restriction and combines with main venturi vacuum to operate the main control diaphragm. As the throttle valve is opened, vacuum is introduced to the system through the off-idle port and, at this point, the vacuum is controlled by the restriction in the tube. As the throttle valve continues to open, auxiliary vacuum decreases and the main venturi vacuum operates the diaphragm.

Acceleration: The extra charge of fuel required for acceleration is obtained as follows: As the throttle valve is opened for acceleration, the air flow and the main venturi vacuum increase immediately. Because of the throttle valve opening, vacuum on the auxiliary vacuum system decreases but the decrease is delayed by the restriction in the vacuum line; so, for a short period, a very high vacuum is maintained at the control diaphragm, resulting in an extra charge of fuel for acceleration.

Power: For power operation, the ratio lever in the fuel control linkage is moved to its rich position by means of a vacuum diaphragm which is connected to manifold vacuum. When manifold vacuum is high and lean mixtures can be used, the diaphragm is held in a lean position. When power is required and engine vacuum drops, a calibrated spring moves the diaphragm to the rich position and holds it there until manifold vacuum rises.

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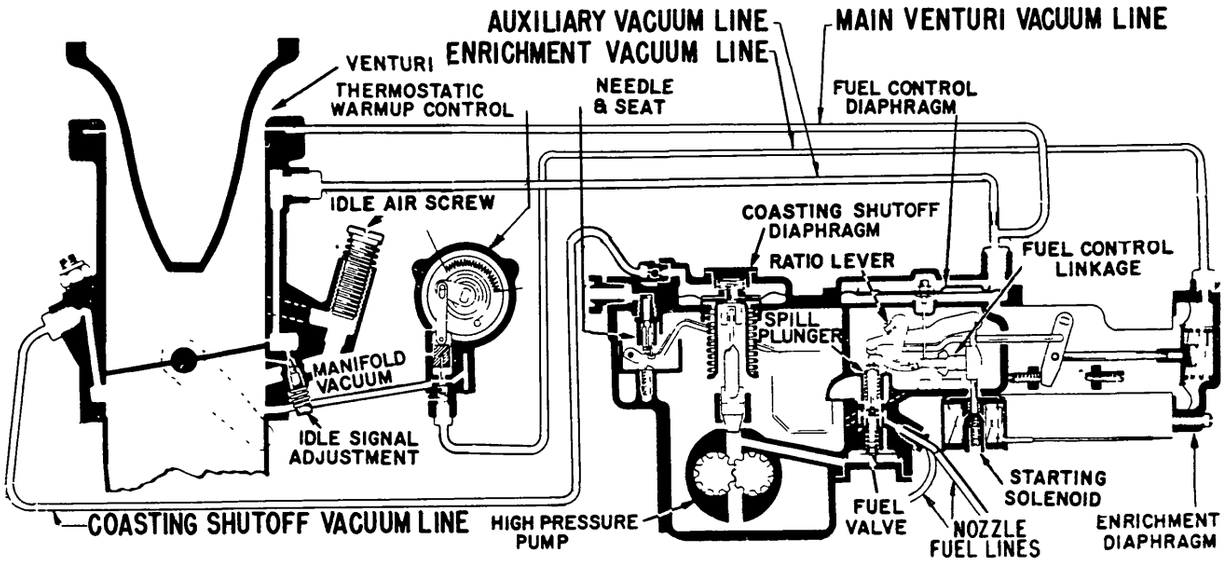
ROCHESTER "RAMJET" FUEL INJECTION (Cont.)

Stops are provided on the fuel meter casting to determine proper rich and lean mixtures. *CAUTION - These stops must not be moved in the field as doing so would require a complete recalibration of the system.*

Coasting Shut-Off: In order to cut off the flow of fuel during deceleration, a diaphragm controlled coasting shut-off valve is included in the fuel meter, which operates as follows: A heavy calibrated spring holds down a large check valve in the high pressure pump outlet so that under normal driving conditions high pressure fuel is fed to the metering system. The heavy spring is connected to a diaphragm and whenever the very high vacuum (due to deceleration) is applied to the diaphragm, it overcomes the spring and lifts the check valve causing the high pressure pump to discharge directly into fuel reservoir and no pressure is applied to metering system. To prevent operation of the coasting shut-off valve except during prolonged deceleration, a fitting containing a check ball and a restricted opening is installed in the coasting shut-off vacuum line at the diaphragm end. When a high vacuum is applied to this fitting, the check ball is pulled off its seat, and vacuum is applied to the diaphragm through the restricted opening. This has the effect of slowing down diaphragm reaction so that fuel is shut-off only during continuous deceleration. When throttle valve is opened and vacuum drops, the ball falls off its seat and relieves vacuum on the diaphragm.

Starting: Because of the low fuel pressure from the gear pump during engine cranking, a starting solenoid is included in the fuel meter which mechanically forces the fuel valve off its seat so that fuel can flow directly from reservoir inlet to nozzles as follows: The starting solenoid which is energized by the starting circuit forces the spill plunger downward, through linkage, until it forces the fuel valve off its seat. This action uncovers a special by-pass fuel line which delivers fuel at supply pump pressure to the metering chamber where it is combined with gear pump pressure to supply sufficient fuel for starting. As soon as engine starts and ignition switch is returned to "run" position, solenoid current is cut off causing the fuel valve to return to normal position, shutting off the fuel by-pass.

Cold Enrichment: To provide a richer mixture during engine warmup, manifold vacuum is cut-off from the enrichment diaphragm causing it to retain the ratio lever in the rich position, as follows: A thermostatically controlled check valve in the manifold vacuum line is pulled upward by manifold vacuum, cutting off vacuum to the enrichment diaphragm and exerting a pull on the enrichment piston. Opposing the vacuum pull on this piston is the tension of a thermostatic coil which will hold the piston up and leave check ball in a closed position until coil is heated and relaxes. A heating element in the thermostatic coil is energized by generator whenever engine is running. When coil has been heated sufficiently to relax its tension, vacuum pulls piston all the way down and piston stem unseats the check ball so that vacuum is applied to enrichment diaphragm, causing it to move the ratio lever to lean position.



ROCHESTER "RAMJET" FUEL INJECTION SYSTEM (SCHEMATIC)

Unloading: To allow cranking without use of the fuel by-pass, a solenoid cut-off switch is attached to air meter next to the throttle lever. Whenever the throttle valve is opened three quarters or wider, a cam on throttle lever operates a micro-switch to break the circuit to fuel by-pass solenoid, allowing a flooded engine to be "unloaded" and restarted.

ADJUSTMENT

► *ADJUSTMENT NOTE: Make all adjustments in the order indicated below.*

CHEVROLET (CORVETTE ENGINE)

Idle Speed & Mixture: For an initial adjustment, turn both the idle air adjustment screw (located below and to rear of fuel enrichment housing- this screw faces left side of car), and the idle fuel adjustment screw (located below and to rear of fuel enrichment housing- this screw faces rear of car and is closer to side of engine than idle air adjustment screw), two full turns open from a seated position. With engine at normal operating temperature and running, adjust air adjusting screw to obtain best possible idle speed. Adjust idle fuel adjusting screw to smooth out the idle speed. Readjust idle air adjusting screw and fuel adjusting screw until best idle is obtained at approximately 500 RPM (700 RPM with racing camshaft).

Throttle Linkage (Synchro-mesh Trans.): With accelerator pedal pressed to floor and throttle bellcrank rotated so throttle valves are in wide open position, adjust upper bellcrank rod for free entry into bellcrank lever.

Throttle Linkag (Pow rglid & Turboglide): On Powerglide models, disconnect lower control rod from transmission throttle lever on side of transmission and loosen throttle lever clamp. Insert Gauge J-5906 (adjusted to 3 5/8") between transmission left hand side cover lower front bolt and hole in transmission throttle lever. With gauge in place, hold clamp counter-clockwise in full detent position and tighten clamp. Install lower control rod. On Powerglide & Turboglide models, disconnect upper control rod from throttle bellcrank and place bellcrank lever in wide open throttle position. Pull upper control rod forward until it is stopped by transmission internal stop. Adjust swivel on end of upper control rod for free entry in bellcrank lever, then install rod in lever. Check adjustment to make sure transmission is on its internal stop and that bellcrank lever reaches wide open throttle position. Depress accelerator so pedal rod is within 3/8" of floor pan with carpet removed. Disconnect upper bellcrank rod from bellcrank and rotate bellcrank lever so throttle valves are in wide open position. Adjust swivel on upper bellcrank rod for free entry into bellcrank lever, then connect rod to lever. Check to make sure throttle reaches wide open position when accelerator depressed fully.

PONTIAC BONNEVILLE

► *PONTIAC NOTE:* The fuel injection system used on Pontiac is basically the same as that used on Chevrolet models, however, the complete system is fully enclosed in a sheet metal shroud and air is introduced through a conventional type air cleaner.

Idle Speed & Mixture: Remove idle adjustment cover (in center of shroud), and air adjustment plug (on left hand end of shroud) from upper shroud. Connect a tachometer and vacuum gauge to engine. Insert a screwdriver through hole in shroud and adjust the air screw to obtain a correct idle speed of 480-500 RPM (with transmission selector lever in "Dr" (Drive) range). Set idle mixture

CONTINUED ON NEXT PAGE

ROCHESTER "RAMJET" FUEL INJECTION (Cont.)

screw (through opening in top of shroud) to best idle, highest vacuum and RPM. *(NOTE* - Turn screw in to lean mixture, out to richen mixture). Recheck idle RPM. If any slight stalling tendency shows up on road test, use a slightly richer (1/8 turn) mixture adjustment.

Thr ttl Linkag : Disconnect rod "A" (see illustration) at throttle lever on air meter. Install linkage adjustment pin J-2544 at point indicated in illustration. Adjust length of rod "A" so that with linkage pin installed the air meter throttle plate will be in full closed position. Connect rod "A" to throttle lever and remove pin J-2544.

TROUBLE SHOOTING & DIAGNOSIS: Check to make sure that all adjustments have been properly made before diagnosing fuel injection trouble.

Failur T Start: Check to make sure that depressing the throttle on a cold engine will allow the fast idle cam to index, and that throttle remains closed until engine has started. Check starting solenoid on fuel meter to make certain it operates when starter is engaged. Make sure fuel is flowing from nozzles. If fuel flows from nozzles, and car won't start, check for large air leaks, such as loose nozzle blocks. If no fuel flows from nozzles, check gas tank and supply pump. Check the gear pump drive cable. There is also the possibility that foreign material under the coasting shut-off valve will prevent pump from delivering fuel.

Starts & Dies: Check for vacuum leaks, especially in lines to main control diaphragm. If this trouble occurs on cold starts, check the thermostat cover for proper location. Check thermostat housing for leaks and make sure the check ball in the sleeve is free to move. Check the spill plunger for sticking by moving it manually (push on solenoid plunger). Check for a leak in main control diaphragm, either at seal between cover and casting or in the diaphragm (diaphragm leakage may be checked by applying a 2.5" vacuum on control line). Check fuel supply pump for capacity and pressure. Be sure the by-pass solenoid is returning to "run" position.

Hesitation or Flat Spot: Check for leaks in control lines and fittings. Check the venturi signal system in the Air Meter for cleanliness and make sure the auxiliary signal passages are clear. Check main control diaphragm for leaks. Make sure there is a restriction in the 'tee" on the auxiliary signal side. Check for sticking spill plunger. Apply an 18" vacuum to enrichment diaphragm to check leakage. Check enrichment linkage for proper cut-in and mixture ratio limits (Enrichment lever should leave power stop at 4" of vacuum and reach the economy stop at 8" of vacuum. Check to be sure enrichment diaphragm is receiving manifold vacuum; if not, look for trouble in the thermostat housing, such as a broken heat element or a sticky piston.

Surge: Check the enrichment diaphragm and spill plunger (see above). Disconnect coasting shut-off diaphragm line and plug it to prevent a vacuum leak into the air meter; if this cures the surge, check adjustment of the coasting shut-off and check springs for distortion.

Rough Idle: Check for correct idle speed and mixture adjustments. Look for plugged nozzle (to do this, short out the spark plugs, one by one). Check for any vacuum leaks in control lines and nozzle blocks. Be sure enrichment lever is on the economy stop when engine is warm.

Cold Driveaway: Check for proper adjustment of cold enrichment cover and the fast idle rod. Check thermostat control piston to make sure it is not sticking and that the enrichment lever rests on the power stop during warm-up. *(See "Starts & Dies" above).* Check for vacuum leaks throughout system.

Fuel Economy: Be sure the enrichment lever rests on economy stop during normal operation. *(See "Hesitation & Flat Spot" above).* Check to see that mixture stop screws are locked in place so they cannot move and vary the mixture. *CAUTION - These stops are pres t.*

BENDIX ELECTROJECTOR FUEL INJECTION

Rambl r R b l (1957) - Optl.

► *NOTE:* Actual installation may differ in detail from units described below.

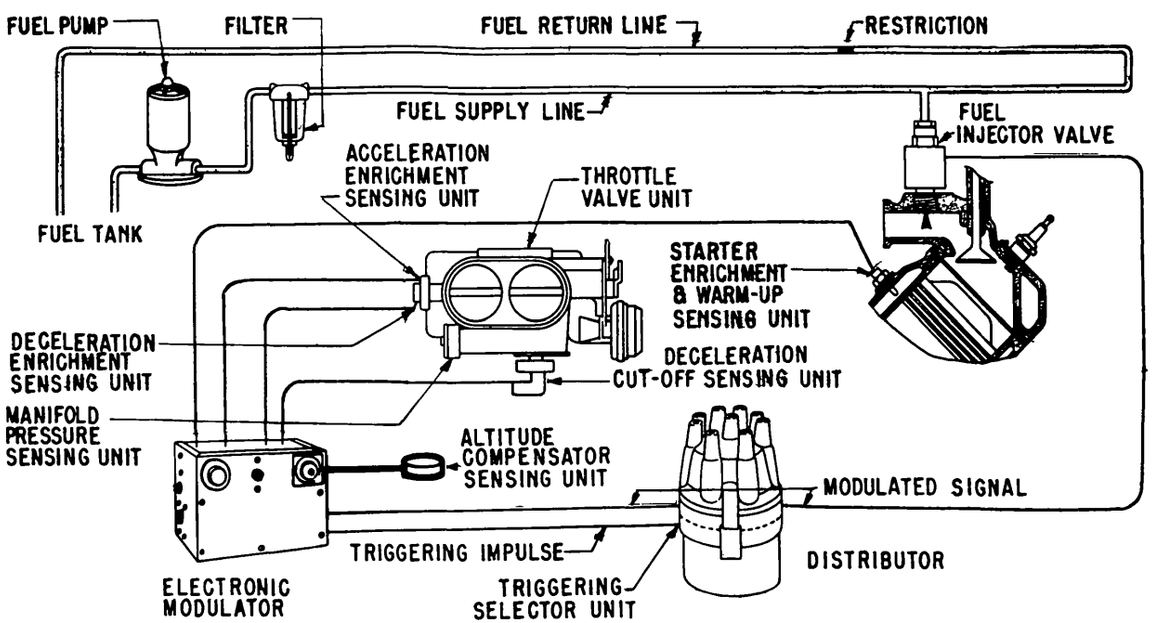
DESCRIPTION: The Bendix "Electrojector" fuel injection system is electrically controlled and actuated by the "Triggering Selector Unit" located in the engine ignition distributor and by the "Electronic Modulator Unit" enclosed in a separate container attached to the engine. The fuel supply to engine cylinders is a "common rail" type using an electric fuel pump to circulate fuel under approximately 20 lbs. pressure to a solenoid injector valve located in the intake valve port of each of the engine's cylinders. Fuel injector valves are electronically timed by the "Triggering Selector Unit" and the amount of fuel delivered to each injector valve is controlled by the "Electronic Modulator Unit" in relation to engine requirements. Controls are employed to make the system responsive to engine speed, air pressure, temperature, and manifold vacuum.

OPERATION: General operation of the fuel injection system and controls are as follows:

Thr ttle B dy: This unit, in addition to containing the throttle valves also contains the Manifold Pressure Sensor and the Idle Enrichment Unit.

Fu l Supply: An electric, non-metering fuel pump delivers fuel at approximately 20 lbs. pressure through a fuel filter into the "common rail" fuel supply line which

CONTINUED ON NEXT PAGE



BENDIX "ELECTR JECT R" FUEL INJECTION SYSTEM (SCHEMATIC)

BENDIX ELECTROJECTOR FUEL INJECTION (Cont.)

connects to all of the fuel injector valves. A fuel return line to the gas tank allows a continuous circulation of fuel in the system continually purging the fuel supply of air and fuel vapors.

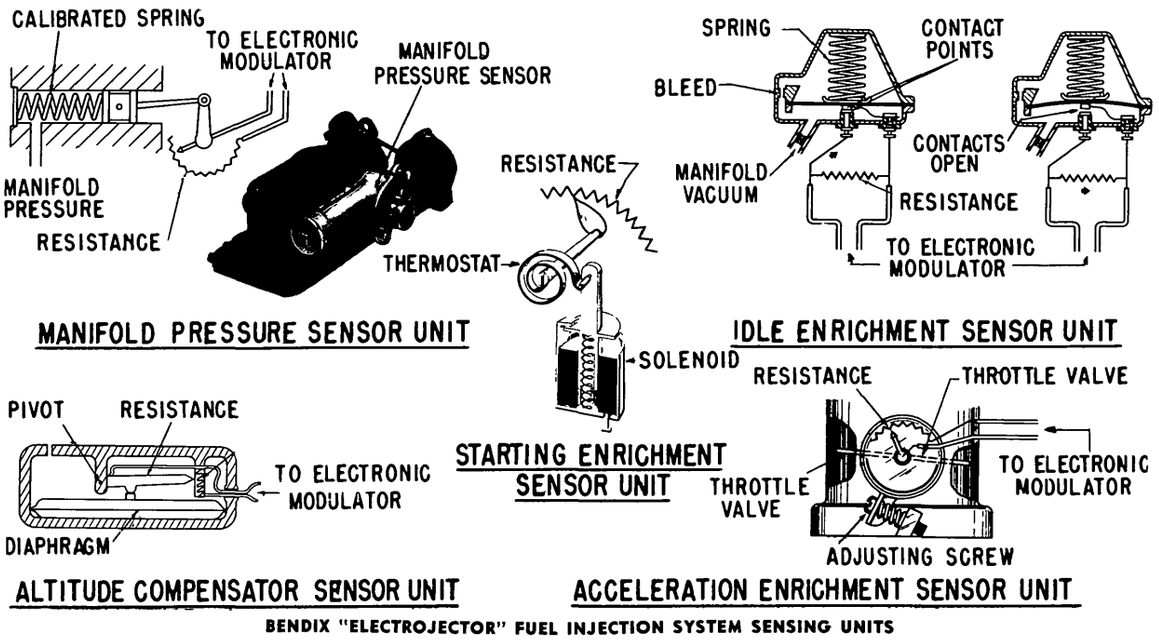
Fuel Injector Valve: This unit is a high speed solenoid operated injector valve and nozzle screwed into the cylinder head so that discharged fuel is directed at the head of the intake valve when the valve is off its seat.

Triggering Selector Unit: Engine speed and injection timing are "sensed" in this unit which consists of a set of breaker points and a distributing commutator having a commutator segment for each of the solenoid injection valves. This assembly is inserted between distributor main body and cap and is actuated by the same cam operating the regular engine ignition points. Each time the fuel injector breaker points make contact, a triggering impulse is transmitted to the modulator where the signal is modified to control the length of time the fuel injector valve is to remain open (depending on engine fuel requirements). The modified signal is then returned to the selector portion of the assembly where it is distributed to the correct injector valve.

Electronic Modulator: The modulator is an electrical unit employing transistors to transform signals received from the triggering selector unit into an electrical pulse of a given standard width. Simultaneously, signals indicating engine operating conditions are also received by the modulator from sensing units located on various parts of the engine. By integrating these external sensing signals into the standard pulse width circuit of the control system, the standard pulse width is modified to reflect engine conditions. This modified electrical pulse is then transmitted to selector portion of the triggering selector unit which in turn distributes the pulse to the correct fuel injector.

External Sensing Units: In all external sensing units, added resistance is introduced into the fundemental circuit to modulate the pulse width of the electrical impulse that is transmitted to the solenoid injector valves. As the sensing circuits resistances increase, the pulse widths increase and the length of time the injector valves are held off their seats likewise increase, resulting in additional fuel flow. Operation of the various sensing units are as follows:

Manifold Pressure Sensor - This unit is mounted on the throttle body and transmits a signal to the modulator



BENDIX "ELECTROJECTOR" FUEL INJECTION SYSTEM SENSING UNITS

control, indicating the relative density of the air charge entering the engine.

Acceleration Enrichment - In order to supply the added amount of fuel required for smooth engine operation when the engine is accelerated, an acceleration enrichment unit controlled by manifold vacuum, is used. This unit, connected to the intake manifold contains a diaphragm and spring assembly, contact points and a resistance circuit. In operation, a rapid decrease in manifold vacuum will cause the points to separate and introduce an additional resistance in the control system thus increasing the operating pulse width of the electrical signal for the length of time necessary to equalize the pressure in the chamber on both sides of the diaphragm. A bleed hole connecting both sides of the diaphragm allows a time interval for the points to close and eliminate the resistance. The added pulse width, during the time the points are open, will increase the fuel flow from each injector as the injectors will be energized for a longer period of time.

Idle Enrichment - This is controlled by a rheostat connected to the throttle shaft to interject a variable resistance in the control circuit when the throttle valve is in an idle position. The idle adjustment is obtained by adjusting this resistance instead of the conventional idle mixture adjusting needle.

Starting Enrichment - Starting and warm-up enrichment is controlled by a thermostatic coil spring which is connected on one end to a solenoid unit, and on the other end to a variable resistance rheostat. During engine cranking the solenoid is energized causing maximum resistance thereby increasing fuel flow during the cranking period. During the warm-up period (solenoid not energized) the thermostatic coil spring maintains a resistance which decreases as engine temperature rises. Enrichment is decreased accordingly. A conventional fast idle cam on the throttle shaft which is linked to the thermostat provides the necessary fast idle speed during the warm-up period.

Altitude Compensator - This sensing unit is connected to the modulator box and consists of a small aneroid connected to a variable resistance unit that transmits its signal to the modulator. As altitude is increased the aneroid expands causing the resistance to be decreased and thereby decreasing the fuel flow.

Fuel Cut-off During Deceleration: As the piston in the manifold pressure sensing device reaches the extreme position during deceleration, fuel is automatically cut off.

CADILLAC (CARTER & ROCHESTER) CARBURETORS

CARTER 4-BARREL WCFB

1957 Eldorado Engine (Two Carbs.)	Carter No.
Without Air Cond. (Early)..(Front)	2582S, (Rear) 2583S
Without Air Cond. (Late)...(Front)	2690S, (Rear) 2691S
With Air Cond. (Early).. (Front)	2584S, (Rear) 2583S
With Air Cond. (Late)....(Front)	2692S, (Rear) 2691S
Service Replacement Carb. (Early).....	① 2582S
Service Replacement Carb. (Late).....	② 2690S

CARTER 4-BARREL AFB ③

1957 Series (Exc. Eldorado Eng.)	Carter No.
Without Air Cond.	2479S
With Air Cond.	2480S
Service Replacement Carb.	④ 2479S

ROCHESTER 4-BARREL 4GC ③

1957 Series (Exc. Eldorado Eng.)	Rochester No.
Without Air Cond. (Early)	7010100
Without Air Cond. (Late)	7012000
With Air Cond. (Early)	7010101
With Air Cond. (Late)	7012001
Service Replacement Carb. (Early)	7015701
Service Replacement Carb. (Late)	7015757

① - Replaces Carburetor Nos. 2583S & 2584S. When using this carburetor to replace 2584S (Front carburetor on cars with air conditioning), it will also be necessary to use Unitized Package 202-111U.

② - Replaces Carburetor Nos. 2691S & 2692S. When using this carburetor to replace 2690S (Front carburetor on cars with air conditioning), it will also be necessary to use Unitized Package 202-111U.

③ - Both Carter and Rochester Carburetors used on cars with single carburetor after Engine No. 101833.

④ - When used on air conditioned cars, Unitized Package 202-114U must also be used.

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1957 ROCHESTER FLOAT ADJUSTMENT PROCEDURE CHANGE: See "Adjustments (Rochester)" below.*

▷*1957 ROCHESTER FLOAT DROP SPECIFICATION CHANGE:* Adjust float drop on both primary and secondary floats to 1 13/16"±1/32". This supersedes previous setting of 1 7/8".

▷*1957 ROCHESTER CARBURETOR FLOODING CORRECTION:* Perform the following operations as outlined.

1) Install the new type filter element, Part No. 854467 (dyed red for identification), and replace the rubber center gasket with the later type gasket, Part No. 854475 which has a cotton reinforcement. The later type gasket is identified by its square shape. On cars without air conditioning rotate the complete filter downward 30° below horizontal to allow dirt to settle in the glass bowl.

2) On early cars with carburetor Nos. 7010100 & 7010101 and on later cars with carburetor Nos. 7012000 & 7012001 not having the letter "A" stamped on brass identification tag, install a new float needle valve and seat assembly, Part No. 7012144. This later valve is made of a harder material and the seat width contacting the needle has been reduced from .010" to .005".

3) On cars before Eng. No. 075598 enlarge the 3/32" holes in the primary and secondary sides of the float bowl that feed fuel into the balance channel between the bowls, to 3/16". The bowl casting should be removed for this operation. Carburetors having this change made in production are identified by the letter "C" stamped on the identification tag.

4) Adjust floats, using the new procedures. *See "Adjustments" below.*

▷*1957 ROCHESTER STALLING OR HARD STARTING WHEN HOT CORRECTION:* Adjust idle speed and mixture using a vacuum gauge and a tachometer to obtain peak vacuum and RPM at the same time, and adjust the mixture screws midway between "Rich" and "Lean" limits. Make sure that throttle return check is correctly adjusted. To avoid flooding the manifold, the accelerpedal should be held only part way down and it should not be pumped. A new vented throttle body-to-bowl gasket, Part No. 7011979 has been released for service replacement (installed in production in carburetors having the letter "C" stamped on identification tag) to reduce the cranking time when engine is hot. The new gasket permits external vapor venting of the throttle bores while parked.

▷*1957 ROCHESTER STALLING OR HARD STARTING WHEN COLD CORRECTION:* Install a new choke piston, Part No. 7010522 which has a deeper slot than the earlier type piston. Carburetors having the later type piston are identified by the letter "D", or later, stamped on the identification tag. In cases of cold stalling at closed throttle, check the intermediate choke rod adjustment *(see "Intermediate Choke Rod Adjustment" below).* In cases of hard starting, or in cold stalling when throttle is opened, set the choke thermostat two notches rich and reset the fast idle speed to 1500 RPM on high step of fast idle cam. *(NOTE* - This is the summer adjustment, which should be changed back to index setting and the conventional 1700 RPM adjustment for cold weather). In cases of hard starting, especially when car has been parked for several days, remove sight plugs and check fuel level. If fuel level is up, readjust choke as indicated above. If level is down, check bowl casting for leaks. If level is down only slightly, remove bowl cover and check slot in side of pump well for the specified depth of 3/8". If slot is too shallow, remove bowl and file slot to correct depth.

▷*1957 ROCHESTER ENGINE "CUT-OUT" ON TURNS CORRECTION:* This condition can be corrected by drilling two additional vent holes in top of air horn as follows: Remove air horn from carburetor and drill a .125" hole in each of the "blind die-cast holes" that are identical to the existing diagonally opposite vent holes now in top of air horn. Carburetors having this change are identified by the letter "E" or later stamped on the identification tag.

DESCRIPTION: Carter - Four-barrel downdraft type similar in design to 1956 models. The throttle body has been changed to lower the carburetor height, and velocity type secondary auxiliary throttle valves have been incorporated in the bowl assembly. Primary & Secondary floats are of different types and the secondary float setting has been changed.

Rochester - Four-barrel downdraft type. Design changes have been made as follows: New type "spring balanced" float assemblies. New velocity type secondary auxiliary throttle valves. The automatic choke has been moved from the air horn to float bowl (Intermediate Choke Rod Adjustment required). Secondary throttle actuating rod has been moved from choke housing side to throttle lever side. The idle air adjusting screw has been moved to rear of throttle body.

ADJUSTMENTS (On Engine): *See "Off Engine" Adjustments for Carter & Rochester Carburetors below.*

Initial Idle Speed & Mixture Adjustment: Back each screw out from a fully seated position as indicated in table below.

Initial Idle Setting

Carburetor	Idle Speed	Idle Mixture
Carter WCFB	3 turns	3/4-1 3/4 turns
Carter AFB	3 turns	3/4-2 1/4 turns
Rochester	2-3 turns	2 turns

Idle Speed & Mixture Adjustments (Single & Dual Carburetors): With engine at normal operating temperature, transmission in "N" (Neutral), choke fully off and carburetor on "slow" idle, loosen throttle lever jam nuts at carburetor trunnion. Place transmission selector lever in either "D" (Drive) range. Adjust engine idle to correct speed (see table below), using the idle air bypass screw (idle speed adjusting screw) on throttle body. Turn one idle mixture screw until highest engine RPM is reached and highest vacuum is obtained at the same time, then repeat this operation with the other screw (on the same carburetor if two carburetors are used). On cars with two carburetors, adjust idle mixture screws on the other carburetor in the same manner. Repeat the above procedure until turning mixture screws will not increase engine RPM, and the smoothest idle is obtained with the highest vacuum.

Idle Speed ①

Model	Air Conditioned	Standard
Single Carburetor	500 RPM ②	450 RPM
Dual Carburetors	500-520 RPM ③	500-520 RPM

① - Transmission selector lever in either "D" range.

② - With Air Conditioner turned OFF.

③ - With Air Conditioner turned ON.

Fast Idle (Single & Dual Carburetors): With engine at normal operating temperature, transmission in "N" (Neutral), choke valve fully open and engine speed properly adjusted (see above), proceed as follows: On Rochester Carburetors, hold throttle lever closed so fast idle adjusting screw is on highest step of fast idle cam. On Carter Carburetors, hold choke rod down by pressing on end of cam trip lever. Open primary throttle valves slightly and rotate fast idle cam to its stop against spring tension, so that screw is on high step of cam. Adjust fast idle screw to obtain an engine speed of 1700 RPM (Single Carbs.), 2000 RPM (Dual Carbs.).

Throttle Check Adjustment (Single & Dual Carbs.): With engine at normal operating temperature, set parking brake and apply foot brake. Place transmission in "D" (Drive) position *(NOTE - Allow engine to idle and make certain that throttle check plunger is not in contact with screw in throttle relay lever).* Open the throttle wide momentarily to allow engine manifold vacuum to drop off and throttle check plunger to come out. Let

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CADILLAC CARBURETORS (Cont.)

throttle snap shut. If engine races, clearance is too small. If engine stalls, clearance is too great. Adjust screw on relay lever so that engine will not quite stall during the above procedure. *CAUTION - Do not perform th above operation too frequently as transmission may b come overheated.*

Idl Speed-up Control (Air Conditioned Cars): With engine warm and air conditioner compressor "ON", and with transmission selector lever in "N" (Neutral) position hold speed-up control stem with a wrench and adjust the hex head screw to maintain an idle speed of 900 RPM.

CADILLAC (Single Carburetor) (Rochester)

ADJUSTMENTS (Off Engine): *See "On Engine Adjustm nts" above. NOTE* - The following adjustments must be made in the sequence given, however, they may be classified into the following separate groups: (1) Float Level and Float Drop. (2) Accelerator Pump and Atmospheric Idle Vent *(NOTE - When group No. 2 is performed separately, the Fast Idle Adjustment must also be made).* (3) Choke, Fast Idle, Choke Rod, Unloader, Secondary Throttle Opening, Secondary Throttle Lockout, Intermediate Choke Rod. *NOTE - When one adjustment of a group is made, the rest in the group must also be performed.*

►*FLOAT ADJUSTMENT PROCEDURE CHANGE NOTE:* Previous adjustment procedures have been superseded by the following:

Fl at Level: With bowl cover assembly removed from carburetor and inverted (with cover gasket in place), place Gauge J-6628 so it is centered in bore of cover and positioned over highest point of floats. Bend float arms at rear of float assembly until floats just clear top portion of gauge between the gauge legs. Dimension from bottom of each float to gasket should be 1 3/8".

Fl at Side Play: *(NOTE - This new adjustment replaces th final steps of the previous level adjustment).* Align the gasket with bowl cover by dropping two attaching screws through mating holes of gasket and bowl cover. Sight down on top of floats and position floats as required to center them sideways in the gasket cutouts. Sides of floats must be parallel to adjacent edges of gasket. *(NOTE* - Position floats by grasping float across diagonally opposite corners so as not to distort the sides. Be careful not to change float volume by denting or crushing). Recheck float positioning with bowl cover tilted 90° to either side, or with floats moved to left and right extreme positions. By removing power piston, each float assembly can be held at mid point of float arms to check the side play without bending the arms. If any portion of float overhangs gasket cutout, reposition float as required. If necessary, replace float assembly, hinge pin, or bowl cover to reduce sideplay of float assembly.

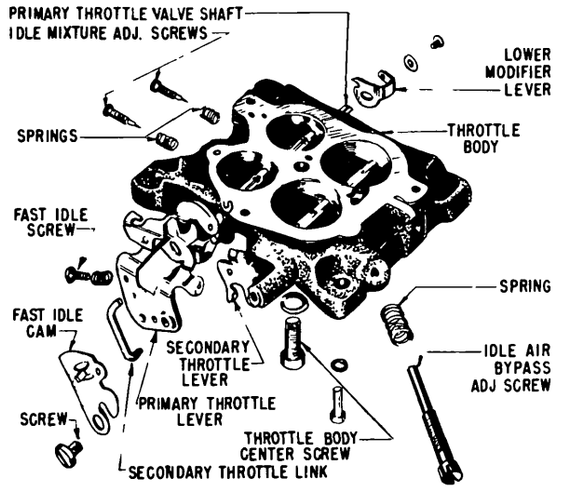
Fl at Tip: After float level and float sideplay have been adjusted and with bowl cover inverted, raise the gasket and sight across flat surface of casting. The lower edge of each float at the tip should be flush with this surface within 1/16". To adjust, carefully bend each float arm as required. Recheck float level after adjustment is made.

Fl at Dr p: *NOTE - Float drop must be adjusted accurately because of the new type spring balanced floats.* With air horn upright and floats hanging freely, distance from air horn gasket to lower edge at float tip should be 1 13/16". Adjust by bending float tang.

►*ACCELERATOR PUMP ADJUSTMENT PRODUCTION CHANGE: The pump adjustment setting has been changed from 15/16" to 29/32".*

Accelerator Pump: With fast idle screw backed out and with throttle valve held fully closed, distance from bowl cover surface to bottom of pump plunger rod should be 29/32".

Atmospheric Idle Vent: With primary throttle valves closed against a .063" wire gauge (BT-79) bend idle vent tang with Tool BT-69 so that tang just touches face of valve.



CADILLAC (ROCHESTER) CARBURETOR THROTTLE BODY

Automatic Choke: Centered (At Index). Adjust choke modifier as indicated below.

Choke Modifier: Loosen thermostat lever retaining screw, Rotate metal pointer counter-clockwise from free position until thermostat spring starts to close choke valve. Continue counter-clockwise until metal pointer lines up with index position on choke cover.

Fast Idle Adjustment ("Off" Engine): *(CAUTION - Make final adjustment "On Engine" as detailed above).* Hold choke valve tightly closed and hold throttle in closed position so that fast idle screw rests on high step of fast idle cam. Turn fast idle screw in until throttle valve opening or clearance between edge of valve and air horn is .020" (Gauge BT-67).

Choke Rod Adjustment: *(NOTE - This rod connects choke valve shaft to fast idle cam).* Position fast idle cam and primary throttle so that fast idle screw contacts second step of fast idle cam, and rests against shoulder of the highest step. Hold choke valve closed with choke trip lever in contact with choke counterweight lever. Hold linkage in this position and check choke valve opening or clearance between upper edge of choke valve and dividing wall in air horn using Gauge BT-102 (.040"). Adjust by bending choke rod.

Choke Unloader: Move throttle to wide open position and hold trip lever down in contact with choke counterweight. Check choke valve opening or clearance between upper edge of choke valve and dividing wall in air horn using Gauge BT-102 (.125"). Adjust by bending tang on fast idle cam using Tool BT-69.

Secondary Throttle Opening: With carburetor inverted, move choke valve to wide open position. Move throttle lever to wide open position and check opening of secondary throttle valves which should reach wide open position at same time as primary valves. If adjustment required, remove fast idle cam and connecting link. Check wide open stops on primary and secondary throttle shafts, and bend tangs with heavy pliers as required to obtain wide open positions. Tangs should contact stops at same instant.

Secondary Throttle Lockout: With choke valve partially closed and throttle valves fully closed, check clearance between upper edge of lockout lever tang and edge of slot in fast idle cam using a feeler gauge. Clearance should be .015". Adjust by bending tang horizontally using Tool BT-18.

Secondary Throttle Contour Cl arance: With choke valve wide open, open throttle valves so tang on secondary lockout lever rides over top of fast idle cam. Measure clearance between tang and fast idle cam edge using feeler gauge. Clearance should be .015". Adjust by bending tang up or down using Tool BT-19.

Intermediate Choke Rod: *(NOTE - This rod conn cts choke valve shaft to lever on automatic choke control).* Remove automatic choke cover and baffle plate. With choke valve held fully closed, bend intermediate throttle rod as necessary so choke piston is flush to 1/32" out of choke piston sleeve.

CADILLAC (Singl Carbur t rs) (Carter AFB)

ADJUSTMENTS (Off Engine): *S "On Engin Adjustments" above. NOTE* - The following adjustments must be made in the exact sequence given.

Float Alignment: Adjust float so it is parallel to outer edge of bowl cover casting by bending float lever. *NOTE* - Bend float lever by appiying pressure to end of float with finger while supporting float lever with thumb. After aligning float, remove as much clearance as possible between arm of float lever and lugs on bowl cover. Arms of float lever should be as parallel to inner surface of lugs as possible. Be sure that floats operate freely without excessive play on hinge pin.

Float Level: With bowl cover inverted, bowl cover and gasket in place, and needle seated, there should be 5/16" clearance between top of float at outer end and bowl cover gasket. Check and adjust float level, using Gauge J-818-9. Adjust by bending float arm. Recheck float alignment after adjusting level.

Float Drop: Hold bowl cover in upright position and measure distance from the top outer end of each float to bowl cover gasket. The distance should be 3/4". To adjust, bend stop tabs on float brackets.

Accel rat r Pump: Back out fast idle screw so throttle

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CADILLAC CARBURETORS (Cont.)

valves are fully closed, making sure that choke is wide open. Distance from top of bowl cover to top of plunger shaft should be 15/32". Adjust by carefully bending throttle connector rod at lower angle using Tool J-1137.

Choke Piston Lever: Remove three choke coil housing screws and remove choke coil housing assembly. Remove gasket and baffle plate. Open choke valve and insert .026" wire gauge, Tool KMO-658 between bottom of slot in piston and top of slot in choke housing. Close choke against this gauge and check clearance between top of choke valve and web of bowl cover casting. This dimension should be 5/64". Check this clearance using a 5/64" drill. Adjust by bending choke connector rod using Tool J-1137.

Choke Modifier: Place choke coil housing on index and remove lower end of connecting rod. Loosen clamp screw and rotate metal pointer until it is in line with raised pointer on coil housing. Align scribed line on lever so it is in a horizontal position and tighten clamp screw. Seat throttle valves (hold choke wide open). Reposition pointer so it is in line with raised pointer on housing. Bend connector rod at upper angle so that lower end of rod will slide freely into hole in modifier lever on primary throttle shaft.

Choke Shaft Lever: With choke valve fully closed and choke lever and arm in contact, adjust choke connector rod to align index on fast dile cam with fast idle screw.

Fast Idle: *(CAUTION - Make final adjustment "On Engine" as detailed above).* With center of fast idle screw aligned with index mark on fast idle cam, adjust screw to obtain .018" clearance between edge of throttle valve and carburetor bore adjacent to throttle lever. Check clearance with Gauge KMO-657. *NOTE* - Tang on fast idle cam and stop on body must have a clearance of .005" minimum. Use a standard feeler gauge to check.

Unloader: Rotate primary throttle to full open position and insert a 9/32" drill between upper edge of choke valve and inner wall of bowl cover assembly. Choke valve should give a slight drag on gauge under finger pressure. To adjust, bend unloader lip on throttle lever using Tool J-1137.

Secondary Throttle Lever: Fully open primary and secondary throttle valves. Stop lugs on primary and secondary throttle levers should contact boss on flange. Adjust by bending secondary operating rod. Close primary and secondary throttle valves. Clearance between positive closing shoes on primary and secondary throttle levers should be .017-.022" (Tool J-1388). Adjust by bending shoe on primary throttle lever.

Secondary Throttle Lockout: Crack throttle valves and manually open and close the choke valve. Tang on secondary throttle lever should engage freely in notch of lockout dog. Adjust by bending tang on secondary throttle lever. With lockout dog held tight against stop on flange casting and secondary throttle valves partially open, there should be .020" clearance between tang on secondary throttle lever and lockout arm. Check this clearance using Tool J-1388. Adjust by bending arm at slot on lockout dog. *NOTE* - Fast idle cam may be removed to ease gauging and adjusting.

CADILLAC (Dual Carburetors) (Carter WCFB)

ADJUSTMENTS (Off Engine): *See "On Engine Adjustments" above. NOTE* - The following adjustments must be made in the sequence given, however, they may be classified into the following separate groups: (1) Float Level & Float Drop. (2) Accelerator Pump, Metering Rod, Atmospheric Idle Vent. (3) Choke Modifier, Choke Rod, Unloader, Secondary Throttle Opening, Secondary Throttle Lockout, Fast Idle. *NOTE - When one adjustment of a group is made, the rest in the group must also be performed.*

Float Level: *NOTE - Primary and Secondary Float Settings are different. VERTICAL & HORIZONTAL adjustments must be made on both floats.* With bowl cover assembly removed from carburetor, remove cover gasket and place correct gauge (see table below) directly under center of floats with notched portion of gauge fitted over edge of cover. Lateral Adjustment - Sides of float should just clear vertical uprights of gauge. Adjust by bending float arm as required. Vertical Adjustment - Floats should just clear horizontal portion of gauge (see table for vertical distance between tops of floats and machined surface of cover). Adjust by bending float arms up or down.

Carter Float Level

Float	Checking Gauge	Vertical Distance
Primary	① T109-232	1/8"
Secondary	② T109-223	1/4"

① - Cadillac No. J-5457. ② - Cadillac No. J-5228.

Float Drop: Hold bowl cover assembly upright so that floats hang down freely. Use scale to measure distance from machined lower surface of bowl cover (gasket removed) to top of floats at center. Distance should be 5/8" (Primary Floats), 3/4" (Secondary Floats). Adjust by bending tab on float bracket.

Accelerator Pump: Install pump connector link in inner hole (short stroke) of pump arm, with end extending toward countershaft. Seat throttle valve in carburetor bore. Remove dust cover and gasket and hold a straightedge across top of dust cover boss at pump arm. The flat on pump arm should be parallel to straightedge. Adjust by bending throttle connector rod at lower angle.

Metering Rod: *Make this adjustment after "Accelerator Pump Adjustment".* Seat throttle valves in bore of carburetor and loosen metering rod arm clamp screw. With metering rods in place, press down on vacumeter link until metering rods bottom in carburetor body casting. Hold rods in downward position, throttle valves seated, and revolve metering rod arm until finger on arm contacts lip of vacumeter link. Hold in place and tighten clamp screw.

Atmospheric Idle Vent: With throttle valve seated in bores, clearance between lower edge of vapor vent valve and dust cover should be 1/16" (Gauge T109-197). To adjust, remove dust cover, bend vapor vent arm up or down.

Automatic Choke: Centered (At Index). Adjust choke modifier as indicated below.

Choke Modifier: Set cover assembly as indicated above. Loosen clamp screw and remove lower end of connector rod. Rotate metal pointer until it is in line with raised pointer on housing. Align scribed line on lever so it is straight up and down. Hold in place and tighten clamp screw. Seat throttle valve (hold choke valves wide open) and with pointer in line with raised pointer on coil housing, lower end of rod must slide freely into hole in throttle arm. To adjust, bend rod at upper angle. Reconnect rod.

Choke Rod: Loosen choke lever clamp screw on choke shaft. Lip of fast idle cam should lightly contact boss of flange casting. Take up all slack in linkage by exerting pressure with a screwdriver on choke lever clamp screw. Hold choke valve tightly closed and tighten clamp screw.

Unloader: Move throttle lever to wide open position. Check choke valve opening or clearance between upper edge of valve and inner wall of air horn using Gauge T109-39 (13/64"). Adjust by bending unloader lip on throttle lever shaft using Tool T109-41.

Secondary Throttle Opening: With carburetor inverted, move choke valve to fully open position. Rotate primary throttle to fully open position. Check opening of secondary valves. They should be fully open at the same time as primary valves. If adjustment required, remove secondary throttle actuating link and check wide open stops on primary and secondary throttle shafts. Bend tangs with pliers as necessary to obtain wide open position. Install secondary throttle link, bending it as necessary so that link fits into proper holes correctly.

Secondary Throttle Lockout: With choke valve tightly closed, tighten fast idle adjusting screw until there is .010" (Gauge T109-200) opening between primary throttle valves and bore of carburetor on side opposite idle ports. Lock pawl should now be in unlocked position, if not, adjust by bending tang on lock pawl using Tool T109-105. Hold primary throttle valves half way open. Open choke valve fully, then open primary throttle valves all the way. Tang on secondary throttle arm should engage notch on lockout lever preventing secondary throttle shaft movement. Keep choke valve in wide open position. Close primary throttle valves so that lock pawl is unlocked, then open primary throttle valves all the way. Lockout lever should fall free allowing secondary throttle valve to be open before primary throttle valves are fully open. To adjust, bend tang on secondary throttle lever for clearance.

Fast Idle: *(CAUTION - Make final adjustment "On Engine" as detailed above).* With fast idle adjusting screw on high step of fast idle cam, clearance between primary throttle valves and side of bore opposite idle ports should be .008".

OVERHAUL: *See "Carter WCFB 4-Barrel", "Carter AFB 4-Barrel" and "Rochester 4GC 4-Barrel" Carburetors.*

OLDSMOBILE TRIPLE 2-BARREL COMPOUND CARBURETORS

OLDSMOBILE (J-2 Engine)	Rochester No.
Front	7010960
Center	7010959
Rear	7010958

DESCRIPTION: Three Rochester 2GC Carburetors are used, with the center carburetor having all the conventional systems (Float, Idle, Part Throttle, Power, Pump, and Choke). The front and rear carburetors contain only Float, Pump, and Main Metering Systems. Throttle valves and accelerator pump on the front carburetor are operated by a vacuum diaphragm which is controlled by a vacuum switch mounted on the center carburetor. Vacuum is supplied to this switch by the vacuum booster side of the fuel pump. Throttle shafts on front and rear carburetors are connected by a common rod and are controlled by the vacuum diaphragm so that both carburetor throttle valves will open simultaneously.

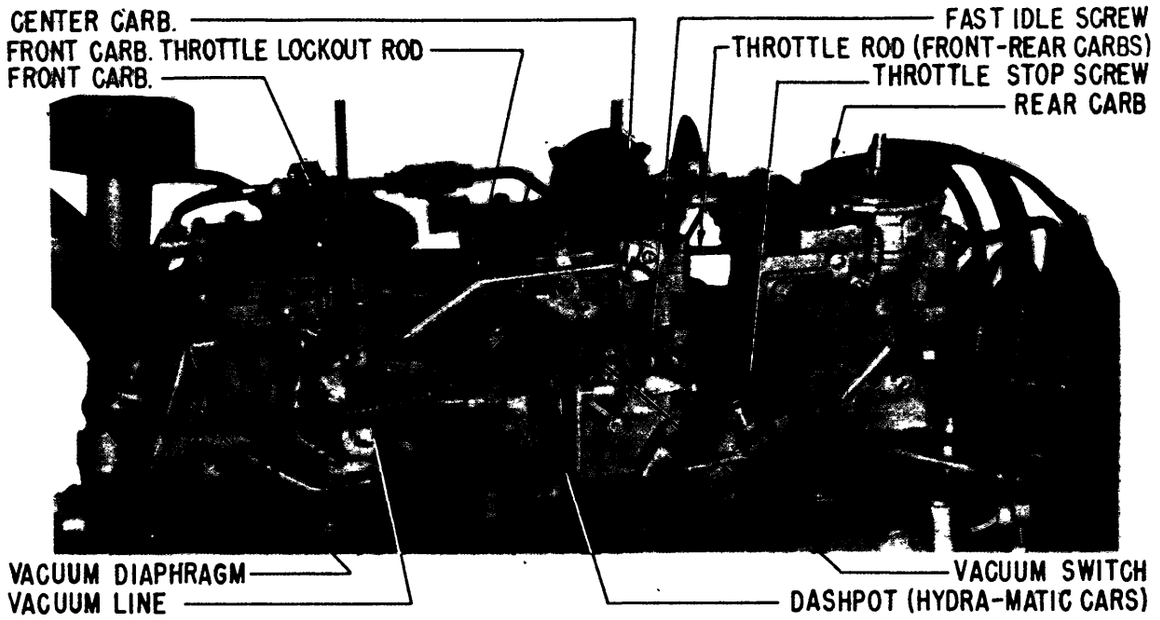
OPERATION: During idle and part throttle operation, the center carburetor feeds fuel while the front and rear carburetors remain idle. On normal acceleration the center carburetor feeds air and fuel until the throttle valves are opened approximately 60° at which time the vacuum switch located on the center carburetor is operated by a tang on center carburetor accelerator pump lever. With the switch actuated, vacuum is applied to the diaphragm on front carburetor, which opens front and rear carburetor throttle valves simultaneously. On deceleration the vacuum switch closes, shutting off all vacuum applied to the diaphragm. Air is then bled from inside front carburetor air horn by another line through the vacuum switch to vacuum diaphragm unit, allowing diaphragm to return to its normal position under spring tension and closing throttle valves on front and rear carburetors. Front and rear carburetors are locked out when choke is on by a lockout lever on front carburetor.

ADJUSTMENT: Some adjustments must be made with carburetor on the engine; other adjustments may be made with carburetor on the engine or on the bench.

► *ADJUSTMENT NOTE: The following adjustments may be made with carburetor either on or off the car.*

Float Level (All Carburetors): 1 9/32" (Center Carb.), 1 5/16" (Front & Rear Carbs.), with bowl cover inverted and Gauge J-5917 placed so it rests against pump side of power piston shaft with outer leg in line with center of float. Bend float arm so float just touches bottom of gauge, using Tool BT-69.

► *TOOL J-5917 NOTE:* To use Tool J-5917 for adjusting float level on center carburetor, scribe a line 1 9/32" from end of both legs of gauge.



OLDSMOBILE "TRIPLE CARBURETORS"

Float Drop (All Carburetors): With air horn held upright, distance from air horn gasket to bottom of float should be 1 29/32". To adjust, bend tang on float.

Choke Setting: 1 notch lean.

Pump Rod (All Carburetors): Back off idle speed adjustment screw and fast idle speed screw until throttle valves are completely closed. Hold throttle valve closed and check distance from top of air horn to top of pump rod with Gauge J-5917. This distance should be 15/16". Bend lower section of pump rod with Tool BT-18

Vacuum Switch (Center Carburetor): *(CAUTION* - Before making adjustments, open throttle valves wide open and close them to position switch post properly for adjustment). Hold throttle valves completely closed and check clearance from tang on pump lever to the actuating post on vacuum switch with a 1/32" (.031") drill. Loosen two retaining screws and move switch assembly up or down to obtain proper clearance.

Choke Rod (Center Carburetor): Turn fast idle screw in until it just touches second step of fast idle cam. Hold fast idle cam so the highest step is against the fast idle screw and check clearance between choke valve and side of air horn, using small end of Gauge J-5918 (.040"). *(NOTE* - Make sure choke trip lever is in contact with choke counterweight). Bend counterweight tang as necessary with Tool BT-69,

► *ADJUSTMENT NOTE: The following adjustments must be made on the car.*

Choke Lockout (Front Carb): Hold choke valve completely open and check distance between lockout lever and throttle lever. This distance should be .030", measured with a feeler gauge. Adjust by bending lockout rod with Tool BT-18.

Choke Lockout Lever Contour Adjustment (Front Carb.): Hold throttle valve on **front carburetor,** completely closed, then with choke valve on **center carburetor** in the closed position and choke lockout lever rod connected, bend lockout tang on **front carburetor** throttle lever to obtain a .015" clearance between lockout lever and tang on throttle lever.

Throttle Rod (Front-to-Rear Carburetors): With throttle valves on front and rear carburetors completely closed and front of throttle rod attached to lever on front carburetor, rear end of rod must be in middle of slotted hole in throttle lever on rear carburetor. Use Tool BT-18 to bend throttle rod as necessary for this adjustment.

Unloader: With throttle valves held wide open, choke valve should be open just enough to admit large end of Gauge BT-110 (.140") between upper edge of choke valve and inner air horn wall. To adjust, bend tang on throttle lever with Tool BT-69.

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OLDSMOBILE CARBURETORS (C nt.)

Idle Sp ed (C nt r Carburetor): 460 RPM (All models). On Hydra-Matic Drive cars, selector lever must be in "DR" position. *NOTE - On air conditioned cars, place controls in "Maximum Cooling" position.* The above supersedes previous idle setting specifications.

Idl S tting (Center Carburetor): With idle speed stabilized, adjust each idle air screw using Tool BT-1000, until smoothest possible idle is obtained Readjust engine idle speed

Fast Idle (Cent r Carburetor)· With engine at normal operating temperature and transmission selector lever in "N" position, rotate fast idle cam so fast idle screw is resting on high step of cam Adjust fast idle screw to obtain an engine speed of 1500-1600 RPM

Throttle Return Check (Center Carburetor)· After fast idle adjustment is made, shut off the engine Rotate fast idle so screw is on high step of fastidle cam Measure clearance between contact screw and contact on throttle lever This clearance should be 050" Adjust contact screw (using two wrenches) to obtain correct adjustment *NOTE* - When fast idle adjustment is changed, readjust throttle return check

REMOVAL & INSTALLATION: Front and rear carburetors can be removed and replaced individually Because of clearances, the rear carburetor must be removed whenever the center carburetor is removed

OVERHAUL: *See "Rochester 2G & 2GC" Carburetors.*

►*NOTE: Overhaul procedure is the same for all carburetors except that the front and rear carburetors have only the pump, float, and metering systems*

PONTIAC TRIPLE CARBURETORS

PONTIAC (Tripl Carb.)	Rochester No.
Front	7011351
Center (Synchro-mesh)	7011500
Center (Hydra-Matic)	7011350
Rear	7011352

DESCRIPTION: Three Rochester 2GC Carburetors are used, with the center carburetor having all the conventional systems (Float, Idle, Part Throttle, Power, Pump and Choke) The front and rear carburetors contain only Float, Pump, and Main Metering systems Throttle valves on the rear carburetor are controlled by a vacuum switch mounted on the center carburetor Throttle valve shafts on front and rear carburetors are connected by a common rod so that throttle valves and accelerating pumps will operate simultaneously

OPERATION: During idle and part throttle operation, the center carburetor feeds fuel while the front and rear carburetors remain idle On normal acceleration, the center carburetor feeds air and fuel until the throttle valves are opened approximately 60°, at which time the vacuum switch located on the center carburetor is operated by a tang on center carburetor accelerating pump lever With the switch actuated, vacuum is applied to the diaphragm on rear carburetor which opens front and rear carburetor throttle valves simultaneously On deceleration, the vacuum switch closes shutting off all vacuum applied to the diaphragm Air is then bled from inside front carburetor air horn by another line through the vacuum switch to vacuum diaphragm unit, allowing diaphragm to return to its normal position under spring tension and close throttle valves on front and rear carburetors Front and rear carburetors are locked out when choke is on by means of a lockout lever on the rear carburetor and a rod connecting this lever to choke shaft on center carburetor

ADJUSTMENTS· *Make all adjustments in the order given below and on each carburetor (except as noted)*

Float Level With air horn inverted and gasket in place, the distance from top of float (not float seam) to gasket surface should be (center carburetor) 1 15/64" (Gauge J-6877), (front & rear carburetors) 1 5/16" (Gauge J-5917) To adjust, bend float arm

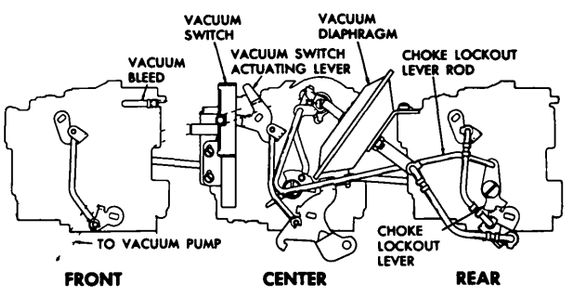
Float Drop· With air horn upright and floats hanging freely, the distance from gasket surface to bottom of the float should be 1 29/32" (all carburetors) To adjust, bend float tang

Pump Rod· With idle stop screw backed off and throttle valve completely closed, check the distance from top of air horn casting to top of pump rod This distance should be (center carb.) 57/64" (Gauge J-6877), (front and rear carbs) 15/16" (Gauge J-5917) To adjust, bend pump rod at lower angle

Vacuum Switch (Center Carb.)· With throttle valves tightly closed, loosen the two screws holding switch to bracket and move lip on switch upward to the end of its travel Position switch on bracket to obtain 1/32" clearance between bottom of lip and top surface of lower finger on pump lever Tighten screws securely

Automatic Choke (Center Carb.): Centered (at index)

Choke Rod (Center Carb.)· Place idle screw on second step of fast idle cam and against shoulder of high step Make sure choke trip lever is in contact with choke counterweight lever Bend counterweight tang so there is a clearance of 061" (Gauge J-6876) between upper edge of choke valve and wall of air horn To adjust, bend counterweight tang



PONTIAC "TRIPLE CARBURETORS"

Unloader (Center Carb.)· With throttle valve wide open, Gauge J-6876 (163") should fit freely between choke valve and air horn wall To adjust, bend unloader tang on throttle lever

Choke Lockout (Rear Carb.) With carburetor installed on engine and lockout linkage installed, hold choke valve (center carb) in the wide open position With rear carburetor throttle valves held slightly open (it may be necessary to remove throttle return springs to open throttle valves), there should be .030" clearance between lockout lever and throttle lever tang on rear carburetor. To adjust, bend lockout rod at sharp bend.

Choke Lockout Lever Contour (Rear Carburetor)· With choke valve on center carburetor closed and choke lockout lever connected, bend lockout tang on rear carburetor throttle lever to obtain 015" clearance between tang and contour portion of lockout lever

Throttle Actuating Rod: Disconnect one end of rod connecting throttle levers on front and rear carburetors With throttle valves closed on front and rear carburetors, the rod should center in the slot in throttle lever Bend rod as necessary to obtain the correct fit

►*THROTTLE RETURN SPRING INSTALLATION NOTE:* Throttle return springs on front and rear carburetors should be installed with open end of spring loop **facing float bowl.**

Idle Mixture & Speed (Center Carburetor)· Adjust with engine at normal operating temperature

Idle Speed - 430-450 RPM with selector lever in "N", (Hydra-Matic Drive Cars), 630-670 RPM (Synchro-mesh Cars)

Idle Mixture - Adjust for smoothest possible idle at specified speed Recheck idle speed after making mixture adjustment

OVERHAUL: *See "Rochest r 2G & 2GC" Carburetors.*

►*NOTE· Overhaul procedures are the same for all carburetors except for the differences in systems on front and rear carburetors*

CARTER WCFB 4-BARREL CARBURETORS

CADILLAC
See SEPARATE "Cadillac (Carter & Rochester)" data for adjustment specifications and procedures.

CHEVROLET	Carter No.
V8 Pass. Cars (Std. Trans.)	2555S
V8 Pass. Cars (Powerglide & Turboglide)	2505S, SA
Corvette (One Carb.) ①	2655S
Corvette (Two Carbs.) ① (Front)	2626S
Corvette (Two Carbs.) ① (Rear)	2627S

① - Used on Pass. Cars with Corvette engine.

CHRYSLER & IMPERIAL *(Carter AFB Carbs. used on later cars)*	
C-75-1 (Early) With Power Pack	2589S
C-75-2 (Early) Standard	2589S
C-76 (Early) Standard	2590S
IM-1,2,4 (Early) Standard	2590S
C-76-300 (Front) 2534S, (Rear)	2535S

DESOTO	
S-26	2588S
S-25 & S-27 (Power Pack)	2532S
Adventurer (Front) 2635S, (Rear)	2636

DODGE	
D-67-2 (Std.). Power Pack (Other V8)	2532S
D-500 (Early) Standard	2532S
D-500 (Late) Standard	2622S, SA
D-500 (Power Pack) (Front) 2633S, (Rear)	2634S
D-500-1 (Standard) (Front) 2534S, (Rear)	2535S
D-500 Special Police	2698S

HUDSON	
Hornet	2593S, SA

LINCOLN & CONTINENTAL	
All	2404S, SA

MERCURY	
368 Cu. In. Engine	2404S, SA

NASH	
Ambassador	2593S, SA

PLYMOUTH	
P-31-2, 3 (Power Pack)	2530S, SA
Fury (Front) 2631S, (Rear)	2632S

RAMBLER	
V8 (Power Pack)	2593S,SA
"Rebel"	2593S,SA

STUDEBAKER	
Comm. & Pres. (Power Pack) Auto. Trans	2214SB
Comm. & Pres. (Power Pack) Synchro-mesh	2219SB

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 CHRYSLER C-300 STUMBLE OR STALLING CORRECTION:* Poor idle, stumble or hesitation on acceleration, stalling on stops or sudden turns conditions can be improved by making the following service corrections. Remove both carburetors from engine and disassemble each carburetor into three major sections (air horn, main body and throttle body). Remove floats and fuel inlet valves from air horn. Proceed as follows: **Vent Passage Rework** - Using a No. 42 drill (.0935"), drill holes through wall of air horn and vent passage boss into vent passage at each end of the two vent tubes (these are the vented tubes extending across and above primary and secondary bores in air horn). Holes into vent passages should be located 11/16" (primary side), 13/16" (secondary side) below top of air horn wall and aligned with centerline of vent tube at a point where vent tube is closest to inner side of air horn wall. Cut away choke housing-to-air horn gasket on rear carburetor for access to vent passage boss behind choke housing.

Idle Tube Well Enlargement - Remove main nozzle plug rivets or primary side of carburetor and remove the two primary idle tubes. Enlarge idle tube wells for their full length (into main nozzle passage), using a No. 4 drill (.209"). Idle tube wells are approximately 8° from vertical and care must be taken to prevent damaging the idle tube seat located just below threads in carburetor main body.

Main Body Pilot Bosses - File projecting pilot bosses on primary side of under side of main body to a height of 1/32". Clean carburetors thoroughly, making sure that all passages are clean and free of metal chips. Reassemble carburetors and note the following changes that must be made.

Secondary Metering Jet Change (Front Carburetor)-Install secondary metering jets, Carter No. 120-193 in **front carburetor only.** Use original jets in rear carburetor.

Metering Rod Change (Front & Rear Carburetors) - Install metering rods, Carter No. 75-1160 in **both front and rear carburetors.**

Float Setting Change - Adjust float level to 1/4" (primary floats), 5/16" (secondary floats).

Carburetor Installation - Install carburetors on engine using a new 1/8" thick flange gasket.

Idle Speed & Idle Setting Procedure Change - Close off completely the idle by-pass screws of both carburetors by turning them in until fully seated. *(NOTE - Leave these screws in the closed position and adjust idle speed with the idle speed screws on the throttle lever).* With engine at normal operating temperature, connect tachometer to engine and adjust front carburetor idle speed screw to obtain 650-700 RPM. Adjust rear carburetor idle mixture screws for best performance, then adjust front carburetor idle mixture screws for best performance. Reset front carburetor idle speed screw to obtain 650-700 RPM.

►*1957 DESOTO, DODGE & PLYMOUTH (CARS WITH TWO 4-BARREL CARBURETORS) IDLE ADJUSTMENT CHANGE NOTE:* The "idle by-pass" screw formerly used for idle adjustment is no longer used and must be screwed in against its seat. *See individual car model pages for idle setting procedure.*

►*1957 CHRYSLER, DESOTO, DODGE & PLYMOUTH TWO 4-BARREL CARBURETOR PRODUCTION CHANGE:* Carburetor Nos. 2534S, 2535S, 2631S, 2632S, 2633S, 2634S, 2635S, 2636S, had a lead ball driven into hole in face of flange to seal over head of screw holding flange onto body. This lead ball must be removed before flange is separated from carburetor body. On later production carburetors, the lead ball has been replaced with a copper washer (Carter No. 136-199), which should be used instead of the lead ball when servicing these carburetors.

►*1957 DESOTO ADVENTURER REAR CARBURETOR THROTTLE LEVER LOSSENESS CORRECTION:* This condition is caused by excessive side strain on throttle lever due to improper adjustment and alignment of the inter-connecting linkage rod. To correct, remove carburetor and place it on a vise so end of throttle shaft (away from lever) is firmly supported. Peen end of shaft, tapping lightly, to tighten lever. Adjust interconnecting link for freeness and alignment.

►*1957 DODGE D-500 STUMBLE & LEANNESS CORRECTION:* On early cars with WCFB 2532S carburetor, install metering rod, Carter No. 75-1251 to replace 75-1327. On later cars with WCFB 2622S carburetor, install metering rod, Carter No. 75-1251 to replace 75-1373.

►*1957 LINCOLN & MERCURY ENGINE STUMBLE OR CUTTING OUT ON TURNS: This condition may b* caused by a poor seal between carburetor body and air horn. Inspect gasketed surfaces and remove any small nicks or burrs with a stone. Make sure that top surface of inner wall of bowl is in good contact with gasket. Before installing air horn, check lateral and vertical float adjustments and float drop.

►*1957 HUDSON, NASH, RAMBLER ROUGH ENGINE IDLE CORRECTION: If idle adjustments do not corr ct* rough idle condition, check for an air leak at front left hand corner of carburetor (with carburetor on engine) by squirting gasoline between throttle body flange and main body at this location. If an air leak exists, a drop in engine RPM will be noted. To correct, remove carburetor from engine, and with carburetor inverted (choke coil housing on left hand side) remove the upper right hand main body-to-throttle flange screw and coat threads with Permatex or other sealing compound. Replace carburetor and recheck for air leakage.

►*1957 HUDSON & NASH VAPOR LOCK OR LOW PRESSURE CORRECTION (Early Cars):* If either of these conditions exist on cars prior to Serial No. V-18114 (Nash), Y-11786 (Hudson), check the carburetor-to-fuel tank return elbow. This elbow must have a .034-.036" (No. 65 drill) restriction. If hole is larger or not drilled through, replace elbow with Part No. 3152259.

►*1956-57 LINCOLN & CONTINENTAL HARD STARTING, STALLING & BACKFIRING CORRECTION (When Caused by Defective Automatic Choke Control Heat Tube):* A new tube, Part No. ECU-9890-B having a larger center section and a larger runout radius at each end replaces the tube formerly used. When replacing intake manifold, make sure later heat tube is installed.

DESCRIPTION: 4-Barrel downdraft types of the same general design used on previous models, with the following special features.

Automatic Secondary Throttle Control (Chrysler 2589S, 2590S; DeSoto 2588S; Lincoln, Continental & Mercury 2404S, SA): Consists of a diaphram type vacuum control unit which opens and closes the secondary throttle valves in accordance with air velocity through primary venturi (vacuum passages connected at primary venturi). A mechanical override linkage ensures that secondary valves will always be closed with primary valves.

Auxiliary Throttle Valves (Chrysler 2555S, 2505S, SA, 2655S, 2626S, 2627S; Chrysler 2534S, 2535S; DeSoto

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CARTER WCFB 4-BARREL CARBURETORS (Cont.)

2532S, 2635S, 2636S; Dodge 2532S, 2622S, SA, 2633S, 2634S, 2534S, 2535S, 2698S; Hudson & Nash 2593S; Plymouth 2530S, SA, 2631S, 2632S): Velocity type valves located directly over secondary valves (action is controlled by counterweight on shaft and valves are not operated by throttle linkage). On some carburetors, these valves are locked out when choke is operating and this lockout must be adjusted (see Adjustments).

Spring L aded Primary Throttle Linkage (Chrysler 2589S, 2590S; DeSoto 2588S; Lincoln, Continental & Mercury 2404S, SA): Consists of a torsion spring on the throttle shaft between flex dog and throttle spring arm with a stop pin located on the throttle shaft dog.

"Cross-Ov r" Typ Automatic Choke (DeSoto & Dodge 2532S, 2622S, SA, 2698S; Plymouth 2530S, SA): On these models, the Thermostatic Coil Assembly is mounted in a well in the manifold and is linked to choke shaft lever by a rod (a plain cover is used on the choke housing on air horn and a lever is mounted in end of choke shaft where it extends through cover). This type automatic choke is adjusted differently.

ADJUSTMENTS: *Make all adjustments in sequence as listed below.*

►*1957 IDLE SETTING & CARBURETOR SYNCHRONIZATION NOTE (CARS WITH TWO 4-BARREL CARBURETORS): See individual car model pages for idle setting and carburetor synchronization procedures. On Chrysler C-300 models with modified carburetors, see "1957 Chrysler C-300 Stumble or Stalling Correction"*

Idl Setting (Exc pt Cars with Two 4-Barrel Carburetors): With engine at normal operating temperature, automatic choke not operating (choke valve wide open), fast idle inoperative (fast idle screw on low step of fast idle cam), proceed as follows: *(NOTE* - If initial adjustment required to allow engine to be started and warmed up, set both idle mixture adjusting screws as indicated in table below). Adjust idle speed adjusting screw for correct engine idle speed (see table below), then adjust each idle mixture adjusting screw (one screw for each primary barrel - two screws only) until engine idles smoothly and RPM is ⁴ maximum. Readjust idle speed.

Idl Mixture Setting

Car & Carb.	Idle Screw Opening
Chevrolet 2505S, SA, 2555S	3/4-1 3/4 turns
Chevrolet 2626S, 2627S	1/4-1 1/4 turns
Chevrolet 2655S	1/2-1 1/2 turns
Chrysler 2534S, 2535S	1/2-1 1/2 turns
Chrysler 2589S	3/4-1 3/4 turns
Chrysler 2590S	1-2 turns
DeSoto 2532S, 2588S, 2635S, 2636S	1/2-1 1/2 turns
Dodge 2532S, 2534S, 2535S	1/2-1 1/2 turns
Dodge 2633S, 2634S	1/2-1 1/2 turns
Dodge 2622S SA	3/4-1 3/4 turns
Dodge 2698S	1/4-1 1/4 turns
Hudson & Nash 2593S, SA	3/4-1 3/4 turns
Lincoln & Continental 2404S SA	1/2-1 1/2 turns
Mercury 2404S, SA	1/2-1 1/2 turns
Plymouth 2530S, SA, 2631S, 2632S	1/2-1 1/2 turns
Rambler 2593S,SA	¾-1¾ turns
Studebaker 2214SB, 2219SB	1/2-1 1/2 turns

Car Model	S.M. Trans. Engine RPM	Aut. Trans. Engin	RPM
Chev. Pass. Car	450	①	425
Chev. Corvette (1 Carb.)	450	①	425
Chev. Corvette (2 Carbs.) ②	600	①	600
Chrysler (1 Carb.)	475-500	③	475- 500
Chrysler (2 Carbs.)		③ ⑤	600- 650
DeSoto (1 Carb.)	450-500	③	475- 500
DeSoto (2 Carbs.)	600-650	③	600- 650
Dodge (D-67-2)	450-500	③	475- 500
Dodge (Power Pack)	450-500	③	475- 500
Dodge D-500 (1 Carb.)	650	③	650
Dodge D-500 (2 Carbs.)	600-650	③	600- 650
Dodge D-500 (Sp. Police)	500-600	③	500- 600
Hudson	550	③ ④	425
Lincoln & Continental		③	475- 500
Mercury	475-500	①	425- 450
Nash	550	③ ④	425
Plymouth (1 Carb.)	450-500	③	475- 500
Plymouth (2 Carbs.)	600-650	③	600- 650
Rambler	550	③④	425
Studebaker	550-600	③	550- 600

① - With transmission selector lever in "D" (Drive).
② - 800-850 RPM cars with "SR" Racing camshaft.
③ - With transmission selector lever in "N" (Neutral).
④ - 475 RPM with air conditioner turned on.
⑤ - 650-750 RPM on C-300 models with reworked carburetors. *See "1957 Chrysler C-300 Stumble or Stalling Correction" above.*

Throttle Return Check (Dashpot) Adjustment: Used with automatic transmission. *See "Throttle Linkage Adjustment" under CARBURETOR on each car model page.*

ACCELERATING PUMP

Accelerating Pump Stroke: *CAUTION—This is a linkage adjustment and not a seasonal change recommendation.* Remove dust cover, make certain that pump connector link installed in **outer** (long stroke) hole of pump arm. Back off throttle stopscrew so that primary throttle valves are fully seated. Hold a straightedge across top of dust cover boss at pump arm. The flat on the top of the pump arm should be parallel with straightedge. Adjust by bending pump connector link at lower angle on all carburetors except 2404S, SA which should be bent at the upper angle. Use Tool T109-213 to bend connector link.

►*STUDEBAKER NOTE:* On carburetors with dashpot, after completing pump rod adjustment (above), make certain that clearance between lower edge of countershaft arm and dashpot bracket is .015" minimum. Correct by bending pump connector rod slightly.

METERING RODS

Metering Rods (Primary Side): *No gauge required for this adjustment and no metering rods used on secondary side.* With dust cover removed and primary throttle valves fully seated (as for Pump Stroke Adjustment above), loosen setscrew in metering rod arm on pump countershaft just enough so that arm has slight bind on shaft, lift arm slightly. Depress metering rod link until metering rods just bottom in bowl casting, position metering rod arm so that it contacts link, tighten arm setscrew. Then adjust Atmospheric Idle Vent (following)

FLOAT LEVEL SETTING

Fl at S tting: *CAUTION—Primary and Secondary Float Assemblies must be checked and adjusted separately and both FLOAT LEVEL and FLOAT DROP must b ch ck d for ach assembly.* Remove bowl cover and float assembly from carburetor for these checks:

Float Level—*Primary and Secondary Float Assemblies set to different heights (Except on Pontiac, Oldsmobile and Studebaker).* Check and adjust as follows: Remove bowl cover gasket (take out float hinge pins, remove float assemblies with intake needles attached, remove gasket, re-install floats). Invert bowl cover. install correct gauge for each float assembly (see table below) on bowl cover under center of floats with notched ends of gauge fitted tightly against sides of bowl cover casting. Both floats should just clear horizontal section of gauge (adjust by bending float arms as required) and each float should barely touch vertical uprights on gauge (bend float arms sideways for this clearance). This sideways adjustment is extremely important to prevent floats hanging up on sides of bowl casing.

Float Level Setting
Primary Floats

Car & Carb.	Height	Gauge No.
Chevrolet 2505S, SA, 2555S	1/8"	T109-232
Chevrolet 2626S, 2627S, 2655S,	1/8"	T109-232
Chrysler 2534S, 2535S	1/8"	T109-232
Chrysler 2589S, 2590S	5/32"	T109-236
DeSoto 2532S	7/32"	T109-283
DeSoto 2588S	5/32"	T109-236
Dodge 2532S, 2622S, SA, 2698S	7/32"	T109-283
Dodge 2534S, 2535S	1/8"	T109-232
Hudson & Nash 2593S, SA	1/8"	T109-232
Lincoln & Continental 2404S, SA	1/16"	T109-293
Mercury 2404S, SA	1/16"	T109-293
Plymouth 2530S, SA	7/32"	T109-283
Plymouth 2631S, 2632S	3/16"	T109-222
Rambler 2593S,SA	1/8"	T109-232
Studebaker 2214SB, 2219SB	3/16"	T109-222

Secondary Floats

Car & Carb.	Height	Gauge No.
Chevrolet 2505S, SA 2555S	1/4"	T109-223
Chevrolet 2626S, 2627S, 2655S	1/4"	T109-223
Chrysler 2534S, 2535S	3/16"	T109-222
Chrysler 2589S, 2590S	9/32"	T109-284
DeSoto 2532S, 2588S	9/32"	T109-284
Dodge 2532S, 2622S, SA, 2698S	9/32"	T109-284
Dodge 2534S, 2535S	3/16"	T109-222
Hudson & Nash 2593S, SA	3/16"	T109-222
Lincoln & Continental 2404S, SA	3/16"	T109-222
Mercury 2404S, SA	3/16"	T109-222
Plymouth 2530S, SA	9/32"	T109-284
Plymouth 2631S, 2632S	5/16"	T109-107
Rambler 2593S,SA	3/16"	T109-222
Studebaker 2214SB, 2219SB	3/16"	T109-222

Float Drop—*Primary and Secondary Float Drop is different (except Oldsmobile, Pontiac, Studebaker). Check and adjust as follows:* Hold bowl cover assembly upright so that floats hang down freely. Use scale to measure distance from machined lower surface of bowl cover (gasket removed) to top of floats at center. If distance not correct (see table below), adjust by bending stop tabs on float bracket.

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Con..)

Float Drop Setting

Car & Carb.	Primary	Secondary
Chevrolet 2505S, 2555S	5/8"	3/4"
Chevrolet 2626S, 2627S, 2655S	5/8"	3/4"
Chrysler 2589S, 2590S	21/32"	25/32"
DeSoto 2532S	23/32"	25/32"
DeSoto 2588S	21/32"	25/32"
Dodge 2532S, 2622S, SA, 2698S	23/32"	25/32"
Hudson & Nash 2593S	5/8"	11/16"
Lincoln & Continental 2404S, SA	9/16"	11/16"
Mercury 2404S, SA	9/16"	11/16"
Plymouth 2530S, SA	23/32"	25/32"
Rambler 2593S,SA	5/8"	11/16"
Studebaker 2214SB, 2219SB	11/16"	11/16"

BOWL VAPOR VENT

Bowl Vapor Vent (Atmospheric Idle Vent) Adjustment: *This vapor vent not used on all carburetors.* **Checking & Adjustment**—With dust cover and gasket installed. Back out throttle lever stopscrew so that primary throttle valves fully closed. Check clearance between lower edge of vapor vent valve and dust cover using Gauge T109-197. Clearance should be 1/16". Adjust by removing dust cover and bending vapor vent arm.

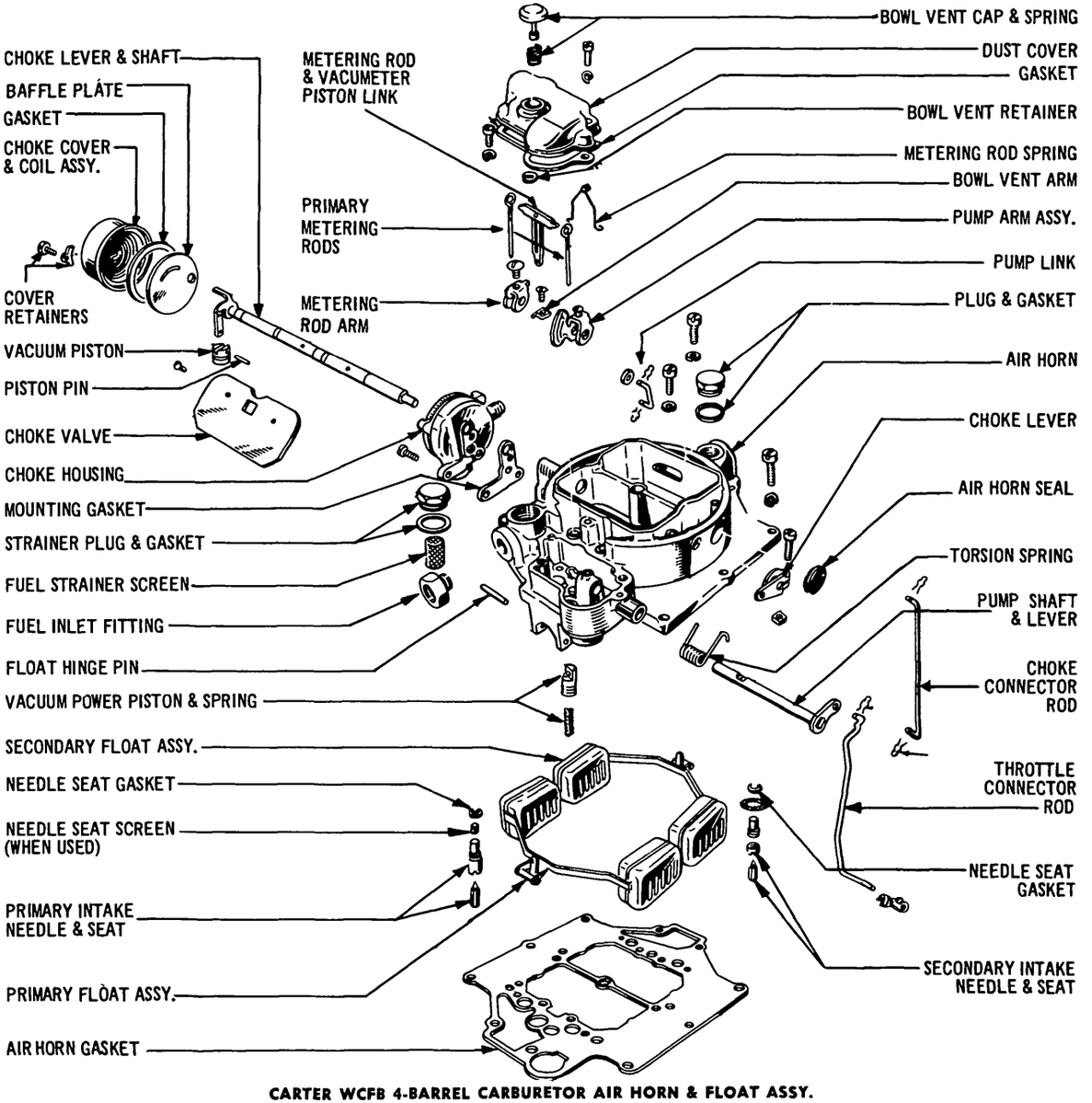
AUTOMATIC CHOKE

Automatic Choke Setting: See table below for settings. Adjust by loosening choke cover screws and rotating cover and coil assembly. Then adjust connector rod.

Car & Carb.	Automatic Choke Setting	Choke Setting
Chevrolet 2505S, SA, 2555S		Index
Chevrolet 2627S, 2655S		Index
Chrysler 2535S, 2589S, 2590S		1 Point Rich
DeSoto 2532S		Index
DeSoto 2588S		1 Point Rich
Dodge 2532S, 2622S, SA, 2698S		Index
Dodge 2535S		1 Point Rich
Hudson & Nash 2593S, SA		Index
Lincoln & Continental 2404S, SA		1 Point Rich
Mercury 2404S, SA		1 Point Rich
Plymouth 2530S, SA		Index
Rambler 2593S,SA		Index
Studebaker 2214SB, 2219SB		1 Point Rich

"Cross-Over" Type Choke Setting (DeSoto 2532S; Dodge 2532S, 2622S, SA, 2698S; Plymouth 2530S) - "Cross-Over" type choke is mounted in well in manifold casting. To adjust, with unit off engine, loosen mounting post locknut and turn mounting post with screwdriver until index mark on disc is centered on scale. When choke is installed on engine, lift cover disc and open and close choke valve manually to make sure connector rod clears sides of hole in housing cover. If rod does not clear, replace unit (bending the rod will affect choke calibration).

Choke Rod: *This adjustment is preliminary to checking and adjusting Fast Idle, Unloader, and Secondary Throttle Lock-out.* Loosen choke lever clampscrew, insert wire gauge of correct thickness (see table below) between tang on fast idle cam and boss on throttle body casting (hold gauge in place by pressure on choke lever) and take up all slack in linkage. Hold choke valve tightly closed and tighten clampscrew.



CARTER WCFB 4-BARREL CARBURETOR AIR HORN & FLOAT ASSY.

Choke Rod Setting

Car & Carb.	Checking Gauge Size & No.
Chevrolet 2505S, SA, 2555S	.020" T109-29
Chevrolet 2627S, 2655S	.020" T109-29
Chrysler 2535S	①
Chrysler 2589S, 2590S	.020" T109-29
DeSoto 2532S, 2588S	.020" T109-29
Dodge 2532S, 2622S, SA, 2698S	.020" T109-29
Dodge 2535S	①
Hudson & Nash 2593S, SA	.026" T109-189
Lincoln & Continental 2404S, SA	①
Mercury 2404S, SA	①
Plymouth 2530S, SA	.020" T109-29
Rambler 2593S,SA	.026" T109-189
Studebaker 2214SB, 2219SB	.020" T109-29

①—No clearance (cam lip should lightly contact boss on flange casting).

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CARTER WCFB 4-BARREL CARBURETORS (Con..)

FAST IDLE

Fast Idl : *This adjustment can be made with carburetor "Off Engine" (on the bench) or "On Engine" (with engine operating).*

Fast Idl Adjustm nt "Off Engine"–Hold choke valve tightly closed so that fast idle cam rotated to point where high step of cam is under fast idle screw. Turn fast idle screw in or out until primary throttle valve opening is correct (see table below). Measure this opening between edge of valve and carburetor wall on side opposite idle ports.

Fast Idle Setting "Off Engine"

Car & Carb.	Checking Gauge Size & No.
Chevrolet 2505S, SA, 2555S, 2655S	015" T109-44
Chevrolet 2626S	018" T109-44
Chrysler 2535S	018" T109-44
Chrysler 2589S, 2590S	012" T109-200
DeSoto 2532S	010" T109-200
DeSoto 2588S	012" T109-200
Dodge 2532S, 2622S, SA, 2698S	010" T109-200
Dodge 2535S	018" T109-44
Hudson & Nash 2593S, SA	023" T109-189
Lincoln & Continental 2404S, SA	030" T109-20
Mercury 2404S, SA	030" T109-20
Plymouth 2530S, SA	010" T109-200
Rambler 2593S,SA	.023" T109-189
Studebaker 2214SB, 2219SB	024" T109-189

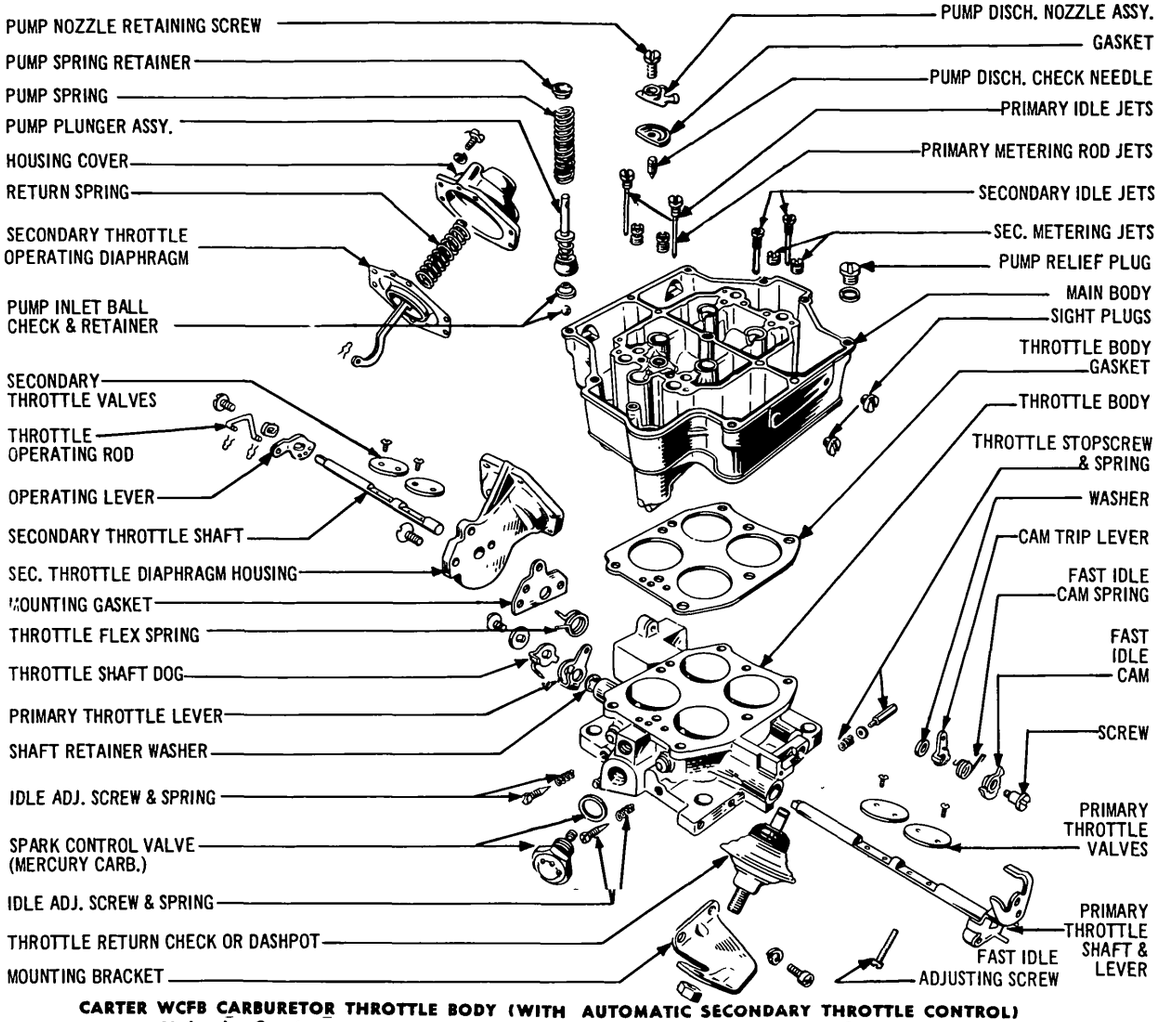
Fast Idl Adjustment "On Engine"–Engine and Transmission must be at operating temperature, shift lever in neutral, and air cleaner in place. (Buick–Disconnect fast idle connector rod from trip lever so that cam may be held in "cold" position while engine running with choke valve fully open). On models listed below, rotate fast idle cam so fast idle screw rests on high step of cam. Adjust fast idle screw to obtain fast idle speed as indicated in table below.

Car M del	Fast Idle Speed Engine RPM
Chevrolet 2505S, SA, 2627S, 2655S	1800
Chevrolet 2555S	1600
Chrysler 2535S, 2590S	1450-1500
Chrysler 2589S	1300-1350
DeSoto 2532S, 2588S	1350-1400
Dodge 2532S, 2622S, SA, 2698S	1350-1400
Dodge 2535S	1450-1500
Hudson & Nash	1600-1800
Lincoln & Continental	① 800
Mercury	① 800
Plymouth 2530S, SA	1350-1400
Rambler	1600-1800

① - With throttle stop screw on lowest step of fast idle cam.

UNLOADER

Unl ad r: *After Choke Rod adjusted (above),* rotate primary throttle valves to wide open position and hold valves in this position. Check choke valve opening by inserting correct Unloader Gauge (see table below) between edge of choke valve and air horn wall. With correct setting, choke valve should have slight drag on gauge. Adjust by using bending tool T109-41 to bend unloader tang on throttle lever as required.



CARTER WCFB CARBURETOR THROTTLE BODY (WITH AUTOMATIC SECONDARY THROTTLE CONTROL)

Unloader Setting

Car & Carb.	Checking Gauge Size & No.
Chevrolet 2505S, 2555S, 2655S	3/16" T109-28
Chevrolet 2627S	1/8" T109-36
Chrysler 2535S	3/16" T109-28
Chrysler 2589S, 2590S	15/64" T109-32
DeSoto 2532S, 2588S	15/64" T109-32
Dodge 2532S, 2622S, SA, 2698S	15/64" T109-32
Dodge 2535S	3/16" T109-28
Hudson & Nash 2593S, SA	9/32" T109-126
Lincoln & Continental 2404S, SA	1/8" T109-36
Mercury 2404S, SA	1/8" T109-36
Plymouth 2530S, SA	15/64" T109-32
Rambler 2593S,SA	9/32" T109-126
Studebaker 2214SB, 2219SB	1/8" T109-36

AUXILIARY THROTTLE VALVES

Auxiliary Throttle Valves (Chevr let 2505S, SA, 2555S, 2626S, 2627S, 2655S; Chrysler 2534S, 2535S; DeSoto 2532S, 2635S, 2636S; Dodge 2532S, 2622S, SA, 2698S, 2534S, 2535S, 2633S, 2634S; Hudson & Nash 2593S; Plymouth 2530S, SA, 2631S, 2632S): Velocity type valve located directly above secondary throttle valves. On carburetor models 2530S, SA; 2532S, 2534S, 2535S, 2622S, SA, 2633S, 2634S, 2635S, 2636S, 2698S, the auxiliary valves are locked out when choke is operating and lockout adjustment is required. Lockout adjustment is not required on the other models.

Auxiliary Throttle Valve Adjustment (Plymouth 2530S, SA) - Disconnect secondary throttle operating rod. Adjust stop lug on secondary throttle lever using bending tool T109-214 until clearance between lower edge of auxiliary throttle valve and bore is 27/64" (Gauge T109-242) with stop lug against stop on lever.

Auxiliary Throttle Lockout Adjustm nt (Chrysler 2534S

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (C nt.)

2535S; DeSoto 2532S, 2635S, 2636S; Dodge 2532S, 2534S, 2535S, 2622S, SA, 2698S; Plymouth 2530S, SA, 2631S, 2632S) - After fast idle adjusted, proceed as follows: (1) With choke valve closed, make certain that edge of hook on lockout arm contacts auxiliary throttle lever with maximum contact on locking step on lever. (2) Open choke valve and make certain that auxiliary valves are unlocked a few degrees before choke reaches wide open position. Adjust by bending the lockout arm.

SECONDARY THROTTLE LINKAGE

►*CAUTION: Adjustment procedure and settings differ due to different linkage designs. Secondary lock-out is not used on all carburetors with Auxiliary Throttle Lock-out (above)*

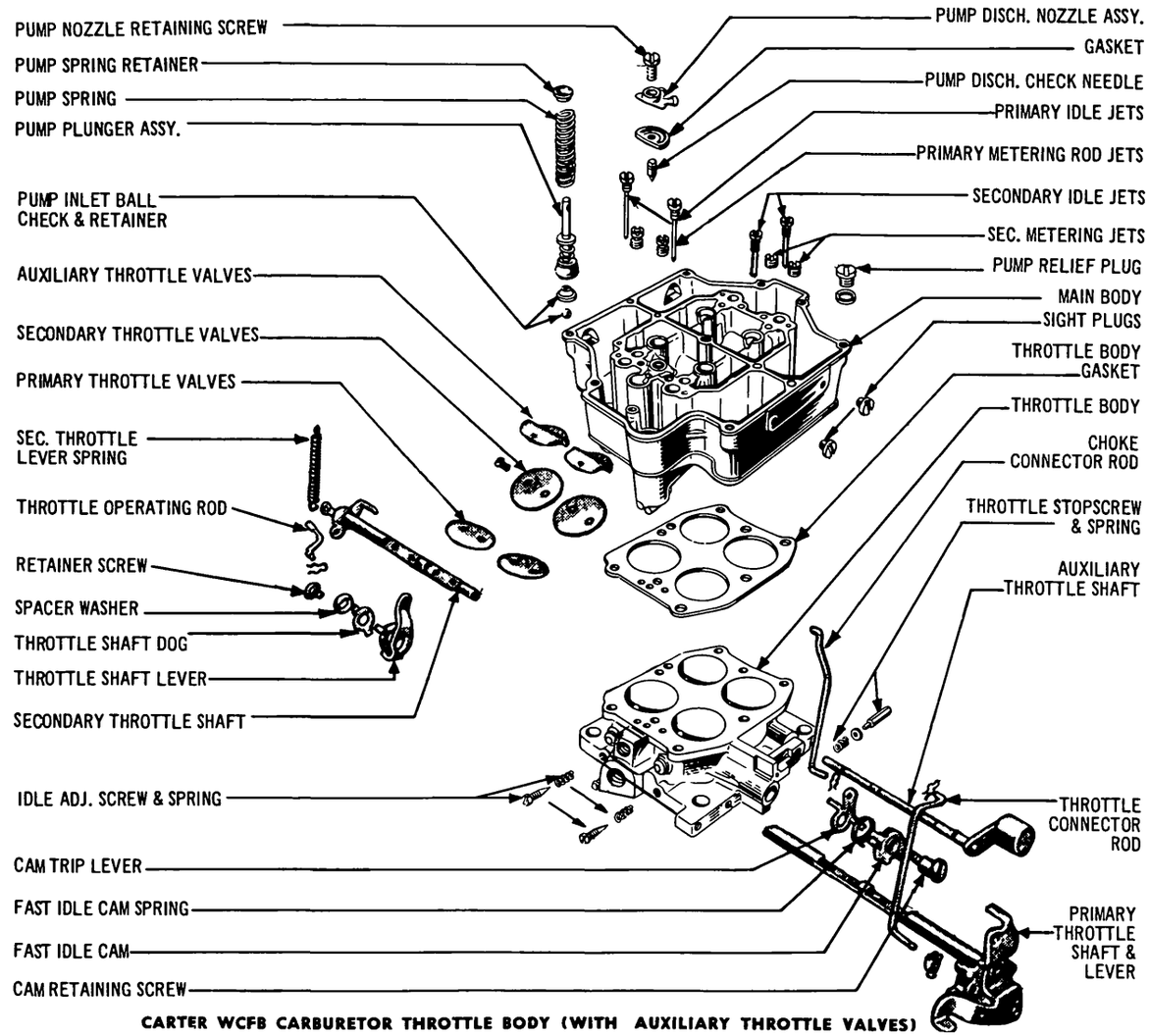
Secondary Throttle Operating Lever Adjustment (Chevrolet 2626S, 2627S, 2505S, SA, 2555S, 2655S; Hudson & Nash 2593S): Block choke valve wide open and back out throttle lever stop screw so primary valves are seated in bores. With primary valves open 3/16" (Chevrolet), Gauge T109-28; 11/64" (Hudson & Nash), Gauge T109-166, secondary valves should just start to open. To adjust, bend throttle operating rod. *(NOTE* - Secondary valves will be a few degrees from wide open when primary valves are wide open). With primary and secondary valves tightly closed, there should be .017-.022" (Chevrolet), Gauge T109-29; .008-.013" (Hudson & Nash), Gauge T109-200 between positive closing shoes on primary and secondary throttle levers. To adjust, bend shoe on primary throttle lever.

Chrysler 2534S, 2535S; DeSoto 2635S, 2636S; Dodge 2534S, 2535S; Plymouth 2631S, 2632S) - Primary and secondary valves should reach wide open position at the same time. To adjust, bend throttle operating rod at upper angle using Tool T109-213. With primary and secondary valves in tightly closed position, there should be .020" clearance between positive closing shoes on primary and secondary throttle levers. To adjust, bend shoe on primary throttle lever, using Tool T109-29.

DeSoto 2532S; Dodge 2532S, 2622S, SA, 2698S; Plymouth 2530S, SA - Stop lug on both primary and secondary throttle levers should contact boss on flange at the same time. To adjust, bend secondary throttle operating rod at angle, using Tool T109-213.

Lincoln, Continental & Mercury 2404S, SA - Block choke valve wide open and back out throttle lever stop screw so that primary valves seat in bores. When primary and secondary throttle valves are seated there should be a minimum clearance of .010" between lug on secondary operating lever and stop on primary throttle shaft dog. To adjust, bend lug on secondary operating lever with Tool T109-214. *NOTE - Secondary valves s at at top edge only.*

Spring Loaded Primary Throttle Linkage Adjustment Chrysler 2589S, 2590S; DeSoto 2588S): With primary throttle valves wide open, adjust secondary operating rod (using Tool T109-213), so there is .054-.064" clearance (Gauge T109-193) between upper edge of secondary throttle valve (next to idle port) and bore of carburetor. Place 1/4" gauge (Tool T109-31) between upper edge of primary throttle valve and bore of carburetor (next to idle port) and adjust long tang on primary throttle shaft dog (using Tool T109-214) so that inner arm of spring just contacts inner lug of secondary operating lever and secondary throttle valves just start to open. With primary and secondary throttle valves tightly closed, there should be .005" clearance (Gauge T109-237) between outer lip on secondary operating lever and stop lug on primary throttle shaft dog. To adjust, bend outer lip on secondary operating lever, using Tool T109-214 *(NOTE - Make sure that secondary operating lev r operat s fre ly and does not bind in any position).* With primary and secondary valves tightly closed, there should be .040" clearance (Gauge T109-193) between short tang on primary throttle shaft dog and outer arm of spring. Adjust by bending short tang on primary throttle shaft dog using Tool T109-214.



CARTER WCFB CARBURETOR THROTTLE BODY (WITH AUXILIARY THROTTLE VALVES)

Lincoln, Continental & Mercury 2404S, SA - Place a .030" gauge (Tool T109-29) *(NOTE - This supersed s previous setting of .076")* between wide open stop tang on primary throttle lever and stop on flange. Adjust upper lug of throttle shaft so that upper arm of spring lightly contacts tang of throttle operating lever. Hold primary and secondary throttle valves in wide open position. Adjust lower lug of throttle shaft dog so lower arm of spring lightly contacts center web of throttle operating lever. Use bending Tool T109-214 to adjust lugs on throttle shaft dog.

Secondary Throttle Lockout Adjustment (Chevr let 2505S, SA, 2555S, 2626S, 2627S, 2655S; Chrysl r 2589S, 2590S; D Sot 2588S; Hudson & Nash 2593S): After fast idle and secondary throttle lever adjustment completed,

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CARTER WCFB 4-BARREL CARBURETORS (Cont.)

crack primary throttle valves, manually close choke valve, then close throttle valves. Tang on secondary throttle lever should freely engage in notch of lockout dog. Adjust by bending tang on secondary throttle lever.

Automatic Secondary Throttle Control (Chrysler 2589S, 2590S; DeSoto 2588S; Lincoln, Continental & Mercury 2404S, SA): This unit requires no adjustment. Bend operating rod as necessary to insure secondary valves closing simultaneously with primary valves. See that linkage is free and that there are no vacuum leaks between carburetor body and unit.

OVERHAUL: *CAUTION–When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor reassembled.*

Disassembly: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Bowl and Throttle Body) which can be overhauled separately.

Air Horn & Bowl Cover–Remove fuel inlet fitting, gasket, and strainer assembly. Disconnect and remove choke connector rod, accelerating pump rod, secondary throttle return spring. Remove dust cover and gasket. Remove metering rods by rotating rods off pins on vacumeter link and lifting rods out carefully. Remove pump connector link by removing pin spring, sliding upper end of link out of pump lever, and rotating link around lever. Remove vent arm (when used) by taking out vent arm screw. Loosen (do not remove) screw holding pump operating lever on pump countershaft and screw in metering rod arm, slide pump countershaft and lever assembly out, remove pump arm and metering rod arm. Take out all air horn attaching screws (inner screws will be lifted out after air horn removed), make certain that screw located within pump countershaft housing is removed, lift air horn assembly straight up (*CAUTION*–use care not to damage floats). Disassemble remaining parts from air horn as follows: Invert air horn on bench, take out float hinge pins, remove floats with intake needles and clips attached, remove needle seats and gaskets (*CAUTION*–Keep each float assembly, intake needle, and needle seat together, DO NOT mix primary and secondary side parts). Remove vacuum piston by rotating it 90° in either direction and lifting it out. Remove accelerator pump plunger assembly. Remove and discard bowl cover gasket. If automatic choke to be disassembled, proceed as follows: Remove choke lever from choke shaft, remove choke valve (file burrs from staked ends of attaching screws before removing the screws), take out attaching screws and remove thermostatic coil housing, gasket, and baffle plate. (*NOTE* – On cars with "cross-over" type choke, remove screws holding dust plate to choke piston housing and slide plate off shaft). On all carburetors, rotate choke shaft counterclockwise to disengage vacuum piston from cylinder, then withdraw choke shaft and piston assembly. Disconnect piston from link by pushing piston pin out with a piece of wire. Take out attaching screws and remove choke housing and gasket (vacuum passage rubber gasket can be removed from inner side of choke housing by rotating gasket with the blunt end of a thin wire).

Carburetor Bowl–Invert bowl to remove pump spring and vacuum piston spring. Take out housing screw and remove pump jet housing, gasket, and pump discharge check needle (needle will drop out if bowl inverted). Remove primary and secondary metering jets (*CAUTION*–keep these jets separate). Remove pump relief valve plug and gasket. Remove pump intake ball retainer from bottom of pump cylinder, invert bowl to remove intake check ball. Remove all primary and secondary low speed jets. (*NOTE* – Low speed jets used on both primary and secondary sides of Chrysler, DeSoto, Dodge & Plymouth Carburetors). Loosen bowl to throttle body attaching screws, remove throttle body from bowl, remove screws. Discard gasket.

Throttle Body – Remove two idle adjusting screws and springs (used on primary side only). Remove four idle port rivet plugs. Remove idle stop screw and spring, and fast idle adjusting screw. On carburetors with vacuum diaphragm assembly remove hairpin clips holding throttle operating link to primary and secondary operating levers. Slide link out and away from levers (don't lose washers). Disengage throttle flex spring from tang on throttle flex dog and slide flex dog off primary shaft. Remove operating lever and flex spring. Disconnect vacuum diaphragm plunger from secondary operating lever by removing hairpin clip. Remove operating lever retaining screw and washer, the slide lever off secondary throttle shaft. Remove screws attaching vacuum diaphragm to throttle body and remove diaphragm and gasket. On all carburetors, take out fast idle mounting screw, remove all fast idle parts (fast idle cam, spring, trip lever, and lockout cam and pawl). Remove primary-to-secondary throttle connector rod, remove secondary throttle lever by loosening clamp screw and sliding lever off shaft, remove primary throttle lever screw from end of shaft, remove all lever parts from shaft. *It is recommended that throttle body not be disassembled further*, however, if it is necessary to remove throttle valves and shaft, proceed as follows: (*NOTE – Mark all throttle valves so they can be reinstalled in the proper position with the correct side of valve upward*). File burrs from staked ends of all throttle valve screws and remove screws and valves from shaft. Remove secondary throttle shaft. Remove primary throttle shaft by using a rawhide hammer to tap shaft through retaining washer. Remove auxiliary throttle valves and shaft when so equipped.

Cleaning & Inspection: Wash all parts in carburetor cleaning solvent except pump plunger assembly, thermostatic coil and housing assembly, and choke housing gasket (clean these parts in clean gasoline). Clean and blow out all passages with compressed air. Remove all gum and carbon deposits. Make certain all calibrated restrictions are clean but DO NOT use drills to clean out these passages. Inspect floats for dents and leaks. Check choke and throttle shafts for excessive wear, inspect pump plunger leather and replace plunger if cracked or creased. See that choke piston operates freely in cylinder (if carbon or dirt present in slots, remove welch plug in bottom of housing to clean slots, install NEW welch plug and make certain that it is air-tight).

Reassembly: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure (above), pay particular attention to the following points.

Valve Installation – Use new screws when installing valves. Install throttle valves as follows: Before tightening screws, shift valves to provide closest possible fit in barrel in closed position (short end of auxiliary valves should have a good bearing on stop bosses). tighten screws securely and stake ends lightly (*CAUTION* – Support shaft on steel block while staking screws). Install retaining washer on end of primary shaft with prongs outward, press washer in on shaft, just far enough to obtain snug fit without endplay in shaft.

THROTTLE VALVE SETTING

Carb. No.	① Idle Port Opening Primary	Secondary	Vacuum Port
2214SB,19SB	113-.119"	④	② .000-.010"
2404S,SA	125-.131"	④	② .020-.030"
2505S,SA	113-.119"	④	③ .028-.038"
2530S,SA	116-.122"	.059-.065"	③ .035-.045"
2532S	092-.098"	.065-.071"	③ .022-.032"
2555S	113-.119"	④	③ .028-.038"
2582S,83S,84S	.061-.067"	④	③ .007-.015"
2588S,89S,90S	130-.134"	.071-.077"	③ .032-.042"
2593S	130-.132"	④	③ .040-.046"
2622S,SA	082-.088"	.065-.071"	③ .022-.023"
2626S,27S	113-.119"	④	⑤
2655S	113-.119"	④	③ .028-.038"
2690S,91S,92S	.061-.067"	④	③ .007-.015"
2698S	082-.088"	.065-.071"	③ .022-.032"

① – Port opening above top edge of throttle valve.
② – Bottom of port above top edge of valve.
③ – Top of port above top edge of valve.
④ – No secondary idle system.
⑤ – None used.

SERVICE PARTS: Gasket Sets -Carter No. 260A (2214SB, 2219SB),No. 294 (2404S, SA), No. 295 (2582S, 2583S, 2584S, 2690S, 2691S, 2692S), No. 296 (2505S, SA, 2555S, 2655S), No. 297 (2588S, 2589S, 2590S), No. 299 (2532S, 2622S, SA, 2698S), No. 301 (2593S), No. 302 (2530S, SA), No. 307 (2626S, 2627S).
Repair Package (With Standard Metering Rods) - Carter No. 1783 (2214SB, 2219SB), No. 1853 (2404S, SA), No. 1855 (2582S, 2583S, 2584S, 2690S, 2691S, 2692S), No. 1856 (2505S, SA), No. 1857 (2589S), No. 1859 (2532S), No. 1861 (2593S). No. 1862 (2588S), No. 1864 (2530S, SA), No. 1869 (2590S), No. 1870 (2626S, 2627S), No. 1875 (2555S).

1956 CHEVROLET CORVETTE (TWO CARTER) CARBURETORS

CARTER CARBURETORS

CHEVROLET CORVETTE	Carburetor No.
1956	(Front) WCFB 2419S
	(Rear) WCFB 2362S

►*IMPORTANT NOTE: The PARTS CHANGES and new ADJUSTMENT PROCEDURE listed below are recommended for improved idling and low speed operation on cars equipped with Corvette Engine with Two Carburetors. This data supersedes that given in the 1956 Annual Data (Pgs. 244 & 251).*

►CHANGES, CAUTIONS, CORRECTIONS

►*RECOMMENDED CHANGES FOR IMPROVED IDLING & LOW SPEED OPERATION:* Make the following changes in the above carburetors and adjust carburetors in accordance with revised Idling Adjustment procedure below

1) Carburetor Parts Changes - Install following new low speed jets and metering rods in BOTH carburetors On REAR carburetor only, install an idle speed screw in the tapped boss on the carburetor (Screw No 101-376, Spring No 61-291, Washer No 136-174) This screw is used to adjust engine idle speed

Carburetor Parts Changes

	Original Part No.	New Part No.
Low Speed Jets	11-294S	11-263S
Metering Rods (Std)	75-1255	75-1356

2) Carburetor Installation & Flange Gasket Modification - Install each carburetor with TWO gaskets (1A-114 or 1A-113) which have been modified by cutting out entire center section as follows: Cut along centerline between two primary barrel bores and two secondary barrel bores, cut along line ¼" out and parallel to centerline between each primary bore and adjacent secondary bore

►*IDLE ADJUSTMENT PROCEDURE:* Engine must be at normal operating temperature (choke valve wide open, fast idle inoperative) Open and close throttle valves several times to make certain throttle valves seat properly *(see Throttle Linkage below).* Connect tachometer and vacuum gauge On Powerglide models, set brakes and place selector lever in Drive "DR" position Then adjust both carburetors as follows

1) - *On both front and rear carburetors, turn Idle Air Adjusting Screw IN until it is just seated and LEAVE SCREW IN THIS POSITION SO THAT NO AIR IS ADMITTED THROUGH THIS PASSAGE. These screws are NOT used for carburetor adjustment.*

2) - Adjust idle speed screw on REAR carburetor (this screw installed as part of carburetor parts change - see Recommended Changes above) for correct hot or slow idle speed of 600 RPM (Standard Camshaft - Engines with "GR" or "GS" engine number suffix), 800-850 RPM (Special Camshaft - Engines with "GT" or "GU" engine number suffix) *NOTE* - Throttle valves in FRONT carburetor remain seated at idle speed

3) - Adjust both idle mixture screws on each carburetor (rear carburetor first, front carburetor second) for highest vacuum reading and engine RPM with best engine idle "feel".

4) - Reset engine idle speed (2 above).

5) - Repeat idle mixture screw adjustment (3 above).

6) - Check and reset engine idle speed (2 above)

►*THROTTLE LINKAGE ADJUSTMENT:* Remove carpet adjacent to accelerator pedal. Remove air cleaners and throttle pull back springs on carburetors. With REAR carburetor throttle valves wide open, accelerator pedal should be 3/8" from toeboard. Adjust by changing length of accelerator linkage rod at rear carburetor (remove clip and turn trunnion nut on rod). Holding rear carburetor throttle valves wide open, check FRONT carburetor for throttle valves being wide open and against throttle stop. Adjust by turning nut on front carburetor control shaft. *NOTE* - With correct linkage adjustment, front carburetor throttle valves begin to open with rear carburetor at half-throttle.

►*OTHER CARBURETOR DATA: S "Chevrolet Corvette (Two Carter Carburetors)" in 1956 Annual Data.*

1957 CARTER WCFB 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Metering Rod No.			Metering Rod Jet		Main Nozzle		Low Speed Jet		Pump Jet	
			Standard	1 Size Lean	2 Size Lean	Size	Part No.	Size	Part No.	Size	Part No.	Size	Part No.
CADILLAC, Eldorado Eng.													
Front, No A.C. (Early)	1957	2582S Pri.	75-1347			.096"	120-160	⑩		.0292"	11-306S	.0292"	48-253S
		2582S Sec.				.055"	120-174	⑩					
Front, W/A.C. (Early)	1957	2584S Pri.	75-1347			.096"	120-160	⑩		0292"	11-306S	.0292"	48-253S
		2584S Sec.				.055"	120-174	⑩					
Rear, All (Early)	1957	2583S Pri.	75-1347			.096"	120-160	⑩		.0292"	11-306S	.0292"	48-253S
		2583S Sec.				.055"	120-174	⑩					
Front No A C (Late)	1957	2690S Pri.	75-1347			.096"	120-160	⑩		.0292"	11-306S	.0292"	48-253S
		2690S Sec.				.055"	120-174	⑩					
Front W/A C (Late)	1957	2692S Pri.	75-1347			.096"	120-160	⑩		.0292"	11-306S	.0292"	48-253S
		2692S Sec.				.055"	120-174	⑩					
Rear,All (Late)	1957	2691S Pri.	75-1347			.096"	120-160	⑩		.0292"	11-306S	.0292"	48-253S
		2691S Sec.				.055"	120-174	⑩					
CHEVROLET													
V8 (Pwr.Pk., S.M)	1957	2555S Pri.	75-1386 ⑭	75-1419	75-1420	086"	120-165	⑩		.031"	11-302S	.024"	48-233S
		2555S Sec.				076"	120-177	⑩					
V8 (Pwr.Pk.,Auto.Trans.)	1957	2505S,SA Pri.	75-1349	75-1402	75-1415U ⑭	.086"	120-165	⑩		.031"	11-302S	.024"	48-233S
		2505S,SA Sec.				.076"	120-177	⑩					
Corvette	1957	2655S Pri.	75-1385			.086"	120-165	⑩		.031"	11-302S	.024"	48-233S
		2655S Sec.				.061"	120-186	⑩					
Corvette Eng. (Front)	1957	2626S Pri.	75-1350			.0935"	120-166	⑩		.031"	11-302S	024"	48-233S
		2626S Sec.	-			.053"	120-217	⑩					
Corvette Eng. (Rear)	1957	2627S Pri.	75-1350		-	.0935"	120-166	⑩		.031"	11-302S	.024"	48-233S
		2627S Sec.				.053"	120-217	⑩			-		

1957 CARTER WCFB 4-BARREL CARBURETOR JET SPECIFICATIONS (Continued)

Car Model	Year	Carburetor No.	Metering Rod No.			Metering Rod Jet		Main Nozzle		Low Speed Jet		Pump Jet	
			Standard	1 Size Lean	2 Size Lean	Size	Part No.	Size	Part No.	Size	Part No.	Size	Part No.
CHRYSLER													
C75-1 (Powerpack)	1957	2589S Pri.	75-1336	75-1387	75-1413	0935"	120-166	⑩		.032"	11-295S	.025"	
		2589S Sec.				.061"	120-186	⑩		.032"	11-295S		
C75-2	1957	2589S Pri.	75-1336	75-1387	75-1413	.0935"	120-166	⑩		.032"	11-295S	.025"	
		2589S Sec.				.061"	120-186	⑩		.032"	11-295S		
C76 & Imperial	1957	2590S Pri.	75-1344	75-1365	75-1336	.0935"	120-166	⑩		.032"	11-295S	.025"	
		2590S Sec.				.0635"	120-176	⑩		.032"	11-295S		
DE SOTO													
S26 (Auto. Trans.)	1957	2588S Pri.	75-1365	75-1336	75-1387	.0935"	120-166	⑩		.032"	11-295S	.025"	
		2588S Sec.				.061"	120-186	⑩		.032"	11-295S		
S25,S27 (Powerpack)	1957	2532S Pri.	75-1327	75-1328	75-1410	.0945"	120-164	⑩		.035"	11-278S	.0225"	48-174S
		2532S Sec.				.067"	120-185	⑩		.035"	11-278S		
DODGE													
V8 (Powerpack)	1957	2532S Pri.	75-1327	75-1328	75-1410	0945"	120-164	⑩		035"	11-278S	0225"	48-174S
		2532S Sec.				067"	120-185	⑩		035"	11-278S		
D-500 (Later)	1957	2622S,SA Pri.	75-1251 ⑮	75-1328		0945"	120-164	⑩		.035"	11-278S ⑯	.0225"	48-174S
		2622S,SA Sec.				067"	120-185	⑩		035"	11-278S ⑯		
D-500 (Police Car)	1957	2698S Pri.	75-1373			098"	120-163	⑩		.035"	11-278S	0225"	48-174S
		2698S Sec.				082"	120-158	⑩		.035"	11-278S		
HUDSON													
Hornet V8	1957	2593S, SA Pri.	75-1364 ⑰	75-1392	75-1393U ⑦①	098"	120-163	⑩		.031"	11-302S	025"	48-234S
		2593S, SA Sec.				.0635"	120-176	⑩					
LINCOLN & CONTINENTAL													
All	1957	2404S, SA Pri.	75-1333	75-1354	75-1362U ⑦②	1015"	120-162	⑩		.0292"	11-282S	0292"	48-256
		2404S, SA Sec.				073"	120-175	⑩					
MERCURY													
368" Engine	1957	2404S, SA Pri.	75-1333	75-1354	75-1362U ⑦②	.1015"	120-162	⑩		0292"	11-282S	.0292"	48-256
		2404S, SA Sec.				073"	120-175	⑩					
NASH													
Ambassador V8	1957	2593S, SA Pri.	75-1364 ⑰	75-1392	75-1393U ⑦①	.098"	120-163	⑩		.031"	11-302S	.025"	48-234S
		2593S, SA Sec.				0635"	120-176	⑩					
PLYMOUTH													
P31,2,3 Powerpack (All Transmissions)	1957	2530S, SA Pri.	75-1227 ⑱	75-1280		089"	120-159	⑩		02925"	11-309S ⑦⓪	.0225"	48-174S
		2530S, SA Sec.				.061"	120-186 ⑲	⑩		.02925"	11-309S ⑦⓪		
RAMBLER													
V8 (Powerpack)	1957	2593S, SA Pri.	75-1364 ⑰	75-1392	75-1393U ⑦①	098"	120-163	⑩		031"	11-302S	.025"	48-234S
		2593S, SA Sec.				0635"	120-176	⑩					
Rebel	1957	2593S, SA Pri.	75-1364 ⑰	75-1392	75-1393U ⑦①	.098"	120-163	⑩		031"	11-302S	025"	48-234S
		2593S, SA Sec.				0635"	120-176	⑩					
STUDEBAKER													
Comm. & Pres.(Powerpack, S.M.)	1957	2219SB Pri.	75-1141	75-1154	75-1155U ⑦③	089"	120-159	⑩		.031"	⑱	.024"	48-228S
		2219SB Sec.				0595"	120-196	⑩					
Comm. & Pres. (Powerpack, Auto. Trans.)	1957	2214SB Pri.	75-1141	75-1154	75-1155U ⑦③	089"	120-159	⑩		.031"	⑱	.024"	48-228S
		2214SB Sec.				0595"	120-196	⑩		.031"			

⑩ - Nozzle is installed permanently. **Do not remove.**

⑱ - Installed permanently. **Do not remove.**

⑭ - Supersedes No. 75-1349.

⑮ - Supersedes No. 75-1373 on 2622S.

⑯ - Supersedes No. 11-295S which supersedes No. 11-310S.

⑰ - Supersedes No. 75-1330.

⑱ - Supersedes No. 75-1251 which supersedes No. 75-1324.

⑲ - Supersedes No. 120-174.

⑦⓪ - Supersedes No. 11-283S.

⑦① - Kit consists of 2 metering rods 75-1404, and 2 metering jets 120-196.

⑦② - Kit consists of 2 metering rods 75-1355, and 2 metering jets 120-186.

⑦③ - Kit consists of 2 metering rods 75-1164, 2 metering jets 120-174, and 1 vacuum piston spring 61-230.

⑦④ - Kit consists of 2 metering rods 75-1403 and 2 metering jets 120-175.

CARTER AFB 4-BARREL CARBURETORS

	Carter Carb. No.
BUICK	
Series 50, 60, 70	2507S
CADILLAC	
See SEPARATE "Cadillac (Carter & Rochester)" data for adjustment specifications and procedures.	
CHRYSLER & IMPERIAL *(Carter WCFB Carbs. used on early cars).*	
C75-1 With Power Pack (Later)	2686S
C75-2 (Later)	2686S
C76 (Later)	2448S
IM-1, 2, 3 (Later)	2448S
FORD	
312 Cu. In. Engine	2441S, SA
MERCURY	
312 Cu. In. Engine	2441S, SA
PONTIAC	
Super Chief & Star Chief	2506S

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 BUICK CHOKE VALVE STICKING CORRECTION (Causing Hard Starting):* This condition is caused by air cleaner interference with choke linkage which allows the choke to be held open. Correct by installing a new carburetor-to-air cleaner gasket, Part No. 1458911.

►*1957 BUICK CARBURETOR CHANGES FOR IMPROVED PERFORMANCE:* Make the following changes on carburetors bearing date codes before "B-7". On carburetors with date code "B-7" and later or with date codes having a suffix letter "X", the changes have been made in production. On carburetors having an "X" stamped or scribed adjacent to left front mounting bolt hole, indicates that the changes were made in service. Date codes are stamped on the rear portion of the throttle body flange (brass identification tags are no longer stamped with the date codes).

1) Accelerating Pump Plunger Spring Replacement (To liminate a lean flat spot on light acceleration) - Install pump plunger and spring assembly, Carter No. 64-209S.

2) Secondary Throttle Operating Lever (To eliminate a lean or sag spot) - This condition may be experienced when engine is at normal operating temperature on one-half to seven-eights throttle acceleration. Correct by installing Secondary Throttle Operating Lever, Carter No. 53A-419, noting the following: When installing lever, secondary throttle return spring should be wound one complete turn clockwise. Make sure that the pick-up lever on primary throttle shaft contacts the loose lever at both points at the same time. If not, bend pick-up lever to obtain proper engagement. Also make sure that primary and secondary throttle valves come to wide open position at the same time. Bend throttle connecting link as necessary.

3) Aut matic Ch k Vacuum Pist n (To liminat a l ading c nditi n n arly warm-up) - Install Automatic Choke Piston, Carter No. 160-125.

►*1957 BUICK ENGINE ROUGHNESS & INCORRECT IGNITION TIMING CORRECTION:* On cars having carburetors bearing code dates K-6, L-6, M-6 & A-7 (Stamped on rear portion of throttle body flange), this condition may be caused by distributor vacuum advance operating during engine idle. To check, operate engine at 485 RPM and disconnect vacu m spark line at throttle body. Attach a vacuum gauge to fitting on carburetor and if gauge indicates 5" or more of vacuum, the one throttle valve (primary) which operates vacuum advance unit must be replaced using Throttle Valve, Carter No. 2-208. If for any reason, production throttle valves on the above identified carburetors need replacement, and the vacuum advance operation has been satisfactory, the standard throttle valve, Carter No. 2-186 should be used.

►*1957 CHRYSLER CARBURETOR FLOODING CORRECTION:* This condition is caused by dirt or foreign matter lodging between fuel inlet needle and seat and can be corrected by installing a new fuel inlet needle and seat assembly, Carter No. 25-343S which has a longer standpipe than previous assemblies. When installing this new assembly, thoroughly clean carburetor and fuel filter. *NOTE* - If Carter No. 25-343S is not available, Carter No. 25-279S can be used by cutting off the standpipe section so the overall length is 1 1/16". Remove all burrs and clean thoroughly before installing.

►*1957 FORD & MERCURY SURGE AT 50-60 MPH (DUE TO LEANNESS) CORRFCTION:* Install the following new parts: Primary Venturi Assembly (choke side), Carter No. 58-179S. Primary Venturi Assembly (pump side), Carter No. 58-180S. Vacuum Piston Spring, Carter No. 61-259. Step-Up (Metering) Rod, Carter No. 16-28.

►*1957 FORD & MERCURY SECONDARY JET CHANGE (To correct rich mixture at high altitudes):* When installing 2-step lean step-up rods for high altitude operation (10,000-15,000 ft.), install secondary metering jet, Carter No. 120-186, which supersedes Carter No. 120-176.

►*1957 FORD & MERCURY CHOKE SETTING CHANGE:* Initial choke setting has been changed from 2 points rich to 1 point rich from index.

►*1957 FORD HARD (HOT) STARTING CORRECTION:* Install a new "resinoid" spacer, Part No. B7A-9603-D between carburetor and intake manifold to replace the former aluminum spacer. Heat transfer between manifold and carburetor will be reduced with the later type spacer.

DESCRIPTION: This new carburetor is a four barrel downdraft type having the float bowl (main body assembly) cast integrally with the throttle body. The primary section contains a low speed (idle) system, high speed system, choke, accelerating pump, dashpot, and vacuum operated metering rods. The secondary section contains only a high speed system. Two separate float bowls are used, each of which supply fuel to both the primary and secondary sections.

Fuel System: A single fuel inlet and passages in air horn casting direct fuel to right and left hand float bowls. Floats operate independently of each other and the float bowls are vented to the air cleaner with a connecting passage between the bowls to maintain a uniform air pressure on the fuel.

Idling & Low Spe d (Primary Sid)—Fuel for idling and early part throttle operation is metered through the low speed circuit on primary side only (secondary throttle valves remain closed). With primary throttle valves closed or at idle position, fuel enters the idle wells through the main metering jets and is metered in the low speed jets. As the fuel passes the economizer, air enters the by-pass and air bleeds and the mixture is discharged at the idle discharge ports and the idle mixture adjustment screw ports in both primary throats.

High Speed (Primary Side)—As primary throttle valves are opened, manifold vacuum at idle ports drops, diminishing fuel-air flow through idle system. At this point, venturi vacuum is increased causing fuel to flow from the high speed nozzles, with the amount of fuel delivered being governed by throttle valve opening and the position of the main metering rods in main metering jets. The position of the main metering rods (one for each primary barrel) is controlled by manifold vacuum applied to the vacuum piston. The metering rods do not require adjustment. As the vacuum existing in primary venturi draws fuel from primary main metering jet and main well up to the high speed nozzle, the fuel passes through the main well tube and is mixed with air which enters the vent tube through the primary venturi high speed air bleed. The air-fuel mixture is then discharged from high speed nozzle into carburetor venturi. The high speed air bleed also acts as an anti-percolator vent when engine is hot.

High Speed (Secondary Side)—Fuel for the high speed circuit of the secondary side is metered through secondary metering jets, and with secondary system supplementary at high speeds only, metering rods are not used. When secondary throttle valves are opened, fuel is drawn from secondary metering jets and wells, through the secondary venturi main well, where it is mixed with air from secondary venturi air bleed and discharged out of the secondary high speed nozzles.

Accelerating Pump (Primary Sid): Pump is conventional type with pump plunger linked to primary throttle valve lever. When the throttle is opened, the pump plunger moves downward and forces fuel out through pump discharge ports. Intake and discharge ball checks are provided in the pump circuit to prevent air being drawn into the system or fuel being forced back into the bowl. During high speed operation, a vacuum exists at pump discharge ports. To prevent fuel from being drawn into pump through pump circuit and out the ports, the pump jets are vented by a cavity between pump jet restrictions and discharge ports. This allows air instead of fuel to be drawn through the pump discharge ports.

Automatic Choke (Primary Sid): Conventional type Carter Climatic Control with thermostatic coil.

Automatic Secondary Throttle C ntr l (F rd & M rcury): Consists of a diaphragm type vacuum control unit which opens and closes the secondary throttle valve in accordance with air velocity through primary venturi (vacuum passage at primary venturi is connected with a vacuum passage in secondary venturi). When secondary throttle valves are closed, the primary venturi vacuum is bled off through the secondary vacuum ports. When accelerator is fully depressed, the second-

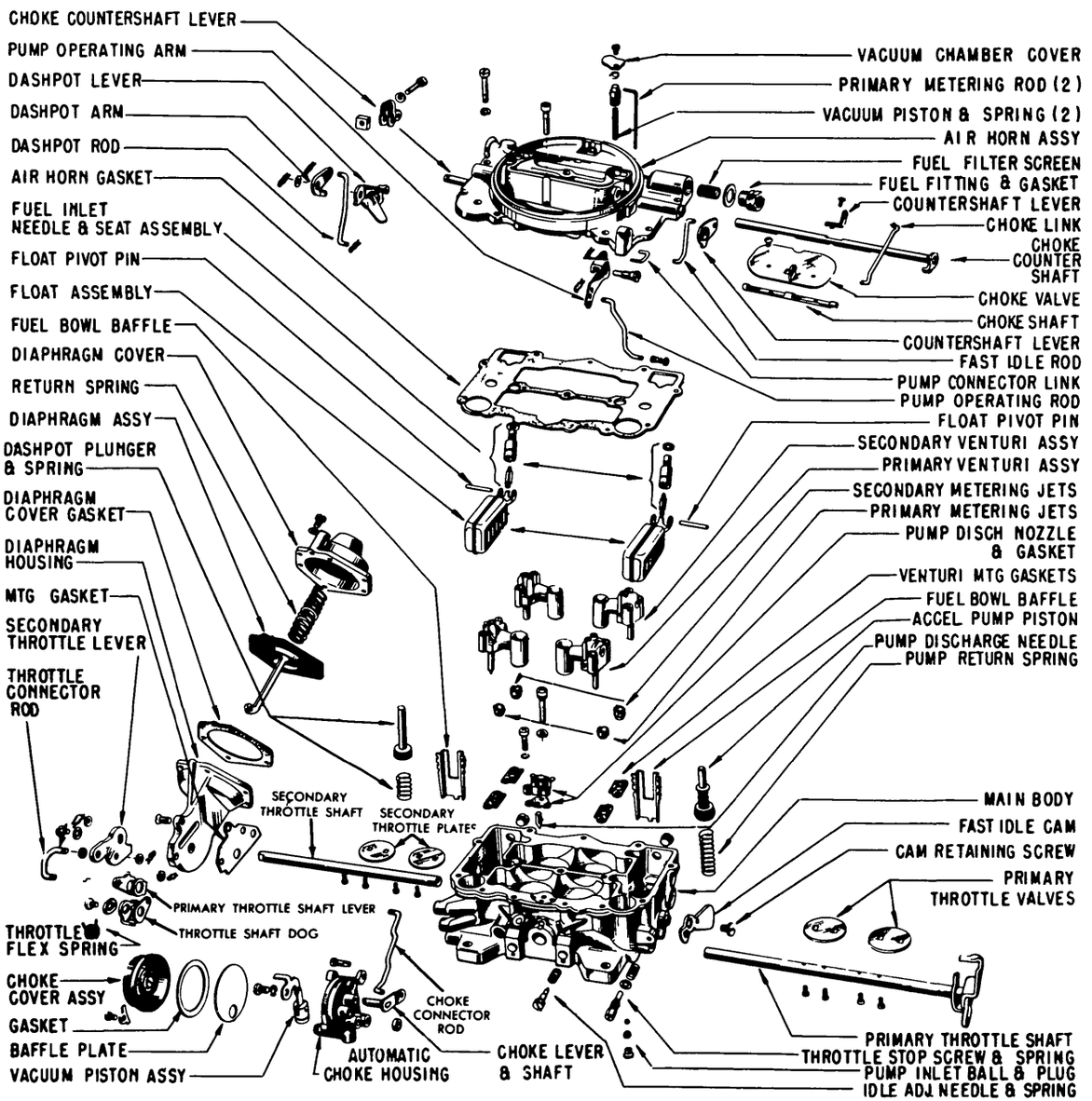
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CARTER AFB 4-BARREL CARBURETORS (C nt.)

ary throttle valves, through linkage are forced a few degrees off the closed position, and close the secondary vacuum ports, causing the vacuum to be applied directly to diaphragm control unit, opening the secondary throttle valves fully. A mechanical overriding linkage insures that secondary valves will always close with the primary throttle valves.

Auxiliary Throttle Valve (Buick & P ntiac): Velocity valves located directly over secondary valves (action is controlled by counterweights on shaft and valves are not operated by throttle linkage).

Spring Loaded Primary Throttle Linkage (Ford & Mercury): Consists of a torsion spring on the throttle shaft between the flex dog and throttle spring arm with a stop pin located on the throttle shaft dog. Special throttle linkage adjustment required (see "Adjustment" below).



CARTER AFB 4-BARREL CARBURETOR (FORD & MERCURY)
(BUICK, CHRYSLER & PONTIAC SIMILAR—SECONDARY VACUUM UNIT NOT USED)

ADJUSTMENTS: *Make all adjustments as indicated below.*

Idle Setting: *Adjust only with engine at normal operating temperature with automatic choke not operating (choke valve wide open, fast idle inoperative so that engin idles at hot or slow idle speed).* If initial adjustment required to allow engine to be started and warmed up, set both idle adjusting screws as indicated in table below (use tachometer), then adjust each idle mixture adjusting screw (one screw for each primary barrel—two screws only) until engine idles smoothly and RPM is at maximum.

Idle Mixture Setting

Car & Carb.	Idle Screw Op ning
Buick 2507S	¾-1¾ turns
Chrysler 2448S, 2686S	¼-1¾ turns
Ford 2441S, SA	½-1½ turns
Mercury 2441S, SA	½-1½ turns
Pontiac 2506S	1-2 turns

Idle Speed Setting

Car	Synchro-mesh	Auto. Trans.
Buick		① 485 RPM
Chrysler		② 500 RPM
Ford	475-500 RPM	② 425-500 RPM
Mercury	475-500 RPM	② 425-500 RPM
Pontiac	③ 450-470 RPM	②③ 430-450 RPM

① - With transmission selector lever in "N" (Neutral)
② - With transmission selector lever in "D" (Drive)
③ - 500-520 RPM with Air Conditioner unit turned "OFF"

Accelerating Pump: Back off idle speed screw until throttle valves seat in bores of carburetor (make sure choke is wide open so fast idle cam does not hold throttle valves open). Place pump operating rod in center hole (Ford & Mercury), and measure the distance from top of air horn to top of plunger shaft (Ford & Mercury), from top of bowl cover to top of plunger shaft (Buick, Chrysler & Pontiac) This measurement should be as indicated below Adjust by bending throttle connector rod at lower angle

Accelerating Pump Setting

Car & Carb.	Setting
Buick 2507S	33/64"
Chrysler 2448S, 2686S	7 16"
Ford 2441S, SA	① 15/32"
Mercury 2441S SA	① 15 32"
Pontiac 2506S	15/32"

① - This supersedes previous setting of 27/64"

Metering Rods: *No adjustment required. Metering rods are not used on secondary side.*

Float Setting: Align float by sighting down side of float to determine if side of float is parallel to outer edge of horn casting. To adjust, bend float lever by applying pressure to end of float shell with fingers while supporting float lever with the thumb *(CAUTION–Apply only enough pressur to bend float l ver).* After aligning float, remove as much clearance as possible between arms of float lever and support lugs on air horn by bending both arms of the lever. Arms should

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CARTER AFB 4-BARREL CARBURETORS (C nt.)

be parallel to inner surfaces of support lugs and float must operate freely without excess clearance on hinge pin.

Float Level–*Both floats are set to the same height.* With air horn inverted, bowl cover gasket in place and needle seated, measure the distance between top of float at outer end and air horn gasket with the proper gauge (see table below). Adjust by bending float arm.

Float Level Setting

Car & Carb.	Height	Gauge No.
Buick 2507S	7/32"	T109-106
Chrysler 2448S, 2686S	5/16"	T109-107
Ford 2441S, SA	5/32"	T109-154
Mercury 2441S, SA	5/32"	T109-154
Pontiac 2506S	© 17/64"	T109-238

© -Plus or minus 1 64"

Float Drop (All Models)–23/32" with bowl cover held in upright position and measured from outer end of float to bowl cover gasket. Adjust by bending stop tabs on float bracket.

Automatic Choke: See table below for settings. Adjust by loosening choke cover screws and rotating cover and coil assembly. Then adjust Choke Piston Lever and Choke Shaft Lever.

Automatic Choke Setting

Car & Carb.	Choke Setting
Buick 2507S	Centered (At Index)
Chrysler 2448S, 2686S	One Point Rich
Ford 2441S, SA	© One Point Rich
Mercury 2441S, SA	© One Point Rich
Pontiac 2506S	Centered (At Index)

© - Supersedes previous setting of 2 Points Rich

Ch ke Piston Lever Adjustment: Buick & Pontiac 045" (Gauge T109-158), Chrysler 040" (Gauge T109-193), Ford & Mercury 086" (Gauge T109-215) clearance between choke lever and stop in piston housing with choke held closed To adjust, bend choke connector rod (Buick, Chrysler & Pontiac), remove slack from linkage by setting choke countershaft lever (Ford & Mercury)

Ch ke Shaft Lever Adjustment (Exc. Chrysler): 010" (Gauge T109-200) clearance between lug on outer choke shaft lever (Buick & Pontiac), outer countershaft lever and stop on inner lever with choke valve tightly closed and fast idle cam against stop on casting (Ford & Mercury) To adjust bend fast idle connector rod (Buick & Pontiac), bend lug on outer countershaft lever (Ford & Mercury)

► *FORD, MERCURY & FONTIAC OPTIONAL CHOKE SHAFT LEVER ADJUSTMENT (LATER CARBURETORS).* With slight clearance between lug on fast idle cam and stop on flange casting, and with inner countershaft lever contacting lug on outer countershaft lever, align index mark on cam with adjusting screw To adjust, bend fast idle connector rod

Chok Shaft Lev r Adjustm nt (Chrysler): With choke valve tightly closed and lug on outer choke shaft lever contacting stop on inner choke shaft lever, align center of fast idle screw with index mark on cam To adjust, bend fast idle connector rod

Fast Idl : This adjustment can be made with carburetor either on or off the car.

Fast Idle Adjustment - Off Engine (Exc. Chrysler) - With choke valve tightly closed and fast idle adjusting screw on high step of fast idle cam, insert a feeler gauge (see table below) between lower edge of primary throttle valve and throttle bore on side opposite idle ports Turn fast idle screw as necessary to obtain correct adjustment

Fast Idle Adjustment - Off Engine (Chrysler) - With choke valve tightly closed clearance between lower edge of throttle valve and bore of carburetor should be 012" (Gauge T109-200) with center of fast idle adjusting screw aligned with index mark on fast idle cam

Fast Idle Setting (Off Engine)

Car & Carb.	Checking Gauge Size & No.
Buick 2507S	.026" T109-189
Ford 2441S, SA	.020" T109-29
Mercury 2441S, SA	.020" T109-29
Pontiac 2506S	.030" J-1388

Fast Idle Adjustment - On Engine (All Models) - With engine at normal operating temperature, transmission in neutral, and air cleaner in place on carburetor, rotate fast idle cam so fast idle screw is on high step of cam (Except Chrysler) so fast idle screw is aligned with index on cam (Chrysler) Adjust fast idle screw to obtain an engine speed as indicated below

Fast Idle Setting (On Engine)

Car & Carb.	Engine RPM
Buick 2507S	1500 RPM
Chrysler 2448S	1450-1500 RPM
Chrysler 2686S	1300-1350 RPM
Ford 2441S, SA	1800-2000 RPM
Mercury 2441S, SA	1800-2000 RPM
Pontiac 2506S	1900 RPM

Unloader: After Choke Rod adjusted (see above), rotate primary throttle valves to wide open position. Use gauge indicated (see table below) to check clearance between upper edge of choke valve and wall of air horn. To adjust, bend unloader lip on primary throttle shaft lever with tool T109-214.

Unloader Setting

Car & Carb.	Checking Gauge Size & No.
Buick 2507S	3 16" T109-28
Chrysler 2448S, 2686S	1 4" T109-31
Ford 2441S, SA	067" T109-234
Mercury 2441S, SA	067" T109-234
Pontiac 2506S	1 8" T109-36

Dashpot (Ford & Mercury): With primary throttle valves in wide open position there should be a distance of 7/16" between top surface of bowl cover and bottom of dashpot arm lever. To adjust, bend dashpot inner arm tang with Tool T109-22.

Auxiliary Throttle Valves (Buick & Pontiac): Velocity type valves. No adjustment required.

S c ndary Throttle L ver Adjustment (Chrysler): Block choke valve wide open With 19 64" clearance between lower edge of primary valve and bore opposite the idle ports, secondary valves should just start to open To adjust, bend operating rod *(NOTE - At wid open throttle primary and secondary valves will reach full vertical position)* With primary and secondary throttle valves in tightly closed position there should be 017-022" (Gauge T109-29) clearance between positive closing shoes on primary and secondary throttle levers. To adjust, bend shoe on secondary throttle lever

Secondary Throttle Lever Adjustment (Buick & Pontiac): Fully open primary and secondary throttle valves. Stop lugs on both primary and secondary throttle levers should contact boss on flange at the same time. To adjust, bend secondary throttle operating rod at angle. *(NOTE–Secondary throttle valves will be a few degrees from vertical at wide open throttle).* With primary and secondary throttle valves in tightly closed position, the clearance between positive closing shoes on primary throttle levers should be 017-022" (Gauge T109-29) To adjust bend shoe on primary lever (Buick), secondary lever (Pontiac).

Secondary Throttle Lockout Adjustm nt (Buick, Chrysler & Pontiac): Crack throttle valves and manually open and close choke valve Tang on secondary throttle lever should freely engage in notch in lockout dog To adjust, bend tang on secondary throttle lever

Spring Loaded Primary Throttle Linkage (Sec ndary Throttle Operation): (Ford & Mercury)–With primary throttle valves in wide open position there should be a clearance of .015" (Gauge T109-44) between edge of secondary throttle valves and bore of carburetor adjacent to primary throttle valves. To adjust, bend rear tang (closest to diaphragm housing) on primary throttle shaft dog *(NOTE–To decrease clearance, bend tang toward end of spring).* With primary and secondary throttle valves in tightly closed position, there should be a clearance of .067" (Gauge T109-234) between primary throttle shaft flex spring and front (closest to choke housing) tang of primary throttle shaft.Dog. To adjust, bend tang with Tool T109-214.

Automatic Secondary Throttle Control (Ford & Mercury): This unit requires no adjustment. See that linkage is free and that there are no vacuum leaks between carburetor body and unit.

Buick Vacuum Starter Switch Timing Ch ck (On Car): Back off throttle stop screw and rotate fast idle cam to slow idle position, then fully close throttle valve *(CAUTION* - Make sure that dashpot does not prevent full closing of throttle) Measure distance from diaphragm flange of dashpot to near edge of dashpot arm on throttle lever. With ignition turned on, slowly open throttle while holding scale in position against flange of dashpot When cranking motor is energized note distance from flange of dashpot to near edge of dashpot arm. Subtract the two measurements If switch is properly timed, the difference should be 3 8-11 16" Adjust by changing timing shims located below contact spring in terminal cap

OVERHAUL: *CAUTION - When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor reassembled*

CONTINUED ON NEXT PAGE

CARTER AFB 4-BARREL CARBURETORS (C nt.)

Disass mbly: This carburetor consists of two main subassemblies (Air Horn & Main Body) which can be overhauled separately Remove air horn from main body as follows On all carburetors except Ford & Mercury, disconnect choke connector rod at choke shaft lever, then disconnect throttle connector rod at pump arm On Ford & Mercury remove air cleaner anchor screw then remove dashpot arm operating lever and choke countershaft lever On all cars disconnect fast idle connector rod at choke lever (choke countershaft lever on Ford & Mercury) On Ford & Mercury disconnect accelerating pump operating rod at pump arm On all cars remove air horn to main body attaching screws and lockwashers and remove air horn from main body by carefully lifting air horn assembly straight up

Air Horn - Remove fuel inlet strainer nut gasket and screen Remove power piston cover plate attaching screws and remove cover plate Remove both metering rods (step-up rods) If necessary rods may be separated from pistons Remove the two power piston springs On all cars except Ford & Mercury remove pump arm and link On Ford & Mercury remove pump plunger assembly Remove hinge pin float and float needle assemblies and mark for proper identification so they can be reassembled in the same location On all cars except Ford & Mercury remove screw and remove inner and outer choke shaft levers and washer Remove choke valve screws and remove choke valve and choke shaft On Ford & Mercury remove choke valve connector link, then slide choke valve countershaft out of air horn assembly Remove choke valve then remove choke valve shaft by sliding it out of air horn Remove and discard air horn gasket

Main Body - On Cadillac remove choke modifier rod at operating lever then loosen clamp screw on choke coil lever and remove lever On all cars remove three screws attaching coil housing to main body and remove coil housing and thermostatic coil Remove housing gasket and baffle plate To disassemble choke remove choke lever attaching screws and retaining washer then remove choke piston lever and link assembly by rotating piston in bore On Buick remove starter switch terminal cap return spring guide block assembly plunger and ball On all cars remove pump discharge nozzle assembly and gasket then remove primary and secondary venturi assemblies *(CAUTION - Venturi assemblies must be marked for reassembly in the same location)* Remove two primary and two secondary metering jets and mark them for reassembly in the same location On Buick Cadillac & Pontiac remove the auxiliary throttle valve assembly On all cars remove the pump return spring idle mixture screws and springs On Buick if starter switch strainer is not visibly damaged or clogged it need not be removed On all cars remove the pump return spring idle mixture screws and springs On Cadillac remove the large idle air adjustment screw and spring On all cars invert carburetor body and remove pump discharge check needle With body inverted remove pump intake screw plug, check ball seat and check ball Remove fast idle cam attaching screw and cam, then on all cars except Ford & Mercury remove spacer and lockout lever throttle operating rod throttle shaft washer secondary throttle lever and spring On Ford & Mercury remove throttle connecting rod, disconnect secondary operating diaphragm lever, then remove secondary throttle operating lever Remove secondary diaphragm housing cover return spring and diaphragm then remove diaphragm housing and gasket from main body On Cadillac, remove choke modifier operating lever On other cars remove throttle shaft arm throttle shaft dog and inner throttle shaft arm and flex spring from end of primary throttle shaft on choke side *NOTE - It is recommended that throttle body not be disassembled further, however, if necessary to remove throttle valves and shafts, proceed as follows* Mark all throttle valves so they can be reinstalled in the proper position with correct side of valve upward File burrs from staked ends of all throttle valve screws and remove screws and valves from shafts Remove secondary throttle shaft Remove primary throttle shaft using a rawhide hammer to tap shaft through retaining washer

Cleaning & Inspection: Clean all metal parts in carburetor cleaner and dry with compressed air *(CAUTION - Do not wash accelerator pump plunger assembly or thermostatic coil and cover assembly in cleaning solvent)* Clean and blow out all passages with air Remove any gum deposits in carburetor Clean carbon out of bowl assembly heat passages Make sure that all calibrated restrictions such as idle ports air bleeds and vents are clean but do not pass drills or wires through these passages Check all shafts and their bearing bores for wear Check each piston in its cylinder Check for worn or damaged jets and worn holes in ends of various levers Check accelerator pump plunger leather and replace as an assembly if leather is creased or cracked Examine float needles and seats and if needle is grooved replace needle and seat assembly Check idle mixture adjusting screws for burrs ridges or grooves and replace screws if necessary Check floats for dents or leaks and check hinge pin bores for burrs or wear and check pins for straightness Clean fuel inlet screen Check fast idle cam for excessive wear on steps and replace if necessary On Buick Cadillac & Pontiac check auxiliary throttle valve assembly to make sure it is free to swing and that weights do not rub on casting On all cars carefully check body assembly and valve assembly for wear at throttle valves and bores and between shafts and their bores On Ford & Mercury check secondary throttle diaphragm housing for cracks and check dashpot plunger leather for damage or wear Make sure the intake check and discharge restriction is free of lint gum or other foreign matter

Reassembly: Use all new gaskets Install parts in reverse order of disassembly procedure(above) and note the following

Valve Installation - Use new screws when installing valves Install valve shafts, then install valves in their respective bores with "C" in circle toward manifold side of carburetor Install new screws but do not tighten Make sure the idle speed adjusting screw is backed out then hold valves in place with fingers pressing on high side of valve Tap valves lightly with a screwdriver to seat them in the bores and while holding in this position tighten the screws securely Stake screws in place by squeezing with pliers

THROTTLE VALVE SETTING

Carb. No.	① Idle Port Opening	Vacuum P rt
2441S SA	187- 193"	② 040- 050"
2448S 2686S	142- 148"	② 026- 034"
2479S 2480S	082- 088"	③ 002- 003"
2506S	147- 153"	② 025- 035"
2507S	156- 162"	④⑤

① - Primary side (none on secondary) Above top edge of fully closed throttle valve

② - Top of port above top edge of fully closed throttle valve

③ - Bottom of port above lower edge of fully closed throttle valve

④ - Bottom of port above top edge of fully closed throttle valve

⑤ 000 010" (Early with valve No 2-186) 008- 016" (Late with Valve No 2-211)

Buick Vacuum Starter Switch Installation - Install starter switch ball plunger (with groove up) guide block assembly return spring terminal cap and screws in main body

Ford & Mercury Secondary Throttle Operating Diaphragm Installation - Install secondary throttle diaphragm housing with a new gasket and stake the screws into indentations with a prick punch Install secondary operating lever and attached operating rod secondary throttle shaft washer and screw Install secondary diaphragm and gasket in diaphragm housing Temporarily attach diaphragm rod to secondary throttle lever pin Install diaphragm return spring and housing cap with vacuum passage in cap indexing with vacuum passage in housing Install six screws and lockwashers *NOTE* - Diaphragm must be positioned so it is not under tension as the attaching screws are being tightened finger tight Disengage diaphragm rod and securely tighten the six screws Reinstall diaphragm rod and retain with spring retainer

SERVICE PARTS- Gasket Sets - Carter Nos 292 (2441S SA) Nos 313 (2448S 2686S) No 315 (2479S 2480S) No 293 (2506S) No 304 (2507S)

Repair Package (With Standard Step-up Rods) - Carter Nos 1851 (2441S SA) No 1876 (2448S 2686S) No 1902 (2479S 2480S) No 1852 (2506S) No 1866 (2507S)

1957 CARTER AFB CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Metering Jet Size	Metering Jet Part No.	Step-Up Rod	Venturi Assembly Main Nozzle	Venturi Assembly Low Speed Jet	Part Numbers ①	Part Numbers ②	Pump Jet Assy. Size	Pump Jet Assy. Part No.
BUICK											
50,60,70	1957	2507S Pri.	.0935"	120-166	16-25	⑩	.0292"	58-158S	58-159S	.028"	48-264S
		2507S Sec.	.0748"	120-229		⑩		58-151S	58-152S		
CADILLAC Std. Engine											
Without A.C.	1957	2479S Pri.	.098"	120-163	16-31	⑩	.032"	58-186S	58-187S	.025"	48-269S
		2479S Sec.	.082"	120-158		⑩		58-196S	58-197S		
With A.C.	1957	2480S Pri.	.098"	120-163	16-31	⑩	.032"	58-186S	58-187S	.025"	48-269S
		2480S Sec.	.082"	120-158		⑩		58-196S	58-197S		
CHRYSLER											
C-75-2	1957	2686S Pri.	.089"	120-159	16-35⑦	⑩	.031"	58-192S⑤	58-193S⑥	.028"	48-264S
		2686S Sec.	.061"	120-186		⑩		58-208S	58-209S		
C-76, IM-1,2,4	1957	2448S Pri.	.089"	120-159	16-35⑦	⑩	.031"	58-192S	58-193S	.028"	48-264S
		2448S Sec.	.0649"	120-226		⑩		58-208S	58-209S		
FORD											
V8 Power Pak	1957	2441S,SA Pri.	.0935"	120-166	16-28③④	⑩	.031"	58-179S⑧	58-180S⑨	.031"	48-258S
		2441S,SA Sec.	.0635"	120-176		⑩		58-142S	58-141S		
MERCURY											
312" Engine	1957	2441S,SA Pri.	.0935"	120-166	16-28③④	⑩	.031"	58-179S⑧	58-180S⑨	.031"	48-258S
		2441S,SA Sec.	.0635"	120-176		⑩		58-142S	58-141S		
PONTIAC											
Hydra-Matic Cars	1957	2506S Pri.	.098"	120-163	16-30⑪	⑩	.032"	58-177S	58-165S	.028"	48-255S
		2506S Sec.	.073"	120-175		⑩		58-164S	58-178S		

① - Choke side. ② - Pump side. ③ - Supersedes 16-14.

④ - 1 size lean 16-21; 2 sizes lean 16-22. Step-up rod 120-186 used with secondary jet 16-22.

⑤ - Supersedes 58-215S.

⑥ - Supersedes 58-216S.

⑦ - 1 size lean 16-39; 2 sizes lean 16-40

⑧ - Supersedes 58-170S which superseded 58-128S on 2441S with Air Horn 6-1304S which supersedes 6-1224S.

⑨ - Supersedes 58-179S which superseded 58-129S on 2441S with Air Horn 6-1304S which supersedes 6-1224S.

⑩ - Nozzle installed permanently. **Do not remove.**

⑪ - 1 size lean 16-46; 2 sizes lean 16-48U (Unitized Pkg. consisting of 2 step-up rods 16-47 and 2 metering jets 120-185).

1957 CARTER DUAL CARBURETORS

CARTER DUAL "WCD"

RAMBLER — **Carter Carburetor No.**

1957 Six (Powerpack) ..... WCD 2350S

1957 Six (Flash-O-Matic Powerpack) ..... WCD 2586S

►CHANGES, CAUTIONS, CORRECTIONS

► *CARBURETOR INSPECTION & INSTALLATION CAUTIONS (TO CORRECT FLASH-O-MATIC TRANSMISSION 1-2 SLIPPAGE OR 2-3 FILE-UP IN D1 RANGE):* Vacuum for transmission Solenoid & Vacuum Control is supplied from carburetor passage which terminates in two ports in carburetor as follows: 1) Vacuum port at throttle edge, 2) In carburetor mounting flange at choke vacuum supply passage. In correcting above transmission complaints, inspect carburetor and observe cautions as follows:

1) Carburetor Vacuum Ports - Check port at throttle edge for correct size (.0465") and make certain passages are not restricted. With throttle valves tightly closed, top edge of this port should be flush with bottom edge of valve.

2) Carburetor Mounting Flange & Gasket - Inspect mating surfaces of carburetor flange and manifold for unevenness, burrs, or chipped areas. These surfaces can be cleaned up by using crocus cloth on a surface plate. Inspect gasket for swelling at the vacuum port and channel area

DESCRIPTION: Dual downdraft carburetors with automatic choke. Same design as used on previous models except as noted below.

Carter 2586S Flash-O-Matic Carburetor Note - This carburetor has additional Vacuum Port at throttle edge for transmission control. With throttle valve tightly closed, top of port should be flush with butt edge of throttle valve.

ADJUSTMENT: *Set these carburetors to the following specifications:*

IDLING ADJUSTMENT

► *CAUTION - Adjust only with engine warmed up so that choke valve wide open and fast idle inoperative.*

Idle Mixture Screw Setting

Car	Idle Screw Opening
Rambler	½-1½ turns

Idle Speed Setting

Car	Synchro-mesh	①Auto. Trans.
Rambler	550 RPM	② 475 RPM

① - With Selector Lever in Neutral.

② - 500 RPM with Air Conditioning turned on.

ACCELERATING PUMP

Pump Stroke Check - Back off idler screw to fully close throttle valves and have choke valve wide open. Place straight edge across dust cover boss at pump arm. Bend throttle rod at upper angle (Tool T109-213) until pump arm is parallel with straight edge.

CONTINUED ON NEXT PAGE

CARTER "WCD" (C nt.)

METERING ROD ADJUSTMENT

►*CAUTION—Adjust metering rods AFTER Pump Stroke adjustment has been completed.*

Metering Rod Check— Check and adjust rods as follows: Back off throttle lever stopscrew so that throttle valves tightly closed, loosen metering rod arm clampscrew (on countershaft under dust cover on bowl cover), press down on vacumeter link until both metering rods just bottom in carburetor casting, rotate metering rod arm until finger on arm contacts lip on vacumeter link, tighten clampscrew *(CAUTION*—do not disturb arm position).

FLOAT LEVEL SETTING

►*RAMBLER "SPLIT" FLOAT NOTE.* Float assembly consists of two floats (right & left hand) and auxiliary lever Floats are adjusted in same manner as on other carburetors and should be set for uniform height (float level or vertical adjustment)

Float Level Setting—With bowl cover and float assembly removed from carburetor, invert assembly, remove cover gasket, install correct gauge on cover directly under floats with notched portions of gauge fitting over edge of cover casting. Sides of floats should just barely touch vertical legs of gauge (lateral adjustment). Adjust by bending arms of floats Both floats should just clear horizontal portion of gauge (vertical adjustment).

►***FLOAT SETTING CAUTION—Floats must be adjusted laterally (parallel to gauge uprights) as well as vertically (Float Level figure in table below).***

Float Level Setting

Car	Float Level	Checking Gauge
Rambler	5/32"	T109-196

CLIMATIC CONTROL (CHOKE) SETTING

Car	Choke Setting
Rambler	Centered (At Index)

FAST IDLE SETTING

CAUTION—TWO settings (1) and (2) required as explained below.

(1) Fast Idle Cam Clearance—Loosen choke valve lever clampscrew on choke shaft, insert gauge of correct thickness (See Checking Gauge (1) in table below) between lip of fast idle cam and boss on flange casting, hold choke valve tightly closed, remove all slack from linkage by pressing choke valve lever toward closed position, tighten choke valve lever clampscrew.

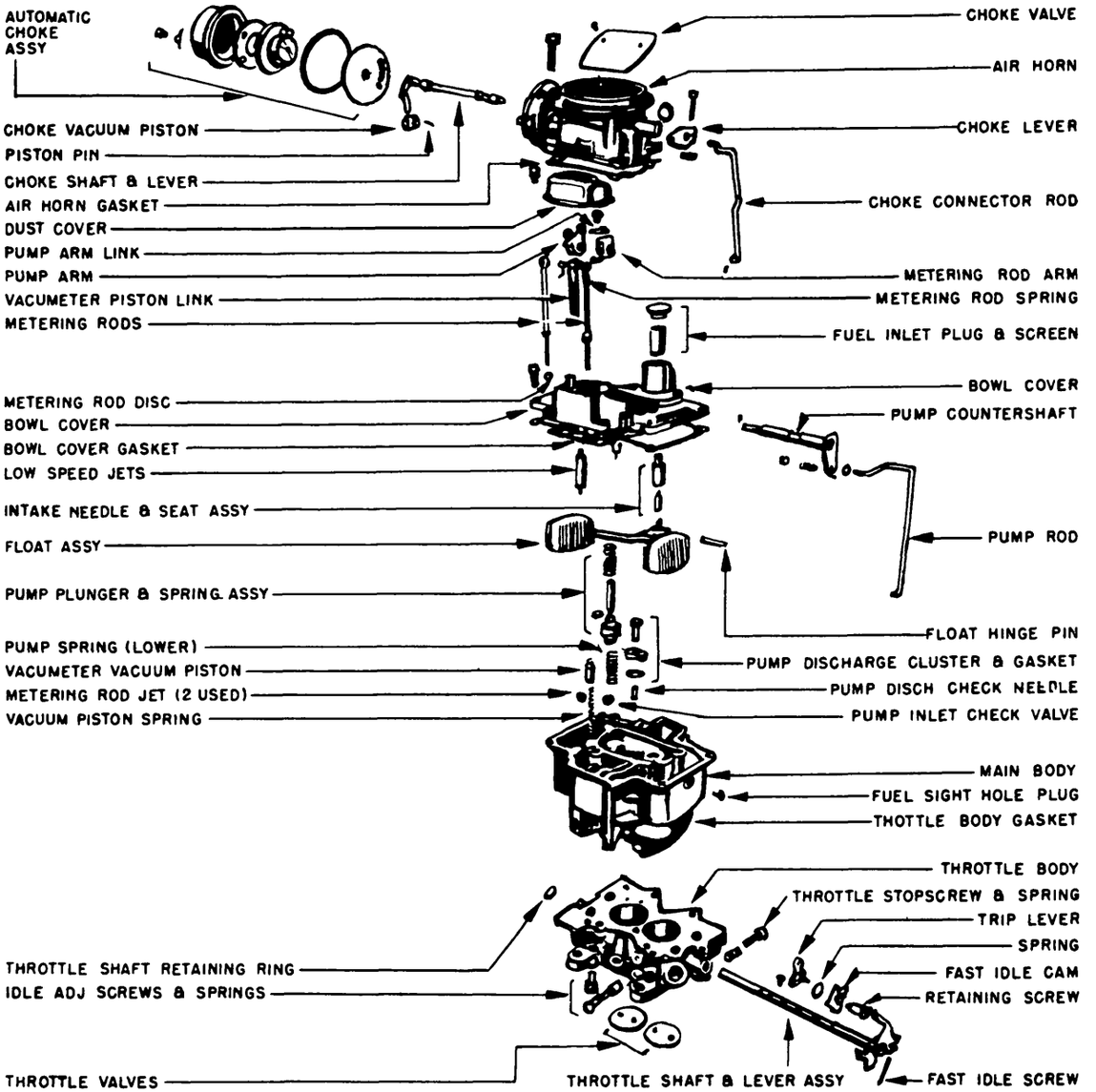
(2) Fast Idle Screw Setting—Hold choke valve tightly closed, tighten fast idle adjusting screw against high step of fast idle cam until throttle valve opening or clearance between edge of valve and carburetor bore on side opposite idle ports is correct (see Checking Gauge (2) in table below

Fast Idle Setting

Car Mod l	S tting & Checking Gauge (1)	(2)
Rambler	010" T109-200	020" T109-29

UNLOADER SETTING

►*CAUTION—Fast Idle Cam Clearance (Fast Idle Setting (1) above) must be adjusted befor Unloader Setting is adjusted*



CARTER "WCD" DUAL CARBURETOR

Unloader Setting—Check choke valve opening with throttle valve held wide open. Adjust by bending unloader lip on throttle shaft lever using bending tool T109-41.

Unloader Setting

Car	Choke Opening	Checking Gauge
Rambler	3/16"	T109-28

THROTTLE VALVE SETTING

Car	Idl P rt	Vacuum Spark P rt
Rambler	① 074- 080"	① 033- 043"

① - Top of port above top edge of valve

Carter 2586S Note - This carburetor has additional Transmission Control vacuum port Top edge of this port should be flush with bottom edge of valve

OVERHAUL: *See "Carter WCD" in Carburetion Secti n f 1955 Final Data or later Manual editions.*

SERVICE PARTS

Gask t Set - Carter No 285 (All Models)
R pair Pkg. (With Std. M t ring R d) - Carter No 1836 (All Models)

CARTER DUAL "WGD"

BUICK	Carter Carburetor No.
1957 Series 40 (Synchro-mesh)	WGD 2529S
1957 Series 40 (Dynaflow)	WGD 2536S
RAMBLER	
1957 V8 Series 5720	WGD 2352S, SA

►CHANGES, CAUTIONS, CORRECTIONS

►*BUICK PERFORMANCE IMPROVEMENTS (Synchro-mesh Cars with Carter 2529S Carburetor):* Parts listed below are used in later carburetors and can be installed in earlier carburetors to improve performance and correct complaints as indicated:

1) Lean Part Throttle Condition at 30-40 MPH - Install parts furnished in Unitized Kit, Carter No. 75-1383U (Buick No. 1180737) as listed below. This pump spring is included in new Pump Plunger, Rod, Spring, & Retainer Assy., Carter No. 64-208S (Buick No. 1180623). This Pump Plunger Assembly will be included in revised Repair Pkgs. and supersedes previous type assembly No. 64-200S.

Carter Unitized Pkg. No. 75-1383U

Part	New No.	Superseded No.
Metering Rods	75-1371	② 75-1348
Pump Plunger Spring ①	61-601	

① - Part of Pump Plunger Assy. No. 64-208S.
② - This rod now 1 Size Lean.

2) Loading During Warm-up Condition - Replace original Vacuum Piston in automatic choke housing with new type, Carter No. 160-122 (Buick No. 1179336), and change Automatic Choke Setting to 1 Point Lean (was 1 Point Rich). Also set Fast Idle Speed (on engine) to 1800 RPM (was 1500 RPM) as directed below. *NOTE* - Previous type Choke Vacuum Piston, Carter No. 160-157, is continued on 2536S carburetors.

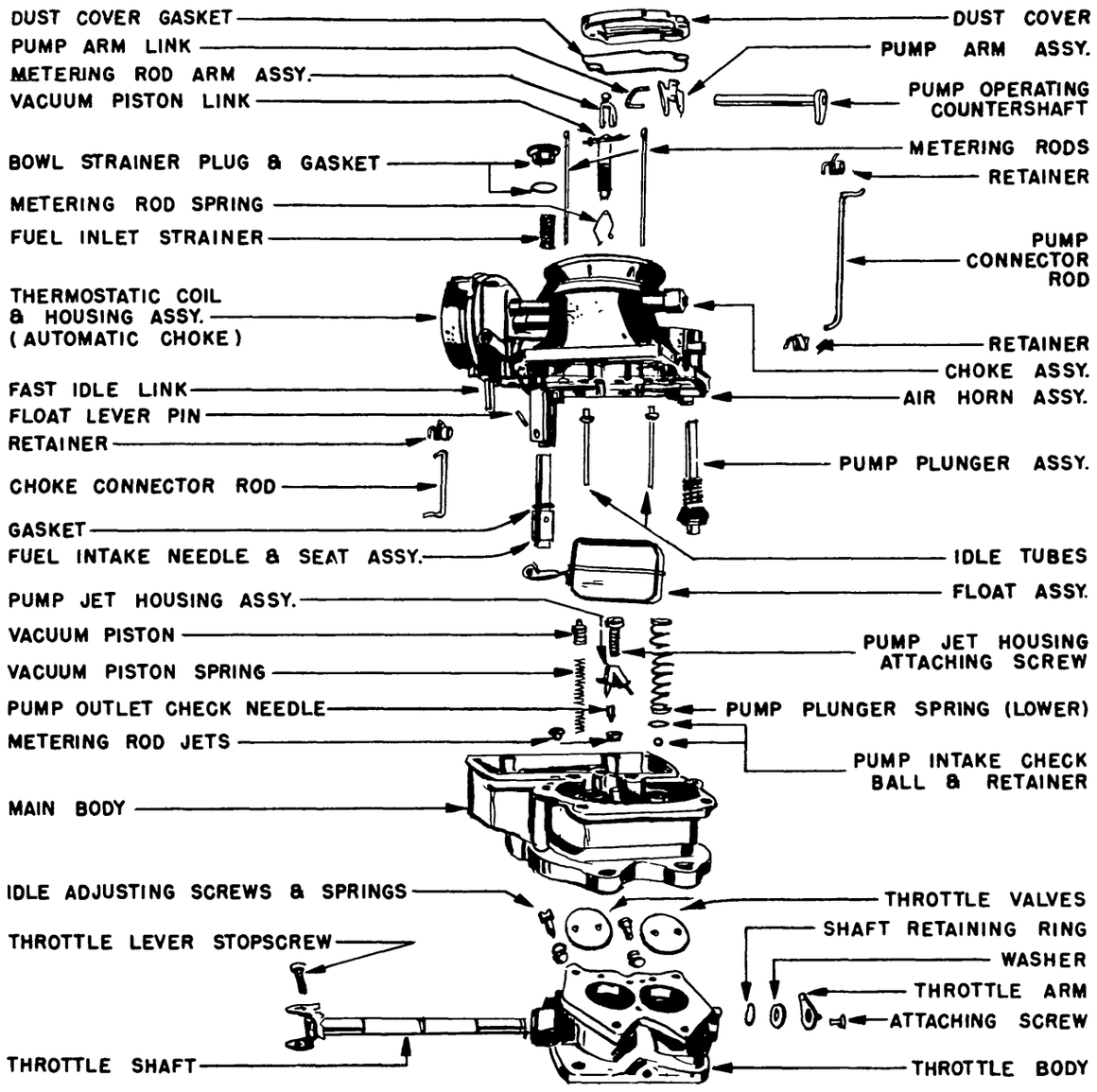
DESCRIPTION: Dual (double barrel) downdraft carburetors of same design used on previous Buick and Nash models. Buick carburetor has different Fast Idle Mechanism than that used on Rambler and each type is adjusted differently as detailed below.

ADJUSTMENTS: *Make all adjustments exactly as follows:*
Idle Setting: Adjust only with engine at normal operating temperature. With engine idling at correct hot or slow idle speed, adjust each idle mixture adjusting screw as follows: Turn screw in until engine begins to run unevenly due to lean mixture, then turn screw out until engine rolls due to rich mixture, finally turn screw in just enough for smoothest engine operation. Recheck idle speed.

Idl Mixtur Setting

Car	Idle Screw Setting
Buick ①	½-1½ turns
Rambler	½-1½ turns

① - Initial setting (for Warm-up) ¾ turn open.



CARTER TYPE WGD CARBURETORS

Idle Speed Setting

Car	Synchro-mesh	③ Auto. Trans.
Buick ②	485 RPM	485 RPM
Rambler	550 RPM	⑩ 475 RPM

② - Initial setting (for Warm-up) 1 turn in from point where screw contacts stop with throttle valves fully closed.
③ - With selector lever in Neutral.
⑩ - 500 RPM on Air Conditioned Cars with air conditioning turned ON.

Dashpot Adjustment (Buick): Used on Dynaflow Cars. *See Throttle Linkage Adjustment under CARBURETOR on car model page for Dashpot Adjustment.*

Accelerating Pump: Check pump stroke as follows: Remove dust cover over pump countershaft. On Buick, make certain that pump link connected in outer (long stroke) hole of pump arm. Back off throttle stopscrew so that throttle valves fully closed. Place straightedge

CONTINUED ON NEXT PAGE

CARTER DUAL "WGD" (Continued)

across dust cover boss in line with pump arm Top surface of pump arm should be parallel to straightedge Adjust by bending pump rod at offset using bending tool T109-213

Metering Rods: *CAUTION - Metering rods should be adjusted after Pump Stroke Adjustment completed No gauge required* Remove dust cover, back off throttle stopscrew so that throttle valves fully closed Loosen clampscrew on metering rod arm on pump countershaft, press down on vacuum piston link until metering rods just bottom in carburetor casting Hold link and rods in this position, revolve metering rod arm until tongue on arm just contacts lip on vacuum piston link, tighten clampscrew

Float Level: Remove bowl cover and float assembly and invert assembly so that float hangs freely with needle valve closed Measure distance from face of bowl cover to top of float at center using gauge listed below Adjust by bending float arm Make certain that float operates freely and that hinge pin clearance is not excessive

Float Level

Car	Checking Gauge	Float Level
Buick	⑤ T109-238	17/64"
Rambler	T109-106	7/32"

⑤ Buick No J-818-6

Fast Idle (Buick): Fast idle cam is pivoted on carburetor main body directly above throttle lever and is linked to choke valve lever by a rod TWO separate adjustments required as follows

Choke Lever Clearance - Open throttle to clear fast idle cam and close choke valve fully Rotate fast idle cam against stop on casting With valve and cam held in these positions, measure clearance between lug on outer choke shaft lever and stop on inner choke shaft lever This clearance should be 020" (Carter Gauge T109-29, Buick Gauge J-1388) Adjust by bending lug on outer choke shaft lever using needle-nosed pliers or Buick Tool J-4552

► *ADJUSTMENT NOTE (LATER CARBURETORS)* These carburetors have index mark on fast idle cam and above adjustment can be made as follows With slight clearance between tang on fast idle cam and stop on flange casting and inner choke shaft lever contacting lug on outer choke shaft lever, index mark (line) on fast idle cam should be aligned with fast idle adjusting screw Adjust by bending lug on outer choke shaft lever

Throttle Valve Clearance - To adjust with carburetor off engine, rotate fast idle cam so that highest step of cam is under fast idle screw (right hand screw facing throttle lever side of carburetor), turn screw in until throttle opening is 028" (all models) Measure by inserting No 70 drill between lower edge of throttle valve and carburetor wall *NOTE* - This setting supersedes previous specifications of 018" and 025" To adjust with carburetor on engine, idle engine (engine must be at normal operating temperature with choke valve open), rotate fast idle cam until highest step is under fast idle screw, turn fast idle adjusting screw in until engine speed is 1800 RPM (Synchro-mesh Cars) 1500 RPM (Dynaflow Cars) *NOTE* - This setting supersedes previous specification of 1500 RPM on Synchro-mesh Cars *See "Changes & Corrections" above*

Fast Idle (Rambler): Fast idle mechanism is built in automatic choke housing For access to adjustments, remove thermostatic coil housing, gasket, and baffle plate To adjust with carburetor off engine crack throttle and close choke valve (to allow fast idle cam to assume fast idle position), close throttle valve Throttle valve opening should be 023" Measure by inserting Gauge T109-189 between edge of throttle valve and carburetor wall on side opposite idle ports Adjust by bending choke connector rod at lower angle With carburetor on engine, fast idle speed should be 1700-1800 RPM with engine at normal operating temperature *Adjust Unloader before reassembling automatic choke*

Unloader (Buick): Consists of an arm on the throttle lever which engages the fast idle cam and rotates the cam to open the choke valve when throttle moved to wide open position To check, hold choke valve closed lightly fully open throttle valve which will open choke valve slightly Measure choke valve opening or clearance between upper edge of valve and air horn wall. Use drill rod or Carter gauge as follows Carburetor 2529S - 9/64" (Carter Gauge T109-34), Carburetor 2536S - 3/16" drill (Carter Gauge T109-166 - 11/64") Adjust by bending unloader arm on throttle lever

Unloader (Rambler): To check setting, hold throttle valves in wide open position, close choke valve as far as possible without forcing, measure choke valve opening or clearance between upper edge of choke valve and air horn wall This clearance should be 3/16" (Gauge T109-28). Adjust by bending unloader arm on choke shaft using bending tool T109-213

Automatic Choke: *See "Changes & Corrections" above for Performance Improvements including choke setting change on Buick 2529S Carburetor*

Automatic Choke Setting

Car & Carb.	Choke Setting
Buick 2529S	1 Point Lean
Buick 2536S	Centered (At Index)
Rambler 2352S, SA	Centered (At Index)

Car Starter (Buick): Switch timing can be checked with carburetor on engine on Dynaflow Cars only On all cars, switch can be timed with carburetor off engine as detailed below

Switch Timing (Off Engine) - Connect battery and test lamp across switch terminals so that lamp will light when switch contact is made. See that choke valve is wide open and fast idle cam in hot or slow idle position Close throttle valve against ¼" drill rod inserted between lower edge of valve and carburetor wall at center. Lamp should light indicating that switch contacts are closed. Repeat test with 7/64" drill rod. Lamp should not light. If switch does not operate within above limits, adjust by adding or removing square timing shims located under contact spring. Shims furnished in thicknesses of 006" and 018".

Switch Timing (On Engine - Dynaflow Cars) - Place transmission selector lever in Park and apply parking brake. Back off throttle stopscrew so that throttle valves tightly closed (fast idle cam must be in hot or slow idle position). Place scale against flange on dashpot diaphragm and measure distance to nearest edge of dashpot arm on throttle lever Turn ignition on, open throttle slowly and, at point where starter is energized, again measure distance to nearest edge of dashpot lever The difference between the two measurements should be 5/8-15/16" If switch timing not correct, adjust as for off engine timing (above).

► *NOTE.* After checking switch timing, reset engine idle speed to 485 RPM

OVERHAUL: *See "Carter WGD Carburetors" in 1955 Annual Data or later Manual edition*

SERVICE PARTS: Gasket Set - Carter No. 289 (Rambler), No. 305 (Buick)

Repair Pkg. (With Std. Metering Rods) - Carter No 1867 (Buick 2529S), No. 1868 (Buick 2536S), No 1843 (Rambler 2352S,SA).

CARTER "WE"

STUDEBAKER	Carter Carburetor No.
1957 Champion 57G	WE 2417S
1957 Silver Hawk 6	WE 2417S

DESCRIPTION: Single barrel downdraft type with automatic choke and fast idle. Similar to design used on previous Champion models

ADJUSTMENT: *Set these carburetors to the following specifications.*

IDLING ADJUSTMENT

Idle Screw Setting - ½-1½ turns open. Turn screw out for richer mixture. Adjust only with air cleaner in place and with engine at normal operating temperature (choke valve open, fast idle inoperative).

Idle Speed – 550 RPM (With selector lever in "N" or "P" position on "Flightomatic" Transmission" cars).

ACCELERATING PUMP SETTING

Pump Stroke Setting - Check pump travel after carburetor has been reassembled. Back off throttle stopscrew so that throttle valve tightly closed, remove dust cover. Install Pump Gauge T109-117S on bowl cover with lip of gauge extending over plunger shaft and gauge held vertically, turn nut on gauge until lip contacts top of plunger shaft note gauge reading. Open throttle wide and again note gauge reading Difference in two readings should be 14/64". Adjust by bending throttle connector rod at lower angle using T109-213 bending tool.

METERING ROD SETTING

Checking & Adjustment - Remove metering rod and install Metering Rod Gauge No. T109-102 (2.468') in place of the rod making certain that gauge seated in metering rod jet. With throttle stopscrew backed off so that throttle valve tightly closed, press down lightly on metering rod arm so that upper lip of arm contacts pin in pump arm. At this point, clearance between metering rod pin and shoulder of notch in gauge should be less than .005"and gauge should not contact pin Adjust by bending upper lip of metering rod arm using bending tool T109-105. *Then check and adjust lower (economy) lip as follows* - Remove gauge,press down on metering rod arm until upper lip contacts pump arm pin. Clearance between pin and upper surface of lower lip should be 3/16" (Float Level Gauge T109-28 can be used). Adjust by bending the lower lip.

ANTI-PERCOLATOR SETTING

Checking & Adjustment - Crack throttle valve open .030" by placing **large** end of Gauge T109-29 between edge of valve and carburetor wall on side opposite idle port. Clearance between rocker arm lip and pump arm should be .025" (Gauge T109-189 can be used to check this clearance). Adjust by bending rocker arm using bending tool T109-105.

FLOAT LEVEL

Checking & Adjustment - Remove and invert bowl cover assembly so that float in closed position. Measure distance from top of projection on bowl cover to top edge of soldered seam on float using gauge T109-80 (3/8"). Adjust by bending lip on float lever which contacts intake needle.

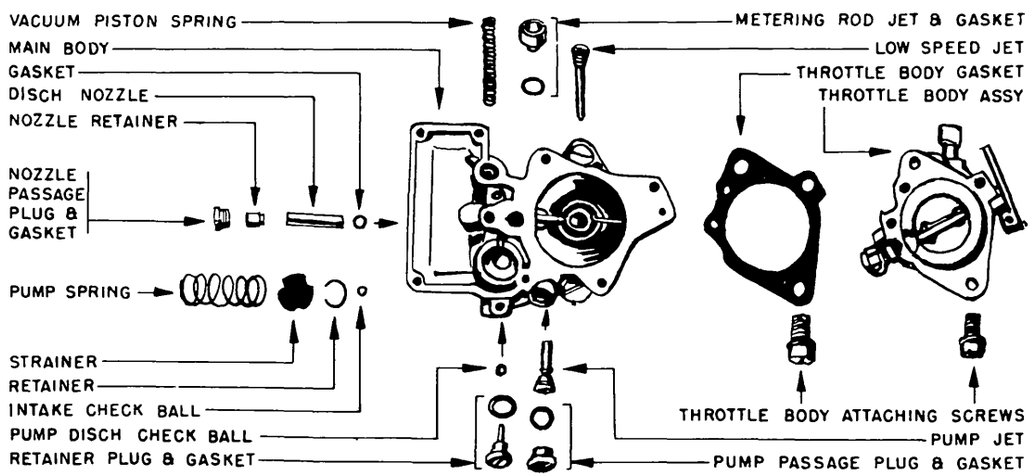
THROTTLE VALVE SETTING

Idle Port Opening - Top of lower idle port should be .112-.116" above upper edge of throttle valve.

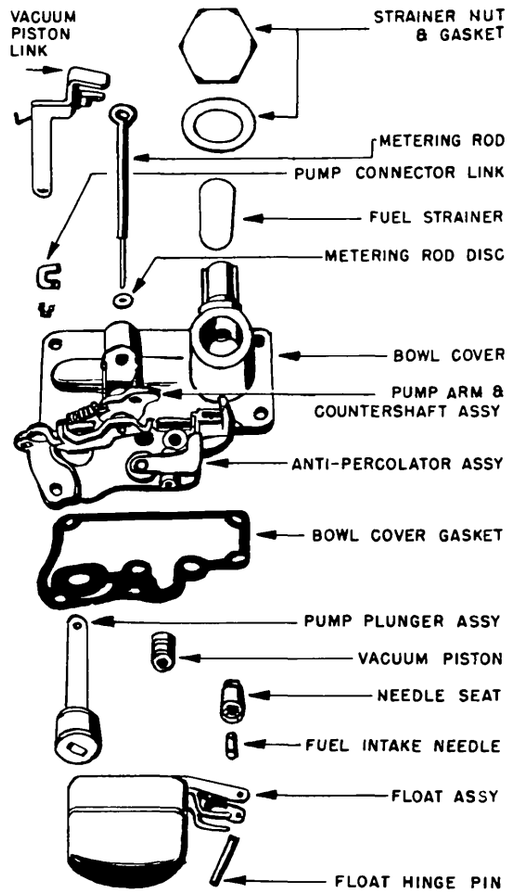
Vacuum Spark Port - Top of port should be .060-.070" above upper edge of throttle valve.

FAST IDLE SETTING

Checking & Adjustment - With thermostatic coil housing, gasket, and baffle plate removed, crack throttle valve to allow choke valve to close, close choke valve, move throttle valve toward closed position as far as possible. Check remaining throttle valve opening which should be .046" (.045" end of gauge T109-158 may be used). If opening not correct, adjust by bending choke connector rod at lower angle using bending tool T109 213. Then adjust Unloader.



"WE" MAIN BODY & THROTTLE BODY ASSEMBLY



"WE" BOWL COVER ASSEMBLY

UNLOADER SETTING

Checking & Adjustment - After fast idle adjustment completed, open throttle valve fully, close choke valve as far as possible without forcing. Check remaining choke valve opening using gauge T109-28 (3/16"). If opening not correct, bend arm on choke trip lever (within choke housing) using bending tool T109-214.

AUTOMATIC CHOKE SETTING

Setting (All Carburetors) 1 Point Lean

Adjustment - Loosen retainer screws around rim of cover, rotate cover and thermostatic coil assembly clockwise (for leaner setting) or counter-clockwise (for richer setting).

OVERHAUL· *See "Carter WE" carburetors in 1955 Annual Data or later Manual edition.*

SERVICE PARTS

Gasket Sets - Carter No. 235.

Repair Pkg. (With Std. Metering Rod) - Carter No 1837

CARTER YF

WILLYS	Carter Carburetor No.
1957 Jeeps CJ-3B, CJ-5, CJ-6	YF 938SA
1957 Jeep Dispatcher DJ-3A	YF 2392S
1957 Utility Wgns. & Truck (4 Cyl.)	YF 951S
1957 Utility Wgns. & Truck (6 Cyl.)	YF 2467S
1957 Forward Control FC-150 (4 Cyl.)	YF 938SA
1957 Forward Control FC-170 (6 Cyl.)	YF 2467S

DESCRIPTION: Single barrel downdraft type of same design as used on previous models.

ADJUSTMENT: *Set following specifications:*

Idle Setting: Adjust only with engine warmed up so that choke valve is wide open and fast idle inoperative. See table for screw settings. Turn screw out for richer mixture. See Car Model pages for complete tune-up data.

	Idl Setting	
Car & Carb.	Idl Screw Opening	Idle Speed
Willys 938SA, 951S	3/4-1 3/4 turns	600 RPM
Willys 2392S	1/2-2 turns	600 RPM
Willys 2467S	1-2 1/2 turns	550 RPM

Float Setting: Invert air horn and float cover assembly allowing float to hang freely, and measure from top of float at free end to bowl cover (gasket removed). Adjust by bending lip which contacts intake needle - do not bend float arm.

► *CAUTION: On models with spring-loaded intake needle, do not compress this spring when checking float level (will result in false reading and incorrect float setting).*

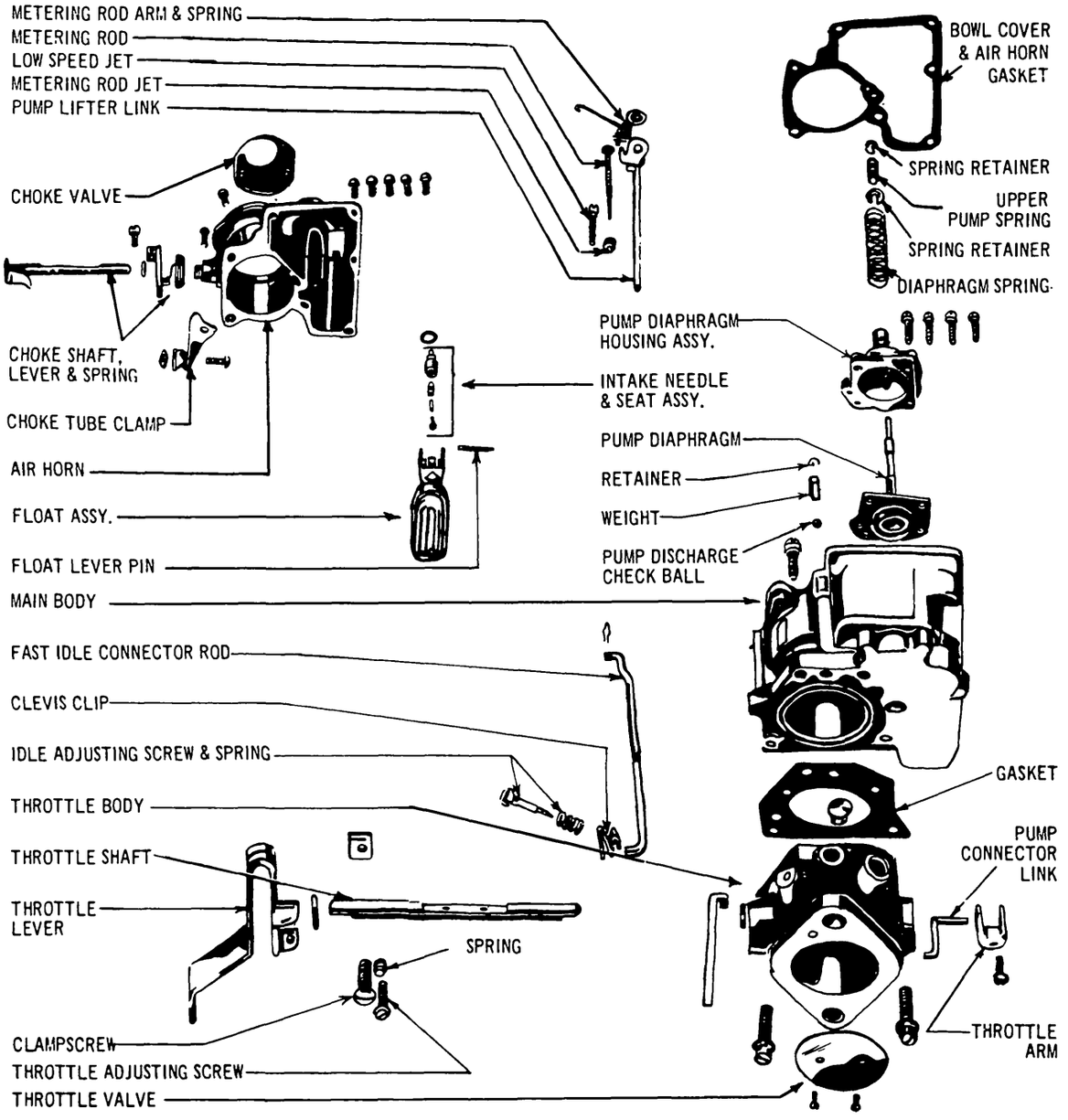
	Float Setting	
Car & Carb.	Checking Gauge	Float Setting
Willys 951S,938SA	T109-107	5/16"
Willys 2392S,2467S	T109-126	9/32"

Accelerating Pump: Diaphragm type pump with ball check discharge valve (except 2467S), discharge needle (2467S). On 2467S only, check pump adjustment whenever carburetor disassembled or pump linkage disturbed **before** checking and adjusting Metering Rod.

Pump Adjustment (2467S). With idle speed screw backed off so that throttle valves fully seated, press down on on upper end of diaphragm shaft until it is bottomed in diaphragm housing (Tool T109-212 may be used to hold diaphragm shaft down in this position). In this position, metering rod arm should contact pump lifter link at outer end nearest the springs. Adjust by bending pump connector link at lower angle using bending tool T109-213. *CAUTION - Bending link at any other point may cause binding of pump lifter link.*

Metering Rod Adjustment: *No gauge required.* Air horn and bowl cover must be removed for access to metering rod. Back off throttle lever stopscrew so that throttle valve completely closed. Press down on upper end of diaphragm stem until diaphragm bottoms in vacuum chamber (tool T109-212 can be used to hold diaphragm down). Metering rod arm must contact lifter link flat surface between springs and at supporting lug under metering rod pin spring (see note below for first carburetors without this lug) and the metering rod should contact the bottom of the metering rod well at the same instant. Adjust by bending lip of metering rod arm to which metering rod is attached up or down.

Fast Idle: To check fast idle, hold choke valve in wide open position and check to see that lip on fast idle arm is in contact with boss on carburetor body casting. To adjust, bend fast idle arm rod at lower offset.



CARTER "YF" DOWNDRAFT CARBURETOR

	Throttle Valve Setting	
Car & Carb.	① Idle Port	① Vac. Spark Port
Willys, 951S,938SA,2392S	.168-.172"	.035-.045"
Willys, 2467S	.143-.147"	.019-.029"

① - Top edge of port above top edge of throttle valve.

OVERHAUL: *See "Carter YF Carburetor" in 1956 Annual Data.*

SERVICE PARTS: Gasket Set - Carter No. 200 (2392S), No. 206A (938SA, 951S), No. 241A (2467S). **Repair Pkg. (With Std. Mtring Rod)** - Carter No. 1546B (2392S), No. 1559C (951S), No. 1764 (938SA), No. 1849 (2467S).

CARTER "AS" DOWNDRAFT

RAMBLER SIX — Carter Carburetor No.

1957 Synchro-mesh & Overdrive (Early) ..... AS 2580S
1957 Synchro-mesh & Overdrive (Later) ..... AS 2665S
1957 Automatic Transmission (Early) ..... AS 2564S
1957 Automatic Transmission (Later) ..... AS 2664S

▷CHANGES & CORRECTIONS

▷ *CARBURETOR INSPECTION & INSTALLATION CAUTIONS (TO CORRECT FLASH-O-MATIC TRANSMISSION 1-2 SLIPPAGE OR 2-3 FILE-UP IN D1 RANGE):* Vacuum for transmission Solenoid & Vacuum Control is supplied from carburetor passage which terminates in two ports in carburetor as follows: 1) Vacuum port at throttle edge, 2) In carburetor mounting flange at choke vacuum supply passage. In correcting above transmission complaints, inspect carburetor and observe mounting cautions as follows:

1) Carburetor Vacuum Ports - Check port at throttle edge for correct size (.0465") and make certain this passage not restricted. With throttle valve tightly closed, top of this port should be flush with bottom edge of throttle valve.

2) Carburetor Mounting Flange & Gasket - Inspect mating surfaces of carburetor flange and manifold for unevenness, burrs, or chipped areas. These surfaces can be cleaned up using crocus cloth on a surface plate. Inspect gasket for swelling at the vacuum port and channel area. See installation below.

3) Carburetor Installation - Use new type corbestos gasket, Rambler No. 3153999. *NOTE* - If this gasket not available, No. 3108576 ro 3143932 can be used. Gasket No. 3108576 has four 3/16" holes but these holes will not affect operation.

▷ *ENGINE SURGE AT STEADY THROTTLE (Early Cars with Carter 2580S Carburetor):* On cars with carburetors code-dated "J-6" or earlier, this condition can be corrected by installing new Metering Rod, Carter No. 75-1366S, to replace original rod No. 75-1332S. This new metering rod used in production on later 2580S & 2564S carburetors. *NOTE* - Metering rod setting is important and should be checked and adjusted.

▷ *ACCELERATOR LINKAGE BIND (FLASH-O-MATIC CARS):* If carburetor throttle does not return to idle position, check for bind between accelerator linkage vertical rod and manifold vacuum line at left rear corner of cylinder head. Correct by moving vacuum line downward to provide minimum clearance of ½" between vacuum line and rod. *NOTE* - This binding occurs with transmission in reverse, or during heavy acceleration and high engine torque.

▷ *REPLACEMENT CARBURETOR NOTE:* Only carburetors with transmission vacuum control port (AS 2564S or 2664S) are furnished for service. When used on Synchro-mesh or Overdrive Cars, this vacuum port will not be used. Production carburetors used with Synchro-mesh or Overdrive (AS 2580S or 2665S) do not have this vacuum port.

DESCRIPTION: Single barrel downdraft type of same design used on previous Rambler Six cars beginning 1956. See Replacement Carburetor Note above.

ADJUSTMENTS: Set these carburetors to the following specifications:

Idling Adjustment: Warm up engine thoroughly, so that choke valve is wide open and fast idle inoperative. See table for idle screw setting. Turn screw out for richer mixture. See car model pages for complete tune-up data.

Idle Mixture Setting

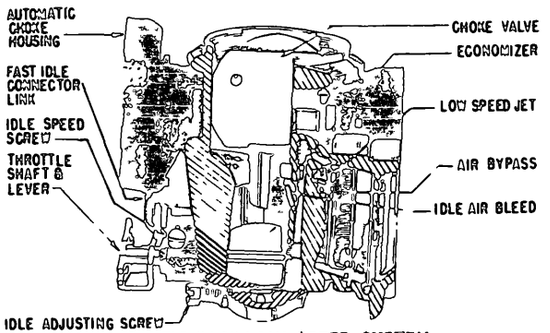
Car & Carb.	Idle Screw Setting
Rambler All Models	¼-1¼ turns

Idle Speed Setting

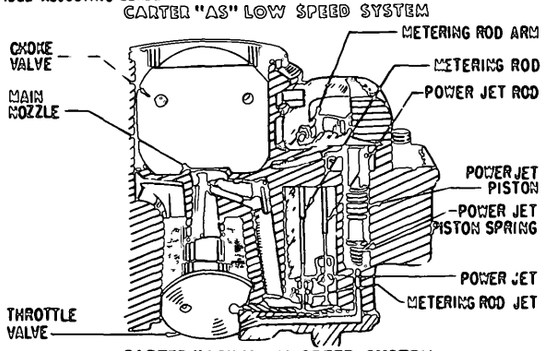
Car & Carb.	S-M & O.D.	Auto. Trans.
Rambler All Models	550 RPM	① 475 RPM

① ~500 RPM in Neutral with air conditioning turned on.

Float Level: *CAUTION - Floats are "split" type and must be checked exactly as follows:* Remove bowl cover, gasket, and float pin retainer. Check each float separately while holding lip of float arm against seated needle (*CAUTION* - Float pin must be at bottom of guide slots). Place gauge squarely on top edge of bowl at free end of float. Ridge on top of float should just contact step on gauge. Adjust by bending lip on float arm. Make certain that floats clear sides of bowl. Adjust by bending float arms as necessary. Install float pin retainer, invert carburetor so that both floats rest against seated needle. Clearance between overlapping tangs on float levers should be .010-.015". Adjust by bending long tang on left hand float. Recheck float level.



CARTER "AS" LOW SPEED SYSTEM



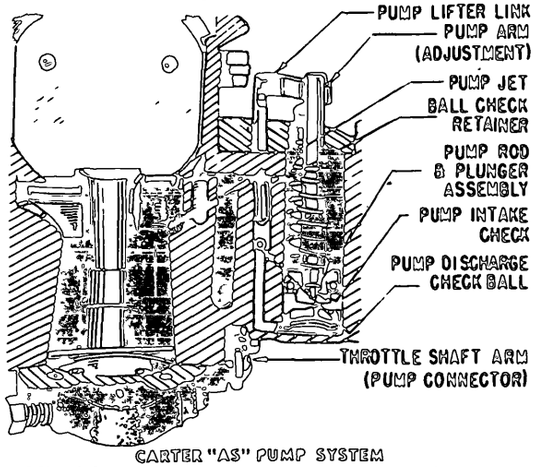
CARTER "AS" HIGH SPEED SYSTEM

Float Setting

Car & Carb.	Checking Gauge	Float Setting
Rambler All Models	T109-282	1/4"

Pump Adjustment: Top of pump arm that engages slot in pump shaft must be parallel to top surface of bowl cover with throttle in wide open position. Adjust by bending pump arm up or down as necessary.

Metering Rod Adjustment: With throttle wide open, metering rod should just bottom in carburetor casting. To adjust bend metering rod arm. When metering rod is properly adjusted, some movement can be noted around eye of metering rod retainer clip when throttle is moved slightly from wide open position. If rod is too low, it will tend to push metering rod retainer clip up. If rod is too high, it will be possible to push rod down.



CARTER "AS" PUMP SYSTEM

Fast Idle Adjustment: Remove thermostat coil housing, gasket and baffle plate. Crack throttle valve and hold choke valve closed to rotate fast idle cam to fast idle position. Close throttle. Measure clearance between throttle valve and bore of carburetor (side opposite idle port) using gauge listed in table below. Adjust by bending choke connector rod at lower angle using bending tool T109-213.

Fast Idle Speed - With correct fast idle adjustment, fast idle speed should be 1600-1800 RPM (Hot).

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Rambler All Models	T109-29	① .030"

① - Supersedes original setting of .043" (T109-158).

Unloader Adjustment: Hold throttle valve wide open and close choke valve without forcing it. Measure clearance between upper edge of choke valve and inner wall of carburetor air horn. See table below. To adjust, bend choke shaft unloader arm.

Unloader Setting

Car & Carb.	Checking Gauge	Choke Opening
Rambler 2564S, 80S	T109-34	9/64"
Rambler 2664S, 65S	T109-28	3/16"

Throttle Valve Setting: *NOTE* - Carburetors 2564S & 2664S have additional Transmission Control Vacuum Port (top of port should be Flush with bottom of throttle valve). Other carburetors do not have this port.

Throttle Valve Setting

Car & Carb.	Idle Port	Vacuum Spark Port
Rambler All Models	① .058-.062"	① .040-.050"

① - Top of port above top edge of valve.

Automatic Choke Setting: 2 Points Rich (All Models).

SERVICE PARTS: Gasket Sets - Carter No. 276.
Repair Pkg. (Std. Metering Rod) - Carter No. 1854.

1957 CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Metering Rod No. Standard	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Size Lean	Metering Rod Jet Size	Metering Rod Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Low Speed Jet Size	Low Speed Jet Part No.	Pump Jet Size	Pump Jet Part No.
BUICK													
40 Synchro-mesh	1957	2529S	75-1371 (60)	75-1348	75-1367	.090"	120-203	(10)		.0292"	11-245S	.031"	48-266
40 Dynaflow	1957	2536S	75-1346	75-1368	75-1369	.090"	120-203	(10)		.025"	11-304S	.0292"	48-252
RAMBLER													
5710	1957	2564S	75-1366S (61)	75-1389S	75-1408U (64)	.1065"	120-171	(10)		.0292"	11-303S	.028"	
5710	1957	2580S	75-1366S (61)	75-1389S	75-1408U (64)	.1065"	120-171	(10)		.0292"	11-303S	.028"	
5710 (Early)	1957	2350S	75-1243	75-1290	75-1291	.089"	120-159	(10)		.026"	11-293S	.032"	48-247S
5710 (Later)	1957	2586S	75-1243	75-1290	75-1291	.089"	120-159	(10)		.026"	11-293S	.032"	48-247S
5710 (Auto. Trans.)	1957	2664S	75-1384S (63)	75-1389S	75-1408U (64)	.1065"	120-171	(10)		.0292"	11-303S	.028"	
5710 (Std. & O.D.)	1957	2665S	75-1384S (63)	75-1389S	75-1408U (64)	.1065"	120-171	(10)		.0292"	11-303S	.028"	
5720	1957	2352S,SA	75-1285 (62)	75-1310	75-1311	.086"	120-165	(10)		.033"	11-198S	.025"	48-234S
STUDEBAKER													
Champion	1957	2417S	75-902	75-917	75-918	.095"	120-17S	.1285"	12-263	.031"	11-242S	.0225"	48-202
WILLYS													
CJ5,6,3B	1957	938SA	75-996	75-1114		.091"	120-155	(10)		.028"	11-163S	.031"	
Utility 4 Cyl.	1957	951S	75-806	75-808		.096"	120-160	(10)		.028"	11-161S	.025"	
DJ-3A	1957	2392S	75-708	75-720		.096"	120-160	(10)		.031"	11-160S	.025"	
FC-150	1957	938SA	75-996	75-1114		.091"	120-155	(10)		.028"	11-163S	.031"	
Utility 6Cyl., FC-170	1957	2467S	75-1279	75-1339	75-1340	.098"	120-163	(10)		.028"	11-256S	.028"	

(10)- Nozzle is installed permanently. **Do not remove.**

(60)- Supersedes 75-1348 (now 1 size lean).

(61)- Supersedes 75-1332S.

(62)- Supersedes 75-1265.

(63)- Supersedes 75-1388S.

(64)- Kit consists of 1 Power Jet Rod 16-16, and 1 Metering Rod Assembly 75-1309S.

1957 CARTER BB UPDRAFT CARBURETORS

CARTER BB UPDRAFT

CHEVROLET FORWARD CONTROL — **Carter Model**

1957 Series 34, 35, 3700 ..... 871SC

►**ACCESS TO CARBURETOR (for Adjustment or Removal):** **Forward Control Models**—Remove toe pan attaching screws, disconnect wires at stop light switch, disconnect accelerator pedal rod from throttle control rod, remove toe pan.

DESCRIPTION: Plain tube, updraft type of same design as used on previous Chevrolet models

ADJUSTMENT & SERVICING: *See complete "Carter (BB) Updraft Type" carburetor in Carburetor Section of Manual and set this carburetor to the following specifications:*

IDLING ADJUSTMENT

Idle Screw Setting—½-1½ turns open (turn screw out for richer mixture).

Idle Speed—450-500 RPM (Std. Trans.), 400-450 RPM (Auto. Trans. in Neutral).

FLOAT LEVEL SETTING

Float Level—0-1/32" (Carter Gauge T109-49 or Chevrolet J-818-13A) from top of float to top edge of bowl with needle valve seated.

CAUTION—Use 1/32" side of gauge (other side used for 1/16" settings).

Intake Needle & Seat Assembly—Carter No. 25-44S

ACCELERATING PUMP

Pump Seasonal Setting—Short Stroke—Summer, Long Stroke—Winter.

Pump Stroke—9/16" (Short Stroke) with connecting screw in holes in throttle lever and pump link nearest throttle shaft, 1" (Long Stroke) with screw in holes farthest from shaft.

THROTTLE VALVE SETTING

Idle Port—.005-.009" from top of lower idle port to lower edge of throttle valve.

Vacuum Spark Port—.000-.004" top of port below lower edge of throttle valve.

NOTE—Above specifications apply with throttle valve tightly closed.

SERVICE PARTS

Gasket Set - Carter No. 202.

Repair Pkg. (With Std. Metering Jet) - Carter No. 1539A.

1957 CARTER BB UPDRAFT CARBURETOR JET SPECIFICATIONS

Car Model	Yr.	Carb. No.	Main Metering Screw Standard Flow	Main Metering Screw Standard Part No.	Main Metering Screw 1 Size Lean Part No.	Main Metering Screw 2 Sizes Lean Part No.	Main Nozzle Size	Main Nozzle Part No.	Step Up Jet Power Orifice Size	Step Up Jet Power Orifice Part No.	Idle Orifice Tube Size	Idle Orifice Tube Part No.	Idle Passag Tube	Pump Valve Size	Pump Valve Part No.
CHEVROLET Trk Forward Control	1957	871SC	339-343cc	159-100	159-129	159-35	①	12-505	.036"	162-27	.031"	123-58	123-45	.0635"	149-65S

① - Inside Diameter .150-.152".

CARTER BBR1 CARBURETORS

STUDEBAKER — **Carter Carburetor No.**
1957 Champion Scotsman — BBR1 2724S

DESCRIPTION: Single barrel downdraft carburetor with manual choke control. Same design as other Carter (B&B) Downdraft carburetors with vacuum controlled step-up jet or power orifice.

ADJUSTMENTS: *Set carburetor to the following specifications*

Idl Setting: Adjust only with engine at normal operating temperature (choke valve wide open).
Idle Mixture - ½-1½ turns open. Turn screw out for richer mixture.

Idle Speed - 550-600 RPM With engine at normal operating temperature (with choke valve wide open so that fast idle inoperative)

Accelerating Pump: Check pump stroke setting after carburetor overhaul, adjust pump for seasonal requirements as indicated.

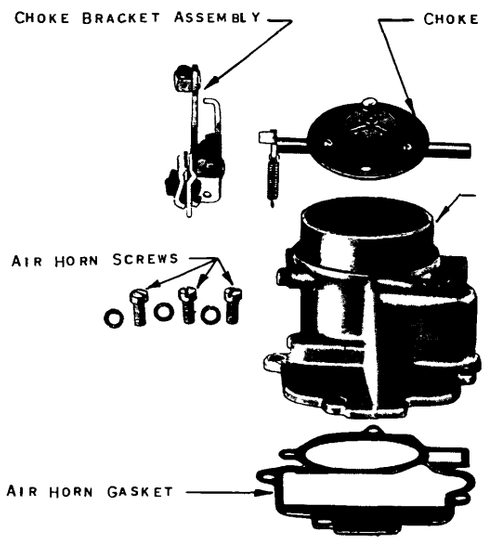
Seasonal Setting - Three holes provided in throttle lever for pump lifter link engagement as follows

Center Hole - Normal operation (medium stroke). **Outer Hole** - Cold weather operation (long stroke). **Inner Hole** - Hot weather operation (short stroke).

Pump Stroke Setting - To check stroke, remove air horn assembly, make certain pump link connected in center hole of throttle lever (medium stroke), back off throttle stopscrew so that throttle valve fully closed. Place pump travel gauge, T109-117S, on upper edge of body casting at pump cylinder, turn gauge until projecting finger contacts top of pump plunger shaft, note gauge reading. Open throttle wide with pump plunger pressed to bottom of pump cylinder, take a second gauge reading. Difference between two gauge readings is pump stroke and should be "32" (32/64"). To adjust stroke, bend horizontal portion of pump lifter link.

Float Level: 5/64" from top edge of float bowl to top of float with needle valve seated. To check float level, remove air horn assembly. If gauge T109-50 used, place gauge squarely to top edge of bowl parallel to float, hold float arm lip firmly against closed needle valve. Top of float should just touch gauging lugs on gauge. If scale used, measure from top edge of bowl to top of float on each side of center seam. This measurement should be 5/64" ± 1/64". To adjust float level, bend lip on float arm.

St p-up (P wer) Valv : No adjustment provided. Vacuum piston should operate freely and clearance between step-up rod and top of piston plate should be .010" minimum with piston pushed all the way down *(CAUTION* - This clearance necessary to permit spring to fully close step-up jet). Adjust clearance by bending plate slightly.



CARTER BBR1 CARBURETOR

Fast Idle: No adjustment required Consists of a fast idle cam serving as a stop for the throttle lever stopscrew Fast idle cam is linked to choke valve and is rotated to fast idle position when choke valve is closed for cold starting

Choke: Manual type Choke valve has poppet type relief valve

Throttle Valve Setting: When installing throttle valve, insert attaching screws loosely, then close valve completely and tap it lightly to centralize it in bore, tighten attaching screws securely. Check throttle valve position.

Idle Port - Top of port .133-.137" above top edge of valve.

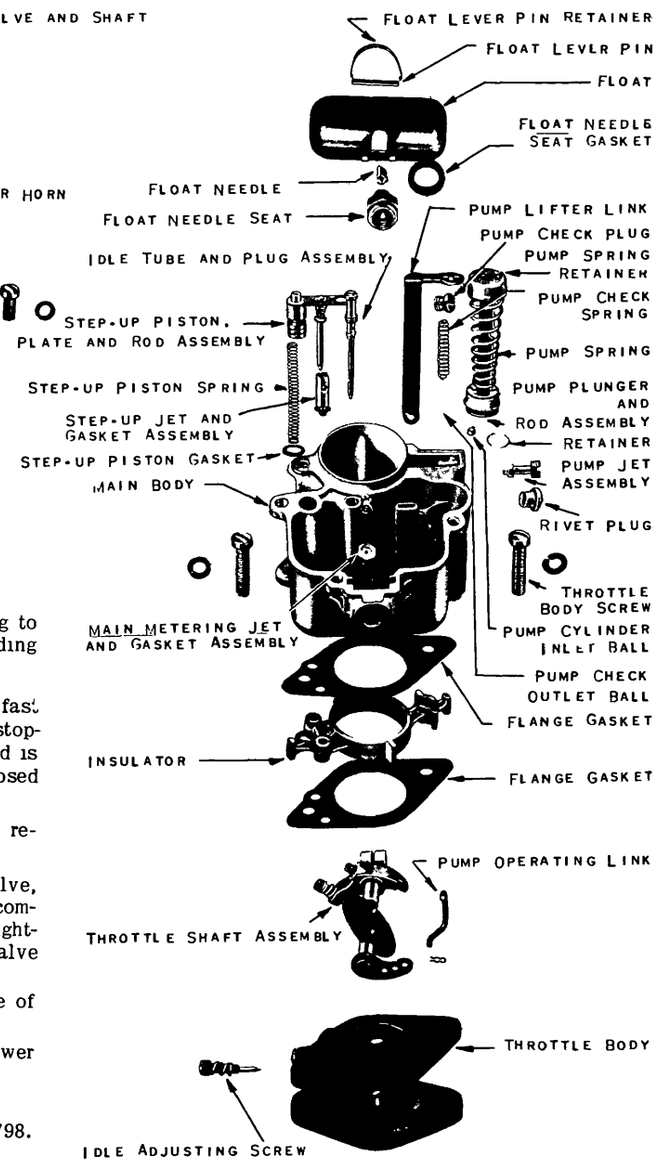
Vacuum Spark Port - Top of port .007-.013" below lower edge of valve.

SERVICE PARTS. Gasket Set - Carter No. 192.
Repair Pkg. (with Std. Metering Jet) - Carter No. 1798.

BBR1 JET SPECIFICATIONS

Part	Size	Part No.
Main Metering Jet (Std.) ①	②	159-59S
Main Vent Tube Air Bleed Assy.	.0135"	145-72
Step-up Jet Power Orifice	037"	149-43S
Idle Orifice Tube	.0276"	123-31S
Pump Jet Assembly	0276"	48-103

① - 1 size lean 159-61S, 2 sizes lean 159-66S, 3 sizes lean 159-82S.
② - Flow 268-272 c.c.



OVERHAUL: *See "Carter (B&B) Downdraft" Carburetor in Carburetion Section of Manual and note the following:*

Main Vent Tube Replacem nt - Remove rivet plug at lower end of vent tube passage below float bowl (use Tool T109-143), remove main vent tube through this opening, install new main vent tube using Tool T109-195 *(CAUTION* - Tube must seat tightly in body), install new rivet plug to close passage.

CARTER "BBS"

PLYMOUTH	Carter Carburetor No.
1957 6 Cyl P-30 (Std)	BBS 2567S
1957 6 Cyl P-30 (Overdrive)	BBS 2568S
1957 6 Cyl P-30 (Auto Trans)	BBS 2569S
1957 Replacement Carburetor	BBS 2604S
1957 6 Cyl P-30 Taxicab	BBS 2410S
1957 6 Cyl P-30 City Service	BBS 2403S

►*PLYMOUTH REPLACEMENT CARBURETOR NOTE* When installing 2604S carburetor as replacement, additional parts required as follows **Overdrive Cars** - Use Unitized Pkg No 192-33U (Kickdown Switch Assy), **P w rFlit Cars** - Use Unitized Pkg No 202-80U (Dashpot, Bracket and Locknut)

DESCRIPTION: Single barrel downdraft type of same design used on previous models with integral Automatic Choke (fast idle mechanism located within choke housing)

City S rvic Carbur t r 2403S - This model has hemispherical throttle restrictors mounted on throttle valve (retained by special screws and nuts which replace regular mounting screws).

ADJUSTMENTS: *Make all adjustments exactly as listed below*

Idle Adjustment: Make preliminary setting of idle adjusting screw by turning screw in until it is lightly seated and then turn screw out exactly 1 turn Warm up engine to normal operating temperature so that choke valve is wide open and fast idle inoperative Set engine idle speed to correct figure then adjust idle mixture as follows

Idl Mixtur - With engine warmed up and idling at correct idling speed turn mixture adjusting screw in or out until highest engine speed and smoothest running is secured Recheck idle speed

Idl Mixture Setting

Car & Carb	Idle Screw Setting
Plymouth 2567S 68S 69S 2604S	½-1¾ turns
Plymouth 2403S	½-1¾ turns
Plymouth 2410S	1-2 turns

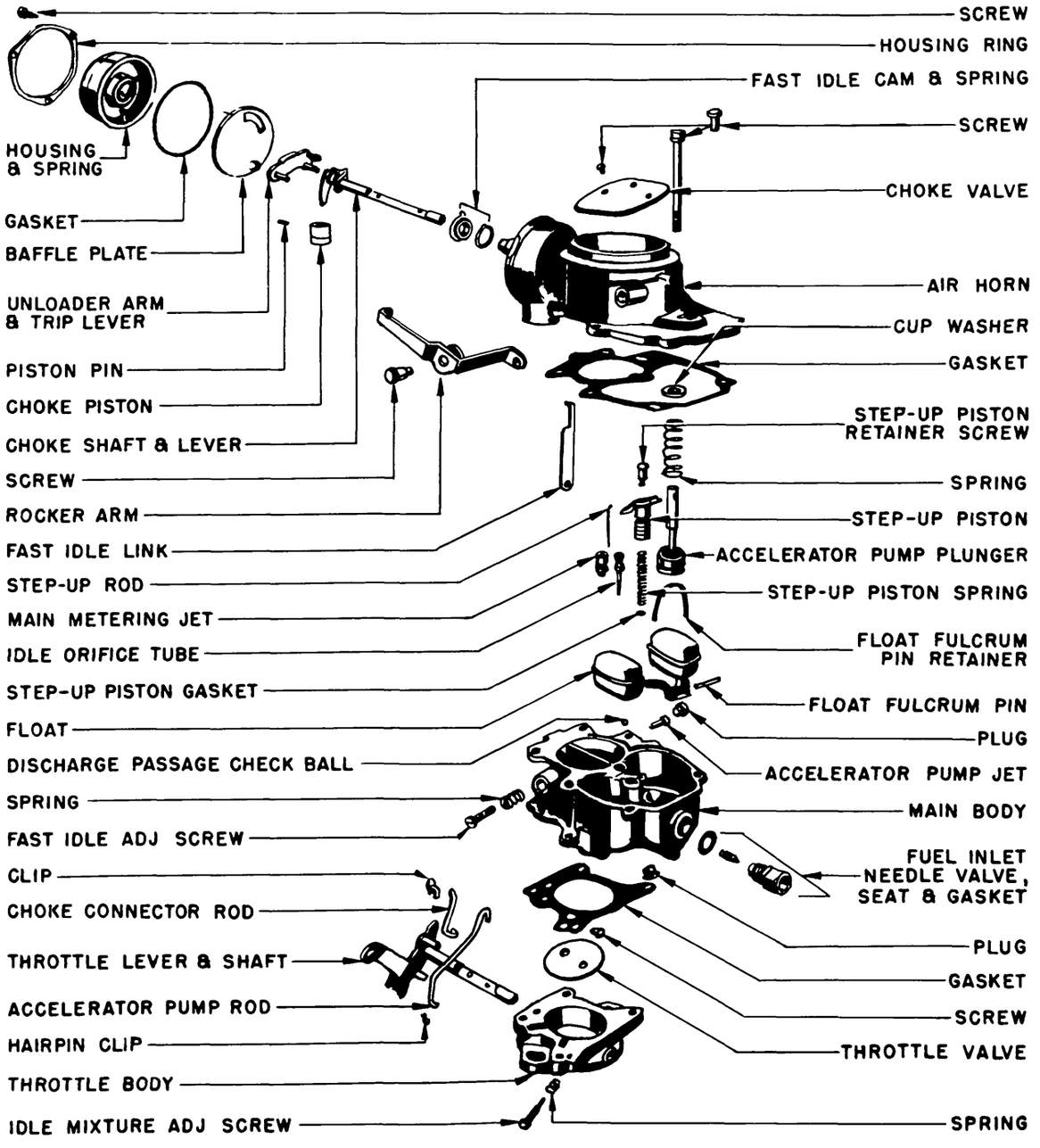
Idle Sp d - 450-500 RPM *NOTE* - On Auto Trans Cars Neutral selector button must be pressed in

Acc l rating Pump: Three holes provided in throttle lever for pump connector rod engagement to provide seasonal pump setting as listed below

Pump Strok Adjustm nt - Back off throttle stopscrew so that throttle valve fully closed. Make certain that connector rod engaged in center hole of throttle lever. Use scale to measure distance from top surface of bowl cover to top of pump plunger shaft This distance should be 54-64" (All models) If height not correct, adjust by bending connector rod at lower angle using bending tool T109-213

Pump Seasonal S tting - Std setting is with pump connector rod engaged in center hole of throttle lever Outer hole in throttle lever will provide maximum stroke (greater discharge), and inner hole minimum stroke (less discharge).

Float L v l: To check float level remove air horn and bowl cover assembly and gasket. Place gauge (see table below) squarely on top edge of bowl at center of floats Remove float pin retainer, hold float arm lip firmly against seated needle valve with float pin at bottom of the guide slots Ridge or crown on each float should just touch step on gauge Adjust by bending float lip *(NOTE* - If one float lower than the other first equalize floats by bending float arm, then adjust both floats by bending the lip) Reinstall float pin retainer



CARTER "BBS" SINGLE CARBURET R

CONTINUED ON NEXT PAGE

CARTER "BBS" (C nt.)

Float Level Setting

Car & Carb	Checking Gauge	Float Level
Plymouth 2567S,68S 69S	T109-239 ①	9/32"
Plymouth 2604S	T109-239 ①	9/32"
Plymouth 2403S,10S	T109-239 ①	7/32"

① - Same gauge used for both 9/32" and 7/32" settings

Fast Idle: Remove choke thermostatic coil housing assembly, gasket, and baffle plate (necessary for access to fast idle mechanism) *NOTE - Adjust Unloader before reassembling choke.*

Fast Idle Setting - Back out throttle stopscrew so that throttle valve fully closed Open throttle partially, close choke valve, then close throttle valve (this will allow fast idle cam to revolve to fast idle position) Measure throttle valve opening or clearance between edge of valve and carburetor wall on side opposite idle ports using gauge listed in table below Adjust by bending choke connector rod at lower angle using bending tool T109-213

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Plymouth (All)	T109-44	016- 020"

Unl ader: After completing fast idle adjustment (above) hold throttle valve in wide open position, close choke valve as far as possible without forcing Measure choke valve opening or clearance between upper edge of valve and air horn wall using gauge listed in table below Adjust by bending arm on choke trip lever which actuates choke lever using bending tool T109-214 Reassemble and adjust automatic choke (below)

Unloader Setting

Car & Carb.	Checking Gauge	Choke Opening
Plymouth (All)	T109-34	9/64"

Aut matic Choke: *CAUTION* - When disconnecting hot air tube at choke housing fitting (for removal or adjustment of choke), hold fitting on housing with open end wrench while loosening tube nut to prevent distorting or breaking housing To adjust choke, with heat tube disconnected, loosen three screws in retainer ring, rotate choke housing until index mark (line) on housing is aligned with longer center line of scale on air horn This is correct Centered setting for all models

Kickdown Switch (Overdrive Cars): With throttle valve wide open, clearance between kickdown lever and switch stem guide should be 1/64-3/64" Adjust by loosening switch mounting nuts and changing position of switch in bracket

Sl w-closing Throttle Dashpot (Auto. Trans. Cars): With throttle valve tightly closed, it should be possible to move dashpot plunger shaft inward 3/32" Adjust by loosening locknut and screwing dashpot in or out of mounting bracket

Throttl Valv S tting: When installing valve, it should be positioned as indicated "Idle Port Opening" is port opening above upper edge of tightly closed valve, "Vacuum Spark Port" is height of top of port above tightly closed valve

Throttle Valve Setting

Car & Carb.	Idle Port Opening	Vacuum Spark Port
Plymouth (All)	140- 144"	044 050"

OVERHAUL: *CAUTION* - Carburetor main castings (air horn, main body, and throttle body) are assembled with long screws (inserted through air horn and threaded in throttle body) so that all three assemblies will be loose when screws removed Use care not to damage throttle body when removing air horn or main body

Disassembly: Disconnect and remove choke connector rod and accelerating pump rod Take out long screws in air horn flange, lift air horn and bowl cover assembly straight up and off main body, discard gasket Remove pump plunger by pressing it up and sliding it off pump arm Take out step-up piston retaining screw, remove piston and step-up rod, remove spring and gasket from cylinder Invert main body to drop out pump discharge check ball from pump passage *(NOTE* - inlet check ball is located under retainer in bottom of pump cylinder) Remove main metering jet and gasket, and idle orifice tube Remove pump jet by first removing plug on side of main body and then removing jet through this hole Do not remove main vent tube unless replacement required (special tools required see Reassembly for removal and installation data) Remove idle mixture screw and spring from throttle body discard throttle body gasket Do not remove throttle valve or shaft unless wear or damage requires parts replacement (see Reassembly for installation data)

Automatic Choke Disassembly - Take out screws in choke housing retainer, remove retainer, housing assembly, gasket, and baffle plate Slide out unloader arm and trip lever Remove staked portion of choke valve screws, remove screws, lift valve out Rotate choke shaft until vacuum piston is clear of cylinder, withdraw shaft and piston assembly, slide fast idle cam and spring off shaft Choke thermostatic coil and heat retainer plate can be removed from housing by rapping assembly hard against palm of hand *(CAUTION* - Do not attempt to remove coil from heat retainer plate)

Cleaning & Inspection· Clean all parts in cleaning solvent and dry with air Blow out all passages with air Do not use wire or drills to clean jets Clean main vent tube by removing plug at end of vent passage, soak in solvent, and blow out with air applied at high speed air bleed hole at top of nozzle bar Clean all parts of choke mechanism thoroughly, make certain that slots in cylinder and air passages are clean Clean heat tube, remove heat tube shield at manifold and clean shield and tube in manifold Inspect tube for dents (obstructing hot air flow) and leaks *(NOTE* -Heavy black carbon deposits on choke parts may indicate exhaust leaks in heat tube) Check all parts for wear or damage and replace as required

Reassembly: Use all new gaskets Reassemble carburetor by reversing disassembly procedure and note the following

Throttle Valve Installation - *NOTE* - If throttle valve shaft or throttle body worn, it is recommended that new throttle body assembly be used Install throttle valve in same relative position as old valve, install new screws loosely, then close throttle and centralize valve by tapping lightly, tighten screws securely and stake by squeezing with pliers Check throttle valve position (see specifications above)

Choke Valve Installation - With fast idle cam and spring assembled on choke shaft, slide shaft and piston assembly into air horn, rotate shaft to enter vacuum piston in cylinder Install choke valve, install new screws loosely, close valve and tap lightly to centralize valve in bore, then tighten screws securely and stake by squeezing with pliers Check for free operation by closing valve with air horn upright Choke should open of own weight

Automatic Choke Assembly - Install unloader arm and trip lever in air horn See that retaining spring in heat retainer plate clears notch in plate, align notch with lug in housing and seat plate in housing Install baffle plate and gasket on air horn, then install choke housing (index mark downward), retainer ring, and retainer screws, tighten screws loosely Rotate housing counterclockwise until index mark on housing aligned with longer center line of scale on air horn, tighten retainer screws

Accelerating Pump Assembly - If old pump plunger being reinstalled, flare plunger leather by rolling it back and then reshaping it between thumb and forefinger *(NOTE* - Plunger leather must be soft and pliable) Install plunger in cylinder Install discharge check ball in discharge passage Check pump operation as follows Pour clean gasoline in carburetor bowl (½" deep), operate pump plunger several times to fill cylinder and remove air from discharge passage Use small brass rod to hold discharge ball down on its seat, press pump plunger down No fuel should be emitted at either discharge or intake passages If fuel discharge noted, remove check balls and inspect for damage clean passages thoroughly Reseat ball by using small brass rod to tap ball lightly to form new ball seat *(CAUTION* - install new check ball after using ball in reseating operation)

Step-up Piston and Rod Assembly - Make certain that step-up rod is free on piston plate (must return freely to vertical position when released) and that piston is free in cylinder See that step-up rod enters metering jet when assembly installed in carburetor

Carburetor Adjustment Make all adjustments listed under ADJUSTMENTS above

SERVICE PARTS· Gasket Set - Carter No 252 (All models)

Repair Pkg. (with Std. Metering Jet) - Carter No 1817 (2567S, 68S 69S, 2604S), No 1838 (2403S 10S)

1957 CARTER BBS CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Main Metering Jet Standard Size	Main Metering Jet Standard Part No.	1 Size Lean Part No.	2 Size Lean Part No.	Main Tube Vent Size	Main Tube Vent Part No.	Step-Up Rod Size	Step-Up Rod Part No.	Idle Orific Tub Size	Idle Orific Tub Part No.	Pump Jet Assy. Size	Pump Jet Assy. Part No.
PLYMOUTH														
P30 (S.M.)	1957	2567S	406cc	120-206S	120-215S	120-214S	.0236"	145-136	.022"	75-1225	.0315"	123-74S	.0276"	48-194
P30 (O.D.)	1957	2568S	406cc	120-206S	120-215S	120-214S	.0236"	145-136	.022"	75-1225	.0315"	123-74S	.0276"	48-194
P30 (Auto. Trans.)	1957	2569S	406cc	120-206S	120-215S	120-214S	.0236"	145-136	.024"	75-943	.0315"	123-74S	.0276"	48-194
P30 (Replacement)	1957	2604S	406cc	120-206S	120-215S	120-214S	.0236"	145-136	.022"	75-1225	.0315"	123-74S	.0276"	48-194
P30 (Taxi)	1957	2410S	382cc	120-215S	120-214S	120-213S	.0236"	145-136	.020"	75-1248	.028"	123-76S	.0276"	48-194
P30 (City Service)	1957	2403S	382cc	120-215S	120-214S	120-213S	.0236"	145-136	.021"	75-1207	.028"	123-76S	.0276"	48-194

CARTER & STROMBERG "CROSS-OVER" AUTOMATIC CHOKE

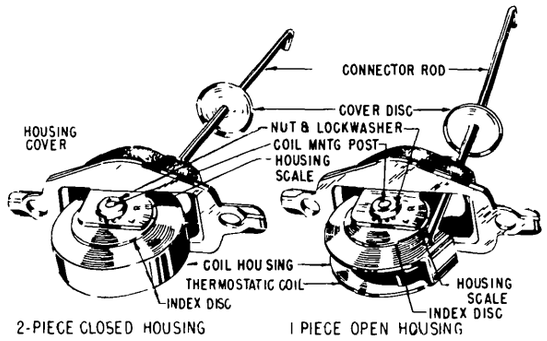
CAR MODEL — **Carburetor Model**

DeSoto S27 (1957) ..... Stromberg WW 3-149, 150
DeSoto S27 (1957) ..... Carter WCFB 2532S, SA
Dodge V8 (1957) ..... Stromberg WW 3-149, 150
Dodge V8 (1957) ..... Carter WCFB 2532S, SA
Dodge V8 (1957) ..... Carter WCFB 2622S, SA
Plymouth V8 (1956)..... Carter BBD 2299S; 2300S, 1S
Plymouth V8 (1956) ..... Carter BBD 2407S; 8S; 9S, SA
Plymouth V8 (1956) ..... Carter WCFB 2302S, SA, SB
Plymouth V8 (1956) ..... Carter WCFB 2442S
Plymouth V8 (1957) ..... Carter BBD 2512S, SA
Plymouth V8 (1957) ..... Carter BBD 2513S, SA
Plymouth V8 (1957) ..... Carter BBD 2514S, SA
Plymouth V8 (1957) ..... Carter WCFB 2530S, SA
Plymouth V8 (1957) ..... Stromberg 15-23, 24, 25

DESCRIPTION: These "Cross-over" type automatic choke controls are separate units mounted in a well in the intake manifold (at the exhaust "cross-over" passage) and linked to the choke valve lever by a connector rod. *See illustration.*

OPERATION: Cross-over type automatic choke operates in the same manner as other thermostatic coil types. The vacuum piston is located in the carburetor air horn and is linked directly to the choke valve shaft (not part of automatic choke assembly).

ADJUSTMENT & CHECKING: No adjustment is required and choke must be removed from manifold well to check the setting. Operation can be checked as follows: **Operation Check** - With choke mounted on engine and connected to carburetor, lift cover disc and open and close choke valve manually to make certain connector rod does not bind on sides of hole in housing cover. If connector rod does not clear the hole, replace assembly *(CAUTION - Bending rod will change calibration).* Move rod up and down to check for free movement of the coil



"CROSS-OVER" TYPE CHOKE ASSY.

housing on the pivot. If internal bind noted, replace assembly.

Setting Check - With choke assembly removed from manifold well, index mark on disc should be midway between "L" and "R" marks of scale on housing (Std. setting - see individual car model pages for specific settings). To adjust setting, loosen mounting post locknut and turn mounting post with a screwdriver to align index mark on disc with correct mark on scale. Hold post from turning while tightening locknut.

CLEANING & INSPECTION: Entire housing and rod assembly can be cleaned with carburetor parts cleaner without disassembly. After cleaning, rinse in solvent and blow out inside of housing with compressed air. Check to make certain that housing revolves freely on mounting post without binding. If necessary, unit can be disassembled for thorough cleaning and should be reassembled as follows:

REASSEMBLY (After Disassembly for Cleaning): *NOTE - Two types of choke assembly have been used: 1) One Piece Open Housing, 2) Two Piece Closed Housing. See illustration. Assemble each type as follows:*

One Piece Open Housing: Insert thermostatic coil in housing with hook on coil pointing toward web on edge of housing approximately 120° below straight upper edge of housing. Insert mounting post through housing and coil with index mark toward hook on coil, secure mounting post with washer and pin spring. Install cover disc on connector rod and install rod through housing cover into housing toward split end of mounting post, secure rod with washer and pin spring (spring eye outward). Assemble housing cover to mounting post with lockwasher and nut, rotate mounting post counterclockwise until hook on coil picks up connector rod, tighten nut. Check for positive spring action by pushing connector rod down through housing cover. Adjust choke setting (see Adjustment above).

Two Piece Closed Housing: Place coil mounting post in one of the coil housing halves, install thermostatic coil on mounting post with hook facing clockwise. Assemble other half of housing with holes in both halves aligned, secure with washer and hairpin. Install connector rod with hairpin end extending through hole in housing toward split end of mounting post, secure with washer and hairpin (hairpin eye outward). Install index disc on mounting post with flat on disc and post aligned, rotate disc and post counterclockwise until hook on coil engages connector rod. *(CAUTION* - Index mark on disc should be approximately 60° to right of connector rod with housing held so that rod points straight up - if mark not in correct position, turn disc over). Assemble housing cover on mounting post and install lockwasher and nut. Install cover disc on rod. Adjust choke setting (see Adjustment above).

CARTER BBD DUAL

CHRYSLER	Carter Carburetor No.
1957 Windsor C-75-1 (Std.)	BBD 2527S
DESOTO	
1957 Firedome S-25 (Std.)	BBD 2522S, SA
PLYMOUTH	
1957 V8 P-31 (Synchro-mesh)	BBD 2512S,SA,SB,SC
1957 V8 P-31 (Overdrive)	BBD 2513S,SA,SB,SC
1957 V8 P-31 (Auto. Trans.)	BBD 2514S,SA,SB,SC

►CHANGES & CORRECTIONS

►*CHRYSLER, DE SOTO, PLYMOUTH CARBURETOR JET CALIBRATION CHANGES FOR IMPROVED PERFORMANCE: See "Carter BBD Carburetor Jet Specification Table" for production changes and latest type jets used in these carburetors.*

►*DE SOTO FLAT SPOT OR HESITATION CORRECTION (2522S Carburetors):* If this trouble not corrected by complete tune-up procedure (including Ignition Timing, Manifold Heat Control operation check, and Carburetor adjustment including Float Level and Pump Stroke check), check pump valves and make changes in carburetor as detailed below. *NOTE* - These new parts installed in 2522SA carburetors in production.

Accelerating Pump Check Valves - Check for leakage by holding discharge check ball at bottom of pump discharge cluster hole while operating pump (Discharge Cluster removed). If leakage noted at discharge ball check, or at intake ball check, reseat balls. Use brass rod to tap ball down if new balls not available.

Venturi Cluster Screws (Main Idle Air Bleed) - Install new screws, No. 101-434 (supersedes 101-433).

Step-up Rods - Install new rods, No. 75-1145 (supersedes 75-1177).

►*PLYMOUTH HESITATION OR STUMBLE CORRECTION (301" ENGINE):* First check Ignition Timing and set to specified setting, check Manifold Heat Control Valve for free operation and correct positioning on shaft, check Carburetor Float Level and set to specified setting (see below). If above steps do not correct complaint, install new parts as listed below. *CAUTION* - These parts provide richer-than-standard mixture and should only be used in cases of extreme necessity.

Plymouth Parts Changes

Part & Usage	Part No.
Step-Up Rod (All Cars)	75-1217
Venturi Cluster Screw (Auto.Trans.)	101-433

►*PLYMOUTH CHOKE PISTON CHANGE FOR INCREASED ECONOMY DURING WARM-UP & SHORT TRIP OPERATION:* New Choke Piston & Link Assembly, Carter No. 160-165S, used in production on all "SB" and later carburetors. Supersedes previous type, No. 160-142S, on earlier carburetors.

►*PLYMOUTH REPLACEMENT CARBURETOR NOTE:* Carburetor No. 2512SC used as replacement for all models. When installing this carburetor on Overdrive Cars, use Unitized Pkg. No. 192-36U also.

►*PLYMOUTH 277" ENGINE CARBURETOR NOTE: Carter BBD 2409S and 2407S carburetors were used on a few 1957 Plymouth Plaza cars. For all data on these models, refer to Carter BBD Carburetors in 1956 Final Data.*

DESCRIPTION: Dual (double barrel) downdraft type of same design used on previous models except for new type Automatic Choke used on Plymouth models:

"Cross-over Type" Automatic Choke (Plymouth) - Automatic choke is separate unit mounted in well in intake manifold (in exhaust cross-over passage) and is linked to choke valve lever by a connector rod. Choke vacuum piston is located in a cylinder on the air horn and is linked directly to the choke valve. *See "Carter Cross-over Type Automatic Choke".*

ADJUSTMENTS: *Make all adjustments exactly as detailed below.*

Idle Adjustment: Make preliminary setting of both idle mixture screws by turning each screw in until it is lightly seated and then backing screw out exactly 1 turn. Warm up engine to normal operating temperature so that choke valve is wide open and fast idle inoperative. Set engine idle speed to correct figure, then adjust idle mixture as follows:

Idle Mixture - With engine warmed up and idling at correct idling speed, turn both idle mixture adjusting screws in 1/8 turn for leaner mixture. If engine speed increases and engine runs smoother, lean mixture further by turning both screws in an additional 1/8 turn. If this results in improved performance, reset idle speed, then make a final adjustment of each mixture screw by turning screw in (leaner) or out (richer) for best performance position of the screw. If any step of above procedure causes engine speed to drop off or engine to run roughly, turn both screws out 1/8 turn for richer mixture and then make final adjustment of each screw. *NOTE* - Best idle performance will normally be found with adjusting screws ¾-1¼ turn open from inner seated position. Both screws should be set alike within 1/8 turn.

Idle Speed - 450-500 RPM. *NOTE* - On Auto. Trans. Cars, Neutral selector button must be pressed in.

Accelerating Pump: Three holes provided in throttle lever and two holes provided in pump arm for connector rod engagement to provide seasonal pump setting as listed below.

Pump Stroke Adjustment - Back off throttle stopscrew so that throttle valves fully closed. Make certain that connector rod engaged in center hole of throttle lever and inner hole of pump arm. Use scale to measure the distance from top surface of bowl cover to top of pump plunger shaft. If height not correct (see table below), adjust by bending connector rod at lower angle.

Pump Stroke Setting

Car & Carb.	Pump Plunger Height
Chrysler 2527S	1 1/32"
DeSoto 2522S, SA	1 1/32"
Plymouth (All)	1 1/32"

Pump Seasonal Setting - Std. setting is with connector rod engaged in center hole of throttle lever and inner hole of pump arm (Medium Stroke). Outer hole in throttle lever will provide maximum stroke (greater discharge), and inner hole minimum stroke (less discharge).

Float Level: To check float level, remove air horn and bowl cover assembly, and gasket. Place gauge (see table below) squarely on top edge of bowl at center of floats. Hold float arm lip firmly against seated needle valve. Ridge or crown on each float should just touch step on gauge. Adjust by bending float lip (*NOTE* - If one float lower than the other, first equalize floats by bending float arm, then adjust both floats by bending lip).

Float Level Setting

Car & Carb.	Checking Gauge	Float Level
Chrysler 2527S	T109-282	1/4"
DeSoto 2522S, SA	T109-239	9/32"
Plymouth (All)	T109-239	9/32"

Fast Idle: *Two different settings required as follows:*

Fast Idle Cam Clearance - With choke valve tightly closed and lip on choke shaft inner lever contacting lug on outer lever, clearance between fast idle cam lever and stop on body should be .020" (Gauge T109-29) and index mark (line) on fast idle cam should be in line with fast idle screw. Adjust by bending lip on inner choke shaft lever using bending tool T109-22.

Fast Idle Throttle Valve Opening - Back out idle speed adjusting screw, close choke valve tightly. Fast idle screw should be in line with index mark on fast idle cam (highest step of cam). Turn fast idle screw in or out until correct throttle valve opening is secured (see table below). Check by inserting gauge between lower edge of throttle valve and carburetor wall on side opposite idle ports.

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Chrysler 2527S	T109-44	.015"
DeSoto 2522, SA	T109-44	.016"
Plymouth (All)	T109-44	.014"

Unloader: To check, close choke valve lightly, open throttle valves to wide open position which will open choke valve slightly. Check choke valve opening or clearance by inserting gauge (see table below) between upper edge of valve and air horn wall. Adjust by bending unloader arm on throttle lever using bending tool T109-213.

Unloader Setting

Car & Carb.	Checking Gauge	Choke Opening
Chrysler 2527S	T109-28	3/16"
DeSoto 2522S, SA	T109-28	3/16"
Plymouth (All)	T109-28	3/16"

Automatic Choke: Different type choke mechanisms used as follows:

Chrysler & DeSoto - Integral type mounted on air horn with thermostatic coil linked directly to lever on choke valve shaft. Choke vacuum piston is mounted within choke housing. Fast idle cam is mounted on main body directly above throttle lever and is linked to choke valve lever on opposite side of air horn from automatic choke. To adjust choke setting, loosen three screws in retainer ring, rotate choke housing. *NOTE* - Standard (Centered) setting is secured with the index line on the choke housing aligned with the center longer line of the scale on the rim of the housing on the air horn.

Automatic Choke Setting

Car & Carb.	Choke Setting
Chrysler 2527S	1 Point Rich
DeSoto 2522S, SA	Centered (At Index)

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (C nt.)

Plymouth - Automatic choke is separate "Cross-over" type mounted in well in intake manifold (at exhaust cross-over passage) and linked to choke valve lever by a connector rod. Choke vacuum piston is located in a cylinder in the carburetor air horn and linked directly to the choke valve. This type choke ordinarily does not require adjustment. *See "Carter Cross-over Type Automatic Choke" for complete data.*

Overdrive Kickd wn Switch (Plymouth): With throttle valves wide open, clearance between kickdown lever and switch stem guide should be 1/64-3/64". Adjust by loosening switch mounting nuts and changing position of switch in bracket.

Thr ttl Valv Setting: When installing valves, they should be positioned as indicated. "Idle Port Opening" is the port opening above upper edge of tightly closed throttle valve. "Vacuum Spark Port" is height of top of port above upper edge of tightly closed throttle valve.

Thr ttle Valve Setting

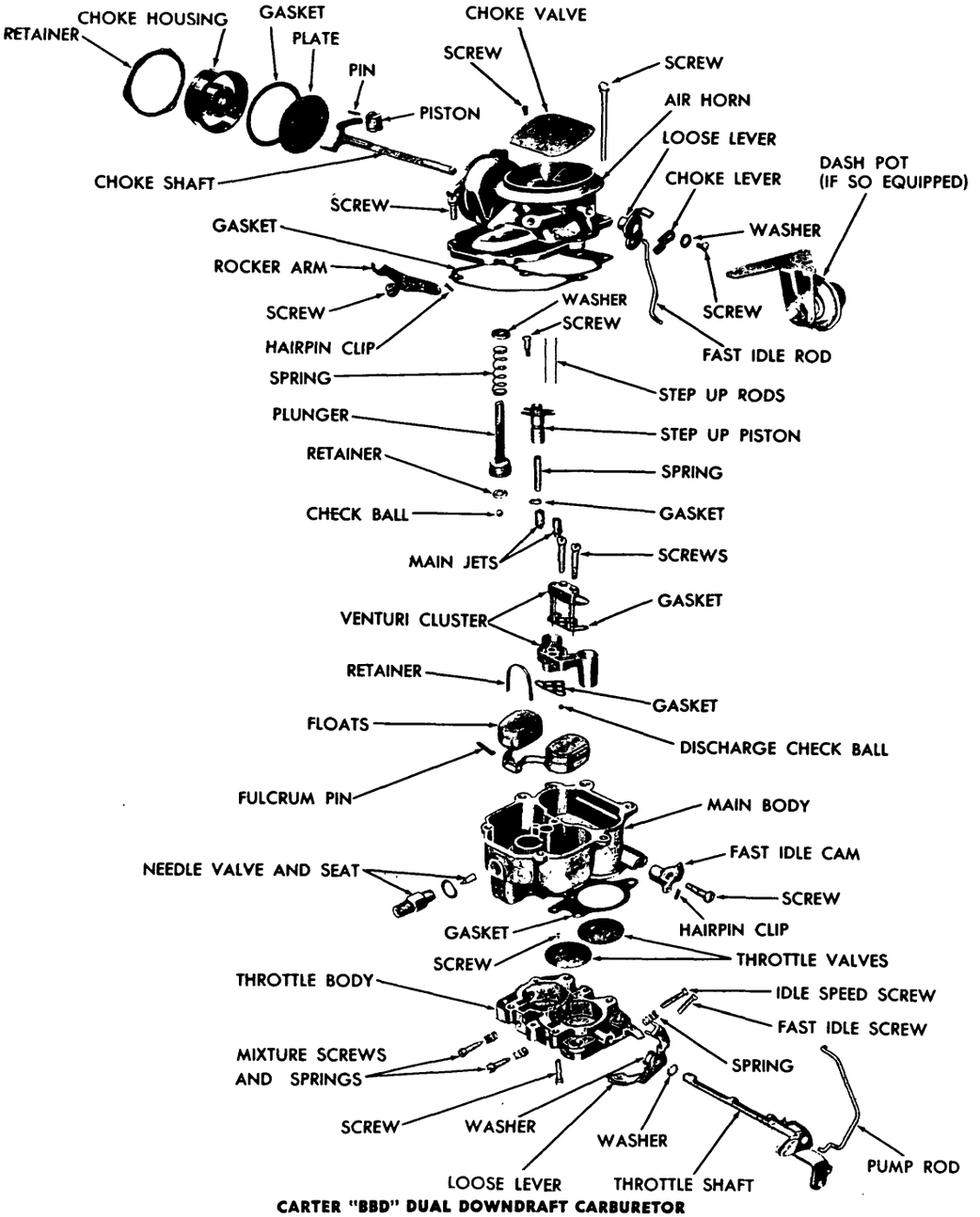
Car & Carb.	Idl Port Opening	Vacuum Spark Port
Chrysler 2527S	.144-.148"	①
DeSoto 2522S, SA	.148-.152"	①
Plymouth (All)	.144-.148"	①

① - .035-.045" (Early Production - .030" x .110" port). .025-.035" (Later Production - .045" x .110" port).

OVERHAUL: With carburetor off engine, proceed as detailed below. *NOTE* - It is recommended that carburetor be mounted on stand, Tool C-3225, to protect throttle valves from damage while carburetor is on the bench.

Disassembly: Disconnect and remove fast idle and pump connector rods. Remove air horn and bowl cover as an assembly (with integral automatic choke), discard air horn gasket. Remove pump plunger and spring by pressing up on plunger and cocking it to one side to disengage plunger stem from pump arm. Remove fuel inlet needle valve seat, gasket, and needle valve. Take out float pin retainer, remove fulcrum pin and floats. Remove vacuum step-up piston retaining screw, lift out piston and step-up rods, remove piston spring from cylinder. Remove main metering jets and gaskets. Loosen venturi cluster screws, lift venturi cluster assembly straight up and remove, separate cover and cluster and discard gaskets (*CAUTION* - Do not attempt to remove idle orifice or main vent tubes from cluster - these parts not furnished separately). Invert carburetor to drop out pump discharge check ball from channel under cluster mounting. Remove idle mixture adjusting screws and springs. Invert carburetor, remove throttle body attaching screws, lift off throttle body, discard gasket. Do not remove throttle valves or shaft unless wear or damage requires installation of new parts (see Reassembly for installation data).

Automatic Ch ke Disass mbly (Chrysler & DeSoto) - Take out screws in choke housing retainer, remove retainer, heat tube cap and gasket, choke housing and thermostatic coil assembly, baffle plate, and gasket. Remove staked portion of choke valve screws (use file or other tool), remove screws, slide choke valve out. Remove screw in end of shaft retaining choke shaft lever (opposite end from automatic choke housing), slide lever, loose lever, and washer off end of shaft. Rotate choke shaft clockwise until vacuum piston clears cylinder in choke housing, withdraw shaft, lever, and piston assembly from air horn.



CARTER "BBD" DUAL DOWNDRAFT CARBURETOR

Cleaning & Inspection: Clean all parts in denatured alcohol, Metalclene, or equivalent cleaner. Clean and blow out all passages in carburetor castings, venturi

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (C nt.)

cluster, and jets (*CAUTION* - Do not use wire or drills to clean jets). Choke thermostatic coil and heat retainer plate can be removed from housing for cleaning by rapping assembly hard against palm of hand (*CAUTION* - Do not attempt to remove coil from heat retainer plate). If heavy black carbon deposits noted on choke parts, check heat tube in exhaust manifold for leaks. Check all parts for wear or damage and replace as required.

Reassembly: Use all new gaskets. Reassemble carburetor by reversing disassembly procedure and note the following:

Throttle Valve Installation - *NOTE* - If throttle valve shaft or throttle body worn, it is recommended that new throttle body assembly (with shaft) be used. Install throttle valves with mark ("C" in circle) downward and on idle port side, install new screws loosely, close throttle valves tightly and centralize valves by tapping them lightly, tighten screws securely and stake screws by squeezing with pliers. Check throttle valve position (see specifications above).

Idle Mixture Screws - Replace screws if tapered portion grooved or ridged. Turn screws in by hand until lightly seated, then back each screw out 1 full turn for approximate idle setting.

Choke Valve Installation - Slide choke shaft and piston assembly into air horn, rotate shaft counterclockwise to enter vacuum piston in cylinder. Install choke valve shaft, install new screws loosely, close valve and tap lightly to centralize valve in bore, then tighten screws securely and stake by squeezing with pliers. Check for free operation by closing valve with air horn upright. Choke should open of own weight.

Automatic Choke Assembly (Integral Type) - See that retaining spring in heat retainer plate clears notch in plate, align notch with lug in housing and seat plate in housing, assemble heat tube cap and retaining ring on housing. Install baffle plate and gasket on air horn, then install choke housing assembly with index mark downward, rotate housing clockwise until index mark is centered on scale on air horn, install retainer screws and tighten. Install choke shaft loose lever and sleeve, choke shaft lever, washer, and screw on opposite end of choke shaft. *NOTE* - See Automatic Choke Setting (above) for correct choke setting on each carburetor model.

Accelerating Pump Assembly - If old pump plunger being reinstalled, flare plunger leather by rolling it back several times, install plunger in cylinder. Install discharge check ball in discharge passage. Check pump operation as follows: Pour clean gasoline in float bowl (½" deep). Operate pump plunger several times to fill cylinder and remove all air from discharge passage. Use small brass rod to hold discharge ball down on its seat, press pump plunger down. No fuel should be emitted at either the discharge or intake passages. If fuel discharge noted, remove check balls and inspect for damage, clean passages thoroughly. Reseat ball by using small brass rod on ball and tapping lightly to form new ball seat (*CAUTION* - install new check ball after using ball in reseating operation). When installing plunger, make certain plunger leather enters cylinder evenly.

Step up Piston & Rod Assembly - Make certain that step-up rods are free on piston plate (must return to vertical position when released), and that piston is free in cylinder. See that step-up rods enter metering jets when installing assembly in carburetor.

Carburetor Adjustment - Make all adjustments listed in Adjustment section above.

SERVICE PARTS: Gasket Sets - Carter No. 298 (Chrysler 2527S & DeSoto 2522S), No. 300 (Plymouth - All).

Repair Pkg (with Std. Metering Jets) - Carter No. 1858 (Chrysler 2527S), No. 1863 (DeSoto 2522S), No. 1860 (Plymouth - all).

1957 CARTER BBD CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Main Metering Jet			Step Up Rod		Venturi Cluster Assy. ⑥				Venturi Cover Screw		
			Std. Part No.	1 Size Lean Part No.	2 Size Lean Part No.	Size	Part No.	Main Vent Tube Size	Idle Tube Size	Pump Jet Size	Part No.	Idle Air Bleed	Idle Restriction	Part No.
CHRYSLER C75-1	1957	2527S	120-214S ⑦	120-213S ⑧	120-212S ⑨	.026"	75-1370 ⑩	.0393"	.0255"	.0275"	58-127S	.051"	.055"	101-423
DE SOTO S25	1957	2522S,SA	120-221S	120-212S	120-209S	.023"	75-1145 ⑪	.0393"	.0275"	.0275"	58-155S	.055"	.055"	101-434 ⑫
PLYMOUTH P31-1,2,3 (S.M.)	1957	2512S,SA,SB,SC	120-213S ⑬	120-212S ⑭	120-209S ⑮	.026"	75-1177 ⑯	.0393"	.0275" ⑰	.0275"	58-155S ⑱	.0472"	.055"	101-440 ⑲
P31-2,3 (O.D.)	1957	2513S,SA,SB,SC	120-213S ⑬	120-212S ⑭	120-209S ⑮	.026"	75-1177 ⑯	.0393"	.0275" ⑰	.0275"	58-155S ⑱	.0472"	.055"	101-440 ⑲
P31 (Auto. Trans.)	1957	2514S,SA,SB,SC	120-213S ⑬	120-212S ⑭	120-209S ⑮	.026"	75-1177 ⑯	.0393"	.0275" ⑰	.0275"	58-155S ⑱	.0472"	.055"	101-448 ⑳

⑥- Main Vent Tube, Idle Tube, Pump Jet now located in Venturi Cluster

⑦- Supersedes 120-213S.

⑧- Supersedes 120-212S.

⑨- Supersedes 120-209S.

⑩- Supersedes 75-1177.

⑪- Supersedes 75-1177 in 2522S.

⑫- Supersedes 101-433 in 2522S.

⑬- Supersedes 120-212S in SA, SB.

⑭- Supersedes 120-209S in SA, SB.

⑮- Supersedes 120-211S in SA, SB.

⑯- Supersedes 75-990 in SA, SB.

⑰- .0255" in SC.

⑱- 58-127S in SC.

⑲- Supersedes 101-433 in S, SA, SB.

⑳- Supersedes 101-440 which superseded 101-434.

FORD 6 "VISI-FLO"

FORD 6 CYL. PASS. CARS	Carburetor No.
1957 (Synchro-mesh)	B7A-9510-C
1957 (Fordomatic)	B7A-9510-D
1957 (Later Cars)	B7A-9510-N
1957 (Special Economy)	B7A-9510-M
1957 (All Transmissions)	B7A-9510-Y
FORD 6 CYL. TRUCKS	
1957 (Synchro-mesh)	B7C-9510-C
1957 (Fordomatic)	B7A-9510-D

►CHANGES & CORRECTIONS

►*CARBURETOR MODIFICATION TO ELIMINATE ENGINE PING (Carburetor B7A-9510-N):* To correct pinging under load at low engine speeds, the following carburetor modifications should be made in addition to a Distributor advance modification. *See Ford 6 Cyl. Pass. Car & Truck car model pages for distributor modification data.*

1) Rework Distributor Vacuum Passages in Carburetor - With carburetor removed from engine, remove throttle body assembly *(see OVERHAUL below)*, remove wire retainer from lower end of distributor passage at mounting face of throttle body, remove nylon ball from passage *(CAUTION* - If ball sticks, dislodge ball by tapping throttle body on hand, DO NOT pound throttle body on bench which may mar mounting surface and prevent proper sealing when carburetor reinstalled). Drill out restriction at upper end of this vertical passage to .0585-.0605" using a No. 53 drill. Working through distributor vacuum line connection hole, drill out restriction at inner end of horizontal passage to .051-.053" using a No. 55 drill. *CAUTION* - Use extreme care to remove all drill chips from passages and mating surfaces of carburetor. Reassemble carburetor.

2) Main Metering Jet Change - Remove glass fuel bowl and install new Main Metering Jets as follows:

Main M tering Jet (New Sizes)

Altitude	Jet Size	Jet Part No.
0-5000 ft.	.069"	B7T-9533-A
5000-10000 ft.	.067"	B4C-9533-A
10000-15000 ft.	.065"	5GA-9533-A

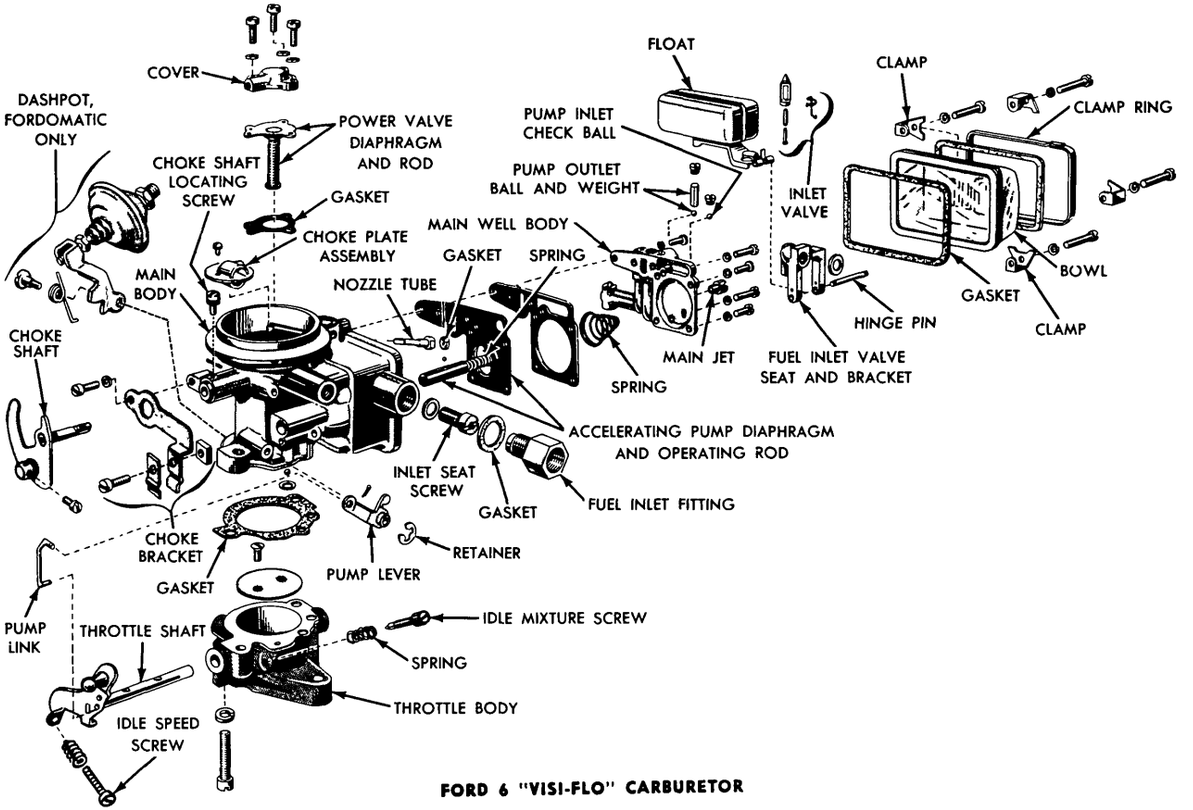
DESCRIPTION: Visi-flo single barrel downdraft type. Design changed from type used on previous models and has the following new features:

Main Fuel System - Consists of a main nozzle tube discharging into a booster venturi formed integrally with the choke valve. Booster venturi rotates with the valve and is turned across the air flow when the choke valve is closed. As the choke valve is opened, air flow is directed through the venturi to apply suction on the main nozzle. Choke valve is attached to stub end of choke shaft (one side only) and pivots on the main nozzle tube on the other side.

Pump Discharge Nozzle - Nozzle is "pressed-in" type (same as 1956) and cannot be removed. If nozzle is loose, replace main body assembly.

ADJUSTMENTS: Make all adjustments exactly as follows:

Idling Adjustment: If initial adjustment required to warm up engine, turn idle mixture screw in until lightly seated,



FORD 6 "VISI-FLO" CARBURETOR

then back screw out exactly 1 turn. Operate ending at fast idle until normal operating temperature reached (20 minutes for cold engine), then adjust as follows:

Idle Mixture - With engine at normal operating temperature (choke valve wide open, fast idle inoperative), adjust idle speed (see below), turn idle mixture adjusting screw in until engine runs rough from lean mixture, then turn screw out until engine begins to roll from rich mixture, finally turn screw in just enough so that engine idles smoothly. This will provide a slightly rich mixture which is desired. Recheck idle speed.

Idle Speed - With engine at normal operating temperature so that throttle stopscrew resting on lowest point of fast idle cam (choke lever), adjust stopscrew for correct idle speed of 475-500 RPM in neutral *(NOTE* - On Fordomatic cars, place selector lever in Neutral "N" and set hand brake to hold car).

►*FORDOMATIC IDLE SPEED:* After setting idle speed at 475-500 RPM in Neutral, place selector lever in Drive "D" position and recheck idle speed. Speed should be 425-450 RPM in Drive. Readjust throttle stopscrew as necessary to secure this 425-450 RPM in Drive setting.

Antistall Dashpot (Fordomatic): After idle speed adjusted, check dashpot setting by depressing dashpot plunger fully with throttle valve closed. Clearance between end of dashpot plunger and adjusting screw on operating lever should be .045-.064". Adjust by loosening locknut and turning adjusting screw.

Accelerating Pump: Seasonal adjustment provided by two holes in throttle lever for pump link engagement:

Inner Hole - Normal or hot weather (short stroke).

Outer Hole - Cold weather operation (long stroke).

Float Level: *NOTE* - Fuel level setting can be checked and adjusted with carburetor on engine, float level setting is a bench check when overhauling carburetor.

Fuel Level - 11/16" below power valve mounting surface. To check fuel level, remove power valve diaphragm cover and valve assembly (adjacent to bowl), install gauge, Tool T52L-9550-AGE in this opening. Fuel in bowl should just touch "Low" gauge pin and should not touch "High" gauge pin. If adjustment required, remove float bowl and install dummy bowl (with open top) using three of the regular retaining screws. Adjust by bending float arm and recheck fuel level before installing regular bowl.

Float Level - With carburetor off engine and float bowl removed, invert carburetor, install special cardboard gauge (furnished in Repair Pkg.) on edge of bowl at free end of float. Lowest point on float should clear gauging leg. Adjust by bending float arm tab.

Power Valve: No adjustment provided. Power valve opens when manifold vacuum decreases to 9½-10".

CONTINUED ON NEXT PAGE

FORD 6 "VISI-FLO" (C nt.)

Fast Idle: No adjustment required. Consists of a cam shaped section of the choke lever which serves as the stop for the throttle stopscrew.

OVERHAUL: With carburetor removed from engine, proceed as follows:

Disassembly: Disconnect and remove pump link. Take out two throttle body screws, lift off throttle body assembly, discard gasket. Remove fuel inlet fitting and gasket, remove dashpot assembly (if used). Take out float bowl retainer screws, remove retainer and clamps, retainer gasket, float bowl, and bowl gasket. Remove fuel inlet seat screw and gasket (in inlet passage), remove complete inlet valve and float assembly from within the main body, remove inlet seat gasket. Disassemble float by removing float shaft to free float, then remove wire clip, spring, and plunger from fuel inlet needle. Take out power valve diaphragm screws and lockwashers, lift the power valve diaphragm assembly out, separate the cover from diaphragm and stem assembly. Take out five main well screws and lockwashers, lift off main well assembly. Remove pump return spring from pump piston disc, remove spacer gasket, pull pump diaphragm out of main body. Remove pump operating lever retainer and slide lever off stud. Remove choke bracket screw and choke valve screw, slide choke shaft and lever assembly out, remove choke bracket. Slide main discharge nozzle out of opposite side of body, remove choke valve and booster venturi assembly. Invert main body, take out distributor passage ball retainer, remove ball from passage. Remove main metering jet, pump inlet and outlet check ball retainers from main well body, invert body to remove check balls *(CAUTION* - Balls are not same size, inlet ball is larger). Press pump rod sleeve toward diaphragm until sleeve retainer ball drops out, remove sleeve and spring. Remove idle mixture adjusting screw and spring, remove dashpot lever (if used). *NOTE* - If necessary to remove throttle valve, mark valve to insure correct reinstallation.

Cleaning & Inspection: Soak all castings and metal parts (except dashpot) in cleaning solution or denatured alcohol. Blow out all passages and jets with air. Inspect all parts for wear or damage.

Reassembly: Use all new gaskets. Install parts in reverse order of disassembly (above) and note the following important points:

Choke Valve Assembly - Install choke bracket on main body, insert choke valve and booster venturi assembly in main body with poppet valve stem down, slide choke shaft and lever assembly in to engage valve, install choke valve screw loosely. Install main nozzle to engage opposite side of choke valve. Close choke valve and check for it being centered by holding main body up to a light (little or no light should show around edges of valve), tighten choke valve screw and check choke valve for free operation without binding. Install choke shaft locating screw and lockwasher.

Pump Assembly - Place pump operating lever on main body stud and install retainer on stud. Install spring on pump diaphragm rod, compress spring by pressing pump rod spring into rod, then drop retainer ball into hole in sleeve. Position pump assembly in main body *(CAUTION* - Make certain main nozzle gasket is in place on end of nozzle), place main well spacer gasket over pump assembly. Install main well assembly (following).

Main Well Assembly - Install pump inlet and outlet check balls *(CAUTION* - Inlet check ball is larger), seat balls by using brass drift to tap ball gently down on seat, install inlet ball retainer and outlet ball weight and retainer. Seat large end of pump return spring in disc on pump diaphragm, insert main well attaching screws and lockwashers in body *(CAUTION* - Two longer screws are used in top and bottom center holes), then install main well body as follows: Apply pressure against protruding end of pump rod sleeve to fully compress pump return spring and at the same time press the main well body into position *(NOTE* - This will prevent spring pressure from disturbing alignment of pump diaphragm, spacer gasket, and main body). Tighten all five main well body screws before releasing pressure.

Float & Inlet Needle Valve Assembly - Assemble inlet valve parts and float on inlet valve seat *(CAUTION* - Needle must be clipped to float lever tab). Install gasket on inlet seat screw, insert screw in inlet fitting boss in main body, install seat gasket on end of screw protruding into fuel bowl. Set float assembly in position at end of screw, place float gauge under float hinge bracket and across lower corners or bowl mounting face to prevent assembly from tilting, tighten inlet seat screw securely before removing gauge. Adjust Float Level using cardboard gauge furnished in repair kit *(see Float Level under ADJUSTMENTS).*

Fuel Bowl Installation - Install new gasket in bowl recess of main body, assemble new gasket and retainer on bowl, position bowl on main body. Assemble clamps, screws, and lockwashers. Tighten two center screws first, and then the two end screws, alternately and evenly, to approximately 8-10 in. lbs. torque. *CAUTION* - Do not overtighten these screws which may crack the bowl.

Carburetor Adjustments - *Make all adjustments listed under ADJUSTMENT above.*

SERVICE PARTS: **Gasket Sets** - Ford No. B6A-9502-A (B7C-9510-C).
Repair Kit - Ford No. B6A-9590-A (B7C-9510-C).

1957 HOLLEY (FORD) SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Model	Main Metering Jet Size	Main Metering Jet Part No.	Main Discharge Nozzle Part No. Left Hand	Main Discharge Nozzle Part No. Right Hand	Economizer Assembly Part No.	Power Jet Part No.	Idle Tub Part No.	Pump Nozzle Part N .
FORD 6 CYL. Cars										
Synchro-mesh	1957	B7A-9510-C	.068"	8MB-9533-A⑥	.....	.....	.....	.....	.....	⑤
Fordomatic	1957	B7A-9510-D	.068"	8MB-9533-A⑥	.....	.....	.....	.....	.....	⑤
Special Economy	1957	B7A-9510-M	.047"	59A-9533-C	.....	.....	.....	.....	.....	⑤
FORD 6 CYL. Trucks										
Synchro-mesh & O.D.	1957	B7C-9510-C	.070"	B6C-9533-A⑦	B7A-9920-A		EAA-9904-A	B7C-9594-A	.....	⑤
Fordomatic	1957	B7A-9510-D	.068"	8MB-9533-A⑥	B7A-9920-A		EAA-9904-A	B7A-9594-A	.....	⑤
FORD V8 Trucks										
Synchro-mesh & O.D.	1957	B7C-9510-A	,054"	06H-9533⑧	B6C-9921-A	B6C-9920-A	78-9904⑨	.....	B6A-9542-A	EAB-9577-A
Fordomatic	1957	B7C-9510-B	.054"	06H-9533⑧	B6C-9921-A	B6C-9920-A	78-9904⑨	.....	B6A-9542-A	EAB-9577-A

⑤- Nozzle is pressed in. Replace main body.

⑥- Use 8MB-9533-B (.066") 5,000 to 10,000 ft. Alt.
Use 1GA-9533-A (.064") 10,000 to 15,000 ft. Alt.

⑦- Use 8MB-9533-A (.068") 5,000 to 10,000 ft. Alt.
Use 8MB-9533-B (.066") 10,000 to 15,000 ft. Alt.

⑧- Use 86H-9533 (.052") 5,000 to 10,000 ft. Alt.
Use 78-9533-A (.050") 10,000 to 15,000 ft. Alt.

⑨- To 5,000 ft. Altitude. Stamped "AM".

FORD TRUCK DUAL CARBURETOR

FORD V8 TRUCK	Carburetor No.
1957 V8 F-100, 250, 350 (S-M)	① B7C-9510-A
1957 V8 F-100, 250, 350 (A-T)	② B7C-9510-B

① - Stamped ECW-L7-1 on left side of main body.
② - Stamped ECW-M7-1 on left side of main body.
(S-M) - Synchro-mesh. (A-T) - Fordomatic.

DESCRIPTION: Dual (2-barrel) downdraft type with manual choke control. Design has been changed from type used on previous models as follows:

Main Nozzl s - Nozzle bars are new type with integral booster venturi (see illustration). Main nozzle consists of a horizontal passage in the nozzle bar discharging into the throat of the booster venturi. Idle system is similar to previous type with idle tube installed in leg of nozzle bar and extending down into the main well. The horizontal idle passage extends around the rim of the booster venturi with the idle air bleed opening in the upper surface of the nozzle bar adjacent to the idle tube.

ADJUSTMENTS: Make all adjustments exactly as follows:

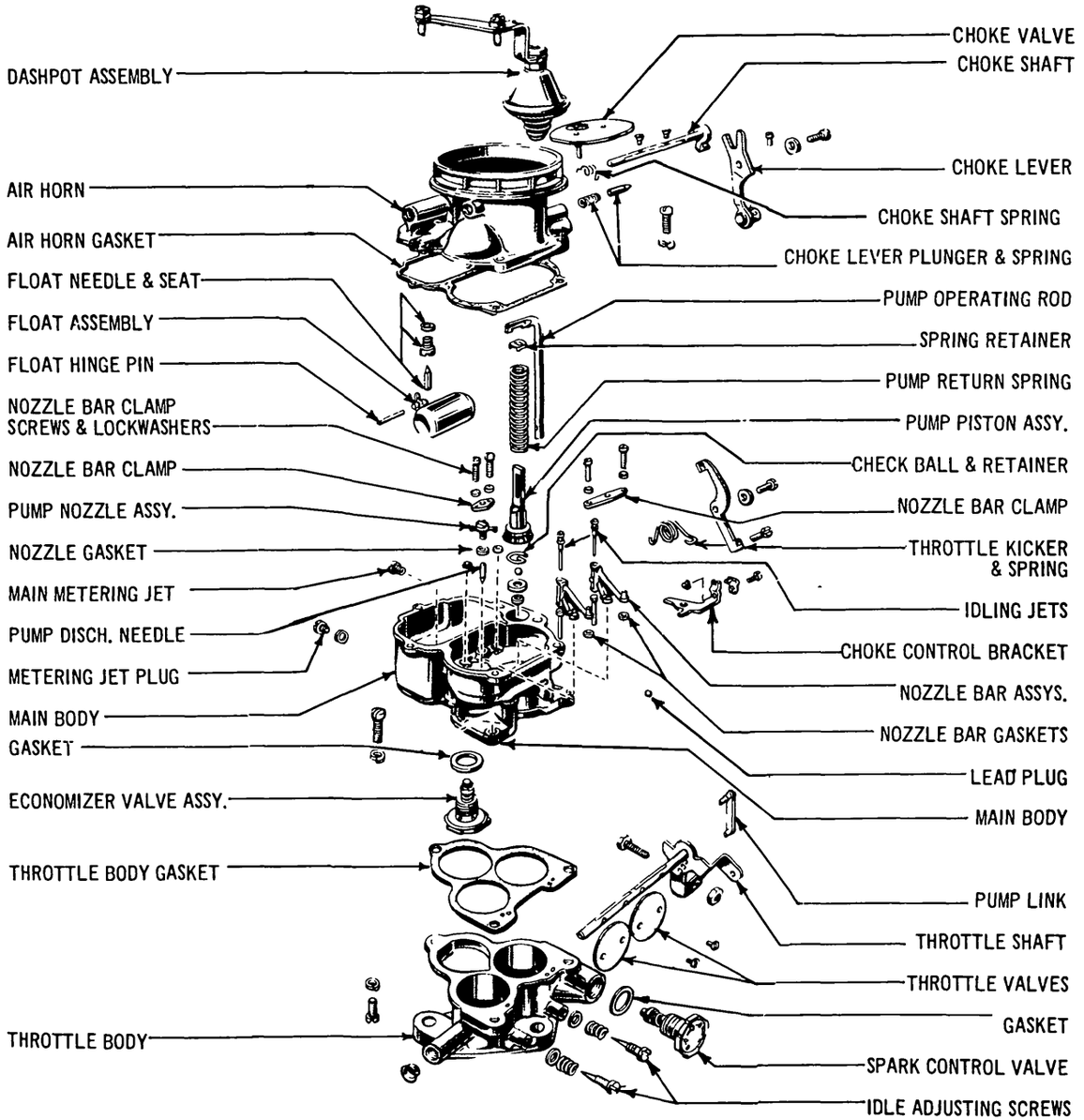
Idling Adjustment: If initial adjustment required to warm up engine, turn each idle mixture screw in until lightly seated, then back screw out exactly 1 turn. Operate engine at fast idle until normal operating temperature reached (20 minutes for cold engine), then adjust as follows:

Idle Mixtur - With engine at normal operating temperature and choke valve wide open, adjust idle speed (see below), adjust both idle mixture screws alike by turning screws in until engine runs rough from lean mixture, then turn screws out until engine begins to roll from rich mixture, finally turn screws in just enough so that engine idles smoothly. This will provide a slightly rich mixture which is desired. Recheck idle speed.

Idle Spe d - With engine at normal operating temperature and choke valve wide open, adjust throttle stopscrew for correct idle speed of 475-500 RPM with transmission in neutral (*NOTE* - On Fordomatic models, place selector lever in Neutral "N" and set handbrake).

►*FORDOMATIC IDLE SPEED:* After setting idle speed at 475-500 RPM in Neutral, place selector lever in Drive "D" position and recheck idle speed. Speed should be 425-450 RPM in Drive. Readjust throttle stopscrew as necessary to secure this 425-450 RPM in Drive setting.

Antistall Dashp t (Fordomatic): After idle speed adjusted, check dashpot setting by depressing dashpot plunger fully with throttle valves closed. Clearance between end of dashpot plunger and adjusting screw should be .045-.064". Adjust by loosening locknut and turning adjusting screw.



HOLLEY (FORD TRUCK) DUAL CARBURETOR

Accelerating Pump: Seasonal adjustment provided by three holes in throttle lever for pump link engagement:
Inn r H le - Hot weather or high altitudes.
Cent r H le - Normal or average conditions.
Out r H l - Extreme cold weather.

Fl at Level: Fuel level can be checked without dismantling carburetor. Float level requires removal of air horn and bowl cover assembly.

Fuel Level - 11/16" below top edge of bowl. To check fuel level, install gauge, Tool T56L-9562-A, in one of

CONTINUED ON NEXT PAGE

FORD TRUCK DUAL CARBURETOR (Cont.)

the main jet plug holes on side of bowl. With engine idling, fuel level should be even with "LO" pins in gauge cap.

Float Level - 1.437-1.500" from lower face of bowl cover to bottom of float (at side of soldered seam) with needle valve closed. To check float level, invert air horn and float assembly, place Float Gauge, Tool T56L-9510-A, squarely on gasket face of bowl cover with gauging leg extending over float adjacent to soldered seam (*CAUTION* - Do not gauge top of seam). "GO" end of gauge should just clear float, "NO GO" end should not clear float. Adjust by bending tab on float arm which contacts intake needle. *NOTE* - Gauge both ends of float and adjust for equal height.

Power Valve (Economizer): No adjustment provided. Power valve opens when manifold vacuum decreases to 7-8".

Spark Control Valve: No adjustment required. Calibrating spring in valve is set to allow valve to operate with manifold vacuum of 5-6".

OVERHAUL: *Se "Ford V8 Dual Downdraft" Carburetor in 1955 Annual Data or later Manual edition and note the following:*

Main Nozzle (Nozzle Bar) Servicing - To remove nozzle bars, take out screws in both nozzle bar clamps, remove clamps. Lift out pump discharge nozzle and both nozzle bars. Remove idle tubes from nozzle bars. Clean nozzle bars by dipping inlet end in cleaning solution (*CAUTION* - Do not immerse booster venturi in solution), blow all passages out with compressed air. Use new gaskets when reinstalling nozzle bars in main body.

SERVICE PARTS: Gasket Sets - Ford No. B6A-9502-B.

1957 FORD 2 & 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Main Metering Jet Size	Main Metering Jet Part No.	Venturi Assembly Part No.	Economizer Assembly Part No.	Pump Nozzle Part No.
FORD V8 Cars							
272" Eng. S.M. & F/M	1957	B7A-9510-A	.052"	86H-9533 ①	B7A-9641-A	B7A-9904-A	B7A-9577-A
272" Eng. S.M. & F/M	1957	B7A-9510-Q	.051"	59A-9533-A ②	B7A-9641-G	B7A-9904-A	B7A-9577-A
272" Eng. S.M. & F/M	1957	B7A-9510-Z	.048"	78-9533-B ③	.....	.....	.....
292" Eng. S.M. & O.D.	1957	B7A-9510-E	.054"	06H-9533 ④	B7A-9641-G	B7A-9904-A	B7A-9577-A
292" Eng. Fordomatic	1957	B7A-9510-L	.062"	1GA-9533-B ⑤	B7A-9641-A	B7A-9904-A	B7A-9577-A
292" Eng. Fordomatic	1957	B7A-9510-W	.061"	B4Q-9533-A ⑥	B7A-9641-G	.....	.....
312" Eng. Fordomatic	1957	B7A-9510-B Pri.	.054"	06H-9533 ⑦	B7A-9641-H	B7A-9904-A	B7A-9577-A
		B7A-9510-B Sec.	.059"	B4Q-9533-B ⑧	B7A-9641-B	.....	.....
312" Eng. Fordomatic	1957	B7A-9510-X Pri.	.054"	06H-9533 ⑦	.....	.....	.....
		B7A-9510-X Sec.	.059"	B4Q-9533-B ⑧	.....	.....	.....

① - Use 78-9533-A (.050") 5,000 to 10,000 ft. Alt.
Use 78-9533-B (.048") 10,000 to 15,000 ft. Alt.

② - Use 59A-9533-B (.049") 5,000 to 10,000 ft. Alt.
Use 59A-9533-C (.047") 10,000 to 15,000 ft. Alt.

③ - Use 78-9533-C (.046") 5,000 to 10,000 ft. Alt.
Use 78-9533-D (.044") 10,000 to 15,000 ft. Alt.

④ - Use 86H-9533 (.052") 5,000 to 10,000 ft. Alt.
Use 78-9533-A (.050") 10,000 to 15,000 ft. Alt.

⑤ - Supersedes B4T-9533-B (.053").
Use 1GA-9533-C (.060") 5,000 to 10,000 ft. Alt. Supersedes 59A-9533-A (.051").
Use 78-9533-F (.058") 10,000 to 15,000 ft. Alt. Supersedes 59A-9533-B (.049").

⑥ - Use B4Q-9533-B (.059") 5,000 to 10,000 ft. Alt.
Use 26H-9533 (.057") 10,000 to 15,000 ft. Alt.

⑦ - Use 86H-9533 (.052") 5,000 to 10,000 ft. Alt.
Use 78-9533-A (.050") 10,000 to 15,000 ft. Alt.

⑧ - Use 26H-9533 (.057") 5,000 to 10,000 ft. Alt.
Use B4T-9533-A (.056") 10,000 to 15,000 ft. Alt.

FORD 2 & 4-BARREL CARBURETORS

FORD 2-BARREL CARBURETORS	Carburetor No.
Pass. Cars 272" Eng. ①② (Early)	B7A-9510-A
Pass. Cars 272" Eng. ①② (Later)	B7A-9510-Q
Pass. Cars 272" Eng. ①② (Later)	B7A-9510-Z
Pass. Cars 292" Eng. ①	B7A-9510-E
Pass. Cars 292" Eng. ③ (Early)	B7A-9510-L
Pass. Cars 292" Eng. ③ (Later)	B7A-9510-W

FORD 4-BARREL CARBURETORS	Carburetor No.
Pass. Cars 312" Eng. ③ (Early)	B7A-9510-B
Pass. Cars 312" Eng. ③ (Later)	B7A-9510-X

Carburetor Identification

Carb. No.	Identification
B7A-9510-A	④ ECG-9510-AU or AV
B7A-9510-B	⑤ ECZ-U
B7A-9510-E	⑤ ECG-BA
B7A-9510-L	④ EDB-9510-K
B7A-9510-Q	⑤ ECG-AY or AZ
B7A-9510-W	⑤ EDB-N
B7A-9510-X	⑤ ECZ-Z
B7A-9510-Z	⑥ ECG

① - Synchro-mesh transmission.
② - When used with Fordomatic, dashpot and attaching parts must also be used.
③ - Fordomatic transmission.
④ - Stamped on brass identification tag.
⑤ - Cast on left side of fuel bowl
⑥ - BJ or BK stamped below prefix.

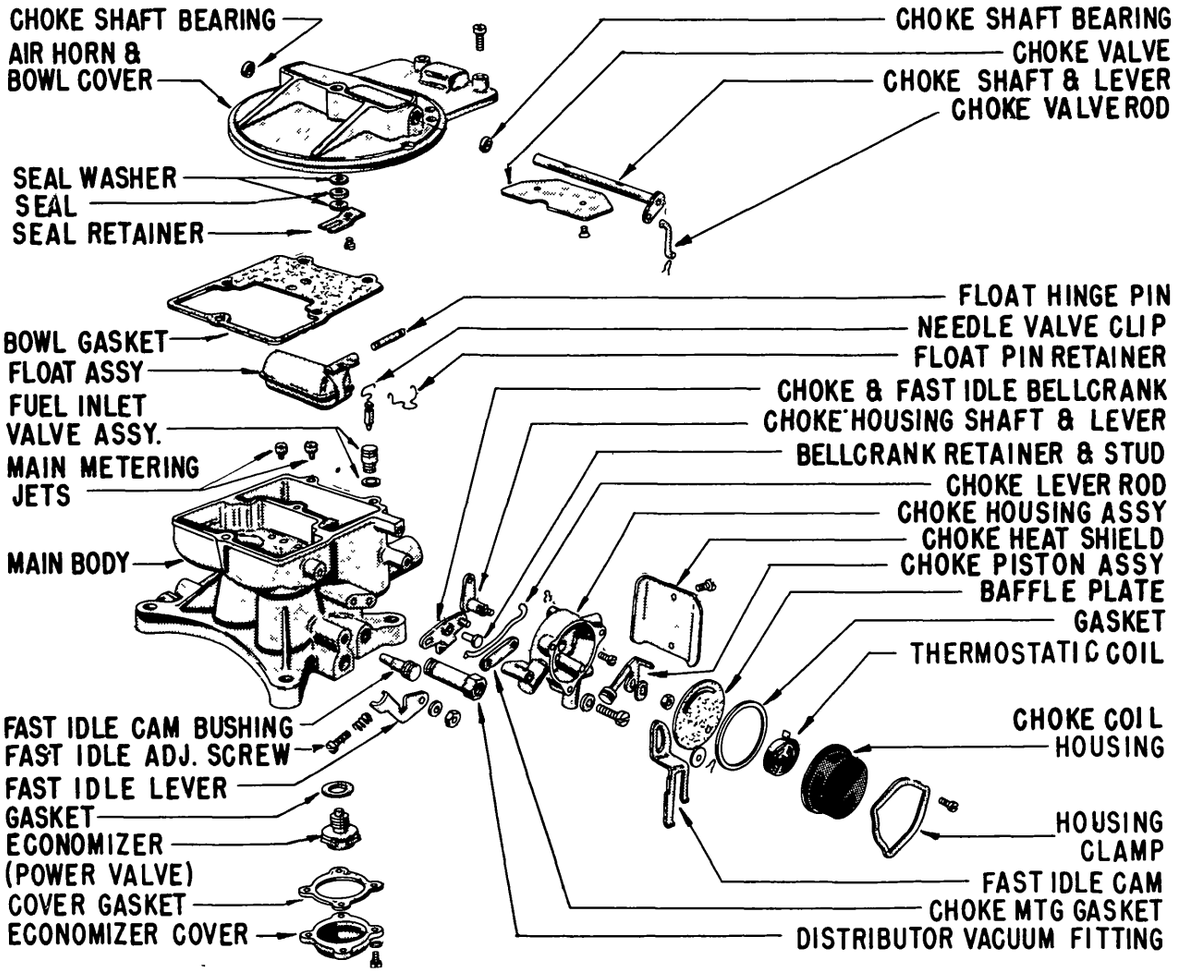
►CHANGES, CAUTIONS, CORRECTIONS

►*1957 FORD 2-BARREL & 4-BARREL CARBURETOR POWER VALVE (ECONOMIZER) BOTTOMING CORRECTION:* On carburetors that appear to have a leaking power valve, check to determine if power valve is bottoming before the gasket is sufficiently compressed. To check, remove power valve and gasket, then install power valve (finger tight) without gasket. Using the removed gasket as a gauge, try and insert gasket between valve and carburetor body. If gasket can be inserted, the power valve has insufficient thread length. To correct, install original gasket and one additional gasket, Part No. B5A-9909-A on power valve assembly. Install valve and check for proper sealing of the two gaskets.

►*1957 FORD 2-BARREL CARBURETOR (B7A-9510-L) MAIN JET PRODUCTION CHANGE:* Main jets have been increased in size as follows: No. 62 (0-5000 ft.); No. 60 (5000-10,000 ft.); No. 58 (10,000-15,000 ft.) replacing the former sizes of Nos. 53, 51, 49.

►*1957 FORD 2-BARREL & 4-BARREL CARBURETOR-TO-INTAKE MANIFOLD GASKET AND SPACER NOTE:* Proper gaskets and spacers must be used as follows: 2-Barrel (Two gaskets, Part No. B7A-9447-A, and one spacer, Part No. B7A-9603-C); 4-Barrel, except on 312" Engine (Two gaskets, Part No. B7A-9447-B, and one spacer, Part No. B7A-9603-B); 4-Barrel, 312" Engine (Two gaskets, Part No. B7A-9447-B and one spacer, Part No. B7A-9603-D).

►*1957 FORD 312" ENGINE HARD STARTING CORRECTION:* Replace the early aluminum carburetor-to-intake manifold spacer, Part No. B7A-9603-B, with the later "resinoid" spacer, Part No. B7A-9603-D. This later spacer, prevents excessive heat transfer between intake manifold and carburetor.



FORD 2-BARREL CARBURETOR BOWL COVER & MAIN BODY ASSEMBLY

►*1957 FORD 2-BARREL CARBURETOR WHISTLE CORRECTION:* This whistling noise is caused by the 90° corner located at bottom of throttle bore and can be corrected by using a file to remove the sharp edge at junction of throttle bores and intake manifold flanges. *Care must be taken so that not more than 1/16" of stock is removed. The removal of additional stock would cause a vacuum leak at this point.*

►*1957 FORD 2-BARREL CARBURETOR SURGE CORRECTION:* This surge may be encountered in the 40-50 MPH range and is caused by air leaking into booster venturi assembly through the plugs on top of the "tower-like" projections in carburetor throat. Eliminate this air leakage by replacing the defective booster assembly or by sealing the plugs with sealing compound, Part No. 8A-19554-B. *CAUTION - Do not cover any of the bleed holes on booster assembly.*

►*1957 FORD "HIGH ENGINE SPEED" CORRECTION (Cars with Ford 4-Barrel Carburetors):* This condition results from the secondary valves not closing completely due to rough edge at flat portion of valve diameter, or to a slight bend in the secondary throttle shaft. Correct by removing secondary throttle valves and shaft and polish the valves (where flat portion of diameter joins), and the throttle shaft at the three points where shaft contacts carburetor body. Remove any burrs on secondary throttle shaft bores. *CAUTION - Do not remove any more stock than is necessary or carburetor calibration will be affected.*

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FORD 2 & 4-BARREL CARBURETORS (C nt.)

DESCRIPTION: **2-Barrel Carburetor** - New design downdraft type with automatic choke. The throttle body and main body (fuel bowl) are integral, and the air horn also serves as the main body cover. The automatic choke is mounted on the main body and is connected to choke valve shaft by linkage. A diaphragm type accelerating pump is also mounted on main body and connected to throttle valve shaft by linkage. A bowl vent is actuated by accelerating pump linkage.

4-Barrel Carburetor - Downdraft type with automatic choke. This carburetor is similar in design to the 2-barrel carburetor (see above). The primary side consists of an idle fuel system, accelerating pump system, main fuel system, power system and choke system. The secondary side has only an idle system and a main fuel system. Secondary throttle valves are operated by a vacuum diaphragm and are connected through linkage to the primary throttle to insure positive closing.

ADJUSTMENTS: Adjustment procedures for both carburetors are the same (except as noted).

Idle Mixture Setting: Initial adjustment 1 turn open from inner seated position (to warm up engine). With engine at normal operating temperature (after running at fast idle speed for 20 minutes), turn both adjusting screws in until engine runs rough from lean mixture, then turn screws out until engine rolls from rich mixture, finally turn screws in just enough for smooth idling (slightly rich rather than lean setting desired). Recheck idle speed.

Idle Speed Setting (Hot Engine): *See Fast Idle for Cold Engine Idle Speed Setting.* Hot engine idle speed is controlled by throttle stopscrew on left side of carburetor (contacts lug on throttle lever). Adjust idle speed only with engine at normal operating temperature and choke valve wide open. Back off fast idle adjusting screw (on opposite side of carburetor) so that it does not contact fast idle cam. Turn stopscrew in or out for correct idle speed. Check by opening throttle by hand and allowing it to close normally.

Idl Speed (Synchro-mesh Cars) - 475-500 RPM.

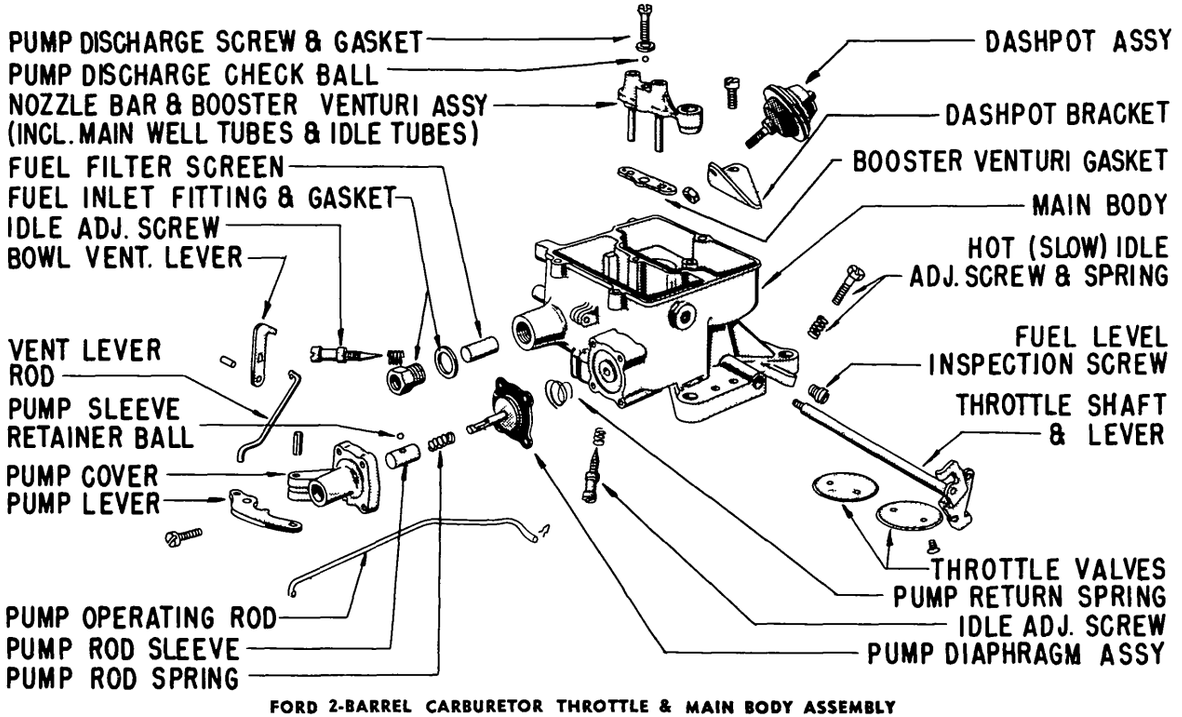
Idle Speed (Fordomatic Cars) - 475-500 RPM with selector lever in Neutral. Set hand brake and check idle speed with selector in Drive (Dr) position. Readjust as necessary for idle speed of 425-450 RPM in Dr.

Anti-Stall Dashpot (Fordomatic Cars): After adjusting engine idle speed, hold throttle closed, press dashpot plunger in to end of stroke, check clearance between end of plunger and lug on throttle lever. Clearance should be .045-.064". Adjust by loosening dashpot adjusting nut and turning dashpot in or out.

Acc l rating Pump Stroke: Bend accelerator pump rod to obtain correct measurement between end of pump plunger and pump cover when throttle valves are closed Install pump lever rod in inner hole (Winter), outer hole (Summer)

Accelerating Pump Setting

Engin	Pump Setting Synchro-mesh	Ford matic
272" Engine	.3 '16-7/32"	3/ 16-7/32"
292" Engine	.3 '16-7 32"	7/32-1 4"
312" Engine		7/ 32-1 4"



FORD 2-BARREL CARBURETOR THROTTLE & MAIN BODY ASSEMBLY

►*ACCELERATING PUMP ADJUSTMENT NOTE.* After installing a new rod or bending the old rod, check operation by slowly moving throttle lever to fully opened position If accelerator link strikes pump cover casting, file a notch in link as necessary for clearance

Bowl Vent: With engine operating at correct idle speed, place a 100" feeler between idle adjusting screw and screw stop Bowl vent valve should just close To adjust bend operating rod on vent

Economizer (Power Valve): *NOTE - On 4-Barrel carburetors, the power valve is located on the primary side only.* Diaphragm type located under cover on bottom of fuel bowl surface on main body. Power valve opens when manifold vacuum falls to 9½-10" and by-passes fuel through the valve directly to main well. No adjustment provided. *CAUTION - Power valve forms vacuum chamber and must be tight.*

Float Level· To check float setting, remove air horn and bowl cover, hold float in upper position with needle valve closed. Use Checking Tool 9590-B (2-Barrel Carb.), 9590-9 (4-Barrel Carb), *(NOTE - These are cardboard gauges furnished with Repair Kit),* or scale to measure from top edge of bowl to top of float at free end This distance should be .325-.355" (2-Barrel Carb.), 540- 570" (4-Barrel Carb.), Adjust by bending tab on float arm which contacts inlet needle.

►*FLOAT GAUGE NOTE:* When using Gauge 9590-B or 9590-9, install gauge on bowl edge at wide section of bowl at free end of float. Float should just touch longer leg on gauge and should not touch shorter leg (turn gauge 180° to bring opposite leg into gauging position).

Fuel Level - With correct float setting, fuel level should be 1" ± 1/32" (2-Barrel Carb.), .970-1.03" (4-Barrel Carb.) below top edge of bowl *(NOTE - Fuel level is the same for secondary float on 4-Barrel Carb.)* A fuel level inspection hole (closed by plug) is provided on side of main body (separate plugs for primary & secondary floats on 4-Barrel Carbs)

Fast Idle: Consists of a stepped sliding cam linked to the automatic choke bellcrank and serving as a stop for the fast idle adjusting screw (on right side of carburetor at opposite end of throttle valve shaft from hot or slow idle speed throttle stopscrew). Adjust fast idle with engine at normal operating temperature after hot or slow idle speed adjustment has been completed. With throttle valves in closed position, turn fast idle adjusting screw in until it just contacts **low st** step on fast idle cam. This setting will provide correct fast idle speed (when screw will contact higher steps on fast idle cam).

►*FAST IDLE SPEED NOTE* If above setting is considered too high for operating conditions, fast idle speed may be reduced by backing off fast idle screw not more than one turn from standard setting On Ford 4-Barrel carburetors clearance between fast idle adjusting screw and cam must not be less than 005" when choke is wide open

Aut matic Ch ke S tting: Centered. Mark on thermostatic coil cover should be in line with center (longest) mark on choke housing. Adjust by loosening three screws in retainer ring and rotating cover.

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FORD 2 & 4-BARREL CARBURETORS (Con..)

► *AUTOMATIC CHOKE ADJUSTMENT NOTE:* For maximum fuel economy, the cover may be rotated in the **lean** direction, dependent on ambient temperatures in the local area. If hard, cold starting is experienced, the cover should be rotated in the **rich** direction.

OVERHAUL: Remove air cleaner anchor screw and lockwasher. On 2-barrel carburetors, invert the carburetor and remove throttle body-to-main body screws and lockwashers. Lift off main body and remove throttle body gasket. On 4-barrel carburetors, disconnect choke rod at bellcrank assembly, then remove rod seal retainer from air horn and slide felt seal and two washers off rod. Remove air horn-to-main body screws, then remove air horn and gasket. Remove choke plate from choke shaft, then remove choke rod, and slide choke shaft from air horn.

Disassembly (2-Barr l Carb.): 1) Remove fuel inlet fitting gasket and screen, then remove fuel bowl retaining screws. Fuel bowl, gasket, metering assembly, and metering assembly gasket will slide off main body. Separate metering assembly from fuel bowl and discard gaskets.

2) Remove vent valve, idle adjusting screws and gaskets, and the power valve and gasket from metering assembly. Remove external vent linkage retainer and spring, then remove vent and linkage from fuel bowl. Remove accelerating pump cover assembly from fuel bowl, then remove diaphragm and spring. Remove float retainer, then lift float out of bowl. Remove float spring and the "O" ring seal from fuel valve seat assembly, then remove baffle plate. Remove fuel valve seat and let the valve, spring, and pin fall out.

3) Remove choke rod pin from choke housing shaft and lever assembly. Remove thermostat housing and gasket from main body, then remove vacuum passage gasket. Remove nut, lockwasher, and spacer from choke housing shaft, then remove shaft and fast idle assembly. Remove choke piston and lever assembly. Remove choke rod pin from choke shaft lever. Remove choke rod, washers, and seal from main body. Remove choke valve from shaft, then slide shaft and lever out of choke housing.

4) Remove pump discharge nozzle screw, then lift pump discharge nozzle and gasket out of main body. Invert main body and let the pump discharge weight and ball fall out into the hand.

5) Remove dashpot assembly, then remove pump operating lever retainer and remove pump operating lever. Remove fast idle pick-up lever and fast idle cam lever and spring. If it is necessary to remove throttle valves, lightly scribe both valves along throttle shaft and mark each valve and its corresponding bore with a number or letter for proper replacement. Remove throttle valve screws and remove valves. Slide throttle shaft out of throttle body.

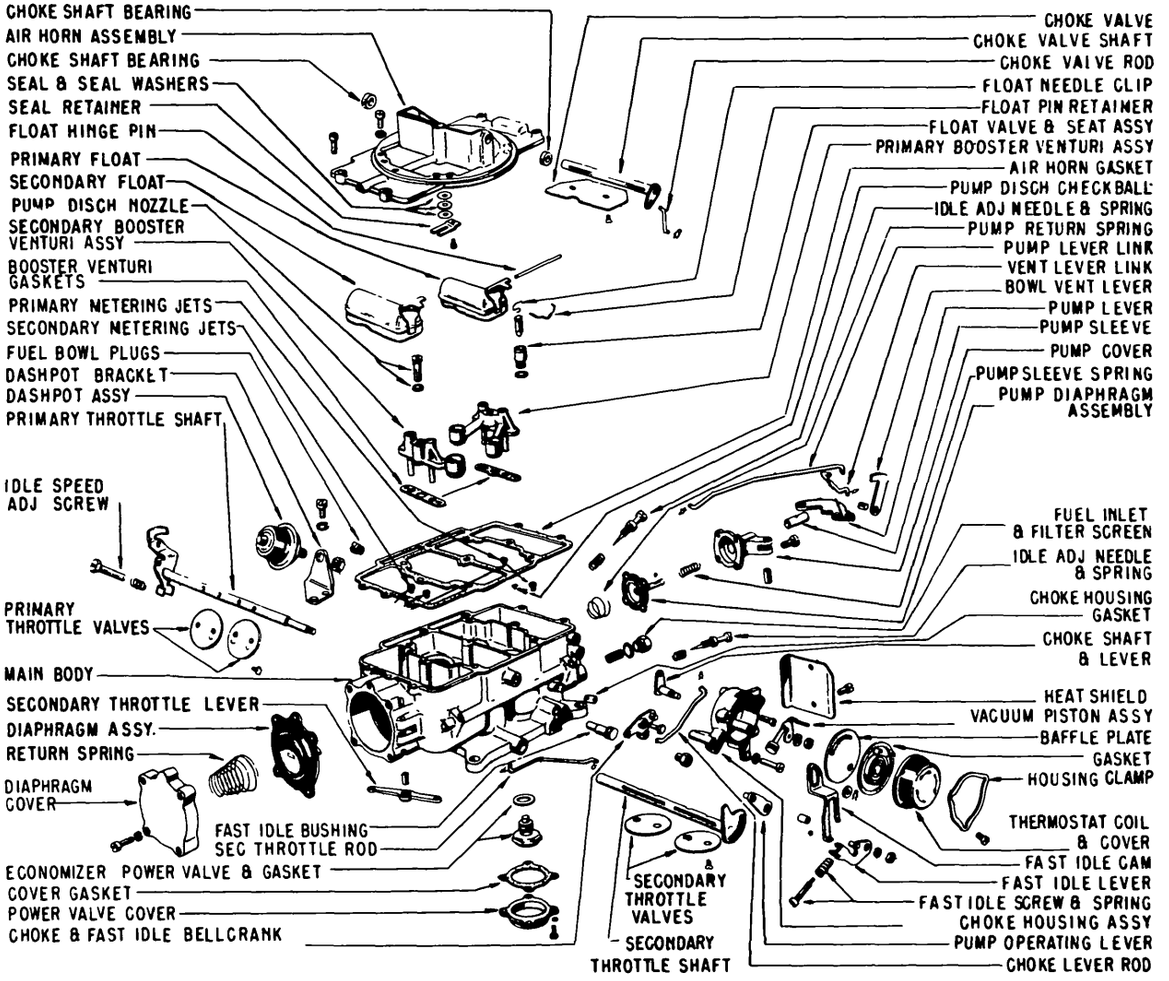
Disass mbly (4-Barr l Carb.): 1) Remove fuel inlet fitting, gasket and screen. With needle nose pliers, disconnect float shaft retainer, and remove the main jets. Invert main body and remove power valve cover and gasket, then remove valve and valve gasket. Remove idle adjusting needles and springs and remove distributor vacuum line fitting.

2) Remove accelerating pump discharge screw and gasket, then remove booster venturi assembly and gasket. Invert main body and let accelerating pump discharge ball fall into the hand. Remove accelerating pump operating rod and bowl vent rod. Remove accelerating pump cover, diaphragm assembly, and spring. Press pump rod sleeve toward diaphragm until sleeve retainer ball drops out. Remove sleeve and spring. Remove dashpot assembly and bracket.

3) Remove choke thermostat shield. Disconnect choke lever rod from choke housing lever, then remove thermostat housing retaining screws and clamp, thermostat housing, gasket, and the choke housing plate. Remove three choke housing-to-main body screws and lockwashers, then remove choke housing and gasket. Remove choke shaft and lever assembly retaining nut and spacer, then remove choke shaft and lever assembly, choke piston, lever and link assembly.

4) Remove nut and lockwasher securing fast idle adjusting lever assembly to throttle shaft, then remove lever assembly. Disconnect fast idle cam assembly at bellcrank, then remove fast idle cam. Remove bushing, primary throttle closing lever, and the inner bushing. Remove choke rod from bellcrank.

5) If it is necessary to remove throttle valves, lightly scribe both plates along the throttle shaft and mark each valve and its corresponding bore with a number or letter for proper installation. Remove throttle valve screws, then slide throttle shaft out of main body.



FORD 4-BARREL CARBURETOR

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FORD 2 & 4-BARREL CARBURETORS (Cont.)

6) On the secondary side, disconnect float shaft retainer, then remove float and shaft, and the fuel inlet needle and clip. Remove fuel inlet needle seat and float retainer, and remove the secondary jets. Remove secondary diaphragm operating rod, diaphragm cover, return spring, and diaphragm assembly. Remove secondary booster venturi assembly retaining screw and lockwasher, then remove booster assembly and gasket. 7) If it is necessary to remove throttle valve, proceed as for primary valve (above).

Cleaning & Inspection (All Carbs.): Wash all parts, except those noted below in clean solvent. *(CAUTION - Do not use solvent on accelerating pump diaphragm, power valve, secondary operating diaphragm, and dashpot).* Blow out passages in casting with air. Inspect all parts for wear or damage with particular attention to the following: Inspect castings and main body cover for cracks or leaks, inspect main well tubes, metering jets, and idel tubes for wear or clogged passages. *(CAUTION - Clean with air, do not use drills to clean out calibrated openings).* Replace all worn or damaged parts.

Reassembly (2 & 4-Barrel Carbs): Use all NEW gaskets. Install parts in reverse order of disassembly procedure (above) and note the following important points:

Throttle Valve Installation - Refer to the line scribed on throttle valve at disassembly, and install valves in their proper location with the screws snug, but not tight. Little or no light should show between throttle valves and throttle bores. Tap valves lightly to seat them, then tighten the screws.

Float Installation (4-Barrel Carb.) - Retainer grooves on float shaft are not equally spaced. To install, slide shaft in float lever so that the groove closest to end of shaft is toward outside of carburetor, then install float retainer.

Acc l rating Pump Ball Ch ck - Seat ball with a brass drift and a light hammer. Make sure the ball is free, then proceed with reassembly.

Air Horn - On 4-barrel carburetors, be sure to install a new fibre washer with the screw that enters the secondary vacuum passage.

Carburetor Adjustments - Make all the adjustments indicated. *See "Adjustments" abov .*

SERVICE PARTS: Gasket Kits - Ford No. B7A-9502-E (B7A-9510-A, E, L, Q, W); Ford No. B7A-9502-F (B7A-9510-B, X).

Repair Kits - Ford No. B7A-9590-F (B7A-9510-L, W). Ford No. B7A-9590-H (B7A-9510-B, X); Ford No. B7A-9590-J (B7A-9510-A, Q).

1957 HOLLEY 2 & 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Main Metering Jet Size	Main Metering Jet Part No.	Metering Block Assy. Part No.	Economizer Assy. Part No.	Pump Nozzle Part No.	Venturi Assy. Part N .
FORD V8 Cars								
272" Eng. S.M. & O.D.	1957	B7A-9510-F	.052"	86H-9533 (1)	B7A-9511-B	B7A-9904-B (5)	B7A-9577-D (2)	(7)
272" Eng. S.M. & O.D.	1957	B7A-9510-R	.052"	86H-9533 (1)	B7A-9511-B	B7A-9904-B (5)	B7A-9577-D (2)	(7)
272" Eng. S.M. & F/M	1957	B7A-9510-AA	.049"	59A-9533-B (3)	.....	.....	.....	(7)
292" Eng. S.M. & O.D.	1957	B7A-9510-G	.053"	B4T-9533-B (4)	B7A9511-C	B7A-9904-B (5)	B7A-9577-D (2)	(7)
292" Eng. S.M. & O.D.	1957	B7A-9510-S	.053"	B4T-9533-B (4)	B7A-9511-C	B7A-9904-B (5)	B7A-9577-D (2)	(7)
292" Eng. S.M. & O.D.	1957	B7A-9510-AB	.050"	78-9533-A (6)	.....	.....	.....	(7)
292" Eng. Fordomatic	1957	B7A-9510-K	.057"	26H-9533 (13)	B7A-9511-D	B7A-9904-B (5)	B7A-9577-D (2)	(7)
292" Eng. Fordomatic	1957	B7A-9510-T	.057"	26H-9533 (13)	B7A-9511-D	B7A-9904-B (5)	B7A-9577-D (2)	(7)
312" Eng. S.M. & F/M	1957	B7A-9510-H Pri.	.055"	B4T-9533-A (8)	B7A-9511-A	B7A-9904-B (5)	B7A-9577-B	(7)
		B7A-9510-H Sec.	.048"	78-9533-B (9)	B7A-9513-A	B7A-9904-D (10)	.....	(7)
312" Eng. S.M. & F/M	1957	B7A-9510-U Pri.	.055"	B4T-9533-A (8)	B7A-9511-A	B7A-9904-B (5)	B7A-9577-B	(7)
		B7A-9510-U Sec.	.048"	78-9533-B (9)	B7A-9513-A	B7A.9904-D (10)	.....	(7)
FORD V8 Trucks								
ECY-272 (Par. Del.)	1957	B7J-9510-A	.052"	86H-9533 (1)	B7T-9511-A	B7A-9904-B (5)	B7A-9577-D (2)	(7)
ECY-272 (Others)	1957	B7T-9510-A	.052"	86H-9533 (1)	B7T-9511-A	B7A-9904-B (5)	B7A-9577-D (2)	(7)
ECR-272	1957	B7T-9510-C Pri.	.051"	59A-9533-A (11)	B7T-9511-B	B7A-9904-B (5)	B7A-9577-B	(7)
		B7T-9510-C Sec.	.062"	1GA-9533-B (12)	B7T-9513-A	.....	.....	(7)
MERCURY								
312" Eng. S.M.	1957	EC Z-9510-Y Pri.	.055"	B4T-9533-A (8)	B7A-9511-A	B7A-9904-B (5)	B7A-9577-B	(7)
		ECZ-9510-Y Sec.	.048"	78-9533-B (9)	B7A-9513-A	B7A-9904-D (10)	.....	(7)
312" Eng. S.M.	1957	ECZ-9510-AD Pri.	.055"	B4T-9533-A (8)	B7A-9511-A	B7A-9904-B (5)	B7A-9577-B	(7)
		ECZ-9510-AD Sec.	.048"	78-9533-B (9)	B7A-9513-A	B7A-9904-D (10)	.....	(7)
312" Eng. Auto. Trans.	1957	ECZ-9510-V Pri.	.055"	B4T-9533-A (8)	B7A-9511-A	B7A-9904-B (5)	B7A-9577-B	(7)
		ECZ-9510-V Sec.	.048"	78-9533-B (9)	B7A-9513-A	B7A-9904-D (10)	.....	(7)
312" Eng. Auto. Trans.	1957	B7A-9510-U Pri.	.055"	B4T-9533-A (8)	B7A-9511-A	B7A-9904-B (5)	B7A-9577-B	(7)
		B7A-9510-U Sec.	.048"	78-9533-B (9)	B7A-9513-A	B7A-9904-D (10)	.....	(7)

(1)- Use 78-9533-A (.050") 5,000 to 10,000 ft. Alt.
Use 78-9533-B (.048") 10,000 to 15,000 ft. Alt.

(2)- Stamped No. 28.

(3)- Use 59A-9533-C (.047") 5,000 to 10,000 ft. Alt.
Use 59A-9533-D (.045") 10,000 to 15,000 ft. Alt.

(4)- Use 59A-9533-A (.051") 5,000 to 10,000 ft. Alt.
Use 59A-9533-B (.049") 10,000 to 15,000 ft. Alt.

(5)- Stamped No. 85.

(6)- Use 78-9533-B (.048") 5,000 to 10,000 ft. Alt.
Use 78-9533-C (.046") 10,000 to 15,000 ft. Alt.

(7)- Part of Main Body Assembly.

(8)- Use B4T-9533-B (.053") 5,000 to 10,000 ft. Alt.
Use 86H-9533 (.052") 10,000 to 15,000 ft. Alt.

(9)- All altitudes.

(10)- Stamped No. 105.

(11)- Use 59A-9533-B (.049") 5,000 to 10,000 ft. Alt.
Use 59A-9533-C (.047") 10,000 to 15,000 ft. Alt.

(12)- Use 1GA-9533-C (.060") 5,000 to 10,000 ft. Alt.
Use 78-9533-F (.058") 10,000 to 15,000 ft. Alt.

(13)- Use B4T-9533-A (.055") 5,000 to 10,000 ft. Alt.
Use B4T-9533-B (.053") 10,000 to 15,000 ft. Alt.

HOLLEY 2 & 4-BARREL CARBURETORS

FORD 2-BARREL CARBURETORS	Carburetor No.
Pass Cars 272" Eng ① (Early)	B7A-9510-F
Pass Cars 272" Eng ① (Later)	B7A-9510-R
Pass Cars 272" Eng ①② (Later)	B7A-9510-AA
Pass Cars 292" Eng ① (Early)	B7A 9510-G
Pass Cars 292" Eng ① (Later)	B7A-9510-S
Pass Cars 292" Eng ① (Later)	B7A-9510-AB
Pass Cars 292" Eng ③ (Early)	B7A-9510-K
Pass Cars 292" Eng ③② (Later)	B7A-9510-T
Thunderbird 292" Eng ① (Early)	B7A-9510-G
Thunderbird 292" Eng ① (Later)	B7A-9510-T

FORD TRK-2-BARREL CARBURETORS -	Carburetor No.
P-350 400 500 Parcel Del (Early)	B7J-9510-A
P-350,400,500 Parcel Del (Later)	B7J-9510-B
F-500,B-500,C-500,550 (Early)	B7T-9510-A
F-500,B-500,C-500,550 (Later)	B7T-9510-D
F-600,B-600,C-600 (Early)	B7T-9510-A
F-600 B-600 C-600 (Later)	B7T-9510-D

FORD 4-BARREL CARBURETORS	Carburetor No.
Pass Cars 312" Eng ③④ (Early)	B7A-9510-H
Pass Cars 312" Eng ③④ (Later)	B7A-9510-U
Thunderbird 312" Eng ③④ (Early)	B7A-9510-H
Thunderbird 312" Eng ③④ (Later)	B7A-9510-U

FORD TRK-4-BARREL CARBURETORS -	Carburetor No.
F-500, B 500 C-500 550	B7T-9510-C
F-600 B-600 C-600	B7T-9510-C

MERCURY - 4-BARREL CARBURETORS -	Carburetor No.
312" Engine ⑤ (Early)	ECZ 9510-V
312" Engine ⑤ (Later)	B7A-9510-U
312" Engine ① (Early)	ECZ-9510-Y
312" Engine ① (Later)	ECZ-9510 AD

Carburetor Identification

Carb. No	⑥ Identification
B7A-9510-AA	ECG-BG or BH
B7A-9510-AB	EDB-AC
B7A-9510-F	ECG-AS or AT
B7A-9510 G	ECJ-AC or EDB-L
B7A-9510-H	ECZ-V or Y
B7A-9510-K	EDB M
B7A-9510-R	ECG BE or BF
B7A 9510-S	EDB-Y
B7A 9510 T	ECJ-AC or EDB-Z
B7A-9510-U	ECZ AD or AC
B7J-9510-A	ECY B
B7J 9510 B	ECY D
B7T-9510 A	ECY-A
B7T-9510-C	ECR L
B7T 9510-D	ECY-C

① - Synchro-mesh transmission
② When used with Fordomatic dashpot and attaching parts must also be used
③ Fordomatic transmission
④ - When used with synchro-mesh transmission remove dashpot and attaching parts
⑤ - Mercomatic transmission
⑥ - Stamped on choke plate flange

►CHANGES, CAUTIONS, CORRECTIONS

►*HESITATION & STUMBLE CORRECTION (2- & 4-Barrel Carbs):* This condition may be caused by a binding fuel bowl vent linkage Check the following points for mis-alignment: Accelerator pump to throttle shaft lever bind at the center shaft, and lever contact alignment. Binding at accelerator pump lever on pin in pump cover assembly Binding at float bowl vent selector where it enters float bowl casting Bowl vent hanging on top of float bowl casting recess.

►*AUTOMATIC CHOKE STICKING CORRECTION (2- & 4-Barrel Carbs):* This may be caused by interference between carburetor main body and end of thermostatic choke lever rod. Correct by bending the choke lever assembly (bellcrank) away from main body

►*ACCELERATOR PUMP-TO-THROTTLE LEVER INTERFERENCE (2- & 4-Barrel Carbs):* If interference is at the dashpot mounting bracket, correct by bending the dashpot bracket upwards. Do not bend more than is necessary to provide clearance Check and adjust alignment between end of dashpot and contact point on throttle lever by bending bracket outward slightly

►*STUMBLE (ON ACCELERATION) CORRECTION (2- & 4-Barrel Carbs):* This condition may be caused by a blocked passage in accelerating pump circuit due to misalignment between fuel bowl and metering block which will press the accelerating pump circuit ferrule into metering block and close the circuit Remove and reposition ferrule as follows: Slip the end of a small piece of wire into ferrule, then using a pair of side cutters or similar tool, work ferrule from metering block *(NOTE* - The wire is used only to prevent ferrule from collapsing) Reposition ferrule, remove wire, and then assemble the fuel bowl to metering block, making sure that all parts are aligned

►*1957 HOLLEY 4-BARREL CARBURETOR SECONDARY FLOAT SETTING NOTE* Some of these carburetors have a boss in the floor of the secondary float bowl which interferes with use of float gauge (Tool 9510-10 Ford, 9550-K-2 Mercury) *(NOTE - These are the gauges supplied with carburetor kit)* Existing instructions indicate the two positioning arms of gauge must touch side of bowl However on bowls with boss in floor the top positioning arm should be tipped away from side of bowl so locating step will seat firmly on bottom of bowl and not ride on boss Firm pressure on gauge will position gauge for correct float setting

►*1957 HOLLEY CARBURETOR FLOAT BOWL PRODUCTION CHANGE & FLOAT SETTING CAUTION* Float bowls and baffle plates have been revised during production as follows to prevent leakage and flooding (1) First design includes primary and secondary bowls with no retaining ribs and a baffle plate with a retaining hole through which the fuel inlet valve passes An "O" ring is used between valve and baffle (2) Second design has one baffle retaining rib and a baffle of same design as used in first type (3) Third design bowls have two retaining ribs and a baffle plate which is slotted at the bottom to clear fuel inlet valve assembly *CAUTION* - When baffle is installed, gently vibrate bowl and determine if baffle has a tendency to tilt toward float If so carefully bend upper portion of baffle until this tendency is eliminated If an "O" ring is used make sure that a good seating condition is established using a new "O" ring Handle baffle carefully at all times as it is easily distorted Do not bend more than indicated above

►*4-BARREL CARBURETOR THROTTLE BODY-TO-MAIN BODY GASKET INSTALLATION CAUTION* This gasket must be installed so ALL holes in gasket align with mating holes in throttle body Because the gasket can be installed in either an inverted or rotated position each gasket installation should be carefully checked before assembling carburetor

►*1957 FORD TRUCK 4-BARREL CARBURETOR "DE-POPPER VALVE" NOTE* The depopper device has been made inoperative on all 4-barrel carburetors by plugging the air inlet passage located between secondary venturi next to air cleaner stud hole boss to maintain proper idle characteristics If the depopper device is needed and a higher idle RPM can be maintained the plug can be removed

►*1957 FORD TRUCK 4-BARREL CARBURETOR CHOKE VALVE STICKING CORRECTION (B7T-9510-C)* The choke valves sticking in the closed position may be caused by sideways movement of the fast idle cam and shaft assembly To correct this condition, bend end of choke rod lever which contacts the fast idle pickup arm approximately 10° outboard of its original position

DESCRIPTION: **2-Barrel Carburetor** - New design dual downdraft type with automatic choke consisting of a main body, throttle body, and a side mounted (on main body) fuel bowl and metering block assembly. The automatic choke is mounted on main body and is connected to choke valve shaft by a connecting rod. The accelerating pump is mounted in bottom of fuel bowl and is connected to throttle shaft by a bellcrank arm and lever A power valve located in main body is controlled by vacuum and actuated by a power valve spring.

4-Barrel Carburetor - New design downdraft type with automatic choke. This carburetor is similar to the 2-Barrel (above). On the primary side there is an idle system, main fuel system, accelerating pump system, power system and choke system The secondary side has an idle system, main fuel system and a power system Throttle valves on secondary side are operated by a vacuum diaphragm

ADJUSTMENTS: Adjustment procedure and settings are the same for 2-Barrel & 4-Barrel carburetors (except float level, fuel setting & economizer setting).

Idle Speed (Hot Engine) Setting: *See "Fast Idle" (below) for Cold Engine Idle Speed Setting* Adjust engine idle speed by rotating throttle stopscrew on left side of carburetor, with engine at normal operating temperature and choke valve wide open. Back off fast idle screw (Except trucks with 4-Barrel carbs) which is on opposite side, so that it does not contact fast idle cam

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HOLLEY 2 & 4-BARREL CARBURETORS (C ntinu d)

Idl Speed (Cars & Trucks, Synchro-mesh Trans.) - 475-500 RPM.

Idl Speed (Cars & Trucks, Automatic Trans.) - 425-450 RPM with transmission selector lever in "D" (Drive) position.

Idl Mixture Setting: *(NOTE - Idle mixture screws are on Primary side, Pass. Cars; Secondary side, Trucks).* Initial adjustment is 1 turn open (Ford Pass. Cars), 1-1½ turns open (Ford Trucks), 1¼ turns open (Mercury) from a lightly seated position. With engine at normal operating temperature, make final adjustment as follows: Turn both idle mixture screws in until engine runs rough, then turn screws out until engine "rolls" (from rich mixture). Finally turn screws in just enough for smooth idling (slightly rich rather than lean setting desired). Reset engine idle speed.

Anti-Stall Dashpot (Fordomatic & Mercomatic): With engine at proper idle speed, hold dashpot plunger into the limit of its travel, then loosen dashpot locknut. Rotate dashpot to obtain .045-.064" clearance (Ford), 1 16" clearance (Mercury) between end of dashpot plunger and throttle operating lever. *(NOTE - Make sure throttle is closed so hot idle screw is against the stop).* Tighten dashpot and recheck clearance.

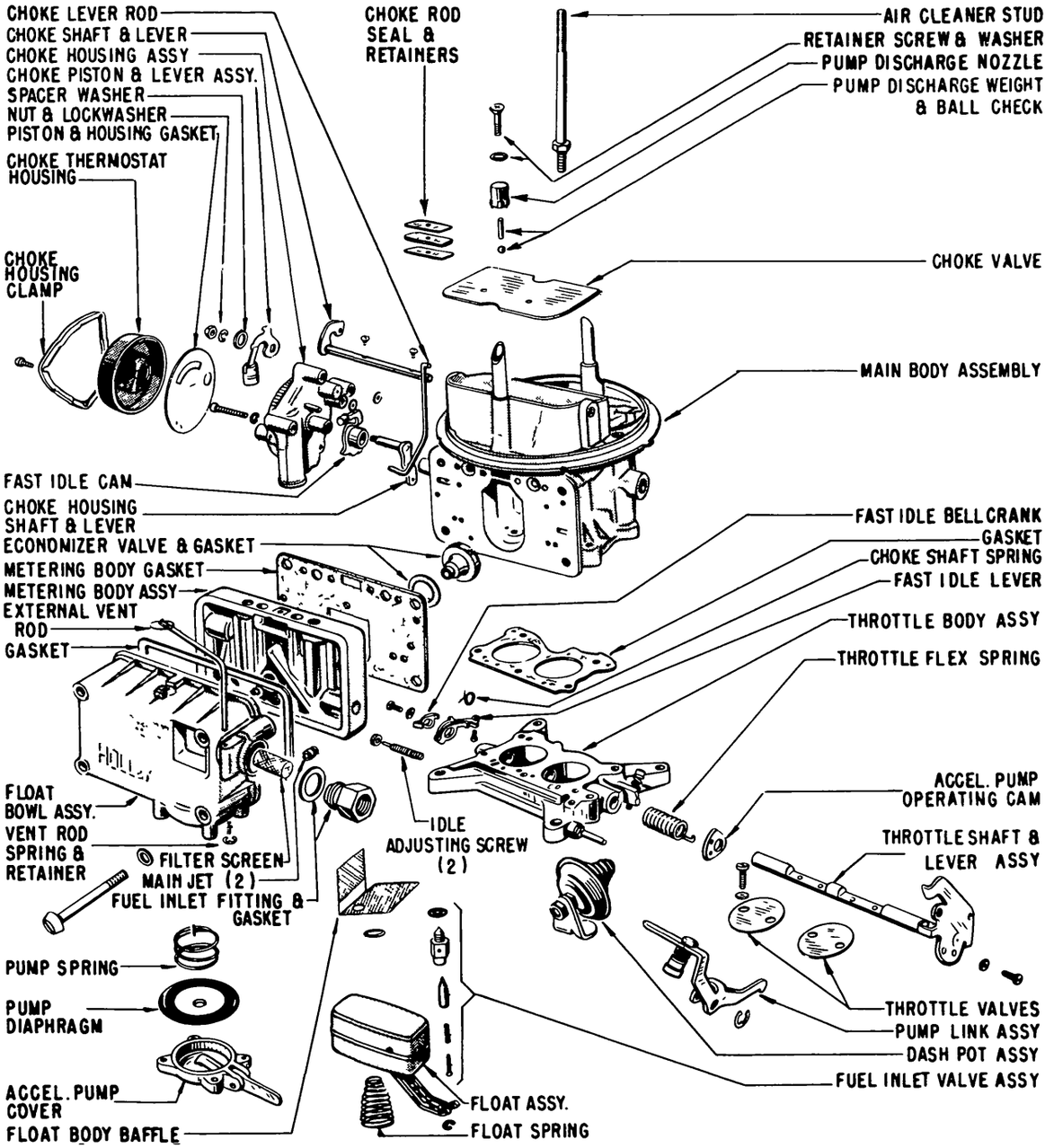
Acc lerating Pump Adjustment (Lever Screw): Hold throttle valves wide open and depress pump arm fully. Distance between pump lever adjusting screw head and pump arm should be .015". *(NOTE - One-half turn of screw changes the adjustment .015").*

S asonal Setting - Align top hole in cam with top hole in throttle lever for long stroke (cold weather). Align bottom hole in cam and bottom hole in throttle lever for short stroke (warm weather).

Ec nomizer (Power Valve): Diaphragm type located in metering assembly. Adjustment not necessary. Power valve opens when manifold vacuum falls below 8-9" (2-Barrel Carb. & Primary side of 4-Barrel Carb.), 10-11" (Secondary side of 4-Barrel Carb.), and by-passes fuel through valve directly into main well.

Fu l Bowl Vent Setting (Pass. Cars): *(NOTE - Adjustment is made on Primary side of 4-Barrel Carb.).* With throttle valves fully closed, distance between top of fuel bowl and vent button should be 1/16". Bend end of horizontal arm on accelerating pump lever.

Fl at Level: *(NOTE - If float is to be checked with carburetor on engine, remove a lower bowl retaining bolt and drain fuel bowl).* Invert fuel bowl and check float setting with Gauge 9590-10 (furnished with carburetor repair kit). If gauge not available, adjust float to correct level (see table below), measured between floor of bowl and top of float at a point on float 11/16" from inside of bowl (end furthest from float needle) and ½" in from gasket mounting surface. Adjust by bending tab on float arm.



HOLLEY 2-BARREL CARBURETOR

Carb.	Fl at L v l S tting	ↄ tting
2-Barrel (Pass. Car)		3/4"
2-Barrel (Truck)		11/16"
4-Barrel (Primary)		13/16"
4-Barrel (Secondary)		3/4"

►*4-BARREL SECONDARY FLOAT SETTING NOTE: S e "1957 H ll y 4-Barrel Carburetor S condary Float S t-ting N t " abov*

Fu l L v l - With correct float setting, fuel level should

CONTINUED ON NEXT PAGE

HOLLEY 2 & 4-BARREL CARBURETORS (Continued)

then remove diaphragm and spring. Remove float retainer, then lift float and spring out of fuel bowl. Remove "O" ring seal from fuel valve seat assembly and remove the baffle plate. Remove fuel valve seat and let valve, spring, and pin fall out into the hand.

2) Remove secondary fuel bowl retaining screws, then remove fuel bowl from main body. Separate main metering assembly from fuel bowl, then remove the gasket. Remove vent valve. On Trucks, remove the idle mixture adjusting needles, then remove the jets, power valve and gasket from metering assembly. Remove float retainer, then lift float and spring out of fuel bowl. Remove "O" ring seal (if so equipped) from fuel valve seat assembly, then remove baffle plate. Remove fuel valve seat assembly and let the valve, spring, and pin fall out into the hand.

3) Remove choke rod retainer from choke housing lever assembly. Remove thermostat housing and gasket, then remove choke housing and gasket from main body. Remove choke housing shaft nut, lockwasher and spacer, then remove choke housing lever and shaft assembly and fast idle cam assembly. Remove choke piston and lever assembly. Remove choke rod retainer from choke lever. Remove choke rod, washers and seal from main body, then remove choke valve from shaft and slide shaft out of choke housing.

4) Remove secondary diaphragm housing and gasket from main body. *(NOTE* - Housing must be removed before cover can be removed). Remove diaphragm housing cover, then remove spring and diaphragm from housing.

5) Remove pump discharge nozzle screw, then lift pump discharge nozzle and gasket out of main body. Invert main body and let pump check weight and ball fall into the hand.

6) Remove dashpot assembly (if so equipped), then remove pump operating lever retainer and pump operating lever. Remove secondary throttle connecting rod and washer. Remove secondary diaphragm lever assembly. Remove fast idle pickup lever and fast idle cam lever and spring. If it is necessary to remove throttle valves, lightly scribe valves along throttle shaft and mark each valve and its corresponding bore with a number or letter for proper installation, then remove throttle plates. On the secondary side, remove the two throttle connecting rod retainers and washer. Slide throttle shafts out of throttle body. On primary throttle shaft, remove the throttle connecting rod and return spring.

Cleaning & Inspection (All Carbs.): Wash all parts, except those noted below in clean solvent. *(CAUTION - Do not use solvent on accelerating pump diaphragm, power valve, secondary operating diaphragm, and dashpot).* Blow out passages in casting with air. Inspect all parts for wear or damage, with particular attention to the following: Inspect castings and main body cover for cracks or leaks, inspect main well tubes, metering jets, and idle tubes for wear or clogged passages. *(CAUTION - Clean with air, do not use drills to clean calibrated openings).* Replace all worn or damaged parts.

Reassembly (2 & 4-Barrel Carbs.): Use all NEW gaskets. Install parts in reverse order of disassembly procedure (above) and note the following important points.

Throttle Valve Installation - Refer to line scribed on throttle valve at disassembly, and install valves in their proper location with the screws snug, but not tight. Little or no light should show between throttle valves and throttle bores. Tap valves lightly to seat them, then tighten the screws.

Accelerating Pump Ball Check - Seat ball with a brass drift and a light hammer. Make sure ball is free, then proceed with reassembly.

Seconadary Diaphragm Housing (4-Barr l Carbs.) - Install secondary diaphragm housing before installing the choke housing.

Carburetor Adjustments - Make all adjustments indicated. *See "Adjustments" abov .*

SERVICE PARTS: Gasket Kits - Ford No. B7A-9502-B (B7A-9510-F,G,K,R,S,T); Ford No. B7A-9502-C (B7A 9510-H,U).

Repair Kits - Ford No. B7A-9590-B (B7A-9510-F,R,AA); No. B7A-9590-C (B7A-9510-G,K,S,T,AB); Ford No. B7A-9590-F (B7A-9510-H,U).

1957 HOLLEY (FORD) 4-BARREL CARBURETOR JET SPECIFICATIONS

► **FOR FORD 270 HP (2 CARBS.) & 300 HP (SCHGD.) ENGINES:** *For Adjustment & Overhaul procedures see 1956 Annual Data.*

Car Model	Year	Carburetor No.	Main Metering Jet Size	Main Metering Jet Part No.	Primary Disch. Nozzles Part No.	Primary Venturi Assy. Part No.	Power Jet Assy. Part No.	Ec n miz r Assy. Part N .
FORD V8 Cars								
270 HP Eng. (2 Carbs.)	1957	B7A-9510-P Pri.	.045"	59A-9533-D	B6A-9577-A	B7A-9641-J	B6T-9594-A	B5A-9904-A
		B7A-9510-P Sec.	.055"	B6A-9648-A	.....	.....	.....	.....
300 HP Eng. (Schgd.)	1957	B7A-9510-V Pri.	.065"	5GA-9533-A	B6A-9577-A	B5A-9641-A	B6Q-9594-A	B5A-9904-A
		B7A-9510-V Sec.	#104	B7A-9648-C	.....	.....	.....	.....
300 HP Eng. (Schgd.)	1957	B7A-9510-AC Pri.	.065"	5GA-9533-A	B6A-9577-A	B5A-9641-A	B6Q-9594-A	B5A-9904-A
		B7A-9510-AC Sec.	#104	B7A-9648-C	.....	.....	.....	.....

ROCHESTER 4G & 4GC 4-BARREL CARBURETORS

	Rochester Carb. No.
BUICK	
Series 50, 60, 70 (Early)	4GC 7010070
Series 50, 60, 70 (Late)	4GC 7011570
Service Replacement	4GC 7015757
CADILLAC	
See *SEPARATE "Cadillac (Carter & Rochester)" data for adjustment specifications and procedures.*	
CHEVROLET PASS. CARS.	
283" Engine with Power Pack (Early)	4GC 7009846
283" Engine with Power Pack (Late)	4GC 7012126
Service Replacement	4GC 7015711
CHEVROLET TRUCKS	
283" Engine (Super Taskmaster Early)	4G 7009661
283" Engine (Super Taskmaster Late)	4G 7011161
Service Replacement	4G 7015713
OLDSMOBILE	
Synchro-mesh (Early)	4GC 7009471
Synchro-mesh (Late)	4GC 7010926
Hydra-Matic (Early)	4GC 7009470
Hydra-Matic (Late)	4GC 7010925
Service Replacement	4GC 7015704
PONTIAC	
Synchro-mesh	4GC 7009829
Hydra-Matic	4GC 7009830
Service Replacement (Synchro-mesh)	4GC 7015705
Service Replacement (Hydra-Matic)	4GC 7015706

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 BUICK FLOAT DROP SETTING CHANGE:* The float drop setting specification has been changed from 1 7/8" ± 1/32" to 1 13/16" ± 1/32".

►*1957 BUICK VACUUM SWITCH STICKING NOTE:* If the vacuum switch sticking is found to be caused by the steel ball sticking in the "up" position and cleaning the unit does not correct the condition, the ball seat may be improperly staked. If this is the case, replace the throttle body.

►*1957 BUICK (WITH CARBURETOR No. 7010070) PRIMARY VENTURI CLUSTER CHANGE (To Correct an Acceleration Flat Spot When Car is Coasted Back From Speed Above 40 MPH and Then Again Accelerated at 30 MPH):* Install primary cluster kit, Part No. 7011329. Make sure that the brass identification tag included in the kit is installed on carburetor along with the original tag. *NOTE - Carburetors built after October 1956 will have this change made and can be identified by the letters "C", "D" or higher on the original identification tag.*

►*1957 BUICK STUMBLE AND FLAT SPOT CORRECTION (CARS WITH CARBURETOR No. 7010070): (NOTE - If carburetor identification tag is not "C" or "D" or later, install primary venturi kit, see "Primary Venturi Cluster Change" above, then proceed as follows):* Install a new pump shaft and lever, Part No. 7011462, which has three holes in end of lever for pump travel adjustment. Install the pump rod in the inner hole. Adjust pump setting to provide a distance of 1 3/32" between bottom of plunger and cover casting (with pump rod in inner hole of lever). Check and adjust float drop *(see "Float Drop Change" above).* Check position of vacuum piston which should be 1/32" to 1/16" above the flush position, *(see "Choke Piston Setting Change" below).* Check choke rod adjustment and adjust the ignition timing.

►*1957 BUICK CHOKE PISTON SETTING CHANGE:* With choke valve held fully closed, vacuum piston should be exposed 1/32" to 1/16" out of cylinder (NOTE—This setting supersedes previous "flush" setting. To adjust, bend intermediate rod (connecting link on choke to choke valve shaft).

►*1957 BUICK CARBURETOR (No. 7010070) MODIFICATION (To correct a lean flat spot condition in part throttle and power ranges):* Install Kit, Part No. 7011-481 as outlined in instructions contained in kit and note the following: If carburetor tag does not have the letter "C", "D" or later, make sure the primary venturi cluster has been changed *(see "Primary Venturi Cluster Change" above).* After installation of kit, adjust accelerating pump so that distance from top of air horn casting to bottom of pump plunger shaft is 1 1/64". Install pump rod in outer hole for warm weather and in inner hole for cold weather operation.

►*1957 BUICK CHOKE HOUSING INDEX POINT CHANGED (Moved From Bottom of Housing to Top:* Only the new housing, Part No. 7011276 and Cover, Part No. 7010778 will be available for service. If necessary to replace either of these parts on carburetors having identification tags with the letter "C" or earlier, both parts will have to be replaced. On later carburetors, either part may be replaced

►*1957 CHEVROLET CARBURETOR (No. 7009846) PUMP JET CHANGE (For improved fuel atomization):* A new pump jet cluster assembly, Part No. 7011576, having four (.024") pump jets instead of the customary two, can be used for replacement on this carburetor.

►*1957 CHEVROLET CARBURETOR (No. 7009846) PRIMARY MAIN METERING JET PRODUCTION CHANGE AND SERVICE REPLACEMENT NOTE :* Primary main metering jets, Part No. 7002645 (.045") used in early carburetors were changed to Part No. 7002647 (.047") in carburetors identified by an "A" on the identification tag. Later carburetors with "B" on the identification tag used main metering jets, Part No. 7002648 (.048").

►*1957 CHEVROLET TRUCK CARBURETOR (No. 7011161) PRIMARY MAIN METERING JET CHANGE:* Main metering jet, Part No. 7002647 (.047") replaced Part No. 7002648 (.048") on carburetors identified by "B" or later stamped on the identification tag.

►*1957 OLDSMOBILE CARBURETORS (Nos. 7009470 & 71) POWER VALVE & POWER PISTON PRODUCTION CHANGE:* Carburetor No. 7009470 with letter "E" and later, and carburetor No. 7009471 with letter "D" and later stamped on the identification tag have a new power valve assembly, Part No. 7009349, replacing Part No. 7010918; and a new power piston assembly, Part No. 7000204, replacing Part No. 7008612. Only the latest power valve and power piston should be used for service replacement.

►*1957 OLDSMOBILE HARD (HOT) STARTING NOTE: After partial warm-up or partial cooling the car will run below idle speed for a few seconds then either speed up and throw clouds of black smoke or else stall out entirely.* This condition is caused by the choke being set two or three notches rich. (Because of the choke modifier it is not possible to tell visually whether choke setting is correct). Adjust choke as specified under "Adjustments" below.

►*1957 OLDSMOBILE CARBURETOR UNLOADER SETTING CHANGE:* Adjust the unloader to obtain .115"± .015" clearance (Gauge BT-90) between upper edge of choke valve and dividing wall in air horn. *See "Adjustments" below.* This supersedes previous setting of .090" ± .015".

►*1957 OLDSMOBILE IDLE MIXTURE & IDLE SPEED SETTING CAUTION:* These adjustments must be made with the air cleaner in place on the carburetor.

►*1957 PONTIAC CARBURETOR MODIFICATION TO PREVENT A FLOODING CONDITION: The following modifications are recommended to eliminate a flooding and stalling condition:*

Fuel Filter Element - Install the later type fuel filter element Part No. 854467.

Float Needle & Seat Assembly - Install Package No. 7012295 which includes needles, seats and gaskets for both the primary and secondary side of carburetor. The needle seat is a new type having a narrower seating area. Do not seat needles by tapping or lapping into place as this would damage the narrow seating area.

Drilling Fuel Balance Ports - With air horn removed from carburetor, drill out the balance passage holes (located below gasket surface of main body in wall of float chambers on side adjacent to choke housing). Use a 3/16" drill, and drill out the existing balance passage holes. *(CAUTION* - These holes are drilled at an angle and care should be taken to make sure the drill does not contact other areas of the carburetor.

Cleaning & Inspection - Use air pressure and clean all passages in carburetor. Remove idle mixture screws and use a light or a tag wire to make sure passages are clean. Remove all gum and carbon deposits.

Float Level Adjustment - Adjust float level to 1 3/8" using gauge J-6628 *(see "Adjustments" below). (NOTE* - Adjust float tip so that lower edge of float tip is flush to 1/16" above gasket surface). Adjust float drop *(see "Adjustments" below).*

Idle Speed - Adjust idle speed to 500 RPM. *See "Adjustments" below for idle mixture and idle speed adjustment procedures.*

►*1957 PONTIAC SECONDARY THROTTLE VALVE SPRING ADJUSTMENT NOTE:* This is a new adjustment to insure positive closing of secondary throttle valves on idle, and must be made with carburetor on the car. *See "Adjustments" below.*

DESCRIPTION: Four-barrel downdraft type with automatic choke (4GC), without automatic choke (4G). Except for Chevrolet Pass. Car carburetors, design changes have been made as noted below.

Buick: The float bowl has been lowered with new type spring balanced, cutaway floats. Automatic choke housing has been moved from the float bowl to throttle body. Counterweighted auxiliary throttle valves have been replaced by a new type spring loaded, factory calibrated auxiliary throttle valve assembly which is now located in the float bowl. These new type valves are not adjustable, and should not be disassembled.

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ROCHESTER 4G & 4GC 4-BARREL CARBURETORS (Cont.)

Oldsmobile: Same design as previously used except that automatic choke housing has been moved from the air horn to the float bowl. A choke modifier is used on the automatic choke for improved cold driveaway.

Pontiac: The float bowl has been lowered with new type spring balanced, cutaway floats. Automatic choke housing has been moved from air horn to float bowl.

ADJUSTMENTS: *Make all adjustments in sequence given below (except for Idle Speed and Mixture adjustments).*

►*OLDSMOBILE IDLE SETTING NOTE: Air cleaner must be in position on carburetor when idle speed and idle mixture adjustments are made.*

Idle Setting: With engine at normal operating temperature, automatic choke not operating (choke valve wide open, fast idle inoperative so that engine idles at hot or slow idle speed), adjust engine to correct idle speed (see table below). Adjust each idle mixture adjusting screw (one screw for each primary carburetor barrel) until engine idles smoothly and RPM is at maximum (see Oldsmobile Note following). Recheck idle speed.

►*OLDSMOBILE NOTE: Manufacturer recommends that after setting idle speed (as above), each idle mixture screw should be turned out (rich) 1/4 turn which will provide desired idling performance. Idle speed and vacuum will drop off slightly after this adjustment.*

►*NOTE:* A change in idle speed adjustment affects throttle linkage adjustment on all cars except Oldsmobile. The split throttle design on Oldsmobile insures throttle linkage remaining as set when idle speed readjusted.

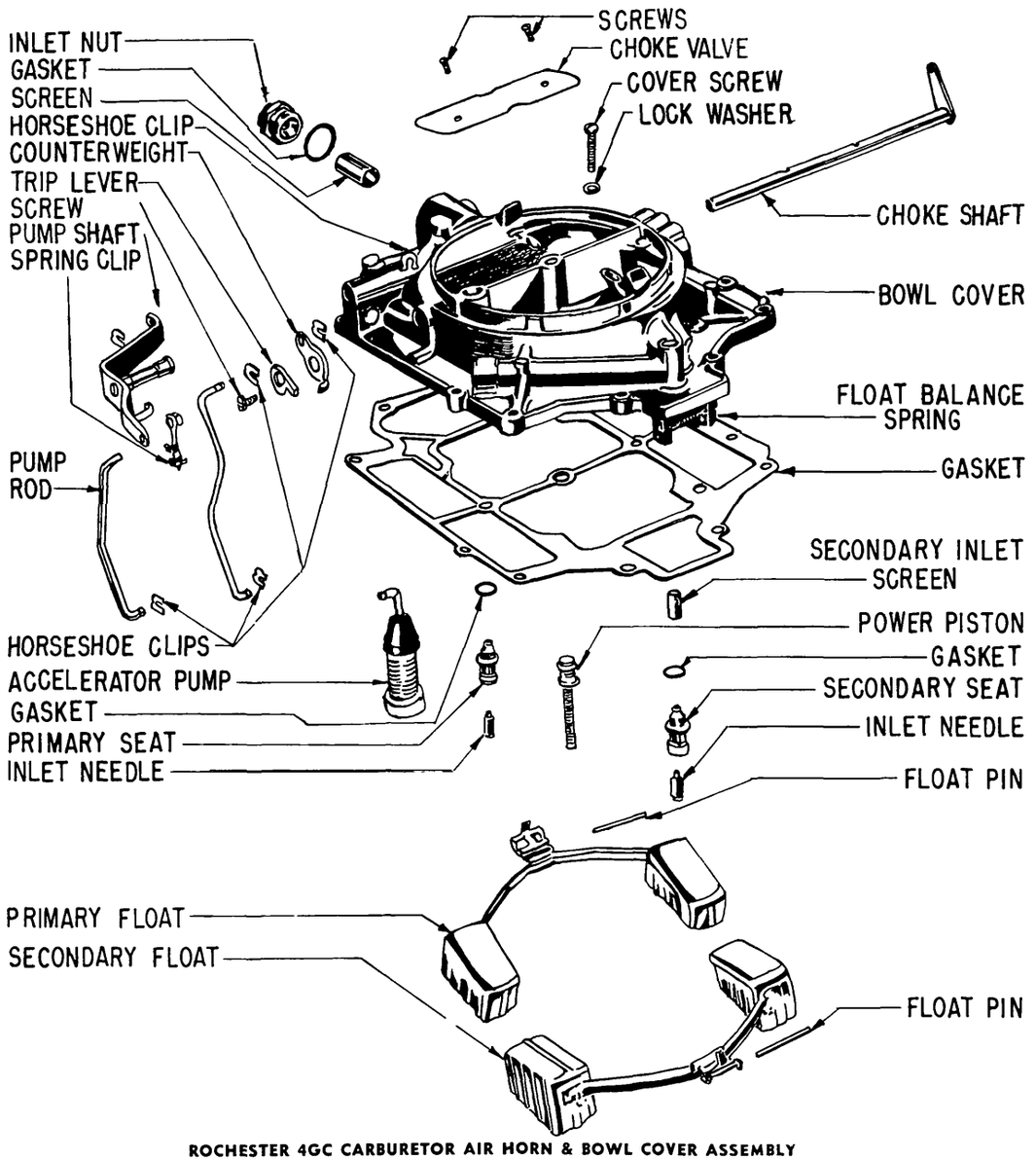
Idle Speed Setting

Car Model	Synchro-mesh	Auto. Trans:
Buick ①	485 RPM	② 485 RPM
Chev. Pass. ①	450 RPM	③ 425 RPM
Oldsmobile ①⑤	⑤ 460 RPM	③ ⑤ 460 RPM
Pontiac	⑩ 450-470 RPM	③⑩⑥ 430-450 RPM
Chev. Truck	450 RPM	③ 425 RPM

① - Air conditioner "ON" (if so equipped).
② - Transmission in "N" (Neutral).
③ - Transmission in "D" (Drive).
⑩ - 500-520 RPM, air conditioner "ON".
⑤ - Supersedes previous idle speed specifications.
⑥ - 500 RPM on cars with modified carburetors. *SEE Pontiac carburetor modification (to correct flooding) above.*

Fl at Setting: *Both Primary and Secondary Float Assemblies must be checked and adjusted separately and both FLOAT LEVEL & FLOAT DROP (Float Tip, on cars with "Spring Balanced" floats), must be checked for each assembly.* Remove bowl cover and float assembly from carburetor but DO NOT remove bowl cover gasket for following checks:

Float L vel–*CAUTION–Do not remove bowl cover gasket.* Invert bowl cover, install correct float gauge (see table below) on cover and against curvature in air horn bore, or use scale to measure distance from gasket on cover to highest point on each float. If floats do not touch top portion of gauge legs, or if scale distance not correct, adjust by bending float arms at rear of float assembly *(CAUTION–All floats must be set alike).* Bend float arms horizontally until each float is centered between gauge legs, then check this setting by tilting bowl cover assembly 90° to each side to make sure that floats do not touch gauge legs under these conditions *(CAUTION–This adjustment is necessary to prevent floats touching sides of bowl and hanging up in service).*



ROCHESTER 4GC CARBURETOR AIR HORN & BOWL COVER ASSEMBLY

Float Level Setting
(Primary & Sec ndary Floats)

Car Model	Float H ight	Gaug N .
Buick	1 3/8"	BT-132
Chev. Pass.	1 5/8"	BT- 89
Oldsmobile	1 5/8"	BT- 89
Pontiac	1 3/8"±1/32"	BT-132
Chev. Truck	1 19/32"	BT-101

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ROCHESTER 4G & 4GC 4-BARREL CARBURETORS (C nt.)

Fl at Tip Adjustment (Buick & Pontiac)–Move Gauge BT-132 to small ends of floats. With gauge held vertically, the upper edge of the float at the point where the radius ends should align between scribe marks.

Float Drop–With air horn upright and floats hanging free (bowl cover gasket in place), distance from air horn gasket to lower edge of float at tip should be as indicated in table below. To adjust, bend the float tang.

Float Drop Setting (Primary & S condary Floats)

Car Mod l	Float Drop
Buick	1-13/16"
Chevrolet Pass. Cars	2-1/4"
Chevrolet Trucks	2-1/4"
Oldsmobile	2-1/4"
Pontiac	1-13/16"

Accel rating Pump Strok : *CAUTION–This is a linkage adjustment and not a seasonal change recommendation.* Back off idle speed stop screw and fast idle screw so that primary throttle valves are fully seated and hold throttle lever in this position, use scale to measure height of pump rod plunger (from top surface of bowl cover to bottom edge of pump plunger rod). If height not correct (see table below), adjust by bending pump rod as required.

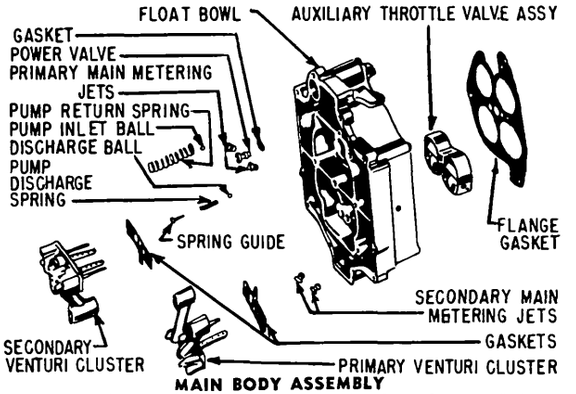
Pump Rod Setting

Car M del	Pump Rod Height
Buick ①	1-1/64"
Chevrolet Pass. Cars	1-1/16"
Chevrolet Trucks	1-1/16"
Oldsmobile	1-3/64"
Pontiac	15/16"

① –See *"1957 Buick Stumble and Flat Spot Correction" above.*

Atmospheric Idle V nt Adjustment: (Oldsmobile) - Adjust the pump rod (see above), then gradually open primary throttle valve to the point where idle vent valve just closes. Using a scale, measure distance from top of air horn to bottom of pump plunger shaft (same as checking pump rod dimension). With idle vent valve just closed, the distance from top of air horn to bottom of pump plunger shaft (right angle bend at top of pump shaft) should be 13/16". Adjust by bending idle vent tang with Tool BT-69.

Pontiac–With throttle valve closed against a 1/16" drill, the bent contact tang on pump lever should be positioned so that valve is just closed. Bend tang as necessary to obtain this adjustment.



MAIN BODY ASSEMBLY

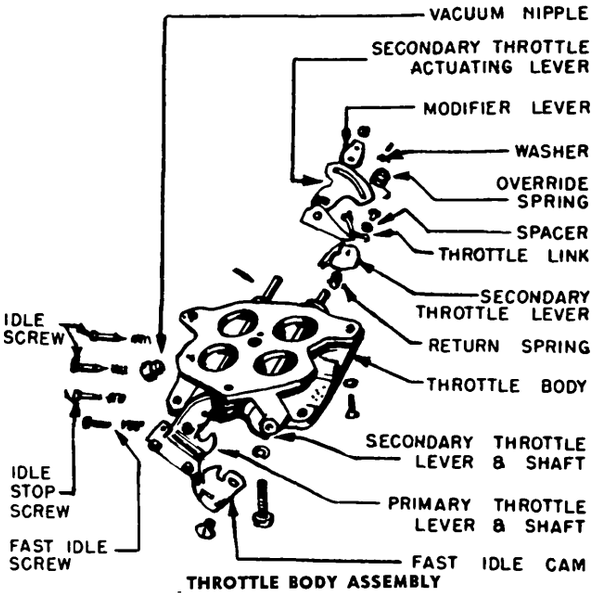
Automatic Choke Setting: To adjust loosen heat suction tube connection on cover (except Oldsmobile) and loosen cover retainer screws. Rotate cover until index mark on cover is aligned with correct mark on housing (see table below). Tighten all cover retainer screws, tighten heat tube connection.

Automatic Choke Setting

Car Model	Choke Setting
Buick	Centered (At Index)
Chevrolet Pass. Cars	1 Notch Lean
Oldsmobile	Centered (At Index)
Pontiac	Centered (At Index)

Intermediate Choke Rod Adjustment (Buick, Oldsmobile, Pontiac): *NOTE–This rod connects lever on choke valve shaft to choke lever on automatic choke housing.* Hold choke valve completely closed and bend intermediate choke rod as necessary so that choke piston is 1/32" to 1/16" (Buick); flush to 1/32" (Other cars) out of end of choke piston sleeve.

Choke Rod Adjustment (All Models Except Chevrolet Truck): *NOTE–This rod connects choke valve shaft to fast idle cam.* Rotate choke valve and fast idle cam untio fast idle screw (Buick & Oldsmobile), slow idle screw (Chevrolet & Pontiac), is in contact with SECOND step of fast idle cam, then close choke valve until screw is against side of highest step on cam making certain that choke trip lever is in contact with choke counterweight lever. Measure choke valve opening or clearance between top edge of valve and dividing wall in air horn (see table below for gauge and clearance specifications). Adjust by bending choke rod at center angle using Tool BT-18.



THROTTLE BODY ASSEMBLY

Choke Rod Setting

Car Model	Gauge & Choke Opening
Buick	BT-135 (.148")
Chevrolet Pass. Cars	BT-131 (.043")
Oldsmobile	BT-68 (.052")
Pontiac	BT-79 (.063")

Choke Modifier Adjustment: Oldsmobile - With fast and slow idle screws backed out and primary throttle valves tightly closed, loosen the choke modifier lock screw and rotate the index pointer counter-clockwise from free position until the thermostat spring begins to close choke valve. Continue counter-clockwise until pointer lines up with index position on thermostat cover.

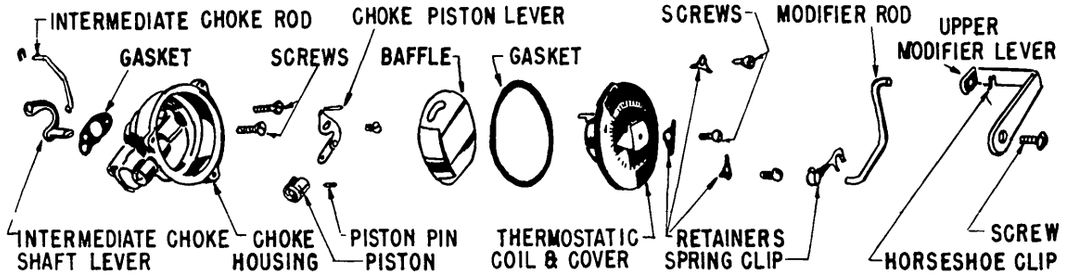
Unloader Setting: After choke rod adjusted (above). Move throttle lever to wide open position and make sure that choke trip lever is in contact with choke counterweight. Measure choke valve clearance between upper edge of valve and dividing wall in air horn (see table below for gauge and clearance specification). Adjust by bending tang on fast idle cam (Tool BT-69).

Unloader Setting

Car Model	Gauge & Choke Opening
Buick	BT-135 (.128")
Chev. Pass. Car	BT-131 (.235")
Oldsmobile	① BT- 90 (.115")
Pontiac	BT- 90 (.115")

① - Supersedes previous setting of .092".

Secondary Throttle Valve Lock Spring (Pontiac): *(NOTE - This adjustment must be made with carburetor on the car).* Adjust idle speed and mixture (make sure secondary throttle valves are completely closed). Turn off engine and place idle speed screw on second step of



AUTOMATIC CHOKE ASSEMBLY (WITH MODIFIER)

CONTINUED ON NEXT PAGE

ROCHESTER 4G & 4GC 4-BARREL CARBURETORS (Cont.)

fast idle cam. Measure distance between secondary lock spring and secondary throttle operating lever. Clearance should be .028". Adjust by bending lock spring. *(CAUTION - This adjustment must be made accurately).*

Secondary Throttle Lock-out Setting: Close choke valve to point where secondary throttle lock-out tang is on lock-out step of fast idle cam (Buick); in fast idle cam slot (Other Models). Distance between cam and step should be .015". Bend tang as required.

Secondary Throttle Contour Setting: Buick-Fully open choke valve so fast idle cam falls to its lowest position, then open throttle so that secondary lock-out tang follows contour portion of fast idle cam. With choke valve held wide open, check clearance between lock-out tang and contour portion of cam. This measurement should be .030" (Gauge J-1388). Bend tang as necessary.

Other Models-Hold choke valve in wide open position so that secondary lock-out tang is positioned over fast idle cam, then measure clearance between tang and cam. This clearance should be .015" (Chevrolet), .010-.020" (Pontiac), .030" ± .010" (Oldsmobile). To adjust, bend tang straight up or down.

Fast Idle Setting: *NOTE-On Chevrolet & Pontiac, the fast idle adjustment will be correct after "slow idle speed" and choke rod adjustment made. On Buick & Oldsmobile, "Off Engine" fast idle adjustment must be checked "On Engine" to insure proper warm-up performance. Adjust fast idle after Choke Rod adjusted (above).*

"Off Engine" Adjustment (Buick & Oldsmobile)-With fast idle screw on "high" step of fast idle cam, clearance between edge of primary throttle valve and bore of carburetor on side opposite idle ports should be .024" (Gauge BT-90).

"On Engine" Adjustment (Buick & Oldsmobile)-With engine at normal operating temperature, rotate fast idle cam so that fast idle adjusting screw is on "high" step of cam. Adjust fast idle screw so that engine operates at 1500 RPM.

Throttle Return Check Adjustment (Oldsmobile): *(NOTE-Make sure that normal idle speed and fast idle speed adjustments are correct).* With engine at normal operating temperature and running, rotate the fast idle cam so fast idle adjusting screw is on "high" step of cam. Measure clearance between contact screw of throttle return check and contact on throttle lever. Clearance should be .020". If adjustment necessary, loosen contact screw locknut and adjust. Use two wrenches when adjusting to prevent damage to plunger and diaphragm.

OVERHAUL: *CAUTION-When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor assembled.*

Disassembly: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Carburetor Bowl, and Throttle Body) which can be overhauled separately as follows:

Buick Vacuum Starter Switch Timing Check (On Car): Back off throttle stop screw and rotate fast idle cam to slow idle position, then fully close throttle valve. *(CAUTION - Make sure dashpot does not prevent full closing of throttle).* Measure distance from diaphram flange of dashpot to near edge of dashpot arm on throttle lever. With ignition turned on, slowly open throttle while holding scale in position against flange of dashpot. When cranking motor is energized, note distance from flange of dashpot to near edge of dashpot arm. Subtract the two measurements. If switch is properly timed, the difference should be 1/2" - 3/4". Adjust by changing timing shims located below contact spring in terminal cap.

Air Horn & Bowl Cover - On Cadillac, (with air conditioning), remove idle speed-up control and bracket. On Chevrolet Pass. Cars, remove choke cover, gasket, and coil assembly from housing. On all cars (except Chevrolet), disconnect intermediate rod from choke shaft lever. On all cars, disconnect pump rod from pump lever. Remove choke trip lever, then disengage choke lever and collar assembly from choke shaft and disengage lower end of choke rod from fast idle cam. Remove choke lever, collar, and rod as an assembly. Remove choke valve, then on all cars (except Chevrolet), remove choke shaft. On Chevrolet Pass. Cars, rotate choke shaft counterclockwise to free choke piston from housing and remove piston and shaft assembly by sliding from bowl cover. Remove choke housing from bowl cover. On all cars, take out all air horn retaining screws *(CAUTION - One screw is located in counterbore in dividing wall just inside edge of air horn),* then carefully lift air horn straight up from main body to avoid damage to floats, pump plunger and vacuum piston. *(CAUTION - Break cover loose from bowl with finger pressure only. DO NOT PRY ON COVER).* Invert bowl cover and take out float hinge pins and remove floats and inlet needles, seats, and gaskets. *(NOTE - On carburetors with spring balanced floats, it is not necessary to remove the balance spring).* Keep each float assembly intake needle, and seat together. DO NOT mix primary and secondary parts. Remove power piston assembly by compressing spring and letting it snap repeatedly until hammering action of power piston drives staked retaining disc from air horn. *(NOTE - It may be necessary to remove burrs if heavy staking is encountered).* Remove horseshoe clip from top of accelerating pump plunger shaft and disengage plunger shaft from pump lever. Pull pump plunger, with rubber boot, downward and out of bowl cover. Remove pump lever and choke countershaft. Remove fuel inlet, gasket and strainer.

Carburetor Bowl - On Cadillac & Oldsmobile, remove modifier lever from choke cover. On all cars (except Chevrolet Pass. Car & Truck), remove thermostat cover and coil assembly. Remove choke piston lever screw and slide choke piston out of vacuum passage. Disconnect choke piston from link attached to shaft by tapping piston and letting it fall into the hand. Remove choke housing from bowl (or throttle body). Remove intermediate choke shaft lever from housing. On all cars, remove accelerator pump spring, then remove power valve and gasket. Remove primary and secondary venturi clusters. *(CAUTION - Break clusters loose with finger pressure only).* Remove and discard venturi cluster gaskets. On Oldsmobile, disconnect throttle return check vacuum line at throttle flange, then remove throttle return check from carburetor body. On all cars, remove metering jets from primary and secondary sides, keeping each jet separate in separate groups. Invert bowl casting and remove pump inlet and outlet check valve balls. If necessary, remove pump inlet screen and retainer from bottom of float bowl.

Throttle Body - Remove large screw and washer from counterbore in center of throttle body. On Cadillac, with air conditioning, remove idle speed-up control vacuum pipe. On all cars, remove three small screws and lockwashers from flange and carefully separate throttle body from bowl. Remove and discard gasket. Remove secondary auxiliary throttle valve assembly from carburetor body by lifting it out of secondary throttle bores. Remove both idle adjusting screws and springs, idle stop screw and spring, and fast idle screw and spring. On Cadillac, remove idle air by-pass screw and spring. *(NOTE - Keep each adjusting spring with its screw for easier identification).* On Cadillac and Oldsmobile, remove choke modifier lever and retaining screw from primary throttle shaft. On all cars, free secondary operating link by taking out cotter pin in each end. Unhook inner end of primary throttle shaft override spring from lever. Remove override spring retaining screw from primary throttle shaft, remove secondary throttle lever retaining screw and washer, then slide secondary throttle operating lever and override spring off primary shaft. Slide secondary throttle lever and spring from secondary throttle shaft.

▷ *CAUTION: Secondary Auxiliary Throttle Body and Main Throttle Body are furnished as an assembly with throttle valves and shafts and no attempt should be made to remove throttle valves (disturbing valves will upset low speed metering performance).*

Cleaning & Inspection: Wash all parts thoroughly in carburetor cleaning solvent except following parts which should be cleaned in clean gasoline: Choke cover and coil assembly, pump plunger, primary venturi cluster (with pump discharge nozzles). Blow out all passages in castings with air, remove all gum and carbon deposits (*CAUTION*-do not use drills to clean out jets and passages). Inspect strainer screens and replace if distorted or plugged. Check floats for dents, leaks, or wear at hinge pin holes. Inspect fast idle cam for wear on steps. Inspect throttle body carefully for wear at throttle valves and bore and shaft wear in bore (replace as an assembly if worn excessively). Inspect all parts for wear or damage and replace as required.

Reassembly: Use new gaskets. Install all parts in reverse order of disassembly procedure (above) and pay particular attention to the following:

Auxiliary Secondary Throttle Valve Assembly - Install the auxiliary secondary throttle valve assembly into base of carburetor body from bottom side (make sure the calibrated spring, nylon bushing and operating pin are in position in throttle body assembly).

Secondary Throttle Lever & Spring Installation: Install return spring on secondary throttle shaft with bent end of spring in hole in throttle body, wind up spring one

CONTINUED ON NEXT PAGE

ROCHESTER 4G & 4GC 4-BARREL CARBURETORS (C nt.)

complete turn, then install secondary lever on shaft over straight end of spring (bent portion of lever should be above shaft), install spacer and retaining screw in end of shaft. Install secondary throttle actuating link (insert plain end through lever hole, install cotter pin on shaft side to clear return spring)

Primary Throttl Lever & Spring–Start secondary throttle actuating lever on primary throttle shaft with curved slot portion outward and toward the rear. With inner portion of lever on shaft, start override spring on shaft with long end inward, then slide lever and spring on shaft and engage washer end of secondary throttle actuating link in slot in lever. Install override spring retaining screw through loop end of spring and into primary throttle shaft from upper side. Hook inner end of override spring over top edge of secondary throttle actuating lever. Install washer and cotter pin on end of secondary throttle actuating link. On Cadillac, install choke modifier lever and retaining screw on end of primary throttle shaft (lever must point upward when throttle closed and marking "RP" must be outward)

Throttle Body-t -Bowl Assembly Caution–Install new gasket on bottom surface of bowl with largest projecting tab on primary side and surrounding vacuum passage to power valve piston (*CAUTION*–gasket is not reversible) Install all throttle body attaching screws loosely (including large screw in center of throttle body), then tighten all screws evenly.

V nturi Clust r Installation Caution–Make certain that brass pump discharge needle installed in pump passage in bowl before installing primary venturi cluster. Use new gaskets and install each venturi cluster in correct position making certain that clusters correctly aligned by the tangs on the cluster. *CAUTION*–Primary and Secondary clusters not interchangeable and can be identified by brass pump discharge nozzles used on primary cluster only

Metering Jet Installation Caution–Primary and secondary side metering jets are DIFFERENT sizes (in general, secondary jets are larger size than primary jets) and must be installed in correct positions. *NOTE*–On later Cadillac carburetors, primary jets are brass finished, secondary jets are copper plated.

Accelerating Pump Plunger Assembly–When installing rubber seal on plunger stem, slide seal on shaft with larger end toward the piston, see that upper end engaged in groove in plunger stem. Insert assembly through bowl cover from below and pull seal through cover so that cover edge engages groove in seal. When installing cover guide pump plunger into cylinder

Floats and Intake Valve Assembly - Make certain that parts are installed in correct position (primary and secondary parts not interchangeable). On carburetors with spring balanced floats, make sure float arm is back of float balance spring. Adjust float level and float drop or travel. See *"Adjustments"* above.

Air Horn & Bowl Cover Installation - Use a new gasket, carefully align holes in gasket and cover. When installing cover, use care in guiding pump plunger into pump cylinder and power valve piston into its bore. Make sure floats are not bent by striking on edge of bowl. Install all bowl cover attaching screws, tighten inner screws first, then outer screws, evenly and securely.

Choke Valve Installation–After choke shaft and piston assembly installed in air horn, slide choke valve through shaft with letters "RP" upward, use new screws and install screws loosely, then tighten screws as follows **Cadillac**-Press firmly on choke housing end of shaft and hold valve tightly closed, tighten screws securely and stake ends of screws lightly taking care not to bend choke shaft. **Oldsmobile**–First install counterweight, spacing washer, and trip lever on end of choke shaft, press lightly on end of choke shaft to obtain minimum clearance of .020" between spacing washer and counterweight, tighten choke valve attaching screws with shaft in this position, stake screws lightly taking care not to bend choke shaft. Install choke baffle plate with curved slot over tang on choke lever.

Thermostatic Housing & Coil Assembly - With retaining screws loose, rotate cover counterclockwise until coil hook picks up choke lever tang, then position cover for correct choke setting *(see "Adjustments")* and tighten retaining screws. On Cadillac and Oldsmobile, install modifier lever loosely. If lever is installed correctly, metal pointer will be at scribed line of housing. Adjust modifier *(see "Adjustments" above).*

SERVICE PARTS: Gasket Sets - Rochester No. 7005740 (7010070, 7011570, 7015757) No. 7015741 (7010100, 7010101) No. 7015743 (7009661, 7011161) No. 7015744 (7009471, 7010926, 7009470, 7010925, 7015704) No 7015745 (7009829, 7009830, 7015705, 7015706) No. 7009953 (7009846, 7012126, 7015711)

Repair Packages - Rochester No. 7015720 (7010070, 7011570, 7015757). No. 7015721 (7010100, 7010101, 7015701). No. 7015723 (70 09661, 7011161). No.7015724 (7009471, 7010926, 7009470, 7010925, 7015704). No. 7015725 (7009829, 7009830, 7015705, 7015706). No. 7015730 (7015711, 7012126, 7009846).

1957 ROCHESTER DUAL CARBURETORS

ROCHESTER DUAL 2G & 2GC

CHEVROLET PASS. CARS	Rochester Model No.
1957 V8 (Std Trans)	① 2GC 7010647
1957 V8 (Powerglide)	② 2GC 7010648
1957 V8 (With Governor)	③ 2GC 7010719
CHEVROLET TRUCKS	
1957 V8 265" Eng (Std)	④ 2G 7010649
1957 V8 265" Eng (With Governor)	⑤ 2G 7010716
1957 V8 265" Eng (Overdrive)	⑨ 2G 7010718
1957 V8 283" Eng (With Governor)	⑥ 2G 7010717
OLDSMOBILE	
See SEPARATE "Oldsmobile Triple 2-Barrel Compound" Carburetor data.	
PONTIAC	
1957 Chieftain (Synchro-mesh)	⑦ 2GC 7009832
1957 Chieftain (Hydra-Matic)	⑧ 2GC 7009831
See SEPARATE 'Pontiac Triple Carburetor" data	

► *Replacement (Service Pkg.) Carburetors for above models*

① - 7015712 ② - 7015715 ③ - 7015719 ④ - 7009912
⑤ 7015759 ⑥ - 7015718 ⑦ - 7015708 ⑧ - 7015707

►CHANGES, CAUTIONS, CORRECTIONS

► *1957 PONTIAC ROUGH IDLE OR SURGE CORRECTION*

This condition caused by excessive leanness and can be corrected by installing new Venturi Cluster Assembly as listed below

NOTE - Revised cluster assemblies used in production on late cars Carburetors with these new clusters may be identified by letter stamped on carburetor tag as follows Synchro-mesh Cars -"D", Hydra-Matic Cars - "A"

Pontiac 2GC Venturi Cluster Change

Carburetor	First Type	Later Type
7009831 (Hydra-Matic)	7010603	7011561
7009832 (Synchro-mesh)	7010575	① 7010575

① - Modified cluster has same part number

► *1957 PONTIAC FUEL FILTER CHANGE TO CORRECT CARBURETOR FLOODING* Carburetor flooding can be corrected by thoroughly cleaning carburetor and installing new type AC Fuel Filter Element No 854347 *NOTE* - This improved filter element can be identified by **heavy blue line** between type designation GF 124 and part no 854347 on package The "blue star" formerly printed behind the numbers has been eliminated

DESCRIPTION: Dual or double barrel downdraft carburetors with manual choke control (2G) automatic choke (2GC) Carburetors are same design used on previous models except as follows

Chevrolet Governor - Governor is a spring-loaded, vacuum diaphragm type unit mounted on the throttle body and linked to the throttle valve lever The throttle linkage does not positively open the throttle valves but permits the spring in the governor unit to do so (when no vacuum applied) The vacuum unit is controlled by a vacuum valve in the Ignition Distributor This valve opens when the preset speed is reached, applying vacuum to the governor vacuum unit, so that the vacuum unit tends to close the throttle valves so that the preset speed will not be exceeded

Pontiac Automatic Choke - Choke assembly is mounted on the throttle body (to reduce overall height) and is linked to the choke shaft lever by a connector rod An internal fuel bowl vent is also provided in the air horn

ADJUSTMENT: *Make all adjustments exactly as detailed below.*

Idling Adjustment· If preliminary adjustment required to warm up engine, turn both idle mixture screws in until lightly seated, then back each screw out 1½ turns Set parking brake, place transmission selector lever in Neutral, run engine until normal operating temperature is reached (at least 15 minutes operation for cold engine)

CONTINUED ONNEXT PAGE

ROCHESTER 2G & 2GC (C nt.)

Connect tachometer and vacuum gauge, then adjust as follows:

Idle Mixture - With engine at normal operating temperature and idling at correct idling speed (see below) with choke valve wide open and fast idle inoperative, adjust each mixture adjusting screw separately for smoothest engine performance (highest vacuum and engine RPM). Recheck idle speed.

Idle Speed - With engine at normal operating temperature, adjust throttle stopscrew for correct idling speed as listed below *(CAUTION* - On "2GC" carburetors, stopscrew must be resting on lowest step of fast idle cam when adjustment being made).

Idle Speed Setting

Car Model	Synchro-mesh	Auto. Trans. Cars
Chevrolet Pass. Cars	475 RPM	① 425 RPM
Chevrolet Trucks	475 RPM	② 425 RPM
Pontiac	450-470 RPM	①③ 430-450 RPM

① - With selector lever in Drive range.
② - With selector lever in Neutral "N".
③ - On Air Conditioned Cars, set speed at 500-520 RPM in Drive range with air conditioning "off".

Float Level: *CAUTION - Two separate adjustments required as follows:*

1) Float Level Setting - Invert bowl cover and float assembly but DO NOT remove cover gasket. Install gauge (see table below) over float with one gauge leg against pump side of power piston and outer gauge leg in line with float center. Float should just clear top edge of gauge cut-out and sides of float should be parallel to gauge legs. Adjust by bending float hinge arm.

Float Level Setting

Car & Carb.	Checking Gauge	Float Level
Chevrolet Cars (All)	④ BT-129	1 1/4"
Chevrolet Trk.(7008394)	⑤ BT-130	1 15/64"
Chevrolet Trk. (Others)	④ BT-129	1 1/4"
Pontiac (All)	⑥ BT-133	1 15/64"

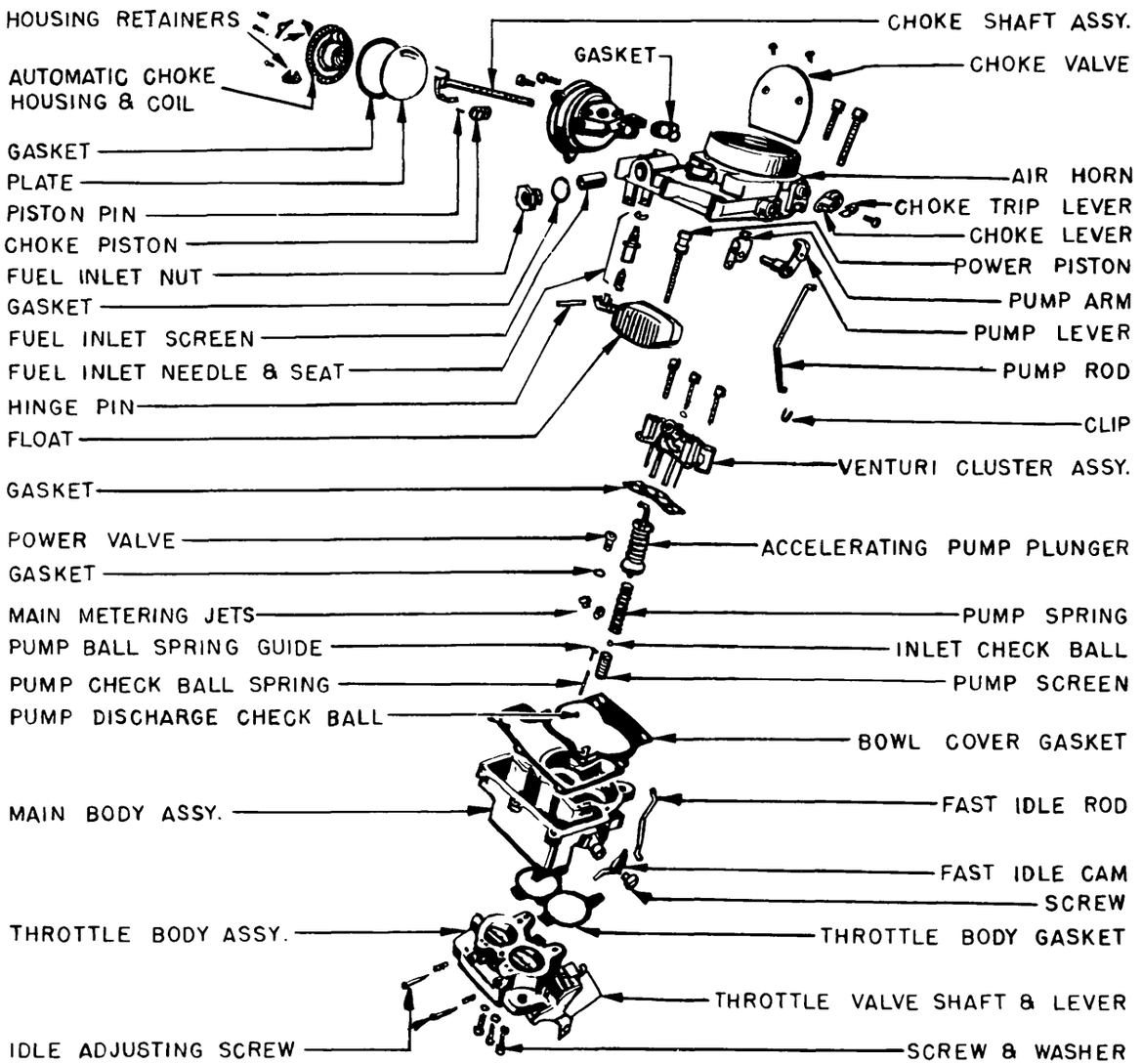
④ - Chevrolet No. J-6326. ⑤ - Chevrolet No. J-5916.
⑥ - Pontiac No. J-6629.

Float Drop Setting - Hold bowl cover and float assembly upright so that float hangs down at bottom of travel. Measure distance from lower face of gasket on cover to bottom of float at center using scale or Float Level Gauge (see above). If float level gauge used, place gauge sideways on underside of bowl cover with extension on lower leg extending under float. Bottom of float should be even with scribed mark on gauge. Adjust by bending float arm tang (behind needle seat) in or out.

Float Drop Setting

Model	Float Drop
Chevrolet Car & Trk. (All Carbs.)	1 29/32"
Pontiac (All Carbs.)	1 29/32"

Accelerating Pump Rod: *This is a linkage adjustment (pump does not have seasonal setting).* With throttle stopscrew backed out so that throttle valves tightly closed, place float level gauge (see table below), inverted, on pump shaft boss on bowl cover next to air horn with single leg of gauge extending down toward pump connector rod. Top of pump rod should just touch lower edge of gauge. Adjust by bending pump rod using bending tool BT-18.



ROCHESTER 2GC DUAL CARBURETOR (2G SIMILAR EXC. MANUAL CHOKE)

Pump Rod Setting

Model	Checking Gauge	⑦ Rod Height
Chevrolet (All)	④ BT-129	57/64"
Pontiac (All)	⑥ BT-133	53/64"

④ - Chevrolet No. J-6326.
⑥ - Pontiac No. J-6629.
⑦ - From top of bowl cover to top of connector rod.

Fast Idle (2GC Carburetors): *NOTE* - Fast idle speed is automatically set when hot or slow idle speed is adjusted (same screw controls both settings). Adjust choke rod (fast idle cam position) as follows:

Fast Idle Cam Positi n - Rotate fast idle cam until throttle stopscrew is on second (next to highest) step of cam and against the shoulder of the highest step, make certain that choke trip lever is in contact with choke rod lever. Check choke valve opening or clearance between upper edge of choke valve and air horn wall using correct gauge (see table below). If clearance not correct, adjust by bending choke lever tang using bending tool BT-69.

Fast Idle Cam S tting

Model	Checking Gauge	Ch ke Opening
Chevrolet Pass. Cars	⑧ BT-108	.089"
Pontiac	⑨ BT-134	.061"

⑧- Chevrolet No. J-5921 (Use small end of gauge).
⑨ -Pontiac No. J-5920 (Use small end of gauge).

CONTINUED ON NEXT PAGE

ROCHESTER 2G & 2GC (Cont.)

Unl ad r (2GC Carbur tors): Move throttle valves to wide open position which will open choke valve slightly (see Pontiac Note below). Check choke valve opening or clearance between upper edge of choke and air horn wall using correct gauge (see table below). If clearance not correct, adjust by bending tang on throttle lever which contacts fast idle cam using bending tool BT-69. **Pontiac Not** - If unloader checked with carburetor on engine, it is recommended that following procedure be followed: Open throttle valves by depressing accelerator pedal forcibly to floor. Make certain that pedal does not hit hump over transmission (Correct by moving upper end of pedal to left by enlarging left hand hole in pedal bracket and rotating pedal to the left). Check choke valve opening (above) and bend tang to secure valve opening of .143-.183" which will insure correct unloader action.

Unl oader Setting

M d l	Ch cking Gauge.	Choke Opening
Chevrolet Pass. Cars	(10) BT-108	.360"
Pontiac	(11) BT-134	.163"

(10)- Chevrolet No. J-5921 (Use large end of gauge).
(11)- Pontiac No. J-5920 (Use large end of gauge).

Automatic Ch k (2GC Carburetors): Adjust by loosening three retainer screws on choke cover and rotating cover and coil assembly. Centered setting is with scribed index mark on cover in line with longest (center) cast mark of scale on housing.

Ch k Setting

M del	Setting
Chevrolet Pass. Cars	Centered
Pontiac	Centered

OVERHAUL: *See "Rochester 2G & 2GC Carburetors" in 1956 Annual Data or latest Manual edition and note the following:*

Ch vr l t G v rnor Ov rhaul: R m val - Remove four governor cover attaching screws, remove cover and gasket. Detach and remove governor throttle spring. Remove diaphragm cover attaching screws, lift off cover. Hold throttle lever and loosen nut attaching governor lever and pin assembly to throttle shaft, free lever from throttle shaft and disengage it from diaphragm rod by rotating lever until tang on rod clears slot in lever. Remove diaphragm assembly from housing. Remove three governor housing mounting screws, remove seal retainer and leather seal. Detach governor housing from throttle body, remove housing gasket.

Cleaning & Inspection - DO NOT immerse throttle lever and bearing assembly in cleaning solution (will damage neoprene seal protecting ball bearings). Make certain that throttle bearings are completely dry (blow out with air) and lubricate with very light machine oil *(CAUTION* - Throttle shaft must rotate freely with no trace of any binding which would affect governor operation).

Installation - Install governor housing mounting gasket (narrower edge toward top of carburetor), install housing, leather seal, seal retainer, and mounting screws (DO NOT tighten screws). Check throttle shaft for free operation in seal, tighten mounting screws while holding throttle in closed position, recheck throttle shaft for free operation. Install diaphragm assembly in housing and align vacuum passage holes in diaphragm and housing. Assemble governor lever and pin assembly on end of diaphragm rod (in housing) and position lever on throttle shaft, install lockwasher and nut on shaft, tighten nut while holding throttle lever to prevent damage to valves. Align diaphragm with mounting screw holes in housing, install cover with cover restriction piloting through diaphragm and into vacuum passage in housing, install cover screws finger-tight. Hold throttle valves wide open (to provide maximum diaphragm travel), tighten cover screws to 25-28 in. lbs., install lockwire on screws. Install throttle spring over governor lever pin and stationary post in housing. Check for free operation of throttle shaft, then install governor cover and gasket, tighten attaching screws, install lockwire on screws.

Pontiac Automatic Choke Overhaul: Removal - Take out cover retaining screws, lift off cover and coil assembly, remove gasket and baffle plate. Remove choke piston lever attaching screw, remove piston link and lever assembly. Remove two choke housing to carburetor mounting screws, detach housing from throttle body, remove gasket. Intermediate choke shaft and lever can then be removed from housing.

Installation:- Install intermediate choke shaft and lever in choke housing, then install housing on carburetor throttle body using a new gasket. Install choke piston and lever assembly in housing and install attaching screw. Connect intermediate choke lever to choke valve lever by installing connector rod. Hold choke valve closed and adjust rod (by bending) so that choke piston is flush with end of choke housing bore. Install baffle plate, gasket, and choke cover and coil assembly. *See Automatic Choke under ADJUSTMENT above for setting.*

SERVICE PARTS: Gasket Sets - Rochester No. 7008534 (2GC No. 7010648), No. 7009949 (2GC Nos. 7010647 & 7010719), No. 7009950 (2G Nos. 7010649, 7010716, & 7010718), No. 7009951 (2G No. 7010717), No. 7015747 (2GC Nos. 7009831 & 7009832).
Repair Kit - Rochester No. 7009928 (2GC No. 7010648), No. 7009929 (2GC Nos. 7010647 & 7010719), No. 7009930 (2G Nos. 7010649, 7010716, & 7010718), No. 7009934 (2G No. 7010717), No. 7015728 (2GC Nos. 7009831 & 7009832).

1957 ROCHESTER SINGLE CARBURETORS

ROCHESTER "B" & "BC"

CHEVROLET PASS. CARS	Rochester Model No.
1957 6 Cyl. (Synchro-mesh)	① BC 7009657
1957 6 Cyl. (Powerglide)	② BC 7009656
CHEVROLET TRUCKS	
1957 6 Cyl. 235" (Std. Trans.)	B 7004468
1957 6 Cyl. 235" (Hydra-Matic)	③ BC 7009255
1957 6 Cyl. 261" Engine	B 7005140

① - Replacement (Service Pkg.) 7015710.
② - Replacement (Service Pkg.) 7015709.
③ - Replacement (Service Pkg.) 7009911.

►CHANGES, CAUTIONS, CORRECTIONS

►*METERING JET CHANGE FOR IMPROVED PART THROTTLE PERFORMANCE: See Rochester Single & Dual Jet Specification Table for latest jets.*

►*1957 CHEVROLET 6 LOADING UP DURING WARM-UP CORRECTION (Cars with "BC" Carbs.):* Caused by over-rich condition. Correct by setting automatic choke to new specifications. *See Automatic Choke Setting below.*

DESCRIPTION: Single barrel downdraft carburetors with manual choke control (Model B), automatic choke (Model BC). Same design as used on previous models except for new low air horn design (Pass. Cars only). These low air horn carburetors also have new type power piston (with solid stem for greater support) and larger fuel inlet with fuel strainer installed under fuel inlet fitting nut.

►*FUEL STRAINER NOTE:* Strainer screen (under fuel inlet fitting nut) can be removed for cleaning.

ADJUSTMENTS: Make all adjustments exactly as detailed below.

Idling Adjustment: If preliminary setting required to warm up engine, turn idle mixture screw in until it is lightly seated, then back screw out correct number of turns (see table below). Set parking brake tight, place selector lever in Drive "D" (Powerglide), Neutral "N" (Hydra-Matic), start engine and allow it to idle until normal operating temperature is reached. Then adjust as follows:

Idle Mixture - With engine at normal operating temperature and idling at correct speed (see below), turn idle mixture adjusting screw in or out until smoothest engine performance is secured. Recheck idle speed.

Idle Mixture Setting

Car Model	Idle Screw Opening
Pass. Car (All)	2½ turns
Truck (B Carb.)	1½-2½ turns
Truck (BC Carb.)	2½ turns

Idle Speed - With engine at normal operating temperature, adjust throttle stopscrew for correct idling speed as listed below *(CAUTION* - On "BC" carburetors, stopscrew must be resting on lowest step of fast idle cam when adjustment being made).

Idle Speed Setting

Car Model	Synchro-mesh	Auto. Trans. Cars
Pass. Cars	475 RPM	① 425 RPM
Trucks	450-500 RPM	② 425 RPM

① - With selector lever in Drive "D".
② - With selector lever in Neutral "N".

CONTINUED ON NEXT PAGE

ROCHESTER "B" & "BC" (Continued)

Float Level: *CAUTION - Two separate adjustments required as follows:*

1) Float Level Setting - *CAUTION - When removing air horn and bowl cover on "BC" carburetors, disconnect heat suction tube at upper coupling nut and use care not to disturb seal at lower end of tube.* Invert bowl cover and float assembly but DO NOT remove cover gasket. Install gauge (see table below) over floats with center tang on gauge in main discharge nozzle on cover. Bend float arms **vertically** so that each float just touches top of cut-out in gauge, bend arms **horizontally** so that each float is centered in gauge cut-out. Check setting by tilting assembly 90° to each side to make certain that floats do not touch gauge *(CAUTION* - This setting necessary to insure that floats will not rub on sides of float bowl).

Float Level Setting

Model	Checking Gauge	Float Setting
All Carbs	③ M-250	1 9/32"

③ - Chevrolet No. 3696192.

2) Float Drop Setting - Hold bowl cover assembly upright so that floats drop down to limit of travel. Measure distance from lower face of gasket on cover to bottom of floats at center using a scale. This distance should be 1¾" (All Carburetors). Adjust by bending tang at rear of float assembly

Fast Idle ("BC" Carburetors): *NOTE* - Fast idle speed is automatically set when hot or slow idle speed is adjusted (same screw controls both settings). Adjust fast idle cam position as follows:

Fast Idle Cam Position - Rotate fast idle cam until throttle stopscrew is on second (next to highest) step of cam and against the shoulder of the highest step. Check choke valve opening or clearance between lower edge of valve and air horn wall using correct gauge (see table below) If clearance not correct, adjust by bending choke connector rod at central angle using bending tool J-4552 (Rochester BT-18)

Fast Idle Cam Setting

Model	Checking Gauge	Choke Opening
All Carbs	⑪ BT-99	.076"

⑪ - Chevrolet No. J-6838 (Use small end of gauge).

Unloader ("BC" Carburetors): Open throttle valves to wide open position which will open choke valve slightly Check choke valve opening or clearance between lower edge of valve and air horn wall using correct gauge (see table below) If clearance not correct, adjust by bending tang on throttle lever which contacts fast idle cam using bending tool J-4552 (Rochester BT-69)

Unloader Setting

Model	Checking Gauge	Choke Opening
All Carbs.	⑤ BT-99	230"

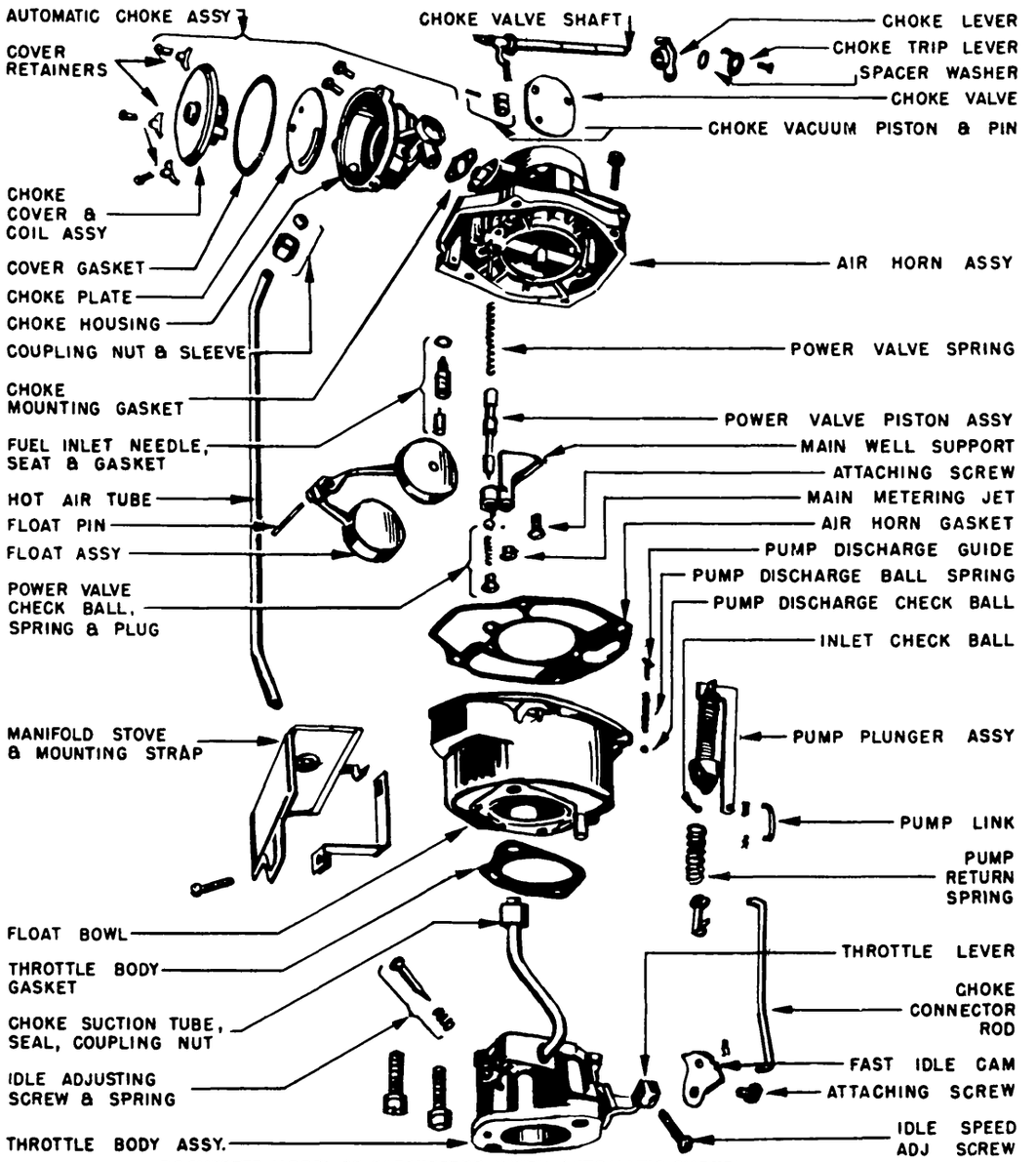
⑤ - Chevrolet No J-6838 (Use large end of gauge)

Automatic Choke: Adjust by loosening three retainer screws on choke cover and rotating cover and coil assembly Centered setting is with scribed index mark on cover in line with longest (center) cast mark of scale on housing

Choke Setting

Model	Choke Setting
Pass. Cars (All)	Ⓒ 3 Notches Lean
Trucks (Hydra-Matic)	Centered

Ⓒ - New setting to correct loading during warm-up Supersedes previous setting of 1 Notch Rich (Synchromesh Cars), 1 Notch Lean (Powerglide Cars)



ROCHESTER MODEL BC CARBURETOR (WITH AUTOMATIC CHOKE)

OVERHAUL: *See "Rochester B & BC Carburetors" in 1955 Annual Data or later Manual edition.*

SERVICE PARTS: Gasket Sets - Rochester No. 7004595 (B No. 7004468), No. 7006126 (B No. 7005140), No. 7015749 (BC Nos. 7009656 & 7009657), No. 7004085 (BC No. 7009255).

R pair Kit - Rochester No. 7004363 (B Nos 7004468 & 7005140), No. 7015729 (BC Nos. 7009656 & 7009657), No. 7009311 (BC No. 7009255).

1957 ROCHESTER 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Main Metering Jet — Standard Size	Main Metering Jet — Standard Part No.	Main Metering Jet — 1 Size Lean Size	Main Metering Jet — 1 Size Lean Part No.	Venturi Cluster	Power Valve	Power Piston & Spring	Float Needle & Seat
BUICK										
50, 60, 70 (Early)	1957	7010070 Pri.	.063"	7008663 ⑤			7010364	7010918	7010332	7010894
		7010070 Sec.	.081"	7008681			7010365			7010894
50, 60, 70 (Late)	1957	7011570 Pri.	.063"	7008663 ⑤			7010364	7010918	7010332	7010894
		7011570 Sec.	.081"	7008681			7011469			7010894
CADILLAC										
Std. Eng. W/O Air Cond.(Early)	1957	7010100 Pri.	.056"	7002656 ⑥			7010334	7010918	7010332	7012144
		7010100 Sec.	.084"	7008684			7010335			7012144
Std. Eng. W/Air Cond.(Early)	1957	7010101 Pri.	.056"	7002656 ⑥			7010334	7010918	7010332	7012144
		7010101 Sec.	.084"	7008684			7010335			7012144
Std. Eng. W/O Air Cond.(Late)	1957	7012000 Pri.	.056"	7002656			7010334	7010918	7010332	7012144
		7012000 Sec.	.084"	7008684			7010335			7012144
Std. Eng. W/Air Cond.(Late)	1957	7012001 Pri.	.056"	7002656			7010334	7010918	7010332	7012144
		7012001 Sec.	.084"	7008684			7010335			7012144
CHEVROLET V8 Cars										
Power Pack (Early)	1957	7009846 Pri.	.048"	7002648 ⑦			7011261	7008614	7008612	7006134
		7009846 Sec.	.051"	7002651			7009699			7006134
Power Pack (Late)	1957	7012126 Pri.	.048"	7002648			7011261	7008614	7008612	7006134
		7012126 Sec.	.051"	7002651			7009699			7006134
CHEVROLET V8 Truck										
265" & 283" Eng. Pwr.Pk.(Early)	1957	7009661 Pri.	.047"	7002647 ⑧			7010665	7008614	7008612	7006134
		7009661 Sec.	.048"	7002648			7010534			7006134
265" & 283" Eng. Pwr.Pk.(Late)	1957	7011161 Pri.	.047"	7002647 ⑧			7010665	7008614	7008612	7006134
		7011161 Sec.	.048"	7002648			7010534			7006134
OLDSMOBILE										
Synchro-Mesh (Early)	1957	7009471 Pri.	.053"	7001498			7010880	7009349 ⑨	7000204 ⑩	7006134
		7009471 Sec.	.070"	7008670			7008955			7006134
Hydra-Matic (Early)	1957	7009470 Pri.	.053"	7001498			7010880	7009349 ⑨	7000204 ⑩	7006134
		7009470 Sec.	.070"	7008670			7008955			7006134
Synchro-Mesh (Late)	1957	7010926 Pri.	.053"	7001498			7010880	7009349	7008612	7006134
		7010926 Sec.	.070"	7008670			7008955			7006134
Hydra-Matic (Late)	1957	7010925 Pri.	.053"	7001498			7010880	7009349	7008612	7006134
		7010925 Sec.	.070"	7008670			7008955			7006134
PONTIAC										
Super & Star Chief (S.M.)	1957	7009829 Pri.	.057"	7002657 ⑪			7010216	7010918	7010332	7010894
		7009829 Sec.	.082"	7008682			7010217			7010894
Super & Star Chief (H.M.)	1957	7009830 Pri.	.057"	7002657			7010225	7010918	7010332	7010894
		7009830 Sec.	.082"	7008682			7010217			7010894

⑤- Supersedes 7008662 (062").
⑥- Supersedes 7002656 (.056").
⑦- Supersedes 7002647 (.047") which superseded 7002645 (.045")
⑧- Supersedes 7002648 (.048").
⑨- Supersedes 7010918.
⑩- Supersedes 7008612.
⑪- Supersedes 7002659 (.059").

1957 ROCHESTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor No.	Main Metering Jet: Standard Size	Main Metering Jet: Standard Part No.	Main Metering Jet: 1 Size Lean Size	Main Metering Jet: 1 Size Lean Part No.	Main Well Support	Venturi Cluster	Power Valve	Float Needle & Seat
CHEVROLET 6 CYL. Cars										
Synchro-mesh	1957	BC 7009657	.058"	7002958 (10)			7010240		7006121	7002359
Automatic Transmission	1957	BC 7009656	.058"	7002958 (10)			7010240		7006121	7002359
Governor Equipped Engine	1957	BC 7009784	.055"	7002955			7010240		7006121	7002359
CHEVROLET V8 Cars										
Synchro-Mesh (Early)	1957	2GC 7010647	.053"	7002953 (11)			7009212	7011497 (12)	7006331	7009458
Synchro-Mesh (Late)	1957	2GC 7011131	.053"	7002953			7009212	7011497	7006331	7009458
Automatic Transmission (Early)	1957	2GC 7010648	.051"	7002951 (13)			7009212	7009215	7006331	7009458
Automatic Transmission (Late)	1957	2GC 7011124	.051"	7002951			7009212	7009215	7006331	7009458
Governor Equipped Engine (Early)	1957	2GC 7010719	.053"	7002953 (11)			7009212	7011497 (12)	7006331	7009458
Governor Equipped Engine (Late)	1957	2GC 7011149	.053"	7002953			7009212	7011497	7006331	7009458
CHEVROLET 6 CYL. Trucks										
235" Eng. Synchro-mesh	1957	B 7004468	.058"	7002958	.057"	7002957	7005428		7002360	7002359
235" Eng. Hydra-matic	1957	BC 7009255	.058"	7002958			7007165		7006121	7002359
261" Engine	1957	B 7005140	.065"	7002965	.064"	7002964	7005597		7002360	7002359
CHEVROLET V8 Trucks										
265" Eng. S.M. W/O Governor (Early)	1957	2G 7010649	.053"	7002953			7009212	7009218	7006331	7009458
265" Eng. S.M. W/O Governor (Late)	1957	2G 7011135	.053"	7002953			7009212	7009218	7006331	7009458
265" Eng. S.M. W/Governor (Early)	1957	2G 7010716	.053"	7002953			7009212	7009218	7006331	7009458
265" Eng. S.M. W/Governor (Late)	1957	2G 7012147	.053"	7002953			7009212	7009218	7006331	7009458
265" Eng. O.D. (Early)	1957	2G 7010718	.053"	7002953			7009212	7009218	7006331	7009458
265" Eng. O.D. (Late)	1957	2G 7011132	.053"	7002953			7009212	7009218	7006331	7009458
283" Eng. W/Governor (Early)	1957	2G 7010717	.052"	7002952			7009212	7009376	7006331	7009458
283" Eng. W/Governor (Late)	1957	2G 7011143	.052"	7002952			7009212	7009376	7006331	7009458
OLDSMOBILE										
Triple Carburetors Front	1957	2G 7010960	.059"	7002659				7010972		7009458
Center	1957	2GC 7010959	.058"	7002658				7011052	7009349	7009458
Rear	1957	2G 7010958	.059"	7002659				7010972		7009458
PONTIAC										
Chieftan (S.M.)	1957	2GC 7009832	.065"	7008665 (14)	.064"	7008664		7011561 (16)	7006331	7011264
Chieftan (H.M.)	1957	2GC 7009831	.064"	7008664 (15)	.063"	7008663		7010575	7006331	7011264
Triple Carb. Option (H.M.) Front	1957	2G 7011351	.056"	7002656				7010972		7012315
Center	1957	2GC 7011350	.062"	7002662				7011434	7006331	7011264
Rear	1957	2G 7011352	.056"	7002656				7010972		7012315
Extra H.P. Engine Front	1957	2G 7011351	.056"	7002656				7010972		7012315
Center	1957	2GC 7011500	.062"	7002662				7011513	7009349	7011264
Rear	1957	2G 7011352	.056"	7002656				7010972		7012315

(10) - Supersedes 7002955 (.055").

(11) - Supersedes 7002952 (.052").

(12) - Supersedes 7009493.

(13) - Supersedes 7002952 (.052").

(14) - Supersedes 7008664 (.064").

(15) - Supersedes 7008663 (.063").

(16) - Supersedes 7010603.

STROMBERG "WW" BUICK CARBURETORS

BUICK — **Stromberg Code No.**

1957 Series 40 (Dynaflow) ..... WW 7 - 106, A, B, C,

►CHANGES, CAUTIONS, CORRECTIONS

►*BUICK CARBURETOR PRODUCTION CHANGES:* Production changes designated by the letter suffix of the carburetor code no. (A,B,C, above) are as follows:

C d 7 - 106A - This carburetor has blunt ended float inlet needle valve to improve anti-vapor lock characteristic of the carburetor.

C d 7 - 106B - Choke positioning setting was changed to correct loading during warm-up period. *See "Adjustm nts" b low.*

C d 7 - 106C - Filter screen added at intake needle valve seat fitting. This screen should be removed after first 1000 miles of operation.

►*ENGINE LOADING DURING WARM-UP PERIOD (Cars with Cod 7-106 & 7-106A): See Production Change Not abov for Chok Positioning Setting change. Adjust th s carbur tors as directed in "Adjustments" b l w.*

DESCRIPTION: Dual downdraft type of same design used on previous Buick models.

ADJUSTMENT: Make all adjustments exactly as outlined below. *NOTE* - Choke setting has been changed (see Production Note above) and should be adjusted as detailed.

IDLING ADJUSTMENT: If initial adjustment required to warm up engine, turn each idle mixture adjusting screw in until lightly seated, then back each screw out exactly one turn: back off throttle stopscrew until throttle valves fully seated, then turn screw in until it just contacts throttle lever, finally turn screw in **one additi nal turn.** Run engine until it reaches normal operating temperature (choke valve wide open and fast idle inoperative), then adjust as follows:

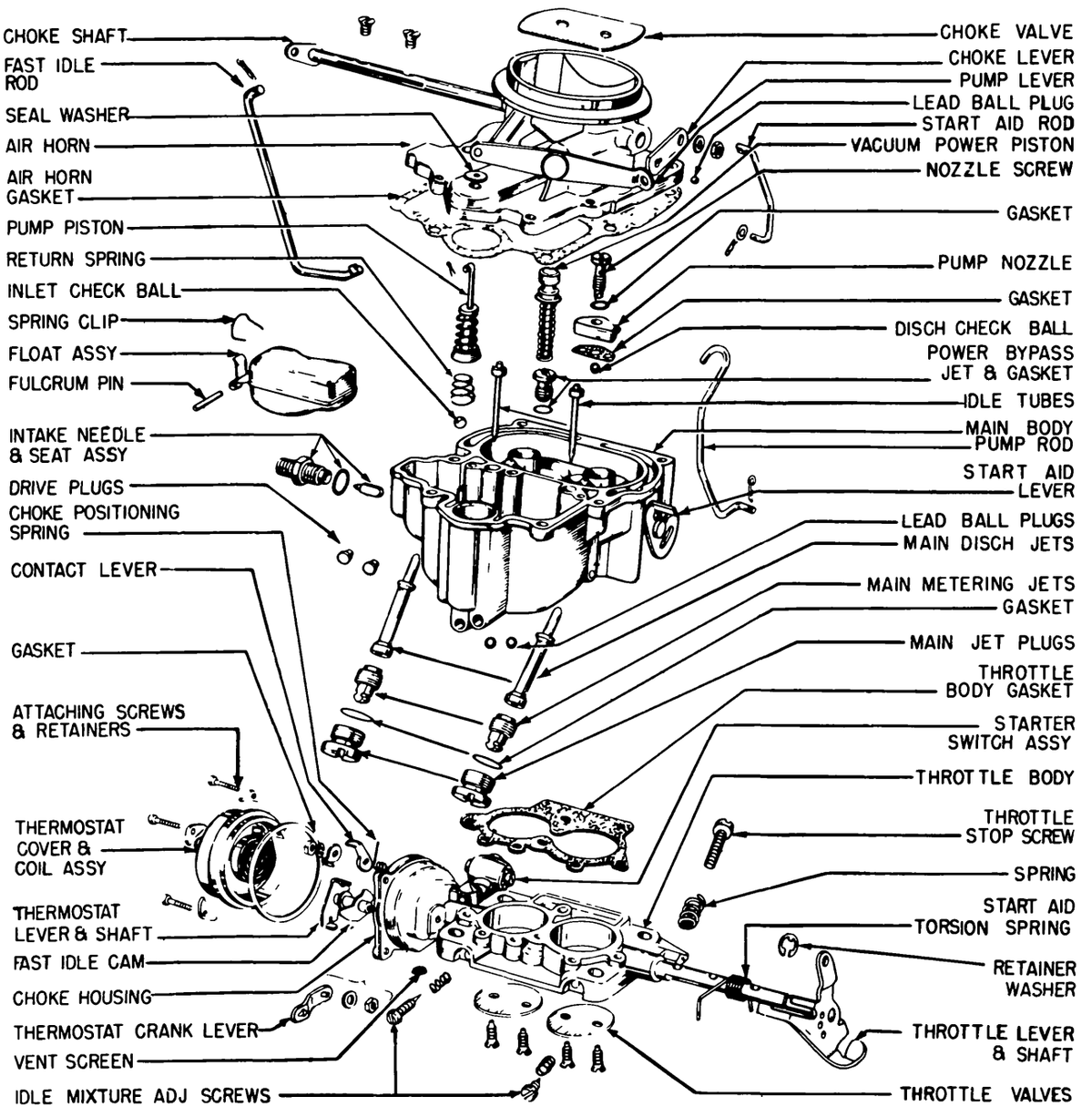
Idl Mixtur - With engine idling at 485 RPM in neutral or park, adjust each idle mixture screw in turn by turning screw in until engine begins to run irregularly due to lean mixture, then turn screw out until engine begins to roll due to rich mixture, finally turn screw in just enough to provide smoothest engine performance. Recheck idle speed.

Idl Sp d - 485 RPM with selector lever in Neutral or or Park. Adjust by turning throttle stopscrew.

Acc l rating Pump: Three holes provided in throttle lever for pump rod engagement to provide seasonal adjustment as listed below.

Pump S as nal S tting - For normal operation, engage connector rod in center hole in throttle lever (medium stroke). **Inn r hol** provides minimum pump stroke, **outer h l** provides maximum stroke.

Pump Str k Adjustm nt - With throttle stopscrew backed out so that throttle valves fully closed, and with pump connector rod engaged in center hole of throttle lever, measure vertical distance from top of bowl cover to top surface of pump plunger offset. This distance should be 7/8". Adjust by bending pump connector rod at lower bend. Check setting by opening throttle to wide open position. Pump arm must clear top of bowl cover by at least 1/32".



STROMBERG "WW" (BUICK) DOWNDRAFT CARBURETOR

Float Level: With air horn and bowl cover assembly removed from carburetor, place Gauge 6646 squarely on top edge of bowl at center of float (*CAUTION-* Use 7/32" side of gauge - opposite 3/16" side of gauge was used for 1956 cars). Hold float arm tang against seated intake needle. Top of float should just contact lower edge of gauge. Adjust by bending float arm tang. Make certain that float is centered in bowl and does not rub against walls of bowl.

Fast Idl , Ch k , Unl ad r & Start r Aid Adjustm nt: *CAUTION* - To prevent incorrect fast idle setting, unloader operation, or fuel mixture at idle and low speeds, **all f th f ll wing adjustm nts must b mad in th rd r indicat d.** Remove air cleaner, thermostat cover,

CONTINUED ON NEXT PAGE

STROMBERG "WW" BUICK CARBURETORS (Cont.)

throttle stop screw and spring, then proceed as follows:

Fast Idle Setting - Replace throttle stop screw without the spring, then with throttle valves held fully closed, turn stop screw in just enough to contact throttle lever. At this point, turn stop screw in 6 full turns. With choke valve fully closed and throttle lever held against its stop screw, the distance between fast idle lever and high step of fast idle cam should be .052" (No. 55 drill). To adjust, bend fast idle lever using Tool J-5197. *CAUTION - Fast idle lever must be parallel to carburetor mounting surface after bending.*

Choke Pick-up Lever Adjustment - Turn the throttle stop screw in 1 additional turn (7 turns in from fully closed throttle position). With throttle in this position, choke positioning spring pick-up lever should just contact choke positioning spring. Adjust as necessary by bending the pick-up lever with needle nose pliers.

Fast Idle Cam Adjustment - Remove throttle stop screw, then open throttle enough to clear fast idle cam and fully close choke valve by pushing up on thermostat spring lever. Close throttle until fast idle lever rests on high step of fast idle cam. The side of fast idle lever should just clear upper index lug on fast idle cam and rest in the corner formed by index lug and high step of cam. Bend choke rod as required for fast idle lever to just clear index lug on cam.

Start Aid Adjustment - Reinstall throttle stop screw and spring. Hold choke valve closed on a No. 53 drill (.60"). As throttle valve is opened, start aid spring should just clear tang on choke unloader plate. To adjust, bend unloader link (side opposite choke thermostat housing).

Unloader Adjustment - Hold choke valve closed with light pressure, then fully open throttle so unloader arm on throttle lever kicks choke partially open. Clearance between upper edge of choke valve and wall of air horn should be .144" (No. 27 drill). To adjust, bend unloader arm on throttle lever.

Choke Positioning Lever Adjustment - Close choke valve with light pressure upward on thermostatic spring lever until positioning spring lever just contacts choke positioning spring. Clearance between upper edge of choke valve and wall of air horn should be .209" (No. 4 drill). To adjust, bend choke positioning lever with needle nose pliers. Install choke cover and gasket. Rotate cover counterclockwise until index mark is aligned with correct mark on housing. See "Choke Adjustment" below.

Automatic Choke Setting: Centered (at Index).

Car Starter (Carburetor Vacuum Switch): Switch timing can be checked with carburetor on engine on Dynaflow Cars only. On all cars, switch can be timed with carburetor off engine as detailed below.

Switch Timing (Off Engine) - Connect battery and test lamp across switch terminals so that lamp will light when switch contact made. See that choke valve is wide open and fast idle cam is in hot or slow idle position. Close throttle valve against 1/4" drill rod inserted between lower edge of valve and carburetor wall at center. Lamp should light indicating that switch contacts are closed. Repeat test with 7/64" drill rod. Lamp should not light. If switch does not operate within above limits, adjust by adding or removing square timing shims located under contact spring. Shims furnished in thicknesses of .006" and .018".

Switch Timing (On Engine - Dynaflow Cars) - Place transmission selector lever in Park and apply brakes. Back off throttle stop screw so that throttle valves tightly closed (fast idle cam must be in hot or slow idle position). Place scale against flange on dashpot diaphragm and measure distance to nearest edge of dashpot arm on throttle lever. The difference between the two measurements should be 13/16-1 3/16". If switch timing not correct, adjust as for off engine timing (above).

OVERHAUL: Remove choke rod, unloader link, and unloader arm. Proceed with disassembly as follows:

Air Horn Disassembly: File off staked ends of choke valve screws, then remove choke valve and shaft. *(NOTE - The choke valve is made with a slight bend in it. Do not straighten this valve).* Remove air horn screws, air horn and gasket *(NOTE - Tip air horn to disengage pump lever from upper end of pump rod).* Remove pump plunger assembly from air horn. Remove power piston assembly by compressing spring and letting it snap repeatedly until hammering action of piston drives staked retaining disc from air horn. *(NOTE - If heavy staking is encountered, remove burrs).*

Main Body Disassembly: Remove pump nozzle with screw, washer, and gasket, then remove idle jet tubes and lower pump spring. Remove float needle seat and connector fitting together with gasket and float needle. Remove float retainer, float, and hinge pin. Remove power valve and gasket, then invert carburetor and catch the large pump inlet check ball and small pump outlet check ball. With main body inverted, remove main well plugs and gaskets using Tool T-19099. Remove main metering jets using wrench T-24924. Remove main discharge nozzles by screwing remover, Tool T-24967 (R. H. thread) into nozzle, then pulling nozzle from main body. *(NOTE - There are no lead gaskets under nozzles in this carburetor).* Remove throttle body screws, throttle body, and gasket from main body

Throttle Body Disassembly: Remove starter switch screws, terminal cap, return spring and guide block assembly. Tilt throttle body and catch plunger and ball. *(NOTE - If starter switch screen is not visibly damaged or plugged, it need not be removed.* Remove choke cover, gasket, screws and retainers. Remove choke housing shaft outside nut; then remove lockwasher, arm, choke housing shaft and lever assembly, spacer washer, and fast idle cam. Remove idle needles, idle stop screw, and springs. *(NOTE* - Throttle valves and shaft should not be disassembled for normal cleaning and inspection).

Cleaning & Inspection: Use Bendix Metalclene or comparable cleaner to soak all parts for cleaning, then follow cleaning operation by rinsing parts in clean solvent to remove all gummy deposits. Remove lead plugs, if necessary, to clean passages in main body. Remove plugs with remover, Tool T-25052; replace plugs with Tool T-25054 to prevent damage to plug seats. Inspect all parts for excessive wear or damage which might affect their usage, and replace all parts that are questionable. Check all passages for restrictions and check all nozzles and jets to make sure they are clear. Maximum allowance for throttle shaft bearing is .006". Replace throttle valves if bent or damaged. Clean and inspect vacuum switch parts.

Throttle Body Reassembly: Install throttle stop screw and spring and idle needles and springs. Seat idle needles lightly, then back each needle out 1 turn for initial setting. *(CAUTION - Do not force needle against its seat).* Install fast idle cam, spacer washer, choke housing shaft and lever assembly arm, lock washer and nut. Install starter switch ball, plunger, guide block assembly, return spring, terminal cap, clip, and screws.

Main Body Reassembly: Invert main body and install throttle body and a new gasket. Install main discharge nozzles using Tool T-24967 *(CAUTION* - Make sure that nozzles are positioned so flat surface is parallel with direction of air flow). Install main metering jets using Tool T-24924, then install main metering well plugs using new copper gaskets if available; otherwise make sure the plugs and seats are clean to insure a tight joint. Tighten plugs with Tool T-19099. Install power valve with a new gasket, then install float and hinge pin and float retainer clip, using needle nose pliers. Install float needle seat and connector fitting together with gasket and float needle. Hold float arm tang against needle, then check and adjust float setting (see above). Make sure that float is centered and does not rub on walls of bowl. Install idle jet tubes. Install accelerator pump check balls (use new balls if available); place large ball in plunger well and place small ball in discharge well. Install lower pump spring in plunger well. Install pump discharge nozzle and screw using a new washer and gasket.

Air Horn Reassembly: Install choke shaft in air horn with attached lever toward choke housing, then install choke valve with identification mark up. Install new choke valve screws loosely, then center valve by pressing up and endwise on choke shaft lever. Tighten screws and check with valve in closed position for uniform clearance and freedom from sticking. If necessary, loosen screws and adjust choke valve position. With valve in correct position and screws tight, check to make sure that choke valve will drop freely of its own weight. Support screw heads on a suitable steel block and stake opposite ends of screws. Install power piston assembly in air horn and carefully stake in three places. Piston must operate freely in cylinder *(CAUTION - D not apply any lubricant).* Lay a new air horn gasket on inverted air horn, then install pump plunger assembly in air horn with washer on top side of air horn hole and attach to pump arm with a new cotter pin. Slide pump lever on upper end of pump rod and install air horn assembly on main body making certain that pump plunger leather does not have any curled edges when it is inserted in cylinder in main body. Install air horn screws. Make sure lower end of pump rod is in the medium stroke hole. Install choke unloader arm, unloader link, and choke rod. Adjust carburetor *(see "Adjustment" above),* then install choke cover and gasket.

SERVICE PARTS: Gasket Set - Buick No. 1172374.
Repair Kit - Buick No. 1179000.

STROMBERG "WW" DE SOTO, DODGE, PLYMOUTH

	Stromberg Code No.
DE SOTO S27 FIRESWEEP	
1957 (Synchro-mesh)	WW 3-149
1957 (Auto. Trans.)	WW 3-150
DODGE 6 CYL. D72	
1957 (Synchro-mesh)	WW 3-159
1957 (Auto. Trans.)	WW 3-160
DODGE V8 D66, 67, 70, 71	
1957 (Synchro-mesh)	WW 3-149
1957 (Auto. Trans.)	WW 3-150
PLYMOUTH V8 P31	
1957 (Synchro-mesh)	WW 15-23
1957 (Overdrive)	WW 15-24
1957 (Auto. Trans.)	WW 15-25

DESCRIPTION: Dual downdraft type. Carburetors are of same design used on previous models except for different types of automatic choke as follows:

Int gral Aut matic Chok (Dodge 6) - Choke assembly is mounted on throttle body (opposite side from throttle lever) and linked to choke valve lever by a rod. Fast idle mechanism is located within choke housing. This design similar to 1956 Dodge.

Cr ss-ov r Typ Aut matic Choke (DeSoto, Dodge, Plym uth V8) - Automatic choke is separate unit mounted in well in intake manifold (at exhaust cross-over passage) and is linked to choke valve lever by a connector rod. Choke vacuum piston is located in a cylinder on the air horn and is linked directly to the choke valve. See *"Stromberg Cross-over Type Automatic Choke"*.

ADJUSTMENTS: *Make all adjustments exactly as listed b low.*

Idle Adjustment: Make a preliminary setting of both idle adjusting screws by turning them in until lightly seated and then turn screws out exactly 1 turn. Warm up engine to normal operating temperature so that choke valve wide open and fast idle inoperative. Set engine idle speed to correct figure, then adjust idle mixture as follows:

Idl Mixtur - With engine warmed up and idling at correct idle speed, turn each idle mixture adjusting screw in or out until highest engine speed and smoothest running is secured. Recheck idle speed.

Idle Sp d - 450-500 RPM. *NOTE* - On Auto. Trans. Cars, Neutral selector button must be pressed in.

Acc l rating Pump: Three holes provided in throttle lever for pump connector rod engagement to provide seasonal pump setting is listed below.

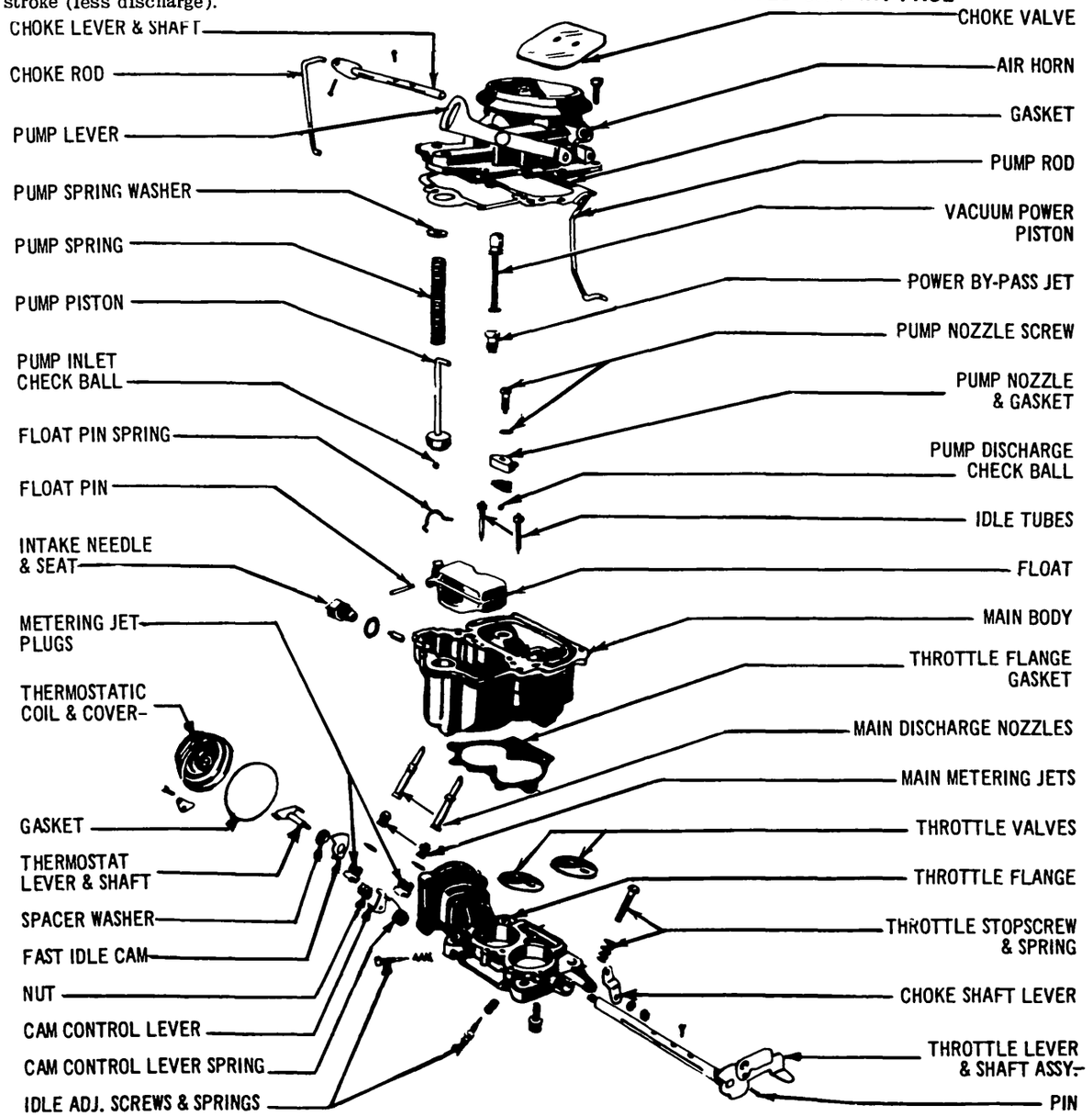
Pump Str k Adjustm nt - Back off throttle stopscrew so that throttle valves fully closed. Make certain that pump connector rod engaged in **Center** hole in throttle lever. Use scale on bowl cover to measure height of top edge of pump arm at pump plunger, open throttle wide, again measure height of pump arm. The **diff r nc** in the two measurements is **pump trav l or strok** and should agree with table below. Adjust by bending connector rod at lower angle using bending tool T109-213.

Car & Carb.	Pump Trav l S tting Pump Trav l
Dodge 6 (All)	3/16-7/32"
DeSoto, Dodge, Plymouth V8 (All)	9/32-5/16"

Pump Seasonal Setting - Std. setting is with connector rod engaged in **center** hole of throttle lever (medium stroke). **Outer** hole in throttle lever will provide maximum stroke (greater discharge), **Inner** hole minimum stroke (less discharge).

Float Lev l: To check float level, remove air horn and bowl cover assembly, and gasket. Place gauge (see table below) squarely on top edge of bowl at center of float (on far side and adjacent to slot in top of pump cylinder). Hold float arm lip firmly against seated needle valve. Top of float should just touch step on gauge. Adjust by bending float lip using bending tool T-24733.

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STROMBERG "WW" D WNDRAFT CARBURET R (INTEGRAL AUTOMATIC CHOKE)

STROMBERG "WW" DE SOTO, DODGE, PLYMOUTH (Cont.)

Car & Carb.	Float Level Setting Checking Gauge	Float Level
DeSoto (All)	T-26019	7/32"
Dodge 6 (All)	T-25569	3/16"
Dodge V8 (All)	T-26019	7/32"
Plymouth (All)	T-26019	7/32"

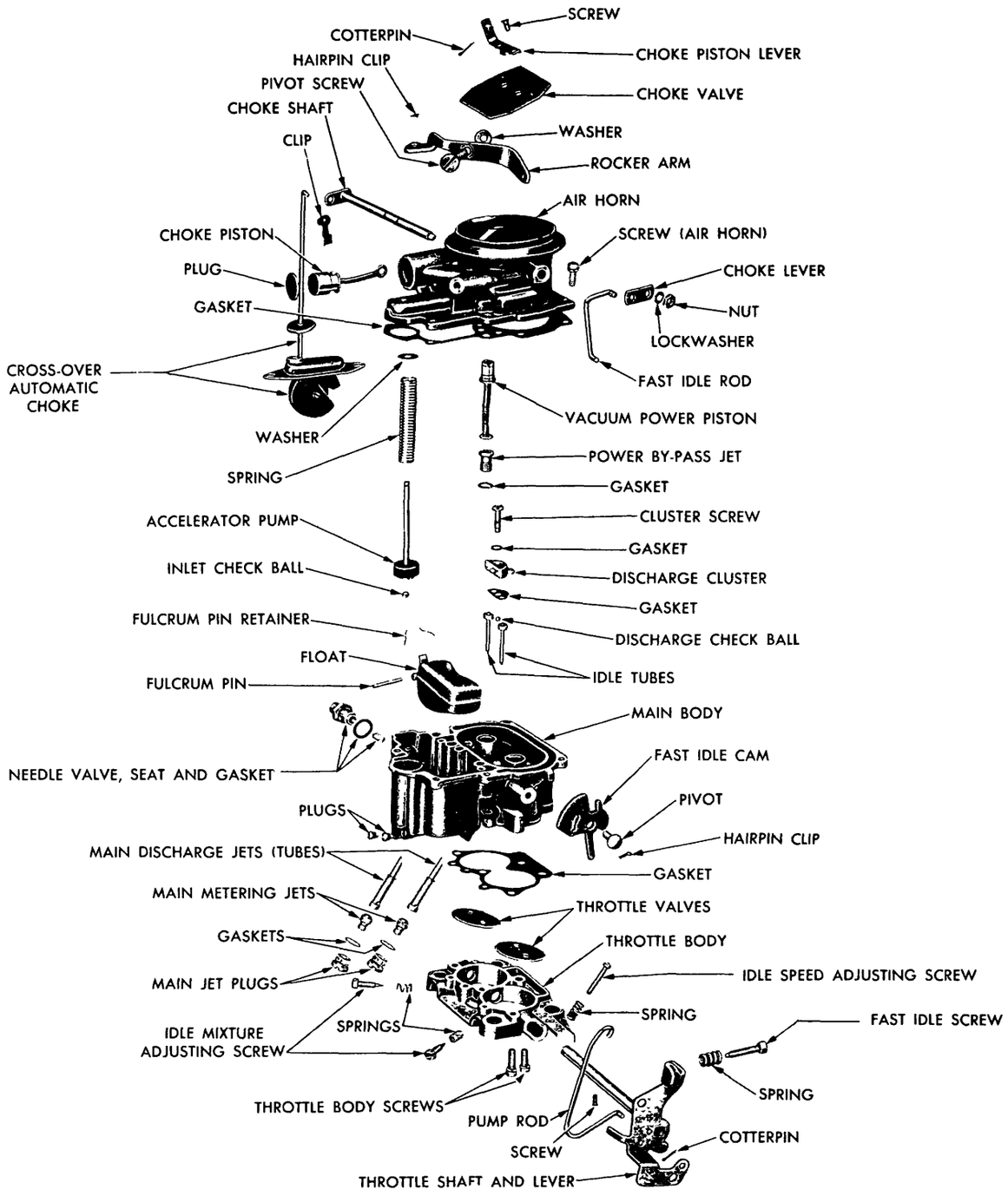
Fast Idle (Dodge 6): Fast idle mechanism is located in choke housing on throttle body and thermostatic coil housing and gasket must be removed before making fast idle adjustments. **Three** different adjustments required as listed below. *NOTE - Special calibrated spring must be installed (to take place of thermostatic coil) while adjustments being made. Install this spring as follows:* **Calibrated Spring Installation** - With thermostatic coil housing removed, install calibrated spring, Tool T-25096, by inserting one cover screw through loop at one end of spring and installing screw in right hand upper mounting screw hole in housing and hooking opposite end of spring over long tang of thermostatic lever. Leave this spring in place while making all Fast Idle and Unloader adjustments.

1) Fast Idle Speed (Throttle Opening) Adjustment - Remove spring from throttle stopscrew, reinstall screw and turn screw in until it just contacts throttle lever with throttle valves held closed, then **turn screw in additional 5 1/8 turns** (this will position throttle valves in correct fast idle position). Hold choke valve closed and hold throttle lever against stopscrew, check clearance between tang on contact lever on throttle shaft and **first step** of fast idle cam with a No. 48 drill rod (.076"). If clearance not correct, adjust by bending tang on contact lever toward or away from cam using bending tool T-25863 *(CAUTION* - Tang must be parallel to throttle shaft after adjustment). Reinstall spring on throttle stopscrew *(CAUTION* - Idle speed must be reset after other adjustments completed).

2) Fast Idle Cam Position Adjustment - Open throttle valve to clear fast idle cam, close choke valve tightly, then close throttle valves fully against tension of choke positioning spring. In this position, tang on cam contact lever should just clear **high step** of fast idle cam, but clearance at this point should not exceed .020" (measure with feeler gauge). Adjust by bending fast idle connector rod at upper angle near choke lever using bending tool T109-213.

3) Choke Positioning Spring Adjustment - With carburetor in vertical position, install slide weight, Tool T-25864, over choke lever (between choke shaft and connector rod). Close throttle valves to make certain that cam contact lever tang is resting on high step of fast idle cam (Rotate cam as necessary to secure this position). Lightly close throttle valves which should cause slight opening of choke valve (choke positioning spring acting against slide weight on choke lever). Measure choke valve opening by inserting correct size drill rod (see table below) between upper edge of choke valve and air

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STROMBERG "WW" DOWNDRAFT CARBURETOR (CROSS-OVER CHOKE)

STROMBERG "WW" DE SOTO, DODGE, PLYMOUTH (Cont.)

horn wall. Adjust by bending tang on thermostat lever that contacts choke positioning spring using long nosed pliers. Remove slide weight. Adjust UNLOADER before removing calibrated spring and reassembling choke.

Choke Positioning Spring Setting

Car & Carb.	Drill Rod Size	① Spring Color
Dodge 3-159	#31	Black
Dodge 3-160	#37	Copper

① - Springs are calibrated and can be identified by color as indicated.

Fast Idle (DeSoto, Dodge, Plymouth V8): Fast idle cam is mounted on main body (above throttle lever) and is linked to the choke shaft lever by a connector rod. A separate Fast Idle Screw on the throttle lever contacts the fast idle cam. Two separate adjustments are required as follows:

1) Fast Idle Speed - Back off throttle stopscrew so that throttle valves tightly closed. Turn fast idle screw out to clear fast idle cam, position cam so that fast idle screw is in line with first step of cam (and against shoulder of highest step), turn screw in until it just contacts cam, then turn screw in additional 5½ turns which will provide correct fast idle speed. *NOTE* - Throttle stopscrew must be adjusted for correct hot or slow idle speed after fast idle adjustments completed.

2) Fast Idle Cam Position - After adjusting fast idle speed, and with fast idle screw in same position as for fast idle speed adjustment (above), close choke valve as far as possible, measure choke valve opening or clearance between top edge of valve and air horn wall using correct size drill rod (see table below). If clearance not correct, adjust by bending fast idle rod at upper angle using bending tool T109-213.

Fast Idle Cam Setting

Car & Carb.	Checking Drill	Choke Opening
DeSoto & Dodge 3-149	#12	.189"
DeSoto & Dodge 3-150	#24	.152"
Plymouth (All)	#12	.189"

Unloader (Dodge 6): After completing fast idle adjustment, and with calibrating spring in place, close choke valve, open throttle valves wide which will open choke valve slightly. Check choke valve opening or clearance between upper edge of valve and air horn wall using a No. 19 drill (.180-.150" valve opening). If clearance not correct, adjust by bending tang of cam contact lever using long nosed pliers. After adjustment completed, remove calibrated spring and reassemble automatic choke (see choke data below).

Unloader (DeSoto, Dodge, Plymouth V8): Two different adjustments required as listed below. *NOTE* - Vacuum piston (Vacuum Kick Adjustment) is located in cylinder in air horn and is linked directly to an ear on the choke valve.

Unloader (Wide Open Kick) Adjustment - Hold choke valve closed lightly, open throttle valves to wide open position which will open choke valve slightly. Measure choke valve opening or clearance between upper edge of valve and air horn wall using a No. 19 drill (.180-.150" valve opening). If clearance not correct, adjust by bending tang on throttle lever using bending tool T109-214.

Vacuum Kick Adjustment - Make up a wire gauge by bending .040" diameter wire (paper clip) as shown in illustration. With choke valve open, insert wire gauge in vacuum cylinder and engage hooked end in slot at bottom of cylinder, close choke valve until inner end of piston grips wire gauge at inner end of slot. Measure choke valve opening or clearance between upper edge of valve and air horn wall using correct size drill rod (see table below). If clearance not correct, adjust by bending choke piston lever ear as required.

Vacuum Kick Setting

Car & Carb.	Drill Rod	Choke Opening
DeSoto & Dodge 3-149	"B"	.238" (¼")
DeSoto & Dodge 3-150	#7	.201"
Plymouth (All)	"B"	.238" (¼")

Automatic Choke (Dodge 6): Centered (At Index). When installing thermostatic coil housing (after fast idle and unloader adjustment), install housing with index mark down, then turn housing counterclockwise until index mark lines up with center (longer) line of scale on housing on air horn. Check by holding choke valve open while opening and closing throttle valves. If full throttle operation not obtained, choke has not been properly assembled or adjusted. Hold throttle valves wide open while opening choke valve. There should be no bind through entire choke valve travel.

Automatic Choke (DeSoto, Dodge, Plymouth V8): Automatic choke is separate "Cross-over" type mounted in well in intake manifold (at exhaust cross-over passage) and linked to choke valve lever by a connector rod. Choke vacuum piston is located in a cylinder in the air horn and linked directly to the choke valve. This type choke ordinarily does not require adjustment. *See "Stromberg Cross-over Type Automatic Choke" for complete data.*

Overdrive Kickdown Switch (Plymouth V8): With throttle valves wide open, clearance between kickdown lever and switch stem guide should be 1/64-3/64". Adjust by loosening switch mounting nuts and changing position of switch in bracket.

Slow-closing Throttle Dashpot (Dodge 6 Auto. Trans. Cars): With throttle valves fully closed, it should be possible to move dashpot plunger shaft inward 3/32". Adjust by loosening locknut and screwing dashpot in or out of mounting bracket.

OVERHAUL: With carburetor off engine, proceed as detailed below. *NOTE* - It is recommended that carburetor be mounted on stand, Tool C-3225, to protect throttle valves from damage while carburetor is on the bench.

Disassembly: If dashpot used, remove two screws in mounting bracket and lift dashpot assembly off. Disconnect and remove pump connector rod and fast idle connector rod. Take out air horn and bowl cover attaching screws, lift assembly straight up and off main body. Remove hairpin clip in upper end of pump plunger, remove plunger assembly from air horn, slide seal washer and spring off plunger rod. Remove vacuum power piston from air horn *(CAUTION* - Edges of cylinder are staked and piston must be removed as follows: Place wood block on air horn as a fulcrum, use open end wrench hooked under end of power piston stem as a pry to force piston out). Remove staking of choke valve screws, remove screws, slide choke valve out allowing piston link and bracket to hang in air horn *(CAUTION* - Do not attempt to remove vacuum piston from air horn cylinder - welsh plug retaining piston and link is factory sealed), withdraw choke shaft and lever from air horn. Lift idle tubes out of main body, invert main body to drop out pump inlet check ball. Remove screw and gasket from pump discharge cluster, lift off cluster and gasket, invert main body to drop out pump discharge check ball. Remove fuel inlet needle valve seat, gasket, and needle valve. Pry out float fulcrum pin retaining spring, lift out float and fulcrum pin. Remove power bypass jet and gasket. *CAUTION* - Do not attempt to remove high speed bleeders from main body. Take out screws attaching throttle body, lift off main body and discard gasket. Invert main body and remove main jet plugs using Tools T-19099, T-24968, & T-25184, discard plug gaskets. Remove main metering jets using Tool T-24924. Remove main discharge jets using Tool T-24967 *(NOTE* - tool has right hand thread and should be screwed into jet - threads formed by tool will not damage the jet). Remove idle mixture adjusting screws and springs. Do not remove throttle valves or shaft unless new parts are to be installed (see Reassembly for removal and installation data).

Automatic Choke Disassembly (Dodge 6) - Take out retaining screws and washers, lift off thermostatic coil assembly and gasket. Remove nut on end of throttle shaft retaining cam contact lever using Tool T-25047 *(CAUTION - This nut has LEFT HAND threads),* remove lockwasher, slide cam contact lever and choke positioning spring off shaft *(NOTE* - Lever engages flats on shaft). Remove nut and lockwasher retaining thermostat crank lever on shaft on rear side of housing, remove lever *(NOTE* - Lever engages flats on shaft). Slide thermostat lever, shaft, and washer out of housing. Lift fast idle cam off shoulder in housing.

Cleaning & Inspection: Clean parts with denatured alcohol or cleaning solvent and dry with air. Blow out all passages with air. Do not use wire or drills to clean jets. Clean all parts of choke mechanism thoroughly *(CAUTION* - Do not attempt to separate thermostatic coil from heat retainer plate - coil, plate, and housing are serviced as an assembly).

Reassembly: Use all new gaskets. Reassemble carburetor by reversing disassembly procedure and note the following:

Throttle Valve Removal & Installation - If new shaft being installed, scribe mark both throttle valves before removal (to insure reinstallation in same position), remove valve screws (screws are staked), slide valves and shaft out. When installing valves, make certain that scribe marks (or dash stamped on valve) is upward and toward idle port and that notch in edge of valve is cen-

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STROMBERG "WW" DE SOTO, DODGE, PLYMOUTH (Cont.)

tered over idle discharge port. Install new screws lightly, then close valves completely (back out stopscrew to insure valves seating), press on high side of valves and tap lightly to seat them in bores, tighten screws securely and stake by squeezing with pliers

Choke Valve Installation - Install choke shaft with lever end toward pump end of air horn. Install choke valve, position choke piston bracket on shaft and install new screws loosely. Hold valve in closed position and tap lightly to seat it in bore, tighten screws securely and stake by squeezing with pliers. Make certain that valve opens and closes freely.

Automatic Choke Assembly (Dodge 6) - Install fast idle cam on hub in choke housing with fast idle steps down and toward throttle shaft (weighted portion against stop). Assemble cam retaining washer on thermostat lever shaft with shoulder against thermostat lever, install assembly in choke housing with choke positioning tang between fast idle steps and weight on fast idle cam. Install thermostat crank lever on end of lever shaft at rear of choke housing (lever must engage flats on shaft), install lockwasher and nut and tighten securely. Install choke positioning spring on end of throttle shaft with coiled portion inward and against thermostat lever shaft housing. Slide cam contact lever over end of throttle shaft with lever tang against fast idle cam, install lockwasher and nut, tighten nut securely *(CAUTION* - This nut has left hand thread). Install thermostatic coil housing *(see Automatic Choke above).*

Main Discharge Jets & Metering Jets - Place main discharge jets firmly on Tool T-24967, seat jets firmly in main body with opening in end of jets (diagonal cut) facing opposite side of main venturi. Install main metering jets and tighten securely with Tool T-24924. Use new copper gaskets on main jet plugs and tighten plugs securely.

Accelerating Pump Assembly & Test - Install pump discharge check ball in discharge passage, fill bowl with clean gasoline to depth of ½", install pump plunger temporarily in cylinder, depress plunger to expel air from discharge passage. Hold discharge check ball down on seat with a small brass rod, operate pump plunger. No fuel should be emitted from intake or discharge passages. If fuel noted, clean passages thoroughly and inspect check balls and seats for damage. Reseat ball by using rod to tap ball down on seat *(CAUTION* - Install new check ball after using ball in seating operation). Recheck pump operation. Install discharge cluster using new gasket. Check pump operation. Discharge from each cluster jet should be a clear straight stream. If stream deflected or restricted, install new cluster. Remove pump plunger and install it in air horn.

Carburetor Adjustments - *Make all adjustments listed under ADJUSTMENTS above.*

STROMBERG DUAL "WW" CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Code No.	Main Metering Jet Size	Main Metering Jet Part No.	By-pass Jet Size	By-pass Jet Part No.	Main Disch. Jet Size	Main Disch. Jet Part No.	High Speed Bleeder Size	High Speed Bleeder Part No.	Idle Tube Size	Idle Tube Part No.	Idle Air Bleed	Pump Disch. Nozzle Size	Pump Disch. Nozzle Part No.
BUICK															
Series 40 Dynaflow	1957	WW7-106,A,B,C	.053"	386208 (14)	2-.049"	387542	#28-28		#70		#62	387366	(15)	#66	
DE SOTO															
S27 S.M.	1957	WW3-149	.053"	386208	#54	386951			#70		#63		(16)	#68	
S27 Auto. Trans.	1957	WW3-150	.053"	386208	#54	386951			#70		#67		(16)	#68	
DODGE															
6 Cyl. S.M.	1957	WW3-159	.046"	386208	#54	386951			#70		#60		(18)	#68	
6 Cyl. Auto. Trans.	1957	WW3-160	.044"	386208	#54	386951			#70		#65		(18)	#68	
V8 S.M.(Std.Eng.)	1957	WW3-149	.053"	386208	#54	386951			#70		#63		(16)	#68	
V8 Auto.Trans.(Std.Eng.)	1957	WW3-150	.053"	386208	#54	386951			#70		#67		(16)	#68	
PACKARD															
Clipper (Schgd.) Early	1957	WW6—121B, C	.057"	386978 (17)	#54	386951			#70		#60	386939	(19)	#57	
Clipper (Schgd.) Late	1957	WW6—122	.057"	386978	#54	386951			#70		#60	386939	(19)	#57	
PLYMOUTH															
V8 P-31 (S.M.)	1957	WW15-23	.052"	386208	#54	P—21197			#70		#64	386924	(16)	#72	
V8 P-31 (O.D.)	1957	WW15-24	.052"	386208	#54	P—21197			#70		#64	386924	(16)	#72	
V8 P-31 (Auto.Trans.)	1957	WW15-25	.051"	386208	#54	P—21197			#70		#67	387498	(16)	#72	
STUDEBAKER															
Comm. & Pres.	1957	WW6-117A	.055"	386272	1 #56	P-21657		387198	#68	P-24315	#70	387183	(13)	#70	385923
Golden Hawk (Schgd.) Early	1957	WW6—121B,C	.057"	386978 (17)	#54	386951			#70		#60	386939	(19)	#57	
Golden Hawk (Schgd.) Late	1957	WW6 — 122	.057"	386978	#54	386951			#70		#60	386939	(19)	#57	

(13)- #50 in Air Horn, #40 Secondary.

(14)- 1 size lean .052", 2 sizes lean .051".

(15)- #36 in Main Body, #42 in Air Horn.

(16)- #40 in Main Body, #50 in Air Horn.

(17)- .055" 4,000 to 8,000 ft., .053" 8,000 to 12,000 ft., .051" over 12,000 ft.

(18)- #48 in Main Body, #60 in Air Horn.

(19)- #36 in Main Body, #50 in Air Horn.

STROMBERG "WW" STUDEBAKER

STUDEBAKER	Stromberg Code No
1957 Commander 57B	WW 6-117A
1957 President & Broadmoor 57H	WW 6-117A

▷CHANGES, CAUTIONS, CORRECTIONS

▷*ALTITUDE CARBURETOR MAIN METERING JET CAUTION* These jets have different flow characteristics than same size jets used on Studebaker Supercharged models and must not be interchanged Correct type jets may be identified by groove around wrench end *See Stromberg Jet Specification Table for all jet sizes*

DESCRIPTION: Dual barrel, downdraft type as same design as "WW" carburetors used on previous Studebaker models

CARBURETOR ADJUSTMENT: *Make all adjustments exactly as follows:*

Idle Setting: Turn both idle mixture adjusting screws in until they are lightly seated, then back each screw out exactly 1¾ turns. Start engine and allow it to run until normal operating temperature is reached. With engine at normal operating temperature (choke valve wide open, fast idle inoperative) and with air cleaner in place, adjust idle speed and mixture as follows:

Idle Mixture—First check and adjust idle speed. Turn BOTH idle mixture adjusting screws in evenly and slowly until engine begins to run unevenly, then turn screws out evenly and slowly until engine again runs unevenly, finally set both screws approximately halfway between these two points where smoothest idling performance is secured Recheck engine idle speed. *CAUTION*—BOTH adjusting screws must be turned equally and in the same direction when making above adjustment

Idle Speed

All Transmissions	①550 RPM

① - With selector lever in Neutral on Flightomatic Cars

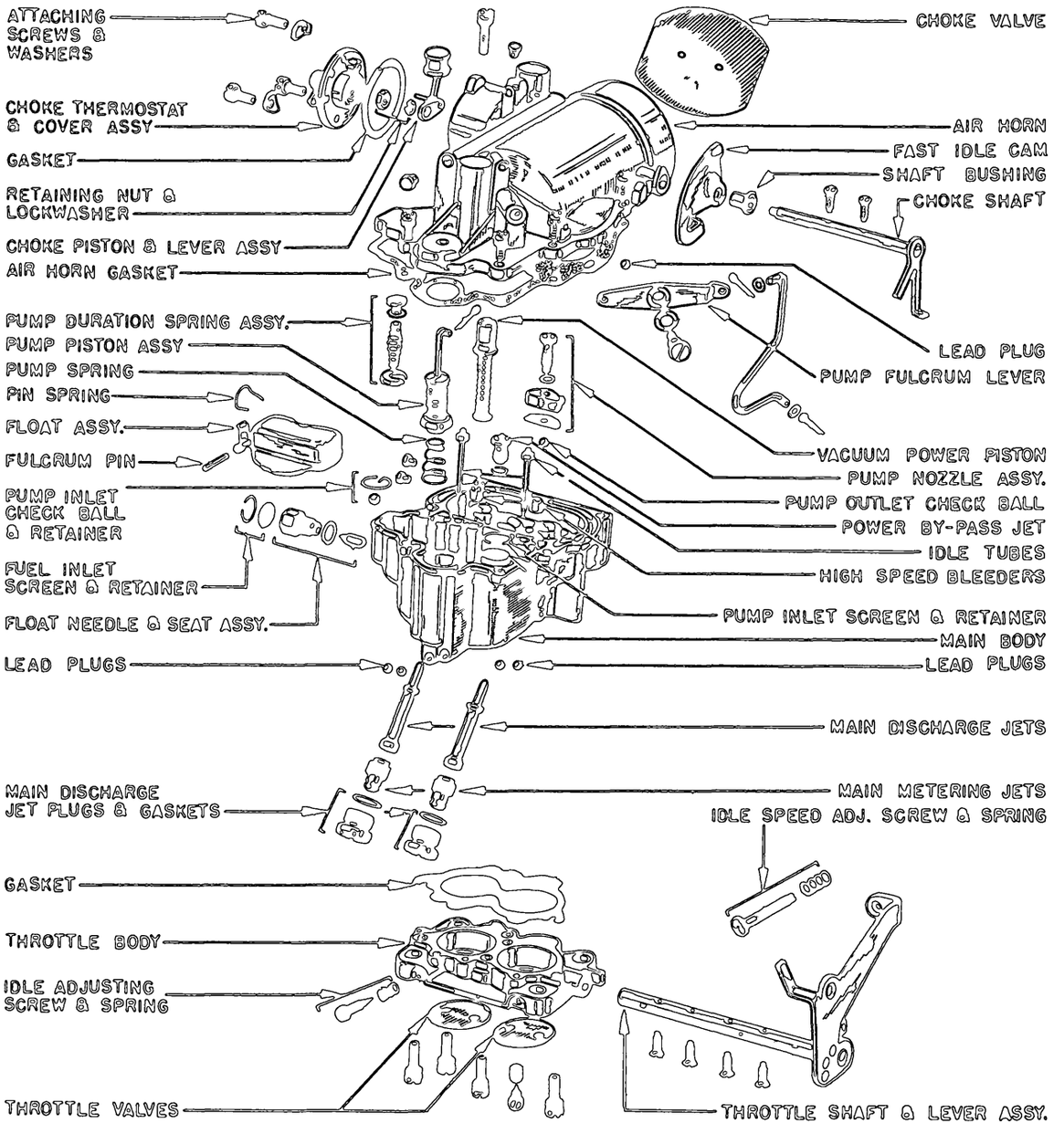
Accelerating Pump: Three holes provided in throttle lever for pump connector rod engagement:
Center Hole—Normal operating conditions.
Inner Hole—Shorter stroke, less fuel discharge.
Outer Hole—Longer stroke, more fuel discharge.

Float Level: To check float setting, remove air horn and bowl cover and gasket, hold float lever lip firmly against intake needle valve to place float in closed-valve position. Measure float height by placing Float Level Gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool T-24733 (Studebaker KMO-269-S5).

FLOAT SETTING

Studebaker WW	3/16"①

①—Top of float below top edge of bowl.



STROMBERG "WW" (STUDEBAKER) DOWNDRAFT CARBURETOR

Fast Idle Cam Setting: Check with fast idle cam in fast idle position with choke valve fully closed. In this position, one-half of diameter of button on throttle stopscrew should rest on highest step of fast idle cam (button should hang over so that half-diameter travel of fast idle cam will cause screw to drop down on to next-lowest step of cam).

NOTE—Fast Idle setting can also be checked as follows With slow idle adjusting screw button resting on high step of fast idle cam, apply light closing pressure to choke valve, check remaining opening by inserting a #31 drill rod between lower edge of choke valve and air horn wall (choke opening should

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STROMBERG "WW" STUDEBAKER (Cont.)

be .105-.135"). Adjust by bending ear on choke lever which contacts fast idle cam up or down, as required, using bending tool KMO-478.

Unloader (Dechoke) Setting: To check setting, hold choke valve closed tightly, open throttle valves to point where stop on throttle lever rests against stop on carburetor throttle body and choke valve is opened slightly. Check choke valve opening by inserting #1 drill rod (.228") between lower edge of choke valve and air horn wall. If opening not correct (.203-.265"), adjust by bending ear on choke lever which contacts throttle lever using bending tool KMO-478.

Automatic Choke Setting: 1 Point Lean with arrow on cover 1 point lean from boss on housing.

Throttle Return Check (Cars with Automatic Transmission): Consists of a dashpot unit mounted on the carburetor with the dashpot plunger contacting the throttle lever during the last 3/16" of throttle movement toward closed throttle position. Dashpot will prevent too-rapid closing of throttle and keep engine from stalling. *See Throttle Linkage Adjustment under CARBURETOR on car model page.*

OVERHAUL: *See "Stromberg WW (Studebaker) Carburetors" in 1955 Annual Data or later Manual editions.*

STROMBERG "WW" STUDEBAKER & PACKARD SUPERCHARGED

PACKARD	Stromberg Code No.
1957 Clipper Model 57L	① WW 6-121
STUDEBAKER	
1957 Golden Hawk Model 57H-K	① WW 6-121

① - Supercharged Carburetors

►CHANGES, CAUTIONS, CORRECTIONS

►*HARD STARTING OR PROLONGED CRANKING WITH HOT ENGINE CORRECTION* Modify the carburetor and Supercharger Air Chamber as detailed below *NOTE* - Carburetor must be removed from engine but need not be disassembled if care is taken to prevent metal chips entering carburetor

1) Carburetor Vents - Drill a 7/64" hole through side of air horn casting into vertical section of balance vent passage (locate this hole to right and below end of choke vacuum piston cylinder and adjacent to the right hand edge of the passage wall) Drill two 5/64" holes in throttle body (locate holes in small bosses directly above mounting flange and at ends of square section of casting when viewing side of carburetor with automatic choke housing toward right side)

2) Air Chamber Cover Vent Valve - If air chamber cover does not have a vent valve install valve as follows Drill a 1" valve hole in cover (When facing air intake hole side of cover locate this hole 3" to left of right hand cover mounting hole and 3¼" up from mounting flange edge of cover) drill two 5/32" valve mounting holes on a line drawn 45° down and to the left of the valve hole center drill first hole 2" from valve hole center and second hole 5/8" beyond this point Install vent valve assembly No 1542765, in cover with two small flat washers between spring and cover use self-tapping screws No G453113 to attach valve Adjust valve by bending spring for opening of ¼" between cover and highest point at outer edge of valve Reinstall carburetor and adjust as directed below

►*STUDEBAKER GOLDEN HAWK CARBURETOR ADJUSTMENT NOTE* On early cars, Air Chamber Cover and Base provided with adjusting holes (closed by pipe plugs) for idle mixture and idle speed adjustments On later cars (and all Packard), extensions are provided on the idle mixture adjusting screws (extending through air chamber base), and the idle speed adjusting screw is located on the external throttle lever, so that all adjustments can be made without disturbing the air chamber cover

►*STUDEBAKER GOLDEN HAWK & PACKARD CLIPPER CARBURETOR CHANGES TO PREVENT STALLING AND IMPROVE PERFORMANCE & ECONOMY* Following changes have been made in production and can be made on earlier cars

1) Engine Stalling on Left Turn Correction - Due to gasoline foam entering air stream through bowl vent tube caused by float dropping on left turn. Correct by installing new Air Horn Gasket, Studebaker No. 1543362 (with vent hole in gasket moved out of line with bowl vent tube), and Float Bowl Baffle, Studebaker No. 1543363 (installed between float and needle valve to prevent fuel surging in bowl) *NOTE* - When installing these parts, check cover for flatness and correct by filing cover or body casting as necessary to insure good seal along vacuum passage to choke and vacuum power piston

2) Over-rich Condition After Starting (Cold Engine) - A ¼" hole should be drilled in the center of the choke valve on the wide side. Automatic choke should be set at Index (Centered). This setting supersedes 1 Notch Lean setting used on cars with first type carburetor

3) Lean Condition After Starting - Correct by shortening choke stove-to-carburetor pipe 1¼". See also Over-rich Condition correction (preceding)

4) Improved Fuel Economy - Install new Power Piston Assembly, Studebaker No 1543290. This assembly has different spring tension which allows power jet to come in at higher speed for improved gasoline mileage.

►*STUDEBAKER GOLDEN HAWK AIR CHAMBER VENT VALVE FLUTTER & NOISE (Engine Idling)* If not corrected by engine idle speed adjustment (when due to insufficient supercharger output or too slow engine speed), check and adjust vent valve as follows Remove air chamber cover, check distance from tip of valve to base or cover (depending on valve mounting location) which should be ¼" Adjust by bending the valve flat spring *See Air Chamber Production Change (following)*

►*STUDEBAKER GOLDEN HAWK AIR CHAMBER PRODUCTION CHANGES* See Carburetor Adjustment Note (above) for changes affecting carburetor adjustment. Other changes have been made as follows Beginning Engine No PS-2375, vent valves in base and cover were removed and holes were plugged. At the same time a vent pipe was installed in the base (extending forward from base and down in front of engine) to provide a vent and drain for the air chamber. These new parts are Drain Pipe Assy No. 1543107, Pipe Nipple (Base End) No. 1543108, Drain Pipe-to-Timing Gear Cover Clip No. 182317. *NOTE* - Vent Valve Assy. No. 1542765 is continued for service on first type air chamber.

►*STUDEBAKER GOLDEN HAWK & PACKARD CLIPPER HIGH FUEL CONSUMPTION OR POOR ENGINE PERFORMANCE* May be due to fuel leakage within air chamber (not visible from outside) caused by loose fuel line connections or porous base casting. Check these points when correcting above complaints.

►*ALTITUDE MAIN METERING JET CAUTION* These jets have different flow characteristics than same size jets used on other Studebaker models and must not be interchanged They may be identified by unmarked end (Jets for other models have groove around wrench end) *See Stromberg Jet Specification Table for all jet sizes*

DESCRIPTION: Dual downdraft type similar to design used on other Studebaker models except for straight air horn (vertical air intake) and fast idle cam mounted on main body above throttle lever and linked to choke valve lever Carburetor is mounted on an Air Chamber Base (on manifold) and is completely enclosed by a cover so that the entire carburetor is supercharged All carburetor connections are made to fittings in the base (fuel line, choke hot air stove pipe, and distributor vacuum line) *See Carburetor Adjustment Note above for other features*

ADJUSTMENT: Make all adjustments exactly as detailed below

Idle Setting: With engine at normal operating temperature and idling at correct idling speed, adjust idle mixture, then recheck idle speed and readjust as necessary

Idle Mixture - See Note below for early Studebaker cars with adjusting screws within air chamber Turn both idle mixture adjusting screws (extensions on forward edge of air chamber base) in slowly until engine begins to run unevenly, then turn screws out until engine again runs unevenly, finally set both screws approximately midway between these two points where smoothest idling performance is secured *CAUTION* - Both screws must be turned equally and in same direction when making this adjustment

►*EARLY STUDEBAKER NOTE* On these cars, idle mixture adjusting screw extensions are not used. To adjust,

CONTINUED ON NEXT PAGE

STROMBERG "WW" STUDEBAKER & PACKARD SUPERCHARGED (Cont.)

remove pipe plugs (on forward edge of air chamber base) and insert flexible shanked screwdriver through holes to engage slotted adjusting screws on carburetor.

Idle Speed - 575 RPM on all cars (with selector lever in Neutral "N" position on Flightomatic Cars) *NOTE - This setting supersedes previous recommendation of 550 RPM and will assist in correcting hard starting when hot (see Changes & Corrections above)* Adjust idle speed by turning throttle lever stopscrew located on bracket on left side of air chamber cover This screw serves as the stop for throttle outer arm.

►*EARLY STUDEBAKER NOTE:* On these cars, throttle stopscrew is located on inner throttle arm (within air chamber cover) and can be adjusted by removing pipe plug on rear face of air chamber cover and inserting small shanked screwdriver through hole to engage slotted adjusting screw. *NOTE* - Throttle stopscrew is outer or left hand screw (inner screw is Fast Idle Adjusting Screw) and adjustment will be facilitated by sighting through hole on left side of air chamber cover.

Throttle R turn Check (Flightomatic Cars): Consists of a dashpot unit mounted on the carburetor within the air chamber cover. *See Throttle Linkage Adjustment under CARBURETOR on car model page.*

Float Lev l: Air chamber cover must be removed and air horn and bowl cover assembly taken off for this adjustment With gasket removed, hold float lever lip firmly against intake needle valve to hold float in closed-valve position. Place gauge, Studebaker No J-6646 squarely on top edge of bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required.

Float Setting

Packard & Studebaker 6-121	① 7/32"

① - Top of float below top edge of bowl.

Fast Idle: This adjustment can be made with the carburetor on the bench (Off Engine), or On Engine as detailed below. *NOTE* - If carburetor on engine, it will be necessary to remove air chamber cover for access to fast idle adjusting screw.

Off Engine Adjustment - Manually close choke valve so that fast idle adjusting screw rests on highest part of fast idle cam. Adjust fast idle screw so that throttle opening is .030" Check by inserting 030" wire gauge between edge of throttle valve and carburetor wall on idle port side.

On Engine Adjustment - After adjusting hot or slow idle speed to 550 RPM, manually close choke valve so that fast idle adjusting screw rests oh highest part of fast idle cam *(CAUTION* - Fast idle screw is the inner screw to the right of the slow idle speed stopscrew). Back fast idle screw out until slow idle speed stopscrew just touches the stop, then turn fast idle screw in exactly 7½ turns. This will provide correct throttle valve opening of .030-.031"

Unloader (Dechoker): To check setting, open throttle valves fully, check choke valve opening by inserting No. 1 drill rod (.228") between lower edge of choke valve and air horn wall. If opening not correct (.203-.265"), adjust by bending ear on throttle lever which contacts lug on fast idle cam.

Automatic Choke: 1 Point Lean with arrow on cover 1 point toward lean side from boss on housing.

Kickdown Switch (Supercharger Control): Switch is mounted on bracket at auxiliary throttle outer lever and can be adjusted without disturbing air chamber cover. To adjust, loosen switch mounting nuts in bracket, position switch so that plunger is fully depressed and throttle outer lever rests against threaded sleeve of switch in wide open throttle position. Tighten mounting nuts after adjustment completed.

CARBURETOR REMOVAL & INSTALLATION: Removal - Loosen supercharger-to-carburetor air chamber hose clamps, remove air chamber mounting stud nuts and lockwashers. Lift cover and disengage studs on right side, then continue to lift and rotate cover to disengage studs on left side and slip hose off supercharger outlet. Disconnect and remove distributor vacuum line, choke heat tube, and fuel line (at carburetor and air chamber base connections). Remove idle mixture screw extensions by unscrewing plugs from base. Remove carburetor mounting nuts Hold auxiliary throttle outer lever so that slot in inner lever is vertical, lift carburetor assembly straight up.

Installation - Use new carburetor-to-manifold gasket on air chamber base. Install carburetor by reversing removal procedure.

AIR CHAMBER BASE REMOVAL & INSTALLATION: Removal - After carburetor removed, disconnect throttle return spring and throttle rod from throttle outer arm, disconnect kickdown switch wires. Disconnect fuel line and distributor vacuum line from base fittings. Remove oil filter bracket screws. Lift air chamber base from manifold.

Installation - Use new gasket between base and manifold. Install base by reversing removal procedure.

CARBURETOR OVERHAUL: *See "Stromberg WW (Studebaker) Carburetors" in 1955 Annual Data or later Manual editions*

SUPERCHARGER OVERHAUL: *See "McCulloch (Studebaker) Supercharger".*

MC CULLOCH SUPERCHARGER

Ford, 300 HP High Performance Eng. (1957). See Note below
Packard Clipper (1957)
Studebaker Goldenhawk (1957)

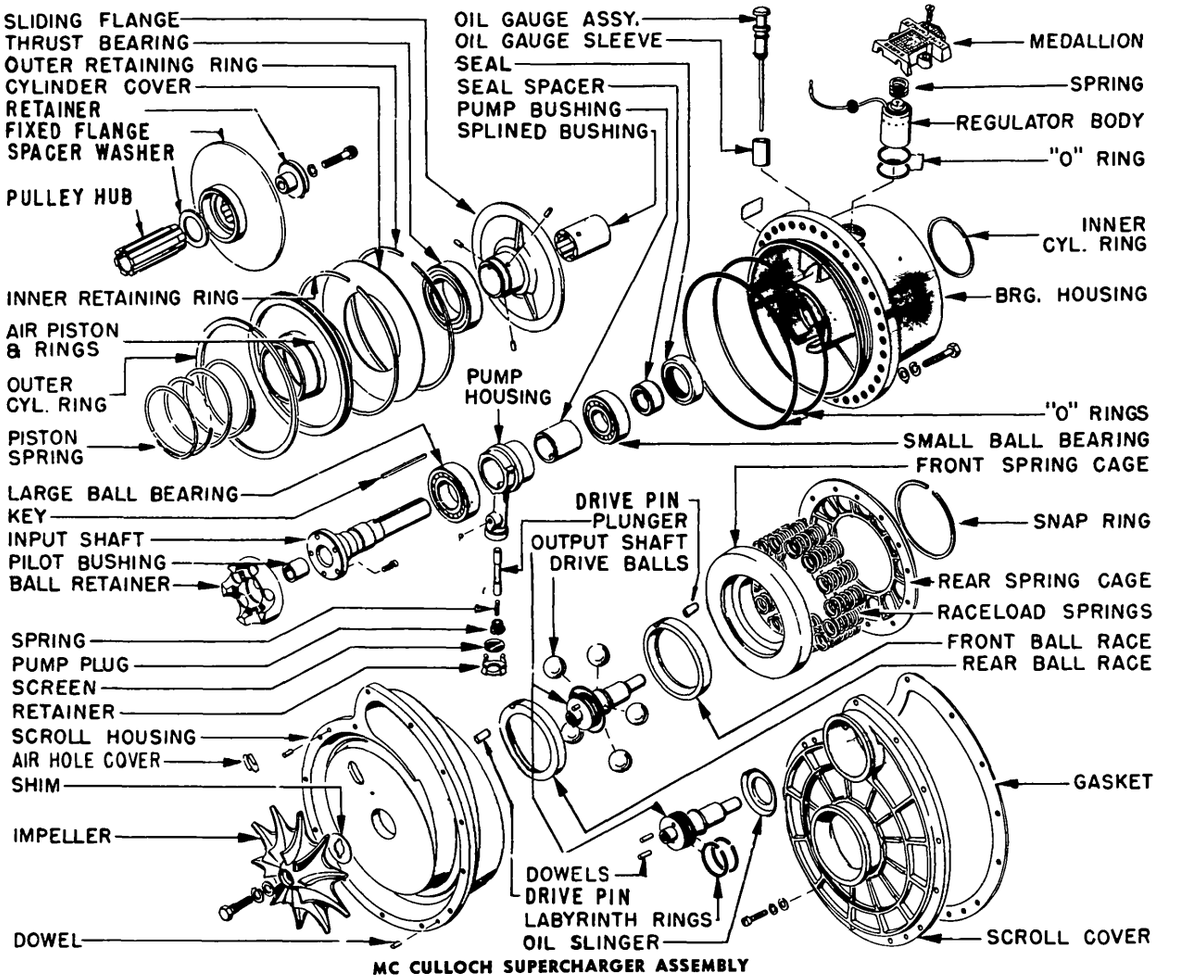
►*1957 FORD SUPERCHARGER NOTE:* Service procedures for the supercharger used on early 1957 production cars are similar to the procedures outlined below.

DESCRIPTION & OPERATION: Supercharger is a centrifugal type mounted on engine and belt driven from the crankshaft. Supercharger has two step-up speeds: (1) Variable ratio drive pulley with belt tensioner, and (2) Planetary drive system between input and output shaft. A control system governs shift from LOW BLOWER to HIGH BLOWER and limits HIGH BLOWER boost output by governing the sliding flange of variable ratio pulley. LOW BLOWER step-up speed ratio is 1-5.7 and HIGH BLOWER 1-10 in relation to crankshaft speed. Planetary drive system consists of front and rear outer ball races, five steel balls, ball retainer and inner race which is milled in the output shaft. Drive is from input shaft to ball retainer, to steel balls, to output shaft with a ratio of 1-4.44. Spring tension from race load assembly applies pressure (from assembly) to front race, reducing space between front and rear outer races, forcing ball pressure on output shaft. Balls are forced to rotate around output shaft as well as on own axis causing output shaft to turn. The impeller fits on hub of output shaft and is driven by two dowel pins.

Lubricating System—Oil supply is contained in oil sump. A piston type oil pump driven off camway ground in input shaft supplies lubrication direct to input shaft bushing and to output shaft pilot bushing in rear end of input shaft. Seepage past these bushings supplies lubricant to input shaft roller bearings, air piston and air chamber, and to planetary drive balls and races. A dipstick is provided to check oil level and the oil level should be checked every 1000 miles. *See LUBRICATION below.*

Control System—Consists of an air pressure valve affected by spring pressure and a Solenoid Regulator. The electric switch for the Solenoid Regulator circuit can be operated either by intake manifold vacuum or by accelerator pedal (kickdown). A spring loaded diaphragm limits air pressure build-up by permitting valve to open at adjusted spring pressure.

Solenoid Regulator Operation—There are three phases:
1) Low air pressure, no circuit to Solenoid Regulator, spring between valve head and Solenoid Armature forces valve open permitting air pressure to enter air chamber forcing air piston and floating pulley flange forward causing shift to Low Blower.
2) Low air pressure, Solenoid energized, forcing Armature up, compressing valve spring and sealing off air passage to air piston resulting in shift to High Blower by the belt tensioner.
3) High air pressure against diaphragm offsets diaphragm spring pressure forcing diaphragm away from valve head. With Solenoid Armature in up position (energized), valve is now permitted to raise sufficiently to open air passage partially. Air piston moves forward reducing input shaft speed ratio and impeller speed, controlling pressure build-up.



MC CULLOCH SUPERCHARGER ASSEMBLY

LUBRICATION: Check oil level by means of dipstick on left side of housing every 1000 miles. Drain and refill sump at 25,000 mile intervals. Dipstick is marked to indicate "safe" oil level and "add oil" points.
Capacity & Recommended Lubricant—8 ozs. Use Mobil-oil ATF200 or Type A Automatic Transmission fluid.

OVERHAUL: *Supercharger is a precision unit with micro-finished surfaces and all precautions listed below must be followed when disassembling unit and handling parts.*

►*CAUTION:* Remove unit from engine before disassembling. Clean exterior thoroughly with solvent, wiping dry with rags or industrial wipers. DO NOT immerse unit in the solvent and avoid use of compressed air during cleaning operation. Work on clean surface with clean tools, using clean solvent and oils. Proper tools eliminate possible damage to precision built parts. Do not handle micro-finished drive line parts with bare hands (output shaft, drive balls, and ball races) to avoid rust and oxidation on these parts. Use clean dry cloth gloves or oiled patches of clean cloth (lint free paper wiping towels such as Scott Industrial Wipers etc. may be used).

1) Remove dipstick gauge and drain oil sump. Remove scroll cover and gasket by first removing retainer screws and then lifting, **not twisting,** the cover from housing and dowels. *(CAUTION - Impeller wheel is a balanced unit and chipping, scratches or gouges will destroy the balance. DO NOT use pliers or screwdrivers while removing retainer screw. If impeller is chipped or gouged, replace the part).*
2) Install Impeller Holder, Tool J-6684 and remove retaining capscrew and washer. Insert Impeller Puller,

CONTINUED ON NEXT PAGE

MC CULLOCH SUPERCHARGER (Continued)

Tool J-6690 into the impeller and turn it clockwise until impeller is lifted clear of output shaft boss, then remove impeller wheel shim or shims. Mount supercharger assembly in holding fixture, Tool J-6689, and using a suitable rubber hose or fan belt to hold the pulley, loosen pulley retaining screw and remove the screw, lockwasher, and retainer. Pull the fixed flange of pulley and splined hub off shaft. *(NOTE* - If splined hub remains on the shaft, use Puller, Tool J-6693 to remove it from input shaft).

3) Remove sealed bearing (ball thrust) from sliding flange using Puller Plate, Tool J-1298, and Puller, Tool HM-925 together with Puller Centering Button, Tool J-6685.

4) *(CAUTION - When removing retainer rings, and air piston cover, the air piston must be held down constantly).* Push in on hub of air piston to compress piston spring and remove pressure from piston cover. Insert a screwdriver in notch at bottom of bearing housing and snap out the outer retainer ring. Remove air piston cover, then snap out the inner retainer ring. Lift air piston and spring from air chamber then remove large oil seal ring from piston.

5) Remove medallion and solenoid regulator spring. Remove solenoid regulator from housing by grasping top shoulder of regulator with vise-grip pliers and then pulling straight out. Remove two seal rings from solenoid regulator well. Scribe an index mark on the scroll and regulator housings for correct reassembly. Remove hex-head screws, lockwashers, and flat washers retaining bearing housing to scroll housing, then remove bearing housing by twisting it free of scroll housing. After housings are separated, remove the two sealing rings from bearing housing. *(CAUTION - Do not use a tool to pry housings apart which may cause damage to housings or mating surfaces).* Remove inner air piston seal from housing.

6) Remove input shaft and oil pump assembly. *(NOTE* - If shaft and pump assembly remained in bearing housing when it was lifted free of scroll housing, tap pulley end of input shaft with a rubber mallet to drive assembly out of housing). Press the input shaft oil seal out of bearing housing. Remove race load assembly from scroll housing. *(CAUTION - DO NOT attempt to disassemble race load assembly without the use of an arbor press. Internal springs will cause damage if released suddenly).*

7) Remove drive balls of planetary system by lifting the output shaft until balls are free of rear ball race. Output shaft can then be removed by pulling it free of scroll housing. Remove ball races by lifting or tapping them from their seats in race load assembly and scroll housing. *NOTE* - Use Anvil, Tool J-6687 to pry against when removing race from scroll housing.

8) Remove hub key and shaft spacer from shaft using Puller, HM-925; Plate, J-1298; Collets, J-6729; and Centering Button, J-6686. Spring the screen retainer off lower end of oil pump and then remove the screen. Screw out slotted head plunger spring retainer and shake the coil spring out of pump body. *(NOTE* - If pump plunger will not shake out, hold pump body steady and rotate shaft until plunger is at high point of the cam. Pump body will now be free to slide off input shaft. DO NOT force pump body off shaft).

9) Remove bushing from body by pushing it out in direction of the staking tang. *(NOTE* - The small ball at foot of pump is staked in place and serves only to seal the drilled passageway). Remove the large ball bearing on input shaft using Puller, HM-925; Plate, J-1298; Collets, J-1298-3; and Centering Button, J-6686. Remove the ball driver by removing the five centering screws.

► *SOLENOID REGULATOR NOTE:* This unit must not be disassembled. If faulty, replace the unit.

REASSEMBLY: *CAUTION–A clean area for assembly is important. All parts must be thoroughly cleaned and well oiled. Lint and dust must be held to absolute minimum when assembling internal drive parts.*

1) Place a race pin in recess in side of ball race housing, then place a ball race in position in scroll housing. Ball race should be a light tap fit with a plastic hammer. Make sure that race is bottomed in scroll housing. Before installing output shaft, check to see that rings are in the first and third grooves of the shaft, and that chamfer on top ring is toward impeller end of shaft. Turn seal rings on output end of shaft so that gaps are 180° apart, and insert the shaft (dowel pins down) into center opening of scroll housing. Angle the shaft slightly away from gap in each ring as shaft moves down, and straighten it to vertical as top ring slides into place inside the bore. *(NOTE* - A slight taper is provided in face of the opening to compress rings as output shaft seats.

2) Place five drive balls around output shaft, then push down gently on one at a time to seat each in its proper place on the ball race. *(CAUTION - Balls are furnished in matched sets. Never install less than a complete set).* Place another race pin in recess in side of race load assembly and install the remaining race. Place race load assembly into position, ball race down, over the drive balls.

3) Install ball retainer or driver, on end of input shaft and tighten retaining screws to 30 inch-pounds, minimum. Using Tool J-6688, press the large ball bearing onto output shaft until it is seated against the shoulder *(NOTE - Lettering on bearing should face away from oil pump).*

4) Slide oil pump, with bushing insert onto the shaft. When installing the pump body, make sure the pump is not upside down before installing the outer ball bearing. *(NOTE* - When pump is correctly installed, the bore in pump body will align with camway ground on input shaft). Using Tool J-6688, press small bearing into place on shaft with the letters up away from oil pump.

5) Install oil pump plunger (spring opening toward the plug), plunger spring, and the pump plug in oil pump body, and secure the screen to end of pump body with the retainer. Install inner air piston ring on boss of bearing housing, and lock ends of ring together. Press input shaft seal into position inside bearing housing with the lips of the seal facing rearward or toward impeller.

6) Install "O" rings (two required) in the inside and outside grooves of housing shoulder (do not install ring in center groove). Lightly oil the two small "O" rings and install them in channels within regulator well. Oil the sides of solenoid regulator and push it down past the two "O" rings until it is firmly seated. Install outer air piston spring in nose section of bearing housing, then slide air piston into place. Oil liberally, then push in on the piston, depressing the spring, and install rear retaining ring on inside of the air chamber.

7) Install dust shield, and retain in place with the outer retainer ring. Fill bore of oil pump (through the screen), using Automatic Transmission Fluid Type A, and then rotate output shaft while holding pump body until oil can be seen pulsating just under the screen. Install input shaft assembly in bearing housing, then place shaft sealing spacer over pulley end of input shaft and push it down into position in shaft seal.

8) Lubricate all moving parts with Automatic Transmission Fluid Type "A". Install bearing housing onto scroll housing, aligning the marks made at disassembly. Secure in place with capscrews, lockwashers, and flat washers. Tighten capscrews evenly to 100 inch-pounds. Press the thrust bearing onto rear of sliding flange of pulley, then insert special washer into rear of the front (fixed) flange of pulley, with chamfered inner edge of special washer facing rear of pulley flange. Press splined pulley hub into place in front (fixed) flange of pulley. Position sliding flange of pulley on the splined hub. *(NOTE* - Sliding flange should fit splines closely but slide easily). Slide key into shaft keyway, then push pulley assembly down into position on end of output shaft and secure with retainer, lockwasher, and screw. Tighten screw to 200 inch-pounds, using a rubber hose or belt to hold pulley assembly.

9) Place retaining spring on top of solenoid regulator and install supercharger medallion. *(NOTE* - The retaining spring must be in place as it serves to ground the solenoid case to supercharger). Wipe face of diffuser, then measure depth of face of output shaft below face of diffuser. This measurement should be .015". Select shims .050" thick and assemble impeller and shims to boss of output shaft. Secure with a flat washer, lockwasher, and capscrew. Tighten to 200 inch-pounds, using Impeller Holding Tool, J-6684. Check clearance between impeller and diffuser at several points around the impeller using a feeler gauge. The allowable clearance is .046-.051". If not within these limits, add or remove shims as necessary. Assemble scroll cover and gasket to housing and tighten retaining screws securely.

AUTO-LITE 12-VOLT REGULATORS

►CHANGES & CAUTIONS

►*GENERATOR REPOLARIZING* Whenever regulator or generator leads are disconnected for ANY reason the generator must be repolarized as follows After generator and regulator leads are reconnected, connect jumper wire between "GEN" and "BAT terminals momentarily to allow a quick current surge through generator windings. This will prevent damage to equipment caused by reversed polarity (vibration, arcing, and burning of contact relay points).

►*NORMALIZING THE REGULATOR*· Before checking regulator, bring it up to normal operating temperature as follows Operate generator at speed of 1500 RPM, adjust charging rate to 10 amperes (connect .25 ohm resistor in charging line or use variable resistance connected across battery). Continue operation for 15 minutes to "normalize" the regulator or bring it up to operating temperature (temperature can be checked by placing an accurate thermometer 2" from cover).

►*VRX 6201A REGULATOR PRODUCTION CHANGE*· Two resistors were used on early regulators and three resistors were used on later regulators. *See Resistor Table and Wiring Diagram below for differences.*

DESCRIPTION: These regulators are similar in design to previous types except for use of a third "R3" resistor on some models.

CHECKING & ADJUSTING: *See "Auto-Lite 12 Volt Regulators" in 1956 Annual Data and note the following:*

V ltage Setting: After regulator normalized (see above), and with generator charging at 10 amps, note voltmeter reading and regulator temperature. If voltage setting not within range shown in Voltage Regulator Setting specifications below, adjust regulator. *See "Auto-Lite 12 Volt Regulators" in 1956 Annual Data.*

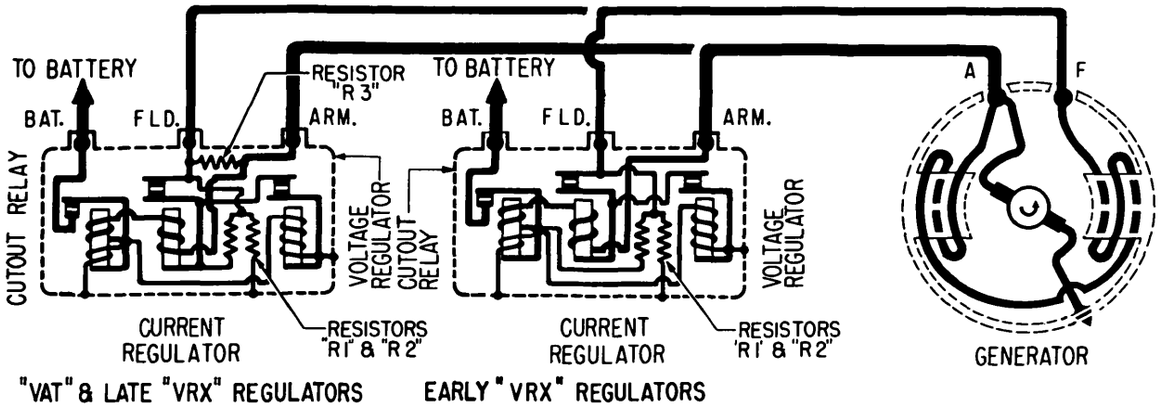
VOLTAGE REGULATOR SETTINGS

Model	Voltage Setting Table
VAT 4001A	No. 1
VAT 4002A, AX	No. 2
VAT 4003A	No. 1
VAT 4004AX	No. 2
VAT 4101AM	No. 1
VAT 6001A,6002A,6003A,6004A,6005A	No. 1
VAT 6201A	No. 1
VRX 4001A	No. 1
VRX 4001B, 4001BX	No. 2
VRX 4002A, 4002B, 4003A	No. 1
VRX 4003AX,4003B,4003BX,4003C,4003CX	No. 2
VRX 4003D,4003DT,4003E	No. 1
VRX 4004A,4005A,4005AX	No. 2
VRX 4006A, 4401A	No. 1
VRX 5003CX	No. 2
VRX 6001A,6002AT,6002BT	No. 1
VRX 6003A,6003B,6003C	No. 1
VRX 6004A,6004AT,6005AT	No. 1
VRX 6006A,6007A,6008A	No. 1
VRX 6009A,6009B,6010A,6011A,6011B	No. 1
VRX 6201A,6201B,6202A,7005AT	No. 1

VAT, VRX Voltage Regulator Setting

Table No. 1 Temp.	① Volts	Table No. 2 Temp.	② Volts
50°F	14.7	50°F	14.3
80°F	14.5	80°F	14.2
110°F	14.3	110°F	14.0
140°F	14.1	140°F	13.9

① - Plus or minus .3 volt. ② - Plus or minus .2 volt.



AUTO-LITE 12-VOLT REGULATOR WIRING DIAGRAM

Current Setting: Normalize regulator (see above). Current regulator setting should then agree with "Test A" specifications in Current Regulator Setting table below. For "Test B", operate generator at 2000 RPM, and add sufficient load to cause current regulator to operate (turn on lights and accessories, add additional load such as a lamp bank or carbon pile, or use a variable resistance across battery) with voltage of 13.7-13.9 volts (VAT Regulators), 13 6-13.8 volts (VRX Regulators). Continue operation for 15 minutes to normalize the current regulator by bringing it up to operating temperature (temperature can be checked by placing an accurate thermometer 2" from regulator cover). At end of the total 30 minute operation, current setting should agree with "Test B" specifications in Current Regulator Setting table below. If charging rate not within range shown in "Test B" column, adjust current regulator. *See "Auto-Lite 12 Volt Regulators" in 1956 Annual Data.*

Regulator Nominal Setting

Model	Operating Amperes
VAT (All)	40 amps.
VRX 6001A	23 amps.
VRX 6003A	25 amps.
VRX 6003B,BC,6007A,6009A,B	30 amps.
VRX 6010A,6011A,B	30 amps.
VRX 6201A,B,6202A	30 amps.
VRX 6008A	35 amps.

Current Regulator Setting

(23 amps. Nominal Setting)

Temp. (°F)	Test "A" - Amperes - Test "B"
50°	33 max. 23-27
70°	31 max. 21-25
90°	29 max. 19-23
110°	27 max. 17-21
130°	25 max. 15-19

(25 amps. Nominal Setting)

Temp. (°F)	Test "A" - Amperes - Test "B"
50°	36 max. 25-29
70°	34 max. 23-27
90°	32 max. 21-25
110°	30 max. 19-23
130°	28 max. 17-21

(30 amps. Nominal Setting)

Temp. (°F)	Test "A" - Amperes - Test "B"
50°	39 max. 30-34
70°	37 max. 28-32
90°	35 max. 26-30
110°	33 max. 24-28
130°	31 max. 22-26

(35 amps. Nominal Setting)

Temp. (°F)	Test "A" - Amperes - Test "B"
50°	46 max. 35-39
70°	44 max. 33-37
90°	42 max. 31-35
110°	40 max. 29-33
130°	38 max. 27-31

(40 amps. Nominal Setting)

Temp. (°F)	Test "A" - Amperes - Test "B"
50°	48 max. 40-44
70°	46 max. 38-42
90°	44 max. 36-40
110°	42 max. 34-38
130°	40 max. 32-36

REGULATOR RESISTORS: Resistors should be checked for correct resistance with an ohm meter. For checking resistances of 3 resistor regulators without disconnecting resistors and coil, see below.

Regulator R sistors

Model VAT	"R1" Mark	"R1" Ohms	"R2" Mark	"R2" Ohms
4001A	80	75-92	20	19-23
4002A, AX	80	75-92	20	19-23
4003A	80	75-92	20	19-23
4004AX	80	75-92	20	19-23
4101AM	80	75-92	20	19-23
6001A	80	75-92	20	19-23
6002A,3A,4A,5A	① 100	95-115	① 38	34.5-42
6201A	① 100	95-115	① 38	34.5-42

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AUTO-LITE 12-VOLT REGULATORS (C ntinu d)

R gulat r Resistors (Cont.)

M d l	"R"1		"R"2	
VRX	Mark	Ohms	Mark	Ohms
4001A,B,BX	80	75-92	20	19-23
4002A,B	80	75-92	20	19-23
4003A,AX	80	75-92	20	19-23
4003B,BX,C,CX,D,DT	80	75-92	30	28-34.5
4003E	38	34.5-42	20	19-23
4004A	80	76-84	20	19-21
4005A,AX	80	76-84	20	19-21
4006A	80	75-92	30	28-34.5
4401A	60	57-70	20	19-23
5003CX	80	75-92	30	28-34.5
6001A	80	75-92	30	28-34.5
6002AT,BT	80	75-92	30	28-34.5
6003A,B	135	122-149	38	34.5-42
6003C	80	75-92	38	34.5-42
6004A,AT	60	57-70	30	28-34.5
6005AT	80	75-92	30	28-34.5
6006A	135	122-149	38	34.5-42
6007A	80	75-92	38	34.5-42
6008A	60	57-70	38	34.5-42
6009A,B	60	57-70	38	34.5-42
6010A,6011A	① 100	95-115	① 38	34.5-42
6011B,6201A	① 60	57-70	① 38	34.5-42
6201B	① 100	95-115	① 38	34.5-42
6202A	135	122-149	38	34.5-42
7005AT	80	75-92	30	28-34.5

① - 3 Resistor Regulator. "R3" resistor marked "30", resistance is 28-34.5 ohms.
② - "R1" resistor on early production regulators were marked "80", later production marked "60".

CHECKING RESISTANCES OF 3 RESISTOR REGULATORS (With ut disc nn cting resistors and coil): Block cut-out relay and voltage regulator contacts open, then proceed as follows:

1) Connect ohmmeter between "F" terminal and current regulator yoke. The reading should be 34.5-42 ohms (value of "R2" resistor). Any other reading indicates that "R2" is defective.

2) Connect ohmmeter between "A" terminal and ground. A reading of **24.8-28.3** (All VAT models and VRX 6010A, 6011A, 6201B models) **22.7-26.2** (VRX 6011B, 6201A models) indicates "R1", "R3", Cutout Relay and Current Regulator resistances are within specifications. If reading is 31-35 ohms, either "R1" or "R3" is open. If reading is **32.2-37 ohms** (All VAT models and VRX 6010A, 6011A, 6201B models), **28.8-33.4 ohms** (VRX 6011B, 6201A models), the Cutout Relay winding is open. If reading is **57.2-66.7** (All VAT models and VRX 6010A, 6011A, 6201B models), **47.2-56.0** (VRX 6011B, 6201A models), the Voltage Regulator winding is open.

3) If the above checks indicate that either "R1" or "R3" is open, proceed as follows: Ground the "A" terminal and connect ohmmeter between "F" terminal and ground. A reading of 28-34.5 (all models), indicates that "R1" is open. A reading of 95-115 (all models) indicates that "R3" is open.

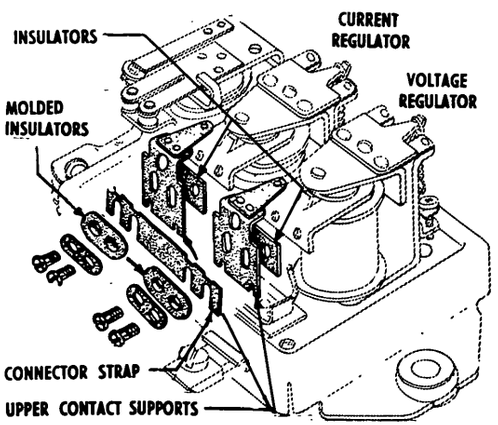
DELCO-REMY 12-VOLT REGULATORS "1119000 SERIES"

► *ADJUSTMENT CAUTION:* When checking Current Regulator on 1119000 Series Regulators, DO NOT use the "Quick Check Method" outlined for previous 1118825 Series Regulators. Using a screwdriver inserted in hole in regulator base to short out Voltage Regulator will short out BOTH the Voltage and Current Regulators and allow generator to operate without control.

► *GENERATOR REPOLARIZING:* Whenever regulator or generator leads are disconnected for ANY reason, the generator must be repolarized as follows: After generator and regulator leads are reconnected, connect jumper lead between regulator "GEN" and "BAT" terminals momentarily to allow a quick current surge through generator windings. This will prevent damage to equipment caused by reversed polarity (vibration, arcing, and burning of contac relay points).

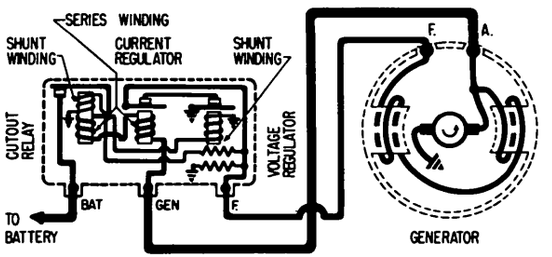
► *NORMALIZING THE REGULATOR:* Before checking voltage setting, bring regulator to operating temperature as follows: Connect ¼ ohm resistance in series with battery, then with regulator cover in place, operate regulator for 15 minutes continuously with no other load than ignition. *(NOTE* - If variable resistor used in place of ¼ ohm resistor, set resistor for 1-10 ampere charging rate).

► *AMBIENT TEMPERATURE NOTE:* "Ambient Temperature" is the temperature of the air surrounding the regulator approximately ¼" from the regulator cover when the regulator is at operating temperature ("Normalizing" procedure as given above should result in an ambient temperature of 125°F.) and can be measured by placing a thermometer ¼" from the regulator cover. For ambient temperatures other than 125°F., see "Voltage Setting Range" table below.



DELCO-REMY 12-VOLT RE ULATORS CONTACT ASSEMBLY

DESCRIPTION: These regulators differ from preceeding "1118825" and "1118900" series **without Letter "B" following the model number** in that the direction of current flow through the Current Regulator contacts has been reversed (see Wiring Diagram and Contact Mounting illustration).



DELCO-REMY 12-VOLT REGULATORS WIRING DIAGRAM

CHECKING & ADJUSTING: *See "Delco-Remy 12 Volt Regulators" in 1956 Annual Data and note the following:*

Ambient Temp.	Voltage Setting Range (For "Normal" settings of 13.8-14.8 volts)					
165°	13.2	13.4	13.6	13.8	14.0	14.2
145°	13.5	13.7	13.9	14.1	14.3	14.5
125°	13.8	14.0	14.2	14.4	14.6	14.8
105°	14.1	14.3	14.5	14.7	14.9	15.1
85°	14.4	14.6	14.8	15.0	15.2	15.4
65°	14.7	14.9	15.1	15.3	15.5	15.7
45°	15.0	15.2	15.4	15.6	15.8	16.0

Current Regulator Setting

Regulator No.	Setting (Amp r s)
1119000	23-27
1119001	27-33
1119002	32-37
1119003	27-33
1119004	37-42
1119122	23-27
1119123	27-33
1119145	33-37
1119148	9-11
1119150,51	32-37
1119152,53	15.5-18.5
1119155	23-27
1119156	48-52
1119161	27-33
1119162	32-37
1119165	13-15
1119168	32-37
1119174	27-33
1119180	13-15
1119181	22-26
1119190	38-42

DELCO-REMY 12-VOLT "DOUBLE CONTACT" REGULATORS

	Regulator	Generator
CADILLAC		
75, 86 (1957) AC Cars	1119163	1102060
Eldorado Brougham	1119175	1106989
PONTIAC		
All (1957) Heavy Duty	1119163	1102074

►CAUTIONS

►*REGULATOR CAUTION: When testing generator and this type regulator, observe the following precautions:*

1) *DO NOT GROUND GENERATOR FIELD WITH REGULATOR CONNECTED TO GENERATOR* - This will cause Lower Set of contacts in Voltage Regulator to burn up immediately.

2) *DO NOT FILE REGULATOR CONTACTS* - All contacts of the Double Contact Voltage Regulator are soft alloy and should be cleaned with crocus cloth or other fine abrasive and washed with carbon tetra-chloride.

DESCRIPTION: These regulators differ from other "1119000 Series" regulators in that a special "Double Contact" Voltage Regulator unit is used. Cutout Relay and Current Regulator units are same as units used in other 1119000 series regulators.

OPERATION: The Double Contact Voltage Regulator has an additional set of "Lower Contacts" connected directly across the generator field (in addition to the regular "Upper Contacts") and the regulating resistor is of lower value than on other type regulators. Regulator operates either on Upper Contacts or Lower Contacts, depending on load and battery requirements, as follows:

Upper Contact Operation (Low Speed & High Load - High Generator Field requirement) - Regulator armature travel opens and closes upper contacts (vibrating action) cutting the regulating resistance in and out of the field circuit. This operation is the same as on other voltage regulators with single set of contacts.

Lower Contact Operation (High Speed & Low Load - Low Generator Field requirement) - Under these conditions, upper contact operation is not sufficient to control generator voltage. Regulator armature travel opens and closes lower contacts (vibrating action), shorting the field out (contacts closed) or cutting the regulating resistance in the field circuit (contacts open). This provides additional regulation.

CHECKING & ADJUSTMENT: *See Regulator Caution above.* Cutout Relay and Current Regulator are checked and adjusted in same manner as on other 1119000 Series Regulators. *See "Delco-Remy 12-Volt Regulators" in 1956 Annual Data.*

Voltage Regulator (Double Contact Type): Battery should be fully charged so that charging rate limited to 1-10 amperes (If charging rate above 10 amperes, connect ¼ Ohm resistor in series with battery). Connect voltmeter from regulator "BAT" terminal to ground. Connect a 25 Ohm (25 watt) variable resistance in generator field circuit (between regulator "F" terminal and field lead normally connected to this terminal). *CAUTION* - Resistor should have an "open" position at the full resistance end to assist in cycling the generator.

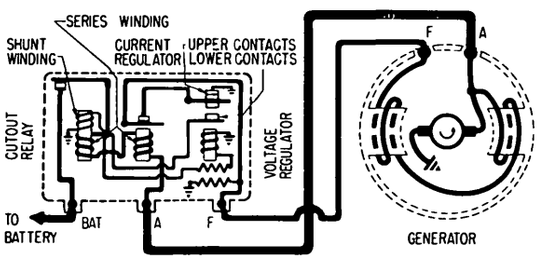
Operation on Lower Contacts - Turn the field resistance completely out and operate generator at medium speed. Regulator should then operate on lower set of contacts. Continue operation for 15 minutes to bring regulator up to operating temperature, cycle generator by turning variable resistance to "open" position momentarily, then slowly cut all resistance out. Note voltmeter reading. This is the regulator setting on LOWER CONTACTS (see table below). Adjust in usual manner by turning double-slotted screw on armature spring lower bracket.

Operation on Upper Contacts - After checking operation on Lower Contacts (above), slowly increase field resistance until regulator begins to operate on upper set of contacts (voltmeter should indicate a slight voltage drop at this point). Voltmeter reading should be .3 to .5 volts below lower contact operation setting for all models. Adjust by turning air gap adjusting screw located on top of armature (turn screw clockwise to increase voltage differential, counter-clockwise to decrease voltage differential). *NOTE* - This adjustment will affect Voltage Setting on lower contact operation and entire checking procedure should be repeated.

►*ADJUSTMENT CAUTION:* If voltage setting on Upper Contacts is ever found to be HIGHER than voltage setting on Lower Contacts, it must be reduced by turning the air gap adjusting screw in a clockwise direction, and if the adjustment is taken up, **the nominal air gap must be reset (see below).**

Regulator Specifications
Cutout Relay
(1119149, 57, 58, 63, 67, 75, 83, 86)

Closing Voltage - 11.8-13.5 volts.
Contact Gap - .020" (both sets).
Air Gap - .020" at center of core with contacts just closed.



DELCO-REMY REGULATOR
(DOUBLE CONTACT VOLTAGE REGULATOR)

Voltage Regulator
(1119149, 57, 58, 63, 67, 75, 83, 86)

Voltage Setting (Operating on Lower Contacts) - 14-14.6 volts with regulator at operating temperature.

Voltage Setting (Operating on Upper Contacts) - .3 to .5 volts below operating voltage on lower contacts.

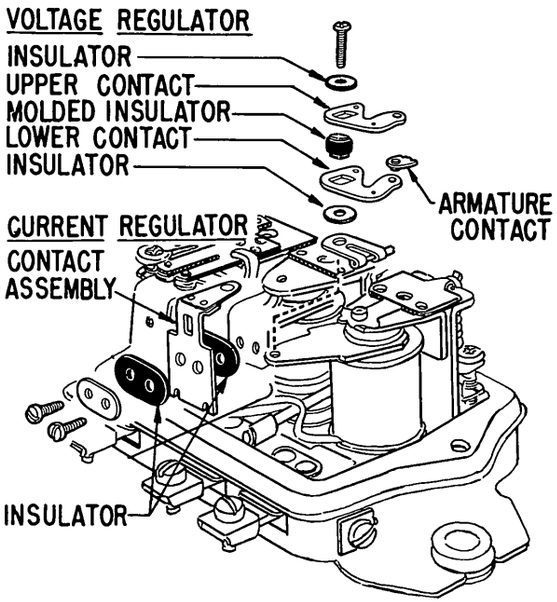
Air Gap - .080" with upper contacts just touching. When adjusting air gap, first turn air gap adjusting screw all the way in a clockwise direction (*NOTE* - this is the adjusting screw for voltage setting when operating on upper contacts), then bend upper contact support for correct air gap.

Contact Gap (Upper Set of Contacts) - .016" with armature pressed down to point where lower contacts just touching. Adjust by bending lower contact support.

Current Regulator
Current Setting Rang

Regulator	Amperes	Regulator	Amperes
1119149	43-47	1119167	48-52
1119157	48-52	1119175	53-57
1119158	33-37	1119183	33-37
1119163	37-42	1119186	43-47

Air Gap - .075" with armature pressed down to point where contacts just touching.



DELCO-REMY REGULATOR CONTACT ASSEMBLY
(DOUBLE CONTACT VOLTAGE REGULATOR)

FORD, LINCOLN, MERCURY 12-VOLT REGULATORS

►CAUTIONS

►*GENERATOR POLARIZING: (NOTE* - Polarization is not necessary except when generator has been rebuilt or if new pole shoes have been installed). To polarize a generator on the car, disconnect the field wire and the battery wire from the regulator and momentarily connect the two wires together (engine not running). *CAUTION - Do not polarize generator by any method that applies battery voltage to field terminal of regulator.*

►*NORMALIZING THE REGULATOR:* **On the Car**—Clip special thermometer T56L-10505-A on regulator cover (see Note below). Operate engine with generator charging at 10 ampere rate for 30 minutes or until regulator temperature is stabilized.

On the Bench—Procedure is same as on the car except that a small fan should be mounted 12-15" from the regulator so as to circulate air over the regulator cover while it is being warmed up.

Thermometer T56L-10505-A Note—This thermometer is calibrated in 10° F. increments and has additional Voltage scales indicating the correct voltage regulator setting for each temperature reading (both 6 volt and 12 volt scales provided).

►*AMBIENT TEMPERATURE NOTE:* Ambient temperature is the temperature taken adjacent to the regulator, using Thermometer T56L-10505-A.

DESCRIPTION: These 12 volt regulators are the same design as previous 12 volt units.

CHECKING & ADJUSTMENT: *CAUTION*—Regulators are temperature-compensated and must be brought up to normal operating temperature before checks are made. This normal temperature is that existing adjacent to the regulator cover after 1/2 hour of operation in the car or after the regulator has been heated until the temperature is stabilized (standard normal temperature is 70-80° F.

►*TEST METER CONNECTIONS:* If special Test Sets used, make all connections in accordance with manufacturer's instructions. If individual meters used, make connections as follows: Connect test ammeter and 1-1/2 ohm fixed resistor in series in charging line at regulator "BAT" terminal (in series with battery). Connect voltmeter between regulator "ARM" terminal and ground (regulator base or battery grounded terminal). Connect a 50 ohm variable field rheostat (2 amp. rating) in generator field circuit (disconnect field lead at regulator "FIELD" terminal, connect rheostat between this lead and regulator "FIELD" terminal).

CUTOUT RELAY

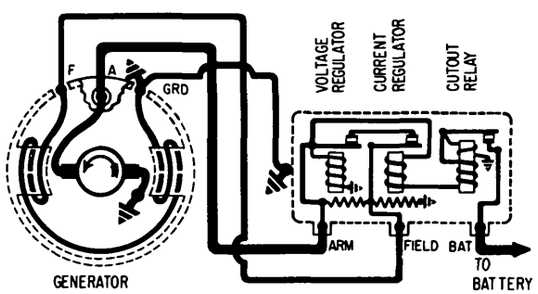
Cut-in (Closing) Voltage: After regulator normalized and with test meters connected (see above), check cut-in voltage by either of the following methods: **(1)**—With resistance turned out of field circuit, slowly increase generator speed and note voltmeter reading at instant relay contacts close (pointer will drop back slightly). Repeat this check several times by decreasing generator speed until contacts open and then increasing speed until contacts close. If closing voltage not correct as shown in setting table below, adjustment is required. **(2)**—With field resistance completely turned in the field circuit, operate generator at 1500 RPM., slowly turn resistance out of field circuit and note voltmeter reading when relay contacts close (pointer will drop back slightly). Repeat this check several times by turning resistance in and out of field circuit.

Adjustment—Bend adjusting arm under armature spring (to left of relay contacts) upward to increase cut-in voltage, or downward to decrease cut-in voltage. Replace regulator cover and recheck the setting.

Cut-in (Closing) Voltage Setting

30 Amp. Models - 12.0-12.8 volts.
40 Amp. Models - 12.0-12.5 volts.

Cut-out (Opening) Discharge Current: This can be checked after checking cut-in voltage by increasing generator speed (or turning out field resistance) until charging current is approximately 10 amperes, then slowly decrease generator speed (or turn in field resistance) until maximum **discharge** current indicated on ammeter (ammeter will return to zero as contacts open). Discharge current should be approximately 2-6 amperes.



FORD, LINCOLN, MERCURY 12-VOLT REGULATOR WIRING DIAGRAM

VOLTAGE REGULATOR

Voltage Setting: After Cutout Relay checked (above), cycle regulator by decreasing generator speed until cutout relay contacts open and then increase speed to 1500 RPM. Clip special thermometer on regulator cover to establish regulator ambient temperature and corresponding voltage setting (see Voltage Regulator Settings for various ambient temperatures below). Turn resistance completely out of field circuit (charging rate should be approximately 10 amperes). Note voltmeter reading. This is the voltage setting and should agree with setting listed below.

Adjustment—Bend adjusting arm under armature spring (to left of regulator contacts) upward to increase voltage setting, or downward to decrease voltage setting. Replace regulator cover and recheck the setting after each adjustment.

Voltage Setting

All Models—14.6-15.4 volts with ambient air temperature of 70-80° F. *See table below.*

Ford Voltage Regulator Settings
(Ambient Temperature Correction)

Ambient Temp. (° F)	Std. 30 Amp. Reg. (Volts)	H.D. 40 Amp. Reg. (Volts)
25°	15.1-15.9	14.3-15.1
35°	15.0-15.8	14.3-15.2
45°	14.9-15.7	14.3-15.1
55°	14.8-15.6	14.3-15.0
65°	14.7-15.5	14.3-14.9
75°	14.6-15.4	14.2-14.9
85°	14.5-15.3	14.1-14.8
95°	14.3-15.1	14.1-14.7
105°	14.2-15.0	14.0-14.7
115°	14.1-14.9	14.0-14.6
125°	13.9-14.7	13.9-14.5
135°	13.8-14.6	13.8-14.4
145°	13.6-14.4	13.7-14.3

CURRENT REGULATOR

Current Setting: This check requires that a load be added, or that the generator voltage be dropped to approximately 13 volts, to cause current regulator to operate. It is recommended that a heavy duty variable resistance (carbon pile) be connected across the 1-1/2 ohm fixed resistor in the charging line (connect resistance from ammeter lead terminal of fixed resistor to ground—see Test Meter Connections above). After Voltage Regulator checked (above), and with all resistance turned out of the field circuit, operate generator at 1500 RPM (Ford), 2000 RPM (Continental, Lincoln, Mercury), decrease the resistance of the carbon pile resistance until voltage drops to approximately 13 volts and ammeter reading is at maximum. This ammeter reading is the current setting. If not correct (see table below), adjust as follows:

Adjustment—Bend adjusting arm under armature spring (to left of regulator contacts) upward to increase current setting, or downward to decrease current setting. Replace regulator cover and recheck setting.

Current Setting

Std. 30 Amp. Regulator—28-32 amperes (all models).
H.D. 40 Amp. Regulator—38-42 amperes (all models).

FORD, LINCOLN, MERCURY DISTRIBUTORS

	Distributor No.
FORD PASS. CARS & THUNDERBIRD	
1957 272" & 292" Eng.	B7A-12127-A
1957 312" Eng. (Std.)	B7A-12127-D
1957 312" Eng. (2 Carbs.)	B7A-12127-E
1957 312" Eng. (Supercharged)	B7A-12127-G
1957 T-Bird 292" & 312" Eng. (Std.)	① B7S-12127-A
1957 T-Bird 312" Eng. (2 Carbs.)	① B7S-12127-B
1957 T-Bird 312" Eng. (Supercharged)	① B7S-12127-C
FORD TRUCKS	
1957 272" (ECY Eng.)	B7A-12127-A
LINCOLN & CONTINENTAL	
1957 Lincoln	FEL-12127-A
1957 Continental	① FES-12127-A
MERCURY	
1957 312" Eng.②(Exc.Turnpike Cr.)	B7A-12127-D
1957 312" Eng.②(Turnpike Cr.)	① FEK-12127-B
1957 368" Eng.③(Exc.Turnpike Cr.)④	FEL-12127-A
1957 368" Eng.③(Exc.Turnpike Cr.)⑤	FEL-12127-B
1957 368" Eng.③(Turnpike Cr.) ④	① FEK-12127-C
1957 368" Eng.③(Turnpike Cr.) ⑤	① FEK-12127-E

① - With Tachometer Drive attachment.
② - ECZ Engine. ③ - ECU Engine.
④ - Early production. ⑤ - Later production.

►*NOTE - Ford 6 cars and trucks, and Ford V8 trucks (except those listed above) have "Loadomatic" Distributors. See "Ford, Lincoln, Mercury Distributors" in 1956 Annual Data.*

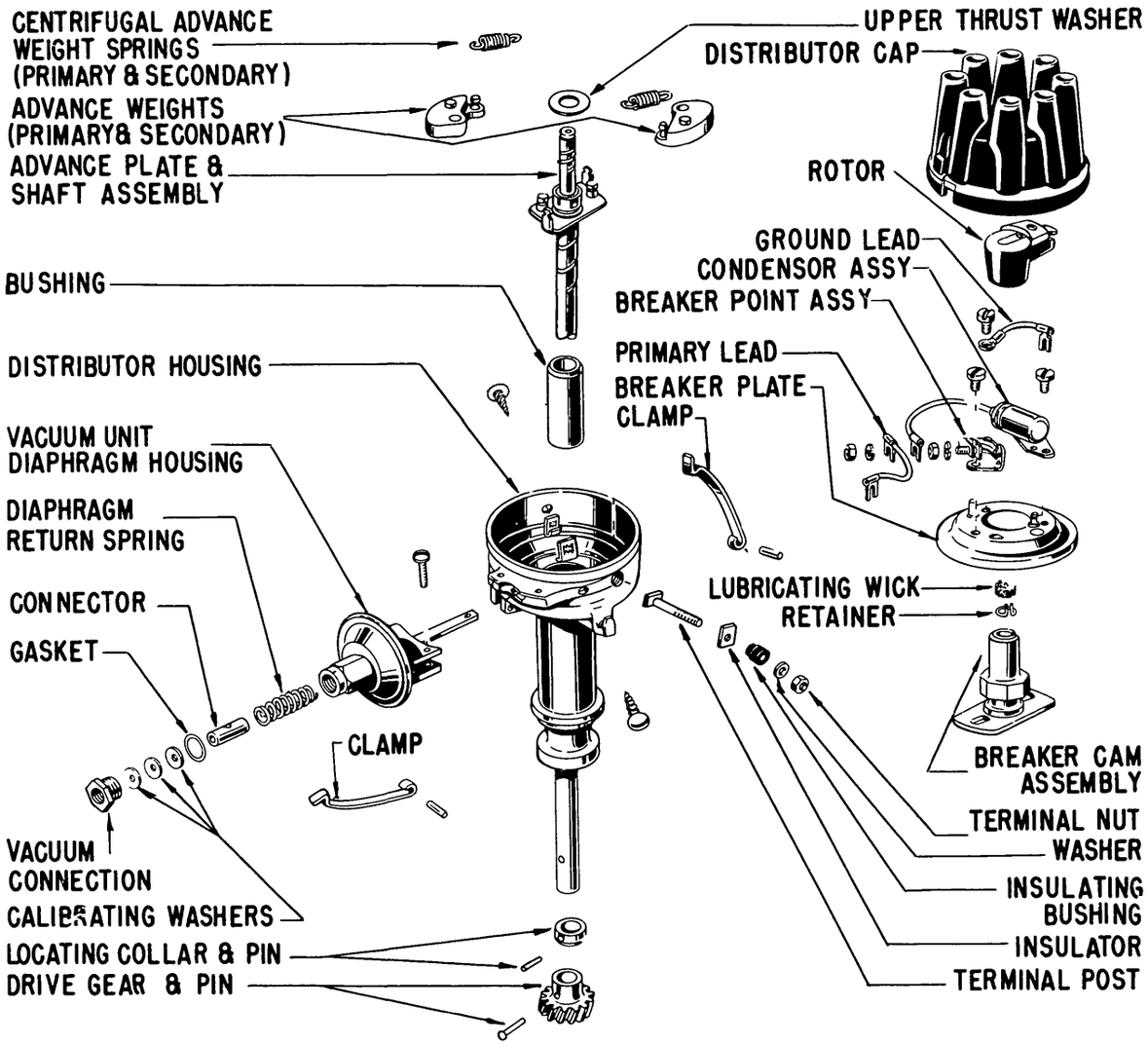
►CHANGES, CAUTIONS, CORRECTIONS

►*1957 FORD 312" SUPERCHARGED ENGINE DISTRIBUTOR NOTE This distributor has "Double Breakers". Both sets of points must be adjusted to the same gap.*

►*1957 LINCOLN & CONTINENTAL DISTRIBUTOR PRIMARY WIRE PRODUCTION CHANGE.* A new primary wire with improved insulation, Part No. B7A-12216-B, having a shiny black vinyl covering, is used in production and should be used for service replacement to correct ignition failures caused by the former cloth covered wire.

►*1957 MERCURY 368" ENGINE DISTRIBUTOR PRODUCTION CHANGE* Distributors, Part No. FEK-12127-E (Except Turnpike Cruiser), and FEL-12127-B (Turnpike Cruiser) replace the distributors used in early production. The later type distributors have different automatic and vacuum advance curves and different primary and secondary distributor weight springs. Early type distributors can be reworked for improved performance by installing new springs and adjusting the advance to later specifications. *See "Mercury FEK-12127-C and FEL-12127-A Distributor Rework for Improved P rformance" below.*

►*1957 MERCURY FEK-12127-C & FEL-12127-A DISTRIBUTOR REWORK FOR IMPROVED PERFORMANCE (NOTE - Before reworking these distributors check the automatic and vacuum advance characteristics to determine if they have been previously reworked).* Remove the early type primary spring, Part No. B7A-12192-A, and secondary spring, Part No. FEK-12191-A and install the new primary spring, Part No. FEL-12192-A-UP, and secondary spring, Part No. B7A-12191-B. Adjust distributor automatic and vacuum advance as indicated for "Late Production" cars. *See Mercury Car Model Pages for specifications.*



FORD, LINCOLN, MERCURY DISTRIBUTOR ASSEMBLY

DESCRIPTION: These distributors differ from previous designs in that a conventional centrifugal advance mechanism is used in conjunction with the vacuum spark control unit as described below. Some distributor models have a Tachometer drive mechanism built in the distributor.

Centrifugal Advance - Consists of two spring-loaded weights pivoted on a plate on the upper end of the distributor driveshaft. Drive pins on these weights engage slots in the base of the breaker cam subassembly so that the breaker cam is rotated by the movement of the weights. Weights move out against spring tension as distributor driveshaft RPM increases, rotating the breaker cam ahead of the driveshaft to advance the spark. With a decrease in driveshaft RPM, the springs pull the weights in and rotate the breaker cam in the opposite direction to retard the spark. Springs are identical but are adjusted for unequal tension to provide primary and secondary advance. Primary spring (greater

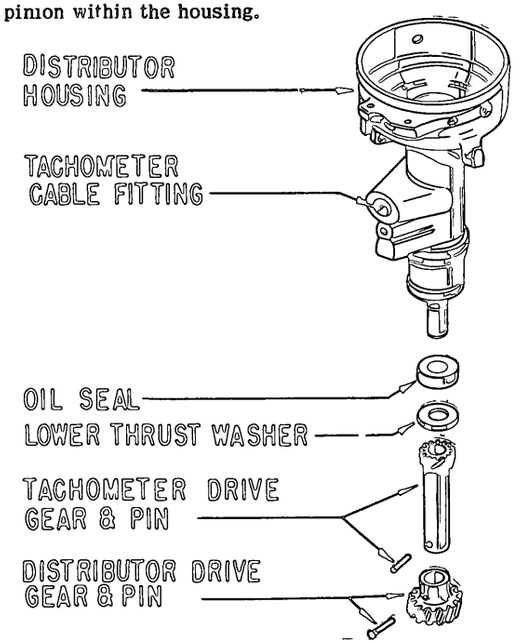
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FORD, LINCOLN, MERCURY DISTRIBUTORS (Cont.)

tension) controls advance at lower engine speeds, secondary spring (less tension) controls advance at higher engine speeds. Spring tension is adjusted by bending the posts at the outer ends of the springs.

Vacuum Advance - Spring-loaded, single diaphragm type unit mounted on distributor housing and linked to breaker plate. Manifold vacuum pulls the diaphragm outward (against spring tension) and rotates the breaker plate against the direction of rotation to advance the spark. When manifold vacuum decreases, the spring returns the breaker plate to the normal position. *NOTE* - Vacuum port in carburetor is above closed-throttle position so that vacuum advance does not operate during closed-throttle idling.

Tachometer Drive - A drive gear and sleeve is pinned on the distributor shaft (replaces regular locating collar on shaft). A boss is provided on the side of the distributor housing for mounting of the tachometer driven pinion and cable assembly. The drive gear engages the pinion within the housing.



FORD, LINCOLN, MERCURY DISTRIBUTOR WITH TACHOMETER DRIVE ATTACHMENT

ADJUSTMENT: Breaker Gap, Cam Angle, Breaker Arm Spring Tension, Ignition Timing, Distributor Automatic & Vacuum Advance - *See individual Car Model pages for specifications.*

Automatic (Centrifugal) Advance: Mount distributor on test set indicating distributor RPM and degrees of advance. Operate distributor in direction of rotation (counter-clockwise), increase RPM until advance begins, then decrease RPM to point where no advance indicated and set advance scale at zero. Increase RPM to first point indicated in Automatic Advance table, check advance and RPM. If advance not correct at this speed, stop distributor and adjust PRIMARY spring (see Adjustment Note below). Recheck minimum advance point. Then increase RPM to point just below maximum advance. If advance not correct at this speed, stop distributor and adjust SECONDARY spring (see Adjustment Note below). Recheck advance throughout entire speed range (first while increasing RPM, and again while decreasing RPM). Readjust as necessary.

▷ *AUTOMATIC ADVANCE SPECIFICATION NOTE: See individual Car Model pages for specifications.*

▷ *PRIMARY & SECONDARY ADVANCE SPRING ADJUSTMENT NOTE:* Springs can be identified by turning distributor to point where advance spring directly under adjustment slot in breaker plate, engaging a wire hook in the spring, and moving spring up and down to check spring tension. Primary spring will have greater tension with distributor at rest (secondary spring will be slack or not under tension at this point). To adjust, insert screwdriver blade through the adjustment slot, bend spring bracket (stationary post on base plate) outward to increase tension and decrease advance or inward to decrease tension and increase advance.

Vacuum Advance: Vacuum unit should be checked for free operation and diaphragm leakage whenever engine is tuned up. Vacuum advance performance can also be checked and adjusted as directed below.

Free Operation - Manually rotate breaker plate in direction of rotation (counter-clockwise). Plate should turn without binding and return to original position when released. If binding indicated, remove plate and clean and lubricate it as required.

Vacuum Diaphragm Leakage - Use vacuum source on distributor test set, set vacuum to highest possible figure. Connect vacuum line to fitting on distributor vacuum unit. Vacuum gauge reading should not fall off. Lower vacuum reading indicates diaphragm leak and diaphragm assembly should be replaced.

Vacuum Advance Check & Adjustment - Mount distributor on test set. After centrifugal advance has been checked and adjusted, operate distributor at constant RPM to eliminate centrifugal advance variations (see Specifications). Connect vacuum line to distributor vacuum unit fitting, set vacuum at first figure in specification table, check advance. If advance not correct, change calibration washers located at outer end of spring under vacuum connection. Recheck vacuum advance throughout entire range (*CAUTION* - Keep distributor RPM constant, vary vacuum). If all points not within limits, incorrect spring tension or vacuum leaks in diaphragm chamber or lines is indicated.

▷ *VACUUM ADVANCE SPECIFICATION NOTE: See individual Car Model pages for specifications.*

▷ *VACUUM UNIT ADJUSTMENT NOTE:* Decrease number or thickness of calibration washers to increase vacuum advance, increase number or thickness of washers to decrease vacuum advance.

SERVICING: Breaker Point Replacement - Breaker Point Assembly consists of Mounting Bracket & Stationary Point Assembly, Breaker Arm, and Primary Lead and complete unit can be replaced without removing distributor from engine. To remove unit, disconnect primary and condenser lead, take out screws mounting unit on breaker plate. To install unit, connect primary and condenser leads to point assembly terminal, position unit on breaker plate, install and tighten hold-down screws (*CAUTION* - Ground lead terminal must be attached to screw at breaker arm pivot end of bracket).

Vacuum Advance Unit Removal & Installation - Remove spring clip securing diaphragm link to breaker plate, take out two screws mounting vacuum unit on distributor housing, remove vacuum unit by withdrawing link through slot in housing.

Breaker Plate Removal & Installation - After removing vacuum advance unit (above), remove nut, washer, and bushing from primary terminal screw, remove terminal screw and insulator from within housing. Remove two screws and retainers in housing which retain breaker plate assembly, then lift breaker plate assembly out.

OVERHAUL: Disassembly - Remove spring clip and disconnect diaphragm link at breaker plate. Disconnect and remove diaphragm assembly from distributor base. Remove primary terminal screw, bushing, and insulator. Remove breaker point assembly and condenser, then remove two screws and retainers securing breaker plate in housing and remove plate. Remove lubricating wick from cam assembly, cam assembly retainer, cam assembly, and upper thrust washer. Remove distributor weight springs. (*NOTE - Mark the secondary spring and bracket to which it is attached for identification at reassembly).* If gear and shaft are to be reused, mark both parts so pin holes can be aligned for reassembly. Remove driven gear roll pin, then remove gear. On cars with a tachometer attachment, align tachometer drive gear roll pin with holes in distributor base, then secure distributor in a vise and remove roll pin. If gear is to be reused, mark gear and shaft so holes may be aligned at reassembly. Using an arbor press, support the assembly so shaft is clear of support plate, then press shaft out of tachometer gear and housing. Remove gear and lower thrust washer, then using an arbor press (and a shaft smaller in diameter than the bushing outer diameter), press bushing and oil seal out of housing. On conventional distributors, remove shaft collar roll pin, then press shaft out of collar and housing and remove distributor shaft bushing in same manner as for distributors with tachometer drive.

Inspection: Inspect all parts for damage or wear and replace as necessary. Check distributor shaft for wear at the bushing. Minimum allowable shaft diameter is .4675". Maximum allowable inside diameter of bushing is .4690". Clean all parts before reassembly.

Reassembly: Install new bushing, then with an arbor press and Bushing Installer, Tool T57L-12120-A or equivalent, press bushing into housing until installer tool bottoms against distributor base which correctly positions the bushing. Burnish bushing to proper size with Tool 12132. On distributors with tachometer drive, install a new oil seal. (*NOTE - If a new shaft is being installed, see "New Shaft & Gear Installation" below).* On distributors with tachometer drive,

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FORD, LINCOLN, MERCURY DISTRIBUTORS (Cont.)

when the old gear and shaft are to be installed, install lower thrust washer, then install tachometer drive gear on shaft. Press gear into place until it bottoms on thrust washer. Align holes in gear, shaft and housing and install a new roll pin. On conventional distributors, place collar in position on shaft, then align holes in collar and shaft and install a new roll pin. Check shaft endplay with a feeler gauge placed between automatic advance stop plate and top of bushing. If endplay is not within limits of .022-.030", replace the shaft. On all distributors, press drive gear on shaft, using the marks made on gear and shaft at disassembly, to align the pin holes. Check gear location which should be 4.991-4.996" between bottom face of gear and bottom face of distributor mounting pad with gear pushed toward distributor base so there is no endplay. Install roll pin. *(NOTE* - Shaft and gear must be replaced as an assembly. Do not replace one part without replacing the other). Install weights and springs making sure that secondary spring marked at disassembly is replaced in the proper location. Fill groove of weight pivot pin with ball bearing lubricant. Lubricate inside of cam assembly with ball bearing lubricant, then install thrust washer, cam, and spring retainer. Lightly oil cam lobes, then saturate wick with SAE 10 engine oil and install wick in cam assembly. Lubricate breaker plate bearings and install breaker plate. Install condenser, breaker points and plate retainers. Be sure ground wire lug is attached to breaker plate attaching screw. Install primary wire and insulator on terminal screw and install bushing and screw in distributor base. Install diaphragm assembly. Align distributor points, adjust spring tension and point gap. Adjust automatic and vacuum advance.

Now Distributor Shaft & Gear Installation: Oil the shaft and slide it into distributor body. Attach Distributor Shaft Support, Tool T57L-12390-A (Detail 1) or equivalent, to distributor and place distributor in Holding Fixture, Tool T52T-12132-DJD or equivalent, and place assembly in press. Insert a .022" feeler gauge between automatic advance stop plate and top of bushing. Tighten backing screw on support tool enough to remove all shaft endplay. On distributors with tachometer drive, install lower thrust washer, then install tachometer drive gear on shaft and press it into position until it bottoms on thrust washer. Support shaft and align holes in shaft and distributor base, then drill a 1/8" hole through shaft using hole in drive gear as a pilot. Install roll pin. On conventional distributor, place collar in position and support the shaft. Hold collar against distributor housing and drill a 1/8" hole through shaft, using hole in collar as a pilot. On all distributors(support tool .022" feeler gauge still installed), press drive gear into position using an arbor press. Drill a 1/8" hole through gear and shaft, using the hole in gear shoulder as a pilot, then install a new roll pin. Remove support tool and feeler gauge and complete distributor assembly as indicated above.

DELCO-REMY STARTER CONTROLS

	Starter	Solenoid	Drive
BUICK			
1957	1107667	① 1119919	1935853
CADILLAC			
1957	1107657	② 1119919	1932188
CHEVROLET			
1957 6 Cyl. Pass.	1107652	1119781	1932188
1957 V8 Pass.	1107660,64	1119919	1935827
1957 Fwd. Cont. Trk.	1107626	1119919	1932188
1957 V8 Trk.	1107664	1119919	1935827
OLDSMOBILE			
1957	1107665	1119798	1932188
PONTIAC			
1956	1107641	1119781	1932188
1957	1107661	1119798	1932188

① - With separate Relay No. 1116921.
② - Eldorado Brougham has Automatic Starter Relay.

DESCRIPTION: "Enclosed Shift Lever" type combined starter switch and solenoid pinion shift operates in exactly the same manner as previous Delco-Remy "Solenoid Starter Switches (No Relay)". The solenoid has been redesigned for more efficient operation and the entire pinion shift lever mechanism has been enclosed in a housing which is integral with the drive housing and end plate. The starter is of the extruded frame type without any opening at the commutator end so that the entire starter and drive assembly is completely enclosed to protect it from dirt and splash. Drive pinion clearance is not adjustable.

TESTING & CHECKING: Solenoid Windings - With switch disconnected from starter motor, the two following current draw tests may be made.

Pull-In Windings (Both Windings in Parallel) - Remove screw from solenoid motor terminal and bend field leads slightly until clear of terminal. Ground solenoid motor terminal with a heavy jumper wire, then connect a 12 volt battery, a variable resistance, and an ammeter of 100 amperes capacity in series with solenoid "S" terminal. *(NOTE* - The "S" terminal is marked, and is located on engine side of motor field strap connector on front of solenoid). Connect a heavy jumper wire from solenoid base to ground post of battery, then connect a voltmeter between base of solenoid and solenoid "S" terminal. Slowly adjust resistance until voltmeter indicates 10 volts. Reading on ammeter should be as indicated in "Test Specifications" below.

Hold-In Winding - After completing above test, remove jumper wire from solenoid motor terminal and readjust the variable resistance until voltmeter reads 10 volts. Ammeter reading should be as indicated in "Test Specifications" below.

▷ *TESTING NOTE:* If solenoid does not test within specifications, replace the solenoid assembly.

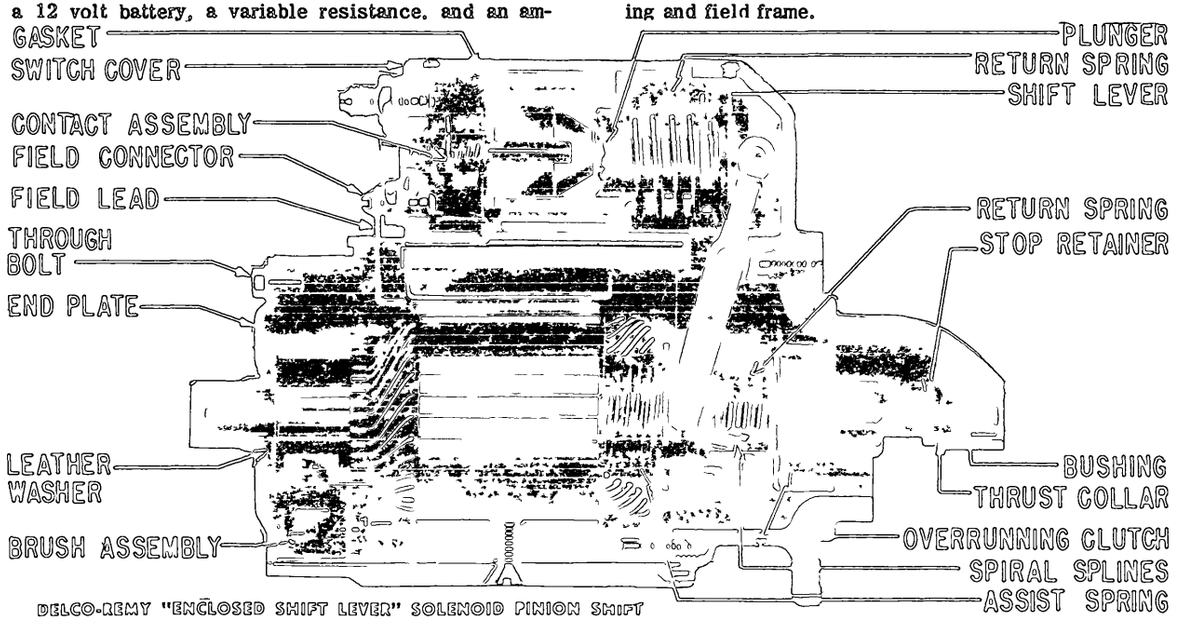
Test Specifications

Pull-In Windings - 40-45 amperes at 10 volts with solenoid at room temperature.

Hold-In Winding - 10-12 amperes at 10 volts with solenoid at room temperature.

Pinion Clearance: *(NOTE - Pinion clearance cannot be adjusted. If not correct, motor must be disassembled and defective parts replaced).* To check clearance, connect a 6 volt battery between "S" terminal and ground. *(CAUTION* - Do not connect battery to "R" ignition coil terminal. To prevent motoring, connect a heavy jumper wire from solenoid motor terminal to ground). With the solenoid energized, push pinion away from stop retainer as far as it will go, then use a feeler gauge to check clearance between pinion and retainer. Clearance should be .010-.140"

▷ *SOLENOID INSTALLATION NOTE:* When installing solenoid, apply sealing compound on both sides of solenoid flange where it extends between drive housing and field frame.



DELCO-REMY "ENCLOSED SHIFT LEVER" SOLENOID PINION SHIFT

4-HEADLIGHT (QUADRI-LIGHT) SYSTEMS

Cadillac, Eldorado Brougham (1957)
Chrysler & Imperial, All Models (1957)
De Soto, All Models (1957)
Lincoln (1957)
Mercury, Turnpike Cruiser (1957)
Nash, Ambassador V8 (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*DE SOTO HEADLIGHT DOOR INTERFERENCE (First Cars):* Before re-installing door after aiming headlights, inspect inner side of door and make certain that lower slots in door flange provide clearance for ears on sealed beam mounting units. If necessary, lengthen slot (lower end of outer lamp slot, upper end of inner lamp slot) to completely clear the ears.

►*LINCOLN AUXILIARY HEADLIGHT WIRING MODIFICATION:* The headlight wiring system can be modified so that it will be IMPOSSIBLE to use the Headlights and Roadlamps (second set of Headlights) at the same time, wherever this is preferred or required by regulations. Proceed as follows: Disconnect lead wires on existing Auxiliary Over-ride Switch (on steering column), remove and discard switch. Install new switch, Part No. FDU-15224-C. Connect switch leads as follows: 1) Red Switch Lead with bullet terminal to Blue Lead in Wiring harness, 2) Tape Black Wire in harness (not used). 3) Route Yellow and Black Leads from switch along main wiring harness to Light Switch, 4) Disconnect Red-with-Yellow-Band Wire from Light Switch and connect new Yellow lead to this terminal, 5) Connect Black Lead to the Red-with-Yellow-Band Wire disconnected from the switch.

DESCRIPTION & OPERATION: The 4-Headlight systems on 1957 car models use new Sealed Beam units (see Lamp Bulb Data below). Conventional double filament headlights (Upper and Lower Beam) are supplemented by a second set of single filament headlights (Upper Beam only) mounted beside (toward center of car) or below the regular headlights. These additional headlights are connected directly to the upper beam lead of the regular headlights so that they are illuminated only when the upper beams are in use (except Lincoln - see Lincoln Wiring Note below). When the regular headlights are switched to lower beam the additional headlights go out, and the usual two-headlight pattern is presented to a passing car.

►*LINCOLN HEADLIGHT WIRING NOTE:* *See Wiring Modification (above).* The Auxiliary Headlights (additional headlights) are controlled by the main Lighting Switch and are lighted with the switch in the "Park" position (Parking & Tail Lights on, regular Headlights off) and also with the switch in the regular "On" position (Regular Headlights and Tail Lights on, Parking Lights off). The Auxiliary Headlights are not controlled by the Beam Selector Switch and do not go out when the regular headlights are switched to Lower Beam. However, an Auxiliary Over-ride Switch is provided (on right side of steering column) so that the Auxiliary Headlights can be switched off whenever they are not wanted.

Lamp Bulbs (All Models except Lincoln - see Lincoln Bulb Note below): New 5¾" Special Sealed Beam Units. Regular headlight units (double filament) are three-prong type, auxiliary headlight units (single filament) are two-prong type and units cannot be installed incorrectly. **Regular Headlight (Outer or Upper Unit)** - No. 4002 (50-37½ W). Numeral "2" is molded in top of lens. **Auxiliary Headlight (Inner or Lower Unit)** - No. 4001 (37½ W). Numeral "1" is molded in top of lens.

►*LINCOLN BULB NOTE:* This model does not use the new small bulb units. Regular headlights are Sealed Beam Unit, No. 5400 (50.40W), Roadlamps (second set of headlights) are Sealed Beam Unit, No. 4415 (35W - single filament).

HEADLIGHT AIMING & ADJUSTMENT: All headlights are aimed with reference to the lamp "Vertical Center-line" and it will be necessary to establish separate center-lines on the screen for outer and inner headlights (side-by-side mounting). Where upper and lower headlights are used, the same vertical center-line can be used for both. A "Horizontal Lamp Center-line" is also used together with the usual horizontal line 2" below lamp center height. Correct light patterns for each type headlight are shown in the illustrations.

Headlight Aiming Gauges - Sealed beam units have the usual pedestals or gauge points molded in the lens and T-3 or other Gauges can be used for headlight adjustment if the necessary adapters are used.

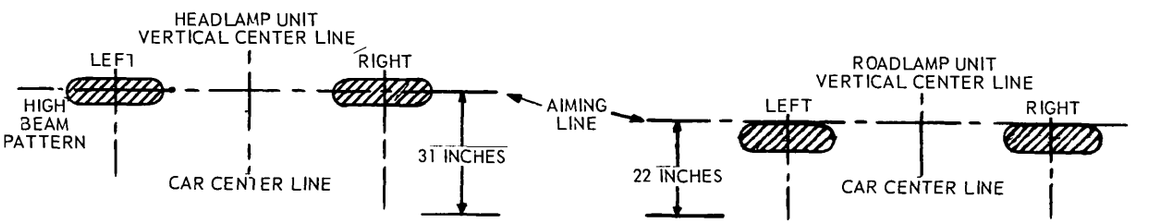
Headlight Aiming Tolerances - Tolerances are Plus or Minus 2" (vertical limits), Plus or Minus 6" (horizontal limits).



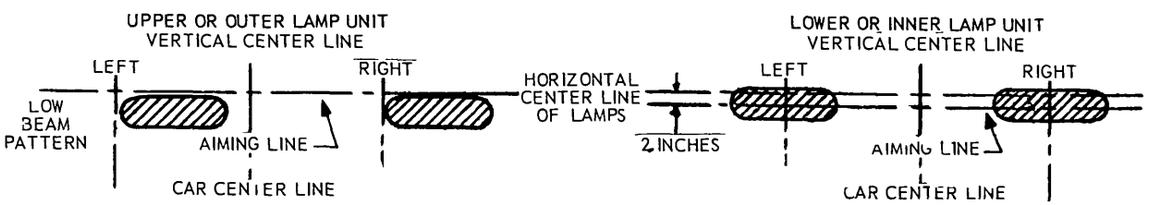
1957 CADILLAC ELDORADO BROUGHAM



1957 CHRYSLER & DE SOTO



1957 LINCOLN MODELS



1957 MERCURY & NASH AMBASSADOR

4-HEADLIGHT AIMING CHARTS (ALL MODELS)

AUTRONIC EYE

Cadillac (1957)
Ch vrolet (1957)
Oldsmobile (1957)
P ntiac (1957)

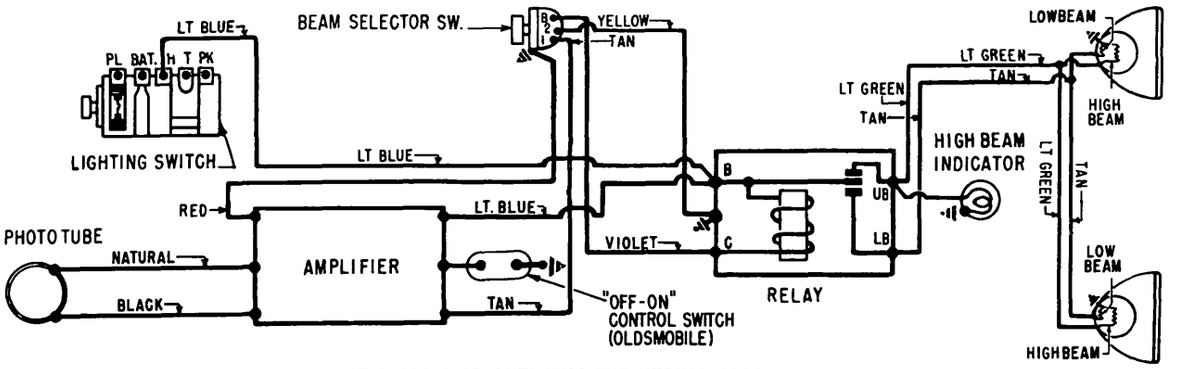
DESCRIPTION: Similar in design and operation to previous models. A combination foot operated dimmer switch and Autronic Eye "over-control" switch is used which automatically controls the headlamps when switch is in the "high" beam position. The "low" beam position provides constant low beam operation. When the foot switch is in "high" beam, or automatic position, it can be used as an override switch to manually turn on the "high" beams by applying a slight downward pressure on top of switch. On Oldsmobile models, a separate "On-off" switch located in the headlamp switch, controls the Autronic Eye in addition to the dimmer switch. On all models, the dimmer switch must be in the "high" beam position before lights will operate automatically.

TESTING & ADJUSTING: *(CAUTION - The Autronic Eye unit develops 800 volts. Make sure the headlamps are OFF before removing cover from phototube unit).*

► *AIMING DEVICE AE-4 INSTALLATION NOTE:* Remove cover from phototube and install the aiming device in accordance with instructions enclosed with the unit. Adjust aiming dial on the Aiming Device to the number stamped on name plate at bottom side of phototube unit (number is a single digit located directly below the serial number).

V rtical Aiming Adjustment: Position car on a level floor (level within ¼" fore and aft of car), then rock car gently to equalize springs. Install Aiming Device AE-4 (see installation note above). Adjust phototube unit aiming screw with an Allen Wrench (screw is located on bottom of phototube unit at rear edge of pedestal), until bubble in aiming device is centered in level. *(NOTE* - If phototube unit is aimed too low, reflections from the car's own headlamps will cause them to be held on "low" beam. Also, the phototube unit must be aimed as low as possible to provide maximum tolerance for car loading).

H riz ntal Aiming Adjustment: Place two pieces of tape or chalk marks 24½" apart on a wall or screen at hood level height. With the car placed 25 feet from wall or screen, align centerline of hood with the right hand tape or chalk mark. Install Aiming Device AE-4, then aim over sights to left hand tape. If phototube unit is aimed more than 4" to right or left of left hand tape, reset phototube by loosening mounting stud nut under instrument panel. If necessary, one of the mounting holes in instrument panel may be elongated.



TYPICAL 1957 AUTRONIC EYE WIRING DIAGRAM

Hold Sensitivity Test: Install Aiming Device AE-4 (see above), then turn headlamps ON and **wait at least four minutes** for amplifier to stabilize. *(NOTE - On Oldsmobile, it will also be necessary to turn Autronic Eye switch ON).* Set foot dimmer switch to "high" beam which also places Autronic Eye in automatic position. Turn "zero corrector" on face of meter until meter pointer is on zero set line. Turn "intensity rheostat" of tester counterclockwise, then insert tester connector into cigar lighter receptacle. Operate engine at fast idle while making sensitivity tests and adjustments. Turn "tester selector switch" to DIM position (be sure to use proper DIM position for clear or tinted windshields). Turn "intensity rheostat" all the way clockwise to end of adjustment to obtain a lower beam. Turn "test selector switch" to HOLD position. Slowly turn "intensity rheostat" counterclockwise just to point where headlamps switch to "high" beam. Meter pointer should now read in the "hold sensitivity adjustment bar" on the meter scale. If not within this range, adjust as follows:

Adjustment - *(NOTE - Both the HOLD and DIM adjustment controls are located on the underside of the amplifier unit and each is identified by a stamp on the amplifier cover. THE HOLD SENSITIVITY ADJUSTMENT MUST BE CORRECTLY MADE BEFORE ADJUSTING THE DIM SENSITIVITY.* Turn the HOLD adjustment clockwise to the end of its travel, then rotate "intensity rheostat" all the way clockwise. Turn selector momentarily to DIM position to switch lights to lower beam, then switch back to HOLD position. *(NOTE - If lights do not switch to lower beam, the DIM adjustment control must be turned clockwise to end of adjustment and then readjusted after HOLD adjustment is correct).* Adjust tester "intensity rheostat" until meter pointer is in center of "hold sensitivity bar". Turn the HOLD adjustment control (on amplifier) counterclockwise SLOWLY just to point where headlamps switch to upper beam. Rotate tester "intensity rheostat" clockwise to end of travel, then turn "selector switch" momentarily to DIM position and back to HOLD. (Headlamps should now be on lower beam). Recheck HOLD adjustment by turning "intensity rheostat" SLOWLY counterclockwise just to point where headlamps switch to upper beam. Meter pointer should now be aligned with the right hand edge of HOLD adjustment green bar if adjustment is correct. If not, repeat the above procedure.

Dim Sensitivity Test: Rotate tester "intensity rheostat" completely counterclockwise. Turn "selector switch" to DIM position. Headlamps should now be on upper beam. Turn "intensity rheostat" SLOWLY clockwise, stopping at the exact point where the headlamps switch to lower beam. Meter pointer should be within the "dim sensitivity adjustment" line. If not properly adjusted, proceed as follows:

Adjustment - *(NOTE - Do not mak this adjustm nt until after "Hold Sensitivity Adjustm nt" is mad).* Rotate DIM control fully counterclockwise. Momentarily turn tester OFF, then back to DIM position. Headlamps should now be on upper beam. Adjust "intensity rheostat" until meter pointer reads in the right hand edge of "dim sensitivity adjustment" line. SLOWLY rotate DIM control clockwise just to point where headlamps switch to lower beam. DO NOT GO BEYOND THIS SETTING. Turn tester "intensity rheostat" completely counterclockwise, then momentarily turn tester to OFF and back to DIM. Rotate tester "intensity rheostat" SLOWLY clockwise just to point where headlamps switch to lower beam. Meter will read within "dim sensitivity adjustment" line if adjustment is correct. If not, repeat the above adjustments. Remove tester, and Aiming Device AE-4. Replace lens, cover and screw.

1957 BRAKE INDEX

BUICK Pag
Bendix Single Anchor....303
Bendix Power Unit (Hydraulic Reaction)....296
Moraine Power Unit....298

CADILLAC
Bendix Single Anchor....303
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data

CHEVROLET PASS. CARS & CORVETTE
Bendix (Chevrolet)....308
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data
Bendix Power Unit (Hydraulic Reaction)....296

CHEVROLET TRUCKS
Bendix (Chevrolet)....308
Twinplex....309
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data

CHRYSLER & IMPERIAL
Chrysler "Center-Plane"....305
"Bellows Type" Power Unit....292
Power Brake Pedal Adjustment....293

DE SOTO
De Soto "Center-Plane"....305
"Bellows Type" Power Unit....292
"Bellows Type" Pedal Adjustment....293
"Oval Piston Type" Power Unit....294

DODGE
Dodge "Total Contact"....305
"Oval Piston Type" Power Unit....294

FORD PASS. CARS & THUNDERBIRD
Bendix (Ford)....310
"Bellows Type" Power Unit....290
Midland Power Unit....Pg. 309 in 1956 Annual Data

FORD TRUCKS Pag
Bendix (Ford)....310
Bendix (Uni-Servo)....313
Self-Centering....312
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data
Midland Power Unit....Pg. 309 in 1956 Annual Data

HUDSON
Bendix Single Anchor....303
Bendix Power Unit (Hydraulic Reaction)....296

LINCOLN & CONTINENTAL
Bendix (Lincoln)....310
Bendix Power Unit (Vacuum Reaction)
Pg. 301 in 1956 Annual Data

MERCURY
Bendix (Mercury Early)....310
Bendix (Mercury) Automatic Adjuster (Later)....311
Bendix Power Unit (Vacuum Reaction)
Pg. 301 in 1956 Annual Data

METROPOLITAN
Girling....Pg. 301 in 1954 Annual Data
or Later Manual Edition

NASH
Bendix Single Anchor....303
Bendix Power Unit (Hydraulic Reaction)....296

OLDSMOBILE
Bendix Single Anchor....303
Bendix Power Unit (Hydraulic Reaction)....296
Bendix Power Unit (Vacuum Reaction)
Pg. 301 in 1956 Annual Data
Moraine Power Unit....298

PACKARD
Wagner (Lockheed) Self-Centering....307
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data

PLYMOUTH Pag
Plymouth "Total Contact"....305
"Bellows Type" Power Unit....292
Power Brake Pedal Adjustment....293

PONTIAC
Bendix Single Anchor....303
Bendix Power Unit (Hydraulic Reaction)....296
Moraine Power Unit....298

RAMBLER
Bendix (Lockheed) Self-Centering....306
Wagner (Lockheed) Self-Centering....307
Bendix Power Unit (Hydraulic Reaction)....296
Bendix Power Unit (Vacuum Reaction)
Pg. 301 in 1956 Annual Data

STUDEBAKER
Wagner (Lockheed) Self-Centering....307
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data

WILLYS
Bendix (Lockheed) Self-Centering....306
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data

POWER BRAKE BOOSTERS
Bendix Power Unit (Hydraulic Reaction)....296
Bendix Power Unit (Vacuum Reaction)
Pg. 301 in 1956 Annual Data
Chrysler, De Soto, Dodge, Plymouth
"Bellows Type" Power Unit....292
"Oval Piston Type" Power Unit....294
Ford "Bellows Type" Power Unit....290
Hydrovac Power Unit
Pg. 305 in 1956 Annual Data
Midland Power Unit....Pg. 309 in 1956 Annual Data
Moraine Power Unit....298

1957 POWER BRAKES

FORD "BELLOWS TYPE"

Ford Pass. (Except Thunderbird) (1957)

DESCRIPTION: The "Pedal-Assist Power Unit" consists of an air-vacuum bellows and control valves, with vacuum supplied from engine intake manifold, and vacuum reserve tank. Unit is mounted on driver's side of dash panel and attached to brake power lever. Brake power lever is linked to brake pedal. Brake pedal position controls closing of air valve and opening of vacuum valve. Master cylinder is mounted on engine side of dash panel, and is operated by master cylinder pushrod directly connected to brake pedal. Eccentric adjustments regulate the action of the air valve and the length of the master cylinder pushrod.

OPERATION: Bellows chamber is open to atmospheric pressure when pedal in released position. As pedal is depressed, finger on pedal contacts air valve causing it to close at the same time opening the vacuum valve. Intake manifold vacuum (or reserve tank vacuum) moves air from bellows chamber. As pressure decreased, bellows contracts and exerts a force on the brake power lever, which is transmitted through the connecting link to the brake pedal and assists the operator in depressing the pedal. When pedal is held in a fixed applied position the assist pressure is held constant. Assist pressure is directly in proportion to pedal apply pressure. As pedal is released, air valve is opened by spring pressure, admitting atmospheric pressure to bellows chamber so bellows expands to normal position.

ADJUSTMENTS: Air Valve - Turn valve-adjusting eccentric until unit chatters when pedal is depressed, then turn eccentric until chatter disappears. (*CAUTION* - Do not turn eccentric more than necessary or "cut-in" will be excessively high). *NOTE* - If satisfactory adjustment of eccentric cannot be made, look for bent pedal trigger. Pedal trigger is bent when distance from back of trigger to front edge of hole in pedal is less or greater than .950"±.005". To correct, bend trigger or replace pedal. Tighten nut to 180-220 inch lbs.

Master Cylinder Pushrod - Loosen pushrod eccentric locknut. Rotate eccentric clockwise to maximum to shorten pushrod so master cylinder piston will return to fully unapplied position. Rotate eccentric counterclockwise until master cylinder piston starts to resist movement of pushrod. Hold eccentric and tighten locknut to 180-220 inch lbs. Bubble or spurt at compensator port in master cylinder indicates pushrod properly adjusted.

REMOVAL: Power Unit - Remove vacuum hose from top of unit. Remove valve adjusting eccentric with flat washer, spring, and bushing. Remove nylon bushing from power unit valve housing. Remove two mounting bracket-to-dash panel screws and remove power unit from car.

Brake Pedal - (Cars with clutch pedal). Release clutch release assist spring tension at adjuster, remove spring, idler lever from clutch pedal lever. Remove clutch shaft retaining clip, spring washer, and flatwasher, clutch pedal and shaft from support bracket. **(Cars without clutch).** Remove brake pedal shaft, support

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FORD "BELLOWS TYPE" POWER BRAKE (C nt.)

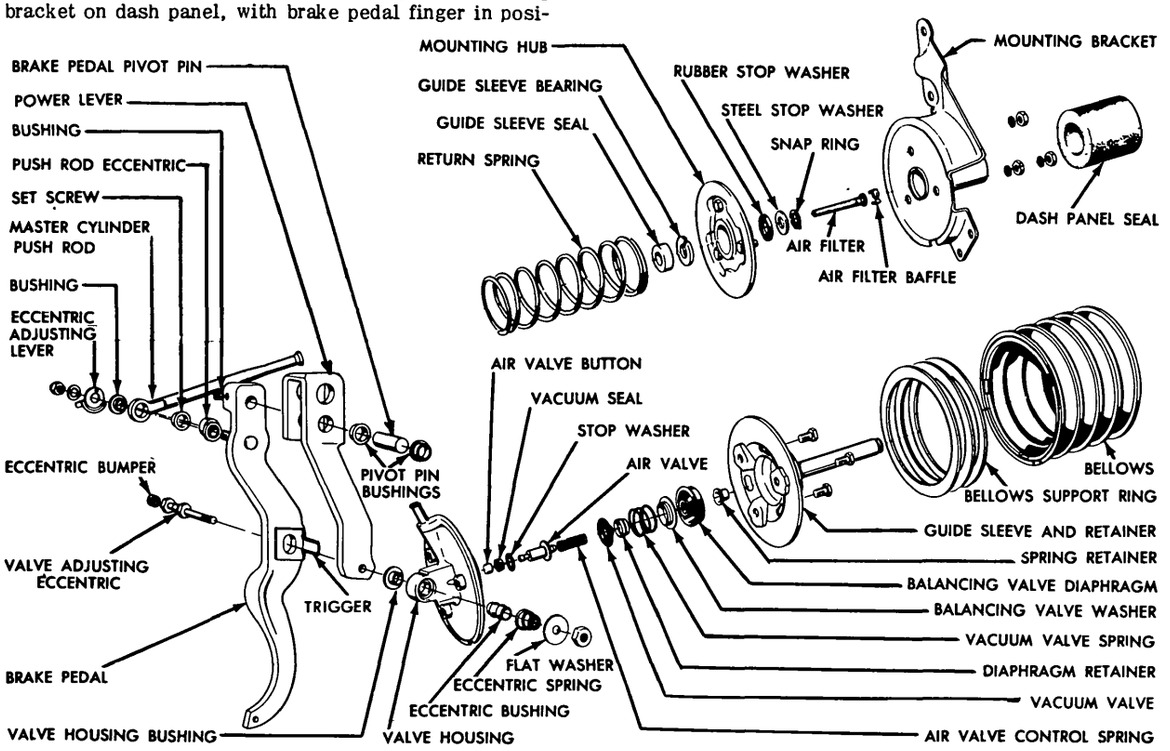
brake pedal and power lever, and remove pedal bushing. Leave master cylinder pushrod attached to brake pedal. Pull master cylinder pushrod out of master cylinder boot. *NOTE* - Replace pedal pivot bushings as necessary. Remove pedal pivot pin set screw, drive out pivot pin, remove power lever. Lubricate new nylon bushings with silicone lubricant, reassemble power lever, install pivot pin and set screw, replace brake pedal and power lever in car.

DISASSEMBLY: Remove mounting bracket, push down and sideways and unhook air filter baffle from guide sleeve, remove baffle and filter. Remove snap ring, steel stop washer and rubber stop washer by pushing down on mounting hub and bellows. Hold down on mounting hub, remove bellows from hub, then remove mounting hub and return spring. Remove three retainer and guide assembly-to-valve-housing mounting screws, retainer and guide sleeve assembly and bellows from valve housing. Remove retainer and sleeve from bellows. Remove air valve control spring, valve balancing diaphragm, retainer, vacuum valve spring, vacuum valve and air valve.

INSPECTION: Wash all metal parts including air filter in alcohol or solvent which will not leave oil film, and dry all parts with moisture-free compressed air. Wash rubber parts in mild soap and water, rinse clean and dry with air. Replace worn or damaged parts, including valve housing if vacuum valve seat is damaged.

REASSEMBLY: Mount valve housing in vise with alignment marks visible. To install air and vacuum valves, reverse disassembly procedure after lubricating parts with silicone lubricant. *NOTE* - Retainer is installed on valve balancing diaphragm with small diameter toward the diaphragm, and the retainer and center diaphragm must be pressed down over the vacuum valve neck. Use three support rings when replacing bellows. Assemble bellows (either end) over retainer and guide sleeve assembly, with three bosses in retainer aligned with three slots in bellows. Place bellows and retainer over valve balancing diaphragm and in position on valve housing. Finger tighten three capscrews, then tighten to 85-115 inch pounds. *CAUTION* - Sight down guide sleeve to insure air valve control spring is seated squarely in retainer. Test air valve by pressing it in gradually and noting the increased spring tension from air valve spring to vacuum valve spring. Valve should snap back readily. Place return spring on guide sleeve, slide mounting hub on sleeve, hold down against return spring and assemble bellows over mounting hub. Hold mounting hub down, install rubber stop washer, steel stop washer over guide sleeve, then snap ring. Install air filter baffle on filter, filter and baffle in guide sleeve. Filter baffle fits in same groove with and above snap ring. Place mounting bracket on mounting hub, align notch in mounting bracket with tab on bellows, install lockwashers and nuts and tighten to 85-115 inch lbs. Install dash panel seal. Install nylon bushing in valve housing.

INSTALLATION: Pull brake pedal back until master cylinder pushrod hangs free. Position power mounting bracket on dash panel, with brake pedal finger in position against air valve button and tighten nuts and screws. Install valve-adjusting eccentric and bumper through brake pedal and valve housing of power unit. Slide eccentric bushing (either end) over valve-adjusting eccentric and into valve housing. Install eccentric spring with large coils toward housing, then flatwasher and nut. Tighten valve eccentric nut until eccentric bolt is firmly locked to power lever but can still be turned for adjustment. Adjust eccentric, see *Adjustments preceding.* Disconnect mounting bracket from dash. Pull power unit and pedal back toward car seat until master cylinder pushrod can be inserted in master cylinder boot. Reattach mounting bracket to dash panel. Adjust master cylinder pushrod, see *Adjustments preceding.*



FORD "BELLOWS" TYPE VACUUM POWER BRAKE ASSEMBLY

CHRYSLER, DE SOTO, PLYMOUTH "BELLOWS TYPE"

Chrysler & Imperial, All Models (1957)
DeSoto S-26 Adventurer (1957)
Plymouth, All Models (1957)

DESCRIPTION: This "Assist Type" power brake unit consists of an oval shaped air-vacuum bellows, control valve, and push rod. A control valve operating rod extends through the push rod and actuates the brake unit control valve. The unit is mounted on the engine side of the dash panel and is connected mechanically to the brake pedal linkage. A trigger arm on brake lever operates the control valve through the valve operating rod. In the event of power failure, normal manual brake action is assured as the brake pedal lever pin is free to slide in slot of power piston rod yoke when brake pedal is depressed.

OPERATION: Vacuum from the intake manifold is applied to unit, and air is evacuated from the air-vacuum bellows through the vacuum valve during brake application. When brakes are released, air (atmosphere) enters the unit through the built in air cleaner and is regulated by the air valve. The valve operating rod, which is controlled by the pedal, overcomes the spring pressure of the air valve and keeps atmospheric pressure inside the air-vacuum bellows. The return spring extends the bellows completely whenever brakes are not applied.

ADJUSTMENT & TROUBLE SHOOTING: *See "Power Brake Pedal Linkage Adjustment (following).*

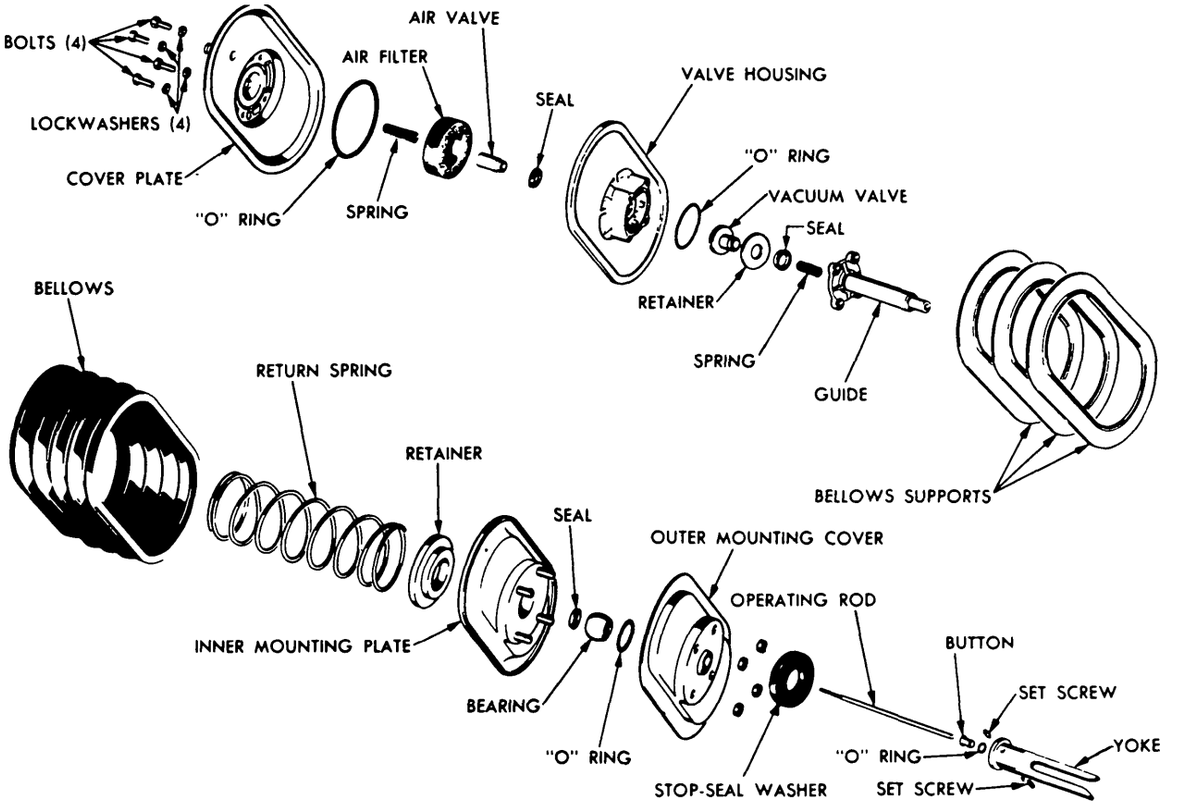
REMOVAL: *(CAUTION – Before removing brake unit, place a wood wedge between brake power lever and the forward edge of triangular opening in brake pedal lever bracket to prevent trigger arm from extending through hole in dash panel which would cause damage to trigger arm).* Remove the nuts and lockwashers mounting unit to dash panel. Pull unit and mounting plate straight out and away from panel, using care not to lose the nylon bushings on pedal linkage pin which engage power unit yoke.

DISASSEMBLY: 1) Remove nuts attaching mounting plate to power unit and remove plate. Remove and discard "O" ring on mounting plate. With an Allan wrench loosen the two setscrews and remove yoke from power unit shaft. Discard the valve operating rod bottom seal.

2) Remove nuts attaching outer mounting plate. Using a screwdriver, gently pry up plate to loosen, and remove plate. Discard "O" ring seal. Compress bellows by hand sufficiently to remove the guide bearing. Remove and discard seal from inside bearing. Peel back outer lip of bearing completely around inner mounting plate (keep one hand on inner plate to keep it from snapping up). Remove plate and lift out return spring and retainer.

3) Place unit on its side and remove bolts and lockwashers attaching valve cover to valve. Lift off valve cover (if necessary, use a flat blade to separate cover plate from bellows flange). *(CAUTION – Use extrem care to avoid marking or scratching inner face of plate where it contacts bellows flange).* Remove "O" ring from valve cover and discard it. Remove air valve spring from center of valve, then remove the air filter. Slide air valve out of valve housing *(NOTE – It may be necessary to make a small hook from a paper clip to remove valve).*

4) Place valve housing end down on bench, then remove bellows from valve, by peeling back the outer lip of bellows. If a new bellows is to be installed, remove the three bellows supports. Remove bolts and lockwashers attaching guide to valve body. Lift out guide to expose vacuum valve, valve spring and seals. Discard seals. Remove vacuum valve and retainer and discard housing to guide seal. Invert valve housing and remove valve seal from its groove in valve body. *(CAUTION – If using a sharp instrument or pointed pliers, be very careful not to mark or scratch inside diameter bore of valve housing).*



"BELLOWS TYPE" POWER BRAKE ASSEMBLY

REASSEMBLY: Clean all parts except bearing, bellows, and filter and blow dry with air. Bellows may be cleaned with mild soap and water if necessary. Inspect all parts for damage and replace all defective parts. During reassembly, use new "O" and seal rings.

1) Insert a new air valve seal into bore of valve housing (lips of seal facing out when installed). Carefully position a new vacuum valve in retainer. Invert valve housing and install valve and retainer. Press down firmly on retainer to snap in place. Position a new valve housing to guide seal in groove provided. Install a new vacuum valve seal in bore of guide, with lips of seal toward bottom of bore.

2) Install the vacuum valve spring in center of valve (smallest). Position guide over vacuum valve, lining up bolt holes in guide with bolt holes in valve body. Carefully lower guide down against valve body, making sure that tapered portion of vacuum valve enters seal evenly. Press down on guide to seat, then install bolts and lockwashers. Tighten evenly and securely. *(CAUTION – Be sure that countersunk holes at end of guide line up with the long centerline of valve housing).*

3) If a new bellows is being installed, position the supports in bellows (bellows supports must be centered in the three center accordian folds and aligned with bellows and each other). Using holding fixture (made from a piece of four inch pipe) to support the guide and valve assembly, install the bellows. *(CAUTION – Be sure the arrows on edge of bellows and housing are aligned).*

CONTINUED ON NEXT PAGE

CHRYSLER, DE SOTO, PLYMOUTH "BELLOWS TYPE" POWER BRAKE (Cont.)

4) With the bellows in the holding fixture, lightly coat the outside surface of the air valve with silicone grease (do not use any other kind), then insert the **small end first** into bore of valve housing. Use finger pressure to test for free movement of valve against vacuum valve spring. Install air valve spring in recess in air valve and filter. Install a new valve housing cover "O" ring on shoulder of valve body hub. Position valve cover over housing, with notch in edge of cover matching arrow on bellows. Be sure that air valve spring nestles on dimple in center of cover. Press cover down evenly over valve housing to seat cover "O" ring. Install bolts and tighten securely.

5) Remove assembly from holding fixture and invert unit. Coat guide lightly with silicone grease, then install return spring. Position the spring evenly around hub of valve housing and guide. Place spring retainer and inner mounting plate over spring, being sure that arrow stamped on plate is in line with arrow on edge of bellows. Compress return spring, then fold edge of bellows over edge of plate so it fits evenly around plate.

6) Install a new guide bearing seal in groove inside bearing bore (seal must seat snugly in bearing). Using silicone grease, lubricate inside of bearing, then slide over guide while compressing bellows, (bearing must be installed with lip of seal facing out). Push bearing down over guide and into pocket of plate. Release bellows (bearing will ride up guide with plate into position. Install the bearing to mounting plate "O" ring, then lower outer mounting plate down onto assembly (the notch in edge of plate must be in line with arrows on bellows). Install nuts and draw down finger tight.

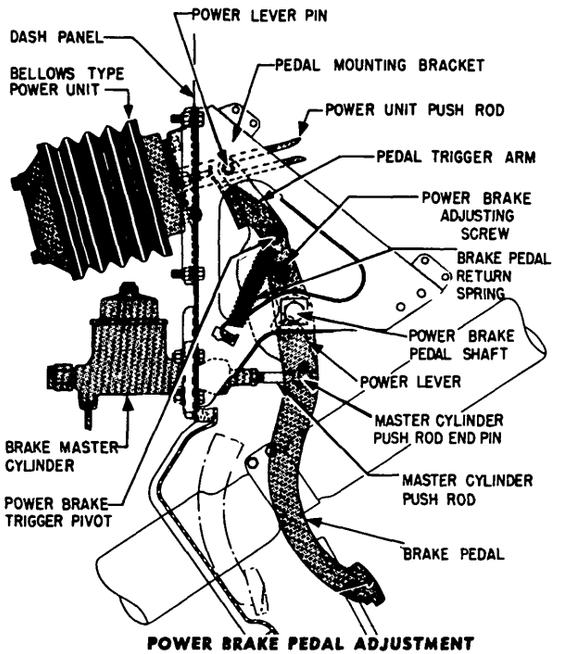
7) Slide a new valve operating rod seal ring over nylon bumper on end of rod and into groove, then install rod in center of guide. Press on end of guide to test for free operation of air and vacuum valves (a "two-step" movement should be felt when rod depressed and released fully). Place a new stop seal washer in position and install yoke on end of guide. Compress bellows slightly, then alternately tighten set screws (hub of yoke must be down snug against shoulder of guide, with the setscrews aligned with tapered holes in guide). Tighten mounting plate nuts securely. Place mounting bracket in position, with long center line of bracket at right angles to long centerline of power unit. The off set of the bracket must be so that when installed in car, the axis of the unit will be inclined down toward front of car. Install lockwashers, nuts and tighten securely.

INSTALLATION: Be sure that unit is so placed that its axis inclines down toward **front** of car and that vacuum inlet connection is toward engine. As the yoke passes through dash panel, be sure that it engages pedal linkage correctly by sliding over nylon bushings on power brake lever cross pin. Install mounting plate nuts and tighten securely.

CHRYSLER, DE SOTO, PLYMOUTH POWER BRAKE PEDAL ADJUSTMENT

ADJUSTMENT: Pedal Trigger –(*NOTE* – This adjustment is made with the brake pedal assembly removed from car). Install Gauge C-3508 (plastic material with scribed lines) over power lever pin, positioning center lines of gauge on center line of power brake lever. Position power brake adjusting screw so arrow on head of screw is pointing toward trigger pivot pin. Using a screwdriver, wedge the power brake pedal pivot to rear side of hole in power lever until the adjusting screw collar is compressed and metal to metal contact is made. With gauge installed and adjusting screw collar compressed, the outer curved surface of trigger arm must contact the inner circle scribed on gauge (distance between center line of power brake lever cross pin and outer curved surface of power brake pedal trigger arm must be .640" ± .005". If position of trigger arm not correct, adjust by turning power brake adjusting screw until trigger arm outer surface is aligned with inner circle of gauge. Tighten adjusting screw securely after correct adjustment made.

Arc of Trigger Arm - Install gauge, Tool C-3508 on power lever cross pin. With wedge removed and trigger arm-to-power brake lever cross dimension adjusted correctly, outer surface of trigger arm must contact outer circle of gauge within the angle scribed on gauge. NOTE - With pedal assembly clamped in vise, it will be necessary to move power lever (by hand) to locate trigger arm on outer circle of gauge. Carefully bend trigger arm to specifications or replace arm assembly. New trigger arm must be checked for correct arc.



POWER BRAKE PEDAL ADJUSTMENT

Pedal Free Play: Check adjustment as follows: Remove vacuum hose from power brake unit and press brake pedal several times to eliminate all vacuum in unit. Insert a screwdriver blade between rubber collar of power brake trigger pivot and rear side of elongated hole in power brake lever, forcing them apart (*NOTE – If brake pedal lever and power brake lever are not held apart, a false free play setting will be obtained).* Check the free play with linkage in this position by pushing lightly at pad end of brake pedal. Pedal free play should be between 1/16" & 1/8" (Dodge & Plymouth), 1/32" & 1/8" (Chrysler & DeSoto). Adjust as necessary by shortening or lengthening the master cylinder pushrod.

TROUBLE SHOOTING: If operation not satisfactory, correct by turning adjusting screw not more than 90° either way from original setting as follows:

Slow Pedal Release: Rotate adjusting screw counterclockwise.

Time Delay During Fast Application: Rotate adjusting clockwise.

Pedal Vibrates (Unit Chatter): Rotate adjusting screw counterclockwise.

CAUTION - Adjusting screw should not be turned more than 90° from vertical (arrow up).

DE SOTO, DODGE "OVAL PISTON" TYPE

D Sot , All xc. S-26 Adventurer (1957)
D dg , All 6 & V8 Mod ls (1957)

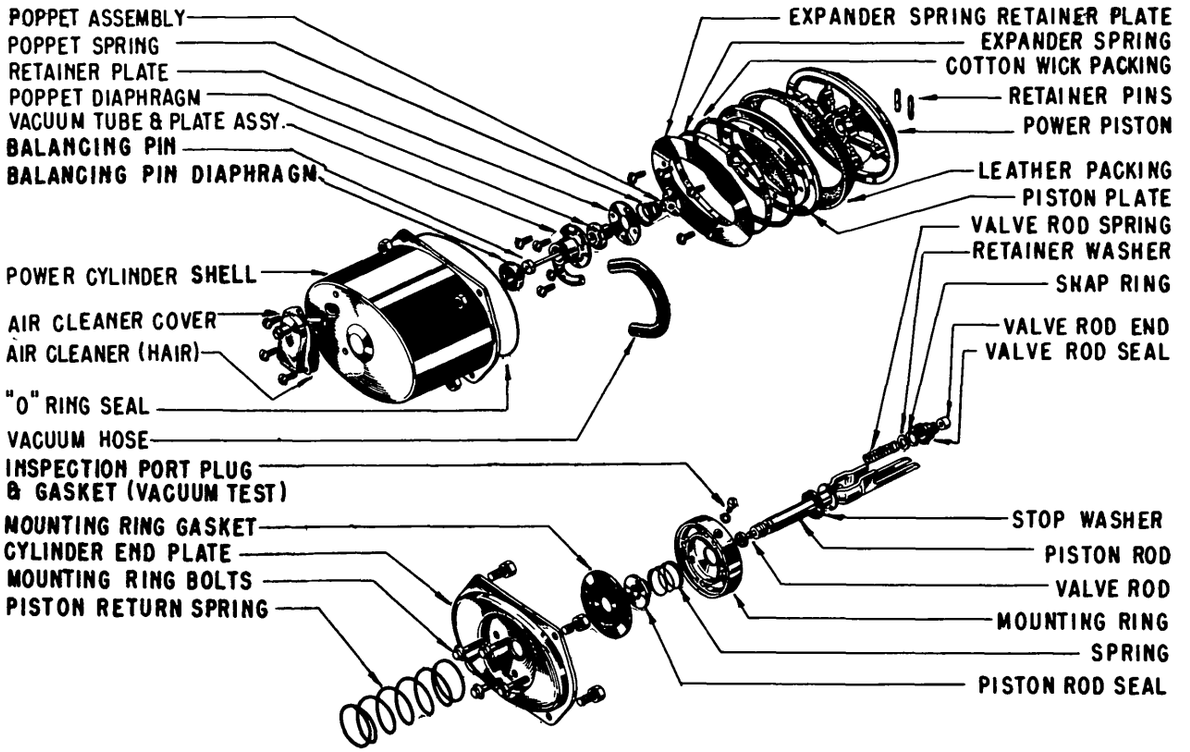
DESCRIPTION: Consists of an oval-shaped air-vacuum unit mounted on engine side of dash panel and connected mechanically to the brake pedal linkage through the power unit pushrod. A yoke at end of piston rod is in contact with the power lever pin of the reactionary linkage. The valve operating rod is located at the center of the piston rod and is always in contact with a ramp at the upper end of the valve trigger arm of pedal linkage. A control valve operating rod moves within the piston rod to actuate the vacuum valve and poppet. Mechanical contact between power unit and brake linkage exists only when power unit is assisting in a brake application. If vacuum fails, brake pedal is free to act independently to apply brakes in conventional manner. A vacuum reservoir, with check valve, is provided for a vacuum reserve.

OPERATION: Vacuum from the intake manifold, through the vacuum reservoir, is applied to unit, and air is evacuated from the applied direction side of the piston through the vacuum valve during brake application. When brakes are released, air (atmosphere) enters the unit through the built-in air cleaner and is regulated by the air valve. The valve operating rod, which is controlled by the pedal, and piston, is forced away from applied direction side by a return spring when brakes are released, permitting air to enter both vacuum and atmospheric chambers. Atmospheric pressure remains on both sides of piston until brakes are reapplied.

ADJUSTMENTS: Pedal Linkage Adjustment - If pedal pressure releases slowly, adjust by rotating adjustment screw (accessible through slot in left side of brake pedal bracket) **count r-clockwise.** A time delay (noted during a fast brake application) can usually be corrected by turning screw **cl ckwise.** Should pedal vibrate (booster chatter) turn screw in **counter-clockwise** direction. *NOTE* - Rotation of adjustment screw should be limited to plus or minus 90° from original setting.

P dal Free Play Adjustm nt: Remove vacuum hose and press brake pedal several times to release all vacuum. Insert blade of screwdriver between rubber collar of power brake trigger pivot and rear side of elongated hole in power brake lever, forcing them apart. *(NOTE* - If brake pedal and lever are not wedged apart, a false free play setting (which includes booster valve travel) will be measured at pad end of pedal). Check free play with linkage in this position by pushing lightly at pad end of brake pedal. Free play travel should be 1/32-1/8". If not within limits, adjust by lengthening or shortening pushrod as required.

Free Play M asur m nt (Alternate Method): Remove master cylinder pushrod end pin. With light finger pressure, move pushrod forward until contact made with master cylinder piston. Attempt to insert pushrod end pin through power lever and pushrod end hole. If pushrod must be pulled back to allow passage of pin, free play is present. If pushrod must be pushed further into master cylinder to allow passage of pin, no free play is present and adjustment must be made at pushrod.



DE SOTO, DODGE "OVAL PISTON" POWER BRAKE ASSY.

LUBRICATION: Periodically place a few drops of SAE 10W Engine Oil on brake lever pin bushings. No other lubrication required.

TROUBLE SHOOTING: Pedal Releases Slowly After Application or Brake Pedal Vibrates (Booster Chatter) - Pedal trigger arm improperly adjusted. *See Adjustments.* **Delay in Application (during Fast Brake Application)** - Pedal trigger arm improperly adjusted. *See Adjustments.* **Lack of Power Assistance (When Cold):** *(NOTE* - This condition only occurs after long periods of disuse). To correct, disassemble, clean off all old lubricants. Soften seals and diaphragm with silicone grease.

TESTING (On the Car): Check brake operation on the car using engine vacuum. Remove screw plug from mounting ring, connect test fitting, hose, and vacuum gauge at this port. Run engine to provide vacuum and make test as follows:

1) With brakes released and engine idling, note vacuum gauge reading. Gauge should read Zero indicating that brakes fully released. Reading of 1-16" indicates brakes not fully releasing. Check pedal adjustment. If pedal adjustment correct, power unit is faulty.

2) Depress brake pedal slowly and note vacuum gauge reading. Reading of 1-16" indicates power unit is operating. A zero reading indicates incorrect pedal operation, restriction in vacuum line, or faulty power unit. Check pedal adjustment. If pedal adjustment correct, remove power unit and disassemble for overhaul.

Checking Vacuum Source (Without Gauge): With engine stopped, depress brake pedal several times to exhaust vacuum in system and reserve tank. Start engine while holding pedal partially depressed. As soon as engine starts, pedal should move away from pressure being applied (indicating action of power boost). Shut off engine. Depress brake pedal 6-10 times noting effort required to press pedal in same distance each time. Effort required should increase from first to last application as vacuum source is depleted. If no difference noted in pedal effort with engine running or stopped, check for restriction in vacuum supply line by disconnecting line at power unit and holding finger over end of hose with engine running. A high vacuum should be noted.

REMOVAL & INSTALLATION: Power Unit - Place wood wedge between power brake lever and forward edge of triangular hole in pedal bracket to prevent trigger arm from extending beyond extremities of bracket. *(NOTE* - If pedal linkage is allowed to extend through hole in dash panel, damage to trigger arm may result). Discon-

CONTINUED ON NEXT PAGE

DE SOTO, DODGE "OVAL PISTON" TYPE (Cont.)

nect vacuum hose at power unit. Remove attaching bolts at dash panel and carefully remove power unit assembly. (*NOTE* - Use care not to lose pedal linkage cross pin). To install, reverse removal procedure. Install unit on dash panel so its axis inclines down and toward front of car.

Pedal Linkage - Remove pedal return spring, master cylinder pushrod end pin and power brake pedal lever shaft. Rotate pedal linkage assembly counter-clockwise while withdrawing power lever cross pin from booster unit yoke. (*NOTE* - Pedal is slotted to provide clearance for removal of brake pedal assembly). To install, reverse removal procedure. (*CAUTION* - Use extreme care during assembly and handling of linkage. Trigger arm is easily damaged). If power brake unit has been removed, place a wooden wedge between power brake lever and forward edge of triangular hole in pedal bracket to prevent trigger arm from extending beyond extremeties of bracket.

OVERHAUL: Disassembly - Scribe mark across flange of power cylinder and end plate as a guide for reassembly. (*CAUTION* - Do not clamp yoke in vise at any time). Remove bolts mounting endplate on cylinder, separate endplate and "O" ring seal from cylinder shell, disconnect vacuum hose from fitting within cylinder. Take out air cleaner attaching screws, remove air cleaner and filter material from end of cylinder. Disconnect vacuum hose from fitting on tube and plate assembly. Separate and disassemble all sub-assemblies as follows:

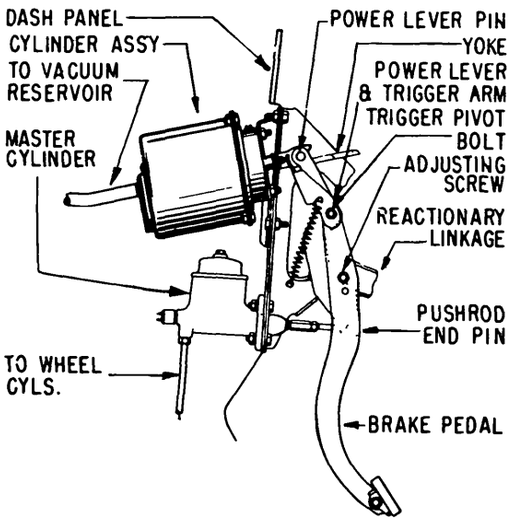
Control Valve - Remove balancing pin diaphragm from end of plate assembly housing, withdraw balancing pin from housing (use long nosed pliers). Take out tube and housing attaching screws, separate housing from piston. Remove valve assembly. Remove valve retaining plate by compressing diaphragm and working plate off over diaphragm, remove spring, remove diaphragm from poppet valve by "peeling" it off. Remove nylon valve rod end button from valve rod (within yoke) by using a thin bladed screwdriver on a 1" x 1" wooden block as a pry. Slide valve rod seal off, remove snap ring retaining valve rod in piston, remove valve rod washer and spring, then slide valve rod out of piston.

Piston Rod - Drive out two piston rod retaining pins using a 3/16" drift (*CAUTION* - Do not allow return spring to snap piston off rod as pins are removed). Remove piston and return spring, then slide piston rod out of endplate and remove rubber stop washer from rod.

Endplate - Take out mounting ring attaching bolts and separate endplate from mounting ring. Remove seal retainer spring, piston rod leather seal and mounting ring gasket. Remove vacuum inspection port plug and gasket from mounting ring.

Piston Plate - Take out screws mounting retainer plate on piston plate, separate these parts, remove expander spring, wick, packing plate, and leather packing.

Cleaning & Inspection: Clean all rubber parts in alcohol. Thoroughly wash all metal parts. If inspection reveals



POWER BRAKE LINKAGE

nicks or scratches on piston rod, valve seat end of valve rod, or valve seat at center of piston plate, replace parts. Replace an excessively worn leather packing or piston rod leatner seal. If vacuum cylinder is rusted or corroded, polish with fine steel wool or crocus cloth.

Reassembly: Use all new gaskets. Lubricate parts with oil or silicone grease as noted below.

Piston Plate Assembly - *NOTE* - Installation will be facilitated by using Tool C-3578 to install packing parts on piston. Proceed as follows: Place piston in assembly tool with threaded holes in piston upward, install leather packing on piston with lip side up, place packing retainer plate on packing with the raised side up and align holes in plate with holes in piston. Coil cotton wick inside packing lip and cut to required length. Remove wick and dip in vacuum cylinder oil, allow excess oil to drip off, then install packing on piston. Install expander spring inside wick (with gripper points next to wicking) and engage notch at loop end of spring with hook at opposite end. Install expander spring retainer plate and align holes in plate with threaded holes in piston plate, install screws and tighten securely. *Leave piston assembly in tool until it is installed in vacuum cylinder.*

Mounting Ring & Endplate Assembly - Install vacuum inspection port screw and gasket in side of mounting ring. Insert ring retaining bolts through holes in endplate, apply silicone grease to outer face of gasket around center hole, install gasket on endplate bolts (*CAUTION* - Vacuum port opening in gasket must be aligned with opening in endplate). Install piston rod leather seal on gasket with raised shoulder up, slide spring over shoulder and seat spring against seal with both parts centered on gasket. Coat bearing surface of mounting ring with silicone grease, slide mounting ring down over mounting bolts with recessed side down and vacuum port holes aligned, tighten bolts securely. *NOTE* - Outer rim of mounting ring should contact endplate.

Piston Rod - Install rubber stop on the piston rod and against the steel washer. Install Pilot Tool C-3579 on end of piston rod (*NOTE* - If pilot not used, wrap approximately 1¼" of piston rod with scotch tape to prevent sharp edges of rod damaging seal). Insert piston rod through endplate, remove pilot tool or tape, install piston spring over piston rod so that it is seated against endplate, install piston assembly on rod and seat it against shoulder on rod, install two retaining pins in holes in piston boss (*CAUTION* - Hold rod seated against piston while installing pins).

Valve Rod Assembly - Insert valve rod through piston and piston rod, install spring and retainer washer on end of rod, compress spring and install snap ring in rod groove. Install valve rod seal on valve rod and piston rod (*NOTE* - To aid in seal installation, turn seal partially inside out and install small diameter over valve rod first, then slide large diameter over piston rod). Install nylon button on end of valve rod and press on until seated.

Control Valve Assembly - Assemble valve diaphragm on valve (small diameter of diaphragm on small diameter of valve), install valve spring over diaphragm (small diameter against valve), install retainer plate over large end of diaphragm (*CAUTION* - Keep assembly compressed to prevent spring separating diaphragm from valve). Install assembly on piston, place vacuum tube assembly in position on retainer plate (*CAUTION* - Bead on diaphragm must be in annular groove of housing and screw holes must be aligned), make certain that scribed marks are aligned, tighten attaching screws securely. Install balancing pin and diaphragm in end of vacuum tube assembly, slide vacuum hose over housing tube.

Final Assembly - Install air cleaner housing on end of cylinder and tighten attaching screws securely. Slide new "O" ring seal over piston and position on shoulder of endplate. Remove assembly tool C-3578 from piston, position piston assembly in front of cylinder, connect vacuum hose to air cleaner tube within cylinder. Slide piston into cylinder and install endplate, tighten bolts securely. Pack air cleaner housing with filter hair. Test brake assembly as follows:

TESTING (Brake Assembly after Overhaul): Operation Test - Connect vacuum source to vacuum tube at air cleaner end of cylinder, apply vacuum of 15-20". Piston and yoke should move to fully extended or applied position (if valve not depressed). Piston should move throughout full stroke without hesitation. *CAUTION - Piston will move out to end of stroke without restriction in above test (with no force applied to end of valve operating rod) and unit should only be tested when fully assembled.*

Leakage Test - Use a vacuum gauge and shutoff valve in the vacuum line near the brake power unit. Press in on valve operating rod, apply 15-20" of vacuum to power cylinder, close shutoff valve. Vacuum leakage (gauge drop) should not exceed ½" in 60 seconds. Open vacuum shutoff valve, release valve operating rod and allow piston to move to the end of its stroke. Close shutoff valve and check leakage which should not exceed 1" in 10 seconds.

BENDIX POWER BRAKE UNIT "HYDRAULIC REACTION" TYPE

Buick (1957) ①
Chevrolet Pass. Cars (1957)
Hudson & Nash (1957)
Oldsmobile (Later 1957)
Pontiac (1957) ①
Rambler 6 & V8 (1957)

① - Moraine Power Units also used in part production.

DESCRIPTION: This new "hydraulic reaction" type power unit is similar in design to previous Bendix units having the vacuum piston balanced in atmospheric pressure (both sides of the vacuum piston are open to atmospheric pressure when in the released position). A new "hydraulic reaction" feature transmits changes in hydraulic pressure to the vacuum valve through a reaction rod and rod membrane and provides the operator with a more definite brake "feel".

OPERATION: In the applied position, atmospheric pressure is blocked off from the forward side of vacuum piston as the valve plunger contacts the floating valve. Further movement of valve plunger pushes the floating valve from its seat in vacuum piston and permits vacuum to be connected to forward side of the vacuum piston. Atmospheric pressure on rear side of piston then moves piston and hydraulic plunger in the applied direction. The hydraulic plunger initial movement causes the compensating valve to close, sealing off fluid reservoir from the hydraulic cylinder. Further movement of the plunger in the applied direction increases pressure in master cylinder and forces fluid past the residual check valve and into the hydraulic lines. As fluid pressure is increased in master cylinder, a reaction force is transmitted to the reaction rod through the plunger seal (membrane) to overcome counter-reaction spring pressure and move valve plunger away from the floating valve. This allows the vacuum port to close and the atmospheric port to reopen, resulting in a reaction force which is in proportion to pressure in master cylinder and brake lines.

▷ *POWER BRAKE UNIT REMOVAL NOTE: The complete unit must be removed from car as an assembly.*

▷ *POWER BRAKE UNIT OVERHAUL CAUTION: Use extreme care to prevent the natural rubber parts in unit coming in contact with mineral oil, grease, gasoline or cleaning solvent. Clean exterior of unit thoroughly before disassembly and make sure that solvent is not allowed to enter unit.*

DISASSEMBLY: (End Plate & Air Cleaner) - With unit in Holding Fixture J-5433, or hydraulic cylinder end clamped in vise, remove rubber dust guard and felt from valve pushrod (a drop of brake fluid on end of pushrod eye will permit removal of guard without damage). Bend out tabs on end plate and remove end plate and gasket. Slide vacuum hose off tube attached to vacuum cylinder. Remove air cleaner attaching screw and remove shell, hair and rubber seal. (*NOTE* - Remove any burr inside cylinder at air cleaner screw hole to prevent damage to packing during removal).

Vacuum Piston & Valves: Remove tube and plate attaching screws, tube and plate and gasket. Pull out vacuum piston and valve assembly from cylinder. Remove counter reaction spring and washer from end of hydraulic plunger, then remove "O" ring seal from groove in hydraulic plunger.

Piston Return Spring: Push in on spring retainer plate to release "C" washer. While holding spring compressed, slide "C" washer out of groove in hydraulic plunger. Remove retainer plate and vacuum piston return spring.

Vacuum & Hydraulic Cylinder: Scribe line across hydraulic master cylinder and vacuum cylinder. Remove three vacuum cylinder attaching screws and lockwashers. Lift off vacuum cylinder, vellumoid gasket and rubber ring gasket. Push hydraulic plunger into master cylinder and remove leather seal from cylinder.

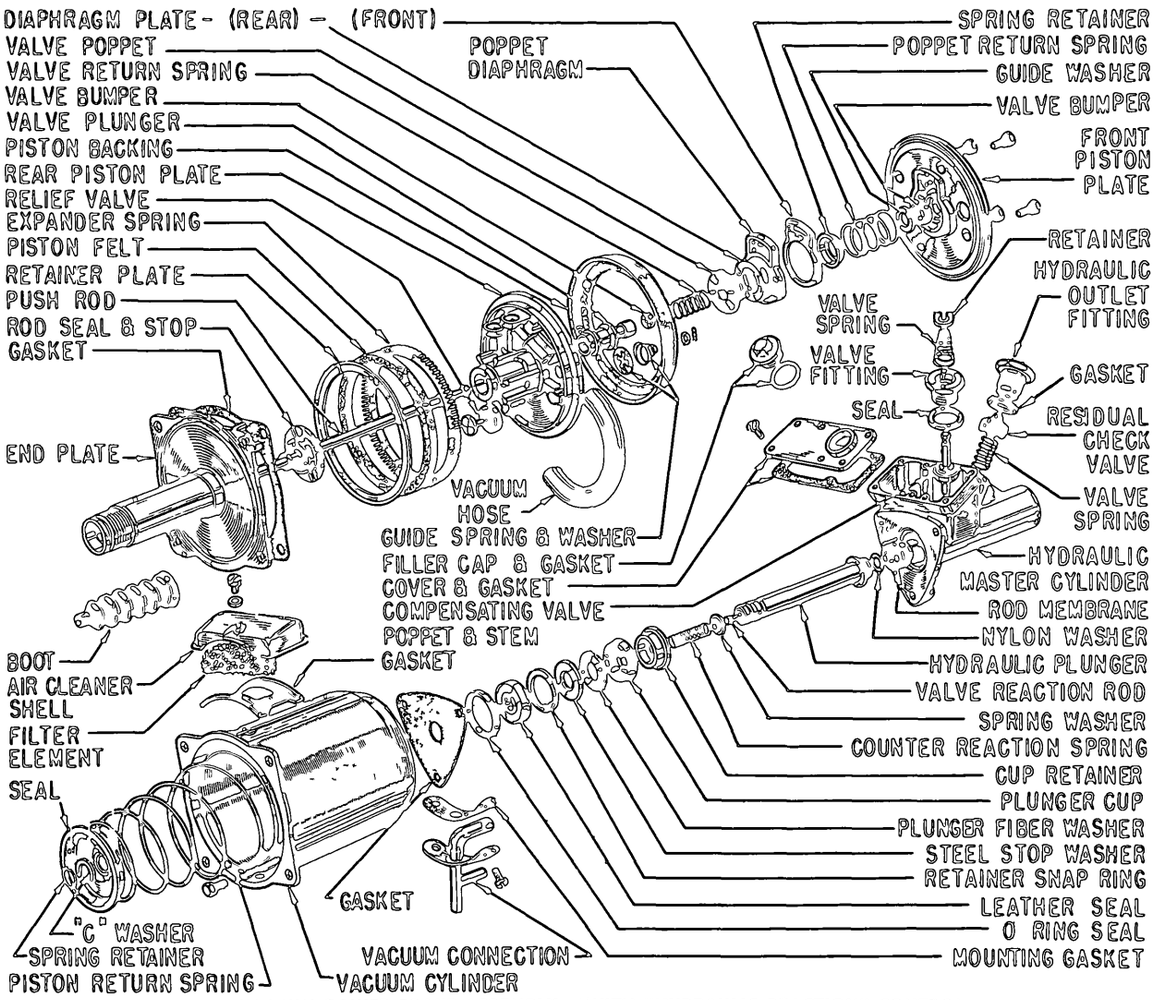
Plunger Seal, Plate & Valve Cover: Scribe a line across master cylinder and cover. Remove filler cap and remove cover attaching screws and gasket. Remove compensating valve (using 1 1/8" "thin wall" socket). Loosen outlet fitting (*CAUTION - Do not remove outlet fitting at this time*). Remove retainer ring. Pull hydraulic plunger out of master cylinder and remove steel washer, fibre washer, rubber cup and cup retainer from plunger. Remove membrane seal, and nylon gasket from plunger.

Residual Check Valve: Remove outlet fitting from master cylinder then remove residual check valve spring, valve cup and retainer. Remove gasket from fitting.

Compensating Valve: Clamp compensating valve fitting in vise and spread and remove spring retainer, then remove spring, valve stem and poppet and fitting gasket from valve fitting.

Piston: Remove valve rod seal and stop from piston and piston rod. Remove vacuum hose from piston assembly. Remove retainer plate felt and expander spring. Hold rear piston plate in vise and remove four capscrews, front piston plate, diaphragm plate and poppet return

CONTINUED ON NEXT PAGE



BENDIX VACUUM POWER BRAKE ASSEMBLY (WITH "HYDRAULIC REACTION" CONTROL)

BENDIX POWER BRAKE UNIT "HYDRAULIC REACTION" TYPE (Continued)

spring. Remove diaphragm parts as an assembly and then separate these parts. Lift off leather piston packing and valve return spring. Remove rubber bumper (using a sharp pointed instrument from end of valve plunger), seal and fibre washer from piston plate. Remove valve operating rod and valve plunger from piston. *(NOTE - If valve operating rod or valve plunger are to be replaced, inject alcohol in valve plunger opening around the valve operating rod to remove rubber lock. Hold valve operating rod in vise and drive valve plunger off operating rod using a ¾" wrench or similar tool against valve plunger).*

CLEANING & INSPECTION: Wash all rubber or parts containing rubber in alcohol. Blow all parts dry with air. Remove rust or corrosion from bore of vacuum cylinder with fine emery cloth. Inspect all parts for wear or damage and replace all parts that are cracked, pitted, scored, scratched or corroded. Make sure that valves and valve seats are sealing properly and are not pitted or damaged. *CAUTION - Do not attempt to refinish bore or plunger of master cylinder.*

REASSEMBLY: *NOTE - Before assembly, dip all hydraulic system parts in clean alcohol and place in a clean pan or on a clean paper.*

Residual Check Valve: Assemble new gasket over threads of hydraulic outlet fitting. Hold fitting in vertical position and insert cone end of cup and retainer in fitting. Place check valve spring in recess in retainer. Hold hydraulic master cylinder upside down and thread outlet fitting into hydraulic master cylinder hand tight.

Compensating Valve: Insert grooved end of valve poppet and stem through hole in fitting from threaded end. Assemble large diameter end of spring over stem, holding poppet valve on seat. Compress spring and assemble retainer washer in groove of valve stem. Squeeze ends of washer together with pliers. Assemble new gasket over threads of compensating valve fitting.

Plunger Seal, Plate and Valve Cover: With master cylinder in vise, assemble nylon washer and rubber membrane at end of hydraulic plunger. Insert membrane end of plunger in cylinder and assemble seal parts with seal installer Tool J-5405 over end of plunger as follows: Cup retainer (with counterbored side away from washer on plunger), cup, fibre washer, and steel washer. Slide seal parts into recess of cylinder, push plunger in to end of its stroke and assemble retainer ring in ring groove. Assemble compensating valve in threaded hole in cylinder and securely tighten. Place new gasket on master cylinder, align cover to scribe marks, replace and securely tighten. Tighten outlet fitting securely.

Vacuum & Hydraulic Cylinder: Pull out hydraulic plunger, then, with seal installer Tool J-5405 placed over end of plunger, assemble leather seal over seal installer with lip of leather toward hydraulic master cylinder. Press seal into recess of master cylinder and then remove seal installer. Place "O" ring seal in recess in master cylinder. Insert three capscrews through holes in end of vacuum cylinder and holes in gasket. Align vacuum cylinder, gasket and master cylinder to scribe marks and tighten sapscrews securely. Wipe out vacuum cylinder, pull master cylinder plunger to end of stroke.

Piston Return Spring: Place large diameter end of vacuum piston return spring in vacuum cylinder and assemble retainer plate over end of hydraulic plunger. Compress spring and assemble "C" washer in inner groove of plunger.

Piston: If valve rod and valve plunger are separated, dip valve plunger in alcohol before inserting valve rod. Make certain ball end of rod is locked in place in valve plunger. It may be necessary to tap end of valve rod to seat ball end in valve plunger. Insert bumper in end of valve plunger, insert valve plunger assembly into rear piston plate, and assemble spring over end of plunger. Assemble leather packing on piston with lip side down. Assemble diaphragm plate in groove of diaphragm then assemble diaphragm over shoulder of poppet valve. Place this assembly in recess in piston plate and assemble spring retainer and diaphragm plate in diaphragm. Assemble poppet return spring over flange of spring retainer. Remove burrs from center bore of front piston plate and assemble seal and fibre washer in recess of front piston plate. Stake in place at three points. Place front piston plate on rear piston plate, making certain by-pass holes are properly positioned, and loosely assemble four attaching capscrews. Place assembly ring J-5406 over piston leather and turn piston assembly upside down. Assemble expander spring against inside lip of leather packing. Dip felt in Bendix Vacuum Cylinder Oil and assemble on expander spring. Assemble retainer plate making certain plate is securely anchored in grooves of four projections of piston assembly. Tighten four attaching capscrews securely and remove assembly ring J-5406. Assemble vacuum hose on piston. Dip valve pushrod seal and bumper in brake fluid and assemble over end of valve pushrod making certain seal is seated in groove in piston assembly.

Vacuum Piston in Cylinder: Apply thin film of vacuum cylinder oil to inside of cylinder. Assemble "O" ring seal in groove of hydraulic plunger, then assemble counterreaction spring and washer in recess at end of plunger. Insert piston in cylinder. When end of hose lines up with elongated hole, assemble new gasket, tube and plate and attach with screw. Slide end of hose on vacuum tube approximately 5/8". Operate piston through its full stroke several times to make certain vacuum hose does not rub against cylinder or piston.

End Plate & Air Cleaner: Assemble rubber seal on edges or air cleaner shell. Attach air cleaner to vacuum cylinder using screw and gasket. With 6" scale, push hair into open spaces at each end of air cleaner. Align holes on end plate and gasket with holes in flange of vacuum cylinder and bend over two tabs of end plate to secure end plate and gasket to cylinder. Assemble pushrod felt in second fold of rubber guard. Dip small end of guard in brake fluid and assemble guard and felt over pushrod. Attach lip of rubber guard over "scallops" at center of end plate.

MORAINE POWER UNIT

Buick (1957) ①
Oldsmobile (1957) ①
Pontiac (1957) ①
① - Bendix Power Brake Unit also used in production.

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 BUICK BRAKE PEDAL HEIGHT ADJUSTMENT:* With brake pedal in the full "OFF" position, distance from floor mat (with mat depressed) to top of rubber pad on brake pedal should be 5½". If not correct, loosen pushrod locknut and rotate pushrod as necessary for correct adjustment.

DESCRIPTION: Self-contained, combined vacuum and hydraulic unit using intake manifold vacuum and atmospheric pressure for its pressure. In "brake-released" position power piston is balanced by atmospheric pressure on both sides of piston. Unit incorporates two main sections—vacuum power cylinder and hydraulic master cylinder. Unit replaces conventional master cylinder only.

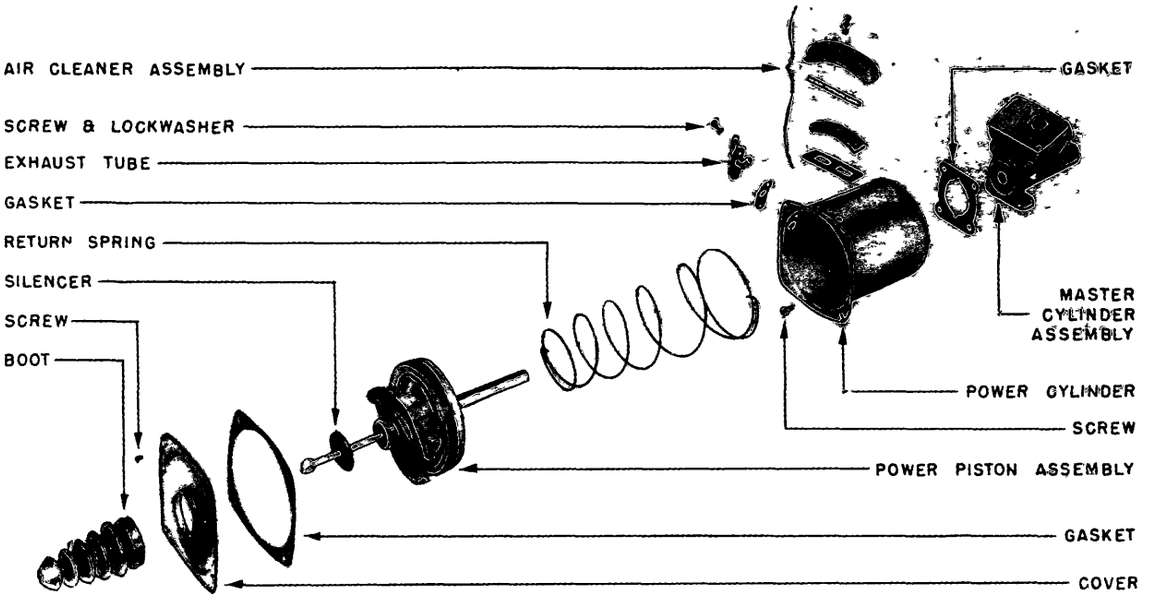
OPERATION: With engine running, brake unapplied, both sides of power piston are under atmospheric pressure. On application of brake pedal, intake manifold port opens and creates vacuum right side of power piston. Atmospheric pressure then moves power piston to right thereby exerting thrust on hydraulic plunger. This increases line pressure to four wheels. Release of brake pedal restores atmospheric pressure balance in power cylinder. In case of engine failure and consequent loss of engine vacuum, several applications of brake are possible by using vacuum supply in vacuum reservoir. In case of complete vacuum loss, brakes can be applied in conventional manner, although more effort is required due to loss of power assist.

CHECKING & ADJUSTMENT: Check all parts of power brake system before disassembling Power Brake Unit whenever brake trouble experienced.

Adjustments: No special adjustments required. Anytime brake pedal goes to within 1" from floor (floor mat to underside of pedal pad), brakes should be adjusted. At time brakes adjusted, following inspections must be made.

1) Check vacuum lines and connections between intake manifold, check valve, vacuum reserve tank, and vacuum power cylinder for possible vacuum leaks.
2) Check fluid level in master cylinder reservoir. See Lubrication below.
3) Check condition of air cleaner element and insert clean element, if necessary.
4) Check steering column pedal plate for loose screws. Check for free operation of brake pedal. If binding exists, check for misalignment between pedal and vacuum cylinder pushrod.
5) Check stop light switch for proper operation.

Bleeding Brakes: Bleed in same manner as for standard brakes. Do not use vacuum assist while bleeding. Engine should not be running and vacuum reserve should be reduced to zero by applying brake several times before starting bleeding procedure. After power unit reinstalled, bleeding of power unit and flex line can be accomplished at junction block bleeder screw, provided remainder of system is free of air.



POWER BRAKE ASSEMBLY

LUBRICATION: Check level of brake fluid in reservoir every 1000 miles. Refill to ½-1" from top of filler plug opening (Buick), high enough to register on dipstick (Oldsmobile), ½" from top of filler plug opening (Pontiac). *NOTE*–Reservoir is separate and under hood on Buick.

PERIODIC SERVICE: Intake manifold tee connector should be removed and cleaned Spring and Fall or every 10,000 miles.

TROUBLE SHOOTING: Before checking Power Brake Unit for source of trouble check remainder of brake system.

Hard Pedal: 1) Vacuum failure due to faulty vacuum check valve, collapsed vacuum hose, plugged vacuum fittings, hose or pipes, leak between vacuum power cylinder and hydraulic master cylinder.
2) Bound up pedal mechanism.
3) Power Brake unit trouble–internal vacuum hose loose or restricted; jammed sliding valve; vacuum leaks in unit caused by loose piston plate screws, loose piston packing, faulty master cylinder piston, vacuum seal, or leak between hydraulic master cylinder and vacuum power cylinder; defective diaphragm; restricted air cleaner.

Grabbing Brakes (Apparent Off-and-On Condition): Power Brake unit valve trouble–reaction diaphragm leakage, faulty rubber bumper pad in reaction diaphragm; sticking sliding valve reaction; restricted diaphragm passage; master cylinder piston binding in power piston guide.

Pedal Goes to Floor (Or Almost To Floor): Brake adjustment; fluid reservoir needs replenishing, power brake hydraulic leakage–defective primary or secondary cup, defective vacuum seal, defective head nut or head nut gasket, cracked master cylinder casting, leaks at wheel cylinders or in pipes, or in connections, defective "O" rings on cylinder plug.

Brakes Fail to Release (Or Slow Release): 1) Bound up brake pedal linkage.
2) Weak brake shoe return springs, or rusty bosses on backing plate.
3) Faulty residual check valve, excessive hydraulic plunger seal friction, excessive piston packing friction, restricted air passage in vacuum piston, restricted air cleaner, sticky air valve, broken piston return spring, broken air valve return spring.

REMOVAL & INSTALLATION: Buick - Disconnect battery ground strap, then remove clevis pin from pushrod clevis. Lift brake pedal to pull linkage out of way, then remove large nut holding brake unit to cowl using Tool 6618. Disconnect stop light wire connector from switch. Disconnect brake pipe from hydraulic cylinder and tape end of pipe. Disconnect vacuum hoses from tee fitting. Remove bolts holding unit to ventilator air duct and remove power brake unit from car. To install, reverse removal procedure and bleed brake lines.

Oldsmobile: Disconnect positive battery cable at junction block on right fender filler plate. Disconnect solenoid lead wire (purple) from wiring harness, then pull cable through sleeve on power brake. Disconnect brake line at master cylinder, plug open ends. Disconnect leads from stop light switch and fold back floor mat. Remove three brake pedal bracket attaching bolts and lockwashers, then remove bracket and pedal assembly. Remove mast jacket grommet and retainer clamp

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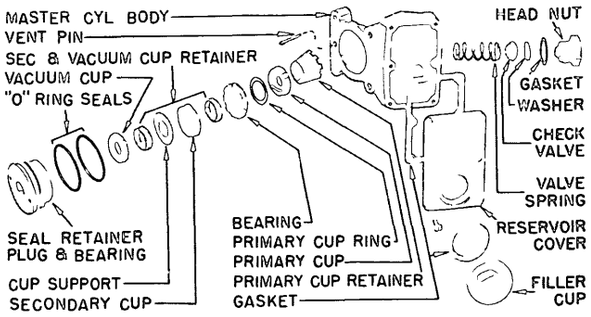
MORAINE POWER UNIT (Cont.)

and slide them up mast jacket. Remove floor cover plate attaching screws and speedometer cable from clip. Remove cover plate-to-power cylinder bolts, and remove cover while positioning the power unit so it rests on edge of opening in floor pan. Disconnect vacuum hose and remove power brake unit through toe pan opening. To install, reverse removal procedure.

Pontiac: Disconnect vacuum hose from pipe leading to tee connector. Raise car and remove engine side apron from left side. Remove coiled hydraulic pipe from outlet fitting on hydraulic cylinder and from tee connector. Disconnect pushrod from pedal and disconnect wires from stop light switch. Remove nuts from U-bolt retaining pedal pivot bracket to steering column and remove pedal and pivot bracket. Remove accelerator pedal. Push rubber grommet up on steering column and move floor mat out of the way. Remove clutch pedal seal retainer (synchro-mesh cars), and steering column seal retainer and seals. On Hydra-Matic cars, remove screws retaining mounting plate to floor pan and remove mounting plate with power brake unit attached. On synchro-mesh cars, remove screws which retain power brake unit to mounting plate (brake unit will rest on frame). Remove screws retaining mounting plate to floor pan and remove mounting plate, jockeying it around to clear clutch pedal, then remove power brake unit. *CAUTION - Do not support or carry brake unit by the pushrod.*

OVERHAUL: *CAUTION: Use extreme care in the handling of hydraulic system parts to prevent their coming in contact with mineral oil or grease. DO NOT HANDLE HYDRAULIC PISTON CUPS OR SEALS WITH GREASY HANDS.*

Disassembly (Oldsmobile & Pontiac): Clean all dirt from outside of power brake unit. Remove dipstick and gasket (Oldsmobile), filler cap and gasket (Pontiac), from master cylinder and pour brake fluid out of reservoir (*NOTE*–Operate pushrod by hand with unit upside down to pump fluid from cylinder bore). Clamp master cylinder end of unit in holding fixture J-5433 with adapter J-5796 and remove cable guide. Remove screw that holds air cleaner unit to outside of power cylinder. (*CAUTION*–Removal of air cleaner unit must precede disassembly of internal parts to avoid damage to large leather piston cup inside power cylinder housing). Remove boot and felt silencer from pushrod end of brake unit. Remove end cover and gasket (held to power cylinder housing by two recessed flat head screws). Slip rubber exhaust hose from vacuum exhaust tube inside power cylinder housing (*NOTE*–Do not use compressed air to remove). Press power cylinder assembly back into power cylinder housing so that it does not rub against vacuum exhaust tube. Holding power piston in this position with one hand, remove two screws that hold vacuum exhaust tube to outside of power cylinder. Using fine emery cloth remove burrs from inside power cylinder housing at screw holes. Ease power piston out of power cylinder housing (There is a strong coil spring back of power piston assembly. Be careful to control piston by hand as it is removed from housing). Remove large coil spring from inside power cylinder housing. Remove hex head bolts at the



MASTER CYLINDER UNIT

inside base of power cylinder housing that hold it to master cylinder (*NOTE*–Power cylinder housing pilots on an extension of cylinder plug and should be removed carefully so as not to damage "O" ring on plug extension).

Air Cleaner Unit–Pull screw out through housing and assembled parts. Unseat rubber gasket from edges of housing, lift out element and hairpin spring.

Master Cylinder–Clamp master cylinder in fixture J-5433 with adapter J-5796 or in a vise in vertical position and remove cylinder plug assembly using special spanner wrench J-5794. Remove two "O" rings from outside diameter of plug. Remove secondary cup and washer from inside of plug. Inspect vacuum seal assembly in plug. If seal appears to be in good condition and there has been no indication of a vacuum leak, DO NOT attempt to remove vacuum seal assembly from cylinder plug. If vacuum seal defective, cylinder plug and vacuum seal must be replaced as an assembly. On Oldsmobile, from the bore of the master cylinder, lift out spacer, plunger bearing, primary cup washer, primary cup and retainer. On Pontiac, from the bore of the master cylinder, lift out expander, spacer, bearing, flat primary cup ring, primary cup and conical retainer. Reset master cylinder in vise or Tool J-5433 and remove head nut assembly and copper gasket (*NOTE*–Be careful so that check valve and check valve spring do not fall from hole as head nut is loosened). Remove rubber check valve seat washer which fits over button on head nut. Lift out check valve and check valve spring. On Oldsmobile, remove cover assembly. Note position of filler tube in relation to master cylinder body so that it may be installed in same position on reassembly. On Pontiac, inspect fluid reservoir through filler hole opening. If reservoir is dirty to the extent that it cannot be cleaned thoroughly through filler hole, remove reservoir cover and gasket. Make note of position of filler hole in relation to master cylinder body so that it may be installed in same position on reassembly. On Oldsmobile and Pontiac, inspect vent on underside of casting. (Vent pin is designed to keep this hold open). If hole clogged and cannot be cleaned out so that pin rides free, pin may be straightened and removed through counterbore end of vent hole.

Power Piston Assembly–Remove vacuum hose from power piston assembly if it is to be replaced (*NOTE*–Hose is cemented to tube). Carefully unseat triangular shaped lock ring with screw driver to permit removal of pushrod and air valve assembly. Use caution in removing lock ring so that it will not flip out and become lost or cause personal injury. Turn power piston assembly upside down. Stop plate washer will slide out of opening in power piston and down onto pushrod. Carefully pull out air valve and pushrod while holding piston in vertical position. Valve spring, shims (and snubber on Oldsmobile) will come out with air valve (*CAUTION* - Note number of shims which fit over valve shank and rest on valve shoulder). Remove "O" ring from air valve. (*NOTE*–It is not necessary to remove pushrod from air valve unless it is noisy or excessively loose). If necessary unseat snap ring by pinching snap ring with pliers J-5403. Pull out pushrod, remove rubber bumper from end of pushrod (ring and washer may be left on pushrod). Set power piston assembly on bench on hub end and loosen four screws that hold two halves of power piston assembly together. Before completely removing screws press down on top half (power piston guide) with one hand. (*NOTE*–There is an internal spring between two halves that will have a tendency to part the two halves unless controlled by hand). Gently lift off power piston guide and master cylinder piston assembly. Turn upside down and remove "O" ring from pilot on power piston guide. Slide power piston guide off master cylinder plunger and remove "O" ring from master cylinder plunger. Examine reaction plate, which is held to end of master cylinder piston by small Truarc ring. If necessary to remove remove reaction plate, expand Truarc ring with special pliers J-4880 and lift off reaction plate. From counterbore of power piston, remove in order six fingers (or reaction levers), reaction spring, valve plate, and valve diaphragm spring. Carefully lift large leather cup off power piston. Keep in mind that underneath leather cup is a metal lip expander and wick assembly that has a tendency to uncoil when released. Wick and expander may be separated for inspection. Eject floating valve assembly from power piston by pulling out or by thumb press from hub end. If parts stick together and cannot be pressed out with fingers, pry gently from opposite end to loosen. Remove rubber power piston stop bumper from hub of power piston.

Floating Valve Assembly–Unseat cup-shaped valve spring retainer with small screw driver (*CAUTION*–Use care to prevent screw driver from damaging diaphragm). Press floating control valve through inner diameter of diaphragm. This also frees diaphragm retainer plate. Unseat rubber diaphragm from groove in diaphragm retainer ring.

Disassembly: Buick - Measure distance pushrod projects through clevis. Record this dimension so clevis can be installed in same location, then remove clevis. Mount power brake unit in a vise with hydraulic cylinder down, being careful not to damage the loose vent pin in flange of hydraulic cylinder. Tighten vise only enough to hold cylinder firmly. Remove pushrod boot from housing cover tube and from pushrod. Proceed as follows:

1) Remove felt air silencer from pushrod boot, then take out air cleaner screw and remove cover and filter.

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MORAINE POWER UNIT (Cont.)

Remove vacuum tube screws. Remove end cover screws, cover and gasket. While holding power piston down, disconnect vacuum hose from vacuum tube and remove tube and gasket from housing. Slowly release power piston, making sure that lip of leather piston cup does not catch in holes as it comes out of housing. Remove vacuum hose from power piston if it is defective.

2) On pushrod side of power piston, remove lock ring and stop plate. Hold piston assembly with pushrod down and pull out pushrod and air valve. Lift off spring, snubber, and spacers (note number of spacers). Remove "O" ring from air valve. *(NOTE* - Unless pushrod is noisy or loose in air valve it need not be disconnected from valve. If necessary to disconnect, disengage snap ring, then pull out pushrod, bumper and washer). Remove sponge rubber piston stop bumper. Remove capscrews holding piston guide to power piston while holding assembly together against inner spring load. With piston flat, carefully lift piston guide straight up to avoid disturbing parts under piston guide. Lift off loose "O" ring.

3) Push hydraulic piston out through piston guide and remove "O" ring from hydraulic piston. If reaction plate or hydraulic piston is defective, separate them, using Truarc pliers to remove snap ring. Inspect relief valve (staked in place in piston guide). Remove if necessary. From power piston assembly, remove reaction levers, reaction spring, small reaction plate and diaphragm spring. Remove leather cup, cup expander and felt wick.

4) Remove floating control valve assembly from power piston and disassemble as follows: With a small screwdriver, pry retainer off diaphragm, then push floating valve through diaphragm, which also frees the retainer plate. Pull diaphragm from retainer. With hydraulic cylinder still clamped in a vise, remove power piston return spring. Remove four bolts and pull power cylinder straight up, then remove gasket. Unscrew master cylinder plug with Tool J-5794, then remove two "O" rings. From inside plug, remove secondary cup expander, secondary cup, flat support, vacuum seal retainer and vacuum seal.

5) Remove cup retainer, piston bearing, flat primary cup ring, primary cup and conical cup retainer from master cylinder body. Reclamp hydraulic cylinder in vise so head nut is straight up, then unscrew the nut being careful not to loose check valve and spring as nut is removed. Remove gasket and check valve seat washer. Inspect vent and vent pin. If necessary to remove for cleaning, straighten pin and remove it.

Cleaning & Inspection: Clean all parts in diacetone alcohol or clean brake fluid *(CAUTION—Do not use antifreeze alcohol, gasoline, kerosene, or any other cleaning fluid that might contain even a trace of mineral oil, as this could cause serious damage to all rubber parts in brake system).* Blow parts dry with air. As an aid in determining cause of power brake failure, carefully examine all rubber parts for nicks, cuts or other damage. After examination, discard these rubber parts if Overhaul Kit being used for repair. Blow dirt and cleaning fluid out of all internal passages. Make sure that small compensating ports in end of master cylinder plunger (hydraulic piston on Buick) are clear. If plugged, clean thoroughly and flush hydraulic system to remove all dirt. Outer surface of master cylinder plunger (hydraulic piston), bore of master cylinder (hydraulic cylinder on Buick) or vacuum cylinder, may be cleaned or reconditioned with fine crocus cloth if not too deeply pitted or scratched. If any parts indicate that heavy abrasive action has resulted from severe contamination of brake fluid, replace damaged parts and be sure to flush fluid reservoir and wheel cylinder lines thoroughly. Make sure that vent pin is properly retained in hole and that vent hole is clear. If using Overhaul Kit for repair of power brake use all new parts in kit, regardless of whether old parts appear fit for use. The six reaction levers may be flattened with a wooden mallet if they are not badly distorted.

Reassembly (Oldsmobile & Pontiac): *CAUTION—During reassembly make certain that no grease or mineral oil comes in contact with internal parts of unit. Until used, keep cleaned parts on clean paper or cloth.* Master Cylinder—1) Drop check valve spring into place in 1" threaded opening in master cylinder casting. Seat check valve assembly into check valve spring. Button check valve seat washer onto head nut, and fit copper head nut gasket over threaded end of head nut. Screw head nut in place carefully to avoid binding check valve as it is depressed into hole in casting. A few drops of brake fluid on check valve seat washer will facilitate assembly. Torque to 80-90 ft. lbs. (Oldsmobile), 85-100 ft. lbs. (Pontiac).

2) Replace reservoir gasket and cover. Install all screws with exception of cable guide attaching screw (Pontiac). Be sure cover is installed with filler hole (Pontiac), filler tube (Oldsmobile), in proper position. Install filler cap and gasket loosely (Pontiac), or dipstick (Oldsmobile) to avoid danger of dirt entering reservoir during reassembly of unit.

3) Clamp master cylinder in fixture or vise, in vertical position, with large counterbore facing upward. Wipe counterbore and threads with very thin coating of brake fluid. Place conical primary cup retainer with notched end down into open end of bore. Press primary cup into hole (Note that outer lip of primary cup fits around and over small end of retainer when it is properly centered in hole). Place primary cup retainer (thin blued steel washer) in place on back of primary cup. Set bearing into bore with notched side up, making sure that hub of bearing fits into counterbore on back of primary cup. Place spacer on top of bearing. On Pontiac, place expander on top of spacer with fingers toward bearing.

4) Assemble cylinder plug assembly as follows: Seat vacuum cup seal with ribbed sides up into bottom of counterbore cylinder plug. Place spacer on top of vacuum cup (this spacer is smaller in diameter than secondary cup spacer), follow with secondary cup washer. Seat secondary cup with ribbed side up in large counterbore. Slip 1 51/64" "O" ring into first groove on outside diameter (nearest end of plug opposite threaded section), slip second 1 51/64" "O" ring over threaded end and seat on hub which has same diameter as first groove. *CAUTION*—No "O" ring should be placed in second groove that has four small through holes.

5) Screw cylinder plug assembly into place *(CAUTION*—On Oldsmobile, spacer must be properly centered on top of bearing, then carefully install plug assembly so that lip of secondary cup fits around spacer when plug is screwed into place. On Pontiac, spacer and expander must be centered properly on bearing so that lip of secondary cup fits around expander when plug is screwed into place). Use special Spanner Wrench J-5794 for tightening cylinder plug assembly (20-30 ft. lbs.).

6) If necessary, replace vent pin in vent hole and bend to approximately 45° to hold in place. Head of pin rides in counterbore of hole.

7) Assemble power cylinder housing to master cylinder with four 5/16" hex head screw and lockwasher assemblies (12-14 ft. lbs.). Be sure to install gasket between housing and master cylinder and position notch in gasket over vent hole in cylinder. The housing pilots on the extended portion of cylinder plug assembly. Assembly is facilitated by wiping bore of housing pilot hole with thin coat of brake or Hydra-Matic fluid. In assembling the housing be sure that two 3/8" air intake holes are on top (match reservoir cover side of master cylinder). Exercise care in installing housing so that "O" ring on cylinder plug extension is not damaged.

Floating Valve Assembly—Fit rubber diaphragm over small diameter of diaphragm retainer ring. Hold diaphragm retainer plate on back of diaphragm with one hand, flat side of plate adjacent to rubber; press floating control valve into place over retainer plate. The hub end of valve fits through the hole in the rubber diaphragm. Press cup shaped valve spring retainer over hub of floating valve and inner flange of diaphragm. Wipe outside diameter of floating valve with Hydra-Matic fluid or Dow Corning No. 4 Silicone Grease.

Power Piston—Set power piston casting on bench, hub end down. Press by hand the floating valve assembly, with rubber valve face down, into power piston counterbore. Assemble felt wick in channel of metal lip expander. *(NOTE*—If new wick is used, soak in Hydra-Matic or Shock Absorber fluid, allowing excess to run off). Install wick and expander assembly into outer groove of piston with expander fingers on outside and pointing toward hub end of power piston. Holding expander in place, slip rubber cup in place with lip also pointing toward hub end of piston. If new leather cup is installed use cardboard cylindrical retainer to confine cup during installation. This will avoid any sluggishness in operation during first few days of use or until leather becomes softened by fluid. Snap valve diaphragm spring in place over valve spring retainer. Seat valve plate on top of valve diaphragm spring so that center portion nests in spring. Place reaction spring around valve diaphragm spring and seat in recess of valve diaphragm retainer. Set six reaction levers in place. Ears on levers fit into mating slots in face of power piston. Small ends of levers will extend toward middle and rest of reaction spring.

Piston Guide—Place 5/8" "O" ring in groove of master cylinder plunger. Place reaction plate over

CONTINUED ON NEXT PAGE

MORAINE POWER UNIT (C nt.)

small end of piston with raised edge extending outward. Retain reaction plate on plunger with Truarc snap ring using pliers J-4880. Lubricate lightly "O" ring and adjacent surface of master cylinder plunger with Dow Corning Valve Seal "A" or equivalent silicone grease. Fit 3½" "O" ring onto machined hub of piston guide.

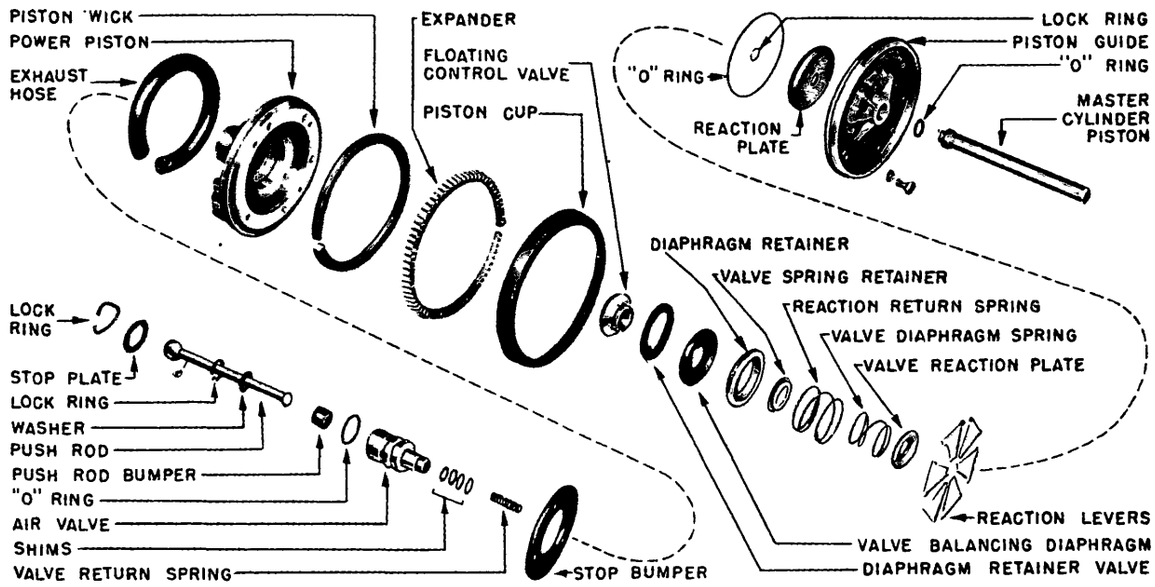
Power Piston & Piston Guide–Holding master cylinder plunger assembly in one hand, in vertical position with reaction plate down, start piston guide (ribbed side up) over upper end of plunger. Gently seat master cylinder plunger and reaction plate assembly onto reaction levers. Press down quickly and firmly until the six reaction levers are held in flat position. Be sure each lever is properly seated. Place hand on top of master cylinder plunger to hold in place. Gently slide piston guide into place indexing holes to match these in piston casting. Install four hex head ¼"screws and lockwashers to complete assembly (5-7 ft. lbs.) To assure that reaction levers are properly seated, check to see that master cylinder piston has slight movement in power piston assembly. Turn the assembled unit over and install rubber bumper in groove on hub of power piston.

Air Valve & Pushrod–1) Assemble rubber bumper onto end of pushrod. Insert bumper and pushrod assembly into air valve. Allow metal washer on pushrod to seat on back of rubber pushrod bumper. Using special pliers J-5403, snap Truarc ring into groove in air valve. Check carefully to make sure that pushrod is firmly locked into air valve. Assemble 1" "O" ring in narrow groove on outside of air valve. Coat "O" ring and outside diameter of air valve with light coat of Dow Corning valve Seal "A" or equivalent silicone grease.

2) Place same number shims that were on air valve, on Tool J-5805. Invert power piston and insert gauge into bore of power piston. Shims and body of gauge will rest on valve plate and pin will extend through hole in valve and rest on end of master cylinder plunger. Turn power piston over so that gauge is on top and check position of pin in gauge body. Pin should be flush or slightly above gauge body. If pin is flush or less than .010" above body, no further adjusting is required. If pin is below top of gauge body, remove shims one at a time until pin is flush or not more than .010" above top of gauge body. If pin is more than .010" above top of gauge body, disassemble and inspect for bent reaction levers, reaction plate or valve plate. After proper number of shims have been added to small diameter of air valve, install snubber (if used), then insert valve return spring into small bore in air valve.

3) Holding power piston and guide assembly with master cylinder plunger pointing upward, insert from below the air valve, spring, and pushrod assembly into hub end of power piston. *CAUTION*–Assemble in this manner to avoid dislodging shims and valve return spring.

4) Carefully turn power piston, guide, air valve and pushrod assembly over and insert stop plate and triangular lock ring which holds air valve in place. Lock ring may be assembled by using small screw driver. After being locked in place, the air valve will have approximately 1/32" travel against valve return spring before picking up floating valve load. *CAUTION*–Care should be exercised during this operation to avoid damage to master cylinder plunger. Never put master cylinder plunger in a vise.



VACUUM POWER PISTON UNIT

Power Piston & Guide Assembly in Power Cylinder Housing–1) Lubricate lightly the large bore of power cylinder housing with Hydra-Matic or Shock Absorber fluid. Clamp the master cylinder in vise or Tool J-5433, in a vertical position with opening in housing extending upward. Place large coil return spring into housing with large diameter in bottom of housing. The tang on bottom of spring should be placed in narrow space between any one of hex bolt heads and closest locating dimple.

2) Wipe lip of leather cup with light coating of Hydra-Matic or Shock Absorber fluid to clean and lubricate. If rubber exhaust hose has been removed from power piston for replacement, coat exhaust tube with 3M Super Weatherstrip Cement and slip new hose on tube as far as it will go.

3) Place power piston and assembled parts on top of coil spring so that the boss plugged with the largest ball will enter housing below the exhaust tube hole in housing by approximately ¼". Press power piston assembly into housing. Depress power piston assembly into housing against coil spring load. This permits assembly of exhaust tube and gasket to outside of housing. Install tube in proper direction so that inside connection will assemble correctly with rubber exhaust hose (Two filister head screws). Slip rubber exhaust hose onto metal exhaust tube inside housing (approximately 1/2-5/8"). Permit power piston to ease back against exhaust tube connection. Install power cylinder cover and gasket using two flat head screws. Press cover down by hand in order to start screws into housing. Slip felt silencer and boot over pushrod. Seat felt silencer against hub of power piston and fit boot snugly over flange on housing cover.

Air Cleaner–Lay hairpin spring inside air cleaner cover. Lay filter element on top of hairpin spring. Place rubber gasket on filter element, depress spring and element so that edges of gasket can be fitted over flanges of air cleaner housing. Insert cover screw with gasket in place through assembled unit and screw into top housing. *CAUTION*–Air cleaner assembly must not be assembled to housing prior to this time, otherwise there is danger of damaging leather piston cup, because air cleaner cover screw extends through inside of housing.

1) Clamp master cylinder body in vise with outlet hole straight up. Install check valve spring, then place a new check valve (concave side out) on spring. Install a new gasket and seat washer on head nut, then install head nut and tighten finger tight. Back nut off one or two turns to allow check valve to center, then tighten to 85-90 ft. lbs. Position cylinder in vise with large bore straight up and wipe bore and threads with brake fluid. Install conical primary cup retainer in body, with notched end inward. Dip primary cup in brake fluid and install lip side first over retainer (center lip of cup must fit into hole), then install cup ring on flat of primary cup. With notched face outward, place piston bearing on primary cup ring with hub of bearing fitting into opening in cup, then press to seat solidly. Install secondary cup to center on bearing and position expander on retainer with notched side in.

CONTINUED ON NEXT PAGE

MORAINE POWER UNIT (C nt.)

2) Install two "O" ring seals on master cylinder plug (in first and third grooves). *(CAUTION - Do not install in c nter groov with the four vent holes).* Install vacuum seal in bottom of bore in plug, with flat side down, then position retainer on seal and flat support on shoulder in bore. Place secondary cup flat side down against support. Moisten plug "O" rings with brake fluid and install plug assembly into body, checking to make sure secondary cup retainer and expander are centered. Tighten plug to 20-30 ft. lbs. using Tool J-5794. If vent pin has been removed, install and bend to about a 45° angle to hold in place.
3) Install a new floating control valve diaphragm on the retainer, then press floating control valve into center hole of diaphragm while holding flat side of plate against flat side of diaphragm. Stretch diaphragm over hub of control valve, then press spring retainer over valve hub and diaphragm lip. Lubricate outer diameter of floating valve with Dynaflow oil and press in place in power piston with rubber face of control valve facing in.

4) Soak felt wick in Dynaflow oil and allow excess to drain. Position wick in cup expander and install in groove in outer diameter of power piston with expander fingers pointing toward piston hub. Hold in groove while leather piston cup is slipped over expander with its lip pointing toward piston hub. If a new leather cup is being installed, use cardboard cylindrical retainer to confine cup during installation. Set piston on flat surface hub down. Install lighter diaphragm spring on spring retainer, then place smaller reaction plate on spring. Lower heavier reaction spring to seat in recess in diaphragm retainer. Set six reaction levers in place with small ends resting in reaction spring. *(NOTE* - If relief valve was removed from piston guide, install new valve and stake it securely being careful not to damage piston guide).
5) Lubricate a new "O" ring and install on hydraulic piston. If reaction plate has been removed from hydraulic piston, install it on piston with raised portion away from piston, and engage the snap ring. Lubricate a new "O" ring and install it on shoulder of piston guide. Lubricate center hole of power piston guide, then, while holding piston vertical with reaction plate down, start piston guide (ribbed side up) on piston. Set reaction plate squarely centered over reaction levers, then lower quickly to hold levers in position while compressing springs. *(NOTE* - Make sure that wide end of levers do not jump out of seats). Install piston guide over piston and install the screws. Tighten to 5-6 ft. lbs. *(NOTE* - Reaction levers must hold position, and piston guide must clamp leather cup while expander and wick hold position under cup). Master cylinder piston will have a slight movement in power piston assembly if reaction levers are properly seated. Install sponge rubber piston stop bumper in groove on hub of power piston. Retain in place with weatherstrip cement.
6) If pushrod was disconnected from air valve, install bumper, pushrod and washer, then install snap ring. Check for proper seating of snap ring with a hard pull on pushrod. Place shims on Gauge J-5805, then hold power piston assembly with air valve bore down and insert gauge and shims into air valve bore. *(NOTE* - Body of gauge rests against smaller reaction plate while pin of gauge extends through to contact the master cylinder piston). Turn the entire assembly over to bring gauge on top and check gauge pin in gauge body. *(CAUTION - Hydraulic master cylinder piston must be at its lowest limit. Do not hold assembly by hydraulic piston or allow hydraulic piston to contact bench).* If pin is flush or sticks out no more than .010", spacers are correct. If pin is low or high, add or remove shims until within the above limits. When shims are correct, remove gauge and install shims and snubber (rubber face out) on air valve. Install air valve return spring in end of air valve and install "O" ring in narrow groove of valve. Lubricate air valve and "O" ring with Dynaflow oil, then while holding power piston assembly with air valve bore down, install complete air valve assembly. Hold in position and turn power piston over. Install stop plate and wire lock ring in hub of piston. Check to see that air valve has about 1/32" movement before it picks up the floating valve, then pull out hard on pushrod to check seating of lock ring.

7) If vacuum hose was removed from power piston, coat outer diameter of hose with adhesive, then slip hose fully into tube so it lays parallel to power piston. Clamp assembled master cylinder in vise (vertically). Lubricate "O" ring on cylinder plug and install gasket so vent passage is open. Install power cylinder housing so air cleaner holes are in same direction as master cylinder filler cap. Install bolts and lockwashers and tighten to 12 ft. lbs. Lubricate inside of housing with Dynaflow oil, then install return spring in housing with large end in position so that bent end fits between bolt head and closest dimple.

8) Lubricate power piston leather cup with Dynaflow oil, then position power piston assembly on spring with large steel ball aligned with vacuum tube hole in housing. Push piston assembly in past vacuum tube hole, then place gasket against vacuum tube flange and insert vacuum tube through hole and slide into vacuum hose. Hold piston assembly in until vacuum tube attaching screws are tightened, then release piston slowly against tube. Operate power piston several times, then check vacuum hose to see that it lays flat against power piston without rubbing on piston hub or housing. If hose rubs, rotate power piston in relation to small end of return spring to correct. Install housing cover and gasket and install two screws. Place felt silencer half way up boot, then slide boot over pushrod ½" past threads and install in groove on cover tube. Install air cleaner filter, cover and screws. Install pushrod clevis so pushrod projects through clevis exact amount as measured before removing clevis nut. Tighten clevis locknut.

BENDIX HYDRAULIC SINGLE ANCHOR (WITHOUT ECCENTRIC)

Buick, All Series (1957)
Cadillac, All Series (1957)
Hudson Hornet V8 (1957)
Nash Ambassador V8 (1957)
Oldsmobile, All Series (1957)
Pontiac, All Models (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 BUICK BRAKE DRUM PRODUCTION CHANGE:* Motor Wheel drums now used on later production cars on front wheels only. These drums are identified by weld spots around circumference between rim and disk. *CAUTION:* If one drum requires replacement, another drum of the same make must be used. Under no circumstances should two different makes of drums be used on the same end of the car.

►*1957 BUICK ALUMINUM DRUMS:* New aluminum finned drums are used on front wheels of Models 75 & 75R. Special wheel attaching bolts are used with these drums and should not be used with other drums, nor should ordinary bolts be used with aluminum drums. Maximum rebore limit on all types of drums is 12.083".

►*1957 BUICK PEDAL LINKAGE CHANGE:* A change in linkage has been made to increase the clearance between brake pedal arm and idler lever arm. This consists of rotating arm on brake pedal slightly and lengthening brake linkage link which in turn increases clearance between arm of brake pedal and arm of idler lever. New brake pedals and old shorter links are not interchangeable. However, only new pedals are available for replacement which requires a new type link also.

►*1957 CADILLAC SILENCER SPRING ELIMINATION:* Effective Engine No. 012025 the brake drum silencer spring has been eliminated.

►*1957 CADILLAC "BUZZING" NOISE CORRECTION:* To eliminate "buzzing" or gurgling noise in power brakes caused by air trapped at control valve assembly, thoroughly bleed hydraulic system - twice if necessary. If condition is not corrected, check system carefully for leaks.

►*1957 HUDSON & NASH PARKING BRAKE PRODUCTION CHANGE:* A new parking brake cable bellcrank return spring is attached to bellcrank and torque tube. An anchor is welded to torque tube to hold it. Return spring hooks into eye of cotter key at bellcrank.

DESCRIPTION: Single anchor, "No-Eccentric", hydraulic type of same design used on corresponding previous models.

ADJUSTMENTS: Before attempting any adjustment, car should be placed on stands with all wheels free. Brake pedal should operate freely and there should be no bind in hand brake lever or cables.

Brake Pedal Adjustment: This adjustment should conform with recommendations before any other adjustment is made. See car model below.

Buick - Make sure large nut holding master cylinder to cowl is tight; tighten brake pedal mounting bracket attaching bolts. Measure from left top side of pedal pad perpendicular to toepan. With ruler pressed firmly against floor mat, pedal height should be 8" (standard brakes), 5½" (power brakes). Adjust by turning pushrod to obtain desired height. *NOTE:* On synchro-mesh cars pedal height same as clutch pedal.

Cadillac - With power brake pushrod in fully released position, pull carpet away from pedal-to-relay rod seal and check distance between pedal reinforcement and seal retainer. Distance should be 4 7/8" 1/8". Screw relay rod into or out of trunnion relay to obtain this distance.

Hudson & Nash—Pedal free travel should be ¼-½" with master cylinder piston against stop. Adjust at master cylinder pushrod.

Oldsmobile—Adjust the master cylinder pushrod to obtain a minimum of 3/16" free travel. Pedal rubber bumper should be slightly compressed.

Packard—Brake pedal should have ¼" free play with master cylinder piston against stop. Adjust at master cylinder pushrod.

Pontiac—Brake pedal should have 4 3/8-4 5/8" clearance (distance from lower side of pedal pad to floor mat) with master cylinder piston against stop. Adjust at master cylinder pushrod.

Minor Wear Adjustment: Check and adjust brake pedal clearance (see Brake Pedal Adjustment), release hand brake lever, and see that cables are free and are not holding brake shoes against drum. At each wheel, expand brake shoes by turning adjusting screw up until wheel can just be turned by hand, adjust hand brake (cars where hand brake adjusted with shoes "expanded"-see Hand Brake Adjustment), then back off adjusting screw the number of notches or "clicks" as shown in table below. Check wheel for freedom of drag. If drag noted, tap backing plate to assist centralization of shoes, then recheck. If drag still exists, anchor pin adjustment may be in order. See Major adjustment.

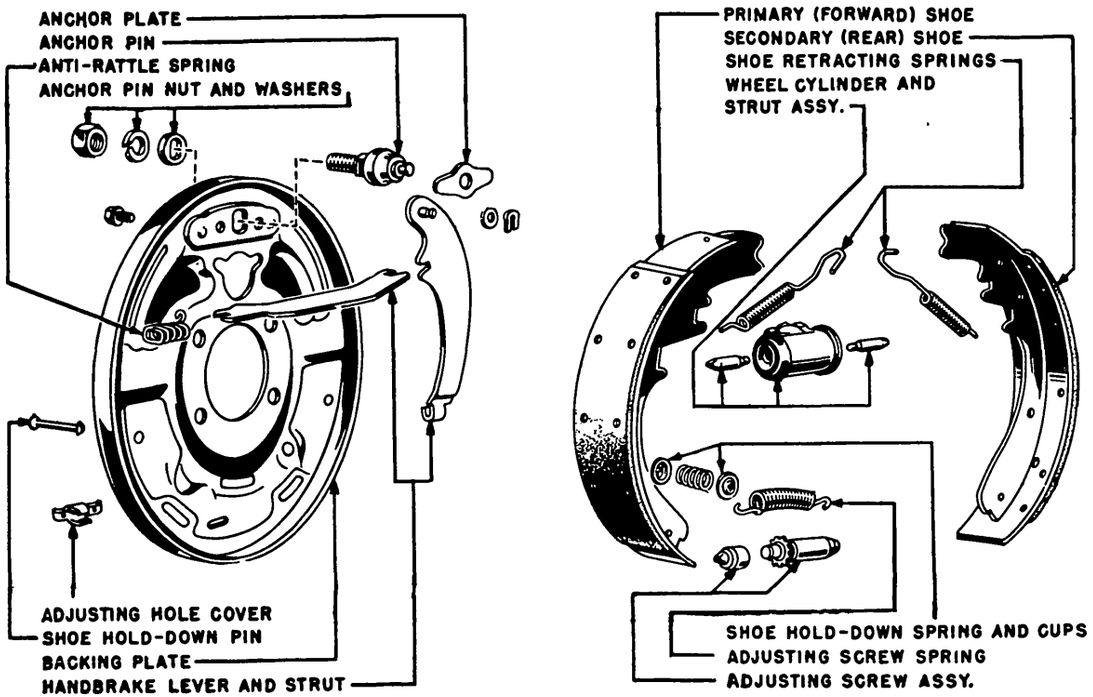
Adjusting Screw Setting

Buick	© 15 Notches
Cadillac	14 Notches
Hudson	14 Notches
Nash	14 Notches
Oldsmobile	16 Notches
Pontiac	14 Notches

© - 17 Notches maximum.

Hudson Mechanical Follow-up Cable Adjustment: Disconnect cable from brake pedal and disconnect master cylinder piston pushrod from brake pedal. Place a 3½" spacer block between brake pedal rod pad and floor mat. Depress pedal rod until pad contacts spacer block; retain in that position and adjust the mechanical follow-up cable length at the clevis end so that the clevis pin can be installed freely with no slack in cable.

Major Adjustment (For New Shoes, Relined Brakes or when Minor adjustment not satisfactory): Jack up all four wheels, loosen or disconnect parking brake cables at equalizer or intermediate lever, remove adjusting hole covers on backing plate and inspection hole cover on drums (remove wheels for access). Check Pedal Clearance (see Brake Pedal Adjustment). Adjust each wheel brake as specified by car manufacturer, given below.



BENDIX HYDRAULIC SINGLE ANCH R BRAKE ASSEMBLY

CONTINUED ON NEXT PAGE

BENDIX HYDRAULIC (Cont.)

CAUTION–If hand brake cables not disconnected or loosened, shoes may be held "ON" by cables.

Buick–Turn adjusting screw up to expand shoes until wheel can just be turned with both hands (if wheel off, drum should just turn with long bar). Back off 15 notches. (Max. 17 notches). Wheels should be free at approximately 6 notches. If not it indicates need for anchor pin adjustment or tight parking brake cables.

Anchor Pin Adjustment–Loosen the anchor pin nut just enough to permit anchor pin to slide in the slotted hole, (*CAUTION*–Loosening anchor pin nut too much will allow brake shoe spring to tilt pin), rap backing plate with hammer adjacent to anchor pin to insure anchor pin assuming central position between shoes, tighten anchor pin nut securely, then recheck drag. (If this has changed recheck anchor pin adjustment). Check and adjust hand brake (see Hand Brake Adjustment). Wheels should be free of any drag.

Cadillac - Loosen anchor pin lock nut ½ turn and tap anchor pin up with a hammer, then all the way down to bottom of its slot. On front wheels it will be necessary to loosen backing plate upper mounting studs slightly and tap anchor pin up, then all the way down to bottom of its slot. Turn adjusting star wheel to expand brakes until wheel can just be turned with two hands. Tap backing plate near anchor pin to raise it to a central position between shoes. Check brake drag. If centering of anchor pin has released brakes, increase expansion of shoes and reset anchor pin again. Repeat until there is no change in drag with change in anchor pin setting, then tighten anchor pin to 80-120 ft. lbs. torque. Loosen star wheel 14 notches, place .015" feeler through drum slot at bottom and rotate wheel until feeler is wedged between secondary shoe and drum. Primary shoe will be tight against drum for measuring secondary clearance. Reverse wheel rotation until .015" feeler is again at bottom and adjust star wheel to obtain .015" clearance. The clearance at top of shoe should now be .010". If upper clearance is greater or less than .010", loosen anchor pin locknut and reset anchor pin, tapping it up to increase clearance and down to decrease clearance. Reset clearance at lower end with star wheel and recheck upper clearance.

Oldsmobile - Expand shoes until heavy drag is felt on brake. Release all adjusting screws approximately 16 notches (until brake drums are free of drag) and replace adjusting screw hole covers. Move adjusting screw end at primary shoe against drum by inserting screw driver into slot provided in drum, then turn drum backward to force end of primary shoe against drum. Check clearance at anchor and adjusting ends of secondary shoes with .015" feeler inserted in brake drum slot. Clearance should be equal to within .002". If not adjust anchor and adjusting screw as required. *NOTE* - Clearance at anchor end should not be more than at adjusting screw end.

Pontiac - Insert a .015" feeler between lining and drum 1½" from adjusting screw end of secondary (rear) lining and expand shoes with adjusting screws until feeler gauge cannot be withdrawn. Back off adjusting screw until only a slight drag is felt on feeler gauge. *NOTE* - this ensures that shoes are against anchor pin and primary shoe is against drum. Withdraw feeler gauge and insert it between lining and drum about 1½" from anchor pin end of secondary lining. This should give slightly heavier drag than near adjusting screw. Adjust anchor pin to get this adjustment. Tighten anchor pin to 75 ft. lbs. Complete adjustment as shown in minor adjustment above, and hand brake adjustment below.

Eccentric Anchor Pin–Pin has square end and can be turned with a wrench after nut has been loosened. Turn pin in direction of forward wheel rotation to decrease clearance. End of anchor pin is beveled and high point indicates high side of eccentric cam. Hold pin with wrench while tightening nut.

Packard–Insert a .015" feeler gauge through inspection hole in drum at point 1½" above lower end of secondary shoe. Expand the adjusting screw (star wheel) until a slight drag is felt on the feeler. Remove feeler and insert a .010" feeler through inspection hole in drum at a point 1½" from upper end of secondary shoe. If clearance not within limits, loosen anchor pin locknut and adjust anchor pin. Turn anchor in direction of forward wheel rotation to decrease clearance. At the same time readjust the adjusting screw to maintain .015" clearance at lower end of shoe. Hold anchor in set position and tighten locknut. Turn clearance adjusting screw (star wheel) until drum can just be turned with both hands, then back off screw until drum turns free.

Hand (Parking) Brake Adjustment: *CAUTION–Brake shoes must be expanded on some cars when adjusting hand brake cables.* Adjust each car as follows:

Buick - *CAUTION* - Do not attempt to adjust parking brakes by simply tightening adjusting nut at brake cable sheave. Pull on both ends of rear brake cable to make sure cables operate rear brake shoes freely and do not bind in conduits. Cable must be free in sheave and spring must return lever to fully released position. Adjust brakes at anchor and adjustment screw as described in minor or major brake adjustment. Never make this adjustment without first making a minor brake adjustment. *NOTE* - When brake lever is in fully released position, signal switch plunger must be depressed 3/16". Adjust by loosening mounting screws and relocating switch.

Cadillac–Adjust the locknut on the equalizer link to obtain 1/8" clearance between the rear edge of the rear relay lever and end of slot in the frame X-member. Do not expand rear brake shoes. Adjust the equalizer lock nut until the rear brake cables are taut. Attach spring scale to hand brake lever and apply a pull of 50 lbs. Measure the distance the hand brake lever has moved from its fully released position. This should be 2 1/8-2 3/8" or 7 notches. Readjust cable tension, if necessary to obtain this amount of movement with 50 lb. pull. Recheck front cable for equalizer 1/8" clearance described above.

Hudson & Nash–Withdraw hand brake lever to rear to provide a 3½" clearance between hand brake lever handle and bracket face. With lever in this position, tighten hand brake cable at equalizer to a point where rear brakes are fully applied. This will prevent possible brake drag. To release parking brake, apply brake pedal pressure, turn the parking brake handle counterclockwise 70°, and push it into released position.

Oldsmobile - Release parking brake, and make minor brake adjustment if there is excessive brake pedal travel. Adjust front cable so that the intermediate lever is held from seating itself on end of the seat in left hand "X" member by ½". Adjust rear brake cables to remove all possible slack without moving brake shoes from released position. Distribute the adjustment between cables so that equalizer link is 90° to the propellor shaft when clevis pin installed. Lock clevis jam nuts and install cotter pins. Install clevis pins with head at top.

Packard–Tighten adjusting screws until wheel can just be turned by hand. Pull hand lever to first notch on ratchet. Adjust clevis on hand brake cable so that the clevis pin can be easily installed without any slack in the cable. Release hand brake lever. Back off adjusting screw at each wheel until wheel turns freely. Apply hand brake and check equalization by turning each wheel by hand. If not equal loosen adjusting screw on the tighter brake. Replace hole covers and road test.

Pontiac–Apply hand brake to first notch and check equalization. Loosen adjusting screw of tightest brake if not equal. If more than a few notches are required, loosen clamp screws on spreader and pull downward on the tight side of cable. This should equalize cable. Tighten spreader clamp screws while hand brake lever is still in the applied position. Brake cables are sufficiently tight if rear wheels can barely be turned by hand with lever in the first notch. When lever fully released, wheels should turn freely with cable pulled down approximately 1½" by gripping cable midway between conduit and clearance hole through frame X-member. When adjusting rear end of front cable for close adjustment for tension, be sure to turn clevis on or off cable end but do not twist cable. Coarse adjustment is secured by selecting the correct hole in the spreader.

BLEEDING BRAKE SYSTEM & OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing" in Brake Section of Manual.*

▷ *BLEEDING POWER BRAKE NOTE:* Bleed power brake master cylinder first by attaching bleeder drain hose to fitting on end of master cylinder, backing off fitting ¾ of a turn and bleed fluid into a partially full bottle of clean brake fluid until bubbles cease. Then proceed as for standard master cylinder.

▷ *BUICK FILLING & BLEEDING CAUTION:* Avoid spilling fluid on backing plates of finned aluminum drums as the perforated construction of these drums may cause fluid to come into contact with linings and cause damage.

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

CHRYSLER, DE SOTO, DODGE & PLYMOUTH "CENTER PLANE" & "TOTAL CONTACT"

Chrysler & Imperial, All Models (1957)
DeSoto, All Models (1957)
Dodge, All Models (1957)
Plymouth, All Models (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*BRAKE "SQUEAK" CORRECTION:* To correct brake squeaks or other brake noises, proceed as follows:

1) Torque axle housing to rear spring U-bolt nuts to a specified torque of 65-80 ft. lbs.
2) Inspect for out of round drums, distorted support plates, or loose anchor pins. To correct loose anchor pins, remove support plates, check alignment, place support plate with the pin resting in vise, repeen end of pin until it is tight.
3) Torque the five rear wheel brake support to axle bolt nuts to 35 ft. lbs. The four front wheel brake support bolt nuts must be torqued to 55 ft. lbs.
4) Brake shoe guide spring, Part No. 1484680, which is held in place by the retainer, Part No. 1486945, must be very tight against brake shoe and support. Loose guide springs should be bent to restore their tension. The retainer must not exceed specifications of 15/32", measured between inside ends.

►*REAR WHEEL REMOVAL CAUTION:* **Do not apply service brakes to hold shoes against drum while using wheel puller.** To hold hub and drum from turning while using wheel puller back off brake shoes from drum with adjusting cams. Apply hand brake and allow one rear wheel to remain on floor, or block wheel in suitable manner.

DESCRIPTION: These hydraulic brakes have two floating shoes mounted between two plates located on the center plane of the lining. On front wheel brakes, two single piston cylinders (single action) are attached to the support plate assembly, the upper cylinder actuating the front shoe, and the lower cylinder actuating the rear shoe. On rear wheel brakes, one double piston cylinder (double action) is attached to the top of the support plate assembly and actuates both brake shoes. An anchor pin in support plate assembly holds spring link in a fixed position at one end. The other end of link is positioned by brake shoe adjusting cam, providing a constant-loaded spring length. Side rattle and twisting of shoe is controlled by spring guide, which maintains a constant pressure against side of web of shoe holding shoe against support plate.

ADJUSTMENTS: Place car on stands, so that all four wheels are free. Check master cylinder and see that fluid level is not over ½" below top of cylinder. Place parking brake lever in fully released position.

Brake Pedal Adjustment: Release locknut on brake pedal to master cylinder pushrod and rotate rod to obtain specified clearance.
Standard Brakes - 1/32-1/8" (Chrysler), 1/8-1/4" (Others).
Power Brakes - 1/16-1/8" (De Soto, Plymouth); 1/32-1/8" (Dodge, Chrysler).

Front Wheel Adjustment: Turn each adjusting cam on both front shoes in the direction of FORWARD wheel rotation until lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction (each cam a little at a time) until no drag is felt.

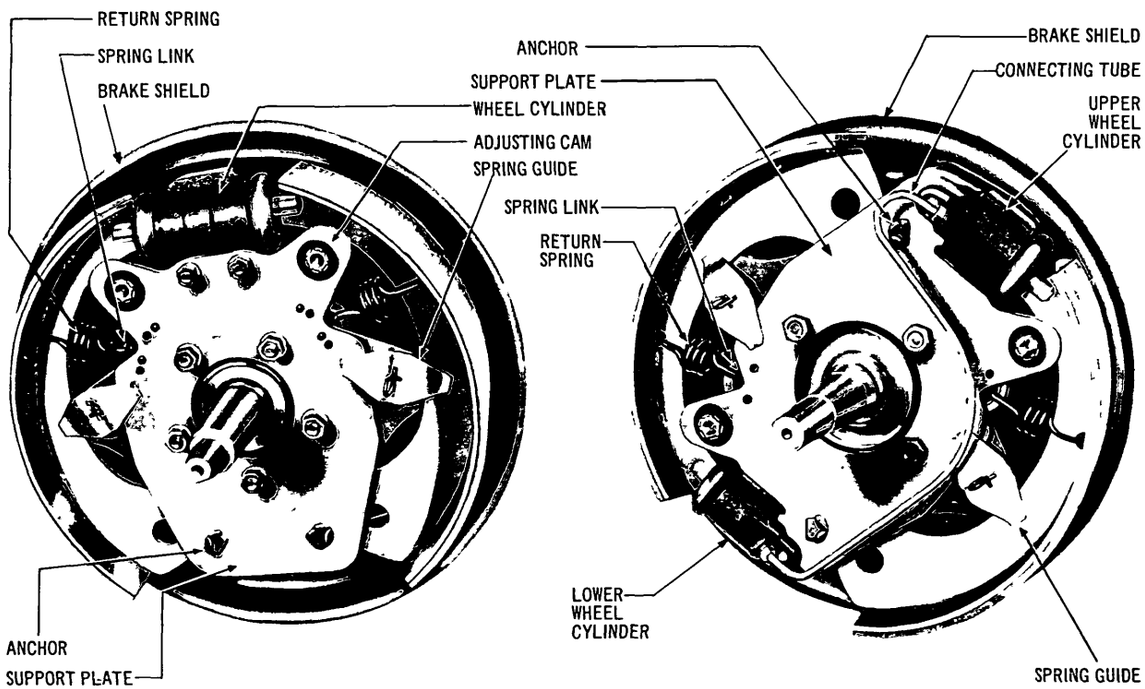
Rear Wheel Adjustment: Turn front shoe adjusting cam in direction of **forward** wheel rotation and rear shoe adjusting cam in direction of **reverse** wheel rotation until lining is solid against drum and wheel is locked. Turn adjusting cams slowly in opposite direction until no drag is felt.

►*RELINED OR NEW SHOE ADJUSTMENT NOTE* – Apply brake pedal prior to adjusting brakes to properly center shoes in brake drum and to assist in adjustment.

Hand Brake Adjustment: Hand Brake is independent type mounted on drive shaft at rear of transmission. *See Car Model Pages and individual model Special Data Pages.*

BLEEDING BRAKE SYSTEM: Use compressed air refiller, Tool C-3496 attached to master cylinder to keep master cylinder filled. Back off adjusting cams all the way, then starting with right rear wheel cylinder, attach bleeder hose, Tool C-650 to valve, with other end in jar partially filled with brake fluid. Bleed intermittently, opening and closing valve (at wheel cylinder) until fluid runs out of bleeder hose in a solid stream without bubbles. Repeat this operation on left rear wheel, right front wheel and finally left front wheel. At front wheels (with two cylinders), bleed lower cylinder first to force air out of connecting line to upper cylinder, then bleed upper cylinder. Repeat bleeding operation if brake action indicates air still in lines. Readjust cams after completing bleeding operation.

BRAKE SHOE REPLACEMENT: Removal - 1) Remove wheel, hub and drum assembly using puller C-845 to remove drum assembly.
2) Insert wrench C-3462, in the inner support plate hole, with tool cam slot engaging the spring hook. Turn tool handle to disengage spring from spring link, and turn handle in opposite direction to release the spring. Remove both springs in this manner. *CAUTION* - Do not use brake spring pliers or damage to lining will result.
3) Turn brake shoe guide spring retainer 1/4 turn and remove (the lip on end of spring is for correct positioning on outer support assembly). Slide shoes from support assembly.
Installation: 1) Position brake shoe in support plate,



REAR WHEEL BRAKE **FRONT WHEEL BRAKE**

CENTER PLANE BRAKE ASSEMBLIES

CONTINUED ON NEXT PAGE

CHRYSLER, DE SOTO, DODGE & PLYMOUTH "CENTER PLANE" & "TOTAL CONTACT" (Cont.)

(make sure that wheel cylinder pushrods properly engage toe end of shoes and that shoes are in alignment).

2) Check tension of springs which should be 70 lbs. plus or minus 5 lbs., installed length. This can be checked by hooking a scale at toe end of shoe and pulling shoe away from wheel cylinder. Scale should read 35-45 lbs., before contact is broken between web of shoe and wheel cylinder.

LINING REPLACEMENT: Drum diameter should not exceed .004" out of round at any point. Grind lining to specified clearance of .010"-.024" below drum diameter.

WHEEL CYLINDER & SUPPORT PLATE: Removal & Disassembly 1) Disconnect flexible brake hose at wheel cylinder (upper cylinder on front), and remove wheel cylinder mounting screws and lockwashers at rear of brake shield.

2) Remove support plate mounting bolts and remove support plate with wheel cylinders and connector tube attached.

3) With assembly on bench, remove cylinder connector tube and wheel cylinders.

Assembly & Installation: 1) Assemble wheel cylinders on support plate. (Install connector tube on front assembly).

2) Position support plate on brake shield and install cylinder mounting screws and lockwasners, but do not tighten.

3) Install support plate bolts, lockwashers and nuts. Tighten to 35 ft. lbs. and cylinder mounting screws to 20 ft. lbs.

WHEEL CYLINDER OVERHAUL: Wheel cylinder pistons that are badly scored or corroded should be replaced. Use new piston cups when reconditioning cylinders. Cylinder walls that have light scratches, or show signs or corrosion, can usually be cleaned up with crocus cloth. Cylinders that have deep scratches or scoring, may be honed using Tool C-3080. Diameter of cylinder bore should not be increased more than .002". If a cylinder does not clean up at .002" it should be replaced *(NOTE* - Black stains on cylinder walls are caused by piston cups and will do no harm).

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Manual.*

BENDIX (LOCKHEED) SELF-CENTERING

Rambler 6 Cyl. 5710 Series (Before Serial No. D-360492) (1957)
Willys, All Models (1957)

► *NOTE:* Later Rambler 6 cyl. cars have Wagner-Lockheed self-centering brakes.

► *WILLYS FORWARD CONTROL MASTER CYLINDER NOTE:* Master cylinder mounted on inside front panel of cab, just underneath instrument panel. Access to filler plug is through hole cover on panel to right of speedometer.

DESCRIPTION: "Self-centering" hydraulic type with non-adjustable anchor ramps for each shoe.

ADJUSTMENT: Before making adjustments, jack up all four wheels, check brake pedal clearance or free travel (see below), fully release hand brake and make certain that rear wheels are free, then adjust each wheel as follows:

Brake Shoe Adjustment (For Wear or New Linings):

► *CAUTION: Brake shoes must be "centralized" by several hard brake applications before adjusting.*

Eccentric Adjustment - Adjust eccentric for each brake shoe by turning eccentric out until brake shoe firmly applied and wheel is locked, then back eccentric off until wheel just rotates freely without drag. Shoe clearance will then be approximately .010".

Anchor Lip Adjustment - Pressure required to pull shoe outward from support plate should be 15 lbs. Measure with spring scale hooked in end of shoe. Adjust by bending anchor lip slightly toward brake support plate to obtain this 15 lb. coil spring pressure to hold shoes on support plate ledges.

Hand Brake Adjustment: Remove all slack from rear wheel brake cables as follows:

Rambler - Withdraw hand brake lever to rear to provide a 3½" clearance between hand brake lever handle and bracket face. With lever in this position, tighten the hand brake cable at equalizer to a point where rear brakes are fully applied. This will prevent possible brake drag. Release control handle fully and see that wheels are free of any drag.

Willys, All Models Except Jeep - Pull hand lever "on" three notches, loosen front nut on connecting link between intermediate lever on frame crossmember and rear cable equalizer, tighten rear nut on link until slight drag noted at each rear wheel, then tighten front nut to lock adjustment. Release hand lever and check for freedom from drag.

CJ-5, 6, & 3B Jeep; & Forward Control - Hand brake is independent internal expanding type, mounted on rear of transfer case. *For adjustment procedure see Car Model pages.*

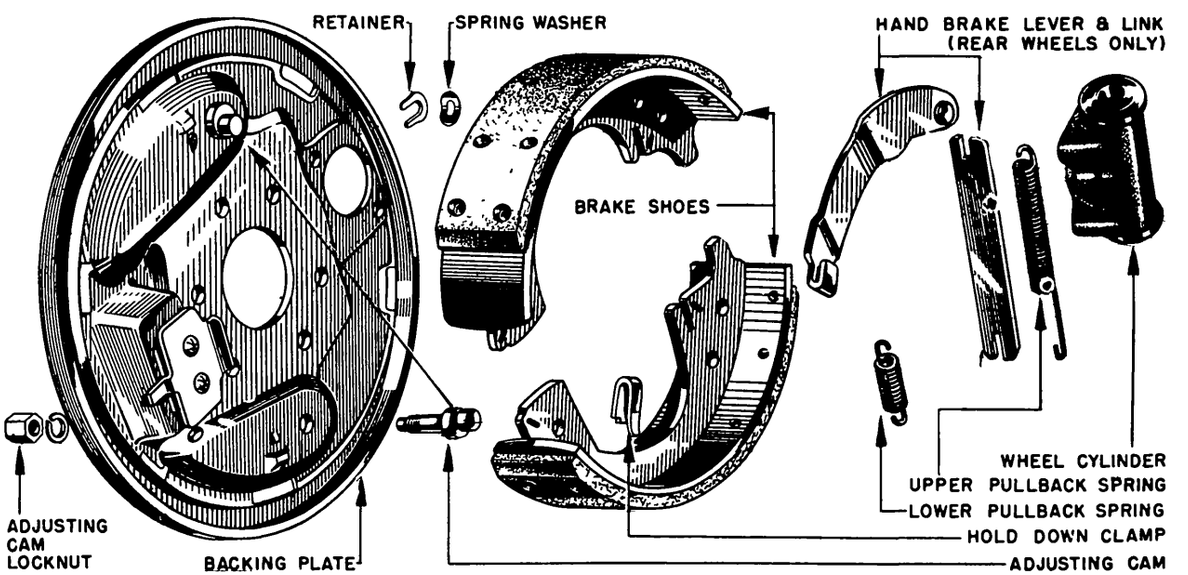
Brake Pedal Adjustment: Adjust master cylinder pushrod by loosening locknut and turning rod for following pedal free travel with master cylinder piston and pushrod back against stop:

Brake Pedal Free Travel

Rambler	¼-½"
Willys	½"min.

BLEEDING BRAKE SYSTEM & OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing" in Brake Section of Manual for complete data.*

TROUBLE SHOOTING: *See "Hydraulic Brake Troubl Shooting" in Brake Section of Manual.*



BENDIX (LOCKHEED) SELF-CENTERING REAR BRAKE (FR NT SIMILAR EXCEPT HAND BRAKE PARTS MITTED)

WAGNER (LOCKHEED) SELF-CENTERING

Packard Clipper (1957)
Rambler 6 Cyl. 5710 Series Beginning Serial No. D-360492 (1957)
Rambler V8 5720 Series (1957)
Studebaker, All Models (1957)

►CHANGES & CORRECTIONS

►*RAMBLER PRODUCTION CHANGE NOTE:* Bendix (Lockheed) Self-centering type used on earlier cars.

►*STUDEBAKER & PACKARD FRONT WHEEL SECONDARY LINING NOTE:* Front wheel secondary lining is ¼" thick **(Champion),** 7/32" thick (all other **Studebakers & Packard)** (3/16" on all other shoes), and is preground off-center at the factory to eliminate brake squeal. This lining is applied to the full length of the shoe, and is marked "Secondary" and "Top" and should be installed as marked.

DESCRIPTION: Wagner-Lockheed Hydraulic self-centering and self-energizing type (with Bendix type brake shoe assemblies). Brakes are not self adjusting. A self-centering device is used.

Rambler Rear Brake Cylinder - Single piston type, mounted on backing plate, linked to primary shoe.

Self-centering Device - The upper anchor pin end of each brake shoe rests against a wedge-shaped anchor block which is mounted on fixed brake anchor pin (shoes do not contact anchor pin directly) so that the shoes are free to move radially. The wide edge of the anchor block is toward the top. When the brakes are applied, the lining surface pressure tends to force the shoe to adjust its position on the block and center itself in the drum. This centering action takes place on light, or heavy brake application and is continuous with drum expansion. The anchor plate aids in keeping the shoes properly aligned at the self-centering block.

Adjusting Device - Consists of a "star wheel" adjusting screw and stud assembly mounted between the lower ends of the two brake shoes (similar to Bendix Duo-servo brake shoe assemblies). Adjusting screw spring serves a dual purpose, holding the shoes against notches of adjusting screw, and binding against ratchet on screw to serve as a screw lock.

ADJUSTMENTS: Place car on stands so that all four wheels are free. Check master cylinder and see that fluid level is ½" below top of cylinder. Place parking brake handle in fully released position. Adjust as follows:

Rambler Brake Pedal Free Travel Adjustment: Adjust the brake pedal play ¼" to ½" by rotating the master cylinder piston pushrod to brake pedal attaching eccentric bolt.

Studebaker & Packard Brake Pedal Free Travel Adjustment: Loosen locknut on brake pedal-to-master cylinder rod, turn master cylinder rod until free travel is ¼" – 3/8" (Manual brakes), or 1/8" – ¼" (Power brakes).

Brak Sh Adjustment: Remove adjusting hole cover from backing plate, insert screwdriver or special adjusting tool through adjusting hole and turn adjusting screw to expand shoes until drum is just locked (pivot tool on edge of slot, move handle upward to expand shoes). Then back off the adjusting screw 10 notches (Rambler), 8 notches or clicks (Others) move if necessary until drum is free of any drag. Replace adjusting hole cover, adjust parking brake.

Rambler Parking Brake Adjustment: Withdraw the hand brake lever to the rear to provide a 3½" clearance between the hand brake lever handle and bracket. With the lever in this position, tighten the hand brake cable at the equalizer to a point where the rear brakes are fully applied. This will prevent possible brake drag. Release control handle fully and see that wheels are free of any drag.

Studebaker & Packard Parking Brake Adjustment: Set control handle four notches from the fully released position. Adjust rear wheel cables at equalizer on frame side rail by backing off front nut and tightening rear nut until all slack is removed from cables and a heavy a drag noted when rotating rear wheels by hand, tighten front adjusting nut. Release control handle fully and see that wheels are free of any drag.

BRAKE SHOE REMOVAL & INSTALLATION:

Removal: Install wheel cylinder clamp to prevent hydraulic system leakage. Unhook the two shoe return springs at anchor. On rear brakes, swing the hand brake lever on the secondary shoe toward the axle to slacken cable. Lift cable from lever slot. Compress and remove hold-down spring clip on each shoe. Spread shoes and lift off brake support plate. On rear brakes, remove parking brake link and anti-rattle spring. Separate shoes by removing star wheel adjusting assembly and spring. On rear brakes, pull clip from parking brake lever mounted on secondary shoe and remove lever from shoe. Anchor plate and anchor block may now be lifted from anchor pin.

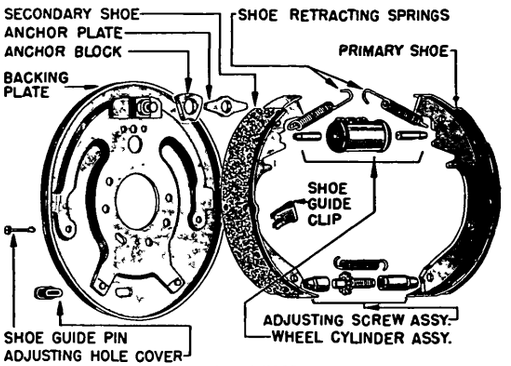
Installation: Reverse the removal procedure. *NOTE* - On Champion and Silver Hawk - 6, the parking brake lever is mounted on outer side of shoe web, inner side on all other models.

WHEEL CYLINDER: Removal & Disassembly - Disconnect flexible hose from cylinder. Remove screws attaching cylinder to backing plate. Remove cylinder.

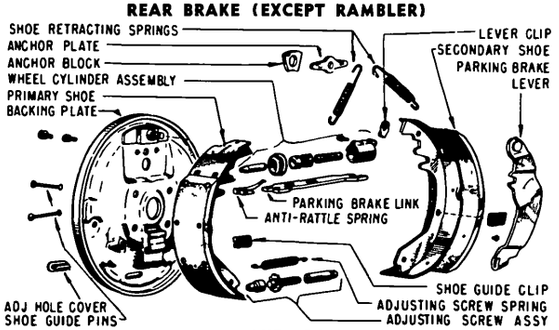
Assembly & Installation: Assemble cylinders as shown in illustrations. Reverse removal procedure to install.

BLEEDING BRAKE SYSTEM & OVERHAULING OF MASTER CYLINDER & WHEEL CYLINDERS: *See "Hydraulic Brake Servicing" in Brake Section of Manual and note the following: CAUTION* - To bleed power brakes, engine must be stopped and no vacuum in power brake system. *NOTE* - On Studebaker equipped with power brake and/or hill holder, these units must be bled before the rest of the system.

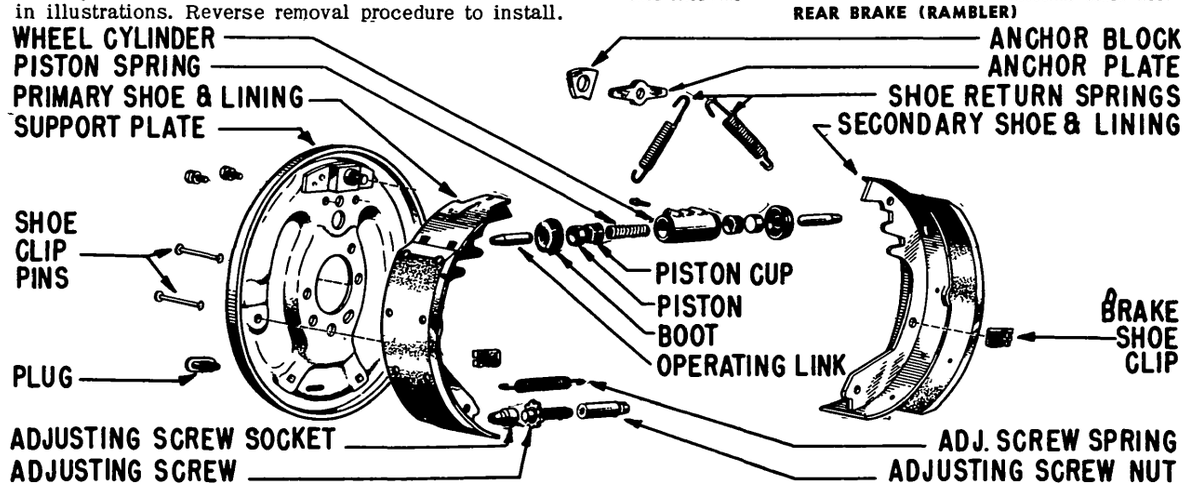
TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*



REAR BRAKE (EXCEPT RAMBLER)



REAR BRAKE (RAMBLER)



FRONT BRAKE (INCLUDING RAMBLER)

CHEVROLET-BENDIX HYDRAULIC

Chevr l t Pass. Cars, All Models (1957)
Ch vr l t Corvett (1957)
Chevr l t Trucks, 3. 4. 5. & 6000 Series except 1½ & 2 Ton R ar Brakes (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*PASS. CARS & HALF TON BRAKE SHOE GRINDING CAUTION:* If bench type grinder used, grind shoes to .057- 087" smaller diameter than drum size If spindle type grinder used, grind shoe to drum diameter.

►*POWER BRAKE NOTE·* Bendix Power Unit optional on passenger cars. Hydrovac Power Unit optional on trucks. *See "Bendix Power Unit" or "Hydrovac Power Unit" under Power Brakes.*

DESCRIPTION: Duo-Servo, single anchor, hydraulic type without eccentric adjustment.

ADJUSTMENT: Adjustments are made differently for wear (Minor Adjustment) and for new lining or shoe assemblies (Major Adjustment). Major adjustment should also be made whenever a minor adjustment is not satisfactory.

Brak P dal Adjustm nt: Before adjustments made, make sure pedal returns to fully released position freely, with no binding, and that pedal retracting spring has not lost its tension.

Passenger Cars - 1/8"-3/8" pedal movement before contact of pushrod and main cylinder piston. To adjust, loosen check nut on clevis. Turn pushrod in proper direction to secure adjustment. Tighten check nut on clevis.

Trucks (F rward Control)–¾' clearance between top of pedal arm and toe board. To adjust, loosen check nut at rear of clevis on main cylinder pushrod. Turn main cylinder pushrod by knurled portion ahead of boot, in proper direction to secure desired clearance. Tighten check nut.

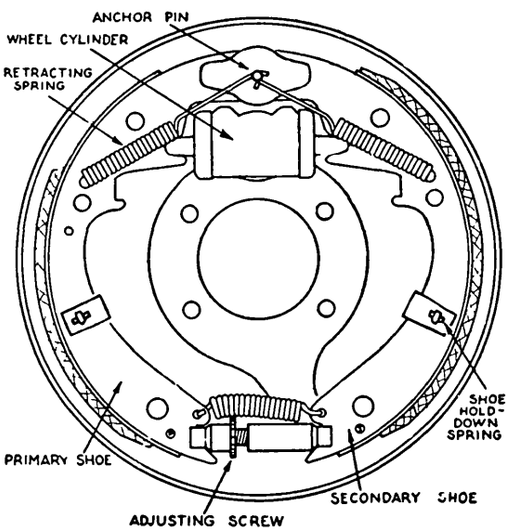
Trucks (Others)– 1¾' (Low Cab Forward), 11/16' (Others except Fwd. Control), clearance between upper corner of lower pedal arm and seal around upper pedal arm in toe board. To adjust, remove cotter pin and loosen castle nut on adjusting bolt, then rotate adjusting bolt in required direction to obtain desired clearance, tighten adjusting bolt nut, recheck clearance, reinstall cotter pin in adjusting bolt nut.

Minor Adjustment (For Wear): Jack all wheels clear of floor. On passenger cars, loosen check nut at brake cable equalizer to remove tension from brake cable. On trucks, disassemble clevis of parking brake pull rod. On all cars and trucks, remove adjusting hole covers from flange plates. Expand brake shoes by turning adjusting screw with Tool J-4707 until a light uniform drag is felt on brake drum (move outer end of tool toward center of wheel to expand shoes). On passenger cars and ½ Ton truck, turn adjusting screw in opposite direction 7 notches to relieve brake drag. On all other truck models, back off adjusting screw just enough to eliminate drum drag (not to exceed 7 notches). *(NOTE–* If more than 7 notches required to eliminate drag, a Major Adjustment is required). Replace adjusting hole covers. Reconnect and adjust parking brake (see Hand (Parking) Brake below). Check brake pedal clearance (see above).

Major Adjustment (New or Relined Shoes): Pass. Cars & ½ Ton Trucks and Trucks (other than ½ Ton) adjusted differently *See "Pass Cars & ½ Ton Brake Shoe Grinding Caution" above*

Pass. Cars & ½ Ton Trucks - Same as Minor Adjustment above *See "Pass Cars & ½ Ton Truck Caution" above.*

¾ & 1 Ton (All Brakes), 1½ & 2 Ton (Front Brakes): Loosen anchor pin nut just enough so that pin can be rotated *(CAUTION–*if nut loosened too much, brake springs will tilt anchor pin). With tool J-4707, turn brake adjusting screw to expand brake shoes until a heavy drag is felt on the drum. Tap brake flange plate and turn eccentric pin in direction tending to reduce drag by allowing shoes to center in drum. If drag on drum is reduced, expand shoes by tightening adjusting screw several more notches and again turn eccentric anchor pin while tapping brake flange plate Repeat this operation until drag remains constant. Then tighten anchor pin nut to 60-85 ft. lbs. torque (¾ Ton Front & Rear Brakes, 1 Ton Front Brakes), 125-150 ft. lbs. torque (1 Ton Rear Brakes, 1½ & 2 Ton Front Brakes). Back off adjusting screw just enough to eliminate drag but **not more than 7 notches.** If more than 7 notches required to eliminate drag, repeat adjustment procedure. Adjust parking brake (below). *NOTE–*If heavy intermittent drag noted, brake drums should be rebored and new linings installed.



FRONT BRAKE ASSEMBLY

HAND (PARKING) BRAKE: Passenger Cars and ½ & ¾ Ton Trucks adjusted differently. 1, 1½, 2 and some ¾ Ton Trucks have propeller shaft mounted parking brakes. *CAUTION–*Service brakes must be properly adjusted before making parking brake adjustment.

Adjustm nt (Pass. Cars): Jack up both rear wheels. Check clearance between idler lever and mounting bracket at equalizer (approximately ¼"). To correct, disconnect equalizer, tighten check nuts on forward cable. Pull hand brake out 7 "clicks" (not same as notches). Loosen forward check nuts on equalizer and tighten rear one until there is a slight drag on both rear wheels when rotating drums. Tighten check nuts securely. Set parking lever back to 2 clicks from full release position, at which point no brake shoe drag should be felt

Adjustment (½ & ¾ Ton Trucks using cable connected to rear wheel service brakes) Jack up both rear wheels. If clevis of parking brake disassembled, place parking brake lever in fully released position, then install clevis to brake pull rod to obtain a dimension of 1 7/16" from end of pull rod to centerline of clevis. With parking brake lever in fully released position and pull back spring in place, adjust parking brake cable at idler lever to obtain a clearance of ¼" between idler lever and rear end of slot in guide. Pull hand brake lever back four notches from fully released position. Pull cables out of conduits by hand as far as possible and assemble cables into idler lever links. Tighten nuts and locknuts. Pull back hand lever until heavy drag is felt at one wheel. Check other wheel for drag, and if any difference is noted, loosen tight wheel until equal drag is obtained. With hand lever pulled out nine notches both rear wheels should be locked so that they cannot be turned by hand. *NOTE–*If more than nine notches are required to lock brakes, check service brake adjustment

Adjustment (¾ & 1 Ton Trucks using propeller shaft mounted parking brakes)· Place the hand brake lever in fully released notch of ratchet sector Loosen locknut on brake pull rod Remove cotter pin from clevis pin holding brake rod to brake cam (leave loose) Set brake cam rest flat on upper brake band bracket Back off adjusting nuts (at lower end of spring) and adjusting nut at top of adjusting bolt (bolt joins lower part of band to bracket) *(CAUTION–*Do not remove nuts, loosen only) Remove lock wire from anchor screw Adjust anchor screw until there is 010- 015"clearance between lining and drum at anchor screw Tighten adjusting bolt (bolt without spring) until there is 020" clearance between drum and lower end of brake band Tighten locknut Tighten adjusting nut at lower end of spring until there is 020" clearance between drum and upper end of brake band Tighten locknut Adjust brake pull rod so clevis pin can be installed while brake cam rests flat on upper brake band bracket Install cotter pin in clevis pin of brake pull rod and tighten locknut on brake pull rod Install lock wire on anchor screw Recheck all points of facing for correct clearances

Adjustment (1½ & 2 Ton Trucks): Propeller shaft mounted, shoe type. *See "Chevrolet Twinplex" for data.*

BLEEDING BRAKE SYSTEM: *See "Hydraulic Brake Servicing" in Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Manual.*

BRAKE SHOE REPLACEMENT: *See "Chevrolet-Bendix Hydraulic" in 1954 Annual Data or later Manual edition.*

CHEVROLET TRUCK TWINPLEX

Chevrolet Trucks 4, 5, & 6000 Series (1½ & 2 Ton) (1957) Rear Wheels Only.

►*BRAKE BOOSTER NOTE* Hydrovac Power Unit Standard on 2 Ton and 1½ Ton Special Models, Optional on others

DESCRIPTION: Two cylinder, four anchor type (each shoe anchored at each end and linked to wheel cylinder at each end) Brakes are radially self-centering

ADJUSTMENT: Each shoe has one adjustment (adjusting screw at adjustable anchor end) Adjustment is same for both wear and for new or relined shoe clearance

Brake Pedal Adjustment: *See "Chevrolet-Bendix Hydraulic" for data.*

Brake Shoe Adjustment: Jack up both rear wheels, remove adjusting hole covers from backing plates (two holes at each wheel—one for each shoe) Use tool J-4707 or screwdriver inserted through rear (lower shoe) adjusting hole and turn adjusting screw up (move outer end of tool toward center of wheel) until light brake drag is felt on wheel then back off adjusting screw 3 notches for correct running clearance Adjust upper shoe similarly by inserting tool through front adjusting hole

Parking (Hand Brake) Adjustment: Parking brake is independent type mounted on propeller shaft at rear of transmission

1½ & 2 Ton—Fully release brake lever Loosen locknut on outer shoe adjusting screw then tighten to secure a clearance of 010" to 015" measured at point directly above screw Tighten locknut Loosen locknut on link between hand brake lever and shoe actuating lever Tighten adjusting nut on link to secure a clearance of 010" to 015" between inner shoe and drum Tighten locknut

BLEEDING BRAKE SYSTEM: Pressure or manual methods can be used.

Pressure Bleeding: **1)** Back off adjusting screw all the way on upper shoes of both rear wheels Fill master cylinder reservoir to top of filler plug opening. Connect pressure bleeder to master cylinder and open valve in bleeder tank line *(NOTE*—Bleeder tank should be charged with 25-35 lbs air pressure and kept at approximately this pressure during bleeding operation. End of bleeder tube must be in a bleeder jar or bottle and covered with fluid while performing all bleeding operations).

2) Connect bleeder tube to bleeder valves in following sequence, open bleeder valve and bleed until all air bubbles disappear, then close bleeder valve. Sequence as follows.

a) Hydrovac slave cylinder (bleeder valve on end cap). *NOTE* - Will take approximately ½ pint of fluid.
b) Hydrovac valve (bleeder valve on top of control valve).
c) Left rear wheel, front cylinder.
d) Right rear wheel, front cylinder.
e) Left front wheel.
f) Right front wheel.

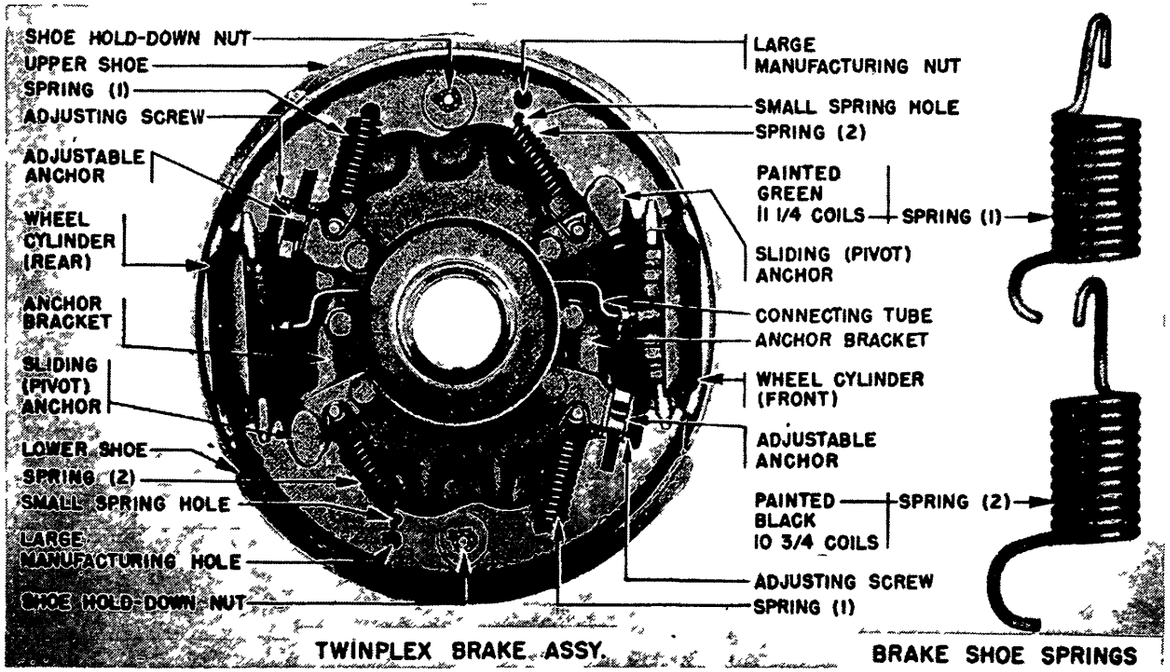
3) Adjust upper shoe on each rear wheel with pressure tank still connected Push down hard on brake pedal several times to centralize shoes Disconnect pressure tank and readjust all brake shoes

4) Apply approximately 75 lbs. pressure on brake pedal and check pedal clearance from toe board to forward edge of pedal pad Clearance should be a minimum of 5" with floor mat removed. If reserve less than 5", rebleed Hydrovac and rear brakes in sequence outlined above

Manual Bleeding: **1)** Install adapter and automatic filler J-713. Connect bleeder tube to Hydrovac bleeder valve (on end cap). Place end of tube in container having sufficient fluid to cover end of tube.

2) Open bleeder valve approximately ¾ of a turn, depress brake pedal a full stroke and allow it to return slowly, making sure end of tube is under surface of liquid in container Continue operating pedal, refilling jar at master cylinder when necessary, until liquid emerging from bleeder tube is air bubble free Close bleeder valve. Proceed to bleed system as outlined in steps **2) b)** through **f), 3) and 4)** under "Pressure Bleeding" above, using automatic filler in place of pressure tank.

TROUBLE SHOOTING: *See "Hydraulic Brak Troubl Shooting" in Manual.*



CHEVROLET TWINPLEX BRAKE ASSY.

FORD, LINCOLN, MERCURY (BENDIX)

Contin ntal Mark II (1957)
F rd 6 Cyl. & V8 Pass. Cars (1957)
F rd Trucks, F-100, F-250 (1957)
F rd Trucks, F, P-350, P-400 All 500 & 600 Series (1957) R ar Wh els Only.
Linc ln, All Models (1957)
M rcury, All M d ls (1957 Early)
Thunderbird (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 FORD ANCHOR PIN BOLT TORQUE:* Torque specifications for front brake anchor pin attaching bolt is 80-100 ft. lbs. When checking sources of trouble for a brake pulling condition, it is recommended that anchor pin bolt be backed off and retightened to 80-100 ft. lbs.

►*1957 MERCURY BRAKE HOSE RUBBING CORRECTION (EARLY CARS):* Rear brake hose may rub on left rear shock absorber. To correct, install new rear axle brake tube fitting Part No. MG-2074-B. *NOTE - Station wagons use Part No. MG-2074-A only.* If old fitting used, twist hose by removing from brake tube and twisting counterclockwise 1 hex flat.

►*1957 MERCURY REAR BRAKE HOSE TENSION CORRECTION (EARLY CARS):* Rear brake hose on some early cars may be under tension. Correct by bending frame bracket tab approximately ¼" to rear *(CAUTION - Do not damage connection between hose and brake tube),* or install ¾" longer hose, Part No. ED-MA-2078-A.

►*1957 MERCURY SPONGY PARKING BRAKE CABLE CORRECTION (EARLY CARS):* If cable has spongy feel, install dash panel retaining clip, Part No. 361767-S8-UP. Drill 13/64" hole in upper portion of "Y" dash panel reinforcement. Install clip with ¼" x 20 self-tapping screw no longer than ½". *CAUTION* - Cable must be free of binding and kinking and not interfere with speedometer cable.

►*1957 MERCURY PARKING BRAKE SPECIFICATION CHANGE:* Two equalizer lever retracting springs installed on later cars to assure positive release of parking brake. When releasing difficulties occur install the second spring, Part No. MG-22794-A. *NOTE - It is important that b fore installing a second retracting spring, the parking brake mechanism be checked and any binding condition and/or improper adjustments be corrected.*

DESCRIPTION: Duo-Servo, single anchor, hydraulic type without eccentric. Anchor pins on all models except Ford Trucks are FIXED and no major adjustment is required on these models. On Ford Pass. Cars (except Thunderbird) and Mercury the front wheel anchor pin is mounted on the wheel spindle through the wheel cylinder and backing plate.

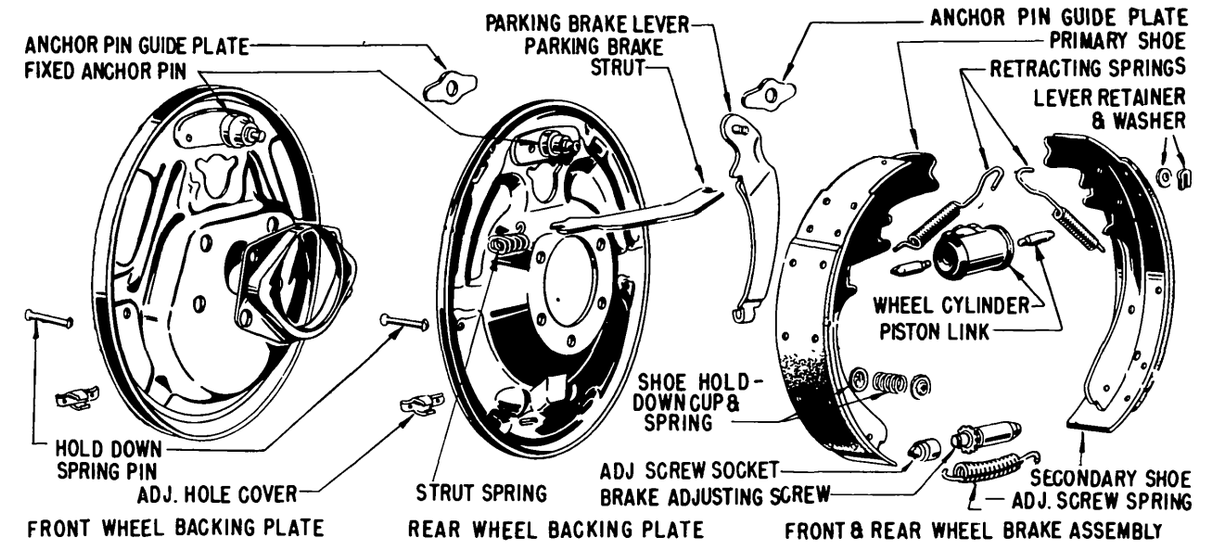
M rcury Parking Brake Pedal - Toe-set parking brake pedal used instead of T-handle. Located to left of regular foot brake pedal. Set by pushing forward on pedal, release by pushing bar on left end of instrument panel (Merc-o-Matic - mounted on selector keyboard).

ADJUSTMENTS: Before making any adjustments, jack up all four wheels, check brake pedal clearance (see below), fully release hand brake lever and make certain that all wheels turn free. Then adjust as directed below.

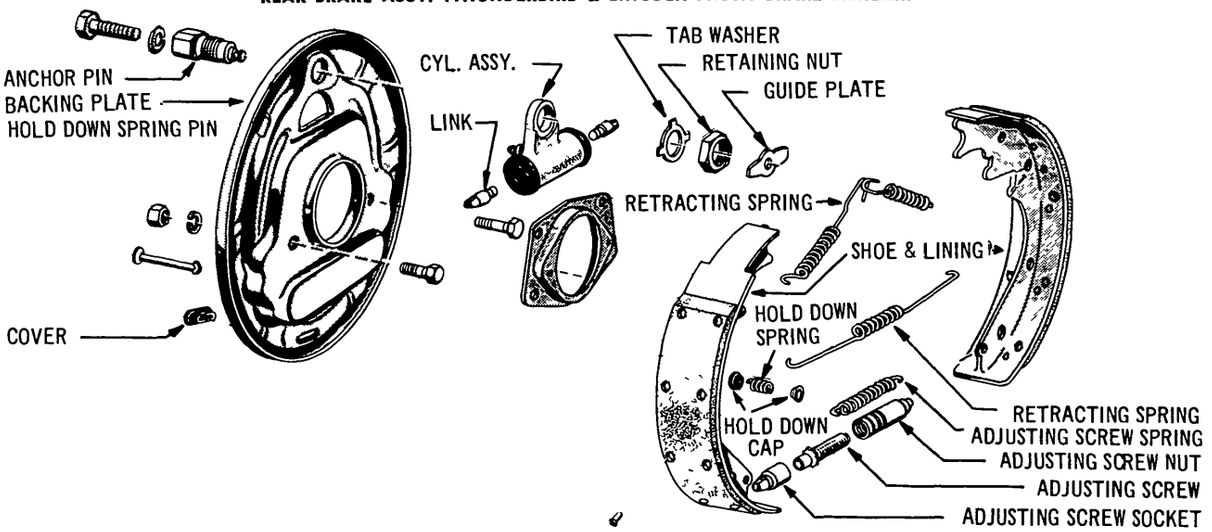
Brake Pedal Adjustment: Pedal must have more than 5/16" but less than 7/16" free travel (Ford Pass. Cars, Lincoln, Mercury); or more than 3/16" but less than 3/8" free travel (Ford Trucks), before master cylinder piston begins to move.

All Poss. Cars and Trucks - Loosen locknut on eccentric bolt attaching brake pedal to master cylinder pushrod and turn bolt for desired freeplay. Tighten to 25-30 ft. lbs. torque.

Minor (W ar) Adjustment: Remove adjustment hole cover, rotate adjusting screw until shoe begins to drag (Ford Pass. Cars & Trucks), or tight against drum (Lincoln & Mercury). Then back off adjusting screw 10 to 12 notches (Ford Pass. Cars & Trucks), 12 to 14 clicks (Lincoln & Mercury) until no drag is felt.



REAR BRAKE ASSY. (THUNDERBIRD & LINCOLN FRONT BRAKE SIMILAR)



FORD PASS. CAR & MERCURY FRONT BRAKE ASSY.

Major Adjustment (Ford Trucks with Adjustable Anch r Pin): Rotate drum until feeler slot is at lower end of Secondary (rear) shoe, then insert .010" feeler between brake shoe and drum, and rotate drum, moving feeler gauge up along secondary shoe until shoe assembly is wedged forward as much as possible. Turn adjusting screw until primary shoe contacts drum securely and secondary shoe is snug against feeler. Back off, adjusting screw to obtain .010" clearance 1½" from each end of secondary shoe. If .010" clearance cannot be obtained at both ends of secondary shoe, an anchor pin adjustment is needed.

Anch r Pin Adjustm nt - Loosen anchor pin nut just enough to permit moving pin up or down by tapping nut

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY (C nt.)

with soft hammer. *NOTE - DO NOT BACK NUT OFF TOO FAR AS SHOES WILL MOVE OUT OF POSITION WHEN NUT IS TIGHTENED.* Move anchor pin up or away from center of drum to reduce clearance at anchor end of secondary shoe, and down to increase clearance. Tighten anchor pin nut securely and recheck secondary shoe clearance.

Hand Brake Adjustment: Ford Pass. Cars & F-100, 250, P-350 Trucks - Adjust service brakes. With service brakes fully released, place parking brake lever in fully applied position. Equalizer should not touch frame crossmember. Adjust cable from control handle to equalizer lever as necessary. There should be no slack in parking brake cables with control lever in fully released position. To adjust, loosen locknut on equalizer rod, tighten adjusting nut to remove slack. Pull cables alternately to equalize tension on each through yoke, tighten locknut. *CAUTION* - Overtightening cables will pull rear brake shoes off their anchors.

Mercury Parking Brake Release Rod Adjustment - Disconnect parking brake release rod trunnion from release arm of pedal assembly. Turn trunnion on rod until it freely enters hole in pedal release arm with arm in locked position. Turn trunnion 1 turn to shorten rod.

Mercury Parking Brake Adjustment - Depress parking brake pedal 1". Make adjustment of cables as in Ford above. Distance from end of equalizer bracket to center of equalizer rod hole should be 2 1/16" 1/16". Parking brakes should be fully applied when pedal is depressed 2".

Ford P-400, All 500 & 600 S ries Trucks - These models have independent parking brake on propeller shaft at rear of transmission. *See "Ford Truck Self-Centering Brake" for adjustment data.*

BLEEDING BRAKE SYSTEM & OVERHAUL OF BRAKE UNITS: *See "Hydraulic Brak Servicing" in Brake Section of Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

MERCURY (BENDIX) AUTOMATIC ADJUSTER

Mercury (1957 Later)

DESCRIPTION: Similar to previous Duo-Servo, single anchor, hydraulic type without eccentric, and incorporating an automatic adjuster to maintain proper lining to drum clearance. A cable guide on secondary shoe moves away from anchor pin on reverse braking, causing cable to lift adjusting lever into engagement with next tooth on adjusting wheel. The lever engages adjusting screw tooth and secondary shoe returns toward anchor as brake is released, shortening distance from anchor pin to cable guide so that cable and adjusting lever are pulled back to original position by automatic adjuster spring, turning adjusting screw. This is repeated on each reverse brake application when shoe-to-drum clearance is sufficient to cause cable to lift adjusting lever to next tooth.

INSPECTION: Inspect adjuster and brake assemblies every 16,000 miles. Check master cylinder fluid and parking brake at same intervals as for early type brake.

ADJUSTMENT: When the amount of reverse braking is not sufficient to maintain proper brake shoe to drum clearance the following procedure should be followed: Raise car, remove adjusting hole cover, turn adjusting screw upward from backing plate side to expand shoes (Use Tool No. 2081 or screwdriver), until wheel is locked. **Hold adjusting screw lever away from screw,** back off screw until wheel turns free, then back off screw one more notch (Approximately 12 strokes). Recheck that wheel turns free, replace adjusting hole cover. *CAUTION - DO NOT back off screw without holding lever away from adjusting screw.*

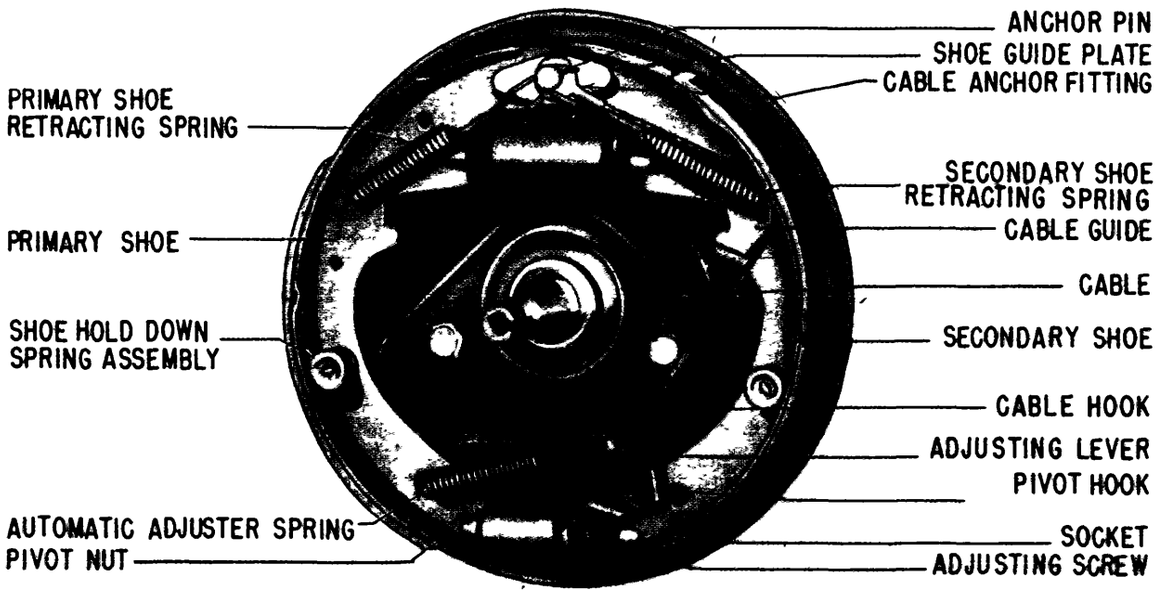
OVERHAUL: Removal - Remove adjusting hole cover, raise lever and back off adjusting screw to free wheels. Remove wheels and brake drum. Install wheel cylinder clamps, raise adjusting screw lever and back off adjusting screw as far as possible. Pull adjusting lever, cable and automatic adjuster spring down toward rear to unhook pivot hook from large hole in secondary shoe web (*CAUTION - DO NOT pry pivot hook out of hole*). Remove secondary anchor spring and unhook cable anchor fitting. Remove primary shoe anchor spring and shoe guide plate, then remove cable guide from secondary shoe. Remove shoe hold-down springs, shoes, adjusting screws, pivot nut and socket. *NOTE* - Exercise care when removing axle shafts to prevent damage to brake adjuster cable or lever.

R ass mbly: Reverse removal procedure and note the following:

1) Cable must be positioned in cable guide groove and not between guide and shoe web.
2) Turn adjusting screw into adjusting pivot nut to limit of threads, then back off ½ turn.
3) Install adjusting screw assembly with adjusting screw nearest secondary shoe.
4) Hook cable hook into hole in adjusting lever from backing plate side.
5) Adjuster lever pivot hook must be in large hole in secondary shoe web, and hooked end of adjuster spring in large hole in primary shoe web.
6) Use Tool 2086-L over adjuster hook to install loop end of spring to adjuster lever hook.
7) Check operation by pulling section of cable between cable guide and adjuster lever, toward secondary shoe web. Lever should lift past a tooth on screw wheel, then snap behind the next tooth. Release cable and spring should return lever to original position, while turning adjuster screw one tooth. *NOTE* - With brake in vertical position (anchor at top), lever should contact adjusting wheel 3/16" ± 1/32" above centerline of screw. If incorrect, check cable end fittings and replace if cable does not completely fill and/or extend slightly beyond crimped section. Cable length should be 11 1/8" ± 1/64". Replace guide if cable groove not parallel to shoe web. Repair or replace lever if hook surfaces are not square with body or lever for pivoting.

Initial Adjustment (Wheels r m v d): For initial shoe-to-drum clearance after overhaul, measure inside diameter of brake drum. Raise adjusting lever, turn adjusting screw to expand shoes so the diameter (use calipers) is .030" (1/32" approximately) less than drum diameter measured across shoes 90° from anchor.

NOTE - When calipers are not available, wheels and drums should be installed and initial adjustment made as outlined under **Adjustment** above.



MERCURY BRAKE ASSY. (WITH AUTOMATIC ADJUSTER)

FORD TRUCK SELF-CENTERING

Ford Trucks - B, C, F, P-500; B, C, F, P-600 (1957) R ar Brakes Only.

►CHANGES, CAUTIONS, CORRECTIONS

►*FRONT WHEEL BRAKE CAUTION: Ford-Bendix "Uni-Servo" type brakes used on front wheels of these models.*

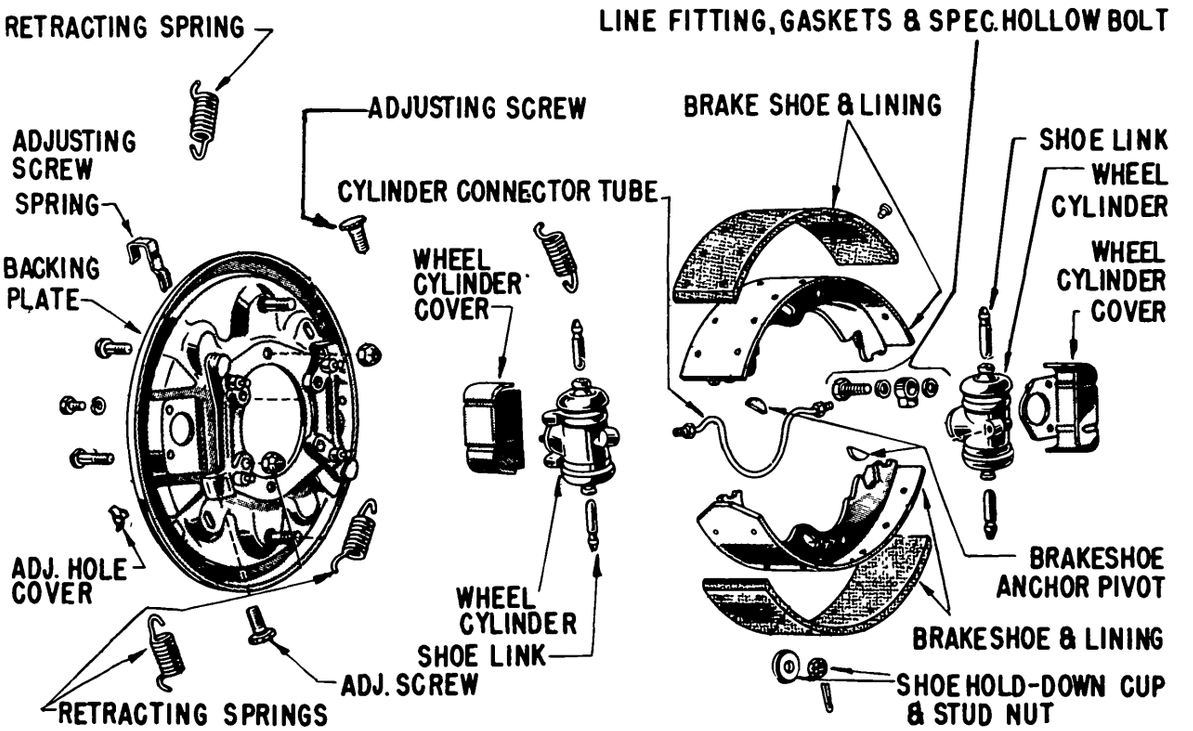
►*POWER BRAKE NOTE: "Hydrovac" or "Midland Hi-Power" Standard or Optional on these trucks. See "Hydrovac" or "Midland Hi-Power" under Power Brakes.*

DESCRIPTION: Two-cylinder, two-shoe, four-anchor type hydraulic brakes. Each shoe is anchored at each end and linked to wheel cylinder at each end so that all shoes are self energizing for both forward and reverse motion. All shoes are radially self-centering.

ADJUSTMENT: Make adjustments with brake drums at normal temperature and with wheels either jacked up or contacting road (if wheels on road so they cannot be turned to check for drag, make this check by striking drum with a hammer - sound will be deadened if shoes contacting drum). Remove two adjusting hole covers on backing plate (adjacent to right hand anchor bolt at each wheel cylinder), insert tool through slot and turn notched adjusting screw "star wheel" until linings drag on drum, then back off adjusting screw until wheel is free of drag. Depress pedal to centralize shoes and recheck wheels. Adjust each shoe in each wheel in this manner. *NOTE* - When brake linings are replaced, an additional adjustment is required. Adjust shoe hold-down bolt until a clearance of .025" is obtained (measure from brake shoe to gauge surface on brake plate). Gauge surface is machined boss on brake plate which is in line with hold-down bolt.

Brake Pedal Adjustment: Pedal must have at least 3/16" but not more than 3/8", free travel measured at pedal pad before master cylinder piston begins to move. To adjust, loosen locknut on brake pedal to master cylinder pushrod, rotate rod until free travel within limits, tighten locknut to 25-30 ft. lbs. torque.

Parking Brake Adjustment: On cable controlled parking brakes, move parking brake lever to fully released position. On transmission mounted parking brake levers set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, then adjust clevis rod to allow flat portion of cam to rest on brake band bracket. Install clevis pin and cotter pin. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until clearance of .010" is established between brake lining and brake drum at anchor bracket. Loosen lock nut on adjusting screw for lower half of brake band, adjust screw to establish .010" between brake lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting nut until .010" clearance established between upper half of band and drum. Be sure to install lock wire in anchor adjusting screw.



FORD TRUCK SELF-CENTERING BRAKE ASSEMBLY

DISASSEMBLY: *NOTE* - Brakes can be serviced without removing hubs or disturbing wheel bearings. Remove wheels, then screws holding drum to hub (mark drum and hub to insure correct assembly). *(CAUTION - If wheel cylinder connecting tubes and bleeder screws removed, mark ports to which tubes attached to assure correct reassembly).* Disassemble brakes as follows: Remove retracting springs with Tool 2035-N. Remove brake shoe hold-down screw, then brake shoes.

REASSEMBLY: *(NOTE* - For best results, new shoe and lining assemblies should have the lining of correct thickness ground to proper radius concentric with brake drum. If linings are not ground, it may be necessary to readjust the linings after the linings have been "worn in". Make sure no nicks or burrs are on shoe edge at point of contact with brake plate). Place light film of Lubriplate on primary (sliding pivot) anchor and shoe bearing surfaces on brake plate. Position brake shoes in anchors and in slotted ends of wheel cylinder. Apply light film of Lubriplate to hold-down screw, then install hold-down screw, washer and nut. Tighten hold-down nut until there is a clearance of .025" between center (of three) machined bosses on plate and edge of shoe. This clearance necessary to hold shoe parallel to drum or prevent shoe from binding against outer machined bosses. Install retracting springs (Tool 2035-N), wheel cylinder brake pipe, drum assembly, wheel. Adjust brakes.

BLEEDING BRAKE SYSTEM: Bleed **top** wheel cylinder **first,** then lower. If power unit used, unit must be bled before wheel cylinders, with engine off and no vacuum in power unit system. *See "Hydraulic Brake Servicing" in Brake Section of Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" in Brake Section of Manual.*

FORD TRUCK BENDIX UNI-SERVO

F rd Trucks - F-250; F, P-350; P-400; B, C, F, P-500; B, C, F-600 (1957) Front Brakes Only.

►*REAR BRAKE CAUTION: Different type brakes used on rear wheels as follows:*
F-250; F, P-350–"Ford-Bendix" Hydraulic, Duo-Servo type. *See "Ford, Lincoln, Mercury Bendix".* **B, C, F, P-500; B, C, F-600**–Ford "Self-Centering" type. *See "Ford Truck Self-Centering".*

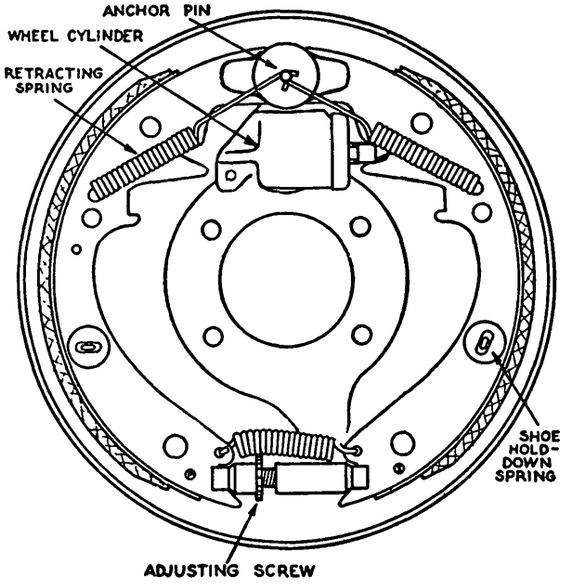
►*POWER BRAKE NOTE: "Hydrovac" or "Midland Hi-Power" Standard or Optional on these trucks. See "Hydrovac" or "Midland Hi-Power" under Power Brakes.*

DESCRIPTION: Bendix "Uni-Servo" single anchor, hydraulic type with single-acting wheel cylinder mounted on the backing plate and actuating the primary shoe through a strut (no direct connection to secondary shoe). Brake shoes are conventional Bendix type (joined by adjusting screw at lower end, single anchor between shoes at upper end with retracting springs hooked to each shoe and anchor pin). Wheel cylinder has single piston and cup with a return spring seated in the end of the cylinder.

ADJUSTMENTS: Make adjustments with brake drums at normal temperature and with wheels either jacked up or contacting road (if wheels on road so they cannot be checked for drag, make this check by striking drum with a hammer–sound will be deadened if shoes contacting drum).

Minor Adjustment: Remove adjustment hole cover from brake carrier plate. Rotate adjusting screw, with a suitable tool, until shoe begins to drag, then back off shoe 10-12 notches until drum can be turned without drag.

Major Adjustment: Wedge primary shoe against the drum by inserting a .010" feeler gauge through slot in drum at center of secondary shoe and expand shoes by turning adjusting screw. Then adjust adjusting screw and anchor pin (slotted type) for .010" clearance at each end of secondary shoe (measure 1½" from each end of shoe).



UNI-SERVO BRAKE ASSEMBLY

Brake Pedal Adjustment: Brake pedal free travel should not be less than 3/16" nor more than 3/8" before push-rod touches master cylinder piston. Adjustable at master cylinder pushrod.

Parking Brake Adjustment: Set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, then adjust clevis rod to allow flat portion of cam to rest on brake band bracket. Install clevis pin and cotter pin. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until clearance of .010" is established between brake lining and brake drum at anchor bracket. Loosen locknut on adjusting screw for lower half of brake band, adjust screw to establish .010" between brake lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting nut until .010" clearance established between upper half of band and drum. Be sure to install lock wire in anchor adjusting screw.

BLEEDING BRAKE SYSTEM & OVERHAUL OF BRAKE UNITS: *See "Hydraulic Brak S rvicing" in Brak Section of Manual.*

TROUBLE SHOOTING: *See "Hydraulic Brak Tr ubl Shooting" in Brake Section of Manual.*

CLUTCH INDEX

	Pag
BUICK	
Series 40, Long	314
CHEVROLET	
Own	Clutch Section of Manual
Borg & Beck	314
CHRYSLER, IMPERIAL & DeSOTO	
Borg & Beck	314
DODGE	
Borg & Beck	314
Auburn	315
FORD	
Long	316
HUDSON	
Borg & Beck	314
MERCURY	
Borg & Beck	314
Long	316
METROPOLITAN	
Borg & Beck	314
NASH	
Borg & Beck	314
OLDSMOBILE	
Long	316
PACKARD	
Borg & Beck	314
PLYMOUTH	
Borg & Beck	314
Auburn	315
PONTIAC	
Borg & Beck	314
RAMBLER	
Borg & Beck	314
STUDEBAKER	
Borg & Beck	314
WILLYS	
Borg & Beck	314
Auburn	315
Rockford	See pg. 326 in 1956 Annual Data

1957 CLUTCHES

BORG & BECK

CHEVROLET PASS. CARS	Model	Assy No.
All V8 & Corvette	10A8W	361468
Corvette (Two Carbs.)	10A8	③ 361466
CHEVROLET TRUCKS		
All 3,4,5, & 6000 Series	11A9	① 361455
CHRYSLER		
C75-1 Windsor	10A8	361417
C75-1 Spec. Pkg.	11A8	361428
C-300	11A8	361447
DESOTO		
S25, S27 Std.	10A8	361417
S25, S27 Heavy Duty	11A8	361428
DODGE		
D72, 6 Cyl. Std.	9A7	361384
D72, 6 Cyl. Heavy Duty	10A7	361376
D72, 6 Cyl. Spec. Pkg.	10.5A8	361418
D66, D70, 8 Cyl.	10A8	361417
D67, D71, (500, 8 Cyl.)	11A8	361447
8 Cyl. Spec. Pkg.	11A8	361428
HUDSON HORNET V8		
Std.	10.5A6	361442
Heavy Duty	10.5A6	361449
MERCURY		
All Models, Std.	10.5A6	361378
METROPOLITAN		
All Models		② 8112097
NASH AMBASSADOR V8		
Std.	10.5A6	361442
Heavy Duty	10.5A6	361449
PACKARD CLIPPER		
All Models	10.5A8	361451
PLYMOUTH		
6 Cyl. Std.	9A7	361384
6 Cyl. Heavy Duty	10A7	361376
6 Cyl. Spec. Pkg.	10.5A8	361418
8 Cyl. Std.	10A7	361376
8 Cyl. "Fury"	10.5A8	361418
8 Cyl. Spec. Pkg.	10.5A8	361418
PONTIAC		
All Models, Std. & Heavy Duty	10.5A9	361423
"Bonneville"	10.5A9	361452
RAMBLER		
6 Cyl. Std. & Heavy Duty	8.5A7	361416
8 Cyl. Std.	10A7	361436
8 Cyl. Heavy Duty	10A7	361407
8 Cyl. "Rebel"	10.5A6	361442
8 Cyl. "Rebel" Heavy Duty	10.5A6	361449
STUDEBAKER		
Champion	9A7	361365
Commander	10A7	361454
President "Classic"	10A6	361456
President 57H, "Silver Hawk"	10A6	361386
"Golden Hawk" Supercharged	10.5A8	361451
WILLYS		
6 Cyl. 2WD	9A7	951
6 Cyl. Others	10A7	360982

① - Same cover assembly used with both 10½" & 11" discs (10½" disc std. on V8, 11" optl.).
② - Metropolitan number.
③ - Use 361468 for replacement.

DESCRIPTION (Except Chevrolet): Single plate, dry disc. Three release levers mounted on bolts piloted in pressure plate and held in clutch cover actuate clutch through struts which provide "knife-edge" action.
Chevrolet - Semi-centrifugal, single plate, dry disc type. Centrifugal action provided by three roller assemblies built into pressure plate which increase pressure plate load with engine speed.

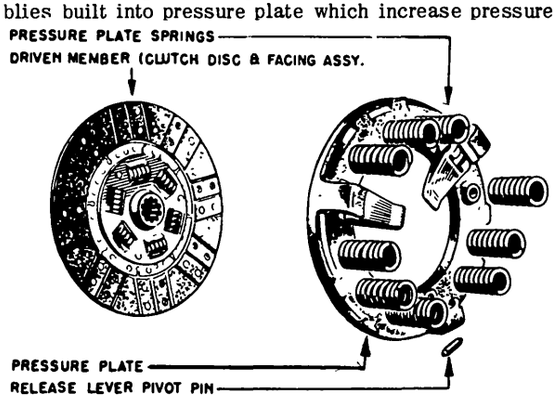
REMOVAL OF CLUTCH: *See "Clutch" on car pag s.*

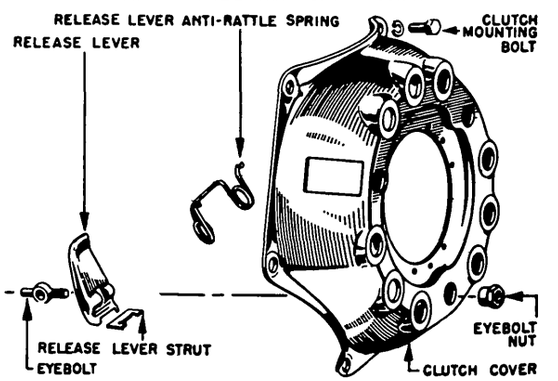
OVERHAUL: Mark all parts before dismantling clutch and reassemble in same position (necessary to maintain balance). Replace grooved, checked or warped pressure plates. Replace springs when pressure plate discolored from heat.

Disassembly: Place clutch on fixture or arbor press (support pressure plate under release levers), place block across cover resting on spring bosses, compress cover slightly, remove metal staking in adjusting nuts by running hacksaw blade through slot, remove nuts. Release pressure slowly, remove cover and springs. Remove release levers by grasping lever and eyebolt between thumb and forefinger, so that inner end of lever and upper end of eyebolt are pressed together, lift strut over ridge in end of lever (press lower end back against lug), lift lever and eyebolt out.

Reassembly: Place pressure plate on fixture or arbor press supporting plate under release lever lugs. Install lever, eyebolt and strut assemblies by reversing removal procedure. Place pressure plate springs on the plate, and install anti-rattle springs in cover. **(Chevrolet** - Install centrifugal rollers). Place cover on pressure plate. Make certain that springs are seated in

CONTINUED ON NEXT PAGE





BOR & BECK CLUTCH ASSEMBLY (TYPICAL)

BORG & BECK (C nt.)

cover recesses and anti-rattle springs in place on release levers. Compress cover slowly and guide eyebolts through holes in cover. If assembly made in fixture, use clamps to clamp cover flange to plate at mounting holes. Install eyebolt nuts and turn nuts down flush with head of bolt. Compress and release clutch several times to seat all working parts. Then adjust release lever heights.

Clutch Springs: Note spring color and install in same relative position (groups of two different springs used on some clutch models). Springs should check with table below. Replace springs if weak or burned or if clutch has been subjected to excessive heat.

Clutch Spring Specifications

Cover Assy.	Springs - No. & Color	Lbs. Pressure
360982	9 - Light Green	① ② 175
361365	3 - Orange	① ③ 170
361376	9 - Brown	④ ② 230
361378	12 - No Color	① ② 155
361384	6 - White	④ ③ 245
361386	6 - Brown	④ ② 230
	3 - Purple	① ② 135
361407	6 - Dark Blue	⑤ ② 190
	3 - Light Green	① ② 175
361416	6 - White	④ ③ 245
361417	12 - Red or No Color	④ ③ 195
361418	9 - White	④ ③ 245
361423	6 - Orange	① ③ 170
	3 - Tan	① ③ 160
361428	6 - Orange	① ③ 170
	6 - Red or No Color	④ ③ 195
361436	6 - Light Blue	① ② 165
	3 - Light Green	① ② 175
361442	6 - No Color	① ② 155
	6 - Light Green	① ② 175
361447	9 - White	④ ③ 245
	3 - Orange	① ③ 170
361449	9 - Light Green	① ② 175
361451	6 - White	④ ③ 245
	3 - Orange	① ③ 170
361452	9 - Red or No Color	④ ③ 195
	3 - Orange	① ③ 170
361454	6 - Dark Blue	⑤ ② 190
	3 - Light Green	① ② 175
361455	6 - White	④ ③ 245
	3 - Red or No Color	④ ③ 195
361456	6 - Brown	④ ② 230
	3 - Purple	① ② 135
361466	6 - Red or No Color	④ ③ 195
	6 - Tan	① ③ 160
361468	6 - Red or No Color	④ ③ 195
	3 - Orange	① ③ 170
8112097 ⑥	6	⑦ 135

① - Plus or minus 5 lbs.
② - At height of 1 11/16".
③ - At height of 1½".
④ - Plus or minus 6 lbs.
⑤ - Plus or minus 7 lbs.
⑥ - Metropolitan number.
⑦ - At height of 1 13/32".

Release Lever Adjustment (With Borg-Warner Universal Fixtures UF-300, 400): Special lands must be installed on fixture under pressure plate lever lugs. Set adjusting arm on adjusting sleeve so that height of lower side arm above bottom of sleeve is correct for each model (see table below). Install indicating plate on levers. Adjust each lever so that it just contacts indicating plate or adjusting arm, lock lever adjusting nuts by peening nut against notches in eyebolt.

Release Lever Settings
(Borg-Warner Fixtures UF–300 & UF–400)

Clutch Assy.	① Lever Height
951	2 3/16"
360982	2 3/16"
361365	2 1/32"
361376	2 1/8"
361378, 384	2 5/32"
361386	2 1/8"
361407, 16, 17, 18	2 5/32"
361423	2 5/16"
361428, 36, 42, 49	2 5/32"
361451	2 1/4"
361452	2 5/16"
361454	2 1/16"
361455	2 3/32"
361456	2 1/8"
361468	2 5/16"

① — Using 3J Lands and 3X Indicating Plate.

Release Lever Adjustment (Using Gauge Plate): Use gauge plate indicated in table below and install clutch on flywheel with gauge plate in place of regular driven member, with lugs on gauge directly under release levers. Use short straightedge placed on edge on gauge plate hub and adjust release levers so they just contact edge of straightedge for all models marked "flush" in table. If lever setting marked "high", a cut-out or step must be made in edge of straightedge at one end so that levers can be set higher than hub. If lever setting marked "low", cut-out or step should be cut in gauge hub end of straightedge so that end extends below hub. Cut-out or step should be in the amount "high" or "low" indicated in table. Lock adjustment by peening nut into notches in eyebolt.

Release Lever Settings
(Using No. 4234 Gauge Plate)

Clutch Model	② Lever Height
8.5A7	- - 3/16" Low
9A7	③ 1/16" Low
10A6	1/8" High
10A7	③ Flush
10A8 (exc 361417)	1/8" Low
10A8 (361417)	Flush
10 5A8 (exc 361451)	- Flush
10 5A8 (361451)	1/4" Low
10 5A9 (exc. 361423)	3/16" Low
10 5A9 (361423)	Flush
11A8	. Flush
11A9	5/32" Low

② — With Borglite Driven Member (except as noted).
③ — 1/8" High when Borglite Driven Member not used

DRIVEN MEMBER: *See car model pages for part nos.*

AUBURN

Dodge, 6 Cyl. (1957) ①
Plymouth, 6 Cyl. without O.D.(1957) ①
Willys, 4 Cyl. (1957) ②
① - Borg & Beck Clutch also used.
② - Rockford Clutch also used.

DESCRIPTION: Single plate, dry disc type of same design used on corresponding previous models.

REMOVAL OF CLUTCH: *See "Clutch" on Car Model pages.*

OVERHAUL: Disassembly (using To l C-585A) - Place cover support plate over main screw of fixture. Install clutch cover assembly on Tool C-585A. Mark cover and pressure plate with punch and install compression washer and fully compress fingers. Remove adjusting screw, washer, and plate return spring or clip. Place ½" steel block under outer end of each finger. Back off compression nut slowly until release levers rise and contact steel blocks. Remove nut and compression washer, lift off cover. To remove release levers from cover, grind off one end of pin and drive out pin.

Reassembly: Assemble levers to cover, peen over ends of lever pins. Install pressure spring between lever and cover. Make sure springs rest on bosses of cover and are seated in the embossed seats of levers. Press down on release lever and then insert steel blocks under outer ends of levers. Place pressure plate on fixture and place cover assembly over the pressure plate. Match up punch marks so parts are in original positions. Place the correct spacer on the center screw of fixture Install compression plate, self-aligning washer, thrust washer and compression nut on center screw. Tighten compression nut on fixture. Install washers and adjusting screws in pressure plate. Release fixture compression nut slowly and install pressure plate return springs.

Release Lever Setting: Install the clutch cover plate assembly on fixture and make certain that housing clamps line up with tne holes With the correct spacer, compression washer, self-aligning washer, and compression nut installed, tighten nut until release levers are completely compressed. Install clutch housing clamps and tighten securely. Adjust clutch release levers until each of the three feeler gauges has the same slight drag when being pushed in and out. Tighten release lever screws to decrease drag or loosen them to increase drag. Recheck adjustment of each lever, tighten locknuts.

Willys Return Clip Spring Installati n - Engage slot on flat end of spring under head of release lever adjusting screw, engage loop on curved end of spring over ridge on outer end of release lever.

► *INSTALLATION ON CLUTCHES IN SERVICE:* Clips can be installed by working through inspection hole in bell housing without dismantling clutch. *CAUTION* - Use string attached to clip to prevent it dropping down into bell housing during installation.

DRIVEN MEMBER: *See Car Model pages for part nos.*

LONG "CF" & "NC"

	Long Model Nos. Model	Assy No.
BUICK		
40 Series	11CF	266716
FORD PASS. CARS & TRUCKS		
See Ford & Long Clutch Part Nos. below.		
MERCURY		
312" Engine, H.D.	11CF	①265126
OLDSMOBILE		
Series 88	11CF	L5167

① - Borg & Beck Clutch Std. Equipment.

FORD PASS. CARS	Long Model Nos. Model	Assy No.	Ford No.
6 Cyl.	9½ CF	268594	1A-7563-A
6 Cyl. Taxi	11 CF	266978	B6A-7563-A
V8 Eng. Std. ①	10 CF	267346	B7A-7563-A
V8 Eng. H.D. ②	11 CF	267350	B7A-7563-B
V8 272" Eng. H.D.	11 NC	266978	B6A-7563-A
V8 292" Eng. H.D.	11 NC	266978	B6A-7563-A
T'Bird 292" Eng.	11 NC	266978	B6A-7563-A
FORD TRUCKS			
6 Cyl. 223" Eng. ③	10 CF	L5222	B4A-7563-B
8 Cyl. 272" Eng. ④	10 CF	L5222	B4A-7563-B
6 Cyl. 223" Eng. ⑤	10½ CF	267371	B7C-7563-A
8 Cyl. 272" Eng. ⑥	10½ CF	267371	B7C-7563-A
All Others ⑦	11 CF	267147	B7Y-7563-A

① - 272" & 292" Eng. & O.D.
② - 272" & 292" Eng. H.D., 312" Eng. & Thunderbird.
③ - F-100, 250, 350; P-350
④ - F-100 (3-speed light duty trans., O.D.)
⑤ - F-100, 250-EBR; P-350 (Heavy Duty).
⑥ - F-100, 250-ECW; P-350 (Heavy Duty).
⑦ - Through 600 Series.

DESCRIPTION: Single plate, dry disc type. Release levers formed with weight on outer ends which increases pressure on driven member as engine speed increases. Levers pivoted on pressure plate on needle bearings with fulcrum located in yoke support on cover plate.

REMOVAL OF CLUTCH: *See "Clutch" on car model page.*

OVERHAUL: Mark all parts before dismantling and reassemble in same position. Replace grooved, warped, or checked pressure plates. Replace springs if pressure plate discolored from heat.

Clutch Fixture Note: Manufacturer recommends use of Borg-Warner Universal Clutch Fixture UF-300 or UF-400 for all servicing and rebuilding operations.

Disassembly: Place clutch on fixture (supporting pressure plate on special lands under lugs) or arbor press. Compress cover plate slightly, take out assembly screws (lever yoke mounting screws) on cover, release pressure on cover plate slowly, lift off plate. Note whether washers used on yokes under assembly screws (these washers must be reinstalled if old pressure plate used again). See special directions below on removing and reinstalling release levers. Remove and test clutch springs.

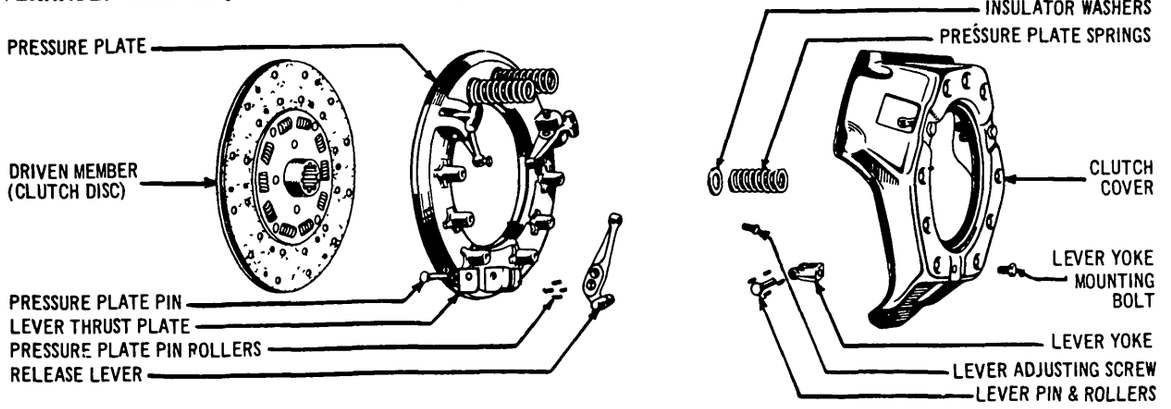
Clutch Springs: Pressure springs should check with table below. Replace springs if weak or burned or if clutch has been subjected to excessive heat.

Clutch Spring Specifications

Cover Assy.	Spring, No. & Color	Lbs. Pressure
L5167	9 - Tan	⑫ 163
L5222 ③	9 - Bronze	⑭ 142
265126	9 - Brn. & White	⑮ 159
266716	9 - Aluminum	⑯ 205
268594	6 - Aluminum	⑯ 205
267147	9 - Orange	⑫ 175
267346	9 - Bronze	⑭ 142
267350	9 - Brn. & White	⑮ 159
266978	9 - Brn. & White	⑮ 159
267371	9 - Bronze	⑭ 142

① - Plus or minus 5 lbs.
② - Pressure at height of 1 9/16".
③ - Some with 208516 (6 springs).
④ - Pressure at height of 1.747".
⑤ - Pressure at height of 1.736".
⑥ - Pressure at height of 1¾".

Release Lever Assembly: Mount lever yoke on release lever, fasten by inserting flat-sided lever pin (flat side out or toward cover) and roller (place roller on flat side of pin). Insert lever in pressure plate lug, use roller pin sawed off to length of lever width as a guide and insert needle bearings, insert roller pin, pushing guide pin out, lock both lever pins with cotter pins. Thread release lever adjusting screws in ends of levers, turning screws down completely.



LONG CLUTCH ASSEMBLY (TYPICAL)

Assembly: Place pressure plate on fixture or arbor press. Assemble pressure springs, locator washers or insulator washers on plate, place washers on lever yokes (if washers used previously and old pressure plate being used). Place cover plate in position (lining up marks made before dismantling), compress cover slowly guiding lever weights through holes in cover and lining up yokes under cover plate holes. See that pressure springs are seated, insert cover screws in yokes, using lockwasher under screw head, tighten screws securely. Compress and release clutch several times (using weight on release levers) to seat all parts. Then adjust release lever heights.

Release Lever Adjustment (on Fixture): Place special lands on fixture under pressure plate lugs, assemble lever adjusting arm and sleeve setting bottom of adjusting arm correct distance as shown in table (all figures plus or minus 1/32") above bottom of sleeve and lock the adjusting arm with the thumbscrew. Swing arm over each release lever in turn, back off adjusting screw on tip of lever until rounded screw head just contacts arm, lock screws by inverting clutch so that screw head is supported and stake or peen lever into adjusting screw slot. Do not disturb lever yoke screws when making this adjustment.

Release Lever Settings
(Borg-Warner Fixtures UF–300 & UF–400)

Clutch Assy.	Lever Height
L-5167	① 1 7/8"
L-5222	① 1 13/16"
265126	① 1 3/4"
266716	③
266978	② 2 5/16"
267147	① 2 7/32"
267346	① 1 13/16"
267350	① 1 3/4"
267371	② 2 7/32"
268594	②1 13/16"

① — With 3J Lands.
② — With 3J Lands and 3X Indicating Plate.
③ — Factory set — no adjustment.

Release Lever Adjustment (without Fixture): Assemble the special lever setting disc or gauge (see table below) on the flywheel in place of driven member, placing gauge so that lugs are under release levers and gauge is centered in clutch. Tighten all clutch cover bolts evenly. Place short straightedge on edge on top of gauge shoulder, turn adjusting screws at tips of release levers up or down until they contact straightedge, lock screws by peening metal of lever into screw slot. Lever heights must be equal within .031" (except Oldsmobile .015").

Release Lever Adjustment Tools

Car	Tool No.
Buick	J-1036
Ford Pass. Cars	①
Ford Trucks	①
Oldsmobile	J-4389

① - Use a ¼" shim between pressure plate and flywheel directly under release levers. Measure relative finger height.

DRIVEN MEMBER: *See Car Model pages for part nos.*

1957 REAR AXLE INDEX

BUICK Pag
All Models 319

CADILLAC
All Models ..... Pg. 322 in 1954 Annual Data or later Manual edition

CHEVROLET
Pass. Cars, Sed. Del. 319
Pass. Cars & Corvette (Power-Lock Diff.) 317
½-ton Truck 319
¾, 1, 1½, 2-ton Trucks Pg. 297 in 1953 Annual Data or later Manual edition
Truck, Heavy Duty ..... Pg. 341 in 1955 Annual Data or later Manual edition
Truck, 2-Speed ..... Pg. 342 in 1955 Annual Data or later Manual edition

CHRYSLER & IMPERIAL
All Models 320

DE SOTO, DODGE
All Models 320

FORD PASS. CARS & THUNDERBIRD Pag
All Models 322

FORD TRUCKS
F-100 322
F-250, P-350 324
Others ..... Pg. 337 in 1956 Annual Data
2-Speed ..... Pg. 347 in 1955 Annual Data or later Manual edition

HUDSON
V8 (Spicer) ..... Pg. 328 in 1956 Annual Data

LINCOLN & CONTINENTAL
All Models ..... Pg. 337 in 1956 Annual Data
Power-Lock Diff. 318

MERCURY
All Models 322

METROPOLITAN
All Models ..... Pg. 327 in 1956 Annual Data

NASH
V8 (Spicer) ..... Pg. 328 in 1956 Annual Data

OLDSMOBILE
All Models 326

PACKARD Pag
All Models ..... Pg. 328 in 1956 Annual Data
Power-Lock Diff. (Early) 318
Power-Lock Diff. (Later) 317

PLYMOUTH
All Models 320

PONTIAC
All Models 328

RAMBLER
6 Cyl. (Own) 325
V8 (Own) 325
V8 (Spicer) ..... Pg. 328 in 1956 Annual Data
Rear Suspension ..... Rear Axle Section of Manual.

STUDEBAKER
All Models ..... Pg. 328 in 1956 Annual Data
Power-Lock Diff. (Early) 318
Power-Lock Diff. (Later) 317

WILLYS
All Models (Spicer) ..... Pg. 328 in 1956 Annual Data
Power-Lock Diff. 318

POWER-LOCK DIFFERENTIAL (PLATE CLUTCH TYPE)

Chevrolet Pass. Car & Corvette (1957)
Packard (1957 Later)
Studebaker (1957 Later)

DESCRIPTION: This assembly replaces the conventional differential assembly and consists of a multiple disc clutch located in the differential housing, which is splined to the housing and to the clutch body. Pinion gears are mounted on cross pins which are free to move on ramps of housing.

OPERATION: As engine power is transmitted from ring gear to differential case, the driving force causes the cross pins to move up ramps of cam surfaces and apply a load on the disc clutch. This action locks the axle shafts in normal, straight ahead driving, preventing momentary spinning of wheels when leaving the road or when encountering poor traction. The division of torque between axle shafts varies in accordance with traction of each rear wheel. When cornering, the faster turning outer wheel relieves the load from clutch surfaces so that wear is reduced to a minimum and the action is essentially that of a conventional rear axle.

► *DIFFERENTIAL ASSEMBLY REMOVAL & INSTALLATION NOTE: See conventional rear axle service procedures for removal, installation and adjustment.*

DISASSEMBLY: With differential assembly removed from rear axle housing, check to see that differential assembly halves are marked with a number or letter to aid in aligning the case at reassembly. If not, scribe an alignment mark across both halves of case at the joint. Remove eight attaching bolts and remove end housing. Remove clutch plates from side gear retainer (note relation of these clutch plates). Remove side gear retainer and side gear, then remove pinion mate shafts and gears. Remove remaining side gear, side gear retainer, and clutch plates.

INSPECTION: Clean all parts in solvent and dry with air. Check for worn, cracked, or distorted clutch plates. Check all other parts for nicks, burrs, and abnormal wear.

REASSEMBLY: Hold ring gear flange half on its side and install side gear retainer and clutch plates alternately so that an external flanged plate is installed first and an internal splined plate last. Make sure side gear retainer will rotate with a slight drag when in the case. Repeat for opposite side. Install side gear on ring gear flange half. With ring gear flange half of differential case in a vertical position, install one pinion shaft and gears, making certain that notch in shaft is upward. Install remaining shaft and gears. Install side gear in other half of case, then hold case half through bearing trunnion and install it on ring gear flange *(CAUTION - Make sure alignment marks are lined up).* Tighten eight attaching bolts evenly to 35-45 ft. lbs. Check clearance between pinion mate shaft and "V" of case by placing shim stock or feeler gauges on both ends of the same shaft and on opposite sides of the "V". Clearance should be .010-.035".

► *CHEVROLET CLUTCH ASSEMBLY NOTE:* For standard "On Road" operation, assemble the two internally splined plates between the two externally splined plates. For maximum traction "Off Road" operation, assemble plates alternately with an internally splined plate against differential carrier or case. *NOTE* - This later type of assembly (Maximum Traction) will result in tire squeal on turns and a slight tendency to oversteer. A slight clink (due to necessity for looseness in assembly for complete release) is normal.

CHEVROLET CLUTCH BACKLASH CHECK AND ADJUSTMENT: To check backlash, jack up one rear wheel and remove wheel. Wedge propellor shaft to hold it stationary. Rotate brake drum forward to remove all backlash and chalk mark both brake drum and backing plate. Rotate brake drum to the rear until all backlash is removed and again mark backing plate at mark on brake drum. The distance between marks on backing plate should not exceed ½". When greater than ½", it will be necessary to reduce backlash by installing a .005" thick shim washer (outer diameter 3¼", inner diameter 2 3/8") between the outboard clutch plate on both the differential carrier and case sides (total .010"). Reassemble differential, insert stub axle shaft and engage splined side gear retainer. Hold ring gear carrier and turn axle shaft. Axle should turn freely. Repeat check on opposite side. If axle shaft is "locked-up" on either side, decrease the shim thickness to .003" on side that "locks-up". If it still "locks-up" on that side, remove the .003" shim. Where axle will turn after installation of the two .005" shims it is advisable to add .002" shims until each axle locks, then remove the last .002" shim.

INSTALLATION: Install differential assembly in the same manner as for a standard differential assembly and note the following:

► *AXLE SHAFT CLEARANCE CHECKING:* Make sure splined end of axle shaft does not interfere with pinion mate shafts. To check, use a steel tape and measure from bottom of axle shaft bearing bore to pinion mate shafts. Then measure axle shafts from corresponding point of bearing to end of spline. Minimum clearance should be 1/8". Grind off spline end of axle if it is too long. Repeat check with other axle shaft.

► *CAUTION: Do not spin wh els with one wheel levated as it is possible to have suffici nt driving load due to friction to actuat the clutch unit and caus the car to mov .*

POWER-LOCK DIFFERENTIAL (CONE CLUTCH TYPE)

Linc In (1957)
Packard (1957 Early)
Stud bak r (1957 Early)
Willys (1957)

DESCRIPTION: Partial locking type differential. The unit consists of a two-piece case, with each piece having two V-shaped ramps or cam surfaces diametrically opposite. When assembled, the V-shaped ramps of one piece are at a 90° angle to the ramps of the other piece, with the V's facing away from each other. The conventional mounting of pinions is replaced by two individual cross pins with a slidable joint at the center, permitting each one to move independently, although continuously engaged. Ends of the pins are machined in the form of a "V" and ride on the V-shaped ramps. Two internally splined clutch rings are fitted over each of the side gears and mate with tapered surfaces in the case halves. Two internally splined differential gears, as well as the clutch rings, are splined to the axle shaft at each end. Four pinions, carried by the cross pins, mesh with the differential gears. Pinions incorporate shoulders which contact the clutch rings. The unit is interchangeable with the standard Spicer differential.

OPERATION: . *NOTE* - The unit is operationally designed to avoid sudden transfer of full engine torque to one axle under unequal rear wheel traction conditions. As a torque divider, sufficient traction torque is supplied to the non-spinning wheel and always a certain percentage of torque is transferred to the wheel with poor traction. Percentage of transfer is dependent upon operating conditions.

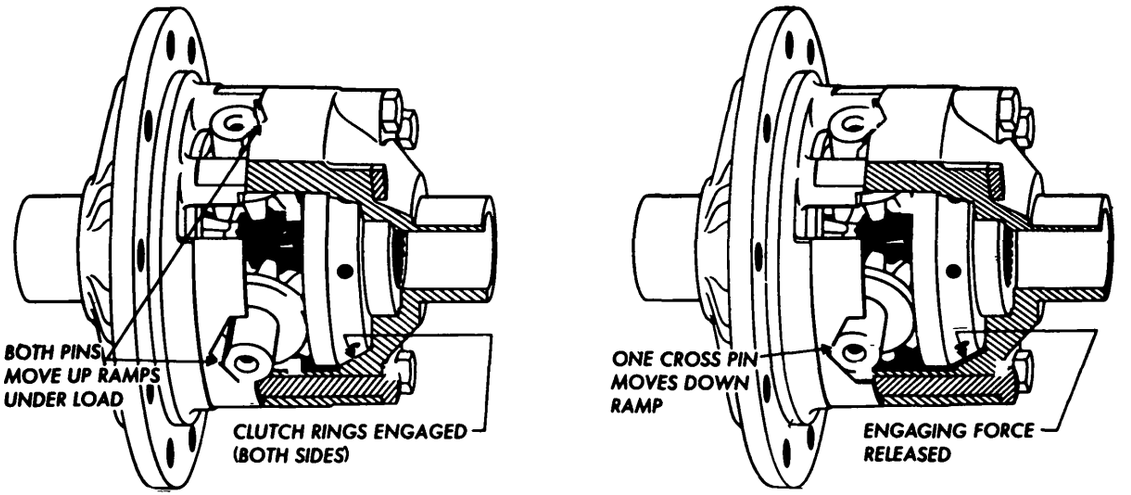
Straight-Ahead Driving: With full traction on both rear wheels, both cross pins move up on the ramp of the cam (a very slight amount), applying a load to and locking the clutch rings and restricting turning of the differential through the friction clutches. This provides a torque ratio between the axle shafts, based on the amount of friction in the differential and the amount of load that is being applied to.the differential.

Turning: When turning a corner, the process outlined in "Straight-Ahead Driving" above is, in effect, partially reversed. The differential gears become a planetary gear set, with the gear on the inside of the curve becoming the fixed gear of the planetary. The outer gear of the planetary overruns as the outside wheel has a greater distance to travel. With the outer gear overrunning and the inner gear fixed, the pinions are caused to rotate. Since they are restricted by the fixed gear, they cause the cross pins to move down the ramps, thus relieving the thrust loads on the cone clutches. This permits the outer wheel to turn faster as in the conventional differential.

Unequal Traction Conditions Under Rear Wheels: When traction conditions under the rear wheels are unequal due to snow, slippery pavement, or rough roads, planetary action, similar to that in turning, takes place. In each case, there is a movement of a cross pin along the ramp to relieve pressure on the cone clutch on the side where less torque is needed. The wheel with traction gets the greater percentage of wheel torque while the wheel with poorer traction receives torque commensurate with that which it can use.

OVERHAUL: Serviced in same manner as conventional Spicer differential. Since replacement parts are not available, the differential must be replaced as an assembly. Ring and pinion gear sets are available for replacement.

LUBRICATION: Differential replacement units are furnished with two quarts of break-in lubricant. Do not attempt to break in a new unit with any fluid other than the recommended lubricant. Break-in period is 10,000 miles. If it is necessary to add or change the lubricant after the break-in period, use a standard brand of Multi-Purpose lubricant.



STRAIGHT-AHEAD POSITION — TURNING POSITION

PACKARD TWIN TRACTION DIFFERENTIAL

BUICK HYPOID

All Series (1957)

▷ *AXLE SHAFT BEARING PULLER TOOL J-6191 PRODUCTION CHANGE:* This tool has been superseded by Tool J-6525 which is constructed more heavily to avoid breakage. The new tool pulls through the retainer and it can be generally expected to damage this part.

▷ *DRIVE LINE RATTLE CORRECTION:* A new rubber "square cut" ring, Part No. 1181614 can be installed between the rear propeller shaft and universal joint at the bearing location. Install ring over splines and against face of rear coupling on front propeller shaft. Coat splines with type "O" grease, then reassemble front and rear propeller shaft assemblies and drive lock pin in place. *NOTE* - Force may be required to compress ring which can be done by inserting a small drift or punch as a lever to line up the holes.

▷ *REAR AXLE OIL LEVEL CAUTION:* To prevent overfilling of rear axle, the fluid level should be from 1/4 to 3/8" below bottom of filler plug opening.

▷ *REAR PROPELLER SHAFT REWORK TO PREVENT LOSS OF LUBRICANT FROM THE SPLINED COUPLING (Early Production Cars):* Drill a 1/16" diameter hole in plug located at bottom of spline coupling and another hole in propeller shaft tube. These holes act as vents to prevent pressure build-up which will force grease out. Remove the seal retainer and install an .029" thick steel washer, Part No. 5672246 (Saginaw shafts), No. 1179324 (Spicer shafts). *(NOTE* - Saginaw shafts can be identified by the "convex" plug at bottom of spline coupling. Spicer shafts have a "concave" plug at this location. As further identification, the seal retainer on the Saginaw shaft is "staked" around its entire diameter. On Spicer shafts, it is "staked" only in four positions). Before installing seal, washer, and retainer, use a sealing compound on both sealing face and coupling. On Saginaw shafts, stake retainer all the way around. On Spicer shafts, stake the retainer in four places.

DESCRIPTION: Hypoid gear, semi-floating type with torque tube drive. The propeller shaft is a two-piece type having two universal joints. The rear universal joint is welded to the front end of the rear propeller shaft and is supported in the torque tube by a sealed ball bearing.

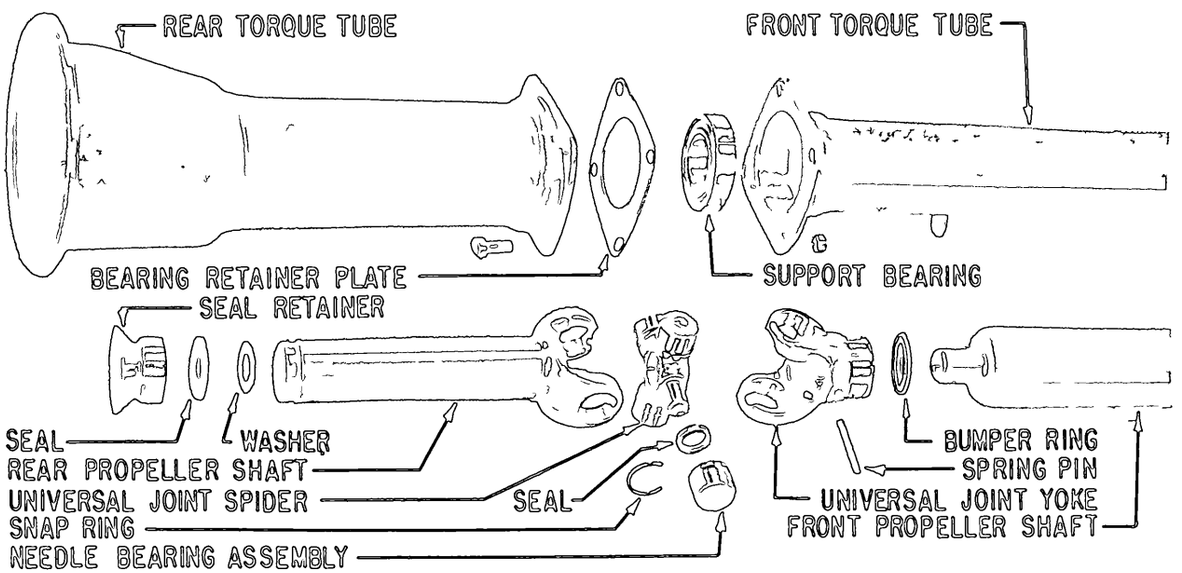
REMOVAL: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Buick Hypoid" rear axle in 1956 Annual Data and note the following:*

Propeller Shaft Bearing Removal & Installation: Remove torque tube from rear axle assembly in the usual manner, then separate front and rear propeller shafts by driving out the spring pin. Place rear propeller shaft and bearing assembly in a press so that it is supported under bearing with shaft down. Using a sleeve or shaft slightly smaller than inside diameter of bearing, press universal joint yoke down through bearing. To install the new bearing, place rear propeller shaft in a press so that it is supported under both sides of front yoke. Start new bearing on yoke, then, using a heavy flat plate, press bearing on yoke until it bottoms against shoulder. *CAUTION - Be careful that bearing does not cock as it starts onto yoke.*

Rear Universal Joint Repair Kit Installation: Remove propeller shaft from torque tube. Rear universal joint can then be disassembled in the same manner as for conventional needle roller bearing type joints.

Propeller Shafts & Torque Tube Installation On Carrier: Pack rear propeller shaft coupling with semi-fluid fibrous lubricant, bringing level to inner end of splines. Install rear torque tube on carrier with brake return spring bracket down (no gasket is used). Tighten bolts to 50-60 ft. lbs. Rotate axle housing so that rear torque tube extends in a horizontal direction. Slide complete propeller shaft assembly into front torque tube until support bearing is seated against shoulder. Push front torque tube and propeller shaft assembly into place in rear torque tube. Rotate propeller shaft as necessary to engage splines. Position torque tube with strut rod bracket down (no gasket used between front and rear propeller shafts), and make sure that bearing retainer plate is in place. Install torque tube bolts and tighten to 65-75 ft. lbs. Connect strut rods and tighten bolts to 85-100 ft. lbs.



BUICK PROPELLER SHAFT & TORQUE TUBE

CHEVROLET HYPOID

Pass. Cars & Sedan Delivery (1957)
Corvette (1957)
½-Ton Truck (1957)

▷ *1955-57 PINION FLANGE OIL SEAL INSTALLATION CHANGE:* When installing the seal, do not bottom it against shoulder in differential bore. This could cause distortion and damage to seal. It is recommended that the seal now be pressed to a depth in carrier housing that permits face of seal case to protrude 3/16" to 7/32" from housing.

▷ *1957 REAR WHEEL BEARING REMOVAL PROCEDURE CHANGE:* Due to clearance restrictions, Press Plate, Tool 5741 will not fit properly on the 1957 axle. *See "Overhaul" below for revised procedure.*

DESCRIPTION: Semi-floating type with Hotchkiss drive. Design is similar to 1956 models.

REMOVAL: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Chevrolet Hypoid (Hotchkiss Drive)" in 1956 Annual Data and note the following:*

Rear Wheel Bearing Removal: With axle shaft and bearing assembly removed from housing, nick the soft metal ring retaining bearing on shaft enough to expand it slightly, then remove ring from axle shaft. Support rear wheel bearing retainer and knock the four serrated bolts from retainer. *(NOTE* - If this operation is performed carefully, the retainer may be reused, installing new serrated bolts at reassembly). Slide bearing retainer down against axle flange and install Press Plate, Tool 5741 on axle shaft between bearing retainer and bearing and fully close the two plate halves. Press bearing from shaft with press plate parting line supported on press bed.

CHRYSLER, DESOTO, DODGE PLYMOUTH HYPOID

Chrysl r, Imp rial, D Soto, Dodge, Plymouth (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*LUBRICANT LEVEL CAUTION (ALL MODELS):* DO NOT fill rear axle housing to level of filler plug opening. *See individual Car Model pages for correct quantity and lubricant l v l recommendations.*

DESCRIPTION: Semi-floating type with hypoid drive gear and pinion. Differential assembly is the "two pinion" type.

►*DRIVE PINION SHAFT NOTE:* Drive pinions used on Chrysler New Yorker & Imperial models (Exc. Town & Country) do not have a bearing spacer. Front bearing and pinion preload shims bear directly on shoulder on shaft.

AXLE SHAFT REPLACEMENT & ENDPLAY ADJUSTMENT: Loosen brake shoe cams and remove rear hub and drum assemblies with Puller, Tool C-845. *(NOTE- Dó not att mpt to r move brake drums by hammering on nd of axle driv shaft as damage to bearings and thrust block will r sult).* Disconnect brake line at each cylinder and remove brake support plates and dust shields as assemblies. Remove axle shaft keys and install Tool C-745 to protect outer axle seal. Remove the shims located between brake backing plate and axle housing flange, then remove inner oil seals with a sliding hammer. Clean all parts and check for bearing wear, or worn bearing and seal surfaces. To install, reverse removal procedure, then adjust axle shaft endplay. See below.

Endplay Adjustm nt: Install shims totaling .040" at one end of axle housing (shims are available in .005", .010", .0125", .015", .030" thicknesses). Lubricate bearing and install the axle shaft, bearing and cup, then using Tool C-413, drive bearing cup into axle housing until tool bottoms tightly against the shims. Remove tool and install dust shield, lockwashers and nuts. Tighten nuts to 30-35 ft. lbs. Working from opposite side of axle housing, install other axle shaft with bearing until inner end of shaft contacts the axle shaft thrust block. Lightly tap end of axle shaft with a fibre mallet to insure shaft is contacting the thrust block (opposite shaft will be forced away from thrust block to its full travel). Install bearing carefully until no axle shaft endplay exists without preloading the bearing (rotate shaft during bearing installation to check against preload). At this point the bearing cup will protrude beyond face of axle housing flange. Hold Tool C-413 firmly against bearing cup and measure the distance between end of tool and flange with a feeler gauge. To obtain the correct endplay of .013-.018" (Chrysler & DeSoto), .008-.013" (Dodge & Plymouth), add .013" (Chrysler & DeSoto), .008" (Dodge & Plymouth) of shims to the above measurement. *(NOTE* - If this gives a total thickness of shims that cannot be built up from the existing shims, use the next larger shim combination). Remove tool and install total shim pack and brake dust shield. Tighten nuts to 30-35 ft. lbs.

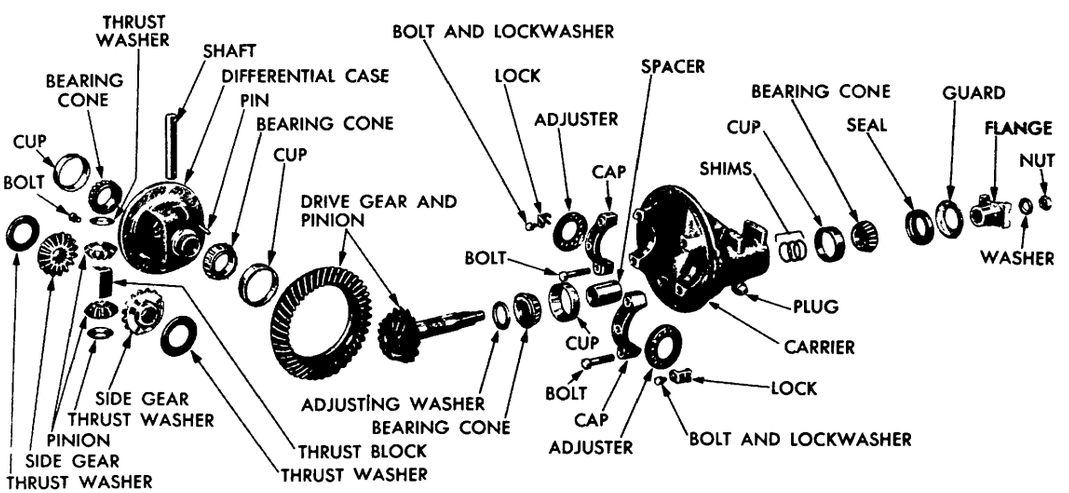
DIFFERENTIAL CARRIER ASSEMBLY REMOVAL & INSTALLATION: Raise car and block brake pedal so it cannot be depressed. Drain differential housing, then back off brake shoes with Tool C-845. Remove axle shafts (see above). *(NOTE - Retain shims found at each end of rear axle housing and mark them for reassembly in the same location).* Disconnect rear universal joint and drop the propeller shaft. Remove bolts attaching carrier to housing and remove the carrier assembly. To install, reverse removal procedure.

OVERHAUL: Carrier Disassembly - *(NOTE* - Before disassembling, check backlash of ring gear with a dial indicator, *see "Backlash Checking & Adjusting" below).* Mount carrier assembly in a suitable stand, then mark both differential bearing caps and adjuster. *(CAUTION - Bearing caps must not be interchanged as they are line bored with the carrier housing).* Remove universal joint companion flange with Tool C-452, then remove pinion front oil seal with Tool C-748. Remove pinion bearing oil slinger, bearing cone, preload shims and spacer (no spacer used on Chrysler New Yorker & Imperial). Remove differential bearing adjuster nut locks, then loosen differential bearing cap bolts and adjusting nuts to relieve bearing load before removing bearing caps. Remove differential case and drive gear assembly. Remove drive pinion, bearing and washer from carrier. Remove pinion rear bearing from pinion shaft with Tool C-293-C-1 and No. 36 plates. Drive pinion bearing cups out of housing with a hammer and punch.

Differential Case Disassembly: Remove drive gear to case attaching capscrews and remove drive gear *(NOTE-* Drive gear to case bolts are left-hand threads, turn clockwise to loosen). Tap ring gear off case using a fibre hammer. At this point, check differential case runout as follows: Mount case and bearings, without drive gear in carrier and adjust by installing bearing adjusters and removing all endplay. Mount a dial indicator on carrier mounting face and check drive gear mounting flange. Runout should not exceed .003". Remove differential case from carrier and check drive gear bolt holes for out of round. Remove bearings from case with Tool C-293 and No. 18 plates. Remove differential pinion shaft lock pins by driving pin from case with a hammer and punch. Drive long differential pinion shaft out of case, using a brass drift and hammer. Rotate one differential side gear until each pinion appears at large opening in case. Remove each pinion and thrust washer, then lift out thrust block. Remove differential side gears and thrust washers.

Differential Case Reassembly: Install a thrust washer over hub of each side gear and install gears in case. Install differential pinion gears and thrust washers so that holes of both gears and thrust washers are properly aligned. Rotate gears 90° so that pinion shaft holes in case are in alignment with holes in gears and thrust washers. From the pinion shaft lockpin hole side of case, insert the slotted portion of pinion shaft through case, thrust washer and just through first pinion gear. Install thrust block between the two pinion gears so hole in block is aligned with pinion shaft and with ground sides of block facing the two side

CONTINUED ON NEXT PAGE



CHRYSLER, DE SOTO, DODGE, PLYM UTH REAR AXLE

CHRYSLER, DESOTO, DODGE PLYMOUTH HYPOID (C nt.)

gears. Keeping all parts in proper alignment, push pinion shaft through until locking pin hole is in exact alignment with hole in case. *(NOTE* - Before installing shaft lock pin, rotate differential gears, making sure they rotate freely through the complete revolution). Check clearance between each gear and case with a feeler gauge. Clearance should be .001-.008". Install pinion lock pin through case from pinion shaft side of drive flange. Position each bearing cone on hub of case with taper away from drive gear, then with Tool DD-1005, drive cone in until it seats. Position drive gear on case aligning the holes in gear and case. Start all capscrews into threads in flange, then tap gear onto case with a fibre hammer until it seats properly on flange. Position drive gear between brass jaws of vise and alternately tighten each capscrew to 55 ft. lbs. (Chrysler & Imperial), 40 lbs. minimum (DeSoto), 35-40 lbs. (Dodge & Plymouth).

Carrier Reassembly: *(NOTE* - If differential assembly was satisfactory from standpoint of noise before disassembly, the drive pinion may be assembled with original adjusting washers and shims. If replacement parts are installed, or differential adjustment is necessary, the proper thickness washers must be installed between pinion and rear bearing, and the pinion must be readjusted. *See "Pinion Preload & Pinion Setting" below).* Install pinion bearing cups squarely in carrier, then place rear pinion bearing over main screw of Tool C-758-D-3 and insert tool into carrier from gear side. Place front pinion bearing over main screw, followed by Adaptor SP-535, Washer SP-534 and Nut SP-533. Press bearing cups into place by tightening tool nut. *(NOTE* - Allow tool to rotate slightly in order not to damage bearings or cups during installation). Remove tools, then proceed as follows *(NOTE* - If pinion setting and preload adjustment required, make these adjustments at this point). With shaft end of pinion facing up, install selected washer on pinion shaft with chamfered side of washer facing the drive gear. Position rear bearing cone on pinion shaft, making sure that all parts are clean. Install rear bearing on pinion shaft with Tool DD-955 (Chrysler & DeSoto), Tool DD-996 (Dodge & Plymouth), using an arbor press. On Chrysler New Yorker & Imperial, install the selected shim pack. On other cars, install bearing spacer, then install selected shim pack. Insert drive pinion assembly in carrier, then install front bearing and seal (lip of seal facing front bearing). Drive seal into carrier until it is seated against shoulder. Support pinion in carrier and start companion flange with installer, Tool 496 or Tool DD-999. Install plain washer (concave side of washer down) and nut. Tighten nut to 240 ft. lbs. (Chrysler & DeSoto), 180-200 ft. lbs. (Dodge & Plymouth). Remove tool. Place differential case bearing cups over bearings and install complete assembly in carrier housing. Seat adjusters in pedestals and install caps and bolts, making sure that caps are correctly located. Using Tool C-406, turn right hand adjuster clockwise until backlash exists between gear and pinion. Back off adjuster nut several turns, then tighten lower pedestal bolts to 85-90 ft. lbs., leaving the top bolts slightly loose. Check gear backlash, *see "Backlash Checking & Adjusting" below,* and adjust as necessary. With backlash properly adjusted, install adjuster lock and attaching bolt, then tighten the right hand bearing cap attaching bolt to 90 ft. lbs. and check the other three. After final tightening of all pedestals, recheck the backlash. *CAUTION* - Whenever adjustment of differential assembly is changed to obtain correct tooth contact, readjust differential bearing preload and backlash between gears

Gear Adjustment for Correct Tooth Contact: Apply gear marking compound to drive gear teeth, then apply a load against back face of gear with a round bar as drive gear is rotated. The contact pattern of a correctly adjusted assembly is well centered on drive and coast sides about 1/16" from edges of teeth. If tooth contact is across length of tooth, narrow and high on the tooth face, correct by moving pinion gear in toward center of drive gear by installing a thicker washer behind pinion. If tooth contact is across length of tooth, but narrow and low on the flank, correct by moving pinion gear away from center of drive gear by using a thinner washer behind pinion.

Backlash Check & Adjusting & Differential Bearing Preload Adjustment: With differential case assembly installed in carrier (see above), mount a dial indicator on housing so plunger rests against one of the ring gear teeth. *(NOTE* - Make sure indicator is properly positioned so plunger will accurately indicate exact amount of backlash). Check backlash at 90° intervals as gear is rotated, the stop at point of least backlash. Turn left hand (tooth side) bearing adjusting nut clockwise until only .001" backlash exists. *(NOTE* - Be sure right hand adjusting nut is screwed out so bearing cup can move without interference). At the point where .001" backlash is obtained, screw the right hand adjusting nut in until indicator just starts to move (to decrease the backlash) and install adjuster lock and attaching bolt. Tighten the **upper** right hand bearing cap bolt to 85-90 ft. lbs. *CAUTION - It is very important to have .001" backlash before upper bolt is tightened).* Turn left hand adjusting nut **clockwise** until dial indicator shows .006" backlash. *(NOTE-* Considerable effort will be required to turn adjusting nut to last notch or two). This adjustment should be made so that adjuster lock and attaching bolt can be installed. Complete reassembly of carrier (see above).

Pinion Setting & Bearing Pr l ad Adjustment: Install Gauge Block S-528 on end of dummy pinion shaft, Tool C-758-D-3. On Chrysler New Yorker and Imperial, assemble Washer, SP-2921 followed by pinion rear bearing and Sleeve, SP-1730 on dummy shaft. Insert the tool assembly in carrier, then install front bearing. On other models, install Locating Washer, SP-2919 and pinion rear bearing on dummy pinion shaft, followed by pinion bearing spacer, with large bore of spacer next to rear bearing. Install Sleeve SP-1730 on tool, then install the assembly in carrier housing and install front bearing. On all models, install Compression Sleeve, SP-535, Centralizing Washer, SP-534, followed by Main Screw Nut, SP-533. Hold compression sleeve with Tool C-784 or C-3281 and tighten nut to 240 ft. lbs. (Chrysler & DeSoto), 180-200 ft. lbs. (Dodge & Plymouth). Install Bearing Arbor, Tool SP-561 in differential carrier bearing supports. Center arbor in pedestals, then insert a piece of .002" shim stock between arbor and each cap and tighten pedestal bolts to 10 ft. lbs. Select a pinion adjusting washer of sufficient thickness so it will just pass between gauge block end of setting tool and machined surface of arbor. For example, if a .090" washer can be installed, but a .092" washer cannot be forced between the two surfaces, the .090" washer should be used. Check end of drive pinion for an etched mark to determine thickness to be added or subtracted from the above selected washer. As an example, if mark on pinion is plus 2, a .002" **thinner** washer should be used for final assembly. If minus 2, a .002" **thicker** washer should be used. When correct washer has been selected for drive pinion, disassemble tool from carrier housing. Add the selected washer to tool, between tool spacer and rear bearing. On Chrysler New Yorker & Imperial, add Spacer SP-2920 over dummy shaft to seat against rear bearing. On all models, add the pinion bearing preload adjusting shims (removed at disassembly), then insert tool into carrier housing. Install front bearing on shaft and into position in bearing cup. Install tool spacer, nut and washer, then tighten nut to 240 ft. lbs. (Chrysler & Imperial), 180-200 ft. lbs. (Dodge & Plymouth). Rotate tool assembly to seat the bearings, then check bearing preload by revolving tool with an inch-pound reading torque wrench. The correct preload should be 25-35 inch-pounds (Chrysler & DeSoto), 20-30 inch-pounds (Dodge & Plymouth). Adjust preload as necessary by **adding a thicker** shim if preload is too great, or a **thinn r** shim if preload is not sufficient. Complete reassembly as indicated. *See "Carrier Reassembly" above.*

FORD & MERCURY "DEEP-OFFSET" HYPOID

F rd Pass. Cars (1957)
Thunderbird (1957)
F rd F-100 Trucks (1957)
Mercury (1957)

DESCRIPTION: New design, banjo housing, semi-floating, hypoid type with straddle mounted drive pinion gear. A separate differential carrier assembly is used which can be removed for overhaul without removing rear axle assembly from car.

AXLE SHAFT REPLACEMENT: Remove wheel and tire assembly and then remove nuts holding brake drum to axle flange. Remove brake drum. Working through holes in axle shaft flange, remove nuts attaching wheel bearing retainer. Pull axle assembly out of housing. *(NOTE - Be careful not to dislodge brake plate - install one nut to hold brake plate in place after axle shaft is removed).* To install, reverse removal procedure, tighten bearing retainer nuts to 30-35 ft. lbs.

Oil Seal & Wheel Bearing Replacement: Remove axle shaft from housing. Remove bearing inner retainer and bearing using Bearing Puller T57L-1225-P. Inspect machined surface of axle shaft and axle housing for rough spots which might affect sealing action of oil seal. Remove any burrs or rough spots. Press a new bearing on shaft using Tool T57L-1225-N, installed in an arbor press, until bearing is seated firmly against shoulder on shaft. Press bearing inner retainer on shaft with bearing installation tool until retainer seats firmly against bearing. Install oil seal.

REAR AXLE ASSEMBLY REMOVAL: *See "Rear Axle" on Car Model pages.*

OVERHAUL

DIFFERENTIAL CARRIER ASSEMBLY REMOVAL: *(NOTE - It is not necessary to remove complete rear axle assembly from car for overhaul).* Drain rear axle assembly, then clean area around point where carrier and housing meet. Remove axle shafts, then remove nuts retaining carrier to axle housing. Remove carrier.

DISASSEMBLY: *NOTE* - Before disassembling differential carrier, mount a dial indicator on carrier and check ring gear backlash which should be .004-.009". Check contact pattern on gear teeth (see "Gear Tooth Contact Pattern" below), and if found to be erratic, check runout of gear which should be .003" max. Loosen differential bearing cap bolts, then tighten them to 25 ft. lbs. Remove adjusting nut locks, then carefully loosen one of the adjusting nuts to determine if any differential bearing preload remains. If there is at least one notch of preload remaining, bearings may be reused if they are not pitted or damaged.

1) Mark one differential bearing cap and support to insure proper reassembly. Remove adjusting nut locks, bearing caps, and adjusting nuts. Remove differential assembly from carrier. If differential bearings are to be removed, use Tool T57L-4220-A (Ford), 4221-AE and 4221-C-13 (Mercury), to remove bearings.

2) Remove bolts attaching ring gear to differential case, then press gear from case or tap it off with a soft hammer. Using a drift, drive out differential pinion shaft retaining pin and separate the two-piece differential case. Drive out pinion shaft with a brass drift and remove gears and thrust washers.

3) Turn carrier case upright and remove the five bolts securing pinion retainer to carrier, then remove pinion retainer assembly. Remove pinion "O" ring seal from retainer, and remove pinion shim *(CAUTION - Be careful not to damage mounting surfaces of retainer and carrier).* Measure thickness of shim for reference at reassembly.

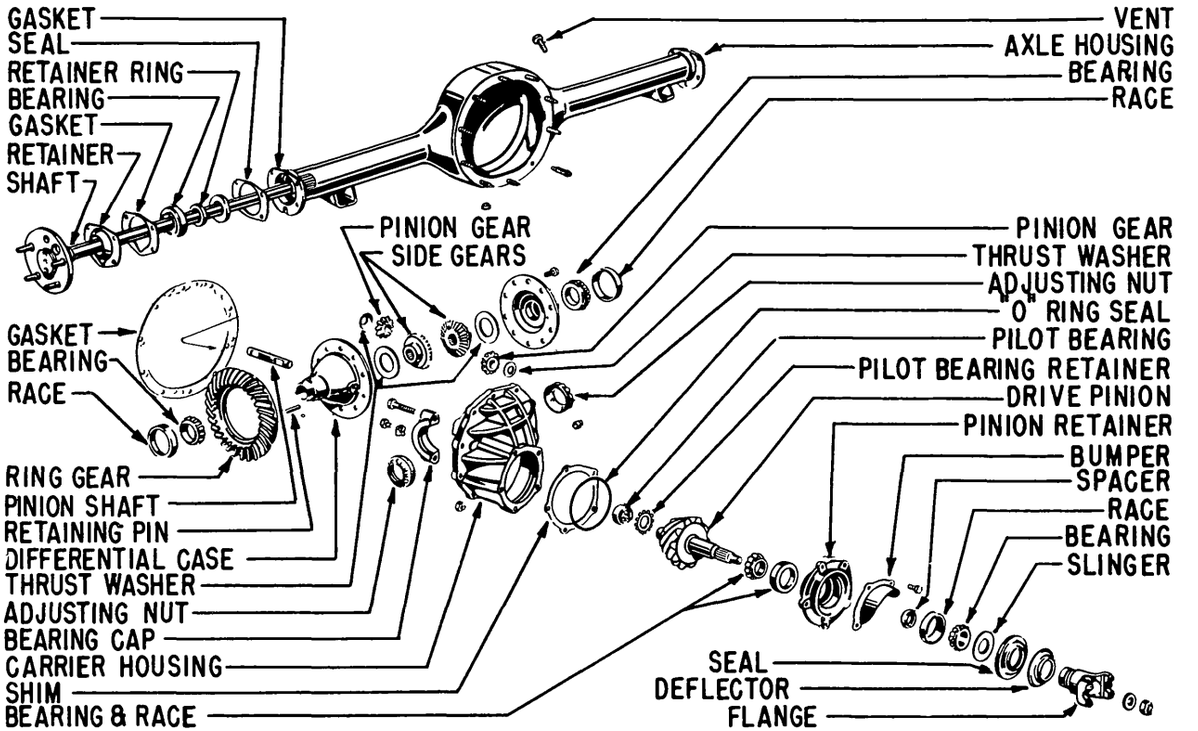
4) If pilot bearing is to be replaced, drive pilot bearing and retainer out with Tool T57L-4625-A and T53L-200-A (Ford), 4625-K (Mercury). Use the same tools to install bearing, driving it in until it bottoms. Install retainer, with concave side upward, using the same tools as for bearing installation *(CAUTION - Be careful not to crack bearing support when installing bearing and retainer).*

5) Mount pinion retainer assembly in Fixture T57L-500-A (Ford) and using Tool T57L-4851-B (Ford), 4851-G (Mercury), remove pinion shaft nut and washer. Remove universal joint flange, oil seal and slinger. Remove pinion retainer from fixture, place a protective sleeve (use a piece of hose or wrap with tape) on pinion pilot bearing surface, and press pinion shaft out of front bearing cone. Remove spacer. *CAUTION - Do not reuse this spacer.*

6) Install pinion shaft assembly in Tool T57L-4614-A and T57L-4621-A (Ford), 4621-K (Mercury), and press pinion out of rear bearing cone. *(NOTE - Do not remove pinion bearing cups from retainer unless cups or bearings are to be replaced).* If it is necessary to remove cups, press cup from retainer with Tool T57L-4616-A1 (Ford), or remove cups with Tool 4615-D (Mercury). To install cups, use same tools as for removal (Ford), press cups into position with Tool 4615-E (Mercury). *NOTE* - After cups installed, make sure they are solidly seated in retainer by attempting to insert a .0015" feeler between cup and bottom of bore in retainer.

INSPECTION: Clean all parts thoroughly with cleaning solvent. Oil bearings immediately to prevent rusting. Check pinion and ring gear teeth for scoring or signs of excessive wear. Check bearing cups for rings, scores or galling, or erratic wear pattern. Make sure cups are solidly seated in bores. Check bearing rollers for pits, scoring, or roughness. Install bearing caps temporarily and test the fit of adjusting nuts in their threads. Nuts should turn freely when caps are tightened to specifications. Face of adjusting nuts must be smooth and square. If necessary, polish with a fine abrasive on a flat surface. Check end of universal joint flange that contacts oil slinger. This surface must be smooth. Polish if necessary. Inspect pinion retainer for damage and make sure bearing cups are solidly seated. Clean burrs and chips from ring gear mounting flange. Clean grooves for "O" ring seal and clean all lubricant passages. Inspect carrier housing for damage, making sure threads are not damaged and that bearing bores are smooth. Remove

CONTINUED ON NEXT PAGE



FORD & MERCURY REAR AXLE ASSEMBLY

FORD & MERCURY "DEEP-OFFSET" HYPOID (C ntinu d)

nicks and burrs from mounting surfaces of carrier housing. Check bearing mounting hubs in differential for smoothness. Check fit of differential gears in counterbores. Inspect thrust surfaces for damage that might have occurred when bearing was removed.

REASSEMBLY: Differential Case - *(NOTE - Lubricate all parts with rear axle lubricant as they are assembled).* Place a side gear and thrust washer in differential case bore, then using a soft hammer, drive pinion shaft into case only far enough to retain a pinion thrust washer and pinion gear. Place second pinion and thrust washer in position, then drive pinion shaft into place, being careful to line up pinion shaft retainer holes. Place second side gear and thrust washer in position and install cover of differential case. Install pinion shaft retainer pin. *(NOTE* - Check for free operation of the assembly by inserting a pinion or axle shaft spline in side gear spline, and rotating the assembly). Insert two 7/16" x 2" (N.F.) bolts through differential flange and thread them three or four turns into ring gear as a guide in aligning ring gear bolt holes. Press or tap ring gear into position. Install and tighten ring gear attaching bolts evenly and alternately across gear to 60-65 ft. lbs. If differential bearings have been removed, press them on hubs using Tool T57L-4221-A (Ford), 4222-K (Mercury).

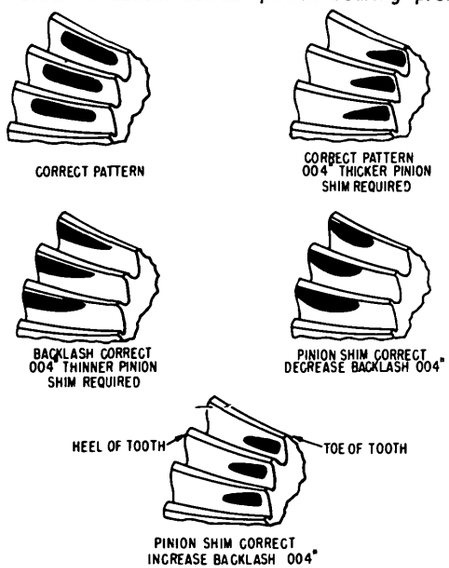
Pinion & Retainer: Install pinion rear bearing cone on pinion shaft using Tool T57L-4614-A and T57L-4621-B (Ford), 4621-L (Mercury), then install a new spacer on shaft. Place bearing retainer on shaft and install front bearing cone, pressing it into place with same tools used for rear cone *(CAUTION - As bearing is pressed into position, rock pinion retainer. Do not press bearing on shaft until all "play" is removed between pinion retainer and bearings as spacer may be compressed too much).* Lubricate both bearings with rear axle lubricant. Place slinger in position, coat outside of new oil seal with an oil resistant sealer and press seal into bearing retainer using Tool T57L-4676-A (Ford), 4676-C (Mercury). *(NOTE - It is not necessary to soak a new Ford or Mercury seal in oil before installation as they are prepared at the factory for immediate installation).* Install universal joint flange and flat washer. Start pinion shaft nut. Adjust pinion bearing preload (see below). *(NOTE - If a new ring gear and pinion, or rear axle assembly housing is being installed, or the tooth contact pattern is not correct, see "Pinion Setting" and "Tooth Contact Pattern" below before further reassembly).*

Carrier Assembly: 1) Lubricate the "O" ring seal with rear axle lubricant and install it in its groove in pinion retainer being careful not to twist the seal. Place correct shim on carrier and install pinion and retainer assembly. Install pinion bumper and retainer bolts and tighten bolts to 35-40 ft. lbs.

2) Wipe a thin coating of lubricant on bearing bores. Place cups on the bearings and set differential case in carrier. Slide the assembly along bores until a slight amount of backlash is felt between gear teeth. Set adjusting nuts in bores so they just contact bearing cups *(NOTE - Each cup should be engaging approximately the same number of threads).* Carefully position bearing caps on carrier, matching the marks made at disassembly. Install bearing cap bolts and tighten alternately to 75-80 ft. lbs. Adjust gear backlash (see below). Install adjusting nut locks and tighten to 12-15 ft. lbs.

DIFFERENTIAL CARRIER ASSEMBLY INSTALLATION: Install carrier assembly in rear axle housing and tighten attaching nuts to 35-40 ft. lbs. Install axle shafts *(CAUTION* - Axle shafts are not the same length and are not interchangeable), wheels, and tires. Fill axle assembly with lubricant until level with filler plug hole.

PINION BEARING PRELOAD ADJUSTMENT: Hold retainer flange and tighten pinion shaft nut until the torque required to turn pinion shaft, as determined by Torque Indicator 4610-N and 4858-N (Ford), 4209 (Mercury), is 8-12 **inch pounds** (used bearings), 17-27 **inch pounds** (new bearings). *(NOTE - A minimum tightening torque of 175 ft. lbs. should be required on pinion shaft nut in order to obtain correct pinion bearing preload).*



TYPICAL GEAR TOOTH PATTERN (DRIVE SIDE)

PINION SETTING (Shim Selection): *(NOTE* - Differential carrier assemblies are manufactured to require a .015" pinion setting shim. If a new carrier assembly is being built up, a .015" shim should be used tentatively, and then adjusted in relation to tooth contact pattern). Adjusting shims are available in .010" to .021" thicknesses in steps of .001". Matching marks are placed on edge of ring gear and on face of pinion gear *(CAUTION - Make sur that both ring gear and pinion have the same matching marks, usually a three digit numeral).* A plus (+) or minus (-) digit, or an "0" (indicating a standard pinion gear) is placed on the pinion gear following the matching number to indicate pinion setting shim requirements as follows: A minus (-) number means that the pinion should be moved closer to the ring gear, and a thinner shim is required. A plus (+) number means the pinion should be moved farther from ring gear, and a thicker shim is required. A pinion marked zero (0) is a standard pinion. To select a shim, measure original shim with a micrometer. Then note dimensional mark on original pinion. Compare the mark on original pinion with mark on new pinion to determine how the original shim should be modified (Example: Original shim is .015", original pinion is marked -1, and new pinion is marked +1. The new pinion would require a .002" thicker shim. Therefore a .017" shim must be used). If new pinion is marked the same as the old pinion, no shim change is required.

GEAR BACKLASH ADJUSTMENT: With differential case installed in carrier, and with adjusting nuts, bearing caps, and bearings in place (see "Carrier Assembly" above), loosen the bearing cap bolts from a fully tightened position, then tighten them to only 20 ft. lbs. before making adjustments. Loosen adjusting nut on pinion gear (right hand) side until it is away from cup. Tighten nut on ring gear side (left hand) until the ring gear is just forced into pinion with no backlash (recheck right hand nut to make sure it is still loose). Tighten the right hand nut two notches beyond the position where it first contacts the bearing cup. Rotate ring gear several revolutions in each direction while the bearings are loaded, to seat bearings in cups *(CAUTION - This st p is very important to insure proper seating of bearings).* Again loosen right hand nut to release the preload. If there is any backlash between gears, tighten left hand nut just enough to remove this backlash. Carefully tighten right hand nut until it just contacts bearing cup, and continue to tighten 2½ to 3 notches. Install dial indicator on carrier so that contact tip of indicator bears against face of a gear tooth on outer diameter of ring gear. Measure backlash which should be .004-.009". Repeat this measurement at several other teeth around ring gear. If measurements vary more than .003", there is excessive runout in gear or mounting. If backlash is not within specification of .004-.009", loosen one adjusting nut and tighten opposite nut an equal amount to move ring gear away from or toward pinion. *(NOTE - When moving the adjusting nuts, the final movem nt should always be made in a tightening direction. For example, if left hand nut had to be loosened one notch, loosen the nut two notches, then tighten it one notch).*

GEAR TOOTH CONTACT PATTERN: With completed carrier assembly mounted in a holding fixture, coat gear teeth with a suitable gear marking compound such as red lead and oil. Wrap a cloth around drive pinion to act as a brake, then rotate ring gear back and forth until a clear pattern is obtained. If tooth pattern is not correct, as indicated in the tooth pattern illustration, make the necessary adjustments for backlash and pinion position. *(NOTE - Tooth patterns in the illustration are typical and are not characteristic of any one gear).*

FORD TRUCK HYPOID

F rd F-250 & P-350 Trucks (1957)

DESCRIPTION: Spicer Model 60. Full-floating, hypoid gear with Hotchkiss drive. **This axle does not have a s parat diff r ntial carri r assembly.**

REMOVAL OF REAR AXLE ASSEMBLY: *See "Rear Axle" on Truck Model pag s.*

AXLE SHAFT REPLACEMENT: Remove axle shaft stud nuts and lockwashers. Strike center of axle shaft flange with a hammer and drift to loosen tapered dowels, then remove dowels. Pull axle shaft from housing. To reinstall, place gasket in position on housing and install axle shaft. Install tapered dowels, lockwashers and nuts on studs. Tighten nuts to 50-70 ft. lbs.

WHEEL BEARING ADJUSTMENT: Remove axle shaft (see above), bearing locknut and washer. Tighten wheel bearing adjusting nut while rotating wheel back and forth, until a noticeable drag is felt, then back off adjusting nut 1/8 turn. Install bearing lockwasher and locknut and bend one tab of lockwasher over adjusting nut and one tab over locknut. Install axle shaft.

OVERHAUL: With axle housing removed from truck, remove axle shafts (see above), then proceed as follows:

Disass mbly: **1)** Remove rear cover from rear axle housing. Rotate gears to check for roughness and inspect teeth for scoring, flaking, or abnormal wear. Check backlash and runout of ring gear (see below).

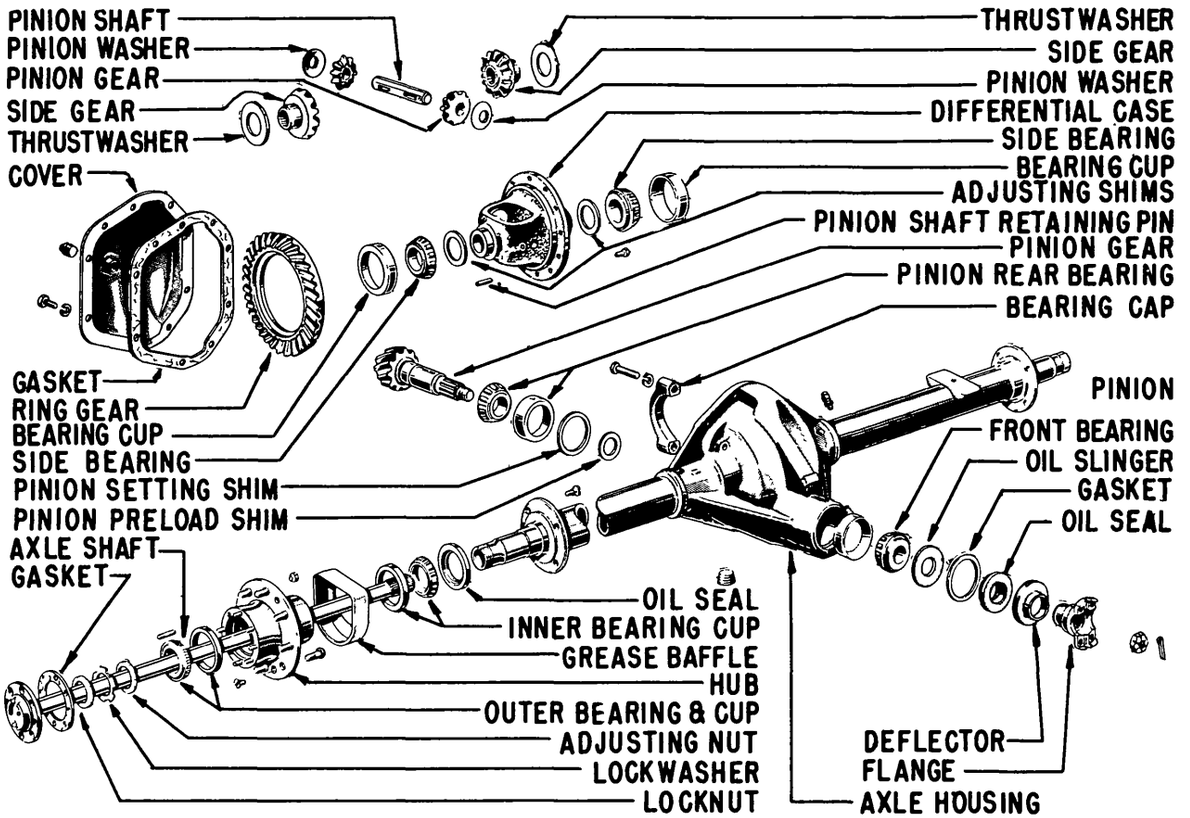
2) Mark side bearing caps and housing to assure reassembly of caps in same position, then remove caps. Install housing spreader Tool 4000-A, and spread housing until differential assembly can be forced out with a pry bar or heavy screwdriver. *CAUTION - Do not spread housing mor than .020" to remove differential assembly. Loosen th spreader immediately after lifting out dif f r ntial assembly to prevent springing the housing.*

3) Using Tool T56L-400-A, remove differential side bearings. Remove and tag shim packs which were installed under each bearing. Remove drive gears from differential case. Drive out pinion shaft lock pin with a punch and remove differential pinion shaft, differential pinions, and thrust washers. Remove side gears and thrust washers.

4) Hold universal joint flange with Tool T53L-4851-D & E and remove nut and washer from pinion shaft. Remove universal joint flange with Tool T53L-4851-A. Press pinion shaft out of housing. If rear bearing cone is to be replaced, use Tool T56T-4630-A (4.88-1 ratio axle), 4630-B (5.87-1 ratio axle), 4630-C (4.55-1 ratio axle), and press cone off pinion shaft. Remove oil seal with Tool 4676-N.

5) Remove oil slinger, pinion front bearing cone, and pinion bearing preload adjusting shim pack (located between front bearing cone and shoulder on pinion shaft). If pinion bearing cups are to be replaced, use Tool T55P-4616-B (front cup), T53T-4616-E (rear cup). Measure thickness of shims found back of rear bearing cup and record the reading or tie shims together for reinstallation.

Insp cti n: Wash all parts with solvent and blow dry with air, then oil all bearings. Check gear teeth for scoring or signs of wear. Check differential side gear hubs, thrust washers, splines and thrust surfaces for pitting or wear. Check bearing cups for rings, galling, scores, and for erratic wear pattern. Make sure that all bearing cups are seated properly in their bores. Temporarily install bearing caps and test fit of adjusting nuts in their threads. They should turn easily when bearing caps are tightened to specifications. Face of nuts must be smooth and square. Polish with a fine abrasive on a flat surface. Remove all nicks and burrs from mating and mounting surfaces.



FORD F-250 & P-350 TRUCK REAR AXLE

Differential Case Reassembly: Install side gears and thrust washers, pinion gears and thrust washers, and pinion shaft in differential case. Install pinion shaft locking pin. Install drive gear on differential case and tighten attaching bolts to 70-90 ft. lbs. Install both differential side bearings on case without shims. Make sure that bearings bottom on shoulders of case. Place cups on bearings and install complete assembly in rear axle housing. Install bearing caps and tighten cap bolts just enough to keep bearing caps in place. Mount a dial indicator on axle housing with indicator button against back side of ring gear. Pry differential assembly away from dial indicator with a screwdriver, then set dial indicator to zero. Pry differential assembly toward dial indicator and note indicator reading. Record this reading for reference when installing differential case in axle housing as it represents the total amount of shims (less those required for bearing preload) necessary to take up clearance between differential cups and case. Remove differential case assembly from axle housing. *NOTE - Do not install shims under bearings at this time.*

Pinion Gear Assembly Installation: With correct pinion depth adjustment shim pack and pinion bearing preload adjustment shim pack selected (see below), install front and rear bearing cups in axle housing (shim pack back of rear bearing cup), using Tool T56T-4616-A and T53T-1239-A. Press rear bearing on pinion shaft with Tool T53T-4621-B and install pinion assembly in housing. Install correct pinion bearing preload adjusting shims on pinion against shoulder and install front bearing. Install oil slinger, oil seal (soak new seal in oil for 30 minutes before installation). Install universal joint flange, washer, and nut. Tighten nut to 200-250 ft. lbs.

Pini n D pth S tting (Shim Sel cti n M th d) - *(NOTE - This method can be used when only a new ring g ar and pinion are installed. Should any of th carrier housing*

CONTINUED ON NEXT PAGE

FORD TRUCK HYPOID (C nt.)

parts be changed, or if tooth contact pattern not correct, the "Master Gauge Method", below, must be used). The thickness of shims required is determined by thickness of shim pack removed at disassembly and by the plus or minus figure etched on pinion. For example, if original pinion was marked +2 and had a .035" shim pack back of rear bearing cup, and the new pinion to be installed is marked −1, the shim pack must be increased by .003" to bring new pinion to its correct position. *NOTE* - A (+) marked pinion calls for the removal of shims in the amount of the marking. A (−) marked pinion calls for addition of shims in the amount of the marking. Replacement shims are available in .003"& .005" thicknesses.

Pinion Depth Setting (Using Gauge T56T-4020-A) - *(NOTE - This method must be used whenever any of the carrier housing parts are changed or when the original shim pack thickness is unknown).* Install pinion in housing (see above) without the front bearing preload adjusting shim pack. Install universal joint flange, flat washer and nut, then tighten nut until pinion bearing preload is 10-30 inch pounds (see "Pinion Bearing Preload" below for checking procedure); as pinion shaft nut is tightened, rotate pinion shaft to seat bearing rollers. Place gauge shaft and discs in differential bearing pockets and tighten caps on larger discs only. Attach dial indicator to its holder and place it on highest step of gauge block. Place gauge block squarely on pinion gear and squarely against gauge shaft. With indicator button resting on gauge block, set dial indicator to zero. Swing indicator to highest point on gauge block and note reading *(NOTE - The highest point on gauge shaft is highest indicator reading while indicator hand is moving clockwise).* The indicator reading at this point must correspond to marking on pinion gear. A (+) reading (clockwise from zero) at highest point on gauge shaft with a zero marked pinion means that the actual dimension is too great in the amount of the plus reading. To correct, add shims that correspond to the plus reading. For a (−) reading (counterclockwise from zero) at the highest point on gauge shaft with a zero marked pinion, remove shims equal to the minus reading. *NOTE* - A −3 marked pinion is installed at the proper depth when the indicator reads −3 at the highest point on gauge shaft. Similarly, a +3 marked pinion is installed at the correct depth when the indicator reads +3.

Pinion Bearing Preload Adjustment - *(NOTE - When pinion setting shim pack is changed (see above), add or subtract the same thickness of shims from pinion b aring preload shim pack at front bearing to maintain correct pinion bearing preload).* To check preload, wrap a strong cord around universal joint flange and attach a pound-pull scale to cord. Note the pull required to keep pinion shaft rotating (disregard pull required to start pinion rotating), which should be **10-30 inch p unds.** *NOTE* - The inch-pound torque required to keep pinion shaft rotating is calculated by multiplying the scale reading in pounds, with one half the diameter in inches. As an example, a 15 lb. pull on a 4" diameter is 30 inch pounds.

Differential Case Installation: With pinion shaft correctly installed in housing (pinion setting & bearing preload adjusted), install differential assembly (with correct shim packs back of bearing cones; see "Differential Bearing Preload & Backlash Adjustment" below), as follows: Install housing spreader Tool 4000-A and spread housing not more than .020". Install differential assembly, with bearing cups in position on bearings, into rear axle housing. Rotate and tap ring gear with a soft hammer to seat bearings properly in cross-bores. Install bearing caps (make sure indexing marks made at disassembly are in alingment), then remove housing spreader. Install and tighten capscrews to 70-90 ft. lbs. Check backlash (see below). Install rear cover and gasket and tighten capscrews to 15-25 ft. lbs.

Differential Bearing Preload & Backlash Adjustment - With differential bearings installed on case without shim packs, install case, with bearing cups, in housing. Install bearing caps and tighten bolts lightly. Mount a dial indicator on housing with indicator button bearing against back side of ring gear. Move differential assembly tight against pinion gear and set dial indicator at zero. Move differential assembly toward indicator and note maximum reading *(NOTE* - This reading indicates the shim pack thickness required behind bearing cone on ring gear side of case). To obtain shim pack required for opposite side of case, take the reading just obtained and subtract it from the reading taken when differential case was reassembled and checked in rear axle housing (see "Differential Case Reassembly) above). The remainder, plus .015-.020" for preload and backlash, will be total shim pack required on side of case opposite the ring gear. As an example, if the reading obtained when differential case clearance checked in axle housing was .070" and the reading obtained on dial indicator (above) was .038", then the thickness of shims required on opposite side of housing from ring gear, would be .070" minus .038"; or .032" to which should be added .015-.020" (.017") shims for preload and backlash, giving a total shim pack of .049". Remove bearing caps and take differential case out of housing. Remove side bearings and install proper amount of shims on each side. Press side bearings on case until they are firmly seated against shims. Install differential case in housing.

Differential Ring Gear Backlash Ch ck: Install a dial indicator to check backlash at four equally spaced points around ring gear. The backlash must be .004-.009" and must not vary more than .002" between positions checked. If backlash does not meet specifications, change the shim packs behind both differential side gears by taking shims from one side and installing them on the other as required. Total shim pack must not be changed.

RAMBLER HYPOID

Rambler Six (1957)
Rambler V8 (Early 1957). See note below.

► *1957 RAMBLER V8 REAR AXLE PRODUCTION CHANGE:* Spicer type rear axles used beginning Serial No. A-11296. Spicer type axles are identified by number "44" cast on housing.

► *1957 RAMBLER SIX AXLE SHAFT PRODUCTION CHANGE:* Beginning with Serial No. D-393951, serrated type axle shafts and hubs were used in production replacing the earlier "keyed" shaft and hub and drum assembly. See "Overhaul" below.

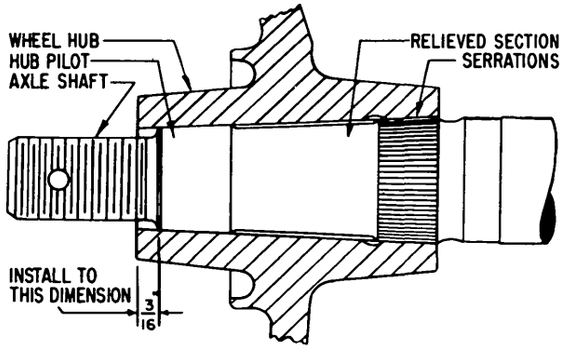
DESCRIPTION: Own semi-floating, hypoid gear type with torque tube drive and coil springs similar in design to previous models.

REMOVAL: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Nash, Hudson, Rambler Hypoid (Torque Tube Drive)" in 1956 Annual Data and note the following:*

Axle Shaft Replacement (Serrated Type): Remove tire and wheel assembly from brake drum and hub, then remove speed nuts holding drum to hub. Use Hub Puller, Tool J-736-B or J-1644-B to remove hub from axle shaft. To install hub, index serrations of hub with those on shaft and tighten with the axle shaft nut and washer. The hub is properly located on axle shaft when the measurement from outside face of hub to the taper of the axle shaft is 3/16". *(CAUTION - Ov r-tightening beyond this dim nsion will caus interference between drum and brak support plat).*

► *SERVICE REPLACEMENT HUB NOTE:* Service replacement hubs are not serrated. Serrations will be cut in the hub when it is installed on the shaft. The measurement of 3/16" from outside face of hub to the taper of the axle shaft applies to a service replacement hub without serrations.



RAMBLER (6 CYL.) SERRATED AXLE

OLDSMOBILE HYPOID

All Models (1957)

►CHANGES, CAUTIONS, CORRECTIONS

► *PINION BEARING PRELOAD CAUTION:* Pinion bearing preload must be adjusted whenever universal joint flange nut on pinion shaft is loosened. Preload is controlled with this nut and will be disturbed when nut loosened for any reason.

DESCRIPTION: Semi-floating hypoid gear type of same design used on previous models.

AXLE SHAFT REMOVAL: *See "Rear Axle" on Car Model pag .*

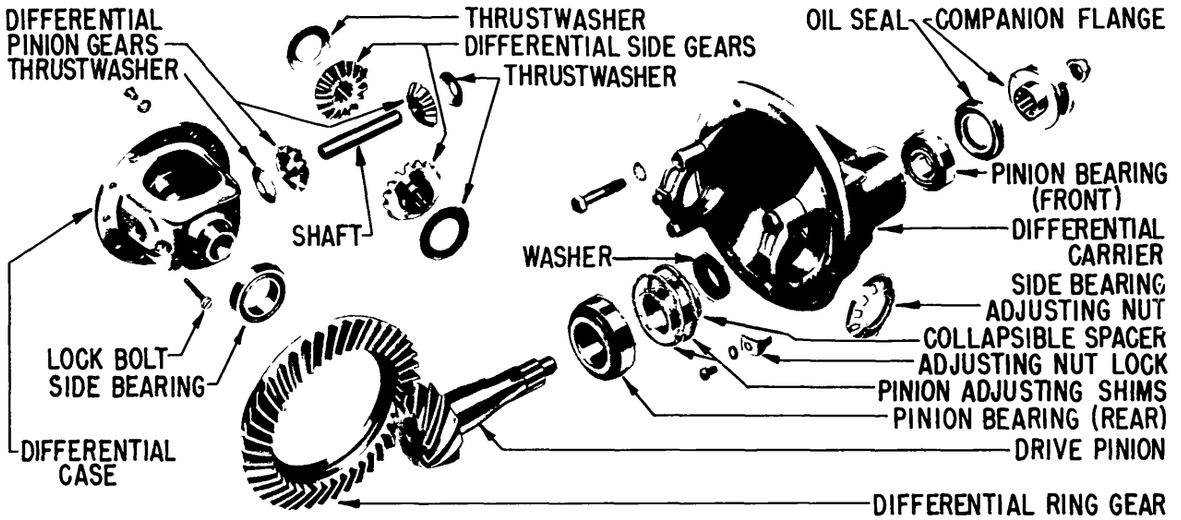
WHEEL BEARING & OIL SEAL REPLACEMENT: *(NOTE* - Wheel bearings have .012-.015" endplay between balls and the races. Do not reject bearing unless endplay is greater than .020" or if there is definite roughness between ball and race). With axle shaft removed, remove bearing retainer collar after splitting with a cold chisel. *(CAUTION* - Do not damage axle when removing collar). Using Tool J-947-2 and J-947-1, press off bearing in an arbor press. To install bearing, use Tool J-947-3 and Plate J-947-1 with an arbor press and press bearing over axle shaft, being sure that pressure is being applied to inner race of bearing. After bearing has been pressed firmly against axle shaft shoulder, press new bearing retainer collar on shoulder of shaft against bearing. Be careful not to damage shaft surface on which oil seal runs.

Oil Seal: With axle shaft removed, remove seal. Before installing a new seal, apply sealer around its outside diameter then install seal in housing with Tool J-5818. *CAUTION* - When installing axle shaft, be careful not to damage seal.

PINION SHAFT OIL SEAL REPLACEMENT: Mark pinion shaft nut before loosening so that it may be retightened to the exact same location. This will avoid necessity of resetting pinion bearing preload. Remove companion flange nut and washer, then remove companion flange with Tool 6295-01. Remove seal by driving it out of housing with a blunt chisel. Lubricate new seal and coat outer diameter with sealing compound. Tap seal into place using Tool J-5395. Apply seal lubricant, Part No. 567196 to outer diameter of flange and to lip of new seal. Install flange and tighten nut to marked position, then tighten nut 1/16" beyond alignment mark.

OVERHAUL: Carrier Removal - Remove axle shafts, then clean area around carrier to prevent entry of dirt. Disconnect propeller shaft at rear universal joint and support shaft in body tunnel. Remove nuts from carrier mounting studs and move carrier away from housing sufficiently to drain the lubricant. Remove carrier from housing. *NOTE* - Do not wash carrier assembly until after it has been completely disassembled. This will avoid washing dirt into bearings.

Carrier Disassembly: Mount carrier assembly in Holding Fixture, Tool J-3289-B. If original pinion and ring gear are to be reinstalled, install Dial Indicator, KMO-30 on carrier and measure backlash of ring gear at two points 180° apart. The lowest reading should be within .003-.012". Check tightness of ring gear to differential case cap screws which should be 55-60 ft. lbs. Mark the right side bearing adjusting nut, bearing cap, and carrier with **two** punch marks, then mark left side in same manner with **one** punch mark. *(NOTE - These marks will be used at reassembly if the original gear set is being used).* Remove bearing cap lock screws and locks, then check side bearing preload to determine if it is correct, as follows: Loosen each bearing cap attaching bolt ¼ to ½ turn (just enough to turn adjusting nut), then tap bearing lightly to assure freeness of nuts in threads. Back off right hand adjusting nut (right hand nut is opposite ring gear) and watch the outer race of bearing. *(NOTE* - If side bearing preload is correct, the outside bearing race should start to turn the instant the adjusting nut is loosened, and should continue to turn until adjusting nut is loosened 1½ to 3 notches. **Count and record the number of notches between punch marks on nut and those on carrier where race stopped turning).** Remove bearing cap bolts, bearing caps, and adjusting nuts. Remove differential case from carrier while holding outer bearing races against rollers. Check pinion bearing preload (see below), then turn carrier assembly to a horizontal position and remove companion flange nut, then remove companion flange with Puller J-6295-01 and Holding Tool J-6544. Remove drive pinion rear bearing and spacer as follows: Tap out front bearing with a plastic hammer, or if necessary, install carrier in an arbor press and press pinion out of front bearing. *NOTE* - In all cases, a shim washer .037" to .045" will be found between the compressible spacer and inner race of front bearing. A second shim is used in production to salvage the compressible spacer should recommended preload be exceeded. This second shim can be used in the same manner for service *(see "Compressible Spacer Note" below).* Remove oil seal by driving it out of housing with a blunt chisel, then remove front inner race and roller assembly. Press front bearing race out of carrier with Tool J-6198, and rear bearing race with Tool J-6533. Using Tool J-6531 and an arbor press, remove rear bearing from pinion shaft.



OLDSMOBILE REAR AXLE ASSEMBLY

Differential Case Disassembly: Remove lock screw and pinion gear shaft, then remove pinion gears, side gears and thrust washers from case. If ring gear or case are to be replaced, remove ring gear. *(NOTE* - Do not remove side bearings from case unless they are to be replaced). If necessary to remove side bearings use Differential Side Bearing Remover, Tool TR-278-R, making sure that ends of puller are placed in recess in case.

Differential Case Reassembly: Reverse disassembly procedure and note the following: Lubricate gears and thrust washers, then place side gear thrust washers over hubs and install side gears in case. While holding upper side gear up into its bore, position one pinion gear (without thrust washer) between side gears and rotate gears until pinion gear is directly opposite loading opening in case. Place the other pinion in position between side gears so that pinion shaft holes line up. Rotate pinion gears in position to assure pinion gear shaft holes in gears are lined up with shaft holes in case. If holes do not line up, pinion will require repositioning in side gear teeth. With gears properly meshed, rotate assembly just enough to permit working the pinion gear thrust washers into position between gears and case. Install gear shaft and lock it in place with lock screw and lockwasher.

Carrier Reassembly: Reverse Disassembly procedure and note the following:

Pinion Gear Setting - Before assembling the carrier, the correct number of shims required to locate drive pinion properly must be determined from markings on

CONTINUED ON NEXT PAGE

OLDSMOBILE HYPOID (Con.inued)

differential carrier and end of pinion. Carrier is marked on face of flange with either of the following codes: "D" (indicating "deep"); "S" (indicating "shallow"); "O" (indicating "standard"). The digit following the letter designates number of thousandths "deep" or "shallow". *(NOTE - A carrier marked "O" will require .016" of shims under pinion bearing, plus or minus the markings on pinion).* Pinions are marked plus(+) or minus (-) together with a number indicating in thousandths of an inch the shims required to position pinion in carrier. *(NOTE* - Drive pinions machined to zero specifications are not marked). Determine markings on carrier and on pinion, then refer to "Pinion Shim Chart" for correct thickness of shims to use.

PINION SHIM TABLE

Carrier Marking	Pinion Marking								
Mark	−4	−3	−2	−1	0	+1	+2	+3	+4
S-5	.007	.008	.009	.010	.011	.012	.013	.014	.015
S-4	.008	.009	.010	.011	.012	.013	.014	.015	.016
S-3	.009	.010	.011	.012	.013	.014	.015	.016	.017
S-2	.010	.011	.012	.013	.014	.015	.016	.017	.018
S-1	.011	.012	.013	.014	.015	.016	.017	.018	.019
O	.012	.013	.014	.015	.016	.017	.018	.019	.020
D-1	.013	.014	.015	.016	.017	.018	.019	.020	.021
D-2	.014	.015	.016	.017	.018	.019	.020	.021	.022
D-3	.015	.016	.017	.018	.019	.020	.021	.022	.023
D-4	.016	.017	.018	.019	.020	.021	.022	.023	.024
D-5	.017	.018	.019	.020	.021	.022	.023	.024	.025

► *PINION SHIM NOTE:* Pinion shims are furnished in the following sizes and are marked for identification as indicated. .004" (Plain), .005" (Blue Steel or 1 notch), .006" (Flash Copper or 2 notches), .007" (Plain), .008" (Blue Steel or 1 notch), .009" (Flash Copper or 2 notches), .010" (Plain).

Pinion Drive Gear Installation - Press rear pinion bearing race into carrier with Tools J-2940 & J-2937. Install front bearing race with Tool J-6133. Install correct number of pinion adjusting shims against shoulder of drive pinion shaft, then lubricate rear bearing and press it firmly against shims on pinion shaft with Tools J-2935 and J-358-1 and an arbor press. Place compressible spacer over pinion shaft (with large diameter against shoulder on pinion), then install washer. *(NOTE - See "Compressible Spacer Note" below).* Place drive pinion into position in carrier. Lubricate front bearing and install it over pinion shaft. *(NOTE* - If pinion shaft is a press fit in front bearing, use an arbor press and Tool J-6133 to install bearing while supporting the pinion shaft. Coat outer diameter of a new pinion seal with Permatex No. 2, then start seal into carrier by tapping lightly and then finish driving in place with Tool J-5395. Apply a coating of seal lubricant, Part No. 567196 to companion flange and sealing lip of new seal. Support drive shaft and tap companion flange onto pinion shaft. Oil flat washer and threads of shaft and install washer and nut, but do not tighten.

Pinion Bearing Preload - *CAUTION - Care must be taken in tightening companion flange nut to preload pinion bearings correctly. If specified preload has been exceeded, it will be necessary to install a new spacer or a second washer. DO NOT back off nut to secure proper preload.* With drive pinion properly installed in carrier (new compressible spacer, companion flange and nut installed), tighten companion flange nut using Flange Holding Tool J-6544, until all endplay in drive pinion assembly is removed. Continue to tighten carefully (not more than 1/6 turn at a time), and check bearing preload with an inch-pound torque wrench or a spring scale. Repeat tightening and checking until preload friction is 24-32 inch-pounds for new bearings, or 10-12 inch-pounds for old bearings.

► *COMPRESSIBLE PINION BEARING PRELOAD SPACER NOTE:* A second washer or a new compressible spacer and one washer must be used under the following conditions: When a new ring gear and pinion is installed. When either front or rear pinion bearings are changed. When a new carrier is installed, or when the compressible spacer is compressed too much and the preload has been exceeded. If two washers are found between spacer and bearing assembly, one washer should be discarded and a new compressible spacer used.

Ring Gear Backlash & Differential Case Side Bearing Adjustment - *(NOTE* - When new parts, such as gear sets, bearings, etc., are installed, the markings on the carrier and adjusting nuts which indicated original position of gears and side bearing preloads, should be disregarded. Whenever original parts are installed the markings can be used to reset the adjustments providing original settings were correct). With differential case installed in carrier and adjusting nuts installed, install the bearing caps and capscrews (no washers) and draw them down sufficiently to lightly hold caps in place. Using Tool J-972-A back off the right hand adjusting nut (one opposite ring gear) approximately three turns. Tighten left hand adjusting nut to move ring gear into mesh with pinion until all lash is removed, **then back ff adjusting nut three notches.** *(NOTE* - This is only a starting point and may need to be readjusted depending on backlash present after making the following adjustments). Tighten the right hand adjusting nut while watching the outer race of bearing. When bearing race just starts to move along with adjusting nut, indicating tension on bearing, continue to tighten two notches. Tighten adjusting nut to align closest notch with capscrew hole in bearing cap. Tighten bearing cap bolts to 70-75 ft. lbs. Clamp dial indicator to differential carrier and check backlash between ring gear and pinion using Dial Indicator, Tool KMO-30. *(NOTE* - If same ring gear and pinion were installed, the backlash should be adjusted according to markings on bearing caps and adjusting nuts providing the differential was not disassembled to correct a noisy complaint). If backlash is not within limits of .003" minimum, .012" maximum (.007-.008" preferred), loosen bearing cap bolts slightly, then move both adjusting nuts one notch at a time until correct backlash is obtained. To increase backlash, move ring gear away from drive pinion and to decrease backlash, move it toward pinion. If left nut is backed off one notch, right nut should be tightened one notch. Tighten bearing cap bolts to 70-75 ft. lbs. each time backlash is checked.

Pedestal Spread Measurement & Adjustm nt - Position Gauge J-511 over pedestal caps, then check clearance between gauge and machined surface of bearing caps. This clearance should be .004-.012". If clearance is less than .004", loosen the right hand bearing cap bolts and loosen adjusting nut ½ notch and again tighten pedestal cap bolts and recheck clearance. *(NOTE* - The right hand nut should not be loosened more than ½ notch from the original 2 notches tight position). If clearance is found to be more than .012", then the right hand nut should be tightened one notch. After side bearing preload is correct, install bearing cap locks and lock bolts.

Carrier Installation: Clean gasket surface on housing and install a new gasket. Install carrier over studs and carefully align carrier with housing so that both pedestal caps enter supports in housing. Apply Permatex No. 2 on stud threads, then install nuts and tighten equally to draw carrier pedestal caps evenly into support in housing. Tighten nuts to 50-60 ft. lbs. Complete installation by reversing removal procedure.

PONTIAC HYPOID

All Models (1957)

DESCRIPTION: Semi-floating, hypoid gear type with Hotchkiss drive. Design is similar to axle used on previous models.

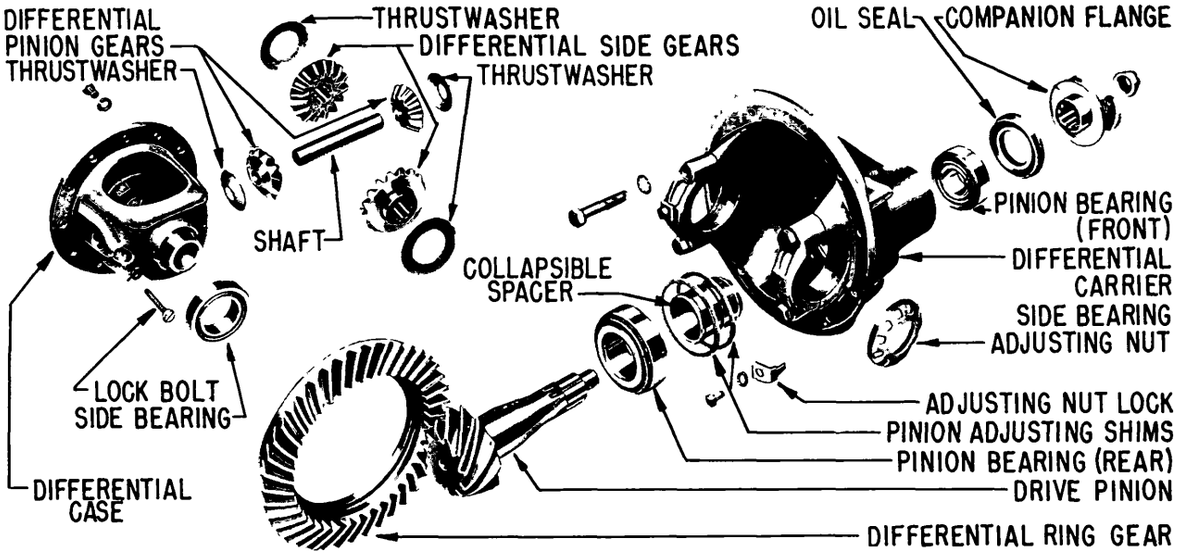
AXLE SHAFT REMOVAL: *See "Rear Axle" on Car Model page.*

WHEEL BEARING & OIL SEAL REPLACEMENT: With axle shaft removed, remove bearing inner retainer by carefully cutting it with a cold chisel. *(CAUTION* - Do not cut into shaft). If a new bearing is to be installed, old bearing and retainer may be pressed off shaft together. With Tool J-947-P engaging outer race of bearing and ring enclosing bearing, press shaft out in an arbor press. *(NOTE* - If oil seal only is to be replaced, remove "O" ring from outer diameter of bearing race, then with an offset screwdriver, pry oil seal assembly from axle shaft bearing. Install "O" ring seal on bearing and start seal assembly into bearing, with lip side of seal toward bearing). To reinstall bearing, install oil deflector, bearing outer retainer plate, and a new gasket. Install bearing on shaft using Tool J-947-P to bear only on inner race and press bearing firmly against shoulder on shaft. Press a new bearing retainer ring in place firmly against bearing using Tool J-947-P. Reinstall axle shaft.

► *BRAKE DRUM INSTALLATION NOTE:* Inner edge of brake drum must not extend beyond edge of backing plate. Install Gasket, Part No. 499776 between axle shaft flange and brake drum as necessary to correctly position the brake drum.

PINION SHAFT OIL SEAL REPLACEMENT: Mark position on companion flange, pinion nut, and pinion shaft to insure reassembly in the same location. *(NOTE* - If companion flange is to be replaced, it will not be necessary to mark the above parts as pinion bearing preload will have to be readjusted). Remove drive pinion nut and washer using Holding Tool J-6289, then remove companion flange with Puller J-6295. Remove oil seal by prying it out of carrier with a blunt tool. Oil lip of new seal and coat outer diameter with Permatex No. 3. Install seal by tapping into place with Tool J-5395. Install companion flange, then install washer and nut. Tighten nut until it and the companion flange are in the same position as marked at disassembly. *(NOTE* - Pinion nut will turn relatively easy until original position is approached and bearings begin to preload. Stop turning nut at this point and check position).

OVERHAUL: Carrier Removal - Remove axle shafts, then disconnect rear universal joint at the companion flange. Clean differential carrier adjacent to axle housing and drain oil by loosening all differential attaching bolts. Pull carrier out about 1/8" to allow oil to drain. Remove nuts and remove carrier assembly.



PONTIAC REAR AXLE ASSEMBLY

Carrier Disassembly: Mark right and left bearing caps and adjusting nuts, then remove adjusting nut locks. Loosen bearing cap bolts and back off on left adjusting nut to relieve side bearing preload. Remove bearing caps and adjusting nuts, then remove differential case assembly from carrier. *(CAUTION* - Keep outer bearing races with side bearings so these mating parts can be reassembled in the same location). Remove drive pinion nut and washer using a heavy duty socket and Holding Tool J-6289, then remove companion flange with Puller J-6295 and Holding Tool J-6289. Remove pinion from carrier, being careful not to damage threads or oil seal. If pinion does not slide freely from front bearing, temporarily install pinion nut and lightly tap pinion out of bearing with a soft hammer. If necessary, use an arbor press to press pinion through bearing. Remove spacer and spacer washer (if washer was installed). Remove pinion oil seal from carrier by prying it out with a screwdriver. If front bearing is to be replaced, press outer race from carrier using Tool J-6198 and Drive Handle J-8092. If pinion rear bearing is to be replaced, press rear bearing race from carrier using Tool J-6533 and Drive Handle J-8092. Using Tools J-6555 and J-6407 and press pinion from bearing in an arbor press. Remove adjusting shims from pinion.

Differential Case Disassembly: Remove pinion shaft lockscrew and washer and drive pinion shaft out of case. Remove pinions, side gears and thrust washers. If necessary, remove ring gear from case. If side bearings are to be replaced, install Remover Tool J-986-P with hooks of puller in recesses in differential case and pull bearings off.

Differential Case Reassembly: Position ring gear on case. *(CAUTION* - Do not use hammer to force ring gear onto case). Install ring gear attaching bolts and tighten all bolts evenly to 55-60 ft. lbs. *(NOTE* - Tighten screws finger tight first, then tighten evenly and alternately across diameter in progressive steps until final tightness is reached). Install side bearing on hub of differential case using Tool J-5292. After bearing has been installed on one side, support side bearing with a front wheel bearing outer race or other suitable means, then install opposite side bearing. Lubricate gears and thrust washers, then place side gear thrust washers over hubs and install side gears in case. While holding upper side gear up into its bore, position one pinion gear (without thrust washer) between side gears and rotate gears until pinion gear is directly opposite loading hole in case. Place other pinion in position between side gears so that pinion shaft holes line up. Rotate pinion gears in position to assure pinion gear shaft holes in gear are lined up with shaft holes in case. If holes are not lined up, pinion will require positioning in side gear teeth. With gears properly meshed, rotate assembly just enough to permit working the pinion gear thrust washers into position between gears and case. Install gear shaft and lock it in place with lockscrew and washer.

Carrier Reassembly: Reverse disassembly procedure and note the following:

CONTINUED ON NEXT PAGE

PONTIAC HYPOID (Continued)

Pinion Gear Setting - Before assembling the carrier, the correct number of shims required to locate drive pinion properly must be determined from markings on differential carrier and on end of pinion. Carrier is marked on face of flange with either of the following codes "D" (indicating "deep"), "S" (indicating "shallow"), "O" (indicating "standard"). The digit following the letter designates number of thousandths "deep" or "shallow". *(NOTE* - A carrier marked "O" will require .016" of shims under pinion bearing, plus or minus the markings on pinion). Pinions are marked plus (+), or minus (−), together with a number indicating in thousandths of an inch the shims required to position pinion in carrier. *(NOTE* - Drive pinions machined to zero specifications are not marked). Determine markings on carrier and on pinion, then refer to "Pinion Shim Chart" for correct thickness of shims to use.

PINION SHIM TABLE

Carrier Marking	Pinion Marking								
Mark	−4	−3	−2	−1	0	+1	+2	+3	+4
S-5	.007	.008	.009	.010	.011	.012	.013	.014	.015
S-4	.008	.009	.010	.011	.012	.013	.014	.015	.016
S-3	.009	.010	.011	.012	.013	.014	.015	.016	.017
S-2	.010	.011	.012	.013	.014	.015	.016	.017	.018
S-1	.011	.012	.013	.014	.015	.016	.017	.018	.019
O	.012	.013	.014	.015	.016	.017	.018	.019	.020
D-1	.013	.014	.015	.016	.017	.018	.019	.020	.021
D-2	.014	.015	.016	.017	.018	.019	.020	.021	.022
D-3	.015	.016	.017	.018	.019	.020	.021	.022	.023
D-4	.016	.017	.018	.019	.020	.021	.022	.023	.024
D-5	.017	.018	.019	.020	.021	.022	.023	.024	.025

► *PINION SHIM NOTE*· Pinion shims are furnished in the following sizes and are marked for identification as indicated. .004" (Plain), .005" (Blue), .006" (Copper), .007" (Plain), .010" (Plain). Use these shims in combination to obtain the required thickness as indicated in pinion shim table (above).

Pinion Drive Gear Installation - Press rear pinion bearing race into carrier with Tools J-6255 and J-8092. Install front bearing race with Tool J-6197. Install correct number of adjusting shims against shoulder of drive pinion shaft, then lubricate rear bearing and press it onto pinion shaft with Tool J-6547 and Press Plate J-6407. Place a new compressible spacer over pinion and install the assembly in carrier housing. Oil pinion front bearing and roller assembly and install on pinion shaft. Coat outer surface of seal retainer with Permatex No. 3 or similar compound, then install seal by tapping it into place using Tool J-5395-A. Install companion flange, then oil threads of pinion nut and face of washer and install these parts. Position the entire assembly horizontally and tighten pinion nut only enough to remove all endplay, using Flange Holding Tool J-6289 and a heavy socket.

Pinion Bearing Preload - *(CAUTION - Extreme care must be taken when tightening pinion nut to preload bearings correctly. Never back off nut to reduce preload. If torque required to keep pinion turning exceeds the following specifications, a new bearing spacer must be installed).* With drive pinion properly installed in carrier (companion flange, nut, and a new compressible spacer installed), tighten pinion shaft nut using Flange Holding Tool J-6289 and a heavy socket until all pinion shaft endplay is removed. Continue to tighten the nut a little at a time, stopping frequently to turn pinion several revolutions to seat rollers and to check turning torque with an inch-pound torque wrench (Tool KMO-652). Repeat this procedure until turning effort required to keep pinion moving is as follows· 10-12 in. lbs. (Old pinion seal and old bearings), 12-15 in. lbs. (New pinion seal and old bearings), 22-26 in. lbs. (Old pinion seal and new bearings), 24-32 in. lbs. (New pinion seal and new bearings).

► *NOTE.* Torque measurement may be taken using a spring scale hooked to Holding Tool J-6289 at a point 10" from pinion shaft center. Reading in lbs., times 10 will give the inch-pounds.

Ring Gear Backlash & Diff rential Side Bearing Adjustment - Hold outer races squarely on side bearings and install differential case into carrier, positioning ring gear against pinion gear. Place adjusting nuts (on correct sides as indicated by marks) into threads of pedestals and squarely against outer races. Install bearing caps and capscrews making certain that threads in caps match those in adjusting nuts. Tighten capscrews slightly more than finger tight. Tighten right adjusting nut, backing off left nut, if necessary, to bring adjusting nuts into full contact with outer races and to provide a slight amount of backlash. When turning nuts keep them in contact with races to maintain a slight amount of preload on bearings. Tighten left nut, backing off right nut, if necessary (keeping nuts against bearing), while rocking case until backlash has just been eliminated. If left nut is not in a locking position when backlash has been eliminated, back off to nearest locking position. Back off right nut to insure that nut and outer race do not turn together. Retighten right nut until outer race just starts to turn with nut, then mark this point on adjusting nut. Tighten right nut **one notch,** tap each bearing cap, and rock ring gear. Check backlash as follows Install Dial Indicator, KMO-30 on carrier flange so indicator button is bearing against rear face of a ring gear tooth, then measure the movement of ring gear against pinion. Continue to turn right nut until it has been tightened a total of two to three notches. Recheck backlash which should be .003-.012". Tighten bearing cap bolts to 70-75 ft. lbs. tapping each bearing cap several times with hammer while tightening to insure proper seating of caps.

Carrier Installation: Clean interior of axle housing with solvent and thoroughly clean surface of housing contacting carrier gasket. Install a new gasket, then install carrier over bolts in housing. Tighten attaching nuts to 45-60 ft. lbs. Install axle shafts (see above), then connect rear universal joint to companion flange. Tighten nuts to 14-20 ft. lbs., then bend ears of lockplate up against flat side of nuts.

1957 SUSPENSION & WHEEL ALIGNMENT INDEX

	Pag
BUICK	
All Series	330
CADILLAC	
All Models	333
Brougham Air Suspension	335
CHEVROLET	
Pass. Cars (Exc. Corvette)	341
Corvette	341
CHRYSLER & IMPERIAL	
All Series	341
DE SOTO, DODGE	
All Series	341
FORD	
Pass. Cars, Sta. Wgn., Sed. Del.	344
Thunderbird	346
HUDSON	
All Series	348
LINCOLN & CONTINENTAL	
All Models	346
MERCURY	
All Models	344
METROPOLITAN	
All Models	Pg. 316 in 1954 Annual Data or later Manual edition
NASH	
All Series	348
OLDSMOBILE	
All Series	349
PACKARD	
All Models	351
PLYMOUTH	
All Series	341
PONTIAC	
All Series	353
RAMBLER	
All Models	348
STUDEBAKER	
All Series	351

1957 SUSPENSION & WHEEL ALIGNMENT

BUICK

All Series (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 LOWER BALL JOINT LOOSENESS NOTE:* With the car jacked up (no load on front wheel), the lower ball joint is normally loose and no corrective measures should be taken unless the looseness, measured at outer circumference of tire is greater than ¼" laterally. If movement of the front wheel exceeds this specification, replace lower ball joint.

►*1957 LOWER CONTROL ARM-TO-FRAME BOLT PRODUCTION CHANGE & TIGHTENING CAUTION:* Two different type bolts have been used at this location. On early cars, bolts having three radical marks in head should be tightened to 55-65 ft. lbs. *(CAUTION - Do not tighten in excess of this specification).* Later cars have bolts with six radial marks in head. Tighten these bolts to 70-80 ft. lbs. A special hardened steel plate, Part No. 1180406 is used with the later type bolts. The normal length of the later type bolts is 1¾", however, a few cars were produced with 1½" bolts. On these cars, if shimming of lower control arm is necessary, the longer bolts must be installed. *If bolts are to be replaced for any reason, be sure and install the later type together with the hardened steel plate.*

►*1957 TIE ROD INTERFERENCE (POWER STEERING CARS):* If an interference condition between outer and of intermediate rod and tie rod exists, it may be caused by the head of the cotter key used to lock plugs in end of intermediate rod rubbing against tie rod. Correct by loosening idler support arm attaching bolts and positioning idler arm support rearward as far as possible. It may also be necessary to change position of cotter key 45°, so that head of key is at rearward side of intermediate rod.

DESCRIPTION: New "ball-joint" suspension with ball and socket type joints connecting upper and lower control arms to steering knuckles. Coil springs and direct acting shock absorbers are mounted between spring seats on lower control arms and spring pockets in frame crossmember. Control arm shafts are bolted to frame crossmember and are connected to control arms by threaded type bushings.

ADJUSTMENT

CHECKING & ADJUSTING: Before checking or adjusting front suspension alignment, inflate tires to specified pressure. Check front wheel bearings for looseness and correct as necessary. Check for runout of wheels and tires and correct to within limit of 1/8" runout at side of tires. Check for looseness at upper ball joints and tie rod ends and correct if found excessive. Bring car to height specified below.

►*CAR HEIGHT (FOR CHECKING ALIGNMENT OF CASTER & CAMBER):* Place a 3/8" square pin 3 21/32" long between frame and front lower control arm at each front wheel (see illustration), making sure that pin is standing vertical and not leaning. Use sandbags or other suitable weight to hold car down on pins. Bring rear of car to proper trim height *(See "Buick Rear Suspension").* If the gas tank is full, trunk empty (except for spare tire), and if car is bounced and allowed to settle, it may then be considered at proper trim height. If these conditions cannot be met, a 3/8" square pin 5 13/32" long should be placed between axle housing and frame at each rear wheel location (see illustration). Use sandbags or suitable weight to hold car down on pins.

Tire Inflation: 24 lbs. (after car has been standing for 3 hours or driven less than 1 mile). **26 lbs.** (after car has been driven for 3 miles or more **below** 40 MPH). **28 lbs.** (after car has been driven 3 miles **above** 40 MPH).

Steering Axis Inclination: Approximately 6° at 0° Camber. Both sides should be within 1° or each other. No adjustment.

►*CAMBER & CASTER ADJUSTMENT CAUTION: Both camber & caster are adjusted by shimming in the same locations, therefore both should be checked before changing either setting.*

►*CONTROL ARM SHIMMING NOTE (FOR CAMBER & CASTER ADJUSTMENT):* If only a small adjustment is required to bring alignment within limits, make shim adjustments at lower control arm. If the amount of shims exceed .160" in any one stack on lower control arms, make adjustments at the upper control arm shafts. Under no circumstances should total shim thickness exceed .160" on lower control arm shafts, and .380" on upper control arm shafts. Replace necessary parts if proper alignment cannot be obtained within these limits.

Caster: Neg. ¼° to Neg. 2¾° (Neg. 1¾° desired), both wheels. *See "Shimming Procedure" below.*

Camber: Pos. 1° to Neg. ½° (Pos. ½° desired). Both wheels should be within ¾° of each other. *See "Shimming Procedure" below.*

Toe-In: 1/16" to 1/8". *(CAUTION - Car must be at curb weight and running height - bounce car and allow it to settle to running height. DO NOT ALLOW ALIGNMENT PINS (see above) TO REMAIN IN POSITION WHILE CHECKING OR ADJUSTING TOE-IN).* Loosen clamp bolts and turn adjusting sleeves at tie rod end as required. Turn right and left adjusting sleeves exactly the same amount but in opposite directions when changing toe-in, in order to maintain front wheels in straight ahead position when steering wheel spoke is straight down. Position tie rod clamps downward to 45° forward to provide frame clearance. *NOTE - It is very important to position bottom face of tie rod end parallel with machined surface at outer end of steering arm when tie rod length is adjusted.*

Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be 23° (Manual Steering), 21¾° (Power Steering). Not adjustable.

Shimming Procedure: *NOTE - No lower control arm shims are installed in production, however, it is recommended that all shimming required for service adjustments be done at lower control arm shaft providing shim stacks at any one location do not exceed .160". If in excess of this thickness, adjustment must be made at upper control arm shaft.*

Shim Selection (For installation at both upper and lower control arms) - *(NOTE - Upper and lower control arm shaft shims are different and are furnished in sizes indicated in table below).* Adding shims at front location will change **caster toward negative** (Practically no change in camber or toe). Adding shims at rear location will change **caster toward positive** and camber toward negative (toe toward toe-out). Adding shims at both locations will **not change caster,** but will change **camber toward negative** *(NOTE* - A .040" shim installed at front location will change caster approximately ¼° toward negative. A .040" shim installed at rear location

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will change caster approximately 5/16° toward positive (camber will be changed approximately 1/8° toward negative). A .040" shim installed at both locations changes camber approximately 3/16° toward negative (does not change caster), and toe approximately 3/16" toward toe-out.

Lower Control Arm Shaft Shims

Thickness	Part No
.040"	1179204
.120"	1179205

Upper Control Arm Shaft Shims

Thickness	Type ①	Identification ②	Part No.
.060"	Horseshoe	6	1171175
.080"	Horseshoe	8	1172986
.100"	Horseshoe	10	1175585
.060"	Round	6	1175794
.080"	Round	8	1175795
.100"	Round	10	1175796

① - Furnished with either "horseshoe slot" or round hole.
② - Identification number stamped on shim.

► *1957 LOWER CONTROL ARM-TO-FRAME BOLT PRODUCTION CHANGE & TIGHTENING CAUTION:* Two different type bolts have been used at this location. On early cars, bolts having three radial marks in head should be tightened to 55-65 ft. lbs. *(CAUTION - Do not exceed this tightening specification).* Later cars have bolts with six radial marks in head. Tighten these bolts to 70-80 ft. lbs. A special hardened steel plate, Part No. 1180406 is used with the later type bolts. The normal length of the later type bolts is 1¾", however, a few cars were produced with 1½" bolts. On these cars, if shimming of lower control arm is necessary, the longer bolts must be installed. If bolts are to be replaced for any reason, be sure and install the later type bolts with hardened steel plates.

Shim Installation (Lower Control Arm) - To prevent movement of lower control arm shaft on frame member during shim installation, loosen only one bolt at a time. Install shim and tighten bolt before installing shim at opposite end.

Shim Installation (Upper Control Arm) - On left side, disconnect negative cable from battery. Force lower edge of inner fender skirt toward wheel so that front shims and bolt head can be reached from engine compartment. On right side, remove generator from engine and move generator and bracket back out of way. Place a wedge between bolt head and frame bracket and with special wrench J-6771, loosen bolt (a 13/16" open end wrench ground to fit between head of bolt and frame bracket can be used in place of wedge). Free shim by either turning wheels to right or left or by prying on upper shaft. Tighten nut with Tool J-6771 to 100 ft. lbs. minimum. *(NOTE* - To determine torque wrench reading, multiply 100 ft. lbs. by length of torque wrench (in feet), then divide by the length of the torque wrench (in feet), plus 1.67 feet. The result will be the reading required on torque wrench. As an example: If length of torque wrench from center of square drive to center or pivot of handle is 13 5/16" (1.11 ft.), reading on torque wrench should be 40 ft. lbs.).

Trim Dimensions Adjustment (Front): *(NOTE - The following dimensions are for a standard car without undercoating or optional equipment and with the car at curb weight. Curb Weight includes gas, oil, and spare tire, but no passengers).* Before measuring trim dimensions, bounce both ends of car up and down several times to make sure there is no bind in suspension members and to let springs take natural position. When car is at rest, measure trim height between front arm of lower control arm assembly and frame at a point between rubber bumper and spring. Measurement must be made as vertical as possible. See table below for trim height limits. When trim dimension is found to be too low, install special 1/8" shims between upper end of spring and frame *(NOTE - If more than three shims are required, replace spring).*

Front Trim Dimensions

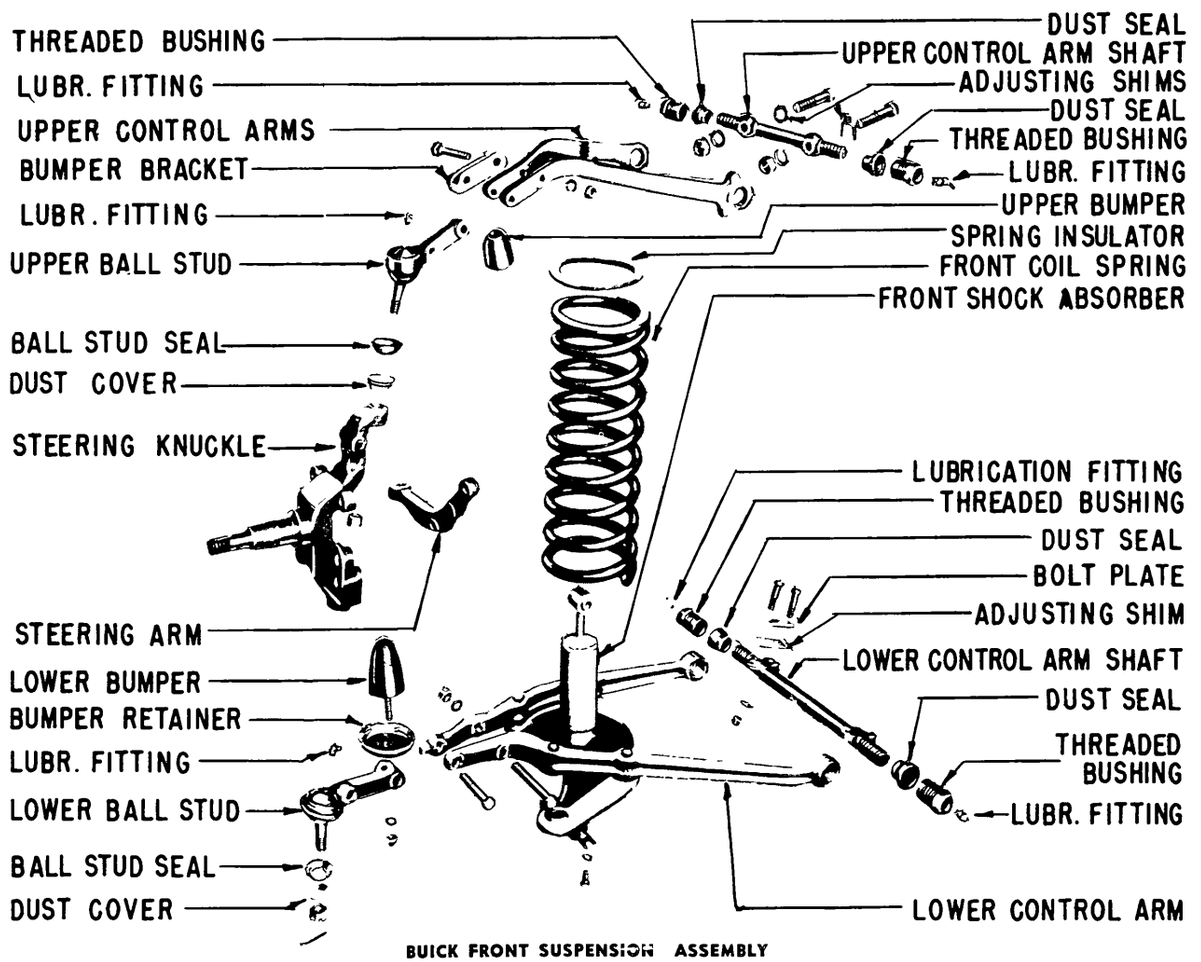
Model	Trim Height
46C, 66C, 56C, 76C	4-4½"
Other Models	4¼-4¾"

REMOVAL & INSTALLATION

FRONT SPRING: Removal - Place jack under lower control arm in a position that will not interfere with removal of shock absorber, and raise wheel off floor. Remove wheel and tire. Disconnect stabilizer link and disconnect outer end of tie rod from steering arm. Remove shock absorber *(see "Shock Absorber Replacement" below).* Remove upper ball joint-to-control arm attaching bolts. Support car frame with another jack, then slowly lower jack under lower control arm which will allow lower control arm to drop low enough to remove coil spring without damaging the brake hose *(NOTE - If necessary, remove brake pipe clip and move pipe slightly to gain enough slack).*

Installation: *(NOTE* - Before installing front spring, check the part number stamped on spring to make sure

CONTINUED ON NEXT PAGE



BUICK FRONT SUSPENSION ASSEMBLY

BUICK (Continued)

it is correct for the car model. *See "Front Spring Application" below).* Make sure rubberized fabric spring insulator is in place around spring centering flange on frame and is in good condition. Place one end of spring over centering flange, and as lower control arm is raised, position lower end of spring so that end coil seats in recess in spring seat. Support lower control arm on a jack. When lower control arm is raised far enough, install the two upper ball joint-to-control arm bolts with upper bumper pad to rear. Tighten bolts to 70-80 ft. lbs. Connect tie rod outer end to steering arm, and connect stabilizer link. Adjust stabilizer link grommets *(See "Stabilizer Link Grommet Replacement" below).* Reinstall shock absorber, wheel and tire assembly, and adjust camber, caster, and toe-in.

Front Spring Application

Series	Standard	Air Cond.
40 Synchro-mesh	1174155	1174154
40, 60 Dynaflow	1174154	1174153
50, 70 Dynaflow ..	1174153	1174152

FRONT SHOCK ABSORBER: *(NOTE - Rubber bushings in mounting eyes of shock absorber are not replaceable. If worn or damaged, the complete shock absorber assembly must be replaced).*

Removal: Raise car by center of frame crossmember far enough to allow removal of upper shock absorber bolt. Remove bolt and shove eye down through opening in frame. Remove bolts and lockwashers attaching lower mounting bracket to spring seat on lower control arm, then pull shock absorber assembly down through opening in spring seat.

Installation. Make sure that shock absorber being installed is correct for the car model *(See "Shock Absorber Application" below).* Insert shock through opening in lower control arm spring seat, and mounting eye up through opening in mounting bracket on frame. Install upper bolt, with nut forward, and tighten to 25-35 ft. lbs. Bolt lower mounting bracket assembly securely to lower control arm spring seat and lower car to floor.

Shock Absorber Application

Series	Part No.
40, 60 (Exc. Est. Wgn.) ①	5531037
40, 60 Est. Wgn. & 50, 70	5531038

① - Use Part No. 5531038 for 200 lbs. overload on these models.

STABILIZER LINK GROMMET REPLACEMENT: Remove nut from lower end of link rod, then remove rod, spacer, retainer and grommets. When assembling, install rubber grommets dry and use care to center grommets in seats on stabilizer shaft and lower control arm. Also center retainers on grommets before tightening rod nut. Tighten rod nut to limit of thread on rod. When rod nut is tightened to limit of thread on rod, the overall dimension between both grommet retainers should be 1 11/16". If this dimension is not correct, adjust nut as necessary.

BALL JOINT & STEERING KNUCKLE: Removal - Jack up car and support weight on front spring seat. Remove wheel and tire assembly. Remove backing plate-to-steering knuckle attaching bolts and remove backing plate. Do not remove brake hose. Support backing plate out of way to avoid damage to brake hose. Remove bolts through lower control arms and ball joint. Lower steering arm out of the way, and remove rubber bumper from ball joint if ball joint is to be replaced. Remove bolts through upper control arms and ball joint. Remove knuckle and ball joint assembly from upper and lower control arms. *(NOTE - If ball joints are to be replaced, drive directly on studs to remove joints from knuckle. If ball joints are to be reinstalled, care should be taken to avoid damage to threads. This can be done by loosening nuts on tapered studs and installing short bolts half way into nuts. Tighten securely and drive ball joint out of knuckle).*

UPPER CONTROL ARM: *NOTE - Upper control arms are not furnished separately, their replacement must be made as an assembly.*

Removal: Jack up car, supporting weight on spring seat and remove wheel and tire. Remove upper control arm-to-ball joint bolts, supporting knuckle and brake drum assembly to avoid damage to brake hose. Remove shock absorber upper mounting bolt and force top of shock absorber down. On right side of car, it will be necessary to remove generator and bracket. Disconnect battery ground strap. Remove shaft attaching bolts *(CAUTION - Remove shims from between shaft and crossmember, noting position and number of shims in each pack).* Remove arm and shaft assembly from car.

Upper Control Arm Shaft & Bushing Replacement - Clamp control arms in vise and remove old bushings and shaft. Apply a liberal amount of Lubriplate to new bushings and ends of shaft. Install bushings and tighten to 150 ft. lbs. Install rubber dust seals on shaft and screw shaft into forward arm so center of attaching bolt hole is 1 9/16" from control arm. Thread rear control arm onto shaft until the distance between front and rear control arms is 7 13/16".

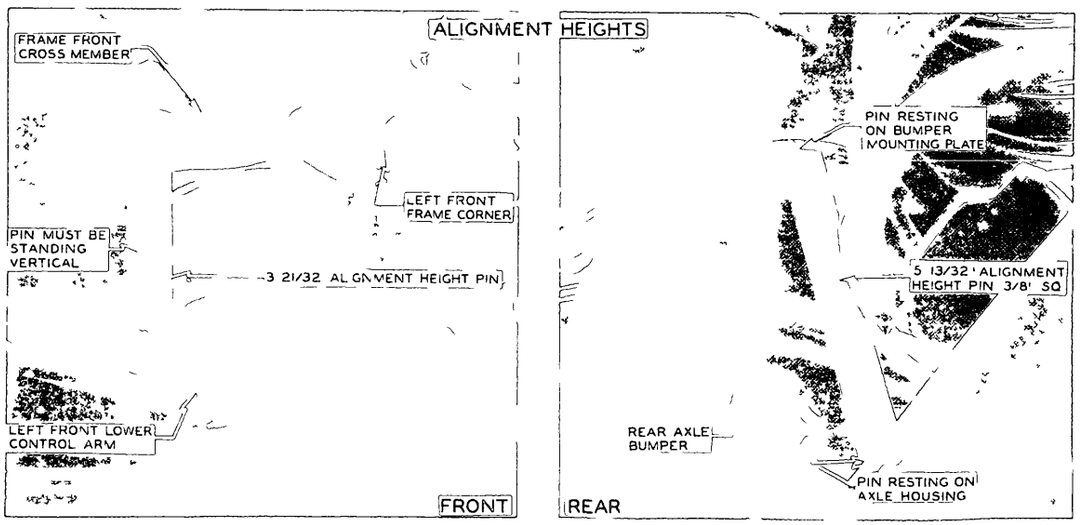
Installation: Using care not to disturb dimension between control arms, install assembly on car by reversing removal procedure. *(CAUTION - Be sure that the shim packs removed at disassembly are installed in their correct positions).* Tighten upper ball joint bolts to 70-80 ft. lbs. Tighten upper control arm shaft-to-shaft bracket bolts to 90-100 ft. lbs. Check and adjust front wheel alignment.

LOWER CONTROL ARM: *NOTE - Riveted parts of lower control arm assembly are not furnished separately.*

Removal: Remove front coil spring *(see "Front Spring Replacement" above),* then remove lower control arm assembly from frame crossmember.

Lower Control Arm Shaft & Bushing Replacement - Unscrew bushings and remove from control arm. Check distance between inner ends of control arm. The normal distance is 11¼" ± 1/32", from inside to inside. Install rubber seal over each threaded end of new control arm shaft, with the large or bell ends of seals outward toward ends of shaft. Insert one end of shaft (with seal in place) in one control arm end and force opposite end of shaft into other control arm end, using a piece of wood as a pry bar. Fasten control arm securely in vise close to one end to prevent springing or distortion. Apply a liberal amount of Lubriplate or white lead to both bushings, then start first bushing in shaft and into control arm at the same time. Turn bushing until head is tight against arm and tighten to a minimum of 150 ft. lbs. Center shaft between arms and install second bushing, turning shaft as required to thread into the bushing so that no binding exists. Rotate shaft to locate bolt holes at both ends so they are equally distant from inside surface of arms.

Installation: Place lower control arm assembly in position on frame crossmember and bolt in place. Tighten bolts to 70-80 ft. lbs. *(NOTE - Two different type bolts have been used at this location. See "Changes, Cautions, Corrections" above).* Install front spring and other parts. Check and adjust caster, camber, and toe-in.



ALIGNMENT HEIGHT PINS

CADILLAC

All Models (1957)

►*ELDORADO BROUGHAM SUSPENSION NOTE:* Front wheel alignment and front suspension linkage removal & installation is the same as for conventional cars, except where noted. *See "Cadillac Eldorado Air Suspension" for air spring removal, installation, and adjustment.*

►CHANGES, CAUTIONS, CORRECTIONS

►*FRONT TIRES RUBBING ON STABILIZER BAR CORRECTION:* This condition occurs on sharp turns and can be corrected by installing Steering Knuckle Stop, Part No. 1468700. This "U" shaped stop is thicker than used in production and is attached to lower suspension arm by the rear outer spherical joint attaching bolt. If only one tire rubs on stabilizer bar, reposition stabilizer bar to center it on car before determining if thicker stops are necessary.

►*1957 DRAG LINK & TIE ROD PRODUCTION CHANGE TO IMPROVE STEERING GEOMETRY DURING BODY ROLL:* A new drag link and tie rod assembly is used in production beginning with Engine No. 023831. With this change, the clearance between frame and tie rod makes repositioning of tie rod sleeve clamps necessary which will eliminate the possibility of clamp interfering with frame when driving over severe bumps. On all cars above Engine No. 023831, the tie rod sleeve should be rotated so that openings in clamps are underneath the tie rod.

►*1957 LOWER CONTROL ARM MOUNTING BOLT PRODUCTION CHANGE:* Beginning with Engine No. 042036, mounting bolts, Part No. 1468512 having larger diameter heads are being used in production and for service replacement. When installing the later type bolt, the hardened steel flat washer formerly used should be discarded.

DESCRIPTION- New "spherical-joint" suspension using ball and socket type joints to connect upper and lower control arms to steering knuckle. Coil springs and direct acting shock absorbers are mounted between spring seats on lower control arms and spring pockets on frame member. Threaded type bushings are used to connect control arms to control arm shafts.

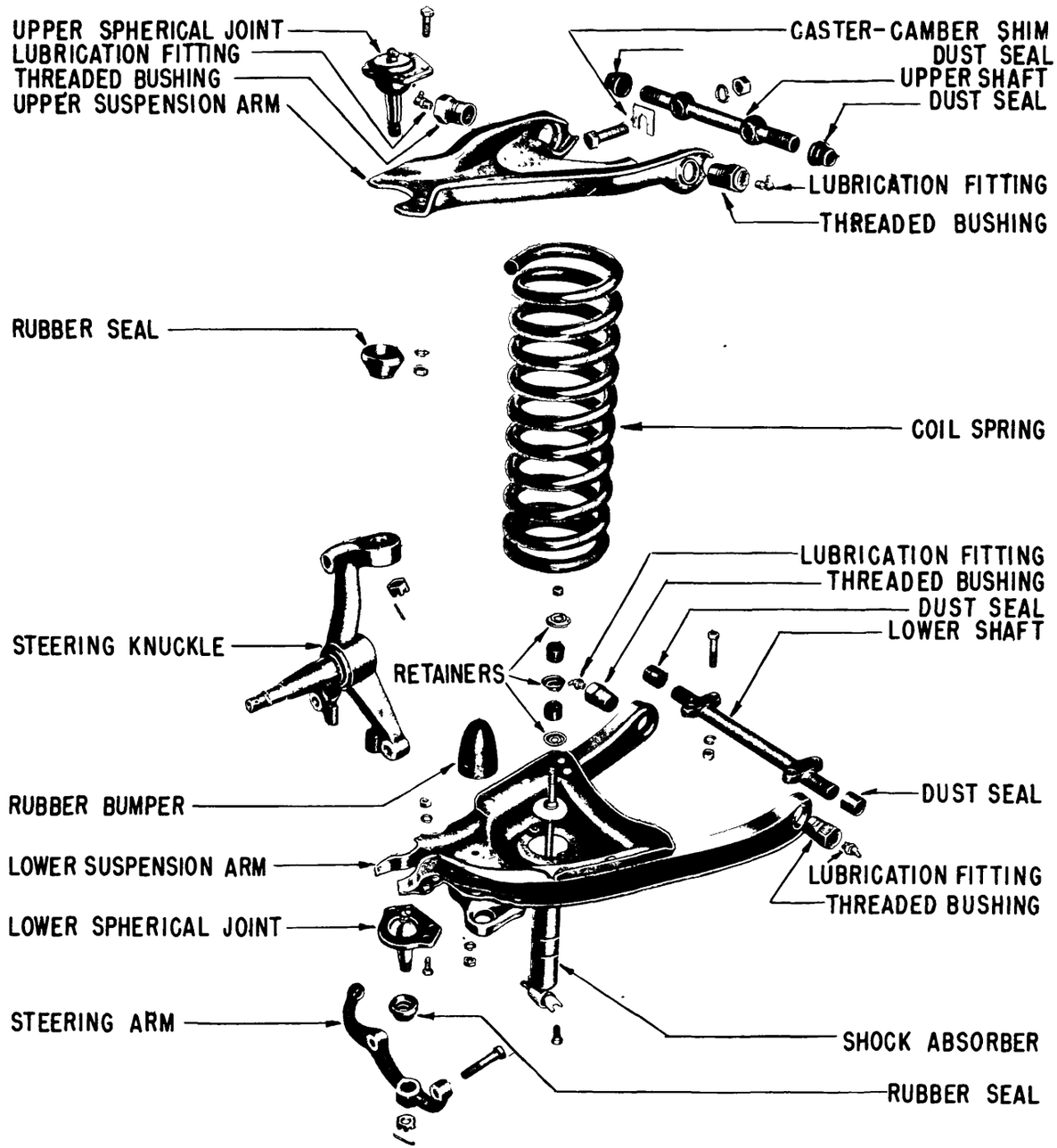
ADJUSTMENT

CHECKING & ADJUSTING: Before checking or adjusting front wheel alignment, check and correct any looseness in spherical joints, steering gear, and connections. Check and correct standing height *(see "Trim Dimensions" below).* Inflate tires to correct pressure and check for runout. Make sure car is at curb weight (full gas tank, no passengers).

►*ELDORADO BROUGHAM CHECKING & ADJUSTING NOTE:* Car must be at normalized standing height when checking front wheel alignment. Open any door and allow car to come to normalized standing height before checking each point. *See "Cadillac Air Suspension" for height adjustment and specifications.*

Tire Inflation: Series 62, 60S, & Eldorado Brougham - 24 lbs. (front & rear). Series 75 - 28 lbs. (front & rear). Series 86 - 24 lbs. (front), 30 lbs. (rear).

Steering Axis Inclination: 4° at 0° camber. Not adjustable.



CADILLAC FRONT SUSPENSION ASSEMBLY

Caster: 0° to Neg. 1°. Adjustment must be within ½° or less on both sides. *See "Shimming Procedure" below.*

Camber: Neg. 3/8° to Pos. 3/8° (¼° to ½° more positive camber preferred on left wheel). *See "Shimming Procedure" below.*

Toe-In: Exc. Eldorado Brougham - 3/16-1/4". Eldorado Brougham - 1/8" ±1/32". *NOTE* - On conventional cars after Engine No. 023831, and Eldorado Brougham, rotate

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CADILLAC (C ntinu d)

tie rod sleeve so that opening in clamps are underneath tie rod. *See "Drag Link & Tie Rod Production Change" above.*

T e-Out on Turns: (C nv ntional Cars) - With outer wheel at 20°, inner wheel should be 22°40'.

Shimming Proc dur : Caster and camber adjustments are made by adding or removing shims between upper control arm mounting shaft and frame mounting bracket. To change caster, remove or add shims at one of the mounting bolts. Addition of shims at front bolt or removal of shims at rear bolt will **d crease** positive caster. Removal of shims at front bolt or addition of shims at rear bolt will **incr ase** positive caster. To change camber, add or remove shims of equal thickness at both mounting bolts. Addition of shims at both bolts will **decrease** positive camber. Removal of shims at both bolts will **increas** positive camber. Tighten both upper and lower control arm shaft bolts to 130-140 ft. lbs. after changing shims. Camber and caster adjusting shims are furnished in .0149", .0418", & .1046" thicknesses. *See tables below for approximate amount of change made by adding or removing shims.*

Shim Selection

Shim Siz	Cast r Change (Shim at one bolt)	Camber Change (Shim at both bolts)
.0149"	1/6°	1/15°
.0418"	1/2°	1/5°
.1046"	1 1/16°	1/2°

► *CASTER CHANGE NOTE:* When possible, make caster adjustments by changing shims at **front bolt** as the resulting camber change will be small.

► *SHIM PACK THICKNESS NOTE:* If more than ¼" total thickness of shims are necessary to bring adjustment within specifications, check for bent or damaged parts.

Trim Dimension Adjustment (Exc. Eldorado Brougham): Before checking front trim height, make sure that trunk is empty and the gas tank full. Normalize position of springs by working bumper up and down and release slowly, permitting car to assume its normal position, Measure distance from top of lower control arm to center of second lower rivet on front of frame side rail. The standing height should be equal on both sides of car within 3/8". If heights are unequal, adjust low side by installing a shim between top of spring and seat inside the frame.

Trim Dimensi n Adjustment (Eldorado Brougham): Normalize position of air springs by working bumper up and down with car door open, permitting car to assume its normal standing position. Measure distance from top of left lower control arm to center of outer rivet on front of frame. This distance should be 3 5/8" ±1/16". *If this measurement not within specifications, see "Cadillac Air Suspension" for adjusting trim dimension.*

Front Trim Heights

M d l	Height
All Models (Exc. Below)	4 11/16-5 7/16"
6237S, 6267S	4 3/4-5 1/2"
7523, 7533	5 7/16-6 3/16"
86 Comm.	5 5/16-6 1/16"

COIL SPRINGS: *For spring replac ment, s e "Lower Control Arm" below.*

1957 Spring Applicati n

Model	Part N .
6039X, 6237SDX, 6267X (Air Cond.)	1465761
6039X, 6237SDX, 6267X, 6267SX (Exc. Air Cond.)	1465759
6237, 6237DX, 6239, 6239DX (Air. Cond.)	1465760
6237, 6237DX, 6239, 6239DX (Exc. Air Cond.)	1465758
6267SX (Air Cond.)	1465762
75 (Exc. Air Cond.)	1465764
75 (Air Cond. or Hvy. Duty)	1465765
86 (Exc. Hvy. Duty)	1465766
86 (Hvy. Duty)	1465767

REMOVAL & INSTALLATION

FRONT SHOCK ABSORBER (Exc. Eldorado Brougham): *NOTE - Bushing in lower mounting bracket on shock absorber is not replaceable. If worn or damaged, the complete shock absorber assembly must be replaced.*

► *ELDORADO BROUGHAM SHOCK ABSORBER REPLACEMENT: See "Cadillac Air Suspension".*

Removal: Raise hood and remove shock absorber upper retaining nut, retainer, and rubber grommet at upper suspension arm frame mounting bracket *(NOTE* - Upper stem of shock absorber is square so that it may be held with a wrench when removing nut). Remove two screws holding shock absorber to lower spring seat and remove shock absorber from spring assembly.

Installation: Install retainer and rubber grommet on shock absorber upper stem. Install shock absorber assembly up through coil spring and guide stem through tower in crossmember. Place lower end in position on lower spring seat and install lockwashers and screws. Install grommet, retainer, and nut on upper stem and tighten nut.

FRONT COIL SPRING REPLACEMENT: *See "Lower Control Arm" below.*

UPPER SPHERICAL JOINT REPLACEMENT: *(NOTE* - To check condition of joint, lubricate it first, then using a regular spherical joint stud nut and a second nut as a locknut, turn joint in its socket with a torque wrench. It should require 2-4 ft. lbs. to rotate joint. Replace if joint is too loose or too tight.

Removal: Raise front of car and place jack stands under lower suspension arms. Remove front tire and wheel, then remove cotter pin from joint stud. Strike steering knuckle with a hammer in area of joint stud to loosen it. Raise upper suspension arm so that joint clears knuckle. With a 5/16" drill, drill out all four joint mounting rivets being careful to avoid damage to mounting holes. Remove spherical joint.

Installation: Install new spherical joint on upper control arm with bolts, nuts, and lockwashers (these items are provided in replacement kit). Tighten nuts to 20-25 ft. lbs. Position spherical joint stud in steering knuckle, install stud nut and tighten to 50-60 ft. lbs. Install cotter pin, then install tire and wheel.

LOWER SPHERICAL JOINT REPLACEMENT: *(NOTE* - The lower joint is designed to turn freely in its socket and cannot be checked with a torque wrench. To check, note amount of free play as joint is worked vertically in its socket. This movement should not exceed 1/16". Replace if movement is greater.

R moval: Raise front end of car and place stands under forward portion of frame side members. Place a hydraulic jack under lower control arm spring seat and raise arm approximately 1" (measured at its outer end). Remove cotter pin and nut from joint stud. Strike steering arm with a hammer in area of joint to break it loose. Remove four lower joint nuts, lockwashers, and bolts. Raise arm sufficiently to allow joint to be removed.

Installation: Install joint on lower control arm with four bolts, lockwashers, and nuts and tighten to 35-40 ft. lbs. *(NOTE* - Head of bolt should be under joint flange). Position joint stud in steering arm mounting hole and lower hydraulic jack to allow joint to seat itself in steering arm. Install stud nut and tighten to 50-60 ft. lbs. Install cotter pin.

STEERING KNUCKLE REPLACEMENT: Removal - Raise front end of car and place jack stands under lower control arms. Remove wheel, then remove cotter pin and nut from upper joint stud. Strike steering knuckle in area of joint to break it loose. Raise upper control arm and allow top of knuckle to move outward. Remove upper nut on knuckle and two lower nuts on side of brake backing plate (leave two lower screws in position). Remove brake backing plate and wire it to a convenient location to prevent damage to brake hose. Remove and discard gasket on spindle between knuckle and backing plate. Separate knuckle from steering arm.

Installation: Install two lower legs of steering knuckle on two lower screws (in steering arm). Install new gasket on spindle. Install backing plate on two lower screws and install lockwashers and nuts. Tighten to 90-100 ft. lbs. Install upper screw through backing plate and knuckle. Install lockwasher and nut and tighten to 85-95 ft. lbs. Position upper spherical joint in knuckle. Install nut and tighten to 50-60 ft. lbs. Install cotter pin. Install brake drum, tire and wheel assembly.

UPPER CONTROL ARM: Removal - Disconnect upper spherical joint from steering knuckle *(see "Steering Knuckle Replacement" above),* then remove mounting bolts on control arm shaft and remove control arm assembly.

Disassembly: Place control arm shaft in vise and remove threaded bushings from arm and shaft. Remove seals and suspension arm from shaft. Place suspension arm in vise and drill out with a 5/16" drill or grind off the four spherical joint rivets and remove joint.

Reassembly: Install new rubber seals on mounting shaft and lubricate threads of shaft. Center shaft in position in control arm and install bushing into arm and onto one end of shaft *(NOTE* - Lubricate new bushings with carbon tetrachloride or penetrating oil for easier installation). Tighten bushings to 140-150 ft. lbs. Install Upper Control Arm Spreader, Tool J-6590, between arms and tighten finger tight. Then, using a wrench, tighten tool **two additional flats.** Install other bushing in arm and onto shaft and tighten to 140-150 ft. lbs. Remove tool from arms and center shaft between arms by turning shaft in bushings. Install new spherical joint assembly *(see "Upper Spherical Joint Replacement" abov).*

Installation: Install arm in position on frame mounting

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CADILLAC (C ntinu d)

bracket with mounting bolts and tighten to 130-140 ft. lbs. Position joint stud in steering knuckle hole. Install nut and tighten to 50-60 ft. lbs. Install cotter pin.

LOWER CONTROL ARM: Removal - Raise front end of car and place jack stands under forward part of both frame side members. Place hydraulic jack under control arm to be removed, then disconnect front stabilizer link on side from which spring is to be removed. Remove shock absorber *(see "Shock Absorber Replacement" above).* Make sure hydraulic jack is supporting lower control arm. Remove lower spherical joint cotter pin and nut, and strike steering arm with a hammer in area of joint to break it loose. Move wheel downward and outward so it clears joint. Slowly lower hydraulic jack and remove spring and rubber insulator. Remove four bolts attaching control arm shaft to frame member, and remove control arm.

Disassembly: Place control arm shaft in vise and remove threaded steel bushings from arm and shaft. Remove seals and control arm assembly from shaft. Remove four joint mounting nuts and bolts and remove joint.

Reassembly: Install new rubber seals on shaft and lubricate threads. Center shaft in position in control arm and install bushing into arm and onto one end of shaft *(NOTE* - Lubricate bushings with carbon tetrachloride or penetrating oil for easier installation). Tighten bushing to 195-205 ft. lbs. Install Lower Control Arm Spreader, Tool J-6591, between arms, tighten center bar finger tight, then with a wrench, tighten **two additional flats.** Install other bushing in arm and onto shaft and tighten to 195-205 ft. lbs. Remove tool and center control arm shaft between arms by turning shaft in bushings. Install lubrication fittings. Install spherical joint with four bolts and tighten to 35-40 ft. lbs.

Installation: Install control arm shaft to crossmember and tighten bolts to 60-70 ft. lbs. Tape upper rubber insulator to top (flat end) of spring and place spring in upper seat of frame crossmember. Rotate spring so that lower tang end will fit in formed depression of lower control arm spring seat when arm is in position. With hydraulic jack placed under lower control arm, raise arm into position. Guide spring into place with tang end bisecting hole in spring seat. Guide spherical joint stud into steering knuckle and install nut. Tighten to 50-60 ft. lbs. Install cotter pin. Connect stabilizer link to lower spring seat. Install shock absorber. Remove car from jack stands and check front end alignment.

CADILLAC ELDORADO BROUGHAM

Cadillac Eldorado Brougham (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*TOWING CAUTION: Instructions for various methods of towing car are different as noted below. NOTE - When towing with front or rear wheels raised off the ground, disconnect battery strap to prevent any leveling action.*

Air in Suspension System (Front End Raised) - Hook chain around front bumper mounting bar through opening in underside of impact bar above fog lights (both sides). Attach both ends of chain to tow truck spreader bar. Place protective padding around front bumper bar extensions, hold a 6 ft. length of 2" pipe under bumper bar guards parallel with front bumper. Then raise front end of car with truck hoist until spreader bar and chains are bearing against length of 2" pipe and front end of car is raised sufficiently for towing purposes. *CAUTION - Check rear end to assure ground clearance at spare tire well.*

No Air in Suspension System (Front End Raised) - Attach tow chains as for "Air in Suspension System" above, then remove front wheels and lower front end of car until there is 6" clearance between lower edge of rear license plate holder and ground. *Disconnect propeller shaft if being towed more than a few blocks.*

Rear End Raised - Turn front wheels to straight ahead position and tie steering wheel securely to prevent movement of front wheels while towing. Hook chain around rear bumper outer mounting bar through opening under rear bumper exhaust ports (both sides). Place protective padding on under side of rear bumper outer impact bars where chain contacts, and connect chain to spreader bar of tow truck. Raise rear end of car with tow truck. *CAUTION - Make certain that front bumper is clear of ground.*

All Wheels on Ground - Hook chain around front bumper mounting bar through opening on underside of impact bar above fog lights. *CAUTION - Do not tow car at speeds over 10 MPH. Disconnect propeller shaft if being towed more than a few blocks.*

►*HOISTING CAUTION:* Use lifting equipment that engages suspension, axle, or wheels. When using a frame contact hoist, special adapters must be used on hoist rails to assure engagement with frame at a point 34" to rear of front wheel centerline *(CAUTION - Do not allow adapters to contact any portion of No. 2 body hanger)* and at extreme tips of widest crossmember which is approximately 97" to rear of front wheel centerline. In no case should rear contact points be less than 40" apart.

►*RAISING REAR OF CAR CAUTION:* Never raise rear end of car with rear shock absorbers disconnected as it is possible to raise rear end off its suspension and result in separation of rear air spring assemblies.

►*SERVICING CAUTION: Do not open any door or turn ignition on when any wheel of the car is off the ground, such as changing a tire or when car is on a hoist.*

►*AIR FILTER LOCATION & CLEANING NOTE:* Three pourex filters located in the high pressure air line fitting at top left side of control solenoid and in the two exhaust line fittings at lower right front and bottom of unit must be cleaned at six-month intervals (more often if car is operated in sandy or desert areas). *See "Overhaul" below for cleaning procedures.*

►*AIR COMPRESSOR OIL FILTER LOCATION & CLEANING NOTE:* A pourex type filter located in the compressor oil inlet fitting must be cleaned each time the engine oil filter is changed. *See "Overhaul" below for cleaning procedures.*

DESCRIPTION

DESCRIPTION: This new suspension consists of pressurized diaphragm units replacing the conventional coil and leaf type springs. Air, under 110-130 lbs. pressure, is controlled by three leveling valves (two at the rear and one at front) and maintains car level at a pre-determined height from the ground regardless of load. The front suspension is basically the same as on conventional models having upper and lower control arms connected to steering knuckle by spherical joints. The rear suspension consists of two lower control links and an upper control yoke which are connected between car frame and rear axle housing. A pressure of 110-130 lbs. is maintained in a 500 cu. in. accumulator tank by an electrically driven, low capacity, piston type compressor mounted on the car generator. An oil pressure switch in engine oil line prevents compressor from operating except when engine is running. Solenoid valves control air flow to and from the air spring units when car ignition is turned on or when a door is opened.

OPERATION

OPERATION: Leveling - (All Doors Closed - Ignition Off) - No leveling occurs. Restriction solenoid and lockout solenoid are closed. High pressure air from accumulator passes through restriction in restriction solenoid and stops at closed lockout solenoid. Lockout solenoid prevents movement of air to and from air springs.

Any Door Open - Ignition On or Off - Both the restriction solenoid and lockout solenoid are open which allows high pressure air to flow unrestricted to the three leveling valves. If weight is added, raising leveling valve arm, the inlet passage is opened allowing air to flow to air spring. If weight is removed, leveling valve arm is lowered, opening the exhaust passage and allowing air to escape from spring.

All Doors Closed - Ignition On - *(NOTE - Two-second delay dashpots in leveling valves prevent any leveling action taking place when wheels move rapidly up and down. Intake or exhaust action occurs only when car is above or below normal standing height for a sustained period of more than two seconds).* The restriction solenoid is closed and the lockout solenoid open. Air to or from the springs is metered as it passes through the restriction solenoid as regulated by the leveling valves.

Door Open - Ignition On - When more weight is added to one side, or when car is parked on an uneven surface,

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CADILLAC ELDORADO BROUGHAM (C ntinued)

both the restriction and lockout solenoids are open High pressure air from the accumulator flows unrestricted through control solenoid to leveling valves and levels the car as required by change in weight distribution

Air C mpr ss r: This unit is a low capacity, piston type compressor having an integral electric motor controlled by a pressure switch Pressure is maintained in the accumulator at 110-130 lbs The compressor is lubricated from the engine oil system which provides a restricted flow of oil into compressor reservoir A standpipe in the compressor reservoir returns overflow to engine oil pan The compressor electrical circuit is energized only when engine is running due to the feed circuit being connected to engine oil pressure tell-tale switch

Control S len id: Consists of two lockout solenoid valves and two restriction solenoid valves One of each type valve is in the inlet circuit and the other in the exhaust circuit to the leveling valves The lockout valves, when closed, prevent flow of air to or from the leveling valves The restriction valves, when open, provide fast leveling (with car standing), and slow leveling (with car moving) Both lockout valves open together as do the two restriction valves Operation of the valves is controlled by ignition switch and door switches

Accumulator Tank: This tank stores enough air at high pressure to re-level the car from curb weight to a five passenger load without additional air from the compressor A pressure switch on the accumulator actuates a red light on instrument panel when pressure falls below 82 lbs pressure (required for car leveling) A petcock at lower side of tank permits periodic draining of dirt and moisture A "Schrader" valve located in a tee fitting in air line leading from the air compressor is provided to fill accumulator with a service air hose

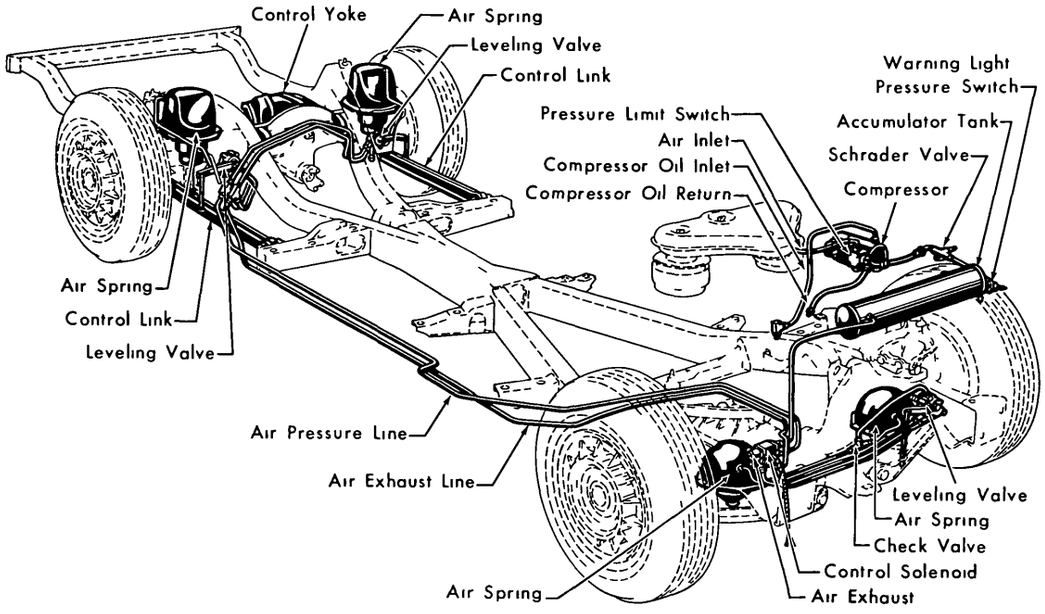
Restricted "Tee" Check Valve: Due to a single leveling valve being used for both front air springs, a check valve is provided to allow rapid flow of air between front springs and control solenoid for fast leveling, and at the same time restrict the air flow between the front air springs during car roll or cornering This valve is mounted on frame front crossmember just to right of left hand radiator support bracket

TROUBLE SHOOTING & DIAGNOSIS

► *TROUBLE SHOOTING & DIAGNOSIS NOTE: The following trouble shooting & diagnosis data indicates conditions and corrections peculiar to Cadillac Air Suspension only. Conditions arising from incorrect wheel alignm nt, loose or worn steering linkage, spherical joints, shock absorbers, or worn tires should be corrected in the usual manner.*

ROAD SHOCKS: May be caused by incorrect standing height or wrong type or size of tires *See "Adjustment" below.*

AIR PRESSURE WARNING LIGHT REMAINS ON: Check and correct any air leaks Check operation of air compressor and solenoid Check for grounded switch or connecting wire



CADILLAC ELDORADO BROUGHAM AIR SUSPENSION SYSTEM

AIR COMPRESSOR OPERATES CONTINUOUSLY: Pressure control switch diaphragm ruptured Air leak in system Valve plate in compressor head worn or broken Pressure limit switch not functioning Compressor relay defective

CAR WILL NOT RETURN TO LEVEL POSITION (AIR PRESSURE NORMAL): Front or rear leveling valve control links not adjusted properly Kink, leak, or obstruction in high or low pressure lines Air compressor relay will not actuate solenoid Control solenoid not operating

NO LEVELING ACTION WITH EITHER FRONT DOOR OPEN: An open circuit may exist between front door dome light switch and control solenoid relay Control solenoid not operating

NO LEVELING ACTION WITH EITHER REAR DOOR OPEN: An open circuit may exist between rear door transmission interlock switch and control solenoid relay Control solenoid not operating

AIR SYSTEM TOO SENSITIVE (EXCESSIVE LEVELING ACTION): Leveling valve dashpot does not delay valve action (replace leveling valve) Control solenoid restriction valve not operating Defective dome light switch at front door hinge or transmission interlock switch at rear door

AIR SPRING INOPERATIVE: Air leak in diaphragm, air dome, or air lines Defective leveling valve, control solenoid, pressure switch, compressor, or compressor relay Insufficient air pressure Defective restriction "Tee" valve Loose electrical connections

HARD RIDING: Insufficient lubrication Tires over-inflated Shock absorbers faulty Standing height incorrect Scuffed air spring diaphragm, Insufficient air pressure

BOTTOMING OF REAR SPRINGS: Incorrect standing height Worn or defective rear suspension linkage Insufficient air pressure in system

ADJUSTMENT

FRONT WHEEL ALIGNMENT: Alignment and adjusting procedures are the same as for conventional models *See "Cadillac Front Suspension".*

STANDING HEIGHT: *NOTE - Air pressure in accumulator tank should be maintained at 90 lbs. or above when checking standing height. All wheels must be on a level surface when checking or adjusting standing height.*

Checking: *NOTE - Normalize position of air springs by working the bumper up and down with a car door open, permitting car to assume its normal standing height.* **Front of Car** - Measure distance from top of left lower control arm to center of the outer lower rivet or front of frame This measurement should be 3 5/8" ± 1/16" If not within specifications, adjust as outlined below **Rear of Car** - Measure distance from top of rear axle housing to underside of frame at a point directly above the axle housing This measurement should be 4 13/16" ± 1/16" *(CAUTION - The rear standing height must be within 1/8" on both sides of car).* If not within specifications, adjust as outlined below

Adjusting: Front of Car - Loosen adjusting nut on leveling valve adjusting link at connection on lower control arm Raise or lower adjusting link until measurement between left lower control arm and center of rivet is 3 5/8" ± 1/16" Allow sufficient time for leveling action to take place, then tighten adjusting nuts and recheck measurement Check standing height on right side If

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CADILLAC ELDORADO BROUGHAM (Continued)

measurement varies more than 1/4", check and adjust rear standing height.

Rear of Car - Loosen adjusting nuts on leveling valve adjusting link at connection on lower control link. Raise or lower adjusting link until measurement between top of axle housing and underside of frame is 4 13/16" ± 1/16" on both sides of car. Allow sufficient time for leveling action to take place, then tighten adjusting nuts and recheck measurement. Recheck front standing height and readjust if necessary.

OVERHAUL

►*REAR UPPER CONTROL YOKE PRODUCTION CHANGE:* The spherical joint used on early production models has been replaced with a rubber bushing on later cars. The grease fitting formerly used with the spherical joint has been replaced with a threaded plug. Under no circumstances should the plug be replaced with a grease fitting on cars with rubber type bushings.

►*AIR SUSPENSION TUBING NUT TIGHTENING CAUTION:* Overtightening of the tubing nuts will damage the "0" ring seal, causing an air leak. Nuts should be tightened to 5-10 ft. lbs. for proper seating.

►*AIR SUSPENSION TUBING NUT FITTING CAUTION:* Whenever any air line fitting is disconnected, the "0" ring seal, Part No. 1467287, should be replaced. After tightening, each fitting should be checked for leakage

►*RAISING REAR OF CAR CAUTION: Never raise rear end of car with rear shock absorbers disconnected as it is possible to raise rear end off its suspension and result in separation of rear spring assemblies.*

►*SERVICING CAUTION: Do not open any door or turn ignition on when any wheel of car is off the ground.*

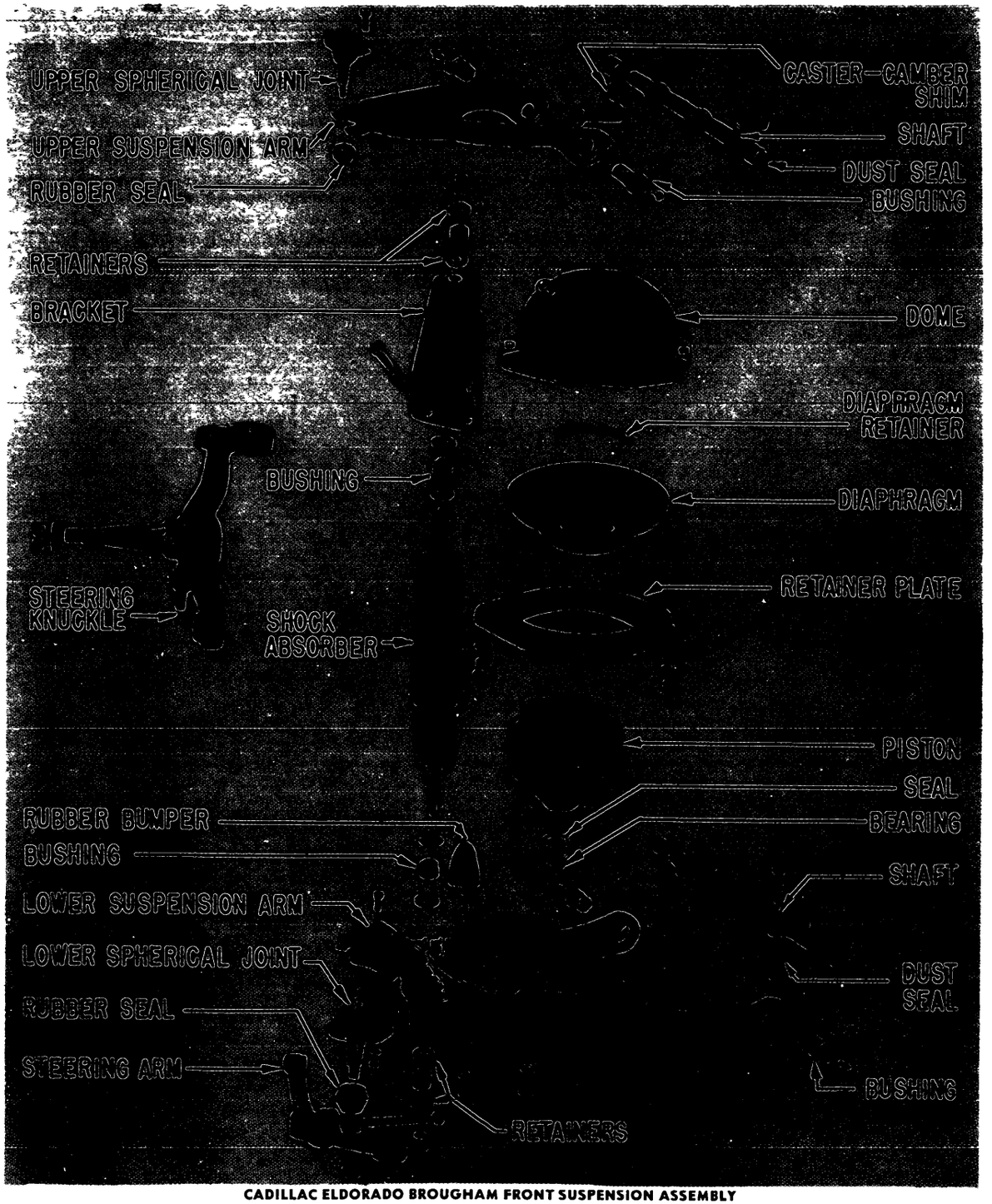
FRONT SHOCK ABSORBER: Removal - Raise front of car and place jack stands under lower control arms. Turn wheel for access to shock absorber and remove shock upper retaining nut, retainer, and rubber grommet at frame tower mounting bracket (*NOTE* - Upper stem is square at top so it may be held from turning). Remove shock lower retaining nut, lockwasher, retainer, and rubber grommet at mounting bracket and remove shock. **Installation:** Reverse removal procedure.

SPHERICAL JOINTS: Removal, Checking & Installation - Same as for conventional type suspension. See "*Cadillac Front Suspension*".

REAR SHOCK ABSORBER: Removal - Raise rear of car and place jack stands under rear axle housing. Remove upper and lower retaining nuts and lockwashers and remove shock. *CAUTION - Under no circumstances should rear of car be raised in such a manner that rear suspension is in rebound position with shocks disconnected* **Installation:** Reverse removal procedure.

UPPER CONTROL ARM: Removal - Disconnect battery ground strap. Raise front of car and place jack stands under lower control arms, and remove wheel. Remove cotter pin and nut from spherical joint stud. Strike steering knuckle with a hammer in area of spherical joint to break joint loose. Remove mounting bolts at mounting shaft and remove upper suspension arm with shaft.

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CADILLAC ELDORADO BROUGHAM FRONT SUSPENSION ASSEMBLY

CADILLAC ELDORADO BROUGHAM (C ntinued)

Disass mbly & Reassembly: Same as conventional type. *See "Cadillac Front Suspension".*

Installation: Install arm in position on frame mounting bracket and tighten bolts to 130-140 ft. lbs. Use original caster and camber shims until alignment checked. Position spherical joint stud in steering knuckle hole, install nut and tighten to 50-60 ft. lbs. Install wheel and connect ground strap to battery.

LOWER CONTROL ARM: Removal - Raise front of car and place jack stands under frame side rails. Remove wheel. Disconnect stabilizer linkage from lower control arm. Disconnect leveling valve adjusting link at lower control arm and pull down on leveling valve control arm to exhaust air from front springs (battery must be connected and a door open). Disconnect battery ground strap, close all doors and remove air piston bearing retainer nut at lower suspension arm. Disconnect air line and remove Schrader valve from front air dome, using Valve Core Remover and Installer Tool J-6888. Disconnect shock absorber at lower control arm and remove lower spherical joint cotter pin and nut. Strike steering arm in area of joint to break it loose, then remove four shaft mounting bolts at frame front crossmember and remove lower control arm.

Disass mbly & Reassembly: Same as conventional type. *See "Cadillac Front Suspension".*

Installati n: Install mounting shaft on frame crossmember and tighten bolts to 60-70 ft. lbs. Guide spherical joint stud into steering knuckle and install nut. Tighten to 50-60 ft. lbs. and install cotter pin. Connect shock absorber at lower control arm. Install Schrader valve and connect air line in front dome. Install air spring piston bearing retainer nut at bottom of lower control arm Connect leveling valve adjusting link and stabilizer link at lower control arm. Connect battery ground strap and open car door. Install wheel, remove jack stands and lower front end of car. Replenish air supply in accumulator tank through Schrader valve. Check air line fitting on front dome for air leaks by using a soapy water solution. Check standing height and adjust as necessary (see above). Check wheel alignment.

STEERING ARM: Removal & Installation - Same as conventional type suspension. *See "Cadillac Front Suspension".*

REAR WHEEL & BRAKE DRUM: Removal - Raise rear of car and place jack stands under rear axle housing. Place jack under rear bumper on side that wheel is to be removed and raise car sufficiently to remove wheel. *(CAUTION - Do not disconnect rear shock absorber for removal of rear wheel).* Remove brake drum.

Installation: Reverse removal procedure.

AIR COMPRESSOR: *NOTE - If air compressor defective, replace it with a new unit. Do not attempt repairs other than replacement of pressure switch, diaphragm, relay, or oil inlet fitting.*

Removal - Disconnect battery ground strap and exhaust air in accumulator tank at Schrader valve. Disconnect oil inlet and return lines at compressor. Disconnect air cleaner hose at inlet side of compressor. Disconnect harness lead (black) at relay on compressor. Remove two bolts securing compressor to mounting bracket on top of generator and remove compressor.

Installation: Reverse removal procedure using a new "O" ring seal at accumulator tank air line. Replenish air supply in accumulator tank through Schrader valve.

AIR COMPRESSOR RELAY: Removal - Disconnect motor lead (black) at relay, and three pressure switch leads (green, white, and pink), at relay. Disconnect harness lead (black) at relay. Remove relay.

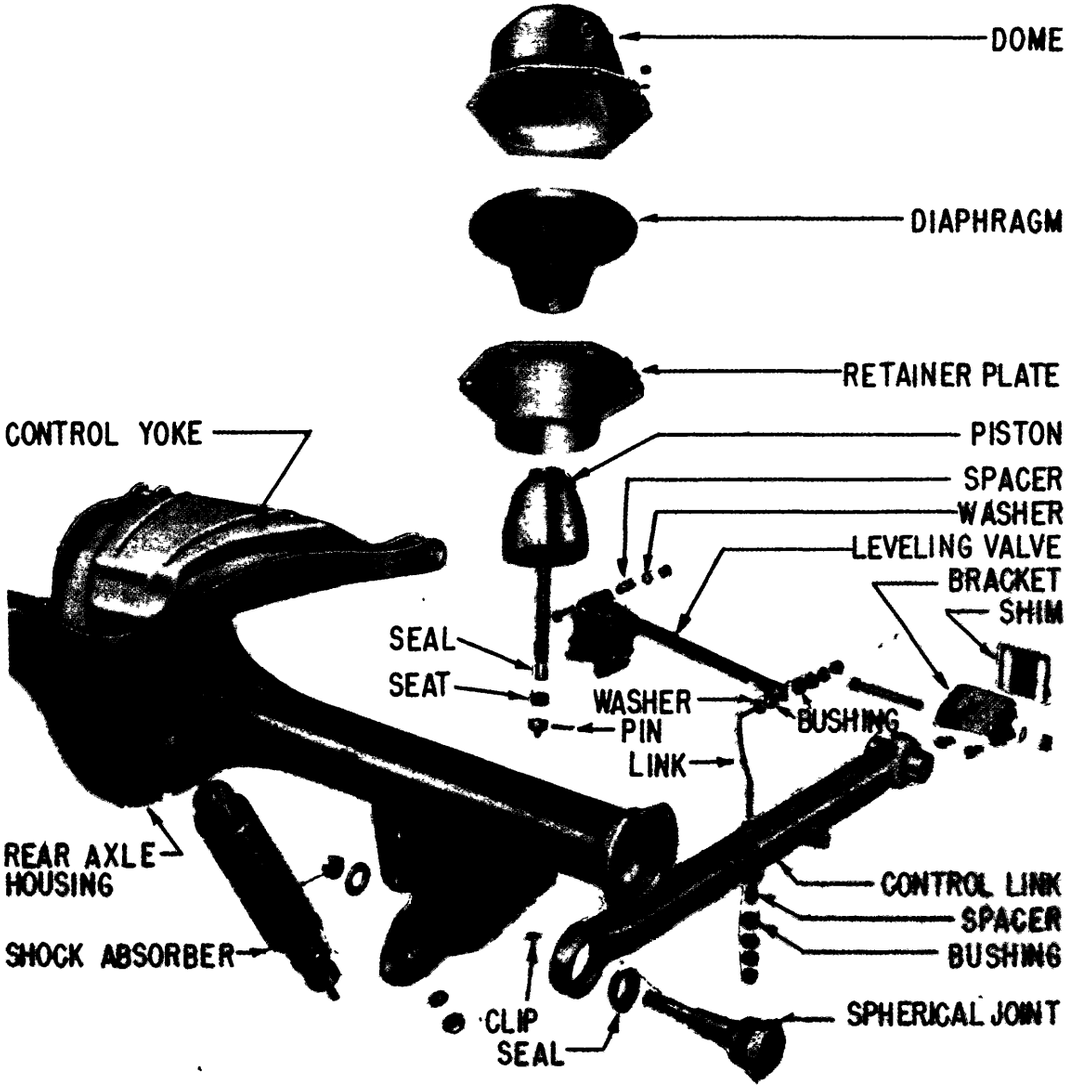
Installation: Reverse removal procedure.

AIR COMPRESSOR PRESSURE SWITCH: Removal - Disconnect three pressure switch leads (green, white, and pink) at relay. Remove two screws securing pressure switch cover to mounting on air compressor head and remove switch cover. Remove four screws securing pressure switch assembly to air compressor head and remove switch assembly. Remove rubber diaphragm from air compressor head.

Installation: Reverse removal procedure, making certain that rubber diaphragm is installed with raised side facing pressure switch plunger.

AIR COMPRESSOR FILTER: *NOTE - A pourex filter in oil inlet fitting should be cleaned when filter changed.*

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CADILLAC EL DORADO BROUGHAM REAR SUSPENSION ASSEMBLY

CADILLAC ELDORADO BROUGHAM (Continued)

Removal: With engine **not** running, remove oil inlet line at top of air compressor and remove fitting *(NOTE - The filter is an integral part of fitting and should not be removed).*

Cleaning: Soak oil inlet fitting in grease dissolving solvent and wash thoroughly. Blow air through fitting with air hose and wipe dry.

Installation: Install oil inlet fitting on compressor and connect inlet line. Run engine and compressor to check for oil leakage at fitting.

ACCUMULATOR TANK: Removal - Disconnect battery ground strap and remove radiator grille. Release air pressure in accumulator tank by opening pet cock at lower left side of tank. Disconnect two air line fittings at top of tank. Disconnect electrical lead on pressure switch at bottom left side of tank. Remove two accumulator tank attaching bolts from mounting brackets on each side of air conditioning condenser, and remove tank through grille opening, using care not to damage pressure switch.

Installation: *(NOTE - If new tank is being installed, check for air leakage before installation).* Reverse removal procedure using new "0" ring seals at ends of accumulator tank air lines. Replenish air supply in tank through Schrader valve. Test all fittings for leakage by using a soapy solution. Connect battery ground strap.

ACCUMULATOR TANK PRESSURE SWITCH: Removal - Disconnect battery ground strap and release air in tank by opening pet cock at lower left side of tank. Disconnect electrical lead at pressure switch and unscrew pressure switch from tank.

Installation: Apply permatex to bolt threads at bottom of pressure switch and install switch on tank. Connect electrical lead on switch. Replenish air supply in accumulator tank through Schrader valve. Check for air leakage using a soapy solution, then connect battery ground strap.

CONTROL SOLENOID: Removal - Disconnect battery ground strap, then raise front of car and place jack stands at outer ends of lower control arms. Exhaust air from accumulator tank at Schrader valve. Disconnect accumulator tank air line at top left side of control solenoid. Disconnect front and rear air spring high pressure and exhaust lines from control solenoid *(NOTE* - When exhaust lines are disconnected, front of car may lower slightly). Disconnect two electrical leads at relay on right front fender dust shield. Remove screws securing control solenoid to supporting bracket and remove solenoid.

Installation: Reverse removal procedure, using new "0" ring seals at ends of all air lines.

CONTROL SOLENOID FILTERS: *NOTE* - Three pourex filters, located in the high pressure air line at top left side of unit and in the two exhaust line fittings at lower right front and bottom of unit, are used to prevent foreign particles in air lines. These filters should be cleaned at six-month intervals (more frequently in sandy or desert areas).

Removal: Disconnect battery ground strap. Raise front of car and place jack stands at outer ends of lower control arms. Exhaust air from accumulator tank through Schrader valve. Disconnect high pressure line at top left side of control solenoid. Disconnect exhaust lines at lower right front and bottom of control solenoid. Remove air line fittings from control solenoid where air lines were previously disconnected and lift out filters.

Cleaning: Clean filters in suitable solvent and blow dry with air.

Installation: Reverse removal procedure using new "0" ring seals at ends of air lines. Check for leakage at all air line fittings using a soapy solution.

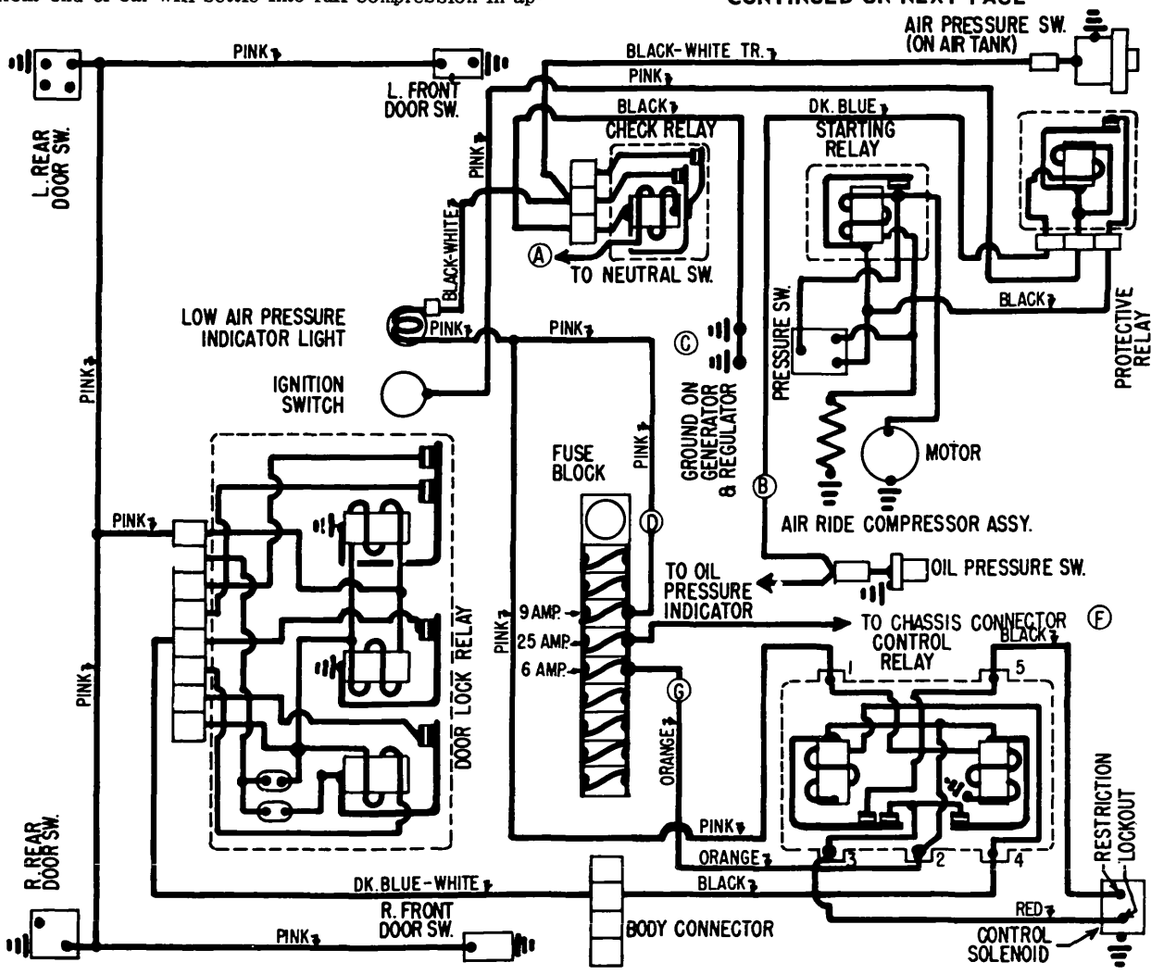
RESTRICTION CHECK "TEE" VALVE: Removal - Disconnect battery ground strap. Raise front of car and place jack stands at outer ends of lower control arms. Disconnect leveling valve air line at top of check valve *(NOTE* - All air will exhaust from front air springs and front end of car will settle into full compression in approximately five minutes). Wait for front end to lower, then disconnect front spring air line at check valve. Remove screw securing check valve to front frame member and remove check valve.

Installation: Reverse removal procedure using new "0" ring seals on ends of all lines. Replenish air supply in accumulator tank. Check for air leakage at all fittings using a soapy solution.

FRONT LEVELING VALVE: Removal - Raise front of car and open any door. Disconnect adjusting link at leveling valve control arm and pull down on control arm to exhaust air from front springs. Disconnect three air lines from leveling valve *(NOTE* - A slight discharge of air might take place). Remove two bolts retaining leveling valve to support bracket and remove leveling valve.

Installation: Reverse removal procedure using new "0" ring seals at ends of all lines. Lower car and leave any door open. Replenish air supply in accumulator tank.

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CADILLAC ELDORADO BROUGHAM AIR SUSPENSION WIRING DIAGRAM

CADILLAC ELDORADO BROUGHAM (Continued)

Check air line connections for leakage using a soapy solution. Check and adjust standing height (see above).

REAR LEVELING VALVE: Removal - Disconnect battery ground strap. Raise rear of car and place jack stands under rear frame side rails. Disconnect air line at rear spring air dome. Disconnect adjusting link at leveling valve control arm. Disconnect three air lines from leveling valve (NOTE - A slight discharge of air may take place). Remove two bolts retaining leveling valve to support bracket and remove valve. (NOTE - On right side only, remove two valve-to-support bracket spacers).

Installation: Reverse removal procedure, making sure to replace leveling valve-to-support bracket spacers on right side. Use a new "0" ring seal at ends of all air lines and check for air leakage. Check and adjust standing height (see above).

FRONT AIR SPRING (RIGHT OR LEFT): Removal - Remove lower control arm (see above). Remove three mounting bolts securing air spring assembly to front frame member and remove spring assembly.

Disassembly: Remove four attaching bolts securing retainer plate to dome, and separate retainer plate from dome. Remove "0" ring seal and phenolic resin bearing from bottom of piston. Remove piston and diaphragm from air dome. Remove diaphragm retainer from piston and lift diaphragm off piston.

Reassembly: Wipe inner surface of air dome and outer surface of piston with a clean cloth. Make sure that diaphragm contact areas are free from foreign particles or sharp edges. Apply DC-4 Silicone compound to outer edges of upper and lower diaphragm lips. Install diaphragm on piston and replace diaphragm retainer. Install piston and diaphragm assembly in air dome in as straight a position as possible, using care not to distort or bend out the upper lip of diaphragm. Install retainer plate on air dome and secure with four attaching bolts. Install Schrader valve core in air dome. Apply a liberal amount of heavy front wheel bearing grease in cavity at base of piston and install a new phenolic resin bushing and "0" ring seal.

Leak Test - Using a vise, install front air spring assembly in Holding Tool, J-6885, making sure that tool is securely attached as it will be subjected to extreme pressure. Insert Pilot Adapter, Tool J-6885-5, in hole at bottom of holding tool. Install Air Dome Valve Adapter, Tool J-6881, in air fitting in dome, making sure that fitting contains valve core. Introduce air slowly into air dome, guiding piston retainer bolt so that it seats properly in pilot adapter. Continue to add air until pressure builds up to 80-100 lbs., check air pressure with Pressure Gauge, Tool J-6840, and remove valve adapter tool. Remove complete assembly from vise, submerge in water and check for air leaks. Release all pressure in air dome by removing Schrader valve core. Remove spring from holding tool and install Schrader valve core in air dome.

Installation: Add a small amount of air to the air dome (approximately 5 lbs.) to prevent movement of diaphragm during installation. Reverse removal procedure using a new "0" ring seal at end of front spring line at air dome. Replenish air supply in accumulator tank and check for air leakage. Check and adjust standing height.

REAR AIR SPRING (RIGHT OR LEFT): Removal - Raise rear end of car, with any door open, and place jack stands under rear frame rails. Remove rear wheel (*CAUTION - Do not disconnect either rear shock absorber*). Disconnect adjusting link at leveling valve control arm and pull down on arm to exhaust air from rear spring. Disconnect battery ground strap. Disconnect air line at dome and remove Schrader valve core, using Valve Core Remover & Installer, Tool J-6888. Remove hairpin clip at bottom of piston rod, then push piston rod up and remove rod from socket in axle housing support bracket. Unscrew piston from diaphragm and remove piston assembly. Remove four mounting bolts securing rear air spring assembly to frame mounting bracket, and remove rubber bumper. Remove rear air spring assembly through wheel opening in fender

Disassembly: In the event piston is still attached to diaphragm in air spring, unscrew and remove it. Remove four attaching bolts securing retainer plate to dome and separate dome from plate. Remove rubber bumper. Remove diaphragm from air dome and tapered pin from lower end of piston rod. Remove seat and rubber seal.

Reassembly: Wipe inner surface of air dome with a clean cloth and make sure that diaphragm contact area is free from foreign particles or sharp edges. Apply DC-4 Silicone compound to outer edge of diaphragm lip, then install diaphragm in air dome in as straight a position as possible, using care not to distort or bend out the lip of diaphragm. Install retaining plate on air dome and secure with four attaching bolts. Install valve core in air dome. Install rubber seal on piston rod. Fill piston rod seat with heavy front wheel bearing grease, then install seat on rod and secure with tapered pin. Attach piston to diaphragm, tightening as much as possible by hand only.

Leak Test - *See "Front Air Spring (Right or Left)" above.*

Installation: Add a small amount of air to air dome (approximately 5 lbs.) to prevent movement of diaphragm during installation. Reverse removal procedure, installing rear air spring as a complete assembly with piston securely attached to diaphragm. Use a new "0" ring seal at end of air line at air dome. Replenish air supply in accumulator tank and check for air leakage. Check and adjust standing height (see above).

REAR UPPER CONTROL YOKE: *NOTE - Early cars are equipped with a spherical joint at rear mounting of yoke. Later cars have a rubber bushing. The lubrication fitting used with the spherical joint is replaced with a threaded plug on later cars having the rubber bushing. Under no circumstance should the plug be removed and replaced with a grease fitting on cars with rubber type bushings.*

Removal: Raise rear of car, with one door open, and place jack stands under rear frame rails. When air pressure is exhausted in springs, remove battery ground strap. Disconnect both rear spring air lines at leveling valves. Center jack under differential housing as a support (do not raise housing). Disconnect rear end of upper control yoke by removing mounting bolts securing yoke to spherical joint or rubber bushing on top of differential housing. Yoke will spring up to its design height position (*CAUTION - Note this position by measurement as control yoke front attaching bolts must be torqued with yoke in this position when yoke is installed*). Remove control yoke front attaching bolts at frame crossmember just forward of rear axle. Remove yoke over top side of differential housing.

Installation: Place control yoke in position and install the two front attaching bolts (do not tighten bolts). Position yoke to same position as noted by measurement at removal and tighten front attaching bolts to 85-95 ft. lbs. Pull down on yoke and attach rear end to spherical joint or rubber bushing. Tighten bolts to 35-40 ft. lbs. Connect both rear spring air lines at leveling valves, using new "0" ring seals at ends of lines. Lower car, open any door, connect battery, and replenish air supply in accumulator tank. Check all air line fittings for leakage. Check and adjust standing height (see above).

REAR LOWER CONTROL LINK (RIGHT OR LEFT): Removal - Raise rear of car with one door open. Place jack stands under rear frame rails, and remove rear wheel. (NOTE - Rear end of control link is not in rebound position, 5" below design height). When air in rear springs is exhausted, disconnect battery ground strap. Center jack under differential housing to support it (do not raise housing). Disconnect rear spring air line at leveling valve. Loosen parking brake equalizer locknut and disconnect cable. Remove spring clip retaining parking brake cable at No. 4 body bracket. Draw parking brake cable through grommet in bracket on outer side of control link. Disconnect leveling valve adjusting link at control link. Measure distance from ground level to centerline of spherical joint at rear of control link. Add 5 inches to this measurement to compensate for rebound distance, and note total. When control link is installed, front attaching bolt must be torqued with control link at design height. Remove attaching bolt from front end of control link at body mounting bracket. Disconnect spherical joint at rear end of control link under rear axle housing and remove control link.

Installation: Install front end of control link first. Replace attaching bolt but do not tighten. Position control link at design height as determined at removal, and tighten front attaching bolt to 85-95 ft. lbs. Pull down on control link and attach rear end to spherical joint under rear axle housing. Tighten stud to 70-80 ft. lbs. Complete installation by reversing removal procedure, using new "0" ring seals in all air lines. Lower car, open door, connect battery, and replenish air supply in accumulator tank. Check for air leakage at all fittings. Check and adjust standing height (see above)

CHEVROLET (EXCEPT CORVETTE)

Chevrolet Pass. Cars (Exc. Corvette) (1957)

DESCRIPTION: Same design as used on previous models.

ADJUSTMENT & PARTS REPLACEMENT: *See "Chevrolet Suspension" in 1955 Annual Data or later Manual dition and note the following:*

Tire Inflation: 22 lbs. (4 ply). 28 lbs. (6 ply).
St ring Axis Inclination: 3° to 4°. Not adjustable.
Caster: Pos. ½° to Pos. 1½°. *See "Shimming Procedure" below.*
Camber: 0° to Pos. 1°. *See "Shimming Procedure" below.*
T -In: 1/8" to 1/4". Adjust by loosening clamp bolts at each end of each tie rod and turning each tie rod equally to increase or decrease toe-in as necessary.
T -Out on Turns: With inner wheel turned 20°, outer wheel should be turned 18°10". Not adjustable.
Shimming Procedure: Adjustment is made by means of shims between upper control arm inner support and support bracket attached to frame side rail. Shims may be changed at either front or rear of inner shaft to change caster, or at both points equally to change camber. Addition of shims at front bolt or removal of shims at rear bolt will decrease positive caster. A 1/32" shim difference will change caster approximately 1/4°. Adding shims at both front and rear of inner shaft will change camber 1/6°. To adjust, loosen upper inner shaft-to-bracket bolts and add or remove shims as required.

1957 Spring Application

Model	② Part No.
Sed. & Coupe (Synchro-mesh) ①	3721372
Sed. & Coupe (Auto. Trans.) ①	3721373
Sed. & Coupe (Auto. Trans. & Air Cond.)	3722423
Sed. & Coupe (Synchro-mesh & Air Cond.)	3714506
Convertible (Synchro-mesh) ①	3721373
Convertible (Auto. Trans.) ①	3737293
Convertible (Auto. Trans. & Air Cond.)	3714506
Sedan Del. (Synchro-mesh) ①	3713966
Sedan Del. (Auto. Trans. & Air Cond.)	3714506
Station Wagon (Synchro-mesh) ①	3721371
Station Wagon (Auto. Trans.) ①	3721372
Taxi (Synchro-mesh)	3719736
Taxi (Auto. Trans.)	3714506

① - Without Air Conditioning.
② - Springs are marked with the following colors for identification: Orange (3721372). Blue (3721373). Yellow (3722423). Dark Green (3714506). White (3737293 & 3713966). Light Green (3721371). Pink (3719736).

SHOCK ABSORBERS: Removal - Hold upper stem from turning and remove upper stem retainer nut, grommet retainer and grommet. Remcve two bolts retaining lower shock absorber pivot to lower control arm and pull shock absorber assembly and mounting out at bottom of spring housing.

Installation: Install grommet retainer and grommet on upper stem of shock absorber and install shock up through lower control arm and spring housing. Index upper stud through mounting hole in top of spring housing. Install grommet and retainer. Tighten nut to 4-6 ft. lbs. while holding upper. stem of shock absorber.

CHEVROLET CORVETTE

Chevrolet Corvette (1957)

DESCRIPTION: Independent linked parallelogram type with direct acting shock absorbers and coil springs. "Threaded Bushing" pivot points used on upper and lower control arms for connection to steering knuckle. Caster and camber adjustments made by rotating upper control arm pivot bolt (eccentric).

ADJUSTMENT & PARTS REPLACEMENT: *Se 1949 or later Manual editions and note the following:*

Tire Inflation: 24 lbs. (normal driving), 36 lbs. (sustained high speed).
Kingpin Inclination: 3½-4½° crosswise. Not adjustable.
Caster: Pos. 2¼° ± ½°. Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting from rear bushing at outer end of upper control arm, insert Allen wrench through hole and turn pivot until correct caster setting secured. *NOTE - Pivot pin must b turned in full turns only for caster adjustment, otherwise camber be changed.*
Camber: Pos. ½° ± ½°. After adjusting caster (above), rotate pivot bolt not more than ½ turn in either direction to secure correct camber. Entire range of adjustment is obtained in ½ turn of pivot bolt.
Toe-In: 1/8". Loosen clamp bolts at each end of **l ft hand tie rod** and turn rod (right hand tie rod is one-piece non-adjustable type), tighten clamp bolts to 8-12 ft. lbs.
Toe-Out on Turns: With outside wheel at 20°, inner wheel should be 23°. Not adjustable.

1957 Spring Application

Type	Color Cod	Part N .
Standard	Black ①	3709497
Heavy Duty		3735953

① - Dot on second coil.

CHRYSLER, DE SOTO, DODGE, PLYMOUTH "TORSION-AIRE"

Chrysler, Imperial, DeSoto, Dodge & Plymouth (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 PLYMOUTH FRONT SUSPENSION BALL JOINT SEAL INSTALLATION CAUTION:* Failure to install seals and seal retainer in proper position will result in dirt and moisture entering ball joint and cause loss of lubricant and noisy front suspension. Seals and retainer positions are shown in front suspension assembly.

►*TORSION-AIRE SUSPENSION NOISE CORRECTION:* To properly lubricate ball joints, raise car so weight is on both lower control arms to unload lower ball joint and move upper control arm rebound bumper away from frame bracket. Use grease with not to exceed 10% lead powder and apply grease intermittently to cause ball joint action. When noise not corrected by lubrication, rotate ball joint stud ¼ turn as follows: Mark ends of both upper and lower ball joint studs and steering knuckle bosses. Start to remove knuckle or until stud-knuckle tapers are separated, then rotate studs 90° or ¼ turn from marked position. Retighten studs to specifications and thoroughly lubricate joints.

DESCRIPTION

DESCRIPTION: "Torsion-Aire" suspension consists oi a new rubber mounted ball joint type system using torsion bars instead of front coil springs. Torsion bar springs, one on each side, are indexed with the lower control arm at inner pivot point, the other end of bar is indexed in an anchor connected to frame side rail below drivers compartment. Steering knuckles are connected to upper and lower control arms by ball joints, eliminating the kingpins. Upper control arms are attached to brackets bolted to frame side rails, and shim packs between brackets and side rails control camber and caster settings at each wheel. The lower control arm pivot point is set in replaceable rubber bushings located on back side of intermediate front crossmember. Shock absorbers are connected to lower control arm and to a frame tower. Two struts, one on each side, prevent fore and aft movement of lower control arm, and a sway eliminator bar is connected between the two struts. The forward end of the strut is attached to a frame crossmember forward of the control arms, and the other end is attached to the lower control arms.

ADJUSTMENT

ADJUSTMENT: Before checking front wheel alignment inflate all tires to recommended pressure. Check adjustment of front wheel bearings, upper and lower ball joints, tie rod ends and idler arm for excessive looseness. Check for bent frame and rear spring "U" bolts for tightness or shifted axle housing. Grasp front and rear bumper at center and jounce car up and down several times to place torsion bar springs and shock absorbers in their normal "unloaded" position. Make adjustments in the following order:

Camber: *(See Specifications b low).* The addition of shims at both front and rear brackets will decrease positive camber. Shims are furnished in 1/16" and 1/32" thicknesses. One shim (1/16") at each bracket will change camber approximately 5/16°. *(NOTE - The shim pack at either front or rear brack t must not exc ed 9/16").* To install or remove shims, raise front wheel off floor with a jack placed under lower control arm as near to wheel as possible. Loosen upper support bracket bolts and add or remove shims.

CONTINUED ON NEXT PAGE

"TORSION-AIRE" (C nt.)

Camber Setting Specifications

Mod l	Right Wheel	Left Wheel
Chrysler	0° ±¼° ①	② Pos. ½° to 0°
Imperial	0° ±¼° ①	② Pos. ½° to 0°
DeSoto	0° ±¼° ①	② Pos. ½° to 0°
Dodge	0° ±¼° ①	② Pos. ½° to 0°
Plymouth	0° ±¼° ①	② Pos. ½° to 0°

① - 0° Preferred. ② - Pos. 3/8° Preferred.

Caster: *(See Specifications below).* The removal of shims at rear bracket or the addition of shims at front bracket will decrease positive caster. Shims are furnished in 1/16" and 1/32" thicknesses. One shim (1/16") will change caster approximately 3/8°. *(NOTE - The shim pack at either front or rear bracket must not exceed 9/16").* To install or remove shims see "Camber Adjustment" above.

Caster Setting Specifications

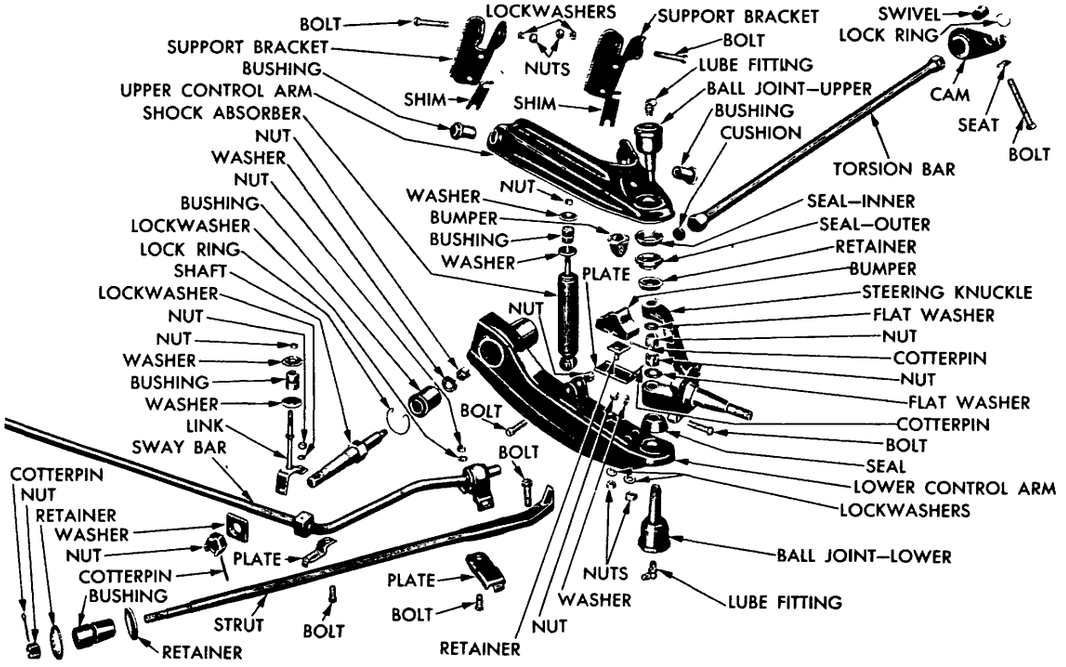
Model	Manual Strg.	Power Strg.
Chrysler	Neg. ¾° ± ¾°	Pos. ¾° ± ¾°
Imperial	Neg. ¾° ± ¾°	Pos. ¾° ± ¾°
De Soto	Neg. ¾° ± ¾°	Pos. ¾° ± ¾°
Dodge	Neg. ¾° ± ¾°	Pos. ¾° ± ¾°
Plymouth	0° to Neg. 1½°	Pos. 1½° to 0°

Steering Axis Inclination: (Chrysler) - 5° to 7°. **(DeSoto)** - 5½° to 7°. **(Dodg & Plym uth)** - 6½°. No adjustment provided. If camber can be adjusted within recommended limits it is unnecessary to check steering axis inclination. *CAUTION - Do not heat parts in order to straighten.*

Toe-In: 1/8"-1/32" (Exc. DeSoto). 3/32"-5/32", 1/8" preferred (DeSoto). Lengthen or shorten the tie rods an equal amount until wheels toe-in the specified amount. *NOTE* - Steering wheel hub, steering gear arm, steering tube and steering gear roller shaft are machined with master serrations to place front wheels in straight ahead position when steering wheel is centered. Do not alter these serrations to change position of these parts. Improper position of steering wheel must be corrected by adjusting tie rod lengths.

Toe-Out on Turns: 21°45' (Chrysler & DeSoto S25, S26). 21°37' (DeSoto S27, Dodge & Plymouth). No adjustment provided. *CAUTION - Do not heat parts in order to straighten.*

Front Susp nsi n Height: Checking - Make sure the car is on a level floor, tires inflated to recommended pressure, and car at curb weight (full gas tank, no passengers or load). Measure from lowest point of lower support arm ball joint to floor and from underside of lower control arm bushing (at center line of bushing housing). *(NOTE - Under car weight, the bushing housing will always be higher than the ball joint housing).* The difference between these two measurements should be as specified in table below. If the difference in measurements between the two sides of the car are less than ¼" of each other and are within the limits specified, suspension height is correct. If these measurements differ more than ¼" or if one or both of them are outside the specified limits, the torsion bar must be adjusted.



CHRYSLER, DE SOTO, DODGE, PLYMOUTH "TORSION-AIRE" ASSEMBLY

Front Suspension Height Limits

Model	① Height Difference
Chrysler (All Models)	2 1/8-2 1/4"
DeSoto (Exc. Sta. Wgn.)	2 1/8-2 1/4"
DeSoto (Sta. Wgn.)	2 5/8-2 3/4"
Dodge (Sed. & Coupe)	1 7/8-2 3/8"
Dodge (Suburban)	2 3/8-2 7/8"
Plymouth (Sed. & Coupe)	2 1/8-2 1/4"
Plymouth (Suburban)	2 5/8-2 3/4"
Plymouth Fury	1 5/8-1 3/4"

① - Difference between measurement at lower ball joint and at lower support arm housing. See "Checking" above.

Adjustment - Tighten or loosen the adjusting bolt at rear end of each torsion bar until measurement differences are as specified. *NOTE - Always jounce front and rear after making adjustment prior to a height check. Also when torsion bar spring adjustment is made, check alignment of front wheels and headlight aiming.*

REMOVAL & INSTALLATION

SWAY BAR: (Removal) - Remove sway bar link retaining nuts and washers and the two sway bar cushion retaining bolts (one on each strut). Slide sway bar out through control arm struts and away from car. *NOTE* - Sway bar cushions are not serviced separately.

Installation: Dip new sway bar link bushing in water, install in opening in frame bracket, using a twisting motion. When installed properly, the groove in bushing will index with opening in frame bracket. Thread sway bar into position over top of lower control arm struts. Engage sway bar cushion housing with struts and install lock plates. Insert bolts and lockwashers and tighten to 25 ft. lbs. Install washers over ends of links (concave side up), then slide links up through bushings. Install washers (concave side down), over ends of links and down on bushings. Install nuts and tighten to 15 ft. lbs.

LOWER CONTROL ARM STRUTS: (Removal) - Remove bolts attaching sway bar bushing housing to struts. Disconnect sway bar from struts. Remove the strut-to-lower control arm mounting bolts and nuts. Remove cotter pin, nut and bushing retainer from forward end of strut at front crossmember. Slide strut and inner bushing retainer from bushing in frame. Cut old bushing out of frame with a knife.

Installation: Dip new bushing in water and with tapered portion toward rear of car, install in opening in frame using a twisting motion until groove in bushing indexes with frame. With cupped side out, slide washer over threaded end of strut. Push strut through bushing in frame. Slide outer washer over end of strut (cupped side in). Install nut and tighten sufficiently to install strut to lower control arm mounting bolts. Install bolts, lockwashers, and nuts and tighten to 65 ft. lbs. Tighten strut nut to 30 ft. lbs. and install cotter pin. Check caster and camber.

STEERING KNUCKLE: (Removal) - Remove wheel, tire and drum. Cover brakes with a clean cloth and remove cotter pins, nuts and lockwashers attaching steering arm and brake dust shield to steering knuckle. Remove steering arm and brake assembly from steering knuckle (leave brake hose attached). (Do not allow assembly to hang by the brake hose). Remove ball joint studs from

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"TORSION-AIRE" (C nt.)

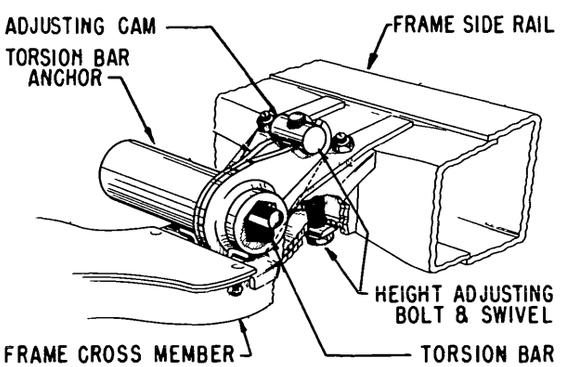
steering knuckle (see "Upper & Lower Ball Joints" below). Lift steering knuckle up and away from car.

Installation: Slide upper and lower ball joints into steering knuckle and install lockwashers and nuts. Tighten ball joint stud to 135 ft. lbs. Install cotter pins. Slide brake assembly over knuckle and into position. Install lockwashers and nuts on upper rear and lower front bolts. Install upper front and lower rear bolts through dust shield and steering knuckle, then slide steering arm over bolts. Install lockwashers and nuts and tighten evenly to 55 ft. lbs. Install cotter pins. Remove covering from brake shoes, replace wheel and drum assembly. Adjust front wheel bearings.

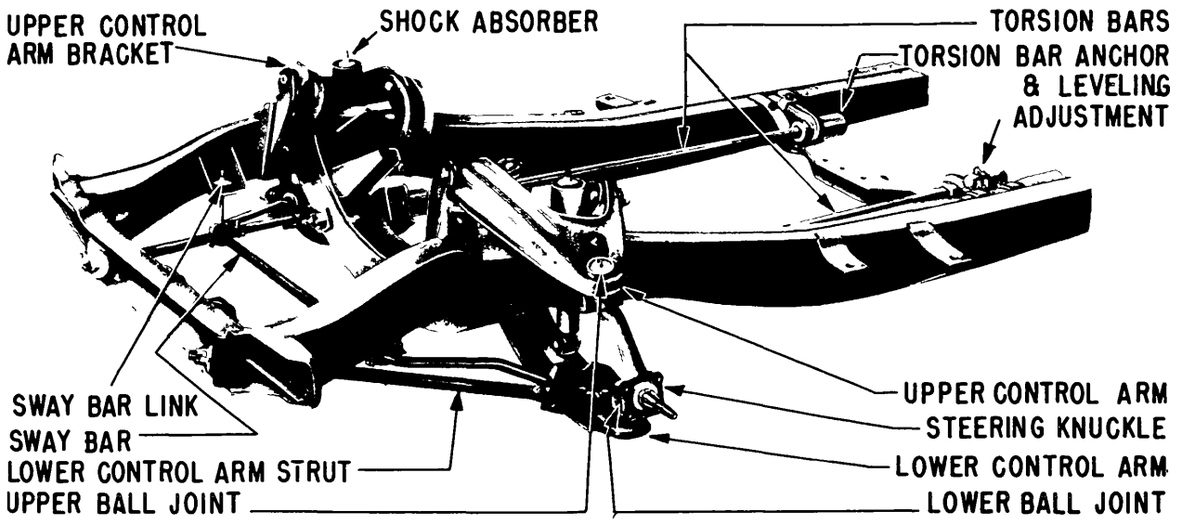
UPPER & LOWER BALL JOINTS: (Removal) - *(CAUTION - Upper and lower ball joints are not interchangeable. The Upper joint is preloaded and should not be used in the lower control arm).* Remove wheel assembly, and remove upper and lower ball joint stud nuts. (Install Tool C-3564 (with threaded end upward to remove lower joint, and with threaded end downward to remove upper joint). Apply load to studs and rap knuckle at ball joint boss sharply with a hammer to loosen stud *(CAUTION - Do not attempt to hammer stud out of knuckle).* Reverse position of tool to remove the opposite ball joint and repeat the above procedure. Remove tool and disengage ball joint from knuckle. Remove dust cover and grease seal. Remove lubrication fittings. Using Tool C-3561, unscrew ball joint from control arm.

Installation: *(CAUTION - When installing new ball joints, make sure that ball joint threads squarely engage threads in control arm).* With lubrication fittings removed, screw ball joint into control arm using Tool C-3561 and tighten until ball joint housing is seated on control arm. Tighten to a minimum to 250 ft. lbs. Install seal and dust cover into position over stud and position stud in steering knuckle. Install cotter pin and lubrication fitting. Lubricate ball joint with chassis lubricant.

TORSION BAR: (Removal) - *(CAUTION Torsion bars are not interchangeable, side for side. Torsion bars are marked "L" (Left), "R" (Right), stamped on one end of the rod. These stamped markings must always be toward rear of car).* Raise car off floor *by jacking under front crossmember.* Release load from torsion bar by unscrewing the cam adjusting bolt partly out of swivel *(CAUTION - To prevent swivel from falling into frame bracket, do not loosen swivel bolt all the way out until torsion bar is removed).* Remove lock ring from rear of anchor. Slide torsion bar rearward until forward end is disengaged from lower control arm, then forward until rear end is disengaged from cam. Remove bar, bolt, swivel and cam from frame bracket anchor.



T RSI N BAR ANCH R & ADJUSTMENT



"TORSION-AIRE" SUSPENSION SYSTEM

Installation; With car raised off floor, assemble cam, swivel, bolt seat (oval side up) and bolt into frame anchor bracket. Check for torsion bar cushion in lower control arm housing and make sure it is in place at end of lower control arm pivot shaft. With cam bolt barely entered in cam swivel, slide torsion bar into rear cam. Rotate cam and torsion bar assembly until cam is positioned as close to floor pan as possible. Engage front of torsion bar in lower control arm shaft assembly as far as the bar will go (up against cushion). *(NOTE - Unless anchor blade is positioned properly, it will be impossible to adjust front suspension to proper suspension height).* Install lock ring in rear of cam housing. Tighten cam bolt until approximately 1" of threads show above anchor bolt swivel. Check and adjust suspension heights, caster and camber (see "Adjustments" above).

UPPER CONTROL ARM: (Removal) - *Place jack under lower control arm and raise front wheel off floor,* with jack placed as close to wheel as possible. Remove wheel. Remove cotter pin, nut and washer from upper ball joint stud. Install Tool C-3564 and remove ball joint (see "Upper & Lower Ball Joints" above). Remove upper control arm front and rear pivot bolts. Remove control arm from support mountings (do not remove brackets from frame).

Upper Control Arm Bushing Replacement - Remove bushings by pressing them out with Tool C-3558, or using a hammer and suitable drift. *(CAUTION - Make sure control arm is properly supported when removing bushings. If hammer and drift are used, extreme care must be used to avoid damaging bushing surface in control arm).* When installing new bushings, make sure control arm is supported squarely at point bushing is being pressed in. Position flange end of new bushing in Tool C-3558, and support control arm squarely. Using an arbor press, install bushings (flange out) into control arm until flanged portion of bushings seat on arm.

Installation: Position upper control arm in support mounting bracket and install front and rear mounting bolts, washers and nuts. With control arm in normal position tighten nuts to 65 ft. lbs. Place upper ball joint in steering knuckle and install washer and nut. Tighten to 135 ft. lbs. and secure with cotter pin.

LOWER CONTROL ARM: (Removal) - Raise car by placing jack under frame crossmember. Remove torsion bar (see "Torsion Bar" above). Remove shock absorber lower eye attachment nut and bolt from mounting bracket. Push lower portion of shock absorber up into frame opening. Remove strut to lower control arm mounting bolts. Remove lower ball stud from knuckle (see "Upper & Lower Ball Joints" above). Remove cotter pin, nut and washer from lower control arm shaft assembly. With washer removed, reinstall nut (to protect threads) until it is flush with end of shaft, (shaft is a tapered fit in crossmember). Use a hammer and brass drift for loosening, then remove nut from shaft. Slide lower control arm and shaft assembly from rear crossmember. *(CAUTION - Do not lose torsion bar spring cushion located in shaft assembly).*

CONTINUED ON NEXT PAGE

"TORSION-AIRE" (C nt.)

Installati n: Position shaft and lower arm assembly in crossmember in normal position, and install washer and nut. Tighten to 175-200 ft. lbs. and secure with a cotter pin. Position lower ball joint stud in steering knuckle and install washer and nut. Tighten nut to 135 ft. lbs. and secure with a cotter pin. Place shock absorber in position in lower mounting bracket and install bolt and nut and tighten to 40 ft. lbs. Install wheel. **Do not lower front f car until torsion bar spring is installed.** See "Torsion Bar" above.

LOWER CONTROL ARM PIVOT SHAFT BUSHING RE-PLACEMENT: (Disass mbly) - Remove lock ring from end of bushing housing. Support lower control arm assembly in an arbor press; then using a brass drift, press shaft and bushing assembly from control arm. Remove cotter pin, nut and washer; and slide bushing from shaft.

Reassembly: Position new bushing (flanged end of bushing first) on shaft and install washer and nut. Tighten nut to 100-150 ft. lbs. and install cotter pin. With lower control arm supported, install shaft and bushing assembly by using Tool C-3557 and pressing bushing into lower control arm until flanged portion of bushing is seated all the way into control arm. Install lock ring making sure it is properly seated in ring groove. Install torsion bar spring cushion in control arm.

UPPER CONTROL ARM SUPPORT MOUNTING BRACK-ETS: *(CAUTION - Brackets are bolted to frame side rails and should not be removed unless damaged due to accident).* When removing mounting brackets, extreme care should be taken so not to lose alignment shim pack located between bracket and frame side rail. In the event a shim pack is lost, a selection of shims 5/16" thick, **may be used as a starting point when re-assembling.**

FORD (EXCEPT THUNDERBIRD) & MERCURY

Ford, Exc. Thunderbird (1957)
M rcury, All M dels (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 LOWER BALL JOINT CHANGE & CHECKING NOTE:* Lower ball joints are not spring loaded and as a result, when there is no load on wheel, a slight looseness will be apparent that is entirely normal. *See "Lower Ball Joint" below.*

►*1957 MERCURY STABILIZER BAR INTERFERENCE WITH FRAME CORRECTION:* Loosen the two stabilizer bar-to-frame brackets and slide the two rubber mounting insulators along stabilizer bar as necessary to center the bar. Tighten clamps and check clearance between bar and frame. If clearance cannot be obtained in the above manner, replace stabilizer bar. *CAUTION - Do not apply heat to bar.*

►*1957 MERCURY "RUBBING" NOISE CORRECTION:* A metallic rubbing noise in front suspension may be caused by the coil spring upper shim being installed without a shim locator allowing shim and spring to shift out of frame pocket. Check clearance between outboard side of coil spring and spring pocket by jacking car up with the jack placed under car frame or crossmember (spring extended). If spring is found to be contacting the spring pocket, remove spring and shim and reinstall with a shim locator.

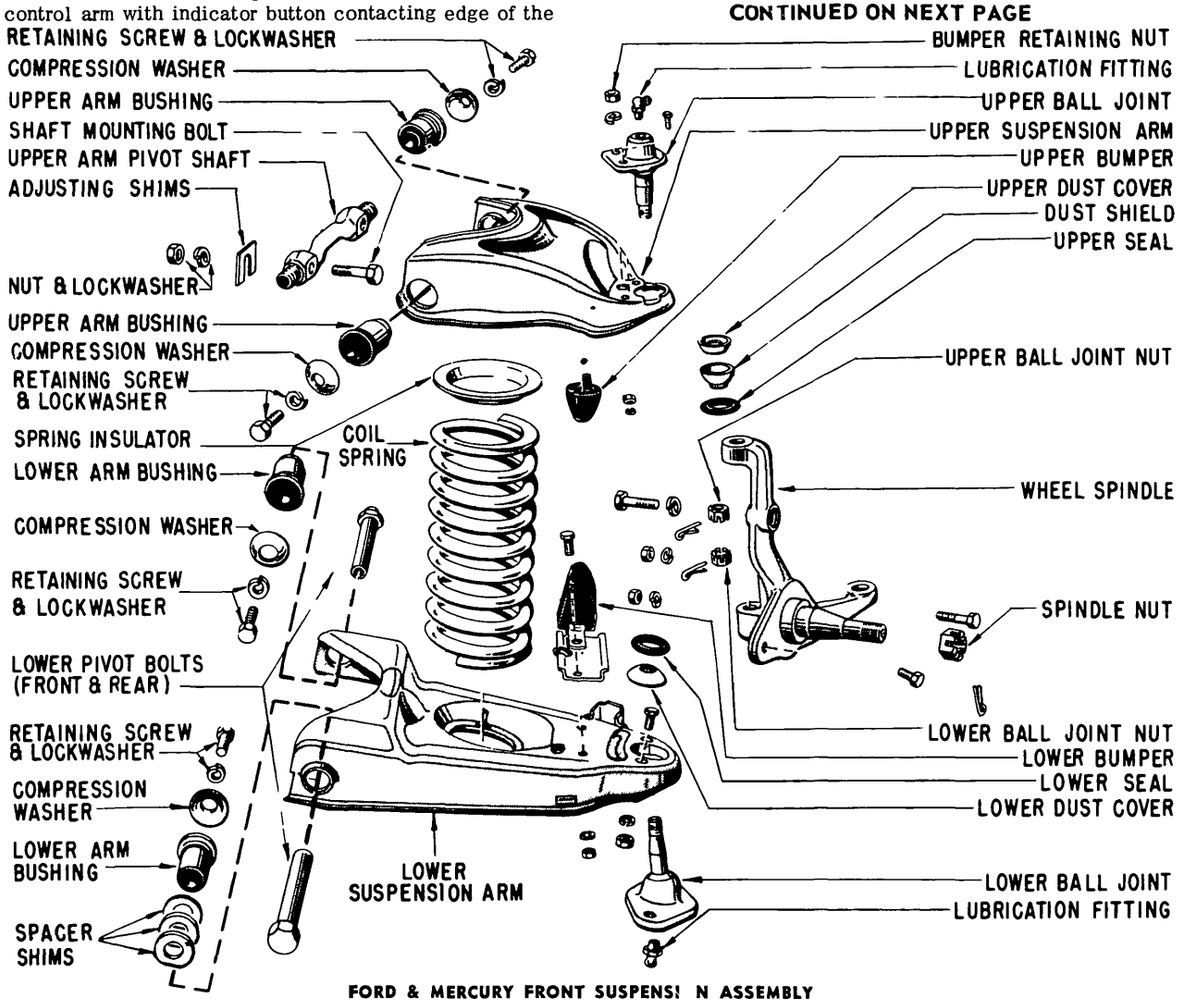
DESCRIPTION: "Ball-joint" type similar in construction and design to previous models. Upper and lower control arms have been changed and service procedures have been revised.

ADJUSTMENT

CHECKING & ADJUSTING: Before adjusting front end alignment, inflate tires to specified pressure (see below). Raise front of car and check front suspension ball joints for looseness, wear, or damage *(NOTE* - Lower ball joint is not spring loaded and a slight normal looseness will be found when car is raised and wheel is hanging free. *See "Lower Ball Joint Checking" below).* Check steering gear mountings and all linkage for looseness. Adjust front wheel bearings. Check tracking of front and rear wheels.

►*LOWER BALL JOINT CHECKING:* Raise front of car with a jack placed under lower control arm. Adjust front wheel bearing, then, using a dial indicator perpendicular to wheel, measure the in and out travel of wheel (Dial indicator should be clamped to front suspension lower control arm with indicator button contacting edge of the wheel rim). The total travel from extreme inboard to outboard position should be less than .125" (1/8"). Replace

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FORD & MERCURY FRONT SUSPENSI N ASSEMBLY

FORD & MERCURY (Cont.)

ball joint if in excess of this specification.

Tire Inflation: As follows.

Model	Front	Rear
Ford (Exc. Sta. Wgn.)	24 lbs	21 lbs.
Ford Sta. Wgn.	24 lbs.	26 lbs.
Mercury (All Models)	24 lbs.	① 24 lbs.

① - On Mercury Sta. Wgn. inflate to 28 lbs if loaded.

Steering Axis Inclination: 7°1' at 45' Camber (Ford). 7° at 0° Camber (Mercury). Not adjustable.

Caster: Pos. ½° to Pos. 1½° (Ford). 0° to Neg. 1½° (Mercury). *See "Shimming Procedure" below.*

Camber: Pos. ½° to Pos. 1½° (Ford). 0° to Pos. ¾° (Mercury). *NOTE* - Maximum variation between wheels must not exceed ½° with ¼° preferred *See "Shimming Procedure" below.*

Toe-In: 1/16-1/8" (Ford). 1/16-3/16" (Mercury). To adjust, place front wheels in straight ahead position and loosen two clamp bolts at each spindle connecting rod sleeve. If steering wheel spokes are in their normal position, lengthen or shorten both rods equally to obtain correct toe-in. If steering wheel spokes are not in their correct position, make necessary rod adjustments to obtain correct toe-in and steering wheel spoke alignment. *NOTE* - On left hand sleeve turn sleeve **downward to increase length.** On right hand sleeve turn **upward to increase length.**

Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be 24¼° (Ford).

Shimming Procedure: Caster and camber adjustments are made by adding or removing shims between upper control arm mounting shaft and frame mounting bracket. To change caster, remove or add shims at one of the mounting bolts. The removal of shims at the front bolt or installation of shims at the rear bolt will cause ball joint on upper control arm to move forward. Reversing this procedure will cause joint to move to rear. A 1/16" change of shim thickness at either bolt will change caster angle ½° *(NOTE - The difference between shim stack thicknesses at the two bolts should not exceed 1/8" and the maximum thickness of shim stack at each bolt must not exceed 9/16").* To adjust camber, remove or install equal shim thicknesses at both bolts. Removal of shims at both bolts will move upper ball joint inward, and installation of shims will move upper ball joint outward. A 1/16" change of shim thickness at both bolts will change camber angle ¼°. Shims are available in 1/32" & 1/8" thicknesses. Tighten control arm shaft mounting nuts to 65-90 ft. lbs.

REMOVAL & INSTALLATION

SHOCK ABSORBER REPLACEMENT: Removal - Raise car and place stands under both lower control arms, making sure that shock absorbers are accessible for servicing. Disconnect shock absorber from lower control arm and mounting bracket on frame. Free lower stud and bushing from arm by removing one mounting bolt and loosening the other. Remove bushings and washers.

Shock Absorber Lower Bushing Replacement - Remove bushing, using Tool T57P-18201-A1 & A5, and pressing it out of shock absorber with an arbor press. To reinstall bushing, apply a vegetable soap solution to bushing and press it into shock absorber, using Tool T57P-18201-A1, A4, & A5. *NOTE* - One quick drive of the press ram should be used to position bushing.

Installation: Place bushings and washers on studs in their correct order. Extend shock absorber and install it inside coil spring with upper stud inserted through hole in mounting bracket. Install and tighten lower bolts to 12-15 ft. lbs. Install upper bushing and washer on upper stud and tighten nut to 25-29 ft. lbs. Install and tighten locknut.

COIL SPRING REPLACEMENT: *See "Lower Control Arm" below.*

► *COIL SPRING IDENTIFICATION NOTE: Springs are marked with various colors as indicated in table below.*

Front Spring Application

Ford 6 Cyl.

Model	Color Code	Part No.
Custom Sedan	Green	B7A-5310-A
Custom Sedan (H.D.)	Red	B7A-5310-B
Town Sed & Club Sed.	Red	B7A-5310-B
Club Victoria	Red	B7A-5310-B
Town Victoria	Alum	B7A-5310-C
Convertible	Alum	B7A-5310-C
Town Sed. & Club Sed. (H.D.)	Alum.	B7A-5310-C
Club Victoria (H.D.)	Alum	B7A-5310-C
Fairlane Tudor Sedan	Yellow	B7A-5310-D
Retractable Hard Top	Yellow	B7A-5310-D
Town Victoria & Conv. (H.D.)	Yellow	B7A-5310-D
Custom Ranch Wagon	Blue	B7A-5310-E
Country Sedan & Squire	Blue	B7A-5310-E
Ranchero & Sed. Del.	Blue	B7A-5310-E
Fairlane Country Sed. (H.D.)	Orange	B7A-5310-F
Country Squire (H.D.)	Orange	B7A-5310-F
Custom Sedan (H.D.)	Orange	B7A-5310-F

Ford V8

Model	Color Code	Part No.
Custom Sedan	Red	B7A-5310-B
Custom Sedan (H.D.)	Alum	B7A-5310-C
Town Sedan	Alum.	B7A-5310-C
Town Victoria & Conv.	Yellow	B7A-5310-D
Club Victoria & Club Sed.	Yellow	B7A-5310-D
Town Sedan (H.D.)	Yellow	B7A-5310-D
Ranchero & Sed. Del.	Blue	B7A-5310-E
Custom Ranch Wagon	Orange	B7A-5310-F
Country Sedan & Squire	Orange	B7A-5310-F
Ranchero (H.D.)	Orange	B7A-5310-F
Town Victoria & Conv. (H.D.)	Purple	B7A-5310-G
Fairlane Tudor Sedan	Purple	B7A-5310-G
Retractable Hard Top	Purple	B7A-5310-G
Custom Sedan (H.D.)	Grey	B7A-5310-H
Fairlane Country Sedan (H.D.)	Grey	B7A-5310-H
Country Squire (H D.)	Grey	B7A-5310-H

Mercury (312" Eng.)

Model	Color Code	Part No.
Exc. Sta. Wgn & Conv. ①	Yellow	MG-5310-F
Exc. Sta. Wgn. & Conv. ②	Orange	MG-5310-G
Convertible ①	Orange	MG-5310-G
Convertible ②	Brown	MG-5310-H
Station Wagon ①	Yellow	MG-5310-F
Station Wagon ②	Orange	MG-5310-G
Exc. Convertible ①③	Green	MG-5310-J
Convertible ①③	Purple	MG-5310-K

Mercury (368" Eng.)

Model	Color Code	Part No.
Exc. Sta. Wgn. & Conv. ①	Orange	MG-5310-G
Exc. Sta. Wgn. & Conv. ②	Brown	MG-5310-H
Convertible (All)	Brown	MG-5310-H
Station Wagons (All)	Orange	④ MG-5310-G

① - Without Air Conditioning.
② - With Air Conditioning.
③ - Heavy Duty.
④ - MG-5310-H may also be used on these models.

UPPER CONTROL ARM: Removal - Raise car and place a stand under lower control arm. Remove wheel and tire and remove cotter pin from nut on upper ball joint stud, then loosen nut one or two turns (do not remove nut at this time). Place a box wrench over lower end of ball joint remover, Tool T57P-3006A (Ford), then install the tool between upper and lower ball joints, making sure that tool seats firmly against ends of both studs and not against stud nuts. Turn wrench until tool places studs under tension, then tap spindle near upper stud with a hammer to loosen stud in spindle (do not loosen stud in spindle with tool pressure only). If both arms are being removed, loosen lower stud in same manner as upper stud. Remove nut from upper stud and remove stud from spindle. Support spindle to prevent damage to brake hose. Remove nuts from retaining bolts on upper arm inner shaft *(CAUTION - These bolts are pressed into inner shaft and should not be turned when removing the nuts).* Remove upper control arm from mounting bracket *(CAUTION* - Measure and note thickness of shim pack at each inner shaft bolt).

Inspection: Inspect upper arm and inner shaft for cracks, bends, or other damage. Check condition of bushings, rubber seal on ball joint stud, and rubber bumper on arm Replace as necessary. Install nut on ball joint stud, then turn stud in ball joint with a torque wrench. If turning effort is not within 25-40 inch pounds, replace the ball joint.

Upper Arm Bushing & Inner Shaft Replacement - *(NOTE - Replace both upper arm bushings if either bushing is worn or damaged).* Remove bolts and washers from both ends of inner shaft. Install bushing remover tools, T57P-3044-A & T54P-3044-A10 (Ford), at front bushing and press bushing out of arm *(NOTE* - Forward mounting bolt on inner shaft must be removed by tapping or pressing before remover tools can be installed). Remove inner shaft from rear bushing, then press rear bushing out of arm. Press a new rear bushing into arm with flange of bushing toward outer side of arm, using tools T57P-3044-A & T54P-3044-A5. Insert end of inner shaft in rear bushing, then press a new front bushing into arm. Install forward mounting bolt in inner arm by tapping or pressing it into place. Install bolts and washers on both ends of shaft but do not tighten bolts until upper arm is installed on mounting bracket.

Upper Ball Joint Replacement - *(NOTE* - The ball joint cannot be repaired and must be replaced if damaged). If ball joint is riveted to arm, drill a 1/8" pilot hole completely through each rivet, then drill off the rivet head through pilot hole with a 3/8" drill. Drive rivets out of holes. Remove burrs from hole edges and install new

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FORD & MERCURY (C nt.)

joint on arm, using only the specified bolts, nuts, and washers (furnished in Kit, Part No. B7A-3049-A). *(CAUTION - Do not attempt to rivet new ball joint to arm).* Tighten nut on suspension arm bumper to 20-35 ft. lbs. and other ball joint retaining nuts and bolts to 28-45 ft. lbs.

Installation: Position upper arm on frame mounting bracket, then install but do not tighten the nuts on inner shaft retaining bolts *(NOTE - "Keystone" type lockwashers must be used on these bolts).* Install adjusting shims on both bolts between inner shaft and mounting bracket (Install the same thickness of shims that were removed from both ends during disassembly). Tighten nuts on both bolts to 65-90 ft. lbs. Position upper ball joint stud in top of wheel spindle then install stud nut and tighten to 80 ft. lbs. Continue to tighten until cotter pin hole and slots line up. Install cotter pin. Install wheel and tire and remove stand from under lower control arm. Tighten bolts on ends of inner shaft to 40-46 ft. lbs. Lubricate upper ball joint (do not lubricate upper arm bushings). Check and adjust front end alignment.

LOWER CONTROL ARM: Removal - Raise car and place stands under frame side members just back of lower arms and under both front wheels. Remove engine splash shields, disconnect stabilizer from lower arms and loosen both outer stabilizer bushing brackets. Remove both inner brackets, then slide one end of stabilizer at a time out of outer bushings. Disconnect lower end of shock absorber and push it up through lower arm. Remove cotter pin from nut on lower end of ball joint stud, then loosen nut two or three turns (do not remove nut from stud at this time). Loosen lower ball joint (procedure is the same as for upper ball joint, see above). Place a jack under lower arm, then remove nut from lower ball joint stud and slowly lower control arm on jack *(CAUTION - On Mercury be careful to prevent coil spring from jumping out of its seat).* Remove coil spring and insulator. Remove lower control arm retaining bolts, sleeve, and shims, and remove arm from car.

Insp cti n: Inspect lower arm for cracks, bends, or other damage, and replace arm if necessary. Check condition of ball joint and socket, bushings, rubber seal on ball joint stud, and rubber bumper on arm. Replace damaged parts.

Lower Arm Bushing Replacement - *(NOTE - Replace both lower arm bushings if either bushing is worn or damaged).* Using bushing removing tools, T54P-3044-A13 and T57P-3044-A (Ford), press both bushings out of arms with an arbor press. Press new bushings into arms with tools T57P-3044-A and T54P-3044-A7 (Ford). Bushing flanges must be at inner sides of arm.

Lower Ball Joint Replacement - *(NOTE* - The ball joint cannot be repaired and must be replaced if damaged). Replace ball joint assembly in same manner as for the upper ball joint (see above), using parts furnished in Kit, Part No. B7A-3050-A. *(CAUTION - Do not attempt to rivet new ball joint to arm).* Tighten nut on suspension arm bumper to 20-35 ft. lbs., and other ball joint retaining nuts and bolts to 28-45 ft. lbs.

Installation: Position lower arm on frame crossmember and install shims as needed between forward arm and frame member to remove all fore and aft motion of control arm assembly. Install pivot sleeve and retaining bolt in each arm but do not tighten bolts. Tape insulator to top of coil spring, then position insulator and spring between upper spring seat and lower arm *(NOTE - Mercury springs require a special procedure for installation. See "Mercury Spring Note" below).* Raise lower arm with a jack and guide lower ball joint stud into bottom of wheel spindle. Install and tighten nut to 70-80 ft. lbs., then continue to tighten nut until cotter pin hole and slots line up. Install cotter pin. Remove jack from under control arm and tighten arm retaining bolts to 40-46 ft. lbs. (make sure arms are in normal load position when bolts are tightened). Pull shock absorber down through coil spring and lower control arm and secure it in place. Connect stabilizer to both lower arms. Coat parts with vegetable soap solution and slide ends of stabilizer into outer bushings. Install inner bushing brackets and tighten all inner and outer brackets to 12-15 ft. lbs. Install engine splash shields. Lubricate lower ball joint (do not lubricate lower arm bushings). Check and adjust front end alignment.

► *MERCURY SPRING INSTALLATION NOTE:* Due to free height of the coil spring being greater than distance between upper and lower spring seats, it is necessary to compress the springs approximately 4" before installation. Install spring in an arbor press (if possible, use a salvage 1957 Mercury lower control arm as a holding fixture to properly retain angled lower end of spring while it is being compressed). Compress spring approximately 4", then fasten chains on sides of spring coils so spring will have a slight curve. Remove from press and install in car, making sure that end coil is fully seated in lower control arm.

FRONT WHEEL SPINDLE: Removal - Raise car until front wheel clears floor, then place a support under lower control arm. Remove wheel and drum. Remove brake backing plate and support it to prevent damage to brake hose. Remove upper and lower ball joints (see above), and remove spindle.

Installation: Reverse removal procedure and note the following: Install brake backing plate and tighten upper retaining bolts to 62-72 ft. lbs. Tighten lower bolts to 25-29 ft. lbs. Check and adjust front wheel alignment.

STABILIZER: *NOTE - Removal & Installation of stabilizer is different on Ford and Mercury as noted below:*

Removal (Ford): Raise car and place supports under both front wheels. Remove engine splash shields and disconnect stabilizer from lower control arms. Loosen both stabilizer outer bushing brackets and remove both inner bushing brackets. Slide one end of stabilizer at a time out of outer bushings.

Installation (Ford): Connect stabilizer to both lower arms. Coat parts with vegetable soap solution and slide ends of stabilizer into outer bushings. Install both inner bushing brackets, and tighten all inner and outer brackets to 12-15 ft. lbs. Install engine splash shields.

Removal (Mercury): Remove engine splash pan and front wheel. Remove two stabilizer to frame mounting brackets and slide left rubber mounting insulator along stabilizer bar about three inches toward center of car. Disconnect stabilizer bar from links and remove rubber insulators from eyes of bar. With front suspension in full rebound, remove bar by moving it out to right of car. The right eye at end of stabilizer bar will just pass over right front brake drum. *NOTE* - It may be necessary to spread coils of left spring slightly to allow left end of stabilizer bar to pass through spring during removal.

Installation (Mercury): Reverse removal procedure. Tighten bracket bolts to 12-15 ft. lbs.

FORD THUNDERBIRD, LINCOLN & CONTINENTAL

Ford Thund rbird (1957)
Linc ln (1957)
Contin ntal (1957)

DESCRIPTION: "Ball-Joint" type of same design used on previous models.

ADJUSTMENTS

CHECKING & ADJUSTING: *ADJUSTMENT NOTE - Due to differences in mounting upper control arm shaft and location of camber & caster adjusting shims, Thund rbird models are adjust d differ ntly than Lincoln & Continental mod ls. S Adjustment data following:*

Tir Inflati n: Linc ln - 24 lbs. (front & rear). **C ntin ntal** - 26 lbs. (front), 24 lbs. (rear). **Th underbird** - 22 lbs. (front & rear).

Steering Axis Inclination: (Thunderbird) 7°7'. (Lincoln) 7°12'14". (Continental) 7°10' with ¾° camber.

Caster: (Thunderbird) Pos. ½° to Pos. 1½°. (Lincoln) 0° to Neg. 1½°. (Continental) Pos. 1° ± ¼°. Caster should not vary more than ½° from side to side. *See "Shimming Procedure" below.*

Camb r: (Thunderbird) Pos. ½° to Pos. 1½°. (Lincoln) 0° to Pos. ¾°. (Continental) Pos. ¾° ± ¼°. Camber should not vary more than ¼° from side to side. *S e "Shimming Procedure" b low.*

T -In: (Thunderbird) 1/16-1/8". (Lincoln) 1/8-3/16". (Continental) 3/32-5/32".

Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be 25° (Thunderbird). With wheels at maximum turning angle, outer wheel is at 26° and inner wheel is at 36° (Lincoln & Continental).

Shimming Procedure: Caster and camber adjustments are made by adding or removing shims between upper control arm mounting shaft and frame mounting bracket. To change caster, remove or add shims at one of the mounting bolts. *(NOTE - On Thund rbird, th adjusting shims ar locat d betw n inn r sid of mounting shaft and frame brack t. On Lincoln & Contin ntal th se shims*

CONTINUED ON NEXT PAGE

THUNDERBIRD, LINCOLN & CONTINENTAL (C ntinu d)

are located between outer side of mounting shaft and frame bracket). On Thunderbird, to **increase positive caster,** add shim at **front** bolt or remove shims at **rear** bolt. On Lincoln & Continental, to **increase positive caster,** add shim at **rear** bolt or remove shim at **front** bolt. To change camber, remove or install equal shim thicknesses at both front and rear mounting bolts. On Thunderbird, for positive camber increase, add shims equally at both bolts. On Lincoln & Continental, remove shims equally at both bolts. A 1/16" shim change at either bolt will change caster ½°. A 1/16" shim change at both bolts will change camber ¼°. Tighten control arm mounting shaft bolts to 65-90 ft. lbs. (Thunderbird), 75-90 ft. lbs. (Lincoln & Continental).

► *ADJUSTING SHIM THICKNESS NOTE:* Difference in thickness of shim pack at front and rear bolts must not exceed 1/8". Total shim pack thickness at each bolt must not exceed 9/16".

RIDING HEIGHT: (Lincoln) - 4.18-4.65" measured vertically from underside of frame to top of lower control arm adjacent to bumper.

Front Spring Application

Model	Spring No.
Thunderbird	B5A-5310-B
Lincoln, (Exc. Conv. & Air. Cond.)	LD-5310-K
Lincoln (Conv. & Air Cond. Cars)	LD-5310-L
Lincoln (Heavy Duty)	I-500915
Continental	4050384

REMOVAL & INSTALLATION

SHOCK ABSORBER: Removal - Remove nut and washer (also rubber bushing and seat washer on Thunderbird) attaching upper end of shock absorber to frame. Disconnect bracket on underside of lower control arm and remove shock absorber through hole in spring seat.

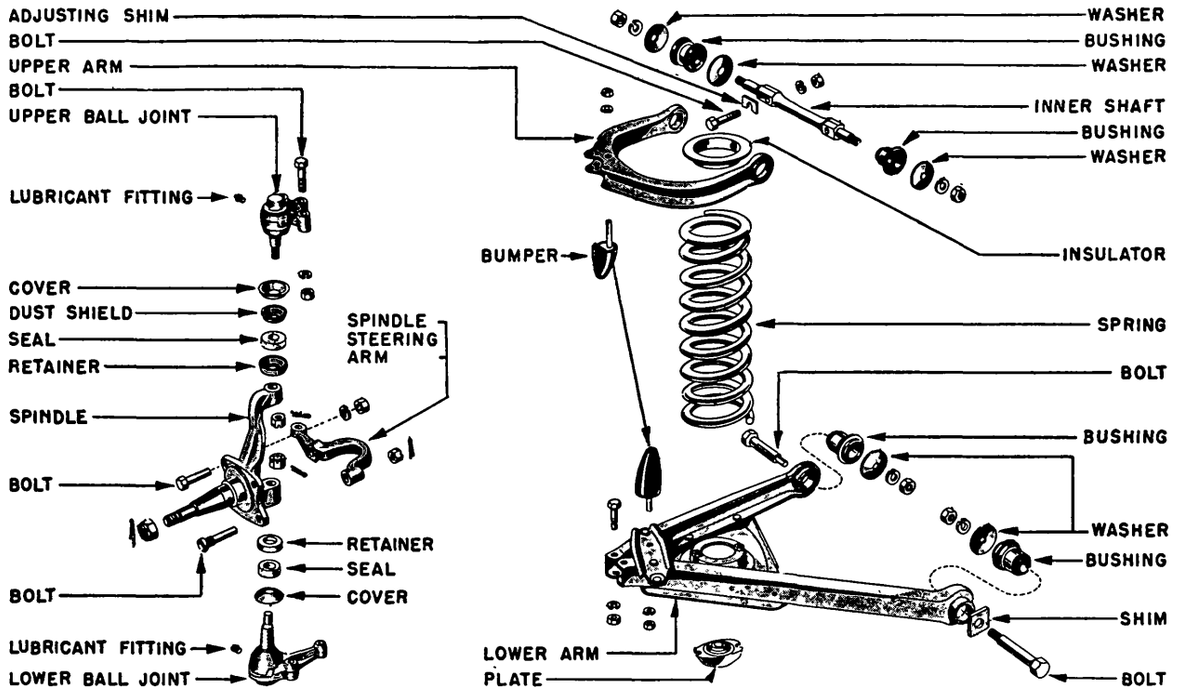
Upper Bushing (Lincoln & Continental) - This bushing is notched in hole in frame and can be removed easily by hand.

Lower Bushing (Lincoln & Continental) - To replace this bushing use Tool 4621-L to support eye of shock absorber and press it in or out with a 1" socket and an arbor press.

Installation: Reverse removal procedure and tighten mounting bracket or plate bolts to 10-13 ft. lbs. (Lincoln & Continental), 13-15 ft. lbs. (Thunderbird).

COIL SPRING REPLACEMENT: *See "Lower Control Arm" below.*

LOWER CONTROL ARM: Removal - Raise front of car and place stand under each frame side rail to rear of lower control arm. Remove wheel and brake drum as an assembly. Remove shock absorber (see above), and disconnect stabilizer bar from lower arm. Loosen lower ball joint to wheel spindle stud nut two turns and loosen ball joint *(see "Ball Joint Removal" below).* Place a jack under lower control arm and raise arm until rebound bumper on upper arm is clear of frame. Remove nut from lower ball joint stud and lift spindle up and off the stud. Lower jack until spring tension is relieved and spring



THUNDERBIRD, LINCOLN, CONTINENTAL FRONT SUSPENSION ASSEMBLY (TYPICAL)

can be removed. Remove spring, insulator and retainer ring (note location of these parts to insure correct reassembly). To remove lower control arm, take out bolts attaching arm to frame. Inspect bushings on inner end of each member and replace if necessary.

Bushing Replacement - Press bushings from control arms using an arbor press and the following tools: 3069, 3069-F, & 3069-J (Lincoln & Continental), T54P-3044-A13, & T54P-3044-A6 (Thunderbird). Install bushings in control arm with tools 3069 & 3069-A (Lincoln & Continental), T54P-3044-A6 & T54P-3044-A7 (Thunderbird). Press bushings into arm until shoulder ribs of bushings bottom on control arm. *(CAUTION* - Do not attempt to press bushings beyond edge of shoulder ribs or raised section of outer sleeve. Under no circumstances should only one bushing be replaced).

Installation: Install lower arm rear leg-to-frame crossmember and tighten attaching nut to 55-75 ft. lbs. (Lincoln & Continental), 40-46 ft. lbs. (Thunderbird). Add enough shims between forward arm and frame to fill the existing space, and tighten the nut finger tight *(NOTE - Shim pack at this point should not exceed ½").* Install bolt in forward arm and tighten nut finger tight, then loosen nut on rear bolt to a finger tight position. With arm in curb load position (approximately horizontal, with outer end slightly lower than inner), tighten nuts to 55-75 ft. lbs. (Lincoln & Continental), 40-46 ft. lbs. (Thunderbird). Place coil spring and upper rubber insulator in position, then place a jack under control arm and compress the spring, making sure that both upper and lower ends of spring are properly seated. Guide spindle boss over ball joint stud, install nut and tighten to 70-90 ft. lbs., continuing to tighten nut until cotter pin hole is lined up with slot in locknut. Remove jack from under control arm, and install shock absorber. Secure stabilizer to lower control arm. Install wheel and drum assembly and adjust front end alignment.

BALL JOINT (UPPER & LOWER): Removal - Ball joints are furnished as assemblies except for seals and related parts assembled on ball joint stud. Raise front of car with a jack placed under lower control arm, then place a support under frame side rail to rear of control arm. Remove front wheel and cotter pin in ball joint stud *(NOTE* - If both ball joints are to be removed, free the lower stud first). Loosen stud nut approximately two turns and install Tool 3006-A with the screw end resting against lower stud nut. Turn screw of tool and apply sufficient pressure to place ball joint under tension. Strike the spindle sharply at a point opposite the stud bore to pop it loose. Increase tension and strike again if necessary *(CAUTION - Spindle or tool may be damaged if pressure only is used to free stud).* Repeat this procedure with other stud if necessary. Remove ball joint from control arm by removing the attaching screws. Remove retainer, seal, and covers from stud. Inspect parts for damage and replace if necessary. If new rubber seals are being installed, make sure they are pushed down into retainer cup before cup is installed. Reassemble all seal parts in original position.

► *CAUTION: Do not wash ball joint assemblies with solvent which may remove lubricant.*

CONTINUED ON NEXT PAGE

THUNDERBIRD, LINCOLN & CONTINENTAL (C ntinu d)

Installati n: Reverse removal procedure and note the following: Tighten upper stud nut to 60-80 ft. lbs. and lower stud nut to 70-90 ft. lbs., then continue to tighten until cotter pin hole lines up with slot. Tighten ball joint assembly mounting bolts to 28-45 ft. lbs.

UPPER CONTROL ARM: Removal - Place jack under lower control arm near ball joint mounting and raise lower arm until some of the tension has been removed from upper control arm. Remove wheel and tire assembly. Wire spindle to frame to avoid damage to brake hose. Remove cotter pin from ball joint stud and loosen nut approximately two turns. Loosen ball joint stud *(see "Ball Joint Removal" above)*, then remove ball joint nut. Remove bolts securing inner shaft to frame *(NOTE* - Check and record amount of shims removed from between control arm mounting shaft and frame). Remove upper control arm.

Bushing Replacement (Lincoln & Continental) - Install Tool 3044-B on inner shaft and place Tool 3069 over bushing. Press bushing from arm. Remove mounting shaft and steel washer. To remove the opposite (double shoulder bushing), on rear upper arm, insert Tool 3069-F into flange of arm, then place Tool 3069 over bushing and into recess of Tool 3069-F. Center bushing over Tool 3069-G and press out *(NOTE* - Tool 3069-G will shear rubber until steel shell is contacted). To install double shouldered bushing in rear of upper arm, lubricate rubber portion of bushing for easier installation. Position Tool 3069 on inner side of rear arm. Install bushing in hole (entering it from outer side of arm), and position Tool 3068 over bushing. Press bushing into arm until shoulder stop is reached. Install long machined end of inner mounting shaft, with washer, into bushing. Install bushing in front arm, positioning it over end of shaft and pressing it into place with Tool 3068. With both bushings in place, install nut and washer on each end of shaft and tighten finger tight. Position shaft in suspension arm so that holes are parallel with shaft and tighten nuts to 55-75 ft. lbs. *CAUTION - Under no conditions should only one bushing be installed.*

Bushing Replacement (Thunderbird) - Install bushing remover Tools T54P-3044-A6 & T54P-3044-A5 in arbor press and press rear bushing out of arm. Install rear bushing with Tools T54P-3044-A6 & T54P-3044-A9. Bushing flange should be at outer side of arm. Insert end of mounting shaft in rear bushing, then press new front bushing into arm using Tool T54P-3044-A8. Install bolts and washers on both ends of shaft, but do not tighten bolts until upper arm is installed on the mounting bracket.

HUDSON, NASH, RAMBLER

Hudson, Nash, Rambl r (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*LOWER CONTROL ARM THROUGH BOLT TIGHTENING CAUTION:* The lower control arm through bolt which also acts as the front shock absorber lower anchor is a special heat treated bolt that must be properly tightened to 90-95 ft. lbs. *DO NOT REPLACE THIS BOLT WITH ONE THAT IS NOT HEAT TREATED.*

►*POWER STEERING TOE-IN ADJUSTMENT NOTE:* When adjusting toe-in on Power Steering cars, operate engine which will permit steering pump oil pressure to center valve spool in control valve

DESCRIPTION: Similar to design used on previous models. Upper and lower control arms are connected to steering knuckles by a trunnion assembly and coil springs are mounted between spring seat attached to top of steering knuckle and seat in wheelhouse panel. Shock absorbers are mounted between lower control arm and bracket on wheelhouse panel. Eccentric bolts are used at inner ends of lower control arm for camber and caster adjustment.

ADJUSTMENT

CHECKING & ADJUSTING: *ADJUSTMENT NOTE - Eccentric bolts used at inner ends of lower control arm for camber and caster adjustment on all models.*

Tir Inflati n: Hudson & Nash - 24 lbs. (front), 20 lbs. (rear). **Rambl r** - 24 lbs. (front & rear).

St ring Axis Inclinati n: 6½° (All Models). Not adjustable.

Cast r: (Exc. Pow r St ring) - 0° to Pos. ½° (Pos. ½° desired). **(Pow r St ring)** - Pos. ½° to Pos. 1° (Pos. 1° desired). *See "Camber & Caster Eccentric Bolt Adjustment" below.*

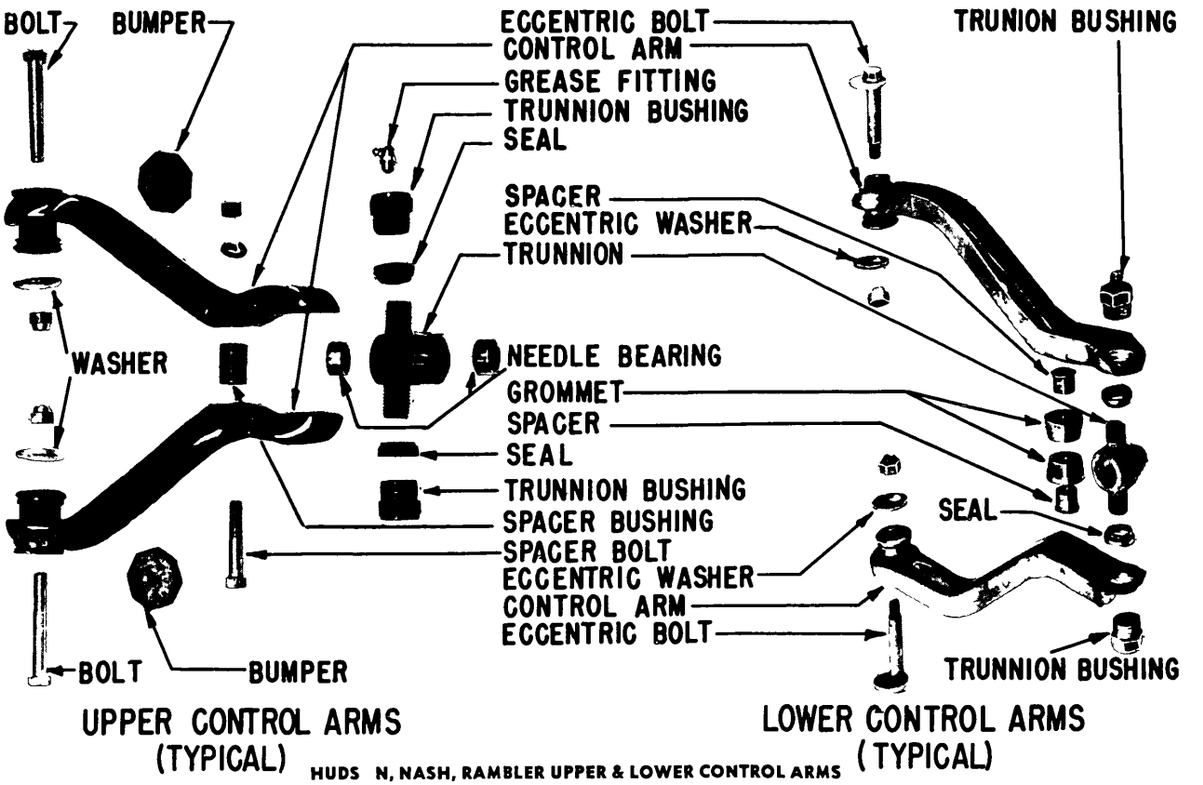
Camber: Neg. ¼° to Pos. ¼° (0° desired), all models. *Se "Caster & Camber Eccentric Bolt Adjustment" below.*

►*CASTER & CAMBER ECCENTRIC BOLT ADJUSTMENT:* Lower control arm attaching bolts are provided with eccentric washers, one being attached to bolt and the other keyed to threaded end of bolt. Loosening the attaching bolt nut will permit turning the bolts and eccentrics for adjustment of camber and caster. Adjust caster first, using one bolt as necessary, then adjust camber, turning both bolts equally as required.

Toe-In: 1/16" to 3/16". Loosen clamps and rotate adjusting tube on each front wheel tie-rod equally in opposite directions. To adjust steering wheel for correct spoke position after toe-in adjustment, rotate both tubes equally in the same direction.

►*TOE-IN ADJUSTING TUBE CLAMP POSITIONING FOR MAXIMUM CLEARANCE:* **(Series 10 & 20)** - Open end of clamp should be to front and bolt head up. **(Seri s 30)** - Open end of clamp should be down with bolt head

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HUDSON, NASH, RAMBLER UPPER & LOWER CONTROL ARMS

HUDSON, NASH, RAMBLER (Continued)

to front. **(Series 80)** - Open end of clamp should be to rear with bolt head up.

To -Out on Turns: (Rambler Series 10, 20, & 30). With inner wheel at 25°, outer wheel should be 22°. **(Hudson & Nash Series 80).** With inner wheel at 25°, outer wheel should be 21¾° (with power steering), 20¼° (without power steering). Not adjustable.

REMOVAL & INSTALLATION

FRONT COIL SPRING: *(NOTE* - Spring seats now have ears at opposite side into which special hooks, Tool No. 3200378 can be installed for spring removal and installation).

R moval: Raise rear of car on side opposite from which spring is to be removed and install hooks, Tool No. 3200378 in holes of ears on spring seats (if necessary, additional compression of spring can be obtained by leaning on front fender over spring). Lower rear of car, then raise front of car with a jack placed under frame at point that will allow wheel and suspension assembly to hang freely. Coil spring, upper and lower spring seats, and insulator can then be lifted out of spring support.

Installation: If original spring is to be installed, reverse removal procedure. If a new spring is to be installed, install upper and lower cushions and spring seats on spring. Align holes in ears on upper and lower spring seats and compress spring in an arbor press to a point where hooks can be installed. Install springs on spring support, lower front of car, then raise rear of car at side opposite spring being installed. Remove hooks from spring seats.

Front Coil Spring Application

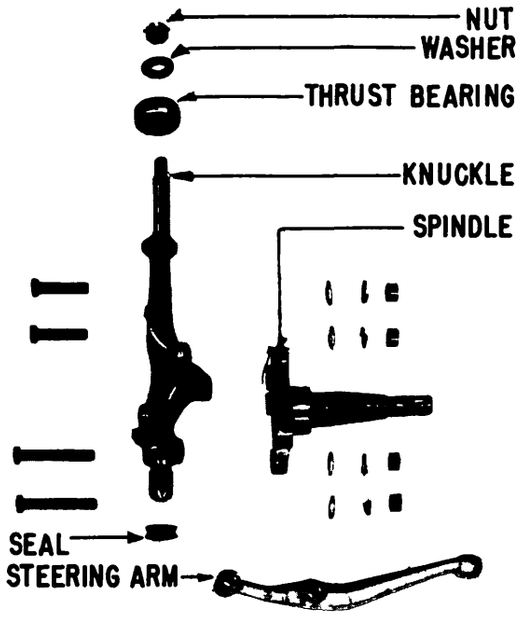
M del	Part Nos. Right	Left
Series 10 (Std.)	3144874	3147585
Series 10 (Air Cond.)	3147585	3147585
Series 20 & 30 (Std.)	3150589	3150588
Series 20 & 30 (Air Cond.)	3150589	3150589
Series 80 (Synchro-mesh) ①	3150590	3150590
Series 80 (Hydra-Matic) ②	3150591	3150591

① - On Air Conditioned cars use No. 3150591.
② - On Air Conditioned cars use No. 3152622.

UPPER CONTROL ARM: Removal - Remove front coil spring, (see above). Disconnect inner ends of control arm assembly from wheelhouse bracket and remove control arm spacer bolt and spacer. Remove bushings from both sides of trunnion and remove control arms.

Installation: Reverse removal procedure, making sure that trunnion is centered between front and rear control arms.

LOWER CONTROL ARM: Removal - Remove front coil spring (if not previously removed). Disconnect inner ends of control arms by removing eccentric bolts and washers at wheelhouse bracket. Remove shock absorber mounting bolt at lower end and remove spacers and grommets. Remove both trunnion bushings, then remove control arms.



STEERING KNUCKLE ASSEMBLY

Installati n: Reverse removal procedure, making sure that trunnion is centered in lower control arm. Tighten shock absorber mounting bolts to 90-95 ft. lbs. *(CAUTION - The shock absorber mounting bolt is a special heat treated bolt and must not be replaced with a standard bolt).*

► *UPPER & LOWER CONTROL ARM RUBBER BUSHING REPLACEMENT NOTE:* These bushings are not furnished separately. If replacement is necessary, the complete assembly must be installed.

STEERING KNUCKLE: Rem val - Remove wheel and brake drum assembly, then remove brake backing plate. Remove front coil spring (see above). Remove spacer bolt from upper control arm and shock absorber mounting bolt, spacers, and grommets from lower control arm. Remove trunnion bushings from upper and lower trunnions. Remove steering knuckle assembly after disconnecting steering arm.

Disassembly: Remove nut and washer securing spring lower support from knuckle and remove support and thrust bearing. Unscrew lower trunnion from knuckle and remove trunnion seal.

Reassembly: Reverse disassembly procedures and note the following: Screw lower trunnion onto steering knuckle until there is approximately ¼" clearance between shoulder on knuckle and lower trunnion.

Installation: Reverse removal procedure.

OLDSMOBILE

Oldsmobile (1957)

DESCRIPTION: New "Pivot Poise" suspension having ball joints as the connection between upper and lower control arms and the steering knuckle. Front coil springs are mounted between spring seat on lower control arm and spring seat in frame crossmember. Direct acting shock absorbers are mounted within coil springs. Camber and caster adjustment is made by varying the shim pack located between upper control arm inner shaft and mounting bracket on frame crossmember.

ADJUSTMENT

CHECKING & ADJUSTING: Before checking or adjusting front wheel alignment, inflate tires to recommended pressure, check and adjust front wheel bearings, and check front wheel and tire assemblies for runout. Bounce front of car several times and allow it to come to its normal position. Check for erratic shock absorber action.

Tire Inflation: (With Air Conditioning) 24 lbs. (front), 20 lbs. (rear). (All Others) 22 lbs. (front), 20 lbs. (rear).

Steering Axis Inclination: 6° at 0° camber. Not adjustable.

Caster: 0° to Pos. ¾°. Maximum variation between wheels must not exceed ½°. *See "Shimming Procedure" below.*

Camber: Neg. ¾° to Pos. ¾°. Maximum variation between wheels must not exceed ½°. *See "Shimming Procedure" below.*

T -In: 1/16" to 1/8". To adjust, loosen clamp bolts at each end of steering tie rod adjustable sleeves. With steering wheel set in straight ahead position, rotate sleeves as necessary to obtain correct toe-in. Position tie rod-to-relay rod ball studs to bottom of slot in relay. Position inner clamps so edge of clamp is not adjacent to slot in adjusting sleeve.

Toe-Out on Turns: With outer wheel at 20°, inner wheel should be 23° ± ½°. Not adjustable.

Shimming Procedure: Caster and camber adjustments are made by adding or removing shims between upper control arm mounting shaft and frame mounting bracket. To change shims, raise car to remove weight from front wheels. Loosen top and rear fasteners on fender filler plate aprons to gain access to control arm shaft mounting bolts, then loosen the bolts. **Additi n** of shims at **front** bolt, or **removal** of shims at **r ar** bolt, will **incr as positive caster. Removal** of shims at **fr nt** bolt, or **addition** of shims at **rear** bolt, will **d cr as p sitiv caster.** To change camber, add or remove shims of equal thickness at both mounting bolts. **Additi n** of shims at **both** bolts will **increase camb r. R moval** of shims at **both** bolts will **decrease camb r.** See "Shim Selection" table below for approximate amount of change made by adding or removing shims. After shims have been installed or removed as necessary, tighten control arm inner shaft mounting bolts to 85-110 ft. lbs. Check adjustment.

Shim Selecti n Table

Shim Siz	Caster Change (Shim at front b lt)	Camb r Chang (Shim at both b lts)
.020"	3/8°	1/8°
.060"	1 1/8°	3/8°
.120"	2 1/4°	3/4°

CONTINUED ON NEXT PAGE

OLDSMOBILE (C nt.)

REMOVAL & INSTALLATION

COIL SPRING REPLACEMENT: *See "Lower Control Arm" below.*

1957 Spring Application

Series 88 & Super 88

Mod l	Right Part No. ②	Left Part No. ②
2 & 4 Dr. Sed. (S-M) ①	568862	568863
Holiday Cpe. & Sed. (S-M) ①	568862	568863
2 & 4 Dr. Sed. (H-M) ①	568863	568864
Holiday Cpe. & Sed. (H-M) ①	568863	568864
Convertible (All)	568865	569994
Air Conditioned Cars	568865	569994
Police & Export Cars	568865	569994
Sed. Wgn. & Holiday Wgn. ①	571096	568865

Series 98

M d l	Right Part No. ②	Left Part No. ②
4 Dr. Sed., Holiday Cpe. & Sed. ①	568864	571065
Convertible (All)	568865	569994
Air Conditioned Cars (Exc. Conv.)	569994	571067
Export Cars	568865	569994

(S-M) - Synchro-mesh Trans. **(H-M)** - Hydra-Matic.

① - Without Air Conditioning.

② - Spring Color Code: No. 568862 (Brown & Blue). No. 568863 (Brown & Red). No. 568864 (Brown & Yellow). No. 568865 (Brown & Gray). No. 569994 (Brown & Green). No. 571096 (Brown & Brown). No. 571065 (Brown & Purple). No. 571067 (Brown & Orange).

► *COLOR CODE NOTE:* Low load range springs are identified by two daubs each color paint. High range are identified by one daub of each color.

► *SPRING REPLACEMENT CAUTION: Both sides of car must have low load range springs or both sides must have high load range springs.*

SHOCK ABSORBER: Upper and lower shock absorber mounting bushings are integral with the shock, and, if replacement is necessary, the complete shock absorber assembly must be replaced.

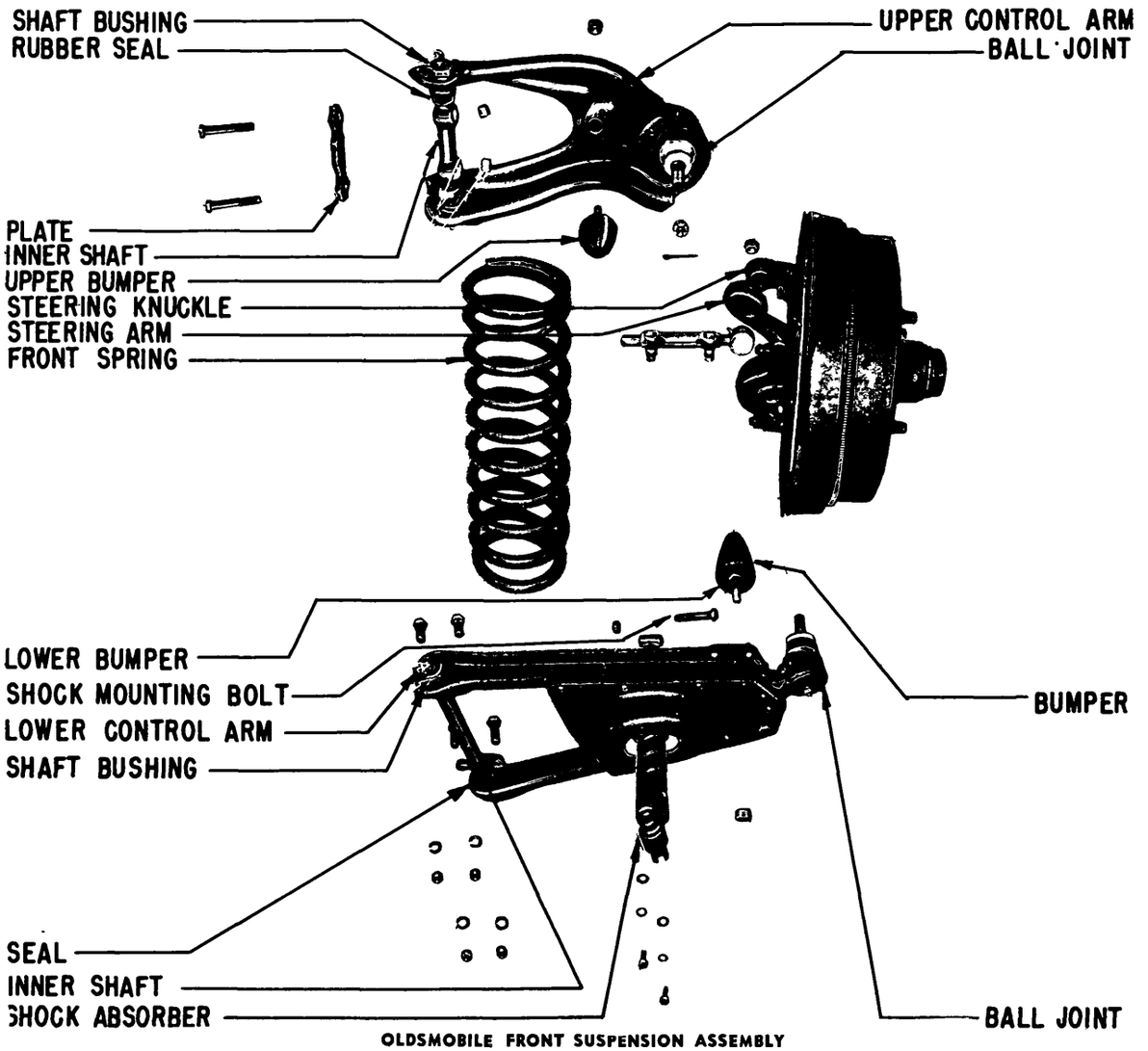
R m val: Remove pivot bolt from upper end of shock absorber, then remove capscrews and lockwashers attaching shock to lower control arm. Remove shock absorber out through lower control arm spring seat.

Installati n: Reverse removal procedure. Tighten pivot bolt to 60-70 ft. lbs. and capscrews at lower end to 15-25 ft. lbs.

STABILIZER: R m val - Disconnect each side of stabilizer linkage by removing nut from top of link bolt; pull out bolt from bottom of linkage, and remove retainer, grommets, and linkage. Remove stabilizer bracket-to-frame bolts and remove stabilizer bar, rubber bushings, and brackets.

Installati n: Reverse removal procedure and note the following: Rubber bushings should be positioned squarely in brackets. Tighten stabilizer link nut to 8-18 ft. lbs., and bracket bolts to 25-35 ft. lbs.

UPPER CONTROL ARM ASSEMBLY: Removal - Raise front of car and support lower control arm with jack stands, placing the stands between lower spring seats and ball joints. Remove front wheel and loosen upper control arm ball joint from steering knuckle *(see "Ball Joints" below).* Remove ball joint stud and pull stud free of knuckle. Support hub and drum assembly to prevent weight damaging brake hose *(NOTE* - If inner control arm shaft is to be removed, loosen shaft bushings at this time). Remove inner control arm shaft-to-frame attaching bolts, nut, lock plate, and wheel alignment shims (retain shim pack found at each bolt so it may be replaced in the same location). Remove arm assembly and inner shaft from car.



OLDSMOBILE FRONT SUSPENSION ASSEMBLY

Disass mbly: *(NOTE* - The ball joint assembly is riveted to control arm and should not be removed. If necessary to replace either the control arm or ball joint, the entire assembly should be replaced). Remove control arm inner shaft bushings and shaft from control arm.

R ass mbly: Apply chassis lubricant to threads of inner shaft and install rubber seals. Position inner shaft in control arm and, while holding shaft centered, start bushing on shaft and into arms. Tighten bushings until they are solidly seated. Rotate inner shaft so that shaft bolt holes are centralized in control arm (centerline of bolt hole should be approximately 1 11/16" from edge of boss on arm).

Installation: Install control arm inner shaft on frame and install attaching bolts, nuts, and lock plate with the original alignment shims installed between inner shaft and mounting bracket on frame. Tighten nuts to 100-110 ft. lbs. Remove temporary support from hub and drum assembly, then connect ball joint to steering knuckle.

CONTINUED ON NEXT PAGE

OLDSMOBILE (C nt.)

Tighten ball joint stud nut to 40 ft. lbs. (minimum) and install cotter pin (tighten nut further as necessary to install cotter pin). Install wheel and lower car. Check alignment and adjust if necessary.

LOWER CONTROL ARM ASSEMBLY: *(NOTE* - If ball joint is suspected of being worn, check by attempting to chuck top of wheel in and out with weight of car on wheels. Under other conditions the lower ball joint will appear to be worn regardless of its actual condition).

Removal: Raise front of car and support with floor stands. Remove wheel assembly and disconnect stabilizer bar from lower control arm. Remove shock absorber (see above). Install Tool 6509 in shock absorber mounting hole in spring seat. Raise floor jack until it supports lower control arm between spring seat and ball joint. Remove lower ball joint from control arm *(see "Ball Joints" below).* Slowly lower floor jack until spring is fully extended and remove spring. Remove control arm inner shaft-to-crossmember attaching bolts and remove assembly from car.

Disassembly: *(NOTE* - The ball joint assembly is riveted to control arm and should not be removed. If necessary to replace either the control arm or ball joint, the entire assembly should be replaced). Remove inner shaft bushings and shaft from control arm assembly.

R assembly: *(NOTE* - If a new lower control arm is to be installed, the bushings must cut their own thread in the new arm. To prevent arms from moving inward during bushing installation, Tool J-1052 must be installed between front and rear arms until distance between inner surfaces of inner ends of control arm assembly is 11½". If the old arm is to be installed it will not be necessary to use expander tool). Apply chassis lubricant to inner shaft threads and install rubber seals on shaft. Position inner shaft in control arm, and while holding shaft centered, start bushings on shaft and into arms. *(NOTE* - If threads are being cut in new control arm assembly, apply white lead to bushing). Tighten bushings until they are solidly seated against shoulder. If expander used, remove it from the assembly and rotate shaft so bolt holes are centralized in control arm (centerline of bolt holes should be approximately 1½" from edge of bushing boss on arm).

Installation: Connect control arm inner shaft to frame crossmember and tighten attaching bolts to 65-75 ft. lbs. *(CAUTION - Right and left coil springs are not interchangeable. See "Spring Application" above).* Tape spring rubber insulator to top of coil spring *(NOTE* - Top of spring is identified by a flat coil which will allow insulator to seat squarely). While holding spring and insulator against pilot in frame crossmember, tilt spring so it will pilot over Tool 6509 in lower control arm. Rotate spring so the end of bottom coil will index with edge of hole in control arm spring seat (the coil should not cover any portion of hole). Position floor jack between spring seat and ball joint. Chain upper control arm to base of jack. Raise lower control arm until ball joint is tight in steering knuckle. Install ball joint stud nut and tighten to 40 ft. lbs. (minimum) and install cotter pin (tighten nut further as necessary to install cotter pin). *(NOTE - A screwdriver slot is provided in ball joint stud to prevent stud turning when tightening nut).* Remove Tool 6509 and install shock absorber. Connect stabilizer to lower control arm and install wheel and tire. Check front end alignment.

BALL JOINTS: *(NOTE* - Ball joints are riveted to control arms and should not be removed).

Removal (From Steering Knuckle): Raise front of car and place jack stands under lower control arm at a point between spring seat and ball joints. Proceed as follows:

Upper Ball Joint - Loosen ball joint stud nut a few turns, then install Removing Tool 6446 with hollow end of tool positioned over lower ball joint stud nut. Rotate screw on tool and press ball joint loose from steering knuckle. Remove tool and ball joint stud nut.

Lower Ball Joint - Loosen ball joint stud nut a few turns, then proceed as for upper ball joint (above), reversing the tool position.

STEERING KNUCKLE: Removal - Raise front of car and place jack stands under lower control arm at a point between lower spring seat and ball joint. Remove wheel and drum assembly. Remove brake backing plate without disconnecting brake hose. Leave plain arm connected to tie rod end. *(NOTE* - Support backing plate to avoid damage to brake hose). Remove cotter pin from upper ball joint, then remove upper and lower ball joints *(see "Ball Joints" above).*

Installation: Connect lower ball joint to steering knuckle and tighten stud nut to 40 ft. lbs. minimum (tighten further as necessary to install cotter pin). Repeat this procedure with upper ball joint. Install brake backing plate and plain arm to steering knuckle and tighten bolts to 55-60 ft. lbs. Install wheel and drum assembly. Lower car to floor and check front end alignment.

STUDEBAKER & PACKARD

Studebaker, All Models (1957)
Packard Clipper (1957)
Golden Hawk (1957)

DESCRIPTION: Suspension design is the same as used on previous Studebaker models with the exception that front coil springs used on sedan models are the "variable rate" type having the coils closer together at upper end. Control arm outer pivot pin is eccentric and caster and camber adjustments are made at this point.

ADJUSTMENT

CHECKING & ADJUSTING: Before checking or adjusting front wheel alignment, inflate tires to correct pressure, check adjustment of front wheel bearings and check steering gear and linkage for excessive looseness. Make the necessary corrections.

Tire Inflation: (Exc. Sta. Wgn.) - 24 lbs. (front), 20 lbs. (rear). **(Station Wagon)** - 24 lbs. (front & rear).

Kingpin Inclination: 6° at 0° camber. Not adjustable.

Caster: Neg. 1° to Neg. 2½° with not more than ¾° variation between wheels. *(NOTE - Adjust caster before making camber adjustment).* To adjust caster, loosen king pin clamp bolt, then remove lubrication fitting from rear bushing at upper control arm outer pin. Insert an Allen Wrench into pin and turn it until proper caster is obtained (a full turn will change caster ½°).

Camber: 0° to Pos. 1° (½° greater camber is desired on left side). To adjust camber (after caster adjustment completed), turn outer pivot pin using an Allen Wrench to obtain desired setting. *(NOTE - ½ turn of the pin covers entire range of camber adjustment).* Tighten clamp bolt and install lubrication fitting.

Toe-In: 1/16" to 1/8". Adjust as follows: With steering gear cam lever shaft on high spot of cam (steering wheel spoke straight down) and left front wheel in straight ahead position (adjust left hand tie rod to bring wheel into straight ahead position if necessary), adjust **right hand** tie rod to obtain desired setting.

Toe-Out on Turns: With outer wheel at 20°, inner wheel should be 22½° to 23½°. Not adjustable.

REMOVAL & INSTALLATION

STABILIZER SHAFT: Removal - Remove capscrews holding shaft to lower control arms and pull down and outward to free shaft clips from slots in control arms. To remove shaft bushings and brackets, locate split in bushing, then spread and remove bushings and brackets from shaft.

Installation: Spread bushings and install them on stabilizer shaft. When installing stabilizer shaft, place shaft in position against control arms with bracket clips in slots in control arms. Using a pipe wrench, pull lower end of bracket under control arm, align hole in bracket with hole in lower control arm, install attaching screw, lockwasher, and nut. Install the remaining brackets in the same manner.

FRONT COIL SPRING: Removal - Raise car and support it with stands under frame just to rear of engine rear support crossmember (be sure car is high enough for lower control arm to clear floor when released). Place a roller jack under center of lower control arm inner shaft and raise jack so it just contacts shaft. Remove front shock absorber (see below), and disconnect stabilizer shaft from control arm. Remove the inner shaft-to-crossmember retaining bolts, then release jack slowly, and lower control arm until spring is unloaded. Remove jack and swing control arm outward, lifting spring off its seat on control arm. Remove lower rubber spring pad from control arm.

Installation: Place shock absorber mounting bolt in position on lower control arm, then place lower spring pad on spring seat. Position spring on upper spring seat, and while holding spring so that it remains seated, swing control arm inward, seating spring on control arm seat. Position roller jack under center of inner shaft and slowly lift jack to compress spring. Align holes in inner shaft and holes in crossmember flange with a drift pin, and continue to lift inner shaft until attaching bolts can be installed. Tighten bolts to 32-37 ft. lbs.

CONTINUED ON NEXT PAGE

STUDEBAKER & PACKARD (C ntinued)

1957 Spring Application

Model (Champion)	Part No.
Custom Sed., Coupe, & Hard Top	1539500
Deluxe & Regal Sedan	1541865
Station Wagon	526133
Heavy Duty (Exc. Station Wagon)	526129
Model (Commander & President)	**Part No.**
Sedan	1541866
Coupe & Hard Top	1539501
Station Wagon	526130
Heavy Duty (Exc. Station Wagon)	526130
Air Conditioned Cars	526122
Model (Golden Hawk)	**Part No.**
Hard Top	1539501
Model (Packard Clipper)	**Part No.**
Sedan	1541867
Station Wagon	526130
Heavy Duty (Exc. Station Wagon)	526130

LOWER CONTROL ARM: Removal - Remove front coil spring (see above), and front wheel assembly. Remove threaded bushings from outer end of control arm and remove tapered lock pin through outer pin by driving it upward with a pin punch. Using a brass drift, drive outer pin out of steering knuckle support and remove control arm.

Disassembly: To remove rubber bushings from control arms, place Tool J-5472-4 over one insulator and screw the ½" x 2½" capscrew into other end of shaft. Turn inner shaft on control arm so that lugs on shaft contact outer shell of lower insulator, and install Tool J-5472-6 to prevent distortion of control arm. Using an arbor press, move inner shaft down so that lugs on shaft contact outer shell of lower insulator. Continue to press until outer shell is flush with flange on control arm. Place control arm in a vise, gripping near the partly removed insulator, and knock the insulator the rest of the way out with a hammer and blunt chisel. Remove capscrew from inner shaft and install it in other end of shaft, then using the same tools as for opposite end, remove second bushing in same manner.

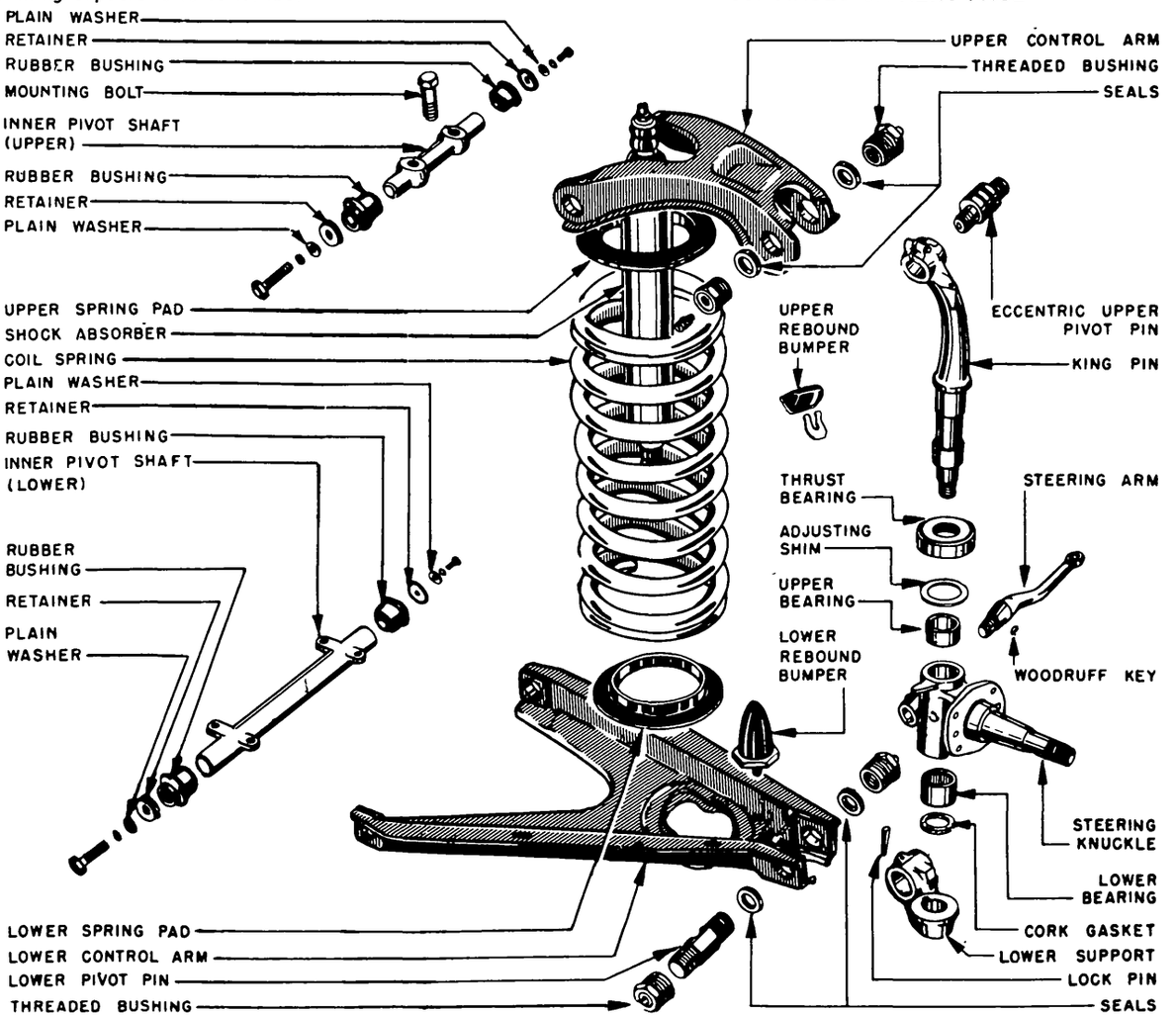
Reassembly: Insert one end of inner shaft in one arm of lower control arm, then install opposite end in other arm. Place Tool J-5472-6 in position between ends of control arm. Start rubber bushings in holes at either end of control arm, then place Tool J-5472-1 in position on each bushing, and using an arbor press, force both bushings in place until shoulder on outer sleeve of bushing is seated against control arm *(CAUTION - Do not attempt to seat flange of bushing on control arm).* Install bushing caps, flat washers, lockwashers, and capscrews *(NOTE* - Tighten these capscrews to 65 ft. lbs. after control arm has been installed on car and weight of car is on springs).

Installation: *(NOTE - Outer ends of lower control arm must be spread .015" before installing outer pin and thread d bushings. Determine this dimension by adjusting calipers to fit over outer end of control arm adjacent to bushing holes with a .015" feeler gauge inserted between outside surface of control arm and one prong of calipers).* After setting calipers, position outer end of lower control arm at lower steering knuckle support and install the outer pin, with a grease seal on pin on each side of steering knuckle support. Using a screwdriver in slot provided in end of outer pin, turn pin and align slot at center of outer pin and hole of lower knuckle support and install lock pin. Install spreader Tool J-2044 between inner surfaces of outer ends and spread the outer ends until the outside dimension is equal to caliper setting. Centralize outer end of control arm on outer pin, then install bushings and tighten to 170 ft. lbs. minimum. Remove spreader tool and make sure control arm turns freely on outer pin. Complete installation by installing coil spring (see above). *NOTE - If new bushings have been installed on inner shaft, tighten retaining capscrews to 65 ft. lbs.*

UPPER CONTROL ARM: Rem val - Raise and support car at outer end of lower control arm. Remove front wheel assembly. Remove threaded bushings from upper control arm outer pin. Mark top front of inner shaft so that it can be installed in the same position *(CAUTION - Holes in control arm inner shaft are drilled off shaft centerline and turning the shaft over will change camber setting).* Remove bolts and nuts retaining inner shaft to frame bracket (be careful not to drop bolts or nuts into front crossmember). Shift upper control arm to one side, turn the arm and lift it off end of pin, then remove arm by slipping it off other end of pin.

Disassembly: Install Tool J-5472-25 on inner shaft and insert the two short capscrews through tool and inner shaft, then install the two nuts to hold tool in position. Insert Tool J-5472-5 between inner surfaces of control

CONTINUED ON NEXT PAGE



STUDEBAKER & PACKARD FRONT SUSPENSION ASSEMBLY

STUDEBAKER & PACKARD (C ntinu d)

arms adjacent to inner shaft holes. Thread a 3/8" x 2½" capscrew into end of inner shaft and install the complete assembly in an arbor press so one end of inner shaft rests on Tool J-5472-3. Press on capscrew in end of inner shaft until Tool J-5472-25 has pushed shell of bushing to a flush position. Invert control arm in press and put capscrew in other end of shaft, then press second bushing to a flush position. Remove control arm from press and knock the bushings out the rest of the way with a hammer and blunt chisel.

R assembly: Insert one end of inner shaft in one arm of lower control arm, then install opposite end in other arm. Place Tool J-5472-5 in position between ends of control arm. Start a rubber bushing in each hole at end of control arm, then place Tool J-5472-2 in position on each bushing, force bushing into place using an arbor press, until shoulder on outer sleeve of bushing is seated in control arm. Install bushing cap, washer, lockwasher, and capscrews. *(NOTE* - Tighten these capscrews to 32-37 ft. lbs. after control arm has been installed on car and weight of car is on springs).

Installation: Place one side of outer end of control arm over one end of outer pin and install opposite side of control arm on outer pin. With marked side of inner shaft up, align holes in inner shaft and holes in frame bracket, and install retaining bolts. washers, and nuts. *(NOTE - Outer ends of upper control arm must be spread .015" before installing outer pin and threaded bushings. Determine this dimension by adjusting a pair of calipers to fit over outer end of control arm adjacent to bushing hol s, with a .015" feeler gauge inserter between outside surface of control arm and one prong of calipers).* Install spreader Tool J-2044 and spread ends of control arm to setting of caliper. Start bushings on ends of outer pin, then center end of kingpin in control arm. With spreader still in place, start bushings and tighten to 170 ft. lbs. minimum. Remove spreader and install wheel assembly. Check and adjust front end alignment.

STEERING KNUCKLE: Removal - Raise car and support it at outer end of lower control arm. Remove wheel, hub, and drum assembly. Remove brake backing plate assembly from steering knuckle flange without disconnecting brake hose and suspend the assembly in an out of way place (do not allow assembly to hang on hose). Disconnect tie rod from steering knuckle arm. Remove cotter pin and kingpin retaining nut, then using a lead mallet, drive kingpin upward out of lower support. Remove upper control arm outer pin bushings and remove kingpin and steering knuckle assembly from outer pin.

Disassembly: Remove Woodruff key from kingpin, then remove steering knuckle, shim, and thrust bearing. Remove cork gasket from bottom end of knuckle. To remove steering knuckle bushing, invert steering knuckle and place Tool J-1294-9 on inner end of bushing. Insert Pilot Tool J-1294-4 in bearing end of knuckle, and using the arbor, Tool J-1294-A, press bushing out of knuckle. To remove needle bearing, place Tool J-1294-9 on inner end of bearing, and place Pilot Tool J-1294-4 in bushing end. Using the arbor, Tool J-1294-A, press needle bearing out of knuckle. *NOTE - To r mov kingpin lower support from lower control arm out r end, see "Lower Control Arm" above*

R ass mbly: To install bushing, place pilot, Tool J-1294-6, over the arbor with wide shoulder of pilot against shoulder of arbor. Place a new bushing on pilot, then insert pilot, Tool J-1294-4 in bearing end of knuckle. Press bushing in until pilot, Tool J-1294-6, stops against knuckle (bushing will be exposed approximately 1/16"). Remove arbor, reverse Tool J-1294-6, and press bushing in until pilot stops against knuckle. To install needle bearing in knuckle, place pilot, Tool J-1294-4, on arbor, Tool J-1294-A, so that wide shoulder of pilot is against shoulder of arbor. Place the bearing on pilot, Tool J-1294-4, so that lettered end of bearing is against shoulder of pilot, Insert pilot, Tool J-1294-6, in bushing bore. Insert the arbor in bearing end of knuckle and press bearing in until pilot, Tool J-1294-4, stops against knuckle. Bearing will then be recessed in knuckle leaving a space for the cork gasket.

Steering Knuckle Endplay Adjustment - Place kingpin in a vise and install steering knuckle on kingpin without the cork gasket (normally installed in bottom of knuckle). Install the thrust bearing and shims on kingpin, then insert a .003-.006" feeler gauge between shoulder of kingpin and steering knuckle. Place a straightedge across top surface of thrust bearing and lower shoulder of kingpin and press down on thrust bearing. If surface of the thrust bearing is not flush with shoulder of kingpin, remove or add shims as required.

Installation: Install upper control arm outer pin *(see "Upper Control Arm" above).* Place thrust bearing, shim, and steering knuckle on kingpin, making sure that shim is located between thrust bearing and steering knuckle. Install Woodruff key in kingpin, then start lower end of kingpin in through support far enough to allow installation of kingpin retaining nut, and tighten nut, drawing the kingpin through the support. Install cotter pin. Install brake backing plate assembly and wheel and drum assembly. Check and adjust front end alignment, then tighten kingpin upper retaining nut.

PONTIAC

Pontiac (1957)

DESCRIPTION: Same design as used on previous models. An eccentric bushing at outer end of upper control arm controls camber and caster adjustments.

ADJUSTMENTS & PARTS REPLACEMENT: *See 1954 Annual Data or later Manual edition and note:*

Kingpin Inclination: 1°20'. Not adjustable.

Caster: Neg. 1° ± ½°. *(NOTE - Adjust caster before camber adjustment is made).* Loosen eccentric bushing clamp in upper control arm and turn bushing with Camber & Caster Adjusting Wrench J-5343 to obtain correct caster. Tighten clamp bolt only enough to prevent setting from changing. *NOTE* - If camber was found to be within specifications, turn eccentric bushing in complete turns only so that camber setting will not be disturbed.

Camber: Pos. ½° ± ½°. Loosen clamp bolt and turn bushing, using the same wrench as used for caster adjustment, to obtain correct setting *(NOTE* - It is not necessary to turn bushing more than ½ turn to obtain maximum adjustment of camber). Tighten eccentric bushing clamp bolt to 30-45 ft. lbs.

Toe-In: 0-1/16" (measured 9" from floor). Adjust by turning tie rod tubes an equal amount (in opposite directions) to obtain correct setting. *(NOTE* - Steering gear must be on high point of worm when making adjustment to insure correct position of steering wheel. Adjust wheels for straight ahead position by turning both tie rod tubes equally in the same direction as necessary).

Toe-Out on Turns: With right wheel turned 20° to right, left wheel should be turned 18° to 19° Not adjustable.

SHOCK ABSORBER REPLACEMENT: Shocks are removed from above upper control arm. Raise car so weight is off front wheels, then remove nut from bottom stud on shock absorber (hold shock with a pair of water pump pliers inserted through coil spring, to prevent shock turning). Remove grommet and retainer and compress shock as far as possible by pushing lower section upward. Remove nuts holding shock bracket to frame (on left side of car, remove shock from bracket). Shock can be removed through frame above upper control arm. Reverse disassembly procedure to install shock.

COIL SPRING REPLACEMENT: Raise front of car until wheels are 10" off floor, then place jack stands under frame side rails at a point forward of front door hinge pillar. Place another jack stand under lower control arm of spring which is not being removed. Place a floor jack under lower control arm spring seat from which spring is to be removed and raise jack until it touches spring seat. Remove wheel, and then remove shock absorber (see above). Disconnect lower end of stabilizer link at lower control arm. Remove lower pivot pin from bushing, then slowly lower jack until coil spring is fully extended, then remove spring. To install spring, place jack under spring seat, then place coil spring in seat on lower control arm with end of coil at bottom of spring indexing with hole in spring seat *(NOTE* - Top of spring is identified by a flat surface on coil). Raise jack gradually until lower arm is in position. Complete installation by reversing removal procedure

FRONT TRIM HEIGHT: Check distance between top of lower control arm to underside of frame at a point directly in line with front of shock absorber. The measurement on both sides must be approximately the same.

1957 Front Spring Application
(Synchro-mesh Transmission Cars)

Model	Color Mark	Part N .
Exc. Sta. Wgn. & Conv.	Yel. & Red	516432
Station Wagon	Grn. & Brn.	516434
Convertible	Grey	516433
Taxi & Police	Red	520926
Air Conditioned Cars		516435
Heavy Duty ①		522106

(Hydra-Matic Drive Cars)

Model	Color Mark	Part No.
Exc. Sta. Wgn. & Conv.	Grey	516433
Sta. Wgn. & Conv.	Grn. & Brn.	516434
Taxi & Police		520925
Air Conditioned Cars		516435
Heavy Duty ①		522106

① - Except Air Conditioned Cars.

1957 STEERING GEAR & LINKAGE INDEX

BUICK — Page
Manual Steering..... Pg. 366 in 1956 Annual Data
Power Steering.....361

CADILLAC
Power Steering.....361

CHEVROLET PASS. CARS (EXC. CORVETTE)
Manual Steering..... Pg. 366 in 1956 Annual Data
Power Steering.....Pg. 356 in 1955 Annual Data or later Manual edition

CHEVROLET CORVETTE
Manual Steering..... Pg. 359 in 1954 Annual Data or later Manual editions.

CHEVROLET TRUCKS
Manual Steering..... Pg. 366 in 1956 Annual Data
Power Steering.....Pg. 363 in 1956 Annual Data

CHRYSLER & IMPERIAL
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering.....357

DE SOTO, DODGE
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering.....357

FORD PASS. CARS & THUNDERBIRD
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering..... .364

FORD TRUCKS — Page
Manual Steering..... Pg. 365 in 1956 Annual Data

HUDSON
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering.....Pg. 364 in 1956 Annual Data

LINCOLN & CONTINENTAL
Power Steering.....361

METROPOLITAN
Manual Steering..... Pg. 372 in 1955 Annual Data or later Manual edition

MERCURY
Manual Steering..... Pg. 366 in 1956 Annual Data
Power Steering.....364

NASH
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering.....Pg. 364 in 1956 Annual Data

OLDSMOBILE
Manual Steering..... Pg. 366 in 1956 Annual Data
Power Steering.....361

PACKARD
Manual Steering.....368
Power Steering.....Pg. 364 in 1956 Annual Data

PLYMOUTH
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering.....357

PONTIAC — Page
Manual Steering..... Pg. 366 in 1956 Annual Data
Power Steering.....361

RAMBLER
Manual Steering..... Pg. 365 in 1956 Annual Data
Power Steering.....Pg. 364 in 1956 Annual Data

STUDEBAKER
Manual Steering (57G) Pg. 372 in 1955 Annual Data or later Manual editions.
Manual Steering (Comm & Pres.)..... 368
Power Steering.....Pg. 364 in 1956 Annual Data

WILLYS
Manual Steering..... Pg. 372 in 1955 Annual Data or later Manual editions.

STEERING LINKAGE
Manual Steering..... 354
Power Steering.....356

POWER STEERING HYDRAULIC PUMPS
Chevrolet..... Pg. 356 in 1955 Annual Data or later Manual edition
Eaton.....368
Saginaw.....363
Thompson..... 366
Vickers (2-Piece housing)..... 367
Vickers (3-Piece housing)..... 368

1957 STEERING LINKAGE

MANUAL STEERING GEAR TYPE

STEERING LINKAGE & ADJUSTMENT: Special linkage and adjustment on cars and trucks as follows:

Buick: Linkage—Consists of an intermediate rod between steering gear pitman arm and idler lever on right side of frame, and individual tie rods between intermediate rod and each wheel. Adjustable sleeves provided at end of each tie rod for toe-in adjustment.

Toe-In Adjustment—Turn steering wheel until lower spoke is vertical, with front wheels in straight-ahead position. Measure horizontal distance from near edge of front boss of lower control arm shaft to front edge of brake backing plate, on each side. Adjust tie rods, if necessary, to make measurements equal on both sides. To adjust toe-in, loosen clamp bolts and turn adjusting sleeves at tie rod ends as required. Decrease toe-in by turning left sleeve in same direction as wheel rotation when moving forward and turn right sleeve in opposite direction. To increase toe-in reverse direction of sleeve movement given above. *CAUTION*—Right and left sleeves must be turned equal amounts but in opposite directions when changing toe-in, in order not to disturb straight-ahead position of front wheels. Before tightening sleeve clamps, have slots in sleeve and clamps aligned.

Idler Lever & Support Adjustment—In order that idler lever ball stud is kept level with pitman arm ball stud, thread support into idler arm bushing until distance from center of support lower bolt hole to nearest face of idler lever is 2 21/32" to 2 3/4".

Intermediate Rod End Plug Adjustment—On idler lever end of rod, turn end plug up tight then back off 1/4-1/2 turn (1/2 turn preferred) and install cotter pin. On pitman arm end of rod, tighten end plug to 20-25 ft. lbs. torque, then back off 1 7/8—2 1/8 turns and install cotter pin.

Cadillac: Linkage—Consists of a drag link between steering gear pitman arm and idler arm mounted on right frame side rail, and individual tie rods between drag link and each wheel. Adjustable sleeves provided at outside ends of tie rods for toe-in adjustment.

Toe-In Adjustment—Loosen clamp screws on adjusting sleeves. Turning adjusting sleeves in direction of forward wheel rotation decreases toe-in. Turn sleeves equal amounts so that relation of steering gear high spot to straight-ahead position of front wheels will not be changed. When tightening clamp screws, be sure open side of clamp is over open side of adjusting sleeve.

Drag Link Adjustment—Place straight bar across two adjustable jacks, directly below drag link. Adjust height of jacks so that distance from top of bar to flat spot on frame is equal on both sides (Adjusting jacks to even number of inches will facilitate measurements). Measure distance from top of bar to bottom of drag link on both sides. Difference in measurement between 1st measurement (top of bar to flat spot on frame) and 2nd measurement (top of bar to bottom of drag link) should be 4½" and equal at both ends of drag link within 1/8" (DRAG LINK MUST BE PARALLEL TO FRAME WITHIN 1/8"). If idler arm end of drag link not within limits, remove idler arm support mounting screws on frame side bar, and screw idler arm in or out of bushing until correct height obtained. *(CAUTION*—When turning idler arm into bushing to raise drag link, be sure idler arm is at least 1/2 turn off base to prevent interference on turns. When turning idler arm out of bushing, do not unscrew more than 2 1/2 turns from base or excessive play will result). If proper height cannot be obtained with this adjustment, replace idler arm. If pitman arm end of drag link is not within limits, pitman arm must be removed and bent as required.

Drag Link Plug Adjustments—Install end plug in pitman arm end of drag link and adjust by turning down tight and backing plug off 1/4 to 1/2 turn. Install cotter pin. Install right end plug and adjust by turning down tight and backing off 1/4 to 1/2 turn. Install cotter pin.

Idler Arm Support Adjustment—Turn idler arm support with seal into idler arm bushing until it bottoms, and then back off 1/2 to 1 1/2 turns depending on position of bushing in idler arm.

Chevrolet Passenger Cars: Linkage—Consists of steering connecting rod between pitman arm and idler arm, bracketed on right frame side rail, and individual adjustable tie rods between steering connecting rod and each front wheel. Tie rods have adjusting sleeves at outer ends for making toe-in adjustment.

Toe-In Adjustment—Set steering gear on high point of worm, with mark on top end of steering mainshaft in

CONTINUED ON NEXT PAGE

MANUAL STEERING GEAR TYPE (C ntinu d)

vertical position and steering wheel positioned for straight ahead driving. Loosen clamp bolt at each end of each tie rod and adjust them individually for desired toe-in. Position tie rod clamp bosses below the tie rod to avoid frame interference, and tighten clamps securely.

Steering Connecting Rod Adjustment - If wheels not in straight-ahead position with steering gear on high point, set front wheels in straight-ahead position (can be checked by measuring distance between lubrication fitting on lower control arm shaft and the wheel fellow on each side). Remove ornamental cap or horn button and check position of mark on end of worm shaft designating gear high point (mark should be at top of shaft). If gear has been moved off high point when setting wheels in straight-ahead position, loosen adjusting sleeve clamps on both left and right hand tie rods, then turn each sleeve an equal amount in same direction to bring gear back to high point. *CAUTION* - Turning sleeves an unequal amount or in different directions will disturb toe-in.

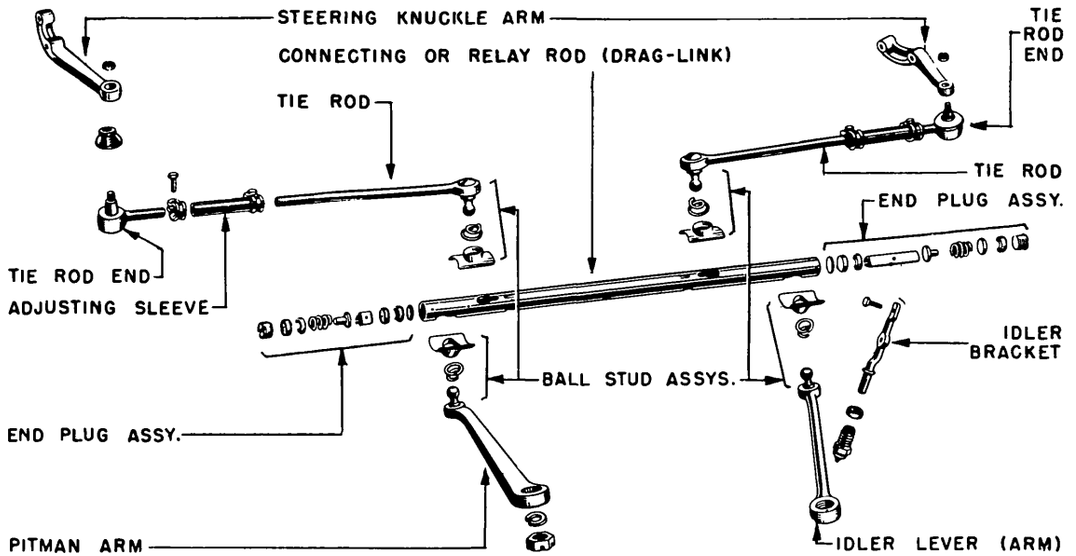
Idler Arm Bushing Replacement - Remove relay rod from idler arm bracket. Press out old bushing, press in new bushing. Install idler arm over idler arm bracket and install nut but do not tighten. Install relay rod to idler arm and do not tighten. Place wheels in straight ahead position and steering gear on high point, then tighten idler arm nut and relay rod nut to 70 ft. lbs. Advance nuts to align castellations and insert pins.

Ch vr let Trucks: Linkage - Consists of three-piece tie rod (rod and two tie rod end assemblies) between front wheels. Tie rod end assemblies have right and left hand threads to facilitate toe-in adjustment. A connecting rod, between steering third arm (on left wheel) and pitman arm, has permanently installed studs in ends. Ends of studs are threaded and are attached to steering third arm and pitman arm with a nut and cotter pin.

T e-In Adjustment - Loosen clamp at each end of tie rod and turn tie rod to increase or decrease its length until proper toe-in is secured. Before locking clamps, be sure tie rod ends are in alignment with studs.

Chrysler, De Soto, Dodge, Plymouth (All): Linkage - Consists of idler arm bracketed to right frame side member and connected to right end of drag link. Pitman arm is connected to left end of drag link. Individual tie rods, connected to drag link near its center, have sleeve adjustment for toe-in at outside ends.

T -in Adjustment - Spin wheels and scribe thin line in center of each tire tread. Place wheels in straight ahead position. Measure distance at hub height between scribed line at both front and rear of tires. There should be less distance (See Toe-In Specifications) at front than at rear measurement. Adjust end of each tie rod an equal amount to correct toe-in and maintain wheels in straight ahead position when steering wheel is centered. With toe-in adjustment set correct, position ends of tie rods in the sockets so both studs are against either the front or back sides of sockets, then tighten clamp bolts to 10-15 ft. lbs. *NOTE* - Steering wheel hub, steering gear arm, steering tube, and steering gear sector shaft are machined with master serrations for a definate location. No attempt should be made to change relative positions of these parts by altering master serration. Improper positioning of steering wheel should be corrected only by adjustment of tie rods.



CADILLAC, CHEVROLET, OLDSMOBILE, PONTIAC STEERING LINKAGE—TYPICAL OF BUICK

Idler Arm Bushing Replacement - Idler arm with bushing is serviced only as an assembly. When bushing worn replace assembly. Opening in Idler Arm Bracket between Idler Arm Bushing positions or contact points should be 2¼". Bend bracket to correct.

Ford Passenger Cars: Linkage - Consists of steering arm-to-idler arm rod which transmits motion from steering gear through pitman arm, attached to left end of steering arm-to-idler arm rod, to front wheels through spindle connecting rods (tie rods). Spindle connecting rods have adjustable sleeves on outside ends for toe-in adjustment. Idler arm attached to right frame side rail and to right end of steering arm-to-idler arm rod.

Toe-In Adjustment - Drive car straight ahead to establish front wheel straight ahead position. Scribe chalk mark on steering wheel hub and steering column. Lower spoke of steering wheel should be pointed at bottom center. To correct toe-in when spoke is centered, loosen both clamp bolts on each tie rod and lengthen or shorten both tie rods an equal amount. If lower spoke is not at lower center position proceed as follows: **(1)** When spoke is left of bottom center, turn both tie rod sleeves upward, when toe-in is correct to correct center position of spoke, or lengthen left hand tie rod to increase toe-in or shorten right hand tie rod to decrease toe-in. **(2)** When spoke is to right of bottom center, turn both tie rod ends downward when toe-in is correct to correct spoke position or shorten left hand tie rod to decrease toe-in or lengthen right hand tie rod to increase toe-in.

Idler Arm & Bushing Replac m nt - Remove bracket from frame side member, then remove bracket and rear bushing from the idler arm. Remove idler arm from bushing in steering arm to idler arm rod, then remove seals from both ends of idler arm. Remove bushings from idler arm bracket and steering arm to idler arm rod. Replace bracket if cracked or bent. DO NOT STRAIGHTEN IDLER ARM BRACKET. Install new bushings in steering arm to idler arm rod and idler arm bracket and tighten bushings to 85-100 ft. lbs. Install new seals at both ends of idler arm, then thread arm into bushing in steering arm to idler arm rod until shoulder on arm is 19/32"±3/64" from top face of rod when arm is in straight ahead position. Thread idler arm bracket and bushing on the arm until shoulder on arm is 19/32"±3/64" below bottom side of bracket when bracket is parallel to frame side member. Install bracket on side member and torque mounting bolts to 28-43 ft. lbs.

Ford Trucks: Linkage - Consists of a connecting rod between front wheels. Rod has adjustable features at both ends. Spindle arm, attached to connecting rod at its left end, is in turn attached to a one-piece drag link with manual adjustment features at both ends. Rear of drag link is attached to sector shaft arm (pitman arm).

Toe-In Adjustment - Loosen clamp nut at each end of connecting rod, turn connecting rod to lengthen or shorten to obtain desired toe-in.

Drag Link Adjustment - Remove cotter pins from each end of drag link. Tighten each drag link plug until drag link ball springs are fully compressed. Back off each plug to first cotter pin hole, then install new cotter pins.

Lincoln & M rcury: Linkag - Consists of steering connecting link between steering gear arm (pitman arm) and idler arm, mounted on right frame side rail, and

CONTINUED ON NEXT PAGE

MANUAL STEERING GEAR TYPE (C ntinu d)

adjustable tie rods between connecting link and each front wheel. Adjustable sleeves provided at outside ends of tie rods for toe-in adjustment.

T -In Adjustment - Loosen clamp bolts on adjustable sleeves. Adjust sleeves equally until proper toe-in obtained.

C nn cting Link Plug Adjustment - Screw plug in left end of connecting link until it bottoms, back off 1½ turns, align cotter pin holes, install cotter pin.

M tr p litan, Huds n & Nash Models: Linkage - Consists of adjustable cross tube (for toe-in adjustment). Idler assembly is attached to body sill at right of car and has a double arm, with front arm attached to cross tube and rear arm attached to right tie rod. Steering gear pitman arm is double-levered, with front lever attached to left of cross tube and rear lever attached to left tie rod. Idler assembly is not adjustable.

T -In Adjustm nt - Loosen locknuts on ends of cross tube, lengthen or shorten cross tube until proper toe-in secured. Tighten locknuts.

Cr ss Tub Plug Adjustment - Remove cotter pin, lightly screw plug in as far as it will go, back off to first cotter pin hole in alignment with castellation.

Huds n, Nash & Rambl r (Exc. Metropolitan): Consists of steering linkage cross tube between steering arm and idler arm, bracketed on frame right side rail. Individual adjustable tie rods are attached to ends of cross tube. Adjusting tubes at outer ends of tie rods provide for toe-in adjustment.

T -In Adjustm nt - Loosen clamps on ends of tubes on tie rods. Turn tubes equally in opposite directions until desired toe-in obtained. Before tightening clamps on adjusting tubes, square ball joints on their studs to prevent excessive steering linkage friction or wear.

Oldsm bil : Linkag - Consists of steering relay rod between pitman arm and idler arm, bracketed to right frame side rail. Individual, adjustable tie rods are attached to center portion of steering relay rod and are provided with adjustable sleeves for toe-in adjustment.

T -In Adjustm nt - Loosen clamp bolts at each end of steering tie rod adjustable sleeves. With steering wheel in straight-ahead position turn tie rod adjusting sleeves to obtain proper toe-in adjustment. Insure that tie rod end ball seats are riding squarely in their seats, then position tie rod to relay rod ball studs to bottom of slot in relay rod. Position clamps on adjusting sleeves so that bolts are below upper surface of adjusting sleeves with edges of clamp **out of slot,** tighten clamp bolts.

R lay R d Plug Adjustment - Draw nut tight, then back off ¼-¾ turn, install cotter pin.

Idler Lever & Support Adjustment - Whenever idler arm is disassembled from idler arm support, reassemble so that there is a dimension of 23/32" between upper face of idler arm and shoulder on support.

Pontiac: Linkage - Consists of steering connecting rod between pitman arm and idler arm, bracketed on right frame side rail, and individual, adjustable tie rods between steering connecting rod and each front wheel. Tie rods have adjusting sleeves at outer ends for making toe-in adjustments.

T -In Adjustm nt - Remove horn button and set gear on high point of worm by turning steering wheel until mark on shaft is exactly at top. Loosen tie rod end clamp bolts and turn tie rod adjusting sleeves equally until desired toe-in is obtained. Turn right tie rod in direction of rotation of wheels to increase toe-in, turn left tie rod in opposite direction of increase toe-in. If front wheels not in straight-ahead position turn both tie rods in same direction (so as not to change toe-in) until error corrected. Tighten clamps on adjusting sleeves with slots in sleeve toward bolts in clamp.

Idler Lever & Support Adjustment - With lever and support off car, thread idle support into bushing until distance between upper face of lever and shoulder on support is approximately 11/16".

Steering Connecting Rod Plug Adjustment - Screw end plugs in until tight, then back off to nearest cotter pin hole alignment and insert new cotter pins.

Studebaker & Packard Linkage; Consists of two adjustable tie rods attached to bellcrank mounted at center of frame crossmember. Bellcrank is attached to steering gear pitman arm by a reach rod (drag link).

Toe-In Adjustment - If tie rods disassembled, count number of turns when unscrewing tie rod ends from rod to facilitate reassembly. To adjust toe-in, adjust **right** tie rod (left tie rod on right-hand control cars). When tightened, inner tie rod bolts should be at bottom and horizontal.

Bellcrank Bearing Adjustment - Insert shims between lower thrust washer and shaft until there is no end play. Shaft should, however, turn freely in bearings. Lock nut securely with cotter pin.

Willys Utility: Linkag - Bellcrank on frame cross member, linked to each front wheel by adjustable tie rods and to steering gear pitman arm by a steering connecting rod (drag link).

Toe-In Adjustment - Set tie rod end of steering bellcrank at right angles to front axle, place straightedge or line against left rear wheel and left front wheel to determine if wheels in straight-ahead position. If front wheel tire does not touch straightedge both at front and rear, adjust left tie rod by loosening clamps on each end and turning tie rod until tire touches straightedge. Check right side in same manner and adjust right tie rod. Adjust toe-in by shortening each tie rod ½ turn.

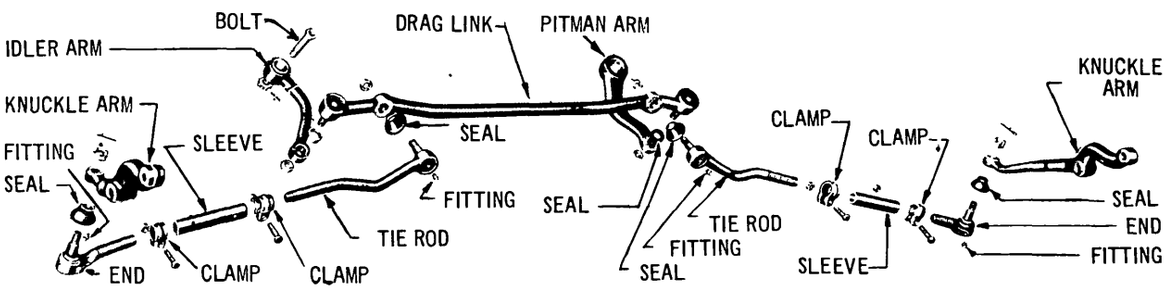
POWER STEERING TYPE

Steering linkage on cars equipped with power steering is essentially the same as for manual steering except as noted for "linkage" type below:

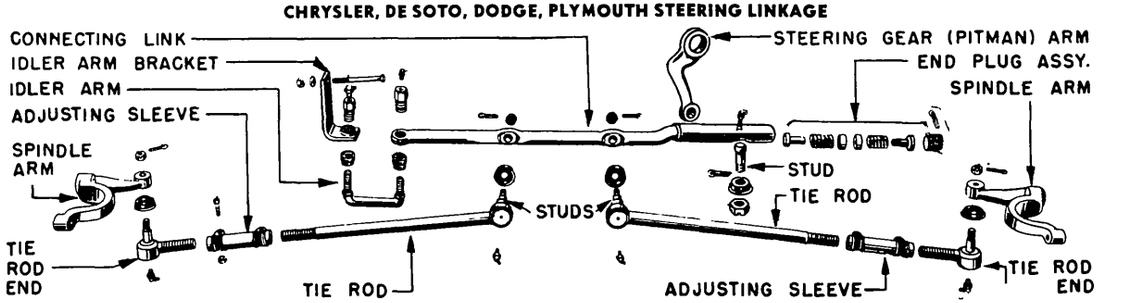
Bendix Linkage Type (Ford & Mercury): Steering pitman-to-idler arm rod has been revised to accomodate the power cylinder. One end of power cylinder is bracketed to right frame side rail and the other to the steering pitman-to-idler arm rod. Control valve is mounted on right end of steering pitman arm-to-idler arm rod. Rubber bushing assemblies are used at each pivot point.

Chevrolet Linkage Type (Pass. Cars): Power cylinder is connected to steering relay rod and piston rod is connected to bracket on right frame side rail.

Chevrolet Linkage Type (Trucks): Power cylinder is anchored to front axle and piston rod is attached to steering cross rod. Conventional drag link replaced by pitman arm ball stud and adapter rod which includes a control valve.



CHRYSLER, DE SOTO, DODGE, PLYMOUTH STEERING LINKAGE



LINCOLN & MERCURY STEERING LINKAGE—TYPICAL OF FORD

CHRYSLER. DE SOTO, DODGE, PLYMOUTH "CO-AXIAL"

Chrysler. Imperial, De Soto, Dodge, Plymouth (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 CHRYSLER NOISY FAN BELT OPERATION CORRECTION:* This noisy condition may be caused by a stuck flow control valve in the power steering pump. Check pump pressure with engine operating at 1200 RPM. If pressure is greater than 950 lbs., replace the pump. DO NOT attempt to recondition the pump.

►*POWER STEERING PUMP APPLICATION: As follows:*
Chrysler, Imperial, & Plymouth V8 - *See "Thompson (Sleeve Type) Pump".*
DeSoto (Early) & Dodge - *See "Vickers (Three Housing) Pump".*
DeSoto (Late) - *See "Vickers (Two Housing) Pump".*
Plymouth 6 Cyl. - *See "Co-Axial Power Steering" in 1956 Annual Data.*

►*DODGE SELF-STEERING TO RIGHT CORRECTION* Adjust power steering gear control valve. If condition is not corrected, it may be caused by fluid leaking by the valve adjusting rod upper "O" ring seal or the reaction seal. See "Overhaul" below for correction.

►*1957 DESOTO POWER STEERING PUMP PRODUCTION CHANGE:* A new power steering pump, Part No. 182-6158, identified by the convex shape of the pulley, replaces Part No. 1730892, beginning with Car Serial Nos. S-25-55337661, S-26-50399739, S-27-58003300. The new pulley used with the later type pump is not interchangeable with the earlier pump. The later type pump will be furnished for service replacement.

►*PUMP PULLEY LOOSENESS CORRECTION:* If the pump pulley is loose and pulley attaching capscrew is tight, replace the washer with Part No. 567331.

DESCRIPTION: Design is similar to power steering gear used on 1956 models, however, changes have been made in the lower housing, power piston rings and in the worm shaft bearing assemblies. A new "vane type" pump is used on DeSoto & Dodge. and a new "sleeve type" pump used on Chrysler, Imperial, Plymouth V8.

ADJUSTMENT: *(NOTE - Three adjustments as follows, can be made without removing steering gear from the car. Make adjustments in the sequence indicated).* Remove steering wheel (see below), steering column jacket and tube. Remove tube coupling bolt and washer from center of coupling, then using Tool C-3392, remove coupling from worm shaft and remove worm housing seal. Remove steering drag link from steering gear arm. Back off gear lash adjusting screw until lash is maximum. Proceed as follows:

Worm Shaft Bearing Adjustment: Slide Tool C-3320A over adjusting nut, and Tool C-3319 on splines of worm shaft with sufficient space between tools to lift Tool C-3320A off the adjusting nut. Turn steering gear to full left and hold in this position with a ft. lb. torque wrench. Attach torque wrench C-3380 to Tool C-3320A in an "in-line" position *(NOTE - Tool C-3380 is a special inch-pound torque wrench having a special extension adapter).* While holding 5 ft. lbs. tension (toward left), loosen nut with small wrench and then adjust to exactly 5 inch-pounds on Tool C-3380. Remove tools with caution to prevent moving adjusting nut and crimp ring section of adjusting nut into keyway in worm shaft. Install worm housing seal.

Piston Valve Adjustment: Start engine and run at medium idle speed. Allow gear to reach normal operating temperature. Attach a small tap handle to flat on end of Tool C-3445, then insert tool through the worm shaft over end of piston valve rod. With a ft. lb. torque wrench on the steering arm nut, read tension while turning steering gear to full right and left. Wrench movement should be smooth. Turn piston valve in the direction necessary to obtain the same torque reading in both directions. Torque reading must be equal and under 40 ft. lbs. If torque reading is equal at less than 25 ft. lbs., a more accurate reading can be made using a 300 inch-pound torque wrench.

Gear Lash Adjustment: With engine running and steering gear at normal operating temperature, turn steering gear to straight ahead position. Using a very light finger tip touch at end of steering gear arm turn gear shaft adjusting screw clockwise until all gear lash has been eliminated. **Turn adjusting screw ¾ turn tighter (clockwise) and tighten locknut.** Stop engine and install worm housing oil seal (with lip of seal down). With gear still in the straight ahead position, install coupling on worm shaft with slot in an up-and-down position. Install drag link on steering gear arm, then install steering tube, steering wheel, etc.

Pump Drive Belt Adjustment: Adjust as follows:
Chrysler & Imperial (Early Cars) - Loosen pivot and adjusting slot bolts, then using a lever between pump and engine, tighten belts so that deflection on one of the belts is 3/8" with a 5 lb. force applied midway between fan and pump pulleys. Tighten pivot bolt first, then tighten adjusting slot bolt.
Chrysler & Imperial (Later Cars) - A square hole is provided in pump bracket to permit using a torque wrench for adjusting belt tension. Loosen pivot and adjusting slot bolts, then insert torque wrench in square hole and apply a 90 lb. torque. Tighten pivot bolt first, then tighten adjusting slot bolt.
DeSoto.- 3/16" belt deflection with a 5 lb. force applied midway between fan and pump pulleys.
Dodge - 1/8" (new belt), ¼" (used belt) deflection of belt measured midway between crankshaft and pump pulleys.
Plymouth V8 - A 20 ft. lb. torque should be required to slip pump pulley on belt with torque wrench applied to pump pullev attaching bolt.

LUBRICATION: Check fluid level in reservoir every 1000 miles or every 30 day. Maintain level of fluid to "Full" mark on reservoir using Automatic Transmission Fluid Type "A".

►*WORM HOUSING FLUID LEVEL NOTE:* It is not necessary to check fluid level in worm housing at regular intervals. When gear is removed for overhaul or for other reasons, fill worm housing to level of filler plug hole (with gear in normal installed position).

DRAINING HYDRAULIC SYSTEM: *(CAUTION–Extreme care should be taken to prevent dirt from entering reservoir while cover or filler cap is removed. To prevent damage to filter element, do not insert sharp objects into reversoir. Do not disturb filter element as periodic changes of this unit are not required).* Disconnect high pressure (small) hose at the gear housing and jack up front end of car sufficiently to raise wheels off floor. Place hose in suitable container. While holding hose in container start engine and allow to idle, turn steering wheel from one extreme to the other until all fluid is forced from unit. *(CAUTION–Do not run engine above idl speed. As soon as fluid starts to show great quantities of air bubbles, stop engine).* Reconnect high pressure nose and refill.

REFILLING HYDRAULIC SYSTEM: Bleed steering gear as follows: Fill reservoir slightly higher than normal. Start engine and run for a short time to circulate oil through hoses. With engine running at idle speed, turn steering wheel back and forth several times from extreme right to left to bleed any remaining air out of system. Check oil level in reservoir. Add oil to reach level mark. Capacity is approximately 2 quarts.

TROUBLE SHOOTING

HARD STEERING IN BOTH DIRECTIONS: 1) Leak in steering system, pump belt slipping or broken, fluid level low.
2) Steering gear linkage not lubricated, tire pressure too low, bind in steering column or gear, improper front end alignment.
3) Low pump pressure (see Hydraulic Pressure Test above) with particular attention to following: Relief and flow control valve, rotors (not turning or worn), pump body or cover worn.
4) Loss of pressure in power unit (see Hydraulic Pressure Test above).

SMALLER TURNING RADIUS IN ONE DIRECTION: 1) Wheel stops not adjusted properly.

HYDRAULIC LEAKS: 1) Check for leaks at hose adapters, pump body, between gear and worm housings, and gear shaft oil seal.

HARD STEERING IN ONE DIRECTION ONLY: 1) Tire pressure too low.
2) Control valve maladjusted.
3) Bind in steering column or gear, improper front end alignment.

VEHICLE ATTEMPTS TO TURN UNLESS FORCE APPLIED TO HOLD STEERING WHEEL: 1) Tire pressure uneven.
2) Control valve maladjusted.

POOR RECOVERY ON TURNS: 1) Tire pressure too low, improper front end alignment.
2) Gear shaft adjustment too tight, worm bearing adjustment too tight.
3) Balls in worm connector binding, fit too tight.
4) Bind in steering column or gear, bind in steering knuckles.

NOISE IN CHUCK ASSEMBLY: Check belt adjustment. Check for vibrating condition set up by control shaft rod. Remove unit and install a new valve rod adjusting disc.

HISSING NOISE (NO LOAD): Caused by low oil pressure or improper operation of back pressure valve.

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"CO-AXIAL" (C ntinu d)

HISSING NOISE (RIGHT TURN ONLY): Caused by oil leaking past lower piston rod gear housing seal.

HISSING NOISE & LOSS OF OIL THROUGH UPPER HOUSING VENT (LEFT TURN ONLY): Caused by oil leaking past upper piston rod housing head oil seal.

CREAKING NOISE ON TURNS: Check for loose gear-to-frame mounting bolts. If noise persists after tightening gear-to-frame bolts, install a new equal tooth sector or gear shaft.

SNAPPING NOISE: Tighten gear-to-frame mounting bolts. Check coupling screw for tightness. Check lower piston rod bushing dowel pin for being too high. Check bushing for seating properly. Check lower piston rod for tight fit at piston.

CHUCKLE NOISE: Check as follows: Steering arm nut loose on gearshaft. Loose front wheel bearing. Gearshaft adjustment too loose. Excessive kingpin endplay. Steering tube coupling screw loose. Worm bearing preload adjustment too loose. Excessive worm shaft endplay.

WANDER (STEERING WHEEL FREEPLAY): Check steering wheel freeplay which should not exceed 5/8". If freeplay excessive (without moving steering linkage), check in same manner as for "Chuckle" above, and also check steering linkage and front wheel alignment.

POOR RETURNABILITY (BOTH DIRECTIONS): Check torque required to turn gearshaft from one extreme to the other with torque wrench on steering gear arm nut (linkage disconnected from steering arm). Torque should not exceed 40 ft. lbs., ± 10 lbs. If torque reading not excessive, check wheel alignment and steering linkage. If torque excessive, check steering column jacket bearing. Check gearshaft adjustment. Check worm shaft bearing preload. Check wormshaft for binding in connector.

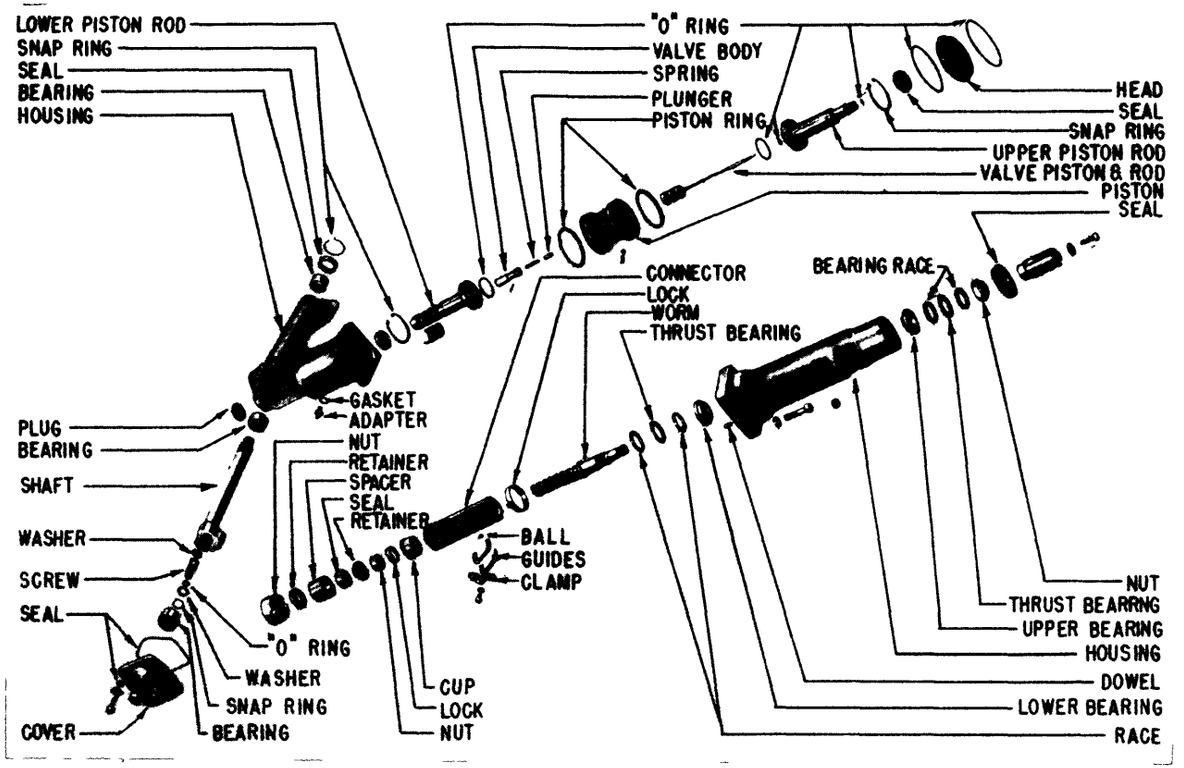
POOR RETURNABILITY (ONE DIRECTION ONLY): Check tire pressure. Center control valve (see Adjustment). Check gearshaft adjustment.

UNEQUAL STEERING EFFORT: Check control valve adjustment. Check for upper piston rod movement in piston. Check worm shaft connector nut for tightness. Check control valve rod for looseness in valve. Check upper piston rod nut for looseness. Check upper piston rod for being scored at reaction seal retainer. If the above fails to correct unequal steering effort, replace all reaction parts.

UNABLE TO MAINTAIN CONTROL VALVE ADJUSTMENT: This may be caused by reaction spacer being too short or too long, or by burrs or out of squareness. Check valve control rod for looseness in disc, or control valve looseness on rod. Upper piston rod nut may be loose, or upper piston rod may be loose in piston.

LACK OF ASSIST(ONE DIRECTION): Check for damaged neoprene piston ring. Check for damaged or improperly seated housing head oil seal. Valve rod lower "O" ring or piston rod "O" rings may be damaged.

LACK OF ASSIST (BOTH DIRECTIONS): Check the following: Low tire pressure. Drive belts slipping. Low oil pressure.



CHRYSLER, DE SOTO, DODGE, PLYMOUTH "CO-AXIAL" POWER STEERING GEAR

STEERING WHEEL & HORN BUTTON REMOVAL & INSTALLATION

HORN BUTTON REMOVAL & INSTALLATION: Chrysler - Disconnect battery. Turn horn blowing ring ornament counterclockwise and remove ornament. Disconnect wire from terminal. Remove three screws and three bushings and remove horn ring. Remove horn blowing contact ring switch from steering wheel hub. Reverse removal procedure to install.

Imperial: Remove two screws and washers from underside of steering wheel spokes and remove horn ring and cushion assembly. Disconnect horn wire. Remove four screws and bushings and remove horn blowing ring retainer and horn switch. Remove four screws and washers and remove ground plate from steering wheel. Reverse removal procedure to install.

DeSoto: Disconnect battery ground cable, then remove horn ring ornament by turning it counterclockwise. Disconnect horn wire at stationary plate and remove plate. Remove horn ring mounting base attaching screws and remove horn ring. Reverse removal procedure to install.

D dg : Remove two screws from horn ring ornament and remove ornament from steering wheel. Disconnect horn wire, then remove three horn ring screws and remove horn ring. Reverse removal procedure to install.

Plymouth: Disconnect battery, then remove the two screws on underside of medallion and remove medallion. Disconnect horn wire from terminal on travel plate and insulator, then remove horn ring, travel plate and insulator assembly, contact spring plate and ground plate. Reverse removal procedure to install.

STEERING WHEEL REMOVAL: Chrysler, Imperial, & DeSoto - Remove horn ring assembly (see above), then loosen steering wheel nut three full turns and attach Puller, Tool C-3428. Remove wheel from serrations, and remove tool, nut and steering wheel. To install steering wheel, place both front wheels in the straight ahead position, then install steering wheel and nut and tighten nut to 40 ft. lbs. *(NOTE* - Check to make sure cancelling dogs on steering wheel actuate the directional switch).

Dodge & Plymouth - Remove horn ring assembly (see above), then install Puller, Tool C-612 and remove steering wheel. When installing steering wheel make sure that master serrations are in alignment and that directional signal cancelling cam on bottom of wheel is inserted between switch levers (if so equipped).

STEERING GEAR REMOVAL & INSTALLATION

REMOVAL: Chrysler & Imperial - Remove horn ring assembly and steering wheel (see above). On Chrysler, remove two screws and bracket clamp securing steering column jacket at instrument panel. Disconnect directional indicator wires and horn wire at connectors

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"CO-AXIAL" (Continued)

below instrument panel. Loosen two screws and nuts at steering gear housing jacket at lower clamp. Remove column jacket by carefully turning assembly clockwise and pulling upward. On Imperial, remove cover plate, then remove turn signal and bracket. Remove shield, Loosen two clamp screws at lower clamp and loosen three gear housing to frame attaching bolts and remove jacket cover. On Chrysler & Imperial, remove pin and disconnect steering tube from coupling. Remove floor mat retaining plate, then remove dust pad and floor panel opening cover. Disengage drag link from steering gear arm and pull steering gear arm with Tool C-3402. Disconnect pressure and return hoses. Cap fittings at steering gear and raise hoses above oil level in reservoir to prevent oil loss. Cap ends of hoses. Disconnect stop light switch wires from brake master cylinder, then disconnect brake booster reservoir from fender side shield and move aside. Remove gear housing-to-frame attaching bolts and alignment wedge. Remove gear assembly by sliding unit forward and out of engine compartment.

Desoto, Dodge, & Plymouth-Remove horn ring assembly and steering wheel (see above), then remove front seat cushion. Raise front of car and remove pitman arm with Tool C-3402 and loosen steering gear housing to frame bolts. Remove jacket tube support bracket at dash panel. On DeSoto, disconnect shroud retaining spring from gear housing shroud and remove shroud and rubber shield at firewall. Remove floor opening panel, then remove jacket tube. On Dodge & Plymouth, remove shroud at upper end of steering column, then pull jacket from steering column shaft. Remove floor mat retaining plate, dust pad and access cover. Disconnect pressure and return hoses and cap ends of hoses and fittings on steering gear. Remove steering gear attaching bolts, then lift gear assembly up through opening in floor pan.

INSTALLATION: All Models - Reverse removal procedure and note the following: Tighten front upper and lower gear housing to frame attaching bolts to 20 ft. lbs. Install wedge over rear bolt between housing and frame, tapping lightly in place. Tighten the three attaching bolts to 50 ft. lbs. (Chrysler, Imperial, & DeSoto), 70 ft. lbs. (Dodge & Plymouth). Check alignment of steering column on DeSoto, Dodge, & Plymouth to make usre there is no bind at instrument panel bracket. If necessary, install shims between frame and gear housing to eliminate any binding condition.

OVERHAUL

▷ *1957 DODGE SELF-STEERING TO RIGHT SIDE CORRECTION:* If adjusting the control valve does not correct this condition, remove the valve adjusting cup to determine if fluid has leaked by the valve adjusting rod upper "0" ring seal or the reaction seal, correct by replacing the seals, then check to see if there is a port in the adjusting cup. If there is no hole, drill a 3/16" opening in disc midway between nylon inserted nut and rim of disc.

▷ *DISASSEMBLY & REASSEMBLY NOTE: Clean steering gear with solvent before disassembly. During disassembly, clean each part and dry with compressed air. Install all new "0" ring seals.*

DISASSEMBLY: (Worm Housing Removal) - Drain upper and lower housing, then attach holding fixture Tool C-3323 and install in a vise. Remove coupling attaching bolt and drive coupling from shaft with Tool C-3392. Gently pry worm housing seal from end of worm shaft, then pry locking collar portion of bearing adjusting nut out of keyway in worm shaft. Install Tool C-3320A on adjusting nut and Tool C-3319 over end of shaft, engaging the serrations. Hold worm shaft steady and loosen bearing adjusting nut. Remove tools and adjusting nut *(NOTE - A new nut must be used at reassembly).* Slide outer bearing race, thrust bearing inner race and spacer out of housing. Remove worm housing attaching bolts, then slide worm housing away from gear housing exposing the worm connector. Remove and discard "0" ring seals on housing head. Remove bearing assembly and spacer from worm housing *(NOTE - The spacer and bearing assembly is serviced as a unit).*

Inspection - Check bearing races and roller for pits or scratches. Spacers should fit flat against shoulders in housing and machined surfaces at each end of housing must be smooth and free of nicks or burrs. Replace all parts that show signs of wear.

Worm Connector & Valve Control: Pry worm connector locknut from openings in connector, then slide up on connector far enough to clear the unit. Using Tool C-3321 and Tool C-3326, remove worm connector nut, then slide connector assembly from upper piston rod. Remove valve adjusting cup from inside of worm connector. Pry retaining portion of piston rod nut lock from indents in nut and remove lock. *(CAUTION - Use care when removing lock so as not to damage control spacer).* Remove nut with Tool C-3328. Slide spacer, seal assembly and nut from valve rod and slide housing head off end of valve rod.

Inspection - Piston rod must be smooth on both ends and Nylon insert nut must be tight in valve adjusting cup. Flange inside connector nut should be smooth and housing head should be free from nicks and burrs. Inner bore of valve control rod should show little or no wear from retainers, and edges should be smooth and free from nicks or burrs. Use crocus cloth spread over a flat surface to remove burrs.

▷ *VALVE CONTROL SPACER NOTE:* Spacer is serviced in two different lengths, with a .001" differential. Spacer must be exactly the same length as space between piston rod nut and shoulder of piston rod. With nut tightened, spacer should roll freely in groove, barely holding its own weight.

Worm Connector: *(CAUTION - When disassembling the worm connector, be careful not to bottom worm shaft in either direction as the ball guides may be damaged causing either a tight or rough operating worm).* Remove ball guide clamp and carefully remove guide (with balls). *(CAUTION - If one or more of the balls are lost or damaged, replace the complete set of 40 balls. Balls are a selected fit and must not be replaced singly).* Hold connector upside down and remove remaining balls by turning connector in and out. Count balls that were removed so that same number may be installed at reassembly. Slide worm out of connector and remove nut lock.

Inspection - Guide rails on connector should be free of nicks or burrs and slide freely on guides in housing. Ball track on worm should be smooth without pitting or roughness. Check balls for pitting, brinelling or flaking. Check fit of adjusting cup and spacer in connector, if loose, install new spacer; adjusting cup, or both.

Gear Housing: Remove locknut from gear adjusting screw. Remove gear shaft oil seal snap ring, then using Tool C-3350, pull seal out of housing. Remove bolts and washers attaching gearshaft adjusting cover to housing (sealing washers are used on the two bolts that thread through to inside of housing). Discard sealing washers. To remove gearshaft cover, turn the adjusting screw into cover until flush, then spin cover off adjusting screw. Remove and discard cover "0" ring seal. Align gear on gearshaft to clear opening in housing, and using a fibre hammer, rap lightly on end of gearshaft. Slide gear and shaft out of housing. Remove adjusting screw retaining snap ring with pliers, Tool C-3229. Slide adjusting screw, "0" ring seal and retaining washer from end of gearshaft. Remove thrust washer from seat in end of shaft. Discard "0" ring seal.

Inspection - Gearshaft should be free of pits, scores, or signs of excessive wear in seal and bearing contact areas. Gear teeth should be smooth and show a good contact pattern. Needle bearings in cover should be smooth and rotate freely in race.

Piston & Rods: Place a suitable container under gear housing to catch trapped oil, remove piston assembly and rods from housing and disassemble as follows: Grasp upper piston rod firmly, twist slightly and pull piston and lower rod straight out of housing. *(CAUTION-Do not allow lower piston rod to touch piston bore).* Remove snap ring holding lower rod in piston, then carefully work lower rod out of piston to expose piston valve. Remove and discard "0" ring seal and slide piston valve out of piston, using care not to bend valve rod. Support piston assembly using a soft wood block and drive piston pin into upper rod using a ¼" round drift. Using snap ring pliers, remove upper rod retaining snap ring, then carefully work upper piston rod out of piston. Insert wire or paper clip down through piston pin, bend inserted end over through oil passage hole in rod and pull pin out of piston. Remove and discard "0" ring seal. Remove large "0" ring seal from base of upper rod, using a paper clip and remove valve rod "0" ring seals from each end of upper rod. Remove and discard piston rings from each end of piston. Using a 7/16"-14 (standard thread) bolt, remove restrictor valve from lower piston rod. Thread bolt into valve, finger tight. Clamp head of bolt in a vise and rap end of rod with a fibre hammer. Slide valve out of rod. Disassemble valve by inserting a stiff wire into pin hole and pushing out retaining pin. Remove plunger and spring.

Inspection - Restrictor valve plunger should slide freely in valve body and show no signs of sticking. Lower piston rod should be free of pits, burrs, or scratches. Upper rod should be unmarked in seal contact area. Valve port ring inside piston should have a bright polished surface with sharp edges, and the valve rod should slide freely through the "0" ring seals. Check

CONTINUED ON NEXT PAGE

"CO-AXIAL" (Continu d)

valve rod by inserting valve in piston until centered, then lay piston on flat surface and place Tool C-3333 under valve rod. Rotate piston slowly and check rod for straightness. If valve is loose, install a new assembly. Check adjusting cup to make sure it grips valve rod tightly by installing cup on valve rod, then, using a torque wrench (inch-pound) rotate cup which should require a minimum of 5 inch-pounds.

G ar Housing: Drive welch plug from bottom of gear housing (drive from cylinder side). Using a thin bladed screwdriver, pry out lower piston rod thrust pad from gear housing. Remove lower piston rod seal, using Tool C-3450 as follows. Insert disc end of tool through opening in end of housing, locating disc between seal and housing shoulder. Using offset (curved) section as a fulcrum, force disc between shoulder and seal until retainer screw almost contacts seal (viewed from opposite end). Drive seal out of housing.

Insp cti n - Inspect gearshaft needle bearings in housing *(NOTE - Do not remove unless they are damaged).* If lower piston thrust pad is scratched, replace it. Check piston walls for nicks or scratches. All machined surfaces of housing should be smooth and free from nicks and burrs.

REASSEMBLY: *NOTE - Clean all parts with solvent and blow dry with compressed air. Use all new "0" ring seals, coating them with Lubriplate at reassembly.*

G ar Housing: Remove garter ring from new piston rod seal and install seal on Driver, Tool C-3331 with lip of seal toward driver. Insert Pilot, Tool SP-1927 through seal and into driver until bottomed, then insert assembly into housing, keeping tool centered in bore. Drive seal into position, then very carefully work garter spring into seal with two long shank screwdrivers. *(NOTE* - If Tool C-3331-A is used, it will not be necessary to remove garter spring from seal). If gearshaft lower needle bearing was removed, drive bearing into position with Tool C-3333 (lettered end of bearing against driver). *(NOTE* - Outer end of bearing should be 1 1/16" from end of housing when properly seated). Install upper bearing in the same manner, with outer end of bearing flush with end of bore. Place lower piston rod thrust pad in position, align shoulder with recess in housing and press into position.

Pist n & R ds: Slide restrictor valve spring and plunger into valve body, secure with pin, then install assembly into lower piston rod bore. Check plunger for free operation in valve. Install two new valve rod "0" ring seals in each end of upper piston rod, making sure that rings are seated evenly in grooves. Coat a new "0" ring seal with Lubriplate and slide into position in groove on end of upper piston rod. Carefully slide rod into piston, aligning piston pin holes. Align new "0" ring seal over piston pin and insert into piston. Be sure pin is perfectly straight, then tap into piston, using a ¼" drift. *(NOTE* - Pin should be flush in piston). Install retaining snap ring with bevelled side out, **making sur that ends f snap ring do not bstruct an il passage** and that it is fully seated in groove. Slide valve and rod into piston and upper rod, carefully working past "0" ring seals previously installed. *(CAUTION - Be careful not to bend the rod).* Slide new "0" ring seal into position in groove on bottom of lower piston rod, then carefully slide rod into piston and down into position. Install retaining snap ring with bevelled side out, **making sure that ends of snap ring do not obstruct an oil passage.** Install new "0" ring seals on each end of piston, then locate Tool C-3344 on gear housing (around cylinder bore). Coat Tool C-3554 with Lubriplate and place over teeth of lower piston rod. Slide piston and rod assembly into cylinder bore, guiding Tool C-3554 out of lower housing as piston is being pushed into cylinder. As piston is installed, align teeth on lower rod for meshing with teeth on gearshaft.

Gear Shaft: Install adjusting screw thrust washer, screw and retaining washer, then install snap ring. Install "0" ring seal on adjusting screw, using Tool C-3401. Install sector gear in mesh with rack and seat shaft to mesh teeth. Check gear timing, using steering gear arm to rotate gearshaft. **Full piston travel must be 2".** *(CAUTION - Failure to obtain proper timing will result in a broken gear housing).* Check operation of gears by rotating gear shaft. Place a new shaft oil seal with lip down (coated with Lubriplate) on a piece of clean paper then carefully slide tapered end of sleeve, Tool C-3350 in seal and slide seal back about ¼" on sleeve. Slide sleeve and seal over shaft with lip of seal toward housing until seal contacts housing bore. Slide adapter over sleeve, followed by coupling nut. Install seal in housing by turning nut on shaft threads until shoulder of adapter touches housing. Remove nut and adapter. Wrap tape around sleeve to provide a firm grip, then slide sleeve off shaft using a twisting motion *(CAUTION - Do not use any tool to remove sleeve).* Install "0" ring seal on adjusting cover, place cover on screw and spin down as far as possible. Align cover with bolt holes, then move adjusting screw outward until cover is seated *(CAUTION - Do not force).* Install bolts and washers (with seals), in inside holes and tighten to 30 ft. lbs. Install adjusting screw locknut but do not tighten. Install a new welch plug in bottom of housing.

Valve Control Spacer: Remove garter spring from a new upper piston rod seal and position seal on Driver, Tool C-3331 with lip of seal toward driver. Install seal aligning pilot in end of driver *(NOTE* - If Tool C-3331-A is used it will not be necessary to remove garter spring). Place housing head on a flat surface with single flange side up and drive seal into head until seated, then install garter spring. Install "0" ring seal over shoulder on head, then slide head over piston and down against housing, making sure it is seated. Install connector nut over piston rod with threaded end out. Slide a new control spacer seal into spacer and install retainers. Place Seal Protector, Tool C-3329 over threads on upper rod and slide spacer assembly over tool and down against shoulder of upper rod. Remove tool. Install piston rod nut and tighten with a sharp rap of a hammer on Tool C-3328. Install new lock cap over nut and index with slots in rod. Using a suitable punch, drive outer diameter into recess in nut.

W rm Connect r & Valve Contr l: Install worm into connector and visually align upper portion of passages with ball guide holes. Insert 30 balls (no more), into lower hole by pushing them gently, using rubber end of pencil, and at the same time, oscillating worm. *(NOTE* - When 30 balls have been installed, they should be visible in the hole). Place remaining 10 balls in either half of ball guide, greasing the balls to keep them in place, then place other half of guide over balls. Insert ball and guide assembly into holes in connector and install clamp, lock washers and bolts. Check operation of worm, making sure that it is free to turn to maximum travel of worm shaft. *(NOTE* - Worm should rotate freely by its own weight in either direction). *(CAUTION - Do not allow worm to bottom at either end).* Install valve adjusting cup on end of valve rod. Slide worm connector nut lock over threaded end of connector with tang side facing threads. Slide worm connector over control spacer and screw nut onto connector by hand. Hold worm connector with Tool C-3321, then using Tool C-3326, tighten nut securely. Engage tang of lock with recess in nut, stake lock in hole in connector, then remove tools.

► *TESTING FOR LEAKS:* Align housing head to gear housing, then install Tool C-3555 over head. Install bolts and tighten securely. Install hose fittings, adaptors and test hoses from pump to unit. Fill pump reservoir with Automatic Transmission Fluid Type "A" and have additional fluid available. Install Tool C-3445 through worm shaft (forked end first) and engage valve rod. Remove wire from ignition coil and turn engine over, using the starting motor (this will prevent damaging steering gear unit should the valve be positioned to give excessively fast steering). As steering gear fills, it will self steer *(CAUTION - Be ready to turn the valve to stop the self steering before piston reaches limit of travel, turning valve to right if piston moves up, and to the left if piston moves down).* Fill reservoir. Replace engine ignition coil, start engine and allow steering gear to warm up to normal operating temperature, then check for leaks. *(NOTE - The above valve adjustment is only temporary. Make final adjustm nt after unit is completely assembled).* After leak test, stop engine and remove tools.

Worm Housing: Install "0" ring seal on smallest land of housing head, then slide bearing race over wormshaft, followed by a thrust bearing and race. Slide spacer and needle bearing assembly into housing past rail guides, then press shoulder of spacer into housing. Turn connector until ball guide is directly down and rails are aligned. Slide worm housing over connector with the vent on top side. *(CAUTION* - Be careful not to force "0" ring seal off housing head). Hold housing in alignment with connector rails, then seat against gear housing. *(NOTE* - Worm housing must meet gear housing with hand pressure only). Install attaching bolts and washers and tighten to 25-30 ft. lbs. Slide bearing spacer over worm shaft with shoulder towards worm, and seat in housing. Slide bearing race thrust bearing and race over worm and down against spacer. Install a new adjusting nut with locking flange up. Pour 14 ounces of Automatic Transmission Fluid Type "A" into upper housing and install filler plug.

► *ADJUSTMENT NOTE:* Make worm bearing adjustment, piston valve adjustment, and gear adjustment before installing steering gear. *S e "Adjustment" above .*

SAGINAW "IN LINE" POWER STEERING

Buick (1957)
Cadillac (1957)
Continental (1957)
Lincoln (1957)
Oldsmobile (1957)
Pontiac (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 BUICK POWER STEERING PUMP MANIFOLD BREAKAGE NOTE:* Excessive leakage at the cover attaching bolt accompanied by a heavy pump growl may be caused by a cracked or broken manifold in bottom of reservoir. This condition is caused by overtightening of the cover bolt.

►*1957 BALL NUT RETAINING SCREW PRODUCTION CHANGE:* A new screw having a hex head socket is now being used in production. Early and late type screws are not interchangeable. *See "Overhaul" below.*

►*1957 CADILLAC PITMAN ARM SHAFT RETAINING NUT TIGHTENING CHANGE:* Tightening specifications have been changed from 105-150 ft. lbs. to 100-125 ft. lbs.

►*1957 PONTIAC (EARLY) HIGH POINT MARK ON STEERING SHAFT CAUTION:* Some early cars had the "high point" mark on upper end of shaft positioned toward the bottom with wheels in straight ahead position (mark should have been at top). Determine correct "high point" by turning wheel to its mid position by counting the turns from stop-to-stop.

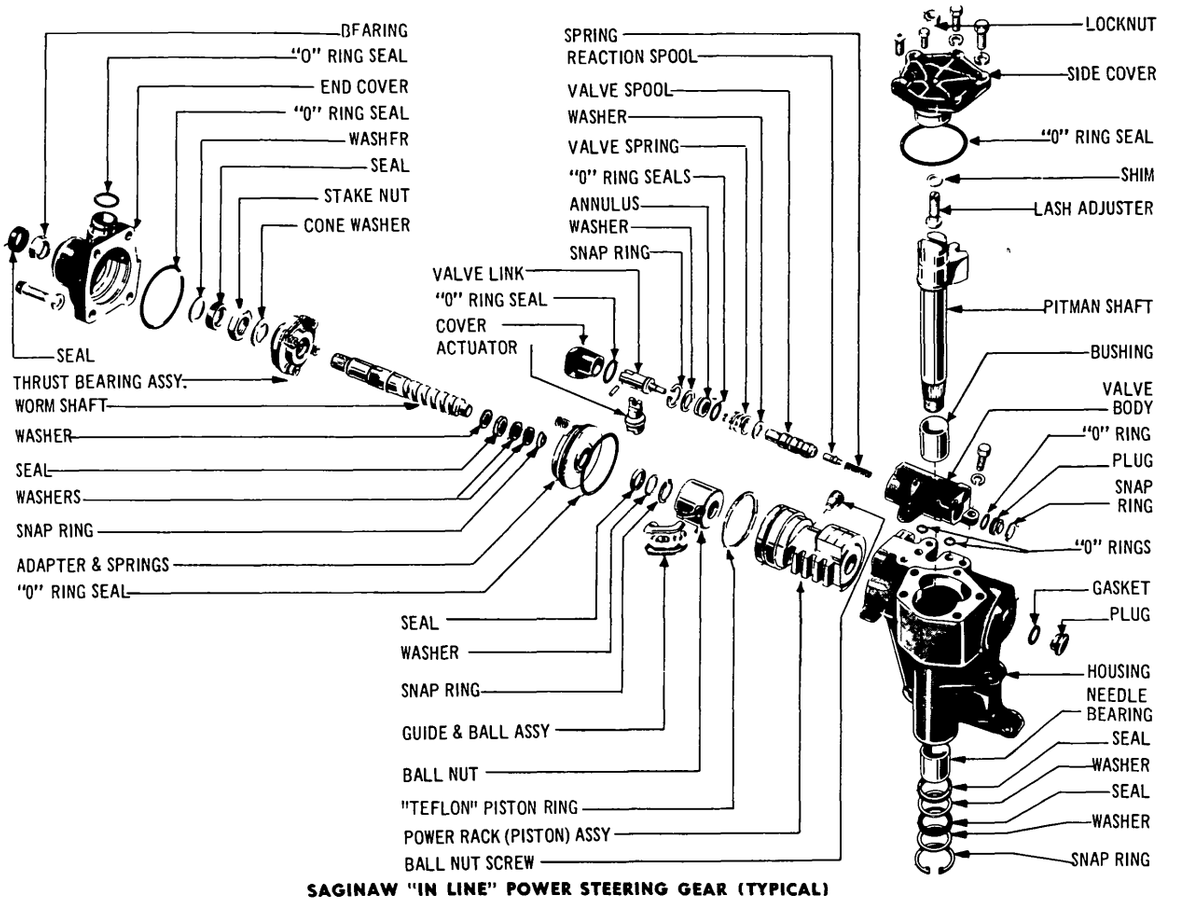
DESCRIPTION: Same design as used in 1956 models. *See "Saginaw (In-Line) Power Steering" in 1956 Annual Data.*

TESTING & TROUBLE SHOOTING: *See "Testing" and "Trouble Shooting" in 1956 Annual Data.*

CHECKING & ADJUSTMENTS (STEERING GEAR IN CAR)

PUMP BELT ADJUSTMENT: **Buick** - Adjust belt tension so belt will slip in pulley when 40-45 ft. lbs. (new belt), 30-35 ft. lbs. (old belt) is applied to pulley nut.
Cadillac - With Belt Tensioner Gauge J-6733 installed, adjust belt tension until red line on barrel of gauge is even with the shoulder.
Lincoln & Continental - ¼" belt deflection midway between pulleys with 5-7 lbs. of force applied.
Oldsmobile - Position Belt Tensioning Gauge No. 33-70 on belt. Loosen pump attaching clamp screws and move pump away from engine until pointers on gauge index with groove in gauge plunger. Tighten clamp screws.
Pontiac - Loosen pump to bracket bolts so pump falls of own weight. Using Tool J-5574 over head of hinge bolt, and torque wrench perpendicular to tool, tighten belt to 58-65 ft. lbs. (new belt), 51-53 lbs. (used belt).

STEERING GEAR CHECKING & ADJUSTING: Pitman Shaft Endplay Adjustment is the only adjustment that can be made with the steering gear installed in car. To determine correct Pitman Shaft Adjustment it is necessary that Thrust Bearing Preload and Ball Nut Preload first be checked. Disconnect pitman arm from pitman shaft or drag link, then proceed as follows.



SAGINAW "IN LINE" POWER STEERING GEAR (TYPICAL)

Thrust Bearing Preload Check: **Buick** - Disconnect pitman arm from intermediate tie rod. Attach Scale J-544-A to spoke of steering wheel at rim. While pulling at a 90° angle to spoke, pull required to turn steering wheel through range where lash normally exists (1/8 turn of wheel from either extreme position) should be ¼-½ lb.
Cadillac - Turn steering wheel two turns off center. Attach spring scale to spoke of wheel at rim. While pulling at 90° angle to spoke, pull required to turn wheel through a 1" arc should be 8-14 ounces.
Lincoln & Continental - Adjustments on car are not recommended, and should be performed when steering gear is removed for overhaul and during reassembly. *See "Overhaul" below.*
Oldsmobile - *(NOTE - Thrust Bearing Preload & Ball Nut Preload are checked in one operation as follows):* Remove pitman arm from shaft, then loosen pitman shaft adjusting screw locknut and thread adjusting screw out to limit of its travel. Attach Spring Scale J-544-A to spoke of wheel (at rim) and check and record pull required to move steering wheel through a 6" arc with steering gear on center position (2¼ turns from either end of steering wheel travel). *NOTE - This pull should be ¼-1¼ lbs.*
Pontiac - *(NOTE - Thrust Bearing Preload & Ball Nut Preload check not required).*

Ball Nut Preload Check: After Thrust Bearing Preload checked (see above), loosen pitman arm shaft adjusting screw locknut and turn adjusting screw a few turns to loosen it. With spring scale attached as for Thrust Bearing Preload Check, check Ball Nut Preload and record the pull.
Buick - Pull through "high point" (on center) should be ¼-¾ lb. higher than for thrust bearing preload.
Cadillac - With steering gear ½ to ¾ turn off center, the pull through an arc not exceeding 1" should be 2-9 ounces in excess of the Thrust Bearing Preload check.
Lincoln & Continental - Checking on car not recommended.
Oldsmobile - *See "Thrust Bearing Preload Check" above.*
Pontiac - Checking not required.

Pitman Shaft Endplay Adjustment: Adjust pitman shaft endplay adjusting screw so that pull required to move steering wheel through center (no lash) position is as follows:

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SAGINAW "IN LINE" (C ntinu d)

Buick - ½-1 lb. higher than for ball nut preload. Total reading should be 1¼-1¾ lbs.

Cadillac - 8-16 ounces higher than for ball nut preload reading, but should not exceed 28 ounces total.

Lincoln & Continental - Adjustment on car not recommended.

Oldsm bil - ½-¾ lb. in excess of thrust bearing & ball nut preload. Total overcenter preload must not exceed 1¾ lbs.

Pontiac - Overcenter preload should be 1¼-1¾ lbs.

LUBRICATION & BLEEDING

LUBRICATION: Buick, Cadillac, Oldsmobile, & Pontiac - Every 2000 miles remove cover on reservoir and add Automatic Transmission Fluid, Type "A" as required to bring level up to "Full" mark on side of reservoir. Tighten cover bolt to 7-9 ft. lbs. *CAUTION - Do not overtighten.*

Lincoln - Every 2000 miles, remove oil level indicator and add Automatic Transmission Fluid, Type "A" to bring level up to "Full" mark on indicator.

C ntinental - Every 2000 miles, remove star nut and vented breather washer, cover, and gasket. Fill reservoir to "Full" mark on side of reservoir. Replace cover using a new gasket. Tighten star nut securely.

BLEEDING: Buick, Cadillac, Oldsmobile, & Pontiac - *NOTE* - Any air trapped in system after overhaul may be expelled by running engine at fast idle for approximately 2 minutes and turning wheels from right to left (without hitting stops). Check fluid level and refill if necessary.

C ntinental - Fill reservoir to full mark, then replace star nut and washer (without cover). Loosen bleed screw in side cover and start engine. With wheels off the ground, turn steering wheel through its entire travel two or three times. Tighten bleed screw, recheck oil level and replace cover.

Lincoln - Fill reservoir to full mark on dipstick. Loosen bleed screw in side cover, then start engine. Turn steering wheel through its entire travel several times with wheels off ground. Tighten bleed screw, recheck oil level and replace dipstick.

STEERING WHEEL & HORN BUTTON REMOVAL & INSTALLATION

Buick: H rn Button Rem val (Series 40 Std.)—Pry cap out with thin bladed tool, then remove contact cup and other parts by removing attaching screws and insulating spacer bushings. To install, reverse removal procedure.

Horn Butt n & Ring Removal (DeLuxe Steering Wheel)—Pry out monogram which is held by prongs of a retain-contact plate and spring with insulators, remove operating ring with cushion and contact spacer. To install, reverse removal procedure. *NOTE*—When contact adjusting nut is being installed, turn it down until contact is made and horns blow, then back nut off ½ turn to provide proper clearance between contact plate and spacer.

Steering Wheel Removal—Remove horn button or operating ring (see above), then re-install steering wheel nut, leaving it backed off several turns. Set direction signal switch in "Off" position to avoid damage to switch operating mechanism. Apply puller J-3274 and pull wheel back to nut (*NOTE*—If wheel hub very tight on shaft, apply a moderate strain with puller then tap end of puller screw to break hub loose from shaft without distorting wheel hub). Remove puller, nut, and steering wheel.

Steering Wheel Installation - Install steering wheel with location marks on shaft and hub of wheel in line. With wheel properly located on shaft, install self-locking nut and tighten securely. Install horn button or operating ring and connect wire to horn cable connector.

Cadillac: Horn Ring Removal & Installation - Disconnect horn wire from terminal underneath instrument panel on steering column. Loosen Allen head screws on underside of horn ring (one on each side of directional signal carrier), and remove horn ring assembly. To install, reverse removal procedure.

Steering Wheel Removal - Remove horn ring (see above), then remove steering wheel hub nut. Remove steering wheel using Steering Wheel Puller, Tool J-1859.

Steering Wheel Installation - Install steering wheel over splines on shaft so that punch marks line up. Install hub nut and tighten to 45-50 ft. lbs., then stake nut to steering wheel. Install horn ring.

Continental & Lincoln: Horn Ring Removal—After removal of steering wheel (see below) remove screws from underside of steering wheel and remove horn ring.

To install, reverse removal procedure.

Ste ring Wh l R moval—Pull cap and emblem outward from steering wheel hub. Remove steering wheel using Puller 3600-D (Lincoln), 3600-AA (Continental). To install, reverse removal procedure. Torque nut to 60-70 ft. lbs. (Lincoln), 40-50 ft. lbs. (Continental).

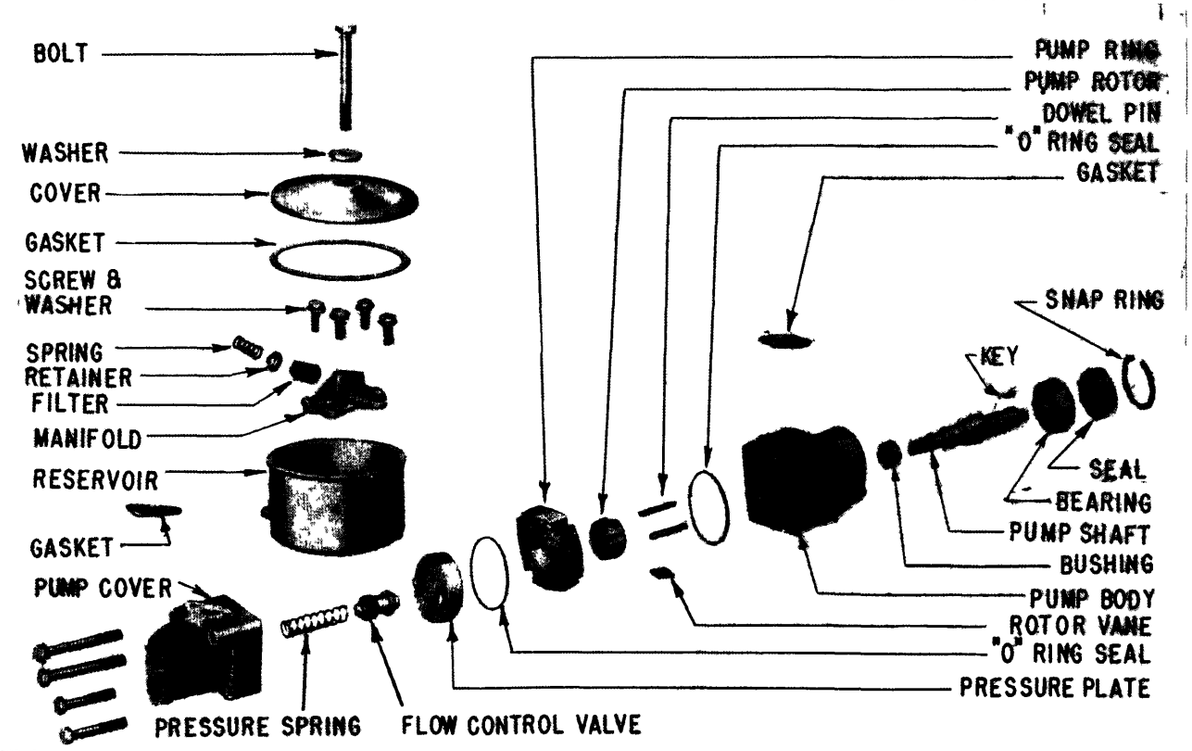
Oldsmobile: Horn Ring Removal & Installation - Disconnect horn wire. On standard steering wheel, remove horn cap by inserting a sharp instrument underneath edge of cap and prying upward. On deluxe steering wheels, horn ring cap is retained to hub by a screw. Remove steering wheel nut, then remove horn contact assembly. To install, reverse removal procedure.

Steering Wheel Removal & Installation - Remove horn ring (see above), then remove steering wheel using Puller, J-1262. To install, reverse removal procedure and tighten nut to 25 ft. lbs. (minimum) and stake.

Pontiac: Horn Ring Removal & Installation - On standard steering wheel, remove horn button by pressing down on one side and inserting a sharp instrument on opposite side. Pry button out. On deluxe wheel, remove four screws retaining covers to bottom of horn ring. Remove horn ring side plates, horn ring adapter bushing screws and associated parts. To install, reverse removal procedure.

Steering Wheel Removal & Installation - Remove horn ring or button (see above), then remove steering wheel shaft nut and washer. Remove steering wheel from

CONTINUED ON NEXT PAGE



SA INAW HYDRAULIC PUMP ASSEMBLY

SAGINAW "IN LINE" (Continued)

shaft using Tool J-3044. To install, reverse removal procedure, making sure that wheel is in the straight ahead position, then tighten nut to 25-30 ft. lbs.

REMOVAL & INSTALLATION

Buick: Disconnect pressure and return line hoses at steering gear and elevate ends to prevent oil draining from pump. Mark upper and lower steering shaft flanges for correct reassembly, then disconnect the flexible coupling. Raise front of car and remove pitman shaft nut and pitman arm. Remove steering gear to frame bolts and remove steering gear. To install gear, reverse removal procedure. Fill reservoir with oil, then start engine and operate pump, add additional oil until level remains constant. Rotate steering wheel through its entire range slowly a few times, then recheck oil level and replace cover on reservoir.

Cadillac: Remove reservoir cover, syphon all fluid from reservoir. Disconnect pressure and return line hoses at reservoir and pump, cap ends to prevent fluid drainage. Raise front of car and place stands near outer ends of lower suspension arms. Disconnect pitman arm from drag link. Remove upper flange-to-upper shaft retaining screw. Remove gear housing-to-frame side side bar screws, remove gear assembly. To install, reverse removal procedure. Torque upper flange-to-shaft retaining screw to 25-30 ft. lbs. *NOTE*–After installing gear, check flexible coupling for distortion. Coupling must rest in flat plane with no visible bend or twist. If distorted, remove lower steering column cover and lower clamp-to-jacket screw. Then loosen steering jacket clamp screws at instrument panel and slide complete steering jacket assembly up or down as required.

Continental: Disconnect battery cable, then remove steering column-to-dash panel upper and lower cover plates. Remove shift rod at shift arm. Remove steering wheel (see above). Remove dash panel trim pad, then remove trim panel. Disconnect turn signal wires at junction block and neutral switch and back-up wires at terminal block on steering column. Disconnect upper steering column tube from instrument panel and slide tube off shaft. Raise car and remove pitman arm from shaft with Tool 3590-AA. Lower car and remove air cleaner duct and air cleaner as an assembly. Remove exhaust manifold on left side of engine and take out the number 7 and 8 spark plugs. Remove as much fluid from power steering pump reservoir as is possible, using a suction gun. Disconnect hoses at steering gear and drain hoses. Drain steering gear by turning from stop to stop several times. Remove bolts holding gear to frame and note position of any shims found under bolts. *(CAUTION - Do not attempt to remove rolled pin out of steering gear shaft coupling at this time).* Rotate steering shaft so that coupling slot is in a vertical position, then tilt housing down and forward so sector shaft is facing up. Lift steering gear up between fender apron and engine and remove from engine compartment. To install, reverse removal procedure and tighten pitman shaft nut to 120-130 ft. lbs. Bleed hydraulic system after filling reservoir with Automatic Transmission Fluid Type "A". *(See "Bleeding" above).*

Lincoln: Disconnect battery cable from battery, then remove radio speaker assembly. Remove steering wheel (see above). Disconnect speedometer cable at speedometer head and accelerator rod at clevis pin connection. Roll carpet away from steering column opening in dash. Remove steering column supports and remove access covers in floor. Disconnect shift rod from shift arm at lower end of steering column. Disconnect turn signal wires at junction block and neutral switch and back-up light wires at terminal block on steering column. Remove steering column clamp and steering column-to-brake pedal support, then remove steering column from steering shaft. Remove rear exhaust manifold screw through hole in floor pan. Raise front of car and remove pitman arm from shaft using Tool 3590-AA. Disconnect exhaust pipe from muffler inlet pipe, then remove exhaust manifold. Remove No. 6, 7, & 8 spark plugs. Using a suction gun, remove as much fluid as possible from power steering reservoir. Disconnect hoses at power steering gear and drain gear by turning from stop to stop several times. Remove bolts securing steering gear to frame. Place steering shaft with coupling slot in a vertical position, then remove gear by tilting gear housing downward and rearward until shaft can be removed first. To install gear, reverse removal procedure and tighten pitman shaft nut to 120-130 ft. lbs. Fill pump reservoir and bleed system *(see "Bleeding" above).*

Oldsmobile: Scribe alignment marks on coupling flange and steering shaft flange. Disconnect hoses from power steering pump and cap pump and hose fittings. Raise car and remove engine filler plate. Remove pitman arm from shaft using Tool J-5504-B or similar tool. Remove gear housing-to-frame bolts, then remove gear assembly with hoses attached. To install, reverse removal procedure and tighten frame-to-gear bolts to 50-60 ft. lbs. Tighten pitman arm nut to 90-120 ft. lbs.

Pontiac: Scribe alignment marks on steering shaft and worm shaft flanges at coupling above steering gear, then disconnect coupling. Disconnect pressure and return hose assemblies from valve body. Remove pitman arm, then remove gear housing to frame bolts and remove steering gear. To install, reverse removal procedures, making sure that shims found between frame and gear are replaced in the original locations. Tighten pitman shaft nut to 130-135 ft. lbs.

OVERHAUL

OVERHAUL: *See "Saginaw (In-Line) Steering Gear" in 1956 Annual Data and note th following:*

1) A new needle bearing replaces the former bronze bushing in gear housing at outer end of pitman shaft.

2) A new "Teflon" piston ring replaces the two cast iron piston rings formerly used on power piston.

3) In later production cars, a new hex head screw is used to retain the ball nut assembly, replacing the former screwdriver slotted screw. The rack piston is slotted and hardened at the screw hole. Tighten the new screw to 30-35 ft. lbs. and stake in place, making sure that metal from screw head enters slots in piston. The hex head screw is not interchangeable with the earlier type screw.

► *1957 BUICK & PONTIAC PITMAN SHAFT SEAL REPLACEMENT NOTE:* This seal assembly may be replaced with the steering gear installed in car as follows: Disconnect pitman arm from shaft. Clean end of shaft and tape splines using one layer of tape. Remove pitman shaft seal retaining ring with Truarc pliers. Start engine and turn steering wheel to right until oil pressure forces seals from housing. Clean end of housing thoroughly, then lubricate new seal with petroleum jelly and install seals using Installer Tool J-6219 (place steel back-up washer between seal and tool to prevent damage to seal). Make sure that snap ring is fully seated in groove with beveled side outward. Fill reservoir and turn steering wheel from right to left several times. Check for oil leaks, then install pitman arm.

HYDRAULIC PUMP

HYDRAULIC PUMP: Buick, Cadillac, Oldsmobil & Pontiac - A Saginaw pump similar in design to 1956 pumps is used on these cars. *See "Saginaw (In-Line) Steering Gears" in 1956 Annual Data and note the following:* Pump drive shaft outer bearing and seal have been repositioned with the seal at outer end of shaft. The shaft inner bearing (needle) has been replaced with a bushing.

Continental & Lincoln - "Vickers Vane Type" used on Continental. "Eaton Rotor Type" used on Lincoln. *See "Eaton & Vickers Hydraulic Pow r Pumps" in 1955 Annual Data or later Manual editi n.*

BENDIX LINKAGE TYPE (FORD & MERCURY)

Ford Pass. Cars (1957)
Mercury (1957)
Thunderbird (1957)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1957 MERCURY CONTROL VALVE CENTERING SPRING CHANGE (To provide heavier steering feel in center position):* A new heavier spring, Part No. MG-33704-B, replaces the earlier spring, Part No. MG-33704-A in production. On cars with 368" engine the later type spring must be used for service replacement. On cars with 312" engine, either spring may be used. For identification, the early spring is dyed a maroon color, and the later spring is dyed green.

▷*1957 MERCURY POWER STEERING NOISE CORRECTION:* A new power steering pressure line hose, Part No. MG-33589-A, having a relocated step-down orifice and revised dimensions for steel tubing at each end of hose to improve clearances in valve and pump areas.

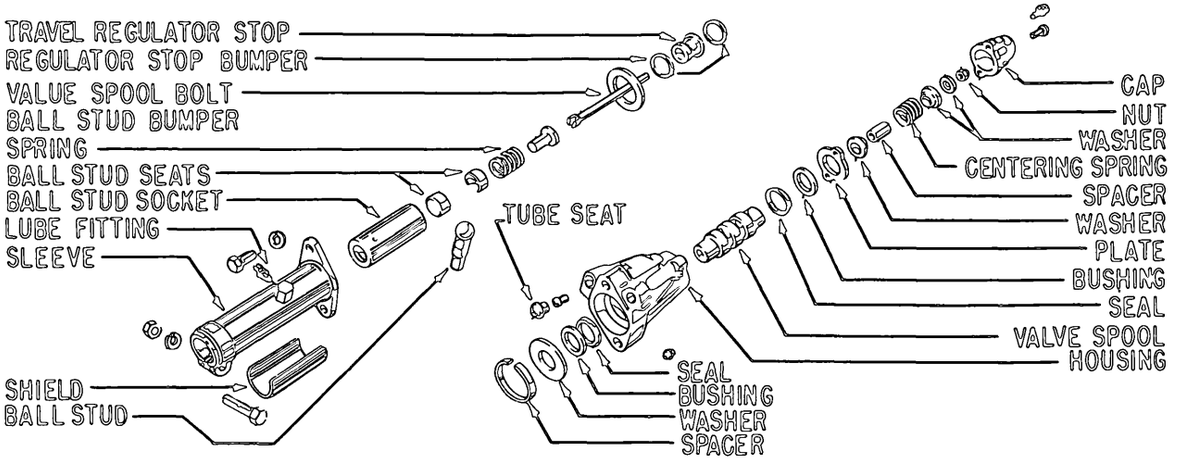
DESCRIPTION: Linkage type similar in design to units used on previous models.

ADJUSTMENT: Pump Drive Belt - Place a heavy duty "C" clamp on pump bracket so pressure can be exerted on the movable adjusting bracket above the adjusting lock bolt. Loosen adjusting bolt enough to permit moving pump when "C" clamp is tightened, then tighten "C" clamp until pulley slips against belt friction when a torque of 14-16 ft. lbs. is applied to pump pulley bolt, using a torque wrench. *(NOTE* - Pull on wrench as if tightening bolt). Tighten belt adjusting bolt to 30-35 ft. lbs. and mounting bolt to 20-25 ft. lbs.

LUBRICATION: Check fluid level every 1000 miles. Start engine and turn steering wheel to full right and left a few times, then shut off engine. Add Automatic Transmission Fluid Type "A" to bring level up to "F" mark. (On "Eaton" pumps, mark is on dipstick. On "Vickers" pumps, mark is on reservoir).

TESTING: Turning Effort - With front wheel properly aligned and tire pressures correct, place car on dry concrete, set parking brakes, then proceed as follows: With engine running at normal idle speed, turn wheel to right and left several times to bring fluid to normal operating temperature. Hook a spring scale to rim of steering wheel and measure pull required to turn wheel at least one complete turn in both directions. The pull should be less than 12 lbs., and should be about equal in both directions.

Pump Pressure: Install pressure gauge, Tool T56L-33610-D (Ford), Tool 3500 (Mercury) in pressure line between hose and pump outlet. Open shutoff valve on tool, then run engine at idle speed for two minutes to bring oil temperature up to normal. Turn wheels fully to right, then to left, and note pressure reading on gauge when wheels are against stops. Normal pressure at both positions is 700-900 lbs., *(CAUTION - Do not hold wheels against stops for more than 30 seconds at a time).* If pressure was below 700 lbs., turn wheels off stops. Slowly close shutoff valve on gauge, and watch for an increase in pressure. *(CAUTION - Do not leave valve closed for more than 15 seconds).* If pressure, with valve fully closed is less than 700 lbs., the pump is causing the trouble. If pressure increases, but does not reach 700 lbs., the pump, control valve, and power cylinder should all be inspected. If pressure increases to 700-900 lbs., the trouble is in either the control valve or power cylinder.



FORD & MERCURY POWER STEERING CONTROL VALVE ASSEMBLY

TROUBLE SHOOTING: Binding or Poor Recovery - Check pitman arm ball stud in control valve sleeve which may be rubbing against the sleeve slot. If this is the case, the roll pin may be missing. Check idler arm bushings. Check all steering gear adjustments. Check operation of control valve and for interference between sector shaft arm and dust shield. Check control valve travel regulator stop adjustment. Check for damaged control valve sleeve and socket tube.

Hard Steering: Check to see that pump drive belt is properly tightened and that pump pressure is correct. If pump pressure is within specifications, check control valve spool centering spring adjustment. Check control valve spool for free movement and repair as necessary. *See "Binding or Poor Recovery" above.*

Excessive Free Play: Check steering gear worm and roller mesh adjustment. Check for excessive clearance between steering arm ball stud and ball stud seats. If ball stud is loose in seat, adjust control valve travel regulator stop. Check control valve centering spring adjustment.

Noisy Pump: Check pump belt tension. Noise may also result if correct hose is not used *(see "Changes, Cautions, Corrections" above).*

Steering Chatter: A loose pump belt can cause chatter against the wheel stops during an extremely sharp turn. Check belt tension. Check for looseness in idler arm connection, and check idler arm bushing. Check power cylinder piston rod insulators for looseness.

Loss of Power Assist: Check for damage or broken hoses. Check pump pressure (see above). Disconnect power cylinder piston rod from idler arm bracket and operate piston by hand to check for resistance to movement. If piston moves freely with little or no resistance, internal parts of power cylinder are damaged. Replace cylinder. Check adjustment of valve spool centering spring. Check operation of control valve check valve.

OVERHAUL

CONTROL VALVE: Removal - Disconnect hoses at control valve and drain fluid, turning wheels to right and left several times to force fluid from system. Loosen clamping nut and bolt at right hand end of sleeve, then pull roll pin out of steering arm-to-idler arm rod through slot in sleeve. Remove cotter pin from control valve ball stud nut, then loosen nut and back it off far enough to cover threads on end of ball stud. Hold a soft hammer against forward side of sector shaft arm to absorb the shock, then lightly tap ball stud with a hammer to loosen it from arm. *(CAUTION - Do not strike any part of valve body while loosening ball stud).* Remove nut from end of ball stud, then raise control valve high enough to remove ball stud from pitman arm. Turn front wheels fully to left and turn control valve counterclockwise to remove it from steering arm to idler arm rod.

Disassembly: Remove two centering spring cap bolts and cap from valve housing. *(CAUTION - When holding control valve in a soft jawed vise for disassembly, clamp valve only around the sleeve flange).* Remove nut from end of valve bolt, then remove washers, spacer, centering spring, adapter and bushing. Remove two bolts holding valve housing and sleeve together, then separate housing from sleeve. Remove lubrication fitting from sleeve and push valve spool out of centering spring end of housing. Remove seal from spool. Remove spacer, bushing and seal from sleeve end of valve housing. Drive stop pin out of travel regulator stop with a punch and hammer *(NOTE* - Pull head of valve spool bolt tightly against travel regulator stop before driving pin out of stop). Turn travel regulator stop counterclock-

CONTINUED ON NEXT PAGE

BENDIX LINKAGE TYPE FORD & MERCURY (Cont.)

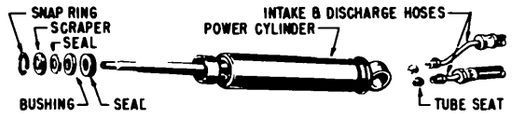
wise in valve sleeve to remove stop from sleeve. Remove valve spool bolt spacer, and rubber washer, from travel regulator stop Remove dust shield from valve sleeve Slide bumper spring and ball seat out of sleeve, then remove ball stud socket

Inspection: Wash all parts in solvent and wipe with a lint free cloth. Inspect valve seals and bushings for wear, making sure that lips of seals are not nicked or scratched. Check bushings for nicks or scratches. Inspect valve housing for nicks and burrs. Use crocus cloth to remove burrs, being carefull not to round off sharp edges of spool *'NOTE* - If spool or inside of valve housing are badly scored, replace the assembly) Dry spool and housing thoroughly, and insert valve into housing. The spool should fall freely of its own weight in housing. *(NOTE* - Clearance between spool and housing should be .0002-.0009"). Inspect mating surfaces of ball stud socket and valve sleeve for wear or damage. Remove minor burrs and scores with crocus cloth. Check fit of socket in sleeve. Socket should slide freely in sleeve.

►*RELIEF VALVE & HOSE SEAT REPLACEMENT NOTE:* If replacement is necessary, proceed as follows Tap existing hole in hose seat, using a 3/8" starting tap for large hose seat and a 1/4" starting tap for small seats *(CAUTION - Remove all metal chips from seat ports after tapping).* Place a nut and large flat washer on a bolt of the same size as tapped hole. *(NOTE* - Washer must be large enough to cover hose seat port) Insert bolt in tapped hole, then use it as a puller to remove hose seat. If return line hose was removed, remove relief valve from port with a screwdriver, and install a new relief valve. Place a new hose seat in port, then thread a bolt of the same size as the port into the port. Tighten bolt enough to bottom seat in port.

R assembly: Coat all parts with Automatic Transmission Fluid Type "A". Insert one of the ball stud seats (flat end first) into ball stud socket, then insert threaded end of ball stud into socket. Place socket in control valve sleeve so threaded end of ball stud can be pulled out through slot in sleeve. Place other ball stud seat, spring, and bumper in the socket, then install and securely tighten travel regulator stop, Loosen stop just enough to align nearest hole in stop with slot in ball stud socket, then install stop pin in ball stud socket, travel regulator stop, and valve spool bolt. Install dust shield and lubrication fitting on sleeve. *(NOTE* - Make sure lubrication fitting is tight and does not bind on ball stud socket). Insert valve spool in housing so that large end of spool will be at centering spring end of housing and small end of spool will face sleeve end of housing. Rotate spool while inserting it in housing. Move spool toward centering spring end of housing, then place small seal, bushing, and spacer in sleeve end of housing. Press valve spool against inner lip of seal and, at the same time, guide lip of seal over spool with a small screwdriver. *(CAUTION - Do not nick or scratch seal or spool).* Place seal end of bushing on a flat surface so that seal, bushing, and spacer are at bottom end, then push down on valve spool until it stops. Carefully install spool seal and bushing in centering spring end of housing around large end of spool. Press spool against inner lip of seal and guide lip over spool with a small screwdriver. *(CAUTION - Do not nick or scratch seal or spool).* Slide spool back and forth in housing and check for free movement. Place valve sleeve on housing so that ball stud is on same side of housing as ports for the two power cylinder hoses, then install two bolts in sleeve. Tighten to 17-22 ft. lbs Place adapter on centering spring end of housing and install bushing, washers, spacers, and centering spring on the valve spool bolt Compress the spring, and install the nut. Tighten nut securely, then loosen it not more than 1/4 turn. Move ball stud back and forth in sleeve slot to check spool for free movement *(NOTE* - The spool should travel approximately .060" in each direction from center). Install centering spring cap on housing and tighten the two cap bolts to 4-6 1/2 ft. lbs Install nut on ball stud so that valve can be positioned in a vise with the vise clamping the nut and holding valve securely, then push forward on cap end of valve to check valve spool for free movement. Turn valve around in vise, and push forward and check for free movement.

Installation: Thread valve on steering arm-to-idler arm rod until about four threads are still visible on the rod. Position ball stud in sector arm, then measure the distance between center of ball stud in pitman arm and



FORD & MERCURY POWER CYLINDER

center of stud at inner end of left hand spindle connecting rod. *(CAUTION - Make sure the measurement is taken parallel to centerline of control valve).* The measurement should be as indicated in table below. If the measurement is not correct, disconnect ball stud from pitman arm and turn valve on steering arm-to-idler arm rod as necessary to obtain the correct measurement. With correct distance obtained and ball stud positioned in pitman arm, align hole in steering arm-to-idler arm rod with slot in end of valve sleeve. Install roll pin in rod hole to lock valve in position on rod. Tighten valve sleeve clamp bolt to 30-35 ft. lbs. Install nut on ball stud and tighten to 56-60 ft. lbs. Install cotter pin. Connect hoses to control valve and tighten all fittings securely. Fill reservoir to "F" mark on dipstick or reservoir with Automatic Transmission Fluid Type "A". Start engine and run at fast idle speed for two minutes, then turn steering wheel to right and left a few times and check for leaks.

Valve Installation Measurement

Model	Dimension
Ford (Exc. Thunderbird)	10 7/8"
Thunderbird	9 1/2"
Mercury (All Models)	11 1/4"

POWER CYLINDER: Except for cylinder seal and hose seat replacement, the power cylinder should be replaced as a complete assembly if faulty.

Removal: Disconnect hoses from power cylinder and fasten open ends of hoses in a raised position to prevent fluid draining out. Move front wheels to left and right several times to force all fluid from cylinder. Disconnect piston rod from idler arm bracket, but do not remove at this time. Remove locknut holding cylinder on mounting stud in steering arm-to-idler arm bracket and remove outer washer, bushing, and cylinder from stud. Remove inner bushing and washer from stud and pull inner insulator and washer from piston rod.

Inspection: Clean exterior of cylinder and piston rod. Inspect cylinder and rod for damage or wear and check for leakage. If parts are damaged or piston is leaking internally, replace the entire power assembly. Inspect mounting bushings and insulators for wear or damage and replace as necessary.

►*POWER CYLINDER SEAL REPLACEMENT NOTE:* Install all parts furnished in repair kit as follows· Clamp cylinder in vise and remove snap ring from end of cylinder, being careful not to distort or crack the cylinder. Pull piston rod out as far as it will go, then apply compressed air to other end of cylinder to blow seals out of cylinder. Lubricate new inner seal with Automatic Transmission Fluid Type "A", then place seal, bushing, outer seal, and scraper on piston rod. Push piston rod all the way in, then using a deep socket slightly smaller than cylinder opening, tap parts into cylinder and replace snap ring.

►*HOSE SEAT REPLACEMENT NOTE:* If either seat is damaged, both seats should be replaced as follows Tap the hole in power cylinder hose seat with a 3/8" starting tap. *(CAUTION - Remove all metal chips from hole after tapping).* Place a nut and large washer (enough to cover seat port) on a 3/8" bolt, then insert bolt in tapped hole and turn it to pull seat out of port. Position a new seat in port, and thread a 5/8"-18 bolt in the port until seat bottoms in port.

Installation: Install inner washer and bushing on mounting stud in steering arm-to-idler arm rod. Install inner insulator and washer on power cylinder piston rod, then install cylinder on mounting stud with piston rod in idler arm bracket. Install outer bushing, washer, and locknut on the mounting stud. If a new nut is installed, tighten it to 60-70 ft. lbs. If a used nut is installed, tighten it to 50-60 ft. lbs. Install outer insulator, washer, and nut on piston rod and tighten to 40-50 ft. lbs. Install locknut and tighten it to 40-50 ft lbs. (finger tight plus 1/3 turn). Connect hoses to cylinder and tighten fitting securely. Fill reservoir to "F" mark on dipstick, or to mark on reservoir with Automatic Transmission Fluid Type "A". Run engine and check for leaks.

POWER STEERING PUMP· Different pumps used as follows

Ford - Eaton Rotor Type. *See "Power Steering Hydraulic Pumps".*

Mercury (312" Engine Exc Turnpike Cruiser & Air Conditioned Cars) - *Eaton Rotor Type. See "Power Steering Hydraulic Pumps".*

Mercury (368" Engine, Turnpike Cruiser & Air Conditioned Cars) - *Vickers Vane Type. See "Power Steering Hydraulic Pumps."*

THOMPSON SLEEVE TYPE

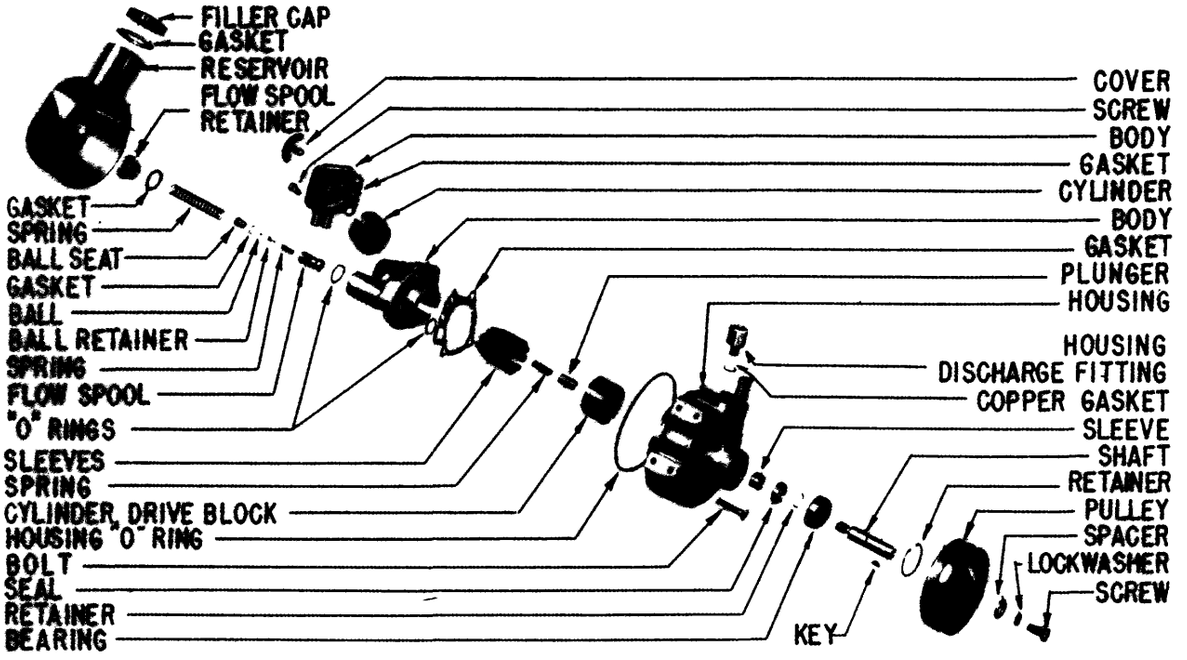
Chrysl r & Imperial (1957)
Plymouth V8 (1957)

DESCRIPTION: Sleeve type rotary reciprocating pump having nine cylinders operating in two cylinder blocks, one of which is diagonally offset in the pump body.

REMOVAL: Remove inlet and discharge hoses at pump and cap all openings to prevent entry of dirt or foreign matter. Loosen drive belt adjusting screw on pump bracket and remove belts. Remove pump from bracket.

DISASSEMBLY: Clean exterior of pump housing, then mount pump in a vise. Remove capscrew and reservoir and loosen the four capscrews at inlet end cap. Remove flow valve spring retainer *(CAUTION* - Flow and plunger springs are under pressure and caution should be used when removing cap and retainer to prevent spring and fitting from flying out). Remove flow valve and spring. Remove and disassemble both end caps from inlet cap body and pump housing. *(NOTE* - Plunger spring will tend to push cylinder blocks out of body, Use care when disassembling). Remove cylinder drive blocks and nine sleeves from body, as well as cylinder plunger spring. Remove ball bearing retainer ring from housing, using snap ring pliers, then remove shaft and bearing assembly. *(CAUTION - Bearing is pre-lubricated and must not be washed with solvent).* Inspect shaft for wear and ball bearing for roughness or noisy operation. If bearing must be replaced, remove shaft key and press bearing from shaft (away from splined or serrated end of shaft). Check retaining ring groove in housing. Replace bearing by supporting it on inner race, then press shaft through bearing until retainer ring stops against inner bearing race. *(NOTE* - The retaining ring must always be located between bearing and splined end of pump shaft).

INSPECTION: Check fit of sleeves in cylinder block bores and make sure they slide freely. If cylinder block is heavily scored, it must be replaced. Hairline markings on sleeves are normal. Check flow valve spool and valve liner. Slight hairline scratches are permissable, Burrs or heavy scratches can be removed with a smooth stone. *(CAUTION - Do not break the sharp edges of spool or liner).* Insert flow valve in valve body and move spool back and forth, rotating slightly on each pass. The spool must slide freely in all positions. If spool sticks or drags, check for dirt, nicks, and burrs. Remove nicks or burrs with a smooth stone. Check shaft seal in bearing cap and replace if worn or damaged. If necessary to replace, align seal properly, then press it in until shoulder stops against cap casting, using an arbor press. Check pressure relief valve *(NOTE* - Valve must not leak at any pressure below 750 lbs. and must open completely at 900 lbs.) Evidence of leakage will be seen at small holes in side of flow spool. If valve leaks, disassemble check valve seat for nicks or dirt. Replace valve seat if nicked or damaged. *(NOTE* - If valve pressure is too low, a 1/32" washer may be placed between spring and ball retainer. If too high, place the washer between valve seat and flow valve spool body). Check pump body for wear or damage. Scratches or burrs can be removed with fine emery cloth. If body is scored or damaged, a new pump should be used.



THOMPSON SLEEVE TYPE HYDRAULIC PUMP

REASSEMBLY: Clean all parts thoroughly. Press drive shaft and bearing assembly into housing and check rotation of shaft to make sure shaft turns freely. Place cylinder driven block (without splines) on fixture C-3602 and insert plunger spring, plunger and seven sleeves into driven block. Place pump body, square end down, over cylinder drive block and fixture locating pins. Use a probe to align sleeves to a uniform spacing, then install the other two sleeves. Position cylinder drive (with splines) over the sleeves. Sighting thru bores in drive block for alignment, lower the cylinder drive block until it engages the two sleeves in forward position. Use a probe and align sleeves in the 5 and 7 o'clock positions at the same time guiding cylinder block downward. Continue this procedure with the other sleeve positions until all sleeves are aligned and engaged. Push block all the way in. *(CAUTION* - Do not force block into position). Remove body and cylinder block assembly from fixture, using care to see that blocks are not forced out of body by plunger spring. Assemble a new end cap gasket on pump body, then install end cap and tighten screws finger tight. Insert a new "0" ring seal in counterbore at flow valve liner in body. Install a new pump body-to-housing gasket and install housing. *(NOTE* - It may be necessary to apply hand pressure on housing to get drive block down into body after housing is seated). Tighten the five capscrews finger tight, then check pump shaft to make sure it is freely rotating. Tighten capscrews to 25 ft. lbs. and recheck pump shaft for free rotation. Mount pump in a vise and install flow valve spool with the 3/16" land down. Place flow valve spring on top of flow spool. Replace "0" ring seal on flow spring retainer, then compress flow spring with fitting and screw fitting into place. Tighten to 20 ft. lbs. Install and align a new reservoir "0" ring seal on housing, then align reservoir so that indentation on back will mate with angular boss on suction end cap. *(NOTE* - Sighting through 9/32" hole in back of reservoir will aid in alignment). Replace copper gasket under head of reservoir capscrew, replace screw and tighten to 15 ft. lbs. *(CAUTION* - Do not attempt to align reservoir in place with the capscrew). Install shaft key, pulley and tighten pulley bolt to 20 ft. lbs. Refill pump with Automatic Transmission Fluid Type "A".

VICKERS VANE TYPE (2 PIECE HOUSING)

DeSoto (Late 1957). See Note below.
Mercury (Cars with 368" Eng., Turnpike Cruiser & Air Conditioned Cars) (1957)

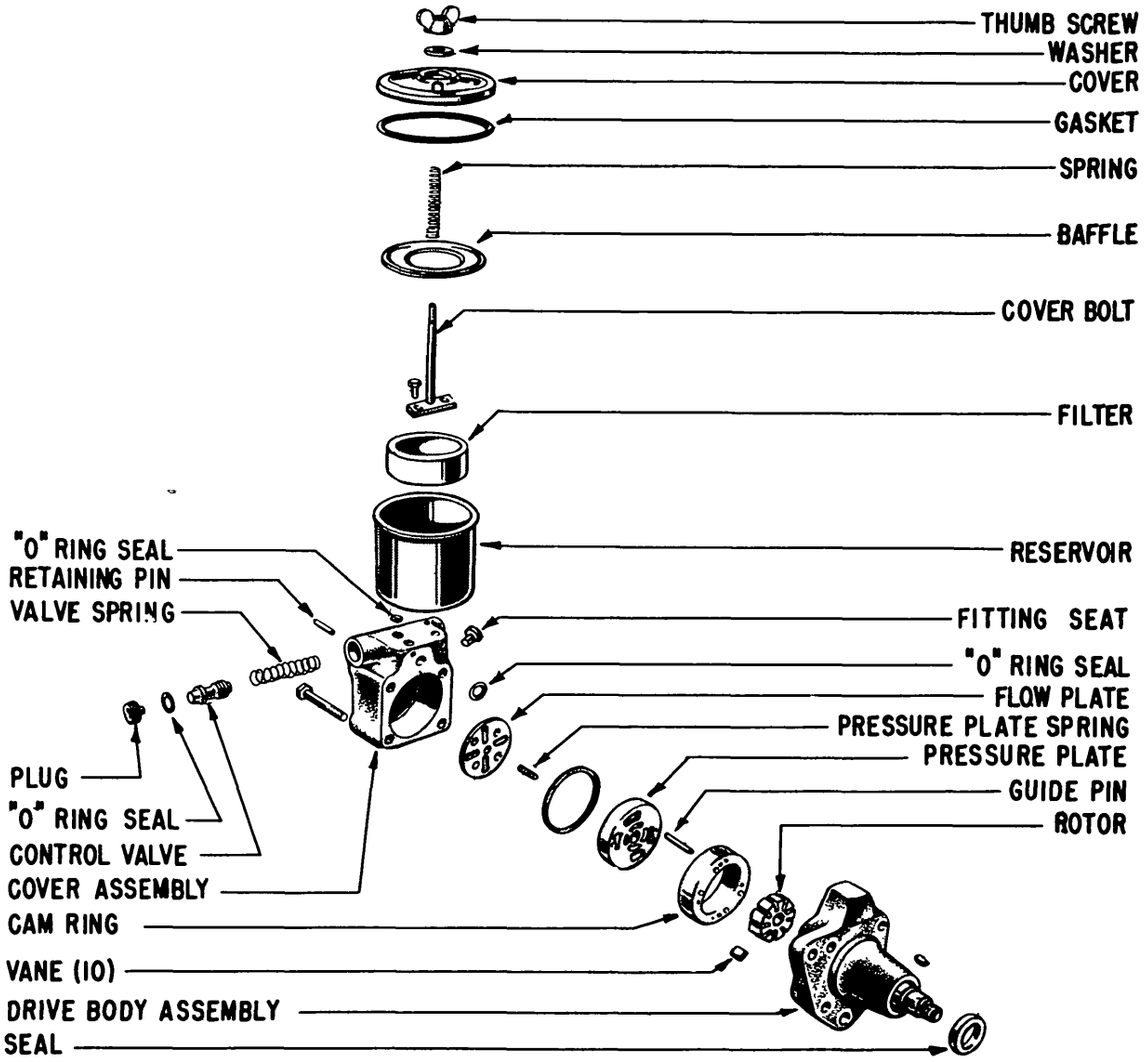
►*1957 DESOTO (EARLY) NOTE:* A "Three Housing" Vickers Vane type pump is used on these models. *See "Vickers Three Housing Vane Type Pump."*

DESCRIPTION: This new pump consists of a two-piece housing (drive body & cover assembly). A new rotor cam ring is retained on pump drive body with two guide pins replacing the separate cam body on previous vane type pumps.

REMOVAL: Loosen pump drive belt adjusting screw and remove belt (or belts). Disconnect intake and discharge hoses and cap the openings. Remove pump from engine.

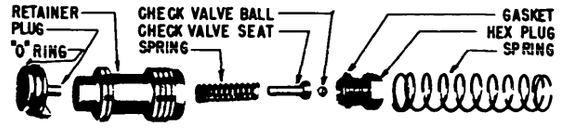
DISASSEMBLY: Drain pump and remove reservoir cover, baffle plate and filter. Remove reservoir retaining screws and remove reservoir and three "0" ring seals, Remove pump pulley, then remove screws attaching pump cover to drive body assembly and lift cover straight up from drive body. Drive retaining pin out of cover assembly and remove control valve assembly. *(CAUTION* - Control valve plug is spring loaded). Remove hex plug from end of control valve plunger and remove relief valve check ball, seat and spring. Remove flow plate and pressure plate spring from cover, then remove pressure plate, rotor cam ring, guide pins and rotor (with ten vanes) from drive body. Place pump body (with front end down) in end of a steel pipe which is large enough to clear forward end of drive body housing. Place drive body and pipe tool in an arbor press, and press at rear (splined) end of shaft to drive shaft, retainers, front bushing and seal out of housing. *(NOTE* - Some early pumps had a bronze retainer ring on shaft that may break when pressed out. If this happens, continue driving shaft completely out and then pry seal out with a screwdriver. Install new steel retaining rings at reassembly). Remove front bushing from body. *(CAUTION - Do not remove rear bushing. If bushing is damaged, replace complete drive body housing).* Check all parts for wear or damage and replace as necessary.

REASSEMBLY: Install new steel retainers around shoulder on pump shaft. Guide splined end of shaft through rear bushing and seat shaft and thrust washers against drive body casting. Slide a new front bushing over drive shaft and down against body casting. Be sure tapered end of bushing enters drive body evenly. Using a suitable tool (DeSoto C-3604) and an arbor press, press bushing into body until it seats against retainers. Be sure tool is in alignment with bushing to prevent damage to drive shaft shoulder. Coat a new seal with Lubriplate and install it over shaft and into position on drive body with lip of seal in and numbered side out. Drive seal into place using a suitable tool (DeSoto C-3603). Place drive body assembly in a vise and install rotor with ten vanes on splined end of shaft. *(NOTE - Vanes should be positioned in rotor with rounded end out).* Insert guide pins in drive body and seat cam ring over pins. *(CAUTION - Cam ring must be installed so that arrow on outside of ring points in a counterclockwise direction when viewing rotor end of shaft).* Slide pressure plate over pins against cam ring with spring recess hole up. Position flow plate at bottom of cover body with spring recess side out. Install new "0" rings in drive body and insert pressure plate spring in center recess hole in plate. Position cover body on drive body and install bracket and attaching screws and tighten to 25 ft. lbs. Install relief valve spring in control valve plunger, then install check ball seat and ball. Hold in place and install hex plug and gasket. Install control valve spring in cover assembly and install control valve plunger, plug (with new "0" ring seal), and then drive in the retaining pin. Install three "0" ring seals on cover body and install reservoir, filter, baffle plate, and reservoir cover. *(NOTE* - Install cover washer under thumb screw, with the groove upward).



VICKERS VANE TYPE HYDRAULIC PUMP (2 PIECE HOUSING)

INSTALLATION: Reverse removal procedure and tighten pump belt.



VICKERS CONTR L VALVE ASSY.

EATON ROTOR TYPE

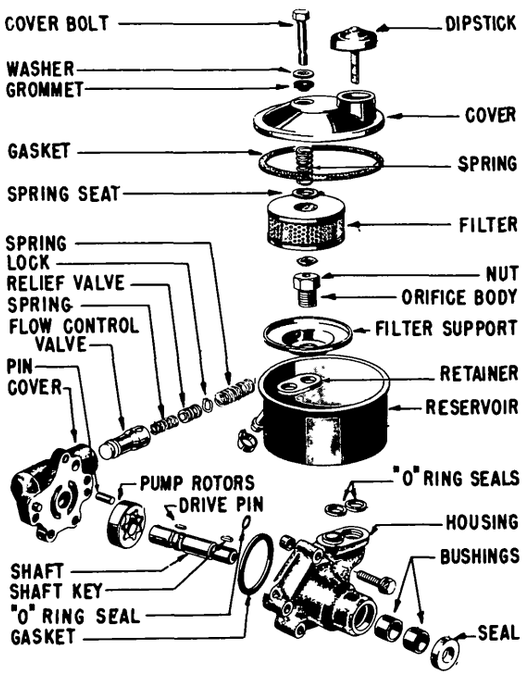
Ford (1957)
Hudson & Nash (1957). S Note below.
M rcury (312" Eng. Exc. Turnpike Cruiser & Air Cond. Cars) (1957)
Lincoln (1957)
Rambler (1957). See N te b low.

►*1957 HUDSON, NASH, & RAMBLER NOTE:* Vickers (Three Housing) Vane Type pumps also used on these models. *See Vickers (Three Housing) Vane Type Pump.*

DESCRIPTION: Similar in design to previous models except that pump shaft is now carried on two bushings, replacing the former ball bearing. *See illustration.*

OVERHAUL: *See "Eaton & Vickers Hydraulic Power Pumps" in 1955 Annual Data or later Manual edition and note the following:*

Rotor Shaft Bushings: These bushings are integral with the housing and cannot be replaced. If bushings are scored or worn, replace the complete housing assembly.



EATON ROTOR TYPE PUMP

VICKERS VANE TYPE (3 PIECE HOUSING)

Continental (1957)
DeSoto (Early 1957). See Note below.
Dodge (1957)
Hudson & Nash (1957). See Note below.
Rambler (1957). See Note below.

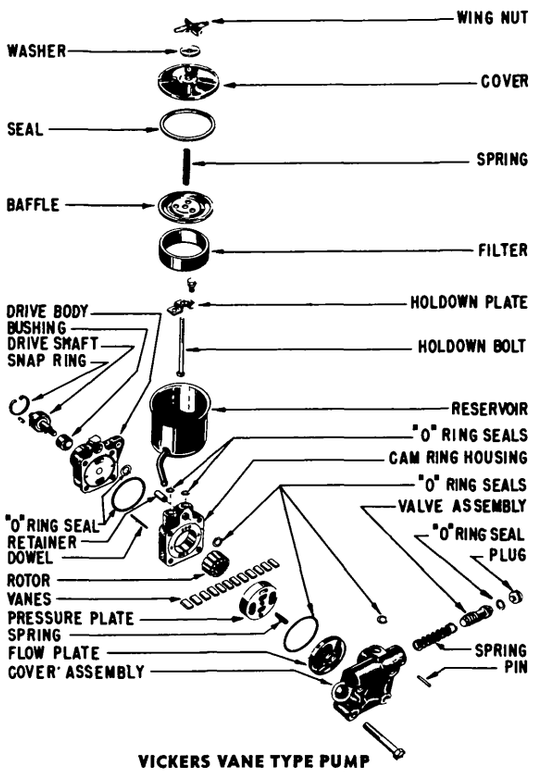
►*1957 DESOTO (LATE) NOTE:* A "Two-Housing" Vickers Vane type pump is used on these models. *See Vickers (Two-Housing) Vane Type Pump.*

►*1957 HUDSON, NASH & RAMBLER NOTE:* Eaton Rotor Type pumps also used on these cars. *See "Eaton & Vickers Hydraulic Power Pumps" in 1955 Annual Data or later Manual edition.*

DESCRIPTION: Design is similar to previous pumps except that the pressure plate has been re-designed and a new "flow plate" has been added.

OVERHAUL: Same as for the previous vane type pump. *See "Eaton & Vickers Hydraulic Power Pumps" in 1956 Annual Data or later Manual edition and note the following:*

Flow Plate: This plate is installed in pump cover assembly, with the recess for pressure plate spring facing outward. Pressure plate must be installed with the spring recess facing the pump cover assembly. See illustration for positions of pump parts.



VICKERS VANE TYPE PUMP (3 PIECE HOUSING)

MANUAL STEERING GEARS

ROSS MODEL SL-54

Packard, Clipper (1957)
Studebaker, Comm., Pres., Golden Hawk (1957).

DESCRIPTION: Similar in design to Ross Cam & Twin Lever except for the single cam lever with tapered roller bearing mounted follower

Disassembly: Same as for the Cam & Twin Lever except as follows:

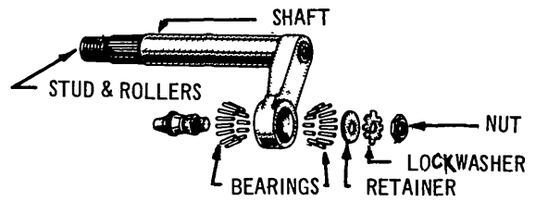
1) To remove follower from lever, bend down locking tang, remove the nut, lockwasher and plain washer. Then slip the bearings and follower out of the cam lever.

Reassembly: Same as for the Cam & Twin Lever except as follows:

1) To reassemble the cam lever, place lower set of bearings around the cam follower; hold them in place by means of heavy grease. Then carefully insert follower and bearings into the lever. Hold the follower in position and install the upper set of bearings. Install washer, lockwasher, and nut.

2) Adjust the cam follower bearing as follows: Hold cam follower and tighten the adjusting nut sufficiently so that cam follower can be turned by hand with a slight drag. This check should be done with the unit lubricated. Bend locking tang to hold adjusting nut securely in place.

Adjustment: The steering post and cam lever end play adjustments are made in the same manner as for the Cam & Twin Lever type.



CAM LEVER SHAFT ASSY.

1957 TRANSMISSION INDEX

BUICK — Page
- Dynaflow Drive 377
- S-M (Series 40) 369

CADILLAC
- Dual-Coupling Hydra-Matic 430

CHEVROLET PASS. CARS & CORVETTE
- Powerglide 389
- Turboglide 394
- S-M (4-Speed) 373
- S-M (3-Speed) 375
- Overdrive ..... Ⓐ Pg. 378 in 1955 Data
- O.D. Control ..... Transmission Section of Manual

CHEVROLET TRUCKS
- Hydra-Matic ..... Pg. 429 in 1956 Data
- 3-Speed S-M (L.D.) ..... Ⓐ Pg. 376 in 1955 Data
- 3-Speed S-M (H.D.) ..... Ⓐ Pg. 371 in 1954 Data
- 4-Speed S-M ..... Transmission Section of Manual
- Overdrive ..... Ⓐ Pg. 378 in 1955 Data
- O.D. Control ..... Transmission Section of Manual

CHRYSLER & IMPERIAL
- TorqueFlite 411
- S-M 371

DE SOTO
- PowerFlite 405
- TorqueFlite 411
- S-M 371
- O.D. (Warner R10) ..... Ⓐ Pg. 385 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

DODGE
- PowerFlite 405
- TorqueFlite 411
- S-M 371
- O.D. (Warner R10) ..... Ⓐ Pg. 385 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

FORD PASS. CARS & THUNDERBIRD — Page
- Fordomatic 447
- S-M ..... Pg. 367 in 1956 Data
- Overdrive ..... Ⓐ Pg. 399 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

FORD TRUCKS
- Fordomatic 447
- 3-Speed, S-M (L.D.) ..... Pg. 368 in 1956 Data
- 3-Speed, S-M (M.D.) ..... Pg. 368 in 1956 Data
- 3-Speed, S-M (H.D.) ..... Pg. 368 in 1956 Data
- 4-Speed ..... Transmission Section of Manual
- Overdrive ..... Ⓐ Pg. 399 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

HUDSON
- Dual-Coupling Hydra-Matic 430
- S-M 375
- O.D. (Warner R10) ..... Ⓐ Pg. 345 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

LINCOLN & CONTINENTAL
- Turbo-Drive 447

MERCURY
- Merc-O-Matic 447
- S-M ..... Pg. 367 in 1956 Data
- Overdrive ..... Ⓐ Pg. 399 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

METROPOLITAN (HUDSON & NASH)
- S-M ..... Ⓐ Pg. 375 in 1954 Data

NASH
- Dual-Coupling Hydra-Matic 430
- S-M 375
- O.D. (Warner R10) ..... Ⓐ Pg. 345 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

OLDSMOBILE
- Dual-Coupling Hydra-Matic 430
- S-M 369

PACKARD — Page
- Flightomatic 467
- S-M (Warner) ..... Ⓐ Pg. 343 in 1953 Data
- O.D. (Warner R11) ..... Ⓐ Pg. 345 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

PLYMOUTH
- PowerFlite 405
- TorqueFlite 411
- S-M 371
- O.D. (Warner R10) ..... Ⓐ Pg. 385 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

PONTIAC
- Dual-Coupling Hydra-Matic 430
- S-M 369

RAMBLER
- Dual Range Hydra-Matic ..... Pg. 429 in 1956 Data
- Dual-Coupling Hydra-Matic 430
- Flash-O-Matic 462
- S-M 375
- O.D. (Warner R10) ..... Ⓐ Pg. 345 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

STUDEBAKER
- Flightomatic 467
- S-M (Warner) ..... Ⓐ Pg. 343 in 1953 Data
- O.D. (Warner R10) ..... Ⓐ Pg. 345 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

WILLYS
- S-M (Warner) ..... Ⓐ Pg. 343 in 1953 Data
- Transfer Case ..... Transmission Section of Manual
- O.D. (Warner R10) ..... Ⓐ Pg. 345 in 1953 Data
- O.D. Control ..... Transmission Section of Manual

Ⓐ - Or later Manual edition.

H.D. - Heavy Duty. M.D. - Medium Duty.
L.D. - Light Duty. O.D. - Overdrive.

S-M - Synchro-mesh Transmission.

BUICK - OLDSMOBILE - PONTIAC

Buick Series 40 (1957)
Oldsmobile Series 88 & Super 88 (1957)
Pontiac (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 BUICK & PONTIAC COUNTERGEAR THRUST WASHER CHANGE (To Reduce Transmission Case Wear):* A new thrust washer (Buick Part No. 1180482) is used in production and for service replacement at rear of countergear. A pin is embedded in the new thrust washer to index with the slot in transmission case to prevent thrust washer from rotating. *(NOTE* - On some early transmissions, it may be necessary to deepen the slot in transmission case). The other two thrust washers at rear of countergear are not affected by the above change.

DESCRIPTION: Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse).

REMOVAL: *See "Synchro-mesh Transmission" on Car Mod l pag s.*

1957 SYNCHRO-MESH TRANSMISSIONS

OVERHAUL: Disassembly - *(CAUTION - Before opening case, clean exterior of transmission thoroughly).*

1) On Buick, remove speedometer driven gear assembly, then remove torque ball. Remove retaining bolt and washer, then pull universal joint from shaft using Puller J-682-A. Remove universal joint retaining ring from main shaft, then remove rear bearing retainer from transmission case. Remove speedometer drive gear. On Pontiac, remove transmission cover, gasket, selector lever, and shifter lever and yoke. Remove speedometer driven gear, then remove rear bearing retainer, gasket, and shift lever spring and yoke support from transmission case. On Oldsmobile, remove return spring, spring extension, spring clip and cover from transmission case. Remove universal joint companion flange bolt, then remove flange with Tools 6504, 6544 & 6295-01. Remove speedometer driven gear, rear bearing retainer and gasket.

2) On all models, remove rear bearing retainer and gasket (if not already done). Remove setscrews from the two shifter shafts using Tool J-2895 (or equivalent), then move the mainshaft rearward until rear bearing clears case. *(NOTE* - If fit between bearing and transmission case is tight, it may be necessary to tap on second speed gear with a block of wood). Disengage shifter yoke from synchronizer and lift front end of mainshaft enough to remove synchronizer from shaft. Remove snap ring holding second speed gear to mainshaft using snap ring pliers. Slide second speed gear off end of mainshaft (thrust washers will come off with gear), and note the wire spacer ring installed in bottom of snap ring groove. Slide low & reverse gear off mainshaft by pulling shaft through rear of transmission case.

3) Remove shifter yokes and shafts, using care to prevent poppet balls from jumping out, then remove poppet balls and springs (poppet balls are under rear end of short shaft and under front end of long shaft). Move selector shaft so that interlock is clear of each shaft as it is removed. Remove setscrews from shift levers on selector shaft. Remove second and third speed in-

CONTINUED ON NEXT PAGE

BUICK-OLDSMOBILE-PONTIAC (C n.inued)

terlock retainer from groove in right end of selector shaft. Remove first and reverse interlock pin from case. Remove shift lever and lockwasher from left end of selector shaft, then drive shaft out through right side of case, using a soft hammer. *(NOTE* - The welch plug on right side of case will be driven out with the shaft. Do not let shifter levers and interlock drop into case). Remove selector lever and shaft, spring washer, flat washer and oil seal from transmission case.

4) Drive countergear shaft lock into the shaft, then drive shaft out through rear of case, using Bearing Loader, Tool J-1001, and a soft hammer. Make sure that bearing loader follows the shaft closely so that countergear bearings and thrust washers will be held in place. Allow countergear to rest on bottom of case. Remove snap ring from main drive gear bearing and tap main drive gear and bearing assembly toward rear of case to remove it. Carefully raise countergear out of case so that bearing loader and bearings will not fall out. Remove all thrust washers.

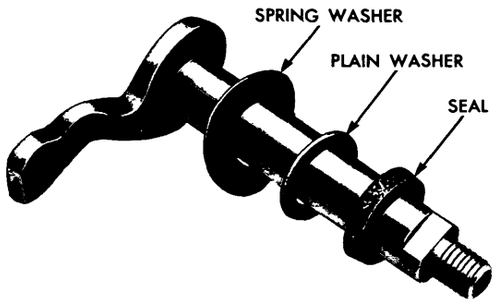
5) Drive reverse idler gear shaft lock into shaft, then remove shaft, idler gear and thrust washers.

Insp cti n: Clean all parts in solvent, then wipe dry with clean cloths. Carefully inspect all parts for evidence of damage (wear, scoring, pitting, chips, nicks, and burrs). Replace any part that is damaged or bent. Inspect all bearings for smoothness, and inspect all bearing seats and seal seats for roughness or burrs. Check cam surfaces of synchronizing drums which must be smooth. Conical surfaces of drums must be free of burrs or scores, and oil grooves must be clean *(CAUTION - Do not polish this surface or change the angle).*

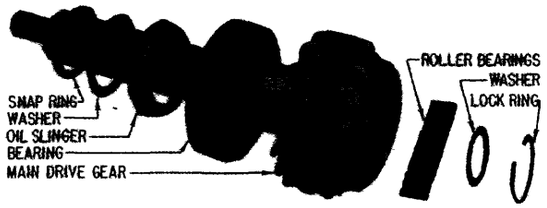
R assembly: 1) Position reverse idler gear and bronze thrust washers into transmission case with oil hole to front of case. Install idler gear shaft until the front of shaft picks up the front thrust washers and just starts into inner support. Coat protruding end of shaft with Permatex No. 3, and complete installation of shaft, making sure that lock pin hole in shaft lines up with hole in case. *(NOTE* - Slot in end of shaft is used to line up shaft and hole). Install a new lock pin coated with sealing compound, driving it 1" below surface of boss on case.

2) Place spring washer, flat washer, and oil seal on selector lever shaft, with crowned side of spring washer against flat washer. Apply Lubriplate to shaft and assemble into transmission case. Install outer shaft lever.

3) Install countergear with bearings, Bearing Loader, Tool J-1001-A, retainer washers, and thrust washers into bottom of case. The small bronze washer is installed between the two steel washers at rear of case *(NOTE - See "Buick & Pontiac Countergear Thrust Washer Change" above).* Install large bronze thrust washer at front of case. Install main drive gear into front wall of transmission case and install snap ring on bearing. Mesh teeth of countergear with teeth of main drive gear and reverse idler gear. Drive countershaft into place with lock pin hole to rear, from rear of case, being careful that it closely follows Bearing Loader, Tool J-1001-A so that bearings and washers are held in proper position. When front end of shaft just enters bore in front wall of case, apply Permatex No. 3 to protruding end of shaft and bore in case, then complete installation of shaft, making sure that lock pin holes in shaft and case are in line. Install a new lock pin coated with sealing compound and drive pin flush with surface of case.



INNER SELECTOR LEVER & SHAFT



MAIN DRIVE GEAR & SHAFT

4) Replace poppet ball and spring, interlock pin, and low and reverse shifter shaft with yoke. Place low and reverse shifter shaft in neutral position. *(NOTE - Shifter shaft will be in neutral position when notch* for shifter lever is directly above shifter shaft bore in case). Install a new welch plug, coated with sealing compound, in right side of case. Raise low and reverse interlock pin into groove in shifter shaft, then from left side of transmission case, install selector shaft. Place low and reverse and second and high shifter levers on shaft, making sure that selector lever engages notch in bottom of shifter lever. Install second and high interlock on shaft, then install a new second and high interlock retainer. Replace poppet ball and spring, yoke, and second and high shifter shaft over and second and high interlock.

5) Insert main shaft assembly through bore in rear of case, slide low and reverse gear onto shaft and replace snap ring holding gear to shaft. Install second speed gear rear thrust washer on main shaft. *(NOTE - Two splines on main shaft are machined the entir length of the second speed gear. Both thrust washers must be installed with tang in the same spline. Th other spline is for lubrication).* Install second speed gear on main shaft. Install wire spacer ring in main shaft snap ring groove if removed. Install front thrust washer with tang in same spline as tang on rear thrust washer and install snap ring in groove.

6) Install synchronizer with counterbored end of clutch next to second speed gear, engage second and high shifter yoke with synchronizer and low and reverse yoke with low and reverse gear. Complete installation of main shaft assembly. Replace setscrews securing shifter levers and yokes to their respective shafts, using Tool J-2895.

7) Use a new gasket and install rear bearing retainer to transmission case, sealing capscrews with sealing compound. On Pontiac, install shifter lever spring yoke support under lower left capscrew, then install top cover gasket, and replace cover and spring clip. Install speedometer driven gear, selector lever, shifter lever, yoke and spring assembly.

8) On Oldsmobile, coat sealing lip of rear bearing retainer oil seal with special lubricant, Part No. 567196. Coat outer diameter with sealing compound, then install seal in rear bearing retainer, using Tool J-5154. Using Companion Flange Installer, Tool 6505, and Companion Flange Holder, Tool 6544, install companion flange. Install companion flange bolt and tighten to 27-36 ft. lbs. Position a new top cover gasket on case and install top cover, spring clip, attaching screws and lockwashers. Tighten screws to 10-12 ft. lbs. Install toggle spring and spring extension between spring clip and outer shaft lever. Install speedometer driven gear into rear bearing retainer and tighten to 6-8 ft. lbs.

9) On Buick, install selector lever and shifter lever. Install speedometer drive gear, then install rear bearing retainer. Install universal joint retainer ring on main shaft, then install universal joint and joint retaining bolt and washer. Install torque ball and speedometer driven gear.

CHRYSLER, DESOTO, DODGE & PLYMOUTH

Chrysler C-75-1 (Early 1957) Std. *See note below.*
Chrysler C-76-300 (1957) Optl.
DeSoto C-25 & C-27 (1957) Std.
Dodge, All Models (1957) Std.
Plymouth, All Models (1957) Std.

►CHANGES, CAUTIONS, CORRECTIONS

►*CHRYSLER C-75-1 NOTE:* Automatic transmission standard on later cars. Synchro-mesh transmission optional.

►*1957 PLYMOUTH HARD SHIFTING (REVERSE & LOW) CORRECTION:* On early cars, if a binding condition is encountered, remove the low-reverse gear and file a 45° chamfer approximately 1/16" long on end of each spline on front (large diameter) end of the gear. This chamfer has been added to gears in later production beginning approximately Dec. 1, 1957.

►*1957 PLYMOUTH HARD SHIFTING INTO REVERSE (OVERDRIVE CARS) CORRECTION:* This condition may be caused by a forging flash at the parting line on low and reverse gearshift lever cam. To correct, remove gearshift housing cover and grind off the flashing to provide sufficient clearance between cam and cover.

►*1957 PLYMOUTH SYNCHRONIZER SPRING PRODUCTION CHANGE (To Provide Easy Engagement of Gears When Shifting from First to Second and Second to Third):* A lighter synchronizer spring, Part No. 1823916 is used on transmissions stamped 3-21-57 and may be used on earlier transmissions for easier gear engagement.

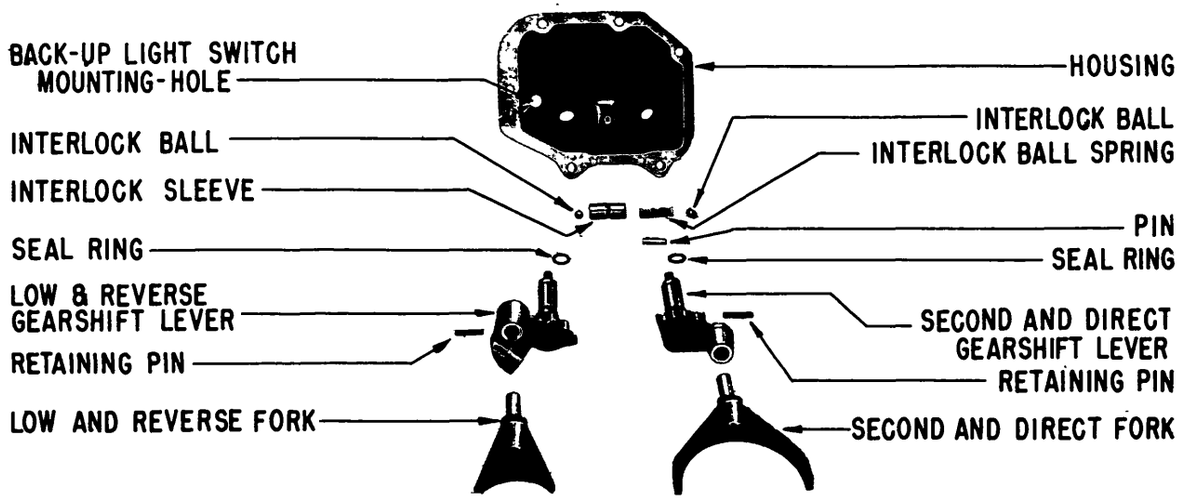
►*1957 PLYMOUTH SECOND SPEED GEAR DISENGAGEMENT CORRECTION:* Adjust gear shift linkage to insure full engagement in all gear positions. Check and correct second speed gear endplay which must be .003-.008". Replace second speed gear or clutch gear (both if necessary), to eliminate parts with excessive tooth runout.

DESCRIPTION: **Own.** New design, three speed, constant-mesh, synchro-mesh (second & high), sliding gear (low & reverse). All helical gear type. Gear shift housing (transmission side cover) has two shift operating levers with separate shafts and shifting fork assemblies. A positive interlock between shifting assemblies prevents engagement in two gears at once.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model pages.*

OVERHAUL

DISASSEMBLY: **Gearshift Housing** - Remove capscrews attaching housing to transmission case and remove housing. Remove shifting forks from transmission if they were not removed with gearshift housing. Remove operating levers from their shafts by driving out the spring pins from lever shafts. Then, slowly withdraw operating shaft from housing. *(CAUTION* - Do not lose interlock ball (spring loaded) located on inner side of shift housing). Remove interlock sleeve, spring, pin, ball, and remaining operating shaft. *NOTE* - Do not remove steel expansion plug from side of gearshift housing unless leakage is noted.



CHRYSLER, DE SOTO, DODGE, PLYMOUTH SHIFT ASSEMBLY

Drive Pinion: Remove nut and bellville washer holding transmission brake drum and flange assembly. Remove main drive pinion bearing retainer and gasket (do not remove pinion at this time). Place transmission assembly in a fixture so forward end of transmission is upward. Remove drive pinion shaft assembly by lifting upward on shaft, tapping it lightly to aid removal. Remove main drive pinion bearing snap ring and bearing washer, then carefully press pinion shaft out of bearing. Remove oil slinger. Remove main drive pinion pilot bearing snap ring from cavity in end of shaft using a hook or flat blade. Remove washer and rollers.

Mainshaft: Remove extension housing-to-transmission case bolts and studs. Place a nut (½-5/8" thick) between synchronizer clutch gear sleeve and inner stop ring assembly *(NOTE* - The spacer nut (above) will minimize interference from synchronizer clutch gear sleeve when transmission case is removed from extension housing). Remove transmission case by lifting upward while guiding cluster gear second speed gear past synchronizer sleeve. Before further disassembly, check endplay of synchronizer clutch gear on mainshaft. Select a snap ring of proper thickness to eliminate all all endplay. Check endplay of second speed gear which should not exceed .008" (if greater, check for wear on thrust faces of second speed gear, clutch gear, and ends of mainshaft spiral splines). Check first and reverse sliding gear for free movement on mainshaft. *(NOTE* - Check spline backlash, and if found to be excessive, check shaft with a new gear before discarding old gear). Remove synchronizer clutch gear snap ring, using Tool C-484 or C-3301. Remove second speed gear and first and reverse sliding gear. Remove extension housing from fixture and remove brake drum and flange assembly, using Tool C-452. Remove oil seal with Tool C-748. Using a soft hammer, drive mainshaft out of extension housing by tapping rear end of shaft. Remove mainshaft rear bearing retainer snap ring with Tool C-760. Remove needle bearing by pressing bearing into extension housing. Drive ball bearing out of its bore with Tool C-3275, and remove needle bearing from rear of extension housing. *(NOTE* - Do not remove speedometer gear lubrication tube unless inspection indicates that it is necessary).

Reverse Idler: Using a brass drift, drive reverse idler gear shaft towards rear of transmission to expose key. Remove key, drive out shaft and remove reverse idler gear and bearing assembly.

Countershaft: Check endplay of countershaft which should be .004-.012". If greater, new thrust washers must be installed at reassembly. Using Tool C-578 (arbor), drive countershaft out rear of case. Remove shaft key, countershaft gear (with arbor installed), thrust washers, rollers, and spacer.

INSPECTION: Wash all parts and blow dry with air. Check bearings for looseness or noise and for fit on shafts and in housing bores. Inspect mainshaft splines for wear, galling, or scoring. Inspect bearing mounting surfaces and snap ring grooves. Slight nicks or burrs can be stoned smooth. Inspect gear teeth and threads on inner and outer synchronizer stop rings. Check gear teeth on clutch gear sleeve for chipped or excessively worn gear teeth. Make sure that synchronizer clutch sleeve slides freely on clutch gear. Check pins of inner and outer stop ring assembly for straightness and length (pins should be 1.570-1.580" long). If not within this specification, replace stop ring assemblies. Check all gears for broken, chipped, or worn teeth. Check rollers for chips and nicks and countershaft for wear. Replace worn thrust washers. Inspect mainshaft pilot rollers for

CONTINUED ON NEXT PAGE

CHRYSLER, DE SOTO, DODGE & PLYMOUTH (Cont.)

play, pitting, or scoring. If roller bearings fall out during disassembly, they are too loose and should be replaced. Check gearshift housing and operating levers for wear, and replace worn or damaged rubber grommets. Check interlock sleeve for free movement in bores and where sleeve contacts operating lever shafts. Check operating shaft detents for wear, and replace shafts if necessary. Check shift shafts for free movement and wear.

REASSEMBLY: *NOTE - Before reassembly, lubricate each part with SAE 80 transmission fluid.*

Mainshaft: Drive mainshaft rear ball bearing into bore at rear of extension housing, using Tool C-3204 until bearing is seated against shoulder. Select and install a snap ring to eliminate all endplay at bearing (snap rings are available in two sizes), making sure snap ring is fully seated. Place needle bearing on extension and press on lettered side of bearing, using a suitable press, until bearing is flush with face of extension. Using Tool C-3105, install oil seal, driving until tool bottoms on extension housing. Position mainshaft into extension housing and tap forward end of mainshaft, using a soft hammer, until shoulder at rear of mainshaft seats firmly against inner race or rear ball bearing. Install brake drum and flange assembly on mainshaft, then place extension housing assembly on mounting fixture with forward end of mainshaft upward. Place first and reverse sliding gear on mainshaft with fork collar facing up. Install second speed gear, place spreader spring and then synchronizer inner stop ring on second speed gear (*NOTE* - Lightly grease threads on stop ring). Install synchronizer clutch gear on mainshaft and secure in place with snap ring to eliminate all endplay at clutch gear. Snap rings are available in the following thicknesses: .086-.088"; .089-.091"; .092-.094"; .095-.097". Properly seat snap ring. Place balance of synchronizer assembly on mainshaft. Lubricate outer snap ring.

Reverse Idler: Insert adapter arbor into reverse idler gear, then place 22 rollers into position in gear. (*NOTE* - A suitable adapter arbor can be made either of wood or metal by turning and cutting the stock to a length of 1.0625" and a diameter of .750"). Install thrust washer at each end of adapter arbor, retaining them in place with a small amount of grease. Place reverse idler assembly into transmission case (pointed end of teeth forward). Remove adapter arbor by driving reverse idler gear shaft through idler gear until key can be installed. Install key and continue to drive shaft into case until shaft is approximately 1/64" below mating surface on case.

Countershaft: Insert adapter arbor, Tool C-578 into countershaft gear. Place spacer over arbor and insert into cluster gear. After installing the 22 bearing rollers (on one end), place small thrust washer against end of rollers. Install remaining 22 rollers at opposite end of countershaft, and place small thrust washer at end of rollers. Add a small amount of grease to hold thrust washers in place (*NOTE* - Do not install large thrust washers at this time). Be sure transmission case is resting on a smooth surface, then position countershaft assembly into transmission, allowing adapter arbor to enter cluster gear shaft hole in rear of case. Install one of the large tabbed washers, making sure tab on washer engages groove in case (washers are available in two thicknesses, marked "A" & "B"). Select one to obtain .004-.012" total endplay of countershaft. Push adapter arbor into countershaft hole in front of transmission case, then turn transmission case so it rests on opposite end. Install remaining large thrust washer, making sure tab engages groove in case. Using the countershaft, push adapter arbor from cluster gear until shaft key can be inserted. Continue to drive shaft into case until it is approximately 1/64" below mating surface on rear of case. Lightly grease gasket surface of extension housing and install gasket. Install transmission case on extension housing. Place a nut between synchronizer clutch gear sleeve and inner stop ring assembly in same manner as used at disassembly. Install extension housing-to-case studs and bolts and tighten finger tight.

Drive Pinion: Place oil slinger (if removed) on pinion shaft, then press pinion shaft into ball bearing. (*CAUTION* - Make sure slinger does not hang up in bearing snap ring groove during pressing operation). Install keyed washer and secure with snap ring to eliminate all endplay (*NOTE* - Snap rings are furnished in the following thicknesses: .086-.088"; .089-.091"; .092-.094"; .095-.097"). Make sure snap ring is properly seated. If large snap ring on main drive pinion bearing was removed, replace at this time. Place shaft in vise equipped with soft jaws, and place 14 rollers in position in pilot pocket of drive pinion. Install washer against end of rollers and install snap ring. *Remove nut from synchronizer clutch gear sleeve and inner stop ring.* Guide drive pinion shaft through front of case, engaging synchronizer outer stop ring with clutch gear on drive pinion (*NOTE - Pinion shaft bearing is fully seated when snap ring makes full contact with front of transmission case).* Slide pinion bearing retainer over pinion shaft and against transmission case. While holding retainer with hand pressure against case, measure the clearance between retainer and case, using a feeler gauge. Select a gasket about .005" thicker than the clearance to eliminate endplay on front bearing (*NOTE* - Gaskets are furnished in various thicknesses). Install retainer and tighten bolts. Remove transmission assembly from mounting fixture, and tighten bearing retainer screws to 15 ft. lbs., and extension-to-case bolts to 30 ft. lbs. Install mainshaft washer (convex side toward nut), and draw nut up snug against washer. Install drain plug and tighten to 20 ft. lbs.

Gearshift Housing: Place gearshift housing in vise equipped with soft jaws. Place "O" ring seal on second and high gearshift lever shaft and install assembly in housing. Secure shaft in place with retaining pin. Install interlock sleeve in its bore, then place one of the interlock balls in sleeve, followed by spring and pin. Place "O" ring seal on low and reverse gearshift lever shaft, and install assembly part way into housing. Place second interlock ball on top of interlock spring, and while depressing ball with a suitable tool, seat shaft in bore while allowing interlock ball to seat in detent in lever. Secure shaft with retaining pin. (*NOTE - Lever shafts must be placed in position to allow clearance for tool).* Install gearshift operating levers and tighten retaining nuts to 20 ft. lbs. Shift transmission into neutral and place shift forks in position in transmission case. Place operating levers in neutral, install gasket, and then install housing, engaging fork ends with the respective shafts. Tighten housing bolts to 20 ft. lbs. Install new steel expansion plug (if removed). Install back-up light switch and speedometer drive pinion.

GEARSHIFT CONTROL ADJUSTMENTS

Crossover Adjustment: (*NOTE - Before making adjustments, gearshift lever shaft must be in its normal fully returned position in neutral).* Remove lubrication fitting from tube lever pin retainer and rotate retainer until gearshift cross pin is exposed. If a .040" round feeler gauge cannot be inserted between gearshift tube cross pin and bottom of slot in the second (high shift lever hub), an adjustment at gearshift tube lower support must be made as follows: Loosen gearshift tube lower support screws sufficiently to permit movement of support when it is tapped slightly with a plastic hammer. Adjust support up or down to obtain .040" clearance. Tighten support clamping screws to 150 inch pounds (90 inch pounds for power steering equipped cars). Rotate tube lever to its original position and install lubrication fitting. Tighten fitting to 70 inch pounds. Operate crossover to make sure it is free of any interference.

Control Rod Adjustment: With transmission in neutral, loosen and back off adjusting nuts at second-high gearshift control rod swivel. Place knob end section of manual control lever (in car) in a horizontal plane. Adjust nuts at swivel block to retain gearshift lever in a horizontal position. Tighten nuts to 70 ft. lbs., making sure the transmission remains in neutral. Loosen and back off adjusting nuts at low-reverse gearshift control rod swivel, then position low-reverse gearshift lever in direct alignment (through center of swivel block pin) with the second-high gearshift lever. Tighten adjusting nuts to 70 ft. lbs. Again check crossover operation for interference. *CAUTION* - Failure to make this adjustment correctly will result in insufficient manual lever-to-steering column clearance. Incomplete engagement of transmission may also result, causing damage to gears.

CHEVROLET (PASSENGER CARS) 4-SPEED SYNCHRO-MESH

Chevrolet Pass. Cars (1957) Optl.
Chevrolet Corvette (1957) Optl.

DESCRIPTION: New 4-speed "close ratio" helical gear type (except reverse), with constant mesh, synchro-mesh in all forward speeds. Sliding gear (reverse).

REMOVAL: *See "Transmission" on Car Model pages.*

OVERHAUL

SPEEDOMETER DRIVEN GEAR: *(NOTE - This gear may be removed with transmission in car).*

Removal: Disconnect speedometer cable, remove lock plate-to-housing bolt and lockwasher, then remove lock plate. Insert screwdriver in lock plate slot in fitting and pry fitting, gear and shaft from housing. Pry "O" ring from groove in fitting.

Installation: Install new "O" ring seal in groove in fitting and insert shaft. Hold assembly so slot in fitting is toward lock plate boss on housing and install in housing. Push fitting into housing until lock plate can be inserted into groove and attached to housing.

SIDE COVER: *(NOTE - Side cover can be removed with transmission in car after shift rods have been disconnected and transmission drained).*

Removal: Remove nine bolts from side cover and remove side cover, gasket, and shifter forks.

Disassembly: Remove outer shifter lever clamp bolts and pull levers from shaft. Carefully push shifter shafts into cover, allowing detent balls to fall free, then remove shifter shafts. Remove interlock sleeve, interlock pin, and poppet spring.

Reassembly: Install interlock sleeve and one shifter shaft. Place steel detent ball into sleeve followed by poppet spring and interlock pin. Start second shifter shaft into position and place second detent ball on poppet spring. Compress ball and spring with screwdriver and push shifter shaft fully in. With synchronizers in neutral and shifter forks in place, lower side cover into place. Install bolts (using sealer on lower right bolt), and tighten evenly.

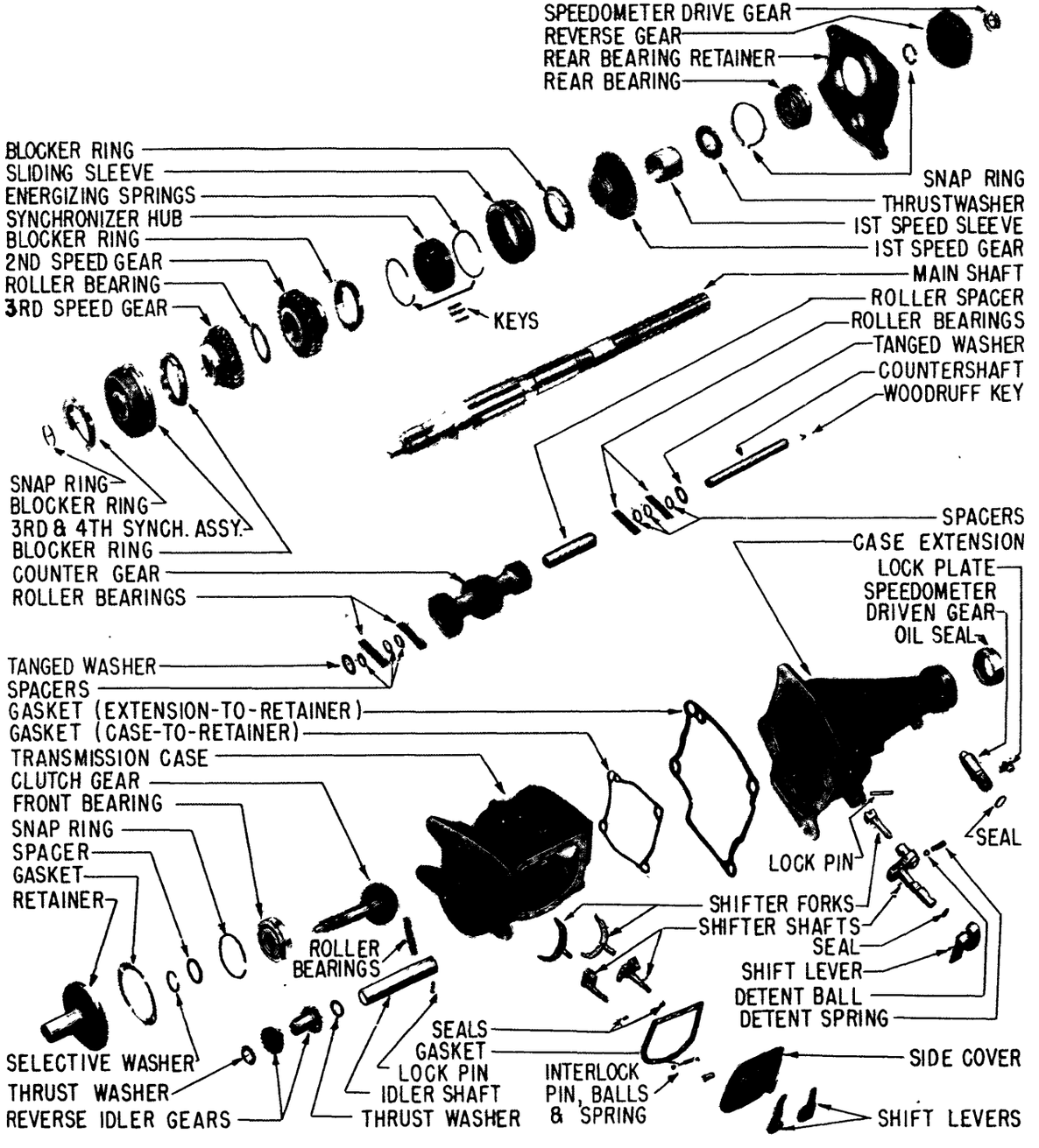
MAINSHAFT OIL SEAL: *(NOTE - Seal may be removed with transmission in car).*

Removal: Remove nuts and bolts retaining rear universal joint trunnion bearings to drive flange. Lower rear end of propeller shaft and slide front flange off mainshaft. Use Tool J-5859 to remove mainshaft oil seal.

Installation: Press new seal into place in extension *(CAUTION - Do not force seal against seat in extension).* Install propeller shaft and connect rear universal joint.

TRANSMISSION CASE: Disassembly - Remove side cover (above), remove front bearing retainer bolts, remove retainer and gasket. Drive retainer pin from reverse shifter lever boss and pull shifter shaft out far enough to disengage shifter fork from reverse gear. Remove bolts attaching extension case to rear bearing retainer plate, then tap extension with a soft hammer, in a rearward direction. When reverse idler shaft is out as far as it will go, move extension to left so reverse fork clears reverse gear and remove extension case and gasket. Remove rear reverse idler gear and tanged thrust washer and front reverse idler gear and flat thrust washer. Remove speedometer gear, using a puller, and reverse gear. Remove self locking bolt attaching rear bearing retainer

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CHEVROLET 4-SPEED CLOSE-COUPLED TRANSMISSION ASSEMBLY

CHEVROLET (PASSENGER CARS) 4-SPEED (Continued)

to transmission case, then carefully remove entire mainshaft assembly. Unload needle bearings from clutch gear and remove fourth speed synchronizer blocker ring. Remove clutch gear retaining snap ring and spacer, then press clutch gear out of bearing toward inside of case. Tap front bearing and snap ring out of case from inside. From front of case, press out countershaft, then remove countergear and thrust washers. Remove the 80 rollers, 6.050" spacer, and roller spacers from countergear.

Cleaning & Inspection: Wash case inside and out with cleaning solvent and inspect for cracks. Inspect front face which fits against clutch housing for burrs. Remove any burrs with a fine cut mill file. Wash front and rear bearings in solvent and blow dry with air. Check for roughness, then oil them with light engine oil. Check clutch and countergear needle bearings and countershaft for wear.

EXTENSION CASE: Disassembly - Drive rear idler shaft lockpin into boss until it falls into clearance hole in shaft. Pry out extension plug at end of shaft and press shaft from extension. Remove shifter fork from shifter shaft, then drive shifter shaft into case, allowing ball detent to drop into case. Remove shaft and detent ball spring.

MAINSHAFT: Disassembly - Remove mainshaft front snap ring, third and fourth speed clutch synchronizer assembly, third speed gear and synchronizer blocker ring, second and third speed gear spacer (needle roller bearing), and second speed gear and blocker ring. Spread rear bearing snap ring and press off the retainer. Remove mainshaft rear snap ring. Support first and second speed synchronizer assembly and press on rear of mainshaft to remove rear bearing, first speed thrust washer, first speed gear and synchronizer blocker ring, second speed synchronizer assembly, and first speed gear sleeve.

▷*SYNCHRONIZER ASSEMBLY CAUTION:* Synchronizer hubs and sliding sleeves are a selected assembly and should be kept together as originally assembled (the three keys and two energizing springs may be replaced if worn or broken). To remove keys and springs, push hub from sliding sleeve. The keys will fall out and the springs can be removed. Reinstall by placing the two energizing springs in position (one on each side of hub), so that tanged end of each spring falls into same keyway in hub. Place keys in position and hold them in place while sliding hub into sleeve.

Reassembly: From rear of mainshaft, assemble first and second gear synchronizer assembly on mainshaft (tapered end of clutch sleeve toward first speed gear), use Tool J-5746 to press first gear sleeve on shaft in an arbor press. Install first speed gear synchronizer blocker ring so that notches in ring correspond with keys in synchronizer hub. Install first speed gear (with hub toward front) and first speed gear thrust washer (grooves in washer must face toward gear). Press rear bearing on shaft (snap ring groove toward front of transmission) using Tool J-5746. Choose the correct selective fit snap ring and install it in groove behind rear bearing (*CAUTION - Always use new snap ring when reassembling transmission and do not expand ring further than is necessary for assembly*). From front of mainshaft, install second speed gear synchronizer blocker ring so that notches in ring correspond to keys in synchronizer hub. Install second speed gear with hub of gear toward back of transmission, and install the second and third speed gear spacer (needle bearing). Install third speed gear with hub to front of transmission, and the third speed gear synchronizer blocker ring (notches to front of transmission). Install third and fourth speed gear synchronizer assembly (hub and sliding clutch sleeve taper toward the front) making sure that keys in synchronizer blocker ring correspond to the notches in third speed gear synchronizer blocker ring. Install snap ring (.086-.088" thickness) in groove in front of the third and fourth speed synchronizer assembly (*NOTE* - With the correct size snap ring, the third speed gear will have correct amount of end play which will be .010-.015" maximum, with the third and fourth speed clutch hub forward against the snap ring). Install rear bearing retainer plate. Spread the selective snap ring (use largest ring which will fit in groove) on plate to allow it to drop around rear bearing, and press on end of mainshaft until snap ring engages groove in rear bearing. Install reverse gear with shift collar to rear. Press speedometer drive gear onto mainshaft using a suitable press plate. Position speedometer gear to get a measurement of 4½" from center of gear to flat surface of rear bearing retainer plate.

EXTENSION CASE: Reassembly - Place ball detent spring into detent spring hole and start reverse shift shaft into hole in boss. Place detent ball on spring and, holding ball down with a suitable tool, push shifter shaft into place and turn until the ball drops into place in detent on shifter shaft detent plate. Install shifter fork (*NOTE - Do not drive shifter shaft locking pin into place until extension case has been installed on transmission case*). Line up locking pin hole in rear idler shaft with hole in boss. Install idler shaft and lock in place with pin. Install new expansion plug behind idler shaft, using sealing compound on plug.

TRANSMISSION CASE: Reassembly - Install roller spacer (6.050" long) in countergear, then, using heavy grease to retain them, install 20 rollers in first gear end of countergear, two .050" spacers, 20 more rollers, and a .050" spacer on top of second race of rollers. Install the same amount of rollers and spacers in the same order in the other end of countergear. Rest transmission on its side with side cover opening upward. Place countergear tanged thrust washers in position, retaining them with heavy grease and making sure that tangs are resting in notches in case. Set countergear in place in bottom of case, making sure that tanged thrust washers are not moved out of position. Press front bearing onto clutch gear, with snap ring groove to front, using Tool J-5746. Install spacer washer and selective fit snap ring in groove on clutch gear ahead of front bearing. Install clutch gear and bearing assembly through side cover opening and into position in transmission front bore. Tap lightly into place with a plastic hammer. Place snap ring in groove in front bearing. Lift countergear, mating fourth speed gear of cluster with clutch gear, then install countershaft into position from rear of case (*NOTE* - Be sure thrust washers remain in place). Install woodruff key in end of countershaft and press shaft into place until shaft is flush with rear face of case. Attach a dial indicator to case so contact button of indicator rests against face of a gear on countergear cluster and check endplay of countergear which should not be in excess of .025". Install the fourteen pilot roller bearings into clutch gear, using heavy grease to retain them in place. Using heavy grease, place gasket into position on front face of rear bearing retainer. Install fourth speed synchronizer blocker ring on clutch gear with notches toward rear of transmission. With front face of transmission case facing down, install the mainshaft assembly into case, making certain that notches on fourth speed synchronizer blocker ring correspond to keys in synchronizer assembly. Install self locking bolt attaching rear bearing retainer to transmission case and tighten to 20-30 ft. lbs. Using heavy grease, install flat thrust washer onto rear face of rear idler thrust boss. Shift transmission into second gear and carefully install the small half of the reverse idler gear into place along side of thrust washer (notches toward rear). From rear of case, insert rear half of reverse idler gear, engaging notches of portion of gear within transmission case. Using heavy grease, place gasket into position on rear face of rear bearing retainer. Install remaining thrust washer into place on rear idler shaft, making sure that tang on thrust washer is in notch in idler thrust face of the extension. Retain thrust washer in place with heavy grease. With transmission facing downward, forward speed gears in neutral, and the reverse shifter shaft as far forward as possible, lower the extension case onto transmission case. Engage reverse shifter fork with the reverse gear flange and lower the extension case into position while moving reverse shifter shaft rearward. Install three extension and retainer-to-case attaching bolts and tighten to 35-45 ft. lbs. Install one extension-to-retainer bolt and tighten to 20-30 ft. lbs. Use a sealing compound on lower right hand attaching bolt. Move shifter shaft to line up groove in shaft with holes in boss and drive in the locking pin. Install shift lever. Install front bearing retainer, gasket and four attaching bolts, using sealing compound on bolts. Tighten to 15-20 ft. lbs. Install shifter fork in each synchronizer (first and second speed gear shifter fork must have its flat surface facing the reverse idler thrust boss). Place both synchronizers in neutral, then install side cover gasket and carefully lower side cover into place. Install attaching bolts and tighten evenly to avoid distortion of cover. *NOTE - Use a sealing compound on side cover lower right hand bolt.*

CHEVROLET (PASSENGER CARS) 3-SPEED SYNCHRO-MESH

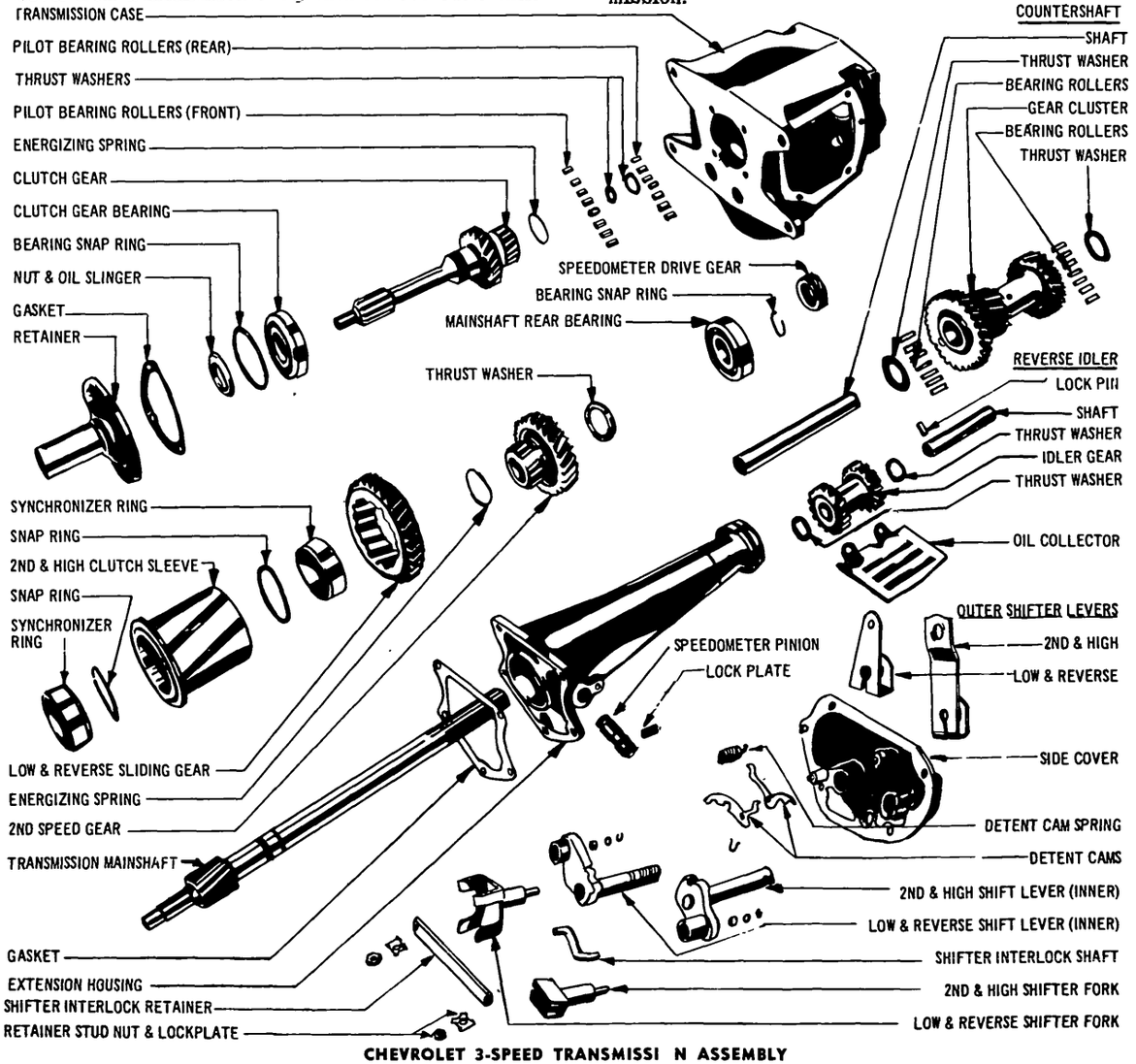
Chevrolet Pass. Cars (1957)
Chevrolet Corvette (1957)

DESCRIPTION: Transmission design is the same as used on 1955-1956 models with the exception that the gearshift interlock assembly has been changed in the side cover. See illustration for details.

REMOVAL: *See "Transmission" on Car Model pages.*

OVERHAUL: Service procedures are the same as for 1955-1956 models. *See "Chevrolet Synchro-Mesh Transmission" in 1955 Annual Data and note the following:*

Side Cover Disassembly & Reassembly: Remove side cover from transmission case, then remove outer shifter lever clamp bolts and pull levers from shafts. Remove nuts and locks and remove shifter interlock retainer. This will allow removal of shifter shaft and fork assembly and cam assembly, or interlock from cover. Replace necessary parts and install shifter interlock retainer. Install outer shifter levers on shafts and install clamp bolts. With transmission gears in neutral and shifter forks in neutral, install cover to transmission, using a new gasket. Tighten retaining screws tightly. *(NOTE* - Hump on first and reverse shifter fork must be toward rear of transmission). Attach control rods to shifter levers, then refill transmission.



CHEVROLET 3-SPEED TRANSMISSI N ASSEMBLY

HUDSON NASH, RAMBLER

Hudson, Nash, Rambler Rebel (1957)

DESCRIPTION: **Warner.** Three speed, constant-mesh, all helical gear type. Synchro-mesh (second & high), sliding gear (low & reverse). Side cover plate contains shifting shafts and interlock assembly.

► *TRANSMISSION HOUSING NOTE:* The four units of the transmission housing (transmission case, adapter plate, rear housing & extension adapter) are similar in appearance to units used with overdrive transmissions, however, only the transmission case and extension adapter are interchangeable with overdrive transmissions.

TRANSMISSION REMOVAL: *S e "Transmission" on Car Model pages.*

OVERHAUL

► *OVERDRIVE TRANSMISSION DISASSEMBLY NOTE: See "Warner R10 Overdriv " f r ov rdriv disassembly, then proceed in same manner as for synchro-mesh transmission (without overdrive) b low.*

DISASSEMBLY: Drain transmission, place in holding stand, then proceed as follows:

Extension Adapter: Remove extension from transmission rear housing and remove oil seal from extension adapter, using Tool J-2626.

Rear Housing: Remove bolts attaching housing to adapter plate and remove housing. Remove both lock rings at speedometer gear and remove gear from shaft, then remove Woodruff key. Drive bearing from housing, using a brass drift.

Transmission Cover & Shift F rk Assembly: Remove screws attaching cover to transmission case and remove cover (including shift forks). Check interlock sleeve and clearance by placing one shaft "in gear" with the other in neutral and measure clearance between interlock sleeve and cam of the "in gear" shaft. Clearance should be .002-.008" (four different length sleeves are available in .005" variations for adjustment). Remove shift levers and forks by tapping shift shafts from cover *(CAUTION - Be car ful not to lose int rlock sleeve, balls, spring, or pin).*

Clutch Shaft Bearing: Remove bearing cap and gasket, then remove clutch shaft snap ring, spacer washer, and bearing lock ring. Using Bearing Puller J-6654 and Thrust Yoke J-6652, remove front bearing from clutch shaft *(NOTE - Clutch shaft cann t b rem v d from front of transmission case).*

Main Shaft: With front bearing removed from clutch shaft, pull shaft as far forward as possible. Separate main shaft and its components from clutch shaft, then slide main shaft assembly out through rear of transmission case. Remove clutch shaft through rear of case and remove the 14 needle bearings and oil baffle. Place mainshaft assembly on bench and remove synchro-clutch spacer washer and lock ring. Remove synchro-clutch, second speed gear, and first and reverse sliding gear from mainshaft. If the large bearing in the adapter plate requires replacement, remove snap ring in adapter and and tap mainshaft and bearing from adapter. Remove

CONTINUED ON NEXT PAGE

HUDSON, NASH, RAMBLER (C ntinued)

snap ring on mainshaft and press bearing off shaft.

Countershaft & Gears: Using a dummy shaft machined to .870" x 8 1/16", drive countershaft out rear of case. Remove countershaft gear, with dummy shaft in place, through rear of case as an assembly.

R v rs Idl 'r G ar & Shaft: Drive reverse idler gear shaft out through rear of case using a brass drift.

INSPECTION: Wash all parts in solvent and blow dry with air. Check all gears for worn or chipped teeth (check wear of gear bore by sliding gear onto a new shaft, replace if found to be loose). *(NOTE - If a transmission gear is replaced, the gear with which it meshes should also be replaced).* Check bearings for cracked races, worn or scored balls. Install gears on mainshaft and check for a smooth fit without excessive play between splines. Inspect synchro-clutch and friction rings. Check fit of taper on cones of second speed gear and clutch shaft by installing friction rings. Replace rings if there is excessive play. Check transmission case for wear and scoring of bearing recesses, cracks, or other defects. Check clutch housing for runout which should not exceed .005" (total). Total runout of clutch housing bore should not exceed .003".

REASSEMBLY: Use new gaskets and oil seals when reassembling transmission.

Countershaft & Gear: With bearings and spacers installed in countershaft gear, and dummy shaft in place, install the thrust washers, indexing the two small projections on face of bronze rear thrust washer with grooves in countershaft gear, and projections of front bronze thrust washer with transmission case. Position the large thrust washer and install assembly in bottom of case. Install Reverse Idler Gear (see below), then install countershaft as follows: Properly align countershaft gear and front and rear thrust washers with opening in case. Enter countershaft into hole in rear of case and carefully press it through bore in countershaft gear, pushing the dummy shaft forward and out of the gear. Before driving the shaft flush to rear of case, install and align the Woodruff key.

R v rs Idl r G ar & Shaft: Install reverse idler gear with chamfered side of teeth toward front of transmission case. Align gear and install idler shaft from rear of case driving it in sufficiently to install the Woodruff key, then continue driving until end of shaft is flush with rear of case.

Clutch Shaft: Insert fourteen clutch shaft needle bearings in pilot hole at rear of clutch shaft using a coating of heavy lubricant to retain them in place during assembly. Insert clutch shaft through rear of case and pull it as far forward as possible, letting it hang downward at front of case (to provide greatest possible amount of room for installation of the mainshaft).

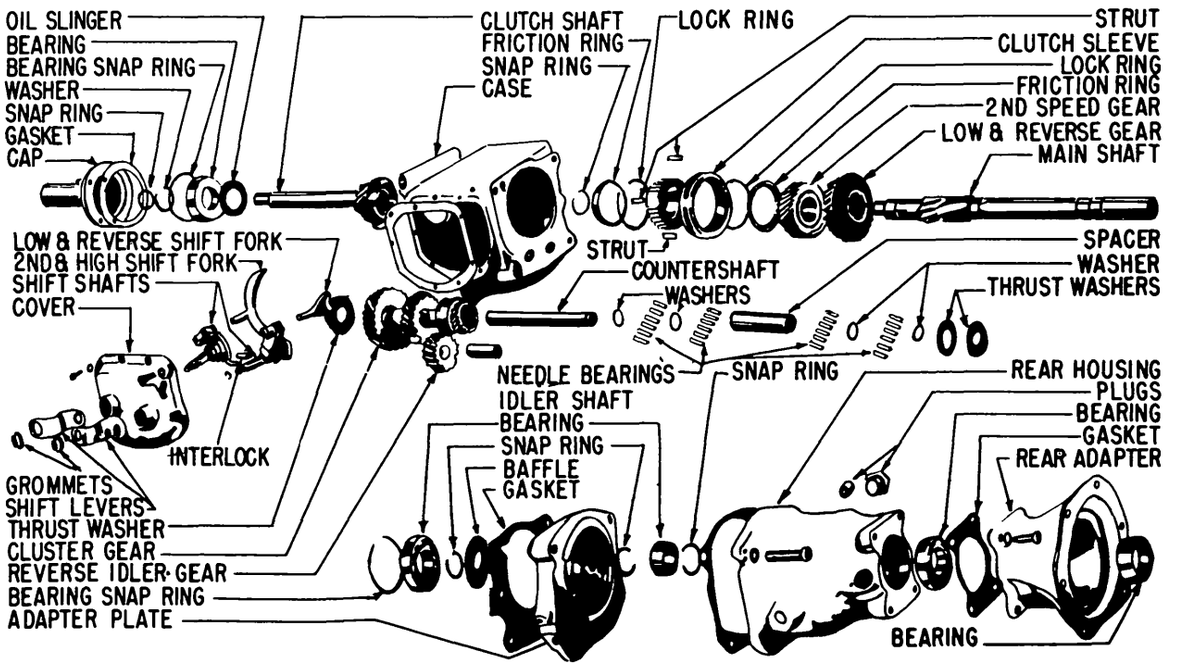
Mainshaft: Install bearing on mainshaft using Tool J-2995, and install the snap ring *(NOTE* - This snap ring is available in the following sizes: .087", .090", .093", .096". Select the thickest ring which will fit into retaining groove). Place oil baffle into adapter plate with concave side facing forward, then tap mainshaft and center bearing assembly into adapter plate. Install the large snap ring in groove in adapter housing *(NOTE* - This snap ring is available in the following sizes: .088", .091", .094",. .097". Select the thickest ring which will fit into retaining groove). Install first and reverse sliding gear on mainshaft with shifting collar toward the front. Install second speed gear with tapered cone toward front. If synchro-clutch was disassembled, check for proper assembly (the hub section and outer ring of synchro-clutch assembly are lapped and matched and are marked accordingly. Etching marks must match when properly assembled). Install synchro-clutch and friction rings on mainshaft, then install lock ring and spacer washer. Insert mainshaft from rear of transmission case, tilting the rear portion of the assembly downward to provide clearance for synchro-clutch and second speed gear to pass over countershaft gear. When synchro-clutch just clears countershaft gear, place clutch shaft in horizontal position and slide it into mainshaft. *(CAUTION - Be sure roller bearings in end of clutch shaft are not moved out of position).* Place clutch shaft and mainshaft assembly in its proper position in transmission case. Check synchro-clutch rings for proper location and freeness.

Rear Housing: Install speedometer gear and Woodruff key, then install snap ring on each side of gear. Place rear housing in position and secure with attaching bolts. Install rear bearing on mainshaft and into position in rear housing.

Extension Adapter: Install seal in rear of housing and attach adapter to transmission rear housing

Clutch Shaft Bearing: Place oil slinger on clutch shaft with concave side toward rear. Install large snap ring on bearing and place bearing on clutch shaft. Using Tool J-2995 and Thrust Yoke J-6652, install bearing into transmission case. When bearing is properly seated, place a spacer washer against bearing race. Install clutch shaft bearing snap ring *(NOTE* - This ring is available in the following sizes: .087", .090", .093", .096", .099", .102". Select the thickest ring which will fit into retaining groove). Install clutch shaft bearing without a gasket and check clearance between bearing cap and case with a feeler gauge. Install the necessary gaskets (furnished in .010" & .015" thicknesses) to take up all clearance between bearing cap and case. Install bearing cap and secure in place with four bolts.

Transmission Cover & Shift Fork Assembly: Remove Thrust Yoke J-6652 from synchro-clutch. Place synchro-clutch and first & reverse sliding gear in neutral position. Place shift shafts and forks in neutral and install assembly on transmission case. Secure in position with attaching bolts.



HUDSON, NASH, RAMBLER TRANSMISSION ASSEMBLY

BUICK "VARIABLE PITCH" DYNAFLOW DRIVE

Buick, All Models (1957)

►CHANGES, CAUTIONS, CORRECTIONS

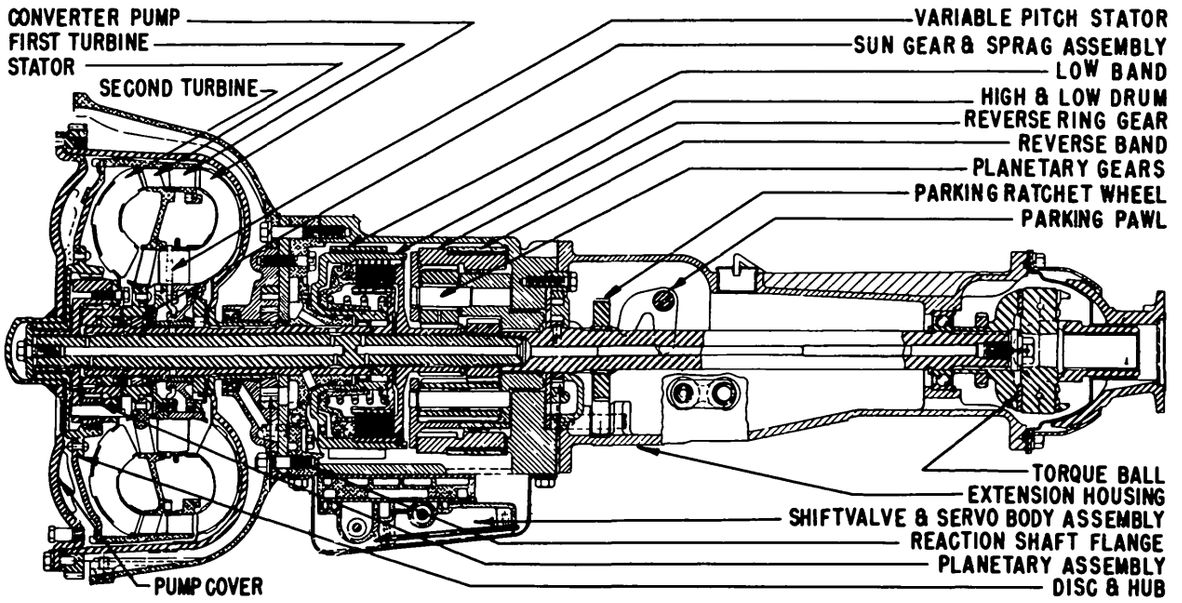
►*STARTING ENGINE BY PUSHING CAR:* Place shift control lever in "N" (Neutral) position until car reaches a speed of 15 MPH, then move control lever to "L" (Low) position and continue to increase speed until engine starts at approximately 25 MPH. After engine starts, return lever to "N" (Neutral) position for engine warm-up.

►*1957 (EARLY CARS) STATOR CONTROL VALVE STICKING CORRECTION:* Stator control valve may stick in the down position and allow stator blades to remain in high angle position at all times. If this condition exists, engine speed during part throttle in drive range will be abnormally high and there will be no evidence of increased engine RPM when accelerator is pressed to floor. Adjust stator control linkage (*see "Throttle Linkage Adjustment" on car model page).* If this does not correct the condition, check to see if there is a belleville type washer (dished washer) between valve operating lever and bearing nut. If one is found at this location, remove and discard it, leaving the flat washer. If stator control valve continues to stick, replace the valve assembly with Part No. 1179828. During reassembly of the high accumulator, adjust stator operating rod as follows: With crank against actuating valve and valve in extreme upper position, lever should be tight against stop pin when lock nut is tightened.

►*1957 VALVE BODY & VALVE PRODUCTION CHANGE:* The later valve body prevents oil being dumped above the screen as ports in the valve body have been changed. The later valve body is identified by absence of ports in valve boss. Valve is identified by a groove in valve land adjacent to actuating lever end. These parts are interchangeable; however, the adjusting procedure is different when later type valve body is used. *See "Valve & Servo Body Installation" under "Overhaul" below.*

►*1957 (EARLY CARS) TRANSMISSION OIL BYPASSING VALVE BODY SCREEN CORRECTION:* When oil pan is removed, check to see if there are openings between screen frame and valve body at the six corners of frame. If so, install an "0" ring, Part No. 1336936 (front pump "0" ring seal) by loosening oil screen screws and pressing the "0" ring under screen frame at all six corners. Tighten screws. Later type screen has been changed to eliminate the openings.

►*1957 LOOSE SHIFT CONTROL LEVER NOTE:* If the shift lever can be moved from "R" to "P" position without lifting lever, and no difinite stops are noticed at any point between these two positions, the stop pin at end of shift lever is worn or broken and the shift lever should be replaced. To install shift lever, proceed as follows: Remove shift lever to housing pin retainer and drive out pin. Pull lever out toward steering wheel and remove lever (*CAUTION - When removing lev r, take care to keep lever return spring from flying loose).* Position lever return spring on lever with closed end of spring engaged in groove of lever and open ends of spring pointing downward. Insert a Phillips screwdriver through spring coils and hole in lever, then insert lever into housing. Using needle-nosed pliers, rotate each end of return spring into lever housing. When spring is in housing, push lever inward until screwdriver makes contact with housing, then remove screwdriver and push lever in until lever retaining pin can be driven into position. Install pin retainer by rotating it on lever housing to lock it in position.



BUICK VARIABLE PITCH DYNAFLOW DRIVE (SECTIONAL VIEW)

►*1957 SHIFT LINKAGE RATTLE CORRECTION:* Install an anti-rattle spring washer, Part No. 1180307, between clevis and control shaft lever at bottom of steering column.

►*1957 DYNAFLOW OIL PAN BOLT TIGHTENING CHANGE:* To prevent overtightening of oil pan bolts and damage to oil pan gasket, resulting in oil pan leakage, tighten the bolts to 10-12 ft. lbs. This supersedes previous specifications of 15-18 ft. lbs.

►*1957 DYNAFLOW VALVE BODY PRODUCTION CHANGE & SERVICE NOTE:* To prevent the possibility of air being drawn into the hydraulic system during cornering, the valve body vent hole has been relocated to a position in the rear pump suction passage. Whenever the oil pan is removed on early 1957 cars, the control valve should also be removed and the original 1/8" vent hole should be plugged with a self tapping screw. A new hole should be drilled in the rear oil pump passage . *See "Overhaul" below.*

►*1957 DYNAFLOW FRONT PUMP OIL SEAL PRODUCTION CHANGE* A new silicone-rubber seal is being used in production and for service replacement. When installing the new seal, care must be taken to prevent tearing or damage. The retaining spring around sealing element must be in toward pump when installed.

DESCRIPTION

"Variable Pitch" twin-turbine torque converter and a hydraulically operated planetary transmission similar to 1955-56 models. *See "Buick Dynaflow Drive" in 1955 Annual Data or later Manual editions.*

LUBRICATION

►*1957 DYNAFLOW OIL CAPACITY INCREASE AND DIPSTICK PRODUCTION CHANGE:* The transmission oil capacity has been increased on all 1957 Dynaflow Transmissions by 1 pint. New dipsticks have been released for production and service replacement having the FULL mark located to indicate the additional fluid capacity. The later type dipsticks can be identified by the handle being bent at right angles to the dipstick. Earlier rods had a "looped" handle.

Check oil level at 1000 miles intervals and add oil as required. Drain and refill at 25,000 mile intervals.

►*CAUTION: Oil must be warm and engine must be idling when checking oil level. Warm up engine before draining.*

Checking Oil Level: With oil warm and engine idling with control lever in "P" (Parking) position, check oil level as indicated on dipstick in filler tube in engine compartment (on right side between battery and engine). If level is more than 1" below FULL mark on rod, add recommended oil to bring level up to FULL mark (CAU-

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

TION - Do not fill abov FULL mark). Distance between ADD OIL and FULL marks on dipstick is equal to approximately 1 pint of oil.

► *CAUTION: If oil l v l is consistently low when check- d (indicating loss of 1 pint or more per 1000 miles), ch ck transmission thoroughly for oil leaks.*

Draining & R filling: With oil warm, drain transmission case by removing drain plug in oil pan, drain torque converter, after removing bellhousing cover for access to drain plug, by loosening one plug and turning converter until second plug is downward, and removing this plug. Re-install and tighten all drain plugs. Install three quarts of recommended oil through filler opening in case. Start engine and allow it to idle with control lever in "P" (Parking) position, add additional oil to bring level up to point 1 3/4" below FULL mark on dipstick. Recheck oil level after transmission warmed up. Oil level should be at FULL mark on rod. *NOTE* - Transmissions with steel torque converter require 1 pint more fluid than transmissions with aluminum converter. See Production Change above.

► *CAUTION: DO NOT FLUSH transmission when changing oil.*

► *DIPSTICK NOTE: S e "Oil Capacity & Dipstick Producti n Chang " abov .*

Capacity (Cars With Early "Looped Handle" Dipstick) - Approx. 11 quarts (refilling after draining). Install an additional 1¾ quarts (after overhaul).

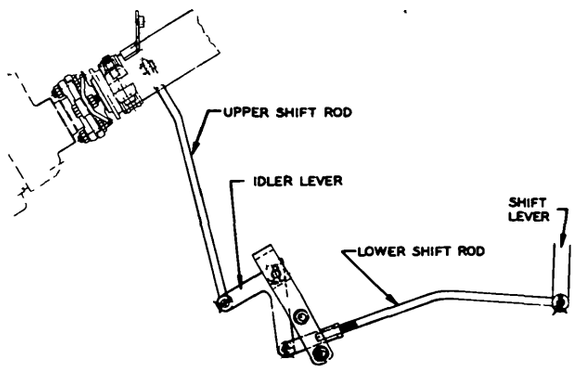
Capacity (Cars With Lat r "Right Angle Handle" Dipstick) - Approximately 11½ quarts(refilling after draining). Install an additional 1¾ quarts (after overhaul).

R c mm nd d Oil - Use only "Special Buick Oil for Dynaflow Drive" or Automatic Transmission Fluid, Type "A", with AQ-ATF number embossed on can.

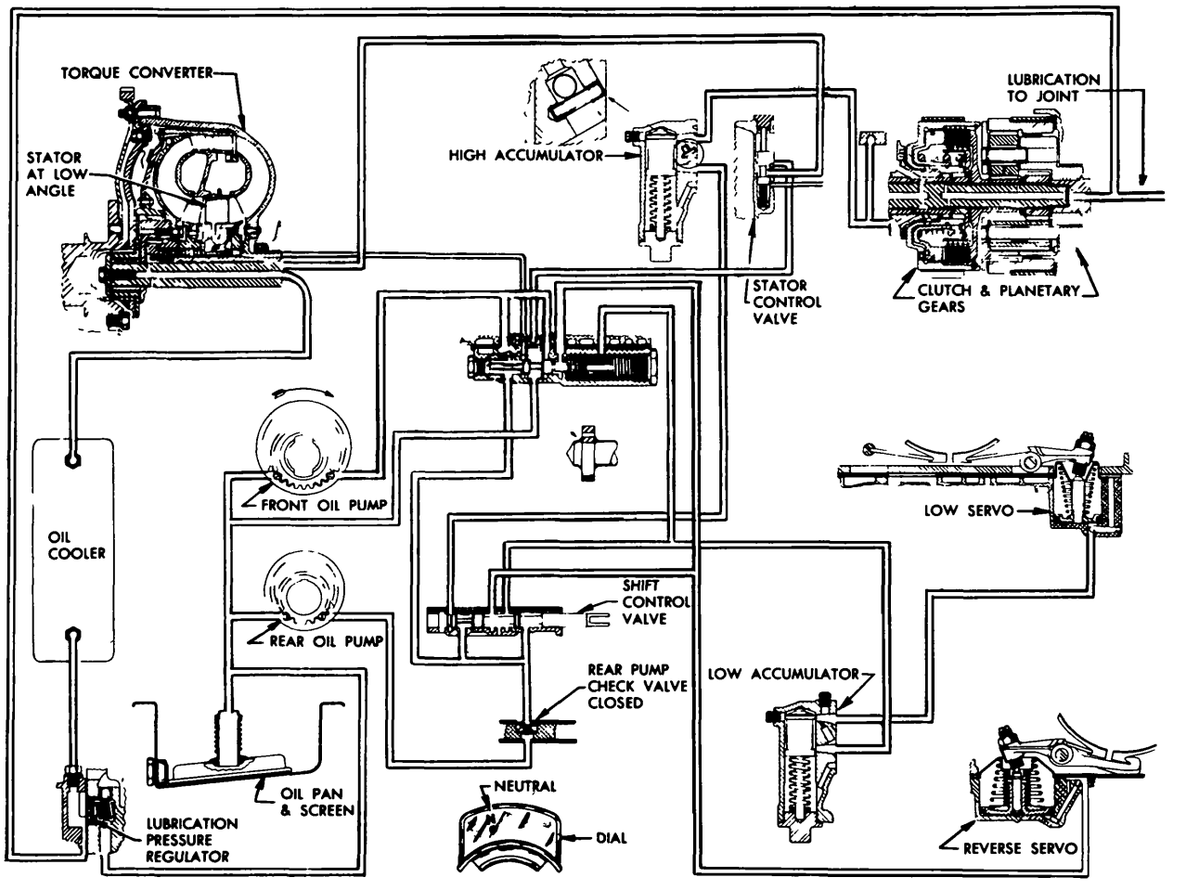
LINKAGE ADJUSTMENT

Thr ttl Linkage & Stat r Control Linkage Adjustment: See *CARBURETOR n Car Model pages.*

Manual Shift Control Linkage Adjustment: 1) Move manual control lever carefully until transmission is shifted into its "D" (Drive) detent position (manual lever will seem to catch). Now move manual control lever toward "N" (Neutral), without lifting toward steering wheel, and notice how far it moves before contacting stop.



DYNAFL W MANUAL LINKAGE



VARIABLE PITCH DYNAFLOW HYDRAULIC CIRCUITS

2) Move manual control lever until transmission is in "L" (Low) detent position. Then move manual control lever toward "R" (Reverse) and notice how far it moves before it contacts stop.

3) If movement from "D" detent to stop is the same as movement from "L" detent to stop, shift control linkage is correctly adjusted. If the above check indicates linkage to be incorrectly adjusted, adjust linkage as follows:

4) With manual control lever in "D", raise car and loosen adjusting clevis locknut on lower shift rod. Remove clevis pin, cotter key and spring washer. Make sure transmission is in "D" detent (center position of five possible detents).

5) Move idler lever so that upper shaft rod is forced upward as far as possible. Then turn clevis until clevis pin will just slip in place without moving transmission shift lever. Shorten lower shift rod by turning clevis **four complete turns,** Install clevis pin spring washer and cotter key.

6) Lower car and check adjustment at manual control lever as indicated above. If movement of lever is not correct, readjust lower shift rod clevis slightly until movement is even.

7) Park car on a ramp or other grade with control lever in "P" (Park) position to determine whether parking lock holds securely. Then let car roll with control lever in "N" (Neutral) position and listen for a clicking or ratchet sound which indicates that parking lock pawl is contacting parking lock ratchet wheel.

8) If parking lock fails to hold or ratchet noise exists, jack car up so a wheel may be turned to rotate propeller shaft. Loosen linkage adjusting lever lock bolt on side of transmission rear bearing retainer. With transmission in "N" (Neutral), tap rear end of lever upward until a slight ratchet noise is heard when propeller shaft is

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

turned, then tap lever down just enough to eliminate the noise.

9) With transmission warmed up and engine idling at approximately 600 RPM, slowly move control lever from "N" to "D" position. The clutch should engage, as indicated by an immediate decrease in engine speed when center of dial pointer is midway between "N" and "D" on speed ratio dial. Slowly move control lever from "D" to "N" position. Clutch should disengage, as indicated by an immediate increase in engine RPM, when center of speed ratio pointer is midway between "D" and "N" on speed ratio dial.

10) If points of clutch engagement and disengagement are not as specified, and all preceding linkage adjustments have been correctly made, it will be necessary to remove transmission oil pan and adjust position of shift control valve. *See "Valve & Servo Body Installation" und r "Overhaul" below.*

11) After adjusting shift control linkage, make sure that dial pointer lines up with letters on face of dial. If necessary, adjust as follows:

C ntrol Dial Pointer Position Adjustment: Place manual control lever in "N" position. Remove dial by prying between dial and housing until dial snaps out. Loosen nut holding pointer to transmission shaft. Correct pointer alignment leaving 3/16" to 1/4" between pointer and back plate. Tighten nut. Snap dial back in place and recheck pointer alignment.

Neutral Safety Switch Adjustment: Check and adjust shift control linkage. Place shift control lever in "N" (Neutral) position. Insert a 3/32" drill through gauging hole in operating lever and through gauging hole in switch body *(CAUTION - Be careful not to move shift control lev r out of neutral position).* If gauging drill is now parallel with centerline of steering column jacket, switch timing is correct. If gauging drill will not go through holes or is not parallel, loosen two switch mounting screws and move switch sideways until gauge is parallel. Tighten screws. To check adjustment, turn on ignition switch, place shift control lever in "R" (Reverse) position, and make sure back-up lights are lit. Then set parking brake, place shift lever in "N" (Neutral) and make sure engine will start.

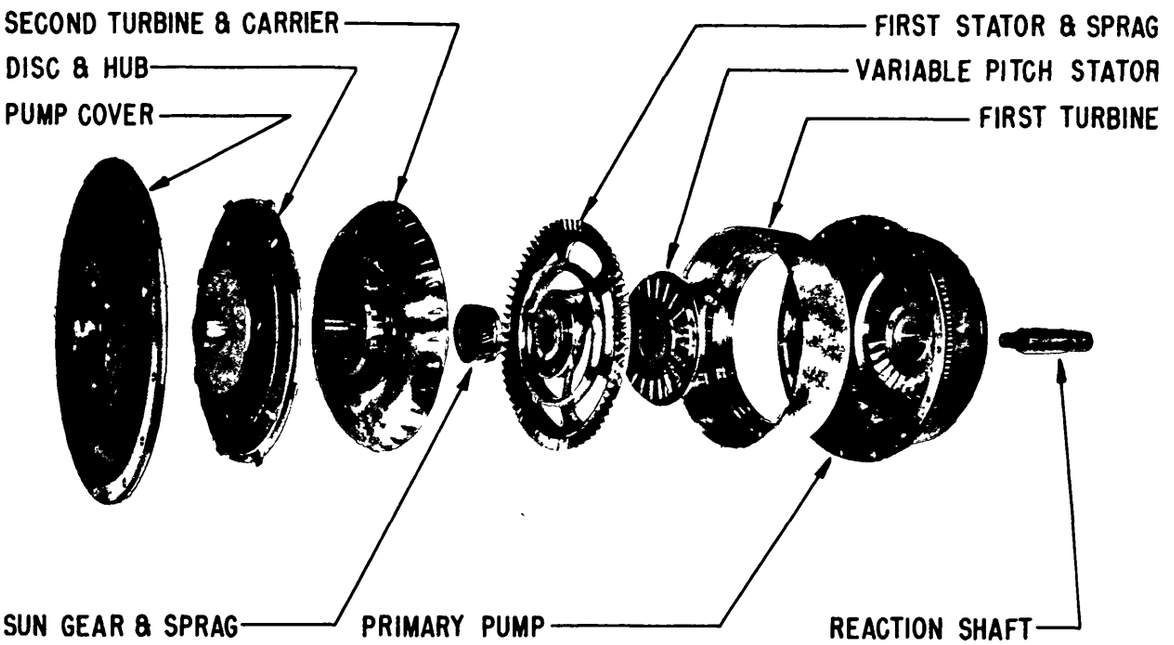
BAND ADJUSTMENT

► *BAND ADJUSTMENT CAUTION: Bands cannot be adjusted with transmission in car and adjustment ordinarily required only when transmission overhauled. BANDS MUST BE CORRECTLY ADJUSTED BEFORE TRANSMISSION INSTALLED IN CAR. See "Band Adjustment" in 1955 Annual Data or later Manual edition.*

TESTING

If performance not satisfactory, make following tests **with transmission thoroughly warmed up and at operating t mperature:**

Oil Lev l: Check oil level, add fluid as necessary to bring level up to FULL mark on dipstick, recheck performance with correct oil level. If car has been losing oil at rate of 1 pint or more each 1000 miles, make thorough check for oil leaks.



BUICK VARIABLE PITCH DYNAFLOW DRIVE TORQUE CONVERTER & BELL HOUSIN

Manual Control Linkage: Check and adjust manual control linkage. See Linkage Adjustment.

Hydraulic Control System Pressures: Use Transmission Oil Pressure Gauge J-2575. Support rear end of car solidly with wheels off floor so that transmission can be operated. Remove transmission cover in floor pan for access to pressure take-off points.

Connect gauge and make tests as follows:

Front Oil Pump - Connect pressure gauge at pipe plug opening on left side of transmission case. Run engine at 500 RPM, check pressure with selector lever in **Low, Drive, and Reverse ranges.** Repeat tests at 1000 RPM, and at 1800 RPM **in Low and Reverse only.** See table below for correct pressures. Low or erratic pump pressures indicate air leaks in suction lines, improper pressure regulator valve action. or excessive pump clearances.

Front Oil Pump Pressures

Selector Lever–	Low	Drive	Reverse
500 RPM	120 lbs.	90 lbs.	120 lbs.
1000 RPM	180 lbs.	90 lbs.	
1800 RPM	180 lbs.	90 lbs.	

Rear Oil Pump - Connect pressure gauge at pipe plug opening in lower flange at front end of rear bearing retainer. Run engine at 500 RPM, check pressure with selector lever in **Low & Drive Range.** Repeat test 1000 RPM and 1800 RPM. See table below for correct pressures. Low or erratic pump pressures indicate air leaks in suction line (this will affect both pumps), improper pressure regulator valve action, excessive pump clearances or leaks in valve and servo body passages between pump and regulator valve.

Rear Oil Pump Pr ssur s

Selector Lever–	L w	Driv
500 RPM	90 lbs.	90 lbs.
1000 RPM	180 lbs.	90 lbs.
1800 RPM	180 lbs.	90 lbs.

High & Low Accumulator - Connect pressure gauge at pipe plug opening on top of accumulator body (**High**–left side of car); (**Low**–right side of car). Place selector lever in **Drive Range** (High Accumulator Test); **L w Range** (Low Accumulator Test). Run engine and check pressures at speeds indicated in tables below. Low accumulator pressure may be caused by leakage past accumulator body gasket. If accumulator pressure more than 10 lbs. lower than front pump pressure, check for leakage between accumulator and multiple disc clutch and for restricted or plugged metering orifice in accumulator dump valve.

Accumulator Pr ssur s

Selector Lever–	L w	Driv
500 RPM	115 lbs.	80 lbs.
1000 RPM	175 lbs.	85 lbs.
1800 RPM	175 lbs.	85 lbs.

Stator - Connect pressure gauge at pipe plug opening on left end of reaction shaft flange. Test pressure in **Drive Range** at 500 RPM, 1000 RPM, and 1800 RPM.

Stator Pressur s

Sel ct r Lev r -	Driv
500 RPM	10 lbs.
1000 RPM	70 lbs.
1800 RPM	75 lbs.

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (Cont.)
TROUBLE SHOOTING

▷*EXCESSIVE DYNAFLOW WHINE CORRECTION: (This condition is usually the result of excessive clearance between input shaft and bearing in the reaction shaft).* If transmission is to be disassembled to correct whine, perform the following:

1) Remove converter cover, twin turbine assembly, and sun gear, then mount dial indicator on end of input shaft with indicator button contacting reaction shaft. Position indicator button 90° to left of top center (facing end of shaft) then move input shaft away from and toward indicator while noting the gauge reading. Repeat this check at 45° to left of top center. If dial reading exceeds .005", excessive clearance exists between input shaft and bearing in reaction flange.
2) Before replacing bearing, remove reaction flange assembly and input shaft and observe the following: (a) Inspect bearing surface on input shaft. If surface appears abnormally rough or scored, replace input shaft; if not, polish journal area with crocus cloth. (b) Inspect the two oil seal rings toward rear of input shaft and the mating surface in the reaction shaft for scoring or other damage. If reaction shaft or input shaft shows evidence of scoring or other damage, replace worn or damaged parts.
3) If inspection reveals that condition of reaction shaft and input shaft are satisfactory, replace only the input shaft bearing (see Overhaul data).
4) If input shaft, reaction flange, or the bearing requires replacement, it will be necessary to replace the converter sun gear and planet pinions. *NOTE*—When installing reaction flange service bushing, be sure the assembly is supported on rear end of reaction shaft to prevent distortion of aluminum reaction flange.

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With selector in any Range (rear wheels free). If car will not move for 1-8 minutes after standing over night—Check front pump oil pressure (see Testing) after allowing car to stand for several hours. If zero pressure noted, check pump for excessive clearances allowing pump to lose its prime. Check alignment of bell housing and converter primary pump hub.

▷*CAUTION—If this condition found, inspect Clutch and Bands for excessive wear due to slippage caused by low oil pressure.*

If car will not move after extended operation in Reverse—Check for air leaks in pump suction line (at rear oil pump gaskets), or excessive clearance in front pump (at pump gears and covers). Check alignment of bell housing and converter primary pump hub.

2) With selector in any Range (rear wheels locked). Parking lock engaged. Broken parts in transmission or rear axle. Parking brake applied.
3) With selector in Drive Range. Check front oil pump pressure and High Accumulator pressure. If OK, check for sticking Low Band Anchor Piston, remove and inspect Clutch for worn or sticking clutch plates, leaking clutch seal rings. If High Accumulator pressure low, also check rear pump Check Valve for correct installation and proper seating, check for leaks at accumulator body gasket, reaction flange gasket, clutch piston outer seal and clutch ball check valve, and leaks at sealing rings on reaction shaft flange and low drum.
4) With selector in Reverse Range. Check reverse band for displaced operating strut caused by too loose adjustment, improper installation, or broken band anchor (indicated by free up and down movement of band operating lever). If band assembly OK (no free movement of lever), check servo operation by running engine and shifting into Reverse. Remove Valve & Servo Body and check for reverse servo piston seal leaks.

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, or poor acceleration).

1) In all Speed Ranges. Low oil level. Incorrect manual control linkage adjustment. Air leak in oil pump suction pipe at oil screen sealing ring. Low front oil pump pressure caused by wear or excessive clearances in pump. Leaks at front pump cover or reaction shaft flange, pressure regulator valve, Valve & Servo Body gasket. Pressure regulator valve defective.
2) In Drive Range. Incorrect manual control linkage adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, check for leaking clutch sealing rings, sticking clutch piston, worn or sticking clutch plates.
3) In Low Range. Incorrect manual control linkage adjustment. Incorrect low band adjustment. Low band and drum worn or scored. If Low Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, remove Valve & Servo Body and check for gasket leaks or leaks at low servo piston seal.
4) In Reverse Range. Incorrect manual control linkage adjustment. Reverse band out of adjustment, strut out of place, or anchor broken. If front oil pump pressure low, remove Valve & Servo Body and check for gasket leaks and leaking reverse servo piston seal.

CAR CREEPS (Forward or Backward).

1) Creeps forward with selector in Neutral. Incorrect manual control linkage adjustment. Sticking low servo piston (check by removing low band adjustment cover). Sticking clutch caused by warped, binding, or incorrectly assembled clutch plates (not stacked properly with "dish" in same direction).
If Car Creeps only when engine accelerated to 2500 RPM—Check clutch vent ball checks in clutch piston and reaction shaft flange.
2) Creeps forward with selector in Reverse or backward with selector in Low. Incorrect manual control linkage adjustment.

SHIFTS ARE ROUGH.

1) Low-to-Drive Shift. Incorrect Low Band adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket and for dump valve or accumulator piston sticking down (top land of piston should be visible through top port in body). Sticking low band anchor piston (remove Valve & Servo Body to check), or incorrect piston location (see piston shimming data in Valve & Servo Body Reassembly). Valve & Servo Body gasket leaks. Clutch plates worn or binding.

EXCESSIVE CHATTER OR CLUNK ON STARTING

▷*CAUTION—Slight "clunk" when shifting into Low or Reverse is normal, and slight chatter when car starting to move in reverse (disappearing as soon as car in motion) is also normal.*

1) In Low & Reverse Range. Incorrect Low or Reverse Band adjustment. Engine and transmission mountings loose or incorrectly adjusted, thrust pad at transmission mounting broken (see Engine Mountings in Buick Special Data). Clutch plates warped, sticking, or incorrectly assembled (not stacked properly with "dish" in same direction). Reverse ring gear bushing worn. Planet pinion needle bearing rough.

NOISE IN TRANSMISSION.

▷*CAUTION—Hum or low whine in Neutral or Parking is normal (due to free rotation of all planetary gears) and slight hum in Low and Reverse may be expected.*

1) Buzzing Noise. Low oil level. Front pump check valve hanging up on edge of gasket between valve and servo bodies. If noise noticed in Parking or Neutral, pressure regulator valve clearance in body may be excessive or orifice in valve land oversize (correct by replacing valve and body).
2) Clicking Noise. If noticed in all ranges, may be caused by foreign material in converter. If noticed only when car in motion, may be caused by parking lock pawl contacting ratchet wheel due to incorrect manual control linkage adjustment.
3) Abnormal Hum or Whine (see Caution above). If noted in all ranges, may be caused by worn parts or excessive front pump clearances (front pump noise will increase in Low and decrease at car speeds above 45 MPH. in Direct Drive). Check front pump for excessive clearances by testing for low pump pressure. If noise noted in all ranges except Direct Drive, may be caused by trouble in planetary gears (gears locked out in Direct Drive).
4) Squealing or Screeching following installation of Front Oil Pump. Pump driving gear installed backward.

▷*CAUTION—Above condition must be corrected WITHOUT FURTHER OPERATION OF TRANSMISSION or severe damage will result.*

REMOVAL FROM CAR

Transmission and torque converter are removed as an assembly as follows:

▷*TRANSMISSION REMOVAL & INSTALLATION CAUTION:* Before removing transmission or disconnecting it from engine disconnect exhaust pipes from manifolds and loosen front muffler joints. After transmission is installed reassemble the exhaust system making sure that pipes are centered in frame member holes and that system is free from binds.

1) Raise car so that frame side rail is at least 20" off floor and place stands at front and rear to support car.
2) Disconnect torque tube from torque ball and move rear axle back to disengage propeller shaft from universal joint. Remove converter housing cover. Turn flywheel until one converter drain plug can be loosened sufficiently to provide an air vent, then turn flywheel until opposite drain plug is straight down. Remove plug and drain oil from converter. Drain oil from transmission.
3) Remove bolts attaching converter to flywheel. Disconnect and remove oil cooler lines. Disconnect speedometer cable, shift rod from shift lever, and stator operating control rod from lever on high accumulator.
4) Place transmission jack or hoist in position and ad-

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DYNAFLOW DRIVE (C nt.)

just it to securely support transmission. Remove four bolts that attach thrust plate to rear bearing retainer, then remove two nuts and plate which attach mounting pad to transmission support.

5) Raise engine and transmission just enough to relieve load on transmission support, remove bolts attaching each end of support to frame, then remove support and thrust plate as an assembly *(CAUTION - Shims may or may not be used to fill space between transmission support and frame. If shims are present note the number and location of shims so they can be installed in their original positions).*

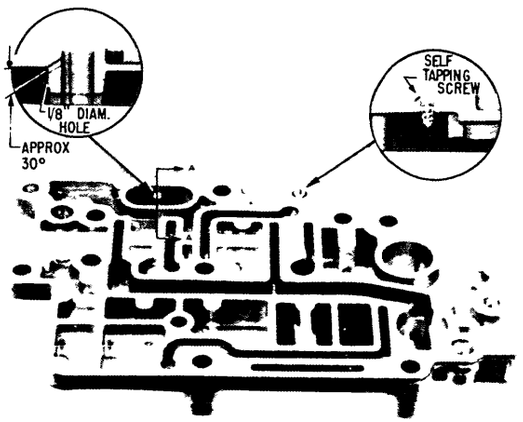
6) Place suitable jack under rear end of engine lower crankcase so engine will be safely supported while transmission is removed. *(CAUTION - Do not use bar or hooks placed over frame side rails as brake pipes on top of left side rail will be damaged).* Lower transmission just enough so that converter housing bolts can be reached.

7) With engine and transmission supported by separate jacks, disconnect converter housing from engine crankcase. Move transmission rearward to disengage hub of converter pump from crankshaft, lower transmission and remove from car.

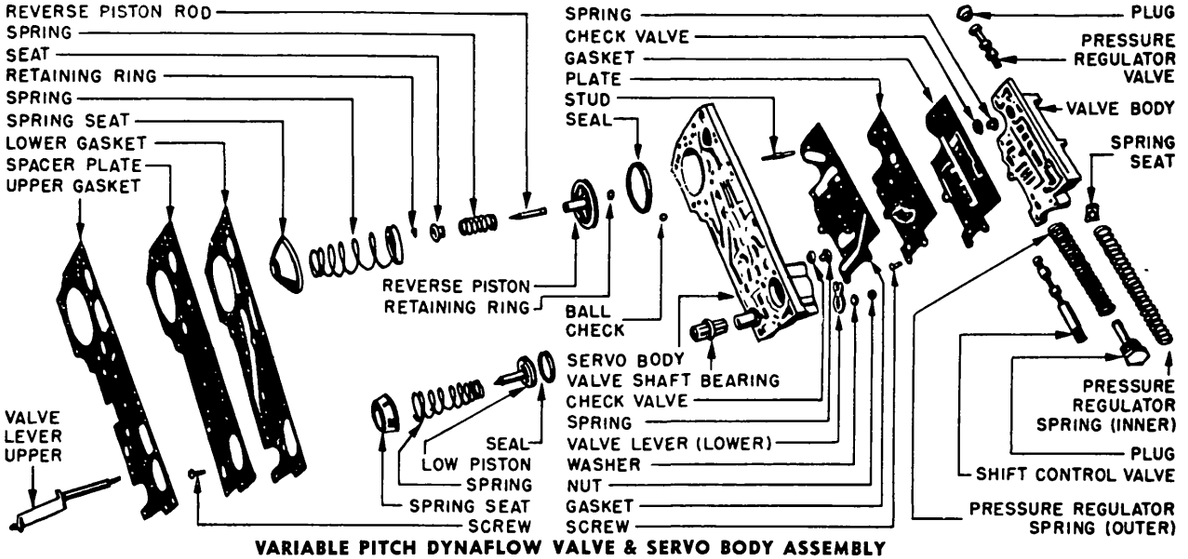
TRANSMISSION OVERHAUL

►*1957 VALVE BODY PRODUCTION CHANGE:* The later valve body prevents oil being dumped above the screen as ports in the valve body have been changed. The later valve body is identified by absence of ports in valve boss. Valve is identified by a groove in valve land adjacent to actuating lever end. These parts are interchangeable; however, the adjusting procedure is different when later type valve body is used. *See "Valve & Servo Bodies" below.*

►*1957 VALVE BODY PRODUCTION CHANGE & SERVICE NOTE:* To prevent the possibility of air being drawn into hydraulic system during cornering, the valve body vent hole has been relocated to a position in the rear pump suction passage. Whenever oil pan is removed on 1957 cars (early), the control valve should be removed and the original 1/8" vent hole should be plugged with a self-tapping screw. A new hole should be drilled in the rear oil pump passage as shown in the illustration.



VALVE BODY CHANGE



VARIABLE PITCH DYNAFLOW VALVE & SERVO BODY ASSEMBLY

►***EXCESSIVE DYNAFLOW WHINE CORRECTION:*** ***(This condition is usually the result of excessive clearance between input shaft and bearing in the reaction flange). See "Trouble Shooting" above.***

►*1957 DYNAFLOW SPRAG CLUTCH PRODUCTION CHANGE:* A new sprag clutch, Part No. 1179222, having two bronze drag strips on inner diameter to provide a bearing surface that rides on reaction shaft when freewheeling, is used in production and for service replacement. This later assembly is interchangeable with the assembly used in 1956 & early 1957 models.

►*1957 THRUST WASHER (BETWEEN PLANET CARRIER & CASE) NOTE:* There is no thrust washer (front or rear) at this location. DO NOT ATTEMPT TO INSTALL THEM.

Converter Twin Turbine & Sun Gear: Disassembly - Pry retaining ring out of groove in first turbine, insert screwdriver in hole in disc and lift disc and hub assembly out of first turbine. Lift second turbine and carrier assembly out of first turbine. Remove tanged thrust washer (this washer may remain in carrier or be found on top of sun gear). Slide sun gear assembly off the first turbine being careful to hold sun gear bearing in place. Lift first stator assembly out of first turbine. Remove bronze thrust washer and sprag from sun gear. Lay first turbine on bench with narrow edge of vanes up. Pry off cupped thrust washer, then remove first stator bearing and sprag assembly. Using a brass drift, carefully tap first stator bearing to remove bearing and cupped thrust washer.

C nv rt r Variabl Pitch Stat r: Disassembly - Remove stator thrust washer and selective spacers from rear side of stator, remove Tool J-5806 (installed on input shaft when converter removed from transmission), then remove free wheel rollers and springs from cam. Pry retaining ring from groove in stator blade rear carrier, and remove free wheel cam and three driving keys. Use screwdriver, Tool J-5826 to remove stator blade front carrier screws and lockwashers, then remove front carrier which is also held to rear carrier by two dowels. Tilt three or four blades toward the low angle position and slide the crank pin ends clockwise around stator piston grooves. The next blade and all succeeding blades will then have enough clearance to be removed.

Inspection (All Converter Parts)—Wash all parts in clean solvent and dry thoroughly. Inspect converter pump hub for scores and for wear caused by front pump seal. (If pump is suspected of leaking oil, it may be tested as described below). Inspect converter pump and turbines for cracked or damaged vanes. Inspect turbine carrier, planetary gear teeth, thrust washers, bushings and related bearing surfaces for wear, scoring or damage. Inspect stator free wheel rollers and cam for nicks or burrs, which should be removed with an Arkansas stone, and polished with crocus cloth. Discard any roller springs that are damaged or distorted. Inspect stator blades for distortion, cracks, loose on cranks, or other damage. Inspect piston oil seal ring and bore of blade carrier for scoring or wear. If bushings of carrier are worn, they should be replaced, using installer tool J-5913. If second turbine or the carrier must be replaced, use care in separating them to avoid damage to the good part. With second turbine suitably supported, tap carrier free of counter-bore in turbine, using a hammer and a hardwood dowel or other soft punch. ***CAUTION—Do not drive against surface of thrust boss in carrier.***

Testing Converter Pump for Leakage: *(NOTE*—Prepare a special stopper to close opening in converter pump for testing, as follows: Using ¼" steel plate, cut a disc 3¼" in diameter and drill a ¼" hole in the center. Install a ¼" x 2¾" bolt thru hole and braze head of bolt to plate to seal bolt hole. From

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DYNAFLOW DRIVE (Cont.)

a piece of 1/8" rubber, make a gasket 3 1/4" O.D. x 1 7/8" I.D. and cement this gasket to side of disc from which the bolt protrudes. Drill a 1/4" hole in a piece of plate 1/4" x 1" x 2" and install this on bolt, retaining it in place with a nut). To test pump, install the plate (with rubber washer) over inside surface of pump hub, securing it in place with the 1/4" x 1" x 2" plate against outside surface of pump hub. Tighten clamp nut sufficiently to make stopper air tight. Install pump cover with seal and tighten all bolts to 25-30 ft. lbs., in same sequence as used for installation of torque converter (see Reassembly of Transmission below). Install one drain plug, and install a Barrett fitting No. 365 in other drain hole. Tighten parts securely. Attach air hose to Barrett fitting and fill pump with compressed air at 80 to 100 lbs. per sq. in. Submerge pump in water tank and check for leaks. *CAUTION—After pump cover seal is used for this test, it should not be used when rebuilding the transmission.*

Variable Pitch Stator: Reassembly - *NOTE - A special fixture which can be made locally is required for reassembly of the stator. See Stator Fixture Note below.*

1) Insert stator piston and oil seal in rear carrier and push it to the extreme forward position. Place rear carrier on center block of fixture to hold piston in position.

2) Place stator outer ring on two outer blocks of fixture. with crank pin up. Holding the blade in the approximate "low pitch" position insert the crank pin in the outer ring. Then rotate the blade to bring the crank throw into the piston groove. Hold the piston, blades, and outer ring together while installing the blades

3) Install the remainder of the blades, working in a clockwise direction. To insert the last blade it will be necessary to tilt the adjacent three blades.

4) Install the front carrier and bolt into place. Be sure that blades operate freely in carrier. Complete the assembly of stator as indicated for first type stator (above).

▷Stator Fixture Note—The fixture is composed of four blocks of wood as follows: One piece 3/4" x 3 1/2" x 11" (base piece). One piece 3/4" x 3" x 2" (center piece). Two pieces 1 1/8" x 3 1/2" x 2 1/4" (end pieces). Place base piece on bench and position center piece in center of base piece so that each end of center piece is 1/4" from edge of base. Position the two end pieces on extreme ends of base piece so they lay lengthwise across base piece flush with end and sides. Stator hub will rest on center piece and ring will rest on the two end pieces for installation of the blades.

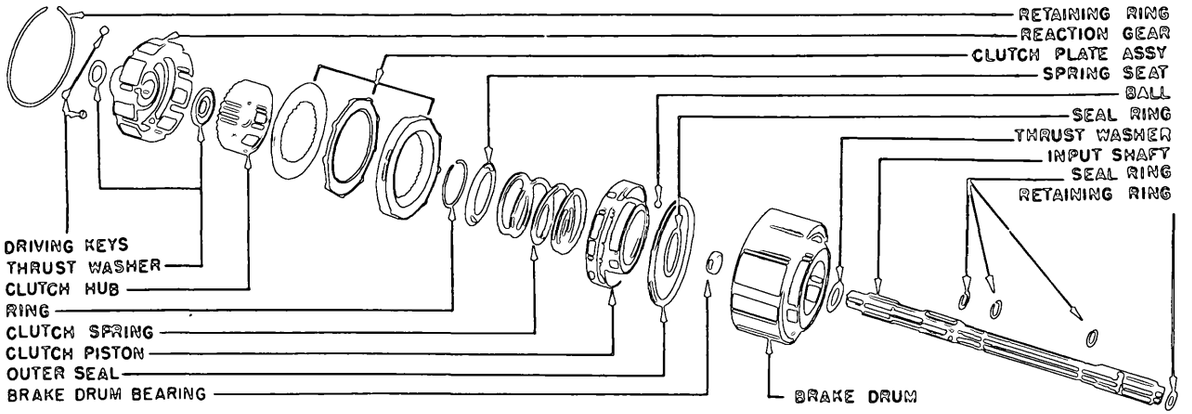
Converter Twin Turbine & Sun Gear: Reassembly - 1) Install sprag in bore of sun gear with shouldered end toward outside then carefully press bearing into place. Check operation of sun gear sprag clutch by sliding sun gear assembly on reaction shaft with gear end toward front of transmission. When viewed from front of transmission sun gear must rotate freely clockwise and lock in a counterclockwise direction.

2) Lay first stator on bench with thin edges up. Place first stator sprag in hub of first stator with shoulder down. Install one bronze bearing and cupped thrust washer on each side of sprag. Check operation of first stator sprag clutch by sliding the first stator on reaction shaft with thin edges of blades toward front of transmission. The first stator must turn freely clockwise and lock in a counterclockwise direction when viewed from front of transmission.

3) If second turbine was separated from carrier, make certain that counterbored recess in turbine and mating surfaces of carrier are clean and free of burrs, and apply a film of oil to these surfaces. Support carrier on suitable blocks, install several pinion pins to serve as pilots, then place turbine in position so that carrier is squarely started into recess in turbine. Use a hammer and hardwood dowel to tap turbine down over the carrier. Avoid distortion of turbine by using light blows applied midway between holes and alternated from side to side to keep parts square with each other. *(CAUTION - If turbine cannot be assembled on carrier with moderate force, remove it and check for burrs in counterbored recess).* With turbine and carrier supported on wood blocks, hub side down, assemble and install the four pinions as follows:

4) Place planet pinion on a thrust washer, install 22 needle bearings in pinion and place a thrust washer on top of pinion. *(NOTE* - A loading tool can be made locally from a piece of 3/8" steel rod, 11/16" long which will simplify loading and installation of pinion). Place assembled pinion in carrier and install a pinion pin with notched end up. After loading tool is pushed out of carrier, slide a block under pinion to hold it in place. Turn all pins so that notches face center of carrier. Install pinion lock plate so that it enters notch in all pins, then install four turbine-to-carrier bolts with lockwashers.

5) Place first stator in first turbine with thin edge of blades up. Place sun gear assembly on first stator with gear end up. Place thrust washers (with tangs) in planet carrier. Use chassis lube to prevent washer from shifting during assembly. Place second turbine and carrier assembly in first turbine, making sure pinions mesh with sun gear. Place thrust washer on carrier, then install first turbine disc and hub assembly over second turbine. Rotate disc until ring gear meshes with carrier pinions, then align driving lugs on disc with notches in first turbine and the assembly all the way down into turbine.



VARIABLE PITCH DYNAFLOW DIRECT DRIVE CLUTCH ASSEMBLY

6) Note that turbine disc retaining ring is "dished". Place ring in position with the "dish" upward so that inner edge will bear firmly against the disc when ring is engaged in groove of first turbine. Start one end of ring into groove in turbine, then twist ring upward in order to lay ring flat on the disc so that it can be progressively entered into groove all the way around. Make certain that ring is fully seated in groove and that inner edge bears against turbine disc. Tap inner edge down against disc if it has raised up.

Valve & Servo Bodies: Disassembly—Remove safety nuts and washers from body studs, lift off valve body and gasket, examine gasket for evidence of oil leakage. Remove shift control valve from valve body and rear pump delivery check valve and spring from servo body. Remove large pressure regulator valve plug from valve body *(CAUTION*—hold plug to prevent it flying off due to heavy spring pressure), remove springs and spring seat. Remove small valve plug and lift out pressure regulator valve. Remove valve body plate and gasket, examine gasket for evidence of oil leakage. Lift out front pump delivery check valve and spring. Take off nut and lockwasher attaching upper and lower valve operating levers in servo body and remove levers. Use wooden block placed across low and reverse servo spring seats to hold them in place with springs compressed while taking out spacer plate attaching screws, carefully relieve spring pressure *(CAUTION*—use care not to spring spacer plate or allow servo springs to fly out), lift off spacer plate and gasket, examine gasket for evidence of oil leakage. Lift out low and reverse servo spring seats, springs and pistons. Remove check valve from reverse servo feed channel.

Inspection—Wash valve and servo bodies and parts with clean solvent, blow out all passages and dry parts with air. Inspect bodies for cracks, damaged gasket surfaces, and scored piston and valve cylinders. Inspect valves and pistons for nicks, scores, scratches, or rounded shoulders (edges must be sharp to keep out foreign material which might cause sticking). Replace worn or damaged piston seals.

▷Piston Seal Installation Caution—Lip on seal must fit over SMALLER diameter land on piston.

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DYNAFLOW DRIVE (Cont.)

Reassembly—Install low and reverse servo pistons in servo body (CAUTION—use care not to damage seals), check to see that pistons move freely in body. Install piston springs and spring seats (small end of low servo spring in groove in piston, large end of both reverse servo springs in grooves in piston). Place check ball in reverse servo feed channel. Use new spacer plate gasket, compress servo springs and tighten all spacer plate attaching screws uniformly. Install both upper and lower operating levers with lower lever pointing to low servo cylinder and upper lever to reverse piston spring seat, tighten lever shaft nut to 15-20 ft. lbs. torque. Install front pump delivery check valve spring (large end down), and valve (ridged side up), then install valve body plate using new gasket and making sure that valve seats against plate (must not hang on gasket). Install pressure regulator spring seat, inner and outer springs, and valve plug in valve body, tighten plug to 20-25 ft. lbs. torque. Install pressure regulator valve (see that oil orifice in end land is clear and place this land outward), tighten valve plug to 20-25 ft. lbs. torque. Install shift control valve with slotted end of valve pointing toward large pressure regulator plug. Install rear pump delivery check valve (ridged face inward), and spring (large end upward). Install valve body on servo body using new gasket *(CAUTION—see that pump delivery check valve spring below gasket)*, tighten all stud nuts to 11-15 ft. lbs. torque.

▷Front Pump Tightening Sequence—Tighten nuts in following order: Top, Bottom, Right Center, Left Upper Center, Right Lower Center, Left Lower Center, Right Upper Center.

High & Low Accumulators: Disassembly—Remove retaining pin and check ball from high accumulator body (low accumulator does not have the check ball). Remove the pipe plug, cap, gasket, spring (2 in low accumulator) and piston from accumulator body. *(NOTE—Keep parts separated so same parts will be installed in same body)*. On high accumulator body only, remove clamp bolt, lever, bearing with seal, gasket, thrust washer and control valve crank, then remove valve stop with gasket, control valve and spring.

Inspection—Clean all parts with solvent, blow out all passages and dry with air. Check parts for excessive wear, scoring, nicks, burrs, and other damage. Remove nicks and burrs from pistons and valves by stoning but do not round off sharp edges of pistons and valves (edges must be sharp to keep out foreign material which might cause sticking). Check mounting face of accumulator body for flatness with a straightedge (face can be trued up by using emery cloth on a surface plate but all traces of emery must be removed). Replace accumulator assembly if body, or piston worn (these parts not furnished separately). Check piston for wear by placing it in cylinder (all parts clean and dry). Piston should slide freely as body is tilted back and forth.

Reassembly—Lubricate each piston and install it in the accumulator body from which it was removed. *(CAUTION—Start piston squarely into body, do not tap or force it)*. Install proper piston springs in each body. The high accumulator uses one heavy spring approximately 4 5/16". The low accumulator uses one shorter heavy spring and one inner spring. Install caps with new gaskets (do not tighten caps at this time). On high accumulator only, install spring, control valve and stop, then install crank with thrust washer, bearing with new gasket and seal (grooved side inward), operating lever and clamp bolt. Adjust operating lever on crank so that lever contacts its stop and the crank contacts the valve without depressing the spring, then tighten clamp bolt. Install pipe plugs in both accumulators and install check ball and retaining pin in high accumulator body. *NOTE—Accumulator body caps will be tightened at time transmission is reassembled.*

Reaction Shaft Flange & Oil Pump: Disassembly—Remove high and low accumulators from reaction shaft flange, using care to prevent the retaining pin and check ball from dropping out of high accumulator and being lost. Check gaskets for indications of oil leakage. Inspect input shaft bearing in front end of reaction shaft (see Production Change above). If bearing is damaged or excessively worn, remove outer bearing ring and then remove bearing, using Remover J-5822 installed on Remover J-1436 *(NOTE—Both types of bearings are removed in the same manner)*. Oil pump must be in place to support the reaction flange during bearing removal. If inner retainer ring remained in place in shaft make sure it is firmly seated in its groove, otherwise replace it. Check front oil pump bolts to make sure they are tight (loose bolts would be the cause of oil leakage around pump). Remove front oil pump body and gears, tapping body lightly with a mallet to free it. Remove front oil pump cover and gasket from reaction shaft flange, and check gasket for evidence of oil leakage. If the check ball located in clutch feed passage is free to drop out, remove ball to avoid loss in handling parts. Do not remove if securely retained by peened edge of hole.

Oil Pump Inspection & Repair—Clean pump parts with solvent and dry with air. Check pump gears and mounting faces of body and cover for excessive wear. Check front pump bushing for excessive wear or looseness which will require replacement of pump assembly *(NOTE—Check flywheel and primary pump hub run-out and bell housing misalignment if bushing worn or loose)*. Check front oil pump seal and replace if damaged or any evidence of leakage noted. Drive out old seal, coat outside of new seal with Permatex #3, start seal in place with deep groove in retainer outward, tap seal into place with wood block and mallet. Check following clearances and replace pump parts if excessive:

Pump Gear Side Clearance—Place straightedge across face of pump body and gears. Clearance between face of gears and straightedge should be .001-.0025" (front pump), .001-.002" (rear pump).

Pump Gear Clearances—Check pump gears with feeler gauge between gear teeth and crescent while pressing gear away from crescent. Clearance should be .005-.009" (front pump driven gear), .0045-.007" (rear pump driven gear), .010-.016" (front pump driving gear), .006-.012" (rear pump driving gear).

Pump Cover Gear Wear—Replace cover if gear bearing area scored or worn to depth of more than .001".

Reaction Shaft Flange Inspection—Wash flange in clean solvent and blow out all passages with air. Inspect surfaces of reaction shaft flange and transmission case for nicks or burrs and remove with a mill file. Inspect race for clutch drum roller bearings on rear end of reaction shaft. If this bearing is worn excessively or scored, replace reaction shaft flange *(NOTE—If reaction shaft flange is replaced, stamp transmission identification number in lower edge of new part in same place as on original flange)*. Check all studs for tightness and replace any with damaged threads. If stud threads are stripped in reaction shaft flange, it will be necessary to tap out the hole for installation of step studs which are available for service replacement. *(The 5/16"—18 step studs have a 3/8"—16 thread on flange end)*. Inspect the oil seal rings on hub of reaction shaft flange and replace if damaged in any way.

Reaction Shaft Flange & Oil Pump: Reassembly - If old input shaft was removed, first make sure that inner retaining ring is firmly seated in groove in reaction shaft, then install a new bearing, using Installer J-5816. Support shaft on wooden block to avoid damage and drive bearing into place with a light hammer until shoulder on tool contacts reaction shaft. Install outer retaining ring. Install check ball in clutch feed passage if ball was removed, then install a new gasket and pump cover on reaction shaft flange. Lubricate and install gears in front pump body. *(NOTE - Driving gear must be installed with beveled side outward so this side will be against cover when pump is installed. Reversing this gear will result in severe damage to transmission)*. Install oil pump on cover so the two dowel pins and the bolt holes match holes in cover, then install bolts and lockwashers. Tighten bolts to approximately 5 ft. lbs. in the sequence shown in illustration, and then tighten in same sequence to 25-30 ft. lbs.

Multiple Disc Clutch & Input Shaft: Disassembly - Remove reaction gear flange retainer ring and remove the flange driving keys with a pointed tool. Remove low range reaction gear, thrust washer, clutch hub and 12 clutch plates from drum. Install Clutch Spring Compressor J-2590 in clutch drum, placing slot in compressor ring over ends of spring seat retaining ring. Compress clutch spring sufficiently to remove retainer ring. Release pressure on clutch spring, making sure that spring seat does not engage retaining ring groove in drum, then remove spring compressor, spring seat and spring. Remove piston from drum *(NOTE - It may be necessary to rap open end of drum against a block of wood to remove piston)*.

Inspection—Wash parts in solvent and dry with air *(CAUTION—use only gasoline or kerosene on clutch bands and plates—do not use chemical degreasers or commercial solvents)*. Inspect and replace all clutch plates which are worn, scored, burred, or warped *(CAUTION—new plates must slide freely on clutch hub—tight plates will prevent full disengagement)*. Inspect oil seal ring on clutch hub and replace if damaged (ring has interlocked ends and is released by compressing ring and depressing one end while raising the other). Replace clutch piston outer seal if hardened, broken, or with turned lip (install new seal with lip extending over smaller diameter piston land). Inspect Low Range Band and replace if worn smooth without visible

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DYNAFLOW DRIVE (Cont.)

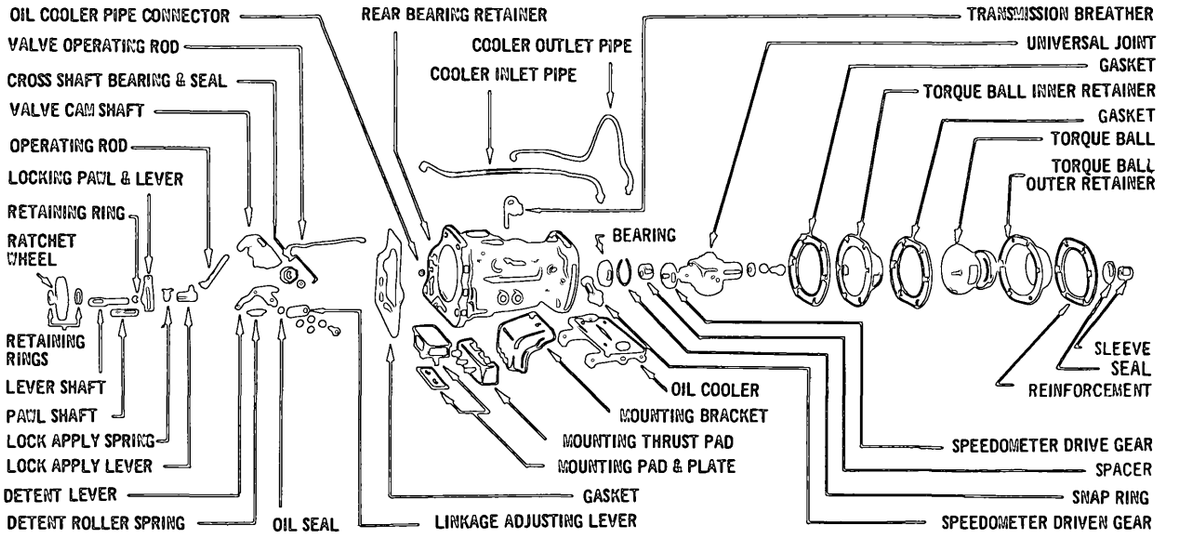
grooves. Inspect oil seal ring and replace if damaged (same type ring with interlocked ends as used on clutch hub). Check to make sure retaining ring in place in shaft groove. See that small bleed hole in piston is open and that check ball is staked in place (*CAUTION*—ball must be free to move in recess) If needle bearing in drum is excessively worn or scored, carefully remove it and install a new one, using tool J-5191. This tool will locate bearing flush with shoulder drum. Place numbered end of bearing, which is hardened, toward shoulder of tool to avoid distortion of cage.

Reassembly—Lubricate piston seal and inner surface of drum with light oil, install piston using extreme care not to distort or turn lip of seal. Top of piston should be approximately even with shoulder in drum when installed. Install clutch spring, use Compressor J-2590 to compress spring, install spring retaining ring in groove in drum, remove compressor. Place reaction gear on bench with flange upward and install all clutch parts in following order: Clutch Hub Thrustwasher, Clutch Hub (open end upward), and all clutch plates (see Clutch Plate Caution below). Bottom clutch plate should be internally splined (faced) type and top clutch plate externally splined (plain steel) type with the two types alternating in the assembly. Install drum and clutch piston assembly over reaction gear and clutch assembly with driving key recesses in drum and gear flange aligned. After drum pressed evenly in place, fully align driving key recesses by tapping reaction gear flange, install three driving keys and flange retainer ring.

▷Clutch Plate Caution—Externally splined (plain steel) clutch plates are concave or "dished" and these plates must be installed with "dished" face in same direction (either up or down). Check each plate with straightedge and stack plates with dished faces in same direction before beginning installation. *NOTE*—Internally splined clutch plates are flat and can be installed in either direction.

Rear Bearing Retainer: Disassembly—Remove spring from detent roller lever and support inside rear bearing retainer, remove adjusting lever on outside of retainer, then remove lever and support assembly. Disconnect parking lock operating rod from cross shaft by unscrewing rod end from cross shaft lever. Push clip from valve operating rod to remove clip and rod from cross shaft. Screw a ¼"—20 bolt into parking lock operating lever shaft and the lock pawl shaft and pull these parts from bearing retainer, then remove lock pawl and lever assembly. Remove cross shaft bearing, using a box wrench (a socket that does not fully engage bearing, or an end wrench will distort the bearing) remove cross shaft.

Rear Bearing Retainer Inspection—Wash parts in solvent and dry with air. Check parking brake pawl, pawl locking link, and ratchet wheel for worn teeth, cracks, or other damage preventing positive locking. Check valve operating cross-shaft and bearing for wear, remove and discard rubber seal in



VARIABLE PITCH DYNAFLOW REAR BEARING RETAINER & TORQUE BALL ASSY.

bearing. Inspect output shaft bushing in retainer for wear scoring, check clearance by inserting output shaft in bushing. Clearance should be .001-.006". Replace bushing with Bushing Remover & Replacer Tool J-2997 (not necessary to ream new bushing).

Universal Joint Inspection—Check for wear and excessive play between spider pins and bushings (should be .002-.004"). Check yokes for wear on shaft splines. Front yoke must be tight fit on output shaft (play will allow "snap" between forward and reverse), rear yoke backlash on propeller shaft should be .0005-.0045". Rear yoke clearance in torque ball bushing should be .004-.006" and bearing surfaces must not be scored.

Torque Ball Inspection—Replace torque ball and retainers if bearing surfaces scored or pitted. Inspect oil seal and replace if worn (use seal which has been soaked in neatsfoot oil), press seal squarely into place until flush with torque ball flange and with feather edge of seal pointing into torque ball. Check universal rear yoke for excessive wear at point where seal bears.

Reassembly—Install valve operating cross shaft, and cross shaft bearing. Install a new seal in bearing, with grooved side facing inward. Install parking lock pawl and lever assembly in rear bearing retainer, then install lock pawl shaft and operating lever shaft with tapped ends outward. Attach valve operating rod with retainer clip to cross shaft lever and snap clip into place over rod. Connect parking lock operating rod to cross shaft lever, using a lockwasher on threaded end of rod. Install detent lever and support assembly with a new seal in groove of shaft, then install linkage adjusting lever on shaft with nut and lockwasher. Attach adjusting lever to bearing retainer with bolt, plain washer and lockwasher, but do not tighten until the following detent adjustment is made.

Parking Pawl Adjustment—Temporarily install shift lever on cross shaft and shift parking pawl into parking position. Shift linkage adjusting lever at slotted end until pawl lock contacts the parking pawl, then tighten adjusting lever lock bolt, being certain to maintain contact between lock and pawl. Move shift lever back and forth to check detent adjustment. Parking lock must contact parking pawl when detent roller in deepest portion of parking notch of detent lever and should break contact at same instant that detent roller starts to move toward neutral position.

Planetary Gear Set: Disassembly—Take out three planet carrier screws and special lockwashers (use 7/32"Allen wrench), separate front and rear halves of planet carrier (hold carrier by output shaft, tap down on flange on front end). Lift out sun gear rear thrustwasher and reverse sun gear. Remove all planet pinion assemblies (three long low pinions, three short reverse pinions) by tapping shaft out of front half of carrier using care not to lose steel ball imbedded in end of each shaft to prevent shaft rotating in carrier. Disassemble pinion assemblies by removing thrustwashers and shafts from pinions and then taking out bearing rollers (long pinions have two sets of rollers separated by spacer, short pinions have one set of rollers).

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

Inspection: Wash all parts in solvent and dry with air. Inspect planet pinion shaft and rollers, replace if worn. Inspect all gear teeth for wear, remove all nicks and burrs by stoning. Replace bushing in rear end of planet carrier if worn or scored (use Bushing Remover J-3197, Bushing Replacer J-2996—new bushing may be installed either end first and need not be reamed). Inspect reverse band anchor for cracks. Replace reverse band if cracked or the lining worn smooth.

Reassembly—Assemble each planet pinion with its bearing rollers, thrust washers, and shaft (24 rollers in each reverse pinion, 20 rollers at each end of low pinion and separated by a spacer). Make certain that thrustwasher installed at each end of each pinion (lower washer against retaining ring on shaft, upper washer on outer end of shaft). Install planet pinion assemblies in carrier making certain that **steel ball imbedded in lower end of each shaft** (necessary to prevent shafts turning). Install reverse sun gear with bronze thrustwasher on top of gear, align assembly marks on both planet carrier halves when installing upper half (numbers stamped on dividing line during production), make certain that special lockwasher used on each carrier screw, tighten screws evenly to 25-30 ft. lbs. torque. Install reverse ring gear thrustwasher.

Transmission Case (Cleaning & Inspection): Wash case and blow out all passages. Inspect for cracks, and stripped bolt threads. Check machined surfaces for nicks and burrs and clean these up with a mill file. Check bushing in case for wear by inserting planet carrier in bushing and checking clearance with a feeler gauge. Clearance should be .002-.004". Replace bushing if clearance excessive or if scored.

Bushing Replacement—To remove old bushing, support case with rear end down, drive bushing out with tool J-3175-1 (part of replacer set). To install new bushing, place pilot J-3175-2 (part of replacer set) in rear oil pump recess in case, slip bushing over J-3175-1 and drive bushing into case from front side until bushing is flush with front surface of case wall which supports the bushing. **Bushing must be installed with wide deep ends of oil grooves toward rear of case.**

Flywheel & Primary Pump Run-out and Bell Housing Alignment Check: ***Make this check if front oil pump noisy, bushing and oil seal worn, or if oil leakage noted at Converter or Front Oil Pump Body.***

Flywheel Run-out—Remove all burrs from around drilled holes in face of flywheel, mount dial indicator on flywheel housing with strip of .005" shim stock between dial indicator and face of flywheel (clamp shim stock under a flywheel housing bolt so that it covers bolt holes and provides smooth surface for dial indicator pick-up). Turn flywheel **holding end thrust in one direction.** Run-out should not exceed .008". If excessive run-out cannot be corrected by tapping high side with mallet or by removing flywheel and cleaning up burrs at crankshaft flange mounting holes, install new flywheel and re-check run-out.

Primary Pump Hub Run- ut—With converter primary pump and bell housing installed, mount dial indicator on bell housing so that it bears against primary pump hub. If run-out exceeds .012" when flywheel turned, mark flywheel and primary pump, remove and re-install pump at point 180° from first position. If pump run-out still exceeds .012", install new primary pump and recheck run-out. When position found where run-out is less than .012", mark flywheel and pump with paint and **align these marks when transmission is finally reinstalled.**

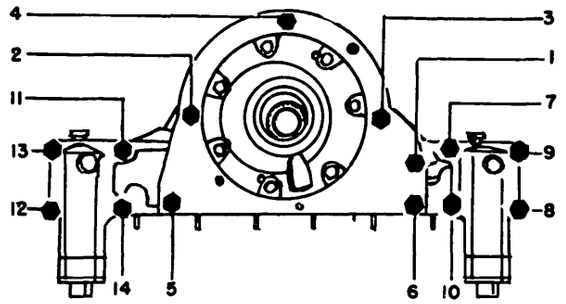
Bell Housing Alignment—Mount dial indicator on oil pump driving lug on rear end of converter primary pump hub ***(CAUTION***—do not clamp indicator on bearing surface) so that it bears against rear face of bell housing at 3¾"" radius. Rotate flywheel **holding end thrust in one direction.** Run-out should not exceed .005". If run-out of bell housing face exceeds .005", cement paper shims of proper thickness to rear face of crankcase to bring run-out to .005" or less, with all bolts securely tightened.

Pilot Hole Run-out—Mount dial indicator and Hole Attachment KMO-30-F to bear against inner edge of pilot hole in bell housing. Run-out of pilot hole should not exceed .004". If run-out greater, remove bell housing and remove the two dowels, and reinstall bell housing, leaving bolts just loose enough to permit shifting housing by tapping with a lead hammer. Set up dial indicator as indicated above and bring pilot hole of bell housing within .004" run-out by tapping in required direction with a lead hammer. If it is not possible to move housing far enough, remove housing and drill bolt holes with a ½" drill. When bell housing is placed so that run-out is .004" or less, tighten all bolts securely. Ream the two dowel holes through housing and crankcase using Reamer J-2548-3 (17/32"), until this reamer bottoms in hole, then finish with bottoming Reamer J-4710-6 to provide full size to bottom of hole. Remove bell housing and install oversize dowels J-808-5 in crankcase.

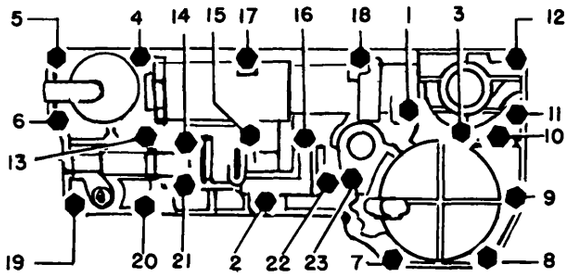
REASSEMBLY

After overhaul of Major Components, make certain that all parts absolutely clean, oil moving parts with 10-W engine oil before installation, use ALL NEW GASKETS & SEALS. Tighten all parts evenly to specified torque and in correct sequence (see illustrations). Proceed in reverse order of disassembly directions and note all of following points:

Planetary Gear Set Installation: After reverse ring gear thrustwasher and reverse band installed in case (with Installing Clip J-2595 on band), rotate band 45° toward servo opening, insert anchor and engage hooked end of band, then rotate assembly back into position. Position band operating lever in place with strut shoulder toward inside of case, install anchor shaft **with tapped end outward.** If installation correctly made, adjustment screw will be centered in servo opening (lever has offset end). See that planet carrier front (steel) thrustwasher installed on carrier with three tangs engaging holes in carrier, install rear (bronze) thrustwasher in case with three tangs engaging holes in case, then install planet carrier. If correctly installed, chamfer on output shaft journal will be flush with rear end of transmission case bushing.



REACTION SHAFT FLANGE & ACCUMULATOR BOLT TIGHTENING SEQUENCE



VALVE & SERVO BODY BOLT TIGHTENING SEQUENCE

Rear Oil Pump & Lubrication Oil Pressure Regulator Valve Installation: Install rear gasket (gasket with LARGER hole—do not confuse with cover gasket) and plate on transmission case with bolt holes aligned, install drive key cushion and key in output shaft, then install driving gear to engage key (old gear should face in same direction as before, new gear with either face in). Tighten attaching bolts to 5 ft. lbs. torque in following sequence: Top, Bottom, Right, Left; then retighten bolts to 25-30 ft. lbs. torque in same sequence. Check pump for free operation by rotating output shaft. Install lubrication oil check valve assembly in case.

Parking Lock Ratchet Wheel & Rear Bearing Retainer: Make certain that retaining ring installed on each side of ratchet wheel on output shaft, insert valve operating rod through square hole in front face of bearing retainer and connect rod to cross-shaft lever, then install rear bearing retainer and gasket, tighten attaching bolts evenly to 35-40 ft. lbs.

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DYNAFLOW DRIVE (Cont.)

Low Brake Band, Clutch, & Input Shaft Installation: Install low band operating lever and anchor lever with strut shoulders of levers toward inside of case and tapped ends of shaft outward (operating lever on side of case having large servo opening, anchor lever on opposite side). Install low band struts in ends of levers with notched ends together using two wooden blocks (1" x 2" x 3½") to support struts and band while assembling. Install low band with J-2595 band installing clip holding band compressed (*CAUTION*—used band must be installed in original position with point of heavier wear at anchor end, (new band can be installed either way). With struts engaging ends of band (notches on struts must straddle pins on band), apply operating lever and remove clip. Place bronze reaction gear thrustwasher on sun gear, install clutch assembly (use wire hook to lift low band if clutch does not go down fully), place bronze thrustwasher on front face of clutch hub. Install input shaft (make certain that oil seal ring ends properly locked and that retaining ring installed in shaft groove). If shaft does not go down into place, make certain all four thrustwashers are properly centered.

Reaction Shaft Flange, Front Oil Pump & Accumulator Installation: Install 5/16" guide pin in accumulator bolt hole at each end of flange on transmission case, then proceed as follows:

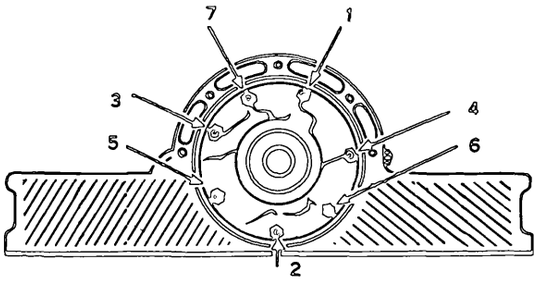
1) Place reaction shaft flange gasket in position on case so all holes in gasket are aligned with holes in case. Install tanged bronze high clutch thrust washer on reaction flange, using chassis lubricant to hold in position. Make certain that oil seal rings are on flange hub, then install flange assembly on case using care to avoid damage to oil seal rings.

2) Install three special bolts (3/8"-16 x 2") with plain washers in positions marked 2, 3, 4 in "bolt tightening sequence" illustration. (*NOTE* - These bolts are for assembly purposes only). Install regular pump bolts and lockwashers at positions marked 1, 5, 6. Coat threads of No. 5 bolt with Permatex No. 3. Tighten bolts marked 1, through 4 to 35-40 ft. lbs. and bolt No. 5 to 20-25 ft. lbs. in numerical sequence.

3) Thread Endplay Gauge J-5804 into rear end of output shaft and thread Extension Rod J-5808 into a bolt hole in rear bearing retainer. Tighten both tools firmly. Use Clamp KMO-30-G and Sleeve KMO-30-K to mount dial indicator KMO-30-B and Extension J-5339 so that extension bears squarely against end of Gauge J-5804. Push Gauge J-5804 as far forward as possible, set dial indicator at zero, then pull gauge rearward toward indicator with sufficient force to remove all endplay from output shaft. Note indicator reading which will be between .015" and .035", if output shaft endplay is within limits. If endplay is not within limits, remove reaction shaft flange, clutch assembly, and the thrust washer located between reaction gear and reverse sun gear.

4) Measure thickness of removed thrust washer and substitute another one of proper thickness to bring output shaft endplay within the above limits. (*NOTE* - If endplay is less than .015" select a thinner washer. If more than .035" select a thicker washer). Reinstall parts and recheck for correct endplay. Place accumulator gaskets in position so holes match holes in reaction shaft flange. Install low accumulator on same side as low band operating lever and install high accumulator on opposite side of flange, first making sure that check ball and retaining pin are in place in high accumulator body.

5) Coat accumulator bolt threads with Permatex No. 3 and install bolts and stud nuts with lockwashers, but do not tighten. Tighten all bolts and nuts (1 through 14) to 5 ft. lbs. (see illustration), in numerical sequence. Following the same sequence again, tighten bolts (1 through 4) to 35-40 ft. lbs., and the remaining bolts and nuts to 20-25 ft. lbs. Remove the three special bolts (2, 3, 4) and tighten accumulator body caps to 40-50 ft. lbs. *NOTE* - If edges of flange gasket protrude beyond bottom surface of transmission case, carefully trim it flush with a sharp knife.



FRONT OIL PUMP TIGHTENING SEQUENCE

▷Guide Pin Note—These 5/16" guide pins can be made up from 5/16" round stock, 2½" long, with 5/16"-18 thread ½" long on one end and screwdriver slot on opposite end (chamfer this end slightly).

▷*SHIFT CONTROL VALVE ADJUSTMENT CHANGE:* The previous valve adjustment procedures included a clearance check between the shift control valve and stop pin which have been superseded by the instructions outlined below. The following adjustment applies whether the adjustment is made with the transmission in the car or during transmission assembly.

Valve & Servo Body Installation: (*NOTE* - Valve body and shift control valve have been changed in production and the adjustment procedure is different for the later type valve assembly. *See "1957 Valve Body & Valve Production Change" above for identification of the later type parts).*

1) With transmission lying bottom side up, raise reverse band operating lever and insert strut between shoulders on lever and end of band, with rounded ends against levers and band. *CAUTION - Do not lift the lever during following steps because strut will fall into transmission.*

2) Install two 5/16" guide pins into case to guide each end of servo body and install servo body spacer plate gasket over guide pins. Push shift control valve and lower operating lever inward to align upper level with opening in case and install valve and servo body on case. Engage pin in control valve with slot in operating lever.

3) Install various length bolts with lockwashers according to depth of holes through valve and servo bodies (*NOTE - Use copper washer on bolt No. 16. See tightening sequence illustration).* Tighten all bolts to 5 ft. lbs. in the numerical sequence indicated in tightening sequence illustration. Repeating the same sequence, tighten all ¼" bolts and nuts to 11-15 ft. lbs., and all 5/8" bolts to 15-20 ft. lbs. While tightening bolts and nuts adjacent to shift control valve, operate the valve to make sure it is not binding (*NOTE* - It may be necessary to tighten some bolts to low limit of torque to prevent valve binding).

4) Using Linkage Hook-Up Finger J-2591, position the socket of valve operating rod under ball of valve upper operating lever and pull upward until ball snaps into socket. Temporarily install shift lever on cross shaft and operate valve linkage to make sure it works freely. Move lever toward front of transmission to engage parking lock pawl in ratchet wheel. Turn output shaft to make certain it is locked.

▷*LATE 1957 SHIFT CONTROL VALVE & BODY PRODUCTION CHANGE NOTE & ADJUSTMENT CAUTION:* The service procedure for adjusting the shift control valve is different than for the early type since the land on the new valve is no longer visible through the discharge port. To facilitate adjustment, the later valve has a locating groove which is to be positioned flush against boss on casting with the shift lever in "Drive" position. Either type valve can be used, but the adjustments are different as indicated below. The later shift control valve can be used in an old type valve body, in which case the valve may be adjusted by using the procedure for early type assemblies. If an old valve (without locating groove) is to be used with a new valve body, first locate the replacement valve in drive position in an old valve body, then mark on the old valve so that the mark may be used as a reference point to adjust the old type valve in the same manner as the later type valve in "Drive" position.

5) On the early type shift control valve and valve body, temporarily install shift lever on cross shaft and operate valve to make sure it works freely. Move lever to engage middle detent "Drive" position. If inner end of valve is not flush with edge of port in valve body, loosen lockbolt and move adjusting lever as necessary

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DYNAFLOW DRIVE (Cont.)

to align edge of valve with edge of port (flush), then retighten lockbolt, making certain that adjustment does not change.

6) On later type valve and valve body, position groove in flush against boss on casting with shift lever in "Drive" position. See note above for adjusting old type shift control valve in a later type valve body.

7) On both old and new assemblies, move shift lever into "Park" position, making certain that pawl engages ratchet wheel (by attempting to turn output shaft), then check for clearance between outside end of shaft and stop pin. If valve does not clear stop pin, loosen valve body attaching bolts. If valve and pin still touch, check lever for distortion and replace if necessary.

8) Install a 5/16" guide pin at each end of transmission case and install a new oil pan gasket over guide pins. Install oil screen, Install oil pan with bolts and stud nuts provided with lockwashers. Tighten all bolts and nuts to 10-12 ft. lbs.

Oil Pan Installation: Coat area on transmission case (where case is cut away under oil pan gasket) thinly with Permatex No. 3. Install 5/16" guide pin at each end (same pin as used for reaction shaft flange), then install a new gasket over pins. Install oil pan (use heavy duty internal tooth lockwashers on bolts and stud nuts), tighten all bolts and nuts evenly to 10-12 ft. lbs. *NOTE* - This tightening torque supersedes previous specification of 15-18 ft. lbs.

Universal Joint Installation: Make certain that joint retaining ring fully seated in groove in output shaft before installing universal joint. Install universal joint using Replacer Tool J-855 to draw universal joint snug against retaining ring. Install plain washer, lockwasher, and bolt and tighten bolt to 30-35 ft. lbs. *(CAUTION—Make certain that oil passage in gear is clear).* Install speedometer driven gear and sleeve assembly in rear bearing retainer.

Bell Housing & Torque Converter Assembly Installation: 1) Install front oil pump seal ring around pump body against pump cover. Install bell housing, using lockwashers on bolts and stud. Sparingly coat threads of lower right side bolt with Permatex No. 3 (because bolt hole opens into transmission case). Tighten bolts and stud nut evenly to 35-40 ft. lbs.

2) Support converter pump firmly on blocks and carefully place stator in proper position, with original selective spacers and the thrust washer between stator and pump hub. *CAUTION—Do not use grease to hold spacers in place.*

3) Place sun gear on stator with tanged thrust washer up, then carefully lower twin turbine assembly into place, making sure that planet pinions enter and mesh properly with sun gear. Install Converter Gauge J-5899 on converter pump flange, making sure that indicator post does not contact turbine. Loosen wing screw, firmly press gauge plunger down against first turbine hub and tighten wing screw.

4) Support converter pump cover firmly on blocks with inner side up and place bronze thrust washer in its recess. Remove Gauge J-5899 from pump, invert it, and center it on cover so that it rests squarely on the gasket surface.

5) Use Sleeve KMO-30-K to mount dial indicator KMO-30-B on the adjustable post of clearance gauge so that indicator button bears squarely against upper end of clearance gauge plunger. Set dial at zero.

6) Loosen plunger wing screw, firmly press plunger down against the thrust washer and note dial reading. The dial reading is clearance that will exist between turbine pump and pump cover when parts are installed, and should be .004-.017". If dial reading not within specified limits, change the total thickness of selective spacers located under the stator. *Increasing* spacer thickness will *decrease* clearance at cover and *decreasing* spacer thickness will *increase* the clearance.

Part No.	Spacers	Thickness
1167710		.013-.010"
1167711		.023-.020"
1167712		.033-.030"

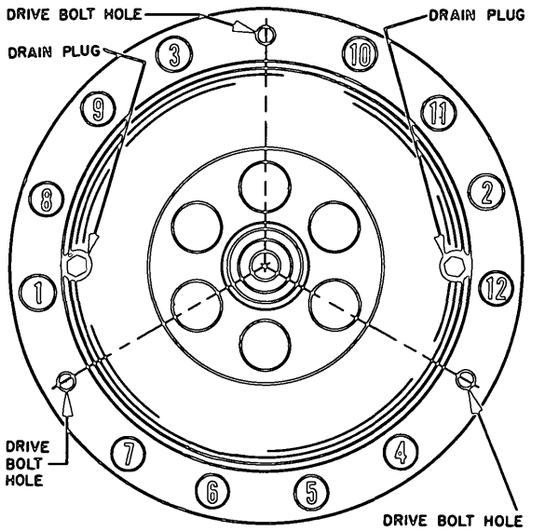
7) Install converter pump on reaction shaft, turning it until lugs on pump hub enter slots in front pump driving gear. Coat selective spacers and thrust washers with petroleum jelly so they will adhere to stator during installation. Make sure that all rollers and springs are in place and held in stator with tool J-5806.

8) While holding thrust washers and spacers to rear side of stator, slide stator off of installing tool onto the reaction shaft. Make certain that washer and spacers remain in place as stator is pushed back against converter pump. Install converter sun gear with the tanged thrust washer outward. If sprag is properly installed, the sun gear may be turned on reaction shaft in clockwise direction only.

9) Make sure that retaining ring is seated in groove of input shaft, then install the twin turbine assembly, turning it as required to mesh planet pinions with sun gear. Install selective thrust washer, retaining washer and bolt, with external tooth lockwasher on front end of input shaft. Shift into "P" (parking) and pry up on reverse band operating lever with a screwdriver to lock input shaft, then tighten bolt to 30-35 ft. lbs.

10) Check clearance between selective thrust washer and first turbine hub, using feeler gauges. Clearance should be .002-.009". If clearance not correct, substitute another thrust washer of proper size. Two sizes furnished for selective fitting (Part No. 1166113, .063-.060". Part No. 1166112, .070-.067").

11) Looking at front face of converter pump cover, select the three bolt holes used for pump to flywheel drive bolts (see illustration). Install a new "O" ring seal on pump cover, making sure that surfaces are clean and that seal has even tension all around and is not twisted.



CONVERTER PUMP COVER TIGHTENING SEQUENCE

▷ *CONVERTER COVER INSTALLATION NOTE:* Tightening sequence and installation procedures have been changed and are not the same as previous models. Proceed as follows: Looking at front face, turn converter cover so that drain plugs are horizontally aligned with seven bolt holes above a line through the plugs and eight below (see illustration). In this position the top center hole is a driving bolt hole as is the fifth hole from top in either direction. Mark these holes for later installation of flywheel-to-pump driving bolts.

(NOTE - With converter in the above position, the triangular flywheel must be turned so that wide flange is down and horizontal, to match converter driving bolt holes and clear drain plugs). Install a new "O" ring seal on pump cover, making sure that seal has even tension, is not twisted, and that all surfaces are clean. Grease selected thrust washer so it will adhere and place it in recess in cover, then install cover on pump. Install bolts with lockwashers in all but the three driving bolt holes, insert shank of 11/32" drill through one bolt hole to align all holes, then tighten bolts to approximately 5 ft. lbs. in numerical sequence (see illustration). Finally tighten bolts in same sequence to 25-30 ft. lbs.

INSTALLATION IN CAR

1) Turn flywheel so that one hole for converter attaching bolt is straight up and wide flange is down. Raise transmission into place with same equipment used for removal. Align converter attaching bolt holes with holes

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DYNAFLOW DRIVE (C nt.)

in flywheel before moving transmission forward against cylinder crankcase. Then with converter pump cover in correct position (*s e "Converter Cover Installation" above*), adjust lifting equipment so converter housing meets engine crankcase squarely and engages the two dowels. Install all converter housing bolts with lockwashers and tighten to 45-55 ft. lbs.

2) Raise transmission just enough to install transmission support and thrust plate, installing shims in their original positions between support and frame. Attach mounting pad to support with plate and nuts, and attach thrust plate to bearing retainer with four bolts and lockwashers.

3) Remove transmission hoist and engine support jack. Check converter drain plugs for tightness, then install converter housing cover. Attach oil filler pipe to oil pan and install oil cooler pipes. Connect torque tube to torque ball (tighten bolts after car is on floor).

4) Connect speedometer cable to driven gear sleeve and connect shift rod to shift lever on transmission, Connect stator operating rod to lever on high accumulator. Wipe all oil from outside of transmission and lower car to floor. Tighten torque ball bolts to 30-35 ft. lbs.

5) Fill transmission to proper level (*see "Draining & Refilling" above*). Check adjustment of control linkage (*see "Linkage Adjustment" above*). Check adjustment of stator operating controls and throttle linkage (*see CARBURETOR on car model page*). Road test car and check for oil leaks.

ENGINE BALANCING

►***IF VIBRATION NOTED AFTER INSTALLATION OF CRANKSHAFT, FLYWHEEL, AND OTHER ROTATING PARTS, CORRECT THIS UNBALANCED CONDITION AS FOLLOWS:***

►*CAUTION:* Procedure below will correct minor unbalance caused by replacement of individually balanced parts. Extreme vibration caused by parts abnormally out of balance, or different in weight from corresponding parts, should be corrected by replacement of these parts.

Critical Speed of Vibration—Determine speed at which vibration is most evident (use tachometer) and operate engine at this speed to check results from the following corrective procedures.

1) Remove bell housing cover and install one balance weight (.060" thick) under head of two converter pump cover bolts, and tighten bolts to 25-30 ft. lbs. (*CAUTION - Do not place a weight at a flywheel-to-converter driving bolt as these bolts are not long enough for addition of weights).*

2) Run engine at critical speed and carefully compare vibration with that obtained without the weight, then stop engine. Mark location of balance weight on converter pump, remove weight and tighten bolt to 25-30 ft. lbs. Install the weight at other converter pump cover bolts and compare vibration produced at critical speed.

3) At the point where valance weight produced greatest improvement in vibration, install weights of proper thickness to eliminate objectionable vibration. Balance weights are furnished in the following thicknesses:

Balance Weight Part Nos.

Thickness	Part No.
.009"	1178106
.018"	1178107
.0345"	1178108
.060"	1178109
.120"	1178110

►*NOTE: When factory balancing of converter pump is changed to balance an engine, the pump cannot be used with any other engine.*

CHEVROLET POWERGLIDE

Chevrolet Pass. Cars (1957)
Chevrolet Corvette (1957)

►CHANGES, CAUTIONS, CORRECTIONS

► *STARTING ENGINE BY PUSHING CAR (Pushing recommended rather than towing):* Place selector lever in Neutral "N" position. When car reaches speed of approximately 16 MPH. (20 MPH if road wet or icy with resultant poor traction), move selector lever to Low "L" position to crank engine. After engine is started, move lever to "N" for engine warm-up.

DESCRIPTION

The 1956 Powerglide Transmission is similar to 1955 design, consisting of a torque converter and a hydraulically operated planetary transmission.

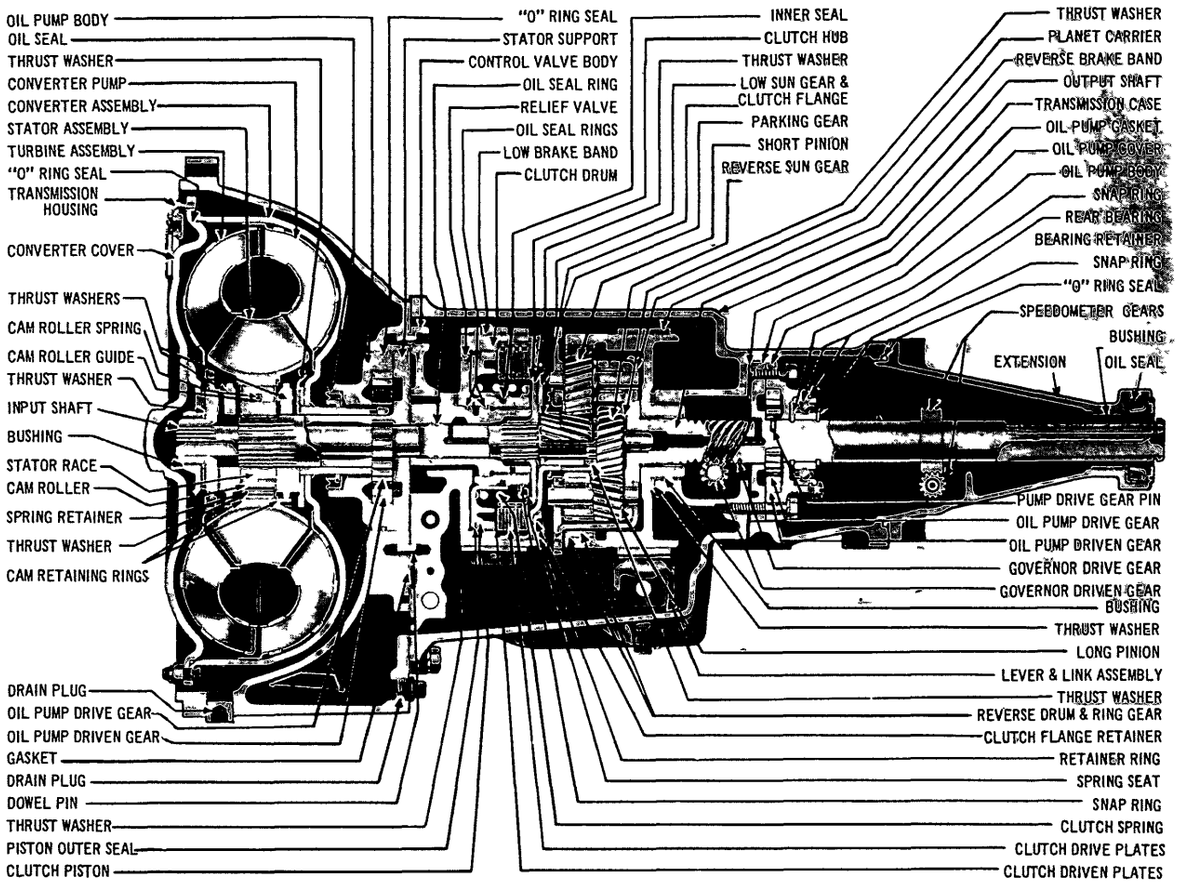
OPERATION

Operation of the Torque Converter and Transmission is similar to the previous type except for automatic shifting in "Drive Range" as follows:

Starting in Drive Range—With the selector lever in Drive "D" position, the manual valve is positioned to direct oil pressure to apply side of the Low Servo and to the Low Drive Valve Body so that the car starts out in low range (torque converter plus planetary gear) providing an equivalent gear reduction of 2.2-1 (torque converter) plus 1.82-1 (gears). Depressing the accelerator pedal applies throttle valve pressure behind the shifter valve in the low drive valve body which assists the spring in keeping the shifter valve closed and the transmission in low range. As soon as the car begins to move, the rear pump begins to operate and to supply oil pressure to the governor which controls the upshift as follows:

Normal Upshift—When the rear pump pressure balances the force of the centrifugal weights in the governor, the governor valve directs oil pressure to the Shifter Valve in the low drive valve body and moves the valve to the drive position. This directs main line pressure to the clutch assembly and to the release side of the low servo piston (balancing of low servo pressures allows spring to release band). Application of the clutch and release of the band places the transmission in Drive Range (converter drops out independently when reversal of pressure on stator vanes causes stator to "free-wheel" so that torque converter acts merely as a fluid coupling). Upshift can be delayed by greater throttle opening as follows:

Delayed Upshift—The shift from Low to Drive Range is dependent on the extent to which the accelerator pedal is depressed and will occur at a higher car speed with greater throttle opening. In addition, if the accelerator pedal is depressed beyond the "detent point" (this point reached just before throttle is wide open and will be noted as a definite resistance to further movement of the accelerator pedal), this movement of the pedal compresses the detent spring in the low drive valve body and moves the Detent Valve which then directs throttle valve pressure to the large plunger which assists in holding the shifter valve in the low range position (see Forced Downshift operation below). This delays the upshift to drive range until the car speed reaches 42 MPH. when the governor pressure becomes great enough to move the shifter valve to the high position regardless of the accelerator pedal position (governor pressure increases with car speed until it equals main line pressure).



POWERGLIDE TRANSMISSION SECTIONAL VIEW

Normal Downshift—With closed throttle, transmission remains in drive range until car speed drops to approximately 9 MPH. and shifts down to low range at this point. However, transmission can be downshifted at will at higher car speeds to provide greater torque for rapid acceleration as follows:

Forced Downshift—At car speeds below 37 MPH., the transmission can be downshifted from drive to low range for rapid acceleration by depressing the accelerator pedal. The amount of pedal movement required, and the resulting action of the transmission control depends on car speed.

LUBRICATION

Check oil level at 1000 mile intervals, drain and refill transmission at 25,000 mile intervals.

► *CONVERTER DRAIN NOTE:* There is no drain plug on converter unit. Oil trapped in converter need only be replaced when transmission disassembled for overhaul.

Recommended Oil - Use only Automatic Transmission Fluid Type "A" (as furnished in containers bearing "AQ-ATF" number).

Capacity - Approximately 5 qts. (refill after transmission case drained), 11 qts. (after overhaul with transmission and converter dry).

►**Warming Up Transmission (For Checking or Draining)**—Drive car approximately 5 miles with frequent starts and stops OR warm up transmission in shop as follows: Run engine for 15 minutes at 750 RPM with selector lever in "Dr" position. ***CAUTION*** —Set hand brake tightly to prevent car moving.

Checking Oil Level—Check only with transmission warm and engine idling with selector lever in Neutral "N" position. Remove dipstick from filler tube in engine compartment on right side. Add oil only if level down to "ADD ONE QUART" mark on stick, fill only to "FULL" mark on stick. ***CAUTION—High oil level (above "FULL" mark) will cause foaming and loss of fluid.***

CONTINUED ON NEXT PAGE

POWERGLIDE (Continued)

▷*OIL FILLER NOTE*—Use of Oil Filler Tube & Funnel No. J-4264 recommended to facilitate filling. This assembly is vented (transmission not vented and may blow-back causing oil spillage if vented filler not used).

▷*LOW OIL LEVEL CAUTION—If oil level in transmission found consistently low, check for internal and external oil leaks. See "OIL LEAKAGE OR HIGH OIL CONSUMPTION" in TROUBLE SHOOTING.*

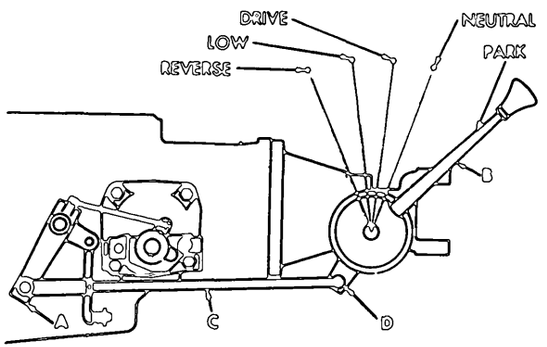
Draining & Refilling—Transmission must be warm. Remove drain plug in rear face of transmission housing under the case to drain the transmission. *NOTE*—It is not necessary to drain converter. Replace and tighten drain plug. Install 5 qts. of new fluid through filler tube on right side of engine (see Oil Filler Notes above). Idle engine with selector lever in "N" until transmission warm, check fluid level and add additional fluid, as required, to bring level up to "Full" mark on dipstick. *CAUTION—Do not overfill (will cause foaming).*

Filling (After Overhaul)—Install 3 qts. of fluid through filler tube, start engine and allow it to idle with selector lever in "N", install additional 8 qts. of fluid. Run engine until transmission warm and check fluid level.

LINKAGE ADJUSTMENT

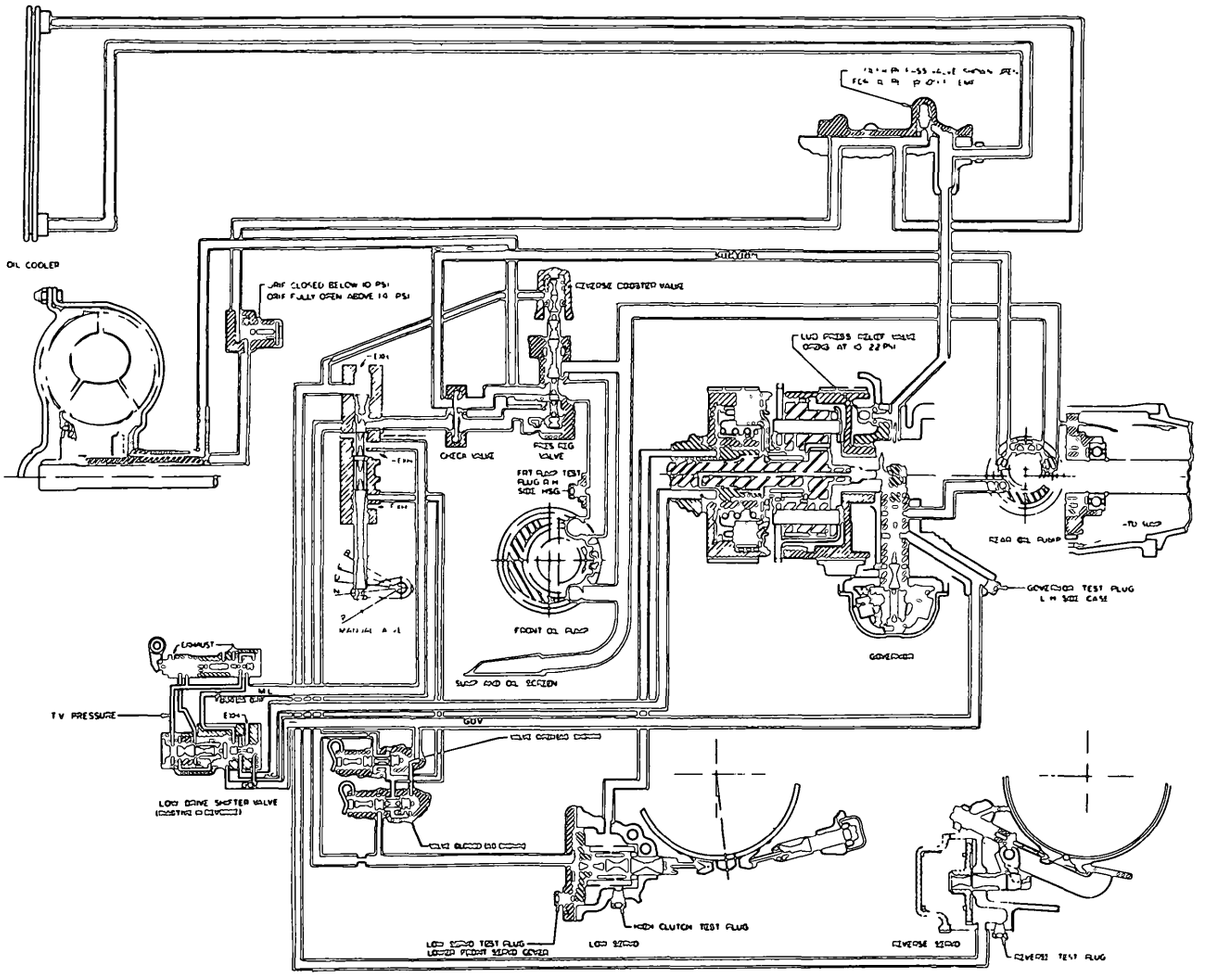
▷*THROTTLE LINKAGE ADJUSTMENT NOTE: See CARBURETOR on car model pages.*

Manual Control Linkage (Except Corvette): Loosen shifter tube lever clamp nut sufficiently to allow upper control rod to move freely in the swivel. Push control rod bellcrank (on left side of transmission case) toward front of car as far as it will go, placing transmission in "Park" position. Place shift control lever on steering column in "P" (Park) position. With both the control rod bellcrank and selector lever held in the "P" (Park) position, tighten shifter tube lever clamp nut securely.



CORVETTE MANUAL CONTROL LINKAGE

Manual Control Linkage (Corvette): Set control rod bell crank (A) on transmission to reverse position (extreme rearward position). Place transmission selector lever (B) in reverse position (extreme forward position). Adjust rod (C) connecting lower end of selector lever with control rod bell crank so that rod will enter hole in lower end of selector lever (D) freely.



POWERGLIDE TRANSMISSION HYDRAULIC CIRCUITS

Neutral Safety Switch: Mounted on steering column mast jacket back of instrument panel. To adjust, loosen mounting screws, and place selector lever in "N" (Neutral). Install cotter pins into both holes on switch (each side of pointer) and rotate switch to pointer between holes. Tighten screws securely. *(NOTE* - Slot in switch must be set on center line of tang on shifter tube). If starter will not operate with selector lever in "N", rotate switch as necessary. *Check to make sure starter will operate only when selector lever is in "P" or "N" positions.*

BAND ADJUSTMENT

▷*BAND ADJUSTING NOTE: Band adjustment not ordinarily required in service (bands adjusted when reassembling transmission). Reverse band adjustment requires removal of Servo Cover Assembly (see Disassembly data).*

Low Servo Band - Adjusting screw located on left side of transmission case (under cover). To adjust band, remove adjusting screw cover. Use Tool J-4277 (see "Tool Modification Note" below), loosen adjusting screw locknut and tighten low band adjusting screw to 5-7 ft. lbs. *(NOTE - This procedure is now and supersedes the previous instructions which required that the screw be tightened firmly).* Back screw out four complete turns, and tighten locknut, taking care not to allow screw to turn. Replace adjusting cover.

▷Tool J-4277 Modification (for Low Servo Band Adjustment)—Adjusting screw has recessed head for ¼" Allen wrench. To use tool, remove screwdriver

CONTINUED ON NEXT PAGE

POWERGLIDE (C ntinu d)

retainer and special screwdriver from tool, use ¼" Allen Wrench in place of the screwdriver in the tool.

Reverse Servo Band—Adjusting screw located on right side of case under servo cover. With servo cover removed, install tool J-4277 on adjusting screw, loosen locknut. Rotate reverse drum to center it in the reverse band. Tighten adjusting screw until all endplay between linkage and band is removed without compressing the band. The reverse drum must be free to rotate after this adjustment. If reverse drum is not free to rotate, back the adjusting screw ¼ turn at a time until drum is free to rotate. ***(CAUTION—This is a sensitive adjustment and must be done carefully).*** Tighten locknut taking care not to allow adjusting screw to turn.

TROUBLE SHOOTING

SEVERE CLOSED THROTTLE DOWNSHIFT "CLUNK": May be caused by a broken closed throttle cushion valve spring retainer. Check this condition by removing right hand side cover and inspecting retainer. *See "Closed & Forced Throttle Valve Spring Retainer Production Change" above.*

MOMENTARY RUN AWAY IN LOW UP TO 30 MPH (WIDE OPEN THROTTLE ACCELERATION): May be caused by a broken forced throttle cushion valve spring retainer. Check mainline pressure which will be lower just prior to shift, and the stall pressure will be low if the faulty transmission operation is caused by a broken retainer. *See "Closed & Forced Throttle Valve Spring Retainer Production Change" above.*

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, poor acceleration, or engine runs away on turns).

1) In all Speed Ranges—Low oil level. Incorrect control linkage adjustment. Air leak in oil pump suction pipe. Low front oil pump pressure.

2) In Drive Range—Incorrect control linkage adjustment. Damaged or leaking clutch piston seal (worn or burned clutch plates resulting from partially engaged clutch).

3) In Low Range—Incorrect control linkage adjustment. Low Band out of adjustment. Sticking accumulator valve, modulator lever, or modulator valve. Damaged or worn Low Servo Piston Ring resulting in poor band application or excessive oil leakage into clutch apply circuit causing partial clutch application and possibly burned clutch plates (check by connecting pressure gauges to Low Servo Apply and to High Clutch test points—there should be no pressure indicated at High Clutch point with selector lever in "L").

CAR CREEPS (Forward or Backward).

1) With Control Lever in Neutral—Incorrect control linkage adjustment. Clutch piston vent valve stuck closed. Clutch plates sticking or incorrectly assembled (not "stacked" in correct order).

2) Creeps forward with Control Lever in Reverse or backward with Lever in Low—Incorrect control linkage adjustment.

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With Control Lever in any range (rear wheels free). If this occurs at other times than after reversing car, see causes listed under EXCESSIVE SLIPPAGE above. If this occurs only after reversing car (indicating loss of front pump pressure) check: Rear pump air leakage into front pump suction line (causing front pump to lose its prime). Rear pump gasket leakage. Front pump clearance excessive.

2) With Control Lever in any range (rear wheels locked). Parking pawl lock engaged. Broken parts in transmission. Parking brake applied.

3) With Control Lever in Drive Range (rear wheels free). If engine runs away and transmission is hot, check for: Low radiator water level, clogged oil cooler, sticking thermostatic valve, or dragging Low Range Band (causing over-expansion of clutch parts due to excessive heat).

SHIFTS ARE ROUGH.

1) Low-to-Drive Shift (car in motion). Incorrect Low Band adjustment. Clutch plates worn or binding. Modulator control lever or piston sticking (will cause excessive pressures). Accumulator dump valve orifice plugged.

If engine speeds up during this shift—Check for incorrect low band adjustment and worn or binding clutch plates.

2) Drive-to-Low Shift. Incorrect Low Band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

3) Neutral-to-Reverse. Incorrect reverse band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

CHATTERS WHEN STARTING.

1) In Low Range. Incorrect Low Band adjustment. Worn or rough band, scored drum. Clutch not disengaging properly due to distorted or binding plates, sticking clutch piston, sticking piston vent valve, or damaged or worn Low Servo Piston Ring allowing oil leakage into clutch apply circuit and causing partial clutch application (see tests for Excessive Slippage in Low Range above).

2) In Drive Range. Incorrect Low Band or Reverse Band Adjustment. Bands worn or rough, drums scored.

3) In Reverse Range. Incorrect Reverse Band adjustment. Worn or rough band, scored drum. Reverse ring gear and drum bushing worn or damaged.

REVERSE OPERATION JERKY OR DRAGGING.

1) Clutch plates are incorrectly assembled (not "stacked" properly) or sticking. Clutch piston vent valve stuck closed.

REVERSE CAN NOT BE ENGAGED WITH ENGINE RUNNING: If reverse can only be engaged when engine not running, check for accumulator snap ring being out of place (allowing accumulator valve and body to be forced against clamp nut on parking lock lever shaft and apply spring assembly, blocking shift into reverse). *NOTE*—Above condition will not prevent shift into Low Range).

DRIVE-TO-LOW or LOW-TO-DRIVE SHIFT DIFFICULT: May be caused by improperly drilled high clutch feed orifice in valve body resulting in slow clutch application in Drive Range and slow clutch release when shifting from Drive to Low (restricted orifice will cause slow oil flow). Check by connecting pressure gauges to Low Servo Apply and to High Clutch (low servo release side) and noting pressures as follows:

1) Move selector from Neutral to Drive with engine idling. If pressure builds up much more rapidly on Low Servo Apply gauge than on High Clutch gauge, a restriction in the passage (undersized orifice) is indicated.

2) Move selector from Drive to Low. Pressure in High Clutch gauge drops slowly, oil drainage from clutch is restricted. NOTE—This will result in slow Low Band application and clutch drag (may cause burned clutch plates).

HIGH CLUTCH PLATES BURNED OR CLUTCH FAIL

►***CAUTION—When High Clutch failure noted, following tests should be made before transmission removed, and transmission should also be carefully examined after removal and disassembly.***

1) Connect pressure gauges to Low Servo Apply, High Clutch (low servo release side), and to Reverse Servo points. Operate engine to supply oil pressure.

2) Place selector lever in Drive position and note pressure build-up in High Clutch gauge. Slow build-up indicates restriction in high clutch apply orifice resulting in clutch slippage and burned plates.

3) Place selector lever in Low position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage past Low Servo Piston Ring resulting in partial clutch application and burned clutch plates.

4) Place selector lever in Reverse position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage between the converter "out" and low servo "release" channels in valve body or damaged Housing-to-Valve Body gasket. This condition will cause partial clutch application and burned clutch plates.

NOISE IN TRANSMISSION.

1) Buzzing Noise (All Ranges). Low oil level. Pump gear interference with crescent in pump. Pump check valve not seating.

2) Ringing Noise in Converter. Low oil level. Air leak in pump suction line (pump not seated properly) resulting in low oil level in converter. Pressure regulator valve stuck (closing converter inlet port). Leakage in oil line between front pump and regulator valve.

3) Clicking Noise. Incorrect manual linkage adjustment (causing interference between parking lock pawl and gear).

4) Whining Noise. Transmission gear teeth worn. Pump gear clearance excessive or pump gear bushings worn.

FUEL CONSUMPTION EXCESSIVE.

1) Transmission Causes. Converter stator freewheeling cams and roller incorrectly assembled. Clutch piston vent valve stuck open.

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POWERGLIDE (C ntinued)

TRANSMISSION OIL BEING FORCED OUT OF FILLER PIPE: Caused by aeration and foaming of the oil due to one or more of the following:

NOTE—This condition may also cause Loss of Power and Lower Stall Speed (due to converter turbulence and lower pressures in control circuits).

1) Oil level too high allowing planet carrier to revolve in oil and aerate it. Correct by lowering oil level to correct point (see LUBRICATION) and driving car for 5 miles to work out air bubbles.

2) Oil suction pipe split, seal damaged, bore for suction pipe in housing too deep, or suction pipe retainer ears bent (preventing proper compression of the seal) resulting in air leaks in oil suction line.

3) Sand hole in suction bore of transmission case or housing or in suction cavity in valve body resulting in air leaks in oil suction line.

TESTING

►***TESTING CAUTION***—Transmission oil level must be checked and corrected (see LUBBRICATION) and ***transmission must be warmed up before tests made.***

Warming Up Transmission: Transmission must be warmed up by road driving or in the shop exactly as follows before checking for oil leaks or trouble.

Road Warm-Up—Drive car for approximately 5 miles with frequent starts and stops to approximate heavy-traffic conditions.

Shop Warm-Up—Set hand brake tight to hold car, place selector lever in "D" range, start engine and run for 15 minutes at 750 RPM. At end of 15 minutes, transmission will be warmed up suffcientl y for testing regardless of initial temperature.

►***CAUTION—Recheck oil level after warm-up and before making following tests.***

ROAD TEST: Road test car when endeavoring to determine the reasons for the following difficulties:

Clutch Slippage: Connect gauges to the test points of the low servo apply and high clutch (release side of low servo). Position selector lever in "D" range and when car starts to move on acceleration, carefully check the pressure readings. Before the upshift takes place, the gauge connected to the low servo apply test point should record between 85 and 95 lbs. After a normal upshift takes place and the high clutch has time to become fully engaged, both gauges should record 85-95 lbs. If on this type of shift, the gauge on the high clutch (release side of low servo) test point records 85-95 lbs., and the clutch slips or does not fully engage, it indicates a mechanical fault in the clutch. If the gauges do not record between 50-60 lbs with engine idling at 425 RPM, or from 85 to 95 lbs upon acceleration, the following items will require checking as it indicates leakage in the oil circuits. (a) Pressure regulator valve stuck, (b) Leak at low servo piston ring (between bore and ring), (c) Leak at low servo piston rod (between bore and rod), (d) Leak at valve body to case gasket, (e) Leak between valve body and housing, (f) Front pump clearances not correct, (g) Leak at low drive valve body (check gaskets and shifter valve), (h) Check passages in transmission housing for porosity, (i) Loose suction screen connection.

Closed Throttle Downshift "Clunk": High engine idle speed, or Closed Throttle Downshift Cushion Valve stuck.

Harsh Abrupt Upshift Above 25 MPH: Forced downshift cushion valve stuck closed

Improper Upshifts and Downshifts: Refer to "Shift Patterns" below. Connect gauges to throttle valve and governor test points *(NOTE—See "Governor Pressure Test Plug Production Change" above).* Throttle valve pressure ranges from 0 to 62 lbs, depending to what extent the accelerator is depressed. Governor pressure is governed by road speed. If difficulty is experienced with the "Shift Patterns" it is recommended that the governor pressure be checked first to determine whether the pressure is within proper range, for if not, it will effect the "Shift Patterns" and the governor assembly is the first thing that should receive attention. Throttle valve pressure is another thing that effects "Shift Patterns" and if governor pressure is correct it is indicative that trouble is in the low drive valve body, provided the positive linkage and throttle valve linkage is in proper adjustment.

SHIFT PATTERNS
Drive Range—Automatic

Throttle Position	①Upshift	②Downshift
Light Throttle③	12-14 MPH	④10-13 MPH
To Detent	30-45 MPH	14-18 MPH
Through Detent	48-53 MPH	45-50 MPH

①—From Low to Drive Range.
②—From Drive to Low Range.
③—Light Throttle on Upshift
④—Closed Throttle on Downshift.

STALL TEST: Check coolant level in radiator as a safety precaution. With tachometer connected to engine and service brakes securely locked, open throttle wide, with transmission in "D" (Drive) range, then in "L" (Low) range, and then in "R" (Reverse) range. Note maximum speed attained in each range and record. Speed should be almost identical in all ranges and be between 1560 and 1610 (6 Cyl.), 1600 and 1700 (V8). ***(CAUTION—Do not maintain stall condition longer than 10 seconds at one time to avoid overheating transmission fluid).*** If engine fails to attain minimum stall speed by several hundred RPM, it is likely that the stator is not locking up on the stator hub. If stall speed varies much between ranges or exceeds the maximum in all ranges, there is slippage which may be due to insufficient oil pressure or to a mechanical fault of clutch or bands.

PRESSURE TESTS: Connect pressure gauges at the following points and make the tests listed below.

►***TEST GAUGE NOTE:*** Five gauges are required. The four-gauge panel, No. J-4872, can be modified for use by installing an additional gauge furnished in conversion package No. J-5491 (reverse original gauges on panel, drilling additional hole to mount new gauge on lower edge of panel).

Gauge Connections—Connect gauge at each of the following points:

1) Low Servo Apply Pressure—Plug on lower front of servo cover on right side of transmission. ***CAUTION—Do not confuse this plug with Modulator Pivot Pin Retaining Plug which is slightly to rear of this Low Servo Apply Plug.***

2) Clutch Apply Pressure (Low Servo Release)—On bottom of transmission case at center and adjacent to servo mounting flange.

3) Reverse Servo Apply Pressure—On bottom of transmission case at rear and adjacent to servo mounting flange.

4) Throttle Valve Pressure—At hex-head plug in center of Low and Drive Valve Body Cover on left side of converter housing.

5) Governor Pressure—At plug on side or at upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (upper plug is between second and third top cover screws (counting from top front corner of cover).

6) Main Line Pressure—At plug on upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (plug is between third and fourth top cover screws (counting from top front corner of cover).

7) Clutch Apply or Main Line Pressure—At plug at outer end of channel in Low and Drive Valve Body Cover on left side of converter housing (this plug is at lower rear corner of cover).

Test Pressures—***CAUTION—Representative pressures listed below may vary 5% (higher or lower).***

FRONT PUMP PRESSURE

	Pressure
Idle (425 RPM)	50-60 lbs
Above Idle	85-95 lbs
Reverse (Idle 425 RPM)	50-60 lbs.
Reverse (Above Idle)	165-195 lbs

DRIVE (AUTOMATIC)
Transmission in Low Range

	Light Throttle (10 MPH)	Through Detent (45 MPH)
Low Apply	85-95 lbs	85-95 lbs.
Clutch Apply	0 lbs.	0 lbs.
Governor	8-13 lbs.	72½-76½ lbs
Throttle Valve	①	①

Transmission in High Range

	Light Throttle (30 MPH)	To Detent (45 MPH)
Low Apply	85-95 lbs.	85-95 lbs
Clutch Apply	85-95 lbs.	85-95 lbs
Governor	52-56 lbs.	72½-76½ lbs
Throttle Valve	①	①

①—Throttle valve pressure will vary from 0 to 62 lbs., depending on throttle position. At wide open throttle (through detent) pressure should read 61 to 63 lbs., on acceleration

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POWERGLIDE (C ntinu d)

REMOVAL FROM CAR (EXCEPT CORVETTE)

Transmission & Torque Converter are removed as an assembly *CAUTION—Torque converter is not retained in housing as on previous transmission and special holding tool must be used to prevent converter falling out when transmission assembly removed.*

TRANSMISSION ASSEMBLY REMOVAL (1) Raise car and install jack stands front and rear Turn back floor mat and remove toe pan plate

2) Remove spark plug wires on all models Disconnect ground strap from battery and wires from starting motor solenoid on eight cyl models only Disconnect oil cooler lines retaining clip bolt from right side cover and disengage lines from retaining clip on engine Move lines away from transmission and tie to right frame side rail

3) Disconnect throttle valve control rod from throttle valve control outer lever and manual shift control rod (long rod) from bellcrank Split rear universal joint Then remove propeller shaft and front universal joint as an assembly by sliding it rearward until front joint is free of transmission output shaft

4) Remove drain plug from rear of converter housing and drain transmission Clean dirt from around filler tube, dipstick and transmission cover and remove side cover bolt retaining filler tube in position Remove filler tube and dipstick *(CAUTION—Use masking tape or rubber stopper to cover filler tube opening*

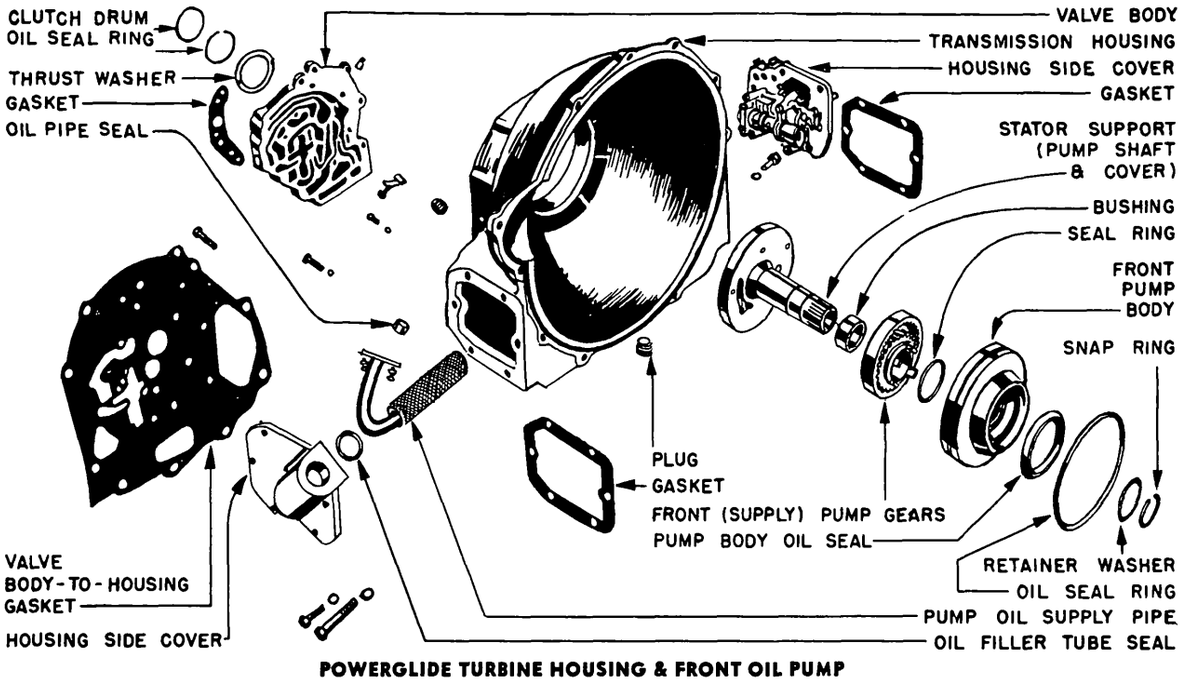
5) On V8 cars only, remove starter, and disconnect exhaust pipe from crossover pipe On 6 Cyl cars disconnect exhaust pipe from exhaust manifold

6) Disconnect muffler from muffler support bracket and move the exhaust pipe and bracket as an assembly to the left and tie it to left frame side member

7) Remove flywheel inspection hole cover and remove the three flywheel to converter attaching bolts through the opening that is adjacent to the starting motor, (opening on six cylinder cars is on left side of engine)

8) Remove all converter housing to flywheel housing attaching bolts except the top three Install engine support bar or cradle to support engine Position jack under transmission (using a suitable transmission handling device) Remove both rear engine mountings making sure that engine is properly supported before removing mountings

9) Remove the three upper converter housing to flywheel housing attaching bolts through opening in toe pan Move transmission to rear slightly and install converter holding tool J-5384 Lower transmission on jack and remove from under car



POWERGLIDE TURBINE HOUSING & FRONT OIL PUMP

TRANSMISSION OVERHAUL

OVERHAUL: Service procedures are the same as for 1956 models *See "Powerglide Transmission" in 1956 Annual Data and note the following*

Front Pump Oil Seal Installation (Revised): Remove transmission from car and remove torque converter from transmission Thread the new oil seal removing tool J-6793 into oil seal and attach sliding hammer to tool. Drive seal out of housing. Position a new type seal, Part No 3737894 in front pump and drive into place with Tool J-6839.

► *LOW BAND ANCHOR STRUT INSTALLATION CAUTION:* The guide stamping of the anchor strut assembly must be installed **toward** the band.

► *1957 POWERGLIDE LOW SUN GEAR THRUST WASHER PRODUCTION CHANGE* The "roller type" thrust washer (078" thick) used in production at this location has been changed to a bronze thrust washer (095" thick) When servicing all 1957 Powerglide clutch assemblies installed in 1953-1957 cars where either the low sun gear thrust washer ("roller type or bronze type"), or the clutch drum thrust washer requires replacement it will be necessary to replace the washer at both of these locations The service replacement clutch drum thrust washer (untanged) Part No 3745897 is 061" thick Replacement low sun gear thrust washers are furnished in the following thicknesses for selective fitting Part No 3719296 (095"), 3719297 (120"), 3719298 (145") *See "Transmission Endplay Check & Adjustment Change" below*

► *1957 POWERGLIDE TRANSMISSION ENDPLAY CHECK & ADJUSTMENT CHANGE* The procedure for selecting and installing the service thrust washers in all transmissions using the 1957 clutch will be the same as for previous (1953 & later) transmissions except that the low sun gear-to-reverse gear clearance will be 025-050" *See "1957 Powerglide Low Sun Gear Thrust Washer Production Change" above for correct thrust washers to use*

CHEVROLET TURBOGLIDE TRANSMISSION

Ch vrol t (1957) Optl. with 283" V8 Engine

►CHANGES, CAUTIONS, CORRECTIONS

►*TURBOGLIDE TRANSMISSION PRODUCTION CHANGE NOTE:* A number of transmission parts have been changed in production and are covered in OVERHAUL below.

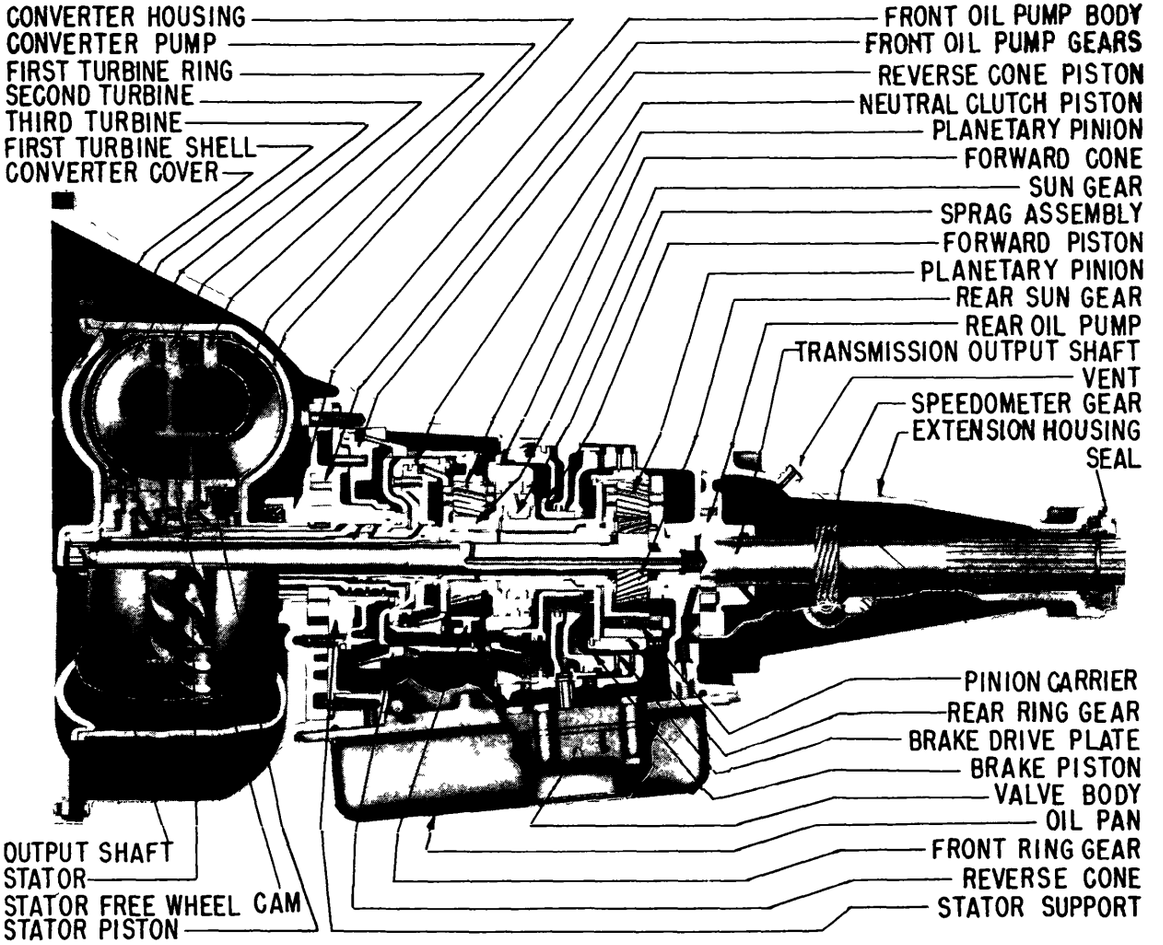
►*TRANSMISSION SELECTOR LEVER INDICATOR CHANGE:* Indicator lettering on face of speedometer has been changed from "HR" (Hill-Retarder) to "GR" (Grade-Retarder) to prevent misinterpreting "HR" position as "High-Range".

►*THERMAL BY-PASS VALVE PRODUCTION CHANGE:* In later transmissions, the thermal by-pass valve has been eliminated and replaced by a new plug which acts as a relief valve in the event oil cooler becomes plugged.

►*VACUUM MODULATOR PRODUCTION CHANGE:* A new vacuum modulator, Part No. 3745607, identified by a stripe of orange paint, replaces all previous vacuum modulators.

►*STARTING ENGINE BY PUSHING CAR:* Place control lever in "N" (Neutral) range until car reaches 25-30 MPH. Turn key on and move control lever to "HR" (Hill Retarder) position. After engine starts, move control lever to "N" (Neutral) for engine warm-up. Towing is is not recommended to start car.

►*TOWING TURBOGLIDE CARS:* Cars must not be towed with rear wheels on the ground except with transmission in "N" (Neutral) position and should not be towed in excess of 30 MPH. If car is to be towed a long distance, drive shaft should be removed. *NOTE* – If car has been damaged and transmission cannot be placed in "N" with selector lever, disconnect long rod from idler lever on left side below mast jacket, then pull lever on transmission toward front of car as far as it will go. Move lever toward rear of car from the forward position to the third detent which is "N" (Neutral) position.



CHEVROLET TURBOGLIDE TRANSMISSION (SECTIONAL VIEW)

DESCRIPTION

The new Turboglide transmission is a non-shifting, hydraulically controlled, planetary type transmission with a five unit torque converter having three turbines which are connected through two planetary units to the output shaft. Band or clutch engagement or disengagement (from standstill to top speed) is eliminated. In addition to the two planetary units, three cone clutches are provided for Neutral, Drive, and Reverse operation. A disc type clutch is used for control of Hill Retarder. A parking lock pawl engages a gear which is integral with the output shaft when selector lever is placed in "P" (Parking) position. Transmission clutches and torque converter variable pitch stator are hydraulically controlled by oil pressure supplied by front and rear oil pumps. A valve body mounted on the bottom of the transmission and enclosed in oil contains units to regulate oil pressure, control operation of clutches and provide manual selection of the operating ranges. When transmission is in "D" (Drive) position, torque multiplication is provided by the "first turbine" for starting and low speed power requirements. The "second turbine" is used for intermediate speeds and acceleration purposes and comes into operation at approximately 30 MPH (at full throttle operation). The "third turbine" is used for cruising and high speed operation and comes into operation at approximately 60 MPH (at full throttle). The actual point at which each turbine provides torque to the output shaft is dependent on car speed, engine speed, and throttle position. Oil pressure in the transmission is regulated and controlled in relation to engine torque by means of a diaphragm operated valve which is exposed to engine vacuum and maintains a pressure no higher than is required to hold clutches stationary. Oil temperature is controlled by a thermostatic valve which receives oil leaving the converter. When oil temperature reaches 180°F. the valve completely closes and directs oil through the heat exchanger installed in bottom of car radiator.

OPERATION

NEUTRAL (Selector Lever in "N"); All clutches are released and no drive is transmitted to transmission output shaft. Engine can be started with transmission in "N".

PARK (Selector Lever in "P"): All clutches are released (as in Neutral). The parking lock pawl is engaged with a gear on output shaft which prevents output shaft from rotating. Engine can be started with transmission in "P".

DRIVE (S l ct r L v r in "D"): Reverse clutch and hill retarder clutch are released. Neutral clutch and forward clutch are applied. Power transmission is through planetary units and output shaft as indicated below. As each

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CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

of the three turbines are directly connected to a component of the two planetary units, power transmission varies in relation to turbine or turbines in operation depending on engine speed, car speed, and throttle position.

P wer Range: As accelerator pressed to set car in motion, the engine drive pump starts, increasing with engine speed, and delivers nearly all of its output to first turbine. Motion of first turbine is transmitted to sun gear of rear planetary gear set, causing transmission shaft to be driven at a reduced rate as the rear planetary gears are forced to "walk" around their ring gear. The ring gear cannot rotate backwards because of its one way clutch. In this phase of operation, greatest transmission torque multiplication is obtained. Transmission gear reduction is 2.67-1, and with torque converter reduction (stator in normal low angle position), the maximum reduction is 3.8-1 at 1700 engine RPM. With stator in high angle, maximum reduction is 4.3-1 at 2700 engine RPM.

Acc leration Range: As car speed increases, angle of oil pumped by converter pump changes due to engine RPM and, because of the angle of first turbine blades, the oil starts to drive the second and third turbine in a progressive and overlapping action while output of first turbine diminishes. Output of second turbine is transmitted to output shaft through the front planetary sun gear at a 1.63-1 ratio. Reduction in the front gear set is obtained by turning the ring gear which causes planet gears to "walk" around sun gears and transmit their speed to the output shaft. The sun gear is prevented from turning backwards by a one way clutch. When second turbine reaches maximum torque, the first turbine is released and freewheels in converter pump oil stream. Like the first turbine declining action, as engine speed continues to increase, less oil pressure plays on the second turbine vanes but more reacts on the third turbine. Because of its direct connection to transmission output shaft, the third turbine is more favorable for high speed acceleration.

Cruising Range: When fluid coupling point of the torque converter is reached, the transmission is in cruising range. At this stage, work of the second turbine is completed and it is released by a clutch to freewheel in converter housing with the first turbine. All output is now from third turbine which is connected mechanically to output shaft at a 1 to 1 ratio.

Variable Pitch Stator: At speeds below 60 MPH, additional torque multiplication is available by depressing accelerator through its detent beyond full throttle position. Stator blades are changed to their high angle, which provides a greater redirection of oil entering the pump, to increase torque multiplication and permits engine speed to increase for greater power output to converter. Above speeds of 60 MPH, at full throttle, the stator freewheels regardless of blade angle, and converter ceases to multiply torque.

Hill Retarder: Hill Retarder clutch is applied and all other clutches are released. The hill retarder may be applied up to 40 MPH to control car forward speed when descending grades. When hill retarder position is applied, the multiple disc clutch on rear planetary gear set ring gear is engaged and all other clutches are released. This drives the first turbine at 2.67 times output shaft speed, while the second and third turbines freewheel. The pumping action of the first turbine creates a turbulence in the converter which effectively brakes the car by increasing engine speed and by transferring energy into heat in the converter oil. The heat is then dissipated by the engine cooling system.

REVERSE: Reverse cone clutch holds ring gear of front planetary gear set and the second turbine stationary and the drive range cone clutch connecting the third turbine to output shaft is also applied. Starting from a standstill in reverse, the reaction within the torque converter is same as for drive range. Inertia of the car tends to hold rear planetary carrier stationary. This causes the planet gears to drive ring gear in reverse. The rear ring gear then turns front planetary sun gear which forces front planetary gears to "walk" around locked ring gear and drive planet carrier and output shaft in reverse.

LUBRICATION

Check oil level at 1000 mile intervals, drain and refill every 25,000 miles.

Capacity – Approx. 3½ qts. (refill), 6½ qts. (after overhaul).

Recommended Oil – Use only Automatic Transmission Fluid Type A (as furnished in containers bearing "AQ-ATF" number).

Checking Fluid Level (Exc. Air Conditioned Cars): With transmission at normal operating temperature, transmission selector lever in "D" (Drive) position, and engine idling. Remove gauge rod located under right side of hood. Wipe with a clean cloth and check oil level. Add sufficient oil to bring level in transmission to the "Full" mark. *CAUTION - Do not overfill.*

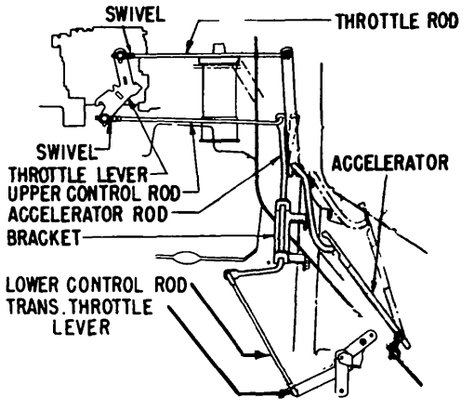
Checking Fluid Level (Air Conditioned Cars): With transmission at normal operating temperature, transmission selector lever in "N" (Neutral) position, raise car on a hoist. Remove cap from oil level tube located at rear of transmission oil pan. Add oil to bring level in transmission to top of tube, as follows: Remove speedometer fitting and speedometer drive gear. Add Automatic Transmission Fluid Type "A" through speedometer gear hole.

Draining & Refilling: With engine and transmission at normal operating temperature, stop the engine and remove transmission oil pan drain plug. *(CAUTION – Do not run engine while draining transmission).* After completing draining, replace drain plug and install 3½ quarts of Automatic Transmission Fluid Type A, through the oil dipstick tube (use Funnel J-4264). Start engine and allow to run a few minutes as idle speed, then check oil level. If necessary, add oil to bring level up to "FULL" mark on dipstick.

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE: See CARBURETOR n car mod l pag s.*

Manual C ntr l Linkag : Loosen shifter tube lever clamp nut sufficiently to allow upper control rod to move freely in the swivel. Move parking lock and range selector lever on left side of transmission case toward front of car to the "N" (Neutral) detent (3rd position forward). Place shift control lever on steering column in "N" (Neutral) position. With the parking lock and range selector lever and the shift tube lever held in the "N" (Neutral) position, tighten the shifter tube lever swivel clamp nut securely. Check linkage operation to insure the "R" and "D" stops of the transmission control selector plate (mast jacket gate) do not prevent positioning of the selector *(CAUTION – L v r position must be established by transmissi n N utral d t nt and not by the "R" and "D" stops of th control selector plate on the mast jacket).* If necessary, reposition control selector plate to permit normal operation in "R" and "N". *CAUTION*—Improper adjustment of linkage will result in partial pressures on the cone clutches resulting in slippage and ultimate failure of the transmission.



CHEVROLET TRANSMISSION THROTTLE LINKAGE

Neutral Safety Switch: Loosen switch assembly mounting screws. Place selector lever in "N" (Neutral) position. Install cotter pin or similar aligning pin in each of the two holes in switch (one on each side of pointer). Rotate switch to place pointer between holes. Tighten screws securely and remove pins *(NOTE* – Slot in neutral safety switch must be set on center line of tang on shifter tube). If engine will not turn over, loosen screws and rotate switch in the direction necessary until it does. Make sure selector lever is in "N" (Neutral) position when changing switch position.

TROUBLE SHOOTING

NO DRIVE IN ANY SELECTOR POSITION: Front pump is assembled backwards.

NO DRIVE EXCEPT IN HILL RETARD: Both overrun clutches assembled backwards.

NO DRIVE EXCEPT IN HILL RETARD AND REVERSE: Outer overrun clutch assembled backwards. Forward and neutral clutch not applied due to severe leakage in forward clutch hydraulic circuit.

DRIVE POOR AT LOW SPEEDS (NO REVERSE, HILL RETARD NORMAL: Inner overrun clutch assembled backwards.

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CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

CAR DRIVE VERY SLIGHTLY IN NEUTRAL (REVERSE NORMAL): Neutral clutch not released.

CAR DRIVES NORMAL IN NEUTRAL AND DRIVE AT LOW SPEEDS (NO REVERSE): Forward clutch not released.

TRANSMISSION WILL NOT SHIFT TO HIGH STATOR ANGLE: Stator control linkage out of adjustment. Converter charging pressure low for one of the following reasons: (a) Leakage which will reduce line pressure enough to cause pressure regulator valve to shut off converter in line. (b) Leakage in converter circuit. (c) Stator control pressure leaking to converter out across front oil seal ring or second oil seal ring on second turbine shaft.

UNABLE TO PUSH START: Rear oil pump drive pin broken or missing.

CLUTCH SLIPPAGE ON WIDE OPEN THROTTLE STARTS: Low oil pressure due to leakage (especially check forward pressure tube "O" ring). Mechanical interference which will prevent forward or neutral piston to fully apply. Neutral or forward clutch facing bond failure.

SECOND TURBINE SEAL RING LANDS INTERFERING WITH I.D. OF STATOR SHAFT: Case locating dowels on engine or dowel holes in case misaligned. Check by indicating front pump bore in case from crankshaft.

HILL RETARD SLOW TO APPLY: Control linkage out of adjustment preventing manual valve getting into hill retard position. Leakage to hill retard clutch (Check pressure tube "O" ring seal and other sources). Mechanical interference of hill retard piston. Glazed hill retard plates (check neutral clutch for release). If neutral clutch does not disengage, during hill retard, hill retard plate can be destroyed.

NO DRIVE, REVERSE NORMAL, NO HILL RETARD: Reverse clutch not disengaged.

HILL RETARD BRAKES VIOLENTLY, STATOR PRESSURE READS HIGH ON CHECKING: Vacuum hose disconnected.

SHIFTS FROM STANDSTILL VERY SLOW: Check linkage to ascertain that shift lever is positioned by transmission detents. Accumulator control valve stuck closed. Leakage in hydraulic system (Check pressure tube "O" rings and other seals and gaskets).

SHIFTS FROM STANDSTILL VERY FAST AND HARSH: Accumulator control valve spring too strong or valve stuck open.

TESTING

►*TESTING CAUTION: Do not stall test this transmission at wide open throttle.*

►*TESTING CAUTION: Before testing transmission, check oil lev l and bring it to the "FULL" mark on dipstick (See LUBRICATION above). Warm transmission to normal operating temperature as outlined below. Adjust engine idle speed to 425 RPM with transmission selector lever in "D" (Drive) range. Adjust throttle linkage (see CARBURETOR on car model pages).*

TRANSMISSION WARM-UP: (In Shop) – Connect tachometer to engine, set parking brake and start engine. Place selector lever in "D" (Drive) range and adjust carburetor idle speed to approximately 750 RPM. Operate engine at this speed for 15 minutes, then readjust engine idle speed to 425 RPM with transmission selector lever in "D" (Drive) range.

On Road – Drive car for approximately 5 minutes with frequent starts and stops. Make sure engine idle speed is 425 RPM with transmission selector lever in "D" (Drive) range. Check fluid level (see LUBRICATION above). *CAUTION* – If fluid level too high, lower the level to "FULL" mark, then drive car five minutes to work bubbles out of fluid.

PRESSURE TEST: Shop – Connect pressure gauge to test point on left side of transmission adjacent to torque converter housing.

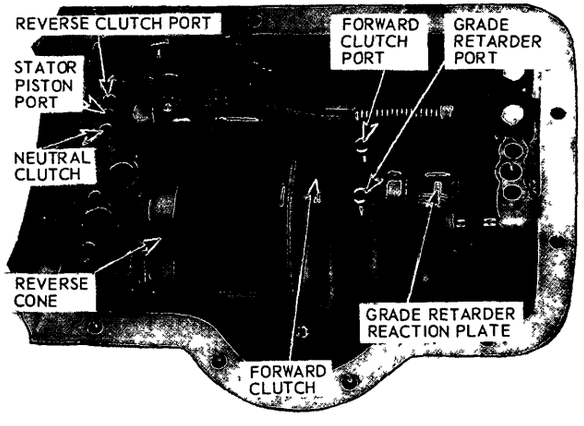
Drive Range: Adjust engine idle speed to 425 RPM, selector lever in drive range. Check idle stator pressure, which should be 45-60 lbs.

Reverse Range: With selector lever in "R" Range, stator pressure should be 45-60 lbs.

Hill Retard Range: With selector lever in "HR", and foot on brake, accelerate engine to 700-900 RPM, stator pressure should be 80-90 lbs.

Park Range: With selector lever in "P" range, accelerate engine to 800-1000 RPM, stator pressure should be 80-90 lbs.

Neutral Range: Test in same manner as for "P" range.



TRANSMISSION AIR TEST POINTS

PRESSURE TEST: Road – Disconnect stator control from throttle. Connect pressure gauge to test point on left side of transmission adjacent to torque converter housing. Connect vacuum gauge to engine.

1) With selector lever in "D" range, pressure should be 45-60 lbs.

2) With selector lever in "D" range and at a car speed of approximately 30 MPH depress accelerator to wide open position, throttle pressure will rise to 135-145 lbs. at 0" of vacuum. At any speed, with foot off throttle, stator pressure should be 50-65 lbs., with engine vacuum reading of 16-25" of vacuum.

3) Stator Operation – Reconnect stator control rod to the throttle, place selector lever in "D" range and drive car at 20 MPH. Open throttle quickly, going through detent. Pressure will then drop to 0 lbs., and engine speed will rise when stator is working correctly. *(NOTE – At wide open throttle, stator pressure should read 0 lbs. at any car speed).*

4) With selector lever in "D" range, traveling at 40 MPH, and foot off the throttle, stator pressure should read 50-65 lbs. With selector lever in "HR" range at 40 MPH, and foot off throttle, stator pressure should rise to 85-95 ft. lbs.

►*NOTE:* If engine tachometer is being used, the engine speed will drop (during manual shift from "D" to "HR") and then when hill retarder pressure reaches 85-95 lbs., the clutch will set down and engine speed will increase.

►*CAUTION: Make sure vacuum hose is properly connected to transmission vacuum diaphragm.*

AIR PRESSURE TESTS (WITH TRANSMISSION IN CAR): Drain oil from transmission and remove converter cover pan, transmission oil pan, and main valve body. Install oil pressure tubes in Forward Clutch and Grade Retarder apply ports (see illustration). Use Tool J-4353-1 and an air source of 100 lbs. pressure. Proceed as follows for the five air pressure checks:

Reverse Clutch: Apply pressure to reverse clutch port (see illustration) and visually check that reverse cone moves rearward. Listen for air leaks. If reverse cone does not move, determine whether front pump-to-transmission case gasket is incorrectly installed and blocking oil passages, or if reverse piston is cocked or bound. If air leaks are heard, check for damaged front pump-to-transmission case gasket or for damaged seals in reverse piston.

Stator Piston: Apply air to stator piston port (see illustration), and listen for air leaks. If air leaks are detected, check for a mispositioned or damaged front pump-to-transmission case gasket, broken or warped seal rings on second turbine shaft, defective stator piston seal, or damaged or worn brass seal in the inside diameter of stator support. Should it be determined that stator support brass seal is at fault, the stator support must be replaced as brass seal cannot be replaced separately.

Neutral Clutch: With air applied to neutral clutch port (see illustration), listen for application of clutch and air leaks. If no clutch application is heard, determine if the front pump-to-transmission case gasket is incorrectly positioned and blocking oil passages; otherwise disassemble neutral clutch and check for a locked-up or binding condition. If air leaks are heard, possible causes are a torn or distorted front pump-to-transmission case gasket, warped or broken oil seal rings on second or third turbine shafts, defective brass seal in the inside diameter of second turbine shaft. If brass seal is faulty, replace front ring gear hub and shaft assembly.

Forward Clutch: With oil transfer tube installed, apply air pressure to tube and observe that forward clutch applies. Listen for air leaks. Failure of clutch to apply can be the result of a wedged forward piston or Grade Retarder piston, probably caused by cocked piston "O" rings. A blockage of oil feed orifice in forward and brake piston support could also prevent clutch application. The first place to check if air leaks are found is

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CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

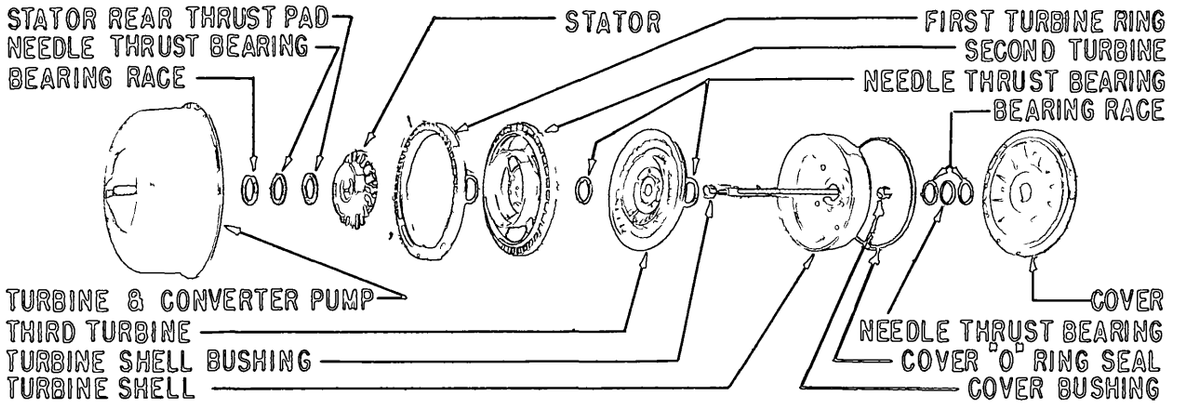
the "0" ring seals on oil pressure tube in forward clutch port; otherwise, check forward piston-to-support seals.

Grade Retarder Piston: Apply air to grade retarder piston port with oil pressure tube installed (see illustration). Check Grade Retarder application by watching for movement of grade retarder reaction plate which will occur as the brake plates are forced against it by piston moving backward. If grade retarder piston does not move, check for cocked "0" ring seals in both the grade retarder and forward pistons or check for blocked orifice in piston support. Leakage could only occur at either the oil pressure tube "0" ring seal or brake piston "0" ring seal.

TRANSMISSION REMOVAL & INSTALLATION

REMOVAL: Place car on jack stands, and remove toe pan plate (under floor mat). Remove spark plugs and disconnect battery ground strap from battery. Disconnect wires from starting motor solenoid and remove starter. Remove underpan mounting bolt retaining oil filler tube clamp and remove filler pipe. *(NOTE - Use masking tape to cover opening in transmission).* On early cars with a thermal by-pass valve, disconnect oil cooler lines and vacuum hose at thermal valve on transmission case. On later cars, disconnect oil cooler lines at plug (replaces vacuum manifold valve). Move lines away from transmission and tie to right frame side rail. Disconnect manual and throttle control rods at transmission levers. Split rear universal joint, then remove propeller shaft and front universal joint as an assembly by sliding complete assembly rearward until free of transmission output shaft. Drain transmission. Disconnect exhaust pipe from crossover pipe and muffler from muffler support bracket. Move exhaust pipe and muffler as an assembly to left and tie to frame member. Remove converter underpan. Install engine support bar or cradle to support engine. Remove the six converter-to-flywheel bolts and nuts. Position hydraulic jack under transmission and attach handling equipment. Remove rear engine mounts from transmission *(CAUTION - Be sure engine is properly supported before removing mounts).* Remove all transmission-to-engine block attaching bolts, then lift accelerator bracket assembly toward front onto the block. Move transmission to rear slightly and install converter holding Tool J-5384. Move transmission to rear off of dowels on engine block and lower transmission from under car.

INSTALLATION: Raise transmission with proper handling equipment until converter housing is in line with flywheel housing. Remove converter assembly Tool J-5384 from converter housing, then carefully align the "X" mark on converter cover with "X" mark on flywheel *(CAUTION - After removing converter holding tool, be careful that converter does not move forward causing disengagement of the pump hub drive slots from lugs of front pump drive gear).* *(NOTE - "X" marks must be aligned. These marks are not visible after assembly has been completed).* Align bolt holes in flywheel and converter, then enter transmission case into dowels on engine and assemble one bolt on right side of center near the top. Assemble throttle bellcrank bracket on left side of case and assemble two bolts holding case and bracket to engine. Install transmission case-to-engine bolts and tighten to 25-30 ft. lbs. Install converter-to-flywheel bolts and nuts and tighten to 15-20 ft. lbs. Install underpan on case. Install rear engine mountings (both sides) and remove engine support bar or cradle. Complete the installation by reversing removal procedure (above).



TURBOGLIDE TORQUE CONVERTER ASSEMBLY

TRANSMISSION DISASSEMBLY

▷ *TRANSMISSION OVERHAUL CAUTION: Before disassembling transmission, clean outside of case thoroughly to prevent dirt getting into transmission parts. As each part is removed, clean it with cleaning solvent and blow dry with air. DO NOT USE WIPING CLOTH (which may leave lint on parts).*

DISASSEMBLY (Into Major Units): 1) Remove converter assembly from transmission *(CAUTION - Prevent damage to converter output shaft during removal as the output shaft bushing may be misaligned which would make replacement of torus shell and shaft assembly necessary).* Remove oil pan and gasket. Remove capscrew and retaining clip holding speedometer gear housing in extension and remove housing. Remove extension housing from transmission, noting the square type seal ring on rear pump body.

2) Remove speedometer drive gear from output shaft, using Puller J-5814. Remove rear oil pump body and seal ring, then remove driven gear. Remove drive gear and pin from output shaft *(CAUTION - Drive pin can fall out if hole on bottom of shaft).* Remove parking pawl spring with needle nose pliers. Remove four bolts retaining valve body assembly to transmission case. *(NOTE - All three units of valve body will come off as an assembly. Bolts are two different sizes. Rear bolt is hollow to permit oil pressure to valve body).*

3) Remove oil pressure tubes between valve body assembly and case *(NOTE - Tubes are interchangeable and the "O" ring seals are the same).* Remove front and rear gasket on valve body.

4) Place transmission with input shaft facing upward, then remove front oil pump cap screws, pump, stator support and reverse piston assembly *(NOTE - Install Puller J-6585 in threaded holes of front pump housing to remove this assembly).* Remove reverse cone and spring from case and place transmission horizontally on bench.

5) Remove neutral clutch and front ring gear assembly, which includes turbine shaft assembly, neutral shaft, and neutral clutch piston. Remove reverse cone ring (tanged to case), with soft drift and hammer. Remove front planet carrier. Remove front sun gear and freewheel assembly (gear section forward). Remove forward cone retaining ring which holds forward cone in place. Remove forward cone ring and forward cone *(NOTE - By exerting slight pressure on output shaft, both ring and cone can readily be removed).* Remove forward and brake pistons and support as an assembly.

6) Remove rear unit ring gear and output shaft and rear planet carrier as a unit. Also remove both brake clutch plates and aluminum separator. Disassemble rear ring gear from rear planet carrier by removing retaining ring, and remove two races and needle bearings from extension of carrier. Remove caged needle bearing assembly from output shaft.

7) Remove hairpin clip and remove detent control lever which is splined to shaft *(NOTE - Do not lose the seat and washer from shaft).* Remove manual selector lever. Remove parking brake bracket from case (two bolts), then remove parking lock actuator assembly. Remove parking brake pawl, pin, and "0" ring. Pin must be removed by driving on front of pin. On early cars with a thermal by-pass valve, remove valve and square seal ring *(CAUTION - Thermal by-pass valve cover is under spring tension).* Remove vacuum diaphragm by holding valve body and removing retainer nut from inside transmission case (valve strut will come off with retaining nut). On later cars, remove the plug which replaces thermal by-pass valve.

▷ *DISASSEMBLY NOTE: For disassembly of the above units, see OVERHAUL following.*

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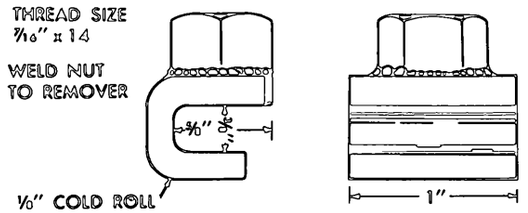
CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

TRANSMISSION OVERHAUL

▷ *OVERHAUL NOTE: After removal from case, overhaul sub-assemblies or units as follows:*

TORQUE CONVERTER (Disassembly): Mount converter in a support to avoid damage to turbine output shaft. *(CAUTION - Scribe a mark on converter housing and cover for alignment and balance).* Remove bolts from cover, then remove cover from converter pump. Remove square seal from cover. Remove first, second, and third turbines as an assembly. Remove stator assembly. Remove stator rear thrust pad, needle thrust bearing and thrust bearing race.

Turbine - Place converter turbine assembly on bench and drive out three drive pins enough to remove first turbine from turbine shell (a small punch should be used to drive pins through the inside of first turbine shell to protrude from first turbine ring). Remove first turbine ring from turbine shell with Tool J-6585, and first turbine ring remover (see illustration). *(NOTE - First turbine ring remover must be fabricated locally).* Remove second and third turbine from turbine shell.

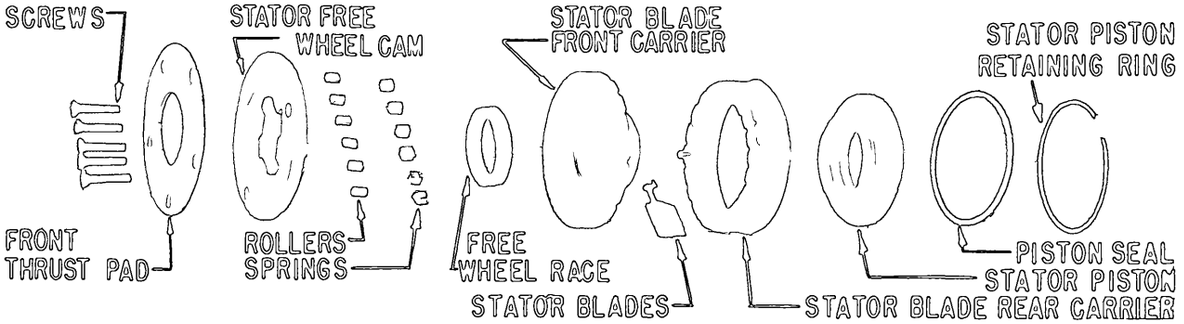


FIRST TURBINE RING REMOVER TOOL

Stator - Remove clutch head retaining screws and front thrust pad, then remove stator freewheel cam, rollers and springs. Remove stator freewheel race, then remove stator blade front carrier by pushing on rear extension of front carrier. Two dowel pins hold the front carrier from turning. Remove 20 stator blades, stator piston and retaining ring, then remove stator piston from blade rear carrier and remove ring from piston *(CAUTION - Be careful not to break cast iron seal ring on stator piston).*

Inspection: Wash all parts in cleaning solvent and blow dry with air *(CAUTION - Do not use rags to dry parts).* Inspect converter pump hub outer surface, and pump thrust washers for galling or scoring. Check converter pump vanes and turbine vanes for looseness or damage. Inspect turbine hubs, turbine thrust washers, stator race and cam rollers for galling or scoring. Inspect converter cover bushing for galling, scoring, or excessive wear. Inspect cam springs for distortion. Inspect stator for galling or scoring and for loose vanes or damage. Inspect loose needle thrust bearing assembly and races for damage.

Converter Cover Bushing Replacement: Use precision type converter cover bushing, Part No. 3737261 for field service replacement (this bushing does not require reaming). Install bushing as follows: Remove thrust washer, needle thrust bearing assembly with a sharp instrument. Remove bushing with a chisel or sharpened tool, taking care not to damage thrust surfaces in bottom of bushing hole. Place new bushing on pilot end of converter cover bushing replacer, Tool J-6583, and press bushing into place. Replace thrust washer and needle thrust bearing assembly.



VARIABLE STATOR ASSEMBLY

First Turbine Hub Bushing Replacement: Remove needle bearing assembly, then remove bushing with a sharp chisel, being careful not to strike turbine hub. Using Tool J-6561, place pilot bushing, Part No. 3732200 (which requires no reaming), on end of tool and press into hub of first turbine. Install new needle bearing assembly with Tool J-6561.

Reassembly: Stator - Install cast iron seal ring in stator piston and install stator piston in rear blade carrier, being careful not to break cast iron seal ring. Install stator piston retaining ring and install the 20 stator blades. *(NOTE - Trailing or sharp edge of blades should point downward after installation in stator. Neck of stator piston must be pushed fully through rear carrier to install stator blades).* Install stator front blade carrier, indexing the dowel pins in holes in rear blade carrier. Install stator freewheel cam in stator front blade carrier, aligning holes for retaining screws. Install freewheel race, springs and cam rollers with springs in large end of ramp slots of freewheel cam. Install front thrust pad and retain with five screws. Tighten screws to no more than 3-4 ft. lbs.

Turbine - Install needle thrust bearings with Tool J-6561, in the three turbines (needle thrust bearing assembly is the same for each of the three turbines). Support third turbine with suitable bushing while installing thrust bearing *(CAUTION - Do not strike or drive needle bearing on thrust surface. The needle bearing should be installed only by applying force to outer edge of bearing).* Install third turbine in turbine shell with vanes up. Install second turbine in turbine shell with flange upward. Align balance marks, then install first turbine inner ring with inner flat surface facing up in turbine shell. Locating three drive pins in shell with their respective holes in the inner ring can be accomplished with a small drift having the diameter of the pin. Complete installation by seating pins in place with a small "C" clamp.

Converter - Install steel spring ring into thrust bearing opening in pump and invert pump and converter assembly on stand and install needle bearing race (thinner washer) in pump. Install needle bearing assembly in pump, then install stator rear thrust pad (heavier of two washers). Install stator assembly into pump with bolts on stator facing up. Mount pump on stand face up, and index converter turbine shaft through pump and stator assembly. Install new square ring seal on converter cover. Place thrust washer, needle bearing, and another thrust washer on face of hub. Install converter cover and align balance marks on converter cover and pump. Install bolts on each side of scribe mark, omitting each fourth bolt, then tighten nuts finger tight. Tighten converter bolts as follows: Tighten every third bolt to 8-12 ft. lbs., (in rotation). Tighten remaining bolts to 8-12 ft. lbs., (in rotation), then tighten all bolts to 13-18 ft. lbs., (in rotation).

PLANETARY UNITS (FRONT & REAR): Front and rear units are similar and service procedures are nearly identical. Front unit does not have a sun gear or sun gear thrust washers.

▷ *FRONT PLANETARY UNIT PRODUCTION CHANGE:* Early units had four planetary gears. Later units have only three. On later units, planet pinion shafts are held in place with a lock plate, and are not held in place by staking as on the earlier units.

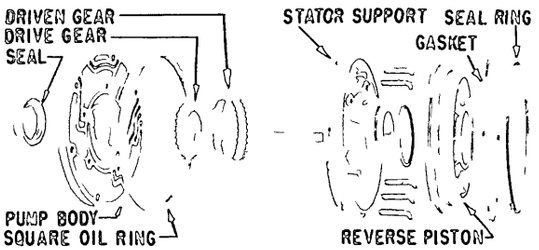
▷ *REAR PLANETARY UNIT PRODUCTION CHANGE:* Rear planet carrier pinion pins are held in place on later units with a lock plate identical to the one used on later front planetary units. On transmissions disassembled for service in which the old pressed-in type pins are found, the pins should be removed and discarded. Carefully file out staking burrs in pinion shaft holes in carrier and output shaft. Reassemble, using a new pinion shaft, Part No. 3746468, and lock plate, Part No. 3746470.

Disassembly: Place planet carrier in a vise (having protected jaws), then mark gear and output shaft for identification and alignment at reassembly. Remove three hex head lock bolts from bottom of carrier (rear unit); four Allen head bolts (three on later units) from top of carrier (front unit), and install Tool J-6559 to top of assembly, retaining it in place with the lock bolts. Install assembly in an arbor press with the output shaft down-

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CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

ward, then install a suitable drift in hole in carrier and press on sun gear (rear unit), flange of output shaft (front unit) until output shaft is away from carrier and planetary gear shafts are freed from carrier *(NOTE - On later transmissions, the pinion shaft lock plates must be removed).* When carrier is separated from output shaft, all parts of the assembly can be removed. Be careful to keep planet pinions on pinion shafts so as not to lose pinion needle bearings *(CAUTION - On early cars with pinion shafts staked in carrier and output shaft, do not attempt to remove pinion shafts by breaking the four way stake. Pinion shafts must be removed by disassembly of planet carrier only).* Remove Tool J-6559 from carrier. Install the part containing pinion shafts into a vise and remove needle thrust bearing assembly, thrust bearing retainer, needle bearing race, and on rear unit, remove sun gear and sun gear thrust washer. Place a dummy shaft (old pinion shaft or a wooden dowel the same size as pinion shaft) to end of pinion shaft and slide a knife blade between lower thrust washer and

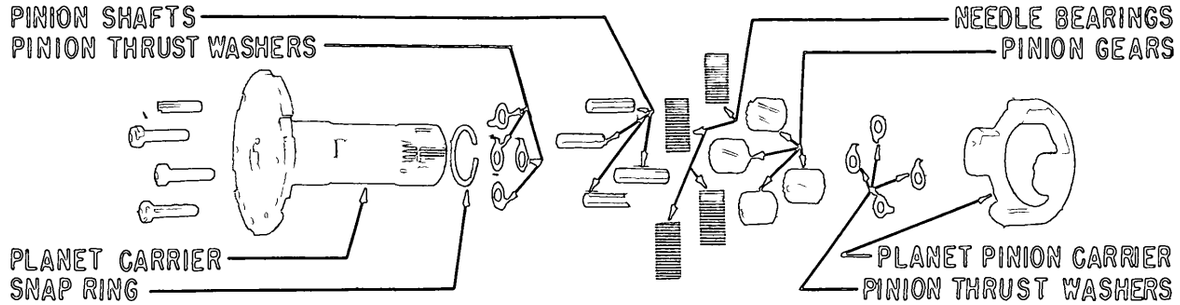


FRONT PUMP & REVERSE PISTON ASSEMBLY

pinion shaft holder. Lift up on knife and slide lower bearing thrust washer onto dummy shaft. Remove other two (three on early type front units) pinion assemblies in the same manner. On units with early type front and rear units, pinion shafts may be removed by knocking shaft out of holder (carrier or output shaft) with a drift no larger than the inner circle formed by staking marks *(CAUTION - Damaging the staking marks will ruin retaining quality of carrier or output shaft and necessitate replacement of these parts).*

Inspection: Wash all parts in solvent and blow dry with air. Check planetary pinion gears and sun gear for nicks or other tooth damage. Check thrust washers for wear or scoring and replace all worn or damaged parts. *(NOTE - The output shaft bushing is precision bored in place during assembly, and is not replaceable).* Inspect planetary needle bearings closely and if excessive wear shows, replace all the bearings in that pinion. Check pinion shafts and replace if worn (install new pinion shafts in output shaft half of the assembly).

Reassembly: *(NOTE -* If pinion shafts have been installed in output shaft, install output shaft in vise, if pinion shafts are not removed, install carrier in vise for installation of pinion gears). Using a dummy shaft, assemble



FRONT PLANET CARRIER ASSEMBLY NOTE—THREE PLANET PINIONS USED IN LATER PRODUCTION

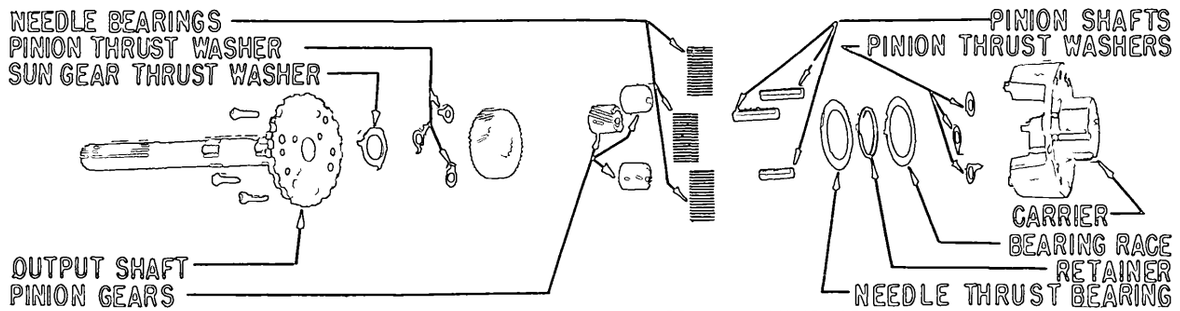
needle bearings, and spacer (17 in each end), in one of the planet pinion gears (use cup grease sparingly to aid in assembling and holding needle bearings in place). Install pinion thrust washer over pinion shaft with tang indexed to small lock hole in output shaft (or carrier). Index dummy shaft with pinion gear assembly, to pinion gear shaft, and slide pinion gear assembly over shaft. Repeat operation for other pinion assemblies. Install sun gear rear thrust washer into output shaft with tang of thrust washer down and into lock hole in output shaft. Install sun gear. Install thrust bearing retainer in rear planet carrier. Install sun gear needle bearing race and needle thrust bearing assembly in rear planet carrier (use a slight amount of lubricant to retain in position). Install pinion thrust washers with tangs up. *(CAUTION - Make sure that no metal is shaved from pinion shafts during assembly as false clearance readings will be obtained).* Align alignment marks on carrier to alignment marks on output shaft and insert dowels of carrier into their respective holes in output shaft *(CAUTION -* While installing carrier to output shaft, align tangs of thrust washers to lock holes in carrier). To accomplish mating of carrier and output shaft, install assembly in arbor press in same manner as that used for disassembly, and press into position. Install the lock bolts and tighten to 18-22 ft. lbs. Check clearance of planet gears between washer and pinion (do not check between washer and carrier), this clearance should be .006-.030".

FRONT OIL PUMP & REVERSE PISTON: Disassembly - Remove gasket and the square oil seal ring. Remove reverse cone piston by using air pressure and applying nozzle approximately ½" from reverse port in stator support. Remove square seal ring from outer diameter of reverse piston, and square seal from stator support hub. Remove five hex bolts holding stator support to front oil pump body and remove oil pump body from stator support. Remove oil pump drive gear and driven gear. *(NOTE -* Lug on drive gear is installed to front of pump body. This lug mates with slot in converter housing hub).

Inspection: Wash all parts in solvent and blow out all oil passages *(CAUTION - Do not use rags to wip parts).* Inspect all parts for nicks or scores. Inspect seals for wear, hardness, damage, or evidence of oil leakage. If pump body oil seal is damaged, pry out and install new seal using Tool J-6584. Inspect splines on stator shaft for wear, and check both ends of shaft inner diameter for wear. Inspect facing material on reverse piston and ring for cracks or flaking and replace if found questionable. Inspect reverse cone and replace if excessive heat indicated. Inspect pump body bushing for galling or scoring. Check clearance between pump body bushing and converter pump hub. Maximum clearance should be .005". With parts clean and dry, install pump gears and check clearance between O.D. of driven gear and body. This clearance should be .0025-.0055". Check clearance between internal gear and crescent. This clearance should be .003-.009". With scale and feeler gauge, check gear end clearance by placing scale across gears and housing. Clearance between scale and gears should be .0005-.0015".

Reassembly: Remove gears from pump after checking and lubricate with automatic transmission fluid, then reinstall gears in pump body *(NOTE -* Drive gear is installed in pump body with lug toward body. Lug mates with

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REAR PLANETARY CARRIER & OUTPUT SHAFT ASSEMBLY (FIRST TYPE

CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

slot in converter housing. If drive gear is installed improperly, pump will not operate). Assemble stator support through drive gear and align attaching bolt holes. Install the five lock bolts but do not tighten. Install Concentricity Gauge J-6560 over front extension of stator support to align stator support to pump body, then tighten the five lock bolts to 18-22 ft. lbs., and remove gauge. Install square seal to stator support hub (lubricate seal with automatic transmission fluid), install outer square seal ring. Guide piston over dowels and press with fingers to seat in place (dowels are off center to facilitate correct mating of parts). Install square seal to outer edge of support. Install gasket on oil pump housing *(NOTE - Reverse cone spring is not installed at this time due to operation for selection of correct size thrust washer, during which spring is removed).*

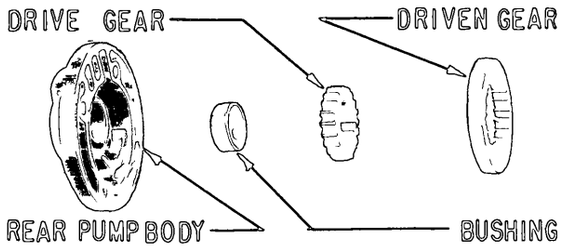
REAR PUMP: Disassembly - Remove pump gears and wash parts with solvent. Blow out all oil passages and check parts for visible damage. Install gears and check all clearances which are the same as for the front pump (see above). *NOTE* - Use output shaft in place of converter to make check for clearance between output shaft and pump bushing.

Rear Pump Body Bushing - Use precision bushing, Part No. 3727490, which requires no reaming, for service replacement. Cut bushing with a chisel and remove from pump body. Press new bushing into pump body with Tool J-6582. Bushing should be flush with neck of pump body on the inside, and flush to .010" below front surface of pump body.

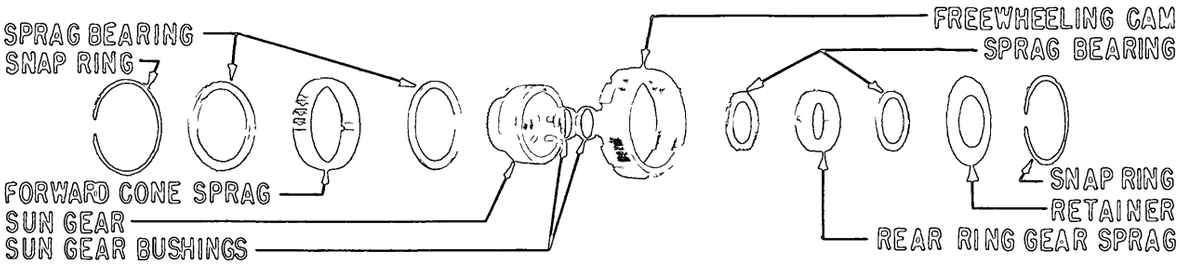
Reassembly: Lubricate all parts with automatic transmission fluid. Reverse the disassembly procedure.

FRONT SUN GEAR FREE WHEEL ASSEMBLY: Disassembly - Remove needle thrust bearing assembly in opening in the rear of sun gear. Remove snap ring in outer cam from rear of assembly with a screwdriver. Remove forward cone freewheel sprag assembly, and outer bearing from sun gear (sun gear may have to be rotated clockwise to freewheel out of cam). Remove sprag assembly from outer cam *(NOTE* - The sprag assembly should not be disassembled. An arrow stamped on outer cage of sprag assembly designates front of transmission). Remove sheet metal retainer from sun gear, using pliers and bending retainer at staking points. Remove ring gear freewheel sprag assembly and bearings.

Inspection: Wash all parts in solvent and blow dry with air *(CAUTION - Do not use rags to wipe parts).* Inspect



REAR PUMP ASSEMBLY



SUN GEAR FREEWHEELING ASSEMBLY

inner race (sprag bearing surface) of cam for excessive scoring or burning. Also check lugs on outer perimeter of cam for nicks or burrs. Check bushings in sun gear for looseness or bushing scoring. Replace if necessary. *(NOTE* - Bushings must be replaced in pairs with sun gear removed from freewheel unit). Inspect front sun gear teeth for nicks and burrs and for fit of sun gear into front planetary unit. Inspect internal and external races (sprag bearing surfaces) of sun gear for excessive scoring or burning. Inspect sprag bearing for excessive wear. Check sprag assemblies and if wear is indicated, replace the assembly.

Front Sun Gear Bushing Replacement - Use precision bushings, Part No. 3727244, which require no reaming, for service replacement. *(CAUTION - Do not attempt replacement of these bushings with freewheel unit assembled).* Remove old bushings with Tool J-6581, using removal end of tool. *(CAUTION - Before installing bushings, note position of oil grooves in bushings. These grooves must point outward to maintain oil reservoir in sun gear).* Using Tool J-6581, mount sun gear in press and press bushings into place.

Reassembly: Install front retainer, then large sprag front bearing (brass) into cam. Install sprag into cam *(NOTE - Stamped arrow on outer cage of sprag assembly indicates front of transmission),* compress unit into cam with fingers (do not force). Install large sprag rear bearing (brass) into cam, then set aside for further assembly. Install front bearing (brass) into rear of sun gear. Install sprag, then install rear bearing (brass) into sun gear. Index tang of new seal retainer into hole in rear of sun gear and clamp in vise, using a steel block and wood block, and stake retainer into place using a staking tool which must be sharp and give a "fingernail" impression *(CAUTION - Shield retainer must be held snug to rear of sun gear while staking operation is performed. Be very careful not to bend shield).* Index sun gear into forward cone sprag, twisting counterclockwise to enable sprag cams to twist, allowing sun gear race to seat under sprags while twisting. Install rear bearing into cam. *(NOTE - Sprags are assembled correctly if units will slip while holding outer cam stationary and turning sun gear clockwise as viewed from front).*

NEUTRAL CLUTCH & FRONT RING GEAR: *NOTE - These assemblies have been changed in production and the service procedures have been revised as noted below.*

▷ *NEUTRAL CLUTCH PISTON & SPRING PRODUCTION CHANGE:* A new piston is being used in production and two release springs are being used in place of the former single spring. These springs are the same as the single original spring but must always be replaced in pairs from the same source and have the same die mark to assure proper nesting. Matched springs are furnished in service package, Part No. 3746425. When installing springs, the ends should be toward piston and the gaps of both springs must line up.

▷ *NEUTRAL CLUTCH CONE RING PRODUCTION CHANGE:* Transmissions bearing a date of Feb. 1, 1957 or later have a new clutch cone ring to which a .045-.035" step has been added to rear face. Slots in clutch hub have been increased .040" in depth to permit removal and installation of the ring retainer. Special procedures are required for disassembly and reassembly of unit using the new rings, as follows: In order to fully depress cone ring, install a small "C" clamp on each side of clutch hub assembly so that the adjustable foot of clamp is seated partly on step of cone ring and partly on clutch cone. Cone ring retainer can then be either removed or installed.

NEUTRAL CLUTCH & FRONT RING GEAR: Disassembly - Remove converter turbine shaft oil seal ring from front of ring gear hub shaft. Remove three turbine shaft oil seal rings and lift converter turbine shaft ring gear thrust washer off shaft *(NOTE* - This washer is a selective fit for proper clearances within transmission). Remove front planet ring gear retainer ring with a sharp instrument and remove ring gear from hub. Remove hub from turbine shaft and neutral clutch assembly. Remove oil seal rings from turbine shaft. Remove race, needle thrust bearing assembly and rear race from turbine shaft. Remove neutral cone ring retainer ring from neutral clutch assembly *(See "Neutral Cone Ring Production Change" above),* then remove cone ring, cone and cone piston return springs (or spring). Remove neutral clutch piston by putting air pressure into ball check hole in hub (Piston is doweled to hub and will not rotate independently of hub). Remove neutral cone piston outer square seal ring, and stator support square seal ring from stator support hub. *NOTE* - Ball check in hub is not removable.

Inspection: Wash all parts in solvent and blow dry with air. *(CAUTION - Do not use rags to wipe parts).* Inspect splines in hubs for nicks or burrs and check hub for fit into third turbine. Inspect ball check for looseness. If leakage is suspected, hub may be checked by filling cavity with oil and noting any leakage at ball check. Inspect inner race of hub for excessive scoring or bur-

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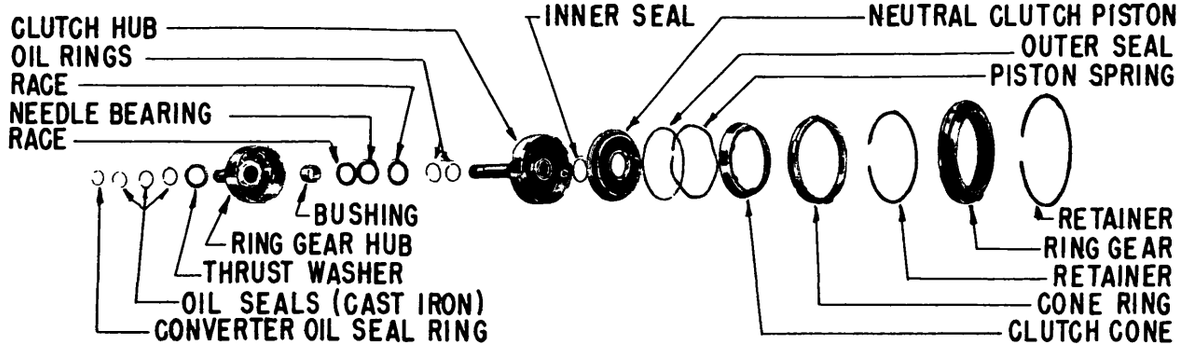
CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

ring (surface on which piston moves must be micro-smooth to eliminate possibility of oil ring breakage). Check all ring lands for nicks or burrs which may restrict ring movement. Check bushing in center of hub. If bushing is scored or loose, or inner race is damaged, replace hub and shaft assembly. Check neutral cone piston for burred or nicked groove for piston outer seal, or inner race being scored or pitted. Any surface roughness in contact with rubber seals will cause seal failure. Inspect neutral cone inner and outer facings for cracks or flaking. If questionable, replace as necessary. Check all tangs and keyways for proper engagement (the smallest burr or tang will hamper assembly). Inspect neutral cone surface and if excessive heat is indicated, replace the part.

Front Ring Gear Hub Bushing Replacement - Use precision bushing, Part No. 3727301, which requires no reaming, for service replacement. Mount hub in vise (with jaws protected). Remove bushing with chisel *(CAUTION - Do not strike hub of ring gear)*. Mount hub in arbor press and using Tool J-6643, pilot bushing on end of tool and press into hub of ring gear.

R assembly: *(NOTE - Lubricate rubber seals with automatic transmission fluid before assembling)*. Install neutral cone piston inner square seal ring to center raised portion of hub. Install neutral piston outer square seal ring on piston. Install neutral clutch piston into hub, indexing hole in piston to fit dowel in hub. Apply hand pressure evenly around piston to facilitate installation. Install neutral cone piston return spring, neutral cone and cone ring, indexing lugs to keyways in hub. Install neutral cone ring retainer ring in groove in hub, seating it fully in groove. Place unit on bench with turbine shaft up and install needle thrust bearing race, needle bearing assembly and front race over turbine shaft of neutral cone hub. Install two piston hub oil seal rings (cast iron) on turbine shaft. Install front ring gear hub over neutral piston and turbine shaft assembly *(CAUTION - Be careful not to break oil seal rings during installation)*. Lift the assembly, keeping units together, and mount in vise. Key front planet ring gear to ring gear hub with large tapered portion of ring gear upward, or retainer cannot be installed. Install front ring gear retainer ring in hub and make sure it seats in bottom of groove. *NOTE - Oil seal rings and selective thrust washers are not installed at this time as it would b necessary to remove them for selecting proper thrust washer during reassembly.*

FORWARD PISTON, BRAKE PISTON & SUPPORT: Disassembly - Remove return spring from forward piston, making sure that facing material is not chipped from piston cone surface. Remove retainer holding brake piston to forward piston. Mount assembly into Holding Fixture J-6580-1 indexing tang of support to keyway in holding fixture, then place in arbor press. Index Tool J-6580 into spline of hub of forward piston and press piston out of support and brake piston. Remove support from holding fixture and remove forward piston. Reverse support and install with brake piston down into holding fixture, then press out brake piston in the same manner as for forward piston. Remove parts from holding fixture and remove "0" rings from support, and square seal rings from forward and brake pistons.



NEUTRAL CLUTCH & RING GEAR ASSEMBLY (FIRST TYPE)

Inspection: Wash all parts in cleaning solvent and blow dry with air. Inspect splines of hub for nicks or burrs and check hub of brake piston for fit into hub of forward piston. Inspect all surfaces contacting oil seal ring surfaces for scoring or burning, and check seal rings for damage. Inspect forward cone ring and piston for cracks or flaking in facing material. If condition of material is questionable, replace the necessary parts. Inspect forward cone surface and replace if excessive heating is indicated. Inspect hill retarder composition plates and replace if damaged.

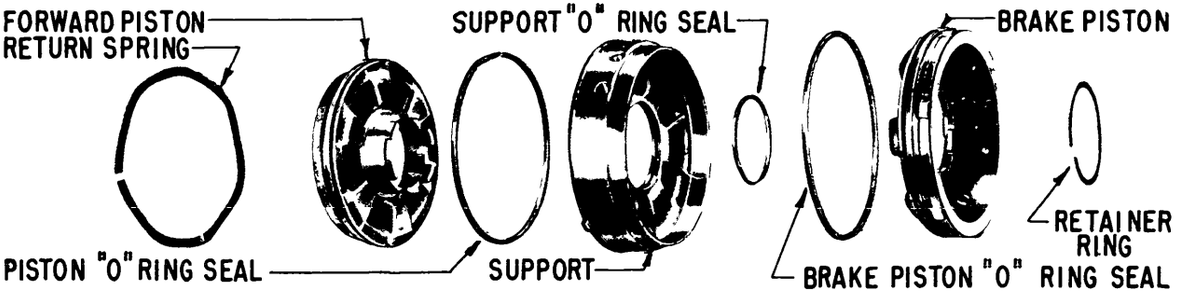
Reassembly: Install new "0" ring in support and square seal rings on brake and forward piston (lightly lubricate with automatic transmission fluid). Place forward piston on bench with splines facing up. Index support over hub of forward piston and hand press together, noting position of raised ribs of piston to mate with cavities in support. Key the splines of hub on hill retarder piston to splines of forward piston and align tang with hill retarder piston between pressure tube holes in support, then press together evenly to avoid damage to seals (rear piston must be down far enough to enable retainer to be installed and fully seated). Install return spring to forward piston taking care not to chip off facing material. *(CAUTION* - Make sure spring is indexed properly with notches in forward cone ring). Install forward cone ring and align tang of ring to tang of support.

TRANSMISSION CASE REAR BUSHING REPLACEMENT: The case rear bushing, Part No. 3732210 is a precision type and requires no reaming after installation. Place transmission case on bench with rear portion facing up, then cut bushing with a cape chisel and remove from case. *(CAUTION - Be car ful not to damage the aluminum transmission case)*. Install bushing into case using Tool J-6582, from inside of case.

► *CONTROL VALVE BODY PRODUCTION CHANGES:* A new main valve body, Part No. 3746447, including the hydraulic modulator valve assembly is being used in production to increase line pressure from 60-170 lbs., to 90-200 lbs. The valve body transfer plate has been replaced by a new plate, Part No. 3745601, which has the .13" x .50" orifice for stator feed oil reduced in size to .062". Two ditch plate straps, Part No. 3747241, and 3747242 are used to prevent oil leakage with the increased oil pressure. New bolts with a torque specification of 8-12 ft. lbs. are being used. The stator detent spring and the manual detent spring have also been changed.

CONTROL VALVE BODY: Disassembly - Remove both oil pressure tubes (if they did not stay on support). Remove valve body screen and manual valve. Remove both gaskets between valve body and transmission case. Remove vacuum modulator valve body and gasket. Remove

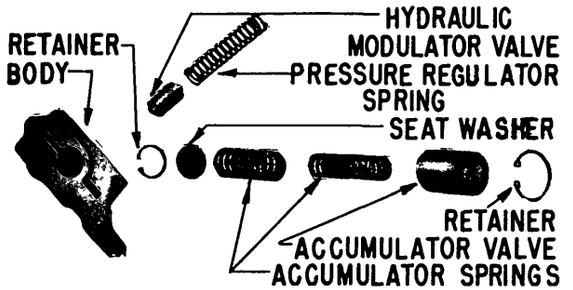
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FORWARD & BRAKE PISTON & SUPP RT ASSEMBLY

CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

modulator valve body (*NOTE* - Hold valve body securely while removing bolts as this unit is spring loaded by pressure regulator valve spring). Remove accumulator valve by installing hydraulic modulator valve body in a vise (or use a "C" clamp) to depress the accumulator valve while the accumulator valve snap ring is being removed (*CAUTION* - This valve is under about 90 lbs. pressure). Then remove seat and inner and outer springs and accumulator piston. Remove hydraulic modulator valve from body. Remove pressure regulator spring, valve, and spring seat washer. Remove main valve by removing screw retaining parking pawl spring strut, then remove other valve body locating screw holding valve body to ditch plate. Reverse valve body and remove seven bolts holding ditch plate to valve body. Separate ditch plate (aluminum) from transfer plate (steel)

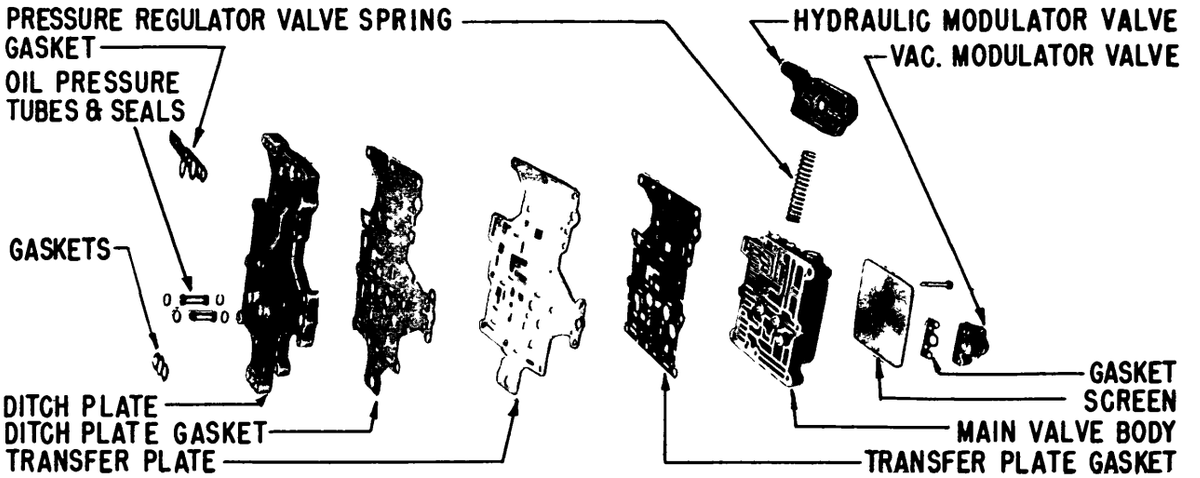


HYDRAULIC M DULATOR VALVE ASSEMBLY

and valve body. Remove gasket between ditch plate and transfer plate, remove transfer plate, then remove gasket between transfer plate and valve body. Remove front and rear pump check and lubrication relief valve and springs (*NOTE* - Front and rear check valve springs are interchangeable. Lubrication relief valve spring is different and is not interchangeable. The three valves are interchangeable). Remove accumulator check valve from ditch plate, then remove accumulator control valve plug roll pin, plug, valve and spring. Remove accumulator valve snap ring (in end of valve body), spring seat, inner and outer springs and accumulator piston. Remove the seven socket head pipe plugs from valve body. Remove detent roll pin, spring, and detent ball.

Inspection: Wash all parts in solvent and blow dry with air (*CAUTION - Do not us rags to wipe parts*). Inspect all springs for distortion or damage and all valves for nicks, burrs, galling, or scoring. Check valves and pistons for free operation in their respective bores. Inspect lands of manual valve for wear or scratches. Inspect valve bodies for cracks, scoring, or galling. Clean sump screen and inspect rubber by-pass valve.

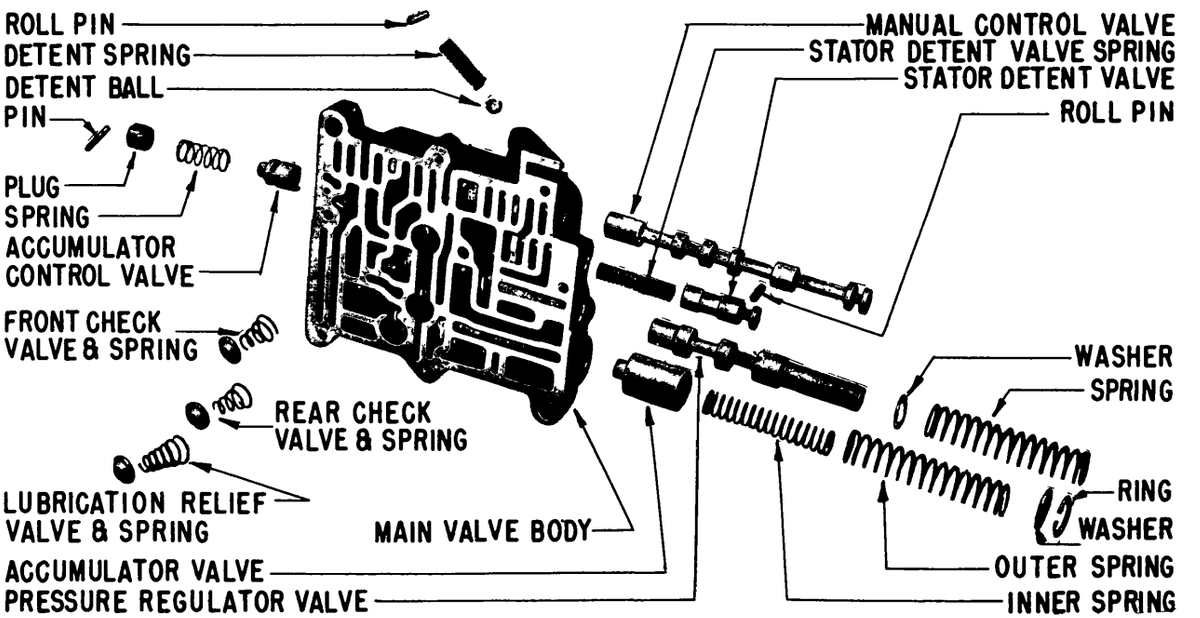
Reass mbly: Install the seven pipe plugs in valve body. Install detent ball and spring, then install new roll pin to retain detent ball and spring. Install inner and outer springs into accumulator piston and install this assembly into valve body (*NOTE - This is not th accumulator 'valv locat d in hydraulic modulator body*). Hold



CONTROL VALVE BODY ASSEMBLY (FIRST TYPE)

spring seat over springs and compress, then install retaining snap ring into groove in bore (*CAUTION - Do not confuse pressure regulator spring with accumulator outer spring. The pressure regulator spring is heavier with a free length of 3¼"*). Install stator detent valve spring in valve body, then install detent valve with hollow end indexing over spring. Hold valve in and press roll pin to engage in groove in end of valve. Do not install pin too deep (end of spring should not touch bottom of groove). Check freedom of the assembly. Install accumulator control valve with tangs of valve inward, then install spring and plug. Compress spring by pushing in on plug, then install retaining pin. Install accumulator check valve spring onto accumulator check valve, then install assembly into respective hole in aluminum ditch plate (set aside for further assembly). (*NOTE* - Accumulator check valve spring is lightest spring in the valve assembly, and check valve has a hole in the center. Valve and spring are not interchangeable with other valves or springs in valve assembly). Install large hollow bolt through rear hole in ditch plate to aid in alignment of gaskets and parts. Install gasket on ditch plate,

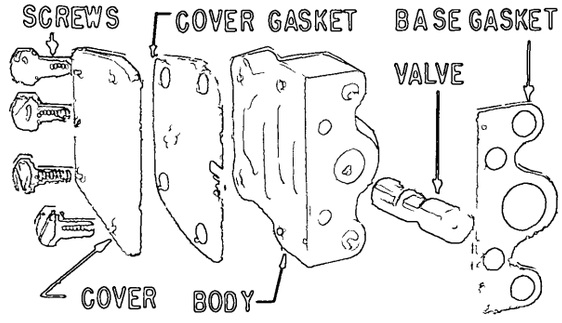
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C NTROL VALVE MAIN BODY ASSEMBLY (FIRST TYPE)

CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

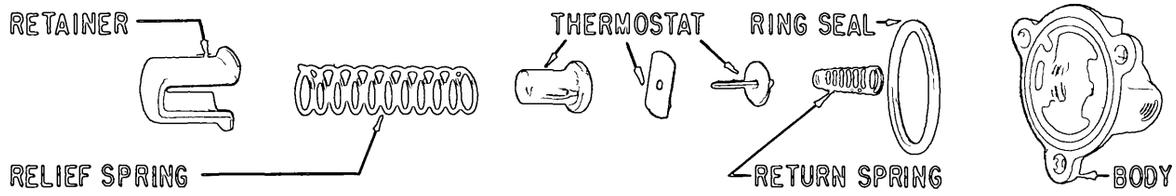
then install transfer plate. Invert valve body and install front and rear pump check valve, lubrication relief check valve and springs. Install gasket on valve body. Install transfer plate and ditch plate assembly on valve body, indexing holes in transfer plate with valves in valve body *(CAUTION - Make sure that valve seats and gaskets are not damaged).* Hold ditch plate down and start three bolts to hold plate to valve body *(NOTE* - On later valve bodies with ditch plate straps, install straps). Turn bolts completely down to overcome tension of valve springs. Install shortest bolt in center hole of valve body (this hole is used for the bottom bolt and for the screw retaining sump screen). *(NOTE* - Installation of wrong length bolt in this hole will prevent sump retaining screw installation). Install and tighten remaining bolts to 8-12 ft. lbs. Reverse valve body and install pressure regulator valve, washer, and spring into valve body. Install accumulator valve into hydraulic modulator valve body with piston boss facing down. Install both springs, then install spring cover with raised portion of cover away from spring, and compress (using a vise or "C" clamp) sufficiently to install snap ring *(CAUTION - Approximately 90 lbs. pressure is exerted by accumulator springs and care must be taken to prevent damage to parts during valve installation).* Install modulator valve into hydraulic modulator valve body (valve can be installed either way). Place regulator valve spring into counterbore of modulator valve in modulator valve body, compress spring and install bolts. Install long bolt through valve body to ditch plate. Install vacuum modulator valve and gasket to valve body assembly and tighten screws. Install manual valve and sump screen. Install parking brake spring clip and bolt and tighten to 8-12 ft. lbs.



VACUUM MODULATOR VALVE ASSEMBLY

REAR EXTENSION HOUSING REAR OIL SEAL REPLACEMENT: Place extension housing on a wooden surface and remove oil seal using a cape chisel or punch *(CAUTION - Be careful not t damage aluminum case).* Using Installing Tool J-5154, install seal in extension housing.

▷ *EXTENSION HOUSING BUSHING NOTE: This bushing is precision bored in position and is not replaceable.*



THERMAL BYPASS VALVE (EARLY CARS)

TRANSMISSION REASSEMBLY

REASSEMBLY: 1) Install parking pawl and parking pawl shaft with "O" ring in transmission case. Index manual control lever into manual control rod and park lock pawl rod (bullet type), and secure with bolt and nut *(NOTE* - Shaft is serrated to permit installation in one position only). Install stator lever through control lever and install detent control lever plate, then install hairpin clip *(NOTE* - Stator lever is serrated to permit installation in one position only). Install parking lever bracket and tighten bolts to 7-9 ft. lbs.

2) Install rear race, needle bearing assembly, and front race on front of output shaft carrier. Install caged needle thrust bearing assembly on rear of output shaft (hold in place with lubricant). Install rear ring gear onto rear planet carrier and output shaft, using grease sparingly, to hold bearing in place. Install output shaft and rear ring gear assembly into case from the front. Install brake drive plate (composition) by indexing rear ring gear, then index brake reaction plate (aluminum) to case. Finally, index the other brake drive plate (composition) to rear ring gear.

3) Install forward cone on forward piston, then install forward cone ring over spring on forward piston, making sure that notches of ring fully engage outer tangs on edge of spring *(CAUTION* - Be careful when placing spring on forward piston so that the indexing is proper for installation of ring to case and indexing of ring to the return spring).

4) Install forward and brake pistons and support in case (outer forward cone ring may have to be tapped gently to compress spring in forward piston to provide enough space to install retainer. *(NOTE - Retainer must be seated in groove in transmission case or failure may result, causing serious damage to transmission).*

5) Install needle thrust bearing race over extension of front planet carrier, then install needle thrust bearing assembly over race. Install tanged washer on front end of planetary (use a small amount of lubricant to retain in position during assembly). Hold the neutral clutch assembly in one hand with the shaft pointing upward, then lift front planetary, with tanged washer installed, and index keyways on front planetary housing to cone lugs in neutral clutch assembly. *(CAUTION - Improper mating of these parts will prevent transmission being assembled).* After planetary assembly is installed, rest shaft of neutral clutch on bench and install freewheel sprag assembly over rear extension of planetary. Twist sprag assembly to mate sun gear to planetary gears. Install needle thrust bearing over extension of front planetary gear extending through freewheel unit.

▷ *REVERSE CONE RING SELECTION (For Proper Running Clearance During Forward Drive Range Operation and Contact Area for Positive H lding in Reverse):* (1) Before installing the neutral clutch and freewheel units in the transmission case, temporarily install the reverse cone ring, cone, spring, and front pump and reverse piston assembly (be sure that cone is seated evenly in reverse cone ring). Secure front pump with at least four bolts. (2) Clamp a dial indicator onto side of transmission case, using an indicator tip 1¼" long, so that tip of indicator is against reverse piston (set tip on a flat area of piston to prevent slippage during piston travel). Set dial indicator at zero, then turn front end of transmission case downward, and, while watching dial indicator, apply air pressure to reverse piston passage in control valve mounting boss (second hole in boss, from control lever side of transmission case). If cone ring is within limits, indicator reading will be between .059-.085". If piston travel is over the high limit, repeat the test using a new green cone ring, Part No. 3740892, or a blue cone ring, Part No. 3740891, in that order. If travel is below the limits, repeat test, starting with the green cone first, then the yellow cone ring, Part No. 3740893.

6) Install neutral clutch and freewheel sprag assembly into case, twisting shaft to engage lugs of freewheeling assembly outer cam to forward clutch assembly mounted in transmission case (forward cam is loose and can be turned to align with lugs of freewheeling cam).

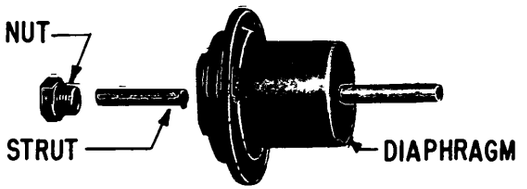
7) Turn transmission so input shaft is facing up and install reverse cone ring in case (tapered portion forward with tang fitted into case and oil return groove at bottom). Check for correct selective washer thickness as follows: With gasket installed on front pump assembly, install dial indicator on Tool J-6557 with indicator set at zero and touching contact arm on tool. Mount gauge and tool assembly to rear hub of front pump so that contact arm is resting on mounting flange of pump. Gauge several points around mounting flange and record the highest reading obtained. Remove gauge and dial indi-

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CHEVROLET TURBOGLIDE TRANSMISSION (Cont.)

cator assembly and mount in transmission case over input shaft so that gauge arm contacts thrust washer pad of neutral clutch and front ring gear assembly. Record highest reading obtained at this point, then subtract reading from the reading taken on front pump assembly. The difference will indicate correct thrust washer thickness. Thrust washers are available in the following three sizes: .068" (Part No. 3727319), .085" (3727321), & .103" (3727320). Select the thrust washer which will provide a clearance of .008-.028".

8) Install four oil seal rings to extension on front ring gear hub. Install reverse cone into case, meshing tangs with slots in neutral clutch and front ring gear assembly. Install reverse cone spring into case. Install two guide studs, J-3361-10 in case to guide the pump assembly and avoid damage to oil seal rings. Install stator support gasket to case, then install square type seal ring on outer lip of stator support. Align tang of oil pump drive gear to bottom of pump housing. With front end of transmission case facing upward, index front pump on guide studs and carefully guide pump over oil seal rings on front ring gear hub shaft (tap housing lightly to fully seat in case). Remove guide studs and install capscrews retaining pump to case, and tighten to 15-18 ft. lbs.



VACUUM DIAPHRAGM

9) Install converter assembly (driving lug of pump to mate with keyway of front pump drive gear) rotating converter as necessary to complete mating of splines.

► *CHECKING CAUTION: A minimum distance of ¾" from front of transmission case to front of converter at flange, measured with a straightedge assures that all parts are properly engaged. If this distance is less, check transmission for improper assembly.*

10) Install Torus Holding Tool J-5384 in position and place transmission in a horizontal position. Turn output shaft to locate drive pin holes to top of transmission, and install drive pins (*CAUTION* - Make sure that drive pins do not fall out of transmission during assembly). Position rear pump output shaft indexing drive gear to drive pin. Install bolts through pump into rear of case and tighten to 7-9 ft. lbs. Install square seal ring over pump.

11) Install thermal by-pass and tighten to 7-9 ft. lbs., and install vacuum diaphragm outside of case along with vacuum modulator strut and attaching nut. Install "O" rings in support and then install "O" rings on oil pressure tubes in support (tapered end of support) through case, making sure that seal rings are seated. Install valve body gaskets, using a small amount of lubricant to retain gaskets in position for assembly.

12) Place stator control or detent lever in "down" position and install valve body in case, guiding detent plate into groove, manual lever to manual valve detent valve, and carefully pick up manual valve, oil pressure tubes and vacuum modulator strut. Install special drilled bolt at rear of valve body to rear case (hole in bolt carries lube pressure to drilled passage in case to output shaft, from valve body). Tighten hollow bolt to 18 ft. lbs. Install remaining bolt in valve body and tighten to 8-10 ft. lbs.

13) Index spring in parking pawl lock, then index into clip on rear bolt of valve body. Install speedometer gear on output shaft with Tool J-5814. Install in extension housing and install extension housing on transmission case. Tighten bolts to 23-26 ft. lbs.

► *EXTENSION HOUSING INSTALLATION NOTE:* After tightening extension housing bolts, install universal joint yoke on output shaft and rotate freely. If yoke is tight, remove rear extension and tap rear oil pump body with plastic hammer to center output shaft with rear extension bushing and seal.

14) Install driven speedometer gear in extension housing and install transmission oil pan gasket and oil pan.

POWERFLITE
(DE SOTO, DODGE, PLYMOUTH)

DeSoto S-25 & S-27 (1957)
Dodge 6, D-72 (1957)
Dodge V8, D-66 (1957)
Plymouth 6, P-30 (1957)
Plymouth V8, P-31 (1957), Except Fury.

►CHANGES, CAUTIONS, CORRECTIONS

►*PUSHING CAR TO START ENGINE:* Pushing is recommended rather than towing. With the "N" (Neutral) button pushed in, turn the key to "ON" position. When car reaches a speed of approximately 25 MPH, push in the "L" (Low) button. This will allow the transmission to crank the engine.

►*TOWING POWERFLITE CARS:* Following procedure recommended.

Transmission Inoperative – Disconnect propeller shaft or tow car with rear end raised.

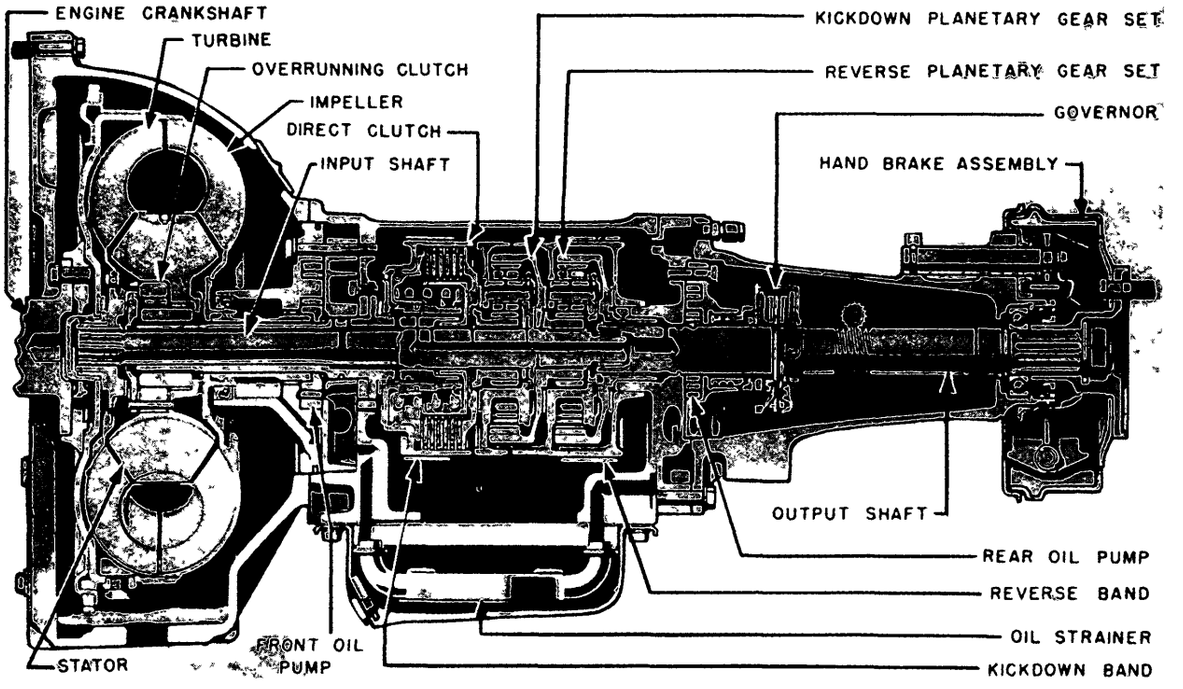
Transmission Operating – The car may be safely towed at moderate speeds with the "N" (Neutral) button pushed in. For long distance towing (over 100 miles), the propeller shaft should be removed.

►*1957 POWERFLITE REVERSE SERVO PISTON PRODUCTION CHANGE:* All transmissions code dated C-5-57 and with the letter "B" preceding the part number will have a new reverse servo which incorporates a spring cushion instead of the hydraulic cushion previously used. New reverse band adjustment specifications are also used with the later type servo. *See "Reverse Band Adjustment Production Change" below.*

►*1957 REVERSE BAND ADJUSTMENT CHANGE (TRANSMISSIONS WITH LATER TYPE REVERSE SERVO PISTON ASSEMBLY):* See production change above. On transmissions having a code date of C-5-57 and with the letter "B" preceding the part number, adjust the reverse band as follows: Loosen locknut and tighten adjusting screw to 20-25 inch-pounds, then back off the adjusting screw **exactly 12 turns** (previous adjustment was 10 turns) Hold adjusting screw and tighten locknut to 30-35 ft. lbs.

►*1957 POWERFLITE REAR OIL PUMP PRODUCTION CHANGE:* A plastic rear oil pump gear and a revised oil pump housing are now being used in production. Transmissions having a code date L-19-56 and the letter "A" preceding the transmission part number stamped on lower side of case will have the later type pump assembly. The new pump parts (Gear, Part No. 1672315 & Housing Assembly, Part No. 1823666) are interchangeable with the previous parts if both the pump gear and housing are replaced together. The new plastic gear cannot be used in the old housing, and the old steel gear cannot be used with the later type housing.

►*1957 PLYMOUTH POWERFLITE TORQUE CONVERTER IDENTIFICATION:* Torque converters used on the 6 cyl. engine have a smooth surface at rear of converter (side nearest transmission) The V8 engine converter is identified by a 1 8" wide groove cut on the rear "donut"



POWERFLITE TRANSMISSION (SECTIONAL VIEW)

►*1957 POWERFLITE RUNNING AWAY DURING PART THROTTLE DOWNSHIFT CORRECTION:* If this condition cannot be corrected by correct throttle linkage and kickdown band adjustment, remove main control valve assembly and examine throttle pressure lever for endplay between spherical surface of adjusting screw and positioning tab on throttle lever. If there is clearance at this point, bend tab against spherical surface of screw to eliminate all clearance *(CAUTION* - Be sure that lever moves freely on screw after bending tab). Examine servo restrictor valve (in valve body transfer plate), and replace if bent. Check servo restrictor valve plug for free movement.

DESCRIPTION

DESCRIPTION: PowerFlite transmission consists of a torque converter and two-speed hydraulically operated planetary gear type automatic transmission of the same design as used on 1956 models.

LUBRICATION

►*TRANSMISSION FLUID LEVEL & CHECKING PROCEDURE CHANGE:* To avoid overfilling and trouble under high speed and high temperature operating conditions, it is recommended that the following checking procedure be used and that the recommended fluid level not be exceeded. *This supersedes previous recommendations.*

►*NOTE:* It is recommended that the fluid level be checked with transmission "Cold" (after being parked for a considerable time and before being driven several miles). If necessary to check transmission "Hot" (after car driven for several miles), observe the special hot fluid level given below.

Checking Fluid Level (Cold Transmissi n) - Run engine at idling speed with parking brake applied. Operate all push buttons in turn (leave in each position momentarily), then check fluid level with "N" (Neutral) button pushed in. Note level indicated on dipstick, add or remove oil as follows: **Level betw en "L" mark and ½" below "L" mark** - Do not add oil - this level is satisfactory. **Level below ½" below "L" mark** - Add oil to bring level up to between "L" mark and ½" below "L" mark. **Level above "L" mark** - Remove oil until level has been lowered to between "L" mark and ½" below "L" mark.

Checking Fluid Level (Hot Transmission) - Proceed as for cold check above. Add or remove oil in accordance with fluid level on dipstick as follows: **L vel between "F" mark and ½" above "L" mark** - Do not add oil - this level is satisfactory. **Level b l w "L" mark** - Add oil to bring level up between the "L" mark and ½" above the "L" mark. **Level above "F" mark** - Remove oil until level is between "F" mark and ½" below "F" mark. *NOTE* - On cars with first type dipstick (1 5/8" between "F" and "L" marks), maintain level at ½" below "F" mark.

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE: See "Carbur t r" on car m d l pages.*

OPERATION: After push button reaches its limit of travel a lock spring (on push button operating slide) engages actuator bar shaft. This action allows the spring lock to hold push button in the engaged position. When operator selects a different driving range, the top or bottom portion of operating slide (depending on which button was pushed) contacts the actuator bar and releases first push button from lock spring.

Manual C ntr l Cabl Adjustment: Remove neutral safety starting switch from side of transmission. Loosen adjustable mounting bracket capscrew and move cable and bracket assembly (manually) as required, to position the manual valve lever in neutral position. Hold the "N" (Neutral) button tightly in at full travel (the neutral starting switch cam should then be practically centered in neutral starting switch mounting hole). Use a free fitting flat-faced shaft inserted through the neutral mounting switch hole, and apply very light pressure against the manual valve lever to maintain the neutral detent position of lever. *(NOTE* - If tool is not available, lever may be held by finger pressure). Carefully move cable assembly "in" and "out" **without moving** the manual lever, to determine total free-play travel of cable. Locate the cable midway in the free-play range, release pressure against the manual lever and tighten mounting bracket securely. *Do not allow cable t move when tight ning the bracket.* Install neutral starting switch and check transmission fluid level.

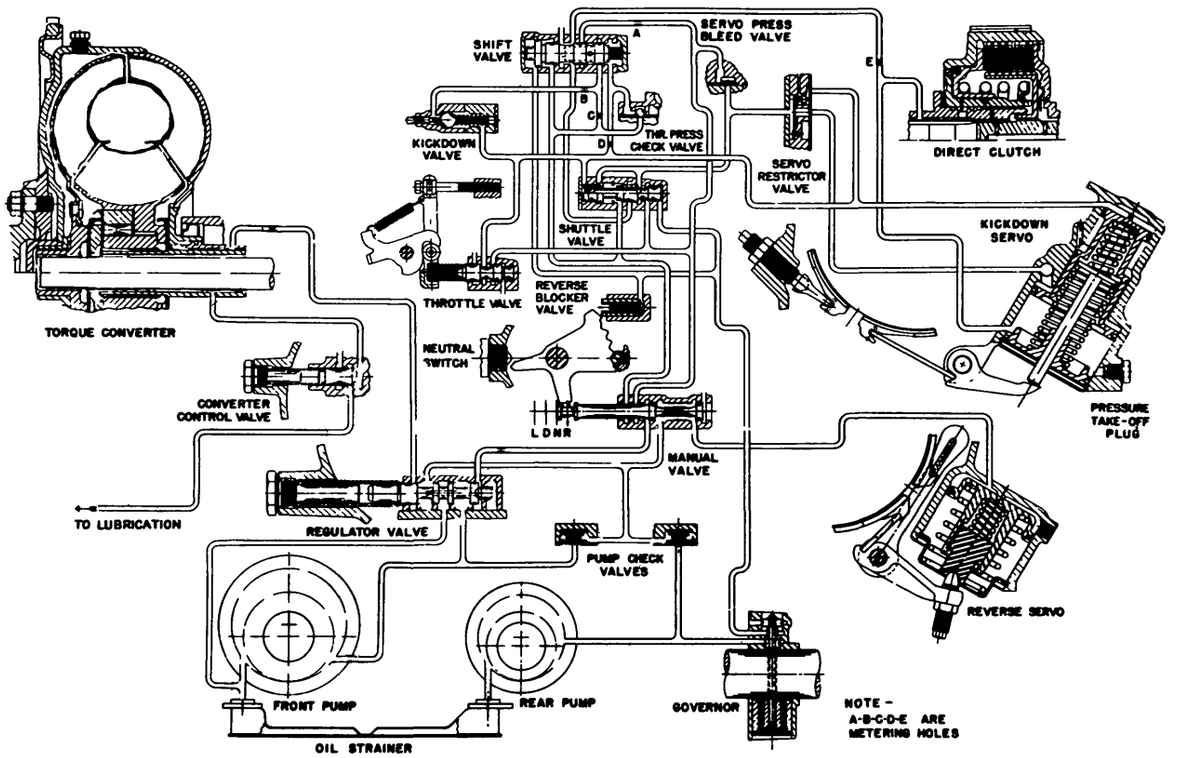
N utral Start r Switch Adjustment: Attach an electrical contact indicator to switch outer terminal and to transmission case, tighten switch until initial electrical contact is made, then tighten switch an additional 1/3 to 1/2 turn.

BAND ADJUSTMENT

BAND ADJUSTMENT: *Kickdown (front) band can be adjusted externally. R v rs (rear) band adjustment requir s removal of transmission case oil pan.*

Kickd wn (Front) Band: Working from beneath car, loosen kickdown band adjusting screw locknut (located on left side of transmission case). Check freeness of adjusting screw in transmission case. If free, use inch-pound torque wrench, Tool C-3380 and tighten adjusting screw to 72 inch-pounds *(NOTE - If Extension, Tool C-3583, is used with torqu wrench, tighten adjusting screw to 40-43 inch-p unds).* Use a reference mark of chalk or colored pencil on a corner of adjusting screw square and the transmission case. **Using extreme care, back th adjusting scr w ut xactly 2¾ turns.** Hold adjusting screw stationary with a wrench and tighten locknut securely.

R v rs (R ar) Band: *(NOTE - S "Rear S rvo Piston Producti n Change" above for id ntification of transmissi ns with lat r type reverse s rv piston).* Drain transmission and remove oil pan. Loosen band adjusting screw locknut and tighten adjusting screw to 20-25 inch-pounds. Mark a reference point and back off the adjusting screw **10 turns** (early type servo piston); **12 turns** (later type servo piston). Hold adjusting screw and tighten locknut to 30-35 ft. lbs. Replace oil pan and refill transmission.



POWERFLITE TRANSMISSION HYDRAULIC CIRCUITS

TESTING

Transmission Shift Speeds (MPH)

DeSoto S-25 & S-27

Throttle Position	Upshift	Downshift
Wide Open	51-61	9-17
Light	14-19	9-11
Kickdown Limit		41-47

Dodge 6 Cyl.

Throttle Position	Upshift	Downshift
Wide Open	41-46	9-16
Light	13-18	9-11
Kickdown Limit		34-44

D dg V8

Thr ttle P siti n	Upshift	Downshift
Wide Open	51-61	9-17
Light	14-19	9-11
Kickdown Limit		41-57

Plymouth 6 Cyl.

Throttle Position	Upshift	Downshift
Wide Open	41-46	9-16
Closed	12-15	9-11
Kickdown Limit		41-46

Plymouth V8

Throttle Position	Upshift	Downshift
Wide Open	50-59	9-17
Closed	13-16	9-11
Kickdown Limit		50-59

ROAD TESTING TRANSMISSION: If transmission operation not satisfactory, following complete procedure is recommended to check performance and diagnose trouble. 1) Move selector push buttons through their positions. Check for binding or hanging, or insufficient travel. Do not operate engine in reverse at wide open throttle. 2) Attach an electric tachometer to engine. Push in "D" (Drive) selector button. Check speed and smoothness of engagement. Apply both hand brake and foot brake and check for band slippage at wide open throttle *(CAUTION - Do not hold throttle wid p n mor than a f w s conds).* See "Stall Speed Table" below. Check for kickdown band adjustment before proceeding with road test.

CONTINUED ON NEXT PAGE

POWERFLITE (Cont.)

3) Accelerate engine at very light throttle. The transmission should upshift at speeds given in "Shift Speed Table" above. Check quality of shift.
4) Slow car to 15 MPH, and go quickly to wide open throttle (without going into kickdown). Check for possible clutch slippage. The transmission should not downshift at this time.
5) Make a kickdown at 15 to 20 MPH and check quality of shift. Release accelerator to approximately half throttle so that transmission upshifts at 25 to 30 MPH. Check quality of shift.
6) Make a kickdown, between kickdown limits as indicated in "Shift Speed Table" above, and check the quality of shift. Release accelerator to closed throttle and check quality of "lift foot" shift.
7) Make a kickdown at 45 MPH and check quality of shift. Accelerate in kickdown, at wide open throttle, until transmission upshifts. The shift should occur at speeds indicated in "Shift Speed Table" above. Check quality of shift.
8) Slow down to 40 to 50 MPH and push in "L" (Low) selector button. The transmission should downshift. Push in "D" (Drive) button at approximately 20 MPH. The transmission will upshift. Coast to a stop. The transmission should downshift as indicated in "Shift Speed Table" above. Check for smoothness of shifts.

STALL TEST: Use an accurate tachometer to check engine speed. With engine idling, push in the "D" (Drive) selector button and note smoothness of shift. Set hand brake firmly and apply foot brakes to hold car. Accelerate engine to wide open throttle and check engine speed. Speed in excess of maximum RPM as indicated below may be caused by band slippage. *Do not hold engine at wide open throttle more than a few seconds.*

Stall Speed Test ①

Car Model	Engine RPM
DeSoto (All Models)	1400-1500
Dodge (All Models)	1400-1500
Plymouth 6 Cyl.	1370
Plymouth V8 (277 Cu. In. Engine)	1670
Plymouth V8 (301 Cu. In. Engine)	1720

① — Wide open throttle, "D" (Drive) selector button pushed in.

▷ *CAUTION — When making stall test, do not hold throttle wide open for more than a few seconds.* If engine speed excessive and is not corrected by band adjustment, make additional checks as follows: Check for incorrect manual control cable adjustment; leakage at valve body mating surfaces; defective throttle valve; defective shuttle valve or valve body and cover plug; defective kickdown servo parts.

HYDRAULIC PRESSURE TESTS: *CAUTION* - Pressure differences from 15 lbs. to 250 lbs. will be found in making following tests and correct pressure gauge must be used.

Gauge No. C-3292 (100 lbs.) — Use for throttle pressure, governor pressure, and lubrication pressure checks.
Gauge No. C-3293 (300 lbs.) — Use for line pressure check.

Line Pressure: Remove 1/8" pipe plug from line pressure take-off hole (front left side of transmission case), install C-3293 (300 lb.) pressure gauge at this point. Check reverse oil pressure first (brakes off), then apply brakes to hold car and check the other points. Run engine at speed indicated in table below, check line pressure for each selector button position.

Line Pressure

Selector Button Engaged	Eng. RPM	Pressure
"R"	1400	225-275 lbs.
"N"	800	85-95 lbs.
"D"	800	85-95 lbs.
"L"	800	85-95 lbs.

▷ *NOTE:* If line pressure not correct, check for: Low oil level or clogged strainer; defective regulator valve and spring; manual valve and lever; throttle valve, cam and spring; oil leakage at valve body, or regulator body mating surfaces; defective kickdown piston and related parts; worn front pump or defective front pump drive sleeve or pinion.

Throttle Pressure: Remove 1/8" pipe plug from throttle pressure take-off hole (right center of transmission case between the servos), install C-3292 (100 lb.) gauge at this point. Apply brakes to hold car, push in the "D" (Drive) selector button, run engine at speed indicated in table below and note throttle pressure at each speed.

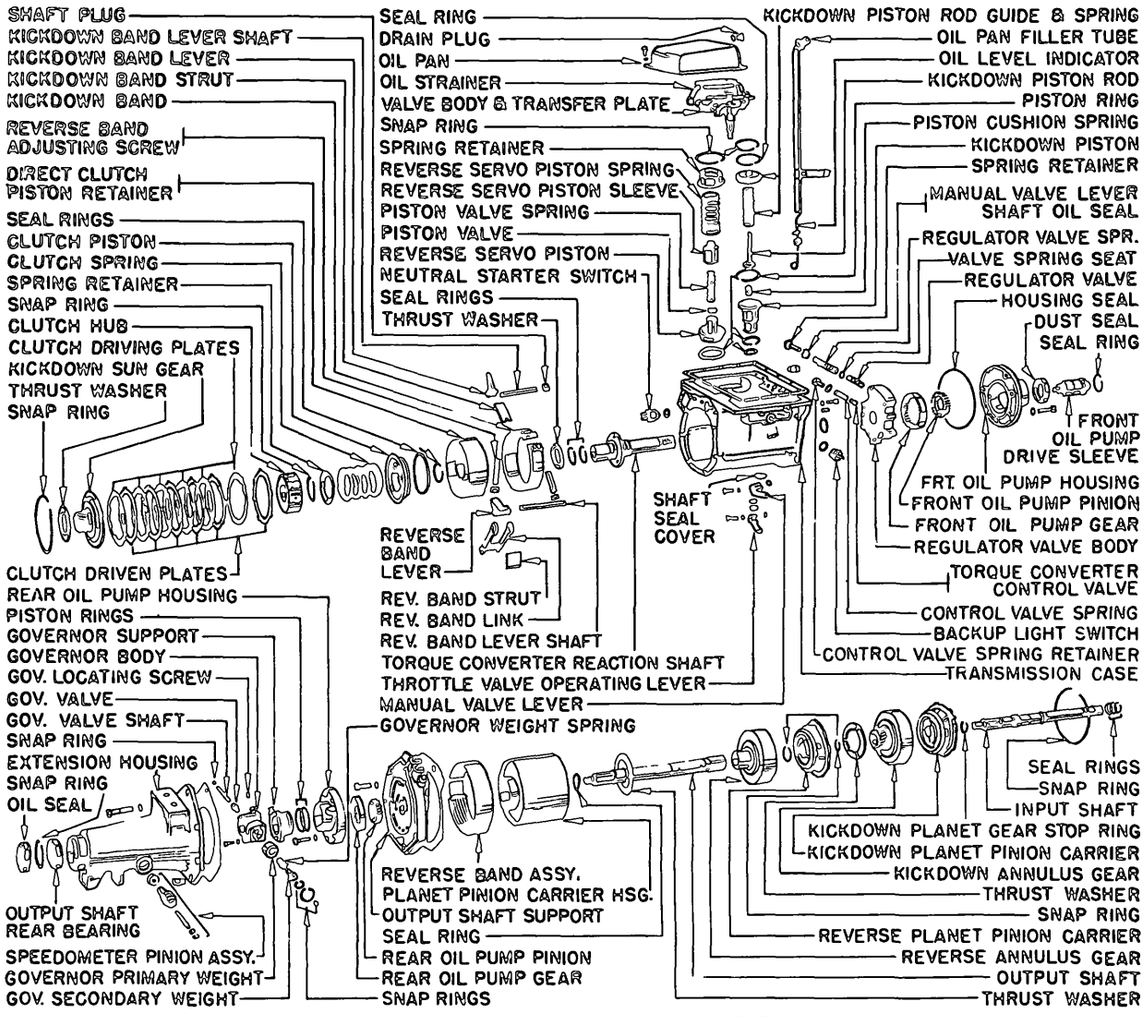
Throttle Pressure

Throttle Opening	Eng. RPM	Pressure
Closed	Idle	13-15 lbs.
Wide Open	①	80-90 lbs.

① — See engine RPM for various models in "Stall Speed Test Table" above.

▷ *CAUTION: When making the above test, do not h ld*

CONTINUED ON NEXT PAGE



POWERFLITE TRANSMISSION (EXPLODED VIEW)

POWERFLITE (Cont.)

throttle wide open for more than a few seconds. If engine speed exceeds maximum as indicated in "Stall Speed Table" above (indicating band slippage), check the cause in the same manner as for "Stall Test".

▷ *NOTE:* If throttle pressure not correct, check line pressure (above) and also check the following points: Incorrect throttle linkage adjustment, leakage at valve body mating surfaces, defective throttle valve, cam & spring, defective throttle pressure check ball or kickdown valve ball and rod, defective kickdown piston or related parts.

Governor Pressure: Remove 1/8" pipe plug from governor pressure take-off hole on lower left side of output shaft support (plate between transmission case and extension housing), install C-3292 (100 lb.) gauge at this point. Support car securely with rear wheels off floor so that they are free to turn, push in the "D" (Drive) selector button and run engine at speed indicated (as noted on speedometer). Note governor pressure in each speed range.

Governor Pressure Table

	℄ Governor Pressures		
Car Model	15 PSI	45 PSI	60 PSI
DeSoto (All Models)	13-16	23-26	55-62
Dodge (All Models)	13-16	23-26	55-62
Plymouth 6 Cyl	12-14	19-23	41-48
Plymouth V8	13-16	23-26	55-62

℄ — Governor pressure at indicated MPH.

▷ *NOTE:* If governor pressure not correct, check for leakat valve body mating surfaces or output shaft support gaskets, defective governor assembly, or defective rear pump.

Lubrication Pressure: Check only when there is reason to believe that it is incorrect Remove pipe plug at upper left side of output shaft support and install 1/8" flared tube connector Connect Gauge C-3292 With engine running at 800 RPM, in "N" (Neutral) position, lubrication pressure should read 35 to 50 lbs

▷ *NOTE:* If lubrication pressure is not correct, check for leakage at regulator body mating surfaces or at output shaft support gasket, defective converter control valve, defective front pump drive sleeve, defective reaction shaft bore, defective input shaft seal rings, plugged lubrication holes.

Clutch Pressur : Remove the 1/8" pipe plug fitting from pressure take-off hole tapped in kickdown servo (clutch pressure take-off plug on forward right hand side of transmission case) and install gauge C-3292. With rear wheels free to turn, accelerate the engine slowly until an upshift occurs. During the upshift, the pressure gauge attached to the kickdown servo should show a very rapid rise from 0 to final clutch or line pressure (see "Line Pressure Table" above). This rise should not take more than 1½-2 seconds. With engine speed not less than 650 RPM (trans. upshifted), the direct clutch pressure should not read lower than 10 lbs. below line pressure. Should a slow rise in clutch pressure be observed or a clutch pressure of more than 10 lbs. lower than line pressure be obtained, it is an indication of abnormal leakage.

▷ *NOTE* – If clutch pressure not correct, check oil level, throttle linkage adjustment, converter control valve, valve body mating surfaces, throttle valve, cam and spring, kickdown piston and guide, regulator valve body mating surfaces, front pump drive sleeve, clutch retainer bushing and reaction shaft seal rings, clutch discs and plates, clutch piston, seal rings and eheck valve ball.

TROUBLE SHOOTING & DIAGNOSIS

EXCESSIVE SLIPPAGE:

All Ranges—Inspect oil level Adjust gearshift linkage Check oil pressure, if low, inspect regulator valve and torque converter control valve for sticking Inspect valve body in transmission case mating surfaces for evidence of oil leakage

Kickdown—Readjust throttle linkage and kickdown band Inspect valve body to transmission case mating surfaces for evidence of oil leakage Check operation of throttle valve and note wear of valve bore and cam Check spring Check valve body end cover for oil leakage Check shuttle valve for free movement Inspect kickdown piston and guide for binding Inspect spring Inspect band lining for wear and band lever for free movement

Kickdown (Over 25 MPH)—Inspect valve body end cover for oil leakage Inspect shuttle valve and plug for free movement Inspect spring

Direct—Inspect valve body to transmission case mating surfaces for evidence of oil pressure leakage Check kickdown piston for binding Check shaft seal rings and clutch retainer bushing for wear Check clutch discs, piston and clutch check valve

Reverse—Check reverse band adjustment Inspect transmission case to valve body mating surfaces for evidence of oil pressure leakage Inspect reverse servo assembly for wear or binding Inspect reverse lever and linkage for free movement

Hill Climbing—Insufficient oil will result in low pressures to kickdown servo or direct clutch if oil level is low

SHIFT PATTERN:

No Upshift—Check oil level and gearshift linkage adjustment Check governor and throttle pressure If there is no pressure rise when accelerating engine in direct drive, governor valve may be stuck closed Check valve body to transmission case for parallelism Check manual valve and lever for correct detent engagement Check shift valve for free operation and shift valve spring for breakage Check kickdown piston assembly Check rear pump drive pinion Drive pinion ball may be cracked or broken, permitting pinion gear to slip Inspect clutch ball check for proper operation Ball check valve must operate freely and seat properly

No Shift in "D" (Drive) Range and an Upshift In Low Range—The cause is the governor valve sticking open This can be verified by checking governor pressure (see "Governor Pressure Test" above) If governor pressure exceeds the pressures indicated in table, governor valve is possibly stuck and in most cases can be corrected in the following manner Clean off area around governor pressure takeoff plug and remove plug Cover oil filler tube with a cloth or plug and hold firmly to prevent air from forcing transmission oil out through filler tube Screw a piece of ⅛" pipe into hole to help direct air into unit Apply clean filtered air to pipe in short blasts, tapping parking brake drum at same time with a rubber hammer just enough to jar governor After applying air pressure, recheck governor pressure and see if valve has been freed up In cases where governor pressure is still to high, it will be necessary to remove transmission extension case for further inspection

Low Upshift Pattern—Readjust throttle linkage Check governor pressure Governor valve may be binding or sticking Inspect the rear pump assembly Check valve body to transmission case for parallelism Check operation of throttle valve and inspect cam and spring Check shift valve for free operation and spring for breakage

Low Upshift Pattern at Heavy Throttle—Inspect regulator valve, throttle valve, and governor for burrs or dirt which may cause binding or sticking Inspect the regulator spring

High Upshift Pattern—Readjust throttle linkage and check both throttle and governor pressures Adjust throttle pressure if necessary If throttle pressure does not rise according to speeds on chart (see "Throttle Pressure" above), throttle valve may be sticking Inspect for dirt or burrs Inspect throttle cam for wear Check valve body to transmission case for parallelism Check shift valve spring If governor pressure does not correspond to pressures indicated in "Governor Pressure" table above, remove governor and inspect valve for sticking Check rear pump gears for wear, broken teeth or excessive clearance Inspect pump drive pinion ball

All Upshifts Below 14 MPH—Inspect throttle valve, cam and spring Check throttle pressure check ball Check governor valve for sticking

Erratic Shifting—Check oil level Inspect valve body to transmission case for parallelism Check action of shift valve Inspect governor support gaskets for oil leakage

No Downshift—Check governor pressure High initial pressure indicates valve is stuck open Remove governor and inspect Inspect shift valve action, check spring

Low Downshift Speed—Governor valve is stuck open Remove and clean and check for burrs and dirt

High Downshift Speed—Readjust gearshift linkage Inspect valve body to transmission case for parallelism Inspect manual valve and lever Inspect kickdown valve and ball

No Kickdown—Adjust throttle linkage Inspect valve body to transmission case for parallelism Inspect throttle valve, cam and spring Also inspect kickdown valve and shift valve components

Low Kickdown Limit—Check governor pressure Governor valve may be sticking due to dirt Inspect regulator valve and spring for proper operation Inspect rear pump gears and drive pinion ball Check valve body cover plate for parallelism

SHIFT QUALITY:

Harsh Shift from Neutral to Reverse—Adjust engine idle speed Readjust rear band Inspect condition of the reverse band, strut and linkage Inspect the reverse servo piston, spring valve and rings

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

Harsh Shift from Neutral to Drive—Adjust engine idle speed. Adjust throttle linkage. Inspect kickdown servo pistons, springs, guide, rod and piston rings.

Delayed Shift from Neutral to Drive—Adjust kickdown band. Inspect condition of band, strut, lever and lever shaft.

Excessive Engine Speed Increase on Upshifts—Check oil level and adjust throttle linkage. Inspect regulator valve and spring and check operation of valve in regulator body. Check valve body mating surface for parallelism. Inspect throttle valve, cam and spring. Check operation of valve in valve body. Inspect kickdown piston components. Check mating surfaces of regulator valve body and transmission for parallelism. Inspect reaction shaft seal ring for deterioration. Inspect input shaft oil seal rings for wear or breakage and condition of reaction shaft bore. Inspect clutch retainer bronze bushing. If worn below bronze surface, replace retainer. Inspect condition of reaction shaft oil seal rings for wear or broken ends. Inspect condition of clutch plate and condition of friction material on seal ring. Check clutch check valve ball.

Excessive Engine Speed Increase on Upshifts at Light Throttle—Check line pressure. Inspect front oil pump gears for wear and excessive clearance.

Harsh Upshift—Adjust throttle linkage. Inspect regulator valve and spring. Check for sticking shuttle valve. Check valve body mating surfaces for parallelism. Inspect throttle valve, cam and spring. Inspect kickdown piston components. Check regulator valve body mating surfaces for parallelism. Inspect direct clutch spring, spring retainer, and snap ring.

Harsh Lift Foot Shift—Adjust throttle linkage. Check valve body mating surface. Check operation of throttle valve. Inspect valve, valve bore, cam and spring. Inspect servo pressure bleed valve for dirt. Check operation of shuttle valve. Inspect shuttle valve, plug, inner and outer springs, and guide pin.

Excessive Engine Speed Increase on Downshift at Part Throttle—Check oil level and adjust throttle and gearshift linkage. Check valve body mating surface. Check operation of manual valve and valve lever. Inspect servo restrictor valve and operating plug. Check plug for free operation. Check valve spring for distortion or looseness.

Harsh Downshift—Adjust engine idle speed and throttle linkage. Inspect valve body mating surface. Inspect throttle valve, cam and spring for proper operation. Inspect for dirt, burrs or wear, or breakage. Inspect servo restrictor valve for proper operation. Inspect clutch plates and disc friction material. Inspect the piston for wear or scoring. Check seal for wear or deterioration which would result in leakage. Inspect thrust washers for excessive wear.

Excessive Increase in Engine Speed on Kickdown—Readjust kickdown band. Check regulator valve and spring for proper operation. Inspect for dirt, wear, or breakage. Check valve body mating surface for nicks, burrs and trueness, which would cause leakage. Check operation of servo restrictor valve and shuttle valve. Inspect valve and plug for dirt, burrs or wear. Inspect all parts of kickdown piston assembly. Inspect piston rings for excessive wear or broken ends. Check governor valve for wear, dirt, binding or sticking. Inspect rear pump gears for excessive wear or broken teeth. Check pump clearance, drive pinion gear and pinion ball.

Harsh Kickdown—Adjust kickdown band. Inspect regulator valve and spring. Inspect for dirt, burrs or breakage. Inspect servo pressure bleed valve for dirt. Check operation of shuttle valve. Check valve and plug for burrs, dirt or excessive wear. Inspect all parts of kickdown piston assembly. Inspect piston rings for scoring, wear or broken ends. Inspect regulator valve body mating surface for nicks, burrs and trueness which would cause leakage. Inspect reaction shaft neoprene seal for deterioration. Inspect governor valve for free operation. Check for dirt which would cause sticking. Inspect rear pump gears for excessive clearance, worn or chipped teeth. Inspect drive pinion gear and drive pinion ball. Inspect the input shaft seal rings for excessive wear or broken ends, and reaction shaft bore for scoring. Inspect all parts of the direct clutch assembly.

OIL PRESSURE:

No Governor Pressure—Governor valve may be stuck in closed position due to dirt. To free valve, apply a short spurt of high air pressure (90 lbs.) to governor pressure take-off hole and at same time tap transmission extension housing with a rubber mallet. Before applying air pressure, cover filler tube with a cloth. In addition, drain two or three quarts of oil from transmission oil pan. After air is applied, reinstall governor pressure take-off plug and run transmission in Reverse a few seconds. Recheck governor pressure. This corrective procedure may not be permanent. If valve becomes stuck again, remove governor for servicing. If pressures do not correspond to those indicated in "Governor Pressure" table above, the governor may need service. However, before servicing governor, check the other points in the transmission that could cause low pressure as follows: Check the valve body mating surface for trueness, nicks or burrs. These could cause oil leakage. Check both output shaft support gaskets for evidence of internal leakage. Check operation of governor valve and inspect for foreign matter. Check the rear pump gears for broken teeth, wear, and excessive clearance. Check the mating surface of output shaft for trueness, burrs or nicks.

High Initial Governor Pressure—High governor pressure at low engine speeds is due to the governor valve being stuck in the open position, usually caused by dirt *(see "No Governor Pressure" above)*, for clearing with air pressure.

Line Pressure—If line pressure does not correspond to pressures indicated in "Line Pressure" table above, it will be necessary to investigate and make the following adjustments or corrections: Check transmission oil level. Inspect regulator valve for free operation, dirt or burrs, and condition of valve spring. Check valve body mating surface for trueness, nicks or burrs. Check operation of manual valve and lever. Inspect front pump gears for worn or chipped gears. Check clearance between gears and face of housing.

Throttle Pressure—If throttle pressures do not correspond to pressures indicated in "Throttle Pressure" table above, check line pressure and make the following adjustments and corrections: Adjust throttle linkage. Inspect operation and condition of regulator valve and spring. Check valve body mating surfaces for nicks, burrs and trueness. Check operation and condition of throttle valve, cam and spring. Check throttle pressure check valve ball for nicks and dirt. Inspect condition of kickdown rod and ball.

Direct Clutch Pressure—Direct clutch pressure should be approximately 10 lbs. lower than line pressure with transmission upshifted and engine speed not lower than 650 RPM. If not, refer to "Excessive Engine Speed on Upshifts" above. A pressure drop between line pressure and direct clutch pressure as high as 25 lbs. may be due to broken or damaged seal rings in the direct clutch circuit. These are: three interlocking type input shaft seal rings; the direct clutch piston retainer seal ring, direct clutch piston neoprene seal ring, the neoprene reaction shaft seal ring, and the two interlocking type reaction shaft seal rings.

Lubrication Pressure—Lubrication pressure is checked at the upper left side of the output shaft support, Remove the ⅛" pipe plug and use 100 lbs., pressure gauge C-3292 to check pressure. Lubrication pressure should be 35 to 50 lbs. pressure with transmission in neutral and engine speed at fast idle. If pressure readings are incorrect, check line pressure and inspect torque converter control valve. Low pressures may be due to internal oil leakage at the following points: drive sleeve seal ring, regulator valve body mating surface, reaction shaft seal ring, output shaft support gaskets, input shaft seal rings, and reaction shaft bore. Low oil pressure may also be caused by plugged lubrication lines.

IMPROPER RESPONSE TO GEARSHIFT SELECTOR LEVER POSITIONS:

Moves Forward in "N" (Neutral)—Adjust gearshift linkage. Adjust kickdown band. Inspect manual valve lever assembly. Check valve body mating surface for nicks, burrs and trueness which would cause leakage. Check operation of manual valve. Inspect all parts of kickdown piston. Check regulator body mating surface for nicks, burrs and trueness. Check clutch discs and plates for warpage which would cause dragging. Inspect clutch ball check.

Car Moves Forward in "N" (Neutral) at High Engine Speed—Clutch check valve ball bleed hole may be plugged causing centrifugal oil pressure to partially engage the direct clutch. A slight surge which is not continuous is normal.

Car Moves Backward in "N" (Neutral)—Readjust gearshift linkage and inspect manual valve and valve lever for proper engagement. Adjust reverse band, levers, strut, and shaft. Check for binding, dirt, excessive wear.

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

MISCELLANEOUS DIAGNOSIS PROCEDURES:
Starter Will Not Energize—Adjust gearshift linkage. Test neutral starter switch. Inspect manual valve lever for proper engagement.
Hard Shifting Into "N" (Neutral)—Check operation of neutral starter switch and inspect manual valve lever.
Hard Shifting Into "R" (Reverse)—Check operation of backup light switch and manual valve lever.
Oil Foams From Filler Tube—Check fluid level in transmission. Inspect transmission breather vent.

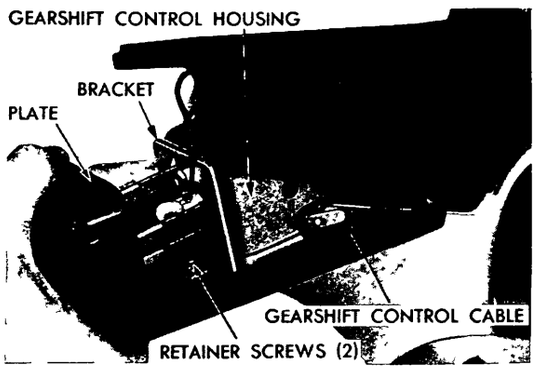
GEARSHIFT CONTROL UNIT REMOVAL & INSTALLATION

MANUAL CABLE ADJUSTMENT: *See "Manual Cable Adjustment" above.*

CABLE ASSEMBLY: Removal (Transmission End) – Drain transmission fluid and remove oil pan. Remove neutral safety switch to provide access to cable lock spring and remove cable bracket and screw. Insert screwdriver through neutral safety switch hole and push gently against vertical projecting portion of cable lock spring and pull outward on cable. *(CAUTION – Move spring only a sufficient amount to permit removal of cable as undue pressure will dislocate spring).*

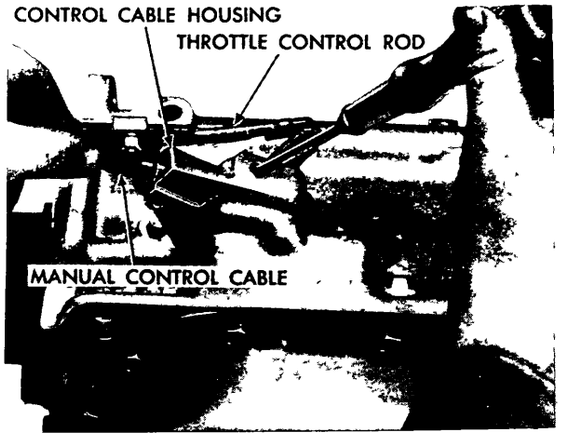
Installation: (Transmission End) – Move manual valve lever into reverse position which will place the cable adapter in close proximity with cable entrance hole in transmission case. Push in the "L" button on transmission control. Place "O" ring seal on cable ferrule *(NOTE –* Inspect "O" ring seal for cuts, abrasions, brittleness or cracking. If any of these conditions are present, replace "O" ring seal. Hold cable parallel to hole centerline in transmission case and push control cable in until spring lock engages groove in cable end. Position cable bracket and install bracket capscrew. Measure and adjust cable free play (See "Free Play Adjustment" below), being careful not to move manual lever *(NOTE –* Rubber sheath on cable must be pressed onto cable ferrule in order to prevent any possible leakage of oil at this point. On later model cable assemblies, the ferrule will be double grooved and the rubber sheath will be held to the ferrule by the crimped connector). Tighten cable bracket screw. Operate push buttons to check cable adjustment. Adjust as necessary *(CAUTION –* Make sure cable housing is not forced in or out during tightening procedure as backlash will be disturbed). Replace neutral safety switch and transmission oil pan. Refill transmission to correct level using Automatic Transmission Fluid Type "A".

Cable Backlash Adjustment: *See Manual Control Linkage Adjustment under LINKAGE ADJUSTMENT.*



PUSH BUTTON GEARSHIFT CONTROL (INSTRUMENT PANEL UNIT)

PUSH BUTTON CONTROL UNIT: (Removal) – Remove three bezel retaining screws (one screw is located on underside of unit receiver), and remove bezel and push buttons. Remove the two hex head nuts and lockwashers holding push button control unit to instrument panel. Pull push button control unit from rear of instrument panel, down and toward front of car. Remove the two screws holding cable assembly bracket to control unit. Remove hairpin clip securing cable end to actuator bar and remove cable. (After cable is removed from transmission, see "Cable Assembly" above, pull cable through rubber grommet, or remove grommet on dash panel).



TRANSMISSION GEARSHIFT CONTROL (CABLE RELEASING PROCEDURE)

Installation: Reverse removal operations and adjust cable free play.

Control Unit Light Bulb Replacement: Remove the three bezel retaining screws (one screw is located on underside of unit receiver) and remove bezel and "D" push button. Install light bulb, replace push button, reinstall bezel and test operation of unit.

OVERHAUL

OVERHAUL: Service procedures are the same as for 1956 models. *See "PowerFlite Transmission" in 1956 Annual Data.*

TORQUEFLITE (CHRYSLER, DE SOTO, DODGE, PLYMOUTH)

Chrysler, Imperial, DeSoto, Dodge, & Plymouth Models (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR: (Towing car to start is not recommended because of sudden surge of power when engine starts).* Turn ignition switch on, then push the "1" (Low) button in and depress accelerator pedal slightly. After car attains a speed of 15 MPH, the transmission will start engine.

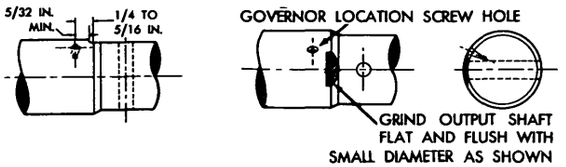
►*TOWING TORQUE-FLITE CARS: Following procedure is recommended:*

Transmission Operating Properly—Car may be towed safely in "N" (Neutral) position at moderate speeds. For long distance towing (over 100 miles), the propeller shaft should be disconnected.

Transmission Inoperative—Tow car with rear end raised or remove the propeller shaft.

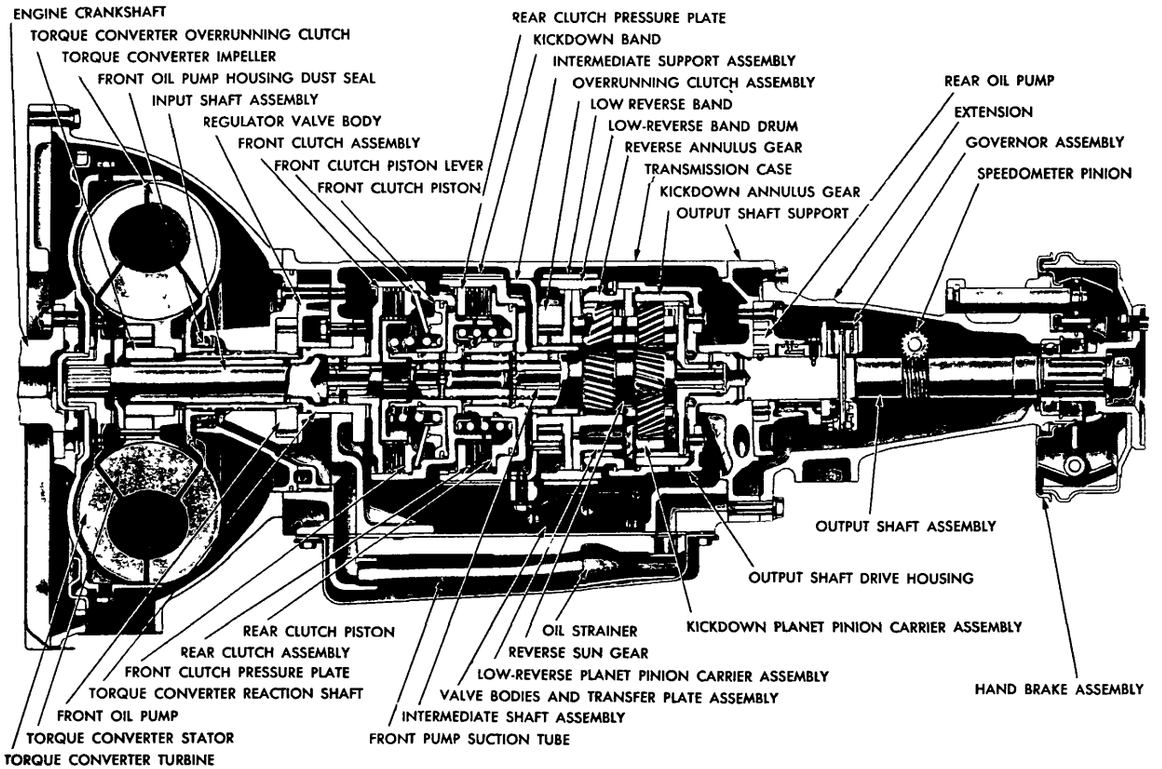
►*1957 TORQUEFLITE REVERSE SERVO PISTON "COCKING" CORRECTION & PRODUCTION CHANGE:* If the reverse servo piston "cocks" over and misses the pilot hole on the reverse band lever, a "no reverse" condition would result. To prevent the above condition, a new reverse servo piston guide, Part No. 1824474, must be installed. This guide is installed in end of servo piston spring and is held in place by the spring retainer and snap ring. Transmissions having the code letter "F" and later, stamped on the pan rail on right side of case have been changed in production and it is not necessary to install the guide.

►*1957 TORQUEFLITE ERRATIC SHIFT PATTERN & NO. 3-1 DOWNSHIFT CORRECTION (Reverse push-button cannot be pushed in with engine running):* This condition may be caused by governor valve or weight sticking due to foreign matter in governor or by governor weight striking output shaft. Check governor pressure with selector lever in "N" position. If pressure is evident (there should be no pressure), inspect governor assembly for cause of sticking. To correct, remove large governor weight and inspect output shaft end for signs of mushrooming. Correct as follows: On all models, except DeSoto Adventurer and Plymouth Fury, grind a 45° chamfer around edge of output shaft end of large governor weight. Diameter of flat surface on end of governor weight must not be less than ¾" after chamfering. On DeSoto Adventurer & Plymouth Fury, the output shaft must be removed and a flat surface ground on shaft surface as indicated in illustration.



GOVERNOR STRIKING CORRECTION

►*1957 TORQUEFLITE FRONT CLUTCH PRODUCTION CHANGE:* The early "8 lever" front clutch assembly has been changed to a "4 lever" assembly on later cars. The "8 lever" clutch uses five bonded discs and four steel plates while the "4 lever" clutch uses four bonded discs and three steel plates



TORQUEFLITE TRANSMISSION (SECTIONAL VIEW)

►*1957 TORQUEFLITE ACCUMULATOR SPRING NOTE:* In some transmissions, two springs, Part Nos. 1732030 and 1732031 were used in the accumulator while other transmissions have one spring, Part No. 1736228. Combined value of the two springs (1732030 & 1732031) are equal to the value of the single spring (1736228) and either may be used.

►*1957 DESOTO & PLYMOUTH REAR CLUTCH PRESSURE PLATE PRODUCTION CHANGE:* In later transmissions, the rear clutch pressure plate, Part No. 1732114 has been changed to the same plate as used in the front clutch (Part No. 1736408). The later type rear plate may be used for service replacement on early transmissions. *NOTE* - The later type pressure plate cannot be used for adjustment of the front clutch clearance. It is necessary that an early type rear clutch pressure plate, Part No. 1732114 be used for this adjustment.

►*1957 DESOTO THROTTLE PRESSURE ADJUSTING GAUGE:* This new gauge, Tool C-3610 is to be used only in the event throttle pressure adjustment is suspected of being incorrect (improper part throttle shift pattern, although governor pressure checks satisfactorily and throttle linkage adjustment is known to be correct). *See "Hydraulic Control Pr ssure Ch cks" below.*

►*1957 PLYMOUTH 1-2 UPSHIFT SLIPPAGE OR HARSH SHIFTING CORRECTION:* If this condition occurs, check line pressure *(See "Hydraulic Control Pressure Tests" below),* and if found to be within specifications, proceed as follows: Attach a tachometer to engine, then with engine operating and transmission in "D" range, raise car on a hoist and attach a pressure gauge in take-off plug on top of kickdown servo. Move accelerator rod until engine reaches 850 RPM (pressure should read 32-34 lbs.). If pressure is not within this range, loosen link on throttle valve rod (adjacent to throttle lever on transmission), and adjust until the correct reading is obtained

►*1957 TORQUEFLITE SPACER WASHER (BETWEEN PLANET PINION CARRIERS) PRODUCTION CHANGE:* A new steel spacer washer, Part No. 1638667 is now being used between the aluminum planet pinion carriers to minimize scuffing.

►*1957 DESOTO S-27 "NO KICKDOWN" CORRECTION:* If this condition exists and throttle linkage cannot be adjusted properly, check to make sure the right bell-

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TORQUEFLITE (C nt.)

crank-to-transmission throttle rod is installed (DeSoto Part No. 1734979 which has a straight portion approximately 7½" long from bellcrank end to center of the bend). The corresponding part for PowerFlite is approximately 1" shorter. Adjust throttle linkage *(see "CARBURETOR" on car mod l page).*

DESCRIPTION

DESCRIPTION: Torque-Flite Transmission consists of a wide range torque converter and a hydraulically controlled automatic planetary transmission. Two multiple disc clutches, an overrunning clutch, two bands and two planetary gear sets provide three forward ratios and one reverse ratio. The oiling system consists of two pumps (front & rear) which circulate oil through transmission, torque converter and oil cooler (where oil cooler is used), with oil supply carried in transmission case oil pan. Transmission speed range selection is controlled by a five button (push button) control located to left of steering wheel in drivers compartment.

OPERATION

OPERATION: Transmission operation in each position of the push button control is outlined below. In "D" (Drive) position (normal driving position), operation varies in accordance with car speed and operating conditions. *See "Shift Speed Tables" below.*

"D" (Driv) P siti n–Br akaway: Power flow is from converter turbine through input shaft and front clutch retainer. Front clutch is applied and the drive continues through clutch hub to intermediate shaft and kickdown annulus gear. Kickdown annulus gear drives the kickdown planet gears, rotating them in the same direction. Kickdown planet gears are meshed with kickdown sun gear which is integral with the reverse sun gear. Both sun gears are forced to rotate in a reverse direction by reaction of the kickdown planet pinion carrier together with the reverse annulus gear, both of which are splined to the output shaft drive housing. The reverse planet pinion carrier is attached to and prevented from turning backward by an overrun clutch and becomes stationary in forward drive (overruns on coast). Therefore, the reverse carrier pinions are forced to rotate in a forward direction and force the reverse annulus to rotate in the same direction transmitting power flow to output shaft with the combined ratio of the kickdown and reverse planetary gear sets of 2.45-1.

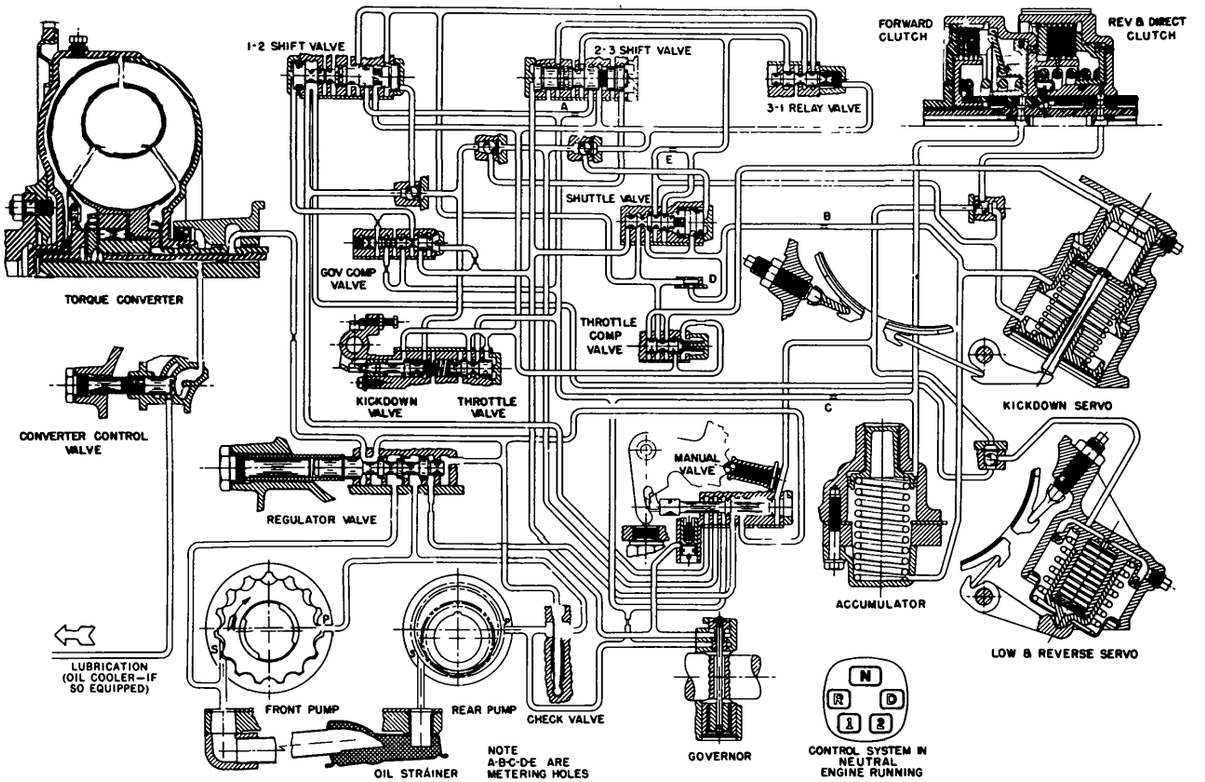
"D" (Drive) – 2nd Sp d, and "2" (Second) Position – 2nd Sp ed: Power flow is from torque converter turbine through output shaft to front clutch (which is applied). From front clutch through intermediate shaft to the annulus gear of the kickdown (rear) planetary gear set. Kickdown band is applied which holds the sun gear stationary. The annulus gear drives the kickdown planet pinions which rotate in the same direction as input and intermediate shafts. Kickdown planet pinions are meshed with the sun gear, therefore, they walk around this gear and exert force through kickdown planet pinion shafts to rotate the kickdown planet pinion carrier. The carrier, which is splined to output shaft drive housing, moves at a slower speed than the annulus gear, thus providing a gear ratio of 1.45-1.

"D" (Drive) Position – Direct: Power flow from converter goes directly through transmission because the planetary elements of the gear train are locked up by two multiple disc clutches and both bands are released. The torque converter provides all the torque multiplication. Gear ratio is 1.00-1.

Kickdown (Forced Downshift) in "D" (Drive) Position Below 25 MPH: This will force transmission to downshift and the power flow will be the same as "D" (Drive) Position – Breakaway.

"l" (Low) Position – Low Speed: In "1" (Low) position, the power flow is the same as "D" (Drive) position – Breakaway or "2" (Second) Position – Breakaway, with one exception, the low-reverse band is applied, locking the overrun clutch to provide engine braking.

'R" (Reverse) Position: Rear clutch and low-reverse band are applied; all other friction elements are released. The power flow is from torque converter turbine through input shaft to rear clutch hub (part of front clutch retainer). The rear clutch is splined to reverse sun gear. The carrier of reverse (front) planetary gear set is held stationary by the low-reverse band; therefore, the set acts as a simple reverse train through reverse planet pinions to reverse annulus (which is splined to output shaft drive housing) and provides a reverse ratio of 2.20-1.



TORQUEFLITE TRANSMISSION HYDRAULIC CIRCUITS

LUBRICATION

► *FLUID LEVEL & CHECKING PROCEDURE CHANGE:* To avoid overfilling and trouble under high speed and high temperature operating conditions, it is recommended that the following checking procedure be used and the recommended fluid level not be exceeded. *This supersedes previous recommendations.*

► *NOTE:* It is recommended that fluid level be checked with transmission "Cold" (after being parked for a considerable time and before being driven several miles). If necessary to check transmission "Hot" (after car driven for several miles), observe the special hot fluid level given below.

Checking Fluid Level (Cold Transmission) - Run engine at idling speed with parking brake applied. Operate all push buttons in turn (leave in each position momentarily), then check fluid level with "N" (Neutral) button pushed in. Note level indicated on dipstick, add or remove oil as follows: **Lev l b tween "L" mark and ½" b l w "L" mark** - Do not add oil - this level is satisfactory. **L v l b l w ½" b l w "L" mark** - Add oil to bring level up to between "L" mark and ½" below "L" mark. **L v l abov**

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TORQUEFLITE (C nt.)

"L" mark - Remove oil until level is between the "L" mark and ½" below the "L" mark

Checking Fluid Level (Hot Transmission) - Proceed as for cold check above Add or remove oil in accordance with fluid level indicated on dipstick as follows: **Level between "F" mark and ½" above "L" mark** - Do not add oil - this level is satisfactory. **Level below "L" mark** - Add oil to bring level up between the "L" mark and ½" above the "L" mark. **Level above "F" mark** - Remove oil until level is between "F" mark and ½" below the "F" mark *NOTE* - On cars with first type dipstick (1 5/8" between "F" and "L" marks), maintain level at ½" below "F" mark

Draining & Refilling: Remove filler tube connector at oil pan and pull back on tube to drain Retighten connector after draining Remove access plate from bottom of housing and rotate torque converter until drain plug is accessible Remove plug and drain fluid Install drain plug and tighten, then install access plate Pour approximately 5 quarts of Automatic Transmission Fluid Type "A" through oil pan filler tube Apply parking brake and start engine Add approximately 4 qts (Chrysler & Imperial), 3 qts (DeSoto, Dodge, & Plymouth) while engine is running, to bring fluid level in transmission to the correct point as indicated in "Checking Fluid Level" (above)

►*WINTER DRIVING NOTE* During extreme cold weather (for which 5W oil is recommended for the engine) should slow engine turn-over be experienced on starting, it is permissable to drain one quart of fluid from transmission and replace with one quart of kerosene If additional lubricant is required, Automatic Transmission Fluid Type "A" should be used to make up the difference *It is not necessary to drain and refill transmission with regular fluid as the weather warms up, as the increased operating temperatures will gradually drive off the kerosene.*

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE See "Carburetor" on car model pages.*

Manual Control Cable Adjustment: **1)** Push the "N" (Neutral) button in Drain approximately 2 quarts of fluid from transmission Loosen cable-to-transmission adjustable mounting bracket screw Remove neutral starting switch Place point of screwdriver through neutral starting switch opening in transmission case and against neutral starting switch cam of manual control lever to hold lever in neutral position

2) While holding manual lever in reverse position, adjust control cable for free play by pushing in until cable stops Mark position on cable in relation to adapter housing Withdraw control cable to stop, and measure travel Push control cable in adapter housing one-half of total travel With cable in this position, install control cable adjusting clip, flat washer, lockwasher, screw, and tighten Install neutral starter switch and wires

3) To check for proper adjustment, push the various push buttons, return to neutral each time and check starter operation A test light attached to starter neutral switch may be used instead of the starter for checking proper operation and adjustment Refill transmission to proper level

BAND ADJUSTMENT

Kickdown (Front) Band: Kickdown band adjusting screw is located on left side of transmission case Using a ¾" wrench, loosen locknut and back off approximately 5 turns Check freeness of adjusting screw in transmission case Tighten the adjusting screws to **70-75 inch pounds,** using wrench C-3380 Using a reference mark of chalk or colored pencil on the corner of adjusting screw square and the transmission case, back the adjusting screw out exactly the number of turns indicated in table below While holding adjusting screw stationary tighten locknut to 35-40 ft lbs

Low-Reverse (Rear) Band Low-reverse band adjusting screw is located on right side of transmission case Using a ¾" wrench, loosen locknut and back off 9 turns Check freeness of adjusting screw in transmission case If free, set the click device on the small inch-pound torque wrench C-3380 for **70-75 inch pounds** and tighten the adjusting screw Using a reference mark of chalk or colored pencil on the corner of adjusting screw square and the transmission case, back the adjusting screw **exactly** the number of turns indicated in table below While holding adjusting screw stationary *tighten locknut to* 35-40 ft lbs

Transmission Band Adjustment

Car Model	Kickdown Band	Low-Rev. Band
Chrysler (All)	3½ turns	2 5 8 turns
DeSoto (S-27)	3½ turns	2 5 8 turns
DeSoto (Early S-25,26) ①	2 turns	2 turns
DeSoto (Late S-25,26) ②	2¼ turns	2 5 8 turns
DeSoto (Adventurer) ③	2¼ turns	2 5 8 turns
Dodge (All)	3½ turns	2 5 8 turns
Plymouth (All)	3½ turns	2 1 4 turns

① - Transmission Part No 1671747 ② - Transmission Part No 1736544 ③ - Transmission Part No 1823593

TESTING

ROAD TESTING TRANSMISSION: If transmission operation not satisfactory, the following complete procedure is recommended to check performance and diagnose trouble

►*ROAD TESTING NOTE* Before road testing, engine must be properly tuned Adjust idle speed to 400-450 RPM (Single 4-Barrel Carb Cars), 650 RPM (Two 4-Barrel Carb Cars), with engine and transmission at normal operating temperature and with transmission in "N" (Neutral) position Bring transmission fluid level to correct mark on dipstick If throttle linkage has been disturbed in tuning engine, linkage must be adjusted before making tests

►*STALL TESTING CAUTION DO NOT stall test the torque converter. To prevent damage to transmission, wide open throttle stall operation is not recommended.*

1) Push in "N" (Neutral) outton and check for dragging up to an engine speed of 800 RPM

2) Push in "R" (Reverse) button and note shift time and smoothness of the shift

3) Push in "D" (Drive) button and note shift time and smoothness of engagement

4) Accelerate car at very light throttle The transmission should upshift into second at approximately 8-10 MPH and into direct speed at approximately 15-17 MPH Check quality of the shifts

5) Slow the car to approximately 15 MPH, then depress accelerator pedal quickly to wide open throttle (without going into kickdown) Check for slippage of front and rear clutches The transmission should not downshift at this time

6) At a car speed of approximately 20-22 MPH, depress accelerator pedal fully The transmission should downshift to breakaway gear Check quality of shift

7) Release accelerator pedal and allow transmission to upshift Accelerate car to 40 MPH Depress accelerator pedal fully The transmission should downshift to second gear Check quality of shift

8) Release accelerator pedal to closed throttle Check quality of the "lift-foot" upshift

9) Accelerate car to 60 MPH and depress accelerator pedal fully The transmission should downshift to second gear Check quality of the shift

10) Accelerate car to kickdown (second gear) at wide open throttle until the transmission upshifts The shift should occur at approximately 70 MPH Check quality of the shift

11) Slow car down to 30-40 MPH and engage the "2" (Second) button The transmission should downshift to second gear Check for gear noise

12) Slow car to 15 MPH and depress accelerator pedal quickly to wide open throttle without going into kickdown Check for kickdown band or front clutch slippage The transmission should not downshift at this time

13) Release accelerator pedal and push the "1" (Low) button The transmission should downshift at approximately 25 MPH

14) With accelerator pedal at light throttle, push the "D" (Drive) button at approximately 20 MPH (the transmission will upshift), coast to a stop The transmission should downshift at approximately 8 MPH Check quality of downshift

HYDRAULIC CONTROL PRESSURE TESTS: *NOTE–Use Pressure Gauge C-3293 (300#) for all the following tests.*

Line Pressure Remove the 1/8" pipe plug from line pressure take-off hole located on left side of transmission case (lower plug forward of control lever and cable connection) Install pressure gauge at this point and make the following tests

Line Pressure Test (All Models)

Push Button Position	Rear Wheels	Engine Speed (RPM)	Pressure (Lbs.)
R	Free	1600	200-250
N		800	85-95
D	Free	800	90
2	Free	800	85 95
1	Free	800	85-95

Line Pressure Adjustment - With transmission in "D" range and engine operating at 800 RPM turn adjusting screw in regulator valve spring retainer (on right side of transmission directly below torque converter control valve) clockwise to increase pressure and coun-

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

terclockwise to decrease pressure, until pressure is within the specified limits as indicated in table.

Govern r Pressure: Remove 1/8" pipe plug from governor pressure take-off hole located on lower left side of transmission case (at rear of case in output shaft support). Install pressure gauge at this point and make the following tests:

Gov rnor Pressure Tests ①

Mod l	Axle Ratio	Governor Pressure (MPH) 15 lbs.	45 lbs.	75 lbs.
Chrysler C75, C76 ..	3.18-1	17-19	32-39	66-71
Chrysler C75, C76 ...	3.36-1	16-18	29-36	63-67
Chrysler C76	2.92-1	19-21	35-42	73-79
Imperial	2.92-1	19-21	36-43	74-80
Imperial	3.18-1	18-20	33-40	68-74
Imperial	3.36-1	17-19	31-37	64-70
DeSoto	All	16-18	29-35	61-66
Dodge	All	16-18	29-35	61-66
Plymouth	All	16-18	29-35	61-66

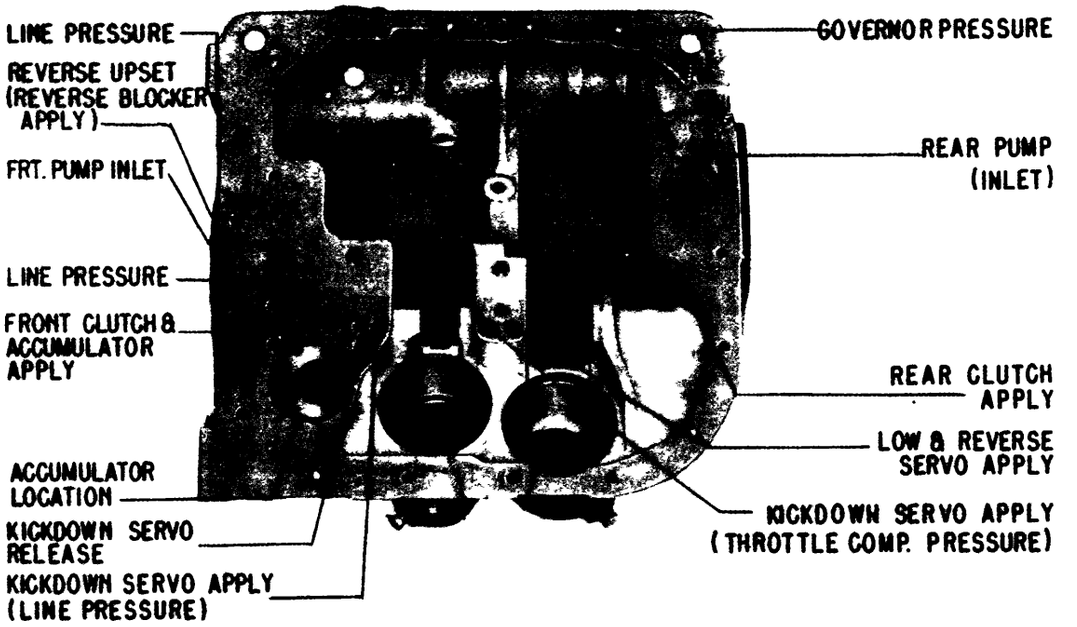
① - Tests are made with transmission in "D" (Drive) range with wheels free to turn.

►*NOTE: If governor pressure not correct, and does not correspond to car spe d, see "Trouble Shooting & Diagnosis" below.*

Lubricati n Pr ssur : Remove 1/8" pipe plug from lubrication pressure take-off hole located on left side of transmission case (middle plug forward of control lever and cable connection). Install pressure gauge at this point and proceed as follows: With engine running at 800 RPM in "N" (Neutral), lubrication pressure should be approximately 10-30 lbs. If pressure is incorrect, check line pressure and see "Trouble Shooting & Diagnosis" below. If pressure is extremely high (above 50 lbs.) it is an indication of a restriction due to dirt or foreign matter in lubrication passages.

Front Servo Release & Rear Clutch Apply Pressure: The front servo release and rear clutch apply pressure can be checked simultaneously with line pressure or immediately after line pressure has been determined. Remove the 1/8" pipe plug from front servo release and rear clutch apply pressure take-off hole located on lower right side of transmission (in servo boss just above transmission lower flange). Install the pressure gauge at this point. The pressure should not be less than 15 lbs. lower than line pressure in the "D" (Drive) position — **in direct only.**

Throttl Pr ssur Adjustment (DeSoto): *NOTE* - This adjustment is to be made only in the event throttle pressure adjustment is suspected of being incorrect (improper part throttle shift pattern, although governor pressure checks satisfactorily and throttle linkage adjustment is known to be correct). With car off floor and wheels free to turn, install a 100 lb. pressure gauge on the compensated throttle pressure take-off hole at top of kickdown servo on right side of transmission. Disconnect throttle linkage bellcrank from transmission. Start engine and place selector lever in "D" (Drive) range. While holding transmission throttle lever forward against its stop, increase engine speed slowly to 1500 RPM to obtain an upshift to direct ratio (there will be no compensated throttle pressure until upshift takes place). After the shift takes place compensated throttle pressure should read 26-32 lbs. Check compensated throttle pressure as follows: As transmission throttle pressure lever is moved away from its stop toward full throttle, compensated throttle pressure should begin to rise after 0° to 5° movement (zero to 7 32" travel at outer end of the 2½" long transmission throttle lever). If compensated throttle pressure is above 32 lbs., and begins to rise immediately when the lever is moved or if pressure is 26-32 lbs., but fails to rise after approximately 5° movement, throttle pressure should be adjusted as outlined: *NOTE*- Before stopping engine, move throttle lever slowly through its full travel. Compensated throttle pressure should rise to approximately 80-90 lbs. and then fall smoothly without hesitation as the lever is returned to its stop. The pressure reading at the stop should be consistent. Failure of the pressure to return smoothly or inconsistent stop pressures is indicative of faulty or sticking throttle valve or throttle compensator valve. Clean and inspect valve body. Shut off engine, drain transmission and remove oil pan. Loosen throttle lever stop screw approximately 5 turns. Insert gauge Tool C-3610 between throttle valve lever tang and the end of kickdown valve. By pushing in on kickdown valve with the tool, bottom the throttle valve and kickdown valve and tighten throttle valve lever stop screw finger tight (do not use wrench) to remove all free play of throttle valve lever. Be sure the adjustment is made with throttle valve spring fully compressed and the gauge pin held squarely in line with the kickdown valve. Before removing gauge, tighten throttle valve lever stop screw locknut securely. Reinstall oil pan and throttle linkage.



TORQUEFLITE OIL PASSAGES IN TRANSMISSION CASE

AIR PRESSURE TESTS: The front clutch, rear clutch, kickdown servo, and low and reverse servo may be checked by applying air pressure to their respective passages when valve body is removed *(CAUTION – Air supply must be free of all dirt and moisture).* Refer to "Oil Passages in Transmission Case" illustration for location of air passages.

1) Raise car on hoist, drain transmission fluid and remove transmission oil pan.

2) **Front Clutch**–Remove accumulator cover. Apply pressure to front clutch passage. Listen for a dull thud which indicates that front clutch is operating. Hold air pressure on for a few seconds and check for excessive oil leaks in system.

3) **Rear Clutch**–Remove valve body assembly and apply air pressure to rear clutch passage. Listen for a dull thud which indicates that rear clutch is operating. Check for excessive oil leaks.

4) **Kickdown Servo**–Apply air pressure to kickdown "apply" (line)) pressure passage. Observe operation of kickdown servo, lever and band when air pressure is applied. Apply air pressure to "apply" (compensated throttle) pressure passage and observe operation of kickdown servo.

5) **Low & Reverse Servo**–Apply air pressure to low & reverse servo passage and observe operation of servo, lever, and band.

6) **G v rnor**–Apply air pressure to "line pressure-to-governor" passage. Rotate propeller shaft slightly to bring governor flyweight down while applying the

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

pressure. Operation of the governor will be indicated by a sharp click when air pressure is applied.

►*AIR PRESSURE TEST NOTE: If all the above units operate properly, "no drive", "erratic" and "no upshift" conditions are caused by trouble in the control valve assembly.*

TROUBLE SHOOTING & DIAGNOSIS

►*TROUBLE SHOOTING & DIAGNOSIS NOTE: Except where noted, the following operations can be performed without removing the transmission from the car.*

LINE PRESSURE INCORRECT: Oil level incorrect. Check for stuck or scratched regulator valve or buckled spring. Check kickdown servo for broken seal rings, stuck piston or broken linkage. Check low & reverse servo for torn seal, stuck piston sleeve, broken band or linkage. Check for possible leak at front pump suction tube, tube elbow or rear pump suction tube. Check for loose bolts, burrs or scratches on mating surfaces of valve body. Clean valve assembly and check for stuck valves, dirt, scratched valve or body, and burrs on valves. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Check regulator valve body for scratches and scoring on valve bores and face which bears against front pump housing. Examine regulator valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

GOVERNOR PRESSURE INCORRECT (Does not correspond to car speeds): Clean governor assembly, and check weight assembly and valve for burrs, scratches or sticky operation. Examine governor valve shaft, shaft snap rings and seal rings. Clean and inspect rear pump assembly for side or diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring.

LUBRICATION PRESSURE INCORRECT: Check for stuck or scratched regulator valve or buckled spring. Check for stuck or scratched converter control valve or buckled spring. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Flush out converter and check converter-to-housing runout.

HARSH NEUTRAL-TO-DRIVE OR NEUTRAL-TO-REVERSE SHIFT: Check hydraulic control pressures. Adjust low and reverse band. Adjust engine idle speed. Check Low & Reverse servo for torn seal, stuck piston sleeve, broken band or broken linkage. Check accumulator cover screw torque and piston for broken rings. *Transmission must be removed for the following:* Clean and inspect front clutch discs, plates, drive hub, return spring and piston. Check front clutch circuit for leakage. Clean and inspect rear discs, plates, return spring and piston. Check rear clutch circuit for leakage.

DELAYED NEUTRAL-TO-DRIVE SHIFT: Check transmission oil level. Check hydraulic control pressures. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side or diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect front clutch discs, plates, drive hub, return spring and piston. Check front clutch circuit for leakage.

RUNAWAY ON UPSHIFT & 3-2 KICKDOWN: Check transmission oil level. Adjust throttle linkage *(see "Carburetor" on car model pages).* Check hydraulic control pressures. Adjust kickdown band. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage.

HARSH UPSHIFT & 3-2 KICKDOWN: Adjust throttle linkage *(see "Carburetor" on car model pages).* Check hydraulic control pressures. Adjust kickdown band. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. *Transmission must be removed for the following:* Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage.

NO UPSHIFT: Proceed as for "Runaway on Upshift & 3-2 Kickdown" above, and clean governor assembly and check weight assembly and valves for burrs, scratches and sticky operation. Examine governor valve shaft, shaft snap rings and seal rings.

NO KICKDOWN OR NORMAL DOWNSHIFT: Proceed as for "Runaway on Upshift & 3-2 Kickdown" above. Check control cable adjustment. Adjust low and reverse band. *Transmission must be removed for the following:* Clean and inspect overrunning clutch assembly for brinnelled rollers and cam, and improperly assembled rollers and springs.

SHIFTS ERRATICALLY: Check transmission oil level. Adjust throttle linkage *(see "Carburetor" on car model pages).* Check control cable adjustment. Check hydraulic control pressures. Check for stuck or scratched regulator valve or buckled spring. Check output shaft rear bearing for roughness or an unseated snap ring. Check for possible air leakage at front pump suction tube, tube elbow or rear pump suction tube. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Test transmission units with air pressure (see above). Clean governor assembly and check weight assembly and valve for burrs, scratches and sticky operation. Examine governor valve shaft, shaft snap rings and seal rings. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side or diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings.

SLIPS IN FORWARD DRIVE POSITIONS: Check transmission oil level. Check hydraulic control pressures. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure. *Transmission must be removed for th following:* Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage. Clean and inspect the overrunning clutch assembly for brinnelled rollers or cam, and improperly assembled rollers and springs.

SLIPS IN LOW-REVERSE ONLY: Check hydraulic control pressures. Adjust low-reverse band. Check low-reverse servo for torn oil seal, stuck piston sleeve, broken band or linkage. Check control valve body for loose bolts, burrs, scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Test transmission units with air pressure. *Transmission must be removed for th following:* Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump. Examine valve body to determine if the secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

SLIPS IN ALL POSITIONS: Check transmission oil level. Check hydraulic control pressures. Check for a stuck or scratched regulator valve or buckled valve spring. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Test transmission units with air pressure (see above). *Transmission must be removed for th following:* Clean and inspect front pump and drive sleeve assembly for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump. Examine valve body to determine if the secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

NO DRIVE IN ANY POSITION: Proceed as for "Slips in all Positions" above, and in addition, check for possible air leakage at front pump suction tube, tube elbow or rear pump suction tube.

CONTINUED ON NEXT PAGE

TORQUEFLITE (Cont.)

NO DRIVE IN FORWARD RANGES: Check hydraulic control pressures. Adjust kickdown band. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Check accumulator cover screw torque and piston for broken rings. Test transmission units with air pressure (see above). *Transmission must be removed for th following:* Clean and inspect front clutch discs, plates, drive hub, return spring and piston. Check front clutch circuit for leakage. Clean and inspect rear clutch discs, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage. Clean and inspect overrunning clutch assembly for brinnelled rollers or cam, and improperly assembled rollers and springs.

NO DRIVE IN REVERSE: Check hydraulic control pressures. Adjust low-reverse band. Check low-reverse servo for torn seal, stuck piston sleeve, broken band or linkage. Test transmission units with air pressure (see above). *Transmission must be removed for the following:* Clean and inspect rear clutch disc, plates, drive hub, return spring and piston. Check rear clutch circuit for leakage.

DRIVES IN NEUTRAL: Adjust gearshift control cable. Check control valve body for loose bolts, burrs or scratches on mating surfaces. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. *Transmission must be removed for the following:* Clean and inspect front clutch disc, plates, drive hub, return spring and piston. Check front clutch circuits for leakage.

DRAGS OR LOCKS: Adjust kickdown band and the low-reverse band. Check handbrake for excessive drag. Check kickdown servo for broken seal rings, stuck servo piston or broken linkage. Check low-reverse servo for torn oil seal, stuck piston sleeve, broken band or linkage. *Transmission must be removed for the following:* Clean and inspect discs, plates, drive hub, return spring and piston of both front and rear clutches. Check front and rear clutch circuits for leakage. Clean and inspect planetary gear set for worn thrust washers, nicked or rough gear teeth, and excessive pinion clearance. Clean and inspect overrunning clutch assembly for brinnelled rollers and cam and improperly assembled rollers and spring.

GRATING & SCRAPING NOISES: Check handbrake for excessive drag. Check output shaft rear bearing for roughness or an unseated snap ring. Clean governor assembly, and check weight assembly and valves for burrs, scratches, or sticky operation. Examine governor valve shaft, shaft snap rings and seal rings. Clean and inspect rear pump assembly for side or diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support for scoring. *Transmission must be removed for the following:* Clean ar l inspect front pump assembly for side or diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect front and rear clutch discs, plate, drive hubs, return spring and pistons. Check front and rear clutch circuits for leakage. Clean and inspect planetary gear set for worn thrust washers, nicked or rough gear teeth, and excessive pinion clearance.

BUZZING NOISES: Check transmission oil level. Check for stuck or scratched regulator valve or buckled spring. Check for stuck or scratched converter valve or buckled spring. *Transmission must be removed for the following:*. Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump housing. Examine valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

TRANSMISSION HARD TO FILL (Oil blow out filler tube): Check transmission oil level. Check for stuck or scratched regulator valve or buckled spring. Check for stuck or scratched converter valve or buckled spring. Check to determine whether tube is free of dirt. Check for possible air leakage at front pump suction tube, tube elbow or rear pump suction tube. *Transmission must be removed for the following:* Clean and inspect front pump assembly for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal rings. Clean and inspect regulator valve body for scratches and scoring on valve bores and face which bears against front pump housing. Examine valve body to determine if secondary reaction orifice if free of dirt. Check gasket for uniformness of compression by valve body.

TRANSMISSION OVERHEATS: Check transmission oil level. Adjust kickdown band and low-reverse band. Check handbrake for excessive drag. Check regulator and converter valves for stuck or scratched valves or buckled springs. Check for mud, dirt, or other foreign material on screens or torque converter cooling fins. Clean and inspect rear pump assembly for side and diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring. *Transmission must be removed for the following:* Clean and inspect front pump and drive sleeve assembly for side and diametral appearance. Examine oil pump inner and outer rotor for scoring. Check drive sleeve seal rings. Check and inspect regulator valve body for scratches and scoring on valve bores and face which bears against the front pump housing. Examine the valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body. Clean and inspect front and rear clutch discs, plate, drive hubs, return spring and piston. Check front and rear clutch circuits for leakage.

IMPOSSIBLE TO PUSH CAR: Check hydraulic control pressures. Adjust low-reverse band. Check low-reverse servo for torn seal, stuck piston sleeve, broken band or linkage. Check valve body for loose bolts, burrs or scratches on mating surfaces. Clean valve body assembly, check for stuck valves, dirt, scratched valves or body, and burrs on valves. Tighten valve body bolts to correct specifications. Clean and inspect rear pump assembly for side and diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring.

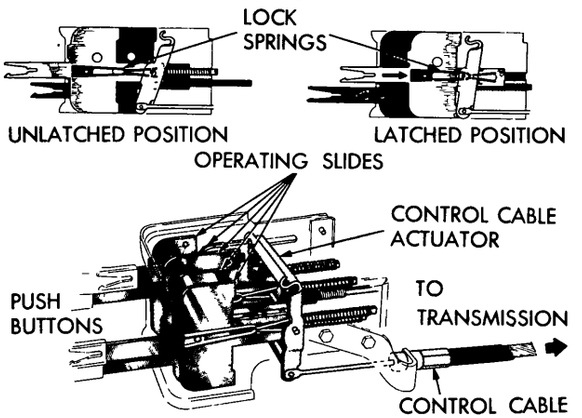
STARTER WILL NOT ENERGIZE: Adjust gearshift control cable. Adjust engine idle speed.

GEARSHIFT CONTROL UNIT

►*BACK-UP LIGHT SWITCH NOTE:* The back-up light switch is located on push button control unit and is operated by the "R" (Reverse) button.

►*STARTER SWITCH NOTE:* On Chrysler and Dodge models, the starter switch is located on rear of push button control unit and is operated by fully depressing the "N" (Neutral) button.

OPERATION: Mechanical connection between gearshift control unit on instrument panel and the transmission manual control valve is by a single push-pull cable. One end of wire cable is secured to cable actuator in push button control unit while other end enters control cable adapter housing on transmission case to engage manual control valve lever assembly. When button is pushed in, the operating slide contacts the cable actuator, causing it to pivot, and movement of actuator about its axis moves that attached wire cable. When push button reaches its limit of travel, a spring lock on the operating slide engages actuator shaft, holding the push button in an engaged position. When another button is pushed to select a different range, the top or bottom portion (depending on which button was pushed) of the slide contacts the actuator which releases the first push button from restraint of spring lock and allows it to return to the original position.



PUSH BUTTON GEARSHIFT CONTROL UNIT

GEARSHIFT CONTROL UNIT (Removal): Remove four screws holding gearshift housing and plate assembly to instrument panel. Pull plate and gearshift control housing assembly straight out and down from instrument panel (*NOTE* - If housing is equipped with back-up light switch, be careful not to damage switch when removing plate). Remove two retaining screws securing gearshift housing to plate and remove plate by withdrawing from push buttons. Remove hairpin clip secur-

CONTINUED ON NEXT PAGE

TORQUEFLITE (Cont.)

ing cable end to actuator. Remove two screws securing cable assembly bracket to gearshift control housing and remove cable assembly. Remove wires from back-up light switch. Remove illuminating lamp lead wire. Remove leads from starting motor switch (if so equipped). *(NOTE* - If necessary to remove push buttons from slides, withdraw by pulling on buttons. Do not spread the slide tangs or fingers).

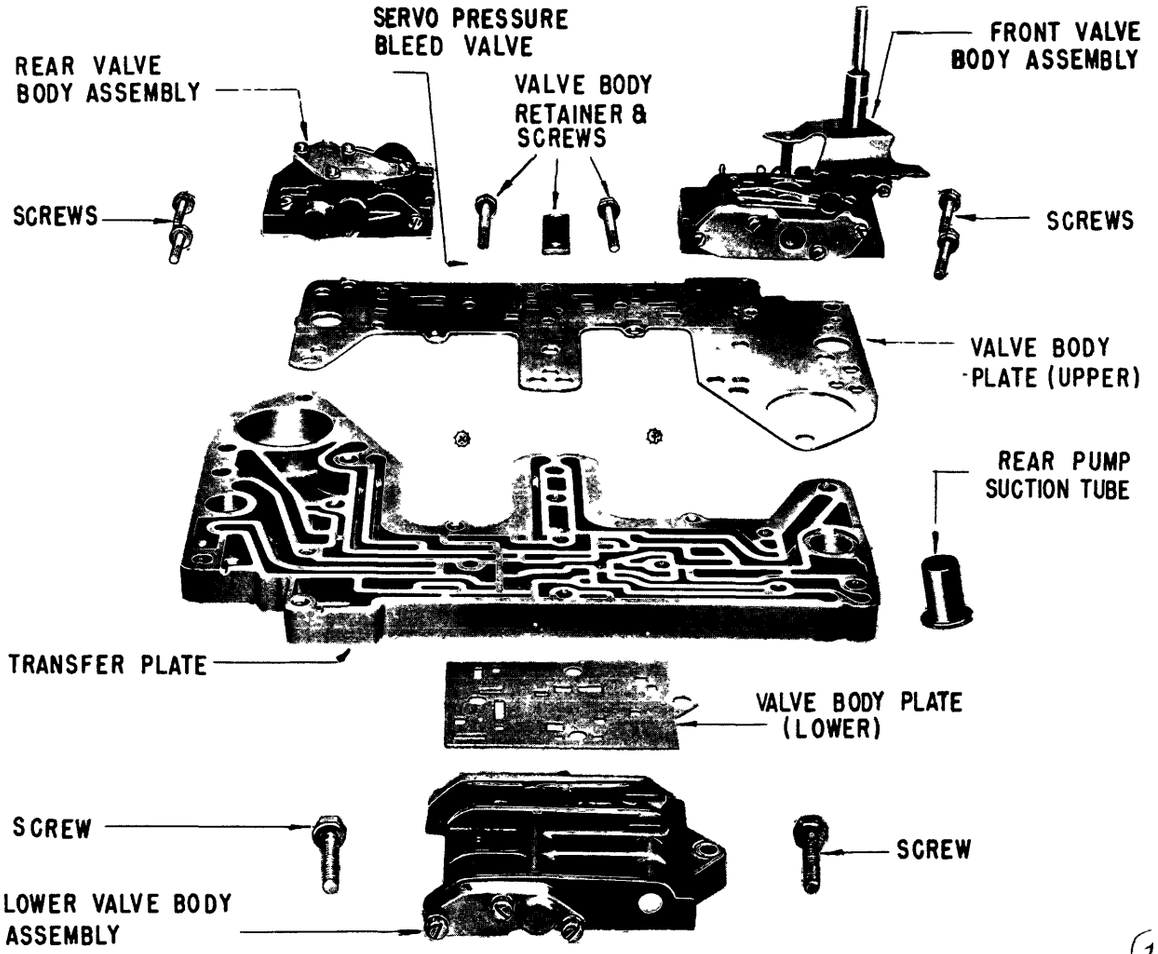
Installation: Install end of control cable on actuator and install clip. Place cable bracket in position on gearshift control housing, install two screws and tighten securely. Reconnect back-up light switch wires (check wire routing as noted at disassembly). Reconnect starting motor switch leads. If push buttons were removed, slightly compress fingers on slides (if necessary) to aid in retention of push buttons. Place gearshift control housing in position on plate and secure with two retainer screws. Carefully guide plate and gearshift housing assembly back into position in instrument panel and secure with four screws. If housing is equipped with back-up light switch, exercise care during positioning of plate in instrument panel to avoid damaging switch. Adjust manual control cable.

MANUAL CONTROL CABLE (Removal): Engage "1" button to place spring lock in line with control cable adapter plug hole in transmission case. Remove gearshift control unit from instrument panel (see above). Remove cable adjustable mounting bracket on transmission. Remove control cable adapter housing plug, insert screwdriver through hole and release control cable spring lock. While releasing the spring lock, remove cable. Using the same screwdriver, insert through cable hole in adapter housing and push lever rearward to last detent. Reinstall housing plug and tighten. From front of dash, pull cable assembly and grommet from dash panel.

Installation: Place grommet on cable. From front of dash, install control housing end of cable through dash panel. Install gearshift control unit (see above). Install cable grommet in dash panel. Remove oil pan. Remove neutral starting switch from transmission case. Position manual lever in "low" range detent. Hold the "R" (Reverse) button in at full travel position. Insert cable into transmission manual lever adapter until spring lock engages control cable securely. Release the "R" button and hold "N" (Neutral) button in. Adjust manual control cable (see above).

GEARSHIFT UNIT LAMP BULB REPLACEMENT: Remove gearshift housing and plate (see above). Remove one or more push buttons for clearance. Replace defective or burned out bulb. Replace control housing and plate assembly. Test operation of unit.

BACK-UP LIGHT SWITCH REPLACEMENT: Remove gearshift control housing and plate (see above). Back-up light switch is fastened to control unit by four tabs. Remove lead wires, then straighten tabs to remove switch. To install, position switch and bend tabs to secure switch to housing. Reconnect lead wires. Check reverse slide action (slide should freely return for full travel). Install gearshift control housing.



TORQUEFLITE VALVE BODY & TRANSFER PLATE ASSEMBLY

STARTING MOTOR SWITCH REPLACEMENT (CHRYSLER & DODGE): Remove gearshift housing (see above). Remove starter motor switch by drilling out rivets. Mount replacement switch on housing assembly and secure by riveting or suitable screws. Be sure that sufficient clearance is maintained for free movement of operating slide ends if screws are used.

Adjustment: Depress "N" (Neutral) button to the neutral position only, then press only far enough beyond this point to remove all free movement from actuator. Clearance between slide and motor starting switch contact should be .010-.015". If clearance is not within specification, tab on neutral operating slide may be adjusted by carefully bending to bring within specifications *(CAUTION - Us car as op rating slid is of hard n d mat rial and may be br k n during bending op ration).*

GEARSHIFT CONTROL UNIT TROUBLE SHOOTING & DIAGNOSIS

LOW & REVERSE BUTTONS REQUIRE HEAVY PRESSURE TO LOCK: Adjust manual control cable. See *"Manual Control Cable Adjustment" above.*

"CLUNKING" NOISE WHEN BUTTON RETURNS: Remove control unit and replace rubber bumper if missing or damaged.

PUSH BUTTON WILL NOT RETURN: Remove control unit and replace broken or defective return spring.

PUSH BUTTON WILL NOT LOCK: Replace operating slide.

PUSH BUTTON BINDS: Replace operating slides if

CONTINUED ON NEXT PAGE

TORQUEFLITE (Cont.)

warped. Align bezel so push buttons are centered. Position light lead wire as outlined under "Gearshift Control Unit Installation" above. Carefully relieve area where push button contacts felt. This can be done by inserting a .005" feeler gauge between push button cover and the felt mask. Gently moving the gauge in and out in this area will usually relieve the binding condition. Should it become necessary to replace or reglue the mask, use a suitable adhesive and place glue in an area where it will not interfere with operation of the push buttons.

LOOSE PUSH BUTTON COVER: Remove bezel to expose push button. Using a small screwdriver, exert sufficient pressure to force tang into plastic recess on push button.

TRANSMISSION UNIT REMOVAL (TRANSMISSION IN CAR)

▷*NOTE: When units are removed from transmission, each unit must be inspected before assembly as outlined under "Transmission Overhaul".*

NEUTRAL STARTER SWITCH (Removal): Drain approximately two quarts of fluid from transmission and reinstall drain plug. Remove wire from switch and remove switch and gasket.

Installation: Reverse removal procedure and tighten switch to 15-20 ft. lbs.

REGULATOR VALVE ASSEMBLY (Removal): Remove regulator valve spring retainer, gasket and spring. Using a mechanical retriever or a piece of welding rod (5/32") inserted in end of valve, remove valve.

Installation: Reverse removal procedure and tighten spring retainer to 45-50 ft. lbs.

TORQUE CONVERTER CONTROL VALVE (Removal): Remove torque converter control valve spring retainer, gasket and spring. Using a mechanical retriever or a piece of welding rod (1/8") inserted in valve, remove valve.

Installation: Reverse removal procedure and tighten retainer to 35-40 ft. lbs.

OIL PAN (Removal): Drain transmission, install drain plug and tighten. Remove oil pan filler tube from pan and loosen support bracket screw. Remove oil pan.

Installation: Reverse removal procedure. Tighten pan screws to 12-17 ft. lbs. Tighten filler tube nut to 35-40 ft. lbs.

VALVE BODIES & TRANSFER PLATE (Removal): Place push button control unit in "L" (Low) position (it is necessary that control adapter be in this position when removing cable). Remove oil pan. Disconnect throttle linkage from throttle lever on transmission. Remove all dirt and foreign material from around control cable housing. Loosen throttle control lever screw and remove lever assembly. Remove flat washer and felt oil seal from throttle lever shaft. Remove control cable adjustable mounting bracket. Remove control cable adapter housing plug, insert screwdriver through hole and release the control cable spring lock. While releasing control cable spring lock, remove cable. Insert screwdriver through cable opening in adapter housing and push lever rearward to last detent. Reinstall housing plug and tighten. Remove three control cable housing screws and washers and remove housing and gasket. Loosen manual control lever screw and slide lever off shaft. Remove the four oil strainer assembly screws and washers and remove oil strainer assembly. Loosen and remove the three accumulator cover screws with washers. Remove cover and spring from transfer case. Remove transfer plate screws and washers and remove valve bodies and transfer plate assembly from transmission case.

Installation: Clean mating surfaces and check for burrs on both transmission case and valve body transfer plate. Install valve bodies and transfer plate assembly on transmission case. Install transfer plate screws and washers and tighten to 16 ft. lbs. evenly (*CAUTION - Dished type washers should be installed on screws with dished portion facing away from screw head*). Install accumulator spring through transfer plate and position in piston. Install accumulator cover, screws, and washers. Draw screws down evenly. Place oil strainer in place on transfer plate assembly. Install four screws and lockwashers. Draw down evenly and tighten strainer and accumulator cover screw to 16 ft. lbs. Install oil pan, then install manual control lever with locking screw to rear on manual valve shaft. Position lever on shaft so there is 7/32" clearance between lever and transmission case (without gasket). If control cable adapter has been removed from manual valve control lever, reinstall by positioning in lever (end of spring lock up), and installing pin. Place manual valve control lever in reverse position (last detent to rear) and install gasket, control cable housing, and screws and washers. Draw down evenly and tighten to 16 ft. lbs. Install felt washer, flat washer, and throttle lever control assembly. Tighten clamping bolt. Connect throttle linkage to throttle lever on transmission. Install control cable in housing and adapter making sure spring lock engages cable. Replace cable adjustable mounting bracket. Adjust manual control cable (see above).

KICKDOWN PISTON (Removal): After removal of valve bodies and transfer plate (see above), loosen kickdown band adjusting screw locknut and back adjusting screw out sufficiently to remove anchor. Remove kickdown band strut. Install Tool C-3529 or C-3289 (modified), apply sufficient pressure on kickdown piston rod guide, and remove snap ring. (Oil will drain from servo when compression portion of tool is loosened). Loosen compression portion of tool and remove piston rod guide, piston spring and piston rod. Using pliers, Tool C-484, remove kickdown piston from transmission case.

Installation: Lubricate piston rings and place kickdown piston assembly into position, compress outer ring, and start assembly into case. With piston properly centered (so not to damage rings) tap lightly and bottom piston into transmission case. Slide piston spring over kickdown piston rod assembly and install in piston. While holding in this position, install the kickdown piston rod guide assembly on kickdown piston rod. Using Tool C-3529 or C-3289 compress the kickdown piston spring to the point that piston guide seal ring slightly binds on transmission case. Work seal ring into position and gradually compress spring until seal ring enters case and snap ring can be installed. Install kickdown piston rod guide snap ring, making sure it is properly seated. Loosen compressing portion of tool and remove tool from transmission. Place kickdown band strut in position in band and lever and compress band end sufficiently to install anchor over adjusting screw. Adjust kickdown band. Install valve bodies and transfer plate assembly.

ACCUMULATOR PISTON (Removal): Remove valve bodies and transfer plate (see above). Using pliers, Tool C-484, remove accumulator piston from transmission case.

Installation: Lubricate seal rings and place accumulator piston into position. Compress outer seal ring and tap lightly into transmission case. Install valve bodies and transfer plate assemblies.

OUTPUT SHAFT REAR BEARING OIL SEAL (Removal): Disconnect front universal joint. Apply hand brake and remove propeller shaft flange nut and Belleville washer. Release hand brake and install puller, Tool C-452 (if necessary). Remove propeller shaft flange and brake drum assembly. Remove transmission brake support grease shield spring (small one). Remove brake support grease shield from extension (*CAUTION* - If screwdriver or sharp instrument is used in performing this operation, care must be taken to prevent damage to neoprene sealing surface at bottom of shield), Install puller, Tool C-748, and remove transmission output shaft rear bearing oil seal.

Installation: Using driver, Tool C-3205, install output shaft rear bearing oil seal (metal portion of oil seal facing in) until driver bottoms on extension. (*CAUTION* - Indent on grease shield must match groove in extension for correct positioning. Also, shield must be located on extension far enough to permit installation of spring). Install brake support grease shield spring (opening in spring toward adjusting sleeve). Make sure spring is properly seated in groove. Install propeller shaft flange, Belleville washer, and nut. Apply hand brake and tighten propeller shaft flange nut to 200 ft. lbs. Connect front universal joint and torque nuts to 33-37 ft. lbs. Refill transmission (if necessary).

EXTENSION HOUSING (Removal): Drain approximately two quarts of fluid from transmission. Disconnect front universal joint. Apply hand brake and remove propeller shaft flange nut and Belleville washer. Release hand brake, and using puller, Tool C-452 remove propeller shaft flange and drum assembly. Remove brake adjusting screw cover plate and loosen cable clamp bolt on hand brake support. Disengage the ball end of cable from operating lever and remove cable from brake support. Disconnect speedometer cable and housing at transmission extension and remove speedometer drive pinion and sleeve assembly. Remove nuts and lockwashers holding engine rear support insulator to crossmember, leaving insulator attached to extension. Remove the two top extension to case screws and lockwashers. Using a suitable jack and extreme care to prevent damage to oil pan, raise transmission sufficient-

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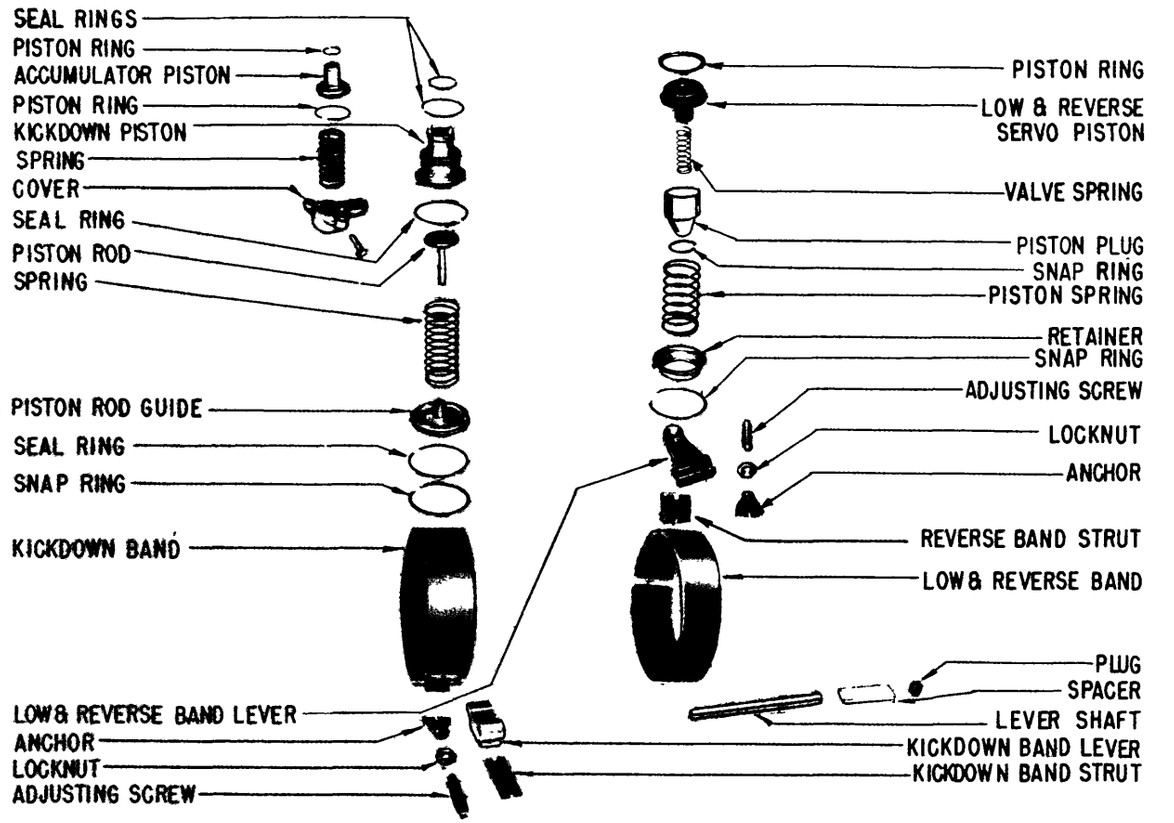
TORQUEFLITE (C nt.)

ly for insulator on extension to clear crossmember. Remove four of the remaining extension to case screws and lockwashers and install guide studs, Tool C-3283. *(NOTE* - Due to interference of the insulator, it will be necessary to remove the bottom extension to case screw with the extension, that is, back out the screw as far as possible and slide extension back and continue loosening screw). *(CAUTION - Do not remove the one output shaft support to transmission case screw).* Remove extension and hand brake as one assembly. Remove extension gasket. *NOTE* - If care is used, it is not necessary to remove hand brake support and shoe assemblies from extension to replace output shaft rear bearing.

Installation: Reverse removal procedure and note the following: Start bottom extension to case screw as the extension is pushed into position against support. *(CAUTION - Do not attempt to pull extension in with aid of th screws; damage to extension may result).* Tighten extension to case screws to 25-30 ft. lbs. Tighten propeller shaft flange nut to 200 ft. lbs. Tighten universal joint nuts to 33-37 ft. lbs. Tighten speedometer pinion and sleeve assembly to 40-45 ft. lbs.

GOVERNOR (Removal): Remove extension housing, see above. Remove governor valve shaft and valve from governor body assembly. Using pliers, Tool C-3229, remove governor weight assembly snap ring (large) and remove weight assembly. *(NOTE* - The primary cause of governor operating failure is usually due to improper operation of governor valve which may be sticking in housing or travel restricted by chips or other foreign matter. If inspection indicates complete removal, proceed as follows): Remove governor support locating screw and remove governor and support assembly from rear oil pump housing. Normal servicing does not require removal of governor body from support. If condition warrants removal of governor body from support, when reassembling, do not tighten governor body screws until governor body support is located on output shaft.

Installation: Slide governor body and support assembly into position in rear oil pump housing, using extreme care, compress governor support seal rings as support enters oil pump housing. DO NOT FORCE. Align locating hole in output shaft to locating screw hole in governor support and install screw. Tighten to 5-7 ft. lbs. Holes can be aligned by turning output shaft and holding governor body. If governor body has been removed and reinstalled, tighten the four governor body screws to 6-8 ft. lbs. Place governor weight assembly (secondary weight snap ring facing out) into governor body; and using pliers, Tool C-3229, install snap ring. Make sure snap ring seats properly. With governor valve (small end up) on governor valve shaft, slide shaft into governor body through the output shaft and governor weight assembly; at the same time position valve into body. Install governor valve shaft snap ring. Make sure it is locked securely to shaft. Replace snap ring if distorted *(NOTE* - After snap ring installation, apply sufficient pressure to both ends of valve shaft to force snap ring to outer portion of snap ring grooves). Check operation of governor weight assembly and valve by turning output shaft. Both should fall freely in valve body. Install extension housing.



TORQUEFLITE SERVO & BAND ASSEMBLIES

REAR OIL PUMP (Removal): Remove extension housing, see above. Using a screw driver, remove governor valve shaft snap ring from weight assembly end. Remove governor valve shaft and valve from governor body assembly. Using pliers, Tool C-229, remove governor weight snap ring (large) and remove governor weight assembly from governor body. Remove governor locating screw from governor support. Remove oil pump-to-output shaft support screws and Belleville washers, and install guide studs, Tool C-3288. Remove pump housing, gear, and governor assembly from output shaft. Use prussian blue and mark pump gears in relation to pump housing face *(CAUTION - Do not scribe).* When removing oil pump pinion, use care so as not to lose the small ball used as a key. Remove rear oil pump pinion from output shaft and mark in same manner. Remove governor assembly from oil pump housing.

Installati n: Install governor support and body assembly into position in rear pump housing. Compress governor support seal rings as support enters oil pump housing. DO NOT FORCE. Place rear oil pump pinion ball in ball socket in output shaft. Place rear oil pump pinion (as marked when removed) over output shaft and into position aligning keyway in pinion with ball in shaft. With rear oil pump properly positioned in pump housing (check marking), slide rear oil pump and governor assemblies over output shaft and guide studs into position against support. *(CAUTION - Ther ar two xtra hol s in housing which are used for v nts. Make d finitely sure no attempt is made to install screws in thes hol s).* Remove guide studs and install pump housing-to-output shaft support screws and Belleville washers (install washers with dished portion facing away from head). Tighten screws evenly to 10-12 ft. lbs. Rotate output shaft to make sure pump gears are free to rotate. If not, remove pump to determine cause. Align locating hole in output shaft-locating screw hole in governor support. Install locating screw and tighten to 5-7 ft. lbs. Complete installation by following governor installation procedure outlined above.

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TORQUEFLITE (C nt.)

TRANSMISSION REMOVAL & INSTALLATION

REMOVAL: 1) Disconnect battery. Push in the "1" (Low) button and raise car off floor *(NOTE* - Push button must be in the "1" position to remove cable from adaptor housing on transmission). Drain transmission and torque converter (see "Draining & Refilling" above). Disconnect oil pan filler tube assembly from oil pan and loosen support bracket screw.

2) Disconnect the front universal joint and secure propeller shaft out of the way. Remove brake adjusting screw cover plate and loosen cable clamp bolt on hand brake support. Disengage the ball end of cable from operating lever and remove cable from brake support. Disconnect speedometer cable and housing at transmission extension. Disconnect neutral starter wire at switch. Unclip wires from crossmember.

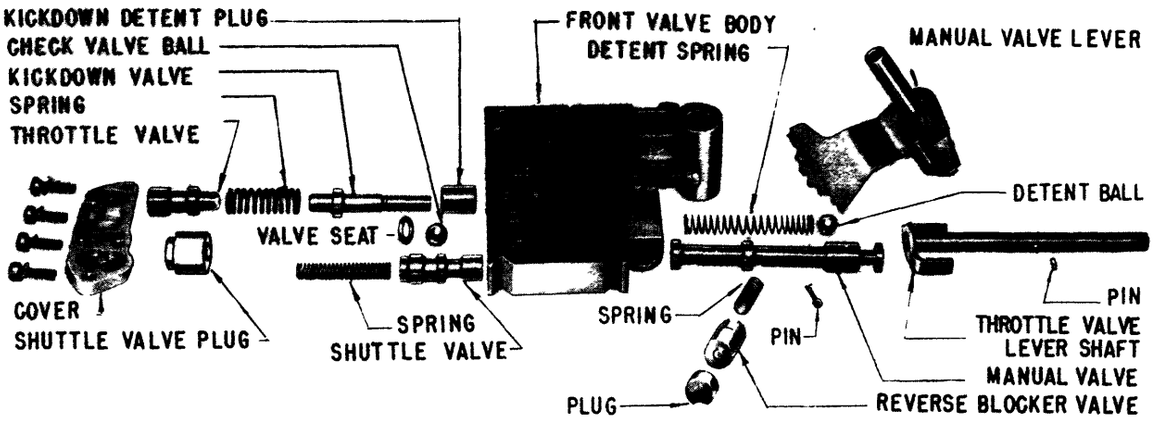
3) Disconnect throttle control linkage from throttle lever on transmission. Loosen push button control cable adjustable mounting bracket. Remove control cable adapter housing plug, insert screwdriver through hole and release control cable spring lock. While releasing control cable spring lock, remove cable from adapter housing. Using same screwdriver, insert through cable opening in adapter housing and push lever rearward to last detent. Reinstall housing plug and tighten.

4) Disconnect the two oil cooler lines from transmission (if so equipped). Remove nuts and lockwashers holding engine rear support insulator to crossmember, leaving insulator attached to extension. Remove starter.

5) Install engine support fixture, Tool C-3487. Insert hooks of fixture firmly into holes in side of frame member with support ends up against underside of oil pan flange. Adjust fixture to support weight of engine. Raise engine slightly, remove crossmember-to-frame bolts and remove crossmember. *(CAUTION - Do not lower engin more than three inches from floor pan).*

6) Remove the two transmission case-to-torque converter housing screws and lockwashers from right side and install guide studs, Tool C-3276. With transmission supported, remove the two transmission case-to-converter housing screws and lockwashers from left side. Slide transmission straight back to avoid damage to front oil pump driving sleeve, then lower to floor.

INSTALLATION: 1) Install guide studs, Tool C-3276, in the two transmission mounting holes in right side of torque converter housing. With front oil pump drive sleeve lubricated, install, making sure driving lugs are properly engaged with oil pump pinion. *(NOTE* - Main portion of drive sleeve will be flush with front of pump housing when properly installed). Note position of driving lugs inside torque converter hub, then position front oil pump drive sleeve on transmission accordingly, to aid on proper engagement when transmission installed. Slide transmission over guide studs and into position against converter housing. Make sure driving lugs on front oil pump drive sleeve properly engage torque converter.



TORQUEFLITE FRONT VALVE BODY ASSEMBLY

►*CAUTION - To avoid damage to front oil pump, do not attempt to use torque converter housing screws to bring transmission and housing together. If oil pump drive sleeve and input shaft have been properly aligned, the transmission should slide into position relatively easy. DO NOT FORCE.*

2) Install the two transmission-to-torque converter housing screws and lockwashers in left side (do not tighten). Remove guide studs and install the two transmission-to-housing screws and lockwashers in right side, then draw the four down evenly and tighten to 45-50 ft. lbs. Place crossmember into position and install crossmember-to-frame bolts. Tighten to 50-55 ft. lbs.

3) Lower engine and at the same time align mounting studs in insulator with holes in crossmember. Install the two nuts and lockwashers holding engine rear support and insulator to crossmember and tighten to 30-35 ft. lbs. Remove support fixture from side of frame member.

4) Install bracket holding oil cooler lines to cylinder block (if so equipped) on transmission case and tighten. Connect neutral starter-to-switch wire. Install oil pan filler tube and tighten filler tube nut to 35-40 ft. lbs. Tighten support bracket screw.

5) Connect speedometer cable and housing at extension. Engage ball end of hand brake cable in operating lever and tighten cable clamp bolt. Install adjusting brake screw cover plate on hand brake support. Connect front universal joint and tighten nuts to 33-37 ft.lbs.

6) Connect throttle control linkage to throttle lever on transmission. Install gearshift control cable in adapter making sure spring lock engages cable. Install starter, connect battery, refill transmission and adjust throttle linkage and gearshift control cable.

TORQUE CONVERTER REMOVAL

REMOVAL: Remove transmission, see above. Remove torque converter housing-to-adaptor screws and lockwashers. Remove torque converter housing. *(NOTE* - If torque converter is being removed because of excessive runout damage, check runout by using a dial indicator on hub, and mark the highest point of runout on both converter and crankshaft flange. This will aid later in determining if runout is due to converter or crankshaft). Using wrench, Tool C-589, remove the stud nuts and lockwashers from crankshaft flange. Remove converter from crankshaft. Check crankshaft flange runout which should be a maximum of .002".

CORRECTING HUB RUNOUT: Permissible converter hub runout, when mounted on the crankshaft is .004" total indicator reading. When mounting a new torque converter, make sure all foreign matter, raised metal around studs, burrs, chips and dirt are removed from converter and crankshaft drive flanges. Check crankshaft runout (maximum .002").

1) Check converter runout by mounting a dial indicator to adaptor plate or some other unit which is mounted rigidly to the engine block. Rotate converter 360° and determine converter hub, outside diameter, runout. If this exceeds .004" total indicator reading, then correct by using heat in the following manner: Mark position of hub low spot as accurately as possible on the impeller shell. Rotate converter so this mark is downward. Remove dust shield from front of adaptor plate. Using a piece of chalk, mark front cover radius directly opposite the hub low spot previously marked on impeller shell. The subsequent heating operation can now be done through the opening in adaptor plate. *(CAUTION - Drain converter housing before heating).* The size of the spot to be heated is governed by amount of hub runout and is usually 1/2" diameter for .008" total indicator reading. Using an acetylene torch having a No. 3 tip (set to maximum heat) apply to selected spot until it becomes a dull red. Rapid heating of the local area is essential and if the torch is adjusted properly, the spot will become red within a few seconds *(CAUTION - If sparks are noted, it is an indication that torch is too close and metal is starting to burn; move torch back slightly. Care should b taken to r move torch th instant the selected spot becomes a dull r d to avoid ov rcorrection or damag to the unit).* The area is then

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TORQUEFLITE (Cont.)

quenched as rapidly as possible with cold water (hose or wet rags). It is suggested this be done by starting around the heated area and working in toward the spot This prevents heat from spreading. *(NOTE - The hub runout should not be rechecked until the converter has returned to a uniform room temperature).* If the converter hub runout exceeds .016" total indicator reading, remove converter and recheck drive flanges for chips, burrs, etc. Check crankshaft flange runout (max. .002"). If runout remains in excess of .016", install a new converter.

STARTER RING GEAR (Removal): Support torque converter assembly in a vise and with a file carefully remove the staking lugs which retain ring gear to converter. *(CAUTION - Be careful when supporting converter in the vise to avoid distortion).* Place converter on blocks of wood for support while removing. Using a blunt chisel or drift, tap around ring gear until it comes off torque converter.

Installation: Remove burrs or raised spots (left on gear contact surface of converter), with a file, being careful not to remove more metal from converter than is required to remove burrs and rough surfaces. Any of the following methods may be used to heat starter ring gear for installation on converter:

Oven - When available, use oven C-794 and set temperature at 150° F. Allow ring gear to remain in oven approximately 15-20 minutes.

Boiling Water – Place ring gear in a shallow pan, add water, and heat approximately 8 minutes after water has come to a boil.

Steam – Place ring gear on a flat surface and direct steam flow around gear for approximately two minutes.

Flame – Place ring gear squarely on a flat surface. Using a medium tip, direct a low flame around inner rim of gear, being careful not to direct flame onto teeth of ring gear. Place a few drops of water on face of gear at short intervals during the heating process. When gear is hot enough to boil the drops of water, installation of gear on converter can be made.

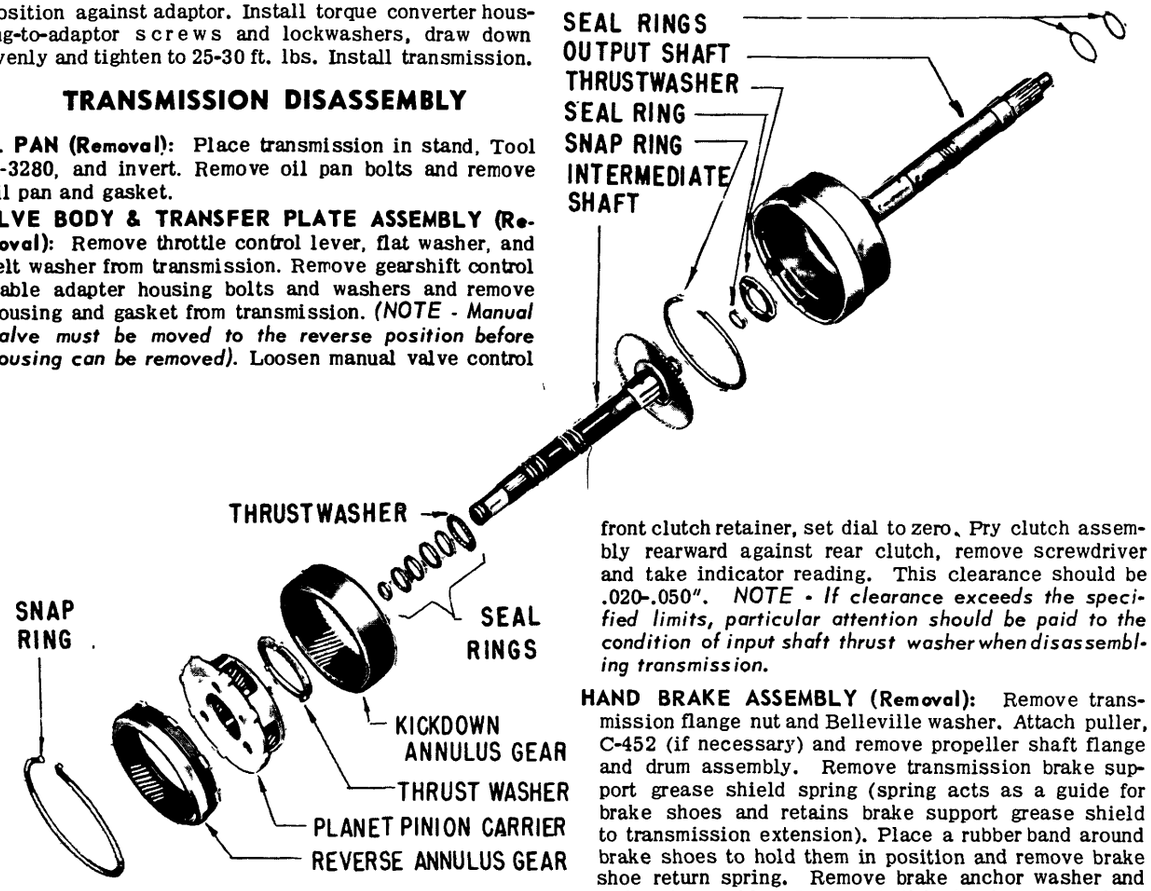
Reweld ring gear to converter using extreme care to place as nearly as possible the same amount of metal in exactly the same location as original assembly. This is necessary in order to maintain proper balance of unit. Place welds alternately on opposite sides of converter to minimize distortion. In making the weld, use a welding current of 200 amps. Use a D.C. welder that is set at straight polarity or an A.C. welder. Use a 5/32" dia. Fleetweld No. 47, or General Electric No. W28 (or equivalent). *(CAUTION - To prevent burning through the converter, the arc should be directed at intersection of gear and housing from an angle of approximately 45° from face of gear. DO NOT GAS WELD).* Before installing converter, inspect all gear teeth and remove nicks where metal is raised, or welding splatter.

INSTALLATION: Inspect mating surfaces on converter and crankshaft flange for burrs and dirt. Install converter on crankshaft. Install torque converter stud nuts and lockwashers. Draw down evenly and tighten. Check converter assembly runout which should not exceed .004". Place torque converter housing over dowels and into position against adaptor. Install torque converter housing-to-adaptor screws and lockwashers, draw down evenly and tighten to 25-30 ft. lbs. Install transmission.

TRANSMISSION DISASSEMBLY

OIL PAN (Removal): Place transmission in stand, Tool C-3280, and invert. Remove oil pan bolts and remove oil pan and gasket.

VALVE BODY & TRANSFER PLATE ASSEMBLY (Removal): Remove throttle control lever, flat washer, and felt washer from transmission. Remove gearshift control cable adapter housing bolts and washers and remove housing and gasket from transmission. *(NOTE - Manual valve must be moved to the reverse position before housing can be removed).* Loosen manual valve control lever bolt. Using caution to prevent loss of cable adapter pin, slide lever and cable adapter off shaft. Remove oil strainer assembly bolts and lockwashers, and remove oil strainer (one strainer is used for both front and rear oil pumps). Loosen (to relieve spring load) the three accumulator cover bolts with washers, and remove cover and spring from transfer plate. Remove transfer plate bolts and washers and remove valve bodies and transfer plate assembly from transmission case *(CAUTION - Use care not to damage mating surfaces).* Place valve body in stand, Tool C-3528. Remove neutral starting switch located in left side of transmission case.



TRANSMISSION UNIT NO. 1

FRONT CLUTCH END CLEARANCE CHECK: Before removal of propeller shaft flange and drum assembly, check end clearance of front clutch piston retainer assembly using dial indicator, Tool C-3339 mounted on case in such a manner as to have dial indicator plunger bearing against rear side of front clutch piston retainer assembly. Pry front clutch forward by inserting screwdriver between front and rear clutch. Remove screwdriver and with dial indicator point contacting edge of front clutch retainer, set dial to zero. Pry clutch assembly rearward against rear clutch, remove screwdriver and take indicator reading. This clearance should be .020-.050". *NOTE - If clearance exceeds the specified limits, particular attention should be paid to the condition of input shaft thrust washer when disassembling transmission.*

HAND BRAKE ASSEMBLY (Removal): Remove transmission flange nut and Belleville washer. Attach puller, C-452 (if necessary) and remove propeller shaft flange and drum assembly. Remove transmission brake support grease shield spring (spring acts as a guide for brake shoes and retains brake support grease shield to transmission extension). Place a rubber band around brake shoes to hold them in position and remove brake shoe return spring. Remove brake anchor washer and brake shoe guide. Remove both brake shoe assemblies, adjusting sleeve, nut, screw, and brake shoe operating lever link. *(NOTE - Operating link is marked for installation purposes).* Make sure adjusting nut turns freely on screw. Remove the other brake shoe guide from anchor pin. Remove brake support grease shield from extension being careful not to damage neoprene sealing surface at bottom of shield. Slide brake support assembly from rear extension and anchor. Inspect neoprene spacer on back of support plate for deterioration and note the steel sleeve used between neoprene spacer and extension.

EXTENSION HOUSING: Remove speedometer drive pinion and sleeve assembly (damage to nylon gear will result if drive pinion and sleeve assembly is not removed first). Inspect output shaft, rear bearing oil seal, and remove if necessary, using puller, Tool C-748. Remove transmission extension-to-case screws and lockwashers. Install guide studs, Tool C-3283, and remove extension from output shaft support assembly by tapping housing lightly with a soft hammer. Housing may be separated

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TORQUEFLITE (C nt.)

from support by using a pry bar between support screw and housing bracket. Remove gasket.

Insp ction: Inspect extension housing for cracks in casting and remove burrs from gasket surfaces. Inspect vent in top of housing and make sure it is free of dirt. Clean output shaft rear bearing and dry with compressed air. Inspect bearing for rough spots. Do not remove from housing unless it is necessary to replace.

GOVERNOR & REAR OIL PUMP HOUSING (Removal): Using a screwdriver, remove governor valve shaft snap ring from weight assembly end. Remove governor valve shaft and valve from governor body assembly. Using pliers; C-3229, remove governor weight assembly snap ring (large) and remove governor weight assembly from body. Using a 5/16" socket, remove governor locating screw from governor support. Remove five rear oil pump-to-output shaft support screws (with Belleville washers). Remove pump housing, gear, and governor assembly from output shaft. Use prussian blue and mark face of pump gears in relation to pump housing. *(CAUTION* - Do not use scribe). Remove oil pump pinion, being careful not to lose ball used to key pinion to output shaft, from output shaft, and mark in same manner as for gears.

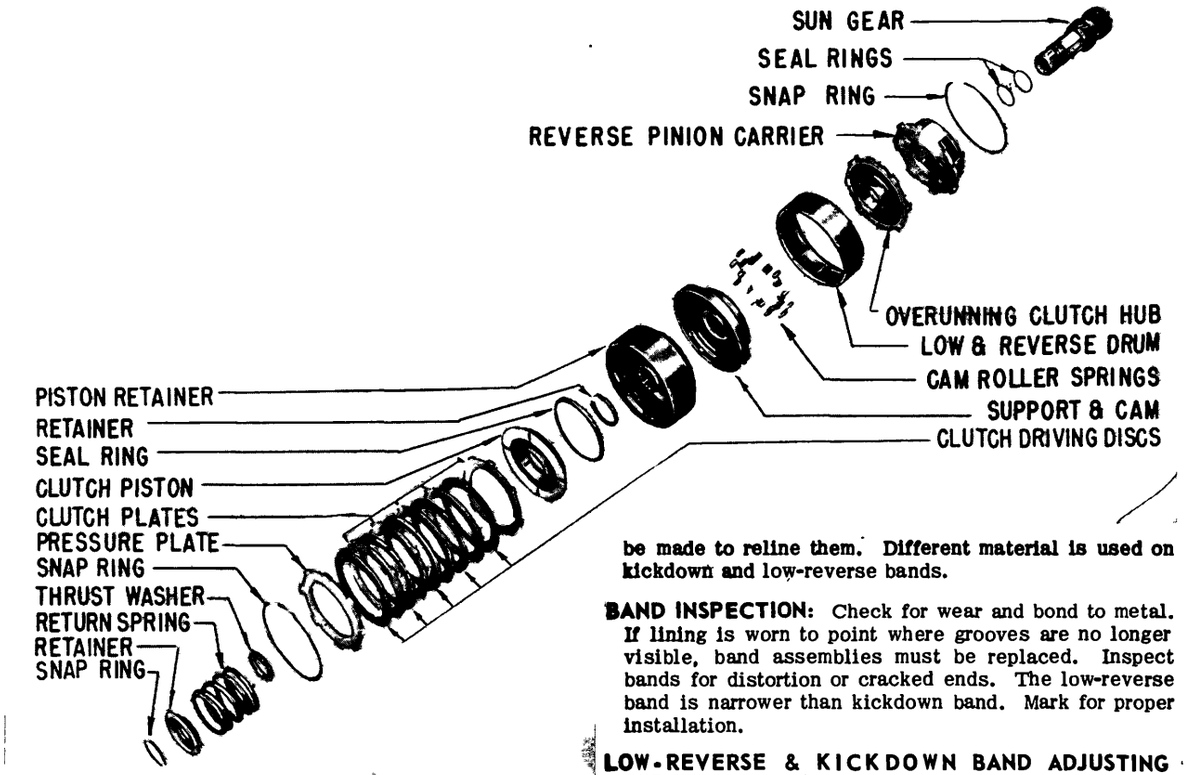
Insp ction: Inspect pump housing plug for leaks and machined surfaces for nicks and burrs. Inspect gears for scoring or pitting. With gears cleaned and installed in housing (as marked) and using straightedge, Tool C-3335 and feeler gauge, check clearance between pump housing face and face of gears. Clearance should be .001-.0025".

OUTPUT SHAFT SUPPORT (Removal): Remove output shaft support-to-transmission case screw and washer. Slide output shaft rear support assembly and gasket from transmission case. If rear support is stuck to case, it can be loosened by tapping with a soft hammer. Remove guide stud from transmission case.

Insp cti n: Inspect all oil passages in support for obstructions. Remove pressure take-off plugs (governor and rear clutch supply) and clean passages with compressed air. Check rear oil pump mating surfaces for burrs and score marks. Check for stripped threads in support. Inspect gasket surfaces for burrs and score marks. Inspect inside bearing surface for wear or scoring.

POWER TRAIN UNITS (Removal): Unit No. 1 (Output Shaft, Kickd wn Planet Pinion Carrier, and Intermedi- at Shaft Assemblies) – Remove by sliding unit out rear of transmission case being careful to support unit as much as possible to prevent damage to seal rings on intermediate shaft.

Unit No. 2 (Sun G ar, Reverse Planet Pinion Carrier, Overrunning Clutch, and Rear Clutch Assemblies) – Loosen locknuts on low-reverse and kickdown band adjusting screws, and back adjusting screws out 2 to 3 turns. Remove the three intermediate support locating screws and lockwashers (two outside of case and one inside). *(CAUTION - When removing unit, identify locating hole in intermediate support to correspond with the thr aded locating hol insid of case, f r installation purposes).* Keep unit centered as much as possible to prevent binding of intermediate support, and remove assembly from transmission case. *CAUTION - Make sure front clutch and sun gear thrust washers remain in position in front of unit.*



TRANSMISSION UNIT NO. 2

Unit No. 3 (Front Clutch Piston Retainer and Input Shaft Assemblies) – Keep unit centered as much as possible, and remove from transmission case. *CAUTION-* Use care when removing to prevent damage to seal rings on input shaft and sealing surface of reaction shaft.

LOW-REVERSE BAND ASSEMBLY (Removal): Mark low-reverse band assembly for installation purposes. Compress ends of band sufficiently to remove low-reverse band strut. Remove low-reverse band assembly by rotating band ends through rear opening in transmission case. Remove low-reverse band anchor from adjusting screw.

KICKDOWN BAND ASSEMBLY (Removal): Compress kickdown band ends sufficiently to remove band strut (note that strut is grooved to act as a guide). Remove kickdown band anchor from adjusting screw. Remove kickdown band assembly by rotating band ends over center support in transmission case, using care not to damage lining on edges of transmission case. *NOTE* - Both bands have bonded lining and no attempt should be made to reline them. Different material is used on kickdown and low-reverse bands.

BAND INSPECTION: Check for wear and bond to metal. If lining is worn to point where grooves are no longer visible, band assemblies must be replaced. Inspect bands for distortion or cracked ends. The low-reverse band is narrower than kickdown band. Mark for proper installation.

LOW-REVERSE & KICKDOWN BAND ADJUSTING SCREWS (Removal): Remove both band adjusting screws locknuts and remove adjusting screws. *CAUTION* -It is very important that adjusting screws fit freely into transmission case. When locknuts are loose, adjusting screws must be finger free. If not, inspect screws and nuts for pulled threads or foreign material in threads.

LOW-REVERSE AND KICKDOWN BAND LEVER ASSEMBLIES (Removal): Remove kickdown and low-reverse lever shaft stop plug at rear of transmission case. Using a pair of long nosed pliers, remove kickdown and low-reverse shaft lever spacer (flat). Thread guide stud, Tool C-3288 into shaft, and remove shaft from case. Remove kickdown and low-reverse servo levers.

Inspection: Inspect levers for being cracked or worn and make sure they are free to turn on shaft and have side clearance when installed. Inspect lever shaft for excessive wear.

LOW-REVERSE SERVO (Removal): Install Tool C-3529 or C-3280 on transmission case and compress piston spring retainer. Using a screwdriver, remove low-reverse servo piston spring retainer snap ring, then loosen compression portion of tool and remove. *(CAUTION* - Spring retainer may require guiding out of transmission case). Remove spring retainer, spring and servo piston assembly.

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TORQUEFLITE (C nt.)

Insp ction: Inspect lever contacting surface on servo piston plug for excessive wear. Remove and inspect servo piston seal ring for deterioration and hardness. Inspect seal ring groove for nicks and burrs. Inspect servo piston return spring, retainer, and snap ring for being distorted.

KICKDOWN SERVO (Removal): Install Tool C-3529. Apply pressure on the kickdown piston rod guide, and remove snap ring. Loosen compressing portion of tool and remove from transmission case. Remove piston rod guide, piston spring, and piston rod. Using pliers, Tool C-484, remove the kickdown piston from transmission case. Remove accumulator piston from case.

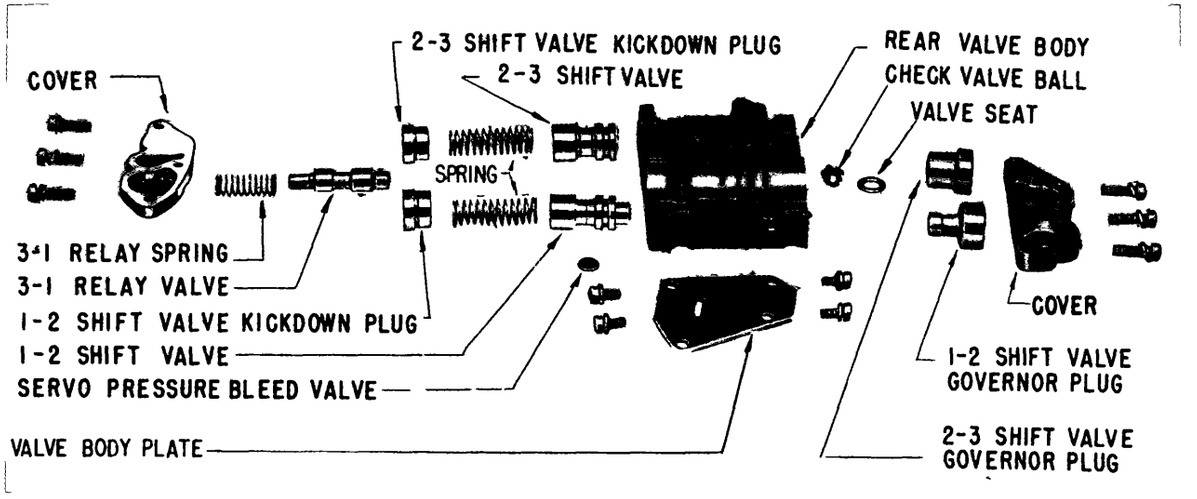
Insp ction: (Kickdown Piston Assembly) – Inspect riveting of kickdown piston rod. Inspect guide contacting surface for nicks or burrs. Inspect seal ring on guide for wear and make sure it turns freely in groove. Check fit of guide on piston rod. Inspect the three rings (two interlocking) on piston for wear or broken locks. Make sure they turn freely in groove. *(NOTE* - It is not necessary to remove rings unless condition warrants. When replacing new rings, use care to avoid damaging interlocking portion of ring). Inspect piston for light scores and wear. Inspect piston spring and rod guide snap ring for distortion.

Insp ction: (Accumulator Piston Assembly) – Inspect both piston seal rings (one interlocking) for wear or broken locks and make sure they turn freely in grooves. *(NOTE* - It is not necessary to remove rings unless condition warrants). Inspect accumulator piston for nicks, burrs, and excessive wear. Inspect accumulator spring for distortion.

FRONT OIL PUMP (Removal): Remove front oil pump drive sleeve (if installed). Remove transmission regulator valve spring retainer, gasket, cup, spring, sleeve, and valve. Remove torque converter valve retainer, gasket, spring, and valve *(NOTE* - This valve can be removed with a mechanical retriever or a piece of welding rod, 5/32" for regulator, 1/8" for torque converter, inserted in end of valve). Remove front oil pump housing-to-transmission case bolts and washers and remove oil pump housing assembly by tapping with a hammer *(NOTE* - Sealing washers used under oil pump attaching bolts are aluminum and should be discarded if damaged). Mark face of gears in relation to face of pump housing using prussian blue. DO NOT SCRIBE.

► *FRONT PUMP DUST SEAL NOTE:* Do not remove dust seal from housing unless inspection indicates that it is necessary. To remove dust seal, use a brass drift and drive seal out front of housing. To replace, position seal in housing (metal portion of seal down) and use driver, Tool C-3278. Drive seal in until tool bottoms on face of housing.

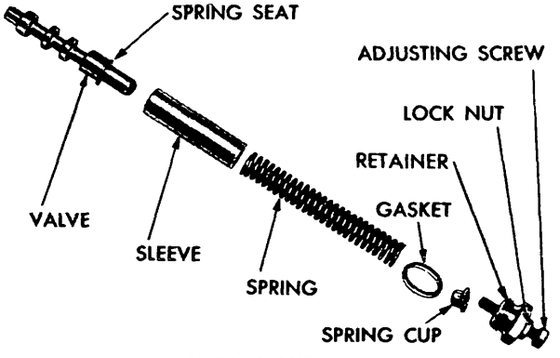
Inspection: Inspect drive sleeve seal ring contacting surface in housing for wear and scratches. Inspect steel back bronze bushing in hub for scratches or scoring and excessive wear, (bushing and housing is serviced as an assembly). Remove oil pump gears and inspect contacting surfaces for scratches, burrs or grooving. Inspect regulator body casting surface on pump housing face for nicks or burrs. Inspect housing passages and make sure they are free of dirt or other material. Clean and replace oil pump gears in housing noting marks made at disassembly. Using straightedge, Tool C-3335, and feeler gauge, check clearance between housing face and face of gears. Clearance limits are .001-.0025". Measure tip clearance between rotor lobes. Replace rotors if clearance exceeds .010". Measure clearance between outer rotor and pump housing bore. Replace rotors or pump housing if clearance exceeds .010". After checking clearance, lubricate with Automatic Transmission Fluid.



TORQUEFLITE REAR VALVE BODY ASSEMBLY

REGULATOR VALVE BODY (Removal): Install guide studs, Tool C-3288, and using two threaded holes provided in valve body, install guide studs and pull regulator valve body off torque converter reaction shaft and remove gasket. *CAUTION - Valve body is aluminum and should be handled with care to avoid damage.*

Inspection: Clean body and valves and dry with compressed air. Inspect reaction shaft seal ring surface in bore for scratches, nicks or burrs. Inspect both valves for free movement in valve body (they should fall in and out of bores when valves and body are dry). Crocus cloth may be used to polish valve (do not round the sharp edges of valve). Check all fluid passages for obstruction and inspect mating surfaces for burrs and distortion. If regulator valve has a slight nick or raised portion on mating surfaces, it may be removed by using a flat surface plate and crocus cloth. Inspect front and rear pump check valve for proper seating on both surfaces. If necessary to remove valve, use a pair of long nosed pliers.



RE ULATOR VALVE ASSEMBLY

TORQUE CONVERTER REACTION SHAFT (R moval): If inspection indicates necessity of removing torque converter reaction shaft, proceed as follows: Remove reaction shaft seal ring (neoprene). Remove the three transmission case-to-reaction shaft screws and washers. Using Tool C-3531, press reaction shaft out of case.

Inspection: Inspect inside of reaction shaft for burrs and inspect splines on shaft for burrs and wear. Inspect seal ring for deterioration and hardness. Inspect thrust surface for wear and slight scores.

TRANSMISSION CASE (Inspecti n): Inspect case for cracks, sand holes and stripped threads. Check for burrs on mating surfaces. Blow compressed air through all passages to make sure they are open. Check pressure takeoff plugs for tightness. Using a straightedge, Tool C-3335, inspect valve body mating surfaces on case for any burrs or irregularity in surface. Surface should be smooth and flat. Inspect servo and accumulator bores for any scores or scratches. Light scratches may be removed with crocus cloth. Check regulator valve body mating surface in front of case for any irregularities. *NOTE* - Disregard any scratches which may have been made by torque converter reaction shaft screw lockwashers.

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

OVERHAUL OF UNITS

VALVE BODY & TRANSFER PLATE DISASSEMBLY: Place valve body and transfer plate assembly in stand, Tool C-3528.

► *CAUTION: Never clamp any portion of this assembly in vise or use force when removing or installing valves and plugs.*

► *CLEANING & INSPECTION NOTE:* After disassembly and each part has been cleaned and inspected, place on clean paper until ready for reassembly.

1) Wash all parts in clean solvent and dry with compressed air. Make sure all passages are free from obstructions. Check for porous castings.

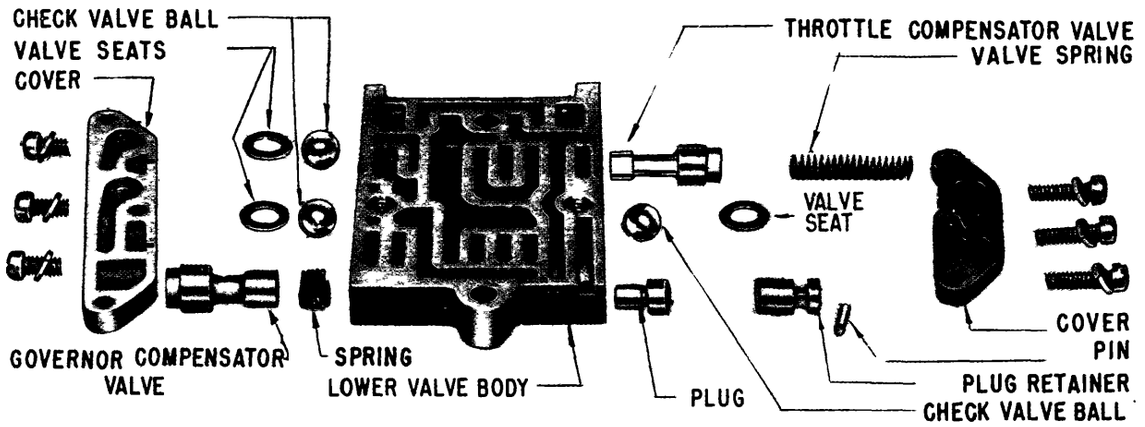
2) Inspect all mating surfaces for burrs, nicks, or grooves. Small ones may be removed with crocus cloth; otherwise damaged parts must be replaced. Using a straightedge, check all mating surfaces for distortion. Using a light, inspect bores in valve body for scoring marks, pits and irregularities. Inspect all springs for distortion and collapsed coils.

3) Inspect all valves and plugs for burrs, nicks, or scores. Small ones may be removed with crocus cloth providing extreme care is used not to round off the sharp edge portion of valve. Check valves and plugs for free operation in bores; they must fall freely in bores when valves, plugs, and bores are clean and dry.

Lower Valve Body (Removal): Remove the two valve body screws from retainer plate located between front and rear valve bodies, and remove plate. Invert valve bodies and remove the two lower valve body screws and lockwashers. Remove lower valve body and plate from transfer plate *(CAUTION - Use extreme care to prevent loss of governor compensator valve plug retaining pin).*

Disassembly - Remove governor compensator valve plug retaining pin, retainer, and compensator plug. Remove the three screws from governor compensator cover (larger cover on valve body). Use care to prevent loss of the two check valve balls and seats, and remove cover. Invert valve body and remove governor compensator valve and spring. While holding throttle compensator valve cover in place (spring loaded), remove the three screws and lockwashers. Use care when removing cover to prevent loss of check valve ball and seat. Remove throttle compensator valve spring and valve. *NOTE* - Inspect ball contacting surface in valve seats and valve body for nicks and burrs. Inspect cover for flatness and porosity.

Reassembly – Place valve body in an upright position and install throttle compensator valve and spring. Make sure spring is properly seated in valve. Place ball and ball seat in position in valve body. Place throttle compensator valve cover in position over spring and body and install three screws and lockwashers. Draw down evenly and tighten. Place governor compensator valve spring on valve then install governor compensator valve into valve body (small end first). Place the two check valve balls and seats in position in valve body; then install governor compensator valve cover, screws and lockwashers. Draw down evenly and tighten. Install governor compensator valve plug (small end first) in valve body, then install retainer and pin.



TORQUEFLITE LOWER VALVE BODY ASSEMBLY

Rear Valve Body (Removal): Remove the two rear valve body screws and lockwashers, and remove rear valve body from transfer plate assembly. Remove the servo pressure bleed valve to prevent loss. Invert valve bodies and transfer plate assembly and place on stand, Tool C-3528.

Disassembly - Hold pressure against kickdown plug cover and remove the bolts and lockwashers. *(CAUTION - Release pressure slowly on cover to prevent loss of small parts).* Remove 3-1 relay valve spring, 1-2 shift valve kickdown plug and 2-3 shift valve kickdown plug. Remove 1-2 shift valve spring and valve, and 3-1 relay valve. Remove 2-3 shift valve spring and valve, then remove the three governor plug cover bolts and lockwashers. *(CAUTION - When removing cover be careful not to lose check valve ball seat and ball).* Remove 1-2 shift valve governor plug from valve body. Remove 2-3 shift valve governor plug, then remove valve body plate.

Reassembly - Install the 1-2 shift valve (small end first), and 2-3 shift valve (spring pilot facing out), in valve body, then position the 1-2 and 2-3 shift valve springs in valves. Place 2-3 shift valve kickdown plug (identified by large pilot) over the 2-3 shift valve spring. Compress spring sufficiently to seat plug in valve body and secure by placing a thin piece of metal (6" scale) behind plug Install 3-1 shift valve (large end first) in valve body and install spring on pilot Place 1-2 shift valve kickdown plug over the 1-2 shift valve spring Place the kickdown plug cover over 3-1 relay valve spring and 1-2 kickdown plug, then compress springs and guide the 1-2 kickdown plug into valve body Install cover screws and lockwashers and draw down evenly and tighten Remove metal strip securing 2-3 shift valve spring Install rear valve body plate then place 1-2 shift valve governor plug in valve body (small end first). Install the 2-3 shift valve governor plug (small end first) in valve body. Install check valve ball and seat, then install governor plug cover, bolts and lockwashers, and tighten securely.

Front Valve Body (Removal): Remove two front valve body to transfer plate screws and lockwashers and separate front valve body from transfer plate assembly. *(CAUTION – Do not disturb throttle valve stop screw setting).*

Disassembly – Keep thumb pressure against shuttle valve cover (spring loaded) and remove the four screws and lockwashers. Use caution when removing cover to prevent loss of front check valve ball seat and ball. While holding thumb over throttle valve, invert valve body and remove shuttle valve plug and the shuttle valve and spring. Remove throttle valve spring, kickdown valve, and detent plug, (it is not necessary to remove detent plug retaining screw and lockwasher). Remove cotter pin from valve body in outer end of reverse blocker valve. Remove reverse blocker valve plug, blocker valve, and spring. *NOTE* - Normally it is not necessary to remove the throttle valve lever shaft, manual valve lever assembly, or manual valve. However, if condition warrants, proceed as follows: Support throttle lever shaft on block of wood. Using a small punch and hammer with care, remove the throttle valve lever shaft pin (a rubber band may be used to hold manual lever in place while removing pin). Remove any burrs from throttle valve and manual valve lever shafts, and slide them from valve body. Slide throttle valve lever shaft out of manual lever assembly. Using caution to prevent loss of detent ball and spring, slide manual valve lever assembly out of valve body. Using a twisting motion, remove manual valve.

► *FRONT VALVE BODY INSPECTION NOTE:* Inspect manual valve detent ball and make sure it slides freely into valve body. Inspect riveting and wear on manual valve lever pin in lever assembly. Inspect the staking of manual lever and throttle cam to their respective

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TORQUEFLITE (C nt.)

shafts. Inspect the kickdown valve detent plug to make sure it slides freely on valve. Inspect check valve ball seat in valve body for faulty casting. Inspect manual valve lever needle bearing in valve body *(CAUTION - Do not remove, as body and bearing are serviced as an assembly).*

Reassembly – Place valve body on clean paper in an upright position, and using a twisting motion, install manual valve until it bottoms on paper. Place manual valve lever detent ball spring and ball in position in valve body. While compressing detent ball in position with right index finger, install manual valve control lever by sliding over detent ball and engage pin on lever with manual valve (hold this assembly in position with a rubber band). While holding manual lever assembly in position against valve body, install throttle valve lever assembly with flat portion on end of shaft facing away from valve body to allow maximum travel of lever. While holding levers in position in valve body with rubber band, support throttle lever on wooden block. Install shaft pin using a small punch and hammer. Remove rubber band. With reverse blocker valve spring in position in valve and with slots in valve aligned with pin, install reverse blocker valve in valve body. Install reverse blocker valve plug and compress spring sufficiently to install pin. Lock pin in position. Check kickdown detent plug stop screws for being tight, and install detent plug (large inner diameter first) on kickdown valve, and position kickdown valve (detent plug first) into valve body. Install throttle valve spring and throttle valve into valve body. Install shuttle valve and spring then install shuttle valve plug in valve body. Install front check valve ball and seat in valve body, then install shuttle valve cover, bolts and lockwashers. Draw down evenly and tighten.

VALVE BODIES & TRANSFER PLATE REASSEMBLY: Place valve body transfer plate in an upright position on stand, Tool C-3528. Place steel plate (upper) over pilots on Tool C-3528 and into position on transfer plate.

Front Valve Body: Position front valve body on steel plate (upper) and install two screws and lockwashers in outer end of valve body and draw down finger tight.

Rear Valve Body: Invert transfer plate and replace on stand. With servo pressure bleed valve in place, hold rear valve body up in position against steel plate and install the two outer screws (short) with lockwashers through the transfer plate and into lower valve body. Draw up finger tight.

Lower Valve Body: To prevent loss of governor compensator valve retainer pin, position steel plate (lower) on lower valve body. Place valve body and steel plate into position on transfer plate. Install the two screws (intermediate length) and lockwashers. Tighten the two lower valve body and rear valve body screws to 50-60 inch lbs. Invert valve bodies and transfer plate and replace on stand. Install valve bodies retainer plate and two screws (long) with lockwasher and tighten retainer plate and front body screws to 50-60 inch lbs. Check manual valve to make sure it operates freely.

OUTPUT SHAFT REAR BEARING & SEAL (Removal): Remove rear bearing seal. Using pliers, Tool C-760, remove rear bearing snap ring (note that snap ring has a beveled edge). Inspect ring for distortion. Using driver, Tool C-3275, drive output shaft rear bearing out of rear extension.

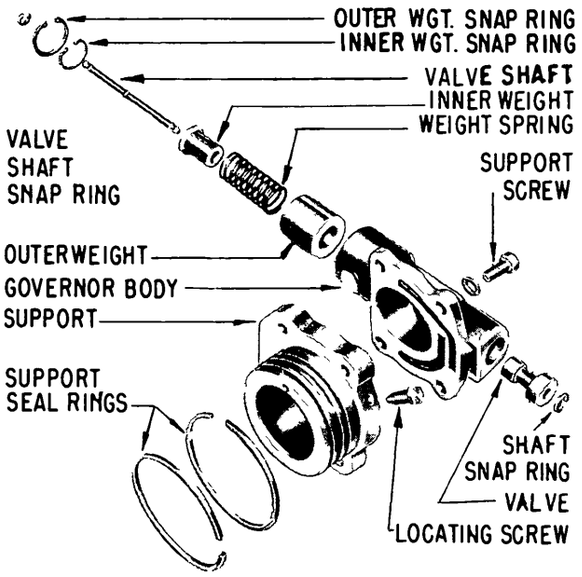
Installation: Using driver, Tool C-3204, install bearing in extension making sure it is properly seated. Lubricate with automatic transmission fluid. Using pliers, C-760, install rear bearing snap ring with beveled side out. Make sure snap ring seats properly. Using driver, Tool C-3205, install shaft bearing seal with metal portion of seal facing in until tool bottoms on extension.

GOVERNOR (Disassembly): Using pliers, Tool C-3229, remove snap ring from governor weight assembly (keep thumb pressure against secondary weight when removing snap ring). Remove governor secondary weight and spring. Inspect all parts for burrs and wear. Check secondary weight for free movement in primary weight by placing secondary weight in primary weight without spring. Primary weight should fall free when both parts are dry. Place secondary weight and spring in primary weight, compress spring and install snap ring. Slide governor body and support from rear oil pump housing. Remove the two governor support seal rings. Remove the four governor body-to-support screws and lockwashers and separate body from support. Inspect oil passages and make sure they are free from dirt or other material. Clean passages with compressed air. Inspect governor body for slight scores. Valve should travel freely in governor body.

Reassembly: Lubricate the two governor support seal rings with automatic transmission fluid and install on governor support. Make sure seal rings are free to rotate in grooves. Position governor body on support and install the four screws and lockwashers (do not tighten screws at this time). Slide governor support and body assembly into position in rear pump housing. Compress governor support seal rings with fingers as support enters oil pump housing. DO NOT FORCE.

POWER TRAIN UNITS (Disassembly): Unit No. 1 (Output Shaft, Kickdown Planet Pinion Carrier, and Intermediate Shaft Assemblies) – *NOTE - Unit may be placed in the propeller shaft flange and hand brake drum assembly to aid in disassembly.* Using a screwdriver, remove output shaft drive housing snap ring. Remove reverse annulus gear from output shaft assembly. Remove intermediate shaft and kickdown shaft and kickdown carrier assemblies from output shaft assembly. Remove output shaft thrust washer located inside of housing. Remove kickdown planet pinion carrier assembly from intermediate shaft assembly *(NOTE - The kickdown planet pinion carrier assembly used in this unit is the same as the low-reverse planet pinion carrier assembly used in Unit No. 2. No attempt should be made to interchange these units).* Remove kickdown carrier thrust washer from carrier assembly. Remove sun gear roller thrust washer from intermediate shaft assembly. With a screwdriver, remove kickdown annulus gear snap ring and separate gear from intermediate shaft assembly.

Inspection (Output Shaft): Inspect all bearing and thrust surfaces for scoring or scratches. Blow compressed air through all oil passages: make sure they are open



TORQUEFLITE GOVERNOR ASSEMBLY

and free of dirt. Inspect the four large and two small interlocking seal rings for excessive wear, broken ends, and make sure they rotate freely in grooves. Intermediate shaft and clutch feed tubes are serviced as an assembly.

Inspection (Kickdown Planet Pinion Carrier): Inspect planet carrier for cracks and pinions for broken or worn gear teeth. Using a feeler gauge, check clearance on individual planet pinion gears (clearance should be .006-.017"). Inspect pinion shafts for fit in carrier and make sure pinions are free to rotate on shafts. Make sure shaft lock pins are installed. Inspect oil holes in carrier to make sure they are open. *(NOTE* - Do not replace carrier unless this inspection indicates it is necessary. The planet pinion carrier and pinions are serviced only as a complete assembly). Inspect kickdown thrust washer for scratches or excessive wear.

Inspection (Reverse and Kickdown Annulus Gears): Inspect for worn, cracked or broken gear teeth. Check contacting surfaces of teeth for indications of binding. This condition will usually be evidenced by a brinelling condition. If "brinelling" is noticed, check thrust washer contacting surfaces and alignment of annulus gear on shaft. (Annulus gear teeth having slight cracks, or what appear to be cracks, should provide sufficient evidence to warrant replacement of gear). While burrs or slight obstructions on gear teeth can be safely removed with a hone, under no circumstances should broken areas of gear teeth be filed or ground. In this case the annulus gear should be replaced. Wash annulus gear and be sure to remove all metal pick-up from teeth.

Reassembly (Unit No. 1): *(NOTE* - To aid in reassembly, position output shaft in the propeller shaft flange and brake drum assembly for use as a holding fixture). With

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TORQUEFLITE (Cont.)

output shaft in an upright position, lubricate output shaft thrust washer with automatic transmission fluid and place into position in housing. Place kickdown annulus gear in position on intermediate shaft assembly and install snap ring (select fit). Using a feeler gauge, check clearance under kickdown annulus gear snap ring. Hold clearance as close as possible to .000". Snap rings are available in the following two thicknesses: .060-.062" (Part No. 1636357), .064-.066" (Part No. 1636358). *(NOTE* - When checking clearance, support annulus gear on edge of bench so intermediate shaft will seat properly in gear). Make sure snap ring seats properly. Place intermediate shaft assembly in output shaft housing. Lubricate kickdown carrier thrust washer with automatic transmission fluid and place in position in kickdown annulus gear (make sure thrust washer remains in position). Place reverse annular gear in position in housing and install output shaft drive housing snap ring, making sure it seats properly in housing. Lubricate and install sun gear thrust washer (roller type) over intermediate shaft and into position in carrier assembly.

Disassembly: Unit No. 2 (Sun Gear, Reverse Planet Pinion Carrier, Overrun Clutch, and Rear Clutch Piston Retainer Assemblies) - With unit in upright position, remove sun gear and front clutch thrust washer. Using two screwdrivers inserted between clutch and intermediate support, remove rear clutch retainer assembly from sun gear. Remove two clutch neoprene seal rings from sun gear. Remove reverse sun gear from overrun clutch and reverse planet pinion carrier assemblies. Install Tool C-3527, in intermediate support and cam assembly from overrun clutch hub. Using a screwdriver, remove snap ring from low-reverse band drum. Remove overrun clutch hub assembly from low-reverse band drum. Remove overrun clutch cam roller springs and rollers (ten of each) by removing Tool C-3527 from intermediate support and cam assembly *(CAUTION* - Place assembly over bench when removing tool so springs and rollers will not be lost).

Rear Clutch Piston Retainer Disassembly - Using screwdriver, remove snap ring (large) from rear clutch piston retainer assembly. Remove rear clutch pressure plate from retainer assembly. *(NOTE* - Rear clutch plates (steel) are dished and identified by a notch in one of the driving lugs. When removing the steel plates from clutch retainer, note that dished side of these plates is facing out. Check for dished side by using a straightedge across plate). Invert clutch piston retainer assembly and remove clutch plates and driving disc assemblies (five each). Using Tool C-3533, slightly compress the rear clutch piston return spring retainer, being careful not to damage retainer by compressing spring too far. Using pliers Tool C-3301, remove piston return spring snap ring. Release Tool C-3533 and remove clutch return spring retainer and spring from clutch piston retainer assembly (spring retainer may require guiding past snap ring groove as tool is released). Using a twisting motion, remove clutch piston assembly from retainer. Remove rear clutch piston inner and outer seal rings.

Inspection (Clutch Driving Disc & Plate) - Inspect driving discs and plates for evidence of burning, glazing and flaking off of facing material. Check disc by scratching facings with finger nail. If material collects under nail, replace all driving discs. Replace driving discs if splines have become damaged. Inspect the steel clutch plates and pressure surface for evidence of burning, scoring, and damaged driving lugs. Replace if necessary.

Inspection (Piston & Seal Rings) - Inspect seal ring surfaces in piston retainer for nicks and deep scratches. Light scratches will not interfere with sealing of neoprene rings. Inspect inner and outer piston seal rings (neoprene) for deterioration, wear, and hardness. Inspect seal ring groove in piston for nicks or burrs. Inspect inside bore of piston for score marks; if light, remove with crocus cloth; if heavy, replace piston. Inspect piston spring, retainer and snap ring for distortion.

Inspection (Clutch Piston Retainer) - Note ball check in clutch retainer. Make sure ball operates freely. Inspect the band contacting surface for deep scores and burns, especially if the band lining is worn to point where steel band has been contacting rear clutch piston retainer. *(CAUTION – Do not machine the piston retainer in an engine lathe to remove score marks).* Inspect steel clutch plate contacting surfaces for burrs or brinelling. Make sure clutch driving lugs on steel clutch plates travel freely into retainer. Remove any metal pick-up on hub of retainer.

Rear Clutch Piston Retainer Reassembly - Lubricate and install inner piston seal ring on hub of clutch retainer (seal lip must be facing down, and seal must be properly seated in groove). Lubricate and install outer seal ring on clutch piston (lip of seal facing away from flange). Place piston assembly in clutch retainer, and with a twisting motion, seat piston in bottom of retainer. Install piston return spring on hub and position spring retainer snap ring on spring. Using Tool C-3533, compress clutch spring sufficiently to seat the snap ring. Make sure snap ring is properly seated. Remove Tool C-3533. Lubricate all clutch plates and discs with automatic transmission fluid. Assemble by placing one rear clutch steel plate (identified by a notch on one of the lugs) with the dished side facing out, in the clutch retainer, followed by a driving disc. Repeat this procedure until all five discs and five plates have been installed *(CAUTION – All steel driving plates must be installed with dished sides facing same direction for proper travel of clutch pressure plate).* Install rear clutch pressure plate. Select and install snap ring making sure it is seated properly in clutch retainer. Using feeler gauge, check the clearance between snap ring and pressure plate. Clearance limits are as close to .000" as possible. Snap rings are available in the following sizes: .060-.062" (Part No. 1636315); .064-.066" (Part No. 1636316).

Inspection (Reverse Sun Gear Assembly): Inspect gears for cracked or broken teeth. Inspect steel back bronze bushing for scoring or excessive wear. Bushing and reverse sun gear are serviced as an assembly. Inspect intermediate support bearing surface of gear for wear and slight scores. Inspect rear clutch seal ring grooves on gear for nicks or burrs. Inspect inner ring sealing surface in bore of sun gear for grooves or scratches. Inspect thrust area of sun gear for nicks, scratches, or burrs. Inspect neoprene seal rings for deterioration, wear, nicks, or hardness. Inspect front clutch and sun gear thrust washers for scratches or excessive wear.

Inspection (Support & Cam Assembly): Inspect riveting of cam to intermediate support. Inspect cam roller surface for brinelling. Inspect roller spring retaining tabs for being bent or distorted. Inspect bearing surface on hub for scoring. Inspect steel backed bronze bushing in hub for scratches or scoring and excessive wear. Bushing and intermediate support are serviced as an assembly. Inspect overrunning clutch cam rollers for being pitted or scored. Inspect overrunning cam roller springs for distortion. Replace if necessary.

Inspection (Low-Reverse Planet Pinion Carrier): Inspect carrier for cracks and pinion for broken or worn gear teeth. Using a feeler gauge, check end clearance on individual planet pinion gears, clearance should be .006-.017". Inspect pinion shaft for fit in carrier and and make sure pinions are free to rotate on shafts. Make sure shaft lock pins are installed. *(NOTE* - Do not replace carrier assembly unless inspection indicates that it is necessary. The planet carrier and pinions are serviced as an assembly).

Inspection (Low-Reverse Band Drum): Inspect band contacting surface for deep scratches and burrs, especially if band lining is worn to point where steel band has been contacting drum *(CAUTION - Do not attempt to machine drum in an engine lathe to improve score marks).* Inspect driving lugs inside drum for excessive wear.

Inspection (Overrunning Clutch Hub): Inspect cam roller contacting surface for brinelling. Inspect steel back bronze bushing in hub for scratching or scoring and excessive wear. Bushing and hub are serviced as an assembly. Inspect lubricating hole and make sure it is free from foreign matter by cleaning with compressed air. Inspect reverse drum snap ring for distortion.

Reassembly (Unit No. 2): Install overrunning clutch hub assembly (hub first) into snap ring side of the low-reverse band drum. Place low-reverse planet pinion carrier assembly in position in low-reverse band drum. With drum supported, select snap ring to give minimum clearance. Snap rings are available in the following thicknesses: .060-.062" (Part No. 1636315); .064-.066" (Part No. 1636316); .068-.070" (Part No. 1636317). Place tool C-3527, in position in intermediate support and cam assembly and install cam springs and rollers. *(CAUTION - Make sure that cam springs and rollers are properly seated against cam; otherwise, damage to springs will result when overrunning clutch hub is installed).* With intermediate support and cam assembly resting on bench, lubricate bushing and install low-reverse band drum assembly over hub. While holding the two assemblies together, remove Tool C-3527. Lubricate bearing surface on reverse sun gear and install intermediate support and planet pinion carrier assembly. Lubricate the two sun gear rear clutch seal rings (neoprene) with automatic transmission fluid, and install on reverse sun gear. Install rear clutch piston retainer assembly on reverse sun gear. *(CAUTION - T prevent injury, do not place fingers under clutch retainer assem-*

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TORQUEFLITE (C nt.)

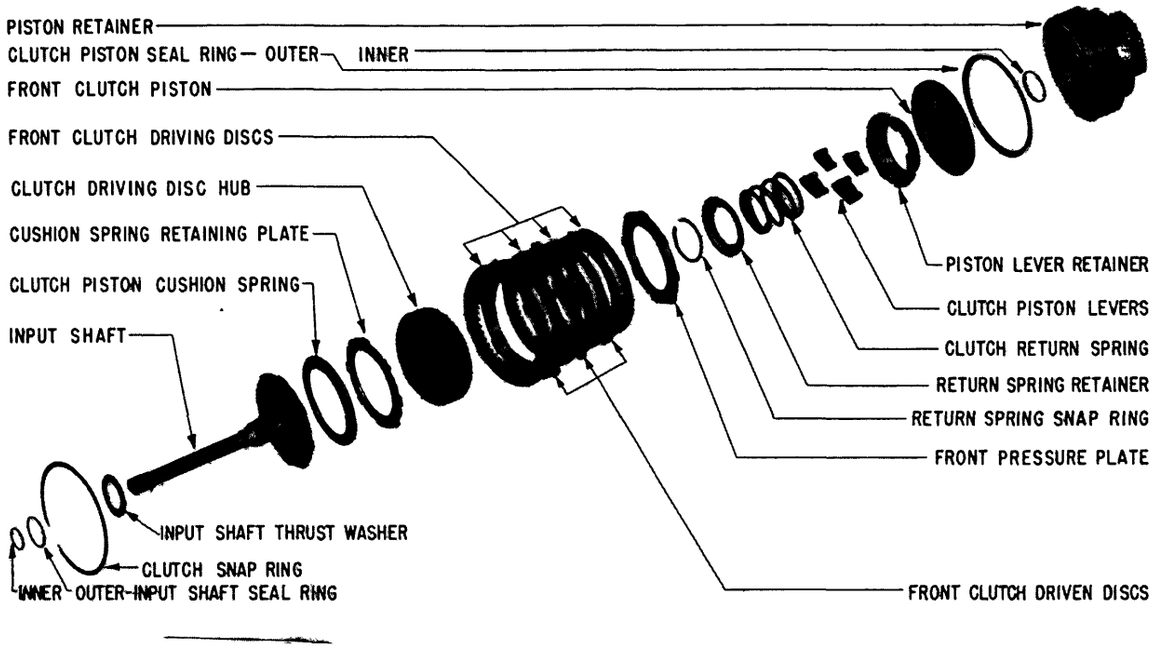
bly when installing). Install front clutch and sun gear thrust washer (Lubriplate may be used to hold thrust washer in position).

Disassembly: Unit No. 3 (Input Shaft & Front Clutch Piston Retainer Assemblies) - Remove input shaft fibre thrust washer (select fit). To remove clutch assembly from piston retainer (front clutch cushion spring is under approximately 500 lbs. pressure), place the assembly in an arbor press with rear of piston retainer resting on a suitable support. Press the input shaft only far enough into retainer to permit removal of the snap ring with a screwdriver. *(NOTE* - If an arbor press is not available, use two large "C" clamps placed 180° apart and apply equal pressure, making sure that clamps are positioned so as not to damage the ball check located in back side of retainer). Slowly release pressure on arbor press, then remove retainer and input shaft from press. Remove input shaft assembly from clutch piston retainer. Invert piston retainer and remove retaining plate, cushion spring, driving discs and clutch plates (Early cars used five driving discs and four clutch plates. Later cars used four driving discs and three clutch plates). Remove pressure plate and clutch hub. Install compressor, Tool C-3575 and compress front clutch piston return spring retainer. Remove piston return spring snap ring, then release and remove Tool C-3575. Remove clutch piston return spring retainer and spring. Remove lever retainer and levers from clutch piston retainer. Using a twisting motion, remove piston assembly.

Inspection (Input Shaft): Inspect thrust washers for cracks or excessive wear. Inspect front clutch snap ring for distortion. Inspect interlocking seal rings for wear or broken locks. Make sure they turn freely in grooves. *(NOTE* - When replacing rings, use extreme care not to damage interlock portion). Make sure all passages are open by blowing air through them. Check splines and lugs for nicks or burrs. Inspect bearing and thrust surfaces for nicks or scratches. Inspect steel back bronze bushing for scratches, scoring or excessive wear (bushing and input shaft are serviced as an assembly).

Inspection (Clutch Driving Discs, Plates, and Hub): Inspect driving discs for evidence of burning or glazing, and flaking off of facing material. Check discs by scratching facings with finger nail; if material collects under nail, replace all driving discs. Replace driving discs if splines have become damaged. Inspect steel clutch plates and pressure plate surface for evidence of burning, scoring, and damaged lugs; replace if necessary. Inspect lever contacting surface on pressure plate for evidence of wear (oil passages in hub are to lubricate clutch plates). Make sure they are free of foreign matter.

Insp cti n (Fr nt Clutch Pist n, S al & L v rs): Inspect levers for wear or distortion. Remove and inspect inner and outer piston seal rings (neoprene) for deterioration, wear, and hardness. Inspect seal ring groove in piston for nicks or burrs. Inspect inside portion of piston hub for score marks. If light, remove with crocus cloth, if heavy, replace piston. Inspect lever ring for seating properly in groove on piston. Inspect lever retainer, return spring, spring retainer, and snap ring for distortion.



TRANSMISSION UNIT NO. 3

Inspection (Front Clutch Retainer): Make sure check ball operates freely. Inspect seal ring surfaces in hub; if intermediate shaft seal rings have excessively worn or grooved this surface, replace the clutch piston retainer. Remove any metal pick-up on hub of retainer, and inspect seal ring groove for nicks or burrs. Inspect steel clutch plate contacting surfaces for scores or brinelling. Inspect thrust surface on rear of retainer for scratches or scoring. Make sure all clutch feed and lubricating passages are open and free of dirt.

Reassembly (Unit No. 3): Lubricate and install neoprene oil seal ring on hub of clutch retainer (seat seal properly in groove with lip of seal facing down). Lubricate and install outer seal ring on clutch piston with lip of seal facing away from flange. With piston lever ring seated in piston, place piston assembly in clutch retainer, and with a twisting motion, seat piston in bottom of retainer. Place lever retainer in piston and install the levers (eight used on early cars, four used on later cars), making sure they are free and properly seated in slots in piston. Install clutch return spring over hub of clutch retainer and position spring retainer and snap ring on spring. Using compressor, Tool C-3575, compress clutch return spring sufficiently to seat snap ring with pliers, Tool C-3301, making sure snap ring is properly seated. Remove Tool C-3301. Install pressure plate with smooth side up, in retainer. Install discs and plates by placing one of the driving discs in clutch retainer followed by a steel plate. Repeat this procedure until all discs and plates have been installed, then check and adjust front clutch pressure plate travel *(see "Front Clutch Pr ssure Plate Trav l & Adjustment" below).* After completing clutch travel adjustment, install front clutch hub, cushion spring (concave side toward retaining plate). Place front clutch and input shaft assembly in an arbor press with rear of piston retainer resting on a suitable support, then press input shaft into clutch retainer until retainer snap ring can be installed. *(NOTE* - It will require approximately 500 lbs. pressure to compress spring for assembly). Remove assembly from arbor press and install input shaft thrust washer.

Front Clutch Pressure Plat Trav l Ch ck & Adjustment: Install a rear clutch pressure plate, Part No. 1732114 on top of front clutch pack. *(NOTE - R ar clutch pressure plate, Part No. 1732114 has be n replaced in production on DeS to & Plymouth, and possibly on other cars, with the same plat , Part No. 1736408, used in the front clutch. Front clutch pressure plate, Part No. 1736408 cannot be used for ch cking front clutch travel. Part No. 1732114 must be us d f r this purpos).* Holding this plate firmly in position, insert a feeler gauge between plate and the top disc in the assembly. Total clearance should be .020-.040". If measured clearance is not within these limits, the clutch discs should be replaced with any combination

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

of new discs, Part Nos. 1636260 (.060-.063"); 1636372 (.073-.076"); 1636373 (.087-.090"), to provide for proper clearance. Remove rear clutch pressure plate and install front clutch hub. Complete assembly as indicated above.

TRANSMISSION REASSEMBLY & INSTALLATION

TORQUE CONVERTER REACTION SHAFT (Installati n): Using sun lamps, heat front of transmission case to approximately 170-190°F. Install guide studs, Tool C-3283, in front face of reaction shaft flange. Lubricate portion of reaction shaft flange (that presses into case) with automatic transmission fluid. Position torque converter reaction shaft into front of transmission case so that guide studs in shaft align with threaded holes in case. Using Tool C-3531, press reaction shaft into place. Remove guide studs and start the three transmission case-to-reaction shaft screws and washers. Draw down evenly and tighten to 10-15 ft. lbs. Coat torque converter reaction shaft seal with automatic transmission fluid, and install on shaft.

REGULATOR VALVE BODY (Installation): Install guide studs, Tool C-3288 in transmission case. Install valve body gasket over guide studs and into position on transmission case. With seal ring (neoprene) in position on reaction shaft, install regulator valve body and valves over guide studs and into position *(CAUTION* - Hold valves in place to prevent damage while installing valve body).

FRONT OIL PUMP (Installation): With inner and outer seals lubricated and pump gears in position in housing (counterbore in pinion gear facing down as identified when removed), place oil pump housing over studs and slide into position. Start five of the screws (with aluminum washers) and draw housing down evenly until it is seated in transmission case. Remove guide studs and install the two remaining screws and washers. Tighten the two long screws and five short screws to 14-16 ft. lbs. *(CAUTION - Improper tightening of these screws may cause pump gears to bind).* Lubricate and install front pump drive sleeve (bearing surface first), and engage the driving lugs of oil pump pinion to determine if oil pump gears turn freely (main body of driving sleeve should be flush with oil pump housing when properly installed). If gears do not turn freely, remove pump and check for foreign matter between pump gears and housing. Install torque converter control valve spring, retainer and gasket. Tighten to 35-40 ft. lbs. Install transmission regulator valve spring, retainer and gasket. Tighten to 45-50 ft. lbs.

ACCUMULATOR PISTON (Installati n): Lubricate seal rings and place accumulator piston into position. Compress outer seal ring and tap lightly in transmission case.

KICKDOWN PISTON (Installation): Lubricate piston seal rings and place kickdown piston assembly into position, compress outer ring, and start assembly into case. With piston properly centered so as not to damage rings, tap lightly and bottom piston into case. Place kickdown piston rod assembly in piston and slide piston spring over kickdown piston rod. Install Tool C-3529, for kickdown piston installation. Compress spring sufficiently to install snap ring. Loosen compressing portion of tool and remove from transmission case. Place servo piston sleeve over piston. Make sure sleeve slides freely on piston by working it up and down.

LOW-REVERSE PISTON (Installation): Lubricate reverse servo piston seal ring and install in piston (with lip of seal facing end of piston). Install cushion spring and plug into servo piston and secure with snap ring. *(CAUTION - Make sure that snap ring seats properly).* Install piston assembly into transmission case, then place reverse servo piston spring over piston and position spring retainer over spring. Install Tool C-3529 or C-3289 compress spring and install snap ring.

KICKDOWN BAND (Installation): Install kickdown band assembly by rotating band ends over center support in transmission case *(CAUTION - Use care when installing bands so not to damage lining on edges of transmission case).* Install anchor on kickdown band adjusting screw.

LOW-REVERSE BAND (Installation): Install anchor on reverse band adjusting screw. Install band by rotating band ends through rear opening in transmission case.

LOW-REVERSE & KICKDOWN BAND LEVER ASSEMBLIES AND STRUTS (Installation): Place levers in position in case and slide shaft through levers from rear of transmission case. Remove guide stud, Tool C-3288, from threaded end of shaft and install shaft lever spacer (flat) and plug. Tighten plug to 30-35 ft. lbs. Position kickdown band over anchor and compress band sufficiently to install kickdown band strut. Place reverse band into position on anchor and compress band end; and with aid of a screwdriver, install strut.

POWER TRAIN UNITS (Installation): Unit No. 3 (Front Clutch Piston Retainer and Input Shaft Assemblies) - If when transmission was disassembled, the end clearance was found to be incorrect, correction can be made at this time by selection of proper input shaft thrust washer. To accomplish this, use a micrometer and measure thickness of thrust washer which was removed. Select a thicker or thinner washer to give proper clearance *(NOTE - Front clutch end clearance should be .020-.050" with transmission fully assembled).* Thrust washers are available in the following sizes: .115-.117" (Natural color, Part No. 1637669); .097-.099" (Black, Part No. 1638670); .078-.080" (Red, Part No. 1638671). With input shaft thrust washer in position and input shaft seals lubricated, start unit through rear of transmission case. By supporting and keeping unit centered as much as possible, guide through bands and reaction shaft into position.

Unit N . 2 (Sun G ar, R v rs Plan t Pini n Carri r, Ov rrunning Clutch, and R ar Clutch Ass mbli s) - Start unit through rear of transmission case. Align identified locating hole in intermediate support with threaded locating hole inside of transmission case. By supporting and keeping unit centered as much as possible, guide through bands until it contacts hub on front clutch. While pushing in on assembly, rock sun gear to engage clutch plates of rear clutch on hub of front clutch *(CAUTION* - While rocking sun gear, make sure unit does not bind on bands or in intermediate support. Do not use excessive force when installing this unit so as to prevent damage to clutch discs in rear clutch). Use a drift punch to assist in alignment of intermediate support locating holes. Install the three intermediate support locating screws, lockwashers, and tighten to 25-30 ft. lbs. Use great care when installing the locating screw to prevent loss of lockwasher. Check input shaft and sun gear for turning freely.

Unit No. 1 (Output Shaft, Kickdown Planet Pinion Carrier, and Intermediate Shaft Assemblies) - Be sure reverse sun gear thrust washer (roller type) is in position in planet pinion carrier assembly. Lubricate seal rings and bearing surfac e on intermediate shaft, with automatic transmission fluid. Install unit by placing intermediate shaft in sun gear. Keeping unit centered as much as possible and slowly turning output shaft, slide into position (large seal ring on output shaft flush with rear of transmission case). *CAUTION* - Use care when installing to prevent damage to seal rings on intermediate shaft.

OUTPUT SHAFT SUPPORT (Installation): With guide studs, Tool C-3283 in rear of transmission case,place output shaft support gasket over guide studs and into position on rear of case. Lubricate output shaft seal rings. Install support over shaft and guide studs, and position against transmission case *(CAUTION* - Use care when installing support so not to damage ring sealing surfaces). Install the one (short) output shaft support-to-transmission case screw and lockwasher, and tighten finger tight.

REAR OIL PUMP & GOVERNOR ASSEMBLIES (Installation): Place rear oil pump pinion ball in ball pocket in output shaft. Lubricate rear oul pump drive pinion. Place over output shaft and slide into position aligning key-way in pinion with ball in shaft. *(CAUTION - Pinion was marked at disassembly. Make sure it is installed correctly).* Lubricate rear oil pump gear and position in pump housing. Make sure gear is installed correctly; check marking. Slide rear oil pump and governor assemblies over output shaft and into position against support. *(CAUTION* - There are two extra holes in housing which are used for vents. Make sure no attempt is made to install screws in these holes. Check each threaded hole before installing screws). Install the five oil pump housing-to-output shaft support screws. Draw screws down evenly and tighten to 10-12 ft. lbs. After screws have been tightened, turn output shaft to make sure pump gears are free to rotate. If not, disassemble pump to determine cause.

CONTINUED ON NEXT PAGE

TORQUEFLITE (C nt.)

GOVERNOR WEIGHTS & VALVE ASSEMBLY (Installation): Align locating hole in output shaft to locating screw hole in governor support and install locating screw. Tighten to 5-7 ft. lbs. If governor body had been removed, and installed, tighten the four body screws to 6-8 ft. lbs. Dry governor weight assembly and valve with compressed air, but do not lubricate when assembling. Place governor weight assembly (secondary weight snap ring facing out) into governor body, and using pliers, Tool C-3229, install snap ring, making sure it is properly seated in groove. With the governor valve (small end up) on governor valve shaft, slide shaft into governor body through output shaft and governor weight assembly, at the same time position valve into body. Install governor valve shaft snap ring (from weight assembly end). Make sure it is properly locked to shaft. After snap ring installation, apply sufficient pressure to both ends of valve shaft to force snap rings to outer portion of snap ring grooves. Check operation of governor weight assembly and valve by turning output shaft. Both should fall free in governor body.

EXTENSION HOUSING (Installation): Install new extension housing gasket over guide studs and into position against output shaft support. *(CAUTION - Do not use sealing material on gasket).* Place extension over output shaft and guide studs and into position against support *(NOTE* - Propeller shaft flange and drum assembly can be used, if necessary, to draw extension output shaft support). Install extension housing-to-case screws and tighten to 25-30 ft. lbs. Tighten output shaft-to-case screw to 25-30 ft. lbs. (Check output shaft to make sure it turns freely). Install speedometer drive pinion and sleeve assembly in extension housing and tighten to 40-56 ft. lbs.

HAND BRAKE (Installati n): Make sure brake support spacer (neoprene) is in position on back of brake support and spacer sleeve is in center of support. Slide brake support assembly over rear of extension and anchor pin. Make sure spacer sleeve remains in center of support. Install brake support grease shield on extension housing (indent on shield is for correct positioning on extension, also, the shield must be located on extension far enough to permit installation of spring). Place both brake anchor washers on brake shoe anchor and install locking anchor washer. Place both shoe assemblies with adjusting sleeve nut and screw into position on anchor. Make sure brake shoes are between anchor washers. Use rubber bands around shoes to hold them in position. Install operating link. Note that link is marked for correct installation. Install the brake support grease shield spring (opening in spring toward adjusting sleeve). Make sure spring is properly seated in groove. Slide brake shoe return spring behind grease shield spring and hook into position. Install propeller shaft flange and drum assembly. Install shaft flange washer and nut. Tighten to 200 ft. lbs.

►*FRONT CLUTCH END CLEARANCE CAUTION:* Recheck end clearance *(See "Front Clutch End Clearance Check" under "Removal & Inspection of Transmission Units" above).* If clearance not correct (.020-.050"), input shaft washer of proper thickness can be installed by removing the seven screws and lockwashers from extension housing. Install guide studs, Tool C-3283. Remove the one output shaft support-to-transmission case screw and washer, and remove the hand brake assembly, extension, output shaft support, and No. 1 unit as an assembly.

BAND ADJUSTMENT: Rotate hand brake drum in both directions to center bands on retainers prior to making band adjustment. *See "Band Adjustment" above, for adjustment procedure.*

VALVE BODIES & TRANSFER PLATE ASSEMBLY (Installation): Clean mating surfaces of valve body assembly and place into position on transmission case. Install five (short) transfer plate screws, with Belleville washers. Draw down evenly and tighten to 14-16 ft. lbs. Install accumulator spring through transfer plate and position in piston. Install accumulator cover, three screws with Belleville washers and draw down evenly. Place oil strainer in position over rear pump suction tube in transfer plate assembly. Check position of front pump suction tube in elbow (opening in suction tube should be facing oil pan). Slide front pump suction tube into strainer and position elbow on transfer plate. Install the two screws (with Belleville washers), draw down evenly and tighten elbow and accumulator cover screws to 14-16 ft. lbs. Install neutral starter switch and visually check manual valve lever contact with switch.

OIL PAN (Installation): Install pan, using new gasket. Tighten screws evenly to 10-12 ft. lbs. Tighten oil drain plug.

MANUAL CONTROL VALVE LEVER AND CONTROL CABLE ADAPTOR HOUSING (Installati n): Install manual control lever (locking screw to rear) on manual valve lever shaft. Position lever so there is 7/32" clearance (without gasket) between bottom of lever and transmission case. Tighten locking screw securely. Place control cable adaptor (with spring lock in position) in lever and install pin. Place manual valve control lever in reverse position and install gasket, control cable housing, and three screws (with Belleville washers). Tighten evenly to 14-16 ft. lbs. Install felt washer, flat washer, and throttle valve lever assembly over shaft. Tighten clamp bolt.

DUAL-COUPLING HYDRA-MATIC

Cadillac (1957)
Hudson (1957)
Nash (1957)
Oldsmobile (1957)
Pontiac (1957)
Rambler, 5720 Series (1957)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*STARTING ENGINE BY PUSHING CAR:* Move selector lever to "N" (Neutral) position and turn on ignition switch. When car reaches speed of 25 MPH (Exc. Cadillac); 30-35 MPH (Cadillac), move selector lever to either "D" (Drive) position on Cadillac, Hudson, Nash & Pontiac; or to "D" or "S" position on Oldsmobile.

▷*TOWING HYDRA-MATIC DRIVE CARS:* Drive shaft must be removed or car must be towed with the rear wheels off the ground. Damage to transmission will result if these precautions not taken.

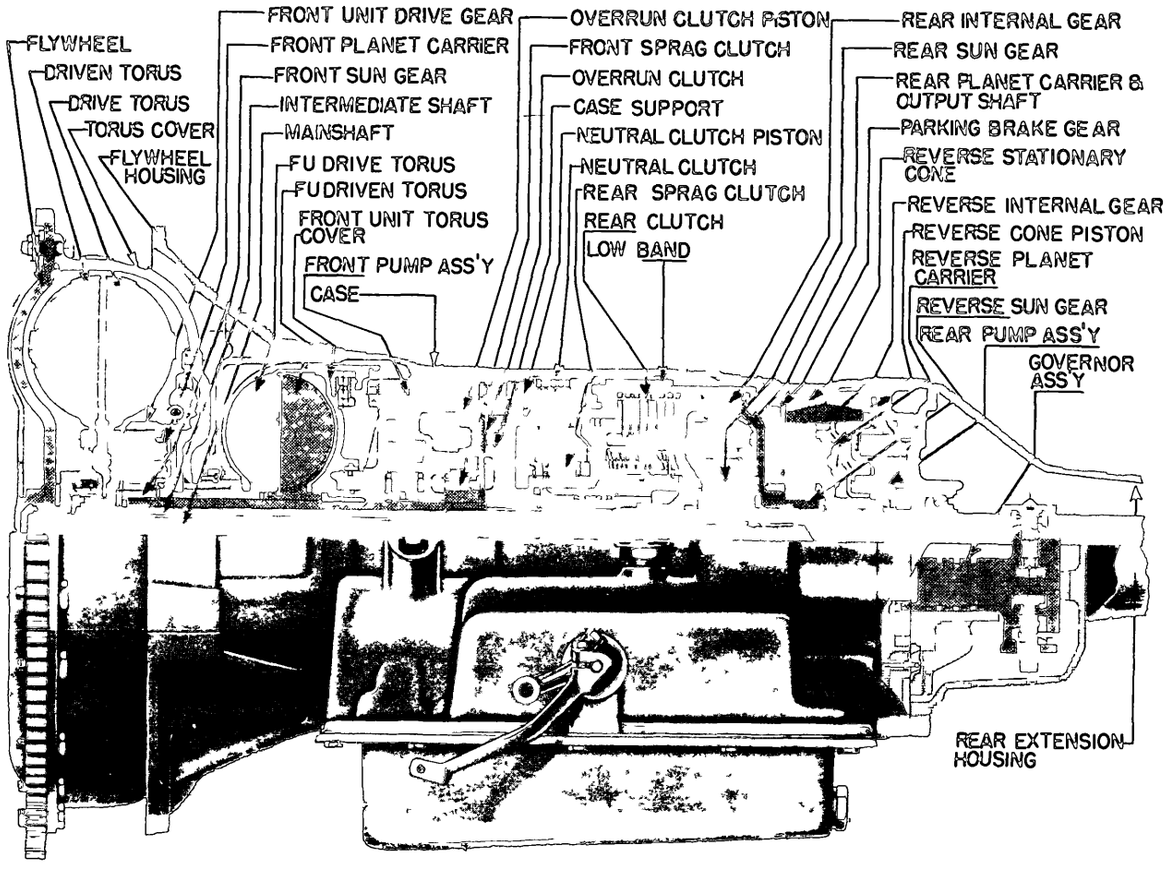
▷*TRANSMISSION OIL COOLER NOTE (ALL MODELS):* In the event of serious damage to transmission, the oil cooler should be replaced as it is not possible to properly clean cooler in the field.

▷*TRANSMISSION OIL FOAMING NOTE (ALL MODELS):* This condition may be caused by water leaking into transmission at the oil cooler. Check oil cooler for leaks as follows: Remove cooler and apply air pressure not exceeding 25 lbs., to either of the two cooler water pipes (plug other pipe). Submerge end of oil pipes in water and check for air bubbles in water. If bubbles appear, oil cooler is leaking and must be replaced. Before installing new cooler, remove transmission oil pan and clean thoroughly. Install clean transmission oil.

▷*1957 CADILLAC "WHISTLING" NOISE CORRECTION:* This condition, noticeable at shift points, is caused by wind action through a hole drilled in one side of external breather tube. If transmission is removed for other work, correct the above condition by drilling a hole through opposite side of tube. To make correction with transmission in car, collapse extreme lower end of tube with a pair of vise grip pliers, until outside narrow cross section of tube measures approximately ¼". Beginning with serial number C57-21596, CA57-2041, & CE57-2220, the condition was corrected in production.

▷*1957 CADILLAC "BUZZING" NOISE CORRECTION:* A buzzing noise occuring during 1-2 & 3-4 shifts may be caused by lower end of front pump intake pipe seating on bottom of the screen, causing restriction of intake oil and flutter of pressure regulator valve. Correct by cutting a 3/16" notch in forward end of opening in pipe and filing or grinding off pipe to increase size of opening toward rear end of pipe. Installation of the earlier type pipe, Part No. 8616283 will also correct the condition. Transmissions affected by the above condition are between serial numbers, C57-26807 & 28919; CA57-2234 & 2434; CE57-2767 & 3163. Earlier and later transmissions used a different intake pipe.

▷*1957 HUDSON, NASH & RAMBLER TRANSMISSION REMOVAL CAUTION:* If transmission is to be removed for correction of oil leakage at front of transmission, a special procedure must be performed to prevent recurrence of the leakage condition. *See TRANSMISSION REMOVAL below.*



DUAL-COUPLING HYDRA-MATIC TRANSMISSION (SECTIONAL VIEW)

▷*1957 HUDSON, NASH, RAMBLER & PONTIAC TORUS COVER OR FLYWHEEL REPLACEMENT NOTE:* Torus cover-to-flywheel dowels are located in the flywheel on 1957 models (in torus cover in 1956 models), and on service replacement flywheels. Two dowel pins will be serviced loose, as part of service replacement torus packages. When attaching 1957 service torus cover to 1956 flywheel, install both dowel pins (*NOTE - Be careful that dowels are placed in proper holes as the dimensions are different*). If a 1957 flywheel is attached to a 1956 cover, remove both dowel pins from original torus cover.

▷*1957 PONTIAC NOISE CORRECTION (Scraping Sound Heard When Operating in Reverse):* This noise may be caused by rear oil pump and can be corrected as follows: Install a Rear Pump Intake Pipe Kit, Part No. 8616978. Remove oil pan and remove rear pump intake pipe "0" ring seal and oil screen (*NOTE* - If the front pump intake pipe "0" ring seal is disturbed during oil screen removal, it should be replaced). Install bolt ½" into counterbored end of sleeve, then using bolt as driver, install sleeve into canted hole adjacent to rear pump intake hole, until sleeve is flush with or up to 1/16" below machined face of case. Remove bolt from sleeve and install steel retaining washer on pump end of pipe. Install new "0" ring seal next to retaining washer. Install check valve into pump end of pipe and install pipe assembly in case. Install retainer bolt and tighten to 5-6 ft. lbs. *NOTE* - Retainer must be installed with raised edge out and open end of retainer toward rear of transmission.

▷*1957 PONTIAC FRONT PUMP STARVATION CORRECTION (Results in a "buzzing" sound when selector lever is in "DR" range, car standing, and up to speeds of 8 MPH):* Correct by adding a notch in the inlet end of front pump inlet pipe (within the screen) in three or four places. Notch should be approximately 1/8" square. Re-

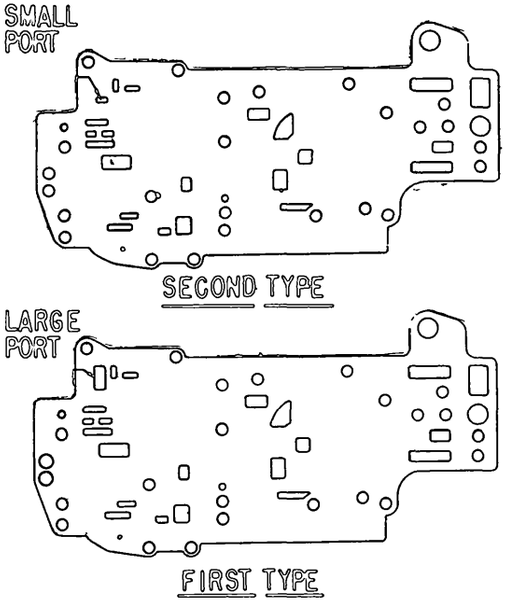
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DUAL-COUPLING HYDRA-MATIC (Continued)

move burrs and clean pipe thoroughly. Install a new "O" ring seal.

▷ *1957 PONTIAC IMPROPER 2-3 SHIFT CORRECTION (EARLY CARS):* In some early 1957 transmissions, the transition valve check ball was not used (same as late 1956). If the 2-3 shift has a tendency to shift from second-to-low-to-direct (with cold oil), the 1/8" ball can be installed (to prevent the transition valve moving too fast). Later 1957 transmissions have this check ball installed.

▷ *1957 PONTIAC BIND OR DRAG DURING REVERSE OPERATION CAUTION & CORRECTION:* May be caused by interlock plate on gearshift lower lever (at lower end of steering column) not having sufficient travel. If this condition exists, serious damage can be done to transmission. *See LINKAGE ADJUSTMENT below.*



CHANNEL PLATE-TO-CASE SPACER (EXCEPT CADILLAC & OLDSMOBILE)

DESCRIPTION

The Dual-Coupling Hydra-Matic is a four speed hydraulically controlled planetary type transmission which is connected to the engine crankshaft through a fluid coupling, and is composed of the following control assembly, parking assembly, and drive units.

Control Valve Assembly—The control valve assembly consists of four individual assemblies connected to one main assembly: Coupling Valve Body Assembly, Shift Valve Body, Reverse Blocker Body, and Manual Control Valve Body Assembly.

Parking Assembly—A pawl actuated by linkage of manual control lever drops into teeth on outer diameter of the reverse planet carrier which is splined to output shaft of transmission and which prevents the output shaft from turning.

Front Unit—Drive parts of the front unit are the controlled fluid coupling, planetary gear set, and front sprag clutch.

Rear Unit—Drive parts of the rear unit are the planetary gear set, multiple disc rear clutch, rear sprag clutch, and the neutral clutch.

Reverse Unit—Drive parts of the reverse unit are the planetary gear set, reverse stationary cone, and reverse apply piston.

Overrun Clutch (Front Unit)—The overrun clutch is a single disc clutch connected to the front sprag clutch and is used to prevent the sun gear from rotating. This unit operates only when overrun braking is required in Dr. 3 range (1st & 3rd speed); Lo range (1st speed); and Reverse.

Lo Band (Rear Unit)—The Lo band is servo operated and is engaged only when transmission is in Lo range. Adjustment of this band is not required.

OPERATION

Transmission operation in each selector lever position is outlined below. In either "D" (Drive) position, operation varies with car speed and operating conditions.

Neutral Position: Front unit is in reduction (controlled coupling empty and sprag clutch holding). Rear unit is in neutral (neutral clutch released, rear clutch released and Lo band released). Reverse unit is in neutral (reverse cone clutch released).

Drive Left (Pointer to left of "D" on Cadillac & Pontiac. "Dr" on Oldsmobile. "D4" on Hudson, Nash, & Rambler):

First Speed—Front unit is in reduction (controlled coupling empty, sprag clutch holding). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 3.97-1.

Second Speed—Front unit is in direct drive (controlled coupling is filled and sprag clutch released). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 2.55-1.

Third Speed—Front unit is in reduction (controlled coupling empty, sprag clutch holding). Rear unit is in direct drive (neutral clutch applied, rear clutch applied, sprag clutch released and Lo band released). Reverse unit is in neutral (cone clutch released). Total reduction is 1.55-1.

Fourth Speed—Front unit is in direct drive (controlled coupling is filled, sprag clutch released). Rear unit is in direct drive (neutral clutch applied, rear clutch applied, sprag clutch released and Lo band released). Reverse unit is in neutral (cone clutch released). No reduction 1.00-1.(Direct Drive).

Drive Right (Pointer to right of "D" on Cadillac & Pontiac. "S" on Oldsmobile. "D3" on Hudson, Nash, & Rambler):

First Speed—Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 3.97-1.

Second Speed—Front unit is in direct drive (controlled coupling filled, sprag clutch released, overrun clutch released). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 2.55-1.

Third Speed—Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is in direct drive (neutral clutch applied, rear clutch applied, sprag clutch released and Lo band released). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 1.55-1.

Lo Range (All Models):

First Speed—Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band applied). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 3.97-1.

Second Speed—Front unit is in direct drive (controlled coupling filled, sprag clutch released, overrun clutch released). Rear unit is in reduction (neutral clutch applied, rear clutch released, sprag clutch holding and Lo band applied). Reverse unit is in neutral (reverse cone clutch released). Total reduction is 2.55-1.

Reverse Range: Front unit is in reduction (controlled coupling empty, sprag clutch holding, overrun clutch applied). Rear unit is acting as reverse idler (neutral clutch released, rear clutch released, sprag clutch released). Reverse unit is in reduction (reverse cone clutch applied). Total reduction is 4.31-1.

LUBRICATION

LUBRICATION INTERVALS: Check fluid level every 1000 miles (Hudson, Nash, Oldsmobile, & Rambler), every 2000 miles (Cadillac & Pontiac). Drain and refill every 25,000 miles (except Cadillac), every 12,000 miles (Cadillac, normal driving), 6000 miles (Cadillac, heavy duty driving).

▷ *CADILLAC DRAIN & REFILL INTERVAL CHANGE: The above fluid change intervals supersede previous instructions on all 1956-57 models.*

Recommended Lubricant: Use only GM Hydra-Matic Fluid or an Automatic Transmission Fluid Type "A" with "AQ-ATF" embossed on top of fluid container.

CHECKING FLUID LEVEL: With selector lever in "N" or "P" position, run engine at normal idle speed (except Cadillac); approx. 20 MPH (Cadillac), for 1½ minutes and check fluid level on dipstick. With engine still running, add fluid to bring level up to within ¼" of "F" (full) mark on dipstick. *CAUTION—do not fill above "F" mark on dipstick as this will cause foaming when transmission oil is hot.*

▷ *NOTE: Fluid level should be ¼" below "F" mark when cold and at the "F" mark when h t.*

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DUAL-COUPLING HYDRA-MATIC (C ntinu d)

DRAINING & REFILLING: Remove transmission oil pan drain plug and drain plug from flywheel or torus cover *(NOTE* - To gain access to flywheel or torus cover drain plug, remove flywheel housing front cover (Cadillac, Hudson, Nash, & Rambler), flywheel inspection plate (Oldsmobile), flywheel housing lower plate (Pontiac). Allow old fluid to drain completely and then reinstall plugs. *(CAUTION - Care must be taken not to damage flywheel or torus drain plug).* Pour 11 qts. (Oldsmobile), 8 qts. (all others) of Automatic Transmission Fluid Type "A" into transmission through filler tube on right side of transmission (tube is located under hood and also houses the dipstick). Run engine at 800 RPM (Cadillac), normal idle speed (all others) for 1½ minutes with selector lever in "N" (neutral). Add fluid as required to bring level to within ¼" of "F" (full) mark on dipstick. On Cadillac, reduce engine to idle speed before adding fluid.

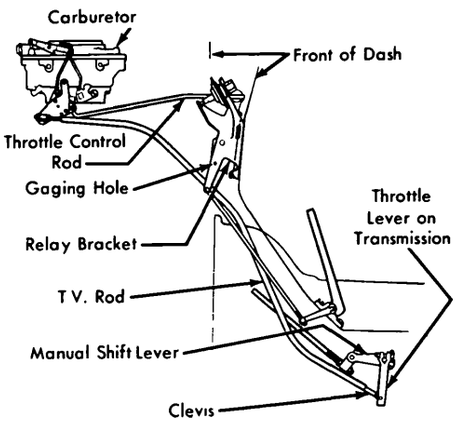
►*NOTE:-* Transmission oil capacity is approximately 12 qts. (Cadillac), 11½ qts. (Hudson, Nash, & Rambler), 11 qts. (Oldsmobile), 9½ qts. (Pontiac).

LINKAGE ADJUSTMENT

►*THROTTLE VALVE LINKAGE ADJUSTMENT NOTE: See "Carburetor" on individual car model pages for throttle valve linkage adjustment.*

CADILLAC

MANUAL LEVER LINKAGE ADJUSTMENT: Loosen the adjusting nuts on transmission manual rod and back off approximately 1". Place manual lever on transmission fully forward to "P" (Park) position. Place selector lever on steering column in "P" (Park) position. Slide clevis of manual lever along manual rod in direction of steering column until all slack in linkage is taken up *(NOTE*–If clevis contacts upper adjusting nut before all slack is taken up, nut should be backed off an additional amount). Tighten lower adjusting nut with fingers against clevis to further remove slack. Bring upper adjusting nut down to contact clevis and tighten with wrench. Check manual selector lever in car. It should be free to enter the "P" (Park) position and the "DR4" stop in the steering column should correspond to the "DR4" detent position in the transmission. Readjust if necessary. Check indicator pointer to see that it indexes to the "DR4" position when selector lever is at the "DR4" stop.

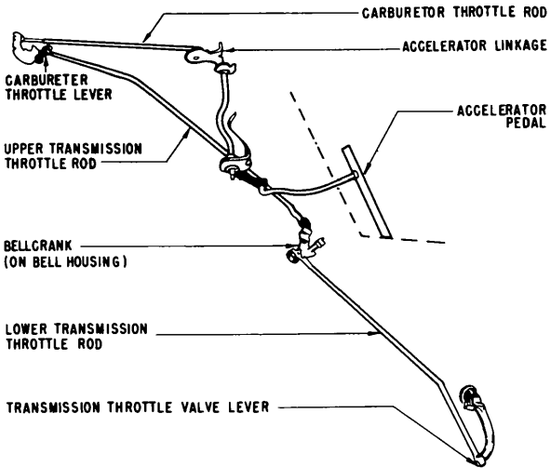


CADILLAC LINKAGE

Neutral Safety Switch Adjustment (Combination Neutral Safety Switch, Back-up Light Switch): Located on steering column forward of instrument panel. Loosen attaching screw on switch and position it on jacket so starter is not operative in any position except "N" (Neutral) or "P" (Park).

NASH, HUDSON & RAMBLER

MANUAL LEVER LINKAGE ADJUSTMENT: Place selector lever in the "D-3" position and set operating lever against stop on starter switch bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever.



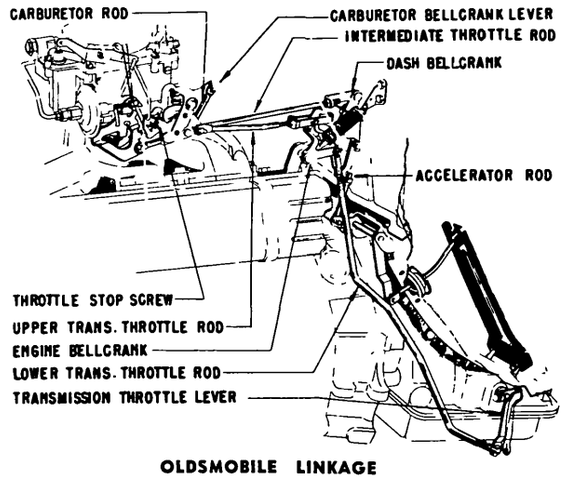
HUDSON, NASH & RAMBLER LINKAGE

Place transmission outer shift lever in "D-3" position. Adjust clevis so that clevis pin passes freely through hole in lever with the operating lever against stop on starter switch bracket, then remove clevis and **lengthen the control rod two full turns** and replace clevis and pin.

OLDSMOBILE

MANUAL LEVER LINKAGE ADJUSTMENT: Place transmission manual lever in neutral detent position. Disconnect manual rod from lower shift lever. Hold lower shift lever upward so selector lever is positioned against stop in upper steering column. Install pin in clevis and rotate clevis until pin enters bushing freely in lower shift lever. Install clevis and pin and tighten locknut. Move selector lever to "P" (Park) position and rock car to check for parking pawl engagement.

N utral Saf ty Switch Adjustment: Located on steering column forward of instrument panel. Loosen attaching screws on mast jacket, and with selector lever in



OLDSMOBILE LINKAGE

"N" (neutral) position, position the switch so that a .090" pin can be inserted through hole in switch arm and into hole in face of switch. Tighten switch attaching screws and remove pins. Check to see that starter will operate only in "P" (Park) and "N" (Neutral) positions, and that transmission is not in gear.

PONTIAC

►*1957 PONTIAC BIND OR DRAG DURING REVERSE OPERATION CORRECTION:* This condition may be caused by improper travel of gearshift interlock plate in slot at lower end of steering column. If sufficient overtravel of lower shift lever beyond the reverse detent position is not allowed, and shift lever is not fully into the reverse detent, the neutral clutch exhaust will be blocked, preventing release and possible burning of neutral clutch plates. Check interlock plate for length of shift lever slot on reverse end of travel. Slot in plate should extend inside of jacket opening (jacket opening should limit the travel). If slot is not correct, check linkage for correct travel of steering column lower shaft lever as follows: Place upper shift control lever and transmission lever in "P" (Park) position. With outer transmission shift lever trunnion nuts backed off clear of trunnion, pull shift rod down toward transmission as far as possible; and, while holding in this position, run trunnion upper nut down to just contact trunnion. Hold shift rod and shift transmission into "R" (Reverse) using upper shift lever. Observe position of upper trunnion nut. If nut is short of trunnion, rework interlock and adjust linkage as indicated below. If upper nut is contacting trunnion, count the number of turns upper nut can be backed off and still contact trunnion. If less than two turns, rework interlock and adjust linkage as indicated below. If more than two turns, screw nut down from "just contact" position to original or starting position and tighten lower nut (linkage will be correct).

►*INTERLOCK REWORK FOR PROPER TRAVEL OF SHIFT LEVER: (See "Bind or Drag During Reverse Operation Correction" above).* Remove interlock plate

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC (Continued)

from steering column jacket and lengthen slot to within at least ¼" (3/16" allowable) from end of plate. Reinstall interlock plate.

MANUAL LEVER LINKAGE ADJUSTMENT: Place selector lever and transmission manual lever in "P" (Park) position; and with outer transmission shift lever trunnion nuts backed off clear of trunnion, pull shift rod down toward transmission as far as possible. While holding in this position, run the upper trunnion nut down to just contact trunnion. Hold the shift rod and shift transmission into "R" (Reverse), and observe position of upper trunnion nut **(This is important).** If upper nut is short of trunnion, screw upper nut down to just contact trunnion, then turn down **two additional turns.** Tighten lower nut. If upper nut is contacting the trunnion, count number of turns nut can be backed off and still contact trunnion. If less than two turns, turn nut down **two turns** against trunnion from the "just contact" position, and lock lower nut. If more than two turns, turn upper nut down against trunnion from the "just contact" position to the original or starting position and lock lower nut. Check transmission parking lock with car on a grade or ramp for positive lock. *NOTE* - The shift indicator must not be off index more than .080" after linkage adjustment is completed.

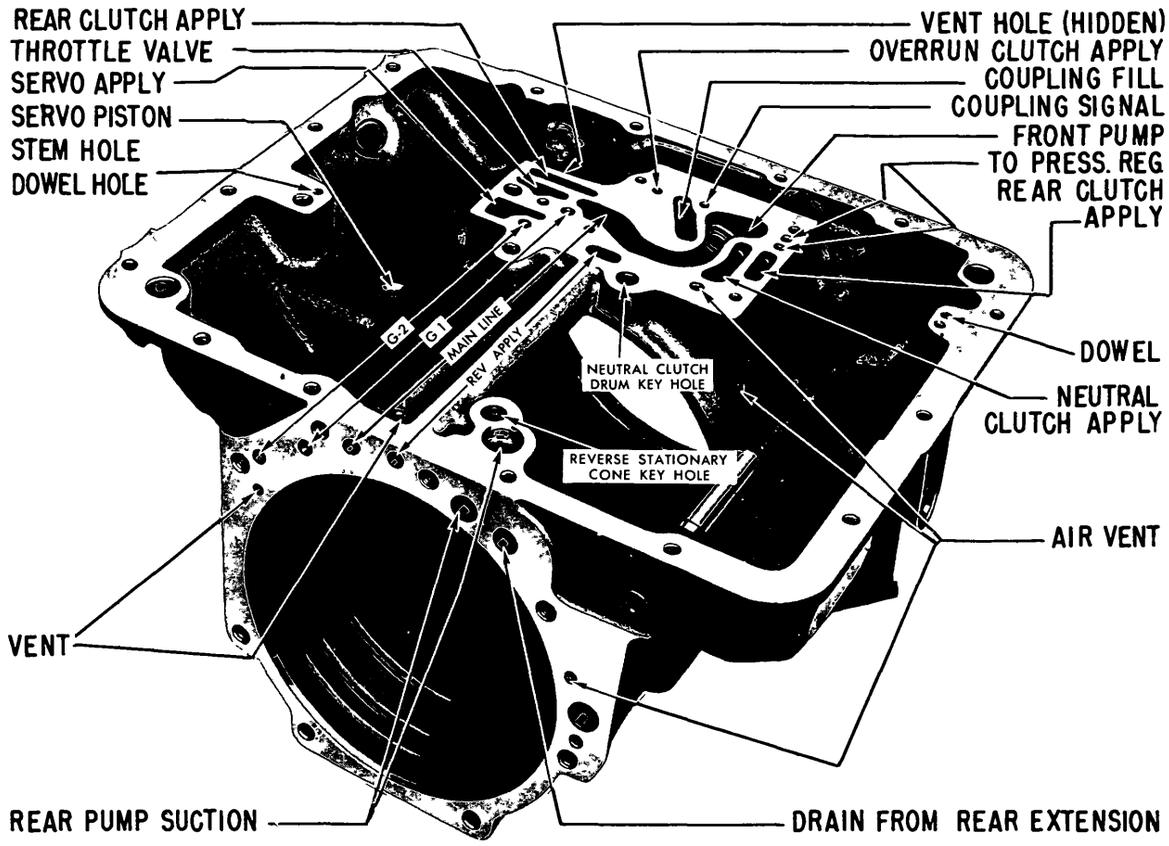
Neutral Safety Switch Adjustment: Located at lower end of steering column in engine compartment. Loosen switch mounting screw and adjust switch bracket to a position where starter will not operate when ignition key is turned to start position. Place manual control lever in "P" (Park) position. Make certain that switch arm does not touch stop on switch bracket. Check to see that engine starts when selector lever is in "P" (Park), or "N" (Neutral) positions. Tighten mounting screw securely.

TESTING

ROAD TEST: Operate car over a test route and note performance and shift speeds. Select a test route that will provide for all types of operation. *See "Dual-Coupling Hydra-Matic" Shift Point Table for correct shift speeds.*

►*1ST SPEED & REVERSE TEST NOTE: See "Stall Test" below.*

2nd Speed Test: With selector lever in "Lo" range, make a full throttle start from a complete stop. The shift to 2nd speed should occur as indicated in "Shift Table" below, accompanied by a drop in engine RPM which then increases in second speed as full throttle opening is maintained. If a definite change from first to second speed is not noticed and engine speed does not drop but increases steadily, a malfunctioning front unit coupling is indicated. When the car is in second speed, permit the car to coast at zero throttle opening. If a definite engine braking effort is noticed, a malfunctioning overrun band is indicated. If transmission slips in second or misses second speed, the front unit coupling is not operating properly. If transmission slips in first and second on coast in "Lo" range, the overrun band is not operating properly.



TRANSMISSION AIR TEST POINTS

3rd & 4th Speed Test: Using the "Dr4" (Drive Left) range to obtain 40 MPH, move the selector lever to "Dr3" (Drive Right) range, forcing a downshift to third speed. Decrease car speed by use of the brakes while throttle is maintained in the open position and car speed is above 25 MPH. If engine RPM increases and the transmission has been satisfactory in reverse, first & second speeds, the rear unit clutch is slipping. If no excessive slip is felt, the rear unit clutch is operating correctly. The operation of the front unit clutch can be checked by bringing the car speed up to 30 MPH in "Dr4" range. With the car coasting in "Dr4" range, manually shift to "Dr3" range. If an immediate shift is felt which results in more braking effect on the car, then the overrun clutch is operating properly. If the manual lever is shifted from "Dr3" to "Dr4" range above 22 MPH with the car coasting and an immediate reduction of braking effort is obtained, then the clutch is releasing properly.

STALL TEST (EXC. OLDS. & PONTIAC): Use this test to check engine and transmission performance. Connect a tachometer to engine, then bring engine and transmission to normal operating temperature. Apply foot brake and set hand brake tightly. Place selector lever in "D" (Drive) position. Depress accelerator to floor and note engine speed. This should be 2100 RPM (Cadillac with single carb.), 2500 RPM (Cadillac with dual carbs.), 1760-1860 RPM (Hudson & Nash), 1675-1775 RPM (Rambler). *(CAUTION - Use extreme care when making this test and DO NOT HOLD THROTTLE OPEN MORE THAN ONE MINUTE, 15-20 SECONDS PREFERABLY. If engine speed exceeds maximum RPM, CLOSE THROTTLE IMMEDIATELY to avoid damage to transmission).* If engine speed not correct, make further tests as indicated below.

If Engine Speed Above Maximum: If engine speed continues above maximum speed as indicated above, it indicates that sprags are not holding properly, or there is slippage in the fluid coupling, damaged torus member, or defective front pump.

Check to Determine Which is Slipping - After above test, place selector lever in "R" position and test again. If slippage still occurs, fault is with front unit (or both front and rear units). If slippage does not occur, then all slippage (above) is in rear unit.

OIL PRESSURE TEST: Connect Oil Pressure Gauge

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DUAL-COUPLING HYDRA-MATIC (C ntinued)

J-2540 (Cadillac), J-2540-A (Hudson, Nash, & Rambler), J-4268-1 (Pontiac) to take off hole at bottom of rear pump using a hose and fitting. Drive car until transmission oil has reached normal operating temperature.

Zer Thrott Pressur (Hudson, Nash, Pontiac, & Rambl r): Check pressure in all ranges. Pressure should be 50 lbs. minimum in all ranges with a maximum variation of 10 lbs., (may be higher in reverse).

Z r Thrott Pr ssure (Cadillac): With transmission in 4th speed, and car above 20 MPH, oil line pressure should be 60-70 lbs.

Driv Right Pressure (Hudson, Nash, Pontiac, & Rambler): With transmission selector lever in "Drive Right" position and car speed at approximately 25 MPH, pressure should be 90-100 lbs. *NOTE* - Pressure at any speed is constant regardless of throttle pressure as throttle valve pressure is not used to modulate line pressure.

Drive Left Pressure (Hudson, Nash, Pontiac, & Rambler): While driving at 25 MPH, move selector lever to "Drive Left" position so that transmission will shift into 4th speed. Oil pressure should drop to 60-70 lbs. in 4th.

Full Throttle Pressure Test (Cadillac): In any drive range, pressure should be at least 20 lbs. higher than zero throttle pressure test reading (see above).

Rear Pump Pressure Test (Cadillac): Drive car at 40-45 MPH in 4th speed, then shift to neutral and turn engine off. Pressure should be at least 60 lbs.

Reverse Pressure Test (Cadillac, Hudson, Nash, Pontiac, & Rambler): Place selector lever in "R" (Reverse) position and apply foot brake. Increase engine speed to half throttle. The pressure range under these conditions should be 160-200 lbs. (Cadillac), 145-190 lbs. (Hudson, Nash, Pontiac, & Rambler).

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DUAL-COUPLING HYDRA-MATIC SHIFT POINTS

CADILLAC
3.07-1 AXLE
60S, 62 Seri s (Single Carb.)

UPSHIFTS:		1-2	2-3	3-4
"Dr4"	(Min. Throttle)	6-9	13-16	20-24
	(Full Throttle)	20-24	39-44	68-75
"Dr3"	(Min. Throttle)	6-9	13-16	68-75
	(Full Throttle)	20-24	39-44	68-75
"Lo"	(Min. Throttle)	6-9	52-58	68-75
	(Full Throttle)	20-24	52-58	68-75

DOWNSHIFTS:		4-3	3-2	2-1
"Dr4"	(Min. Throttle)	14-18	11-15	0-5
	(Full Throttle)	61-68	23-27	0-5
"Dr3"	(Min. Throttle)	61-68	11-15	0-5
	(Full Throttle)	61-68	23-27	0-5
"Lo"	(Min. Throttle)	61-68	41-47	0-5
	(Full Throttle)	61-68	41-47	0-5

CADILLAC
3.36-1 AXLE
60S, 62 Series (Dual Carbs.)

UPSHIFTS:		1-2	2-3	3-4
"Dr4"	(Min. Throttle)	6-9	13-16	17-21
	(Full Throttle)	18-22	37-40	72-79
"Dr3"	(Min. Throttle)	6-9	13-16	62-69
	(Full Throttle)	18-22	37-40	62-69
"Lo"	(Min. Throttle)	6-9	47-53	62-68
	(Full Throttle)	18-22	47-53	62-69

DOWNSHIFTS:		4-3	3-2	2-1
"Dr4"	(Min. Throttle)	12-16	12-15	0-5
	(Full Throttle)	60-66	22-25	0-5
"Dr3"	(Min. Throttle)	56-62	12-15	0-5
	(Full Throttle)	56-62	22-25	0-5
"Lo"	(Min. Throttle)	56-64	37-43	0-5
	(Full Throttle)	56-62	37-43	0-5

CADILLAC
3.36 AXLE
75 Series Optl. on 60S, 62 Series (Single Carb.)

UPSHIFTS:		1-2	2-3	3-4
"Dr4"	(Min. Throttle)	6-9	12-15	18-22
	(Full Throttle)	18-22	35-40	62-69
"Dr3"	(Min. Throttle)	6-9	12-15	62-69
	(Full Throttle)	18-22	35-40	62-69
"Lo"	(Min. Throttle)	6-9	47-53	62-68
	(Full Throttle)	18-22	47-53	62-69

DOWNSHIFTS		4-3	3-2	2-1
"Dr4"	(Min. Throttle)	12-16	10-18	0-5
	(Full Throttle)	56-62	21-25	0-5
"Dr3"	(Min. Throttle)	56-62	10-18	0-5
	(Full Throttle)	56-62	21-25	0-5
"Lo"	(Min. Throttle)	56-64	37-43	0-5
	(Full Throttle)	56-62	37-43	0-5

3.77-1 AXLE
(86 Series)

UPSHIFTS:		1-2	2-3	3-4
"Dr4"	(Min. Throttle)	5-8	11-14	16-19
	(Full Throttle)	16-20	31-36	55-61
"Dr3"	(Min. Throttle)	5-8	11-14	55-61
	(Full Throttle)	16-20	31-36	55-61
"Lo"	(Min. Throttle)	5-8	55-61	56-62
	(Full Throttle)	16-20	55-61	55-61

DOWNSHIFTS:		4-3	3-2	2-1
"Dr4"	(Min. Throttle)	11-14	9-12	0-4
	(Full Throttle)	50-56	18-22	0-4
"Dr3"	(Min. Throttle)	50-56	9-12	0-4
	(Full Throttle)	50-56	18-22	0-4
"Lo"	(Min. Throttle)	50-56	33-38	0-4
	(Full Throttle)	50-56	33-38	0-4

HUDSON & NASH

UPSHIFTS:		1-2	2-3	3-4
"Dr4"	(Light Throttle)	5-9	10-14	15-19
	(Full Throttle)	13-17	33-37	59-63
"Dr3"	(Light Throttle)	5-9	10-14	65-69
	(Full Throttle)	13-17	33-37	65-69
"Lo"	(Light Throttle)	5-9	46-50	65-69

DOWNSHIFTS:		4-3	3-2	2-1
"Dr4"	(Full Throttle)	30-34	7-11	
	(Closed Throttle)	15-11	11-7	7-3
	(Max. Kickdown)①	59-55	21-27	
"Dr3"	(Closed Throttle)	65-61	11-7	7-3
"Lo"	(Closed Throttle)	65-61	43-39	7-3

① - Maximum Part Throttle Kickdown (4-3) 34-30 MPH.

PONTIAC

UPSHIFTS:		1-2	2-3	3-4
"Dr. Left"	(Min. Throttle)	4-9	11-15	17-20
	(Full Throttle)	11-15	35-40	65-70
"Dr.Right"	(Min. Throttle)	4-9	11-15	
	(Full Throttle)	11-15	35-40	65-75
"Lo"	(Min. Throttle)	4-9		
	(Full Throttle)	11-15	42-52	65-75

DOWNSHIFTS:		4-3	3-2	2-1
"Dr.Left"	(Closed Throttle)	15-11	10-6	6-2
	(Full Throttle)	35-28	10-6	6-2
	(Forced)	70-60	25-20	6-2
"Dr.Right"	(Closed Throttle)	70-60	10-6	6-2
	(Full Throttle)	70-60	10-6	6-2
	(Forced)	70-60	25-20	6-2
"Lo"	(Closed Throttle)	70-60	45-39	6-2
	(Full Throttle)	70-60	45-39	6-2
	(Forced)	70-60	45-39	6-2

RAMBLER

UPSHIFTS:		1-2	2-3	3-4
"Dr4"	(Light Throttle)	5-9	10-14	15-19
	(Full Throttle)	13-17	30-34	59-63
"Dr3"	(Light Throttle)	5-9	10-14	59-63
	(Full Throttle)	13-17	30-34	59-63
"Lo"	(Light Throttle)	5-9	42-46	59-63

DOWNSHIFTS:		4-3	3-2	2-1
"Dr4"	(Full Throttle)	28-32	16-20	
	(Closed Throttle)	15-11	11-7	7-3
	(Max. Kickdown)①	60-56	20-16	
"Dr3"	(Closed Throttle)	59-55	11-7	7-3
"Lo"	(Closed Throttle)	57-53	41-37	7-3

① - Maximum Part Throttle Kickdown (4-3) 32-28 MPH.

DUAL-COUPLING HYDRA-MATIC (Continued)

TROUBLE SHOOTING & DIAGNOSIS

FORWARD DRIVE IN NEUTRAL: Manual linkage not adjusted correctly. Neutral clutch not releasing properly. Rear unit clutch not releasing properly. Overrun band not fully released.

REVERSE DRIVE IN NEUTRAL: Stationary cone sticking. Reverse piston not fully released.

NO DRIVE (Resulting in Neutral Condition): Front sprag clutch slipping. Front sprag clutch incorrectly installed. Rear sprag clutch slipping. Rear sprag clutch incorrectly installed. Neutral clutch apply restricted or leaking. Manual linkage incorrectly installed. Manual valve not engaged with valve pin. Low oil pressure.

NO DRIVE (Resulting in Stall Condition): Stationary cone sticking. Reverse piston not fully released. Front sprag clutch broken. Rear sprag clutch broken.

LOCKED-UP CONDITION IN REVERSE RANGE: Neutral clutch not releasing properly. Rear unit clutch not releasing properly. Overrun band not fully released. Rear sprag clutch incorrectly installed.

NEUTRAL CONDITION IN REVERSE RANGE: Reverse piston apply restricted or leakage. Stationary cone key missing.

NO REVERSE (Drive Slips): Reverse piston apply restricted or leaking. Low oil pressure. Manual linkage not adjusted correctly. Manual valve not engaged with valve pin. Front sprag clutch slipping or broken.

SELECTOR LEVER WILL NOT GO INTO REVERSE RANGE: Governor valves sticking or broken govenor oil seal rings. Reverse blocker piston stuck open.

SLIPS IN 1ST & 3RD IN "DR4" RANGE: Front sprag clutch slipping or broken.

SLIPS IN OR MISSES 2ND & 4TH: Front unit coupling cover seals leaking. Front unit coupling cover exhaust valves sticking or missing. Front unit coupling cover feed restriction or leak. Front unit coupling cover signal restriction or leak. Low oil pressure. Coupling valve sticking. Sticking valve or dirt in valve body.

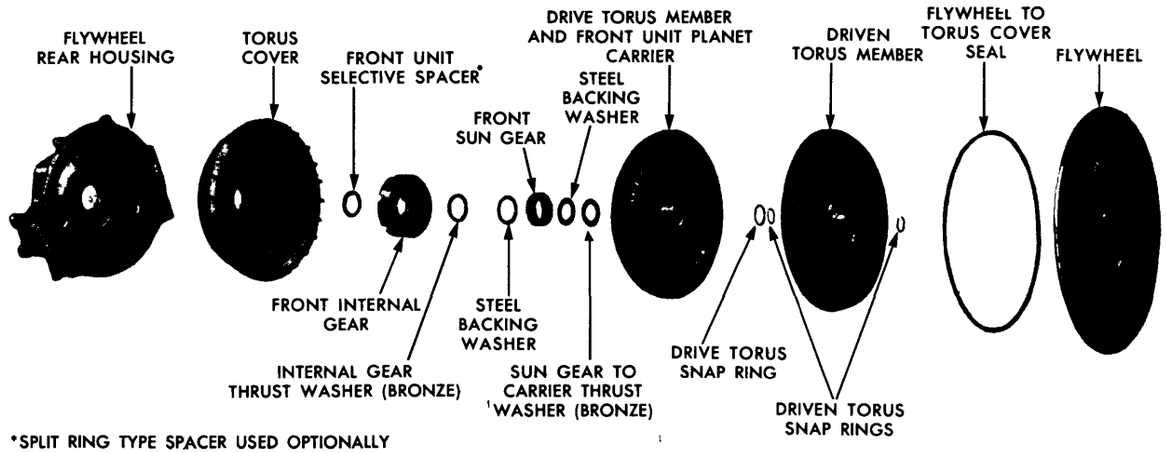
SLIPS IN 1ST & 2ND (All Drive Ranges): Neutral clutch slipping or burned. Neutral clutch apply restricted or leaking. Incorrect number of clutch plates. Rear sprag clutch slipping or broken. Low oil pressure.

SLIPS IN 3RD & 4TH (In Both "Dr4" & "Dr3"): Rear clutch unit slipping or burned. Rear unit clutch apply restricted or leaking. Incorrect number of clutch plates.

SLIPS IN 3RD (In "Dr3" on Coast): Overrun clutch slipping or burned. Overrun clutch apply restricted or leaking. Sticking valve or dirt in valve body.

SLIPS IN 1ST & 2ND (In "Lo" on Coast): Servo apply restricted or leaking. Overrun clutch not anchored to case or broken. Servo piston binding in case or in servo and accumulator body. Overrun band facing worn or loose.

SLIPS IN 1ST (In all Driv Rang s): Front sprag clutch slipping or broken. Front sprag clutch incorrectly installed. Rear sprag clutch slipping or broken. Rear sprag clutch incorrectly installed. Neutral clutch slipping or burned. Neutral clutch apply restricted or leaking. Incorrect number of neutral clutch plates.



*SPLIT RING TYPE SPACER USED OPTIONALLY

DUAL-COUPLING HYDRA-MATIC FLYWHEEL REAR HOUSING & TORUS ASSEMBLY

NO UPSHIFTS: Governor valves sticking. Broken governor oil seal rings. Sticking valve or dirt in valve body.

MISSES 2ND SPEED: Amplifier valve sticking. Transition valve sticking. Sticking valve or dirt in valve body.

MISSES 3RD SPEED: Transition valve sticking. Sticking valve or dirt in valve body.

ROUGH 2-3 UPSHIFT: Trimmer valve stuck. Accumulator piston stuck. Accumulator gasket broken or leaking. Restricted or leaking oil passages. Broken accumulator spring. Broken or leaking accumulator piston oil seal ring.

LOCKS UP IN 3RD & 4TH: Rear sprag clutch broken.

LOCKS UP IN 2ND & 4TH: Front sprag clutch broken.

UPSHIFTS HIGH: Governor valves sticking. Leaking or restricted main line feed to governor. Broken governor oil seal rings.

UPSHIFTS LOW: Governor valves sticking. Broken governor oil seal rings. Sticking valve or dirt in valve body.

REMOVAL & INSTALLATION

CADILLAC

REMOVAL: 1) Place car on hoist or jack stands and drain cooling system. Disconnect battery and remove transmission filler pipe bracket from right cylinder head. Remove starter motor and slush deflector. Clean dirt away from pipe flange and slide filler pipe out of sleeve in transmission case. Remove lower flywheel front cover. Drain transmission at oil pan and flywheel.

2) Remove propeller shaft assembly. Remove intermediate frame crossmember below flywheel housing. Disconnect hoses at cooler and speedometer cable from extension housing. Remove throttle valve and manual levers from shafts.

3) Remove nuts from flywheel-to-drive plate screws. Place a jack under rear of engine oil pan, using a wood block to prevent damage to oil pan. Place transmission jack under transmission and raise it just enough to take strain off rear engine support.

4) Disconnect engine rear support at transmission extension housing, and remove crossmember that carries support. Lower transmission and engine below normal position and use a 5/8" universal socket and a 2½ ft. long, 3/8" drive extension to reach the upper flywheel housing to cylinder block bolts.

►*NOTE:* The above engine removal procedure supersedes previous instructions requiring the removal of upper flywheel housing-to-block by removing the access holes in floor pan. These floor pan holes are provided for use only when a damaged bolt may not be accessible.

5) Remove four remaining screws holding flywheel housing to engine. Remove flywheel housing and transmission as a unit by moving assembly toward rear of car, disengaging flywheel housing from locating dowels on engine, then tilting front of unit downward to lower it from car. Remove washer from pilot hole in crankshaft and four spacer washers from flywheel-to-drive plate screws.

INSTALLATION: 1) Install spacer washer in pilot hole in crankshaft and install spacer washers on flywheel-to-drive plate screws. Raise transmission into position carefully with transmission jack. Align drive plate with four torus cover screws, and dowel holes in flywheel housing with dowels on engine.

2) Install four lower flywheel housing-to-crankcase screws (be sure that flywheel is as far forward as possible). Install four nuts attaching drive plate to flywheel and tighten to 15-20 ft. lbs. Be sure drain plugs in flywheel and oil pan are tight.

3) With transmission and engine in a lower than normal position (same position used for removal), install and tighten upper flywheel-to-cylinder block bolts. Raise engine and transmission about one inch above normal

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC (C ntinued)

height and install engine rear support bracket on frame. Lower transmission carefully and install support screws. Remove jack and block from engine pan.

4) Install flywheel housing front cover and starter motor. Install transmission filler tube with support bracket properly positioned on cylinder head. Install manual and throttle valve levers making sure that serrations on levers lineup with serrations on their respective shafts. Tighten securely. Install slush deflector and install speedometer cable. Connect hoses to cooler and tighten securely.

5) Install frame crossmember below flywheel housing. Install propeller shaft assembly, then lower car to floor. Connect battery and install filler pipe bracket to cylinder head screw. Fill cooling system. Fill transmission *(see "Draining & Refilling" above)*. Adjust manual and throttle valve linkage *(see "Linkage Adjustments" above)*.

HUDSON, NASH, & RAMBLER

REMOVAL: Raise car sufficiently on car stands, supporting rear of car at side sills. Support rear axle with a hydraulic jack.

1) Drain flywheel and transmission oil pan *(see "Draining & Refilling"* above). Remove oil filler tube from oil pan. Disconnect oil cooler tubes at right side of transmission.

2) Disconnect hand brake cable at bell crank brake cable housing at bell crank bracket. Remove brake hose bracket from floor pan to prevent damage to hose. Disconnect speedometer cable and housing at transmission adapter.

3) Disconnect throttle rod assembly from throttle lever at transmission and bellcrank at bell housing. Disconnect manual control rod from lever at transmission.

4) Disconnect torque tube from rear bearing retainer, then move rear axle and torque tube assembly to the rear and separate by sliding universal joint to rear off splines of output shaft.

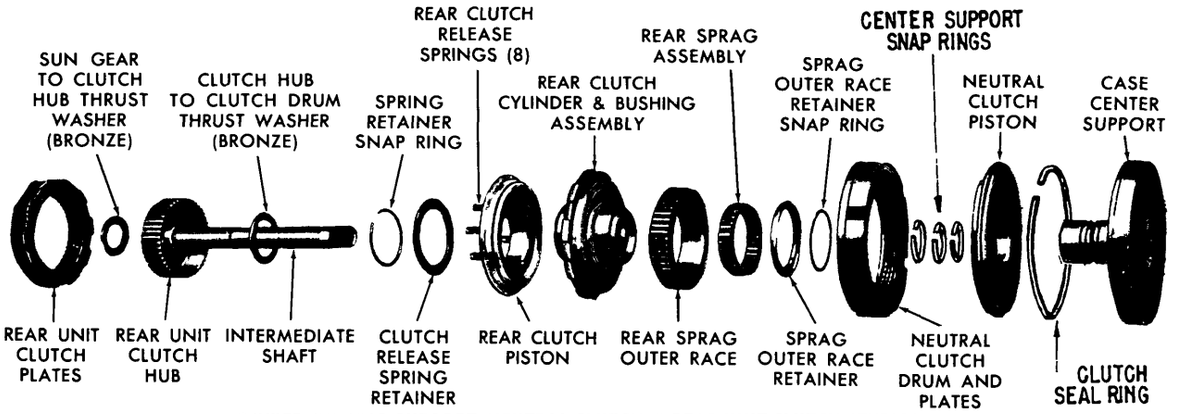
5) Support rear of engine to remove weight from rear engine support cross member. Remove plate from flywheel housing and remove six nuts retaining flywheel and torus assembly to engine flex plate, Place a hydraulic jack. with Tool J-6130 under transmission. Disconnect flywheel housing-to-engine attaching bolts.

6) Disconnect the cross member from rear engine supports and from body side sills. With jack handle toward rear of car, raise the jack slightly to remove strain or bind from bolts fastened to flex plate. Move transmission assembly to rear and lower assembly after six bolts have been withdrawn from engine flex plate.

INSTALLATION: Reverse removal procedure and note the following:

1) Coat torus pilot with lubriplate. Exercise caution when entering torus pilot into flywheel.

2) Line up the two torus covers with clearance holes in flywheel or flex plate when retaining nuts are tightened. *CAUTION* - If these dowels are not lined up, they can be forced out and damage the bell housing.



CENTER BEARING SUPPORT, NEUTRAL CLUTCH, & REAR UNIT CLUTCH (TYPICAL)

OLDSMOBILE

REMOVAL: 1) Disconnect battery and remove transmission oil filler tube. Raise car with all four wheels off floor. Drain transmission *(see "Draining & Refilling" above)*. Disconnect speedometer cable at transmission.

2) Disconnect manual and throttle valve linkage and remove throttle lever. Remove crankcase lever outlet tube. Scribe a line from one propeller shaft center bearing support-to-frame bolts on frame member to aid in aligning center bearing support at installation.

3) Remove propeller shaft center bearing support bolts and shims (mark shims for installation at the same location). Disconnect front universal joint at transmission. Raise center bearing so it will clear frame member and, slide front propeller shaft and bearing assembly approximately 2" to rear on slip joint (bearing mounting plate will rest on frame and keep propeller shaft from dropping down).

4) Remove starter and lower flywheel housing. Support transmission with a transmission hoist and adapter. Raise engine enough to relieve weight from rear engine mounts and remove engine mount-to-crossmember bolts. Remove crossbar to frame attaching bolts and remove crossmember.

5) Remove torus oil plug and drain torus, reinstall plug and tighten to 6-7 ft. lbs. Install engine support bar (Tool 30-13), with support screw pilots seated into lower flywheel housing front attaching screw holes. *NOTE* - Locate support bar forward on frame so transmission will clear when it is lowered.

6) Lower transmission hoist until it is free of transmissions, then lower engine (using support bar adjusting screws), NOT TO EXCEED 1½", to permit removal of the two upper bell housing-to-block bolts. Disconnect oil cooler hoses at lines and cap lines immediately.

7) Raise transmission hoist to contact transmission, supporting it slightly. Remove the four flex plate-to-flywheel nuts (note position of flywheel dowels in relation to the flex plate). Remove remaining flywheel housing-to-block bolts. Move transmission to rear approximately ¾" to clear dowels (standard thread holes adjacent to dowels are provided for installing bolts to push flywheel housing off dowels). Lower transmission from car.

INSTALLATION: Reverse removal procedure and note the following:

1) Lubricate crankshaft pilot bore and wick in pilot bore with Synthetic Oil Seal Lubricant, Part No. 567196.

2) To assemble flex plate to flywheel, align one dowel in flywheel with the small recess adjacent to small ear in flexplate, then cross tighten flex plate-to-flywheel attaching nuts to 17-22 ft. lbs. Tighten oil pan drain plug.

3) Use a 4" "C" clamp to hold bearing against spider journals and obtain clearance of bearing snap rings when installing front propeller shaft to companion flange on transmission. Tighten "U" bolt nuts to 18-22 ft. lbs.

4) Refill transmission. *See "Draining & Refilling" above.*

PONTIAC

REMOVAL: 1) Drain cooling system and remove transmission oil level indicator. Drain transmission oil pan (torus assembly can be drained at same time or it can be drained after transmission removed).

2) Disconnect rear universal joint from differential companion flange and slide propeller shaft from transmission output shaft. Disconnect speedometer cable from driven gear.

3) Remove flywheel housing bottom cover and crankcase ventilator outlet filter. If car is equipped with dual exhaust system, the right hand exhaust pipe must be removed (it is not necessary to disturb the exhaust system on cars with single exhaust).

4) Disconnect rear engine insulators from rear engine support cross member. Using Engine Fixture J-4732, raise rear of engine until insulators are about 1/2" above cross member *(CAUTION–Do not raise engine more than necessary to remove cross member).*

5) Loosen transmission filler pipe to cylinder head clamp. Remove transmission throttle control lever and disconnect manual control rod from transmission lever. Remove engine rear support cross member.

6) Remove nuts from six torus cover and flywheel-to-flex plate attaching bolts. Disconnect water hoses from oil cooler. Push transmission filler pipe upward out of transmission.

CONTINUED ON NEXT PAGE

DUAL-COUPLING HYDRA-MATIC (Continued)

7) Lower engine about 1½" below its normal position and position special automatic transmission jack under transmission and raise transmission slightly to take load off rear flywheel housing attaching screws. Using 18" to 22" socket extension, remove screws attaching flywheel housing. Work transmission rearward to disengage dowels from front flywheel housing, then lower transmission from car.

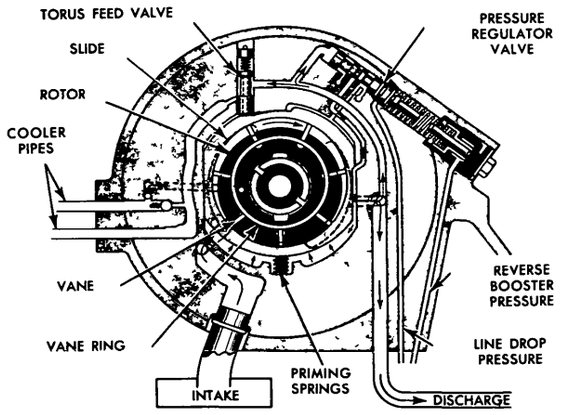
INSTALLATION: 1) With transmission on special automatic transmission jack, raise it under car until engine flex plate and transmission flywheel and torus cover are at the same level. Rotate torus cover until dowels in cover and flywheel are aligned with holes in flex plate (torus cover and flex plate can be fastened at either of two positions). Move transmission into position engaging flywheel dowels into flex plate and rear flywheel housing dowels into front flywheel housing.

2) Install and tighten two rear flywheel housing attaching screws (*NOTE* - Check to see that flywheel and torus cover are free to move back and forth slightly. If pilot on flywheel has entered end of crankshaft properly, some movement should be possible).

3) Rotate flywheel to position one flex plate mounting pad down. Push forward slightly on flywheel to seat it against crankshaft. Measure clearance between pad on flex plate and flywheel, using feeler gauges. Clearance should be .013-.024". If clearance is outside these limits, install shims as follows:

If Clearance Less Than .013" - Move transmission away from engine and install a special spacer, Part No. 522975 over flywheel pilot which fits into crankshaft. Move transmission back into place, install and tighten flywheel housing attaching bolts. Recheck clearance (which will be greater than .024") and install correct shims as indicated below.

If Clearance More Than .024" - Insert shims, Part No. 523087 (.011"), and Part No. 523088 (.030") to reduce clearance between pad and flex plate to .013-.024", at each of the six pads. Coat shims with petrolatum so they will remain in position. Do not install nuts until shims have been installed at each attaching pad as it will cock the assembly giving a false measurement of clearance at the other pads.



FR NT PUMP & REGULATOR VALVE (TYPICAL)

4) Remove plugs from oil cooler adapter and fasten adapter to transmission case. Remove special transmission jack. Raise engine until transmission touches floor pan (using Support Fixture J-4732). Install engine support rear crossmember. Install bolts, washers, and nuts and tighten securely. Lower engine into position and fasten insulators to crossmember.

5) Install nuts which retain flex plate to flywheel and torus cover and tighten to 15 ft. lbs. using torque wrench with adapter J-6498. Install crankcase ventilator outlet filter and flywheel housing bottom cover. Slide filler pipe into place in transmission, making sure shoulder on filler pipe is seated against sleeve which extends out of transmission case. On cars with dual exhaust, replace right hand exhaust pipe.

6) Replace outer shift lever and outer throttle lever. Connect speedometer cable to driven gear. Install propeller shaft, then lower car to floor. Fasten transmission filler pipe clamp to cylinder head after making sure pipe is fully seated in transmission. Fill transmission with automatic transmission fluid (*see "Draining & Refilling" above*). Adjust throttle valve linkage and manual control linkage (*see "Linkage Adjustment" above*).

TRANSMISSION OVERHAUL

►CHANGES, CAUTIONS, CORRECTIONS

►*1957 MANUAL VALVE BODY PRODUCTION CHANGE (EXCEPT CADILLAC & OLDSMOBILE):* The manual valve body and channel plate-to-case spacer has been changed to decrease neutral clutch apply oil in "Reverse". Only the later type parts will be available for service replacement. When installing a new manual valve body, the later type spacer plate must be used. The later type spacer plate can be used with either early or later manual valve bodies. See illustration for identification of channel plate-to-case spacer.

TRANSMISSION UNIT REMOVAL (TRANSMISSION IN CAR)

►*REMOVAL OF TRANSMISSION UNITS NOTE: The following transmission units may be removed without removing transmission assembly fron car. Note the following points and see "Disassembly" below, for removal procedure.*

MAIN CONTROL VALVE BODY (ALL MODELS): Remove in usual manner after removal of oil pan.

EXTENSION HOUSING (HUDSON, NASH & PONTIAC): *OLDSMOBILE NOTE*–While the extension housing cannot be removed from transmission, it can be moved rearward far enough to gain access to the following indicated units that would normally require extension housing removal.

GOVERNOR ASSEMBLY (EXCEPT CADILLAC): Remove extension housing. See Oldsmobile Note above.

REAR OIL PUMP (HUDSON, NASH & PONTIAC): On Oldsmobile, the rear oil pump can be moved rearward and rotated sufficiently to remove parking brake pawl bolt.

REVERSE PARTS (HUDSON, NASH & PONTIAC): After removing rear extension housing, reverse parts can be removed.

PARKING BRAKE LINKAGE (ALL MODELS): On Oldsmobile, see "Rear Oil Pump" above.

INSIDE DETENT & THROTTLE LEVERS: Requires removal of outside throttle control and manual levers and also of oil pan, oil screen and intake pipes.

REAR SEAL IN EXTENSION HOUSING (EXCEPT CADILLAC): On Pontiac, the slide hammer used for seal removal must be inserted through shaft tunnel in frame. When installing the seal, use an extension on the installing tool so it can be used through frame shaft tunnel.

ACCUMULATOR & SERVO (ALL MODELS): Can be removed without disturbing the main control valve assembly.

TRANSMISSION DISASSEMBLY

►*TRANSMISSION DISASSEMBLY NOTE: Instructions below cover removal of sub-assemblies from transmission case. See "OVERHAUL OF UNITS" for disassembly, inspection, and reassembly of these sub-assemblies.*

OIL COOLER, TORUS ASSEMBLY & FLYWHEEL REAR HOUSING: Disconnect oil cooler pipes from transmission cooler adapter plate, remove two bottom extension housing attaching screws and remove oil cooler.

1) Mark flywheel and torus cover so flywheel can be reinstalled in same position and remove torus cover to flywheel attaching nuts and remove flywheel. Remove and discard the "O" ring seal from flywheel.

2) Remove snap ring retaining driven torus to mainshaft, and remove driven torus member with check valve and spring. *NOTE*–If torus member sticks, tap end of mainshaft with soft hammer and at same time pull out torus member.

3) Remove inner snap ring locating driven torus member to mainshaft. Remove snap ring retaining drive torus member to intermediate shaft, and remove drive torus member. *CAUTION–Do not attempt to remove torus cover and driving torus member together.*

4) Remove front unit sun gear to drive torus hub bronze thrust washer and steel backing washer. Remove front unit sun gear from shaft of front unit coupling driven torus member. Remove sun gear to internal gear steel backing washer. Leave staked bronze thrust washer in internal gear. Remove internal gear.

5) Remove torus cover assembly (*CAUTION*–Do not attempt to remove torus cover by pulling or pushing in a rough manner as this may result in a damaged oil seal. Work hub of torus cover back through oil seal, pulling torus cover out with even pressure).

6) Remove selective spacer washer from front unit drive torus hub (spacer may have remained in internal gear). Spacer may be either a solid or split ring.

7) Install Front Seal Protector J-6119 to protect front oil seal and bushing when removing flywheel

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DUAL-COUPLING HYDRA-MATIC (Continued)

housing. Remove flywheel housing from front of transmission case. *NOTE*–On Pontiac models, leave engine insulators attached to flywheel housing.

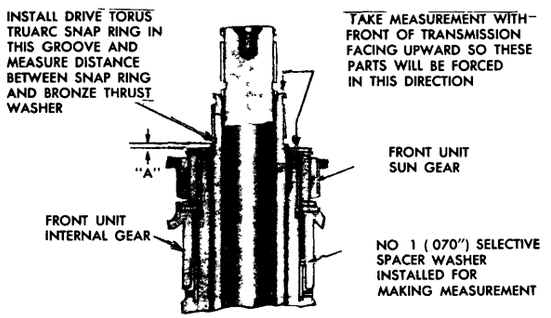
8) Remove Front Seal Protector and remove housing-to-case "O" ring seal.

MAINSHAFT ENDPLAY CHECK: *NOTE–Check and record the mainshaft endplay as it is necessary for the selection of proper selective washer at reassembly.* 1) Install collar of Endplay Checking Fixture J-6127 on intermediate shaft and secure in position by installing snap ring on mainshaft. Install Dial Indicator Support J-6126 and a dial indicator.

2) Move mainshaft back and forth th check endplay of mainshaft. Record the amount of endplay.

►*NOTE:* In order to find the actual endplay of the rear unit, it will be necessary to measure endplay of sun gear on mainshaft after transmission has been disassembled. This dimension must then be subtracted from mainshaft endplay to determine proper selective washer to be used.

3) Remove dial indicator and endplay checking fixture.

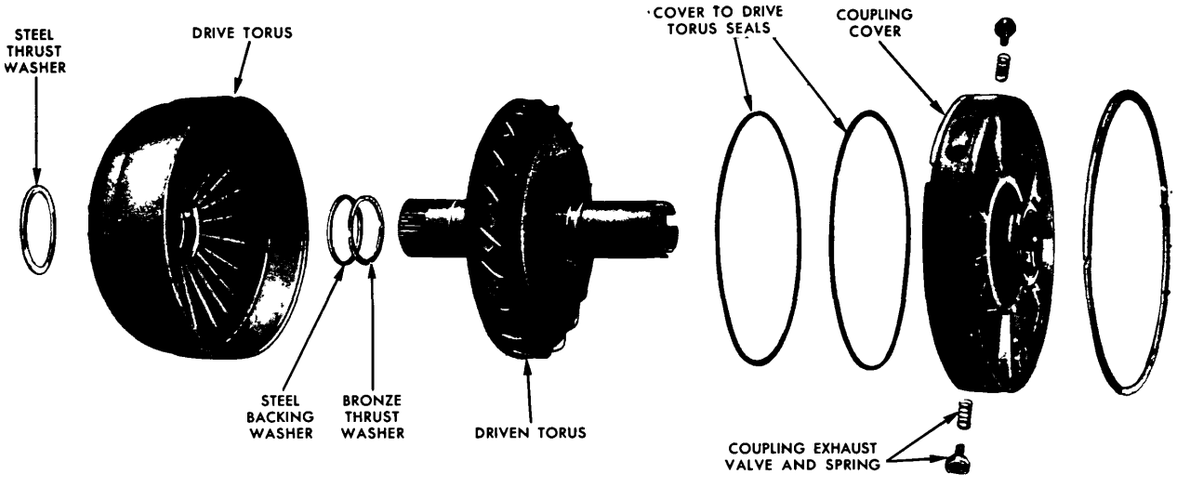


MAINSHAFT ENDPLAY CHECK PROCEDURE

FRONT UNIT ENDPLAY CLEARANCE: *(NOTE–This measurement must be made with transmission in vertical position with front end upward).* 1) Install a No. 1 (.0695–.0705") selective spacer washer over front unit driven torus hub in place of the washer removed at disassembly *(NOTE–The No. 1 washer must be used for gauging purposes).* Install front unit internal gear over front unit driven torus shaft against spacer washer.

2) Install bronze thrust washer and steel backing washer in front unit internal gear (steel washer has splines which engage splines of driven torus shaft). Install front unit sun gear and install steel and bronze thrust washers over intermediate shaft against sun gear. Install drive torus Truarc snap ring in groove on intermediate shaft nearest to bronze thrust washer.

3) Push intermediate shaft and sun gear firmly to rear of transmission to make sure all end play is taken up. Push snap ring down against bottom of groove and very carefully measure clearance between snap ring and bronze thrust washer using a set of feeler gauges. *CAUTION–Feeler gauge must be flat against the thrust washer to obtain an accurate reading.*



DUAL-COUPLING HYDRA-MATIC FRONT UNIT COUPLING (TYPICAL)

4) Compare measurement with feeler gauge with spacer washer chart (below) to determine the correct selective spacer washer to use. (For example: If measurement is found to be .067", a number "6" selective spacer washer should be used when transmission is reassembled). Check number on original spacer which was removed from transmission. It should be the same as the number found on the chart. If not, a new spacer washer must be used at reassembly. Record identification number of required spacer for use at reassembly.

Selective Spacer Washer Chart

Spacer No.	Dimension "A" ①	Thickness
1	.024-.031"	.0695-.0705"
2	.032-.039"	.077-.079"
3	.040-.047"	.085-.087"
4	.048-.055"	.093-.095"
5	.056-.063"	.101-.103"
6	.064-.071"	.109-.111"
7	.072-.079"	.117-.119"
8	.080-.087"	.125-.127"
9	.088-.095"	.133-.135"
10	.096-.103"	.141-.143"
11	.104-.111"	.149-.151"
12	.112-.119"	.157-.159"
13	.120-.127"	.165-.167"
14	.128-.135"	.173-.175"

① - See feeler gauge (Dim. "A") in illustration.

5) Remove Truarc snap ring, sun gear with bronze and steel thrust washers, internal gear with bronze and steel thrust washers, and .070" selective space washer.

FRONT UNIT COUPLING, PRESSURE REGULATOR & COOLER ADAPTER: 1) Rotate transmission to horizontal position with oil pan upward. Remove front coupling assembly from transmission case. Remove pressure regulator assembly from side of transmission.

2) Remove oil cooler adapter, with gasket, from side of transmission case. Remove two oil cooler sleeves and seals by pulling from case.

OIL PAN, OIL SCREWS & INTAKE PIPES: Remove oil pan and gasket. Remove screw holding front pump intake pipe clamp and remove pipe and clamp from pump screen. Remove "O" ring seal from pump. Remove oil screen and rear pump intake pipe and "O" ring seal.

CONTROL VALVE, SERVO & ACCUMULATOR: Remove screws holding servo and accumulator assembly to case *(NOTE–Servo piston is spring loaded),* and remove servo and accumulator assembly and servo spring. Remove five remaining control valve assembly screws and remove control valve assembly. *CAUTION –Do not drop manual control valve.*

FRONT PUMP & OVERRUN CLUTCH: 1) Remove front pump locking screw and lockwasher located under control valve assembly.

►*FRONT PUMP CLEARANCE CAUTION:* When front pump is removed, check clearance between pump bushing and front unit driven torus shaft. This clearance must not exceed .003", using a 1/2" wide feeler. If a .004" feeler can be inserted, the front unit driven torus member and the front pump should be replaced. If the inner sprag race is not the late type which can be identified by an "O" or "S" in the recess in tang end, it should be replaced.

2) Remove the two front pump cover-to-body screws and the three front pump-to-case support attaching screws. Install two Slide Hammers J-6125 into two opposite cover-to-body screw holes in front pump and remove front pump assembly from case. *NOTE*–Front sprag inner race may stick in pump. Be careful not to drop it when pump is removed

3) Remove overrun clutch release spring and front sprag inner race if it did not come out with pump. Remove clutch overrun plate and clutch thrust washer. Install Rear Unit Clutch Retainer J-6135 with set screw end toward front and lock securely.

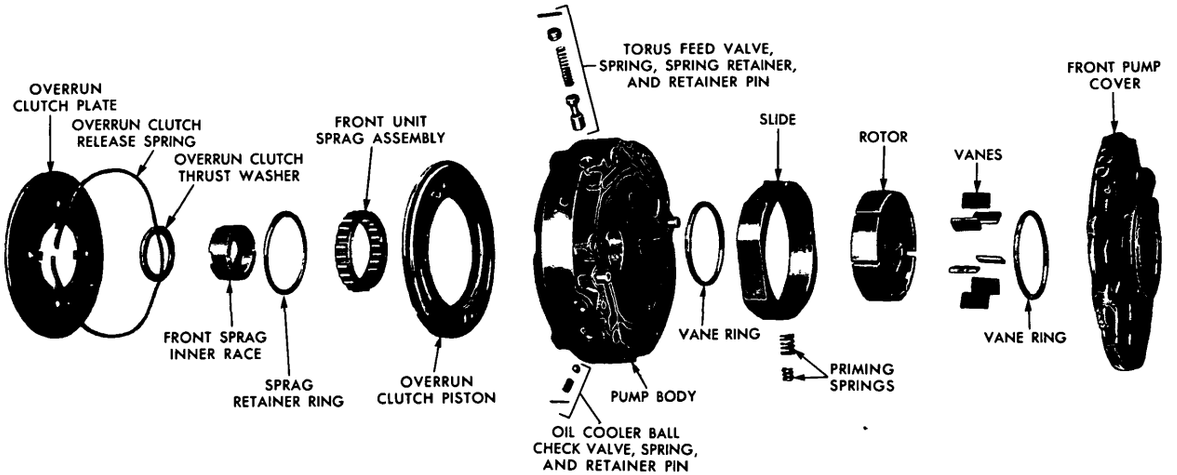
CENTER BEARING SUPPORT, NEUTRAL CLUTCH & REAR UNIT ASSEMBLY: 1) Remove speedometer driven gear from rear extension housing. Remove large snap ring retaining center bearing support. Position transmission horizontally, bottom side up.

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DUAL-COUPLING HYDRA-MATIC C ntinu d)

2) Remove extension housing and gasket. If housing sticks, tap lightly with a soft hammer. Remove governor assembly by pulling governor out of rear housing (Governor drive key may not remain with governor).
3) Remove breather pipe clamp screw from rear of transmission case and carefully pry breather pipe out of pump body. Remove rear pump locating screw (located to right of pump cover, facing pump, and is inset into pump body). Remove pump attaching screw (This screw is located to left of governor bore and is the center screw of the three in that area).
4) Remove rear bearing snap ring from output shaft. If necessary, remove two opposite rear pump cover screws and install Slide Hammers J-6125 and remove rear pump, and reverse clutch piston assembly and gasket. Remove special tools.
5) Remove large wave-type reverse piston release spring, reverse internal gear and tang-type reverse clutch release spring (*NOTE*–Tangs on reverse clutch release spring point outward toward rear of transmission.
6) Remove reserse planet carrier outer snap ring from output shaft. Remove reverse stationary cone (take care to prevent binding), and remove cone key from case. Remove reverse planet carrier while lifting up on output shaft.
7) Remove center bearing support locking screw from side of transmission case. Remove center bearing support, neutral clutch and rear unit as an assembly by sliding complete assembly toward front of transmission. If assembly is tight in case, use Slide Hammers J-6125 with adapters, to insert into center bearing support and pull entire assembly forward. Remove entire assembly and position into Clutch Unit Holding Fixture J-6116, with output shaft down.

PARKING BRAKE ASSEMBLY, OVERRUN BAND, NEUTRAL CLUTCH DRUM STATIONARY STOP KEY AND INSIDE DETENT AND THROTTLE CONTROL ASSEMBLY: **1)** Remove stationary stop key from case. Unhook overrun band end from anchor inside of case and rotate band to horizontal position with band ends facing rear of case. Remove band through front of case.
2) Remove inside detent control and inside throttle control lever assembly as follows: Remove snap ring retaining detent control lever to case. Remove lever assembly and outer and inner washers. Remove "O" ring seal from case counterbore.
3) Disconnect parking brake lever spring and remove bracket and spring. Install 3/8" bolt into parking brake pawl pin and remove pin and spacer. Remove spacer, lever and pawl as an assembly.

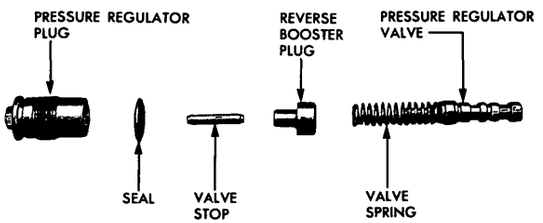


FRONT PUMP AND OVERRUN CLUTCH ASSEMBLY (TYPICAL)

OVERHAUL OF UNITS

PRESSURE REGULATOR: Disassembly–Remove pressure regulator valve stop pin from reverse booster plug and remove booster plug from regulator plug. Remove "O" ring seal from pressure regulator plug.
Inspection: Inspect all passages for dirt or metal chips and all parts for burrs or other damage. Burrs can be removed with crocus cloth and oil. Replace all damaged parts.
Reassembly: Install new "O" ring seal and reverse disassembly procedure.

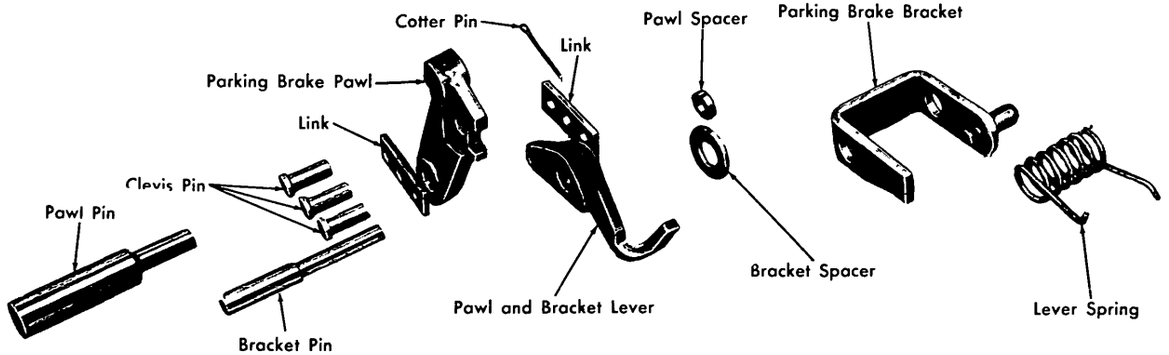
FRONT PUMP: Disassembly–1) Remove front sprag inner race if still in pump and remove pump cover from body. Remove retaining pin, torus feed valve, spring and retainer.
2) Remove front pump rotor along with top vane ring. Remove 7 vanes and bottom vane ring (vanes may remain in rotor). Remove slide by pushing slide toward priming springs, then lift out of body at opposite end. Note position. Remove inner and outer priming springs.
3) Turn pump body over and remove spiral type snap ring retaining front sprag to pump body and remove sprag assembly. (*NOTE*–If outer sprag is damaged, the oil pump assembly must be replaced). Mark overrun clutch piston and pump body for proper reassembly, and remove clutch piston from pump body. If piston sticks, use a soft hammer and tap around outer rear edge of pump body.
4) Remove interlocking oil seal ring from front pump cover.



PRESSURE REGULAT R VALVE

Inspection: Using a small diameter wire, inspect all passages for dirt or restrictions. Check slide for excessive wear or scoring and make sure that it moves freely in pump body. Check freeness of vanes in rotor slots (pump vanes will have a tendency to show a polished surface on the side bearing against the front pump slide, if not excessive, this is a normal condition). Check torus slide valve priming springs for free movement in bores. Check bushing for scores or flaking (a normal wear can be noticed on bushing surface which if not excessive is a normal condition). Examine pump body and pump cover slide surface contacts for smoothness. Clean all parts thoroughly before assembly.

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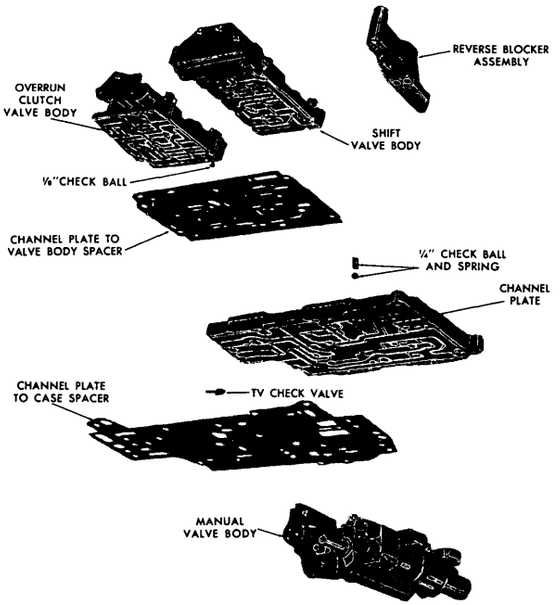


DUAL-COUPLING HYDRA-MATIC PARKING BRAKE ASSEMBLY

DUAL-COUPLING HYDRA-MATIC (Continu d)

►*FRONT SPRAG CLUTCH FAILURE CORRECTION:* In the event of front sprag clutch failure it is recommended that in all cases the following parts should be replaced: Front Pump, Front Sprag Assembly, Front Sprag Inner Race, Front Unit Driven Torus Member Assembly. Inspect all other adjacent parts and replace where needed.

R ass mbly: 1) Check location mark on pump body and overrun clutch piston, align and install piston into pump body (insert one side of oil seal ring and position in cavity). At same time, work around ring, compressing and seating it in pump cavity. Do not force clutch piston into cavity. If sticking occurs, dowels and holes are not correctly aligned.



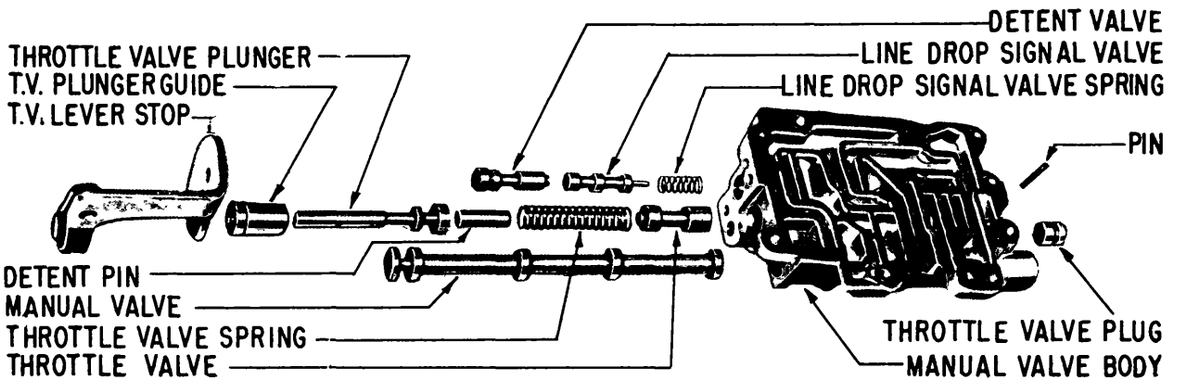
CONTROL VALVE ASSEMBLY (TYPICAL)

2) Install sprag assembly into rear body with rim of sprag facing up, and check rotation of sprag by inserting inner race. Then remove inner race. Install spiral type snap ring retaining sprag assembly to body. Install interlocking oil seal ring on front pump cover.

3) Insert inner and outer priming springs in pump body. Position pump slide into pump body toward priming spring. Compress priming springs with slide and drop slide into cavity of pump.

4) Insert bottom vane ring, locating it concentrically with slide bore. Install rotor with drive slots up and install 7 vanes in rotor slots (make certain vanes fit between bottom vane ring and slide). *NOTE*–Check edges of vanes for wear pattern. One edge of vane will be polished full length. This edge should face the slide.

5) Install top vane ring on rotor, centering it between vanes. Install torus feed valve, spring, retainer and retainer pin. Make sure that valve moves freely. Check for free rotation of rotor and that all parts in pump are positioned correctly. Install check valve ball, spring and retaining pin and install cover to pump body. *NOTE* –Leave two opposite cover screws out for later insertion of slide hammers.



MANUAL VALVE ASSEMBLY (TYPICAL)

CONTROL VALVE: The control valve assembly consists of four individual assemblies connected to one main channel plate. Each individual part of the control valve assembly should be disassembled and reassembled separately to avoid confusion of component parts.

►*CONTROL VALVE DISASSEMBLY & REASSEMBLY CAUTION: The number of individual valves and springs in each of the control valve bodies may vary with the make of car. Following illustrations are typical of all makes and care should be exercised when disassembling to identify all parts in relation to their location in the valve body.*

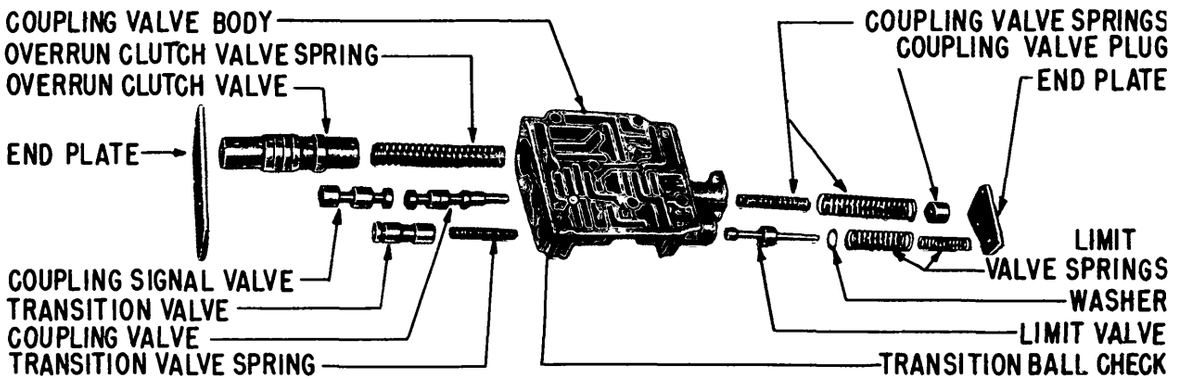
Coupling Valve Body: Removal & Disassembly - Remove coupling valve body making sure not to lose transition check ball (*NOTE* - Support valve assembly to prevent damage to channel plate case spacer). Remove coupling valve rear end plate being careful of limit valve spring tension. Remove inner and outer limit valve springs, coupling valve spring and plug, and limit valve and washer. Remove coupling valve front plate and remove transition valve and spring, coupling valve (some assemblies may have two separate valves within the one bore) and overrun control valve and spring (some assemblies may not contain the spring).

►*INSPECTION NOTE: See "Control Valve Inspection" below.*

Reassembly & Installation - Insert overrun control valve (and spring if used) into large bore in body. Insert transition valve and spring into valve body. Install coupling valve (two valves and additional valve springs may be be used on some cars). Install coupling valve front end plate and install coupling valve spring (or springs). Install limit valve and washer and inner and outer limit valve springs. Position coupling valve plug on spring and install coupling valve rear end plate (*NOTE* - Make certain limit valve springs are aligned properly after tightening screws). Install coupling valve assembly to channel plate using petrolatum to hold transition ball check in place.

Shift Valve Body: Removal & Disassembly - Remove shift valve body. If coupling valve body has been removed, remove spacer plate (*NOTE* - When removing spacer plate be sure not to lose check ball and spring).

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COUPLING VALVE ASSEMBLY (TYPICAL)

DUAL-COUPLING HYDRA-MATIC (C ntinu d)

Remove shift valve body end plate, 3-4 governor valve, 2-3 governor valve, amplifier valve spring and valve. Remove regulator valve body plate and body. Remove 3-4 throttle valve regulator valve, and 2-3 throttle valve regulator valve, then remove regulator valve body cover. Remove neutral clutch valve and spring 2-3 throttle valve (inner) and shift valve (outer) springs. Remove 3-4 throttle valve regulator spring. Remove 2-3 and 3-4 shift valves.

►*INSPECTION NOTE: See "Control Valve Inspection" below.*

Reassembly & Installation - Install 2-3 and 3-4 shift valves, neutral clutch valve, then install 3-4 throttle valve regulator valve spring, 2-3 throttle valve (inner) and shift valve (outer) springs. Install neutral clutch spring. Install 3-4 throttle valve regulator valve in regulator body and install 2-3 throttle valve regulator valve. Install regulator valve body plate on regulator valve body. Install assembly on shift valve body and install attaching screws. Install regulator valve body cover. Install 3-4 governor valve with large end inward. Install 2-3 governor valve, amplifier valve and spring, and shift body end plate. Install by-pass reed valve, then install shift valve body to control valve assembly.

R v rse Blocker Body: Removal & Installation - Remove reverse blocker body from manual valve body. Remove hairpin clip retaining detent plunger and remove detent plunger and spring from body. Remove reverse blocker retaining pin (pin is peened and requires filing to remove). Remove reverse blocker spring and piston.

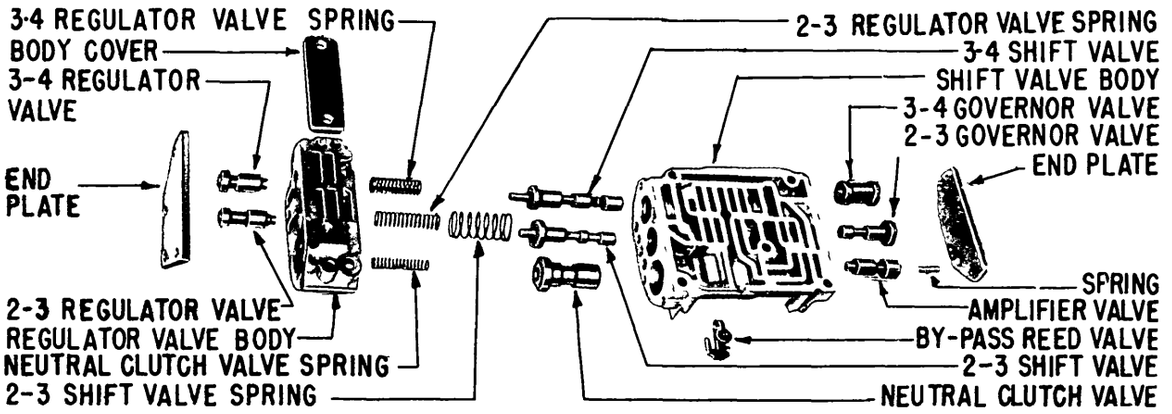
►*INSPECTION NOTE: See "Control Valve Inspection" below.*

R assembly & Installation - Install reverse blocker piston and spring into body. Install reverse blocker retaining pin and peen in place. Install detent plunger and spring. Install hairpin clip to retain detent plunger and install reverse blocker body to manual valve body.

Manual Valve Body: Removal & Disassembly - Remove reverse blocker body from manual valve body if not already done. Remove manual valve body from channel plate. Remove manual valve. Remove throttle valve lever stop from body and remove throttle valve plunger and guide. Remove detent valve and line drop signal valve (these two valves may be combined) and spring. Remove detent pin (if used), throttle valve and spring. Remove throttle valve plug retainer pin and throttle valve plug.

►*INSPECTION NOTE: See "Control Valve Inspection" below.*

R assembly & Installation–Install throttle valve plug and retainer pin. Swedge over edge of retainer pin hole to keep pin in place. Install throttle valve, making sure valve is seated against plug and install throttle valve spring. Install throttle valve plunger guide on throttle valve plunger and install unit. Install pressure drop signal valve spring and valve, lining up spring to be sure it is fully positioned on bottom of bore. Install detent valve. Install throttle valve lever stop on manual valve body and install manual valve body to channel body. Install reverse blocker to manual valve body and install manual valve.



SHIFT VALVE ASSEMBLY (TYPICAL)

Control Valve Inspection: Clean all parts thoroughly and do not allow valves to bump together, as this may cause nicks and burrs. Inspect all valves carefully to make sure they are free from dirt and are not damaged in any respect. If burrs are present, they should be removed with a fine stone or crocus cloth and light oil. All valves and plugs should be tested in their individual bores to make certain that free movement can be obtained. All valves should fall free of their own weight with a slight tapping action on the body. The manual valve is the only valve which may be serviced separately. If other valves are defective or damaged beyond repair, an individual assembly should be installed.

►*CONTROL VALVE ASSEMBLY NOTE:* If all the individual assemblies were removed at one time, proceed as follows: Position channel body separator plate on channel body. Install manual valve to channel body and install reverse blocker body to manual valve body, positioning one dowel pin. Install ball check and and spring in channel body (ball first, then spring). Install and align separator plate on channel body. Install shift valve body on channel body. Install coupling valve on channel body using petrolatum to hold transition ball check in place. Install manual valve in manual valve body.

FRONT UNIT COUPLING: Disassembly–*(CAUTION–The front unit coupling is balanced at the factory and any change in positioning of the cover will affect the balance. On early transmissions without an indexing point on driving torus shell, punch marks should be made on both cover and shell in line with the snap ring gap (using a very fine punch). On later transmissions the No. 1 exhaust valve is lined up with the snap ring gap and mark on driving torus cover).*

1) Remove steel thrust washer from recess at front of front unit drive torus if it did not come off with flywheel housing. Install front unit coupling assembly into Clutch Holding Fixture J-6116 with splined shaft down.

2) Remove large snap ring retaining coupling cover to drive torus shell (make sure that all parts are marked for correct reassembly). Install two Coupling Valve Retainers J-6122 to hold exhaust valve in position when removing cover.

3) Remove coupling cover from coupling using Front Unit Coupling Cover Remover J-6121 as follows: Place cross piece of remover on end of torus shaft with end of shaft indexed in counterbore on underside of tool. Screw stud at end of each leg into holes in coupling cover until they bottom (nuts on studs should be backed off so they will not contact cross piece). Insert long stud of tool J-6121 through coupling and cross piece. Index bottom end with hole in holding fixture so it cannot turn. Install washer and nut on upper end and tighten securely. Tighten nuts on four studs evenly and only a small amount at a time to pull cover out of unit.

4) Remove tool J-6121 and remove coupling cover from unit. Hold fingers over valve so they will not be ejected and remove Coupling Valve Retainers and exhaust valves and springs from cover. Remove rubber seal rings from outer diameter of cover.

5) Remove driven torus member by pulling up on shaft, and remove steel and bronze thrust washers *(NOTE-* It may be necessary to cut the bronze thrust washer). Remove drive torus member from holding fixture.

Inspection: Check for burrs and scratches. Remove burrs with crocus cloth and oil.

Reassembly: 1) Install driving torus into Rear Unit Holding Fixture J-6116. Install interlocking oil seal rings to hub and shaft of driven torus member. Install bronze and steel thrust washers into driving torus member, install one interlocking oil seal ring on driven torus member and install driven torus member into driving torus member.

2) Install two springs and exhaust valves in coupling cover and hold in place, using Front Unit Coupling Valve Retainers J-6122. Install two oil seal rings on cover hub. Install two square rubber ring seals on coupling cover, making sure that seals are square in their respective grooves and apply petrolatum to circumference of seals.

3) Install studs from Front Unit Coupling Cover Re-

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DUAL-COUPLING HYDRA-MATIC (C ntinu d)

mover J-6121, into coupling cover and position cover in driving torus member, lining up marks made during disassembly (*CAUTION*–Cover must be inserted evenly to prevent cocking in drive torus member and damaging seals).

4) Install large snap ring retaining coupling cover to driving torus member. Remove studs from coupling cover and remove coupling assembly from fixture.

ACCUMULATOR & SERVO ASSEMBLY: Disassembly–Remove servo apply piston from assembly. Remove two opposite accumulator cover screws and install Accumulator Cover Remover & Installer J-6124. Remove remaining three cover to accumulator body attaching screws. Using extreme care remove cover, gasket and special tool. Discard gasket and remove accumulator piston assembly. Remove accumulator spring (more than one spring may be found at this location. See Production Changes & Corrections above). Remove pin retaining trimmer valve assembly in accumulator body. Remove plug, trimmer valve and spring.

Inspecti n: Inspect servo piston assembly for damaged oil seal ring, scores or burrs in ring land grooves. Inspect accumulator spring for collapsed or distorted coils. (*NOTE*–Slight wear "bright spots" on side of spring are permissable). Inspect accumulator body for restricted passages, scores or burrs. Inspect servo piston assembly for distorted pin, damaged oil seal ring lands or broken oil seal ring.

R assembly: Install trimmer valve spring, valve and plug in accumulator body. Install pin retaining trimmer valve assembly. Install accumulator spring (or springs) in accumulator body and install piston on outer accumulator spring. Align new gasket to accumulator cover and install Accumulator Cover Remover & Installer J-6124. Compress accumulator spring and install piston into body, making certain that aluminum piston ring is not binding. Install three screws retaining accumulator cover to body. Remove special tool and install the remaining two screws. Tighten all attaching screws and install servo piston into body.

REAR PUMP: Disass mbly–**1)** Remove vent pipe from rear pump body by carefully prying out of bore with screwdriver. Remove reverse piston from back of rear pump and remove oil seal ring. Remove rear pump cover by tapping pump body with plastic hammer.

2) Remove governor drive key from driven gear in rear pump. Mark top of drive and driven gears to insure correct reassembly, and then remove gears. Remove snap ring retaining rear bearing to rear pump body and remove rear bearing.

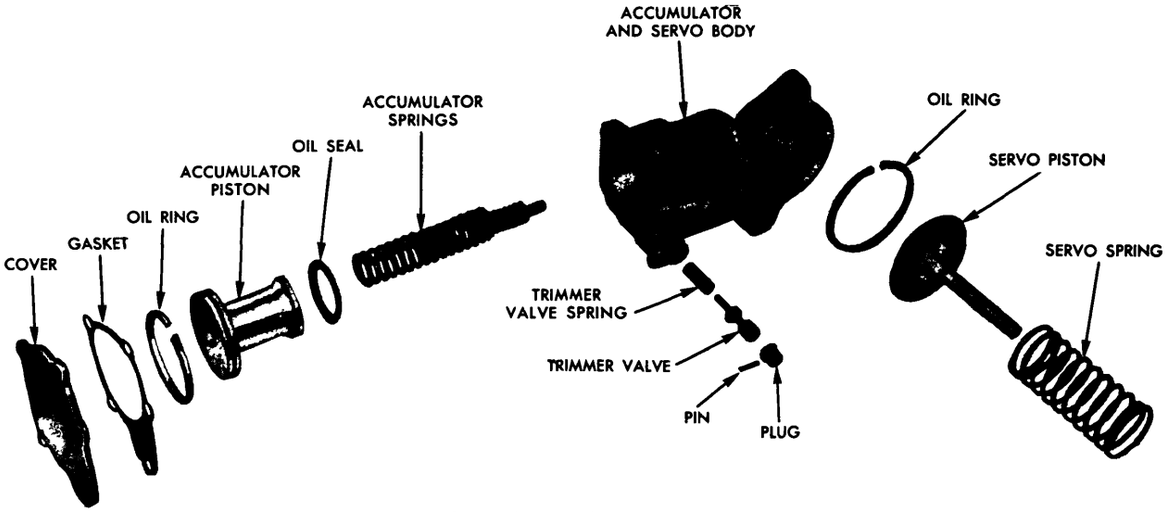
3) Remove reverse piston inner oil seal ring from pump body hub.

Insp cti n: Inspect all parts to make sure they are free of dirt, burrs, scoring or other damage. Remove burrs with crocus cloth and oil. Check oil seal ring grooves. Make sure vent pipe is not damaged and is free from restrictions.

Reassembly: 1) Install rear pump bearing into pump body and install snap ring retaining rear bearing. Install pump gears, noting the locating marks made at disassembly.

2) Install governor drive key into driven gear, making certain key is properly seated. Install pump cover to body, positioning governor hole over drive gear in pump, indexing properly with dowels.

3) Install reverse servo piston in back of rear pump as follows: Install oil seal rings on pump body hub and on reverse piston. Insert piston into bore of rear pump, positioning on top of dowels. Compress large oil seal ring on piston with fingers at one end of gap. After the end is seated in the cavity, gradually work oil seal around, at the same time applying light pressure, forcing piston into cavity.



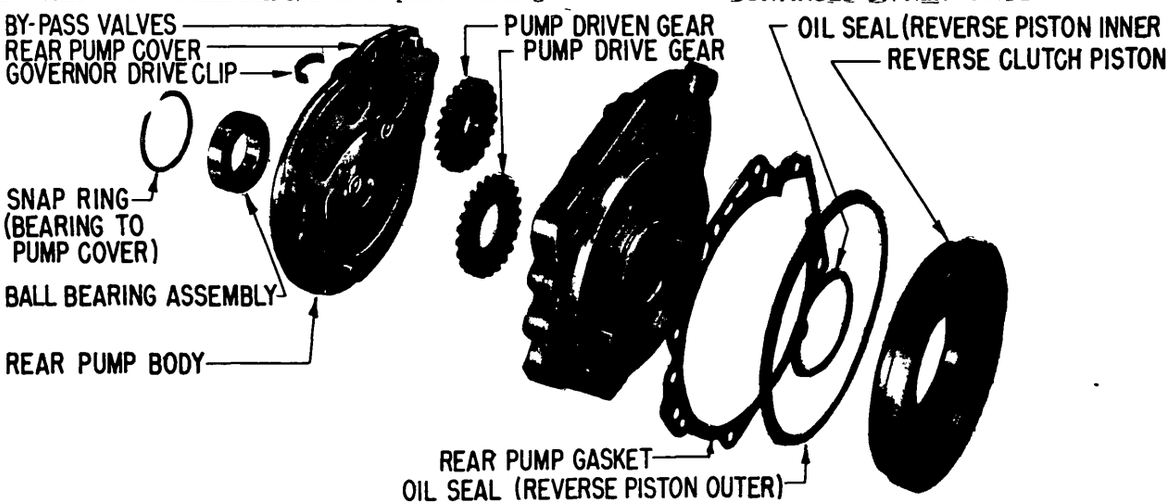
SERVO & ACCUMULATOR ASSEMBLY (TYPICAL)

GOVERNOR: Disassembly–Remove four oil seal rings and remove cover. Remove end cover plate retaining G-2 valve assembly. Remove valve and bushing assembly and remove valve from bushing.

Inspection: Inspect all parts to make sure they are free from dirt, burrs and other damage. Remove burrs with crocus cloth and oil. Test all valves in their respective bores for free movement. Inspect governor ring lands and oil seal rings for freedom in grooves. If lands are damaged or worn, replace complete governor assembly.

Reassembly: Insert G-2 governor valve into bushing and install assembly in governor body. Install cover plate retaining G-2 valve assembly, making sure dowel in cover plate enters recess in governor body and governor valve bushing. Install governor cover to body. Install four oil seal rings in grooves which do not contain oil holes.

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DUAL-C UPLING HYDRA-MATIC REAR PUMP ASSEMBLY

DUAL-COUPLING HYDRA-MATIC (C ntinu d)

TORUS CHECK VALVE (Main Drive): Disassembly—Remove cotter key retaining check valve in fluid coupling driven torus member, and remove torus check valve and spring.

Insp ction: Inspect parts for nicks, burrs and for collapsed spring.

R ass mbly: Install spring into check valve and install check valve and spring into driven torus member. Make sure spring seats properly and valve fits evenly. Install cotter key retaining check valve and spring. Make sure check valve can move freely.

PARKING BRAKE: Disassembly—Remove cotter pin retaining three clevis pins and parking brake links and separate pins, links, parking pawl and pawl lever.

Inspection: Inspect parking pawl for cracks or signs of unusual wear. Check pawl pivot pin and linkage for wear.

R ass mbly: Assemble parking brake links, clevis pins, pawl and pawl lever and insert cotter pin.

INSIDE CONTROL LEVER: Disassembly—Remove pin retaining throttle control shaft to inside detent control shaft and separate levers, washers and "O" ring oil seal.

Insp ction: Check fit of inside throttle control shaft in shaft of inside detent control shaft. If shaft binds, is excessively worn, or if splines are damaged, replace the defective parts.

R ass mbly: Install new "O" ring seal, washers, and throttle control shaft in manual control hub and insert retaining pin.

CENTER BEARING SUPPORT, NEUTRAL CLUTCH & REAR UNIT: Disassembly—1) Remove Rear Unit Clutch Retainer J-6135 *(CAUTION—Be sure to back off screw far nough to prevent damage to machined surface at front of intermediate shaft).* Remove hook-type oil seal ring from intermediate shaft by pushing one end toward center of shaft and other way from shaft. Remove case support and neutral clutch piston assembly.

2) Remove oil seal rings from support hub and remove neutral clutch piston. Turn support over and bump on bench to remove piston *(NOTE—On late type assemblies with rubber lip seals, remove seals from piston hub and hub of support. Leave rings in place on piston and support of early type.*

3) Remove neutral clutch drum assembly which contains five composition clutch plates, four steel clutch plates and five release springs. Remove large snap ring from rear drum assembly with screwdriver.

4) Remove rear clutch cylinder and sprag assembly by lifting over intermediate shaft. Remove intermediate shaft and clutch hub, along with front clutch hub washer from rear unit assembly. *(NOTE—Intermediate shaft and clutch hub may be disassembled if parts replacement necessary).* Remove clutch hub front thrust washer from clutch hub.

5) Remove mainshaft assembly and rear unit sun gear from rear unit. Remove clutch hub thrust washer from sun gear.

►*REAR UNIT SUN GEAR CAUTION: Make sure the sun gear is marked properly for reassembly. On later type units, a drill mark is made on rear side of gear. Early type gears were not marked and it is very important that a mark be placed on the rear side to indicate side of gear facing rear of transmission.*

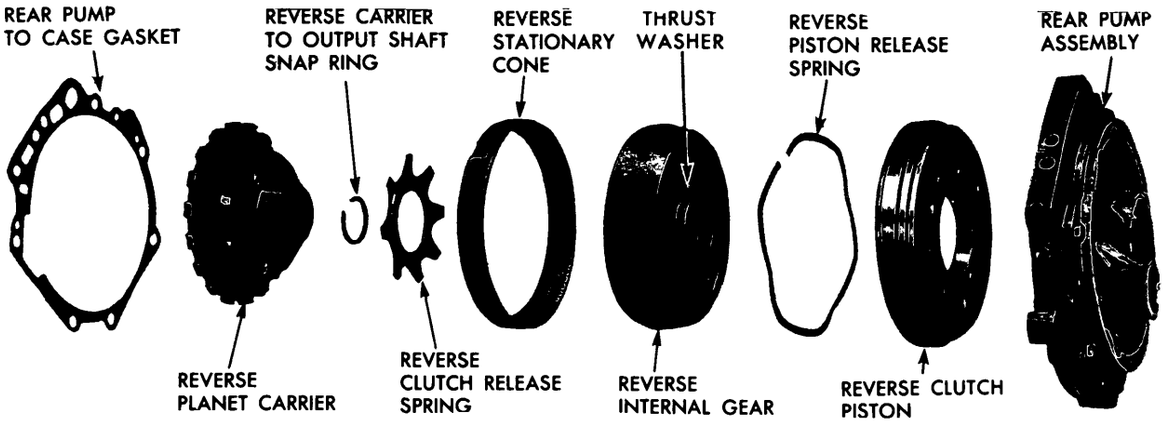
6) Remove seven steel clutch plates and seven composition plates. Remove bronze thrust washer from rear unit carrier. Remove rear unit drum and output shaft assembly from holding fixture and set on bench with output shaft end up.

7) Remove large snap ring holding reverse drive flange to rear unit drum. Lift output shaft and reverse drive flange assembly out of rear unit drum.

8) If parts replacement is necessary, mark internal gear so it can be installed with the same side up. Remove internal gear and rear unit clutch backing plate from rear unit drum assembly together by tapping backing plate with soft hammer. Remove reverse planet carrier locating snap ring from output shaft and remove reverse drive flange and sun gear assembly from output shaft. Remove selective washer from reverse drive flange assembly or output shaft.

9) Remove spiral snap ring from rear unit sprag outer race, using small needle nose pliers or small screw driver. Insert tool into small hole in end of spiral ring and pull upward. Remove outer race, sprag and retainer by rotating counterclockwise and pulling upward *(NOTE—Do not attempt to disassemble sprag assembly).* Remove rear unit sprag retainer and sprag from neutral clutch hub.

10) Disassemble rear unit clutch piston assembly as follows: Place cylinder and piston assembly over tool J-6129 with spring end up. Set spring compressor J-4670 on top of spring retainer and start nut on stud of J-6129. *(NOTE—On models of J-4670 without hole in center, drill at 7/16" hole so J-6129 can be inserted through it).* Turn nut down to compress clutch springs until snap ring is free. Remove snap ring and compressor tool and release spring retainer from rear clutch springs. Remove eight clutch release springs. Remove rear clutch piston from cylinder by rapping piston end of cylinder assembly on wood block. Remove seals from piston and hub.



DUAL-COUPLING HYDRA-MATIC REVERSE ASSEMBLY

Inspecti n: 1) Inspect center bearing support for burrs, damaged oil seal ring grooves, worn or damaged bushing or damaged threads. Check to see that all passages are open and not interconnected, using either a fine wire or air pressure.

2) Inspect neutral clutch piston for scoring, burrs, or damaged oil seal groove. Check ring gap with feeler gauge (gap should be .002-.007"). If a new ring is installed, gap must be checked and ends of ring must be filed, if necessary, to provide proper gap.

3) Inspect neutral clutch drive plates for damaged surfaces or worn teeth. Plates must be flat. If flakes of facing material can be removed by scratching surface with thumb nail, plate should be replaced. Discoloration is not an indication of failure. Inspect release springs for distortion (springs have 5 waves).

4) Inspect neutral clutch driven plates (steel) for scored surfaces or damaged lugs. Also make sure they have six equally spaced waves .008-.012" high when measured on a surface plate. Inspect clutch drum for scored or damaged surfaces. Inspect spiral snap ring for distortion or damage. Inspect rear unit sprag assembly for damaged shoulder, broken springs, or scored sprags. Inspect rear unit sprag outer race for damaged splines or scored sprag race.

5) Inspect rear clutch cylinder and bushing assembly for scoring, burrs, or damaged lugs. Inspect eight rear clutch springs for distortion or collapsed coils *(NOTE - Slight wear "bright spots" on sides of release springs indicating slight contact with the piston assembly is permissible).* Inspect rear clutch release spring retainer for cracks or damage. Inspect rear unit clutch cover-to-rear clutch hub bronze thrust washer.

6) Inspect intermediate shaft and rear unit clutch hub. Clutch hub and shaft can be separated if either needs replacement. Inspect rear unit sun gear-to-clutch hub bronze thrust washer. Inspect seven rear unit composition faced clutch drive plates for damaged surfaces. Plates should be flat. Check in same manner as for neutral clutch plates. Inspect seven driven plates (steel) for scored surfaces or damaged lugs. Driven plates must have six equally spaced waves (approx. .010" deep).

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DUAL-COUPLING HYDRA-MATIC (C ntinued)

7) Inspect main shaft and rear unit sun gear for damaged splines, teeth or bearing surfaces. Gear and shaft can be separated for replacement if necessary. If shaft only is to be replaced, put old gear on new shaft with same side toward front.

8) Measure endplay of rear unit sun gear on mainshaft and determine correct selective washer to use in rear unit as follows: Clamp sun gear and mainshaft assembly in Holding Fixture J-6116 using "C" clamp and dial indicator. Be sure gear is firmly clamped on both sides so it cannot give. Set dial indicator to contact end of mainshaft. Move mainshaft straight up and down to measure endplay and record endplay. Subtract this endplay from the mainshaft endplay recorded before transmission was disassembled. The difference will be the actual endplay of the rear unit and should be .004-.018". If endplay is outside the limits of .004-.018", select the reverse drive flange-to-rear unit planet carrier thrust washer which will give the proper endplay. Selective washers are furnished in the following nine sizes and are stamped with an identification number:

Id ntificati n N .	Siz	Identification No.	Size
1	.055-.059"	6	.080-.084"
2	.060-.064"	7	.085-.089"
3	.065-.069"	8	.090-.094"
4	.070-.074"	9	.095-.099"
5	.075-.079"		

9) Inspect rear unit internal gear for tooth damage *(NOTE*–Internal gear and clutch backing plate can be separated from drum if replacement is necessary). If drum or backing plate is replaced, the gear should be reinstalled with the same side toward the front (the edges of the gear teeth are chamfered on the side which goes against the backing plate). Inspect output shaft to rear unit sun gear bronze thrust washer. Inspect output shaft for damaged pinions, splines, bearing surfaces or speedometer gear teeth.

10) Inspect reverse drive flange and sun gear assembly *(NOTE*–Reverse drive flange and sun gear are serviced as an assembly and should not be separated). Inspect rear unit selective washer for wear and damage.

R ass mbly: 1) Holding reverse drive flange and sun gear in left hand with drive flange up, install proper selective washer *(as determined by rear unit endplay check, see "Inspection" above)* in recess of drive flange with locating lugs indexed in flange. Use petrolatum to hold washer in place. Still holding reverse drive flange and sun gear in left hand, insert output shaft through the assembly until carrier bottoms on selective thrust washer. Hold unit tightly together and place on bench on carrier end. Install reverse planet carrier front ring on output shaft.

2) Insert Reverse Drive Flange Retainer J-6120 between snap ring and flange snug against rear unit carrier to prevent selective washer from dropping out of position *(NOTE*–When the selective washer used between reverse drive flange and planet carrier is at or near the upper limit of thickness, Retainer Tool J-6120 cannot be inserted between snap ring and flange. In this case, it is not necessary to use the retainer since there is not enough clearance to allow the thrust washer to drop out of place. Set rear unit drum on bench with long undercuts on lugs upward (or with internal gear up if it was not removed). Install clutch backing plate with flat surface down if it was removed (it may be necessary to tap plate into place with a soft hammer).

3) Install rear unit internal gear with mark upward (drill mark in rear face of gear or mark made at disassembly) if it was removed (gear teeth are beveled on side which goes against backing plate). Position gear against clutch backing plate. Install output shaft and reverse drive flange assembly into rear unit drum and secure with large snap ring. Set rear unit assembly into Holding Fixture J-6116 with shaft end down. As unit is lowered into fixture, lift up on drum and remove Drive Flange Retainer *(CAUTION–Do not lift on output shaft after retainer is removed).* Position thrust washer in counterbore of output shaft and retain with petrolatum.

4) Apply Hydra-Matic Oil to faces of seven drive and seven driven plates and alternately install them in rear unit drum. Start with a drive (composition) plate and finish with a driven (steel) plate. Install all drive plates with same side upward. Assemble driven plates with lugs in rear unit drum slots so notches in lugs are all in line *(NOTE*–Indexing the notches will nest the plates together so waves are all in the same direction, and with no gaps between plates). Install mainshaft and sun gear assembly into output shaft in rear unit, meshing sun gear with planet pinions of output shaft.

5) Assemble rear unit clutch hub to rear end of intermediate shaft if it was removed (open side of hub toward front of shaft. End with longest spline and longest machined surface will be toward rear). Install two bronze thrust washers on rear unit clutch hub, one on each side and retain with petrolatum. Install intermediate shaft and rear unit clutch hub and thrust washers into rear drum *(NOTE*–Pick up clutch drive plates by rotating intermediate shaft). Do not drive or force rear unit clutch hub into rear unit drum.

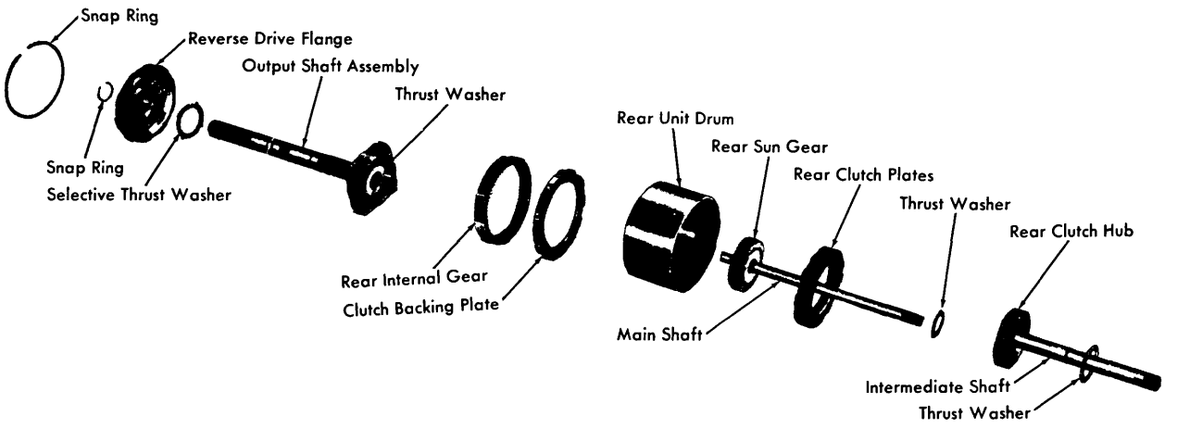
6) Assemble rear clutch piston into rear clutch cylinder as follows: Install new inner seal on hub of clutch cylinder with lip down. Install new outer seal on piston with lip facing away from spring bore side. Install piston into cylinder using flat edge of screwdriver to start seal into cylinder. Install eight clutch release springs into bores in piston. Place spring retainers on springs with tangs facing upward. Compress springs using tool J-4670-B and J-6129. Install snap ring which holds release spring retainer. Remove compressor tools.

7) Install rear unit sprag assembly in rear unit outer race with shoulder side of sprag on counterbored side of outer race. Install sprag and outer race of rear unit inner race (push sprag part way down through outer race then rotate sprag counterclockwise to assemble). Install rear unit sprag retainer in outer race with large outer diameter upward. Push retainer down to expose snap ring groove. Install spiral snap ring on rear unit clutch hub. Install rear unit cylinder and sprag assembly into rear clutch drum with sprag side up. Secure cylinder and sprag assembly into rear clutch drum with large snap ring.

8) Install neutral clutch drum on rear unit with driven clutch plate lug slots upward. Apply Hydra-Matic Oil to five clutch drive plates (composition) and four driven plates (steel). Install plates alternately using a release spring between steel plates (start with a composition plate, release spring, then steel plate, and end up with composition plate and spring).

9) Install seal on second type neutral clutch piston with lip side facing side with dowel holes, or install ring on first type. Install seal on hub of second type center bearing support with lip facing bottom of piston cavity, or install oil ring on first type center bearing support. Install neutral clutch piston into center bearing support aligning notch in edge of piston with lockscrew hole in side of center bearing support. This alignment assures that dowels will enter dowel holes (seal or piston ring can be installed by compressing with fingers). Install two oil rings in grooves of center bearing support hub. Center rings around hub and install center bearing support assembly into neutral clutch drum in rear unit using care not to damage bushing when lowering support over intermediate shaft. If properly centered, oil rings

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REAR UNIT DRUM, MAINSHAFT, & OUTPUT SHAFT ASSEMBLY (TYPICAL)

DUAL-COUPLING HYDRA-MATIC (Continued)

on support hub will be compressed by taper on hub of rear clutch cylinder. Install hook type oil seal ring on intermediate shaft.

FLYWHEEL HOUSING SEAL INSTALLATION: Start seal into bore in flywheel housing with lip facing toward bushing *(NOTE–Do not use sealer).* Drive seal into place using Flywheel Housing Oil Seal Installer J-6118. Stake housing against seal in three places.

TRANSMISSION REASSEMBLY

PARKING BRAKE ASSEMBLY, OVERRUN BAND, NEUTRAL CLUTCH DRUM STATIONARY STOP KEY AND INSIDE DETENT AND THROTTLE CONTROL ASSEMBLY: 1) Install overrun band through front of case with the band ends facing rearward in a horizontal position (anchor support hole should face right hand side). When band is approximately halfway through transmission case, with band still horizontal, rotate band so that ends are in cavity in case above anchor pin and rotate band into position. Position band end on anchor in case.

2) Place parking brake pivot shaft spacer in recess in case. Position parking brake pawl and lever assembly in case with upper lever on pivot in case. Locate parking pawl at pivot shaft hole and insert parking pawl pivot shaft through case, pawl and spacer until end of shaft is flush with rear of case. Slide spacer washer onto pivot shaft against parking brake lever. Position parking brake lever spring in bracket with long end toward rear. Slide bracket and spring assembly onto pivot shaft with end of spring under parking brake lever. Hook other end of spring over pin at front of bracket.

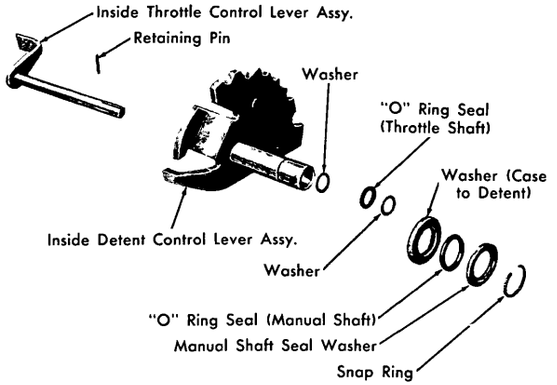
3) With throttle and detent levers assembled, place spacer washer over detent shaft against detent lever. Insert lever and shaft assembly through hole in case from inside with parking brake tang below pin in parking brake bracket. Install "O" ring seal and special washer which fits into bore on outside of case over detent lever shaft. Install snap ring to retain seal and washer.

4) Install neutral clutch stop key in case using petrolatum to hold it in place. Position rounded side toward front to provide lead for guiding neutral clutch drum over key.

CENTER BEARING SUPPORT, NEUTRAL CLUTCH & REAR UNIT ASSEMBLY: 1) Install rear unit, neutral clutch, and center bearing support assembly into case as follows: Insert output shaft end of assembly part way into front of case and then rest rear unit drum on case, while holding intermediate shaft. Rotate neutral clutch drum until groove for neutral clutch key is up.

2) Holding neutral clutch drum in this position, rotate center bearing support so that set screw hole in support is aligned with the second clutch plate slot counterclockwise from key slot in neutral clutch drum.

3) With parts aligned, slide assembly into case, engaging neutral clutch drum key with slot in clutch drum. Alignment can be checked by looking through lockscrew hole in side of case and observing that clutch plate slot in neutral clutch drum is aligned with set screw hole. This will properly align both the setscrew hole

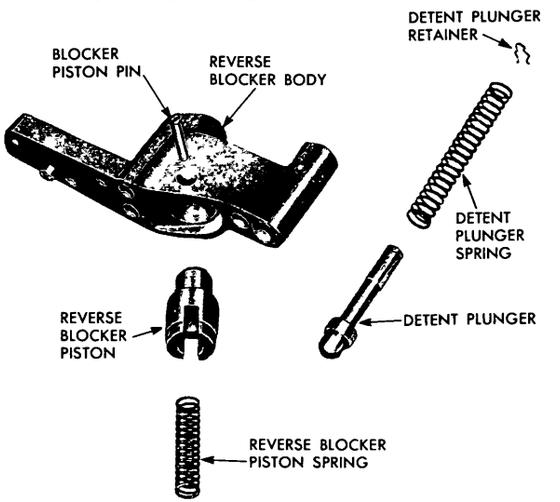


INNER CONTROL LEVER ASSEMBLY

in support and locking key groove in neutral clutch drum. When properly installed, snap ring groove in case will be visible at front edge of case support. *NOTE–* If unit fits tightly in case, assembly may be aided by pulling on output shaft. Also make sure low band does not cock on rear unit drum and hold unit.

4) Make sure case support locking screw hole is aligned and install snap ring which positions center bearing support in case. Tap snap ring as necessary with screwdriver and hammer to make sure it seats fully in groove. *(NOTE–*If necessary to align center bearing support after installation, install Slide Hammers J-6125 to act as handles). Install center bearing support locking screw from outside of transmission case.

REVERSE ASSEMBLY, REAR PUMP & GOVERNOR: 1) Install reverse planet carrier on output shaft, aligning splines and pinions. Install reverse planet carrier to to output shaft snap ring. Install reverse stationary cone key in case with rounded side toward rear and retain with petrolatum. Install stationary cone key making certain that cone aligns with key. If cone sticks, tap gently with plastic hammer until seated.



REVERSE BLOCKER ASSEMBLY

2) Install reverse clutch release spring on carrier. Tangs should be positioned away from carrier. Install reverse internal gear on carrier. Position reverse internal gear-to-pump hub thrust washer against internal gear. Install reverse clutch piston release spring over internal gear against shoulder in case and stationary cone.

3) Install new gasket on rear pump, and install the reverse piston and rear pump as an assembly into case aligning splines of pump drive gear and output shaft by rotating shaft. Install locking screw and rear pump-to-case attaching screw. Tighten attaching screw to 25 ft. lbs. and locating screw to approximately 6-8 ft. lbs.

4) Remove Rear Unit Clutch Retainer J-6135 from intermediate shaft. Install rear bearing over output shaft into pump cover. *(NOTE–*If rear bearing is tight on shaft, it will be necessary to tap bearing into place using Rear Bearing Installer J-6133. While tapping bearing into place hold a block of wood aginst front of the mainshaft to hold output shaft to rear until groove for snap ring can be seen behind the rear bearing). If bearing is a slip fit on output shaft install snap ring on shaft against bearing, then pull shaft rearward and push snap ring into groove.

5) Install rear bearing snap rings on output shaft, if not previously installed, and in rear pump cover. Check mainshaft endplay as follows: Install Dial Indicator Support J-6126. Install collar of Endplay Checking Fixture J-6127 and secure in position by installing Truarc snap ring on mainshaft. Attach fixture to collar by threading collar securely into fixture. Install dial indicator. Move mainshaft back and forth to check endplay of mainshaft. Be sure to get free mainshaft endplay. Forcing mainshaft will not give accurate reading. Subtract endplay of rear unit sun gear on mainshaft from mainshaft endplay. Difference will be actual endplay of rear unit and should be .004-.018". If outside these limits it will be necessary to remove and disassemble the clutch unit so that correct selective washer can be installed between rear unit planet carrier and the reverse drive flange. *See "Center Bearing Support, Neutral Clutch & Rear Unit" under "Disassembly & Reassembly of Units" above.*

6) Remove endplay checking tool. Install governor into rear pump as follows: Align snap rings so gaps will be upward when governor sleeve is aligned with drive key. Compress rings by hand and work governor into bore in rear pump. Rock governor back and forth to engage drive key. Check to see that governor turns when output shaft is turned.

7) Install new extension housing gasket on rear pump with petrolatum, and install extension housing on case with six attaching screws and washers. Tighten to 25 ft. lbs. torque. Leave out bottom two screws which are used to fasten oil cooler. Install speedometer driven gear in extension housing. Insert vent pipe into hole in top of rear pump and clamp pipe to case.

8) If rear oil seal was removed, coat new seal with Permatex and drive seal into housing using seal Installer J-5154-A. Felt portion of seal must be toward rear. Seal should be driven in until it bottoms in housing.

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DUAL-COUPLING HYDRA-MATIC (Continued)

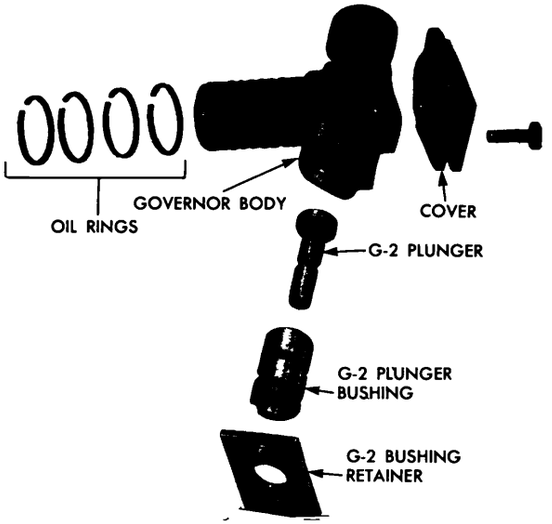
FRONT PUMP & OVERRUN CLUTCH: 1) Install front pump and overrun clutch plate assembly over intermediate shaft and at the same time align intake pipe holes in front pump and case. These should be indexed properly before any attempt is made to install pump into transmission.

2) Install front pump into transmission case and tighten the three front pump-to-center bearing support bolts, then back off 1/4 turn. Apply air in the neutral clutch hole of transmission case to position center bearing support against snap ring. With air still applied, tighten case to front pump lock screw to 22-27 ft. lbs. Tighten pump-to-center bearing support screws to 25-30 ft. lbs.

FRONT UNIT COUPLING, PRESSURE REGULATOR & COOLER ADAPTER: 1) Make sure seals are in place on ends of oil cooler sleeves and insert sleeves in case with seal end first. Place oil cooler adapter with gasket on case over oil cooler sleeves, install two attaching screws with copper washers, and tighten securely.

2) With spring in place on regulator valve install valve and spring into case. Install pressure regulator plug assembly and tighten to 5 ft. lbs. *CAUTION–Overtightening of pressure regulator may push pump away from side of case causing an oil leak between passages in pump and case.*

3) Install front unit coupling cover first (with transmission vertical, and front end up), into transmission case. Rock drive torus shell to make sure drive hub engages front pump rotor and rock driven torus shaft to make sure lugs on shaft engages front unit sprag inner race. Driven torus shaft should turn clockwise freely, but should not turn counterclockwise as viewed from front.



GOVERNOR ASSEMBLY

CONTROL VALVE, SERVO & ACCUMULATOR: 1) Rotate transmission to horizontal position. Attach control valve assembly to transmission with five attaching screws, leaving out screw which will position front pump intake pipe retainer. *(NOTE–*The four outer screws have star washers and the center two have flat washers). Position detent lever so it will engage detent plunger and manual valve.

2) Install new front pump "O" ring seal in intake pipe at front of case. Install servo and accumulator assembly and servo spring. Install front intake pipe into case and secure with clip and valve body attaching screw.

3) Install rear pump "O" ring seal on rear pump intake pipe. Install oil screen on front pump intake pipe. Install rear pump intake pipe into screen and case. Install oil pan with new gasket and tighten attaching screws securely.

FLYWHEEL REAR HOUSING, TORUS ASSEMBLY & OIL COOLER: 1) Remove transmission from holding fixture and position on bench in a horizontal position, with pan down. Install steel thrust washer in recess in front unit drive torus shell. Position Flywheel Housing Bushing and Seal Protector J-6119 over intermediate shaft.

2) Install rear flywheel housing-to-case "O" ring seal on flywheel housing. Install rear flywheel housing on case and attach with six screws. Tighten securely. Remove Bushing and Seal Protector.

3) Install proper selective washer on drive shaft of front unit as determined when checking front unit end clearance at disassembly. Install torus cover and push cover on evenly, without rocking, to prevent damage to seal and bushing.

4) Install internal gear assembly into cover, indexing with torus cover and front unit drive torus hub. Install bronze thrust washer then steel backing washer in internal gear. Steel backing washer must be indexed with splines of front unit drive torus shaft.

5) Install sun gear over front unit driven torus shaft, chamfered side first. Install steel backing washer and bronze thrust washer against sun gear. Install drive torus member on intermediate shaft indexing front unit planet carrier with sun gear and internal gear. Secure drive torus to intermediate shaft with Truarc snap ring.

6) Install driven torus rear Truarc snap ring on mainshaft. Install driven torus front Truarc snap ring on mainshaft to secure torus member.

7) Install flywheel "O" ring seal on flywheel and position flywheel against torus cover, indexing with dowels (flywheel can be installed in only one position since dowels are of different sizes). Install and tighten flywheel-to-torus cover nuts, leaving nuts off bolts required for attaching flywheel and torus cover to flex plate. Tighten nuts to 20 ft. lbs.

8) Place oil cooler in position against bottom of rear extension housing and install attaching screws. Connect oil cooler pipes to adapter on side of transmission case.

FORDOMATIC, MERCOMATIC & TURBO-DRIVE TRANSMISSION

Ford Pass. Cars, All Models (1957)
Ford Trucks F-100, F-250, F-350, P-350, P-400, P-500 (1957)
Lincoln & Continental (1957)
Mercury (1957)

►CHANGES, CAUTIONS, CORRECTIONS

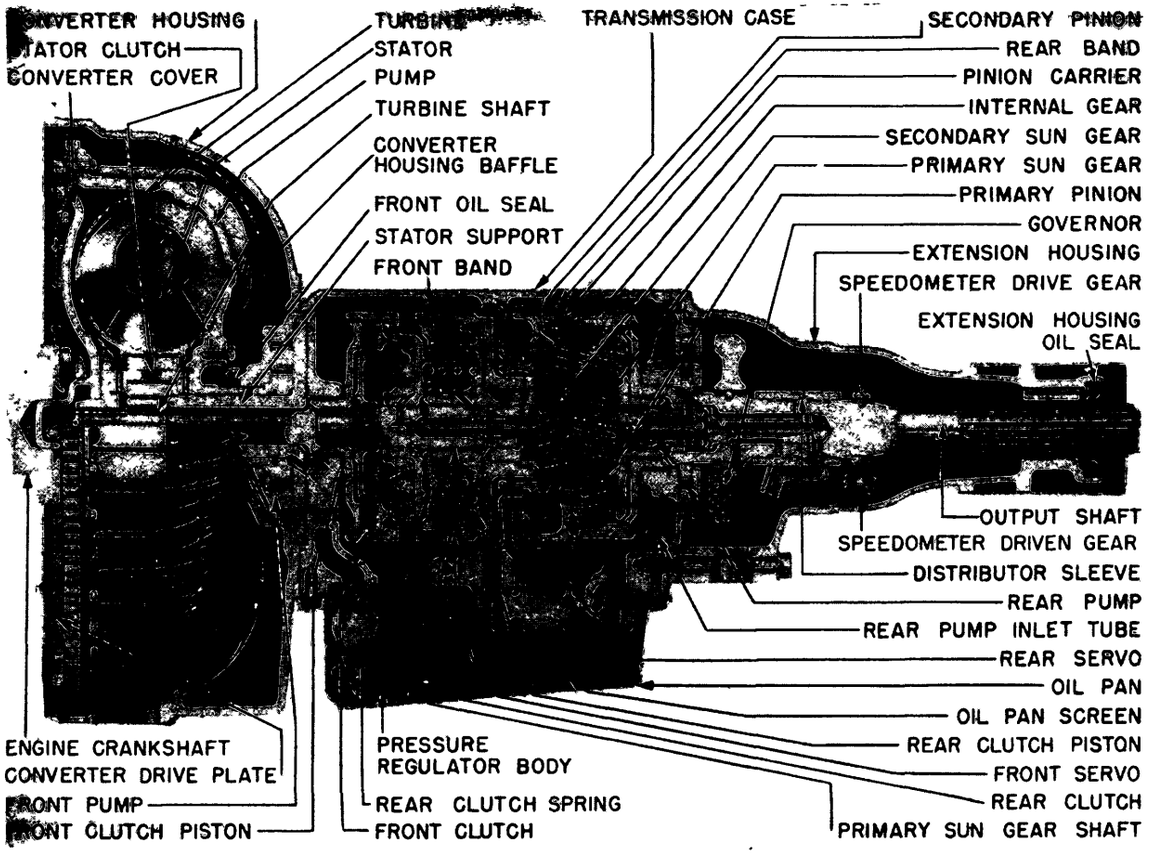
►*POOR ACCELERATION OR LACK OF POWER ON HILLS NOTE:* This condition may be caused by converter clutch slippage due to improperly installed clutch sprags. To determine if converter clutch is at fault, perform a stall test *(see "Stall Test" below).* A slipping converter clutch will cause a decrease of 300-400 RPM in specified stall speeds. Inspect sprags as one or more may be turned 180° which would prevent clutch locking up. See "Torque Converter Overhaul" below.

►*AUTOMATIC TRANSMISSION FLUID COLOR CHANGE:* Fluid having a red dye in it may be found in 1957 transmissions. This color is being added to aid in detecting oil leakage. Uncolored fluid may be mixed with colored fluid.

►*1957 FORDOMATIC, MERCOMATIC & TURBO-DRIVE TORQUE CONVERTER STATOR CLUTCH PRODUCTION CHANGE:* A new converter stator clutch assembly Part No B7A-7940-B having two brass drag strips replacing the "T" bar on the inner cage insures positive engagement of the sprags The new clutch assembly which replaces Part No B7A-7940-A & PAR-7940-B has fourteen sprags compared to 16 sprags in the earlier assemblies When installing the new assembly inner race into stator clutch, care must be taken to prevent bending the drag strips. The stator clutch sprag assembly must be assembled into outer race so that the flange on the cages will face toward the front of car and drag strips face toward rear. *CAUTION- To prevent repeat failures in service, DO NOT race engine in neutral, or stall test immediately after an overhaul. DO NOT operate car at full throttle until car has been driven 5-10 miles after overhaul.*

►*1957 FORD V8 FLYWHEEL PRODUCTION CHANGE:* A new one-piece flywheel, Part No. B7A-6375-A is being used on all Fordomatic Cars. When installing converter to flywheel, align converter drain plugs with flywheel drain plug slots A reinforcing plate, Part No. B7A-6383-A is used between crankshaft bolts and the new flywheel

►*1957 MERCURY REVERSE AND PARK INHIBITOR SWITCH PRODUCTION CHANGE:* On later cars, the switch mechanism formerly mounted on the transmission is now mounted in the drivers compartment. A two-piece speedometer cable provides the drive for the switch and for the speedometer. When replacing the early type switch, use Kit, Part No. MHK-15824-A. Installation instructions are included with the kit. *NOTE* - When replacing the switch on air conditioned cars, it should be mounted to the left of steering column to prevent interference with air conditioner plenum chamber.



FORDOMATIC, MERC-O-MATIC & TURBO-DRIVE TRANSMISSION SECTIONAL VIEW

►*1957 FORD "DOWNSHIFT CLUNK" CORRECTION:* If a 3-2 downshift "clunk" is evident when coasting to a stop, with no throttle applied, and a linkage adjustment will not correct the condition, rear clutch plates, Part No. B6A-77519-A, should be installed. These plates can be identified by eight oil grooves on each side of plate.

►*1957 FORD SPEEDOMETER DRIVEN GEAR CORRECTION (GEAR FALLS INTO TRANSMISSION):* Remove drive gear and retainer and bend retainer so that distance between legs at center is .330-.350". Position driven gear on the cable to its full depth, making certain that inner core is fully seated in square hole of gear. Insert retainer clip through slots of driven gear to secure gear to cable with closed end of clip riding against gear.

►*1955-57 LINCOLN & CONTINENTAL MANUAL DETENT LEVER & SPRING CHANGE (To minimiz ffort in shifting s l ctor quadrant l v r):* A new manual valve detent lever, Part No. PAN-77280-A, and lever spring, Part No. PAN-77276-A, are available for service replacement. These parts are interchangeable individually with the parts formerly used.

►*1957 MERCURY CONVERTER HOUSING LOWER COVER SERVICE REPLACEMENT NOTE:* Converter housing lower cover, Part No. 77979-A, may be used to service either the cast iron or aluminum converter housing. When used on aluminum housing, the retaining tang must be bent down toward cover to provide a tight fit.

►*1957 MERCURY "NO DOWNSHIFT" CORRECTION (EARLY CARS):* If kickdown cannot be obtained with properly adjusted linkage, install a new adjustable type accelerator rod, Part No. MG-9784-B, as follows: Set new rod to shortest overall length and install it in position. Adjust rod 2 or 3 turns until proper kickdown obtained. When rod is properly adjusted, distance between accelerator pedal and bare floor pan will be about 4" *(CAUTION* - Excessive adjustment will cause accelerator shaft to ride on engine block).

►*1957 LINCOLN & MERCURY (WITH 368" ENGINE) CONVERTER STATOR REAR THRUST WASHER CHANGE:* A new steel backed bronze thrust washer, Part No. PAN-7937-D has been added between the stator and impeller because of the increased thrust. A new aluminum thrust washer PAN-7937-C is used

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

in conjunction with PAN-7937-D, replacing the former washer When wear is found on rear converter stator thrust washer in early production cars the new washers should be installed

►*1957 MERCURY PARK HANDLE LOOSE ROLL PIN CORRECTION* Install a new longer roll pin Part No 353660-S2 in park slide handle Spread the slot in the new pin slightly to insure a good fit and then install with slot facing rear of car

►*1957 MERCURY ERRATIC OR IMPROPER SHIFT PATTERN* This condition may be caused by improper installation of transmission main control assembly *See "Transmission Reassembly" below*

►*1951-57 MERCURY MANUAL CONTROL LEVER REPLACEMENT NOTE* Two types of manual control lever assemblies are furnished for service replacement and both have the same part number On one type the lever is "staked" to shaft, and on the other, the lever is brazed to shaft When using the staked type, spacer Part No PAR-77351-A must also be used

►*1957 MERCURY PARKING PAWL LINKAGE PRODUCTION CHANGE* The following parking pawl parts are being used in production Do not intermix these parts with previous parts as the later type parts must be used together Brake Pawl, Part No PBA-77311-B, Toggle Lever Link Pin Part No PBA-77317-B, Toggle Link Pin Part No PBA-77318-B, Toggle Link, Part No PBA-77316-C

►*TRANSMISSION IDENTIFICATION NOTE:* Transmission Model No and Serial No on name plate on left side of transmission case must be used to identify individual units for parts replacement etc

►*STARTING ENGINE BY TOWING OR PUSHING CAR:* Pushing is recommended Place selector lever in Neutral "N" position When car reaches 20 MPH speed, turn on ignition, move selector lever to "LO", depress accelerator pedal to half throttle position until engine begins to run *NOTE–On ice or snow where traction not good, move selector lever to "DR" position to crank engine*

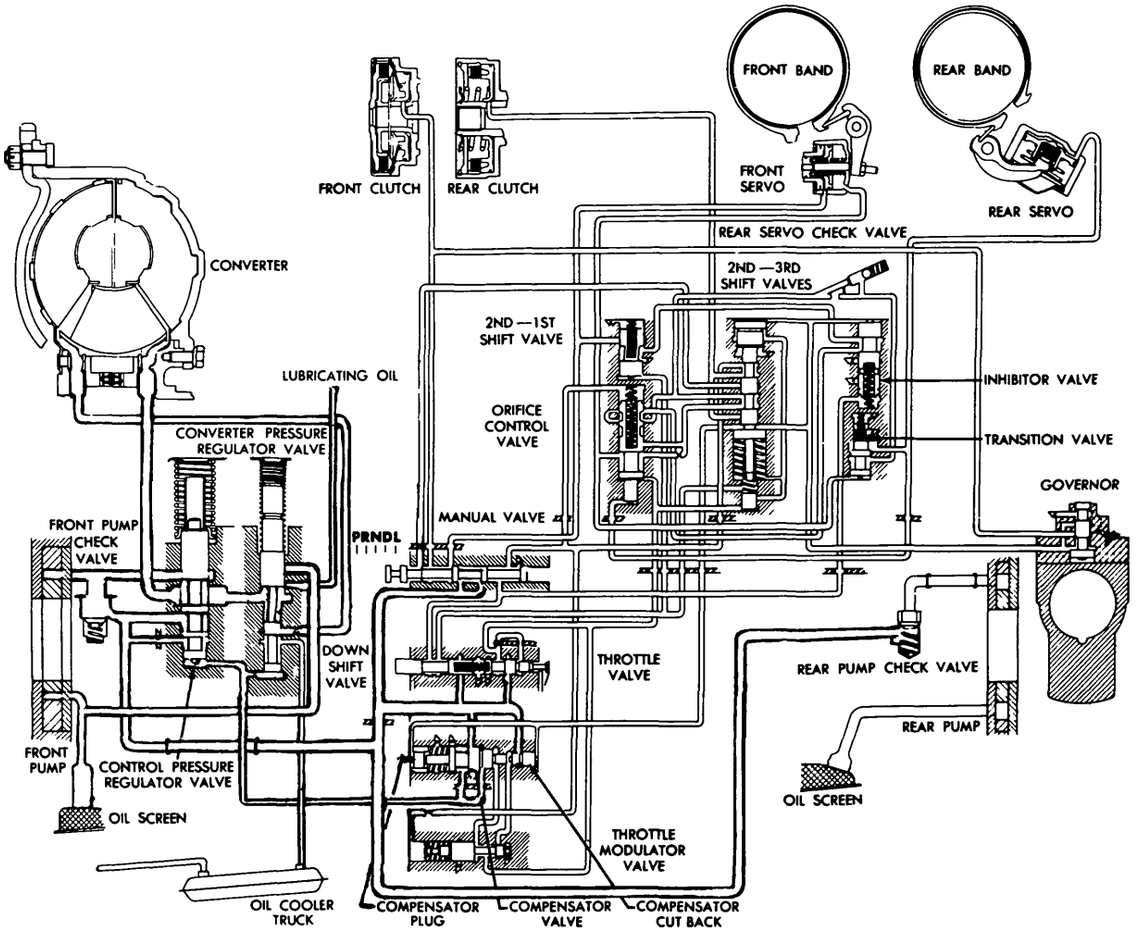
►*TOWING CAR CAUTIONS: Do not tow at speed greater than 40 MPH and observe following precautions*

If Transmission Operating Properly–Place selector lever in Neutral "N" position Car can be towed normally for distances not to exceed 12 miles **For greater distanc s, use sam procedure as for inoperative transmission.**

If Transmission Inoperative–Tow car with rear wheels lifted off road, or disconnect and remove propeller shaft and protect rear end of transmission from entry of dirt (U-joint Knuckle, Part No 1M-4841 can be installed and wired in place for this purpose)

DESCRIPTION

Fordomatic Merc-O-Matic & Turbo-Drive Automatic Transmissions consist of a hydraulic torque converter and a three speed planetary type transmission which provides automatic operation in "DR" range, "LO" 'R" & "P' ranges are controlled manually Transmission oil coolers are provided on all models except Ford 6 Cyl Pass Cars A new 'Key Board" type transmission range selector is used on all Mercury models The selector head contains a "push-pull" lever for applying and releasing the transmission parking pawl a parking brake release bar (to release foot operated parking brake) and four transmission control buttons A combination neutral safety, back-up light and starter switch is attached to rear of the selector assembly Depressing the "N" (Neutral button past the neutral position engages the starter switch A reverse inhibitor switch located on back of selector assembly is controlled by a speedometer cable driven centrifugal switch mounted on the transmission (early cars) in drivers compartment (later cars) and prevents shifting transmission into "Park" or "Reverse" when car speed is greater than 5 MPH



FORDOMATIC, MERC-O-MATIC & TURBO-DRIVE TRANSMISSION HYDRAULIC CIRCUITS

OPERATION

Torque converter automatically provides a torque multiplication ranging from 2 1-1 (maximum for starting and acceleration) to 1.0-1 (normal driving range with torque converter acting as a fluid coupling) This torque multiplication is supplemented by the planetary gears when selector lever placed in "DR", "LO", and "R" ranges.

Drive Range–Car starts in Intermediate Gear (except when accelerator pedal depressed to floor when car will start in Low Gear) with a gear ratio of 1 467-1 (Ford), 1 46-1 (Lincoln & Mercury), with Front Clutch applied locking the Primary Gear to the Turbine Shaft, and the Front Band applied, holding Secondary Sun Gear stationary The power flow at this point is from Turbine Shaft through Front Clutch to Primary Pinion, to Secondary Pinion, to Internal Gear, to Output Shaft As car speed increases (depending on throttle pressure) to a certain point, the Front Band is released and the Rear Clutch is applied, automatically causing transmission to change to direct (1.0-1) drive The power flow in "High" gear is from the Turbine Shaft through the Front and Rear Clutches to the Planetary Gears

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

which are locked together and rotate as a unit, causing the Output Shaft to rotate at engine speed

Low Range—Front Clutch applied, locking the Turbine Shaft to Primary Sun Gear, and the Rear Band applied, holding Pinion Carrier stationary The flow of power is from the Turbine Shaft through the Front Clutch, to Primary Pinions to Secondary Pinions, to Internal Gear and out the Output Shaft at a ratio of 2 40-1 *See "Fordomatic, Mercomatic & Turbo-Drive Transmissions" in 1955 Annual Data or later Manual dition.*

LUBRICATION

►*OIL COOLER HOSE CONNECTION CAUTION. When reconnecting oil cooler hoses after installation of radiator, care must be taken to connect hoses to correct fitting on radiator When removing hoses, connections should be marked for correct assembly*

►*AUTOMATIC TRANSMISSION FLUID COLOR CHANGE* Fluid having a red color may be found in 1957 transmissions This color is being added to aid in detecting oil leaks Uncolored fluid may be mixed with colored fluid Be sure and use Automatic Transmission Fluid Type "A"

►*CAUTION· Transmission oil level should be checked at 1000 mile intervals (Ford Pass Cars & Trucks), 2000 mile intervals (Lincoln, Continental, & Mercury) Drain and refill every 25,000 miles (Ford Pass Cars), 15,000 miles (Ford Trucks), 16,000 miles (Lincoln, Continental, & Mercury)*

R commended Oil - Automatic Transmission Fluid Type 'A"

Capacity - Approximate capacities as follows

Ford 6 & 8 (Pass Cars & Trucks, except Thunderbird & Police Interceptor) - 9½ qts

F rd Thunderbird & Police Interceptor - 10½ qts

Mercury - 10½ qts

Lincoln & Continental - 11.3 qts

Ch cking Fluid Level—Apply hand brake, place selector lever in Neutral "N" position, run engine at idle speed for approximately four minutes, then move selector lever to Park "P" position When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission, return lever to "P" position Raise engine hood, clean all dirt from around filler cap at right rear corner of engine. Check fluid level on dipstick in filler tube *(CAUTION—* make certain dipstick pushed all the way down in the filler tube when checking fluid level) Add fluid as necessary to bring level up to "F" full mark on dipstick

Drainage and Refilling—Remove converter housing lower plate and drain converter by removing one drain plug, then rotate the engine 180° and remove the second drain plug Disconnect filler tube from transmission oil pan to drain fluid from transmission Tighten converter drain plugs to 7-10 ft lbs Tighten filler tube connection Install 5 quarts of automatic transmission fluid, start engine and allow to idle four minutes Add 4 qts, of fluid and bring transmission to operating temperature Place selector lever in parking (P) position and check oil level If level is not up to dip stick level mark, add additional fluid as required

►*CAUTION—Correct fluid level should be determined by dipstick reading rather than actual number of qts. installed*

LINKAGE ADJUSTMENT

Throttle Linkage Adjustment (Pressure Method): *NOTE This method should be used in addition to regular throttle linkage adjustment procedures (see Car Model pages), after transmission overhaul* With transmission at normal operating temperature, adjust engine idle speed, anti-stall dashpot, manual linkage, neutral safety switch and throttle linkage (see Car Model pages), then proceed as follows Set hand brake securely Raise car on hoist and install pressure gauge (300 lbs) in 1/8" pipe plug hole on transmission case Lower the car to floor and install a tachometer on engine Position pressure gauge so it can be read from driver's seat Place selector lever in "DR" (Drive) range and increase engine speed to 1000 RPM. Note pressure reading on gauge which should be the same as specifications in Line Pressure Range Table *(see "Testing" below)* If pressure is less than specified, rotate throttle rod clevis to lengthen rod If more than specified, shorten rod as necessary to bring pressure within limits Check pressures at idle and stall speeds Pressures should be as indicated If idle pressure is above specifications and linkage cannot be shortened further, the throttle lever internal stop must be bent away from valve body If idle pressure or stall speed is not within specifications perform Shift Test & Stall Test and refer to "Trouble Shooting and Diagnosis"

►*CAUTION Do not operate car for long periods under stall or partial stall conditions*

FORD, LINCOLN, CONTINENTAL

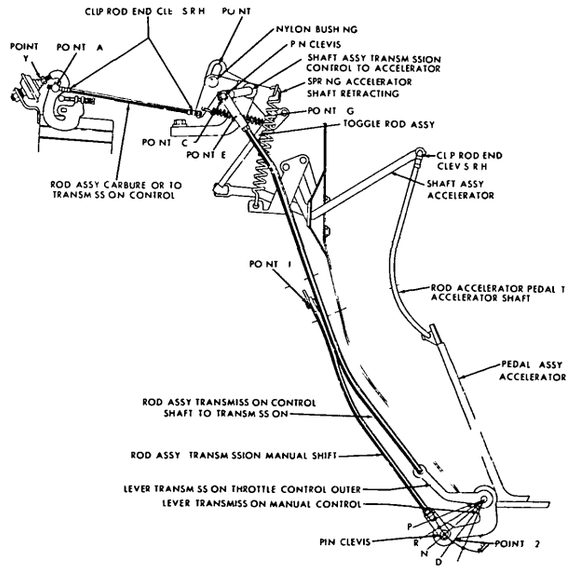
Manual Linkage Adjustment (Except Mercury): Disconnect upper end of manual shift rod from selector arm Position selector lever with indicator in the quadrant down against its stop in 'DR" position Place manual lever at transmission in the "DR" detent (second from bottom) Rotate manual shift rod clevis until clevis pin fits freely into holes in clevis and selector arm Length-rod assembly 2 complete turns (Ford Pass Cars & Trucks except Thunderbird), 1 complete turn (Thunderbird, Lincoln, & Continental), counterclockwise Install clevis pin and check pointer alignment in all positions

MERCURY KEYBOARD CONTROL ADJUSTMENT

Manual Selector Cable Adjustment (Mercury): Raise car remove splash shield and remove pipe plug from left side of transmission case Remove park release cable from lever and clamp *(NOTE - Park release cable must not be connected to adjusting bracket or park release lever while making manual selector lever adjustment)* Loosen control cable mounting bracket retaining screw and washer leaving it finger tight Hold "D" button on transmission keyboard selector in the FULLY DEPRESSED position, then move adjusting bracket downward to limit of travel Install Tool 77270-F in place of pipe plug in transmission case Pull upward on selector cable and housing assembly until pin in gauge seats in the locating slot of selector cable connector sleeve Leaving Tool 77270 F in place torque control cable mounting screw to 18-22 ft lbs Remove tool and replace pipe plug Check for correct keyboard control operation of all buttons before proceeding with park cable adjustment

Park Cable Adjustment (Mercury): *(NOTE - Manual selector cable must be adjusted before park cable adjustment is made)* Install park cable on the pin of park release lever and install clamp and screw on adjusting bracket Fully depress park bar on keyboard selector Install gauge Tool 77270-E over torsion lever support pin in transmission case and the pin on park release lever Remove cable slack by pulling cable housing toward rear of car then while holding cable in this position tighten cable clamp screw *(NOTE-* No external park release lever retracting spring is used on later transmissions) Remove Tool 77270-E Install washer and retaining pin in park release lever pin Check operation of all control buttons and park bar

STARTER NEUTRAL SAFETY SWITCH: *(NOTE - Neutral Safety Switch is located at lower end of steering column (Ford, all models), on steering column, inside passenger compartment (Lincoln & Continental), at back of "key-board" control (Mercury)*



TURBO-DRIVE THROTTLE LINKAGE

BAND ADJUSTMENT

►*Band Adjustment is recommended to be made at 15000 mile intervals when transmission fluid is changed (pan should be removed and cleaned at this time)*

FRONT BAND ADJUSTMENT· Drain fluid from pan using a drain can with a fine mesh screen, remove pan Remove fluid screen from transmission and loosen

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

the front servo adjusting screw locknut TWO FULL TURNS, using a 9/16" wrench. Using front band adjusting tool No. 7225, insert gauge block between servo piston and adjusting screw and tighten adjusting screw until wrench overruns. Back off adjusting screw exactly ONE COMPLETE TURN and remove gauge block. While holding adjusting screw stationary, tighten locknut clockwise (20-25 ft. lbs.). Install fluid screen and install pan using new gasket. Install the drain plug and refill transmission to "Full" mark using fluid drained from transmission unless fluid being changed. Check fluid level (see LUBRICATION).

►*CAUTION–Severe damage may result if adjusting screw not backed off exactly 1 full turn.*

REAR BAND ADJUSTMENT: Fold back floor mat to expose right side of floor pan and remove access cover on right side of transmission floor pan. Using rear band adjusting tool No. 7195 or 7195-B *(NOTE* - See note below for adjusting rear band on air conditioned cars), loosen rear band adjusting screw locknut. Using "T" handle of tool No. 7195, tighten rear band adjusting screw until wrench overruns (if screw found to be tighter than wrench capacity (10 ft. lbs.) loosen screw several turns and retighten until wrench overruns). Back off adjusting screw exactly 1½ COMPLETE TURNS. While holding adjusting screw stationary, tighten adjusting screw locknut to 35-40 ft. lbs.

►*CAUTION: Severe damag may result if adjusting screw not backed off exactly 1½ turns.*

►*REAR BAND ADJUSTMENT NOTE (AIR CONDITIONED CARS):* To avoid interference on air conditioned cars when using band adjusting tool No. 7195, substitute a sliding handle for the stationary type handle of tool Using a piece of steel rod 7/16" x 6½", (with threads on each end of rod), slide rod into the original handle hole of tool and install nuts on ends of rod. The later tool No. 7195-B can be used by loosening the handle attaching screw and sliding the handle as required to clear air conditioning unit.

TESTING

►*CAUTION: While making the Stall Test never hold the throttle open longer than 5 seconds.*

STALL TEST: The stall test is made in "D", "LO" & "R" ranges to determine if bands or clutches are slipping. Connect a tachometer to engine and set it to read on the "high" scale. Make sure engine is idling properly at normal operating temperatures. Start engine, then firmly apply parking brake and service brake. Place selector lever in "D" range, then press accelerator slowly all the way to the floor without going into "low gear" kickdown. The engine speed should be as indicated in the "Stall Speed Table" below. If engine speed is below minimum limit, tune the engine and repeat test. If engine speed exceeds maximum limit, release accelerator immediately because front band or clutch slippage is evident. To determine whether the front band or front clutch is causing slippage, move lever to "LO" range and repeat the test. If slippage is evident in "LO" range also, the front clutch is slipping. If slippage is found in "DR" range, but not in "LO" or "R" ranges, the front band is causing the the slippage. If engine exceeds the maximum limit with selector lever in "R" range, the rear band or rear clutch is slipping. To determine which of the two is faulty, move selector lever to "LO" range. If slippage is evident in "LO" and "R" ranges, but not in "D" range, the rear band is slipping. When slipping is noted in "R" range but not in "LO" or "D", the rear clutch is causing the slippage.

TRANSMISSION SHIFT SPEEDS

	AXLE RATIO	SHIFT SPEED (MPH)						MAN. SHIFT
SHIFT		2 – 3		3 – 2		1 – 2	2 – 1	①
THROTTLE		MIN.	MAX.	MIN.	FORCED	MAX.	FORCED	
Ford 6 Pass. Cars	3.10-1	12-21	57-60	14-8	67	33-41	19-15	27-18
	3.56-1	11-18	50-60	12-6	58	30-37	17-13	27-15
Ford V8 Pass. Cars, 272" & 292" Engines	3.10-1	12-21	59-70	14-8	68	34-43	19-15	27-18
	3.56-1	11-18	52-61	12-6	60	30-38	17-13	24-15
Ford V8 Pass. Cars & Thunderbird, 312" Engine	3.10-1	12-21	59-70	17-10	68	36-44	19-15	27-18
	3.56-1	11-18	52-61	14-9	60	31-39	17-13	24-15
Ford Truck, F-100	All	11-14	50-60	10-6	58	30-36	16-13	22-14
Ford Truck, F-250	4.88-1	11-14	42-52	10-5	50	25-34	15-10	22-14
Ford Truck, F-350, P-350, P-400	5.14-1	8-11	33-41	9-6	42	20-26	11-9	16-13
Ford Truck, F-500, P-500	6.80-1	6-11	29-35	8-5	34	17-22	10-8	14-10
Lincoln	All	15-20	60-70	16-10	28-78	41-48	16-21	24-30
Continental	All	16-20	60-70	16-10	26-70	41-48	15-19	24-30
Mercury	All	16-20	59-76	15-9	24-75	36-47	0-21	23-30

① - If manual shift made above speed indicated, transmission will shift from High to Intermediate; if made below these speeds, transmission will shift from Intermediate to Low (Ford); High to Low (Lincoln, Continental & Mercury).

ENGINE STALL SPEEDS

Car & Model	Low Limit – Engine RPM – High Limit
Ford 6 Cyl. (223" Eng.)	1380 – 1580
Ford V8 (272" Eng.)	1460 – 1660
Ford V8 (292" Eng.)	1550 – 1750
Ford V8 (312" Eng.)	1620 – 1820
Lincoln & Continental	1820 – 2020
Mercury (312" Eng.)	1620 – 1820
Mercury (368" Eng.)	1820 – 2020

SHIFT TESTS: Select a smooth road for the tests. Make test as outlined below and see "Shift Point Table" for correct speed where shifts should occur.

2-3 Upshift (Minimum Throttl): Place selector lever in "DR" range, and starting from a standstill, apply accelerator lightly but steadily.

3-2 D wnshift (Minimum Throttl): Permit car to decelerate (from speed attained in above test) until downshift occurs from high to intermediate.

3-2 Downshift (Forced): Reduce car speed below 45 MPH (Ford), 50 MPH (Mercury & Lincoln). Press accelerator pedal to floor. Transmission should shift from high to intermediate. This shift should occur only with car in high gear.

2-3 Upshift (Maximum Throttle): Place selector lever in "DR" range, and starting from a standstill, press accelerator to the floor. Full throttle upshift should occur as indicated.

2-1 Downshift (Forced): With selector lever in "DR" range and car speed below 18 MPH (Ford), 19 MPH (Mercury & Lincoln), quickly press accelerator fully to the floor. This action shifts transmission from high, to intermediate, or low.

1-2 Upshift (Maximum Throttle): With accelerator fully pressed to floor for above test (2-1 Downshift, Forced), transmission should upshift from low to intermediate when car speed indicated in table is reached. The 2-3 Upshift will occur at same speed as for 2-3 Upshift (Maximum Throttle).

"DR" to "LO" Manual Shift: With car speed between 40-45 MPH (Ford), 45-50 MPH (Mercury & Lincoln), Manually shift selector lever from "DR" to "LO". Instead of shifting to low gear, the transmission should shift from high to intermediate. When car speed is reduced within the range indicated in table, the trans-

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

mission should shift into low range.

"R" Shift: Bring car to a stop and place selector lever in "R" range. The car should move in reverse direction smoothly, upon light throttle pressure.

CONTROL PRESSURE TESTS: *(NOTE - The Throttle Lever Protractor Gauge formerly used in testing the transmission is no longer required).* Install Pressure Gauge No. 77820-A (300 lbs.) in pressure take-off hole in transmission (located either near throttle lever or at rear of transmission case), and position it so it may be read from the driver's seat. Install tachometer to engine and adjust engine to correct idle speed. Set hand brake and allow engine and transmission to reach normal operating temperature. Proceed as follows *(NOTE - See "Line Pressure Range" table below for pressure specifications):*

1) With selector lever in "DR" (Drive) range, check idle pressure which should be within specifications.

2) Increase engine speed to 1000 RPM and note control pressure. If pressure is not within specifications, adjust throttle rod *(see "Throttle Linkage Adjustment" above).*

3) With selector lever in "DR" (Drive) range, increase engine speed to a stall condition. Pressure must be within specifications.

4) Move selector lever to "R" (Reverse) range and repeat the pressure tests at idle speed, 1000 RPM, and stall. Pressures should be within specifications.

► *CONTROL PRESSURE DIAGNOSIS NOTE: If pressures for the above tests are not within specification as outlines in "Line Pressure Range" table below, perform Shift Test & Stall Test as indicated above. Refer to "Trouble Shooting & Diagnosis".*

LINE PRESSURE RANGE TABLE
Ford Pass. Cars & Trucks

Engine Speed	Lever Position	223" Engine ①	272" & 292" Engine ①	312" Engine ①
Idle	DR	49-63	51-69	50-70
1000 RPM	DR	80-85	80-85	80-85
Stall	DR	124-155	133-165	147-180
Stall	R	173-195	181-205	194-216

① - Lbs. Pressure.

Lincoln, Continental, & Mercury

Engine Speed	Lever Position	Pressure
Idle	All	56-70 lbs.
1000 RPM	D	80-85 lbs.
Stall ①	R	197-215 lbs.
Stall ①	D-L	152-180 lbs.
Stall ②	D	152-180 lbs.

① - To detent. ② - Through detent.

AIR PRESSURE TESTS (WITH TRANSMISSION IN CAR): Raise car on hoist and remove transmission oil pan, and control valve assembly. Proceed as follows:

Front Clutch: Apply pressure to front clutch and governor input passage (see illustration). Listen for dull thud which indicates that clutch is operating. Keep air pressure in passage for several seconds to check for leaks in this part of system.

Governor Valve: Remove governor inspection cover. Apply air pressure to the same passage as for front clutch (above). Listen for a click and also watch valve snap inward.

Rear Clutch: Apply air pressure to rear clutch oil passage (see illustration). Listen for a dull thud to indicate clutch is operating. Check for leaks in same manner as for front clutch (above).

Rear Band & Servo: Apply pressure to rear servo oil passage (see illustration), and observe band application.

Front Band & Servo: Apply pressure to front servo apply tube (rear tube), and observe band application.

► *TESTING NOTE: If servos, bands, clutches, and governor operate with air pressure, then the no drive problems, erratic shift, or no upshift conditions indicate that the control valve assembly is the cause of the trouble. See "Control Valve" in OVERHAUL BELOW.*

TROUBLE SHOOTING & DIAGNOSIS

► *TROUBLE SHOOTING & DIAGNOSIS NOTE: Make corrections in sequence shown, testing operation of transmission after each correction.*

SEVERE ENGAGEMENT ("Lo", "Dr", or "R" Ranges): Check engine idle speed and throttle linkage adjustments. Adjust rear band. Perform a control pressure test. Remove and clean main control valve assembly and pressure regulator valve.

2-3 SHIFT IS LOW, HIGH, OR ERRATIC: Check fluid level. Adjust throttle and manual linkage. Check governor operation. Perform a pressure control test. Remove and clean main control valve assembly and pressure regulator valve.

SEVERE 2-3 SHIFT: Adjust throttle linkage. Adjust front band. Remove and clean main control valve assembly and pressure regulator valve. Remove and inspect front servo.

ENGINE OVERSPEEDS (2-3 SHIFT): Adjust front band. Remove and clean main control valve assembly.

NO 2-3 SHIFT: Remove and inspect governor. Remove and clean main control valve assembly. Rear clutch slipping. Leakage in hydraulic system. Fluid distributor sleeve in output shaft is faulty.

NO FORCED DOWNSHIFT (3-2 SHIFT): Adjust throttle linkage. Perform control pressure check. Remove and clean main control valve assembly. Check operation of inner and outer throttle levers.

SEVERE 3-2 DOWNSHIFT (CLOSED THROTTLE): Check engine idle speed and throttle linkage. Remove and clean main control valve assembly.

SLIPPAGE OR CHATTER IN 2ND SPEED: Check fluid level. Adjust throttle linkage. Adjust front band. Check control pressure. Clean main control valve and pressure regulator assemblies. Front servo not performing properly. Front clutch slipping. Leakage in hydraulic system.

SLIPPAGE OR CHATTER IN 1ST SPEED: Check fluid level. Adjust throttle linkage. Adjust rear band. Clean main control valve and pressure regulator assemblies. Check inner and outer throttle levers. Front clutch slipping. Leakage in hydraulic system. Fluid distributor sleeve in output shaft is faulty.

SLIPPAGE OR CHATTER IN REVERSE: Check fluid level. Adjust throttle linkage. Adjust rear band. Check control pressure. Clean main control valve and pressure regulator assemblies. Front clutch slipping. Leakage in hydraulic system. Fluid distributor sleeve in output shaft faulty

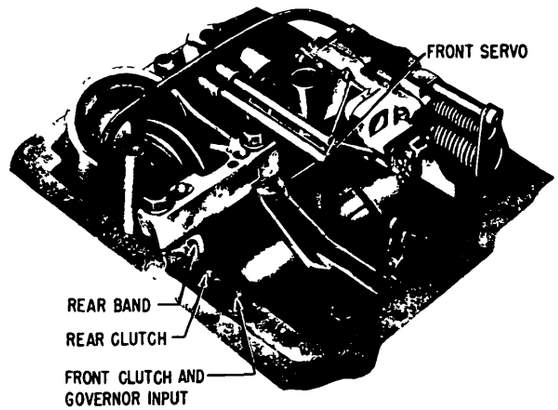
NO DRIVE IN "DR" RANGE: Adjust front band. Clean main control valve assembly. Make an air pressure check. Front clutch slipping. Leakage in hydraulic system. Fluid distributor in output shaft faulty.

NO DRIVE IN "R" RANGE: Adjust rear band. Rear servo not operating properly. Clean main control valve assembly. Make an air pressure check. Rear clutch not operating. Leakage in hydraulic system. Fluid distributor sleeve in output shaft faulty.

NO DRIVE IN "LO" RANGE: Adjust manual linkage. Adjust rear band. Rear servo not operating properly. Clean main control valve assembly. Leakage in hydraulic system. Fluid distributor sleeve in output shaft faulty.

NO DRIVE IN ANY RANGE: Check fluid level. Adjust manual linkage. Check control pressure. Clean main control valve and pressure regulator assemblies. Make an air pressure check. Leakage in hydraulic system.

LOCKUP IN "DR" RANGE: Adjust manual linkage. Adjust rear band. Rear servo not operating properly. Front servo not operating properly. Rear clutch slipping. Check parking linkage. Leakage in hydraulic system.



TRANSMISSION TEST POINTS

LOCKUP IN "R" RANGE: Adjust front band. Front servo not operating properly. Front clutch slipping. Check parking linkage. Leakage in hydraulic system.

LOCKUP IN "LO" RANGE: Adjust front band. Front servo not operating properly. Clean main control valve assembly. Rear clutch slipping. Check parking linkage. Leakage in hydraulic system.

PARKING LOCK BINDS OR WILL NOT HOLD: Adjust manual linkage. Check parking linkage.

UNABLE TO START ENGINE BY PUSHING: Check fluid level. Adjust manual linkage. Clean main control and pressure regulator valve assemblies. Rear pump not operating. Leakage in hydraulic system.

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Con..)

TRANSMISSION OVERHEATING: Converter cooling air passages blocked. Oil cooler and connections faulty. Clean pressure regulator assembly. Converter one-way clutch slipping or faulty.

ENGINE RUNAWAY ON FORCED DOWNSHIFT: Adjust front band. Clean main control valve and regulator valve assembly. Front servo not operating properly. Leakage in hydraulic system.

MAXIMUM SPEED BELOW NORMAL (POOR ACCELERATION): Converter one-way clutch not operating properly.

NO 2-1 DOWNSHIFT: Adjust throttle linkage. Clean main control valve assembly. Rear servo not operating properly.

NOISE IN NEUTRAL: Clean and inspect pressure regulator. Engine rear oil seal faulty. Front clutch not releasing properly. Front pump faulty.

NOISE IN 1ST, 2ND OR REVERSE SPEEDS: Clean and inspect pressure regulator. Fault in planetary assembly. Front or rear clutch faulty. Front pump faulty.

NOISE IN PARK RANGE: Clean and inspect pressure regulator. Front pump faulty.

NOISE WHEN COASTING IN NEUTRAL (20-30 MPH) WITH ENGINE OFF: Rear pump faulty.

MINOR REPAIRS (TRANSMISSION IN CAR)

The following transmission units can be removed for repair without removing transmission assembly from car. Raise car on hoist for these operations, then drain fluid from transmission and remove oil pan.

►*NOTE: For Disassembly & Overhaul of the following units, see OVERHAUL (TRANSMISSION UNITS) below.*

Govern r Removal: Remove governor inspection cover from extension housing. Rotate the drive shaft to bring governor body in line with inspection hole. Remove the two screws that secure governor body to sleeve. Remove governor.

►*CAUTION: Use care not to drop bolts or governor valve into housing.*

Installation–Lubricate governor valve with transmission fluid and install valve in governor body (*CAUTION*–valve must move freely in body). Install governor body on counterweight with the **side plate forward** (*CAUTION*–fluid passages in governor body and counterweight must be aligned), install governor body attaching screws. Install inspection cover with NEW gasket, tighten cover screws to 4-6 ft. lbs. torque.

►**NOTE:** For the following operations, remove transmission fluid level indicator. Remove transmission filler tube and drain the fluid into clean container using a fine mesh wire screen for straining. (Fluid may be re-used). Then remove transmission oil pan and screen.

Front S rv Removal: Loosen lubrication tube from pressure regulator and rear pump and remove. (NOTE–If necessary, tap tube with soft hammer to remove. *CAUTION*–Do not bend or distort tube). Loosen control valve body attaching bolts. Remove servo attaching bolt and while holding servo strut with fingers, remove servo assembly.

Installation–Position servo band forward in case with band ends down. Position servo strut with large end indexing with servo actuating lever and small end indexing with band end. Rotate band, strut and servo into position, indexing tubes from valve body to servo, and anchor end of band with anchor in case. Install attaching bolt, tightening to 30-35 ft. lbs. Tighten control valve attaching bolts to 8-10 ft. lbs. Install lubrication tube and adjust servo band. See "Front Band Adjustment". Install screen, install oil pan using NEW gasket, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

Rear Servo Removal: Remove lubrication tube from rear pump and regulator. (*NOTE*–If necessary tap tube with soft hammer to remove). Remove rear pump intake tube. Remove front servo (see above). Take out rear servo attaching bolts, hold actuating and anchor struts with the fingers, remove rear servo assembly.

Installation–Position servo anchor strut and rotate servo band to engage strut. Hold in position with fingers. Position actuating lever strut and install servo, install servo attaching bolts (*CAUTION*–Longer attaching bolt must be installed in forward bolt hole), tighten attaching bolts to 40-45 ft. lbs. torque. Install front servo (see above). Install rear pump intake tube and lubrication tube. Adjust rear band (see BAND ADJUSTMENT). Install oil pan with NEW gasket, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

Control Valve Body Removal: Remove two "U" tubes from pressure regulator and control valve body. Loosen front servo attaching bolt three turns. Take out three valve body attaching bolts, lower the valve body and pull it off the servo tubes.

►*CAUTION–Use extreme care when removing valve body to prevent damage to body and attached parts.*

Installation–Align servo tubes with holes in control valve body, position manual lever in neutral, position inner throttle lever between stop and downshift valve and at the same time push the throttle valve in to clear the transmission case **making certain that manual valve engages actuating pin manual detent lever.** Install control valve body attaching bolts but do not tighten the bolts. Install two "U" tubes in pressure regulator and control valve body. Tighten control valve body attaching bolts to 8-10 ft. lbs. torque. Tighten front servo attaching bolt to 35-40 ft. lbs. torque. Adjust front and rear bands (see BAND ADJUSTMENT). Install oil screen, install oil pan using NEW gaskets, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used) recheck fluid level with transmission at normal operating temperature.

Pressur Regulat r Rem val: Remove lubrication tube. Remove control pressure tube and compensator tube from valve body and regulator. Remove pressure regulator spring retainer. (*CAUTION*–Maintain pressure on retainer to prevent springs flying out). Remove the control pressure and converter pressure valves. Take out pressure regulator attaching bolts and washers, remove regulator.

►*MAIN OIL PRESSURE REGULATOR VALVE INSTALLATION CAUTION:* If regulator removed to correct transmission "buzzing" noise, examine valve for undersize bleed flats and rotate valve 90° in bore from original position when re-installing it. This should correct the noise.

Installation–Install regulator body and attaching bolts and tighten to 17-22 ft. lbs. Install converter pressure and control pressure valves and make certain valves operate freely in bore, then install valve springs and retainer. Install large control pressure tube, small compensator tube, and lubrication tube. Install oil screen, install oil pan using NEW gaskets, tighten pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used), recheck fluid level with transmission at normal operating temperature.

Manual & Throttle Lever Seal Replacement: Remove control valve body (see above), disconnect manual and throttle linkage rods at transmission levers. Remove nut on inner throttle lever shaft and remove inner throttle lever. Remove outer throttle lever and shaft, remove throttle shaft seal from counterbore in manual lever shaft. Take out cotter pin in each end of parking pawl torsion lever rod and remove the rod, rotate manual lever shaft until detent lever clears detent ball (*CAUTION*–do not allow detent ball to fly out), remove detent ball and spring. Remove manual lever shaft nut, remove detent lever, remove outer manual lever and shaft assembly. Remove manual shaft seal.

Installation–Coat outer diameter of new seal with Permatex No. 3, install seal in case using tool No. 77288. Install outer manual lever and shaft, rotate shaft until manual lever points downward, place detent lever on inner end of shaft, install attaching nut and tighten nut to 35-40 ft. lbs. torque. Place detent spring and ball in hole in case (use piece of thin wall tubing to depress ball and spring), rotate detent lever until detent ball is held in place. Install parking pawl torsion lever rod and cotter pins. Install new throttle shaft seal, outer throttle lever and shaft, inner throttle lever and attaching nut, tighten nut to 25-28 ft. lbs. Connect manual and throttle rods to outer levers. Check linkage for free movement. Install control valve assembly and other parts. *See Control Valve Assembly Installation (above).*

TRANSMISSION & CONVERTER REMOVAL
FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD)

►*TRANSMISSION OR CONVERTER REMOVAL NOTE: Transmission and converter can be removed as an assembly, or transmission can be removed separately (without disturbing converter) as follows:*

1) Place car on hoist. On truck models, drain radiator, fold front of floor mat back and remove covers from converter housing access bolt holes. Loosen water inlet and outlet hose clamps at oil cooler and pull hoses off cooler. On all cars and trucks, remove the two upper converter-to-engine bolts and lockwashers then raise vehicle with the hoist.

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

2) Disconnect oil filler tube at oil pan and drain transmission Remove converter housing front plates (8 Cyl.) or the access plate (6 Cyl.). Remove one of the converter housing drain plugs Rotate converter 180°, then remove second drain plug Drain converter.

►*NOTE: Converter may be drained after it is removed from car.*

3) Disconnect drive shaft at rear axle and remove shaft On F-250, F-350, P-350, P-400 or P-500 trucks, remove the four bolts attaching drive shaft coupling yoke at parking brake assembly

4) Remove flywheel-to-converter bolts Install the lower converter housing front plate (V8) or wedge the converter in place (6-Cyl) to prevent converter from sliding out of housing when transmission is removed

5) Disconnect starter cable at starter, then disconnect transmission-to-frame ground cable at transmission remove starter. On truck models, remove bolts attaching oil cooler to support brackets, on all models with oil cooler, disconnect oil cooler inlet and outlet hoses at transmission. On truck models, remove oil cooler On air cooled models, remove converter air duct and linkage dust shield, (cars), or the exhaust duct shield (trucks).

6) Disconnect manual and throttle linkages at transmission Disconnect speedometer cable at transmission On Pass. Cars, remove the two engine rear support-to-transmission bolts Position a transmission jack under transmission and raise it slightly to take weight off crossmember. On trucks, with the transmission jack in place remove the converter housing crossmember bolts. On all vehicles, then remove the two lower converter housing-to-engine bolts

7) Tilt rear of converter and transmission assembly upward slightly, then move assembly toward rear of vehicle sufficiently to remove the six engine crankshaft flange-to-flywheel attaching bolts Remove flywheel to provide sufficient clearance, then lower converter and transmission assembly

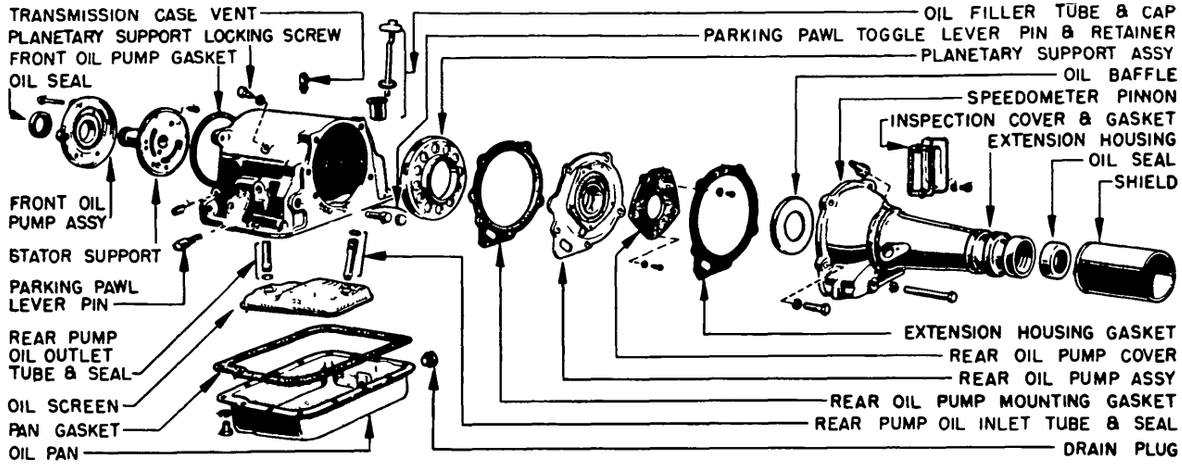
Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

THUNDERBIRD

►*NOTE The converter and transmission assembly cannot be removed with engine in the car. Either the engine can be removed first, or transmission, converter and engine can be removed as an assembly*

1) Remove engine *(see "Engine Removal" in Ford Special Data)* If converter and transmission have been removed with the engine, they can be removed from the engine by removing the six converter-to-flywheel drive plate bolts, then removing the four converter housing to engine attaching bolts

2) To remove converter and transmission after the engine has been removed separately, remove the two transmission extension housing-to-rear engine support attaching bolts Remove speedometer cable at transmission Disconnect the manual shift control lever at transmission Move transmission forward and remove forward drive shaft, then remove converter and transmission from car



TRANSMISSION CASE & EXTENSION HOUSING ASSEMBLY

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

LINCOLN & MERCURY

1) Remove ground strap from battery Remove bolts and nuts securing throttle linkage bar bracket to engine and body Place car on support stands with all four wheels approximately 12' off ground On Mercury models with single exhaust pipe, remove nuts securing muffler inlet and cross over pipe to exhaust manifolds Remove manifold outlet pipe from mounting bracket at rear of manifold and move exhaust system away from working area.

2) Disconnect manual linkage and throttle linkage at transmission Disconnect speedometer cable at extension housing Disconnect drive shaft at rear universal joint and remove drive shaft from transmission output shaft. On models with water cooled torque converter, remove inlet and outlet hoses at transmission. On models with air cooled torque converter, remove air duct from torque converter housing.

3) Remove splash deflector, and converter housing lower plate Drain converter by removing one drain plug, then rotate engine 180° and remove second drain plug Drain fluid from transmission

4) Remove engine rear mount-to-frame crossmember bolts Position transmission lift under transmission and raise engine and transmission sufficiently to install support tool Remove rear engine mount from transmission On Lincoln, remove the detachable frame crossmember from frame "X' member (the Mercury models have a tubular crossmember with brackets welded to the crossmember). Lower lift under transmission to allow engine to rest on support tool Reposition transmission lift under transmission assembly and raise lift just enough to relieve weight of transmission on engine.

5) Remove starter and upper converter housing plate with seal Remove six bolts securing converter to flexible drive plate. Remove the bolts securing converter housing to engine block

6) Remove transmission and converter assembly by sliding assembly toward rear of car sufficiently to disengage converter housing dowels and converter cover pilot Secure converter to converter housing to prevent damage to converter. Lower the assembly and remove from under car

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below*

TRANSMISSION REMOVAL (WITHOUT CONVERTER)

FORD PASS. CARS & TRUCKS

►*NOTE: On most cars and trucks, the transmission can be removed without removing the converter assembly.*

1) Raise vehicle with a hoist and drain fluid from transmission Disconnect drive shaft at rear axle and remove drive shaft

2) On trucks, disconnect oil cooler-to-transmission fluid inlet and outlet lines at transmission Remove bolts holding oil cooler on support brackets, then move cooler to one side

3) Remove converter air duct from pass cars, and remove exhaust duct splash shield from trucks

4) Disconnect manual control and throttle linkage at transmission Disconnect speedometer cable at extension housing. On pass. cars, remove the two rear support-to-transmission bolts Position a transmission jack under transmission and raise it slightly to take weight off crossmember Remove crossmember bolts and crossmember

5) On all vehicles, with transmission jack in place, remove the four transmission-to-converter housing attaching bolts On trucks, remove oil cooler from front support bracket Tilt rear of transmission slightly upward and move assembly toward rear, with a jack, until clear of turbine shaft Lower assembly and move it from under vehicle

LINCOLN & MERCURY

1) Place car on support stands with all four wheels approximately 12" off floor On Mercury models with

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

single exhaust pipe, disconnect muffler pipes at exhaust manifold and the outlet pipe at support bracket, and move complete exhaust system away from work area

2) Drain fluid from transmission and disconnect manual and throttle linkage at transmission Disconnect speedometer cable at extension housing Disconnect drive shaft at rear universal joint and remove drive drive shaft from transmission output shaft

3) Remove rear engine mount to frame crossmember bolts (Mercury models have a tubular crossmember with brackets welded to crossmember) Position lift under transmission and raise engine and transmission and raise engine and transmission sufficiently to install engine support tool Remove rear engine mount from transmission On Lincoln, remove the detachable crossmember from frame "X" member

4) Lower lift under transmission and allow engine to rest on support tool Reposition transmission lift to relieve the weight of transmission Remove four bolts securing transmission to converter housing.

5) Remove transmission by sliding assembly toward rear of car sufficiently to disengage the turbine shaft. Lower the assembly and remove from under car.

TORQUE CONVERTER OVERHAUL

►*DISASSEMBLY & REASSEMBLY CAUTION. CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first, clean ach part as removed*

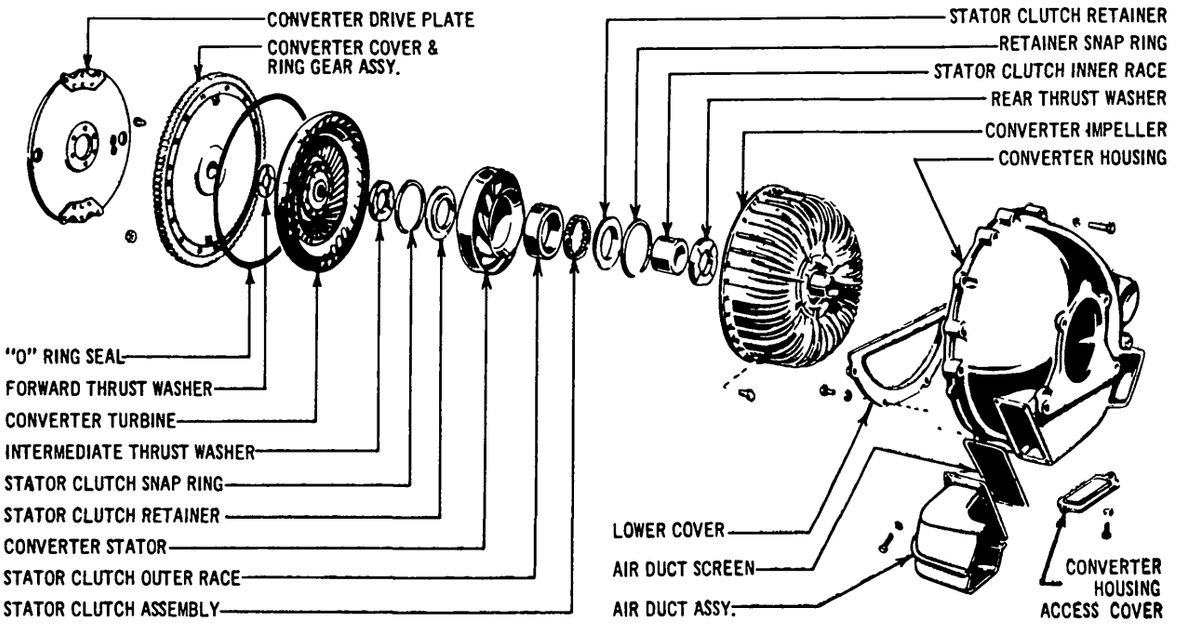
TORQUE CONVERTER REMOVAL (From Transmission): Grasp converter cover with both hands and pull straight out *(CAUTION–To prevent damage to front seals, do not rock assembly from side to side)* Remove converter housing attaching bolts and remove housing from transmission

DISASSEMBLY: Remove converter cover attaching bolts and nuts Remove cover and "O" ring seal Remove bronze thrust washer from turbine and remove turbine Remove stator from pump housing *(CAUTION–Check and locate the balancing marks on cover and stator so they may be replaced in the exact same position)* Remove thrust washer from pump hub and from turbine hub. Remove sprag clutch inner race and remove snap ring retaining outer hub to stator *(CAUTION–Do not burr snap ring groove)* Remove outer hub, sprag assembly, outer race and inner hub as an assembly Separate hubs and sprag assembly from outer race Remove snap ring retaining inner hub to stator

INSPECTION: Inspect converter blades for looseness, and check thrust surfaces for scores and splines for burrs and wear Inspect seal surfaces and front pump driving lugs for wear Inspect sprag assembly for worn or broken sprags or broken or distorted spring Inspect bushings for wear or scoring (if bushings worn, polish bearing surface of journal with crocus cloth to eliminate possibility of wear having been caused by rough bearing surface)

REASSEMBLY: Install stator inner hub and snap ring Turn assembly over, install outer race in stator Install sprag assembly in outer race making sure that sprags are pointed in the right direction Install outer hub and outer hub snap ring Insert Tool No 7946, tapered side first, into sprag assembly while rotating tool counter-clockwise to position sprags Install inner race with spline section up Guide tool No. 7946 with hand while pushing inner race into position. Check stator for clockwise rotation while holding the inner race Install new seal in pump hub and install hub in pump Tighten hub capscrews to 8-10 ft lbs Install thrust washer into hub of converter pump and install stator with the word "front" (stamped into face of stator) upward Install thrust washer in hub of turbine and install turbine Install bronze thrust washer on turbine hub. Position converter cover on pump housing with new "O" ring seal and properly align balance marks on cover and housing *(CAUTION–Cover and housing must be installed in the same position noted when these parts disassembled)* Install all converter bolts and tighten to 25-28 ft lbs in the sequence indicated below Install converter housing on transmission case and tighten attaching bolts to 40-45 ft lbs Install converter assembly and press it firmly into position on turbine shaft *(CAUTION–Do not "rock" converter assembly while installing it on shaft (will damage oil seals)*

►*COVER BOLT TIGHTENING SEQUENCE (To prevent leaks)* Tighten two nuts directly opposite each other just snug, tighten two nuts 90° from first two similarly, tighten two nuts 45° from first four nuts similarly, Continue this sequence until all nuts have been tightened **just snug,** then torque all nuts in same sequence to 25-28 ft lbs torque



TORQUE CONVERTER ASSEMBLY

TRANSMISSION DISASSEMBLY

►*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first. CLEAN each part as removed with cleaning fluid or gasoline and dry with air–wiping cloths will leave lint on parts.*

DISASSEMBLY OF TRANSMISSION (Into Major Units): With transmission on bench fixture, (tool No. 7000-C-D recommended for holding transmission), remove all transmission units as follows:

1) Remove pan and gasket and take out fluid screen.

2) Remove pressure regulator spring retainer, regulator springs, control pressure and converter pressure regulator valves.

►*CAUTION: Maintain pressure on retainer to pr vent valve springs from flying out.*

3) Loosen pressure regulator and valve body attaching bolts, and remove lubrication tube from pressure regulator and rear pump. NOTE– If necessary tap tube with soft hammer. *CAUTION–do not bend or distort tube.*

4) Remove rear pump intake tube, being careful not to bend or distort it

5) Remove compensator pressure tube (small) and control pressure tube (large) from pressure regulator and valve body. NOTE–If necessary, tap tube with a soft hammer. *CAUTION–do not bend or distort tube.*

6) Remove pressure regulator spring retainer, pressing it inward toward regulator to release Remove pressure regulator springs, control pressure and con-

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

verter pressure regulator valve. Remove regulator body attaching bolts and washers and remove body from case. NOTE—After removing regulator body from case, replace valve in body to protect them.

7) Loosen front and rear servo band adjusting screws five turns and loosen front servo attaching bolts three turns. Remove valve body attaching bolts and raise valve body to clear case and disengage valve body to clear case and disengage valve body to servo tubes and remove valve body.

8) Remove front servo apply and release tubes by twisting and pulling tubes. Take out front servo attaching bolt, hold front servo strut with fingers, lift servo out.

9) Remove rear servo attaching bolts and while holding actuating and anchor struts with fingers, lift servo from case *(CAUTION—Do not allow struts to drop into cas).*

10) *CHECK TRANSMISSION ENDPLAY before proceeding with disassembly, as follows:* Remove one front pump attaching bolt and mount Dial Indicator & Support Tool No. 77067 in this bolt hole so that contact button rests on end of turbine shaft. Install Extension Housing Seal Replacer Tool No. 7657-D on output shaft to provide support for shaft. Pry front clutch cylinder toward rear of transmission using a large screwdriver, and set dial indicator to zero while maintaining a slight pressure on clutch cylinder. Remove screwdriver and pry units forward (toward front of transmission) by inserting screwdriver between large internal gear and case. Record indicator reading (endplay) for use in step 17 (below). This endplay should be .010-.029". Remove dial indicator and support and remove tool from output shaft.

11) Remove front pump attaching bolts and remove front pump assembly. (NOTE—If pump is tight in case, use soft hammer to loosen pump). Remove pump to case gasket. *CAUTION—Pull pump off shaft carefully to avoid damaging oil seal.*

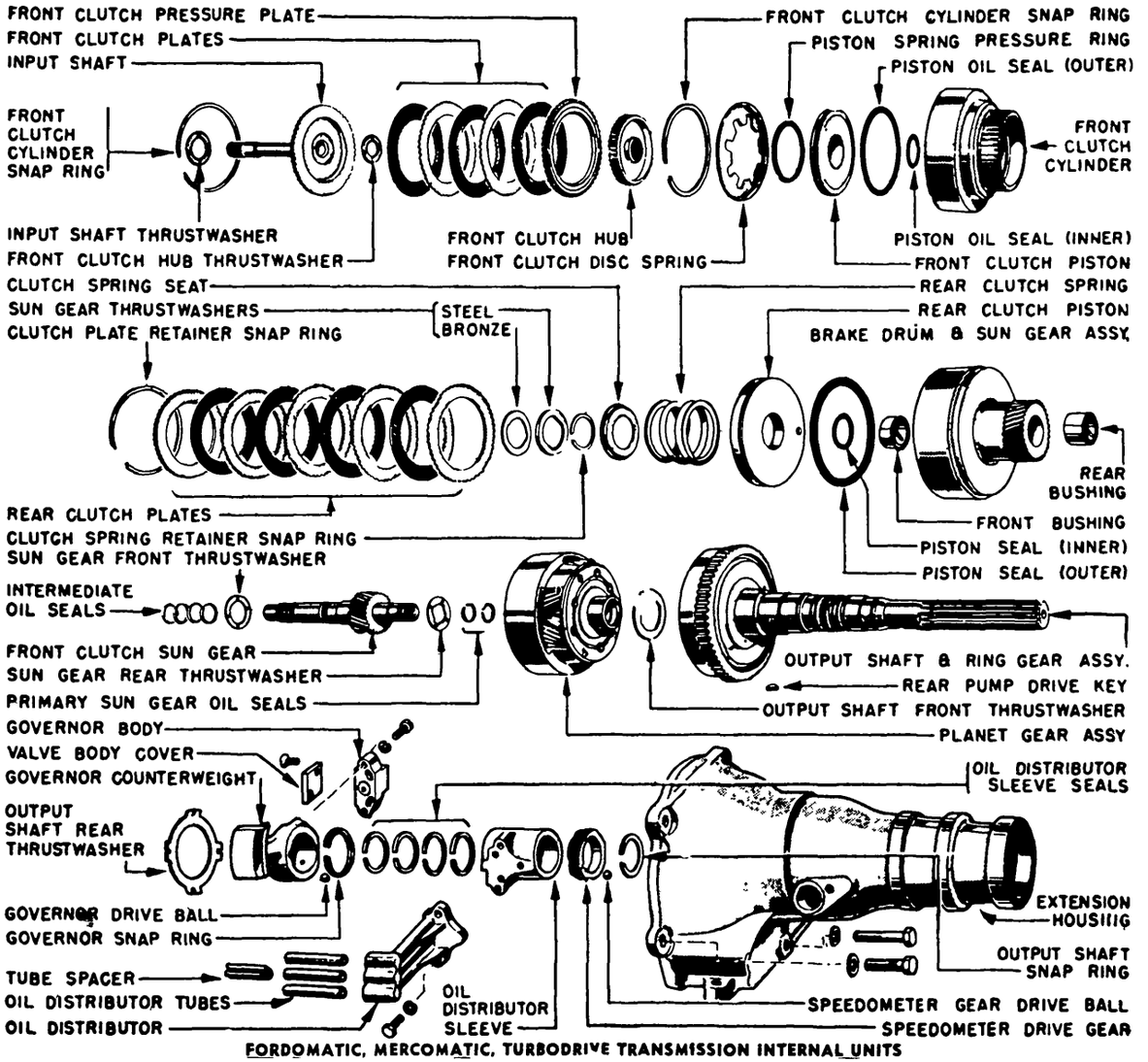
12) Remove five extension housing-to-transmission bolts (these bolts also hold rear oil pump on case), withdraw extension housing carefully while holding rear pump in place. *CAUTION—Pull housing off output shaft carefully to avoid damaging rear oil seal.*

13) Remove speedometer drive gear snap ring from output shaft and take off the speedometer drive gear. *(CAUTION—*Do not lose drive ball).

14) Remove fluid distributor attaching bolts and slide distributor and tube from transmission. Remove distributor sleeve from output shaft. Carefully remove the four seal rings from the output shaft with the fingers *(CAUTION—*use care not to damage these rings).

15) Remove governor snap ring from shaft and slide governor assembly from output shaft. *(CAUTION—*Use care so as not to damage seal rings on output shaft. Do not lose governor drive ball).

16) Remove rear pump discharge tube using tool 77869 and remove pump from case. Remove extension housing and pump gaskets. Remove rear pump drive key from output shaft. Remove bronze thrust washer from output shaft. (NOTE—Washer may come off with pump). Hold rear drum forward and remove the output shaft.



FORDOMATIC, MERCOMATIC, TURBODRIVE TRANSMISSION INTERNAL UNITS

17) Remove selective thrust washer from rear of pinion carrier. If endplay as recorded in step 10 (above) was not within limits of .010-.029", replace this washer with one of proper thickness to give desired endplay. This washer furnished in following sizes: .063-.061", .069-.067", .076-.074", .083-.081".

18) Remove two seal rings from primary sun gear shaft. *CAUTION—use care not to distort rings.*

19) Remove pinion carrier from case and remove bronze thrust washer.

20) Mark rear band position so that it can be assembled in the same position. Remove band by squeezing ends together and tilting band forward.

21) Remove two center support bolts (on outside of case-one on each side). Press on end of turbine shaft to force clutch units toward rear of transmission and remove center support from case.

22) Remove rear and front clutch assemblies from transmission case as a unit. Install clutch assembly into bench fixture, tool No. IP-77530 and remove thrust washer from front of turbine shaft. Remove the front band from case. Lift front clutch assembly from

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Con..)

primary gear shaft. (*CAUTION*–Do not rock assembly while lifting to prevent damage to seal rings)

23) Remove bronze and steel thrust washers from primary sun gear shaft and then remove the front clutch seal rings from primary sun gear shaft. Lift rear clutch assembly from shaft. (*CAUTION*–Do not rock assembly while lifting to prevent damage to seal rings). Remove rear clutch seal rings and thrust washers from shaft.

TRANSMISSION OVERHAUL (TRANSMISSION UNITS)

►*DISASSEMBLY & CLEANING CAUTION:* Handle all parts with care to avoid nicking or burring bearing surfaces and mounting faces. Clean all parts with clean solvent and dry with air. DO NOT use wiping cloths which might deposit lint and interfere with proper operation of transmission. Minor scores or burrs may be removed with crocus cloth. *CAUTION–When polishing valves use extreme care not to round edges of valve lands.*

►*REASSEMBLY CAUTION: Use all new gaskets when assembling or installing units in transmission. Lubricate all internal parts with Automatic Transmission Fluid Typ "A" (vaseline may be used to retain gaskets and thrust washers). Tighten all bolts, nuts, and screws to correct torqu .*

PRIMARY SUN GEAR SHAFT (Disassembly): Remove rear clutch seal rings by applying pressure on one end and at back of ring forcing ring into groove at these two points. Other end will spring out and free the hook. Remove thrust washer from thrust face of primary gear.

Inspecti n: Inspect all thrust surfaces and journals for wear or scores. Inspect sun gear for broken, chipped, or worn teeth. Inspect shaft splines and ring grooves for wear or burrs. Check all fluid passages for evidence of leakage and make certain passages are clean and free from obstructions. Check seal rings for wear by installing rings in bore and measuring end gap which should be .002-.009", check rings for free fit in groove (must not bind) If front clutch lubrication valve not operating properly, repair it by installing a new kit.

Reassembly: Install bronze thrust washer against thrust face of primary sun gear, install seal rings in shaft grooves. Seals can be installed in the same manner in which they were removed (see Disassembly above)

REAR CLUTCH (Disassembly): Using arbor press and tool No. 77515, remove clutch release spring snap ring (*CAUTION*–Guide spring retainer while releasing press to prevent retainer interfering with snap ring groove. Remove retainer, release spring, pressure plate snap ring, and pressure plate. Remove the four bronze and four steel clutch plates (Ford & Mercury), Five bronze and Five steel plates (Lincoln), from the drum. Place splined end of primary sun gear shaft in clutch piston bore, entering it as far as it will go, apply air pressure to hole in end of shaft which will force clutch piston out of cylinder (*CAUTION*–Hold hand over piston to prevent it flying out and being damaged) Remove outer seal ring from groove in piston and inner seal ring from clutch drum. Discard these seals (do not re-use).

Inspection: Inspect drum band surface, the bushing, and thrust surfaces for scores. Remove minor scores with crocus cloth. Replace badly scored parts. Inspect needle bearings for worn or loose rollers. Inspect gear teeth for burrs or wear. Inspect clutch piston bore and piston inner and outer bearing surfaces for scores. Check fluid passages for obstructions, making sure that they are free and clear. Inspect clutch plates for scores, and check plates for fit on clutch hub serrations. Replace all plates that are worn or do not fit properly (*CAUTION*–Front clutch plates differ from rear clutch plates and are not interchangeable). Check coning of the steel plates. Position plates on a flat surface, then check coning with a feeler gauge. Plates are coned to .010" clearance and should be checked on the inside diameter. Inspect clutch pressure plate for scores on clutch plate bearing surface. Replace plate if deeply scored. Check clutch release spring for distortion and discard if badly bent.

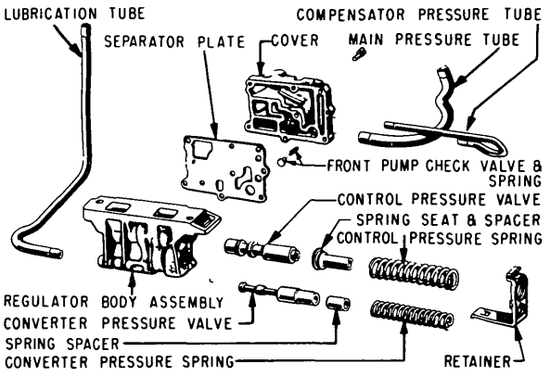
Reassembly: Lubricate all parts with Automatic Transmission Fluid Type "A". Install clutch piston inner seal ring in groove in drum. Install a new outer seal ring on piston and install piston in clutch drum. Install four steel and four bronze clutch plates (Ford & Mercury), five steel and five bronze (Lincoln), alternately, starting with a steel plate, convex side up (Ford), concave side up (Lincoln & Mercury). Install clutch pressure plate with bearing surface down, and install snap ring. Make sure snap ring is fully seated in groove. Install clutch release spring, then position retainer on spring. Position the clutch assembly in an arbor press using tool No. 77515 positioned on spring retainer, and compress clutch spring. Install snap ring (*CAUTION–While compressing the spring, guide retainer to avoid interference of retainer with snap ring groove. Make sure snap ring is fully seated in groove).*

FRONT CLUTCH: Disassembly–Remove clutch cover snap ring and remove turbine shaft (input shaft) from clutch drum. Remove thrust washer and clutch hub. Remove four bronze and three steel clutch plates and pressure plates. Using arbor press and tool No. 77565 depress clutch release spring and remove snap ring. Release spring pressure, remove clutch release disc spring from drum. Using air pressure and a piece of 3/16" tubing (bend at the end for entry into hole in clutch bore) force clutch piston out of cylinder. (*CAUTION–Hold hand over piston to prevent damage).* Remove piston inner seal from clutch cylinder and remove piston outer seal from groove in piston.

Inspection: See "Rear Clutch Inspection" above and follow the same procedure except that all front clutch plates are flat. *CAUTION–Front and rear clutch plates are not interchangeable.*

►*FRONT CLUTCH ASSEMBLY PRODUCTION CHANGE (ALL TRANSMISSION):* To prevent gear noise or clutch "roll over" during manual shift from "D" to "N", Front Clutch Plate (bronze). Part No. B5A-77519-A is used to replace two of the original four bronze plates. Install one later type plate identified by additional parallel grooves on both sides, next to clutch pressure plate, and the other installed on top of the balance of the plates. These later type plates can be used to correct the above condition in early 1955 transmissions

Reassembly: Install a new piston inner seal ring in clutch cylinder and a new outer seal ring in piston groove. Install piston in clutch housing. (*CAUTION–Make certain that steel bearing ring is in place on piston).* Position release spring in cylinder with **c n-**



PRESSURE REGULATOR ASSEMBLY

cave side up, place spring compressor tool on spring and compress spring in an arbor press to enable installation of snap ring, make sure that snap ring is fully seated in groove. *NOTE–Complete reassembly of front clutch after rear clutch assembly has been installed on primary sun gear shaft as indicated below.*

PRIMARY SUN GEAR SHAFT & CLUTCH (Reassembly): After individual units assembled (Shaft and Front & Rear Clutches), place primary sun gear shaft assembly in bench fixture and install rear clutch assembly on sun gear shaft (*CAUTION–Center seal rings on shaft to prevent breakage as clutch assembly installed).* Install steel and bronze thrust washers on shaft in that order. Install two seal rings in shaft grooves. Install two seal rings in shaft grooves. Install front clutch housing on primary gear shaft while rotating clutch units to mesh rear clutch plates with serrations on clutch hub being careful not to damage seal rings as clutch assembly being installed. Install clutch hub in clutch cylinder with deep counterbore down. Install bronze thrust washer on clutch hub. Install pressure plate in clutch cylinder with bearing surface up then install four bronze and three steel clutch plates alternately, starting with a bronze plate, (*CAUTION–*Lubricate all plates with Automatic Transmission Fluid Type "A" as they are installed. Install turbine shaft in clutch cylinder and install snap ring in groove, making sure that it is fully seated. Install bronze thrust washer on turbine shaft. Assembly is now ready for installation in transmission case. *See "Transmission Reassembly" below.*

FRONT PUMP (Disassembly): Remove pump cover attaching screws and remove cover with stator support. Mark the driven gear with Prussian Blue to assure correct assembly and remove drive and driven gears

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Con..)

from pump body. To remove seal from pump body, mount the pump body on transmission case, use tool No. 1175-AB to remove seal

►*CAUTION: Extreme care must be taken not to scratch or mar pump gears or bearing surfaces*

Inspection: Inspect bushing, gear pockets and crescent for scores. Inspect front cover, pump body, gear teeth and stator support splines for burrs. Check pump for evidence of contact between outside diameter of drive gear and crescent. REPLACE PUMP if such contact noted. Check bushing for wear and scoring

Reassembly: Use tool No. 77837 to install new seal in pump body (*CAUTION*—coat outside diameter of seal with Permatex No. 3 before installation to prevent fluid seepage). Install pump driven gear in pump body in accordance with marks made before disassembly, install drive gear. Install pump cover, attaching screws, lockwashers, and tighten cover screws evenly to 1-3 ft. lbs. Check pump for free movement.

REAR PUMP: (Disassembly): Remove screws and lockwashers securing pump cover to pump body and remove cover. Using Prussian Blue, mark pump drive and driven gears to assure correct assembly, and remove gears from body.

►*CAUTION—Handle pump parts with care to avoid scratching or marring*

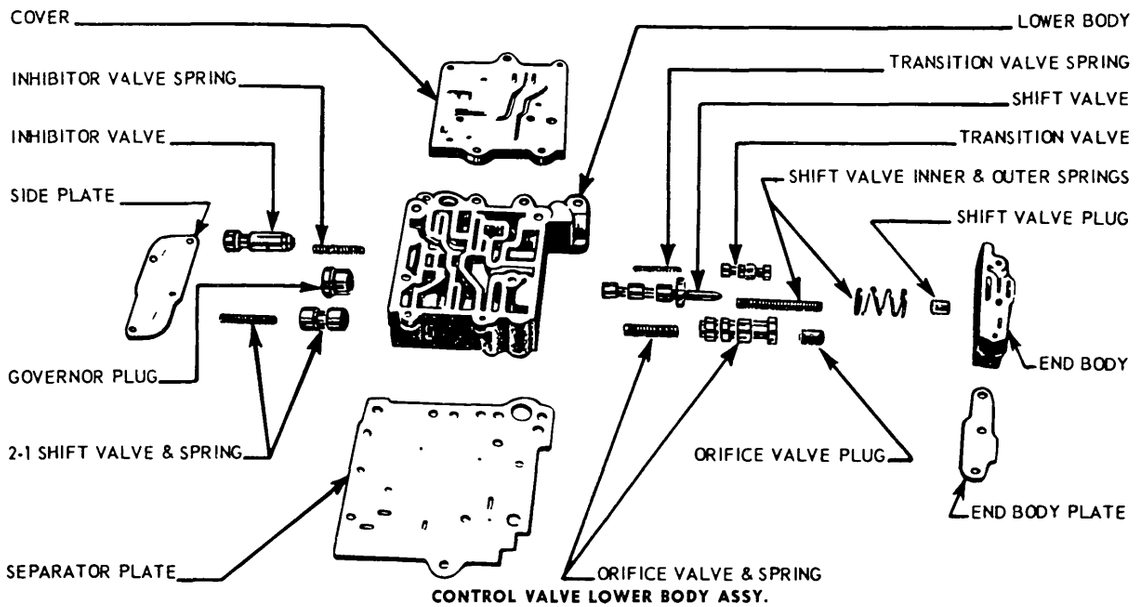
Inspection: Inspect all pump parts for excessive wear, score, or burrs. Check fluid passages for obstructions. Check pump for evidence of contact between outside diameter of drive gear and crescent. REPLACE PUMP if such contact noted. Check bushing for wear or scoring.

Reassembly: Install pump driven gear into pump body, positioning gears as marked on disassembly. Install drive gear into position as marked. Install pump cover, install cover screws with lockwashers, tighten screws evenly to 50-60 inch lbs. (¼"), 20-30 inch lbs.,(10-24 screws). Check pump for free movement of gears.

PRESSURE REGULATOR BODY (Disassembly): Remove valves from body Take out cover attaching screws, remove cover and separator plate

Inspection: Inspect regulator body and cover mating surfaces. Check fluid passages in body and fluid passages in separator plate for obstructions Inspect valves and valve bores for scoring and check freedom of valves in valve bores. Check regulator valve springs for distortion. Wash thoroughly in clean solvent and blow dry with air.

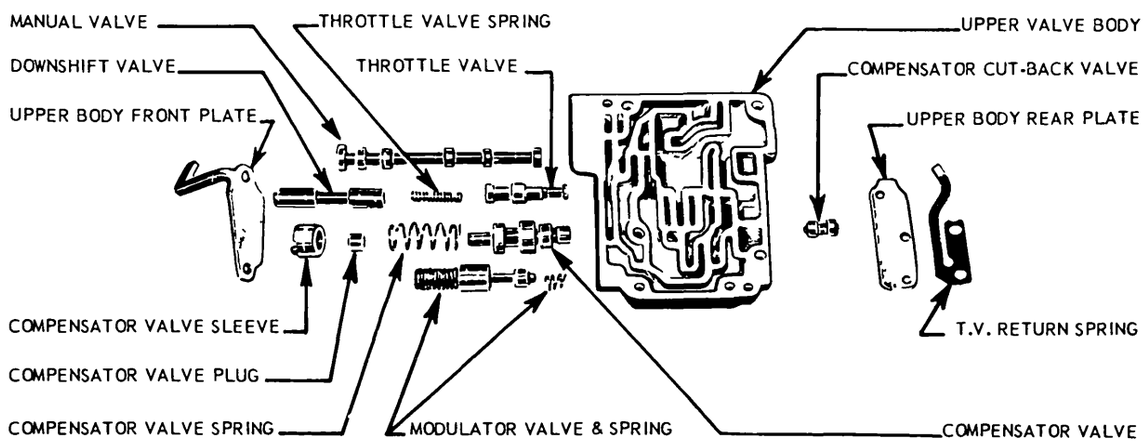
Reassembly: Install check valve spring in regulator cover and position valve on spring (*see "Pressure Valve Installation Caution" below*) Position separator plate on regulator cover Hold regulator and cover together and check for free movement of valve. Place regulator body in position on separator plate and install attaching screws. *NOTE—Do not install valves at this time as they should be installed after regulator assembly is installed in transmission. See "Transmission Reassembly" below.*



CONTROL VALVE LOWER BODY ASSY.

►*MERCOMATIC & TURBO-DRIVE PRESSURE REGULATOR VALVE SPRING & SPACER INSTALLATION CAUTION.* It is extremely important that the spring seat and spacer be installed so that the cupped end fits over the end of the control pressure valve, and the stem fits down through the control pressure spring. Two types of spacers are used in production, one having the small diameter end closed, and the other with the end open. Install either spacer as indicated above.

CONTROL VALVE (Disass mbly): During disassembly of the control valve avoid damage to valve parts and keep valve parts clean. Place valve assembly on a clean cloth while performing the disassembly operation. *(NOTE—Do not separate th valve bodies until after valves have been removed).* Remove manual valve and remove one screw attaching separator plate to lower valve body. Remove upper body front plate *(NOTE—The plate is spring loaded. Apply pressure to plate while removing the attaching screws).* Remove compensator spring and plug, remove valve spring and valve. Remove modulator valve retainer, both large and small springs and valve. Remove downshift valve and spring. Remove two screws attaching throttle valve return spring to upper body, then remove spring. Remove the remaining screw attaching upper valve body rear plate to valve body, then remove plate. Remove throttle valve, then the compensator cut back valve. Remove lower body side plate *(apply pressure to plate while removing as it is spring loaded).* Remove the 2-1 shift valve spring and valve, low inhib-



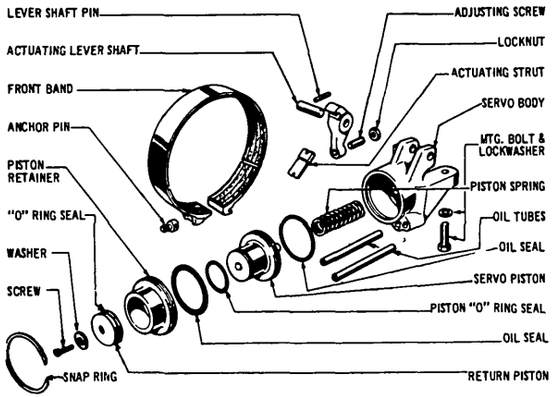
CONTROL VALVE UPPER BODY ASSY.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

itor valve and spring, then remove the 2-3 shift valve and governor plug. Remove the end body *(End body is spring loaded. Apply pressure while removing attaching screws).* Remove orifice control valve plug and 2-3 shift valve plug from end body and remove end body plate. Remove 2-3 shift valve outer and inner springs, then remove shift valve. Remove orifice control valve and transition valve and spring. Remove attaching bolts and screws and separate bodies. Remove separator plate from upper body and remove check valve seat, valve and spring from lower body.

Inspection: *(CAUTION–Handle all parts carefully to avoid scoring, burrs and distortion).* Clean all parts

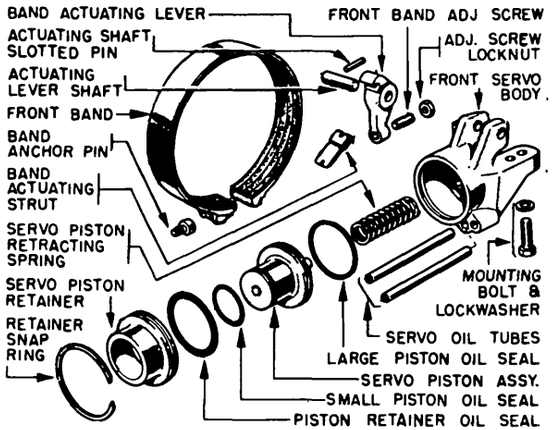


TURBODRIVE FRONT SERVO & BAND ASSY.

thoroughly in clean solvent and blow dry with air. DO NOT USE CLOTH FOR WIPING PARTS (lint left by a cloth may cause poor valve operation). Inspect all mating surfaces for burrs, scratches, and flatness. Check all passages for obstructions. Inspect all valves and valve bores for scoring and check valves for free movement in bores (valves should slide in bore of own weight). Valves can be polished with crocus cloth.

►*CAUTION–Do not round the sharp edges of valves and plugs.*

Reassembly: *(NOTE–Arrange all parts in their correct position. Rotate valves and plugs when inserting them in their bores, to avoid shearing of soft body castings).* Install separator plate on upper body (do not tighten screws). Install check valve spring, valve, and seat in lower body. Position lower body on upper body. Install lower body cover and tighten attaching bolts finger tight. Align the valve body attaching bolt holes in the separator plate and lower body. Tighten the four valve body bolts to 4-6 ft. lbs. *(CAUTION–Excessive tightening of these bolts may distort valve bodies, causing valves or plugs to stick).* Install the three lower cover to lower body screws and tighten to 20-30 inch lbs. Install the plate on lower end body and tighten attaching screws. Install orifice control and shift valve plugs in end body. Install transition valve and spring, the orifice control valve and spring, 2-3 shift valve in lower body. Install shift valve inner and outer springs, and install end body on lower body, *(CAUTION–Make sure that inner spring is piloted on shift valve regulator plug).* Install governor plug in lower body. Install low inhibitor valve spring in valve, and install spring and valve. Install 2-1 shift valve spring in valve, and install valve and spring. Install lower body side plate. Install compensator cut-back valve in upper body. Install throttle valve and position upper body rear plate on upper body with the plate between end lands of throttle valve. Install one plate to body screw in hole next to throttle valve. Position throttle valve return spring on plate, and secure plate in place with the remaining plate to valve body screws. Install compensator valve and spring and downshift spring and valve. Install modulator small spring, valve, spring, and retainer as an assembly. Install the plug in the compensator valve sleeve, castellated end out, and install assembly in body, with smooth end toward body. Install upper body front plate. Install separator plate to lower body screw and install manual valve.



FORDOMATIC & MERCOMATIC FRONT SERVO & BAND ASSEMBLY

GOVERNOR (Disassembly): Remove governor body side plate attaching screws, remove plate. Remove governor body attaching screws and remove body from counterweight. Remove governor valve from body.

Inspection: Inspect valve and valve bore for scores and check free movement of valve in bore. Inspect all fluid passages for obstructions. Inspect mating surfaces for burrs and distortion.

Reassembly: Install governor valve in bore of governor body and install body cover plate and attaching screws. Mount governor body on counterweight, making sure that fluid passages line up with passages in counterweight. Install body attaching screws. Tighten body-to-counterweight screws.

FRONT SERVO (Disassembly–Ford & Mercury): Remove piston retainer snap ring *(CAUTION–Servo piston is spring loaded. Apply pressure to piston when removing snap ring).* Remove servo piston and retainer from servo body (NOTE–If necessary, tap servo piston guide lightly with soft hammer to remove from servo body). Remove servo spring, and remove retainer from piston and seal from retainer.

Disassembly (Lincoln): Proceed as with Ford & Mercury (above), then loosen to one half its length the screw that secures servo piston release piston to servo piston stem. Tap screw head with soft hammer until stem is forced from release piston. Separate release piston, piston retainer and piston. Remove seal from release piston. Remove "O" ring seals from piston.

Inspection: Inspect servo body for cracks. Inspect piston and piston bore for scores. Check fluid passages for obstructions. Check actuating lever for free movement and inspect for wear. (NOTE–If necessary to replace actuating lever or shaft, remove retaining pin and push shaft out of bracket). Inspect threads in lever and on adjusting screw. Check servo spring and servo band for distortion. Inspect servo band lining for excessive wear and bond to metal band. (NOTE–Band should be replaced if worn to a point where grooves are not evident). Inspect bands for cracks and distortion.

Reassembly (Ford & Mercury): Install new "O" ring seals on piston, and new oil seal on piston retainer. Lubricate seals and install retainer on piston. Position servo spring in servo body. Lubricate and install piston and retainer assembly in servo body. Press retainer into servo body and install snap ring. *(CAUTION–Make sure snap ring is fully seated in groove).* Install adjusting screw and locknut in actuating lever if previously removed. Check operation by applying air pressure to apply hole.

Reassembly (Lincoln): Install new "O" ring seals on piston, and install new seal on piston retainer. Lubricate seals and install retainer on piston. Install new oil seal on release piston and retainer piston and piston retainer. Install new "O" ring seals on piston. Install piston in retainer and move piston to full release position in retainer. Place piston release piston in position, concave side toward stem and press into place. Install screw retaining release piston to piston stem. Complete reassembly in same manner as for Ford & Mercury (above).

REAR SERVO (Disassembly): *(NOTE–Ford & Mercury Rear Servo is smaller in diameter than that used on Lincoln).* With a 1/8" pin punch, remove servo actuating lever shaft retaining pin, and remove shaft and operating lever *(CAUTION–Use care when removing actuating lever to avoid losing needle bearings).* While pressing down on servo spring retainer, remove snap ring (release pressure on retainer slowly). Remove retainer and servo spring. Hold hand over piston to prevent damage and force piston from servo body with air pressure. Press down on accumulator piston and hold in this position while removing "cir-clip" type lock ring with lock ring pliers. With lock ring removed, gradually release accumulator piston until all tension has gone from spring. Remove piston seal ring from servo piston.

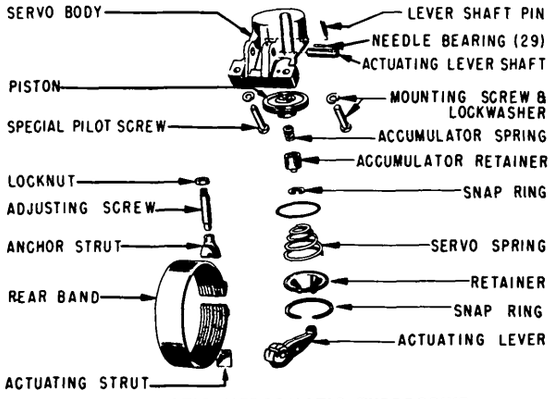
Inspection: Inspect servo body for cracks, and piston bore for scores. Inspect servo body-to-transmission case mating surface for burrs. Check fluid passages

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

for obstruction and passage plugs for tightness in body. Inspect piston stem for scores. Inspect accumulator bore and piston for scores and wear, and accumulator spring for distortion. Inspect actuating lever, socket, and shaft for scores and wear. Check needle bearings for wear and distortion. Inspect servo spring for distortion. Inspect servo band lining for excessive wear and bond to metal band. (Band should be replaced if worn to point where grooves are not clearly evident). Inspect band and struts for distortion and band ends for wear

R assembly: Install new seal ring in servo piston. Install accumulator spring and piston in servo piston and retain with lock ring. Install piston in servo body (lubricate parts to facilitate assembly). Install servo



FORDOMATIC, MERCOMATIC, TURBODRIVE REAR SERVO & BAND ASSEMBLY

spring with small end against servo piston and install retainer. Compress spring and install snap ring, making sure that snap ring is fully seated in groove. Place needle bearings in actuating lever shaft hole. With a pencil, position needle bearings around hole Lock bearings in place by placing thumb over bearings and rotating clockwise. Install actuating lever with socket in lever bearing on piston stem. Needle bearing retainers at each side of actuating lever shaft hole must be installed with actuating lever. Install actuating lever, aligning the retaining pin holes and bearing retainers, and install pin. Check lever for free movement and then check operation of servo by applying air pressure to apply hole.

DISTRIBUTOR SLEEVE (Inspection): Inspect all passages for obstructions. Inspect sleeve bore for scores or excessive ring wear. Inspect mating surfaces for burrs and flatness. Check fit of fluid tubes. *NOTE*–Make sure spacer is on center tube.

PINION CARRIER (Inspecti n): Inspect servo band surfaces for scores. Inspect inner bushing for scores. Check free movement of pinions on pins and inspect for worn or broken teeth. Check pinion endplay (.010-.020"). Pinion pins must be a tight fit in carrier. Check all fluid passages. Check journal bushing for scores. *NOTE*–Planet carrier is serviced only as an assembly.

OUTPUT SHAFT (Inspection): Inspect thrust surfaces and journals for scores. Inspect internal gear for broken or worn teeth. Inspect aluminum sleeve for scores and check ring grooves for burrs. Inspect keyway and drive ball socket for wear. Inspect splines for burrs or wear. Inspect external parking gear teeth for damage and speedometer drive gear for burrs

EXTENSION HOUSING (Inspection): Inspect housing for cracks and drive shaft slip yoke bearing surface for scores. Inspect gasket surface for burrs. If inspection reveals it necessary to remove rear seal, use tool No. 1175-AB. (NOTE–Rear seal may be replaced without removing transmission from car). Use tool No. 7657-D and install new seal in extension housing. Remove inspection cover and gasket and check fluid baffle for tight fit in housing.

TRANSMISSION CASE LINKAGE (Disassembly): Remove throttle lever nut and take off inner and outer throttle levers. Remove throttle lever shaft seal from counterbore in manual lever shaft. Remove parking mechanism actuating rod, detent ball and spring. Remove manual lever shaft nut, detent and outer manual lever and shaft. Remove torsion lever retainer clip and take off torsion lever assembly. Disassemble torsion lever assembly by rotating lever while holding spring. Disengage pawl return spring from toggle link pin and remove pin. Remove pawl pin by working pawl fore and aft until pin protrudes from case. Remove toggle pin retainer clip, toggle pin, pawl return spring, spring retainer and link. Remove toggle lever pin by tapping lever toward rear of case, then remove plug, toggle lever pin and lever (NOTE–toggle lever pin is held in place by the plug). Remove manual shaft seal and transmission vent from case.

Inspection: Inspect each part of parking mechanism for wear, distortion or other damage.

Reassembly: Assemble toggle lever, link, pawl return spring and pawl and install assembly in transmission case. Install toggle lever and pawl pins. Install torsion lever assembly. (NOTE–Use screwdriver to position spring on torsion lever). Install washer and retainer clip. Coat outer diameter of new manual shaft seal with Permatex No. 3 and use Tool 77288 to install seal in case. Install manual lever and shaft in case, mount detent lever and tighten attaching nut to 35-40 ft. lbs. torque. Install detent spring and ball *(NOTE*–use a piece of thin tubing to depress ball and spring while rotating detent). Position ends of parking pawl torsion lever rod in detent lever and torsion lever and secure with cotter pins. Install new seal on throttle lever shaft, install outer throttle lever and shaft in case, install lever on inner end of shaft and tighten attaching nut to 35-40 ft. lbs. Check linkage for free operation without binding.

TRANSMISSION CASE (Insp ction): Inspect case for cracks and stripped threads Inspect all gasket and mating surfaces for burrs. Inspect all bearing surfaces for wear, scores, and burrs.

TRANSMISSION REASSEMBLY

►*REASSEMBLY CAUTION: Use Automatic Transmission Fluid Type "A" only to lubricate parts for assembly. DO NOT use any other form of lubricant. Use all new gaskets and tighten all bolts and screws to correct torque specifications. DO NOT USE FORCE WHEN ASSEMBLING PARTS. If parts do not assemble freely, examine parts for cause of difficulty*

CLUTCH ASSEMBLIES: Install front band in transmission case so that anchor end aligned with anchor in case. Install clutch assemblies into transmission case from the rear *(CAUTION–Do not allow clutches to separate)*, while positioning servo band on drum. Hold units together while making installation. Position center support in case, aligning hole in center support with hole in right hand side of case. Install right and left hand center support outer bolts and external tooth lockwashers *(CAUTION–Lockwashers must be installed with the rolled edg toward transmission case to insure tight seal).*

PINION CARRIER & OUTPUT SHAFT: Position rear servo band in transmission case, with the strut ends up. Place anchor end (identified by a depression in center of strut retainer), toward adjusting screw. Install a bronze thrust washer on thrust face inside pinion carrier. To install pinion carrier assembly, position rear band over drum while meshing the planet pinions. Install two seal rings on primary sun gear shaft, and check rings for free movement in grooves. Install selective thrust washer on rear of planet carrier, retaining it in place with the transmission fluid. *(NOTE–If endplay was not within specifications, when checked prior to disassembly, replace washer with one of proper thickness).* Install output shaft, carefully meshing internal gear with pinions.

REAR PUMP: Position rear pump drive key in keyway on output shaft. Position new front and rear gaskets on pump body, retaining gaskets with transmission fluid. Install thrust washer on pump body with the bronze side up. Align thrust washer tangs with bosses on pump body, then install the rear pump *(CAUTION–*Be sure drive key is aligned with keyway in pump drive gear).

GOVERNOR: Position governor drive ball in the pocket in output shaft. Retain ball with transmission fluid Install governor assembly aligning groove with ball in output shaft. Install governor snap ring. *NOTE–Install governor with the governor body plate toward front of transmission.*

DISTRIBUTOR: Place the four seal rings in distributor sleeve, and check ring gap. Check fit of seal rings in grooves of output shaft. Install distributor sleeve on output shaft, chamfer forward (lubricate parts to aid assembly) Install distributor and tubes on sleeve, making sure passages in sleeve and distributor are aligned. Install attaching bolts and lockwashers. Tighten bolts finger tight. Insert distributor tubes in transmission case, until spacer on center tube is against case, then tighten distributor attaching bolts to 8-10 ft. lbs. Install a new seal on rear pump outlet tube and install tube in transmission case and rear pump body.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

EXTENSION HOUSING: Position speedometer drive gear ball in pocket in output shaft, retaining it with fluid. Install speedometer drive gear, and gear snap ring. Insert extension housing oil seal replacer and pilot in housing, then install extension housing on transmission case. Install attaching bolts and external tooth washers. *(CAUTION–Washers must be installed with rolled edge toward transmission case to insure a tight seal).* Tighten extension housing attaching bolts to 28-30 ft. lbs. Install governor inspection cover and a new gasket on housing.

FRONT PUMP: Position a new front pump gasket in counterbore of transmission case. Install front pump, aligning pump bolt holes with holes in case. Install three of the pump attaching bolts and tighten them to 17-22 ft. lbs.

TRANSMISSION ENDPLAY (Checking): Mount a dial indicator support on front pump bolt hole Mount dial indicator on support so that contact rests on end of turbine shaft. Use a large screw driver to pry front clutch drum toward rear of transmission. Set dial indicator to zero. Remove screw driver and pry units toward front of transmission case by inserting the screw driver between large internal gear and transmission case. Note indicator reading. Endplay should be .010-.029". Remove indicator and remove tool from extension housing. Install the one remaining front pump attaching bolt and tighten it to 17-22 ft. lbs

FRONT SERVO: Position front band forward in case with band ends up. Position servo strut with the slotted end aligned with servo actuating lever and the small end aligned with band end. Rotate band, strut, and servo into position engaging anchor end of band with anchor end in case. Locate servo on dowel in case, then install attaching bolt (or bolts), tightening them only two or three turns. Install servo tubes

REAR SERVO: Position servo anchor strut, then rotate rear band to engage the strut. Position servo actuating lever strut with a finger, then install servo and attaching bolts. Tighten bolts to 40-45 ft. lbs

PRESSURE REGULATOR BODY: Install pressure regulator body and attaching bolts and tighten bolts to 17-22 ft. lbs. Install control and converter valve guides and springs and install spring retainer. Install a new seal ring on rear pump intake tube, then install tube in case. *NOTE–When installing spring retainer be sure that both tangs attach at the same time*

►*1957 MERCURY ERRATIC OR IMPROPER SHIFT PATTERN·* This condition may be caused by main control valve being installed in such a way that only a slight contact exists between detent pin and lands of manual valve This can cause excessive wear and result in binding, distortion, or disengagement of the pin from manual valve To prevent this condition the following procedure should be used to install main control valve Check for bent manual valve by rolling valve on a true flat surface Install main control assembly, engaging detent pin between the correct lands on manual valve Loosely install bolts securing main control assembly to transmission case Move main control assembly as far as possible toward left side of car then tighten mounting bolts Check for binding between detent pin and manual valve by rotating manual valve while the detent is in each position If manual valve binds in any position, loosen mounting bolts and move main control assembly slightly toward right side of car *CAUTION* - Move it only enough to eliminate binding

CONTROL VALVE BODY: Install control valve assembly, using care to align servo tubes with control valve Align the inner throttle lever between throttle lever stop and downshift valve, and at the same time push the throttle valve in to clear transmission case. *(CAUTION–Align manual valve with actuating pin in the manual detent lever. Do not tighten attaching bolts).* Install the large control pressure tube in valve body and regulator. Install small control pressure compensator tube in valve body and regulator. Install lubrication tube in rear pump and regulator body. Tighten control valve body attaching bolts to 8-10 ft. lbs. Tighten front servo attaching bolts or bolt to 30-35 ft. lbs.

ADJUSTMENT (Front Servo): Loosen front servo adjusting screw locknut, then back nut off three turns. Loosen adjusting screw five complete turns Using the front band adjusting wrench, tool No. 7225, insert a ¼" spacer between lever and stem, then tighten the screw until ratchet overruns. **Back the adjusting screw one complete turn,** then tighten locknut to 20-25 ft. lbs.

ADJUSTMENT (Rear Servo): Loosen adjusting screw locknut three turns with a ¾" socket of the rear band adjusting wrench. Back off the adjusting screw until free travel is obtained. Using tool No. 7195, tighten adjusting screw until ratchet overruns, then back off the adjusting screw 1½ turns. Hold rear servo adjusting screw stationary, and tighten the locknut to approximately 40 ft. lbs.

FLUID SCREEN & PAN: Position fluid screen over rear pump inlet tube then over front pump inlet tube. Press screen down firmly and install screen retaining clip. In trucks, position the oil cooler to sump discharge tube in case. Place a new gasket on transmission case, then install the pan. Install attaching bolts and lockwashers and tighten to 10-13 ft. lbs.

TRANSMISSION & CONVERTER INSTALLATION

FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD & SUNLINER)

1) If converter has been removed from converter housing, position converter in housing, then install converter housing lower cover plate (8 Cyl.), or wedge converter in places (6 Cyl) to prevent converter slipping out of housing. Rotate converter until drive plate bolt holes are in horizontal position (8 Cyl), or in the vertical position (6 Cyl). Position flywheel on crankshaft flange, then install attaching bolts

2) Move converter and transmission assembly forward into position, using care not to damage converter drive plate and converter pilot Install lower converter housing to engine bolts and tighten them to 40-45 ft lbs. Install crossmember on pass. cars. Lower transmission until extension housing rests on crossmember and install extension housing to crossmember bolts

3) On trucks, install converter housing to crossmember bolts. On all vehicles position flywheel drive plates, and install drive plate attaching bolts. Tighten drive plate bolts to 28 ft. lbs. Install converter drain plugs and access plates. On trucks, position the oil cooler on support brackets, then install cooler. Connect oil inlet and outlet lines to transmission.

4) Coat universal joint knuckle with transmission fluid, then install drive shaft. Connect speedometer cable at transmission. Connect manual linkage at transmission manual lever. Install converter air duct and the linkage splash shield (pass. cars), exhaust duct shield (trucks).

5) Install starter motor and connect transmission-to-frame ground strap at transmission. Connect fluid filler tube to oil pan. Lower hoist, on trucks, position water inlet and outlet lines on oil cooler. Tighten hose clamps securely. Install the two upper converter housing-to-engine bolts and tighten to 40-45 ft. lbs. Replace covers on converter housing access holes, and floor mat. Fill radiator with water.

6) Fill transmission with Automatic Transmission Fluid Type "A" *(see "Lubrication" above).* Check transmission and converter assembly for fluid leaks, adjust manual and throttle linkages *(see "Linkage Adjustment" above)*

THUNDERBIRD

►*INSTALLATION NOTE: Converter and transmission assembly must be installed before engine installed in chassis. The converter and transmission assembly can be installed in the chassis separately before engine is installed, or converter, transmission, and engine may be installed together as a unit*

1) To attach converter and transmission to engine before assembly into chassis as a unit, first align converter pilot, housing dowel holes, and drive plate holes Remove all foreign material from converter pilot bore in crankshaft. Apply a heavy film of lubricant evenly on converter pilot bearing surface. *(CAUTION–Excessive lubricant in pilot bore will prevent proper entry of converter pilot into bore, forcing converter rearward and scoring front pump)*

2) Install pilot studs in two of the converter housing to engine bolt holes Remove converter housing lower front cover plate Move converter and transmission forward into position using care not to damage converter drive plate and converter pilot. Install four converter housing to engine bolts, remove pilot studs, then tighten bolts to 40-45 ft. lbs

3) If engine has been removed separate from converter and transmission assembly, mount transmission on a transmission floor jack and position assembly in car. Connect drive shaft to transmission output shaft. Install the two extension housing to rear engine support bolts. Connect speedometer cable and manual linkage at transmission. Install engine lifting sling and lower engine carefully into engine compartment, starting converter pilot into crankshaft. Make sure studs on manifold are aligned with holes in muffler inlet pipe, and dowels in block engage holes in converter housing. Raise car and position jack stands. Install engine

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

front insulator bolt, and right and left hand insulator support bolts. Connect exhaust pipe to manifold and lower car to floor

4) Install two lower converter housing to engine bolts and tighten them to 40-45 ft. lbs. (Tighten bolts slowly and evenly to avoid binding on dowel pins). Install converter housing to engine bolts, and tighten them to 40-45 ft lbs. Align flywheel and drive plate bolts with converter Install the six bolts and tighten them to 25-28 ft lbs. Complete engine installation

LINCOLN & MERCURY

1) Position transmission and converter assembly under car, raise it into position and move it forward to engage converter pilot with hole in crankshaft *(CAUTION*–Guide assembly carefully to avoid damage to flexible drive plate and converter pilot).

2) Install converter housing attaching bolts and tighten to 40-45 ft. lbs. Install six bolts securing converter to drive plate and tighten to 25-28 ft. lbs. (On Lincoln, install detachable frame crossmember to "X" member). Install engine rear mount to transmission. Remove engine support tool, lower engine and install rear engine mount to crossmember bolts and remove lift. Connect speedometer cable at extension housing.

3) Connect throttle and transmission manual linkage to transmission levers. Adjust linkage (see "Linkage Adjustment" above). Install converter housing upper plate with new seal. Install starter, converter drain plugs, and place fluid filler tube on pan and tighten filler hex nut to 40-50 ft. lbs.

4) Install converter housing lower plate. On air cooled torque converters install duct on converter housing and deflector between frame and housing. On water cooled torque converters, install inlet and outlet hoses. Install drive shaft (lubricate front universal slip yoke to aid installation). On Mercury models with single exhaust, install exhaust system. Check operation of neutral switch. Install throttle linkage brackets to engine and body using original nuts and bolts. Install battery ground cable. Fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above).

TRANSMISSION INSTALLATION (WITHOUT CONVERTER)

FORD PASS. CARS & TRUCKS

►*NOTE: On Thunderbird and Sunliner it is not possible to remove the transmission (without converter) due to limited clearance.*

1) Install guide pins in the two top transmission to converter housing bolt holes. Mount transmission on jack and position it under vehicle. Rotate engine to position the front pump drive lugs on converter impeller housing in a vertical position. Rotate front pump to position slots in front pump drive gear in a vertical position. Apply lubriplate to seal the surface on the converter impeller cover hub. (If a new transmission is being installed, position a new rubber extension housing duct shield over end of housing)

2) Raise transmission and move it toward front of vehicle *(CAUTION*–Be sure to align the turbine shaft splines with turbine hub splines and the converter impeller lugs with slots in front pump drive gear)

3) On trucks, position the oil cooler front support bracket on case. On all vehicles, install the lower transmission to converter housing attaching bolts. Remove the two guide pins and install the two upper attaching bolts. Tighten bolts to 40-45 ft. lbs.

4) On cars, install the frame crossmember and bolts. Lower transmission onto crossmember and then install engine rear support to transmission bolts On trucks, position the oil cooler on the support bracket and install attaching bolts. Connect oil cooler to transmission oil lines at transmission. Tighten fittings securely. Install universal joint yoke onto transmission output shaft and connect drive shaft

5) On F-250, F-350 & P-350 trucks, coat universal joint knuckle with transmission fluid. Install the four bolts attaching drive shaft coupling yoke at the parking brake assembly, then connect drive shaft at rear axle Connect speedometer cable at extension housing.

6) Connect manual linkage and throttle linkage to transmission levers and adjust the linkage (see "Linkage Adjustment" above). Connect fluid filler tube to oil pan and tighten fitting securely. Lower vehicle to floor and fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above).

LINCOLN & MERCURY

1) Install guide pins, tool No. ST-0711 into top transmission to converter housing attaching bolt holes. Mount transmission on lift and position under car. Rotate engine to position front pump drive lugs on converter pump housing in a vertical position. Rotate transmission front pump to position slots in pump drive gear in a vertical position. Apply lubriplate to seal surface on converter pump cover hub.

2) Raise transmission and move toward front of car *(CAUTION*–Use care to index turbine shaft splines with turbine hub, and lugs on converter pump with slots in front pump drive gear). Install two lower transmission to converter housing attaching bolts. Remove the two guide pins and install two upper attaching bolts and tighten to 40-45 ft. lbs.

3) Install rear engine mount to transmission

4) Raise engine and transmission sufficiently to remove engine support fixture. Lower unit to crossmember and install rear engine mount to crossmember bolts. Install drive shaft. (Lubricate front universal joint yoke with transmission fluid to aid assembly).

5) Connect speedometer cable at extension housing Connect manual and throttle linkage to transmission levers. Adjust linkage (see "Linkage Adjustment")

6) Place fluid filler tube in position on pan and tighten filler hex nut to 40-50 ft lbs Remove support stands and lower car to floor Fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above) Road test car

FLASH-O-MATIC TRANSMISSION

Rambler 5710 Series (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*FLASH-O-MATIC TRANSMISSION NOTE:* This transmission used as Optl. Equipment on 1957 Rambler beginning Serial No. D-367711 (supersedes Dual-Range Hydra-Matic Drive used on earlier cars).

►*STARTING THE ENGINE BY PUSHING CAR: NOTE -* Pushing rather than towing is recommended (to avoid possibility of car ramming towing vehicle). Place selector lever in Neutral "N" position. When speed of 15-20 MPH is reached, turn ignition "on" and move selector lever to "D-1" or "D-2" position.

►*TOWING THE CAR:* If transmission inoperative, always tow car with rear wheels raised or with propeller shaft disconnected. If transmission operating properly car can be towed for **short distance** with selector lever in Neutral "N". Prolonged towing may cause damage to transmission.

►*1-2 SLIPPAGE OR 2-3 "PILE-UP" WITH LIGHT THROTTLE IN "D1" RANGE CORRECTION:* This condition may be caused by an unbalanced vacuum condition due to clogged vacuum ports or vacuum leakage at carburetor *(See "Carter (AS) Carburetor" in Carburetor Section)*. Check adjustment of Vacuum & Solenoid Control Unit on transmission *(See "Throttle Control Adjustment" below)*.

DESCRIPTION

Flash-O-Matic transmission consists of a hydraulic torque converter and a hydraulically controlled automatic 3-speed planetary transmission which provides automatic operation in "D1" & "D2" ranges. Additional "L" (Low), "R" (Reverse), and "P" (Park) ranges are controlled manually. In "D1" range, the car starts in low and upshifts to intermediate and then to direct. In "D2", the car starts in intermediate, then shifts to direct. Downshifts follow the same pattern (in reverse) in relation to car speed and throttle position. Throttle valve pressure is controlled by a vacuum and solenoid unit located at left rear of transmission. This unit is calibrated with carburetor throttle valve opening to control transmission shift pattern, and is operated by a vacuum line from the carburetor. A forced downshift (kickdown) from direct to intermediate can be made by fully depressing the accelerator pedal.

►*THROTTLE CONTROL NOTE:* The above Vacuum & Solenoid Unit performs the same function as the conventional Throttle Control Linkage used with other automatic transmissions.

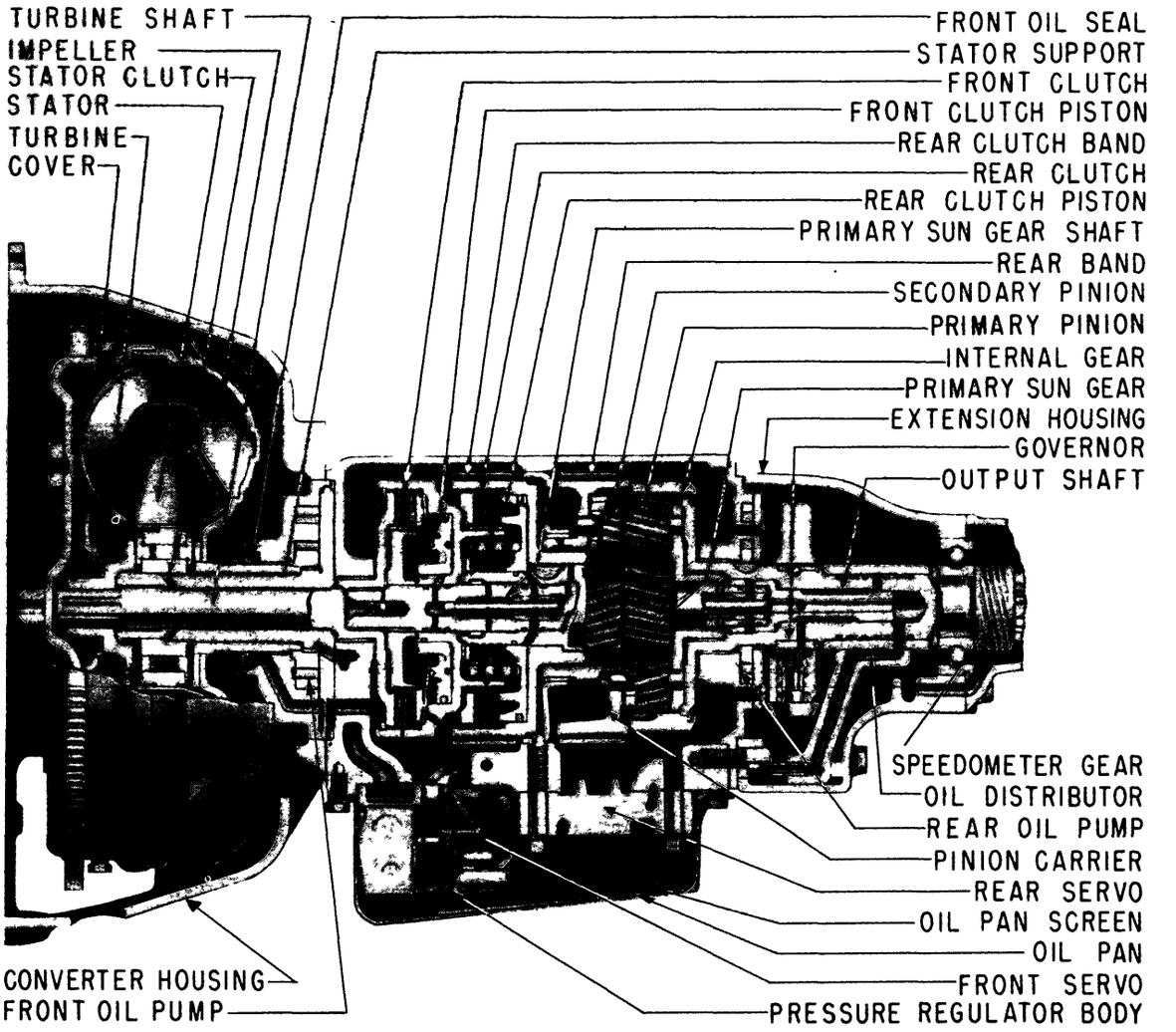
LUBRICATION

►*CAUTION: Check fluid at 1000 mile intervals. Drain and refill at 15,000 mile intervals, using Automatic Transmission Fluid Type "A". The dipstick is located at right rear of engine under the hood.*

Capacity - 8½ quarts (approximately).

Checking Fluid Level - Bring engine and transmission to operating temperature with transmission in "P" (Park) position. Move selector lever from "P" to "R", then to "D2" position. Check oil level on dipstick and add fluid as required to bring level to "F" mark. *NOTE - Approximately 1½ qts. of fluid are required to raise fluid level from "L" to "F" mark.*

Draining & Refilling - With transmission at normal operating temperature, rotate converter until one of the drain plugs is visible through square opening in converter bell housing. Remove plug and then turn converter 180° and remove second drain plug. Remove drain plug at rear of transmission oil pan. After draining, replace the drain plugs and tighten converter plugs to 7-10 ft. lbs. Install 5 qts. of Automatic Transmission Fluid Type "A". Set hand brake and run engine with transmission selector lever in "N" position. Add 3½ qts. of fluid and move selector lever through all ranges. Check oil level, and if necessary, add sufficient fluid to brain level to "F" mark on dipstick. *CAUTION - Do not overfill transmission as this will cause foaming when transmission is warm.*



FLASH-O-MATIC TRANSMISSION SECTIONAL VIEW

LINKAGE ADJUSTMENT

►*THROTTLE CONTROL NOTE:* Throttle control pressure should be 85 lbs. ± 5 lbs. at 1000 RPM, and is controlled by the Vacuum & Solenoid Control Unit on the transmission case. The control unit ordinarily requires adjustment only when it has been reinstalled on the transmission. *See "Throttle Control Adjustment" following.*

CONTINUED ON NEXT PAGE

FLASH-O-MATIC TRANSMISSION (Continued)

Manual Linkage Adjustment: Place transmission selector lever in "D-1" (Drive) position. Disconnect clevis at transmission manual lever and place the lever in "D-1" (Drive) position. Adjust clevis to transmission manual lever so that clevis pin enters hole in lever freely. Check selector lever pointer in all positions to be sure pointer is set correctly. *NOTE* - If pointer does not line up properly, remove bottom half of jacket tube and adjust pointer to line up with center of "N".

Vacuum & Solenoid Control Unit: *(NOTE - After installation, initially adjust the control unit by screwing it in or out of case for a distance of 5/16-13/32" between front edge of unit and transmission case).* Connect a tachometer to engine. Remove the 1/8" pipe plug located at left front lower side of transmission case and install a pressure gauge. Start engine and move transmission selector lever to "D" (Drive) position. Apply hand brake and service brakes and accelerate engine to 1000 RPM. Pressure gauge should read 85 lbs. ± 5 lbs. If reading not correct, adjust by rotating the vacuum solenoid unit clockwise to increase pressure and counterclockwise to decrease pressure. If control pressure cannot be adjusted by setting control unit, check vacuum supply from carburetor which should be 5½-6½" at 1000 RPM using the stall test procedure above.

▷ *VACUUM READING NOTE:* Above vacuum reading (5½-6½") is normal. Vacuum varies with altitude and the following vacuum readings are considered normal at the altitudes indicated: 6.2" (650 ft.), 6.1" (1860 ft.), 5.3" (3140 ft.), 5.0" (4040 ft.), 4.3" (5100 ft.), 4.0" (6250 ft.). 3.5" (6920 ft.), 3.1" (8050 ft.), 2.5" (8980 ft.).

BAND ADJUSTMENT

Front Band: Remove transmission oil pan, gasket, and screen. Using Tool J-5880, loosen adjusting screw and insert .250" gauge block (part of Tool J-5880) between end of adjusting screw and servo piston rod. Turn tool in until tool "overruns", then back off tool one complete turn and tighten the locknut to 20-25 ft. lbs. Install screen, gasket, and transmission oil pan. Refill transmission.

Rear Band: Loosen locknut on adjusting screw located on left side of transmission case and install Tool J-6655 on adjusting screw. Tighten screw with a torque wrench to 7 ft. lbs. Mark adjusting screw with a reference point, then back screw off 1½ turns. Tighten locknut securely.

TESTING

FLASH-O-MATIC SHIFT SPEEDS

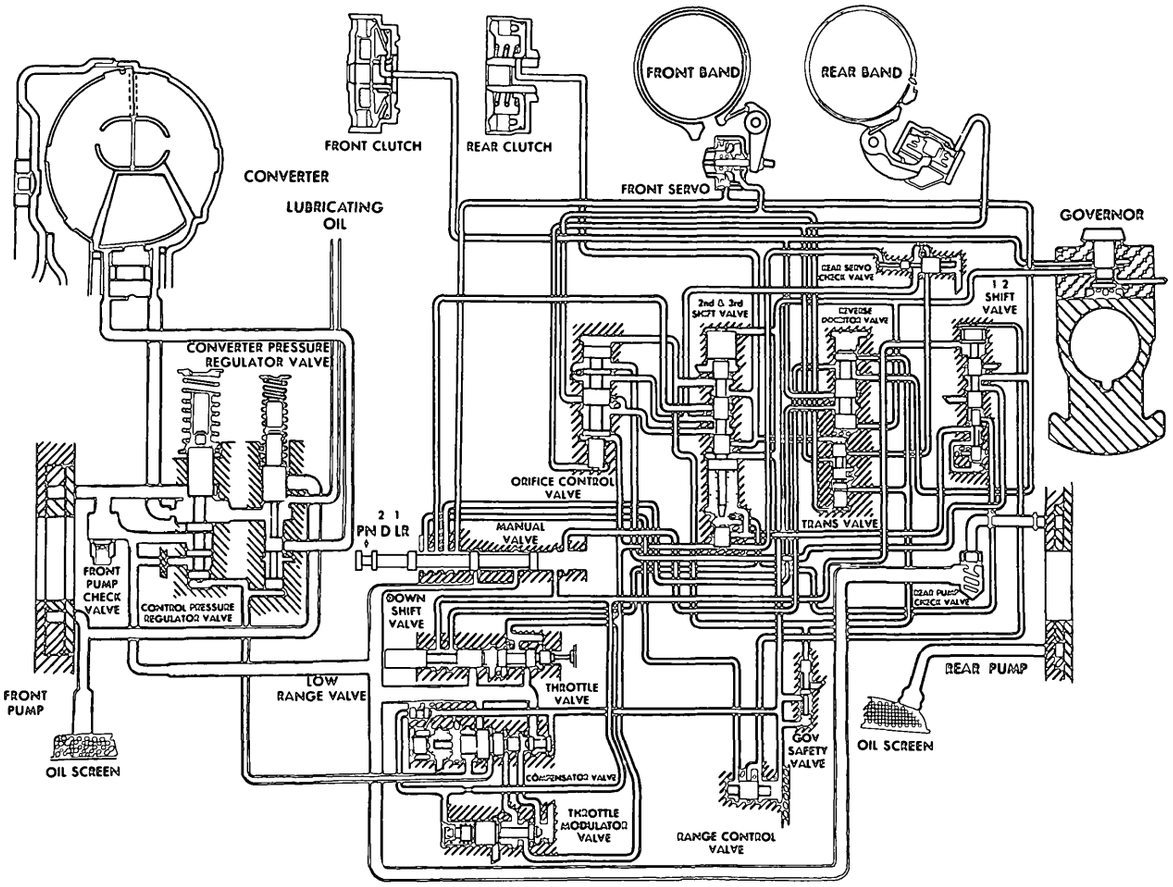
Upshifts

Shift	Light Throttle	Full Throttle	Kickdown
1-2	7-9 MPH	22-26 MPH	①36-38 MPH
2-3	15-19 MPH	46-50 MPH	②57-59 MPH

① - 3700 RPM. ② - 3650 RPM.

Downshifts

Shift	Closed Throttle	Full Throttle	Kickdown
3-2	10-12 MPH	24 MPH Max.	53 MPH Max.
2-1	5-7 MPH	8 MPH Max.	18 MPH Max.



FLASH-O-MATIC TRANSMISSION HYDRAULIC CIRCUITS

STALL TEST: Connect tachometer to engine and place it where it can be easily read from driver's seat. Set hand brake and start engine. Place selector lever in "D1" position, apply service brakes and operate engine at full throttle. Note tachometer reading. *(CAUTION - Do not operate engine at high speed while selector lever is in one of the driving ranges, with rear wheels held stationary, for more than 10 seconds at a time to prevent overheating transmission).* Normal stall speeds are 1400-1475 RPM. If stall speed is greater than normal, slippage in transmission is indicated. If stall speed is below normal, poor engine performance is indicated.

VACUUM & OIL PRESSURE TEST: With engine and transmission at normal operating temperature, connect a tachometer to engine and a vacuum gauge to carburetor, then remove the 1/8" pipe plug on left front side of transmission case and install an oil pressure test gauge. Move selector lever to "D1" or "D2", apply hand and service brakes and operate engine at 1000 RPM. Vacuum reading should be 5.5-6.5" (at sea level). Transmission oil pressure should be 80-90 lbs. If transmission vacuum is in excess of 6.5" at 1000 RPM, vacuum leakage, obstructions, or improper carburetor vacuum calibrations are indicated. *NOTE - Altitude will reduce vacuum reading slightly (see "Throttle Control Adjustment" above.*

AIR PRESSURE TEST (Transmission in Car): Raise car on hoist and remove transmission oil pan and control valve assembly. The front servo tubes should remain in front servo and the servo attaching screw must be tight. *NOTE - When making air pressure tests, hold a clean towel over transmission pening to prevent excessive oil spray.*

Front Clutch: Apply air pressure to front clutch passage (on transmission case rear flange). Listen for a dull thud indicating clutch is operating. Retain air pressure in this passage for several seconds to check for leaks in this circuit.

Governor Valve: Remove governor inspection hole cover and apply air pressure to front clutch passage (see

CONTINUED ON NEXT PAGE

FLASH-O-MATIC TRANSMISSION (C ntinued)

above). Listen for a click and watch valve snap inward. Replace inspection hole cover.

Rear Clutch: Apply air pressure to rear clutch passage (on transmission case rear flange). Listen for a dull thud indicating clutch is operating. Retain air pressure in this passage for several seconds to check for leaks in this circuit.

Front Band & Servo: Apply air pressure to front servo apply tube (rear tube) and observe band application.

Rear Band & Servo: Apply pressure to rear clutch oil passage (transmission case rear flange), and observe band application.

► *TESTING NOTE· If servos, bands, clutches, and governor operate with air pressure, then the no-drive problems, erratic shift, or no-upshift conditions indicate that the control valve ass mbly and pressure regulator valve ass mbly is the cause of the trouble. See "Control Valve" and "Pressure R gulator Valve" below.*

TROUBLE SHOOTING & DIAGNOSIS

INITIAL ENGAGEMENT TOO ROUGH: Idle speed may be too high. Control pressure may be too high caused by improper adjustment of throttle control vacuum unit. Regulator control valve may be dirty.

INITIAL ENGAGEMENT DELAYED: Check fluid level. Adjust rear band as it may be loose. Control pressure may be too low at idle speed. Clean control valve assembly and pressure regulator assembly. Check front pump for wear. Check fluid circuits for leaks and correct as necessary.

INOPERATIVE IN ALL RANGES: Check fluid level. Manual linkage may be disconnected. No control pressure, which may be caused by trouble at front pump Check rear band adjustment Check rear servo action with air pressure. Inspect and clean control valve assembly. Check engine stall speed, as converter may not be operating properly.

NO DRIVE IN "D" OR "L" POSITION: Check fluid level. Manual linkage may be disconnected. Control pressure may be low. Adjust vacuum control unit. Clean control valve and pressure regulator valve assemblies Check front clutch action with air pressure. Check rear servo and band with air pressure. Check transition valve in control valve assembly as it may be stuck.

NO DRIVE IN "R" POSITION: Check fluid level. Check and adjust manual linkage. Control pressure may be too low. Adjust vacuum control unit. Clean control valve and pressure regulator valve assemblies. Check rear clutch action with air pressure. Check rear servo and band with air pressure. Check transition valve in control valve assembly.

LOCKS UP IN "D" POSITION: Rear clutch or front band may be applied. Clean control valve and governor valve assemblies. Check rear clutch and front band and servo for mechanical failure.

LOCKS UP IN "D" POSITION (2ND GEAR): Check rear band and servo and rear clutch for mechanical failure.

LOCKS UP IN "D" POSITION (3RD GEAR): Front or rear band may be applied. Check bands and servos for mechanical failure. Clean control valve assembly.

LOCKS UP IN "R" POSITION: Check front clutch and band and front servo for mechanical failure. Clean control valve assembly.

SLIPS IN "D" OR "L" POSITION: Check fluid level. Control pressure may be low. Adjust vacuum control unit. Clean control valve and pressure regulator valve assemblies. Rear servo travel may be limited, check for mechanical failure of band or servo. Check front clutch for mechanical failure. Rear pump check valve may be stuck open.

1-2 UPSHIFT ROUGH: Control pressure may be too high. Check and correct vacuum and solenoid adjustment. Check and adjust bands. Clean governor valve assembly.

1-2 UPSHIFT SLIPPAGE (LIGHT THROTTLE): This condition may be caused by an unbalanced vacuum condition due to clogged vacuum ports or vacuum leakage at carburetor *(See "Carter (AS) Carburetor" in Carburetor Section)* Check adjustment of Vacuum & Solenoid Control Unit on transmission *(See "Throttle Control Aduustment" above)*

1-2 UPSHIFT SLIPS: Adjust vacuum and solenoid unit. Adjust bands. Check for stuck governor valve. Check front servo piston for limited travel with air pressure. Check for fluid leakage.

NO 1-2 UPSHIFT: Check for stuck governor valve or 1-2 shift valve.

1-2 UPSHIFT TOO EARLY: Check for stuck governor valve.

1-2 UPSHIFT TOO LATE: Check for stuck governor valve or leak in governor circuit. Adjust vacuum solenoid unit.

2-3 UPSHIFT ROUGH: Control pressure may be too high, adjust vacuum solenoid unit. Clean control valve assembly and adjust front band. Check for stuck governor valve.

2-3 UPSHIFT "PILE-UP" (LIGHT THROTTLE): *See "1-2 Upshift Slippage (Light Throttle)" above*

2-3 UPSHIFT SLIPS: Control pressure may be too low, adjust vacuum solenoid unit. Clean control valve assembly and adjust front band. Check for internal leaks and stuck governor valve.

NO 2-3 UPSHIFT: Governor valve or 2-3 shift valve may be stuck.

2-3 UPSHIFT EARLY: Check for stuck governor valve.

2-3 UPSHIFT LATE: Check for stuck governor valve or leak in governor circuit. Adjust vacuum solenoid unit.

3-2 DOWNSHIFT ROUGH (CLOSED THROTTLE): Adjust vacuum solenoid unit. Orifice control valve may be stuck.

3-2 KICKDOWN (EARLY): Check for stuck governor valve.

2-1 DOWNSHIFT ROUGH (CLOSED THROTTLE): Adjust vacuum solenoid unit. Rear servo check valve may be stuck

WILL NOT START BY PUSHING: Rear pump not operating. Pressure regulator valve may be stuck.

NO PARK POSITION: Adjust vacuum solenoid unit. Check for damaged internal linkage or pawl.

TRANSMISSION REMOVAL & INSTALLATION

REMOVAL: Disconnect battery cable. Raise car on hoist and place jack stands under rear of car at body sills. Disconnect oil filler tube at oil pan and drain transmission. Disconnect vacuum line and wire terminal at vacuum unit on rear of transmission. Disconnect speedometer cable at transmission. Disconnect rear brake hose bracket from floor panel. Disconnect manual shift linkage at transmission lever. Disconnect rear shock absorbers from rear axle. Disconnect torque tube, propeller shaft and hand brake cable. Lower rear axle and move rearward to separate torque tube and propeller shaft from transmission. Place a hydraulic hoist with suitable cradle in position under transmission oil pan. Remove transmission case-to-converter housing upper capscrews and lockwashers. With hydraulic hoist and cradle adjusted so transmission is in alignment with converter housing, pull transmission to rear with the hydraulic hoist to disengage transmission from housing and converter assembly. Remove transmission from car.

► *TRANSMISSION, BELL HOUSING & CONVERTER ASSEMBLY REMOVAL NOTE:* These parts may be removed as an assembly as follows In addition to transmission removal procedure (see above), remove the starter attaching bolts and remove starter. Support transmission and remove crossmember at side sill bolts. Lower engine and block engine on both sides from the top ledges of oil pan to side sill crossmember (these blocks should be 5" long and 2" square) Remove bell housing-to-engine bolts and bell housing lower mud pan Remove six capscrews attaching torque converter to drive plate. Complete removal as outlined above.

INSTALLATION: Reverse the removal procedure and note the following If transmission removed separately, position front pump drive tangs on converter in a horizontal position and position the front pump external tooth gear drive lugs in a vertical position. Tighten transmission-to-bell housing attaching bolts to 40-45 ft. lbs If converter has been removed, converter-to-drive plate attaching capscrews must be tightened to 23-28 ft. lbs.

TRANSMISSION OVERHAUL

► *CONVERTER OVERHAUL NOTE:* Torque converter is a sealed assembly (case is welded together during manufacture) and cannot be disassembled for service

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FLASH-O-MATIC TRANSMISSION (Continued)

TRANSMISSION OVERHAUL: Overhaul procedures are the same as for Fordomatic, Mercomatic, and Turbo-Drive Transmissions. *See "Fordomatic, Mercomatic, & Turbo-Drive Transmission" for all data except the following:*

VACUUM & SOLENOID CONTROL UNIT

►*NOTE:* Control unit cannot be disassembled and is serviced by replacement.

REMOVAL: Disconnect vacuum line and solenoid wire. Loosen locknut and unscrew unit from transmission case.

INSTALLATION: Screw unit into transmission case until distance from front edge of unit to face of transmission case is 11/32", tighten locknut. *This is a preliminary setting only. See "Throttle Control Adjustment" for final setting after transmission installed in car.*

CONTROL VALVE

►*CONTROL VALVE CAUTION: Do not separate valve bodies until valves have been removed. Keep all parts clean and avoid damage to all valve parts.*

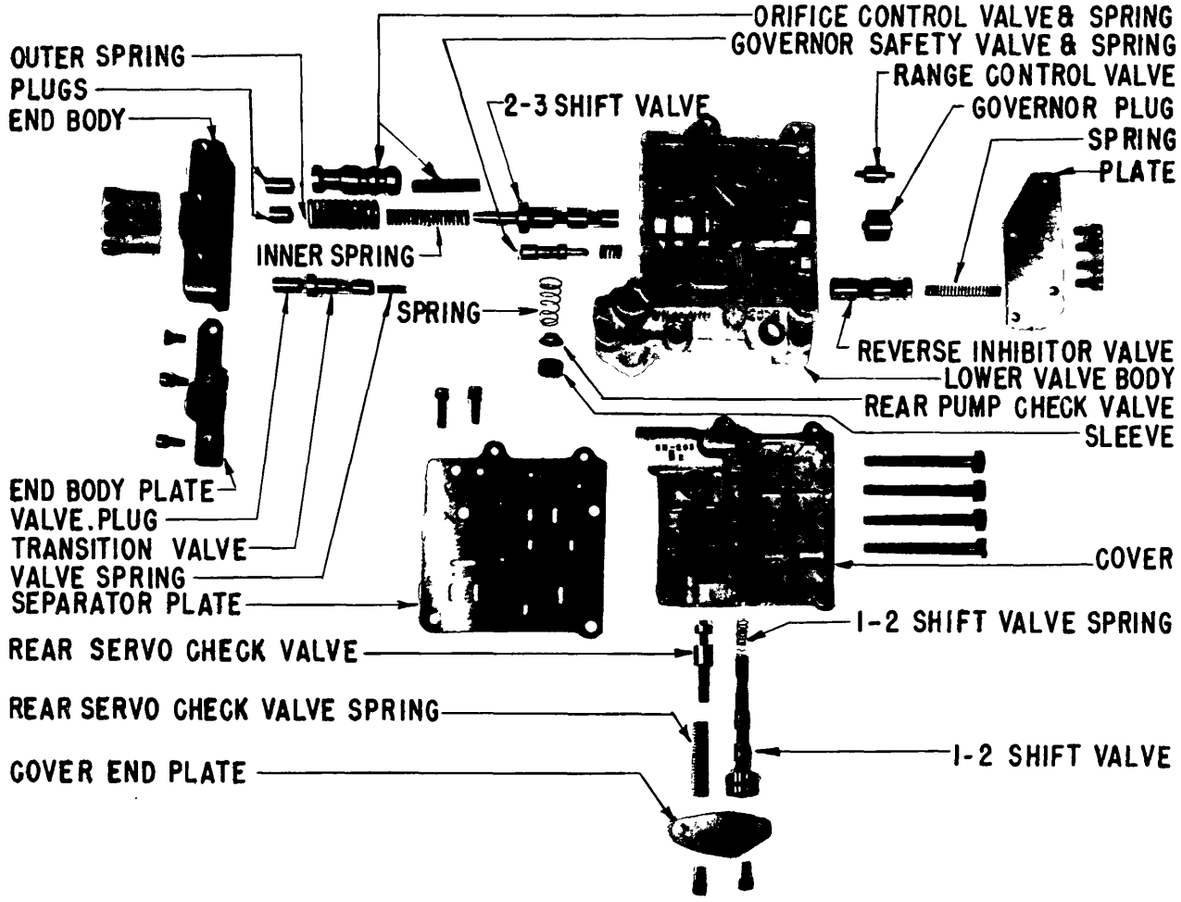
DISASSEMBLY: 1) Remove manual valve, then remove upper body front plate by removing one screw attaching separator plate to lower body (apply pressure to plate while removing, as it is spring loaded). Remove compensator sleeve and plug, then remove compensator valve inner and outer springs and valve. Remove low range valve, modulator valve retainer, outer spring, valve and inner spring (modulator outer spring retainer may be removed from valve by pressing outward on the three retainer flanges). Push downshift valve into bore to remove vacuum control lever hook (control lever may be removed, if necessary, by pulling out retainer and pin). Remove downshift valve and spring.

2) Remove two screws attaching throttle valve return spring to upper body and remove the spring. Remove remaining screw attaching upper valve body rear plate to body and remove plate. Remove throttle valve and compensator cut-off valve. Remove lower body side plate (spring loaded). Remove reverse inhibitor valve spring and valve, governor plug, and range control valve. Remove end body (spring loaded).

3) Remove orifice control valve plug, 2-3 shift valve plug and transmission valve plug from end body. Remove end body plate. Remove 2-3 shift valve outer spring, inner springs and shift valve. Remove orifice control valve and spring, transition valve and spring, and the governor safety valve and spring. Remove cover end plate, 1-2 shift valve and spring and rear servo check valve spring and valve. Remove attaching bolts, then separate the bodies.

4) Remove valve body plate and separator plate from upper and lower bodies. Remove rear pump check valve sleeve, check valve and spring from lower body. *(NOTE -* Check valve sleeve can be removed with snap ring pliers).

INSPECTION: Clean all parts in solvent and blow dry with air. Inspect all valves and plug bores for scores. Check all fluid passages for obstructions. Inspect check valves for free movement. Inspect all mating surfaces for burrs and distortion. Inspect all plugs and valves for burrs or scores. *(NOTE - Crocus cloth can be used to polish plugs and valves. Be careful not to round off sharp edges of valves and plugs).* Inspect all springs for distortion. Check valves and plugs for free movement in their bores (valves and plugs, when dry, must fall of their own weight, in their respective bores).



FLASH-O-MATIC TRANSMISSION CONTROL VALVE LOWER BODY

REASSEMBLY: *NOTE - Arrange all parts in their correct position. When installing valves and plugs, rotate them into their bores to avoid sheering of soft body castings.* 1) Install valve body plate on upper body (do not tighten screws). Install rear pump check valve spring, valve, and sleeve into lower body. Position lower body on upper body. Place the separator plate on lower body, and install the lower body cover. Tighten attaching bolts finger tight. Align valve body attaching bolt holes in valve body plate and lower body. Tighten the four bolts to 4-6 ft. lbs. *(CAUTION - Excessiv tightening of th se bolts may distort valve bodies, causing the valves r plugs to stick).*

2) Install the two lower cover-to-body screws, then tighten all cover and body screws to 20-30 **Inch** lbs. (2 ft. lbs.). Install plate on lower end body and tighten attaching screws.

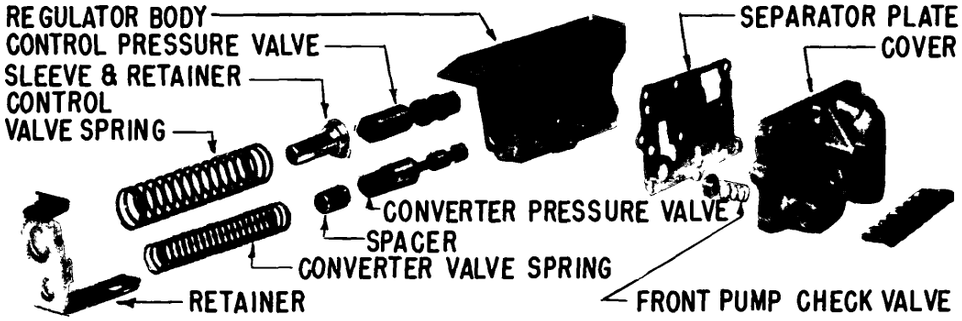
3) *(NOTE - Lubricate all valv s and plugs with Automatic Transmission Fluid Type "A" b for installing them).* Install orifice control valve plug, 2-3 shift valve plug, and the transition valve plug in end body. Install transition valve spring and valve, orifice control valve spring and valve, governor safety valve spring and valve, and 2-3 shift valve in lower body. Install shift valve inner and outer springs, install end body on lower body *(CAUTION - Make sure the inner spring is piloted on the 2-3 shift valve plug).* Install range control valve and

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FLASH-O-MATIC TRANSMISSION (C ntinued)

governor plug in lower body. Install reverse inhibitor valve spring in the valve and install valve. Install lower body side plate. Install 1-2 shift valve and spring in cover, then install rear servo check valve and spring. Install cover end plate.

4) Install compensator cut-off valve in upper body and install throttle valve. Position the upper body rear plate on upper body with the plate between end bands of the throttle valve. Install one plate-to-body screw in hole next to throttle valve. Position throttle valve return spring on plate and secure plate in place with the remaining plate-to-valve body screws. Install compensator valve and springs, throttle valve spring and downshift valve. Install low range valve, then the modulator spring, valve, outer spring, and retainer as an assembly. Be sure both springs are fastened into position on valve before installation in upper body.

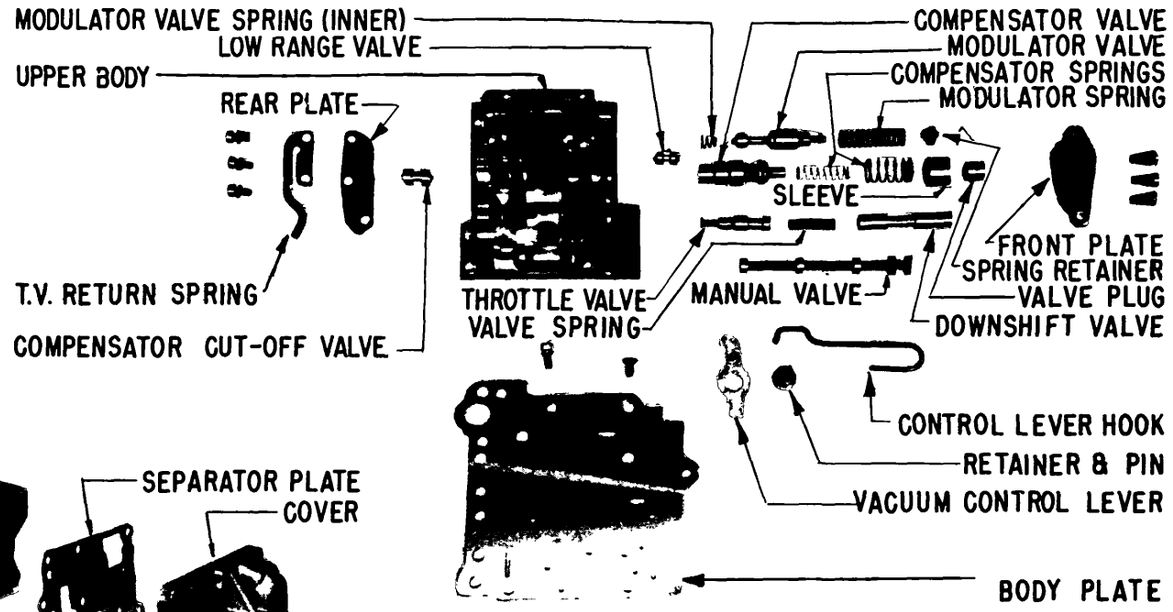


FLASH-O-MATIC TRANSMISSION PRESSURE REGULATOR

5) Install plug in compensator valve sleeve, castellated end out, and install the assembly in body with smooth end toward body. Install upper body front plate and the screw attaching the separator plate to lower valve body. If vacuum control lever was removed, reinstall lever with retainer and pin. While pressing the downshift valve into its bore, insert the vacuum control lever hook into downshift lever and control lever. Install manual valve.

PRESSURE REGULATOR VALVE OVERHAUL

DISASSEMBLY: Remove valves from regulator body and remove body cover. Remove check valve and spring from separator plate, then remove separator plate from regulator body.



FLASH-O-MATIC TRANSMISSION CONTROL VALVE UPPER BODY

INSPECTION: Wash all parts in solvent and blow dry with air. Inspect regulator cover and body mating surfaces for burrs. Check all fluid passages for obstructions. Inspect control pressure and converter pressure valves and bores for burrs and scores. Remove all burrs carefully with crocus cloth. Check free movement of valves in bore (with both parts dry, valves should fall freely of their own weight). Check springs for distortion.

REASSEMBLY: Position check valve spring and valve in regulator cover. Position separator plate on regulator and place this assembly on regulator body and install attaching screws. Tighten screws to 20-30 **Inch** lbs. (2 ft. lbs.). Insert valve in regulator body.

STUDEBAKER FLIGHTOMATIC

Studebaker, All Models (1957)
Packard Clipper (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR:* Move selector lever to "N" (Neutral) position. When car speed reaches 20 MPH, turn the ignition switch on and move transmission selector lever to the "L" (Low) position. It is recommended that the car be pushed to start it rather than be towed.

►*TOWING CAR CAUTION:* Car can be towed for very short distances with the transmission selector lever in the "N" position. Prolonged towing will result in damage to the transmission unless the drive shaft is disconnected or the rear wheels are off the ground.

►*1957 FLIGHTOMATIC OVERHEATING (HEAVY DUTY OPERATION) NOTE:* The following procedures should be observed for service on cars used for heavy duty operation such as police cars, taxi cabs, etc.

Band Adjustment - Adjust bands at 5000 mile intervals.

Control Pressure Check & Adjustment - Check control pressure and adjust to 85 lbs. at 1000 RPM in "D" (Drive) range every 5000 miles.

Pressure Regulator Change (to speed up oil flow) - Remove pressure regulator valve assembly and note if converter return passage is restricted to approximately 3/32" in valve body (converter return passage is the restricted opening in center of pressure regulator valve body attaching surface). If this passage has a restriction, disassemble unit and carefully enlarge orifice to 9/32" with a drill.

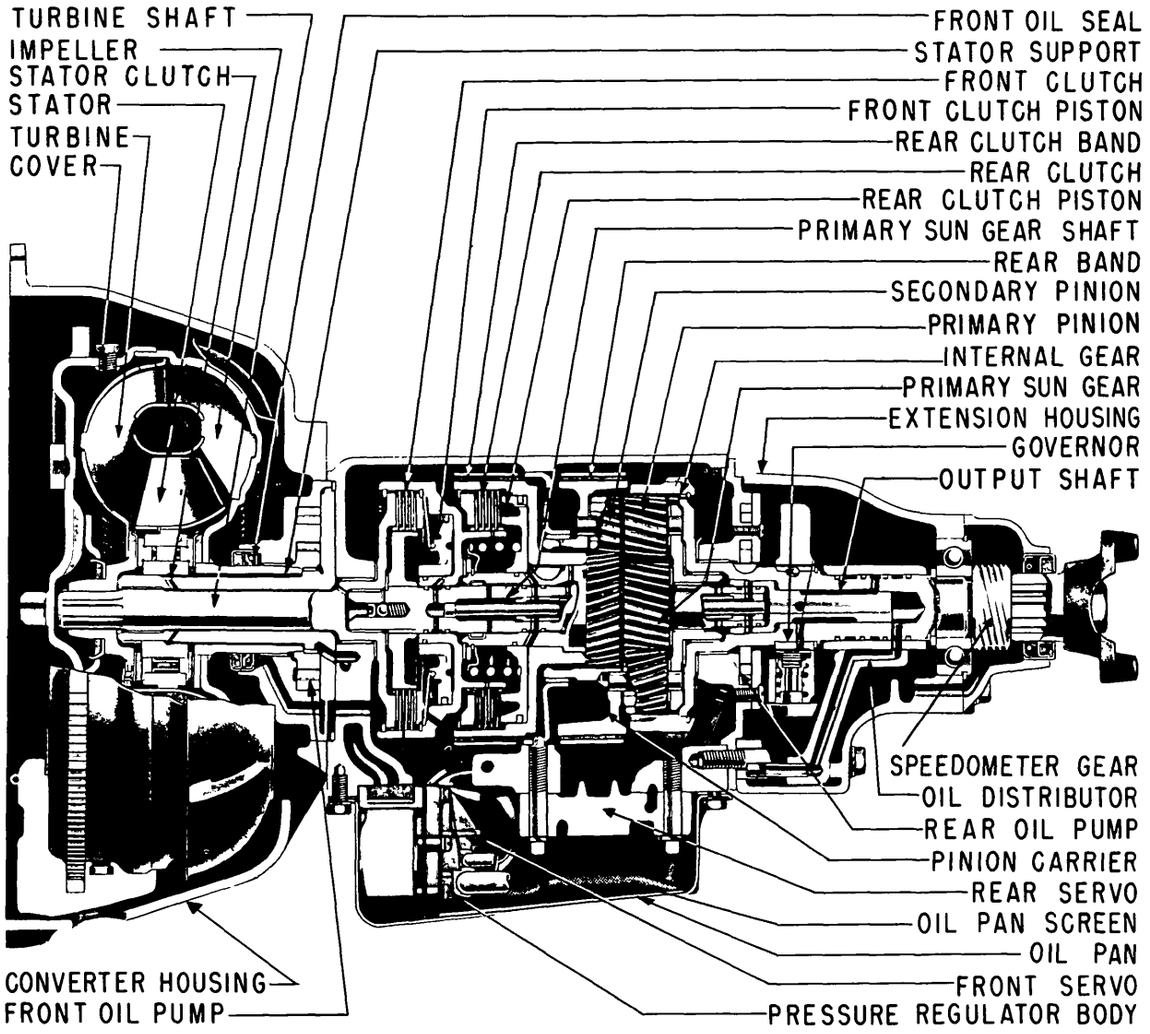
►*CONTROL VALVE ASSEMBLY IDENTIFICATION:* Different control valve assemblies are used on Packard Clipper and Goldenhawk than on the other models. A figure "1" stamped on lower body cover near front servo apply and release tubes identifies Part No. 1543076 used on Packard and Goldenhawk. The figure "2" identifies Part No. 1542992 used on other models.

►*GOVERNOR ASSEMBLY IDENTIFICATION:* A narrow groove machined into smallest diameter of governor valve (sleeve) identifies the assembly used on Packard and Goldenhawk models. The valves used on other models do not have the groove.

►*BAND SLIPPAGE & ERRATIC SHIFT PATTERN CORRECTION NOTE:* This condition may be caused by a loose control valve or regulator valve assembly moving off its seat enough to allow escape of oil. Make sure that these parts are properly tightened to specified torque.

►*TRANSMISSION REMOVAL & OIL PAN DAMAGE CAUTION:* When removing transmission assembly, use the proper factory recommended jack and cradle. A conventional floor jack may bend and distort oil pan and cause weight of transmission to be taken on the control valve body. Damage and sticking of control valves may result.

►*1956-57 COMMANDER & PRESIDENT MAIN CONTROL VALVE SEPARATOR PLATE CHANGE (To correct a condition of "No Reverse When Hot"):* This condition may be caused by sluggishness and inoperation of the 1-2 shift valve due to decreased and escaping pressure when oil is hot. If all other operations of transmission are normal, install a new separator plate, Part No. 1542984, having a relocated passage to the 1-2 shift valve. This later plate is identified by a notch adjacent to one of the capscrew holes.



STUDEBAKER FLIGHTOMATIC TRANSMISSION (SECTIONAL VIEW)

DESCRIPTION

Flightomatic transmission consists of a hydraulic torque converter and a hydraulically controlled 3-speed planetary type transmission which provides automatic operation in "D" (Drive) range. Additional "Lo" (Low), "R" (Reverse), and "P" (Park) ranges are controlled manually. In "D" (Drive) range, the car starts in "1st" speed (Champion) "2nd" speed (Other Models). Design is similar to that used for late 1956 Studebaker models.

LUBRICATION

►*CAUTION: Check fluid level at 1000 mile intervals. Drain and refill at 15,000 mile intervals, using Automatic Transmission Fluid Type "A".*

Capacity—9 qts. (approximately).

Checking Fluid Level—Place transmission selector lever in "P" (Park) position and operate engine for approximately four minutes, or until engine and transmission have reached normal operating temperature. Roll up the floor mat from right side until oil level inspection hole cover in floor pan is accessible, and remove cover. Clean all dirt and foreign material from around transmission fluid dipstick. Apply the parking

CONTINUED ON NEXT PAGE

STUDEBAKER FLIGHTOMATIC (C ntinu d)

brake and foot brake and move selector lever slowly from "P" position to "R" position and then back to "D" position. Remove dipstick and wipe clean, then install it in transmission and **turn clockwise to the l ck position.** Remove dipstick and check fluid level. Add fluid through dipstick hole to raise level to the "F" mark on dipstick. *NOTE*–The amount of fluid required to raise the level from "L" mark on dipstick to "F" mark is approximately 1½ pints.

Draining & Refilling–Place transmission selector lever in "P" (Park) position and operate engine for approximately four minutes, or until engine and transmission are at normal operating temperature. Stop engine and raise car on hoist. Remove transmission dipstick *(see "Checking Fluid Level" above).* Remove transmission drain plug. Rotate the converter until one of the drain plugs is visible through hole in converter housing, remove drain plug and quickly rotate converter 180°, and remove the other converter drain plug. After fluid has drained from transmission and converter, install transmission drain plug using a new gasket, and the two converter drain plugs. Lower the car to floor and install three quarts of Automatic Transmission Fluid Type "A" through dipstick hole. Apply parking brake and foot brake; start the engine and operate it with the selector lever in "N" (Neutral) position. Slowly pour four additional quarts of fluid into transmission. Move selector lever through all ranges. Check oil level on dipstick *(see "Checking Fluid Level" above).* Add sufficient oil to bring level up to "F" mark on dipstick.

LINKAGE ADJUSTMENT

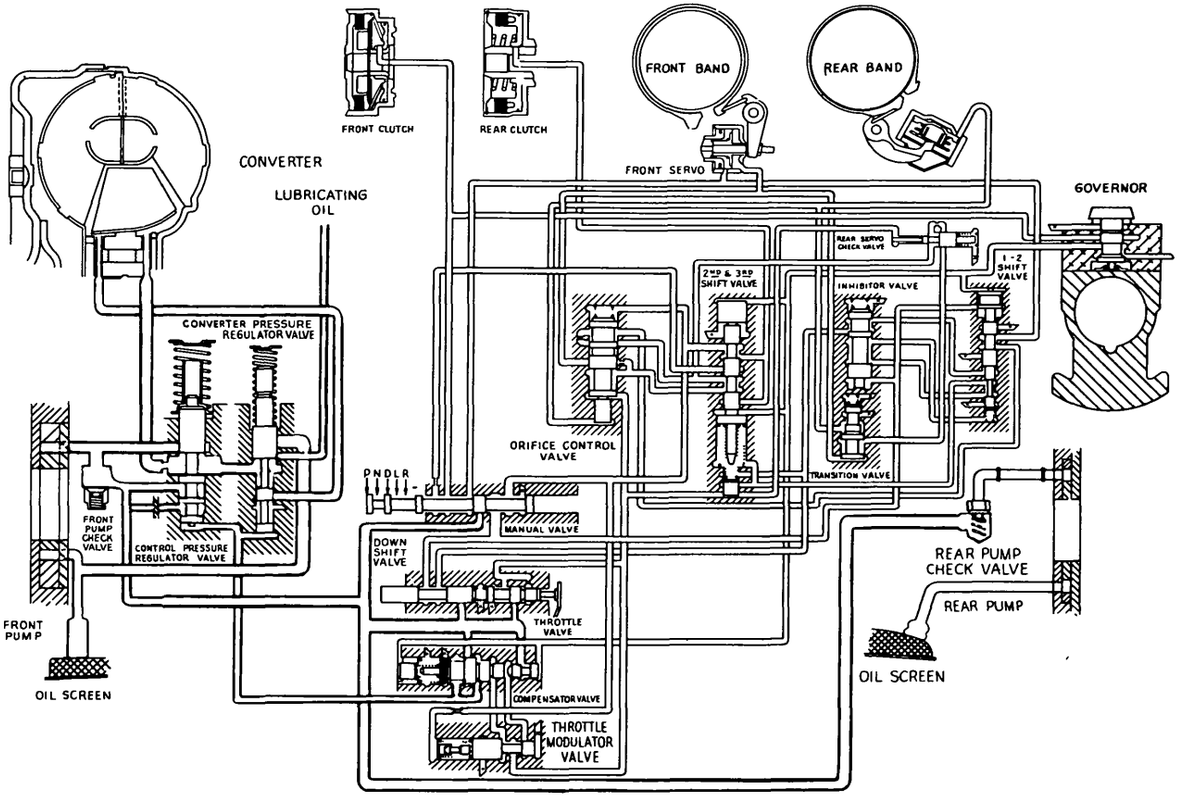
Throttle Linkage Adjustm nt: *See CARBURETOR on Car Mod l Pag s.*

Manual Linkage Adjustment: Disconnect shift lever-to-transmission manual valve lever rod at transmission manual valve lever by removing the ball joint assembly. Place selector lever in "D" (Drive) position and place the manual lever on transmission in the "D" (Drive) position (this is center of manual valve lever travel). Adjust the shift lever-to-manual valve lever rod until the ball joint stud will slip freely through the hole in the manual valve lever. Install ball joint stud locknut and lock to rod.

BAND ADJUSTMENT

► *1957 FLIGHTOMATIC OVERHEATING (HEAVY DUTY OPERATION) NOTE: See "Changes, Cautions, Corrections" (abov) for service recommendations.*

Fr nt Band: Remove transmission oil pan, gasket and screen. Loosen the front servo adjusting screw locknut two full turns with a 9/16" wrench. Check the adjusting nut for free rotation in the actuating lever and free the adjusting screw if necessary. Install the gauge block of the adjusting tool (J-5880) between the servo piston rod and the adjusting screw. Place the Front Band Adjusting Tool J-5880, on the adjusting screw and tighten until the tool overruns. **Back ff th adjusting scr w on full turn,** and tighten locknut to 20-25 ft. lbs. Place the screen over the rear pump inlet first then over the front pump inlet, and install the screen retaining clip. Position a new oil pan gasket on transmission oil pan flange and hold it in place with petroleum jelly. Align oil pan on transmission flange and install capscrews and lockwashers. Tighten to 10-13 ft. lbs. Install drain plug and fill transmission *(see "Lubrication" above).*



FLIGHTOMATIC TRANSMISSION HYDRAULIC CIRCUITS

Rear Band: Roll up floor mat from the right side until the oil level inspection hole cover in the floor is visible, and remove the cover. Clean dirt and all foreign material from around rear band adjusting screw and locknut, and oil the adjusting screw threads. Using Rear Band Adjusting Tool J-5883, tighten the screw until wrench overruns, **back off adjusting screw 1½ turns,** and tighten the locknut to approximately 35-40 ft. lbs. torque. *CAUTION–It is very important the adjusting screw be backed off 1½ turns to avoid damage to band and servo.*

TESTING

STALL TEST: Connect tachometer to the engine and place it where it can be easily read from the drivers seat. Set the hand brake and start the engine. Place selector lever in "D" (Drive) position, apply service brakes and operate the engine at full throttle. Note tachometer reading. Repeat this procedure with selector lever in "L" and "R" positions. *(CAUTION–Do not operate the engine at high speed while the selector lever is in one of the driving ranges, with the r ar wheels held stationary, for more than 10 seconds at a time or for a total time greater than one minute in any half-hour period).* Normal stall speeds are 1400-1500 RPM (Champion); 1550-1650 RPM (Commander); 1750-1850 RPM (President, Golden Hawk, & Packard Clipper). If stall speed is greater than normal, slippage in transmission is indicated. If stall speed is between 900-1000 RPM (if engine is normal), slippage is indicated in torque converter stator free wheel unit.

ROAD TEST: A thorough test must be made to determine the shift speed and transmission performance. The initial application of the various bands and clutches should be checked in all driving ranges by stopping the car and moving the selector lever to "D", "Lo", & "R" ranges. A driving test should be made in the "D" range to check the shift speeds. *See "Shift Sp ds" below.*

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STUDEBAKER FLIGHTOMATIC (Continued)

FLIGHTOMATIC SHIFT SPEED (MPH)

Light Throttle Upshift

Shift	Champion	Comm. & Pres.	Packard & Gold. Hawk
1-2	5-11		
2-3	16-22	14-19	11-16

Maximum Throttle Upshift

Shift	Champion	Comm. & Pres.	Packard & Gold. Hawk
1-2	30-40	35-41	36-43
2-3	53-63	56-69	65-74

Maximum Kickdown

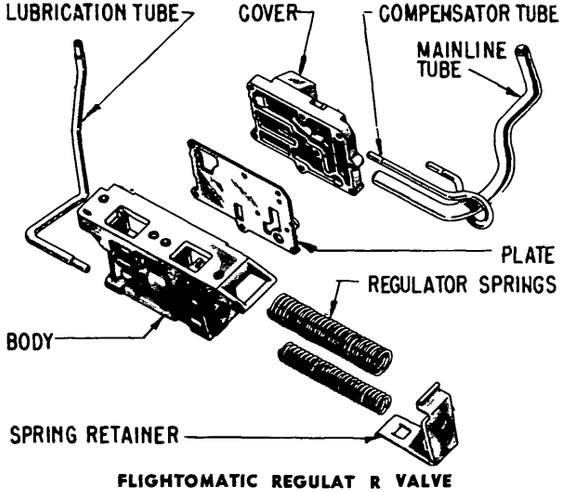
Shift	Champion	Comm. & Pres.	Packard & Gold. Hawk
3-2	48-58	56-63	58-65
2-1	16-24	8-12	6-10

Closed Throttle Downshift

Shift	Champion	Comm. & Pres.	Packard & Gold. Hawk
3-2	8-17	8-12	6-10
2-1	4-7		

FLUID PRESSURE TESTS: Fluid pressure tests should be made to ascertain whether or not the pressure regulator system is functioning correctly and to determine if there is fluid leakage in the clutch circuits. Remove the 1/8" pipe plug located near throttle lever and manual lever, and install pressure gauge hose (pressure gauge should be in drivers compartment). Connect a tachometer to engine and position it so it can be read from drivers compartment. Make the following tests:

1) Idle Pressure Test - With engine and transmission at normal operating temperature, and with engine at normal idle speed, move selector lever to "D", "L", & "R" positions. The pressure gauge should read approximately 50-80 lbs. (Champion, Commander, & President), 52-95 lbs. (Golden Hawk & Packard Clipper), in all ranges. If pressure is low in any one range, a fluid leak in that range circuit is indicated. If pressure is high, the throttle linkage should be checked and adjusted *(see CARBURETOR on Car Model pages).*



FLIGHTOMATIC REGULAT R VALVE

2) Pressure Regulation Check - Move selector lever to "D" range and firmly set hand brake and foot brake. Run engine at 1000 RPM and read pressure gauge. Pressure should be approximately 80-85 lbs. (Champion, Commander, & President), 95-100 lbs. (Golden Hawk & Packard Clipper). If the pressure is less, it indicates the throttle valve linkage is too long and must be adjusted. If pressure is greater, it indicates throttle valve linkage is too short and must be readjusted.

3) Stall Pressure Test - Firmly set hand brake and foot brake and operate engine at full kickdown position. Move selector lever to "D", "L", & "R" ranges and read gauge pressure. The pressure in "D" & "L" positions should be 130-175 lbs. (Champion, Commander, & President), 132-184 lbs. (Golden Hawk & Packard Clipper). In the "R" range, the pressure should be 170-190 lbs. (Champion, Commander, & President), 184-203 lbs. (Golden Hawk & Packard Clipper). If pressure is less or greater than the above pressures, malfunctioning of throttle valve, modulator valve, compensator valve, or pressure regulator assembly is indicated and it will be necessary to remove and clean the control valve assembly and pressure regulator valve assembly.

AIR PRESSURE TEST (With Transmission in Car): Raise car on hoist and remove transmission oil pan and control valve assembly. Proceed as follows:

Front Clutch: Apply pressure to front clutch and governor input passage (case rear flange). Listen for dull thud which indicates that clutch is operating. Keep air pressure in passage for several seconds to check for leaks in this part of the system.

Governor Valve: Remove governor inspection cover. Apply air pressure to the same passage as for front clutch (above). Listen for a click and also watch valve snap inward.

Rear Clutch; Apply air pressure to rear clutch oil passage (case rear flange). Listen for a dull thud to indicate clutch is operating. Check for leaks in same manner as for front clutch (above).

Rear Band & Servo: Apply pressure to rear servo oil passage (case rear flange), observe band application.

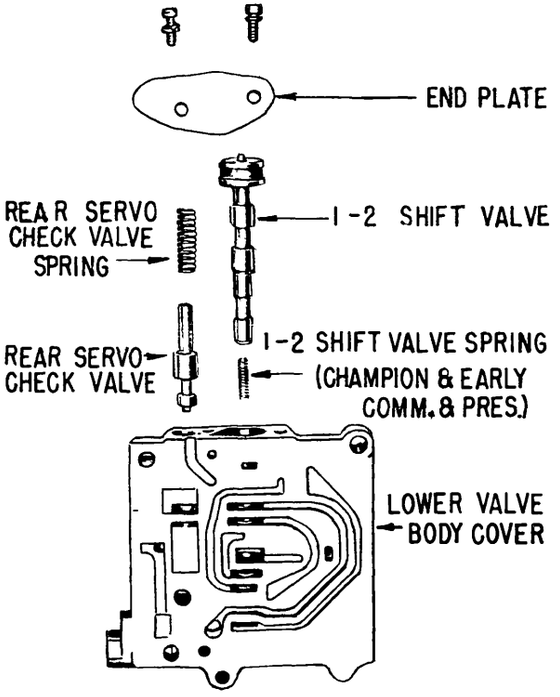
Front Band & Servo: Apply pressure to front servo apply tube (rear tube), and observe band application.

►*TESTING NOTE: If servos, bands, clutches and governor operate with air pressure, then the no drive problems, erratic shift, or no upshift conditions indicate that the control valve assembly is the cause of the trouble. See "Control Valve" below.*

TROUBLE SHOOTING

►*FLIGHTOMATIC TRANSMISSION FAILURE TO OBTAIN AUTOMATIC UPSHIFT OR REAR CLUTCH APPLICATION CORRECTION:* If control pressure and all other transmission adjustments are normal, this condition may be caused by shifting of distributor tube in output shaft. Dependent on how the distributor tube shifted, the following conditions may occur:

1) No governor action, in which case the transmission would not upshift automatically.



FLIGHTOMATIC LOWER VALVE B DY COVER

2) Obstructed rear clutch passage, in which case transmission would not provide third gear or reverse.

3) Allowing a common passage to supply pressure to both front and rear clutches simultaneously, in which case a locking (or partial locking) condition would exist in "D", "L", or "R" ranges.

To determine correct position of tube within output shaft, remove output shaft and locate governor drive ball pocket in shaft (at approximate center of shaft). Then, looking at front of output shaft assembly, locate elongation of oil passage in center of distributor tube (visible from gear end of output shaft). Using governor drive ball pocket as a reference point, elongated portion of passage should be located 180° from (or relatively opposite) the governor drive ball pocket.

INITIAL ENGAGEMENT TOO ROUGH: Idle speed may be too high. Control pressure may be too high caused by improper throttle valve linkage or dirt in control valve assembly or regulator valve assembly. Check throttle valve stop and reset if necessary.

INITIAL ENGAGEMENT DELAYED: Check fluid level. Adjust rear band as it may be loose. Control pressure may be too low at idle speed. Clean control valve assembly and pressure regulator assembly. Check front pump for wear. Check fluid circuits for leaks and correct as necessary.

INOPERATIVE IN ALL RANGES: Check fluid level. Manual linkage may be disconnected. No control pressure

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STUDEBAKER FLIGHTOMATIC (C n.inued)

which may be caused by trouble at front pump. Check rear band adjustment. Check rear servo action with air pressure. Inspect and clean control valve assembly. Check engine stall speed, as converter may not be operating properly.

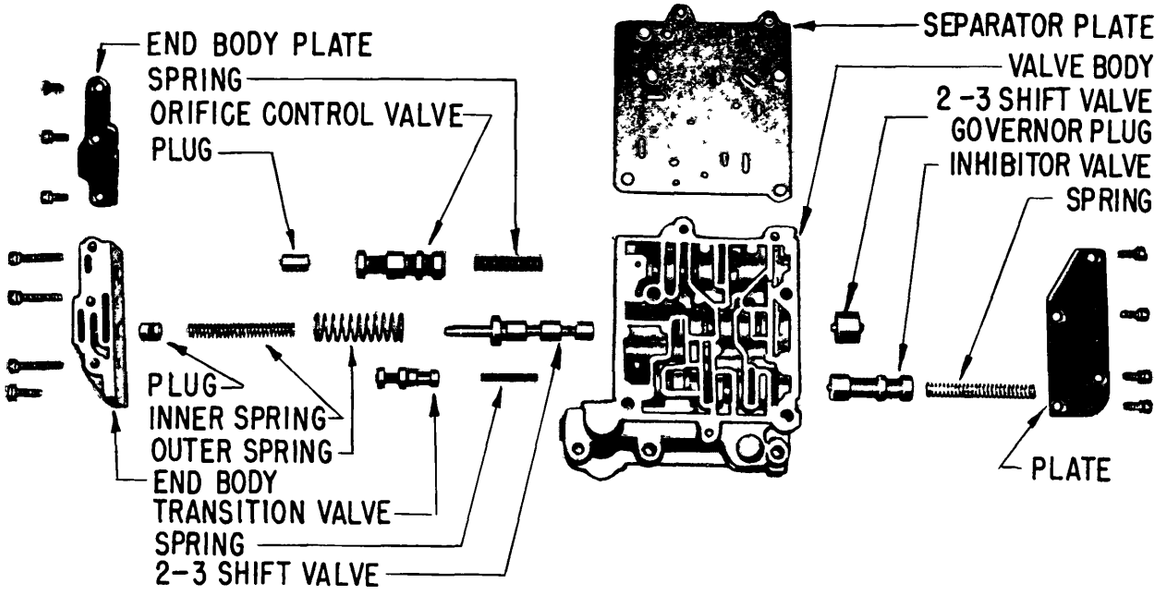
NO DRIVE IN "D" OR "L" POSITION: Check fluid level. Manual linkage may be disconnected. Control pressure may be low. Adjust throttle valve linkage. Clean control valve and pressure regulator valve assemblies. Check front clutch action with air pressure. Check rear servo and band with air pressure. Check transition valve in control valve assembly as it may be stuck.

NO DRIVE IN "R" POSITION: Check fluid level. Check and adjust manual linkage. Control pressure may be low. Check and adjust throttle valve linkage, and clean control valve and regulator valve assemblies. Check rear clutch action with air pressure. Check rear servo action with air pressure. Check transition valve in control valve assembly.

LOCKS UP IN "D" POSITION: Rear clutch or front band may be applied. Clean control valve and governor valve assemblies. Check rear clutch and front band and servo for mechanical failures.

LOCKS UP IN "D" POSITION (2ND GEAR): Check rear band and servo, and rear clutch for mechanical failure.

LOCKS UP IN "D" POSITION (3RD GEAR): Front or rear band may be applied. Check bands and servo for mechanical failure. Clean control valve assembly.



FLIGHTOMATIC LOWER VALVE BODY

LOCKS UP IN "R" POSITION: Check front clutch and band and front band servo for mechanical failure. Clean control valve assembly.

SLIPS IN "D" OR "L" POSITION: Check fluid level. Control pressure may be low. Check throttle valve linkage. Clean control valve and pressure regulator valve assemblies. Rear servo travel may be limited; check for mechanical failure of band or servo. Check front clutch for mechanical failure. Rear pump check valve may be stuck open.

SLIPS IN "R" POSITION: Check fluid level. Check and adjust throttle control linkage. Clean control valve and regulator valve assemblies. Check rear servo for limited travel. Check front clutch for mechanical failure as it may be slipping. Rear pump check valve may be stuck open.

1-2 UPSHIFT ROUGH: Check and correct throttle control linkage as control pressure may be too high. Clean and adjust bands. Governor valve may be stuck.

1-2 UPSHIFT SLIPS: Check and adjust throttle control as control pressure may be too high. Adjust bands. Check for stuck governor valve. Check front servo piston for limited travel with air pressure. Check for fluid leakage.

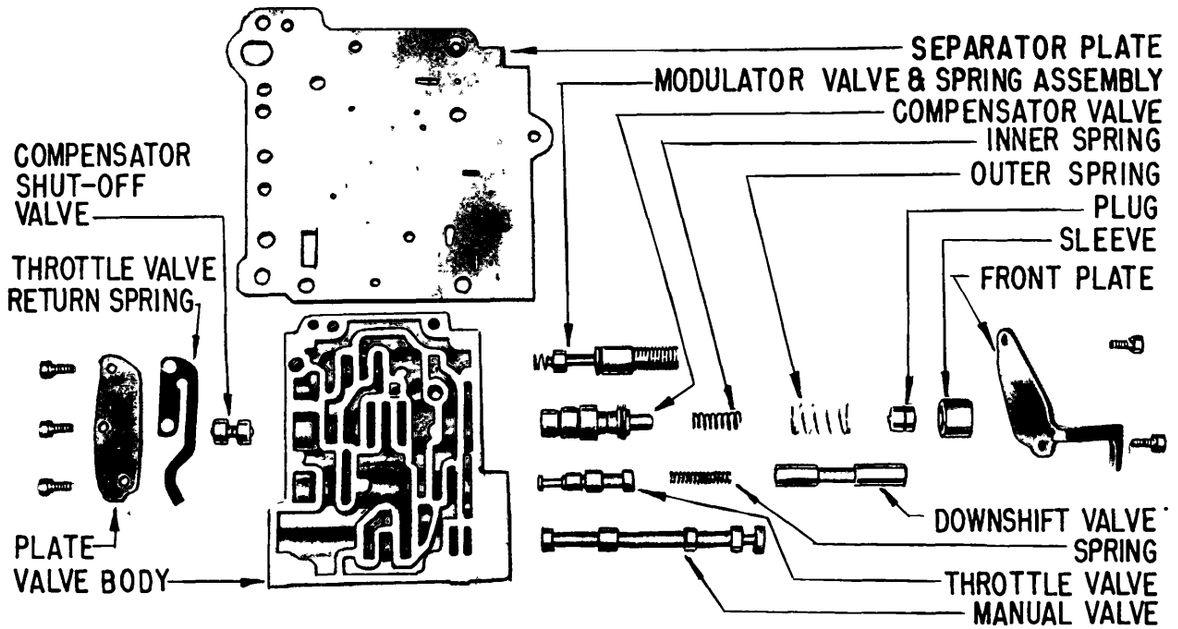
NO 1-2 UPSHIFT: Check for stuck governor valve or 1-2 shift valve.

1-2 UPSHIFT TOO EARLY: Check for stuck governor valve.

1-2 UPSHIFT TOO LATE: Check for stuck governor valve or leak in governor circuit. Check and adjust throttle control linkage. Clean control valve assembly.

2-3 UPSHIFT ROUGH: Control pressure may be too high; adjust throttle control linkage and clean control valve assembly. Adjust front band. Check for stuck governor valve.

2-3 UPSHIFT SLIPS: Control pressure may be too low; adjust throttle control linkage and clean control valve



FLIGHTOMATIC UPPER VALVE BODY

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STUDEBAKER FLIGHTOMATIC (Continued)

assembly. Adjust front band. Check for internal leaks and for stuck governor valve.

NO UPSHIFT 2-3: Governor valve or 2-3 shift valve may be stuck.

2-3 UPSHIFT EARLY: Check for stuck governor valve.

2-3 UPSHIFT LATE: Check for stuck governor valve or leak in governor circuit. Adjust throttle control linkage.

3-2 DOWNSHIFT ROUGH (CLOSED THROTTLE): Adjust throttle control linkage. Orifice control valve stuck.

3-2 KICKDOWN (EARLY): Adjust throttle control linkage.

NO KICKDOWN: Adjust throttle control linkage.

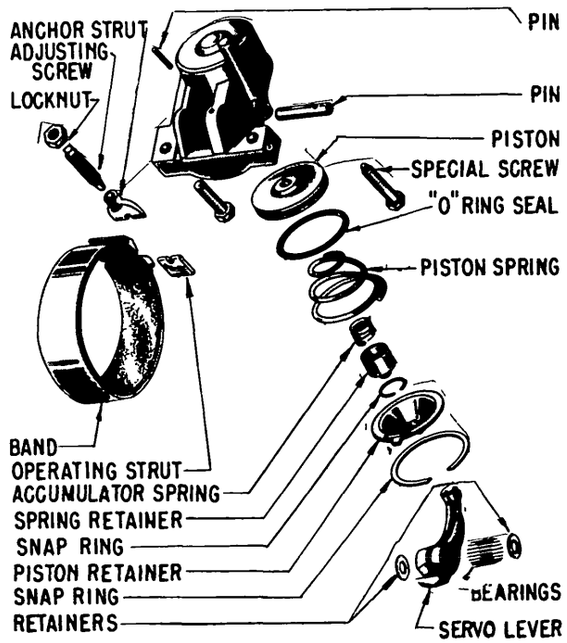
2-1 DOWNSHIFT ROUGH (CLOSED THROTTLE): Adjust throttle control linkage. Rear servo check valve may be stuck.

WILL NOT START BY PUSHING: Rear pump not operating. Pressure regulator valve may be stuck.

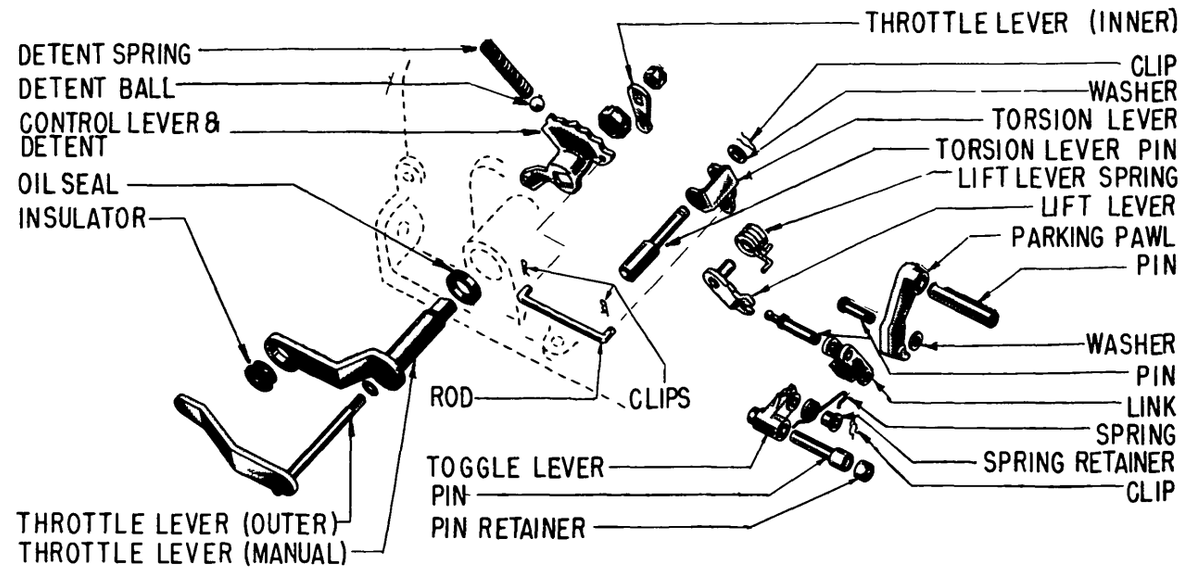
NO PARK POSITION: Adjust throttle control linkage. Check for damaged internal linkage or pawl.

TRANSMISSION REMOVAL & INSTALLATION

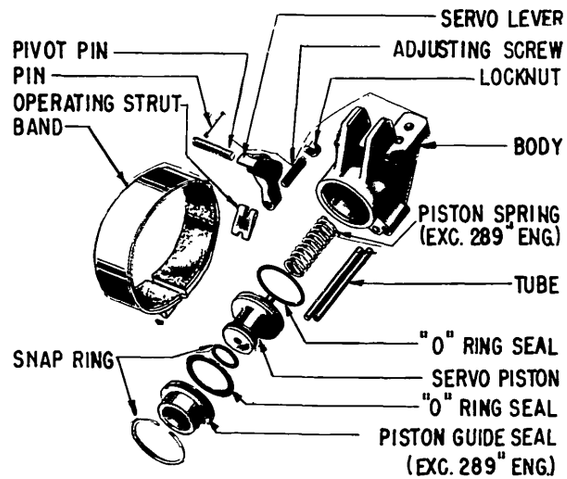
REMOVAL: Raise car on hoist, and remove transmission drain plug and converter drain plug. On coupe and hardtop models, remove body front pillar support crossmember. On cars with dual exhaust system, remove the left hand exhaust system. Remove complete propeller shaft assembly. Disconnect shift lever-to-transmission manual valve lever rod from manual valve lever. Disconnect bellcrank-to-throttle valve lever rod at throttle valve lever. Remove speedometer cable retaining screw and remove pinion and cable. Place transmission lift with the saddle as far forward in the tracks as possible, in position on transmission oil pan flange and align saddle on oil pan flange. Remove the four transmission-to-converter bell housing capscrews. Install transmission-to-converter housing guide pins, Tool J-4284, into upper capscrew holes. Remove transmission assembly by sliding it rearward on saddle out of converter bell housing and converter.



FLIGHTOMATIC REAR SERVO & BAND ASSEMBLY



FLIGHTOMATIC TRANSMISSION INNER CONTROL LEVER ASSEMBLY



FLIGHT MATIC FRONT SERV & BAND ASSEMBLY

INSTALLATION: Position front pump drive tangs on converter hub in horizontal position. Using a thin screwdriver, position the front pump external tooth gear drive lugs in vertical position. Install transmission-to-converter housing guide pins, Tool J-4284 (if they were removed). Raise transmission to proper height and angle and carefully slide transmission assembly into torque converter and bell housing, using the pilot studs as guides. Do not force transmission into converter by using transmission retaining screws to draw transmission into position, as this may damage converter or front pump. Make sure transmission fits snugly against converter bell housing. When transmission is in contact with bell housing, install the two lower transmission-to-bell housing retainer capscrew and lockwashers. Remove guide pins and install remaining capscrews and lockwashers. Tighten capscrews to 40-45 ft. lbs. Remove transmission hoist and saddle. Install speedometer pinion and cable and install retaining screw. Install shift lever-to-transmission manual valve lever rod. Install bellcrank-to-transmission throttle valve lever rod. On coupes and hardtops, install the body front pillar support cross-member. On cars with dual exhaust, install left exhaust pipe. Install propeller shaft assembly. Fill transmission to proper level (see "Draining & Refilling" above).

TORQUE CONVERTER REMOVAL & INSTALLATION

REMOVAL: Remove transmission (see above), and starter. Disconnect tail pipe support and remove the "U" bolt from exhaust pipe support at converter housing. Disconnect rear exhaust pipe from front exhaust pipe and pull muffler and pipe assembly rearward. Move assembly

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STUDEBAKER FLIGHTOMATIC (C ntinued)

to one side out of the way. Using a suitable support for engine (support must be shaped to support weight of engine at oil pan flanges and not under oil pan) and a hydraulic jack, remove rear insulator studs and raise engine just enough to have a separation between insulators and crossmember. Remove rear engine support crossmember. Remove converter bell housing-to-engine capscrews and remove bell housing, being careful not to damage dowels or distort converter blower. Lower rear of engine, being careful not to pull off water outlet hose (if additional clearance is required) drain cooling system and disconnect water outlet hose). Remove capscrews and washer holding converter assembly to the crankshaft-to-converter drive plate, and remove converter assembly.

INSTALLATION: Install converter assembly on the crankshaft-to-converter drive plate and loosely install retaining screws and lockwashers. Clean engine rear plate and mating surface on bell housing and install bell housing, taking care not to damage dowels or converter blower. Be sure bell housing is installed on dowels. Install bell housing retaining capscrews and tighten to 23-28 ft. lbs. If engine has been lowered, raise it to normal position. Position converter aligning tool, J-6310, into bore of bell housing and over pump drive fingers on torque converter assembly. Install the two upper transmission capscrews to hold aligning flange in position, and rotate converter assembly through two complete revolutions to center the torque converter assembly. Tighten converter-to-drive plate capscrews to 23-28 ft. lbs. Remove aligning tool. Install rear engine support crossmember. Install exhaust pipe, muffler and tail pipe assembly, making sure that proper alignment exists between assembly and the supports. Install transmission (see above), and starter.

TRANSMISSION OVERHAUL

CONVERTER OVERHAUL: Converter assembly is welded together and cannot be disassembled for servicing or overhaul.

TRANSMISSION OVERHAUL: Transmission overhaul procedures are the same as for Fordomatic, Merc-O-Matic, & Turbo-Drive Transmissions. *See "Fordomatic, Merc-O-Matic, & Turbo-Drive Transmissions" in 1956 Annual Data and note the following:*

CONTROL VALVE DISASSEMBLY & REASSEMBLY

►*CONTROL VALVE DISASSEMBLY NOTE:* Each valve body of the assembly should be disassembled, cleaned and inspected, and reassembled at one time to reduce the possibility of interchanging springs in the assembly. Clean all parts in solvent and dry with compressed air. Inspect all valves for burrs, scores or scratches. Check fluid passages for obstructions. Inspect mating surfaces for nicks and burrs. Check springs for distortion.

DISASSEMBLY: (Upper Valve Body)–Remove four capscrews and lockwashers that attach lower valve body cover to control valve assembly. Invert assembly and remove the screw attaching separator plate to lower valve body. Remove upper valve body and separator plate. Remove the two separator plate attaching screws and remove separator plate (note that one of the screws is countersunk). Remove throttle valve return spring screws and remove spring. Remove the remaining screw and rear plate. Remove compensator cut-off valve and remove manual valve. Remove front plate retaining screws and lockwashers, and remove plate. Remove downshift valve, throttle valve spring and throttle valve. Remove compensator valve sleeve, valve plug. valve inner and outer springs and the compensator valve. Remove modulator valve and spring assembly. *NOTE*–Do not separate modulator valve and spring assembly.

Reassembly: After cleaning and inspection install modulator valve and spring assembly, compensator valve, inner and outer springs, valve plug and sleeve; throttle valve, valve spring, and downshift valve in their respective bores and install front plate and attaching screws. Tighten screws to 20-30 inch lbs. Install compensator cut-off valve in its bore and install rear plate and screw. *NOTE*–When installing rear plate the throttle valve must protrude from the valve body to provide clearance for the stop on the rear plate. Position throttle valve return spring on rear plate and install screws. Tighten screws to 20-30 inch lbs. Position separator plate on upper valve body and install the screw. Tighten screws to 20-30 inch lbs. Install manual valve in its bore.

DISASSEMBLY: (Lower Valve Body)–Remove rear pump check valve seat, valve and spring. Remove screws and washers attaching cover to lower valve body and remove cover. Remove separator plate. Remove retainer facer screws and lock washers and remove the side plate. Remove inhibitor valve spring and valve, and 2-3 shift valve governor plug from their respective bores. Remove the four remaining screws and lockwashers and remove the end body. Remove transition valve and spring, 2-3 shift valve inner and outer springs and 2-3 shift valve, and orifice control valve and spring. Remove the 2-3 shift valve plug and the orifice control valve plug from the end body. Remove retaining screws and remove end body plates.

Reassembly: Position end body plate on end body and install retaining screws and lockwashers. Tighten screws 20-30 inch lbs. Install orifice control valve plug and the 2-3 shift valve plug in their respective bores. Install orifice control valve spring and valve; the 2-3 shift valve and inner and outer springs, the transition valve spring and valve in their respective bores. Position the end body on lower valve body and install retaining screws and lockwashers. Tighten screws to 20-30 inch lbs. Install the 2-3 shift valve governor plug, and the inhibitor valve and spring in their respective bores. Position side plate on lower valve body and install retaining screws and lockwashers. Tighten to 20-30 inch lbs. Install rear pump check valve spring, valve, and seat.

DISASSEMBLY: (Lower Valve Body Cover)–Remove end plate retaining screws and lockwashers and remove end plate. Remove rear servo check valve spring and check valve from its bore. Remove the 1-2 shift valve and spring from its bore. *NOTE*–Models with "intermediate gear start" (later Commander & President models, and early Commander & President having a modified control valve assembly) have the 1-2 shift valve spring, which is conical, installed between end plate and valve. All Champion models, and early Commander & President models have the spring located at opposite end of valve.

Reassembly: After cleaning and inspection, install the 1-2 shift valve and spring (see "Disassembly" above for spring location), and the rear servo check valve and spring in their respective bores. Position end plate on lower valve body cover and install retaining screws and lockwashers. Tighten screws to 20-30 inch lbs.

►*CONTROL VALVE REASSEMBLY NOTE:* Position the upper valve body and separator plate on lower valve body and install retaining screw and lockwasher, do not tighten screw. Position separator plate and lower valve body cover on lower valve body and install retaining screws and lockwashers, do not tighten screws. Install four capscrews and lockwashers that attach lower valve cover to control valve assembly. Tighten capscrew to 4-6 ft. lbs. Tighten all retaining screws to 20-30 inch lbs.

AIR CONDITIONING SERVICE CAUTIONS

DISCONNECTING LINES OR UNITS FOR SERVICING ENGINE: *See Individual Air Conditioning Car Data.*

HANDLING FREON: Though considered the safest and best refrigerant for use in Air Conditioning systems the following precautions must be observed to avoid serious accidents or damage to the system

Drum: 1) Do not leave drum uncapped (metal cap furnished with drum is for protection of valve and safety plug) It should be replaced after each use of drum

2) Do not carry drum in passenger compartment of car Place drum in luggage compartment or if in an open truck cover drum to protect it from radiant sun heat If precaution not taken resultant increase in pressure may cause safety plug to release or drum to burst

3) When charging system do not subject drum to high heat Use water no warmer than 125°F (Hot rags will suffice) *Never place drum on radiator, stove, or use torches for heating during charging* Keep drums upright

4) Never permit a drum to be dropped or strike another drum violently

5) Do not fill drum completely (when filling one drum from another) Leave space above liquid for expansion

P rsonal: 1) Do not discharge Freon into room with exposed flame because concentrations of this gas in contact with open flame will produce a toxic gas

2) Do not expose eyes to liquid *USE GLASSES OR GOGGLES Liquid Freon will freeze anything with which it comes in contact* If Freon should strike eyeballs splash water to area of eye to gradually get temperature above freezing point apply a few drops of sterile mineral oil to eyes as an irrigator If irritation continues wash eyes with a weak solution of boric acid *DO NOT RUB EYES See an eye specialist at once*

3) Do not inhale large quantities of Freon vapor as it will act an an anesthetic

4) If Freon comes in contact with skin injury should be treated for frostbite

HANDLING REFRIGERANT LINES. 1) Keep refrigerant lines dry and clean Whenever a connection or joint is broken clean all dirt from joint or connection

2) Parts from stock are capped and dehydrated Caps should only be removed just prior to installation Lines removed from system to be used again should be capped immediately, to prevent dirt and moisture from entering lines

3) Lines should be free of kinks, and should be carefully stored to avoid crushing or bending

4) Proper size wrenches should be used when tightening fittings Always use two wrenches to prevent twisting copper tubing

5) Tubing that is left free to vibrate will harden and crystallize the area of the tubing at flare sections so that it may become brittle and break

6) When using paint drying lamps, ovens steam cleaners, or other heat producing devices avoid heating any part of system If sufficient heat applied, pressure will increase to a point where system will rupture

7) When undercoating, use care to see that undercoating does not plug evaporator drain Do not coat air conditioning joints and connections

8) Keep gauge set and lines free of moisture

9) Compressor lubricant container must not be left open longer than necessary as the special oil is moisture free and will absorb moisture from air if left uncapped

AIR CONDITIONING LEAK TESTS

LEAK TESTING CONFINED AREAS For leak testing confined areas such as sections of evaporator and condenser a torch or flame type detector must be used Two types are available One type uses anhydrous methyl alcohol under pressure for producing the testing flame The cylinder is refillable and must be pre heated to pressurize cylinder The other type uses propane gas under pressure to produce the testing flame The cylinder is replaceable and comes already pressurized making it unnecessary to pre-heat cylinder in order to produce testing flame Instructions for use of the detectors are furnished with the detector

Leak Testing With flame adjusted explore for leaks by moving end of hose or sampling tube around all points where a leak may be Especially check around bottom of connections since Freon is heavier than air and will be more apparent at bottom of fitting Color of flame will turn to a yellow-green when a small leak is detected Large leaks will be indicated by a change in color to bright or brilliant blue or purple When hose or tube is moved away from leak flame will clear to an almost colorless pale-blue or green *CAUTION*–Do not use lighted detector in any place where combustible or explosive gases dust or vapors may be present Do not breathe fumes and black smoke that are produced if leak is a big one Before leak testing be sure car is thoroughly aired (particularly if Freon tank used or if system opened for any reason) and moved to a Freon-free area in order that false readings may be prevented

PIN-POINTING LEAKS There are a number of fittings and places throughout the air conditioning unit where a leak detector solution or detergent may be used to pin-point leaks Apply solution to suspected area with with swab that is attached to bottle cap Bubbles will will form within seconds if there is a leak

AIR CONDITIONING TROUBLE SHOOTING

►*CAUTION Do not disconnect refrigerant lines, replace parts, or attempt adjustments without complete instructions See "Air Conditioning Service Cautions"*

POOR COOLING: 1) Blowers Not Operating–Fuse blown or faulty circuit breaker, switch in "Off" position, defective switch, switch resistors or blower rheostats inoperative, broken wire or loose connections, blower motor defective, blower fans or motor improperly installed

2) Restricted Air Flow–Filters clogged, dirt or other obstructions in air ducts, evaporator fins or coils clogged or restricted with frost or ice

3) Refrigerant Flow to Cooling Coils or Fins Incorrect–Expansion valve improperly adjusted or defective, power element or temperature bulb does not contact pressure line properly, restriction in liquid line between receiver and cooling coils or fins, power element or temperature bulb discharged, insufficient refrigerant, by pass valve thermostatic switch or solenoid (if so equipped) not properly set or inoperative, modulator valve (if so equipped) defective, break in any part of closed refrigeration system

4) Refrigerant Not Condensing Properly–Air flow through condenser restricted high engine operating temperatures, air or excess refrigerant in system, restriction in high pressure side of compressor and condenser

5) Clutch (If So Equipped) Does Not Engage–Defective coil or relay, clutch plate lining worn or saturated with oil causing slippage, air conditioning "On" switch defective, thermostat inoperative, clutch adjustment incorrect

6) C mpr ssor - Belts not adjusted properly worn or broken operating above normal pressures valves faulty service valves not fully open

7) El ctrical–Loose connections or broken wires between electrical units blown fuses or faulty circuit breakers

TOO COLD· 1) Clutch (If S Equipp d) Do s Not Disengage–Thermostat inoperative, relay stuck closed, air conditioning "On" switch inoperative

2) Blower Speed Cannot be R duced–Defective blower switch

VIBRATION–NOISE 1) Blow rs–Loose on shaft, striking housing foreign material, motor bearings or mounts loose or worn

2) Compressor–Mounting brackets loose, loose internal parts, insufficient oil, too much refrigerant

3) Air Flow–Foreign material in air system, small slits or openings in ducts

INCORRECT OPERATING PRESSURE: 1) Exc ssiv Pressure on High Pressure Sid–Air or excess refrigerant in system, air flow through condenser core restricted, kinks or restrictions in line on high pressure side, high engine temperature, shut-off valve on high pressure side of compressor not fully open, insufficient air flow through cooling coil, defective expansion valve or incorrect adjustment

2) Insufficient Pressure on High Pr ssure Side–Shortage of refrigerant, defective expansion valve or incorrect adjustment, leaky or broken compressor valves

3) Excessive Pressure on L w Pr ssur Side–Power element or temperature bulb not making correct contact with pressure line expansion valve needle stuck open or leaking

4) Insufficient Pressure on L w Pressur Side–Restriction in lines shortage of refrigerant, expansion valve needle stuck shut expansion valve not open far enough plugged or defective, dehydrator-filter (strainer-drier) plugged, power element or temperature bulb charge lost or line plugged compressor valves faulty, blower fans inoperative, temperature control thermostat does not cut out, moisture or freeze-up

CHRYSLER, DE SOTO, DODGE, PLYMOUTH

Chrysler, DeSoto, Dodge, Plymouth & Imperial (1957)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1957 "V2" COMPRESSOR NOISE (WHISTLING – PULSATING) CORRECTION:* This condition can be corrected by installing a new compressor oil pump relief valve ball (MoPar Service Package, Part No. 1843474). See *"Compressor" below for installation procedures.*

▷*1957 AIR CONDITIONER OPERATING CAUTION: Engine cooling system must be protected to a temperature of 20°F. above zero for summer operation.*

DESCRIPTION: This new unit is a combined heater-air conditioner system with all components located on dash panel and in engine compartment. Temperature control is obtained through a reheating process. During the cooling cycle, air is cooled as it passes through the evaporator coil and then is reheated to the desired temperature by the heater core. Air for this cycle may be brought from outside the car or it may be recirculated. During the heating cycle, outside air is introduced into the system through a permanently open vent in top of cowl section, and is drawn through both the cooling and heating coils by a centrifugal blower. The heated air is then forced into the duct for distribution. The air conditioner compressor is a two cylinder reciprocating type located on right side of engine and driven by a belt. A magnetic clutch on the compressor is actuated by a thermal switch and controls operation of the compressor in relation to requirements of the system. The Recirculating Door is operated by engine oil pressure through a power piston and is controlled by the main operating control lever on instrument panel.

SERVICE CAUTIONS: *Before disconnecting any part of air conditioning system or lines, see "Air Conditioning Service Cautions" at beginning of Air Conditioning Section.*

LEAK TESTING & TROUBLE SHOOTING: *See "Leak Testing" & "Trouble Shooting" at beginning of Air Conditioning Section.*

COMPRESSOR REMOVAL (For service work on engine): Air conditioning compressor cannot be repositioned for service work on engine except by disconnecting and removing it from the engine compartment. See *"Compressor" below.*

ADJUSTMENT

ADJUSTMENTS: Compressor Belt – Adjust as follows: Chrysler, DeSoto, Dodge & Imperial – 3/8" (used belt), 5/16" (new belt) deflection with a 5 lbs. pull at center of longest span.

Plymouth – 5/16" (used belt), 3/16" (new belt) deflection with a 5 lbs. pull at center of longest belt span.

▷*FAN BELT REPLACEMENT NOTE: Always replace both compressor belts. Do not run a new belt with an old one.*

Thermal Switch: Three positions are provided for adjustment at eccentric slot on side of switch. To adjust, turn in clockwise direction for "Cold" or counterclockwise for "Warm". When midway between these two points the temperature setting will be "Normal", which is standard factory setting.

Checking – Insert thermometer bulb through hole at lower left side of evaporator housing into well of suction line, then seal the opening with tape. Connect a test light lead to compressor circuit and the other lead to ground. Operate engine at 1200 RPM, control switch on "Cooling", and control lever at "Cold". Test light should light. Turn blower switch off. Close all windows and allow thermal switch to cycle a few times, indicated by test light going on and off. The following specifications indicate opening and closing of thermal switch (in relation to switch setting).

Thermal Switch Specifications

Adjustment	Switch Opens	Switch Closes
Normal Setting	34°F ± 2°F	37°F ± 2°F
Cold Setting	30°F ± 2°F	34°F ± 2°F
Warm Setting	42°F ± 2°F	45°F ± 2°F

Expansion Valve: Not adjustable. If unit is faulty, it must be replaced.

SERVICING

▷*INTAKE & DISCHARGE SERVICE VALVE NOTE:* On Chrysler and Imperial, both service valves are attached directly to the compressor. On DeSoto, Dodge & Plymouth, the intake service valve is attached to compressor and the discharge service valve is connected in discharge tube at inlet side of condenser. Rotating the valve stems *COUNTERCLOCKWISE,* until valves are fully open, is the operating position. This position also isolates the service ports for connecting gauge manifold set. Rotating valve stems *CLOCKWISE,* until valves are fully closed, isolates the compressor from the system. *CAUTION – Do not operate compressor with valves in CLOCKWISE position.*

COMPRESSOR OIL LEVEL: Checking & Filling – Place temperature control on "Cool", blower motor on "High", and toggle switch on "Cool". Operate engine at 1200 RPM for about 10 minutes to return any excess oil to compressor crankcase. Stop engine and remove protective caps from discharge and intake service valves, then close both valves by turning stem clockwise with Tool C–3361, until valve is firmly seated. *(CAUTION – Do not start engine with service valves in the closed (clockwise) position).* Clean area around compressor filler plug and discharge service valve port cap with solvent and blow dry with air. Carefully loosen the 1/4" flare cap fitting of discharge service valve 1/4 turn and gradually release or purge gas pressure from compressor. When completely purged, loosen (do not remove) oil filler plug on compressor enough to allow gas pressure (if any) to escape. When pressure is released, remove filler plug and use a clean dry dipstick (1/8" round or similar rod) to measure oil level. See table below for correct oil level. Add MoPar Air Conditioning Oil as required, or siphon off excess oil if necessary, then replace oil filler plug. Loosen discharge valve service port cap approximately 1/2 turn, then slightly open the intake service valve (counterclockwise) and let gas drift slowly through compressor for about 10 seconds. This will purge air from compressor. Tighten cap on discharge port and turn both valves fully counterclockwise. Replace protective caps and tighten securely.

Compressor Oil Capacity

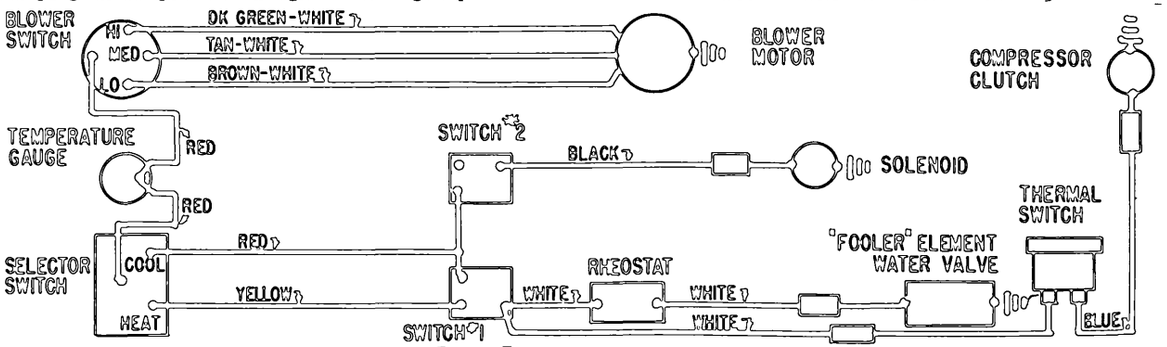
Model	Height on Dipstick
Chrysler & Imperial	2-2 1/2"
DeSoto	1 1/8-1 3/8"
Dodge & Plymouth	3/4-1"

GAUGE SET (TOOL C–3354) INSTALLATION: Remove protective caps from intake and discharge valves. Using Tool C–3361, make sure that both valves are turned fully counterclockwise. (*NOTE* – This is the normal operating position). Remove protective caps from both service valve ports. Install 4 ft. test hose from 600 lb. gauge fitting on Tool C-3354 to discharge service valve. Connect a similar hose to 300 lb. and to intake service valve. Turn both valves on gauge set fully clockwise.

DISCHARGING THE SYSTEM: Install Gauge Set, Tool C-3354 (see above) and connect an 8 ft. test hose to gauge manifold center fitting. Open discharge and intake service valves one turn (clockwise from a full counterclockwise position). Crack gauge set manifold discharge valve a fraction of a turn counterclockwise and allow gas to escape. *(CAUTION– Opening manifold valve t much will cause compressor oil to be drawn off with the gas).* As pressure on manifold discharge gauge drops near zero, open manifold intake valve.

EVACUATING THE SYSTEM: *(NOTE – After air conditioning system has been opened to the atmosphere, it is absolutely essential that the system be evacuated and swept with refrigerant to remove all air and moisture).* Connect gauge set to compressor and discharge system (see above). Connect an 8 ft. test hose to center fitting on manifold and to Vacuum Pump, Tool C-3372. Open both discharge and intake service valves about one turn (clockwise). Open both gauge set manifold valves (count-

CONTINUED ON NEXT PAGE



CHRYSLER, DE SOTO, DODGE, PLYMOUTH AIR COND. CONTROL DIAGRA

CHRYSLER, DE SOTO, DODGE, PLYMOUTH (Continued)

erclock wise). Start vacuum pump and check compound gauge (vacuum & pressure). Operate pump until gauge registers 26-28 inches of vacuum. Continue evacuating at this vacuum for five minutes. *(NOTE – If vacuum of 26-28 inches cannot be obtained, a leak is indicated in the system and must be corrected. See "Leak Testing" at beginning of Air Conditioning Section).* Close both gauge set manifold valves. Turn off vacuum pump and remove long gauge hose. Charge system with refrigerant gas *(See "Charging The System" below).* Start engine and operate at 1200 RPM for 5 minutes, with temperature control on "Cold", and blower on "High". Check for leaks, then discharge system *(see "Discharging The System" above).* Again evacuate the system at 26-28 inches of vacuum for 10 minutes. Recharge system with 3 lbs. of refrigerant *(see "Charging The System" below).*

CHARGING THE SYSTEM: With air conditioning system purged and evacuated (see above), proceed as follows: Attach "Drier" and "Dry-Eye" units to refrigerant tank (Refrigerant 12), then open valve on "Dry-Eye" unit and purge air from drier by opening valve on refrigerant tank for a few seconds. Close valve on "Dry-Eye" unit and install a 1/4" cap at end of valve. Check all connections for leaks, and correct as necessary. Open valve on refrigerant tank and allow "Drier" to absorb any moisture that may be present in the refrigerant. *(NOTE – Window on "Dry-Eye" unit should change to a deep blue before proceeding further).* Remove cap from valve on "Dry-Eye" unit and connect an 8 ft. test hose between valve and center fitting on gauge manifold, making sure that both valves on gauge manifold are fully closed. Open valve at "Dry-Eye" unit and slightly loosen test hose at center fitting for a second or two to purge air from hose, then tighten hose and close valve. Start car engine and operate at 1200 RPM with blower control set to "High" and temperature control set at "Cold". Open both the discharge and intake valves at compressor one full turn (clockwise). *NOTE* – If gauge hand fluctuates, close discharge valve at compressor (counterclockwise) slowly until gauge hand steadies. Place refrigerant tank upright in a pail of warm water (maximum temperature 125°F), then set tank and pail on a scale and weigh the assembly. Make a note of the combined weight. Open intake valve on gauge manifold slightly (counterclockwise), and control the refrigerant entering system with this valve. *(CAUTION – Do not allow pressure to exceed 60 lbs.).* Carefully watch scale and shut refrigerant tank valve off when system has absorbed 3 lbs. Close intake valve on gauge manifold (clockwise) and both valves on compressor (fully counterclockwise). Remove center hose from gauge manifold, allowing pressure in hose to escape slowly. Remove test hoses from compressor valves.

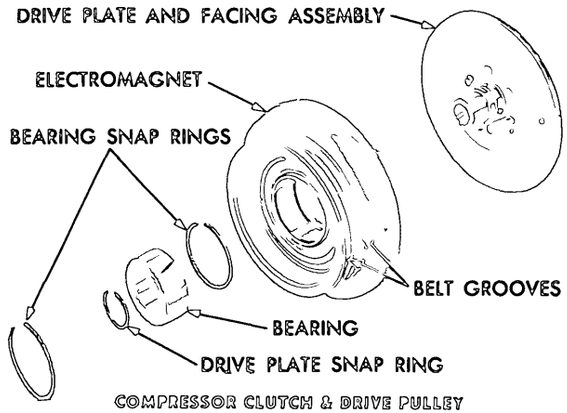
COMPRESSOR: *(NOTE – "V" type compressor used on Chrysler & Imperial, "In-Line" type compressor used on DeSoto, Dodge & Plymouth.*

▷ *COMPRESSOR REPAIR NOTE (DeSoto, Dodge & Plymouth):* Valve plate assemblies, intake & discharge service valves, cylinder head, gaskets, shaft seal and support brackets are the only parts that are available for service replacement. If pistons, cylinders, crankshaft or connecting rods are damaged, the complete assembly must be replaced.

▷ 1957 *CHRYSLER "V" TYPE COMPRESSOR NOISE (WHISTLING – PULSATING) CORRECTION:* Install a new compressor oil pump relief valve ball (MoPar Service Package, Part No. 1843474) as follows: With compressor removed from engine (see below), secure right head of compressor in a vise in such a manner so compressor body mating line with oil sump is in a horizontal position (to prevent loss of oil when sump is removed). Remove oil sump-to-compressor bolts, making sure that outer surfaces of sump and crankcase are clean Slightly tap sides of sump with a plastic hammer to break seal to compressor. *(CAUTION – When breaking sump-to-compressor seal, do not allow sump to break loose quickly or with a sideways motion as the relief valve spring may be lost).* Remove oil sump and take out the oil pressure relief valve spring. Remove old gasket, being very careful to prevent any foreign material falling into crankcase. Make a small ball out of body sealing compound and place it on the end of a pencil point. Insert it into hole from which spring was removed and press down slightly. Steel relief valve ball will adhere to end of pencil and can then be removed. Place rubber replacement ball in hole and replace the spring. Dampen both sides of a new gasket with refrigerant oil and set it in place. Make sure mating surface of sump is clean. Using two of the longer bolts as guides, place sump onto compressor, compressing the relief ball spring. Install sump bolts and tighten to 22 ft. lbs. Reinstall compressor on engine and evacuate, sweep, test for leaks and charge system *(see above).*

Removal: On Chrysler & Imperial models, the air conditioning system must be completely discharged for compressor removal *(see "Discharging The System" above).* On other cars, start engine and operate at fast idle until compressor is warm, then shut off engine. Close intake and discharge service valves by rotating stems clockwise, using Tool C-3361, until both valves are fully seated. Loosen port caps on both valves a couple of turns to gradually release gas pressure. Loosen oil filler plug a few turns (do not remove). On all cars, remove drive belts. On DeSoto, Dodge & Plymouth, disconnect discharge flared connection at discharge valve fitting. Remove screws securing intake service valve to compressor (all models), and screws securing discharge service valve to compressor (Chrysler & Imperial). Remove compressor-to-support and mounting bracket attaching screws. *(CAUTION – Be careful not to bend vibration eliminator excessively or it will be damaged).* Remove compressor from engine, then cover all openings with masking tape.

Installation: Reverse removal procedure and note the following: On Chrysler & Imperial models, evacuate, sweep, test for leaks, then charge system *(see above).* On DeSoto, Dodge, & Plymouth, purge air from compressor by opening the intake service valve counterclockwise slightly and loosening the discharge service port cap a few turns for about 10 seconds. This will allow gas to drift through compressor and bleed air from system. Rotate both discharge and intake service valve stems counterclockwise until they are fully back seated. Start engine and turn on blower and temperature control switches to "High" and "Cold". Operate engine for 5 minutes, stop engine and test for leaks. Test operation of system, then remove gauge set.



COMPRESSOR CLUTCH & DRIVE PULLEY

COMPRESSOR VALVE PLATE REPLACEMENT (DESOTO, DODGE & PLYMOUTH): Remove compressor from car (see above). Remove cylinder head bolts and tap cylinder head with a plastic hammer. If, when lifting the cylinder head, the valve plate does not come off with it, separate head from plate by placing a brass rod against plate and head between cylinders at side of head and tapping it. *(CAUTION – Do not tap plate near finished surface).* Remove head, valve plate, and gaskets. Examine valves. If valves are broken, and the parts have damaged top of piston or scored cylinder walls, replace the compressor. If compressor is not damaged, clean cylinder block top and cylinder head thoroughly. Be sure to remove all shreds from old gasket. Install cylinder head bolts in head, then place a piece of cardboard over bolt heads and turn assembly upside down. Lay on bench with bolts facing up. Dip new gaskets in clean refrigeration oil. Place cylinder head gasket, then valve plate, and last, the valve plate gasket over bolts. Lift the cardboard, turn assembly over and place the entire assembly on cylinder block and start the bolts. Tighten bolts evenly (from center out) to 15-20 ft. lbs. Install compressor.

COMPRESSOR CYLINDER HEAD REMOVAL & INSTALLATION (Chrysler): *See "Compressor Valve Plate Replacement (DeSoto, Dodge & Plymouth)" above,* and note the following: Install cylinder head bolts and tighten each bolt alternately and evenly to 26 ft. lbs.

COMPRESSOR SHAFT SEAL REPLACEMENT (DESOTO, DODGE & PLYMOUTH): With compressor removed from car (see above), remove self locking bolt from compressor crankshaft at front of pulley. Tap pulley and clutch assembly to free it from tapered shaft *(CAUTION – Do not damage brushes when removing or installing clutch. If brushes are allowed to snap to full travel, they will break).* Remove brush holder assembly. Remove compressor front bearing end plate, then install Puller, Tool C-3473, using the center screw that threads into end of compressor shaft. Install alignment screws in puller and screw them in until inner steps on puller contact the seal bellows evenly. Hold compressor shaft by

CONTINUED ON NEXT PAGE

CHRYSLER, DE SOTO, DODGE, PLYMOUTH (Continued)

inserting a screw—driver in shaft keyway and resting against puller leg while turning the puller screw. Compress bellows sufficiently to expose retaining snap ring, then remove snap ring. Change puller screw, using the one designed to press against center of compressor shaft, and install the two screws through puller plate, threading them into the holes provided in compressor end plate. Turn in on center screw and remove compressor front bearing end plate and seal assembly. Remove carbon seal and "O" ring from bearing end plate. To install seal, coat new bearing end plate gasket and large "O" ring with refrigeration oil. Install "O" ring in front bearing end plate. Install gasket and end plate, then insert two long screws on opposite side of plate. *(NOTE – Make sure that oil pocket is upward).* Start end plate squarely and tighten screws evenly finger tight. Install puller, using the center screw designed to be threaded into center of compressor shaft. Hold compressor shaft with screwdriver and pull bearing end plate into housing. Remove puller and install screws. Tighten evenly to 15—20 ft. lbs. Coat carbon seal with refrigeration oil and place over shaft with tangs in recesses of end plate. Lubricate "O" ring in seal with refrigeration oil, then slide end snap ring over compressor shaft. Install puller and compress bellows (in same manner as for removal). While compressing bellows, rotate to insure proper alignment. Install snap ring, making sure that ring is seated in groove. Remove puller. Install brush holder assembly *(CAUTION – Be very careful not to damage brushes).* Install magnetic clutch and pulley assembly over shaft, lining up keyway and key. Push assembly over shaft and install washer and self locking nut. Tighten to 15—20 ft. lbs.

MAGNETIC CLUTCH: *NOTE – Servicing on this assembly is limited to the drive plate, pulley, and electro-magnet assembly, snap rings, bearing and brush holder assembly.*

▷*SERVICING CAUTION: Do not attempt to remove the electro-magnetic coil from pulley assembly. The coil is held in place with a special adhesive material. Once this bond is broken, the coil cannot be reattached.*

Current Draw: 1. 5—2. 0 amps. at 12.0 volts.

Removal: Loosen and remove the drive belts. On Chrysler, Imperial, & DeSoto, remove the upper right shroud section. Remove self locking bolt and washer from compressor shaft at center of clutch. On Chrysler & Imperial, support clutch assembly and remove pulley with a 5/8" cap screw, screwed into end of clutch shaft. On DeSoto, Dodge, & Plymouth, support clutch assembly with one hand and tap the pulley with a soft hammer and remove assembly from compressor.

Drive Plate Removal & Installation – Remove drive plate retaining snap ring hub with Tool C—3301. Place suitable sleeve against hub and remove drive plate by tapping sleeve with a soft hammer. Inspect springs for loss of tension and cracks, and inspect liner on face of plate. Replace drive plate if liner is worn, springs are weak or broken, or if drive plate is warped. Install drive plate by installing plate hub squarely into inner bearing race. Place a brass drift against drive plate inner hub and tap plate hub into bearing by tapping on brass drift with a hammer. Install snap ring on hub. Use a long feeler that will reach into gap at hub and measure air gap between drive plate and electro-magnet. Air gap should measure .025—.035". Adjust air gap by turning the three screws on front face of drive plate. Adjust all three screws to obtain an evenly spaced air gap.

Clutch Bearing Replacement – Remove drive plate (see above). Remove snap ring and grease slinger (at outer race of bearing) from pulley assembly. Tap bearing from pulley assembly.

Installation: Align key and keyway and push clutch assembly over shaft and key. Install self locking bolt and washer. Install upper right shroud section on Chrysler, Imperial, & DeSoto. Install drive belts.

FRIGIDAIRE & HARRISON

Buick (1957)
Cadillac (1957) See Series 75 Note below.
Chevrolet (1957)
Oldsmobile (1957)
Pontiac (1957)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*CADILLAC SERIES 75 NOTE: The evaporator unit used in this model is located in the trunk.*

▷*1957 BUICK COMPRESSOR DISCHARGE VALVE PLATE PRODUCTION CHANGE (To correct a noisy compressor condition):* Beginning with compressor Serial No. 44GC002, a new discharge valve plate, Part No. 5913872 is being used to reduce compressor noise. This plate may be used on 1956 and early 1957 compressors. *NOTE - On 1956 compressors, if the discharge plate is defective and the compressor is not noisy, Discharge Valve Plate, Part No. 5912672 should be used.*

▷*1957 BUICK FAN SHROUD PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE:* The full type fan shroud, Part No. 1178037 used on early air conditioned cars has been replaced by a ring type shroud, Part No. 1174402. Use the ring type shroud for service replacement on cars having the full type shroud. Two mounting brackets, Part No. 1178198 & 1178199 must be used to install the ring type shroud. *See "Radiator Production Change" below.*

▷*1957 BUICK RADIATOR PRODUCTION CHANGE:* A new wider radiator is being used on late 1957 air conditioned cars. A new full type fan shroud, Part No. 1179450, and mounting brackets, Part No. 1178198 & 1178199 is used with the wider radiator.

▷*1957 BUICK INSUFFICIENT COOLING CORRECTION:* This condition may be caused by the Ranco valve not being locked out due to improper adjustment of the control cable or the lock pin on cam of Ranco valve not being positioned properly. To adjust control cable, loosen cable clamp at valve, and close valve, making sure that cam is in complete engagement with lockpin and holding lockpin up. Set control knob 1/16" from the off position and tighten cable clamp. Check to see that valve is locked out when control lever is in the "off" position. To adjust lockpin (in instances where the valve is not operating properly, allowing warm water to enter heater core and warming the cool air before it enters passenger compartment), bend lockpin on Ranco valve "down" just enough to cause a drag on cam of valve, or when rotating cam clockwise, the cam over-center spring snaps edge of relieved portion of cam to centerline of lockpin, where further movement of cam to the fully closed position will lock valve closed. *CAUTION - The above lockpin adjustment must be made at room temperature or not more than 70°F.*

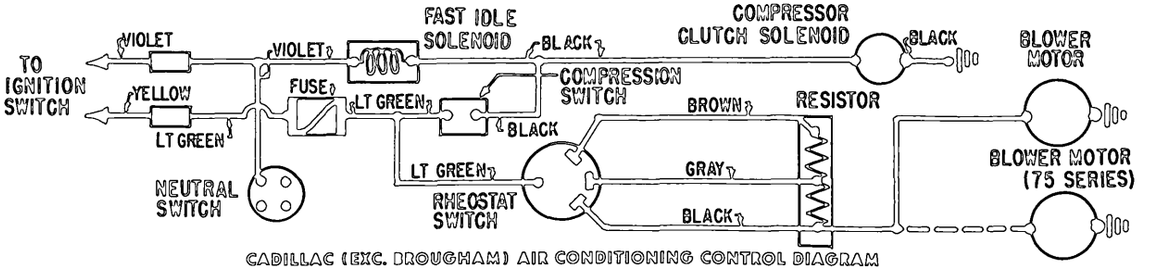
▷*1957 BUICK AIR CONDITIONING COMPRESSOR VIBRATION AT LOW SPEED (WITH BLOWER ON "LOW"):* This vibration may be reduced by reworking the compressor rear mounting bracket as follows: Remove bracket and use a 5/8" drill to enlarge bracket-to-intake manifold bolt hole. Remove burrs and rough edges. Reinstall compressor bracket using a spacer made from ½" I.D. welded steel tubing cut to a length of 7/32", and a spring washer. Tighten bolt at intake manifold to 10-15 ft. lbs. This will allow engine to move sideways without exerting pressure against bracket.

▷*1957 CADILLAC AIR CONDITIONER COMPRESSOR CLUTCH CHANGE:* On later cars, the rear face of clutch cover, Part No. 5916841, is not ground with a finished surface. The unground side, identified by a stamped letter "O", must be installed toward rear of compressor.

DESCRIPTION: Similar in design and operation to previous models with all units of the system located on front of dash or in engine compartment (except Cadillac Series 75 which has the evaporator located in luggage compartment). *See "Frigidaire & Harrison Air Conditioning" in 1956 Annual Data and note the following changes.*

Buick: Hand operated shut-off valves at compressor head have been replaced with Schrader type valves which

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CADILLAC (EXC. BROUGHAM) AIR CONDITIONING CONTROL DIAGRAM

FRIGIDAIRE & HARRISON (C ntinu d)

require special adapters for connection to charging lines *(CAUTION - As these adapters open the Schrader valves when installed, it is very important that Gauge Set, Tool J-5725, manifold valves be closed and charging lines be connected).* A nonadjustable Expansion Valve replaces the adjustable type.

Cadillac: High and low pressure hand operated shut-off valves at compressor head have been replaced by Schrader type valves, the high pressure being located at compressor head, and low pressure at hot gas bypass valve *(CAUTION - As these valves are opened by sp cial adapters on charging hoses, it is very important that charging hoses be connected to Gauge Set, Tool J-5725, and gauge set manifold valves be completely closed).* A Hot Gas Bypass Valve has been incorporated in the system to control operating temperatures, replacing the former Evaporator Freeze Control Thermostat.

Chevrolet: Schrader type valves in high and low pressure lines at compressor head have been replaced with hand operated shut-off valves. *(CAUTION - Both valves should be backseated (turned completely COUNTER-CLOCKWISE) when system is in operation and should b turned completely CLOCKWISE for removal of compressor).* A new nonadjustable thermostatic switch replaces the switch formerly used. The thermostatic expansion valve is factory adjusted and cannot be adjusted after installation. A high pressure line quick disconnect connection located just above the sight glass allows line to be broken without loss of refrigerant charge. This allows components of air conditioning system to be removed for service of other units in engine compartment.

Oldsmobile: A high pressure line muffler is mounted on the compressor to reduce noise and vibration. A new nonadjustable thermostatic expansion valve replaces the adjustable type formerly used.

SERVICE CAUTIONS: *Before disconnecting any part of air conditioning system or lines, see "Air Conditioning S rvice Cautions" at beginning of Air Conditioning Section.*

LEAK TESTING & TROUBLE SHOOTING: *See "Leak T sting" & "Trouble Shooting" at beginning of Air Conditioning Section.*

MAINTENANCE & INSPECTION: *See "Frigidaire & Harrison Air Conditioning" in 1956 Annual Data.*

ADJUSTMENTS: Compressor Belt - Adjust as follows:

Buick - Adjust compressor drive belt to 3/8" deflection measured midway between fan and compressor pulleys.

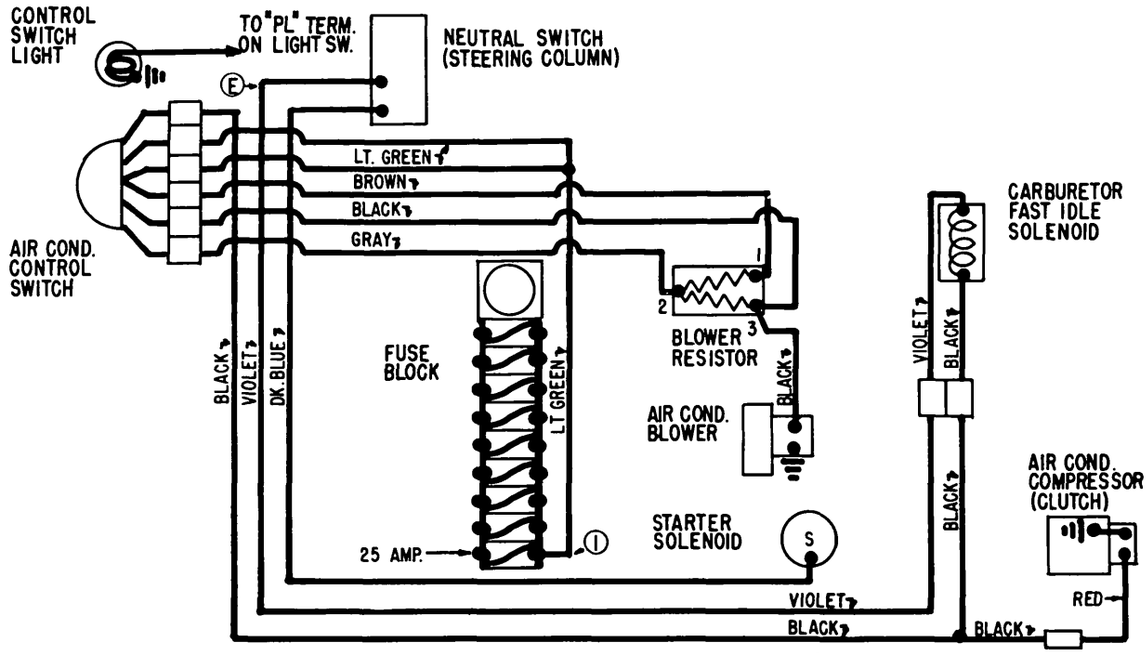
Cadillac - Using Belt Tensioner Gauge, Tool J-6733, install tool on belt and adjust tension so red line on gauge lines up with gauge shoulder.

Chevrolet - Install Tool 6212 on torque wrench, then place tool on compressor seal and coil housing with lug of tool facing toward rear of car and inserted into unused hole in compressor mounting flange on battery side of electrical connector. Loosen compressor brace bolt and bracket pivot bolt and apply 30-40 ft. lbs. torque to compressor. Tighten brace and bracket pivot bolts.

Oldsm bil - Loosen generator adjusting link bolt and bracket pivot bolts. Place Tool 33-70 on belt, then pry generator away from engine until pointers on Tool 33-70 are even with line on tool plunger. Tighten generator link bolt and bracket pivot bolts.

Pontiac - Loosen three bolts retaining idler pulley to mounting bracket (pump support bracket on power steering equipped cars). Heads of bolts are located behind pulley. Insert torque wrench in square hole at end of power steering pump (or idler pulley) bracket. Apply 35 ft. lbs. torque with wrench to tighten belt. While holding proper torque, tighten retaining bolts securely. *NOTE - Do not adjust belt unless looseness in indicated by slipping.*

Magnetic Clutch: Energize clutch coil from battery and check clearance between clutch plate armature and coil housing at three different positions. The clearance should be .025-.035". If clearance not correct, remove pulley and add or remove shims as necessary. Shims are furnished in .010", .015", .020", .025" thicknesses.



CADILLAC ELDORADO BROUGHAM AIR CONDITIONING CONTROL DIAGRAM

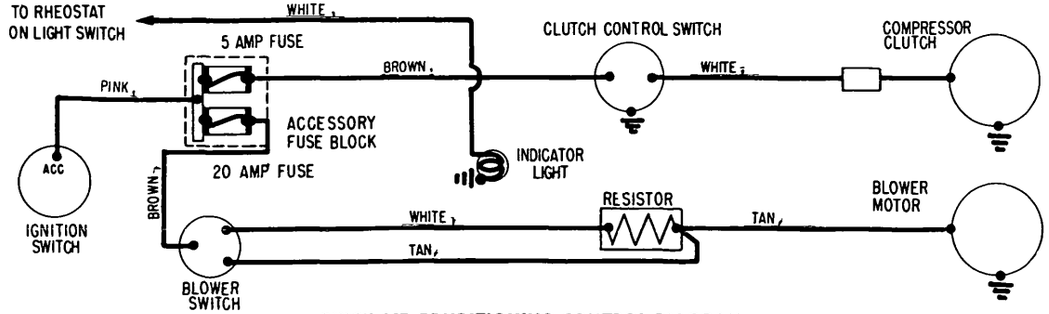
Expansion Valve: Expansion valve is preset at the factory and cannot be adjusted in the field.

Hot Gas Bypass Valve: Used on Buick, Cadillac & Oldsmobile. Adjust valve for each car as follows:

Buick - Disconnect valve control wire and remove control lever, counterbalance spring, and nylon cam follower. Connect Gauge Set, Tool J-5725 to compressor *(see "Gauge Set, J-5725 Installation" below).* Set engine speed at 1600 RPM, and turn unit on, allowing time for stabilization. Turn adjusting screw (located under nylon cam follower) in or out to obtain proper 28-30 lb. reading on "Low Pressure" gauge. Remove gauges, replace protective caps, cam follower, control pin, lever and spring, then readjust and connect control wire *(see below).*

Cadillac - Remove cap from gauge fitting on lower side of Hot Gas Bypass Valve. Install Adapter J-5420 on low

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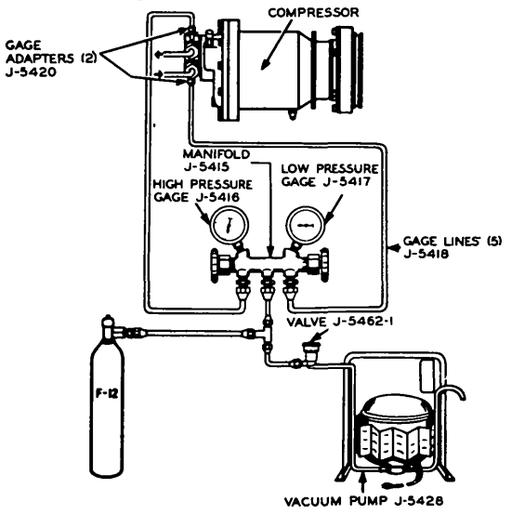
BUICK AIR CONDITIONING CONTROL DIAGRAM

FRIGIDAIRE & HARRISON (C ntinu d)

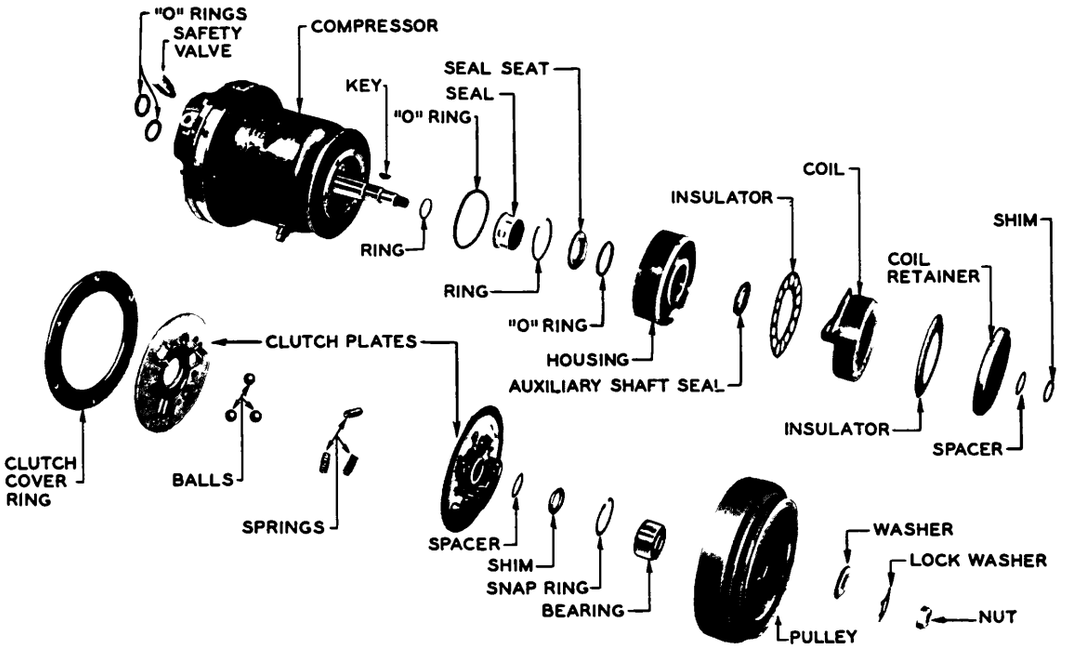
pressure gauge line and connect adapter to gauge fitting. Purge gauge and hose by opening low pressure gauge valve for a few seconds. Start engine and allow to run at 1500 RPM. Move "Temp" lever to coldest setting and set "Air Cond" lever to "low". Check pressure on gauge and adjust only if reading is not 29½-30¼ lbs. To adjust, disconnect return spring and bowden cable, then remove control lever and nylon plunger. Using Tool J-6389, turn adjusting screw clockwise to increase pressure, counterclockwise to decrease pressure, to obtain 30 lbs. pressure. *(NOTE - Turn adjusting screw ¼ turn and allow time for gauge to settle).* With engine off, remove gauge hose from pressure fitting and replace cap. Adjust control cable *(see below).*

Oldsmobile - Remove cap from gauge fitting on low pressure line near the evaporator assembly. Install Adapter J-5420 on low pressure gauge line and connect adapter to gauge fitting on low pressure line. Purge gauge and hose by opening low pressure gauge valve for a few seconds. Start engine and allow to run at 2000 RPM. Move temperature control lever to extreme right position, turn blower speed on "low" and engage "Recirculation" button. Place paper in front of condenser to obtain a head pressure of 200 lbs. Check pressure on low pressure gauge and adjust only if pressure is not 29-30 lbs. To adjust, remove control cable, lever and cam, then insert Tool J-6389 into valve. Adjust pressure to 29½ lbs. by turning screw clockwise to increase pressure, counterclockwise to decrease pressure. Turn engine off, remove gauge hose from pressure fitting and replace cap. Reinstall control lever assembly, then adjust control cable *(see below).*

Control Cable Adjustment (Hot Gas Bypass Valve): Buick - Set temperature control (left hand) lever on lower roll of control panel to "Max.". Disconnect bowden wire loop from pin on lever of hot gas bypass valve and push lever all the way toward dash and release slowly. Lever will stop in "Max." cooling position. Adjust bowden wire sheave so loop matches position of pin on lever. Clamp bowden sheave in position with loop encircling pin and replace spring grip washer.



GAU E SET INSTALLATION



COMPRESSOR CLUTCH & SEAL ASSEMBLY (TYPICAL)

Cadillac - Check to insure cable is not kinked and operates freely, then disconnect return spring. Place "Temp" control lever in extreme forward position. Disconnect control cable from lever on bypass valve and loosen cable clamp on bracket. Loosen lock screw on lever assembly, then with lever against stop, position cam so that it just touches nylon plunger. Tighten lockscrew. Install control wire coil over lever pin and while pushing cable conduit toward lever, tighten cable clamp. Install return spring. Move control lever back and forth to make sure cam is against nylon plunger.

Oldsmobile - Place control lever in extreme right position. Disconnect control cable from lever and loosen cable clamp on bypass valve bracket. Loosen lockscrew on lever assembly. With lever against stop, position cam so that it just touches nylon plunger, then tighten lockscrew. With bypass lever held against its stop, install control wire coil over lever pin while pushing cable conduit toward lever to remove slack. Tighten cable clamp and install return spring. Move control lever to extreme left and back to extreme right position. There should now be 1/16-3/32" spring back of lever. Check to make sure cam is just touching nylon plunger.

Thermostatic Switch: Chevrolet - Adjustment of this switch is not possible as it is preset at the factory and sealed. *See "Control Cable Adjustment" below.*

Control Cable Adjustment (Thermostatic Switch): Chevrolet - Adjust cable as required to give full travel of switch lever. Adjustment may be necessary at both ends of cable and should be made by loosening clamp screws as required, then retightening after proper positioning. *NOTE* - In the off position, COLD lever should be full "UP" and the switch actuating lever fully up. Adjustment should be made to engage compressor when the COLD lever is depressed 1/8" to ¼".

Compressor Clutch Switch: Oldsmobile - Switch should close when sliding lever in control assembly is moved ¼" from extreme left position. To adjust, bend switch bracket for correct operation.

Fast Idle Adjustment: Chevrolet - Adjust hand throttle wire guide stop to limit engine speed to 900 RPM with control lever pulled out and transmission in neutral. Check to see that fast idle control linkage does not interfere with normal operation of carburetor linkage when fast idle is not in operation.

Thermostat Control Cable: Pontiac - Place air conditioning control lever to full right position. Loosen thermostat control cable clamp (on top of blower housing under right side of instrument panel). Hold cable and housing assembly so housing cannot move and slide cable assembly toward left side of car to position temperature valve lever to extreme left position. While holding in this position, tighten cable clamp.

Master Clutch & Relay Control Switch Adjustment: P ntiac - Remove radio speaker, glove box, and radio. Position air conditioning control lever to "VENT" position and blower switch to right for high speed. Loosen clutch and relay control switch locating bracket nut and pull that part of switch and locating bracket assembly held secure by the nut towards rear of car. Set hand brake and move ignition key to "ON" position. Move switch locating bracket towards front of car slowly until blower operates, then hold in this position and tighten nut to secure bracket. Move air conditioning

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FRIGIDAIRE & HARRISON (Continued)

control lever to left end of "COOLER" band, turn ignition switch to start car and check air conditioning operation (compressor clutch will energize and operate compressor). Turn ignition off and replace radio, glove box, and radio speaker.

SERVICING

GAUGE SET INSTALLATION (TOOL J-5725): Connect gauge set to compressor (see illustration). *(NOTE - For purging or adding oil to system, Freon Tank and Vacuum Pump are not connected to center connection on manifold).* Make sure that shut off valves on gauge set are fully closed and that hand shut off valves on compressor head (cars with this type valve) are turned fully COUNTERCLOCKWISE (back seated).

▷*CADILLAC NOTE: Low pressure Schrader type valve is located at Hot Gas Bypass Valve.*

▷*SCHRADER TYPE VALVE CONNECTION CAUTION: On cars using this type valve in place of hand operated shut off valves in refrigerant lines at compressor head, it is necessary to connect Adapters J-5420 to gauge connecting lines and to make sure that both valves on gauge set are completely closed before connecting adapters to Schrader type valves as the adapters will automatically open these valves.*

▷*HAND OPERATED SHUT OFF VALVE NOTE:* These are two-way valves. When turned COUNTERCLOCKWISE (back seated), compressor is connected to refrigerant lines and line to gauge fitting is closed. This is the normal operating position. When turned CLOCKWISE (front seated), compressor is closed off from refrigerant lines and open to gauge fitting. When valves are turned to middle position, compressor is open to both refrigerant lines and to gauge fitting. In this position, gauge readings can be taken with system in operation.

PURGING THE SYSTEM: Connect Gauge Set J-5725 (see above), then open both compressor hand shut off valves ¼ turn clockwise from a full counterclockwise position (on cars equipped with this type valve). Remove cap from gauge set center connection on manifold, then open high pressure gauge valve being careful not to open it too far, and slowly discharge vapor through center connection *(CAUTION - Opening valve too far will cause compressor oil to be discharged with the Freon).* When pressure is reduced to below 100 lbs., on high pressure gauge, open low pressure gauge valve and continue discharging until 1 to 2 lbs. of refrigerant remain in the system *(NOTE - Valves on gauge set can be closed from time to time to check remaining pressure).* Leave gauge set connected in preparation for evacuating and charging.

EVACUATING THE SYSTEM: (Vacuum Pump Method) - With system completely purged and Gauge Set J-5725 installed (see above), open hand shut off valves on compressor head ¼ turn clockwise from the full counterclockwise position. Install center gauge line to tee connector, Tool J-5462-2. Install female connector, Tool J-5462-7 at inlet side of Vacuum Pump, Tool J-5428. Insert flare seat, Tool J-5462-8, into connector, J-5462-7, at vacuum pump. Install shut off valve, Tool J-5462-1, to connector at vacuum pump. Install a gauge line from one side of tee connector to valve at vacuum pump (make sure valve is closed). Install gauge line from remaining tee connection to drum of Freon 12 or to 3 full cans of Freon 12 in Tool J-6272 *(NOTE - When using a drum, it will be necessary to use fitting, Tool J-5462-9, and reducer, Tool J-5462-4, with lead washer, Tool J-5462-3, between gauge line and drum).* Check level of fluid in vacuum pump and add correct oil if necessary. Make sure dust cap on discharge side of vacuum pump has been removed. Open high and low pressure valves on gauge set *(CAUTION - Shut off valve at vacuum pump must be closed).* Start vacuum pump and SLOWLY open shut off valve at pump *(NOTE - If oil is blown from pump, it must be refilled to proper level).* Operate pump to obtain approximately 28" of vacuum for 10 minutes. *NOTE* - If vacuum of 28" cannot be obtained, close valve at pump. Note low pressure gauge to see if vacuum in system holds. If vacuum holds, pump or gauge may be at fault. If vacuum will not hold, charge system with Freon, check for leaks, and repair as necessary, then purge system. When vacuum of 28" has been obtained for 10 minutes, close valve at pump, stop pump and check vacuum to see that it will hold for 3 minutes. If vacuum holds and no leaks are apparent, open Freon container valve to charge system to cylinder pressure, then close valve. Discharge system and again evacuate it. Close gauge valves. The system is now ready for a complete charge.

EVACUATING THE SYSTEM: (Pontiac) - *(CAUTION - Before removing protective cap from compressor discharge gauge fitting, make sure that the discharge valve is turned completely COUNTERCLOCKWISE).* In this system, the evacuated air must be discharged through the compressor relief valve as follows: Using a 1" long 3/8"-24 bolt, drill a hole lengthwise through the bolt center, then cut off the bolt head. Press a 12" length of rubber or plastic hose over end of bolt from which the head was removed. Loosen pressure relief valve slowly, letting pressure in compressor escape completely. Screw the above assembly into compressor in place of relief valve and insert hose into a clean container to collect any oil that may be lost during evacuation. Connect Gauge Set J-5725 *(see "Gauge Set Installation" above).* Close valves on gauge set, making sure that center connection on gauge set is plugged. Turn compressor low pressure valve 1½ turns clockwise from a fully counterclockwise position. Turn discharge valve all the way clockwise to seal passage to discharge hose. Start engine and operate at normal idle speed. Place air conditioning centered lever to full right position. Compressor will now evacuate the system, pumping air from system out through high pressure relief valve opening on compressor. Check low pressure gauge and operate compressor until gauge shows 26-28" of vacuum. Continue to run compressor for five additional minutes *(NOTE - If a vacuum of 26" cannot be obtained, a leak is indicated).* Check container to see that compressor has not pumped out more than one ounce of oil. If more than this amount has been pumped out, it should be replaced immediately *(see "Adding Oil" above).* *(NOTE - If a leak in system has been repaired or oil has been added, it will be necessary to again evacuate the system).* Replace relief valve in compressor with compressor operating, then stop engine. Purge air from compressor head as follows: Connect Freon drum to center fitting on gauge set and purge air from gauge line by cracking center line connection at gauge manifold momentarily. Turn low pressure valve on compressor fully clockwise. Open high pressure shut off valve on gauge set, then turn high pressure valve on compressor counterclockwise slightly to open passage to compressor. Open valve on Freon drum and while Freon is passing into compressor, loosen pressure relief valve slowly and leave loose approximately fifteen seconds to allow air to be purged from compressor head. Tighten compressor relief valve and close high pressure valve on gauge set. Turn valves on compressor completely COUNTERCLOCKWISE, then CLOCKWISE 1½ turns.

CHARGING THE SYSTEM (Except Pontiac): With system evacuated, gauge set and Freon tank installed, make sure high and low pressure gauge valves, vacuum pump valve, and valve on Freon container are closed. Open low pressure gauge valve. On cars with hand operated shut off valves at compressor head, make sure these valves are open ¼ turn clockwise from a fully counterclockwise position. Place drum of Freon in a pail of water heated to not more than 125°F., then place Freon and pail of water on scale and weigh accurately. *NOTE* - If disposable cans of Freon are used, scales can be eliminated since each can weighs 15 ounces. *See "Freon Capacity" table below.* If a fraction of a pound of Freon is required to complete filling system, use as much Freon from can as required for sight glass to run clear, but in no instance use more Freon than the amount indicated in Freon Capacity table. Open valve wide on container and allow correct amount of Freon to enter system *(see "Freon Capacity" table below).* Close low pressure valve on gauge set at frequent intervals to be certain pressure is always maintained above 12 lbs. *NOTE* - If it is not possible to charge system to full capacity by this method, then operate engine and compressor at 1000 RPM minimum to complete the charging. Energize clutch operating coil with coil with a jumper wire from battery positive terminal to insure positive operation. When correct amount of Freon has entered system, close container valve and low pressure gauge valve. Operate engine at 1500 RPM to check high and low pressure gauges and sight glass. Stop engine and turn both compressor hand shut off valves fully counterclockwise (if car is equipped with this type valve). If car is equipped with Schrader type valves, close both high and low pressure gauge valves on gauge set, then remove adapters from Schrader valves (or connecting hoses from hand operated valves on compressor). Remove jumper wire, replace caps on fittings and shut off valves.

CHARGING THE SYSTEM (Pontiac): With system completely evacuated, turn both valves on compressor 1½ turns clockwise from a full counterclockwise position. Close both valves on gauge set, then connect center flexible line of gauge set to Freon drum. Place Freon drum in a pail of hot water (maximum 125°F) and place Freon drum and water on scales. Loosen line at center fitting on gauge set and crack valve on Freon drum to evacuate air from line. Retighten line at center fitting, then weigh Freon tank and water on scales. Record the

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FRIGIDAIRE & HARRISON (Continued)

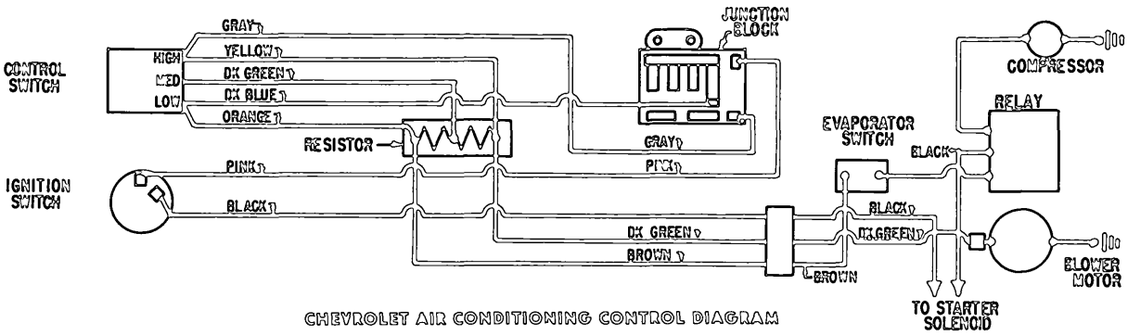
accurate weight, then open Freon drum valve and both valves on gauge set. Allow Freon to charge system until scales show that 4.25 to 4.5 lbs. of Freon have entered system. *(NOTE - If full charge cannot be attained, close both valves on guage set, connect jumper wire from compressor hot lead to battery terminal, start engine and air conditioning control lever to full right position. Open low pressure valve on gauge set slowly and leave open until full charge of 4.25-4.5 lbs. of Freon is taken in). (CAUTION - Check high pressure gauge while charging with compressor running. Shut off engine if pressure exceeds 300 lbs. A large fan placed in front of car will help reduce excessively high head pressure).* Close both valves on gauge set (high pressure valve will already be closed if charge was completed by running compressor) and close valve on Freon drum. *(NOTE - If engine was used to complete Freon charge into the system, close valve on Freon drum to permit compressor to draw any Freon left in line from drum to center fitting of gauge set, then close low pressure valve on gauge set).* Operate engine at 1200 RPM with air conditioner control lever turned to full right position and blower on high speed. After five minutes of operation, check appearance of Freon in sight glass. If bubbles are present, open low pressure gauge valve and valve on Freon tank and allow more Freon to enter system. Close valve when sight glass clears up *(CAUTION - In no case should the system be charged with more than 4.5 lbs. of Freon).* When system operating properly, close both valves on compressor fully COUNTERCLOCKWISE, remove gauge set and replace protective caps on valves. Remove jumper wire from compressor.

Freon Capacity

Mod l	Capacity
Buick	5 lbs.
Cadillac 60S, 62	4 lbs.
Cadillac 75, 86	4¾ lbs.
Chevrolet	4 lbs.
Oldsmobile	4 7/8 lbs.
Pontiac	4½ lbs.

CHECKING & ADDING OIL TO COMPRESSOR: Checking - Operate engine at slow idle for 5 to 7 minutes with system operating, then stop engine. Loosen screw in oil test fitting on side of compressor and allow a slight seepage of oil to escape. Retighten screw for a moment then "crack" open slightly again. If a steady flow of oil is evident, the oil level is either at a safe minimum level of 4 ounces, or above it. When oil test screw is cracked open a second time and no oil escapes, or there is a hissing sound, the oil is below a safe minimum and oil should be added. *NOTE - Compressors are originally filled with 9 ounces of Frigidaire 525 viscosity oil.*

Adding Oil (Buick & Chevrolet): Remove compressor *(see "Compressor Removal" below)* and place it on a bench. Position a clean container, then remove oil test screw and gasket and drain all oil from compressor. If oil is found to be dirty or contaminated, flush compressor and condenser with liquid Freon which can be obtained by turning drum or can of Freon upside down. If oil is clean, pour 9 ozs. of new Frigidaire 525 viscosity compressor oil into compressor through oil checking fitting. Replace checking screw and install compressor on car. Purge, evacuate, and charge system (see above).



CHEVROLET AIR CONDITIONING CONTROL DIAGRAM

Adding Oil (Cadillac): With Gauge Set J-5725 connected to compressor (see above), attach oil charging line to center connection of gauge set. Operate engine at slow idle in "Dr" (Drive) range with Air Conditioner "On", crack open high and low pressure valves on gauge set and allow Freon vapor to purge air out of gauge set and lines. While Freon vapor is still escaping, insert oil charging line to bottom of a graduated bottle of Frigidaire 525 viscosity oil. Close high and low pressure valves on gauge set. Clamp bypass hose between bypass valve and evaporator (this hose does not have the low pressure gauge fitting) using two wooden blocks and a "C" clamp *(CAUTION - Do not clamp hose more firmly than is required to close off passage of Freon).* Clamp the hose between sight glass and evaporator in the same manner. Slowly open low pressure valve on gauge set, allow 2 ounces of oil to be drawn into equalizer line, then close valve. Remove oil charging line and cap center gauge set connection with a dead-head fitting. Open low pressure valve on gauge set, then slowly open high pressure valve on gauge set, allowing Freon pressure to force all oil out of equalizer line into evaporator. Close both gauge set valves and remove hose clamps. Run engine at 2000 RPM in "Park" position for 5 minutes. Recheck oil level and if found to be low, repeat the above, adding 2 ounces more oil.

Adding Oil (Oldsmobile & Pontiac): With both valves on compressor head turned fully counterclockwise and valves of gauge set closed, install high pressure hose of gauge set to high pressure valve on compressor. Install plug in center hose on gauge set. Turn compressor high pressure shut off valve two turns clockwise and crack open the high pressure valve on gauge set. Crack open low pressure valve on gauge set to purge air from lines and while vapor is still escaping, connect low pressure hose of gauge set to low pressure hand shut off valve on compressor. Close both valves on gauge set and turn the compressor low pressure hand shut off valve fully clockwise. Remove center hose on gauge set and install oil charging line. *(NOTE - Use a 10" piece of ¼" copper tube with fittings connected in center opening of manifold).* Purge air from oil charging line by cracking high pressure valve on gauge set. While vapor is still escaping from oil charging line insert line to bottom of oil bottle (Frigidaire 525 viscisity oil), allowing vapor to bubble through the oil. Close high pressure valve. Run engine at slow idle, with compressor operating until 10" of vacuum is indicated on gauge. Open low pressure valve on gauge set and allow 2 ounces of oil to enter system, then close valve. Remove oil charging line from gauge set and cap opening. Open high pressure valve on gauge set, then open low pressure valve slowly to allow high pressure to force oil remaining in lines into compressor. Close both valves on gauge set, then turn shut off valve on compressor fully counterclockwise. Run engine at 1500 RPM with compressor operating for 5 minutes, then recheck oil level in compressor. If necessary, repeat the above procedure to add 2 ounces more oil.

COMPRESSOR REMOVAL & INSTALLATION

▷ *CAUTION: To prevent dirt and moisture entering air conditioning system, it is very important to cap all openings and to complete work on system as soon as possible.*

REMOVAL: Buick - Purge Freon from air conditioning system *(see "Purging the System" above),* then disconnect mufflers from brackets. Disconnect hot gas line (from high pressure muffler-to-hot gas bypass valve) at hot gas bypass valve fitting. Remove retaining bolt and washer to disconnect mounting plate and lines from rear end of compressor. Discard "O" rings. Cover openings in lines and compressor with tape, then disconnect clutch solenoid wire. Loosen belt and remove compressor from mounting on engine.

Cadillac: Remove Freon from system by depressing the Schrader core in high and low pressure gauge connection on compressor head. *(NOTE - Depress cores very slowly at first to prevent oil from being forced out of compressor).* Remove high and low pressure line fitting center bolt and remove fitting from compressor. Cover pressure openings in both compressor and pressure line fittings (use a protective plate over compressor openings). Disconnect clutch coil wires and drive belts. Remove two bolts and nuts holding bypass valve to compressor front bracket and move bypass valve, pipe, and hoses away from compressor. Remove compressor from mounting supports.

Chevrolet: Purge Freon from air conditioning system *(see "Purging the System" above).* Back off compressor attaching bolt just enough to loosen suction discharge connector and allow pressure inside to escape. Remove bolt and connectors after low side has been completely purged. Disconnect electrical lead to clutch actuating coil. Remove gauge set and replace caps. Remove two refrigerant line retainer-to-radiator support screws and

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FRIGIDAIRE & HARRISON (C ntinu d)

remove retainer. Loosen brace and bracket pivot bolts and detach bolt. Remove brace bolt and swing compressor to highest position. Retighten pivot bolt. Remove the four bolts retaining compressor to mounting brackets and remove compressor assembly.

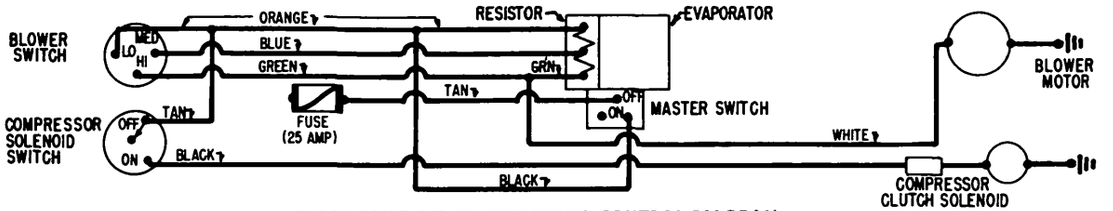
Oldsmobile: Remove protective caps from compressor high and low pressure hand shut off valves, then turn valves two turns clockwise from fully counterclockwise position to open compressor gauge outlets. Crack open compressor high pressure gauge outlet cap and allow Freon to purge from system until "hiss" is no longer heard, then turn both valves fully clockwise. Disconnect both wires at clutch coil, then remove belts from pulley. Remove bolt holding hand shut off valve assembly to compressor and remove assembly. Remove compressor assembly.

INSTALLATION: All Models - Reverse removal procedure, then purge, evacuate, and charge the system *(see above).*

COMPRESSOR OVERHAUL

► *OVERHAUL NOTE: Compressor clutch, discharge valve assembly, compressor clutch coil, and shaft seal are the only parts that are recommended for service replacement. The compressor main body assembly should be replaced as a unit if faulty.*

COMPRESSOR CLUTCH: Removal: Remove compressor from car *(see above).* Bend tangs on shaft lockwasher, then loosen the six screws in clutch cover ring. Energize clutch coil with jumper wire from battery to hole compressor clutch and shaft assembly. Remove shaft nut and metal-felt washer. Remove screws and lockwashers securing clutch cover ring to pulley casting *(CAUTION - These screws must be removed at this time to avoid damage to internal parts of clutch. It may also be necessary to remove the three coil retaining screws to allow clutch cover plate to move back).* Remove pulley and ball bearing assembly with Compressor Pulley Puller, Tool J-6351, *(NOTE* - This bearing has a .0001-.0006" press fit onto first step of compressor shaft). Remove hub-to-bearing spacer and shims and set aside. *NOTE* - Spacer and washer and shims may be reused providing original parts are being installed. If new parts are being installed, adjust clearance *(see "Hub-to-Bearing Clearance Adjustment" below).* Check shaft and ball bearing for wear, scoring or pitting. If necessary to replace ball bearing in pulley casting, remove retaining ring and press out bearing. When reinstalling, make sure retaining ring is installed with beveled edge toward outside (away from bearing). Remove clutch plate assembly using Clutch Plate Puller, Tool J-6322. Remove woodruff key and air gap adjusting shims and washer *(NOTE* - If same pulley parts are to be reinstalled, the same shims and washers may be used). Disassemble actuating springs from clutch plate and check plate for wear. *(CAUTION - Do not use any cl aning solv nts on clutch frictional surfaces).* Check nylon balls, replacing all three if any are damaged. **Hub-to-B aring Clearance Adjustm nt** - Place pulley (with bearing installed) on a flat surface with clutch side of pulley facing up. Place two pieces of .008" shim stock on pulley facing across from each other.



OLDSMOBILE AIR CONDITIONING CONTROL DIAGRAM

Select a combination of shims (furnished in .010",.015", .020", .025" thicknesses), and place on inner race of bearing for a trial thickness, then place bearing spacer on shims. Place clutch plate assembly in pulley so that hub is in contact with spacer and shims. Press down firmly at center of hub and rotate clutch plate assembly. If a heavy drag is felt, thicker shims must be selected in order to provide a slight drag across the .008" shim stock. If no drag is felt, thinner shims should be selected. When desired condition is obtained, remove the two pieces of shim stock and use the selected shims when installing clutch and pulley on compressor.

Installation: Install clutch coil retaining screws and place clutch cover ring against coil and seal housing. Install clutch spacer and air gap control shims on shaft against shoulder. Replace woodruff key, tapping it lightly into place. Reassemble nylon balls and clutch plate springs. Press clutch plate assembly on shaft using Tool J-6323, making certain that clutch cover ring does not get caught between coil housing and rear clutch plate. Replace clutch hub and pulley bearing washer and shims on compressor shaft. Place "free" washer of Tool J-6323 over small end of stud so that small diameter of washer will contact INNER race of bearing. Screw stud of Tool J-6323 onto threaded end of compressor shaft, then press pulley assembly into position. Assemble felt and metal washer, shaft lockwasher, and nut. Tighten nut to 5-7 ft. lbs. and bend up tabs on lockwasher. Assemble clutch cover ring, screws, and lockwashers and tighten to 2 ft. lbs. Energize clutch coil with a jumper lead from battery. Use a nonmagnetic feeler gauge and check air gap between armature and coil housing which should be .025-.035". Adjust with correct shims.

Clutch Coil & Shaft Seal Replacement: With compressor clutch removed from compressor (see above), disconnect electrical leads of coil from terminal clip and ground screw. Remove three coil retaining screws from housing and remove coil retainer and insulating gasket. Carefully insert a thin screwdriver through wire opening in rear of coil housing and pry coil forward to remove coil from housing. Remove inner insulating gasket and six housing mounting screws. Remove coil and seal from compressor flange and remove seal seat retaining ring. Remove large diameter"0" ring from outer flange of seal housing. Remove shaft seal assembly. Make certain seal drive pin and retainer ring remain in place on shaft. Remove auxiliary shaft seal from seal housing. *(CAUTION - Discard old "0" ring seals and replace with new ones. The shaft seal, metal seal seat, and retainer should be handled very carefully to avoid damage to fin finished surfaces .Lint-free tissu s should b used for final cleaning of compressor shaft, seal cavity and parts. Seal cavity in coil housing and around auxiliary seal should b flooded with clean fresh Frigidaire 525 viscosity oil befor assembling. All oil seal rings, seal surfaces and parts should also be coated with this oil).* To reassemble, install Shaft Pilot Bushing, Tool J-6320, over compressor shaft and against shoulder of shaft. Apply a light coating of Frigidaire oil to surface of bushing. *(NOTE* - This bushing protects seals during installation). Slide shaft seal and "0" ring into place on compressor shaft. Install "0" ring seal seat and auxiliary seal in coil housing and install large diameter "0" ring seal to outer flange of housing *(NOTE* - Coat inner lip of auxiliary seal heavily with oil before assembly into housing). Install coil housing to compressor flange and install six mounting screws. Add oil to compressor (pour six ounces of Frigidaire 525 viscosity oil into compressor through oil test screw opening).

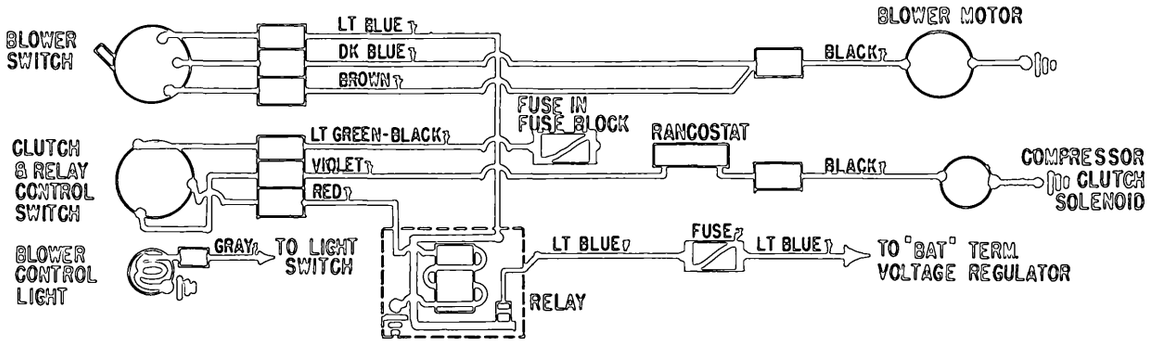
VALVE PLATE: Disassembly - Remove compressor from car and place on bench in a vertical position with the pulley end down. Form a protective skirt out of heavy paper and tape securely to compressor shell *(CAUTION- This is very important to prev nt oil that will be in head of compressor spilling into the clutch ass mbly).* Remove twelve head bolts and compressor head. Remove cylindrical suction screen and set aside for reuse *(CAUTION - Be careful not to damage gask t mat rial that is vulcanized to irregular center and inner portion of casting).* Lift discharge plate (thick one) assembly from off the two dowel pins. It may be necessary to use two screwdrivers under piston reed retainers, or two pairs of pliers, to "break" oil cohesion and release the plate. Remove suction reed plate (thin one). Do not disturb thrust washer at center of assembly.

Inspection· Inspect discharge and suction reed plates. If any reeds are found broken, examine compressor head and cylinder for any broken portions or slivers of metal. Remove all broken pieces. Inspect each cylinder bore and piston head for damage. Depress each piston by hand for full travel of stroke. Inspect underside of suction reed plate (thin one) in center area where shaft thrust washer contacts this plate A normal condition will be indicated by a slight circular burnished wear pattern. If an overheated condition is indicated by a dark discoloration or burning of reed plate, reed plate must be replaced *(NOTE* - Burned thrust washer is caused by operating the system without sufficient Freon in system which does not allow normal oil return). If scored or damaged cylinder walls, distorted pistons, or burned, seized, or distorted thrust washers are found, the compressor must be replaced If broken discharge reeds or suction plate are found, replace with new discharge valve plate assembly and new suction plate.

CONTINUED ON NEXT PAGE

FRIGIDAIRE & HARRISON (Continued)

Reassembly: Place suction reed plate (thin) over the two dowel pins in cylinder so that the 3/16" diameter hole which is approximately ¾" from center of reed, mates with a similar hole in cylinder block. *(NOTE* - This hole is located between two piston bores). Install discharge plate (thick) over the two dowel pins. Remove and discard old large diameter "O" ring located in recess in head casting. Coat new seal with Frigidaire 525 viscosity oil and install in recess groove in head. Place brass ferrule end of suction screen into center of head casting and grasp head so that suction screen will not fall out when head is inverted for assembly. (This can be accomplished by inserting little finger through center opening to hold screen). Hold compressor head over compressor shell flange so dowel holes register as closely as possible to their proper location. Rotate head slightly until exact dowel pin alignment is obtained, then seat head over dowel pins and onto compressor flange *(CAUTION* - If this is not done properly, there is a possibility of damaging gasket material). Install bolts finger tight, then tighten uniformly, by cross-tightening, to 7½-10 ft. lbs.



PONTIAC AIR CONDITIONING CONTROL DIAGRAM

HUDSON & NASH

Hudson (1957)
Nash (1957)
Rambler (1957)

DESCRIPTION: Similar in design and operation to previous models. *See 1956 Annual Data Pg. 471.*

LINCOLN

Lincoln & Continental (1957)

DESCRIPTION: Similar in design and operation to previous models. *See 1956 Annual Data Pg. 474.*

FORD & MERCURY

Ford V8 (1957)
Mercury (1957)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*SERVICE CAUTIONS: Before disconnecting any part of the air conditioning system or lines, see "Air Conditioning Service Cautions" at beginning of Air Conditioning Section.*

▷*LEAK TESTING: See "Leak Testing" at beginning of Air Conditioning Section.*

▷*COMPRESSOR REMOVAL (For service work on engine):* If engine work makes it necessary that the compressor be removed, it may be isolated without discharging the complete system. *See "Compressor" below.*

▷*1957 FORD AIR CONDITIONER BLOWER HOUSING WHISTLE CORRECTION:* This whistling noise which occurs with air conditioner operating, can be eliminated by sealing the air bleed in the blower housing air valve. Remove blower housing, then with air valve in cooling position, apply body sealer between valve and flange in the area where the valve is cut off at the corner.

▷*1957 MERCURY BLOWER MOTOR BURNING OUT CORRECTION:* This condition may be caused by the cooling tube from blower housing to blower not being installed. If the air conditioner unit does not have the cooler tube, Part No. FEK-17174 must be installed.

DESCRIPTION: Ford - Simular in design to previous models with the following exceptions: The solenoid bypass valve and control cut-off valve have been eliminated and the magnetic clutch is now controlled by the thermostatic switch. The former oil separator is now integral with the compressor unit.

Mercury - The complete air conditioning unit is located on the dash panel and in the engine compartment. This unit is similar in design to the Ford unit.

ADJUSTMENT

Compressor Belt: Loosen generator-to-bracket bolt and pull generator out so there is ½" (Ford), ¼" (Mercury), belt deflection midway between water pump and compressor pulleys with normal thumb pressure.

▷*BELT REPLACEMENT NOTE: Belts must be replaced in matched pairs. Do not run an old belt with a new one.*

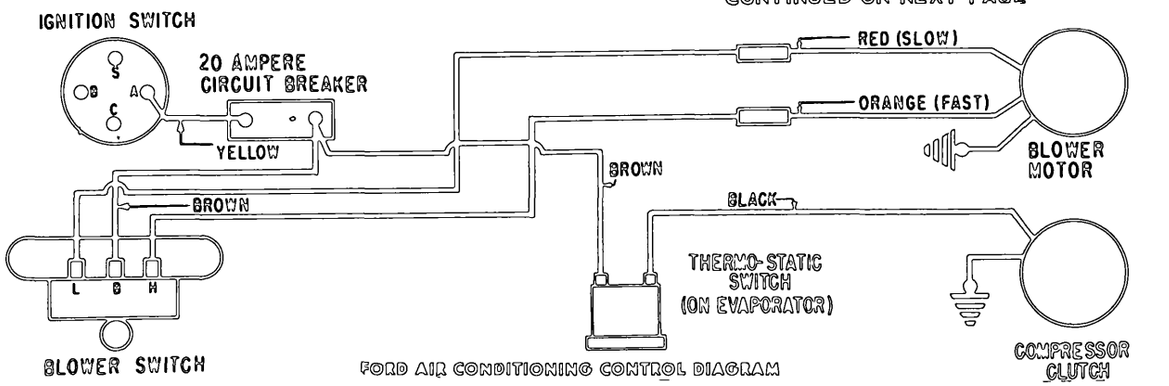
SERVICING

▷*INTAKE & DISCHARGE SERVICE VALVE NOTE:* On field installed SelectAire and PolarAire air conditioners, the intake & discharge service valves are the "Schrader" type, having fast connect and disconnect fittings. On production models, intake & discharge service valves are hand operated. The low pressure valve is mounted on the compressor and the high pressure valve is located on the upper right corner of the condenser. Rotating the valve stems *COUNTERCLOCKWISE* until fully seated, is the normal operating position. This position also isolates the service valve gauge ports for connecting gauge manifold set. Rotating valve stems *CLOCKWISE* until fully seated, isolates the compressor from the system. *(CAUTION - Do not operate compressor with service valves fully seated clockwise).*

COMPRESSOR OIL LEVEL: Checking & Filling - Operate engine at 1500 RPM with compressor operating. Turn off engine and isolate the compressor (see "Compressor" below). Remove oil filler plug from compressor and insert a 1/8" diameter rod in filler hole until it bottoms. The rod should show ¾" of oil which is equivalent to 9 ounces. If additional oil is required, add Suniso 4-G refrigerator oil, or equivalent. Replace filler plug, evacuate and cut the compressor back into air conditioning system. Check filler opening for leaks.

GAUGE SET INSTALLATION: Remove service valve stem covers and make sure that both service valves are turned fully counterclockwise. Remove service

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FORD AIR CONDITIONING CONTROL DIAGRAM

FORD & MERCURY (Continued)

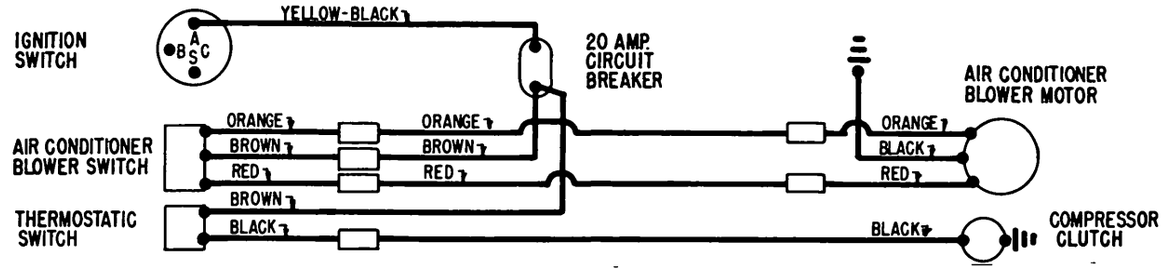
valve gauge port covers, and attach flexible hoses of gauge set to gauge ports. Connect hoses from center fitting on gauge set manifold to tank of Freon 12 and to Vacuum Pump. Turn both manifold gauges to a fully seated clockwise position and close the vacuum pump valve. *(NOTE* - Manifold valves are so arranged that when turned fully clockwise, the center manifold connection is cut off from the gauges, but the gauges continue to read pressures in their respective hoses).

DISCHARGING THE SYSTEM: *(CAUTION - Discharge refrigerant from system before replacing any part of the system, except compressor or compressor high pressure hose).* Connect gauge set to manifold as indicated above (do not connect manifold center connection hoses to Freon tank or to vacuum pump). Place open end of hoses from center connection on manifold in the garage exhaust outlet or into an open area havsufficient air movement to disipate the gas. Set high pressure gauge valve on manifold to open position (fully counterclockwise). Open high pressure service valve a slight amount and allow refrigerant to discharge from system. *(CAUTION - Do not allow refrigerant to rush out, as the compressor oil will be forced along with it).*

EVACUATING THE SYSTEM: Connect the gauge set, tank of Freon 12, and vacuum pump to the system *(see "Gauge Set Installation" above).* Make certain that Freon 12 tank valve is closed tightly. Set both valves to the mid-position (between full clockwise and full counterclockwise positions). Open vacuum pump valve and run pump until low pressure gauge reads at least 25 inches, and as close to 30 inches of vacuum as possible. Continue vacuum operation for 20 to 30 minutes. Close pump valve and turn pump off.

►*FREON CHARGING NOTE:* The correct amount of Freon 12 introduced into the air conditioning system must be accurately determined as follows: Before charging the system (after hoses and lines have been purged of air), place Freon 12 tank in a container of warm water (not to exceed 150°F), then place container and tank, on an accurate scale. Weigh the assembly and record its total weight. As Freon enters the system, the exact amount in pounds can be determined.

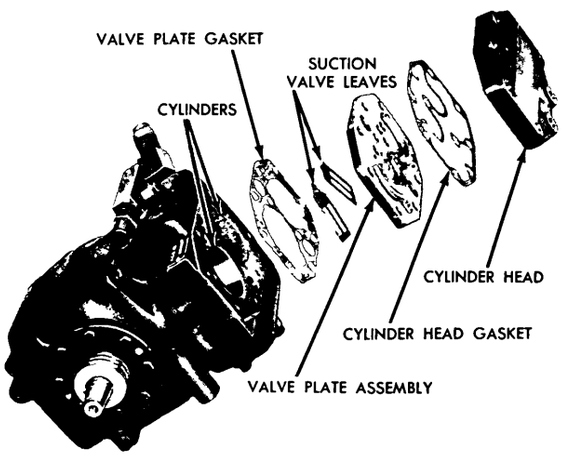
CHARGING THE SYSTEM (PARTIAL CHARGE): *(NOTE- If a loss of refrigerant is indicated by bubbles appearing in the sight glass, the refrigerant can be brought up to proper charge as follows).* Attach gauge set *(see "Gauge Set Installation" above).* Open both manifold valves and close vacuum pump valve. Open Freon 12 tank valve. Purge air from high pressure hose by loosening the high pressure hose fitting at the service valve for a few seconds (do not remove hose from fitting). Tighten connections and set high pressure manifold gauge valve at maximum clockwise position. Purge air from low pressure hose in the same manner, then open both service valves to the mid position. With Freon 12 tank setting in a container of warm water (maximum 150°F.), and the assembly on an accurate scale *(see "Freon Charging Not " above),* operate engine at 1500 RPM with COOLING control lever at maximum cold position and blower on HI. Charge system until an additional ½ pound of Freon 12 has been removed from tank, then close tank valve. Place both service valves at the full counterclockwise position. Remove gauge set, and cap service valve ports and valve stems.



MERCURY AIR CONDITIONING CONTROL DIAGRAM

CHARGING THE SYSTEM (COMPLETE CHARGE): Evacuate the system (see above), leaving both service valves at the mid position and the vacuum pump valve closed. Leave low pressure manifold gauge valve at maximum counterclockwise (open) position. Set high pressure manifold gauge valve at maximum clockwise (closed) position. Set COOLING control lever to maximum cold position, and the blower on HI. Open Freon 12 tank valve. Run engine at 1500 RPM and weigh 3½ pounds of Freon 12 into system *(CAUTION - During this operation, do not allow pressure on gauge to exceed 240 lbs.).* When proper charge has entered system, no bubbles will be seen in sight glass. Close Freon 12 tank valve, and check system for proper operation. Place both service valves at the full counterclockwise position. Remove gauge set, and cap service valve gauge ports and valve stems.

►*HIGH PRESSURE (DURING CHARGING) NOTE: If pressure exceeds 240 lbs., stop engine and check for the cause; which may be due to an overcharge of refrigerant, overheated engine, or air in the lines, with a combination of high surrounding temperatures.*



COMPRESSOR CYL. HEAD & VALVE ASSEMBLY

COMPRESSOR: *(NOTE - All compressor service operations, except belt replacement, can be performed only after the unit has been isolated from the rest of the air conditioning system).*

Isolating The Compressor: Turn both high and low pressure service valves to the full clockwise position. Loosen cap on high pressure service valve gauge port, and allow gas to escape slowly until compressor and attaching hoses are relieved of pressure. *(CAUTION - Loosen the cap a small amount only, and do not remove it until pressure is completely relieved).* To cut compressor back into the system, evacuate the compressor and connecting lines at the high pressure service valve gauge port, turn both service valves to maximum counterclockwise position, shut off vacuum pump and cap high pressure service valve gauge port and service valve stems.

Removal: Isolate compressor, then raise car on a hoist and remove generator adjusting bracket bolt from below. Loosen the two generator to compressor mounting bolts, swing generator inward and disengage both belts from generator and compressor pulleys. Disconnect three leads from generator, remove generator mounting bolts, and remove generator from car. Remove compressor to cylinder block bolt and the compressor to lower bracket bolt. Lower car and complete the operation in engine compartment. Disconnect magnetic clutch wire at bullet connector. Disconnect low pressure service valve and discharge hose from compressor. Remove the two compressor mounting bolts, then loosen the angle bracket bolt and remove compressor from car.

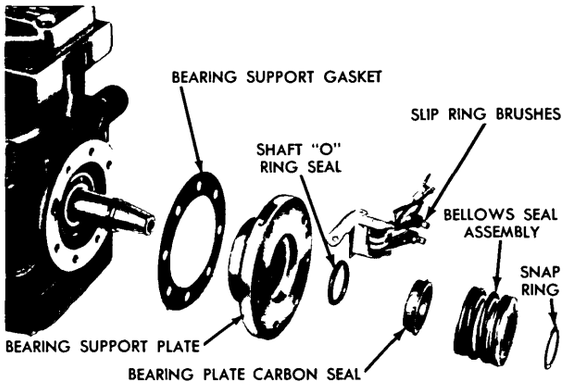
Valve Plate Replacement - *(NOTE - Valve plate may be replaced with compressor in car, after isolating the compressor, see above).* Remove cylinder head bolts and tap cylinder head and valve plate lightly to loosen them, then remove these parts from top of compressor body. *(CAUTION - Be careful not to shear off the valve plate locating pins).* Remove and discard all gaskets and clean gasket shreds from all gasket surfaces. If valves were broken, check piston heads and cylinder walls. Replace complete compressor if damage is evident. Check valve plate for damage, and if necessary, install the entire replacement kit which includes valve plate, valve leaves and the two gaskets. *(CAUTION* - If valve plate and leaves are reused, be sure to replace leaves in their original position on valve plate). Install valve plate gasket on compressor

CONTINUED ON NEXT PAGE

FORD & MERCURY (C ntinu d)

body, then, before installing valve leaves and plate assembly, dip the valve leaves in clean refrigeration oil, and mount them on valve pins that are pressed into underside of valve plate. Install cylinder head gasket and cylinder head. Install all cylinder head bolts and tighten them finger tight, then tighten bolts ¼ turn at a time to 15-20 ft. lbs. Check oil in compressor and add oil if necessary *(see "Compressor Oil L vel" abov).* If compressor was not removed from car, cut compressor back into the system *(see "Isolating The Compr ssor" abov).*

C mpr ss r Crankshaft S al Replacement (Ford) - With compressor removed from car, remove clutch and key from compressor shaft. Use a wheel puller and remove compressor clutch. Remove slip ring brush assembly. Compress bellows assembly with Tool T56P-19670-A, and remove snap ring and bellows assembly. Remove bearing support plate mounting screws. Mount bearing support plate removing tool, T56P-19670-A to the plate, using two threaded holes in plate, and remove plate. Press bearing plate carbon seal from plate and remove "O" ring. Clean all old gasket material from bearing plate and compressor. *(CAUTION - Do not force bearing support plat from its seat with the use of the two scr ws through th thr ad d holes in plate).* Lubricate new shaft seal parts with compressor oil. Install new "O" ring seal in bearing plate and carefully insert new carbon seal into place. Attach bearing plate mounting tool to plate, position the new gasket and force bearing plate into position. When plate is nearly in position, rotate it so that the slip ring brush assembly mounting holes are at the top. Install two bearing mounting plate bolts to act as guides, and seat plate with the installing tool. Remove tool and install and tighten mounting plate bolts. Place bellows seal in



COMPRESSOR SEAL ASSEMBLY

position and compress the assembly with mounting tool, then install snap ring. Remove tool and install slip ring brush assembly, key and clutch. Make certain there are no burrs or dirt on compressor shaft before installing key and clutch. Install clutch mounting bolt and washer. Tighten to 18-22 ft. lbs.

Compressor Crankshaft Seal Replacement With Compressor Mounted on Engine (Mercury) - *(NOTE - For seal replacement with compressor removed, see "Ford" above).* Isolate the compressor (see above), then remove both drive belts. Remove capscrew securing magnetic clutch assembly to compressor shaft. Using a soft hammer or suitable pry bar, remove clutch from crankshaft, then remove woodruff key. Remove brush holder assembly from compressor housing, then compress bellows seal assembly with Tool ACL-53-20. Remove snap ring and bellows. Remove capscrews holding bearing support plate to housing, then install Tool ACL-53-20 and remove the bearing support plate. Press bearing plate carbon seal from plate and remove the "O" ring. Lubricate new shaft seal parts in compressor oil, then install a new "O" ring in bearing plate and carefully insert the new carbon seal into place. Attach bearing plate mounting tool (ACL-53-20) to plate and start installation. When plate is nearly in position, rotate it so that slip ring brush assembly mounting holes are at top, then install two bearing plate bolts for guides, and seat the plate with installing tool. Remove tool and install and tighten mounting bolts. *(CAUTION - Be careful when installing plate in housing to prevent tilting carbon ring off c nter as this will cause it to chip).* Place bellows seal assembly in position and compress bellows with mounting tool, then install snap ring. Remove tool and install slip ring brush assembly, key and clutch. Make sure there are no burrs or dirt on shaft before installing key and clutch. Install clutch mounting bolt and tighten to 18-22 ft. lbs. Cut compressor back into system, then check compressor oil level.

Installation: Place compressor on engine and install the two upper mounting bolts. Tighten the mounting bolts and the angle bracket bolt. Raise car on hoist and install compressor to cylinder block bolt and the compressor to lower bracket bolt. Connect three leads to generator, then mount generator to brackets on compressor and install the bolts. Install generator adjusting bracket bolt but do not tighten it. Engage the two belts with generator and compressor pulleys and adjust belt tension so there is ½" deflection midway between water pump and compressor pulleys, with normal thumb pressure. Tighten generator adjusting bracket bolt, then tighten the two generator to compressor mounting bolts. Lower car and connect low pressure service valve and the discharge hose to compressor, using new gaskets. Check for leaks, evacuate compressor *(See "Isolating The Compressor" above),* then cut back into system.

FORD, LINCOLN, MERCURY

Continental (1957)
Ford (1957)
Lincoln (1957)
Mercury (1957)
Thunderbird (1957)

DESCRIPTION: Power windows are operated by a reversible type electric motor combined with each individual window regulator assembly. Front and rear doors (rear quarter windows on 2-door models) are controlled by individual switches located adjacent to each window and by a master control switch located on left front door. *(NOTE* - On Mercury, the master control switch is located on the instrument panel left hand extension). In addition to power door and quarter windows, other power operated windows are used as follows:

Door Vent - Standard on Continental, and optional on Lincoln models.

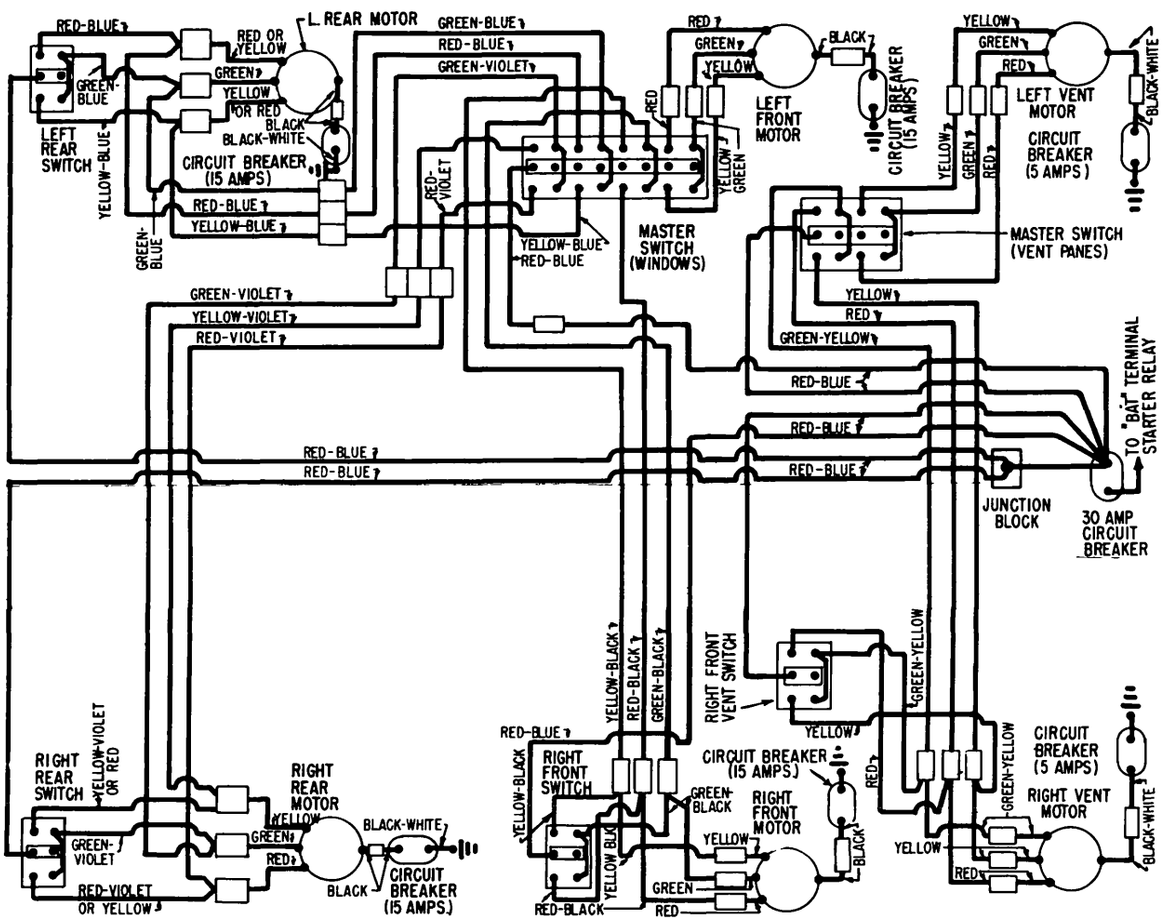
Back Window - Standard on Mercury Turnpike Cruiser. Controlled by a switch on instrument panel left hand extension.

Tail Gate Window - Optional on Mercury Station Wagon models. Controlled by a switch on instrument panel left hand extension and by a key operated switch on tailgate. A limit switch in tailgate prevents operation of window when door is in an open position.

REMOVAL & INSTALLATION (REGULATOR ASSEMBLY): Proceed as follows:

Continental (Door Windows): Disconnect battery ground cable, then remove door lock control rod knob. Remove garnish molding from inner door panel, then loose setscrew on door handle and unscrew handle. Pry door arm rest upper molding from panel and remove rest panel from door *(NOTE* - It will be necessary to work through the access hole to remove inner screws). Remove upper trim panel and water seal. Place window in half closed position and remove access hole plate and lower window stop. Lower window glass and remove two spring retainers securing glass channel rollers to regulator arms, then remove rollers from arms. Raise window to full up position and secure in place with a rubber wedge. Disconnect wires from motor-to-relay at bullet connectors. Remove capscrews from regulator and remove regulator through access hole. To install, reverse removal procedure.

Continental (Quarter Windows): Place glass in full down position, then remove rear seat and seat back cushions. Remove garnish molding and lower arm rest panel. Disconnect wires from window regulator switch, then remove upper trim panel. Remove arm rest panel mounting bracket. Disconnect relay and breaker assemblies from wheelhouse flange, then disconnect lead wires from relay and circuit breaker. Remove lower cover plate and remove nut from window guide lower adjusting screw. Remove capscrews holding regulator panel assembly to quarter panel and remove panel assembly as follows: Free window guide adjusting screw at locking point. Rotate top of regulator panel to rear of quarter panel, disengaging glass from rear glass run. Remove regulator panel assembly from quarter panel. Remove retainers attaching quarter window assembly to guide, and retainers from roller assemblies. Remove window glass from regulator panel assembly. Remove screws holding regulator assembly to panel and remove regulator.



LINCOLN WINDOW CONTROL WIRING DIAGRAM

Ford (Front Door Window): Remove door lock push button, garnish molding, door handles, arm rest and door trim panel. Remove plastic water shield, then proceed as follows:

Custom 2 & 4-Door Sedans, Station Wagons - Remove division bar lower retaining screw. On 2-Door models, remove clip, washer and spring retaining regulator arm to scissors arm and plate assembly. On 4-Door models, pull clip out of roller assemblies and remove all roller assembly parts. Raise window and retain in place with a prop or tape. Remove regulator retaining screw, then spring lower end of division bar outward slightly to allow regulator assembly to pass between inner door panel and division bar and remove assembly through access hole. To install, reverse removal procedure.

Town Sedan & Club Sedan - Remove division bar lower bracket screw and the glass stop. On 4-Door models, lower glass and remove roller assembly from glass lower channel. On 2-Door models, remove regulator arm-to-scissors arm and plate assembly clip washer and spring. Raise glass manually and tape to door upper frame. Remove regulator retaining screws, then remove regulator through access hole. To install, reverse removal procedure.

Town Victoria, Club Victoria & Convertible - Remove clip, washer and spring retaining regulator arm to scissors arm and plate assembly. Raise window manually

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FORD, LINCOLN, MERCURY (Cont.)

and tape in the full up position. Remove regulator retaining screws and remove regulator.

Thunderbird - Remove access hole cover, leaving lower stop attached to the cover. Disconnect regulator arm at the arm and plate assembly. Working through the small access holes, remove four screws attaching regulator to regulator arm supports. Do not remove regulator supports. Pull regulator out through the access hole. Pull clip out of each lower channel roller assembly, remove roller parts, then raise and support the glass. Remove arm and plate assembly retaining screws. Slip equalizer arm roller out of its bracket, then remove arm and plate assembly through the access hole. To install, reverse removal procedure.

Ford (Rear Door Window): Remove door lock push button, garnish molding, arm rest, door handles, door trim panel and plastic water shield. Proceed as follows:

Custom 4-Door Sedan & Station Wagons - Disconnect regulator arms from lower glass channel by pulling the hairpin clips and removing parts of the roller assemblies. Raise window and tape it to upper door frame. Remove regulator retaining screws, then pull regulator sideways to slip the equalizer arm roller out of stationary guide, and remove regulator through access hole. Remove roller assembly from equalizer arm pin. To install, reverse removal procedure.

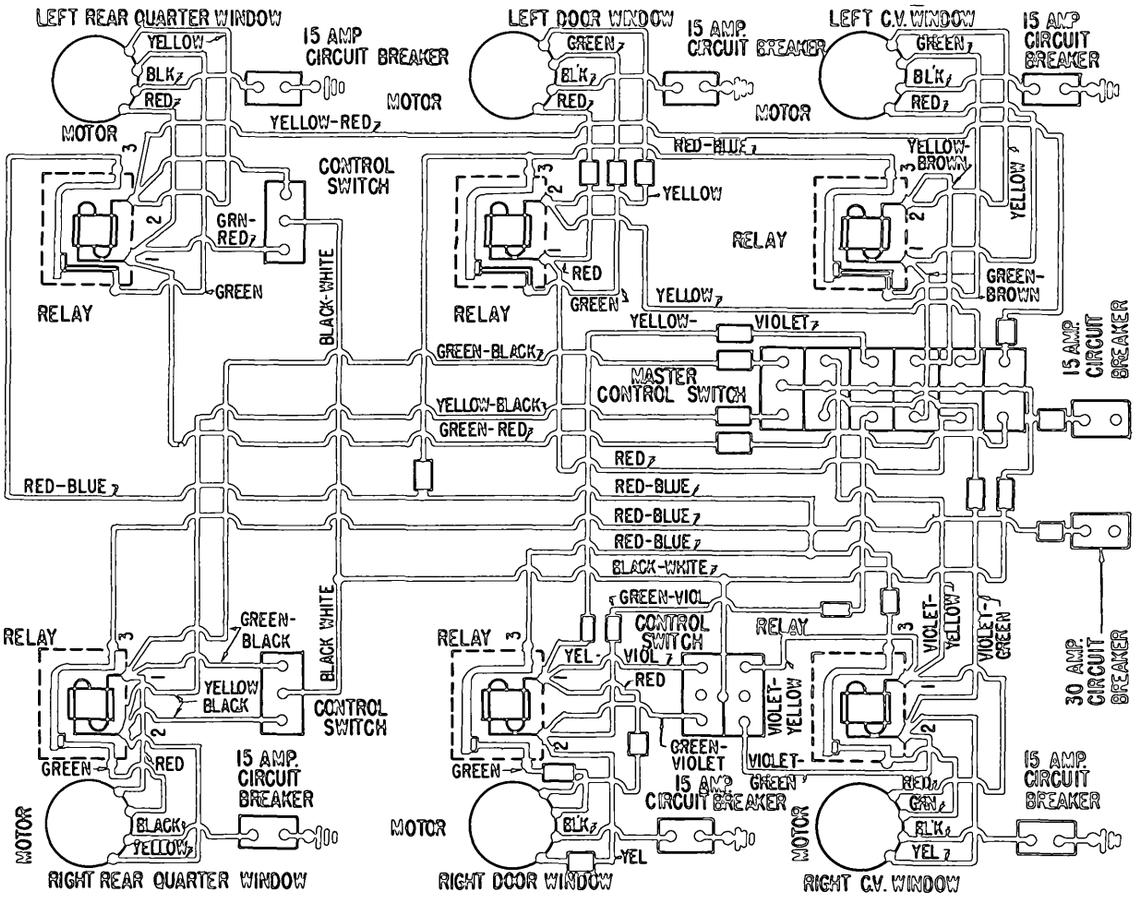
Town Victoria & Town Sedan - Disconnect regulator arm from arm and plate assembly pivot by pulling the hairpin clip at pivot. Remove regulator retaining screws, then remove regulator through access hole.

Ford (Quarter Window): Remove rear seat cushion, arm rest, rear seat back medallion (on Club Victoria), rear seat back, garnish molding and quarter trim panel. Proceed as follows:

Custom 2-Door Sedan - Remove fibre lower access hole cover, and lower the quarter window. Disconnect regulator arm from lower glass channel by removing hairpin clip from roller assembly, and removing all parts of roller assembly. Raise glass and tape in place. Remove regulator assembly retaining screws, then remove regulator through lower access hole. To install, reverse removal procedure.

Club Victoria - Remove fibre lower access hole cover and the upper access hole cover. Lower quarter window so regulator arm is accessible through the upper access hole, then disconnect regulator arm from glass lower channel by pulling the roller assembly hairpin clip and removing parts of the roller assembly. Raise glass to top of opening and tape in position. Remove regulator retaining screws and remove regulator through lower access hole. To install, reverse removal procedure.

Club Sedan - Remove upper and lower access hole covers. Remove front guide adjusting screw nuts and the front guide retaining screws, then pull front guide down to disengage it from guide roller on lower channel, and remove front guide through lower access hole. Lower window so regulator arm is accessible through upper access hole, then disconnect regulator arm from lower channel by pulling the hairpin clip and removing the parts of the roller assembly. Raise quarter window to top position and tape in place. Remove regulator retaining screws and remove regulator assembly through lower access hole. To install, reverse removal procedure.



CONTINENTAL WINDOW CONTROL WIRING DIAGRAM

Convertible - Remove access hole cover and lower the window half way. Disconnect regulator arm from glass lower channel by pulling roller assembly hairpin clip and removing all parts of the roller assembly. Raise glass to the top position and tape in place. Remove regulator retaining screws, then remove regulator assembly through the access opening. To install, reverse removal procedure.

Lincoln (Front Door Windows): Disconnect battery ground cable. Remove door locking control rod knob and inside door handle. Remove screw attaching arm rest to inner panel bracket and remove trim panel from door. Disconnect courtesy light wires at bullet connectors. Remove access hole cover plate, window glass stop bracket with stop attached, two spring type retainers that attach glass channel rollers to window regulator arms, and remove rollers. Raise glass to top position and tape in place. (NOTE - On models without channel and frame assembly, use a rubber wedge to hold window glass up). Remove screws securing regulator assembly to inner door panel. Disconnect wires from motor at bullet connectors. Remove regulator assembly through access hole. To install, reverse removal procedure.

Lincoln (Rear Door Windows): Disconnect battery ground cable. Lower window to full down position and remove door locking control rod knob and garnish molding, inside door handle, and screw attaching arm rest to inner panel bracket. Pry off trim panel. Remove access hole cover plate and window glass stop. Raise window to full up position and tape glass in place. Disconnect wires from motor at bullet connectors. Remove screws attaching regulator to door inner panel and remove regulator through access hole. To install, reverse removal procedure.

Lincoln (Quarter Windows): Lower glass to full down position. Disconnect battery ground cable and remove rear seat and back cushions. Remove sheet metal screws retaining trim garnish molding and remove molding. Remove sheet metal screws securing trim panel to quar-

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FORD, LINCOLN, MERCURY (C nt.)

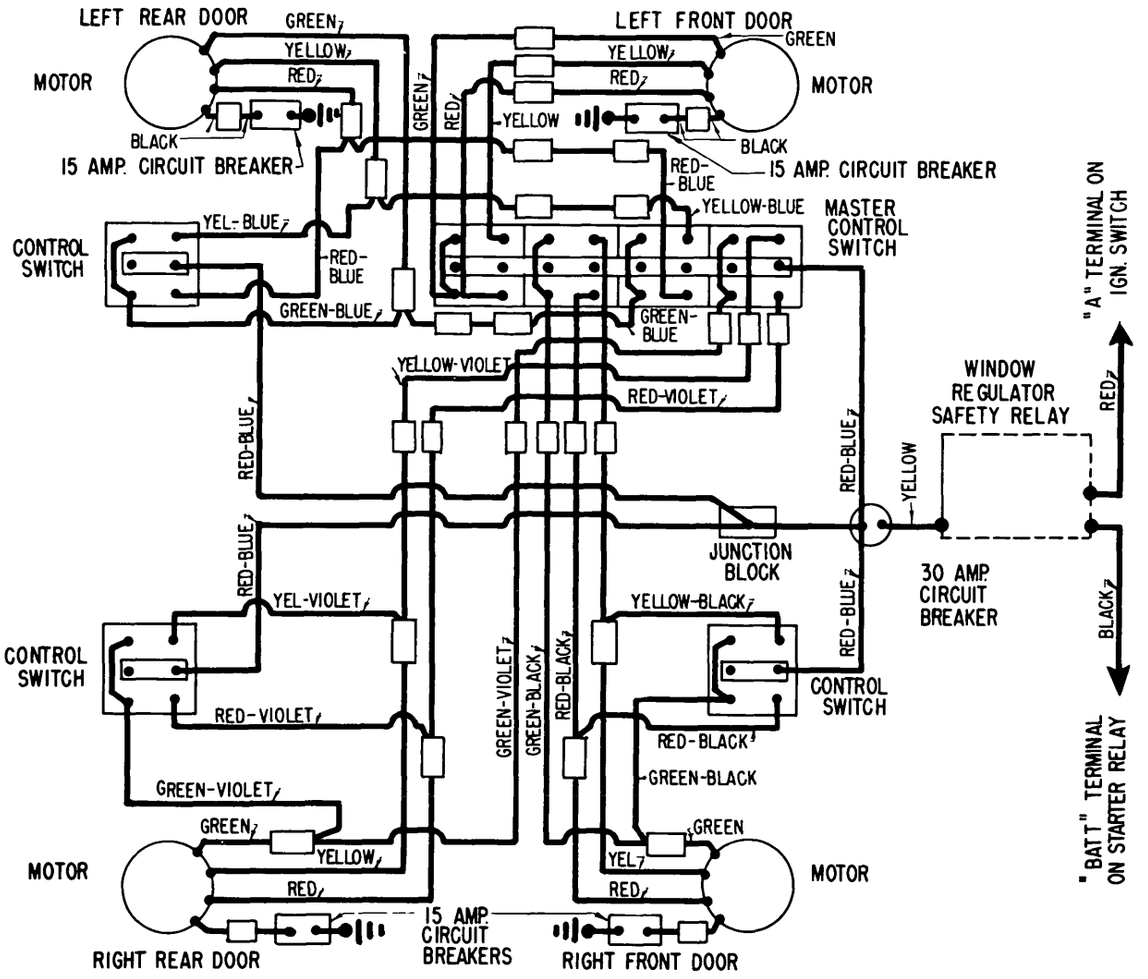
ter panel and remove trim panel. Disconnect wires at bullet connectors from window switch and cigar light ground. Remove positive (hot) wire from cigar lighte r. Remove water shield, then disconnect wires from motor at bullet connectors. Remove capscrews securing quarter window and regulator panel assembly to quarter panel. Move quarter window and regulator panel assembly to rear and lift front end upward to remove. Remove two nuts securing window glass to glass channel rollers and remove window glass. Remove screws securing regulator assembly to panel assembly and remove regulator. To install, reverse removal procedure.

Lincoln (Ventilator Window): Proceed as for removal of front door window regulator assembly (see above) for removal of molding and trim panel. At this point, remove front access hole cover, then remove capscrews securing ventilator window motor mounting bracket to door inner panel. Remove motor and bracket assembly through access hole. To install, reverse removal procedure.

M rcury (Front & Rear Door Windows): Lower window to full down position. Remove inside door handle, then remove garnish molding, edge trim molding, or lower trim molding as necessary. Remove screws securing arm rest finger tip plate to support bracket and screws securing lock control escutcheon to door inner panel. Remove two screws from lower edge of trim panel. Pry trim clips free along sides of trim panel and lift panel to free lower trim clips from retainer at bottom edge of door. On rear doors, disconnect window regulator switch from connector. Remove arm rest support from door inner panel, then peel plastic shield down to lower edge of door. *(NOTE* - To remove motor only, disconnect motor wires at bullet connectors. Remove two nuts and eyelets securing motor assembly and coupling to regulator assembly. Remove motor and coupling through door inner panel access hole). Remove two screws from window lower stop to door inner panel and remove stop. Disconnect motor wires at bullet connectors. With window at full down position, remove two spring type retainers securing window channel roller assemblies to window regulator arms. Separate regulator arm pivots from rollers. Raise window assembly to full up position and retain in place with tape or rubber wedge. Remove screws securing regulator assembly to door inner panel and remove regulator assembly.

Mercury (Quarter Windows): Disconnect battery at ground cable, then proceed as follows:

C nvertible - Lower convertible top, then remove rear seat and back cushions. Remove quarter window garnish molding and upper rear quarter trim panel. Remove arm rest panel assembly and disconnect courtesy lamp from panel. Remove quarter front trim panel. Lower quarter window to full down position by operating the switch, then remove wires from switch. Remove plastic shield, then remove spring retainer securing window channel guide roller assembly to regulator arm pivot. Remove two screws securing quarter window guide button retainer assembly and remove retainer and guide button from guide assembly. Remove screws retaining regulator assembly to quarter panel and remove regulator through access hole. To install, reverse removal procedure.



FORD & MERCURY WINDOW CONTROL WIRING DIAGRAM

Other Models (Exc. Convertible) - Remove rear seat and back cushions, then remove window garnish molding. If necessary, remove two screws at lower front of trim panel and one screw at lower edge of trim panel directly below ash tray. Pry trim clips loose from inner quarter panel along forward edge of trim panel and remove panel. Peel off plastic shield, starting at forward edge of inner panel, leaving shield attached at rear edge. Move window to a position where regulator arm is accessible through rectangular access hole. Remove spring type retainer securing window channel roller assembly to window regulator arm pivot. Pull regulator arm free of window guide. Raise window and retain in the full up position with tape or by inserting a screwdriver in slanted slot at upper edge of inner panel. Remove wires from regulator switch, then remove screws securing regulator to inner panel and remove regulator through access hole. To install, reverse removal procedure.

Mercury Turnpike Cruiser (Back Wind w): Remove spare wheel and tire assembly and luggage compartment front lining board. Remove back window housing cover. Lower back window assembly down to approximately one inch above lower stops. Disconnect battery ground cable, then remove spring retainers securing window channel roller assemblies to regulator arms. Push regulator arms forward to separate pivots from rollers. Remove two capscrews securing each lower side run assembly.

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FORD, LINCOLN, MERCURY (C nt.)

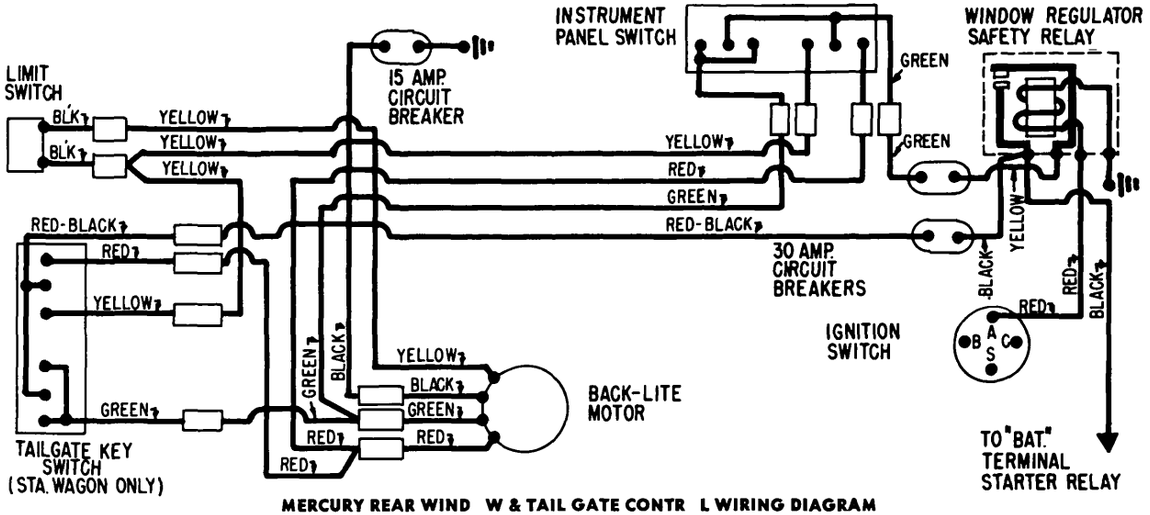
Remove back window assembly by pulling down and out of lower side run assemblies. Temporarily connect battery ground cable and operate back window switch to lower regulator arms to full down position *(CAUTION Do not raise regulator arms as they may damage packag tray trim panel)*. Disconnect regulator motor wires at bullet connectors. Remove capscrew securing motor bracket to regulator back panel, then remove screws securing regulator assembly to back panel and remove regulator and motor as an assembly. To install, reverse removal procedure.

M rcury Stati n Wag n (Tailgate Window): Lower tailgate and remove latch handle. Remove three screws securing tailgate lock release control assembly to window lower garnish molding. Remove garnish molding and end spacers. Remove four tailgate skid strips. Remove both side tailgate inner panel lock access hole cover plates and regulator access hole cover plate. Remove plastic shield. *(NOTE* - If motor only is being removed, remove two nuts securing motor to regulator and screw securing motor brace to inner panel. Turn motor coupling manually to raise window to gain access to wires, then disconnect wires at bullet connectors. Remove motor). Depress back window latch with a screwdriver and raise window to full up position. While supporting window, remove spring retainers from window channel guide roller assemblies. Lower window into tailgate approximately two inches. While raising regulator arms for free arm pivots from rollers and window channel guides, remove back window from tailgate. Disconnect wires at bullet connectors and key-switch wires at quick disconnect. Disconnect right side lock control rod from lock release control assembly and disconnect lock trigger release rod from trigger. Move lock control rod and lock release control assembly out to sides. Remove screws attaching regulator assembly to tailgate inner panel and screw attaching motor brace to tailgate. Move regulator assembly to free roller assembly from regulator equalizer arm guide bracket, then remove regulator and motor out of window opening. To install, reverse removal procedure.

► *MERCURY STATION WAGON TAILGATE KEY-SWITCH & LIMIT SWITCH NOTE: Replacement procedure are the same as for motor and regulator assemblies. See above.*

DISASSEMBLY (MOTOR & REGULATOR ASSEMBLY): Turn coupling until regulator quadrant completely disengages from drive assembly gear, relieving regulator spring tension. *(NOTE - Coupling must be turned in direction of least resistance)*. Make sure that regulator arms are held when disengaging quadrant from drive assembly gear to prevent arms from springing. Remove nuts and steel eyelets attaching motor to regulator. Pull motor shaft from coupling and remove motor from regulator. Remove capscrews attaching drive assembly to regulator and remove drive assembly.

REASSEMBLY (MOTOR & REGULATOR ASSEMBLY): Install drive assembly to regulator with capscrews and install coupling on drive assembly shaft. Install motor with motor shaft properly engaged in coupling. Secure motor with steel eyelets and nuts to regulator assembly. To obtain proper torque, tighten the nuts until eyelets on each side of rubber grommet butt together. Pull regulator arms against spring tension so that first tooth of quadrant begins to engage with one tooth of drive assembly gear, then turn coupling to complete engagement of gear teeth. Continue to turn coupling until quadrant travels approximately three-quarters of its distance over drive assembly gear.



MERCURY REAR WIND W & TAIL GATE CONTR L WIRING DIAGRAM

G.M. ELECTRIC

Buick (1957)
Cadillac, Exc. Brougham (1957)
Chevrolet (1957)
Oldsmobile (1957)
Pontiac (1957)

DESCRIPTION: Similar in design and operation to those used on previous models. *See 1956 Annual Data Pg. 481 and note the following:*

SERVICE PARTS: Window Lift Motor - No. 4902201 or 4902202.

AUTO-LITE ELECTRIC

Chrysler & Imperial (1957)
De Soto (1957)
Dodge (1957)
Packard (1957)
Plymouth (1957)
Studebaker (1957)

DESCRIPTION: Similar in design and operation to type used on previous models. *See 1956 Annual Data Pg. 483 and note the following:*

SERVICE PARTS: Auto-Lite Nos. as follows:

WINDOW LIFT MOTOR
Chrysler & Imperial, De Soto, Dodge, Plymouth

Left Front Door (All Exc. IM-1)	EPJ-4005
Left Front Door (IM-1)	EPJ-4102
Right Front Door (All Exc. IM-1)	EPJ-4004
Right Front Door (IM-1)	EPJ-4103
Left Rear Door (C75,76 Exc. Hard Top)	EPZ-4001
Left Rear Door (C75,76 Hard Top)	EPZ-4002
Left Rear Door (IM-1 Exc. Hard Top)	EPJ-4102
Left Rear Door (IM-1 Hard Top)	EPZ-4101
Left Rear Door (Exc. C75,76; IM-1; D70,71 and Hard Tops)	EPJ-4005
Left Rear Door (D70,71)	EPZ-4001
Left Rear Door (Hard Tops Exc. C75,76)	EPZ-4001
Right Rear Door (All Exc. IM-1; D70,71 and Hard Tops)	EPJ-4004
Right Rear Door (IM-1, Exc. Hard Top)	EPJ-4103
Right Rear Door (IM-1 Hard Top)	EPZ-4102
Right Rear Door (D70,71 and Hard Tops)	EPZ-4002
Left Qtr. (Exc. IM-1; Dodge & Plymouth Sp. Cl. Cpe.)	EPJ-4004
Left Qtr. (IM-1)	EPJ-4003
Left Qtr. (Dodge & Plymouth Sp. Cl. Cpe.)	EPZ-4002
Right Qtr. (Exc. IM-1; Dodge & Plymouth Sp. Cl. Cpe.)	EPJ-4005
Right Qtr. (IM-1)	EPJ-4003
Right Qtr. (Dodge & Plymouth Sp. Cl. Cpe.)	EPZ-4001

HUDSON & NASH

Huds n H rn t (1957)
Nash Ambassad r (1957)

DESCRIPTION: Similar in design and operation to previous electric types used. *S e 1956 Annual Data Pg. 485.*

CADILLAC ELDORADO BROUGHAM

Cadillac Eldorado Brougham (1957).

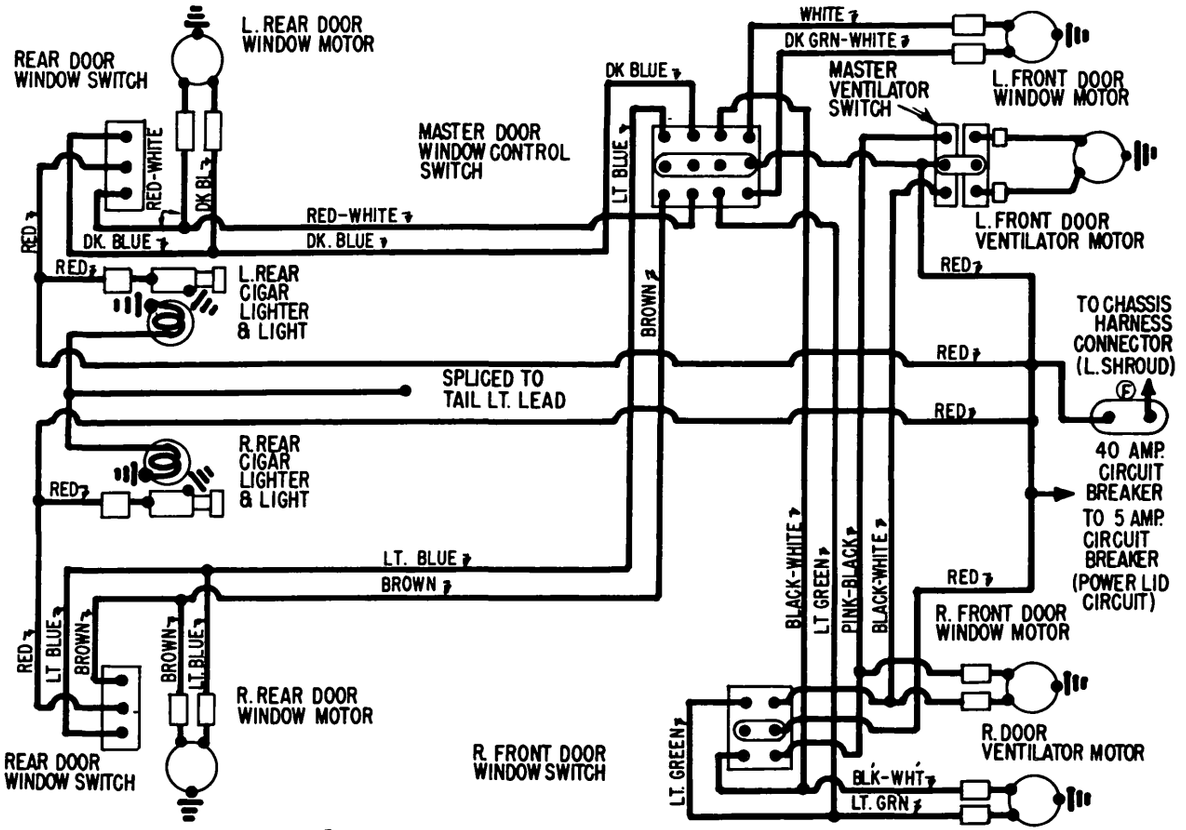
DESCRIPTION: Electrically operated door windows and front door ventilator windows having individual motors. A master control switch on left front door controls all windows. Individual window controls are also located on right front and both rear doors. The right front door also includes a control switch for operation of both front door ventilators.

REMOVAL & INSTALLATION: Front Door Window Regulator Assembly - Lower the window and remove door belt finishing molding and door trim finishing panels. Remove inner panel access hole cover. Remove window assembly and front guide assembly. *(CAUTION - Do not operate regulator motor after assembly is disngaged from regulator).* Remove front guide-to-rear guide brace rear attaching screws, then disconnect regulator motor lead wires at connector. Remove inner panel cam attaching screws and detach cam from regulator balance arm. Through access holes in door inner panel, remove regulator attaching screws and remove regulator assembly through large access hole. To install the assembly, reverse removal procedure.

Fr nt Door Window Regulator Electric Motor Assembly: Remove window regulator assembly from door (see above), and clamp in a vise. *(CAUTION - Be sure to p rform the following steps in sequence indicated or s rious injury may result).* Drill a ¼" hole through back plate and sector within the area immediately above motor assembly (location of hole depends on position of lift arm). *(CAUTION - Do not drill into motor housing. Locate hole not less than ¾" away from edge of back plate or sector).* Insert a 3/16" bolt through back plate and sector and install a nut (do not tighten). Remove three motor attaching screws and remove motor assembly from regulator. To install, reverse removal procedure being sure to remove nut and bolt locking the sector.

Fr nt Door Ventilator Regulator and Motor Assembly: Remove door belt finishing molding and door trim finishing panels. Remove inner panel access hole cover and disconnect switch and lead wires from ventilator regulator motor wires. Remove ventilator tee shaft attaching screw, then remove ventilator regulator attaching screws. With windows in "up" position disengage regulator shaft from ventilator tee shaft and remove regulator and motor assembly from door through large access hole.

R ar Door Window Regulator Assembly: Raise window and remove belt finishing molding and door trim finishing panel. Remove inner panel acce ss hole cover. Through small access hole remove window lower sash channel front cam rear attaching screw. Through small access hole (approx. 1 ½" diameter), remove rear cam rear attaching screw. Lower window to a position where, through the large access hole, the window lower sash channel front cam front attaching screw and rear cam front attaching screw can be removed. Disconnect window regulator motor wiring harness connector. Disengage window lower sash channel front and rear cams from window lower sash channel and from window regulator arms and remove cams from door. Lift window and "prop" it in up position. *(CAUTION - Do not operate regulator motor after assembly is disengaged from regulator).* Remove window lower bumper support from door. Disconnect door lock remote control freewheeling solenoid feed wire at connector. Disengage spring clip and detach remote control connecting rod from remote control. Remove remote control attaching screws, disengage remote control handle shaft from hole in door inner panel and remove assembly through large access hole. Remove window rear guide lower attaching stud and nut. Remove front-to-rear guide brace attaching screws and remove front-to-rear guide brace. Remove inner panel cam attaching screw, disconnect cam from window regulator arm and remove cam from door. Remove window regulator attaching screws. Position regulator assembly so that motor end of regulator can be started out of access hole first; then remove window regulator assembly from door. To install, reverse removal procedure.



CADILLAC ELDORADO BROUGHAM WINDOW CONTROL WIRING DIAGRAM

Rear Door Window Regulator Electric M tor Assembly: Remove regulator assembly from door, then proceed as for removal of front door motor assembly. (See above).

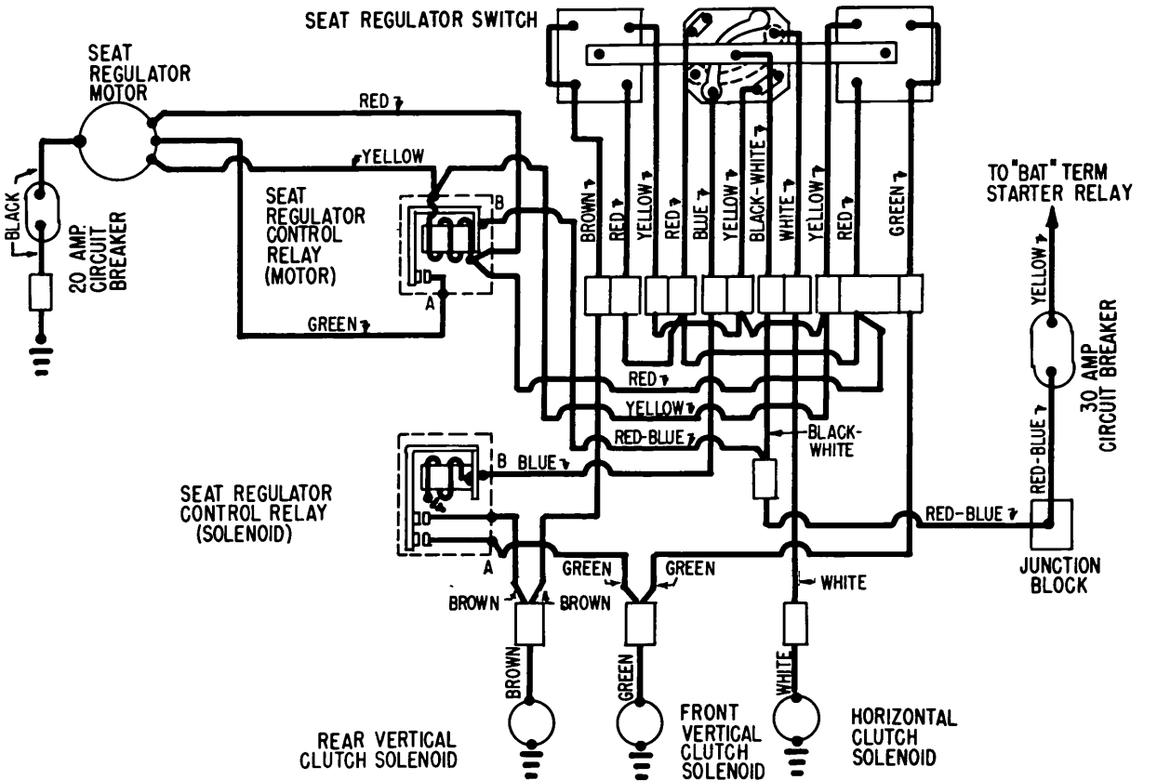
TROUBLE SHOOTING & OTHER DATA: S *"G.M. El ctric Window Regulators" in 1956 Annual Data.*

G.M. & LINCOLN FOUR & SIX-WAY SEAT CONTROL

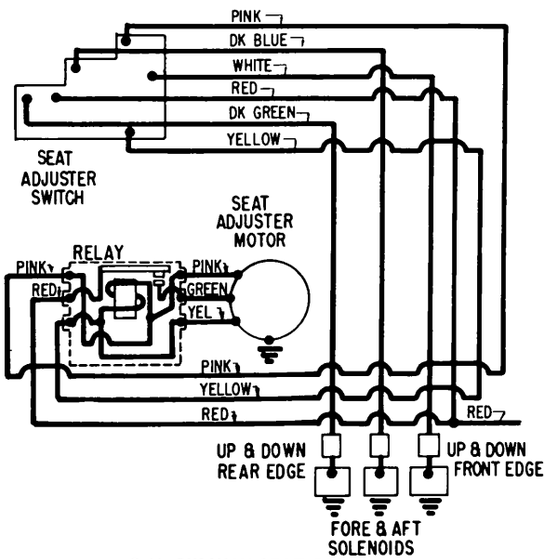
Buick (1957).
Cadillac (Exc. Eld rado Brougham) (1957).
Lincoln (1957) *See "4-Way Seat Control Note" below.*
Oldsm bil (1957) *See "4-Way Seat Control Note" below.*
P ntiac (1957).

►*ACTUATOR ROLL PIN INSTALLATION CAUTION:* When replacing an actuator spinning nut assembly or an actuator assembly (less spinning nuts) roll pins should be installed so that center of protruding portion of pin is located **b tween** threads of the jackscrew. If pin installed in center of a thread there is a possibility pin may shear or cause assembly to jam. When installing roll pins in jackscrew, install pin so that 1/16" of pin protrudes above jackscrew threads.

DESCRIPTION: The 6-Way Seat Adjusters provide horizontal and vertical movement, and forward and rearward tilt. The 4-Way Seat Adjusters provide horizontal and vertical movement only (see "4-Way Seat Control Note" below). The adjusters are operated by an actuator assembly consisting of a reversible motor, gear box, jackscrew and relay. Spinning nut (solenoid clutch) assemblies located on regulator jackscrew transmit movement to seat adjusters through torque tube assemblies and links *(NOTE* - There are three spinning nuts on 6 way seat adjusters, and 2 spinning nuts on 4-way seat adjusters). In each of the three spinning nut (solenoid clutch) assemblies, there is a free-wheeling nut mounted in ball bearings which freewheels with the jackshaft unless locked out of freewheeling by the solenoid located in spinning nut assembly. When spinning nut is locked out of free-wheeling by solenoid action, the nut assembly moves on jackscrew and transmits movement to seat adjusters through connecting links and torque tube assemblies.



LINCOLN SIX-WAY SEAT CONTROL WIRING DIAGRAM



G.M. SIX-WAY SEAT CONTROL WIRING DIAGRAM

Seat regulator is controlled by switches located at left panel of front seat.

►*4-WAY SEAT CONTROL NOTE:* 4-Way Seat Adjusters are basically the same as 6-Way Seat Adjusters. The rear vertical torque tube and the center spinning nut (solenoid clutch) and linkage which operate rear of seat up and down on 6-way seat adjusters are not used on 4-way seat adjusters. The rear of the 4-way adjusters is operated up and down in unison with the front of the adjusters by means of a connecting link to front vertical linkage. Service is the same for both types.

REMOVAL & INSTALLATION: Front Seat Assembly (Including Seat Adjusters & Actuator Assembly): Operate seat to raised position. Under front of seat disconnect adjuster control wire harness from adjuster feed wire harness and detach control harness from clip on floor pan. Disconnect lighter feed wire (where applicable) and detach wire from clip on floor pan. On Cadillac, remove screws securing rear floor carpet to right and left adjusters. On all cars, remove seat adjuster to floor pan bolts, then with aid of helper lift seat assembly, with adjusters and actuator assembly attached, from body. To install, reverse removal procedure. Make sure ground wire is secured under seat adjuster floor pan bolt. When installing seat assembly to body, carefully align seat adjuster attaching holes with attaching holes in floor pan to avoid possible binding of seat adjuster linkages. Seat adjusters should be parallel when properly aligned. Check operation of seat to extreme limit of each position.

Front Seat Assembly (Less Seat Adjusters & Actuator Assembly): Operate seat to fully raised position and midway between full forward and rearward horizontal positions. Remove both right and left seat side panels. Under front of seat disconnect control wire harness from adjuster feed wire harness. Detach lighter feed wire and detach wire from clip on floor pan; remove ground wire from under seat adjuster bolt. At both adjusters remove front and rear seat adjuster-to-seat frame attaching bolts. Tilt seat assembly rearward and remove control wire harness from spring clips along front of seat bottom frame. With aid of h e l p e r carefully lift seat assembly (less seat adjusters and actuator assembly) from body. To install, reverse removal procedure. Make sure ground wire is secured under seat adjuster floor pan bolt. Check operation of seat to extreme limit in each position.

Front S at Adjuster: Remove seat assembly including seat adjusters and actuator assembly (see above). Place

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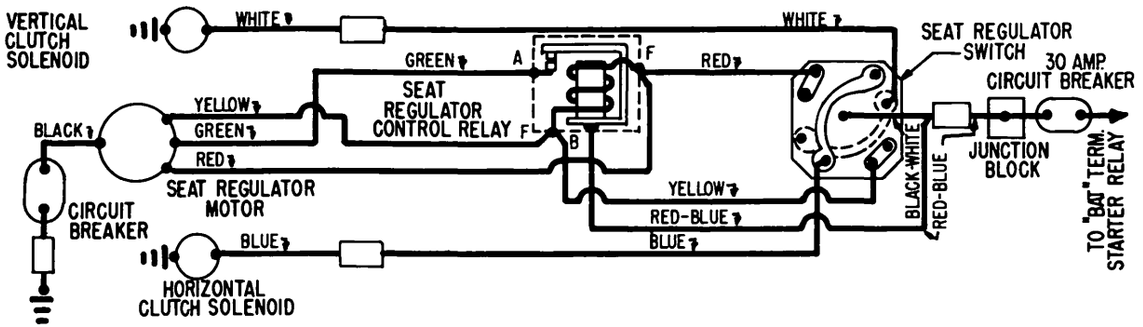
G.M. & LINCOLN FOUR & SIX-WAY SEAT CONTROL (Cont.)

seat assembly upside down on a covered bench. Remove seat side panel and counterbalance spring from adjuster being removed. Support torque tube assembly with board between torque tube and seat front and rear rails on side of seat from which adjuster is being removed. Remove cotter keys and washers securing adjuster links to torque tube assembly and cotter key and washer securing torque tube link to adjuster. Remove both front and rear seat adjuster-to-seat frame attaching bolts. Lift adjuster slightly, then carefully work adjuster outboard to disengage it from torque tube. Disengage link from adjuster. If removing right adjuster, remove cotter key and washer and disengage actuator assembly from support pin. To install, reverse removal procedure.

Adjuster Actuator Assembly: Operate seat midway between forward and rearward horizontal positions. Operate front of seat to up position and rear of seat midway between up and down positions. Remove seat assembly including seat adjusters and actuator assembly. Place assembly upside down on covered bench. Remove both right and left seat adjuster counterbalance springs. Check to see that all spinning nut attaching screws are accessible for removal. If screws not accessible, hook up control harness feed wire to power and ground seat frame; hook up control switch, then operate actuator to position spinning nuts so that all screws are accessible. Disconnect the three spinning nut solenoid feed wires at connectors. Disconnect control harness feed wires from motor relay. Remove anti-creep spring from center spinning nut. Remove shoulder screws securing spinning nuts to mounting supports. Remove cotter key and washer securing actuator to support pin. Raise spinning nut mounting supports to vertical position. Raise front of actuator sufficiently to allow unit to be removed from support pin, then remove actuator assembly from seat. To install, reverse removal procedure. Connect relay and solenoid wires.

Adjuster Actuator Spinning Nut Assembly (Including Solenoids): Remove seat adjuster actuator assembly (see above). Carefully drive roll pins out of jackscrew. Insert drift punch or suitable tool into spinning nut frame mounting hole, rotate spinning nut frame slowly until drift punch engages in locking nut of spinning nut, then unscrew complete spinning nut assembly from jackscrew. To install, reverse removal procedures. *CAUTION - See "Actuator Roll Pin Installation Caution" above.*

Adjuster Actuator Spinning Nut Solenoids: Remove seat assembly (less seat adjusters and actuator assembly). Disconnect solenoid feed wire at connector. Remove solenoid cover carefully bending down tabs at bottom of cap and pulling upward. Remove solenoid plunger, plunger shunt, and shunt spring. Remove nut and washer securing solenoid ground wire to spinning nut frame. Carefully push solenoid forward or rearward and remove from retainer on spinning nut assembly. To install, reverse removal procedure. Solenoid plunger should move up or down freely; if necessary, move solenoid slightly forward or rearward to allow free movement of plunger. Before installing seat assembly, hook up feed wire with control harness and check operation of solenoid.



LINCOLN FOUR-WAY SEAT CONTROL WIRING DIAGRAM

Control Switch (GM Cars): Remove switch and escutcheon assembly from seat side panel. Through holes in side of switch escutcheon, depress tabs of clips and remove clips securing switch to escutcheon and remove switch. To install, reverse removal procedure.

LUBRICATION: Jackscrew – Thoroughly wipe off old lubrication. Apply Lubriplate No. 630 AA-W (winter grade). Operate adjuster to all positions and to extreme limit. Wipe off excess lubricant.

TROUBLE SHOOTING: Seat Adjuster Motor Does Not Operate – Short or open circuit between power source and motor; defective motor.

Seat Adjuster Motor Operates, But Seat Adjusters Are Not Actuated: Short or open circuit between switch and affected solenoid; defective solenoid.

Seat Adjuster Motor Operates, Rear Edge of Seat Cannot be Adjusted (Other Operations Normal): Short or open circuit between switch and affected solenoid.

Seat Adjuster Motor Operates, Front & Rear Edge of Seat Move Up & Rearward, But Will Not Move at Down & Forward: Short or open circuit between one of motor field wires and seat control switch; defective field coil in motor.

Seat Adjuster Motor Operates, Front & Rear Edge of Seat Move Down & Forward, But Will Not Move at Up & Rearward: Short or open circuit between one of motor field wires and seat control switch; defective field coil in motor.

SERVICE PARTS: Actuator Assembly (With Motor, Less Spinning Nuts & Relay) - G.M. Part No. 5047975 (Exc. Lincoln). Lincoln No. BAJ-5860472-A (Lincoln).
Motor Relays - G M Part No. 4711553 (Exc. Lincoln). Lincoln No. FDU-14546-B & FEL-14546-A.

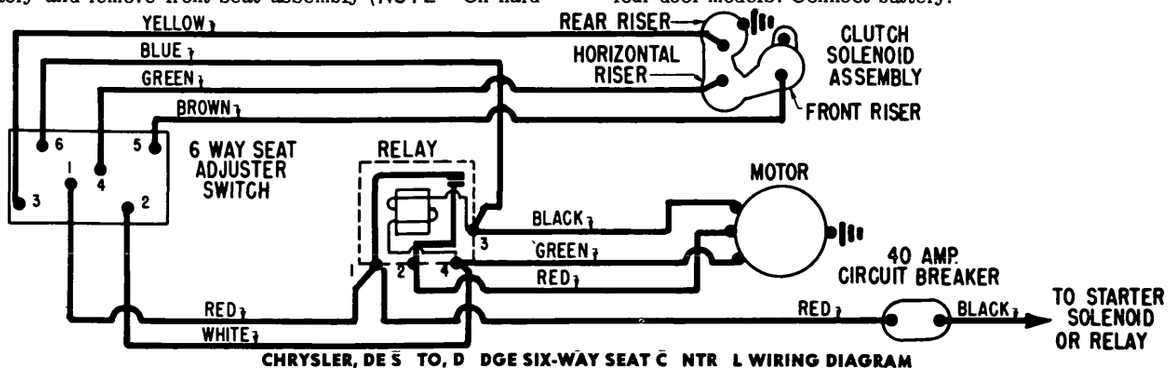
CHRYSLER, DE SOTO, DODGE SIX-WAY SEAT CONTROL

Chrysler, Imperial, DeSoto & Dodge (1957).

DESCRIPTION: 6-Way Power Seat operated by a single reversible electric motor located under the front seat. The motor drives a gear assembly which transmits power to slave units located in the seat tracks. Solenoid clutches in the gear assembly, when energized by actuation of the control switches on left side of front seat, engage the flexible drive cables with the gear assembly to operate the seat horizontally, up and down, and tilt it.

FRONT SEAT ASSEMBLY: Removal - Disconnect battery and remove front seat assembly *(NOTE* - On hardtop models, remove front seat and cushion as an assembly). Disconnect control wires at switch and disconnect seat adjuster battery wire at circuit breaker in cowl. Remove seat guide attaching stud nuts and remove adjuster. *CAUTION - Do not damage flexible tubing during removal.*

Installation: Install adjuster and stud nuts. Connect seat adjuster battery wire to circuit breaker on cowl. Form a loop in the wires from relay to clip on floor for horizontal travel. Install front seat assembly. Connect control wires to switch and install front seat cushion of four-door models. Connect battery.



CHRYSLER, DE SOTO, DODGE SIX-WAY SEAT CONTROL WIRING DIAGRAM

CADILLAC ELDORADO BROUGHAM

Cadillac Eldorado Brougham (1957).

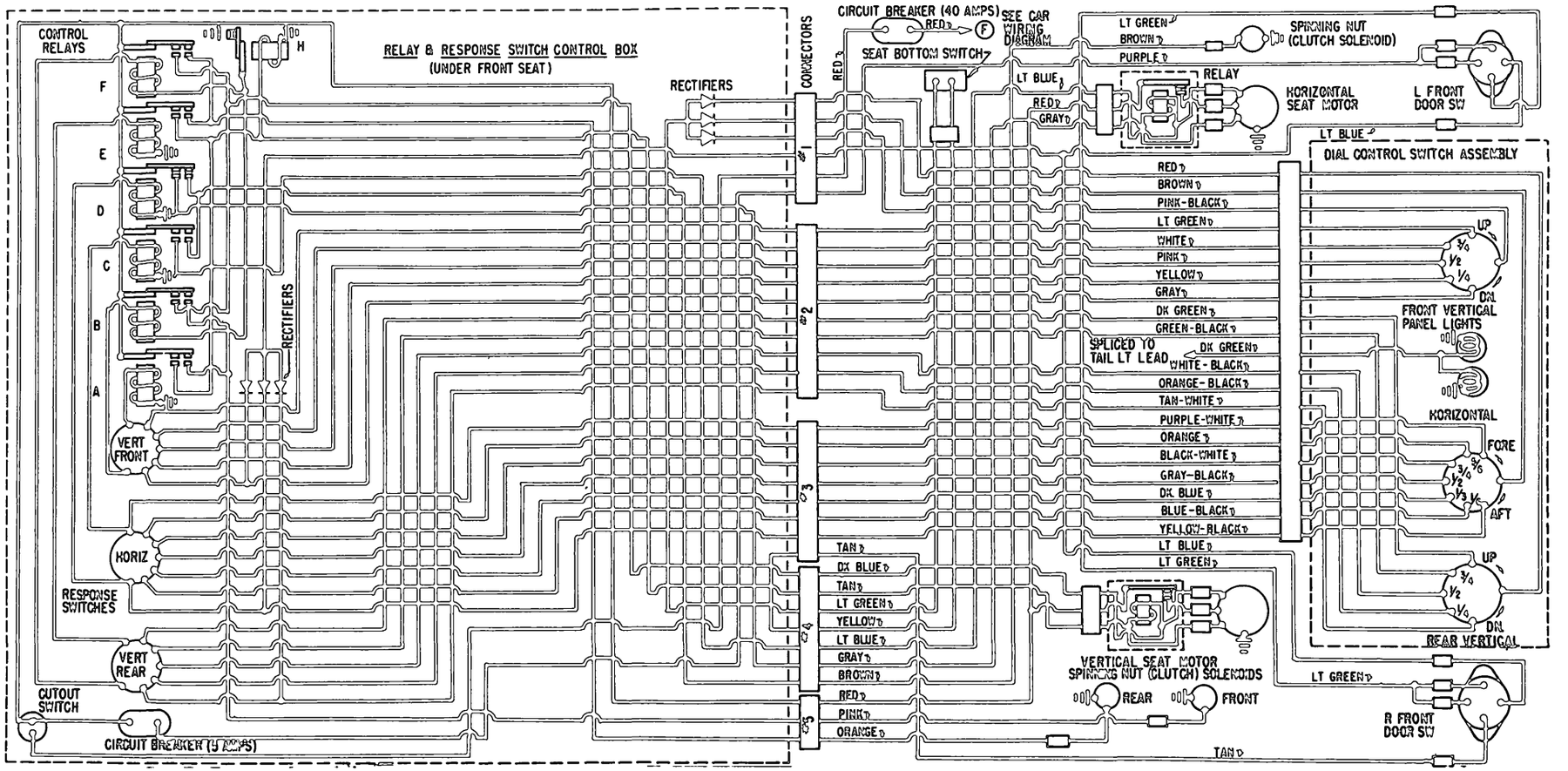
DESCRIPTION: This six-way front seat control consists of two reversible motors for vertical and horizontal seat movement. The right hand assembly controls vertical movement of the front and or rear edge of seat through a jack screw and two spinning nuts (solenoid clutches). The left hand assembly controls horizontal seat movement through a jack screw and one spinning nut (solenoid clutch). The electrical control unit provides automatic movement of the seat to a "favorite" position as determined by the driver. A dial selector control switch installed on left front door arm rest controls front edge and rear edge to five positions, and the horizontal movement to seven positions, by manual operation. Two buttons, one red and one green, over each control knob selects the "favorite" position to two locations when actuated. Opening either front door causes the seat to operate to a full "back" and "down" position. Closing either front door, with a person in the drivers seat causes the seat to automatically return to the selected "favorite" position. A switch on relay control box under front seat at left side is provided to turn off the seat controls.

OPERATION: By Adjusting Dial Selector Control Switch- Current from power source flows through door jamb switches (with door closed), through the seat bottom switch (when closed) and then to the three control knobs of control switch. If the front vertical control knob is adjusted to operate seat to extreme "up" position, the current flows from switch indicator, through the extreme "up" wire circuit to the left half of the response switch bar, thereby energizing relay "A" which energizes the "up" field coil in the vertical motor, and the front vertical spinning nut solenoid (clutch solenoid). The response switch rotates, due to the connecting link being attached to the seat torque tube, until the gap between switch bars opens the circuit between the feed from control switch to response switch. *NOTE* - This principle is used in all operations of the system.

Automatic Operation: With one of the front doors opened, current from the power source is directed from selector control switch to the automatic circuit which simultaneously energizes the extreme "down" and "back" positions and automatically stops when the gap in each of the response switches opens the circuit. When driver enters the car, sits in driving position on front seat cushion and closes both front doors, the current from power source is directed from the automatic circuit to dial control switch circuit; then the seat operates back to its original position (the position seat was in before driver left car).

Vertical Actuator Motor: Operates front and/or rear edge of seat up and down and is located at the left seat adjuster.

CONTINUED ON NEXT PAGE



CADILLAC ELDORADO BROUGHAM SEAT CONTROL WIRING DIAGRAM
(SEE FOLLOWING PAGE FOR NUMBERED CONTROL PLUGS)

CADILLAC ELDORADO BROUGHAM (Continued)

H rizontal Actuator Motor: Operates the complete seat assembly forward and rearward and is located at the left seat adjuster.

Fr nt Seat Bottom Switch: Controls circuit from power source to selector control switch. The complete system is inoperative when doors are closed and this switch is open (seat unoccupied). This switch is located in the seat spring construction on drivers side of front seat cushions. When driver sits in the seat, the switch is closed.

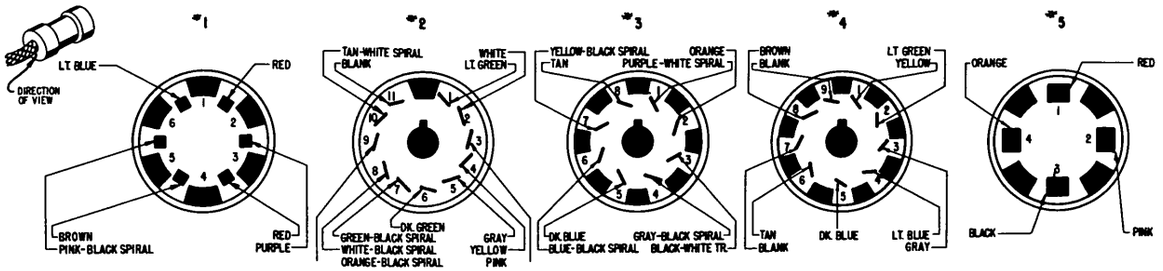
D or Jamb Switches: Directs current from power source to dial selector control switch when doors are closed, and to the automatic circuit when one or both doors are open.

S at Relay & Response Switch Control Box: This box consists of seven control relays and three response switches. The relays energize actuator motors and spinning nuts (solenoid clutches on jack screws) to operate the seat. Relays must first be energized by current from one of the response switches which in turn is actuated mechanically by linkage connected to the front seat torsion bar. (*NOTE* - There is a response switch for each major movement of seat assembly). Current flows from dial control switch circuit or the automatic circuit, energizing response switches and control relays. The response switch remains energized until feed from power source to relay is broken by action of the response switch mechanical linkage.

Dial Selector Control Switch: Control switch is installed on left front door arm rest and is designed with three switches, each of which energize a particular response switch in the control box. When doors are closed, and the seat bottom switch is actuated (drivers seat occupied), current flows to the three control switches. From control switches, current flows through one side of response switch which energizes the affected relay.

PRE-SELECTION "FAVORITE" SEAT POSITION: (*NOTE* - The seat can also be pre-set for the "favorite" position of a second person. Each of the two persons adjusting the seat to a "favorite" position must choose one color of the two push buttons located above each switch knob to control the seat adjustment, and each person must follow the pre-setting procedure outlined below. Other persons driving the car can manually operate the control knobs to obtain the desired seat position).

Adjustment: Sit in driving position and close both front doors. Choose one color (red or green) for the drivers use in setting controls. Rotate each control knob until arrowhead of the chosen color is lined up with the stationary arrowhead in the outer lens. Depress button of the chosen color behind first control knob, using a dull pointed tool. While holding button down, rotate this control knob until seat is in the desired position. Repeat this procedure with the buttons of the chosen color behind each of the other control knobs.



POWER SEAT CONTROL PLUGS
(AT CONTROL BOX)

CADILLAC ELDORADO BROUGHAM SEAT CONTROL PLUGS

The seat will now return to the "favorite" position of this driver each time he enters the car and indexes the arrowheads of the chosen color.

REMOVAL & INSTALLATION: Front Seat Assembly (Complete) - Remove front seat cushions (see below), then turn back floor carpets to expose pedestal-to-floor pan attaching bolts on each side and remove bolts. Identify wiring for correct installation, then disconnect seat wire harness from seat control box and seat actuator motors and remove complete assembly from body. To install, reverse removal procedure.

Front Seat Cushion, Back & Frame Assembly: Remove seat cushion from seat frame assembly by lifting front edge of cushion upward. Disconnect seat bottom switch wire connectors, then pull cushion forward and remove seat from frame. To remove seat back from frame assembly, remove seat cushion, then remove two screws securing lower edge of seat back to frame. Pull bottom edge of seat back cushion forward and lift upward. Remove back from frame assembly. To remove seat frame from adjusters, remove seat cushion, then remove four bolts securing each seat adjuster to seat bottom frame. Identify wiring for correct installation, then disconnect seat wiring harness from control relay and seat actuator motors and remove frame assembly. To install, reverse removal procedure.

Front Seat Adjuster Assembly: Remove seat assembly (without adjusters and pedestals) from body. Operate seat to a full "up" position. Detach vertical assist spring and remove horizontal anti-chuck spring from adjuster being removed. Support torque tube assembly on side from which adjuster is being removed. Remove three bolts securing torque tube links to adjuster and pedestal. If removing left adjuster, proceed as follows: Remove bolts securing relay box to adjuster, then disconnect wire harness from motor relay and solenoid feed wire from solenoid. If removing right adjuster, remove retaining ring from motor support pin. Disengage adjuster from torque tube links and remove adjuster. If removing left adjuster, remove adjuster and horizontal regulator from body. Remove regulator assembly from left adjuster as a bench operation. To install adjuster, reverse removal procedure.

V rtical Actuator Ass mbly: Operate seat to full "up" position. Remove complete seat assembly with adjusters and pedestal and place upside down on covered bench. Remove retaining ring from motor support pin. Remove anti-creep springs from spinning nut (solenoid clutch) assemblies. Disengage actuator from support pin, and spinning nut assemblies from between torque tube links and remove from body. To remove spinning nut assemblies, see below. To install reverse removal procedure.

Horizontal Actuator Assembly: Operate seat to full "up" and "rearward" positions. Remove complete front seat assembly with adjusters and pedestal and place upside down on a covered bench. Remove bolts securing torque tube links to spinning nut assembly and disengage anti-creep spring from spinning nut. Remove retaining ring from motor support pin and disengage motor-to-response switch connecting link. Disengage motor from support pin and spinning nut assembly from support; then, remove actuator assembly from seat adjuster. To remove spinning nut assemblies, see below. To install, reverse removal procedure.

Vertical & Horizontal Spinning Nut (S l n id Clutch) Assemblies: Remove actuator assembly, then, as a bench operation, carefully drive roll pins located in front of spinning nut out of jackscrews. Insert drift punch or suitable tool into one of the spinning nut frame mounting holes. Rotate spinning nut frame slowly until drift punch engages in locking notch in spinning nut; then rotate spinning nut until it runs off jackscrew. (*NOTE* - In cases where the motor operates, it may be actuated to rotate the jackscrew while the spinning nut is held stationary). To install spinning nut, reverse removal procedure and note the following: When installing roll pins into jackscrew, install pins so that the center of protruding end of pin is located between threads of jackscrew threads.

Relay & Response Switch C ntr l Ass mbly: Remove seat cushion assembly from seat frame. Identify harness connectors for proper installation then disconnect from relay box. Disengage horizontal response switch connecting link from torque tube. In addition, disengage connecting links at outboard side of relay box from torque tube. Remove three relay box attaching screws and remove box from adjuster assembly. To install, reverse removal procedure and note the following: When connecting harness to relay box, line up key in harness plug with slot on relay plug.

FORD & MERCURY FOUR-WAY SEAT CONTROL

Ford, Exc. Thunderbird (1957).
Mercury (1957).

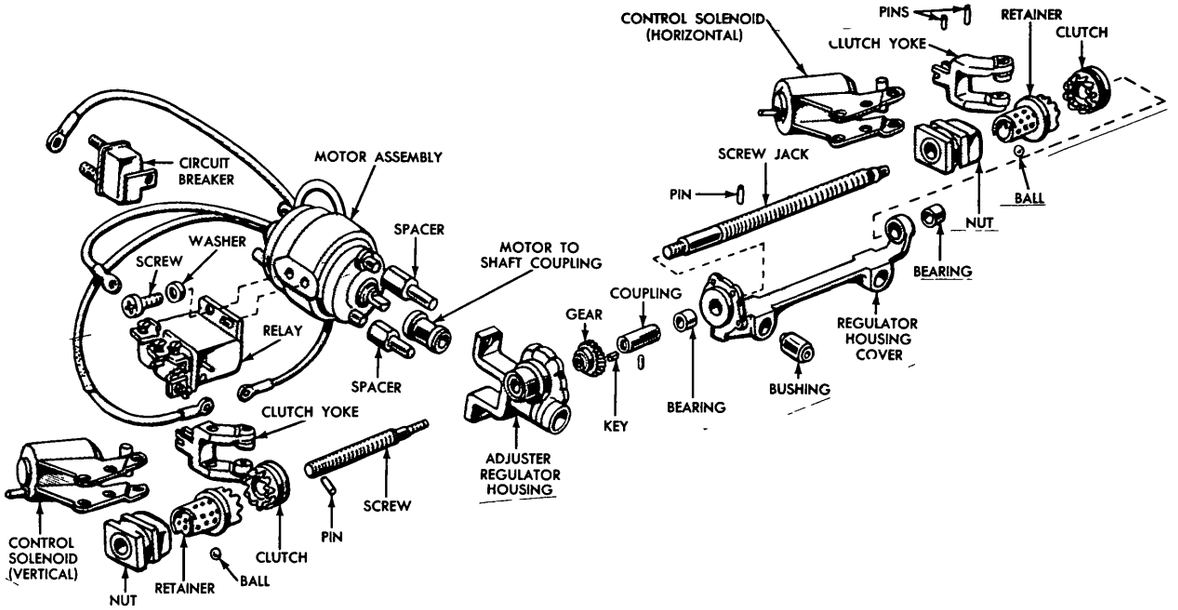
DESCRIPTION: This 4-Way power seat is operated by a single reversible type electric motor driving two jackscrews. Mechanical type clutches operated by solenoids engage the jackscrews for up and down and fore and aft movement of the seat. Operating the toggle switch located on left side of seat (Ford), left side of instrument panel (Mercury), in the direction of desired seat movement energizes the reversible motor and the proper clutch solenoid.

TROUBLE SHOOTING: Seat Will Not Operate in Any Direction: Check for open circuits in all wires. Check circuit breakers and switches. Check for current at green wire terminal on relay (under seat). If current not available, replace relay. On the ground circuit breaker mounted on motor, ground the terminal which has the wire running into the motor and operate seat switch. If motor runs, either the ground circuit breaker or wire between circuit breaker and junction block is defective. If wiring and circuit breaker are not at fault, replace the motor. Check for faulty operating clutch solenoids.

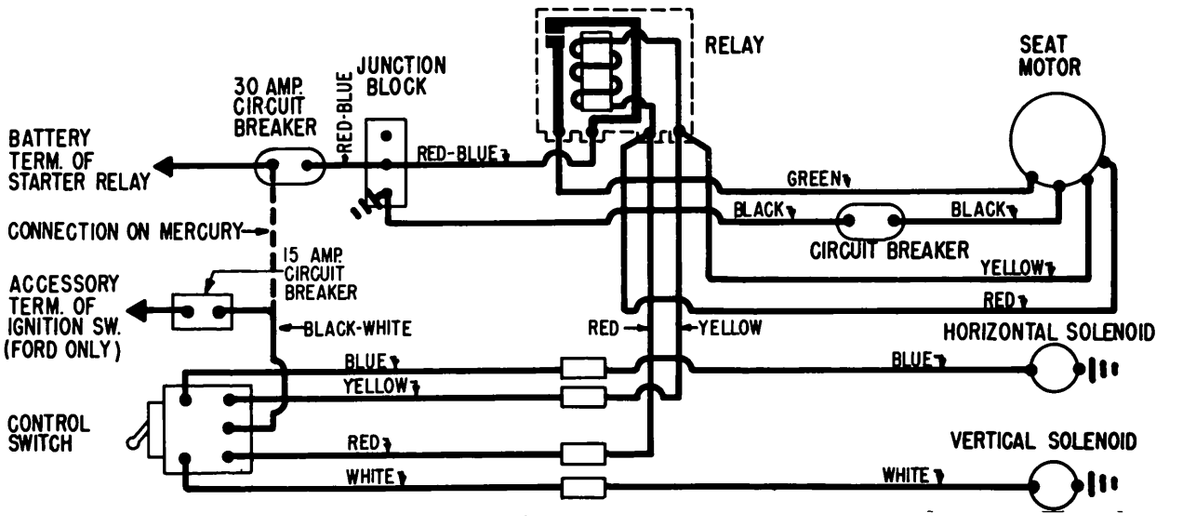
Seat Operates Opposite Switch: Crossed wires at relay or switch. Check wiring diagram.

Seat Operates Sluggishly: Binding in seat track or jackscrew. If no binding is evident, disconnect wires from solenoid which will allow motor to run free without any load. Connect an ammeter in series with the ground (black) wire at junction block and operate motor. The no-load current draw should be 8-10 amperes at 12.0 volts. If current is less than specified, replace motor.

REMOVAL & INSTALLATION: *See "Mercury Seat-O-Matic 4-Way Power Seats".*



FORD & MERCURY FOUR-WAY POWER SEAT ASSEMBLY



FORD & MERCURY FOUR WAY SEAT CONTROL WIRING DIAGRAM

MERCURY SEAT-O-MATIC SEAT CONTROL

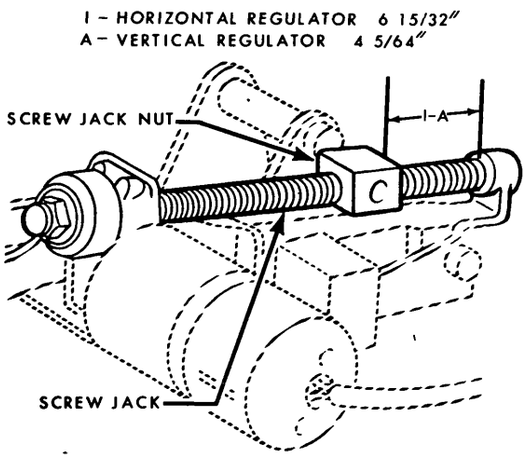
M rcury (1957).

DESCRIPTION: Seat-O-Matic Power Seat consists of two electric motors and jackscrew assemblies operating the seat adjusters for vertical and horizontal movement. An electrical control system automatically positions the seat to one of five vertical, or seven horizontal, preset positions when ignition key is turned to the "On" or "Acc" position. The seat will automatically be moved to the extreme rear position when ignition key is turned to the "Off" position.

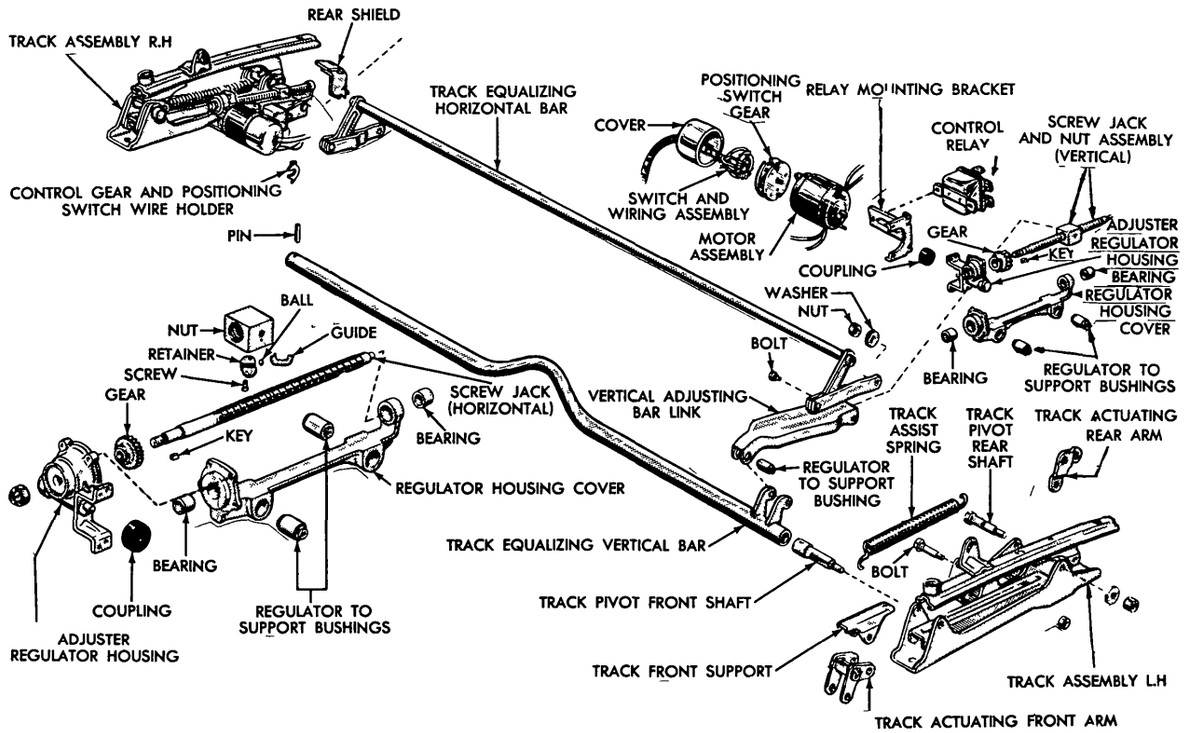
OPERATION: The power seat control components operate as follows·

S at Relay: The "easy entry" seat relay is located on the left front fender apron and allows the seat to return to extreme rear position by completing the circuit to No. 7 terminal of horizontal motor seat positioning switch when ignition key is turned to "Off" position. When key is turned to "On" position, the relay completes the circuit to seat horizontal positioning switch which then assumes control and moves seat to a preselected position.

Seat Dial Control Switch: This dial control switch on the instrument panel is a combination of two multiple switches. The horizontal switch incorporates seven contacts and is controlled by the outer bezel. These contacts are labeled "1" through "7" on face of control dial. The No. 1 position places seat furthest forward. The vertical switch contacts are labeled "A" through "E", with the "A" placing the seat in its highest position



"I-A" INDEX POSITION OF SCREW JACK



MERCURY SEAT-O-MATIC POWER SEAT ASSEMBLY

Motor Seat Positioning Switch: Horizontal and vertical seat motor positioning switches are the "wafer" type and are mounted under the seat on the rear of their respective motors and are driven through clock-like gear reduction mechanisms. Wafer switches establish position of seat by interrupting seat regulator control relay circuits when seat reaches a pre-selected position.

Seat Regulator Control Relay: This relay completes seat regulator motor armature and field circuits as dictated by seat dial control and motor positioning switches.

TROUBLE SHOOTING: *CAUTION* - Should it be necessary to operate seat regulator motor assemblies independently of seat dial control, extreme caution should be taken to prevent extending the seat past normal extreme positions (dial positions "A" or "E" and "1" or "7"). If seat is extended past these positions, the seat track and associated parts will be damaged. *DO NOT use a jumper wire for locating el ctrical troubles.*

Seat Will N t Mov in Any Directi n Wh n Dial C ntr l P siti ns ar Chang d: With a test light or voltmeter, check for current at green wire terminal on "easy entry" seat relay. If current not indicated, replace the 10 amp. circuit breaker. If current is indicated, check for current at the No. 3 terminal at either seat regulator control relay. If no current is indicated at this point, replace the 30 amp. circuit breaker.

Seat Will Not Move Up or Down But Will M v F r and Aft: Check current at terminals No. 2 and No. 5 of vertical regulator control relay with seat control switch in several different positions. If current is available at No. 2 terminal and not at No. 5 terminal, replace seat vertical regulator control relay. If current available at No. 5 terminal, check for current at No. 1 and No. 6 terminals with control switch in several different positions. If current is available at No. 1 terminal and not at No. 6 terminal, replace seat vertical regulator control relay. If current is not available at No. 1 or No. 2 terminals when previous tests are made, check wiring harness and seat control switch for loose connections.

Seat Will Not Move Fore or Aft But Will M ve Up and Down: Remove green wire from terminal on "easy entry" seat relay. Temporarily connect green wire to blue wire terminal. Place vertical seat control switch in various positions to check operation. If seat operates, replace "easy entry" seat relay.

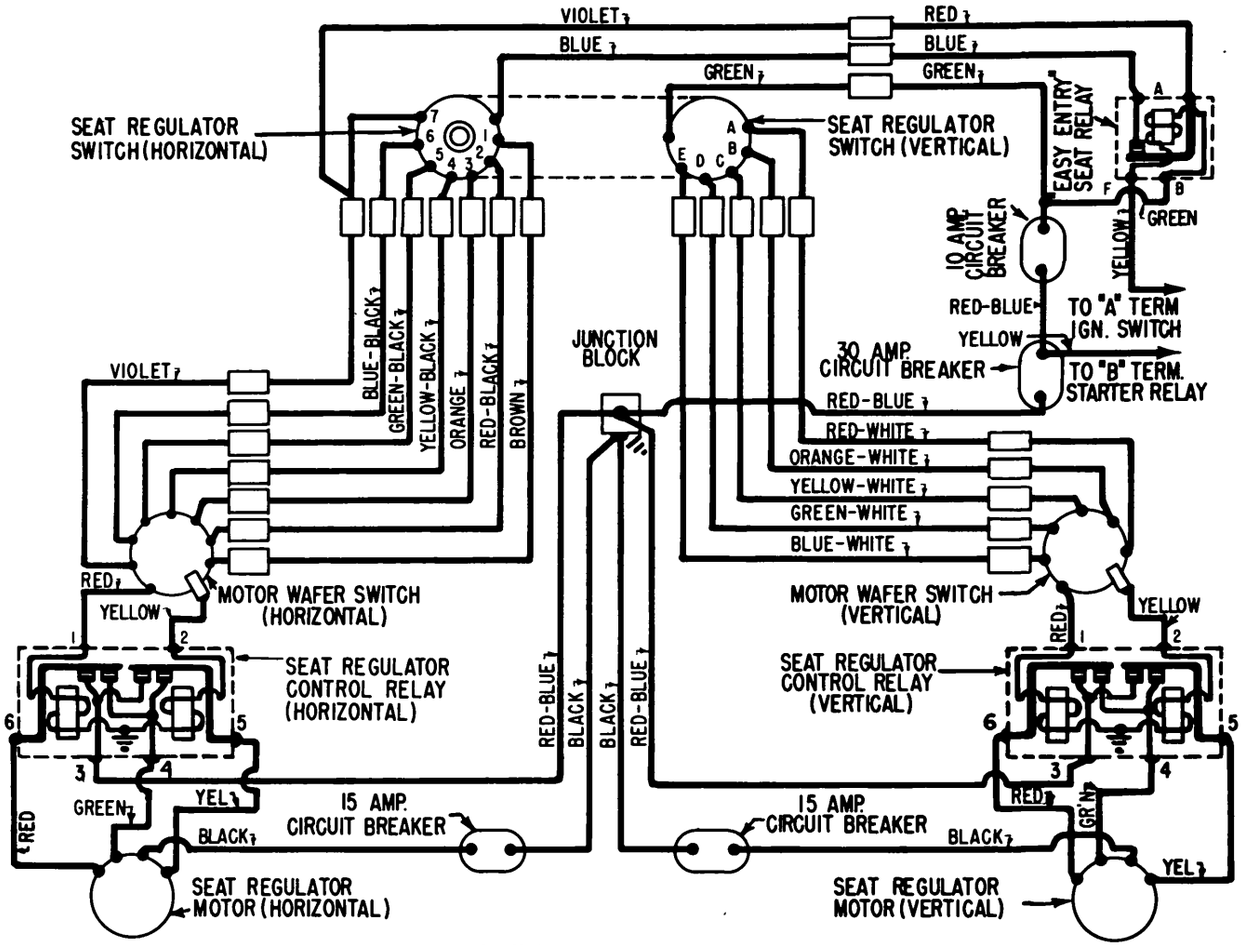
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MERCURY SEAT-O-MATIC (C n.inued)

REMOVAL & INSTALLATION: Regulator Motor (Seal-O-Matic) - If either of the regulator motors are removed for any reason other than motor failure, the seat should be placed in the "1-A" position before disassembly is made. If either seat motor is replaced because of motor failue, the seat must be positioned manually in the "1-A" position by locating the horizontal regulator screwjack nut 6 15/16"; and the vertical regulator screwjack nut 4 5, 64" from end of screwjack (see illustration).

Fr nt S at Ass mbly: R m val - To remove seat cushion and front seat back from the seat tracks as an assembly, proceed as follows: Remove front seat cushion side shields and remove side shield brackets at rear of seat cushion. Remove two nuts securing rear of seat assembly to seat tracks. With seat assembly in forward position, remove two screws securing front of seat assembly to tracks. *(NOTE* - If seat assembly cannot be moved forward due to failure of seat mechanism, remove nut and bolt securing front seat regulator to frame seat and move seat manually). Tilt seat assembly back or remove from car to gain access to seat assembly mechanism.

Installati n - Install front seat assembly over seat tracks with rear studs on tracks inserted in seat cushion frame holes. Connect front seat regulator link to seat cushion frame bracket with nut and bolt. Install two nuts to secure rear of seat assembly to seat tracks. *(NOTE* - On "4-Way" seats, place two spacers on front of seat tracks over screw holes). Install two screws to secure front of seat assembly to tracks. Install side shield brackets and front seat cushion side shields.



MERCURY SEAT-O-MATIC WIRING DIAGRAM

LINCOLN POWER TOP & LATCH CONTROL

Lincoln (1957)

►CHANGES, CAUTIONS, CORRECTIONS

►*TRANSMISSION ASSEMBLY PRODUCTION CHANGE & CORRECTION:* When shaft pulls out of early production type transmission assembly, replace with new type transmission assembly Part No. BY-7653504-1-A now used in production.

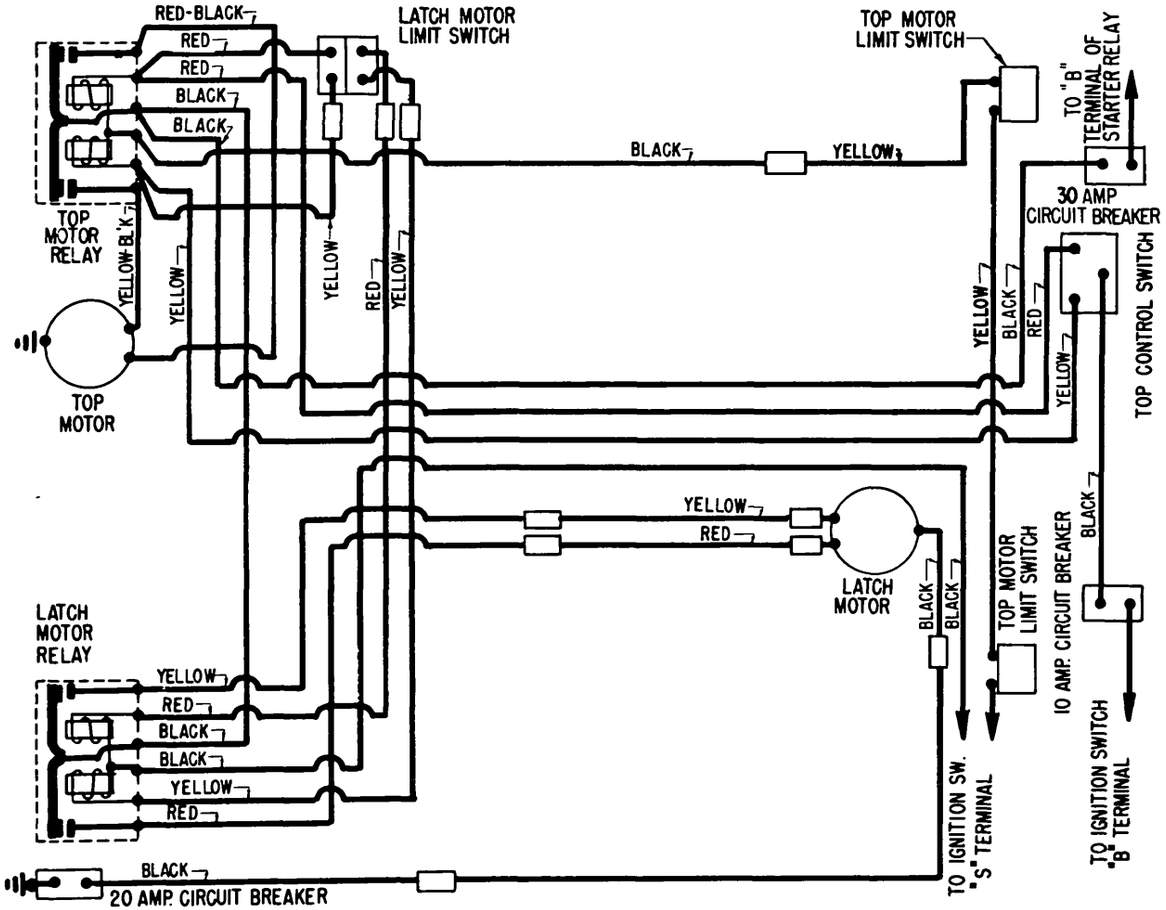
DESCRIPTION: Power Top Control – Hydraulic-electric type. System consists of an electric motor, hydraulic pump, and two hydraulic cylinders. A valve and port assembly directs flow of fluid in the system. The electric motor is controlled through a circuit breaker, limit switches, control switch, and relay.

T p Locking Mechanism – Consists of an electric motor and two transmission assemblies which are connected to and driven by the motor through two casing and cable assemblies. These two components are located in the No. 1 top bow and engage and lock into two lock nut housing assemblies which are attached to the inside of the windshield header bar. Locking mechanism is controlled automatically by a limit switch mounted in the left rear top linkage stack compartment.

ADJUSTMENTS: The following adjustments should only be made after top stack adjustment is correct. *Do not overheat motor while making adjustments.*

L cking Mechanism Limit Switch: Adjust limit switch, located in left rear quarter, so locking motor will start just before the No. 1 bow contacts the windshield header bar. Make sure it will operate the motor in the up direction, too.

L cking Mechanism Nut Housing: Nut housing can be adjusted up and down and slightly from side to side with respect to windshield header bar. In addition, it can be given a certain amount of tilt to rear by installing caster shims between windshield header bar and locknut boss on the nut housing. Locknuts should freewheel or ratchet.



LINCOLN POWER TOP & LATCH CONTROL WIRING DIAGRAM

Locking Mechanism Transmission Assembly: Transmission assembly can be moved fore and aft with respect to No. 1 top bow because of floating tapping plate installation and slotted holes.

Locking Mechanism Locking Screw: Can be adjusted for length by first loosening Allen setscrew in hex head and then turning screw transmission shaft until desired length is obtained. *CAUTION* - Do not attempt any trial locking of top unless Allen setscrew is properly tightened.

MOTOR & PUMP ASSEMBLY (POWER TOP): *See "Power Operated Top Motor & Pump (Rotor Type)".*

CHECKING FLUID LEVEL: *See "Auto-Lite Electric Top Control".*

SERVICE PARTS: Power Top M t r – Lincoln No. B6A-15667-A.
Locking Mechanism Motor - Lincoln No. FDR-15690-A.

FORD RETRACTABLE HARDTOP

Ford (1957)

▷CHANGES. CAUTIONS. CORRECTIONS

▷*RETRACTABLE HARDTOP OPERATION CAUTION: DO NOT retract or raise top with the car in motion. To operate top, stop car, place transmission in neutral position before operating top control switch on instrument panel.*

DESCRIPTION: The retractable hardtop has a complete metal roof assembly which may be lowered into luggage compartment automatically through electric power mechanical linkage. The electrical system includes seven reversible motors, ten power relays, eleven limit switches, an actuating switch and a cycle indicator light. Circuit breakers in control circuit feed, motor feed circuits, and in each motor ground feed protect the system. A neutral switch mounted on steering column prevents operation of top when transmission is in any drive range. A three-position spring loaded switch on the instrument panel automatically returns to the "OFF" (Center) position when switch plunger is released.

OPERATION: Retract Cycle - *NOTE - This cycle starts with roof in erected position and deck lid closed and locked.*

Deck Lid Unlock - With top control switch in retract position, current flows through roof erect and delay switch, deck open limit switch, and deck unlock power relay, actuating the deck lock motor which unlocks the deck lid through two flexible drive shafts.

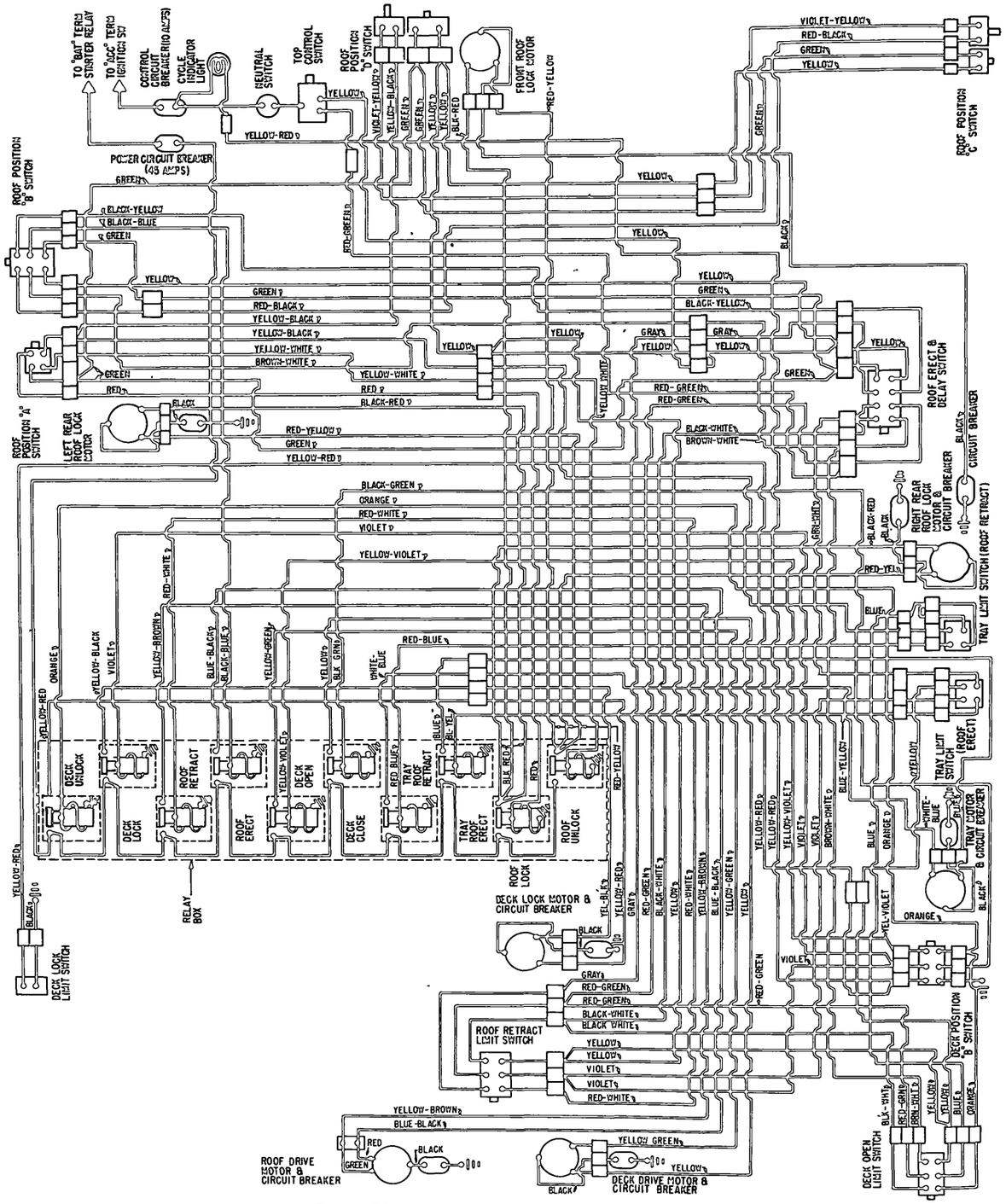
Deck Lid Opening - Mechanical motion of unlocking deck lid actuates the deck position "B" switch and deck lock limit switch allowing current to flow to deck open power relay, actuating deck motor. As deck lid reaches open position, mechanical motion of deck actuates deck open limit switch stopping deck lock motor and deck drive motor

Package Tray Extend - The actuation of deck open limit switch by the deck (which opens deck motor and deck lock motor circuits) also closes a second set of contacts in deck open limit switch allowing current to flow through tray limit switch (roof retract cycle) to tray power relay (roof retract cycle), actuating tray motor and extending package tray so it is parallel with deck lid. As tray reaches the parallel position, it opens the tray limit switch (retract cycle), stopping tray motor.

Roof Unlock - When tray limit switch (retract cycle) is opened by package tray, another set of contacts in limit switch close, allowing current to flow through roof position "A" switch, to unlock power relay, actuating roof front lock motor and two roof rear lock motors. These motors drive power lock, two at the header and one at each roof quarter, unlocking the roof.

Roof Retract - As roof is raised by the roof locks, the roof position "D" switch, "C" switch, "B" switch, and roof erect & delay switch are actuated, allowing current to flow through roof retract power relay and actuate the roof motor, retracting the roof. When roof is raised approximately 4" off locks, the rear roof left power link actuates the roof position "A" switch and stops roof lock motors. As roof retracts, front portion of roof is folded under rear roof by means of mechanical

CONTINUED ON NEXT PAGE



FORD RETRACTABLE HARDTOP WIRING DIAGRAM

FORD RETRACTABLE HARDTOP (Continued)

linkage. When roof reaches fully retracted position, the roof retract limit switch is actuated, stopping the roof motor.

D ck Lid Close & Lock - As roof retract limit switch opens, another set of contacts in this switch closes allowing current to flow to deck lock power relay through deck position "B" switch to deck close power relay - actuating deck lid and deck lock motors, closing the deck lid and locking it. As deck lock screws draw deck lid down, the deck position "B" switch is opened, stopping the deck motor. When deck is fully locked, deck position "B" switch and deck lock limit switch are actuated, turning off the cycle indicator light, indicating that deck lid is fully locked and that top control switch can be released, shutting off the deck motor.

Er ct Cycle: *NOTE - This cycle starts with roof in lugg ag compartment and deck lid closed and locked.*

D ck Lid Unlock - With top control switch in erect position, current flows through roof retract limit switch, deck open limit switch, to deck unlock power relay actuating the deck lock motor and unlocking the deck lid.

D ck Lid Opening - As deck lid is unlocked, the deck position "B" switch and deck lock limit switch closes, allowing current to flow to cycle indicator light. At the same time, other contacts in deck position "B" switch close allowing current to flow to deck open power relay, actuating the deck motor, which opens the lid. As deck lid reaches fully open position, it opens the deck open limit switch, stopping deck lock motor and deck motor.

R of Erect - When the deck open limit switch opens, another set of contacts in the same switch close. This allows current to flow through roof position "B" switch (middle contacts) to roof erect power relay, actuating the roof motor, and erecting the roof. As roof reaches erect position, middle contacts of roof position "B" switch are opened, stopping the roof motor.

R of Lock - When roof reaches a position approximately 4" above the roof locks, the roof position "A" switch closes allowing current to flow through four parallel switches to roof lock power relay, actuating the three roof lock motors. When the left rear lock engages, the roof position "B" switch middle contacts open, stopping the roof motor (erect cycle). The motion of roof locking also opens the roof erect and delay switch (contacts farthest from plunger), roof position "C" switch, roof position "D" switch, and roof position "B" switch (contacts farthest from plunger). When all four of these paralled switches are opened, the roof lock power relay is de-energized, stopping the three roof lock motors.

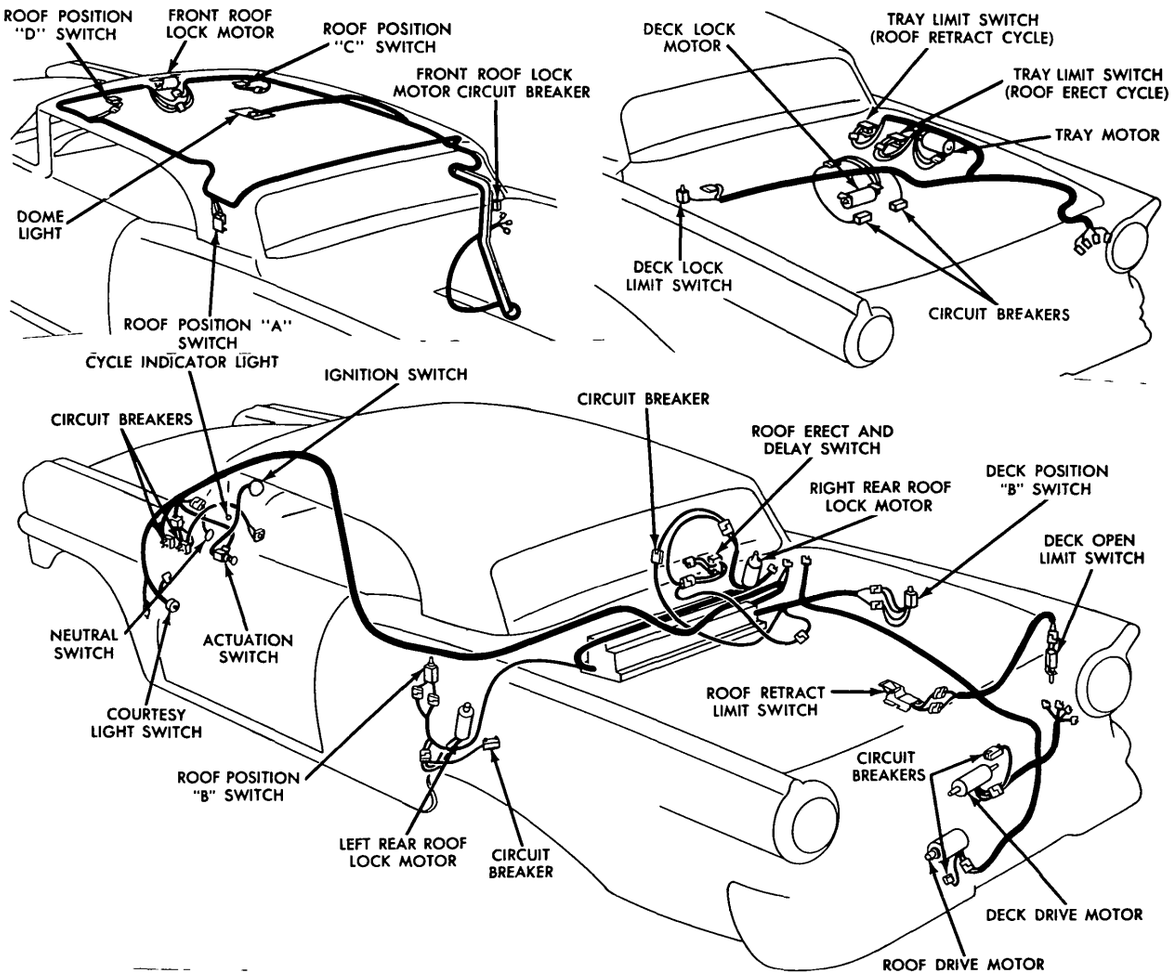
Package Tray Fold - As roof reaches erect position, it also closes roof erect and delay switch (contacts closest to plunger), allowing current to flow through tray limit switch (roof erect cycle) to tray power relay (roof erect cycle) actuating the tray motor. This motor folds tray under the deck lid. When tray is completely folded, tray limit switch (roof erect cycle) is opened stopping the tray motor.

D ck Lid Cl s And L ck - As package tray is folded, a second set of contacts in tray limit switch (roof erect cycle) are closed, allowing current to flow to deck lock power relay and also through deck position "B" switch (middle contacts) to deck close power relay. These two power relays actuate deck lock motor and deck motor, closing and locking the deck lid. As deck lid reaches closed position, the deck position "B" switch (middle contacts) are opened, stopping the deck motor. As deck locks pull deck lid to locked position, the deck position "B" switch (contacts farthest from plunger), and deck lock limit switch are opened. This turns off cycle indicator light showing operator that cycle is completed and that top control switch can be released, stopping the deck lock motor.

EMERGENCY MANUAL OPERATION: Unlocking Deck Lid - If deck motor fails to operate and it is necessary to gain access to motor, proceed as follows: Place a floor jack under frame rear crossmember and raise car approximately 9". From underside of wheelhouse, remove deck lid lock retaining screws (one on each side). Lift front edge of deck lid about 1", then operate the top control switch to complete opening of deck lid.

Opening Deck Lid: Unlock deck lid by operating top control switch. If deck lid will not operate, unlock deck lid manually (see above). From underneath lower back panel, remove deck lid lirt jack retaining screws (two on each side). *(CAUTION* - Have a helper hold deck lid down while removing the screws, then raise deck lid just far enough so that clevis pins can be removed from top of lift jacks. This must be done to avoid damage to flexible shafts). Complete opening of deck lid manually. *NOTE* - If deck lid locks have been released from wheelhousings, the nut and housing portion of locks will remain attached to deck lid.

CONTINUED ON NEXT PAGE



FORD HARDT P M TOR & SWITCH L CATI NS

FORD RETRACTABLE HARDTOP (Continued)

Erecting Roof: Open deck lid. Lift forward edge of roof slightly (about 5") and block it in position. Remove roof lift jack-to-roof lift arm bolts. Complete roof erection to the point of roof lock engagement.

Unlocking Roof: *(NOTE* - If locks fail to operate when top is erected, it will be necessary to manually release locks in order to retract roof far enough to remove lock assemblies as follows): Remove windshield upper garnish mouldings, then remove roof lock-to-header screws (two on each side) which can be removed through the access holes in header. This will release locks from header, and locks will remain attached to roof. Remove center panel from roof front section and disconnect header lock motor wires. Manually lift roof at header, then pull out top control switch to continue the retract cycle.

Releasing Quarter Lock - Remove roof quarter trim panel and retainer. Remove two lock-to-roof retaining screws. *(NOTE* - Clearance is provided between quarter panel and roof panel so screws can be removed with a box wrench). This will release lock from roof and lock will remain attached to quarter panel. Disconnect wires from motor, then manually lift rear of roof at both sides. Pull out top control switch to continue retract cycle.

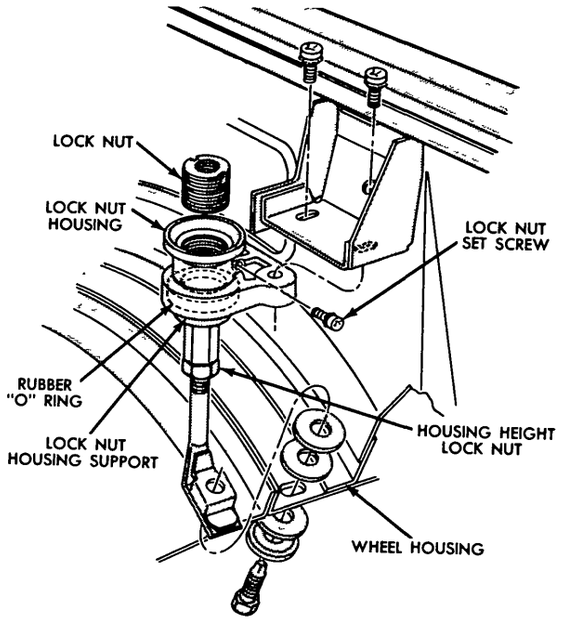
TROUBLE SHOOTING & DIAGNOSIS

►*DIAGNOSIS NOTE:* Make sure that battery is fully charged. To determine if control circuit is at fault, operate basic motor power circuit of that portion of system that does not operate. Any of the ten basic circuits can be operated by energizing the applicable power relay directly by connecting a wire from hot or common terminal of relay to relay actuating terminal (all relays are housed in a metal box behind rear seat back and are identified as indicated below). Before bypassing a relay, make sure that motor is not stalled against a jammed lockscrew, or running free due to a broken flexible shaft. If bypassing a control circuit does not operate the motor, and no mechanical failure is evident, the power relay may be at fault. Check power relay by connecting a jumper wire from hot terminal of relay to motor feed side of relay. Check circuit breaker in motor ground circuit and in power circuit.

►*STUCK RELAY NOTE:* If a motor continues to run after a particular portion of cycle has been completed, and releasing the top control switch does not stop the motor, a stuck power relay is indicated. Disconnect battery, then replace relay.

►*RELAY IDENTIFICATION NOTE:* Ten relays (five mounted vertically and five horizontally) are enclosed in a metal box behind back of rear seat. With cover removed and looking down on relays (facing rear of car), their location from **left to right** are as follows: (1) - Deck Unlock. (2) - Deck Lock. (3) - Roof Retract. (4) - Roof Erect. (5) - Deck Open. (6) - Deck Close. (7) - Tray (Roof Retract Cycle). (8) - Tray (Roof Erect Cycle). (9) - Roof Lock. (10) - Roof Unlock.

DECK LID WILL NOT UNLOCK (ONE SIDE) Check flexible drive shaft and deck lock assembly.



FORD RETRACTABLE HARDTOP DECK LID LOCK ASSEMBLY

DECK LID WILL NOT UNLOCK (BOTH SIDES): Check the following: Control circuit breaker and power circuit breaker. Neutral switch. Top Control Switch. Deck unlock power relay. Deck open limit switch (the contacts closest to plunger). Roof retract limit switch contacts farthest from plunger (on retract cycle). Roof erect and delay switch contacts second from plunger (on erect cycle). Deck lock motor and circuit breaker. Deck lock flexible drive shafts and lock assemblies.

DECK LID UNLOCKS WITH CYCLE INDICATOR LIGHT OUT: Check the following: Cycle indicator light. Deck position "B" switch (contacts closest to plunger initiate deck motor when deck lid is locked).

DECK LID UNLOCKS, BUT WILL NOT OPEN: Check the following: Deck open power relay. Deck position "B" switch (contacts closest to plunger initiate deck motor when deck lid is locked). Deck motor and circuit breaker. Deck lid flexible drive shafts. Deck lid lift jacks.

DECK LID OPENS OR CLOSES ERRATICALLY: Check deck lid assist springs.

DECK LID OPENS, BUT MOTOR WILL NOT STOP: Check the following: Deck open limit switch (contacts closest to plunger opens circuit to deck open power relay). Deck open power relay. Deck unlock power relay.

DECK LID WILL NOT CLOSE: Roof Retract Cycle - Check the following: Roof retract limit switch (middle contacts initiate the deck close cycle). Deck position "B" switch (middle contacts). Deck motor and circuit breaker. Deck lid flexible shafts. Deck lid lift jacks. **Roof Erect Cycle** - Tray limit switch (roof erect cycle); contacts farthest from plunger initiate deck close cycle. Deck position "B" switch (middle contacts). Deck motor and circuit breaker. Deck lid flexible drive shafts. Deck lid lift jacks. Deck close power relay.

DECK LID CLOSES, BUT WILL NOT LOCK: Check the following: Deck lock motor and circuit breaker. Deck lock power relay. Deck lock flexible drive shafts. Deck lock assemblies.

DECK LID CLOSES, BUT MOTOR WILL NOT STOP: Check the deck position "B" switch (middle contacts open circuit to deck power close relay as the lock engages).

DECK LID LOCKS WITH CYCLE INDICATOR LIGHT ON: Check the following: Deck position "B" switch (contacts farthest from plunger together with deck lock limit switch energize the cycle indicator light). Deck lock limit switch.

TRAY WILL NOT EXTEND: Check the following: Deck open limit switch (middle contacts initiate tray extend cycle). Tray limit switch (roof retract cycle); contacts closest to plunger. Tray motor and circuit breaker. Tray transmission. Tray power relay (roof retract cycle).

TRAY EXTENDS, BUT MOTOR WILL NOT STOP: Check the following: Tray limit switch (roof retract cycle); contacts closest to plunger limit tray extend travel). Tray power relay (roof retract cycle).

TRAY WILL NOT FOLD: Check the following: Tray motor and circuit breaker. Tray limit switch (roof erect cycle); contacts closest to plunger. Tray transmission. Tray power relay (roof erect cycle). Roof erect and delay switch (contacts closest to plunger initiate tray fold cycle).

TRAY FOLDS, BUT MOTOR WILL NOT STOP: Check the following: Tray limit switch (roof erect cycle); contacts closest to plunger limit tray fold travel. Tray power relay (roof erect cycle).

REAR ROOF LEFT LOCK WILL NOT OPERATE: Check the following: Roof left lock motor and circuit breaker. Roof lock flexible drive shaft. Roof lock assembly.

REAR ROOF RIGHT LOCK ONLY WILL NOT OPERATE: Check the following: Roof right lock motor and circuit breaker. Roof lock flexible drive shaft. Roof lock assembly.

FRONT ROOF LOCKS ONLY (ONE OR BOTH WILL NOT OPERATE): Check the following: Roof front lock motor and circuit breaker. Roof front lock flexible drive shafts. Roof front lock assemblies.

ROOF WILL NOT UNLOCK (ALL LOCKS): Check the following: Tray limit switch (roof retract cycle); the contacts farthest from plunger initiate roof unlock cycle. Roof position "A" switch (contacts with yellow wires). Roof unlock power relay.

ROOF UNLOCKS, BUT WILL NOT RETRACT: Check the following: Roof motor and circuit breaker. Roof retract limit switch (contacts closest to plunger). Roof flexible drive shafts. Roof lift jacks. Roof retract power relay. Roof position "D" switch (switch with the long plunger). Roof position "C" switch (switch with the long plunger). Roof position "B" switch (contacts closest to plunger). Roof erect and delay switch (third set of contacts from plunger).

ROOF PANEL WILL NOT FOLD OR UNFOLD: Check front roof power linkage.

ROOF WILL NOT ERECT: Check the following: Deck

CONTINUED ON NEXT PAGE

FORD RETRACTABLE HARDTOP (Continued)

open limit switch (contacts farthest from plunger initiate roof cycle). Roof erect power relay. Roof position "B" switch (middle contacts). Roof motor and circuit breaker.

ROOF ERECTS, BUT WILL NOT LOCK (ALL LOCKS): Check the following: Roof position "A" switch (contacts with red and green wires attached, initiate the lock cycle). Roof lock power relay.

ROOF MOTOR WILL NOT STOP: Roof retract cycle - Check roof retract limit switch (contacts closest to plunger limits roof retract travel). Roof retract power relay.

R f Erect Cycle - Roof erect power relay. Roof position "B" switch (middle contacts stop roof motor when locks engage).

ROOF LOCK MOTORS WILL NOT STOP: Roof lock power realy. Roof position "B" switch (contacts farthest from plunger). Roof erect and delay switch (contacts farthest from plunger). Roof position "C" switch (switch with short plunger). Roof position "D" switch (switch with short plunger). Check roof and roof lock alignment, since misalignment can result in binding and stalled locks.

ADJUSTMENT

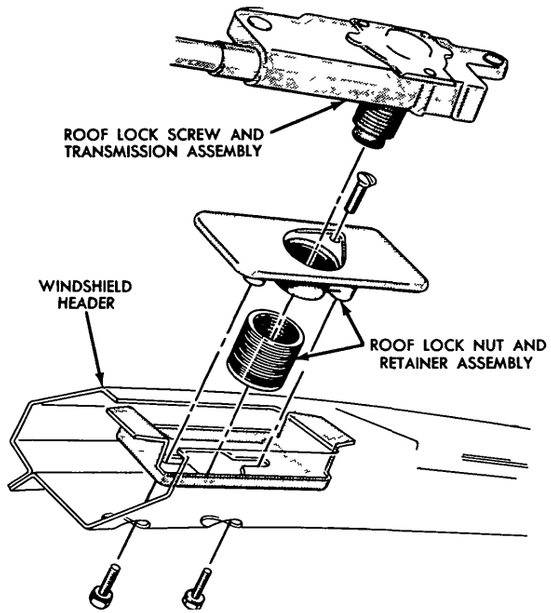
NEUTRAL SWITCH: Located on steering column back of instrument panel. Tighten switch actuator and place transmission selector lever or gear shift in neutral. Rotate switch and bracket assembly against actuator with a 1/64" shim held between actuator and switch plunger. Push switch firmly to the end of its travel and tighten mounting screws.

DECK LOCK LIMIT SWITCH: Adjust limit switch so contacts open when there is .045" clearance between male and female lock parts as follows: Disconnect deck position "B" switch wires at a wiring connector. Using an extra locknut, screw on the left deck lock screw to a point of ratchet. Turn ignition switch to "ACC" position and then, back off the locknut from the ratchet point until cycle indicator light comes on. The deck lock limit switch should be adjusted so that the light comes on one-half turn from the ratchet point.

DECK OPEN LIMIT SWITCH: With deck lid in fully open position, place a .100" shim between switch plunger and the actuator on hinge. Adjust switch firmly against shim with the plunger fully depressed, then tighten switch mounting screws.

TRAY LIMIT SWITCH (ROOF ERECT CYCLE): With package tray folded to stall point of motor, place a .100" shim between end of switch plunger and actuator part of tray support arm. Then, push the switch to end of its travel against actuator and tighten switch mounting screws.

TRAY LIMIT SWITCH (ROOF RETRACT CYCLE): With package tray extended to stall point of tray motor against tray stops, insert a .100" shim between tray switch actuator (roof retract cycle) and the end of tray switch plunger. Move actuator toward tray switch (roof retract cycle) until plunger is completely depressed, then tighten actuator attaching screws.



FORD RETRACTABLE HARDTOP ROOF HEADER LOCK ASSEMBLY

ROOF RETRACT LIMIT SWITCH: With roof completely retracted and firmly on wheelhouse boots, place .100" shim between actuator and the roof control link. Adjust roof retract limit switch and housing forward to limit of its travel, then tighten switch mounting screws.

DECK POSITION "B" SWITCH: Actuator Adjustment - A special tool, Ford No. T57P-15780-A, is required to adjust deck position "B" switch actuator. Position the tool over lockscrew using the 5/8" hole in tool. Press tool firmly against lockscrew shoulder and pivot the tool to line up with deck position "B" switch actuator. Using pliers, bend actuator until it just touches raised portion of tool.

Switch Adjustment: After adjusting switch actuator, adjust switch as follows, using the same tool. It will be necessary to operate the deck lock limit switch by inserting a small screwdriver between the switch plunger and the actuator as the cycle light will not go out until both the deck lock limit switch and deck position "B" switches are actuated. Press tool firmly into locknut and slide switch upward until cycle indicator light goes out. Then, tighten switch mounting screws. *NOTE* - If operation of deck lid discloses that cycle indicator light does not go out when deck lid is fully closed and the locks are ratcheting, or if deck lid "pops" up when opening, the deck position "B" switch actuator may be bent very slightly downward.

ROOF ERECT & DELAY SWITCH: Use an extra rear roof lock stationary screw for this adjustment. *(NOTE* - An existing rear roof lock stationary screw can be removed from the car and used, but be very sure to measure the length of exposed threads before removal so that screw may be installed to its original position). Install lockscrew into rear roof locknut to the ratchet point. With a self powered test light, connect the lead to the contacts farthest from switch plunger on roof erect and delay switch, then back out the lockscrew until light comes on. *(NOTE* - Switch should be adjusted so that light comes on one-half turn from the ratchet point).

ROOF POSITION "B" SWITCH: Adjust this switch in same manner as for Roof Erect & Delay Switch (see above).

ROOF POSITION "C" SWITCH & "D" SWITCH: *(NOTE* - These switches each have two switches mounted side by side, functioning as one switch. One switch, with short plunger, is used for the front roof lock circuit, and the other switch, with long plunger, is for the roof motor circuit). Remove lock screw and switch assemblies from roof front section. Attach a self powered test light to front roof lock circuit switch. Use a spare locknut screwed on lock screw to the point of ratchet, then back off the locknut until test light goes on (light should go on at one-half turn from ratchet point). If light goes on before one-half turn, move switch away from linkage; if light goes out after one-half turn, move switch toward linkage. On the roof motor circuit switch, with long plunger, which is used only on the roof retract cycle, the light should go on one full turn before the lockscrew threads disengage. Adjust roof motor switch as necessary, then recheck roof lock switch. *(NOTE* - Actuator pin and switch linkage must be free to assure full return of switch plunger).

ELECTRICAL SPECIFICATIONS

OPERATING CURRENT DRAW: Measured at starter relay terminal with a fully charged battery.

Roof Retract Cycle

Operation	Current Draw
Deck Unlock	16–24 amps.
Deck Open (with deck unlocked)	36–48 amps.
Tray Extend	22–28 amps.
Roof Unlock	60–75 amps.
Roof Retract	8–30 amps.
Deck Close	36–48 amps.
Deck Lock	16–24 amps.

Roof Erect Cycle

Operation	Curr nt Draw
Deck Unlock	16–24 amps.
Deck Open (with deck unlocked)	36–48 amps.
Roof Erect (lift from compartment)	20–40 amps.
Roof Erect (moving roof forward)	10–25 amps.
Roof Locking & Tray Folding	80–120 amps.
Deck Close	36–48 amps.
Deck Lock	16–24 amps.

NO LOAD CURRENT DRAW: With all drive shafts disconnected except for tray motor.

Motor	Current Draw
All (except Roof Motor)	16–23 amps.
Roof Motor	10 amps.

CIRCUIT BREAKERS: Various capacities used as follows:

Circuit	Capacity
Control Circuit	10 amps.
Motor Power Circuit	45 amps.
Roof Motor Ground Circuit	20 amps.
All Other Motor Circuits	15 amps.

G.M. HYDRO-LECTRIC

Buick (1957)
Cadillac (1957)
Chevr l t (1957)
Oldsmobile (1957)
P ntiac (1957)

DESCRIPTION: Similar in design and operation to models previously used. System is a sealed unit and is not vented to the atmosphere, making it unnecessary to replace hydraulic fluid periodically. System is "self-air bleeding". Should air become trapped in lines due to replacement of hydraulic units, a few operational cycles of the top will expel trapped air into reservoir.

CHECKING FLUID LEVEL: With top in raised position, disconnect positive or negative battery cable. Remove pump and motor shield, in rear compartment, and place absorbent material below reservoir. Remove filler plug from reservoir. On motor and pump assemblies installed horizontally, fluid should be at lower edge of filler cap hole. If fluid low, add hydraulic fluid Delco No. 11 (GM Hydraulic Brake Fluid Super No. 11).

REPLACING FLUID (Aft r Repairs): Cylinders and hydraulic system contains more fluid than one filling of reservoir will supply. Check reservoir frequently during refilling of system. Air in system will automatically bleed out with a few operations of top.

CHECKING HYDRAULIC PRESSURES: Remove motor and pump assembly. Install plug in one port and pressure gauge in port to be checked. Actuate motor with an applied terminal voltage of 9.5-11.0 volts. Gauge should show a pressure between 240 and 280 PSI. Check pressure in other port. *NOTE*–A difference in pressure readings may exist between pressure port for top of cylinders and for bottom of cylinders. This condition is acceptable if both readings are within the limits of 240-280 PSI. If pressure not within specified limits, unit is defective and should be repaired or replaced.

CHECKING OPERATION OF LIFT CYLINDERS: Remove rear seat cushion and folding top compartment side panel assembly. Operate folding top control switch and observe lift cylinders during up and down cycles for these conditions;
1) If movement of cylinder rods is not coordinated or sluggish when motor is actuated, check hydraulic hoses from the motor and pump to cylinders for kinks.
2) If one cylinder rod moves slower than other, cylinder with slow moving rod is defective and should be replaced.
3) If both cylinder rods move slowly, or do not move at all, check pressure of pump. See "Checking Hydraulic Pressures" above.

MOTOR & PUMP ASSEMBLY: *Se "Power Operated Top Motor & Fump (Rotor Type)".*

SERVICE PARTS: Mot r - Part No. 4711912. *NOTE* - Motor replaced as an assembly only.

CHEVROLET CORVETTE

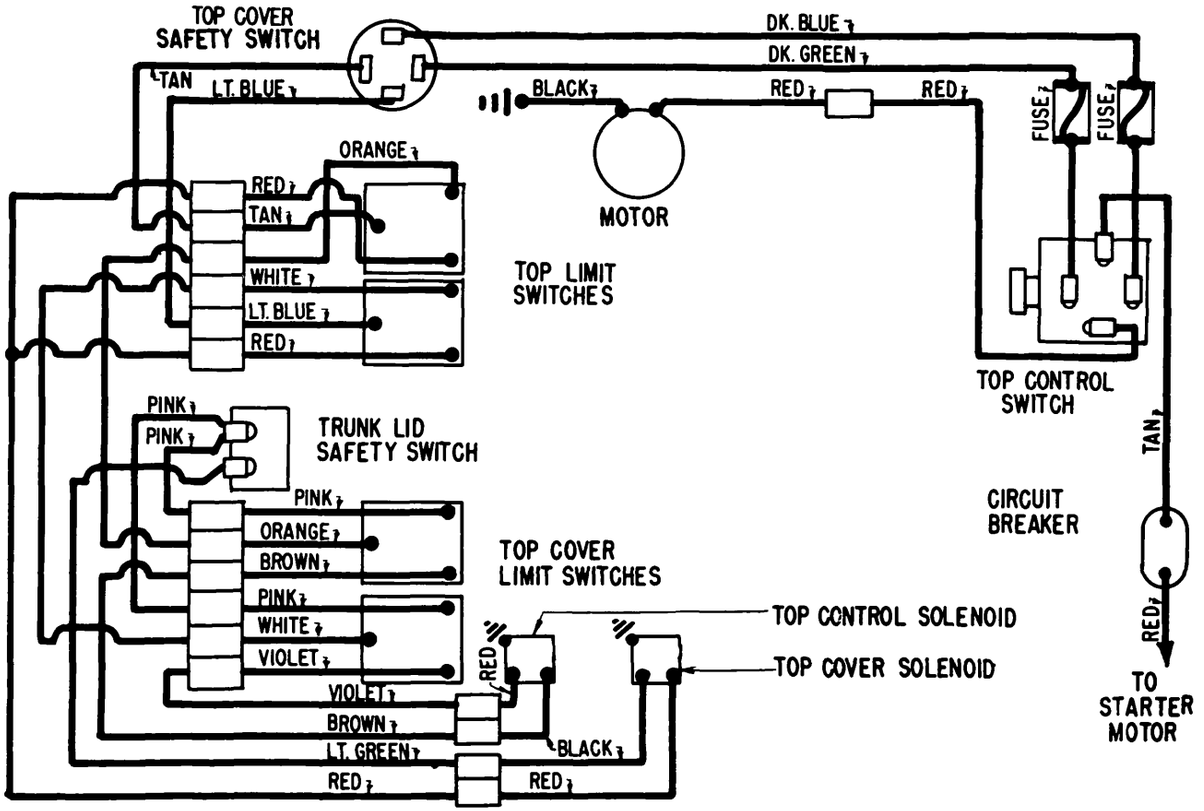
Chevrolet Corvette (1957)

DESCRIPTION: Power operated folding top and folding compartment cover. A safety switch in the rear compartment breaks the folding top circuit and prevents top mechanism from operating while rear compartment lid is open. This prevents damage to finish of either rear compartment or folding top compartment lids. A second safety switch, in the top compartment, prevents operation of the top compartment cover or folding top operating mechanism unless cover is unlatched. Hydraulic motor will run but a by-pass prevents pressure build-up in the system. Raising and lowering operations require about 20 seconds each.

► *CAUTION: Never operate top control without first unlatching top compartment cover.*

OPERATION: Raising The Top - Unsnap top compartment end straps at outer edge of each seat back. Push button located on seat separator panel. This unlatches the folding top compartment and at the same time completes the folding top electrical circuit. *(CAUTION* - Do not attempt to operate top without first unlatching the top compartment cover). **Push** folding top control and hold it in until the folding top compartment-cover opens, the top lifts out, and the cover closes. Push top compartment cover down until it latches. Unhook snap fasteners and allow rear bow to drop. Latch rear bow to the body. Latch header to windshield.

Lowering The Top: Unlatch header and rear bow. Double check to see that all latches are completely free and not caught. Hook rear bow with straps provided. Push button to unlatch top compartment cover. **Pull** the folding top control and hold until top compartment cover opens, the top folds into the compartment, and the cover closes. Push cover to close on latch. Snap top compartment end straps.



CHEVR LET CORVETTE TOP CONTROL DIAGRAM

AUTO-LITE POWER TOP CONTROL

Chrysler & Imperial (1957)
De Soto, Dodge (1957)
Ford, Mercury (1957)
Plymouth (1957)

DESCRIPTION: Hydraulic-electric type. System consists of an electric motor, hydraulic pump and two hydraulic cylinders. A valve and port assembly directs flow of fluid in the system. The electric motor is controlled through a circuit breaker, switch, and on some cars, a relay.

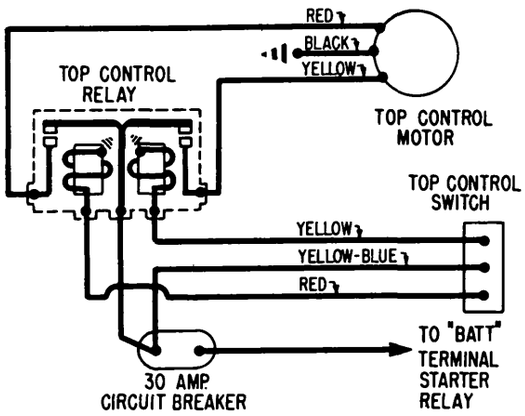
MOTOR & PUMP ASSEMBLY: *See "Power Operated Top Motor & Pump (Rotor Type)".*

CHECKING FLUID LEVEL: Remove rear seat cushion, then proceed as follows:

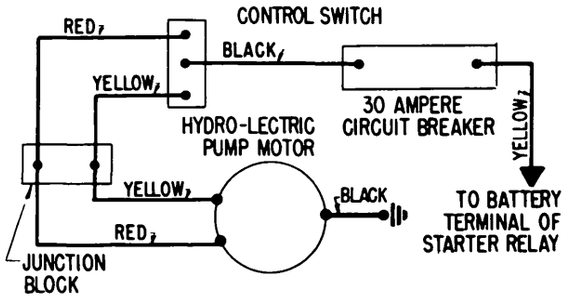
Ford, Lincoln, Mercury: Loosen filler plug in end of reservoir. Operate top three times to remove all air from system. With top in "UP" position, remove filler plug and check oil level. If hydraulic fluid does not run from filler hole, add enough hydraulic brake fluid to raise level to edge of filler plug hole.

Others: Check fluid level in reservoir. If low, check for a leak due to a broken line or loose connection. Fill reservoir until fluid runs out of filler hole. Use hydraulic brake fluid such as MoPar Super Brake Fluid. After filling reservoir, raise and lower top several times to force out air in system. Always check fluid level when top is "DOWN".

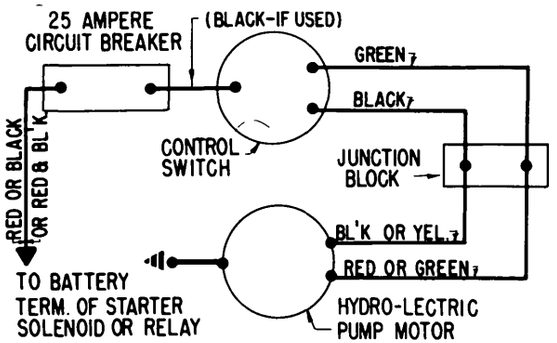
SERVICE PARTS: Motor - (Chrysler, DeSoto, Dodge, Plymouth) Auto-Lite No. EMJ-4104. (Ford, Mercury) Ford or Mercury No. B6A-15667-A. *NOTE* - Motor replaced as an assembly only.



MERCURY TOP CONTROL DIAGRAM



FORD TOP CONTROL DIAGRAM



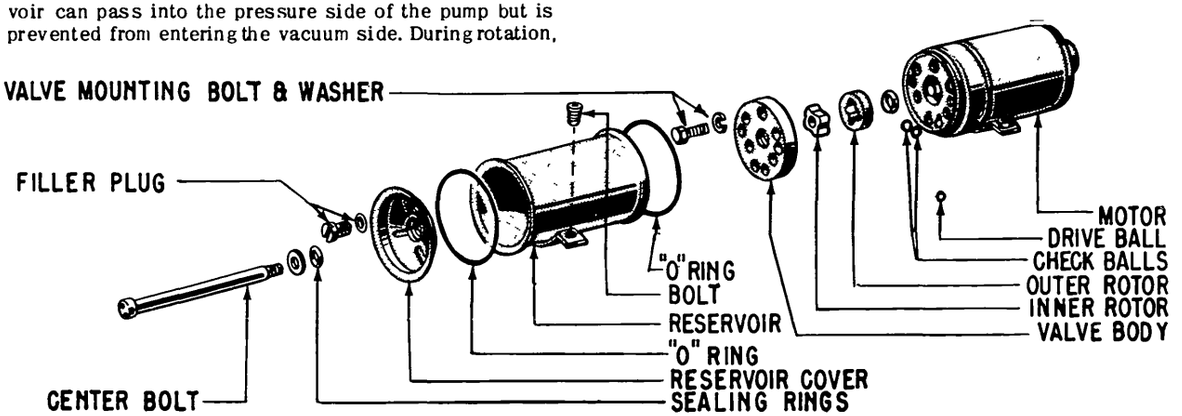
CHRYSLER, DE SOTO, DODGE, PLYMOUTH TOP CONTROL WIRING DIAGRAM

POWER OPERATED TOP MOTOR & PUMP (ROTOR TYPE)

DESCRIPTION: Motor - 12 Volt, direct current, reversible type. Serviced by replacement.

Pump - Rotor type. Pump housing is attached to motor frame by two through bolts from end cover. The outer rotor fits into the pump housing and the inner rotor revolves within the outer rotor. The pump is connected to the motor armature shaft by means of a drive ball located in a hole in end of armature shaft. The drive ball fits into a groove in the inner rotor. The valve body is mounted to the pump body by five mounting bolts. The reservoir is attached to the valve body by a center bolt which engages threads in center of valve body. Reservoir is sealed at each end with a neoprene "O" ring.

OPERATION: Hydraulic pressure is created by the rotation of the inner rotor gears, and is exhausted through one of two ports in the pump housing. Since motor is reversible, either port may be on the vacuum or pressure side of the pump, depending on direction of pump rotation. When pump rotors turn, hydraulic pressure is created through one side of the pump while the other side of the pump becomes the vacuum side. Two small check valves are seated in the valve housing and are held in place by a fulcrum and lever-type retainer. The vacuum created on the inlet side of the pump pulls the ball against its seat and thus cuts off the reservoir from the inlet side of the pump. This seating action of the ball at the inlet side permits the ball on the other end of the fulcrum to raise off its seat in the outlet side of the pump. At the beginning of pump rotation, fluid from the reservoir can pass into the pressure side of the pump but is prevented from entering the vacuum side. During rotation, excess fluid can pass from pressure side back to the reservoir. When pump rotation is reversed, pressure and vacuum sides are reversed; and the check balls and fulcrum act to make the pressure reversal almost instantaneous.



TYPICAL POWERTOP MOTOR & PUMP (ROTOR TYPE)

CADILLAC (EXCEPT BROUGHAM)

Cadillac, Exc pt Br ugham (1957).

DESCRIPTION: Trunk Lid Lock Unit consists of a power-operated closing unit and a solenoid-operated lock assembly. Closing unit fastens to inside of rear end panel at lid lock position. Its 12-Volt motor operates a jackscrew mechanism which retracts and extends trunk lid striker approximately 1". This action creates a pressurized seal between lowered lid and trunk opening. The solenoid operated lock assembly fastens to rear compartment lid at the normal lid lock position and operates like past model lid locks in that it can be unlocked from the outside with a key. In addition, a remote unlocking solenoid permits unlocking the lid from inside body by means of a switch located in glove compartment.

OPERATION: L cking - When trunk lid is lowered manually to a position approximately 1" above closed position, lid lock bolt engages the lock striker and depresses the striker switch, actuating closing unit motor, causing jackscrew to retract striker, pulling lid shut until proper closing pressure seal is reached. At this pressure a spring-loaded limit switch breaks the circuit and stops motor. Lid remains locked until lock assembly is again actuated.

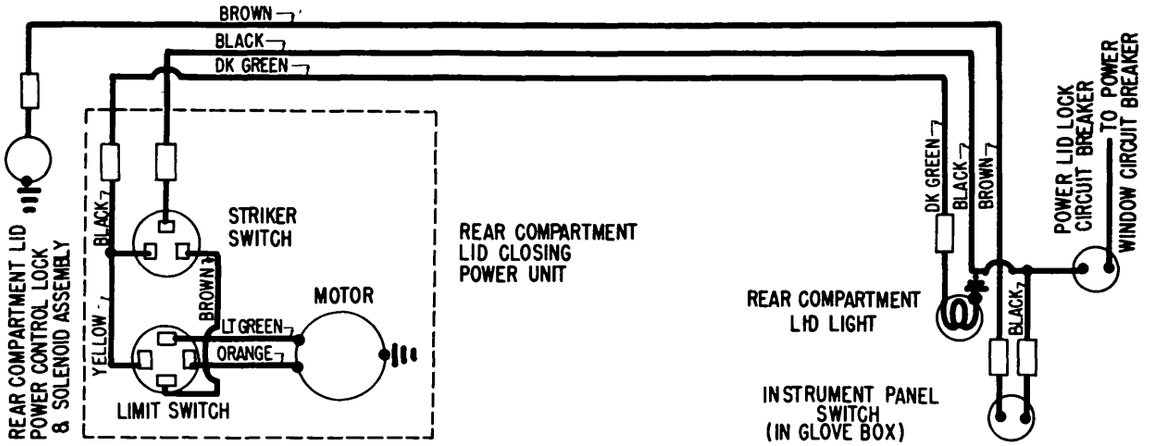
Unl cking - When trunk lid is unlocked by either key or switch, lock bolt is disengaged from the striker, releasing striker switch and completing circuit to reverse action of power closing motor. The motor raises the striker and lid upward approximately 1" to a counterbalanced position. From this position lid may be raised manually. A light on instrument panel signals when lid is unlocked.

REMOVAL & INSTALLATION: Lock Cylinder - Insert hooked tool through opening in rear compartment lid inner panel and pull lock cylinder retainer away from lock cylinder. Remove lock cylinder and gasket from outer panel. To install reverse removal procedure, after sealing lock cylinder gasket to outer panel.

Lid L ck & C ver - Remove lock cylinder, see above. Remove protective cover screws and cover and lock mounting screws. Remove lock and cover.

Lid L ck Strik r - Scribe location of striker for reinstallation, then remove striker.

Lid L ck - Remove unit cover and three attaching bolts and remove closing unit. *CAUTION* - Mark position of tabs to insure accurate reinstallation.



CADILLAC (EXC. BROUGHAM) REAR COMPARTMENT LID LOCK WIRING DIAGRAM

ADJUSTMENTS: Striker Position - To check striker engagement, insert small quantity of clay at bottom of slot, and close lid with light slam. Open lid and check amount of engagement of lock bolt with striker. Measure distance between base of "U" in clay and base of "U" in lock bolt which should be 1/8-5/32". Adjust striker by loosening bolts and move striker up or down as required. To adjust striker forward, loosen bolts, insert emergency spacer between striker and support and tighten bolts.

Striker and Lock Bolt Alignment - Place clay over striker and lower lid until bolt makes an impression in clay. Note relative lateral position of bolt and striker. If necessary, adjust power closing until horizontally by loosening three attaching bolts and sliding unit to right or left in slotted holes then retighten bolts.

TROUBLE SHOOTING ELECTRICAL CIRCUITS: *NOTE* - Before checking for electrical failures, check power unit and lid lock bolt for mechanical failure then proceed as follows:

1) Ground one wire of tester and check for current at power unit by contacting black wire at starter switch, or current at circuit breaker by contacting battery side of circuit breaker.

2) To check power unit striker switch, place switch knob, in released position, ground test lead, and contact yellow lead wire terminal of striker and limit switch. If tester doesn't light, check wire, and striker switch.

3) To check switch operation for closing unit, depress switch knob and connect test lead to brown wire terminal. If tester does not light, check brown wire or striker switch.

4) To check power unit limit switch, first place knob in released position, then contact brown, orange, and green terminals of limit switch individually. If light comes on at any of the three terminals, replace limit switch. If tester does not light at brown terminal, depress switch knob and contact green terminal. If tester does not light replace limit switch.

5) To check power unit, connect No. 12 jumper wire to either orange or green lead of motor. If motor does not operate, check motor ground lead or repair motor if ground lead checks all right.

6) To check solenoid operated lid lock circuit, check circuit breaker, see above, then disconnect solenoid switch lead at instrument panel, attach test light to lead wire and check for current. If tester does not light, trouble is between end of wire and circuit breaker.

7) To check switch, disconnect lock solenoid wire from switch, ground test lead and contact solenoid terminal of switch and actuate switch. Tester should light, or switch is defective. If switch operates light, failure is in solenoid or wire leading to switch.

CADILLAC ELDORADO BROUGHAM

Cadillac Eldorad Br ugham (1957)

DESCRIPTION: This electrically operated automatic trunk lid consists of a motor and regulator assembly, power opening & closing unit, and a power control lock assembly. Opening and closing of the lid is controlled by two switches in glove compartment and a two-way (key operated) switch at rear compartment lid lock.

OPERATION: T Op n Lid - When control switch in glove compartment or at trunk lid lock is actuated, the lid lock solenoid is energized, retracting the lock bolt. The power closing unit is then energized, extending the striker and opening lid slightly. This action operates a switch and opens the solenoid circuit; at the same time closing the circuit to energize clutch solenoid and motor assembly to open the lid. When lid is fully open, a hinge contacts a limit switch, opening the motor circuit. A warning light on instrument panel indicates when lid is opened.

T Cl s Lid - Closing is accomplished in a similar manner except that a different set of relays are energized. The lid is lowered sufficiently to enable power closing unit to trip lock bolt and energize power lock unit to lock lid.

TROUBLE SHOOTING: Motor & Regulator Assembly - Disconnect motor and solenoid wire connectors from relay box. Using a 12 gauge jumper wire, connect power source to a motor lead and a solenoid lead. Regulator should raise or lower lid. If motor operates and regulator does not move lid, the clutch solenoid is inoperative. If motor does not operate it is defective. If motor and solenoid operate with a jumper wire, but do not operate with control switches, check for defective or inoperative relay box.

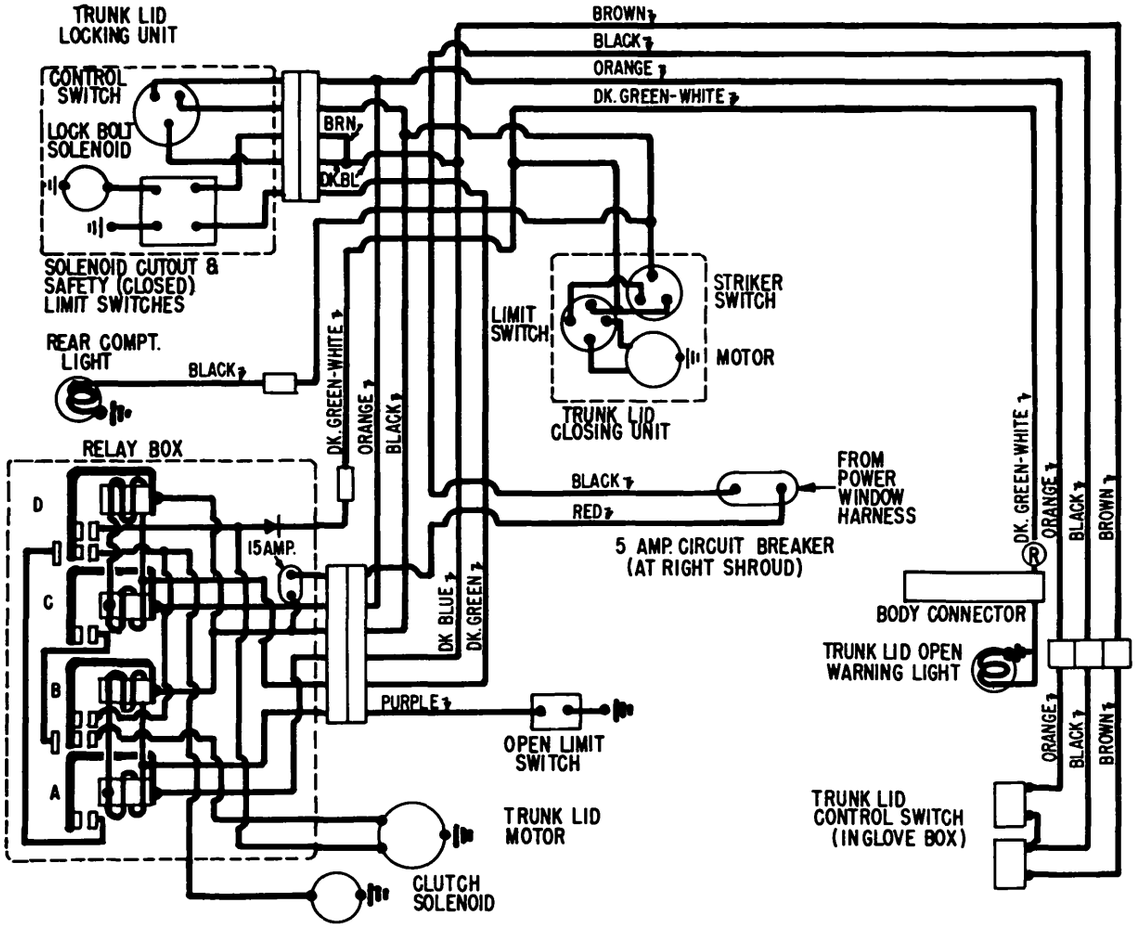
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CADILLAC ELDORADO BROUGHAM (Continued)

Control Switches, Circuit Breaker & Relay Box Circuits: Disengage harness connector from relay box. With light tester, check for current at red wire terminal of connector. Tester should light. If it does not, there is an open or short circuit between power source and circuit breaker. Insert tester in blue wire terminal connector, then actuate control switch to open lid. Tester should light. If it does not, control switch is inoperative or there is an open circuit between connector and power source to or from control switches. Insert tester in orange wire terminal of connector and actuate control switch to close lid. Tester should light. If it does not, there is an open circuit between connector and power source to or from control switches. To check ground circuit of relay coils, proceed as follows: Make sure the "open" limit switch plunger is not depressed and lid lock bolt is in "open" position. Connect one end of light tester to power source and connect other end to dark green or purple wire terminal of connector. Tester should light. If it does not, ground circuit of relays which control opening of lid is not complete.

Relay Assembly: Disconnect motor and solenoid connector and harness connector at relay box. Connect one end of a 12 gauge jumper wire to power source and the other end to red wire connector on relay. Connect a second jumper wire to body ground and to dark green wire terminal of connector on relay. Then, momentarily connect power source to dark blue wire terminal. With light tester, check for current at yellow wire (opening cycle) motor terminal and solenoid wire terminal on relay box. Tester should light. If it does not, relays "A" and/or "B" are inoperative. Disconnect ground wire from dark green wire terminal and connect it to purple wire terminal of relay connector. Then, momentarily connect power source to orange wire terminal of relay box. With light tester, check for current at black wire (closing cycle) motor terminal and solenoid wire terminal on relay box. Tester should light. If it does not, relays "C" and/or "D" are inoperative.

Lid Power Control Lock Assembly: Disconnect harness connector from lock connector. Use a 12 gauge jumper wire and connect power source to black wire terminal of lock connector. Then, insert key into lock cylinder. Turn cylinder clockwise and with light tester, check for current at dark blue wire terminal. Tester should light. Turn cylinder counterclockwise, and with tester, check for current at orange wire terminal of connector. Tester should light. If it does not, switch is inoperative. Position lock bolt to lid closed position; then, using a 12 gauge jumper wire, connect power source to brown solenoid wire terminal of lock connector. The solenoid should retract lock bolt to lid open position. In addition, check for current at input side of solenoid cut-out switch. Current should be present at only input end of switch when lock bolt is in lid open position. To check operation of lid closing limit switch, connect one end of light tester to power source and other end to dark green wire terminal of lock connector. With lock bolt in lid open position, tester should light. With lock bolt in lid closed position, tester should not light.



CADILLAC ELDORADO BROUGHAM LID LOCK WIRING DIAGRAM

Power Closing Unit: Ground one light tester lead and connect other lead to white wire terminal (#1) of limit switch. If tester does not light, fault is in white wire or striker switch. To check switch operation for closing unit, depress switch knob and simultaneously connect light tester to red wire terminal (#2) on limit switch. If tester does not light, fault is in red wire or striker switch. To check warning light on instrument panel (if light is inoperative and does not light up when lid is unlocked) proceed as follows: Remove bulb, and with light tester, check for current at bulb socket. If tester lights, the bulb is defective. If tester does not light, fault is in wire between light socket and limit switch. To check power unit limit switch, ground one tester lead and connect the other lead to white wire terminal of limit switch. If tester does not light, fault is in white wire or striker switch (with striker switch knob in released position). Ground one lead of light tester and connect other lead to red (#2), orange (#3), and green (#4) terminals of limit switch. Check each terminal individually. The tester should not light up. If tester lights at any of these terminals, limit switch is defective. If tester does not light up, depress striker switch knob to simulate a lid closed position. Simultaneously connect light tester lead to green terminal of limit switch. If tester does not light up, limit switch is defective. To check power unit motor, connect one end of a jumper wire to either of the motor leads (orange or green). If motor does not operate, check ground connection. If motor is still inoperative, failure is located in motor.

DIAGNOSIS: Lid Will Not Open Or Close Electrically (non-rear compartment lid units operate electrically) - Check feed wire from power window harness to circuit breaker for failure. Check circuit for proper operation.

CONTINUED ON NEXT PAGE

CADILLAC ELDORADO BROUGHAM (Continued)

Lid Regulator Assembly Will Not Raise or Lower Lid (power closing unit and solenoid operated lock operate satisfactorily): Check feed from circuit breaker to relay box for open or short circuit. Check operation of switches and relay box.

Closing Unit Does Not Retract or Extend Striker When Striker Switch is Actuated (lid regulator assembly raises and lowers lid): Check circuit between circuit breaker at right shroud side panel and power closing unit for open or short circuit. Check operation of power closing unit.

Trunk Lid Does Not Operate When Instrument Panel Switch is Actuated (operates with switch at lock cylinder only): Check affected circuits for open or short circuit. Check operation of control switch and lock solenoid.

Motor Lowers Lid (will not raise lid): Check feed wire from control switches to relay box for open or short circuits. Check ground circuit from relay box, through open limit switch in hinge box; then through safety limit switch in lock assembly. Check operation of relay box and motor.

Trunk Lid Does Not Raise or Lower (regulator motor operates in both directions): Check circuit from relay to clutch solenoid for failure. Check operation of solenoid and check clutch for mechanical failure.

Regulator Motor Continues to Operate After Lid Reaches Full Open Position: Check adjustment of limit switch for proper contact with hinge when lid is opened. Check wire from relay box to limit switch for ground.

REMOVAL & INSTALLATION: Lid Motor & Regulator Assembly - Loosen trunk compartment trim at right hinge, then with a suitable tool disengage retaining ring from pin securing regulator arm and remove pin. Disconnect wire harness from relay box, and disconnect wire leads from limit switches and regulator motor. Remove bolts securing regulator support to floor pan supports and remove complete assembly. To install regulator, reverse removal procedure and connect wires to original locations.

Lid Power Closing Unit: Remove access hole cover from trunk lid and disconnect wire harness from power closing unit. Remove four screws securing unit to lid and remove unit from between lid inner panels through access hole. To install unit, reverse removal procedure.

Lid Power Control Lock Assembly: Remove luggage guard attaching screws and remove guard. Disconnect wire harness from connector on lock assembly and scribe location of lock on support. Remove lock cylinder, then remove lock. To install lock, position it within scribe marks and reverse removal procedure.

Lid Lock Cylinder: Remove luggage guard. With a suitable tool, engage hooked end of sliding retainer and disengage it from lock cylinder, then remove cylinder. To install, reverse removal procedure.

Lid Power Closing Unit & Power Lock Adjustment: (*NOTE* - Power closing unit attaching holes are slotted to permit lateral and forward or rearward adjustment). Insert a small quantity of modeling clay at bottom of bolt slot and close lid. Open lid and check amount of engagement of lock bolt with striker as indicated by compression of clay. With a rule, carefully measure distance between base of "U" in clay-to-base of "U" in lock bolt. This dimension should be 1/8-5/32". If not as specified, loosen four power closing unit attaching bolts and adjust as required. (*CAUTION* - Lid lock bolt should contact centerline of power closing unit striker when lid is closed to insure proper operation of closing unit). Check adjustment visually by lowering lid manually until striker contacts lock bolt.

ELECTRICAL SPECIFICATIONS: Relay - Delco-Remy No. 1116925.
Air Gap - .012". At core with points closed.
Contact Gap - .030".
Closing Voltage - 7.0-8.0 volts.
Trunk Control Unit: Delco-Remy No. 4695445.
Lid Unlatch Solenoid - Delco-Remy No. 1119930 (Early), 1119958 (Late):
Current Draw - 34-36 amps. at 10.0 volts.
Lid Motor Actuating Switch: Delco-Remy No. 1119941.
Current Draw - 10.5-11.7 amps. at 9.0 volts.
Transmission Interlock Solenoid: Delco-Remy No. 1119917.
Lid Limit Switches: Delco-Remy No. 1998176 & 1998179.

CADILLAC ELDORADO BROUGHAM ELECTRIC DOOR LOCK

Cadillac Eldorado Brougham (1957)

DESCRIPTION: Consists of solenoid operated lock assemblies in each door which prevent opening door with outside door handle when actuated by a switch located in each front door panel. To unlock the doors, each door locking lever must be operated separately. The rear door locking assemblies include a solenoid controlled by the neutral switch that causes the inside remote door handles to freewheel when transmission is placed in any drive range, preventing opening of rear doors when car is in motion. A safety interlock switch also included in rear door locking assemblies controls operation of the transmission interlock solenoid which prevents transmission selector lever being placed in a drive range with either of the rear doors in an open position.

OPERATION: Transmission Interlock Solenoid - This solenoid is energized when a switch secured to each rear door lock is actuated by opening rear door.

Rear Door Remote Control Freewheeling Unit: Freewheeling circuit is completed when transmission selector lever is placed in one of the drive positions. With circuit completed, solenoids on rear door remote control assemblies are energized, providing a freewheeling movement of remote control knob.

Door Inside Remote Locking Unit: Circuit is completed by relay "C" which is energized when either front door inside locking switch lever is depressed. The relay provides current to a locking solenoid in each of the four door locks. To unlock the doors, it is necessary to unlock each door individually by actuating the inside locking levers manually.

Relay "A": Completes circuit to side roof rail lamp and courtesy light when energized by one of the door jamb switches.

Relay "B": Completes circuit to car leveling system when energized by actuating one of the door jamb switches.

TROUBLE SHOOTING: Door Lock Relay Box - (*NOTE* - This relay box is located beneath right side of front seat cushion and incorporates three relays. Power feed is routed from circuit breaker on left shroud). To check operation of relay box, proceed as follows: With light tester, check for current at feed terminal in harness connector. If current is present, connect a 12 gauge jumper wire between relay box No. 1 terminal and power source. With another jumper wire, ground No. 8 wire terminal in relay connector. With light tester check for current at No. 6, No. 7 and No. 4 terminals on lock connector. Tester should light at all three terminals checked. If tester does not light, relay "A" and/or "B" are inoperative. With light tester, check for current at No. 5 terminal on box connector. Tester should light. (*NOTE* - This terminal feeds transmission selector solenoid circuit). With a jumper wire, ground No. 2 terminal on relay box connectors; then with light tester check for current at No. 3 wire terminal on lock connector. Tester should light. If it does not, relay "C" is inoperative.

DIAGNOSIS: Door Locks do not Lock Electrically - Check operation of relay box (see "Trouble Shooting" above).

All Doors Lock Electrically From Left Front Door Switch (but do not operate from right switch): Check feed circuit from relay "C" to right door control switch for open circuit. Check ground lead attachment behind shroud trim panel (*NOTE* - Each control switch has its own ground lead which terminates at right shroud). Check operation of right switch with light tester.

All Doors Lock Without Actuating Control Switches: Check for and eliminate short circuit between relay "C" and one of the control switches.

Three Doors Lock Electrically (the other does not): Check for and eliminate short circuit between relay "C" and the affected lock solenoid. Check engagement of harness connectors. Check operation of solenoid by connecting one end of a jumper wire to hot lead, and the other end to solenoid.

Transmission Selector Lever can be Placed in a Drive Position With Rear Doors Open: Check operation of transmission interlock solenoid. Locate and eliminate short or open circuit between lock relay box and selector lock. Check body harness to lock connector engagement.

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CADILLAC ELDORADO BROUGHAM ELECTRIC DOOR LOCK (Cont.)

Transmission Selector Lever can be Placed in a Drive Position but Lever is Locked in a "P" or "N" Position When Left Rear Door is Open (roof rail lamps and courtesy lamps do not light): Check and eliminate open circuit between relay box and left rear door lock switch. Check engagement of harness connectors at lock. Check switch actuating mechanism on lock and operation of jamb switch.

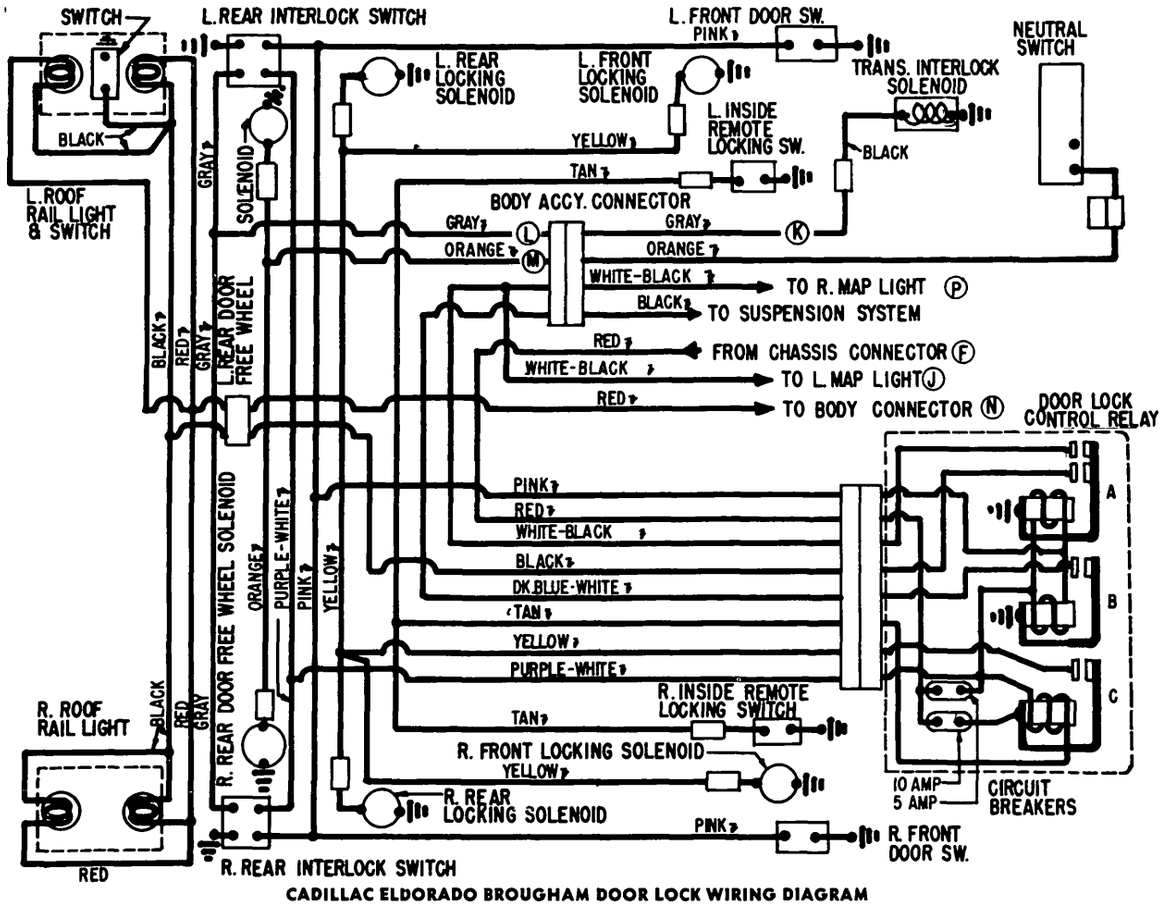
R ar Door (or Doors) Open When Remove Control Ass mbly is Actuated While Shift Lever is in Drive Position: Check for short circuit in freewheeling circuit. Check remote control assembly for mechanical failure. Check operation of solenoid with a jumper wire.

REMOVAL & INSTALLATION: Front Door Inside Locking Control and Switch Assembly - Raise door window and remove door belt finishing molding and door trim finishing panels. Remove inner panel access hole cover. Through large access hole, disengage spring clip and detach inside locking connector rod from lock lever. Disconnect inside locking control switch wires at connectors and detach wires from clips. Remove inside locking control attaching screws and remove control with attached connecting rod and switch from door (switch may be removed from control assembly if necessary). Before installing inside locking control and switch assembly, first install switch and connecting rod to locking control, then lubricate connecting rod attaching point with Lubriplate. To install locking control and switch assembly, reverse removal procedure.

Fr nt & Rear Door Locking Solenoid: Remove door lock assembly, then carefully remove rivet securing lock link to solenoid plunger. Remove solenoid attaching screws and remove solenoid from lock assembly. To install, reverse removal procedure. *NOTE* - Check operation of locking solenoid and adjust as necessary by moving up or down to provide proper locking action.

R ar Door Lock Remote Control Freewheeling Solenoid: Remove rear door lock remote control, then carefully remove rivet securing remote control linkage to solenoid plunger. Remove solenoid attaching nuts and bolts and remove solenoid from remote control assembly. To install remote control solenoid, reverse removal procedure. *NOTE* - Check operation of solenoid and adjust as necessary by moving up or down to provide proper operation of remote control assembly.

ELECTRICAL SPECIFICATIONS: Relay - Delco-Remy N . 1116936.
Air Gap - .012". At core with contact points closed.
C ntact Gap - .030".
Closing V ltag - 7.0-8.0 volts.
D or Lock Switches: Delco-Remy No. 1119944 (Right Hand), 1119945 (Left Hand).



CADILLAC ELDORADO BROUGHAM DOOR LOCK WIRING DIAGRAM

LINCOLN ELECTRIC DOOR LOCK

Lincoln (1957).

DESCRIPTION: The electric door lock assemblies consist of an electric solenoid connected to the sliding lock bellcrank in each door assembly. When solenoid is actuated by a toggle switch on the instrument panel, solenoid plunger moves out and operates the door lock bellcrank to lock the door. Front doors may be opened by pulling rearward on inside door handles. To open rear doors, the lock control on rear door must be moved to the "unlock" position before door inside handle can be moved manually. By depressing door lock toggle switch on instrument panel, prior to leaving car, the driver need only lock his exit door by key to completely lock car. With the ignition switch "On", or turned to the "Accessory" position, a red indicator light over the toggle switch indicates if all doors are not locked.

OPERATION: Closing toggle switch on instrument panel allows current to flow through switch to an auxiliary relay on right fender apron. Points in relay will close, sending battery current through the circuit breaker and into solenoids located in each door, energizing them and locking the door. (*NOTE* - When toggle is released, no current flows into solenoid, however, solenoid remains in its energized or locked position, returning to the unlocked position only when inside door handle (front doors), sliding lock control (rear doors) is actuated). When the ignition switch is turned to the "On" position or "Accessory" position and any or all of the doors are not locked, the warning light circuit is closed and the red warning light will come on.

TROUBLE SHOOTING: Warning Light D s N t Op rat When Any or All Doors Ar N t L cked - Check ignition switch to make sure it is turned to "On" or "Accessory" position. Check warning light wiring to determine if circuit is closed. Bypass solenoids by grounding solenoid-to-warning light wire. If warning light

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LINCOLN DOOR LOCK (C nt.)

comes on, the solenoid and/or bellcrank is misaligned on door panel, or solenoid is defective. Check rod from solenoid-to-bellcrank as improper bends in this rod will not allow solenoid to extend to its full travel and actuate warning light switch contacts.

On r All D rs Will Not Lock Electrically: Check for open circuit. Bypass the auxiliary relay on right front fender apron with a jumper wire. If door locks, auxiliary relay and or toggle switch is defective. If one door remains unlocked, lock linkage is broken, disconnected or maladjusted. A circuit is open or the solenoid is defective.

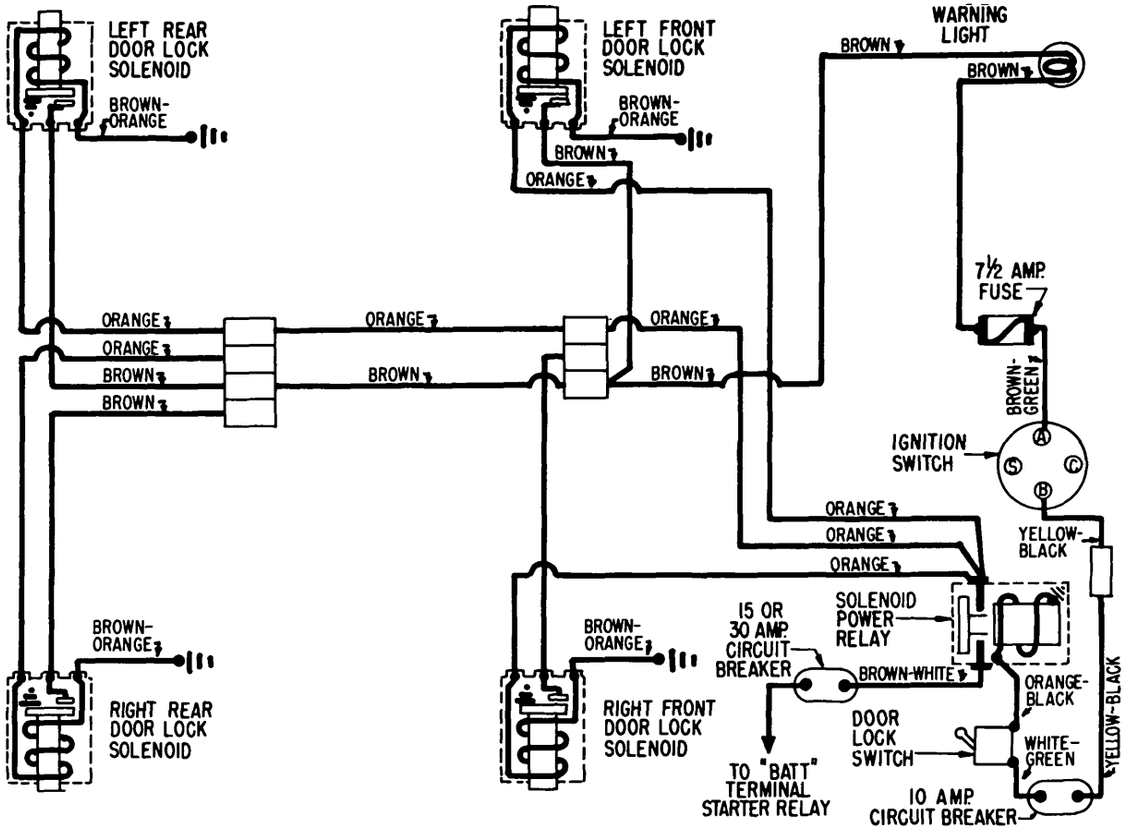
ADJUSTMENTS: R m te C ntrol & Link Assembly - Adjusted fore and aft by elongated holes in remote control and link assembly

B llcrank: Adjusted fore and aft by elongated holes in door inn er panel.

S l n id: Adjusted up and down by elongated holes in door cover plate. To position solenoid, move sliding bellcrank to the "Lock" position (forward). Adjust solenoid up or down as far as it will go without undue tension on solenoid rod. Tighten solenoid attaching screws and test operation of electric lock by depressing switch on instrument panel. Adjust solenoid up or down to obtain correct operation of electric lock and toggle switch indicator light.

REMOVAL & INSTALLATION: Front Door Lock Assemblies - Remove door glass, then remove front cover plate from door inner panel, being careful not to break the solenoid wires (solenoid is attached to cover plate by two screws). Disconnect tie rod from solenoid by removing clip retainer. Remove the two screws holding bellcrank to door inner panel, and remove five screws holding remote control assembly and bracket to door inner panel. Remove the lock cylinder retainer and lock cylinder, then remove outside door handle. Remove lock plate cover and screws holding lock assembly to inner door panel. Remove door window lower stop and brace assembly. Lower the lock assembly, rods, bellcrank, and remote control and link assembly and remove through rear access hole. To install, reverse removal procedure

R ar D or Lock Assemblies: Raise window to topmost position, then remove inside door handle with Tool 21812-A. Remove garnish molding with door lock control attached. Remove screws holding finger tip plate to door arm rest support, then remove wires from window switch. Remove arm rest support from door inner panel. Remove two screws holding window assembly lower stop bracket to door inner panel and remove bracket with stop attached. Remove front cover plate from door inner panel, being careful not to break solenoid wires. Disconnect rod from solenoid by removing clip retainer. Remove screws holding bellcrank assembly to door inner panel and disconnect bellcrank link from lock assembly by removing clip retainer. Remove bellcrank link and rod. Remove the three screws holding remote control assembly to door inner panel. Disconnect and remove remote control link from lock assembly. Remove outside door handle, then remove the four screws holding door lock assembly and remove lock. To install, reverse removal procedure.



LINCOLN DOOR LOCK WIRING DIAGRAM

WINDSHIELD WIPERS

VACUUM (CABLE OPERATED)

Buick (1957)
Cadillac (1957)
Chevrolet (1957)
Ford (1957)
Lincoln & Continental (1957)
Mercury (1957)
Oldsmobile (1957).
Pontiac (1957)
Willys (1957)

►CHANGES, CAUTIONS, CORRECTIONS

► *BUICK WIPER CAM PRODUCTION CHANGE:* To improve cleaning action, install new type wiper cam Part No. 4726069 (Rt.), No. 4726070 (Lt.) which entered production on cars built approximately March 1st 1957. New cams give smoother operation and wider arc.

► *PONTIAC CABLE ADJUSTMENT AND WIPER INSTALLATION NOTE:* Excessively loose cables can be corrected as follows:

1) Install Cable Tighteners Part No. 4726957 as necessary on each cable on each side.

2) When cable tighteners will not take up all slack, check and relocate wiper transmission. Remove wiper arm and blade assembly. Relocate transmission base flush with shroud inner panel. Use body sealer on body side of gasket and locate transmission with key in notch of body panel. Install spacer and spanner nut on outside of body, then install support attaching screws on inside of body and attach cables to auxiliary drive. Install blade and arm assembly.

► *BUICK WIPER ARM SPRING NOTE:* When splines on end of shaft are visible under wiper arm, remove arm for inspection and install retaining spring (if missing) Part No. 1172260 (Trico No. 81021).

► *CADILLAC WIPER ARM TENSION NOTE:* If blades do not wipe complete area, check arm tension by removing blade and attaching ounce spring scale to tip of arm with arm in center of blade travel. 10.5 to 12.5 ounces should be required to lift blade off glass. Replace arm if tension not to specifications.

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VACUUM WINDSHIELD WIPERS (CABLE OPERATED) (Cont.)

►*MERCURY WIPER CABLE BREAKAGE CORRECTION:* Check tensioner pulley for freedom of rotation. Bend cowl trough (in tensioner area) to provide 3/8" clearance for pulley to rotate. Failure to rotate causes cable to fray and break.

►*BUICK WIPER OPERATION CORRECTIONS:* When wipers operate with hesitation or erratic action check the following items:

1) Cam-O-Matic wiper arm black nylon plastic guide for wear, cracked, or damage. If defective replace wiper arm assembly.

2) Wiper arm must be fully seated on splines, *see "Wiper Arm Spring Note" above.*

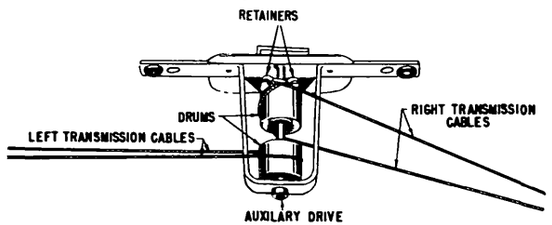
3) Distance from top of blade vertically down to rubber windshield seal with blade at furthest travel of outboard stroke (wide stroke operation), should be 8" (Std.), 11" (Cam-O-Matic). Replace wiper auxiliary drive Part No. 4716598 (Std.), No. 4716685 (Cam-O-Matic). *NOTE* - Drive pulley diameter stamped on face of pulley, 1.76" (Std.), 1.94" (Cam-O-Matic).

4) Vacuum pump should register 22" at 1600 engine RPM with vacuum line disconnected from check valve and connected to gauge. If below specifications, replace vacuum side of oil pump.

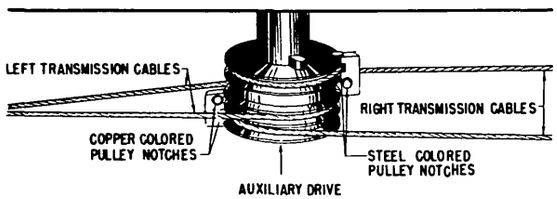
5) Check for bind in transmission shaft by removing blade and operating wiper transmission at wide stroke. Shaft should move in and out approximately ¼". If bind present in shaft, replace transmission.

6) Cable must be free, with no bind or contact with other items. Drive pulley must be clear of cowl, drive adjusted to remove bind or cowl panel opening enlarged. There should be no interference between pulley tab and pulley guard. If interference noted replace transmission.

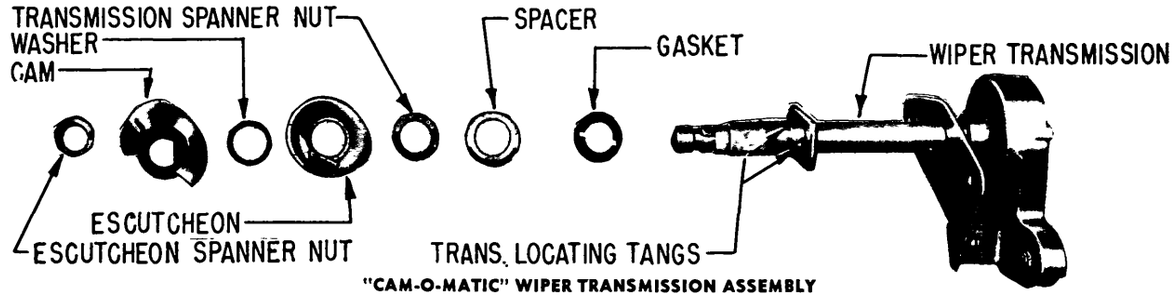
DESCRIPTION: Drive is through auxiliary pulleys and cable to windshield wiper transmission at each side of windshield (Chevrolet uses two drums, and Lincoln uses a lever as auxiliary drives). Tensioners are located within each wiper transmission (Buick, Cadillac, Chevrolet, Oldsmobile & Pontiac), in auxiliary drive (Continental), in pulley brackets (Others).



AUXILIARY CHEVROLET DRIVE



AUXILIARY DRIVE (BUICK, CADILLAC, LDSMOBILE, P NTIAC)



"CAM-O-MATIC" WIPER TRANSMISSION ASSEMBLY

CABLE ADJUSTMENT: Buick, Cadillac, Chevrolet, Oldsmobile & Pontiac (Except CAM-O-MATIC Equipped Cars) - Push in on end of transmission shaft. Spring-loaded pulleys will unlock and tension cables.

Cam-O-Matic Equipped Cars - Remove arm and blade assembly by raising upper section of wiper arm to disengage cam follower from cam. With wiper arm in raised position, carefully pull or pry arm from transmission shaft. Push in on end of transmission shaft. Spring-loaded pulleys will unlock and tension cables.

Continental: Loosen wing nut on auxiliary drive. Adjust cable tension. Tighten wing nut.

Lincoln: No adjustment except to see that tensioners are free to operate.

REMOVAL & INSTALLATION: Wiper Motor - Remove screws securing motor to auxiliary drive, detach control cable and vacuum hose from motor, remove motor. To install, reverse removal procedure.

Auxiliary Drive Assembly: Buick & Cadillac - Remove upper section of instrument panel. Remove arm and blade assemblies (Cam-O-Matic). (See ADJUSTMENT for Cam-O-Matic removal). Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of transmission cables at auxiliary drive pulleys to assure proper reassembly, disconnect cables from auxiliary drive pulleys. Remove screws securing auxiliary drive, remove auxiliary drive assembly. To install, reverse removal procedure.

Chevrolet, Oldsmobile & Pontiac - Remove instrument panel compartment box. Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of cables to auxiliary drive, then detach cables from pulleys or drums. Remove screws securing wiper motor, remove motor. Remove screws securing drive to dash, remove auxiliary drive. To install, reverse removal procedure.

Continental - Remove lower insulator panels and carpet. Remove two screws securing control tower to tunnel brackets. Remove glove box liner and screws from check straps. Remove screws securing glove box hinge to brace. Disconnect spring at firewall. Slide check arms from glove box door. Remove glove box. Remove screws securing control tower to firewall and screws on right hand side securing control tower to instrument panel brace. Remove screws securing speaker frame to lower control panel. Lower control tower using care not to kink bowden wires. Remove antenna lead, hot wires and two speaker leads, remove radio. Loosen wing nut on idler puller and retract tension on cables, disconnect cables. Remove capscrews securing auxiliary drive to firewall, remove auxiliary drive. To install, reverse removal procedure.

Ford, Mercury - Remove cowl top ventilator grille and weather strip assembly (Ford), fresh air intake grille and rubber seal (Mercury). Remove idler pulley water shield (Ford), rubber plugs from tensioner access holes (Mercury), and remove tensioners.

Lincoln - Remove screws securing auxiliary drive to cowl, remove auxiliary drive. To install, reverse removal procedure.

Wiper Transmissions: Buick & Cadillac - Remove wiper blade and arm assembly (see ADJUSTMENT for Cam-O-Matic removal). Remove upper section of instrument panel. Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of transmission cables at auxiliary drive pulleys to assure proper installation, then disconnect cables from auxiliary drive pulleys. Remove transmission spanner nut, escutcheon, cam, and reveal molding clip. Remove transmission support bolts, rubber gasket and retainer nuts. Disconnect windshield washer hose, and carefully pull transmission down through shroud panel and remove from body. To install, reverse removal procedure. *NOTE* - Copper-colored cable ends must be installed to copper-colored pulley notches and steel-colored cable ends to steel-colored pulley notches.

Chevrolet, Oldsmobile & Pontiac - Remove wiper blade and arm assemblies. Remove instrument panel glove box. Obtain slack in cables by pushing in on end of transmission shaft. With helper inside car to pull on cable to hold slack, release end of transmission shaft to lock cable in slack position. Observe attachment of transmission cables to auxiliary drive, then disconnect cables from pulleys or drums. Remove escutcheon spanner nut. Lift esctucheon from body, disconnect washer hose and remove escutcheons. Remove transmission spacer spanner nut. On inside of body pull each transmission down through shroud panel, remove from body. To install, reverse removal procedure. *NOTE* - Right transmission cables are crossed.

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VACUUM WINDSHIELD WIPERS (CABLE OPERATED) (Continued)

Continental (Right Hand) - Remove wiper arm, nut, and gasket. Remove cowl trim panel, glove box liner, defroster nozzle and windshield washer hose. Remove capscrew securing transmission to brace, remove transmission. Remove capscrew and special bolt securing spacer to cowl top, remove spacer. To install, reverse removal procedure.

Continental (Left Hand) - Remove three screws securing wiper switch plate to underside of instrument panel, and eight screws securing courtesy light switch plate to instrument panel. Remove wiper arm, nut and gasket. Remove washer hose. Remove capscrew securing transmission to brace, remove transmission. Remove capscrew and special bolt securing spacer to cowl top, remove spacer. To install, reverse removal procedure.

Ford, Mercury - Remove motor, tensioners, and disconnect cable from motor drive pulley. Then remove mounting plate assembly.

Lincoln - Remove wiper arm and blade. Remove nut, spacer and gasket that secure transmission to cowl top. On right side, remove defroster outlet. Remove glove compartment box. Pull cable tensioner toward center of car and lock in this position with drift pin through hole provided. Remove drive cable from auxiliary drive, remove transmission. To install, reverse removal procedure. When installing, be sure to rig cables properly on pulleys before connecting to auxiliary drive. Take drift pin out of cable tensioner and allow pulleys to take up slack.

Ford, Mercury - Lift off wiper arms and blades. Remove idler pulley water shields (Ford), rubber plugs from tensioner access holes (Mercury), and remove tensioners. Disconnect cables from motor pulley. Remove pivot attaching nuts, spacers and washers and lower pivot assembly into cowl compartment.

Cable Tensioner (Lincoln): Remove defroster outlet from right side. Remove glove compartment box. Pull cable tensioner toward center of car, and lock in this position with a drift pin through hole provided. Remove drive cable from auxiliary drive. Remove two capscrews that secure tensioner to cowl panel, remove tensioner. To install, reverse removal procedure.

(LINK & CRANK ARM)

Chevrolet Trucks (1957)
Ford Thunderbird (1957)
Hudson (1957)
Nash (1957)
Rambler (1957)

DESCRIPTION: Wiper consists of single motor unit connected to right and left hand wiper arm shafts by flat or round metal links. Motor control valve is either integral with motor or is a separate remote control depending on car application.

REMOVAL & INSTALLATION: Wiper Motor - (Except Rambler) Remove radio. On Hudson & Nash models, remove wiper motor access hole cover. Disconnect vacuum hose and control cable. Remove link retainers and disconnect links. Remove motor mounting screws and lower wiper motor assembly. To install, reverse removal procedure.

Rambler - Open heater control valve. Drain approximately two quarts of liquid from radiator to lower coolant level. Disconnect heater hoses and remove heater core. Remove rain baffle below motor. Remove link retainers. Disconnect control conduit and vacuum hose from motor. Remove motor mounting screws and lower wiper motor assembly. To install, reverse removal procedure.

Pivot Shaft: Remove wiper arm and blade. Remove link from pivot shaft. Remove nut, spacer and gaskets as required, remove pivot shaft. To install, reverse removal procedure. *NOTE* - On Hudson, Nash & Rambler models it will be necessary to remove cowl air intake for access to retaining nuts.

CHEVROLET & PONTIAC ELECTRIC

Chevrolet, Truck & Pass. Cars (1957).
Pontiac (1957).

DESCRIPTION & OPERATION: Similar in design and operation to previous models with the following exceptions:

► *1957 CHEVROLET WIPER PRODUCTION CHANGE:* Cars produced after Dec. 1st. 1956, have "Slow-Park" type wipers. A new type drive gear returns blade to park position slowly. Motor and switch assembly are identical to previous type with the exception that the early Series 1957 wiper switch has five contacts (No. 5 contact not used) and later series have only four contacts. When servicing the switch, there are only two wires to unsolder and they should be installed as follows: Hold switch in its installed position, with switch mounting bracket downward and away from you. The **black** lead should be soldered to upper left switch connection and **red** lead to lower right connection.

REMOVAL, OVERHAUL, INSPECTION & ADJUSTMENTS:
See Page 494 in 1956 Annual Data.

AUTO-LITE ELECTRIC

CHRYSLER & IMPERIAL	Auto-Lite Wiper Motor No.
C75,76	EPV-4001A
IM-1,2,4	EPV-4001
DE SOTO	
S25,26	EPV-4001A
S27	EPW-4001
Special Equip.	EPV-4001A
DODGE	
D64,65	EPW-4001
Special Equip.	EPV-4001A
D66,67,70,71,72	EPW-4001
Special Equip.	EPV-4001B
PLYMOUTH	
P30,31	EPW-4001
Special Equip.	EPV-4001A
STUDEBAKER	
All Models	EPS-4001

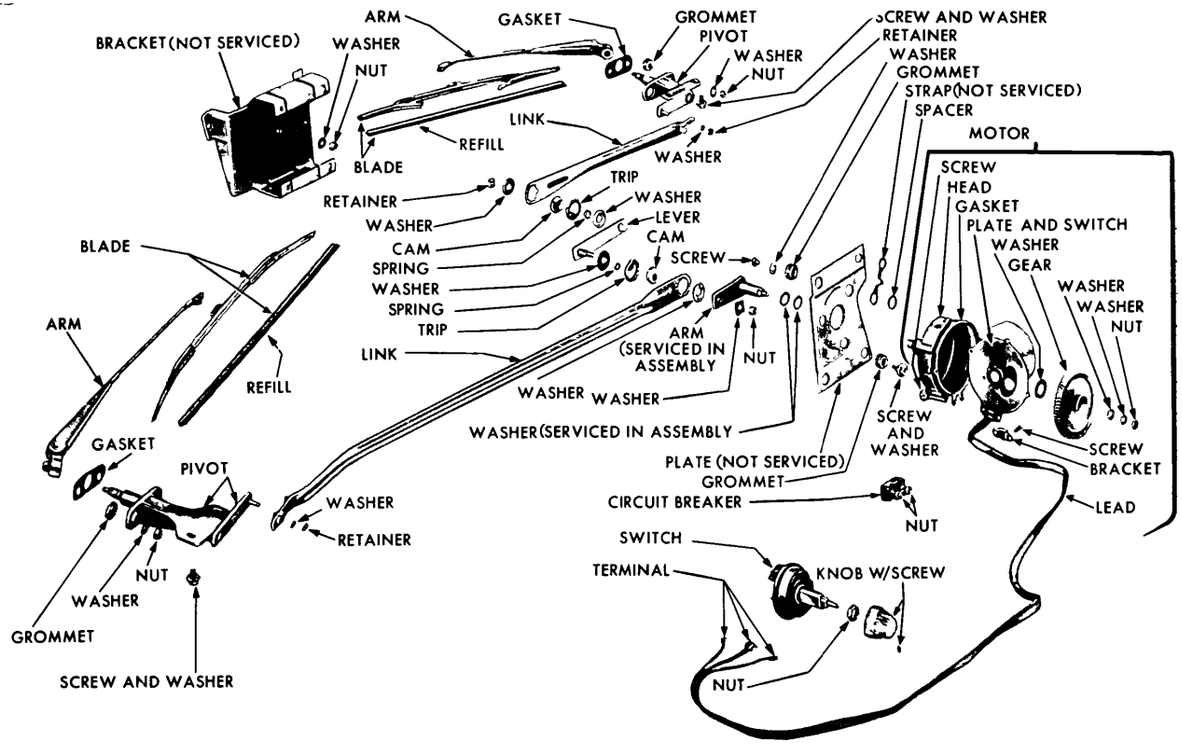
DESCRIPTION: Single and Variable types used, similar in design and operation to previous models. Both types use the same wiper blades, arm assembly and pivots. *NOTE* - Convertible and Sport Coupe blades, arms and pivots are different. Variable speed type has "Off Glass Parking" accomplished by reversing motor, and use of parking cams at pivot pins of intermediate crank arm.

►*WINDSHIELD CLEANING CAUTION:* Do not move wiper blades across glass to clean glass. Raise blades and arms outward and away from glass against pivot spring mechanism to save damage to wiper motor gears.

►*WIPER MOTOR REMOVAL CAUTION (Variable Speed Type):* Wiper should be operated and shut off by disconnecting it at circuit breaker, or by turning off ignition key. Damage to motor switch and spring parking cam, upon removal of switch cover, will result if cranks are in parked position.

REMOVAL: Remove windshield wiper assembly as a unit whenever wiper or links are to be serviced. Disconnect wires at wiper motor. On De Soto remove radio if so equipped. On Chrysler (with Heater and Deforster Ducts), remove glove box and door, and radio if it removes from front of instrument panel. Disconnect links from pivot cranks, remove motor mounting screws and remove motor from bracket (Chrysler), or motor and bracket (Others), from instrument panel. Lower assembly and remove from car.

Disassembly: Remove left hand link from crank arm, parking cam and spring release. Remove coil spring by spreading the ends. Remove right hand link in same manner after removing crank arm to lever nut, spacing washers between link crank arm and lever. To replace wiper switch or Geneva Wheel, remove switch plate.



AUTO-LITE ELECTRIC WINDSHIELD WIPER ASSEMBLY

Reassembly: Make sure gear box contains lubricant, and Geneva Wheel follower pin engages smoothly with top of gear. Then install spring washer with concave surface toward crank arm. Expand ends of crank pin coil spring and install on crank pin. Install spring release. *NOTE* - The same code letter must be visible when looking directly at the crank, the spring release, and the link. Install parking cam so that it will index with spring release and engage ends of spring between release and parking cam in openings at point of index. Install washer with convex surface toward cam and link assembly. Install retaining bolt and nut. Assemble right link and cam assembly to crank lever pivot in same manner, locking in place with clip instead of retaining bolt.

Wiper Pivot Replacement: Remove wiper blade. Disconnect link from pivot and remove pivot retaining plate pivot and gasket. Install new gasket and pivot with retaining plate. Install Bellville washer so convex surface is against head of bolt. Tighten retaining bolts to 75 ft. lbs. torque and install wiper blade.

Installation: Attach links to pivot crank pins. Install spring washer and lock clips on crank pins. Install wiper motor and bracket assembly making sure rubber mounting gasket is in place. Tighten mounting bolts to 25 ft. lbs. Reinstall radio, glove box and door.

Adjustment: Adjust parking cam at motor switch plate so that blades park as low as possible, then loosen blade arms at pivots. Position blades against windshield moulding on variable speed motors and tighten pivot attaching nuts. Position blades of constant speed motors one inch from windshield moulding.

TROUBLE SHOOTING: Wiper Operates Slowly - High resistance in brush to commutator contact, or carbon deposits in slots. Check armature commutator and brushes. High resistance in ground connection, or defective control switch.

Wiper Fails to Operate - Linkage binding, defective switch, motor, or open or grounded wiring.

Wiper Blades Not Parking Off Glass - Broken link spring, link spring not releasing, link spring not engaging stop on linkage, parking switch out of adjustment.

Blades Slap Windshield Mulding - Improperly installed link spring trip.

Blades Chatter - Twisted arm or wrong type blades used.

Motor Will Not Park - Follower pin in parking switch plate is bent too low and is not breaking contact. Contact spring leaf on parking switch plate is distorted causing excessive tension and not breaking contact. Dirty or worn contact points.

CARBURETOR & EQUIPMENT INDEX

AUTOMATIC CHOKES Pag
- Carter Climatic Control:
  - W1, WA1, WE (Single Carb.) ... 1555
  - YH, YF, B&B (Single Carb.) ... 1555
  - WDO, WCD, WGD, BBD (Dual Carb.) ... 1556
- Lincoln-Mercury ... 1611
- Rochester
  - Single (BC) Carburetors ... 1625
  - Dual (AA) Carburetors ... 1624
  - Dual (BB) Carburetors ... 1625
  - 4 Barrel (4GC) Carbs. ... 1632
- Sisson AC-600, 700, 750, 758 ... 1571
- Stromberg
  - AAV-16, 167; AAV-26, 267 Carbs. ... 1646
  - AAUVB-26, 267; AAVB-267 Carbs. ... 1646
  - 4A 4-Barrel Carbs. ... 1646
  - BXOV-26 Carburetors ... 1648
  - WW Carburetors ... 1668

BALL & BALL CARBURETORS
- All Models ... See Carter (B&B)

CARTER CARBURETORS
- W1 Downdraft ... 1536
- WA1 Downdraft ... 1538
- WE Downdraft ... 1543
- WO Downdraft ... 1545
- WCD Dual Downdraft ... 1520
- WDO Dual Downdraft ... 1528
- WGD Dual Downdraft ... 1531
- WCFB 4-Barrel Downdraft ... 1511
- WCFB 1955 Cadillac ... 1508
- YF Downdraft ... 1547
- YH Horizontal ... 1552

CARTER CAR STARTER See Electrical Sect.

CARTER JET SPECIFICATIONS
- Single & Dual ... 1557
- 4-Barrel ... 1563

CARTER (B&B) CARBURETORS
- B&B Updraft (Chevrolet) ... 1573
- B&B Single Downdraft ... 1565
- BBD Dual Downdraft ... 1577
- BBS Single Downdraft ... 1575

CARTER (B&B) JET SPECIFICATIONS
- B&B Updraft ... 1572
- B&B Downdraft ... 1569
- BBD Dual Downdraft ... 1583
- BBS Single Downdraft ... 1574

CADILLAC CARBURETORS
- 1955 Carter & Rochester ... 1508

CHEVROLET CARBURETORS
- Carter Updraft ... 1573
- Carter W1 Downdraft ... 1536
- Carter YF (Repl. Carb.) ... 1547
- Carter YH Downdraft ... 1552
- Rochester B & BC ... 1612
- Rochester (Repl. Carb.) ... 1612
- Rochester 2G & 2GC ... 1622

FAST IDLES Pag
- See Individual Carburetors

FORD CARBURETORS
- 6 Cyl. Downdraft ... 1585
- 6 Cyl. "Visi-flo" ... 1587
- 6 Cyl. C-O-E Updraft ... 1584
- V8 Dual Downdraft ... 1589
- Dual "Centri-flo" ... 1597
- Centri-Quad ... 1607

FUEL PUMPS
- AC Mechanical:
  - Testing & Trouble Shooting ... 1678
  - Overhaul ... 1680
  - AC & Ford Fuel Pump Conversion Nos. ... 1679
- Auto-Lite Mechanical ... 1682
- Carter Mechanical ... 1683
- Ford-AC Fuel Pump Conversion Nos. ... 1679

GASOLINE GAUGES
- AC Electric ... 1684
- Auto-Lite Electric "Two-Wire" ... 1685
- Auto-Lite Electric "One-Wire" ... 1686
- King-Seeley Electric Telegauge ... 1687
- King-Seeley "CV" Electric Telegauge ... 1688
- Stewart (Stewart-Warner) Electric ... 1686

HOLLEY CARBURETORS
- Ford 6-Cyl. Downdraft ... 1585
- Ford 6 Cyl. "Visi-flo" ... 1587
- Ford C-O-E Updraft ... 1584
- Ford V8 Dual Downdraft ... 1589
- Ford V8 "Centri-Quad" ... 1607
- Lincoln Dual Downdraft ... 1589
- Lincoln Dual "Concentric" ... 1594
- Lincoln Dual "Centri-flo" ... 1597
- Lincoln "Centri-Quad" ... 1602
- Lincoln "Centri-Quad" 1955 ... 1607
- Mercury Dual Downdraft ... 1589
- Mercury Dual "Concentric" ... 1594
- Mercury Dual "Centri-flo" ... 1597
- Mercury "Centri-Quad" ... 1602
- Mercury "Centri-Quad" 1955 ... 1607

HOLLEY JET SPECIFICATIONS
- Ford (Updraft) ... 1593
- Ford (Downdraft) ... 1592
- Lincoln & Mercury ... 1592
- Ford-Lincoln-Mercury 4 Bbl. ... 1610

ROCHESTER CARBURETORS
- AA Dual ... 1617
- BB Dual ... 1619
- B & BC Single ... 1612
- 4GC 4-Barrel ... 1627
- 4GC 1955 Cadillac ... 1508
- 2G, 2GC ... 1622

ROCHESTER JET SPECIFICATIONS Page
- Single & Dual ... 1626
- 4 Barrel ... 1633

SLOW-CLOSING THROTTLE DASHPOT
- Chrysler Six Fluid Drive ... 1572
- Chrysler 8 Fluid Dr. (Carter B&B) ... 1572
- Chrysler 8 Fluid Dr. (Stromberg) ... 1650
- Chrysler V8 (Carter) ... 1582
- De Soto Fluid Drive ... 1572
- De Soto V8 ... 1582
- Dodge Fluid Drive (Carter B&B) ... 1572
- Dodge Fluid Drive (Stromberg) ... 1652
- Dodge V8 ... 1582
- Plymouth (Carter B&B) ... 1572

STROMBERG CARBURETORS
- 4A 4-Barrel ... 1653
- AAV-1, AAV-2, AAVS-2 ... 1634
- AAV-16, AAV-167 ... 1637
- AAV-26, AAV-267 ... 1637
- AAUVB-26, AAUVB-267 ... 1641
- AAVB-267 ... 1641
- BXOV-26 ... 1647
- BXV-3, BXVD-3 ... 1649
- BXVES-3 ... 1649
- WW (Buick) 1955 ... 1663
- WW (Dodge) 1953-54 ... 1659
- WW (Dodge) 1955 ... 1661
- WW (Studebaker) ... 1665

STROMBERG STARTING SWITCH
- See Electrical Section

STROMBERG JET SPECIFICATIONS
- AX & BX ... 1657
- WW ... 1667

SUPERCHARGER
- Kaiser ... 1676

THROTTLE GUARDS
- Chrysler 8 Fluid Drive ... 1634

THROTTLE KICKDOWN SWITCHES
- Chrysler, DeSoto, Dodge ... See Elec. Sect.
- Others ... See Transmission Sect.

TILLOTSON CARBURETORS
- DY-9A, 9B, 9C ... 1669

UNLOADERS
- See Individual Carburetors

ZENITH CARBURETORS
- 28AVX9R, 228AV10 ... 1670
- 28BV10 ... 1672
- 31A11 ... 1674
- 30-VIG-8, 10 ... 1673

ZENITH JET SPECIFICATIONS
- 28AVX9R, 228AV10 ... 1671
- 28BV10 ... 1672
- 31A11 ... 1675
- 30-VIG-8, 10 ... 1674

CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor Make	Carburetor Model No.	Page No.
BUICK				
1946-47	40, 50	Carter WCD	608-S	1520
	40, 50	Stromberg	AAV-16	1637
	70	Carter WCD	609-S	1520
	70	Stromberg	AAV-26	1637
1947 Late	40, 50	Carter WCD	608SA, SC	1520
	70	Carter WCD	609SA, SC	1520
1948	40, 50	Carter WCD	608-SC	1520
	40, 50	Carter WCD	663-S	1520
	40, 50	Stromberg	AAV-167	1637
	70	Carter WCD	609-SC	1520
	70	Carter WCD	664-S	1520
	70	Stromberg	AAV-267	1637
1949	40, 50	Carter WCD	663S	1520
	40, 50	Stromberg	AAV-167	1637
	70	Carter WCD	664S	1520
	70	Stromberg	AAV-267	1637
1950-51	40, 50	Carter WCD	725S, SA	1520
	40, 50	Stromberg	AAUVB-267	1641
	70	Carter WCD	726S, SA	1520
	70	Stromberg	AAVB-267	1641
1951 Late	40, 50	Carter WCD	882S, SA	1520
	70	Carter WCD	883S	1520
	40, 50	Stromberg	AAUVB-267	1641
	70	Stromberg	AAVB-267	1641
1952	40, 50	Carter WCD	882SA	1520
	40, 50	Stromberg	AAUVB-267	1641
	70	Carter WCFB	894S, SA	1511
	70	Stromberg	4A	1653
1953	40	Carter WCD	882SA	1520
	40	Stromberg	AAUVB-267	1641
	50	Carter WCD	2017S	1520
	50	Stromberg	AAVB-267	1641
	70	Carter WCFB	996S, 2053S	1511
	70	Stromberg	4A	1653
1954	40, 50	Carter WCD	2081S, SA	1520
	40, 50	Stromberg	AAVB-267	1641
	60, 70, M/100	Carter WCFB	2082S	1511
	60, 70, M/100	Stromberg	4A	1653
1955 Early	40	Carter WCD	2179S	1520
	40	Stromberg	AAVB-267	1641
1955 Later	40	Carter WGD	2292S	1531
	40	Stromberg	WW	1663
1955	50, 60, 70	Carter WCFB	2197S, 2358S	1511
	50, 60, 70	Rochester 4GC	7006200,	1627
CADILLAC				
1946-47	V8 All Models	Carter WCD	595-S	1520
	V8 All Models	Stromberg	AAV-26	1637
1948	V8 All Series	Carter WCD	595-SA	1520
	V8 All Series	Stromberg	AAV-26	1637
1949 Early	V8 All Series	Carter WCD	682S	1520
1949 Late	V8 All Series	Carter WCD	722S	1520
1950	V8 All Series	Carter WCD	742S	1520
1951	V8 All Series	Carter WCD	845S	1520
	V8 All Series	Rochester	BB	1619
1952	V8 All Series	Carter WCFB	896S	1511
	V8 All Series	Rochester	4GC	1627
1952-54	All (Repl.)	Carter WCFB	2143S	1511
1953	V8 (Hydra-Matic)	Carter WCFB	2005S, SA	1511
	V8 (Twin-Turbine)	Carter WCFB	2088S	1511
	V8 (Twin-Turbine)	Rochester 4GC	7006215	1627
	V8 (Air-Cond.)	Carter WCFB	2072S, 2119S, SA	1511
	V8 All Series	Rochester	4GC	1627
1954 Early	V8 All Series	Rochester 4GC	7006220, 21	1627
1954 Late	V8 All Series	Rochester 4GC	7006962	1627
1954	V8 All Series	Carter WCFB	2109S, 2110S	1511
1955 Early	Std. Engine	Carter WCFB	2185S, 2186S	1508
	Std. Engine	Rochester 4GC	7006655, 56,	1508
1955 Later	Std. Engine	Carter WCFB	2266S, 2267S	1508
	Std. Engine	Rochester 4GC	7007970, 71	1508
1955 Latest	Std. Engine	Carter WCFB	2354S, 2355S	1508
	Std. Engine	Carter WCFB	2255S	1508
1955	Eldorado Eng.	Rochester 4GC	7007240, 7942	1508
	Eldorado Eng.	Rochester 4GC	7007240, 41	1508
CHEVROLET				
1946-47	Pass. Cars	Carter W1	574-S	1536
	With Econ. Engine	Carter W1	616-S	1536
	Trucks (exc. COE)	Carter W1	574-S	1536
	C-O-E Trucks	Carter (BB)	517-S	1573
1948	Pass. Cars	Carter W1	574-S	1536
	With Econ. Engine	Carter W1	616-S	1536
	Trucks (Downdraft)	Carter W1	574-S	1536
	Trucks (Updraft)	Carter (BB)	517-S, 699-S	1573
1949	Pass. Cars	Carter W1	684S	1536
	Trucks (Downdraft)	Carter W1	684S	1536
	Trucks (Updraft)	Carter (BB)	517S, 699S	1573
1949-50	Pass. Cars	Rochester	B	1612
1950	Trucks (Downdraft)	Rochester	B	1612
	Trucks (Updraft)	Carter (B&B)	745S, 871S	1573
1951	Pass. Cars	Rochester	B	1612
	Trucks (Downdraft)	Rochester	B	1612
	Trucks (Updraft)	Carter (B&B)	745S, 871S	1573
1952	Pass.Cars	Rochester	B	1612
	Trucks (Downdraft)	Rochester	B	1612
	Trueks (Updraft)	Carter (B&B)	871S, SA	1573
1953	Pass. Cars	Rochester	B & BC	1612
	Corvette	Carter YH	Three 2066, SA	1552

CONTINUED ON NEXT PAGE

CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor Make	Carburetor Model No.	Page No.
CHEVROLET (Continued)				
1953	Trucks (Downdraft)	Rochester	B	1612
	Trucks (Updraft)	Carter (B&B)	871SA	1573
1954	6 Cyl. Pass.	Rochester BC	7005921, 22	1612
	Corvette 6	Carter YH	Three 2066S, SA	1552
	Trks. (235")	Rochester B	7004468	1612
	Trks. (261")	Rochester B	7005140	1612
	Trks. (Auto. Tr.)	Rochester BC	7005921	1612
	Trucks (Updraft)	Carter (B&B)	871SB, 2075S	1573
1955	6 Cyl. Pass.	Rochester BC	7007180, 81	1612
	V8 Pass.	Rochester 2G	7005810, 6825	1622
	V8 Pass.	Rochester 2GC	7008004, 5	1622
	V8 Powerpack	Carter WCFB	2218S, 2351S	1511
	Corvette 6	Carter YH	Three 2066S, SA	1552
	Corvette V8	Carter WCFB	2218S, 2351S	1511
	Trks (235")	Rochester B	7004468	1612
	Trks. (261")	Rochester B	7005140	1612
	Trks. (Auto. Tr.)	Rochester BC	7005921	1612
	V8 Trk. (½T.)	Rochester 2G	7008399	1622
	V8 Trk. (Other)	Rochester 2GC	7006770	1622
	Trucks (Updraft)	Carter (B&B)	871SB	1573
CHRYSLER				
1946-47	C38 Six	Carter (B&B)	EX1, 2, 3 EV1, 2	1565
	C39, C40 Eight	Carter (B&B)	E7A1	1565
	C39, C40 Eight	Stromberg	AAVS-2	1634
1948	C38 Six Std. Trans.	Carter (B&B)	EX1, 2, 3	1565
	C38 Six Hydr. Trans.	Carter (B&B)	EV1, 2	1565
	C39, C40 Eight	Stromberg	AAVS-2	1634
	C39, C40 Eight	Carter (B&B)	E7A1	1565
1949	C45 Six Std. Trans.	Carter (B&B)	EX3	1565
	C45 Six Auto. Trans.	Carter (B&B)	E7L1, 2, 3, 4	1565
	C46, C47 "8" Auto. Tr.	Carter (B&B)	E7J1, 2, 3, 4	1565
1950	C48 Six S-M Tr.	Carter (B&B)	EX3	1565
	C48 Six Auto Tr.	Carter (B&B)	E7L4	1565
	C49, C50 Eight	Carter (B&B)	E7J4	1565
1951	C51 Six S-M Tr.	Carter (B&B)	E9C1	1565
	C51 Six Auto Tr.	Carter (B&B)	E9A1	1565
	C52, C53, C54 Eight	Carter WCD	830S, SA, SB	1520
1952	C51 Six S-M Tr.	Carter (B&B)	E9C1	1565
	C51 Six Auto Tr.	Carter (B&B)	E9A1	1565
	C52, 3, 4, 5 Eight	Carter WCD	931S, SA, SB, SC	1520
1953	C60 Six S-M Tr.	Carter (B&B)	E9C1	1565
	C60 Six Auto Tr.	Carter (B&B)	E9A1	1565
	C56, 58 Eight	Carter WCD	935S, SA	1520
	C59 Eight	Carter WCD	992S	1520
	C58 59 Powerflite	Carter WCD	2039S, SA	1520
1954	Six (All)	Carter (B&B)	E9B1, E9C1	1565
	V8 (New Yorker)	Carter WCD	2039SA	1520
	V8 (Other)	Carter WCFB	2041S	1511
1955	V8 (Windsor)	Carter BBD	2164S,80S,SA,SB	1575
	V8 (Other)	Carter WCFB	2126S	1511
	C300	Carter WCFB	Two 2137S	1511
CROSLEY				
1947-48	CC	Tillotson	DY-9A, 9B	1669
1949-51	CD & VC Hotshot	Tillotson	DY-9C	1669
1952	CD & VC Hotshot	Carter WO	870S	1545
DE SOTO				
1946-48	S11 Std. Trans.	Carter (B&B)	EX1, 2, 3	1565
	S11 Hydr. Trans.	Carter (B&B)	EV1, 2	1565
	S11 Fluid Drive	Stromberg	BXVD-3	1649
	S11 Std. Trans.	Carter (B&B)	EX1, 2, 3	1565
1949	S13 Std. Trans.	Carter (B&B)	EX3	1565
	S13 City Traffic	Carter (B&B)	E7V1,E7W1	1565
1949 Early	S13 Auto. Trans.	Carter (B&B)	E7L1, L2	1565
1949 Late	S13 Auto. Trans.	Carter (B&B)	E7L3, L4	1565
1950	S14 S-M Trans.	Carter (B&B)	EX3	1565
	S14 Auto Tr.	Carter (B&B)	E7L4	1565
1950-51	S14, S15 (City Traffic)	Carter (B&B)	E7W1	1565
1951	S15 S-M Tr.	Carter (B&B)	E9C1	1565
	S15 Auto Tr.	Carter (B&B)	E9A1	1565
1952	S15 Six S-M Tr	Carter (B&B)	E9C1	1565
	S15 Six Auto Tr.	Carter (B&B)	E9A1	1565
1952 Early	S17 V8	Carter WCD	884S, SA, SC	1520
1952 Late	S17 V8	Carter BBD	901S, 5S, 6S	1577
1952-53	S17, S16 V8	Carter BBD	908S. 9S, 10S	1577
1953	S18 Six.	Carter (B&B)	E9A1 E9C1	1565
	S16 V8	Carter BBD	911S, 12S, 13S	1577
1954	Six	Carter (B&B)	E9B1, E9C1	1565
	Six (City Traffic)	Carter (B&B)	E7W1	1565
1954 Early	V8	Carter BBD	2067S, 68S, 70S	1577
1954 Later	V8	Carter BBD	2129S, 30S, 31S	1577
1955	V8 S21	Carter WCFB	2126S	1511
	V8 S22	Carter BBD	2176S,77S,78S,SA	1577
DODGE				
1946-48	D24 Std. Equip.	Stromberg	BXV-3	1649
	D24 Fluid Drive	Stromberg	BXVD-3	1649
	D24 Fluid Drive	Carter (B&B)	D6J1	1565
1949	D29, D30 Std. Trans.	Stromberg	BXVD-3	1649
	D29, D30 Std. Trans.	Carter (B&B)	D6P1	1565
	D30 Auto. Trans.	Stromberg	BXVES-3	1649
	D30 Auto. Trans.	Carter (B&B)	D6M1	1565
1950	D33, D34 Std. Trans.	Stromberg	BXVD-3	1649
	D33, D34 Std. Trans.	Carter (B&B)	D6P1	1565
	D34 Auto Trans.	Stromberg	BXVES-3	1649
	D34 Auto Trans.	Carter (B&B)	D6M1	1565
1951	All S-M Tr.	Stromberg	BXVD-3	1649
	All S-M Tr.	Carter (B&B)	D6P1	1565
	All Auto Tr.	Stromberg	BXVES-3	1649
	All Auto Tr.	Carter (B&B)	D6M1	1565
1952	All S-M Tr.	Stromberg	BXVD-3	1649
	All Auto Tr.	Stromberg	BXVES-3	1649
1953	Six S-M Tr.	Carter (B&B)	D6H2	1565
	Six Fluid Dr.	Carter (B&B)	D6P1, P2	1565
	Six Overdrive	Carter (B&B)	D6U1	1565
	Six O.D. & Fluid Dr.	Carter (B&B)	D6V1	1565
	Six Auto Tr.	Carter (B&B)	D6M1	1565
	Six Auto Tr.	Stromberg	BXVES-3	1649
	V8 All Models	Stromberg	WW	1659
1954 Early	Six	Carter (B&B)	E9N1,T1,U1,V1	1565
1954 Later	Six	Carter BBS	2062S, 63S, 2116S	1575
1954	V8	Stromberg	WW	1659
	V8 Optl.	Carter WCFB	2191S	1511
1955	Six	Stromberg	WW	1661
	V8	Stromberg	WW	1661
	V8 Powerpack	Carter WCFB	2181S, 2253S	1511

CONTINUED N NEXT PAGE

CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor Make	Carburetor Model No.	Page No.
FORD				
1946-47	6 Cyl. Pass. Cars	Holley-Ford		1585
	V8 Pass. Cars	Holley-Ford		1589
	Trucks (V8)	Holley-Ford		1589
	Trucks (6 Cyl.)	Holley-Ford		1585
1948	6 Cyl. Pass. Cars	Holley-Ford		1585
	V8 Pass. Cars	Holley-Ford		1589
	Trucks (6 Cyl.)	Holley-Ford	(Downdraft)	1585
	Trucks 6 Cyl. C-O-E	Holley-Ford	(Updraft)	1584
	Trucks (V8)	Holley-Ford		1589
1949	6 Cyl. Pass. Cars	Holley-Ford		1585
	V8 Pass. Cars	Holley-Ford		1589
	Trucks 6 Cyl.	Holley-Ford	(Downdraft)	1585
	Trucks 6 Cyl. C-O-E	Holley-Ford	(Updraft)	1584
	Trucks V8	Holley-Ford		1589
1950	Pass. Cars 6 Cyl.	Holley-Ford		1585
	Pass. Cars V8	Holley-Ford		1589
	Trucks 6 Cyl.	Holley-Ford	(Downdraft)	1585
	Trucks 6 Cyl. C-O-E	Holley-Ford	(Updraft)	1584
	Trucks V8	Holley-Ford		1589
1951	Pass. Cars 6 Cyl. S-M Tr.	Holley-Ford	8HA-9510	1585
	Pass. Cars 6 Cyl. Auto Tr.	Holley-Ford	1HA-9510A	1585
	Pass. Cars V8 S-M Tr.	Holley-Ford	8BA-9510A	1589
	Pass. Cars V8 Auto Tr.	Holley-Ford	1BA-9510A	1589
	Trucks 6 Cyl. (Updraft)	Holley-Ford	7HW-, 8MHW-9510A	1584
	Trucks 6 Cyl. (Downdrft)	Holley-Ford	7HT-, 8MTH-9510A	1585
	Trucks V8	Holley-Ford	7RT, 8RT-9510A	1589
1952 Early	Pass. Cars 6 Cyl. S-M Tr.	Holley-Ford	EAA-9510D	1587
	Pass. Cars 6 Cyl. Auto Tr.	Holley-Ford	EAA-9510E	1587
1952-53	Pass. Cars 6 S-M Tr.	Holley-Ford	EAA-9510G, L	1587
	Pass. Cars 6 Auto Tr.	Holley-Ford	EAA-9510H, M	1587
	Pass. Cars V8 S-M Tr.	Holley-Ford	EAB-9510C	1589
	Pass. Cars V8 Auto Tr.	Holley-Ford	EAB-9510D	1589
	Trucks 6 S-M Tr.	Holley-Ford	EAG-9510B, G	1587
	Trucks 6 "M" Eng.	Holley-Ford	8MTH-9510A	1585
	Trucks V8 S-M Tr.	Holley-Ford	8RT-9510E, F	1589
1953	Trucks 6 Auto Tr.	Holley-Ford	EAA-9510H	1587
	Trucks V8 Auto Tr.	Holley-Ford	8RT-9510G	1589
1954	6 Cyl. Pass. Cars	Holley-Ford	EBP-9510A, B	1587
	V8 Pass. Cars	Holley-Ford	EBU-9510U	1589
	Trucks (6 Cyl.)	Holley-Ford	EBR-, EBP-9510-A	1587
	Trks. V8 239"	Holley-Ford	EBV-9510H	1589
	Trks. V8 256"	Holley-Ford	EBZ-9510C	1597
	Trks. 256" Repl.	Holley-Ford	B4T-9510A	1597
1955	Pass. Cars 6 Cyl.	Holley-Ford	EBP-9510A, B	1587
	Pass. Cars V8	Holley-Ford	B5A-9510J,K,B	1589
	V8 Powerpack	Holley-Ford	B5A-9510G,H,M,N	1607
	V8 Interceptor	Holley-Ford	B5A-9510G,H,M,N	1607
	V8 Thunderbird	Holley-Ford	B5A-9510G,H,M,N	1607
	Trucks 6 Cyl.	Holley-Ford	EBR-, EBP-9510-A	1587
	Trks. V8 239"	Holley-Ford	EBV-9510H	1589
	Trks. V8 256"	Holley-Ford	B4T-, B5T-9510A	1597
FRAZER				
1947-48	All Models	Carter WA-1	622-S, SA, SB	1538
	All Models	Carter W1	574-S	1536
1948	Manhattan (Optl.)	Carter WCD	685-S, SA	1520
1949	F-495, F-496	Carter WCD	723S	1520
1950	F-505, F-506	Carter WCD	723S	1520
1951	F-515, F-516	Carter WGD	813S	1531
HENRY J				
1951-54	Std. 4 Cyl.	Carter YF	820S, SA, SB	1547
	Deluxe 6 Cyl.	Carter YF	814S, 833S, SA, SB	1547
HUDSON				
1946	51, 52, 58 Six	Carter WDO Vacm.	501-S	1528
	53, 54 Eight	Carter WDO Vacm.	502-S	1528
1947	171, 172, 178 Six	Carter WDO Vacm.	501-S	1528
	173, 174 Eight	Carter WDO Vacm.	502-S	1528
1948	481, 482 Six	Carter WDO Vacm	647-S	1528
	483, 484 Eight	Carter WDO Vacm	648-S	1528
1949	491, 492 Six	Carter WDO Vacm	647S, SA	1528
	493, 494 Eight	Carter WDO Vacm.	648S	1528
1950 Early	Six	Carter WDO	647SA	1528
	Eight	Carter WDO	648S	1528
1950-51	Pacemaker	Carter WA1	749S	1538
	Six	Carter WGD	776S	1531
	Eight	Carter WGD	773S	1531
1952	4B Pacemaker	Carter WA1	749S	1538
	5B Wasp, 6B Comm.	Carter WGD	776S	1531
	7B Hornet	Carter WGD	776S	1531
	8B Eight	Carter WGD	773S	1531
	5B, 6B Twin H-Power	Carter WA1	Two 990S	1538
	7B Twin H-Power	Carter WA1	Two 968S	1538
1953	1C, 2C Jet	Carter WA1	2009S, SA	1538
	4C Wasp	Carter WA1	749S	1538
	5C Super Wasp	Carter WGD	776S	1531
	7C Hornet	Carter WGD	776S	1531
	1C, 2C Twin H-Power	Carter WA1	Two 2013S	1538
	4C, 5C Twin H-Power	Carter WA1	Two 990S	1538
	7C Twin H-Power	Carter WA1	Two 968S	1538
1954	Jet Std.	Carter WA1	2009SA	1538
	Jet Twin H-Power	Carter WA1	Two 2013S	1538
	Wasp Std.	Carter WA1	749S	1538
	Wasp Twin H-Power	Carter WA1	Two 2114S	1538
	Super Wasp Std.	Carter WGD	2115S	1531
	Super Wasp Twin H-P	Carter WA1	Two 2114S	1538
	Hornet 6 Std.	Carter WGD	2115S	1531
	Hornet 6 Twin H-P	Carter WA1	Two 2113S	1538
1955	Wasp Std.	Carter WA1	2009SA	1538
	Wasp Twin H-Power	Carter WA1	Two 2013S	1538
	Hornet 6 Std.	Carter WGD	2252S	1531
	Hornet 6 Twin H-P	Carter WA1	Two 2113S	1538
	Hornet V8	Carter WGD	2231S, SA	1531
JEEP				
All Models			See Willys	

CONTINUED ON NEXT PAGE

CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor Make	Carburetor Model No.	Page No.
KAISER				
1947	K-100, K-101	Carter WA-1	610S,22S,22SA	1538
1947-48	All Models	Carter WA-1	622-S, SA, SB	1538
	All Models	Carter W1	574-S	1536
1948	Custom (Optl.)	Carter WCD	685-S, SA	1520
1949	491	Carter WA1 Vacm	622SB	1538
	492	Carter WCD	723S	1520
1950	K-501	Carter WA1 Vacm.	622SB	1538
	K-502	Carter WCD	723S	1520
1951	K-511, K-512	Carter WGD	781S	1531
1952	All Models	Carter WGD	781S	1531
1953 Early	All Models	Carter WGD	999S	1531
1953 Late	All Models	Carter WGD	2052S	1531
1954	K545 Special	Carter WGD	2052S, SA	1531
	Darrin	Carter YF	2094S	1547
1954-55	Manhattan Schgd	Carter WCD	2146S	1520
LINCOLN				
1946-47	66H Lincoln & Cont'l.	Holley-Ford		1589
1948	V12 Lincoln & Cont'l	Holley-Ford		1589
1949	9EH, 9EL V8	Holley-Ford		1594
1950	OH & OL, V8	Holley-Ford		1594
1951	All V8.	Holley-Ford		1594
1952	All Models	Holley-Ford	Centri-flo	1597
1953	All Models	Holley-Ford	Centri-quad	1602
1954	All Models	Holley-Ford	Centri-quad	1602
1955	All Models	Holley-Ford	Centri-Quad	1607
MERCURY				
1946-47	69M V8	Holley-Ford		1589
1948	89M V8.	Holley-Ford		1589
1949	9M, V8	Holley-Ford		1594
1950	OM, V8	Holley-Ford		1594
1951	All Models	Holley-Ford	Concentric	1594
1952	All Models	Holley-Ford	Centri-flo	1597
1953	All Models	Holley-Ford	Centri-flo	1597
1954	All Models	Holley-Ford	Centri-quad	1602
1955	All Models	Holley-Ford	Centri-quad	1607
METROPOLITAN				
1954	Nash & Hudson	Zenith	30 VIG-8	1673
1954-55	Nash & Hudson	Zenith	30 VIG-10	1673
NASH				
1946	4640 '600' Six	Carter WA-1 Vacm	611-S	1538
	4660 Amb. Six	Carter WA-1	464-S	1538
1947	4740 '600' Six	Carter WA-1 Vacm.	611-S	1538
	4760 Amb. Six	Carter WA-1	464-S	1538
1948	4840 '600' Six	Carter WA-1 Vacm.	662-S, SA	1538
	4860 Amb. Six	Carter WA-1	464-S	1538
1949	4940 '600' Six	Carter WA1 Vacm.	694S	1538
	4960 Amb. Six	Carter WA1	683S	1538

Car Model		Carburetor Mak	Carburetor Model No.	Pag No.
NASH (Continued)				
1950-51.	Statesman	Carter WA1	694S, 780S	1538
	Ambassador	Carter WA1	746S	1538
1951 Early.	Statesman	Carter YF	824S, SA, SB	1547
1951 Late .	Statesman	Carter YF	877S, SA	1547
1951	Ambassador	Carter WA1	746S	1538
	Amb Dual Jetfire	Carter YF	Two 892S	1547
1952	Statesman	Carter YF	877SA	1547
	Ambassador	Carter YH	895S, SA	1552
	Amb Dual Jetfire	Carter YH	973S & 974S	1552
1953	Statesman	Carter WCD	2034S	1520
	Ambassador	Carter YH	895SA	1552
	Amb. Dual Jetfire	Carter YH	973S & 974S	1552
	Nash Healey	Carter YH	973S & 974S	1552
1954 Early	Statesman	Carter YF	Two 2098S	1547
1954 Later	Statesman	Carter YF	Two 2137S, SA	1547
1954 Latest	Statesman	Carter YF	Two 2163S	1547
1954	Amb Jetfire	Carter YH	895S, SA	1552
	Amb Dual Jetfire	Carter YH	973S & 974S	1552
1955	Stsmn Powerflyte	Carter WCD	2061S	1520
	Dual Powerflyte	Carter YF	Two 2258S	1547
	Amb Jetfire	Carter YH	895SA	1552
	Amb. Dual Jetfire	Carter YH	973S & 974S	1552
	Amb V8	Carter WGD	2231S, SA	1531
OLDSMOBILE				
1946-47	66, 76 Std.	Carter WA-1 Vacm.	504-S	1538
	66, 76 Spec. (H-D).	Carter WA-1 Vacm.	481-S	1538
	68, 78, 98 Std.	Carter WDO Vacm.	503-S	1528
	68, 78, 98 Spec. (H-D)	Carter WDO Vacm.	480-S	1528
1947	68, 78, 98 Eight (H-D)	Carter WCD	665-S	1520
1948	66, 76 Six Std.	Carter WA-1 Vacm.	504-S	1538
	66, 76 Spec. (H-D)	Carter WA-1 Vacm.	651-S	1538
	68, 78 Eight Std.	Carter WDO Vacm.	503-S, SA	1528
	68, 78 Spec. (H-D)	Carter WDO Vacm.	650-S, SA	1528
	98 Futuramic Std.	Carter WDO Vacm.	503-S, SA	1528
	98 Futuramic Spec. (H-D)	Carter WDO Vacm.	650-S, SA	1528
1949	76 Six Std.	Carter WA1 Vacm.	710S	1538
	76 Six (H-D)	Carter WA1 Vacm.	709S	1538
	88, 98 Eight (H-D)	Carter WGD Vacm.	714S, SA	1531
	88, 98 Eight (H-D)	Rochester	AA	1617
1949-50	Repl. Carb.	Carter WGD		1531
1950	76 Six Std.	Carter WA1 Vacm.	764S	1538
	76 Six (H-D)	Carter WA1 Vacm.	763S,SA	1538
	88 & 98 Eight	Rochester	AA	1617
1951	88 & 98 Eight	Carter WGD	851S	1531
	88 & 98 Eight	Rochester	BB	1619
1952	88 Deluxe	Carter WGD	851S, SA	1531
	88 Deluxe	Rochester	BB	1619
	88 Super, 98	Carter WCFB	932S	1511
	88 Super, 98	Rochester	4GC	1627

C NTINUED N NEXT PAGE

CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor Make	Carburetor Model No.	Page No.
OLDSMOBILE (Continued)				
1953 Early	88 Deluxe	Carter WGD	851SA	1531
	88 Super, 98	Carter WCFB	2016S	1511
1953 Late	88 Deluxe	Carter WGD	2015S	1531
	88 Super, 98	Carter WCFB	2080S	1511
1953	88 Super, 98	Rochester 4GC		1627
	88, 98 Twin Turbine	Rochester 4GC	7006250	1627
1954	88 Deluxe	Carter WGD	2058S	1531
	88 Super, 98	Carter WCFB	2059S	1511
	88 Super, 98	Rochester 4GC	7005900, 6000	1627
1955	88 Deluxe	Rochester 2GC	7006970	1622
	88 Super, 98	Carter WCFB	2246S	1511
	88 Super, 98	Rochester 4GC	7006000, 7000	1627
PACKARD				
1946-47	2100, 2130 Six	Carter WA-1 Vacm.	530-S	1538
	2101, 2111 Eight	Carter WDO Vacm.	512-S	1528
	2103, 23 Super 8	Carter WDO Vacm.	531-S	1528
	2106, 26 Cust. 8	Carter WDO Vacm.	531-S	1528
1948	2201, 2211 Eight	Carter WDO Vacm.	644-S, SA	1528
	2202, 2232 Super 8	Carter WDO Vacm.	643-S, SA	1528
	2206, 2233 Cust. 8	Carter WDO Vacm.	531-S, SA	1528
1949	"2200" & "2300" Eight	Carter WDO Vacm.	644SA	1528
	"2200" & "2300" Super 8	Carter WDO Vacm.	643SA	1528
	"2200" & "2300" Cust. 8	Carter WDO Vacm.	531SA	1528
1949 Late	"2300" Eight	Carter WGD Vacm.	728S, SA	1531
1950	"2300-5" Eight	Carter WGD Vacm.	728S,SA	1531
	"2300-5" Super 8	Carter WDO Vacm.	643SA	1528
	"2300-5" Cust. 8	Carter Vacm.	531SA	1528
1951	200 Eight	Carter WGD	784S	1531
	300 Eight	Carter WGD	767S	1531
	400 Patrician	Carter WGD	767S	1531
1952	200 Eight	Carter WGD	784S	1531
	250, 300, 400	Carter WGD	928S	1531
1953	2501, 2633	Carter WGD	784S	1531
	2611, 2613	Carter WGD	928S	1531
1953 Early	2602, 6, 26, 31	Carter WCFB	985S	1511
1953 Late	2502, 6, 26, 31	Carter WCFB	2084S	1511
1954	5400, 1, 11 Clipper	Carter WGD	986S, 2102S	1531
	5402 Cavalier	Carter WCFB	2103S, 2142S	1511
	5406, 26, 31	Carter WCFB	2112S	1511
1955	5540 Clipper	Carter WCFB	2232S, 2284S	1511
	5560, 5580	Rochester 4GC	7007230	1627
	Caribbean	Rochester 4GC	7008230 & 31	1627
PLYMOUTH				
1946-47	P15	Carter (B&B)	D6G1	1565
	P15	Stromberg	BXV-3	1649
	P15 Econ. Models	Carter (B&B)	B6V1,W1	1565
1948	P15	Carter (B&B)	D6G1	1565
	P15	Stromberg	BXV-3	1649
	P15	Carter W1	574-S	1536
	P15 Econ. Models	Carter (B&B)	B6V1, W1	1565
PLYMOUTH (Continued)				
1949	P17, P18	Carter (B&B)	D6H1,H2	1565
	P17, P18 City Traffic	Carter (B&B)	D6N1,N2	1565
1950	P19, P20	Carter (B&B)	D6H2	1565
	P19, P20 City Traffic	Carter (B&B)	D6N2	1565
1951	All	Carter (B&B)	D6H2	1565
	All (City Traffic)	Carter (B&B)	D6N2	1565
1952-53	All	Carter (B&B)	D6H2	1565
	All (City Traffic)	Carter (B&B)	D6N2	1565
	All (Overdrive)	Carter (B&B)	D6U1	1565
1953	All (Hy-Drive)	Carter (B&B)	D6P1, P2	1565
	Taxicab	Carter (B&B)	D6R1	1565
1954 Early	Six	Carter (B&B)	D6H2, P2, U1	1565
	Six (City Traffic)	Carter (B&B)	D6R1, N2	1565
1954 Later	Six Std.	Carter BBS	920S, 2063S, SA	1575
	Six (Overdrive)	Carter BBS	993S, 2062S, SA	1575
	Six (Auto. Tr.)	Carter BBS	994S, 2116S, SA	1575
	Six (City Traffic)	Carter BBS	2203S, 2215S	1575
1955	Six	Carter BBS	2062S, SA; 63S, SA	1575
	Six (Auto. Tr)	Carter BBS	2116S, SA	1575
	Six (Repl. Carb.)	Carter BBS	2249S	1575
	V8 157 HP	Carter BBD	2141S, 54S, 55S	1577
	V8 157 HP (Repl.)	Carter BBD	2262S	1577
	V8 167 HP	Carter BBD	2259S, 60S, 61S	1577
	V8 167 HP (Repl)	Carter BBD	2274S, SA	1577
	V8 Powerpack	Carter WCFB	2253S	1511
PONTIAC				
1946	46-25, 26 Six	Carter WA-1 Vacm.	537-S	1538
	46-27, 28 Eight	Carter WDO	548-S	1528
1947	47-25, 26 Six	Carter WA-1 Vacm.	537-S	1538
	47-27, 28 Eight	Carter WCD	630-S	1520
1948	48-25, 26 Six	Carter WA-1 Vacm.	537-S	1538
	48-25, 26 Spec. (H-D)	Carter WA-1 Vacm.	652-S	1538
	48-27, 28 Eight	Carter WCD	630-S, SA, SB	1520
	48-27, 28 Spec. (H-D)	Carter WCD	653-S	1520
1949	Six Std.	Carter WA1 Vacm.	717S	1538
	Six (H-D)	Carter WA1 Vacm.	718S	1538
	Eight Std.	Carter WCD	719S	1520
	Eight (H-D)	Carter WCD	720S	1520
1950	Six S-M Tr.	Carter WA1	717S	1538
	Six Auto Tr.	Carter WA1	718S	1538
	Eight S-M Tr.	Carter WCD	719S, SA	1520
	Eight Auto Tr.	Carter WCD	720S, SA	1520
1951	Six (All)	Rochester	BC	1612
	Eight S-M Tr.	Carter WCD	719SA	1520
	Eight Auto Tr.	Carter WCD	720SA	1520
1952	Six (All)	Rochester	BC	1612
	Eight S-M Tr.	Carter WCD	719SA	1520
	Eight Auto Tr.	Carter WCD	720SA	1520
1953	Six (All)	Carter WCD	2010S	1520
	Eight S-M Tr.	Carter WCD	719SA	1520
	Eight Auto Tr	Carter WCD	720SA	1520

CONTINUED ON NEXT PAGE

CARBURETOR CAR APPLICATION INDEX

Car Model		Carburetor Make	Carburetor Model No.	Page No.
PONTIAC (Continued)				
1954	Six (All)	Carter WCD	2010S	1520
	Eight S-M Tr	Carter WCD	719SA, 720SA	1520
	Eight Auto Tr	Carter WCD	2122S	1520
1955	V8	Carter WGD	2207S, 2182S	1531
	V8	Rochester 2GC	7006100	1622
	V8 Powerpack	Carter WCFB	2268S, 2283S	1511
	V8 Powerpack	Rochester 4GC	7007800	1627
RAMBLER				
1950-51	Rambler	Carter WA1	694S, 780S	1538
1951 Early	Rambler	Carter YF	757S, SA, SB	1547
1951 Late	Rambler	Carter YF	876S, SA	1547
1952	Rambler	Carter YF	876SA	1547
1953 Early	Rambler	Carter YF	876SA	1547
1953 Late	Rambler	Carter YF	2014S	1547
1954-55	Rambler	Carter YF	2014S	1547
1955	R H D Exp	Carter WA1	780S	1538
STUDEBAKER				
1946	5G Champion	Carter WE	532-S	1543
1947	6G Champion	Carter WE	532-S	1543
	14A Commander	Stromberg	BXOV-26	1647
1948 Early	7G Champion	Carter WE	532-S	1543
1948 Late	7G Champion	Carter WE	661-S	1543
1948	15A Commander	Stromberg	BXOV-26	1647
1949	8G Champion	Carter WE	715S	1543
	16A Commander	Stromberg	BXOV-26	1647
1950	9G Champion	Carter WE	715S	1543
1950 Early	17A Commander	Carter WE	627SA	1543
1950 Late	17A Commander	Stromberg	BXOV-26	1647
1951	10G Champion	Carter WE	715S	1543
	H Commander	Stromberg	AAUVB-26	1641
1952	12G Champion	Carter WE	715S	1543
	3H Commander	Stromberg	AAUVB-26	1641
1953	14G Champion	Carter WE	989S, SA	1543
	4H Commander	Stromberg	WWUVL-26	1665
1954	Champion	Carter WE	989SA, 2108S, 90S	1543
	Commander	Stromberg	WW	1665
1955	Champion	Carter WE	2108S	1543
	Commander	Stromberg	WW	1665
	Comm Powerpack	Carter WCFB	2214S, SA; 19S, SA	1511
	President	Carter WCFB	2214S, SA; 19S, SA	1511
	Pres Deluxe	Carter WCFB	2330S	1511
WILLYS				
1946-47	Jeep, Civ. CJ-2A	Carter WO	596-S, 636-S	1545
	Jeep Sta. Wagon 4-63	Carter WA-1 Vacm.	613-S	1538
	Jeep Truck 2T, 4T	Carter WO	636-S	1545
1948	Jeep, Civ. CJ-2A	Carter WO	636-SA	1545
	Jeep Sta. Wagon 4-63	Carter WA-1 Vacm.	613-S	1538
	Jeep Sta. Wagon 4-63	Zenith	28BV10	1672
	Jeep Sta. Sedan 6-63	Carter WA-1 Vacm.	645-S	1538
WILLYS (Continued)				
1948	Jeepster VJ-2	Carter WA-1 Vacm.	613-S	1538
	Jeep Sedan Del. 4-63	Carter WA-1 Vacm.	613-S	1538
	Jeep Truck 2T, 4T	Carter WO	636-SA	1545
1949-50	Jeep, Civ. CJ-3A	Carter WO	636SA	1545
	Jeep, Sta. Wgn. 4X4-63	Carter WO	636SA	1545
	Sta. Wgn. & Del. 4-63	Carter WA1 Vacm.	613S	1538
	Sta. Wgn. & Del. 4-63	Zenith	228AV10	1671
	Jeepster VJ-3	Carter WA1 Vacm.	613S	1538
	Jeepster VJ-3	Zenith	228AV10	1671
	Jeep, Tr. 2-WD & 4-WD	Carter WO	636SA	1545
	Jeep, Sta. Sedan 6-63	Carter WA1 Vacm.	645S	1538
	Jeep, Sta. Sedan 6-63	Zenith	228AV10	1671
1950	Sta. Wgn. & Del. 4-63	Carter YF	738S	1547
1950-51	Jeep, Civ. CJ-3A	Carter WO	636SA	1545
	4 Cyl. Sta. Wgn. 473-SW	Carter YF	768S,SA; 832S,SA,SB	1547
	6 Cyl. Sta. Wgn. 673-SW	Zenith	31A11	1674
	4 Cyl. Jeepster 473-VJ	Carter YF	768S,SA; 832S,SA,SB	1547
	6 Cyl. Jeepster 673-VJ	Zenith	31A11	1674
	4 Cyl. Sedan Del. 473-SD	Carter YF	768S,SA; 832S,SA,SB	1547
	Jeep Sta. Wgn. 4x473	Carter YF	768S,SA; 832S,SA,SB	1547
	Trk. 473-HT & 473-4WD	Carter YF	768S,SA; 832S,SA,SB	1547
1952	4 Cyl. Sta Wgn., Trk	Carter YF	832SB, 951S	1547
	6 Cyl. Sta Wgn	Carter YF	924S	1547
	CJ-3A Jeep	Carter WO	636SA	1545
	675 Aero Pass Cars	Carter YF	937S	1547
	685 Aero Pass Cars	Carter YF	924S	1547
1953	4 Cyl. Sta Wgn , Trk	Carter YF	951S	1547
	6 Cyl Sta Wgn	Carter YF	924S, 2071S	1547
	CJ-3A Jeep	Carter WO	636SA	1545
	CJ-3B Jeep	Carter YF	938S, SA	1547
	475 4 Cyl Pass Car	Carter YF	938S, SA	1547
	675A Aero Pass. Car	Carter YF	937S	1547
	685A Aero Pass. Car	Carter YF	924S, 2071S	1547
1954	CJ-3B Jeep	Carter YF	938SA	1547
	4 Cyl Utility	Carter YF	951S	1547
	6 Cyl Utility (F-Hd)	Carter YF	2071S	1547
	6 Cyl Utility (L-Hd)	Carter WGD	2052S, SA	1531
	6 Cyl Utility (L-Hd)	Carter WCD	2204S	1520
	Pass Car (F-Hd Eng.)	Carter YF	2071S	1547
	Pass Car (675 L-Hd)	Carter YF	937S	1547
	Pass Car (6226 L-Hd)	Carter WGD	2052S, SA	1531
1955	CJ-3B Jeep	Carter YF	938SA	1547
	CJ-5 Jeep	Carter YF	938SA	1547
	4 Cyl Utility	Carter YF	951S	1547
	6 Cyl Utility (F-Hd)	Carter YF	2071S	1547
	6 Cyl Utility (L-Hd)	Carter WCD	2204S	1520
	Pass Car (6226 L-Hd.)	Carter WGD	2052S, SA	1531

CADILLAC (CARTER & ROCHESTER) CARBURETORS

CARTER WCFB

CADILLAC	Carter Carb. No.
1955 All Series exc pt Eldorado Engine.	
Early (No Air Cond.)	2185S
Later (No Air Cond)	2266S
Latest (No Air Cond)	2354S
Early (With Air Cond)	2186S
Later (With Air Cond)	2267S
Latest (With Air Cond)	2355S
All (Replacement Carburetor)	①2255S

ROCHESTER 4GC

CADILLAC	Rochester Carb. No.
1955 All Series exc pt Eldorado Engine.	
Early (No Air Cond.)	7006655
Late (No Air Cond)	7007970
Early (With Air Cond)	7006656
Late (With Air Cond)	7007971
1955 Eldorado Engine (Two Carburetors).	
Front (No Air Cond)	7007240
Rear (No Air Cond)	7007942
Front (With Air Cond)	7007240
Rear (With Air Cond)	7007241

①—See Application Data below

►CHANGES, CAUTIONS, CORRECTIONS

►*CARTER REPLACEMENT CARBURETOR APPLICATION* When installing this carburetor on **Air Conditioned Cars,** it will be necessary to use Unitized Pkg No 202-44U consisting of complete Speed-up Control (Fast Idle device) and attaching parts

►*CARTER & ROCHESTER CARBURETOR PRODUCTION CHANGE* "Later" carburetors listed above were used after approximately first 3000 cars These carburetors have larger Secondary System parts as follows Secondary Throttle Bore, Main Venturi, & Metering Jets

►*1955 CADILLAC "OFF-IDLE LEANNESS" AT 20-30 MPH DURING LIGHT ACCELERATION (Rochester Carburetors before Engine No. 44710)* May be accompanied by slight vibration and is caused by insufficient fuel during initial action of accelerating pump Correct by installing new parts listed below *NOTE—Carburetors marked "A-5" on brass tag (Engine No. 34110 to 44710) have later type Pump Plunger Assy. and Power Valve Piston Assy. Carburetors marked "B5X" (used beginning Eng. No. 44710) have latest type parts and do not require modification.*

Late Type Carburetor Parts

Carburetor Type :	Single 4GC	Eldorado (Two 4GC)
Pump Plunger Assy	7000208	7007807
Power Valve Piston Assy	7000204	
Primary Venturi Cluster	7008768	7008770

►*1952-55 CADILLAC CARBURETOR "ICING" CORRECTION* This condition generally noted after consistent high speed driving with outside temperature of 32-65°F and high relative humidity. Causes loss of power and high fuel consumption and may result in stalling Icing can be prevented by installing Sheet Metal Baffle No 1463839 on radiator support tie bar to reduce gap between tie bar and radiator upper tank and prevent outside cold air entering engine compartment Edge of baffle must be 1/8" from radiator upper tank and must not pinch wiring harness *NOTE—This baffle installed in production on later 1955 cars.*

►*1955 CADILLAC "FLAT-SPOT or SHUDDER" at 20-40 MPH ON PART THROTTLE ACCELERATION* May be caused by over-rich Idle Mixture Setting and Idle Adjustments must be made exactly as detailed below *ROCHESTER CARBURETOR NOTE—See "Off-Idle Leanness Correction" above also*

►*1955 CADILLAC HIGH IDLE SPEED (First Cars)* May be caused by loose or improperly positioned throttle valves or improperly adjusted secondary throttle linkage causing throttle valves to remain slightly open Check throttle valve position and linkage adjustment

►*1955 CADILLAC ROUGH IDLE OR DETONATION* May be caused by vacuum advance ports in carburetor being too low, causing distributor vacuum advance mechanism to operate and provide too much advance at idling speeds Check for this condition by connecting a vacuum gauge at the vacuum advance line fitting on the carburetor If gauge reading is over 5' with engine idling, ports are incorrectly located Correct by replacing carburetor throttle body

DESCRIPTION Four-barrel downdraft types with automatic choke These carburetors have new idle system as follows

Cadillac Idle System—Consists of SEPARATE Primary Idle Fuel System and Idle Air System (new) as described below Vapor vent passages located in throttle bores directly above the throttle valves dissipate spill over fuel from above throttle valves and improve hot idling performance

Idle Fuel System—Primary idle fuel system is similar to previous models with Idle Mixture Adjusting Screw controlling fuel discharge through lower idle port below the throttle valves Throttle valves are COMPLETELY closed at low idle and air is admitted through Idle Air System (below) Secondary idle fuel system has been modified by elimination of closed throttle idle ports (below primary throttle valves) so that the secondary idle system does not operate during closed-throttle idling At part-throttle positions, the secondary idle system discharges fuel through the ports located **above** the primary throttle valves

Idle Air System—Consists of air by-pass passage (primary barrels only) through which air for closed-throttle idling is taken from above the throttle valves and discharged into the manifold below the valves through a metered (non-adjustable) orifice and an adjustable orifice in each primary barrel An Idle Speed Screw (single screw for both barrels) controls this adjustable orifice and all Idle Speed Adjustments are made by means of this screw (No throttle stopscrew used) Throttle valves are COMPLETELY closed at low idling speed

ADJUSTMENTS *Make all adjustments exactly as follows* **Idling Adjustment:** *Each model must be adjusted exactly as detailed below. This is important to secure correct balance between Idle Mixture and Idle Air settings.*

Cadillac (Single Carburetor)

►*CAUTION This carburetor has TWO Idle Mixture Adjusting Screws (primary barrels only) and ONE Idle Air Adjusting Screw (regulates idle speed by controlling air for both primary barrels).*

1)—Make a preliminary carburetor adjustment by setting Air Adjusting Screw three turns open from point where spring is compressed, set each Idle Mixture Screw two turns open from inner seated position Connect Vacuum Gauge and Tachometer to engine, set hand brake securely. Start engine and run until it reaches **normal operating temperature.**

2)—Adjust idle speed by turning Air Adjusting Screw in or out for speed of 400 RPM with selector lever in either "Dr" position (or slightly higher without "creeping") *CAUTION—Air Conditioning must be turned "On".*

3)—Adjust one Idle Mixture Screw until highest engine RPM and vacuum reading is secured

4)—Adjust second Idle Mixture Screw likewise for highest engine RPM and vacuum

5)—Readjust engine idle speed (step 2 above)

6)—Repeat idle mixture and idle speed adjustments (steps 3, 4, 5 above) until no increase in engine speed results from idle mixture screw adjustment and smoothest engine idle is secured with highest vacuum reading

►*IDLE SETTING CAUTION Make certain that highest engine RPM is obtained with MINIMUM Air Adjusting Screw setting. An over-rich mixture will cause a flat spot at 20-40 MPH. on light acceleration*

7)—Adjust Fast Idle *See Fast Idle Adjustment below.*

Cadillac Eldorado (Two Carburetors)

►*CAUTION These carburetors are same design as single carburetor (above) The linkage connecting the two carburetors must also be adjusted to secure correct balanced performance.*

1)—Adjust linkage as follows Remove carburetor air cleaner, disconnect throttle return spring and manual control rod from end of connector link at forward carburetor, loosen connector link jam nut Hold or block both choke valves fully open and all throttle valves tightly closed, adjust connector link so that front end of link fits freely in hole in throttle lever of forward carburetor, tighten jam nut Connect manual control rod and throttle return spring

2)—Make preliminary carburetor adjustments by setting each Air Adjusting Screw three turns open from point where spring is compressed, set all Idle Adjusting Screws two turns open from inner seated position

3)—Replace air cleaner Connect Vacuum Gauge and Tachometer to engine, set hand brake securely Set selector lever in "Dr" Start engine and run until it reaches **normal operating temperature.**

4)—Adjust idle speed by turning Air Adjusting Screw on **each carburetor equally** in or out for speed of 480 RPM with selector lever in "Dr" position (or slightly higher without creeping) *CAUTION—Air Conditioning must be turned "On"*

5)—Adjust each Idle Mixture Adjusting Screw **in same number listed below** by turning screw in to its lean limit (RPM will drop off or flutter will be noted), then richen mixture by turning screw out ¼ turn *Special Screwdriver Tool J-6044 will make adjustment easier.*

CONTINUED ON NEXT PAGE

CADILLAC CARBURETORS (C nt.)

Adjustm nt Sequ nc

(1) Right hand screw on rear carburetor.
(2) Right hand screw on front carburetor.
(3) Left hand screw on front carburetor.
(4) Left hand screw on rear carburetor.

6)—Repeat Idle Speed adjustment (step 4 above) turning each screw an equal amount to reduce engine speed to 480 RPM.

7)—Repeat idle mixture and idle speed adjustments (steps 5 and 6 above) in sequence to obtain highest engine RPM (should be over 480 RPM) with highest possible manifold vacuum reading. Final setting should provide smooth idle at specified RPM.

►*IDLE SETTING CAUTION: Make certain that highest engine RPM is obtained with MINIMUM Air Adjusting Screw setting. An over-rich mixture will cause a flat spot at 20-40 MPH. on light acceleration.*

8)—Adjust Fast Idle. *See Fast Idle Adjustment below.*

►*HYDRA-MATIC THROTTLE LINKAGE ADJUSTMENT: Linkage is not disturbed by carburetor Idle Adjustment.*

Idl Speed-Up Control (Air Conditioned Cars): After idling adjustment completed, and with engine at normal operating temperature, position selector lever in Neutral and turn Air Conditioning "On". Engine should idle at 900 RPM. Adjust by loosening locknut on diaphragm shaft and turning knurled nut for correct idling speed. Lock adjustment by tightening locknut.

Atmospheric Idle (Bowl Vapor) Vent Adjustment: *On Carter WCFB carburetors, make this adjustment after Pump and Metering Rod Adjustments completed.*

Carter Carburetors—With throttle valves seated in bores, clearance between lower edge of bowl vapor vent valve and dust cover should be 1/16" (Gauge T109-197). To adjust, remove dust cover and bend vapor vent arm up or down as required.

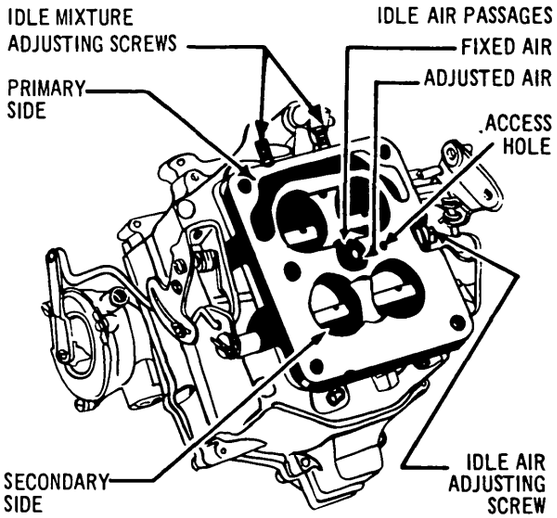
Rochester Carburetors—Open primary throttle valves .063" by inserting LARGE end of Gauge BT-79 between edge of valve and bore on side opposite idle adjusting screws. Operating tang on pump lever should just contact vent valve. Adjust by bending tang on contact arm using BT-69 bending tool.

Accelerating Pump Rod Adjustment: *Throttle valves must be tightly closed (fast idle screw must be backed off) when making this adjustment.*

Carter Carburetors— See that pump connector link installed in outer hole (long stroke) of pump arm. Remove dust cover and gasket. Place straightedge across dust cover boss at pump arm. Flat on top of pump arm should be parallel to straightedge. Adjust by bending throttle connector rod at lower angle using bending tool T109-213.

Rochester Carburetors—Use scale on bowl cover to measure height of pump plunger rod. Distance from top of bowl cover to bottom edge of plunger rod should be 63/64" (except Eldorado), 1 1/16" (Eldorado Front & Rear Carburetors). Adjust by bending throttle connector rod at lower angle.

Metering Rod Adjustm nt (Carter Carburet rs): *No gaug r quir d and met ring rods us d only on primary sid of carburetor. Check m t ring rods aft r making pump rod adjustment (abov).* Make certain that throttle valves seated in bores. Remove dust cover and gasket. Loosen metering rod arm clampscrew, press down on vacumeter link until metering rods bottom in carburetor body. Hold rods in this position, rotate metering rod arm until finger on arm contacts lip on vacumeter link, carefully tighten clampscrew.



CADILLAC CARBURETOR IDLE SYSTEM

Float Level Adjustment: *Primary and secondary floats must both be adjusted VERTICALLY and LATERALLY and Float Drop must also be adjusted.*

Carter Carburetors

Carter Float Level—With bowl cover assembly removed from carburetor and inverted, **remove cover gasket,** place correct gauge (see table) directly under center of floats with notched portions of gauge fitted over edges of cover. **Vertical Adjustment**—Floats should just clear horizontal portion of gauge (see table for vertical distance between tops of floats and machined surface of cover). Adjust by bending float arms up or down. **Lateral Adjustment**— Sides of floats should just clear vertical uprights of gauge. Adjust by bending float arms as required.

Carter Float Level	Checking Gauge	Vertical Distance
Primary (All)	①T109-232	1/8"
Secondary (All)	②T109-222	3/16"

①—Cadillac No. J-5437. ②—Cadillac No. J-5458.

Carter Float Drop—Hold bowl cover upright with floats down at limit of travel. Measure distance from top of each float at center to machined undersurface of bowl cover. Adjust by bending stop tabs on float bracket.

Carter Float Drop	
Primary (All)	5/8"
Secondary (All)	11/16"

Roch st r Carbur t rs

Roch ster Fl at L v l—With bowl cover assembly removed from carburetor and inverted, and **c v r gask t in plac ,** place correct gauge (see table) directly over center of floats with gauge against curvature in air horn bore. **Vertical Adjustm nt**—Floats should just touch top portion of gauge between gauge legs (see table for vertical distance from bottom of each float to gasket). Adjust by bending float arm at rear of float assembly. **Lateral Adjustm nt**—Each float should be centered between the gauge legs. Adjust by bending float arms horizontally. Check by tilting air horn assembly 90° to each side and make certain floats do not touch gauge legs.

Rochester Float L v l	Checking Gaug	Vertical Distanc
Primary & Secondary	③BT-101	1 19/32"

③—Cadillac No. J-5683.

Rochester Float Drop—Hold bowl cover upright with floats down at limit of travel. Measure distance from bottom of floats at center to gasket on bowl cover. Adjust by bending float tang at rear of float toward needle seat to lessen drop and away from seat to increase drop.

Rochester Float Drop	
Primary & Secondary (All)	2¼"

Automatic Choke & Modifier Adjustment: Choke setting on all models is CENTERED (at Index). Choke Modifier must be adjusted as directed below.

►*WARM-UP PERFORMANCE IMPROVEMENT (CARS WITH CARTER CARBURETORS):* If warm-up performance is poor due to a too-rich choke setting, the standard Centered setting can be changed to **l P int L an** which will correct this condition. Adjust Modifier as follows:

Carter Choke Modifier—Set cover assembly at index for centered setting (see Warm-up performance improvement above). Disconnect choke modifier rod at lower end, rotate metal pointer and lever (to which rod connected) until it is in line with raised pointer on coil housing. Hold pointer in this position, loosen clampscrew in modifier lever, rotate lever until scribed line on lever is vertical, tighten clampscrew. Make certain that throttle valves fully seated, bend rod at upper angle until rod freely enters hole in throttle arm. Connect rod.

Rochester Choke Modifier—Set cover assembly at index for centered setting. Make certain that throttle valves fully seated, loosen lockscrew in modifier lever on choke cover, rotate index pointer counter-clockwise until it lines up with long scribed line on cover (choke valve should be closed), tighten lockscrew securely.

Choke Rod Adjustment: *This adjustm nt sh uld b mad BEFORE adjusting Fast Idl , Unload r, and Sec ndary Throttle Linkage.*

Carter Carburetors—Loosen clamp screw on lever on choke shaft. Insert .020" feeler gauge between lip of fast idle cam and boss on flange casting, hold choke valve tightly closed and remove all slack from linkage by pressing choke lever toward closed position, tighten clampscrew while holding lever in this position.

Rochester Carburetors—Turn fast idle adjusting screw in until it contacts the SECOND step of the fast idle cam, close choke valve until screw is against high step of cam and make certain that choke trip lever is in contact with counterweight lever. Hold linkage in this position and check choke valve opening or clearance between upper edge of valve and dividing wall in air horn using SMALL end of Gauge BT-102 (.040"). Adjust by bending choke rod.

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CADILLAC CARBURETORS (C nt.)

Unl ad r Adjustm nt: *This is don aft r Chok Rod adjusted.*

Carter Carbur tors—Move throttle lever to wide open position. Check choke valve opening or clearance between upper edge of valve and inner wall of air horn using Gauge T109-39 (13/64"). Adjust by bending unloader lip on throttle shaft lever using T109-41 bending tool.

R ch ster Carbur tors—Move throttle lever to wide open position and hold trip lever down in contact with choke counterweight. Check choke valve opening or clearance between upper edge of valve and dividing wall in air horn using LARGE end of Gauge BT-102 (.125"). Adjust by bending tang on fast idle cam using BT-69 bending tool

Fast Idl Adjustm nt: *CAUTION—When Fast Idle set "Off Engin ", a final adjustment should be made "On Engin " as d tail d below to insure correct ngin warm-up p rformanc .*

"Off Engin " Fast Idle Setting

Carter Carburetors—Hold choke valve tightly closed so that high step of fast idle cam is in line with fast idle screw, turn fast idle screw in until primary throttle valve opening or clearance between edge of valve and wall on side opposite idle ports is .015" (Gauge T109-44).

R ch st r Carburet rs—Hold choke valve tightly closed and hold throttle lever in closed position so that fast idle screw rests on high step of fast idle cam Turn fast idle screw in until throttle valve opening or clearance between edge of valve and air horn wall is 020' (SMALL end of Gauge BT-67)

"On Engin " Fast Idle Setting

All Carbur t rs—After completing Idle Adjustment (above), idle engine, place selector lever in Neutral, rotate fast idle cam so that fast idle screw contacts highest step of cam, adjust fast idle screw for engine speed of 1700 RPM (All Cars except Eldorado Engine), 2000 RPM (Eldorado engine)

Secondary Throttle Linkage· *Separate adjustments required on each carburetor as follows*

Carter Carburetors

1) Secondary Throttle Lever—With choke valve wide open, move throttle lever to wide open position and note movement of secondary throttle valves which should reach wide open position at same time as primary valves Adjust by bending secondary throttle operating rod at upper angle using bending tool T109-213

2) Secondary Throttle Lock-out—With fast idle adjustment correctly made (above), close choke valve and hold in tightly closed position Lock pawl should be in unlocked position If not, adjust by bending tang on lock pawl using bending tool T109-105 Hold primary throttle valves halfway open, open choke valve fully, then open primary throttle valves all the way Tang on secondary throttle arm should engage notch in lock-out lever preventing secondary throttle shaft movement Then close primary throttle valves (with choke valve wide open) until lock pawl is unlocked, finally open primary throttle valves all the way Lock-out lever should fall free allowing secondary throttle valves to open before primary throttle valves are fully open Adjust by bending tang on secondary throttle lever to provide clearance for proper operation of lock-out lever

Rochester Carburetors

►*ROCHESTER CARBURETOR SECONDARY LEVER CLEARANCE CAUTION (Insufficient clearance will interfere with correct Idling Adjustment)* With both primary *and secondary* throttle valves completely closed, check the following points (1) Clearance between secondary throttle lever and secondary throttle actuating lever must be 010- 015" (2) Clearance between upper edge of secondary throttle lever and bottom of float bowl must be 020' After establishing these clearances, operate linkage and check for positive closing of the throttle valves (bend secondary throttle, if necessary, to secure positive closing)

1) Secondary Throttle Lever—With choke valve wide open, move throttle lever to wide open position and note movement of secondary throttle valves which should reach wide open position at the same time as primary valves. If adjustment required, remove secondary throttle actuating link, check wide-open stops for both primary and secondary valves and adjust by bending tangs so that wide-open position can be secured, connect link Bend link so that both throttle shafts contact wide-open stops at the same instant

2) Secondary Throttle Lock-out—With choke valve partially closed and throttle valves closed, check clearance between secondary lock-out lever tang and edge of slot in fast idle cam using a feeler gauge Clearance should be 015' Adjust by bending tang horizontally using bending tool BT-18

3) Secondary Throttle Contour Clearance—With choke valve wide open, open throttle valves so that tang on secondary lock-out lever rides over top of fast idle cam Measure clearance between tang and fast idle cam edge using a feeler gauge Clearance should be 015' Adjust by bending tang up or down using bending tool BT-91

OVERHAUL: *See "Carter 4-Barrel Carburetors" & "Rochester 4-Barrel Carburetors".*

SERVICE PARTS

Gasket Sets—Carter No. 263 (2255S, 2266S, 2267S, 2354S, 2355S). Rochester No. 7006135 (7006962, 7006963), No. 7007134 (7007970, 7007971).

Repair Pkg.—Carter No. 1792 (2255S, 2266S, 2267S, 2354S, 2355S). Rochester No 7006375 (7006962, 7006963, 7007970, 7007971).

CARTER "WCFB" 4-BARREL CARBURETORS

	Carter Carburetor No.
BUICK	
1952 Series 70	894S, SA
1953 Series 70 (Early)	996S
1953 Series 70 (Later)	2053S
1954 Series 60, 70, M/100	2082S
1955 Series 50, 60, 70 (Early)	2197S
1955 Series 50, 60, 70 (Later)	2358S
CADILLAC	
1952 V8 Series	896S
1953 V8 Hydra-Matic	2005S, SA
1953 V8 Twin Turbine Dynaflow	2088S
1953 Air Cond. Cars	2072S
1953 Twin Turbine & Air Cond.	2119S, SA
1954 V8 Series	2109S
1954 Air Cond. Cars	2110S
1952-54 Repl	②2143S
1955 *See SEPARATE "Cadillac (Carter & Rochester) Carburetor" data.*	
CHEVROLET	
1955 V8 Cars	2218S or 2351S
1955 V8 Corvette	2218S or 2351S
CHRYSLER	
1954 V8 C 63-2, C64, C66	2041S
1955 V8 C68, C69, C70	2126S
1955 V8 "300"	Two 2317S
DESOTO	
1955 S21	2210S
DODGE	
1954 V8 D 53-3 Royal	2191S
1955 V8 D55-1, 2, 3 (Std. & O D.)	2253S
1955 V8 D55-1, 2, 3 (PowerFlite)	2181S
OLDSMOBILE	
1952 Super 88, 98	932S
1953 Super 88, 98 (Early)	2016S
1953 Super 88, 98 (Later)	2080S
1954 Super 88, 98	2059S
1955 Super 88, 98	2246S
PACKARD	
1953 2602, 6, 26, 31 (Early)	985S
1953 2602, 6, 26, 31 (Later)	2084S
1954 5402 Cavalier	①2142S & 2103S
1954 5406, 26, 31	2112S
1955 Clipper Deluxe & Super	2232S or 2284S
PLYMOUTH	
1955 P27 (Optl.)	2253S
PONTIAC	
1955 V8 Synchro-mesh (Optl.)	2283S
1955 V8 Hydra-Matic (Optl.)	2268S
STUDEBAKER	
1955 Commander (Std.) Optl.	2219S, SA
1955 Commander (Auto) Optl	2214S, SA
1955 President (Std.)	2219S, SA
1955 President (Auto)	2214S, SA
1955 President Deluxe	2330S

①—No. 2103S can be used in place of 2142S.
②—See Application Data below.

►CHANGES, CAUTIONS, CORRECTIONS

►***1952 BUICK NO. 894S & 894SA CARBURETOR CHANGE TO SHORTEN CRANKING TIME WITH HOT ENGINE:*** ***The following modifications can be made on first No. 894S & 894SA carbureors (CAUTION—Later carburetors have similar changes made in production and do not require this rework):***

1) With carburetor off engine, remove air horn assemblies, remove float and needle assemblies *(CAUTION*—mark floats to insure re-installation in same position), remove choke housing, choke valves, and choke shaft.

2) Working from bottom side of air horn and cover assembly, drill two ⅛" (.125") holes through cored passages on secondary side (these passages are at center of opening on each side and immediately adjacent to rib around inner edge of casting).

3) With air horn and cover assembly upright, drill four No. 42 (.0935") holes (3/32" drill can be used) into the vertical vent passages in the air horn to provide external vents. Locate these holes as follows: On Choke Housing Side: Locate primary side vent (to right of choke housing mounting boss) 13/16" down from upper edge of air horn and in line with existing vent hole. *NOTE*—plug this existing vent hole with ⅛" lead plug. Locate secondary side vent 1" down from upper edge of air horn. **On Side opposite Choke Housing:** Locate both primary and secondary vent holes 1⅛" down from upper edge of air horn (left hand or primary side vent should be in line with existing vent near upper edge of air horn). *NOTE*—Plug this existing vent hole with ⅛" lead plug. Carefully clean casting, reassemble all parts of the air horn assembly and re-install assembly on carburetor.

4) Remove throttle body assembly from carburetor, use a No. 36 (.1065") drill (7/64" drill can be used) to drill an external vent hole into each of the four carburetor barrels, locating holes as follows: All holes should be 5/16" down from upper (main body mounting) face of throttle body. On throttle lever and fast idle cam side of throttle body, secondary side hole should be located at top of flat boss to right of auxiliary throttle shaft, primary side hole should be to left of center line of throttle valve shaft. On secondary throttle linkage side of throttle body, primary side hole should be to right of secondary throttle lever, secondary side hole should be to left of boss on flange closed by plug. Carefully clean casting and re-install throttle body on carburetor.

5) Remove metering rod housing cover (dust cover), use a No. 36 (.1065") drill (7/64" drill can be used) to drill an external vent hole at center of flat surface on left hand end of cover (viewing cover from side from which "Carburetor" can be read) locating hole ⅛" up from bottom mounting face of cover.

6) Adjust carburetor and re-install on engine. ***See "Carter WCFB 4-Barrel Carburetor" in 1952 Annual Data.***

►***BUICK 894SA FLOAT CHANGE:*** "Wedge" type floats used on later carburetors REQUIRE SPECIAL FLOAT SETTING. See Float Setting data below.

►***1953 BUICK ACCELERATION HESITATION CORRECTION (Early Cars):*** If a cold engine tends to hesitate on quick throttle opening, completely tune-up engine using extreme care that all settings are correct and exact, check manifold heat control thermostatic spring, and operation of carburetor hot-air stove. ***See Buick 50, 70 Tune-up data in Car Model Section.***

►***1953 BUICK 70 CHANGE TO ELIMINATE DETONATION OR SPARK RAP (Carter 996S and First 2053S Carburetors tag dated prior to "E3"):*** Increase size of vacuum spark control port from .040" to .081" as follows: Remove carburetor from engine, place throttle valves in wide open position and protect valves from damage by drill. Remove spark control fitting from throttle body. Working through spark control fitting hole, use No. 47 drill to enlarge original .040" spark control hole, then finish drill hole with No. 46 drill (.081"). Blow out all chips and thoroughly clean carburetor, re-install spark control fitting, re-install carburetor. ***NOTE—Carburetors tagged "E3" & later have this change.***

►***1954 BUICK METERING ROD PRODUCTION CHANGE (All Series with 2082S Carburetor):*** Metering Rod No 75-1108 used on later carburetors and supersedes No. 75-995 used on early carburetors

►***1954 BUICK ACCELERATING PUMP PLUNGER LEATHER TURNING BACK CAUSING IMPROPER ACCELERATION & THROTTLE RESISTANCE (Early Cars with carburetors tag-dated "L3" through "C4"):*** Caused by too long pump stroke allowing leather to catch in overflow slot in pump cylinder at closed-throttle. Correct as detailed below. ***CAUTION—Unless these changes made, replacement of pump plunger will result in recurrence of trouble.***

(1) Install new Pump Plunger and READJUST PUMP STROKE (see Accelerating Pump data below).

(2) Adjust Metering Rods (see below).

(3) Remove Pump Jet Cluster Hold-down Screw and rework inner slotted end to assure full stroke of pump discharge needle. Screw has slotted projection extending 1/16" beyond end of threads. Grind off one side of projection entirely and reduce height of opposite side from 1/16" to 1/32". Re-install screw.

►*1955 BUICK CARBURETOR CHOKE PISTON CHANGE TO IMPROVE WARM-UP PERFORMANCE (First Carburetors tag-dated "L-4" & Earlier):* If rolling, loading, or stalling noted immediately after engine started, and this is not caused by leak in Intake Manifold or vacuum lines (Windshield Wiper, Washer, or Power Brake), install new type Choke Piston furnished in Carter Unitized Pkg. No. 160-140U or Buick Kit, No 1169567. Attach new Copper identification tag (furnished in kit) which will indicate modification has been made *NOTE—Carburetors tag-dated "M-4" and later have this piston installed in production.*

►***CADILLAC 896S SECONDARY THROTTLE STICKING CORRECTION:*** If secondary throttle tends to stick open, check wide-open stop position, and change secondary throttle spring hook-up as follows:

Wide-open Stop Position—Valves must not open beyond the vertical position (intake air force would tend to hold valves open). Adjust by bending tangs of primary and secondary throttle stops on throttle levers with heavy pliers as required.

Secondary Throttle Return Spring—Connect spring in UPPER hole of secondary throttle lever (move spring up from lower hole), loosen screw on spring bracket and move bracket back 20-30° from original position to increase tension of spring *(CAUTION*—clearance between spring and bowl

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

casting must not be less than 1/32"). These changes will increase closing torque on secondary throttle shaft.

NOTE—Above change was made in production after approximately 70,000 cars.

▷*CADILLAC 896S FLOAT CHANGE TO CORRECT ENGINE STALLING ON QUICK STOPS:* On carburetors with date code earlier than G2, new type float assembly with "wedge" type floats can be installed and will prevent flooding of the primary side due to surging of fuel in bowl on quick stops. This new Float Assembly No. 1459998 may be used as a service replacement on both Primary and Secondary side of any carburetor prior to code date G2 to correct flooding and subsequent rough idle or stalling caused by a quick stop. *See Float Level data below. These "wedge" type floats are used in production on all 896S carburetors code dated "G2" and later.*

▷*CADILLAC FLOAT SETTING CAUTION*—New "wedge" type floats have greater buoyancy and REQUIRE SPECIAL FLOAT SETTING. *See Float Level data below.*

▷*FLOAT ARM INTERFERENCE CORRECTION:* On early WCFB carburetors, the sideways float adjustment should be made very carefully to make certain that floats and arms are positioned correctly and do not scrape on sides of bowl casting. In addition, greater clearance can be secured between arms and venturi by relieving the upper edge of each arm with a file on the venturi side. *PRODUCTION CHANGE NOTE*—Later carburetors have floats with extra bend in arms to provide greater clearance.

▷*FLOAT BOWL COVER SCREW CAUTION:* Later WCFB carburetors have THREE DIFFERENT LENGTHS of bowl cover screws which must be used in correct locations as follows:

Seven Long Screws—Install in shallower counterbores in air horn section (six), and under dust cover (one).

One Intermediate Screw—Install at secondary throttle return spring bracket location.

Eight Shorter Screws—Install in remaining bowl cover holes.

NOTE—On first WCFB carburetors, all 16 bowl cover screws were of same length.

▷*1953 CADILLAC "SPEED-UP" CONTROL ON AIR-CONDITIONED CARS:* This device automatically increases engine idle speed to 750-800 RPM. when air-conditioning switch turned on. *See Speed-Up Control Adjustment data following Idle Adjustment.*

▷*CADILLAC & OLDSMOBILE "TWIN-TURBINE DYNA-FLOW" CAR CAUTION:* If "Throttle Return Check Dashpot" used, this unit should be adjusted as directed below (following Idle Adjustment).

▷*1952-54 CADILLAC 2143S CARBURETOR APPLICATION:* This carburetor must be used with special accessory packages as listed below on all cars except the following: 1952 (All Models), 1953 (Hydra-Matic Cars without Air-conditioning), 1954 (All Models without Air-conditioning). On other models use the following Unitized Packages:

1953 Hydra-Matic & All 1954 with Air-conditioning: Use Unitized Pkg. 202-44U (Idle Speed-up Control).

1953 Twin-Turbine without Air-conditioning: Use Unitized Pkg. No. 202-60U (Slow-closing Throttle Dashpot).

1953 Twin-Turbine with Air-conditioning: Use Unitized Pkg. No. 202-44U (Idle Speed-up Control) & No. 202-60U (Slow-closing Throttle Dashpot).

▷*1953 CADILLAC CARBURETOR THROTTLE BODY PRODUCTION CHANGE & 1952-53 REPLACEMENT NOTE:* Cast Iron Throttle Body used in production beginning Engine No. 91594. This cast iron throttle body can be used for replacement on 1952-53 carburetors where excessive corrosion found in heat passage and will also reduce warpage resulting in frozen or binding throttle valve shafts or leakage between carburetor mounting flange and manifold.

▷*1953 CADILLAC CARBURETOR CLEANING CAUTION TO PREVENT FLOODING:* When disassembling carburetors marked by daub of blue dye on fuel inlet connection, fuel passage between fuel inlet and primary float needle valve should be very carefully cleaned with carburetor solvent and blown out with air to remove any loose particles of bowl sealing material (sodium silicate) which might lodge under the needle valve. *NOTE*—This sealing material not used on later carburetors.

▷*1954 CADILLAC IDLE SPEED SETTING CAUTION ON AIR-CONDITIONED CARS:* Idle speed setting should be adjusted seasonally: (1) When air-conditioning use discontinued for winter months, (2) When air-conditioning is put into use for summer months. This is necessary to compensate for compressor load when engine idling in "Dr." *See Idling Adjustment below. CAUTION—Engine may stall during summer months, or operate at too fast an idle speed during winter months, if proper procedure not followed.*

▷*1955 CHEVROLET LOADING (WHEN STARTING PARTIALLY WARM ENGINE):* Choke setting has been changed to 2 Points Lean (superseding Centered setting) which will improve this condition.

▷*1955 CHEVROLET HARD STARTING (AFTER FLOODING):* May be caused by primary throttle valves not opening wide which prevents Unloader operating. Check throttle linkage to make certain that primary throttle valves wide open when accelerator pedal pressed to floorboard. Check Unloader setting. *See ADJUSTMENTS below.*

▷*1955 CHEVROLET AIR CLEANER INSTALLATION CAUTION:* When installing air cleaner, make certain that cutouts in gasket line up with carburetor bowl vent tubes and use care that gasket does not rotate when cleaner installed. *Blocking of carburetor bowl vents will interfere with carburetor operation.*

▷*1952 OLDSMOBILE 932S SECONDARY THROTTLE LINKAGE CHANGE & INSTALLATION CAUTION:* Secondary throttle linkage parts changed in production as listed below. *See "Throttle Linkage" Reassembly under OVERHAUL below for each type linkage assembly.*

932S Secondary Throttle Linkage

Part	First	Later
Throttle Operating Rod	115-185	115-199
Secondary Operating Lever	53A-341S	53A-348S
Sec. Throttle Shaft Assy.	3-796S	3-788S

▷*1954 OLDSMOBILE CHOKE HEAT TUBE REMOVAL & INSTALLATION:* Choke heater tube is installed in intake manifold (extending crosswise through exhaust gas cross-passage). If necessary to replace tube proceed as follows: Removal—Remove pipe plug in right side of manifold directly below manifold-to-carburetor passage. Apply penetrating oil to both ends of heat tube, drive tube out through pipe plug hole. Installation—Insert small necked end of tube first through pipe plug hole, use Tool BT-47 to drive tube into place until large end protrudes about 1/16" into vertical manifold-to-carburetor passage. Replace pipe plug.

▷*PACKARD CARBURETOR FLOODING (Early 985S):* May be caused by equalizer tube (cast in body) leaking into vacuum passage for starter switch allowing raw gasoline to go directly into intake manifold. Check by blowing smoke through starter switch vacuum hole below throttle valve. Correct by replacing carburetor.

▷*PACKARD 985S CARBURETOR CHANGES:*

1) Choke Setting Change to reduce possibility of flooding during cold starts—Set automatic choke to Centered (At Index) instead of 1½ Points Rich as originally specified.

2) Low Speed Jet Size Change to correct part-throttle engine surge and improve cold weather idling—All low speed jets (primary and secondary) have been increased from .032" or #67 drill size to .033" or #66 drill size (Part No. 11-234S). *NOTE—Carburetors tagged "B3" & later have these new jets.*

3) Unloader Setting Change—Setting should be 9/32" ± 1/64" (was 9/64"). See Unloader data.

4) Throttle Rod Override Spring Note—If override in throttle rod lengthens before choke valve opens 9/32", install throttle rod assembly with stronger spring (furnished as Part No. 446613).

▷*1955 PACKARD ROUGH ENGINE IDLE, POOR PERFORMANCE & POOR ECONOMY (Due to high vacuum at Distributor Advance Unit):* High vacuum may be caused by foreign material deposits in either primary or secondary throttle bores, or insufficient clearance of secondary throttle valves in bores. This condition makes it necessary to open primary valves too far to obtain the correct 400 RPM idle speed and results in distributor vacuum port being uncovered, causing distributor vacuum advance to operate at idle speed. The resulting too early ignition at idle speed and late timing throughout the rest of the range will not only cause a rough idle but also poor performance and poor gasoline economy. Check and correct this condition as follows:

Checking for High Vacuum—Connect vacuum gauge at distributor line fitting on carburetor. Idle engine at 400 RPM with selector lever in Drive Range. Vacuum must not exceed 5" Hg.

Correcting High Vacuum—Examine throttle bores for foreign material deposits at the throttle valves. Correct by cleaning throttle body in carburetor cleaner. If no deposits noted, reposition secondary throttle valves on shaft as follows: Loosen secondary throttle valve screws, place a .002" shim ¼" wide between upper edge of valves and carburetor bore, retighten screws while holding valves in this position.

▷*1955 PONTIAC LOADING OR CARBURETOR FLOODING: May be caused by excessive fuel pump pressure. See "Fuel Pump" under CARBURETOR on Car Model page for corrective procedure.*

▷*1955 PONTIAC HARD STARTING CORRECTION (DUE TO UNSATISFACTORY UNLOADER OPERATION*

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

AFTER FLOODING: If this condition not corrected by regular Unloader Adjustments, follow the procedure given below and install new parts as indicated.

1) Install new Throttle Flex Spring, Pontiac No. 7008801, on carburetor (spring is linked between throttle shaft dog and outer throttle lever). New spring is lighter type and will reduce effort required to unload carburetor.

2) Install new Engine Throttle Control Bracket Assembly, Pontiac No. 521986. This is a redesigned assembly.

3) Adjust throttle control linkage (see "Throttle Linkage Adjustment (Hydra-Matic drive Cars)" under CARBURETOR on car model page) and adjust the throttle control intermediate rod as follows: Push rod downward until end of accelerator pedal rod lever is felt to touch the end of its travel, shorten the intermediate rod enough to allow 1/8" clearance between end of accelerator pedal rod lever and rubber bellows assembly (3 turns of the trunnion nut). This adjustment will provide maximum allowable accelerator pedal travel.

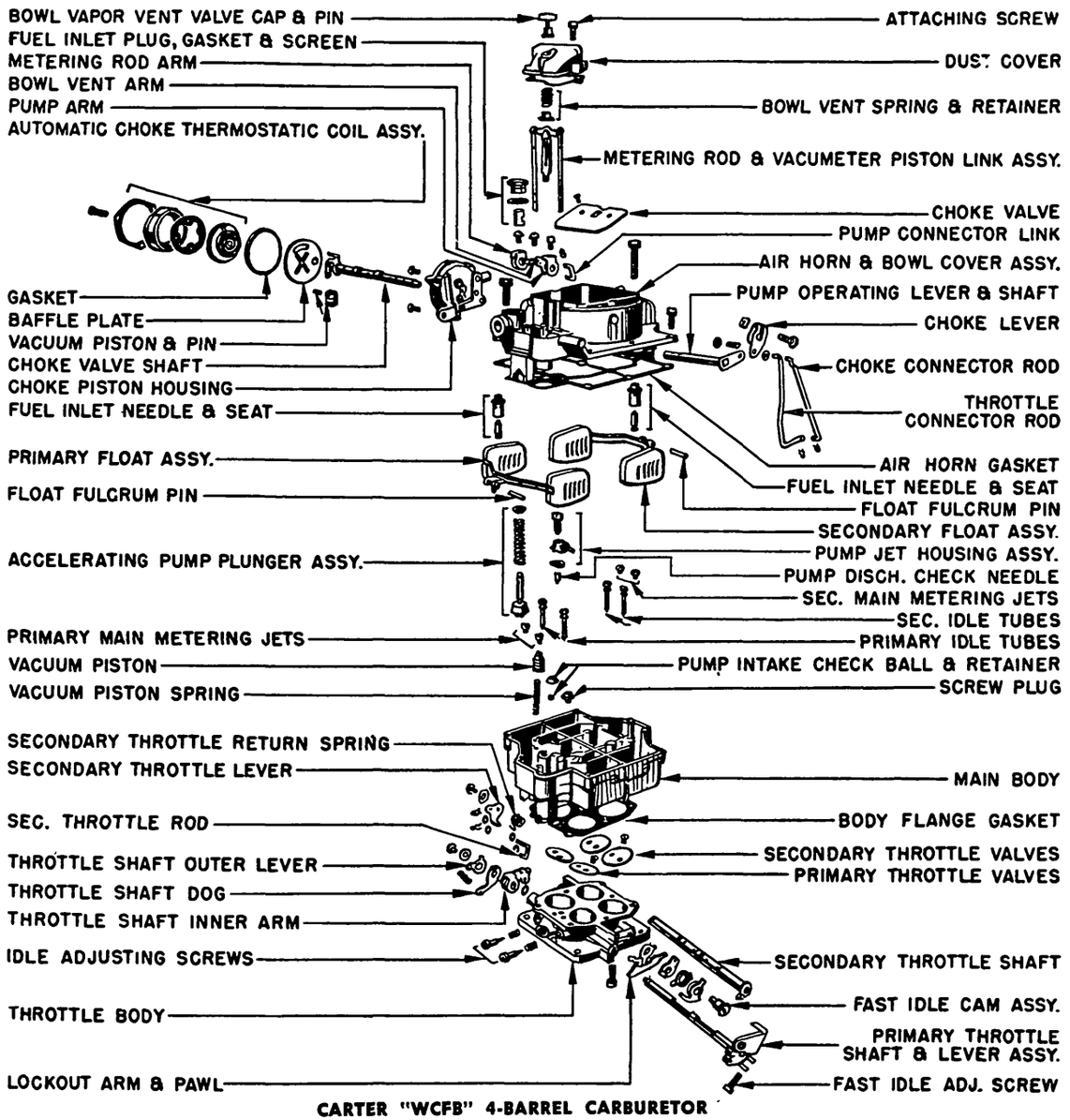
4) Inspect accelerator pedal. Replace pedal if hinge pin or pedal rod holes worn oversize or out-of-round.

5) Check for interference between accelerator pedal lever and throttle control dash bracket at wide open throttle position. If interference noted grind 1/16" relief on dash bracket at point of contact. *NOTE*–This interference will be noted particularly on cars where 4-barrel carburetor installed in the field.

DESCRIPTION: These models are essentially double dual (two-barrel) carburetors with a conventional dual **primary** unit supplemented by a similar dual **secondary** unit for maximum engine performance. Both the primary and secondary units have separate fuel bowl and float systems, idle systems, main metering and discharge systems, and interconnected throttle valves as described below. Only the primary unit has an accelerating pump system and choke valve with an automatic choke control (the secondary throttle valves or auxiliary throttle valves are locked closed for starting and warming up and remain closed during part-throttle operation). ***See Throttle Linkage data below.***

Fuel System: A single fuel inlet is used (located on secondary side of bowl cover) with a passage in the cover leading to the fuel inlet valve for each float chamber. Each bowl has a twin float assembly controlling the fuel inlet valve. Bowls are vented to the air horn by vent tubes and have additional vent passages terminating at the air cleaner mounting flange. ***See Idle Vent data below also.***

Idling & Low Speed—Entire idle system is duplicated for both the primary and secondary sides of the carburetor except that idle mixture adjusting screws are provided only on the primary side (adjusting screw holes closed by plugs on secondary side). Fuel is discharged into each of the carburetor barrels and secondary idle system continues to function through-out the part throttle range until the secondary throttle valves also begin to open. Secondary throttle valves (auxiliary throttle valves on Buick carburetors) are locked out by the choke mechanism when the engine is cold and even when the engine is warm these valves do not begin to open until primary throttle valves are 50-60% open.



CARTER "WCFB" 4-BARREL CARBURETOR

►*SECONDARY IDLE SYSTEM NOTE:* On some carburetors (Oldsmobile 1954-55, Chevrolet, Packard, Pontiac, Studebaker 1955), no secondary side idle system is used (primary idle system only).

Driving Range (Less than 50-60% Throttle)—The primary throttle valves are directly connected to the accelerator pedal and open as the pedal is depressed (secondary throttle valves are linked to the primary throttle valves and remain closed until primary valves are 50-60% open). Opening of the primary throttle valves bring the main discharge nozzles into action and the primary idle systems drop out (secondary idle systems continue to operate as long as secondary throttle valves are closed). Fuel for these main nozzles is metered by primary main metering jets (these jets have the usual vacumeter type metering rods). Under conditions of low manifold vacuum (hill climbing, acceleration, etc.), the vacuum piston spring lifts the metering rods

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

out of the metering jets and permits a greater fuel flow to the nozzles.

High Speed or Full Power (More than 50-60% Throttle)—At 50-60% throttle, the linkage between the primary and secondary throttle valve levers begins to open the secondary valves. These secondary valves open at a relatively greater rate so that both the primary and secondary valves reach the "wide open" position at the same time. In this range, fuel is discharged through all four carburetor barrels to provide maximum engine power. Secondary fuel is metered by secondary main metering jets and discharged through secondary main nozzles in exactly the same manner as on the primary side except that no metering rods are used with the secondary metering jets.

Accelerating Pump—Used only on primary side of carburetor. Pump is conventional type with pump plunger linked to primary throttle valve lever so that the additional fuel needed for acceleration is discharged through the pump jets into the primary carburetor barrels when the primary throttle valves are opened for acceleration. A relief check valve is located in the pump discharge channel to prevent excessive pressures in the pump circuit (opening of check valve permits by-passing of fuel back into the bowl). Pump is effective only at car speeds below 30 MPH. (at higher speeds, pump plunger bottoms in cylinder and air is drawn through the jets from a vent passage opening into the bowl above the fuel level).

Auxiliary Throttle Valves (Buick Carburetors): These are offset type counterweighted valves located directly above the secondary throttle valves (not used on primary side of carburetor). These valves are locked closed by the choke mechanism during choke operation (to insure faster cold engine starting) and when unlocked are controlled entirely by the air velocity through the carburetor (not connected to the throttle linkage).

Primary & Secondary Throttle Linkage: Secondary throttle valve lever is linked to a secondary actuating lever on the primary throttle valve shaft with an overrun provision so that secondary valves do not begin to open until primary valves are 50-60% open. The linkage provides a more rapid opening of the secondary valves so that both the primary and secondary valves reach the wide open position at the same time. This linkage must be checked and adjusted to insure this synchronized opening. *See Adjustment data.*

Secondary Throttle Lock-out (Auxiliary Throttle Valve Lock-out on Buick): A means is provided by which the choke mechanism locks the secondary or auxiliary throttle valves closed while the choke is in operation so that no choke valve is required on the secondary side of the carburetor. This lock-out mechanism differs on the various carburetors but all types must be checked and adjusted to insure unlocking of the secondary valves for normal operation. *See Adjustment data.*

Atmospheric Idle Air Vent: *CAUTION—Several types have been used in production as follows:*

First Type (In Air Horn Casting)—Consists of a ball or disc type check valve located in the air horn casting under the dust cover and actuated by an arm on the pump countershaft. Valve is opened when throttle valves are closed to provide an external bowl vent which minimizes hot weather starting and idling difficulties due to fuel vapor formation in the fuel bowl. Vent valve closes when the throttle valves are opened. *NOTE*—On first carburetors produced after this type vent discontinued, a spacer collar was used to cover the flat area around the tapped hole in countershaft (to hold metering rod lever in correct position on countershaft).

Later Type (On Dust Cover)—Consists of a cap type valve on top of dust cover actuated by arm on pump countershaft (arm contacts lower end of valve stem and raises valve off its seat). Vent operates in same manner as first type (above).

Automatic Secondary Throttle Control (Chrysler 2126S & DeSoto 2210S): Secondary throttle valves operated by vacuum control unit which opens and closes secondary throttle valves in accordance with air velocity through primary venturi. Vacuum is supplied from the primary venturi. A mechanical overriding linkage insures that secondary throttle valves always close with the primary throttle valves.

ADJUSTMENT: *CAUTION—Adjustments should be made in sequence as shown below.*

IDLE SETTING

Idle Setting: *Adjust only with engine at normal operating temperature with automatic choke not operating* (choke valve wide open, fast idle inoperative so that engine idles at hot or slow idle speed). If initial adjustment required to allow engine to be started and warmed up, set both idle adjusting screws as indicated in table below. With engine warm, adjust idle speed adjusting screw for correct engine idle speed as shown in table below (use tachometer), then adjust each idle mixture adjusting screw (one screw for each primary carburetor barrel—two screws only) until engine idles smoothly and RPM. is at maximum. Recheck idle speed. Adjust Throttle Return Check and check Speed-up Control (on cars with these units) as directed below.

▷*OLDSMOBILE 1955 NOTE:* Manufacturer recommends that after setting idle as above (for highest vacuum reading and RPM), each screw should be turned out (Rich) ¼ turn which will provide desired idling performance. Check this setting by opening throttle to 1000 RPM point and then snapping throttle closed. If engine rolls from richness, turn each screw in (Lean) ⅛ turn.

Idle Mixture Setting

Car & Carb.	Idle Screw Opening
Buick 894S, SA	¼-1¼ turns
Buick 2082S	½-1½ turns
Buick (Others)	¾-1¾ turns
Cadillac 896S	1¼-2 turns
Cadillac 2005S, SA, 2072S	1¼-2¼ turns
Cadillac (Others)	¾-1¾ turns
Chevrolet 2218S, 2351S	¼-1¼ turns
Chrysler 2041S	1-2 turns
Chrysler 2126S	¾-1¾ turns
Chrysler 2317S	¼-1¼ turns
DeSoto 2210S	1-2 turns
Dodge 2191S	1-2 turns
Dodge 2181S, 2253S	½-1½ turns
Oldsmobile 2016S, 2080S	⅜-1¾ turns
Oldsmobile (Others)	1-2 turns
Packard 985S, 2142S	1-2 turns
Packard 2084S, 2103S	1¼-2¼ turns
Packard 2112S	¾-1¾ turns
Packard 2232S, 2284S	½-1½ turns
Plymouth 2253S	½-1½ turns
Pontiac 2268S, 2283S	¾-1¾ turns
Studebaker (All)	½-1½ turns

Idle Speed Setting

Car	Synchro-mesh Tr.	Automatic Tr.
Buick	450 RPM	② 450 RPM
Cadillac ('52)	400 RPM	② 375 RPM
Cadillac ('53-55)	400 RPM	① 400 RPM
Chevrolet	450-500 RPM	② 400-450 RPM
Chrysler (300)		③ 700 RPM
Chrysler (Others)		③ 475-500 RPM
DeSoto	500 RPM	③ 500 RPM
Dodge	450-500 RPM	③ 475-500 RPM
Oldsmobile	425 RPM	② 400 RPM
Packard ('53-54)	400-450 RPM	③ 375 RPM
Packard ('55)	400-450 RPM	③ 400 RPM
Plymouth	450-500 RPM	④ 475-500 RPM
Pontiac	450-470 RPM	② 390-410 RPM
Studebaker	500 RPM	③ 550-600 RPM

①—With selector lever in "Dr" and Air-conditioner "ON" (Summer months), "OFF" (Winter months). See special procedure following.

②—With selector lever in "Dr".

③—With selector lever in "H".

④—With selector lever in "N" neutral.

▷*CADILLAC IDLE SPEED SETTING PROCEDURE:* Set idle speed in accordance with season as follows: When air-conditioning being used (Summer months), place selector lever in "Dr," turn Air-conditioner "ON," set idle speed at 400 RPM. When air-conditioning not being used (Winter months), place selector lever in "Dr," see that Air-conditioner "OFF," set idle speed at 400 RPM. (It will be necessary to cut idle speed setting down from summer setting to maintain this 400 RPM. idling speed).

Throttle Return Check (Dashpot) Adjustment: Adjust each model as follows:

Buick (1953)—Dashpot is adjusted as part of Throttle Linkage Adjustment. *See "Buick Dynaflow Drive" in Transmission Section.*

Buick (1954-55)—After linkage adjusted, and engine at normal operating temperature, rotate fast idle cam to cold idle (choke closed) position, insert .030" feeler gauge between stop screw and highest step of fast idle cam. Loosen dashpot mounting stud locknut, position dashpot so that plunger barely clears throttle lever, tighten locknut. Check setting by noting engine performance when throttle closed. If engine stalls, move dashpot forward (toward throttle lever); if engine slow in returning to idle speed, move dashpot to rear. Tighten locknut after each adjustment.

Cadillac (1953 Twin-Turbine Dynaflow Cars)—After idle adjustment completed, close throttle valves, loosen dashpot mounting stud locknut, adjust dashpot for .047" clearance between end of plunger and throttle lever tang with dashpot plunger bottomed in housing (use pliers to hold plunger in while measuring clearance). Check performance by accelerating engine (with selector lever in "Dr" and brakes applied) release accelerator quickly. If engine stalls, decrease dashpot plunger clearance;

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

if engine does not return to idle speed promptly, increase clearance. Tighten locknut after each adjustment.

Adjustment (Oldsmobile Dynaflow Cars)—Hold plunger shaft with wrench, turn adjusting screw in or out of return check plunger to secure 1/16" clearance between screw and throttle lever with plunger bottomed in return check and throttle valves closed in hot or slow idle position. *NOTE*—Plunger has 7/32" total travel (from inner to outer position).

Studebaker (1955)—On cars with dashpot, after fast idle adjustment completed, hold choke valve tightly closed with fast idle screw on high step of cam, loosen locknut and adjust dashpot unit for 1/16" clearance between throttle lever and lower tip of plunger shaft Tighten locknut

Cadillac Speed-Up Control (Air-conditioned Cars): This unit increases engine idle speed when idling with selector lever in "N" and air-conditioner "ON"

Adjustment—With engine warm and idling, place selector lever in "N", turn air-conditioning ON, loosen locknut on diaphragm shaft and turn knurled adjusting nut to obtain engine speed of 900 RPM, tighten locknut *NOTE*—This setting supersedes previous recommendation of 750-800 RPM

FLOAT LEVEL SETTING

Float Setting: ***CAUTION—Primary and Secondary Float Assemblies must be checked and adjusted separately and both FLOAT LEVEL and FLOAT DROP must be checked for each assembly.*** Remove bowl cover and float assembly from carburetor for these checks:

Float Level—*Primary & Secondary Float Assemblies set to different heights (some carburetors only). Check & adjust carburetors as follows:* Remove bowl cover gasket (take out float hinge pins, remove float assemblies with intake needles attached, remove gasket, re-install floats). Invert bowl cover, install correct gauge for each float assembly (see table below) on bowl cover under center of floats with notched ends of gauge fitted tightly against sides of bowl cover casting. Both floats should just clear horizontal section of gauge (adjust by bending float arms as required) and each float should barely touch vertical uprights on gauge (bend float arms sideways for this clearance). This sideways adjustment is extremely important to prevent floats hanging up on sides of bowl casing

►***"WEDGE TYPE" FLOAT CHECKING CAUTION***—Float measurements (both horizontal & vertical) should be made near free end of floats.

Float Setting
Primary Floats

Car & Carb.	Height	Checking Gauge
Buick 894S ①	1/4"	T109-223
Buick 894SA ②	3/32"	T109-233
Buick 996S, 2053S	3/32"	T109-233
Buick 2082S	1/8"	T109-232
Buick 2197S, 2358S	3/32"	T109-233
Cadillac 896S ①	1/4"	T109-223
Cadillac 896S ②	1/8"	T109-232
Cadillac (Others)	1/8"	T109-232
Chevrolet 2218S, 2351S	1/8"	T109-232
Chrysler 2041S, 2126S	1/8"	T109-232
Chrysler 2317S	3/16"	T109-222
DeSoto 2210S	1/8"	T109-232
Dodge (All)	1/8"	T109-232
Oldsmobile 932S, 2059S	1/4"	T109-223
Oldsmobile (Others)	3/16"	T109-222
Packard 985S, 2084S	5/32"	T109-236
Packard 2103S, 2142S	5/32"	T109-236
Packard 2112S	1/8"	T109-232
Packard 2232S, 2284S	1/8"	T109-232
Plymouth 2253S	1/8"	T109-232
Pontiac 2268S, 2283S	3/16"	T109-222
Studebaker (All)	3/16"	T109-222

Secondary Floats

Car & Carb.	Height	Checking Gauge
Buick 894S ①	3/8"	T109-224
Buick 894S ②	1/4"	T109-223
Buick (Others)	3/16"	T109-222
Cadillac 896S ①	5/16'	T109-220
Cadillac 896S ②	3/16"	T109-222
Cadillac (Others)	3/16"	T109-232
Chevrolet 2218S, 2351S	1/4"	T109-223
Chrysler 2041S	1/4"	T109-223
Chrysler 2126S	3/16"	T109-222
Chrysler 2317S	5/16"	T109-220
DeSoto 2210S	3/16"	T109-222
Dodge (All)	3/16"	T109-222
Oldsmobile 932S, 2059S	1/4"	T109-223
Oldsmobile 2016S, 2080S	3/16"	T109-222
Oldsmobile 2246S	3/16"	T109-222
Packard (All)	5/32"	T109-236
Plymouth 2253S	3/16"	T109-222
Pontiac 2268S, 2283S	3/16"	T109-222
Studebaker (All)	3/16"	T109-222

①—With FIRST type floats
②—With LATER "WEDGE" type floats

Float Drop—*Primary & Secondary Float Drop is different (some carburetors only). Check and adjust all carburetors as follows* Hold cover assembly upright so that floats hang down freely. Use scale to measure distance from machined lower surface of bowl cover (gasket removed) to top of floats at center. If distance not correct (see table below), adjust by bending stop tabs on float bracket.

Float Drop Setting

Car & Carb.	Primary Float	Secondary Float
Buick 894S ①	3/4"	7/8"
Buick 894SA ②	5/8"	3/4"
Buick 996S, 2053S 82S	5/8"	11/16"
Buick 2197S, 2358S	19/32"	11/16"
Cadillac 896S ①	3/4"	13/16"
Cadillac 896S ②	5/8"	11/16"
Cadillac (Others)	5/8"	11/16"
Chevrolet 2218S, 2351S	5/8"	3/4"
Chrysler 2041S, 2126S	5/8"	11/16"
Chrysler 2317S	11/16"	13/16"
DeSoto 2210S	5/8"	11/16"
Dodge (All)	5/8"	11/16"
Oldsmobile 932S, 2059S	3/4"	3/4"
Oldsmobile 2016S	1/2"	1/2"
Oldsmobile 2080S, 2246S	11/16"	11/16"
Packard 2232S, 2284S	5/8"	21/32"
Packard (Others)	5/8"	5/8"
Plymouth 2253S	5/8"	11/16"
Pontiac 2268S, 2283S	11/16"	11/16"
Studebaker (All)	11/16"	11/16"

①—With FIRST type floats
②—With LATER "WEDGE" type floats

ACCELERATING PUMP

Accelerating Pump Stroke: ***CAUTION—This is a linkage adjustment and not a seasonal change recommendation.*** Remove dust cover, make certain that pump connector link installed in uter (long stroke) hole of pump arm. Back off throttle stopscrew so that primary throttle valves are fully seated. Hold a straightedge across top of dust cover boss at pump arm. The flat on the top of the pump arm should be parallel with straightedge. Adjust by bending pump connector link at lower angle using tool T109-213.

►***STUDEBAKER NOTE*** On carburetors with dashpot, after completing pump rod adjustment (above), make certain that clearance between lower edge of countershaft arm and dashpot bracket is 015" minimum Correct by bending pump connector rod slightly

METERING RODS

Metering Rods (Primary Side): ***No gauge required for this adjustment and no metering rods used on secondary side.*** With dust cover removed and primary throttle valves fully seated (as for Pump Stroke Adjustment above), loosen setscrew in metering rod arm on pump countershaft just enough so that arm has slight bind on shaft, lift arm slightly. Depress metering rod link until metering rods just bottom in bowl casting, position metering rod arm so that it contacts link, tighten arm setscrew. Then adjust Atmospheric Idle Vent (following).

BOWL VAPOR VENT

Bowl Vapor Vent (Atmospheric Idle Vent) Adjustment: *NOTE—First type vent adjusted differently.*

Checking & Adjustment (Buick 894S & Cadillac Early 896S)—With dust cover removed, close primary throttle valves against wire gauge of correct size (see table below) and hold valves in this position Vent arm should just contact vent ball Adjust by bending vent arm using long-nosed pliers

Vapor Vent Setting (First Type)

Car & Carb.	Checking Gauge Size & No.
Buick 894S	020" T109-29
Cadillac 896S (Early)	040" T109-193

Checking & Adjustment (All Later Carburetors): *CAUTION*—Dust cover and gasket must be in place Back out primary throttle lever stopscrew fully so that primary throttle valves fully closed. Check clearance between lower edge of vapor vent valve and dust cover using correct gauge (see table below). Adjust by removing dust cover and bending vapor vent arm.

Cadillac Note—Clearance is same as other models (1/16" Gauge T109-197) but manufacturer recommends that adjustment be checked as follows Measure difference in height of vent valve (measure at rivet on head) with primary throttle valves open and closed (choke valve must be wide open) This difference should be 1/32"

CONTINUED N NEXT PA E

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

Vapor Vent Setting (Later Type)

Car & Carb.	Vent Cap Clearance	Checking Gauge
Cadillac 896S (Later)	1/16"	T109-197
Cadillac (Others)	1/16"	See Note above
Chevrolet (All)	1/16"	T109-197
Chrysler (All)	1/16"	T109-197
DeSoto & Dodge	1/16"	T109-197
Oldsmobile 932S	3/32"	T109-125
Oldsmobile (Others)	1/16"	T109-197
Packard 2232S, 2284S	1/16"	T109-197
Packard (Others)	3/32"	T109-125

AUTOMATIC CHOKE

Automatic Choke: *CAUTION—Cadillac carburetors have Choke Modifier and are adjusted differently than other models as described below.*

Choke Setting (All models except Cadillac): See table below for settings. Adjust by loosening choke cover retaining screws and rotating the cover and coil assembly. Then adjust choke connector rod (following).

Automatic Choke Setting

Car & Carb.	Choke Setting
Buick (All Models)	Centered (At Index)
Cadillac (All Models)	See Modifier Adjustment
Chevrolet 2218S, 2351S	①2 Points Lean
Chrysler, DeSoto, Dodge	Centered (At Index)
Oldsmobile (All Models)	Centered (At Index)
Packard 985S	②Centered (At Index)
Packard 2084S, 2103S, 42S	Centered (At Index)
Packard 2112S	1½ Points Lean
Packard 2232S, 2284S	1 Point Rich
Plymouth 2253S	Centered (At Index)
Pontiac 2268S, 2283S	Centered (At Index)
Studebaker (All Models)	1 Point Rich

①—Supersedes Centered setting. Will correct loading when starting partially warm engine.

②—Supersedes 1½ Points Rich (original setting).

Choke Modifier Setting (Cadillac)—Loosen choke cover retaining screws, rotate cover assembly as required for 1 Point Lean setting (896S), Centered setting (Other Carburetors), tighten cover screws to retain this setting. Disconnect choke modifier rod at lower end, rotate metal pointer and lever (to which rod connected) counter-clockwise from its free position until the thermostatic spring picks up the choke valve lever and continue to rotate pointer until it lines up with plastic pointer on cover. Hold pointer in this position. Loosen clampscrew in modifier lever, rotate lever until it points forward (away from fuel inlet) and scribed line on lever is vertical, tighten clampscrew. Use Bending Tool J-1137, to bend modifier rod at upper angle until rod freely enters hole in primary throttle valve lever with throttle valves seated. Connect rod and install clip.

Choke Rod: *This adjustment is preliminary to checking and adjusting Fast Idle, Unloader, and Secondary Throttle Lock-out.* Loosen choke lever clampscrew, insert wire gauge of correct thickness (see table below) between tang on fast idle cam and boss on throttle body casting (hold gauge in place by pressure on choke lever) and take up all slack in linkage. Hold choke valve tightly closed and tighten clampscrew.

Choke Rod Setting

Car & Carb.	Checking Gauge Size & No.
Buick 2358S	.025" T109-189
Buick (Others)	.020" T109-29
Cadillac (All Models)	.020" T109-29
Chevrolet (All Models)	.020" T109-29
Chrysler 2041S, 2317S	.020" T109-29
Chrysler 2126S	.010" T109-200
DeSoto 2210S	.010" T109-200
Dodge (All Models)	.020" T109-29
Oldsmobile (All Models)	.020" T109-29
Packard (All Models)	.020" T109-29
Plymouth 2253S	.020" T109-29
Pontiac (All Models)	.020" T109-29
Studebaker (All Models)	.020" T109-29

FAST IDLE

▷*OLDSMOBILE CAUTION—Manufacturer recommends that fast idle be set with carburetor on engine. See special adjustment procedure below.*

Fast Idle: *NOTE—This adjustment is made with carburetor OFF engine or ON engine as follows:*

▷*CADILLAC CAUTION—Secondary Throttle Lock-out Adjustment should be made first (fast idle setting is disturbed by this adjustment).*

Carburetor Off Engine—Hold choke valve tightly closed so that fast idle cam rotated to point where high step of cam is under fast idle screw. Turn fast idle screw in or out until primary throttle valve opening is correct (see table below). Measure opening between edge of valve and carburetor wall on side opposite idle ports.

Carburetor On Engine—Run the engine until both engine and transmission are at operating temperature. With the engine idling, and choke valve wide open, rotate fast idle cam against the spring until the high step is under the fast idle screw. Use tachometer to check engine speed and adjust fast idle screw until engine speed is correct as shown in table below.

Fast Idle Setting Off Engine

Car & Carb.	Throttle Opening	Checking Gauge
Buick 894S,SA,996S	.020"	T109-29
Buick 2053S	.020"	T109-29
Buick 2082S, 2197S	.018"	T109-44
Buick 2358S	.016"	T109-44
Cadillac (All)	.020"	T109-29
Chevrolet (All)	.015"	T109-44
Chrysler 2041S	.015"	T109-44
Chrysler 2126S	.018"	T109-44
Chrysler 2317S	.012"	T109-200
DeSoto 2210S	.018"	T109-44
Dodge 2191S	.015"	T109-44
Dodge 2181S, 2253S	.012"	T109-200
Oldsmobile 932S	.018"	T109-44
Oldsmobile 2016S,2080S	.018"	T109-44
Oldsmobile 2059S,2246S	.015"	T109-44
Packard 985S, 2084S	.020"	T109-29
Packard 2103S,2142S	.020-.023"	T109-29
Packard 2112S	.027-.029"	T109-189
Packard 2232S, 2284S	.031"	T109-29
Plymouth 2253S	.012"	T109-200
Pontiac 2268S, 2283S	.018"	T109-44
Studebaker (All)	.024"	T109-189

On Engine

Car Model	Fast Idle Speed
Buick ('52-54)	1200 RPM
Buick ('55)	1800 RPM
Cadillac ('52-54)	1700 RPM
Chevrolet ('55)	1600 RPM
Oldsmobile ('52-53)	1600 RPM
Oldsmobile ('54-55)	1400-1500 RPM
Packard ('55)	1500 RPM
Pontiac ('55)	1900 RPM

UNLOADER

Unloader: *After Choke Rod adjusted (above),* rotate primary throttle valves to wide open position and hold valves in this position. Check choke valve opening by inserting correct Unloader Gauge (see table below) between edge of choke valve and air horn wall. With correct setting, choke valve should have slight drag on the gauge. Adjust by using bending tool T109-41 to bend unloader tang on throttle lever as required.

Unloader Setting

Car & Carb.	Choke Opening	Checking Gauge
Buick 894S, SA	3/16"	T109-28
Buick 996S, 2053S	3/16"	T109-28
Buick 2082S, 2197S	11/64"	T109-166
Buick 2358S	3/16"	T109-28
Cadillac (All Models)	3/16"	T109-28
Chevrolet 2218S,2351S	3/16"	T109-28
Chrysler (All Models)	3/16"	T109-28
DeSoto & Dodge (All)	3/16"	T109-28
Oldsmobile 932S	1/8"	T109-36
Oldsmobile (Others)	3/16"	T109-28
Packard 2232S, 2284S	3/16"	T109-28
Packard (Others)	9/32"	T109-126
Plymouth 2253S	3/16"	T109-28
Pontiac 2268S, 2283S	1/8"	T109-36
Studebaker (All)	1/8"	T109-36

CARTER CAR STARTER CHECKING & ADJUSTMENT (Buick & Packard): With the carburetor on the bench, the switch timing can be checked as follows. Connect battery and 6 volt test lamp across switch so that lamp will light when switch contacts close. Back off throttle stopscrew so that primary throttle valves tightly closed, disconnect pump connector rod and choke connector rod, rotate fast idle cam to slow idle position. Place a scale horizontally against the choke unloader arm of the throttle lever and make a mark on the carburetor body at the ½" point on the scale. Hold end of scale against unloader arm and slowly open throttle until the test lamp lights indicating that switch contacts have closed. Note scale reading at mark on carburetor body. Correct scale reading (and travel as measured by arm movement) is shown in table below. If travel not correct, adjust switch timing by adding or removing shims located under the "W" shaped switch contact spring. These shims furnished in two sizes. No. 153-11 (.018"), and No. 153-12 (.006").

CAR STARTER SWITCH SETTING

Car Model	Scale Reading	Arm Travel
Buick	1¼-1 9/16"	¾-1 1/16"
Packard	1½-1⅞"	1-1⅜"

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

Car & Carb.	Throttle Valve Setting ①Idle Port Opening Primary	Secondary	Vacuum Port
Buick 894S,SA	.067-.073"	.046-.053"	②.046-.050"
Buick 996S	.074-.080"	.047-.053"	②.042-.046"
Buick 2053S⑨	.057-.063"	.052-.058"	②.028-.032"
Buick 2053S⑤	.057-.063"	.052-.058"	②.008-.012"
Buick 2082S	.057-.063"	.059-.065"	②.013-.017"
Buick 2197S	.057-.063"	.059-.065"	②.013-.017"
Buick 2358S	.074-.080"	.065-.071"	②.008-.014"
Cadillac 896S	.084-.090"	.062-.068"	③.033-.043"
(Others)	.091-.097"	.067-.073"	③.060-.070"
Chevrolet (All)	.113-.119"	⑥	③⑦.023-.033"
Chrysler 2041S	.091-.097"	.067-.073"	③.035-.045"
Chrysler 2126S	.084-.092"	.071-.077"	③.032-.042"
Chrysler 2317S	.116-.122"	.059-.065"	③.035-.045"
DeSoto 2210S	.084-.092"	.071-.077"	③.032-.042"
Dodge 2191S	.091-.097"	.067-.073"	③.035-.045"
Dodge 2181S	.049-.055"	.059-.065"	②.035-.045"
Dodge 2253S	.116-.122"	.059-.065"	②.035-.045"
Oldsmobile 932S	.089-.095"	.047-.053"	③.023-.033"
2016S, 80S	.108-.114"	⑥	③.018-.028"
2059S,2246S	.113-.119"	⑥	③.046-.056"
Packard 985S⑧	.122-.128"	.062-.068"	③.052-.062"
Packard 985S⑨	.122-.128"	.070-.076"	③.052-.062"
Packard 2084S	.122-.128"	.070-.076"	③.052-.062"
Packard 2103S	.122-.128"	.070-.076"	③.052-.062"
Packard 2112S	.137-.143"	.070-.076"	③.052-.062"
Packard 2142S	.122-.128"	.070-.076"	③.052-.062"
Packard 2232S	.126-.132"	⑥	③.046-.056"
Packard 2284S	.126-.132"	⑥	③.046-.056"
Plymouth 2253S	.116-.122"	.059-.065"	③.035-.045"
Pontiac (All)	.139-.145"	⑥	③.029-.039"
Studebaker (All)	.113-.119"	⑥	②.000-.010"

①—Port opening above top edge of throttle valve.
②—Bottom of port above top edge of valve.
③—Top of port above top edge of valve.
④—With .039-.041" diameter spark port.
⑤—With .080-.082" diameter spark port.
⑥—No secondary idle system used.
⑦—.018-.028" on early 2218S carburetors.
⑧—First carburetors.
⑨—Later carburetors.

AUXILIARY THROTTLE VALVES

Auxiliary Throttle Valves (Buick All Models, Chrysler 2317S, Dodge 2181S & 2253S, Plymouth 2253S): Velocity type valves located directly above secondary throttle valves. Auxiliary throttle valves are "locked out" when choke is operating. Adjust as follows: **Auxiliary Throttle Valve Adjustment (Buick 996S, 2053S, & 2082S; Chrysler 2317S, Dodge 2181S & 2253S, Plymouth 2253S)**—Disconnect secondary throttle operating rod Adjust stop lug on secondary throttle lever (use bending tool T109-214) until clearance between lower edge of auxiliary throttle valve and bore is 27/64" (Gauge T109-242) with stop lug against stop on flange casting.

Auxiliary Throttle Lockout Adjustment (All Models)—After fast idle adjusted, proceed as follows (1) With choke valve closed make certain edge of hook on lockout arm contacts auxiliary throttle lever with maximum contact of locking step on lever (2) Open choke valve and make certain that auxiliary throttle valves are unlocked a few degrees before choke reaches wide open position Adjust by bending the lockout arm

SECONDARY THROTTLE LEVER & LOCK-OUT

Secondary Throttle Lever & Lock-out: *Adjustment procedure and settings differ on these carburetors due to different linkage designs. No secondary lock-out is used on carburetors with Auxiliary Throttle Valves (above).*

Secondary Throttle Lever: *Adjust each model as follows:* **Buick 894S,SA; Cadillac All Models, Chrysler 2041S; Dodge 2191S; Oldsmobile 932S, 2016S, 2059S, 2080S; Packard 985S, 2084S, 2103S, 2112S, 2142S**—Primary and secondary throttle valves must reach wide open position at the same instant. Adjust by bending secondary throttle operating rod at upper angle using bending tool T109-213

Buick (Except 894S,SA), Chrysler 2317S; Dodge 2181S & 2253S; Plymouth 2253S—Stop lugs on both primary throttle lever and secondary throttle lever should contact stop bosses on throttle body at the same instant as throttle valves are opened. *(NOTE*—At this point, secondary throttle valves will be a few degrees from wide open position). Adjust by bending secondary throttle operating rod at angle bend using bending tool T109-213.

Chrysler 2126S & DeSoto 2210S—Block choke valve in wide open position, back out throttle stopscrew so that primary throttle valves fully closed Hold secondary throttle valves slightly open, close primary throttle valves Secondary throttle valves should close tightly at same instant as primary valves Hold primary valves closed It should not be possible to open secondary valves Adjust by bending throttle operating rod (Secondary connector rod) slightly at the angle bend

Chevrolet All Models, Oldsmobile 2246S, Packard 2232S & 2284S, Pontiac & Studebaker All Models—Primary and secondary throttle valves must reach wide open position at same instant Adjust by bending throttle operating rod at upper angle using T109-213 bending tool Close both primary and secondary throttle valves tightly, check clearance between positive closing shoes on primary and secondary throttle levers This clearance should be 017-022" (Gauge T109-29 can be used) Adjust by bending the shoe on the primary lever

Secondary Throttle Lock-out (All Carburetors except where Auxiliary Throttle Valves used—see Auxiliary Throttle Valves above): Adjust each model as follows:

Cadillac (All Carb.), Chrysler 2041S, Dodge 2191S: (1) Hold choke valve closed so high step of fast idle cam is under fast idle screw, tighten fast idle adjusting screw until primary throttle valve opening is .015" (use Gauge T109-44 to measure clearance between edge of valve and carburetor wall on side opposite idle ports—valve should have slight drag on gauge). Lock pawl should be in unlocked position at this point. Adjust by bending tang on lock pawl using bending tool T109-105. (2) Hold primary throttle valves halfway open, open choke valve fully, then open primary throttle valves fully. Tang on secondary throttle arm should engage in notch on lock-out lever preventing secondary throttle shaft movement. Then hold choke valve wide open and close primary throttle valves sufficiently so that lock pawl is unlocked, finally open primary throttle valves fully. Lock-out lever should fall free allowing secondary throttle valves to be open before primary throttle valves are fully open. Adjust by bending tang on secondary throttle lever, as required, to provide clearance for correct operation of lock-out lever. *R adjust Fast Idl (see Fast Idle data above).*

Oldsmobile 932S, 2016S, 2080S; Packard 985S, 2084S, 2103S, 2112S, 2142S—Close choke valve tightly, open primary throttle valves fully and make certain that the tang on secondary throttle arm engaged in notch in lock-out lever to prevent secondary throttle valves opening. Hold choke valve wide open and open primary valves fully. Check to make certain that lock-out lever falls free allowing secondary valves to open before primary valves are fully open. Adjust as necessary by bending tang on secondary throttle lever to provide clearance for correct operation of lock-out lever.

Chevrolet, Chrysler 2126S, D Sot 2210S, Oldsmobil 2059S & 2246S, Packard 2232S & 2284S, P ntiac & Studebaker—Hold choke valve wide open, close primary throttle valves fully, allow choke valve to close. Tang on secondary throttle lever should freely engage notch on lock-out dog Adjust by bending tang on secondary throttle lever.

Automatic Secondary Throttl Control (Chrysl r 2126S & DeSoto 2210S): This unit requires no adjustment. Bend operating rod, as necessary, to insure that secondary valves close simultaneously with primary valves. See that linkage is free and that there are no vacuum leaks between carburetor body and unit.

OVERHAUL: *CAUTION—When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confus d or interchanged when carburetor reassembled.*

DISASSEMBLY: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Bowl and Throttle Body) which can be overhauled separately.

Air Horn & Bowl Cover—Remove fuel inlet fitting, gasket, and strainer assembly. Disconnect and remove choke connector rod, accelerating pump rod, secondary throttle return spring *(NOTE*—On Cadillac, remove choke modifier rod). Remove dust cover and gasket, Remove metering rods by rotating rods off pins on vacumeter link and lifting rods out carefully. Remove pump connector link by removing pin spring, sliding upper end of link out of pump lever, and rotating link around lever. Remove vent arm (when used) by taking out vent arm screw. Loosen (do not remove) screw holding pump operating lever on pump countershaft and screw in metering rod arm, slide pump countershaft and lever assembly out, remove pump arm and metering rod arm. Take out all air horn attaching screws (inner screws will be lifted out after air horn removed), make certain that screw located within pump countershaft housing is removed, lift air horn assembly straight up (*CAUTION*—use care not to damage floats). Disassemble remaining parts from air horn as follows·

C NTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

Invert air horn on bench, take out float hinge pins, remove floats with intake needles and clips attached, remove needle seats and gaskets (*CAUTION*–Keep each float assembly, intake needle, and needle seat together, DO NOT mix primary and secondary side parts). Remove vacuum piston by rotating it 90° in either direction and lifting it out. Remove accelerator pump plunger assembly. Remove and discard bowl cover gasket. If automatic choke to be disassembled, proceed as follows: Remove choke lever from choke shaft, remove choke valve (file burrs from staked ends of attaching screws before removing the screws), take out attaching screws and remove thermostatic coil housing and gasket remove baffle plate, rotate choke shaft counter-clockwise to disengage vacuum piston from cylinder, withdraw choke shaft and piston assembly, disconnect piston from link by pushing piston pin out with a piece of wire. Take out attaching screws and remove choke housing and gasket (vacuum passage rubber gasket can be removed from inner side of choke housing by rotating gasket using blunt end of a thin wire).

▷*CADILLAC CHOKE CAUTION:* Choke modifier lever can be removed from pointer shaft but DO NOT remove metal pointer or thermostatic coil from housing.

Carburetor Bowl–Invert bowl to remove pump spring and vacuum piston spring. Take out housing screw and remove pump jet housing, gasket, and pump discharge check needle (needle will drop out if bowl inverted). Remove primary and secondary metering jets (*CAUTION*–keep these jets separate). Remove pump relief valve plug and gasket. Remove pump intake ball retainer from bottom of pump cylinder, invert bowl to remove intake check ball. Remove all primary and secondary low speed jets. (*NOTE*–No low speed jets used on secondary side of Oldsmobile, Packard, Pontiac or Studebaker carburetors). Loosen bowl to throttle body attaching screws, remove throttle body from bowl, remove screws, remove and discard gasket.

Throttle Body–Remove two idle adjusting screws and springs (used on primary side only). Remove four idle port rivet plugs. Remove idle stop screw and spring, and fast idle adjusting screw. Take out fast idle cam mounting screw, remove all fast idle parts (fast idle cam, spring, trip lever, and lockout cam and pawl). Remove primary-to-secondary throttle connector rod, remove secondary throttle lever by loosening clamp-screw and sliding lever off shaft, remove primary throttle lever screw from end of shaft, remove all lever parts from shaft. On Buick carburetors, remove accelerator vacuum switch (remove terminal cap and switch return spring, lift out switch guide block with contact spring and shims, turn body over to allow plunger and ball to drop out). It is recommended that throttl body not be disassembled further, however, if necessary to remove throttle valves and shafts, proceed as follows: File burrs from staked ends of all throttle valve screws, take out screws and remove valves from shaft. Remove secondary throttle shaft. Remove primary throttle shaft by using rawhide hammer to tap shaft through retaining washer. Remove auxiliary throttle valves and shaft when so equipped.

Cleaning & Inspecti n: Wash all parts in carburetor cleaning solvent except pump plunger assembly, thermostatic coil and housing assembly, and choke housing gasket (clean these parts in clean gasoline). Clean and blow out all passages with compressed air. Remove all gum and carbon deposits. Make certain all calibrated restrictions are clean but DO NOT use drills to clean out these passages. Inspect floats for dents and leaks. Check choke and throttle shafts for excessive wear, inspect pump plunger leather and replace plunger if cracked or creased. See that choke piston operates freely in cylinder (if carbon or dirt present in slots, remove welch plug in bottom of housing to clean slots, install NEW welch plug and make certain that it is air-tight).

REASSEMBLY: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure (above) and pay particular attention to the following points:

Throttle Valve Installation: On all models (except as noted below), install primary and secondary valves with stamped numbers downward and toward middle of flange, install auxiliary valves with trademark (c in circle) toward top of flange. Use new screws, and before tightening screws, shift valves to provide closest possible fit in barrel in closed position (short end of auxiliary valves should have good bearing on stop bosses), tighten screws securely and stake ends lightly (*CAUTION*–support shaft on steel block while staking screws). Install retaining washer on end of primary throttle shaft with prongs outward, press washer in on shaft just far enough to obtain snug fit without endplay in shaft.

Buick & Studebaker. Install both primary and secondary valves, with stamped numbers on valve downward and toward middle of flange. The dimple on auxiliary valve must point toward throttle valve.

Chrysler. Primary valve thin, secondary valve thick. Each valve should be returned to its original position. Install valves with numbers facing down and away from idle ports.

Pontiac. Install both primary and secondary valves from top of body with (C in circle) away from center of carburetor.

Buick Vacuum Switch Installation: Assemble the contact spring in guide block with original number of timing shims. Place ball in body flange, guide block in switch plunger and install in body flange with grooved side of plunger upward toward main body flange. Install switch return spring and terminal cap.

Secondary Throttle Linkage: The secondary throttle lever return spring, and operating rod design and hook-up differ on these carburetor models and each type should be assembled and connected as follows:

Buick–Single hole provided in primary throttle lever and secondary throttle lever for operating rod engagement. Likewise single hole provided in secondary throttle lever for return spring connection.

Cadillac (896S)–Connect throttle operating rod in middle hole of inner throttle shaft arm (on primary throttle shaft), and in inner hole of secondary operating lever (on secondary throttle shaft). Connect secondary throttle return spring in UPPER hole of secondary lever and spring bracket to which other end of spring attached should be moved back 20-30° from original position to increase spring tension and prevent possibility of secondary valves sticking in service. *CAUTION–Above return spring installation data supersedes original instructions (see Changes & Corrections).*

Cadillac (Except 896S)–Connect throttle operating rod in middle hole of inner throttle shaft arm (on primary throttle shaft) and in inner hole of secondary operating lever (on secondary throttle shaft). Helical secondary throttle return spring should be wound-up one-half turn with throttle in closed position.

Chrysler 2041S & Dodge 2191S–Connect secondary throttle operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in single hole of secondary throttle operating lever (on secondary throttle shaft). Helical secondary throttle return spring should be wound-up 1½ turns clockwise when installed on shaft.

Chrysler 2317S, Dodge 2253S & 2181S, Plymouth 2253S–Connect secondary throttle operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in single hole of secondary throttle operating lever (on Secondary throttle shaft).

Oldsmobile 932S–*CAUTION–Two types of secondary throttle linkage used. Assemble each type as follows:*
1) *First type* 932S Linkage–Connect throttle operating rod in lower hole of inner throttle shaft arm (on primary throttle shaft) and in outer or upper hole of secondary operating lever (on secondary throttle shaft). Engage secondary throttle return spring in extreme outer or upper hole of secondary operating lever (spring connector holes are left hand row facing the carburetor).
2) *Later type* 932S Linkage–Connect throttle operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in the single hole of the secondary throttle operating lever (on secondary throttle shaft). Engage secondary throttle return spring in middle hole of secondary operating lever (spring connector holes are left hand row facing carburetor).

Oldsmobile 2016S & 2080S–Connect throttle operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in the single hole of the secondary throttle lever, Secondary throttle return spring is helical type and should be wound-up one-half turn with throttle closed.

Oldsmobile 2059S & 2246S–Connect secondary throttle operating rod in single hole of both the inner throttle shaft arm (on primary throttle shaft) and secondary throttle operating lever (on secondary throttle shaft). Secondary throttle return spring is helical type and should be wound-up one-half turn with throttle closed.

Packard (All Models)–Connect throttle operating rod in inner hole of inner throttle shaft arm (on primary throttle shaft) and in single hole of secondary throttle lever (on secondary throttle shaft). Secondary throttle return spring is helical type and should be wound-up one-half turn with throttle closed.

CONTINUED ON NEXT PAGE

CARTER WCFB 4-BARREL CARBURETORS (Cont.)

Chevrolet, Pontiac, Studebaker–Connect secondary throttle operating rod in single hole in primary throttle inner lever and single hole in secondary throttle lever.

Oth r Reassembly Cautions:

Throttle Body-to-Bowl Gasket–Use a NEW gasket and make certain that all passage hole line up.

Pump Discharge Jet Assembly–Install pump discharge check needle with pointed end down, hold jet housing square with carburetor while tightening attaching screw.

Metering Jet Installation Caution–Primary and Secondary metering jets must not be interchanged

Choke Assembly–When installing choke housing, line up choke shaft hole with bore in air horn so that shaft will not bind. Install choke valve with trade mark (C in circle) upwards, use new attaching screws, tighten screws while holding valve closed, stake ends of screws lightly. Check assembly for free operation after valve installed

Vacumeter Piston Link–Install link with lip or tang at center opening pointing toward air horn.

Carburetor Adjustments– Make all carburetor adjustments as directed under ADJUSTMENTS above

SERVICE PARTS: Gasket Sets–Carter No. 219 (894S, SA), No. 221 (932S), No. 229 (985S, 2084S, 2142S), No. 233 (2005S,SA; 2072S, 2088S, 2103S, 2109S, 2110S, 2112S, 2119S,SA, 2143S), No. 234 (996S, 2016S, 2053S, 2080S, 2082S, 2181S, 2253S), No. 244 (2041S, 2191S), No. 250 (2059S, 2246S), No. 257 (2197S), No. 260 (2214S, 2219S, 2330S), No 264 (2126S, 2210S), No. 266 (2232S, 2284S), No. 267 (2268S, 2283S), No. 269 (2317S), No. 273 (2358S).

Repair Pkg. (with Std. M t ring R ds)–Carter No. 1599B (894S,SA), No. 1703 (932S), No. 1718 (896S), No. 1717A (985S), No. 1730 (2016S), No. 1733 (2005S, SA; 2072S), No. 1734 (996S), No. 1744 (2053S), No. 1745A (2080S), No. 1751 (2082S), No. 1752 (2041S, 2191S), No. 1756 (2059S), No. 1761 (2109S, 2110S), No. 1781 (2197S), No. 1783 (2214S, 2219S), No. 1786 (2126S), No. 1789 (2210S), No. 1796 (2268S), No. 1813 (2358S).

CARTER DUAL "WCD"

	Carter No.
BUICK	
1946-47 Series 40, 50	608S, SA, SC
1946-47 Series 70	609S, SA, SC
1948-49 Series 40, 50	663S
1948-49 Series 70	664S
1950-51 Series 40, 50	725S, SA
1950-51 Series 70	726S, SA
1951 Late Series 40, 50	882S
1951 Late Series 70	883S
1952-53 Series 40	882S, SA
1952 Series 50	882S, SA
1953 Series 50	2017S
1954 Series 40, 50	2081S, SA
1955 Series 40	2179S
CADILLAC	
1946-48 All Series	595S, SA
1949 Early All Series ①	682S
1949 Later All Series ②	722S
1950 All Series	742S
1951 All Series	845S
CHRYSLER	
1951 V8 C51, 2, 3, 4, 5	830S, SA, SB
1952 V8 C52, 3, 4, 5	931S, SA, SB, SC
1953 V8 C58, 9	935S, SA
1953 V8 C59 ③	992S
1953 V8 C58, 9 ④	2039S, SA
1954 V8 C63-1	2039SA
DE SOTO	
1952 V8 S17 Early	884S, SA, SC
FRAZER	
1948 Manhattan Optl	685S, SA
1949-50 All Models	723S
KAISER	
1948 Custom Optl	685S, SA
1949-50 Deluxe Models	723S
1954-55 Manhattan Schgd	2146S
NASH	
1953 Statesman	2034S
1955 Statesman	2061S
OLDSMOBILE	
1947 Eight (H-D) Late	665S
PONTIAC	
1947-48 Eight (S-M)	630S, SA, SB
1948 Eight (H-D)	653S
1949 Eight (S-M)	719S
1949 Eight (H-D)	720S
1950-51 Eight (S-M)	719S, SA
1950-51 Eight (H-D)	720S, SA
1952-53 Eight (S-M)	719SA
1952-53 Eight (H-D)	720SA
1953-54 Six	2010S
1954 Eight (S-M) ⑤	719SA
1954 Eight (S-M) ⑥	720SA
1954 Eight (H-D) ⑦	2122S
WILLYS	
1954-55 (6-226 Engine)	2204S

①—Before Engine No 06566
②—Beginning Engine No 06566
③—With 12 volt electrical equipment
④—PowerFlite Transmission cars
⑤—Synchro-mesh Cars (First Cars only)
⑥—Synchro-mesh Cars (After first cars) Also used on approximately 15,000 Hydra-Matic Drive Cars
⑦—Hydra-Matic Cars (except approximately 15,000 cars with 720SA)
S-M—Synchro-mesh Transmission Cars
H-D—Hydra-Matic Drive Cars

►CHANGES, CAUTIONS, CORRECTIONS

►*BUICK (1946-48) THROTTLE CONNECTOR ROD INSTALLATION* Connector rod linking throttle valve lever and countershaft on bowl cover must be installed with grooved end (for pin spring) at top, and flattened end (for spring and spring retainer) at bottom Spring and spring retainer retain rod in throttle valve lever

►*BUICK (1947) 608SA & 609SA CARBURETOR PRODUCTION CHANGE* These carburetors used on late 1947 cars have new type **Body Flange Casting & Switch Assembly** No 1-547S (608SA), 1-549S (609SA) and new type **Throttle Shaft & Lever Assembly** No 3-594S (608SA), 3-596S (609SA) No throttle centering screw is used (special retaining ring used instead) See Reassembly of Carburetor for installation of this retaining ring

►*BUICK 608SC & 609SC REPLACEMENT CARBURETORS* These carburetors have same type Body Flange Casting and Throttle Shaft & Lever Assembly as 608SA & 609SA described above See specification tables following for other differences

►*BUICK 1950 725S & 726S CARBURETOR CHANGE (to correct complaints of gasoline odors noticeable in the car)* Remove and discard original Air Horn & Piston Housing Assembly and Air Horn Gasket, drill two ¼" holes in bowl cover to coincide with new vent hole locations in air horn (use new air horn gasket as template in locating holes), install new type Air Horn Gasket No 121-186 and Air Horn & Piston Housing Assembly No 6-730S With this change, carburetors will be similar to later 725SA and 726SA models

►*BUICK LATE 1950 CARBURETOR PRODUCTION CHANGE* New 725SA & 726SA (superseding earlier 725S & 726S) carburetors have bowl vents faced toward rear of engine to eliminate possibility of gasoline fumes being noticed in car (see 725S and 726S recommended change above)

►*BUICK AIR CLEANER "BLOW-UP" CORRECTION (1950-51 Series 725S, SA, 726S, SA, 882S, 883S Carb.)* Caused by vapors collecting in silencer chamber and can be prevented by venting carburetor by drilling holes to allow fumes to escape into the atmosphere as follows Drill 1/16" holes in rear of carburetor, locating one hole 13/16" on each side of center-line boss cast in center of throttle body and exactly 7/8" up from bottom face of flange *CAUTION*—If this modification made with carburetor on car, use extreme care to prevent metal chips falling into manifold *882SA NOTE*—This carburetor has these vent holes incorporated in production

►*BUICK LATE 1951 882S & 883S CARBURETORS* These carburetors have modified idling specifications designed to prevent stalling tendencies during cool humid weather Previous carburetors cannot be converted to new specifications

►*BUICK 1953 SERIES 50 ACCELERATION HESITATION (FIRST CARS)* If not corrected by careful and exact tune-up, see Manifold Heat Control data under Tune-Up on 1953 Buick car model page for recommended changes

►*BUICK 1953 SERIES 50 CHANGE TO ELIMINATE DETONATION OR SPARK RAP (FIRST 2017S CARBURETORS TAG-DATED PRIOR TO "E3")* Increase size of vacuum spark control port in carburetor throttle body from 040" to 081" as follows Remove carburetor from engine, place throttle valves in wide open position and protect valves from damage by drill Remove spark control fitting from throttle body Working through spark control fitting hole, use a No 47 drill to enlarge original 040" spark control hole, then finish drill the hole with a No 46 drill (.081") Blow out all chips and thoroughly clean carburetor, reinstall spark control fitting, check metering rod adjustment, re-install carburetor on engine *NOTE—All carburetors tag-dated "E3" and later have this .081" spark control port*

►***1954 BUICK SERIES 40 & 50 SYNCHRO-MESH CARS LOADING UP ON ACCELERATION WITH COLD ENGINE CAUSING A STUMBLE OR BUCK (Cars with first 2081S Carburetor):*** Can be corrected by making following changes *NOTE*—All required parts are furnished in Carter Unitized Pkg No 170-353U
(1) **Choke Coil & Cover Assembly**—Remove and discard original assembly, Carter No. 170AJ73S (stamped on cover). Install NEW assembly, Carter No. 170U73S, using a new gasket and set choke for Centered (At Index) setting.
(2) **Choke Warm Air Passage Bushing**—Remove air horn assembly and gasket Install special Reducer Bushing (I.D. #42 Drill or 0935") in choke warm air passage which is hole in top edge of bowl cover under choke mounting location (this passage has #38 drill or 1015" metering orifice at bottom). Use a square end tool to drive bushing in flush with upper surface of bowl cover Re-install air horn assembly using a new gasket
(3) **Metering Rod**—Make certain carburetor has later type No. 75-1107 Metering Rods See Metering Rod Production Change following
(4) Install new Identification Tag stamped 2081SA
NOTE—Later 2081SA carburetors do not require the above change.

►***1954 BUICK SERIES 40 & 50 METERING ROD PRODUCTION CHANGE (Early No. 2081S Carburetors):*** First type Metering Rods, Carter No 75-994, changed to No. 75-1107 which will improve performance and correct low-speed buck (see Correction immediately above) *NOTE*—All 2081SA carburetors have this later metering rod

►***1955 BUICK 40 ROUGH IDLE ON SYNCHRO-MESH CARS (Bucking or Missing)*** May be caused by flash in cylinder head exhaust crossover passages resulting in uneven manifold heat Remove head, examine passages and make certain that openings are at least 5/8" diameter Correct by knocking out flash with a punch and blow passages out thoroughly

►***1954-55 BUICK 40 WARM-UP PERFORMANCE IMPROVEMENT (SYNCHRO-MESH CARS) Check and correct the following***

CONTINUED ON NEXT PAGE

CARTER "WCD" (C nt.)

1) Check cylnder head for obstructed exhaust crossover passages (see Rough Idle Correction above) 2) Make certain that correct Carter carburetor installed On 1954 cars with first 2081S carburetor, make certain that carburetor brought up to later 2081SA specifications and that later type No 75-1107 Metering Rod installed *See "1954 Buick Series 40 & 50 Synchro-mesh Cars Loading up on Acceleration with Cold Engine" in Carter WCD Carburetor data in 1954 Final Data.*

3) Adjust carburetor (Fuel Level, Pump Stroke, Metering Rod Setting, Idle Adjustment) *Idle setting must not be too lean.*

4) Set Automatic Choke at 2 Points Lean (original setting was CENTERED) Choke setting may be varied on individual engines but must not exceed 3 Points Lean

►*CADILLAC (1947-48) 595SA CARBURETOR PRODUCTION CHANGE:* This carburetor has new type **Body Flange Casting Assembly** Carter No 1-553S and a new type **Throttle Shaft & Lever Assembly** No. 3-601S without throttle centering screw. See Throttle Shaft & Lever Assy. data for Buick 608SA & 609SA (above).

►*CADILLAC 1949 722S CARBURETOR JET CHANGE TO CORRECT A SLIGHT ACCELERATION STUMBLE AT 20-35 MPH:* On carburetors dated before February 1949, this condition can be corrected by installation of following parts furnished in Carter Unitized Package No 75-680U. **Low Speed Jets** No. 11-196S (identified by 5/8" long hexagonal collar integral with tube), and **Metering Rods** No. 75-670 (identified by additional raised dot of same size as trademark on rod flat opposite part number). *NOTE*—These parts installed in production after February 1949

►*CADILLAC 1950 742S & 1951 845S CARBURETOR CHANGE TO CORRECT DETONATION COMPLAINTS:* Manufacturer recommends installation of modified Metering Rods and 1949 type Vacuum Piston Spring (furnished in kit as Cadillac Part No 1458068 or Carter Unitized Package No 75-772U) as part of detailed procedure to correct this complaint See *"Detonation Complaint Correction" in Cadillac Special Data in Car Model Section.*

Cadillac 742S & 845S

Parts Change	First Type	Later Type
Metering Rods (2 req'd)	75-716	Ⓒ75-771
Vacuum Piston Spring	61-226	61-332

Ⓒ—Can be identified by two trademarks (c in circle) on rod flat

►*CHRYSLER 1951 830S CARBURETOR SLOW WARM-UP CORRECTION (BEFORE APRIL 1951):* This condition caused by air leak at thermostatic coil housing gasket. Correct by installing new gasket, special thermostatic coil housing retainer ring (63-153) installed **with flared side away fr m air horn** and two special thermostatic housing retainer screws (101-82). These parts furnished in Unitized Pkg. 63-155U. **D not r -us original th rm static coil housing retain rs and retain r screws.** Carburetors "D1" and later (April 1951) have above parts installed.

►*CAUTION· Hold thermostatic coil housing with opennd wr nch on fitting wh n tight ning heat tube connection. Use extreme care not to turn or distort cover.*

►*CHRYSLER 1951 CARBURETOR PRODUCTION CHANGE:* First type 830S carburetor superseded by later type 830SA carburetor, 830SA has new No. 1-861S Body Flange Assy. and special thermostatic coil housing assembly retainer ring (see 830S recommended change above)

►*CHRYSLER 1951 830S & 830SA Carburetor Correction for Engine Cutting out on Turns:* If this complaint not corrected by servicing air cleaner and properly tuning engine, carburetor can be altered for outside venting (by plugging existing vents and drilling new vents as directed below) and new parts installed as furnished in Unitized Pkg. No 75-820U

Carter Unitized Pkg. 75-820U

Metering Rods (2) 75-769 Indent. Tag(830SB) 107-40
Vent Tube Rivet
Plugs(2) 11B-228 Instruction Sheet MSI-15

Venting Procedure—Remove air horn assembly from carburetor (not necessary to remove carburetor from engine). Use 3/16" drill to drill outside vent hole upward and through top of the two BOWL VENT STACKS *(CAUTION—do not drill kick-down switch vent stack).* Blow out all passages with compressed air to remove metal chips. Plug the two inside bowl vent tubes (in air horn) by tapping a 11B-228 plug lightly in end of tube. *(CAUTION—do not plug kick-down switch vent tube).* Install NEW metering rods, adjust rods. Re-install air horn assembly on carburetor and attach NEW 830SB identification tag.

►***1953-54 CHRYSLER POPPING BACK ON ACCELERATION (Cars with 935SA, 2039S, 2039SA Carburetors):*** If this condition noted on acceleration between 5-50 MPH. after a hard run at high speed, and if not corrected by regular tune-up procedure, install special Vacuum Piston Spring No. 61-485 (replacing regular production spring No. 61-134).

►*DE SOTO V8 1952 HESITATION WHEN ACCELERATING BETWEEN 10-20 MPH. (In 3rd Gear) OR 25-35 MPH. (In 4th Gear) with Carter 884S & 884SA Carburetors·* Correct this complaint as follows.

1) Tune-up engine carefully. See *DeSoto S17 car model page for complete data.*

2) Check Manifold Heat Control Valve. Valve must operate freely and thermostatic spring must have sufficient tension to close valve when engine is stopped. See *"Manifold Heat Control" in DeSoto Special Data.*

3) Check engine water temperature and make certain engine warming up properly (carburetor is water-jacketed and too little heat will reduce vaporization of fuel).

4) *If above steps do not correct complaint,* on carburetors with BRASS identification tag only, replace standard metering rods with One Size Rich or Two Size Rich rods (try one size rich rods first, if trouble not corrected, then try two sizes rich rods), *CAUTION—Both m t ring rods must b sam size. DO NOT mak this chang on later carbur tors with COPPER id ntification tag.*

On Siz Rich M t ring R ds—Carter No. 75-841 (.001" smaller).

Tw Siz Rich M t ring R ds—Carter No. 75-842 (.002" smaller).

►*FRAZER & KAISER 685S CARBURETOR CONVERSION TO 685SA:* First type 685S carburetors can be converted to later 685SA by installing following parts: Needle & Seat Assembly No. 25-162S. **Chang float level to 1/16".**

NOTE—Later 685SA carburetors have above Needle & Seat Assembly and new float level setting. Pump Jet & Housing Assembly No. 48-158S (superseding No. 48r143S) is also used.

►***1954-55 KAISER HOT ENGINE STARTING IMPROVEMENT (Venting of Supercharger Enclosure)*** Installation of gravity type rubber disc valve in carburetor hood will allow venting of supercharging pressure when engine is stopped (disc drops away from hood, opening vent hole) All parts required for this installation are furnished in Vent Valve Kit Part No 908167 Install valve as follows

Carburetor Hood Vent Installation—With hood removed from carburetor, cut 1" diameter hole perpendicular to slanting top of hood at point 3¾" in from edge of supercharger connection and 1½" to right of centerline Drill a 5/32" hole 1 1/16" toward supercharger connection from center of the 1" vent hole Attach support arm to hood by installing self-tapping screw through arm and into this 5/32" hole in the hood (hole in opposite end of arm must be centered in vent hole) Assemble rivet in hole of rubber disc, install disc and rivet on underside of support arm, install cotter pin in outer end of rivet Make certain that disc and rivet move freely up and down in support arm and that disc closes vent hole when in upper position

►***1953 NASH STATESMAN ENGINE STALLING ON QUICK STOPS (Cars with Carburetor No. 2034S):*** Can be corrected by installing "Split Type" Floats, Carter No 21-150U. This requires modification of float mounting pivot boss but does not require removal of complete carburetor assembly from engine Make this modification as follows

1) Remove carburetor bowl cover assembly from carburetor, remove all parts including intake needle and seat assembly from cover. See OVERHAUL data below.

2) File 3/64" from inside of each float bracket to widen distance between brackets to 25/32" as required for mounting of new split type floats. Carefully clean all filings from cover with compressed air.

3) Install needle seat Remove pull clip from intake needle and **discard this clip,** install intake needle. Install auxiliary float lever and both float assemblies. Check for free operation of float lever and both float arms. If binding noted, correct by additional filing of brackets as required.

4) Set **both** floats for float setting of 5/32" (Gauge T109-196). Adjust both floats alike. See FLOAT SETTING below. Reassemble and adjust carburetor.

►*NASH 1953 STATESMAN ENGINE CUTTING OUT ON EXTREME RIGHT TURNS (First Cars):* If engine cuts out during or at end of a hard right turn, install 5° angular spacer plate, Nash No. 3138063, under carburetor so that it is inclined 5° toward right side of

CONTINUED ON NEXT PAGE

CARTER "WCD" (C nt.)

engine. *NOTE*—This spacer installed in production beginning with following Serial Numbers: K-568401 (Kenosha), KC-43793 (El Segundo).

►*NASH 1953 STATESMAN STUMBLE ON LIGHT ACCELERATION (Cars b fore engine No. S-378530 with Carburetors tag-dat d prior to "B3"):* Install all parts included in Carter Unitized Pkg. No. 75-900U (Nash No. 3116455) as listed below. *NOTE*—This change made in production beginning with above engine number and carburetor tag-date.

Cart r Unitiz d Pkg. No. 75-900U

Idle Jet (2 used) ..... Part No. 11-171S
Metering Rod (2 used) ..... Part No. 75-899

►*NASH 1953 STATESMAN ENGINE STALLING ON QUICK STOPS (Cars with No. 2034S Carburetor with First Type Float):* This condition can be corrected by installing SPLIT TYPE floats, Carter No. 21-150U. Float mounting pivot boss must be modified but complete carburetor need not be removed from engine. Make this modification as follows:

1) Remove carburetor bowl cover assembly from carburetor, remove all parts including intake needle and seat assembly from cover.

2) File 3/64" from inside of each float bracket to widen distance between brackets to 25/32" as required for mounting of new type split floats. Clean all filings from cover with compressed air.

3) Install needle seat. Remove pull clip from intake needle and **discard this clip,** install intake needle. Install auxiliary float lever and both float assemblies. Check for free operation of float lever and both float arms. If binding noted correct by additional filing of brackets as required.

4) Check float level and set BOTH floats alike. See Float Level Data below.

5) Reassemble and adjust carburetor. See ADJUSTMENTS below.

►*OLDSMOBILE 665S CARBURETOR REPLACEMENT BY MODEL 503SA:* The 665S carburetor used on approximately 6000 1947 cars and superseded by 503SA which is furnished for replacement. When installing 503SA carburetor on these cars, note the following settings:

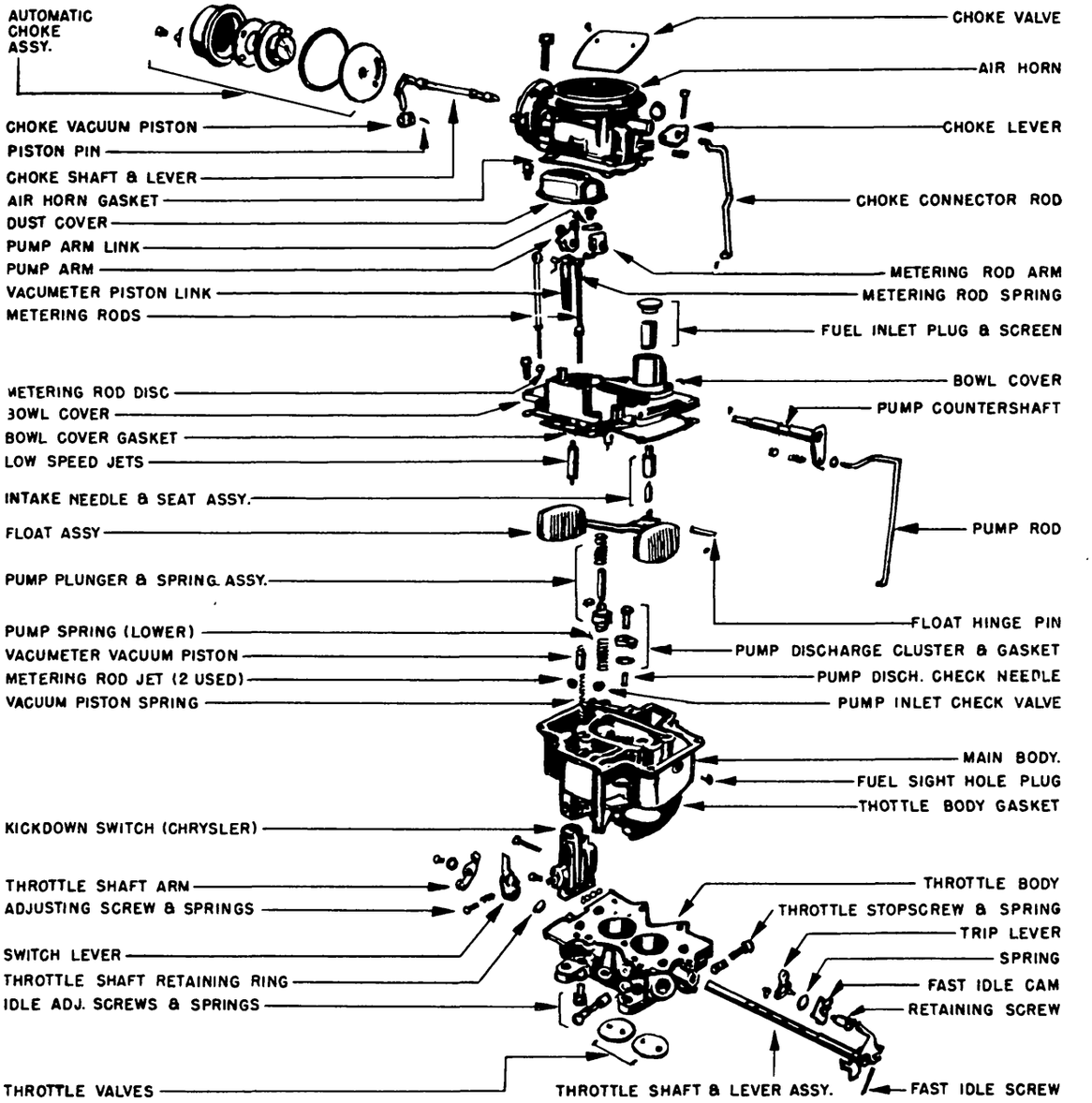
Idl Sp d—375 RPM (for all cars with Hydra-Matic Drive).

Climatic C ntr l S tting—2 Points Rich (Centered on Synchro-mesh cars).

►*PONTIAC 630S, 630SA, 630SB CARBURETOR PRODUCTION CHANGES:* These carburetors used successively during 1947-48. 630SA & 630SB have following new parts: **B dy Flange Casting & Switch Ass mbly N . 1-551S and Throttle Shaft & Lever Ass mbly N . 3-598S.** No throttle centering screw used with these parts. See Throttle Shaft & Lever Assy. installation in Reassembly of Carburetor.

Air H rn & Climatic Control Assembly No. 6-576S. Climatic Control should be set 1 Point Lean on all carburetors with this new assembly (Carburetors with first type No. 6-547S assembly should be set at index "centered").

Pump Plung r, R d, Spring & R tain r Ass mbly N . 64-113S. This assembly supersedes first type plunger and rod assembly No. 64-112S.



CARTER "WCD" DUAL CARBURETOR

►*PONTIAC 630S CARBURETOR FLOODING CORRECTION:* Caused by back of float pivot arm striking on inside wall of float bowl and preventing free movement of the floats. If flooding noted on early 1947 cars, check back of float arm and float bowl wall for evidences of contact and rubbing. Correct by filing the curved edge of the float arm to provide clearance between arm and wall.

►*PONTIAC 630S, 630SA, 630SB CORRECTION FOR ENGINE STALLING ON SHARP RIGHT TURN:* Use Unitized Package No. 75-648U and install new carburetor parts as directed.

►*PONTIAC 1947-48 CORRECTION FOR RICH CHOKE ACTION:* To correct complaints of too-rich mixture during warming up period (too much choke action), check thermostatic coil housing for mark "RPD"

CONTINUED ON NEXT PAGE

CARTER "WCD" (C nt.)

(molded on outer face). Test coil action as follows: With carburetor at room temperature (75°F), remove air cleaner, disconnect fast idle connector rod, loosen three thermostat housing screws so housing can be rotated freely. Rotate housing clockwise by hand until choke valve is open, then rotate housing until choke valve is just closed, note adjustment mark on housing which should coincide with center mark of scale on air horn. If choke valve closes before this point reached (may be 2-4 points rich), replace Thermostatic Coil and Housing Assembly (Carter No. 170N-77S).

►*PONTIAC (1949-50) 719S & 720S CARBURETOR CHOKE RATTLE CORRECTION:* This complaint can be corrected by installing new type Air Horn Assembly with choke valve anti-rattle feature as used on 719SA & 720SA carburetors (see description following). Part Nos. are 6-674S (719S), 6-675S (720S) and choke valves have special bleed hole in valve No. 45 drill or .082" (719S,SA), 5/32" or .156" (720SA type used to replace original 720S valve which had .218" bleed hole). *CAUTION—Correct valve must be used on each type carburetor—SMALL bleed hole on cars with Synchro-mesh Trans., LARGE bleed hole on Hydra-Matic cars.*

►*PONTIAC (1950) CARBURETOR PRODUCTION CHANGE:* New carburetors 719SA (Cars with Synchro-mesh Trans.), 720SA (Hydra-Matic Drive Cars) used on later cars have new Air Horn Assembly with new choke valves designed to prevent choke valve rattles. Choke valves have irregular sides and are installed with spacer washer and special self-locking retainer washer (see Choke data).

►*CAUTION: Air Horn Assemblies and Choke Valves on these models NOT INTERCHANGEABLE and can be identified as follows:*

719SA Air Horn & Choke Valve Assy.—Part No. 6-674S. Choke Valve No. 7-166 has SMALL bleed hole in valve (No. 45 drill or .082" size). *This carburetor must be used on cars with Synchro-mesh Transmission.*

720SA Air Horn & Choke Valve Assy.—Part No. 6-675S. Choke Valve No. 7-167 has LARGE bleed hole in valve (5/32" or .156" size—decreased from .218" size used on 720S). *This carburetor must be used on Hydra-Matic Drive cars.*

►*PONTIAC SIX 1953 CARBURETOR PRODUCTION CHANGE & ADJUSTMENT CAUTION:* First carburetors had TWO Idle Adjusting Screws (one for each barrel of the dual carburetors), later carburetors have ONE screw only. *Special Idle Adjustment procedure required for these carburetors (see ADJUSTMENT below).*

►*PONTIAC SIX 1953 ACCELERATION FLAT SPOT (When accelerating from Part-throttle to Full-throttle position):* Carburetors tag-dated "B3" and earlier (except where "X" stamped in place of usual star) had first type metering rods as listed below. Carburetors tag-dated "C3" and later (also earlier carburetors with "X" stamped in place of star) have later type metering rods which will correct this condition.

Pontiac Six Metering Rod Change

	First Type	Later Type
Std. Metering Rod (2 used)	No. 75-873	No. 75-910

►*1954 PONTIAC SIX CHOKE SETTING CHANGE TO CORRECT ENGINE LOADING DURING WARM-UP (Carburetor No. 2010S):* New choke setting of **2 Points Lean** supersedes original Centered setting.

►***1954 PONTIAC SIX CHOKE SETTING CHANGE TO CORRECT ENGINE LOADING DURING WARM-UP (Carburetor No. 2010S):*** New choke setting of **2 Points Lean** supersedes original Centered setting.

DESCRIPTION: These "WCD" carburetors differ from previous Carter Vacumeter types ("WDO" models) mainly in that they have a new design concentric float bowl and double float, new type permanently assembled main nozzles, high pressure type spring operated accelerating pump, and built-in Carter Car Starter (Buick models only). Conventional plunger type anti-percolators not used. Carburetors have Fast Idle and Climatic Control.

►*CADILLAC 845S "CHOKE MODIFIER":* Consists of connector rod linking the automatic choke thermostatic coil to the throttle valve lever so that the thermostatic coil tension is lessened as the throttle valves are opened. Provides improved economy and performance during the warming up period. *See Climatic Control.*

►*CHRYSLER & DESOTO CLIMATIC CONTROL:* Have heat tube connection at center of thermostatic coil housing and "delayer plate" within housing which provides longer choke action during warm-up and prevents too rapid closing of the choke after engine is shut off. *See Climatic Control data below.*

►*CHRYSLER & DESOTO "WATER JACKETED" THROTTLE BODY:* Two water connections at carburetor throttle body and passages in body casting used to circulate engine coolant water around throttle valves. This provides sufficient heat to prevent ice formation on throttle valves at idling speed which might cause stalling of engine during warming-up period (vaporizing of fuel has refrigerating effect sufficient to cause ice formation at temperatures below 65°F).

►*INSTALLATION CAUTION:* Water tubes must be properly connected and coupling nuts tightened to prevent water leaks when carburetor installed on engine.

►*NASH STATESMAN (MODIFIED 2034S) & PONTIAC SIX "SPLIT" FLOAT ASSEMBLIES:* On these carburetors floats operate independently on auxiliary float lever and floats must be adjusted separately for correct float level. See Float Level data below.

ADJUSTMENT: ***Set these carburetors to the following specifications:***

►***CAUTION—Adjust only with engine warmed up so that choke valve wide open and fast idle inoperative. See individual car model pages for complete Tune-Up instructions.***

IDLING ADJUSTMENT

Idle Adjustment—Adjust only with engine warmed up to normal operating temperature so that choke valve is wide open and fast idle inoperative. Adjust each idle adjusting screw until best mixture and highest vacuum reading obtained, at specified engine RPM.

Idle Mixture Screw Setting

Car & Carb.	Idle Screw Opening
Buick 608S,SA	½-1 turns
Buick 608SC, 609S,SA,SC; 663S, 664S	¾-1¼ turns
Buick 725S,SA	7/8-1 1/8 turns
Buick 726S,SA	¾-1¼ turns
Buick 882S,SA	1¼-1¾ turns
Buick 2017S,2081S,SA; 2179S	½-1½ turns
Buick 883S	1-1½ turns
Cadillac 595S,SA; 682S, 722S	½-1½ turns
Cadillac 742S, 845S	¾-1¼ turns
Chrysler 830S,SA	½-1½ turns
Chrysler (All Others)	½-1 turns
DeSoto 884S,SA,SC	½-1 turns
Frazer & Kaiser 685S,SA; 723S	1-1½ turns
Kaiser 2146S	½-1½ turns
Nash 2034S, 2061S	½-1½ turns
Oldsmobile 665S	¾-1¾ turns
Pontiac 6 (Early-2 screws)	¾-1¾ turns
Pontiac 6 (Later-1 screw)	1¼ (½-1½) turns
Pontiac 8 (All Models)	¾-1¾ turns
Willys 2204S	1-2 turns

Idle Speed Setting

Car Model	Synchro-mesh	Automatic Trans.
Buick (All)	450 RPM	450 RPM
Cadillac ('46-48)	375-380 RPM	375 RPM
Cadillac ('49-51)	400 RPM	375 RPM
Chrysler (All)	475-500 RPM	450-500 RPM
DeSoto (All)	475-500 RPM	450-500 RPM
Frazer & Kaiser	550 RPM	
Kaiser ('54-55)	500 RPM	©450 RPM
Nash ('53)	500-550 RPM	©375 RPM
Nash ('55)	500-550 RPM	©450 RPM
Oldsmobile		375 RPM
Pontiac 6	520-540 RPM	©365-385 RPM
Pontiac 8 ②	450-475 RPM	©365-385 RPM
Pontiac 8 ③	450-475 RPM	©460-480 RPM
Willys	500 RPM	

©—With selector lever in "N" Neutral.
②—Cars WITHOUT Air-conditioning.
③—Cars WITH Air-conditioning. See Idle Speed-up Control following.

►***KAISER MANHATTAN CARBURETOR ADJUSTMENT:*** This carburetor used with Supercharger and is completely shrouded by supercharger air pipe. Three access plugs in shroud are provided for carburetor adjustment (Idle Mixture Screws and Idle Speed Screw). Shroud must be removed for other carburetor adjustments.

►***PONTIAC 8 IDLE SPEED-UP CONTROL (Air-conditioned Cars):*** Consists of a solenoid controlled dashpot which increases engine idle speed to 750 RPM. with transmission lever in Neutral and Air-conditioning Switch ON (and clutch engaged on Synchro-mesh Cars).

Dashpot Adjustment—After slow idle speed correctly adjusted (above), see that transmission selector lever in Neutral, turn Air-conditioning Switch

CONTINUED ON NEXT PAGE

CARTER "WCD" (C nt.)

ON, loosen locknut on diaphragm shaft, turn knurled nut to secure engine idle speed of 750 RPM., tighten locknut.

Control Switch Adjustment—See "Idle Speed-Up Control" data under CARBURETOR on Pontiac 8 car model page.

ACCELERATING PUMP

►*ACCELERATING PUMP NOTE: All "WCD" Pumps or not ch ck d and adjusted in the same manner. See separat data for ach as follows:*

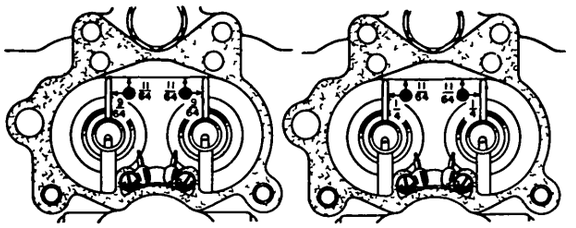
Car & Carb.	Pump Type
Buick 608S,SA,SC, 609S,SA,SC	"A"
Buick 663S, 664S	"A"
Buick 725S,SA, 726S,SA	"B"
Buick 882S,SA, 883S, 2017S	"B"
Buick 2081S,SA, 2179S	"B"
Cadillac 595S,SA	"A"
Cadillac 682S, 722S, 745S, 845S	"B"
Chrysler & DeSoto (All)	"B"
Frazer & Kaiser 685S,SA, 723S	"B"
Kaiser 2146S	"C"
Nash (All)	"C"
Oldsmobile (All)	"B"
Pontiac 6 2010S	"C"
Pontiac 8 (All Models)	"B"
Willys (All)	"B"

Typ "A" Accel rating Pump: Pump is high-pressure delayed-action type with positive throttle lever connection. Pump plunger is loose on plunger stem and is positioned by spring above plunger to provide uniform pump action (compression and expansion of spring provides uniform plunger movement and pump discharge). Check and adjust as follows.

►*CAUTION:* When measuring pump stroke, care must be taken not to compress spring on plunger stem. Pump stroke measurement must be plunger stroke (not plunger stem movement)

Pump Str k Adjustment—See table below for correct plunger travel (from closed throttle to wide open throttle position) To check stroke, take out cover screws and remove dust cover, back off throttle stopscrew so that throttle valves tightly closed Place Universal Pump Gauge T109-117S in inverted position on upper edge of dust cover boss on carburetor and adjust knurled nut on gauge so that lip on lower end of gauge indicator arm rests on top of pump plunger stem. Note gauge reading. Open throttle slowly until plunger bottoms in pump cylinder (at approximately half-throttle—can be determined by added resistance felt when plunger spring begins to compress—*CAUTION*—Do not open throttle further than necessary to bottom plunger in cylinder) Turn knurled nut on gauge until indicator lip again rests on top of pump plunger stem Note gauge reading The difference between the two readings is pump stroke (in 64ths of an inch) and should agree with figure in table below Adjust by bending throttle connector rod at lower angle near throttle lever

SERIES 40, 50 PUMP JET TARGETS SERIES 70



BUICK PUMP JET TARGET CIRCLES

Type "A" Pump Setting

Car & Carb.	Stroke	Setting
Buick 608S,SA, 609S,SA.	21/64"	Non-Adj
Buick 608SC, 609SC	21/64"	Long Stroke
Buick 663S, 664S	21/64"	Long Stroke
Cadillac 595S, SA	27/64"	Non-Adj

Pump Jet Aim Adjustment (Buick Models)—Fuel discharged from pump jets must strike within 3/16" diameter target circles on carburetor wall Pump jet aim should be checked and pump jets adjusted, if necessary, as follows: Note location of pump jet target circles on carburetor wall (target circles not marked on first carburetors and targets must be established as directed in Note below). Operate pump by opening throttle with short quick stroke and note whether discharge stream strikes in target circle Adjust by bending pump jets

►*CAUTION: Use extreme care not to distort jets when making adjustments.*

Pump Jet Target Note—On first carburetors where pump jet targets are not marked on the carburetor wall, it will be necessary to establish these by measurement (as shown in illustration) Mark target circles with a pencil.

Type "B" Accelerating Pump: Pump is high-pressure delayed-action type (same as Type "A" above) but pump stroke is checked and adjusted differently as follows:

►*CAUTION·* When measuring pump stroke, proceed exactly as follows (gauge reading indicates plunger shaft position rather than actual movement.

Pump Stroke Checking & Adjustment—Install pump connector link in hole of pump arm which provides correct stroke for checking (see table), back out throttle lever stopscrew so that throttle valves are tightly closed (CAUTION—See that fast idle cam does not hold throttle valves open).

►*CAUTION: Check pump stroke by either of the two following methods:*

(1) Gauge T109-117S Method—Invert gauge on edge of dust cover boss of bowl cover at pump plunger shaft (CAUTION—hold gauge vertical to insure correct reading). Turn knurled nut on gauge until gauge finger just touches upper end of plunger shaft. Number indicated on gauge should agree with "Gauge" figure in table below. Adjust by bending throttle connector rod at upper angle.

(2) Scal M th d—Use a scale to measure distance from top of pump plunger shaft to top of dust cover boss on bowl cover. This distance should agree with "Scale" figure in table. Adjust by bending throttle connector rod at upper angle.

Type "B" Pump Setting

Car & Carb.	Reading Gauge	Reading Scale	Pump Stroke
Buick 725S,SA,726S,SA	33	20/64"	Short
Buick 882S,SA,883S	33	20/64"	Short
Buick 2017S,2081S,SA	29	17/64"	Long
Buick 2179S	29	17/64"	Long
Cadillac 682S	24	7/32"	Non-Adj.
Cadillac 722S,845S	32	5/16"	Long
Cadillac 742S	30	19/64"	Long
Chrysler 8 (All)	29 ℂ	17/64"	Long
DeSoto (All)	33	23/64"	Long
Frazer 685S,SA,723S	29	9/32"	Short
Kaiser 685S,SA, 723S	29	9/32"	Short
Oldsmobile 665S	24		Long
Pontiac 630S,SA,SB, 653S	30		Short
Pontiac 719S,SA	32	20/64"	Short
Pontiac 720S,SA,2122S	32	20/64"	Short
Willys 2204S	28	3/16"	Long

ℂ—Supersedes 26 (15/64") setting on 830S

Pump Jet Aim—Pump jets must be properly aimed so that pump discharge stream strikes venturi at correct angle To check (with air horn removed), operate pump by opening throttle with short quick stroke and note direction of pump jet stream Stream should miss outer wall of primary venturi and strike lower part of inner wall of secondary venturi To adjust, bend pump jet slightly Check both pump jets similarly.

►*CAUTION· Use extreme care not to distort jets when making adjustments.*

Type "C" Accelerating Pump: Pump is high-pressure delayed-action type (same as Types "A" & "B" above) but pump stroke is checked and adjusted differently as follows

Pump Stroke Adjustment—Back out throttle stopscrew so that throttle valves seated (CAUTION—make certain fast idle screw does not hold throttle valves off seat) Remove dust cover over pump countershaft. Place straightedge across top of dust cover boss at pump arm. Flat op top of pump arm should be parallel to straightedge Adjust by bending throttle connector rod at upper angle using bending tool T109-213.

METERING ROD SETTING

►*METERING ROD CHECKING NOTE Gauge is required to check metering rod setting on some carburetors only. Check each type as follows:*

Metering Rod Check (With Gauge)—Use special metering rod gauge (see table below). Install gauge in place of either metering rod seating gauge in metering rod jet Back out throttle lever stopscrew so that throttle valves tightly closed. Press down lightly on vacuum piston link until lug of piston link contacts lip of metering rod arm. In this position, clearance between metering rod bearing and shoulder in notch or gauge should be less than 005" Adjust by bending lip of metering rod arm using bending tool T109-105 Re-

CONTINUED N NEXT PAGE

CARTER "WCD" (Cont.)

move gauge and reinstall metering rod.

Metering Rod Check (No Gauge Required)—Check and adjust the rods as follows: Back off throttle lever stop-screw so that throttle valves tightly closed, loosen metering rod arm clampscrew (on countershaft under dust cover on bowl cover), press down on vacumeter link until both metering rods just bottom in carburetor casting, rotate metering rod arm until finger on arm contacts lip on vacumeter link, tighten clampscrew *(CAUTION*—do not disturb arm position).

Metering Rod Setting

Car & Carb.	Metering Rod Gauge
Buick 608S,SA	T109-152 (2.440")
Buick 609S, SA	T109-163 (2.940")
Buick (All Others)	No Gauge Req'd
Cadillac 595S,SA, 682S	T109-163 (2.940")
Cadillac (All Others)	No Gauge Req'd
Chrysler & DeSoto (All)	No Gauge Req'd
Frazer 685S,SA, 723S	T109-163 (2.940")
Kaiser 685S,SA, 723S	T109-163 (2.940")
Kaiser 2146S	T109-163 (2.940")
Nash 2034S	No Gauge Req'd
Nash 2061S	T109-163 (2.940")
Oldsmobile 665S	T109-163 (2.940")
Pontiac 6 2010S	No Gauge Req'd
Pontiac 8 (All Models)	T109-163 (2.940")
Willys 2204S	No Gauge Req'd

FLOAT LEVEL SETTING

Float Level Setting—With bowl cover and float assembly removed from carburetor, invert assembly, remove cover gasket, install correct gauge on cover directly under floats with notched portions of gauge fitting over edge of cover casting. Sides of floats should just barely touch vertical legs of gauge (lateral adjustment). Adjust by bending arms of floats. Both floats should just clear horizontal portion of gauge (vertical adjustment).

►***FLOAT SETTING CAUTION—Floats must be adjusted laterally (parallel to gauge uprights) as well as vertically (Float Level figure in table below).***

Float Level Setting

Car & Carb.	Float Level	Checking Gauge
Buick 608S,SA,609S,SA	3/16"	T109-162
Buick 608SC,609SC	5/32"	T109-196
Buick 663S,664S	5/32"	T109-196
Buick 725S,SA,726S,SA	5/32"	T109-196
Buick 882S,SA,883S	5/32"	T109-196
Buick 2017S,2081S,SA	5/32"	T109-196
Buick 2179S	3/16"	T109-162
Cadillac 595S,SA	9/64"	T109-160
Cadillac 682S,722S	9/64"	T109-160
Cadillac 742S,845S	11/64"	T109-205
Chrysler & DeSoto (All)	11/64"	T109-205
Frazer & Kaiser 685S	9/64" ①	T109-160
Frazer & Kaiser 685S,SA	1/16" ②	T109-197
Frazer & Kaiser 723S	③	
Kaiser 2146S	3/16"	T109-162
Nash 2034S ④, 2061S	5/32"	T109-196
Oldsmobile 665S	3/16"	T109-162
Pontiac 6 2010S ⑤, 2061S	5/32"	T109-196
Pontiac 8 (All Models)	3/16"	T109-162
Willys 2204S	3/16"	T109-162

①—With 1st.type Needle & Seat Assy.No.25-161S.
②—With 2nd.type Needle & Seat Assy.No.25-162S.
③—Allow floats to hang freely on inverted cover so that spring not compressed Floats should be flush to 1/32" above edge of bowl cover.
④—For both Double Float & Later "Split" floats.
⑤—Adjust both floats alike (Split type)

►***NASH & PONTIAC 6 "SPLIT" FLOAT NOTE:*** **Float consists of two floats (right & left hand) and auxiliary lever. Floats are adjusted in same manner as on other carburetors and should be set for uniform height (float level or vertical adjustment). In service, fuel level is controlled by highest float so that uniform level is maintained regardless of any fuel surges in the bowl.**

Fuel Level Note—Quick check for correct float setting can be made by removing sight hole plug on side of bowl. Fuel level should be even with bottom of sight hole (or just run out of hole with engine idling).

CLIMATIC CONTROL (CHOKE) SETTING

Car & Carb.	Choke Setting
Buick 608S,SA,SC;609S,SA,SC	Centered (At Index)
Buick 663S, 664S	Centered (At Index)
Buick 725S,SA,726S,SA	1 Point Rich
Buick 882S,SA,883S	1 Point Rich
Buick 2017S,2081S,SA,2179S	Centered (At Index)
Cadillac 595S,SA	Centered (At Index)
Cadillac 682S	1 Point Rich
Cadillac 742S	1 Point Lean
Cadillac 845S	See Modifier Note (below)
Chrysler & DeSoto (All)	Centered (At Index)
Frazer & Kaiser 685S,SA;723S	Centered (At Index)
Kaiser 2146S	Centered (At Index)
Nash 2034S	Centered (At Index)
Nash 2061S	2 Points Lean
Oldsmobile 665S	1 Point Rich
Pontiac 6 2010S	Centered (At Index)
Pontiac 8 630S,SA,SB	①
Pontiac 8 (All Others)	Centered (At Index)
Willys 2204S	Centered (At Index)

①—Centered (1st. No. 6-547S Air Horn & Climatic Control Assy., 1 Point Lean (2nd. No. 6-576S Air Air Horn & Climatic Control Assy.).

Cadillac 845S Choke Modifier Setting—Choke and modifier adjusted together: Disconnect throttle-to-choke rod. Set climatic control 1 Point Rich (loosen retainer screws, rotate cover and coil assembly until notch on cover 1 point to left of center mark on housing, tighten retainer screws). Loosen modifier arm clampscrew, rotate metal pointer until it is in line with pointer on cover, hold pointer in this position and rotate modifier arm until scribed line on face of arm is vertical, tighten clampscrew securely. Turn throttle lever stop-screw out exactly two turns, hold choke valve open, open throttle and then close throttle completely and check metal pointer alignment with pointer on cover. If both pointers do not line up, bend connector rod until alignment secured. Turn throttle stopscrew in exactly two turns (to restore original speed setting).

CHRYSLER & DESOTO SLOW CLOSING THROTTLE DASHPOT (All Models): Consists of a diaphragm type unit with a plunger which contacts an arm on the throttle valve shaft and prevents a too-rapid closing of the throttle valves when accelerator released Dashpot is a separate unit mounted on the carburetor. **Adjustment**—Check dashpot action with engine running, by shifting to Driving Range (hold car with brakes), and rapidly depressing and releasing accelerator pedal. If engine stalls, increase dashpot action by turning adjusting screw on actuating lever on throttle shaft. Maximum dashpot action is secured with screw set so that dashpot plunger can be moved inward approximately 1/16" after engine has returned to normal idle speed. If correct performance cannot be secured by adjusting dashpot, tune up engine and recheck performance

See "Chrysler & DeSoto V8 Slow-Closing Throttle" for complete data.

CHRYSLER & DESOTO KICK-DOWN SWITCH (All Models): Consists of separate unit mounted on carburetor throttle body (used for transmission control). When disassembling these carburetors, take out two mounting screws and remove switch unit. Vacuum passages for switch operation terminate at holes in mounting flange on carburetor and switch body

See "Chrysler & DeSoto V8 Kick-down Switch" in Electrical Section for complete data.

FAST IDLE SETTING

CAUTION—TWO settings (1) and (2) required as explained below.

Car & Carb.	Setting & Checking Gaug (1)	(2)
Buick 608S, SA	.020" T109-29	.012" T109-200
Buick 608SC,663S	.020" T109-29	.015" T109-44
Buick 609S,SA,SC	.020" T109-29	.018" T109-44
Buick 664S	.020" T 109-29	.018" T109-44
Buick 725S,SA	.020" T109-29	.015" T109-44
Buick 726S,SA	020" T109-29	.015" T109-44
Buick 882S,SA	.020" T109-29	.012" T109-200
Buick 883S,2017S	.020" T109-29	.015" T109-44
Buick 2081S,SA	.020" T109-29	.028" T109-189
Buick 2179S	.020" T109-29	.025" T109-189
Cadillac 595S,SA	.010" T109-71	.018" T109-44
Cadillac 682S,722S	010" T109-200	.020" T109-29
Cadillac 742S,845S	020" T109-29	.020" T109-29
Chrysler (All)	.040" T109-193	① T109-44
DeSoto (All)	.040" T109-193	① T109-44
Frazer 685S,SA	.010" T109-71	.016"
Frazer 723S	.010" T109-200	018" T109-44
Kaiser 685S,SA	.010" T109-71	.016"
Kaiser 723S	.010" T109-200	.018" T109-44
Kaiser 2146S	.040" T109-193	.026" T109-189
Nash 2034S,2061S	.005" T109-237	.026" T109-189
Oldsmobile 665S	.010" T109-71	018" T109-44
Pontiac 6 2010S	.040" T109-193	.026" T109-189
Pontiac 8 (All)	.040" T109-193	.026" T109-189
Willys 2204S	.040" T109-193	.016"

①—.017-.021" (Gauge T109-44 can be used).

(1) Fast Idle Cam Clearance—Loosen choke valve lever clampscrew on choke shaft, insert gauge of correct thickness (See Checking Gauge (1) in table above) between lip of fast idle cam and boss on flange casting, hold choke valve tightly closed, remove all slack from linkage by pressing choke valve lever toward closed position, tighten choke valve

CONTINUED ON NEXT PAGE

CARTER "WCD" (Cont.)

lever clampscrew.

(2) Fast Idle Screw Setting—Hold choke valve tightly closed, tighten fast idle adjusting screw against high step of fast idle cam until throttle valve opening or clearance between edge of valve and carburetor bore on side opposite idle ports is correct (see Checking Gauge (2) in table above).

UNLOADER SETTING

▷*CAUTION—Fast Idle Cam Clearance (Fast Idle Setting (1) above) must be adjusted before Unloader Setting is adjusted.*

Car & Carb.	Choke Opening	Checking Gauge
Buick 2179S	1/4"	T109-31
Buick (All Others)	3/16"	T109-28
Cadillac 595S,SA	3/16"	T109-28
Cadillac 682S,722S	3/16"	T109-28
Cadillac 742S,845S	7/32"	T109-106
Chrysler & DeSoto (All)	7/32"	T109-106
Frazer (All)	1/8"	T109-36
Kaiser 685S,SA,723S	1/8"	T109-36
Kaiser 2146S	7/32"	T109-106
Nash (All)	11/64"	T109-166
Oldsmobile (All)	1/8"	T109-36
Pontiac 6 2010S	9/64"	T109-34
Pontiac 8 (All)	1/8"	T109-36
Willys 2204S	1/8"	T109-36

Unloader Setting—Check choke valve opening with throttle valve held wide open. Adjust by bending unloader lip on throttle shaft lever using bending tool T109-41.

THROTTLE VALVE SETTING

Car & Carb.	Idle Port Opening ℄	Vacuum Spark Port
Buick 608S,SA,SC	.067-.073"	① 046-.050"
Buick 609S,SA,SC	.082-.088"	② .060- 064"
Buick 663S	067-.073"	① 046-.050"
Buick 664S	.082-.088"	② .060- 064"
Buick 725S,SA	062- 068"	① 046- 050"
Buick 726S,SA	.072-.078"	① .060-.064"
Buick 882S,SA	052-.058"	① .046-.050"
Buick 883S	072-.078"	① 060-.064"
Buick 2017S	047-.053" ②	③
Buick 2081S,SA	.057-.063" ②①	010-.014"
Buick 2179S	.057-.063" ②①	.010-.014"
Cadillac 595S	.100-.106"	② .033- 037"
Cadillac 595SA	100- 106"	② .040-.040"
Cadillac 682S,722S	.115-.121"	② .033-.043"
Cadillac 742S,845S	.119-.125" ④	② .033-.043"
Chrysler (All)	.136-.140" ⑤	② .035-.041"
DeSoto (All)	.136-.140"	② .035-.041"
Frazer (All)	.122-.128"	② .033-.038"
Kaiser 685S,SA, 723S	.122-.128"	② .033-.038"
Kaiser 2146S	.122-.128" ②	② .052-.056"
Nash (All)	.117-.123"	② 033-.038"
Oldsmobile (All)	.100-.106"	② .016-.020"
Pontiac 6 2010S	.122-.128"	② .052-.058"
Pontiac 8 (All)	.122-.128" ⑥	② .052-.056"
Willys 2204S	.125-.131" ②	② .027-.037"

℄—Bottom of port above top edge of valve.

②—Top of port above top edge of valve.

③—.033- 037" (with .040" diameter spark port), .013-.017" (with .081" diameter spark port).

④—.115-.121" on first 742S carburetors.

⑤—.067-.073" on first 830S carburetors.

⑥—.117-.123" on first 630S carburetors.

℄—Idle Port Opening above throttle valve.

CAR STARTER SETTING

Buick Carburetors: Check switch timing on each model as follows:

Buick 1946-54)—With carburetor on the engine, place transmission selector lever in neutral, apply parking brake, make certain throttle linkage and dashpot correctly adjusted. Back off throttle stop-screw, disconnect throttle connector rod and rotate fast idle cam to slow idle position, close throttle valves. Place scale against choke unloader arm on throttle lever, make a mark on the carburetor body at the 1" point on the scale. Turn on ignition (use test lamp and battery if carburetor off engine), open throttle slowly while holding end of scale against unloader arm. Note point at which starter drive pinion just engages flywheel (or test lamp lights). Scale should read between 1 15/16" and 2 5/16" at reference mark on carburetor (15/16" to 1 5/16" travel of the arm). If switch timing too early, remove shims; if switch timing too late, add shims, on guide block under contact spring.

▷*CAUTION—Do not use less than one .018" shim (153-11), or more than three of these .018" shims plus two .006" shims (153-12).*

Buick (1955)—Place transmission selector lever in neutral and apply parking brake Back off throttle stop screw, rotate fast idle cam to slow idle position, fully close throttle valve *(NOTE (Dynaflow Cars)*—Dashpot must not interfere with full closing of throttle) Place scale against rear face of lower arm of throttle lever which contacts dashpot, with scale resting on rocker arm cover Mark rocker arm cover at front edge of scale (throttle valve fully closed) Turn "IGN" switch ON, slowly open throttle, mark cover again at point where cranking motor is energized Timing is correct if distance between marks on rocker arm cover is 29/32—1 7/16" Adjust by changing number of shims Reset idle speed to 450 RPM (engine hot) and recheck adjustment of throttle linkage and dashpot

OVERHAUL: *NOTE—On carburetors equipped with Car Starter or Dashpot, remove these units as follows:*

Car Starter Removal (Buick Carburetors)—Disconnect and tape leads on switch terminals. Take out switch terminal cap attaching screw, hold-down clip, switch cap. Withdraw return spring, guide block and contact spring assembly, switch plunger, and ball.

Dashpot Assembly—Take out attaching screws and lift dashpot assembly off carburetor.

Disassembly: Disconnect and remove throttle connector rod, disconnect fast idle rod from choke lever. Take out screws fastening air horn, lift off air horn assembly (see Air Horn disassembly below). Take out two attaching screws in dust cover, remove dust cover and gasket. Remove fuel inlet strainer cover nut and remove strainer Take out bowl cover attaching screws and remove bowl cover assembly *(CAUTION*—lift bowl cover straight up to avoid damaging parts on underside of cover). See Bowl Cover disassembly below. Remove spring from accelerating pump cylinder. On Chrysler carburetors, lift out vacuum piston, spring, and gasket from vacuum piston cylinder. On all other carburetors, remove the vacuum piston spring (piston pulls out with cover assembly). Unscrew and remove metering rod jets (use Tool T109-58 or wide bladed screwdriver which will engage both slots in jet) Take out attaching screw in pump discharge jet cluster, remove cluster and gasket. Remove pump relief valve plug assembly and gasket. Remove intake check valve retainer in bottom of pump cylinder, invert carburetor body and catch pump discharge check needle and intake ball as they drop out. Remove pump intake strainer (if used). Take out four screws attaching throttle body, lift off throttle body and gasket. See Throttle Body disassembly below. *CAUTION—DO NOT attempt to remove main Discharge Nozzles (nozzles are permanently installed in body).*

Throttle Body—On Buick carburetors, see Car Starter data (above) for removal of these parts. Remove both idle adjusting screws and springs. Remove both idle port rivet plugs (use Rivet Extractor Tool T109-43). DO NOT remove throttle valves and shafts unless replacement of parts required. To remove these parts, first mark both valves (to insure re-installation in same carburetor barrel), take out attaching screws and remove valves. Take out screw on end of throttle shaft, remove lever and washer. Remove shaft retainer ring or use rawhide mallet to tap shaft out through retainer, remove shaft and lever assembly. Remove fast idle cam and trip lever mechanism.

Bowl Cover—Unhook and remove both metering rods *(CAUTION*—use care not to bend or otherwise damage the rods), do not lose metering rod discs (when used). Unhook vacuum piston from link (on Chrysler carburetors, piston is not attached to link but it will be necessary to compress link spring and retainer, remove brass pin from end of link, then remove retainer and link spring). Lift vacuum piston link out. Push float fulcrum pin out, remove float assembly, remove intake needle from float lever (types where needle clipped to float lever). Remove fuel intake needle seat and gasket. Unscrew both low speed jets (use T109-76 wrench). Remove cover gasket. Remove hairpin clip from pump connector link, remove link, remove pump plunger assembly. If pump arm countershaft requires removal (for parts replacement), loosen screws in metering rod and pump arms, take out pin spring in end of countershaft, pull countershaft and lever assembly out and at the same time lift out the metering rod arm and pump arm.

Air Horn—Remove retainer screws and retainers, remove choke housing and coil assembly, gasket, and baffle plate. Remove lever from end of choke shaft. Take out attaching screws and remove choke valve. Rotate shaft to disengage vacuum piston from cylinder, withdraw shaft and piston assembly.

▷*CHRYSLER THERMOSTATIC COIL HOUSING CAUTION:* Thermostatic coil, heat retainer plate, and housing are serviced as an assembly. Coil and heat retainer plate can be removed from housing for cleaning by hitting assembly sharply against palm of hand with coil side down.

CONTINUED ON NEXT PAGE

CARTER "WCD"

Cleaning & Inspection: Wash all parts except thermostatic coil and housing assembly in suitable cleaning solvent. Blow out all passages and dry with air. Make certain that all gum and carbon deposits removed, particularly from carburetor barrels at throttle valves and idle ports. Inspect all parts for wear or damage.

Reassembly: Use all NEW gaskets. Install parts in reverse order of disassembly procedure and note the following important instructions:

Throttle Valve Installation—Insert throttle shaft in throttle body, install shaft retaining ring on end of shaft with prongs outward, press ring on shaft so that it is snug fit against body without endplay in shaft. Install throttle valves with trademark ("c" in circle) on idle port side and facing downward toward manifold side, insert throttle valve screws loosely. Close throttle fully, center both valves in carburetor barrels, hold valves firmly in place while supporting screw heads on a steel block.

Pump Jet Assemblies—Use loader tool T109-122U to install pump intake check ball and retainer in pump cylinder (place ball and new retainer in small end of tool sleeve, tap sleeve to seat retainer in pump cylinder recess). Place pump discharge check needle with tapered end down in passage in main body, install pump discharge cluster with new gasket, tighten screw securely. Install pump relief valve plug and gasket.

Accelerating Pump, Metering Rod & Vacuum Piston Assembly—Install vacuum piston link in bowl cover with lip at center opening pointing toward outer side of cover (*CAUTION*—use care not to distort metering rod spring). Install piston on lower end of link on all carburetors except Chrysler (NOTE—On Chrysler, install link spring and retainer on link, compress spring and install brass pin in end of link, install vacuum piston in main body). Coat pump operating countershaft with light graphite grease and insert it through hole in bowl cover and through metering rod arm and pump arm (hold metering rod arm so that it engages opening in piston link and pump arm so that it extends over pump plunger), install pin spring in groove in end of countershaft. Center pump arm over pump plunger rod and tighten setscrew temporarily, install pump link in plunger rod and pump arm with ends of link pointing toward countershaft arm and secure with pin spring. After bowl cover installed and pump connector rod installed, adjust pump stroke (see ADJUSTMENTS). Install metering rods, inserting end of each rod through hooked end of metering rod spring and entering metering rod in metering rod jet, rotate rod eye over pin on piston link, adjust metering rods (see ADJUSTMENTS).

Automatic Choke Assembly—Install choke shaft, link, and piston assembly in air horn, rotate shaft to enter piston in cylinder. Install choke valve on shaft with trademark on valve ("c" in circle) upward, install new screws loosely, then close choke valve and tap it gently to center the valve, tighten screws securely. Check for uniform clearance at edges of valve and for free operation (valve should open of own weight from closed position). Stake screws lightly while supporting screw heads on a steel block. Install baffle plate and coil housing with a new gasket, place indicator mark on cover downward and install retainers and screws loosely, then rotate housing counter-clockwise until correct setting secured (see ADJUSTMENTS), tighten retainer screws securely.

SERVICE PARTS

Gasket Sets—Carter No. 189 (595S,SA; 608S,SA,SC; 609S,SA,SC; 663S, 664S, 682S, 685S,SA; 719S,SA; 720S,SA; 722S, 723S, 2122S, 2146S), No. 190 (630S,SA, SB; 653S, 665S), No. 195A (725S,SA; 726S,SA; 882S, SA; 883S, 2017S, 2081S, SA), No. 201A (742S, 845S), No. 212D (830S, SA, SC; 931S, SA, SB, SC; 935S,SA; 884S,SA,SC), No. 230 (2034S), No. 231 (2010S), No. 237 (2039S,SA), No. 256 (2179S), No. 258 (2204S), No. 268 (2061S).

Repair Pkg. (with Std. Metering Rods)—Carter No. 1363C (595S,SA), No. 1364D (608S,SA), No. 1365D (609S,SA), No. 1369A (630S, SA, SB; 653S), No. 1390A (685S, SA), No. 1391B (608SC, 663S), No. 1392B (609SC, 664S), No. 1506A (722S), No. 1507A (719S,SA; 720S,SA), No. 1508A (682S), No. 1512A (723S), No. 1515D (725S,SA), No. 1532C (726S,SA), No. 1538A (742S, 845S), No. 1577A (830S,SA), No. 1595 (882S,SA), No. 1596 (883S), No. 1704B (884S, SA, SC), No. 1705B (931S, SA, SB, SC), No. 1731 (2010S), No. 1732 (2034S), No. 1735 (2017S), No. 1740 (935S, SA), No. 1747(2081S,SA) No. 1748 (2039S, SA), No. 1750 (2122S), No. 1780 (2179S).

CARTER DUAL TYPE "WDO"

HUDSON	Carter No.
1946-47 Six	501S
1946-47 Eight	502S
1948-50 Six	647S, SA
1948-50 Eight	648S
OLDSMOBILE	
1946-48 Eight S-M Trans.	503S, SA
1946-47 Eight H-D Trans.	480S
1948 Eight H-D Trans.	650S, SA

H-D—Hydra-Matic Drive Trans.
S-M—Synchro-mesh Transmission.

PACKARD	Carter No.
1946-47 Super 8	531S, SA
1946-47 Cust. Super 8	531S, SA
1948-49 "2200" Eight	644S, SA
1948-49 "2200" Super 8	643S, SA
1948-49 "2200" Cust. 8	531S, SA
1949-50 "2300" Super 8	643SA
1949-50 "2300" Cust. 8	531SA
PONTIAC	
1946 Eight	548S

▷CHANGES, CAUTIONS, CORRECTIONS

▷Buick & Packard Carter Car Starter: All models have Car Starter (Vacuum Switch) mounted on throttle body casting for starter motor control. *Refer to Electrical Equipment Index for 'Carter Car Starter' for complete data on this unit.*

▷Hudson 6 & 8 647S, SA; 648S Carburetor Correction for Stumble on Acceleration: If this condition noted at low speeds (just off idle), check throttle connector rod for excessive play at upper end where rod linked to pump countershaft lever, correct by installing No. 136-37 Washers on pin spring side of connector rod end to remove any excessive play.

▷Hudson Six 647S Carburetor Change to correct complaint of Lean Condition at 20 MPH. On cars with later Intake Manifold (mounting carburetor in vertical position) and new No. IGS-4213A-1 Distributor, new parts listed below can be installed in 647S carburetors which will bring them up to 647SA standards (CAUTION—If air horn removed with carburetor on car, do not open throttle valve which may cause pump check needle to drop down in manifold).

Unitized Package No. 75-700U

Metering Rods (2 furnished)	Carter No. 75-686
Bypass Bleeder Screw Plugs (2 furnished)	Carter No. 11B-159
Identification Tag (647SA)	Carter No. 107-30

Intake Manifold Change—New intake manifold (as noted under 647S Carburetor change above) with changed flange angle to provide for vertical mounting of the carburetor used in production on late 1949 cars. If this manifold installed on early cars, following new parts must be installed:

	New Part No.	Superseded Part No.
Intake Manifold (Aluminum)	302459	301150
Intake Manifold (Cast Iron)	302460 (when used)	
Accelerator Cross-shaft & Lever Assy.	302515	301631
Carburetor Choke Heat Tube	302518	300674
Carburetor Air Cleaner Brace	302520	301265
Fuel Line (Fuel Pump to Carburetor)	302514	300830

▷Hudson Six Later 647SA Carburetors—Has new parts listed above for 647S carburetor and was used in production on later cars.

▷Oldsmobile 480S, 503S, 505S, 650S Change to Improve Warm Engine Starting. Use Repair Parts Package No. 1096A and install following new parts (contained in pkg.): Needle & Seat Assembly No. 25-164S, Vacuum Piston Spring No. 61-175, Metering Rod No. 75-641, and change float level to 15/64" (was 3/16").

Oldsmobile 503SA & 650SA Carburetor Note—Have new type parts and new float level setting (as recommended for 503S & 650S above).

▷Packard Eight 512S Production Changes—Various changes in specifications and settings made as follows:

Fast Idle Cam & Fast Idle Setting—Cam Assembly changed to No. 181-110S (was 181-81S) and setting changed to .030" (was .020") for improved Car Starter action. See Fast Idle adjustment instructions following. Throttle Shaft & Lever Assembly also changed to No. 3-454S (was 3-433S).

Unloader Setting Change—Setting changed to 11/64" (was 3/16"). This requires use of new gauge No. T109-166. See Unloader adjustment data.

▷Packard Eight 644S Carburetor Recommended Changes—Following parts have been changed and only new type parts should be installed: Low Speed Jet Assembly No. 11-162S (was 11-163S), Metering Rod No. 75-638 (was 75-451).

Packard 644SA Carburetor Note—Has new type parts listed for 644S above.

▷Packard 531S Choke Trip Lever and Unloader Setting Change: New No. 14-249 Choke Trip Lever should be installed on Model 531-S carburetors used on this model and Unloader should then be set at 11/64" (supersedes setting of 3/16" originally specified for this model). This 11/64" setting requires use of new gauge T109-166 (same as used on Packard 8).

▷Packard Super & Custom 8 531S Carburetor Change for Smoother Warm-up & Low Speed Performance and Increased Gasoline Mileage. Install new Metering Rods Part No. 75-616 (superseding No. 75-538). Inspect and replace Bypass Bleeder Plugs Part No. 11B-168 if plugs have been altered or replaced previously. Check automatic choke thermostatic coil and make certain that it is standard "M" type (if "G" coil found, replace with "M" type). Mark carburetor by punching round hole in brass identification tag to indicate new type metering rods

▷*NOTE—Carburetors on which above changes made at factory are marked by punched hole in brass identification tag (531SA carburetors also have these changes).*

▷Packard Custom 8 531SA Carburetor Note—Has new Metering Rods 75-616 (see 531S change above) and new Body Flange Casting & Starter Switch Assembly No. 1-563S (casting identification number 564), new Bypass Bleeder Screw Plug No. 11B-168 (supersedes No. 11B-159), and new Spring Retainer No. 63-93 (supersedes No. 63-35). NOTE—When overhauling carburetors with new No. 1-563S Body Flange Casting, use No. 3-607S Throttle Shaft & Lever Assembly and No. 63-118 Throttle Shaft Retaining Ring (install with prongs extending outward). On carburetors with first type No. 1-378S Body Flange Casting, use No. 3-445S Throttle Shaft & Lever Assy. and No. 101-69 Throttle Centering Screw.

▷Packard Super 8 643S Production Change—Body Flange Casting & Switch Assembly No. 1-537S (marked 377) changed to Part No. 1-562S (marked 561).

Packard Super Eight 643SA Carburetor Note—Has later type Body Flange Casting & Switch Assy. No. 1-562S (see 643S changes above).

DESCRIPTION: Dual barrel carburetors. Same design as Single Barrel Vacumeter type except for dual feature. Carburetor has two independent mixing chambers, main nozzles, metering rods and jets, throttle valves, and idling systems. One accelerating pump (with double discharge jets) and one economizer vacuum piston assembly used for both barrels.

IDLING ADJUSTMENT: Adjust carburetor only with engine warmed up & idling at hot or slow idling speed (choke valve wide open, fast idle inoperative). Idle adjusting screw provided for each carburetor barrel. Screws control fuel mixture and should be turned in for leaner mixture, out for richer mixture and both screws just be adjusted exactly alike. See table below for approximate settings on each car model. Idle speed controlled by throttle lever stopscrew and should be set for speed shown in table. See tune-up data on car model pages

IDLE SETTING

Car Model	Carburetor	Idle Screw Setting	Idle Speed
Hudson 6 ('41-47)	501-S	½-1½ turns open	600 RPM.③
Hudson 6 ('48-49)	647S, SA	1¼-1¾ turns open	⑨
Hudson 8 ('41-47)	502-S	½-1½ turns open	600 RPM.③
Hudson 8 ('48-49)	648S	1-1½ turns open	⑨
Oldsmobile 8 ('41-48)⑤	503S, SA	½-1¼ turns open	6 MPH.
Oldsmobile 8 ('40-47)⑥	480S, SA	½-2¼ turns open	375 RPM.
Oldsmobile 8 ('48)⑥	650S, SA	½-1½ turns open	375 RPM.
Packard 8	644S, SA	⅝-1⅛ turns open	⑦
Packard 8	531S, SA	1½-2 turns open	⑦
Packard Super 8	643S, SA	¾-1¼ turns open	⑦
Pontiac 8	548S	¼-1¼ turns open	7-8MPH.

③—7½-8MPH. (4 1/9-1 Axle), 6½-7 MPH. (4 5/9-1), 6-6½ MPH. (4 7/8-1).
⑨—540-560 RPM (Std.), 580-600 RPM (With Vacumotive Drive or Drivemaster).
④—8-10 MPH. on cars with Electromatic Clutch.
⑤—Cars with Synchro-mesh Trans. ⑥—Cars with Hydra-Matic Drive.
⑦—6 MPH (Std. Trans.), 400 RPM (With Ultramatic Drive).

ACCELERATING PUMP: High pressure type (spring operated—pump operating lever and pump arm linked by small coil spring).

Pump Seasonal Adjustment—On some models, pump arm (under dust cover) has two or three holes for pump rod link connection to provide varied pump stroke for seasonal pump requirements. See tune-up data on car model pages for recommended settings and seasonal changes.

Pump Stroke Adjustment—On models with integral air horn and dust cover, remove this assembly to expose pump countershaft and connector link (on models with separate dust cover, take out two retaining screws and remove dust cover only). Back off throttle lever stopscrew so that throttle valves tightly closed, check pump seasonal adjustment (connector link must be engaged in hole for correct stroke as shown in table below). Install Universal Pump Stroke Gauge T109-117S on rim of bowl cover at plunger shaft so that projection on gauge rests on top surface of connector link at pump shaft (see gauge note below). Note gauge reading with throttle closed, then open throttle wide and

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CARTER DUAL TYPE "WDO" (C ntinued)

again note gauge reading. Difference between two readings is pump stroke (in sixty-fourths of an inch) and should agree with figure shown in table below. Adjust by bending throttle connector rod at lower angle near throttle lever (use bending tool T109-75). CAUTION—Check metering rod setting and anti-percolator adjustment after adjusting pump stroke.

ACCELERATING PUMP SETTING

Car Model	Carburetor	Pump Stroke	Pump Setting
Hudson 6	501-S, 647S, SA	18/64"	Long Stroke
Hudson 8	502-S	18/64"	Long Stroke
Hudson 8	648S	14/64"	Long Stroke
Oldsmobile	503S, SA	19/64"	Non-Adj.
Oldsmobile	471S, 480S, SA; 650S, SA	19/64"	Non-Adj.
Packard 8	644S, SA	14/64"	Short Stroke
Packard 8	531S, SA	26/64"	Short Stroke
Packard Super 8	643S, SA	28/64"	Non-Adj.
Pontiac 8	548S	19/64"	Short Stroke

METERING ROD (EXC. PONTIAC): Main nozzle fuel metered by metering rod and jet (independent rod and jet for each nozzle). Metering rods operated by single vacuum piston with throttle control (stop pin on pump arm limits piston travel so that metering rod lifted in accordance with throttle opening). No adjustment provided but metering rods can be changed to secure leaner-than-standard fuel mixture to compensate for special fuel or high altitude conditions (both rods must be same size and should be changed as a unit). Check metering rod setting whenever rods removed or pump stroke adjusted.

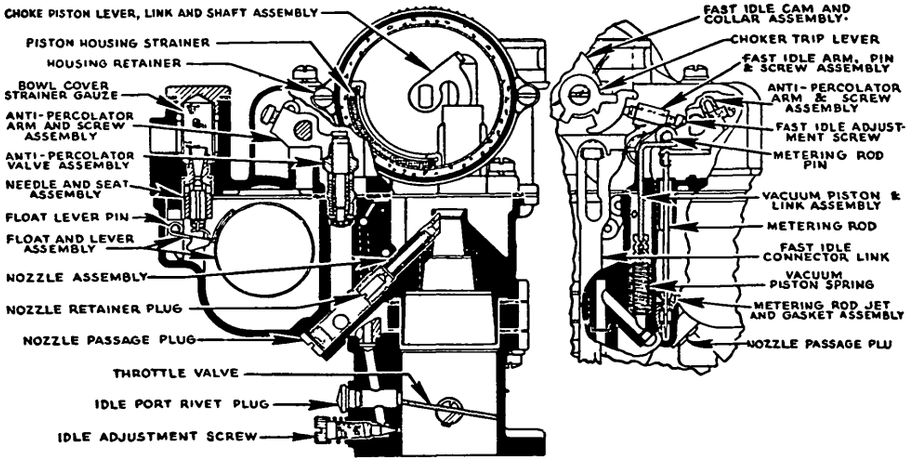
To Remove Metering Rods—Take out screws and remove dust cover or remove air horn and dust cover assembly (where these parts integral—see Service data for removal instructions). Remove pin spring from metering rod pin and slide pin from vacuum piston link being careful not to bend metering rod spring. Lift out metering rods, remove metering rod discs (on some models, discs held by retainer (must be removed first by taking out retainer screw).

To Check Metering Rods—Back off throttle lever stopscrew so that throttle valves are tightly closed. Install metering rod gauge (see table below) in place of each metering rod making certain that tapered ends are seated in metering rod jets. Install metering rod pin in piston link. Push piston link down until metering rod pin rests lightly on shoulder of notch in each gauge. With throttle valves seated, and vacuum piston held down, bend lip on anti-percolator arm (which extends under metering rod pin) so that lip just touches pin (use adjusting tool T109-105).

METERING ROD SETTING

Car Model & Carb.	Metering Rod Gauge (& Length)
Pontiac 548S	T109-27 (2 359")
All Other Cars & Carburetors	T109-113 (2 280")

METERING ROD (PONTIAC): Metering rod operates similarly to other carburetors except that vacumeter piston is not used and rods are mounted on pump arm and positively controlled by the throttle lever. Check metering rod setting as follows:



Checking Metering Rods—Back off throttle stopscrew so that throttle valves tightly closed, loosen anti-percolator arm screw. Install metering rod gauge (see table above) in place of each metering rod, make certain that gauges seat in metering rod jets and are vertical. Install metering rod pin and pin spring in metering rod arm. Press down lightly on pump arm. Pin must rest on shoulder of notch in each gauge (bend arm as necessary to equalize), and clearance between pin and each gauge must be less than .005". Tighten anti-percolator arm screw Re-install metering rods, check anti-percolator setting

FLOAT LEVEL: To check float level, with bowl cover assembly removed, remove cover gasket, invert cover, measure from machined gasket seat on cover to top of float (check at both ends of float—settings must be alike). See table below for float level and special checking gauge for each model. To adjust, bend lip on float lever at point where it contacts valve needle (do not bend float or arm).

FLOAT LEVEL SETTING

Car Model	Carburetor	Float Level	Checking Gauge
Hudson ('41-47)	501-S, 502-S	1/8"	T109-36
Hudson 6 ('48-49)	647S, SA	3/16"	T109-28
Hudson 8 ('48-49)	648S	13/64"	T109-39
Oldsmobile	480S, 503S, 650S	②3/16"	T109-28
Oldsmobile	480S, 503S, 650S	③15/64"	T109-32
Oldsmobile	480SA, 503SA, 650SA	15/64"	T109-32
Packard 8	644S, SA	5/32"	T109-154
Packard 8	531S, SA; 643S, SA	5/32"	T109-154
Pontiac 8	548S	5/16"	T109-107

②—With 1st. type Needle & Seat Assy. No. 25-100S.
③—With 2nd. type Needle & Seat Assy. No. 25-164S (see Recommended Changes).

FAST IDLE: Consists of a fast idle lever linked to the throttle valve lever and mounted directly below the fast idle cam on the choke valve shaft. To adjust, hold choke valve tightly closed, adjust fast idle arm screw so that clearance between throttle valve and carburetor wall on side opposite idle port is correct as shown in table below (use special checking gauge inserted between throttle valve and wall to check opening).

FAST IDLE SETTING

Car Model	Carburetor	Throttle Opening	Checking Gauge
Hudson 6 ('41-47)	502-S	.045"	T109-58②
Hudson 8 ('41-47)	501S	.053"	T109-58②
Hudson 6 & 8	647S, SA; 648S	.054"	T109-193④
Oldsmobile ('41-48)	480S, SA; 503S, SA 650S, SA	.015"	T109-44
Packard 8	512S, 644S, SA	.020"①	T109-29
Packard Super 8	531S, SA	.023-.028"	T109-189③
Packard Super 8	643S, SA	.026"	T109-189③
Packard Cust. 8	531S, SA	.023-.028"	T109-189③
Pontiac 8	548S	026"	T109-189

①—Supersedes original setting of .030" on 512S.
②—Gauge T109-58 used for both .045" and .053" settings.
③—Gauge T109-189 used for .023" & .026" settings (supersedes T109-114).
④—Gauge T109-193 used for both .040" and .054" settings.

ANTI-PERCOLATOR: Plunger Type. Consists of vent above each main jet well controlled by spring-loaded plunger type valves. Valves are opened by anti-percolator arm connected to throttle when throttle valves are closed to vent nozzle and prevent any "percolating" discharge when carburetor is hot.

Buick Models (except 419-S)—These carburetors have suction type anti-percolators which are pressed in carburetor and require no adjustment. Do not remove these anti-percolators (correct tube location extremely important).

Adjustment—Make this adjustment after metering rod setting and pump stroke setting have been adjusted (use extreme care not to disturb these settings). On models with integral air horn and dust cover, remove this assembly to expose anti-percolators (on models with separate dust cover, take out two retaining screws and remove dust cover only). Back off throttle lever stopscrew so that throttle valves tightly closed. On models listed in table below, insert special gauge (or feeler gauge of thickness listed) between anti-percolator stems and lips on anti-percolator arms—do not use any gauge on other models. Adjust by bending lips on anti-percolator arms so that center of indicator line on each anti-percolator stem is flush with top of anti-percolator plug. Use extreme care to secure same adjustment on both anti-percolator units.

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CARTER DUAL TYPE "WDO" (Continued)

ANTI-PERCOLATOR SETTING

Car Model	Carburetor	Checking Gauge	Thickness
Packard 8	512S, 644S, SA	T109-72	.015"
Packard 8	531S, SA; 643S, SA	T109-72	.015"
Pontiac 8	548S	T109-72	.015"
All Others		None	None

THROTTLE VALVE SETTING: Install valves with trademark "C" toward idle port side, use new attaching screws, install screws loosely, tap valves lightly to centralize them in bore, then tighten screws securely. Check valve setting with throttle lever stopscrew backed out so that valves tightly closed. Idle port figure is distance from top edge of valve to top of idle port. Vacuum spark port figure is distance from top edge of valve to top (or bottom as noted) of vacuum spark port. Shims furnished .002" thick (2-93), .005" thick (2-94) for throttle valve setting adjustment.

THROTTLE VALVE SETTING

Hudson 6 ('40-47)	501-S	.108-.112"	③.029-.033"
Hudson 8 ('40-47)	502-S	.133-.137"	None
Hudson 6 & 8	647S, SA; 648S	.157-.163"	③.030-.040"
Oldsmobile ('41-48)	480S, SA; 503S, SA	.144-.150"	③.029-.033"
Oldsmobile ('48)	650S, SA	.144-.150"	③.029-.033"
Packard 8	644S, SA	.127-.133"	③.060"
Packard Super 8	531S, SA	.152-.158"	③.050-.054"
Packard Super 8	643S, SA	.127-.133"	③
Packard Cust. 8	531S, SA	.152-.158"	③.050-.054"
Pontiac 8	548S	.140-.146"	②.050-.054"

①—Bottom of port above top of valve.
②—Top of port above top of valve.
③—Top of port above valve: (643S) .050-.054", (643SA) .060".

UNLOADER: -Consists of a lip on throttle connector which engages the choke trip lever on the choke valve shaft so that the choke valve is opened when the throttle is wide open. To adjust, hold throttle valve wide open, bend lip on fast idle connector link so that clearance between upper edge of choke valve and air horn wall correct as shown in table below (use gauge to check opening).

UNLOADER SETTING

Car Model	Carburetor	Unloader Gauge	Clearance
Hudson 6 & 8	501-S; 502-S	T109-31	1/4"
Hudson 6 & 8	647S, SA; 648S	T109-31	1/4"
Oldsmobile	480S, SA	T109-28	3/16"
Oldsmobile	503S, SA; 650S, SA	T109-31	1/4"
Packard 8	644S, SA	T109-166	11/64"
Packard Super 8	531S, SA	T109-166	②11/64"
Packard Super 8	643S, SA	T109-166	11/64"
Packard Cust. 8	531S, SA	T109-166	11/64"
Pontiac 8	548S	T109-166	3/16"

④—Supersedes 3/16" setting (T109-28) with No. 14-219 Choke Trip Lever which should be replaced by new No. 14-249 Choke Trip Lever for which 11/64" setting given above is correct.

Choke Valve Lock:—With unloader properly adjusted, choke valve will be locked in wide open position with throttle valves wide open. Choke valve will be released when throttle valves closed.

CHOKE: -Thermostatic coil housing reference mark should be centered on mark on piston housing (for all models except those shown in table below) or should be rotated counter-clockwise (Rich), clockwise (Lean), the correct number of notches from the center mark as follows:

CLIMATIC CONTROL (CHOKE) SETTING

Car Model	Carburetor	Choke Setting
Hudson 6 & 8	501-S, 502-S	1 point Lean
Hudson 6	647S, SA	1 point Lean
Oldsmobile ('41-48)	480S, 650S, 650SA	2 points Rich
Packard Super & Cust. 8	531S, 531SA	②Centered
Pontiac 8	548S	2 points Rich
All Others		Centered

②—With later type No. 170M-64S Thermostatic Coil & Housing Assy.

CARBURETOR OVERHAUL: *CAUTION—When disassembling carburetor, note the following important points:*

▷Carter Car Starter Note—When disassembling carburetors which are equipped with this unit, the Car Starter which is located in the Throttle Body Casting must be disassembled as follows: Hold switch firmly against casting, remove terminal cap clip and screw, withdraw switch using care not to lose small square adjusting shims, remove switch ball. Invert casting and remove retainer ring and switch strainer. *Refer to Carter Car Starter article in Electrical Equipment Section for complete switch servicing and adjusting directions.*

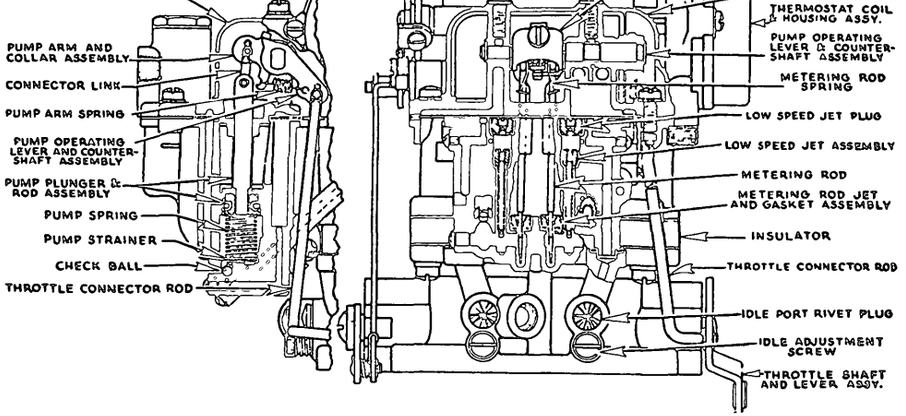
Disassembly: Remove dust cover attaching screw and lockwasher, remove the dust cover (when dust cover is separate), remove fast idle arm and spring assemblies. Take out air horn attaching screws (two screws outside, one screw inside under choke valve) and remove air horn and Climatic Control assembly. Remove pin spring and pump connector link, spring retainers and springs to remove throttle connector rod, take out four flange attaching screws and lift off flange, gasket and two idle passage gaskets taking care not to lose vacuum piston spring. Disconnect piston from piston link, lift out metering rod and piston link assembly, disconnect metering rods from link. Remove four bowl cover attaching screws, remove bowl cover and body gasket. Remove metering rod disc retainer and discs, pump plunger and rod assembly, pump spring, pump inlet ball check, metering rod jets and gaskets, anti-percolators (use 13/32" socket wrench T109-68), pump jet passage plugs, pump jets, nozzle plug and gasket assemblies, nozzle retainer plugs and nozzles (nozzles pressed in, use tool No. T109-55), nozzle gaskets, low speed jet and gasket assemblies, pump outlet ball retainer plug and ball (in center of casting next to air horn retaining screw hole), throttle valve attaching screws and throttle valves, throttle centering screw, arm attaching screw, washer, and arm. Remove fast idle spring retainer, spring, connector link, connector link spring, withdraw throttle shaft assembly. Take out idle adjusting screws, remove idle port plugs.

Servicing—Clean castings and all parts with gasoline (no not immerse cork parts in gasoline), blow out all passages with compressed air, check all parts for correct specifications and replace all worn parts. Use all new gaskets when reassembling. Soak needle seat gasket, low speed jet gasket and metering rod jet gasket in alcohol for 15 minutes, install and let dry on part.

Reassembly: Reassemble in reverse order. Check throttle valves (see Throttle Valves above), make certain that low speed jets seat at both ends and are tight, install nozzles with flat side facing up. Vacuum piston is offset from link and should be installed with large side of piston toward bores. When installing flange assembly on body casting, hold body casting upside down with vacuum piston vertical, place piston spring in piston, then place flange assembly on body casting, guiding piston and spring into cylinder in flange casting. Check metering rods, anti-percolator, pump, and fast idle as directed above.

SERVICE PARTS: Gasket Sets—No. 149 (501S, 502S, 647S, SA, 648S), No. 156 (512S, 513S, 531S, 643S, SA, 644S, SA), No. 158 (480S, SA, 503SA, 650S, SA).

Repair Packages (with std. Metering Rods): No. 1092A (512S), No. 1096A (480S, SA, 503S, SA, 650S, SA), No. 1302A (501S), No. 1303A (502S), No. 1321C (531S), No. 1375B (643S, SA), No. 1376C (644S, SA), No. 1381B (647S, SA), No. 1382A (648S).



CARTER DUAL TYPE WGD

	Carter Model No.
BUICK	
1955 Series 40 (Late)	2292S
FRAZER	
1951 All Models	②813S
HUDSON	
1950-52 Six (exc. Pacemaker)	②776S
1950-52 Eight	②773S
1953 Sixes (exc. Jet)	②776S
1954 5D Super Wasp, 7D Hornet	2115S
1955 Hornet 6 Std.	2252S
1955 Hornet V8	2231S, SA
KAISER	
1951-52 All Models	②781S
1953 All Models (Early)	999S
1953 All Models (Later)	2052S
1954 K-545 Special	2052S, SA
NASH	
1955 Ambassador V8	2231S, SA
OLDSMOBILE	
1949-50 88 & 98 Repl.	①714SU, 714SAU, 849SU
1949 88 & 98	②714S, SA
1951 88 & 98	851S
1952-53 Deluxe 88	851S, SA
1953 Deluxe 88 (Later)	2015S
1954 Deluxe 88	2058S
PACKARD	
1949 Late "2300" Eight	②728S, SA
1950 "2300-5" Eight	728SA
1951 "200"	784S
1951 "300" & "400"	767S
1952 "200"	784S
1952 "250", "300", "400"	928S
1953 2601 Clipper, 2633 Comm'l	784S
1953 2611 Del. Clipper, 2613 Comm'l	928S
1954 5400 Clipper Special	986S
1954 5401, 11 Clipper Deluxe & Super	2102S
PONTIAC	
1955 V8 Synchro-mesh	2207S, SB
1955 V8 Hydra-Matic	2182S, SA, SB
WILLYS	
1954 All (6-226 Eng.)	2052S, SA
1955 Pass. Cars	2052SA

①—Replacement Pkg. (carburetor and necessary installation parts) for cars not Carter equipped.
②—See Production Change Notes below.

►**CARBURETOR MODEL IDENTIFICATION:** Individual models may be identified by Body Casting No. on face of flange: 604 (714S, SA; 849S), 615 (728S, SA), 774 (781S, 813S), 803 (767S. 784S), 836 (851S), 1236 (2231S), 1185 (2052S, SA).

►CHANGES & CORRECTIONS

►**FRAZER 813S & KAISER 781S CHANGE (to correct Stalling & Hard Starting caused by Flooding):** On carburetors before June 1950 (stamped "EO" and previous and not marked by "X" on tag) with original type No. 25-173S Intake Needle & Seat Assembly, install latest type needle and seat assembly and change float level as follows:

Intake Needle & Seat Assy. No. 25-196S—Install this new type which has SOLID needle (no spring) and longer standpipe to prevent foreign material entering carburetor. Make certain that intake needle pull clip engages float lever lip. *NOTE*—25-196S can be distinguished from second type 25-185S by solid needle (both types have longer standpipe but 25-185S also has spring-loaded needle).

Float Level—Set float level at ¼" (Float level Gauge T109-31) measured from top of float at center to gasket seat on bowl cover with assembly inverted.

►*CAUTION*—Float level setting of ¼" used only when SOLID needle (no spring) installed. Carburetors with SPRING-LOADED needle have 7/64" float level setting.

Carburetor Marking—Stamp "XX" on carburetor identification tag to indicate that above changes have been made.

Fuel Pump Pressure—Fuel pump pressure should be 3½-4½ lbs. and must not exceed 4½ lbs.

►*CAUTION*—Carburetors stamped "FO" and "GO" (June & July 1950) and also carburetors marked by an "X" on identification tag have second type No. 25-185S needle and seat assembly and need not be changed as directed above. All carburetors stamped "HO" and later (beginning August 1950) have latest type No. 25-196S needle and seat assembly and new ¼" float level setting.

►**HUDSON CARBURETOR PRODUCTION CHANGES:**

Choke Setting Change (6 Cyl. 776S)—Setting changed to 2 Point Lean (superseding original setting of 1 Point Lean).

Metering Rod Change (6 Cyl. 776S)—New Std. Rod No. 75-754 supersedes original rod No. 75-732 which is now 1 Size Lean. Original 1 Size Lean Rod No. 75-740 has been discontinued.

Intake Needle & Seat Assembly Change (6 & 8 Cyl. 776S & 773S)—New type No. 25-186S supersedes original No. 25-165S. This new 25-186S assembly has longer standpipe to lessen possibility of failure due to dirt or other foreign material in fuel and will correct starting difficulties due to flooding.

Other Parts Changes (6 & 8 Cyl. 776S & 773S)—Accelerating Pump Plunger, Rod, Spring, & Retainer Assembly No. 64-132S supersedes No. 64-129S (776S), No. 64-133S supersedes No. 64-130S (773S). New Pump Spring Retainer No. 63-149 supersedes No. 63-92 (all carburetors).

►*HUDSON "TWIN H-POWER" CARBURETION NOTE: Twin H-Power Cars have two WA1 Carburetors. See "Carter WA1 Carburetors" for data on these models.*

►*HUDSON & NASH PRODUCTION CHANGES (To correct Hard Starting):*

1) **Atmospheric Vent Valve**—This valve entered production with Car Serial No. Y-5836 (Hudson), V-8116 (Nash), and should be installed on all earlier cars. Unitized package Carter No. 118-122U, consists of Dust Cover, Screws & lockwashers. *NOTE*—Should Dust Cover strike Air Cleaner, make depression in Air Cleaner to relieve contact.

2) **Carburetor Float Level**—Float level revised starting with engine No. P-14763. *NOTE*—Check float for bind in bowl or that pin end of float lever striking bowl chamber sides.

3) **Heat Deflector**—Heat Deflector installed between carburetor & intake manifold starting with engine No. P-10050. Available for use on earlier cars under Hudson & Nash No. 5300977 (Deflector), No. 6348465 (Gaskets).

►**OLDSMOBILE 714S CHANGE (to correct starting difficulties du to Flooding):** New Intake Needle & Seat Assembly, Part No. 25-182S, should be installed on first cars (supersedes previous type No. 25-163S). Will also lessen possibility of failure due to dirt or other foreign material in fuel (needle seat has longer standpipe so that fuel drawn in at higher level). **When this assembly installed, stamp an "X" on carburetor identification tag.**

NOTE—This new 25-182S needle & seat assembly used on later production carburetors.

►**OLDSMOBILE 851S THROTTLE STICKING CORRECTION (Carburetors before February 1951):** On carburetors prior to Code date B1, Fast Idle Link Spring No. 61-443 should be installed on lower end of fast idle link (loop spring around connector clip, engage upper end on shank of fast idle link, engage lower end on end of connector rod). Spring will prevent throttle sticking in wide open position.

NOTE—Carburetors stamped "B1" and later have this spring installed in production and also have small boss on choke housing which acts as additional guide for fast idle link.

►**OLDSMOBILE REPLACEMENT CARBURETORS:** Packages listed above consist of one carburetor: 714S (Pkg. 714SU), 714SA (Pkg. 714SAU), 849S (Pkg. 849SU) together with 195-43U Installation Unit:

No. 195-43U Installation Unit—Consists of the following parts needed to install carburetors on this model: 180-49 Air Cleaner Mounting Bracket, 90-17S Air Cleaner Adapter Clamp Assy., 108-48 Air Cleaner Spacer, 105A-44 Air Cleaner Nut, 86-12 Flange Stud & Air Cleaner Lockwasher, 101-280 Bracket Capscrew, 137-59 Choke Heat Tube, 99-10 Tube Compression Coupling Cone, 156-17 Elbow Fitting.

►**PACKARD 728S & 728SA PRODUCTION CHANGE:** Model 728SA has changes in calibrations as follows: **Metering Rod (Std.)**—(728S) No. 75-679, (728SA) No. 75-707.

Main Nozzle—(728S) #38 drill I.D., (728SA), #30 drill I.D. NOTE—Nozzle is installed permanently and should not be removed.

Intake Nozzle & Seat Assembly Chang (728S & 728SA). New type No. 25-186S supersedes first type No. 25-165S. New 25-186S assembly has longer standpipe on seat to lessen possibility of dirt or other foreign material in fuel entering carburetor and will correct starting difficulties due to flooding.

►**PACKARD 767S & 784S FUEL LEAKAGE CORRECTION:** Fuel leakage at passage in main body directly below Climatic Control may be caused by loose Pump Jet & Housing assembly. To check, remove air cleaner, open throttle by hand (engine must not be running), note evidence of leakage at gasket between pump jet housing and main body casting. To correct, check gasket (replace if not in good condition), and tighten pump jet housing attaching screw using long screwdriver inserted through air horn.

►**PACKARD 767S & 784S FAST IDLE & CHOKE SETTING CHANGE:** New settings will provide slightly lower engine speed when engine is cold and will shorten period during which fast idle operates:
Fast Idle Setting—.023" (supersedes .026").
Choke Setting—1 Point Rich (supersedes 3 Rich).

►**PACKARD 784S CARBURETOR PARTS CHANGES:** New type parts used on later carburetors as follows:
Vacuum Piston Spring—No. 61-134
Accelerating Pump Lower Spring—No. 61-150

►*PONTIAC CARBURETOR FLOODING CORRECTION:* When carburetor flooding is experienced, make the following service checks in the sequence listed: Fuel pump pressure must not exceed 5 lbs. See

CONTINUED N NEXT PAGE

CARTER DUAL TYPE WGD (Cont.)

Pontiac Special Data for corrective procedure. Remove float cover and inspect for foreign material in float chamber. Install late type filter stamped No. 47, if not so equipped. Check float for alignment or binding condition and for proper float level.

▷*WILLYS 4-WHL. DRIVE UTILITY ROUGH ROAD FLOODING & STALLING CORRECTION (Carter 2052S Carburetors):* On Utility vehicles only (Truck & Station Wagon), this condition can be corrected by installing special SPRING-LOADED Intake Needle & Seat assembly as listed below and using special Float Level Setting (see Float Level). On all other models, regular SOLID Intake Needle and Seat are used.

Intake Needle & Seat Assembly

Type	Part No.	Float Level Setting
Solid (Reg. Prod.)	25-196S	9/32"
Spring-loaded (spec.)	25-173S	7/32"

DESCRIPTION

DESCRIPTION: Dual downdraft, horizontal air intake (Oldsmobile 714S, 714SA, 849S), vertical air intake (Oldsmobile 851S and all other carburetors) type with vacuum control of the metering rods (vacumeter), spring-loaded piston type accelerating pump operated by throttle lever, well type non-adjustable anti-percolator, and Automatic Choke and Fast Idle.

Fuel System: Consists of Idle (Low Speed) Fuel System, Main (High Speed) Fuel System, and Accelerating Fuel System which operate as follows (Idle & Main Fuel Systems duplicated for each barrel):

Idle Fuel System—Fuel for idling is taken from main nozzle well up through the Idle Tube which meters the fuel and is then mixed with air admitted through idle air bleed opening in air horn. Fuel mixture passes through restricted horizontal passage and additional air is admitted through idle passage bleed opening in air horn. Fuel mixture then flows down through passage to idle discharge ports at throttle edge. For closed throttle idling, all fuel is discharged through lower port below throttle and is controlled by the Idle Adjusting Screw (upper port serves as additional air bleed). As soon as the throttle is cracked open, additional fuel is discharged through upper port also. At higher car speeds idle system drops out and all fuel is discharged by main fuel system.

Main Fuel System—Fuel enters main well through metering jet and is metered by the metering rod in this jet. Fuel then flows up through main well and is discharged through Main Discharge Nozzle located in throat of primary venturi. Anti-percolator well acts as an air bleed for the main nozzle and this air bleed action is controlled by the size and location of the anti-percolator well vents so that at high speeds practically all back bleeding of air into the system is eliminated.

Anti-Percolator Well Vents—Well is vented through pocket formed by flat on nozzle in high speed passage at inner wall of primary venturi and by restricted opening in air horn at top of well. Additional side vent opening into top of idle well prevents accumulation of vapor in well resulting in rough idle at higher operating temperatures.

ADJUSTMENT & OVERHAUL

IDLING ADJUSTMENT: Adjust only with engine warmed up so that choke valve wide open and engine idling at hot or slow idle speed (Automatic Choke and Fast Idle inoperative). Set throttle stopscrew for correct idle speed, adjust both idle adjusting screws (one for each barrel) so that engine idles smoothly. Screws control fuel mixture and should be turned in for leaner mixture, out for richer mixture. See car model page for complete tune-up data.

Idle Screw Setting

Car & Carb.	Idle Screw Turns Open
Buick 2292S	¼-1¼
Frazer 813S	½-1
Hudson 6 776S	½-1
Hudson 8 773S	½-1
Hudson 2115S	¾-1¾
Hudson 2231S	½-1½
Hudson 2252S	1¾-2¾
Kaiser 781S	½-1
Kaiser 999S, 2052S, SA	½-1½
Nash 2231S	½-1½
Oldsmobile 714S, SA	½-1
Oldsmobile 849S	1-1½
Oldsmobile 851S, SA	¾-1¾
Oldsmobile 2015S	¾-1¾
Oldsmobile 2058S	½-2½
Packard 728S, SA	1-1½
Packard 767S, 784S	½-1½
Packard 928S, 986S	½-1½
Packard 2102S	½-1½
Pontiac 2207S, SB	½-1½
Pontiac 2182S, SA, SB	1¼-2¼
Willys 2052S, SA	½-1½

Idle Speed Setting

Car & Carb.	Synchro-mesh	Auto. Trans.
Buick 2292S	450 RPM	③450 RPM
Frazer 813S	550-600 RPM	425-450 RPM
Hudson 6 776S	540-560 RPM	Ⓒ
Hudson 8 773S	540-560 RPM	Ⓒ
Hudson 2115S	550 RPM	②500 RPM
Hudson 2231S	425 RPM	③425 RPM
Hudson 2252S	540-560 RPM	③490-510 RPM
Kaiser 781S	550-600 RPM	425-450 RPM
Kaiser 999S, 2052S, SA	500 RPM	425-450 RPM
Nash 2231S	425 RPM	③425 RPM
Oldsmobile 714S, SA	425 RPM	②425 RPM
Oldsmobile 849S	425 RPM	②425 RPM
Oldsmobile 851S, SA	425 RPM	②425 RPM
Oldsmobile 2015S	425 RPM	④400 RPM
Oldsmobile 2058S	425 RPM	②400 RPM
Packard 728S, SA	6 MPH	⑤375 RPM
Packard 767S, 784S	6 MPH	⑤375 RPM
Packard 928S, 986S	400-450 RPM	⑤375 RPM
Packard 2102S	400-450 RPM	⑤375 RPM
Pontiac 2207S, SB	450-475 RPM	③390-410 RPM
2182S, SA, SB	450-475 RPM	③390-410 RPM
Willys 2052S, SA	550 RPM	②425-450 RPM

Ⓒ—580-600 RPM (Vacumotive Drive, Drive Master & Supermatic Drive), 490-510 RPM (Hydra-Matic).

②—With Selector lever in "DR" position.

③—With Selector lever in "N" Neutral, compressor running on Air Conditioned cars.

④—400 RPM in "DR" (Hydra-Matic), in "P" (Dynaflow).

⑤—With Selector lever in "H".

ACCELERATING PUMP: No seasonal adjustment provided. Pump stroke should be checked and adjusted before adjusting metering rods. *CAUTION—Oldsmobile carburetors adjusted differently than other models.*

Adjustment (Except Oldsmobile)—Remove the dust cover by taking out two cover screws. Back off throttle lever stopscrew so that throttle valves tightly closed, wedge choke valve in wide open position. Place Pump Gauge T109-117S inverted on edge of dust cover flange, turn knurled nut on gauge until finger at end of gauge extension just touches top of pump plunger shaft. Note gauge reading (see table below). Adjust by bending pump connector rod at upper angle near countershaft lever using tool T109-41. If gauge not used, use scale to measure disance from top edge of flange to top of plunger.

Adjustment (Oldsmobile)—Remove dust cover (on bowl cover) by taking out two screws. Back off throttle lever stopscrew so that throttle valves tightly closed. Place straightedge across dust cover boss at pump arm on countershaft. Bend connector rod linking throttle lever and pump arm at upper bend in arm until upper flat surface of pump arm is parallel to straightedge.

▷*CAUTION—Check Metering Rod Adjustment after adjusting Pump.*

Accelerating Pump Setting

Car & Carb.	Gauge Reading	Plunger Height
Buick 2292S	Ⓒ	
Frazer 813S		1/2"
Hudson 6 776S	46	1/2"
Hudson 8 773S	46	1/2"
Hudson 2115S	43	1/2"
Hudson 2231S	Ⓒ	
Hudson 2252S	Ⓒ	
Kaiser 781S, 999S		1/2"
Kaiser 2052S, SA		1/2"
Nash 2231S	Ⓒ	
Oldsmobile (All)	See Special Above	
Packard 728S, SA; 767S	42	15/32"
Packard 748S, 928S	43	32/64"
Packard 986S, 2102S	43	1/2"
Pontiac 2207S, SB	Ⓒ	
2182S, SA, SB	Ⓒ	
Willys 2052S, SA		1/2"

Ⓒ—Same as Oldsmobile Adjustment above.

▷Pump Vent Note—Pump jet cluster pocket is vented to outside of carburetor body casting to prevent pump jet discharge when engine operated at constant-throttle. If accelerator pedal is depressed repeatedly with engine not running, fuel will be forced out vent and appear on outside of carburetor.

METERING ROD ADJUSTMENT: Metering rods are controlled by a single spring-loaded vacuum piston (rods held down in jets for maximum economy by vacuum piston, and lifted out of jets by spring for acceleration and full power operation when vacuum decreases as throttle is opened). A lip on the metering rod arm (on pump countershaft which is linked to throttle lever) acts as a stop for the vacuum piston link and insures correct metering rod position for all throttle positions.

▷*CAUTION—Check accelerating pump before adjusting metering rod (pump adjustment disturbs metering rod setting). No metering rod gauge required.*

CONTINUED ON NEXT PAGE

CARTER DUAL TYPE WGD (C nt.)

Adjustment—Remove dust cover (on bowl cover) by taking out two cover screws. Back off throttle lever stopscrew so that throttle valves are tightly closed. Loosen clampscrew on metering rod arm on countershaft, press down on vacumeter arm until metering rods just bottom in carburetor casting, hold rods and arm in this position, see that throttle valves closed, position metering rod arm so that lip on arm just contacts vacumeter arm, tighten clampscrew.

►*CAUTION—Reset throttle stopscrew for correct idling speed after metering rod adjustment completed.*

►**Countershaft Lubrication Note**—Lubricate shaft with light graphite grease through hole in center shaft support and outer dust cover screw hole before installing dust cover.

FLOAT LEVEL: Remove the bowl cover and air horn (CAUTION—use extreme care not to damage float and jets when lifting off bowl cover), remove gasket, invert cover and allow float to hang freely. Use correct checking gauge (see table below) between gasket face of bowl cover and nearest point on float (top center of float). Adjust by bending lip on float arm at pivot point. *CAUTION—do not bend float arm.*

►**Frazer & Kaiser Caution**—Do not compress spring loaded pin in intake needle when checking float level (will result in false reading). Allow float to hang freely on inverted cover assembly.

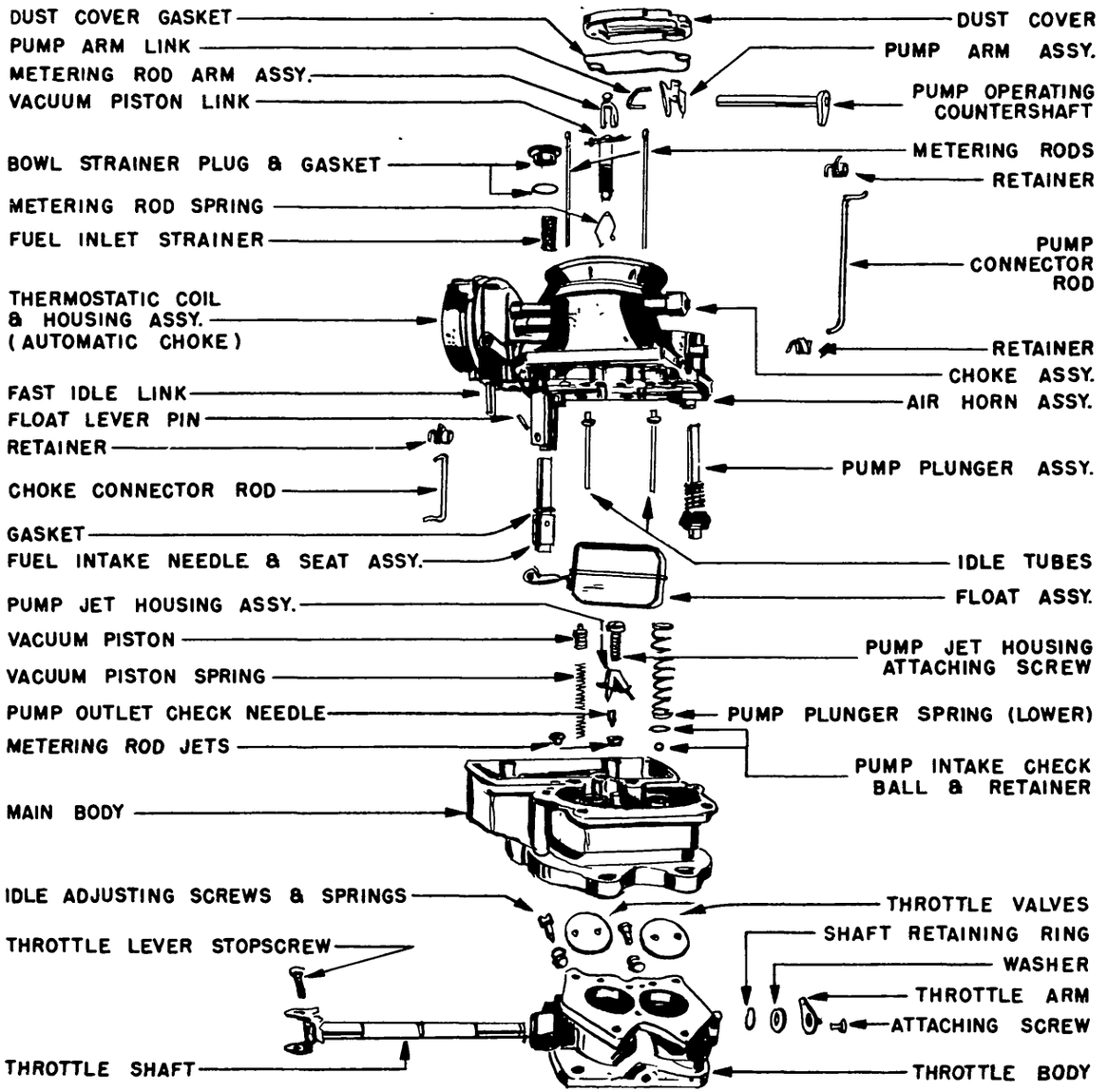
Float Level

Car & Carb.	Checking Gauge	Float Level
Buick 2292S	T109-31	1/4"
Frazer 813S (Early)		① 7/64"
Frazer 813S (Later)		② 1/4"
Hudson 6 776S	T109-28	3/16"
Hudson 8 773S	T109-28	3/16"
Hudson 2115S	T109-28	3/16"
Hudson 2231S	T109-31	③ 1/4"
Hudson 2252S	T109-126	9/32"
Kaiser 781S (Early)		① 7/64"
Kaiser 781S (Later)		② 1/4"
Kaiser 999S, 2052S, SA	T109-126	9/32"
Nash 2231S	T109-31	③ 1/4"
Oldsmobile 714S, SA	T109-31	1/4"
Oldsmobile 849S	T109-31	1/4"
Oldsmobile 851S, SA	T109-31	1/4"
Oldsmobile 2015S	T109-31	1/4"
Oldsmobile 2058S	T109-31	1/4"
Packard 728S, SA	T109-39	13/64"
Packard 767S, 784S	T109-39	13/64"
Packard 928S	T109-39	13/64"
Packard 986S, 2102S	T109-39	13/64"
Pontiac 2207S, SB	T109-106	7/32"
Pontiac 2182S, SA, SB	T109-106	7/32"
Willys 2052S, SA	T109-126	④ 9/32"
Willys 2052S, SA ⑤	T109-106	⑥ 7/32"

①—With No. 25-173S or 25-185S SPRING LOADED Intake Needle & Seat Assy. (Carburetors stamped "GO" and earlier and without "XX" on tag indicating latest type 25-196S Assy. has been installed).

②—With new No. 25-196S SOLID Intake Needle & Seat Assy. (Carburetors stamped "HO" and later or with "XX" stamped on tag indicating that this assembly has been installed on earlier carburetor).

③—Supersedes earlier setting of 3/16".



CARTER TYPE WGD CARBURETORS

④—4-Wheel Drive Utility vehicles only with special Intake Needle & Seat (to overcome rough road flooding and engine stalling.

⑤—With regular solid Intake Needle and Seat 25-196S.

⑥—With Spring-loaded Intake Needle and Seat 25-173S.

FAST IDLE: *OLDSMOBILE CAUTION*—Carburetor Nos. 714S, 714SA, 849S have special fast idle mechanisms and are adjusted differently. Oldsmobile 851S and later carburetors have same design fast idle as used on other car models (except that adjustment made by turning adjusting sleeve rather than bending connector rod).

Adjustment (Oldsmobile 714S, SA; 849S Carburetors):

CAUTION—Two separate adjustments required:

Fast Idle Linkage—Back off fast idle screw on throttle lever until fast idle cam can be revolved freely with throttle valves closed. Loosen clampscrew on choke lever to which fast idle cam connected place correct feeler gauge (.018" T109-44 for 714S, SA; .015" T109-72 for 849S) between lip on fast idle cam and boss on carburetor casting, hold choke valve tightly closed, remove all slack from linkage by pressing choke lever toward closed po-

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CARTER DUAL TYPE WGD (Cont.)

sition, tighten lever clampscrew while holding lever in this position.

Fast Idle Screw—Back off throttle lever stopscrew so that throttle valves tightly closed, revolve fast idle cam until raised projection (narrow separate step) on cam lines up with fast idle screw, turn screw in or out until it just touches this projection

NOTE—This adjustment can also be made by closing throttle valves against correct .015" or .018" round feeler gauge (inserted between edge of valve and carburetor wall). Close choke valve tightly, so that high step of fast idle cam is opposite fast idle screw. Turn fast idle screw in against step on fast idle cam until feeler gauge just falls free of throttle valve (CAUTION—Carburetor must be upright and gauge free to fall out when making this adjustment).

Adjustment (Oldsmobile 851S & Other Carburetors): Remove retainer screws and retainers, thermostatic coil and housing, gasket, and baffle plate (to expose fast idle mechanism). Open throttle valve to release fast idle, then close choke valve, hold choke valve closed and close throttle valve. Invert carburetor and check clearance between edge of throttle valve and carburetor wall with correct gauge (see table below). If throttle opening not correct, adjust by bending choke connector rod at lower angle near throttle lever. Adjust Unloader.

▷*OLDSMOBILE 851S & LATER ADJUSTING NOTE:* Adjust these carburetors by loosening locknut and turning adjusting sleeve on connector rod.

Fast Idle Setting

Car & Carb.	Checking Gauge	Throttle Opening
Buick 2292S	T109-44	.015"
Frazer 813S	T109-29	① .018-.023"
Hudson 773S, 776S	T109-189	② .026"
Hudson 2115S	T109-189	.026"
Hudson 2231S	T109-29	.030"
Hudson 2252S	T109-29	.030"
Kaiser 781S, 999S	T109-29	① .018-.023"
Kaiser 2052S, SA	T109-29	① .018-.023"
Nash 2231S	T109-29	.030"
Oldsmobile 714S, SA; 849S		Special (above)
Oldsmobile 851S, SA	T109-29	① .020"
Oldsmobile 2015S	T109-29	① .020"
Oldsmobile 2058S	T109-29	.020"
Packard 728S, SA	T109-189	② .026"
Packard 767S, 784S	T109-189	③ ② .023"
Packard 928S	T109-189	② .023"
Packard 986S, 2102S	T109-189	.023"
Pontiac 2207S, SB	T109-189	.026"
Pontiac 2182S, SA, SB	T109-189	.026"
Willys 2052S, SA	T109-29	.018-.023"

①—Gauge T109-29 used for .020" & .030" settings.
②—Gauge T109-189 used for .023" & .026" settings.
③—Supersedes original setting of .026" specified for these models (use other end of same gauge).

AUTOMATIC CHOKE: Carter Climatic Control (Dual Carburetor type). *See Carburetion Equipment Section for complete data.*

Automatic Choke Setting

Car & Carb.	Choke Setting
Buick 2292S	Centered (At Index)
Frazer 813S	Centered (At Index)
Hudson 6 776S	① 2 Points Lean
Hudson 8 773S	Centered (At Index)
Hudson 2115S	2 Points Lean
Hudson 2231S	1 Point Rich
Hudson 2252S	Centered (At Index)
Kaiser 781S	Centered (At Index)
Kaiser 999S	1 Point Rich
Kaiser 2052S, SA	2 Points Rich
Nash 2231S	1 Point Rich
Oldsmobile (All)	Centered (At Index)
Packard 728S	① 2 1/2 Points Lean
Packard 728SA	2 Points Lean
Packard 767S, 784S	② 1 Point Rich
Packard 928S	1 Point Rich
Packard 986S, 2102S	1 Point Rich
Pontiac 2207S, SB	1 Point Lean
Pontiac 2182S, SA, SB	1 Point Rich
Willys 2052S, SA	2 Points Rich

①—Supersedes original setting of 1 Point Lean.
②—Supersedes original setting of 3 Points Rich.

UNLOADER: *OLDSMOBILE CAUTION*—Models 714S, 714SA, 849S have different Unloader mechanism and are adjusted differently than other models.

Adjustment (Oldsmobile 714S, 714SA, 849S): Hold the throttle valves in wide open position, check choke valve opening with correct gauge (¼" T109-31 for 714S & 714SA, 7/64" T109-125 for 849S). Adjust by bending lip on throttle lever using tool T109-41.

Adjustment (Oldsmobile 851S & Other Carburetors): With thermostatic coil, housing, gasket, and baffle removed, hold throttle valves wide open, close choke valve as far as possible, check choke valve opening (see table below for checking gauge and correct opening). Adjust by bending choke trip lever arm (on choke lever) using bending tool T109-214.

Buick Choke Lever Clearance—Hold choke tightly closed with fast idle cam against stop on casting, check clearance between lug on OUTER choke shaft lever and stop on INNER choke shaft lever which should be .020" (Gauge T109-29). Adjust by bending lug on outer choke shaft lever using tool T109-214.

Unloader Setting

Car & Carb.	Checking Gauge	Choke Opening
Buick 2292S	T109-28	3/16"
Frazer 813S	T109-34	9/64"
Hudson 6 776S	T109-154	5/32"
Hudson 8 773S	T109-154	5/32"
Hudson 2115S	T109-154	5/32"
Hudson 2231S	T109-28	3/16"
Hudson 2252S	T109-126	7/32"
Kaiser 781S	T109-34	9/64"
Kaiser 999S, 2052S, SA	T109-34	9/64"
Nash 2231S	T109-28	3/16"
Oldsmobile 714S, SA, 849S		Special (above)
Oldsmobile 851S, SA	T109-31	1/4"
Oldsmobile 2015S	T109-31	1/4"
Oldsmobile 2058S	T109-106	7/32"
Packard (All)	T109-36	1/8"
Pontiac 2207S, SB	T109-154	5/32"
Pontiac 2182S, SA, SB	T109-154	5/32"
Willys 2052S, SA	T109-34	9/64"

THROTTLE VALVE SETTING: To check throttle valves, back off throttle stopscrew so that valves tightly closed. Check Idle Port Opening (above top edge of valve), and Vacuum Spark Port (Distance from top edge of valve to top of port) as follows:

Throttle Valve Setting

Car & Carb.	① Idle Port	② Vacuum Port
Buick 2292S	.077-.083"	④ .010-.016"
Frazer 813S	.135-.141"	.033-.038"
Hudson 6 776S	.157-.163"	.015-.025"
Hudson 8 773S	.157-.163"	.015-.025"
Hudson 2115S	.157-.163"	.020-.030"
Hudson 2231S	.109-.115"	④ .038-.044"
Hudson 2252S	.112-.118"	.028"
Kaiser 781S	.135-.141"	.033-.038"
Kaiser 999S	.117-.123"	.033-.038"
Kaiser 2052S, SA	.117-.123"	.020"
Nash 2231S	.109-.115"	④ .038-.044"
Oldsmobile 714S, SA	.132-.138"	③ .021-.031"
Oldsmobile 849S	.132-.138"	.021-.031"
Oldsmobile 851S, SA	.079-.085"	.023-.033"
Oldsmobile 2015S	.079-.085"	.023-.033"
Oldsmobile 2058S	.109-.115"	.028"
Packard (All)	.135-.141"	.052-.062"
Pontiac 2207S, SB	.139-.145"	.040-.050"
Pontiac 2182S, SA, SB	.139-.145"	.029-.039"
Willys 2052S, SA	.117-.123"	.020"

①—Idle port opening above valve.
②—Top of vacuum port above valve.
③—.029-.033" on early production carburetors.
④—Bottom of Port above top edge of throttle valve.

CARBURETOR OVERHAUL: With carburetor removed from engine, disassemble, clean, and inspect all parts as follows:

Disassembly: Remove dust cover on bowl cover by taking out two attaching screws, disconnect fast idle connector rod and pump connector rod at both ends. Take out eight bowl cover and air horn attaching screws, lift air horn straight up and remove from main body casting (CAUTION—use extreme care not to damage float and jets installed in cover). Disassemble these parts as follows:

Air Horn & Bowl Cover—Remove float by taking out float hinge pin and unhooking intake needle pull clip, remove intake needle seat. Loosen setscrews on metering rod arm and pump arm, slide countershaft out of housing. Lift out metering rod arm, pump arm, pump plunger assembly, vacumeter piston and link, and metering rods, remove cover gasket. Unscrew low speed jets (Idle Tubes). Loosen clampscrew and remove choke shaft lever, take out attaching screws and remove choke valve. Take out three attaching screws, remove automatic choke cover and thermostatic coil assembly (rotate cover counterclockwise to free coil hook), remove gasket and baffle plate. Revolve choke shaft until piston clears vacuum cylinder, remove shaft and piston assembly. Take out three self-tapping screws and remove piston housing assembly from air horn casting, lift out piston housing gasket.

Main Body Casting—Take out attaching screw and remove pump jet cluster and gasket. Invert casting and catch vacumeter spring, pump discharge needle, and lower pump spring. Remove metering jets, pump relief valve assembly, and

CONTINUED ON NEXT PAGE

CARTER DUAL TYPE WGD (C nt.)

pump intake strainer. Use tool T109-56 to remove retainer ring from bottom of pump cylinder, remove pump intake check ball (under retainer ring). Take out attaching screws and remove throttle flange assembly.

►*CAUTION—Do not attempt to remove main nozzles from body casting (permanently installed in casting).*

Throttle Flange Casting—Take out attaching screw and remove pump lever from throttle shaft, remove throttle shaft retaining ring, take out attaching screws and remove throttle valves. Slide throttle shaft and lever assembly out. Remove fast idle cam assembly. Remove idle adjusting screws and springs, and idle port plugs.

Cleaning & Inspection: Wash all parts in solvent or approved carburetor cleaner, dry with air, blow out all channels and passages with compressed air. Remove carbon from flange casting bore with sandpaper (CAUTION—do not use emery cloth). Examine vacuum cylinder in automatic choke housing for dirt and carbon accumulation (if necessary, remove welch plug from base of vacuum cylinder by drilling small hole in plug and using nozzle puller T109-178 to remove plug, install new plug after cleaning cylinder). Replace all worn or damaged parts. Use all new gaskets when reassembling carburetor.

Reassembly: Reassemble carburetor by reversing disassembly directions and note the following important instructions:

Throttle Valve Installation—Back off throttle lever stopscrew, install throttle valves with trademark (small "C") toward idle ports when viewed from manifold side of casting, insert screws loosely, hold valves firmly in place with fingers and tap valves lightly to centralize them in bores, hold lever end of shaft against flange casting boss, tighten valve screws securely. Then install new retaining ring on shaft.

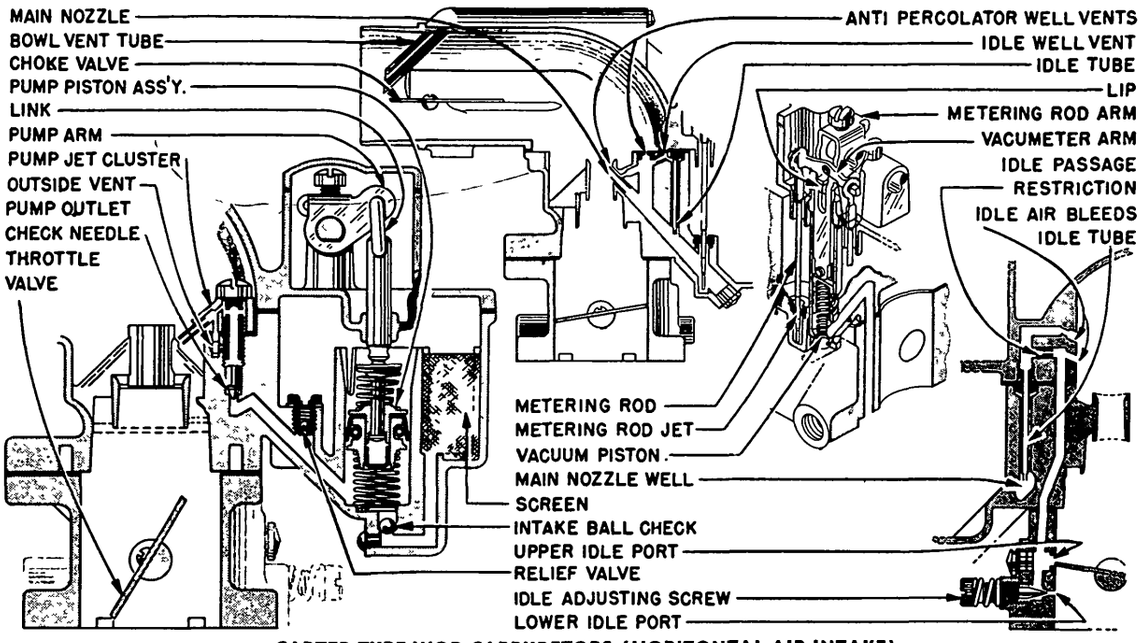
Pump Jet Assembly—Install pump discharge needle first (insert with point downward), use new gasket under pump jet cluster, tighten retaining screw securely. Install pump relief valve assembly. Drop pump intake ball into recess in pump cylinder, use tool T109-122U to install retainer ring.

Pump Plunger & Arm Assembly—Assemble pump link on pump countershaft arm and install pin spring retainer. Insert pump plunger stem in place in bowl cover, slide lower end of link through hole in upper end of plunger stem and revolve ½ turn. When installing bowl cover and air horn, see that lower spring installed in pump cylinder, insert pump plunger, hold pump arm in place while inserting countershaft.

Float Assembly—Make certain that intake needle is attached to float arm with pull clip when installing float. Check float level before installing bowl cover and air horn on main body casting.

Metering Rod Jets—Do not use a gasket under these jets.

Metering Rod & Vacumeter Assembly—Install metering rod spring in vacuum piston link and install vacuum piston spring in cylinder in main body casting. Install vacuum piston link through slot in bowl cover with lip on link pointing toward air horn. Install vacumeter piston on link with pin extending toward air horn. When installing bowl cover and air horn on body casting guide vacumeter piston into vacuum cylinder in body casting. Hold pump arm in position and slide countershaft in through arm and support in casting, then hold metering arm in position with lip on arm extending through slot in vacumeter link and slide countershaft through arm. Install throttle connector rod and retainers. Install both metering rods (CAUTION—see that rods enter metering jets), connect metering rod spring. Check assembly for free movement by pressing down on vacumeter link.



CARTER TYPE WGD CARBURETORS (HORIZONTAL AIR INTAKE)

Choke Assembly—Make certain that new gasket installed in hot air passage in air horn, install piston housing assembly (CAUTION—attaching screws are self-tapping type and must be pulled down securely but with care not to strip threads). Install choke valve shaft and piston, rotating shaft to enter piston in cylinder. See that tapered edges of choke valve seat in air horn, hold valve with fingers and tap with screwdriver to centralize valve before tightening attaching screws. Check valve for free movement (valve should open freely of own weight). When assembling automatic choke mechanism, install flat baffle plate first (with choke lever prong extending through slot in plate), then install extruded baffle plate, gasket, cover and thermostatic coil assembly.

Starter Switch (not used on all Carburetors)—Install switch strainer in recess in throttle body, install switch ball, switch plunger (notch up), guide block, and "W" shaped switch contact spring (CAUTION re-install adjusting shims under contact spring). Install switch return spring, terminal cap assembly, hold-down clip and attaching screw.

CAR STARTER SETTING

Car Starter Switch Adjustment (Buick 2292S)—Connect test lamp across starter switch. Hold choke valve wide open, adjust idle speed screw until it just contacts stop lug on throttle lever when throttle fully closed. Hold scale between center of idle screw and top edge of throttle lever stop lug. Open throttle until light comes on (indicating contact). Distance from top edge of stop lug to center of idle speed screw should be between 31/64" & 11/16". Adjust by adding or removing shims located in switch guide block. Shims furnished under Carter No. 153-11 (.018"), 153-12 (.006").

Car Starter Switch Adjustment (Packard 728S, SA; 784S, 767S, 928S)—Switch must make contact within throttle opening range of 30-45°. Check with Protractor Gauge T109-155S. Adjust by adding or removing shims located in switch guide block.

►*CAUTION—Do not use less than one No. 153-11 (.018") shim or more than three No. 153-11 (.018") shims plus two No. 153-12 (.006") shims.*

See "Carter Car Starter" in Electrical Equipment Section for complete data.

REPAIR PARTS: Gasket Sets. Carter No. 193 (714S, 714SA, 849S), No. 196 (728S, 728SA, 767S, 773S, 776S, 781S, 784S, 813S, 851S, 851SA, 928S, 999S, 2015S, 2052S, SA), No. 249 (2058S, 2231S, 2252S), No. 254 (2207S, SB; 2182S, SA, SB), No. 274 (2292S).

Repair Pkgs. (with Std. Metering Rod)—Carter No. 1505B (714S, 714SA, 849S), No. 1524A (728S), No. 1525A (728SA), No. 1542 (767S), No. 1548C (781S), No. 1554A (773S), No. 1555B (776S), No. 1558B (813S), No. 1568A (784S), No. 1573 (851S, 851SA) No. 1700 (928S), No. 1724 (999S), No. 1755 (2058S), No. 1759 (2052S, SA), No. 1765 (2102S), No. 1773 (2115S), No. 1777 (2182S, SA, SB), No. 1778 (2207S, SB), No. 1814 (2292S).

CARTER TYPE W1 (CHEVROLET)

CHEVROLET	Carter No.
1941-43 Cars & Trucks	③483S, 574S
1941-43 Economy Engine	492S
1946-48 Cars & Trucks	574S
1946-48 Economy Engine	616S
1949 Cars & Trucks	⑤684S
FRAZER	
1947-48 (See Note)	574S
KAISER	
1947-48 (See Note)	574S
PLYMOUTH	
1947-48 P15 (See Note)	574S

②—Superseded by 518SA.
③—Superseded by 574S.
④—Superseded by 570S.
⑤—Rochester Carburetor also used on late cars and trucks.

CARBURETOR MODEL IDENTIFICATION: Individual carburetor models can be identified by Body Casting Number stamped on face of carburetor flange.

CHEVROLET REPLACEMENT CARBURETORS: Carter "WE" and "YF" models (with or without Climatic Control). *See Carter "WE" and Carter "YF" carburetor data.*

▷FRAZER & KAISER NOTE: This 574S carburetor used for limited production. Carter WA1 Carburetors (622S, SA, SB) and Carter WCD Carburetors (685S, SA) used on other cars.

▷PLYMOUTH NOTE: This 574S carburetor used for limited production. Carter (B&B) carburetor (D6G1) and Stromberg Model BXV-3 used on other cars.

▷CHEVROLET CHANGES, CAUTIONS, CORRECTIONS

Chevrolet Economy Model Carburetors. Have smaller venturi and jet calibration and are fitted with stop pin limiting throttle opening to half-throttle (45 M.P.H.). Pin may be removed to permit top speed where necessary by inserting hacksaw blade behind lever and cutting off pin.

▷Engine Running Backward (when key turned off) Correction: To correct this complaint, check idle speed with the engine warm and set the stopscrew for idle speed not to exceed 7 M.P.H. Check throttle valve and make certain that it is not sticking. Check manifold heat control valve thermostatic spring. Spring must be wound up only enough so that end can be slipped over manifold pin (approximately ½ turn). Excessive tension will cause poor performance.

▷Pump Connector Spring Installation on 483S, 492S, 515S, 574S Carburetors: This new type connector consists of a coiled spring with 'hairpin' type lock ends. When installing this spring, insert long end (with 90° bend) through hole in upper end of pump plunger, then insert short (straight) end of spring through hole in pump lever, finally hook the long end of the spring link over the short end so as to lock the spring in place.

▷1942 Accelerator Pedal Rod and Starter Linkage Binding Correction. Binding of these parts may be caused by misalignment between throttle cracker lug on accelerator rod and starter cross-shaft extension which may allow the extension to slip past the lug and bind the starter pedal linkage and accelerator rod. If this misalignment is not caused by either section of the accelerator rod being loose in the metal-encased rubber coupling, correct the alignment by clamping the lug in a vise and twisting lug with a wrench.

CAUTION—Do not bend accelerator rod and use care not to break lug loose from rod when making this adjustment. NOTE—Accelerator rod must be replaced if either section of rod loosens in metal-encased rubber coupling.

▷Engine "Surge" in 22-35 MPH. Range (1947 574S) Complaints: Will be noted when driving with practically constant-throttle or on slight down grades with car over-running engine and may be more evident on new, tight, engines. Check and correct surge complaints as follows (do not attempt correction on new engines until run 1000 miles or more):

Spark Plug Gaps—Must not be set at less than .040" (closer gap may affect engine surging).

Ignition Timing—Make certain that timing set exactly as recommended and not advanced beyond 5° BTDC setting. See Tune-Up data on car model page.

Carburetor Fuel Mixture—Check for lean mixture. If surging due to lean carburetion, install one step richer metering rod (Standard Metering Rod—Carter No. 75-485, One-step Rich Metering Rod—Carter No. 75-562).

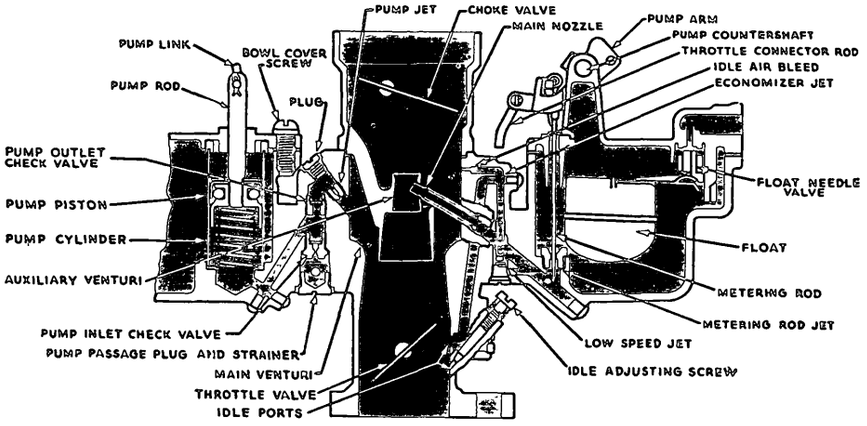
DESCRIPTION

DESCRIPTION: 1941-48. "Balanced" bowl construction. The carburetor bowl is vented through system of passages in bowl cover, carburetor body, and air horn casting to air intake below air cleaner (#35 drill hole below choke valve, #27 hole above choke valve through drilled hole in shaft). This construction eliminates surging of fuel into air passages on rough roads (bowl vent located in top of countershaft dome on bowl cover) and holds air-and-fuel proportions constant under all conditions. Low speed jet well has been lowered and jet is fed through drilled passage opening through side of jet. One idle air bleed only is used (this air by-pass increased in size and second by-pass discontinued) and an additional idle discharge port is located above the throttle valve. Balance passages in air horn have been increased in size and opening above choke valve consists of brass tube pressed in casting. New type float bowl cover used with new granodized pump shaft pressed in place and lubricated by felt oil wick (not necessary to pack screw hole with graphite grease as on previous models). Accelerating pump has new rectangular plunger stem and is furnished as an assembly with shaft, guide and leather. Pump outlet check valve is a brass disc (was bakelite) and must not be interchanged with the former bakelite type. Throttle connector rod upper end is flattened for new type anti-rattle coil spring and lock (flat anti-rattle spring riveted inside dust cover not used).

1949 Carburetor: Same design as used on previous models except for new Accelerating pump and new Fast Idle mechanism as follows:

Fast Idle—Consists of a lever pivoted on the throttle valve shaft and serving as a stop for the throttle lever stopscrew. Slot at upper end of lever is engaged on pin on choke lever so that lever is "rocked" when choke valve closed for cold starting and warming up. Rocking of the lever opens the throttle valve to the fast idle position.

Accelerating Pump—New "submerged" type with short cylinder so that pump piston and seal are submerged in the gasoline in the float bowl at all times. Piston spring is placed above the piston so that the delivery stroke of the pump is spring-driven and independent of rate at which throttle is opened (pump link hole in countershaft is slotted and opening of the throttle allows the pump spring to actuate the pump piston). No seasonal adjustment of the pump is provided.



CARBURETOR ADJUSTMENT & OVERHAUL

IDLE ADJUSTMENT: Adjust only with engine warmed up so that choke valve is wide open and fast idle inoperative. Idle adjusting screw controls fuel mixture and should be turned in for leaner mixture, out for richer mixture. Idle speed is controlled by throttle lever stopscrew. Approximate settings are given in table below. See car models pages for complete tune-up data.

IDLE SETTING

Car Model	Carburetor	Idle Screw Setting	Idle Speed
Chevrolet ('41-48)	All Models	1¼-2¼ turns open	450-500 RPM
Chevrolet (1949)	All Models	1-2 turns open	450-500 RPM
Frazer & Kaiser	574S	1¼-2¼ turns open	500 RPM
Plymouth	574S	1¼-2¼ turns open	6 MPH

PERFORMANCE: Should be satisfactory if idling adjustment and accelerating pump adjustment correctly made. See Carter Jet Specification Table for standard jet calibration and recommended changes for special operating conditions

CONTINUED ON NEXT PAGE

CARTER TYPE W1 (CHEVROLET) C ntinu d

ACCELERATING PUMP: Low pressure type positively actuated by throttle lever. Fuel is drawn into pump cylinder through intake check valve and strainer when throttle is closed and is discharged through outlet check valve and pump jet in wall of mixing chamber when throttle opened for acceleration.

►***PUMP OUTLET VALVE CAUTION***—The 1941 and later outlet valve is a brass disc and must not be interchanged with bakelite type check valve used on former carburetors (use of bakelite check valve on 1941 carburetor, or brass check valve on 1940 and earlier carburetors will upset carburetor calibration).

Adjustment (1941 & Later Models). Pump stroke not adjustable and pump countershaft does not require any lubrication. Refer to the Service Notes for description and installation directions for new type pump connector spring.

METERING ROD (ECONOMIZER): Metering rod and jet assembly meters all fuel for main nozzle (stepped and tapered rod is lifted out of jet as throttle is opened to provide greater fuel flow through jet to nozzle). Metering rods can be changed for special operating conditions such as high altitudes. See Carter Jet Specification Table for standard and special lean metering rods for each model. Check and adjust metering rods whenever rods removed and replaced

Metering Rod Adjustment (All Models). Take out dust cover screw, remove dust cover, remove pin spring, turn metering rod ¼ turn to disengage it from pump arm pin, lift rod out being careful not to lose the rod spring and disc. Back off throttle stopscrew so that throttle valve tightly closed, install metering rod gauge (see table below) in place of rod using care that gauge is vertical and tapered end seats in metering rod jet. If metering rod pin does not rest on bottom of notch on gauge with pump arm connector rod centered freely in pump arm hole, remove connector rod and bend until this setting secured. Remove gauge and re-install metering rod, make certain that disc in place on rod and that pin spring properly connected.

METERING ROD SETTING

Car Model	Carburetor	Metering Rod Gauge	Length
Chevrolet	All Models	T109-25	2.795"
Frazer & Kaiser	574S	T109-25	2.795"
Plymouth	574S	T109-25	2.795"

FLOAT LEVEL: To check float level, remove bowl cover and float assembly, invert cover, remove gasket, measure from gasket seat on cover to top of float at free end. Distance should be correct as shown in table below (plus or minus 1/64"). Adjust float level by bending tip of float lever.

FLOAT LEVEL SETTING

Car Model	Carburetor	Float Level
Chevrolet ('39-49)	420S, 34S, 83S, 92S; 574S; 616S, 684S	½"
Chevrolet (Gov't Trks)	387S, 515S, 518S, 570S	⅜"
Frazer & Kaiser	574S	½"
Plymouth	574S	½"

Float Travel—Float travel from open to closed position should be ½". To check travel, measure distance from cover to top of float at free end with float hanging freely from cover. Distance should be 1". Adjust by bending two float stops slightly with small pliers.

Needle Valve & Seat—Furnished only in matched Sets as follows: Part No. 25-33S—#48 Intake Hole (All Models).

THROTTLE VALVE SETTING: When installing valves, use new attaching screws and install screws loosely, tap valve lightly to centralize it in bore, then tighten attaching screws securely.

Setting—Check with stopscrew backed off so that throttle valve tightly closed Distance from valve to top of lower idle port (Ide Port Distance) or idle port opening (below valve) and distance from top of valve to bottom of vacuum spark port is shown in table below. Shims furnished .002" thick (No. 2-93), .005" thick (No. 2-94) to correct throttle valve position.

THROTTLE VALVE SETTING

Car Model	Carburetor	Idle Port Distance	Vacuum Spark Port
Chevrolet ('41-47)	515S, 570S	.044-.048"	②.000-.004"
Chevrolet ('41-48)	483S, 92S; 574S, 616S	.044-.048"	.000-.004"
Chevrolet ('49)	684S	.044-.048"	.000-.004"
Frazer & Kaiser	574S	.044-.048"	.000-.004"
Plymouth	574S	.044-.048"	.000-.004"

②—Model 515-S only (No vacuum spark port on Model 570-S)

FAST IDLE (1949 684S): No adjustment required. Rocking of the lever when the choke is closed for cold starting opens the throttle valve to the fast idle position. Fast idle throttle opening will be correct if idling speed correctly set.

CHOKE: Choke valves are butterfly type with following special pressure relief devices:

483S, 492S, 515S, 574S, 616S, 684S. Butterfly type with offset valve seating solidly in air horn when closed to prevent possible damage caused by backfire. Choke is semi-automatic type with choke valve lever linked to operating lever by a coil spring which allows valve to be automatically positioned for correct choke action during the warm-up period.

DISASSEMBLY OF CARBURETOR: Take out screw and remove dust cover, remove lock on upper end of connector rod by pushing lock in and turning it 90°, remove lock and anti-rattle spring. Disconnect metering rod spring, remove metering rod, using care not to lose metering rod disc. Remove accelerating pump link. Take out bowl cover screws, remove bowl cover assembly, disassemble float, remove float needle valve and seat. Remove pump plunger, plunger spring, and metering rod jet. Loosen three air horn screws, remove main nozzle passage plug and nozzle screw plug. Reach down through air horn with screwdriver and press on 'D' section of nozzle to force nozzle out of 'D' section of main venturi (CAUTION—do not press on end of main nozzle). Take out air horn screws and remove air horn. Remove low speed jet, accelerating pump passage plug and pump check valves, pump jet passage plug and pump jet, idle adjusting screw and idle passage plug.

Servicing—Wash all parts in clean gasoline, blow out all passages with compressed air, check idle ports and idle air bleed for carbon deposits. Inspect metering rod, metering rod jet, low speed jet, pump jet and check valves, and pump plunger for wear or damage. See that choke valve operates freely. Inspect main nozzle for burrs on end (CAUTION—Do not dismantle nozzle assembly (inner nozzle pressed in outer nozzle). Replace all worn or damaged parts.

REASSEMBLY OF CARBURETOR: Use all new gaskets, soak the needle seat gasket and metering rod jet gasket in denatured alcohol for 15 minutes, install gaskets on parts and allow to dry before installing in carburetor. Install all parts in reverse order to disassembly directions above and note following special instructions and cautions:

Throttle & Choke Valves—Install choke valve with trademark 'C' upward, throttle valve with trademark toward idle port side, use new attaching screws and install screws loosely, tap valve lightly to centralize it in bore, then tighten attaching screws securely.

Nozzle Assembly—Install air horn screws loosely, make certain that copper gasket in place on nozzle, invert carburetor and drop nozzle into place with flat portion of 'D' section of nozzle in line with 'D' section of primary venturi, install nozzle screw plug securely, tighten air horn screws Check nozzle position by measuring from inner diameter of primary venturi to end of nozzle. Distance should be .210-.230" and is adjusted by the copper gaskets on the nozzle.

Low Speed Jet—Jet must seat securely in casting. To check seating, install jet, then remove jet and inspect for complete bearing around top end of jet.

Air Horn—Make certain that small fibre gasket in place at balance passage when installing air horn. This gasket is very important to insure correct 'balanced' performance of carburetor.

Adjustment—Check metering rod setting, float level, and float travel (see directions above). Adjust carburetor when re-installed on engine.

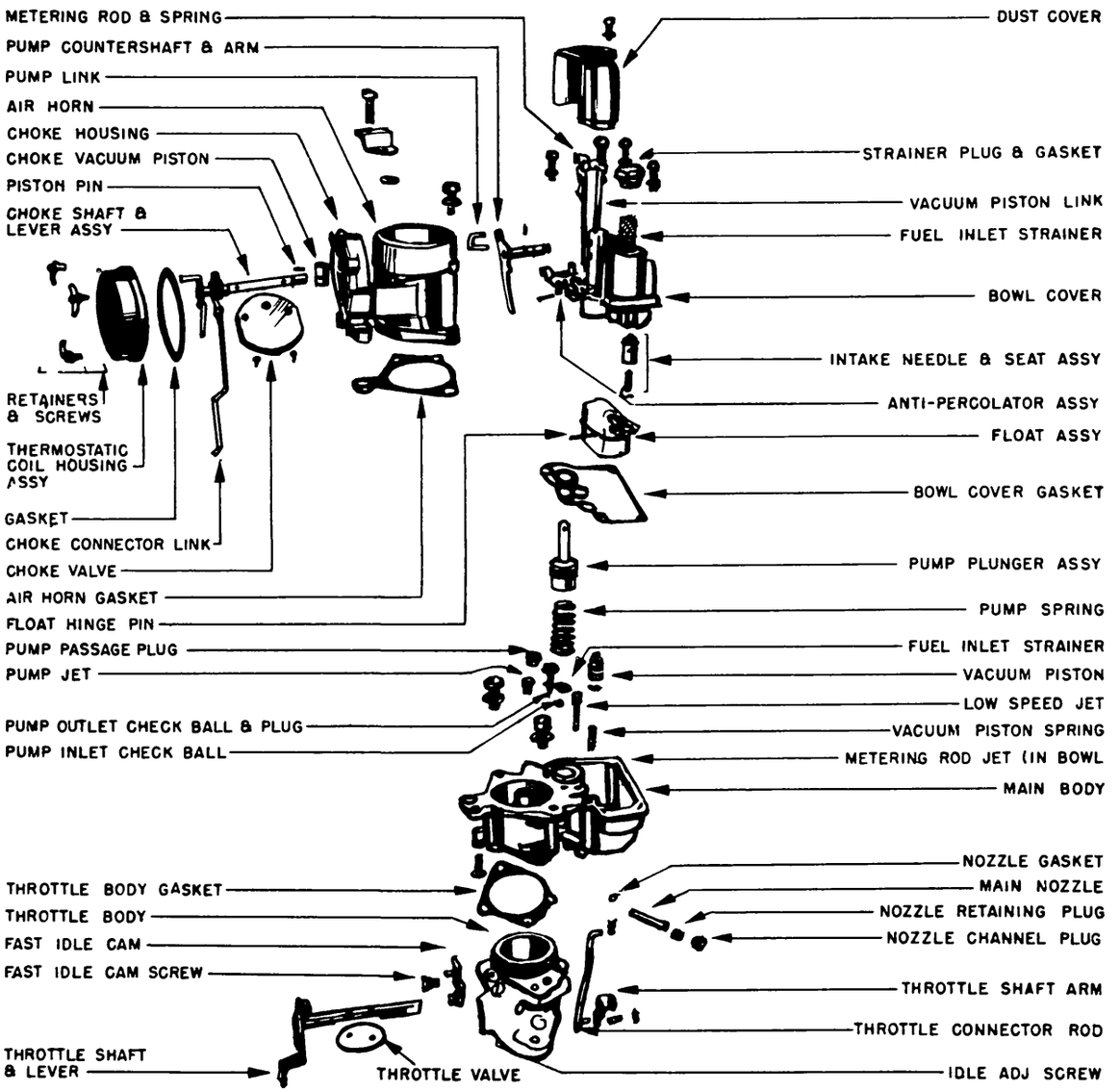
SERVICE PARTS: Gasket Sets—Carter No. 110 (346S, 358S), No. 129 (391S), No. 138A (420S, 434S, 483S, 492S, 574S—Civilian use only, 616S, 684S), No. 174A (483S, 515S, 556S, 570S, 574S—Military use only).

Repair Pkgs. (with Std. Metering Rod)—Carter No. 1005C (346S), No. 1006C (319S), No. 1013E (420S), No. 1089D (483S, 574S), No. 1091B (492S, 616S), No. 1336B (483S, 515S, 570S, 574S—Military use—see Note), No. 1074B (387S, 518S, 518SA), No. 1500A (684S).

NOTE—Repair Package No. 1336 contains Metering Rod No. 75-562 (original equipment on 570-S) but this part may be used also on Carburetor Models 483-S, 515-S, 574-S (originally equipped with No. 74-485) for military use only

CARTER WA1

	Cart r No.
FRAZER	
1947-48 All	610S,622S,SA,SB
HUDSON	
1950 Pacemaker Six 500	749S
1951 Pacemaker 3A,4A,11A	749S
1952 Pacemaker 4B	749S
1953 Jet 1C, 2C	①2009S,SA
1953 Wasp 4C	749S
1954 1D,2D,3D Jet Models	2009SA
1954 4D Wasp	749S
1955 Wasp (Std)	2009SA
(Optl.Twin H-Power)③	
1952-53 5B 6B,4C,5C	Two 990S
1952-53 7B, 7C	Two 968S
1953 Jet 1C, 2C	Two 2013S
1954 1D,2D,3D Jet Models	Two 2013S
1954 4D Wasp,5D Super Wasp	Two 2114S
1954 7D Hornet	Two 2113S
1955 Wasp	Two 2013S
1955 Hornet Six	Two 2113S
KAISER	
1947-48	610S,622S,SA,SB
1949 Spec & Trav 491	622SB
NASH	
1946-48 Amb Six	464S
1946-47 "600"	611S
1948 "600"	622S,SA
1949 "600"	694S
1949 Amb Six	683S
1950-51 Statesman	⑨694S,780S
1950-51 Ambassador	746S
OLDSMOBILE	
1946-48 Six S-M Trans	①504S
1946-47 Six H-D Trans	481S
1948 Six H-D Trans	651S
1949 Six S-M Trans	710S
1949 Six H-D Trans	709S
1950 Six S-M Trans	764S
1950 Six H-D Trans	763S,SA
PACKARD	
1946-48 Six	②530S
PONTIAC	
1946-48 Six S-M Trans	537S
1948 Six H-D Trans	652S
1949-50 Six S-M Trans	717S
1949-50 Six H-D Trans	718S
RAMBLER	
1950-51	⑨694S
1955 RHD (Export)	780S
WILLYS	
1946-50 Sta Wgn 4-63	613S
1946-50 Sed Del 4-63	613S
1948-50 Jeepster VJ2,3	613S
1948-50 Sta Sed 6-63	645S



CARTER WA1 CARBURETOR (WITH AUTOMATIC CHOKE)

S-M—Synchro-mesh Transmission

H-D—Hydra-Matic Drive Trans

①—See Production Changes below

②—**Packard Six 530S**—This carburetor is equipped with Carter Car Starter vacuum switch for starter control *See Electrical Section*

③—See Special Idling Adjustment instructions for equalizing carburetors

⑨—Carter "YF" carburetors also used on these models

►CHANGES, CAUTIONS, CORRECTIONS

►*FRAZER & KAISER 622S CARBURETOR CONVERSION TO 622SA*· Install the new type Float & Lever Assembly, ,No 21-86S, and new type Needle & Seat Assembly, No 25-155S and change float level from 3/8" to 1/2" *NOTE*—These new parts are furnished in special Unitized Package No 21-101U

►*FRAZER & KAISER 622SA CARBURETOR CHANGES:* Following parts supersede first type parts and **only**

CONTINUED ON NEXT PAGE

CARTER WA1 (C nt.)

these parts sh uld be used on these carburetors:
Metering Rod—New Part No. 75-642 (75-55) supersedes No. 75-593.
Low Speed Jet Tube—New Part No. 11-160S (.031" or No. 68 drill size) supersedes No. 11-163S
Accelerating Pump Plunger Spring—New Part No. 61-200 supersedes No. 61-23.
Repair Package—New Part No. 1362B supersedes No. 1362A.

►*FRAZER & KAISER 622SB REPLACEMENT CARBURETOR:* Supersedes 622S and 622SA and has all new parts listed under "622S Conversion" and "622SA Carburetor Changes" as listed above.

►*HUDSON 1953 JET & SUPER JET HESITATION OR CUTTING OUT ON SHARP TURNS (With First No. 2009S Carburetor):* May be caused by momentary starving due to fuel surge in bowl. Correct by changing float setting from 1/2" to 7/16" which will have the effect of raising the fuel level in the bowl 1/16". *Also see 2009S Carburetor Conversion data following.*

►*HUDSON 1953 JET FIRST 2009S CARBURETOR CONVERSION TO LATER 2009SA:* Install all parts furnished in Unitized Pkg. No. 75-915U as listed below. Set Float Level to new specification and use new type gauge when adjusting Metering Rod. *See Adjustment Data below.*

Carter Unitized Pkg. No. 75-915U

Part Nos.	First Part (2009S)	New Part (2009SA)
Metering Rod (Std.)	75-864	75-914
Metering Rod Jet	120-15S	120-191S
Vacuum Piston Spring	61-178	61-199
Ident. Tag (2009SA)		107-45

►*CARBURETOR NO. 2009SA NOTE:* This carburetor has new type parts and later specifications as listed for 2009S conversion above.

►*NASH AMB. 683S CARBURETOR CHANGE (New Metering Rod):* Metering rod has been changed by increasing length of "power step" on rod but new rod has same part no. as original type. IDENTIFICATION NOTE—New metering rod (with increased power step) has raised dot in addition to trademark on rod flat on side opposite part number (trademark only on first rods).

►*NASH AMB. AIR CLEANER BOOT BAFFLE:* A new carburetor-to-air cleaner boot baffle, No. 3127726, has been released to prevent possibility of air turbulence in this boot restricting air flow to carburetor and causing an over-rich carburetor fuel mixture.

►*NASH RAMBLER & STATESMAN 694S & 780S CARBURETOR PARTS & SPECIFICATIONS CHANGES: Note following data when overhauling or adjusting carburetors:* **694S & 780S Parts Change**—New Choke Lever, Link, & Screw Assembly No. 14-406S supersedes first type No. 14-223S. *NOTE*—New assembly does not have lock-out lip on link and no lock-out adjustment required for this type assembly.
780S Ch k S tting Chang—Should be centered (At Index). Supersedes original setting of 2 Points Rich.

►*WILLYS (1946-48) CARBURETOR MOUNTING GASKET CAUTION:* Vacuum passage for metering rod vacuum piston extends down to face of carburetor mounting flange and special slotted type flange gasket, No. 1A-30, must be used when mounting carburetor on manifold (slot must register with vacuum passage hole). If Governor used on this engine, special gasket with four small holes must be used between carburetor and governor and slotted type gasket (above) between governor and manifold.
CAUTION—Use of plain type gasket will blank off this vacuum passage and interfere with correct operation of the carburetor. **Never use a plain (solid) type gasket with this carburetor.**

►*WHISTLING COMPLAINTS (ALL CARBURDTORS):* To correct whistle at vacuum spark port, remove vacuum passage plug (on side of main casting near idle adjusting screw, install special bushing No. 38A-35 in passage, install new plug.

DESCRIPTION: Single barrel, downdraft type. Primary and secondary venturis are mounted in main body casting (not air horn) by two streamlined struts with nozzle directly above one strut on center-line of venturis and float bowl. Float bowl has been designed to eliminate clearance between sides of bowl and float. Bowl cover extends down in bowl to eliminate air space above fuel and float is larger than W1 type. Low speed jet is installed through top of float bowl (no external plug). Anti-percolator seat is cast in bowl cover and complete anti-percolator, pump arm, vacumeter arm (vacumeter types) is mounted on top of bowl cover. Air horn contains only choke valve assembly (choke valve sides not exactly parallel and ridge in air horn serves as stop for valve in wide open position). Lower Throttle casting has main venturi and throttle valve.
Fuel System—Same as for W1 models. Metering rod is controlled by pump arm (non-vacumeter type), separate vacuum piston with stop pin on pump arm to limit travel (vacumeter type). Adjustment data for each type below.
Vacuum Passage (Willys 613S,645S)—On these models, vacuum passage for metering rod vacuum piston (Vacumeter type Carburetor) extends down to the face of the carburetor mounting flange and special slotted type flange gasket must be used when installing carburetor (See Special Service Notes).

ADJUSTMENT: *CAUTION—See special "Twin Carburetor" adjustment procedure below. Set carburetors to the following specifications.*

IDLING ADJUSTMENT: Single Carburetor—*See special Twin Carburetor adjustment procedure below.* Adjust only with engine warmed up to normal operating temperature with choke valve wide open and fast idle inoperative. Set throttle stopscrew for correct idle speed then adjust idle mixture screw for smooth idle (turn screw out for richer mixture), recheck idle speed.

►*HUDSON TWIN H-POWER IDLE ADJUSTMENT (1952-54):* The two carburetors must be adjusted exactly as follows to insure proper equalizing or balancing of the carburetor throttle valves:
1) Remove front and rear air cleaners, install Linkage Adjusting Pin J-2544-1 through accelerator pedal link bell crank lever into hole in block to lock the linkage.
2) On Wasp 5B, 5C and 5D models, adjust throttle shaft rod trunnion to 1 25/32" from top face of bracket on cylinder head to center of clevis pin hole in cross shaft lever.
3) Connect accurate tachometer to engine. Remove clevis pins from yokes at ends of both throttle shaft-to-carburetor rods. Hold fast idle cam in "OFF" position, adjust throttle stopscrew on each carburetor until they just touch cam. Set idle screw mixture adjusting screw on each carburetor 1¼ turns open (1C, 1D, 2C, 2D, 3D, 4D, 5B & 5C), 2 turns open (6B, 7B, 7C & 7D). Run the engine until it reaches normal operating temperature.
4) Adjust engine idle speed by turning throttle stopscrew on each carburetor an equal amount to secure the following idle speed: Synchro-mesh Trans. Cars—500 RPM, Overdrive Cars—575 RPM. Hydra-Matic Drive Cars—500 RPM.
5) Adjust idle mixture adjusting screw in each carburetor for maximum increase in idle speed. Reset idle speed to correct RPM. (4 Above).
6) Adjust front and rear throttle shaft-to-carburetor rod clevises so that clevis pins enter holes in clevises and cross-shaft levers freely. Connect rods. On Hydra-Matic Drive Cars, adjust Hydra-Matic throttle linkage. *See "Hydra-Matic Drive Linkage Adjustment" in Transmission Section.*
7) Remove linkage adjusting pin to free throttle linkage. Adjust length of accelerator pedal-to-bellcrank rod for clearance of 1/64 to 1/16" between pedal and pedal stop in wide open position. *NOTE*—On models without pedal stop, adjust rod for ¼" clearance between pedal and floor mat in wide open throttle position.

►*HUDSON TWIN CARBURETOR ADJUSTMENT (1955):* Remove clevis pins from throttle shaft-to-carburetor rod clevises. Connect vacuum gauge and tachometer. Hold fast idle cam in normal idle position, adjust idle screws to just seat valves in closed position. "Crack" rear throttle valve and adjust idle mixture screws (Wasp ½-1½ turns out, Hornet 1¼-2¼ turns out). Warm up engine to normal operating temperature. With front carburetor throttle valve closed, adjust rear carburetor idle speed 25 to 40 RPM less than specified below. Adjust rear carburetor mixture for best operation. Adjust front carburetor idle speed to point of 10 to 15 RPM increased idle speed, and adjust idle mixtures. Readjust rear carburetor to bring idle speed to specifications and then adjust front carburetor until a slight increase in speed is noted. Readjust idle mixture for best mixture and manifold vacuum. Adjust throttle shaft to carburetor rod clevis, retaining throttle valves in idle position and accelerator linkage in released position. Reinstall the clevis pins.

Car Model	Idle Setting Idle Scr w S tting Turns Open	Idle Sp ed (RPM)
Frazer	¾-1¾	500
Hudson (Single 749S)	½-1½	②550
Hudson (Single 2009S,SA)	½-1½	②550
Hudson (Twin 968S,2113S)	1¼-2¼	②550
Hudson (Twin 990S,2114S)	¾-1¾	②550

CONTINUED ON NEXT PAGE

CARTER WA1 (C nt.)

Idle Setting (C nt.)

Car & Carb.	Idl Screw Setting	Idle Speed
Hudson (Twin 2013S)	⅜-1¾	②550
Kaiser	⅜-1¾	550
Nash Amb. 6('46-48)	½-1½	350
Nash 600 ('46-47)	1¼-2¼	350
Nash 600 ('48-49)	⅜-1¾	450-500
Nash Stsmn. ('50-51)	⅜-1¾	⑧
Nash Amb. ('49)	½-1½	⑧
Oldsmobile ('46-50) S-M	½-1½	425
Oldsmobile ('46-50) H-D	½-1½	⑨350
Packard ('46-48) Six	½-1½	⑤6 MPH
Pontiac 6 ('46-48) Std.	¾-1¾	⑥7-8 MPH
Pontiac 6 ('49-50) S-M	1-1¾	450-475
Pontiac 6 ('48-50) H-D	1-1¾	⑨365-385
Rambler ('50-51,55 RHD)	⅜-1¾	⑧
Willys 4	½-1½	600
Willys 6	1-2	600

S-M—Synchro-mesh Transmission. **H-D**—Hydra-Matic Drive Transmission.

②—Synchro-mesh Cars only. 575 RPM (Overdrive), 500 RPM (Hydra-Matic).

⑨—Special Setting for Hydra-Matic Drive Cars—use Tachometer.

⑤—8-10 MPH on cars with Electromatic Clutch.

⑥—450-475 Engine RPM.

⑧—450-500 RPM (Synchro-mesh Trans.), 375 RPM (Hydra-Matic Drive).

⑨—With selector in "Dr" range (Hydra-Matic Drive Trans.).

ACCELERATING PUMP: Several different types of pumps used as follows:

1) Frazer & Kaiser 610S,622S,SA,SB; Nash 662S,SA; Willys 613S—Pumps are high-pressure type and are actuated by the throttle valve lever through a spring-loaded arm (pump arm and pump operating lever linked by coil spring). Frazer and Kaiser types have seasonal adjustment.

2) Nash 611S, Packard 530S—These accelerating pumps are low-pressure type and are actuated by the throttle valve lever through a spring-loaded arm (pump arm and pump operating lever linked by a coil spring). Pontiac type has seasonal adjustment (see Adjustment data below).

3) Other Models—Accelerating pumps are low pressure type and are positively operated by throttle lever through arm and countershaft assembly on bowl cover. Countershaft arm has three holes for pump link engagement to provide varied pump stroke for seasonal requirements.

►*NASH "UNIFLO JET" CARBURETORS (683S, 649S, 746S, 780S):* No separate pump discharge jet used and accelerating pump discharges fuel through the main nozzle into the primary venturi (a spring-loaded ball type check valve prevents fuel discharge except when pump in operation). Pump stroke adjustment is made in same manner as on other models.

Pump Stroke Adjustment: To check the pump plunger travel, back off throttle lever stopscrew so that throttle valve closes tightly, adjust pump connector link for correct pump stroke as shown in "Pump Setting" column of table below (see Pump Adjustment above for this connector link adjustment). Install Universal Pump Stroke Gauge T109-117S on ridged portion of bowl cover so that projecting portion of gauge rests on top surface on connector link at pump shaft. Hold gauge vertical and note reading, then open throttle wide and again note reading. Difference between these two readings is pump stroke (in sixty-fourths of an inch) and should agree with 'Pump Stroke' figure in table below. To adjust, bend throttle connector rod at lower angle near throttle lever. *CAUTION*—Check metering rod adjustment (disturbed by this adjustment).

Accelerating Pump Stroke Setting

Car & Carb.	Pump Stroke	Pump Setting
Frazer (610S,22S,22SA,22SB)	18/64"	Medium
Hudson (All Carbs.)	16/64"	Medium
Kaiser (610S,22S,22SA,22SB)	18/64"	Medium
Nash (464S)	27/64"	Long
Nash (611S)	25/64" ④	Non-Adj.
Nash (662S,SA)	25/64"	Medium
Nash (694S)	25/64" ⑥	Long
Nash (780S)	25/64"	Long
Nash (683S,746S)	27/64"	Long
Oldsmobile(481-S,504-S,651-S)	16/64" ①	Medium ⑤
Oldsmobile (709S,710S)	16/64"	Non-Adj.
Oldsmobile (763S,SA,764S)	16/64"	Non-Adj.
Packard (530S)	16/64"	Non-Adj.
Pontiac (537S)	16/64"	Medium
Pontiac (652S,717S,718S)	17/64"	Medium
Rambler (694S,780S)	25/64" ⑥	Long
Willys (613-S,645-S)	11/64"	Non-Adj.

①—Carburetors with new 53A-247S Pump Arm and Countershaft Assembly.

④—Supersedes 24/64" originally specified for this model.

⑤—Pump Stroke Non-adjustable on later models with new 53A-247S Pump Arm.

⑥—Supersedes 23/64" (Medium Stroke) originally specified for this model.

Pump Seasonal Adjustment: Three holes are provided in pump arm on countershaft for pump link connection. Inner hole provides minimum pump stroke, lower hole medium stroke, outer hole maximum stroke (adjustment accessible by removing dust cover). See tune-up data on car model pages for settings and seasonal changes.

METERING ROD (ECONOMIZER): Metering rod and jet assembly meters all fuel for main nozzle (stepped and tapered rod is lifted out of jet as throttle is opened and provides greater fuel flow through jet to nozzle). Metering rods can be changed for special conditions. See Carter Jet Specification Table.

Vacuumeter Type Note—On these types, metering rod is linked to vacuum piston stem so that rod is controlled by vacuum piston within limits determined by throttle valve opening (lug on pump arm serves as stop for lip on piston link to prevent vacuum piston pulling metering rod down in jet beyond correct point for the particular throttle opening). These models adjusted in special manner (see below).

Metering Rod Setting

Carb.	Metering Gauge & Length
2009S	T109-102 (2.468")
2009SA	T109-241 (2.548")
All other Carbs.	T109-102 (2.468")

Metering Rod Adjustment (except Vacuumeter Types)—Take out screw and remove dust cover on float bowl cover. Unhook metering rod spring, disengage metering rod from arm on pump shaft, lift out rod being careful not to lose metering rod disc. Install gauge No. T109-102 (2.468") in place of metering rod making certain that gauge seats in metering rod jet and is held vertical. Back off throttle lever stopscrew so that throttle valve tightly closed. Clearance between pin in arm on pump shaft and shoulder of notch in gauge should be less than .005" and gauge should not drag on pin. Adjust by bending arm (use extreme care not to bend lower portion of arm to which throttle connector link is attached—this will disturb pump stroke setting). Remove gauge, install metering rod and disc, connect metering rod spring.

Metering Rod Adjustment (Vacuumeter Type)—Remove metering rod (hung on pin on upper end of vacuum piston link) being careful not to lose metering rod disc. Install gauge No. T109-102 (2.468") in place of metering rod making certain that gauge seats in metering rod jet and is held vertical. Back off throttle stopscrew so that throttle valve tightly closed. Press down lightly on vacuum piston link at point directly over piston. Clearance between pin on piston link and shoulder of notch in gauge should be less than .005" and gauge should not drag on pin. Adjust by bending lip on piston link so that it contacts lug on pump arm (use special tool T109-105). Remove gauge, install metering rod and disc, connect metering rod spring.

ANTI-PERCOLATOR: Saxophone Key Type. Consists of a main nozzle vent in bowl cover controlled by a leather-faced, felt-backed metal cap which opens the vent when the throttle is closed to prevent any percolating discharge from the nozzle. The cap must be seated to close the vent when the throttle is opened.

Adjustment—Crack throttle open by inserting special gauge (see table below for gauge for each model) between edge of valve and carburetor wall on side opposite idle port. Bend anti-percolator rocker arm (use special tool T109-105) so clearance between rocker arm lip and pump arm .005-.015" (use feeler gauge)

Anti-Percolator Setting

Car & Carb.	Gauge No. & Throttle Opening
Frazer (610S,22S,22SA,22SB)	T109-29 ..... .030"
Hudson (749S,990S,2114S)	T109-29 ..... .020"
Hudson (2009S, SA)	T109-29 ..... .030"
Hudson (968S, 2013S, 2113S)	T109-44 ..... .016"
Kaiser (610S,22S, 22SA, 22SB)	T109-29 ..... .030"
Nash (464S)	T109-29 ..... .020"
Nash (683S)	T109-29 ..... .030"
Nash (746S)	T109-29 .... ①.030"
Nash (611S, 662S, SA)	T109-29 ..... .030"
Nash (694S, 780S)	T109-29 ..... .030"
Oldsmobile(481-S,504-S,651-S)	T109-29 ..... .020"
Oldsmobile (709S,710S)	T109-29 ..... .020"
Oldsmobile (763S, SA, 764S)	T109-29 ..... .020"

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CARTER WA1 (C nt.)

Anti-Percolator S tting (Cont.)

Car & Carb.	Gauge No. & Throttle Opening
Packard (530S)	T109-29 .030"
Pontiac (537-S, 652-S)	T109-29 .030"
Pontiac (717S, 718S)	T109-29 .030"
Rambler (694S, 780S)	T109-29 .030"
Willys (613S, 645S)	T109-29 .030"

①—Supersedes .020" setting originally specified for this model.

NOTE—The No. T109-29 Gauge is used for both .020" and .030" setting.

Pontiac Note—Anti-percolator can be adjusted after throttle stopscrew has been set for correct 7 MPH idle speed (turn screw in until it just contacts lowest step of fast idle cam, then turn screw in additional ½ turn) by rotating fast idle cam until stopscrew rests on highest step of cam and then bending the anti-percolator arm for clearance of .078" (No. 47 drill) between arm and pump arm.

FLOAT LEVEL: To check float level, remove float bowl cover, invert cover, measure from top edge of machined projection on cover at free end of float to top of soldered seam (see table below). Adjust by bending lip of float lever.

►*CAUTION:* On cars with spring-loaded pin in intake needle, use care not to compress the spring when checking float level (invert cover assembly and allow float to rest on intake needle of own weight. Compressing spring will cause false reading and result in incorrect float setting).

Float Level Setting

Car & Carb.	Float Level
Frazer (610-S)	5/16"
Frazer (622-S)②	3/8"
Frazer (622-S③, 622-SA, 622-SB)	1/2"
Hudson (749S, 968S, 990S, 2113S, 2114S)	1/2"
Hudson (2013S)	1/4"
Hudson (2009S)	⑨ 1/2"
Hudson (2009SA)	7/16"
Kaiser (610-S)	5/16"
Kaiser (622-S②)	3/8"
Kaiser (622-S③, 622-SA, 622-SB)	1/2"
Nash (464-S)	3/8"
Nash (683S, 694S, 746S, 780S)	1/2"
Nash (611-S, 662-S, SA)	1/2"
Oldsmobile (All)	1/2"
Packard (530-S)	3/8"
Pontiac (All)	7/16"
Rambler (694S, 780S)	1/2"
Willys (613S, 645S)	5/16"

②—With first type Float & Lever Assy. 21-70S and Needle & Seat Assy. 25-42S.

③—With second type Float & Lever Assy. 21-86S and Needle & Seat Assy. 25-155S.

⑨—Change to 7/16" (Gauge T109-81) to correct hesitation or cutting out on sharp turns (see Changes & Corrections above). Set to 7/16" when carburetor converted to 2009SA.

Fl at Trav l—Should be ½" (all models). To check travel, hold float bowl cover in normal position, note drop or free travel of float at free end. To adjust travel, bend the two small float stop lips at the hinge end of the float.

Float N edl Valv & S at—Furnished only in matched sets as follows:

Car & Carb.	Float Inlet Valve Part No.	Intake Hole Size No.
Frazer (610S, 22S, 22SA, 22SB)	25-155S①	38
Hudson (749S, 968S, 990S)	25-75S	46
Hudson (2009S,SA,2113S,2114S)	25-75S	46
Hudson (2013S)	25-162S	42
Kaiser (610S, 22S, 22SA, 22SB)	25-155S①	38
Nash (464-S, 683S, 746S)	25-34S	46
Nash (611S,662S,SA,694S,780S)	25-33S	48
Oldsmobile (All)	25-75S	46
Packard (530-S)	25-42S	38
Pontiac (All)	25-83S	38
Rambler (694S, 780S)	25-33S	48
Willys (613S, 645S)	25-94S	48

①—Supersedes No. 25-42S used on 610-S and first 622-S carburetors.

THROTTLE VALVE SETTING: When installing valves, see that trademark is up and on idle port side, install screws loosely, tap valve lightly to centralize it in bore, tighten screws securely. See that throttle valve stopscrew is backed off so that valve closes tightly, check throttle valve setting as shown in table below. Shims furnished .002" (2-93), .005" thick (2-94) to correct valve position.

Throttle Valve Setting

Car & Carb.	Idle Port Opening	Vacuum Port Hgt.
Frazer (610-S, 622-S)	②.133-.137"	①.035-.040"
Frazer (622SA, SB)	②.133-.137"	①.033-.043"
Hudson (749S)	.136-.140"	.020"
Hudson (968S, 2113S)	.178-.182"	①.049"
Hudson (990S, 2114S)	.120-.124"	①.040"
Hudson (2009S, SA)	.120-.124"	.005-.015"
Hudson (2013S)	.103-.107"	①.010-.020"
Kaiser (610-S,622-S)	②.133-.137"	①.035-.040"
Kaiser (622SA, SB)	②.133-.137"	①.033-.043"
Nash (464-S)	.137-.141"	.022-.027"
Nash (683S, 746S)	.137-.141"	.020-.030"
Nash (611-S)	.011-.015"	.021-.029"
Nash (662-S,SA)	.153-.157"	.021-.029"
Nash (694S, 780S)	.153-.157"	.021-.029"
Oldsmobile (481-S, 504-S)	.136-.140"	⑩.030-.035"
Oldsmobile (651S)	.136-.140"	.025-.035"
Oldsmobile (709S, 710S)	.136-.140"	①.050"
Oldsmobile (763S,SA;764S)	.136-.140"	①.050"
Packard (530S)	.158-.162"	.022-.027"
Pontiac (All)	.166-.170"	.022-.027"
Rambler (694S, 780S)	.153-.157"	.021-.029"
Willys (613S)	.198-.202"	①⑤.036-.044"
Willys (645S)	.198-.202"	①.036-.044"

①—Top of port above throttle valve (bottom of port all others).

②—Port opening below valve (above valve all other models).

③—Late production carburetors. .045-.055" on early production models.

⑩—For late type carburetors with slotted type (round end) port. First carburetors with .061-.064" round type port should be .022-.027".

⑤—.020-.028" on first production carburetors.

FAST IDLE: Consists of fast idle cam pivoted directly above the throttle lever so as to serve as stop for throttle stopscrew and is linked to the choke valve. Refer to Climatic Control article in Carburetion Equipment Section for Data.

Adjustment—To check, turn fast idle cam to normal or slow idle speed position, tighten throttle lever stopscrew until it just seats against cam, rotate cam until stopscrew is against first step of cam (screw must not be on step) check clearance between lower edge of choke valve and air horn wall (use gauge). If this clearance not correct as shown in table below, adjust by bending fast idle link at offset using bending tool T-109-41.

Fast Idle S tting

Car & Carb.	Choke Clearance & Ch cking Gaug
Hudson 990S, 2013S, 2114S	1/2" T109-83
All other Cars & Carburetors	5/8" T109-85

►*WILLYS 613S, 645S NOTE:* Fast Idle on these models consist of a fast idle cam linked to the choke valve lever (no Automatic Choke). Cam serves as stop for throttle lever idle speed screw and throttle is opened to fast idle position when carburetor choked for starting. Should not require adjustment.

CHOKE (All Models except Willys): Valve is offset, butterfly type linked directly to automatic choke (Climatic Control) mechanism. *See Carter Climatic Control article in Carburetion Section for complete Automatic Choke data.*

Setting—Thermostatic coil housing should be set so that reference mark centered on scale on piston housing for all models except those listed in table below, and should be rotated counter-clockwise (Rich) or clockwise (Lean) for these special models as shown. To adjust, loosen two thermostatic coil housing attaching screws, rotate housing.

Climatic Control (Ch ke) S tting

Cars & Carb.	Ch ke S tting
Hudson (749S)	Centered (At Index)
Hudson (968S, 990S, 2013S, 2113S)	1 Point Lean
Hudson (2114S, 2009S, 2009SA)	1 Point Lean
Nash (611S, 662S, 694S)	2 Points Rich
Nash (780S)	① Centered (At Index)
Pontiac (537-S,652-S,717S,718S)	3 Points Rich
Rambler (694S)	2 Points Rich
Rambler (780S)	① Centered (At Index)
All other Cars & Carburetors	Centered (At Index)

NOTE—No Automatic choke used on Willys 613S & 645S.

①—Supersedes setting of 2 Notches Rich originally specified for this model.

UNLOADER: Consists of a cam on the throttle lever which opens the choke valve (through fast idle linkage) when throttle is held wide open to correct flooding. To check, hold throttle wide open, check clearance between lower edge of choke valve and air horn wall. See table below for correct clearance and checking gauge on each model. To adjust, bend cam on throttle lever (use Tool T109-41).

CONTINUED ON NEXT PAGE

CARTER WA1 (C nt.)

Unl ad r Setting

Car & Carb.	Gauge No. & Choke Valve Clear.
Frazer (610S, 22S, SA, SB)	T109-81 .... 7/16"
Hudson (749S)	T109-80 .... 7/16"
Hudson (968S, 2113S, 990S, 2114S)	T109-84 .... 9/16"
Hudson (2009S, SA, 2013S)	T109-84 .... 9/16"
Kaiser (610S, 22S, SA, SB)	T109-81 .... 7/16"
Nash (464S, 683S, 746S)	T109-82 .... 31/64"
Nash (611S, 662S, SA, 694S, 780S)	T109-81 .... 7/16"
Oldsmobile (504S)	T109-81 .... 7/16"
Oldsmobile (481S, 651S, 709S, 763S, SA)	T109-80 .... 3/8"
Oldsmobile (710S, 764S)	T109-81 .... 7/16"
Packard (530S)	T109-81 .... 7/16"
Pontiac (537S, 652S, 717S, 718S)	T109-107 .... 5/16"
Rambler (694S, 780S)	T109-81 .... 7/16"

NOTE–No unloader used on Willys 613S & 645S.

►*CHOKE VALVE LOCK CAUTION:* On carburetors with choke valve lock (lip on lower end of fast idle link which prevents choke valve closing when throttle valve wide open), lock should be checked and adjusted as directed below. Later carburetors do not have this choke valve lock.

Ch k Valv Lock Adjustment–Bend lip at lower end of fast idle link for clearance of 1/32" between lip and throttle lever lock.

CHOKE (Willys 613S & 645S): Semi-automatic butterfly type with manual control. Choke valve lever linked to operating lever by spiral spring. Choke valve must be fully closed with button on instrument panel pulled out and wide open when button pushed in.

TROUBLE SHOOTING: P or Idling Performance – If engine stalls while idling, low speed performance is unsatisfactory, or correct adjustment cannot be secured, remove idle tube (low speed jet) and clean with compressed air or install new tube. See that tube seats tightly at shoulder. Remove idle adjusting screw and clean low speed channels with air. If idle is rich, check metering rod linkage for binding and see that rod is not rubbing on dust cover. On Vacumeter types, see that vacuum piston is clean and operates freely.

Po r Accelerati n–Check pump seasonal adjustment and pump stroke. Remove and clean or replace pump jet. Examine pump for damaged or worn plunger leather, loose plunger, corrosion or dirt in pump cylinder, ball check valves sticking or leaking. If plunger removed from cylinder, use loading tool when re-installing to avoid damaging plunger leather. On vacumeter types, see that vacuum piston clean and operates freely, check piston spring.

Carbur tor L ads Up r Performance is Poor–Check and adjust float level. See that correct type metering rod installed (replace metering rod and jet as an assembly–check metering rod setting when installed). On vacumeter types, see that vacuum piston operates freely and vacuum channel open and clean.

CARBURETOR OVERHAUL: *CAUTION–When disassembling carburetor for overhaul, note the following points:*

►*CARTER CAR STARTER NOTE:* When disassembling carburetors which are equipped with this unit, Car Starter switch parts must be removed before throttle valve shaft can be removed from body flange casting. To disassemble switch, hold switch firmly against casting, remove terminal cap, clip, and screw. Withdraw switch using great care not to lose small square adjusting washers, remove switch ball, invert casting and remove switch strainer and retainer ring. *Refer to "Carter Car Starter" in Electrical Section for complete data.*

►*WILLYS 613S & 645S NOTE:* No automatic choke or fast idle are used on this model. Disregard all data on these units when servicing these carburetors.

Disassembly: Remove dust cover attaching screw and lockwasher, remove the dust cover. Remove fast idle cam screw and fast idle cam. Take out air horn attaching screws (two screws on top, one beneath Climatic Control housing), remove air horn and gasket. Take out retainer screws, remove thermostatic coil and housing assembly, piston housing strainer. Take out choke valve screws and remove choke valve. Loosen screw on choke lever and link assembly 4 full turns, pry lip on lever away from shaft with screwdriver. Revolve choke shaft counter-clockwise to free piston from cylinder and remove assembly (*CAUTION*– Do not remove pin holding piston housing and air horn casting together–these parts line-reamed at factory and must be kept in alignment). Remove pin spring, spring retainer, and spring from throttle connector rod and remove rod. Remove pin spring and connector link from pump arm. Remove low speed passage plug and gasket assembly (located next to anti-percolator cap), Take out bowl cover screws and remove bowl cover assembly intact. On Vacumeter types, remove vacuum piston spring from cylinder in casting, disconnect piston from link by turning piston ¼ turn, remove piston link and metering rod from bowl cover and disassemble rod and link, using care not to lose metering rod disc. On non-Vacumeter types, remove metering rod and disc, using care not to lose disc or damage spring, remove pump arm and collar assembly and pump operating lever and countershaft assembly by revolving ½ turn. On all models, remove float, needle and seat assembly, strainer nut and gasket, and strainer. Take out pin and remove anti-percolator cap and rocker arm assembly and spring. Remove pump plunger and rod assembly, take out strainer and check ball in lower end of pump cylinder. Remove low speed jet assembly, nozzle passage plug, nozzle retainer plug, and nozzle (use tool T109-55). *CAUTION*–Make certain that small nozzle gasket removed from nozzle passage. Remove metering rod jet and gasket assembly. Remove pump jet passage plug and pump jet. Remove pump discharge ball retainer and check ball. Remove body flange (lower casting) gaskets and insulator, idle adjusting screw and spring, and idle port rivet plug. remove throttle shaft arm and shaft assembly, take out throttle valve screws, remove throttle valve and shaft and lever assembly.

Servicing–Wash all parts in clean gasoline (except thermostatic coil and housing assembly and cork parts), blow out all passages with compressed air, examine metering rods and jets, replace all worn parts.

Reassembly: Use all new gaskets (see Parts List below), group all the low speed circuit, high speed circuit, float, pump, and choke circuit parts together to insure correct re-installation. Install parts in reverse order of disassembly directions given above and note following special instructions and cautions: When installing throttle valve, use new attaching screws, install valve with trademark up and on idle port side of bore, install screws loosely, tap valve lightly to centralize it in bore and then tighten attaching screws. Centralize choke valve in same manner and check operation by making certain that choke valve falls open freely of own weight. When installing nozzle, make certain that new gasket used, install nozzle with flat side up. See that low speed jet seats firmly in casting at shoulder. Check and adjust metering rod, anti-percolator setting, pump stroke, float level, fast idle and choke setting, throttle valve setting as directed above. Pack dust cover attaching screw hole in bowl cover with graphite grease before installing dust cover and attaching screw (oil or grease must not be used at any other point). Adjust carburetor when re-installed.

SERVICE PARTS: Gasket Sets–No. 139A (464S, 530S, 610S, 622S, SA, SB; 662S, SA; 683S, 694S, 746S, 780S, 990S, 2009SA, 2013S, 2114S). **No. 146** (537S, 652S, 717S, 718S). **No. 157A** (481S, 504S, 651S, 709S, 710S, 763S, SA, 764S), **No. 159A** (613S, 645S). **No. 198** (749S, 968S, 2113S).

Repair Packages (with Std. Metering Jets)–No. 1065A (464-S) **No. 1095A** (610-S), **No. 1097B** (481-S, 504-S, 710-S), **No. 1320** (530-S), **No. 1360B** (613-S), **No. 1361B** (611-S), **No. 1362C** (622S, SA, SB), **No. 1366A** (537S, 717S), **No. 1379A** (662S, SA), **No. 1383B** (651S, 709S), **No. 1388** (652S, 718S), **No. 1399** (683S), **No. 1501A** (694S, 780S), **No. 1518** (746S), **No. 1535** (749S), **No. 1536** (763S, SA), **No. 1537** (764S), **No. 1723** (968S, 2112S), **No. 1736** (2009S, SA), **No. 1737** (2013S),

CARTER "WE"

CHEVROLET	Carter Model No
1946-49 Repl Carb	730S
STUDEBAKER	
1946-49 Comm Repl Carb	627S,SA
1946-48 Champ 5G 6G, 7G	532S
1948 Late Champ 7G	661S
1949-52 Champ 8G 9G 10G 12G	715S
1950 Comm,17A (10,000 Cars)	627SA
1953 Champ 14G	989S SA
1954 Early Champ 15G①	989SA
1954 Later Champ 15G②	2108S
1954 Custom Champ 15G	2190S
1955 Champ 16G6	2108S

①—Before Serial No 1099741
②—Beginning Serial No 1099741

►CHANGES, CAUTIONS, CORRECTIONS

►*STUDEBAKER CHAMPION 715S AUTOMATIC CHOKE CHANGE* New Thermostatic Coil & Housing Assembly with DIFFERENT Choke Setting used on later cars

Part	First Type	Later Type
Coil & Housing Assy	170P-77S	170U-61S
Choke Setting	Centered	1 Point Lean
Air Horn & Choke Assy	6-557S	6-727S

►*1953 STUDEBAKER CHAMPION ACCELERATION HESITATION OR STUMBLE on light acceleration at 20-25 MPH. (First 989S Carb)* Caused by delay in effective pump action at partial throttle position Correct by installing new parts (1) Pump Operating Spring, (2) Pump Plunger Expander Spring, also check pump inlet and outlet ball check valves and reseat balls if required

Parts Installation—*See Production Change Note below for new parts, When these parts installed, change carburetor marking to 989SA (add "A" on tag)*

Reseating Check Valves—Use light hammer and 5/32" brass drift to tap original ball down on seat to form new seat, then **discard** original ball and install NEW ball No 116-13 (original ball will be damaged by seating operation)

►*1953 STUDEBAKER CHAMPION 989S & 989SA CARBURETOR PRODUCTION CHANGES: Two different changes made as follows.*

(1) Carburetors code dated "B3" & Later—Metering rods changed for more uniform flow characteristics.

	Metering Rod Part No.
First Type	75-666 (046")
Later Type	75-902 (050")

(2) 989S Carburetors (Accelerating Pump Change) Pump Operating Lever Spring and Pump Plunger Expander Spring (under lip of pump plunger leather) changed to provide improved part-throttle acceleration (see Acceleration Hesitation above)

Accelerating Pump Springs

	First Typ	Lat r Typ
Operating Lever Spring	61-228①	②61-252
Plunger Expander Spring	61-143③	④61-157

①—12 coil type ②—9 coil type
③—Copper-plated ④—Cadmium-plated

NOTE—All carburetors stamped "989SA" have the above No 61-252 Pump Operating Spring installed

DESCRIPTION· Single barrel downdraft type with Carter Climatic Control (Automatic choke), Fast Idle, Anti-percolator, and throttle lever operated Accelerating Pump Models 989S, SA, 2108S and 2190S have throttle body heating system as follows

Model 2108S - Idle system has various changes (Keyhole slot idle port, reduced size economizer, air bleed, and by-pass, shorter idle tube with larger diameter metering hole). Accelerating pump plunger is longer (not interchangeable with previous type) and stroke occurs lower in cylinder which prevents entrance of air.

Model 2190S - Same design as 2108S except that different Metering Rod used. See Jet Specifications.

Throttle Body Heating—Holes provided in throttle body and intake manifold by which exhaust gases are transmitted from the exhaust manifold to the heating passages in the throttle body when the manifold heat valve is closed This prevents possibility of ice forming at the throttle valve during the engine warm-up period Heating action in throttle body diminishes as the manifold heat control valve opens

ADJUSTMENT: *Set these carburetors to the following specifications:*

IDLING ADJUSTMENT

Idle Screw Setting - ½-1½ turns open. Turn screw out for richer mixture. Adjust only with air cleaner in place and with engine at normal operating temperature (choke valve open, fast idle inoperative).

Idle Speed Setting

Car Model	Idle Speed
Chevrolet (730S)	450-500 RPM
Studebaker (All-Synchro-mesh)	①550-600 RPM
Studebaker (All—Auto Trans,)	②500-550 RPM

①—Or 8-10 MPH
②—With selector lever in Neutral "N" position

ACCELERATING PUMP SETTING

Pump Stroke Setting - Check pump travel after carburetor has been reassembled. Back off throttle stop-screw so that throttle valve tightly closed, remove dust cover. Install Pump Gauge T109-117S on bowl cover with lip of gauge extending over plunger shaft and gauge held vertically, turn nut on gauge until lip contacts top of plunger shaft, note gauge reading. Open throttle wide and again note gauge reading Difference in two readings should be correct as shown in table below Adjust by bending throttle connector rod at lower angle near throttle lever using bending tool T109-213

Accelerating Pump Setting

Car & Carb	Pump Stroke
Chevrolet (730S)	14/64"
Studebaker Champ (532S,661S,715S)	14/64"
Studebaker Champ (989S,SA)	14/64"
Studebaker Comm (627S SA)	20/64"
Studebaker Champ (2108S, 2190S)	14/64"

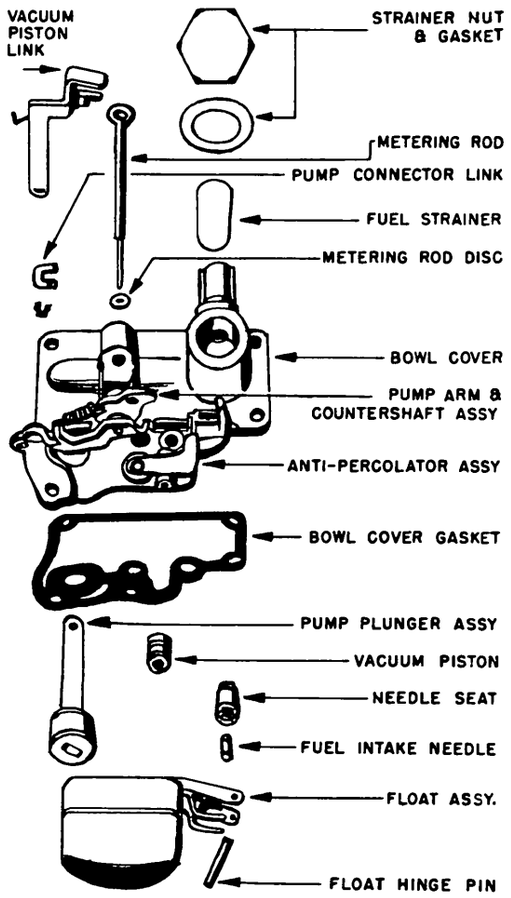
METERING ROD SETTING

Ch cking & Adjustment - Remove metering rod and install Metering Rod Gauge No. T109-102 (2.468") in place of the rod making certain that gauge seated in metering rod jet. With throttle stopscrew backed off so that throttle valve tightly closed, press down lightly on metering rod arm so that upper lip of arm contacts pin in pump arm. At this point, clearance between metering rod pin and shoulder of notch in gauge should be less than .005"and gauge should not contact pin Adjust by bending upper lip of metering rod arm using bending tool T109-105. *Then check and adjust lower (economy) lip as follows:*- Remove gauge,press down on metering rod arm until upper lip contacts pump arm pin. Clearance between pin and upper surface of lower lip should be 3/16" (Float Level Gauge T109-28 can be used). Adjust by bending the lower lip.

ANTI-PERCOLATOR SETTING

Checking & Adjustment—Crack throttle open by inserting correct gauge between edge of valve and carburetor wall on side opposite idle port (see table above for gauge and throttle opening) Check clearance between rocker arm lip and pump arm (see Clearance in

CONTINUED ON NEXT PAGE



"WE" B WL COVER ASSEMBLY

CARTER "WE" (C nt.)

table below). If clearance not correct, adjust by bending anti-percolator arm using tool T109-105.

Anti-P rc lator Setting

Car & Carb.	Thr ttle Opening	③ Clearance
Chevrolet (730S)	.025" ①	.005-.015"
Studebaker (532S,661S)	.030" ②	.005-.015"
Studebaker (715S)	.030" ②	.025"
Studebaker (627S,SA)	.030" ②	.005-.015"
Studebaker (989S,SA)	.030" ②	.025"
Studebaker (2108S,2190S)	.030" ②	.025"

①—Use Gauge T109-189.
②—Use large end of Gauge T109-29.
③—Between rocker arm lip and pump arm.

FLOAT LEVEL

Ch cking & Adjustm nt—Remove and invert bowl cover assembly so that float in closed position. Measure distance from top of projection on bowl cover to top edge of soldered seam on float using gauge (see table below). Adjust by bending lip on float lever which contacts intake needle. Then check float travel.

Float Trav l—Adjust stops on float bracket so that free end of float has ½" movement (plus or minus 1/32").

Fl at L vel Setting

Chevrolet (730S)	3/8" T109-80
Studebaker (532S)	1/4" T109-31
Studebaker (661S, 715S)	3/8" T109-80
Studebaker (627S,SA)	7/16" T109-81
Studebaker (989S.SA)	3/8" T109-80
Studebaker (2108S,2190S)	3/8" T109-80

THROTTLE VALVE SETTING

Car & Carb.	Idle Port	① Vacuum Port
Chevrolet (730S)	①.112-.116"	.060-.070"
Studebaker (532S,661S)	②.010-.014"	.055-.060"
Studebaker (715S)	①.112-.116"	.060-.070"
Studebaker (627S. SA)	①.112-.116"	.065-.069"
Studebaker (989S,SA)	①.112-.116"	.060-.070"
Studebaker (2108S,2190S)	①.112-.116"	.060-.070"

①—Top of Port above top edge of valve.
②—Port opening below valve.

Throttl Valve Installation—See *OVERHAUL data.*

FAST IDLE SETTING

Checking & Adjustm nt—With thermostatic coil housing, gasket, and baffle plate removed, crack throttle valve to allow choke valve to close, close choke valve move throttle valve toward closed position as far as possible. Check remaining throttle valve opening (see table below). If opening not correct, adjust by bending choke connector rod at lower angle using bending tool T109-213. Then adjust Unloader.

Fast Idle Setting

Car & Carb.	Throttle Opening & Gauge
Chevrolet (730S)	.046" T109-158
Studebaker (532, 661S)	.054" T109-193
Studebaker (627S,SA)	.054" T109-193
Studebaker (715S)	.046" T109-158
Studebaker (989S,SA)	.046" T109-158
Studebaker (2108S,2190S)	.046" T108-158

UNLOADER SETTING

Ch cking & Adjustm nt—After fast idle adjustment completed, open throttle valve fully, close choke valve as far as possible without forcing. Check remaining choke valve opening using gauge (see table below). If opening not correct, adjust by bending arm on choke trip lever (within choke housing) using bending tool T109-214.

Unloader Setting

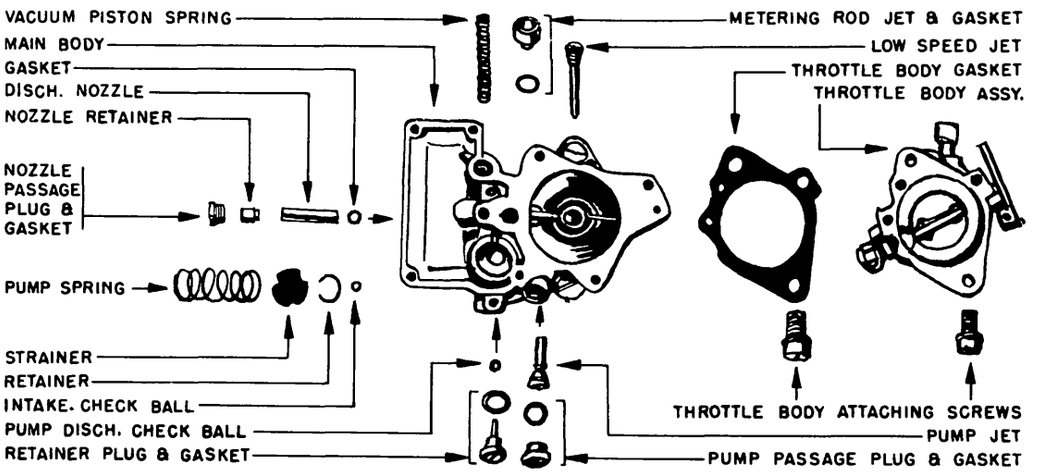
Car & Carb.	Choke Opening & Gauge
Chevrolet (730S)	3/16" T109-28
Studebaker (532S,661S,715S)	3/16" T109-28
Studebaker (627S,SA)	17/64" T109-238
Studebaker (989S,SA)	3/16" T109-28
Studebaker (2108S,2190S)	3/16" T109-28

AUTOMATIC CHOKE SETTING

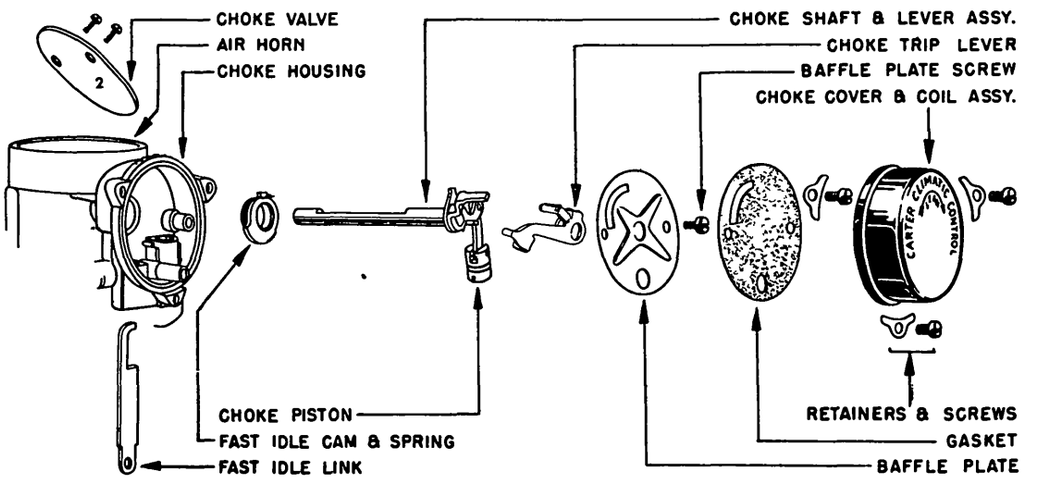
Car & Carb.	Ch ke S tting
Chevrolet (730S)	Centered (At Index)
Studebaker (532S)	Centered (At Index)
Studebaker (661S)	1 Point Lean
Studebaker (627S,SA)	Centered (At Index)
Studebaker (715S-First) ①	Centered (At Index)
Studebaker (715S-Later) ②	1 Point Lean
Studebaker (989S,SA)	1 Point Lean
Studebaker (2108S,2190S)	1 Point Lean

①—First No. 170P-77S Thermostatic Coil & Housing.
②—Later No. 170U-61S Thermostatic Coil & Housing.

CONTINUED ON NEXT PAGE



"WE" MAIN BODY & THROTTLE BODY ASSEMBLY



"WE" AUTOMATIC CHOKE ASSEMBLY

CARTER "WE" (Cont.)

OVERHAUL: Disassembly - Take out attaching screw and remove dust cover from bowl cover. Disconnect choke connector rod from fast idle link and throttle lever and remove rod. Take out air horn attaching screws and lift off air horn assembly, remove gasket. Disconnect throttle connector rod at throttle lever and pump operating lever, remove rod. Remove idle passage plug and gasket from bowl cover, take out bowl cover attaching screws, lift bowl cover assembly straight up to remove it from the bowl.

Air Horn Disassembly - Take out retainer screws, remove thermostatic coil housing and gasket. Remove baffle plate (retained by one screw), trip lever, fast idle link. Take out choke valve screws and remove choke valve. Unhook fast idle cam spring from lip on choke shaft, rotate shaft counter-clockwise until choke piston clears cylinder, withdraw shaft and lever assembly, lift fast idle cam off hub on body. Choke piston can be removed from shaft lever link by pushing out piston pin.

Bowl Cover Disassembly - Disconnect and remove pump connector link, slide pump plunger and rod assembly out, remove bowl cover gasket. Unhook vacuum piston from piston link by turning it 90°, then withdraw link and metering rod assembly from cover (*CAUTION* - do not lose metering rod disc). Unhook metering rod spring and remove metering rod from link. Remove plug and gasket at fuel inlet boss, lift out fuel strainer. Remove float lever pin, lift off float assembly and intake needle, remove needle seat and gasket using tool T109-57.

Main Body Disassembly - Lift vacuum piston spring and pump spring out. Remove pump strainer, intake check ball retainer (use tool T109-56), and check ball retainer (use tool T109-56), and check ball from pump cylinder (invert casting to drop ball out) Remove low speed jet, pump discharge passage plug and gasket, pump discharge jet, pump discharge check ball retainer plug and gasket, and discharge check ball (tilt casting to drop ball out) Remove metering rod jet and gasket using tool T109-57 Take out throttle body attaching screws, lift off throttle body and gasket Remove main discharge nozzle passage plug (tool T109-57), nozzle retainer plug (tool T109-58) and nozzle (use Extractor tool T109-55) *CAUTION*—Make certain that nozzle gasket removed from recess in body

Throttle Body Disassembly - Take out idle adjusting screws and spring. Do not disturb throttle valve and shaft assembly.

Cleaning & Inspection: Clean all castings and metal parts thoroughly with suitable carburetor cleaner, rinse in solvent, blow out all passages and dry with air. Make certain that all carbon and gum deposits removed. Remove all carbon deposits from heater holes in throttle body (heater holes in manifold should also be thoroughly cleaned). Inspect all parts for wear or damage.

Reassembly: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure above and note following important points

Main Discharge Nozzle Installation - Use new copper gasket on nozzle and make certain that flat on nozzle is upward. Tighten nozzle retainer plug and passage plug securely.

Throttle Valve Installation—If valve has been removed, use new screws when re-installing Install valve with trademark up and on idle port side, install screws loosely, then close throttle fully and tap valve lightly to centralize it in bore then tighten attaching screws securely Check throttle valve location (see Throttle Valve Setting)

Idle Tube Installation—See that idle tube seats firmly against shoulder in casting When installing air horn gasket, see that idle air bleed hole in gasket is aligned with passage in body casting and air horn (air bleed extends up into air horn to point above choke valve)

Accelerating Pump Assembly—Make certain that pump intake strainer is clean, install intake ball check, retainer, and strainer in pump cylinder (use Tool T109-122U to install retainer), see that pump plunger is not worn or damaged, use loading tool to install plunger in cylinder

Pump Operating Countershaft Lubrication - Lubricate shaft with No. 3 graphite grease before assembling bowl cover parts.

Choke Valve Installation - After shaft and piston assembly installed in air horn, lock fast idle cam spring around lip of choke lever shaft. Install choke valve with trademark (small "c" in circle) upward, install new screws loosely, center valve by tapping it lightly in closed position before tightening attaching screws. Check for free operation (valve should fall open of own weight).

Thermostatic Coil & Housing Installation - After fast idle and unloader adjustment completed, install coil housing with indicator mark approximately one-quarter turn clockwise from reference mark on body, then rotate housing counter-clockwise for correct choke setting. *CAUTION* - If housing not installed as above thermostat spring may hook up on hot air tube.

Carburetor Installation—Make certain that special slotted type flange gasket is used when installing carburetor or manifold *CAUTION*—Metering rod vacuum piston passage terminates in hole on face of mounting flange and passage hole must not be covered by gasket

Carburetor Adjustments - Make all adjustments listed under ADJUSTMENT above.

SERVICE PARTS

Gasket Sets—Carter No 186A (532S, 627S, 627SA, 661S, 715S, 730S), No 235 (989S,989SA, 2108S)

Repair Pkg (with Std Metering Rod)—Carter No 1356C (532S,661S), No 1504 (715S), No 1514A (730S), No 1520 (627S, 627SA), No 1729 (989S, 989SA), No. 1746 (2108S).

CARTER TYPE WO

CROSLEY	Carter No.
1951-52 CD&VC	870S
WILLYS	
1946 Early Jeep CJ-2A	①596S
1946-48 Jeep CJ-2A	①636S, SA

WILLYS (Cont.)	Carter No.
1947-50 Jeep Trk. 2WD	①636S, SA
1947-50 Jeep Trk. 4WD	①636S, SA
1949-50 Sta. Wgn. 4x4-63	636SA
1949-53 Jeep CJ-3A	①636S, SA

①—See Field & Production Change Notes below

►CHANGES, CAUTIONS, CORRECTIONS

►**Willys 596S & 636S Carburetor Changes for Improved Performance at Transfer (Flat Spot) Point**—New Low Speed Jet, Part No. 11-186S, can be installed to supersede original No. 11-180S. NOTE—New jet furnished in Repair Package No. 1355A.

►**Willys 450SA, 507SA, 636SA Replacement Carburetor Caution**—Have new parts (non-interchangeable with like parts on previous carburetors) as follows:

Nozzle—No. 12-323 (supersedes 12-255), **Nozzle Gasket**—No. 20-45 (supersedes 20-72), **Nozzle Retainer Plug**—No 11B-164 (supersedes 11B-105).

DESCRIPTION: Single barrel, downdraft. Design same as WA-1 except as follows:

Idle System—Idle Orifice Tube (low speed jet) is located in idle well which is fed directly from float bowl (not main nozzle well as on other models) through a drilled passage in the body casting in which the Idle Well Jet is located. Idle well is vented to float bowl by drilled channel in carburetor body. Cross-channel at top of idle tube has two air bleed openings into mixing chamber above main venturi (upper air bleed hole is located ahead of economizer restriction in cross-channel (lower air bleed is beyond this point).

Venturi—Double venturi system used with small (primary) venturi located in main body casting above large (main) venturi which is integral with casting.

IDLE ADJUSTMENT: Adjust only with engine warmed up (choke valve open, fast idle inoperative). Idle adjusting screw controls fuel mixture and should be turned in for leaner mixture, out for richer mixture. Approximate settings below. See tune-up data on car model pages for complete tune-up data.

IDLE SETTING

Car Model & Carb.	Idle Setting	Idle Speed
Crosley 870S	¾-1¾ turns open	450-500 RPM
Willys 596S, 636S,SA	1-2 turns open	600 RPM

ACCELERATING PUMP:—High pressure type (spring operated). Operated by throttle lever through spring connection between pump operating lever and pump arm (under dust cover on bowl cover). Fuel is drawn into pump cylinder through strainer and inlet ball check valve when throttle is closed and is dis-

CONTINUED ON NEXT PAGE

CARTER TYPE WO (Continued)

charged through outlet ball check valve and pump jet location in side of mixing chamber above main venturi when throttle is opened for acceleration. Pump is not adjustable for seasonal changes.

Pump Stroke Adjustment—To check pump plunger travel, remove dust cover on float bowl cover, install Universal Pump Stroke Gauge T109-117S on raised portion of bowl cover so that gauge is vertical and projecting ear rests on top surface of pump shaft. Back off throttle lever stopscrew so that throttle valve tightly closed, note gauge reading. Open throttle wide and again note gauge reading. Difference between two readings is pump stroke (in sixty-fourths of an inch) and should agree with table below. To adjust, use special bending tool T109-41 to bend throttle connector link at lower angle near throttle lever. CAUTION—Check metering rod setting (disturbed by this adjustment).

ACCELERATING PUMP SETTING

Car Model & Carb.	Pump Stroke	Pump Setting
Crosley 870S	10/64"	Lower Hole
Willys 596S, 636S,SA	17/64"	Non-Adjustable

METERING ROD (ECONOMIZER):—Metering rod and jet assembly meters fuel for main nozzle and rod is operated by throttle lever in same manner as on other Carter models. Metering rod mounting on pump operating lever is new and consists of a pin locked in place in a slotted hole in the pump arm by a nut.

METERING ROD SETTING

All Carburetors.....Gauge T109-26 (2.718")

Metering Rod Adjustment—Disconnect choke linkage, take out air horn attaching screws, remove air horn and dust cover. Unhook metering rod spring, remove metering rod being careful not to lose disk on rod at bowl cover. Insert special gauge, T109-26 (2.718") in place of metering rod so that tapered end is seated in metering rod jet and gauge is vertical. Back off throttle lever stopscrew so that throttle valve closes tightly. Metering rod pin on pump operating rod should be even with shoulder of notch in gauge. To adjust, loosen pin nut, shift pin on arm, tighten nut securely (use special wrench T109-76).

▷*CAUTION*—On 539S, 596S, 636S, 636SA, metering rod spring must be engaged in hole in metering rod and spring must exert slight downward pressure on rod so that rod seats in jet when throttle valve stopscrew set for normal idle speed. Bend lower end of spring, if necessary, to secure this setting.

FLOAT LEVEL: To check, remove bowl cover and float assy., invert cover, turn gasket so that machined surface of bowl cover is exposed, measure distance from this machined surface to top of float at free end (see Caution below). Adjust by bending lip of float lever at point where it contacts valve needle (do not bend float arm).

▷*CAUTION*—Use great care not to compress spring in needle valve stem when checking float level (allow float to hang freely on inverted cover).

FLOAT LEVEL SETTING

Car Model & Carb.	Float Setting	Checking Gauge
Crosley 870S	½"	T109-83
Willys (All Carburetors)	⅜"	T109-80

Float Travel—To check, hold bowl cover and float assembly in normal position Free end of float should drop ½". Adjust by bending two small float stop lips at hinge end of float.

Needle Valve & Seat—Furnished in matched sets only as follows: Part No. 25-93S (All Carburetors) Intake hole is #53 drill size.

▷*CAUTION*—When installing intake needle, make certain that spring and pin are in place in needle (all carburetors have spring-loaded type needle.

CHOKE: Offset valve with poppet type relief valve. Check choke linkage to see that choke valve closed when control button on instrument panel pulled out and fully open with control button pushed in (valve spring-loaded).

THROTTLE VALVE SETTING: When installing valves, back off throttle lever stopscrew, see that trademark on valve is on idle port side, use new attaching screws and install screws loosely, tap valve lightly to centralize it in carburetor bore, tighten screws securely, check valve setting.

Setting—With stopscrew backed off and throttle valve tightly closed, idle port opening (above or below valve as noted) and height of vacuum spark port (above valve) should be correct as shown in table below. Shims furnished .002" thick (2-93), .005" thick (2-94) to correct throttle valve location.

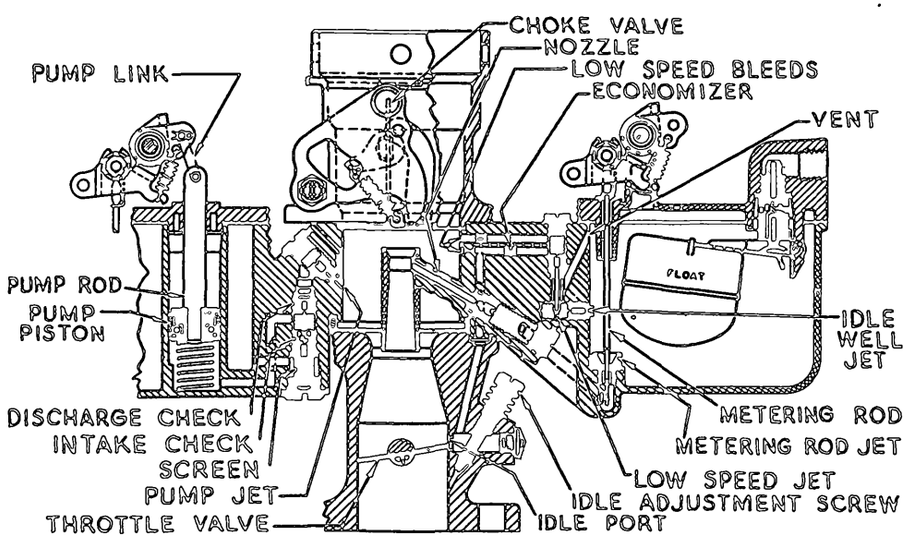
THROTTLE VALVE SETTING

Car Model & Carb.	Idle Port Opening	③Vacuum Port Height
Crosley 870S	050- 054"①	None
Willys 596S, 636S,SA	086- 090"①	④ 056- 062"

①—Idle port opening above throttle valve
②—Idle port opening below throttle valve
③—Top of port above top edge of throttle valve
④—None on Carburetor No 596S

DISASSEMBLY OF CARBURETOR: Remove the choke connector link, take out attaching screws and remove air horn assembly. Remove idle well plug and gasket assembly, remove idle well jet. Remove throttle shaft arm and connector rod. Take out screws and remove bowl cover assembly, disassemble parts on bowl cover. Remove low speed jet plug and gasket, low speed jet, idle adjusting screw and spring, metering rod jet and gasket assembly, nozzle passage plug and gasket, nozzle retainer plug, nozzle (use tool T109-55). Take out body casting flange attaching screws, remove flange casting and throttle valve assembly. Remove pump strainer plug and gasket, strainer, inlet ball check valve assembly, outlet ball check valve assembly. Remove pump jet passage plug and gasket, and pump jet. Remove idle port rivet plug. Take out throttle valve attaching screws, remove valve, withdraw shaft and lever assembly. Remove choke control bracket assembly from air horn, take out choke valve attaching screws, remove valve, withdraw choke valve shaft and lever assembly.

Servicing:—Clean body castings and all parts in gasoline, blow out all passages in castings and all jets with compressed air, dry all parts with air before reassembling. Check all parts for wear, see that they agree with specifications.



REASSEMBLY OF CARBURETOR: Use new gaskets, soak metering jet and inlet gasket in 90 proof alcohol for 15 minutes, install on part and allow to dry before using). Reassemble by reversing disassembly directions above and note:

Nozzle Installation—Use new gasket. Use special tool T109-55 to install nozzle and make certain that flat side of nozzle is upward.

Low Speed Jet—Make certain that hole at lower end is open, work jet into seat by moving it back and forth, make certain that jet seats tightly in casting before installing low speed jet plug and gasket assembly

SERVICE PARTS: Gasket Sets—Carter No 147A (450S, SA, 507S, SA), No 175A (539S, 596S, 636S, SA), No 217 (870S)

Repair Pkg. (with Std. Metering Rod)—No 1087B (450S, SA), No 1304A (507S, SA), No 1319C (539S), No 1355C (596S, 636S, SA), No 1712 (870S)

CARTER TYPE "YF"

	Carter No.
CHEVROLET	
Repl. Carb. (Manual Choke)	
1941-51 "216" Engine	②787S, SA, SB
1950-51 "235" Eng. (Trks)	788S, SA
1937-53 "216" Engine	964S
1950-52 "235" Engine	966S
1937-52 All Engines (Econ.)	2008S
1953 Truck "235" Engine	2100S
1953-54 Repl. (235" Eng.)	2100S
Repl. Carb. (Automatic Choke)	
1941-51 "216" Engine	756S
1950-51 "235" Eng. (Cars & Trks)	789S
1937-53 "216" Engine	965S
1950-52 "235" Engine	967S
1953 Pass. & Trk. "235" Engine	2101S
1953-54 Repl. (235" Eng.)	2101S
HENRY J	
1951-53 4 Cyl.	②820S, SA, SB
1951-53 6 Cyl	②814S, 833S, SA, SB
1954 4 Cyl	820SB
1954 6 Cyl	833SB
KAISER DARRIN	
1954 Sports Car	2094S
NASH	
1950-51 Statesman③	②824S, SA, SB
1951 Late Statesman	②877S, SA
1951 5160 "Dual Jetfire"	Two 892S
1952 Statesman	877SA
1954 Statesman⑤	Two 2098S
⑥	Two 2137S
⑦	Two 2137SA
⑧	Two 2163S
1955 Statesman Dual Powerflyte	Two 2258S
RAMBLER	
1950-51③	②820S, SA, SB
1951 Late	②876S, SA
1952-53	876SA
1953 Later	2014S
1954-55	2014S
WILLYS	
1950 Early "463" 4 Cyl.	738S
1950 Later "473" 4 Cyl.①	②768S, SA
1950-51 "473" 4 Cyl.①	②832S, SA, SB
1952 Early 4 Cyl. (exc Jeep)	832SB
1952 Later 4 Cyl. (exc. Jeep)	951S
1952-53 6 Cyl. Station Wgn.	924S, 2071S
1952-53 6 Cyl. Pass. Car④	937S
1952-53 6 Cyl. Pass Car①	924S, 2071S
1953 4 Cyl Pass Car①	938S, SA
1953 CJ3B Jeep①	938S, SA
1953 4 Whl Dr Trk & Sta. Wgn ①	951S
1954 CJ-3B Jeep	938SA
1954 4 Cyl exc Jeep	951S
1954 6 Cyl. Sta Wgn. (F-Hd Eng.)	2071S
1954 Pass Car (6 Cyl 675 Eng.)	937S
1954 Pass Car (6 Cyl F-Hd. Eng.)	2071S
1955 Jeep	938SA
1955 Utility (4 cyl. "F" Hd. Eng.)	951S
1955 Sta Wgn (6 cyl "F" Hd. Eng.)	2071S

①—With new "F" Head Hurricane Engine.
②—See Production Change data following.
③—Carter "WA1" carburetor also used.
④—With "L" Head Engine
⑤—First cars (Eng. No. J-1001 to J-4697)
⑥—Eng. Nos. J-4697 to J-7511.
⑦—Eng. Nos. J-7511 to J-11186.
⑧—Eng. Nos. J-11186 and up.

►**CARBURETOR MODEL IDENTIFICATION:** Individual carburetors may be identified by Body Casting Number on face of flange.

►CHANGES & CORRECTIONS

►*CHEVROLET 787S & 787SA CARBURETOR CHANGES: 787S superseded by 787SA which has following changes:*

Intake Needle & Seat Assembly—787S has conventional type seat and solid needle No. 25-33S. **787SA**—Has new seat assembly with longer standpipe and new **spring-loaded needle** No. 25-195S (includes No. 61-207 Intake Needle Spring and No. 150-98 Intake Needle Pin).

Float & Lever Assembly—787S No. 21-117S. 787SA—New type No 21-122S. *CAUTION—Different float level setting required for 787SA with this new float.*

Float Level Setting—Different float settings required for 787S and 787SA. *See Float Level data.*

Accelerating Pump Discharge Valve—787S—Has flat type discharge disc No. 169-22 used with No. 63-139 Disc Retainer and No. 63-138 Disc Retainer Ring. **787SA**—Has new aluminum discharge check needle No. 17-80 installed with pointed end down in pump channel.

►*CHEVROLET & WILLYS STUMBLE ON LIGHT ACCELERATION (Caused by incorrect seating of Pump Discharge Check Valve on carburetors listed below):* On early carburetors with either Disc Check Valve or Aluminum Needle Check Valve, the original check valve (including disc retainer, and retainer ring) should be removed and discarded, and a new type aluminum check ball No. 116-25 (furnished in service pkg. listed below) should be installed:

Check Valve Pkg.

Car	Carburetor	Pkg. No.
Chevrolet	756S, 87S, 87SA, 88S, 89S.	116-26U
Willys	738S, 68S, 68SA, 832S.	116-27U

Check Valve Installation—With air horn and bowl cover removed, remove old retainer ring and discharge check valve parts (discard these parts). Form a new seat by using the ⅛" steel ball (furnished in package) by tapping on ball with 5/32" brass drift and light hammer, remove and discard this steel ball. Install new aluminum check ball (can be identified by dark color) and check seating of ball by pouring a few drops of gasoline in the channel on top of the ball. Gasoline should remain visible in the passage above the ball for approximately 60 seconds if a good seat has been formed. On Willys carburetors, install ball check weight No. 221-13 above ball, (weight not used on Chevrolet carburetors), install new No. 63-152 retainer ring.

►*NASH 757S & 824S CARBURETORS RECOMMENDED CHANGES:* First 757S and 824S carburetors can be changed for smoother engine performance up to 40 MPH. by installation of all parts contained in correct Unitized Package (different for earlier and later carburetors) as follows:

►*CAUTION—Different package (with different parts) used for first and later production carburetors.*

757S & 824S CARBURETORS stamped "FO" & "GO" (July 1950 & Earlier). Use Unitized Pkg., Carter No. 75-776U, and install all parts as listed below.

CAUTION—Do not change original Metering Rod Jet No. 120-163 used in these carburetors to any other size.

Unitized Pkg. No. 75-776U

	New Part in Pkg.	Replaced Part.
Low Speed Jet	11-202S	11-200S
Metering Rod	75-775	75-755
Bowl Cover Gasket	121-169	
Pump Diaphragm Housing	170-208S	

Carburetor Tag Note—New Identification tags (757SA & 824SA) furnished in package. **Install correct tag on carburetor to indicate above changes have been made.**

757S & 824S CARBURETORS stamped "HO" & Later (August 1950 & Later). Use Unitized Pkg., Carter No. 120-169U, and install all parts below.

Unitized Pkg. No. 120-169U

	New Part in Pkg.	Replaced Part
Low Speed Jet	11-202S	11-200S
Metering Rod	75-775	75-755
Metering Rod Jet	120-160	
Bowl Cover Gasket	121-169	
Pump Diaphragm Housing	170-208S	

Carburetor Tag Note—New Identification tags (757SB & 824SB) furnished in package. **Install correct tag on carburetor to indicate above changes have been made.**

►**NASH 757SA, SB; 824SA, SB CARBURETORS:** Have had changes made as recommended above.

►*NASH 876S & 877S CARBURETOR CHANGE:* These carburetors can be brought up to later 876SA & 877SA specifications by installation of following latest type parts and changing float level:

	First Type	Latest Type
Float & Lever Assy.	21-122S	21-117S
Intake Needle & Seat Assy.	25-195S①	②25-189S

①—Spring-loaded needle. ②—Solid needle.

Float Level Setting—½" with new type float and new **solid** type intake needle (5/16" setting used only with first type float and spring-loaded type intake needle).

CAUTION—Correct type Float and Intake Needle Assy. must be used together with correct float level setting

►**NASH 876SA & 877SA CARBURETORS:** Have latest type Float and Intake Needle & Seat Assy. and new float setting as indicated above.

►*NASH STATESMAN CARBURETOR ADJUSTMENT CAUTION:* Both carburetors must be synchronized for correct operation. See special Idle Adjustment procedure below.

►*NASH STATESMAN CARBURETOR FLOODING RECOMMENDED CORRECTION & PRODUCTION CHANGES:* Following changes were made in production and can be incorporated in earlier cars to eliminate flooding caused by (1) Vibration of Needle Valve, and (2) Dirt under Needle Valve.

(1) Carter 2098S, 2137S, & First 2137SA Carburetors—Flooding caused by vibration can be eliminated by installing Spring-loaded Needle Valve & Seat Assy. No 25-239S and Float Assembly No 21-122S, and setting float level to new specification (see Float Level below). *NOTE—Carburetor 2137SA tagdated "M3" and later have the above changes made in production.*

(2) Cars before Serial No. K-624096—Flooding caused by dirt under intake needle can be eliminated by installing Fuel Filter (Service Replace-

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CARTER TYPE "YF" (Cont.)

ment No. 3117218) at rear carburetor (use Tee No. 3140204 and attach fuel pump line to inlet side of filter using Elbow EL-204). Cars after above serial number have filter installed in production.

▷*WILLYS STUMBLE ON LIGHT ACCELERATION (738S, 768S, 768SA, 832S Carburetors):* *See Chevrolet & Willys recommended correction*

▷WILLYS 832SA, SB CARBURETOR: Have aluminum ball type accelerating pump check valve (as recommended for installation on earlier carburetors above).

▷*WILLYS 832S, SA, SB METERING ROD CHANGE:* See Carter Carburetor Jet Specification Table for latest type metering rods for these models.

▷*WILLYS 4 CYL. ACCELERATION STUMBLE OR FLAT SPOT CORRECTION (Carter 832SB & 951S):* To correct this complaint, first Tune-Up engine (Check compression, check and adjust Tappet Clearance, Spark Plug Gaps, Breaker Gap, Ignition Timing, Carburetor Idle Adjustment, Cooling System Thermostat operation). Then road test car and if stumble or flat spot still noticed, proceed as follows:

(1) Remove air cleaner and carburetor air horn, remove accelerating pump discharge ball check retainer ring, ball check weight, and ball. Disconnect pump link and remove pump diaphragm housing, diaphragm, metering rod, and pump lifter link.

(2) Check diaphragm and replace if not soft and pliable or if shaft does not slide freely in housing.

(3) Check diaphragm housing inlet hole for restrictions, blow out all passages with air. *If gum deposits noted, disassemble carburetor completely and clean with carburetor cleaner.*

(4) Install pump discharge ball check and weight. Test ball for proper seating by filling passage with gasoline. Gasoline should remain visible in passage above discharge ball for approximately 60 seconds. If not, install Parts Kit No. 116-27U.

(5) If above procedure does not correct trouble, install new parts as listed below. *NOTE—Modification may cause slight loss of economy.*

New Carburetor Parts

Low Speed Jet... .....No. 11-163S (sup. 11-161S)
Diaphragm Spring ..... No. 61-389
Diaphragm Spring Retainer ..... No. 63-92

▷*WILLYS 768S PUMP CHANGE: Late production* 768S carburetors have new type Diaphragm Housing incorporating an accelerating pump Intake Check Valve (see illustration). These carburetors can be converted to 768SA by installation of parts furnished in unitized package as follows:

Unitized Pkg. No. 170-182U (for conversion of late type 768S Carburetors to 768SA); Contains following parts which should be installed as a unit:

	Carter Part No.
Pump Diaphragm Housing①	170-150
Pump Intake Strainer	30-62
Metering Rod (Later Std.)	75-750

①—Without intake check valve (has #72 drill size intake hole in diaphragm housing under strainer).

▷WILLYS 768SA CARBURETOR: Supersedes 768S. Has same type pump Diaphragm Housing, pump intake and strainer as first type 768S (see late production 768S change above). Also has latest type 75-750 Std. Metering Rod.

▷*WILLYS 6 CYL. ROUGH IDLE CORRECTION (Carter 924S):* To correct this complaint, first check and correct engine idle speed (set at 550 RPM. minimum), then check carburetor for evidence of fuel dripping off end of pump jet when engine idling. If this fuel drip noted, install ball check weight, No. 221-13, above the pump discharge ball check to control the check valve (remove air horn and air horn gasket, take out pump discharge ball check retainer, install the weight).

▷*1953 WILLYS JEEP IMPROVED IDLE OPERATION UNDER STEEP ANGLE CONDITIONS (Carter 938S Carburetor):* Install all parts furnished in Unitized Pkg. No. 75-960U. Instruction sheet is included in pkg. *CAUTION—Do not make this change on later 938SA carburetor.*

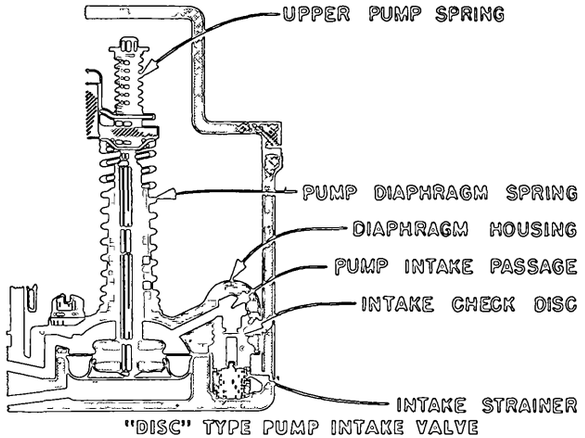
Unitized Pkg. 75-960U

Part	Part No.
Metering Rod	75-959
Metering Rod Jet.....	120-155
Pump Jet Air Bleed Pin.....	150-168

DESCRIPTION

DESCRIPTION: New design, single barrel, downdraft type with diaphragm operated metering rod (vacuum and mechanically controlled), diaphragm type accelerating pump (vacuum and mechanically controlled), Anti-Percolator, Fast Idle, and manually or automatically controlled choke (Climatic Control). Diaphragm assembly (accelerating pump and metering rod control) is new design as follows:

Diaphragm Type Accelerating Pump (& Metering Rod Control)—Consists of a spring-loaded diaphragm and plunger assembly mounted in the main body casting. Lower chamber (below diaphragm) is vacuum chamber and is connected to manifold by restricted passage opening at carburetor mounting flange with a second diaphragm bleed passage opening into the mixing chamber above the throttle valve. Upper chamber (above diaphragm) is the accelerating pump chamber. Fuel enters pump through strainer screen and restricted opening in diaphragm housing (or intake check valve on some carburetors) and is discharged through a pump jet in the carburetor wall at the side of the secondary venturi (except Nash Uni-flow carburetors).



"DISC" TYPE PUMP INTAKE VALVE

▷Nash "Uni-flo" Carburetors—These models do not have separate pump discharge jet. Pump discharges through a spring-loaded ball check valve to the main nozzle.

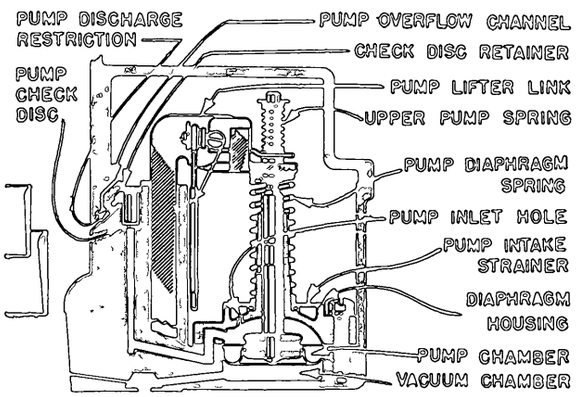
ADJUSTMENT & OVERHAUL

IDLING ADJUSTMENT: Adjust only with engine warmed up and idling at hot or slow idle speed with choke valve wide open and fast idle inoperative. Idle adjusting screw controls fuel mixture and should be turned in for leaner mixture, out for richer mixture. See car model page for complete tune-up instructions.

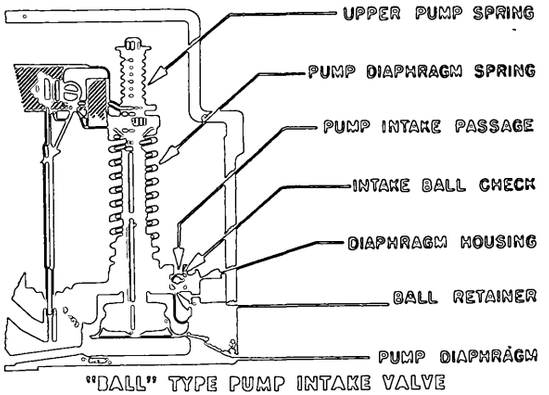
▷*1951 NASH AMBASSADOR DUAL JET-FIRE IDLING ADJUSTMENT: For correct synchronization adjust as follows:*

1) Back out idle speed screw on rear carburetor to fully close throttle. Set idle speed screw on front carburetor for correct engine idle speed of 550 RPM.
2) Adjust idle mixture screw on front carburetor for best idling performance, reset idle speed screw for correct 550 RPM. idle speed.
3) Back out idle speed screw on front carburetor to fully close throttle. Set idle speed screw on rear carburetor for correct engine idle speed of 550 RPM.

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INTAKE PASSAGE TYPE PUMP



"BALL" TYPE PUMP INTAKE VALVE

CARTER TYPE "YF" (C nt.)

4) Adjust idle mixture screw on rear carburetor for best idling performance, reset idle speed screw for correct 550 RPM idle speed

5) Turn idle speed screw on front carburetor in as much as possible without increasing engine RPM This should result in balanced operation of both carburetors

Idle Mixture

Car & Carb.	Idle Screw Opening
Chevrolet (756S, 787S, SA SB)	1-2 turns
Chevrolet (788S,SA, 789S)	1-2 turns
Chevrolet (965S, 967S, 2101S)	1-2 turns
Chevrolet (964S, 966S, 2100S)	½-1½ turns
Chevrolet (2008S)	¾-1¾ turns
Henry J 4 (820S, SA, SB)	½-1½ turns
Henry J 6 (814S, 833S,SA, SB)	1-2 turns
Kaiser Darrin (2094S)	1-2 turns
Nash (892S Double Carb)	½-1½ turns
Nash Statesman (All)	½-1¾ turns
Nash (All Others)	1-2 turns
Rambler (2014S)	½-1½ turns
Willys (938S, SA, 951S)	¾-1¾ turns
Willys (All Others)	1-2 turns

Idle Speed

Car Model	Automatic—Trans.	Synchro-mesh
Chevrolet(1941-53 Pass)	450-500 RPM	①450-500 RPM
Chevrolet(1941-53 Trks)	450-500 RPM	
Chevrolet(1954)	475 RPM	④425 RPM
Henry J(1951-53)	550 RPM	
Henry J 4 (1954)	550 RPM	
Henry J 6 (1954)	500 RPM	
Kaiser Darrin	500 RPM	
Nash (1950-53)	550 RPM	②375 RPM
Nash (1954, No AC)	550 RPM	④475 RPM
Nash (1954, AC)⑤	500 RPM	③500 RPM
Nash (1955, No AC)	500-550 RPM	①450 RPM
Nash (1955, AC)⑤	500 RPM	①500 RPM
Rambler (1950-53)	550 RPM	
Rambler (1954, No AC)	550 RPM	④475 RPM
Rambler (1954,AC)⑤	500 RPM	④ 500 RPM
Rambler (1955, No AC)	500-550 RPM	①450 RPM
Rambler (1955, AC)⑤	500 RPM	①500 RPM
Willys 4 Cyl	600 RPM	
Willys 6 Cyl	550-600 RPM	③575 RPM

①—With selecter lever in "D" position
②—With selector lever in "N" position
③—With selector lever in "DR" position
④—With selector lever in Neutral "N" position
⑤—With Air-Conditioning Compressor operating

►*1954-55 NASH STATESMAN IDLING ADJUSTMENT (Two Carburetors):* For correct synchronization adjust as follows

1)—Remove air cleaner assemblies from carburetor air horns Starting with rear carburetor, turn throttle stopscrews out until throttle valves fully seated in closed position *(CAUTION*—choke valve must be open to insure stopscrew contacting hot or slow idle speed stop of fast idle cam) Then turn stopscrews in two turns to crack throttle valves slightly

2)—Start engine and run until it is at operating temperature Attach tachometer for accurate check of engine RPM

3)—Adjust rear carburetor throttle stopscrew for for correct idle speed See table below

4)—Synchronize front carburetor with rear carburetor by adjusting the throttle linkage between the carburetors **without** disturbing position of rear carburetor throttle valve *(NOTE*—Note tachometer reading when making this adjustment, carburetors are synchronized at point where any further opening of front carburetor throttle causes an increase in RPM) When carburetors synchronized, air inlet noise of each carburetor should be identical

5)—Replace air cleaners Adjust idle mixture screw for each carburetor Start with rear carburetor, turn screw in to lean mixture until engine becomes rough, then turn screw out ½ turn (1954), ¼ turn (1955) Repeat adjustment on front carburetor

6)—Check idle speed and repeat throttle synchronization procedure (steps 3 & 4) if required (improved idle mixture may change engine speed)

METERING ROD: Metering rod and jet meters all fuel for main nozzle. Metering rod is controlled by diaphragm assembly and by throttle lever (vacuum and mechanical control) as follows:

Metering Rod Control—Rod is hooked on metering rod arm which rests on shoulder on upper end of diaphragm assembly stem (retained by upper pump spring) so that the metering rod is lifted out of the jet as the diaphragm assembly is moved upward by the pump diaphragm spring. This movement is controlled by manifold vacuum acting on the lower face of the diaphragm. Metering rod is held down in the jet for maximum economy when manifold vacuum is high, and is raised out of the jet by the spring when manifold vacuum drops off (during acceleration, high speed, pulling, or other wide open throttle operation). The pump lifter link which is connected to the throttle lever serves as a stop for the metering rod arm (eye on upper end of link slides freely on diaphragm stem below metering rod arm) so that the metering rod is positioned in accordance with throttle opening for all constant-throttle operation.

Adjustment—***No Metering Rod Gauge required.*** Air horn and bowl cover must be removed for access to metering rod. Back off throttle lever stopscrew so that throttle valve completely closed. Press down on upper end of diaphragm stem until diaphragm bottoms in vacuum chamber (tool T109-212 can be used to hold diaphragm down) Metering rod arm must contact lifter link flat surface between springs and at supporting lug under metering rod pin spring (see note below for first carburetors without this lug) and the metering rod should contact the bottom of the metering rod well at the same instant. Adjust by bending lip of metering rod arm to which metering rod is attached up or down

►**Early 738S, 768S, 768SA, 787S Carburetors Note**—These carburetors do not have lug or projection on lifter link, when adjusting metering rod, make certain **metering rod arm parallel to lifter link flat.**

ANTI-PERCOLATOR: ***No adjustment required.*** Anti-percolator on each carburetor operates as follows

Chevrolet Anti-percolator—Consists of a drilled passage from the anti-percolator well (opening from main nozzle passage) to the inside of the nozzle This passage vents the main nozzle well

Henry J. Anti-percolator—Consists of a #66 drill size well vent in body and a passage from the anti-percolator well (opening from main nozzle well) leading to a vent channel on the side of the nozzle. This passage has a #70 drill size restriction.

Nash Anti-Percolator—Consists of a 035" (757S SA, SB, 824S, SA, SB), 028" (876S, SA, 877S, SA, 892S, 2014S) diameter drilled hole in plug at top of anti-percolator well (opening from main nozzle well)

Willys Anti-Percolator—Consists of 0276" (738S), 0225" (832S, SA, 938S, SA, 951S), 0223" (768S, SA), 021" (924S, 2071S), 028" (937S) drilled hole in top of anti-percolator well plug (opening from main nozzle passage)

ACCELERATING PUMP: Diaphragm type, operated by spring, controlled by diaphragm assembly and throttle lever (vacuum and mechanical control) as described below Different types of pump valves are used as follows

Pump Intake Check Valve: ***NOTE—Early carburetors do not have any check valve (restricted intake opening in diaphragm housing directly below flat strainer screen on top of housing).***

Disc Type Intake Check Valve—Consists of disc type check valve in plug on underside of diaphragm housing with cylindrical strainer mounted on valve plug

Ball Type Intake Check Valve—Ball check valve located in intake passage in diaphragm housing Ball is retained by retainer installed in housing at lower end of intake passage

Pump Discharge Check Valve: Several different types used as follows *(See Chevrolet and Willys Stumble correction data):*

Nash (All Carbs.)—Have spring-loaded ball check valve located under plug on top face of diaphragm housing NOTE—On these models pump discharges into main nozzle passage (no pump discharge jet)

Other Carburetors—Have disc type check valve or or ball check valve at top of pump discharge passage in body casting (under bowl cover gasket) Pump discharge needle or weight may be used above the check valve and disc type valve has retainer above valve

Pump Adjustment: On Chevrolet carburetors, pump should be adjusted BEFORE adjusting Metering Rod and also whenever carburetor overhauled

NOTE—Adjustment not required on other models.

Chevrolet Pump Adjustment—With idle speed screw backed off so that throttle valves fully seated, press down on upper end of diaphragm shaft until it is bottomed in diaphragm housing (Tool T109-212 may be used to hold diaphragm shaft down in this position) In this position, metering rod arm should contact pump lifter link at outer end nearest the springs Adjust by bending pump connector link at lower angle using bending tool T109-213 ***CAUTION—Bending link at any other point may cause binding of pump lifter link.***

►**Unsatisfactory Acceleration Performance**—To correct this condition, remove pump diaphragm assembly (see Disassembly data), check for wear or damaged diaphragm, clean intake screen and inlet hole under screen or make certain that intake check valve seats properly, make certain that discharge check valve seats properly, blow out all passages with air.

CONTINUED ON NEXT PAGE

CARTER TYPE "YF" (C nt.)

FLOAT LEVEL: To check float level, remove air horn and bowl cover assembly, invert assembly allowing float to hang freely while resting against intake needle (see Caution below), measure from bowl cover to top of float (see table for setting). Adjust by bending lip which contacts intake needle—do not bend float arm.

►***CAUTION—On models with spring-loaded needle, do not compress this spring in the needle valve stem (allow to hang freely). Compressing the spring will result in false reading and incorrect float setting.***

FLOAT SETTING

Car & Carb.	Checking Gauge	Float Setting
Chevrolet 787S only	T109-83	①1/2"
Chevrolet 756S, 787S, SB	T109-107	②5/16"
Chevrolet 788S,SA, 789S	T109-107	②5/16"
Chevrolet (All Others)	T109-126	9/32"
Henry J (All)	T109-126	9/32"
Kaiser Darrin	T109-126	9/32"
Nash 877S	T109-107	②5/16"
Nash 877S,SA	T109-83	③1/2"
Nash 892S (Two used)	T109-107	21/64"
Nash 824S, SA, SB	T109-83	1/2"
Nash 2098S, 2137S, SA④	T109-80	3/8"
Nash 2098S, 2137S, SA⑤	T109-31	1/4"
Nash 2137S. 2163S⑥	T109-31	1/4"
Nash 2258S	T109-220	5/16"
Rambler 757S, SA, SB	T109-83	1/2"
Rambler 876S,SA	T109-83	③1/2"
Rambler 2014S	T109-83	1/2"
Willys 738S	T109-126	9/32"
Willys 768S, SA	T109-107	5/16"
Willys 832S, SA, SB	T109-107	5/16"
Willys 938S, SA, 951S	T109-107	5/16"
Willys 924S, 937S, 2071S	T109-126	9/32"

①—**With No. 21-117S Float & Lever Assy. and No. 25-33S Intake Needle & Seat Assy. with solid needle.**

②—**With No. 21-122S Float & Lever Assy. and No. 25-195S Intake Needle & Seat Assy. with spring-loaded needle.**

③—With No. 21-117S Float & Lever Assy. and No. 25-189S Intake & Seat Assy. (**solid** needle).

④—With original solid type Intake Needle & Seat No. 25-189S (or 25-257S on 2098S), & Float No. 21-117S.

⑤—With special Spring-loaded Intake Needle & Seat No 25-239S & Float No 21-122S to correct flooding (See Changes & Corrections above).

⑥—With production type Spring-loaded Needle & Seat No. 25-239S & Float No. 21-122S.

Float Drop (Chevrolet Carburetors) — Check travel or drop of float by holding bowl cover assembly upright and measuring from lower face of bowl cover to top of float at free end (float hanging free). Distance should be 1¼". Adjust by bending stop tabs on float arm.

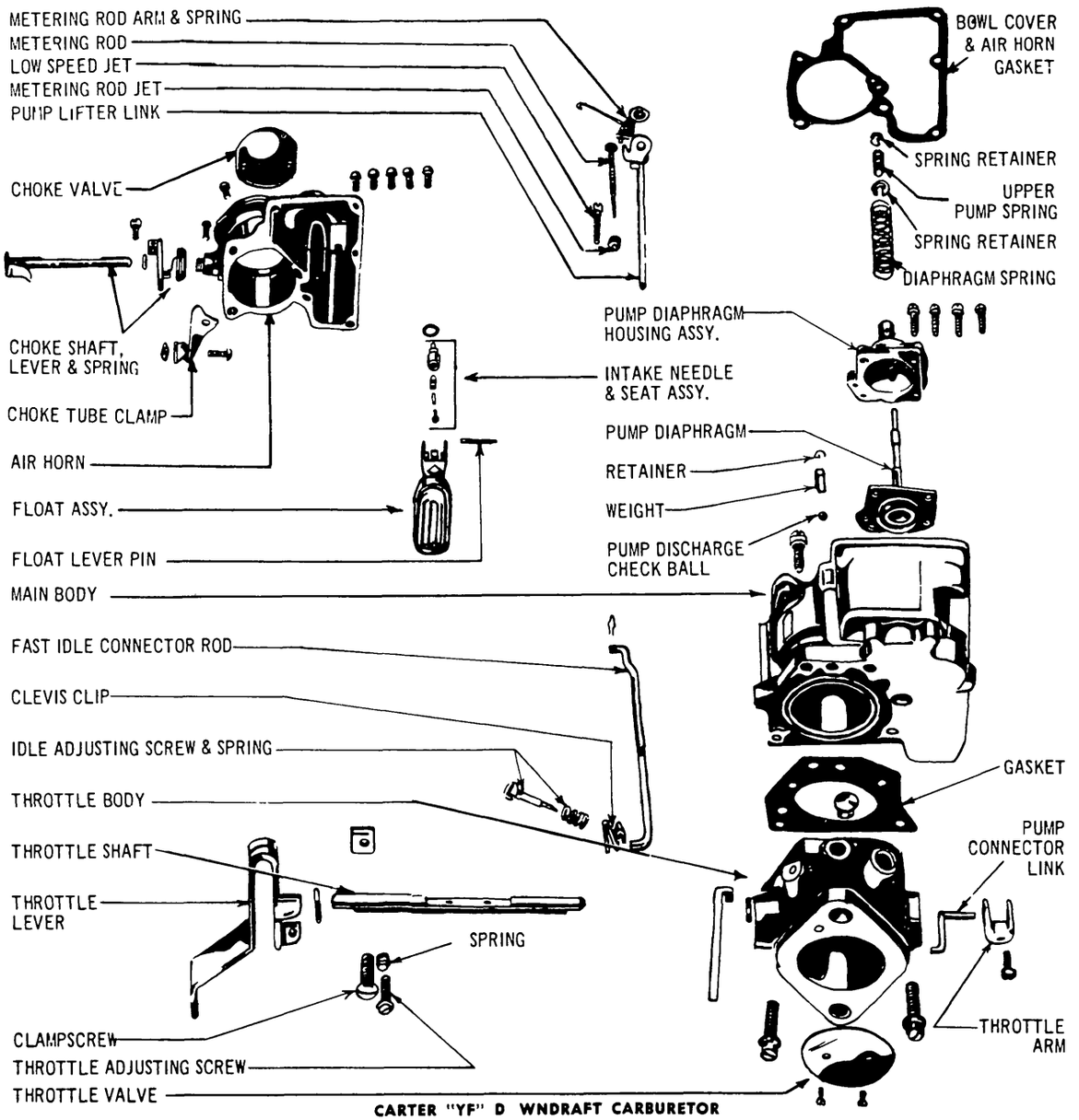
FAST IDLE: ***CAUTION—Different design with special adjustment settings used on carburetors with automatic choke (Climatic Control):***

►**Carburetors with Manual Choke Control**—Fast idle mechanism consists of fast idle arm linked to the choke valve shaft lever with a lip which serves as the stop for the throttle stopscrew. Fast idle arm is rotated when choke valve closed for cold starting and opens throttle to fast idle position.

Adjustment—To check, hold choke valve in wide open position and check that lip on fast idle arm is in contact with boss on carburetor body casting. To adjust, bend fast idle arm rod at lower offset.

►**Carburetors with Automatic Choke Control**—Fast idle mechanism consists of a fast idle cam on the choke valve shaft and a trip lever and link assembly within the choke housing connected to the throttle lever by a connector rod. **Thermostatic coil housing, gasket, and baffle plate must be removed**

CONTINUED ON NEXT PAGE



CARTER "YF" D WNDRAFT CARBURETOR

CARTER TYPE "YF" (C nt.)

to check and adjust fast idle.

Adjustment: Remove thermostatic coil housing, gasket, and baffle plate. Crack throttle valve (to allow choke valve to close), hold choke valve fully closed, close throttle valve as far as possible so that choke trip lever contacts high step of fast idle cam. Check throttle valve opening or clearance between edge of valve and carburetor wall on side opposite idle port (see table for checking gauge and throttle valve opening). If opening not correct, adjust by bending rod at lower angle using Tool T109-213

FAST IDLE SETTING

Car & Carb.	Throttle Opening & Gauge
Chevrolet 756S	076"
Chevrolet 789S	.086"
Chevrolet 965S	.067" T109-234
Chevrolet 967S	.080" T109-234
Chevrolet 2101S	.040" T109-193
Nash 892S	028"
Nash 2098S, 2137S, SA	.024" T109-189
Nash 2163S, 2258S	.024" T109-189
Nash (All Others)	.054" T109-193
Rambler (All)	.054" T109-193

►*CAUTION—Check Unloader after adjusting Fast Idle.*

UNLOADER (Carburetors with Automatic Choke): Consists of an arm on the trip lever within the choke housing which rotates the choke valve shaft when the throttle valve is opened wide. **Thermostatic coil housing, gasket, and baffle plate must be removed to check and adjust unloader.**

Adjustment—After adjusting fast idle, hold throttle valve in wide open position, move choke valve toward closed position as far as possible (CAUTION—do not force valve closed). Check choke valve opening or clearance between lower edge of valve and air horn wall (see table below for checking gauge and choke valve opening). If opening not correct, adjust by bending arm on choke trip lever using bending tool T109-213.

UNLOADER SETTING

Car & Carb.	Choke Opening & Gauge
Chevrolet 756S, 89S, 965S, 67S	3/16" T109-28
Chevrolet 2101S	1/4" T109-31
Nash 824S, SA, SB	3/16" T109-28
Nash 877S, SA	9/32" T109-126
Nash 892S	3/8" T109-80
Nash 2098S, 2137S, SA	29/64" T109-81
Nash 2163S, 2258S	29/64" T109-81
Rambler 757S, SA, SB	3/16" T109-28
Rambler 876S, SA, 2014S	9/32" T109-126

CHOKE (Manual Type): Offset, butterfly type valve. **Adjustment**—Adjust linkage so that valve is completely closed when choke button is pulled out.

CAUTION—Make certain that choke valve completely open when control button pushed in fully.

AUTOMATIC CHOKE (Climatic Control): Used on carburetors listed below.

CLIMATIC CONTROL (CHOKE) SETTING

Car & Carb.	Choke Setting
Chevrolet 756S, 789S	1 Point Lean
Chevrolet 965S	2 Points Rich
Chevrolet 967S, 2101S	1 Point Rich
Nash 824S,SA, SB	Centered
Nash 877S, SA	1 Point Lean
Nash 892S	Centered
Nash 2098S,2137S,SA, 2163S,2258S	2 Points Lean
Rambler 757S, SA, SB	Centered
Rambler 876S, SA; 2014S	1 Point Lean

THROTTLE VALVE SETTING: When installing valve, check Idle Port Opening (top of port above top edge of valve), and Vacuum Spark Port Height (top of port above top edge of valve) with throttle stop-screw backed off and throttle valve tightly closed.

THROTTLE VALVE SETTING

Car & Carb.	①Idle Port	Vacuum Spark Port
Chevrolet 756S	166- 170"	②.022-.032"
Chevrolet 789S	.143- 147"	①.025- 035"
Chevrolet 787S,SA,SB	166- 170"	②.022-.032"
Chevrolet 788S,SA	.153- 157"	①.025-.035"
Chevrolet 964S,65S	.166- 170"	②.022-.032"
Chevrolet 966S	.153- 157"	①.025-.035"
Chevrolet 967S	.143-.147"	①.025-.035"
Chevrolet 2008S	166-.170"	②.022-.032"
Chevrolet 2100S, 2101S	.143- 147"	①.030- 040"
Henry J 820S,SA, SB	.126-.130"	②.025-.035"
Henry J 814S	126-.130"	①.025-.035"
Henry J 833S, SA, SB	.126-.130"	①.035-.045"
Kaiser Darrin 2094S	.148-.152"	①.035- 045"
Nash 824S, SA, SB	.142-.146"	②.025-.035"
Nash 877S, SA	142- 146"	②.021-.029"
Nash 892S	.142- 146"	② 021- 029"
Nash 2098S	.142-.146"	②.001-.009"
Nash 2137S, SA	.115-.119"	②.001-.009"
Nash 2163S, 2258S	.115-.119"	②.001-.009"
Rambler 757S, SA, SB	.142-.146"	②.025-.035"
Rambler 876S, SA, 2014S	.142-.146"	②.021- 029"
Willys 738S, 768S	.168-.172"	①.035-.045"
Willys 832S, SA, SB	.168-.172"	①.035-.045"
Willys 924S	.148-.152"	①.035- 045"
Willys 937S	.126-.130"	①.035- 045"
Willys 938S, SA, 951S	.168-.172"	①.035-.045"
Willys 2071S	.148-.152"	①.035- 045"

①—Top of port above top edge of valve.
②—Bottom of port above top edge of valve.

DISASSEMBLY: With carburetor removed from engine, proceed as follows:

1) Remove pin springs and fast idle connector rod springs, remove fast idle connector rod. Take out air horn and bowl cover attaching screws, remove choke tube clamp, lift off air horn and gasket.

2) Take out pump disc check valve retainer ring (when used), lift out retainer and pump check valve disc or pump discharge needle. Then remove throttle shaft arm assembly from end of throttle shaft (pump connector link, shaft seal spring, dust seal washer, felt dust seal). Unscrew four pump diaphragm housing attaching screws, lift out entire pump and metering rod assembly.

3) Disassemble pump by removing attaching screws, pin spring, metering rod, upper pump spring retainer, upper pump spring, metering rod arm, pump lifter link, diaphragm spring retainer, diaphragm spring, and diaphragm housing. Remove intake strainer from housing (use knife tip to lift flat type strainer out of housing recess). On carburetors with disc type intake check valve, remove valve plug assembly. On Nash carburetors, take out plug on upper side of diaphragm housing and remove discharge check valve spring and ball.

►*PUMP DIAPHRAGM CAUTION*—If old diaphragm is to be re-used, store the diaphragm in gasoline. Diaphragm will shrink and stiffen if allowed to dry out for more than one hour.

4) Remove metering rod jet from body casting. Remove Low Speed Jet assembly.

►*CAUTION—Do not attempt to remove pressed-in parts such as Nozzle, Pump Jet and Anti-percolator Air Bleed.*

5) Take out three body flange (throttle body) attaching screws, remove throttle body from main body casting.

6) Remove idle adjustment screw and spring, idle port rivet plug, throttle lever assembly and washer, fast idle arm. Take out throttle valve attaching screws, lift valve out, remove throttle shaft, remove shaft seal by prying out seal retainer.

►*CAUTION—Do not attempt to remove vacuum passage orifice restriction which is pressed in.*

7) Remove float pin, lift out float, remove needle and seat assembly from air horn casting.

8) On carburetors with manual type choke control, take out choke valve screws, lift choke valve out, unhook choke spring, slide choke shaft out of housing. If necessary to replace choke lever assembly, pry off choke lever retainer ring (in end of shaft), remove lever assembly from shaft.

►*CAUTION—Do not attempt to remove balance vent tube.*

CLEANING & INSPECTION: Wash all parts in carburetor cleaning solution (CAUTION—do not immerse diaphragm assembly, pump check disc, or seals in the solution). Inspect all parts for wear or damage, replace if necessary. Blow out all passages with compressed air.

REASSEMBLY: Use all new gaskets. Assemble by reversing the disassembly order as given above and note the following important points:

Throttle Valve Installation—Install valve with trademark (c) toward idle port when viewed from manifold side of flange. Install screws loosely, tap valve and then hold with fingers to insure it being centralized in bore, tighten screws securely.

Metering Rod Jet Installation—NO gasket used

Pump Diaphragm Assembly Installation—Before tightening attaching screws, make certain that diaphragm is flat and edges are not wrinkled, then tighten screws evenly.

Pump Linkage—Check pump linkage to make certain that it does not bind in any position. If binding noted, loosen throttle arm clampscrew and adjust throttle arm, retighten clampscrew.

Float Intake Needle & Seat Assembly—Soak new gasket in 90 proof alcohol for 15 minutes, install and let dry on needle seat before installing this

CONTINUED ON NEXT PAGE

CARTER TYPE "YF" (Cont.)

part. When installing float, make certain that shoulder on float pin is on side away from carburetor bore.

Choke Valve Installation—Install the attaching screws loosely, center valve by tapping on valve lightly and hold in this position with fingers while tightening screws securely.

Fast Idle Linkage (Manual Choke Carburetors): Install connector rod with offset end upward, and with pin spring on outside.

Fast Idle Linkage (Automatic Choke Carburetors): Install connector rod with angle end down toward throttle lever and open ends of rod in toward carburetor body.

▷*CARBURETOR INSTALLATION CAUTION*—Special slotted type flange gasket must be used to install carburetor on engine. Diaphragm type metering rod and accelerating pump control will not function if this gasket not used.

REPAIR PARTS: Gasket Sets—Carter No. 200 (738S, 937S), No. 206A (768S, SA; 787S, SA, SB, 832S, SA, SB; 924S; 938S, SA; 951S; 964S; 2008S; 2071S), No. 208A (756S, SA; 757S, SA, SB; 824S, SA, SB; 965S), No. 209B (789S, SA; 967S), No. 210B (788S, SA; 966S), No. 211 (814S, 820S, SA, SB; 833S, SA, SB), No. 216 (876S, SA; 877S, SA; 892S; 2014S), No. 240 (2101S), No. 241 (2100S), No. 206S (2071S), No. 216 (2098S, 2137S, SA; 2163S).

Repair Pkgs. (with Std. Metering Rods): Carter No. 1546B (738S), No. 1557A (768S, SA); No. 1559C (832S, SA, SB; 938S, 951S), No. 1570B (757S, SA, SB; 824S, SA, SB), No. 1571 (833S, SA, SB; 937S), No. 1572 (820S, SA, SB), No. 1590A (876S, SA; 877S, SA, 2014S), No. 1706 (787S, SA, SB), No. 1707 (756S, SA), No. 1708 (788S, SA), No 1709 (789S, SA), No. 1715 (924S, 2071S), No. 1720 (964S, 2008S), No. 1721 (966S), No. 1741 (965S), No. 1742 (967S), No. 1715 (2071S), No. 1767 (2137S, SA), No. 1760 (2163S).

CARTER "YH" HORIZONTAL

CHEVROLET	Carter Model No.
1953-54 Corvette 6	Three 2066S or 2066SA
1955 Corvette 6	Three 2066SA
NASH	
1952-53 Amb. 5260, 5360	895S, SA
1952-53 Amb. Dual Jetfire	(Front) 973S (Rear) 974S
1954-55 Amb. 6 Jetfire	895SA
1954-55 Amb. 6 Dual Jetfire	(Front) 973S (Rear) 974S
NASH-HEALEY	
1953-54 Models①	973 (Front), 974S (Rear)

①—Beginning 1953 Serial No. NH-2310 (102" WB), NH-3024 (108" WB).

▷CHANGES, CAUTIONS, CORRECTIONS

▷*CHEVROLET CORVETTE CAUTION:* THREE carburetors used per engine with interconnected linkage. CARBURETORS MUST BE ADJUSTED AS SHOWN BELOW.

▷*NASH 895S CARBURETOR CHANGES:* Following parts and setting changes were made in production

Parts Change:	First—Part No.—	Later
Intake Needle & Seat Assy.	25-208S	25-228S
Diaphragm Spring Retainer	63-149	63-178
Metering Rod (Std.)	75-831	75-852
Choke Piston	160-35①	②160-116S

①—One-piece type piston.
②—Two-piece type piston & bushing assy.
Choke Setting Change—DIFFERENT setting required for each type choke piston. *See Choke Setting*

▷*NASH DUAL JETFIRE & NASH-HEALEY 973S & 974S THERMOSTATIC COIL ASSY. & SETTING CHANGES FOR IMPROVED HOT STARTING PERFORMANCE:* Thermostatic Coil Assy. Change: First "N" type No. 170N-250S Assy. superseded by later "P" type No. 170P-250S with DIFFERENT CHOKE SETTING. *See Choke Setting data below.*

Fast Idle & Unloader Setting Changes: *See Fast Idle & Unloader Setting data below.*

▷*NASH DUAL JETFIRE & NASH-HEALY CAUTION:* TWO carburetors used per engine with interconnected throttle linkage. CARBURETORS MUST BE ADJUSTED AS SHOWN BELOW.

▷*NASH AMBASSADOR HARD STARTING OR PERCOLATION CORRECTION (Jetfire & Dual Jetfire Models):* Following production changes were made to improve carburetor operation when hot and can be installed on earlier cars as detailed below.

Heat Deflector—Nash No. 3141499 (Jetfire starting Eng. No. A-262326), No. 3141496 (Dual Jetfire starting Serial No. R-736465) heat deflector used in production beginning with above numbers. Installation—Remove and discard battery heat shield. Install deflector on upper exhaust pipe clamp studs on top of present stud nuts, use check nuts No. NU-819 to retain deflector. See that deflector does not contact exhaust pipe clamps. On Overdrive Cars, mount Kick-down Switch on deflector (holes provided for attaching screws).

Insulated Fuel Line—Nash No. 3142006. Used in production beginning Engine No. 262585. Installation—Interchange elbow fitting on front carburetor and Tee fitting on rear carburetor. Connect fuel line between fuel pump and front carburetor.

Carburetor Drain Tube & Hole—Drain tube installed in carburetor air horn drain hole beginning with Serial No. R-734366 & RC-22771. Package No. 3117368 is furnished for installation on earlier cars.

Installation—Carburetor need not be removed from engine. Remove air cleaner, boot, tee, and adapter. Remove pipe plug from drain hole in bottom of air horn. Enlarge existing drain hole to 5/16" diameter (drill from below, using small ¼" electric drill), remove all metal particles from inside of air horn. Install drain tube, nut, and connection (furnished in package).

DESCRIPTION: "YH" type horizontal carburetors are similar to "YF" models with modifications as required for horizontal operation.

ADJUSTMENT: *Make all adjustments exactly as follows:*

▷*IDLING ADJUSTMENT CAUTION—Models with TWO carburetors (Nash Dual Jetfire & Nash-Healey) or THREE carburetors (Chevrolet) must be adjusted exactly as detailed below for proper synchronization and correct performance.*

Idle Setting: If initial adjustment required to start and warm up engine, set idle mixture adjusting screw (see table below). When engine at normal operating temperature so that choke valve wide open and fast idle inoperative, set throttle stop-screw for correct idling speed (see table below), adjust idle mixture screw so that engine runs smoothly (turn screw out for richer mixture, in for leaner mixture), recheck idle speed.

Idle Mixture Setting

Car & Carb.	Idle Screw Opening
Chevrolet Corvette 2066S, SA	½-1½ turns
Nash Amb. 895S, SA	½-1½ turns
Nash & Nash-Healey 973S, 74S	¾-1¾ turns

Idle Speed Setting (RPM)

Car Model		1952-53	1954	1955
Chevrolet Corvette		①475	①475	①475
Nash Amb. 6	(S-M)	500-550	③550	③500-550
	(A-T)	②375	③②475	③②450
Dual Jetfire	(S-M)	550-650	550-650	③500-550
	(A-T)		②550-650	③②450
Nash-Healey		550-650	550-650	

①—With selector lever in "D" position.
②—With selector lever in "N" position
③—No Air Conditioning, 500 RPM Air Conditioner operating, (All Trans. in Neutral)
S-M Synchro-mesh Trans., A-T Automatic Trans

▷*CHEVROLET CORVETTE IDLE ADJUSTMENT (Three-Carburetor installation):*

Throttle Valve Synchronizing: (Preliminary)—With engine turned off and all three choke valves in wide open position, remove the throttle lever stop screw and spring from each carburetor. Loosen the fillister head screws on carburetor shaft universal which secures couplings to throttle shaft at forward end of both center and rear carburetors. Snap accelerator pedal several times to allow couplings to find their normal position so there is no end pressure on throttle valves. Then tighten the fillister head screws. Loosen the two Allen head screws at front end of rear carburetor (NOTE—Clearance provided for throttle valve adjustment by holes in flexible couplings being larger than Allen head screws). Manually close throttle valve in rear carburetor, hold it tightly closed and then tighten the two Allen head screws on rear carburetor flexible coupling. Loosen the two Allen head screws at front end of center carburetor and manually close throttle valve in FRONT carburetor. Hold valve tightly closed and tighten the two Allen head screws on flexible coupling on front of center carburetor.

Checking Throttle Valve Synchronization: Throttle valves must be checked separately and in the following sequence and manner.

CONTINUED ON NEXT PAGE

CARTER "YH" (C nt.)

Rear Carburetor—Check closing off of **rear** throttle valve by twisting (in closing direction) the rear lever of **rear** carburetor. ***There should not be any noticeable signs of rotating on front end of REAR carburetor throttle shaft.*** If rotation is noticeable, loosen Allen screws on rear of **center** carburetor and hold throttle valve in **rear** carburetor closed and tighten Allen screws. If rotation is still noticeable, loosen Allen screws at front of **rear** carburetor and hold **rear** carburetor throttle valve closed and tighten Allen screws.

Front Carburetor—Check closing off of **front** throttle valve by twisting (in closing direction) front lever of **front** carburetor. ***There should not be any noticeable signs of rotating on rear end of FRONT carburetor throttle shaft.*** If rotation is noticeable, loosen Allen screws rear of **front** carburetor and hold throttle valve in **front** carburetor closed and tighten Allen screws. If rotation is still noticeable, loosen Allen screws on front of **center** carburetor and hold throttle valve in **front** carburetor closed and tighten Allen screws.

Center Carburetor—Check **center** carburetor throttle valve as follows: Disconnect accelerator rod at **center** carburetor. Close throttle valve in **rear** carburetor manually at rear end of **rear** carburetor. Hold closed and press throttle lever on **center** carburetor and check for rotation of center throttle shaft at front end. ***There should not be any noticeable signs of rotating on front end of CENTER carburetor throttle shaft.*** If rotation noticeable, correct by the Allen screws between **center** and **rear** carburetors. Close throttle valve in **front** carburetor manually at front end of **front** carburetor and check as outlined above. Correct by the four Allen screws between **center** and **front** carburetors.

Idle Speed & Mixture Adjustment: Assemble throttle lever stop screw and spring on center carburetor only, and adjust so throttle valves are slightly open. Set Idle adjustment (mixture) screws ¾ turn open. Start engine and run until warm. Pull hand brake lever on and move transmission selector lever to "P" (Park) position. Adjust throttle lever stop screw on center carburetor for 475 engine RPM. Turn idle mixture screw on **rear** carburetor **⅛ turn—no more,** whichever increases the RPM or manifold vacuum. If no change, leave adjustment at ¾ turn. Repeat same with center and front carburetors. If RPM changed, correct speed adjustment on center carburetor. Repeat this adjustment more than once to make sure engine RPM or manifold vacuum remain at their highest point. Assemble throttle lever stop screws and spring in front and rear carburetors. Turn front and rear throttle lever stop screw until engine speeds up slightly, then back off screw at least one turn. The center throttle lever stop screw is the only one which should control idle speed.

►***NASH DUAL JET FIRE & NASH-HEALEY ENGINE IDLE ADJUSTMENT (Two-carburetor installations):***

1) Remove air cleaner boots and "Tee" from carburetor air horns.

2) Adjust throttle stopscrew on **rear** carburetor as follows: Hold choke valve open, back off throttle stopscrew until throttle valve is just closed, then turn screw in approximately 2 turns to crank throttle valve slightly. Adjust **front** carburetor similarly.

3) Start engine and allow it to idle until normal temperature reached. Attach Tachometer.

4) Adjust rear carburetor stopscrew for minimum idle speed of 550 RPM.

5) While noting idle speed, synchronize front carburetor by adjusting connecting throttle linkage between carburetors, opening front carburetor throttle just to the point where a further opening begins to increase engine speed. At this point, air suction noise in both carburetors should be identical.

6) Replace air cleaner boots and "Tee" connections.

7) Adjust idle mixture on rear carburetor by turning adjusting screw in (to lean mixture) until engine begins to be rough, then turn screw out ¼ turn. Adjust idle mixture for front carburetor similarly.

8) Recheck idle speed. If not within limits of 550-650 RPM., repeat throttle synchronization (1 thru 5).

Accelerating Pump: No seasonal adjustment provided and pump stroke does not require adjustment.

METERING ROD SETTING

Car Model	Checking Gauge & Length
Chevrolet Corvette	T109-104 (2 312")
Nash (All Models)	T109-104 (2 312")

Metering Rod Setting: ***CAUTION—Gauge required for this setting.*** Back off throttle stopscrew so that throttle valve fully seated, remove bowl cover assembly, unhook metering rod spring from rod and **remove metering rod,** insert correct gauge in place of rod and make certain tapered end is seated in metering rod jet (hold gauge vertical to insure correct seating in jet). Press down on diaphragm shaft until metering rod arm contacts lifter link at diaphragm stem. At this point, metering rod pin should rest lightly on metering rod gauge. Adjust by bending metering rod arm at undercut point using bending tool T109-22. Make certain that metering rod arm contacts lifter **at diaphragm shaft and at outer end of lifter link.** Remove gauge and re-install metering rod. Reset idle speed.

FLOAT SETTING

Car & Carb.	Float Setting	Checking Gauge
Chevrolet 2066S, SA	⅜"	T109-80
Nash 895S, SA	⅜"	T109-80
Nash 973S, 974S	7/16"	T109-81

Float Level: Remove bowl cover and float assembly and remove cover gasket. Invert cover so that float hangs freely. Check float height at highest point on float by inserting gauge between float and cover. Adjust by bending float lever.
CAUTION—Do not compress spring in intake needle which would cause incorrect setting.

Float Drop—Check by holding bowl cover assembly in upright position so that float drops to limit of travel. Distance from float seam at free end of float to underside of bowl cover should be 2". Adjust by bending stop tab on float arm.

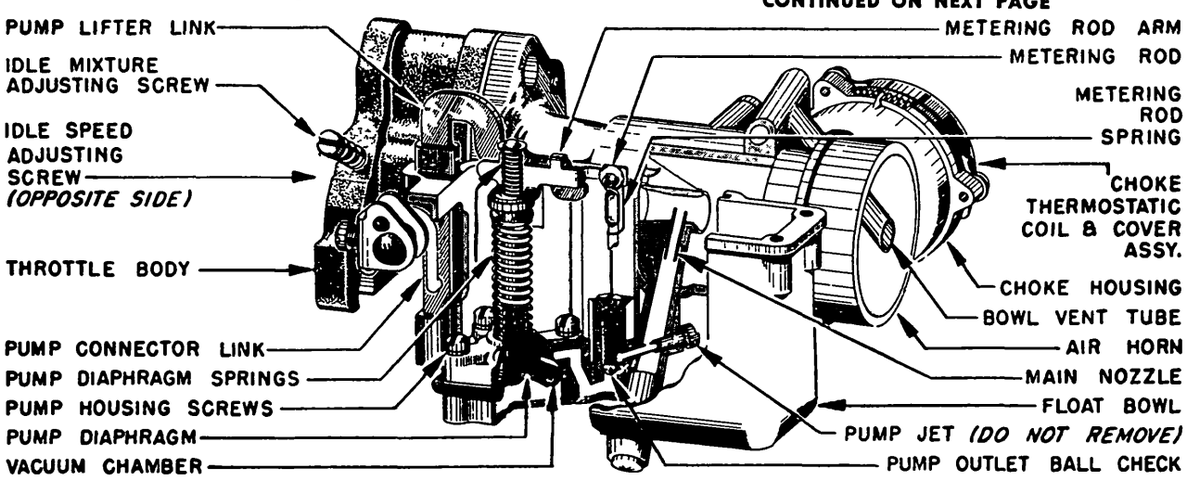
FAST IDLE SETTING

Car & Carb.	Throttle Opening & Gauge
Chevrolet 2066S, SA	020" T109-29
Nash 895S, SA	③.030" T109-29
Nash 973S, 974S	④.015" T109-44

③—Supersedes 033" setting on 895S, SA
④—Supersedes .030" setting on 973S, 974S.

Fast Idle Setting: ***NOTE—Chevrolet carburetor has manual choke and fast idle adjusted differently.***
Chevrolet—Hold choke valve tightly closed, measure throttle valve opening or clearance between edge of valve and air horn wall on side opposite idle port. If opening not correct (see table below), adjust by bending offset portion of choke connector link using bending tool T109-213.
Nash—Remove thermostatic coil housing gasket, and baffle plate (for access to fast idle cam located within choke housing). Open throttle valve partially (to free fast idle linkage), close choke valve fully, close throttle valve. Hold choke valve tightly closed, apply slight tension to throttle lever to remove play from linkage, check throttle valve opening (clearance between edge of valve and carburetor bore on side opposite idle port). If clearance not correct, adjust by bending throttle connector link at lower angle using tool T109-213. Check Unloader.

CONTINUED ON NEXT PAGE



CARTER "YH" HORIZONTAL CARBURETOR

CARTER "YH" (C nt.)

UNLOADER SETTING

NOTE—No Unloader used on Chevrolet 2066S, SA.

Car & Carb.	Choke Opening & Gauge
Nash 895S, SA	⑨1/2" T109-83
Nash 973S, 974S	⑩5/8" T109-85

⑨—Supersedes 3/16" & 1/4" settings on 895S, SA.
⑩—Supersedes 1/2" settings on 973S & 974S.

Unloader: After making fast idle adjustment (above), hold throttle valve in wide open position and close choke valve as far as possible *(CAUTION—do not force valve beyond point where it is held open by unloader arm).* Check choke valve opening (clearance between lower edge of wall and air horn wall). If clearance not correct, adjust by bending choke shaft unloader arm using tool T109-105.

CHOKE SETTING

NOTE—Choke on Chevrolet 2066S, SA is manual type.

Car & Carb.	Choke Setting
Nash 895S (1st choke piston) ⑤	1 Point Lean
Nash 895SA (Later choke piston) ⑥	1 Point Rich
Nash 973S, 74S (First "N" Coil) ⑦	1 Point Lean
Nash 973S, 74S (Later "P" Coil) ⑧	2 Points Lean

⑤—One-piece Choke Piston No. 160-35.
⑥—Two-piece Choke Piston No. 160-116S.
⑦—"N" Coil No. 170N-250S.
⑧—"P" Coil No. 170P-250S.

THROTTLE VALVE SETTING: *See OVERHAUL data for throttle valve installation.* With valve correctly installed, Idle Port Height (top of port above top edge of valve) and Vacuum Spark Port (bottom of horizontal port above top edge of valve) with throttle valve tightly closed should be:

THROTTLE VALVE SETTING

Car & Carb.	⑪Idle Port	Vacuum Spark Port
Chevrolet 2066S, SA	.124- 128"	⑫ 026-.036"
Chevrolet 2066SA⑬	.124-.128"	⑪.016-.026"
Nash (All)	.124- 128"	⑫.026-.036"

⑪—Top of port above top edge of valve.
⑫—Bottom of port above top edge of valve.
⑬—Late production carburetors.

OVERHAUL (With Carburetor removed from engine):
Disassembly: Remove bowl strainer nut and gasket, take out inlet screen. Remove bowl cover assembly (bowl cover, float, intake needle and seat). Remove choke connector rod, throttle shaft arm assembly, and pump connector link. Take out throttle valve screws, remove valve, remove throttle shaft by carefully tapping it through shaft retaining ring. Take out attaching screws and remove body flange assembly (throttle body) and gasket. Unscrew idle mixture adjusting screw and spring. Use tool T109-210 to remove idle passage rivet plug. Take out four diaphragm housing attaching screws, lift out entire diaphragm and metering rod assembly, disassemble this unit. Remove pump intake passage plug and ball check from diaphragm housing. Remove metering rod jet, pump discharge check plug, spring, ball, and low speed jet. Take out attaching screws and remove climatic control and housing assembly, remove gasket, baffle plate, and fast idle link. Take out choke valve attaching screws, remove choke valve, revolve choke shaft counter-clockwise until piston clears cylinder, remove choke shaft, fast idle cam, and piston as an assembly. Take out attaching screw and remove choke piston housing assembly and gasket. Remove all passage plugs.

►*CAUTION—DO NOT remove Nozzle, Bowl Vent, Tube, Economizer, Passage Bushings, or Pump Jet.*

Cleaning & Inspection: Wash all parts except climatic control coil and housing assembly in cleaning solution. Remove all carbon from flange bore, blow out all passages with compressed air. If choke piston is not free in cylinder, remove welch plug from bottom of housing and clean out all carbon and dirt from cylinder walls and grooves. Install NEW welch plug **air tight.** Inspect all parts for wear or damage.

Reassembly: Use all NEW gaskets. Reassemble parts by reversing order of disassembly procedure (above) and note the following points:

Throttle Valve & Shaft Installation—After throttle valve shaft installed in body, back off throttle stopscrew, install throttle valve with trademark (c in circle) toward idle port when viewed from manifold side of body, insert screws loosely, tap valve lightly to center it in bore before tightening screws. *See Throttle Valve Setting (above).* Install throttle centering washer (prongs outward) while pressing on shaft at lever end, press washer tight against casting (use drive end of 3/8" drive 1/2" socket to press washer in place). Check throttle shaft for free operation after centering washer installed.

Pump Diaphragm Installation—Make certain that discharge hole in diaphragm is aligned with passage in diaphragm housing, install the four attaching screws through housing holes and diaphragm so that it is held smoothly against housing. After baffle plate installed in fuel bowl, install diaphragm assembly in the bowl and tighten the attaching screws evenly. Check for free operation.

Climatic Control Installation—After choke piston housing and gasket installed on body, install choke shaft, fast idle cam, and piston assembly in air horn and check for free operation (if shaft binds loosen housing attaching screws and align housing). Install choke valve so that trademark (c in circle) is visible when valve closed, use new attaching screws, tap valve lightly before tightening screws.

SERVICE PARTS: Gasket Sets—Carter No 223 or 227 (895S, SA, 973S, 974S), No. 248 (2066S, SA).

Repair Pkg. (with Std. Metering Rod)—Carter No 1713 or 1719 (895S, SA), No. 1754 (973S, 974S), No 1771 (2066S, SA).

CARTER CLIMATIC CONTROL (AUTOMATIC CHOKE)
(SINGLE BARREL W1, WA1, WE, YH, YF, & B&B CARBURETORS)
OVERHAUL

►*CAUTION—Choke mechanism on different carburetor models are not all of same design. See SEPARATE servicing data for different types following.*

W1 & WA1 TYPE: Disassembly. Take off three attaching screws and retainers on rim of piston housing plate which holds thermostatic coil housing in place. Turn thermostatic coil to right or clockwise to disengage coil hook from prong, lift assembly off. Remove strainer screen (when used). Take out choke valve screws, lift choke valve out. Loosen clamp screw on fast idle link and lever assembly, bend lip under screw with screwdriver (see Unloader adjustment when reassembling) so that it will clear portion of choke valve shaft which is not flat, revolve the choke shaft so that piston clears cylinder edge, remove choke shaft, piston, piston lever and link as an assembly. Remove suction passage gasket from air horn. Do not remove piston housing plate from air horn.

Reassembly. Install the choke piston lever, piston and link, and shaft assembly in air horn and see that choke lever pin and screw assembly correctly located on shaft. Tighten screw on choke lever and see that these parts work freely. Install choke valve using new valve screws. Turn screws down loosely, then close choke valve and tap lightly to centralize valve in air horn, tighten screws securely, see that choke valve operates freely without binding in air horn. Install strainer in housing (when used) and new suction passage gasket in air horn (do not use old gasket). Install air horn assembly on carburetor, tightening screws securely. Install attaching screw and lockwasher under piston housing plate. See that the cork insulating strip on thermostatic coil housing is in good condition and has not shrunk, turn housing so that word 'Climatic' is at bottom, install in this position, turn counter-clockwise until center mark on piston plate housing is in line with reference mark on housing, install retainers and tighten attaching screws which hold housing in place.

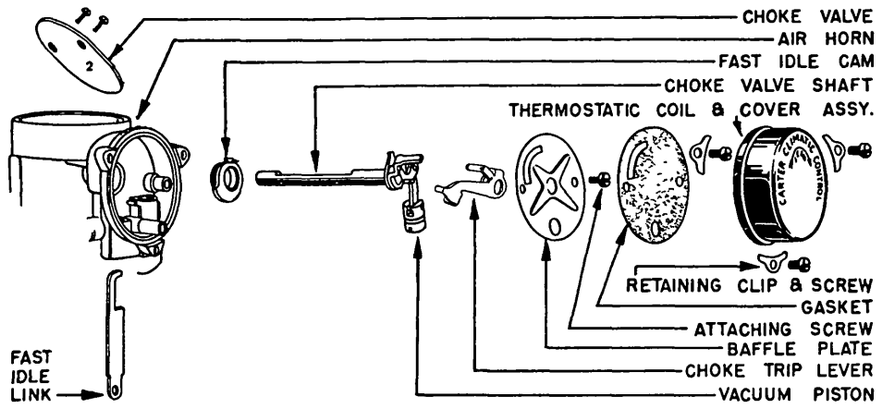
WE, YH, & YF TYPE: Disassembly. Remove screws and retainer clips around thermostatic coil housing assembly, lift this assembly and gasket off. Remove screw retaining baffle plate, lift baffle plate out. Remove choke trip lever and slide fast idle link out. Take out mounting screws and remove choke valve. Unhook fast idle cam spring from lip on choke shaft, rotate shaft and lever counter-clockwise until vacuum piston is clear of cylinder, then withdraw lever, link, and shaft assembly from air horn (*CAUTION*—do not lose small pin retaining vacuum piston on link). Remove fast idle cam and spring from hub in choke body. Vacuum piston can be removed from link by taking out pin in link.

►*CAUTION—Do not attempt to remove thermostatic coil from cover.*

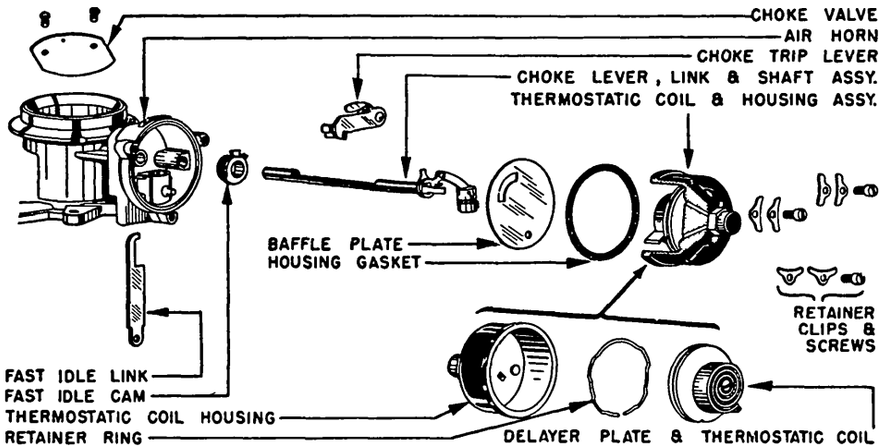
Reassembly—Install fast idle cam and spring assembly on hub in choke body, insert choke lever, link, and shaft assembly in air horn, rotate shaft until piston enters cylinder, then lock fast idle cam spring around lip on choke shaft. Install choke valve with trade mark up, install screws loosely, then close valve and tap it lightly to centralize it in air horn, tighten valve screws securely. Check assembly to make certain that valve operates freely and falls open of own weight. After air horn installed on carburetor body, install fast idle link, install choke trip lever, connect throttle shaft connector rod. Install baffle plate and attaching screw. Install cover gasket. Hold choke valve in open position, install thermostatic coil and cover assembly turned so that coil hook is approximately one-quarter turn counter-clockwise from prong on choke lever, rotate assembly clockwise until mark on cover is aligned with center graduation of scale on housing (*CAUTION*—use care not to catch coil hook in hot air tube connection), install retainer clips and tighten screws.

"B&B" CARBURETOR TYPE: Disassembly. Remove screws and retainer clips around rim of thermostatic coil housing assembly, lift this assembly and gasket off. Remove choke trip lever and slide fast idle link out. Take out mounting screws and remove choke valve (CAUTION—these screws are staked). Rotate choke shaft counter-clockwise and press in on fast idle cam until vacuum piston is clear of cylinder, withdraw lever, link, and shaft assembly from air horn (*CAUTION*—do not lose small pin retaining piston on link). Unhook fast idle cam spring from choke shaft lever, slide cam and spring assembly off shaft. Vacuum piston can be removed by taking out small piston pin in link. Do not attempt to remove thermostatic coil from retainer plate (see Caution below).

►*THERMOSTATIC COIL CAUTION*—Thermostatic coil is mounted on heat retainer plate in cover and this assembly can be removed by striking the cover sharply with the hand. *Do not attempt to remove coil from heat retainer plate.*



CARTER WE, YH, & YF AUTOMATIC CHOKE & FAST IDLE



CARTER (B&B) AUTOMATIC CHOKE & FAST IDLE

Reassembly—Install fast idle cam and spring assembly on choke shaft, hook spring end on anchor on shaft lever. Install vacuum piston on shaft link by inserting piston pin. Insert lever, link, and shaft assembly in air horn, rotate shaft clockwise until piston enters cylinder (CAUTION—make certain that fast idle cam is against boss in housing). Install choke valve using new screws, install screws loosely, then close valve and tap it lightly to centralize it in air horn, tighten screws securely and stake screws by squeezing with pliers. Check assembly to make certain that valve operates freely and does not bind (valve should fall open of own weight). After air horn installed on carburetor body, install fast idle link and trip lever (CAUTION—arm on trip lever must engage slot in link), connect throttle lever connector rod. Make fast idle and Unloader adjustments (see separate data following). Hold choke valve shut, install baffle plate (CAUTION—plate must be centered on pin in housing), install new gasket. Make certain that thermostatic coil properly installed in cover (see Note below), install assembly with indicator mark straight up and down, install retainer clips and screws loosely, rotate assembly counter-clockwise until indicator mark on cover is in line with center graduation of scale on housing, tighten retainer screws securely.

►*INSTALLATION CAUTIONS*—When installing carburetor on engine, note the following important points:

Tightening Heat Tube Connection (Carter B&B Carburetors)—Use two wrenches and hold heat tube fitting in choke cover from turning while tightening heat tube coupling. **Use car not to turn or distort chok housing.**

CLIMATIC CONTROL (AUTOMATIC CHOKE)
(DUAL WDO, WCD, WGD, & BBD CARBURETORS)
OVERHAUL

▷*CAUTION—Choke mechanism on different carburetor models are not all of same design. See SEPARATE servicing data for different types following.*

WDO & WCD TYPES: Disassembly. With air horn assembly removed from main body, remove fast idle lever from choke valve shaft (opposite end from choke housing), remove attaching screws and retainers around rim of thermostatic coil and housing assembly, rotate housing clockwise to disengage coil hook from lever prong, lift off housing assembly, remove gasket and baffle plate. Take out choke valve attaching screws, remove valve. Rotate shaft until vacuum piston is clear of cylinder, then withdraw shaft and lever assembly with piston attached. Remove piston from link by taking out piston pin. On early WDO carburetors, remove strainer screen.

Cleaning & Inspection—Clean all parts with carburetor cleaner or suitable solvent, dry with compressed air (CAUTION—support thermostatic coil with fingers to prevent air blast distorting coil). Examine vacuum piston and cylinder for burrs and scores, make certain that slots or grooves in cylinder and piston are clean and free from carbon deposits (welch plug in end of cylinder can be removed for inspection and cleaning of the cylinder by drilling a small hole in the plug and prying it out).

▷*CHRYSLER CARBURETOR THERMOSTATIC COIL CAUTION:* Thermostatic coil is mounted on heat retainer plate in housing and this assembly can be removed by striking the housing sharply with the hand. When reassembling, use new gasket under heat retainer plate, make certain that notch in plate is aligned with lug in housing and that assembly seated firmly in housing. Do not attempt to remove coil from heat retainer plate.

Reassembly: Reverse disassembly directions given above. See that choke valve operates freely without binding or rubbing on carburetor after screws have been tightened securely. Replace cork insulator strip inside control housing, if old insulator not in good condition, to insure tight seal. Install thermostatic coil and housing assembly with label down, insert attaching screws and lockwashers loosely, then rotate housing counter-clockwise one-half turn until pointer on piston plate housing and notch in coil housing line up and tension can be felt on choke valve, tighten attaching screws. Check setting.

Installing Carburetor on Engine. Make certain that hot air flexible tubing is properly connected at both ends (air leaks will interfere with choke operation). Thermostatic coil setting as given above is standard. If operation is unsatisfactory, see Adjustment directions below.

Choke Valve Installation—When installing choke valve, it must be correctly aligned in air horn so that it does not drag or stick in the closed position which will interfere with correct choke operation. Install valve with trademark upward, use new attaching screws and install screws loosely, then centralize valve by tapping it lightly in the closed position before tightening screws securely.

▷*CHRYSLER CARBURETOR CAUTION:* Use care not to distort or rotate choke housing when tightening heat tube connection. Hold tube fitting in housing with one wrench while tightening connection with second wrench.

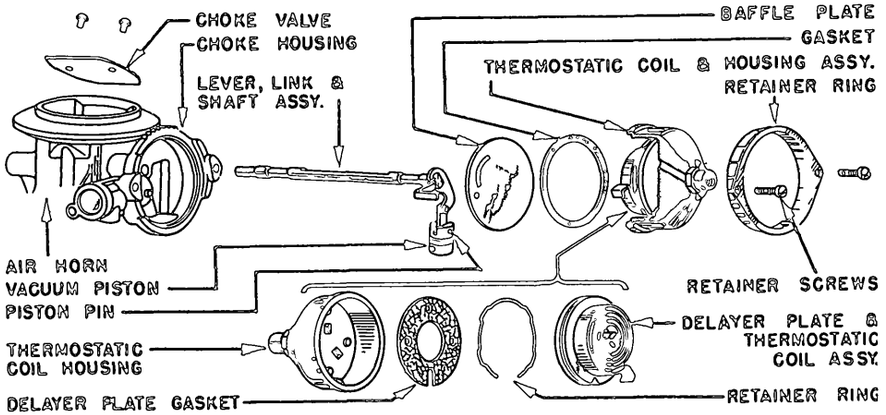
WGD & BBD TYPES: Disassembly. With air horn removed from the main body, remove attaching screws and retainers on rim of thermostatic coil and housing assembly, rotate housing clockwise to disengage coil hook from lever prong, lift off housing assembly, remove gasket and baffle plate. Remove choke trip lever, slide fast idle cam out. Take out attaching screws and remove choke valve. Unhook fast idle cam spring from choke lever, rotate choke shaft until vacuum piston is clear of cylinder, withdraw lever, link, and shaft assembly from air horn with the piston attached (CAUTION—do not lose small pin linking piston on lever, piston can be detached by taking out this pin). Lift out fast idle cam and spring assembly. Choke housing can be removed from air horn casting by taking out three self-tapping screws (CAUTION—remove air passage gasket from air horn and use new gasket when re-installing housing).

Cleaning & Inspection—Wash all parts except thermostatic coil and housing assembly with carburetor cleaner or suitable solvent, dry with compressed air. Examine vacuum piston and cylinder for burrs and scores, make certain that slots or grooves in cylinder and piston are clean and free from carbon deposits (welch plug in end of cylinder can be removed for inspection and cleaning of cylinder by drilling small hole in plug and prying it out). Replace all worn or damaged parts.

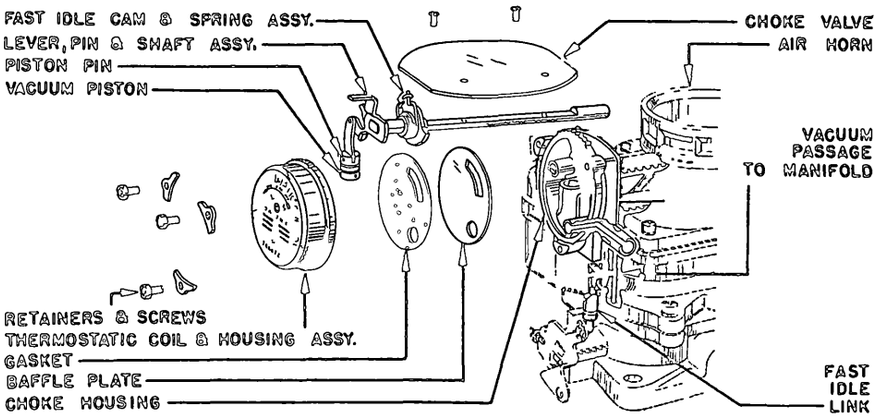
▷*DE SOTO BBD CARBURETOR THERMOSTATIC COIL CAUTION:* Thermostatic coil is mounted on heat retainer plate in housing and this assembly can be removed by striking the housing sharply with the hand. When reassembling, use new gasket under heat retainer plate, make certain that notch in plate is aligned with lug in housing and that assembly is seated firmly in housing. Do not attempt to remove coil from heat retainer plate.

Reassembly—Install new air passage gasket in air horn, install choke housing and tighten the three self-tapping screws securely. Install fast idle cam and spring assembly in housing, insert choke shaft and piston assembly, rotate shaft until piston enters cylinder, engage fast idle cam spring on choke valve lever. Install choke valve with trademark upward, use new attaching screws and install screws loosely, then centralize valve by tapping it lightly in the closed position and tighten screws securely. Check assembly for free operation without binding (valve should close of own weight). Install fast idle link, choke connector rod and retainers, and trip lever. Adjust Fast Idle and Unloader (see data following). Install baffle plate and new gasket. Install thermostatic coil and housing assembly with the index mark at the bottom, revolve housing clockwise until index mark on housing is aligned with center graduation of scale on choke housing, install retainers and attaching screws and tighten securely. Check setting (see Adjustment data).

▷*DE SOTO BBD CARBURETOR CAUTION:* Use care not to distort or rotate choke housing when tightening heat tube connection. Hold tube fitting in housing with one wrench while tightening connection with second wrench.



CHRYSLER V8 "WCD" & DE SOTO V8 "BBD" AUTOMATIC CHOKE & FAST IDLE



CARTER "WGD" AUTOMATIC CHOKE & FAST IDLE

CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Metering Rod No.			Metering Rod Jet		Main Nozzle		Low Spd. Jet		Pump Jet	
			Std.	1 Size Lean	2 Size Lean	Size	Part No.	Size	Part No.	Size	Part No.	Size	Part No.
BUICK													
40, 50	1946-48	608S,SA	75-459	75-488	75-489	.082"	120-65S	(10)		#65	11-177S	#71	48-132S
70	1946-48	609S,SA	75-592	75-557	75-558	.082"	120-65S	(10)		#65	11-185S	#72	48-140S
40, 50	1948	608-SC	75-614	75-633	75-634 (11)	.082"	120-158	(10)		#65	11-177S	#71	48-132S
40, 50	1948	663-S	75-614	75-633	75-634 (11)	.082"	120-158	(10)		#65	11-177S	#71	48-132S
70	1948	609-SC	75-615	75-635	75-636 (11)	.082"	120-158	(10)		#65	11-185S	#72	48-140S
70	1948	664-S	75-615	75-635	75-636 (11)	.082"	120-158	(10)		#65	11-185S	#72	48-140S
40, 50	1949	663S	75-614	75-633	75-634 (11)	.082"	120-158	(10)		#65	11-177S	#71	48-132S
70	1949	664S	75-615	75-635	75-636 (11)	.082"	120-158	(10)		#65	11-185S	#72	48-140S
40, 50	1950-51	725S,SA	75-685	75-702	75-703 (11)	.082"	120-158	(10)		#65	11-185S	#74	48-165S
70	1950-51	726S,SA	75-677	75-717	75-718 (11)	.082"	120-158	(10)		#68	11-183S	#74	48-165S
40, 50	Late 1951	882S	75-685	75-702	75-703 (11)	.082"	120-158	(10)		#62	11-219S	#74	48-165S
70	Late 1951	883S	75-677	75-718	75-718 (11)	.082"	120-158	(10)		#64	11-220S	#74	48-165S
40, 50	1952	882SA	75-685	75-702	75-703 (11)	.082"	120-158	(10)		#62	11-219S	#74	48-165S
40	1954	2081S, SA	75-1107 (1)	75-968 (2)	75-969	#43	120-159	(10)		#69	11-245S	#70	48-208S
40	1955	2179S	75-1138	75-1152	75-1153	#43	120-159	(10)		#66 (31)		#70	48-208S
40	1955	2292S	75-1187			086"	120-165	(10)		.028"	11-181S	#72	48-236
CADILLAC													
V8	1946-48	595S,SA	75-576	75-597	75-598	.089"	120-103S	(10)		#70	11-181S	#70	48-138S
V8	Early 1949	682S	75-673			.089"	120-103S	(10)		#68	11-183S	#70	48-138S
V8	Late 1949	722S	75-670 (50)			.089"	120-159	(10)		#68 (48)	11-196S	#70	48-138S
V8	1950	742S	(26)	75-729	75-730	.089"	120-159	(10)		#70	11-196S	#72	48-171S
V8	1951	845S	(26)	75-729	75-730	089"	120-159	(10)		#70	11-196S	#72	48-171S
CHEVROLET													
Std.	1946-48	574-S	75-485	75-517		.093"	120-115S	(15) (8)12-274S		.035"	11-173S	#72	48-43
Econ.	1946-48	616-S	75-508	75-518		.0835"	120-49S	(15) (8)12-274S		.025"	11-147	#72	48-43
Std.	1949	684S	75-485	75-517		.093"	120-115S	(15) (8)12-274S		.035"	11-173S	#72	48-43
Repl.	1950-51	756S	75-678	75-736	65-737	.091"	120-155	1285" (10)		#66	11-213S	#72	
Repl.	1950-51	789S	75-678	75-736	75-737	.095"	120-155	.1285" (10)		#66	11-213S	#72	
Repl.	1950-51	787S,SA	75-678	75-736	75-737	.091"	120-155	1285" (10)		#68	11-197S	#72	
Repl.	1950-51	787SB	75-787	75-788	75-789	.091"	120-155	.1285" (10)		#68	11-197S	#75	
Repl	1950-51	788S	75-678	75-736	75-737	.095"	120-167	.1285" (10)		#66	11-213S	#72	
Repl.	1950-51	788SA	75-790	75-795	75-796	.095"	120-162	(10)		#66	11-213S	#75	
Repl.	1952	756SA	75-678	75-736	75-737	091"	120-155	1285" (10)		#66	11-213S	#72	
Repl.	1937-52	964S	75-837	75-871	75-872	.098"	120-163	(10)		#68	11-212S	#74	
Corv.	1953-55	2066S,SA	75-936			.082"	120-158	(10)		#70	11-202S		
Repl.	1950-52	966S	75-838	75-879	75-880	.1015"	120-162	(10)		#67	11-232S	#72	
Corv.	1953-54	2066S, SA	75-936			.082"	120-158	(10)		#70	11-202S		
Flt. Repl	1937-52	2008S	75-837	75-871	75-872	.098"	120-163	(10)		#68	11-212S	#74	
Repl.	1953-54	2100S	75-952	75-1100	75-1101	.0945"	120-164	(10)		#70	11-256S	#74	
Repl	1953-54	2101S	75-952	75-1100	75-1101	.0945"	120-164	(10)		#70	11-256S	#74	
Corv. 6 Cyl.	1955	2066SA	75-936			#45	120-158	(10)		#70	11-202S		

(1) Supersedes 75-994 used on first 2081S carburetors
(2) 1 Size Rich No 75 1122
(8) Nozzle Assembly (Inner and Outer Nozzle)
(10) Nozzle is installed permanently. DO NOT REMOVE
(11) High Altitude only
(15) Inner Nozzle 120", Outer Nozzle 125"
(26) 75-711 with No 61-332 Vacuum Piston Spring
75-716 with No 61-226 Vacuum Piston Spring
(31) Was No 69 Part No 11-269S
(48) Supersedes No 11-181S and 11-183S (identified by 5/8" long hex collar)
(50) Use only latest type (identified by raised dot above trade mark)

CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model Year	Carb. No.	Metering Rod No. Std.	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Sizes Lean	Metering Rod Jet Size	Metering Rod Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Low Speed Jet Size	Low Speed Jet Part No.	Pump Jet Size	Pump Jet Part No.
CHRYSLER												
V8 1951	830S,SA	75-765 (29)	75-769	75-770	.089"	120-159	(10)		.0295"	11-221S (41)	#74	48-180
V8 1951	830SB	75-769	.....	.....	.089"	120-159	(10)		.0295"	11-221S	#74	48-180
V8 1952	931S,SA,SB,SC	75-811 (25)	.....	.....	.089"	120-159	(10)		.0295"	11-221S	#74 (31)	48-191S
C56, C58 1953	935S, SA	75-933 (3)	75-934 (23)	75-935 (24)	.089"	120-159	(10)		.0295"	11-235S	.0315"	48-204S
C58, C59 (2) 1953	2039S,SA	75-933 (3)	75-934 (23)	75-925 (24)	.089"	120-159	(10)		.0295"	11-235S	.0315"	48-204S
C59 1953	992S	75-933 (3)	75-934 (23)	75-925 (24)	.089"	120-159	(10)		.0295"	11-235S	.0315"	48-204S
V8 C63-1 1954	2039SA	75-933	75-934	75-935	.089"	120-159	(10)		.0295"	11-235S	.0315"	48-204S
CROSLEY												
All Models 1952	870S	75-780	.....	75-813	.067"	120-135S	#40	12-322	#70	11-170S	#75	48-181
DESOTO												
V8 1952	884S,SA	75-809	75-810 (35)	75-811	.086"	120-165	(10)		.0295"	11-221S	#74 (31)	48-191S
FRAZER												
All Models 1947-48	622S,SA	75-642	75-599	75-600	.099"	120-95S	(36)	12-268	.031"	11-160S (1)	#67	48-89
All Models 1948	622-SB	75-642	75-599	75-600	.099"	120-95S	(36)	12-268	.031"	11-160S	#67	48-89
All Models 1947-48	574-S	75-485	75-517	.....	.093"	120-115S	(15) (8)	12-274S	.035"	11-173S	#72	48-43
Manhattan 1948	685S,SA	75-622	75-674	.....	.0846"	120-125S	(10)		.033"	11-191S	#74 (20)	48-158S
All Models 1949-50	723S	75-669	75-694	75-695	.0846"	120-125S	(10)		#66	11-191S	#74	48-158S
All Models 1951	813S	75-748	75-759	75-738	.086"	120-165	(10)		#68	11-195S	#74	48-169S
HENRY J												
Four 1951-54	820S,SA,SB	75-762	75-781	75-782	.089"	120-159	(10)		#70	11-202S	#75	
Six Early 1951	814S	75-749	75-783	75-784	.0935"	120-166	(10)		#70	11-202S	#75	
Six 1951-54	833S,SA,SB	75-749	75-783	75-784	.0935"	120-166	(10)		#70	11-202S	#75	
HUDSON												
Six 1942-47	501-S	75-467	75-474	75-475 (19)	.082"	120-65S	(12)	12-277	#71	11-161S	#74	
Eight 1942-47	502-S	75-529	75-480	75-531 (49)	.086"	120-121S	(12)	12-248	#69	11-162S	#74	
Six 1948	647S	75-686	75-623	75-624 (9)	.086"	120-121S	(12)	12-248	#67	11-168S	#74	
Eight 1948	648-S	75-607	75-627	75-628 (16)	.086"	120-121S	.061" (5)	12-312	#68	11-160S	#74	
Six 1949	647S,SA	75-686	75-623	75-624	.086"	120-121S	(12)	12-248	#67	11-168S	#74	
Eight 1949	648S	75-607	75-627	75-628	.086"	120-121S	.061"	12-312	#68	11-160S	#74	
Six 1950	647SA	75-686	75-623	75-624 (9)	.086"	120-121S	(12)	12-248	#67	11-168S	#74	
Eight 1950	648S	75-607	75-627	75-628 (16)	.086"	120-121S	(40)	12-312	#68	11-160S	#74	
Pcm 1950-52	749S	75-704	75-712	75-713 (45)	.1015"	120-15S	(6)	12-280S	#65	11-165S	#72	48-72
Six 1950-52	776S	75-754	75-732	75-741 (46)	.089"	120-159	#30	(10)	#66	11-198S	#74	48-174S
Eight 1950-52	773S	75-724	75-744	75-745 (47)	.089"	120-159	#30	(10)	#66	11-198S	#74	48-174S
7B 1952	968S	75-834	.....	.....	.1015"	120-15S	(6)	12-280S	#65	11-206S	#74	48-74
5B, 6B 1952	990S	75-851	75-856	75-857 (48)	.1015"	120-15S	(6)	12-280S	#65	11-206S	#74	48-74

(1) Supersedes Part No. 11-163S.
(2) Cars with PowerFlite Trans.
(3) Supersedes No. 75-811 (used on first 935S, 2039S, 992S).
(5) .0635" on early 1948 Production.
(6) Inner (Screw) Nozzle No. 31 or .120", Outer (Slip) Nozzle .110"
(8) Nozzle Assembly (Inner & Outer Nozzle).
(9) Three Sizes Lean. Part No. 75-625
(10) Nozzle Installed Permanently - DO NOT REMOVE.
(12) Closed Tip. Top hole .028" or No. 70 (45° Angle), Lower hole .0635" or No. 52 (60° Angle).
(15) Inner Nozzle .120", Outer Nozzle .125".
(16) Three Sizes Lean, Part No. 75-629.
(19) Three Sizes Lean, Part No. 75-476.
(20) Supersedes Part No. 48-143S.
(23) Supersedes No. 75-813 (used on first 935S, 2039S, 992S).
(24) Supersedes No. 75-875 (used on first 935S, 2039S, 992S).
(25) Supersedes No. 75-817 in 931S, SA; and No. 75-855 in 931SB, SC; when modified with Unit Pkg No. 75-870U.
(29) Superseded by 75-769 when modified to 830SB.
(31) Supersedes No. 48-180.
(35) One Size Rich No. 75-841 and Two Sizes Rich No. 75-842.
(36) Closed Tip. Top Hole .021" (45° Angle), Lower hole .0945" (70° Angle).
(40) .0635" (Early Production), .061" (Later Production).
(41) Supersedes No. 11-215S.
(45) Three Sizes Lean No. 75-714.
(46) Three Sizes Lean No. 75-742.
(47) Three Sizes Lean No. 75-746.
(48) Three Sizes Lean No. 75-858.
(49) Three Sizes Lean No. 75-532.

CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model Year	Carb. No.	Metering Rod No. Std.	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Sizes Lean	Metering Rod Jet Size Part No.	Main Nozzle Size Part No.	Low Spd. Jet Size Part No.	Pump Jet Size Part No.
HUDSON (Continued)								
1C, 2C 1953	2009S	75-914 (14)	75-907	75-908	.1015" 120-191S (16)	(6) 12-280S	#65 ..... 11-206S	#68 48-87
1C, 2C 1953	2009SA	75-914	75-920	75-921 (32)	.1015" 120-191S	(6)	#65 ..... 11-206S	#65 48-87
4C 1953	749S	75-704	75-712	75-713 (45)	.1015" 120-15S	(6) 12-280S	#65 ..... 11-165S	#72 48-72
5C, 7C 1953	776S	75-754	75-732	75-741	.089" 120-159	#30 ..... (10)	#66 ..... 11-206S	#74 ..... 48-174S
1C, 2C Optl. 1953	2013S (2)	75-878	75-904	75-905 (17)	.096" 120-17S	(6) 12-280S	#68 ..... 11-169S	#68 48-87
4C, 5C Optl. 1953	990S (2)	75-851	75-856	75-857 (48)	.1015" 120-15S	(6) 12-280S	#65 ..... 11-206S	#74 48-74
7C Optl. 1953	968S (2)	75-834	75-861	75-862 (35)	.1015" 120-15S	(10)	#65 ..... 11-206S	#74 48-74
Jet 1954	2009 SA	75-914	75-920	75-921	.1015" 120-191S	(11) 12-280S	#65 ..... 11-206S	#68 48-87
Jet (20) 1954	2013S	75-878	75-904	75-905	.096" 120-17S	(11) 12-280S	#68 ..... 11-169S	#68 48-87
4D (19) 1954	749S	75-704	75-712	75-713	.1015" 120-15S	(11) 12-280S	#65 ..... 11-165S	#72 48-72
5D, 7D 1954	2115S	75-732	75-980	75-741	.089" 120-159	(10)	#68 ..... 11-183S	#74 ..... 48-174S
4D, 5D (20) 1954	2114S	75-956	75-977	75-978	.1015" 120-15S	(11) 12-280S	#66 ..... 11-258S	#74 48-74
7D (20) 1954	2113S	75-955	75-974	75-975	.1015" 120-15S	(11) 12-280S	#66 ..... 11-258S	#74 48-74
Rambler 1955	2014S	75-779	75-793	75-794	.102" 120-170	(10)	#70 ..... 11-202S	#65 .....
Wasp 1955	2009SA	75-914	75-920	75-921 (32)	.1015" 120-191S	110" 12-280S	#65 ..... 11-206S	#68 48-87
Wasp (20) 1955	2013S	75-878	75-904	75-905 (33)	.096" 120-17S	110" 12-280S	#68 ..... 11-169S	#68 48-87
Hornet 6 1955	2252S	75-1169	75-1193	75-1194	.086" 120-165	(10)	#67 ..... 11-211S	#70 ..... 48-157S
Hornet 6 (20) 1955	2113S	75-955	75-974	75-975 (34)	.1015" 120-15S	110" 12-280S	#66 ..... 11-206S	#74 48-74
Hornet V8 1955	2231S	75-1166	75-1191	75-1192	.089" 120-159	(10)	#69 ..... 11-238S	#72 ..... 48-234S
KAISER								
All Models 1947-48	622S,SA	75-642 (3)	75-599	75-600	.099" 120-95S	(36) ... 12-268	.031" ... 11-160S (2)	#67 48-89
All Models 1948	622-SB	75-642	75-599	75-600	.099" 120-95S	(36) ... 12-268	.031" 11-160S	#67 48-89
All Models 1947-48	574-S	75-485	75-517	.....	.093" 120-115S	(15) (8) 12-274S	.035" 11-173S	#72 48-43
Custom 1948	685S,SA	75-622	75-674	.....	.0846" 120-125S	(10)	.033" 11-191S	#74 (49) 48-158S
All Models 1949-50	622SB	75-642	.....	.....	.099" 120-95S	(36) ... 12-268	#68 ..... 11-160S	#67 48-89
All Models 1949-50	723S	75-669	75-694	75-695	.0846" 120-125S	(10)	#66 ..... 11-191S	#74 ..... 48-158S
All Models 1951-52	781S	75-734	75-738	75-739	.086" 120-165	(10)	#68 ..... 11-195S	#74 ..... 48-169S
All Models 1953	999S	75-867	75-897	75-898	.0685" 120-165	(10)	#67 ..... 11-211S	#74 ..... 48-169S
All Models 1953-54	2052S,SA	75-901	75-948	75-949	.086" 120-165	(10)	#70 ..... 11-199S	#74 ..... 48-212S
Std. 1954	2052S, SA	75-901	75-948	75-949	.086" 120-165	(10)	#70 .... 11-199S	#74 ..... 48-212S
Schgd 1954	2146S	75-1115	.....	.....	.091" 120-139S	(10)	#62 .... 11-265S	#74 ..... 48-143S
Darrin 1954	2094S	75-804	75-840	.....	.098" 120-163	(10)	#70 .... 11-163S	#72 .....
Manhattan 1955	2146S	75-1115	.....	.....	.091" 120-139S	(10)	#62 ..... 11-265S	#74 ..... 48-143S
NASH								
"600" 1946-47	611-S	75-584	75-585	75-586	.096" 120-17S	(46) ... 12-261	#71 ..... 11-161S	#70 ..... 48-136S
"600" 1948	662S,SA	75-619 (4)	75-631	75-632	.103" 120-117S	.086" .. 12-307	#67 ..... 11-168S	#72 ..... 48-151S
Amb. 6 1946-48	464-S	75-372 (47)	75-384	75-385	.0995" 120-133S	(1) 12-288	#65 ..... 11-165S	#70 48-58
"600" 1949	694S	75-646	75-660	75-661	.103" 120-117S	.086" .. 12-307	#69 ..... 11-162S	.....
Amb. 1949	683S	75-650 (50)	75-658	75-659	.0995" 120-133S	(30) ... 12-326	#64 ..... 11-174S	.....
Rmbl. & Statsmn. 1950	694S	75-646	75-660	75-661	.103" 120-117S	.086" .. 12-307	#69 ..... 11-162S	.....
Rmbl. & Statsmn. 1950	780S	75-646	75-660	75-661	.103" 120-117S	.0885" 12-307	#69 ..... 11-162S	.....
Ambass. 1950-51	746S	75-650	75-658	75-659	.0995" 120-133S	(39) ... 12-326	#64 ..... 11-174S	.....
Rambler 1951	757S,SA	75-775	75-791	75-792	.098" 120-163	(10)	#70 ..... 11-202S	.....

① Closed Tip. Top hole No. 75 (45° Angle), Lower hole No. 47 (70° Angle).
② Supersedes No. 11-163S.
③ Supersedes No. 75-593.
④ Supersedes No. 75-612.
⑥ Inner (Screw) Nozzle No. 31 or .120", Outer (Slip) Nozzle .110"
⑧ Nozzle Assembly (Inner and Outer Nozzle).
⑩ Nozzle Installed Permanently - DO NOT REMOVE.
⑪ Nozzle Assembly, Inner Nozzle No. 31 (.120"), Outer Slip Nozzle .110".
⑭ Supersedes 75-864 (used on first 2009S).
⑮ **Inner Nozzle .120". Outer Nozzle .125".**
⑯ Supersedes No. 120-15S (This Jet part of Kit No. 75-915U).
⑰ Three Sizes Lean No. 75-906.
⑲ With 232" Engine (No. 2115S with 262" Engine).
⑳ Twin H-Power Cars (Two Carburetors).
㉚ Closed Tip. Top hole .021" (45° Angle), Lower hole .081" (70° Angle).
㉜ Three Sizes Lean No. 75-922.
㉝ Three Sizes Lean No. 75-906 (use 75-1137 for Sports Car "Italia").
㉞ Three Sizes Lean No. 75-976.
㉟ Three Sizes Lean No. 75-863.
㊱ Closed Tip. Top hole .021" (45° Angle). Lower hole .0945" (79° Angle).
㊴ Closed Tip. Top hole .021" (45° Angle), Lower hole .081" (70° Angle).
㊺ Three Sizes Lean No. 75-714.
㊻ Closed Tip. Top hole .021" (45° Angle), Lower hole .076" (70° Angle).
㊼ Supersedes No. 75-534.
㊽ Three Sizes Lean No. 75-858.
㊾ Supersedes No. 48-143S.
㊿ Use only latest type (identified by raised dot above trade mark).

CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Metering Rod No. Std.	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Size Lean	Metering Rod Jet Size	Metering Rod Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Low Spd. Jet Size	Low Spd. Jet Part No.	Pump Jet Size	Pump Jet Part No.
NASH (Continued)													
Rambler	1951	757SB	75-775	75-791	75-792	.096"	120-160		(10)	#70	11-202S		
Stsmn.	1951	824S,SA	75-775	75-791	75-792	.098"	120-163		(10)	#70	11-202S		
Stsmn.	1951	824SB	75-775	75-791	75-792	.096"	120-160		(10)	#70	11-202S		
Rambler	Late 1951	876S	75-779			.102"	120-170		(10)	#70	11-202S		
Stsmn.	Late 1951	877S	75-779			.102"	120-170		(10)	#70	11-202S		
Rmblr	1952	876SA	75-779	75-793	75-794	.102"	120-170		(10)	#70	11-202S	#65	
Stsmn.	1952	877SA	75-779	75-793	75-794	.102"	120-170		(10)	#70	11-202S	#65	
Amb. (20)	1951	892S	75-803			.0935"	120-166		(10)	#70	11-202S	#65	
Amb.	1952	895S,SA	75-852 (40)	75-865	75-866	.098"	120-163	.086"	(10)	#70	11-202S	#68	
Rmblr.	1953	876SA,2014S	75-779	75-793	75-794	.102"	120-170"		(10)	#70	11-202S	#65	
Stsmn.	1953	2034S	75-899 (35)			.082"	120-158		(10)	#68	11-171S (25)	#74	48-113S
Amb.	1953	895SA	75-852	75-865	75-866	.098"	120-163	.086"	(10)	#70	11-202S	#68	
Amb. (20)	1952-55	973S,974S	75-1127 (19)	75-894	75-895	.089"	120-159		(10)	#70	11-202S	#68	
Nash Healey (20)	1952-54	973S,974S	75-1127 (19)	75-894	75-895	.089"	120-159		(10)	#70	11-202S	#68	
Rambler	1954	2014S	75-779	75-793	75-794	.102"	120-170		(10)	#70	11-202S	#65	
Stsmn (21)	1954	2098S	75-958			.102"	120-170		(10)	#71	11-161S	#69	
Stsmn (22)	1954	2137S, SA	75-992			.098"	120-163		(10)	#70 (41)	11-202S	#69	
Stsmn (23)	1954	2163S	75-1128 (14)	75-1130	75-1131	.090" (15)	120-203		(10)	#71	11-161S	#68	
Amb.	1954	895SA	75-852	75-865	75-866	.098"	120-163	.086"		#70	11-202S	#68	
Amb. (24)	1954	973S, 974S	75-1127 (16)	75-894	75-895	.089"	120-159		(10)	#70	11-202S	#68	
Healey (24)	1954	973S, 974S	75-1127 (16)	75-894	75-895	.089"	120-159		(10)	#70	11-202S	#68	
Rambler	1955	2014S	75-779	75-793	75-794	.102"	120-170		(10)	#70	11-202S	#65	
Stsmn	1955	2061S	75-1158			.091"	120-155		(10)	#70	11-181S	#74	48-113S
Stsmn (38)	1955	2258S	75-1162			.090"	120-203		(10)	#70	11-163S	#68	
Amb. 6	1955	895SA	75-852	75-865	75-866	.098"	120-163	.086"		#70	11-202S	#68	
Amb. 6 (24)	1955	973S, 974S	75-1127	75-894	75-895	.089"	120-159		(10)	#70	11-202S	#68	
Amb. V8	1955	2231S	75-1166	75-1191	75-1192	.089"	120-159		(10)	#69	11-238S	#72	48-234S
OLDSMOBILE													
6 Std.	1946-48	504S	75-487	75-512	75-513 (17)	.1015"	120-15S	(6)(8)	12-280S	#70	11-170S	#72	48-72
6 (18)	1946-47	481-S	75-487	75-512	75-513 (17)	.1015"	120-15S	(6)(8)	12-280S	#70	11-170S	#72	48-72
6 (18)	1948	651-S	75-487	75-512	75-513 (17)	.1015"	120-15S	(6)(8)	12-280S	#70	11-170S	#72	48-72
8 Std.	1946-48	503S,SA	75-641 (13)	75-509	75-510 (5)	.089"	120-103S	(6)(8)	12-227S	#71	11-161S	#72	
8 (18)	1946-47	480-S	75-486	75-509	75-510 (5)	.089"	120-103S	(6)(8)	12-227S	#71	11-161S	#72	
8 (18)	Late 1947	665-S	75-613			.082"	120-65S		(10)	#68	11-183S	#74	48-143S
8 (18)	1948	650S,SA	75-641 (13)	75-509	75-510 (5)	.089"	120-103S	(6)(8)	12-227S	#71	11-161S	#72	
6	1949	710S	75-651			.1015"	120-15S	(6)(8)	12-280S	#70	11-170S	#72	48-72
6 (18)	1949	709S	75-651			.1015"	120-15S	(6)(8)	12-280S	#70	11-170S	#72	48-72
8 (18)	1949-50	714S,SA	75-682	75-705	75-706	.096"	120-160	#38	(10)	#70	11-199S	#70	48-157S
6	1950	764S	75-651	75-512	75-513 (17)	.1015"	120-15S	(6)	12-280S	#65	11-206S	#72	48-72
6 (18)	1950	763S	75-719	75-512	75-513 (17)	.1015"	120-15S	(6)	12-280S	#65	11-206S	#72	48-72
6 (18)	1950	763SA	75-651	75-512	75-513 (17)	.1015"	120-15S	(6)	12-280S	#65	11-206S	#72	48-72

(5) Three Sizes Lean No. 75-511.
(6) Inner Nozzle No. 31, Outer Nozzle .110".
(8) Nozzle Assembly (Inner & Outer Nozzle).
(10) Nozzle Installed Permanently - DO NOT REMOVE.
(13) Supersedes No. 75-486.
(14) Supersedes No. 75-1111.
(15) Supersedes No. 120-155 (.091").
(16) Supersedes No. 75-845.
(17) Three Sizes Lean No. 75-514.
(18) Used only on cars with Hydra-Matic or Self-Shifting Trans.
(19) Supersedes No. 75-845.
(20) "Dual Jet Fire" Installation (Two Carburetors).
(21) First Cars (Two Carburetors of Same Type).
(22) Later Cars (Two Carburetors of Same Type).
(23) Latest Cars (Two Carbs.) can be used to replace 2098S or 2137S, SA.
(24) Dual Jet Fire Engine (Two Carbs. 973S Front, 974S Rear).
(25) Supersedes No. 11-176S.
(35) Supersedes No. 75-890.
(38) Super Powerflyte (Two Carburetors).
(40) Supersedes No. 75-831 (used on first 895S Carburetors).
(41) Supersedes No. 11-163S.

CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model Year	Carb. No.	Metering Rod No. Std.	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Size Lean	Metering Rod Jet Size Part No.	Main Nozzl Size Part No.	Low Spd. Jet Size Part No.	Pump Jet Size Part No.
OLDSMOBILE (Continued)								
8 Rpl....1949-50	849S	75-763	75-706	.....	.096"..... 120-160	⑩	#70.....11-199S	#70.....48-157S
8....1951-52	851S,SA	75-766	.....	.....	.089"..... 120-159	⑩	#65.....11-216S	#70.....48-157S
Del. 88....1953	851SA,2015S	75-766	.....	.....	.089"..... 120-159	⑩	#65..... 11-216S	#70.....48-157S
88....1954	2058S	75-993	.....	.....	.086" 120-165	⑩	#67 ....11-211S	#70..... 48-157S
PACKARD								
Eight....1946-47	512-S	75-451	75-519	75-520	.0846"..... 120-125S	⑦.... 12-262	#70.....11-163S	#70.....
Super 8....1946-47	531S	75-616 ㉒	75-539	75-540	.09055".... 120-139S	㉘.. 12-259	#70.....11-163S	#72.....
Eight....1948	644S,SA	75-638 ⑭	75-519	75-520	.0846"..... 120-125S	⑫.. 12-262	#69.....11-162S③	#70.....
Super 8....1948	643S,SA	75-606	75-620	75-621	.09055".... 120-139S	⑲...12-311	#70.....11-163S	#72.....
Cust. 8 ....Early 1948	531S	75-616 ㉒	75-539	75-540	.09055" ... 120-139S	㉘.. 12-259	#70.....11-163S	#72.....
Cust. 8 ....Late 1948	531-SA	75-616	75-639	75-640	.09055".... 120-139S	㉘...12-259	#70.....11-163S	#72.....
Eight....1949	644SA	75-638	75-519	75-520	.0846".... .120-125S	⑫....12-262	#70.....11-162S	#70 .....
Super 8....1949-50	643SA	75-606	75-620	75-621	.09055".... 120-139S	⑲...12-311	#70.....11-163S	#72.....
Cust. 8....1949-50	531SA	75-616	75-639	75-640	.09055".... 120-139S	㉘...12-259	#70.....11-163S	#72.....
Eight....1950	728S	75-679	75-709	75-710	.089"..... 120-159	#38.. ⑩	#66.....11-198S	#74.....48-169S
Eight....1950	728SA	75-707	75-721	75-722	.089"..... 120-159	#30.... ⑩	#66.....11-198S	#74.....48-169S
200 8....1951	784S	75-722	75-767	75-768	.089"..... 120-159	⑩	#67.....11-211S	#74.....48-169S
300, 400....1951	767S	75-764	75-777	75-778	.089"..... 120-159	⑩	#67.....11-211S	#74.....48-169S
200....1952	784S	75-722	75-767	75-768	.089".....120-159	⑩	#67.....11-211S	#74.....48-169S
250, 300, 400....1952	928S	75-767	75-814	75-815	.089"..... 120-159	⑩	#67.....11-211S	#74.....48-169S
2601,33....1953	784S	75-722	75-767	75-768	.089" 120-159	⑩	#67.....11-211S	#74 ..... 48-169S
2611,13....1953	928S	75-767	75-814	75-815	.089" 120-159	⑩	#67 .....11-211S	#74 ..... 48-169S
5400....1954	986S	75-722	75-767	75-768	.089"..... 120-159	⑩	#67.....11-211S	#74.....48-169S
5401, 11....1954	2102S	75-767	75-814	75-815	.089"..... 120-159	⑩	#67.....11-211S	#74.....48-169S
PLYMOUTH								
P15....1947-48	574-S	75-485	75-517	.....	.093"..... 120-115S	⑮⑧12-274S	.039".... 11-190S	#72.....48-43
PONTIAC								
6....1946-48	537-S	75-528	75-582	75-583	.0995"..... 120-133S	⑱ ...12-286	#67.....11-168S	#72.....48-72
6 ⑱....1948	652-S	75-528	75-582	75-583	.0995"..... 120-133S	⑱...12-286	#67.....11-168S	#72.....48-72
8....1946	548-S	75-443	75-444	75-445	.089"..... 120-103S	②.... 12-265	#72..... ..⑯	#70.....48-63
8....1947-48	630S,SA,SB	75-594	75-604	75-605	.082" 120-65S	⑩	#68.....11-183S	#74.....48-143S
8 ⑱....1948	653-S	75-594	75-604	75-605	.082"..... 120-65S	⑩	#68.....11-183S	#74.....48-143S
6....1949-50	717S	75-528	75-582	75-583	.0995"..... 120-133S	⑱ 12-286	#67.....11-168S	#72.....48-72
6 ⑱....1949-50	718S	75-528	75-582	75-583	.0995"..... 120-133S	⑱...12-286	#67.....11-168S	#72.....48-72
8....1949-53	719S, SA	75-664	75-683	75-684	.082"..... 120-65S	⑩	#68.....11-183S	#74 .....48-143S
8 ⑱....1949-53	720S,SA	75-664	75-683	75-684	.082"..... 120-65S	⑩	#68.. .....11-183S	#74.....48-143S
6....1953-54	2010S	75-910 ⑳	75-945	75-946	.082"..... 120-158	⑩	#66.....11-191S	#74.....48-113S
Six 1954	2010S	75-910	75-945	75-946	.082" 120-158	⑩	#66.....11-191S	#74.....48-113S
Eight ㉕....1954	719SA	75-664	75-683	75-684	.082" 120-65S	⑩	#68 .....11-183S	#74..... 48-143S

② Closed Tip. Top hole No. 75 (45° Angle), Lower hole No. 52 (60° Angle).
③ Supersedes No. 11-163S.
⑦ Closed Tip. Top hole .028" (45° Angle), Lower hole .0635" (70° Angle).
⑧ Nozzle Assembly (Inner and Outer Nozzle).
⑩ Nozzle Installed Permanently - DO NOT REMOVE.
⑫ Closed Tip. Top hole No. 70 (45° Angle), Lower hole No. 52 (60° Angle).
⑭ Supersedes No. 75-541.
⑮ Inner Nozzle .120", Outer Nozzle .125".
⑱ Use only on cars with Hydra-Matic Drive.
⑲ Closed Tip. Top hole .0292" (45° Angle), Lower hole .0635" (60° Angle).
⑳ Supersedes No. 75-873.
㉒ Supersedes No. 75-538.
㉕ Used on first Synchro-mesh Trans. Cars.
㉘ Closed Tip. Top hole .037" (45° Angle), Lower hole .071" (60° Angle).
⑯ Jet Installed permanently in carburetor - DO NOT REMOVE.
㊽ Closed Tip. Top hole .020" (45° Angle), Lower hole .070" (60° Angle).

CARTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Metering Rod No.			Metering Rod Jet		Main Nozzle		Low Spd. Jet		Pump Jet	
			Std.	1 Size Lean	2 Sizes Lean	Size	Part No.	Size	Part No.	Size	Part No.	Size	Part No.
PONTIAC (Continued)													
Eight (26)	1954	720SA	75-664	75-683	75-684	082"	120-65S		(10)	#68	11-183S	#74	48-143S
Eight (27)	1954	2122S	75-986	75-1109	75-1110	082"	120-65S		(10)	#66	11-261S	#74	48-143S
V8 (39)	1955	2207S, SB	75-1135	75-1172	75-1173	086	120-165		(10)	#66	11-198S	#74	48-169S
V8 (40)	1955	2182S, SA, SB	75-1136	75-1174	75-1175	086"	120-165		(10)	#70	11-199S	#74	48-169S
STUDEBAKER													
Champion	1946-48	532-S	75-484	75-493	75-494 (19)	098"	120-67S	#44	12-278	#64	11-174S	#71	48-154
Champion	1948	661-S	75-484	75-493	75-494 (19)	098"	120-67S	#44	12-278	#64	11-174S	#71	48-154
Commander	1950	627SA	75-725	75-726	75-727	098"	120-67S	(37)	12-271	#67	11-168S	#71	48-90
Champion	1949-51	715S	75-652	75-666	75-667 (42)	095"	120-129S	(32)	12-263	02925"	11-186S	#73	48-161
Champion	1952	715S	75-652	75-666	75-667 (42)	095"	120-129S	(32)	12-263	02925"	11-186S	#73	48-161
Champion	1953	989S,SA	75-902 (21)	75-917	75-918 (49)	095"	120-129S	#30	12-263	031"	11-242S	#74	48-202
Champ (28)	1954	989SA	75-902	75-917	75-918	.095"	120-129S	(12)	12-263	#68	11-242S	#74	48-202
Champ (31)	1954	2108S	75-902	75-917	75-918	095"	120-129S	(12)	12-263	#65	(13) 11-165S	#74	48-202
Champ (33)	1954	2190S	75-917	75-918	75-919	095"	120-129S	(12)	12-263	#65	11-165S	#74	48-202
Champ	1955	2108S	75-902	75-917	75-918	095"	120-129S	#30	12-263	#65	11-165S	#74	48-202
WILLYS													
Jeep	Early 1946	596-S	75-547	75-548		070"	120-151S	096"	12-255	026" (24)	11-180S	#73	48-84
Jeep	1946-48	636-S	75-547	75-548		070"	120-151S	096"	12-255	#69 (24)	11-186S (22)	#73	48-84
Four	1946-50	613-S	75-589	75-601		098"	120-67S	086"	12-307	#66 (3)	11-167S	#71 (41)	48-122
Jeep	1948-51	636S,SA	75-547	75-548		070"	120-151S		12-323	#69 (24)	11-186S (22)	#73	48-84
6 6-63	1948-50	645-S	75-609			098"	120-67S	086"	12-307	#66 (3)	11-167S	#71 (41)	48-122
Four	1950	738S	75-708	75-720		096"	120-160	(10)		#68	11-160S	#72	
Four	1951	768S,SA	75-750	75-735	75-751	096"	120-160	(10)		#70	11-163S	#72	
Four	1951	832S,SA,SB	75-806 (35)	75-808 (43)	75-751	096"	120-160	(10)		#70	11-161S (44)	#72	
475	1952	951S	75-806	75-808		096"	120-160	(10)		#70	11-161S	#72	
685 Pass	1952-53	924S,2071S	75-804	75-840		098"	120-163	(10)		#70	11-163S (29)	#72	
675 Pass	1952-53	937S	75-749	75-783	75-784	0935"	120-166	(10)		#70	11-202S	#75	
475 Pass, CJ-3B	1952-53	938S	75-806 (17)	75-808 (50)		096"	120-160 ©	(10)		#70	11-163S (29)	#72	
CJ-3B	1953	938SA	75-996			091"	120-155	(10)		#70	11-163S	#72	
475 St W, Trk	1953	951S	75-806	75-808		096"	120-160	(10)		#70	11-163S (29)	#72	
CJ-3A Jeep	1953	636SA	75-547	75-548		070"	120-151S	096"	12-323	026"	11-186S (30)	#73	48-84
Jeep	1954	938SA	75-996	75-1114		091'	120-155	(10)		#70	11-163S	#72	
4 Cyl	1954	951S	75-806	75-808		096"	120-160	(10)		#70	11-161S	#72	
675	1954	937S	75-749	75-783	75-784	0935"	120-166	(10)		#70	11-202S	#75	
685	1954	2071S	75-804	75-840		098"	120-163	(10)		#70	11-163S	#72	
6-226	1954	2052S	75-901	75-948	75-949	086'	120-165	(10)		#70	11-199S	#74	48-212S
Jeep	1955	938SA	75-996	75-1114	-	091'	120-155	(10)		#70	11-161S (17)	#72	
4 Cyl 'F" Hd	1955	951S	75-806	75-808		096	120-160	(10)		#70	11-161S	#72	
6 Cyl 'L" Hd	1955	2204S	75-1129	75-1142	75-1190	086'	120-165	(10)		#68	11-183S	#72	48-171S
6 Cyl 'F' Hd	1955	2071S	75-804	75-840	-	098	120-163	(10)		#70	11-163S	#72	
Pass Cars	1955	2052SA	75-901	75-948	75-949	086	120-165	(10)		#70	11-199S	#74	48-212S

© Change to 120-155 for Steep Idle Improvement (Unitized Pkg No 75-960U)
(3) Supersedes No 68 No 11-160S
(41) Supersedes No 72 No 48-61
(10) Nozzle Installed Permanently - DO NOT REMOVE
(12) Diameter No 30 Top hole 035', Lower hole 089'
(13) Supersedes No 11-242S
(17) Superseded by No 11-163S
(19) For 12 000 ft Alt only Use No 75-495 For economy use No 75-554
(21) Supersedes No 75-666 (used on first 989S)
(22) Supersedes No 11-180S
(24) Idle Well Jet No 61 drill No 43-67
(26) Used on later Synchro-mesh Trans Cars and some Hydra-Matic Cars
(27) Used on Hydra-Matic Cars (Except 720SA on some cars)
(28) First Cars Only
(29) Supersedes No 11-161S
(30) Supersedes No 11-180S
(31) Later Cars (Except later Custom Models)
(32) Closed Tip Top hole 035' (45° Angle) Lower hole 089' (60° Angle)
(33) Custom Models only (later cars)
(35) Supersedes No 75-750
(36) Superseded by No 75-1136
(37) Closed Tip Top hole 035 (45° Angle) Lower hole 0945' (60° Angle)
(39) Synchro-mesh Trans Cars
(40) Automatic Trans (Hydra-Matic etc)
(42) Three Sizes Lean No 75-672
(43) Supersedes No 75-735
(44) Supersedes No 11-163S
(47) Change to 75-959 for Steep Idle Improvement (Unitized Pkg No 75-960U)
(49) Three Sizes Lean No 75-919
(50) One Size Rich No 75-913

CARTER 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Metering Rod No. Std.	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Sizes Lean	Metering Rod Jet Size	Metering Rod Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Low Spd. Jet Size	Low Spd. Jet Part No.	Pump Jet Size	Pump Jet Part No.
BUICK 70	1952	894S SA Pri 894S SA Sec	75-846		75-829 (11)	086" 055" (13)	120-165 120-176	(10) (10)		#69 (12) #69 (12)		#74	
BUICK 70	1953	896S Pri 896S Sec	75-877	75-926	75-928U (3)	0935" 061" (13)	120-166 120-186	(10) (10)		#69 #69	11-240S 11-240S	#74	48-185
BUICK 70	1953	2053S Pri 2053S Sec	75-903	75-929	75-931U (3)	089" 061" (13)	120-159 (C) 120-186	(10) (10)		#69 #69	11-247S 11-247S	#74	48-185
BUICK 60, 70	1954	2082S Pri 2082S Sec	75-1108 (3)	(4)	75-973U (5)	0935" 0635"	120-166 120-176	(10) (10)		#69 #69	11-274S 11-274S	#70	48-221S
BUICK 50, 60, 70	1955	2197S Pri 2197S Sec	75-1147	75-1148	75-1150U	096" 082"	120-160 120-158	(10) (10)		#69 #69	11-247S 11-247S	#70	48-226
BUICK 50 60, 70	1955	2358S Pri 2358S Sec	75-1147	75-1148	75-1150U	096" 082"	120-160 120-158	(10) (10)		031"	11-280S	#70	48-226
CADILLAC V8	1952	896S Pri 896S Sec	75-824			0935" 073" (13)	120-166 120-175	(10) (10)		#70 #70	11-196S 11-196S	#74	48-185
CADILLAC V8	1953	2005S, SA Pri 2005S SA Sec	75-889	75-939U (3)	75-940U (5)	0935" 067" (13)	120-166 120-185	(10) (10)		#70 #70	11-243S 11-243S	#74	48-185
CADILLAC V8 (16)	1953	2072S Pri 2072S Sec	75-889	75-939U (5)	75-940U (5)	0935" 067" (13)	120-166 120-185	(10) (10)		#70 #70	11-243S 11-243S	#74	48-185
CADILLAC V8	1953	2088S Pri 2088S Sec	75-937	75-939U (5)	75-940U (5)	0935" 067" (13)	120-166 120-185	(10) (10)		#70 #70	11-243S (2) 11-243S (2)	#74	48-185
CADILLAC V8 (16)	1953	2119S SA Pri 2119S, SA Sec	75-937	75-939U (5)	75-940U (5)	0935" 067" (13)	120-166 120-185	(10) (10)		#70 #70	11-243S (2) 11-243S (2)	#74	48-185
CADILLAC Repl	1952-54	2143S Pri 2143S Sec	75-889 (6)			0935" 067"	120-166 120-185	(10) (10)		#70 #70	11-260S 11-260S	#74	48-185
CADILLAC Dynaflow	1953	2088S Pri 2088S Sec	75-937	75-939U (5)	75-940U (5)	0935" 067"	120-166 120-185	(10) (10)		#70 (7) #70 (7)	11-260S 11-260S	#74	48-185
CADILLAC Dyn. & AC	1953	2119S, SA Pri 2119S, SA Sec	75-937	75-939U (5)	75-940U (5)	.0935" .067"	120-166 120-185	(10) (10)		#70 (7) #70 (7)	11-260S 11-260S	#74	48-185
CADILLAC Std.	1954	2109S Pri 2109S Sec	75-889			0935" 067"	120-166 120-185	(10) (10)		#70 #70	11-260S 11-260S	#74	48-185
CADILLAC AC	1954	2110S Pri 2110S Sec	75-889			0935" 067"	120-166 120-185	(10) (10)		#70 #70	11-260S 11-260S	#74	48-185
CADILLAC Repl	1955	2255S Pri 2255S Sec	75-1139			0935" 082"	120-166 120-158	(10) (10)		#70 #70	11-268S 11-268S	#74	48-145
CADILLAC Std Eng	1955	2185S Pri 2185S Sec	75-1139			0935" 082"	120-166 120-158	(10) (10)		#70 #70	11-268S 11-268S	#74	48-145
CADILLAC Std Eng	1955	2266S Pri 2266S Sec	75-1139			0935" 082"	120-166 120-158	(10) (10)		#70 #70	11-268S 11-268S	#74	48-145
CADILLAC Std Eng	1955	2354S Pri 2354S Sec	75-1139	(4)		0935" 082"	120-166 120-158	(10) (10)		#70	11-268S	#74	48-185
CADILLAC Std (AC)	1955	2186S Pri 2186S Sec	75-1139			0935" 082"	120-166 120-158	(10) (10)		#70 #70	11-268S 11-268S	#74	48-145
CADILLAC Std (AC)	1955	2267S Pri 2267S Sec	75-1139			0935" 082"	120-166 120-158	(10) (10)		#70 #70	11-268S 11-268S	#74	48-145
CADILLAC Std (AC)	1955	2355S Pri 2355S Sec	75-1139	(4)		0935" 082"	120-166 120-158	(10) (10)		#70	11-268S	#74	48-185
CHEVROLET V8	1955	2218S Pri 2218S Sec	75-1161	75-1214		091" 0512"	120-155 120-187	(10) (10)		#68 #68	11-263S 11-263S	#73	48-233S
CHEVROLET V8 (Late)	1955	2351S Pri 2351S Sec	75-1161			091" 0512"	120-155 120-187	(10) (10)		#68	11-263S	#73	48-233S
CHRYSLER V8 C63, 4, 6	1954	2041 S Pri 2041 S Sec	75-1106 (8)	75-963U (5)	75-964U (5)	0935" 0595" (9)	120-166 120-196	(10) (10)		#69 #69	11-250S 11-250S	#68	48-201S
CHRYSLER C68, 69, 70	1955	2126S Pri 2126S Sec	75-1143	75-1178	75-1179	0935" 053"	120-166 120-217	(10) (10)		#69 #69	11-247S 11-247S	#70	48-221S
CHRYSLER C300	1955	2317S Pri 2317S Sec	75-1186			089" 053"	120-159 120-217	(10) (10)		#69 #69	11-247S 11-247S	#74	48-174S
DESOTO S21	1955	2210S Pri 2210S Sec	75-1144	75-1178	75-1179	0935" 053"	120-166 120-217	(10) (10)		#69 #69	11-247S 11-247S	#70	48-221S

CARTER 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model Year	Carb. No.	Metering Rod No. Std.	Metering Rod No. 1 Size Lean	Metering Rod No. 2 Size Lean	Metering Rod Jet Size	Metering Rod Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Low Speed Jet Size	Low Speed Jet Part No.	Pump Jet Size	Pump Jet Part No.
DODGE V8 D-53-3 1954	2191S Pri.	75-1106	75-963U (5)	75-964U (5)	.0935"	120-166	(10)		#69	11-250S	#68	48-201S
	2191S Sec.	.....	.....	.....	.0595"	120-196	(10)		#69	11-250S	.....	.....
DODGE V8 Optl. 1955	2181S Pri.	75-1144	75-1178	75-1179	.0935"	120-166	(10)		#69	11-247S	#70	48-221S
	2181S Sec.	.....	.....	.....	.057"	120-193	(10)		#69	11-247S	.....	.....
DODGE V8 Optl. 1955	2253S Pri.	75-1160	75-1180	75-1181	.0935"	120-166	(10)		#69	11-247S	#74	48-174S
	2253S Sec.	.....	.....	.....	.057"	120-193	(10)		#69	11-247S	.....	.....
OLDSMOBILE Spr. 88, 98 1952	932S Pri.	75-850	.....	.....	.0935"	120-166	(10)		#68	11-229S	#68	48-201S
	932S Sec.	.....	.....	.....	.073" (13)	120-175	(10)		#68	11-229S	.....	.....
OLDSMOBILE Spr. 88, 98 1953	2016S Pri.	75-887	.....	.....	.0935"	120-166	(10)		#68	11-244S	#68	48-201S
	2016S Sec.	.....	.....	.....	.0635" (13)	120-176	(10)	(14)	.....		.....	.....
OLDSMOBILE Spr. 88, 98 1953	2080S Pri.	75-887	.....	.....	.0935"	120-166	(10)		#68	11-244S	#68	48-201S
	2080S Sec.	.....	.....	.....	.0635" (13)	120-176	(10)	(14)	.....		.....	.....
OLDSMOBILE 88, 98 1954	2059S Pri.	75-985	.....	.....	.0935"	120-166	(10)		#68	(18)	#67	48-218S
1954	2059S Sec.	.....	.....	.....	#53	120-196	(10)		.....		.....	.....
OLDSMOBILE 88, 98 1955	2246S Pri.	75-985	.....	.....	.0935"	120-166	(10)		#68 (18)	.....	#67	48-218S
	2246S Sec.	.....	.....	.....	.0595"	120-196	(10)		.....		.....	.....
PACKARD 2602, 2606, 2626, 2631.....1953	985S Pri.	75-824	75-892	75-893	.086"	120-165	(10)		#66	11-234S	#74	48-213S (15)
	985S Sec.	.....	.....	.....	.067" (13)	120-185	(10)		#66	11-234S	.....	.....
PACKARD 2602, 2606, 2626, 2631..... 1953	2084S Pri.	75-942	75-987	75-988	.086"	120-165	(10)		#67	11-253S	#74	48-213S
	2084S Sec.	.....	.....	.....	.073" (13)	120-175	(10)		#70	11-252S	.....	.....
PACKARD Cav. 1954	2103S Pri.	75-942	75-987	75-988	.086"	120-165	(10)		#67	11-253S	#74	48-213S
1954	2103S Sec.	.....	.....	.....	.073"	120-175	(10)		#70	11-252S	.....	.....
PACKARD Patr. 1954	2112S Pri.	75-942	75-987	75-988	.086"	120-165	(10)		#67	11-253S	#74	48-213S
1954	2112S Sec.	.....	.....	.....	.0785"	120-194	(10)		#67	11-253S	.....	.....
PACKARD Cav. 1954	2142S Pri.	75-942	75-987	75-988	.086"	120-165	(10)		#66	11-234S	#74	48-213S
1954	2142S Sec.	.....	.....	.....	.067"	120-185	(10)		#66	11-234S	.....	.....
PACKARD 5540 Early.....1955	2232S Pri.	75-1163	75-1211	75-1213U	.098"	120-163	(10)		#68	11-270S	#70	48-195S
	2232S Sec.	.....	.....	.....	.052"	120-218	(10)		.....		.....	.....
PACKARD 5540 Later.....1955	2284S Pri.	75-1170	75-1195	75-1197U	.098"	120-163	(10)		#68	11-270S	#70	48-195S
	2284S Sec.	.....	.....	.....	.055"	120-174	(10)		.....		.....	.....
PLYMOUTH V8 Optl. 1955	2253S Pri.	75-1160	75-1180	75-1181	.0935"	120-166	(10)		#69	11-247S	#74	48-174S
	2253S Sec.	.....	.....	.....	.057"	120-193	(10)		#69	11-247S	.....	.....
PONTIAC V8 Optl.... (39)..... 1955	2283S Pri.	75-1183	.....	.....	.0935"	120-166	(10)		#67	11-276S	#72	48-235S
	2283S Sec.	.....	.....	.....	.0512"	120-187	(10)		.....		.....	.....
PONTIAC V8 Optl (40)..... 1955	2268S Pri.	75-1171	75-1203	75-1205U	.0935"	120-166	(10)		#68	11-274S	#72	48-235S
	2268S Sec	.....	.....	.....	.0492"	120-181	(10)		.....		.....	.....
STUDEBAKER Comm. .... (39) 1955	2219S, SA Pri.	75-1141	75-1154	75-1155U (37)	.089"	120-159	(10)		#68 (18)	.....	#73	48-228S
	2219S, SA. Sec.	.....	.....	.....	.0595"	120-196	(10)		.....		.....	.....
STUDEBAKER Comm..... (40) 1955	2214S, SA, Pri.	75-1141	75-1154	75-1155U (37)	.089"	120-159	(10)		#68 (18)	.....	#73	48-228S
	2214S, SA, Sec.	.....	.....	.....	.0595"	120-196	(10)		.....		.....	.....
STUDEBAKER Pres. (39)..... 1955	2219S, SA, Pri.	75-1141	75-1154	75-1155U (37)	.089"	120-159	(10)		#68 (18)	.....	#73	48-228S
	2219S, SA, Sec.	.....	.....	.....	.0595"	120-196	(10)		.....		.....	.....
STUDEBAKER Pres. (40).....1955	2214S, SA, Pri.	75-1141	75-1154	75-1155U (37)	.089"	120-159	(10)		#68 (18)	.....	#73	48-228S
	2214S, SA, Sec.	.....	.....	.....	.0595"	120-196	(10)		.....		.....	.....
STUDEBAKER Pres. Del. 1955	2330S Pri.	75-1154	.....	.....	.089"	120-159	(10)		#68 (18)	.....	#73	48-228S
	2330S Sec.	.....	.....	.....	.0595"	120-196	(10)		.....		.....	.....

(1)—Supersedes Part No. 120-192 (used on first 2053S carburetor). (2)—Superseded by 11-260S on later carburetors. (3)—Supersedes No. 75-995 used on first carburetors. (4)—1 Size Rich No. 75-1123. (5)—Metering Rod & Jet Unit. (6)—Except No. 75-994 (1952), No. 75-937 (1953 Dynaflow Cars). (7)—Supersedes No. 11-243S. (8)—Supersedes No. 75-941 used on first carburetors. (9)—Supersedes No. 120-185. (10)—Nozzle is installed permanently. DO NOT REMOVE. (11)—High Altitude only. (12)—Size #67 for Carburetors No. 894S. (13)—No metering rod used on secondary side. (14)—No idling system used in secondary side of carburetor. (15)—Supersedes Part No. 48-169S. (16)—Air-conditioned Cars. (37)—75-1156U 3 size lean (rod & jet unit). (18)—Installed permanently. DO NOT REMOVE. (35)—Superseded by 75-1136. (39)—75-919 3 size lean. (39)—Synchro-mesh Transmission Cars. (40)—Automatic Trans. (Hydra-Matic). (41)—75-1201U Metering Rod & Jet Unit (for altitude use), consists of 1-61-246, 2-75-1199, 2-120-194.

CARTER (B&B) DOWNDRAFT TYPE

	Carter No.
CHRYSLER SIX	
1946-48 C38 (Synchro-mesh Trans.)	⑤EX1, EX2, EX3
1946-48 C38 Canada (Synchro-mesh Trans.)	EU1, EU2
1946-48 C38 (Hydr. Trans. & Fluid Drive)	EV1, EV2
1949-50 C45 & C48 (Synchro-mesh Trans.)	⑤EX3
1949-50 C45 & C48 (Prestomatic Trans. & Fluid Drive)	⑥E7L1, L2, L3, L4
1951-53 C51 & C60 (Synchro-mesh Trans) (First)	E9C, (Later) E9C1
1951-53 C51 & C60 (Fluid-Matic Trans. & Fluid Drive)	E9A1
1954 C62 (Synchro-mesh Trans)	E9C1
1954 C62 (PowerFlite Trans.)	E9B1
CHRYSLER EIGHT	
1946-48 C39 & C40 (Hydr. Trans. & Fluid Drive) Some Cars	E7A1
1949 C46 & C47 (Prestomatic Trans. & Fluid Drive)	⑥E7J1, J2, J3, J4
1950 C49 & C50 (Prestomatic Trans. & Fluid Drive)	E7J4
DE SOTO	
1946-48 S11 (Synchro-mesh Trans.)	⑤EX1, EX2, EX3
1946-48 S11 (Tip-Toe Trans. & Fluid Drive)	EV1, EV2
1946-48 S11 Taxicab	EL1
1949-50 S13 & S14 (Synchro-mesh Trans.)	⑤EX3
1949 S13 City Traffic	E7V1, E7W1
1949-50 S13 & S14 (Synchro-mesh Trans.)	⑤EX3
1949-50 S13 & S14 (Tip-Toe Trans. & Fluid Drive)	⑥E7L1, L2, L3, L4
1950-53 Six (City Traffic)	E7W1
1951-53 Six (Synchro-mesh Trans.) (First)	E9C, (Later) E9C1
1951-53 Six (Tip-Toe Trans & Fluid Drive)	E9A1
1954 S20 (Synchro-mesh Trans)	E9C1
1954 S20 (PowerFlite Trans)	E9B1
1954 S20 (City Traffic)	⑧E7W1
D DGE	
1946-48 D24 Some Cars	D6J1
1949 D29 & D30 (Fluid Drive Only)	D6P1
1949 D30 (Gyromatic Trans. & Fluid Drive)	D6M1
1950-51 All (Fluid Drive only)	D6P1
1950-51 All (Gyromatic Trans. & Fluid Drive)	D6M1
1953 Six (Std Synchro-mesh Trans)	D6H2
1953 Six (Synchro-mesh Trans. & Fluid Drive)	D6P1, D6P2
1953 Six (Overdrive Trans.)	D6U1
1953 Six (Overdrive Trans. & Fluid Drive)	D6V1
1953 Six (Gyromatic Trans. & Fluid Drive)	D6M1
1954 D51, 2 ⑨ (Synchro-mesh Trans.)	E9T1
1954 D51, 2 ⑨ (Overdrive Trans)	E9N1
1954 D51, 2 ⑨ (Gyro-Matic Trans.)	E9V1
1954 D51, 2 ⑨ (PowerFlite Trans.)	E9U1
PLYMOUTH	
1942-48	D6G1
1942-48 Economy Models	B6V1, B6W1
1949 Std.	D6H1, D6H2
1949 City Traffic	D6N1, D6N2
1950-53 All (Synchro-mesh Trans.)	D6H2
1950-53 All (City Traffic)	D6N2
1952-53 All (Overdrive Trans.)	D6U1
1953 All (Hy-Drive Trans.)	D6P1, D6P2
1953 Taxicab	D6R1
1954 P25 ⑨ (Synchro-mesh Trans.)	D6H2
1954 P25 ⑨ (Overdrive Trans)	D6U1
1954 P25 ⑨ (Hy-Drive Trans.)	D6P2
1954 P25 ⑨ (Taxicab)	D6R1
1954 P25 ⑨ (City Traffic)	⑧D6N2

①—Replacement Carb. No. E6W1R.
②—Replacement Carb. No. E6U2R.
③—Replacement Carb. No. EB1R.
④—Replacement Carb. No. E6P5.
⑤—Replacement Carb. No. EX3R.
⑥See Production Change Notes.
⑧—With "Throttle Restrictor"
⑨—Early 1954 cars only. (See Carter "BBS" for later cars).

NOTE: Chrysler Eight C39 & C40 (1946-48)—Stromberg Model AAVS-2 carburetor also used. See Stromberg Model AAV-2 & AAVS-2 article for complete data.

Dodge Models (1946-51)—Stromberg Models BXV-3 and BXVD-3 or BXVES-3 also used on these cars. See Stromberg data.

Plymouth Models (1946-48)—Carter W1 574S and Stromberg BXV-3 carburetors also used on these cars. See Carter W1 (Chevrolet) and Stromberg BXV-3 data.

►CHANGES, CAUTIONS, CORRECTIONS

►**Chrysler 6 & 8 and DeSoto EG1, EV1, E7A1 Carburetor Change to Improve Dashpot Action:** Original Dashpot Valve Cage Assembly, Part No. 149-73S, changed to new type, Part No. 149-102S.

►**CHRYSLER 6 & DE SOTO E7L1 & E7L2 PRODUCTION CHANGE:** Model E7L1 carburetor used on first cars, superseded by E7L2. These carburetors alike except for new **Air Horn Assembly** (No. 6-622S superseding No. 6-608S) with changes in idle system as follows: **Idle Passage Air Bleed (in Air Horn)**—(E7L1) .0531" (E7L2) .0465"; **Restriction in Body**—(E7L1) .0531", (E7L2) .0452". **Body Flange Assy. (both)**—No. 1-629S superseded by 1-687S. **Air Horn Assembly**—(E7L1) 6-608S, (E7L2) 6-622S. NOTE—Unitized Pkg. No. 195-42U furnished to bring Kick-down Switch up to later standards (E7L1 & L2).

►**CHRYSLER 6 & DE SOTO E7L3 & E7L4 PRODUCTION CHANGE:** Model E7L4 supersedes E7L3 and earlier carburetors. These models similar to E7L2 (above) except for following changes: **Body Flange Assy.** No. 1-687S, **Throttl Shaft & Arm Assy.** No. 3-671S. **Pump Jet** No. 48-167. **Pump Link** No. 117-141, **Dash Pot Pick-up Arm Spring** No. 61-393, **Dash Pot Valve Cage Assy.** (E7L4 only) No. 149-108S, **Valve Plunger Rod & Plate Assy.** (E7L4 only) No. 49-173S, **Kick-down Switch Terminal Block** No. 184-52 or 184-53S (with Clip Assy.).

NOTE—Accelerating pump on these models does not require adjustment other than to see that lifter arm link is at right angles to lifter link shaft.

►**CHRYSLER 8 E7J1 & E7J2 PRODUCTION CHANGE:** Model E7J1 carburetor used on first cars, superseded by E7J2. These carburetors alike except for new **Air Horn Assembly** (E7J1) No. 6-592S, (E7J2) No. 6-619S, and new **Body Flange Assembly** (E7J1) 1-600S, (E7J2) 1-631S, with changes in idle system as follows: **Idle Passage Air Bleed** (E7J1) .063", (E7J2) .0531", **Restriction in Body** (E7J1) .053", (E7J2) .057", **Kickdown Switch Terminal Block** (E7J1) No. 184-26, (E7J2) No. 184-52.

►**CHRYSLER 8 E7J3 & E7J4 PRODUCTION CHANGES:** Model E7J4 supersedes E7J3 and earlier carburetors. These models similar to E7J2 (above) except for following changes: **Body Flange Assy.** No. 1-688S (supersedes 1-631S), **Valve Plunger Rod & Plate Assy.** (E7J4 only) No. 49-173S, **Dash Pot Valve Cage Assy.** (E7J4 only) No. 149-108S, **Step-up Jet & Gasket Assy.** (E7J4 only) No. 149-110S.

►**CHRYSLER 6 & DE SOTO 1951 CARBURETOR PRODUCTION CHANGE:** E9C used on first cars, superseded by E9C1. Following parts not interchangeable between these models:

	E9C Carb.	E9C1 Carb.
Air Horn & Climatic Control Assy.	6-754S	6-739S
Air Horn Assy.	6-768S	6-769S
Body Gasket (main body-to-air horn)	121-177	121-194

►**CHRYSLER 6 & DE SOTO E9A1 AUTOMATIC CHOKE CAUTION:** See Automatic Choke data for special choke Removal & Installation instructions to avoid breakage of thermostatic coil housing.

►***PLYMOUTH 1953 ENGINE SURGE (during light acceleration at 20-25 MPH):*** If not corrected by careful engine tune-up, this condition can be corrected by installing slightly richer Main Metering Jet and leaner Step-up Power Jet:

	Original Part No.	New Part No.
Main Metering Jet	224-11S	224-15S
Step-up Power Jet	149-41S	149-50S

►**Carburetor Mounting Flange Gasket Caution (For all Models):** Step-up jet vacuum piston vacuum passage terminates at carburetor mounting flange and special slotted type gasket must be used when mounting carburetor on manifold CAUTION—Use of plain or solid type gasket will shut off vacuum passage and cause excessive fuel consumption complaints.

►**Engine Stalling while Idling Correction**—Check idle setting (see below). Check slow-closing throttle adjustment (first type only) as directed in article on Chrysler Slow-closing Throttle in Carburetion Equipment Section. Remove Idle Orifice Tube and Plug Assembly and clean tube and passages with compressed air. Remove idle adjusting screw and blow out idle ports with air.

CONTINUED N NEXT PAGE

CARTER (B&B) DOWNDRAFT TYPE (Cont.)

▷Carburetor Loading Up Complaints—Check and adjust float level.

▷Engine Stalling or Stumbling when Throttle Opened—May be caused by accelerating pump leakage (worn or wrinkled pump leather, inlet or outlet ball check valves not seating). To check pump for leakage, remove bowl cover, float, pump outlet ball check valve plug, and pump assembly. Fill pump cylinder with gasoline and re-install pump plunger, taking care not to wrinkle or damage pump leather. Hold outlet ball check valve firmly on seat (use brass rod inserted through valve plug hole), press down on pump plunger. Leakage will be evidenced by gasoline at inlet or outlet ball check valves or above pump plunger. If pump plunger can be pushed all the way down and all gasoline discharged from the cylinder, replace pump plunger or reseat ball check valves by tapping on ball with a brass rod. Install new ball (original ball will be flattened by reseating operation) and repeat check. Repeat reseating operation if necessary. remove pump jet and clean with compressed air or install new jet.
CAUTION—Ball check valves are relatively soft (inlet ball Monel, outlet ball Stainless Steel) and any ball used in reseating operation should be replaced for service.

▷Poor Gasoline Mileage (Economy) Complaints—Check float level. See that the main metering jet is correct type and not worn (special lean metering jets available for special service such as high altitudes or high test fuel). See that step-up jet tight on seat and not leaking, make certain that step-up valve rod and piston clean and not binding or sticking, check step-up piston spring (replace spring if weak or damaged). Check for clogged main vent tube (will cause excessive richness and poor gasoline mileage at speeds above 50 MPH.).

DESCRIPTION

DESCRIPTION: Plain tube, downdraft type with balanced bowl vent (bowl vented through tube cast in air horn), throttle operated accelerating pump, and vacuum controlled step-up jet or power orifice. Some models have special features:

Throttle Restrictor (D6N1, D6N2, E7V1, E7W1)—Restrictor consists of a hemispherical casting bolted on top and bottom of throttle valve (special studs used instead of regular throttle valve mounting screws) to provide control similar to a governor action. *See Throttle Valve Setting (below).*

Automatic Choke (E9A1, B1, C, C1)—Carter Climatic Control assembled on carburetor air horn (has integral fast idle mechanism and unloader). *See adjustment data below and also "Carter Climatic Control"*

Fuel System (Idling):—Fuel taken from main nozzle well up through Idle Orifice tube (metered by restriction in tube) to cross-channel in which it is mixed with air admitted through idle air bleed opening in carburetor wall above venturi. From this point fuel mixture is taken down through channel to discharge ports at throttle edge.

Driving Range—Fuel for main nozzle metered by main metering jet in float bowl. Main nozzle air bled by main vent tube in upper end of nozzle which connects with air vent leading to bowl vent. Lower end of nozzle closed by rivet.

High Speed & Wide Open Throttle Operation—Vacuum piston, which is normally at lower end of stroke with piston spring compressed, will be forced up by spring when manifold vacuum falls off, raising the step-up rod or needle and opening the valve, permitting additional fuel to flow through the power orifice (step-up jet) to the main nozzle.

ADJUSTMENT & OVERHAUL

SLOW-CLOSING THROTTLE (DASHPOT): On carburetors used on cars with Fluid Drive or automatic transmissions (Vacamatic, Simplimatic, Tip-toe Shift, Prestomatic, etc.). *NOTE—Two types of dashpot used:*

ADJUSTABLE TYPE

Dashpot is mechanical type with adjusting screw located on bowl cover (this screw regulates plunger travel). *See "Chrysler, DeSoto, Dodge Slow-closing Throttle" and adjust this unit as follows:*

Adjustment—Turn adjusting screw in or clockwise fully, then back screw out 5 turns (all carburetors except D6P2, V1, E9U1), 4½ turns (D6P2, V1, E9U1). This will provide correct dashpot action. *NOTE—Turning screw out further will provide additional retarding action.*

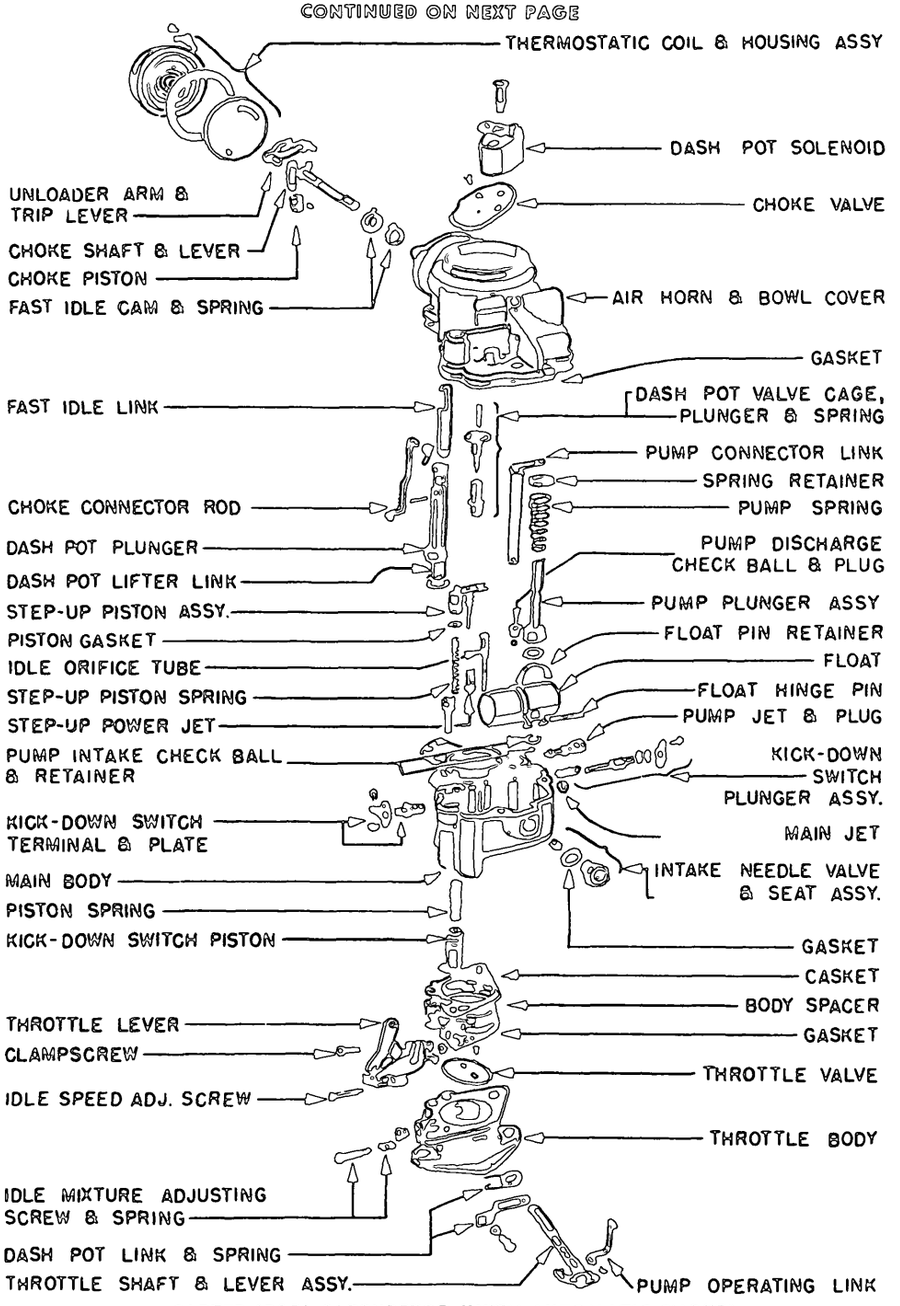
NON-ADJUSTABLE (MAGNETIC) TYPE

Dashpot has by-pass check valve controlled by solenoid connected in automatic transmission control circuit. No adjustment is provided.

See "Chrysler, DeSoto, Dodge Slow-closing Throttle"

THROTTLE KICK-DOWN SWITCH: *TWO DIFFERENT TYPES used as follows:*
Automatic Transmission Control Kick-down Switch (All Cars with Automatic

CONTINUED ON NEXT PAGE



CARTER (B&B) CARBURETOR (WITH AUTOMATIC CHOKE)

CARTER (B&B) DOWNDRAFT TYPE (C nt.)

Transmission)—This switch is built-in the carburetor and does not require attention in service. No adjustment is provided. See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.

►**Kick-down Switch Change for Improved Performance**—*See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Overdrive Control Kick-down Switch (E9N1, D6U1, D6V1): Switch is separate unit mounted on the carburetor and actuated by a lever on the throttle valve shaft. Adjust as directed below. NOTE—On other Overdrive Cars, Kick-down switch is mounted separately and is not part of the carburetor assembly.

Adjustment—Adjust switch position on bracket (loosen one mounting nut on switch stem, tighten opposite nut) for clearance of 1/64-3/64" with throttle valve in wide open position. *CAUTION—Throttle lever must have sufficient over-travel to operate switch.*

VACUUM STEP-UP (ECONOMIZER): No adjustment required but setting should be checked when carburetor reassembled after servicing to insure step-up valve closing. To check, push vacuum piston down in cylinder to end of stroke, check clearance between piston plate and head of step-up valve needle stem. Clearance should be 1/64-1/32". To adjust, bend piston plate slightly.

Vacuum Step-Up Spring—When servicing carburetor, make certain correct type Step-Up Spring installed as follows:

Part No. — Used On:

61-135—513S, D6A2, D6C2, D6G1, D6H1, D6H2, D6M1, D6P1, D6P2, D6R1, D6U1, D6V1, E6N3, E6P5, E6S1, E6S2, E6S3, E6T1, E6T2, E6U1, E6U2, E6W1, E7L1, E7L2, E7L3, E7L4, E9A1, E9C, E9C1, EE1, EG1, EG2, EL1, EU1, EV1, EV2, EX1, EX1R, EX2, EX2R, EX3, EX3R.

61-134—B6P1, B6R1, B6T1, B6U1, B6V1, B6W1, D6J1, D6N1, D6N2.

61-146—E7A1, E7J1, E7J2, E7J3, E7J4.

IDLING ADJUSTMENT: Idle adjusting screw controls fuel discharge through lower idle port and should be turned in for leaner mixture, out for richer mixture. Approximate idle screw settings given in table below. Adjust only with engine warmed up so that choke valve is wide open and fast idle inoperative. Idle speed controlled by throttle lever stopscrew. See tune-up data on car model pages for complete tune-up data on each car model.

IDLE SETTING

Car Model	Carburetor	Idle Setting	Idle Speed
Chrysler 6①	EX1, 1R, 2, 2R, 3, 3R	½-1½ turns open	6 MPH.
Chrysler 6①	EV1	¾-1¼ turns open	450-475 RPM.
Chrysler 6④	E7L1, L2, L3, L4	½-1½ turns open	450-475 RPM.
Chrysler 6①	E9C, E9C1	½-1½ turns open	6 MPH.
Chrysler 6④	E9B1, E9A1	½-1½ turns open	475-500 RPM.
Chrysler 8④	E7A1	¾-1¼ turns open	450-475 RPM.
Chrysler 8④	E7J1, J2, J3, J4	½-1½ turns open	450-475 RPM.
DeSoto①	EX1, 1R, 2, 2R, 3, 3R	½-1½ turns open	6 MPH.
DeSoto①	EL1	½-1½ turns open	6 MPH.
DeSoto④	EV1	¾-1¼ turns open	450-475 RPM.
De Soto④	E7L1, L2, L3, L4	½-1½ turns open	450-475 RPM.
De Soto⑤	E7V1, E7W1	½-1½ turns open	6 MPH.
DeSoto①	E9C, E9C1	½-1½ turns open	6 MPH.
DeSoto④	E9B1, E9A1	½-1½ turns open	475-500 RPM.
Dodge①	D6H2, J1, P1, P2, U1, V1	½-1½ turns open	6 MPH.
Dodge④	D6M-1	½-1½ turns open	475-500 RPM.
Dodge①	E9N1, E9T1	½-1½ turns open	6 MPH.
Dodge④	E9U1, E9V1	½-1½ turns open	475-500 RPM.
Plymouth	D6G1	½-1¼ turns open	6 MPH.
Plymouth	D6H1, H2, N1, N2, R1, U1	½-1½ turns open	6 MPH.
Plymouth⑥	D6P1, D6P2	½-1½ turns open	450-500 RPM.

①—Cars with Standard Transmission.
④—Cars with Hydraulically Controlled Transmission & Fluid Drive.
⑤—Special City Traffic. ⑥—Hy-Drive Transmission Cars

FLOAT LEVEL: To check float level, remove air horn (integral with float bowl cover), use special gauge (see Note), placing gauge on top edge of bowl with lugs extending down toward float on either side of soldered seam. Press lip of float lever against needle valve, float should contact both lugs on gauge. Adjust by bending float lever lip slightly at point where it contacts valve needle (do not bend float arm. If gauge not used, measure from top edge of bowl to top of float (not soldered seam). This measurement should be 5/64" for all models except those listed in table below. Float level figures are plus or minus 1/64".

FLOAT LEVEL SETTING

Car Model	Carburetor	Float Level	Checking Gauge
Chrysler 6	EV1, 2	1/16"	T109-49
Chrysler 8	E7A1	1/16"	T109-49
DeSoto	EV1, 2	1/16"	T109-49
Dodge	E9U1	1/16"	T109-49
ALL OTHERS		5/64"	T109-50

►**D6U1, V1, E9B1, N1, U1, V1 FLOAT SETTING CAUTION:** Remove the float pin retainer, hold lip of float arm against seated intake needle and make certain float pin is at the bottom of its guide slots.

Float Needle Valve and Seat—Triangular type. Furnished only in matched sets as follows:

FLOAT INLET VALVE

Car Model	Carburetor	Part No.	Intake Hole Siz
Chrysler 8	E7A1	25-63S①	#38
Chrysler 8	E7J1, J2, J3, J4	25-44S	#38
DeSoto Taxicab ('46-47)	EL1	25-102S	#44
DeSoto City Traffic	E7V1, E7W1	25-102S	#44
Plymouth Econ.	B6V1	25-104S	#48
ALL OTHERS		25-82S	#44

①—**Supersedes No. 25-82S (#44) used on first carburetors.**

ACCELERATING PUMP: Delayed action type (spring operated pump plunger).

Seasonal Adjustment—Three holes provided in throttle lever for connector link engagement. Inner hole provides minimum stroke, center hole medium stroke, outer hole max. stroke. See car model pages for recommended settings.

Pump Stroke Adjustment—To check, remove air horn and float bowl cover assembly, back off throttle stopscrew so that throttle valve closes tightly, connect pump connector link in correct hole of throttle lever (see table below), install Universal Pump Stroke Gauge T109-117S on bowl so that indicator lip on gauge rests on top of pump plunger shaft. Note gauge reading, then open throttle wide and again note gauge reading. Difference between two readings is pump stroke (in sixty-fourths of an inch) and should agree with table below To adjust, bend horizontal portion of pump connector link

►*EX3, EX3R, E7L3, E7L4, E7W1 (some), E9A1, E9C, E9C1 NOTE*—No pump stroke adjustment required on these models. Make certain that horizontal portion of pump lifter link is at right angles to pump lifter link shaft (bend arm if necessary) using bending tool T109-41.

ACCELERATING PUMP SETTING

Car Model	Carburetor	Pump Stroke	Pump Setting
Chrysler 6 ('46-48)	EU1, 2; EV1, 2	26/64"	Medium Stroke
Chrysler 6 ('46-48)	EX1, 1R; EX2, 2R	20/64"①	Medium Stroke
Chrysler 6 ('46-50)	EX3, EX3R		See Note (above)
Chrysler 6 ('49)	E7L1, E7L2	20/64"	Medium Stroke
Chrysler 6 ('49-50)	E7L3, E7L4		See Note (above)
Chrysler 6 ('51- 54)	E9A1, E9C, E9C1, E9B1		See Note (above)
Chrysler 8	E7A1	26/64"	Medium Stroke
Chrysler 8	E7J1,2,3,4	26/64"	Medium Stroke
DeSoto ('46-48)	EV1, EV2, EL1	26/64"	Medium Stroke
DeSoto ('46-48)	EX1, 1R; EX2, 2R	20/64"①	Medium Stroke
DeSoto ('46-50)	EX3, EX3R		See Note (above)
DeSoto ('49)	E7L1, E7L2	20/64"	Medium Stroke
DeSoto ('49-50)	E7L3, E7L4		See Note (above)
DeSoto ('49-50)	E7V1, E7W1②	26/64"	Medium Stroke
DeSoto ('49-51)	E7W1③		See Note (above)
DeSoto ('51-54)	E9A1, E9B1, E9C, E9C1		See Note (above)
Dodge	D6J1	24/64"	Medium Stroke
Dodge	D6H2, M1, P1, P2, U1, V1	22/64"	Medium Stroke
Dodge	E9N1, E9T1, E9U1, E9V1		See Note (above)
Plymouth	D6G1	24/64"	Medium Stroke
Plymouth	D6H1, H2, D6N1, N2	22/64"	Medium Stroke
Plymouth	D6P1, P2, R1, U1	22/64"	Medium Stroke

CONTINUED ON NEXT PAGE

CARTER (B&B) DOWNDRAFT TYPE (Cont.)

①—26/64" on early production carburetors.

②—Early production with No. 3-459S or 3-452S Throttle Shaft & Arm Assy., No. 117-62 Pump Lever, and No. 48-145 Pump Jet.

③—Later Production with No. 3-728S Throttle Shaft & Arm Assy., No. 117-141 Pump Lever, and No. 48-167 Pump Jet.

THROTTLE VALVE SETTING: When installing valves, insert attaching screws loosely, back throttle stopscrew off, tap valves lightly to centralize in bore, then fasten screws securely.

▷*D6N1, D6N2, E7V1, E7W1 CAUTION*—These models have hemispherical throttle restrictors bolted on upper and lower faces of throttle valve. First install valve in usual manner using No. 101-286 Throttle Restrictor Screws (studs) instead of usual valve attaching screws, then install restrictors on studs and use special No. 105A-45 Throttle Restrictor Nuts to retain the restrictors.

Setting—With throttle stopscrew backed off so that valve tightly closed, distance from top edge of valve to top of upper idle port should agree with 'Idle Port' figure in table below, and distance from top of valve to top of vacuum spark port should agree with 'Vacuum Spark Port' figure (except as noted).

THROTTLE VALVE SETTING

Car Model	Carburetor	Idle Port Height	Vacuum Spark Port
Chrysler 6	EX1, 1R, 2, 2R; EV1, 2	.088-.092"	①.052-.058"
Chrysler 6	EX3, EX3R	.118-.122"	①.052-.058"
Chrysler 6	E9A1, E9C, E9C1	.118-.122"	①.012-.018"
Chrysler 8	E7A1	.088-.092"	①.052-.058"
Chrysler 8	E7J1	.125-.129"	①.052-.058"
Chrysler 8	E7J2, J3, J4	.130-.134"	①.052-.058"
DeSoto	EX1, 1R, 2, 2R; EV1, 2	.088-.092"	①.052-.058"
DeSoto	EX3, EX3R	.118-.122"	①.052-.058"
DeSoto	E7L1, L2, L3, L4	.118-.122"	①.052-.058"
DeSoto	E7V1	.093-.097"	①.052-.058"
DeSoto	E7W1	.118-.122"	①.052-.058"
DeSoto	E9A1, E9C, E9C1	.118-.122"	①.012-.018"
DeSoto Repl. Carb.	E6P5	.088-.092"	①.052-.058"
Dodge	D6H2, M1, P1, P2, U1, V1	.118-.122"	②.021-.027"
Dodge	D6J1	.118-.122"	②.003-.009"
Dodge	E9N1, E9T1, E9U1, E9V1	.118-.122"	
Plymouth	D6A2, D6C2, D6G1	.118-.122"	②.003-.009"
Plymouth	D6H1, H2, D6N1, N2	.118-.122"	②.021-.027"
Plymouth	D6P1, P2, R1, U1	.118-.122"	②.021-.027"

①—Top of port above top of valve. ②—Bottom of port above top of valve.

CHOKE (EXCEPT E9A1, B1, C, C1): Offset type with poppet type relief valve. Control on Plymouth models (without Automatic Choke) is semi-automatic (spring-loaded). Sisson Automatic Choke is standard on all models (Optl. on Plymouth before 1949). *See "Sisson Automatic Choke"*

CHOKE MODELS E9A1, B1, C, C1): Carter Climatic Control on carburetor air horn. *See "Carter Climatic Control"*

CHOKE SETTING

Car Model	Carburetor	Choke Setting
Chrysler 6 & DeSoto	E9A1, E9B1, E9C, E9C1	Centered (At Index)

▷*THERMOSTATIC COIL & HOUSING REMOVAL & INSTALLATION CAUTION*—When servicing carburetor or air cleaner, observe the following precautions to avoid breaking or otherwise damaging the coil housing:

1) Use two wrenches when removing or replacing the heat tube on the housing cover (hold fitting on cover with one wrench while turning coupling nut). Align heat tube with cover fitting to prevent strain on cover.

2) Make certain that gasket installed between air cleaner and carburetor air horn to insure proper clearance.

3) Install air cleaner with indention on underside in line with automatic choke heat tube to provide adequate clearance at this point.

▷*THERMOSTATIC COIL ASSY. CAUTION*—Thermostatic coil is mounted on "Delayer Plate" within housing (delayer plate provides longer choke operation during warm-up and prevents choke closing too rapidly after engine stopped). It should not be necessary to remove the coil assembly from the housing for choke servicing, and coil must not be removed from delayer plate.

FAST IDLE (EXCEPT E9A1, B1, C, C1): Consists of throttle shaft dog pivoted below the throttle shaft and linked to the choke valve lever so that throttle opened to fast idle position when choke valve closed for starting (dog acts as stop for throttle lever idle speed screw).

No adjustment required.

FAST IDLE (MODELS E9A1, B1, C, C1): Consists of throttle shaft dog pivoted assembly mounted on the choke valve shaft within the Climatic Control housing and linked to the throttle valve lever.

▷*CAUTION—Thermostatic Coil Housing, Gasket, and Baffle Plate must be removed to check or adjust the fast idle and unloader.*

Adjustment—To check fast idle setting with thermostatic coil housing, gasket, and baffle plate removed, back out throttle stopscrew so that throttle valve tightly closed. Crack throttle valve, close choke valve completely, then close throttle valve (this will allow fast idle cam to assume fast idle position). Check throttle valve opening or clearance between edge of valve and carburetor wall on side opposite idle port (see table). Adjust by bending choke connector rod at lower angle near throttle lever using tool T109-41. *Check and adjust Unloader before reassembling choke.*

FAST IDLE SETTING

Car Model	Carburetor	Checking Gauge	Throttle Opening
Chrysler 6 & DeSoto	E9A1, E9B1, E9C, E9C1	T109-44①	.015-.019"

①—Double-ended gauge (.015" and .018").

UNLOADER (MODELS E9A1, E9C, E9C1): Consists of an arm on choke trip lever in the choke housing which engages a lug on the choke lever and opens the choke valve when the throttle valve is held wide open.

Adjustment—To check unloader with thermostatic coil housing, gasket, and baffle plate removed, hold throttle valve wide open, close choke valve as far as possible (CAUTION—do not force valve closed), measure choke valve opening or clearance between upper edge of valve and air horn wall (see table). Adjust by bending arm on choke trip lever using bending tool T109-187.

UNLOADER SETTING

Car Model	Carburetor	Checking Gauge	Choke Valve Opening
Chrysler 6 & DeSoto	E9A1, E9B1, E9C, E9C1	T109-154	5/32"

OVERHAUL: *DISASSEMBLY CAUTION—Automatic Choke, slow-closing throttle dashpot, and kick-down switch not used on all carburetors. Disregard data on these units when overhauling carburetors on which they are not used.*

Disassembly: 1) Remove dashpot magnet from air horn by taking out attaching screw (carburetors with magnetic dashpot only).

2) On carburetors with automatic choke, disengage fast idle rod from throttle lever, remove choke thermostatic coil housing (take out screws and remove retainer ring on housing), remove gasket and baffle plate. Remove choke trip lever, slide fast idle link out. Remove choke valve (*CAUTION*—screws are staked, remove carefully to avoid stripping threads or breaking screws). Rotate shaft counter-clockwise and push in on fast idle cam to disengage choke piston from cylinder, withdraw shaft, lever, and piston (*CAUTION*—do not loose piston pin).

▷*THERMOSTATIC COIL HOUSING CAUTION*—Thermostatic coil, heat retainer plate, and housing are serviced as an assembly. Coil and heat retainer plate can be removed from housing for cleaning by hitting assembly sharply against palm of hand with coil side down. *DO NOT ATTEMPT TO SEPARATE COIL FROM HEAT RETAINER PLATE.*

3) Take out five air horn screws (one screw underneath choke housing), lift off air horn assembly, remove air horn gasket. Remove fulcrum pin retainer, remove fulcrum pin, lift off float assembly. Remove fuel inlet needle and needle seat assembly. Remove pump operating link after freeing hairpin clip, lift out pump lifter, plunger, and spring assembly.

4) Take out dashpot connector link screw, lift out dashpot lifter and plunger assembly, dashpot valve cage plunger and spring, and dashpot valve cage.

5) Unscrew idle orifice tube, remove tube with step-up piston, plate, and rod assembly. Remove step-up piston spring and gasket, unscrew step-up jet.

6) Unscrew main metering jet, remove pump jet plug, unscrew pump discharge jet (*CAUTION*—use narrow blade screwdriver). Unscrew pump discharge check ball plug, remove ball check by inverting carburetor.

7) Take out three screws attaching main body to throttle body and separate these parts. If kick-down switch used, remove screws and retainer plates, pull out plunger and spring, carefully pull out terminal assembly to release kick-down limit piston and spring. Unscrew idle mixture adjusting screw and spring. Do not disturb throttle valve assembly.

CONTINUED ON NEXT PAGE

CARTER (B&B) DOWNDRAFT TYPE (C nt.)

Cleaning & Inspection: Wash parts in suitable cleaning solvent, blow out all passages with compressed air and dry parts with air. Remove all carbon deposits paying particular attention to throttle bore in vicinity of throttle valve and idle ports. Thoroughly clean choke piston cylinder and slots and grooves in choke piston. Inspect all parts for wear or damage.

►*THROTTLE SHAFT REPLACEMENT CAUTION*—It is recommended that throttle body assembly be replaced if throttle shaft or bearing points in body are worn.

Reassembly: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure and note the following special instructions:

Step-up Piston Assembly—Make certain that step-up rod enters step-up jet, tighten idle orifice tube snugly. Check assembly by pressing the step-up piston down onto its seat. In this position clearance between head of rod and plate should be .010" minimum. Adjust by bending plate slightly.

Accelerating Pump & Dashpot Plungers—Plunger leather must be in good condition (replace if shrunk or hard). Carefully roll leather back, return it to original position (to flare the leather), work leather between thumb and forefinger until soft and pliable. *NOTE*—Treat new plungers similarly.

Pump Ball Check Valves (Testing)—After pump assembly, test check valves for good seating as follows: Fill bowl to depth of ¼" with clean gasoline, operate pump several times to expel air, then operate pump while holding discharge ball check down with small brass rod. There should be no fuel discharge through either the inlet ball check or discharge ball check valves. If leakage noted, remove parts and clean thoroughly.

Automatic Choke Assembly—Insert choke shaft and piston assembly in air horn, rotate shaft until it is possible to insert piston in cylinder, turn shaft clockwise to enter the piston. Make certain that fast idle cam is centered on boss on air horn. After installing choke valve (below), check assembly for free operation (valve should open freely of own weight from closed position). Make fast idle and unloader adjustment before installing baffle, gasket, and coil assembly (see ADJUSTMENT). Make certain that baffle plate engages locating pin in housing, install new gasket, then install coil housing assembly with indicator mark on rim **downward**, install retainer ring and screws loosely, then rotate coil housing counter-clockwise until indicator mark lines up with center graduation on air horn, tighten retainer screws securely.

Choke Valve Installation—Use new screws and turn screws in loosely, then hold valve in closed position and tap valve gently to center it in bore, tighten screws securely, stake screws by squeezing with pliers.

Carburetor Adjustments—*See ADJUSTMENT section above.*

SERVICE PARTS: Gasket sets and Repair Packages furnished as follows:

Gasket Sets: Carter No. 136 (D6G1, D6H1, D6N1), No. 137A (E7V1, E7W1, EX1, EX1R, EX2, EX2R, EX3, EX3R, E9N1, E9T1), No. 164A (E7A1, E7L1, E7L2, E7L3, E7L4, E9V1), No. 187 (D6J1, D6P1), No. 194A (E7J1, E7J2, E7J3, E7J4), No. 199 (D6M1), No. 203 (D6H2, D6N2, D6R1, D6U1, D6U2), No. 213A (E9A1, E9B1), No. 214 (E9C1), No. 215 (D6P1, D6P2, D6V1), No. 242 (E9U1).

Repair Pkg. (with Std. Metering Rod): Carter No. 1311C (EL1), No. 1323C (D6G1), No. 1367C (EV1, EV2), No. 1368 (D6J1), No. 1348 (E7A1), No. 1510A (E7L1, E7L2), No. 1511A (E7J1, E7J2, E7J3, E7J4), No. 1513A (D6H1, D6H2, D6U1, D6R1, D6R2), No. 1526A (D6P1, D6P2), No. 1527 (D6M1), No. 1528 (E7L3, E7L4), No. 1540 (E7V1), No. 1541A (E7W1), No. 1543 (D6N1, D6N2), No. 1578 (E9C1), No. 1579 (E9A1, E9B1).

CARTER (B&B) DOWNDRAFT CARBURETOR JET SPECIFICATIONS

Car Model	Yr.	Carb. No.	Main Metering Jet Standard Flow	Main Metering Jet Standard Part No.	Main Metering Jet 1 Size Lean Less	Main Metering Jet 1 Size Lean Part No.	Main Metering Jet 2 Sizes Lean Less	Main Metering Jet 2 Sizes Lean Part No.	Main Vent Air Bleed Size	Tube Assem. Part No.	Stepup Jet Power Orifice Size	Stepup Jet Power Orifice Part No.	Idle Orifice Tube Size	Idle Orifice Tube Part No.	Pump Jet Assembly. Jet Size	Pump Jet Assembly. Part No.
CHRYSLER C38⑭	1946-48	EX1,2,3	312-316cc	224-13S㉖	—	224-14S㉗	—	224-15S㉘	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0374"	⑯48-145
CHRYSLER C38⑮	1946-48	EV1, 2	312-316cc	159-89S	—	159-87S	—	159-63S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0374"	48-75
CHRYSLER C39, 40⑮	'46-48	E7A1	312-316cc	159-89S	—	159-87S	—	159-63S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0374"	48-75
CHRYSLER C45⑮	1949	E7L1, 2	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0334"	48-145
CHRYSLER C45⑮	1949	E7L3, 4	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0413"	48-167
CHRYSLER C46, C47⑮	1949	E7J1-4	332-336cc	224-10S	—	224-13S	—	224-14S	.0354"	145-13	.0492"	㉔149-105S	.0276"	123-31S	.0374"	48-75
CHRYSLER SIX⑭	1949-50	EX3㉙	315-319cc.	224-13S㉖	—	224-14S㉗	—	224-15S㉘	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0413"	48-167
CHRYSLER C49, 50⑮	1950	E7J4	332-336cc	224-10S	—	224-13S	—	224-14S	.0354"	145-13	.0433"	149-110S	.0276"	123-31S	.0374"	48-75
CHRYSLER Six⑮	1950	E7L4	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0413"	48-167
CHRYSLER Six⑭	1951	E9C, C1	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
CHRYSLER Six⑮	1951	E9A1	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
CHRYSLER 6⑭	1952-54	E9C1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
CHRYSLER 6⑮	1952-53	E9A1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
CHRYSLER 6⑮	1954	E9B1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DE SOTO S11⑭	1946-48	EX1,2,3	312-316cc	224-13S㉖	—	224-14S㉗	—	224-15S㉘	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0374"	⑯48-145
DE SOTO S11⑮	1946-48	EV1, 2	312-316cc	159-89S	—	159-87S	—	159-63S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0374"	48-75
DE SOTO S13㉑	1949	E7V1㉔	312-316cc	159-89S	—	159-87S	—	⑳159-63S	.0315"	145-13	.0315"	149-46S	.0256"	123-57S	.0334"	⑰48-167
DE SOTO S13⑮	1949	E7L1, 2	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0334"	48-145
DESOTO S13⑮	1949	E7L3, 4	315-319cc	224-13C	—	224-14S	—	224-15S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0413"	48-167
DESOTO S13㉑	1949	E7W1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0315"	149-46S	.0236"	123-59S	.0334"	⑰48-167
DESOTO⑭	1949-50	EX3㉙	315-319cc.	224-13S㉖	—	224-14S㉗	—	224-15S㉘	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0413"	48-167

⑭—Cars with Synchro-mesh Transmission.
⑮—Cars with Automatic Transmission.
⑯—Supersedes No. 48-75.
⑰—Supersedes No. 48-145.
⑳—3 Sizes Lean—159-76S
㉑—City Traffic.
㉔—Superseded by E7W1
㉖—Part No. 224-13S supersedes former No. 159-89S.
㉗—Part No. 224-14S supersedes former No. 159-87S.
㉘—Part No. 224-15S supersedes former No. 159-63S.
㉙—Models EX1, EX1R, EX2, EX2R, EX3 all superseded by EX3R.

CARTER (B&B) DOWNDRAFT CARBURETOR JET SPECIFICATIONS

Car Model	Yr.	Carb. No.	Main Metering Jet: Standard Flow	Main Metering Jet: Standard Part No.	Main Metering Jet: 1 Size Lean Less	Main Metering Jet: 1 Size Lean Part No.	Main Metering Jet: 2 Sizes Lean Less	Main Metering Jet: 2 Sizes Lean Part No.	Main Vent Air Bleed Size	Tube Assem. Part No.	Stepup Jet Power Orifice Size	Stepup Jet Power Orifice Part No.	Idle Orifice Tube Size	Idle Orifice Tube Part No.	Pump Jet Assembly. Jet Size	Pump Jet Assembly. Part No.
DE SOTO⑮	1950	E7L4	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0413"	149-56S	.0276"	123-31S	.0413"	48-167
DE SOTO㉑	1950-51	E7W1	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0315"	149-46S	.0236"	123-59S	.0413"	48-167
DE SOTO⑭	1951	E9C, C1	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	0374"	149-70S	.0295"	123-39S	.0413"	48-167
DE SOTO⑮	1951	E9A1	315-319cc.	224-13S	—	224-14S	—	224-15S	.0315"	145-13	0374"	149-70S	.0295"	123-39S	.0413"	48-167
DESOTO 6⑭	1952	E9C1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DESOTO⑮	1952	E9A1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DESOTO 6⑭	1953	E9C1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DESOTO 6⑪	1953	E9A1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DESOTO 6㉑	1953	E7W1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0315"	149-46S	.0236"	123-59S	.0334"	48-145
DESOTO 6⑭	1954	E9C1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DE SOTO 6⑮	1954	E9B1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0374"	149-70S	.0295"	123-39S	.0413"	48-167
DESOTO 6㉑	1954	E7W1	315-319cc	224-13S	—	224-14S	—	224-15S	.0315"	145-13	.0315"	149-46S	.0236"	123-59S	.0334"	48-145
DODGE D24	1946-48	D6J1	254-258cc	159-61S	—	159-66S	—	159-82S	.0315"	145-17	#63	149-43S	.0295"	123-39S	.0276"	48-103
DODGE ALL⑭	1949	D6P1	256cc.	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE D30⑮	1949	D6M1	256cc.	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE⑭	1950-51	D6P1	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE⑮	1950-51	D6M1	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE 6⑭	1953	D6H2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE 6⑫	1953	D6P1, P2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE 6㉚	1953	D6U1	287cc	224-15S①	—	224-12S③	—	224-11S④	.0315"	145-17	.0295"	⑤149-113S	.0276"	123-31S	.0276"	48-103
DODGE 6㉓	1953	D6V1	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE 6㉒	1953	D6M1	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
DODGE 6⑭	1954	E9T1	332-336cc	224-10S	—	224-13S	—	224-14S	.0315"	145-13	.0394"	149-62S	.0276"	123-31S	.0374"	48-75
DODGE 6㉚	1954	E9N1	332-336cc	224-10S	—	224-13S	—	224-14S	.0315"	145-13	.0394"	149-62S	.0276"	123-31S	.0374"	48-75
DODGE 6㉒	1954	E9V1	332-336cc	224-10S	—	224-13S	—	224-14S	.0315"	145-13	.0394"	149-62S	.0276"	123-31S	.0374"	48-75
DODGE 6⑮	1954	E9U1	332-336cc	224-10S	—	224-13S	—	224-14S	.0315"	145-13	.0394"	149-62S	.0276"	123-31S	.0374"	48-75
PLYMOUTH P15	1946-48	D6G1	254-258cc	159-61S	—	159-66S	—	159-82S	.0315"	145-17	#63	149-43S	.0295"	123-39S	.0276"	48-103
PLYMOUTH Econ.	1946-48	B6V1, W1	168-172cc	159-70S	—	——	—	——	.0315"	145-39	.0236"	149-60S	.0276"	123-40S	.0236"	48-81
PLYMOUTH, ALL	1949-50	D6H1, 2	256cc.	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH, ALL㉑	1949-50	D6N1, 2	256cc.	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#71	149-50S	.0276"	123-31S	.0276"	48-103
PLYMOUTH	1950-51	D6H2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉑	1950-51	D6N2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#71	149-50S	.0276"	123-31S	.0276"	48-103
PLYMOUTH	1952	D6H2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	——	.0276"	48-103
PLYMOUTH⑭	1953	D6H2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉚	1953	D6U1	287cc	224-15S①	—	224-12S③	—	224-11S④	.0315"	145-17	.0295"	⑤149-113S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉘	1953	D6P1, P2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉑	1953	D6N2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#71	149-50S	.0276"	123-31S	.0276"	48-103
PLYMOUTH⑩	1953	D6R1	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH⑭	1954	D6H2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉚	1954	D6U1	287cc	224-15S①	—	224-12S③	—	224-11S④	.0315"	145-17	.0295"	⑤149-113S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉘	1954	D6P2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103
PLYMOUTH㉑	1954	D6N2	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#71	149-50S	.0276"	123-31S	.0276"	48-103
PLYMOUTH⑩	1954	D6R1	256cc	224-11S	—	224-17S	—	224-18S	.0315"	145-17	#65	149-41S	.0276"	123-31S	.0276"	48-103

①—Supersedes 224-11S used on Carburetors code dated B3 and earlier.
②—Used with Step-Up Rod (metering wire) No. 75-876 (.022" diameter).
③—Supersedes No. 224-17S.
④—Used as Std. on carburetors code dated B3 and earlier.
⑤—Supersedes No. 149-41S.
⑥—Supersedes 159-58S (248-252cc.), now 1 Size Lean.
⑦—Supersedes 159-60S.
⑧—Supersedes 159-64S.
⑨—Supersedes 149-56S (.0413").
⑩—Taxicab models.
⑪—Cars with Tip-Toe Shift Trans. & Fluid Drive.
⑫—Cars with Fluid Drive.
⑭—Cars with Synchro-mesh Transmission.
⑮—Cars with Automatic Transmission.
⑲—Used with Step-Up Piston Rod (metering wire) No. 75-798 (.022" dia.).
㉑—City Traffic
㉒—Cars with Gyromatic Trans. & Fluid Drive.
㉓—Cars with Hy-Drive Transmission.
㉚—Cars with Synchro-mesh Trans. & Overdrive.
㉛—Dual (double barrel) Carburetor.
㉜—Cars with Tip-Toe Shift & Fluid Drive or Fluid-Torque.
㉝—Cars with Overdrive & Fluid Drive.

SISSON "AC-600" & "AC-700" SERIES

Car Model	Sisson Model
Chrysler Six, All Models (1939-50)	AC-758B
Chrysler Eight, All Models (1939-48)	AC-600
Chrysler Eight, All Models (1949-50)	AC-758B
DeSoto, All Models (1939-50)	AC-758B
Dodge 6, All Models (1939-53)	AC-758B
Plymouth, All Models (1939-54)	AC-758B

DESCRIPTION: The Sisson Automatic Choke is a separate unit mounted on exhaust manifold and connected to the carburetor choke valve lever by a connector rod. A solenoid within the choke case is connected to the starter side of the starting switch so that the solenoid is energized while the starter is operating. A thermostat is also mounted within the choke case and the solenoid and thermostat operate together to close the choke valve for cold starting and to control the choke valve during the warming up period. The AC-700 Series (AC-751, AC-751B, AC-758B) and AC-600 Series operate in the same manner.

OPERATION: When the starter is operated to crank the engine, automatic choke solenoid is energized, attracting the armature, and rotating the choke lever, which is attached to the choke valve lever through a control rod so that the choke valve is closed if the engine is cold. When the engine is warm this armature movement does not take place and no choking action results. When the engine begins to fire and the starting switch is opened, the solenoid circuit is broken. The choke lever is then controlled entirely by the thermostatic spring within the choke case which tends to rotate lever and open choke valve as engine warms up. At normal operating temperature, choke valve is wide open.

ADJUSTMENT: **Model AC758B.** Remove air cleaner, open throttle approximately ¼. Move choke lever until hole in automatic choke shaft (opposite end from lever) lines up with slot in bearings, insert special tool, Sisson No. C-723, through hole in shaft and push tool down so that lower end engages slot in choke base mounting flange. Loosen clampscrew on choke lever, press up on lever until choke valve is closed tight (sight down air horn), hold lever in this position and tighten clampscrew. Remove tool.

Model AC-600—Remove air cleaner, open throttle approximately ¼, take off automatic choke cover. Clamp special adjusting tool, Sisson No. AC-620, in place on choke so that end of tool enters and lines up hole in armature and hole in magnet core, move flat bar on tool so that armature is locked tightly against magnet core. Loosen clampscrew on choke lever, move lever until choke valve is closed tight (sight down air horn), hold lever in this position and tighten clampscrew. Remove tool and replace automatic choke cover.

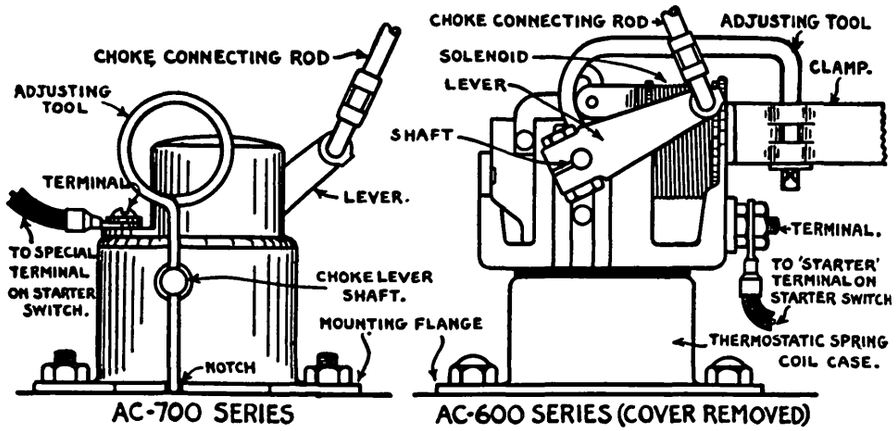
CAUTION—When replacing air cleaner, make certain that clamp not tightened excessively which may cause choke valve to bind. See that choke valve does not bind or stick and that entire choke mechanism and fast idle linkage operate freely with throttle partly open. See car model page for Throttle Cracker.

SERVICING: If Trouble Shooting data below does not correct faulty operation, remove Automatic Choke Unit and test operation on test fixture such as Sisson Model AC-753. Replace units which are defective. Do not oil any part of choke mechanism. When installing choke, make certain that heat insulating gasket is in place between exhaust manifold and choke case. Do not use a terminal screw on AC-758B models which is longer than original screw (Caution—a longer terminal screw will interefere with correct operation).

TROUBLE SHOOTING: If engine does not start or warm up properly, and for hard starting complants due to faulty choke operation, check following points

Hard Starting with Cold Engine:

1. Check fast idle mechanism to see that it is free and not binding at any point (fast idle connector rod usually connected to choke valve lever).
2. See that choke rod connecting Automatic Choke lever and choke valve lever does not bind in levers.
3. Examine carburetor choke lever, Automatic Choke lever, and fast idle mechanism and remove all paint, grease, or dirt which might cause binding.
4. Check carburetor choke valve, see that edges are smooth and that valve does not rub against air horn walls or bind in any position. See that air cleaner does not interfere with choke valve and that mounting screw is not tightened excessively which will distort air horn and bind choke valve (check choke valve operation with air cleaner in place).
5. Check electrical connections at Automatic Choke and starter switch. Examine wire for short-circuits and breaks.
6. Check Automatic Choke ground (unit grounded through case). See that mounting screws are tight and that manifold under mounting flange is clean.
7. Check throttle cracking linkage (see Tune up instructions on car model page). This is important to insure correct throttle opening for starting and to place automatic choke in operation (on some cars with fast idles, fast idle will prevent choke closing until throttle valve opened to free fast idle cam.
8. Check Automatic Choke adjustment (see instructions above). If Automatic Choke does not function after above points checked, replace the unit.



Hard Starting with Hot Engine:

1. Check for rich mixture or flooding caused by percolating discharge of carburetor when engine stopped. To check, remove air cleaner immediately after stopping engine, note whether gasoline dripping into manifold from carburetor nozzle (this overflow should show up within 3-5 minutes after engine is stopped). Correct by installing special size Float Valve Needle and Seat Assembly and checking float level. See Carburetor article in Carburetor Section.
2. Check carburetor for High Float Level. See Carburetor article in Carburetor Section for Float Level specifications and adjusting directions.

Engine Stalls while Cold:

1. Check Manifold Heat Control Valve. See Manifold Heat Control data on car model page for directions.
2. Check carburetor Fast Idle setting. See Carburetor article in Carburetor Section for directions.

INSTALLATION (PLYMOUTH): Mounting pad is provided on the exhaust manifold for the automatic choke. Position choke on mounting pad with operating lever pointing toward carburetor, drill two 3/16" holes in line with mounting holes in base flange, tap with ¼x20 USS. tap, use studs furnished to mount choke on manifold. Take off all hand choke linkage, replace with control rod linking choke valve lever and choke operating lever.

CHRYSLER, DE SOTO, DODGE SLOW-CLOSING THROTTLE
(CARTER B&B CARBURETOR TYPE)

CHRYSLER SIX	Carburetor Model
1946-48 Auto. Trans.	EV1, EV2
1949-50 Auto. Trans.	E7L1, 2, 3, 4
1951-53 Auto. Trans.	E9A1

CHRYSLER EIGHT	
1946-48 Auto. Trans.	E7A1
1949-50 Auto. Trans.	E7J1, 2, 3, 4

①—With Fluid Drive.

DE SOTO	Carburetor Model
1946-48 Auto. Trans.	EV1, EV2
1949-50 Auto. Trans.	E7L1, 2, 3, 4
1951-53 Auto. Trans.	E9A1

DODGE	
1946-48 Std. Trans.	D6J1
1949-53 Std. Trans.①	D6P1, P2
1949-53 Auto. Trans.	D6M1
1953 O.D. Trans.①	D6V1

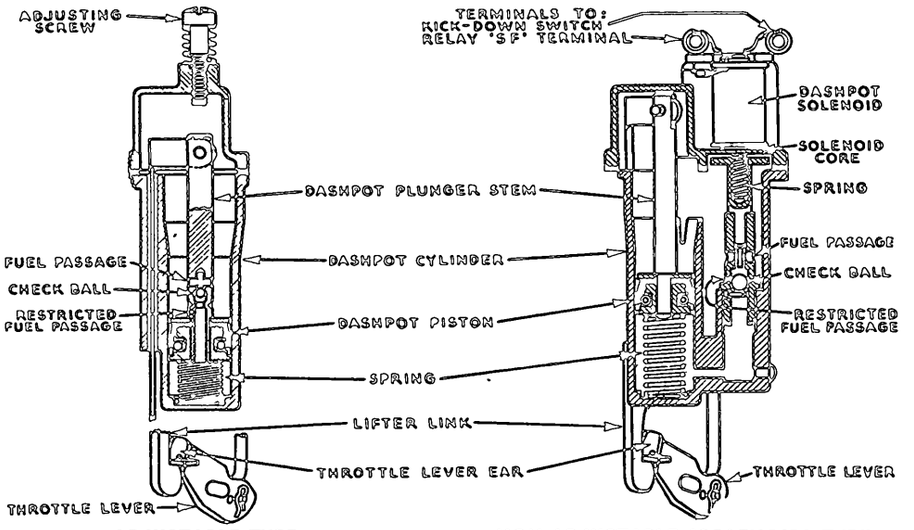
PLYMOUTH	
1953 Hy-Drive	D6P1, P2

DESCRIPTION & OPERATION: *CAUTION—Two different types used:*

Adjustable (First) Type—This first type slow-closing throttle consists of dashpot built in the carburetor float bowl with the dashpot piston linked to the throttle lever. When the throttle valve is opened, dashpot piston is lifted up in cylinder and cylinder fills with fuel which flows in through the fuel passage and past the check ball. When the accelerator pedal is released to close the throttle, the check ball moves up to close the large fuel passage and the fuel trapped in the cylinder prevents the dashpot piston moving down so that the throttle is prevented from closing. The fuel in the cylinder is allowed to escape through the restricted fuel passage and this allows the piston to descend slowly and the throttle valve to close slowly. The first type slow-closing throttle has an adjustment screw located in the carburetor casting directly above the upper end of the dashpot piston stem. This screw should be adjusted as directed below. Second type slow-closing throttle does not have this adjustment screw

Magnetic (Second) Type—The dashpot fuel control valve is a separate unit (valve built in dashpot plunger stem on first type) with a spring-loaded solenoid operated valve plunger directly above the fuel passage check ball. At car speeds below 8 MPH (First or Second Gear), 15 MPH. (Third or Fourth Gear), solenoid is energized and the valve plunger is drawn up so that the check ball is free to seat and shut off the large fuel passage so that fuel forced out of cylinder is required to flow through restricted fuel passage which retards closing of throttle valve and provides correct slow-closing throttle action. At car speeds above 8 MPH. (First or Second Gear), 15 MPH. (Third or Fourth Gear), solenoid is not energized and spring forces valve plunger down which prevents check ball seating. Fuel is then free to escape from cylinder through upper large fuel passage and throttle closes promptly without slow-closing throttle action.

Solenoid Wiring Note—Solenoid has two terminals. Either terminal can be connected to the terminal on the 'Kick-down Switch' on the carburetor and the other terminal should be connected to the 'SF' terminal on the Transmission Control Relay (see wiring diagram on car model pages for the complete transmission wiring diagram). With these connections, solenoid is energized with the Governor Switch contacts closed, and inoperative with the Governor Switch contacts open (at speeds above 8 or 15 MPH. as detailed above).



ADJUSTABLE TYPE — NON-ADJUSTABLE (SOLENOID) TYPE

ADJUSTMENT: First "Adjustable" Type. Adjusting screw should be turned out correct number of turns as shown in table below. To adjust, turn screw in as far as possible, then back screw out correct number of turns. Check operation If engine tends to stall when throttle is closed, retarding action is insufficient and screw should be turned out slightly. If automatic upshift is retarded (too slow throttle closing will delay synchronizing of gears and delay shifting), turn screw in slightly.

DASHPOT ADJUSTING SCREW SETTING

Car Model	Carburetor	Adjusting Screw Setting
Chrysler	E6T1, E6U1, EA1, EF1	5 full turns
DeSoto	E6U1, E6V1, EB1, EF1	5 full turns
Dodge	D6J1, D6P1	5 full turns
Dodge	D6P2, D6V1	4½ full turns
Plymouth	D6P1	5 full turns
Plymouth	D6P2	4½ full turns

Second "Non-adjustable" Type—No adjustment provided.

CARTER (B&B) UPDRAFT CARBURETOR JET SPECIFICATIONS

Car Model	Yr.	Carb. No.	Main Metering Screw "Flow"	Main Metering Screw Standard Part No.	Main Metering Screw 1 Size Lean Part No.	Main Metering Screw 2 Sizes Lean Part No.	Main Nozzle Size	Main Nozzle Part No.	Stepup Jet Power Orifice Size	Stepup Jet Power Orifice Part No.	Idle Orifice Tube Size	Idle Orifice Tube Part No.	Idle Passage Tube	Pump Size	Valve Part No.
CHEVROLET Trk①	1941	489-S	268-72cc.	159-46	5%	159-53	10%	159-54	#33	12-166	.038"	162-22	.0236".	123-16	123-12	.0635"	149-65S
CHEVROLET Trk①	1942-49	517-S	366-70cc.	159-98	5%	159-99	10%	159-100	#33	12-283	.055"	162-24	.0236"	123-16	123-45	.0635"	149-65S
CHEVROLET Trk①	1942-49	699-S	352-56cc.	159-99	5%	159-100	10%	159-129	.125"	12-330	.043"	162-26	.025"	123-55	123-45	.0635"	149-65S
CHEVROLET Trk①	1950-51	745S	339-343cc.	159-100	5%	159-129	10%	159-35②	③	12-344	.0394"	162-17	.031"	123-58	123-45	.0635"	149-65S
CHEVROLET Trk①	1950-51	871S	339-343cc.	159-100	5%	159-129	10%	159-35②	③	12-344	.0394"	162-17	.031"	123-58	123-45	.0635"	149-65S
CHEVROLET Trk①	1952-53	871SA	339-343cc.	159-100	5%	159-129	10%	159-35③	③	12-344	.036"⑥	162-27	.031"	123-58	123-45	.0635"	149-65S
CHEVROLET Trk④	1954-55	871SB	339-343cc.	159-100	5%	159-129	10%	159-35②	③	12-344	.036"	162-27	.031"	123-58	123-45	.0635"	149-65S
CHEVROLET Trk⑤	1954-55	2075S	366-370cc.	159-98	5%	159-99	10%	159-100	③	12-344	040"	162-28	.031"	123-58	123-45	.0635"	149-65S

Main Metering Screw "Flow" is capacity in cc. per minute. Do not gauge these jets with wire drills.

①—Cab-Over-Engine & Forward Control Trucks.
②—1 Size Rich—Part No. 159-99.
③—Discharge Jet Size .150-.152".
④—Forward Control Models.
⑤—Cab-Over-Engine Models (1st. Series 1955 only).
⑥—Supersedes No. 162-17 (.0394").

CARTER (B&B) UPDRAFT TYPES

CHEVROLET CAB-OVER-ENGINE TRUCK

	Carter No.
1946-49	517S, 699S
1950	745S
1951-53	871S, SA, SB
1954-55 Early Series	2075S

CHEVROLET FORWARD CONTROL TRUCK

	Carter No.
1947-49	517S, 699S
1950	745S
1951-53	871S, SA, SB
1954-55	871SB

►CHANGES, CAUTIONS, CORRECTIONS

►**Carburetor Flange Gasket Installation Caution**—When installing the carburetor on engine, use special slotted flange gasket 1A-41 and make certain that vacuum power cylinder port in carburetor mounting flange opens into this slot. If this port covered, mixture will be rich and gasoline consumption high.

►**Engine Stalling or Unsatisfactory Idling Complaints**—Check idle adjusting screw and idle speed setting (below). If engine stalls, remove idle passage tube idle tube, and idle adjusting screw; blow out passages with air.

►**Acceleration Unsatisfactory**—Check pump setting. Remove the main metering jet, pump jet, and check valve assemblies and clean with compressed air. See that check valves are tight in carburetor casting. Examine pump spring.

►**Carburetor Loading Up Correction**—Check and adjust float level.

►**Excessive Fuel Consumption (Poor Gas Mileage) Complaints**—See that vacuum piston operates freely and does not stick in cylinder. Examine vacuum piston spring (replace spring if weak or damaged). Make certain that correct flange gasket used at manifold, that vacuum port opens into gasket slot and that vacuum passage is clean. See that step-up valve is tight in carburetor casting and seats properly (disassemble and clean valve and power jet assembly). Check vacuum piston pushrod for free operation. Check jet calibration.

►**ACCESS TO CARBURETOR (for Adjustment or Removal): Forward Control Models**—Remove toe pan attaching screws, disconnect wires at stop light switch, disconnect accelerator pedal rod from throttle control rod, remove toe pan.

Cab-Over-Engine Models—Remove rear half of left fender skirt.

DESCRIPTION

DESCRIPTION: Plain tube type with throttle operated accelerating pump and vacuum operated 'step-up' or economizer. Fuel for main nozzle is metered by main metering jet in carburetor body casting (see illustration), and by power orifice or step-up jet (wide open throttle or high speed). Idling adjustment and accelerating pump seasonal adjustments are provided.

NOTE—Model 2075S is same design as 871SB and differs only in size and jet calibration. *See "Carter (BB) Updraft Carburetor Jet Specifications.*

ADJUSTMENT & OVERHAUL

IDLE ADJUSTMENT: Idle adjusting screw controls fuel discharge from upper (closed throttle) idle discharge port and should be turned in for leaner mixture, out for richer mixture. Approximate setting is ½-1½ turns of the screw out from inner seated position and should be adjusted only with engine warmed up and idling at hot or slow idle speed with choke valve wide open. Idle speed controlled by throttle lever stopscrew and should be set for 450-500 RPM. idle speed. See tune-up data on car model pages for complete instructions.

IDLE SETTING

Idle Screw Setting—½-1½ turns open (turn out for richer mixture).

Idle Speed—450-500 RPM with engine at operating temperature (Std. Trans.), 400-450 RPM (Auto. Trans. in Neutral).

PERFORMANCE: Should be satisfactory if idling adjustment and accelerating pump setting correct. Main metering jet is fixed type and special Lean or Rich jets furnished for special operating conditions. *See Carter (B&B) Updraft Carburetor Jet Specifications.*

ACCELERATING PUMP: Low pressure, delayed action type. Operated by throttle lever. Pump piston is positioned on pump plunger stem by a spring which is compressed when throttle is closed and pump piston is drawn upward in cylinder, the cylinder then being filled by fuel from the bowl flowing through the pump intake check valve. When throttle is opened for acceleration, spring forces piston down on stem, discharging fuel through main nozzle.

ACCELERATING PUMP SETTING

Pump Stroke—Short stroke (9/16") secured with connecting screw in holes in pump link and throttle lever nearest throttle shaft, long stroke (1") with screw in holes farthest from shaft.

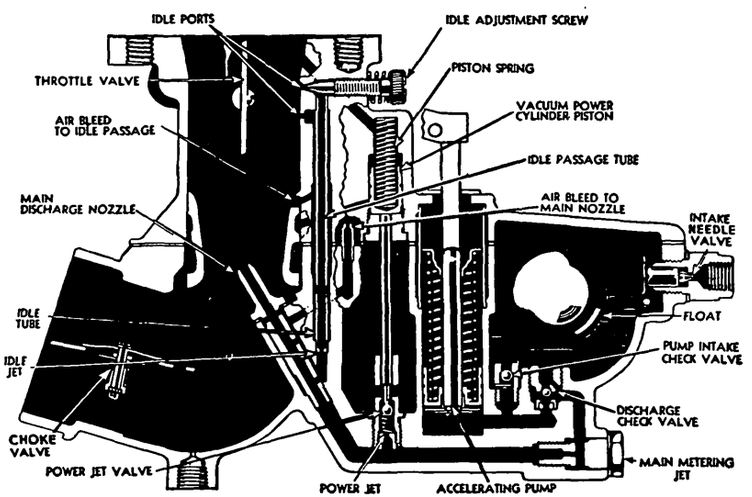
Adjustment—Two holes provided in throttle lever and pump link to provide seasonal adjustment. Inner Hole (Summer) provides minimum discharge and Outer Hole (Winter) maximum. See car model page for settings.

VACUUM STEP-UP (ECONOMIZER): Consists of a step-up valve assembly controlled by a vacuum piston. Vacuum piston is normally held at top of stroke by manifold vacuum so that valve is closed. At high speed or when engine operated with wide open throttle with reduced manifold vacuum, spring above piston forces piston and push rod down so that step-up valve is opened and additional fuel is allowed through the valve directly to the main nozzle. This fuel is metered by power orifice (step-up jet) and not by main metering jet.

►*STEP-UP VALVE CAGE ASSY. & POWER ORIFICE PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Step-up Valve Cage Assembly and power orifice (First type below) used in production on 745S & 871S carburetors has been superseded by later type (listed below). This later type was used in production on 871SA & 871SB carburetors. *Use LATER TYPE PARTS when overhauling carburetors.*

	First Type	Later Type
Step-up Valve Cage Assy	149-44S	149-112S
Power Orifice (Part No. & Size)	162-17 (.0394")	162-27 (.040")

Vacuum Step-up Piston Spring—No. 61-60 (all models).



FLOAT LEVEL: To check float level, remove bowl cover and gasket, use checking gauge or measure from straightedge across top of bowl vertically down to top of float with needle valve seated. To adjust float level, bend float lever lip slightly (do not bend float lever).

FLOAT LEVEL SETTING

Carburetor Model	Float Level	Checking Gauge
517S, 699S	1/32" to 1/16"	T109-49
745S, 871S, SA, SB	Flush to 1/32"	

NOTE—Gauge T109-49 is Chevrolet No. J-818-13A.

Needle Valve & Seat—Part No. 25-44S. Triangular type. Furnished as matched set only. Intake hole size #38.

CONTINUED ON NEXT PAGE

CARTER (B&B) UPDRAFT TYPES (Cont.)

THROTTLE VALVE SETTING: When installing valves, insert attaching screws loosely, back throttle stopscrew off so that valve closes tightly, tap valve lightly to centralize it in bore, then tighten screws securely.

Setting—With throttle valve tightly closed, distance from lower edge of throttle valve to top of idle port and to top of vacuum spark port should be as shown in table below. NOTE—Throttle valve is notched at idle port.

THROTTLE VALVE SETTING

Carburetor	①Idle Port	②Vacuum Spark Port
All Models	005- 009"	000- 004"

①—Top of lower port below valve. ②—Top of port below valve.

CHOKE: Choke valve is butterfly type with poppet type relief valve. Check choke linkage and see that choke valve is closed with choke button on instrument panel pulled out and fully open when button pushed in.

DISASSEMBLY OF CARBURETOR: Take out screws and remove bowl cover and accelerating pump assembly. Compress pump spring, take out connector pin, disassemble and remove pump spring, retaining spring, and piston from pump rod and plate assembly. Take out vacuum piston plug, remove vacuum piston and spring. Remove idle adjusting screw and idle passage tube, pump sleeve, power jet pushrod, float lever pivot pin, float, and needle valve. Remove pump intake check valve, pump discharge check valve, and power jet from bowl. Remove main nozzle air bleed jet, idle jet, main nozzle, and main metering jet (on side of carburetor).

Servicing—Wash all parts in clean gasoline, blow out all passages in carburetor and all jets with compressed air. See that idle ports, air bleed passages, vacuum spark port, and throttle bore are free from carbon. See that vacuum piston cylinder is clean and that piston moves freely, clean vacuum passages thoroughly. (CAUTION:—Sticking of piston may cause power jet to be open at low speeds which will cause excessive fuel consumption and poor economy). Disassemble power jet valve and clean valve and power jet thoroughly. Clean and inspect pump check valves, idle jet, main nozzle, metering jet and air bleeds. Replace all worn or damaged parts.

REASSEMBLY OF CARBURETOR: Use all new gaskets. Soak needle seat gasket in denatured alcohol for 15 minutes, install on needle seat and allow to dry in place before needle and seat assembly is installed. Assemble carburetor in reverse order to disassembly directions above and note following special instructions and cautions: If throttle valve removed, make certain that notch on edge of valve is placed on vacuum port side and set throttle valve as directed above. Install accelerating pump sleeve with holes in end of sleeve downward. When installing carburetor upper body, see that accelerating pump enters pump cylinder properly and that vacuum piston pushrod is in place. Check float level and adjust carburetor when re-installed on engine.

CAUTION—When installing carburetor, make certain that correct flange gasket is used and that slot in gasket uncovers vacuum spark port on carburetor flange. If this port covered, gasoline consumption will be excessive.

SERVICE PARTS: Gasket Sets—Carter No 153 (489S), No 170A (517S, 699S), No 202 (745S, 871S, SA, SB)
Repair Pkg. (with Std. Metering Jet)—Carter No 1090 (489S), No 1327B (517S), No 1529 (699S), No 1539A (745S, 871S, 871SA)

CARTER BBS CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb.	Metering Jets: Standard Flow	Metering Jets: Standard Part No.	Metering Jets: 1 Size Lean Part No.	Metering Jets: 2 Size Lean Part No.	Main Vent Tube: Size	Main Vent Tube: Part No.	Step-Up Rod: Size	Step-Up Rod: Part No.	Idle Orifice Tube: Size	Idle Orifice Tube: Part No.	Pump Jet Assy.: Size	Pump Jet Assy.: Part No.
DODGE														
Synchro-mesh	1954	2063S,SA	453cc	120-199S	120-205S	120-206S	.0315"	145-91	027" ⑤	75-998	.0354"	123-67S	.0276"	48-194
Overdrive	1954	2062S,SA	453cc	120-199S	120-205S	120-206S	.0315"	145-91	027" ⑤	75-998	.0354"	123-67S	.0276"	48-194
Auto Trans	1954	2116S,SA	453cc	120-199S	120-205S	120-206S	.0315"	145-91	027" ⑤	75-998	.0354"	123-67S	.0276"	48-194
PLYMOUTH														
④Synchro-mesh	1954	920S SA	390cc	120-200S①	120-201S②	120-204S③	.0315"	145-91	027"	75-998	.0354" ⑥	123-67S	.0276"	48-194
④Overdrive	1954	993S,SA	390cc	120-200S①	120-201S②	120-204S③	.0315"	145-91	027"	75-998	.0354"	123-67S	.0276"	48-194
④Auto Trans	1954	994S,SA	390cc	120-200S①	120-201S②	120-204S③	.0315"	145-91	027"	75-998	.0354'	123-67S	.0276"	48-194
④City Traffic	1954	2203S	322cc	120-182S	120-211S	120-183S	.0315"	145-91	018"	75-1125	.0315"	123-65S	.0276"	48-194
⑦Synchro-mesh	1954	2063S,SA	453cc	120-199S	120-206S	120-205S	.0315"	145-91	027" ⑤	75-998	.0354"	123-67S	.0276"	48-194
⑦Overdrive	1954	2062S SA	453cc	120-199S	120-206S	120-205S	.0315"	145-91	027" ⑤	75-998	.0354"	123-67S	.0276"	48-194
⑦Auto Trans	1954	2116S,SA	453cc	120-199S	120-206S	120-205S	.0315"	145-91	027" ⑤	75-998	.0354'	123-67S	.0276"	48-194
⑦City Traffic	1954	2215S	322cc	120-182S	120-211S	120-183S	.0315"	145-91	018"	75-1125	.0315"	123-65S	.0276"	48-194
Repl All	1954	2248S	390cc	120-200S	120-201S	120-204S	.0315"	145-91	027"	75-998	.0354"	123-67S	.0276"	48-194
Synchro-mesh	1955	2063S,SA	453cc	120-199S	120-205S	120-206S	0315"	145-91	027" ⑤	75-998	.0354"	123-67S	0276"	48-194
Overdrive	1955	2062S,SA	453cc	120-199S	120-205S	120-206S	0315"	145-91	027" ⑤	75-998	0354"	123-67S	.0276"	48-194
Auto Trans	1955	2116S,SA	453cc	120-199S	120-205S	120-206S	0315"	145-91	029"	75-999	0354"	123-67S	0276"	48-194
Repl All	1955	2249S	453cc	120-199S	120-205S	120-206S	0315"	145-91	027"	75-998	0354"	123-67S	0276"	48-194

①—Supersedes No. 120-198S (412 cc.)
②—Supersedes No. 120-200S
③—Supersedes No. 120-201S (now 1 Size Lean)
④—Early Cars
⑥—No 123-63S (0315") Used on early 920S
⑦—Later Cars

CARTER "BBS"

DODGE SIX	Carter Carburetor No.
1954 Late (Std. ①)	BBS, 2063S, SA
1954 Late (O.D.②)	BBS 2062S, SA
1954 Late (F.D.③)	BBS 2116S, SA
PLYMOUTH	
1954 Early (Std.①)	BBS 920S
1954 Early (O.D.②)	BBS 993S
1954 Early (Hy-Drive)	BBS 994S
1954 Early (City Traffic)	BBS 2203S
1954 Later (City Traffic)	BBS 2215S
1954 Later (Std.①)	BBS 2063S, SA
1954 Later (O.D.②)	BBS 2062S,SA
1954 Later (④)	BBS 2116S, SA
1955 6 Cyl. ①	2063S, SA
1955 6 Cyl. ②	2062S, SA
1955 6 Cyl. ③	2116S, SA
1955 6 Cyl. Replacement	2249S

①—Synchro-mesh Transmission.
②—Synchro-mesh Trans. & Overdrive.
③—Fluid Drive or PowerFlite Transmission.
④—Hy-Drive or PowerFlite Transmission.

►CHANGES, CAUTIONS, CORRECTIONS

►*PLYMOUTH METERING JET PRODUCTION CHANGE (Carburetor Nos. 920S, 993S, 994S): See "Carter BBS & BBD Jet Specifications" for later type jets.*

►*PLYMOUTH CARBURETOR INSTALLATION CAUTION (To prevent air leaks at intake manifold):* Due to use of Intake Manifold Diffuser (between manifold and carburetor), first type Flange Gasket No. 1A-80 will not provide air-tight mounting unless a larger bore gasket (1A-24, 1A-31, 1A-69, 1A-70) is also used between the regular flange gasket and the manifold. If necessary, back out manifold studs slightly to accommodate the extra gasket thickness. *NOTE*—Later type Gasket No. 1A-94 has undercut on lower face to clear diffuser and will provide satisfactory sealing. This gasket will be furnished in later Gasket Sets and Repair Packages.

DESCRIPTION: Single barrel downdraft type with automatic choke. Carburetors have low over-all height and are similar to previous B&B design with the following new features:

Float System—Concentric bowl with twin floats. Floats pivot on a single float lever pin in the carburetor main body and are checked in the same manner as previous types except that both floats must be adjusted to same height.

Metering Jet & Step-up Mechanism—Jet is fixed type located in fuel bowl and has a metering wire (step-up rod) in the jet which is controlled by the vacuum step-up piston. During normal operation, when manifold vacuum holds the piston down at the lower end of its stroke, fuel flow through the jet is restricted by the step-up rod. For full power or acceleration, when manifold vacuum is low, the vacuum piston lifts the step-up rod out of the jet and allows an increased fuel flow to the nozzle.

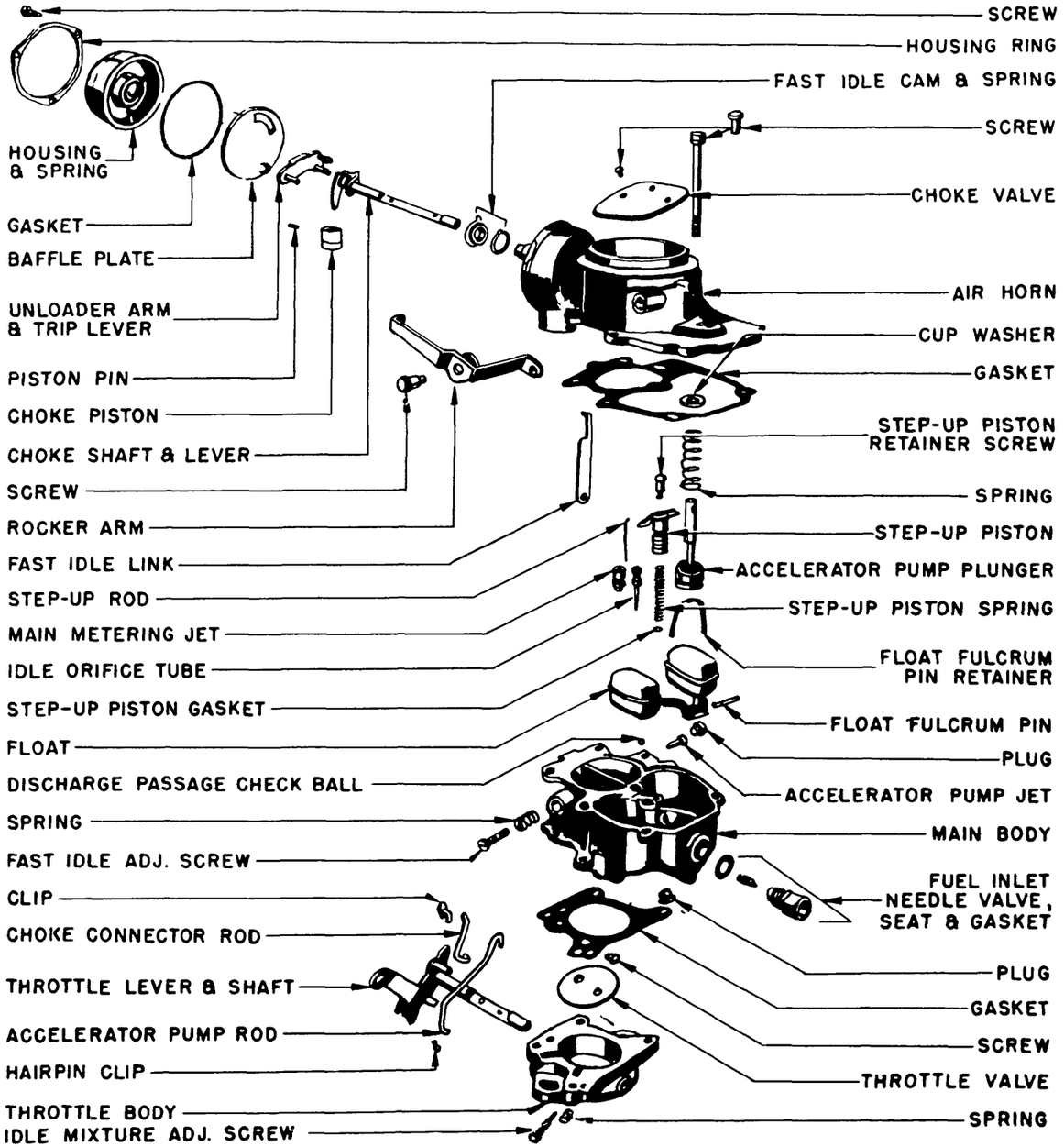
Accelerating Pump—Similar to previous B&B design except that pump is operated by an idler lever or walking beam on the bowl cover (see Pump Production Change Note below). Pump discharge jet in the venturi is vented by an air bleed passage in the air horn connected to the carburetor bowl vent tube which prevents fuel being drawn through the pump jet during high speed operation. A calibrated vent passage in the pump plunger prevents fuel vapor pressure building up in the pump circuit due to heat.

►**Pump Production Change**—On first carburetors, pump plunger stem was positively connected to the pump arm by a pin. On later carburetors, the pump arm engages a slot in the end of the stem and the plunger stroke is actuated by the pump spring.

Automatic Choke & Fast Idle—Similar to type used on B&B and BBD carburetors. Fast idle cam and unloader mechanism is located within the choke housing.

Throttle Restrictor (Plymouth 2203S & 2215S "City Traffic" Carburetors)—Provides greater economy on these models. *NOTE*—Unitized Pkg., Carter No. 195-57U, can be used to convert standard 920S carburetor to 2203S City Traffic carburetor.

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CARTER "BBS" SINGLE CARBURETOR

CARTER "BBS" (C nt.)

ADJUSTMENT: Make adjustments in order as listed below.

NOTE—Slow-closing Throttle Dashpot and Kickdown Switch used on some carburetors only.

Idle Setting: Adjust only with engine warmed up to normal operating temperature with choke valve wide open and fast idle inoperative. Use tachometer to set engine idle speed, adjust idle mixture screw for smooth engine operation and highest vacuum reading. See car model page for complete tune-up data.

Idle Setting

Car Model	Idle Screw Opening	Idle Speed
Dodge (All)	½-1½ turns	①450-500 RPM
Plymouth (All)	½-1½ turns	①450-500 RPM

①—With gearshift lever in Neutral.

Accelerating Pump Setting: Check Pump Stroke when overhauling carburetor, change Seasonal Setting as required for best performance.

Seasonal Setting—Three holes provided in throttle lever for connector rod engagement. Provides varied pump stroke as follows:

Center Hole—Medium stroke and normal setting.

Upper Hole—Minimum stroke (less fuel delivery).

Lower Hole—Maximum stroke (more fuel delivery).

Pump Stroke Setting—Connect pump rod in correct hole of throttle lever (see table below), back off throttle stopscrew and make certain that throttle valve fully closed (choke valve must be open). Use scale placed on bowl cover adjacent to pump plunger to measure height of top edge of plunger (not pump arm). If height not correct, adjust by bending connector rod at lower angle near throttle lever, using bending tool T109-213.

Pump Stroke Setting

Car & Carb.	Plunger Height	Connector Rod
Dodge (All)	54/64"	Center Hole
Plymouth (2203S)	51/64"	Upper Hole
Plymouth (2215S)	49/64"	Upper Hole
Plymouth (All Others)	54/64"	Center Hole

Fast Idle Setting: Remove thermostatic coil assembly, gasket, and baffle plate for access to fast idle mechanism (within choke housing). Back out throttle stopscrew. Crack throttle valve open, hold choke valve in fully closed position, then close throttle valve. This will place fast idle cam in fast idle position. Measure throttle valve opening by inserting gauge (see table below) between throttle valve edge and bore on side opposite idle ports. If the throttle opening is not correct, adjust by bending choke connector rod at lower angle, using bending tool T109-213. ***Adjust Unloader before reassembling choke.***

Fast Idle Setting

Car & Carb.	Clearance & Checking Gauge
Dodge (All)	.022-.026" T109-29
Plymouth (920S, 93S, 94S)	.019-.023" T109-29
Plymouth (2062S, 2063S, 2116S)	.022-.026" T109-29
Plymouth (2203S, 2215S)	.019-.023" T109-29
Plymouth (2249S)	.022-.026" T109-29

Unloader Setting: After fast idle adjusted (above), hold throttle valve wide open, close choke valve as far as possible without forcing. Measure choke valve opening by inserting gauge (see table below) between upper edge of choke valve and air horn wall. If choke valve opening not correct, adjust by bending arm on choke trip lever (within choke housing) using bending tool T109-214. Then reassemble and adjust automatic choke.

Unloader Setting

Car & Carb.	Clearance & Checking Gauge
Dodge & Plymouth (All)	9/64" T109-34

Automatic Choke Setting: After unloader adjusted (above), install baffle plate, gasket, and thermostatic coil housing assembly. Make certain that hook on coil picks up choke shaft lever, rotate cover until mark is in line with longer center graduation of scale on housing (centered setting), tighten retainer screws.

Automatic Choke Setting

Car & Carb.	Setting
Dodge & Plymouth (All)	Centered (At Index)

Slow-closing Throttle Dashpot (Carburetor Nos. 994S & 2116S): To check setting, close throttle valve fully, measure distance dashpot plunger can be moved inward (hold plunger in and measure clearance between end of plunger and throttle lever with a feeler gauge). This clearance should be 3/32" for maximum dashpot action. Adjust by loosening locknut and turning dashpot in or out of mounting bracket.

Kickdown Switch (Carburetor Nos. 993S & 2062S): Hold throttle valve in wide-open position, check clearance between kickdown lever on throttle shaft and end of switch stem guide (after switch plunger has moved inward to kickdown position). This clearance should be 1/64-3/64". Adjust by moving switch up or down on bracket (loosen one mounting nut, tighten opposite nut).

Float Level: Float level must be checked with bowl cover gasket and float pin retainer removed. To check float level, remove air horn and bowl cover assembly, remove gasket. Remove float pin retainer. Hold lip on float arm against seated intake needle and see that **float pin is at bottom of guide slots.** Place checking gauge squarely on top edge of bowl with gauging lugs directly over centers of floats. Gauge lugs should just touch tops of floats. Adjust by bending float arm to equalize floats, bend lip on float arm if both floats require same adjustment.

►*CAUTION*—Floats must not rub against inner wall of float bowl. Bend float arm as required to provide clearance on all sides of floats.

Float Level Setting

Car & Carb.	Float Setting	Checking Gauge
Dodge (All Models)	7/32"	①T109-139
Plymouth (All Models)	7/32"	①T109-139

①—Gauge used for both 7/32" & 9/32" settings.

OVERHAUL: BBS carburetors are overhauled in same manner as BBD models except that they are single barrel rather than dual carburetors.

SERVICE PARTS: Gasket Sets—Carter No. 247 (920S, 993S, 994S), No. 247A (2203S, 2215S), No. 252 (2062S, SA; 2063S, SA; 2116S, SA).

Repair Pkg. (with Std. Metering Jet)—Carter No. 1753 & 1753A (920S, 993S, 994S), No. 1766 (2062S, SA; 2063S, SA; 2116S, SA).

CARTER BBD DUAL

CHRYSLER C67 (1955)

1955 Synchro-mesh	2180S, SA, SB
1955 PowerFlite	③2162S, SA, SB

DE SOTO V8 S17 (Late 1952)	**Carter Model No.**
1952 (First) Std. Synchro-mesh	905S
1952 (First) Overdrive	①906S
1952 (First) Tip-Toe Shift Trans	②901S
1952 (Later) Std. Synchro-mesh	909S
1952 (Later) Overdrive	①910S
1952 (Later) Tip-Toe Shift Trans	②908S
1952 PowerFlite Repl.④	2250S

DE SOTO V8 S16 (1953)	**Carter No.**
1953 (Early) Std.-Synchro-mesh	.... 909S
1953 (Early) Overdrive Trans. .	.①910S
1953 (Early) Tip-Toe Shift Trans..	..②908S
1953 (Later) Std.-Synchro-mesh	.... 912S
1953 (Later) Overdrive Trans....	..①913S
1953 (Later) Tip-Toe Shift Trans.	....②911S
1953 PowerFlite Repl.④	2250S

DE SOTO V8 S19 (1954)

1954 (Early) Synchro-mesh	2067S
1954 (Early) Overdrive Trans	①2068S
1954 (Early) PowerFlite Trans	③2070S
1954 (Later) Synchro-mesh	2129S
1954 (Later) Overdrive Trans	①2130S
1954 (Later) PowerFlite Trans	③2131S
1954 PowerFlite Repl.④	2250S

DE SOTO V8 S22 (1955)

1955 Synchro-mesh	2176S, SA
1955 Overdrive Trans.	①2177S, SA
1955 PowerFlite Trans	③2178S, SA

PLYMOUTH V8 P27 (1955)

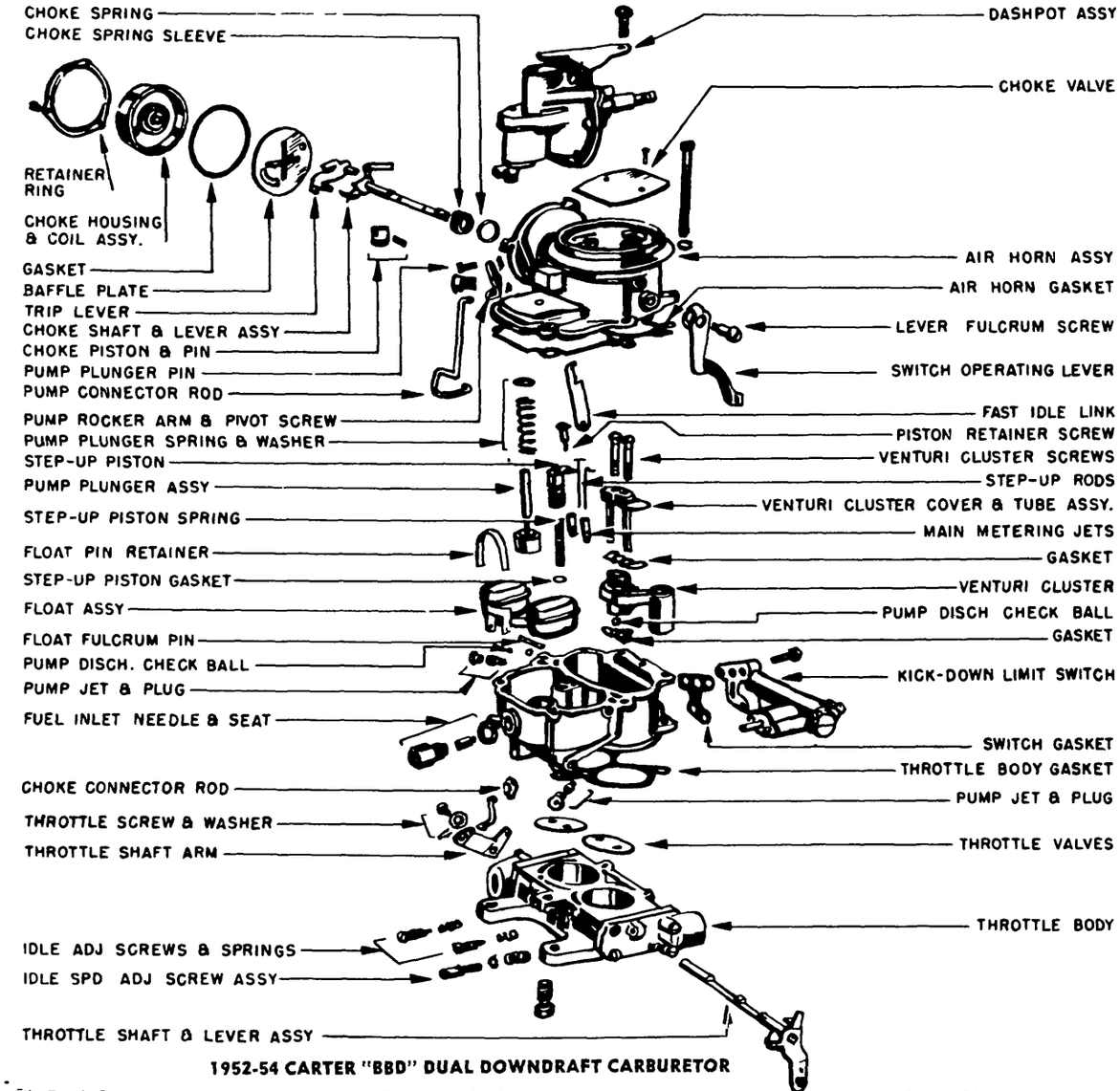
1955 157 HP Synchro-mesh	2141S
1955 157 HP Overdrive Trans	①2154S
1955 157 HP PowerFlite Trans	③2155S
1955 157 HP Replacement	2262S
1955 167 HP Synchro-mesh	2259S, SA, SB
1955 167 HP Overdrive	①2260S, SA, SB
1955 167 HP PowerFlite	③2261S, SA, SB
1955 167 HP Replacement	2274S, SA

①—Has Kick-down Switch for Overdrive Control.
②—Has Kick-down Switch for transmission control and Slow-closing Throttle Dashpot.
③—Has Slow Closing Throttle Dashpot
④—With 192-34U (Kickdown Switch) less Dashpot for Overdrive Trans, Less Dashpot for Synchro-mesh Trans

►CHANGES, CAUTIONS, CORRECTIONS

►***IMPROVED ACCELERATION CHANGE (Carter BBD First 901S, 5S, 6S Carburetors with single-hole accelerating pump plunger):*** Use Unitized Pkg. No. 64-149U and install new parts and make changes as follows:

1) Remove air cleaner and carburetor from engine, remove air horn.
2) Remove the two pump discharge ball checks and retainers by applying air pressure to pump cylinder.
3) Remove intake ball check retainer using tool T109-173 (5/16" hexagonal socket) over top of retainer and prying sideways and pulling upward to loosen retainer (long-nosed pliers can be used if tool not available). Remove pump intake ball check by applying air to intake passage.
4) Install NEW intake ball check (use vacuum step-up spring to guide ball into its seat), install NEW pump intake check retainer.



1952-54 CARTER "BBD" DUAL DOWNDRAFT CARBURETOR

5) Install two NEW pump discharge ball checks but do not re-install discharge check retainers.
6) Install NEW pump plunger. *NOTE*—this new type plunger can be identified by TWO holes in upper end of plunger shaft.
7) Install the wire vacuum piston retainer over the boss between the pump and vacuum cylinders, position retainer over the step-up piston so that the step-up rods (metering wires) are held in the jets. ***OTHER CHANGES—When carburetor disassembled, examine head of step-up piston passage screw and if screw is ROUND HEAD type, make "Rough Idle Correction" as outlined below.***
8) Reassemble carburetor.
9) Check pump adjustment. ***See adjustment data below.***

►***ROUGH IDLE CORRECTION (Carter BBD 901S, 5S, 6S Carburetors with ROUND HEAD Step-up Piston Passage Screw):*** Use Unitized Pkg. 121-239U and install new parts and make changes as follows:

1) Remove air cleaner and carburetor from engine, remove air horn assembly and gasket.
2) Remove two venturi cluster screws, remove venturi cover, cluster and nozzle assembly, and gasket.
3) Remove step-up piston spring and gasket.
4) Remove float retainer and float assembly.

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (C nt.)

5) Remove step-up piston passage screw.

6) Remove body flange assembly and gasket.

7) Remove pump discharge retainers (used on first carburetors only), remove pump discharge check balls.

OTHER CHANGES—If first type pump plunger used (with one hole in pump plunger shaft), make "Improved Acceleration Change" as outlined above.

8) Check mating surfaces of venturi cluster and nozzle assembly, body flange, and main body. If these surfaces not flat and free from burrs, clean up surfaces as follows: Use a fine-cut file to take a small amount off each surface, true up surfaces to remove all high or low spots which show up, finish surfaces with fine sandpaper on a surface plate. Chamfer top edge of each side of step-up piston passage screw lug on throttle body back 1/32" from edge.

9) Thoroughly clean all parts of carburetor and blow out all filings with compressed air.

10) Install throttle body on main body casting using NEW gasket, install NEW TYPE Hexagonal-head Self-sealing Type Piston Passage Screw WITHOUT ANY GASKET, tighten this screw **finger-tight** (screw will be finally tightened later).

11) Install float assembly, pin, and retainer. Adjust float level. See Float Level Setting below.

12) Install step-up piston gasket, spring, piston plate and rod assembly, and retainer.

13) Install gasket, venturi cluster and nozzle assembly, gasket, venturi cover, and venturi cluster screws WITHOUT ANY GASKETS.

CAUTION—Use new gaskets between castings as outlined above but DO NOT USE GASKETS UNDER HEADS OF SELF-SEALING CLUSTER SCREWS.

14) Install both pump discharge ball checks, pump plunger, spring, and retainer.

15) Install gasket and air horn assembly. Tighten the two long screws **finger-tight** (screws will be finally tightened later).

16) Install new identification tags as follows:
901S—Install new COPPER tag.
905S, 906S—Install new Copper tag UNDER original Brass tag.

17) Tighten the hexagonal-head step-up piston passage screw securely, then tighten the two long body attaching screws securely.

18) Connect throttle connector rod and choke connector rod.

19) Check and adjust pump stroke. See Accelerating Pump Adjustment below.

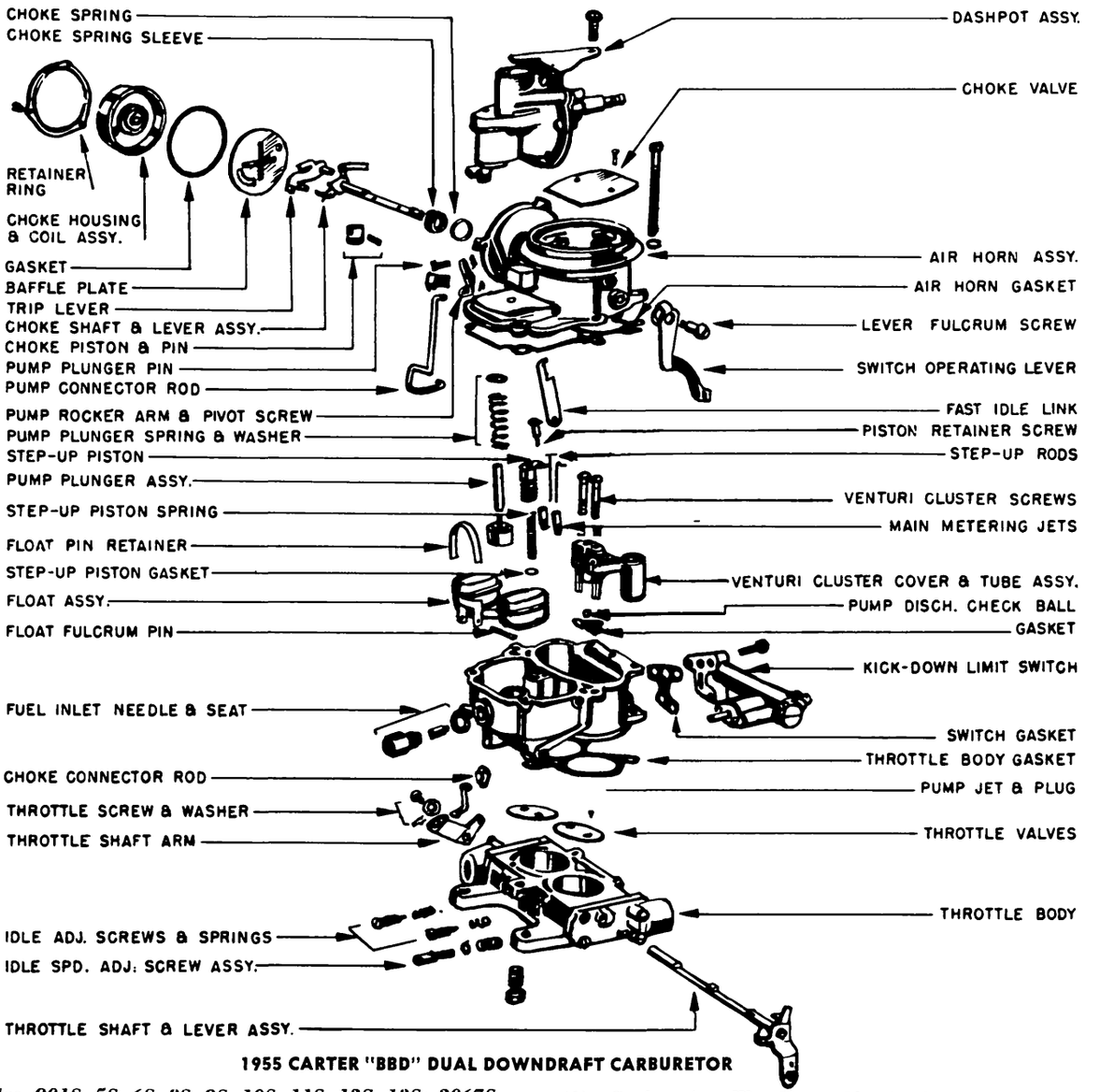
20) Disassemble climatic control (automatic choke) mechanism, blow out with air pressure and examine for evidences of corrosion or varnish-like deposits, remove all deposits. Set climatic control for Centered (At Index) setting when reassembling.

►***CAUTION***—Check pump for installation of latest type pump plunger with TWO HOLES in upper end of plunger shaft. ***See "Improved Acceleration Change"***

►***FLOAT LEVEL SETTING CAUTION (Later 911S, 912S, 913S Carburetors)—TWO DIFFERENT types of floats (flat top and curved top) used on these models and DIFFERENT FLOAT SETTING used for each type float.***

►***1952-54 DE SOTO V8 HESITATION OR STALLING ON ACCELERATION WITH HOT ENGINE (Carburetor Nos. 901S, 5S, 6S, 8S, 9S, 10S, 11S, 12S, 13S; 2067S, 68S 70S):*** May be noted on warm days when accelerating after prolonged idling or in heavy traffic. Caused by percolation or boiling of gasoline in carburetor bowl due to use of very volatile fuel and high under-the-hood temperatures. ***Correct by installing parts furnished in Carter Unitized Kit No. 195-58U as directed below AFTER FOLLOWING DIAGNOIS PROCEDURE TO MAKE CERTAIN TROUBLE NOT CAUSED BY OTHER CONDITIONS:***

DIAGNOSIS OF TROUBLE: Check following points first to make certain that trouble is caused by fuel percolation in carburetor:



1955 CARTER "BBD" DUAL DOWNDRAFT CARBURETOR

(1) **Carburetor Flooding**—Check float level. Examine fuel bowl for dirt or foreign material particularly around intake needle and seat. Check for worn intake needle and seat, leaking float, or sticking float pivot.

(2) **Excessive Fuel Pump Pressure**—Check pump pressure. Normal pressure is 3½-5 lbs.

(3) **Manifold Heat Control Valve Operation**—Valve must operate freely throughout entire travel. ***See "Manifold Heat Control" in DeSoto Special Data.***

(4) **Automatic Choke Operation**—Check automatic choke for free operation. See that valve is not stick-

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (C nt.)

ing and that hot air system is tight so that warm air is drawn into choke housing for correct opening of the choke valve as the engine warms up.

(5) Ignition Interruption—Check automatic transmission switches and wiring to make certain that ignition is not being interrupted incorrectly.

REWORKING CARBURETOR (Nos. 901S, 5S, 6S, 8S, 9S, 10S, 11S, 12S, 13S): Remove carburetor from engine, disconnect choke connector rod, remove pump arm and pump connector rod, remove slow-closing throttle dashpot. Remove air horn. Remove following pump parts: plunger spring retainer, spring, plunger, intake check retainer, intake ball check, discharge checks. Take out two venturi cluster screws, remove venturi cover, cluster, nozzle assembly, and gaskets. Remove needle and seat, hinge pin retainer, and float assembly. Examine fuel bowl for excessive accumulation of foreign material and clean thoroughly with compressed air *(NOTE*—installation of filter at fuel inlet is recommended if dirt found in bowl). Install new parts and reassemble carburetor as follows:

(1) Install NEW Nylon pump intake check ball No. 116-29 and new retainer, NEW vented pump plunger No. 64-171S, and NEW pump discharge check balls No. 116-30 (two). Check pump system as follows: Partially fill float bowl with gasoline, press down lightly on pump discharge balls, using two pieces of ⅛" rod and press down on pump plunger while watching for fuel leaks. If fuel noted at discharge or intake check balls, reseating of the balls is indicated. Use a 5/32" steel ball to reform seats, tapping ball lightly with a hammer (use ⅛" rod as a drift). Re-install the regular check balls and repeat test. Then install two pump discharge check ball retainers No. 63-179.

(2) Drill out metered hole in top of vent tubes (two used) to 1/32" diameter. Use drill furnished in kit with grease on end of drill to collect metal chips. Clean venturi cluster thoroughly, install venturi cluster with new gasket No. 121-237, and venturi cover with new gasket No. 121-238 *(CAUTION*—make certain that venturi cluster and cover mating surfaces are clean and flat), tighten cluster screws securely.

(3) Install intake needle and seat and float assemblies. Adjust float level. *See ADJUSTMENTS below.*

(4) Drill two 3/16" outside vent holes in bowl cover and air horn assembly, working from bottom face of bowl cover and locating one hole at each end of rectangular area in which lower end of inside vent terminates, plug this inside vent by inserting No. 11B-228 rivet plug (furnished in pkg.) in upper end of vent tube *(CAUTION*—DO NOT PLUG kickdown Vent Tube on opposite side of air horn). Clean bowl cover and air horn assembly thoroughly with compressed air.

(5) Re-install pump spring and retainer, install air horn, using new body gasket No. 121-203, install slow-closing throttle dashpot. Install NEW pump lever No. 53A-373 and NEW pump connector rod No. 115-191. Connect pump rod in outer (long stroke) hole. Check pump stroke and adjust to 57/64". *See ADJUSTMENTS below.*

(6) Install carburetor on engine, using new gasket No. 1A-71 on **each side** of insulator No. 183-82 *(NOTE*—If necessary, mounting studs can be backed out slightly to accommodate insulator thickness).

(7) Remove water hose or metal tubing water connectors at intake manifold and chain case cover, install pipe plugs at these points. THERE SHOULD BE NO WATER CIRCULATION THROUGH CARBURETOR AFTER THIS MODIFICATION IS MADE.

(8) Adjust carburetor after engine reaches normal operating temperature. Set idle speed at 500 RPM minimum (may vary up to 525 RPM but must not be less than 500 RPM).

(9) Check and adjust slow-closing throttle dashpot. *See ADJUSTMENTS below.*

(10) Check and adjust automatic choke. Choke should be set at index (Centered) but setting can be varied up to 2 Points Lean to compensate for any tendency to load up during warm-up.

REWORKING CARBURETOR (Nos. 2067S, 2068S, 2070S): On 1954 DeSoto V8 before Engine No. S19-18341, if stumbling, stalling, or loading up is experienced, rework carburetors in same manner as earlier models listed above EXCEPT do not install new pump operating lever on air horn and do not install new pump connector rod.

►*CHRYSLER WINDSOR HESITATION OR LAG ON LIGHT ACCELERATION (PowerFlite Cars with First 2162S Carburetor):* This condition occurs at 10-20 MPH during warm-up in cold weather. Correct by installing all parts furnished in Unitized Pkg Carter No. 195-59U as follows: Step-up Spring No 61-549, Step-up Rods No. 75-1140, Pump Plunger No. 64-184S. Venturi Cover & Tube Assy. No. 118-117S.

►*CHRYSLER WINDSOR CARBURETOR PRODUCTION CHANGE (Carter 2162SA, SB, 2180SA, SB):* These carburetors have later type parts as listed above for "Hesitation or Lag on Light Acceleration" correction installed in production.

►*CHRYSLER WINDSOR CARBURETOR CHANGE FOR IMPROVED GASOLINE ECONOMY (All Carburetors):* Carburetors may be modified for slightly leaner mixture by installation of parts furnished in Unitized Pkg. Carter No. 195-66U (BBD 2162S & 2180S), or No. 195-65U (BBD 2162SA, SB; 2180SA, SB) as listed below. *CAUTION—This change should only be made to correct gasoline mileage complaints. If installed in carburetors which are on lean limit, some surge or leanness may be experienced.*

Installation Note—Choke Restriction Bushing should be installed in upper end of choke suction passage in main body. Install brass tag OVER original tag on carburetor. *NOTE*—Car should be carefully tuned up to secure best results from this change.

Unitized Pkg. 195-65U & 195-66U

Part	Part No.
Main Metering Jet (2 used)	120-213S
Step-up Jet Rod (2 used)	75-990
Choke Restriction Bushing	158-76
Venturi Cluster Screw①	101-413
Venturi Housing Gasket①	121-252
Venturi Cover Gasket①	121-253
Body Gasket	121-254
Brass Tag	107-48

①—Not furnished in Pkg. 195-66U (use original Venturi Cluster Screw).

►*PLYMOUTH 167 HP ENGINE CARBURETOR PRODUCTION CHANGES):* Several changes have been made in carburetors in production as listed below. *See also "Plymouth 167 HP Engine Carburetor Improved Gasoline Mileage Change" below.*

1) Carter 2259SA, 2260SA, 2261SA Carburetors—These carburetors have "2nd. Type" parts and specifications as listed below to improve Cold Starting, Part Throttle Loading, and Road Load Economy. *When making this change on earlier 2259S, 2260S, 2261S carburetors (with "1st. Type" parts), refer also to Improved Gasoline Mileage change below.*

Carter "S" & "SA" Carburetor Parts Changes

Part	Part No. & S tting 1st. Type	2nd. Type
Step-up Rod (2 used)	75-1168①	②75-1182
Venturi Cluster Screws (2)	101-401	③101-404
Choke Piston & Lever Assy.	14-503S	④14-515S
Automatic Choke Setting	2 Pts. Lean	Centered

①—.018" diameter ②—.019" diameter.
③—Has different Air Bleed Hole calibration
④—Has different vacuum piston

2) Carter 2259SB, 2260SB, 2261SB, 2274SA Carburetors—*These carburetors have all parts listed under "Plymouth 167 HP Engine Carburetor Improved Gasoline Mileage Change" (below) installed in production.*

►*PLYMOUTH 167 HP ENGINE CARBURETOR IMPROVED GASOLINE MILEAGE CHANGE (Carter Carburetors 2259S, SA; 2260S, SA; 2261S, SA; 2274S):* Carburetors can be modified for slightly leaner mixture by installation of all parts furnished in Carter Unitized Pkg 195-62U as listed below and by modifying Distributor Vacuum Unit for increased vacuum advance. *CAUTION—This change should only be made to correct gasoline mileage complaints. If installed in carburetors which are already on lean limit, some surge or leanness may be experienced.*

Carter Unitized Pkg. 195-62U

Part	Part No.
Main Metering Jet (2 used)	120-212S
Step-up Rod (2 used)	75-1168
Venturi Cluster Screw (2 used)	101-364
Venturi Housing Gasket	121-252
Venturi Cover Gasket	121-253
Body Gasket	⑤121-274
Brass Tag⑥	107-48

⑤—Supersedes No. 121-254 furnished in first kits
⑥—Install over original tag.

Distributor Vacuum Unit Change—Replace original Vacuum Diaphragm Assembly with new part, Plymouth No 1439671 or Auto-Lite No. IAZ-2023RA, transferring the spring calibration washers, sealing washer, and nut from the original diaphragm assembly to the new part. This change will increase maximum vacuum advance to 25° (engine) at 17" of vacuum (was 23°). *NOTE*—Spark plug gap should be changed to .040" (was .035").

DESCRIPTION: Dual or double barrel downdraft type with automatic choke control. BBD carburetors are similar to single barrel BB design with the following special features:

Venturi Cluster (Main Nozzl) Assembly—This assembly consists of the secondary venturis, main nozzles, main vent tubes, and idle tubes which are mounted as a unit in the main body (attaching screws are hollow with calibrated restriction at upper end and serve as Idle Air Bleeds).

Metering Jets & Step-up Mechanism—Metering jets are fixed type located in bottom of bowl. Each jet has a metering wire (step-up rod) in the jet which is controlled by the vacuum step-up piston. For normal operation, when manifold vacuum holds

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (Cont.)

vacuum piston down, fuel flow through the jets is restricted by the metering wire. For full power or acceleration, when manifold vacuum drops off, the vacuum piston is moved upward by the step-up piston spring and lifts the metering wires out of the jets allowing increased fuel flow to the nozzles.

Accelerating Pump—Similar to other pumps except that pump plunger is operated through idler lever or walking beam mounted on side of air horn. Pump discharge jets are vented to carburetor bowl through passage in air horn to prevent fuel being discharged through these jets during high speed operation when a vacuum exists at the jets.

Automatic Choke—Same design as used on "BB" carburetors on other Chrysler and De Soto cars.

"Water-jacketed" Throttle Body—Water connections at carburetor throttle body and water passages in body casting are used to circulate engine coolant water around throttle valves. This provides sufficient heat to prevent ice formation around throttle valves at idling speed which might cause stalling of engine during warming up period (vaporizing of fuel has refrigerating effect sufficient to cause ice formation at temperatures below 65°F.).

INSTALLATION CAUTION—Water tubes must be properly connected and coupling nuts tightened to prevent water leaks when carburetor installed.

Slow-closing Throttle Dashpot & Transmission Kick-down Switch—Separate units mounted on carburetor. See data below.

ADJUSTMENT: Make adjustments in order as listed below (except for Idling and Pump settings).

IDLE ADJUSTMENT

Idle Screw Setting—Adjust only with engine warmed up to normal operating temeprature so that choke valve wide open and fast idle inoperative. Make a preliminary setting by turning both idle screws out 1 turn from inner seated position. Set idle speed at 475-500 RPM. (use tachometer). Then turn both idle screws in or clockwise 1/8 turn for leaner mixture, if engine speed increases and engine is smoother, turn both screws in an additional 1/8 turn, reset idle speed and adjust each screw separately in or out not more than 1/8 turn for smoothest performance and highest RPM. If first leaning of the mixture (when both screws turned in 1/8 turn) causes engine speed to drop off or engine is rougher, reverse the above procedure by turning the screws out or counter-clockwise for richer mixture.

Idle Speed—475-500 RPM (Chrysler & DeSoto), 450-500 RPM (Plymouth) Shift lever in neutral

ACCELERATING PUMP

▷*PUMP STROKE SETTING CAUTION (901S, 5S, 6S CARBURETORS)*: DIFFERENT settings required for earlier and later carburetors (except where earlier carburetors modified as directed under "CHANGES & CORRECTIONS" above).

Pump Stroke Setting—Carburetor Nos. 901S, 5S, 6S code dated "G2" and earlier and NOT modified (with SINGLE hole in plunger shaft): See that pump rod engaged in center hole of throttle shaft arm, open throttle to wide-open position, measure distance from top of bowl cover to top of plunger shaft (NOT pump arm). This distance should be 33/64". Adjust by bending pump connector rod at lower angle using bending tool T109-213.

Pump Stroke Setting—Carburetor Nos. 901S, 5S, 6S code dated "H2" and later, and earlier MODIFIED Carburetors (with TWO holes in plunger shaft): Check and adjust pump stroke in same manner as later carburetor models (following).

Pump Stroke Setting (Carburetor Nos. 908S, 909S, 910S, 911S, 912S, 913S): Make certain that pump rod connected in throttle shaft arm outer hole and that pump arm pin in top hole of plunger shaft. Back out throttle speed adjusting screw and see that choke valve open so that throttle valves are in fully closed position. Measure distance from top of bowl cover to top of plunger shaft (not pump arm). This distance should be 57/64" (all carburetors) Use Tool T109-213 to bend arm at lower angle to alter distance (2067S, 2068S, 2070S, 2129S, 2130S, 2131S, 2180S, SA, SB; 2141S, 2154S), Upper angle (2162S, SA, SB; 2155S, 2262S).

Recommended Setting—Center Hole for normal conditions. Inner hole provides minimum stroke, outer hole provides maximum stroke.

FLOAT LEVEL

▷*FLOAT SETTING CAUTION:* FLAT TOP top floats take different setting than CURVED TOP floats. See table below for correct float setting

Carb. No.	Float Level	Checking Gauge
901S, 905S, 906S	5/16"	②T109-230
908S, 909S, 910S	9/32"	T109-230
911S, 912S, 913S	①	T109-239
2067S, 68S, 70S	①	T109-239
2129S, 30S, 31S	①	T109-239
2141S, 2154S, 55S	7/32"	T109-239
2162S, SA, SB	7/32"	T109-239
2176S, SA, 77S, SA	7/32"	T109-239
2178S, SA, 80S, SA, SB	7/32"	T109-239
2259S, SA, SB	7/32"	T109-239
2260S, SA, SB	7/32"	T109-239
2261S, SA, SB	7/32"	T109-239
2262S, 2274S, SA	7/32"	T109-239

①—Set FLAT TOP floats at 9/32", CURVED TOP floats at 7/32" (same gauge for both settings)
②—PLUS 1/32" (use feeler gauge with T109-230).

Float Level Setting—Take off air horn and bowl cover, remove bowl cover gasket. Remove float pin retainer. Hold lip of float arm firmly against intake needle with the needle seated and make certain that float pin is at the bottom of its guide slots. Place correct gauge (see table) squarely on top edges of float bowl with gauging legs directly above center of each float. Each float should just touch gauge. If float heights not equal, adjust by bending one float arm, then adjust float height by bending lip on float arm.

Float Clearance Setting—Floats must not rub on inner walls of float bowl at any point throughout their entire travel. Adjust by bending float arms slightly for clearance on all sides of floats.

CAUTION—Both floats must be set alike and floats must be adjusted vertically (for correct float level) and laterally for clearance in bowl (to prevent floats dragging on sides of bowl).

▷*AIR HORN INSTALLATION CAUTION*—When air horn removed for float level setting, spring will lift step-up piston so that step-up rods will pull out of metering jets. Install air horn exactly as follows: Press step-up piston down and guide rods into metering jets, place thin steel rule across bowl to hold piston down. AFTER air horn replaced, slide rule out.

FAST IDLE

Carb. No.	Throttle Opening	Checking Gauge
All Models	.015-.019"	T109-44

Checking & Adjustment—Remove thermostatic coil housing assembly, gasket, and baffle plate (fast idle mechanism located in choke housing). Crack throttle valve to allow fast idle mechanism to operate, close choke valve fully, then close throttle valve. Check throttle valve opening or clearance between edge of valve and bore on side opposite idle ports using Gauge T109-44 (double end gauge, .015" & .018"). Adjust by bending choke connector rod at lower angle using bending tool T109-213. Then check and adjust Unloader.

UNLOADER

Carb. No.	Choke Opening	Checking Gauge
901S, 905S, 906S	9/64"	T109-34
908S. 909S, 910S	9/64"	T109-34
All Others	1/4"	T109-31

Checking & Adjustment—After fast idle adjusted (above), hold throttle valves wide open, close choke valve as far as possible *(CAUTION*—do not force valve closed). Check choke valve opening or clearance between upper edge of valve and air horn wall using correct gauge (see table above). If choke opening not correct, adjust by bending arm on choke trip lever, using tool T109-214. Assemble thermostatic housing, gasket, and baffle plate, adjust automatic choke.

AUTOMATIC CHOKE

Setting—Mark on choke cover and proper line of scale on choke housing as follows:

Car & Carb.	Setting
Chrysler & DeSoto (All)	Centered
Plymouth (157 Eng)	2 Points Lean
Plymouth (167 Eng) 2259S, 60S, 61S, 74S	2 Points Lean
Plymouth (167 Eng) Others	Centered

SETTING CAUTION—Heat tube connection on cover must be loosened to remove or adjust choke cover. When tightening heat tube coupling, hold connection on cover with second wrench to prevent rotating or distorting cover.

SLOW-CLOSING THROTTLE DASHPOT
(Tip-Toe Shift & PowerFlite Cars)

See "Chrysler, DeSoto, Dodge V8 Slow-Closing Throttle Dashpot" in Carburetion Equipment Section for data.

Checking & Adjustment—Check dashpot action with engine running by shifting to Driving Range (use brakes to hold car) and rapidly depressing and releasing accelerator pedal. If engine stalls, increase dashpot action by turning adjusting screw on end of dashpot plunger. Maximum dashpot action is secured with adjusting screw set so that dashpot plunger can be moved inward approximately 1/16" after engine has returned to normal idle speed. If correct action cannot be secured by adjusting dashpot, tune up engine and recheck performance.

KICK-DOWN SWITCH

CAUTION—Kick-down Switches for Automatic Transmission Control and for Overdrive Control are different:

Automatic Transmission Control

Adjustment—*See "Chrysler, DeSoto, Dodge V8 & Plymouth V8 Kickdown Switch" in Electrical Section.*

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (C nt.)

Overdrive Control

Adjustment—Two settings: (1) With throttle valves seated in carburetor bore, hold kick-down switch lever against stop on switch bracket, bend lip on throttle lever until it just contacts kick-down lever; (2) With throttle valves in wide-open position, adjust switch position (turn mounting nuts on switch stem) for 1/64-3/64" clearance between kick-down lever and switch stem guide.

THROTTLE VALVE SETTING

Carb. No.	①Idle Port	②Vacuum Spark Port
901S, 5S, 6S	.101-.105"	.017-.023"
908S, 9S, 10S	.101-.105"	③ .021-.023"
911S, 12S, 13S	.101-.105"	③ .021-.023"
2067S, 68S, 70S	101- 105"	021- 023"
2129S, 30S, 31S	101-.105"	.021-.023"
2141S, 54S, 55S	.133-.137"	.030-.040"
2176S, SA, 77S, SA	.102-.106"	.035-.045"
2178S, SA	.102-.106"	.035-.045"
2180S, SA, SB	.102-.106"	.035-.045"
2259S, SA, SB	.148-.152"	.035-.045"
2260S, SA, SB	.148-.152"	.035-.045"
2261S, SA, SB	.148-.152"	.035-.045"
2262S	.133-.137"	.030-.040"
2274S SA	.148-.152"	.035-.045"

①—Opening above upper edge of valve.
②—Top of port above upper edge of valve.
③—.017-.023" on early production carburetors.

OVERHAUL: ***NOTE—Slow-closing Throttle Dashpot and Kick-down Switches (both types) can be serviced separately without otherwise disassembling carburetor.***

Disassembly: First remove Dashpot unit (take out two screws in bracket), Overdrive Kick-down Switch (take out two screws in bracket), or Kick-down Limit Switch (three screws in bracket) and remove assemblies from carburetor. Proceed as follows: (1) Disconnect accelerator pump plunger rod and pump link from rocker arm, disconnect link from throttle shaft arm and remove the link. Disconnect choke connector rod from fast idle link and throttle shaft arm and remove rod.
(2) Take out screws attaching air horn and bowl cover to main body, lift air horn straight up and off carburetor, remove air horn gasket.
(3) Take out choke thermostatic coil and housing retaining screws and retaining ring, lift off coil and housing assembly, remove gasket and baffle plate. Slide unloader arm and trip lever out and away from fast idle link, slide link down and remove from below. Take out choke valve screws *(CAUTION—these screws are staked)*, remove choke valve. Turn choke shaft counter-clockwise until choke piston clears the cylinder, then slide choke shaft and piston assembly out of the air horn. Drill a 3/16" hole in center of expansion plug closing end of choke piston cylinder, pry plug out carefully.

►***THERMOSTATIC COIL HOUSING CAUTION***—Thermostatic coil, delayer plate, and housing are serviced as an assembly. Coil and delayer plate can be removed from housing for cleaning by removing retainer ring from within housing and rapping assembly sharply against palm of hand with coil side down. ***DO NOT ATTEMPT TO SEPARATE COIL FROM DELAYER PLATE.***

(4) Remove step-up piston and rods as an assembly *(CAUTION—use care not to damage the rods)*. Lift out step-up spring, remove small gasket from bottom of step-up cylinder. Remove accelerator pump plunger and plunger return spring *(CAUTION—keep plunger immersed in jar of gasoline to prevent the leather from drying out)*.
(5) Remove float fulcrum pin retainer, lift out float assembly and fulcrum pin.
(6) Invert carburetor and allow two pump passage filler plugs and check balls to drop out.
(7) Remove fuel inlet valve seat and gaket.
(8) Remove two plugs from accelerator pump jet passage (Tool T109-43), then remove the two pump jets (use narrow-blade screwdriver).
(9) Loosen venturi cluster screws, lift out venturi cluster cover and tube assembly with screws and gaskets.
(10) Remove main metering jets and gaskets.
(11) Invert carburetor and remove step-up passage screw and gasket. Separate throttle body from main body by taking out attaching screws, discard gasket.
(12) Remove idle mixture adjusting screws and springs.

CAUTION—Do not remove throttle valves or shaft unless replacement required by wear or damage.

Cleaning & Inspection: Thoroughly clean all metal parts with carburetor solvent or denatured alcohol. Blow out all passages with compressed air. Examine all parts for wear or damage and replace as required.

Reassembly: Reverse the disassembly procedure as given above and note following important points: **Throttle Valve or Shaft Replacement**—***Manufacturer recommends replacement of Throttle Body Assembly rather than installation of new shaft in old body.*** If necessary to rework old throttle body, proceed as follows: Mark each valve to insure re-installation in same barrel (if valve to be re-used). Take out valve attaching screws and remove valves *(CAUTION—these screws are staked)*. Take out screw and washer attaching throttle arm to throttle shaft, pull arm off shaft, slide shaft off of body. ***CAUTION—DO NOT remove water jacket end plates—plates are sealed against water leakage and MUST NOT BE REMOVED AT ANY TIME.*** Install throttle shaft in body (no bushing used), install throttle valves (trademark "C" in circle toward idle port when viewed from bottom or manifold side of throttle body) using NEW screws but do not tighten screws. Back off throttle stopscrew so that throttle lever is against the stop, hold throttle valves closed and tap lightly with a screwdriver to seat them in the bore, tighten screws securely while holding them from moving. Stake screws by squeezing them with pliers. Make certain that throttle lever tight on shaft (lever must be silver-soldered or brazed—do not attempt to tighten lever by peening shaft). Open throttle valves fully, slide throttle shaft arm over end and onto flats on shaft with long stroke hole pointing upward, secure arm with screw and washer.

Venturi Cluster Assembly & Installation: ***CAUTION On Early 901S, 905S, 906S Carburetors, see ROUGH IDLE CORRECTION under Changes & Corrections for revised cluster Assembly using new type self-sealing screws used without gaskets. Proceed as follows:***
Slide the two venturi cluster retaining screws in place in cluster cover *(CAUTION—these screws contain idle air bleed and idle restriction holes which are calibrated and screws must be handled carefully —make certain that passages are clean)*. Slide a new gasket over cluster cover tubes and screws, then slide cluster cover and tubes into venturi cluster *(CAUTION—idle orifice tubes and main vent tubes MUST NOT BE REMOVED from the cover—make certain that all passages are clean)*. Install new cluster gasket over tubes and screws on underside of venturi cluster, install complete assembly in carburetor main body and tighten screws securely.
Step-up Piston Assembly Installation—Make certain that step-up rods properly installed on piston plate (rods must hang true and be free to move on either side of the vertical position). Install new gasket in cylinder, then install step-up piston assembly and guide rods into metering jets. ***DO NOT INSTALL STEP-UP PISTON SPRING UNTIL AFTER THROTTLE BODY INSTALLED. See Throttle Body Installation.***

Accelerator Pump Check—After pump parts installed (pump plunger and piston, discharge jets, and discharge check balls), test pump action as follows: Fill carburetor bowl approximately ½" deep with clean gasoline, raise pump plunger and press lightly on plunger shaft to expel air from pump passage. Use small brass rods to hold each check ball firmly on its seat, press pump plunger down. If fuel leakage noted at intake or discharge passages, clean passages carefully and install new discharge check balls.

Air Horn Installation—Install new gasket on main body (CAUTION—gasket must clear choke suction hole), lower air horn down on main body aligning pump shaft with air horn opening. Install two air horn attaching screws (on side nearest choke) but DO NOT tighten until after Throttle Body installed. See Throttle Body Installation following.
Throttle Body Installation—With main body inverted, install new gasket (CAUTION—gasket must clear choke suction and spark control passages), install throttle body. Install step-up piston spring in step-up passage, install the step-up passage screw (self-sealing type used without gasket except on first carburetors—see Note below) but DO NOT tighten this screw. Carefully invert carburetor and install the two long air horn screws, install dashpot or overdrive kick-down switch (if used), on air horn with two mounting screws, then securely tighten all six air horn attaching screws and step-up piston passage screw evenly.

►***STEP-UP PASSAGE SCREW NOTE***—Gasket used only on Early 901S, 905S, 906S carburetors with first type ROUND HEAD screw. See ROUGH IDLE CORRECTION under Changes & Corrections for installation of HEXAGONAL HEAD screw used without gasket (this type screw used on modified 901S, 905S, 906S carburetors and all later models).

Choke Valve & Shaft Installation—Make certain that all parts of choke assembly clean and free from any trace of dirt or grit, see that slots in choke piston cylinder and groove in piston are clean and entirely free of carbon deposits. Install new expansion plug in piston cylinder (seat plug with a drift and hammer—this plug must be tight). Insert choke shaft, piston, and fast idle cam assembly into air horn and turn shaft so that piston enters cylinder (CAUTION—fast idle cam must fit over shoulder on choke shaft boss). Install choke valve and start NEW screws, hold valve closed and tap lightly with screwdriver to center the valve, then

CONTINUED ON NEXT PAGE

CARTER BBD DUAL (Cont.)

tighten screws securely and stake screws by squeezing with pliers. Check valve operation—valve should open freely of own weight with carburetor upright.

Automatic Choke Installation—After choke valve and shaft installed, slide fast idle link up into position, install unloader arm and trip lever and engage fast idle link. Install choke connector rod and install retainer clips. Adjust Fast Idle and Unloader (see Adjustments). Install baffle plate and new gasket, install choke housing and retainer ring with indicator mark straight down, turn assembly clockwise until indicator mark is in line with center mark of scale on housing, tighten retainer screws securely.

Carburetor Adjustments—*See ADJUSTMENT section above for all carburetor adjustments.*

SERVICE PARTS

Gasket Sets— Carter 225 (901S, 5S, 6S, 8S, 9S, 10S, 11S. 12S. 13S). No. 243 (2067S 68S, 70S; 2129S 30S, 31S), No. 265 (2180S, SA, SB; 2162S, SA, SB; 2176S, SA; 2177S, SA; 2178S, SA; 2259S, SA, SB; 2260S, SA, SB; 2261S, SA, SB; 2274S), No. 255 (2141S, 54S, 55S, 62S).

Repair Pkgs.— Carter 1717 (901S, 5S, 6S), No. 1728 (908S, 9S, 10S, 11S, 12S, 13S), No. 1757 (2067S, 68S, 70S), No. 1758 (2129S, 30S, 31S), No. 1793A (2162S, SA; 2180S, SA), No. 1793B (2162SB, 2180SB), No. 1791 (2176S, SA; 2177S, SA; 2178S, SA), No. 1779 (2141S, 54S, 55S; 2262S), No. 1795 (2259S, SA, SB; 2260S, SA, SB; 2261S, SA, SB; 2274S).

CHRYSLER, DE SOTO, DODGE V8 SLOW CLOSING THROTTLE

CHRYSLER	Carburetor Model
1951 V8	Carter WCD 830S, SA, SB
1951-52 V8	Carter WCD 931S, SA, SB, SC
1953 V8	Carter WCD 935S, SA
1953 V8	Carter WCD 992S
DE SOTO	
1952 V8	Carter WCD 884S, SA. SC
1952 V8	Carter BBD 901S
1952-53 V8	Carter BBD 908S
1953 V8	Carter BBD 911S
DODGE	
1953 V8	Stromberg WW Code 3-106

DESCRIPTION: This slow-closing throttle device is a separate unit mounted on a bracket on the carburetor with the dashpot plunger contacting an actuating arm on the throttle. Unit is spring-loaded diaphragm type with magnetic solenoid control.

ADJUSTMENT: After carburetor adjustments completed, turn dashpot travel adjusting screw (On actuating arm on Chrysler & DeSoto, in end of dashpot plunger on Dodge), so that plunger has only 1/16" overtravel with throttle in normal idle position. This will provide maximum retarding action.

TESTING: First test unit on the car, then remove unit and disassemble for additional tests as necessary.

Testing on the Car:

1) Turn ignition on and off rapidly. Dashpot action should be audible. If action cannot be heard, disconnect both wires at magnetic solenoid terminals and connect test light between these two leads. Lamp should light when ignition turned on. If lamp does not light, check circuit for shorts, broken wires, or poor contact at terminals.

2) Run engine, place gear shift lever in Driving Range, hold car with brakes. Depress and release accelerator pedal rapidly. Engine should not stall when pedal released. If engine stalls and dashpot adjustment does not correct trouble, disassemble unit and make further tests as follows:

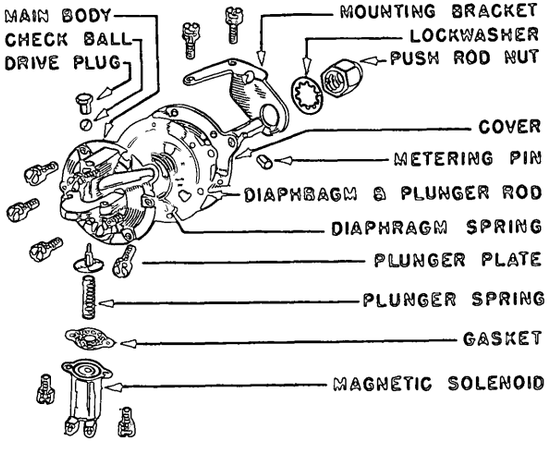
Testing off the Car: *See Disassembly data below for procedure in disassembling unit for following tests.*

1) With magnetic solenoid removed from housing, hold dashpot unit with mounting bracket down, press plunger in and note plunger resistance. Rotate unit one-half turn so that mounting bracket up, press plunger in and compare plunger resistance with that noted in first test. Resistance should be noticeably greater with bracket in down position. If no resistance noted, make test (2).

2) Install dashpot plunger plate, hold dashpot unit with mounting bracket down and plunger plate in upward position. Press plunger in. Plunger should move freely with no resistance. Allow plunger plate to drop down slightly and again press plunger in. Resistance to plunger travel should be noticeable. If resistance noted, check electrical circuits (test 3). If no resistance noted, diaphragm unit is at fault and unit should be completely disassembled for cleaning and inspection.

NOTE—If plunger plate does not drop freely from upward position when making above test, install new plunger plate and repeat test.

3) Connect test lamp across two leads disconnected from solenoid terminals. Turn ignition switch on. Lamp should light. Run engine in neutral and increase engine speed. Lamp should go out as speed increased indicating that governor contacts opening properly. If not, check governor and entire transmission control circuit. Remove test lamp and connect leads to solenoid terminals, repeat above tests. A definite magnetic attraction should be noted at low speed and should not be noted at higher speeds above governor contact opening point. If this action not correct, replace solenoid.



SLOW CLOSING THROTTLE DASHPOT ASSEMBLY (CHRYSLER, DE SOTO, DODGE V8)

DISASSEMBLY: With dashpot unit off carburetor, take out two screws attaching magnetic solenoid, lift solenoid off housing (*CAUTION*—do not lose or damage plunger plate and plunger spring). On Dodge only, remove adjusting screw and spring from outer end of the diaphragm plunger Take out screws around diaphragm flange, separate cover and body, lift out diaphragm compression spring, remove diaphragm assembly (*CAUTION*—do not lose small brass metering pin in hole in side of plunger shaft).

Cleaning & Inspection: Clean all parts thoroughly and dry with compressed air. Blow out channels with air. Check diaphragm for leaks or ruptures, check mating surfaces of body and cover for burrs, or scores which might cause leaks. Check plunger shaft for wear and scores.

REASSEMBLY: Install small brass metering pin in hole in side of plunger shaft, insert plunger and diaphragm assembly in housing and align screw holes in diaphragm and housing. Install compression spring on diaphragm, then install housing cover and all cover screws and lockwashers (*CAUTION*—hold diaphragm flat by pressing in on plunger while starting screws and use great care not to wrinkle or tear diaphragm). With diaphragm in flexed position (plunger pushed out by compression spring), tighten all cover screws evenly and securely. Install dashpot plunger plate, gasket, spring, and solenoid unit. Tighten solenoid screws securely. Test and adjust dashpot unit after installation on carburetor.

CARTER DUAL BBD CARBURETOR JET SPECIFICATIONS

Car Model Year	Carb. No.	Main Metering Jet			Step Up Rod	Venturi Cover Assy.				Venturi Cover Screw		
		Std. Part No.	1 Size Lean Part No.	2 Size Lean Part No.	Size Part No.	Main Vent Tube Size	Idl Tub Size	Pump Jet Size	Part No.	Idle Air Bleed	Idl Restriction	Part No.
CHRYSLER C67												
Synchro-mesh 1955	2180S,SA,SB	120-214S	120-213S	120-212S	.022" ① 75-1140	.0275"	.0334"	.0275"	118-117S②	.063"	.0472"	101-364
PowerFlite 1955	2162S,SA,SB	120-214S	120-213S	120-212S	.022" ① 75-1140	.0275"	.0334"	.0275"	118-117S②	.063"	.0472"	101-364
DESOTO S17 (Early)												
Synchro-mesh 1952	905S	120-173S⑥	120-182S	120-183S	.022" 75-798	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Overdrive 1952	906S	120-173S⑥	120-182S	120-183S	.022" 75-798	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Auto. Trans. 1952	901S	120-1735⑥	120-182S	120-183S	.022" 75-798	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
DESOTO S17 (Late), S16												
Synchro-mesh (Early) 1952-53	909S	120-173S⑦	120-182S	120-183S	.022" 75-876	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Overdrive (Early) 1952-53	910S	120-173S⑦	120-182S	120-183S	.022" 75-876	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Auto. Trans. (Early) 1952-53	908S	120-173S⑦	120-182S	120-183S	.022" 75-876	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Synchro-mesh (Late) 1952-53	912S	120-173S⑦	120-182S	120-183S	.022" 75-876	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Overdrive (Late) 1952-53	913S	120-173S⑦	120-182S	120-183S	.022" 75-876	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
Auto. Trans. (Late) 1952-53	911S	120-173S⑦	120-182S	120-183S	.022" 75-876	.0196"	.0295"	.0315" ⑨	118-96S	.059"	.0472"	101-350
DESOTO S19												
Synchro-mesh (Early) 1954	2067S	120-195S	120-173S	120-182S	.024" 75-990⑧	.0196"	.0295"	.0315" ⑨	118-96S	.063"	.0472"	101-364
Overdrive (Early) 1954	2068S	120-195S	120-173S	120-182S	.024" 75-990⑧	.0196"	.0295"	.0315" ⑨	118-96S	.063"	.0472"	101-364
Auto. Trans. (Early) 1954	2070S	120-195S	120-173S	120-182S	.024" 75-990⑧	.0196"	.0295"	.0315" ⑨	118-96S	.063"	.0472"	101-364
Synchro-mesh (Late) 1954	2129S	120-195S	120-173S	120-182S	.024" 75-990	.0196"	.0295"	.0315" ⑨	118-96S	.063"	.0472"	101-364
Overdrive (Late) 1954	2130S	120-195S	120-173S	120-182S	.024" 75-990	.0196"	.0295"	.0315" ⑨	118-96S	.063"	.0472"	101-364
Auto-Trans. (Late) 1954	2131S	120-195S	120-173S	120-182S	.024" 75-990	.0196"	.0295"	.0315" ⑨	118-96S	.063"	.0472"	101-364
Repl. All 1952-54	2250S	120-214S	120-213S	120-212S	.024" 75-990	.0197"	.0334"	.0275"	118-117S②	.063"	.0472"	101-364
DESOTO S22												
Synchro-mesh 1955	2176S,SA	120-214S	120-213S	120-212S	.024" 75-990	.0275"	.0334"	.0275"	118-117S②	.063"	.0472"	101-364
Overdrive 1955	2177S,SA	120-214S	120-213S	120-212S	.024" 75-990	.0275"	.0334"	.0275"	118-117S②	.063"	.0472"	101-364
PowerFlite 1955	2178S,SA	120-214S	120-213S	120-212S	.024" 75-990	.0275"	.0334"	.0275"	118-117S②	.063"	.0472"	101-364
PLYMOUTH V8 157 HP												
Synchro-mesh 1955	2141S	120-211S	120-210S	120-216S	.022" 75-1140	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364
Overdrive 1955	2154S	120-211S	120-210S	120-216S	.022" 75-1140	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364
PowerFlite 1955	2155S	120-211S	120-210S	120-216S	.022" 75-1140	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364
Replacement 1955	2262S	120-211S	120-210S	120-216S	.022" 75-1140	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364
PLYMOUTH V8 167 HP												
Synchro-mesh 1955	2259S,SA,SB	120-212S⑤	120-209S	120-211S	.019" ③ 75-1168	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364⑩
Overdrive 1955	2260S,SA,SB	120-212S⑤	120-209S	120-211S	.019" ③ 75-1168	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364⑩
PowerFlite 1955	2261S,SA,SB	120-212S⑤	120-209S	120-211S	.019" ③ 75-1168	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364⑩
Replacement 1955	2274S,SA	120-212S⑤	120-209S	120-211S	.019" ③ 75-1168	.0256"	.035"	.0275"	118-108S	.063"	.0472"	101-364⑩

①—Supersedes 75-1145 used on 2180S, 2162S.

②—Supersedes 118-115S

③—Supersedes 75-1182 used on 2259SA, 2260SA, 2261SA & 2274S, which supersedes 75-1168 used on 2259S, 2260S, 2261S.

⑩—Supersedes 101-404 used on 2259SA, 2260SA, 2261SA & 2274S, which supersedes 101-401 used on 2259S, 2260S, 2261S.

⑤—Supersedes 120-213S used on 2259S & SA, 2260S & SA, 2261S & SA & 2274S.

⑥—Used with Step-Up Piston Rod (metering wire) No. 75-798 (.022" diam.).

⑦—Used with Step-Up Piston Rod (metering wire) No. 75-876 (.022" diam.).

⑧—Supersedes No. 75-876.

⑨—Part No. 48-187.

HOLLEY (FORD) 6 CYL. UPDRAFT TYPE

FORD C-O-E & PARCEL DLVRY. TRK. Carb. No.
1948-51 F3 Parcel Del. ("H" Eng.) . 7HW-9510-A
1948-51 F5, 6 C-O-E ("H" Eng.). . . .7HW-9510-A
1950-52 F6 C-O-E ("M" Eng.) 8MWH-9510-A

DESCRIPTION: Single barrel, plain tube, updraft type with throttle operated accelerating pump and vacuum controlled power valve or economizer.

Idle System—Fuel for idling is taken from main jet well up through a channel to discharge ports at the throttle edge. This fuel is controlled by the Idle Discharge Needle. This system operates for closed throttle idling and slow speed operation.

Main (Driving Range) System—At intermediate speeds, fuel metered by main metering jet at bottom of main jet well is discharged through the main nozzle in the venturi throat.

Power System—Consists of a spring-loaded power jet controlled by a spring-loaded vacuum piston. At normal operating speeds and throttle openings, piston is held up at upper end of stroke by manifold vacuum and power jet is closed. At wide open throttle, or whenever throttle opened for acceleration, drop in manifold vacuum allows piston to move down, opening power jet and permitting greater fuel flow to main nozzle (this fuel metered by power jet and by-passes main metering jet).

Accelerating System—Pump cylinder and piston located in float bowl, operated by inverted "L" shaped pump rod linked to a second rod which is linked to the throttle valve lever. Fuel is drawn into pump cylinder through ball check valve in lower end of cylinder when throttle is closed and is discharged past outlet check valve needle when throttle opened for acceleration.

IDLE ADJUSTMENT: Idle adjusting needle valve controls idle fuel mixture. Adjust only when engine thoroughly warmed up so that choke valve wide open and throttle kicker inoperative. See car model page for complete tune-up instructions.
Idle Mixture Setting—Turn idle adjusting needle in until engine runs unevenly, then turn screw out until engine runs unevenly, finally turn screw in just enough so that engine runs smoothly.

ACCELERATING PUMP: Throttle lever has three holes for actuating rod link connection as follows:
Inner (Upper Hole)—Min. stroke for hot weather.
Center (Lower) Hole—Medium stroke for average operating conditions.
Outer Hole—Maximum stroke for cold weather.

POWER VALVE (ECONOMIZER): No adjustment.

MAIN METERING JET: Non-adjustable type located at lower end of main nozzle well. Accessible by removing plug below float bowl. See Holley (Ford) Updraft Carburetor Jet Specifications.

FLOAT LEVEL: Fuel Level—Fuel level in bowl should be .500" (½") plus or minus .032" (1/32") below top edge of bowl with needle valve seated.

Float Level Setting: To check setting, remove air horn and float assembly from carburetor, invert assembly, use float gauge (Holley 82R-9-2) to measure from face of cover to bottom of float. Should be 1.180-1.200" (All)

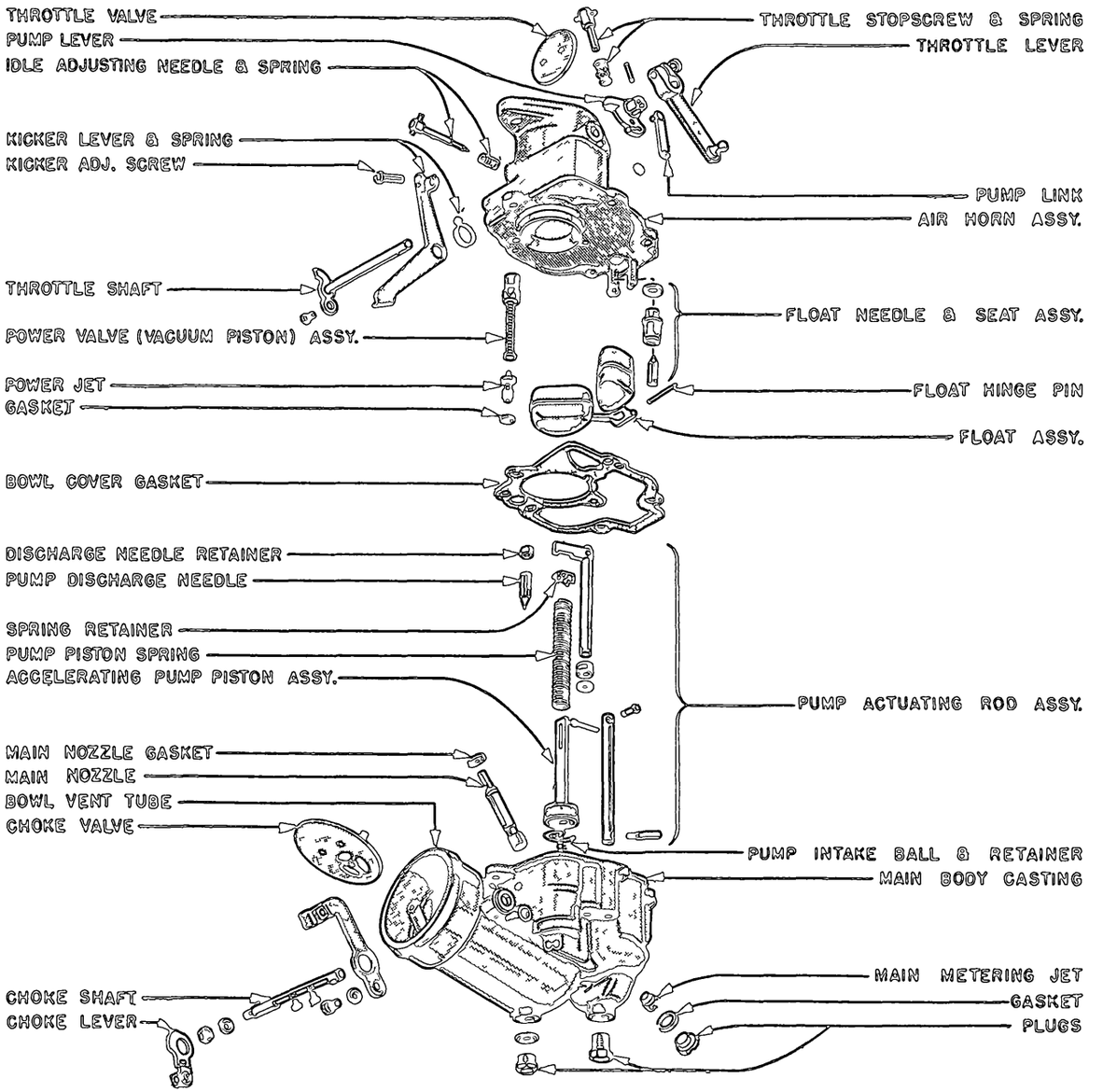
Adjustment—Use bending tool to bend float arm.

▷*CAUTION—Both floats must be set alike and floats must not be twisted to avoid possibility of floats rubbing on sides of bowl.*

THROTTLE KICKER: Consists of a spring-loaded lever on the side of the carburetor which rides on a cam surface on the choke valve lever and has an adjustable screw at the upper end which contacts lever on throttle valve shaft.
Adjustment—Should not be required if adjusting screw at upper end of kicker lever not disturbed.

CHOKE: Offset type butterfly valve with poppet type relief valve. Adjust linkage so that valve closed when choke button pulled out fully.

REPAIR PARTS: Separate kits furnished (one for jets, one for other parts) containing all necessary parts for carburetor overhaul as follows:
Repair Kit (Metering Jets)—Ford No. 7HW-9995 contains one 5GA-9533-A Main Metering Jet, one 7HA-9594 Power Jet and necessary gaskets.
Repair Kit (Other Parts)—Ford No. 7HW-9590.
Gasket Sets—Ford No. 7HW-9502.



HOLLEY (FORD) UPDRAFT CARBURETOR

HOLLEY (FORD) SIX CYL. DOWNDRAFT TYPE

6 CYL. PASS. CAR MODELS	Ford Part No.	6 CYL. TRUCK MODELS	Ford Part No.
1941-42	1GA-9510-A	1941-42	1GA-9510-A
1946-47 ("G" Eng.)	5GA-9510-A	1946-47 ("G" Eng.)	5GA-9510-A
1947-48 ("H" Eng.)	7HA-9510-A	1947-51 ("H" Eng.)	7HT-9510-A②
1949-51 (Std. Trans.)	8HA-9510①	1950-51 ("M" Eng.)	8MTH-9510-A
1951 (Fordomatic Tr.)	1HA-9510-A	1952-53 ("M" Eng.)	8MTH-9510-A

①—See Production Change Note below. ②—Marked "7HA".

►CHANGES, CAUTIONS, CORRECTIONS

►**THROTTLE BODY GASKET CAUTION**—New type gasket, No. 7HA-9516, with hole for distributor control vacuum passage must be used on all carburetors with distributor vacuum line connection. ***Previous type gaskets must not be used.***

►**1950 CARB. 8HA-9510 METERING JET PRODUCTION CHANGE:** Main Metering Jet changed in production on these carburetors as listed below. *NOTE*—Carburetor model designation indicates Altitude range and correct metering jet for this use.

6 Cyl. Main Metering Jets

		1949-50		Late 1950 & 1951	
Carb No.	Altitude Range	Size	Part No.	Size	Part No.
8HA-9510-A②	Up to 5000 ft.	.065"	5GA-9533A	.064"	1GA-9533A
8HA-9510-B	5000-10000 ft.	.063"	5GA-9533B	.062"	1GA-9533B
8HA-9510-C	10000-15000 ft.	.061"	5GA-9533C	.060"	1GA-9533C
8HA-9510-D	Over 15000 ft.	.059"	5GA-9533D	.058"	1GA-9533D

②—Replaced by 8HA-9509-A (Carb. Assy. less choke lever).

►**ANTI-STALL DASHPOT (1HA-9510A CARB.):** Used on cars with Fordomatic Transmission. See Description and Anti-stall Adjustment below.

DESCRIPTION

DESCRIPTION: Plain tube, downdraft type with throttle operated accelerating pump and vacuum controlled economizer (power jet). Carburetor is similar to dual types used on Ford V8 models except for single barrel and new type economizer as described below.

Anti-stall Dashpot (1HA-9510A Carb.)—Consists of a diaphragm type dashpot with spring loaded plunger which engages a screw on the throttle lever as the lever moves toward the closed position and slows the throttle lever movement (controlled by rate of air bleed from dashpot) to prevent the engine stalling.

►**1947 & Later Carburetors with Vacuum Control for Distributor Advance**—Carburetors have two ports (one in venturi, one in carburetor throat above throttle. edge) terminating in distributor vacuum line connection to provide vacuum for operation of advance on new "Loadomatic Distributor."
See "Ford & Mercury Distributor" in Electrical Equipment Section for checking of these vacuum ports and passages.

Fuel System (Idling):—Fuel for idling taken from main jet well up through Idle Tube (which meters the fuel) to cross-passage in main nozzle bar where it is mixed with air admitted through Idle Air Bleed drilled passage in top of nozzle bar. Fuel mixture flows from this cross-passage down through channel to idle ports at throttle edge. For closed throttle idling, all fuel discharged through lower idle port (below throttle) and controlled by Idle Adjusting Needle. As soon as throttle opened, additional fuel is discharged through upper port also.

Driving Range—At intermediate speeds, fuel metered by metering jet at lower end of main jet well flows through cross-passage in main nozzle bar to antechamber at center where it is mixed with air admitted through air bleed opening in side of cross-channel and through Nozzle Air Bleed Plug which is screwed in top of nozzle bar. Fuel mixture is then discharged through main nozzle opening below nozzle bar into throat of venturi.

High Speed & Wide Open Throttle Operation—At high speed or whenever throttle opened sufficiently so that vacuum decreases, economizer valve spring opens economizer valve allowing additional fuel to flow directly from float bowl to main jet well (by-passes metering jet). This fuel metered by economizer restriction which is small drilled passage at well end of economizer fuel channel.

ADJUSTMENT & OVERHAUL

IDLING ADJUSTMENT: Idle adjusting needle or screw controls fuel discharge from lower (closed throttle) idle discharge port. Settings given below. See car model pages for complete tune-up instructions.

IDLE SETTING

Idle Screw S tting—Preliminary setting 1 turn open. After engine warmed up to normal operating temperature (choke valve wide open, fast idle inoperative), adjust screw for highest steady vacuum reading. If vacuum gauge not used, turn screw out until engine begins to roll, then turn screw in until engine speed falls off, finally turn screw out to smooth idling position.

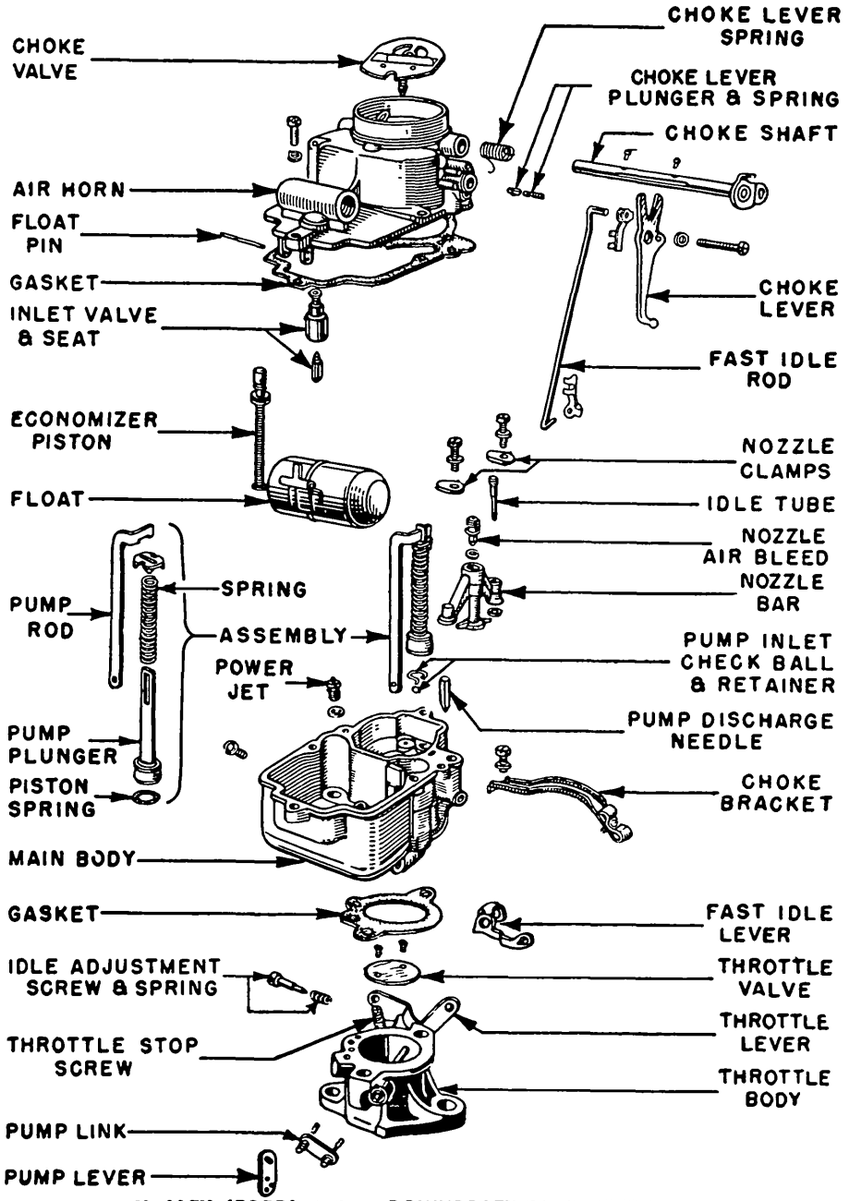
Idle Speed (Synchro-mesh Trans. Cars)—475-500 RPM.

Idle Speed (Fordomatic Trans).—425 RPM. (selector lever in neutral "N").

►***NOTE—Check Anti-stall setting on cars with Fordomatic Transmission.***

ANTI-STALL DASHPOT (1HA-9510-A CARB.): Consists of a separate diaphragm type vacuum unit mounted on bracket bolted on carburetor with diaphragm plunger engaging an adjustable screw on the throttle lever. Check dashpot setting after adjusting carburetor idle speed.

CONTINUED ON NEXT PAGE



H LLEY (FORD) 6 CYL. DOWNDRAFT CARBURETOR

HOLLEY (FORD) SIX CYL. DOWNDRAFT TYPE (C nt.)

Setting—.038-.040" clearance between dashpot plunger and head of adjusting screw on throttle lever with throttle valve closed and dashpot plunger bottomed in dashpot. To adjust, hold throttle lever in closed position, loosen adjusting screw locknut, turn screw out (counter-clockwise) until dashpot plunger bottoms in dashpot, then turn screw in (clockwise) 1¼ turns, tighten locknut. This will give correct clearance of .038-.040".

METERING JET: Main Meteringjet is non-adjustable type located in float bowl and accessible by removing float bowl cover. Jet should be changed only to compensate for special operating conditions such as high altitudes. See Holley (Ford) Jet Specification Table.

ECONOMIZER: Consists of a spring-loaded vacuum piston located in the air horn and float bowl cover casting with the piston stem extending down so as to contact the power jet valve located in the main body casting. Vacuum piston is normally held up at the top of its stroke by manifold vacuum (vacuum passage drilled in carburetor castings and opens into carburetor throat below throttle valve) so that power jet valve is held closed by the spring on the valve stem. when manifold vacuum decreases, spring forces the piston down and opens the p wer jet valve. Fuel then flows from float bowl through valve to main jet well directly without passing through main metering jet.

S tting—Valve opens when manifold vacuum drops to approximately 6½-7½". No adjustment is required.

ACCELERATING PUMP: Pump assembly is located in float bowl, operated by inverted 'L' shaped pump rod linked to throttle lever. Fuel is drawn into pump cylinder through inlet ball check valve at lower end when throttle is closed and is discharged through outlet check valve and pump discharge nozzle when throttle opened for accelerating (nozzle is located at upper edge of venturi). Pump piston connection to pump rod is through a driving spring on the piston stem which prevents loading up engine when throttle opened suddenly and also prolongs pump discharge (spring compressed at beginning of piston travel, expands at end of travel).

Seasonal Adjustment—Engage pump link in proper hole in throttle lever (holes numbered 1-2-3 from throttle shaft outward):
#2 (center)—normal. #1 (inner)—hot weather. #3 (outer)—cold weather.

NOTE—Pump link is locked in lower end of pump rod by a spring-loaded snap lock. To disengage lock, pull link shaft out of pump rod.

FLOAT LEVEL: Use Ford 9550-A Float Position Gauge to check float level. With bowl cover and float assembly removed, remove gasket, invert cover so that float weight holds needle valve closed, place gauge on bowl cover with gauging arm extending over float (CAUTION—check both ends of float). "Go" end of gauge should clear float and "No Go" end should not clear (with "No Go" end of gauge resting on float, base of gauge should clear bowl cover at gauging arm end).

FLOAT LEVEL SETTING

Carburetor Model	Checking Gauge	"Go"—Height—"No Go"
All except 8MTH-9510-A	9550-A	1.353" — 1.322"
8MTH-9510-A only	T52L-9510-AHD	1.315" — 1.283"

Adjustment—Use 9550-C bending tool to bend float arm using extreme care to keep float level (recheck float at both ends). Make certain that float has sufficient travel to drop to bottom of float chamber (travel controlled by stop on float arm.)

Fuel Level: With correct float setting, level of fuel in float bowl (below top edge of bowl) should be:

FUEL LEVEL SETTING

Car Model	①Fuel Level Setting
Ford 6 Cyl. (exc. 8MTH-9510 Carb.)	.687" (11/16")
Ford 6 Cyl. (8MTH-9510 Carb.)	.720" (23/32")

①—Plus or minus .032" (1/32").

Float Needle Valve & Seat: Furnished only in matched sets as follows:
Part No. 78-9564—(1GA-9510-A & 5GA-9510-A Carburetors).
Part No. 7HA-9564—(7HA-9510A, 7HT-9510A, 8HA-9510A, 8MTH-9510A Carbs.).

CHOKE: Offset type with poppet type relief valve to prevent over-choking.

THROTTLE KICKER (STARTING): Consists of spring loaded lever pivoted on side of carburetor casting so as to contact cam on choke lever at upper end and throttle lever at lower end (through throttle stopscrew which is mounted on this starting lever). Lever is rotated by ch ke lever cam when choke valve closed for starting and opens throttle slightly. No adjustment required.

DISASSEMBLY OF CARBURETOR: Remove choke lever screw, lever, plunger, and spring (disconnect lever from connector link). Take out throttle kicker screw and remove throttle kicker. Take out air horn screws and lift off air horn assembly being careful not to damage float or power jet (economizer) vacuum piston assembly. Disconnect accelerating pump link, lift out pump plunger and rod assembly. Remove main metering jet (use screwdriver with blade that fits jet snugly) and power jet from float bowl. Remove nozzle bar screws and clamps, remove Idle Tube and air bleed from nozzle bar, lift out nozzle bar gaskets. Remove check valve retainer from bottom of pump cylinder (use small rod with hooked end), invert main body casting and remove pump discharge needle and check ball (these parts will drop out). Remove throttle body attaching screws and washers, lift throttle body off. Remove idle adjusting screw and spring, take out float hinge pin and remove float assembly from air horn, remove fuel inlet needle valve and seat assembly and gasket.

Servicing—Clean all carburetor parts and make certain that all corrosion removed from float bowl. Examine all parts for wear and replace all worn or damaged parts. Use new gaskets when reassembling carburetor.

Accelerating Pump—When installing check ball in bottom of pump cylinder, seat the ball by tapping lightly with a brass drift rod, then install retainer using a wooden or fibre dowel to press retainer down in place. When installing pump discharge needle, tap needle lightly with a brass drift to insure that it seats properly. Check pump action when completely assembled, a good stream should be apparent at the pump discharge nozzle when throttle valve is opened (bowl must be filled with gasoline when making this test).

Float Inlet Valve & Seat—Keep needle valve and seat together as a set, rinse in cleaning solution and wipe off with clean cloth; if re-installed in carburetor, polish float lever end of needle valve with #320 'wet or dry' paper.

Choke Valve—Check valve tightness by holding air horn assembly against light and noting light around edge of valve. Check poppet relief valve and replace choke valve assembly if relief valve spring weak or broken. Check choke lever boss on air horn for wear using new choke lever, replace air horn if boss worn. Check choke lever for wear at ball end and in 'V' opening which engages choke shaft lever. Clean out choke lever pawl hole.

Float Assembly—See that float lever firmly soldered to float, examine float for leaks (immerse float in water heated just below boiling point, bubbles indicate that float leaks). Polish needle valve contact point on float arm with #320 'wet or dry' paper. Check float level and travel (use 9550-A gauge) as directed under Float Level (above) when float re-installed.

Throttle Valve Assembly—Check valves for tightness in same manner as choke valve (above). Replace complete assembly if valves worn, shaft worn or loose, throttle valve lever loose on shaft, or if pump link hole in throttle lever worn. If throttle valves replaced, stake attaching screws securely (use 9518-C anvil and 9518-D punch). Check throttle valve position using gauge (which gauges distance from valve to idle ports with valve closed).

Vacuum Economizer:—Vacuum piston is located in air horn and float bowl casting and will be removed when air horn is taken off. Power valve is screwed in place in main body casting and can be removed with air horn off and vacuum piston removed. When removing and installing jets, use screwdriver which just fits jet slots and take care not to damage jets and fuel orifices, see that gaskets are in good condition and in place when jets installed.

Pump Discharge Nozzle—Nozzle is a drilled passage in the main body casting and is not removable. A metering restriction is installed in the nozzle passage.

REASSEMBLY OF CARBURETOR: After cleaning and inspecting parts for wear (see Servicing above), reassemble carburetor by reversing disassembling directions. Adjust carburetor after re-installation on engine.

TROUBLE SHOOTING: See Ford V8 carburetor data.

SERVICE PARTS: Repair Kits. Kits listed below contain all necessary parts (gaskets, jets, etc.) required for carburetor overhaul.

►*REPAIR KIT NOTE—Jets furnished in kits are correct size for use in altitude range*

Carburetor	Repair Kit Part No.
8HA-9510A (Up to 5000 ft.)	7HA-9590A
8HA-9510B (5000 to 10000 ft.)	7HA-9590B
7HT-9510A (Up to 5000 ft.)	7HT-9590A
7HT-9510A (5000 to 10000 ft.)	7HT-9590B
8MTH-9510A	8MTH-9590

Gasket Sets—Ford No. 7HA-9502 (8HA-9509A, 8HA-9510A, 7HT-9510A Carb.), No. 8MTH-9502 (8MTH-9510A Carb.).

FORD 6 "VISI-FLO"

FORD 6 CYL. CARS	Carburetor No.
1952 (Synchro-mesh)	①EAA-9510-D
1952-53 (Synchro-mesh)	①EAA-9510-G
1952-53 (Synchro-mesh)	EAA-9510-L
1952 (Fordomatic)	EAA-9510-E
1952-53 (Fordomatic)	②EAA-9510-H
1952-53 (Fordomatic)	EAA-9510-M
1954-55 Synchro-mesh	EBP-9510-A
1954-55 Fordomatic	EBP-9510-B

FORD 6 CYL. TRUCKS	
1952	EAG-9510-B
1953 (exc. Fordomatic)	EAG-9510-D
1953 (Fordomatic)	②EAA-9510-H
1954-55 Std. Transmission	EBR-9510-A
1954-55 Fordomatic Trans.	EBP-9510-B

①—Replaced by No. EAA-9510-L.
②—Replaced by No. EAA-9510-M.

►CHANGES, CAUTIONS, CORRECTIONS

►*1952 LEAKAGE CORRECTION (Leaks at Vent Hole):* May be caused by gasoline seeping or "wicking" out through edge of power jet main well spacer gasket and leaking out through pump vent chamber vent hole on first carburetors where gasket installed between main body and accelerator pump piston assembly. Correct by reversing the location of the gasket by installing parts in following order: Install Pump Piston Assembly first **against** carburetor main body, then install the gasket, finally install main well body assembly.

NOTE—Later carburetors have parts installed in this order and this leakage should not be encountered.

►*1952 FLOAT BOWL CHANGE (To prevent breakage and provide better seal):* Kit No. CPA6-99521-A has following new parts which will prevent fuel bowl breakage and provide better seal against leakage:

Float Bowl No. EAN-99521-A—Identified by word "Holley" in ¼" high letters in lower left hand corner. Bowl is thicker and is deeper to provide more float clearance. Mounting flange is thicker and incorporates a sealing rib.

Float Bowl Gasket No. EAN-9561-A. Granular cork type with synthetic rubber binder to prevent gasoline-soaking and possible leakage.

Float Bowl Retainer Gasket No. EAA-99589-A—This gasket acts as a cushion to prevent cracking bowl from over-tightening or uneven-tightening.

Float Bowl Retainer Spacers No. EAA-99590-A—Must be used with old Retainer Clamp No. EAA-99562-A to compensate for additional thickness of new parts.

►*1952 DASHPOT PRODUCTION CHANGE (Fordomatic Cars):* Dashpot No. EAA-99560-A used on cars beginning late October, 1952. Dashpot has neoprene dust shield or boot on plunger to protect plunger from dirt which might interfere with proper operation.

►*METERING JET SPECIFICATION CHANGES: See "Holley (Ford) Downdraft Carburetor Jet Specifications" for production changes and latest jet specifications.*

►*FLOAT INTAKE NEEDLE & SEAT PRODUCTION CHANGE & REPLACEMENT PARTS NOTE:* New design Needle Valve & Seat Assembly No. EAA-9564-B (steel needle with brass seat insert in seat casting) used in later 1953 production and can be installed in previous 1952-53 carburetors to replace first type No. EAA-9564-A assembly (nylon needle valve and seat assembly).

DESCRIPTION: This "Visi-flo" carburetor has very low over-all height, side-opening glass fuel bowl, diaphragm type accelerating pump, and a special "Main Well & Power Valve Body" sub-assembly in which all of the calibrated metering parts (Main Jet, Power Valve, Pump Inlet and Outlet Check Valves and Fuel Inlet Valve) are mounted. This sub-assembly can be removed as a unit.

ADJUSTMENT: For tune-up on the car, adjust as follows:

Idle Mixture: With engine at normal operating temperature and choke valve wide open (so engine runs at slow idle speed), use vacuum gauge and adjust idle mixture adjusting screw for highest steady vacuum. If gauge not used, turn screw out to enrich mixture until engine begins to roll, then turn screw in to lean mixture until engine slows down, finally turn screw out until engine idles smoothly. Re-adjust idle speed screw.

***NOTE*—If initial adjustment required to warm up engine, turn screw in until lightly seated, then back screw out one turn and start engine.**

Idle Speed:	Synchro-mesh	Fordomatic
1952-54	475-500 RPM	440-460 RPM
1955	475-500 RPM	①450-475 RPM

①—With selector lever in "N" Neutral position.

NOTE—If anti-stall Dashpot adjusting screw holds throttle open and prevents proper idle adjustment, loosen locknut, turn Dashpot screw clockwise until idle speed can be adjusted, then readjust Dashpot setting, see below.

CAUTION—Set idle speed only with engine warm and choke valve wide open.

Accelerating Pump: Inner hole for normal or hot weather, outer hole for cold weather operation (holes located in throttle lever, shift pump link as required).

Float Level: *Fuel level can be checked through glass bowl cover without disturbing carburetor.*

Fuel Level—Flush to 1/16" below top edge of float hinge bracket in bowl. To adjust, remove bowl cover, bend float tab which contacts float needle spring.

Float Level—Can be checked with Gauge No. T52L-9550-AEE (Gauge, Bending Tool, and Dummy Fuel Bowl), or with cardboard gauge (furnished in repair package) as follows:

Using Gauge 9550-AEE—Remove regular carburetor fuel bowl, install dummy fuel bowl (with open top) using regular fuel bowl gasket and three of the retaining screws. Remove power valve cover and diaphragm assembly, install fuel gauge No. T52L-9550-AEE in this opening. Fuel in bowl should touch tip of "LOW" gauge pin, but should not touch tip of "HIGH" gauge pin. Adjust by bending float arm tab using special slotted bending tool.

Using Cardboard Gauge (in Repair Pkg.)—With fuel bowl removed, invert carburetor so that float hangs down in valve-closed position. Install gauge over edge of bowl opening. Float should not touch gauge at free end of float. Adjust by bending tab on float arm. *This is approximate setting only and fuel level should be checked after carburetor has been assembled.*

Dashpot (Fordomatic Cars & Trucks): After engine idle speed adjustment completed, turn ignition off, loosen dashpot adjusting screw locknut (on dashpot operating lever), hold throttle in closed position and turn adjusting screw out or counter-clockwise until the head of the screw pushes the dashpot rod up to the limit of its travel, then turn adjusting screw in or clockwise 1½-2 turns, tighten locknut.

This will provide correct clearance of .045-.064" between dashpot rod and adjusting screw (apparent only when rod bottomed in dashpot).

OVERHAUL: Carburetor consists of three main sub-assemblies (Main Body, Main Well & Power Valve Body, and Throttle Body) which are removed and disassembled as follows:

Disassembly: With carburetor off engine, disconnect pump link at pump operating lever, take out throttle body screws and separate main body from throttle body, disassemble each part as follows:

Main Body—Remove fuel inlet fitting. Remove glass fuel bowl and gasket (four retainer screws and clamps). Remove fuel inlet seat screw and gasket, then remove fuel inlet valve and float assembly and gasket. Remove power valve diaphragm by taking out three cover screws on top of main body *(NOTE*—If diaphragm defective, separate cover and discard diaphragm and stem assembly). Take out five main well and power valve body screws, lift this assembly out. Remove pump diaphragm return spring from seat on diaphragm disc, pull diaphragm and rod assembly straight out of main body *(CAUTION*—do not rotate assembly while removing it). Press pump rod sleeve toward diaphragm to allow sleeve retainer ball to drop out *(CAUTION*—do not lose this ball), remove sleeve. Spread notch in pump operating lever retainer, pry retainer off stud and remove the pump operating lever. Remove pump discharge nozzle screw (visible at side of choke valve when looking down on carburetor), lift discharge nozzle out. Remove retainer in distributor vacuum passage, remove ball from passage. If necessary to remove choke valve or shaft, first drive distribution pin out of shaft (support shaft with piece of tubing and drive pin down in tubing using a small punch), take out valve attaching screws *(CAUTION*—clean up staked ends of screws with a file first to avoid damaging threads in shaft holes), remove valve, then drive shaft retainer pin out of boss in main body and remove choke shaft and lever. Remove choke lever bracket.

Main Well & Power Valve Body—Unscrew main metering jet using special tool T52L-9594-AAD. Unscrew pump inlet and discharge check valve retainer plugs, invert body to allow inlet check ball, discharge check ball, and pump discharge valve weight to fall out. Do not attempt to remove power valve from the body.

Float Disassembly—Remove float shaft retainer and slide shaft out to release the float. Slide fuel inlet needle assembly off float lever tab, remove the wire clip, spring, and plunger from the fuel inlet needle.

Throttle Body—Remove idle adjusting needle and spring, remove pump link by taking out cotter pin. Do not remove throttle valve or shaft.

Cleaning & Inspection: Soak all metal parts in carburetor cleaning solvent, carefully clean off all carbon and gum deposits, blow out all passages and dry parts with air. Inspect all parts for wear and dam-

CONTINUED ON NEXT PAGE

FORD 6 "VISI-FLO" (Continued)

age. Replace throttle body if valve edges nicked or if protective plating damaged so that casting metal exposed. Replace main body if protective plating damaged. Replace choke valve if bent, nicked, or if poppet relief valve does not operate freely.

Reassembly: Use all NEW gaskets. Assemble parts in reverse order of disassembly procedure above and note these important points:

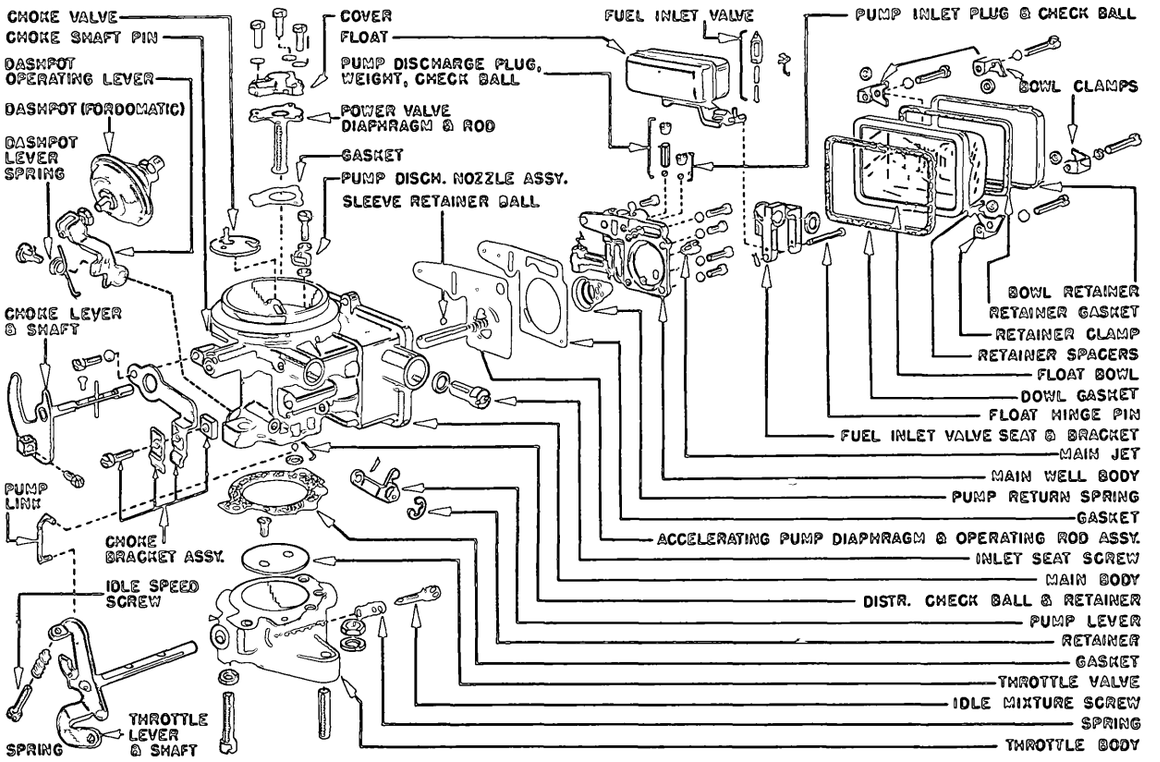
Pump Discharge Nozzle Installation—Use new gasket on each side of nozzle, insert screw through grooved side of nozzle, allow nozzle to turn clockwise until stopped by edge of recess in main body when tightening the screw.

Choke Valve & Distribution Pin Installation—After choke shaft installed and retainer pin driven into hole in top of choke shaft boss, turn lever so that swivel is directly beneath choke shaft and insert choke valve in shaft slot with relief poppet valve spring on top of valve (*CAUTION*—use care not to damage main nozzle which fits in slot in valve). Install two valve attaching screws and tighten just enough to hold valve (*CAUTION*—Filister head screw must be installed in hole nearest lever end of shaft). Install distribution pin by driving pin in through hole in shaft and valve (*CAUTION*—support shaft with piece of tubing and drive pin down into tube), position pin so that clearance at each end is uniform when choke valve wide open. Hold choke valve in fully closed position and tighten attaching screws securely. Check choke valve for free operation and, if no bind exists, stake screws.

Accelerating Pump Installation—First assemble pump by installing spring and sleeve on pump rod and pressing the sleeve on to compress the spring until the retainer ball can be dropped into the hole in the sleeve. Then position pump assembly in main body so that diaphragm bears directly against the main body, then install main well body spacer gasket (this gasket can be slipped over main well body attaching screws and installed with the main well body if desired), finally install main well body.

▷*CAUTION—Above position of pump piston assembly and gasket is reversed over original assembly on first carburetors and will prevent leakage through vent hole. Later carburetors were assembled in this order.*

Main Well Body Installation—After spacer gasket and pump diaphragm assembly installed in main body, seat large end of pump return spring in pump diaphragm disc, install main well body exactly as follows: Insert power valve end of main well body into main body first, apply pressure against protruding end of pump rod sleeve to fully compress pump return spring while pressing main well body



FORD 6 "VISI-FLO" CARBURETOR

into position, tighten all five main well body screws BEFORE releasing pump sleeve. *NOTE*—Two long screws should be placed in center top and bottom holes, shorter screws in remaining three holes.

Float Assembly Installation—Install a new gasket on the fuel inlet seat screw, insert screw through fuel inlet fitting boss on main body, install second gasket on threaded end of screw, install float and fuel inlet valve assembly in position to engage the screw, align float hinge bracket by placing bar section of float gauge under bracket (between lower end of bracket at float shaft and face of main body casting), tighten inlet seat screw securely before removing gauge.

Float Bowl Installation—Install new gasket in recess in rim of fuel bowl, place bowl in position on main body, install retainer gasket, retainer, and all retainer clamps with spacers and screws (use lock-washers under screw heads).

Tighten attaching screws exactly as follows: (1) Tighten screws finger-tight in following sequence—Lower—Upper—End, (2) Use a proper size screwdriver to tighten screws in same sequence additional ¾ to 1 full turn, (3) Finally tighten all screws in same sequence to final tightness of approximately 8-10 in. lbs. torque.

▷*CAUTION—DO NOT overtighten fuel bowl screws and make certain screws tightened evenly to avoid danger of cracking glass bowl.*

Carburetor Adjustments—Make all adjustments as listed in ADJUSTMENT section above.

SERVICE PARTS: Gasket Sets—Ford No. B2A-9502-A (1952-53), No. B2A-9502-C (1954-55).

Repair Kit (with Std. Metering Jet)—Ford No. B2A-9590-A (1952-53), No. B4A-9590-B (1954-55).

HOLLEY (FORD) V-8, LINCOLN, MERCURY

FORD V8 PASS. CARS	Ford Part No.	FORD V8 TRUCKS	Ford Part No.
1946-48 "100"	59A-9510-A	1945-47 "100"	59A-9510-A
1949-51 (Std.)	①8BA-9510-A	1948-51	④7RT-9510-A
1951 (Fordomatic)	1BA-9510-A	1951-52	⑤8RT-9510-A, E
1952-53 (Std.)	②EAB-9510-C	1953 (Std.)	8RT-9510-F
1952-53 (Fordomatic)	②EAB-9510-D	1953 (Fordomatic)	8RT-9510-G
1949-53 Repl. Carb.	EAB-9510-F	1948-53 Repl. Carb.	8RT-9510-F
1954 All Cars.	EBU-9510-E	1954 V8 239" Trucks	EBV-9510-H
1955 Synchro-mesh	B5A-9510-J	1955 V8 239" Trucks	EBV-9510-H
1955 Fordomatic	B5A-9510-K	LINCOLN	
1955 All (Later)	B5A-9510-B	1946-48	26H-9510-C
		MERCURY	
		1946-48	59A-9510-A

①—Replaced by EAB-9510-C.
②—Replaced by EAB-9510-F.
④—Replaced by 8RT-9510-F.
⑤—"A" type replaced by "E" type.

▷CHANGES, CAUTIONS, CORRECTIONS

▷*"HIGH-LIFT" NOZZLE BAR CARBURETORS (Models 8RT-9510-E, F, G; EAB-9510-C, D, F):* Nozzle bar assemblies are different design than assemblies used on other carburetors and these "High-Lift" Nozzle Bar carburetors require SPECIAL FLOAT SETTING. See Float Level data below.

▷*"HIGH-LIFT" NOZZLE BAR NON-INTERCHANGEABILITY CAUTION (V8 Passenger Car & Truck Carburetors):* TWO types of High-Lift Nozzle Bars used with different Idle Air Bleed locations. THESE NOZZLE BARS MUST NOT BE INTERCHANGED:

1) Pass. Car & Fordomatic Truck Carburetors Nos. 8RT-9510-G, EAB-9510-C, D, F): Ford Part No. EAB-9920-B & EAB-9921-B. Air bleed is drilled in Idle Tube (screwed in top of nozzle). Some nozzles may have three apparent holes drilled in flat surface of nozzle adjacent to idle tube passage but these holes are BLANK and not drilled through.

2) Trucks (except Fordomatic Models) Carburetors Nos. 8RT-9510-E, F: Ford Part No. EAB-9920-A & EAB-9921-A. Air bleed consists of drilled hole in nozzle bar casting on flat surface adjacent to idle bleed passage (NO bleed hole in Idle Tube). Some nozzles may have three apparent holes drilled on flat surface of nozzle, in this case, CENTER hole will be drilled through to idle passage and is the air bleed.

▷*1954 V8 239" ENGINE CARBURETOR PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Later carburetors (identified by "2" stamped on mounting flange opposite throttle lever (have different Nozzle Bars with bleed hole in idle cross-over passage drilled through one wall only (nozzle bars on early carburetors have bleed hole drilled through both walls). Repair Kit No. B4A-9590-F has two sets of Idle Jets and correct type should be used for each carburetor as follows:
Early Carburetors—Use Jet No. EBU-9542-B (stamped "68"). Later Carburetors—Use Jet No. B4A-9542-A (stamped "54"). *See recommended correction following.*

▷*1954 V8 239" ENGINE CARBURETOR STALLING CORRECTION & IMPROVED ECONOMY: See Production Change above.* To correct stalling on early carburetors, install new nozzles furnished in Nozzle Bar Replacement Kit No. B4A-9920-D in conjunction with Repair Kit No. B4A-9590-F (CAUTION—Use Idle jets stamped "54" with these new nozzles). To improve economy (and correct stalling), on all carburetors, install new Throttle Body furnished in Throttle Body Replacement Kit No. B4A-9510-B.

▷*1954 CARBURETOR IDLE ADJUSTING NEEDLE PRODUCTION CHANGE & REPLACEMENT CAUTION:* Idle adjusting needle changed from 15° included angle tip to a 40° included angle tip. New 40° needle can be used to replace former 15° needle in pairs only.

▷*ANTI-STALL DASHPOT (FORDOMATIC CARS):* Consists of a diaphragm type dashpot with spring-loaded plunger which engages a screw on the throttle lever as the lever moves toward the closed-throttle position. This slows the throttle lever movement (controlled by rate of air bleed from dashpot) and prevents the engine stalling. An adjustment is provided. *See Adjustment data below.*

▷*DASHPOT PRODUCTION CHANGE:* Dashpot No. EAB-99560-A (used in production after November, 1952) has neoprene dust shield or boot on control plunger to protect plunger from foreign material which might interfere with proper operation.

▷FORD V8 & MERCURY CARBURETOR POWER VALVE CHANGE (No. 78-9904 Carburetor Economizer or Power Valve). Diaphragm material changed from Neoprene to Fairprene to prolong life of this part. Parts may be identified by color of power valve cover as follows:

First Type (Neoprene Diaphragm)—Silver (cadmium plated).
Later Type (Fairprene Diaphragm)—Black (oxidized).

▷FORD V8 ('49) ACCELERATOR ASSY. INTERFERENCE CORRECTION. To correct complaints of interference between acelerator assembly (levers and cross-shaft on dash) and accelerator rod assembly (linking accelerator and carburetor) and which may cause linkage to come apart, grind or file off the end of the accelerator assembly at the accelerator rod connection to provide clearance and prevent accelerator assembly contacting the clip locking the two assemblies together (interference at this point forces tines on clip off and allows the rod to disengage from the accelerator).

▷THROTTLE BODY GASKET CAUTION—New type gasket, No. 7RA-9516, with hole for distributor control vacuum passage must be used on all carburetors with distributor vacuum line connection. *Previous type gaskets must not be used on these carburetors.*

DESCRIPTION

DESCRIPTION: Dual (double barrel), plain tube, downdraft types with throttle operated accelerating pump and vacuum controlled economizer (power jet). All models are similar except for following special features:

▷Ford 1948 & Later Carburetors with Vacuum Control for Distributor Advance—Carburetors have two ports (one in venturi, one in carburetor throat above throttle edge) terminating in distributor vacuum line connection to provide vacuum for operation of advance on new "Loadomatic Distributor."
See "Ford & Mercury Distributor" in Electrical Equipment Section for checking of these vacuum ports and passages.

▷1954-55 Spark Control Valve: Consists of a spring-loaded diaphragm controlled valve which controls the opening of the distributor advance control vacuum channel terminating at the throttle edge. The valve remains open under normal operating conditions but closes under acceleration (with drop in manifold vacuum) cutting off manifold vacuum to distributor and retarding the spark advance. The valve likewise closes when the throttle is wide open to prevent venturi vacuum bleeding back into the manifold.

Fuel System (Idling):—Fuel for idling taken from main jet well up through Idle Tube (which meters the fuel) to cross-passage in main nozzle bar where it is mixed with air admitted through Idle Air Bleed drilled passage in top of nozzle bar. Fuel mixture flows from this cross-passage down through channel to idle ports at throttle edge. For closed throttle idling, all fuel discharged through lower idle port (below throttle) and controlled by Idle Adjusting Needle. As soon as throttle is opened, additional fuel is discharged through upper idle port also. Independent idle system used for each carburetor barrel.

Driving Range—At intermediate speeds, fuel metered by metering jet at lower end of main jet well flows through cross-passage in main nozzle bar to antechamber at center where it is mixed with air admitted through air bleed opening in side of cross-channel and through Nozzle Air Bleed Plug which is screwed in top of nozzle bar. Fuel mixture is then discharged through main nozzle opening below nozzle bar into throat of venturi.

High Speed & Wide Open Throttle Operation—At high speed or whenever throttle opened sufficiently so that vacuum decreases, economizer valve spring opens economizer valve allowing additional fuel to flow directly from float bowl to main jet well (by-passes metering jet). This fuel metered by economizer restriction which is small drilled passage at well end of economizer fuel channel

CONTINUED ON NEXT PAGE

HOLLEY (FORD) V-8, LINCOLN, MERCURY (C nt.)

ADJUSTMENT: Set these carburetors to following specifications:

IDLING ADJUSTMENT

Idle Mixture Setting—***CAUTION—See Idle Screw Production Change above.*** Make an initial adjustment by turning both screws in until they are lightly seated (*CAUTION*—do not turn screws hard against seats which will groove points and make adjustment impossible unless screws replaced), then back each idle screw out approximately 1 turn (1946-53), 1½ turn (1954-55). Run the engine at a fast idle speed until it is at normal operating temperature. Then adjust as follows: If vacuum gauge used, adjust both screws equally for highest steady vacuum reading. If vacuum gauge not used, turn each adjusting screw ⅛ turn at a time until smoothest idle position secured. Final setting should not exceed ½ turn difference between setting of both screws. Recheck idle speed and adjust stopscrew for correct speed as listed below.

►***PASSENGER CAR STALLING CORRECTION:*** If car tends to stall at idle speed or when brakes applied with idle setting made as above, modify idle setting as follows: After Idle Mixture and Idle Speed have been set to above specifications, turn each idle mixture adjusting screw out ⅛ turn at a time until engine speed has been reduced a total of 25 RPM., then readjust idle speed stopscrew for correct idle speed. This will provide a slightly richer idle mixture which will prevent stalling.

►***NOTE—Check Anti-stall setting on Fordomatic cars.***

Idle Speed Setting

Car Model	Idle Speed
Ford (All—Synchro-mesh)	475-500 RPM
Ford (1951-53 Fordomatic)	①425 RPM
Ford (1954 Fordomatic)	①445-455 RPM
Ford (1955 Fordomatic)	①450-475 RPM
Lincoln & Mercury	500 RPM

①—With selector lever in Neutral "N" position.

ANTI-STALL DASHPOT SETTING

Setting—After idle speed adjusted (above), turn off ignition, loosen locknut on dashpot adjusting screw stud, turn screw out or counter-clockwise until screw pushes dashpot rod up to the end of its travel, then turn screw in or clockwise 1½-2 turns and tighten locknut. This will provide correct clearance of .045-.064" between dashpot rod and adjusting screw (when rod bottomed in dashpot).

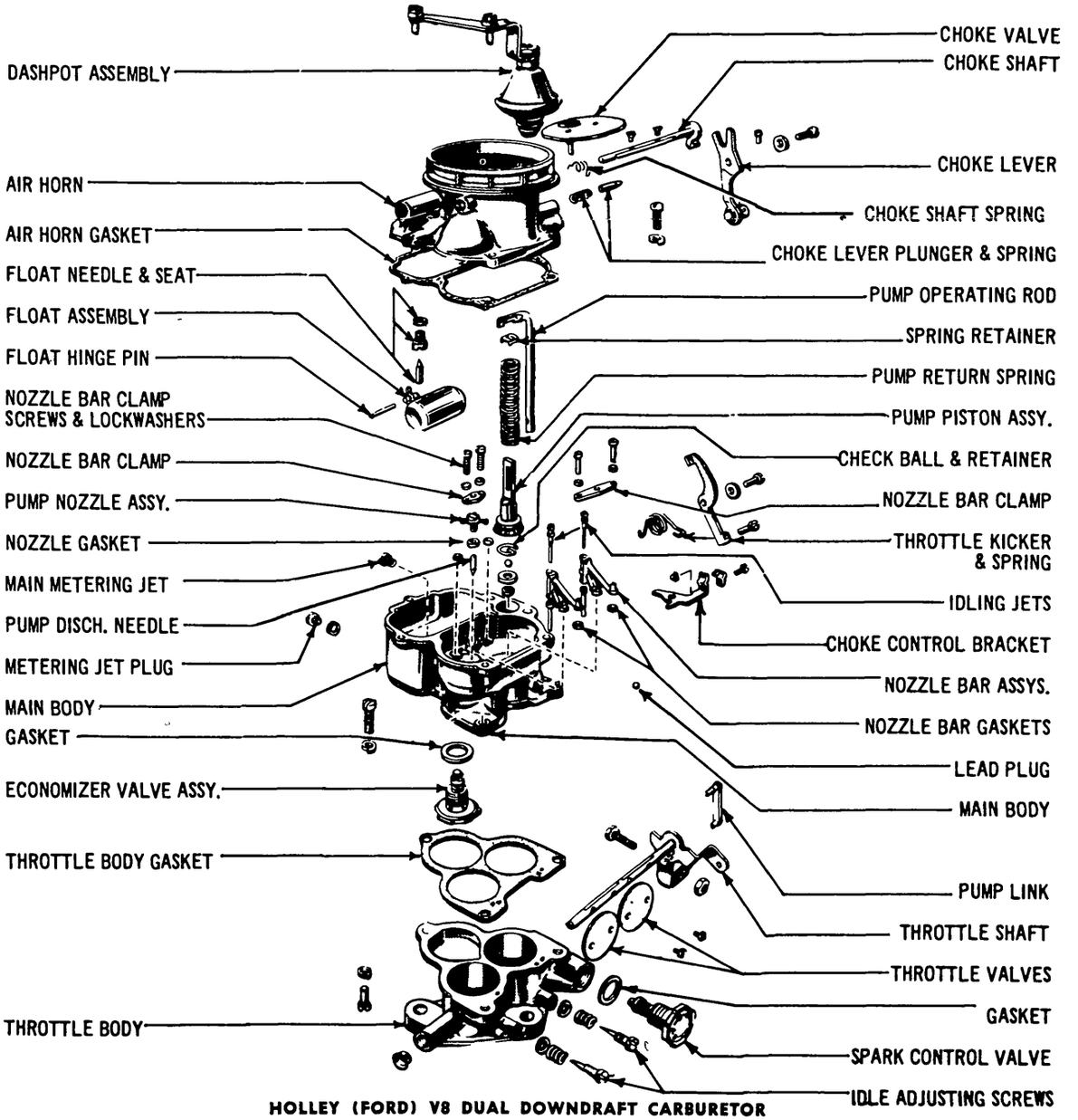
VACUUM SPARK CONTROL VALVE

No adjustment required. Calibrating spring in valve is set to allow valve to operate at 6½-7½" of manifold vacuum. If operation not satisfactory, remove and inspect valve for free movement of the valve stem and inspect passage in adapter screw.

ACCELERATING PUMP SETTING

Seasonal Adjustment (Except B5A-9510-A)—Engage pump in Center hole for Normal operation, Inner hole for Hot weather, Outer hole for Cold weather.

Seasonal Adjustment (B5A-9510-A)—Accelerating pump links stamped "C" or "D" on side of body Pump nozzles are identified by numerals "69" or "70" in top center of nozzle. Set linkage as shown in table below.



HOLLEY (FORD) V8 DUAL DOWNDRAFT CARBURETOR

B5A-9510-A Pump Setting

Transmission	Nozzle No.	Link Setting
Std. & Overdrive	"69"	①#3 hole
Std. & Overdrive	"70"	①#3 hole
Fordomatic	"69" or "70"	#2 hole

①—Farthest hole from shaft.

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HOLLEY (FORD) V-8, LINCOLN, MERCURY (Cont.)

ECONOMIZER (POWER VALVE)

Opens at 6-6½" manifold vacuum (1946-54), 7.9-9.0" manifold vacuum (1955). No adjustment is provided.

FLOAT LEVEL

►***FLOAT GAUGE NOTE***—**Use Gauge No. T52L-9510-AHD for all "High Lift" Nozzle Bar Carburetors.**

Float Level Setting

Car Model	"Go" — "No Go"
Ford (Std. Nozzle Bar)	①1.535" — 1.322"
Ford (Hi-Lift Nozzle Bar)	②1.305" — 1.275"
Lincoln	③1.290" — 1.260"
Mercury	①1.353" — 1.322"

①—Float Checking Gauge 9550-A.
②—Float Checking Gauge T52L-9510-AHD.
③—Float Checking Gauge 9550-H.

Float Checking Gauge Note—When checking float level with gauge, invert cover assembly with gasket removed, mount gauge on cover. The "GO" end of the gauge should pass over the bottom of the float while the "NO GO" end of the gauge should not. Check both ends of the float and adjust so that both ends are same height.

Fuel Level—Fuel level in bowl can be checked with a sight level indicator or other means and should be as follows:

Fuel Level Setting

Car Model	①Fuel Level
Ford (Std. Nozzle Bar)	11/16"±1/32"
Ford (Hi-Lift Nozzle Bar)	5/8"±1/32"
Lincoln	19/32"±1/32"
Mercury	11/16"±1/32"

①—Below top edge of bowl.

THROTTLE KICKER (STARTING)

Spring-loaded lever on side of carburetor contacting cam on choke lever at upper end and throttle lever at lower end. Opens throttle to starting position when choke closed for starting. No adjustment required.

OVERHAUL: Disassembly—Take out screw and flat washer attaching choke lever to air horn, remove lever, lift choke lever plunger and spring from air horn recess. Remove screw and washer attaching throttle kicker to main body, lift off throttle kicker and spring. Disconnect pump link from pump rod and throttle shaft lever and remove link. Take out throttle body attaching screws and remove throttle body gasket. Take out air horn attaching screws and remove air horn assembly and gasket.

Air Horn Disassembly—Take out float pivot shaft, remove float and inlet needle valve. Remove inlet needle valve seat. Do not remove choke valve unless parts replacement required. To remove valve, take out valve attaching screws, remove valve from shaft, slide choke shaft and lever assembly out.

Main Body Disassembly—Lift accelerating pump plunger assembly out. Remove attaching screws in each nozzle bar clamp, lift pump discharge nozzle and both nozzle bar assemblies out, remove gaskets. Invert body to drop out pump discharge needle. Remove access plugs and gaskets on side of body, use jet wrench T52L-9594-AAD to remove main metering jets. Remove pump inlet check ball retainer from bottom of pump cylinder, invert body to drop out the check ball. Remove idle jet tubes from both nozzle bar assemblies.

Throttle Body Disassembly—Remove both idle adjusting screws and springs. DO NOT remove throttle valves or disturb throttle assembly. ***NOTE*** Replace throttle body if valves or shaft worn.

Cleaning & Inspection: Clean all parts except Power Valve in cleaning solvent, make certain that all carbon deposits and gum or varnish completely removed, blow out all passages and make certain they are clean and not restricted. Inspect all parts for wear or damage. Replace throttle body if valves not snug fit or wear of looseness evident.

Reassembly: Use all NEW gaskets. Install parts in reverse order of disassembly procedure above and note the following important points:

Choke Valve Installation—Install choke shaft in air horn with tension spring properly positioned on shaft and engaged in slot in air horn so that valve will remain in closed position, install valve in shaft, install new screws loosely. Close valve and centralize it by tapping lightly, hold valve in position while tightening screws securely, stake screws. Check valve assembly for free operation. After air horn installed on main body, make certain that plunger and spring installed in air horn recess before installing choke lever.

"High Lift" Nozzle Bar Installation—Use two new gaskets for each nozzle bar, position nozzle bars in main body with high end of bar toward float bowl, install nozzle bar clamps, install nozzle bar clamp screws inserting the two **long** screws at the pump discharge side, tighten all screws evenly.

SERVICE PARTS

Gasket Sets—Ford No. B2A-9502-B (All 1946-53 Carbs.), No. B4A-9502-A (All 1954 Carbs.), No. B5A-9502-A (1955 Pass. Car & 239" Trk.), No. B5T-9502-A (1954-55 256" Trk.—supersedes No. B2Q-9502-B).

Repair Kit—Ford No. 8BA-9590-A (1946-51 Pass. Cars & 1946-52 Trks.), No. B2A-9590-C (1952-53 Pass. Cars), No. B2C-9590-A (1952-53 Trks.), No. B4A-9590-A (1954 Pass. Cars), No. B4C-9590-D (1954 239" Trks.—supersedes No. B4C-9590-A), No. B5A-9590-A (1955 Pass. Cars except Carb. No. B5A-9510-P), No. B5A-9590-B (1955 Pass. Cars with B5A-9510-P Carb.), No. B5C-9590-A (1955 239" Trks.), No. B4T-9590-B (1954-55 256" Trks.).

HOLLEY (FORD) SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Model	Main Metering Jet Size	Main Metering Jet Part No.	Main Discharge Nozzle Part Number Left Hand	Main Discharge Nozzle Part Number Right Hand	Nozzle Air Bleed Plug Part No.	Economizer Assembly Part No.	Idle Tube Part No.	Pump Nozzle Part No.
FORD 6 "G"	1946-47	5GA-9510-A	.065"⑦	5GA-9533A	1GA-9920⑰		1GA-9924	1GA-9904④	1GA-9542B	
FORD V8 '100'	1946-48	59A-9510-A	.051"⑧	59A-9533A	91A-9923B	91A-9922B	78-9924	78-9904	78-9542	78-9577
FORD 6 "H" Car	1947-48	7HA-9510A	.064"⑤	1GA-9533-A	7HA-9920		1GA-9924	1GA-9904⑫	1GA-9542B	
FORD 6 "H" Truck	Late 1947	7HT-9510A	.064"③	1GA-9533-A	1GA-9920⑰		1GA-9924	1GA-9904⑫	78-9542	
FORD V8 "100" Trk.	1948	7RT-9510A	.051"⑧	59A-9533A	91A-9923B	91A-9922B	78-9924	78-9904	78-9542	78-9577
FORD 6 "H" Truck	1948	7HT-9510A	.064"③	1GA-9533-A	1GA-9920⑱		1GA-9924	1GA-9904⑫	1GA-9542B	
FORD V8 "100" Car	1949	8BA-9510A	.051"⑧	59A-9533A	91A-9923B	91A-9922B	78-9924	78-9904⑲	78-9542	78-9577
FORD 6 "H" Car	1949	8HA-9510A①	.064"㉓	1GA-9533-A③	7HA-9920		1GA-9924	1GA-9904-B⑳	1GA-9542B	
FORD V8 "100" Trk.	1949	7RT-9510A	.051"⑧	59A-9533A	91A-9923B	91A-9922B	78-9924	78-9904	78-9542	78-9577
FORD 6 "H" Trk.	1949	7HT-9510A	.064"	1GA-9533-A③	1GA-9920⑱		1GA-9924	1GA-9904⑫	1GA-9542-B	
FORD 6 Std. Tr.	1950-51	8HA-9510-A①	.064"㉓	1GA-9533-A③	7HA-9920㉒		1GA-9924	1GA-9904-B⑳	1GA-9542-B	
FORD 6 Auto Tr.	1951	1HA-9510-A	.064"	1GA-9533-A③	7HA-9920㉒		1GA-9924	1GA-9904-B⑳	1GA-9542-B	
FORD V8 Std. Tr.	1950-51	8BA-9510-A	.051"	59A-9533-A㉑	91A-9923-B	91A-9922B	78-9924	78-9904	78-9542	78-9577
FORD V8 Auto. Tr.	1951	1BA-9510-A	.051"	59A-9533-A㉑	91A-9923-B	91A-9922B	78-9924	78-9904	78-9542	78-9577
FORD Truck V8 "R"	1950-51	7RT-9510-A	.051"	59A-9533-A㉑	91A-9923-B	91A-9922B	78-9924	78-9904	78-9542	78-9577
FORD Truck 6 "H"	1950-51	7HT-9510-A	.064"	1GA-9533-A③	1GA-9920⑱		1GA-9924	1GA-9904-B⑳	1GA-9542-B	
FORD Truck 6 "M"	1950-51	8MTH-9510-A	.064"	1GA-9533-A③	8MTH-9920		1GA-9924	1GA-9904-B⑳	1GA-9542-B	
FORD 6 Std. Tr.	1952	EAA-9510-D	.064"	1GA-9533-A③				EAA-9904-A㉘		EAA-9577-A
FORD 6 Auto Tr.	1952	EAA-9510-E	.064"	1GA-9533-A③				EAA-9904-A㉘		EAA-9577-A
FORD V8 Std. Tr.	1952	EAB-9510-C	.051"	59A-9533-A⑧	EAB-9921-B	EAB-9920-B	78-9924	M91A-9904	EAB-9542-A	EAB-9577-A
FORD V8 Auto Tr.	1952	EAB-9510-D	.051"	59A-9533-A⑧	EAB-9921-B	EAB-9920-B	78-9924	M91A-9904	EAB-9542-A	EAB-9577-A
FORD Truck 6 "D"	1952	EAG-9510-B	.064"	1GA-9533-A③				EAA-9904-A㉘		EAA-9577-A
FORD Truck V8 "R"	1951-52	8RT-9510-A	.051"	59A-9533-A⑧	91A-9921	91A-9920	78-9924	78-9904	78-9542	78-9577
FORD C.O.E. "M"	1952	8MTH-9510-A	.064"	1GA-9533-A③	8MTH-9920		1GA-9924	1GA-9904-B㉛	1GA-9542-B	
FORD 6 Std. Tr.	1953	EAA-9510-G	.064"	1GA-9533-A㉜				EAA-9904-A		EAA-9577-A
FORD 6 Auto. Tr.	1953	EAA-9510-H	.064"	1GA-9533-A㉜				EAA-9904-A		EAA-9577-A
FORD V8 Repl.	1949-53	EAB-9510-F	.051"	59A-9533-A㉑	EAB-9921-B	EAB-9920-B		78-9904㊱	EAB-9542-A	EAB-9577-A
FORD V8 Std. Tr.	1953	EAB-9510-C	.051"	59A-9533-A㉑	EAB-9921-B	EAB-9920-B		78-9904㊱	EAB-9542-A	EAB-9577-A
FORD V8 Auto. Tr.	1953	EAB-9510-D	.051"	59A-9533-A㉑	EAB-9921-B	EAB-9920-B		78-9904㊱	EAB-9542-A	EAB-9577-A
FORD V8 Trk. Std. Tr.	1953	8RT-9510-F	.052"	8EQ-9533-B㉝	EAB-9921-A	EAB-9920-A		78-9904㊱	1BA-9542-A	EAB-9577-A
FORD V8 Trk. Auto. Tr.	1953	8RT-9510-G	.051"	59A-9533-A㉑	EAB-9921-B	EAB-9920-B		78-9904㊱	EAB-9542-A	EAB-9577-A
FORD 6 Trk. Std. Tr.	1953	EAG-9510-B	.064"	1GA-9533-A㉜				EAA-9904-A		EAA-9577-A
FORD 6 Trk. Auto. Tr.	1953	EAA-9510-H	.064"	1GA-9533-A㉜				EAA-9904-A		EAA-9577-A
FORD Trk. (254 Eng.)	1953	8MTH-9510-A	.065"	5GA-9533-A㉟	8MTH-9920			8MWH-9904-A	1GA-9542-B	
FORD 6 Std. Tr.	1954	EBP-9510-A	.066"	8MB-9533-B㊴				EAA-9904-A		EAA-9577-B
FORD 6 Auto. Tr.	1954	EBP-9510-B	.066"	8MB-9533-B㊴				EAA-9904-A⑤		EAA-9577-B
FORD V8 All	1954	EBU-9510-E	.056"	78-9533-E㊵	B4A-9921-A	B4A-9920-A		78-9904⑲	EBU-9542-B	EBU-9577-A
FORD 6 Trk. Std. Tr.	1954	EBR-9510-A	.066"	8MB-9533-B㊴				EAA-9904-A②		EAA-9577-A
FORD 6 Trk. Auto. Tr.	1954	EBP-9510-B	.066"	8MB-9533-B㊴				EAA-9904-A⑤		EAA-9577-A
FORD V8 Trk. (239 Eng.)	1954	EBV-9510-H	.057"	26H-9533㊶	B4A-9921-A	B4A-9920-A		78-9904⑲⑥	EBU-9542-B	EBU-9577-A
FORD V8 Trk. (256 Eng.)	1954	EBZ-9510-C	.055"	B4T-9533-A㊷	㊸			EAM-9904-A㉕	8CM-9542	
FORD V8 Repl.	1954	B4T-9510-A	.055"	B4T-9533-A㊷	㊸			EAM-9904-A㉕	8CM-9542	
FORD 6 Std. Tr.	1955	EBP-9510-A	.066"	8MB-9533-B㊴				EAA-9904-A㊹		EAA-9577-B
FORD 6 Auto Tr.	1955	EBP-9510-B	.066"	8MB-9533-B㊴				EAA-9904-A㊹		EAA-9577-B
FORD 6 Trk. Std. Tr.	1955	EBR-9510-A	.067"	B4C-9533-A㊺				EAA-9904-A②		EAA-9577-B
FORD 6 Trk. Auto. Tr.	1955	EBP-9510-B	.066"	8MB-9533-B㊴				EAA-9904-A⑤		EAA-9577-B
FORD V8 Std. Tr.	Early 1955	B5A-9510-J	.059"	B4Q-9533-B㊻	B5A-9921-A	B5A-9920-A		78-9904⑲	B5A-9542-B	EBU-9577-A
FORD V8 Auto. Tr.	Early 1955	B5A-9510-K	.059"	B4Q-9533-B㊻	B5A-9921-A	B5A-9920-A		78-9904⑲	B5A-9542-B	EBU-9577-A
FORD V8 All	Late 1955	B5A-9510-B	.057"	26H-9533㊶				㊾		㊿
FORD V8 Repl.	1955	B5A-9510-P	.057"	26H-9533㊶	B5A-9921-D	B5A-9920-D		78-9904⑲	B5A-9542-C	EBU-9577-A
FORD V8 Trk. (239 Eng.)	1955	EBV-9510-H	.057"	26H-9533㊶	B4A-9921-A	B4A-9920-A		78-9904⑲⑥	EBU-9542-B	EBU-9577-A
FORD V8 (256 Eng.)	Early 1955	B4T-9510-A	.055"	B4T-9533-A㊷	㊸			EAM-9904-A㉕	8CM-9542	
FORD V8 (256 Eng.)	Late 1955	B5T-9510-A	.055"	B4T-9533-A㊷	㊸			EAM-9904-A㊽	8CM-9542	

HOLLEY (FORD) SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor Model	Main Metering Jet Size	Main Metering Jet Part No.	Main Discharg Nozzl Part Number Left Hand	Main Discharg Nozzl Part Number Right Hand	Nozzle Air Bleed Plug Part No.	Economiz r Assembly Part No.	Idle Tube Part No.	Pump Nozzle Part No.
LINCOLN 66H	1946-48	26H-9510-C	.055"	26H-9533	06H-9923	06H-9922	78-9924	96H-9904	86H-9542	78-9577
LINCOLN 9EH, 9EL	1949	8EL-9510⑯	.055"⑨	8EL-9533A			8EL-9991⑪	8CM-9904B⑬	8CM-9542	
LINCOLN V8	1950-51	OEL-9510-A⑯	.055"	8EL-9533-A⑨			8EL-9991	8CM-9904-B⑬	8CM-9542	
LINCOLN V8	1952	EAD-9510-B-D	.061"	EAD-9533-A㉖				EAD-9904-A㉙	8CM-9542	
LINCOLN V8	1953	EAD-9510-H	.061"	EAD-9533-A㉖	㊼			EAD-9904-A	EAD-9542-A	
MERCURY	1946-48	59A-9510-A	.051"⑧	59A-9533A	91A-9923B	91A-9922B	78-9924	78-9904	78-9542	78-9577
MERCURY 9M	1949	8CM-9510⑯	⑩				8CM-9991B⑮	8CM-9904B⑭	8CM-9542	
MERCURY V8 Std. Tr.	1950-51	8CM-9510-G⑯	.049"	8CM-9533-D㉑			8CM-9991B	8CM-9904B⑬	8CM-9542	
MERCURY V8 Std. Tr.	1950-51	1CM-9510-G⑯	.049"	8CM-9533-D㉑			8CM-9991B	8CM-9904B⑬	8CM-9542	
MERCURY V8 Auto Tr.	1951	1CM-9510-K⑯	.049"	8CM-9533-D㉑			8CM-9991B	8CM-9904B⑬	8CM-9542	
MERCURY V8 Auto Tr.	1951	1CM-9510-N⑯	.049"	8CM-9533-D㉑			8CM-9991B	8CM-9904B⑬	8CM-9542	
MERCURY V8 Std. Tr.	1952	EAC-9510-E⑯	.056"	EAC-9533-A㉗				EAD-9904-A㉚	8CM-9542	
MERCURY V8 Auto Tr.	1952	EAC-9510-G⑯	.056"	EAC-9533-A㉗				EAD-9904-A㉚	8CM-9542	
MERCURY V8 Std. Tr.	1953	EAC-9510-E, F⑯	.056"	EAC-9533-A㉗	㊽			EAD-9904-A㉚	8CM-9542	
MERCURY V8 Auto. Tr.	1953	EAC-9510-H, J⑯	.056"	EAC-9533-A㉗	㊽			EAD-9904-A㉚	8CM-9542	

①—Replaced by Carburetor No. 8HA-9509-A.
②—Power Jet B4C-9590-C.
③—Use No. 1GA-9533-B (.062") for 5000-10000 ft. altitude.
Use No. 1GA-9533-C (.060") for 10000-15000 ft. altitude.
④—Power Jet Part No. 1GA-9494.
⑤—Power Jet B4A-9590-B.
⑥—Power Jet B4C-9590-D (1954), B5C-9590-A (1955).
⑦—Use No. 5GA-9533-B (.063") for 5000-10000 ft. altitude.
⑧—Use No. 59A-9533-B (.049") for 5000-10000 ft. altitude.
Use No. 59A-9533-C (.047") for 10000-15000 ft. altitude.
⑨—Use No. 8EL-9533-B (.053") for 5000-10000 ft. altitude.
Use No. 8EL-9533-C (.051") for 10000-15000 ft. altitude.
⑩—Main Metering Jets:

	Carb. 8CM-9510-A, B, C	Carb. 8CM-9510-D, E, F
0-5000 ft. Altitude	.048" 8CM-9533A	.049" 8CM-9533D
5000-10000 ft. Alt.	.046" 8CM-9533B	.047" 8CM-9533E
10000-15000 ft. Alt.	.044" 8CM-9533C	.045" 8CM-9533F

⑪—Main Well Tubes (Carb. marked "10-48" and later). No. 8CM-9991A used on carburetors marked "9-48" and earlier. Not interchangeable.
⑫—Power Jet Part No. 7HA-9594.
⑬—Supersedes Nos. 8EL-9904A & 8EL-9904B. Power Jet No. 8EL-9594.
⑭—No. 8CM-9904A used prior to 8-48. Power Jet No. 8CM-9594.
⑮—Main Well Tubes (Carb. marked "10-48" and later). No. 8CM-9991C used on carburetors marked "9-48" and earlier. Not interchangeable.
⑯—See carburetor for various models used.
⑰—Replaced by No. 7HA-9920.
⑱—Has 7/16" diameter base. No. 7HA-9920 (3/4" diam. base) also used.
⑲—Use No. M91A-9904 for 5000-10000 ft. altitudes.
⑳—Supersedes No. 1GA-9904A. Power Jet No. 7HA-9594.
㉑—Use No. 59A-9533-B (.049") for 5000-10000 ft. altitude.
Use No. 59A-9533-C (.047") for 10000-15000 ft. altitude.
㉒—Has 3/4" diameter base.
㉓—No. 5GA-9533-A (.065") used on 1949 and early 1950 cars.
㉔—Use No. 8CM-9533-E (.047") for 5000-10000 ft. altitude.
Use No. 8CM-9533-F (.045") for 10000-15000 ft. altitude.
㉕—Power Jet B4T-9590-B.
㉖—Use No. EAD-9533-B (.059") for 5000-10000 ft. altitude.
Use No. EAD-9533-C (.057") for 10000-15000 ft. altitude.
㉗—Use No. EAC-9533-B (.054") for 5000-10000 ft. altitude.
Use No. EAC-9533-C (.052") for 10000-15000 ft. altitude.
㉘—Jet & Main Well Assembly No. EAA-9594-A.
㉙—Power Jet No. EAD-9594-A.
㉚—Power Jet No. EAC-9594-A.
㉛—Power Jet No. 8MTH-9594-A.
㉜—Use No. 1GA-9533-B (.062") for 5000-10000 ft. altitude.
Use No. 1GA-9533-C (.060") for 10000-15000 ft. altitude.
㉝—Use No. 78-9533-A (.050") for 5000-10000 ft. altitude.
Use No. 78-9533-B (.048") for 10000-15000 ft. altitude.
㉞—Use No. 5GA-9533-B (.063") for 5000-10000 ft. altitude.
㉟—Use Part No. M91A-9904 (stamped "AM") for over 5000 ft. altitudes.
㊱—Main Well Tube Assy. EAM-9991-A. Secondary Tube Assy. EAD-99594-A.
㊲—Main Well Tube Assy. EAM-9991-A (supersedes No. EAD-9991-A).
㊳—Use IGA 9533-A (.064") for 5,000-10,000 ft. altitudes.
Use IGA 9533-B (.062") for 10,000-15,000 ft. altitudes.
㊴—Use .054" jet for 5,000-10,000 ft. altitudes.
Use .052" jet for 10,000-15,000 ft. altitudes.
㊵—Use B4T-9533-A (.055") for 5,000-10,000 ft. altitudes.
Use B4T-9533-B (.053)" for 10,000-15,000 ft. altitudes.
㊶—Use B4T-9533-B (.053") for 5,000-10,000 ft. altitudes.
Use 59A-9533-B (.051") for 10,000-15,000 ft. altitudes.
㊷—Main Well Tube Assy. B4T-9991-A.
㊸—Power Jet Part No. EBP-9594A.
㊹—Use 5GA-9533-A (.065") for 5,000-10,000 ft. altitudes.
Use 5GA-9533-B (.063") for 10,000-15,000 ft. altitudes.
㊺—Use 26H-9533 (.057") for 5,000-10,000 ft. altitudes.
Use B4T-9533-A (.055") for 10,000-15,000 ft. altitudes.
㊻—Power Jet No. B5T-9590-A.
㊼—Stamped "84" for identification.
㊽—Nozzles stamped "68" or "70" both used.

HOLLEY (FORD) UPDRAFT CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb.	Venturi Size	Main Metering Jet Size	Main Metering Jet Part No.	Main Nozzle Size	Main Nozzle Part No.	Nozzle Air Bld.	Power Valve Size	Power Valve Part No.	Idle Jet Part No.	Idle Air Bld.	Pump Nozzle
FORD 6 Trk①	1948-51	7HW-9510A	1 7/32"	.065"③	5GA-9533A	.031"	8MWH-9530-A	.031"	#62	7HA-9594	8HW-9542A	.040"	.028"
FORD 6 Trk②	1950-52	8MWH-9510A	1 7/32"	.065"③	5GA-9533A	.031"	8MWH-9530A	.031"	#86	8MWH-9594-A	8HW-9542-A	.040"	.028"

①—Cab-Over-Engine Trucks with 6 Cyl. "H" Engine. ②—Cab-Over-Engine Trucks with 6 Cyl. "M" Engine. ③—Use No. 5GA-9533B (.063") for 5000-10000 ft. altitudes.

LINCOLN & MERCURY DUAL CONCENTRIC TYPE

LINCOLN CARBURETORS

1949 (With Synchro-mesh Trans.).

9-48 & Earlier①	10-48 to 6-49①	Altitudes
8EL-9510-A	8EL-9510-D②	0-5000 Ft.
8EL-9510-B	8EL-9510-E②	5000-10000 Ft.
8EL-9510-C	8EL-9510-F②	10000-15000 Ft.

1949-51 (With Hydra-Matic Drive Trans.).

6-49 to 10-49①	10-49 & Later①	Altitudes
8EL-9510-G	OEL-9510-A⑤	0-5000 Ft.
8EL-9510-H	OEL-9510-B⑤	5000-10000 Ft.
8EL-9510-J	OEL-9510-C⑤	10000-15000 Ft.

MERCURY CARBURETORS

1949-51 (With Synchro-mesh Trans.).

9-48 & Earlier①	10-48 to 8-49①	Altitudes
8CM-9510-A③	8CM-9510-D④	0-5000 Ft.
8CM-9510-B③	8CM-9510-E④	5000-10000 Ft.
8CM-9510-C③	8CM-9510-F④	10000-15000 Ft.

8-49 to 7-50①	7-50 & Later①	Altitudes
8CM-9510-G	1CM-9510-G	0-5000 Ft.
8CM-9510-H	1CM-9510-H	5000-10000 Ft.
8CM-9510-J	1CM-9510-J	10000-15000 Ft.

1950-51 (With Merc-O-Matic Trans.).

8-50 & Later①		Altitudes
1CM-9510-K	1CM-9510-N⑤	0-5000 Ft.
1CM-9510-L	1CM-9510-P⑤	5000-10000 Ft.
1CM-9510-M	1CM-9510-R⑤	10000-15000 Ft.

①—Manufacture date stamped on top of air horn.
②—Have modified Main Well Tubes (cannot be installed on earlier models). Beginning 1-49, have Float Control Spring (can be installed on earlier carbs.—see "Carburetor Float & Spring Change").
③—Have original Main Well Tubes & Main Metering Jets (see "Mercury Carburetor Jet Change").
④—Have new type Main Well Tubes (cannot be installed on earlier carbs.) and second type Main Metering Jets. Beginning 1-49, have Float Control Spring (can be installed on earlier carbs.—see "Carburetor Float & Spring Change" below).
⑤—Carburetors with SEPARATE Choke Control.

▷CHANGES & CORRECTIONS

▷LINCOLN & MERCURY FLOAT NEEDLE VALVE CHANGE (Orig. Production Carb. stamped 8-50 & Later): New type Float Needle & Seat Assy. used. Float needle has wire clip which hooks over float arm so needle is positively actuated by float.

INSTALLATION CAUTION—Make certain that wire clip on needle is hooked over float arm.

▷LINCOLN & MERCURY REPLACEMENT FLOAT NEEDLE VALVE: Use new type Float Needle & Seat Assy. (see Production Change Note above) for replacement on ALL carburetors. This assembly is Part No. 1CM-9564A (Steel Needle) or 1CM-9564B (Nylon Needle).

▷Erratic Engine Performance Correction (Erratic Idle speed, poor gasoline mileage, and mis-firing)—May be caused by automatic choke opening late or not opening fully due to air leak in hot air tube between manifold and choke housing if 5/16" fitting used instead of correct 1/4" type. See that correct fitting used and that all connections are tight.

▷Lincoln & Mercury Carburetor Float & Spring Change to improve float level stability—On carburetors prior to date 1-49 (stamped on top of air horn directly above accelerating pump), install new Float and Float Spring, as furnished in Carburetor Float Kit Part No. 8CM-99525, as follows:

Float & Float Spring Installation—Completely disassemble and clean carburetor (see Disassembly data) and when reassembling carburetor, install new float and spring as follows: Insert float needle valve and see that needle move freely, tilt carburetor to prevent needle dropping out. Place straight end of float spring in hole in arm of float and lever assembly, position float in carburetor main body so that free end of spring drops over rounded boss in bottom of bowl, insert hinge pin through bowl and float lever hinge, screw pin securely in place. Check to see that float and needle move freely and that spring is properly positioned. Change stamping date on carburetor to 1-49 (Carbs. dated 10-48 to 12-48—do not stamp this date on Mercury carburetors dated 9-48 and prior unless Kit 8CM-99524 also installed).

▷Lincoln & Mercury Carburetor Flooding Correction See Float & Spring installation (above). Flooding and unsatisfactory performance may also be caused by clogged channels or excessive fuel pump pressure (must not exceed 4 lbs.).

▷Mercury Carburetor Jet Changes to Correct Flat Spot or Stumble on Acceleration—On carburetors prior to date 10-48 (stamped on top of air horn directly above accelerating pump), install new Main Well Tubes and Main Jets, furnished in Carburetor Kit, Part No. 8CM-99524 for Mercury carburetors only. To install these jets, disassemble and clean carburetor (see Disassembly data), discard old parts and install new parts. Change stamping date on carburetor to 10-48.

IDENTIFICATION NOTE—For new type parts:

Main Well Tubes—Marked by letter "S" stamped on top. Side holes are 66 (upper), 70 (lower) and both holes are 3/32" lower than corresponding (68 upper and lower) holes on old type main well tube.

Main Jet—Marked "49" on side (was "48").

▷Lincoln & Mercury Carburetor Acceleration Stumble Correction—See Mercury jet changes (above). May also be caused by dirt restricting carburetor channels or improper seating of accelerating pump intake ball check or discharge needle valve (clean all channels and reseat ball check and needle).

▷Carburetor Fuel Inlet Screen (All Carburetors stamped 3-49 & Later)—Have fine-mesh cylindrical screen in fuel inlet on carburetor bowl. When installing screen, install coil spring first, and seal fuel inlet fitting with washer on inlet boss (no washer used at this point on first carburetors). Clean this inlet screen frequently.

▷Lincoln & Mercury Fuel Filter Change—First type (copper screen) filter in combination fuel-and-vacuum pump should be replaced by later "Edge Type Filter" when servicing carburetor.

FILTER PARTS KIT—New "Edge Type Filter" furnished in kits containing strainer and cork gasket Lincoln—#8EL-99360, Mercury—#8CM-99360.

▷ADAPTING LATE TYPE CARBURETORS TO EARLIER MERCURY MODELS: Later type carburetors with production changes listed above, require some linkage and fitting modifications for installation on earlier cars as follows:

1) Carburetors dated 3-49 & Later—These carburetors have fuel screen in inlet boss and are designed for flared or flanged type fuel inlet pipe connection. If used on earlier cars with compression type fuel inlet pipe connection, this fuel inlet pipe must be replaced by Part No. 8CM-9369-B (flared type), or adapter plug at carburetor inlet boss must be changed to Part No. 8CM-9224-A (compression type).

2) Carburetors dated 8-49 & Later—These carburetors have increased length throttle arm and new trunnion type throttle rod-to-throttle arm connection. If this carburetor used on earlier cars with ball joint type rod connection, a special ball fitting may be installed in the throttle arm if available (not furnished by Mercury—may be available from carburetor vender) to enable the old throttle rod to be used, or special Throttle Rod Assy. Part No. 8M-9747-C may be installed to connect carburetor throttle arm to old style carburetor linkage "Z-bar."

CAUTION—Regular production throttle rod (as used with new carburetor CANNOT be used on earlier cars (entire throttle linkage changed when this new rod entered production).

▷MERCURY "1CM" SERIES CARBURETOR: These carburetors have new vacuum system for distributor control and new non-interchangeable parts as listed below. These changes cannot be made on prior carburetor models and "1CM" carburetors cannot be used for replacement on earlier models.

Distributor Control Vacuum System (1CM Carbs. stamped 6-50 & Later): Plug at bottom of vacuum passage in carburetor replaced by screw pin with loose Nylon ball in passage above pin. When vacuum at venturi port (upper end of passage) reaches a sufficiently high point as at nearly wide open throttle and high speed, the Nylon ball travels to the top of the passage and cuts off the bleed effect of the port at the throttle valve. This results in higher vacuum at distributor and maintains maximum spark advance.

New 1CM Carburetor Parts: Following parts not interchangeable on prior carburetors: Throttle Shaft & Lever. 1CM-9927, Fast Idle Cam 1CM-9597.

DESCRIPTION

DESCRIPTION: These "Dual Concentric" carburetors are plain tube, dual (double barrel), downdraft types with automatic choke and fast idle control. Air intake is on side of air horn and circular float bowl (main body) is mounted on throttle body casting within air horn so that air flow is directed around the bowl to cool the fuel. All metering jets are located in this main body casting and air bleeds and vents consist of openings in the main body cover plate which open into the air horn.

▷Automatic Choke Control (OEL-9510-A, B, C & 1CM-9510-N, P, R Carburetors)—Part No. OEL-9851. Separate unit mounted on the intake manifold and linked to the carburetor choke valve shaft by a connector rod. Choke assembly is similar to previous type mounted on the carburetor air horn.

▷Anti-Stall Dashpot (Mercury Carbs. on Merc-O-Matic Trans. Cars)—Consists of a diaphragm type dashpot with a spring-loaded plunger which engages a screw on the throttle lever as the lever moves toward the closed position. This slows the throttle lever movement (controlled by rate of air bleed from the dashpot) to prevent engine stalling. Screw on throttle lever is adjustable.

Fuel System: Operates as follows:

CONTINUED ON NEXT PAGE

LINCOLN & MERCURY DUAL CONCENTRIC (C nt.)

Idle Fuel System—Fuel for idling is taken from main jet well up through the Idle Tube which meters the fuel and is mixed with air admitted through Idle Air Bleed (hole in cover plate above channel). Fuel mixture is then taken down through a channel in the throttle body casting to idle discharge ports at the throttle edge. For closed throttle idling (400 RPM), all fuel is discharged through lower idle port (below throttle valve) and is controlled by the Idle Adjusting Screw. As throttle is opened, additional fuel is discharged through upper port also (begins at 700 RPM) and fuel flow through both ports is at maximum at approximately 850 RPM. Above this speed, idle port discharge gradually drops off.

Main Fuel System—Fuel for main nozzle is metered by Main Metering Jet in bowl (at lower end of main jet well) and is taken up through (and around) Main Well Tubes where it is mixed with air admitted through Main Air Bleed (hole in cover plate above Well Tube and above nozzle passage). Fuel mixture is then taken down through nozzle passage and discharged into secondary venturi throat. Main nozzle begins to operate at approximately 850 RPM., blending with the idle system discharge. At 950-1050 RPM. idle system drops out and all fuel is discharged through the main nozzles.

Power Fuel System—Consists of a power valve controlled by a vacuum piston assembly which bypasses fuel directly from the bowl to the main jet well when the valve is open. This fuel is metered by a High Speed Restriction in the fuel channel. Valve is normally closed (piston held up against spring tension by manifold vacuum). At high speed or for wide open throttle operation, when vacuum drops to 7-5", spring forces piston down, opens valve, and permits additional fuel flow to main nozzles.

Accelerating Fuel System—Pump arm and plunger stem are positively operated by throttle lever (pump piston is spring-loaded on plunger to prolong discharge on sudden throttle openings). Fuel is drawn into pump cylinder through intake ball check in bottom of cylinder when throttle is closed and is discharged past discharge valve needle and through twin discharge jets on bottom of main body when throttle is opened. Pump stroke is adjustable.

ADJUSTMENT & OVERHAUL

IDLING ADJUSTMENT: Idle adjusting screws control fuel mixture discharge from lower idle ports and should be turned out for richer mixture. Adjust only when engine warm (automatic choke and fast idle inoperative) and set for highest steady vacuum reading. If gauge not used, set for smooth idle (turn screws out for richer mixture). See car model pages for complete Tune-up data.

Idle Speed Setting

All (Synchro-mesh Trans.) .....400-450 RPM.
Lincoln (Hydra-Matic) .....375 RPM.
Mercury (Merc-O-Matic) .....Max. 425 RPM.

►*Check Dashpot Setting on Merc-O-Matic Trans. Cars after making idling adjustment.*

ANTI-STALL DASHPOT (Mercury Carburetors on Merc-O-Matic Cars): Check and adjust after completing the idling adjustment on these cars.

Setting—To adjust dashpot (with engine not running), first turn adjusting screw on throttle lever in to limit of adjustment, hold throttle valves fully closed and turn idle speed adjusting screw until it just contacts lowest step (hot or slow idle speed position) of fast idle cam. Turn dashpot adjusting screw out against the dashpot plunger until throttle valves begin to open (idle speed screw will begin to leave fast idle cam), finally **turn dashpot screw in one complete turn for correct plunger clearance.**

►*CAUTION—Reset Idle Speed after completing dashpot adjustment.*

METERING JETS: All jets are fixed non-adjustable type. See Holley (Ford) Jet Specification Table.

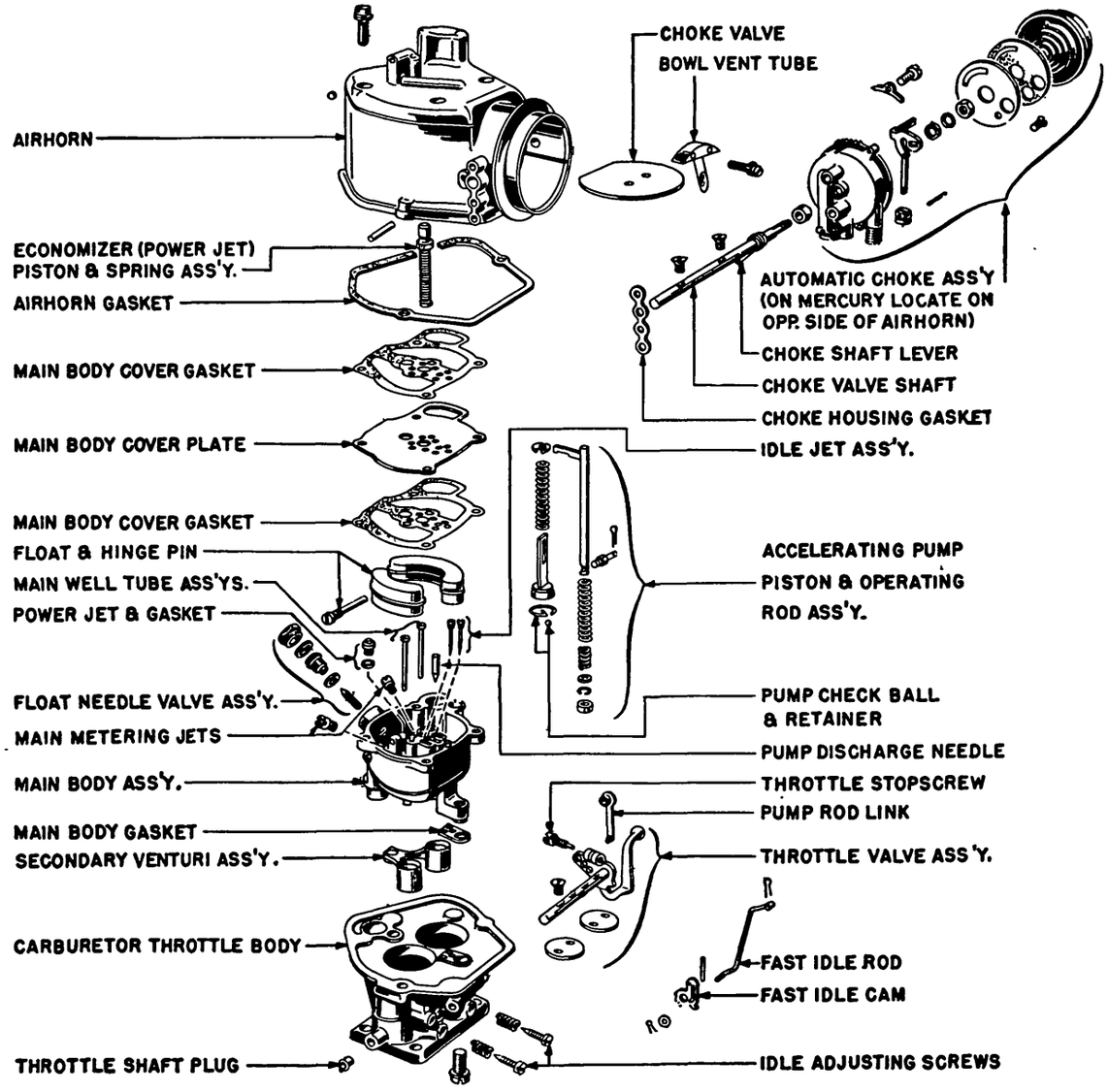
►*CAUTION—See Mercury Carburetor Jet Change data under "Field & Production Changes" above.*

POWER VALVE (ECONOMIZER): Valve remains closed in the normal speed range and is opened by the vacuum piston spring (when manifold vacuum falls off).

Setting—Valve opens when manifold vacuum decreases to 5-7" of mercury.

ACCELERATING PUMP: Positively operated by throttle lever with spring-loaded piston for prolonged discharge. Stroke is adjustable by engaging pump rod link in correct hole of throttle shaft lever

CONTINUED N NEXT PAGE



LINCOLN DUAL CONCENTRIC CARBURETOR (MERCURY SIMILAR)

LINCOLN & MERCURY DUAL CONCENTRIC (Cont.)

Center Hole—Normal operation (medium stroke).

Inner Hole—Extreme hot weather (min. stroke).

Outer Hole—Extreme cold weather (max. stroke).

NOTE—Accelerator link length decreased 1/16" (Lincoln), 1/32" (Mercury) beginning 10-48.

FLOAT LEVEL: Fuel Level. ½" ± 1/32" (.500" ± .023") below top edge of main body with fuel pump pressure of 3½-4½ lbs.

Checking Fuel Level—Use Gauge 9550-B with air horn and bowl cover assembly, gaskets, and cover plate removed. Place gauge on top edge of main body with gauging pins extending down into bowl. Fuel level should be at least even with longer "GO" pin, but should not be as high as shorter "NO GO" pin on the gauge.

Adjustment—Bend tab at rear of float which contacts intake needle down to raise float level, or up to lower float level.

CAUTION—Double floats are used and must be set alike.

Intake Needle, Seat & Gasket Assy.—Use only new type No. 1CM-9564A (Steel Needle) or 1CM-9564B (Nylon Needle) with wire clip for attachment to float lever (CAUTION—see that wire clip hooked over float lever).

NOTE—Above type assembly supersedes previous type and should be used on all carburetors.

AUTOMATIC CHOKE: Assembly consists of thermostatic coil and a vacuum piston unit in a housing mounted on the air horn (first carburetors) or a separate assembly mounted on the intake manifold and linked to the carburetor choke valve lever (later carburetors).

Setting—Centered with mark on cover in line with longer center line of scale on housing. Setting can be varied not more than 1 graduation Rich or Lean for special operating conditions.

FAST IDLE: Consists of a fast idle cam linked to the choke valve and serving as a stop for the throttle stopscrew (idle speed adjusting screw). With choke valve closed, cam is rotated to position with throttle stopscrew on highest step for fast or cold idle.

CARBURETOR OVERHAUL: With carburetor removed from engine, proceed as follows:

▷Carburetors with Separate Choke Control—On models with separate choke control unit, disconnect connector rod at choke valve lever and disregard data below on the automatic choke disassembly.

Disassembly: Disconnect fast idle connector rod at fast idle cam. Take out five screws and lockwashers on top of air horn, carefully lift air horn off carburetor bowl. Remove main body cover plate and both gaskets from top of bowl. Invert carburetor (place hand over bowl to prevent parts falling out), take out both Main Well Tubes and Pump Discharge Needle. Unscrew float hinge pin, lift out float assembly and intake needle. Remove Main Jets, Idling Jets, and Power Jet Valve assembly. Remove accelerating pump piston assembly, spring retainer and pump check valve ball from cylinder.

▷*CAUTION—Do not remove power valve piston unless new piston being installed (cannot be re-installed).*

Cleaning & Inspection: Clean out all passages and blow out with air (CAUTION—Do not use wire to clean jets and passages or wire brush to clean parts). Inspect all parts for wear or damage, note following

Bowl & Cover Plate Mating Surfaces—These surfaces must not be burred or scratched (will permit leaks between drilled passages). Do not file these surfaces (if surfaces not smooth and flat, replace bowl). Check cover plate for correct type. Each plate stamped with number indicating size of air bleed holes above main wells (.073" Lincoln, .087" Mercury).

Main Jet & Well Jet Tubes—Check for correct size.

See Mercury Carburetor Jet Change data under "Field & Production Changes" above.

Accelerating Pump Check—Should be checked for leakage. Install pump discharge needle, pump check ball and spring retainer, and pump piston assembly. Fill bowl with fuel to normal level (½" below top). Hold discharge needle on seat with a blunt tool, operate pump and check for leakage at the following points:

(1) At Pump Discharge Needle. Fuel leakage at this point can be corrected by reseating needle (tap lightly using a brass drift and light hammer).

(2) At Pump Piston. Leakage past the piston indicates worn or damaged piston leather or loose pump rod. Inspect piston and replace if required.

(3) At Pump Intake Ball Check. Leakage at this point permitting fuel to flow back into bowl can be corrected by reseating ball. Tap ball lightly using a brass drift and light hammer.

CAUTION—Do not use steel drift which will flatten ball and permit leakage.

Float & Float Spring—*See Lincoln & Mercury Carburetor Float & Spring Change under "Field & Production Changes" above for parts and instructions.*

Reassembly: Install Main Jets, Idling Jets, accelerating pump check ball and spring retainer, pump piston (CAUTION—use care not to damage piston leather), float needle, float and spring assembly, main well tubes. Then install carburetor on engine and crank engine to fill bowl with fuel. Check float level (see Float Level data). Install bowl cover plate using new gaskets below and above plate. Place new air horn gasket on throttle body flange, use two Aligning Pins, No. 9524, to install air horn. Tighten air horn screws securely.

SERVICE PARTS: *CAUTION*—Jets furnished in Metering Jet Kits listed below are Std. (for 0 to 5000 Ft. Altitudes). Use same kit for other altitudes but CHANGE MAIN METERING JET to correct type as listed below.

Metering Jet Kits

Lincoln—No. 8EL-9995A (8EL-9510-A, B, C Carbs.), No. 8EL-9995D (8EL-9510-D, E, F, G, H, J & OEL-9510-A, B, C Carbs.). This kit has No. 8EL-9533-A Main Metering Jet. Use same kit for other carburetors but substitute different jet on other carburetors as follows:

Carburetor	Main Metering Jet
8EL-9510-A, D, G; OEL-9510-A	①8EL-9533-A
8EL-9510-B, E, H; OEL-9510-B	8EL-9533-B
8EL-9510-C, F, J; OEL-9510-C	8EL-9533-C

①—Furnished in Kit No. 8EL-9995A & 8EL-9995D.

Mercury—No. 8CM-9995-A (8CM-9510-A, B, C Carbs.); No. 8CM-9995D (8CM-9510-D, E, F, G, H, J; 1CM-9510-G, H, J, K, L, M, N, P, R Carbs.). These kits have No. 8CM-9533-A or 8CM-9533-D Main Metering Jet. Use these kits but substitute different jet on other carburetors as follows:

Carburetor	Main Metering Jet
8CM-9510-A	②8CM-9533-A
8CM-9510-B	8CM-9533-B
8CM-9510-C	8CM-9533-C
8CM-9510-D, G; 1CM-9510-G, K, N	③8CM-9533-D
8CM-9510-E, H; 1CM-9510-H, L, P	8CM-9533-E
8CM-9510-F, J; 1CM-9510-J, M, R	8CM-9533-F

②—Furnished in Kit No. 8CM-9995-A.

③—Furnished in Kit No. 8CM-9995-D.

Repair Parts Kits

Lincoln—No. 8EL-9590-A (8EL-9510-A, B, C Carbs.), No. 8EL-9590-B (8EL-9510-D, E, F Carbs.).

Mercury—No. 8CM-9590-A (8CM-9510-A, B, C Carbs.), No. 8CM-9590-B (all other carburetors).

NOTE—These kits contain all necessary overhaul parts other than gaskets and metering jets.

Gasket Sets

Lincoln & Mercury—No. 8CM-9502 (all carburetors).

FORD LINCOLN & MERCURY "CENTRI-FLO" TYPE

FORD V8 TRUCKS	Carburetor No.
1954 256" Engine (Orig. Equip.)	EBZ-9510-C
1954 256" Engine (Repl. Carb.)	①B4T-9510-A
1955 256" Eng. (Early)	B4T-9510-A
1955 256" Eng. (Late)	B5T-9510-A
LINCOLN	
1952 (First Cars) ③	②EAD-9510-B
1952 (Later Cars) ③	②EAD-9510-D
1952 Altitude ①	EAD-9510-E
1952 Repl. Carb.	④EAD-9510-L
MERCURY	
1952-53 Std. (Synchro-mesh)	EAC-9510-E
1952-53 Alt. (Synchro-mesh) ①	EAC-9510-F
1952 Std. (Mercomatic) ⑤	EAC-9510-G
1952-53 Std. (Mercomatic) ⑤	EAC-9510-G
1952-53 Alt. (Mercomatic) ①	EAC-9510-H

①—For 5000-10000 ft. alt.—not furnished for service. See High Altitude Carburetor Note below.
②—Replaced by No. EAD-9510-L.
③—EAD-9510-B (without Vacuum Spark Control Valve used on first 450 cars. Use EAD-9510-D (with Spark Control Valve) for replacement).
④—This carburetor has Revised Main Body Cover & Plugs Assy. (See Changes & Corrections below).
⑤—See 1952 Mercury Dashpot Production Change below.
⑥—See Hesitation Detonation Correction below.

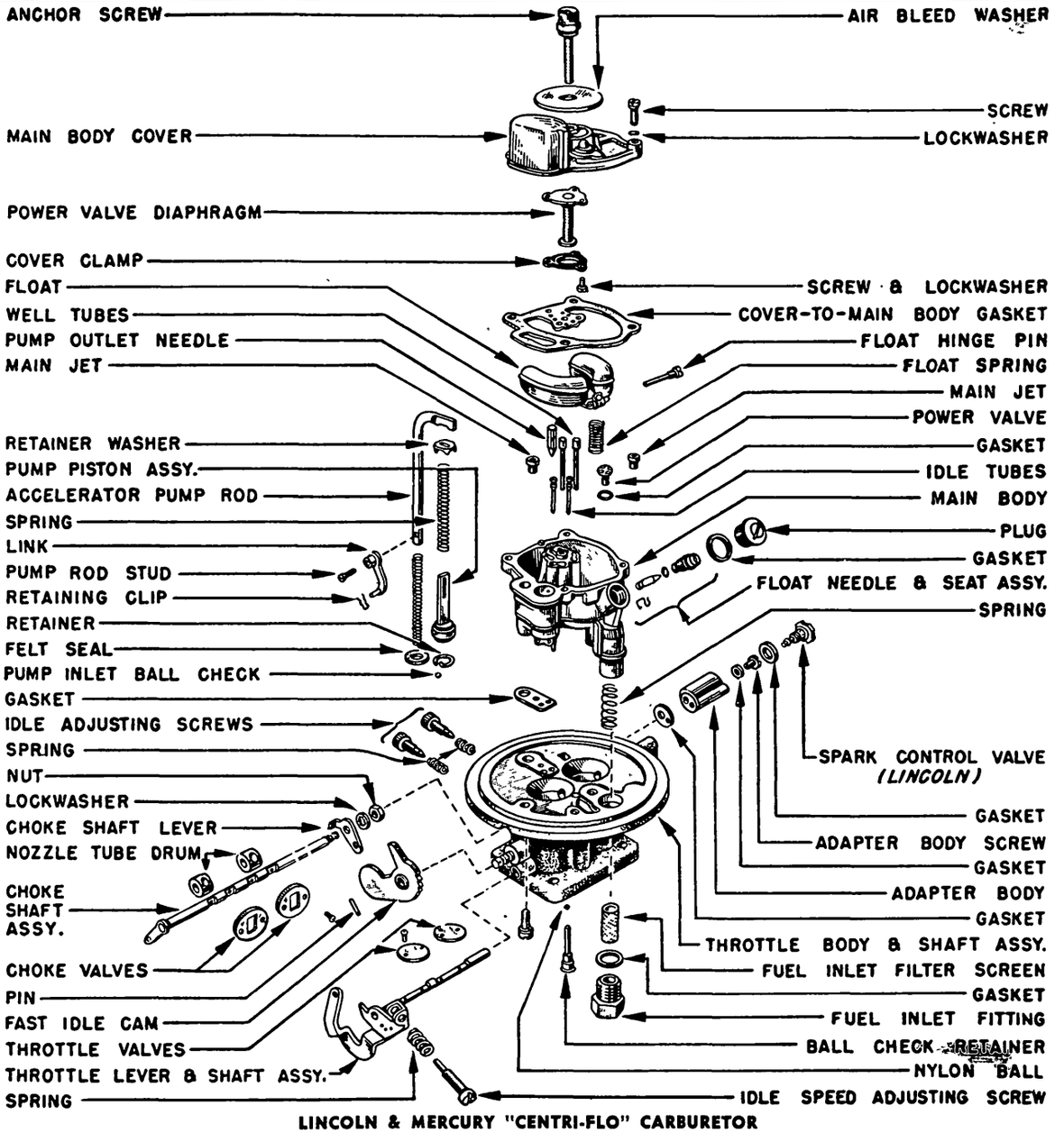
►CHANGES & CORRECTIONS

►*1952 ENGINE HESITATION & LOSS OF POWER AT 30-35 MPH. (All Lincoln & Mercury Carburetors):* Check and correct the following points: Remove air cleaner. Check all four main body cover screws for looseness and tighten these screws evenly and securely. Tighten air cleaner anchor screw to 6-9 ft. lbs. torque—**do not over-tighten.** Tighten Spark Control Valve (Lincoln only) securely. Install air cleaner and tighten wing stud nut finger-tight (do not tighten with pliers or wrench).

►*1952 LINCOLN ENGINE SURGE AT 20-25 MPH. (Lincoln Carburetor before Mar. 26, 1952):* This condition caused by a momentarily lean mixture at point where main fuel system comes in. Correct by installing new type Idle Jet Tubes No. EAD-9542-A (replacing original type No. 8CM-9542). Make this installation as follows: Remove carburetor air cleaner, anchor screw, four cover screws, and carburetor main body and gasket. Use Tool 9544 to remove original idle tubes. Install NEW TYPE No. EAD-9542-A Idle Tubes (Identified by figure "68" stamped on outer circumference of tube head), reassemble carburetor, adjust idle mixture and idle speed. *NOTE—See Engine Hesitation Correction (above) for cautions to be taken when reassembling carburetor.*

►***CARBURETORS PRODUCED AFTER MARCH 26, 1952 have the new type EAD-9542-A Idle Tube Jets and will not require the above correction.***

►*EARLY 1952 THROTTLE STICKING (Lincoln & Mercury Carburetors):* May be caused by accelerator pump rod (with lubrized finish) sticking in carburetor throttle body or in opening in main body. Correct by removing pump rod and polishing with crocus cloth or fine emery cloth. Lubricate rod when re-installing it in carburetor.



LINCOLN & MERCURY "CENTRI-FLO" CARBURETOR

►*1952 LINCOLN IMPROPER AUTOMATIC CHOKE ACTION:* Due to exhaust gas leaks in heat chamber in manifold (heat chamber consists of Iconel Tube extending down into exhaust crossover passage in intake manifold and leakage may occur at mating face of outlet hole on side of tube and drilled outlet passage in manifold). If following troubles noted, test for leaking tube and replace tube if necessary: (1) Engin may backfire into carburetor during warm-up period (due to lean mixture caused by rapid choke release), (2) Choke action erratic (due to carbon formation and heat damage in choke con-

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FORD, LINCOLN, MERCURY "CENTRI-FLO" (C nt.)

trol housing), (3) Carbon formation in choke control housing at air inlet opening.

Gas Leakage Test—Remove air cleaner, carburetor, intake manifold assembly. Remove choke control unit from manifold. Tighten fresh air tube jam nut. Hold finger over hot air outlet hole, blow smoke into fresh air tube. If smoke noted in manifold heat riser port, defective Iconel tube seal is indicated.

Replacement f Iconel Tube—Use ⅝"-18 tap or Easy-out to remove old tube. Thoroughly clean manifold recess with solvent, remove all corrosion and carbon deposits. Inspect tube recess in manifold for tool marks or damaged surfaces in vicinity of air outlet hole and replace manifold if good tube seal cannot be obtained. Coat tube recess sealing area with 8M-19554 Perfect Seal Sealer *(CAUTION*—this sealer has necessary sealing ability at high temperatures—do not use substitutes). Insert new tube with outlet hole aligned with drilled passage in manifold, use special driver (see Note) to fully seat tube in manifold recess *(CAUTION*—drive tube in gently with tool held vertically to avoid side thrust which may damage tube). Check alignment of fresh air outlet hole and passage in manifold *(CAUTION*—**do not** rotate tube to correct alignment—a misaligned tube should be removed and a **new** tube installed). Install fresh air tube assembly, coat jam nut lightly with graphite grease and tighten nut to approximately 15 ft.lbs. torque. Test assembly for leakage (see Gas Leakage Test above). Replace Choke Control Unit No. EAD-9850-A with new part (do not re-use old part if tube has been leaking), reassemble engine and check choke operation.

Iconel Tube Driver Note—Driver can be made from piece of ¾" x 5" round bar stock by reducing diameter at one end to .540" for distance of ¾".

►*DISTRIBUTOR CONTROL NYLON BALL CAUTION: Different size balls were used in Lincoln & Mercury carburetors and balls must not be interchanged* (incorrect size ball will impair accelerating and high speed performance of engine). This ball is located in vacuum passage in carburetor to cut off bleed action of throttle valve port at high speeds or with wide open throttle. Balls can be identified by diameter as listed below. Later production Lincoln ball will be colored RED (Mercury ball remains natural color).

	Nylon Ball Diameter	Part No.
Lincoln	.15625" (5/32")	EAD-99547-A
Mercury	.125" (1/8")	1CM-99547

►*HIGH ALTITUDE CARBURETOR NOTE*—"High Altitude" carburetors not furnished for service but can be made up by modifying std. carburetor by installation of correct metering jet as follows:

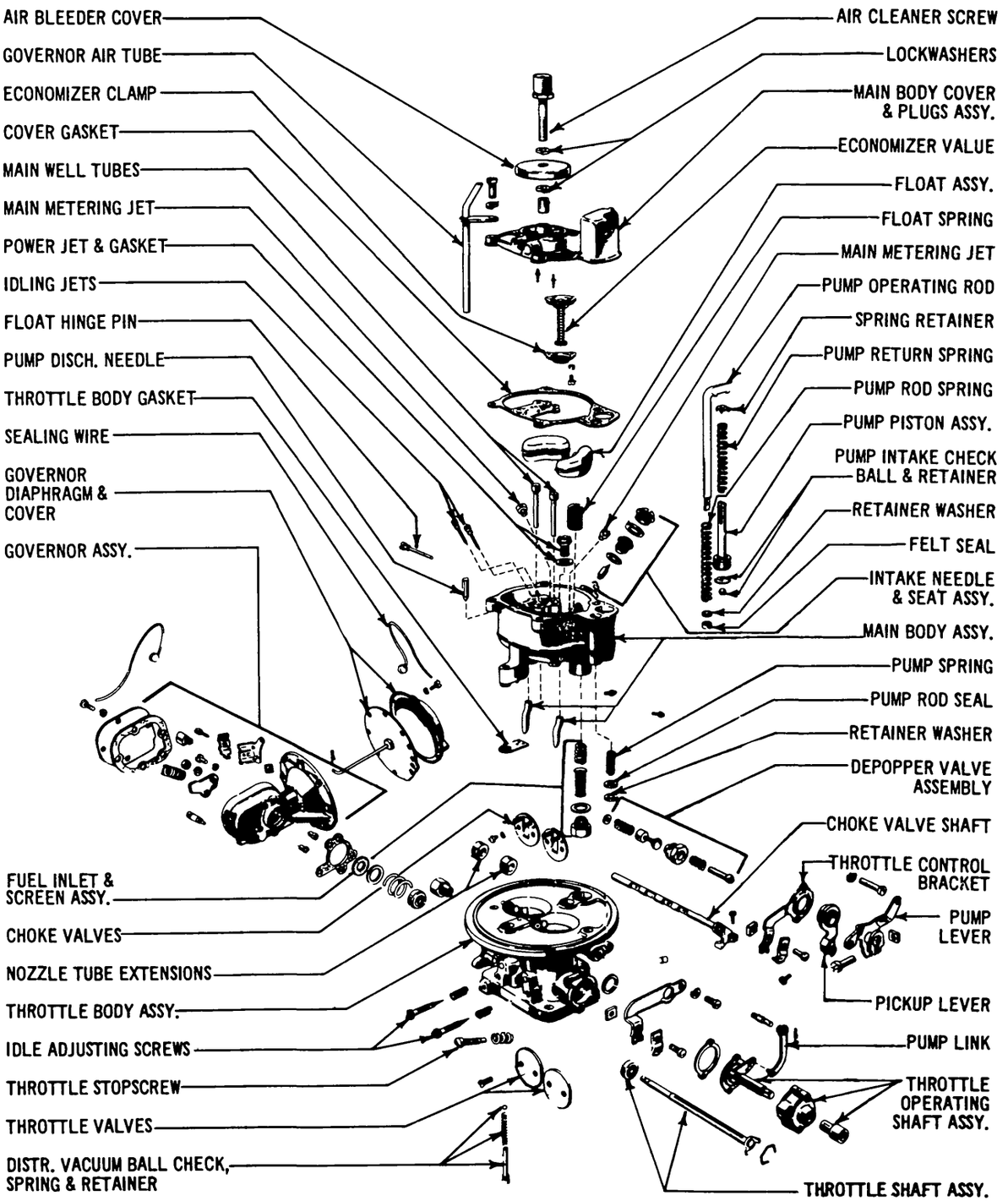
Lincoln Carburetors

Main Metering Jet:	Size	Part No.
Sea Level (0-5000 ft.)	.061"	EAD-9533-A
Alt. (5000-10000 ft.)	.059"	EAD-9533-B

Mercury Carburetors

Main Metering Jet:	Size	Part No.
Sea Level (0 to 5000 ft.)	.056"	EAC-9533-A
Alt. (5000-10000 ft.)	.054"	EAC-9533-B
Alt. (10000-15000 ft.)	.052"	EAC-9533-C

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HOLLEY (FORD) FORD V8 TRUCK "CENTRI-FLO" CARBURETOR

FORD, LINCOLN, MERCURY "CENTRI-FLO" (Cont.)

Jet Identification—Jets stamped with last two figures of "size" indicated above.

►*1952 LINCOLN MAIN BODY COVER & PLUG ASSEMBLY CHANGE (To Improve Power Valve Action):* New Main Body Cover & Plugs Assy. No. EAD-99983-C available for installation on these cars. This assembly has brass bushing pressed in anchor screw stud opening so that power valve vacuum passage in cover is entirely independent of stud opening.
Cover Identification Note—New Cover Assy. No. EAD-99983-C (above) can be identified by stamped or etched number "2" on top of cover.

►*1952-53 MERCURY MAIN BODY COVER & PLUG ASSY. CHANGE (To minimize complaints of Lean Mixture at Off-Idle or Transfer Speeds):* New Main Body Cover & Plugs Assy. No. EAC-99983A (superseding previous Assy. No. EAD-99983A) available for installation on 1952-53 cars. This assembly has slightly smaller idle air bleed holes (.070" superseding .073") providing slightly richer mixture in transfer range. *NOTE*—New cover has brass bushing pressed in anchor screw stud opening so that power valve vacuum passage in cover is entirely independent of stud opening.
Cover Identification Note—New Cover Assy. No. EAC-99983A (above) can be identified by stamped or etched number "1" on top of cover.

►*COVER INSTALLATION CAUTION:* When installing new cover assy. (above), use ¼" lockwashers, one above and one below, bleeder plate washer. *See Overhaul Data below.*

►*1952 LINCOLN EXTERNAL VENTING OF CARBURETOR TO IMPROVE HOT STARTING (To correct abnormally rich fuel-air mixture):* Install new parts listed and modify carburetor as directed below. This modification will create a passage between the bowl chamber and the pump chamber and provide an external vent for fuel vapors originating in the bowl when a hot engine is not operating and throttle valves are closed (external vent is provided for in the new hollow pump piston rod).

Installation Procedure—*See OVERHAUL data for disassembly instructions preliminary to making the following changes:*

1) With main body cover off and pump operating rod and piston assembly removed, increase size of existing 1/16" hole in wall between float bowl and pump chamber to 1/8" using extreme care to prevent metal chips and other foreign material entering carburetor chambers and passages. *NOTE*—Use drill with reduced included angle of drill point (sharper point) so that drill pilots in existing hole. Clean carburetor carefully to remove all metal chips.

2) Rework NEW Carburetor Accelerator Pump Piston Operating Rod (see Parts List below) by tapping the pump rod link hole (lower hole) with an 8-32 starting tap to provide the necessary threaded connection for the stud.

3) Install NEW Accelerator Pump Rod Packing and Washer (see Parts List below) in packing recess at upper end of pump rod hole in main body. *NOTE*—This packing necessary to seal rod and maintain correct relationship between pump rod upper vent hole and bushing.

4) Reassemble carburetor using reworked pump operating rod and new bowl cover gasket. Tighten air cleaner anchor screw to 4-5 ft. lbs. torque.

5) Check choke valve location in closed position. Top edge of valves should be 1/16" down from top edge of venturi. Adjust by bending choke cam retainer on choke cam lever pin.

6) It is recommended that new type Automatic Choke Assembly No. EAD-9850-D be installed to minimize cold starting difficulty. *See also External Vent Seasonal Adjustment below.*

7) After carburetor installed, check and adjust choke connector rod. *See Automatic Choke data under ADJUSTMENTS below.*

External Vent Parts List

New Part	Part No.
Bowl Cover Gasket	EAD-9985-A
Pump Rod Assembly	EAD-9531-B
Pump Rod Packing	EAD-9535-A
Packing Washer	351336-S8

►*1952 LINCOLN INSTALLATION OF SEASONAL ADJUSTMENT FOR EXTERNALLY VENTED CARBURETORS:* On carburetors modified for external venting (above), a spring type clip, Part No. EAD-99608-A, can be installed on pump rod directly above link stud at lower end to provide a means of closing off vent holes for winter operation. This will improve cold starting. *See Seasonal Adjustment of External Vent under ADJUSTMENTS below for recommended settings.*

►*1952 LINCOLN AUTOMATIC CHOKE CHANGE TO IMPROVE COLD STARTING:* New assembly, Part No. EAD-9850-B, can be installed on cars where carburetor modified by external venting (above). **Choke Identification** Choke cover stamped "B" under directional arrow OR cover has **three** counter-clockwise arrows each marked "Lean" spaced equally around cover.

►*1952-53 MERCURY CARBURETOR-TO-MANIFOLD AIR LEAKAGE CORRECTION:* If air leakage into manifold noted at this point (dashpot vacuum control passage may overhang manifold flange allowing air leaks at unsupported flange gasket), install parts furnished in Repair Kit No. EAC-99576-A as follows:
1) Remove carburetor and discard mounting gasket. Remove and discard the four carburetor-to-manifold mounting studs. Install new longer studs.
2) Install new gaskets and spacer (spacer between two gaskets). *CAUTION*—Make certain that "De-icer" heat passage holes are not obstructed. Reinstall carburetor.
3) Check and adjust carburetor choke rod (may be thrown out of adjustment by raising of carburetor on manifold). See Choke Adjustment below.

Repair Kit No. EAC-99576-A

Gasket (Carb-to-manifold) 2 reqd.	1CM-9447-A
Spacer (Carb-to-manifold)	EAC-9603-A
Mounting Studs (4 reqd.)	88391-S

►*1952 MERCURY DASHPOT PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION (Mercomatic Cars):* On late 1952 cars, Dashpot Assembly No. EAC-99560-B (with nylon check ball, spring, and retainer incorporated IN DASHPOT) used with Carburetor No. EAC-9510-J (WITHOUT check ball, spring, and retainer). IF LATER TYPE DASHPOT INSTALLED ON FIRST TYPE CARBURETOR (EAC-9510-G), check ball, spring, and retainer must be removed from carburetor throttle body.

►*1953 MERCURY RECOMMENDED REMOVAL OF AIR CLEANER HOLD-DOWN BOLT SPEED NUT (To prevent nut falling down and entering engine):* On first cars with this nut installed on lower end of oil bath type air cleaner hold-down bolt (to facilitate removal of silencer from oil receptacle compartment), it is recommended that nut be removed and discarded. *NOTE*—This nut not used on later cars.

►*1954 FORD TRUCK HESITATION OR DETONATION WHEN ACCELERATING FROM SLOW SPEEDS (Engines with Camshaft No. B4T-6250-A):* Correct by installing the "New" parts listed below in the original carburetor No. EBZ-9510-C OR by installing Replacement Carburetor No. B4T-9510-A. These parts furnished in Kit No. B4R-9590-B. *NOTE*—This replacement carburetor has the new parts and should be installed if carburetor replacement is required.

Kit B4T-9590-A Carburetor Parts

Carburetor Part	New Part No.
Main Well Tube Assembly	①B4T-9991-A
Vacuum Ball Check Valve Spring	②B4T-9606-A

①—Supersedes Part No. EBZ-9991-A.
②—Supersedes Part No. EAM-99515-B.

DESCRIPTION: These "Centri-flo" models are similar to previous type "Dual Concentric" carburetors with following new features:

Air Horn Eliminated—No air horn casting used and air cleaner fits down around main body to form the air intake passage resulting in lower over-all height.

New Discharge Nozzle & Choke Valve Assy.—Main discharge nozzles consist of two drums mounted concentrically on the choke valve shaft (one drum mounted within each choke valve—valves are cut out to clear drums and rotate around them). Choke valve assembly is mounted in venturi throat in throttle body and no secondary venturis are used.

Diaphragm Type Pow r Valve—Diaphragm type power valve is mounted in main body cover to eliminate possibility of leakage which was possible with previous piston type valve.

De-icing Feature—Consists of two drilled passages in manifold riser, spacer, and slot in base of main throttle body to permit warmed manifold air to heat area around idle jets and passages and prevent condensation and freezing of moisture in idle system.

Vacuum Spark Control Valve (Lincoln only)—Consists of vacuum operated spark control valve assembly on carburetor throttle body (see illustration) which prevents excessive spark advance when engine accelerated (used on all except first 450 cars).

New Vacuum-operated Dashpot (Mercury Merc-O-Matic Cars)—Mounted on carburetor throttle body and operates pick-up lever which opens throttle valves independently of the throttle linkage to prevent engine stalling.

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY "CENTRI-FLO" (Cont.)

▷*NOTE*—Truck carburetors have main body enclosed in air cleaner horn on Cab Forward models and in the air cleaner on other models, plus the following special features:

Governor Assembly—Governor unit is mounted on throttle body and linked directly to end of throttle valve shaft. Throttle body is modified for governor mounting and throttle valve shaft is special type for governor connection.

Depopper Valve—Consists of a spring-loaded piston type valve built in the throttle body. This valve controls a by-pass through which part of the idle air supply passes around the closed throttle valves (a conventional idle system with idle mixture adjusting screws is used to supply the engine idling fuel supply in the usual manner). Valve is normally open during engine operation but closes when manifold vacuum rises to 22" (when throttle is closed). Closing of the valve enriches the idle fuel mixture to the point where it will not support combustion in the engine or exhaust system thus eliminating any "popping." An adjusting screw is provided for Depopper adjustment. See ADJUSTMENTS below.

Choke Control—Convention manual type (automatic choke not used).

ADJUSTMENT: Make all adjustments as follows:

Idle Setting—Turn adjusting screws in to lightly seat and back off each screw ½ turn. Run engine until operating temperature is obtained, then adjust each screw ⅛ turn in the direction which gives smoothest idle at a high steady manifold vacuum. Final position of both screws should not vary more than ½ turn. Reset idle speed. *See depopper valve adjustment below.*

IDLE SPEED SETTING

Lincoln (Hydra-Matic)	400-425 RPM.
Mercury (Synchro mesh Trans.)	400-450 RPM.
Mercury (Merc-O-Matic Trans.)	425 RPM. max.
Ford Trucks	475-500 RPM

▷*NOTE*—On Trucks, engine speed should be controlled by adjusting throttle stop screw and not by depopper valve positioning screw.

Vacuum Dashpot (Merc-O-Matic Cars): After setting engine idle speed (above), check clearance between end of dashpot rod and adjusting stud on dashpot pickup lever using a feeler gauge. (If this clearance not .020" (.020-.025"—see New Car Caution below), adjust by loosening locknut and turning adjusting stud up or down as required.

▷New Car Caution—For first 500 miles of operation of new cars, dashpot clearance is set at .040-.050" to eliminate excessively high engine idle speed and possible "galloping" of engine after deceleration. After 500 miles, setting should be changed to .020-.025".

Seasonal Adjustment for Externally Vented Carburetors (Lincoln): See "Changes & Corrections" above for installation of spring clip on pump rod for vent control. Adjust clip as follows to provide best Hot & Cold Starting performance:

Summer (Temp. above 50°F.)—Slide clip up on pump rod so that vent holes are exposed.

Winter (Temp. below 50°F.)—Slide clip down on pump rod to close off vent holes.

Vacuum Spark Control Valve (Lincoln): No adjustment required. Calibrating spring in valve is permanently set to allow valve operation at 9½-10½" of manifold vacuum. If operation not satisfactory, remove and inspect valve for free movement of the valve stem. Also inspect passage in adapter screw.

Float (Fuel) Level: 1/2" ± 1/32" below top edge of bowl with fuel pump pressure of 3½-4½ lbs. Use Fuel Level Gauge 9550-B to check fuel level placing gauge squarely on top edge of main body so that gauging pins extend down into bowl. Fuel should be at least as high as longer GO pin but must not touch shorter NO GO pin. Adjust by bending tab on float lever which contacts intake needle.

CAUTION—Both floats should be set to same height and floats must not contact float bowl walls.

Depopper Valve Adjustment—Adjust throttle screw to close throttle plates to where they will not bind in bores. Turn depopper valve adjusting screw inward (clockwise) until valve seated (closed). CAUTION—Do not force valve against seat. Turn depopper valve adjusting screw outward (counter clockwise) ⅜-½ turn. Make Idle Setting & Idle Speed Adjustment as given above. If engine fails to run when throttle released, increase idle speed sufficently (Idle stop screw) to maintain operation of engine. If popping is evident after high road speed or maximum engine RPM, upon deceleration without brake action, check depopper valve piston actuating spring as follows:

Depopper Piston Spring Test—Use Tool No. T54T-9976-A to check calibration of spring and proceed as follows: Remove air cleaner, depopper retainer and valve adjusting screw from throttle body. Install screw adapter in throttle body, install sleeve on screw adapter until pointer reads approximately 16 ounces. Pull back runner (rod protruding from gauge) and release gently. Then push runner forward. NOTE—The pointer will move indicating that valve is not seated. Screw sleeve in until pointer reads 16½ ounces. Repeat step of pulling runner back, releasing runner gently and pushing runner forward in ½ ounces increments until pointer will not move when pushed forward. The pointer should then read within 21.0-21.5 ounces. NOTE—If reading is not within specifications of 21.0-21.5 ounces, adjust depopper piston spring tension adjusting screw and repeat above procedure. Turn adjusting screw clockwise to increase tension and counter clockwise to decrease tension.

Alternate Method (Tool not available)—This will give approximate adjustment for emergency operation. Connect vacuum gauge to intake manifold. Increase engine speed manually to approximately 2000 RPM. Close throttle quickly and notice vacuum reading when hissing sound of air is first heard in carburetor. This is point when depopper valve opened. If vaccum reading was not between 22.5-23.5 inches of mercury, the piston spring tension adjusting screw should be turned until correct vacuum reading is obtained.

▷*DEPOPPER CLEANING NOTE:* If necessary to clean depopper valve with carburetor on engine, apply light grease to center section of spring tension washer to hold it in place on end of tension adjusting screw during assembly. Add light application of grease to end of spring to hold it in valve recess so valve and spring can be installed together without dislodging washer from end of adjusting screw.

Accelerating Pump: Seasonal adjustment provided by three holes in throttle shaft lever for pump link engagement:

Center Hole—Normal operating conditions.

Outer Hole—Extreme Cold weather.

Inner Hole—Extreme Hot weather.

Automatic Choke: *NOTE—Choke is separate unit mounted on side of intake manifold and linked to choke valve lever by a rod.* Mark on cover should be in line with center mark of scale on choke housing. Adjust by loosening three cover retainer screws and rotating cover assembly.

Choke Setting—Centered.

Choke Rod Adjustment—With rod disconnected from choke valve lever, hold choke valves closed, raise rod to upper limit of travel. If rod end does not enter hole in lever freely, adjust rod length by bending it at the offset. Connect rod and check entire choke linkage for free movement without binding.

Fast Idle: No adjustment required (fast idle cam operated directly by lever on choke valve shaft). Fast idle speed will be correct if throttle stopscrew correctly set (Idle Speed setting above).

OVERHAUL: Work on carburetor will be facilitated by use of Holding Fixture 9510-C (hinged fixture which can be clamped in a vise).

Disassembly: Remove air cleaner anchor screw and air bleed washer from top of main body cover, remove four attaching screws and lockwashers holding main body cover on main body, remove cover and gasket. Remove pump rod stud from lower end of pump rod, disconnect and remove pump link while holding pump rod and piston assembly down against spring tension, lift out pump piston and rod assembly.

Main Body Disassembly—Remove float needle seat plug, unscrew float needle seat with tool 9564, remove inlet needle. Unscrew and remove float hinge pin, lift float and float spring out. Remove power valve using tool 9510-AA. Remove main metering jets using tool 9533. Remove idle jet tubes using tool 9544. Take out accelerating pump ball check retainer spring using needle-nose pliers. Tip carburetor up and catch pump discharge needle, pump ball check, main well tubes which will fall out of main body. Take out two screws and lockwashers holding main body on throttle body, lift off main body and gasket.

Throttle Body Disassembly—Remove idle adjusting needles and spring, then remove governor plate, gasket and spring. Remove cotter pin from vacuum rod and push rod from governor lever. Remove governor lever nut, lockwasher and lever. Remove governor retaining screws, governor housing and diaphragm. Remove depopper valve adjusting screw assembly, but DO NOT remove adjusting screw from nut. Remove depopper valve, tension spring and spring washer, DO NOT remove tension spring adjusting screw from throttle body. Remove throttle shaft seal, retainer and spring. Throttle plates and

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY "CENTRI-FLO" (Cont.)

shaft should not be removed from throttle body. If necessary to remove choke plates and shaft, file off tips of choke plate screws and choke plates. Slide shaft out of body. Identify plates so they can be installed in original positions. Clean and inspect all parts for justifiable replacement.

Power Valve Diaphragm—DO NOT remove assembly from main body cover unless tests indicate that replacement is necessary. Remove by taking out three attaching screws and lifting off cover clamp and diaphragm assembly.

Distributor Control Nylon Ball—Remove retaining pin and remove nylon ball from vacuum passage in throttle body.

Cleaning & Inspection: Wash all parts except those noted below in clean solvent *(CAUTION*—Do not use solvent on pump piston leather, power valve diaphragm, spark control valve, nylon fuel inlet needle valve, or nylon distributor passage ball). Blow out all passages in castings with dry air, dry all parts with air. Inspect all parts for wear and damage with particular attention to the following: Inspect castings and main body cover for cracks or leaks, inspect main well tubes, metering jets, and idle tubes for wear or clogged passages *(CAUTION* —clean with air, do not use drills to clean out calibrated openings). Replace all worn or damaged parts (nicked or burred gasket surfaces can be stoned lightly but parts should be replaced if stoning does not clean up surfaces).

Reassembly: Use all NEW gaskets. Install parts in reverse order of disassembly procedure (above) and note the following important points:

Distributor Passage Nylon Ball Caution—If new ball installed, make certain that correct size used.

Throttle Valve Installation—Valves have depression on one side and must be installed with this depressed side down. After valves installed, check for free operation and if binding noted, correct by loosening screws and retightening while valves held closed. Stake screws with staking pliers 9586 after installation completed.

Choke Valve Installation—Slide choke shaft in through body and install nozzle tube drum on shaft as it enters each venturi *(CAUTION*—rounded opening on drum must face inlet side of carburetor and tapered side of hole must face downward). Install choke valves and tighten attaching screws while holding valves closed and applying pressure on threaded end of shaft. Check valves for free operation and make certain that nozzle drums rotate freely within choke valves.

Throttle Body Assembly—Install control shaft and housing on throttle body with new gasket. A correctly installed throttle shaft and lever will close plates but will not open them. Install spring, retainer and throttle shaft seal with seal shoulder inside retainer. Install governor housing using new gasket. Install governor lever, lockwasher and nut on shaft. Install diaphragm rod through lever and secure it with cotter pin. Install governor spring. Install depopper spring tension washer properly centered on adjusting screw. Install spring, depopper valve, and adjusting screw assembly with new gasket. Turn valve adjusting screw "IN" until just seated. See depopper adjustment while on engine, above. Install governor plate with new gasket. Install fuel needles and springs. Close needles gently against seats, then back out ½ turn for preliminary adjustment.

Main Body Assembly—Install main well tubes, idle jet assemblies and main jets. Install power valve with new gasket. Install float valve seat and plug with new gasket. Install float spring, float, inlet needle valve and secure float with hinge pin. Install accelerating pump piston and operating rod. Install pump discharge needle. Install power diaphragm assembly in cover with edge of diaphragm visible all around to insure against leakage. Hold cover in position on bowl with new gasket in place and install center screw and plate. Install retaining screws. NOTE—One of retaining screws also secures the governor air vent tube which seats in the throttle body when sub-assemblies are reassembled.

Main Body & Throttle Body Assembly—Install main body and new gasket on throttle body, aligning rounded opening of each nozzle drum with its discharge nozzle, and properly positioning choke opening lever on fast idle cam as main body is seated on throttle body, install attaching screws and lockwashers from underside of throttle body flange.

Diaphragm Assembly Installation—***Assembly must be installed as follows to properly s at diaphragm on main body cover:*** Place cover clamp over diaphragm stem, compress spring and wind rubber band tightly around stem and spring to hold spring compressed while assembly being installed. Position assembly on main body cover, tighten three attaching screws securely, then remove rubber band and check for free operation by pressing on diaphragm stem. Action must be absolutely free.

Accelerator Pump Installation & Check—Use care not to damage piston leather when installing pump piston and rod assembly. Pump system can be checked after bowl filled with fuel as follows: Use blunt instrument (small drift, etc.) to press down on discharge needle while pressing pump piston down in cylinder. If fuel forced past discharge needle, clean needle and seat and reseat needle by tapping needle lightly using a brass drift and light hammer. Replace needle if leakage continues. Also while pressing on pump piston, note if fuel level rises in bowl or if bubbles evident at pump intake hole in base of bowl indicating leakage at pump intake ball check. If leakage noted, remove ball retainer, clean ball and seat and reseat ball by tapping ball lightly using a brass rod and light hammer. If leakage continues, examine seat for foreign material or imperfections and replace ball.

Main Body Cover & Plug Assy. Installation: Tighten air cleaner anchor screw to 4-5 ft.lbs. torque (this supersedes 6-9 ft. lbs. previously recommended). When installing new type Cover Assembly (see Changes & Corrections above), use ¼" lockwasher **above** and **below** the bleeder plate washer (one at each point).

Carburetor Adjustments—Make all adjustments listed in ADJUSTMENTS above.

SERVICE PARTS: ***CAUTION—Metering jets furnished in repair kits listed below are STANDARD (for 0 to 5000 ft. Altitude). See High Altitude Carburetor Note (above) for special high altitude metering jets.***

Gasket Set—Ford No. B2Q-9502-B, Lincoln No. HCK-9502A, Mercury No. MCK-9502A.

Repair Kit (incl. Std. Metering Jets)—Ford No. B4T-9590-A (includes B2Q-9502-B gasket set), Lincoln No. HCK-9590B (replaces HCK-9590A), Mercury No. MCK-9590A.

1953-54 LINCOLN-MERCURY 4-BARREL "CENTRI-QUAD"

	Carburetor No.
LINCOLN	
1953 First Cars	①EAD-9510-H
1953 Later Cars	②EAD-9510-K
1953 Later Cars③	④EAD-9510-M
1954 Early	EAD-9510-N
1954 Later	⑤ED-EAD-9510-S
MERCURY	
1954 Synchro-mesh	EBY-9510-G
1954 Mercomatic	EBY-9510-H
1954 Later Cars	⑤ED-EBY-9510-K

①—Replaced by EAD-9510-M.

②—Has Improved Main Body Cover & Plugs Assembly. Can be converted for "External Venting" as detailed in Changes, Cautions, Corrections below.

③—Replacement carburetor for earlier models.

④—Has Improved Main Body Cover & Plugs Assembly and External Venting System.

⑤—These carburetors have new Cover with revised External Vent system to correct fuel spill-over on sharp turns. *See Fuel Spill-over Correction below.*

►CHANGES, CAUTIONS, CORRECTIONS

►***HIGH ALTITUDE OPERATION CAUTION:*** All production carburetors are equipped with "Sea Level" size main metering jets. On cars operated at higher altitudes, BOTH main metering jets should be replaced with proper size jets for the altitude at which car being operated as follows:

Lincoln Carburetors

Main Metering Jet:	Size	Part No.
Sea Level (0 to 5000 ft.)	.061"	EAD-9533-A
Alt. (5000-10000 ft.)	.059"	EAD-9533-B
Alt. (10000-15000 ft.)	.057"	EAD-9533-C

Jet Identification—Jets stamped with last two figures of "size" listed above.

►***1953 LINCOLN AIR CLEANER INTERFERENCE WITH CHOKE LOCK-OUT LEVER (Throttle locking in Partially Open Position):*** Caused by interference between choke lock-out lever and air cleaner. Remove and inspect air cleaner for point of interference (paint will be chipped off or scratched at point of contact). Correct by using ball peen hammer to tap down area on cleaner around point of contact to conform to preformed indentation. Use care not to damage seating surface of air cleaner. Check for free operation of choke lock-out lever when air cleaner re-installed.

►***1953 CARBURETOR NO. EAD-9510-H MAIN BODY COVER & PLUGS ASSEMBLY REPLACEMENT (To minimize faulty power valve action due to air leakage around air cleaner Anchor Screw Stud):*** New Main Body Cover & Plugs Assy. with identification number "5" etched or stamped on top of the cover can be installed on earlier carburetors. New assemblies have inserted brass bushing in air cleaner anchor screw stud hole to make power valve vacuum passage in cover entirely independent of anchor screw stud hole. When installing these new assemblies, use ¼" lockwashers, one above and one below, the bleeder plate washer. See OVERHAUL data for disassembly instructions. Tighten anchor screw stud to 4-5 ft. lbs. torque (supersedes 6-9 ft. lb. specification).

NOTE—Carburetor Nos. EAD-9510-K & M have this new type cover and plugs assembly.

Replacement Main Body & Plugs Assy.

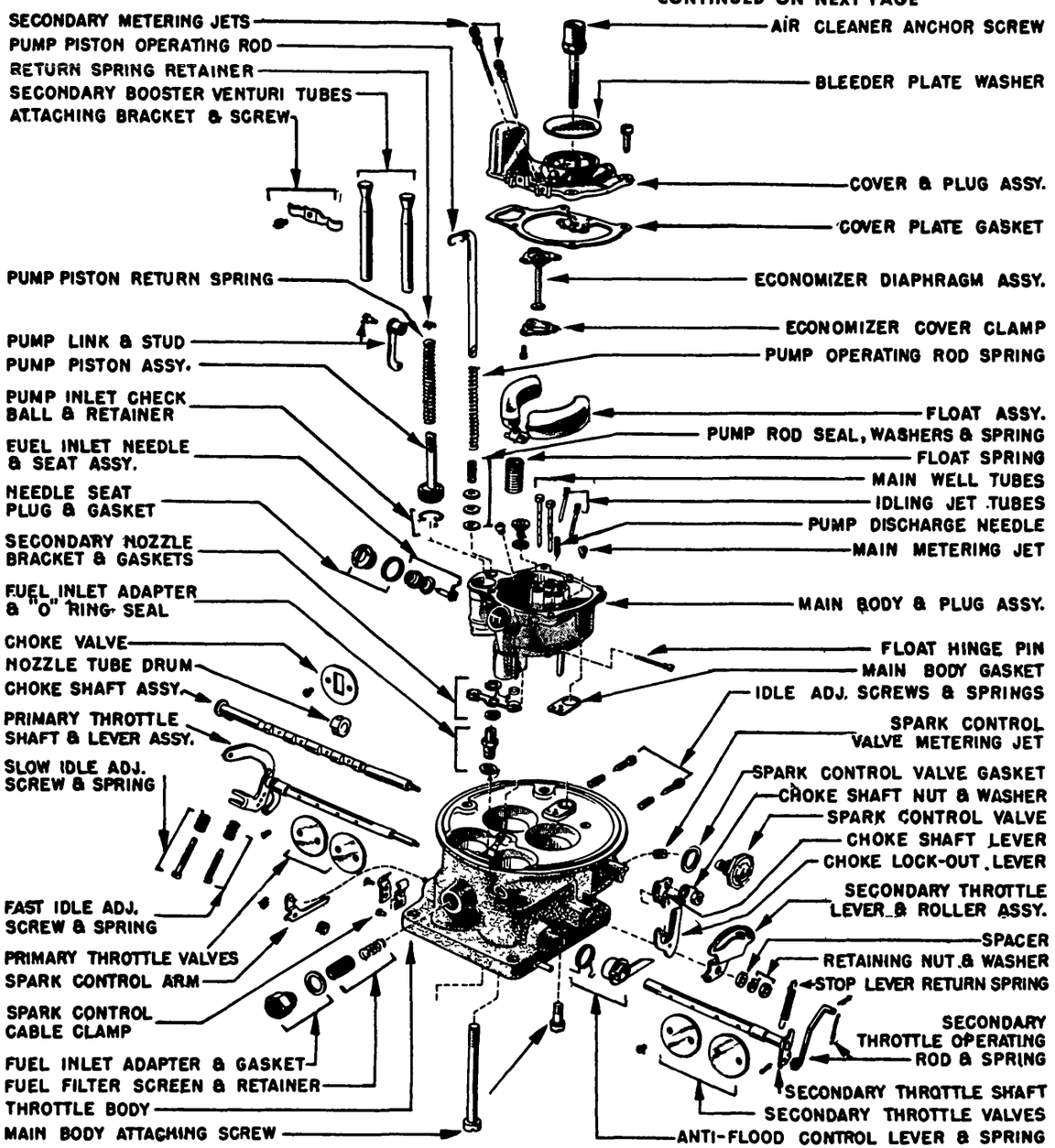
Model	Orig. Part No.	Repl. Part No.	①Ident.
1953	EAD-99983B	EAD-99983D	"5"

①—Number stamped on top of cover.

►***PRIMARY & SECONDARY THROTTLE SYNCHRONIZATION CAUTION:*** For uniform engine acceleration, secondary throttle valve opening must be properly synchronized with opening of primary throttle valves. *See "Primary & Secondary Throttle Plate Synchronization" under ADJUSTMENTS below.*

►*1953 CARBURETORS EAD-9510-H & EAD-9510-K*

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1953 LINCOLN "CENTRI-QUAD" 4-BARREL CARBURETOR

1953-54 LINCOLN-MERCURY "CENTRI-QUAD" (Cont.)

EXTERNAL VENTING TO IMPROVE HOT STARTING (To correct an abnormally rich fuel-air mixture): External Vent Kit No. HDK-9531-A parts can be installed and other modifications made as listed below. This modification will create a passage between the bowl chamber and accelerating pump chamber and provide an external vent for fuel vapor originating in the bowl when a hot engine is not in operation and the throttle valves are closed (external vent is provided for in the new hollow pump piston operating rod).

Installation Procedure—*Use instruction sheet furnished with kit and see OVERHAUL data following for disassembly data in making following changes:*

1) With main body cover off and pump operating rod and piston assembly removed (CAUTION—do not disturb pump rod upper seal and retainer), increase size of existing 1/16" hole in wall between float bowl and pump chamber to ⅛" using extreme care to prevent metal chips and other foreign material entering carburetor chambers and passages.

NOTE—Use drill with reduced included angle of drill point (sharper point) so that drill pilots in existing hole. Clean carburetor carefully to remove all metal chips.

2) Reassemble carburetor using NEW TYPE PARTS as listed below. *CAUTION*—Torque air cleaner anchor screw to 4-5 ft. lbs.

3) Install NEW Choke Lever and Choke Rod. Check position of choke valve plates and check and adjust length of choke operating rod. *See Choke Valve Installation under Automatic Choke data below.*

4) It is recommended that new type Automatic Choke Assembly No. EAD-9850-B be installed to minimize cold starting difficulties. *See also External Vent Seasonal Adjustment below.*

5) Invert air cleaner on bench (drain oil first), use blunt rounded punch and hammer to tap down indented area 3/16" to provide necessary clearance for new choke shaft lever. *CAUTION*—Use care not to distort or damage seating surface of air cleaner. Check for clearance of choke operating mechanism after air cleaner re-installed on carburetor.

External Vent Kit No. HDK-9531-A

Part	Part No.
Choke Lever	EAD-9551-C
Bowl Cover Gasket	EAD-9985-A
Pump Rod Assy.	EAD-9531-B
Pump Link Pin	EAD-9988-C
Link Pin Retainer	351826-S
Pump Link Assy.	EAD-9526-C
Pump Link Retainer	1GA-9599
Choke Rod	EAD-9869-D
Choke Rod Cotter Pins (2)	352200-S

►***1953 LINCOLN AUTOMATIC CHOKE PRODUCTION CHANGE & INSTALLATION ON EARLIER CARS TO IMPROVE COLD STARTING:*** New assembly, Part No. EAD-9850-B can be installed on cars where carburetors modified by external venting (above) and will provide better cold starting performance. **Choke Identification**—Choke Cover stamped "B" under directional arrow OR cover has **three** counter-clockwise arrows each marked "Lean" spaced equally around cover.

►***1953 LINCOLN INSTALLATION OF SEASONAL ADJUSTMENT FOR EXTERNALLY VENTED CARBURETORS:*** On carburetors with external venting (above), a spring type clip, Part No. EAD-99608-A, can be installed on pump rod directly above link stud at lower end of rod to provide a means of closing off vent holes for winter operation which will improve cold starting. *See Seasonal Adjustment of External Vent under ADJUSTMENTS below for recommended settings.*

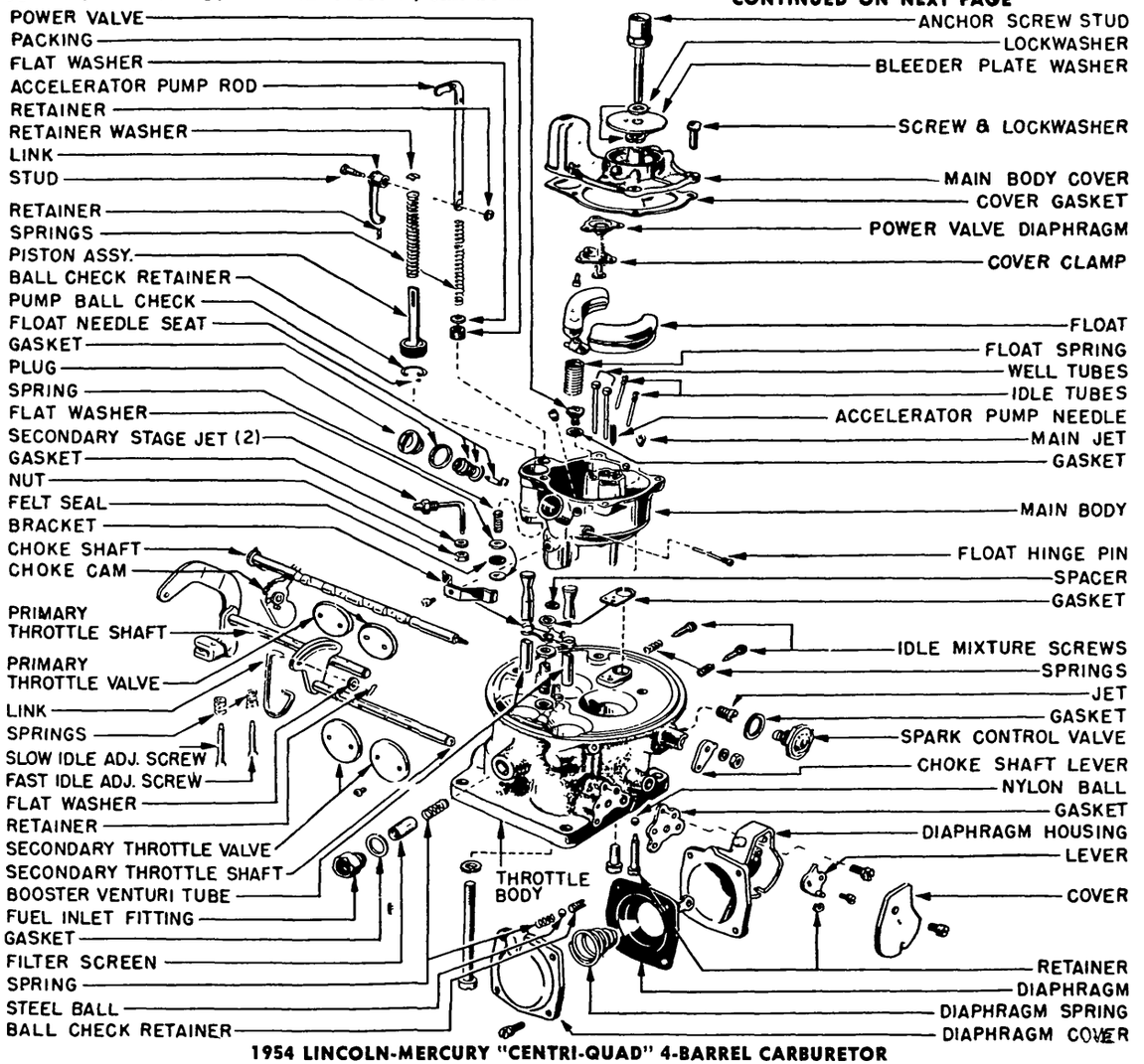
►***EXTERNAL VENT CHANGE & SEASONAL ADJUSTMENT TO IMPROVE COLD STARTING (1954 Lincoln & Mercury & 1952-53 Lincoln Carburetors where External Vent Kit has been installed):*** On carburetors with external vent through hollow pump rod, spring type Adjustable Clip, No. EAD-99608-A, can be installed on lower end of accelerator pump rod to provide means for cutting off vent during winter operation. See "EXTERNAL VENT ADJUSTMENT" below *NOTE*—This clip will be installed in production on later carburetors.

►***1954 LINCOLN & MERCURY FUEL SPILL-OVER FROM EXTERNAL VENT ON SHARP RIGHT TURNS CORRECTION (Cars with early carburetors):*** Correct by installing new Carburetor Bowl Cover No. ED-EAD-99983-F (Lincoln), ED-EBY-99983-C (Mercury). Install cover as follows:

1)—Remove air cleaner. Remove carburetor cover and gasket, and accelerating pump assembly.

2)—Insert piece of ⅛" string solder in existing vent hole located ¼" down in web between fuel bowl and accelerating pump chamber. Cut off solder so that slight amount protrudes into float chamber

CONTINUED ON NEXT PAGE



1954 LINCOLN-MERCURY "CENTRI-QUAD" 4-BARREL CARBURETOR

1953-54 LINCOLN-MERCURY "CENTRI-QUAD" (Cont.)

(CAUTION—do not allow more than 1/16" protrusion in pump cylinder). Use needle-nose pliers to squeeze solder in hole to securely plug this vent hole

▷*CAUTION*—Minimum amount of solder should be left in pump chamber to avoid damage to pump plunger leather piston (use thin shim stock to protect leather when inserting pump plunger in cylinder).

3)—Reassemble carburetor, using new Bowl Cover Assembly as listed above with new gasket. These new bowl covers have a vent passage connecting the accelerating pump chamber with the float bowl which eliminates necessity of vent in web

NOTE—Later type carburetors ED-EAD-9510-S (Lincoln), ED-EBY-9510-K (Mercury) have this new type bowl cover and revised vent system.

▷*1953-54 LINCOLN & 1954 MERCURY AUTOMATIC CHOKE CONTROL HEAT TUBE ASSEMBLY CHANGE (To minimize exhaust gas leakage into automatic choke)*: New type heat tube assemblies (as listed below) and new intake manifolds were used in 1954 production starting approximately June 25, 1954 (Lincoln), August 16, 1954 (Mercury). This assembly can be installed on earlier cars provided that NEW Intake Manifolds are also installed. *NOTE*--Previous type Heat Tube Assemblies are furnished for use with first type manifolds.

Choke Heat Tube Assy.

Part	Part No.
Heat Tube Assembly	B4A-9890-A
Retaining Nut	B4A-9864-A
Washer Gasket	353999-S
Intake Manifold (Lincoln)	EAD-9425-D
Intake Manifold (Mercury)	EBY-9425-D

▷*HIGH ALTITUDE CARBURETOR CAUTION*: All production carburetors are fitted with Std. Metering Jets (Sea Level to 5000 ft.). Cars operated at higher altitudes are modified in the field by installation of correct type metering jets as listed below. ALL primary and secondary metering jets must be of correct size.

Metering Jet Assemblies

	Main Metering Jet No.		Secondary Jet Tube Assy.	
Lincoln Carb.	Mark	Part No.	Mark	Part No.
0 to 5000 ft.	60	1GA-9533C	55	EAD-99594B
5000-10000 ft.	56	78-9533E	52	EAD-99594C
10000-15000 ft.	53	8EL-9533B	49	EAD-99594D
Mercury Carb.				
0 to 5000 ft.	52	86H-9533	55	EAD-99594B
5000-10000 ft.	48	78-9533B	52	EAD-99594C
10000-15000 ft.	45	59A-9533D	49	EAD-99594D

DESCRIPTION: The 4-Barrel Centri-Quad carburetor is similar in design to previous dual Centri-flo carburetor with following new features:

Secondary Stage—Consists of two additional carburetor barrels located adjacent to the primary barrels. Secondary stage fuel system consists of two Metering Jets in the main body cover which discharge fuel through two Booster Venturi Tubes extending down into the secondary stage barrels. Booster venturi tubes are clamped in bracket on main body cover. Secondary stage does not have separate idle system or idle adjusting screws but primary stage idle passages are continued down to the mounting face of the throttle body and grooved passages are provided through which a portion of the idle fuel mixture is discharged through the secondary stage throttle bores. Secondary stage throttle valve shaft is linked to the primary stage throttle valve shaft with additional linkage to lock out secondary stage while choke operating.

NOTE—Secondary stage jets in 1954 models are located in side of main body and extend down into the fuel bowl Jets discharge into the booster venturi tubes which are likewise mounted on the side of the main body.

Bowl Vent System—Bowl is vented through a tube located in the front side of the main body cover so that filtered air enters the bowl at the same pressure as exists in the air horn providing "balanced" operation. Fuel bowl is also vented externally through hollow pump piston operating rod (cross-drilled passage near upper end of rod and vent hole near lower end of rod provide a vent for the fuel bowl when the throttle valves are closed or in nearly closed position). *See "1953 External Venting to Improve Hot Starting" Correction above.*

Idle Adjusting Screws (Primary Stage)—Angle of screw points has been reduced to provide a less critical adjustment of the idle fuel mixture.

Independent Fast Idle & Slow Idle Speed Adjustment—Fast and slow idle speed controlled by individual screws located on throttle shaft lever. Inner fast idle screw contacts fast idle cam while outer slow idle screw contacts side of cam lever pin.

Mechanical Spark Advance Control—Consists of a cable control linked to the carburetor throttle lever and the distributor breaker plate to provide mechanical control of the spark advance during rapid engine acceleration.

Secondary Stage Distributor Vacuum Control—A port in the secondary stage venturi provides an additional vacuum source for distributor advance control (this vacuum connection is located on throttle body adjacent to fuel inlet connection).

1954 Models—Also have following new features·

Vacuum Control of Secondary Stage Throttle Valves—Secondary throttle shaft is controlled by vacuum diaphragm unit mounted on throttle body. Vacuum passage terminates at right primary stage venturi so that secondary throttle valves open during periods of heavy engine loads or high speed operation (open when vacuum rises to point where atmospheric pressure on opposite side of diaphragm is sufficient to overcome diaphragm spring pressure). The mechanical linkage at the opposite end of the secondary throttle shaft closes the secondary throttle valves promptly (overcoming any lag in vacuum system) when the throttle is closed. *NOTE*—This mechanical linkage will hold secondary throttle valves closed in the event of failure of the vacuum control mechanism.

Choke Valves & Automatic Choke—Valves are round to provide full choke action when closed, Automatic choke thermostatic spring provides more positive choking action for cold starting.

ADJUSTMENT: *Make all adjustments exactly as follows:*

Idle Setting: First set BOTH primary idle mixture adjusting screws EXACTLY 1¼ turns open (no screws used for secondary stage). Start engine and operate it until normal operating temperature secured with choke valve wide open and fast idle cam in slow idle position. Back off fast idle adjusting screw (inner screw on throttle lever) so that it clears the fast idle cam. Set engine speed to correct hot or slow idle speed (see below) by turning slow idle speed adjusting screw (outer screw on fast idle cam). Turn both idle mixture adjusting screws equally ⅛ turn at a time in or out until smoothest idle performance obtained with highest steady vacuum reading. If engine speed changes during this operation, reset speed and repeat idle mixture adjustment. After idle adjustment completed, adjust fast idle (all models), and Anti-stall Dashpot (Mercury Mercomatic Cars).

▷*IDLE SPEED SETTING NOTE*: It is recommended that the idle speed be set with selector lever in NEUTRAL to approximately 475-500 RPM. (Synchro-mesh Cars), 460 RPM. (Automatic Trans. Cars). Then place selector lever in DRIVE and recheck engine idle speed which should be within range shown in table below. Readjust if speed is not within specified range.

Idle Mixture Setting

All Models — 1¼ turns open

Idle Speed Setting

	Synchro-mesh	Auto-Trans.
1953-54 (Lincoln)		①400-425 RPM
1954 (Mercury)	475-500 RPM	①425-440 RPM

①—With selector lever in "DR" position

▷*CAUTION*—Unless idle adjustment made exactly as outlined above (turning screws equally and in same direction), an apparently correct setting may result with a too-rich setting of one screw tending to offset a too-lean setting of the other screw (due to interconnected idle fuel passages in base of throttle body). Screws must be set alike except for slight variation in making final fine adjustment.

Dashpot Setting (Mercury with Mercomatic): After idle adjustment completed, turn ignition off, see that fast idle cam in slow idle position, hold throttle lever in closed position, turn dashpot adjusting screw out (counter-clockwise) until dashpot rod is pushed in to the limit of its travel, then turn adjusting screw in (clockwise) 1½-2 turns which will provide correct clearance of .045-.064".

Seasonal Adjustment for Externally Vented Carburetors: See "Changes, Cautions, Corrections" above for installation of spring clip on pump rod for vent control. Adjust clip as follows to provide best Hot & Cold Starting performance:

Summer (Temp. above 50°F)—Slide clip up on pump rod so that vent holes are exposed.

Winter (Temp. below 50°F)—Slide clip down on pump rod to close off vent holes.

Fast Idle Setting: After completing slow idle setting (above) and with engine at normal operating temperature, so that fast idle cam in slow idle position, turn fast idle adjusting screw (inner screw on throttle lever) in until screw just contacts lowest step on fast idle cam. This will provide correct fast idle speed. *NOTE*—If fast idle speed is unnecessarily high with above setting, fast idle screw may be backed off *not to exceed one full turn.*

CONTINUED ON NEXT PAGE

1953-54 LINCOLN, MERCURY "CENTRI-QUAD" (Cont.)

►*CAUTION*—If fast idle screw backed off more than one full turn from specified setting (above), engine flooding and stalling may occur during fast idle operation due to engine speed being too low to burn all fuel discharged into intake manifold.

Accelerating Pump Setting: Seasonal adjustment provided by three holes in primary throttle shaft lever for pump link engagament:
Center Hole—Normal operating conditions.
Outer Hole—Extreme cold weather.
Inner Hole—Extreme hot weather.

Float (Fuel) Level: To check fuel level with carburetor on car, remove air cleaner and main body cover from carburetor, crank engine with starter to fill bowl to operating level. Install Gauge 9550-B (1953 Lincoln) Gauge 9550-AH (1954 Lincoln-Mercury) squarely on top edge of main body so that gauging pins extend down into bowl. Fuel should be at least as high as longer "GO" pin but must not touch shorter "NO GO" pin. Adjust by bending float tab.

►*FLOAT LEVEL ADJUSTING NOTE:* Due to carburetor design (position of secondary jet tubes above floats), use of Float Adjusting Tool 9550-E may be difficult and following procedure is recommended for float level adjustment: **To raise fuel level**—Support float assembly with finger placed under float bracket, insert tip of medium screwdriver between bottom of float needle seat and edge of float tab, twist screwdriver so as to bend float tab downward. **To lower fuel level**—Support each segment of float by placing finger on top of float, insert tip of medium screwdriver beneath float tab and pry tab upward.

►*CHECKING FLOAT LEVEL:* After making float level adjustment, remove some fuel from bowl, crank engine (with ignition off) to bring fuel level up to new setting. Recheck fuel level and readjust if necessary.

CAUTION—Both floats must be same height and floats must not contact walls of float bowl.

FUEL LEVEL

All Carburetors.....①1/2" ± 1/32"

①—With fuel pump pressure of 3½-4½ lbs.

Automatic Choke: ***NOTE—Choke is separate unit mounted on side of intake manifold and linked to choke valve lever by a rod.*** Mark on cover should be in line with center mark of scale on choke housing. Adjust by loosening three cover retainer screws and rotating cover assembly.
Setting—Centered.

►*CHOKE OPERATING ROD ADJUSTMENT:* Operating rod length should be checked and adjusted whenever manifold, carburetor, automatic choke, or choke linkage removed and replaced. ***See Step 4 under CARBURETOR INSTALLATION ON ENGINE for operating rod adjustment.***

Spark Control Valve: No adjustment required. Calibrating spring in valve is permanently set to allow valve operating at 9½-10½" (1953), 8-10" (1954) of manifold vacuum. If operation not satisfactory, remove and inspect valve for free movement of the valve stem and inspect passage in screw.

Power Valve: No adjustment required. Power valve is calibrated to open below 7.5-9" of manifold vacuum.

Spark Advance Control Cabl : ***Adjustment required when carburetor installed on engine or whenever linkage disturbed or disconnected. See Lincoln Tune-Up data in Car Model Section.***

Primary & Secondary Throttle Plate Synchronization: Adjust hot engine idle speed to specifications (see Idle Setting above). Clearance between stop located on loose lever on secondary throttle shaft and secondary throttle lever should be .038-.044". To adjust without removing carburetor from engine, bend or file stop tab on loose lever arm. As a bench check, place .039" wire gauge (No. 61 drill) between primary throttle plate and throttle bore on throttle lever side of carburetor. With .039" gauge in position, tab on secondary loose lever on secondary throttle shaft should have a slight play between it and secondary throttle lever. Remove .039" gauge and replace with .040" wire gauge (No. 60 drill). There should be no play between loose lever and secondary throttle lever.

OVERHAUL: *NOTE*—Carburetor Holding Fixture 9510-C can be used to mount carburetor for overhaul if special adapter plate made up to match mounting holes of this carburetor. Check Secondary Throttle Operating Diaphragm before disassembling carburetor (see below). Then disassemble and overhaul carburetor as follows:

►***SECONDARY THROTTLE OPERATING DIAPHRAGM CHECK (Before disassembling carburetor):*** Fully open secondary throttle valves and block off diaphragm passage at opening in primary stage venturi (use eraser end of a pencil) BEFORE releasing secondary throttle valves. Release secondary throttle valves. Valves should remain open as long as venturi opening is blocked off. If valves do not remain open, diaphragm or gasket seal between diaphragm assembly and throttle body may be defective. Remove assembly from carburetor, disassemble, and inspect. Also inspect ball check valve located in diaphragm cover.

Disassembly (Secondary Throttle Operating Diaphragm): Take out attaching screw and remove vacuum diaphragm assembly cover plate. Remove retainer securing diaphragm rod to pin on lever and screw holding diaphragm lever on secondary throttle shaft, remove lever. Take out three screws retaining diaphragm housing on carburetor throttle body, remove diaphragm assembly and gasket.

Disassembly (Carburetor—after Secondary Throttle Operating Diaphragm removed): Mount carburetor on Holding Fixture 9510-C (modified for use with four barrel carburetors) and proceed as follows: Remove air cleaner anchor screw and air bleed washer from top of main body cover, remove four attaching screws and lockwashers holding cover on main body, remove cover and gasket. Remove pump rod pin and retainer from pump operating rod (hold top of pump piston while removing pin from pump rod), lift out pump piston assembly, remove pump rod upper seal and washer, remove pump rod lower seal, washers, and spring.

Main Body Disassembly—Remove float needle seat plug and gasket, using tool 9510-BB, remove float needle seat and gasket, using tool 9564. Remove screw and bracket retaining secondary venturi booster tubes, remove venturi tubes. Loosen lock-nuts holding secondary jets in man body, remove secondary jets, gaskets, and nuts. Remove float hinge pin, lift entire float assembly out (float, float needle, clip, and float spring). Remove power valve and gasket, using tool 9510-AA. Remove main metering jets, using tool 9533. Remove idle jet tubes, using tool 9544. Remove accelerating pump ball check retainer, using a wire hook to remove retainer from pump cylinder. Tip carburetor up and catch pump ball check, discharge needle, and main well tubes which will fall out of main body. Remove retainer from pump link pin, remove link from throttle lever. Remove two screws and lockwashers retaining main body on throttle body lift off main body (*CAUTION*—Note gasket and spacer between main body and throttle body, and "O" ring seal on fuel inlet adapter). Remove fuel inlet adapter and booster venturi bracket and gaskets (*NOTE*—One gasket on each side of bracket).

Throttle Body—Remove spark control valve and gasket from boss on throttle body, remove metering jet from inside spark control valve housing. Remove fuel inlet adapter, filter, gasket, and spring. Remove both idle adjusting screws and springs. Take out ball retainer in distributor vacuum passage, remove nylon ball. DO NOT disturb throttle valve and shaft assemblies, fast idle cam, or choke valve and shaft assembly unless replacement required due to wear or damage as determined by inspection. If replacement required, install NEW Throttle Body Assembly. Disconnect and remove secondary throttle control rod. If necessary to remove fast idle cam, proceed as follows:

Fast Idle Cam—Tap out retaining pin, remove fast idle cam from shaft. *CAUTION*—do not attempt to remove the cam shaft from the throttle body (retained by pin in body).

Power Valve Diaphragm—DO NOT remove assembly from main body cover unless tests indicate that replacement required. Remove by taking out three attaching screws and lifting off cover clamp and diaphragm assembly.

Cleaning & Inspection: Wash all parts except those noted below in clean solvent (*CAUTION*—Do not use solvent on pump piston leather, power valve diaphragm, spark control valve, nylon fuel inlet needle valve, nylon distributor passage ball, dashpot assembly, or secondary throttle operating diaphragm). Blow out passages in castings with air, dry all parts with air. Inspect all parts for wear and damage with particular attention to the following: Inspect castings and main body cover for cracks or leaks, inspect main well tubes, metering jets, and idle tubes for wear or clogged passages (*CAUTION*—clean with air, do not use drills to clean out calibrated openings). Replace all worn or damaged parts

Reassembly: Use all NEW gaskets. Install parts in reverse order of disassembly procedure (above) and note the following important points:
Distributor Passage Nylon Ball Caution—If new ball installed, make certain that correct size used.
Choke Valve Installation—Slide choke shaft in through throttle body and install nozzle tube drum on shaft as it enters each venturi (*CAUTION*—rounded opening on drums must face inlet side of carburetor and tapered side of hole must face

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1953-54 LINCOLN, MERCURY "CENTRI-QUAD" (C nt.)

downward). Install choke valves, hold valves closed while tightening attaching screws. Install choke lever on end of shaft and make certain that pin on lockout lever engages slotted hole in choke lever, secure lever on shaft with lockwasher and nut. Install "C" washer on pin of choke lockout lever.

Choke Valve Plate Position—Check choke valve angle in closed position as follows: Hold choke valves closed at limit of travel, measure distance from top edge of venturi to top edge of choke valves at rear side. This distance must be 1/16". Adjust by bending stop tab on choke lever shaft. *NOTE—Choke operating rod length is adjusted as part of carburetor installation procedure. See step 4 under CARBURETOR INSTALLATION ON ENGINE below.*

Secondary Throttle Valve Equalization—If secondary throttle valve removed, use strips of .004" shim stock 1/8-3/16" wide between lower side of each valve (viewed from bottom) and carburetor throat, and hold valves closed against shims while tightening retaining screws. This method will insure proper closing of valves which is necessary for maximum manifold vacuum.

Main Body & Throttle Body Assembly—Install fuel inlet adapter, filter, spring, and gasket. Install fuel inlet fitting and bracket with a gasket on each side of the bracket, tighten the fitting securely. Apply light film of lubricant to "O" ring seal and install seal on fuel inlet adapter. Install gasket on main body support and position main body on throttle body aligning rounded opening of each nozzle tube drum with its discharge nozzle and properly positioning choke lever on fast idle cam. Tighten main body-to-throttle body attaching screws to 4-5 ft.lbs. torque. *(NOTE*—One long screw is located in recessed hole in center of bottom face of throttle body and special small diameter washer must be used with this long screw).

Secondary Jet Installation—Use a new gasket on each secondary jet, insert jets through openings in main body, install locknut on end of each jet with chamfered face of nuts toward carburetor wall. Position jets by moving lower ends to each side as far as possible to avoid interference with power valve operating rod, securely tighten retaining nuts.

Power Valve Diaphragm Installation—*This must be installed as follows to properly seat diaphragm on main body cover:* Place cover clamp over diaphragm stem, compress spring and wind rubber band tightly around stem and spring to hold spring compressed while assembly being installed. Position assembly on main body cover, tighten three attaching screws securely, then remove rubber band and check for free operation by pressing on diaphragm stem. Action must be absolutely free.

Carburetor Adjustments—Make all adjustments listed in ADJUSTMENTS above.

CARBURETOR INSTALLATION ON ENGINE: Install carburetor exactly as follows:

►*CAUTION—DO NOT use gasket sealer or compound on carburetor mounting gaskets.*

1) Position spacer on carburetor mounting pad on manifold with one gasket BELOW and second gasket ABOVE spacer.

2) Position carburetor over mounting studs and start fuel line and choke control inlet tube fittings but DO NOT tighten fittings at this time. Do not connect vacuum lines.

3) Install carburetor attaching nuts and lockwashers and tighten exactly as follows: Tighten all nuts just snug, then tighten each pair alternately in a criss-cross to a torque of 12-15 ft. lbs. *CAUTION*—Correct tightening is important to prevent air leaks or fuel leaks at grooved passages in base of carburetor throttle body.

4)—Install choke operating rod. Make certain that choke valve closed position is correct (see Reassembly), then check choke rod length as follows: With rod disconnected from carburetor lever, hold choke plates in fully closed position, raise rod to highest position, and check whether rod end enters carburetor lever freely. If not, bend rod (first type), adjust trunnion on rod (later type) until rod end enters hole in lever freely, connect rod.

5)—Tighten choke control inlet tube fitting, distributor vacuum line, and fuel line connection.

6)—Start engine and run it sufficiently to fill carburetor bowl with fuel. Check fuel level. *See Float Level data above.*

7)—Re-install main body cover (CAUTION—Do not use gasket sealing compound on cover gasket). Install bleeder plate washer (install lockwasher below and above bleeder plate washer), tighten anchor stud screw to 4-5 ft. lbs. torque.

8)—After engine warmed up, make all carburetor adjustments. See ADJUSTMENTS above.

SERVICE PARTS: *CAUTION—Metering jets furnished in repair kits listed below are STANDARD (for 0 to 5000 ft. Altitude). See High Altitude Carburetor Note (above) for special high altitude metering jets.*

Gasket Set—Lincoln-Mercury No. HDK-9502A (Lincoln Carb.), No. MEK-9502-A (Mercury Carb.).

Repair Kit (With Std. Metering Jets)—Lincoln-Mercury No. HDK-9590-B or HDK-9590-C (1953 Lincoln), No. HEK-9590-B (1954 Lincoln & Mercury).

FORD, LINCOLN, MERCURY 4-BARREL CENTRI-QUAD CARBURETORS

FORD CARS & THUNDERBIRD①	Carburetor No.
1955 Early V8 (Synchro-mesh)	B5A-9510-G
1955 Early V8 (Fordomatic)	B5A 9510-H
1955 Later V8 (Synchro-mesh)	B5A 9510-M
1955 Later V8 (Fordomatic)	B5A-9510-N
LINCOLN	
1955 Early	EBJ-9510 D
1955 Later	EBJ-9510-F
MERCURY	
1955 Early (Synchro-mesh)	②ECK-9510-C
1955 Early (Mercomatic)	③ECL-9510-B
1955 2nd. (Mercomatic)	③ECK-9510-D
1955 Later (Mercomatic)	ECK-9510-H
1955 Later (Synchro-mesh)	ECK-9510 G

①—Ford 272' Special (with Power Package) & 292" Engine (Intercepter & Thunderbird)

②—Serv Part No B5A 9510-G for replacement

③—Serv Part No B5A-9510 H for replacement

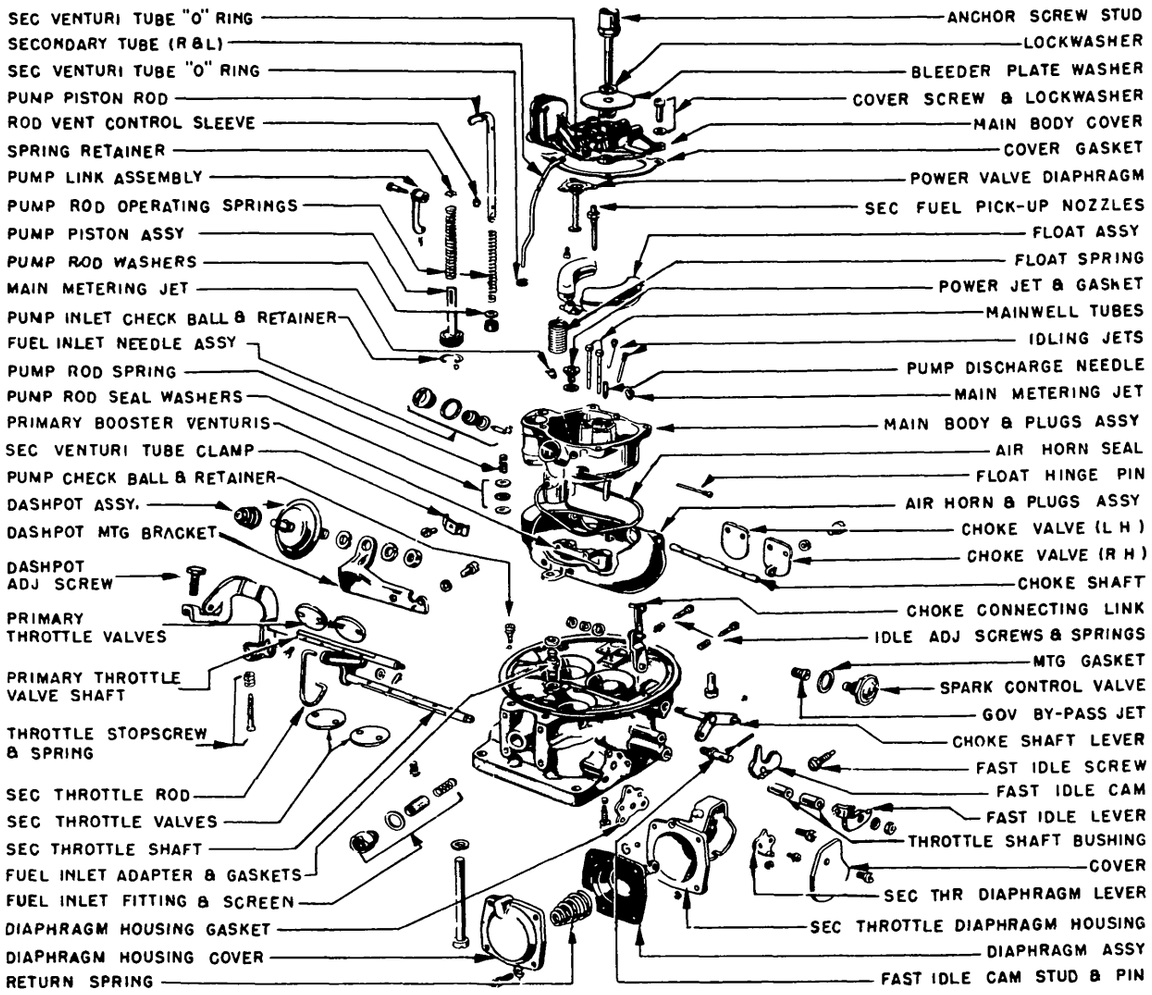
►CHANGES, CAUTIONS, CORRECTIONS

►*CARBURETOR INSTALLATION CAUTION (First Cars with Choke Inlet Air Tube Washer in Throttle Body)* First carburetors have "0" Ring seal and retaining washer in recess in top surface of throttle body which seals air inlet tube when carburetor installed on engine This washer must be properly staked in throttle body and care must be used when installing carburetor that washer and seal are not dislodged by tube **Loose washer or seal may be carried into combustion chamber with resulting damage to engine** If washer is loose, install later type rubber grommet (Ford No B5A-9655 A) which replaces both "0" ring seal and washer

►*CHOKE VALVE BIND CORRECTION (Ford Carburetors)* On first carburetors, if choke valves bind on upper surface of throttle body, correct by grinding a slight depression in the top surface of the throttle body to provide 020' minimum clearance between valves and body *NOTE*—Later carburetors have additional clearance at this point

►*AUTOMATIC CHOKE ROD ADJUSTMENT (When installing Carburetor or Automatic Choke)* This adjustment extremely important for correct starting and warming up performance See latest adjustment procedure under "Automatic Choke" below

►*ROUGH ENGINE IDLE CORRECTION (Due to Leakage)* Check engine at 2000 RPM to stabilize fuel level in bowl If engine idles smoothly immediately after operation at 2000 RPM, but roughens progressively with length of time on idle, it can be assumed that leakage at inlet needle or gasket is occuring Remove inlet needle, seat and gasket Clean carburetor carefully to remove any foreign material. Install new inlet needle, seat and gasket. If rough idle not corrected by above and by engine tune-up (including valve lash), intake manifold should be checked for air leakage at gasket between manifold and cylinder head mating surface.



FORD, LINCOLN, MERCURY 4-BARREL "CENTRI-QUAD" CARBURETOR

►*HESITATION UPON ACCELERATION CORRECTION.* When a slight hesitation is felt upon light acceleration check to see that the carburetor is equipped with the correct accelerator nozzle and link and that link is set to correct adjustment See Accelerating Pump below.

DESCRIPTION· Four-barrel downdraft type Design has been changed from that used on 1954 Lincoln and new Secondary Fuel System, Primary Discharge Nozzles, and Choke Valve Assembly are used as follows

Primary Discharg N zzles—Discharge nozzles are located in the booster venturis mounted on the underside of the Air Horn & Plugs Assembly Distribution pins mounted in the lower end of the booster venturis assist in fuel distribution

Secondary Fuel System—Fuel is supplied to each secondary stage throat by tubes extending from the main body cover down to the main body Pick-up nozzles in the main body cover extend down into the fuel to the tubes Booster venturi tubes are not used

Choke Valve Assembly—Conventional choke valves are mounted on a short shaft in a new Air Horn & Plugs Assembly mounted on the throttle body directly above the primary barrels The choke shaft and lever assembly is mounted in the throttle body below the choke valves and is linked directly to the right hand choke valve (see illustration)

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FORD, LINCOLN, MERCURY CENTRI-QUAD (C nt.)

C ld Engine Idle Screw—The adjusting screw on the right side of all models contacts steps on fast idle cam during the engine warm-up period and controls cold engine idle speed (choke fast idle speed). Adjust cold engine idle speed each time the hot engine idle speed is adjusted.

ADJUSTMENTS: *Make all adjustments exactly as follows:*

Idle S tting: First set BOTH primary idle mixture adjusting screws (see table below) for initial adjustment. Start engine and operate it until normal operating temperature secured with choke valve wide open and fast idle cam in slow idle position. Back off fast idle screw so that it clears the fast idle cam. Set engine speed to correct hot or slow idle speed (see table below) by turning slow idle speed adjusting screw.

F rd—Turn both idle mixture screws (1/8 turn at a time) until smoothest idle at highest vacuum reading is obtained.

Linc ln-M rcury—Turn one idle mixture screw in until engine begins to run rough (lean), then back off needle until engine begins to roll (rich), then turn needle inward just enough to provide smoothest engine idle. Fuel mixture should favor the rich side. Repeat this procedure on other mixture screw.

All M d ls—Recheck idle speed and if not within limits readjust to specifications.

Idl Screw Setting

M d l	Turns Out
Ford (B5A-9510-G, H)	1 1/4
Ford (B5A-9510-M, N, B)	1/2-5/8
Lincoln-Mercury	1 1/2

Idle Speed

M d l	Idle Speed
Ford (Std. Trans.)	475-500 RPM
Ford Pass. Cars (Fordomatic)	①450-475 RPM
Ford Interceptor (Fordomatic)	①475-500 RPM
Ford Thunderbird (All Trans.)	①475-500 RPM
Lincoln (Turbo-Drive)	②425-450 RPM
Mercury (Std. Trans.)	475-500 RPM
Mercury (Merc-O-Matic)	②425-500 RPM

①—Selector lever in Neutral "N".
②—In "Drive" range.

Dashpot S tting (All Aut . Transmissions): After idle adjustment completed, turn ignition off, see that fast idle cam in slow idle position, hold throttle lever in closed position, turn dashpot adjusting screw out (counter-clockwise) until dashpot rod is pushed in to the limit of its travel, then turn adjusting screw in (clockwise) 1½-2 turns which will provide correct clearance of 045- 064"

Acc lerating Pump S tting: Set pump link in hole closest to throttle shaft (shortest stroke) for average or hot weather operation, outer hole for cold weather operation.

Bowl Ext rnal V nt S as nal S tting: Adjust clip on lower end of accelerator pump rod to open or close vent hole for best operation as follows:

Winter Operation (Temperatures b low 50°F)—Slide clip down on pump rod so that vent hole is CLOSED.

Summer Operation (Temperatures above 50°F)—Slide upward on pump rod so that full diameterof vent hole is open.

Fast Idle Setting: After making idle speed adjustment and with engine at normal operating temperature, turn fast idle speed adjusting screw until it just touches lowest step of fast idle cam *NOTE*—If this setting is unnecessarily high, the idle speed may be reduced by backing off the adjusting screw not to exceed one full turn

Secondary Throttle Operating Diaphragm Check: Remove carburetor from engine, remove main body and choke housing from throttle body Fully open (at the linkage) both primary and secondary throttle. Block off the secondary vacuum openings in the right primary and secondary venturi with the fingers Release sedondary throttle linkage while holding primary throttle linkage open. If no leak exists secondary throttle plates should remain partially open To check diaphragm unit, remove complete diaphragm and housing assembly from carburetor. Pull diaphragm rod in a direction to compress spring. Cover slot located in housing to carburetor mounting face with finger Release diaphragm rod If no leaks exist spring should remain partially compressed.

Float (Fuel) Level: To check fuel level with carburetor on car, remove air cleaner and main body cover from carburetor, crank engine with starter to fill bowl to operating level Install Gauge T54L-9550-C (Ford), 9550-AH (Lincoln-Mercury) squarely on top edge of main body so that gauging pins extend down into bowl. Fuel should be at least as high as longer GO pin but must not touch shorter NO GO pin Adjust by bending float tab.

► *CAUTION:* Both floats must be the same height and floats must not contact walls of float bowl.

FUEL LEVEL

All Carburetors	① 1/2±1/32"

①—With fuel pump pressure of 3½-4½ lbs.

Automatic Choke Setting: Mark on cover should be in line with center mark of scale on choke housing. Adjust by loosening three cover retainer screws and rotating cover assembly.

►*CHOKE ROD LENGTH NOTE:* Mercury engine has manifold to carburetor spacer EBJ-9447A (½" thick) and automatic choke rod B5A-9869-A (4¼" long). Whenever difficulty is experienced in adjusting choke rod for proper closing of choke plates, check dimension of these two parts.

Aut matic Choke R d Adjustm nt: Remove air cleaner, choke connector rod retainer and pull trunnion out of choke lever. Hold choke plates in fully closed position, raise and hold choke connector rod in its uppermost position and align the adjustable trunnion (on the upper section of rod) with the hole in carburetor choke shaft lever. Adjust the trunnion two additional turns upward (to lengthen the connecting rod). Secure the trunnion to the choke shaft lever.

Spark Control Valve: No adjustment required If operation not satisfactory, remove and inspect valve for free movement of the valve stem and inspect passage in adapter screw.

OVERHAUL: Check Secondary Throttle Operating Diaphragm before disassembling carburetor (see below). Then disassemble and overhaul carburetor as follows:

►*SECONDARY THROTTLE OPERATING DIAPHRAGM CHECK (Before disassembling carburetor):* Fully open secondary throttle valves and block off diaphragm passage at opening in primary stage venturi (use eraser end of a pencil) BEFORE releasing secondary throttle valves. Valves should remain open as long as venturi opening is blocked off. If valves do not remain open, diaphragm or gasket seal between diaphragm assembly and throttle body may be defective. Remove assembly from carburetor, disassemble, and inspect. Also inspect ball check valve located in diaphragm cover.

Disassembly (Secondary Throttle Operating Diaphragm): Take out attaching screw and remove vacuum diaphragm assembly cover plate. Remove retainer securing diaphragm rod to pin on lever and screw holding diaphragm lever on secondary throttle shaft, remove lever. Take out three screws retaining diaphragm housing on carburetor throttle body, remove diaphragm assembly and gasket.

Disassembly (Carburetor—after Secondary Throttle Operating Diaphragm removed): Remove carburetor cover and gasket. Remove pump rod pin from accelerator pump activating rod. Lift out pump piston. Remove pump rod upper seal and washer, accelerating pump rod lower seal, washers, and spring. Remove hairpin retainer from pin of the pump link, and link from throttle lever.

Main Body Disassembly—Remove float needle seat plug and gasket, and float hinge pin. Lift out float, float needle and clip, and float spring from carburetor bowl. Remove power valve and gasket, main metering jets and idle tube jets. Remove accelerating pump ball check retainer, invert carburetor to release main well tubes, accelerator pump discharge needle, and accelerator pump ball check valve. Remove two screws and lockwashers and separate choke housing from main body, remove main body. Remove spacer between main body and throttle body, remove fuel inlet adapter from main body.

Throttle Body—Remove spark control valve and gasket from throttle body, spark control metering jet from inside of spark control valve bore. Remove fuel inlet adapter, screen, filter, gasket, and spring, idle mixture adjusting screws, and the two screw-in plugs in secondary fuel passages. Invert throttle body and remove two

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY CENTRI-QUAD (Cont.)

steel balls. Remove two screws securing dashpot bracket to throttle body and remove bracket and dashpot assembly. Remove pin retainers from each end of throttle control rod, and flat washer from stop lever end of rod, remove rod. If fast idle cam not defective, remove retaining pin with a punch and remove fast idle cam. DO NOT ATTEMPT TO REMOVE FAST IDLE CAM SHAFT. If it is necessary to remove throttle plates for cleaning or repair, each plate must be identified as to the bore from which it was removed (left or right) so that plates can be installed in their original positions.

Power Valve Diaphragm–DO NOT remove assembly from main body cover unless tests indicate that replacement required. Remove by taking out three attaching screws and lifting off cover clamp and diaphragm assembly.

Cleaning & Inspection: Wash all parts except those noted below in clean solvent *(CAUTION*–Do not use solvent on pump piston leather, power valve diaphragm, spark control valve, nylon fuel inlet needle valve, nylon distributor passage ball, dashpot assembly, or secondary throttle operating diaphragm). Blow out passages in castings with air, dry all parts with air. Inspect all parts for wear and damage with particular attention to the following: Inspect castings and main body cover for cracks or leaks, inspect main well tubes, metering jet, and idle tubes for wear or clogged passages *(CAUTION*–clean with air, do not use drills to clean out calibrated openings). Replace all worn or damaged parts.

R assembly: Use all NEW gaskets. Install parts in reverse order of disassembly procedure (above) and note the following important points:

Throttle Plat Installati n–In addition to replacing each plate in its original position, place a .004" piece of shim stock 1/8-3/16" wide between the upper side (viewed from top) of each secondary throttle plate and the throat. Hold throttle plates closed against shim stock and tighten throttle plate screws. This assures maximum manifold vacuum for smooth efficient engine idle.

Main Body to Choke Housing & Throttle Body–Install spacer over mounting hole for long screw in throttle body, choke plate link so as to permit free travel of link under main body. Be sure "O" ring seal is not displaced and that main body locating dowels engage the throttle body. Small diameter washer must be used with longer of two main body to throttle body screws.

Accelerating Pump–Drop check ball into cylinder bore and tap lightly, using brass rod and mallet, to seat ball. Ball spring retainer projection must be placed over ball, and spring must bottom in cylinder bore groove.

Float Installation–Float spring must seat over boss in main body. Clip must hook the under side of float tab.

Main Body Cover Gasket–Make sure all holes have been punched in new gasket and that no foreign material has adhered to it. Never use any gasket sealer or any form of sealing compound on carburetor gaskets.

Power Valve Diaphragm Installation–Place new assembly on main body cover, position clamp, install the screw and secondary supply jets finger tight. Compress power valve stem to full limit of its travel, then tighten retaining screw and secondary supply jets. *NOTE*–Screw and tubes must be tightened while stem is in the compressed position to insure full travel of the power valve stem.

►*AIR CLEANER ANCHOR SCREW TIGHTENING CAUTION:* Over tightening may cause distortion of the carburetor main body and affect calibration of the metering passages.

Carbur tor Adjustm nts–Make all adjustments listed in ADJUSTMENTS above.

CARBURETOR INSTALLATION ON ENGINE: Install carburetor exactly as follows:

►*CAUTION: DO NOT use gasket sealer or compound on carburetor mounting gaskets.*

1) Position spacer on carburetor mounting pad on manifold with one gasket BELOW and second gasket ABOVE spacer.

2) Position carburetor over mounting studs and start fuel line and choke control inlet tube fittings but DO NOT tighten fittings at this time. Do not connect vacuum lines.

3) Install carburetor attaching nuts and lockwashers and tighten exactly as follows: Tighten all nuts just snug, then tighten each pair alternately in a criss-cross to a torque of 12-15 ft. lbs. *CAUTION*–Correct tightening is important to prevent air leaks or fuel leaks at grooved passages in base of carburetor throttle body.

4) Hold choke plates in fully closed position and adjust trunnion until the trunnion pin freely enters the hole in the choke lever. Adjust the trunnion two additional turns upward (to tighten the connecting rod). Install the trunnion in choke lever, secure it with a cotter pin. Check choke linkage for free movement. Install air cleaner. *NOTE*–This adjustment will assist in overcoming hard starting.

SERVICE PARTS: *CAUTION–Metering jets furnished in repair kits listed below are STANDARD (for 0 to 5000 ft. Altitude).*

Gasket Set–Ford No. B5A 9502-B (Ford Carb.), Lincoln-Mercury No. MFK 9502-A (Lincoln EBJ 9510-D, Mercury ECK 9510C, D, ECL 9510-B).

Repair Kit–(With Std. Metering J ts)–Ford No. B5A 9590-B (Ford B5A 9510-G,H), Lincoln-Mercury No. HFK 9590-A (Lincoln EBJ 9510-D), No. MFK 9590-A (Mercury ECK 9510C, D, ECL 9510-B).

FORD, LINCOLN, MERCURY 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model Year	Carburetor Model	Main Metering Jet Size Part No.	Secondary Metering Jet Size Part No.	Main Well Tube Assembly	Economizer Assembly Part No.	Power Jet Part No.	Idle Tub Part No.
FORD V8 Cars							
Optl. Synchro-mesh..... 1955	B5A-9510-G	.053" ④....B4T-9533-B	.078"..... B5A-9648-A	B5A-9991-A	B5A-9904-A	B5A-9594-A	8CM-9542
Optl. Fordomatic.....1955	B5A-9510-H	.052" ⑤....86H-9533	.078".....B5A-9648-A	B5A-9991-A	B5A-9904-A	B5A-9594-A	8CM-9542
THUNDERBIRD							
Synchro-mesh..... 1955	B5A-9510-G	.053" ⑥....B4T-9533-B	.078" ⑧... B5A-9648-A	B5A-9991-A	B5A-9904-A	B5A-9594-A	8CM-9542
Fordomatic..... 1955	B5A-9510-H	.052" ⑦....86H-9533	.078" ⑧....B5A-9648-A	B5A-9991-A	B5A-9991-A	B5A-9594-A	8CM-9542
LINCOLN							
All.....1953	EAD-9510-H	.061".....B4Q-9533-A	.058".....EAD-99594-A	EAM-9991-A	EAD-9904-B	EAD-9594-C	EAD-9542-A
All.....1954	EAD-9510-N	.066".....IGA-9533C①	.055".....EAD-99594-A②	EAM-9991-A	EAD-9904-B	EAD-9594-E	EAD-9542-A
Early 1955	EBJ-9510-D	.052".....86H-9533-B	ECK-99594-A & 600-A	ECK-9991-A	ECK-9904-A	ECK-9594-A	EAD-9542-A
Later..... 1955	EBJ-9510-F	.053"..... B4T-9533-B	.....	None ⑨	ECK-9904-A	⑩	EAD-9542-A
MERCURY							
Synchro-mesh.....1954	EBY-9510-G	.052".....86H-9533 ⑥	.055".....EAD-99594-C②	EAM-9991-A	EAD-9904-B	EBY-9594-A	8CM-9542
Auto. Trans.....1954	EBY-9510-H	.052".....86H-9533⑥	.055".....EAD-99594-C ②	EAM-9991-A	EAD-9904-B	EBY-9594-A	8CM-9542
Early Synchro-mesh..... 1955	ECK-9510-C	.053"..... 86H-9533-B	.078".....B5A-9648-A	B5A-9991-A	B5A-9904-A	EBY-9594-A	8CM-9542
Later Synchro-mesh..... 1955	ECK-9510-G	.051"	.086" ⑫	....	B5A-9904-A	⑩	8CM-9542
Early Mercomatic..... 1955	ECL-9510-B	.052"..... 86H-9533	.078".....B5A-9648-A	B5A-9991-A	B5A-9904-A	EBY-9594-A	8CM-9542
Later Mercomatic..... 1955	ECK-9510-D	.052".....86H-9533	.078".....B5A-9648-A	B5A-9991-A	B5A-9904-A	EBY-9594-A	8CM-9542
Later Mercomatic 1955	ECK-9510-H	.050"	.086" ⑫	None ⑨	B5A-9904-A	⑪	8CM-9542

①—Use 78-9533-E (.056") for 5,000 to 10,000 ft. altitudes.
Use 8EL-9533-B (.053") for 10,000 to 15,000 ft. altitudes.

②—Use EAD-99594-C (.052") for 5,000 to 10,000 ft. altitudes.
Use EAD-99594-D (.049") for 10,000 to 15,000 ft. altitudes.

④—Use 59A 9533-A (.051") for 5,000 to 10,000 ft. altitudes.
Use 59A 9533-B (.049") for 10,000 to 15,000 ft. altitudes.

⑤—Use 78 9533-A (.050") for 5,000 to 10,000 ft. altitudes.
Use 78 9533-B (.048") for 10,000 to 15,000 ft. altitudes.

⑥—Use 78 9533-B (.048") for 5,000 to 10,000 ft. altitudes(supersedes .050").
Use .045" for 10,000 to 15,000 ft. altitudes (supersedes .047").

⑦—Use 78 9533-B (.048") for 5,000 to 10,000 ft. altitudes (supersedes .049").
Use .045" for 10,000 to 15,000 ft. altitudes (supersedes .046").

⑧—Use .070" for 5,000 to 10,000 ft. altitudes (supersedes .075").
Use .063" for 10,000 to 15,000 ft. altitudes (supersedes .072").

⑨—None (Main Well Discharge Nozzles used). ⑩—New (Size No. 40).
⑪—New (Size No. 43). ⑫—New Secondary Venturi Fuel Supply Metering Jet Tube.

LINCOLN & MERCURY AUTOMATIC CHOKE

►*1952 LINCOLN IMPROPER AUTOMATIC CHOKE OPERATION (Caused by exhaust gas leakage in Iconel Tube in Manifold): See "Lincoln-Mercury Centri-flo Carburetor" in Carburetor Section for complete data on checking and correcting this trouble.*

►*ERRATIC ENGINE PERFORMANCE (Erratic Idle Speed, Poor Gasoline Mileage, or Mis-firing caused by automatic choke opening late or not opening fully):* May be caused by air leak in hot air tube between manifold and choke housing due to use of 5/16" fitting instead of ¼" type. See that correct type fittings used and that all connections are tight.

DESCRIPTION: *Two types used (1) Integrally mtd. (on carburetor air horn), (2) Separately mtd. (on manifold and linked to choke valve lever by connector rod).*

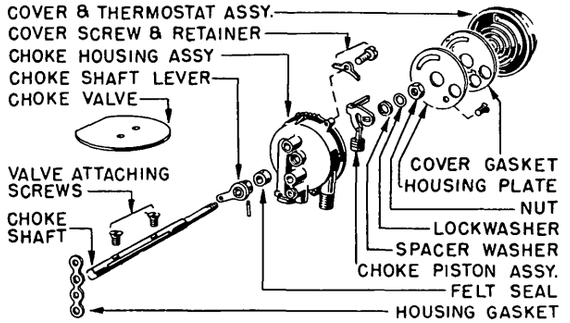
(1) Integrally Mtd. Type—Assembly is mounted on carburetor and linked directly to the choke valve shaft. It consists of a thermostatic coil and vacuum piston assembly to control the choke valve, a fast idle linkage which opens the throttle valve to provide a faster engine idle speed when cold, and an unloading device to correct engine flooding.

(2) Separately Mtd. Type—Choke assembly is similar to first type except that the complete assembly is mounted on the intake manifold by three attaching screws with air and vacuum channels (for control) terminating in ports at the mounting gasket. Automatic choke shaft lever is linked to carburetor choke shaft lever by a connector rod.

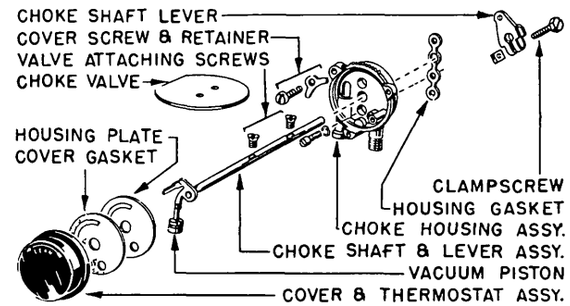
OPERATION: Automatic Choke—Thermostatic coil is bi-metal type and tends to "wind-up" and close the choke valve when the engine is cold so that the choke valve is fully closed for cold starting. In this position, the vacuum piston is at the top of the cylinder. As soon as the engine begins to fire, manifold vacuum tends to pull the piston down in the cylinder which opens the choke valve partially (valve is offset and air flow through the air horn also tends to open the valve). As the engine warms up, the thermostatic coil "unwinds" lessening the tension on the choke valve and allowing it to open so that at normal operating temperatures the choke valve will be wide open. Warm air is introduced into the choke housing to effect this unwinding of the thermostatic coil (filtered air from air horn passes through stove in manifold and then flows to the housing). This air flow is controlled by the vacuum piston (slots in the cylinder are uncovered when piston moves down in cylinder and warm air is drawn into housing).

Fast Idle—Consists of a stepped fast idle cam linked to the choke valve shaft and serving as the stop for the throttle valve idle speed adjusting screw.

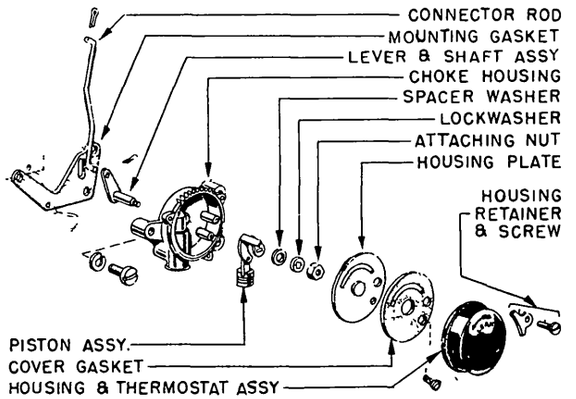
Unloading Device—When the throttle valve is opened wide, the throttle lever opens the choke valve slightly through the fast idle linkage. This can be used to correct flooding caused by over-choking.



LINCOLN INTEGRAL AUTOMATIC CHOKE



MERCURY INTEGRAL AUTOMATIC CHOKE



LINCOLN & MERCURY SEPARATE AUTOMATIC CHOKE

CHOKE SETTING: Centered (At Index). Reference mark on edge of thermostatic coil and cover assembly shound be aligned with center (longer) line of scale on housing. If a richer or leaner setting required, setting should be changed not more than one division either way from centered setting.

Automatic Choke Adjustment—Loosen 3 cover retaining screws, rotate cover and coil assembly in direction of the arrow for Leaner setting and less choke action, and in opposite direction for Richer setting or more choke action.

FAST IDLE SETTING: Fast idle is set in production and should not require adjustment in the field.

DISASSEMBLY: *Each type disassembled as follows:*

Integrally Mtd. Type—Disconnect and remove connector rod linking choke lever and fast idle cam. On Mercury take out clampscrew and remove choke lever from shaft. Take out retaining screws and remove choke valve. Remove screws and retainers on cover, rotate cover and thermostatic coil assembly toward "lean" to disconnect coil hook, remove cover assembly and gasket. Take out attaching screw and remove housing plate. On Mercury, rotate shaft until vacuum piston is free from the cylinder, withdraw shaft and piston assembly from air horn. On Lincoln, remove nut, lockwasher, and spacer washer from end of shaft, rotate shaft and remove piston and link assembly (shaft cannot be removed until after choke housing removed). Remove choke housing attaching screws, remove housing and mounting gasket from air horn (On Lincoln, felt seal and shaft can then be removed from air horn).

Separately Mtd. Type—Disconnect and remove rod linking choke lever and carburetor choke valve lever. Take out three attaching screws and remove choke assembly and mounting gasket from air horn. Remove screws and retainers on cover, rotate cover and thermostatic coil assembly toward "lean" to disengage coil hook, remove cover assembly and gasket. Take out attaching screw and remove housing plate. Remove nut, lockwasher, and spacer washer on end of shaft, rotate shaft and remove vacuum piston and link assembly, withdraw choke shaft and lever through back of housing.

INSPECTION: See that all parts of choke mechanism are clean and that choke shaft and piston assembly operate freely and that piston edges and cylinder are free from burrs. *NOTE*—Carbon deposits on piston or in choke housing indicate possibility of exhaust gas leakage in Inconel Tube passage (see 1952 Lincoln Improper Choke Operation Note above). Blow out all passages in choke housing (and in carburetor on integrally mounted type) with compressed air. Use all new gaskets and seals when reassembling unit. DO NOT lubricate any part of the choke mechanism.

REASSEMBLY: Reverse disassembly directions (above). When installing cover and thermostatic coil assembly, see that coil hook is down, then rotate cover toward "rich" (opposite to direction of arrow) until hook is felt to engage choke shaft prong, install cover locking plates and screws. Readjust automatic choke after installation.

ROCHESTER B & BC (CHEVROLET & PONTIAC)

ORIGINAL EQUIP CARBURETORS

CHEVROLET	Carburetor No.
(216" Engine)	Carburetor No.
1949-50 Cars & Trucks	B 7002050
1951 First Cars & Trucks	B 7003152
1951 Later Cars	B 7003865
1951 Later Trucks	B 7003863
1952 Cars	B 7004477
1952-53 Trucks	B 7004475
(235" Engine)	
1950 Early Powerglide Cars	①B 7002051
1950 Later Powerglide Cars	②B 7003060
1950-51 Trucks	B 7002051
1951 Early Powerglide Cars	B 7003160
1951 Later Powerglide Cars	B 7004495
1951 Later Trucks	B 7003864
1952 Powerglide Cars	BC 7003526
1952 Trucks	B 7004476
1953 Synchro-mesh Cars	BC 7004915
1953 Powerglide Cars	BC 7004478
1953 Trucks	B 7004468
1954 Synchro-mesh Cars	BC 7005921
Powerglide Cars	BC 7005922
Auto. Trans. Trucks	BC 7005921
Std. Trans. Trucks	B 7004468
1955 Synchro-mesh 6 Cyl. Cars	BC 7007181
Powerglide 6 Cyl Cars	BC 7007180
Std. Trans Trucks (Early)	B 7004468
Auto. Trans. Trucks (Early)	BC 7005921
Std. Trans. Trucks (Late)	B 7004468
Auto Trans. Trucks (Late)	BC 7007181
(261" Eng.)	
1954 Trucks	B 7005140
1955 Trucks (Early)	B 7005140
(Late)	B 7005140
PONTIAC	
1951-52 Six	BC 7002870

CHEVROLET REPL. CARBURETORS

Application	Repl. Carburetor Pkg.
All 216" Eng. Cars & Trks.④	7004600
All 216" Eng. Cars & Trks ⑤	③7005060
1950-51 Powerglide Cars④	7003986
1950-52 Powerglide Cars⑤	③7003526
1950-52 235" Eng. Trk.④	7004476
1953 235" Eng Cars⑤	7005921
1953 Powerglide Cars⑤	7005922
1953 235" Eng. Trks.④	7004468

①—See Throttle Return Check Installation.
②—This model has Throttle Return Check.
③—When used to replace manual choke carburetor, Stove Adapter Pkg. No. 7003924 will be required.
④—With manual choke control.
⑤—With automatic choke control.

▷CHANGES, CAUTIONS, CORRECTIONS

▷CARBURETOR IDENTIFICATION—Carburetors similar in appearance but have part number embossed on brass tag attached by one air horn screw and also have last two digits of part number stamped on air horn.

▷CHEVROLET CARBURETOR INSULATOR & GASKET INSTALLATION CAUTION: Use gasket only on 1932-36 cars where gasket used (discard gasket when heat insulator used). When installing insulator, remove and discard old insulator and inner metal sleeve. Install new insulator (or gasket) with two vacuum ports upward (next to carburetor).

CAUTION—Incorrect gasket or insulator installation will cause rich mixture and poor gasoline mileage (by allowing power jet to operate all of the time).

▷ENGINE STALLING WHILE PARKING (EARLY POWERGLIDE CARS with 7002051 Carburetor): Can be corrected by installing Throttle Return Check No. 7003220 (as used on later 7003060 carburetors). Requires installation of new type Throttle Body Assembly No. 7003235 (with contact arm on throttle lever for throttle check operation). *See Throttle Return Check data below.*

▷CHEVROLET 1949-50 ENGINE STALLING WHEN DECELERATED OR ON SUDDEN STOPS: Caused by incorrect adjustment or leakage. If condition not corrected by tuning up engine and adjusting carburetor (idle mixture and idle speed adjustment), remove carburetor and check for leakage as follows:

1) Leakage at Vacuum Channel or Carburetor Throat caused by incorrect sealing of Air Horn Gasket. Fill bowl with fuel, tip carburetor to left and roll back slightly on mounting flange until vacuum channel hole is at lowest point, check for fuel leakage from vacuum channel outlet at mounting flange face. Tilt carburetor in all directions and check for leakage in throat at gasket edge. If leaks noted, remove air horn assembly, remove floats, replace air horn gasket (and main well support gasket on first carburetors) with new rubberized Air Horn Gasket No. 7002894 (7003060 Carb.—may be identified by ⅛" round notch at edge of one bowl opening), No. 7002799 (Others). Check and adjust float level.

2) Leakage at Vacuum Power Piston. To check install carburetor on engine with manifold heat insulator upside down (will shut off vacuum channel). If this corrects stalling, leakage past piston is indicated. Correct by replacing air horn. CAUTION—heat insulator must be correctly installed when carburetor replaced on engine (two cut-out vacuum ports upward next to carburetor flange).

▷CHEVROLET ENGINE STALL OR HARD TO START WHEN HOT (Cars with 7002050 & 7002051 Carburetors): May be experienced in hot weather after prolonged high speed driving. On Powerglide cars, correct by installing later type 7003060 carburetor with new design bowl vents and Throttle Return Check. On other cars with 7002050 carburetor (& Powerglide cars if 7003060 carburetor not available), provide additional bowl vent by drilling air horn as follows:

7002050 & 7002051 Bowl Vent—Remove air horn from carburetor, drill ¼" diameter hole in air horn tower over top of accelerating pump plunger locating hole on side of tower ¼" down from top and 1" forward from rear edge of tower. Carefully clean all drill chips from air horn and recheck float level when re-installing air horn.

7002051 Carburetor Note—Install new Throttle Body and Throttle Return Check when making above correction on these carburetors.

▷CHEVROLET ENGINE ROUGH IDLE: If engine stalls when hot, see stalling correction above. If rough idle cannot be corrected by tuning up engine and cleaning out all fuel passages (blow out with compressed air), check for air leaks as follows: Examine main well support for burrs preventing tight connection at support mounting face, see that support is securely attached to air horn. Check for leak at upper seat of power piston by removing air cleaner and placing moistened finger over power piston vent passage in air horn (inside air horn toward right front edge and approximately 2" down). If engine idle smooths out when vent closed, air leak is indicated. Correct by replacing air horn and power piston.

▷CHEVROLET ENGINE SPEED EXCESSIVE WHEN CHOKE IN USE (Early 1950 Cars & Trucks): Caused by design of choke lever (has definite raised portion on cam in area where kick lever contacts cam in full choke position). Correct by installing later design No. 7002888 Choke Lever & Swivel Assy. (supersedes No. 7002084) or file approximately .038" off choke lever cam, starting at point where kick lever contacts cam in full choke position and blending back to zero at point ⅛" from starting point where kick lever contacts cam in no choke position. NOTE—Reworking of cam will result in approximately 1/16" throttle opening in full choke position (can be checked by inserting 1/16" drill between valve and carburetor wall).

▷CHEVROLET ENGINE SURGE AT 22-35 MPH. (1949-50 216" Engine Cars): Correct by tuning up engine with particular attention to following points:
Ignition Timing—Set at 5° BTDC. with octane selector at "0." Avoid excessive spark advance.
Spark Plug Gap—Increase gap to .040". Avoid excessively close plug gaps.
Tight Engine—Do not attempt to correct surge on cars until engine has been run 1000 miles or more.

▷CHEVROLET HESITATION ON ACCELERATION: Check for clogged pump passages (blow out with air), check pump plunger leather (replace if creased or not sufficently flexible to contact entire surface of cylinder), check seating of vent check ball in plunger (replace plunger if ball sticking or not seating). Check pump outlet check ball for leakage by operating pump with air horn removed. Fuel should remain on top of brass outlet guide. If fuel seeps back into bowl, remove pump guide and reseat ball by tapping lightly with brass rod. If ball seat pitted, replace bowl casting.

▷CHEVROLET 1949 CARBURETOR BOWL COVER GASKET CHANGE: Gasket No. 7002799 (superseding No. 7002114), used which incorporates main well support gasket. When this gasket used, gasket can not be removed for float setting (see float setting change following).

▷CHEVROLET 1949 FLOAT SETTING CHANGE: Float setting changed to 1 5/16" measured with the bowl cover gasket in place (new cover gasket described above cannot be removed for float level setting check). See FLOAT LEVEL data.

▷*CHEVROLET 1953 ENGINE SURGE ON EARLY PASS. CARS (At part-throttle float operation at 20-25 MPH. or during 40-25 MPH. overrun):* May be caused by too much vacuum advance or by slightly lean carburetor. Correct as follows:

1) Limit Vacuum Advance—On engines before No LAA-391110 (without Powerglide), No. LAQ-178807

CONTINUED ON NEXT PAGE

ROCHESTER B & BC (C nt.)

(with Powerglide), with 20° Vacuum Spark Advance Link (stamped "744"), limit link travel to 15° by inserting a ⅛" cotter pin in the link slot. *NOTE*—Engines after above numbers have new 15° Spark Advance Link (stamped "845").

2) Change Carburetor Main Well & Power Valve Support Assembly (First Powerglide Engines only)—On carburetors date stamped "L2" or "M2" (on bowl cover), replace original Main Well & Power Valve Support Assembly with new Assembly No. 7005422 which has slightly richer main metering jet and power jet. *NOTE*—Carburetors date stamped "A3" and later have this new No. 7005422 assembly (also used in ALL carburetors on engines without Powerglide).

3) Change Carburetor Metering Jet (All Engines): If carburetor slightly lean, install #59 or #60 Main Metering Jet (replacing original .057" Part No. 7002657 jet).

►**PONTIAC CARBURETOR INSTALLATION CAUTION:** Same carburetor used on all cars but throttle connector rod should be connected to **right hand** hole in throttle lever on Synchro-mesh Trans. cars, and to **left hand** hole on Hydra-Matic Drive cars (facing throttle lever side of carburetor).

DESCRIPTION

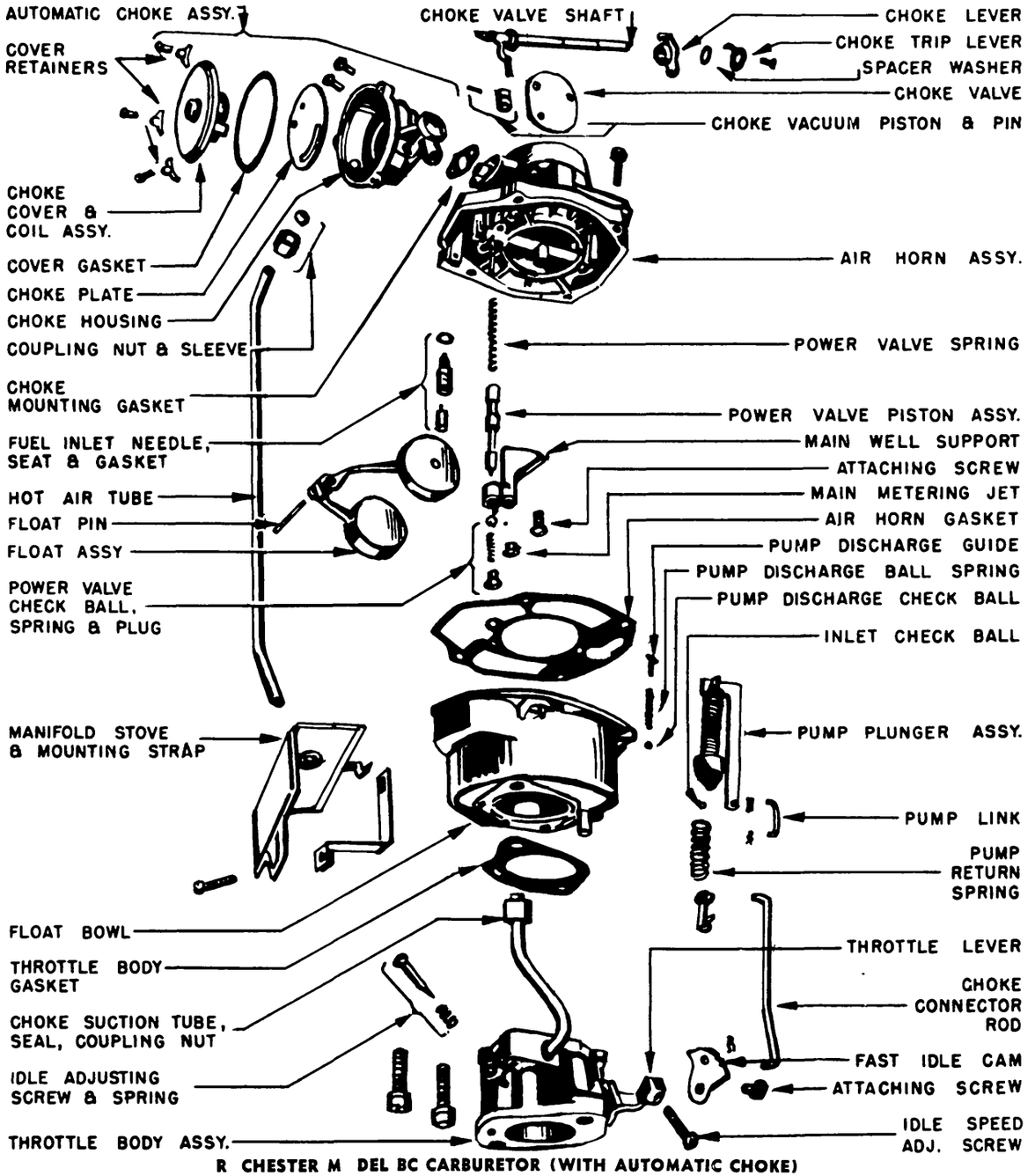
DESCRIPTION: Plain tube, downdraft type of new design with concentric fuel bowl, double float, vacuum controlled power system, and fast idle and throttle kicker linkage for starting and warming up.

Idle Fuel System—Fuel is drawn from main nozzle cross-bar in air horn and mixed with air admitted through three air bleeds in cross-bar. Fuel mixture is then metered by idle tube (in end of cross-bar) and taken down through passage to idle ports at throttle edge. For closed throttle idling, fuel is discharged through lower port and controlled by idle adjusting screw. As soon as throttle valve is opened for low speed operation, additional fuel is discharged through secondary ports above throttle.

1952-55 IDLE SYSTEM CHANGES: Idle cross passage in nozzle bar has only two air bleed holes (was three) and an additional passage is provided in the air horn to vent the idle passage to the fuel bowl which prevents vapor collecting in idle passages and cross bar when a hot engine is shut down. This vent system also acts as an air bleed for the idle system.

Main Fuel System—As throttle valve is opened and suction increases at main discharge nozzle under cross-bar, fuel mixture is discharged through this nozzle and idle system drops out. This fuel is metered by Main Metering Jet and mixed with air admitted through air bleeds in cross-bar. Main fuel system delivers all fuel required for normal operation in 25-70 MPH. range.

Power System—Consists of a ball type Power Valve controlled by a spring-loaded vacuum piston which permits additional fuel to flow to main nozzle when valve is open. Vacuum piston is normally held up by manifold vacuum so that power valve is closed by spring below ball. Whenever manifold vacuum drops below 5" (for full power or high speed operation), spring forces piston down and plunger stem opens valve. Fuel admitted through valve is metered by Power Restriction in fuel passage.



R CHESTER M DEL BC CARBURETOR (WITH AUTOMATIC CHOKE)

1954-55 TWO-STEP POWER SYSTEM (Model "BC" Carburetors): Power valve check ball is located in a well so that at a slight opening of the ball check, the fuel flow is controlled and metered by the clearance between the ball and the well. At wide open throttle, the ball is moved out of the restricted well area and the fuel flow is controlled by the power restriction in the fuel discharge channel. A special

CONTINUED ON NEXT PAGE

ROCHESTER B & BC (Cont.)

"barrel" shaped spring is used below the ball to provide clearance within the well.

Accelerating Pump System—Spring-loaded piston type which provides sustained discharge regardless of rate of throttle opening (link hole in pump plunger slotted and actuating spring located above pump piston). Fuel is drawn into pump cylinder through intake ball check in bottom of cylinder and is discharged through pump jet which sprays the fuel on the lower edge of the small venturi.

1952-55 PUMP SYSTEM CHANGES: Discharge passage in air horn and pump discharge jet have been eliminated (pump discharges through passage drilled in main body from point just below pump discharge guide and opening into main venturi section of carburetor). Pump inlet ball check screen, and inlet passage also eliminated (vapor vent passage in pump piston acts as pump inlet passage).

Pump Vapor Vent—Consists of a ball check valve in the piston head which allows any fuel vapor in cylinder to escape through passage in pump plunger opening into bowl. This check valve is closed during normal pump operation.

Automatic Choke & Fast Idle (All BC Carburetors): Consists of a thermostatic coil and vacuum piston assembly mounted in housing on air horn and linked to the choke valve shaft. Choke has two external tube connections—Heat Suction Tube from the choke housing to carburetor throttle body, Heat Tube from choke housing to manifold stove. Fast Idle and Unloader mechanism is linked to lever on opposite end of choke valve shaft.

Throttle Return Check (Chevrolet Powerglide Cars): Consists of a spring-loaded diaphragm type dashpot mounted on the carburetor with an adjustable plunger which contacts an arm on the throttle lever and prevents throttle valve closing too rapidly when accelerator pedal released. *See Throttle Return Check data below.*

ADJUSTMENT & OVERHAUL

IDLE ADJUSTMENT: If carburetor out of adjustment, turn idle adjusting screw in until it is seated, then back screw out 1½ turns. Start engine and allow it to idle until thoroughly warm. Then adjust with choke valve wide open and fast idle inoperative.

Idle Screw Setting—Set for smooth idle. Final setting should not be more than ½ turn in or out from initial position as shown below.

Idle Mixture Setting

Model	No. Turns Open
Chevrolet	
1949-53 (Exc. Powerglide)	1½-2½ turns
(Powerglide)	1-2½ turns
1954 Pass Cars (All)	1-2½ turns
Trucks (235" Eng)	1½-2½ turns
(261" Eng)	1-1½ turns
1955 Pass Cars (All)	2½ turns
Trucks (BC Carb)	2½ turns
(B Carb)	1½-2½ turns
Pontiac	1½ turns

Idle Speed Setting

Model	Synchro-mesh	Auto. Trans.
Chevrolet		
1949-53 All	450-500 RPM	①425 RPM
1954 Pass Cars	475 RPM	①425 RPM
Trucks	450-500 RPM	②400-450 RPM
1955 Pass Cars	475 RPM	①425 RPM
Trucks	450-500 RPM	②400-450 RPM
Pontiac	450-475 RPM③	365-385 RPM

①—With selector lever in "DR" position.
②—With selector lever in "N" position.
③—Or 7-8 MPH.

ACCELERATING PUMP: Not necessary to check pump. No seasonal adjustment provided.

▷*CHEVROLET 1949-50 PUMP LINK PRODUCTION CHANGE & REPLACEMENT CAUTION:* Design changed in production and correct type must be used on each of the following carburetor models:

Chevrolet Accelerating Pump Link

Carburetor	First Type Link	Later Type Link
7002050 & 7001374	7002353	③7002820
7002051	7002355①	②④7002821
7003060		②④7002821

①—Has shallow groove machined on upper end.
③—Has shallow groove machined on center.
③—Length .840". ④—Length .805".

POWER JET: Valve opens when manifold vacuum drops below 5" of mercury. No adjustment required.

▷*CHEVROLET POWER VALVE PISTON SPRING CAUTION:* Correct type must be used on each carburetor:

Power Valve Piston Spring

Carburetor	Length	Weight	Part No.
7002050 & 7001374	2 3/16"	4½ ozs.	①7002071
7002051 & 7003060	2 17/64"	5 ozs.	②7002366
7002870			7002896
7003152, 7003863, 7003865			7002071
7003160, 7003526, 7003864			7002366
7004475, 7004477, 7004620			7002071
7004468, 7004476, 7004478.			7002366
7004495, 7004915			7002366
7004468, 7005140			7002366
7005921, 7005922			7002896
7007180, 7007181			7002896

①—Wire Diameter .014".
②—Wire Diameter .015". Copper flash marking.

FLOAT LEVEL: *CAUTION—Two adjustments required: (1) Float Level Setting, (2) Float Drop or Travel.*

▷*MODEL BC CAUTION*—When removing bowl cover, disconnect heat tube at upper coupling nut and use extreme care not to disturb seal at lower end of tube.

▷Chevrolet Float Level Note—First type Float Level Gauge J-4186 can be used but should be placed on top of gasket (do not remove gasket). New Gauge No. 3696192 checks both floats for height and alignment in single operation.

Float Level Setting: Measure from bottom of each float to gasket on bowl cover (do not remove gasket) with needle valve closed (float and cover assembly inverted). To check float level, remove air horn and float assembly and invert with cover gasket in place. Install gauge (see table below) in position over floats (on Chevrolet, center tang on gauge will enter main discharge nozzle). Bend float arms vertically so that each float just touches top of cut-out in gauge. On Chevrolet, bend float arms horizontally so that each float is centered in gauge cut-out (this adjustment made as part of float drop setting on Pontiac). Check setting by tilting assembly 90° to each side and make certain that floats are still centered in gauge, recheck float level. This alignment of floats is neecssary to insure that floats will not rub on sides of bowl.

Float Level Setting

Car & Carb.	Float Level	Checking Gauge
Chevrolet (all)	1 5/16"	①3696192
Pontiac 7002870	1 1/4"	J-4554

①—Rochester Gauge No. M-250.

▷*CAUTION—Both floats must be set exactly alike.*

Chevrolet Float Travel (Drop) Setting—1¾" from cover gasket to the bottom of each float with the floats in extreme lower position. To check, hold assembly in upright position so that floats drop to bottom of travel, measure from gasket seat on cover to bottom of floats. If distance not within limits, adjust by bending float tang on float lever.

Pontiac Float Travel (Drop) Setting—¼" from cover gasket to top of each float with the floats in extreme lower position. Use float level gauge (below) to check float travel. Hold air horn assembly right side up with floats hanging freely. Install gauge with flat side up against cover gasket and small cut-out in gauge over main discharge nozzle. Bend float tang at rear of float arm so that tops of both floats just contact bottom of cut-outs in gauge (gauge should slide freely between cover gasket and floats). Bend float arms horizontally so that each float is centered in gauge cut-out (this alignment necessary to insure that floats will not rub on sides of bowl).

▷*CAUTION—Recheck float level after adjusting float travel.*

▷Chevrolet Air Horn Installation Caution: When reinstalling air horn assembly, hold throttle kicker in vertical position (against spring tension) while lowering air horn on body casting.

Float Needle Valve & Seat: Furnished as matched sets.

Float Needle Valve & Seat

Car Model	Size	Part No.
Chevrolet (All)	.091"	②7002359
Pontiac		③7002885

②—Marked by two grooves on O. D. of seat.
③—Used with No. 7002849 Float Valve Clip by which intake needle is clipped to float arm.

THROTTLE KICKER (Chevrolet Model B Carburetors): Spring-loaded kicker lever mounted on side of bowl casting. Lower end of kicker lever acts as stop for the throttle lever stopscrew and upper end bears against fast idle cam which is integral with

CONTINUED ON NEXT PAGE

ROCHESTER B & BC (C nt.)

the choke valve lever. Rotation of cam as choke valve is closed for cold starting rocks the kicker lever and opening throttle for fast idle.

Adjustment—Not required. Operation will be satisfactory if parts correctly assembled.

FAST IDLE (Model BC Carburetors): A stepped fast idle cam linked to the choke valve and serving as a stop for the throttle lever stopscrew. Stopscrew engages high step of cam when choke valve is closed for cold starting so that the throttle valve is opened to fast idle position. Rotation of the cam as the choke valve opens causes the stopscrew to rest on successively lower steps of the cam and allows the throttle to close to the final hot or slow idle position. Adjustment required only when linkage disconnected (to establish correct relationship between fast idle cam and choke valve positions).

Adjustment—To check setting, rotate fast idle cam until throttle stopscrew rests on second (next to highest) step of cam. Check choke valve opening or clearance between lower edge of valve and air horn wall. This clearance should be equal to thickness of proper checking gauge (see table below). If clearance not correct, adjust by bending connector rod using bending tool BT-18 (Chevrolet & Pontiac No. J-4552).

Fast Idle Setting

Car & Carb.	Choke Opening	①Checking Gauge
Chevrolet (1949-53)	.073"	③ BT-64
(1954-55)	.076"	BT-99
Pontiac (All)	.059"	④ BT-50

①—SMALL end of combination gauge.
③—Chevrolet Gauge No. J-5120.
④—Pontiac Gauge No. J-4553.

UNLOADER (Model BC Carburetors): Consists of tang throttle lever which engages the fast idle cam and opens the choke valve to correct flooding when the throttle valve is opened wide.

Adjustment—To check setting, hold throttle in wide open position, check choke valve opening or clearance between lower edge of valve and air horn wall. This clearance should be equal to thickness of proper checking gauge (see table below). If clearance not correct, adjust by bending tang on throttle lever using bending tool BT-18 (Chevrolet & Pontiac No. J-4552).

Unloader Setting

Car & Carb.	Choke Opening	②Checking Gauge
Chevrolet (1949-53)	.166"	③ BT-64
(1954-55)	.230"	⑫ BT-99
Pontiac (7002870)	.221"	④ BT-50

②—LARGE end of combination gauge.
③—Chevrolet Gauge No. J-5120.
④—Pontiac Gauge No. J-4553.

THROTTLE RETURN CHECK (CHEVROLET): Used on Powerglide Cars. *NOTE*—Not originally installed on first No. 7002051 carburetors, but can be installed in the field by installing new Throttle Body Assembly No. 7003235 also. Make installation as follows:
Installation (On Carburetor No. 7002051)—Install the carburetor together with the Throttle Return Check Unit on manifold (return check held in place by one mounting stud nut), check alignment of return check plunger adjusting screw with contact arm on throttle lever and bend bracket or contact arm as necessary to center the adjusting screw on radius or contact arm. Make certain that latest type No. 3695705 Throttle Return Spring (with ½" loop at each end) is used.

CAUTION—No. 3685718 Throttle Return Spring (with 1½" loop at each end) was used on first cars but is now used only on truck engines.

Adjustment: ***CAUTION—Different procedure required on manual choke and automatic choke carburetors as directed below. After adjusting, check performance as indicated.***

Model B (Manual Choke) Carburetors—Check alignment of adjusting screw with contact arm on throttle lever and bend return check mounting bracket or contact arm to center adjusting screw on arm. With engine thoroughly warmed up, adjust carburetor for smooth idle at 425 RPM. with selector lever in "D" position, shut off engine. Remove air cleaner. Insert .090" feeler gauge between choke lever cam and fast idle lever on air horn. Hold return check shaft from turning with a 9/32" wrench, turn adjusting screw out until it just contacts the throttle lever contact arm. Screw must not project more than ⅜-½" measured from underside of screw head to shoulder on shaft. If screw projects more than ½", bend mounting bracket and readjust screw. Then check performance (see below).

Model BC (Automatic Choke) Carburetors—Check and adjust return check adjusting screw alignment, and adjust engine idle speed, as directed for Model B type above. Shut off engine. Move choke valve to closed position so that throttle stop screw rests on high step of fast idle cam. Hold return check shaft from turning with a 9/32" wrench, turn adjusting screw out until it just contacts the throttle lever contact arm. Screw must not project more than ⅜-½" measured from underside of screw head to shoulder on shaft. If screw projects more than ½", bend mounting bracket and readjust screw. Then check performance (see below).

Throttle Return Check Performance Test—Set parking brake securely, place selector lever in "D" position. Accelerate engine to stall speed, then release accelerator pedal quickly. If engine stalls, turn adjusting screw out ½ turn and repeat test. Do not turn screw out more than 1½ turns from point of initial setting. *CAUTION*—More than 1½ turns will disengage screw from nylon locking device.

CHOKE (Chevrolet—Manual Type): Offset, semi-automatic type valve (lever is spring-loaded on shaft so that valve is free to assume correct position during warming up period).

Adjustment—With control wire retainer screw on choke lever loosened, see that choke button on instrument panel pushed all the way in, hold choke valve wide open, tighten retainer screw.

CHOKE (Carburetor Model BC—Automatic Type): Thermostatic coil and vacuum piston assembly mounted in housing on air horn and linked directly to choke valve shaft. A special suction tube is used extending from choke housing to vacuum port in carburetor throttle body.

Setting—Centered (At Index) for all models.
Adjustment—Loosen three retainer screws on cover, rotate cover until scribed mark on cover is in line with longer center mark of scale on housing. This will provide centered setting.

►***CARBURETOR 7005922 & 7007180 NOTE:*** On these models, heat tube connected directly at center of Thermostat Coil & Cover Assembly and cover is locked in place by one of the cover retainers which has two teeth engaging serrations in the cover. When adjusting choke setting, retainer screw must be backed off sufficiently so that retainer can be disengaged from cover.

OVERHAUL: With carburetor off engine, proceed as follows:

Disassembly: ***CAUTION—Choke assembly on Model B (manual choke with throttle kicker) and on Model BC (automatic choke and fast idle) disassembled differently as follows:***

Model B Air Horn & Manual Choke—Take out 4 air horn and bowl cover attaching screws, remove choke control bracket. Hold throttle kicker in vertical position (free of fast idle cam), lift air horn and bowl cover assembly straight up taking care not to damage floats. Choke valve and shaft can be disassembled, if necessary, after bowl cover parts have been disassembled (below).

Model BC Air Horn & Automatic Choke—Loosen ½" brass fitting on upper end of heat suction tube at automatic choke housing (CAUTION—use care not to disturb tube seal in throttle valve body). Remove three choke cover attaching screws, rotate cover counter-clockwise to free thermostatic coil hook from choke valve tang, lift off cover and thermostatic coil assembly, remove cover gasket and baffle plate. Free fast idle connector rod retainers and remove rod. Remove retaining screw on opposite end of choke valve shaft, carefully pry off choke trip lever, spacing washer, and counterweight. Take out two choke valve screws, remove valve, rotate choke shaft clockwise until vacuum piston clears bore in housing, withdraw shaft and piston assembly from air horn. Piston can be removed from shaft by taking out piston pin. Take out two choke housing attaching screws, remove choke housing and gasket from air horn. Take out 6 air horn and bowl cover attaching screws, lift air horn and bowl cover assembly straight up using care not to damage floats.

Bowl Cover Disassembly—Remove float hinge pin and lift off float assembly, remove float needle, remove needle seat and gasket. Remove the main metering jet and power valve from main well support (CAUTION—do not lose ball and spring when removing power valve). Take out main well support attaching screw, lift off support, remove gasket, lift out power piston and spring.

►***CAUTION—Do not remove idle tube which is pressed in bowl cover (serviced as an assembly).***

Choke Valve—For choke valve servicing or replacement, remove choke valve screws, lift valve out. Remove retainer ring from groove in shaft boss on air horn, slide shaft, spring, and lever assembly out of air horn casting.

Float Body—Remove screw, lift off throttle kicker lever and spring. Hold pump plunger down in cylinder, remove cotter pin or hairpin retainer from

C NTINUED ON NEXT PAGE

ROCHESTER B & BC (Cont.)

pump link, remove link from throttle lever and pump plunger, lift pump plunger from bowl, lift out return spring. Remove ball check from bottom of pump cylinder. Turn pump discharge guide until it can be removed, remove discharge spring and ball check by inverting assembly and allowing these parts to fall out. Remove pump intake screen retainer and screen.

Throttle Body—After disassembling float body, take out two throttle body attaching screws, lift throttle body off. Unscrew idle adjusting screw and remove screw and spring. On "BC" carburetor, take out attaching screw and remove fast idle cam.

▷*HEAT SUCTION TUBE CAUTION*—Do not remove tube or disturb tube seal in throttle body. If seal is loose, seal can be tightened or new seal installed after carburetor completely reassembled.

▷*THROTTLE VALVE CAUTION*—Do not remove throttle valve. Valve is close fit and idle discharge holes are drilled in close relationship to valve. This will be disturbed if valve and shaft removed.

Cleaning & Inspection: Wash all parts EXCEPT automatic choke housing, coil, and pump plunger, in carburetor cleaning solvent and dry with air. Blow out all passages with air and inspect for carbon deposits. Inspect all parts for wear or damage.

▷*CAUTION—Do not use wire or drills to clean out drilled passages or calibrated jets and restrictions.*

▷*NOTE*—Replace Throttle Body Assembly if throttle arm or shaft excessively worn or damaged. Do not attempt to remove and replace throttle valve.

Reassembly: Use new gaskets. Reassemble carburetor by reversing disassembly directions and note the following important points:

Model B Choke Valve Installation—Center the valve in air horn with mark "RP" facing upward before tightening attaching screws. Turn choke shaft spring clockwise until outer hooked end engages upper end of choke lever (loose lever to which choke control attached), wind up inner end of spring approximately ½ turn and hook over end of choke shaft lever.

Model BC Choke Valve Installation—After air horn assembled on bowl casting, install choke housing using new gasket and tightening attaching screws securely. Place NEW packing on upper end of heat suction tube and tighten coupling nut (if new seal required on lower end of tube see data below). Install choke valve shaft and vacuum piston assembly, rotate shaft counter-clockwise to enter piston in bore in housing, install choke valve on shaft with mark "RP" upward, center valve in air horn before tightening attaching screws. Install baffle plate and choke housing gasket, install choke cover and thermostatic coil, rotate cover clockwise until coil hook engages tang on choke shaft lever and index mark on cover is aligned with center mark of scale on housing, tighten three cover screws. Install counterweight on opposite end of shaft with tang facing in toward choke housing, install spacing washer, trip lever (with tang over tang on counterweight with choke valve fully open) tighten screw in end of shaft. Install fast idle connector rod with cotter pin end of rod at fast idle cam, connect rod and check entire choke system for free movement. *NOTE*—Choke valve should be closed at temperature of 75°F.

▷Heat Suction Tube Seal Servicing—If tightening of loose seal does not correct leaks at this point (check with gasoline while engine idling—leak will cause engine to roll or stall), install new seal as directed below.

Tightening Tube Seal—Use installing tool J-4551 to tap seal down evenly around tube.

Installing New Tube Seal—Loosen throttle body-to-bowl casting screws, insert flared end of heat suction tube and seal into hole in throttle body and tap seal down lightly with tool J-4551 (rotate tube while tapping seal to insure starting uniformly into hole in throttle body). Tighten coupling nut at upper end of tube finger tight, using NEW packing on tube. Use hammer and tool J-4551 to spread seal securely in throttle body (rotate tool to secure uniform spreading of seal). Loosen coupling nut at upper end of tube, check tube tightness in throttle body (tube should not turn), tighten coupling nut securely, tighten throttle body attaching screws. Check seal for leaks after carburetor installed on engine.

Accelerating Pump Ball Checks—Install aluminum intake check ball in bottom of pump cylinder, see that ball lifts freely from its seat. Install steel outlet check ball in outlet passage in bowl casting, tap ball lightly with hard fibre or brass rod to seat it, then make certain that ball lifts freely from its seat. Install bronze spring on top of outlet ball, index end of discharge guide in spring and press guide down until top is flush with bowl surface.

Float Assembly—Install air horn and bowl cover gasket before installing floats. Make certain that tang on the float lever faces up toward cover. Adjust float level and float travel before installing air horn on float body.

Adjustment—When carburetor assembled, set idle adjusting screw 1½ turns open. After carburetor installed and engine warmed up, adjust idle as directed under Idle Adjujstment. Check and adjust Fast Idle, Unloader, and Choke Setting.

REPAIR PARTS: Gasket Kits—No. 7001386 (Chevrolet Model B Carburetors through 1950 and also later carburetors as follows: 7003152 & 7003160), No. 7004595 (Chevrolet Model B Carburetors as follows: 7003863, 7003864, 7003865, 7004468, 7004475, 7004476, 7004477, 7004495), No. 7004085 (Chevrolet Model BC Automatic Choke Carburetors), No. 7006126 (Model B No. 7005140), No. 7001391 (Pontiac).

Repair Kit—No. 7004363 (Chevrolet—all carburetors), No. 7001392 (Pontiac). *NOTE*—Chevrolet Kit does not include gaskets and separate Gasket Kit must be used.

ROCHESTER MODEL AA (OLDSMOBILE)

OLDSMOBILE	Carburetor No.
1949 Series 88 & 98	7001570
1950 Series 88 & 98	7002570

DESCRIPTION: Dual downdraft, concentric bowl, horizontal air intake type with vacuum controlled power jet and positively operated diaphragm type accelerating pump operated by throttle lever through a rack-and-pinion engagement. The circular float bowl is mounted on the underside of the carburetor cover and is suspended in the air stream so that it is cooled by the air entering the carburetor.

►**1950 Carburetor Changes**—1950 carburetor modified from 1949 design for increased performance. Principal change is in Accelerating Pump design permitting Pump Jet Targeting before carburetor completely assembled. *See Accelerating Pump data below.*

Fuel System: Consists of Idle (Low Speed) Fuel System, Main (High Speed) Fuel System, Power Fuel System, and Accelerating Fuel System which operate as follows (Idle & Main Systems duplicated for each carburetor barrel):

Idle Fuel System—Fuel for idling is taken from the main jet well up through a brass Idle Tube which meters the fuel and is then mixed with air admitted through Idle Air Bleed in cover passage above tube. Fuel mixture then flows through horizontal passage in cover and additional air is admitted through Idle Channel Bleed opening into air horn. Fuel mixture is then taken down through passage to idle ports at throttle edge. For closed throttle idling, all fuel is discharged through lower port below throttle and is controlled by the Idle Adjusting Screw. As the throttle is opened, additional fuel is discharged through Secondary Idle Port and Top Idle Port also. Idle system supplies all fuel up to approximately 25-30 MPH.

Main Fuel System—Fuel is metered by Main Metering Jet in bottom of float bowl and flows up through vertical passage to Discharge Nozzle in small venturi. This fuel is mixed with air admitted through Main Well Air Bleed in cover. This air bleed action is controlled by the brass Main Well Tube in the upper end of the main well or vertical passage. Main Well Tube has calibrated holes on one side which control the fuel/air ratio through the driving range. Main discharge nozzles supply all fuel through the 30-60 MPH. driving range and this fuel is metered by the main metering jets.

Power Fuel System—Consists of a power valve controlled by a spring-loaded vacuum diaphragm assembly which bypasses fuel directly to the main Discharge Nozzles. Valve is normally closed (diaphragm and stem held up against spring tension by manifold vacuum) but is opened by the stem whenever manifold vacuum drops off (wide open throttle or full-power operation, or sudden acceleration) permitting fuel flow through Power Restriction.

Accelerating Fuel System—Consists of a diaphragm type pump assembly mounted on the side of the bowl and pump jets mounted in the pump housing which are aimed to discharge fuel across the throat of each carburetor barrel when throttle valve opened for acceleration. Pump is positively actuated through a rack-and-pinion drive by an actuating spring on the pump shaft which is wound up by the closing of the throttle. Return spring bearing on inner side of diaphragm is calibrated to take up all play and lost motion in the pump linkage. Pump intake strainer screen, intake ball check and outlet check needle located in bowl casting.

IDLING ADJUSTMENT: Adjust only with engine warmed up so that choke valve wide open and engine idling at hot or slow idle speed (Automatic Choke & Fast Idle inoperative). Set throttle stopscrew for correct idle speed, adjust both idle adjusting screws (one for each barrel) so that engine idles smoothly. Screws control fuel mixture and should be turned in for leaner mixture, out for richer mixture. Recheck idle speed. See car model page for complete tune-up instructions.

Idle Setting

Idle Screw Setting—Approximately 1 turn open.

Idle Speed (Synchro-mesh Trans.)—425 RPM.

Idle Speed (Hydra-Matic Trans.)—350 RPM. with selector lever in Drive "Dr" position.

PERFORMANCE: Should be satisfactory if idling adjustment and accelerating pump seasonal setting correct. All jets are fixed non-adjustable type.

POWER VALVE ASSEMBLY: Not adjustable. Valve remains closed with manifold vacuum greater than 8" of HG. and opens when vacuum drops below 8".

Checking Power Valve—Assembly can be checked for improper assembly, leakage, or punctured diaphragm with cover assembly removed as follows: Depress power valve stem to full down position, place finger over vacuum supply hole in cover and hold tightly. Release power stem. Stem should move slightly. Remove finger from supply hole. Stem should move out through full travel with slight metallic click. Check seal at vacuum supply hole in cover gasket (leakage at this point will be noted by carbon deposit extending from hole to outer edge of cover gasket). Check vacuum passage for clogging and restrictions with air.

ACCELERATING PUMP: Pump is controlled by throttle lever through connector rod and pump shaft lever with pump adjustment on pump shaft lever (3 holes for connector rod) as follows:

Outer Hole—Minimum Stroke.

Center Hole—Medium Stroke.

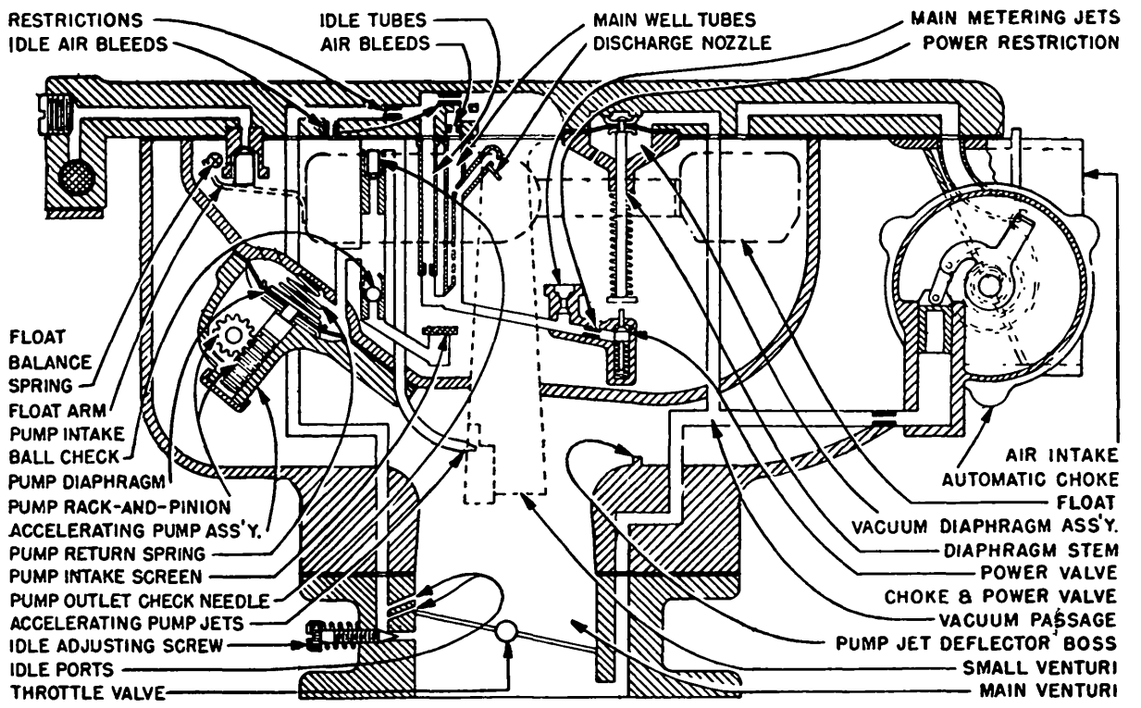
Inner Hole—Maximum Stroke.

Recommended Setting (1949)—Outer hole (min.). **(1950)**—Center hole (medium stroke).

►**Other Pump Adjustments**—*Pump Actuating Lever adjustment and Pump Jet Targeting adjustment should be made after carburetor has been overhauled:*

Pump Actuating Lever Adjustment—See that pump connector rod installed in recommended hole of pump shaft lever (above), disconnect rod from throttle lever. Back off throttle lever stopscrew and fast idle screw so that throttle valves close tightly. Hold throttle lever in closed throttle position, pull

CONTINUED ON NEXT PAGE



R CHESTER (OLDSM BILE) DUAL CARBURET R

ROCHESTER MODEL AA (Cont.)

down on pump connector rod so that pump shaft and lever in closed position, check rod length. TOP edge of rod end should be flush with BOTTOM edge of hole in throttle lever (rod should be "too long" by thickness of rod diameter). Adjust by bending rod at center bend. Connect rod.

▷*CAUTION*—Fast Idle and Engine Idle Speed must be readjusted after pump adjustment completed.

1949 Pump Jet Targeting—Pump jets must be aimed so discharge stream from jet strikes housing venturi on opposite side of carburetor throat at point just below deflector boss on casting. To check pump jets with carburetor completely assembled and filled with fuel, note fuel discharge visible in air horn while operating pump slowly by hand. Fan-shaped spray should be noted and spray should not come out end of air horn. Adjust by bending pump jet slightly. *CAUTION—Use care not to damage jet.*

1950 Pump Jet Targeting—Adjust before assembling bowl and cover housing. Pump jets must be aimed to strike small splashers (raised bosses) cast on bowl. To check aim, place small amount of fuel in carburetor, operate pump by hand and note fuel discharge. Adjust by bending pump jet slightly until stream strikes splasher to give a fan-shaped spray.

▷*CAUTION—Use care not to damage jets when adjusting.*

FLOAT LEVEL: *CAUTION*—Float Balance Spring tension must be checked and adjusted whenever the float level is adjusted.

Float Level—23/32" from top of seam on free end of float to gasket seat on cover with cover assembly inverted and needle valve seated. To check, remove and invert cover assembly, remove gasket, use scale or Carburetor Gauge (see gauge note) to measure from cover to top of float seam with float hanging freely. To adjust, bend float arm at point between needle valve and float (CAUTION—do not bend front of float, float must be parallel to cover).

▷Carburetor Gauge Note—Marked line for above setting will be found near square end of Gauge BT-17 (1949), BT-35 (1950).

Float Balance Spring Tension—Balance spring at back of float hinge pin assists float and also acts as a dampener. To check float tension, hold cover assembly right side up and horizontal so that float drops of own weight against balance spring tension. Bottom of float at free end should be 1/8" above bottom of power valve stem. Check by placing scale on bottom of power valve stem. Adjust by bending tang on float arm which engages balance spring (bend tag against spring to lessen float drop, away from spring to increase drop).

▷*CAUTION—Float tang must be assembled BACK of Balance Spring. Flooding will result if tang is in front of balance spring.*

Float Intake Needle & Seat—Furnished only as matched set—Oldsmobile No. 7001846.

CHOKE: Rochester Automatic Choke.

▷*CAUTION*—Choke Rod adjustment must be made whenever carburetor disassembled and overhauled

Choke Setting—Centered (index mark on cover aligned with index mark on housing).

▷Choke Coil Housing Gasket Note—1950 gasket is wider than Early 1949 type to insure proper fit around housing circumference and should always be used as service replacement on 1949-50 carburetors.

Choke Rod Adjustment—To check, hold throttle valve closed, move fast idle cam so that fast idle screw is against (not on) first step of cam, see that choke trip lever is in contact with counterweight on choke shaft, measure choke valve opening or clearance between lower edge of valve and air horn wall with Carburetor Gauge BT-17 (1949), BT-35 (1950)—see Note below. Choke valve opening should be .047". To adjust, use Bending Tool BT-18 to bend connector rod slightly at point between fast idle cam and choke lever. Check to make certain that rod does not bind or rub on housing.
Carburetor Gauge Note—First or "C" step of gauge is used for this .047" setting (both gauges).

UNLOADER: Consists of a tang on the throttle lever which engages the fast idle cam and opens the choke valve slightly when the throttle valve opened Setting—.238" (1949), .220" (1950) choke opening with throttle wide open. Hold throttle lever in wide open throttle position, see that choke trip lever is in contact with counterweight tang on choke shaft, measure choke valve opening or clearance between lower edge of valve and air horn wall with Carburetor Gauge BT-17 (1949) or BT-35 (1950)—see Note below. Adjust by using Bending Tool BT-18 to bend tang on throttle lever slightly.

▷Carburetor Gauge Note—Second or "D" step of gauge used for above setting is .238" (BT-17), .220" (BT-35).

FAST IDLE: Consists of a fast idle cam serving as a stop for the fast idle screw (upper screw) on the throttle lever. Cam is linked to choke valve lever and is rotated so that the fast idle screw rests on the first (highest step) when choke valve closed.

Setting (Carburetor on Engine)—500 RPM. engine idling speed. To adjust, with engine and transmission warm, idle engine, open throttle partially and rotate fast idle cam by hand so that fast idle screw rests on first (low step) of fast idle cam. Adjust screw so that engine idling speed is 500 RPM.

Setting (On Bench)—.020" ('49), .023" ('50) throttle opening with choke valve closed and fast idle screw on highest (starting) step of fast idle cam. To check, move connector rod so that choke valve fully closed, close throttle so that fast idle screw rests on high step of fast idle cam. Check throttle valve opening or clearance between edge of valve and carburetor wall with Carburetor Gauge BT-17 (1949), BT-35 (1950). Adjust by turning fast idle screw in or out until correct throttle opening secured.

▷Carburetor Gauge Note—Wire gauge section of gauge used for above setting is .020" (BT-17), .023" (BT-35).

▷*CAUTION*—If stalling experienced during warm-up with above setting (equivalent to engine speed of 1200-1250 RPM. with engine and transmission warm), increase this engine speed to 1600-1650 RPM. by turning fast idle screw in further.

CARBURETOR OVERHAUL: With carburetor removed from engine, proceed as follows:

Disassembly: Take out eight screws (outer circle of screws) retaining cover on carburetor housing, hold throttle lever in FULL open position (to free pump actuating lever from pump yoke inside housing), lift cover and bowl assembly straight up and out of housing. Take out six screws retaining bowl on cover, lift cover and float assembly off bowl.

Carburetor Bowl—Remove power valve and fibre gasket from bottom of bowl (use 5/16" width screwdriver), remove two main metering jets, remove retaining ring and pump strainer screen (use thin blade screwdriver or pointed tool to free ring). Invert bowl and catch two main well tubes, two idle tubes, and pump outlet check valve which should drop out (tap bowl lightly or use toothpick or other wooden wedge to lift tubes out if necessary—do not use metal tool to remove these tubes). Use small flexible wire hooked in outside hook of pump actuating spring to unwind spring three full turns to free position (CAUTION—use care not to distort or stretch spring). Take out five pump housing attaching screws, lift pump housing off (CAUTION—use care not to disturb pump jets which are aimed for proper targeting of pump discharge). Lift out conical pump return spring. Unscrew and remove pump intake ball check plug (use 1/4" width screwdriver).

▷*CAUTION—Do not attempt to remove Main Discharge Nozzles from bowl.*

Bowl Cover—Remove float hinge pin, lift float off, remove intake needle valve. Take out three retaining screws and lift out power valve diaphragm and stem. Remove float intake needle seat and gasket Remove fuel inlet nut and strainer screen.

Carburetor Housing & Throttle Body—Lift out balance tube in air horn. Take out three attaching screws and remove automatic choke cover and thermostatic coil as an assembly (CAUTION—use care not to distort coil). Take out choke valve attaching screws and remove valve. Disconnect and remove pump rod using care not to bend rod. Disconnect and remove choke rod. Take out choke shaft counterweight attaching screw, remove collar, washer, and counterweight. Revolve choke shaft until vacuum piston free from cylinder, withdraw piston and shaft as an assembly. Take out three throttle body attaching screws and lift off throttle body. Remove nut and lockwasher on pump shaft, remove pump yoke from within housing (CAUTION—do not lose small felt packing washer in housing counterbore at outer end of shaft).

Throttle Body—Take out fast idle cam attaching screw, remove fast idle cam. Remove both idle adjusting screws and springs.

▷*CAUTION*—Do not remove throttle valves or shaft unless these parts require replacement (channels in throttle body can be cleaned with valves in place).

Accelerating Pump Housing—Lift off conical return spring, pull diaphragm and rack out (allow pump lever to rotate—necessary to disengage rack from pinion). Remove cotterpin and washer from end of pump shaft, tap shaft out of housing and pinion gear, lift pinion gear out.

▷*CAUTION*—Do not lose felt washer on shaft at each side of housing.

Cleaning & Inspection: Clean all parts (EXCEPT

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ROCHESTER "AA" (C ntinu d)

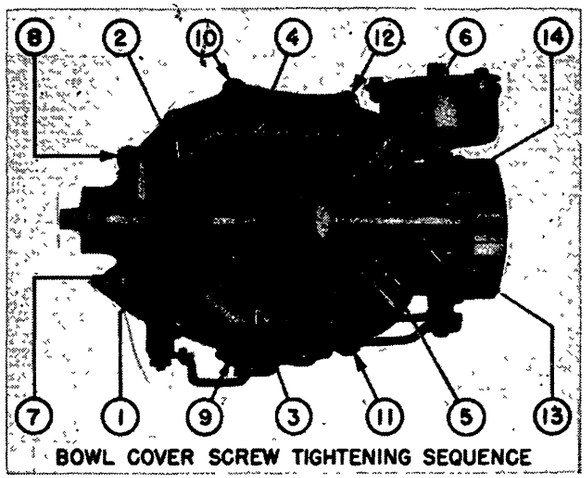
Pump & Diaphragm Assembly and Power Valve Diaphragm Assembly) in carburetor cleaning solvent, blow out all fuel channels and passages with air, dry parts with air. Check all parts for wear or damage.

►*CAUTION—Do not use wire or drills to clean or gauge jets and other calibrated parts.*

Reassembly: Use all new gaskets (see Service Parts data below). Reassemble carburetor by reversing disassembly directions and note the following important instructions:

Float Assembly—Install float over power valve stem with tang on float arm on outside of balance spring. See that balance spring not distorted, replace spring if free length greater than 9/16". Adjust float level and balance spring tension before installing cover assembly on carburetor housing.

Pump Housing Assembly—Parts must be assembled and installed exactly as follows to insure correct pump operation: Place steel washer and felt washer on pump shaft, assemble actuating spring on shaft with small hooked end against actuating lever, place pinion gear in gear slot in housing, insert pump shaft, sliding shaft through gear until knurled section of shaft is against gear, then tap shaft lightly through gear, assemble felt washer and flat washer on end of shaft, install cotter pin. Check to see that shaft rotates freely. Install pump diaphragm, engaging rack teeth with pinion gear (pinion will turn as rack inserted in housing), in such a position that when the diaphragm is in the "pump refill" or "cocked" position, the flat side of the pump lever arm will be parallel to the mounting face of the pump housing (NOTE—this may require lifting of rack and rotating of pump shaft and lever until correct position is secured). Install conical return spring on diaphragm retaining cup (spread last spring coil slightly so that spring is retained in cup). Install housing assembly on bowl, insert five mounting screws loosely, see that diaphragm not pinched or distorted, tighten all five screws evenly and securely. Check assembly for free movement. Return spring should cause arm to rotate freely from "discharge" point to "cocked" position (NOTE—if pump binds, tap end of shaft lightly to free it in housing). Turn actuating spring so that free end is against housing, use light wire engaged in spring hook to "wind up" spring 2½ turns, hook end of spring over pump lever. Check to see that pump operates freely from "cocked" to "discharge" position by hand.



BOWL COVER SCREW TIGHTENING SEQUENCE

Main Well Tubes—See that flat on head of each tube aligned with flat in housing counterbore. On later carburetors with key pinched in upper end of tube, see that key enters slot cast in float bowl.

►**Main Well Tube Change**—These keyed type tubes started in production April 1949 (carburetors with D-9 Identification Tag). Use only **plain type** Main Well Tubes, No. 7001675, on these first carburetors (without key slot in bowl casting), **keyed typ** Main Well Tubes, No. 7002124, on later carburetors with mating slot in bowl casting.

►*CAUTION—Late type Main Well Tubes (with key) must only be used on carburetors with mating slot in bowl.*

Balance Tube—Tube is curved and open end must face open end of air horn.

Cover & Bowl Assembly Installation—When installing assembly in housing, hold throttle valve in wide open position and make certain that pump actuating lever engages pump yoke in housing. After installation completed, check for free operation by moving throttle lever from closed to open position.

Bowl Cover Screw Tightening Caution—Always tighten cover screws in correct sequence (see illustration) to eliminate possibility of leaks at bowl cover.

►*NOTE*—Pump spring will partially open throttle valves in closed position.

Carburetor Adjustments: After reassembly completed, check and adjust: Pump Actuating Lever, Pump Jet Targeting or Aim, Automatic Choke Setting, Choke Rod adjustment, Unloader & Fast Idle setting.

SERVICE PARTS: Gasket Set—Oldsmobile No. 7001849. **Repair Kits**—(1949) No. 7001353, (1950) 7001376.

ROCHESTER "BB" (CADILLAC & OLDSMOBILE)

CADILLAC	Carburetor No.
1951 All Series	7004200
OLDSMOBILE	
1951 88 & 98	7002900
1952 Deluxe 88	7002900

►CHANGES & CORRECTIONS

►*REDUCED GASOLINE MILEAGE (Caused by air leakage due to cracked Accelerator Pump Boot):* Improved type boot furnished under Part No. 7003147 (same number as previous type) should be used for replacement and will provide longer service life without cracking and resultant air leaks.

NOTE—This new boot may be identified by raised ridge around shaft hole at top of boot.

►*CADILLAC SETTING CHANGES (To prevent possibility of engine stalling during warm-up):* Use following latest specifications when adjusting carburetor:

Choke Setting—Should be CENTERED (supersedes previous setting of 2 Point Lean).

Fast Idle Setting—Engine should run at 1500 RPM. **at operating temperature** with fast idle screw resting on **high step** of fast idle cam.

Float Travel or Drop—Should be 1¾" (supersedes previous setting of 1⅝"). *CAUTION—Scribed line on Float Gauge should not be used for this setting.*

►**CADILLAC CARBURETOR THROTTLE RETURN CHECK:** These carburetors have spring-loaded diaphragm type dashpot mounted on the carburetor with an adjustable plunger which contacts an arm on the throttle lever and prevents throttle closing too rapidly when accelerator pedal released. *See Throttle Return Check data below.*

DESCRIPTION

DESCRIPTION: Dual or double barrel, plain tube downdraft type with concentric fuel bowl and double floats, vacuum controlled power system, fast idle and automatic choke. Carburetor used on Cadillac has special "Choke Modifier" which prevents loading up or excessively rich mixture during warming up period.

Idle Fuel System—Fuel is drawn from main nozzle cross-bar in air horn and mixed with air admitted through air bleed holes in cross-bar. Fuel mixture is then metered by Idle Tube (pressed in end of cross-bar) and taken down through passage to idle ports at the edge of each throttle valve. For closed throttle idling, fuel is discharged through lower ports (below throttle) and is controlled by the idle adjusting screw. As soon as the throttle valve is opened, additional fuel is discharged through the upper ports (above throttle) also.

Main Fuel System—As the throttle valves are opened and suction increases at the main discharge nozzles under the cross-bar, fuel mixture is discharged through these nozzles and the idle system drops out. This fuel is metered by the Main Metering Jet and is mixed with air admitted through the air bleeds in the cross-bar. Main fuel system supplies all fuel required for normal operation below 75 MPH, and is supplemented by the Accelerating Pump (sudden acceleration) or Power System (for full power or wide open throttle operation).

Power System—Consists of a plunger type valve controlled by a spring-loaded vacuum piston which provides additional fuel flow to main nozzles when the valve is open. Vacuum piston is normally held up at the top of its stroke by manifold vacuum so that the power valve is held closed by the spring below the valve plunger. Whenever the manifold vacuum drops below 7" (sudden acceleration or

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ROCHESTER BB (Cont.)

driving speeds above 60-75 MPH.), the piston spring forces the piston down and opens the power valve. The additional fuel admitted through the valve is metered by the Power Restriction in the channel leading to the Main Well Passage.

Accelerating Pump System—Spring-loaded piston type which provides sustained discharge regardless of rate of throttle opening (pump plunger is spring-loaded on plunger stem with second spring below plunger). Fuel is drawn into pump cylinder through strainer screen and ball type intake check valve and is discharged through ball type outlet check valve and pump jet at side of secondary venturi in each carburetor barrel.

Pump Vapor Vent—Consists of a ball type check valve in the pump plunger which allows any vapor in the pump cylinder to escape through a passage in the plunger and return to the bowl. This check valve is closed during normal pump operation.

ADJUSTMENT & OVERHAUL

IDLE ADJUSTMENT: Adjust only with engine warmed up so that choke valve wide open and fast idle inoperative (idling at hot or slow idle speed). Set throttle stopscrew for correct idle speed, adjust both idle adjusting screws so that engine idles smoothly. Screws control fuel mixture and should be turned out for richer mixture. Recheck idle speed. See car model page for complete tune-up instructions.

Idle Setting—Screws approx. 1½ turns open.

Idle Speed	Synchro-Mesh	①Hydra-Matic
Cadillac	400 RPM.	375 RPM.
Oldsmobile	425 RPM	②375 RPM.

①—With selector lever in "Dr" position.
②—"Whirlaway" only. 400 RPM. on cars where Hydra-Matic reworked to start in First Gear.

ACCELERATING PUMP: Pump is operated by throttle lever through a connector rod and rocker arm linkage. No seasonal adjustment is provided and no Targeting of the pump jets is required but pump rod setting should be checked and adjusted to insure correct pump stroke and delivery.

Pump Rod Adjustment—Disconnect choke rod from fast idle cam or back out fast idle screw, back out throttle stopscrew so that throttle valves are fully closed, disconnect connector rod at pump rocker arm. Hold rocker arm down so that pump plunger is in extreme up position. Use bending tool to bend connector rod until bottom edge of rod end is flush with top edge of hole in rocker arm (rod "too long" by amount equal to diameter of hole). Connect rod.

▷*CAUTION—Idle speed (and fast idle setting if screw disturbed) must be reset after this adjustment.*

POWER VALVE ASSEMBLY: Not adjustable. Valve opens when manifold vacuum drops to 7" (at road speed of 60-70 MPH. or upon rapid acceleration).

FLOAT LEVEL: *CAUTION—Two adjustments required:* Float Level—With air horn and bowl cover assembly removed and inverted (CAUTION—DO NOT remove cover gasket), install float level gauge over floats with locating tangs on gauge inserted in secondary venturi. Bend float arms until both floats are equal vertically, then bend float button (which contacts float needle) until both floats just touch upper edge of cutout in gauge. Finally bend float arms horizontally until each float is centered between gauge legs (CAUTION—this adjustment necessary to prevent floats hanging up on float bowl walls). Tilt air horn assembly 90° to each side and make certain that floats do not touch gauge legs in either position.

Float Level Gauge

Cadillac	J-4715
Oldsmobile	BT-51

Float Tension—Hold air horn and bowl cover assembly right side up with floats hanging free. Measure distance from underside of cover gasket to bottom edge of float (see setting notes below). If this distance not correct, bend float tang at rear of float toward balance spring to lessen the distance, or away from spring to increase the distance.

Cadillac Setting Note—Setting is 1¾" (supersedes previous specification of 1⅝") and should be measured with a scale. CAUTION—do not use scribed line on gauge.

Oldsmobile Setting Note—Setting is 1⅝" and can be checked with Float Level Gauge by placing leg of gauge against gasket (scribed line on gauge should be even with bottom of float).

Oldsmobile Setting Note—Setting is 1¾" and can be *Modifier" which must be adjusted as part of choke setting.*

CHOKE SETTING

Cadillac	①Centered
Oldsmobile (Synchro-mesh Cars)	2 Points Rich
Oldsmobile (Hydra-Matic Cars)	Centered

①—Supersedes previous specification of 2 Points Lean.

Cadillac Choke & Modifier Setting: Back off fast idle screw and throttle stopscrew so that throttle valves tightly closed. Loosen choke modifier lever retaining screw, rotate index pointer counter-clockwise until pointer is aligned with long scribed line on cover (Centered setting), tighten retainer screw. With this setting, choke valve should be almost closed at 75°F.

▷*CAUTION—If choke valve does not close when pointer rotated (above), thermostatic coil is not engaging choke valve lever in housing.*

Oldsmobile Choke Setting: Loosen heat tube coupling on choke cover, loosen three cover retainer screws and free the toothed retainer from the serrations on the cover, rotate cover until index mark on cover is aligned with center graduation of scale on housing (centered setting) or correct number of graduations on Rich side (Rich setting), engage toothed retainer with serrations in cover, tighten all retainer screws, tighten heat tube coupling.

▷*CAUTION—Use care not to rotate or distort choke cover when tightening heat tube coupling.*

FAST IDLE: *CAUTION—Two adjustments required and must be made in DIFFERENT SEQUENCE on Cadillac and Oldsmobile:*

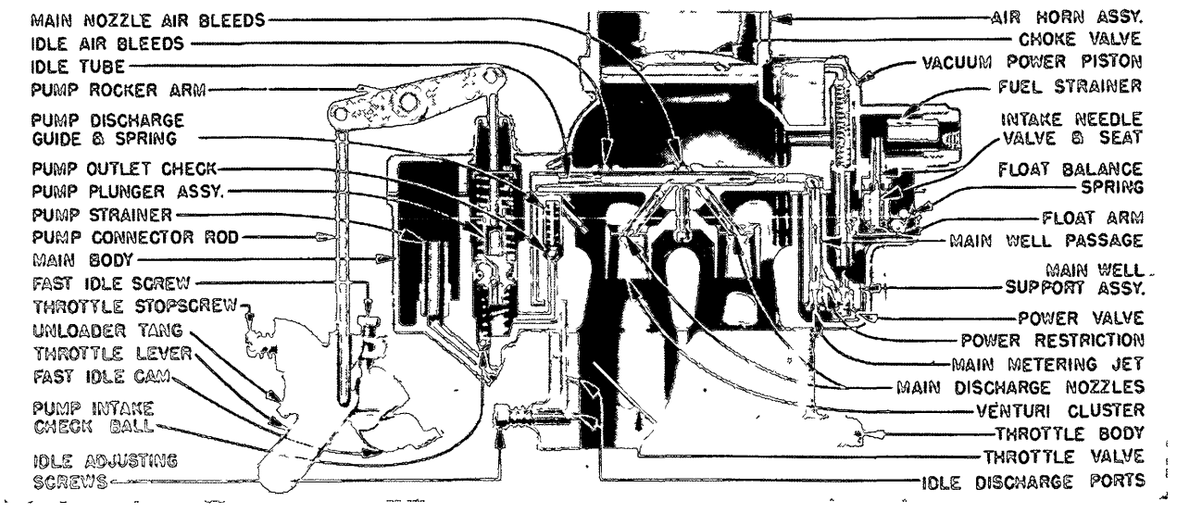
Cadillac: Adjust in following order:

1) Fast Idle Adjustment—Carburetor on Engine. Hold throttle partly open and rotate fast idle cam until fast idle screw rests on high step of fast idle cam, adjust fast idle screw until engine runs at exactly 1500 RPM. with engine at normal operating temperature.

Carburetor off Engine—Rotate fast idle cam until choke valve is fully closed, hold throttle lever in closed position so that fast idle screw rests on highest step of fast idle cam. Adjust fast idle screw until throttle valve opening (clearance between edge of valve and carburetor bore on side opposite idle ports) is exactly .0295" (measure with wire gauge on Tool J-4716).

2) Choke Rod Adjustment—Hold choke valve open, close throttle valve, then move choke valve toward closed position until fast idle screw contacts edge of fast idle cam. With choke valve in this position,

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ROCHESTER MODEL BB CARBURETOR

ROCHESTER BB (C nt.)

measure clearance between lower edge of choke valve and flat on inside of air horn using wide step of gauge J-4716 (.620"). If clearance not correct, adjust by bending choke rod.

Oldsmobile: Adjust in following order:

1) Choke Rod Adjustment—Rotate fast idle cam until intermediate step (short center step) is under fast idle screw. With choke cover set at center index mark and choke shaft trip lever in contact with choke counterweight, choke valve should be slightly open. Measure this opening (clearance between lower edge of valve and air horn wall) with smaller "A" end section of Gauge BT-49 (.177"). If clearance not correct, bend rod at lower bend near fast idle cam.

►*CAUTION—Choke rod must not rub against side of housing in any position.*

2) Fast Idle Adjustment—Carburetor on Engine. Rotate fast idle cam so that fast idle screw rests on extreme end of lowest step of fast idle cam, adjust screw so that engine runs at 500 RPM.

Carburetor off Engine—With choke cover set at center index mark, hold choke valve and throttle valves closed so that fast idle screw rests on highest step of fast idle cam, adjust screw for throttle valve opening (clearance between lower edge of valve and carburetor wall on side opposite idle ports) of .025" (measure with wire gauge on Tool BT-49).

UNLOADER: Consists of a tang on the throttle lever which engages the fast idle cam and opens the choke valve when the throttle lever is moved to the wide open position. Check unloader after setting automatic choke and adjusting choke rod.

Checking & Adjustment—Move throttle lever to wide open position, measure choke valve opening (clearance between lower edge of valve and inner wall of air horn) with gauge listed below. If opening not correct, adjust by bending tang on fast idle cam (Cadillac), tang on throttle lever (Oldsmobile).

UNLOADER SETTING

	Tool No.	Choke Opening
Cadillac	J-4176	.515"①
Oldsmobile	BT-49	.209"②

①—Use smaller step of gauge.

②—Use intermediate "B" step of gauge.

CADILLAC THROTTLE RETURN CHECK: Spring-loaded diaphragm type dashpot mounted on carburetor with adjustable plunger which contacts arm on throttle lever.

Adjustment: First check alignment of adjusting screw on throttle return check plunger with contact arm on throttle lever and bend return check mounting bracket, as necessary, to center adjusting screw on radius of contact arm. Set throttle valves partly open by installing 27/64" drill rod between pump rocker arm and return check mounting bracket on top of bowl cover, locating the drill against the head of the air horn screw. Hold return check plunger from turning (use wrench on plunger flats), turn adjusting screw with a ⅜" wrench until it just contacts throttle lever arm.

THROTTLE VALVE SETTING: It is recommended that throttle valves not be removed from throttle body and that **Throttle Body & Valves be replaced as an assembly** whenever wear noted at throttle valve, shaft or shaft bore in body.

CARBURETOR OVERHAUL: With carburetor off engine, proceed as follows:

Disassembly: On Cadillac carburetors, first disconnect choke modifier rod from lever on choke cover and remove lever and pointer by taking out retainer screw in lever.

Automatic Choke & Choke Valve—Disconnect choke suction tube by loosening coupling nut at choke housing (CAUTION—use care not to disturb seal at lower end of tube). Take out three cover screws and retainers and lift off choke cover and thermostatic coil assembly, lift out choke baffle plate. Remove choke valve from shaft. Disconnect choke rod from fast idle cam, then take out screw in end of choke shaft and pry trip lever, spacing washer, and choke counterweight and rod assembly off shaft. Rotate choke shaft counter-clockwise until piston is free, then withdraw shaft and piston assembly (piston can be removed from shaft lever by removing piston pin). Remove choke housing and gasket by taking out two attaching screws within housing.

Air Horn & Bowl Cover—Disconnect and remove pump actuating rod. Disconnect pump plunger stem from rocker arm, remove rocker arm. Remove fuel inlet fitting, strainer nut, and strainer. Take out four lower cover screws (carburetor inverted), four upper cover screws, lift cover assembly off carefully (if necessary, tap cover lightly to break seal). Take out float hinge pin and remove float assembly with intake needle attached (CAUTION—use care not to damage float balance spring). Press pump plunger rubber seal through cover and remove pump plunger and seal, then remove seal from plunger. Remove intake needle seat and gasket with ½" screwdriver. Remove both main metering jets from main well support, then remove power valve plug, spring, and valve from support, remove support and lift off cover gasket. Remove power valve vacuum piston and spring from cover. Take out secondary venturi cluster attaching screw, lift off cluster (CAUTION—do not damage locating tongue on cluster). Carefully remove float balance spring and clips.

►*CAUTION—Do not attempt to remove Idle Tube from cross bar.*

Bowl (Main Body)—Lift pump return spring out of pump cylinder, then invert bowl while holding pump discharge guide in place and remove pump intake check ball (will fall out of cylinder). Remove pump screen. Invert bowl and remove pump discharge guide, spring, and outlet check ball. Take out four bowl-to-throttle body attaching screws, separate throttle body and gasket from bowl.

►*CAUTION—Do not remove heat suction tube from throttle body and use extreme care not to disturb tube seal.*

Throttle Body—Remove both idle adjusting screws and springs. Take out fast idle cam screw and remove cam. On Cadillac carburetors, take out choke modifier rod lever screw and remove lever and rod. Remove throttle stopscrew and fast idle adjusting screw from throttle lever.

►*CAUTION—Do not remove throttle valves or throttle shaft (replace throttle body assembly if wear noted in these parts).*

Cleaning & Inspection: Clean carburetor castings and metal parts except choke coil, housing, and pump plunger with carburetor cleaning solvent. Clean pump plunger with clean gasoline only. Blow out all passages in castings with compressed air. Clean or replace all filter screens. Inspect all parts for wear and replace as necessary. Inspect tightness of suction tube seal in throttle body (seal can be tightened after carburetor reassembled) and condition of packing in coupling nut at upper end of tube. Replace packing if tightly compressed or distorted.

►*CAUTION—Do not use wire or drills to clean passages and jets.*

Reassembly: Use new gaskets (see Service Parts data below). Reassemble carburetor by reversing the disassembly procedure and note the following points:

Float Assembly—Tang on float arm must be on OUTSIDE of float balance spring. Adjust float level and float tension before installing air horn on bowl casting.

Main Well Support Assembly—Install gasket on cover and align all cover and gasket holes before installing support. Install vacuum power piston and spring first, then place support over power piston (CAUTION—main well guide sleeves must be aligned in cover) and tighten both support screws evenly. Hold power piston up in cylinder when installing power valve, spring, and plug in support.

Pump Check Ball Installation—Install the SMALL ALUMINUM inlet check ball in the bottom of the pump cylinder and the LARGE STEEL discharge check ball in the pump discharge passage below the discharge spring and guide.

Choke Valve Assembly Install valve with "RP" mark up or outward, use new screws to attach valve. Install choke shaft counterweight with "RP" mark outward, then install spacing washer and trip lever with tang on lever on top of counterweight tang. Assemble offset end of choke rod to counterweight. Check entire choke assembly for free movement.

►**Suction Tube Seal Replacement**—If new seal required due to loose seal or damaged tube, install seal **after carburetor completely assembled.** Loosen throttle body-to-bowl attaching screws, place new seal on lower end of suction tube and against the flared end of the tube, insert tube and seal in throttle body recess using tool J-4551 (Cadillac), BT-45 (Oldsmobile) to start seal evenly in throttle body (tap lightly on seal while rotating tool). Position tube and tighten coupling nut at upper end finger-tight. Then use tool and hammer to spread seal securely in throttle body (rotate tool to insure uniform spreading of seal). Tighten coupling nut at upper end of tube securely, tighten throttle body-to-bowl attaching screws.

Carburetor Adjustments: After carburetor assembled, check and adjust: Accelerating Pump Rod, Automatic Choke, Fast Idle, Unloader, Idle mixture (set both screws 1½ turns open for preliminary setting). After carburetor installed on engine, adjust idle mixture and hot or slow idle speed.

SERVICE PARTS: Gasket Sets—No. 7001393 (all).

Repair Kit—No. 7001399 (Cadillac), 7001390 (Oldsmobile).

ROCHESTER DUAL 2G & 2GC

CHEVROLET PASS. CARS.	Rochester Carb. No.
1955 V8 Early Cars (Synchro-mesh)	2GC 7006825
1955 V8 Late Cars (Synchro-mesh)	2GC 7008005
1955 V8 Early Cars (Powerglide)	2GC 7005810
1955 V8 Late Cars (Powerglide)	2GC 7008004
CHEVROLET TRUCKS	
1955 2nd Series 265" Eng. (½ ton O.D.)	2G 7008399
1955 2nd Series 265" Eng. (Std. Trans.)	2GC 7006770
1955 2nd Series 265" Eng. (Auto Trans.)	2GC 7006770
OLDSMOBILE	
1955 88 Hydra-Matic	2GC 7006970
PONTIAC	
1955 Hydra-Matic	2GC 7006100

►CHANGES, CAUTIONS, CORRECTIONS

►*1955 CHEVROLET V8 LEAN SURGE CONDITION AT 55-75 MPH. (All Cars with Early No. 7006825 & 7005810 Carburetors)* Correct by installing late type Venturi Cluster Assemblies & Main Metering Jets as listed below *NOTE*—These new parts are installed in production on later Nos 7008004 & 7008005 Carburetors

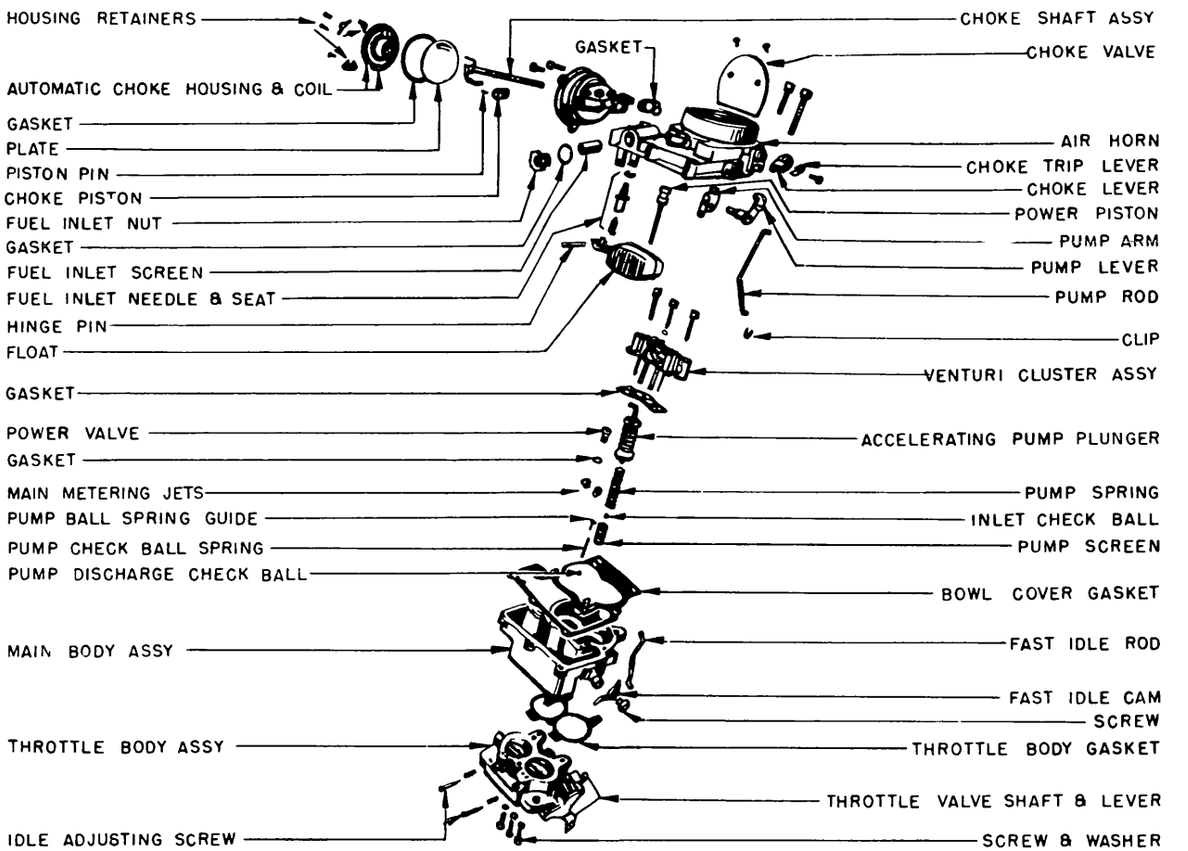
Carburetor	Lat Typ Carburetor Parts No. 7006825	No. 7005810
Venturi Cluster Assy	7007990	7007989
Main Metering Jet (2)	7002952	7002951

►*1955 PONTIAC V8 ROCHESTER CARBURETOR INSTALLATION CAUTION (First 1000 ENGINES)* Intake manifold on these engines will not take Rochester carburetor without possibility of high vacuum leak at windshield wiper vacuum passage in carburetor flange (insufficient sealing area) These manifolds can be identified by curved section at rear edge of carburetor mounting flange and *only Carter carburetor should be used.* On later manifolds, with nearly straight section at above point, *either Carter or Rochester Carburetors can be used.*

►*1955 PONTIAC CARBURETOR FLOODING OR OVERLOADING May be caused by excessive fuel pump pr ssure (in excess of 5 lbs.). See Fuel Pump data on Pontiac V8 car model page.*

►*PONTIAC HARD STARTING OR LOADING CORRECTION.* New type choke piston Rochester No. 7009032 is used on late production carburetors. It is .041" shorter and has five grooves instead of six. This construction provides a greater initial choke opening and relieves complaints of hard starting or loading on early production cars.

DESCRIPTION Dual downdraft type with Automatic Choke (2GC), or Manual Choke (2G) Standard Trans. Truck These carburetors have Rochester Calibrated Cluster design "Venturi Cluster Assembly", vacuum controlled Power System, throttle operated accelerating pump with double-spring pump plunger All carburetors have an internal vent in the air horn and an external vent on the bowl cover (On Oldsmobile, this vent is controlled by a tang on the pump lever and is opened at low idle only)



ROCHESTER 2GC DUAL CARBURETOR

ADJUSTMENTS: Make all adjustments exactly as follows

Idle Setting: If preliminary adjustment required to warm up engine, set both idle adjusting screws 1½ turns open from inner seated position (all models) With engine at operating temperature (choke valve wide open, fast idle inoperative), adjust throttle stopscrew for correct idle speed (see table below), then turn each idle adjusting screw in or out to secure smoothest possible idle performance (highest manifold vacuum and RPM) See Oldsmobile Note following Readjust idle speed and recheck idle setting

►*OLDSMOBILE NOTE·* After setting idle adjusting screws as above, turn each screw out (rich) ¼ turn which will provide desired idle performance (manifold vacuum and RPM will drop off slightly) Check performance by opening throttle to 1000 RPM point and then snapping throttle closed If engine rolls due to richness, turn each screw in (lean) not more than 1/8 turn

Car Model	Idle Speed Setting Synchro-mesh Cars	Automatic Trans.
Chevrolet V8	475 RPM	425 RPM in "D"
Chevrolet Trucks	475 RPM	425 RPM in "N"
Oldsmobile	425 RPM	400 RPM in "Dr"
Pontiac	450-475 RPM	390-410 RPM in "Dr"

►*AUTOMATIC TRANSMISSION THROTTLE LINKAGE ADJUSTMENT·* See Car Model pages for necessary adjustment following idle speed adjustment *OLDSMOBILE NOTE*—Carburetor has "Split-Throttle Lever" and linkage will not be disturbed by idle speed setting.

Atmospheric Idle Vent (Oldsmobile): *Not used on Chevrolet & Pontiac.* Consists of a vent opening in the bowl cover with a vent cap actuated by a tang on the pump lever. Vent is opened at low idle but must be closed at all other throttle positions

Idle Vent Checking & Adjustment—Back off fast idle screw until it clears highest step of fast idle cam Open throttle valves exactly .020" by inserting SMALL end of Gauge BT-67 between edge of throttle valve and bore on side opposite idle adjusting screw At this point, idle vent should just be closed. Adjust by bending pump lever tang using bending tool BT-69

Accelerating Pump Rod Setting: *This is a linkage adjustment (Pump does not have Seasonal setting).* With throttle stopscrew backed off so that throttle valves completely closed, place combination Float & Pump Gauge (see table below) in inverted position on pump housing on bowl cover Leg on gauge should just con-

CONTINUED ON NEXT PAGE

ROCHESTER 2G & 2GC (C nt.)

tact top of pump rod. Adjust by bending lower end of pump rod using bending tool BT-18.

Pump Rod Setting

Car Model	Checking Gauge & Distance
Chevrolet V8 (Pass. & Trk.)	①BT-107 (15/16")
Oldsmobile	②BT-109 (15/16")
Pontiac	③BT-105 (15/16")

①—Chevrolet No. J-5915. ②—Oldsmobile No. J-5917. ③—Pontiac No. J-5916.

Fl at Setting: *Both Float Level and Float Drop must be correct. Check and adjust as follows:*

Float Level—Remove bowl cover and float assembly but DO NOT remove bowl cover gasket. Invert assembly, place combination Float & Pump Gauge (see table below) over float and against pump side of power piston shaft so that outer gauge leg is in line with center of float. Bottom of float should just contact bottom edge of gauge. Adjust by bending float arm using bending tool BT-69.

Float Level Setting

Car Model	Checking Gauge & Height
Chevrolet V8	①BT-107 (1 5/32")
Oldsmobile	②BT-109 (1 9/32")
Pontiac	③BT-105(1 15/64")

①—Chevrolet No. J-5915. ②-Oldsmobile No. J-5917. ③—Pontiac No. J-5916.

Float Drop—Hold bowl cover and float assembly upright so that float drops down to limit of travel. Place combination Float & Pump Gauge against gasket on cover at free end of float (see Float Level Setting table above for gauge number) so that single leg of gauge extends downward. Bottom of float at free end should be even with scribed line on gauge (1 29/32" on all carburetor models). Adjust by bending float arm tang (behind needle seat) toward needle seat to decrease drop or away from needle seat to increase drop.

Fast Idle Setting: *On Chevrolet & Pontiac, Choke Rod Setting automatically provides correct fast idle setting (no separate Fast Idle Screw). On Oldsmobile (with separate Fast Idle Screw), an additional Fast Idle Adjustment is required:*

Choke Rod Checking & Adjustment (All Models)—Turn throttle stopscrew (Chevrolet & Pontiac), Fast Idle Screw (Oldsmobile) in until it just contacts second step of fast idle cam, close choke valve until screw rests against shoulder of high step on cam. Check choke valve opening or clearance between upper edge of choke valve and air horn wall by inserting SMALL end of gauge (see table below) vertically. Adjust by bending tang on choke lever counterweight using bending tool BT-69

Choke Rod (Fast Idle) Setting

Car Model	Checking Gauge & Choke Opening
Chevrolet V8	④BT-108 (.089")
Oldsmobile	⑤BT-110 (.040")
Pontiac	⑥BT-106 (.053")

④—Chevrolet No J-5921 ⑤—Oldsmobile No. J-5918. ⑥—Pontiac No J-5920.

Fast Idle Screw Setting (Oldsmobil only)—*Manufacturer recommends that this adjustment be mad ON THE ENGINE as outlined below.*

Ch cking & Adjustment (Off th Engine)—Back off fast idle screw Place SMALL end of Gauge BT-67 (.020") between edge of throttle valve and bore on side opposite idle adjusting screw, close throttle against gauge and apply tension to throttle lever to hold gauge in place. Close choke valve so that high step of fast idle cam is in line with fast idle screw, turn fast idle screw in until gauge just drops out.

Checking & Adjustment (On the Engine)—With engine and transmission at normal operating temperature and selector lever in Neutral, rotate fast idle cam so that high step in line with fast idle screw, turn fast idle screw in until engine speed is 1400-1500 RPM. This will provide correct warm-up speed and prevent stalling.

Unloader Setting: Place throttle lever in wide open position (see Oldsmobile Note below), check choke valve opening or clearance between upper edge of valve and air horn wall using LARGE end of correct gauge (see table below) inserted vertically. Adjust by bending tang on throttle lever using bending tool BT-69

►*OLDSMOBILE NOTE:* Before making above adjustment, the throttle stopscrew (slow idle speed screw) must first be turned IN one turn from point where throttle valves are completely closed.

Unloader Setting

Car Model	Checking Gauge & Choke Opening
Chevrolet V8	④BT-108 (23/64")
Oldsmobile	⑤BT-110 (9/64")
Pontiac	⑥BT-106 (.163")

④—Chevrolet No. J-5921. ⑤—Oldsmobile No. J-5918. ⑥—Pontiac No J-5920.

Automatic Choke Setting: CENTERED with scribed index mark on cover in line with long cast mark on choke housing (all models). To adjust, loosen heat tube connection on cover, loosen three cover retainer screws (*CAUTION*—If one retainer is "toothed" type engaging notches in cover, screw must be backed off sufficiently so that retainer can be disengaged from cover notches), rotate cover to align marks.

NOTE—With above setting, choke valve should be lightly closed at 75°F.

OVERHAUL: Adjustments may be made and various parts be serviced without completely disassembling the entire unit.

Disassembly: Major units of carburetor consist of Air Horn Assembly, Main Body, and Throttle Body.

Air Horn Assembly—Consists of Automatic Choke & Fuel Bowl Cover.

Automatic Choke—Remove three choke cover screws and retainers, choke cover and coil assembly, cover gasket and baffle plate. Remove choke trip lever, fast idle link and lever (rotate lever until slot in lever will pass over tang on link). Remove two choke valve screws and choke valve. Rotate choke shaft counterclockwise to free choke piston from housing, then pull piston and choke shaft from carburetor. Remove two choke housing attaching screws and remove choke housing and gasket from Air Horn.

Fuel Bowl Cover—Disconnect pump link from throttle lever by rotating it until it clears pump lever. Remove eight cover screws and remove cover. Invert cover on flat surface, remove float hinge pin, float assembly and float needle. Remove float needle seat and gasket and remove filter screw. Depress power piston shaft allowing spring to snap, which forces piston from casting. Remove retainer on pump plunger shaft and plunger assembly from pump arm. Remove pump lever and shaft by loosening setscrew on inner arm and removing outer lever and shaft. Remove cover gasket.

Main Body—Remove pump plunger return spring from pump well main metering jets, and power valve. Remove three screws from top of cluster and remove cluster and gasket. With long nose pliers, remove pump discharge spring retainer, then the spring and check ball. Invert Main Body and remove three large bowl to throttle body attaching screws, remove throttle body.

Throttle Body—Remove fast idle cam, idle adjusting needles and springs. Throttle body should be replaced as an assembly to insure proper relation of valves.

Cleaning & Inspection: Thoroughly clean carburetor castings and metal parts in clean solvent. *CAUTION*—Choke coil and housing and pump plunger should not be immersed in solvent. Clean pump plunger in clean gasoline only. *DO NOT SOAK AIR HORN ASSEMBLY IN CLEANER OR SOLVENT FOR MORE THAN ONE HALF HOUR IF CHOKE PISTON HOUSING HAS NOT BEEN REMOVED.* Blow out all passages in casting until dry. *CAUTION*—Do not pass drills or wires through calibrated jets or passages as they may enlarge orifice and seriously affect carburetor calibration. Inspect all parts for wear damage, burrs or ridges. Inspect gaskets for being hard or brittle, pump leather for damage.

Reassembly: Throttle Body to Main Body—Install idling adjusting screws and springs in throttle body until finger tight and then back off 1½ turns for temporary adjustment, add throttle body gasket and attach throttle body to bowl. Install fast idle cam, drop pump discharge ball into discharge hole and replace spring and retainer. Install cluster with new gasket, tighten screws evenly, (center screw takes red fibre gasket). Replace main metering jets and power valve with new gasket.

Fuel Bowl Cover (Air Horn)—Replace pump lever assembly, install filter screen float needle seat and gasket. Replace power piston in vacuum cavity (check to see that piston travels freely). Lightly stake retainer in place. Attach plunger shaft with retainer shaft end pointing inward. Install cover gasket. Attach needle to float, position it carefully and insert float hinge pin. Adjust float (see table above for setting). Place cover in position making certain that accelerator pump plunger is positioned and will move freely.

Choke—Place new gasket in position, attach choke housing to cover and tighten screws securely. Place choke shaft in choke housing and rotate clockwise so that piston rides in bore in housing. Install choke valve on shaft with letters "RP" facing upward, center choke valve before tightening screws. Place baffle plate and choke housing gasket into position and install choke coil and cover. Rotate cover clockwise until index marks on cover and housing are aligned. Attach retaining screws and tighten securely. Replace link in fast idle cam and choke lever, place choke lever on cover with the tang facing outward and toward the pump lever. Install trip lever so that tang of trip lever is under tang of choke lever.

SERVICE PARTS

Gask t Sets—Rochester No. 7007009 (7005810, 7008004, 7006825, 7008005), No. 7006999 (7006770, 7006100).

R pair Kits—Rochester No. 7007011 (7005810,7008004, 7006825, 7008005), No. 7007012 (7006970, 7006100).

ROCHESTER "AA" AUTOMATIC CHOKE

Car Model	Carburetor
Oldsmobile 8, 88 & 98 (1949)	7001570
Oldsmobile 8, 88 & 98 (1950)	7002570

DESCRIPTION: Automatic choke assembly is mounted on the side of the carburetor air horn and linked directly to the choke valve shaft lever. It consists of a thermostatic coil and vacuum piston assembly to control the choke valve and also operates the fast idle mechanism through a connector rod linked to the lever on the opposite end of the choke shaft.

OPERATION: Automatic Choke—Thermostatic coil is bi-metal type and tends to "wind up" and close the choke valve when the engine is cold so that the choke valve will be completely closed for cold starting. In this position, the vacuum piston is at the top of cylinder. As soon as the engine begins to fire, manifold vacuum tends to pull the piston down in the cylinder which opens the choke valve slightly to prevent stalling (valve is offset and air flow through intake also tends to open valve). As the engine warms up, coil unwinds, lessening tension on choke valve and allowing air flow to open the valve so that at normal operating temperatures the choke valve is wide open. Warm air is introduced into the coil housing through a pipe extending from the exhaust manifold to the coil housing cover to effect this unwinding of the coil.

Fast Idle—Consists of a stepped fast idle cam mounted so as to serve as a stop for the fast idle screw on the throttle lever and linked to the choke lever by a connector rod. Cam is rotated to the "fast idle" position (with stopscrew resting on high step of cam) when choke valve closed for cold starting, and is rotated to the hot or slow idle position (with stopscrew resting on progressively lower steps of the cam) as the engine warms up and the choke valve opens.

Unloader—When the throttle valves are opened wide, choke valve is opened slightly through the fast idle linkage. This will correct flooding caused by over-choking.

ADJUSTMENT: *CAUTION—Three separate settings (Choke Setting, Fast Idle Setting, and Unloader Setting) are required. Adjust in order as follows:*

Choke Setting: Centered (At Index). With cover screws loosened, rotate cover until index mark on cover is aligned with mark cast on carburetor housing. With this setting, choke valve should be fully closed at 75°F.

▷*CHOKE COIL HOUSING COVER GASKET CAUTION*—New wider housing gasket used on 1950 carburetors and should be used for service replacement on all 1949-50 carburetors. See that gasket seats evenly and correctly seals entire circumference of choke housing. Any air leak at this point will prolong choke operation, resulting in over-choking.

▷*CHOKE HEAT PIPE CAUTION*—⅛" pipe plug is installed in right hand end of heat pipe in manifold and this pipe plug and all heat pipe connections must be securely tightened. Any air leaks in the heat pipe system will prolong choke operation and result in over-choking and poor economy.

Choke Rod Adjustment—Turn fast idle screw in until spring is slightly compressed, hold throttle valves in closed position and rotate fast idle cam until screw resting aaginst first step on cam. Check to see that trip lever is in contact with choke counterweight. Choke valve should be slightly open in this position. Check opening with gauge tool BT-17 (use .147" or "C" step of gauge) inserting gauge between lower edge of choke valve and air horn wall. If opening not correct, adjust by bending connector rod slightly, using tool BT-18. Make certain that choke valve does not rub on air horn wall in any position.

Unloader Setting: Thermostatic coil cover must be correctly set at INDEX when making this adjustment (see Choke Setting above). Open throttle valves to wide open position, making certain that choke trip lever is in contact with tang on choke counterweight. Check choke valve opening with special gauge (see table), inserting gauge between lower edge of valve and air horn wall. If opening not correct, adjust by bending tang on throttle lever slightly, using bending tool BT-18.

UNLOADER SETTING

Carburetor	Checking Tool	Choke Opening
7001570 (1949	BT-17	.238"①
7002570 (1950)	BT-35	.220"②

①—"D" step of BT-17 gauge.
②—"D" step of BT-35 gauge.

Fast Idle Setting: *Can be adjusted on the bench or on engine (if set on bench, check setting after carburetor installed on engine).*

Setting (Carburetor on bench)—Check by moving connector rod so that choke valve fully closed, close throttle valve so that fast idle screw rests on fast idle step of fast idle cam. Check throttle valve opening or clearance between valve edge and carburetor wall, using correct gauge (see table). Adjust by turning fast idle screw in or out until throttle valve opening is correct.

Setting (Carburetor on engine)—Hold throttle partially open, rotate fast idle cam until fast idle screw is in line with lowest step on cam, hold cam in this position. Run engine and turn fast idle screw in or out until engine speed is exactly 500 RPM (all models) with engine warm.

FAST IDLE SETTING

Carburetor	Checking Tool	Throttle Opening
7001570 (1949)	BT-17	.020"③
7002570 (1950)	BT-35	.023"④

③—"E" step of BT-17 gauge.
④—"E" step of BT-35 gauge.

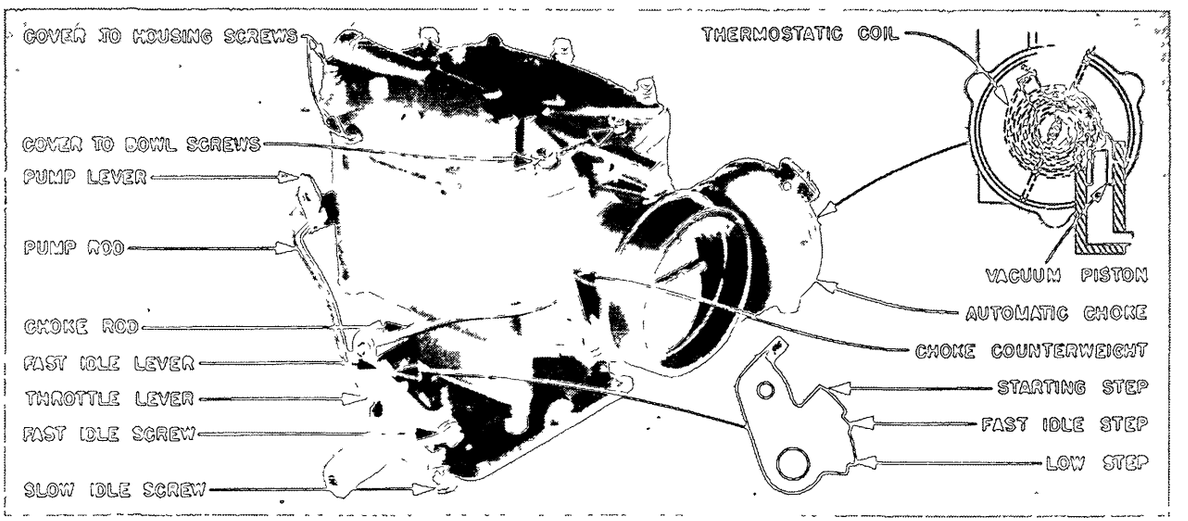
DISASSEMBLY: Remove float bowl balance tube from air horn. Take out three attaching screws and lugs on thermostatic coil cover, remove cover and coil assembly (CAUTION—use great care not to distort coil). Take out choke valve screws, remove choke valve. Remove pump rod and choke connector rod (CAUTION—use care not to bend or distort rods). Remove choke counterweight, collar and washer from choke shaft. Revolve choke shaft until vacuum piston is free from cylinder, remove shaft and piston as an assembly. If necessary to remove fast idle cam, take out cam attaching screws.

INSPECTION: Check choke shaft for wear in air horn, replace if clearance excessive. Clean all parts with carburetor cleaning solvent, blow out all passages with compressed air (CAUTION—make certain that vacuum piston cylinder vacuum passage is open and clean).

REASSEMBLY: Reverse the disassembly directions and also note the following important points:

Choke Valve Installation—Install valve with identifying letter "RP" outward. Check valve for free operation. Valve must not rub on air horn and should fall freely to wide-open position with thermostatic coil not engaged.

Adjustment—Adjust Choke Setting, Unloader Setting, and Fast Idle Setting. See Adjustment data above.



ROCHESTER "AA" AUTOMATIC CHOKE & FAST IDLE

ROCHESTER "BB" & "BC" AUTOMATIC CHOKE

►CHANGES, CAUTIONS, CORRECTIONS

►**CHOKE SUCTION TUBE SEAL CAUTION:** This tube extends from choke housing to throttle body and **must be tight** at both ends to insure correct choke operation. If tube seal disturbed by carburetor or choke assembly, *see Suction Tube Seal Replacement data below.*

DESCRIPTION: The automatic choke assembly is mounted on the side of the carburetor air horn and is linked directly to the choke valve lever. It consists of a thermostatic coil and vacuum piston assembly to control the choke valve and also operates the fast idle mechanism through a connector rod linked to a lever on the choke valve shaft.

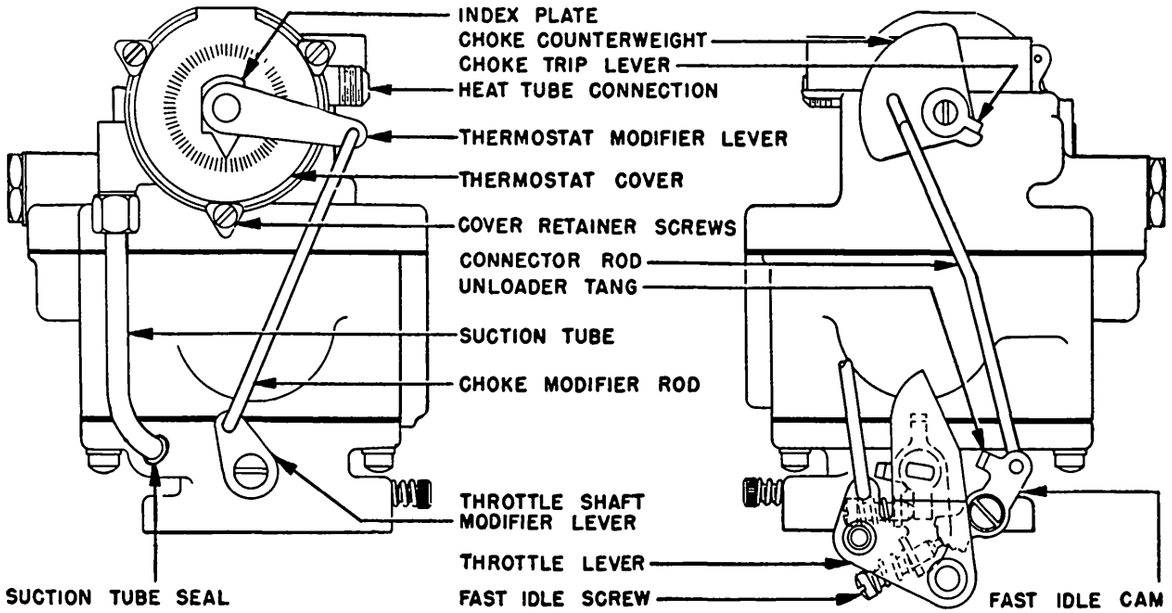
Cadillac "Choke Modifier"—Consists of a linkage between the thermostatic coil and throttle valve lever so that thermostatic coil tension is controlled by the throttle and is lessened as the throttle is opened to provide a continuously variable unloading action which improves performance and economy during warming-up period.

►*CAUTION—Choke modifier must be adjusted as part of automatic choke setting (see adjustment data).*

OPERATION: Automatic Choke—Thermostatic coil is bi-metal type and tends to "wind up" and close the choke valve when the engine is cold so that the choke valve will be completely closed for cold starting. In this position, the vacuum piston is at the top of cylinder. As soon as the engine begins to fire, manifold vacuum tends to pull the piston down in the cylinder which opens the choke valve slightly to prevent stalling (valve is offset and air flow through intake also tends to open valve). As the engine warms up, coil unwinds, lessening tension on choke valve and allowing air flow to open the valve so that at normal operating temperatures the choke valve is wide open. Warm air is introduced into the coil housing through a pipe extending from the exhaust manifold to the coil housing cover to effect this unwinding of the coil.

Fast Idle—Consists of a stepped fast idle cam mounted so as to serve as a stop for the fast idle screw on the throttle lever and linked to the choke lever by a connector rod. Cam is rotated to the "fast idle" position (with stopscrew resting on high step of cam) when choke valve closed for cold starting, and is rotated to the hot or slow idle position (with stopscrew resting on progressively lower steps of the cam) as the engine warms up and the choke valve opens.

Unloader—When the throttle valves are opened wide, choke valve is opened slightly through the fast idle linkage. This will correct flooding caused by over-choking.



ROCHESTER "BB" (CADILLAC) AUTOMATIC CHOKE & FAST IDLE (OTHER "BB" & "BC" TYPES SIMILAR EXCEPT NO MODIFIER)

DISASSEMBLY: On Cadillac carburetors, first disconnect choke modifier rod from lever on choke cover and remove lever and pointer by taking out retainer screw in lever. On all models, disconnect choke suction tube by loosening coupling nut at choke housing (CAUTION—use care not to disturb seal at lower end of tube). Take out three cover screws and retainers and lift off choke cover and thermostatic coil assembly, lift out choke baffle plate. Remove choke valve from shaft. Disconnect choke rod from fast idle cam, then take out screw in end of choke shaft and pry trip lever, spacing washer, and choke counterweight and rod assembly off shaft. Rotate choke shaft until piston is free, then withdraw shaft and piston assembly (piston can be removed from shaft lever by removing piston pin). Remove choke housing and gasket (2 screws within housing).

CLEANING & INSPECTION: Clean all metal parts except choke coil and housing with carburetor cleaning solvent. Blow out all passages with compressed air. Inspect all parts for wear and replace as necessary. Inspect tightness of suction tube seal in carburetor throttle body (seal can be tightened or renewed after choke and carburetor reassembled—see below) and condition of packing in coupling nut in upper end of tube).

REASSEMBLY: Install all parts in reverse order of disassembly procedure above using all new gaskets. Install choke valve with trademark "RP" up or outward, using new screws to attach valve. Install choke shaft counterweight with "RP" mark outward, then install spacing washer and trip lever with tang on lever on top of counterweight tang. Assemble connector rod with offset end of rod at counterweight (Cadillac & Oldsmobile), cotter pin end of rod at fast idle cam (Chevrolet & Pontiac).

►**SUCTION TUBE SEAL SERVICING:** If tightening of seal at lower end of tube does not correct leaks at this point, install new seal as directed below.

Tightening Tube Seal—Use installing tool and hammer to tap seal down evenly around tube.

Installing New Tube Seal—If new seal required due to loose seal or damaged tube, install seal **after carburetor completely assembled.** Loosen throttle body-to-bowl attaching screws, place new seal on lower end of suction tube and against the flared end of the tube, insert tube and seal in throttle body recess using tool J-4551 (except Oldsmobile), BT-45 (Oldsmobile) to start seal evenly in throttle body (tap lightly on seal while rotating tool). Position tube and tighten coupling nut at upper end finger-tight. Then use tool and hammer to spread seal securely in throttle body (rotate tool to insure uniform spreading of seal). Tighten coupling nut at upper end of tube securely, tighten throttle body-to-bowl attaching screws.

ROCHESTER SINGLE & DUAL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor	Main Metering Jet Part No.			Main Well Support	Float Needle & Seat
			Standard	1 Size Lean	1 Size Rich		
CADILLAC							
All	1951	7004200	7002646				
CHEVROLET 6 CYL CARS							
Replacement	1946-50	7002050	7002651	7002650	7002652	7002061	7002359
Powerglide	1950	7003060	7002658	7002657	7002659	7003079	7002359
Synchro-mesh (Early)	1951	7003152	7002651	7002650		7002061	7002359
Synchro-mesh (Late)	1951	7003865	7002651	7002650		7003922	7002359
Powerglide (Early)	1951	7003160	7002658	7002657		7003079	7002359
Powerglide (Late)	1951	7004495	7002656	7001860		7004523	7002359
Synchro-mesh	1952	7004477	7002652	7002651		7004512	7002359
Powerglide	1952	7003526 ①	7002657	7002656		7003822	7002359
Synchro-mesh	1953	7004915	7002958	7002957		7005422	7002359
Powerglide	1953	7004478	7002958	7002957		7005422	7002359
Synchro-mesh	**1954**	**7005921**	**7002958**	**7002957**	**7002959**	**7005924**	7002359
Powerglide	**1954**	**7005922**	**7002958**	**7002957**	**7002959**	**7005924**	7002359
Synchro-mesh	1955	7007181	7002957	7002956	.....	7007165	**7002359**
Powerglide	1955	7007180	7002957	7002956	.....	7007165	**7002359**
CHEVROLET V8 CARS							
Early Synchro-mesh	1955	7006825	7002952 ①	7002951 ①	7006331	7006011	7006941
Late Synchro-mesh	1955	7008005	7002952	7002951	7006331	7006011	7006941
Early Powerglide	1955	7005810	7002951 ①	7002950 ①	7006331	7006011	7006941
Late Powerglide	1955	7008004	7002951	7002950	7006331	7006011	7006941
CHEVROLET TRUCKS							
Replacement	1946-50	7002050	7002651	7002650	7002652	7002061	7002359
235" Eng. Std. Trans.	1950-51	7002051	7002658	7002657	7002659	7002158	7002359
216" Eng. Std Trans.(Early)	1951	7003152	7002651	7002650		7002061	7002359
216" Eng. Std. Trans. (Late)	1951	7003863	7002651	7002650		7003922	7002359
235" Eng. Std. Trans.(Late)	1951	7003864	7002658	7002657		7003921	7002359
216" Eng. Std Trans	1952	7004475	7002652	7002651		7004512	7002359
235" Eng. Std. Trans.	1952	7004476	7002659	7002658		7004571	7002359
Repl. 216" Eng.	1946-52	7004620 ②	7002652	7002651		7004622	7002359
Repl. 235" Eng.	1950-52	7003526 ②	7002657	7002656		7003822	7002359
216" Eng. Std. Trans.	1953	7004475	7002652	7002651		7004512	7002359
235" Eng. Std. Trans.	1953	7004468	7002959	7002958		7005428	7002359
235" Engine	**1954**	**7004468**	7002958	**7002957**	**7002959**	**7005428**	7002359
216" Engine	**1954**	**7005140**	7002958	**7002964**	**7002966**	**7005597**	7002359
Automatic Trans.	**1954**	**7005921**	7002965	**7002957**	**7002959**	**7005924**	7002359
235" Eng. Std. Trans.	1955	7004468	**7002958**	7002957	.....	7005428	**7002359**
235" Eng. Auto. Trans.	1955	7005921	**7002956**	7002957	.....	7005924	**7002359**
261" Eng.	1955	7005140	**7002958**	7002964	.....	7005597	**7002359**
CHEVROLET V8 TRUCKS							
½ Ton O.D.	1955	7008399	7002953	7002952	7006331	7006011	7006941
Others	1955	7006770	7002953	7002952	7006331	7006011	7006941
OLDSMOBILE							
Hydra-Matic	1949	7001570	7001607	7001498	7001860	③	7001846
All	1950	7002570	7001607	7001498	7001860	③	7001846
All	1951	7002900	7002951			7003076	7001395
"88"	1952	7002900	7002951			7003076	7001395
All Cars	1955	7006970	7001498	7002652	7006331	7008069	7006998
PONTIAC 6 CYL. CARS							
All	1951-52	7002870	7002958	7002957 ④		7002843	7002885
Hydra-Matic	1955	7006100	7001860	7001607	7006331	7006323	7006998

①—Replace float bowl, metering jets, or venturi cluster as a unit.
②—Automatic Choke Carburetor.
③—Main Well Tube 7001675, Idle Tube 7001494.
④—Two sizes Lean No. 7002956.

ROCHESTER 4-BARREL 4GC

	Rochester Carburetor No.
BUICK	
1955 Series 50, 60, 70	7006200
CADILLAC	
1952 V8 Series (All)	7004500
1953 V8 Series (H-D)	7005100
1953 V8 Series (TTD)	7006215
1954 V8 Series (No. A.C.)	7006220
1954 V8 Series (With A.C.)	7006221
1954 Late (Eng. No. 57962 Up)	7006962
1955 *See SEPARATE "Cadillac (Carter & Rochester)" data.*	
OLDSMOBILE	
1952 Super 88, 98 (S-M)	7004800
1952 Super 88, 98 (H-D)	7004300
1953 Super 88, 98 (S-M)	7005700
1953 Super 88, 98 (H-D)	7005600
1953 Super 88, 98 (TTD)	7006250
1954 All (S-M)	7006000
1954 All (H-D)	7005900
1955 Super 88, 98 (S-M)	7006000
1955 Super 88, 98 (H-D)	7007000
PACKARD	
1955 Series 5560	7007230
1955 Series 5580	7007230
1955 Caribbean 5588 (Front)	7008230
1955 Caribbean 5588 (Rear)	7008231
PONTIAC	
1955 Hydra-Matic	7007800

(S-M) Synchro-mesh Transmission Cars.
(H-D) Hydra-Matic Drive Cars.
(TTD) Twin-Turbine Dynaflow Drive Cars.

►CHANGES, CAUTIONS, CORRECTIONS

►***CADILLAC & OLDSMOBILE "TWIN-TURBINE DYNAFLOW" CAR CAUTION:*** If "Throttle Return Check Dashpot" used, this unit should be adjusted as directed below (following Idle Adjustment).

►***1952 CADILLAC ACCELERATOR PUMP STEM BOOT CRACKING (Causing air leaks which may result in reduced gasoline mileage):*** If pump boot on pump stem at bowl cover cracked, install improved boot which will provide longer service life. NOTE—This improved boot, No. 7003147 (same number as previous type), can be identified by raised ridge at pump stem hole on upper end of boot.

►***1952 CADILLAC ROUGH IDLING (Caused by Improper Seating of Secondary Throttle Valves):*** If caused by weak throttle return spring, install new type STRONGER SPRING, No. 7004145, and wrap spring **one complete turn** around throttle shaft to provide correct tension.
Return Spring Identification—The new No. 7004145 spring is made of heavier wire and fewer turns than previous type and can be identified by slight bend of secondary throttle lever end of spring. ***NOTE—This spring used in production on late 1952 and all 1953 carburetors.***

►***1952 CADILLAC FLOAT SETTING CHANGE TO CORRECT CUTTING OUT ON SHARP TURNS OR STEEP HILLS*** **(Early "B-2" Series carburetors without "X" on Brass Code Tag):** When servicing these early carburetors, float balance springs and clips should be **removed and discarded.** Set float level (both float height and float travel or drop) to new specifications (see Float Setting data below). Make this change as follows
(1) Remove bowl cover assembly from carburetor (not necessary to remove carburetor from engine).
(2) Invert bowl cover and remove both primary and secondary float assemblies, power valve vacuum piston and piston spring.
(3) Remove AND DISCARD both float balance springs and clips.
(4) Use pliers to bend float arm tang under float hinge on each float assembly toward float about 45° from original position.
(5) Re-install both float assemblies on bowl cover.
6) Adjust Float Height and Float Drop to new specifications (see Float Setting data below).
(7) Install power valve vacuum piston and spring. Reassemble carburetor and tune up engine.

►***LATER CARBURETOR NOTE***—All "B-2" series carburetors marked by "X" on brass code tag have had above correction made on them. All "C-2" and later series have this change incorporated in production.
1953 CADILLAC "SPEED-UP" CONTROL ON AIR-CONDITIONED CARS: This device automatically increases engine idle speed to 750-800 RPM. when air-conditioning switch turned on. ***See Speed-Up Control Adjustment following Idle Adjustment.***

►***1953 CADILLAC HIGH SPEED ENGINE SURGE (At 60-70 MPH. in "Dr. 3" range):*** Caused by slightly lean condition due to fuel swirling in bowl and not being directed into lower end of main well pick-up tubes. Correct by installing later type Primary Venturi Cluster, Part No. 7006114 (not necessary to remove carburetor from engine for this change). ***NOTE***—This new cluster used on late 1953 carburetors.

►***CADILLAC & OLDSMOBILE "TWIN-TURBINE DYNAFLOW" CAR CAUTION:*** If "Throttle Return Check Dashpot" used, this unit should be adjusted as directed below (following Idle Adjustment).

►***1953 CADILLAC HIGH SPEED ENGINE SURGE (At 60-70 MPH. in "Dr. 3" range):*** Caused by slightly lean condition due to fuel swirling in bowl and not being directed into lower end of main well pick-up tubes. Correct by installing later type Primary Venturi Cluster, Part No. 7006114 (not necessary to remove carburetor from engine for this change). ***NOTE***—This new cluster used on late 1953 carburetors.

►***1953-54 CADILLAC "SPEED-UP" CONTROL ON AIR-CONDITIONED CARS:*** This device automatically increases engine idle speed when air-conditioning turned on while engine idling with selector lever in Neutral "N" position. ***See Speed-Up Control Adjustment following Idle Adjustment below.***

►***1954 CADILLAC CARBURETOR PRODUCTION CHANGE (To eliminate Surge in 20-30 MPH. Speed Range):*** Carburetor No. 7006962 used on later cars This carburetor has revised idle circuit (New Idle Tubes and changed idle channel resistance), New Main Metering Jets, and New Throttle Body. Adjustment specifications are same as for previous carburetor models.

►***1954 CADILLAC IDLE SPEED SETTING CAUTION ON AIR-CONDITIONED CARS:*** Idle speed setting should be adjusted seasonally: (1) When air-conditioning use discontinued for winter months, (2) When air-conditioning is put into use for summer months. This is necessary to compensate for compressor load when engine idling in "Dr." ***See Idling Adjustment below. CAUTION—Engine may stall during summer months, or operate at too fast an idle speed during winter months, if proper procedure not followed.***

►***1953 OLDSMOBILE METERING JETS & VENTURI CLUSTER PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION: Different parts used in production as follows:***

Primary & Secondary Main Metering Jets—FIVE different jet combinations used in production on all carburetors (Synchro-mesh & Hydra-Matic Carburetor Types) as indicated by production tag-dates as follows: A through D, E, F through G, H through I, J through L. ***EXISTING JET SIZES NEED NOT BE CHANGED UNLESS JETS BEING REPLACED. SELECT REPLACEMENT JETS FROM TABLE BELOW.***

REPLACEMENT MAIN METERING JETS: TWO jet combinations required for all 1953 carburetors as follows:

1953 Oldsmobile Main Metering Jets
(Hydra-Matic Drive Cars)

Carb No.	Primary		Secondary	
7005600①	Size	Part No.	Size	Part No.
A thru G	051"	7002651	056"	7002656
H thru L	049"	7002649	.056"	7002656

(Synchro-mesh Trans. Cars)

Carb No.	Primary		Secondary	
7005700①	Size	Part No.	Size	Part No.
A thru G	051"	7002651	.047"	7002647
H thru L	.049"	7002649	.049"	7002649

①—Tag-dated production groups as indicated.

Venturi Cluster & Nozzle Assembly—Beginning with carburetors tag-dated "H" a new Primary Venturi Cluster with "crushed" nozzles was used in all carburetors. This nozzle assembly has same part number as previous type with "full" nozzles and will be furnished for service. ***PRIMARY VENTURI CLUSTER & NOZZLE TYPE FOR EACH METERING JET GROUP LISTED ABOVE IS AS FOLLOWS:***

1953 Oldsmobile Primary Venturi Cluster
(Synchro-mesh & Hydra-Matic Cars)

Carburetor	Primary Venturi Cluster	
Tag-date	Part No.	Nozzle Type
A thru G	7005533②	Full Nozzle
H thru L	7005533②	Crushed Nozzle

②—Part No. continued without change.

►***1953-54 OLDSMOBILE SECONDARY VENTURI RESTRICTOR RING CAUTION:*** When overhauling carburetors, check steel restrictor rings installed in end of secondary venturi clusters and make certain that these are tight. Rings are staked at two points and should be staked, if loose, to prevent dropping out in service.

►***1954 OLDSMOBILE CARBURETOR GASKET CAUTION: New Air Horn Gasket and Throttle Body Gasket used in 1954 carburetors as detailed below. Previous type gasket MUST NOT BE USED in 1954 carburetors*** (Wrong air horn gasket may cause stalling on quick stops, wrong throttle body gasket will cause excessively rich mixture due to cutting off of power piston vacuum line), however, these gaskets may be used in earlier carburetors.

1954 Air Horn Gasket—No. 7006061. Has two additional cutout sections on primary side to allow pri-

CONTINUED ON NEXT PAGE

ROCHESTER 4-BARREL 4GC
(C ntinu d)

mary bowl fuel to enter air horn section of bowl during quick stops.

1954 Throttle Body Gasket—No. 7006062. Has additional vacuum channel hole to line up throttle body and bowl vacuum channels for power piston operation.

DESCRIPTION: These models are essentially double dual (two-barrel) carburetors with a conventional dual **primary** unit supplemented by a similar dual **secondary** unit for maximum engine performance. Both the primary and secondary units have separate feul bowl and float systems, idle systems, main metering and discharge systems, and interconnected throttle valves as described below. Only the primary unit has an accelerating pump system and choke valve with an automatic choke control (the secondary throttle valves are locked closed for starting and warming up and remain closed during part-throttle operation). ***See Throttle Linkage data below.***

Fuel System: A single fuel inlet is used (located on secondary side of bowl cover) with a passage in the cover leading to the fuel inlet valve for each float chamber. Each bowl has a twin float assembly controlling the fuel inlet valvc. Bowls are vented to the air horn by vent tubes and have additional vent passages terminating at the air cleaner mounting flange. ***See also Idle Vent data below.***

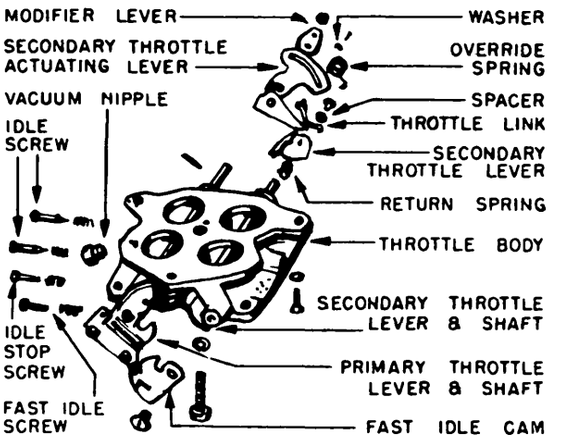
Idling & Low Speed—Entire idle system is duplicated for both the primary and secondary sides of the carburetor except that idle mixture adjusting screws are provided only on the primary side. Both idle systems discharge into the primary carburetor barrels so that both idle systems are controlled by the opening of the primary throttle valves (idle systems drop out as primary throttle valves open and main nozzles come into action and take over). Secondary throttle valves are locked out by the choke mechanism when the engine is warm these valves do not begin to open until primary throttle valves are 50-60% open.

Driving Range (Less than 50-60% Throttle)—The primary throttle valves are directly connected to the accelerator pedal and open as the pedal is depressed (secondary throttle valves are linked to the primary throttle valves and remain closed until primary valves are 50-60% open). Opening of the primary throttle valves brings the main discharge nozzles into action and the idle systems drop out (both the primary and secondary idle systems are controlled by the primary throttle valve position). Fuel for these main nozzles is metered by the primary main metering jets. Under conditions of low manifold vacuum (hill-climbing, acceleration, etc.), main metering jets are supplemented by fuel bypassed through the power valve and metered by the power restriction (separate valve operated by a spring-loaded vacuum power piston). Power valve is used only for the primary side of the carburetor.

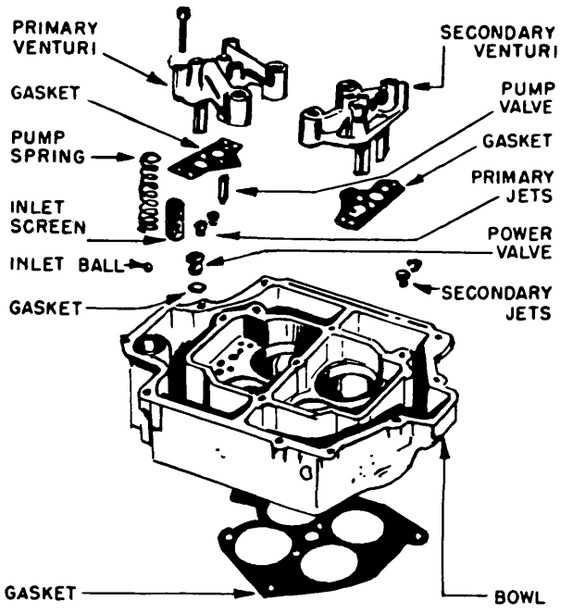
High Speed or Full Power (More than 50-60% Throttle)—At 50-60% throttle, the linkage between the primary and secondary throttle valve levers begins to open the secondary valves. These secondary valves open at a relatively greater rate so that both the primary and secondary valves reach the "wide open" position at the same time. In this range, fuel is discharged through all four carburetor barrels to provide maximum engine power. Secondary fuel is metered by secondary main metering jets and discharged through secondary main nozzles in exactly the same manner as on the primary side except that no power valve is used.

Accelerating Pump—*Used only on primary side of carburetor.* Pump is conventional type with pump

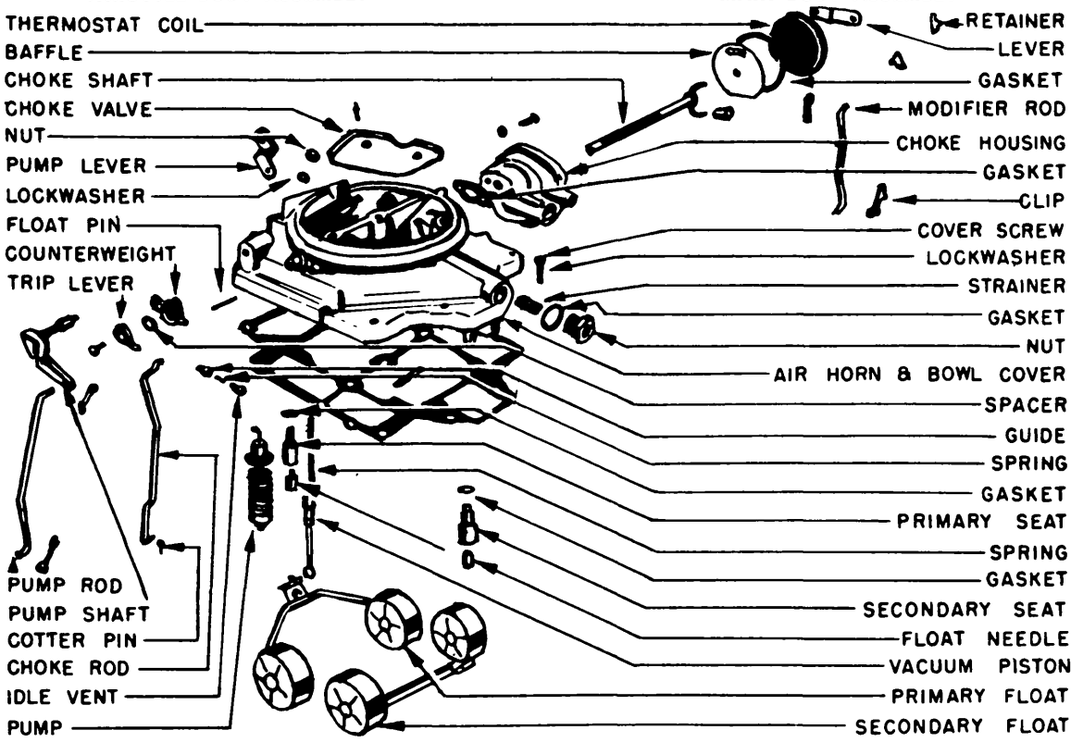
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THROTTLE BODY ASSEMBLY



MAIN BODY ASSEMBLY



ROCHESTER 4GC 4-BARREL CARBURET R AIR H RN & B WL COVER ASSEMBLY

ROCHESTER 4-BARREL 4GC (Continued)

plunger linked to primary throttle valve lever so that the additional fuel needed for acceleration is discharged through the pump jets into the primary carburetor barrels when the primary throttle valves are opened for acceleration. A relief check valve is located in the pump discharge channel to prevent excessive pressures in the pump circuit (opening of the check valve permits fuel to be by-passed back into the bowl).

Primary & Secondary Throttle Linkage: Secondary throttle valve lever is linked to a secondary actuating lever on the primary throttle valve shaft with an overrun provision so that secondary valves do not begin to open until primary valves are 50-60% open. The linkage provides a more rapid opening of the secondary valves so that both the primary and secondary valves reach the wide open position at the same time. This linkage must be checked and adjusted to insure this synchronized opening. *See Adjustment data.*

Secondary Throttle Lock-out: A means is provided by which the choke mechanism locks the secondary throttle valves closed while the choke is in operation so that no choke valve is required on the secondary side of the carburetor. This lock-out mechanism differs on the various carburetors but all types must be checked and adjusted to insure unlocking of the secondary valves for normal operation. *See Adjustment data.*

Atmospheric Idle Vent: This is an outside bowl vent controlled by a ball or disc type check valve which is opened mechanically (by an arm on the pump countershaft or operating lever) when the throttle valves are closed. This permits fuel vapors to escape and minimizes hot weather starting or idling difficulties due to fuel vapor formation. Vent must close when throttle valves open and vent setting should be checked and adjusted as part of the carburetor adjustment procedure. *See Adjustment data.*

Throttle Return Check Dashpot: Used on all Cadillac and Oldsmobile Dynaflow Drive Cars. Consists of a dashpot which slows throttle closing when accelerator pedal released suddenly and prevents engine stalling. See Adjustment data below.

1954 Air Horn Assemblies—Over-all height has been reduced with following principal changes: New Floats ("D" shaped with flat at top), Modified Choke System (Bakelite coil cover, larger vacuum piston, narrower choke valve, relocated indicator mark visible without removing air cleaner), redesigned Power Piston, New Pump Plunger (shorter with new type pump boot), additional bowl vents, and new Air Horn Gasket. *(CAUTION*—previous type gasket must not be used on 1954 carburetors).

1954 Float Bowl Assemblies—Minor changes only (Oldsmobile), no change (Cadillac). Oldsmobile carburetor does not have secondary side idle system (see Overhaul data for new Primary & Secondary Venturi Cluster assemblies).

1954 Throttle Body Assemblies—Oldsmobile throttle body has lower over-all height with throttle linkage mounted directly on the body (no separate linkage plate used). New throttle lever and linkage assembly insures positive closing of secondary throttle valves.

ADJUSTMENT: *CAUTION—Adjustments must be made in exact sequence as given below (except for Idle Mixture and Idle Speed Tune-up adjustments).*

Idle Setting: *Adjust only with engine at normal operating temperature with automatic choke not operating* (choke valve wide open, fast idle inoperative so that engine idles at hot or slow idle speed). With engine warm, set idle speed adjusting screw (throttle stopscrew) for correct idling speed as shown in table below (use tachometer), then adjust each idle mixture adjusting screw (one screw for each primary carburetor barrel—two screws only) until engine idles smoothly and RPM. is at maximum. Recheck idle speed.

OLDSMOBILE NOTE—It is recommended that after above adjustment (for highest vacuum reading and maximum idle speed), each idle screw be turned out ¼ turn for slightly richer mixture (both idle speed and vacuum reading will drop off slightly). Check setting by slowly opening throttle until engine speed increases to 1000 RPM., then close throttle rapidly. If a slightly rich roll is noted as engine returns to idle speed, turn each idle screw in not more than ⅛ turn.

NOTE—Change in Idle Speed affects throttle linkage adjustment on all cars except Oldsmobile. Oldsmobile split throttle lever design insures throttle linkage remaining as set when idle speed adjusted.

IDLE SPEED

Car Model	Synchro-mesh	Auto. Trans.
Buick ('55)	450 RPM	450 RPM
Cadillac ('52)	400 RPM	① 375 RPM
Cadillac ('53) ③	400 RPM	② 400 RPM
Cadillac ('54)		④ 400 RPM
Oldsmobile ('52-53)	425 RPM	② 400 RPM
Oldsmobile ('54)	425 RPM	① 400 RPM
Oldsmobile ('55) ⑤	425 RPM	① 400 RPM
Packard ('55)	400-450 RPM	400 RPM in "High"
Pontiac ('55)	450-470 RPM	390-410 RPM

①—With selector lever in either "Dr" position.
②—With selector lever in "Dr" (Hydra-Matic Drive Cars), "P" position (Dynaflow Drive Cars).
③—See "Speed-Up" Control below for special idle speed on Air-conditioned Cars.
④—with selector lever in "DR" and Air-conditioner "ON" (Summer months), "OFF" (Winter months). See special procedure following.
⑤—Air Conditioning must be turned "ON" on cars with Air Conditioning equipment.

►*CADILLAC IDLE SPEED SETTING PROCEDURE:* Set idle speed in accordance with season as follows: When air-conditioning being used (Summer months), place selector lever in "Dr," turn Air-conditioner "ON," set idle speed at 400 RPM. When air-conditioning not being used (Winter months), place selector lever in "Dr," see that Air-conditioner "OFF," set idle speed at 400 RPM. (it will be necessary to cut idle speed setting down from summer setting to maintain this 400 RPM. idling speed).

Cadillac Speed-Up Control (Air-conditioned Cars): This unit increases engine idle speed when idling with selector lever in "N" and air-conditioner "ON."

Adjustment—With engine warm and idling, place selector lever in "N," turn air-conditioning ON, loosen locknut on diaphragm shaft and turn knurled adjusting nut to obtain engine speed of 900 RPM., tighten locknut. *NOTE*—This setting supersedes previous recommendation of 750-800 RPM.

Throttle Return Check Dashpot Adjustment: Check setting by opening throttle for a few seconds, then quickly release accelerator pedal. If engine stalls, adjustment is required.

Adjustment (Cadillac)—Check alignment of adjusting screw and contact arm on secondary throttle lever, bend return check bracket as necessary to center screw on contact lever radius. Check performance with selector lever in "Dr" or "L," by opening throttle and quickly releasing accelerator pedal. *(CAUTION*—apply brakes firmly when making this test). If engine stalls, adjust by turning adjusting screw (hold shaft with ⅜" wrench while turning screw), repeat test and readjust until stalling condition eliminated.

Adjustment (Oldsmobil)—Turn adjusting screw in or out of return check plunger to secure 1/16" clearance between screw and throttle lever with plunger bottomed in return check and throttle valves closed in hot or slow idle position. *NOTE*—Plunger travel 7/32" from inner to outer position.

Float Setting: *CAUTION—Both Primary and Secondary Float Assemblies must be checked and adjusted separately and both FLOAT LEVEL & FLOAT DROP must be checked for each assembly.* **Remove bowl cover and float assembly from carburetor but DO NOT remove bowl cover gasket for following checks:**

►*1952 CADILLAC FLOAT SETTING CAUTION*—Specifications below apply to carburetors without balance springs (B-2 Series marked by "X" on brass code tag and all C-2 Series and later carburetors). *See "Cadillac Float Adjustment Change" under Changes, Cautions, Corrections (above) for removal of balance springs on first carburetors.*

Float Level—*CAUTION—Do not remove bowl cover gasket.* **Invert bowl cover, install float gauge on cover and against curvature in air horn bore, or use scale to measure distance from gasket on cover to highest point on each float. If floats do not almost touch top portion of gauge between gauge legs, or if scale distance not correct, adjust by bending float arms at rear of float assembly** *(CAUTION*—all floats must be set alike). **Bend float arms horizontally until each float is centered between the gauge legs and check this setting by tilting bowl cover assembly 90° to each side to make certain that floats do not touch gauge legs under these conditions** *(CAUTION*—this adjustment important to prevent floats touching sides of bowl and hanging up in service).

FLOAT LEVEL SETTING
(Primary & Secondary Floats)

Car Model	Float Height	Gauge No.
Buick ('55)	1 35/64"	J-6151
Cadillac ('52)	1 3/4" ①	② BT-85
Cadillac ('53)	1 9/16"	③ BT-87
Cadillac ('54)	1 19/32"	BT-101
Oldsmobile ('52)	1 1/4"	BT-66
Oldsmobile ('53)	1 9/16"	BT-87
Oldsmobile ('54-55)	1 5/8"	BT-89
Packard ('55)	1 5/8"	④ BT-89
Pontiac ('55)	1 19/32"	J-6179

①—For carburetors WITHOUT Float Balance Springs only (supersedes 1⅜" setting applicable to carburetors WITH balance springs).
②—Cadillac No. J-5198.
③—Cadillac No. J-5465. ④—Packard No. 5399.

CONTINUED ON NEXT PA E

ROCHESTER 4-BARREL 4GC (Continued)

Float Drop—*CAUTION—Do not remove bowl cover gasket.* Hold bowl cover assembly in upright position so that floats are free to hang down. Use scale to measure distance from bottom face of gasket on bowl cover to bottom of floats. If this distance or float travel (see table below) not correct, adjust each model as directed below (*CAUTION*—All floats must be set alike).

Cadillac Carburetors (without Balance Spring). Bend float tang on float arm under float hinge which contacts side of needle seat (this tang repositioned as part of balance spring removal procedure) away from needle seat to increase float drop, or toward seat to decrease float drop.

Oldsmobile Carburetors (With Balance Spring). Bend tang at rear of float assembly (which contacts balance spring) away from the balance spring to increase float drop, or toward balance spring to decrease float drop.

FLOAT DROP SETTING
(Primary & Secondary Floats)

Car Model	
Buick ('55)	2 1/4"
Cadillac ('52)	①2 1/4"
Cadillac ('53-54)	2 1/4"
Oldsmobile ('52)	②1 15/16"
Oldsmobile ('53-55)	2 1/4"
Packard ('55)	2 1/4"
Pontiac ('55)	2 1/4"

①—For carburetors WITHOUT Float Balance Springs only (supersedes 1 15/16" setting applicable to carburetors WITH balance springs).
②—2¼" on later carburetors.

Accelerating Pump Stroke: *CAUTION—This is a linkage adjustment and not a seasonal change recommendation.* Back off idle speed stopscrew and fast idle screw so that primary throttle valves are fully seated, hold throttle lever in this position, use scale to measure height of pump plunger rod (from top surface of bowl cover to bottom edge of pump plunger rod). If height not correct (see table below), adjust by bending pump rod as required.

PUMP STROKE SETTING

Car Model	
Buick ('55)	1 3/32"
Cadillac ('52-54)	15/16"
Oldsmobile ('52-55)	1 1/16"
Packard ('55)	1 3/32"
Pontiac ('55)	1 1/16"

CAUTION—Do not readjust fast idle screw until after Choke Modifier has been adjusted on Cadillac.

Atmospheric Idle Vent: *CAUTION—Targeting or centering of the lever tang on the vent valve must be done first to insure proper closing of the valve (hanging up of valve in open position may cause poor mileage).*

Targeting of Lever Tang—Check position of idle vent lever tang and bend tang, as necessary, to centralize it on the vent valve.

Setting—Close primary throttle valves against wire gauge of correct size (see table below) installing gauge on side opposite idle adjusting screws, hold throttle valves in this position while adjusting idle vent. The operating tang on the lever should just touch vent valve. Adjust by bending contact arm using bending tool BT-69.

IDLE VENT SETTING

Car Model	Gauge Size & No.
Cadillac	①② .063" BT-79
Oldsmobile	① .040" BT-67
Packard	①③ .040" BT-67

①—LARGE end of gauge.
②—Cadillac Gauge No. J-5195.
③—Packard No. J-6061.

Automatic Choke: *CAUTION—Cadillac carburetor has Choke Modifier and is adjusted differently as follows:*

Choke Modifier (Cadillac)—With throttle stopscrew and fast idle screw backed off so that primary throttle valves fully seated, loosen retainer screw in index lever and rotate the index pointer on the Choke cover 1 Notch Rich position or one graduation counter-clockwise from long scribed line or center graduation on cover (1952-53), Center At Index (1954), tighten lever retaining screw. Then adjust choke rod, fast idle, unloader.

AUTOMATIC CHOKE SETTING

Car Model	Choke Setting
Buick ('55)	Centered At Index
Cadillac ('52-54)	See Choke Modifier
Oldsmobile ('52-53)	Centered At Index
Oldsmobile ('54-55) Synchro-mesh	1 Notch Lean
Oldsmobile ('54-55)Hydra-Matic	Centered At Index
Packard ('55)	Centered At Index
Pontiac ('55)	Centered At Index

Choke Rod: With automatic choke correctly set (above), turn fast idle screw in until it contacts intermediate step of fast idle cam, rotate cam until fast idle screw is against shoulder of highest step on cam and make certain that choke trip lever is in contact with choke counterweight. Measure choke valve opening by inserting wire gauge of correct size (see table below) between top edge of choke valve and dividing wall in air horn. If valve opening not correct, adjust by bending choke connector rod.

CHOKE ROD SETTING

Car Model	Gauge Size & No.
Buick ('55)	③ .040" J-6152
Cadillac ('52-53)	①② .031" BT-78
Cadillac ('54)	① .040" BT-102
Oldsmobile ('52-55)	① .053" BT-68
Packard ('55)	①③ .053" BT-68
Pontiac ('55)	.054" KMO-480A

①—SMALL end of gauge.
②—Cadillac Gauge No. J-5196.
③—Packard No. J-6056.
④—Large end of gauge.

Fast Idle: *NOTE—Adjustment can be made with carburetor OFF ENGINE or with carburetor ON ENGINE:*

Carburetor Off Engine—With automatic choke and choke rod correctly adjusted, move fast idle cam so that choke valve is fully closed, hold primary throttle valves closed so that fast idle screw is aligned with highest step of fast idle cam. Adjust fast idle screw in against fast idle cam until throttle valve opening is correct as measured by wire gauge (see table below) inserted between edge of valve and carburetor wall on side opposite idle screws.

FAST IDLE SETTING

Car Model	Gauge No.
Buick ('55)	.020" J-1388
Cadillac ('52-54)	①.028" BT-79
Oldsmobile ('52-53)	①.020" BT-67
Oldsmobile ('54-55)	①.024" BT-90
Packard ('55)	①②.024" BT-90
Pontiac ('55)	.033" J-6178

①—SMALL end of gauge.
②—Packard No. J-6057

Carburetor On Engine—Run the engine until both the engine and transmission are at operating temperature. With engine idling and transmission in neutral, and with choke valve wide open, rotate fast idle cam so that high step of cam is under the fast idle screw. Adjust fast idle screw for correct engine speed as shown in table below (use tachometer). *CAUTION—Air cleaner must be in place.*

FAST IDLE SPEED

Buick ('55)	1800 RPM
Cadillac ('52-55)	1700 RPM
Oldsmobile ('52-55)	① 1400-1500 RPM
Packard ('55)	① 1500 RPM
Pontiac ('55)	1800 RPM

①—With transmission in neutral.

Unloader: With automatic choke and choke rod correctly adjusted, hold choke trip lever down so that it is in contact with the choke counterweight, move throttle valves to wide open position, measure choke valve opening by inserting wire gauge of correct size (see table below) between upper edge of valve and dividing wall in air horn. If choke valve opening not correct, bend tang on fast idle cam using tool BT-69.

UNLOADER SETTING

Car Model	Gauge Size & No.
Buick ('55)	③ .115" J-6152
Cadillac ('52-53)	①② .067" BT-78
Cadillac ('54)	① .125" BT-102
Oldsmobile ('52-53)	① .092" BT-68
Oldsmobile ('54-55)	① .115" BT-90
Packard ('55)	①③ .115"BT-90
Pontiac ('55)	.115" J-6178

①—LARGE END of gauge.
②—Cadillac Gauge No. J-5196.
③—Use small end of gauge.
④—Packard No. J-6057.

Secondary Throttle: *CAUTION—Three separate adjustments required as follows:*

1) Secondary Throttle Position—Move both choke and primary throttle valves to wide open position. If secondary throttle valves not wide open, remove throttle operating link, bend tangs on wide open stops on primary and secondary shafts as required to obtain wide open position, then bend throttle operating link to proper length.

2) Secondary Throttle Lock-out—With choke valve partially closed, check side clearance between secondary lock-out lever tang and edge of slot in fast idle cam using a feeler gauge of correct thickness (see table below). If clearance not correct, adjust by bending tang on lever using BT-18 tool.

3) Secondary Throttle Clearance—With choke valve wide open check clearance between lower face of secondary lock-out lever tang and edge of fast idle

CONTINUED ON NEXT PAGE

Form 28B—1956-M

ROCHESTER 4-BARREL 4GC
(C ntinu d)

cam using a feeler gauge of correct thickness (see table below). If clearance not correct, adjust by bending tang on lever up or down using BT-69 bending tool (1952-53), BT-91 (1954-55).

SECONDARY THROTTLE SETTING

Setting:	Feeler Gauge Thickness (2) Lock-out	(3) Lever Clearance
Buick	.015"	.030"
Cadillac	.015"	.015"
Oldsmobile	.015"	.035"
Packard	.015"	015"
Pontiac	.015"	015"

Car Starter Switch Setting (Buick): Back off throttle stop screw to close throttle valves completely. Make pencil mark on switch end of primary throttle shaft to line up with longest of three indicator marks on casting. With test light across switch terminals, slowly open throttle valves. Light should come on when pencil mark is between the two marks on casting. Adjust by changing shims (Maximum .066"). Reset idle RPM to specifications.

Dampener Valve Setting (Buick): Remove fast idle cam and replace retaining screw. Adjust lever tang (Tool J-6058A) to give measurement of 51/64" (Tool J-6153 No. 1 end) from cam screw shoulder vertical to top of counterweight lever. Hold lever in this position, seat damper valves against outside of bore and tighten in place. Readjust tang to give 53/64" (Tool J-6153 No. 2 end) from cam screw shoulder vertical to top of lever. Proper adjustment prevents valve edge striking bore when in closed position.

OVERHAUL: ***CAUTION—When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor reassembled.***

Disassembly: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Carburetor Bowl, and Throttle Body) which can be overhauled separately as follows:

Air Horn & Bowl Cover—On Cadillac, disconnect and remove choke modifier rod. On all models, disconnect and remove pump connector rod. Remove trip lever retaining screw from end of choke shaft, remove trip lever and spacing washer from shaft. Take out fast idle cam pivot screw, remove choke rod with lever and cam as an assembly. Take out all air horn retaining screws *(CAUTION*—there are 13 screws—3 inner and 10 outer—with **one screw in counterbore in dividing wall just inside edge of air horn**). Lift air horn and bowl cover assembly straight up using extreme care not to damage float assemblies *(CAUTION*—break cover loose from bowl with finger pressure only, DO NOT pry on cover flange). Disassemble as follows: Invert the cover assembly, take out float hinge pins and remove floats and intake needles, remove needle seats and gaskets *(CAUTION*—Keep each float assembly, intake needle, and seat together, DO NOT mix primary and secondary side parts). Remove power piston by rotating retaining washer until flat side allows piston to pass, remove piston spring. Remove idle vent valve, spring, and retainer by pressing on retainer with a screwdriver and sliding assembly up out of well in bowl cover. Remove pump plunger and rubber seal as an assembly by disengaging plunger shaft from pump lever and pulling assembly out of cover (seal, retainer, washer, and spring can be removed from plunger for cleaning). Remove pump inner lever from countershaft by removing nut and washer, then slide countershaft out of cover boss. Remove fuel inlet fitting, gasket and strainer. If choke to be disassembled, proceed as follows: On Cadillac, remove retaining screw and lift off choke modifier lever. Remove cover attaching screws and retainers, lift off thermostat cover and coil assembly *(CAUTION*—On Cadillac, do not remove metal pointer or coil from shaft in cover), remove gasket and baffle plate. Remove choke valve (remove staking burrs from valve screws before taking screws out). Rotate choke shaft counter-clockwise until choke piston clears cylinder, slide shaft out and remove shaft and piston as an assembly (piston can be disconnected by using a wire to push piston pin out of piston and link). Remove choke housing by taking out two attaching screws, remove and discard choke housing gasket.

Carburetor Bowl—Take out three attaching screws and lockwashers in each venturi cluster, carefully remove clusters by lifting them straight up to avoid damaging idle tubes and main well tubes *(CAUTION*—Clusters are serviced as an assembly and should not be disassembled further). Keep primary and secondary side clusters separate (primary cluster has pump discharge nozzles). Remove all main metering jets (located in bowl adjacent to venturi cluster support). *CAUTION*—Primary and secondary side metering jets are different size and must not be interchanged. Remove power valve and gasket (located in bowl adjacent to primary metering jets). Remove pump return spring from pump cylinder, then invert bowl casting to remove aluminum pump inlet ball (from bottom of pump cylinder) and brass pump outlet check needle (from passage under primary venturi cluster mounting face). *CAUTION*—Do not lose these parts and NEVER substitute a steel ball for the aluminum inlet ball. Remove pump inlet screen from intake passage at side of cylinder.

Throttle Body—Remove large screw and washer from counterbore in center of throttle body (visible when bowl and throttle body inverted), remove three smaller screws and lockwashers from flange, carefully separate throttle body from bowl, remove and discard gasket. Remove both idle adjusting screws and springs, idle stop screw and spring, and fast idle screw and spring *(CAUTION*—keep each screw and its proper spring together). On Cadillac, remove choke modifier lever and retaining screw from primary throttle shaft. Free secondary throttle actuating link by taking out cotter pin in each end, unhook inner end of primary throttle shaft override spring from lever using long-nose pliers, remove override spring retaining screw from primary throttle shaft, remove secondary throttle lever retaining screw and washer, then slide secondary throttle actuating lever and override spring off primary throttle shaft, remove link. Slide secondary throttle lever and return spring from secondary throttle shaft. This completes throttle body disassembly.

►***CAUTION—Throttle body is furnished as an assembly with throttle valves and shafts and no attempt should be made to remove throttle valves (disturbing valves will upset low speed metering performance).***

Cleaning & Inspection: Wash all parts thoroughly in carburetor cleaning solvent **except** following parts which should be cleaned in clean gasoline: Choke cover and coil assembly, pump plunger, primary venturi cluster (with pump discharge nozzles). Blow out all passages in castings with air, remove all gum and carbon deposits *(CAUTION*—do not use drills to clean out jets and passages). Inspect strainer screens and replace if distorted or plugged. Check floats for dents, leaks, or wear at hinge pin holes. Inspect fast idle cam for wear on steps. Inspect throttle body carefully for wear at throttle valves and bore and shaft wear in bore (replace as an assembly if worn excessively). Inspect all parts for wear or damage and replace as required.

Reassembly: Use new gaskets. Install all parts in reverse order of disassembly procedure (above) and pay particular attention to the following:

Secondary Throttle Lever & Spring Installation: Install return spring on secondary throttle shaft with bent end of spring in hole in throttle body, wind up spring one complete turn, then install secondary lever on shaft over straight end of spring (bent portion of lever should be above shaft), install spacer and retaining screw in end of shaft. Install secondary throttle actuating link (insert plain end through lever hole, install cotter pin on shaft side to clear return spring).

Primary Throttle Lever & Spring—Start secondary throttle actuating lever on primary throttle shaft with curved slot portion outward and toward the rear. With inner portion of lever on shaft, start override spring on shaft with long end inward, then slide lever and spring on shaft and engage washer end of secondary throttle actuating link in slot in lever. Install override spring retaining screw through loop end of spring and into primary throttle shaft from upper side. Hook inner end of override spring over top edge of secondary throttle actuating lever. Install washer and cotter pin on end of secondary throttle actuating link. On Cadillac, install choke modifier lever and retaining screw on end of primary throttle shaft (lever must point upward when throttle closed and marking "RP" must be outward).

Throttle Body-to-Bowl Assembly Caution—Install new gasket on bottom surface of bowl with largest projecting tab on primary side and surrounding vacuum passage to power valve piston *(CAUTION*—gasket is not reversible). Install all throttle body attaching screws loosely (including large screw in center of throttle body), then tighten all screws evenly.

Venturi Cluster Installation Caution—Make certain that brass pump discharge needle installed in pump passage in bowl before installing primary venturi cluster. Use new gaskets and install each venturi cluster in correct position making certain that clusters correctly aligned by the tangs on the cluster. CAUTION—Primary and Secondary clusters not interchangeable and can be identified by brass pump discharge nozzzles used on primary cluster only.

►*1953 OLDSMOBILE VENTURI CLUSTER PRODUCTION CHANGE*—See data under Changes, Cautions, Corrections above for different types used in production and replacement parts caution.

Metering Jet Installation Caution—Primary and secondary side metering jets are DIFFERENT sizes

CONTINUED ON NEXT PAGE

ROCHESTER 4-BARREL 4GC CARBURETOR (Continued)

(in general, secondary jets are larger size than primary jets) and must be installed in correct positions. *NOTE*—On later Cadillac carburetors, primary jets are brass finish, secondary jets are copper-plated.

▷*1953 OLDSMOBILE METERING JET PRODUCTION CHANGE*—See data under Changes, Cautions, Corrections above for different sizes used in production and recommended replacement jet sizes.

Accelerating Pump Plunger Assembly—When installing rubber seal on plunger stem, slide seal on shaft with larger end toward the piston, see that upper end engaged in groove in plunger stem. Insert assembly through bowl cover from below and pull seal through cover so that cover edge engages groove in seal. When installing cover, guide plunger carefully into pump cylinder.

Float and Intake Valve Assembly—Make certain that parts installed in correct position (primary and secondary parts not interchangeable). On Cadillac, make certain that float hinge pins installed in holes farthest from bowl cover. On Oldsmobile, see that tang on float arm is back of float balance spring (balance springs not used on later Cadillac carburetors and should be removed and discarded on earlier carburetors—see Changes & Corrections above). Adjust float level and float drop or travel (see Adjustment data above).

Air Horn & Bowl Cover Installation—Use new gasket, carefully align all holes in gasket and cover. When installing cover, use care in guiding pump plunger into pump cylinder and power valve piston into its bore, and see that floats not bent by striking on edge of bowl. Install all bowl cover attaching screws, tighten inner screws first, and then outer screws, evenly and securely.

Choke Valve Installation—After choke shaft and piston assembly installed in air horn, slide choke valve through shaft with letters "RP" upward, use new screws and install screws loosely, then tighten screws as follows: Cadillac—press firmly on choke housing end of shaft and hold valve tightly closed, tighten screws securely and stake ends of screws lightly taking care not to bend choke shaft. Oldsmobile—First install counterweight, spacing washer, and trip lever on end of choke shaft, press lightly on end of choke shaft to obtain minimum clearance of .020" between spacing washer and counterweight, tighten choke valve attaching screws with shaft in this position, stake screws lightly taking care not to bend choke shaft. Install choke baffle plate with curved slot over tang on choke lever.

Thermostatic Housing & Coil Installation—With retainer screws loose, rotate cover counter-clockwise until coil hook picks up choke lever tang, then position cover for correct choke setting (see Adjustment data) and tighten retaining screws. On Cadillac, install choke modifier lever loosely (lever should be forward and slightly down when metal pointer is at scribed line), tighten lever screw as part of Choke Modifier adjustment (see Adjustment data).

Carburetor Adjustments—Make all adjustments as directed in Adjustment section above.

SERVICE PARTS: Gasket Sets—Rochester No. 7004690 (7004300, 4500, 4800, 5100, 5600, 5700, 6125, 6250), No. 7006135 (7005900, 6000, 6220, 6221, 6250, 6962), No. 7007134 (7007000, 7230), No. 7008804 (7006200).

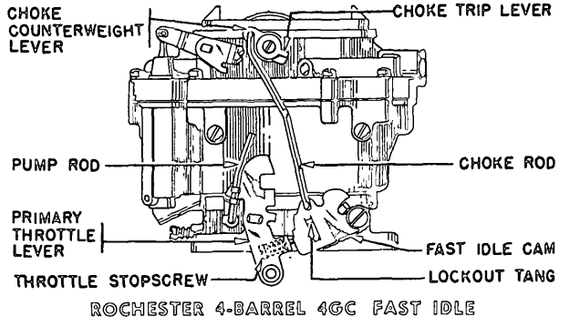
Repair Kit Pkg.—Rochester No. 7004691 (7004500), No. 7005588 (7005100, 6215), No. 7005592 (7004300, 4800, 5600, 5700, 6250), No. 7006375 (7006220, 6221, 6962), No. 7006133 (7005900, 6000, 7000, 7230), No. 7008803 (7006200).

ROCHESTER 4-BARREL "4GC" AUTOMATIC CHOKE

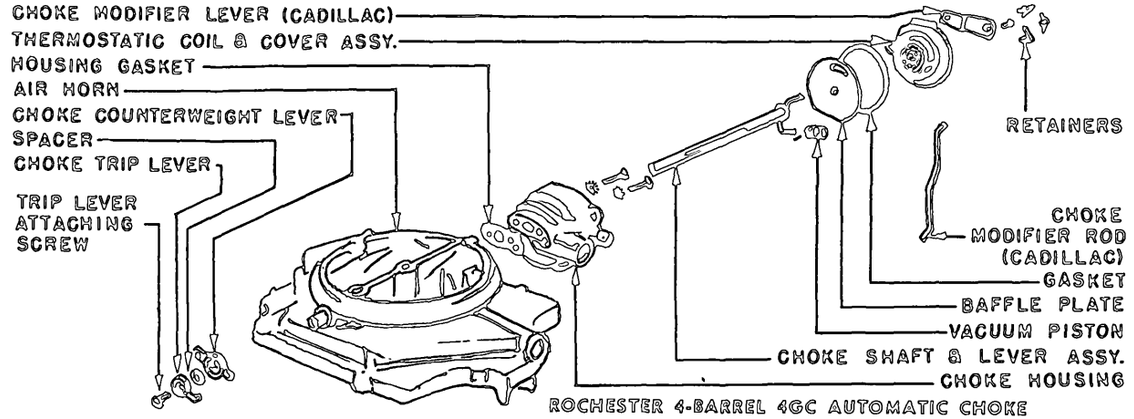
DESCRIPTION: Automatic choke and fast idle mechanism is similar to type used on Rochester dual carburetors and is adjusted in the same manner. Choke valve is located on primary side of the air horn and controls the primary barrels only (Secondary throttle valves are locked closed while the choke is in operation and no choke valve is required).

Cadillac Choke Modifier—Consists of linkage between the thermostatic coil and the throttle lever so that the thermostatic coil tension is controlled by the throttle and is lessened as the throttle is opened to provide a continuously variable unloading action which improves performance and economy during warm-up period.

DISASSEMBLY: On Cadillac, remove retaining screw and lift off choke modifier lever (*CAUTION*—do not remove metal pointer or coil from shaft in cover). Remove thermostatic coil cover attaching screws and retainers, lift off cover and coil assembly, remove gasket and baffle plate. Take out choke trip lever attaching screw, remove choke trip lever, spacing washer, and choke lever and collar assembly from choke shaft. Take out fast idle cam attaching screw, remove choke lever and collar assembly, choke rod, and fast idle cam as an assembly. Remove choke valve by taking out two valve attaching screws (remove staking burrs from screws before removing them). Rotate choke shaft counter-clockwise to free choke piston from cylinder, withdraw shaft and piston assembly from housing. Take out piston pin to remove piston from choke lever. Remove two choke housing-to-air horn screws, remove housing and gasket from air horn.



ROCHESTER 4-BARREL 4GC FAST IDLE



ROCHESTER 4-BARREL 4GC AUTOMATIC CHOKE

Cleaning & Inspection: Wash all metal parts thoroughly in carburetor cleaning solvent except choke cover and coil assembly (clean with clean gasoline). Inspect choke shaft for wear in bore in air horn, check fast idle cam for wear on steps or in rod attaching holes. Inspect thermostatic coil for distortion. Blow out all passages with compressed air.

REASSEMBLY: Use new gaskets, install parts in reverse order of disassembly procedure and note the following important points:

Choke Valve Installation—After choke shaft and piston assembly installed in air horn, slide choke valve through shaft with letters "RP" upward, use new screws and install screws loosely, then tighten screws as follows: Cadillac—press firmly on choke housing end of shaft and hold valve tightly closed, tighten screws securely and stake ends of screws lightly taking care not to bend choke shaft. Oldsmobile—First install counterweight, spacing washer, and trip lever on end of choke shaft, press lightly on end of choke shaft to obtain minimum clearance of .020" between spacing washer and counterweight, tighten choke valve attaching screws with shaft in this position, stake screws lightly taking care not to bend choke shaft. Install choke baffle plate with curved slot over tang on choke lever.

Thermostatic Housing & Coil Installation—With retainer screws loose, rotate cover counter-clockwise until coil hook picks up choke lever tang, then position cover for correct choke setting (see Adjustment data) and tighten retaining screws. On Cadillac, install choke modifier lever loosely (lever should be forward and slightly down when metal pointer is at scribed line), tighten lever screw as part of Choke Modifier adjustment

ROCHESTER 4-BARREL CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carburetor	Main Metering Jet Part No.		Power Valve Assy. No.	Power Piston & Spring No.	Float Needle & Seat
			Standard	1 Size Lean			
BUICK, Series 50, 60, 70	1955	7006200 Pri. 7006200 Sec.	7001860 7008678	7001607	7001608	7000204	7006134
CADILLAC, All Series							
All	1952	7004500 Pri. 7004500 Sec.	7002652 7002664	7002651	7004659	7002366	7004779
All	1953	7005100 Pri. 7005100 Sec.	7002649 7002660	7002648	7001608	7002897	7004779
Twin Turbine Cars	1953	7006215 Pri. 7006215 Sec.	7002648 7002660	7002647		7002897	7004779
Early Cars (No A-C)	1954	7006220 Pri. 7006220 Sec.	7002648 7002664	7002647	7001608	7000204	7006376
Early (With A-C)	1954	7006221 Pri. 7006221 Sec.	7002648 7002664	7002647	7001608	7000204	7006376
Late Cars (No A-C)	1954 1954	7006962 Pri. 7006962 Sec.	7002649 7002664	7002648	7001608	7000204	7006367
Late Cars (With A-C)	1954 1954	7006963 Pri 7006963 Sec.	7002649 7002664	7002648	7001608	7000204	7006367
CADILLAC, Std. Eng.							
Late (No A-C)	1955	7007970 Pri. 7007970 Sec.	7002649 7008673	7002648	7001608	7000204	7006367
(With A-C)	1955	7007971 Pri. 7007971 Sec.	7002649 7008673	7002648	7001608	7000204	7006367
CADILLAC, Eldorado Eng.							
Front (All)	1955	7007240 Pri. 7007240 Sec.	7002649 7008664	7002648	7001608	7007522	7006376
Rear (No A-C)	1955	7007942 Pri. 7007942 Sec.	7002649 7008664	7002648	7001608	7007522	7006376
Rear (With A-C)	1955	7007241 Pri. 7007241 Sec.	7002649 7008664	7002648	7001608	7007522	7006376
OLDSMOBILE, Super 88, 98							
Synchro-mesh Cars	1952	7004800 Pri. 7004800 Sec.	7002651 7002643	7002650	7001608	7002897	7004682
Hydra-Matic Cars	1952	7004300 Pri. 7004300 Sec.	7002651 7002661	7002650	7001608 7001608	7002897 7002897	7004682
Synchro-mesh Cars	1953	7005700 Pri. 7005700 Sec.	7002651 7002643	7002650	7001608	7002897	7004682
Hydra-Matic Cars	1953	7005600 Pri. 7005600 Sec.	7002651 7002651	7002650	7001608	7002897	7004682
Twin Turbine Cars	1953	7006250 Pri. 7006250 Sec.	7002649 7002656	7002648		7002897	7004882
Synchro-mesh Cars	1954	7006000 Pri. 7006000 Sec.	7002649 7002639	7002648	7001608	7000204	7006134
Hydra-Matic Cars	1954	7005900 Pri. 7005900 Sec.	7002649 7002649	7002648	7001608	7000204	7006134
Synchro-mesh	1955	7006000 Pri. 7006000 Sec.	7002649 7002639	7002648	7001608	7000204	7006134
Hydra-Matic	1955	7007000 Pri. 7007000 Sec.	7002649 7002649	7002648 7002648	7001608	7000204 7000204	7006134 7006134
PACKARD							
5560, 80	1955	7007230 Pri. 7007230 Sec.	7002650 7002658	7002649	7001608	7000204	7006134
5588 Front	1955	7008230 Pri. 7008230 Sec.	7002649 7002644	7002648	7001608	7000204	7006134
Rear	1955	7008231 Pri. 7008231 Sec.	7002649 7002644	7002648	7001608	7000204	7006134
PONTIAC, Hydra-Matic	1955	7007800 Pri. 7007800 Sec.	7001498 7001498	7002652	7001608	7000204	7006134

STROMBERG MODELS AAV-1, AAV-2, AAVS-2

CHRYSLER	Stromberg Model & No.
1941 C30 & C33 Eights	AAV-2 No. 380041
1942 C36 & C37 Eights	AAV-2 No. 380086
1946-48 C39 & C40 Eights	AAVS-2 No. 380165 or 380169

▷CHANGES, CAUTIONS, CORRECTIONS

▷Chrysler 1938-42 Replacement Carburetor—Stromberg Model AAV-2, No. 380853, Carburetor replaces following original equipment carburetor Nos: A-18792, 380041, 380059, 380060, 380061, 380086, 380090.

▷Chrysler 1946-48 Carburetor Note—Two types of carburetors—Stromberg Part No. 380165, Code No. 4-111, with Square Air Horn; and Part No. 380169, Code No. 4-112, with Round Air Horn. Carter (B&B) Model E7A1 Carburetor also used on these models. *See Carter (B&B) carburetor article in this section for all data on this model.*

▷Chrysler Throttle Guard (1940-48 Cars with Fluid Drive and Vacamatic or Hydraulically Controlled Transmissions)—This device mounted on carburetor and designed to prevent engine stalling when accelerator pedal released suddenly (prevents throttle valve closing too suddenly). *See "Chrysler Throttle Guard article in Carburetion Equipment Section for complete data on this unit.*

▷Chrysler 1946-48 Transmission Kick-down Switch (AAVS-2 Carburetor)—This transmission control kick-down switch, Stromberg Part No. 384476, is mounted on the carburetor and operated by the throttle valve shaft. *See servicing data (below) and Chrysler Transmission Control Kick-down Switch article in Carburetion Equipment Section for complete data on this unit.*

DESCRIPTION

DESCRIPTION (AAV-1, 2):—Duplex, downdraft, throttle actuated accelerating pump and vacuum controlled economizer. Carburetor has single air intake, float chamber and accelerating pump but has two independent mixing chambers or barrels. Venturi, main discharge jet, main metering jet, throttle valve, accelerating pump discharge nozzle, and idling system duplicated for each barrel. Float bowl is new design fitted with baffles to prevent surging and has twin floats mounted at opposite ends of bowl chamber which encircles carburetor body. Float valve is clipped to lever midway between floats.

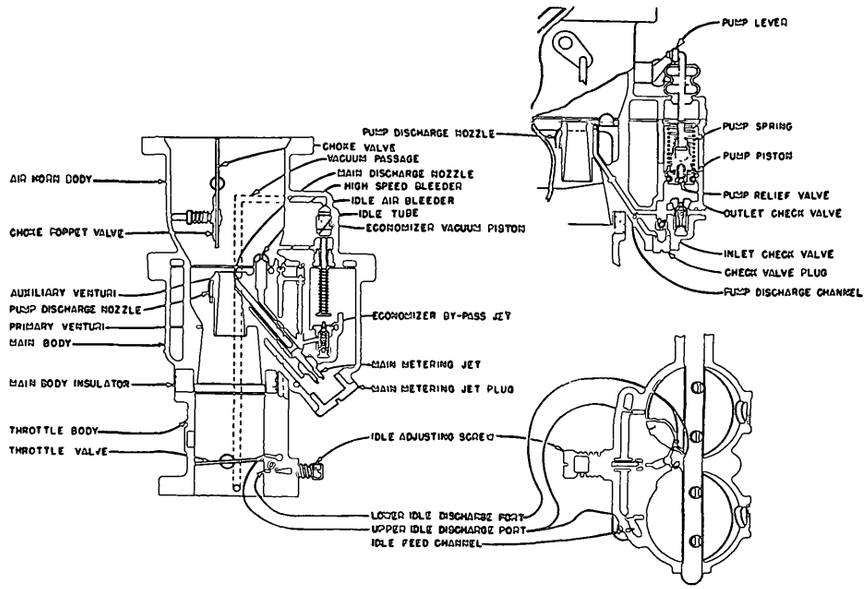
Fuel System (Idling and Low Speed):—Fuel for idling is taken from the main jet well up through the idling tube which meters the fuel and is mixed with air admitted through the idle air bleed hole in the cross channel. From this point the fuel mixture is taken down through a channel to the discharge ports. For closed throttle idling, the fuel mixture is discharged through the lower port below the throttle and is controlled by the idle adjusting screw. In this position the upper port above the throttle valve serves as an additional air bleed. When the throttle is opened for low speed running, additional fuel is discharged through this upper port also.

Driving Range (22-75 M.P.H.):—At approximately 22 M.P.H. the idling system drops out and all fuel is supplied by the main discharge jet located directly above the main metering jet and discharging into the small auxiliary venturi. Main nozzle is air bled by the high speed air bleeder located directly above the nozzle in the auxiliary venturi support.

High Speed and Wide Open Throttle Running:—At speeds above 75 M.P.H. or whenever the throttle is held open, the drop in vacuum above the spring loaded vacuum piston allows the spring to force the piston down so that the piston stem opens the by-pass valve located directly below the piston assembly. This allows additional fuel, metered by the by-pass jet, to flow to the main discharge nozzle.

DESCRIPTION (AAVS-2): Carburetor is of same design as AAV-1 and AAV-2 models (above) except for new idle discharge ports and single idle mixture adjusting screw as follows:

Fuel System (Idling & Low Speed)—Fuel for idling is taken from the main jet well up through the idling tube which meters the fuel and is mixed with air admitted through the idle air bleed hole in the cross-channel. From this point, the fuel mixture is taken down through a channel to the discharge ports. A single idle adjusting screw is located in this channel below the upper (secondary) discharge ports so that this screw controls the fuel mixture discharge through both lower (primary) discharge ports for closed throttle idling. In this position, the upper idle discharge ports serve as additional air bleeds. As soon as the throttle is opened for low speed running, additional fuel is discharged through the upper ports also.



ADJUSTMENT & OVERHAUL

IDLING ADJUSTMENT (AAV-1, 2): Idling adjusting screw for each barrel controls fuel discharge from lower port. Turn each screw in for leaner mixture and out for richer mixture (set both screws alike). Idle speed controlled by throttle lever stopscrew and should be set for 6 MPH idling speed with engine warmed up (choke valve wide open and fast idle inoperative). See tune up instructions on car model page for complete adjustment data.

Chrysler Vacamatic Transmission Car Note—On 1942 cars with Vacamatic Transmission, idle speed should be set at 4½ MPH. maximum. Idle speed of 6 MPH is correct for cars with Synchro-mesh Transmission only.

IDLING ADJUSTMENT (AAVS-2): A single idling adjusting screw controls fuel discharge from lower discharge ports in both carburetor barrels. This screw should be turned in for leaner mixture and out for richer mixture. Idle speed is controlled by throttle lever stopscrew and should be set for 6 MPH. idling speed (Cars with Synchro-mesh Transmission) with engine warmed up (choke valve wide open and fast idle inoperative). See Tune-up data on car model page for complete adjustment data.

NOTE—The single idling adjusting screw controls both carburetor barrels and they will be equalized automatically without special attention when the screw is turned to adjust the mixture for closed throttle idling.

METERING JETS:—Main metering jets are non-adjustable fixed type. Jets should be changed only for special operating conditions such as high altitude. See Jet Specification Table for standard jet calibrations for all models.
NOTE—Whenever main discharge jet located directly above main metering jet is removed, new lead gasket must be used in carburetor body to insure a good seal when jet is replaced. Use tool T-19099 to remove plug, tool T-24924 to remove and install main metering jet, tool T-24967 for main discharge jet.

ECONOMIZER:—Consists of a by-pass valve and jet in the carburetor main body controlled by a vacuum piston in a cylinder in the air horn casting. Economizer by-passes fuel around main metering jets to main nozzles when vacuum in

CONTINUED ON NEXT PAGE

STROMBERG MODELS AAV-1, AAV-2, AAVS-2 (C nt.)

manifold decreases sufficiently so that piston is forced down by spring. No adjustment required.

NOTE—Use special tool T-24733 to remove vacuum power piston No. P-22803.

Setting—Vacuum piston opens valve with manifold vacuum of 5-7" of HG. (AAV-1, 2), 4-6" of HG. (AAVS-2) corresponding to a car speed of approximately 70-75 MPH.

ACCELERATING PUMP:—Operated by throttle lever through 'walking beam' linkage. Fuel is drawn into pump chamber through inlet ball check valve when throttle is closed and is discharged through outlet check valve and pump discharge nozzle in each carburetor barrel when throttle is opened for acceleration. Piston is spring loaded on pump rod to increase duration of pump discharge (sudden throttle opening will cause piston to lag, compressing pump spring, expansion of spring prolongs piston movement and pump discharge). A spring loaded relief valve located in head of pump piston will by-pass some fuel if accelerating pump operated rapidly to prevent loading up engine (this valve normally closed so that all fuel is discharged to nozzles).

NOTE—Pump outlet check valve (By-pass jet) consists of a spring-loaded plunger type valve located in the bottom of the pump cylinder.

Capacity—With pump link connected as indicated, and pump operated slowly (S), fast (F), capacity in cc. per 10 strokes should be as follows:

ACCELERATING PUMP SETTING

Car Model	Carburetor	Pump Capacity	Setting
Chrysler ('39-42)	AAV-2	21-25 (F), 27-31 (S)	Maximum
Chrysler ('46-48)	AAVS-2	21-25 (F), 27-31 (S)	Minimum

Adjustment (Chrysler)—Two holes provided in throttle lever for pump link engagement. Inner hole (short radius) provides minimum stroke, outer hole (long radius) max. stroke. See car model page for settings.

FAST IDLE: Consists of a rotary cam linked to the choke valve and which serves as throttle lever stopscrew stop. Cam is rotated to fast idle position when choke valve closed for cold starting so that throttle valve is held open slightly.

Adjustment—To check setting, hold stopscrew against first step of fast idle cam and check choke valve opening with 1/8" drill rod inserted between edge of choke valve and air horn wall. If opening not correct, adjust rod length (turn ball joint end on rod). Open throttle wide and again check choke valve opening with 7/32" rod. If opening not correct, bend extended arm of fast idle cam slightly.

FLOAT LEVEL: Fuel Level—Should be 5/8" below top edge of bowl with 4 lbs. pressure (engine idling) or approximately even with the bottom of the inspection hole on side of bowl (remove plug to check level).

Float Height—Use special service tool, T-24971 when setting floats. Remove air horn and float bowl cover assembly, invert assembly, mount gauge tool on gasket. Tops of floats should be even with tops of vertical guides on tool and sides of floats should be parallel to tool guides without any drag (this is important to prevent floats dragging on sides of bowl when installed). Adjust floats by bending float lever. CAUTION—Use extreme care to set both floats alike.

Float Valve & Seat—Part No. P-22499. Furnished only as matched sets.

NOTE—Valve needle is clipped to float lever by wire clip.

Float Bowl Vent—Bowl is vented to outside through opening inside of air horn directly below air cleaner collar or into air horn by vent tube pressed in side of air horn above choke valve.

THROTTLE VALVE SETTING: To check throttle valve setting, back throttle stopscrew off so that throttle valves tightly closed, insert drill rod of correct size in idle port and vacuum spark port (when used), measure distance from throttle valve edge to drill rod. See table below for settings. All distances are plus or minus .004".

THROTTLE VALVE SETTING

Car Model	Throttle Valve	Idle Port① Setting — Drill	Vacuum Port① Setting — Drill
Chrysler (1942)	P-22752—5°	.030"—#56	.015"—#56
Chrysler ('46-48)	P-22752—5°	.018"—#55	.018"—#56

①—"Drill" figure is correct size drill rod to be used in checking valve.

CHOKE: Sisson Automatic Choke is standard equipment.
See "Sisson Automatic Choke" in Carburetion Equipment Section.

SERVICING: AAVS-2 Kick-down Switch Note—This unit is a separate sub-assembly mounted on the air horn by means of two attaching screws. When overhauling carburetor, remove switch assembly by taking out these attaching screws. CAUTION—Use new gasket, Part No. 384468, when re-installing switch (vacuum passages in mounting flange must be tight).
See Chrysler Transmission Control Kick-down Switch article in Carburetion Equipment Section for complete data on the kick-down switch unit.

Disassembly: Disconnect both the pump connector and the fast idle connector rods, take out retaining screws and lift off bowl cover and air horn assembly. Take out float hinge pin, remove float and needle valve assembly, remove fuel inlet elbow. Remove idle tubes from main body casting, take out pump discharge nozzle attaching screw, remove nozzles, remove pump discharge ball check valve from screw hole (ball will drop out when carburetor inverted, use extreme care not to lose this ball and make certain that it is re-installed when carburetor reassembled). Remove main discharge jet plugs (use special screwdriver T-19099), take out metering jets (use special tool T-24924). If main discharge jets are removed, use special tool T-24967 and see that all traces of old lead gasket removed from jets and seat in carburetor (use new gasket when jets re-installed). Take out four retaining screws and remove throttle body. Remove pump inlet valve plug, strainer screen and inlet valve. Remove economizer by-pass valve. Remove vacuum piston assembly (use special wrench T-24733).

Servicing: Examine the economizer vacuum piston and remove any carbon or gum with crocus cloth (do not use emery or clean piston with gasoline or other cleaning fluid). Check by-pass valve and pump check valves for tightness by using special T-24970 tester (screw valve in proper opening of tester, immerse valve in gasoline and blow through tester—any leakage of valve will be indicated by bubbles). Clean all jets with gasoline or use denatured alcohol to dissolve gum deposits (CAUTION—do not attempt to clean jets with wire or drill rod). Blow out all channels and passages in carburetor with air, remove any carbon deposits in ports and throttle body. Replace worn and damaged parts.

Reassembly: Use all new gaskets (see Service Parts lists below). Reassemble the carburetor by reversing disassembly directions given above. Use new lead gasket when installing main discharge jets and make certain that all traces of old gasket removed from jets and seat in carburetor casting. Check and adjust float level, accelerating pump setting, throttle valve setting, fast idle, and idle setting when carburetor reassembled.

SERVICE PARTS: Gasket Sets—Stromberg No. 382395.
Repair Kits (incl. Gaskets)—Stromberg No. RK-113.

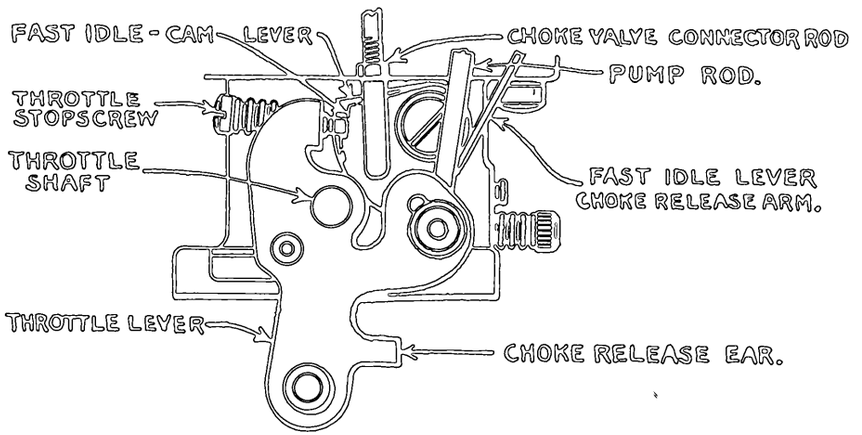
CHRYSLER EIGHT FAST IDLE
(STROMBERG CARBURETOR TYPE)

Car Model	Carburetor	Automatic Choke
Chrysler 8, C39, C40 (1946)	Stromberg AAVS-2	Sisson AC-600
Chrysler 8, C39, C40 (1947)	Stromberg AAVS-2	Sisson AC-600
Chrysler 8, C39, C40 (1948)	Stromberg AAVS-2	Sisson AC-600

▷*AUTOMATIC CHOKE NOTE:* These carburetors and fast idle mechanism are used with separately mounted Automatic Choke. See Sisson Automatic Choke data.

DESCRIPTION & OPERATION: Fast Idle. Consists of a stepped fast idle cam and a fast idle lever pivoted directly above the throttle valve shaft and linked to the choke valve lever. Fast idle cam serves as the stop for the throttle stopscrew. When the choke valve is closed for cold starting, fast idle cam is rotated so that the stopscrew rests on the highest step of the cam and the throttle valve is opened to the fast idle position. As the engine warms up and the choke valve opens, fast idle cam is allowed to drop down and throttle valve to close progressively until, when the choke valve is wide open, the throttle is closed to the hot or slow idle position with the stopscrew resting on the lowest step of the cam.

Unloader or Choke Release—Consists of an ear on the throttle lever which strikes an extended arm on the fast idle lever when the throttle is opened wide so that choke valve is opened somewhat to correct flooding.



SETTING & ADJUSTMENT: Fast Idle. To check setting, close throttle valve so that stopscrew is against first step of fast idle cam. Move choke valve toward closed position as far as possible (do not force valve beyond point where stopscrew strikes edge of next step on fast idle cam). Choke valve opening in this position should be ⅛" (check by inserting ⅛" drill rod between edge of valve and air horn wall). Adjust by loosening locknut and changing position of ball joint on lower end of connector rod.

Choke Release—To check setting, open throttle valve wide, note choke valve opening by inserting drill rod between edge of valve and air horn wall. Opening should be 7/32". Adjust by bending arm on fast idle cam lever slightly.

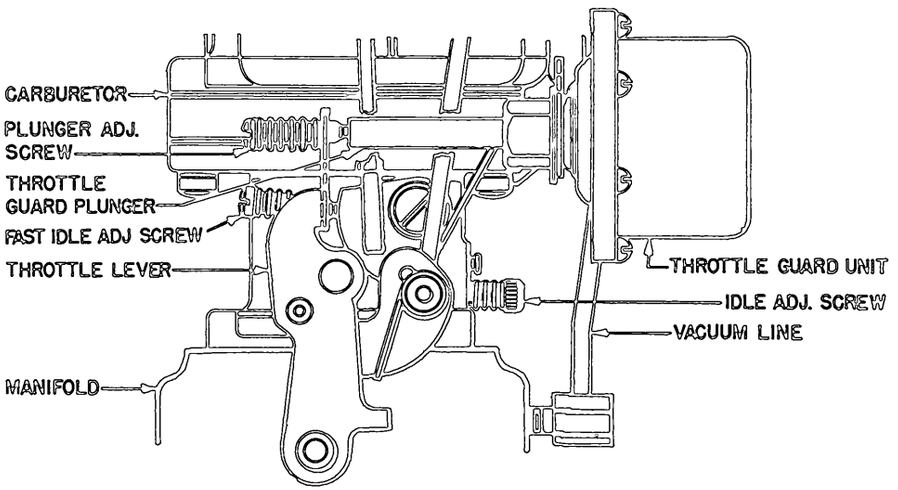
AUTOMATIC CHOKE: Setting & Adjustment. See Sisson Automatic Choke.

CHRYSLER EIGHT THROTTLE GUARD
(STROMBERG CARBURETOR TYPE)

Used on following Models with Fluid Drive:

Chrysler 8, Saratoga C39K, New Yorker C39N, Town & Country (1946-47-48)
Chrysler 8, Crown Imperial Model C40 (1946-47-48)

DESCRIPTION & OPERATION: Throttle Guard is designed to prevent engine stalling when the accelerator pedal is released quickly. It consists of a plunger operating on a swivel block which is part of the accelerator linkage. Plunger is actuated by a spring-loaded vacuum diaphragm unit (similar to those used for vacuum spark control) connected to the engine manifold and having a relief valve at the point where it is connected to the Throttle Guard body. In normal operation, the throttle guard plunger follows the swivel in the linkage as the accelerator pedal is depressed (due to the vacuum unit spring pressure). When the accelerator pedal is released quickly, the increase in manifold vacuum acting with the throttle return spring pull offsets the vacuum unit spring pressure and the accelerator pedal return is retarded, the speed of the pedal return being controlled by the metered relief valve in the vacuum line.



ADJUSTMENT: With push pin removed, hold choke valve wide open and close throttle valve so that adjusting screw is against lowest step of fast idle cam. Insert the stub pin setting tool, then adjust each model as follows:

Models C26 27 ('40), C30, 33 ('41)—Adjust nut on rear end of bell crank-to-carburetor rod until a slight drag is secured on a .010" feeler placed between the swivel block and the stub pin setting tool. Tighten locknut and lock against adjusting nut using care not to disturb setting. Remove stub pin setting tool and install throttle guard push pin.

Models C36, C37 ('42), C39, C40 ('46-48)—Turn adjusting screw on carburetor throttle lever (directly above idle speed adjusting screw) until clearance between screw and end of throttle guard plunger is .010" (slight drag on .010" feeler) with engine running.

SERVICING: No special servicing operation required. If throttle guard does not operate satisfactorily after adjustments have been correctly made, check connecting tube, fittings, and vacuum unit for leaks.

Installation (All Models)—Attach the throttle guard and bracket so that the bracket is in a horizontal position when the assembly is mounted on the engine.

STROMBERG MODELS AAV-16, 26, 167, 267

	Stromberg Model & Part No.
BUICK	
1941-42 40 (Single Carburetor)	AAV-16 No. 380029
1942-47 40, 50③	AAV-16 No. 380106
1942-47 60, 70, 90③	AAV-26 No. 380097
1948-49 40, 50	AAV-167 No. 380225
1948-49 70	AAV-267 No. 380226
CADILLAC	
1941-42 V8	AAV-26 No. ('41) 380015, ('42) 380063
1946-48 V8	AAV-26 No. 380154
PACKARD	
1940-41 Super & Custom Super 8	AAV-26 No. ('40) A-19172, ('41) 380037
STUDEBAKER	
1941-42 President 7C, 8C	AAV-26 No. 380038

①—With Standard Air Cleaner.

②—With Heavy Duty (Oil Bath) Air Cleaner.

③—Late 1942 beginning with Engine No. 4540297.

CARBURETOR MODEL IDENTIFICATION: Individual carburetors may be identified by Code Number on bowl cover above fuel level inspection plug as follows: **Buick Code Numbers**—7-37 (380029), 7-57 (380097), 7-66 (380106), 7-69 (380225), 7-70 (380226).

Cadillac Code Numbers—205-8 (380015), 205-10 or 205-10A (380063), 205-14A or 205-14B (380154).

Packard Code Numbers—10-40, 10-40A, B, C, D, or E (A-19172), 10-44 (380037).

Studebaker Code Numbers—6-97, 6-97A, 6-97B or 6-97C (380038).

►CHANGES, CAUTIONS, CORRECTIONS

►**Buick 1941 & Later Carburetor Idle Channel Wire Cautions:** Special restricting wire installed in the idle fuel channel in the carburetor throttle body and main body castings on these carburetors. This wire must not be removed and must be re-installed when carburetors are re-assembled.

►**Buick Starting Switch Note**—Separate assemblies mounted on carburetor and operated by throttle valve shaft as follows: (1941-47) Delco-Remy No. 1990127, (1948-49) Stromberg No. 385000. *See "Starter Controls" in Electrical Equipment Section.*

►**Cadillac 1946-48 Carburetor Production Change**—Carburetor changed from first type (Code No. 205-14A) to later type (Code No. 205-14B). These carburetors have different jet calibrations. *See Stromberg Jet Specification Table for complete data on each model.*

►**Buick, Cadillac Studebaker Other Carburetors**—Carter Dual "WCD" or "WDO" dual carburetors are also used on these models. *See Carburetor Index for Carter carburetor articles for data on these models.*

►**Packard Throttle Guard Note**—Used on Econo-Drive (Overdrive) cars to prevent engine stalling when free-wheeling. *See article in Carburetion Equipment Section for complete adjustment instructions.*

►**Packard 1941 Air Bleed Change to correct Poor Idling Performance Complaints.** Idle air bleed in carburetor main body (see illustration) was #70 drill size on first 10-44 and 10-44A carburetors and has been changed to #60 drill size on later Code 10-44B carburetors. To correct complaints of poor idling performance on Packard cars, check carburetor and on first types with #70 idle air bleed, increase this hole size by drilling idle air bleed out with #60 drill.

►**Studebaker 1941 Acceleration Flat Spot Correction (First Code 6-97 Carbs.):** Later Code 6-97A carburetors (Serial No. 7139912 up) have idle passage inserts installed in idle passages and main metering jet orifice counterbore. To correct complaints of acceleration flat spot at approximately 20 MPH. on cars with first type 6-97 carburetor (before above Serial No.), install following parts: Two No. 382269 Idle Passage Inserts, Two new type No. P-24773 Main Metering Jets. To make this installation, remove carburetor and remove throttle body which will expose drilled idle passages in main body casting. Install insert in each idle passage, driving insert down flush with bottom of counterbore in carburetor body with big end of insert toward opening in passage. Remove and discard both old metering jets, install new type metering jets.

►**Studebaker Code 6-97A Later Production Carburetors**—Have all parts and changes as recommended for earlier 6-97 carburetors installed in production.

DESCRIPTION

DESCRIPTION: Aircraft type (double float), duplex or dual, downdraft types. Similar to "AAV" carburetors (preceding) except for new design Automatic Choke.

AAV-167 & AAV-267 Carburetors—Similar to corresponding AAV-16 & AAV-26 carburetors except that assemblies include Stromberg No. 385000 Starting Switch. *See "Stromberg Starting Switch" in Electrical Equipment Section.*

CARBURETOR ADJUSTMENT & OVERHAUL

IDLE ADJUSTMENT: Adjust only with engine warmed up so that Automatic Choke and Fast Idle inoperative (choke valve wide open and stopscrew on lowest step of fast idle cam). Check idle speed, then turn both idle screws (one screw for each barrel, adjust both screws alike) in until the engine begins to miss, then turn screws out until engine begins to roll, finally turn screws in slowly until engine fires smoothly. These screws control idle fuel discharge from lower idle port and should be turned in for leaner mixture. Recheck idle speed. See car model page for complete tune-up instructions.

IDLE SETTING

Car Model	Carburetor	Idle Setting	Idle Speed
Buick ('41-47)	AAV-16, 26	1¼ turns open	450 RPM, 8 MPH.
Buick ('48-49)	AAV-167, AAV-267	1¾ turns open	450 RPM, 8-MPH.
Cadillac ('39-47)①	AAV-26		7-8 MPH.
Cadillac ('48)①	AAV-26		375-380 RPM.
Cadillac ('41-48)②	AAV-26		375 RPM.
Packard ('40)	AAV-26	1½-1¾ turns open	6 MPH.
Packard ('41)	AAV-26	1-1⅛ turns open	6 MPH③
Studebaker ('41-42)	AAV-26		450 RPM, 8 MPH.

①—Cars with Synchro-mesh Trans. ②—Cars with Hydra-Matic Drive.

③—8-10 MPH. on cars with Electromatic Clutch.

⑤—550-600 RPM. (Synchro-mesh Trans.), 500-550 RPM. (Automatic Trans.)

Buick Note—If vacuum gauge used for idle adjustment, turn both idle adjusting screws out evenly in 'rich' direction until vacuum gauge reading is 1" lower than maximum.

METERING JETS: Main metering jets are non-adjustable type located under plug at lower end of each nozzle. Jets should be changed only for special operating conditions such as high altitude. See Stromberg Jet Specification Table. IMPORTANT—See Notes (above) for production changes in jet sizes.

ECONOMIZER: Consists of by-pass valve and jet in the carburetor main body controlled by a vacuum piston in a cylinder in the air horn casting. Economizer by-passes fuel around main metering jets to main nozzles when vacuum in manifold decrease sufficiently to allow piston to be forced down by spring. Vacuum piston is set to open valve with manifold vacuum as listed in table below which corresponds to a car speed of approximately 65-70 MPH.

ECONOMIZER SETTING

Car Model	In. of HG.	Car Model	In. of HG.
Buick 40, 50 (1941-49)	5-6"	Cadillac (1940)	4-6"
Buick 60, 70, 90 (1942)	4-6"	Cadillac (1946-48)	6½-7½"
Buick 70 (1946-47)	4-6"	Packard	4-6"
Buick 70 (1948-49)	5-6"	Studebaker ('41-42)	5-6"
Cadillac (1939, 41-42)	5-6"		

ACCELERATING PUMP: Similar design as used on other "AAV" carburetors with spring-loaded relief valve in piston head and duration spring on rod above piston (light spring above duration spring in dust washer retainer).
Capacity—Pump capacity per 10 strokes fast (F), slow (S) is shown in table below. Pump must be set for correct stroke (see Adjustment) as shown in table.

CONTINUED ON NEXT PAGE

STROMBERG MODELS AAV-16, 26, 167, 267
(C ntinu d)

ACCELERATING PUMP SETTING

Car Model	Carburetor	Pump Capacity	Pump Setting
Buick 40, 50	AAV-16, 167	11-15 cc. (F), 15-19 cc. (S)	Medium
Buick 60, 70, 90 ('40-47).	AAV-26	10-14 cc. (F), 15-19 cc. (S)	Center
Buick 70	AAV-267	10-14 cc. (F), 15-19 cc. (S)	Medium
Cadillac ('39-42)	AAV-26	13-17 cc. (F), 18-22 cc. (S)	Minimum
Cadillac ('46-48)	AAV-26	23-27 cc. (F), 29-33 cc. (S)	Maximum
Packard	AAV-26	14-18 cc. (F), 27-31 cc. (S)	Maximum
Studebaker ('41-42)	AAV-26	12-16 cc. (F), 16-20 cc. (S)	Minimum

Adjustment (Buick)—Three holes provided in throttle lever for pump rod engagement. Center hole is recommended setting for normal operating conditions. See car model page for recommended settings and changes on each model.

Adjustment (Others)—Two holes provided in throttle lever for pump rod engagement. Inner hole (short radius) provides minimum stroke and pump discharge, outer hole (long radius) maximum stroke. See tune-up data on car model page for recommended settings and seasonal changes.

Pump S rvicing N te—Strainer screen located in plug below pump intake check valve should be cleaned frequently to insure satisfactory pump operation.

FAST IDLE: ***CAUTION—All cars not adjusted alike and each model must be adjusted exactly as follows:***

Buick (1940-47): To check setting, close choke valve on #53 drill (insert drill between upper side of valve and air horn wall), check clearance between ear on locking lever on throttle valve shaft and lug on loose lever on fast idle cam stud (this lever linked to fast idle cam by torsion spring). These levers should just clear as throttle valve is opened and closed. To adjust, bend connecting rod between choke valve lever and fast idle cam using care not to bind the rod in the cam slot or to distort the fast idle cam return spring.

Buick (1948 & Later): ***CAUTION—Two separate settings required as follows:***

Fast Idle Cam Setting—Close choke valve against #26 drill (insert drill between air horn wall and center of upper edge of choke valve), hold valve against drill, see that fast idle cam spring holds cam up against end of fast idle connector rod. Close throttle valve until stopscrew contacts fast idle cam. Screw should clear edge of highest step of cam and rest on second step. Adjust by bending fast idle connector rod at large curve for correct screw contact.

Lock Lever & Loose Lever Clearance—Close choke valve against #53 drill (insert drill between air horn wall and center of upper edge of choke valve), hold valve against drill. Slowly open and close throttle valve and check clearance between lock lever on throttle shaft and loose lever behind fast idle cam. If clearance not just enough to permit lock lever to pass loose lever, bend end of lock lever up or down as required for this clearance.

FAST IDLE SETTING (BUICK)

Car Model	Carburetor	Choke Valve Opening
Buick ('40-47)	AAV-16, AAV-26	#53 drill
Buick ('48-49)	AAV-167, AAV-267	#26 & #53 drill

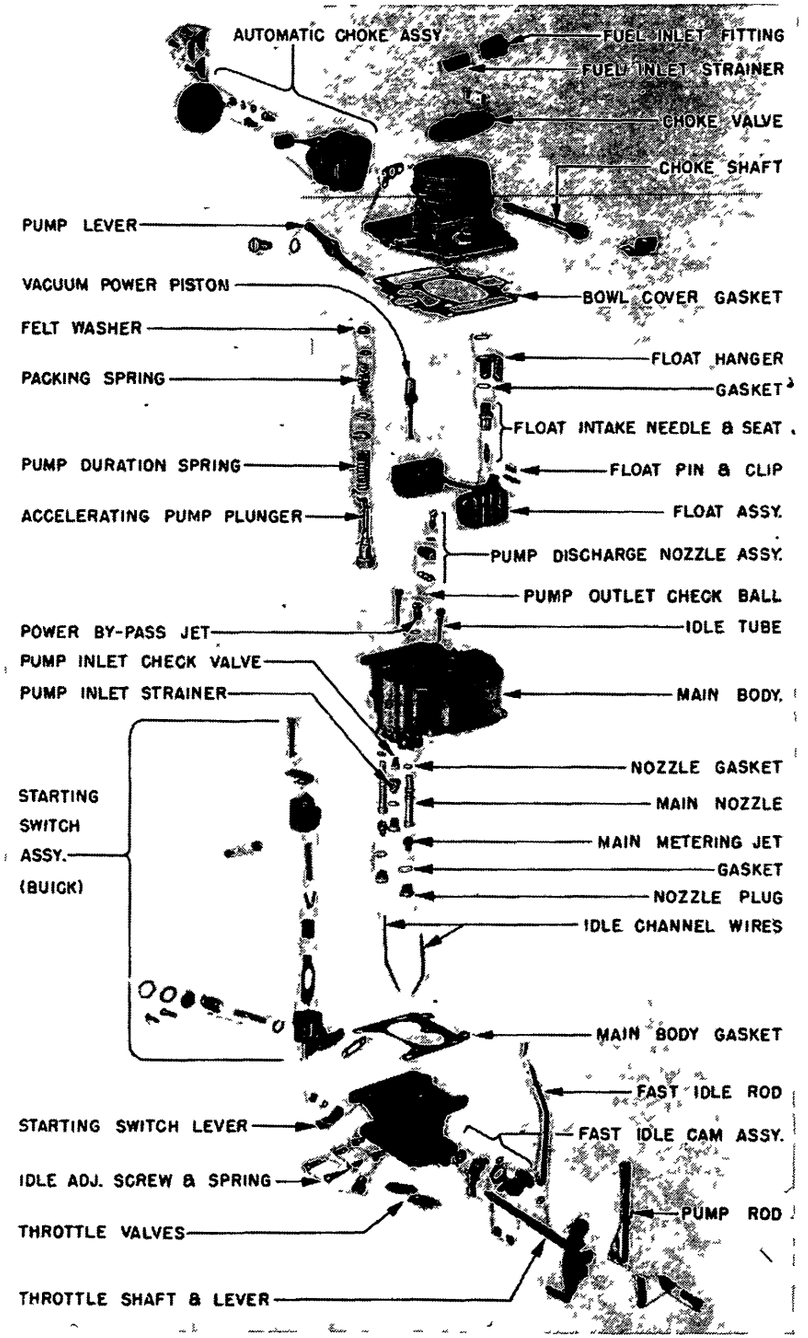
Cadillac (1939-48), Packard (1940-41), Studebaker (1941-42): Open the throttle, rotate fast idle cam until stopscrew is on high lobe of cam, move choke valve toward closed position as far as possible. Check remaining choke valve opening by inserting drill rod of correct size (see table) between edge of choke valve and air horn wall. If choke valve opening not correct, adjust by bending connector rod slightly at point near choke valve lever using extreme care not to cause any bind in the fast idle mechanism.

FAST IDLE SETTING (EXCEPT BUICK)

Car Model	Carburetor	Choke Valve Opening
Cadillac (41-42)	AAV-26	#32 drill (.116")
Cadillac ('46-48)	AAV-26	#40 drill
Packard ('40)	AAV-26	3/32" drill
Packard ('41)	AAV-26	7/64" drill
Studebaker ('41-42)	AAV-26	7/64" drill

UNLOADER (CHOKE RELEASE) SETTING: When throttle valve is opened wide, an ear on the throttle lever contacts a lug on the fast idle cam or fast idle cam

CONTINUED ON NEXT PAGE



STROMBERG "AAV" CARBURETOR (BUICK SHOWN—OTHERS SIMILAR)

STROMBERG MODELS AAV-16, 26, 167, 267
(C ntinu d)

loose lever and opens the choke valve to correct flooding. To check operation, hold throttle valve wide open, check choke valve opening by inserting drill rod (or special tool) of correct size (see table below) between edge of choke valve and air horn wall. If choke valve opening not correct, adjust by bending ear on throttle lever slightly, using care not to cause binding of fast idle rod or to distort fast idle cam spring.

UNLOADER SETTING

Car Model	Carburetor	Drill Size	Tool No.
Buick ('39-49)	AAV-16, 167; AAV-26, 267	11/64"	T-25057
Cadillac ('39-41)	AAV-26	11/64"	T-25056
Cadillac ('42-48)	AAV-26	11/64"	T-25057
Packard	AAV-26	11/64"	T-25056
Studebaker ('41-42)	AAV-26	11/64"	T-25056

FLOAT LEVEL: ***CAUTION—Floats must be adjusted vertically (Float Height) and laterally (to prevent floats dragging on sides of bowl) as follows:***

Float Level: Use special service tool T-24971 to check floats. Remove air horn and bowl cover assembly, invert cover, install tool on gasket. Tops of floats should be even with, or above or below (see table) tops of vertical guides on gauge and sides of floats must be parallel to sides of gauge guides (to prevent floats dragging on sides of float bowl). CAUTION—Use extreme care to adjust both floats exactly alike.

Float Setting Note—When using gauge (see table), adjust floats vertically for float setting shown, adjust laterally so that sides of floats parallel to gauge without any drag (necessary to prevent floats dragging on sides of bowl). Correct float setting should give correct fuel level (below).

FLOAT LEVEL SETTING

Car Model	Carburetor	Float Height (On Gauge)
Buick 40, 50 ('40-49)①	AAV-16, 167	3/64" above
Buick 40, 50 ('40-49)②	AAV-16, 167	1/32" below
Buick 60, 70, 80, 90 ('40-47)	AAV-26	3/64" above
Buick 70 ('48-49)	AAV-267	1/32" below
Cadillac ('41)	AAV-26	5/64" above
Cadillac ('42-48)	AAV-26	1/64" above
Packard ('40)	AAV-26	Even
Packard ('41)	AAV-26	1/64" above
Studebaker ('41-42)	AAV-26	Even

①—Carburetors with Brass Float. ②—Carburetors with Steel Float.

Fuel Level: Fuel level in float bowl should be even with the bottom of the inspection hole on the side of the bowl with 5 lbs. pressure (3 lbs. on Packard and Studebaker). Remove plug in inspection hole to check fuel level. With bowl cover and gasket removed, fuel level in bowl (below top edge of bowl) should be:

FUEL LEVEL SETTING

Car Model	Carburetor	Fuel Level
Buick ('39-49)	AAV-16, 167; AAV-26, 267	19/32"
Cadillac	AAV-26	5/8"
Packard	AAV-26	5/8"
Studebaker ('41-42)	AAV-26	5/8"

Float Valve & Seat—Part No. P-22499. Furnished only as matched sets. When installing, make certain that needle valve is clipped to float lever.

THROTTLE VALVE SETTING: To check the throttle setting, back throttle stop-screw off so that valves are tightly closed, insert drill rod of correct size in idle port and vacuum spark port (when used), measure distance from throttle valve edge to drill. See table below for settings. All figures are plus or minus .004".

THROTTLE VALVE SETTING

Car Model	Throttle Valve	Idl P rt① Setting	Idl P rt① Drill	Vacuum Port① Setting	Vacuum Port① Drill
Buick ('41-47—AAV-16)	P-24684—5°	.022"	#60	.041"	#58
Buick ('42-47—AAV-26)	P-24740—5°	.022"	#60	.055"	#58
Buick ('48-49 AAV-167)	P-24684—5°	.022"	#60	.080"	#58
Buick ('48-49 AAV-267)	P-24740—5°	.022"	#60	.055"	#58
Cadillac ('40-42)	P-24172—5°	.040"	#56	.012"	#58
Cadillac ('46-47)⑧	P-24172—5°	.037"	#55	.012"	#58
Cadillac ('46-48)⑨	⑩	Flush⑪	#60	.012"	#58
Packard ('40)	P-24740—5°	.040"	#56	.012"	#58
Packard ('41)	P-24740—5°	.022"	#58	.012"	#58
Studebaker ('41-42)	P-24740—5°	.015"	#60	Flush	#56

①—**"Drill" figure is correct size drill rod to be used in checking valve.**
⑧—First Code No. 205-14A Carb.
⑨—Later Code No. 205-14B Carb.
⑩—Part No. 384912 (Right, 384913 (Left).
⑪—Plus .006" or minus .000".

CHOKE: Offset type butterfly valve with Stromberg Automatic Choke control. ***See Stromberg Automatic Choke in Carburetion Equipment Section.***
Choke Setting—Inverted "V" mark on thermostat cover scale should be "Centered or in line with projection on top of choke housing except models noted in table below. This standard setting may be varied not more than two graduations in either direction to provide best performance under exceptional operating conditions. To adjust, loosen three housing cover retainer screws, rotate cover and coil assembly.

►***CAUTION***—When connecting heat tube to the choke thermostat cover, do not use excessive pressure (may distort or rotate cover and change setting).

AUTOMATIC CHOKE SETTING

Car Model	Carburetor	Choke Setting
Buick 40, 50 ('40-49)	AAV-16, AAV-167	1 Graduation Lean
Buick Others ('39-49)	AAV-26, AAV-267	Centered
Cadillac ('39-40)	AAV-26	Centered
Cadillac ('41-42)	AAV-26	See Note (below)
Cadillac ('46-48)	AAV-26	Centered
Packard ('40-41)	AAV-26	Centered
Studebaker ('41-42)	AAV-26	Centered

Cadillac ('41-42) Setting—First Code 205-10 carburetors set 2 Graduations Rich (inverted "V" mark on thermostat cover scale two graduations counter-clockwise from reference mark on housing), **Later Code 205-10A** carburetors Centered (inverted "V" mark in line with reference mark on housing).

Cadillac ('46-48) Setting—On both Code No. 205-14A and 205-14B carburetors, **the inverted 'V' mark on the thermostat cover scale should be set to coincide with the reference mark on the housing. Thermostat, Cover, and Screen Assembly is Part No. 384648 and is marked '20' for identification.**
Studebaker ('41-42) Setting—Cover is marked for 3 settings as follows: 'H', 'M', 'R'. **Standard setting is with 'R' mark coinciding with reference mark on housing flange and is correct for regular fuel and operating conditions. If engine loads up or over-chokes with this 'R' setting, change to 'M' setting. Use 'H' setting only when highly volatile fuel is used continuously.**

Thermostatic Coil Identification:—All thermostatic coil and cover assemblies are marked by small figure stamped on cover for identification as follows:

Buick—6 (All Series).

Cadillac—19 (1942—First Code 205-10 Carbs.), 13 (1942—Later Code 205-10A Carbs.), 20 (1946-48—Code 205-14A and 205-14B Carbs.).

Packard—10 (1940—Std. on Code 10-40D Carbs. and used to replace "11" and "3" units on Code 10-40C and earlier Carbs.), 14 (1941).

STARTING SWITCH (Buick Models): Delco-Remy or Stromberg unit mounted on carburetor and operated by throttle valve shaft.
See "Delco-Remy Vacuum Starter Switch" and "Stromberg Starter Switch" in Electrical Equipment Section for complete data.

DISASSEMBLY OF CARBURETOR: With carburetor removed from engine, proceed as follows:

C NTINUED ON NEXT PAGE

STROMBERG MODELS AAV-16, 26, 167, 267 (Continued)

Automatic Choke Removal—Take out three cover screws, lift off choke cover and thermostat assembly, remove locknut from choke shaft (wrench T-25047), remove lockwasher, serrated washer, housing screws. Remove housing while sliding vacuum piston lever off end of choke shaft. Remove choke valve, withdraw choke shaft and lever assembly. Remove lead ball plugs from choke housing (tool T-25052) using care not to damage plug seats.

Air Horn & Float—Disconnect fast idle rod from fast idle cam and pump rod from pump lever (push upward on spring housing and pull outward). Take out pump lever fulcrum screw (left-hand thread) and spring washer, disconnect lever from accelerating pump plunger stem. Take out air horn attaching screws, lift off air horn and float as an assembly. Remove pump piston assembly, remove felt washer, splash washer, and retainer spring from piston link. Remove float pin (tap on end opposite serrated end), lift out float, remove inlet valve and seat assembly (use wrench T-20140). Remove vacuum power piston from air horn (use wrench T-29733), remove gasoline connection and inlet strainer. Remove starter vacuum switch by taking out two mounting screws.

Main Body Casting—Remove power bypass jet and gasket with a large screwdriver, remove both idle tubes (CAUTION—use care not to damage small end of tubes which contain metering orifice). Remove pump discharge nozzle screw, nozzle, gaskets, invert assembly and catch check valve ball which will drop out of channel. Remove main discharge jet plugs and gaskets, then remove main metering jets. Remove main discharge nozzles by screwing Jet Remover J-24967 into base of jet and pulling nozzles out of body (NOTE—threads cut by removing tool will not affect metering characteristics of nozzles). Make certain that lead gaskets are removed from main body. Remove screws attaching throttle body, then remove idle channel reducer wires. Remove pump inlet check valve plug and gasket, remove strainer and inlet check valve. Remove all lead plugs from main body casting using Plug Remover T-25052 being careful not to damage plug seats in casting.

Throttle Body—Take out both idle needle valves and springs, remove taper drive plugs from body (unless carburetor very dirty, do not disturb these plugs). Mark each throttle valve to insure replacement in same barrel and in same position, take out valve attaching screws, withdraw throttle valve assembly.

CLEANING & INSPECTION: Use Bendix Carburetor Cleaning Solvent to thoroughly clean all parts (immerse and soak all metal parts in solvent), rinse in kerosene or white gasoline, dry with air and blow out all channels and passages with air. Inspect all parts for wear or damage, replace all doubtful parts. Use all new gaskets when reassembling.

REASSEMBLY OF CARBURETOR: Use all new gaskets. Assemble carburetor by reversing order of disassembly and note following important points:

Throttle Valve Installation—Align marks made before disassembly, make certain that small bleed holes in valve are toward idle discharge holes, check for even clearance of valve in bore before tightening attaching screws.

Pump Inlet Strainer—Use tool T-25097 to install strainer after pump inlet check valve has been installed (place strainer on rounded end of tool pin, insert strainer in tool tube, place tube in main body and use opposite end of tool pin to slide strainer into place). Install check valve plug using new copper gasket (make certain that plug and seat are clean to insure good seal).

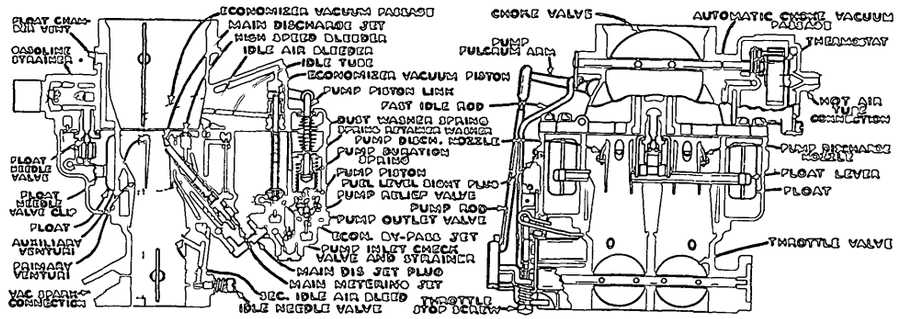
Idle Reducer Wires—Insert long ends of reducer wires in idle channels in throttle body, guide short ends of wires into idle channels in main body when installing throttle body. *NOTE*—These idle channel wires used only in Buick carburetors and Studebaker AAUVB-26 carburetor.

Main Discharge Nozzles and Jets—Make certain that old lead gaskets completely removed from nozzle seats in main body, use new lead gaskets assembled over beveled ends of main nozzles, use tool T-24967 to install nozzles making certain that nozzles positioned so that flat surface on end is parallel to direction of air flow through venturi. Use tool T-24924 to install main metering jets. Use new copper gasket on main discharge jet plugs (make certain that plug and seat are clean to insure good seal).

Vacuum Power Piston—Use wrench T-24733 to install piston in air horn (CAUTION—hold tool flat against gasket surface to avoid damage to piston). Do not lubricate piston. Check piston for free operation after installation.

Float & Needle Valve Installation—Install float hanger with new gasket on each side. Install new needle valve seat (wrench T-20140). Place new gasket on air horn, attach inlet valve needle to clip on float lever, install floats and tap fulcrum pin lightly in place so that serrated end grips hanger leg securely.

CAUTION—Check float lever for binding in hanger after installation.



▷*BUICK FLOAT CAUTION—Buick floats beginning 1948 are designed for 5 lbs. fuel pump pressure and identified by figure "5" stamped on float lever. No other type float should be used (both brass and steel floats are marked in this manner).*

Carburetor Adjustments—Check Float Level Setting, Fast Idle Setting, Unloader Setting, Choke Setting as carburetor is assembled. After carburetor installed on engine, adjust idle mixture and idle speed. See adjustments.

Buick Starter Switch Setting—*See "Delco-Remy Vacuum Starter Switch" and "Stromberg Starter Switch" in Electrical Equipment Section.*

SERVICE PARTS: Gasket Sets—Stromberg No. J-5656-G (Buick AAV-16), No. 382373 (Buick AAV-167), No. J-5655-G (Buick AAV-26), No. 382372 (Buick AAV-267), No. 382393 (Cadillac 1941-48, Studebaker 1941-42), No. 382394 (Packard 1941).

Repair Parts Kit: Furnished for each model as follows:

Buick—Stromberg No. RK-72 (Series 40, 50 1940-47), No. RK-73 (Series 60, 70, 90 1942-47), No. RK-140 (Series 40, 50 1948-49 AAV-167), No. RK-141 (Series 70 1948-49 AAV-267).

Cadillac—Stromberg No. RK-20 (A-18962), RK-76 (A-19212), No. RK-108 (380015), No. RK-125 (380063), No. RK-134 (380154).

Packard—Stromberg No. RK-106 (1940 Code 10-40, 1040A, 10-40B Carbs.), No. RK-78 (1940 Code 10-40C, 10-40D Carbs.), No. RK-107 (1940 Code 10-40E and later Carbs.), No. RK-110 (1941 380037 Carbs.).

Studebaker—Stromberg No. RK-111 (1941-42).

STROMBERG "AAUVB" & "AAVB"

BUICK	Stromberg Model & No.
1950-51 40, 50	①AAUVB-267 No. 380257
1950-51 70	②AAVB-267 No. 380258
1951 Late 40, 50	③AAUVB-267 No. 380309
1951 Late 70	④AAVB-267 No. 380310
1952 40, 50	⑤AAUVB-267 No. 380309
1953 Series 40	⑤AAUVB-267 No. 380309
1953 Series 50	⑥AAVB-267 No. 380338
1954 Series 40 & 50	⑫AAVB-267 No. 380245
1955 Series 40	⑬AAVB-267 No. 380372
STUDEBAKER	
1951 First V8⑦	⑨AAUVB-26 No. 380278
1951 Later V8⑧	⑩AAUVB-26 No. 380313
1952 V8	⑪AAUVB-26 No. 380313

①—Code No. 7-88, A, & B. See Changes below.
②—Code No. 7-89, A, & B. See Changes below.
③—Code No. 7-90 & 7-90B. See Changes below.
④—Code No. 7-91 & 7-91A. See Changes below.
⑤—Code No. 7-90B.
⑥—Code No. 7-95 & 7-95A. See Changes below.
⑦—Before Engine No. V-95954.
⑧—Beginning Engine No. V-95954.
⑨—Code No. 6-107 & 6-107A. See Changes below.
⑩—Code No. 6-111, B, & C. See Changes below.
⑪—Code No. 6-111B & 6-111C. See Changes below.
⑫—Code No. 7-96. See Changes below.
⑬—Code No. 7-102 & 7-102A.

►CHANGES & CORRECTIONS

►***BUICK 1950-51 AAUVB-267 & AAVB-267 CARBURETOR PRODUCTION CHANGES:*** Parts changes were made at two different points in production so that THREE different types of each carburetor may be found in service as identified by Code Number (see Code Nos. listed in footnotes above). ***WHEN SERVICING THESE CARBURETORS, MAKE RECOMMENDED CHANGES AS FOLLOWS:***

FIRST TYPE (Code 7-88 & 7-89)—Install Torsion Spring on pump lever and **change Code No. to 7-88A & 7-89A.** To install spring, remove pump lever attaching screw, slip spring over lever boss on carburetor, re-install lever, engage hooked end of spring under short end of lever. Remove air horn attaching screw directly under pump lever, align looped end of spring with screw hole re-install screw.

SECOND TYPE (Code 7-88A & 7-89A)—These carburetors have Pump Lever Torsion Spring as recommended for installation on first Code 7-88 & 7-89 carburetors above. No changes recommended.

CAUTION—New parts listed below for later 7-88B & 7-89B carburetors are not interchangeable with earlier parts and cannot be installed on these earlier 7-88A & 7-89A carburetors. CORRECT TYPE PARTS MUST BE USED ON EACH CARBURETOR.

THIRD TYPE (Code 7-88B & 7-89B)—These carburetors have new parts listed below which are NOT INTERCHANGEABLE with similar parts on earlier carburetors:

Parts Changes:	7-88 & A 7-89 & A	7-88B & 7-89B
Accelerating Pump Lever	P-24677	385589
Accelerating Pump Rod	385352	385592
Start-Aid Lever	P-24462	385606
Start-Aid Spring	P-24681	385607
Starter Switch Assy.	385000	①385611
Switch Contact Spring	385006	385610
Switch Housing	385031	①385063
Assistor Spring	385569	385605

①—Identified by letter "A" on housing. NOT interchangeable with first type due to new design contact guide spring.

►***BUICK 1950-51 AIR CLEANER "BLOW-UP" CORRECTION***—This condition caused by gasoline vapor collecting in silencer chamber and can be corrected by venting carburetor as follows: Drill a 1/16" hole through center of each welch plug on rear of carburetor body (hole located at point of low suction and will not affect carburetor performance). Use extreme care to prevent metal chips falling into manifold if this modification made with carburetor on engine. ***NOTE***—Later production carburetors have these holes.

►***BUICK CARBURETOR STARTING SWITCH CHANGE (Stromberg Carburetors)***—Design of some switch parts changed (Vacuum Piston Seal, Felt Air Filter, Filter Spring, Washer, Slide, and Filter Screen Retainer) and only **new type parts should be used when servicing Starter Switches.** These parts furnished in Change-over Kit Part No. 386260. ***See "Stromberg Starter Switch" in Electrical Equipment Section for complete data.***

NOTE—Code No. 7-90B and 7-91A carburetors have new type switches and do not require modification.

►***BUICK 1953 SERIES 50 CHANGE TO ELIMINATE DETONATION OR SPARK RAP (First 7-95 Carburetors):*** Increase size of vacuum spark control port from .040" to .081" as follows: Remove carburetor from engine, place throttle valves in wide open position and protect valves from damage by drill. Remove spark control fitting from throttle body. Working through spark control fitting hole, use No. 47 drill to enlarge original .040" spark control hole, then finish drill hole with No. 46 drill (.081"). Blow out all chips and thoroughly clean carburetor, reinstall spark control fitting. MAKE OTHER RECOMMENDED CHANGES (following). Re-install carburetor on engine. ***NOTE—Code 7-95A carburetors have this .081" spark port.***

►***BUICK 1953 SERIES 50 IMPROVED WARM-UP & STALLING ELIMINATION (First 7-95 Carburetors) Make following Choke & Fast Idle Cam Changes:***

1) Automatic Choke—Enlarge heat hole in choke housing as follows: Remove air horn and float bowl cover assembly from carburetor, remove float assembly, remove thermostat cover and coil assembly. Remove lead ball from outer end of horizontal vacuum passage in choke housing (adjacent to choke piston cylinder). Using No. 54 drill in pin vise (***CAUTION***—use grease on drill to catch chips), work through the vacuum passage and enlarge the original No. 56 hole at the inner end of the passage to No. 54 drill (.055") size. Blow out passage thoroughly with air, install new lead ball to seal outer end of passage, install thermostat cover and set to Center (At Index) setting, assemble float and reassemble carburetor.

2) Fast Idle Cam Setting—Check and adjust Fast Idle Cam using No. 41 drill for setting gauge (was #26 drill), check "Start Aid" (Fast Idle Lever Clearance). ***See Fast Idle Setting data below.***

3) Unloader (Choke Release) Setting—Check and adjust unloader. ***See Unloader Setting data below.***

►***BUICK 1953 SERIES 50 ENGINE SURGE ON TURNS CORRECTION (First 7-95 Carburetors):*** Drill 3/16" hole through wall of baffle in float bowl (above power by-pass valve) exactly as follows: Remove air horn and bowl cover assembly from carburetor, remove throttle body from main body (see OVERHAUL data below for disassembly instructions), remove power by-pass valve and gasket from main body and **drop a ¼" x ½" round head stove bolt in by-pass valve well** (to protect valve seat from drill damage). Use a 3/16" drill in electric drill or hand chuck, slip piece of ¼" tubing over drill stem so that only first 7/16" of drill exposed, rest cutting end of drill on head of stove bolt and shank end of drill on idle tube boss on side of bowl (opposite side from starting switch mounting), drill through the wall. Remove all drill chips by blowing out with air, remove stove bolt from by-pass well, thoroughly clean carburetor. Reassemble and adjust carburetor.

►***STUDEBAKER 1951 RECOMMENDED CHANGES (First Code No. 6-107 Carburetors):*** When servicing these carburetors, manufacturer recommends that following new type parts be installed (or old parts reworked as indicated) and that new settings be used as listed below.

Parts Changes:	Code 6-107	Cod 6-107A
Main Metering Jet	P-24473①	②P-24473
Power By-pass Jet	P-21657③	④P-24674
Vac. Piston, Link, Lever	385580	⑤385579
Thermostat Cover Assy.	385638	⑤385778
Fast Idle Cam	385593	⑥385593
Fuel Strainer & Clip	385360 & 385355	

①—.044". ②—.045". ③—#56. ④—#60.
⑤—First type can be reworked—see below.
⑥—Marked by "1" stamped on end of cam..

Vacuum Piston Change—Rework first type piston by drilling #54 hole in center of piston head. When installing piston, make certain that piston and cylinder are thoroughly clean and that piston moves freely in cylinder **without any type of lubrication.**

Thermostat Cover Assembly—Thermostat Cover Plate (behind thermostatic coil) must be removed (not used on later No. 385778 Assy.). To remove plate, break staking on center of hub which retains thermostatic coil end, remove coil, remove and discard cover plate. Replace thermostatic coil making certain that hook on end of coil is adjacent to inverted "V" mark on edge of cover, restake end of hub with small punch to retain the coil end.

Fast Idle Cam—Install new fast idle cam identified by figure "1" stamped on highest step of cam (same part number as original type). This cam will provide faster idle speed during warm-up period.

Fuel Inlet Strainer & Clip—Install these parts at fuel inlet (same parts as used for accelerating pump).

Carburetor Code Marking—After above parts installed, add "A" to 6-107 code number on float chamber cover.

Automatic Choke Setting—Set all Code 6-107A carburetors to **2 Points Lean.** ***See "Hot Air Stove Change" and "Filtered Air Change" below for choke setting change when these other changes mad .***

►***STUDEBAKER 1951 CODE 6-107A CARBURETORS:*** This carburetor has all parts and changes recommended for inclusion in Code 6-107 carburetors (above).

►***STUDEBAKER 1951 AUTOMATIC CHOKE HOT-AIR STOVE CHANGE FOR IMPROVED CHOKE ACTION:*** Beginning with 1951 Engine No. V95954, new hot-air stove used which is located closer to automatic choke. This new stove can be installed on previous engines with Code 6-107A carburetors (6-107 carburetors on first engines must be modified to 6-

CONTINUED ON NEXT PAGE

STROMBERG "AAUVB" & "AAVB" (Continued)

107A as directed in previous release before stove can be installed on these engines):

Choke Stove Installation (Engines before No. V-95954)—See Note below for parts required. Remove carburetor from manifold, carefully cover manifold opening with masking tape, remove and discard old automatic choke-to-manifold pipe, then proceed as follows:

1) Center-punch approximate center of boss located to left of left front carburetor mounting stud. Drill a ¼" hole in the boss, then enlarge the hole using a 33/64" drill (CAUTION—DO NOT use any other drill than 33/64" for enlarging or finishing this hole).

2) Insert new Automatic Choke Manifold Heat Tube, No. 531359, in this hole with plugged end toward center of left bank cylinder head, use a rawhide mallet to set the tube into place so that end of tube extends 1" above the boss.

3) Use compressed air to clean off manifold and remove all dirt from bottom of heat tube.

4) Install shroud, No. 531361, on manifold-to-choke tube and loom assembly, No. 531812, then install assembly in tube slipping shroud down over end of tube.

5) Clean carburetor automatic choke housing and vacuum piston. Set choke for centered setting (arrow on cover aligned with index or sharp edge of boss on top of housing).

6) Re-install carburetor with new gasket, connect manifold-to-choke tube and tighten coupling nut finger-tight (tighten coupling securely after carburetor mounting nuts tightened).

Parts Change Note—Parts required for above change are: Manifold Heat Tube No. 531359, Manifold-to-Choke Tube & Loom Assy. No. 531812, and Shroud No. 531361.

▷*STUDEBAKER 1951 AUTOMATIC CHOKE "FILTERED AIR" CHANGE FOR IMPROVED CHOKE ACTION:* Beginning with 1951 Engine No. V172611, new system used by which filtered air (from air cleaner) is fed to choke stove in manifold to prevent dust being carried into choke mechanism and interfering with choke operation. This "filtered air" sytem can be installed on eariler cars as follows:

NOTE—On engines before No. V95954, new Automatic Choke Stove must be installed first (see Automatic Choke Hot Air Stove Change above).

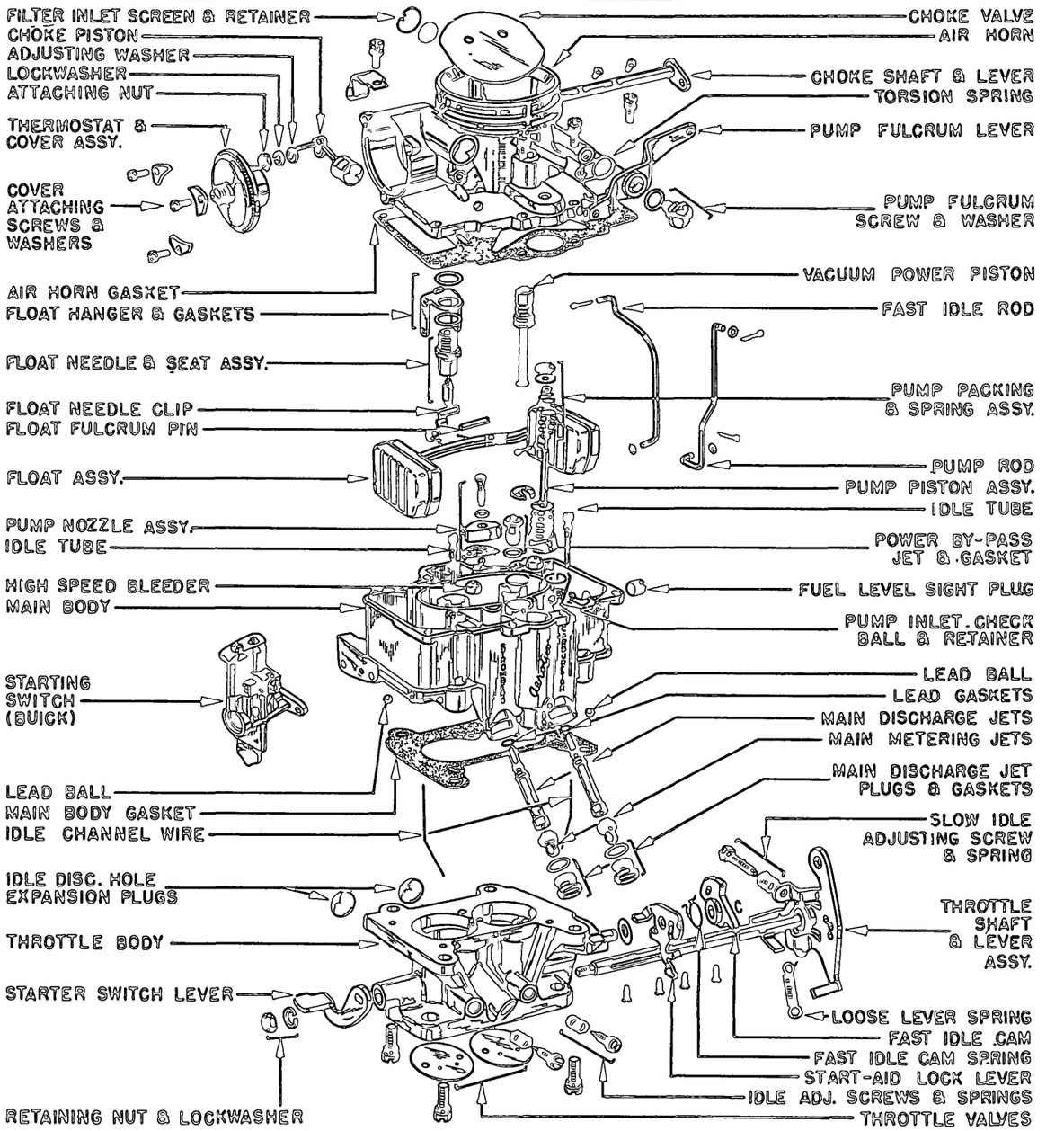
1) Thoroughly clean entire intake manifold and carburetor with compressed air, remove air cleaner.

2) Disconnect manifold-to-choke tube and loom assembly and remove the tube and shroud.

3) Remove choke cover, inspect vacuum piston and cylinder for evidence of sticking caused by dust, clean out cylinder with small wire brush, polish piston with crocus cloth, clean entire choke housing and cover assembly with compressed air. Make certain that choke assembly moves freely after reassembly.

CAUTION—See Choke Valve Bind Correction above.

4) When re-installing choke cover, make certain that additional gasket installed between cover and baffle plate on Code 6-111 carburetors (not used on Code 6-107A) and that regular gasket installed in housing recess (all carburetors). Set choke cover 1 Notch Lean (6-107A carburetors) or centered (6-111 carburetors).



STROMBERG "AAUVB" & "AAVB" CARBURETORS

5) Thoroughly clean heater tube in manifold by blowing out with compressed air (use 18" length of ¼" copper tube on air line to insure cleaning bottom of heater tube).

6) Install Shroud Base No. 532350 on heater tube with larger opening up (*CAUTION*—bottom of shroud base must seat on intake manifold). Install two Shroud Base Asbestos Gaskets No. 532358 in the base (*CAUTION*—use extreme care that gasket material does not fall into heater tube). Install new Shroud-and-Pipe Assy. No. 532362 on base and use wooden block to tap it down over heater tube so that it seats securely on the gaskets in the base.

CONTINUED ON NEXT PAGE

STROMBERG "AAUVB" & "AAVB" (C ntinu d)

7) Install small end of Heater Tube Seal Spring No. 532360 over lower end of manifold-to-choke tube and loom assembly, then assemble Seal Washer No. 361-04 and Silicone Seal No. 532366 on tube under the spring. Insert tube and loom assembly down into heater tube and position spring on tube so that spring will be compressed at final assembly. Connect upper end of tube assembly to choke cover.
8) Disassemble air cleaner, drill 7/16" hole in air cleaner elbow 1½" up from lower edge of elbow and 90° to rear of elbow center line. Thoroughly clean inside of elbow with compressed air. Install Rubber Grommet No. 532367 in this hole with external chamfer in (use liquid soap on grommet).
9) Clean and service air cleaner and re-install.
10) Insert Nipple No. 532368 in end of Nipple-to-Shroud Hose No. 959x7½ so that flared end protrudes ¼" from end of hose, inset flared end of nipple into air cleaner elbow grommet (use liquid soap as lubricant), connect other end of hose to Shroud and Pipe Assy. No. 532362 (see step 6 above).
11) Check installation by running engine until it is warmed up to operating temperature, note choke action. Then allow engine to cool off and make certain that choke valve returns to closed position.
Parts Change Note—Above parts furnished in Automatic Choke Heater Tube Kit No. 532365.

►***STUDEBAKER LATE 1951 CODE 6-111 CARBURETORS:*** This carburetor has different specifications (not interchangeable with Code 6-107 & 6-107A).

►***1951 STUDEBAKER AAUVB-26 CODE 6-107A CARBURETOR MODIFICATION FOR IMPROVED HOT STARTING:*** Vent the carburetor externally by drilling holes in Throttle Body Casting ONLY:

Throttle Body Vents—Remove carburetor from engine and disassemble throttle body so that it can be thoroughly cleaned after drilling. Use #36 drill, drill two holes through from outside into carburetor barrels (one hole in each barrel). Locate holes 3/8" below upper gasket surface of throttle body and toward center of each barrel from idle passage. ***CAUTION—Vent holes must be of proper size and located exactly as above. DO NOT vent air horn (as done on Code 6-111 carburetors).***

►***STUDEBAKER 1951 V8 ACCELERATION HESITATION CORRECTION (Stromberg AAUVB-26 No. 6-111):*** If this condition apparent when accelerating gradually in high gear at approximately ¼ throttle, check for leak in accelerating pump at intake ball seat. Check and correct as follows:

Checking for Leakage—With carburetor on bench, remove pump piston assy., partially fill bowl with fuel (to fill pump passages and pump cylinder), re-install pump piston. Hold pump discharge nozzle screw hole closed, depress pump piston. If fuel seen bubbling up through inlet port screen, or if a noticeable resistance to pump piston movement is not felt (with fuel escaping around piston), leakage is indicated. Reseat ball check as follows:

Seating Ball Check—Dismantle pump for access to inlet ball check. Use a drift to tap the ball sharply with a light hammer to smooth out ball seat. Recheck for leakage before reassembling.

►***STUDEBAKER 1951 CHOKE VALVE BIND (First Stromberg AAUVB-26 Code 6-111)***—Choke valve bind causing incorrect choke operation due to interference between air horn body and sides of choke valve (most noticeable in extremely cold weather). Correct by loosening two valve attaching screws and relocating valve on choke shaft. If free operation of the valve cannot be secured in this manner, remove valve and carefully file flat surface on each side of valve (not necessary to remove more than several thousandths of an inch of metal).

►***STUDEBAKER 1951-52 IMPROVED STARTING WITH HOT ENGINE CHANGE (Stromberg AAUVB-26 Code 6-111):*** To correct starting difficulties or excessive cranking when engine hot, carburetor should be vented externally by drilling holes in Air Horn Casting and Throttle Body Casting EXACTLY as detailed below. Remove carburetor from engine and disassemble for this modification. ***CAUTION—Vent holes must be proper size and located as follows:***

Air Horn Vent—Use #32 drill. Drill one hole through from outside into bowl vent passage in air horn. Locate hole 3/16" above upper surface of cover flange and in center of bowl vent riser (just to left of pump plunger hole in cover).

Throttle Body Vents—Use #36 drill. Drill two holes through from outside into carburetor barrels (one hole in each barrel). Locate these holes 3/8" below upper gasket surface of throttle body and toward center of each barrel from idle passage.

►***LATE 1952 STUDEBAKER CARBURETORS:*** Stromberg Code No. 6-111B and 6-111C carburetors, with modifications from original 1951-52 Code 6-111 carburetor, used on later 1952 cars as follows:
Code 6-111B Carburetors—These carburetors were modified in the field to provide external venting for improved hot starting (one hole in bowl vent passage, two holes in carburetor barrels) as directed above for Code 6-111 carburetors.
Code 6-111C Carburetors—Used beginning Engine No. V-201506. These carburetors have the external vent holes (see 6-111B note above) and do not require modification in the field.

►***1953 BUICK SERIES 50 HARD COLD STARTING & WARMING-UP PERFORMANCE CORRECTION (Stromberg AAVB-267 Carburetor):*** This condition noted by excessive cranking time when starting, and stalling when stopping or stumble on acceleration during warming-up period. Correct by making the changes detailed below. *NOTE*—All parts required for this change furnished in Service Kit, Buick No. 1391945.

1)—Remove carburetor from engine and disassemble air horn (see Overhaul data below).
2)—Remove and discard Thermostat Cover Assembly. Remove and discard automatic choke vacuum piston.
3)—Remove lead plug from passage inside choke housing and from passage at gasket surface on lower face of air horn (use Tool T-25052).
4)—Using a #30 drill in a pin vise, enlarge the original #53 restriction in the horizontal passage (insert drill through choke housing) to meet the vertical passage. ***CAUTION—DO NOT drill into outer wall—vertical passage is approximately 1 5/64" deep from edge of boss.***
5)—Blow out all chips with compressed air and thoroughly clean air horn. Assemble new lead plug in channel in choke housing (use Tool T-25054) and in passage in gasket surface in air horn. NOTE—tap lead plug in passage carefully to avoid restricting cross-channel and smooth the surface of the plug down with a file to provide a complete and smooth surface for the air horn gasket.
6)—Reassemble air horn, using NEW Choke Piston and NEW Thermostat Coil & Cover Assembly (furnished in kit—cover identified by stamp "30"). No adjustment required for this new choke piston.
7)—Make all carburetor adjustments, setting the carburetor to following specifications:

Float Level—5/64" above vertical guides on Gauge T-24971.

Choke Setting—Centered (inverted "V" mark on cover in line with left end of boss on choke housing).

Fast Idle Setting—Use #26 drill to adjust fast idle rod, and #53 drill to check locking lever and loose lever clearance.

Unloader Setting—Use #29 drill to check choke valve opening.

8)—Remove main discharge jet plugs (see illustration). Remove and discard both Main Metering Jets. Install NEW .051" Main Metering Jets (Part No. P-24673), install main discharge plugs and tighten securely.
9)—Check Starting Switch Adjustment. With starting switch operating lever just contacting switch slide, throttle opening or clearance between edge of throttle valve and barrel should be 3/32" (.090-.100").
10)—Stamp Code No. 7-95C on carburetor.

DESCRIPTION: Dual or Double Barrel Downdraft Carburetors with automatic choke. Buick carburetors have two types of Starting Switch assemblies. See Starter Switch below. Similar in design to "AAV" carburetors used previously.

ADJUSTMENT: Set these carburetors to the following specifications:

IDLING ADJUSTMENT

Idle Screw Setting—Adjust both screws equally with engine warmed up to normal operating temperature so that choke valve wide open and fast idle inoperative. Set throttle stopscrew for correct idle speed, turn each idle adjusting screw in until engine begins to miss, then turn screw out until engine begins to roll, finally turn screw in until engine runs smoothly. Recheck idle speed. See car model page for complete Tune-Up instructions.

Idle Setting

Buick (All Models).....Approx. 1½ turns open
Studebaker.....Approx. 1¾ turns open
Idle Speed (Buick)—450 RPM. (all cars).
Idle Speed (Studebaker)—550-600 RPM. (Synchromesh Trans. Cars), 500-550 RPM. (Automatic Trans. Cars with selector lever in Neutral "N").

ACCELERATING PUMP

Car Model	Pump Capacity	Pump Setting
Buick 70	10-14 cc(F), 15-19 cc(S)	Medium
Studebaker	11-14 cc(S)	Minimum

NOTE—Pump capacity is for 10 strokes, Fast (F), Slow (S) with pump stroke setting as indicated.
Recommended Pump Setting—Buick—Center Hole (medium stroke), Studebaker—Inner Hole (minimum stroke)

ECONOMIZER SETTING

No adjustment required. Valve opens when manifold vacuum drops to 4-6" (or 65-70 MPH.).

FLOAT LEVEL

Float Setting—5/64" projection above top edge of Checking Gauge T-24971 (all models). To check float level, invert bowl cover and float assembly, place checking gauge on cover gasket (DO NOT remove gasket) with lugs on gauge seated in holes in

C NTINUED ON NEXT PAGE

STROMBERG "AAUVB" & "AAVB" (Continued)

bowl cover. Adjust both floats vertically so that tops of floats are 5/64" above gauge guides, adjust floats laterally so that they are parallel to gauge guides without binding (necessary to prevent floats dragging on sides of bowl).

Fuel Level—21/32" below top edge of bowl with pressure of 5 lbs. (all models) or even with bottom of threads in inspection hole on side of bowl.

THROTTLE VALVE SETTING

NOTE—When checking throttle valve position, insert drill of size noted in idle port and vacuum spark port, check clearance (edge of valve to drill).

Idle Port Clearance

Car Model	Drill Size	⑧Setting
Buick 40, 50 ('50-51)①	#58	.030"
Buick 70 ('50-51)②	#60	.015"
Buick 40, 50 ('51)③	#55	.036"
Buick 70 ('51)④	#53	.035"
Buick 40, 50 ('52-53)	#55	⑤.036"
Studebaker ('51)⑥	#58	.040"
Studebaker ('51-52)⑦	#56	.040"

Vacuum Spark Port Clearance

Car Model	Drill Size	⑧Setting
Buick 40, 50 (All)	#58	.080"
Buick 70 (All)	#58	.055"
Studebaker (All)	#58	.020"

①—Code 7-88, 7-88A, 7-88B carburetors.
②—Code 7-89, 7-89A, 7-89B carburetors.
③—Code 7-90 carburetors.
④—Code 7-91 & 7-91A carburetors.
⑤—Notch in valves should center with secondary idle hole within .010" with valves closed.
⑥—Code 6-107 & 6-107A carburetors.
⑦—Code 6-111 & A, B, C carburetors.
⑧—Plus or minus .004".

FAST IDLE SETTING

Buick Fast Idle: *TWO settings required:*

▷*CAUTION—1953 Series 50 with Automatic Choke & Fast Idle Cam Changes (see Changes & Corrections) requires different fast idle cam setting.*

1) Fast Idle Cam—Close choke valve against correct size drill rod (see table below), see that fast idle cam spring holds cam upward against end of fast idle rod (rod in lower end of slot in cam). Close throttle until stopscrew contacts fast idle cam. If screw does not just clear edge of highest step on cam and bear against second (short) step, adjust by bending fast idle rod at upper curve. See that rod does not bind on cam or in choke lever.

Buick Fast Idle Cam Setting

Car & Carburetor	Checking Drill Size
Buick 40 All AAUVB-267	#26 (.147")
Buick 50 ('50-52) AAVB-267	#26 (.147")
Buick 50 (1953) AAVB-267	①#41 (.096")
Buick 70 ('50-51) AAVB-267	#26 (.147")
Buick 40, 50 (1954)	#51 (.067").
Buick 40 (1955)	#54 (.055").

①—Supersedes #26 (see Improved Warm-up and Stalling Elimination Change).

2) Lever Clearance. Close choke valve against #53 drill, adjust clearance between ear on locking lever on throttle valve shaft and lug on loose lever on fast idle cam stud so that these levers just clear as throttle valve opened and close. Adjust by bending end of loose lever up or down.

Studebaker AAUVB-26 Fast Idle: Hold throttle valve stopscrew against lowest lobe of fast idle cam. Move choke valve as far as possible toward closed position (CAUTION—do not force valve past point at which stopscrew comes up against step on fast idle cam). Measure choke valve opening by inserting 11/32" drill rod (Tool T-25085) between edge of choke valve and air horn wall. Adjust by bending connector rod at horizontal bend below choke lever.

UNLOADER (CHOKE RELEASE)

Setting—.151-.121" or #29 drill (Exc. 1955 Buick), .086" or #44 drill (1955 Buick), choke valve opening with throttle valve wide open. To check open throttle valve wide, measure choke valve opening or clearance between edge of valve and air horn wall using correct size drill rod. Adjust by bending throttle lever ear which contacts fast idle cam.

▷*BUICK NOTE*—After making above adjustment, close throttle and choke valve, then open throttle against tension of the start-aid lever spring. The lock lever should release the loose lever and the spring tension before stop arm on throttle lever contacts stop boss on throttle body.

AUTOMATIC CHOKE

Car Model	①Choke Setting
Buick (All Models)	Centered
Studebaker (Code 6-107)②	Centered
Studebaker (Code 6-107A)②	2 Points Lean
Studebaker (Code 6-111, A, B, C)	Centered

①—Reference point is left end of boss on choke housing.
②—*See "Hot Air Stove Change" and "Filtered Air Change" under Changes & Corrections above for DIFFERENT Choke Settings when these changes made.*

▷*THERMOSTAT CAUTION:* The correct Thermostat and Cover Assembly, identified by a number stamped on cover adjacent to "V" mark must be used. See table below.

Car & Year	Identification No.
Buick 1950-52	#23
Buick 1953-55	#30
Studebaker 1951①	#25
Studebaker 1951②	#26
Studebaker 1952	#26

①—Up to Engine number V-95954.
②—Starting with Engine number V-95954.

CHOKE ADJUSTMENT CAUTION—Use extreme care when tightening heat tube connection not to rotate or distort choke cover.

STARTING SWITCH
(1950-54 Buick Carburetors)

▷*BUICK 1950-51 NOTE—See Changes & Corrections above for changes on 7-88B & 7-89B carburetors.*

Switch Setting (Carburetor on Engine)—On Dynaflow cars, make certain Dashpot and throttle linkage correctly adjusted, place transmission selector lever in neutral and set hand brake firmly to hold car. With engine not running, insert a pin through felt filter and screen to operate vacuum piston, push vacuum piston in and hold it while opening throttle (this will allow slide to engage groove in piston and prevent slide dropping down to complete contact), hold throttle open, remove pin. Place 5/64" spacer between fast idle stopscrew and fast idle cam with fast idle cam in cold idle position. Close throttle so that spacer holds cam in cold idle position. Turn ignition on, hold spacer, depress accelerator to start engine. Engine should not crank. Repeat above test with 3/64" spacer between stopscrew and fast idle cam. Engine should crank. If engine cranks with 5/64" spacer, bend tang on switch operating lever downward slightly and recheck switch timing. If engine does not crank with 3/64" spacer, bend tang on operating lever upward slightly and recheck switch timing. *See "Stromberg Starter Switch" in Electrical Equipment Section for complete data.*

(1955 Buick Carburetor)

Switch Setting (Carburetor on Engine)—On Dynaflow cars make certain Dashpot and throttle linkage are correctly adjusted, and transmission selector lever is in Neutral and parking brake fully applied. Back off throttle stop screw, rotate fast idle cam to slow idle position if necessary, and fully close throttle valve. Hold a stiff 6" scale or straight edge against rear face of lower arm of throttle lever which contacts Dashpot, with scale resting on rocker arm cover. With throttle valve fully closed, scribe pencil mark on cover at front edge of scale. Turn ignition switch and open throttle slowly. Scribe a second mark on rocker arm cover at point where starting motor is energized. The switch is correctly timed when distance between marks on rocker arm cover is 29/32"-1 7/16". To retime switch, change timing shims in switch assembly. Reset engine idle speed to 450 RPM and recheck throttle linkage and Dashpot adjustments. *See "Carter Car Starter" in Electrical Section.*

OVERHAUL: On Buick carburetors, first remove vacuum switch assembly and gasket. Disconnect and remove accelerating pump rod and fast idle rod. Disconnect pump lever from pump piston stem, then take out pump lever fulcrum screw (this screw has left-hand thread), remove lever. Take out air horn attaching screws and lockwashers, lift air horn assembly straight up and off main body. Remove pump spring from pump cylinder and pump piston assembly from air horn. Take out throttle body retaining screws and lockwashers, then lift main body straight up and off. Remove gasket, lift idle channel wires out of throttle body.

Air Horn Disassembly—Tap float hinge pin out (push pin out toward serrated end), remove float and intake needle assembly, free needle from float lever clip, lift off air horn gasket. Unscrew needle valve seat (Wrench T-20140), remove seat, float hanger, and gaskets. Remove staking from around edges of vacuum piston cylinder, remove piston assembly (piston can be removed by gripping upper end of stem directly above the spring with pliers and using 1" block of wood as a fulcrum so that piston can be pulled straight out). Take out thermostat cover screws, remove thermostat cover assembly. Use wrench T-25047 to remove locknut on end of choke shaft, remove lockwasher and serrated washer (Buick carburetors). Take out choke valve attaching screws, remove valve, slide choke shaft out, remove choke piston and lever assembly.

Main Body Disassembly—Remove power by-pass jet and gasket, remove both idle tubes. Remove main discharge jet plugs and copper gaskets, use special socket wrench T-24924 to remove main metering jets. Use Jet Remover T-24967 to remove main discharge jets (screw tool into end of jet and pull jet from main body—threads formed by tool will not affect metering characteristics of jet), make certain that discharge jet lead gaskets removed from body recess. Take out pump discharge nozzle screw, remove nozzle assembly and gaskets, invert body to drop discharge check ball from dis-

CONTINUED ON NEXT PAGE

STROMBERG "AAUVB" & "AAVB" (C ntinu d)

charge passage. Remove intake check ball retainer from bottom of pump cylinder, invert body to drop out intake check ball. Remove pump inlet strainer screen (not used on all carburetors).

Throttle Body Disassembly—Hold down on vacuum switch terminal cap while removing hold-down clip. Remove terminal cap and switch return spring, then lift out switch guide block with contact spring and shims. Do not lose timing shims and the spring washer on contact spring. Turn throttle body over to allow plunger rod ball to drop into hand. Mark throttle valves so they may be reinstalled in original positions in barrel of throttle body (Scribe valve, stem and bore to insure accurate repositioning). Remove screws, slide valves out of stem, remove retainer washer, then remove throttle lever and stem assembly, from throttle body. Remove idle needle valves & springs, pry ring from post which supports fast idle cam and remove fast idle cam, lock lever, and spacer washer.

Cleaning & Inspection: Clean all parts thoroughly in Bendix Metalclene or similar cleaning solution, rinse in solvent. Make certain that all carbon and gum deposits removed, blow out all passages and dry parts with air *(NOTE*—If necessary to remove lead plugs, use Tool T-25052. Install new plugs with Plug Set T-25053. Inspect all parts for wear.

Air Horn & Choke Parts—Vacuum piston and cylinder in air horn must be clean and free of burrs or scores. DO NOT use any abrasive material for cleaning these parts.

Vacuum Power Piston & By-Pass Jet—Surface of piston must be thoroughly cleaned. DO NOT use any abrasive material for polishing the surface of piston. Test by-pass jet for tight seating by sucking on upper end. Replace as necessary.

Main Body—Main body must be thoroughly clean and all passages free of foreign material. Check high speed and idle air bleeders for correct sizes. Use drill size #70 for checking high speed bleeder, and #56 for idle air speed bleeder.

Main Discharge Jets & Idle Tubes—Inspect main discharge jets to insure that tips are not damaged or walls distorted so as to deform holes. Test idle tubes by blowing or sucking to make sure metering holes are clear, be sure small ends are not damaged so as to deform metering holes.

Pump Piston, Discharge Nozzle and Related Parts—Pump piston leather must be free of cracks, creases, turned edges or other damage. Relief valve in piston must seat (test by blowing on lower end of piston). Suck or blow on discharge nozzle to be sure holes are clear and always replace pump inlet and discharge channel check valve balls. Replace check valve ball seats if strong light reveals that they are rough or loose in seat. To replace seat, use a steel ball and tap lightly, then discard ball.

Throttle Valves, Throttle Lever & Stem Assembly—Check throttle stem bearing for wear. Air leaks will affect performance if wear is in excess of .006". Replace throttle valves that show sharp edges, burrs, or are bent.

Reassembiy: Use all NEW gaskets, install parts in reverse of disassembly procedure. Note following:

Throttle Shaft & Lever Assembly—Attach fast idle rod to fast idle cam with washer and hook cam spring into groove in rod. Install spacer washer, loose lever lock lever, and fast idle cam on post in throttle body, then snap ring in groove in post. Install lever and stem assembly in throttle body and retainer in end of stem.

Throttle Valve Installation—After throttle shaft and lever assembly installed in body, install each throttle valve in same barrel from which removed, install new valve screws loosely, then close valves, carefully align marks made before disassembly and tighten screws securely. Check valves by holding throttle body up toward a light, shift valves as necessary until least amount of light visible around valve edge, finally stake valve screws (support screw head on steel block while staking opposite end).

Accelerator Vacuum Switch—Lubricate contact surfaces of terminal cap with Beacon M-285 lubricant, or petroleum jelly if Beacon Lubricant not available, by working lubricant into a piece of clean cloth and lightly swabbing inside of cap. *CAUTION*—Do not use ordinary lubricants or lubricate ball or plunger as poor switch contact will occur during cold weather. Place plunger in position with groove up so that ball rests on lip at inner end of plunger. *NOTE*—If plunger not correctly installed, poor switch action with resulting gear clashing will occur. Make sure all timing washers, contact spring, and return spring washer are in proper position before installing return spring and terminal cap. Be sure terminal cap is properly seated. *For switch timing, see "Switch Setting (Carburetor on Engine)" above.*

Main Discharge Jet Assemblies—Place new lead gasket over beveled end of main discharge jet, use remover tool T-24967 to seat jets in main body *(CAUTION*—flat surface on end of jet must be parallel to air flow), install main metering jets and plugs with new copper gaskets.

Idle Channel Wires—When installing throttle body on main body, make certain that idle channel wires installed with short end in throttle body and guide opposite end into idle channel in main body. *CAUTION—use care not to bend channel wires.*

Choke Valve Installation—After choke shaft installed in air horn, install valve with dash mark on valve toward top of air horn, install new screws loosely, close valve and make certain clearance around valve uniform, then tighten screws securely. Check for free operation (valve should drop freely of own weight and should not bind at any position),

Choke Piston Setting (Buick)—After choke piston and lever assembly installed in cylinder, install adjusting washer with serrated side toward piston lever, install lockwasher and nut and tighten nut finger-tight. Install Gauge T-25046 in choke housing with the outer flange piloting in the housing and the small hole in the gauge fitting over the pin on the choke lever. Turn gauge until two indicator lines on face are centered on left end of indicator boss on housing. Close choke valve against #29 drill rod (insert drill between upper edge of valve and air horn wall), tighten piston lever locknut lightly. Remove drill and gauge, close choke valve, tighten locknut securely, recheck setting. *NOTE*—This adjustment not required on Studebaker.

Thermostatic Coil Installation—Place coil assembly on housing with coil hook downward, rotate assembly in direction of arrow until "V" mark on cover in line with left edge of indicator boss on housing, tighten retainer screws securely.

Vacuum Power Piston Installation—Make certain that piston operates freely in cylinder but DO NOT lubricate piston, seat retaining washer in body recess and stake edge of cylinder at three points

Float & Intake Valve Installation—Use new gasket on each side of float hanger, tighten intake needle seat securely. Install new gasket on air horn before installing float assembly, clip intake needle to float arm, install assembly and tap float fulcrum pin in so that serrated end locks in hanger leg. Adjust float level (see ADJUSTMENTS). Make certain that float lever moves freely in hanger and that intake needle has 1/16" travel in closed position (adjust by bending float lever stop).

Carburetor Adjustment—See ADJUSTMENTS.

SERVICE PARTS

Gasket Sets—Stromberg No. 382370 (Buick AAUVB & AAVB), No. 382367 (Studebaker AAUVB).

Repair Kits (with Std. Metering Jets):

RK-151—1950-51 Buick 40, 50 Code 7-88, 88A, 88B.
RK-152—1950-51 Buick 70 Code 7-89, 89A, 89B.
RK-168—1951-53 Buick 40 & 1951-52 50 Code No. 7-90 & 7-90B.
RK-169—1951 Buick 70 Code 7-91 & 7-91A.
RK-180—1953 Buick 50 Code 7-95 & 7-95A.
RK-181 1954 Buick 40, 50 Code 7-96.
RK-187 1955 Buick 40 Code 7-102A.
RK-163—1951 Studebaker Code 6-107 & 6-107A.
RK-170—1951-52 Studebaker Code 6-111, B, C.

STROMBERG DUAL "AAV," "AAUVB," "AAVB" & 4-BARREL "4A" TYPES

DESCRIPTION

DESCRIPTION & OPERATION: Thermostatic coil and vacuum piston type. Thermostatic coil and vacuum piston are mounted on carburetor and linked directly to choke valve lever (no external linkage). Vacuum passage (for piston operation) is drilled in carburetor casting and opens into manifold below throttle valve. Hot air tube (for thermostatic coil operation) is connected between choke housing and hot air stove on exhaust manifold. When engine is cold, thermostatic coil winds up and tends to close choke valve (valve cannot close until throttle opened momentarily to release fast idle screw from cam; but is snapped closed as soon as throttle opened). When engine begins to fire, manifold vacuum causes vacuum piston to be drawn into cylinder which opens choke valve slightly against the thermostatic coil tension to provide proper air mixture for continued running. As engine warms up, thermostatic coil tends to unwind, releasing choke valve and allowing it to open (valves are offset).

▷*BUICK 70 "4A" 4-BARREL NOTE:* Automatic choke and fast idle mechanism is similar to design used on other Buick dual or 2-barrel carburetors and is adjusted in same manner. Choke valve is located on primary side of air horn and controls primary barrels only (Auxiliary Throttle Valves on secondary side are locked closed by the choke valve while choke is in operation so that no choke mechanism is required on the secondary side).

Fast Idle:—Consists of a stepped cam linked to the choke valve. When choke valve closed by thermostatic coil for cold starting, cam is revolved so that the throttle stopscrew rests on highest step of the cam and throttle is held open in fast idle position. As engine warms up and choke valve opens, cam is revolved and throttle allowed to close, until with the engine warm and choke valve wide open, throttle is closed to hot or slow idle position.

ADJUSTMENT & OVERHAUL

▷*CAUTION—When reassembling all models except Studebaker AAV-26 & AAUVB-26, special ring gauge must be used to adjust vacuum piston assembly position on choke shaft (see Reassembly data below).*

DISASSEMBLY: Disconnect heat tube from thermostat housing cover, remove carburetor from manifold. Remove thermostat cover retaining screws and lug washers, remove thermostat cover assembly by rotating it clockwise to disengage coil hook from lever prong and then lifting it off the housing. Remove locknut on end of choke valve shaft (use socket wrench T-25047), remove lockwasher and serrated washer (serrated washer not used on Studebaker models). Remove vacuum piston assembly from the housing.

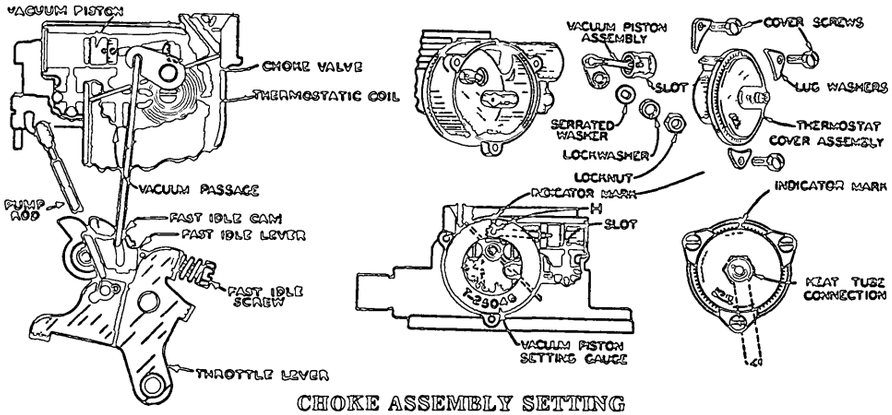
CLEANING & INSPECTION: Clean vacuum cylinder and piston with a clean cloth saturated with acetone or alcohol (CAUTION—do not use abrasives to clean cylinder or piston). Blow out all channels with compressed air. Clean the screen on the inside of the cover by blowing through heat tube connection and around inside cover (CAUTION—when using compressed air, use care not to distort screen or thermostatic coil). Do not attempt to remove thermostatic coil from cover (these parts furnished as an assembly).

REASSEMBLY: *Do not lubricate piston or cylinder.* Install vacuum piston assembly in cylinder, assemble lever on choke valve shaft. Install serrated washer (not used on Studebaker), lockwasher, and locknut. On all models except Studebaker, adjust vacuum piston assembly before tightening locknut (see Adjustment below). Tighten locknut securely, recheck choke valve opening to make certain setting not disturbed by tightening the nut. Install thermostat cover assembly with coil hook at the bottom, then rotate cover in "Rich" direction (counterclockwise) until inverted "V" mark on cover is in line with center graduation of scale on housing. Install lug washers and tighten retainer screws securely. NOTE—This procedure will provide "Centered" setting. See Choke Setting data for special settings used on some models.

Vacuum Piston Assembly Adjustment (Not required on Studebaker AAV-26 and AAUVB-26). With locknut tightened loosely (do not tighten fully until piston adjusted), install ring gauge (see Note below) with hole in tool fitting over pin on choke lever and indicator line on rim of tool in line with reference mark on choke housing. Hold choke valve closed against drill or gauge (see table), tighten locknut lightly with wrench T-25047, remove the gauge ring and then tighten the locknut securely. Recheck the choke valve to make certain that setting not changed by tightening of locknut. See that choke valve operates freely. This adjustment is extremely important to properly position vacuum piston and thermostatic coil prong.

▷Buick Ring Gauge Note: Gauge No. T-25046 used on all Buick models with dual (2-barrel) carburetors EXCEPT Models AAUVB-267 & AAVB-267 for which NEW Gauge No T-25367 should be used or T-25046 gauge modified to permit its use on these models. *See "Buick Service Tool" under CHANGES, CAUTIONS, CORRECTIONS for modification instructions.*

▷Buick Series 70 (4-Barrel Carburetor) Ring Gauge Note: Use Gauge No. T-25367 on these models. Reference point on this gauge consists of two lines and reference point on housing (left end of boss) should be centered between the two lines.



CHOKE ASSEMBLY SETTING

Car Model	Carburetor	Drill Size	Ring Gauge
Buick 40, 50 ('40-49)	AAV-16, 167	15/64"①	T-25046
Buick 70 ('42-49)	AAV-26, 267	#3 drill②	T-25046
Buick 40, 50 ('50-52)	AAUVB-267	#29 drill	③T-25367
Buick 70 ('50-51)	AAVB-267	#29 drill	③T-25367
Buick 40 ('53)	AAUVB-267	#29 drill	T-25367
Buick 50 ('53)	AAVB-267	#29 drill	T-25367
Buick 70 ('52-53)	4A	#29 drill	T-25367
Cadillac ('41-42)	AAV-26	#3 drill②	T-25046
Cadillac ('46-48)	AAV-26	#2 drill	T-25046
Packard ('41)	AAV-26	#4 drill	T-25046

①—Or Tool No. T-25085.

②—Or Tool No. T-25086.

③—Tool No. T-25046 can be used if modified (see Tool Note).

Fast Idle Connector Rod Installation: When reassembling the fast idle connector rod, install bushing (washer—Buick), on lower end of rod after rod has been assembled to lever. See that fast idle cam torsional spring is assembled with end of spring hook against ear of lever. See that cam operates freely and make certain that rod does not bind in slot in cam. This is very important.

Auxiliary Throttle Valve Lockout Slide Clearance (Buick 4A Carburetors): *The Lockout Slide is operated by the choke mechanism and must be checked and adjusted after the choke mechanism has been reassembled. Two separate adjustments are required:*

Locked Clearance—With auxiliary throttle valves in closed position, close choke valve fully so that lock slide engages auxiliary valve counterweight lever. Check clearance between ear on slide and edge of lever with a feeler gauge. This clearance should be .025" minimum, .060" maximum. Adjust by bending ear on slide.

Unlocked Clearance—With choke valve wide open, move auxiliary throttle valves to wide open position. Clearance between end of locking ear on slide and edge of auxiliary valve counterweight lever should be 3/64" minimum, 5/64" maximum. Adjust by bending choke lever slide actuating arm.

STROMBERG MODEL BXOV-26

STUDEBAKER	Stromberg No.
1941-42 Commander 11A & 12A	①380036
1947-50 Comm. & Land Cruiser 14A, 15A, 16A, 17A②	380178

①—See Replacement Carburetor data below.
②—Except First 10,000 cars in 1950 (Carter "WE").

►CHANGES & CORRECTIONS

Studebaker 1941-42 Replacement Carburetor—Original carburetor (Code No. 6-98 and 6-98A) replaced by 1947 carburetor No. 380178 (Code No. 6-104).

►**Studebaker No. 380036 & 380178 Carburetor Replacement Parts Change:** New type Accelerating Pump Piston, Duration Spring, and Pump Spring have superseded parts formerly furnished for these carburetors. **All of these parts must be installed as an assembly** when servicing the above carburetors and are furnished in Repair Parts Kit No. RK-112.

Parts Changed:	New Part No.	Superseded Part No.
Accelerating Pump Piston	385100	382485
Pump Duration Spring (Upper)	385164	P-24102
Pump Spring (Lower)	385102	Not Used

DESCRIPTION: Plain tube, downdraft type with throttle operated accelerating pump. This model fitted with integral Fast Idle & Automatic Choke (thermostatic coil mounted on air horn and linked directly to choke valve shaft).

IDLING ADJUSTMENT: Adjust only when engine warm and Automatic Choke and Fast Idle inoperative (choke valve wide open, throttle stopscrew on lowest step of fast idle cam) and engine idling at hot or slow idle speed. Idle adjusting screw controls fuel mixture discharge from lower idle port and should be turned in for leaner mixture, out for richer mixture (standard setting approximately 1¼ turns open from inner seated position). Idle speed controlled by throttle lever stopscrew and should be reset after idling adjustment completed for correct hot or slow idling speed. See car model page for complete tune-up instructions.

IDLE SETTING

Car Model	Idle Screw Setting	Idle Speed
Studebaker	1-1¼ turns open	①8-10 MPH.

①—On Automatic Transmission cars, set at 500-550 RPM.

METERING JETS: Main metering jet is non-adjustable type located under plug at lower end of discharge jet. Jets should be changed only for special operating conditions such as high altitudes. See Stromberg Jet Specification table for complete jet data.

ECONOMIZER: Consists of a by-pass valve and jet in the carburetor main body controlled by a vacuum piston in a cylinder in the air horn casting. Economizer by-passes fuel around main metering jets to main nozzles when vacuum in manifold decreases sufficiently so that piston is forced down by spring. No adjustment required.

Setting—Vacuum piston opens valve with manifold vacuum of 4-6" of HG. corresponding to car speed of 65-70 MPH.

ACCELERATING PUMP: Operated by throttle lever through vertical pump rod under float bowl cover. Fuel is drawn into pump chamber through strainer screen and inlet ball check valve and is discharged through outlet valve and pump discharge nozzle located in side of mixing chamber above main venturi when throttle opened for acceleration. Pump piston has duration spring on piston rod (spring compressed on sudden throttle openings, subsequent spring expansion prolongs pump discharge).

Capacity—Pump capacity in cc. per 10 strokes with pump set for medium stroke (link in center hole of throttle lever) is shown in table below. Use T-24972 Pump Capacity Burrette Gauge to check pump capacity.

ACCELERATING PUMP SETTING

Car Model	Pump Capacity	Pump Setting
Studebaker	11-14 cc. (S), 5-8 cc. (F)	Medium Stroke

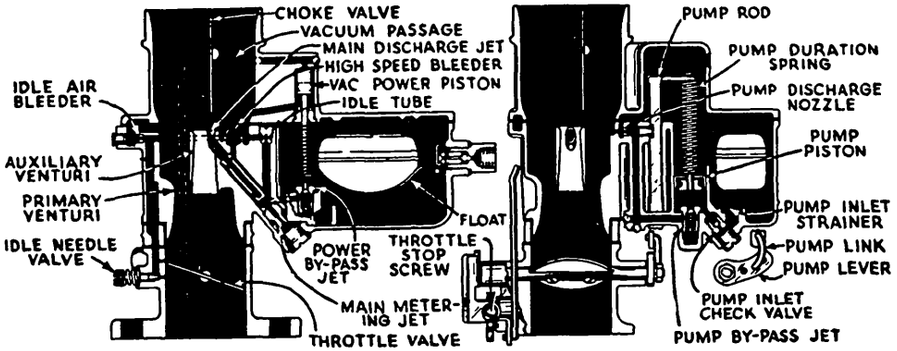
(F)—Fast Stroke, (S)—Slow Stroke.

Adjustment—Three holes provided in throttle lever for pump link connection. Link engaged in center hole provides normal setting, outer hole (long radius) provides maximum pump discharge, inner hole (short radius) minimum discharge. See car model page for settings and seasonal changes.

Pump Servicing Note—Strainer screen located in pump inlet in bottom of float bowl should be cleaned at frequent intervals to insure satisfactory pump performance.

FAST IDLE & CHOKE RELEASE:—Fast idle mechanism consists of a fast idle lever and cam mounted below the throttle valve shaft so that the cam serves as a stop for the throttle stopscrew. Fast idle lever is linked to choke valve lever by connecting rod so that cam is rotated to the fast idle position when the choke valve closes for cold starting. Choke release mechanism consists of an ear on the throttle lever which engages a lug on the fast idle cam so that the cam is rotated and choke valve opened when the throttle valve is opened wide. Fast idle and choke release setting are both adjusted by bending connector rod as follows:

Adjustment—Hold throttle stopscrew on lowest step of fast idle cam and against edge of second step, move choke valve toward closed position as far as possible (do not force valve beyond point where fast idle cam and lever are stopped against throttle stopscrew). Check choke valve opening by inserting 11/32" drill rod between upper edge of valve and air horn wall. If choke opening not correct, adjust by bending connector rod at bend near choke valve lever.



FLOAT LEVEL: Fuel Level—Set at 5/8" below top edge (gasket seat) of bowl with 3 lbs. pressure (engine idling). Adjust by bending float arm at point where it is attached to float (use tool T-24733).

NOTE—Float fulcrum pin is retained by spring clip seated in float seat recess. When installing fulcrum pin, see that spring clip is seated and that it engages notches at ends of pin.

Float Bowl Vent—Bowl is vented to outside atmosphere through slot in upper end of pump rod housing on bowl cover.

Float Needle Valve & Seat: Furnished in matched sets only as follows:

Studebaker—Part No. P-24063—.086" Intake Hole.

THROTTLE VALVE SETTING: To check throttle valve setting, back throttle stopscrew off so that valve is tightly closed, insert drill rod of correct size (see table below) in idle port and vacuum spark port, measure distance from throttle valve edge to drill rod. See table below for settings. All specificationes are plus or minus .004" except as noted.

	Idle Port ①		Vacuum Spark Port①	
Car Model	Setting	Drill	Setting	Drill
Studebaker	.010"	#60	Flush	#56

①—"Drill" figure is correct size drill rod to be used in checking valve.

CHOKE: Valve is offset plain type. Operated by automatic choke thermostatic spring coil which is linked directly to shaft.

Choke Setting (Studebaker)—Three settings marked on coil housing cover as follows: 'H', 'M', 'R' (additional mark '7' provided for coil identification). Standard setting is with 'R' mark coinciding with projection on thermostat housing and is correct for regular fuel and operating conditions. If engine loads up or overchokes with this 'R' setting, change setting to 'M'. Use 'H' setting only when highly volatile fuel is used continuously.

CAUTION—When connecting heat tube at thermostatic coil housing cover connection, do not use excessive pressure which may rotate cover and change choke setting.

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STROMBERG MODEL BXOV-26 (Continued)

DISASSEMBLY OF CARBURETOR: Disconnect choke link, take out six retaining screws, remove bowl cover and air horn assembly. Remove float pin lock wire (this will spring out when released), remove float hinge pin, remove float, needle valve, and needle valve seat. Remove idle tube from carburetor body casting, disconnect pump link and withdraw pump rod and piston assembly. Remove pump outlet check valve (in bottom of pump cylinder), remove inlet check valve plug and valve assembly. Remove main jet plug (use tool T-19099), main metering jet (use tool T-24924), and main discharge jet (use tool T-24967). Remove vacuum economizer by-pass valve assembly. To remove vacuum piston, use tool T-24733 inserting tool prongs in slots in piston retaining plug. To dismantle choke assembly, take out retaining screws and remove thermostat cover and coil assembly (do not remove thermostat coil from cover), remove small nut and lockwasher on end of choke valve shaft, turn lever to withdraw vacuum piston from cylinder and remove piston and link assembly.

Servicing—Examine vacuum economizer piston and automatic choke vacuum piston for carbon or gum deposits. Check economizer by-pass and pump check valves for tightness by using special T-24970 tester (screw valve in proper opening of tester, immerse valve in gasoline and blow through tester—any valve leakage will be indicated by bubbles). Clean all jets with gasoline or use denatured alcohol to dissolve gum deposits (CAUTION—do not attempt to clean jets with wire or drill rods). Blow out all channels and passages in carburetor with air, remove all carbon deposits in ports and throttle body. Replace all worn or damaged parts.

REASSEMBLY OF CARBURETOR: Use all new gaskets (see below), reassemble carburetor by reversing disassembly directions given below. Check and adjust float level, accelerating pump setting, throttle valve setting, fast idle and choke setting, and idle setting when carburetor reassembled.

SERVICE PARTS:—Gasket Sets—Part No. J-5652-G (all models).
Repair Kits (incl. Gaskets)—No. RK-112 (Studebaker).

STROMBERG BXOV-26 TYPE AUTOMATIC CHOKE

Used On:

Car Model	Carburetor
Studebaker Commander, 11A (1941), 12A (1942)	BXOV-26
Studebaker Commander, all Models (1946-50)	BXOV-26

DESCRIPTION & OPERATION: Thermostatic coil and vacuum piston type. Thermostatic coil and vacuum piston are mounted on carburetor and linked directly to choke valve lever (no external linkage). Vacuum passage (for piston operation) is drilled in carburetor casting and opens into manifold below throttle valve. Hot air tube (for thermostatic coil operation) is connected between choke housing and hot air stove on exhaust manifold. When engine is cold, thermostatic coil winds up and tends to close choke valve (valve cannot close until throttle opened momentarily to release fast idle screw from cam, but is snapped closed as soon as throttle opened). When engine begins to fire, manifold vacuum causes vacuum piston to be drawn into cylinder which opens choke valve slightly against the thermostatic coil tension to provide proper air mixture for continued running. As engine warms up, thermostatic coil tends to unwind, releasing choke valve and allowing it to open (valves are offset).

Fast Idle (BXOV-26 Type):—Stepped valve linked to choke. When choke valve closed for cold starting, cam is revolved so that throttle stopscrew rests on highest step of cam and throttle is held open in fast idle position. As engine warms up and choke valve opens, cam is revolved and throttle allowed to close, until with the engine warm and choke valve wide open, throttle is closed to hot or slow idle position.

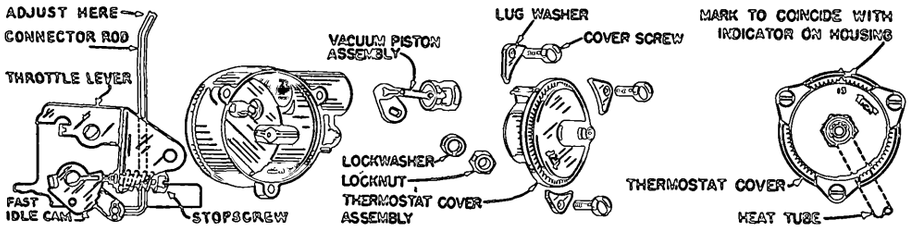
ADJUSTMENT: Thermostatic Coil Setting. Inverted "V" mark or "O" mark on thermostatic coil housing should line up with reference mark on choke housing. This standard setting may be varied not more than 2 graduations for use of high test fuel or with exceptional operating conditions. If warming up performance is not satisfactory with this setting, check choke valve and linkage for binding or replace thermostatic coil assembly. When installing thermostatic coil, place coil housing in position with coil hook down, then rotate housing in 'Rich' direction until correct setting secured (this will insure coil hook engaging prong properly).

Studebaker Models—Choke housing on these models marked by three letters 'H', 'M', 'R'. To adjust, loosen mounting screws, rotate housing until 'R' mark lines up with reference projection on housing flange. This is standard setting. If engine tends to load up or over-choke, change setting to 'M' position. Use 'H' setting only when highly volatile fuels used.

Fast Idle Setting—With choke valve open, close throttle so that stop-screw is on low lobe of fast idle cam and against step on cam. Move choke valve toward closed position as far as possible (do not force valve beyond point where all clearance is taken up). Check remaining choke valve opening by inserting 11/32" drill (BXOV-26), 35/64" drill (EE-16) between edge of choke valve and air horn wall. If choke valve opening not correct, adjust by bending fast idle connector rod slightly at bend near upper end.

CAUTION—Make certain that fast idle mechanism operates freely without binding.

DISASSEMBLY: Disconnect the heat tube from the thermostatic coil cover, remove carburetor from manifold. Remove thermostat coil cover attaching screws and lug washers, remove thermostat coil and cover assembly (rotate cover clockwise to disengage coil hook from lever prong). Remove cork insulator and baffle plate. Remove locknut on end of choke valve shaft (use wrench T-25047), remove lockwasher. Loosen housing attaching screws slightly (do not take screws out), take out vacuum piston assembly.



Servicing—Clean vacuum piston cylinder with clean cloth saturated with Acetone or alcohol. Clean vacuum piston (do not use abrasives). Blow out all channels with compressed air. Do not attempt to remove thermostatic coil from housing (service as an assembly).

REASSEMBLY: Do not lubricate the vacuum piston or cylinder when installing assembly. Install piston and engage slot in lever on flatted end of choke valve shaft (can only be installed in correct position), tighten housing attaching screws securely. Install lockwasher and and locknut, use wrench T-25047 to tighten locknut securely. Install baffle plate and cork insulator (CAUTION—if cork insulator buckled or does not fit properly, it will cause vacuum piston lever to bind and new insulator should be used). Install thermostat coil and cover assembly and adjust as directed above.

Thermostat Checking (Studebaker Models)—To calibrate a replacement thermostat, or to check a thermostat which may have been damaged or tampered with, proceed as follows: Submerge coil and cover assembly in water at exactly 70°F. (use thermometer to check water temperature) and allow assembly to remain in the water for several minutes. Remove assembly and mark edge of cover in line with center of thermostatic coil hook. The "H" mark should be two graduations, "M" mark four graduations, and "R" mark six graduations, from this reference mark. Thoroughly dry the thermostatic coil and cover assembly before installing it in the carburetor.

STROMBERG MODELS BXV-3, BXVD-3, BXVES-3

DE S TO	Stromberg Model & Part No.
1947-48 (Fluid Drive & Synchro-mesh Trans.)	①BXVD-3 No. 380218
D DGE	
1940-41	②BXV-3 No. A-18123, A-18133
1941 (Fluid Drive)	②BXVD-3 No. 380044, 380045
1942	③BXV-3 No. 380079, 380837
1942 (Fluid Drive)	①BXVD-3 No. 380080, 380848
1946-47	③BXV-3 No. 380158
1946-47 (Fluid Drive)	①BXVD-3 No. 380159
1947-48	③BXV-3 No. 380219
1947-48 (Fluid Drive)	①BXVD-3 No. 380218
1948-52 (Fluid Drive & Synchro-mesh Trans.)	BXVD-3 No. 380249
1948-52 (Canada—Fluid Drive & Synchro-mesh)	BXVD-3 No. 380253
1948-52 (Fluid Drive & Automatic Trans.)	④BXVES-3 No. 380251
1950-52 (Canada—Fluid Drive & Automatic Trans.)	BXVES-3 No. 380268
1952-53 (Fluid Drive & Automatic Trans.)	BXVES-3 No. 380331
PLYMOUTH	
1947-48	BXV-3 No. 380220

①—Superseded by BXVD-3 No. 380852 for replacement.
②—Superseded by BXVD-3 No. 380221 for replacement.
③—Superseded by BXV-3 No. 380851 for replacement.
④—Superseded by BXVES-3 No. 380331 for replacement.

CARBURETOR MODEL IDENTIFICATION:—Carburetors are identified by Code Number stamped on float bowl as follows: **3-54A (A-18123), 3-55 (A-18133), 3-59 & 3-59B (380044), 3-60 & 3-60B (380045), 3-65 (380079), 3-66 (380080), 3-76 (380158), 3-77 (380159), 3-82 (380218), 3-83 (380219), 3-84 (380220), 3-87, A, B, & later (380221); 3-93, A, B, C & later (380249); 3-95, A, B, C, D, E, F, & later (380251); 3-97, A, B, & later (380253); 3-103, A, & later (380268).** 3-111 (No. 380331).

►***See Production Change Notes below for parts changes indicated by these Code Number letter changes.***

►CHANGES & CORRECTIONS

►**1951 Carburetor Main Body & Vacuum Power Piston Production Change (BXVD-3 Carburetors No. 380249 & 380253, BXVES-3 Carburetors No. 380251 & 380268):** Beginning with early 1951 production, new Main Body casting with new longer Vacuum Power Piston used on all carburetors listed above. First type Main Body will not be furnished for service and new type Main Body **with new longer Vacuum Power Piston** must be used when replacement of main body required. Old and new type parts can be identified as follows:

Main Body—Bottom of by-pass jet boss (below float bowl) is **7/16" above** bottom of dashpot on first type main body, and is even with bottom of dashpot on new type main body.

Vacuum Power Piston	Part No.	Over-all Length
First Type	P-24201	2 5/32"
Later Type	385527	2 9/16"

NOTE—When new main body and new vacuum power piston installed, code number stamped on carburetor should be changed to show the latest number (code when this change occurred in production) as follows: No. 380249—Code 3-93C & Later, No. 380253—Code 3-97B & Later, No. 380251—Code 3-95F & Later, No. 380268—Code 3-103A & Later.

►**Dodge 1941 BXVD-3 Carburetor Production Change**—On later cars with Code 3-59B (U.S.), 3-60B (Exp.) carburetors, these carburetors differ in specifications from first Code 3-59 and 3-60 carburetors as follows: Main Metering Jet—.057" Part No. P-19442 (was .058"), Power By-pass Jet—#58 Part No. 382675 (was #54 No. P-21197), Vacuum Piston Assembly—No. P-24201 (was No. P-24043).

►**Dodge 1941 BXVD-3 Economy Complaints on First Cars**—On these cars with first BXVD-3 carburetors Code 3-59 (Domestic), 3-60 (Export); new Main Metering Jet, Power By-pass Jet, and Vacuum Piston Assembly (same as listed above for later 3-59B and 3-60B carburetors) may be installed for increased economy. Refer to Servicing data below. Change does not apply to BXV-3.

►**Dodge & Plymouth 1947-48 BXV-3 Carburetor Production Change**—New type Pump Link 384390, & Pump Link Clip 384391, used on late carburetors, furnished in Repair Kits for use in servicing earlier carburetors (supersedes Pump Link No. P-24836 & Cotter Pin No. P-19374). Install these parts as follows: Install pump link with open end in toward carburetor casting engage center loop of clip on center of pump link, with loop on upper end of clip encircling upper leg of link in back of pump rod, and lower end of clip in back of pump lever on throttle shaft.

►**Dodge & De Soto 1947-48 BXVD-3 Carburetor Production Change**—Parts listed below were used on late production carburetors and are furnished in regular Repair Kits for installation on earlier carburetors:

Pump Link & Retainer—Same as production change on BXV-3 (see above for part numbers and installation data).

Dash Pot Lever Torsion Spring—A Torsion Spring, No. 384614, and special Throttle Shaft Nut, No. 384613, have been added and should be installed on earlier carburetors. Spring is held in position by the nut and spring ends should be looped under dash pot lever and pump lever.

Dash Pot Rod Clevis Clip—New type clip, No. 384618 used to retain dash pot rod in dash pot lever. This clip supersedes No. 382745 Torsion Spring used for this purpose on earlier carburetors.

►**Dodge 1948-51 Canadian BXVD-3 No. 380253 Carburetor Production Changes:** Later Code 3-97A and succeeding carburetors have various parts changes from first Code 3-97 carburetors as listed below. **Correct type parts must be used on each carburetor.**

Carburetor:	Code 3-97	Code 3-97A	Code 3-97B & Later
Main Body Assembly	385057	385386	①
Main Body Gasket	P-24037	385384	385384
Throttle Body Assy	382902	385387	385387
Main Body Insulator Spacer	384677	385385	385385
Vacuum Power Piston	P-24201	P-24201	①385527

①—See Main Body & Vacuum Power Piston Change (above).

►**Dodge 1949-51 BXVD-3 No. 380249 Carburetor Production Changes:** Later Code 3-93A and succeeding carburetors have various parts changes from first Code 3-93 carburetors as listed below. **Correct type parts must be used on each carburetor.**

Carburetor:	Code 3-93	Code 3-93A & B	Code 3-93C & Later
Main Body Assembly	385057	385386	①
Main Body Gasket	P-24037	385384	385384
Throttle Body Assy	382902	385387	385387
Main Body Insulator Spacer	384677	385385	385385
Vacuum Power Piston	P-24201	P-24201	①385327

①—See Main Body & Vacuum Power Piston Change (above).

►**Dodge 1949-51 BXVES-3 No. 380251 Carburetor Production Changes:** These carburetors have various parts changes as listed below. **Correct type parts must be used in each carburetor.**

Carburetor	Code 3-95, 3-95A & B	Code 3-95C & D
Main Body Assembly	385166	385372
Main Body Gasket	P-24037	P-24037
Vacuum Power Piston	P-24201	P-24201
Contact Piston Spring	385162②	③385155
Terminal Block Assy	385133④	④385133

Carburetor:	Code 3-95E	Code 3-95F & Later
Main Body Assembly	385372	①
Main Body Gasket	385390	385390
Vacuum Power Piston	P-24201	①385527
Contact Piston Spring	385155③	③385155
Terminal Block Assy	385438	385438

①—See Main Body & Vacuum Power Piston Change (above).
②—Marked by Blue color. See Kick-down Switch Change (following).
③—Not colored. May be identified by free length of 1⅜'.
④—Includes No. 903899 Wire Clamp Screw & No. 384450 Lockwasher.

►**Dodge 1949 BXVES-3 Carburetor Kick-down Switch Change for Improved Transmission Performance**—On first Code 3-95 & 3-95A carburetors, original No. 385146 Kick-down Switch Contact Piston Spring should be replaced by

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STROMBERG MODELS BXV-3, BXVD-3, BXVES-3 (C nt.)

No. 385162 spring which is colored with Blue dye for identification. This new spring raises kick-down speed limit to 35-43 MPH. (was 40 MPH.). When this change made, stamp letter "B" next to stamped code no. 3-95A on bowl cover near fuel inlet (this spring used in regular production on Code 3-95B carburetors).

►*CAUTION—Do not use this No. 385162 spring on Code 3-95C and later carburetors (have new uncolored spring with free length of 1 3/8").*

►**Dodge 1950-51 Canadian BXVES-3 No. 380268 Carburetor Production Change:** Later 3-103A and succeeding carburetors have new type Main Body Casting and new Vacuum Power Piston. *See Main Body & Vacuum Power Piston Change (above).*

DESCRIPTION

DESCRIPTION: Single barrel, plain tube, downdraft type, throttle operated accelerating pump and vacuum controlled economizer. BXVD-3 carburetors have special "Slow-Closing Throttle." BXVES-3 carburetors have this same Slow-Closing Throttle and also have special "Kick-down Switch" for automatic transmission control.

Slow-Closing Throttle (Dashpot)—Consists of a dashpot and piston in float bowl and linked to the throttle lever with an adjusting screw on the control lever under the float bowl. Dashpot on BXVES-3 carburetor has solenoid control of the dashpot outlet check valve (cuts out dashpot action at speeds above 8-15 MPH.). *See Slow-Closing Throttle adjustment data below and "Dodge Slow-Closing Throttle" in Carburetion Equipment Section for complete data.*

Kick-down Switch—Built-in grounding switch on carburetor operated by throttle lever (lug on lever depresses switch plunger when throttle valve wide open). Used for automatic transmission control. *See Transmission Control Kick-down Switch adjustment data below and "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section for complete data.*

Fuel System (Idling and Low Speed):—Fuel for idling taken from main jet well up through Idling Tube which meters the fuel to a cross-channel in which it is mixed with air admitted through Idle Air Bleed (air bleed passage opens into carburetor barrel below choke valve). Fuel mixture then taken down through channel to discharge ports at the throttle edge. For closed throttle idling, fuel discharged through lower port below throttle valve and controlled by idle adjusting screw. When throttle cracked open for low speed running, additional fuel is discharged through upper idle port also.

Driving Range (Below 65 MPH.)—As throttle is opened, suction increases on main discharge jet and this jet supplies fuel, the idling system dropping out. Fuel for main discharge jet is metered by main metering jet located at lower end of discharge jet. Discharge jet is air bled by High Speed Bleeder.

High Speed and Wide Open Throttle Operation—At speeds above 65 MPH. or whenever throttle held wide open so that manifold vacuum falls off, spring on vacuum piston forces piston down and opens by-pass valve. Fuel metered by the by-pass jet then flows directly to the main discharge jet.

ADJUSTMENT & OVERHAUL

IDLING ADJUSTMENT: Adjusting screw controls fuel discharge from lower idle port and should be turned in for leaner mixture, out for richer mixture. Adjust only with engine warmed up so that choke valve wide open and fast idle inoperative. Recheck idle speed after adjustment completed. See car model page for complete tune-up instructions.

IDLE SETTING

Car Model	Idle Screw Setting	Idle Speed
Dodge, DeSoto, Plymouth	①	6 MPH.
Dodge (Auto. Trans.)	①	450-475 RPM.

①—Midway between "rich" and "lean" points.

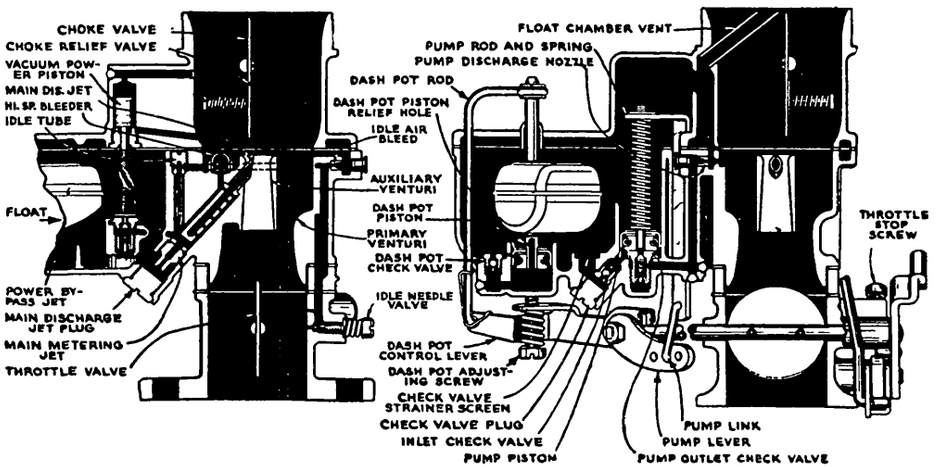
METERING JET: Main metering jet is non-adjustable and should be changed only for special operating conditions such as high altitude. See Stromberg Jet Specification table for complete jet data.

ECONOMIZER: Vacuum piston type. Consists of vacuum piston in cylinder in the air horn casting which controls the by-pass valve and jet assembly in the main body casting. No adjustment required.

ECONOMIZER SETTING

Car Model	Carburetor	Valve Opening (" of HG)
Dodge ('39-41)	BXV-3, BXVD-3	4-6" (65-70 MPH)
Dodge ('42-48)	BXV-3	4-6" (65-70 MPH)
Dodge ('42-47)	BXVD-3	3-4" (65-70 MPH)
Dodge ('47-53)	BXVD-3, BXVES-3	3-5" (65-70 MPH)
De Soto ('47-48)	BXVD-3	3-5" (65-70 MPH)
Plymouth ('47-48)	BXV-3	4-6" (65-70 MPH)

ACCELERATING PUMP: Operated by the throttle lever through a pump rod under float bowl cover. Fuel is drawn into pump chamber through strainer screen and inlet ball check valve and is discharged through outlet valve and pump discharge nozzle located in side of mixing chamber above main venturi when throttle opened for acceleration.



ACCELERATING PUMP SETTING

Car Model	Pump Capacity	Pump Setting
Dodge, De Soto, Plymouth	11-14 cc. (10 slow strokes)	Medium

NOTE—Pump travel will be 1/4-9/32".

Adjustment—Three holes provided in throttle lever for pump link connection. Link engaged in center hole provides normal setting, outer hole (long radius) provides maximum pump discharge, inner hole (short radius) minimum discharge. See car model page for settings and seasonal changes.

Pump Servicing Note—Strainer screen located in pump inlet in bottom of float bowl should be cleaned frequently to insure satisfactory pump performance.

FAST IDLE: Consists of a cam directly below the throttle lever shaft and linked to the choke valve. Cam serves as stop for throttle lever stopscrew and opens throttle to fast idle position when choke valve is closed for starting. No adjustment (stopscrew should be at high point of cam with choke valve closed).

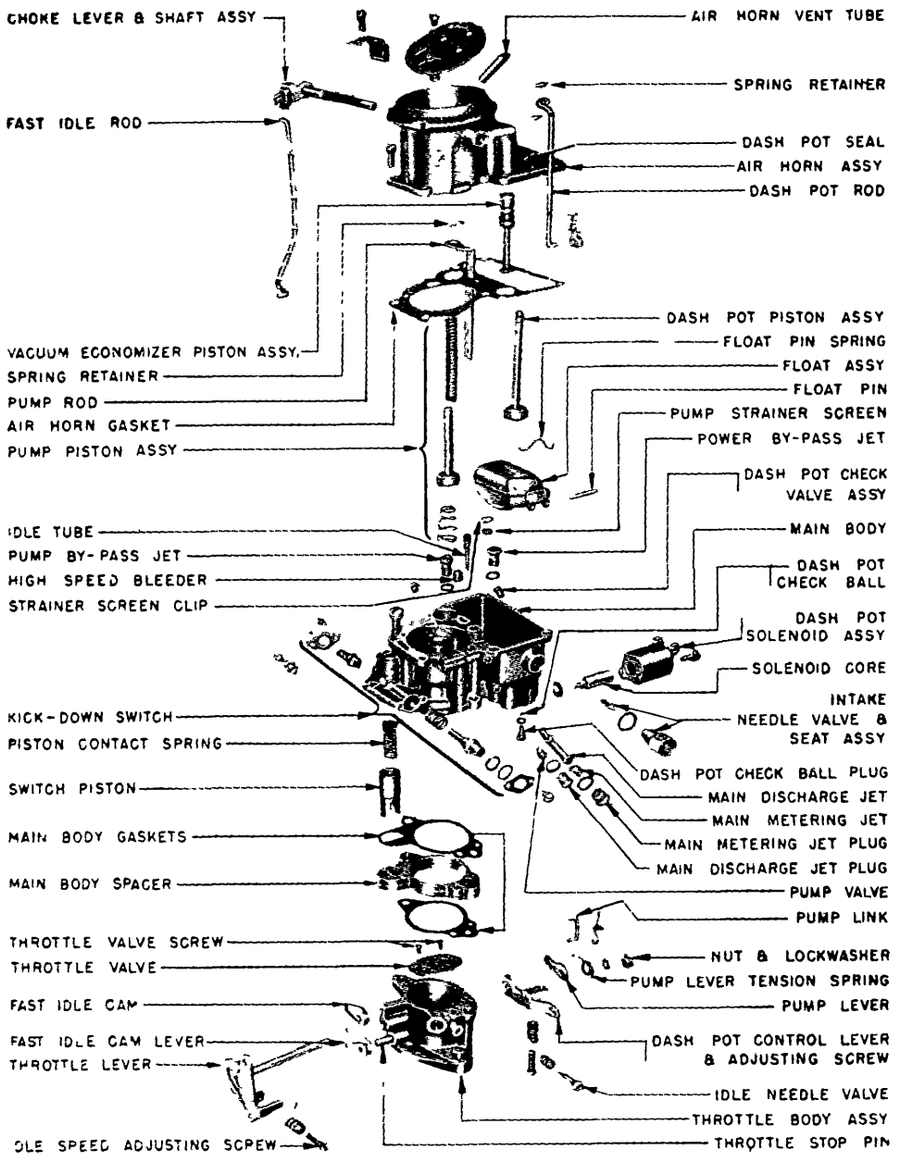
SLOW-CLOSING THROTTLE (BXVD-3 & BXVES-3): Dashpot piston assembly in the float bowl with the piston linked by a rod to a control lever which engages the throttle valve lever. When the throttle is opened, dashpot cylinder is filled with fuel which flows freely in through dashpot check valve. When the accelerator pedal is released (to close throttle), this fuel is trapped in the cylinder and escapes through relief hole in piston stem, retarding piston movement, and preventing throttle closing too rapidly.

See "Dodge Slow-closing Throttle" in Carburetion Equipment Section.

Setting: Full travel of dashpot piston 5/16-11/32" (BXVD-3), 13/32-7/16" (BXVES-3) with all slack removed from linkage. To check travel, place scale on float bowl cover at dashpot piston stem, measure distance from bowl cover to edge of retainer on stem, then open throttle and recheck distance. Difference in readings is piston travel (above).

Adjustment—Turn adjusting screw on dashpot control lever under float OUT to lengthen stroke, IN to shorten stroke.

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STROMBERG MODEL BXVES-3 CARBURETOR (BXV-3 & BXVD-3 SIMILAR)

STROMBERG MODELS BXV-3, BXVD-3, BXVES-3 (C nt.)

KICK-DOWN SWITCH FOR TRANSMISSION CONTROL (BXVES-3): Consists of vacuum-controlled, throttle operated, grounding switch.

See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.

Kick-down Switch Production Change—See Production Change Notes (preceding) for 1949 Code 3-95 & 3-95A carburetors.

Setting—5/32" minimum travel of switch plunger when carburetor throttle valve in wide open position. Plunger should have minimum of 1/64" over-travel in this position.

Adjustment—Bend tang or ear on throttle lever which contacts switch plunger for proper travel.

FLOAT LEVEL: Fuel Level—Should be 5/8" below top edge of float bowl (gasket removed) with 3 lbs. fuel pressure. Measure with depth gauge. Adjust by bending float lever arm using Tool T-24733.

Needle Valve & Seat Assembly—Furnished only in matched sets as follows:

Dodge—(1939) No. 24063, (1940-41) No. P-24827—.086" Intake Hole, (1942 380079 & 380080) No. 382901—.093" Intake Hole), (1942-47 380158 & 380159) No. P-21918 .093" Intake Hole. (1947-53 No. 380218 and later Carburetors) No. 384956 with .093" Intake Hole.

De Soto & Plymouth—(1947-48) No. 384956—.093" Intake Hole.

CAUTION—Valve spring clip must be engaged in notches on float fulcrum pin.

CHOKE: Choke valve is offset type with poppet type relief valve.

Automatic Choke—Sisson. See article in Carburetion Equipment Section.

THROTTLE VALVE SETTING: Valve is No. P-24059—20° type. To check the valve setting, back stopscrew off so that valve closed tightly, insert #58 drill in idle port, two #60 drills (1939-48), #58 drills (1949-53), in vacuum spark ports. Throttle valve should be flush with drills (.006" maximum clearance between valve and idle port drill).

DISASSEMBLY OF CARBURETOR: Disconnect fast idle rod. On the BXVD-3 only, disconnect dashpot piston connector rod. Take out retaining screws, remove bowl cover and air horn assembly. Free clip on float hinge pin (clip will spring out when released), take out hinge pin, remove float and needle. Disconnect accelerating pump link, withdraw pump rod and piston assembly, remove pump outlet check valve (in bottom of pump cylinder). Remove economizer valve assembly. Remove main discharge jet plug (use T-19099 screwdriver). If main metering jet and main discharge jet to be removed (can be cleaned with air without being removed) use special tool T-24924 (to remove metering jet), T-24967 (to remove discharge jet). To remove vacuum economizer piston, use tool T-24733 and engage tool prongs in slot in piston retainer.

Servicing—Clean all jets with gasoline or use denatured alcohol to dissolve gum deposits (do not attempt to clean jets with wire or drill rods). Blow out all jets and passages in carburetor with air.

REASSEMBLY OF CARBURETOR: Use new gaskets (see Parts List), assemble carburetor by reversing disassembly directions. Check and adjust float level, accelerating pump setting, throttle valve setting, dashpot or slow closing throttle setting (BXVD-3 & BXVES-3), kick-down switch setting (BXVES-3). After carburetor installed on engine, adjust idle mixture and idle speed.

SERVICE PARTS: Gasket Sets. Stromberg No. J-5968-G (All BXV-3 & BXVD-3 carburetors except following), No. 382369 (BXVD-3 No. 380249 Code 3-93A and later carburetors). No. 382369 (BXVD-3 No. 380253), No. 382371 (BXVES-3 No. 380251, 380268, 380331 carburetors).

Repair Parts Kits (incl. Gaskets): Stromberg No. RK-16 (A-18073), No. RK-75 (A-18123, A-18133), No. RK-118 (380044), No. RK-119 (380045), No. RK-120 (380089), No. RK-121 (380079), No. RK-130 (380158), No. RK-131 (380159), No. RK-139 (380219 & 380220), No. RK-143 (380218 & 380852), No. RK-148 (380249 Code No. 3-93 only), No. RK-159 (380249 Code No. 3-93A & later carbs.), No. RK-149 (380251 & 380331), No. RK-150 (380253), No. RK-161 (380268).

DODGE SLOW-CLOSING THROTTLE
(STROMBERG CARBURETOR TYPE)

Car Model Used n following Models with Fluid Drive	Carburetor
D Soto, Model S11S, S11C (1947-48)	Stromberg BXVD-3
Dodge, Deluxe & Custom Model D24 (1946-48)	Stromberg BXVD-3
Dodge, All Models (1949-52) Std. Trans.	Stromberg BXVD-3
Dodge, All Models (1949-53) Auto. Trans.	Stromberg BXVES-3

►**Slow-Closing Throttle Note:** Two different types used. The type used on BXVD-3 carburetors does not have solenoid controlled check valve and operates whenever throttle is closed regardless of car speed. The solenoid controlled check valve on BXVES-3 type is controlled by the transmission governor and cuts out the slow-closing feature at higher car speeds as described below.

DESCRIPTION & OPERATION: (BXVD-3). Slow-closing throttle consists of a dashpot and piston assembly in the float bowl with the piston linked by a rod to a control lever which engages the throttle valve lever. When the throttle is opened, dashpot cylinder is filled with fuel which flows freely in through dashpot check valve. When the accelerator pedal is released (to close throttle), this fuel is trapped in the cylinder and is allowed to escape slowly through the relief hole in the dashpot piston stem above the piston. This action retards the movement of the piston and linkage toward the closed throttle position and the linkage prevents the throttle valve closing too rapidly.

(BXVES-3)—Operates similarly to BXVD-3 type (above) at low car speeds but has solenoid control of an outlet ball check valve (in addition to regular bleed passage with fixed orifice). At car speeds below 8 MPH. (Low Range), 15 MPH. (High Range), with governor contacts closed, solenoid is energized and holds check valve ball on its seat so that all fuel in dashpot cylinder is forced to escape through the fixed-orifice bleed passage to secure the slow-closing throttle feature. At speeds above 8 MPH. (Low Range) or 15 MPH. (High Range), with governor contacts open, solenoid is not energized and check valve is open. Fuel in dashpot cylinder is then free to escape through this check valve in addition to the regular bleed passage and no slow-closing throttle action results.

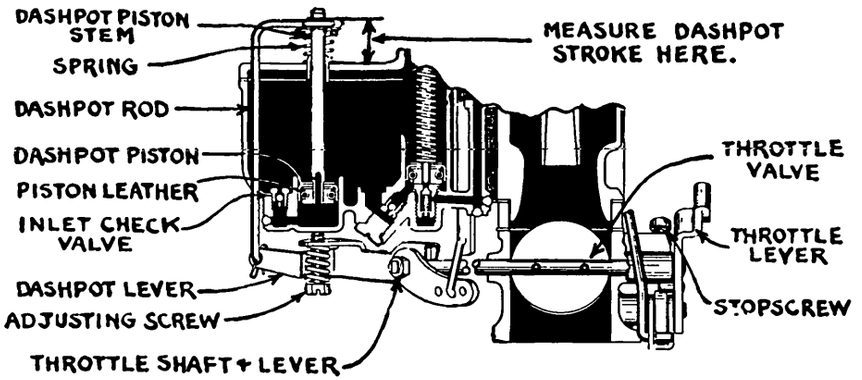
CHECKING & ADJUSTMENT: To check dashpot travel, place rule on float bowl cover at dashpot piston stem, measure distance from bowl cover to edge of retainer on stem with throttle valve closed. Open throttle wide, remove all slack from dashpot linkage, repeat measurement. Difference in these two readings is DASHPOT TRAVEL (see setting below).

DASHPOT PISTON TRAVEL SETTING

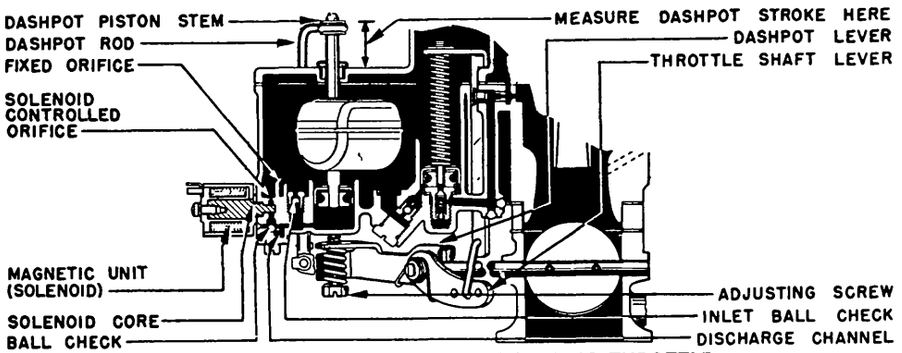
BXVD-3 Carburetors—5/16-11/32". **BXVES-3 Carburetor**—13/32-7/16".

Adjustment—Turn adjusting screw on dashpot control lever under float bowl IN to shorten travel setting or OUT to lengthen travel setting.

SERVICING: *No special service operations required. See "Stromberg BXV-3, BXVD-3, BXVES-3 Carburetor" in Carburetor Section for complete disassembly and overhaul data.*



STROMBERG BXVD TYPE SLOW-CLOSING THROTTLE



STROMBERG BXVES TYPE SLOW-CLOSING THROTTLE

STROMBERG 4-BARREL 4A

BUICK	Stromberg Model & Code No.
1952 Series 70 . . .	①Code 7-92 & 7-92B
1953 Series 70	①Code 7-94 & A, B, C
1954 Series 60, 70, M/100	Code 7-98

①—See Changes and Corrections below.

▷CHANGES & CORRECTIONS

▷*1952 BUICK CODE 7-92 CARBURETOR CHANGE TO SHORTEN CRANKING TIME WITH HOT ENGINE: The following modifications can be made on first Code 7-92 Carburetors (CAUTION—Later Code 7-92B carburetors have similar change made in production and do not require this rework):*

1) With carburetor off engine, remove air horn and float bowl cover assembly, remove float asemblies from cover.

2) Working from bottom side of cover, use a No. 22 (.157") drill (⅛" drill can be used) and drill four holes through air horn rim and cored passages (on choke housing side of casting, holes should be to right and left of center dividing wall in cover and in line with passage in this wall; on opposite side of casting, holes should be in cored passages and all holes should open on upper or air cleaner face of air horn immediately adjacent to edge of air intake).

3) With air horn upright, drill external vents as follows: On side opposite Choke Housing: On primary (left hand) side, use No. 36 (.1065") drill (7/64" drill can be used) to drill into the vertical #22 vent passage locating the hole 5/16" up from the top face of the air horn flange and in line with the existing vent hole at the upper end of the vent passage, plug this original vent hole using a suitable ⅛" lead plug. On the secondary (right hand) side, drill into the vertical vent passage similarly (5/16" up from top of flange) using a No. 42 (.0935") drill (3/32" drill can be used). On Choke Housing Side: On secondary side, drill a No. 42 hole into the vertical #22 vent passage locating the hole directly below the horizontal fuel channel in the casting. Plug the existing vent hole (above and to right of new hole location) using a ⅛" lead plug. On primary side, drill a No. 36 hole into the #22 vertical vent passage locating the hole directly below the vacuum passage boss below the vacuum piston cylinder.

4) Carefully clean air horn and bowl cover casting, reassemble floats and re-install assembly.

5) Remove throttle body assembly from carburetor, use a No. 36 (.1065") drill (7/64" drill can be used) to drill an external vent hole into each of the four carburetors barrels, locating holes as follows: All holes should be ½" down from upper (main body mounting) face of throttle body Primary Side Holes should to toward outside or away from secondary barrels, Secondary Side holes should be toward inside or toward primary barrels and adjacent to vertical passages in casting. Carefully clean throttle body and re-install.

6) Adjust carburetor. *See ADJUSTMENT below.*

▷*1953 BUICK ACCELERATION HESITATION CORRECTION (Early Cars):* If a cold engine tends to *(First Engines):* If a cold engine has tendency to hesitate on quick throttle opening, completely tune-up engine using extreme care that all settings are correct and exact, check manifold heat control thermostatic spring, and operation of carburetor hot-air stove. *See Buick 50, 70 Tune-up data in Car Model Section.*

▷*1953 BUICK 70 CHANGE TO ELIMINATE DETONATION OR SPARK RAP (First Code 7-94 & 7-94A Carburetors).* Increase size of vacuum spark control port from .040" to .081" as follows: Remove carburetor from engine, remove carburetor throttle body (see OVERHAUL data below for disassembly). Turn idle speed adjustment screw out or counter-clockwise until primary throttle valves seat tightly. Using a long shank No. 50 drill, and working from inner side of throttle valve bore (directly above throttle valve edge), enlarge original spark control hole. Drill hole out further with No. 47 long shank drill, finally finish drill the hole with a No. 46 (.081") drill. *CAUTION*—Drilling hole out in steps as directed above will prevent gouging of throttle valve and insure accurate sizing of spark control hole. Blow out all chips and thoroughly clean throttle body, reassemble carburetor and re-install on engine. Reset idle speed at 450 RPM. with warm engine.

▷*1953 BUICK 70 IMPROVED WARM-UP & STALLING ELIMINATION (First Code 7-94 & 7-94A Carburetors):* Make following Automatic Choke and Fast Idle Cam changes:

1) Automatic Choke—Enlarge heat hole in choke housing (from No. 60 drill size to No. 55 drill size) and drill No. 70 hole in head of choke piston as follows: Remove air horn and float bowl cover assembly from carburetor, remove float assembly (to prevent damage to floats), remove thermostatic coil and cover assembly. Remove locknut, lockwasher, and serrated washer from choke valve shaft, remove vacuum piston, link, and lever assembly from housing. Using a No. 70 (.028") drill, drill a hole through the center of the head of the vacuum piston. Using a No. 55 (.052") drill, enlarge the original No. 60 drill hole in center of brass bushing in choke housing (on left side facing open end of housing with choke setting indicator boss upward). Re-install choke piston and adjust piston lever position on choke shaft. *See "Choke Piston Setting Adjustment" under ADJUSTMENTS below.*

2) Fast Idle Cam Setting—Check and adjust Fast Idle Cam using a No. 41 drill rod as a setting gauge (changed from No. 26 drill), check and adjust "Start Aid" (Loose Lever and Lock Lever Clearance). *See "Fast Idle" under ADJUSTMENTS below.*

3) Unloader (Wide-open Kick & Deflooder) Setting —Check and adjust unloader. *See "Unloader" under ADJUSTMENTS below.*

▷*1953 BUICK SERIES 70 HARD COLD STARTING & WARMING UP PERFORMANCE CORRECTION (Stromberg 4A Carburetor):* This condition noted by excessive cranking time when starting, and stalling when stopping or stumble on acceleration during warming up period. Correct by making the changes detailed below. *NOTE*—All parts for this change furnished in Service Kit, Buick No. 1391946.

1)—Remove carburetor from engine. Remove and discard Thermostat Cover & Coil Assembly. Remove choke stem nut and serrated washer. Remove and discard Choke Piston.

2)—Remove brass reducer from passage inside choke housing by drilling reducer with a #30 drill and using tool T-24967 or "easy-out" tool to remove reducer. Discard reducer.

3)—Remove and discard drive plug from outer end of channel directly below vacuum piston cylinder in choke housing. Use a special length #42 drill (T-25086 drill, 3¼-3½" long, ground for brass) in a pin vise to drill out the restriction in this channel inserting drill through drive plug end of channel and drilling until drill breaks through at point where brass reducer removed from within choke housing. *CAUTION*—On some Code 7-94 & 7-94A carburetors, a small reducer was located approximately 1½" in from drive plug end of channel. Use care when drilling through this reducer and if it is moved out of position by drill, re-install reducer with a drift pin. Blow out all chips from drive plug end of channel *(CAUTION*—do not blow from choke housing end of channel).

4)—Remove air horn from carburetor (see Disassembly under OVERHAUL below). Remove float assemblies. Remove and discard SECONDARY float needle valve, pin, spring, seat, and gaskets. Install NEW secondary needle valve seat and gaskets (gasket above and below float hanger), tighten seat to approximately 75 in. lbs., using tool T-20140. Check primary needle valve seat to make certain it is tightened to same torque.

5)—Assemble intake needle parts and install floats *(CAUTION*—Primary float marked "522", secondary float marked "520").

6)—Check and adjust Float Level to NEW settings of: Primary—#46 Drill or 5/64". Secondary—#52 Drill or 1/16". *NOTE*—This float setting is same as used on 1954 Code 7-98 carburetors. See Float Setting below.

7)—Check Idle Tubes for looseness. Retighten wedges or re-install tubes, using new wedges. *See Idle Tube Removal & Installation under OVERHAUL below.*

8)—Re-install air horn on carburetor body. Install NEW brass plug in choke housing and NEW aluminum drive plug in outer end of channel.

9)—Install NEW choke piston, serrated washer, lock washer, and nut, using tool T-25047. NOTE—No adjustment necessary with new piston.

10—Install NEW Thermostat Cover & Coil Assembly (marked "30") and adjust for centered setting (inverted "V" mark on cover in line with end of projection on cover).

11)—Make carburetor adjustments, setting the carburetor to the following specifications:

Fast Idle—Use #41 drill to check choke opening when adjusting fast idle rod, use #53 drill when checking loose lever and lock lever clearance.

Unloader—Use #2 drill to check choke valve opening with throttle valve wide open.

Lock-out Slide—Locked clearance should be .025" min., .060" max. (1/32"-1/16"), unlocked clearance should be 3/64" min., 5/64" max.

12)—Remove PRIMARY main discharge jet plugs, remove and discard primary main metering jets. Install NEW .049" jets (Part No. P-19442), reinstall main discharge jet plugs and tighten securely.

13)—Check Starting Switch adjustment. With switch operating lever just contacting switch slide, throttle valve opening or clearance between edge of valves and barrel should be within .100" to .110" (#39 and #41 drill).

14)—Stamp new Code No 7-94D on carburetor.

DESCRIPTION: These models are essentially double dual (two-barrel) carburetors with a conventional dual primary unit supplemented by a similar dual secondary unit for maximum engine performance. Both the primary and secondary units have separate fuel bowl and float systems, idle systems, main

CONTINUED ON NEXT PAGE

STROMBERG 4-BARREL 4A (Continued)

metering and discharge systems, and interconnected throttle valves as described below. Only the primary unit has an accelerating pump system and choke valve with an automatic choke control (the auxiliary throttle valves are locked closed for starting and warming up and remain closed during part-throttle operation). *See Throttle Linkage data below.*

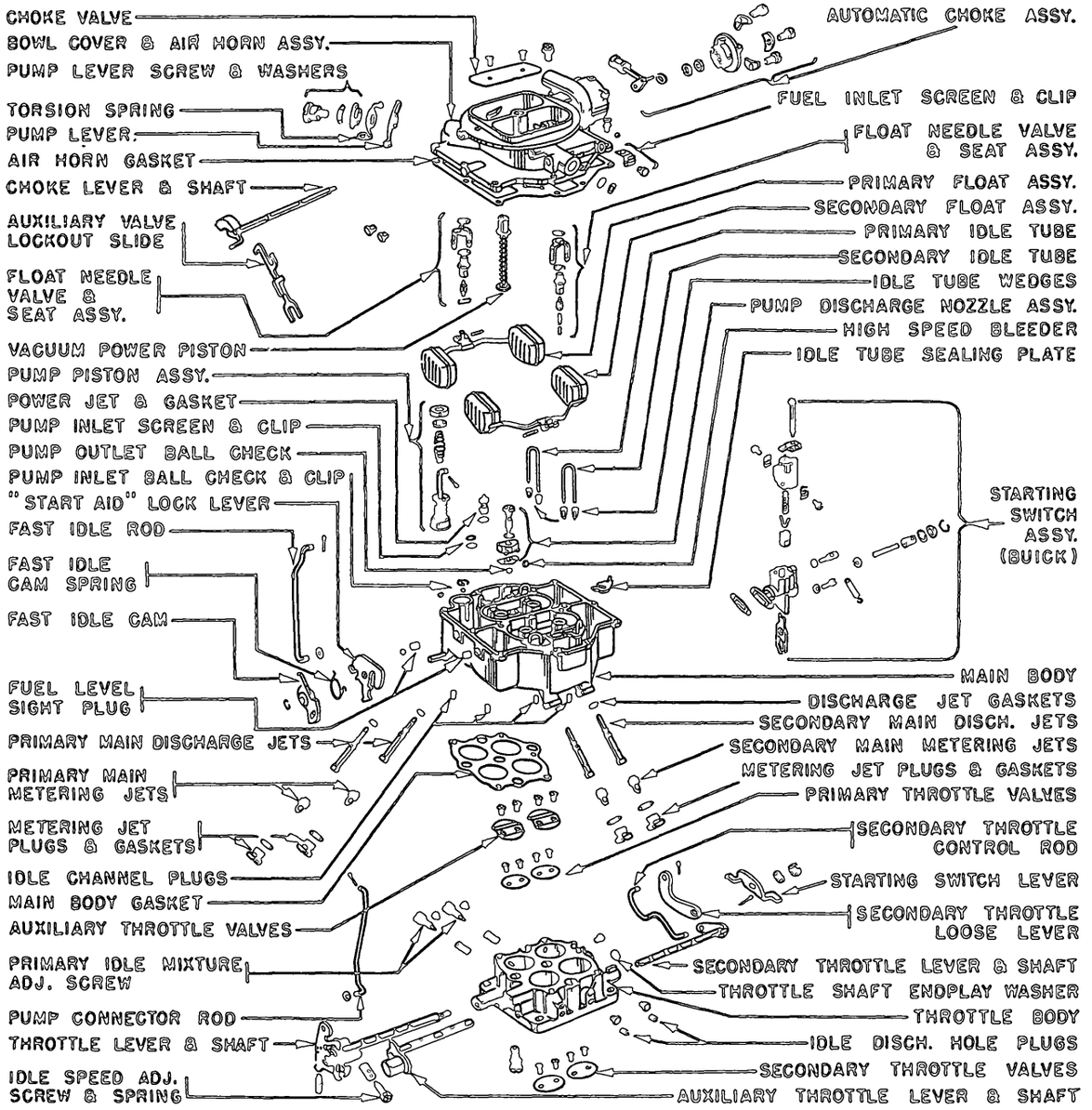
Fuel System: A single fuel inlet is used (located on secondary side of bowl cover) with a passage in the cover leading to the fuel inlet valve for each float chamber. Each bowl has a twin float assembly controlling the fuel inlet valve (secondary inlet valve is "spring-loaded" type). Bowls are vented to the air horn by vent tubes and have additional vent passages terminating at the air cleaner mounting flange (also have external vents in bowl cover). *See also Idle Vent data below.*

Idling & Low Speed—Entire idle system is duplicated for both the primary and secondary sides of the carburetor except that idle mixture adjusting screws are provided only on the primary side (adjusting screw holes closed by plugs on secondary side). Fuel is discharged into each carburetor barrel and secondary idle system continues to function throughout the part-throttle range until the secondary throttle valves begin to open. Primary idle systems drop out as primary throttle valves open and main nozzles come into action and take over. Auxiliary throttle valves are locked out by the choke mechanism when the engine is cold and even when the engine is warm these valves do not begin to open until primary throttle valves are 50-60% open.

Driving Range (Less than 50-60% Throttle)—The primary throttle valves are directly connected to the accelerator pedal and open as the pedal is depressed (secondary throttle valves are linked to the primary throttle valves and remain closed until primary valves are 50-60% open). Opening of the primary throttle valves bring the main discharge nozzles into action and the primary idle systems drop out (the secondary idle systems continue to function as long as the secondary throttle valves remain closed). Fuel for these main nozzles is metered by the primary main metering jets. Under conditions of low manifold vacuum (hill-climbing, acceleration, etc.), main metering jets are supplemented by fuel by-passed through the power valve and metered by the power restriction (separate valves operated by a spring-loaded vacuum power piston). Power valve is used only for the primary side of the carburetor.

High Speed or Full Power (More than 50-60% Throttle)—At 50-60% throttle, the linkage between the primary and secondary throttle valve levers begins to open the secondary valves. These secondary valves open at a relatively greater rate so that both the primary and secondary valves reach the "wide open" position at the same time. In this range, fuel is discharged through all four carburetor barrels to provide maximum engine power. Secondary fuel is metered by secondary main metering jets and discharged through secondary main nozzles in exactly the same manner as on the primary side except that no power valve is used.

Accelerating Pump—Used only on primary side of carburetor. Pump is conventional type with pump plunger linked to primary throttle valve lever so that the additional fuel needed for acceleration is discharged through the pump jets into the primary carburetor barrels when the primary throttle valves are opened for acceleration. A relief check valve is located in the pump discharge channel to prevent excessive pressures in the pump circuit (opening of the check valve permits fuel to be by-passed back into the bowl).



STROMBERG "4A" 4-BARREL CARBURETOR

Auxiliary Throttle Valves (Buick Carburetors): These are offset type counterweighted valves located directly above the secondary throttle valves (not used on primary side of carburetor). These valves are locked closed by the choke mechanism during choke operation (to insure faster cold engine starting) and when unlocked are controlled entirely by the air velocity through the carburetor (not connected to the throttle linkage).

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STROMBERG 4-BARREL 4A (Con.inued)

Primary & Secondary Throttle Linkage: Secondary throttle valve lever is linked to a secondary actuating lever on the primary throttle valve shaft with an overrun provision so that secondary valves do not begin to open until primary valves are 50-60% open. The linkage provides a more rapid opening of the secondary valves so that both the primary and secondary valves reach the wide open position at the same time. This linkage must be checked and adjusted to insure this synchronized opening. *See Adjustment data.*

Auxiliary Throttle Valve Lock-out: A means is provided by which the choke mechanism locks the auxiliary throttle valves closed while the choke is in operation so that no choke valve is required on the secondary side of the carburetor. This lock-out mechanism must be checked and adjusted to insure unlocking of the secondary valves for normal operation. *See Adjustment data.*

ADJUSTMENT: *CAUTION—Adjustments must be made in exact sequence as given below (except for Idle Mixture and Idle Speed Tune-up adjustments).*

Idle Setting. *Adjust only with engine at normal operating temperature with automatic choke not operating* (choke valve wide open, fast idle inoperative so that engine idles at hot or slow idle speed). If initial adjustment required to enable engine to be started and warmed up, set each screw 1 turn open. With engine warm, adjust idle speed adjusting screw for correct idle speed shown in table below (use tachometer), turn each idle mixture adjusting screw (one screw for each primary carburetor barrel—two screws only) in until engine begins to miss or run unevenly, then turn screws out until engine begins to roll, finally set screws midway between these two points so that engine idles smoothly. Recheck idle speed.

IDLE SETTING

	Idle Screw Setting	Idle Speed
Buick 70	1 1/8 turns open.	450 RPM.

Float Setting: *CAUTION—Primary and Secondary float assemblies must be checked and adjusted separately.* Fuel level can be checked without disassembling carburetor, float level setting requires removal of bowl cover and float assemblies.

Fuel Level—*CAUTION—Primary and Secondary fuel levels are different.* Fuel level in each bowl should be even with bottom of threads in fuel level inspection holes on sides of bowl casting with 5 lbs. fuel pump pressure. Fuel level distance below top edge (gasket seat) of bowl should be 11/16" (Primary), 5/8" (Secondary). See Float Level data for adjustment.

Float Level—*CAUTION—Secondary float intake needle is spring-loaded type and spring must not be compressed when checking float setting.* Remove air horn and bowl cover assembly but DO NOT remove bowl gasket from bowl cover. Invert bowl cover, install Float Setting Gauge No. T-25489 on bowl cover gasket under floats with locating buttons on gauge fitting into two holes along center line of gasket and air horn *(CAUTION*—gauge must seat flat and solidly on gasket). Inner side of each float should just clear upright guide on gauge and be parallel to the guides (floats should move freely with gauge in place). This will insure floats not dragging on sides of bowl in service. Adjust by bending float arm. Check height of each float by using correct size drill rod (see table below) to gauge distance between top of float at center and face of gasket. Adjust by bending float lever. *CAUTION—Both floats of each set must be adjusted exactly alike.*

FLOAT SETTING

Primary Floats

Carb. Code	Float Level	Drill Size
7-92 & 7-92B	3/64"	#56
7-94, A, B, C	5/64"	
7-98	5/64"	#47

Secondary Floats

Carb. Code	Float Level	Drill Size
7-92 & 7-92B	1/32"	#68
7-94, A, B, C	1/16"	
7-98	1/16"	#52

►*FLOAT ASSEMBLY CAUTION*—Different float assemblies and intake needle valve and seat assemblies used on primary and secondary sides af carburetor. Floats can be identified by "marking" figure on float lever as follows:

	Float Assy. Marking	Part No.	Intake Valve & Seat Size	Part No.
Primary	522	385959	.101".	P-22499
Secondary	520	385998	.076".	③385945

③—SPRING-LOADED type needle valve.

Accelerating Pump: Recommended setting is Short Stroke (pump rod connected in inner hole in throttle lever). Not necessary to check pump stroke.

Automatic Choke: Centered (inverted "V" mark on cover in line with end of projection on cover). Thermostat and Cover Assembly stamped "23" (1952-53), "30" (1954). Do not use any other number.

►*ADJUSTMENT CAUTION*—Heat tube connection and cover retainer screws must be loosened for adjustment. Use extreme care not to rotate or distort cover when tightening heat tube connection.

Fast Idle: *CAUTION*—Fast Idle Cam Setting should be checked first before making regular fast idle adjustment (Loose Lever & Lock Lever Clearance).

Fast Idle Cam—Remove air cleaner for access to choke valve. Close the choke valve against correct size drill rod (see table for sizes and changes) placed between center of upper edge of choke valve and air horn wall, hold choke valve firmly against drill. Make certain that fast idle cam spring holds cam up against end of fast idle rod, close throttle until stopscrew contacts fast idle cam. Stopscrew should just clear edge of highest step on cam and come up against second step. Adjust as required by bending fast idle rod at the large curve.

Fast Idle Setting

Carb. Code	Drill Size & Choke Clearance
7-92 & 7-92B	#26 drill (.147")
7-94, A, B, C	①#41 drill (.096")
7-98	#51 (.067")

①—See Note following

►*FAST IDLE CAM SETTING NOTE*—Use of #41 drill rod (above) is part of recommended "Improved Warm-Up & Stalling Elimination" change on first 7-94 and 7-94A carburetors.

Loos Lever & Lock Lever Clearance—After adjusting fast idle rod above, substitute a #53 drill for the drill used in making the rod adjustment. Hold choke valve firmly against the #53 drill, open and close primary throttle valve and note clearance between start-aid lock lever on throttle shaft and loose lever behind fast idle cam. This clearance should be just enough to permit the levers to clear. Adjust by bending end of lock lever up or down.

CAUTION—Use care not to distort fast idle cam return spring or cause bind between rod and slot in cam.

Unloader (Wide-open Kick & Deflooder): Move throttle valves to wide open position, measure choke valve opening (clearance between upper edge of choke valve at center and air horn wall). This clearance should be .221" (use No. 2 drill rod). Adjust as required by bending tongue on throttle lever which contacts arm on fast idle cam. Close both choke valve and throttle valve, then open the throttle against the tension of the start-aid loose lever spring. Lock lever should release the loose lever and the spring tension before stop arm on throttle lever contacts stop boss on throttle body.

Secondary Throttle: *Secondary throttle linkage should be checked and adjusted at two points:*

Wide-open Throttle—Move primary throttle valves to wide-open position. If secondary throttle valves are not wide open, or if secondary shaft lever comes up against its stop before primary throttle valves are wide open, adjust vacuum switch lever as follows: Hold switch lever by applying wrench to flat surface below loose lever, then bend curved end of switch lever up or down as required with pliers so that primary throttle valves are wide open (parallel with walls) and secondary throttle valves are also wide open with inner end of secondary throttle shaft lever bearing against stop boss on body.

Part Throttle—With secondary throttle valves closed, open primary throttle valves just enough to take up all slack in linkage so that secondary valves are ready to open. Check primary throttle valve opening (clearance between lower edge of valves and carburetor wall). This clearance must be 125" minimum, .180" maximum. Adjust as required by bending the throttle control rod at the large curve back of the loose lever. Rod ends should measure 2 11/16" plus or minus 1/32" between centers.

Auxiliary Throttle: *Auxiliary throttle valve closed position, and lock-out action must be checked and adjusted:*

Valve Position—With auxiliary throttle valves closed, clearance between edge of valve and carburetor wall should be .015" measured on longer side of valve at dividing wall between primary and secondary barrels. Adjust by loosening valve attaching screws and shifting valve. Check valves for free operation without binding through entire travel except for lock-out action in closed position

Lock-out Slide Clearance—*Two separate adjustments required as follows:*

Locked Clearance—With auxiliary throttle valves in closed position, close choke valve fully so that locking slide engages auxiliary valve counterweight lever. Check clearance between ear on slide and edge of lever with a feeler gauge. This clearance should be .025" minimum, .060" maximum. Adjust by bending ear on slide.

Unlocked Clearance—With choke valve wide open, move auxiliary throttle valves to wide open position. Clearance between end of locking ear on slide and edge of auxiliary valve counterweight lever

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STROMBERG 4-BARREL 4A (Continued)

should be 3/64" minimum, 5/64" maximum. Adjust by bending choke lever slide actuating arm.

STARTING SWITCH: *See "Stromberg Starter Switch" in Electrical Equipment Section for complete data. Switch setting can be checked as follows:*

Switch Setting (Carburetor on Engine)—On Dynaflow cars, make certain Dashpot and throttle linkage correctly adjusted, place transmission selector lever in neutral and set hand brake firmly to hold car. With engine not running, insert a pin through felt filter and screen to operate vacuum piston, push vacuum piston in and hold it while opening throttle (this will allow slide to engage groove in piston and prevent slide dropping down to complete contact), hold throttle open, remove pin. Place 5/64" spacer between fast idle stopscrew and fast idle cam with fast idle cam in cold idle position. Close throttle so that spacer holds cam in cold idle positon. Turn ignition on, hold spacer, depress accelerator to start engine. Engine should not crank. Repeat above test with 3/64" spacer between stopscrew and fast idle cam. Engine should crank. If engine cranks with 5/64" spacer, bend tang on switch operating lever downward slightly and recheck switch timing. If engine does not crank with 3/64" spacer, bend tang on operating lever upward slightly and recheck switch timing.

OVERHAUL: *CAUTION—When disassembling carburetor, be sure to keep PRIMARY and SECONDARY side parts separate so they will not be confused or interchanged when carburetor reassembled.*

Disassembly: Carburetor consists of three main subassemblies (Air Horn & Bowl Cover, Main Body, and Throttle Body) which can be overhauled separately as follows:

Air Horn & Bowl Cover—First disconnect spring from secondary throttle shaft lever and remove accelerator vacuum switch and gasket by taking out two attaching screws in throttle body. Disconnect fast idle rod from choke shaft lever and pump rod from pump lever. Remove pump lever fulcrum screw (left-hand thread), anti-rattle washer, and torsion spring washer, then disconnect pump lever from pump piston stem and remove lever. Take out all air horn and bowl cover attaching screws, lift air horn just far enough to free lock-out slide, remove slide, then lift air horn straight up *(CAUTION*—use extreme care not to damage floats, pump piston, or vacuum power piston). Invert air horn and remove pump piston assembly. Remove float hinge pins (tap plain end of pin to force serrated end out of hanger), remove float and intake needle assemblies, use wrench T-20140 to remove needle seats and gaskets *(CAUTION*—keep each float assembly, intake needle, and needle seat together, DO NOT mix primary and secondary side parts). Remove float hangers and bowl cover gasket. Remove vacuum power piston (compress spring to obtain grip on outer end of piston stem with pliers, then pull piston straight out to avoid bending piston stem). Remove choke cover and coil assembly by taking out screws and removing retainers. Use wrench T-25047 to remove nut on end of choke shaft, remove lockwashers and serrated washer. Remove choke valve attaching screws, remove valve. Remove choke shaft and vacuum piston and lever assembly.

Main Body—Remove four idle tube sealing plates to avoid losing them during overhaul but DO NOT remove Idle Tubes unless replacement required (see special Idle Tube Installation data below). Take out pump discharge nozzle screw, remove nozzle and gaskets, then invert body and catch valve ball which will fall out of pump discharge passage. Take out retainer clip in bottom of pump cylinder and remove inlet check valve ball located in cylinder below retainer. Take out attaching screws and remove throttle body from main body, remove gasket. Pry snap ring from fast idle cam post, remove cam, lock lever, and spacer washer. Take out main discharge jet plugs (tool T-19099), remove copper gaskets, remove main metering jets (Socket wrench tool T-24924), remove main discharge jets (Jet Remover tool T-24967—screw tool into base of jet and then pull jets straight out of main body). *CAUTION*—Lead gasket at discharge jet seat in main body must be completely removed. Take out small plugs on bottom of main body directly below end of tubes (will allow idle tubes and passages to be cleaned without disturbing tubes).

Throttle Body—Remove both idle adjusting screws and springs. Take out attaching screws and remove auxiliary throttle valve from shaft, pry washer off end of shaft, remove shaft and lever assembly. Mark all throttle valves by lightly scribing line on valve along both sides of shaft and also indicate location to insure re-installing valve in same barrel, take out attaching screws and slide valves out. Disconnect control rod from secondary throttle shaft lever, remove shaft from body. Remove nut, lockwasher, switch lever and loose lever from end of primary throttle shaft, remove shaft and lever assembly from body.

Cleaning & Inspection: Thoroughly clean all parts using Bendix Metalclene or equivalent cleaning solvent, rinse with clear gasoline and dry with air. Blow out all passages in casting with air (pay particular attention to idle tubes and passages—if tubes require removal, see special removal and installation data below), make certain all gum and carbon deposits removed. Check choke shaft and throttle shafts for wear in bearings. Inspect choke thermostatic coil for distortion or damage, see that vacuum piston and cylinder are clean and free of burrs or scores. Replace fuel inlet strainer and pump strainer if clogged or damaged. Check pump piston leather for cracked, creased or turned edges or other damage, make certain relief valve in piston is tight (blow on lower end of piston). Inspect all check ball seats in castings (if seats rough, reface by placing ball on seat and tapping ball lightly, then DISCARD balls after such use). Inspect all jets for wear or damage. Replace all worn or damaged parts.

Idle Tube Removal & Installation: If tubes require removal for any reason, always install NEW tubes as directed below:

Removal—Pry old tube out using a screwdriver blade placed under tube loop *(CAUTION*—use piece of wood under screwdriver blade to avoid marring top edge of main body. DISCARD old tube and wedges.

Installation—Place tool T-25525 on top surface of main body with flat surfaces vertical, place NEW idle tube and wedges in position over tool (tube should loop over tool which will position the tube properly). *CAUTION*—Small diameter end of tube should be inserted in hole which is directly above main discharge jet passage. Hold tube loop down against positioning tool, slide wedges down into holes in main body, use Wedge Driver T-25488 and light hammer to seat wedges snugly in place. Remove positioning tool T-25525 using care not to disturb tube seals.

Reassembly: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure (above) and pay particular attention to the following:

Throttle Valve Installation—Install each valve in same carburetor barrel from which removed (as marked before removal) with dash mark on primary valves and crescent mark on secondary valves toward top of body and on same side as idle ports. Install new valve screws loosely, align scribe marks carefully, then tighten screws. Check valves by sighting through barrel and shifting valves as required until least amount of light visible around edge of valve. After valves properly set, tighten screws securely and stake ends lightly *(CAUTION*—support screw heads on steel block while staking to prevent bending of shaft).

Auxiliary Throttle Valve Installation—Use new screws to attach valves, position valves so that clearance between inner edge of valve and middle wall of carburetor is .015" (measure with a wire gauge). After valves correctly positioned, tighten screws securely and stake ends in same manner as other throttle valve screws above.

Idle Adjusting Screws & Springs—Turn both screws in until lightly seated, then back screws out 1⅛ turns for preliminary adjustment which will allow engine to be started and warmed up (see ADJUSTMENT data for final setting).

Main Discharge Jets—Use new lead gasket on upper end of jet, install by using Remover Tool T-24967 to seat jet in main body. Flat surface of all jets must be parallel to air flow when installed in carburetor *(CAUTION*—Secondary jets only are notched on this upper flat surface).

Main Metering Jets—Make certain that primary and secondary jets are not interchanged (Secondary jets have groove on shank—primary jets not grooved).

Main Discharge Jet Plugs—Use new copper gasket on plugs. Plugs must be tight.

Choke Valve Installation—Use new screws to attach choke valve and position valve so that clearance uniform between valve edges and air horn. After tightening screws, make certain that valve operates freely and falls open of own weight without binding at any point, then stake ends of screws lightly (support screw heads on steel block to avoid bending shaft).

Choke Piston Installation & Adjustment (1952-53)—Install vacuum piston in cylinder *(CAUTION*—do not use any kind of lubricant on piston or cylinder), engage lever on end of choke shaft, then assemble adjusting washer (serrated side toward piston lever), lockwasher, and nut, tighten nut finger-tight only. Adjust piston position as follows: With nut on end of choke shaft finger-tight, install Piston Setting Gauge T-25367 in choke housing so that small hole fits over pin on vacuum piston lever and

CONTINUED ON NEXT PAGE

STROMBERG 4-BARREL 4A (C ntinu d)

the two indicator lines on face of the gauge are centered on end of indicator boss on housing (install two cover washers to hold gauge in this position). Close choke valve tightly against small end of Gauge T-25086 (or No. 29 drill rod) placed between upper edge of valve and air horn wall, tighten locknut on shaft tightly, then remove gauge or drill rod and close choke valve fully, tighten locknut securely. Recheck setting.

Choke Piston Installation (1954)—Install vacuum piston in cylinder (*CAUTION*—do not use any kind of lubricant on piston or cylinder), engage lever on end of choke shaft, install lockwasher and nut. Tighten nut with wrench T-25047.

Vacuum Power Piston Installation—When installing piston in air horn DO NOT use any kind of lubricant on piston. Stake edge of cylinder at three points to retain piston. Make certain that piston operates freely in cylinder.

Float & Intake Needle Valve Installation—When installing float hangers and needle seats, use new gaskets above and below hanger. Make certain that corect float, intake needle, and seat used on primary and secondary sides (see Float data under ADJUSTMENTS above). Intake needle must be clipped to float arm properly and float assemblies must operate freely on fulcrum pins. Adjust float height and float alignment (see Float Level under ADJUSTMENTS above).

Accelerator Vacuum Switch Installation & Adjustment—Use new gasket when installing switch and place long grooved mounting screw on **primary** side, hook secondary throttle shaft lever return spring on this screw). After all linkage assembled, adjust switch as follows: Close primary throttle valve against a No. 41 drill rod, bend tang on switch operating lever until it just touches switch slide. This is an approximate setting only and should be rechecked after carburetor installed on engine. *See Stromberg Starter Switch data in Electrical Equipment Section.*

Carburetor Adjustments—Make all adjustments as listed under ADJUSTMENTS above.

SERVICE PARTS: Gasket Set—Stromberg No. 382361. **Repair Parts Kit**—Stromberg No. RK-171 (1952 Code 7-92 & 7-92B), No. RK-176 (1953 Code 7-94, A, B, C). No. RK-182 (1954 Code 7-98).

STROMBERG "AA" & "BX" CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Venturi Size	Main Metering Jet Size	Main Metering Jet Part No.	By-Pass Jet Size	By-Pass Jet Part No.	Main Discharge Jet Size	Main Discharge Jet Part No.	H.S. Bldr.	Idle Tube Size	Idle Tube Part No.	Idle Air Bld. Jet Size	Idle Air Bld. Jet Part No.	Pump Discharge Nozzle Siz	Pump Discharge Nozzle Part No.
BUICK 40, 50	1946-47	AAV-16	1 1/32"	.045"	P-24773	#60	P-24674	#38-28	P-24670	#70⑭	#70	P-19424	#42㉘	P-24683	#68	P-24594
BUICK 70	1946-47	AAV-26	1⅛"	.051"	P-24673	#54	P-21197	#38-28	P-24670	#70⑭	#70	P-19424	#42㉙	P-24683	#68	P-24594
BUICK 40, 50	1948	AAV-167	1 1/32"	.045"	P-24773	#60	P-24674	#32-28	P-24670	#70⑭	#70	P-19424	#42㉘	P-24683	#68	P-24594
BUICK 70	1948	AAV-267	1 1/8"	.051"	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#70	P-19424	#42㉘	P-24683	#68	P-24594
BUICK 40, 50	1949	AAV-167	1 1/32"	.045"	P-24773	#60	P-24674	#32-28	P-24670	#70⑭	#70	P-19424	#42㉘	P-24683	#68	P-24594
BUICK 70	1949	AAV-267	1 1/8"	.051"	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#70	P-19424	#42㉘	385350	#68	P-24594
BUICK 40, 50	(1950)	AAUVB-267	1 1/32"	.047"	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#65	382572	#40㊸	P-24683	#68	P-24594
BUICK 70	(1950)	AAVB-267	1⅛"	.051"	P-24673	#56	382454	#32-28	P-24670	#70⑭	#68	P-21962	#42⑨	P-24683	#68	P-24594
BUICK 40, 50	1951	AAUVB-267㉗	1 1/32"	.047"	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#65	382572	#40㊸	385350	#68	P-24594
BUICK 70	1951	AAVB-267㊳	1 1/8"	.051"	P-24673	#56	382454	#32-28	P-24670	#70⑭	#68	P-21962	#42⑨	P-24683	#68	P-24594
BUICK 40, 50	Late '51	AAUVB-267㊾	1 1/32"	.047"	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#58	385798	#42⑮	P-24683	#68	P-24594
BUICK 70	Late '51	AAVB-267㊿	1 1/8"	.051"	P-24673	#56	382454	#32-28	P-24670	#70⑭	#66	385804	#42㉞	P-24683	#68	P-24594
BUICK 40, 50	1952	AAUVB-267	1 1/32"	.047"③	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#58	385798	#42⑮	P-24683	#68	P-24594
BUICK 70	1952	4AUV-267	⑪1 1/32"	.049"④	P-19442	#56	P-21657	#28-32	P-22428	#70	#66	385953	⑥	——	#68	P-24594
			⑫1 1/32"	.051"⑤	P-24773			#28-32	P-24670	#70	#70	385954	⑦			
BUICK 40	1953	AAUVB-267	1 1/32"	.047"③	P-24673	#54	P-21197	#32-28	P-24670	#70⑭	#58	385798	#42⑮	P-24683	#68	P-24595
BUICK 50	1953	AAVB-267	1 1/8"	.049"②	P-24673	#60	386398	#32-28	P-24670	#70⑭	#66	385804	⑧	——	#70	385923
BUICK 70	1953	4A-267	⑪1 1/32"	.048"	P-19442	#70	386388	#28-32	386379	#70⑭	#66	386421	⑥	——	#68	P-24594
			⑫1 1/32"	.051"	P-24773			#28-32	P-24670	#70⑭	#70	386422	⑦	——		
BUICK 40, 50	1954	AAVB267⑯	1 1/8"	.052"	P-19442	#60	386398	#32-28	P-24670	#70⑭	#58	385798	⑳	——	#70	385923
BUICK 70	1954	4A⑰	⑪1 1/32"	.048"	P-19442	#59	386630	#32-28	P-24670	#70⑭	#66	386421	⑥	——		
			⑫1 1/32"	.051"	P-24773			#28-32	386379	#70⑭	#70	386422	⑦	——	#68	P-24595
BUICK 40	1955	AAVB-267㉚	1 1/8"	.052"	P-19442	#70	386398	#28	386931	#70⑭	#66	385804	㉙	——	#68	P-24594

②—.047" for High Altitudes (3500-9000 ft.).
③—.044" for High Altitudes (3500-9000 ft.).
④—.045" for High Altitudes (3500-9000 ft.).
⑤—.048" for High Altitudes (3500-9000 ft.).
⑥—#70 in Idle Tube, #39 in Throttle Body.
⑦—#70 in Idle Tube, #42 in Throttle Body.
⑧—#53 in Main Body, #42 in Throttle Body.
⑨—#65 in Main Body also.
⑪—Primary Side (4-barrel Carburetor).
⑫—Secondary Side (4-barrel Carburetor).
⑭—Part No. P-23985.
⑮—#55 in Main Body also.
⑯—Code No. 7-96.
⑰—Code No. 7-98.
⑳—#60 in Main Body, #42 in Throttle Body.
㉔—#52 in Main Body also.
㉕—#70 in Main Body also.
㉗—First Code 7-88 carburetors.
㉙—#56 in Main Body, #36 in Throttle Body.
㉚—Code No. 7-102.
㉞—#53 in Main Body also.
㊳—First Code 7-89 carburetors.
㊸—#58 in Main Body also.
㊾—Later Code 7-90 carburetors.
㊿—Later Code 7-91 carburetors.

STROMBERG "AA" & "BX" CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb. No.	Venturi Size	Main Metering Jet Size	Main Metering Jet Part No.	By-Pass Jet Size	By-Pass Jet Part No.	Main Discharge Jet Size	Main Discharge Jet Part No.	H.S. Bldr.	Idle Tube Size	Idle Tube Part No.	Idle Air Bld. Jet Size	Idle Air Bld. Jet Part No.	Pump Discharge Nozzle Size	Pump Discharge Nozzle Part No.
CADILLAC V8	1946-47	AAV-26㊶	1⅛"	.049"	P-19442	#53	P-24064	#32	P-23567	#70⑭	#66	382933	#36㉔	P-23658	#68	P-24594
CADILLAC V8	1947-48	AAV-26㊷	1 1/8"	.048"	P-24773	#53	P-24064	#32	P-23567	#70⑭	#66	382933	#48㉔	383203	#68	P-24594
CHRYSLER C39, C40	1946-48	AAVS-2	1 1/8"	.051"	P-22660	2#56	382454	#36	P-22795	#70㉑	#70	P-19424	#40	——	㉒#65	P-23245,6
De SOTO S11 Fluid Dr.	1947	BXVD-3	1 7/32"	.061"	P-19442	#55	P-23676	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	#70⑱	——
DODGE D22 Fluid Dr.	1942	BXVD-3	1 7/32"	.061"	P-19442	#55	P-23676	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	#70⑱	——
DODGE D24 Std.	1946-48	BXV-3	1 7/32"	.061"	P-19442	#55	P-23676	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	⑱#70	P-24067
DODGE D24 Fluid Dr.	1946-48	BXVD-3	1 7/32"	.061"	P-19442	#55	P-23676	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE Canada	1949	BXVD-3	1 7/32"	.062"	P-19442	#54	P-21197	#28-32	385192	#68㉓	#70	P-21778	#54	P-20470	⑱#70	
DODGE Fld. Dr.	1949	BXVD-3	1 7/32"	.061"	P-19442	#58	385056	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE D30, D34㊺	1949	BXVES-3	1 7/32"	.061"	P-19442	#60㊹	385449	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE Fld. Dr.	1950-51	BXVD-3	1 7/32"	.061"	P-19442	#60	385449	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE Fld. Dr. Canada	1950-51	BXVD-3	1 7/32"	.062"	P-19442	#54	P-21197	#28-32	385192	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE㊺	1950-51	BXVES-3	1 7/32"	.061"	P-19442	#60	385449	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE㊺ Canada	1950-51	BXVES-3	1 7/32"	.062"	P-19442	#54	P-21197	#28-32	385192	#68㉓	#70	P-21778	#54	P-20470	⑱#70	——
DODGE	1952	BXVD-3	1 7/32"	.061"	P-19442	#60	385449	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	#70⑱	——
DODGE㊺	1952	BXVES-3	1 7/32"	.061"	P-19442	#60	385449	#28-36	382897	#68㉓	#70	P-21778	.051"	P-21714	#70⑱	——
DODGE Canada	1952	BXVD-3	1 7/32"	.062"	P-19442	#54	P-21197	#28-32	385192	#68㉓	#70	P-21778	#54	P-20470	#70⑱	——
DODGE㊺ Canada	1952	BXVES-3	1 7/32"	.062"	P-19442	#54	P-21197	#28-32	385192	#68㉓	#70	P-21778	#54	P-20470	#70⑱	——
PLYMOUTH P15	1946-47	BXV-3	1 7/32"	.061"	P-19442	#55	P-23676	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	#70⑱	P-24067
PLYMOUTH P15	1947	BXV-3	1 7/32"	.061"	P-19442	#55	P-23676	#28-36	382897	#68㉓	#70	P-21778	#54	P-20470	#70⑱	P-24067
STUDEBAKER 14A	1947	BXOV-26	1 3/16"	.057"	P-19442	#54	P-21197	#28-36	382492	#70⑭	#70	P-21778	#54	P-20470	#70㉒	P-24067
STUDEBAKER 15A	1948	BXOV-26	1 3/16"	.057"	P-19442	#54	P-21197	#28-36	382492	#70⑭	#70	P-21778	#54	P-20470	#70㉒	P-24067
STUDEBAKER Com.16A	1949	BXOV-26	1 3/16"	.057"	P-19442	#54	P-21197	#28-36	382492	#70⑭	#70	P-21778	#54	P-20470	#70	P-24067
STUDEBAKER Com.17A	1950	BXOV-26	1 3/16"	.057"	P-19442	#54	P-21197	#28-36	382492	#70⑭	#70	P-21778	#54	P-20470	#70	P-24067
STUDEBAKER V8	Early '51	AAUVB-26㊻	1 1/32"	.045"㊽	P-24473	#60⑧	P-24674	#28-36	385636	#70⑭	#65	382572	#40㊸	385350	#70	385637
STUDEBAKER V8	Late '51	AAUVB-26㊼	1 1/32"	.048"	P-24473	#57	P-23348	#28-36	385636	#75㊵	#65	382572	#40㊸	385350	#70	385923
STUDEBAKER V8	1952	AAUVB-26	1 1/32"	.048"	P-24773	#57	P-23348	#28-36	385636	#75㊵	#65	382572	#40㊸	385350	#70	385923
STUDEBAKER Cmmdr.	Late 52	AAUVB-26⑬	1 1/32"	.048"	P-24773	#57	P-23348	#28-36	385636	#75㊵	#65	382572	#40㊸	385350	#70	385923

⑧—Supersedes #56, Part No. P-21657 on first 6-107 carburetors.
⑩—Supersedes #65 By-pass Jet used on early models. Studebaker No. 531497.
⑬—Code No. 6-111C Carburetors.
⑭—Part No. P-23985.
⑱—Discharge Reducer. Also uses Pump By-pass Jet 2#56, Part No. P-24062.
⑲—Secondary Bleeder #38, Part No. P-23658 in Throttle Body.
㉑—Part No. P-22369.
㉒—Pump Discharge Nozzles in Main Body. Pump By-pass Jet #63, Part No. P-23742
㉓—Part No. P-24315. ㉔—#52 in Main Body also.
㊵—Part No. 385852.
㊶—Code No. 205-14A carburetors.
㊷—Code No. 205-14B carburetors.
㊸—#58 in main body also.
㊹—Supersedes #58, Part No. 385056.
㊻—First Code 6-107 & 6-107A carburetors.
㊼—Later Code 6-111 carburetors.
㊽—Supersedes .044" No. P-24473 on first 6-107 carburetors.

1953-54 STROMBERG "WW" (DODGE)

	①Stromberg Model & Code
DODGE V8 1953	
Synchro-mesh Trans.	WW, 3-108, A
Fluid Drive	②WW, 3-105, A
Overdrive	③WW, 3-109, A
Automatic Trans.⑤	④WW, 3-106
DODGE V8 1954	
Synchro-mesh Trans.	WW, 3-108A
Overdrive	③WW, 3-109A
Gyromatic Trans.	④WW, 3-106A
PowerFlite	②WW, 3-105A

①—Code No. stamped on bowl cover above fuel inlet connection.

②—Has Slow-Closing Throttle Dashpot **without** magnetic control.

③—Has Overdrive Kick-down Switch mounted on bracket on main body.

④—Has Slow-Closing Throttle Dashpot **with** magnetic control and Transmission Kick-down Limit Switch mounted on main body.

⑤—Gyro-matic or Gyro-Torque Drive Cars.

DESCRIPTION: "WW" carburetors are dual barrel, downdraft type of new design with vertical air intake. Fuel system is similar to other Stromberg carburetors with usual Float System (single float), Idle System, Main Metering System, Power System (with vacuum piston operated power by-pass jet), and Accelerating System (pump operated by horizontal fulcrum lever with duration spring type pump piston). Carburetor has automatic choke and Fast Idle. ***All models are alike except for added units for each type service as listed above.***

ADJUSTMENTS: ***CAUTION—Make all adjustments exactly as listed below. Kick-down Switches and Dashpot not used on all models (see listing above).***

Idle Setting: First synchronize both idle mixture adjusting screws by turning each screw in until it is lightly seated, then back each screw out exactly one turn. Start engine and run it until it is thoroughly warmed up (water temperature 160°F. or higher) with choke valve wide open and fast idle inoperative. Then adjust idle mixture and idle speed as follows:

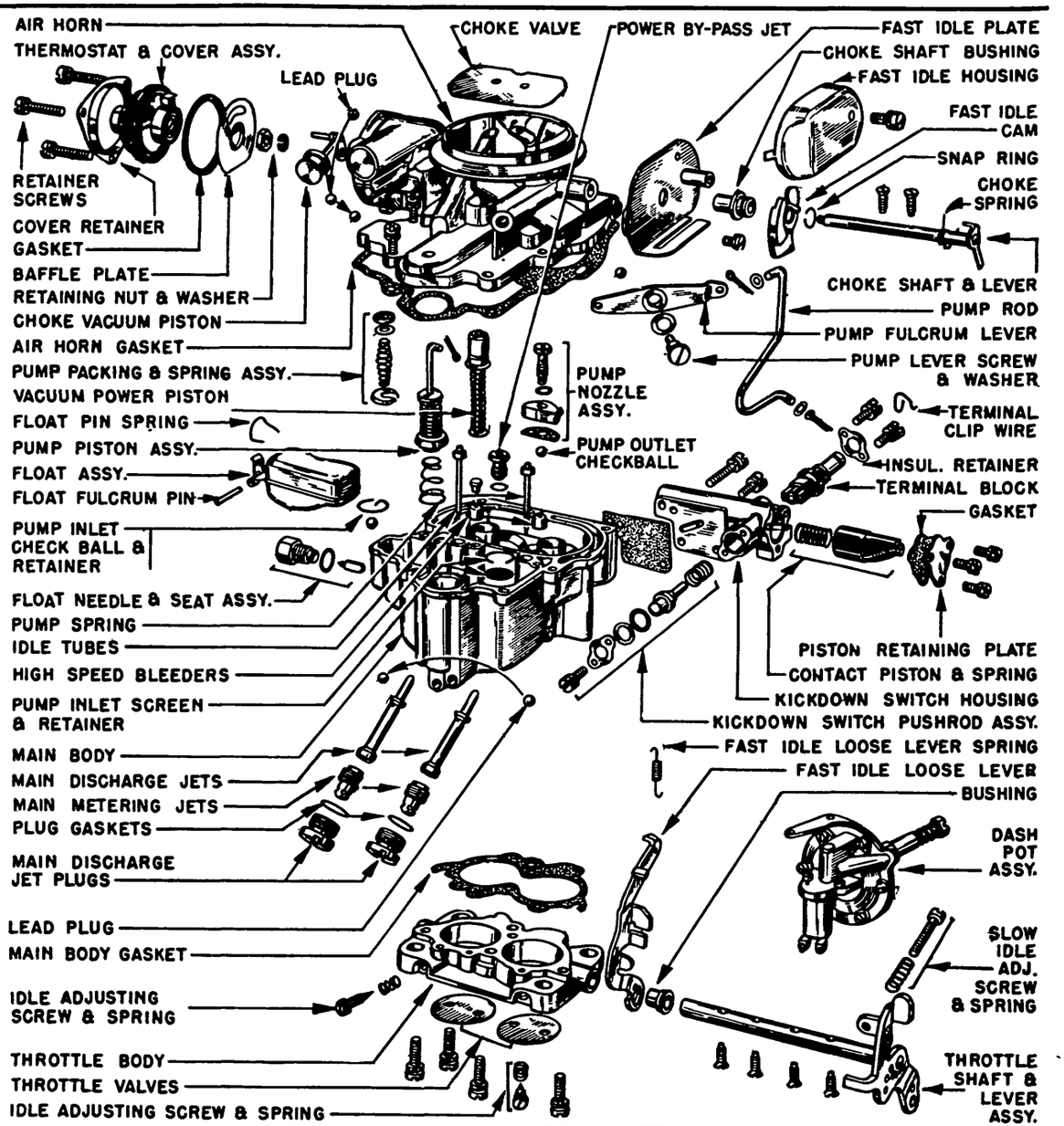
Idle Mixture—First check and adjust idle speed (see below). Make trial adjustment by turning BOTH idle adjusting screws in ⅛ turn to lean the mixture and note effect this has on performance.

If engine speed increases and engine is smoother, turn both screws in additional ⅛ turn. If performance improved, reset engine idle speed and make a fine adjustment by turning EACH idle adjusting screw in ⅛ turn and out ⅛ turn to find exact best setting for each screw. Finally reset idle speed.

If engine speed decreases and engine is rougher, turn both screws out ⅛ turn for richer mixture. If performance improved, reset engine idle speed and make a fine adjustment by turning EACH idle adjusting screw in ⅛ turn and out ⅛ turn to find exact best setting for each screw. Finally reset engine idle speed.

►***CAUTION—BOTH idle adjusting screws must be set exactly alike (plus or minus ⅛ turn to allow for final exact setting of each screw).***

Idle Speed—Adjust only with engine at normal operating temperature with choke valve wide open and fast idle inoperative. Turn throttle stopscrew in or out for correct idle speed as measured with tachometer with shift lever in neutral.



STROMBERG "WW" (DODGE) DOWNDRAFT CARBURETOR

IDLE SETTING

	Idle Mixture	Idle Speed
Dodge V8 (All)	¾-1¼ turns open.	475-500 RPM.

Accelerating Pump: ***NOTE***—Pump Seasonal Setting can be changed as required, Pump Stroke Setting should be checked and adjusted whenever carburetor overhauled.

Pump Seasonal Setting—Throttle lever has three holes for pump connector rod engagement:

Center Hole—Normal operating conditions.
Inner Hole—Min. stroke for less discharge.
Outer Hole—Max. stroke for greater discharge.

Pump Stroke Setting—To check pump stroke, back out throttle stopscrew so that throttle valves tightly closed, use scale to measure distance from top of bowl cover at side of pump plunger to top of plunger. This distance should be ¾". Adjust by bending pump connector rod using tool T109-213.

CONTINUED ON NEXT PAGE

1953-54 STROMBERG "WW" DODGE (Cont.)

Float Level: To check float level, remove air horn and bowl cover and air horn gasket. Hold lip of float lever firmly against intake needle valve so that float held up in closed-valve position. Use Float Gauge T-25569 placed squarely on top edge of bowl at center of float. Float should just contact step on gauge. To adjust float level, bend lip on float lever as required using bending tool T-24733.

FLOAT LEVEL

Dodge V8 (All)	3/16"①

①—Top of float below top edge of bowl.

Fast Idle: To check fast idle setting, first remove fast idle cam housing to expose fast idle cam on end of choke valve shaft. Open throttle valve, close choke valve against FIRST STEP of Gauge T-25570 (second step of gauge used for Unloader setting) placing gauge between upper edge of choke valve and air horn wall, then move throttle valve toward closed position. Top of fast idle lever should just enter the first step on the fast idle cam. To adjust, bend lever on fast idle cam. *CAUTION*—hold fast idle counterweight while bending the lever.

Unloader: To check unloader setting, close choke valve, open throttle valves to wide-open position, check choke valve opening by inserting Gauge T-25570 between upper edge of choke valve and air horn wall. Choke valve opening should be equal to SECOND STEP on gauge (first step is used for Fast Idle setting). To adjust, bend choke lever on choke shaft which contacts ear on fast idle lever. Reinstall cam housing after completing adjustment.

Choke Setting: Centered (indicator mark on edge of thermostatic coil cover lined up with projection on top of choke housing). To adjust, loosen heat tube connection on cover and three screws in cover retainer, rotate cover and coil assembly.

▷*CAUTION—Hold heat tube fitting on cover with a wrench while loosening or tightening heat tube connection to avoid damaging or rotating coil assembly.*

Kick-down Switch (Code 3-109 Carb.): Adjust switch position on bracket by backing off one locknut on mounting stem and tightening opposite nut until switch "B" contacts (terminals on opposite end of switch from plunger) are closed with the throttle valves wide open (use test lamp connected to switch terminals to check operation).

Kick-down Limit Switch (Code 3-106 Carb.): Check operation by road-testing car as follows: With car running at 30 MPH. accelerate with approximately ¾ throttle and when car speed reaches 40 MPH., push accelerator pedal to kick-down position. Repeat this test at 45 MPH. and at 50 MPH. *Kick-down should operate below 40 MPH. and should not operate above 45 MPH.*

Dashpot (Code 3-105 & 3-108 Carb.): Check operation by running engine and holding car with the brakes. Shift to driving range and rapidly accelerate and decelerate engine. Engine should not stall when accelerator pedal released quickly. If engine stalls, adjust dashpot for maximum action by turning adjusting screw out until overtravel of plunger (possible inward movement of plunger) is only 1/16" with throttle valves in closed position.

OVERHAUL: *NOTE—Carburetor should be mounted on repair block, Tool C-3225, which will prevent damage to throttle valves while working on carburetor.*

Disassembly: On carburetors so equipped, first remove Dashpot and gasket (two screws in mounting bracket), Kick-down Switch and gasket (two screws in mounting bracket), or Kick-down Limit Switch (three screws and lockwashers in housing). Disconnect pump operating rod from throttle lever, disconnect pump plunger stem from pump rocker arm, take out rocker arm fulcrum screw and spring washer (screw has left-hand thread), remove rocker arm and rod assembly. Remove fast idle cam housing dust cover, disengage fast idle lever return spring from housing and lever. Take out four air horn attaching screws, lift air horn assembly straight up while disengaging fast idle lever from slot in housing by pushing outward.

Air Horn Disassembly—Remove pump compression spring from bottom of pump plunger, slide plunger assembly out of air horn, discard plunger rod felt washer, remove and discard air horn gasket. Remove vacuum power piston by hooking end of small open end wrench under head on piston stem and using wood block on air horn as a fulcrum so that piston assembly can be pulled straight out (*CAUTION*—this assembly is staked in air horn and will be damaged unless removed in this manner). Take out screws in choke housing retainer ring, remove retaining ring, thermostatic coil housing assembly, gasket, and baffle plate. Remove nut attaching choke piston link on choke shaft, take out choke valve attaching screws, remove choke valve. Withdraw choke shaft and lever from air horn and disengage choke piston link, lift out choke piston and link assembly. Disengage spring from choke shaft lever and slide spring off choke shaft. Pry out fast idle cam retaining snap ring, remove fast idle cam. Take out screw and lockwasher attaching fast idle backing plate to air horn, use open end wrench inserted between backing plate and air horn and over choke shaft boss to pry backing plate loose, remove backing plate and choke shaft bushing. Remove lead plug from lower side of choke piston cylinder so that passage can be blown out (plug can be drilled out using No. 44 drill). Remove thermostatic coil and heat retainer plate from choke housing by rapping assembly sharply on palm of hand with coil side down (*CAUTION*—do not attempt to remove coil from heat retainer plate).

Main Body Disassembly—Lift both idle tubes out. Remove attaching screw and gasket in pump discharge cluster, remove cluster and gasket, invert body to drop discharge check ball from discharge passage. Remove fuel inlet needle seat and gasket, lift out inlet needle. Pry out float fulcrum pin retaining spring (*CAUTION*—do not allow spring to fly out), lift out float and fulcrum pin assembly. Remove power by-pass jet and gasket. Pry out snap ring in bottom of pump cylinder, remove strainer screen, remove snap ring retaining intake check ball, invert body to drop out the check ball. Remove both main jet plugs, discard gaskets. Use tool T-24924 to remove main metering jets. Use tool T-24967 to remove main discharge jets by screwing tool into jet and then pulling jet out of the body (threads formed by tool will not damage jet). Take out screws attaching main body to throttle body, lift main body off and discard gasket.

Throttle Body Disassembly—Remove both idle adjusting screws and springs. DO NOT disturb throttle valve and shaft assembly unless new parts must be installed (Manufacturer recommends replacement of Throttle Body Assembly if shaft or shaft hole in body worn). To remove throttle valves, first mark each valve to insure re-installation in same barrel, take out valve attaching screws, slide valves out of shaft slots, withdraw throttle shaft and lever assembly from throttle body.

Cleaning & Inspection: Clean all metal parts thoroughly in suitable cleaning solution. Make certain all carbon and gum deposits removed. Blow out all passages and dry parts with air. Inspect all parts for wear or damage.

Reassembly: Use all NEW gaskets. Install all parts in reverse order of disassembly procedure above and note the following important points:

Throttle Valve Installation—After throttle shaft inserted in throttle body, slide valves in place in throttle shaft lining up marks made before disassembly and with dash stamped on valve toward idle port and visible from top of throttle body, install new screws loosely. Centralize valves by closing valves tightly (throttle stopscrew must be backed off), tap valves lightly and hold them in place by pressing on high side of valves while tightening screws securely. Stake screws by squeezing with pliers.

Main Discharge Jet Assemblies—Engage remover tool T-24967 securely in end of main discharge jet, seat jet firmly in main body with nozzle opening (diagonal end) facing opposite wall of small venturi. Install main metering jet and tighten securely with tool T-24924. Install metering jet plug with new copper gasket and tighten securely.

Accelerating Pump Assembly & Testing—Drop 3/16" intake check ball into recess in bottom of pump cylinder, use tool T-25568 to seat check ball retainer, install new pump strainer, use tool T-25568 to install screen retainer. Drop 1/8" discharge check ball in pump discharge passage in main body, install pump plunger assembly temporarily in pump cylinder, fill carburetor bowl approximately 1/2" deep with clean gasoline. Press lightly on plunger shaft to expel air from pump system, then hold discharge check ball down on seat firmly using a small brass rod, raise pump plunger to fill cylinder and press downward on plunger. No gasoline should pass either the discharge check ball or intake check ball. If check balls are not tight, thoroughly clean pump passages and install new check balls. Install pump discharge cluster with new gasket and tighten screw securely. Check pump action. Identical clear straight streams should be emitted from each pump jet. If either stream diverted or restricted, install new pump discharge cluster. After tests completed, remove pump plunger and pour out the gasoline. Before finally installing pump plunger, flex leather several times and replace assembly if leather hard, cracked or worn. After pump plunger installed in cylinder (with compression spring under plunger), install air horn gasket, then place new metal and felt washer on pump plunger stem before installing air horn.

Vacuum Power Piston Installation—After vacuum piston installed in air horn, lock assembly in place by prick-punching rim at several points. Check piston for free operation and replace if any binding or sticking noted.

Automatic Choke & Fast Idle Assembly—Make certain thermostatic coil and heat retainer plate correctly installed in choke housing with notch in

CONTINUED ON NEXT PAGE

1953-54 STROMBERG "WW" DODGE (C nt.)

plate aligned with lug in housing and retaining spring seated in groove *(CAUTION*—spring must clear notch in plate). Install choke shaft bushing in backing plate, position backing plate on air horn, use tool T-25570 to drive bushing in place in air horn, slide fast idle lever into backing plate slot, install screw and lockwasher. Install fast idle cam on shoulder of choke bushing and secure with snap ring. Slide choke piston into cylinder, slide choke shaft and lever into position *(CAUTION*—make certain spring properly installed on shaft), hook long end of spring in notch of fast idle cam lever. Install choke valve (see below), engage piston link on choke shaft, install lockwasher and nut and tighten nut securely with tool T-25047. Install baffle plate with dimpled side out *(CAUTION*—lever must clear baffle at full travel). Check choke assembly for free operation (valve must open freely of own weight). Install coil housing gasket, coil housing assembly, and retainer ring with indicator mark on housing straight down, turn assembly counter-clockwise until indicator mark on housing in line with projection on air horn, tighten retainer screws securely. Install fast idle lever return spring with long loop hooked to lever and short loop hooked in backing plate Adjust fast idle and unloader before installing fast idle housing cover.

Choke Valve Installation—Slide valve in position in shaft, install new screws loosely, close valve and center it by tapping lightly with a screwdriver, then tighten screws securely and stake screws by squeezing with pliers.

Carburetor Adjustments—See ADJUSTMENT above.

SERVICE PARTS: Gasket Set—Stromberg No 382363 (Code 3-105, A; 3-108, A; 3-109, A). No. 382364 (Code 3-106, A)

Repair Kit Pkg.—Stromberg No. RK-173 (Code 3-108, A, 3-109, A). No RK-172 (Code 3-106, A).

1955 STROMBERG "WW" (DODGE)

DODGE 1955	Stromberg Code No.
D-56 Synchro.mesh	WW3-124
D-56 Overdrive	WW3-125
D-56 PowerFlite	WW3-126
D-55-1-2 Synchro-mesh	WW3-131, A
D-55-1-2 Overdrive	WW3-132, A
D-55-1-2 PowerFlite	WW3-133, A, B
D-55-3 Synchro-mesh	WW3-120, A, B
D-55-3 Overdrive	WW3-121, A, B
D-55-3 PowerFlite	WW3-122, A, B, C

►CHANGES, CAUTIONS, CORRECTIONS

►*HARD STARTING AFTER WARM UP OR FLOODING CAUTION.* Use of other than mounting Gaskets, Dodge Nos 1615860 or 1634701, can result in restriction or blocking off of hot air passages to choke as well as the vacuum passage to the piston that operates the power by-pass or economizer jet. Incorrect choke setting or incorrect mounting gasket will cause hard starting after normal start and affect economy of operation.

DESCRIPTION: These carburetors are dual barrel, downdraft type of new design with vertical air intake. Automatic choke housing with fast idle cam is located on throttle body on opposite side from throttle lever. Choke valve operated by connecting link. Fuel system is similar to other Stromberg carburetors with usual Float System (single float), Idle System, Main Metering System, Power System, (with vacuum piston operated power by-pass jet), and Accelerating System (pump operated by horizontal fulcrum lever with duration spring type pump piston). All models are alike except for added units for each type service as listed above.

ADJUSTMENTS: *CAUTION—Make all adjustments exactly as listed below. Kickdown switches used only on Overdrive equipped cars. Dashpot only on PowerFlite equipped cars. See table above.*

IDLE SETTING

Idl S tting—Turn both idle adjusting screws in until they bottom lightly then back off 1 turn. Start engine, turn each adjusting screw in equally until engine starts to reduce speed then back off screws to obtain smooth operation and highest vacuum

Idl Speed—Turn throttle stop screw in or out to obtain 450-500 RPM Std. Trans., 475-500 RPM PowerFlite (selector lever in Neutral)

ACCELERATING PUMP

Pump Seasonal Setting—Setting can be changed as required Centered hole for Normal operation, Inner hole for minimum stroke for less discharge, Outer hole for maximum stroke and greater discharge.

Pump Stroke Setting—Hold carburetor in vertical position to properly seat pump check ball. With pump rod in center hole of throttle lever, hold choke valve wide open, travel of accelerator pump, as throttle valves are moved from open to fully closed, should be 13/64-15/64" (6 cyl. carb.), 7/32-1/4" (V8 carb.).

ECONOMIZER SETTING

No adjustment required. Valve opens when manifold vacuum drops to 4-6" (65-70 MPH).

FLOAT LEVEL

3/16" distance from center of float with lip held firmly against needle valve, to top of bowl casting (gasket removed). Use Tool T-25569 placed at center of float and resting on bowl casting (gasket removed). Use Tool T-24733 to bend lever next to float as necessary.

FAST IDLE

►*CAUTION All Fast Idle Adjustments including Unloader Adjustment must be made in the sequence given below.*

1) Fast Idle Speed—With choke cover removed, place one cover screw through Spring Tool T-25906 and attach Tool to housing above choke lever. Hook other end of spring to choke lever. Remove spring from throttle stop screw and replace screw only. Close throttle valves, turn stop screw in until it contacts lever, then continue to turn screw in 4½ turns (V8 Carb.), 5 1/8 turns (6 Cyl. Carb.). Hold choke valve closed and bend cam contact ear so that No. 48 drill rod will just go between ear end of contact lever and first step of fast idle cam *NOTE*—Ear must be parallel to throttle shaft after bending. Replace throttle stop screw spring

2) Fast Idle Cam Position—Open throttle valve to clear fast idle cam, close choke valve tightly. Force throttle closed against tension of cam positioning spring Ear on cam contact lever should just clear high step of fast idle cam (Max. .020") Bend fast idle rod as necessary.

3) Choke Positioning Spring—With Spring Tool T-25906 in position, attach weight Tool T-25864 on choke lever between rod and end of shaft. Hold carburetor vertical, close throttle making sure cam contact lever ear rests on high step of fast idle cam (If necessary rotate fast idle cam to get this position). Apply light closing pressure on throttle valve which should open choke valves against choke positioning spring tension (see Spring Color Caution below), just enough to insert correct size drill rod (see table below), between choke valve and wall of air horn Apply by bending ear of choke lever as required.

►*CHOKE POSITIONING SPRING CAUTION Make sure correct colored spring is used and use correct drill rod specified for that carburet*

Choke Positioning Spring Setting

Carb. Code No.	Drill R d	Spring Col r
WW3-120	#30	Copper
WW3-120 A,B	#24	Copper
WW3-121	#30	Copper
WW3-121A,B	#24	Copper
WW3-122	#28	Silver
WW3-122A,B,C	#24	Copper
WW3-124, 125	#31	Black
WW3-126	#37	Copper
WW3-131,A	#24	Copper
WW3-132,A	#24	Copper
WW3-133	#24	Silver
WW3-133 A, B	#24	Copper

UNLOADER SETTING

Apply light closing pressure to choke valve and open throttle valve to wide open position. Choke valve should open .180-.150" (Distance between choke valve and wall of air horn) Adjust by bending ear of cam lever as necessary

AUTOMATIC CHOKE SETTING

Carburetor Code Number determines correct cover and setting (see table below) Rotate cover clockwise to correct setting and tighten retaining screws. Hold choke open, then open and close throttle valves Failure to obtain full throttle operation indicates faulty assembly or improper adjustment. Hold throttle wide open, then open choke slowly to wide open position. There should be no bind through entire travel of choke mechanism.

CONTINUED ON NEXT PAGE

1955 STROMBERG "WW" DODGE (C nt.)

Carb. Code No.	Choke Cov r Cover	Setting
120, A,B	#31	2 points lean
121, A,B	#31	2 points lean
122,A,B	#33	2 points lean
122C	#31	2 points lean
124,125	#32	Centered (At Index)
126	#33	Centered (At Index)
131,A	#31	2 points lean
132,A	#31	2 points lean
133	#33	Centered (At Index)
133A,B	#31	2 points lean

DASHPOT SETTING

Push plunger in to end of its stroke. With throttle stop screw set at normal idle speed, there should be 1/16-3/32" clearance between end of dashpot plunger and ear on throttle lever. Adjust by loosening locknut and turning dashpot in bracket.

OVERDRIVE KICKDOWN SWITCH

Clearance between ear of throttle lever and threaded end of switch housing should be 1/64-1/32" with throttle valves held in wide open position. Adjust by loosening locknuts and repositioning switch.

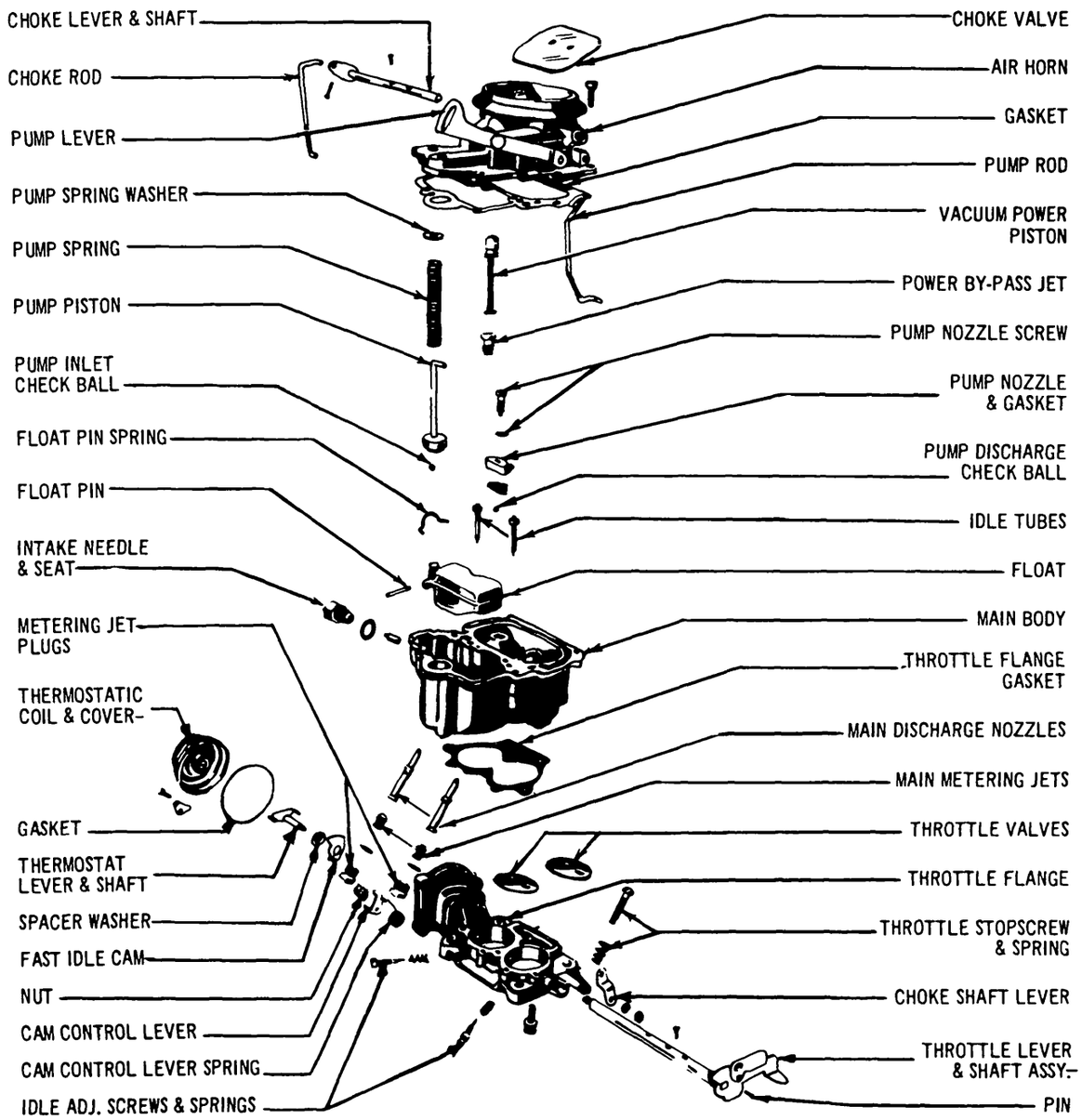
OVERHAUL: *NOTE*–Throttle valves in open position extend below the throttle flange, making it of vital importance to handle the throttle flange unit with extreme care to prevent damage to valves or their proper position in flange.

Disass mbly: Consists of separating the three units Air Horn, Throttle Flange and Main Body and removing component parts of each unit separately. Release upper end of choke rod and lower end of pump rod and remove rods. Remove Overdrive Unit & Dashpot Control if so equipped. Remove Air Horn attaching screws, Air Horn & gasket. Remove idle tubes, invert carburetor and catch pump inlet check ball. While inverted, remove four throttle body attaching screws, remove Throttle Flange & gasket from Main Body.

Air Horn–Remove accelerating pump piston, and remove washer and spring from pump piston. Remove vacuum power piston with small block of wood and open end wrench as a pry. Remove choke valve screws, choke valve, and choke shaft.

Main Body–Remove pump discharge nozzle, screw and gasket, float needle valve seat, gasket and needle valve. Remove fulcrum pin spring clip, float and fulcrum pin, power by-pass jet and gasket. Invert body and remove accelerating pump and check ball, metering jet plugs and gaskets, (Tool T-19099), main metering jets (Tool T-24924) and main discharge jets (Tool T-24967). Remove lead ball and drive plugs.

Throttl Body–Remove thermostat cover attaching screws, lug washers, thermostat cover assembly, and gasket. Remove nut, lockwasher, and crank lever from end of thermostat lever and shaft. Remove thermostat lever and shaft, spacer washer, and fast idle cam. Remove nut, lockwasher, cam control lever, and spring from end of throttle shaft. *NOTE*–Nut and shaft have left hand thread, and nut is colored black for identification. Remove idle needle valves and springs. Scribe mark on throttle valves along throttle shaft as well as throttle body to assure assembly in same position in same barrel, **particularly on notched throttle valves.** Remove throttle valve screws, valves, throttle shaft and lever.



STROMBERG "WW" (DODGE) DOWNDRAFT CARBURETOR

STROMBERG WW (BUICK) CARBURETORS

BUICK — **Stromberg Carburetor No.**
1955 Series 40 (Dynaflow) — WW7-105

►CHANGES, CAUTIONS, CORRECTIONS

►*LEAN MIXTURE ON MODERATE ACCELERATION CORRECTION:* To eliminate this condition, install repair kit, Buick Part No 1392722, consisting of idle tubes, main metering jets and main discharge jets After installation completed, scribe letter "A" changing carburetor Code (found on air horn directly above float chamber) from 7-105 to 7-105A. *Carburetors with Code 7-105A have these new changes made*

DESCRIPTION: These carburetors are dual barrel type with each barrel having its own idle system, main metering system and throttle valve Automatic choke housing with fast idle cam is located on throttle body on opposite side from throttle lever. Two holes drilled in intake manifold into exhaust gas cross-over permit exhaust gas heat to enter passages around throttles to prevent ice formation around throttle area

ADJUSTMENTS: *Make all adjustments exactly as follows:*

Idle Setting—1¾ turns open Turn each adjusting screw in until it bottoms lightly then back off 1¾ turns

Idle Speed—450 RPM Hot Engine idle, with brakes applied and selector lever in neutral.

Pump Seasonal Setting—One hole in pump lever, three holes in throttle lever **(1955)** Set pump rod in long stroke hole for normal setting

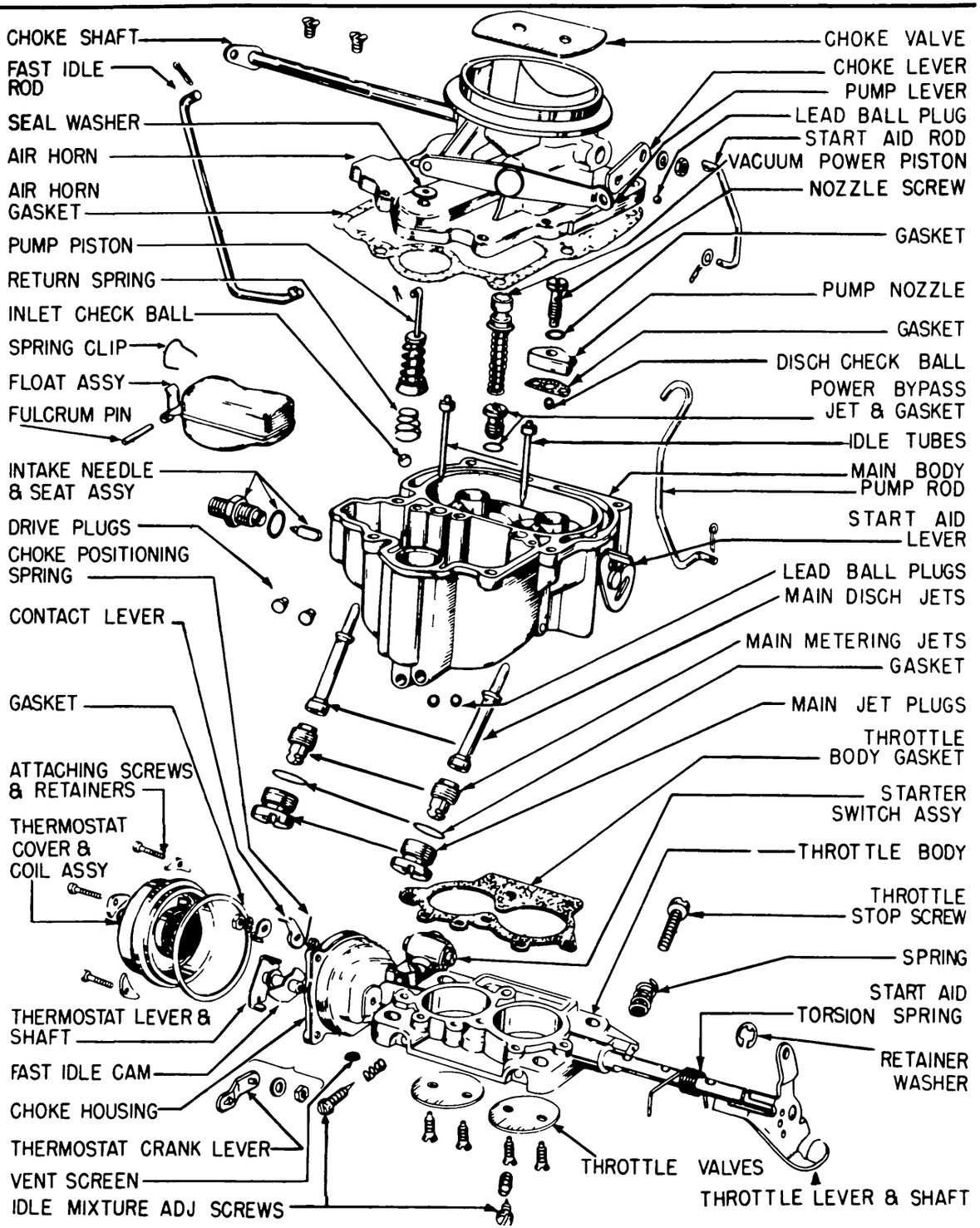
Pump Stroke Setting—**(1955)** 1" from top of plunger offset to bowl cover with pump rod in long stroke hole.

Float Level—3/16" distance from center of float with lip held firmly against needle valve, to top of bowl casting (gasket removed). Use Tool T-25569 placed at center of float and resting on bowl casting (gasket removed) Use Tool T-24733 to bend lever next to float as necessary

►*CAUTION: Make the following adjustments in the same sequence as given*

Fast Idle Speed Setting: Remove thermostat cover, insert one cover screw through loop at end of coil spring (Tool 25906) and attach screw to housing at upper screw position Hook other end of tool to ear of thermostat lever **T l must r main attached f r all adjust-**

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STROMBERG WW (BUICK) CARBURETORS (Cont.)

ments. Remove throttle stop screw and spring and reinstall screw without spring, close throttle valves (apply pressure on valves not on throttle lever) and turn screw in to point of contact with lever then continue to turn screw in for 5½-5¾ turns (1955) or 6 1/8-6 1/4 turns (1956) carburetors. With choke valve closed and throttle lever held against throttle stop screw, clearance between ear of contact lever and first step of fast idle cam should be. .0760" (No. 48 drill). To adjust bend ear on contact lever (Tool T-25863). *NOTE*–Ear must be parallel to throttle shaft, after bending.

Fast Idl Check n Car–At normal operating temperature, remove choke cover, open throttle slightly, rotate fast idle cam so that ear on the contact lever can come to rest on first step of fast idle cam. If ear on contact arm is properly positioned engine operating speed will be 1700 RPM.

Chok Positioning P riod: Turn throttle stop screw in 6½ to 7 turns from fully closed throttle position. At this position, the spring pick-up lever should be at the point of contact with the choke positioning spring. If pick-up lever does not contact spring or if pick-up lever has moved spring away from choke housing, adjust by bending ear on pick-up lever with long nose pliers.

Cam Position Setting: Open throttle to just clear fast idle cam. Move throttle to closed direction until ear on cam contact lever rests against fast idle cam. In this position ear on cam contact lever should just clear high step of fast idle cam. Clearance must not exceed .020". Bend fast idle rod to obtain correct clearance.

Choke Positioning Spring: Place weight Tool T-25864 on choke lever (center of arm), hold carburetor in vertical position open throttle fully and then close throttle until choke positioning spring just contacts thermostat housing at the lever shaft boss. Hold throttle in this position, clearance between choke valve and wall of air horn should be .159" (No. 21 drill). Adjust by bending ear of thermostat lever as required.

Start Aid Setting: With No. 53 drill (.0595") between choke valve and wall of air horn, hold choke valve closed against rod, make certain that start aid rod is at top of slot in start aid lever, then rotate throttle valves toward open position. Start aid torsion spring should just clear the ear on the start aid lock lever as throttle is opened. To adjust, bend start aid rod as required.

Wide Open Kick Setting: Open throttle valve while holding choke valve closed lightly. Choke valve should open just enough to insert No. 27 drill gauge (.1440") between the choke valve and wall of air horn. Adjust by bending ear on throttle lever. *NOTE*–Start aid rod must be at top of slot in start aid lever.

Starting Switch Setting (On Car): Same as for Carter WCFB except distance between marks should be 3/4-1 1/8".

STROMBERG "WW" (STUDEBAKER)

STUDEBAKER	Stromberg Model WWUVL-26
1953 V8 Model 4H.....	.Code 6-112, 6-112-A, 6-112B
1954 Early	6-112B
1954 Later (Eng. No. V296775 Up)	6-112C
1954 Land Cruiser (Later Cars)①	6-113
1955 (Early Cars)	WW 6-112-C, D, E, F
1955 (Later—exc. Ultra-Vista)	WW 6-115
1955 (Ultra-Vista—Auto. Trans.)	WW 6-116

①—Beginning Eng. No. 300436 (L.A. 8838927).

►CHANGES & CORRECTIONS

►***ADJUSTMENT CAUTION: Carburetor throttle linkage is new design and must be adjusted exactly as detailed below whenever linkage or settings have been disturbed.***

►***FUEL ECONOMY IMPROVEMENT AT HIGHER CAR SPEEDS (First Code 6-112 & 6-112A Carburetors):*** On cars where considerable operation is at higher car speeds and fuel economy appears lower than normal, the following changes can be made:

1) Cut off exposed end of fuel bowl vent tube in air horn so that end is **square.** ***(CAUTION***—Leave the tube as long as possible). This will provide better uniformity of fuel flow but affects fuel-to-air ratio at higher speeds which must be compensated for.

2) Disassemble carburetor (see OVERHAUL data), remove and discard original #65 Power By-pass Jet, install new #60 jet (Studebaker No. 531497). This jet will provide correct fuel-to-air ratio at higher car speeds.

3) Stamp letter "B" following code number on bowl cover to indicate above changes have been made.

►***CARBURETOR PRODUCTION CHANGE:*** Code 6-112B used in production on later cars have the square-end vent tube and #60 power by-pass jet used for improved fuel economy on earlier carburetors (above).

►***1953-54 COMMANDER HESITATION OR MISS (At 30-45 MPH. with constant throttle):*** May be caused by lean limit carburetor. If not corrected by proper engine tune-up, slightly richer main metering jets (.051" Studebaker No. 533401x5) may be installed.

►***1954 STUDEBAKER LAND CRUISER CARBURETOR NOTE (Code 6-113):*** This carburetor same as Code 6-112C used on other models except for slightly smaller Main Metering Jets (.047"). All settings and service procedures are the same for all models.

►***CARBURETOR POROUS FUEL BOWL CHECK (Draining of fuel from bowl when standing causing excessive engine cranking time):*** With carburetor on bench, remove bowl cover and float, power by-pass jet, pump discharge nozzle, and outlet valve check. Fill bowl with gasoline to normal fuel level. Blow compressed air through spark modifier channel. Air bubbles in fuel indicate a porous casting. Correct by replacing fuel bowl casting.

►***STUDEBAKER COMMANDER CARBURETOR PRODUCTION CHANGES & REPLACEMENT CAUTION:*** Later carburetors (beginning Code 6-112D) have different air flow system requiring different jet calibration and design has been changed to eliminate such parts as Pump Inlet Screen & Retainer Clip, Pump Plunger Link Felt Washer, Pump Inlet Ball Check Retainer Clip *See Stromberg Jet Specification Table for complete jet data.*

Replacement Carburetor Note—Later Code 6-115 carburetor is furnished as service replacement for earlier Code 6-112C, D, E, F carburetors.

DESCRIPTION: WWUVL-26 carburetors are dual barrel, downdraft type of new design with side air intake. Fuel system is similar to other Stromberg carburetors with usual Float System (single float), Idle System, Main Metering System, Power System (with vacuum piston operated power by-pass jet), and Accelerating System (pump operated by horizontal lever with duration spring type pump piston). Carburetor has Automatic Choke (with filtered air system as used on previous Studebaker Commander) and new design Fast Idle mechanism.

CARBURETOR ADJUSTMENT: ***Make all adjustments exactly as follows:***

Idle Setting: Turn both idle mixture adjusting screws in until they are lightly seated, then back each screw out exactly 1¾ turns. Start engine and allow it to run until normal operating temperature is reached. With engine at normal operating temperature (choke valve wide open, fast idle inoperative) and with air cleaner in place, adjust idle speed and mixture as follows:

Idle Mixture—First check and adjust idle speed. Turn BOTH idle mixture adjusting screws in evenly and slowly until engine begins to run unevenly, then turn screws out evenly and slowly until engine again runs unevenly, finally set both screws approximately halfway between these two points where smoothest idling performance is secured. Recheck engine idle speed. ***CAUTION***—BOTH adjusting screws must be turned equally and in the same direction when making above adjustment.

Idle Speed—With engine at normal operating temperature and fast idle cam in slow idle position so that idle adjusting button contacts lowest step of cam, adjust screw for correct idle speed:

Idle Speed

Model	Synchro-mesh	Auto. Trans.
1953	550-600 RPM	ℂ 500-550 RPM
1954	ℂ 550 RPM	ℂ 550 RPM
1955	ℂ 550-600 RPM	ℂ 550-600 RPM

①—With selector lever in "N" position.

Accelerating Pump: Three holes provided in throttle lever for pump connector rod engagement:
Center Hole—Normal operating conditions.
Inner Hole—Shorter stroke, less fuel discharge.
Outer Hole—Longer stroke, more fuel discharge.

Float Level: To check float setting, remove air horn and bowl cover and gasket, hold float lever lip firmly against intake needle valve to place float in closed-valve position. Measure float height by placing Float Level Gauge T-25569 (Studebaker No. J-5475) squarely on top edge of float bowl at center of float. If float not even with step on gauge, bend float lever lip next to float pin as required using bending tool T-24733 (Studebaker KMO-269-S5).

FLOAT SETTING

Studebaker WWUVL-26 ....3/16"①

①—Top of float below top edge of bowl.

Fast Idle Cam Setting: Check with fast idle cam in fast idle position with choke valve fully closed. In this position, one-half of diameter of button on throttle stopscrew should rest on highest step of fast idle cam (button should hang over so that half-diameter travel of fast idle cam will cause screw to drop down on to next-lowest step of cam). If button and cam contact not correct, bend ear on choke lever which contacts fast idle cam up or down as required using bending tool KMO-478. ***NOTE—Throttle stopscrew is adjusted as part of Idle Setting.***

NOTE—Fast Idle setting can also be checked as follows. With slow idle adjusting screw button resting on high step of fast idle cam, apply light closing pressure to choke valve, check remaining opening by inserting a #31 drill rod between lower edge of choke valve and air horn wall (choke opening should be .105-.135"). Adjust by bending ear on choke lever which contacts fast idle cam up or down, as required, using bending tool KMO-478.

Unloader (Dechoke) Setting: To check setting, hold choke valve closed tightly, open throttle valves to point where stop on throttle lever rests against stop on carburetor throttle body and choke valve is opened slightly. Check choke valve opening by inserting #1 drill rod (.228") between lower edge of choke valve and air horn wall. If opening not correct, adjust by bending ear on throttle lever which contacts choke lever using bending tool KMO-478.

Automatic Choke Setting: Centered (arrow on edge of cover aligned with boss on air-cleaner end of housing). Adjust by loosening heat tube connection and three retaining screws and rotating cover and thermostat assembly.

CAUTION—Use care not to rotate or distort cover when tightening heat tube connection.

Thermostat Assembly Identification—Stamped "29."

Throttle Return Check (Cars with Automatic Transmission): Consists of a dashpot unit mounted on the carburetor with the dashpot plunger contacting the throttle lever during the last 3/16" of throttle movement toward closed throttle position. Dashpot will prevent too-rapid closing of throttle and keep engine from stalling. *See Throttle Linkage Adjustment under CARBURETOR on car model page.*

OVERHAUL: Disconnect pump operating rod from throttle lever and pump operating lever and remove rod. Take out air horn attaching screws, lift air horn assembly straight up and off main body, remove spring from end of pump plunger (spring may remain in pump cylinder and can be lifted out). Lift off air horn gasket.

Air Horn Disassembly—Disconnect pump plunger stem from pump operating lever, remove pump assembly. Take out pump lever fulcrum screw (screw has left-hand thread), remove spring washer and lift lever off. Remove felt washer, plain washer and retainer spring from pump plunger stem (duration spring can also be removed by compressing spring and sliding retainer out of groove in stem). Clean up staking around vacuum piston cylinder edge, pull vacuum piston assembly out of cylinder. Take out choke cover retainer screws, remove cover and coil assembly and gasket. Use tool T-25047 to remove nut and lockwasher from end of choke shaft, disengage choke piston link from shaft, remove piston and link assembly. Take out choke valve retaining screws, remove valve, slide choke shaft and lever assembly out of air horn.

Main Body Disassembly—Lift both idle tubes out, invert body and take out four throttle body attach-

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STROMBERG "WW" STUDEBAKER (Cont.)

ing screws (recessed in bottom face of throttle body), lift throttle body off and remove gasket. Remove both main metering jet plugs and gaskets, use tool T-24924 to remove main metering jets, use tool T-24967 to remove main discharge jets (screw tool into base of jets, pull jets out of body recess). Take out pump discharge nozzle screw and gasket, lift discharge nozzle and gasket off, invert body to drop out discharge check ball. Unscrew fuel inlet fitting on side of bowl, remove retainer and fuel strainer from within fitting. Take out float hinge pin spring clip, remove float and hinge pin assembly, tip casting to remove fuel intake needle. Remove power by-pass jet and gasket. Remove pump intake strainer screen retainer and strainer screen from intake passage at side of pump cylinder. Remove pump intake check ball retainer from bottom of pump cylinder, invert body to drop out the intake check ball. *CAUTION*—Retainer not used on later carburetors and care must be used not to lose ball which will drop out whenever carburetor inverted.

Throttle Body Disassembly—Remove both idle adjusting screws and springs. Do not disturb throttle valve and shaft assembly unless required for replacement of parts. If necessary to remove valves, first mark each valve and mark throttle body correspondingly to insure re-installing valves in same barrel, take out valve attaching screws, slide valves out, slide throttle shaft and lever assembly out of throttle body.

Cleaning & Inspection: Clean all castings and parts thoroughly with Benrix Metalclene or equivalent cleaning solution, rinse with solvent, blow out all passages and dry parts with air. Make certain all carbon and gum deposits completely removed. Inspect all parts for wear and damage.

Reassembly: Use all NEW gaskets. Re-install parts in reverse order of disassembly procedure above and note following important points:

Throttle Valve Installation—After throttle shaft inserted in throttle body, install valves in accordance with markings, insert new screws loosely. Close throttle tightly, centralize valves by tapping lightly to secure best closing position, tighten screws securely and stake the screws.

Accelerating Pump Discharge Nozzle—Install discharge check ball in discharge passage, then install nozzle assembly with new gasket, use new gasket on attaching screw and tighten screw securely.

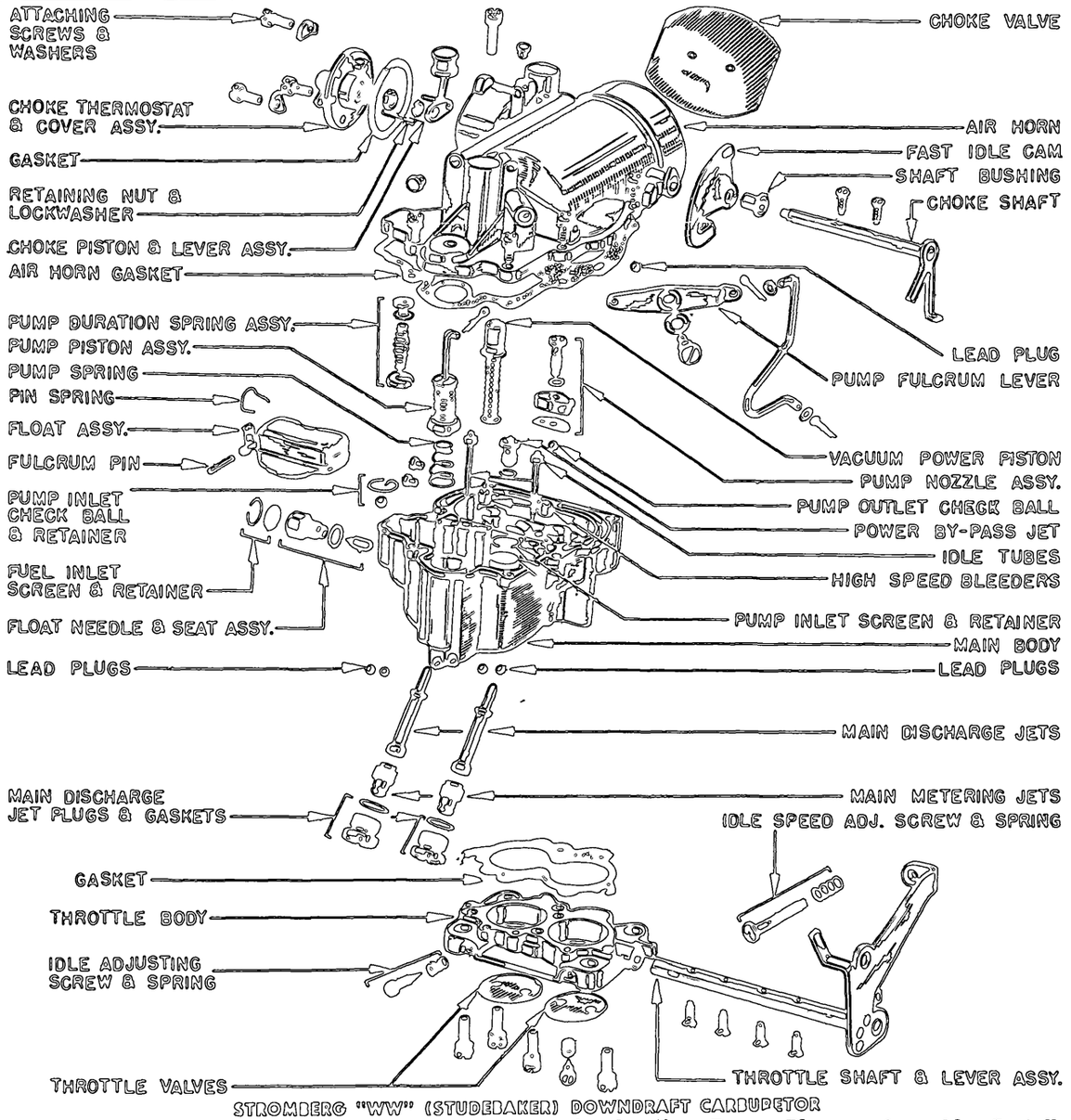
Accelerating Pump Intake Check & Strainer—Install intake check ball in recess in bottom of pump cylinder, use tool T-25360 to seat the ball retainer clip. Install strainer screen retainer clip

Main Metering Jet Assemblies—Use remover tool T-24967 to seat main discharge jets firmly in main body, tighten main metering jets securely using tool T-24924. Use new gaskets on main metering jet plugs and tighten plugs securely.

Vacuum Power Piston—After installing piston assembly in air horn, seat retaining washer and stake washer in place by prick-punching the edge of the cylinder at two points.

Choke Valve & Shaft Assembly—Assemble choke shaft and choke valve and install new screws loosely, close valve tightly, centralize valve by tapping lightly to secure best closing position, tighten screws securely and stake the screws. Install choke piston in cylinder and engage piston lever on choke shaft. Install spacer, lockwasher, and retainer nut, use tool T-25047 to tighten nut securely. Check choke valve for free operation.

Automatic Choke Assembly—Install thermostatic coil assembly and gasket with coil hook downward, rotate cover counter-clcokwise in direction of arrow on cover until reference mark on cover is aligned with boss on housing, tighten retainer screws securely.



STROMBERG "WW" (STUDEBAKER) DOWNDRAFT CARBURETOR

Accelerating Pump Plunger Assembly—Install duration spring and washer on piston rod, compress spring and engage retainer in groove in rod. Install retainer spring, plain washer, and new felt washer on piston rod. Install plunger assembly in air horn after air horn gasket has been installed. When installing air horn on main body, place pump spring on end of pump plunger, guide piston into cylinder.

SERVICE PARTS: Gasket Set—Stromberg No. 382362. Repair Kit—Stromberg No. RK-175 (All carburetors except Code 6-116).

STROMBERG "WW" CARBURETOR JET SPECIFICATIONS

Car Model	Year	Carb.	Main Metering Jet Size	Main Metering Jet Part No.	By-Pass Jet Size	By-Pass Jet Part No.	Main Discharge Jet Size	Main Discharge Jet Part No.	High Speed Bleed Size	High Speed Bleed Part No.	Idle Tube Size	Idle Tube Part No.	Idle Air Bleed Size	Idle Air Bleed Part No.	Pump Discharge Nozzle Size	Pump Discharge Nozzle Part No.
BUICK																
40 (Dynaflow)	1955	WW7-105	.053"	P-19442	(13)		#28-36		#70		#69		(9)		#66	
40 (Dynaflow)	1955	WW7-105A	.054" (10)	P-19442	(13)		#28-36		#70		#66		(9)		#66	
DODGE																
V8	1953	WW (8)	048"	386208	#61	P-21198		386307	#70	P-23985	#66	386197	(1)		#68	P-24594
V8	1954	WW (3)	.048"	386208	#61	P-21198	--------	386207	#70	P-23985	#66	386197	(11)		#68	P-24594
D56 Synchro-mesh	1955	WW 3-124	045"	386208	#62 (43)	386951		386943	#70	P-23985	#64	386924	(42)		#68	P-24594
D56 Overdrive	1955	WW 3-125	045"	386208	#62 (43)	386951		386943	#70	P-23985	#60	386924	(42)		#68	P-24594
D56 PowerFlite	1955	WW 3-126	.045"	386208	#62 (43)	386951		386943	#70	P-23985	#64	386924	(42)		#68	P-24594
D55-1,2 Synchro-mesh	1955	WW (14)		(45)		(24)		386949	#70	P-23985	#60	386939	(44)		#68	P-24594
D55-1,2 Overdrive	1955	WW (15)		(46)		(25)		386949	#70	P-23985	#60	386939	(44)		#68	P-24594
D55-1,2 PowerFlite	1955	WW (16)		(47)		(26)		386949	#70	P-23985	#60	(40)	(41)		#68	P-24594
D55-3 Synchro-mesh	1955	WW (17)		(21)		(27)		386207	#70	P-23985	#60 (30)	386939	(41)		#68	P-24594
D55-3 Overdrive	1955	WW (18)		(22)		(28)		386207	#70	P-23985	#60 (31)	386939	(41)		#68	P-24594
D55-3 PowerFlite	1955	WW (19)		(23)		(29)		386207	#70	P-23985	#60 (32)	386939	(33)		#68	P-24594
STUDEBAKER																
Commander	1953	WWUVL-26	049"	386272	#60 (10)	386418		386207	(2)			386414	383203			386416
Commander	1954	WW (4)	.049"	386272	#60	386418	--------	386207	#68	P-24315	#68	386414	(12)		#66	386416
Land Cruiser	1954	WW (5)	.047"	386272	#60	386418	--------	386207	#68	P-24315	#68	386414	(12)		#66	386416
Commander	1955	WW (20)	.050"	(34) 386272	#60	P-24674		(39)	#68	P-24315	#68	386414	(35)		#66	386416
Commander (37)	1955	WW 6-115	050"	386272	#60	P-24674		386839	#68	P-24315	#68	386414	(36)		#66	386416
Commander (38)	1955	WW 6-116	.048"	386272	#60	P-24674		386839	#68	P-24315	#68	386414	(36)		#66	386416

(1)—#70 In Air Horn, #70 in Main Body

(2)—Part No P-24315.

(3)—Use Code No. 3-108A for cars with Synchro-mesh Trans-
Use Code No. 3-109A for cars with Overdrive Trans
Use Code No. 3-105A for cars with PowerFlite Trans
Use Code No. 3-106A for cars with Gyromatic Trans

(4)—Code Nos. 6-112B & 6-112C

(5)—Code No. 6-113

(8)—WW Code No 3-108 for cars with Synchro-mesh Trans.
WW Code No 3-109 for cars with Overdrive Trans.
WW Code No. 3-105 for cars with Fluid Drive & Overdrive
WW Code No 3-106 for cars with Gyromatic Trans.

(9)—#36 Main Body, #42 Air Horn.

(10)—Use .052" No. P-19442 above 3500 ft altitude.

(11)—#70 in Air Horn, #48 in Main Body.

(12)—#58 in Main Body (Part No. 383203).

(13)—Two #57.

(14)—Code 3-131, A, B, C, D.

(15)—Code 3-132, A, B, C, D.

(16)—Code 3-133, A, B, C D, E.

(17)—Code 3-120, A, B, C, D.

(18)—Code 3-121, A, B, C, D

(19)—Code 3-122, A, B, C, D, E

(20)—Code 6-112C, D, E, F.

(21)—.053" (3-120, A), .052" (3-120B, C, D), #386208.

(22)—.053" (3-121, A), .052" (3-121B, C, D), #386208.

(23)—.053" (3-122, A), .052" (3-122B, C, D, E), #386208.

(24)—#55 (P-23676) for 3-131, A, B, #66 (P-23606) for 3-131C, D.

(25)—#55 (P-23676) for 3-132, A, B, #66 (P-23606) for 3-132C, D.

(26)—#55 (P-23676) for 3-133, A, B, C, #66(P-23606) for 3-133D, E.

(27)—Two #55 (386937) for 3-120, A, #54 (P-21197) for 3-120B, C, D.

(28)—Two #55 (386937) for 3-121, A, #54 (P-21197) for 3-121B, C, D.

(29)—Two #55 (386937) for 3-122, A, #54 (P-21197) for 3-122B, C, D, E

(30)—Supersedes #68 used on 3-120.

(31)—Supersedes #68 used on 3-121.

(32)—Supersedes #68 used on 3-122.

(33)—#48 Main Body, #60 Air Horn (3-122, A, B)
#45 Main Body, #60 Air Horn (3-122C, D, E)

(34)— 049' (6-112C, E), 048' (6-112D) Use 050' for service.

(35)—#70 Air Horn, #48 Secondary Side.

(36)—#60 Air Horn, #48 Secondary Side

(37)—Comm. (Except Custom Sedan and Auto Trans.)

(38)—Comm (Custom Sedan with Auto. Trans.).

(39)—386207 (6-112C), 386839 (6-112D, E).

(40)—386939 (3-133, A, B, C), 386197 (3-133 D, E).

(41)—#56 Main Body, #36 Throttle Body.

(43)—Restriction in Main Body.

(44)—#45 Main Body, #60 Air Horn.

(45)—.056" (3-131), .055" (3-131A, B), .053" (3-131C, D) #386208.

(46)—.056" (3-132), .055" (3-132A, B), .053" (3-132C, D) #386208.

(47)—.056" (3-133,A), .055" (3-133B, C), .053" (3-133D, E), #386208.

STROMBERG DUAL "WW" AUTOMATIC CHOKE

DODGE V8	Carburetor Code No.
1953-54	WW3-106, A; 108, A; 109, A
1954	WW3-105, A
STUDEBAKER	
1953-55 Comm. V8	WW6-112, A, B, C, D, E, F
1953-55 Comm. V8	WW6-115
1954 Comm. V8	WW6-113

DESCRIPTION: Automatic choke consists of a thermostatic coil and a vacuum piston assembly linked directly to the choke valve shaft. This assembly is similar to design used on other Stromberg carburetors. Two types of Fast Idle mechanism are used:

Dodge Fast Idle—"External Tooth" type. Consists of a fast idle cam and lever assembly mounted under a cover plate on the opposite side of the air horn from the thermostatic coil assembly. Fast idle cam is mounted on a bushing on the choke shaft and is rotated by the choke shaft lever through a torsion spring. Fast idle loose lever is pivoted on a bushing on the throttle valve shaft with the upper end bearing against the fast idle cam. A lug at the center of the lever serves as a stop for the throttle stopscrew so that the throttle valve position is controlled by the position of the stepped fast idle cam. *NOTE*—A second lug on the loose lever controls the "wide-open kick" or unloader action.

Studebaker Fast Idle—"Internal Tooth" type. Consists of a large cam segment (with steps on inner edge) mounted on the opposite side of the air horn from the thermostatic coil assembly. The throttle stopscrew is mounted on an extension of the throttle lever so that the contact button on the end of the stopscrew contacts the fast idle cam directly. Fast idle cam is mounted freely on a bushing on the choke shaft and tends to rotate to the open position as the choke valve opens.

ADJUSTMENT: *Make all adjustments following*

Automatic Choke Setting: To adjust setting, loosen heat tube connection on cover (see Caution below), loosen three retainer screws around cover rim, rotate cover until mark on scale at cover rim is aligned with boss on edge of housing, tighten retainer screws and heat tube connection.

▶*CAUTION—When loosening and tightening heat tube connection, hold fitting on cover with a wrench to prevent rotating or distorting cover assembly.*

Automatic Choke Setting

All Models	Centered

Fast Idle Setting: *Each model adjusted differently:*

Dodge—Insert **first step** of Gauge T-25570 between upper (short) side of choke valve and air horn wall, hold choke valve lightly against gauge and slowly close throttle valve. Top end of fast idle loose lever should just enter first step of fast idle cam. Adjust by bending fast idle cam lever ear as required (*CAUTION*—hold counterweight with thumb while bending ear).

Studebaker—Hold throttle valve open and close choke valve fully so that fast idle cam moves to fast idle position, then close throttle valve. In this position, one-half of the diameter of the button on the end of throttle stopscrew should rest on the highest starting step of the fast idle cam. Adjust by bending choke lever ear (which contacts fast idle cam) up or down as required.

Unloader "Wide-Open Kick" Setting (All Models): To check setting, hold choke valve closed lightly, move throttle valve to wide open position and hold in this position, measure choke valve opening by inserting gauge of correct size (see table below) between edge of choke valve and air horn wall. Adjust by bending ear on choke lever as required. *NOTE*—The unloader ear is the one which contacts the lug on the fast idle loose lever (Dodge) or lug on throttle lever (Studebaker).

Unloader Wide-Open Kick Setting

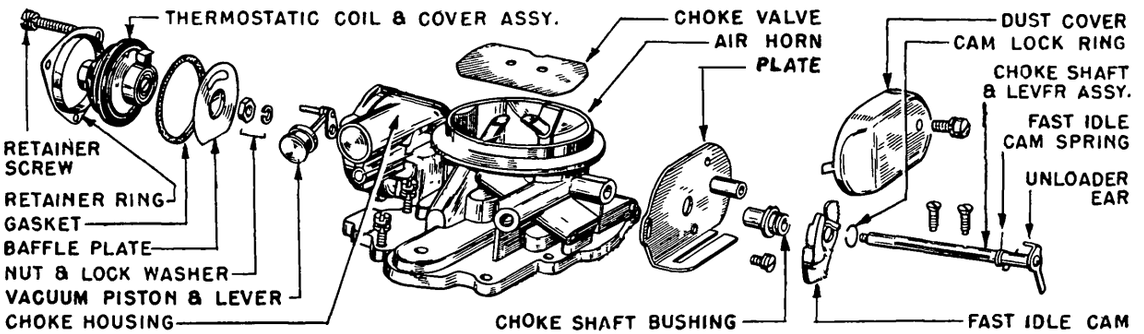
Car Model	Gauge No. & Size
Dodge	T-25570① (.150-.180")
Studebaker	#1 drill (.203-.265")

①—SECOND step of gauge

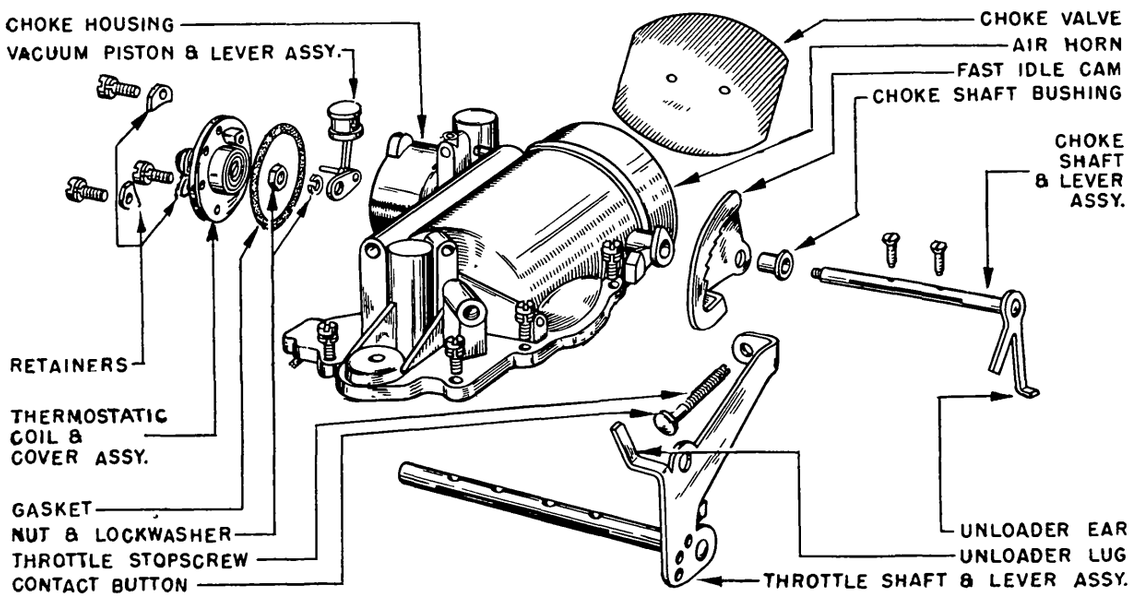
REASSEMBLY: Remove retainer screws and clips from around thermostatic coil cover (retainer ring on Dodge), lift off thermostatic coil and cover assembly, gasket, and baffle plate. Use tool T-25047 to remove nut and lockwasher from end of choke shaft. Lift vacuum piston lever off end of choke shaft and remove lever and piston assembly. Mark choke valve location on shaft (scribe valve on both sides of choke shaft), take out attaching screws and remove valve. On Dodge, remove dust cover over fast idle mechanism on opposite side of air horn. On all models, slide choke shaft and lever assembly out of the air horn (CAUTION—on Dodge, disengage fast idle cam spring from fast idle cam). On Dodge, unhook spring from fast idle loose lever, then remove fast idle cam lock ring and remove cam. On Studebaker, fast idle cam is retained by choke shaft bushing.

Cleaning & Inspection: Clean all metal parts with Bendix Metalclene or equivalent cleaner. Blow out all passages with air. Inspect all parts for wear or damage with particular attention to shaft wear in air horn, fast idle cam wear on steps and thermostatic coil distortion.

REASSEMBLY: Use all new gaskets. Install all parts in reverse order of disassembly procedure above and make adjustments as detailed under ADJUSTMENTS.



STROMBERG WW (DODGE) AUTOMATIC CHOKE



STROMBERG WW (STUDEBAKER) AUTOMATIC CHOKE

TILLOTSON MODELS DY-1A, DY-9A, DY-9B, DY-9C

CROSLEY	Tillotson Model No.
1941-42 CB41 & CB42	DY-1A
1946-47-48 CC	DY-9A, DY-9B
1949-51 CD & VC	DY-9C

TYPE: Single barrel, plain tube, downdraft type with high speed (Main), low speed (Idle) adjustments. Carburetor is of special design with concentric float bowl and double floats which allow carburetor to be operated in tilted positions

Fuel System (Idling & Low Speed):—Fuel is metered by restriction at lower end of Idle Tube and flows up through tube (located in main nozzle—see illustration) where it is mixed with air admitted through Idle Air Bleed hole in side of idle tube. Fuel mixture is controlled by Idle Adjusting Screw (at upper end of tube) and flows through Idle Fuel Supply Channel in carburetor casting to Idle Discharge Ports at the throttle edge. For closed throttle idling, all fuel is discharged through lower port. As soon as the throttle is opened for low speed running, additional fuel is discharged through upper port.

Cruising & High Speeds (& Wide Open Throttle operation)—When throttle valve is opened, this causes reduced suction on idle ports and increased suction on main nozzle so that fuel is discharged at main nozzle and idle system drops out. Fuel for main nozzle is metered by Main Adjustment Screw and is mixed with air admitted through holes in nozzle from main nozzle air bleed channel opening into air horn above venturi. This air is metered by Main Nozzle Air Bleed Restriction located in air bleed channel at top of carburetor main casting.

ADJUSTMENT: ***CAUTION—Make adjustments in order as follows:***

Preliminary Adjustment: Close both the Main Adjustment Screw and Idle Adjustment Screw by turning to right or clockwise until they are lightly seated, then back screws out as indicated in table. This will allow engine to be started and warmed up. After engine thoroughly warm, make final adjustments as directed below.

Carburetor	Main Adjustment Setting	Idle Adjustment Setting
Crosley DY-1A, DY-9A, DY-9B	2 turns open	1 turn open
Crosley DY-9C	2¾ turns open	1¼ turns open

Main (High Speed) Adjustment:—With engine warm and running, open throttle approximately ⅓ of full travel. Turn Main Adjustment Screw in or clockwise slowly (¼ turn at a time) until engine slows down due to lack of fuel, then back screw out very slowly (⅛ turn at a time) until maximum speed is secured. Correct setting approximately 1½-1¾ turns open (DY-1A, DY-9A, DY-9B), 2-2⅛ turns open (DY-9C).

Idle (Low Speed) Adjustment:—Set throttle lever stopscrew so that engine runs at faster than normal idling speed. Close throttle. Turn Idle Adjustment Screw in or clockwise to lean mixture until engine begins to miss, then back screw out slowly until engine fires smoothly. Clear manifold by opening throttle momentarily, recheck idle setting. Correct setting approximately 1 turn open.

Idle Speed—Set throttle stopscrew for warm idle speed of 700 RPM. or 7-8 MPH.

PERFORMANCE: Should be satisfactory for operation at altitudes less than 5000 feet if adjustments correctly made as directed above. If performance not satisfactory, check adjustments and tune up engine (see car model page for tune up data). See Trouble Shooting Section below.

FLOAT LEVEL: Fuel Level—Should be 23/32" below top edge of float bowl or just below lower edge of inspection hole on side of float bowl (remove inspection hole plug to check level).

►***CAUTION***—Before removing Upper Body Assembly to check or adjust float level, take out Idle Adjustment Screw and remove Idle Tube from adjustment screw hole. Idle Tube and Main Nozzle will be damaged if this is not done.

Float Level—To check, invert upper body assembly (air horn and float bowl cover with complete float mechanism), measure from face of body gasket to top of raised seam on each float. Distance should be 1 27/64". To adjust, bend each float lever arm **using extreme care to secure equal setting for both floats.**

FAST IDLE (DY-9C): Consists of adjustable rod linking fast idle lever on choke valve shaft to throttle lever so that throttle valve is opened to fast idle position when choke valve closed for cold starting and warming-up.

Adjustment—Back off throttle lever stopscrew so that throttle valve tightly closed. Hold throttle valve in this position, hold choke valve wide open, loosen setscrew on adjusting collar on fast idle connector rod (at throttle lever trunnion), position collar on rod so that it is against the trunnion, tighten setscrew.

►***CAUTION***—**Reset idle speed after making this adjustment.**

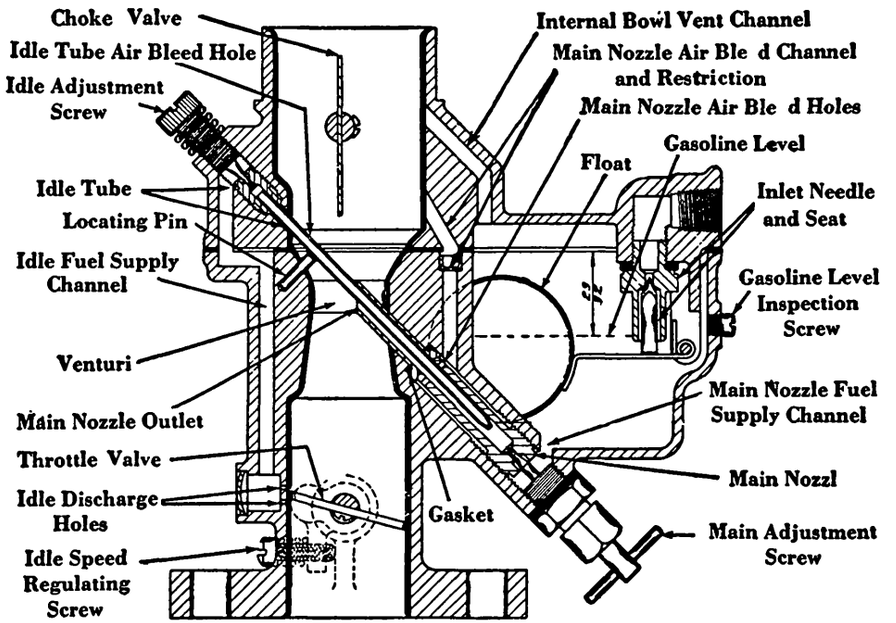
CHOKE:—Plain butterfly type. Adjust choke linkage so that choke valve is wide open when dash control button is pushed all the way in.

TROUBLE SHOOTING:—**Engine Stalls**—Check idle speed setting, tighten throttle stop retaining screw, check idling or low speed adjustment, see that idle adjustment screw not ringed, clean idle tube and idle fuel channels with air, check float level (see Fuel Level Note below).

Flatness on Acceleration—Check Idle (Low Speed) and Main (High Speed) Adjustments, check float level (if engine loads up, see Fuel Level Note below), clean idle tube and idle fuel channels with air.

Fuel Level Note—If fuel level in float bowl rises above setting, dismantle needle valve, clean needle valve and seat with a soft clean cloth, reseat needle valve by tapping with finger several times while turning needle around. Reset float level. If level not maintained, install new needle valve and seat.

SERVICING:—Before removing Upper Body Assembly (air horn and float bowl cover), remove Idle Adjustment Screw and spring, unscrew and remove Idle Tube through adjusting screw hole—this is important to avoid damage to tube and nozzle when upper assembly lifted off. Idle tube positioning pin in main



body casting is not removable. Main nozzle outlet and gasket are staked in main body casting and cannot be removed (nozzle base can be removed through main adjustment screw plug hole after adjustment screw assembly removed). Blow out all jets and channels with compressed air—do not use wires or drills to clean passages. See that float bowl vent to air horn is open and clean.

Reassembly—Replace all worn or damaged parts with genuine Tillotson service parts. Use all new gaskets and replace parts in same order as removed. See that nozzles and plugs are tight. Set float level and adjust carburetor.

SERVICE PARTS: Gasket Set—Tillotson Part No. 07144.

Repair Parts Kit (incl. Gaskets)—Tillotson No. 08196 (DY-9A, DY-9B), No. 08613 (DY-9C).

Tillotson Jet Calibration

Part	Tillotson No.	Part	Tillotson No.
Throttle Valve (All)	06232	Main Adj. Screw (DY-1A)	03076
Idle Tube (DY-1A)	06415	(DY-9A, 9B)	03076
(DY-9A, 9B, 9C)	07009	(DY-9C)	04185
Main Nozzle (DY-1A)	06413	Float (All)	06436
(DY-9A, 9B, 9C)	07973	Inlet Needle & Seat (DY-1A)	06287
Idle Adj. Screw (All)	06336	(DY-9A, 9B, 9C)	07440

ZENITH 28AVX9R & 228AV10

Model 228AV-10, No. 10760①

Willys Jeep 4 Cyl. Station Wagon 4-63, Jeepster VJ-3, & 6 Cyl. Station Wagon & Sedan 6-63 (1948-50).
①—This Outline No. stamped on metal identification disc pinned on bowl cover (2nd. number on disc is car manufacturers part number). Use in ordering parts.

DESCRIPTION: Single barrel, plain tube, downdraft type with double venturi. Carburetor has vacuum controlled power jet valve system and positively operated accelerating pump linked to throttle lever.

Model 28AVX9R—This model has built-in governor and is similar to other "28 Series" carburetors except for the governor mechanism.

▷*CARBURETOR IDENTIFICATION*—The "228 Series" and "28 Series" carburetors are similar except that the 228 Series have two-hole idle system with idle adjusting screw located in throttle body which controls fuel discharge from lower (closed throttle) idling port.

Fuel System: Consists of an Idle Fuel System, High Speed System (Main Jet System & Power Jet System), and Accelerating Pump System which operate as follows:

Idle Fuel System—Supplies fuel for idling and driving up to approximately one-fourth throttle opening. Fuel is taken from main jet well (below main discharge jet) and is metered by calibrated hole in side of Idling Jet. At this point it is mixed with air admitted through permanent air bleed opening in carburetor air horn. Fuel mixture is then taken down through passage to idle discharge ports at throttle edge. Idle adjusting screw controls fuel mixture discharge through lower (closed throttle) idle port. As soon as throttle is cracked open, additional fuel is discharged through upper idle port

High Speed System—Supplies fuel for driving range above approximately one-fourth throttle opening. Consists of a discharge nozzle or ring slot in throat of secondary venturi through which fuel mixture is discharged into the airstream. This fuel mixture is supplied by Main Jet System (¼ to ¾ throttle opening) and is supplemented by Power Jet System (¾ to full throttle opening) as follows:

Main Jet System—Fuel is metered by Main Jet in bottom of float bowl and flows through Main Discharge Jet where it is mixed with air admitted through Well Vent Jet opening in carburetor air horn. Air enters fuel stream through bleed holes in side of main discharge jet. Fuel mixture then goes to discharge nozzle.

Power Jet System—Consists of a power valve controlled by a spring-loaded vacuum piston assembly which by-passes fuel directly to the main discharge jet. Valve is normally closed (piston held up against spring tension by manifold vacuum) but is opened by the piston stem whenever manifold vacuum drops off (sustained high speed, wide open throttle full-load operation, or sudden acceleration) permitting fuel to flow directly to the main discharge jet.

Accelerating Pump System—Pump arm and plunger stem are positively operated by throttle lever (pump piston is spring-loaded on plunger stem to prolong discharge on sudden throttle openings). Fuel is drawn into pump cylinder through intake check valve in bottom of cylinder when throttle is closed, and is discharged through outlet ball check valve and Accelerating Jet into the throat of the primary (large) venturi when the throttle is opened. This fuel flow through the pump passages closes the Air Vent Check Valve (disc valve directly above outlet ball check) which vents the pump system when it is not in operation.

IDLING ADJUSTMENT: Adjust only when engine is warm (choke valve wide open, fast idle inoperative). Set throttle lever stopscrew for idling speed of 600 RPM. or 8 MPH. Adjust Idle Adjusting Screw for smooth idle, recheck idle speed.

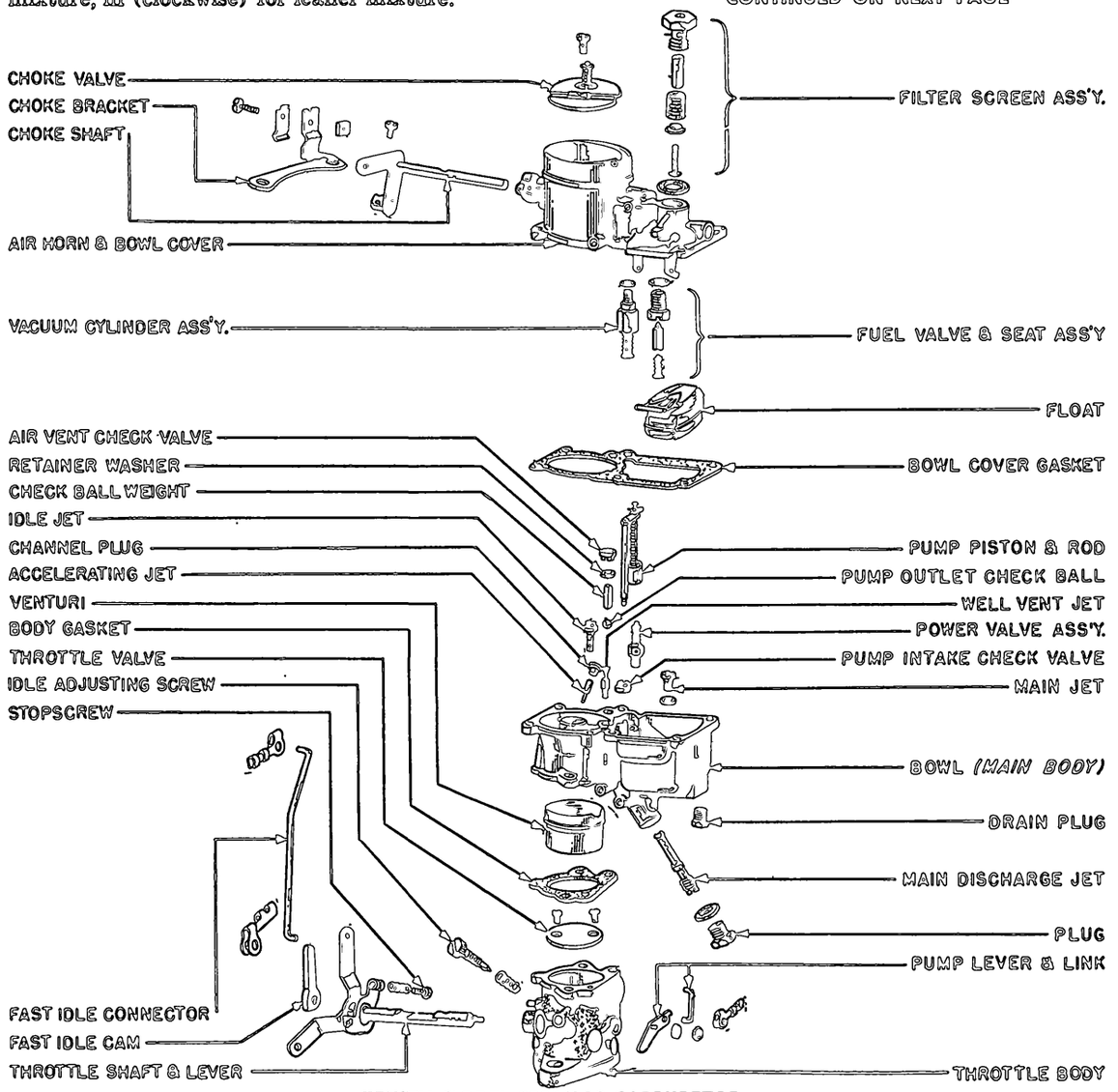
▷*CAUTION*—Idle screw controls fuel mixture and should be turned out (counter-clockwise) for richer mixture, in (clockwise) for leaner mixture.

PERFORMANCE: Should be satisfactory if idling adjustment correctly made. Main metering jet is fixed type and should not be changed for normal operating conditions. See Jet Calibration Table below.

ACCELERATING PUMP: Pump stroke is adjustable for seasonal requirements by engaging hairpin cotter in correct groove of pump plunger stem (directly above pump rod arm—accessible by removing air horn and bowl cover assembly) as follows:

Upper Groove—Minimum Stroke (hot weather).
Center Groove—Medium Stroke (normal operation).
Lower Groove—Maximum Stroke (cold weather).

CONTINUED ON NEXT PAGE



ZENITH MODEL 228AV-10 CARBURETOR

ZENITH 28AVX9R & 228AV10 (C ntinued)

FLOAT LEVEL: 45/64" plus or minus 1/64" from upper edge of float seam at free end of float to gasket seat on bowl cover with float and bowl cover assembly inverted. When checking float level, remove gasket, invert assembly and allow float to hang freely. Adjust by bending float lever at point next to float body (hold hinge lever firmly with thin-nosed pliers while bending).

►*CAUTION—Do not compress spring in valve stem which will cause incorrect float setting. Allow float to hang freely on inverted cover when checking float level.*

FAST IDLE: Consists of a fast idle cam linked to the choke valve lever. Cam serves as the stop for the throttle lever stopscrew and opens the throttle valve to a fast idle position when choke valve is closed for starting. No adjustment is required—see choke valve data below.

►*CAUTION—Fast idle cam must be in hot or slow idle position (stopscrew resting on flat of cam) when idle speed is adjusted.*

CHOKE: Choke valve is manually controlled and has poppet type relief valve. Adjust control cable so that choke valve is fully closed when choke button is pulled out, and fully open when button pushed in. Check fast idle rod and make certain that fast idle lever on choke valve shaft is positioned so that it allows choke valve to close fully with fast idle cam in fast idle position.

FUEL FILTER: Consists of a filter screen assembled on filter head (large hexagonal plug on bowl cover). Filter screen can be removed for cleaning by taking out screw in lower screen retainer.

DISASSEMBLY OF CARBURETOR: Each section should be separated and disassembled as follows:

Air Intake Body (Air Horn & Bowl Cover): Remove fuel filter assembly by taking out large hexagonal plug on bowl cover, disconnect fast idle connector rod, remove six screws attaching air intake body to fuel bowl assembly. Lift air intake body up slightly, loosen gasket from fuel bowl, lift air intake body straight up to avoid damage to float, remove gasket. Remove float axle (use screwdriver to press against axle at slotted side of hinge bracket, force axle through bracket), remove float, lift out needle valve. Remove fuel valve seat and fibre washer (C161-85 wrench). Remove vacuum cylinder assembly and fibre washer (C161-10 wrench). Take out choke valve attaching screw (CAUTION—file riveted end of screw flat before turning screw out to avoid stripping threads), lift out choke valve, slide choke valve shaft and lever assembly out.

Fuel Bowl (Main Body Casting): Remove main discharge jet plug and gasket on bottom of fuel bowl, disconnect accelerating pump link retainer and remove pump link, remove accelerating pump piston and rod assembly from pump cylinder (CAUTION—file burrs and rough spots off link connector end of pump rod before attempting to remove assembly). Take out two screws attaching fuel body to throttle body and separate these sections. Lift out venturi and gasket. Remove all jets, check valves, and channel plugs as follows:

Idling Jet—Use a screwdriver.

Well Vent Jet—Use special wrench C161-80.

Main Jet & Washer—Use a screwdriver.

Power Jet Valve Assy.—Use wrench C161-9.

Main Discharge Jet—Use wrench C161-1.

Pump Intake Check Valve—Bend back ears on upper end of valve, remove valve disc, screw special check valve tool, C161-5, securely into check valve body, remove valve by moving sliding weight on tool up against stop bar sharply.

Pump Air Vent Check Valve & Outlet Check Valve—Remove air vent check valve with tool C161-5 (see intake check valve removal above), invert assembly and remove retainer washer, weight, and ball.

Fuel Channel Plugs—Remove four lead channel plugs and accelerating jet channel plug by center-punching each plug and drilling #46 hole through plug (CAUTION—use care not to damage casting when drilling), pull plugs with special extractor tool C161-21 (lead plugs), C161-15 (accelerating jet channel plug).

►*CAUTION*—Do not remove idle channel bushing or nozzle bushing (these parts pressed in and need not be removed for carburetor servicing).

Throttle Body: Remove pump lever nut on end of throttle shaft, pull lever off shaft. Take out two screws in throttle valve (CAUTION—File riveted end of screws flat before turning screws out to avoid stripping threads), remove valve, slide throttle shaft and lever assembly out. Remove idle adjusting screw and spring.

CLEANING & INSPECTION OF PARTS: Remove corrosion and dirt from passages in fuel bowl casting with a ⅛" drill (grind cutting edge blunt to avoid damaging casting). Clean all metal parts thoroughly with cleaning solution and rinse in solvent. Blow out all passages with air. Inspect all parts for wear and damage, check jets and other calibrated parts for correct size (see Zenith Jet Specifications), use NEW PARTS as listed below when reassembling carburetor.

►*CAUTION—Do not use wire or drills to clean jets.*

New Parts—Install following new parts each time carburetor is overhauled (in addition to other parts being replaced because of wear or damage): Fuel Valve & Seat Assy., Power Jet Valve, Vacuum Cylinder Assy., Pump Intake Check Valve and Air Vent Check Valve, all Gaskets. NOTE—These parts included in Service Parts Kit.

REASSEMBLY OF CARBURETOR: After cleaning and inspecting all parts, reassemble carburetor by reversing disassembly directions and note following important points:

Throttle Shaft Bushing Replacement—Special tools must be used to install and line-ream bushings as follows: Counterbore Reamer C161-73-2, Bushing Driver C161-72-3, Line Reamer C161-71-3.

Throttle Valve Installation—Install valve attaching screws with heads upward (away from mounting flange), turn screws in loosely, close valve, tap valve lightly on mounting flange side to centralize it in bore, maintain pressure on valve while screws are tightened securely. Do not attempt to rivet ends of screws.

►*CAUTION—Above procedure necessary to insure correct flush fit of beveled edges of valve in bore.*

Pump Intake Check Valve Installation—Place new check valve on formed end of special tool C161-53. Invert fuel bowl assembly, insert tool in pump cylinder with guide bar in pump rod passage, press on tool to start check valve, then turn assembly over and drive check valve down to seat by striking tool with light hammer.

Pump Air Vent & Outl t Check Valve Installation—Insert valve ball, weight, retainer washer in passage in fuel bowl casting, start air vent check valve evenly in counterbore above retainer washer by hand (CAUTION—flat head of valve must face upward toward top surface of casting), fit machined end of stop bar on special tool C161-5 into upper end of check valve, drive check valve down into place. See that valve seats evenly in counterbore and is not cocked.

Accelerating Pump Check—After completing pump installation, check assembly for leaks by filling bowl with gasoline and forcing pump piston downward in cylinder. Fuel should be discharged through accelerating jet and no leakage should be noted at air vent check valve or intake check valve (leak at this point would result in fuel flowing back into bowl).

SERVICE PARTS: Gasket Set—Zenith No. C181-94. **Repair Kit**—Zenith No. K-746.

ZENITH JET SPECIFICATIONS

Carb. Model 228AV-10, Outline No. 10760

Part	Size	Part No.
Venturi	#28	C38-72—8
Main Jet	#26	C52-7—26
Main Discharge Jet	#80	C66-70-2—80
Well Vent Jet	#28	C77-14—28
Accelerating Jet	#13	C55-8—13
Power Jet Valve	#17	C97-12—17
Idle Jet	#12	C56-3—12
Fuel Valve & Seat①	#35	C81-53—35

①—Matched Valve & Seat Assy. (spring-loaded type needle valve).

ZENITH MODEL 28BV10

Part No.① Used On:

10569-A—Willys Jeep Station Wagon, Model 4-63 (Late 1948)—Serial No. 54134 Up.

①—Outline No. stamped on round metal tag riveted on top of float bowl cover. Use in ordering parts.

▷REPLACEMENT CARBURETOR No. 10569B. This field replacement carburetor omits some parts used in original equipment carburetor No. 10569A and has the following new parts: Air Intake Body No. A4-15, Choke Plate No. C101-1, Choke Plate Screw No. T11S6-5, Choke Bracket No. C109-1, and Choke Shaft & Lever No. C108-7.

DESCRIPTION: Single barrel, plain tube, downdraft type with double venturi. Carburetor has vacuum controlled power jet valve system and positively operated accelerating pump linked to throttle lever.

IDLING ADJUSTMENT: Adjust only when engine is warm (choke valve wide open, fast idle inoperative). Set throttle lever stopscrew for idling speed of 600 RPM. or 8 MPH. Adjust Idle Adjusting Screw for smooth idling (screw controls air and should be turned in for richer mixture, out for leaner mixture). Recheck idle speed.

ACCELERATING PUMP: Pump stroke is adjustable for seasonal requirements by engaging hairpin cotter in correct groove of pump plunger stem (directly above pump rod arm—accessible by removing air horn and bowl cover assembly) as follows:

Upper Groove—Minimum Stroke (hot weather).

Center Groove—Medium Stroke (normal operation).

Lower Groove—Maximum Stroke (cold weather).

FLOAT LEVEL: 29/64" from upper edge of seam at free end of float to gasket seat on bowl cover with needle valve seated (bowl cover and float inverted, float hanging freely).

▷*CAUTION—Do not compress spring in valve stem which will cause incorrect float setting. Allow float to hang freely on inverted cover when checking float level.*

FAST IDLE: Consists of a fast idle cam linked to the choke valve lever. Cam serves as the stop for the throttle lever stopscrew and opens the throttle valve to a fast idle position when choke valve is closed for starting. No adjustment is required.

CHOKE: Choke valve is manually controlled and has poppet type relief valve. Adjust control cable so that choke valve is fully closed when choke button is pulled out, and fully open when button pushed in. Check fast idle rod and make certain that fast idle lever on choke valve shaft is positioned so that it allows choke valve to close fully with fast idle cam in fast idle position.

FUEL FILTER: Consists of a stack of filter discs assembled on the filter head which provide edge filtering of fuel (fuel flows in through discs to channel in filter head and out through side hole to channel in carburetor casting).

Cleaning Filter—Remove filter head and element. Clean sump with soft cloth (use care not to wipe dirt or water into fuel channel in carburetor casting). Remove disc element from head (discs can then be separated slightly), wash element in gasoline, blow out with compressed air (CAUTION—use only moderate pressure).

CARBURETOR DISASSEMBLY: Disconnect fast idle rod, remove fuel filter head (see above), remove bowl cover and air horn attaching screws. Raise bowl cover slightly, loosen gasket (to avoid damage to float), lift off bowl cover and float assembly. Remove float by pushing axle pin out of slotted end of hinge bracket. Remove fuel valve seat (use Tool C161-85). Remove vacuum cylinder assembly (use Tool C161-10 or 7/16" thin-wall box wrench). Remove idle adjusting screw and spring, main jet plug, pump lever nut and lockwasher (loosen lever on shaft), and bowl casting-to-throttle body casting screws. Lift bowl casting off and at the same time disengage pump lever from throttle valve shaft. Push pump arm down and disengage link from lower end. Remove large venturi and gasket. Pull pump rod and pump assembly out (CAUTION—file off any burrs on lower end of rod at link hole first). Remove main discharge jet (use Tool C-161-1), power jet and valve assembly (use Tool C-161-9), main jet and gasket (use screwdriver), idling jet, well vent (use Tool C-161-80 or 3/16" wrench), pump channel plug and accelerator plug (use Tool C-161-21 Extractor), pump air vent check valve assembly (use Tool C-161-5). Invert bowl and allow retainer washer, weight, and discharge check ball to drop out. Remove pump inlet check valve (bend retainer lugs up, remove valve disc, remove valve assembly with Tool C-161-5—Do not remove valve seat). Remove pump channel lead plugs (use #46 drill and C-161-21 Extractor). If Choke Valve & Throttle Valve to be removed, see data under Carburetor Assembly below.

CAUTION—Do not remove the following parts: Pump Intake Check Valve Seat, Secondary Venturi, Idle Channel Bushing, Priming Plug (see Throttle Valve Data).

CARBURETOR REASSEMBLY: After cleaning all parts, reassemble carburetor using new jets, plugs, and gaskets and note the following important precautions:

Throttle Valve & Shaft—Idle ports in priming plug are drilled in assembly after throttle valve installed and correct relationship between valve and ports must be maintained in service. If necessary to replace valve, before removing old valve, back off stopscrew so that valve completely closed, mark inside wall of throttle body at throttle valve edge. File off riveted ends of throttle valve screws, remove screws and valve, withdraw shaft. When installing new valve, check valve position with relation to mark on carburetor wall and select a valve which fits close to mark when installed. Rivet ends of throttle valve attaching screws.

▷*CAUTION—Use extreme care not to spring shaft (use small mandrel in vise and light hammer*

Choke Valve & Shaft—If old valve to be removed, file off riveted end of valve attaching screws before removing screws. New screws must be riveted after valve installed.

▷*CAUTION—Use extreme care not to spring shaft (use small mandrel in vise and light hammer*

Main Jet—Use new gasket with this jet.

▷*CAUTION—Main Jet is marked by Star on head to prevent confusion with Compensator Jets used in other carburetors. Use only star-marked jets (compensator jets have shorter calibration length and will change metering characteristics of carburetor if installed by mistake).*

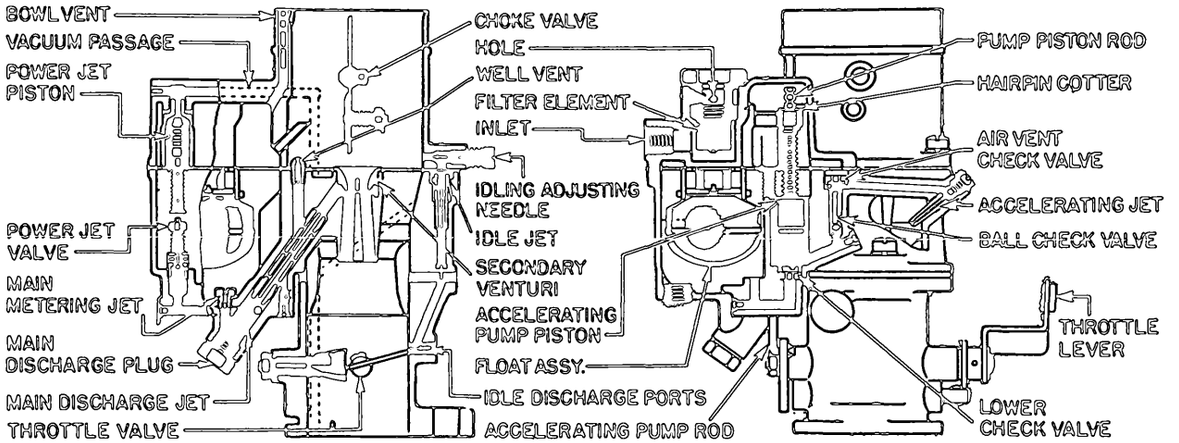
Power Jet Valve—Do not use a gasket under this valve. Do not attempt to change spring tension of valve or vacuum piston assembly.

Main Discharge Jet—Do not use a gasket with this jet. Use tool C-161-1 to tighten jet securely.

Well Vent—Do not use a gasket under this vent. Use tool C-161-80 or 3/16" wrench to install vent.

Idling Jet—Do not use a gasket under this jet.

SERVICE PARTS: Gasket Set—Zenith No. C181-94. Repair Kit—Zenith No. K-741.



ZENITH MODEL 28BV10 CARBURETOR

ZENITH JET SPECIFICATIONS

Carb. Model 28BV-10—Outline No. 10569-A

Part	Size	Part No.
Venturi	#28	C38-7--28
Main Jet①	#27	C52-7--27
Main Discharge Jet	#80	C66-70-2--80
Well Vent Jet	#28	C77-14--28
Accelerating Jet	#13	C55-8--13
Power Jet Valve	#16	C97-12--16
Idle Jet	#14	②C56-3--14
Fuel Valve Seat③	#35	④C81-53--35

①—Use only jets marked by STAR on head.
②—Replaces #12—Part No. C56-3--12.
③—Matched Valve & Seat Assembly.
④—Spring-loaded type. Replaces No. C81-1--35.

ZENITH DOWNDRAFT

METROPOLITAN	Zenith Model
1954 Nash & Hudson Model	30 VIG-8
1955 Nash & Hudson Model	30 VIG-10

DESCRIPTION: The Zenith Model 30 carburetor is a single barrel downdraft type with manual choke control and inter-connected fast idle device.

Fuel System: Carburetor has Idle Fuel System, Main & Compensating Fuel System, mechanically operated Accelerating Pump, and diaphragm type Economizer which operate as follows:

Idle Fuel System—Fuel for idling is taken from the Main Well into the Idle Jet Well and then up through the Idle Speed Jet which meters the fuel. At the upper end of the idle jet, fuel is mixed with air admitted through an air bleed in the emulsion block opening into the air horn above the venturi. An additional air bleed controlled by the Idle Mixture Adjusting Screw also admits air into the idle mixture passage. From this point the fuel mixture flows down to the Idle Discharge Ports at the throttle edge. Fuel is discharged through the lower port for closed-throttle idling. As soon as the throttle valve is opened, fuel is discharged from the upper idle port also.

Main & Compensating Fuel System—Both the Main Jet and Compensating Jet are located in the bottom of the fuel bowl and fuel metered by these jets flows through separate passages to the Main Well in the emulsion block (located between bowl casting and main casting). From this point, the fuel flows through a passage to the main nozzle and is discharged into the air stream at the venturi nozzle bar. A capacity well in the bowl casting controls the fuel discharge (see Economizer) and acts as an air bleed for the main system with additional air being introduced through the idle system and pump system while the main nozzle is operating.

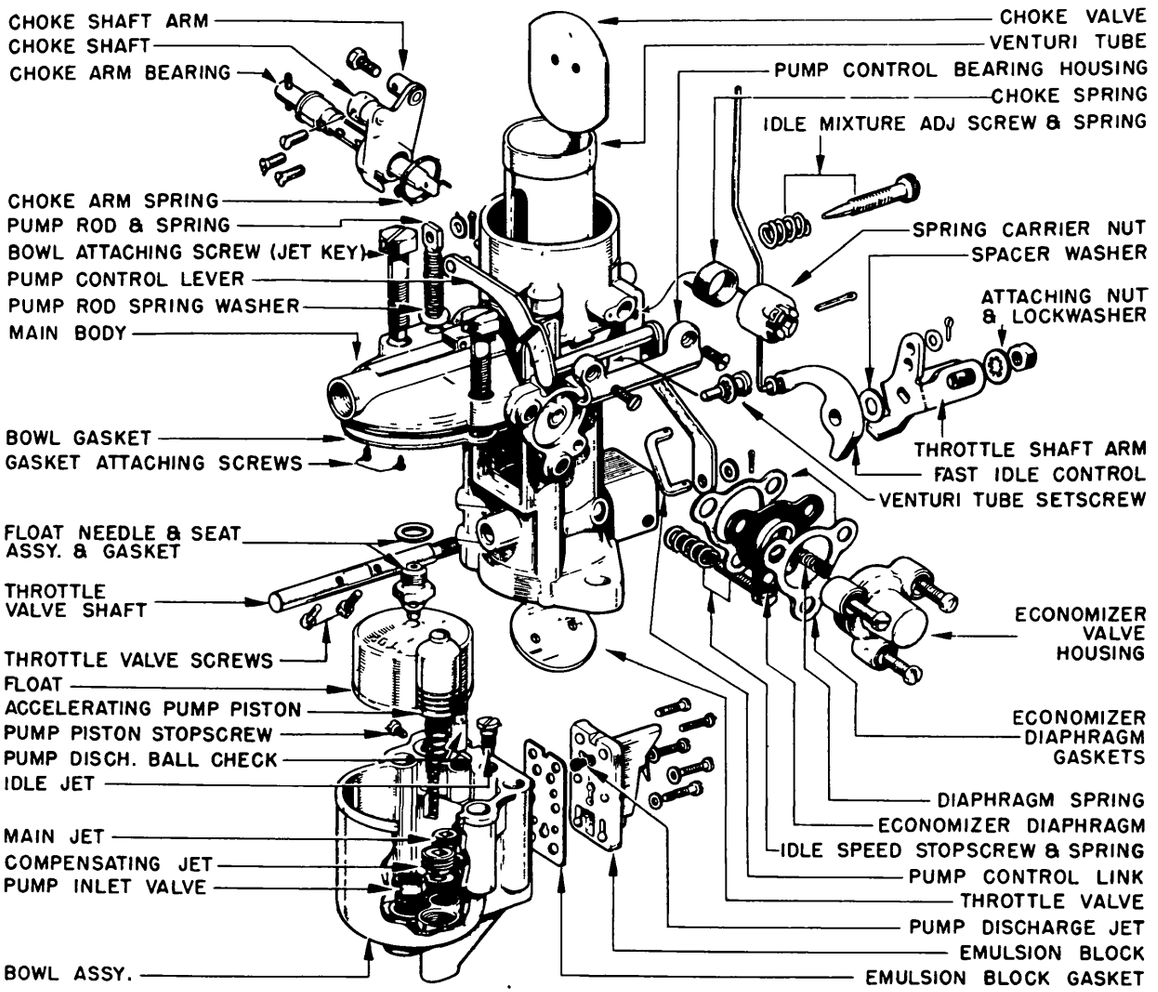
Economizer—Diaphragm type vacuum controlled valve which regulates the Capacity Well Air Bleed. At part throttle, with high vacuum in manifold, the economizer opens a large air bleed to the capacity well resulting in a leaner fuel mixture. At full throttle, the valve closes supplying a richer mixture for full power operation.

Accelerating Pump—Mechanical type with spring-loaded pump plunger operated by a pump rod linked to the throttle lever. Fuel flows into pump cylinder through a disc type Pump Inlet Valve in the bottom of the fuel bowl. As the throttle is opened, fuel is forced out past a ball type Pump Discharge Check Valve and is discharged through a Pump Discharge Jet located at one end of the nozzle bar.

ADJUSTMENTS: Adjust carburetor as follows:

Idle Adjustment: Adjust only with engine at operating temperature with choke valve wide open and fast idle inoperative. If preliminary adjustment required to warm up engine, turn idle mixture adjusting screw until lightly seated, then back off screw ½ turn. With engine warmed up, turn screw in or out for smooth idling performance. *CAUTION— Screw controls idle air bleed and should be turned IN for richer mixture.*

Idle Mixture Setting—0 to 1 turn open.



ZENITH DOWNDRAFT CARBURETOR

Idle Speed Setting—500 RPM. at normal operating temperatures.

Accelerating Pump Setting: Two holes provided in throttle lever for pump link. Connect link as follows: **Upper Hole**—Maximum stroke (Winter or cold weather operation), **Lower Hole**—Minimum stroke (Summer or warm weather operation).

Float Level: Non-Adjustable. Float is free type (guided by sides of bowl) and acts directly on fuel intake needle valve in bowl cover.

Fast Idle: Consists of an inter-connected linkage between choke valve lever and throttle valve lever which opens the throttle valve 1/32" when choke closed for cold starting. To adjust fast idle, remove cotter pin from grooved nut controlling the choke spring, turn nut clockwise until spring tension is just relieved, then with choke valve closed, turn nut ½ turn counter-clockwise and secure setting with cotter pin. This will provide correct throttle valve opening.

Choke Valve Linkage: Adjust so that choke valve is fully closed when button on instrument panel is pulled out.

OVERHAUL: With carburetor off engine, separate bowl assembly from main body by removing two bowl attaching screws, and sliding bowl downward carefully to avoid damage to emulsion block and main nozzle. Then disassemble as follows:

Bowl Disassembly—Lift float out. Use one of bowl attaching screws ("Jet Key" screw with square end) to remove main jet and compensating jet from bottom of bowl. Remove idle jet from top of bowl casting (jet is slotted for screwdriver blade). Remove emulsion

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ZENITH DOWNDRAFT (Cont.)

center screw first, remove the other four screws, finally remove this lower center screw, which acts as a puller for the block). Remove pump inlet check valve from bottom of bowl and discharge ball check valve from top of bowl casting Remove pump piston locating stopscrew, remove pump piston and spring. Remove air inlet orifice plug from top of capacity well *NOTE*—It is not necessary to remove pump discharge jet from emulsion block (can be cleaned from rear of block)

Main Body Disassembly—Remove three screws retaining economizer diaphragm housing on main body, carefully remove housing, diaphragm, diaphragm spring, and gaskets Remove fuel intake needle and seat assembly from bowl cover. Remove idle adjusting screw block from side of bowl. (*CAUTION*—Loosen lower and spring. Remove bowl gasket from cover by using pliers to remove the gasket retaining drive screws Cleaning & Inspection—Clean all parts thoroughly, clean and blow out all passages in carburetor castings. Inspect all parts for wear or damage.

▷*BOWL COVER GASKET NOTE:* If care is used to locate gasket properly when installing bowl on main body casting, it will not be necessary to use the locating drive screws which are installed in production to hold the gasket in place.

SERVICE PARTS: Repair Kit Metropolitan No. 8111493.

Reassembly—Install all parts and assemble carburetor by reversing disassembly procedure above. Use all new gaskets and install gaskets without any sealing compounds.

ZENITH JET SPECIFICATIONS

Model 30 VIG-8

Part	Size
Main Jet	#92
Compensating Jet	#60
Idle Speed Jet	#50
Capacity Well Air Vent	#33
Pump Discharge Jet	#50
Full Throttle Bleed	1.8 mm
Fuel Intake Needle & Seat Assembly	1.5 mm

Model 30 VIG-10

Part	Size
Main Jet	#67
Compensating Jet	#95
Idle Speed Jet	#50
Pump Discharge Jet	(.5 MM Rod) #50
Full Throttle Bleed	1.8 MM
Fuel Intake Needle & Seat Assembly	1.5 MM

ZENITH MODEL 31 A11

WILLYS	Zenith Assy. No.
1950-51 673-SW & 673-VJ	11119
1951 673-SW & 673-VJ	11307

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1950-51 WILLYS IDLE DIFFICULT TO ADJUST (No. 11119 Carburetor):* If carburetor does not respond to idle adjustment, cause may be fuel discharging from accelerating pump jet at idle Check by removing air cleaner and noting if fuel discharge apparent at pump jet with engine idling Correct as follows
1) Remove air intake assembly, accelerating pump spring, invert lower assembly and catch pump spacer and pump guide which will fall out
2) Install new type Pump Guide, Zenith No C131-30 (this guide 334" in diameter with reduced section at end—previous guide 303" in diameter) with same pump spacer inside guide
3) Reassemble carburetor and adjust after installation on engine

▷CARBURETOR FLANGE GASKET CAUTION—Correct type of flange gasket must be used when installing carburetor on engine. Gaskets must not be interchanged as use of gasket which blanks off vacuum channel into intake manifold will result in failure of the accelerating pump and constant operation of the vacuum power valve with consequent rich mixture and poor gasoline economy.
Gasket No. C141-18—Use on engines without governor. Gasket has four cut-out slots at rim of center hole to provide opening for vacuum channel regardless of gasket position on manifold flange.
Gasket No. C141-4-3—Use only on engines with "samdwich" type governor. This gasket has slotted hole at either end designed to complete vacuum channel to manifold through governor body.

DESCRIPTION: Single barrel, plain tube, downdraft type with double venturi and vacuum controlled accelerating pump and power jet system. Carburetor is balanced with float bowl vented in air horn.

IDLING ADJUSTMENT: Adjust only when engine is warm (choke valve wide open, fast idle inoperative). Set throttle lever stopscrew for correct idle speed, adjust idle adjusting screw for smooth idling, recheck idle speed.
Idle Screw Setting—Approximately 1½ turns open.
CAUTION—Screw controls fuel mixture and should be turned OUT for richer mixture.
Idle Speed—600 RPM. or 6 MPH.

POWER JET (ECONOMIZER): No adjustment required. Power valve is normally closed and opens when manifold vacuum falls below 6".

ACCELERATING PUMP: No seasonal adjustment provided. Pump stroke is adjustable by changing stroke spacer in pump spring guide.

NOTE—Pump must be disassembled (see Overhaul data) to make this change.

FLOAT LEVEL: Use Float Level Gauge C161-169 to check float level. Remove air horn and bowl cover, remove gasket. Install gauge on top edge of bowl over center of float, press down firmly on float arm directly over intake needle. Top of float should be flush with bottom edge of gauge (plus or minus 1/32").

FAST IDLE: Consists of a fast idle cam (advance lever) linked to the choke valve and serving as a stop for the throttle stopscrew. Cam is rotated when the choke is closed for starting and opens the throttle to the fast idle position. No adjustment is required.

▷*CAUTION—Fast idle cam must be in the hot or slow idle position (stopscrew resting on low point of cam) when adjusting idle speed.*

CHOKE: Choke valve is manually controlled. Valve is spring-loaded on shaft and is free to open slightly against spring tension when engine begins to fire. Adjust control cable so that valve is fully closed when choke button is pulled out and is fully open when button pushed in. See that fast idle cam is rotated to the point where throttle stopscrew rests on high point of cam when choke valve is fully closed.

DISASSEMBLY: The three main castings are separated and disassembled and reassembled as units:

Air Horn & Bowl Cover—Take out fast idle cam screw, disconnect connector rod at choke valve lever. Remove air horn and bowl cover attaching screws, raise assembly slightly to free cover gasket, then lift straight up using care not to damage float and other protruding parts. File off riveted end of choke valve screw, remove screw, unhook and remove spring. Withdraw choke shaft and lever, lift out choke valve.

▷*CAUTION*—Do not remove bowl vent tube in air horn, pump guide tube, channel plugs, choke shaft plug, or identification disc.

Fuel Bowl (Main Body)—Lift out metering well, well vent and idle tube (single assembly), remove cork gasket from top of unit. Lift off bowl cover gasket. Lift out flexible pump piston, piston guide, pump stroke spacer, and pump spring as a unit (CAUTION—use fingers only, do not pry these parts out). Lift out accelerator jet and check valve assembly and cork washer. Remove float, float axle, retainer plugs, and intake needle as a group by inserting forked end of tool under float axle and prying axle and retainers up out of bowl. Remove intake needle seat and fibre washer (C161-85 wrench). Remove power jet valve and fibre washer from bottom of pump cylinder (C-161-121 wrench). Remove pump intake check valve from bottom of bowl by screwing C161-25 extractor firmly into valve and striking cross-bar sharply to pull valve (CAUTION—be sure check valve disc is removed from channel). Remove main jet passage plug and fibre washer from outside of casting under bowl, then remove main jet and fibre washer from this channel (C161-83 wrench). Remove filter plug and fibre washer from under float bowl, take off filter screen. Remove two lead channel plugs by drilling #46 hole in each plug and using C161-21 extractor tool to pull plugs out. Take out fuel bowl-to-throttle body

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ZENITH 31A11 (C nt.)

attaching screws, lift fuel bowl off, invert bowl and remove venturi from lower end. Do not remove idle channel bushing unless replacement required.

►*CAUTION*—Do not remove secondary venturi (pressed in fuel body) or accelerator channel brass plug.

Throttle Body—Unscrew idle adjusting needle and spring. File off riveted ends of throttle valve screws, remove screws, lift out throttle valve. Withdraw throttle shaft and lever, remove shaft packing washer and retainer from lever end of shaft recess. Use 5/16" rod inserted through shaft hole to drive out plug in opposite shaft hole.

►*CAUTION*—If throttle shaft and bushings being replaced, remove old bushings only as new bushings installed (old bushing must be used to line-ream new bushing). See Reassembly data.

CLEANING & INSPECTION OF PARTS: Clean all metal parts with cleaning solution and rinse in solvent. Blow out all passages with air and clean carbon deposits from carburetor bore and idle ports. Do not use wire or drills to clean jets or metering restrictions. Inspect all parts and replace if worn. Replace following parts whenever carburetor is being overhauled: Intake Needle & Seat Assy., Flexible Pump Piston, Power Valve & Jet, Choke Valve Spring, Pump Intake Check Valve, Pump Outlet Check Valve & Jet, all Gaskets and Fibre Washers.

REASSEMBLY: Reassemble carburetor by reversing disassembly procedure and note following important points:

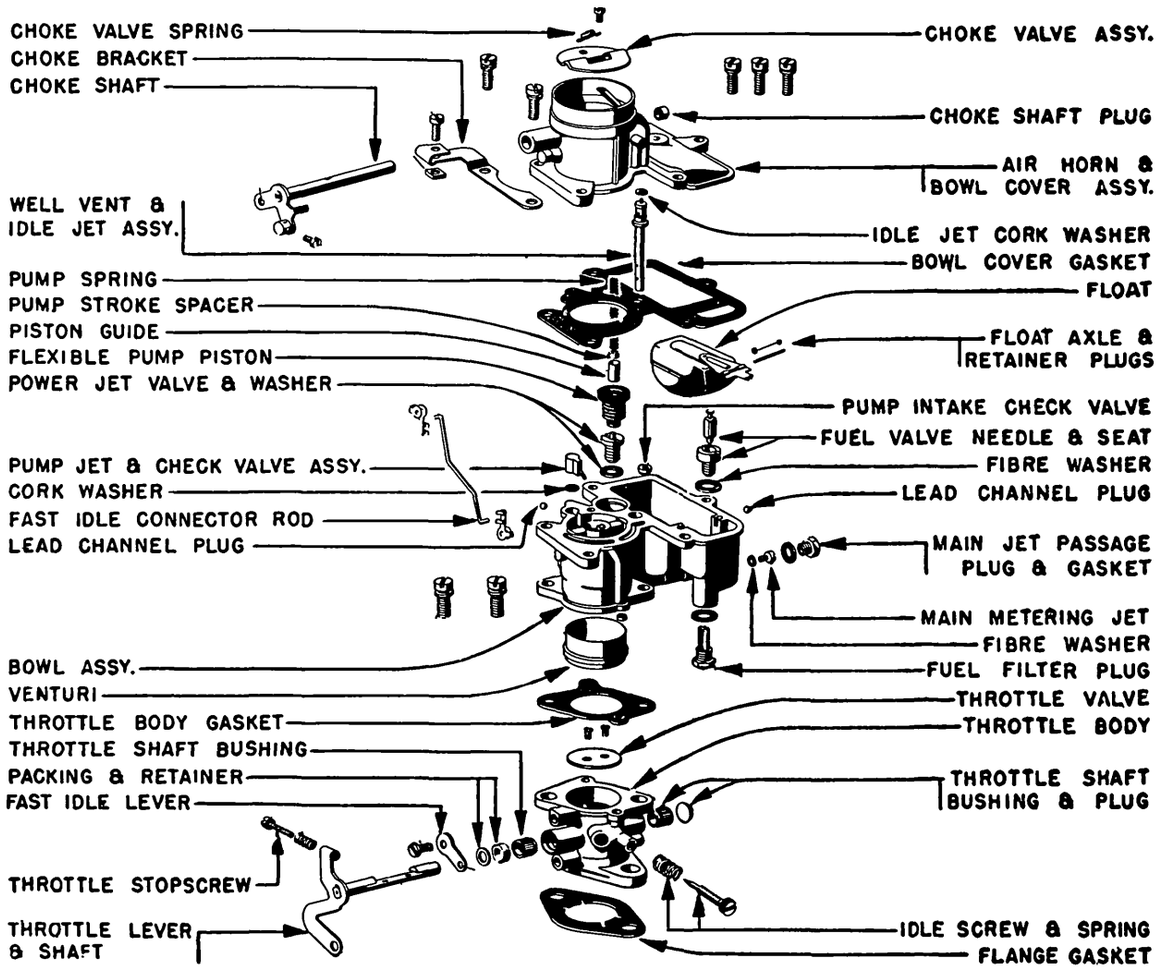
Throttle Shaft Bushing Replacement—Remove one old bushing by threading 3/8" fine thread tap into bushing and using 5/16" rod inserted through opposite shaft hole to drive bushing out. Install new bushing using C161-72-3 driver. Line-ream this bushing with C161-71-3 reamer using opposite bushing as a guide. Repeat this procedure to install opposite bushing. Install plug in shaft hole (opposite end from throttle shaft lever) and stake plug in place.

Throttle Valve—Install throttle shaft with packing and retainer in throttle body, turn shaft to wide open position with cut-out on shaft facing away from idle discharge ports, insert throttle valve with bevel on leading edge away from idle ports, close throttle valve and center the valve so that bevel fits carburetor bore snugly, start throttle valve screws, tighten screws **while pressing in on end of shaft** to insure packing being in place.

Float & Intake Needle Valve—Engage slotted end of float lever with knot end of intake needle, slip float axle through float lever, lower axle into casting slots, install axle retainer plugs using a flat end punch to seat plugs in slots. Plug height tolerance is 1/64" above machined surface of casting.

Pump Inlet Check Valve—Install valve with disc side down, use C161-161 driver to seat valve flush with casting.

Pump Outlet Check Valve & Jet—Install cork washer first, then install check valve and jet assembly **with open end down.** Assembly should extend approximately 1/64" above surface of bowl casting.



ZENITH MODEL 31A11 CARBURETOR

Accelerating Pump Assembly—Install flexible pump piston, piston guide, pump stroke spacer (see note), and pump spring in this order in the pump cylinder.

►**Pump Stroke Spacer Note**—This part controls pump stroke and pump discharge. Parts used as regular equipment on Willys is Part No. C63-193-2 and provides one-half stroke.

Metering Well, Well Vent, & Idle Jet Assy.—This unit should be installed **after** the bowl gasket has been installed and shoulder should seat on top of gasket.

Choke Valve—With choke valve in closed position and choke shaft rotated clockwise until lever is against its stop, install screw through eye of choke valve spring but **do not tighten** screw completely (spring must be free). Rivet the end of the screw using a flat end punch held in a vise as a mandril to support the screw and to prevent bending the choke shaft. Then hold choke in open position and hook end of spring over anchor clip on valve.

SERVICE PARTS: Gasket Set—Zenith No. C181-313.

Repair Parts Kit—Zenith No. K-11119 (11119), No. K-11307 (11307). *NOTE*—If Basic Repair Kit No. K764 used, additional parts listed below will be required:

ZENITH JET SPECIFICATIONS

Willys Carb. Nos. 11119 & 11307

Part	Size	Part No.
Venturi	#28	B38-67--28
Main Jet	#28	C52-7--28
Idle Tube & Well Vent	①	C66-92-1-1
Power Jet Valve	#30	C97-28--30
Fuel Valve Seat (11119)	#40	C-57--40
Fuel Valve Seat (11307)	#40	C-59--40
Accelerating Jet	② #12	C41-27--12
Pump Stroke Spacer	③	C63-193-2

①—Idle Jet Size (#14) stamped on end, Well Vent Size (#28) stamped on side near the end.

②—Includes Pump Check Valve in assy.

③—Provides ½ pump stroke.

KAISER SUPERCHARGER

Kaiser Manhattan Model K542 (1954-55)

DESCRIPTION & OPERATION: Model VS-57A. Centrifugal type mounted on engine and belt driven from the crankshaft. Supercharger has two step-up speeds: (1) Variable ratio drive pulley with belt tensioner, and and (2) Planetary drive system between input and output shafts. A control system governs the shift from LOW BLOWER to HIGH BLOWER and limits HIGH BLOWER boost output by governing the sliding flange of variable ratio pulley. LOW BLOWER step-up speed ratio is 1-5.7 and HIGH BLOWER 1-10. Planetary drive system consists of front and rear outer ball races, five steel balls, ball retainer and inner race which is milled in the output shaft. Drive is from input shaft to ball retainer to steel balls to output shaft with ratio of 1-4.44. Spring tension from race load assembly applies pressure (from assembly) to front race, reducing space between front and rear outer races, forcing ball pressure on output shaft. Balls are forced to rotate around output shaft as well as on own axis causing output shaft to turn. The impeller fits on hub of output shaft and is driven by two dowel pins.

Lubricating System—Oil supply is contained in oil sump. A piston type oil pump driven off camway ground in input shaft supplies lubrication direct to input shaft bushing and to output shaft pilot bushing in rear end of input shaft. Seepage past these bushings supplies lubricant to input shaft roller bearings, air piston and air chamber, and to planetary drive balls and races. A dipstick is provided to check oil level and the oil level should be checked every 1000 miles. *See LUBRICATION below.*

Control System—Consists of an air pressure valve affected by spring pressure and a Solenoid Regulator. The electric switch for the Solenoid Regulator circuit can be operated either by intake manifold vacuum or by accelerator pedal (kickdown). A spring loaded diaphragm limits air pressure build-up by permitting valve to open at adjusted spring pressure.

Solenoid Regulator Operation—There are three phases:

1) Low air pressure, no circuit to Solenoid Regulator, spring between valve head and Solenoid Armature forces valve open permitting air pressure to enter air chamber forcing air piston and floating pulley flange forward causing shift to Low Blower.

2) Low air pressure, Solenoid energized, forcing Armature up, compressing valve spring and sealing off air passage to air piston resulting in shift to High Blower by the belt tensioner.

3) High air pressure against diaphragm offsets diaphragm spring pressure forcing diaphragm away from valve head. With Solenoid Armature in up position (energized), valve is now permitted to raise sufficiently to open air passage partially. Air piston moves forward reducing input shaft speed ratio and impeller speed, controlling pressure build-up.

ADJUSTMENT: Solenoid Regulator. Adjustment must be made exactly as listed below. The spring tension governing the diaphragm position is controlled by a socket-head screw acting against top of spring over diaphragm. Turn screw in or out to either increase or reduce output level. Read pressure output level with supercharger operating in High Blower with engine turning at 3000 RPM under load as follows:

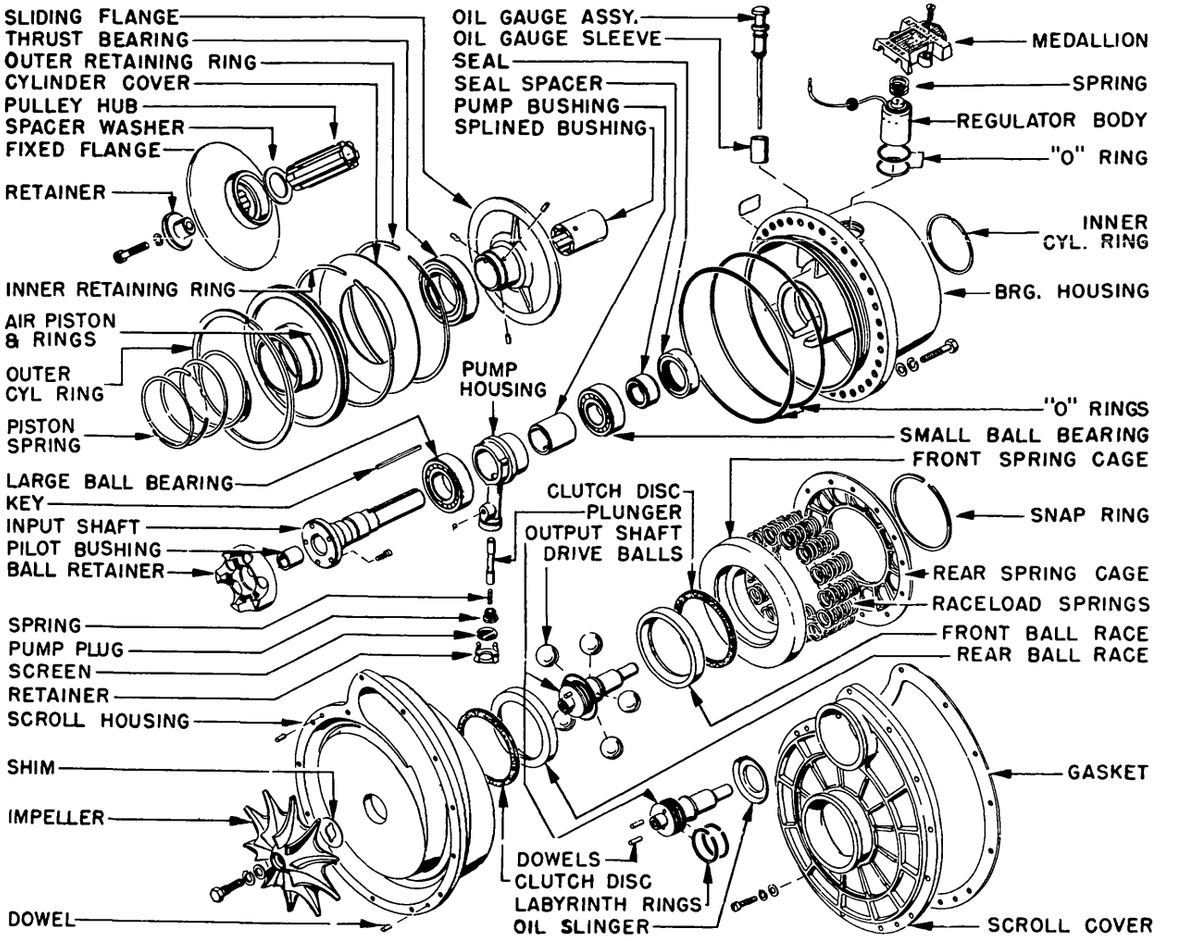
1) Bring engine and supercharger to operating temperatures before attaching tachometer and pressure gauge (Pressure gauge to intake manifold).

►*CAUTION:* Readings must be made under actual driving (under load) conditions (Dynamometer or road driving).

2) Remove medallion and retaining spring. Back out adjusting screw (No. 54 Allen wrench) until screw head is flush with top of regulator. Turn screw in to just touch spring collar. Then add three turns.

3) Replace retaining spring and medallion. Run engine at 3000 RPM for 15 minutes and read pressure. NOTE: Pressure should be less than 4 lbs. (psi). Remove medallion, retaining spring, back out screw ½ turn and replace spring and medallion. Check pressure. Final setting should read 4 lbs. (psi) in intake manifold at 3000 RPM under load conditions. Regulation tolerance will be from 3½-4½ lbs. (psi).

►*CAUTION:* Do not adjust regulator to higher setting. Use G-E Glyptol or equivalent to cement adjusting screw to fixed setting. Retain the setting.



KAISER SUPERCHARGER ASSEMBLY

LUBRICATION: Check oil level by means of dipstick on left side of housing every 1000 miles. Drain and refill sump at 25,000 mile intervals. Dipstick is marked to indicate "safe" oil level and "add oil" points.

Capacity & Recommended Lubricant—8 ozs. Use Mobiloil ATF200 or Type A Automatic Transmission fluid.

OVERHAUL: *Supercharger is a precision unit with micro-finished surfaces and all precautions listed below must be followed when disassembling unit and handling parts.*

►*CAUTION:* Remove unit from engine before disassembling. Clean exterior thoroughly with solvent, wiping dry with rags or industrial wipers. DO NOT immerse unit in the solvent and avoid use of compressed air during cleaning operation. Work on clean surface with clean tools, using clean solvent and oils. Proper tools eliminate possible damage to precision built parts. Do not handle micro-finished drive line parts with bare hands (output shaft, drive balls, and ball races) to avoid rust and oxidation on these parts. Use clean dry cloth

CONTINUED ON NEXT PAGE

KAISER SUPERCHARGER (C ntinued)

gloves or oiled patches of clean cloth (lint free paper wiping towels such as Scott Industrial Wipers etc. may be used).

1) Remove dipstick gauge and drain oil sump. Remove retainer and pull front flange of pulley (Tool No. 37272). Remove sliding flange (pulls off hard). Remove splined hub (Tool No. 37273, if necessary).

2) Force hub of air piston in and pry off cover retaining ring (notch at bottom of bearing housing). Remove cover and inner retaining ring. *CAUTION*–Release spring behind air piston gradually to save possible personal injury. Remove piston and spring from housing.

3) Remove medallion and regulator retaining spring. Remove solenoid regulator with vise grip pliers. Remove two "O" rings. Remove retaining screws and lift (not twist) scroll cover from housing. Hold impeller wheel (Tool No. 37274) and remove retaining screw. Remove impeller wheel (Tool No. 37261) from output shaft with shim or shims.

►*CAUTION:* Nicks, scratches or any damage to impeller wheel affects balance. Replace, do not repair, if damaged.

4) Replace scroll cover and retain with four equally spaced screws, lockwashers and flat washers (flat washers against scroll surface). Install assembly in fixture (Tool No. 37271). Remove screws and washers. Screw removal handles into bearing housing and twist bearing housing free of scroll housing. Remove two "O" rings.

►*CAUTION:* Pry housing apart or rocking bearing housing back and forth may damage scroll housing, bend or damage input or output shafts and cause loss of concentricity.

►*INPUT & OUTPUT SHAFT REMOVAL CAUTION:* To avoid damage to internal parts handle input and output shafts, balls and ball races with soft cloth gloves (see CAUTION under DISASSEMBLY PROCEDURE). Do not throw balls, ball races or other parts into container causing scratches, pits or other surface damage. Keep internal steel parts submerged in clean oil following removal to avoid rusting. Do not use steel wool or or other abrasive material to clean or polish contact surfaces of planetary system. Parts oxidized or rusted must be replaced.

5) Remove input shaft and oil pump assembly (Can be tapped out with rubber mallet). Remove race load assembly from scroll housing.

►*CAUTION:* Use arbor press to diassemble race load assembly to avoid personal injruy.

6) Lift output shaft until drive balls clear rear ball race and pull output shaft free of scroll housing. Lift ball races and clutch discs from their respective seats. *NOTE*–Do not drive them free, but heat surrounding metal to 110°F. Expansion will free ball races.

7) Remove hub key, seal and spacer from input shaft. Pull bearing (Tool No. 37273) from shaft. Remove screen retainer and screen. Screw out spring retainer and remove spring, and plunger. Hold pump body steady, rotate input shaft to highest point of cam and remove pump body from input shaft. Can only be removed from this position. Remove bushing out past staking tang. Remove inner bearing (Tool No. 37273). Remove 5 retaining screws and remove ball driver.

►*CAUTION: DO NOT DISASSEMBLE SOLENOID REGULATOR.*

REASSEMBLY: *CAUTION–A clean area for assembly is important. All parts must be thoroughly cleaned and well oiled. Lint and dust must be held to absolute minimum when assembling internal drive parts.*

1) Install scroll cover with four retaining screws and fit assembly in Fixture (Tool No. 37271). Place a clutch disc in position and press ball race over clutch disc. Race should bottom against disc. Assemble labryinth rings in first and third grooves of output shaft with ring grooves in line. Insert shaft, dowel pins down, in center opening of housing. Shaft will angle slightly with ring gaps up. Push shaft gently into opening and straighten to vertical. Tapered face of opening compresses rings as shaft seats. Lift shaft and insert drive balls. *NOTE*–Move shaft sideways, balls will enter freely. Insert clutch disc and ball race in race load assembly (seat well) and place race load assembly in position with ball race down over drive balls.

2) Attach ball retainer or driver to input shaft (30 lbs. torque), press large ball bearing on shaft against shoulder. Slide oil pump body with bushing onto shaft. *CAUTION*–Bore in Pump body must align with camway in shaft. Press small ball bearing in place and assemble plunger, spring, retainer etc. to pump body. Place assembled input shaft down over pilot boss of output shaft. Rotate shaft to seat drive balls in drive ball retainer.

3) Install inner air piston ring on boss of bearing housing, insert seal with sealing face to front of supercharger. Install "O" rings (2) in inside and outside grooves of housing shoulder. (Not in center groove). Oil "O" rings lightly to aid in installation. Install bearing housing on scroll housing and secure all six screws, using lockwashers and plain washers. Plain washers against housing. *CAUTION*–Tighten evenly to prevent loss of concentricity (100 inch lb. torque).

4) Install outer air piston ring. (Place piston spring in nose section and slide piston in place. Compress spring and install rear retaining ring. Place shaft sealing spacer over pulley end of input shaft and push into place under shaft seal. Install air cylinder cover and outer retaining ring.

5) Place key in input shaft, slide splined hub in place, position sliding flange of pulley to hub and push flange down to seat thrust bearing in air piston. Insert special washer (chamfered inner edge at rear of flange). Add fixed flange and retainer. Torque screw to 200 inch lbs. torque. Sliding flange must be free on sleeve (no bind).

6) Install impeller with sufficient shims to give .012" clearance. (Measure depth of output shaft shoulder under face of diffuser and add .012" for shim pack). Tighten screw with flat and lock washer in place to 200 inch lbs. torque. Check impeller to diffuser clearance at several points. (.009" GO, .016"NO GO). *CAUTION*–All bearing to scroll housing screws must be tightened to 100 inch lbs. torque. Assemble scroll cover (flat washers against cover) and tighten retaining screws.

7) Insert "O" rings (lightly oiled) in regulator well. Position regulator in well against seat, add retaining ring over shoulder and install medallion. *CAUTION*–Never operate supercharger with medallion removed.

8) Check for freedom of rotation before installing on engine. It should turn hard but not bind, drag, grab or ratchet. Assemble to mounting bracket, add 8 ozs. lubricant (see lubrication), turn supercharger at least 12 revolutions to prime pump. DO NOT adjust Solenoid Regulator until engine and supercharger have been brought to operating temperature. Idle supercharger until pump has had time to deliver adequate lubrication to all working parts.

AC FUEL PUMPS

DESCRIPTION: All AC fuel pumps are mechanically operated, diaphragm type, and operate on the same basic principle. Pumps are driven by a special cam built into the engine camshaft. A rocker arm built into the pump rides the cam, or on some engines a push rod rides the cam which in turn operates pump rocker arm. Pump diaphragm is fastened to a pull rod which is connected to the rocker arm by a linkage. Various linkage types are used. Movement of the diaphragm is controlled by the rocker arm travel on inlet stroke, and by a drive spring on the return stroke. Pumps are equipped with a sediment bowl or built-in sediment chamber and filter screen. On early type pumps the diaphragm was fastened to the pull rod by a nut and washer, later types use one-piece diaphragm and pull rod assembly. Fuel pump pressures range from 2½ lbs. to 5½ lbs. depending on the type of pump used.

OPERATION: Operation of pumps is similar although different types of bodies, valves, linkage are used. In all pumps the down stroke of the diaphragm is positive, being pulled down by the operation of the rocker arm, through the linkage. On the down stroke a vacuum is created above the diaphragm and fuel is drawn into the pump chamber through the pump inlet, sediment chamber, filter screen, and inlet valve. On the return stroke the driving spring forces the diaphragm up, the pressure closing the inlet valve and the fuel is forced out through the outlet valve to the carburetor. The rocker arm is forced to follow the cam at all times by means of the rocker arm spring. The amount of fuel delivered by the pump is governed by the carburetor float needle valve. The pressure is controlled by the drive spring forcing the diaphragm up on the return stroke. The diaphragm can move up on the return stroke only when fuel is flowing out of the pump.

AC COMBINATION FUEL & VACUUM PUMPS

DESCRIPTION: A fuel and vacuum pump are combined in one unit on combination pumps. A single rocker arm operates both pumps. The fuel pump section is similar to the single unit type fuel pump. The vacuum pump is diaphragm type and is used to furnish vacuum for windshield wiper operation when manifold vacuum is low.

OPERATION OF VACUUM PUMP: The vacuum pump consists of a vacuum chamber containing the inlet and outlet valves and is closed at the upper end by the pump diaphragm. A spring is assembled in the center of the pump under the diaphragm. The operating shaft on the upper surface of the diaphragm assembly is connected to the pump rocker arm through the linkage. In operation when the rocker arm is actuated by the eccentric on the camshaft the vacuum pump diaphragm is forced down, expelling any air in the pump chamber through the outlet valve into the manifold. When the rocker arm moves back (freeing the pump linkage), the driving spring under the diaphragm forces the diaphragm upward, creating a vacuum in the chamber, opening the inlet valve, and operating the windshield wiper. Whenever the engine is operated with the windshield wiper turned off the vacuum in the vacuum chamber will hold the diaphragm at its lowest position (with the driving spring compressed) and the vacuum pump will not operate. Whenever the manifold vacuum is higher than the pump vacuum the pump will likewise be inoperative and the windshield wiper will be operated by the manifold vacuum straight through the pump with both valves open. At other times pump acts as a booster to operate windshield wiper.

FUEL PUMP TESTING

NOTE: AC Fuel Pump Analyzer No. 44 consisting of gauge, 1 pint measure, hose and adapter fittings is recommended for use in testing fuel pumps.

TESTING: Static Pressure Test—Disconnect the carburetor fuel line at the pump. Connect Pressure Gauge to pump outlet using adapter fitting. Start engine on fuel remaining in carburetor and run engine to 30 MPH speed. Pressure reading on gauge should be within specified limits. *See Fuel Pump Static Pressure Table.*

Capacity Test—Note: Pressure must be within specified limits before making a capacity test. To test capacity, disconnect carburetor fuel line at pump. Insert a Tee fitting in pump. Connect carburetor fuel line to one Tee outlet and a length of hose to the other outlet. Start engine and run at 450 RPM. Hold a one-pint measure approximately the height of the carburetor bowl and fill the measure from the hose on the Tee. Check the time required to fill the measure, using the following table:

FUEL PUMP CAPACITY

Type	Minimum Capacity
A, B	1 Pint in 1 Minute
C, D	1 Pint in 45 Seconds
E	1 Pint in 1 Minute
F, G, I	1 Pint in 45 Seconds
J, L, N, O, P, R, S, T, V, W, X, Y	1 Pint in 1 Minute
AA, AB	1 Pint in 45 Seconds
AC, AD, AE, AF	1 Pint in 1 Minute
AG, AH, AJ, AK	1 Pint in 45 Seconds
AL, AM, AR, AS, AT	1 Pint in 1 Minute
AU, AW, AX	1 Pint in 45 Seconds

NOTE: Adequate fuel delivery is available when the pint measure is filled in the time shown below according to engine size:

1 Minute—engine under 225 cu. ins. displacement.
45 seconds—engine 225 to 400 cu. ins. displacem't.
30 seconds—engines over 400 cu. ins. displacement.
See car page for displacement under Engine Specifications.

FUEL PUMP TROUBLE SHOOTING

TROUBLE SHOOTING: If the pump action is not satisfactory, check in accordance with the following:

No Fuel or Insufficient Fuel at Carburetor:
(1) Gasoline tank empty.
(2) Plugged fuel line. (Disconnect line at tank and blow out line from pump end, otherwise dirt will be blown back into tank).
(3) Bent, kinked, leaky tubing or connections. Tighten all connections. Check condition of tubing. Replace if necessary.
(4) Clogged filter screen or leaky cork bowl gasket in pump. Remove bowl or sediment chamber cover and remove screen. Always use a new cork gasket when bowl or sediment chamber cover is removed. A leaky gasket will cause loss of pump vacuum.
(5) Dirty or warped valve, broken valve springs, or loose valve cages. Remove pump for inspection.
(6) Worn pump linkage, which cuts down pump pressure and capacity. (Check capacity and pressure).

Fuel Leakage through Vent in Pump Body:
(1) Worn or punctured diaphragm. Replace diaphragm.
(2) On early models a loose diaphragm nut or gasket on pull rod will cause leakage.

Carburetor Flooding:
(1) Carburetor needle valve not seating. Check for worn valve or seat, sediment or other obstruction preventing seating of valve, or wrong needle valve and seat assembly. Check float level.
(2) Excessive pump pressure. Check pressure. Too high pump pressure can be caused by wrong diaphragm driving spring (too strong).

VACUUM PUMP TESTING

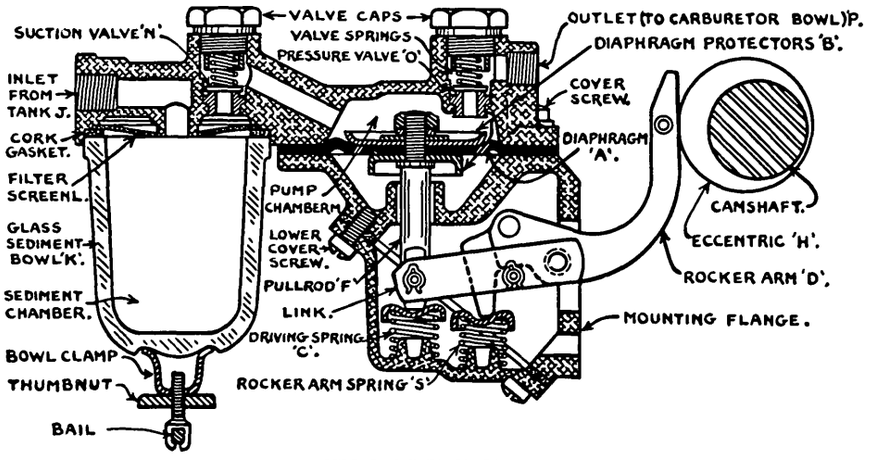
CHECKING WITH VACUUM GAUGE: Due to the strength of the spring used in the vacuum pump unit, it is not practical to check the pump off the engine.
(a) Disconnect both inlet and outlet lines at pump.
(b) Attach vacuum gauge to inlet port (side attached to wiper line).
(c) Operate engine at equivalent of 20 MPH road speed and the gauge should show 7 to 12 inches of vacuum.
(d) If less than 7 inches of vacuum are produced, the vacuum section of the pump is inoperative.
(e) Always test the vacuum pump with the outlet open because internal pressure due to closing the outlet will damage the mechanism.

CHECKING WITHOUT VACUUM GAUGE:
(a) Disconnect manifold line from pump.
(b) Operate engine from idle, through slow acceleration to about 40 MPH.
(c) The wiper should start operating on pump vacuum at about 15 MPH engine speed and reach full speed at about 40 MPH. This indicates the vacuum section is operating correctly.
(d) If wiper does not operate, detach windshield wiper line at pump and join it to the already detached manifold line with a piece of rubber hose.
(e) SLOWLY operate engine from idle to about 25 MPH and the wiper should run at full speed, operating on the engine vacuum only. If it does not, the wiper motor or tubing is defective. The pump vacuum section is inoperative if the windshield wiper operates on engine vacuum, but not on pump vacuum.

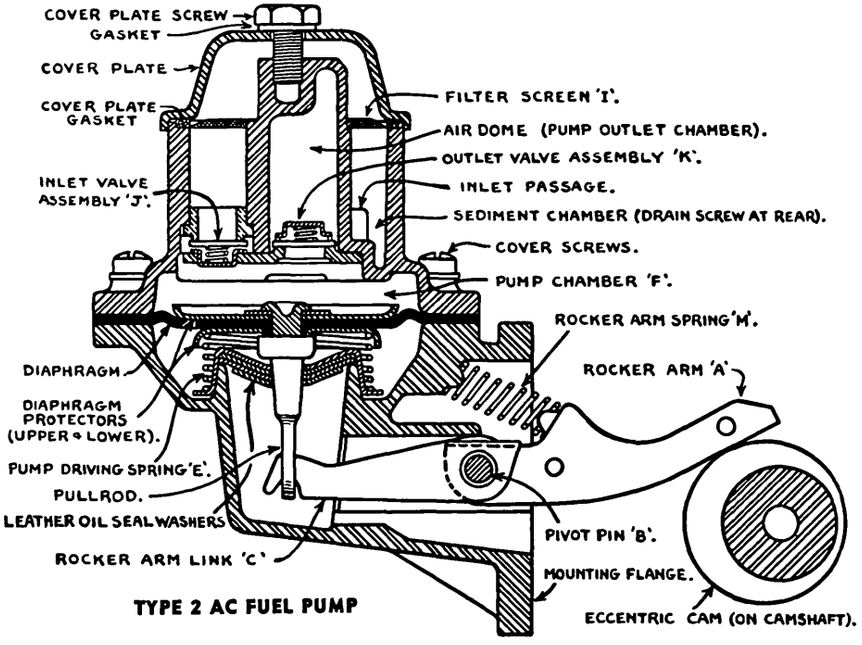
VACUUM PUMP TROUBLE SHOOTING

Excessive Oil Consumption: May be caused by a punctured vacuum pump diaphragm. The intake manifold line will suck oil through the punctured diaphragm from the linkage housing. Test vacuum pump to determine if pump is operating properly. A check can also be made before removing pump, by disconnecting the line bteween the pump and manifold, operating the pump, and holding a piece of paper over the pump outlet. Oil spray from the pump outlet onto the paper indicates a punctured diaphragm.

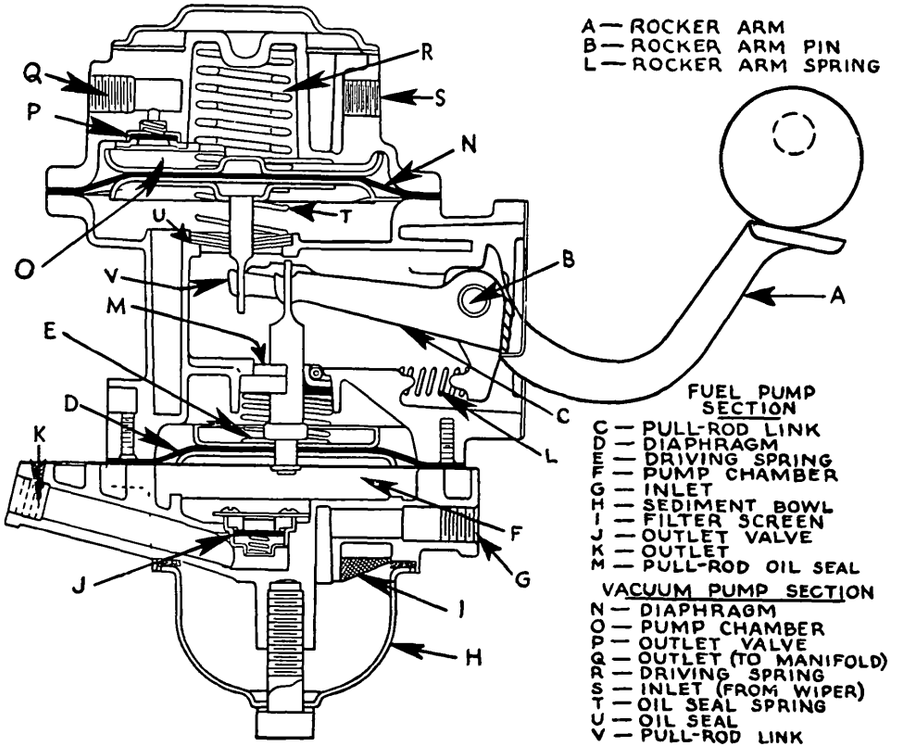
Poor Idle Due to Defective Vacuum Pump: In case the diaphragm of the vacuum pump is punctured it will allow air to be sucked in from the crankcase through the diaphragm and into the intake manifold. This will cause the two cylinders (nearest the manifold leg where the vacuum line connects) to miss when idling.



TYPE 1 AC FUEL PUMP



TYPE 2 AC FUEL PUMP



TYPE 3 AC FUEL & VACUUM PUMP

AC & FORD FUEL PUMP CONVERSION NUMBERS

Model	Ford No.	AC Repl. Pump No.
Ford 6 Cyl 1941-47 "G" Series	IGA-9350	543
Ford 6 Cyl 1947-50 "H" Series	7HA-9350-B	592
Ford 6 Cyl 1949-50	8HA-9350	9443
Ford 6 Cyl 1951	IHA-9350-B	9599
Ford 6 Cyl 1951 (Std)	IHA 9350-A, G	9786
Ford 6 Cyl 1951 (O D)	IHA 9350-E, H	9786
Ford 6 Cyl 1952-54	EAA-9350-E	9787
Ford 6 Cyl 1952-53	EAA-9350-F	9638
Ford V8 1940-46	11A-9350	591
Ford V8 1947-48	59A-9350-A	571
Ford V8 1949-50	IBA-9350-A	586
Ford V8 1951-53	IBA-9350-G	9785
Ford V8 1951-53	IBA-9350-H	9597
Ford V8 1954	EAA 9350-E	4070
Ford V8 1955 (Std)	B5A 9350-A, B	4209
Ford V8 1955 (O D)	B5A 9350-B	4212
Lincoln 1942-48	59A-9350-A	571
Lincoln 1949-51	8EL-9350-A	9142
Lincoln 1952	EAD-9350-A	9626
Lincoln 1952	EAD-9350-D	4049
Lincoln 1953-54	EAD-9350-C	4049
Mercury 1940-48	11A-9350	571
Mercury 1949	7RA-9350-C	9268
Mercury 1949	8CM-9350-A	578
Mercury 1950-51 (Early)	8CM-9350-C	9544
Mercury 1951 (Late) 1952-53	1CM-9350-A	9601
Mercury 1951-53	EAB-9350-A	9597
Mercury 1954	B4A 9350-E	4052
Mercury 1955	B5A 9350-D	4206

FUEL PUMP OVERHAUL

NOTE—THE FOLLOWING DISASSEMBLY AND RE-ASSEMBLY INSTRUCTIONS ARE GENERAL AND APPLY TO ALL TYPES OF AC PUMPS. CARE SHOULD BE TAKEN TO NOTE POSITION OF COVER ASSEMBLY AND LINKAGE BEFORE DISASSEMBLY TO INSURE CORRECT REASSEMBLY. (SEE ILLUSTRATIONS FOR FOUR BASIC TYPES.)

TYPE 1 FUEL PUMP

DISASSEMBLY: File mark across diaphragm flanges at heat stud position (if one used). Remove screws holding cover to body and remove cover. Remove valve caps and air dome and remove inlet and outlet assemblies. Remove nut from pull rod and take out diaphragm and protectors. Remove lower cover and drive springs (on some types), then remove rocker arm pin by driving pin out through side of body (usually "swedged" in position) and take out rocker arm assembly. Disassemble rocker arm by taking out "hairpin" keepers in pins and remove links.

REASSEMBLY: (Pump Body)—Assemble the two links with one link pin and attach the two links to pull rod with pin and insert "hairpin" clips to retain pin position. *(NOTE*—Links should be installed with cut-off corners toward diaphragm.) Install assembly in pump body inserting rod through hole provided. *(NOTE*—Be sure the two links will swing to one side toward rocker arm pin hole. This is necessary so that rocker arm pin will pass through pin holes at end of links.) Hold pull rod in position and slip rocker arm through slot. Be sure arm slides between the two links and that projecting hook goes over link pin. Insert small end of assembly Tool PT-6 through body, link, and rocker arm and push in position. Maintain a slight pressure on assembly pin while driving it out through body with permanent rocker arm pin. Peen edges of pin hole over both ends of pin with Tool PT-3. If pin is type which uses rings to hold it, slip the two spring clips into grooves at each end of pin. If the pin has a head at one end and a tapered hollow end at the other, install a washer over taper and spread hollow part.

Diaphragm: Install diaphragm on pull rod in following order: Pull rod gasket, lower diaphragm protector, fabric diaphragm (use a new one and be sure tab does not interfere with bowl when in postion), upper diaphragm protector, alignment washer (six sided), lockwasher and nut. Hold hexagon washer with wrench PT-7 while tightening pull rod nut. Alignment washer must be held steady to avoid damage to diaphragm. Hold lower cover so rocker arm spring and diaphragm spring can be placed over bosses inside cover, then install two spring caps over springs with rims down. Replace gasket on cover, then hold pump body over lower cover and bring them together. Be sure that spring cap fits around end of pull rod and around end of rocker arm, and install cover screws.

Pump Cover: Install inlet and outlet valve assemblies in pump cover and install chamber plugs. *(NOTE*—When an air dome is used it is always placed over the outlet valve.) Place pump body in vice, line up the file marks on flanges, level the diaphragm by moving rocker arm and hold it in this position while installing all screws and washers finger tight. Be sure they pass through holes in diaphragm without chewing fabric. Actuate rocker arm several strokes, releasing with a snap. Tighten cover screws, alternating from one side to the other. Replace screen, gasket and pump bowl and install bail.

TYPE 2 FUEL PUMP

DISASSEMBLY: File mark across diaphragm flanges to insure correct reassembly. Remove cover from pump body. Remove capscrew securing cover plate to pump cover and remove plate, gasket and retainer. Remove valve retainer screw and retainer and then lift inlet and outlet valve assemblies from cover. File the peened end of rocker arm pin until flush with flat washer and drive pin out of body with a punch, then lift rocker arm and spring from body. Compress the diaphragm and disengage pull rod from inner rocker arm. *(CAUTION—DO NOT TILT OR TWIST DIAPHRAGM AND PULL ROD ASSEMBLY. DAMAGE TO INNER OIL SEAL WILL RESULT.)* See Note below for different type oil seals.

▷OIL SEAL NOTE—Two types of oil seals are used:

1. Compression type consisting of two leather washers or a rubber disc retained between metal discs and held in place with a compression spring.
2. Integral type consisting of a seal "staked" into pump body. Diaphragm assembly must not be titled or twisted during removal or reassembly with this type seal to avoid damage.

NOTE—Manufacturer recommends that a new Fuel Pump Repair Kit be used when repairing pumps.

REASSEMBLY (Pump Body): Assemble rocker arm and link, retain with bushing, if one used. Slide assembly into body and retain with thin end of Tool PT-6. Replace rocker arm spring. Replace large coil diaphragm spring on staked-in oil seal, (if other type seal used, replace seal and seal retainer, then install spring). Push diaphragm pull rod straight through oil seal (Use extreme care not to damage seal). Press on diaphragm to title pull rod slightly away from link, then turn pump body over while holding diaphragm, so link will fall into engagement with pull rod, then turn pump body so push rod will hook onto link. Push assembly pin through body so large end is holding arm and link in position. Maintain a slight pressure on assembly pin and drive it out with permanent rocker arm pin. For "bullet" type pins, "peen" or "stake" the edges of both pin holes with Tool PT-3. If pin has a head on one end and tapered hollow at other end, install a washer over taper and spread hollow part to retain in position.

Pump Cover: Place cover on bench with flange up and drop fibre valve seat gaskets into the two valve pockets. Drop inlet and outlet valve assemblies into valve holes on top of gaskets, (valve legs UP for inlet valve and DOWN for outlet valve. Place valve cage retainer on valves so that the two pairs of arms rest on edges of valve assembly, and so the two small holes in retainer line up with screw holes in casting (NOTE—This retainer is slightly curved. Install so the hump is up). Replace bowl cover gasket and screen. The two projections on screen should be on top side when installed. Install bowl, bowl gasket and retaining screw.

▷*VALVE ASSEMBLY NOTE—If* valve assembly is not a unit, install the separate parts in the following order: (OUTLET) Valve spring retainer, spring, valve, and valve plate. (INLET) Valve, and valve spring. Then install retainer plate, screws and lockwashers.

Final Assembly: Clamp pump body in vice, then line up file marks on flanges. Level diaphragm by moving rocker arm, and hold in this position while installing screws and lockwashers. Be sure they pass through holes in diaphragm without chewing fabric. Tighten only enough so screws touch lockwashers. Push rocker arm back and forth several strokes, releasing with a snap. Tighten screws, alternating from side to side so cover is pulled down evenly.

TYPE 3 FUEL & VACUUM PUMP

DISASSEMBLY: File marks across upper and lower diaphragm flanges to insure correct reassembly, then remove fuel body and vacuum body from pump body. Remove cover plate from vacuum body and retaining screw from valve retainer, then take out valves. Remove glass bowl, or cover plate, from fuel body and take out gasket, screen, retaining screw and plate. Remove inlet and outlet valves. To avoid damaging seals, remove rocker arm pin (hollow type, file pin flush with washer and then drive out; if solid "staked" type, drive pin out with punch). Disengage inner rocker arms from pull rods and remove vacuum and fuel diaphragms.

REASSEMBLY (Fuel Cover): Replace the small fibre valve gaskets in valve seat, then replace one valve-and-cage assembly (if valve assembly is not a unit, see Valve Note below) in valve seat nearest the outlet hole (Three legged side DOWN into chamber). Replace other valve-and-cage assembly in other seat (three legged side UP in chamber). Install valve cage retainer (with hump up) and retain with screw. Install new bowl gasket and bowl.

Pump Body: Slide spacer over short rocker arm inner link so holes line up. Spacer should hang down from link so it points in opposite direction to link hook. Projection on spacer should point to hook end of link. Replace one long link on each side of spacer and line up the holes. Be sure hook ends of long links come together so long links surround short links. Also be sure hooks of two long links point in same direction as hook on short link. Place spacer washer on outside of each long link (if required), lining up all holes. Slide this whole assembly between the jaws of rocker arm. The flat surface of rocker arm should face same direction as link hooks. Slide the pin bushing (hollow steel tube) through holes in rocker arm, spacer washers, long links, spacer and short link. Stand pump body on bench with fuel flange down, then replace rocker arm coil spring in rocker arm slot and set end of spring over cone (or stud) cast into body. Slide rocker arm assembly into slot (NOTE—The outer end of rocker arm spring slips over projection on link spacer). Push rocker arm assembly in until pin bushing lines up with pin holes in pump body. Insert small end of Tool PT-6 through hole to retain assembly in body. Replace diaphragm spring on metal casing of oil seal, install retainer (dish down) on top of spring. Push diaphragm pull rod straight through oil seal, then push down on diaphragm to tilt pull rod slightly away from link. Raise pump body until it is upside down so link will fall into engagement with pull rod. Bring diaphragm back

CONTINUED ON NEXT PAGE

FUEL PUMP OVERHAUL (C nt.)

to level position to hook pull rod on link. Push assembly Tool PT-6 through body so large end is retaining assembly, then drive tool out with permanent pin. Install washer over hollow end of pin and spread or mushroom pin over washer with ball peen hammer.

►*OIL SEAL NOTE*—This seal can be removed and replaced with special tools provided by pump manufacturer.

Attaching Fuel Cover to Pump Body: Line up file marks on edge of flanges, then maintain a pressure on rocker arm so that diaphragm is level with flange and install all screws and lockwashers, tightening only enough for head to touch lockwasher. Pump rocker arm several full strokes, then tighten cover screws, alternating from side to side.

Vacuum Cover: Lay cover casting, diaphragm side down, on bench and replace screen over valve hole and install retainer. Replace cover and gasket and tighten securely. Turn cover over and replace inlet and outlet valve gasket in valve recess. Install valve-and-cage assembly (if valve assembly is not a unit, see Valve Note below) in valve seat nearest outlet hole (three legged side DOWN in chamber). Replace other valve-and-cage assembly into other chamber (Three legged side UP in chamber), then install valve cage plate with hump up and retain with screw.

►*VALVE ASSEMBLY NOTE*—If valve is not "unit" type assembly, install separate parts in following order: **(Outlet Valve)** Valve spring retainer with three legs, valve spring, valve. **(Inlet Valve)** Valve and valve spring. Retain both valves with valve plate and gasket, securing in position with three screws.

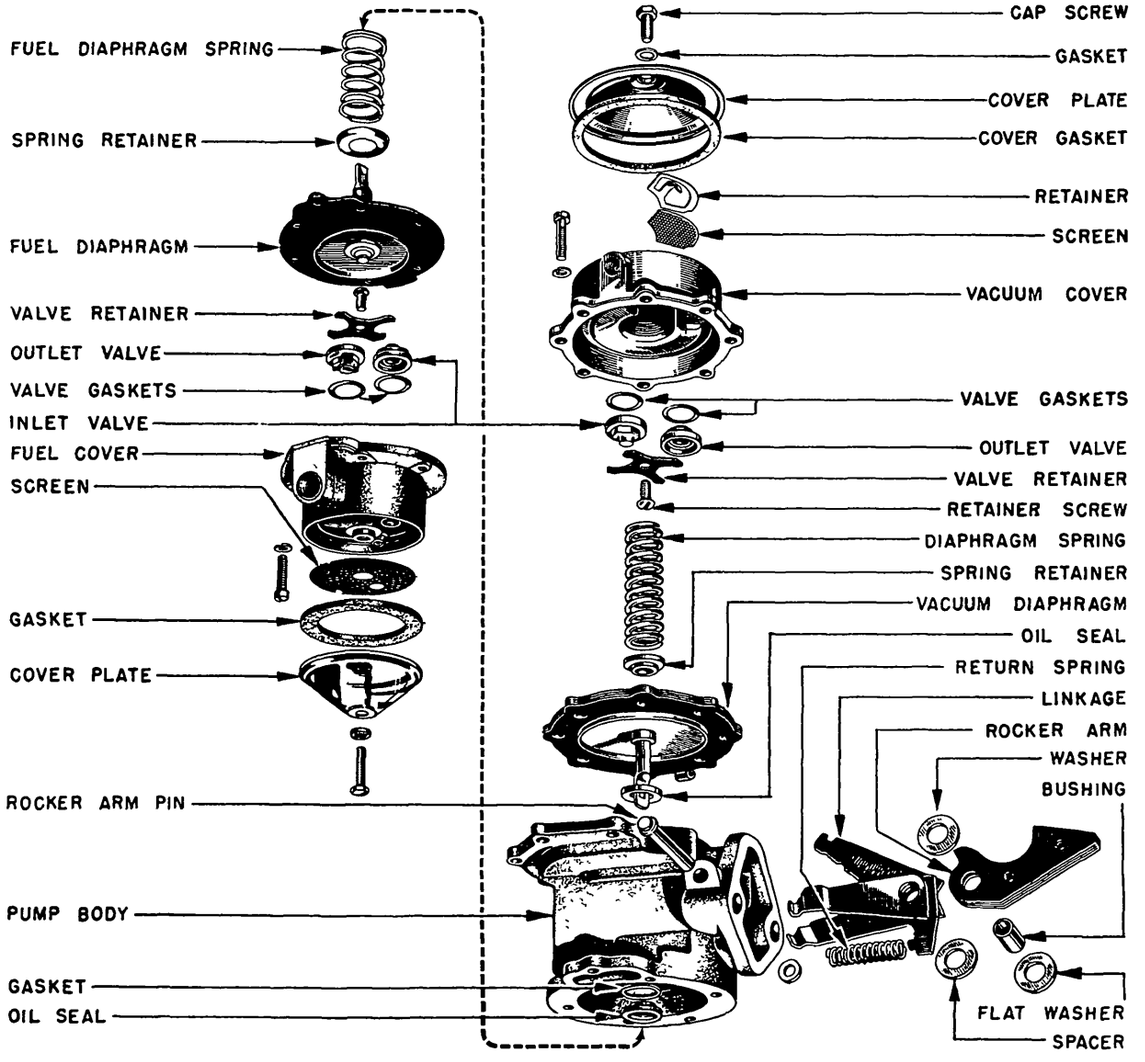
Attaching Vacuum Cover to Pump Body: Lift pump body above eye level so you can see inside through center hole from vacuum side. Put the pull rod up through this hole and slip the pull rod slot over hooks on two long links. Do not force vacuum links down by operating rocker arm. The vacuum links should be left free so they rise naturally when pull rod is engaged. Applying force to the links will distort pull rod. Hold vacuum diaphragm assembly in place while pump body is placed in vice with vacuum side up. Push rocker arm until diaphragm is level with flange on which it rests. Hold rocker arm at this point and slip Tool PT-8 in between body casting and rocker arm. Release rocker arm against leveling tool and the diaphragm will remain in level position. Install circular spring seat on center of diaphragm retainer and install spring, then drop vacuum cover over the spring (do not try to press cover all the way down). Make sure spring seat is down against diaphragm protector, then line up file marks on flanges and insert two long (10-32x1½") screws in two opposite holes in cover flange, and turn down as far as they will go without forcing. Cover will be pulled down so short screws will take hold. Install screws with lockwashers and tighten screws only enough so they press lightly against lockwashers. Remove the two long screws and replace with short ones. Remove leveling tool. Diaphragm will then flex the correct amount. Tighten the cover screws, alternating from side to side.

TYPE 4 FUEL & VACUUM PUMP (DOUBLE ACTING VACUUM PUMP)

DESCRIPTION: Type 4 combination fuel and vacuum pump is the same as type 3 except it has a glass bowl and is double-acting on the vacuum side. Where the type 3 pump has one inlet and one outlet valve above the diaphragm, the type 4 pump has an inlet and an outlet valve on both sides of the diaphragm.

OPERATION: Engine vacuum holds diaphragm practically neutral when windshield wiper valve is closed or when engine vacuum is sufficient to operate windshield wiper. When engine vacuum is insufficient or the wiper valve is opened, additional vacuum is produced by the movement of the diaphragm. As the diaphragm moves up it exhausts air from the upper chamber into the intake manifold while drawing air into the lower chamber from the windshield wiper. As the diaphragm moves down, air is exhausted from the lower chamber into the engine crankcase while drawing air into the upper chamber from the windshield wiper.

DISASSEMBLY & REASSEMBLY: Same as for Type 3 Pump as given above.



AC COMBINATION FUEL & VACUUM PUMP (TYPICAL)

AUTO-LITE MECHANICAL PUMP

DESCRIPTION: The Auto-Lite fuel pump is a mechanically operated diaphragm type pump, driven by a special cam on the engine camshaft. Operating principle is similar to the AC type pumps. Pump has one piece cam lever (rocker arm), one piece diaphragm and pull rod assembly. "Cage type" valves are used and a filter screen is incorporated in the inlet valve unit.

OPERATION: Suction stroke of pump is positive (eccentric on camshaft causes cam lever to pull up on diaphragm assembly), delivery stroke is powered by a spring on diaphragm shaft which is compressed back during suction stroke. Fuel delivery is controlled by a back pressure in the line and, whenever carburetor float needle valve is closed, the diaphragm assembly remains at the end of its stroke with the spring compressed. Under these conditions the cam lever slides up and down on the diaphragm shaft (lever return spring keeps cam lever in contact with eccentric on camshaft).

DISASSEMBLY & INSPECTION: Mark cover and housing to insure correct location when re-assembling pump. Remove all cover screws. Drive the rocker arm pivot pin through the retaining washer with a center punch. Remove washer and drive pin back to its original position. Remove burrs from pin and drive pin out. With the pin out the rocker arm, arm spring and pad can be removed. Diaphragm can now be removed from the housing. Inspect lever housing for cracks, make sure housing diaphragm flanges are smooth and flat. Inspect diaphragm for cracks around screw holes. Inspect pull rod oil seal and examine rubber carefully by pinching with fingers to determine if it is cracked or punctured. Inspect rocker arm pin for wear and for snug fit in housing. A loose fitting pin will cause an oil leak at that point.

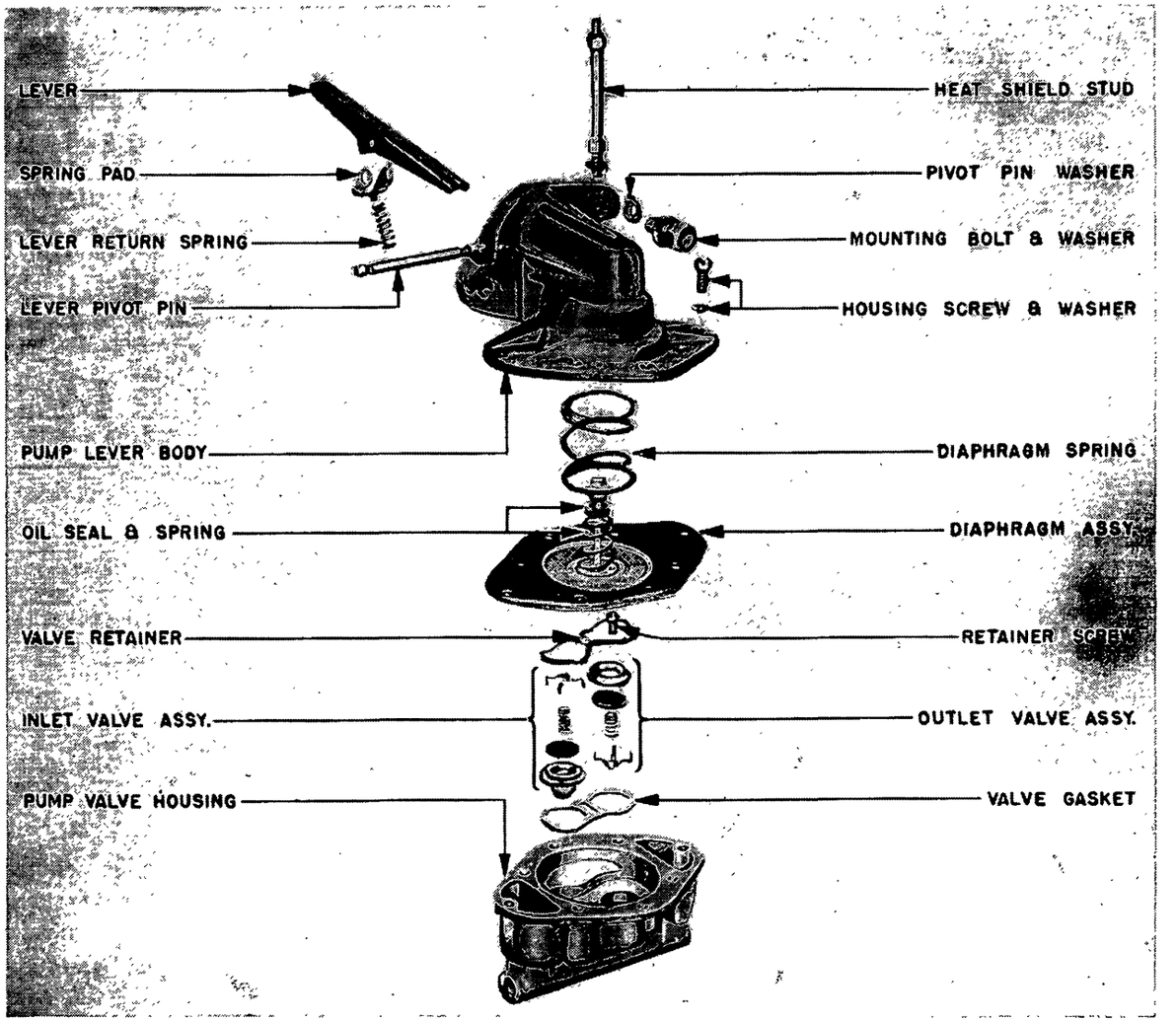
Installing New Diaphragm: Hold diaphragm assembly and diaphragm spring in position in the housing with oil seal and seal spring properly placed. Insert lever and lever spring pad, install a loose dummy pin through lever and housing as a guide to hold parts in place. Drive in new pin, install washer and stake end of pin. Install lever return spring.

Valves: Remove and clean valves in gasoline and allow to dry. **Do not blow off valves with air.** Inspect valve seats and discs. These should be smooth and flat. Inspect valve disc springs for good seating of the discs. When installing valves use new gaskets. The inlet valve screen should be down and be on the "in" side of the housing. The outlet valve should be installed with the spring and disc down. Install valve retainer. Be sure retainer is bearing on both sides of each valve.

REASSEMBLY: Install valve housing in place on lever housing so that the untapped hole in the valve housing lines up with the tapped hole in the lever housing directly under the lever. Install flange screws loose. Mount pump in vise and press rocker arm down beyond normal stroke and tighten all screws.

CAPACITY TEST: Install pump on engine, connect fuel lines. Install a Tee connection in fuel line at the carburetor and connect a line to the Tee. Install a #44 carburetor float seat orifice on the end of the line with a shut-off valve between the Tee and the orifice. Start the engine and operate at idle speed. Open the shut-off valve and measure the amount of fuel which flows from the orifice in a quart measure. If the amount of fuel is 1½ pints or more in one minute the pump capacity is sufficient.

PRESSURE TEST: Connect a pressure gauge to Tee, operate engine at idle. Pressure should be 3 to 5 pounds. Repeat test at 40 MPH speed. If pressure is low use a stiffer diaphragm spring. If pressure is high, remove pump and loosen all diaphragm cover screws and press operating lever beyond normal stroke and retighten screws. If pressure is still too high, disassemble pump and install a weaker diaphragm spring.



AUTO-LITE FUEL PUMP

CARTER MECHANICAL FUEL PUMP
COMBINATION (FUEL & VACUUM) & SINGLE (FUEL) PUMPS

DESCRIPTION: Mechanically operated, diaphragm type pump mounted on side of engine block and driven by eccentric on camshaft. Pump has one-piece cam lever, intake and discharge air domes (discharge air dome is diaphragm sealed type to prevent loss of air cushion) Valves (early type) are "cage assemblies" and are replaceable; (later type) are enclosed in fuel pump body and are not replaceable. Diaphragms are furnished as an assembly and consist of diaphragm, shaft, spring and oil seal.

Vacuum Pump (Combination Type Pump): Diaphragm assembly consists of diaphragm and shaft. Vacuum pump valves and vacuum strainer are retained in valve housing by welch plugs and are not replaceable. Diaphragm shaft oil seal, breather vent filter, breather plate and retainer are located in pump body.

OPERATION: Suction stroke of pump is positive (eccentric on camshaft causes cam lever to pull up on diaphragm assembly), delivery stroke is powered by spring on diaphragm shaft which is compressed during suction stroke. Fuel delivery is controlled by back pressure in the line and, whenever carburetor float needle valve is closed, the diaphragm assembly remains at the end of its stroke with the spring compressed. Under these conditions the cam lever slides up and down on the diaphragm shaft (lever return spring keeps cam lever in contact with eccentric on camshaft).

Vacuum Pump (Combination Type Pump): Diaphragm assembly shaft is held against cam lever by return spring and is actuated on pressure stroke by cam lever, and by return spring on vacuum stroke.

TESTING (FUEL PUMP): Connect a Tee in the fuel line at the carburetor. Use this Tee connection when making following tests:

Capacity Test: Connect short piece of hose to Tee in fuel line. Operate engine at 500 RPM. allowing fuel to flow through hose into measuring container. Pump should fill one-quart measure in 1 minute or less.

Pressure Test: Connect pressure gauge to Tee in fuel line. Run engine at 500 RPM. Pressure should be 3½ lbs. (minimum) to 5 lbs. (maximum).
CAUTION—Gauge pressure line (Tee to gauge) should not be more than 6" long for accurate testing.

Vacuum Test: Disconnect fuel line from inlet side of pump and connect vacuum gauge at pump inlet connection. Vacuum reading should be 10" or greater at engine speed of 500 RPM.

TESTING (VACUUM PUMP): Check pump on the engine. First idle engine and turn on windshield wiper to make certain wiper is in operating condition. Then disconnect vacuum line at intake manifold, plug manifold fitting hole, but **do not plug** the vacuum line. Run engine and note windshield wiper operation. Pump is satisfactory if wipers operate (wipers may slow down slightly but should not stop).

OVERHAUL: ***NOTE—See "Repair Package" data below for sub-assemblies furnished for these pumps.***

Disassembly: Make certain that pump body and pump valve housing marked to insure correct reassembly, remove rivet plug (or setscrew used on some models) which retains cam lever pin, remove pin, withdraw cam lever, spring retainer, and return spring. Remove bowl cover retaining capscrew, lift off bowl cover, gasket, cover screw packing, and strainer. Remove bowl retainer screw, lift off bowl assembly and outlet air valve diaphragm. Remove capscrews and lockwashers around pump body flange, separate body and valve housing, lift out diaphragm assembly. Remove valve cage assemblies. Remove vent packing retainer ring and take out packing in recess in side of pump body.

Vacuum Pump (Combination Type Pump): Remove vacuum pump valve housing cap screws and remove housing and diaphragm spring. Take out diaphragm assembly and then remove breather vent filter, plate and retainer. Take out diaphragm shaft oil seal.

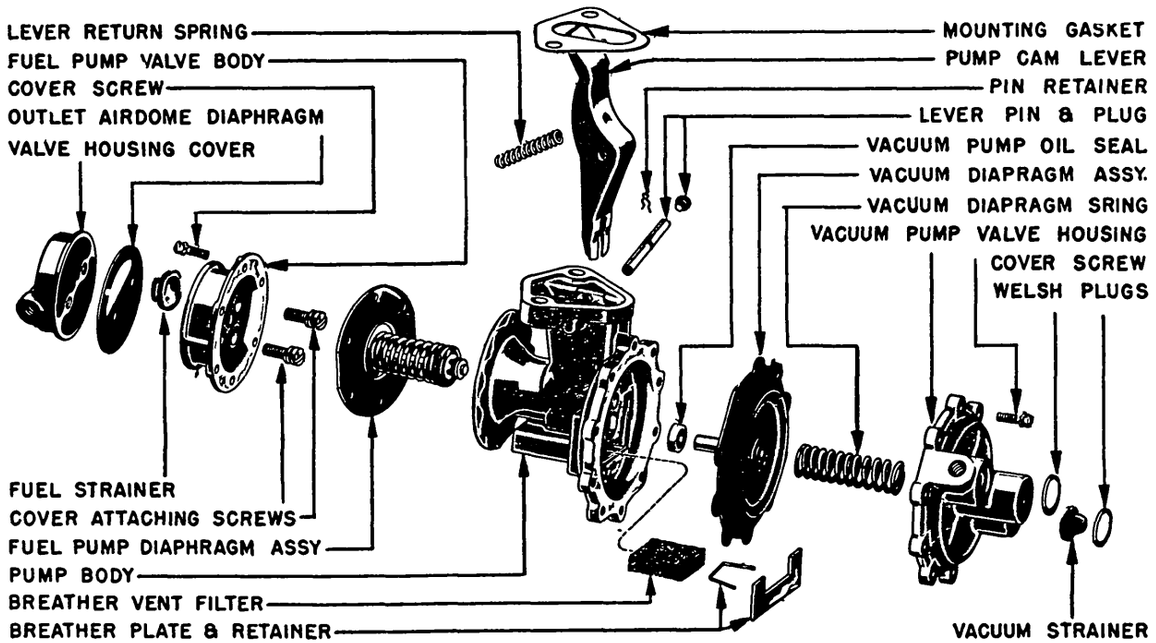
Cleaning & Replacement of Parts: See "Repair Package" data below for new parts which should be installed when rebuilding pump. Clean all other pump parts with gasoline, blow out all passages, and dry parts with air. Replace all worn or damaged parts.

Reassembly: Install packing and retainer in vent recess in body. Use Valve Cage Assembly Tool, T109-191, to install new intake and outlet valve cage assemblies in valve body. Place new diaphragm assembly in position in pump body with diaphragm flats at fuel line connections, install valve body (line up marks made before disassembly), turn capscrews in loosely around flange. Install cam lever, return spring retainer, and spring making certain that end of lever engages diaphragm shaft, install lever pin and pin rivets (or one rivet and one retaining screw on models where setscrew used). Use Diaphragm Flexing tool, T109-192, to hold diaphragm flexed at end of stroke while tightening capscrews around flange evenly and securely (CAUTION—This is necessary to insure full stroke of the pump in service). Install bowl assembly with new outlet air dome diaphragm between bowl and valve body, tighten bowl retainer screw. Install strainer and bowl cover using new cover screw packing, cover gasket, and cover screw gasket.

Vacuum Pump (Combination Type Pump): Install oil seal, breather vent filter, breather plate and retainer. Insert diaphragm shaft through oil seal, then install valve housing in correct position (marks on diaphragm flanges made at disassembly). ***CAUTION***—Use Diaphragm Flexing tool, T109-192 to hold diaphragm flexed at end of stroke while tightening cap screws around flange.

REPAIR PACKAGE: Gasket & Diaphragm Kit.

Carter Kit No.	for Pump No.
M20004	M594S
M20006	M639S, M639SL, M639SZ
M20009	M729SL, M729SZ
M20012	M774S



CARTER COMBINATION FUEL & VACUUM PUMP
(SIN LE FUEL PUMP SIMILAR)

AC TYPES

DESCRIPTION: AC Electric Gasoline Gauge is of the balanced coil type and consists of two units, a dash unit or recording gauge and a tank unit or measuring device mounted on top of the gasoline tank. The dash unit mounted on the instrument panel consists of two coils mounted at an angle of 90 degrees. The gauge pointer is attached to an armature which is pivoted at the intersection of the coil axes. The dash unit is connected to the coil side of the ignition switch and to the tank unit through insulated wires. The dash unit is grounded through the mounting screws to the instrument board and car frame.

Tank Unit:—Gearless type with integral float arm and contactor arm (rheostat ground brush). Float arm is pivoted in lower end of tank unit case so that movement of the arm (with the rise and fall of the float in the tank) causes the upper end of the arm to sweep across the tank unit resistance coil. Except for this float arm construction and separately mounted fuel outlet pipe (some models), all types are similar. NOTE—On first type gauges, float mechanism in tank unit is 'geared' type with float arm clamped to gear pivoted on tank unit bracket so as to mesh with gear on contactor operating shaft. Both types of gauges operate in the same manner.

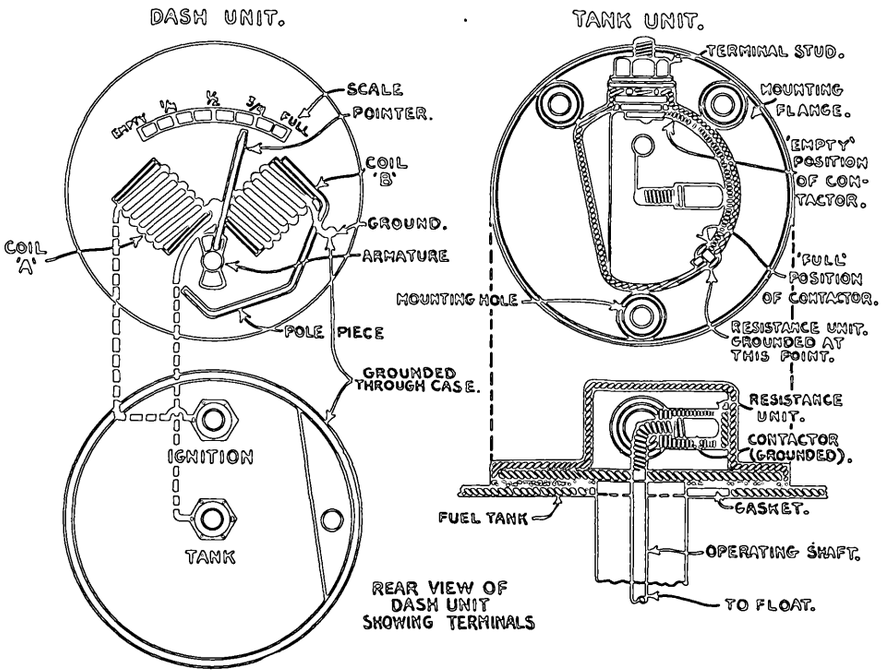
OPERATION: The upper terminal of dash unit marked "Ignition" is connected to the coil side of the ignition switch (or to the 'auxiliary' terminal of lock switch coils) so that the gauge is operative whenever the ignition switch is turned on. Current flows through coil 'A' of the dash unit to the center terminal marked 'Tank'. The second coil 'B' is connected to this terminal. The other end of this coil winding is grounded to the gauge case. The 'Tank' terminal of the gauge is connected to the terminal on the tank unit and circuit is completed to ground through the tank unit resistance winding. This resistance winding in the tank unit is grounded through the movable contactor so that the resistance is cut in or out of the dash unit coil circuits as the float rises and falls with the gasoline level in the tank.

INSTALLATION: Both dash unit and tank unit are grounded and care must be taken whenever the units are installed or replaced that a ground is provided. On the tank unit it will be sufficient to remove paint and carefully clean the tank under the tank unit flange.

TROUBLE SHOOTING: Defective units should be replaced and service operations will be confined to locating trouble in dash unit or tank unit. Check gauge operation from following table:

1. Pointer does not move when ignition is turned 'on'.
   The line from the ignition switch to the dash unit is open. Check connections and supply new lead from switch to 'IGN' terminal on gauge.
2. Gauge indicates 'Full' at all times.
   The line between dash unit and tank unit is open. Check connections and replace line with insulated wire.
   Tank unit burned out. Replace tank unit.
   Tank unit not grounded. Check by supplying new ground from tank unit to car frame.
3. Gauge indicates 'Empty' at all times.
   Wires reversed on dash unit. See that connections are made as indicated above on diagram.
   Dash unit is not grounded. See that dash unit is properly grounded. Check by supplying special test ground to car frame. If dash unit does not register correctly, it must be replaced.

SERVICING:—No service operations required other than to see that wires are properly connected and terminals are tight. Defective units (as determined by tests given below) should be replaced.



AC GASOLINE GAUGE TESTING

NOTE: Manufacturer recommends that AC Gas Gauge Tester, Part 1516000, or HMO-204 be used to make tests. Tester similar to gas gauge Tank Unit equipped with test leads and an operating handle by which the resistance can be cut in and out of the gauge circuit in a similar manner to the operation of the tank unit on the car.

TESTING: Make the following tests in order given which will completely check all gas gauge units and wiring.

DASH UNIT

With ignition switch 'off', disconnect tank wire at terminal on back of dash unit, connect RED tester lead to this terminal, ground BLACK tester lead to frame. Turn ignition switch 'on', move Tester arm up and down. Gas gauge dash unit should register 'Full' and 'Empty'. If operation is O.K., disconnect tester and reconnect tank wire. If dash unit pointer does not register correctly, check feed wire by connecting 6 volt test lamp between dash unit Ignition Terminal (second terminal on back of dash unit) and ground. If test lamp does not light, circuit from ignition switch is defective and ignition switch and connecting wire should be checked or replaced. If lamp lights (gauge circuit O.K.) and dash unit does not operate, replace dash unit and reconnect wires.

GAUGE WIRING

Disconnect tank unit wire at nearest point to tank unit (bayonet type snap connector or junction block). Attach Red tester lead to wire running back to dash unit, ground BLACK tester lead to the car frame. Turn ignition 'on'. Move tester arm up and down and watch dash unit pointer which should move from 'Empty' to 'Full'. If dash unit reads 'Empty' at all times, or if reading is lower than when dash unit tested alone (dash unit test above), check wire for shorts or leaks (broken insulation, short junction block terminals, un-insulated connectors touching body or frame, etc.). If dash unit reads above 'Full' at all times, or if reading is higher than when dash unit tested alone, check wire for open-circuits (break in wire, loose connections, corroded terminals, etc.). If dash unit and wire tests O.K., check tank unit.

TANK UNIT

Remove tank unit, clean tank unit terminal and mounting flange thoroughly, connect tank unit to wire running to dash unit, ground tank unit by connecting jumper wire from tank unit mounting flange to car frame. Turn ignition 'on'. Move tank unit float arm up and down. Dash unit pointer should move from 'Empty' to 'Full'. If dash unit reading indicates tank unit defective, replace tank unit. Always check tank units before installing in tank and make certain that float arm is free (check for freedom of movement by noting that float arm falls back to empty position when released in various positions). See that gasoline tank and tank unit mounting flange are clean (tank unit grounded to frame through tank) and that a good ground contact exists between tank and frame.

AUTO-LITE "TWO-WIRE" TYPE

IMPORTANT SERVICE NOTE: Three dash unit types have been used as described below and special precautions must be observed when tightening connections at dash unit terminals on each model. Excessive tightening will loosen terminal stud and destroy the accuracy of the gauge requiring replacement of the dash unit (see also Calibration Adjustment below).

First Type Dash Unit—No identification marks. No terminals staked to prevent turning. Use great care when tightening connections, particularly at 'IGN.SW.' terminal.

Second Type—May be identified by radio resistor terminal at top of gauge between '1' and '2' terminals and use of round insulating washers on each of these terminals. The 'IGN.SW.' terminal is staked to prevent turning. Other terminals are not staked.

Latest Type—May be identified by radio resistor terminal and insulating strip extending across between '1' and '2' terminals (replaces individual insulating washers used on other types). All three terminals staked to prevent turning.

DESCRIPTION: Gauge consists of a bimetal or thermostatic arm dash unit and a rheostat type tank unit connected together by two wires.

Dash Unit—Pointer actuated by the two bimetal arms on which heating coils are wound (these arms hinged at upper end with lugs to engage pointer at lower end). The two outer bimetal arms (without heating coils) compensate the dash unit for temperature changes (left hand arm controls dash unit contacts, right hand arm has insulated stop at each side to limit motion in each direction) and the contacts compensate for battery voltage variations (remain closed at 5 volts or less, open and close at voltages above 5 volts to maintain constant gauge input). The circuit through the dash unit is from the 'IGN.SW' terminal through the contacts and then through each heating coil to terminals '1' and '2'.

Tank Unit—Consists of a resistance coil wound on a flat form and connected between the two tank unit terminals. Contact arm is grounded and circuit from each terminal is through the resistance to ground at the contact arm. Contact arm is mounted on the float lever and moves across the resistance as the float rises and falls so that resistance is cut out of one dash unit heating coil circuit and in on the other heating coil circuit with this movement.

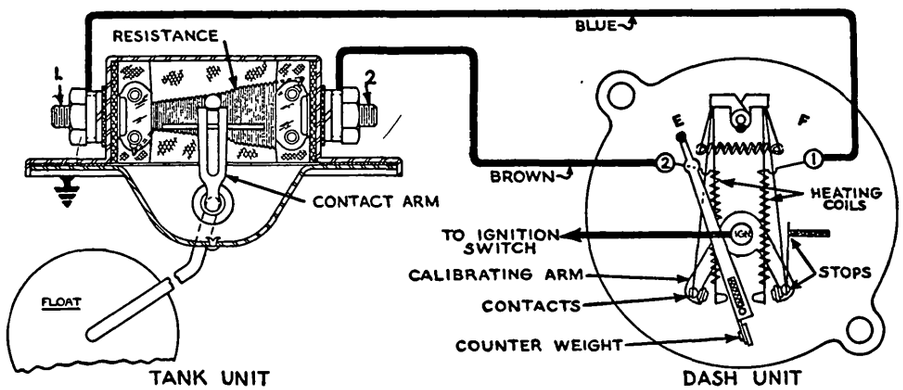
OPERATION: When ignition switch is turned on, current flow through heating coil on each bimetal arm in the dash unit depends on contact arm position in tank unit (contact arm controls amount of resistance in each heater coil circuit) and the unequal current flow through each coil causes an unequal deflection of the bimetal arms so that the pointer is moved on the scale. Any change in the position of the tank unit contact arm (caused by float movement) causes a like change in the bimetal arm deflection and pointer reading of the dash unit. When voltage at gauge exceeds 5 volts, or if bimetal arms become overheated, contacts open and close to maintain constant input so that readings are accurate regardless of voltage fluctuations (pointer position entirely dependent on division of current between heating coils on bimetal arms as controlled by tank unit. Contact opening and closing is sufficiently rapid so that pointer does not change). External temperature changes (affecting outer unwound bimetal arms) cause a slight rotation of the hinge so that position of inner bimetal arms and pointer remains unchanged. Gauge design results in a lag or damping action so that pointer fluctuations due to fuel tank surges are minimized. When ignition switch is turned off, bimetal arms flex away from pointer which is then returned to the empty position by the counterweight at the lower end.

TESTING: Disconnect leads from #1 & #2 terminals of dash unit and turn on ignition switch. Any movement of the gauge indicates an internal ground in dash unit. With ignition switch in "ON" position, ground #2 terminal, and allow approximately one minute for gauge to complete movement. It should read full. Ground both terminals. Gauge should read ½ full. If gauge does not read correctly remove it for check and adjustment.

If gauge reads correctly reconnect leads to both terminals of dash unit and disconnect leads from tank unit. Gauge should not move. Any reading of the gauge with both wires disconnected indicates a ground in one or both wires. If no reading with wires disconnected, ground #2 wire, and proceed with test as given above. Failure to have correct reading indicates open circuit or broken wire. If gauge reads correctly for both tests given above any misoperation of the system can be attributed to a defective tank unit.

Note: Should #1 & #2 wires be crossed on units, readings will be reversed.

TROUBLE SHOOTING: Erratic or incorrect indications may be caused by a loose connection or ground in the wiring or terminals, while a fluctuating pointer is usually caused by dirty contacts in the dash unit. Sticking pointers may be caused by a bent pointer or frame or by interference between the gauge and panel. Remove the gauge from the panel and inspect for a bent pointer or pointer bearings. Check to see that there is a slight amount of end play in the pointer shaft and that the pointer turns freely. Clean the contacts by drawing a strip of bond paper between them.



AUTO-LITE "TWO-WIRE" GAUGE WIRING DIAGRAM

CALIBRATION ADJUSTMENT: If pointer position not correct Empty or Full or if gauge reads inaccurately, dash unit should be calibrated as follows: Remove dash unit from car, connect to tank unit known to be in good condition and to a battery (see illustration for connections). Loosen both nuts on 'IGN.SW' terminal (inner nut is staked on later type units) to release calibrating arms. Set tank unit float in Empty position, move left hand calibrating arm (on which stationary contact is mounted) to right to raise pointer reading, or to left to lower pointer reading. Move tank unit float arm to Full position, mov right hand calibrating arm to right to raise pointer reading, or to left to lower pointer reading. Recheck gauge at Empty position (setting may be changed by the Full adjustment). Tighten nuts on 'IGN.SW' terminal to lock calibrating arms in position using extreme care not to shift arms while tightening inner nut.
NOTE—When making this adjustment, or when testing dash unit on the bench, unit must be shielded from air currents which might cause unequal cooling of the bimetal arms and affect the gauge reading. Allow 1 minute for bimetal arm heating coils to heat up, after moving tank unit float, before checking dash unit pointer position.

AUTO-LITE (MOTOMETER) "ONE-WIRE" TYPE

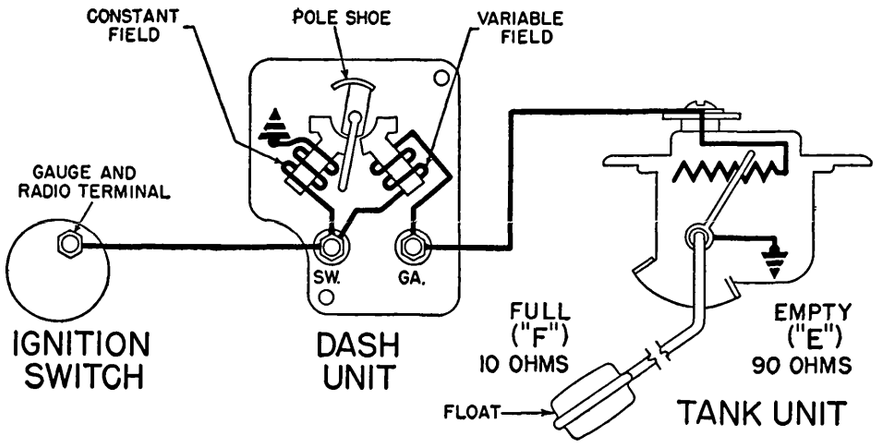
DESCRIPTION: This electro-magnetic fuel gauge uses one wire only between the dash unit and tank unit. This type gauge responds instantly to any change in fuel level in the tank, and when driving on rough roads or turning sharp curves the needle will fluctuate. A radio suppressor is not required for this type gauge, since no contacts are used in the dash unit.

TESTING: See diagram for connections. All terminals must be clean and electrically tight and both units properly grounded.

Dash Unit: Disconnect lead from "GA" terminal. With ignition switch "ON" gauge should show empty. Ground terminal "GA". Gauge should show full. Reconnect lead to "GA" terminal and disconnect lead at tank terminal. Repeat above test. Failure of gauge to read full with lead grounded indicates open circuit or broken wire.

Tank Unit: Connect tank unit (known to be good) or unit removed from tank if none available. Ground tank unit, and operate float arm. Gauge should read empty to full as arm is operated. If gauge does not operate correctly recalibrate dash unit. No movement of gauge indicates defective tank unit. ***Note: If constant field winding is open in dash unit, gauge will read full over most of movement of arm.***

CALIBRATION (DASH UNIT): Moving the pole shoe toward the armature increases its effect. For example, decreasing gap between the armature and variable field pole increases the readings over the entire range, while decreasing the gap at the constant field decreases the indications, and decreasing the gap at the upper pole reduces the amount of pointer movement. Proper calibration is obtained by adjusting all three poles to give correct readings over the entire scale.



ELECTRO-MAGNETIC FUEL GAUGE CIRCUIT

AUTO-LITE "ONE-WIRE" GAUGE WIRING DIAGRAM

STEWART GASOLINE GAUGE

DESCRIPTION: This electric gauge is of the "balanced" coil type and consists of a dash unit or recording device and a tank unit or measuring device. The two units are connected by an insulated wire and each unit is grounded. The feed wire on the dash unit is connected to the accessory terminal of the ignition switch (or coil side of switch) so that the gauge is operative only with the ignition turned 'on'.

OPERATION: The two coils in dash unit are connected in parallel to the switch terminal (1) on the gauge case. Coil (A) is grounded to the gauge case so that the current flow through this coil is constant. The other end of coil (B) is connected to the tank terminal on the gauge case so that the coil is in series with the resistance unit in the tank unit. The resistance unit is grounded through the contactor on the upper end of the gasoline tank float rod so that the resistance is cut in or out of the coil (B) circuit as the float rises and falls.

MOUNTING: Both the dash unit and tank unit are grounded through the case and a good ground must be provided when they are mounted on the car. Remove all paint and grease from under the mounting flange.

TANK UNIT NOTE: Tank units furnished in both gear type (for tanks greater than 12" in depth or where baffles prevent installation of lever type) and Lever Type (for tanks of 12" depth or less). Tank units furnished with floats not attached to arm and should be installed as follows:

Gear Type—Travel limited to 52½° above and below horizontal position of arm. When installing, cut off float arm to correct length required for depth of tank and solder float on arm in horizontal position.

Lever Type—Furnished with float arm 12" long. Cut off float arm to correct length and solder float on arm at right angles to arm and with long diameter of float horizontal.

TROUBLE SHOOTING: If gauge operation not satisfactory, make following tests:

Gauge Reads 'Full' at all times

1. Lead between dash unit and tank unit is grounded. Check by disconnecting lead at each end and substituting a test jumper wire. If gauge operates correctly, replace lead.
2. Connections on dash unit reversed. Reverse wires and note performance.
3. Coil (A) in dash unit open-circuited. To check, disconnect tank unit lead on dash unit momentarily. Pointer should move to 'Empty' end of scale. This coil should draw .13 ampere at 6.0 volts (between switch terminal on dash unit and ground on case with tank unit lead disconnected).
4. Resistance unit in tank unit short-circuited. Check with voltmeter and battery between tank unit terminal and ground on case with dash unit lead disconnected. Resistance of unit should be 110 ohms.

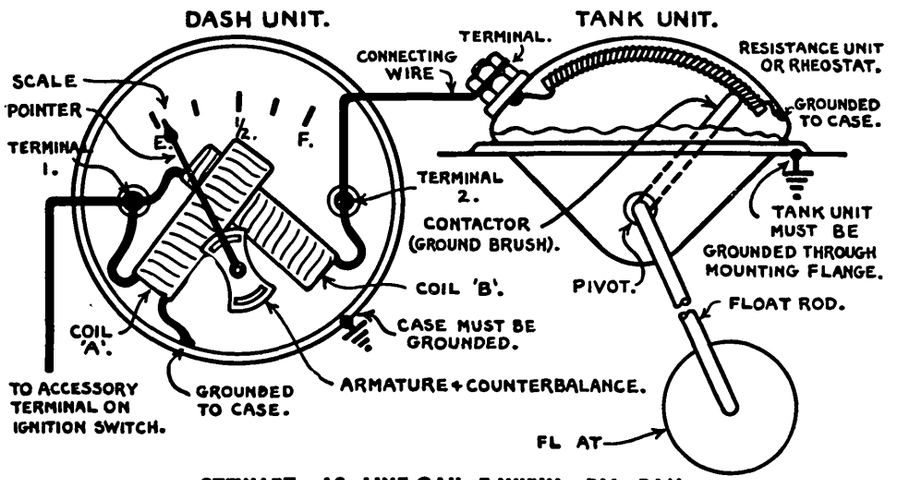
Gauge Reads 'Empty' at all times

1. Dash unit not grounded. Examine ground contact or run extra ground lead from case to car frame.
2. Open-circuit between dash unit and tank unit. Check by connecting jumper wire between terminals on units and noting gauge performance.

Gauge Reading Inaccurate

Mechanical defect in dash unit or tank such as tight pivot bearings, armature counterbalance binding or incorrectly positioned, bent dial pointer, or bent float rod.

SERVICING:—Replace all defective dash units and tank units.



STEWART AS LINE GAU E WIRIN DIA RAM

KING-SEELEY ELECTRIC TELEGAUGE

DESCRIPTION:—This is an electric type gauge of a new type using bi-metal arms on which heating coils are wound in both the tank or engine unit 'Sender' and the dash unit 'Receiver'. The two heating coils are connected in series and the gauge circuit is completed to ground through a set of contacts in the Sender unit (one of which is mounted on the bi-metal arm). The feed wire on the Receiver unit is connected to the accessory terminal of the ignition switch so that the gauge registers only with the ignition on.

Gasoline, Oil, Water Level—For this purpose the ground contact in the Sender is mounted on a movable arm (arm mounted through diaphragm forming lower cover of Sender unit and flexes diaphragm as it is moved). The lower end of the ground contact arm is actuated by a cam on the upper end of the float rod pivot. When the float moves up to follow the gasoline, oil, or water level, the cam moves the arm so that contact pressure and length of time contacts remain closed is increased.

OPERATION:—When the Sender contacts are closed a current flows through the heating coils of both the Sender and Receiver units. This causes the bi-metal arm in the Receiver to bend, moving the pointer, and indicating a reading on the gauge dial. At the same time the heating coil in the Sender unit causes its bi-metal arm to bend, opening the contacts and interrupting the current flow. When this occurs the heating action stops and the cooling of the bi-metal arm causes it to flex in the opposite direction and again close the contacts. In operation, this cycle takes place very rapidly (approximately once each second for the gasoline gauge with tank **empty), and a steady reading is obtained on the Receiver dial.**

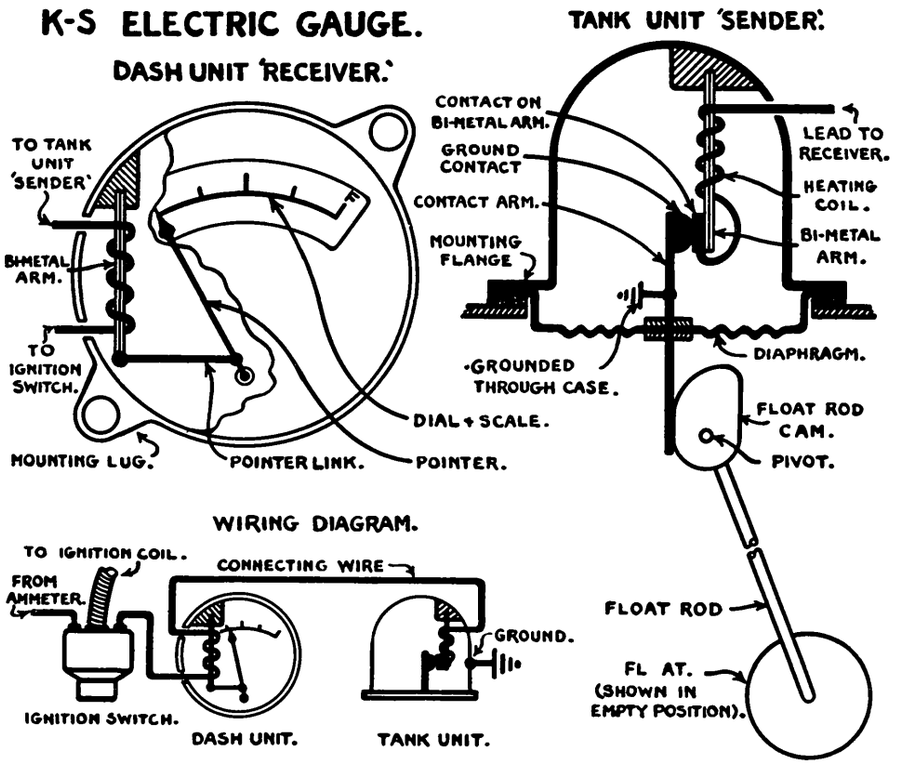
TROUBLE SHOOTING:—**Gasoline, Oil, Water Level Gauges**—Manufacturer recommends use of extra or test Sender and Receiver to check operation of units which do not perform satisfactorily. Make tests as directed below:

Testing Sender:—Disconnect lead of Sender unit on car, connect this lead to test Sender and ground this Sender to the car frame. Turn on ignition, move Sender float up to 'full' position and note reading on Receiver. Receiver should read full or 'F' after 10-15 seconds time. If Receiver reading is correct, check following points before replacing Sender unit.

1. Ground. Sender is grounded through case| See that all paint and grease are removed under flange and both surfaces make good contact.

2. Radio By-pass Condenser Shorted. If by-pass condenser is connected at Sender on cars with radio, test for short-circuit by disconnecting condenser and noting gauge operation. If gauge is satisfactory, replace condenser. Use only condenser of .05 microfarad capacity (manufacturer recommends Cornell Dubilier Corp. Condenser No. 22-259).

If reading is secured with test Sender is same as that with Sender on car, check wire connecting Sender and Receiver and replace if found to be open-circuited or grounded.



Testing Receiver—Disconnect wires on Receiver on car and connect to same terminals on test Receiver. Turn on ignition switch and note reading on gauge. If test Receiver reading is correct, replace Receiver on car. If test Receiver reading is same as car Receiver, repeat tests on Sender and wiring.

SERVICING:—No service operations are required other than to see that wires are properly connected and terminals are tight. No repair operations are possible and defective Senders and Receivers should be replaced.

KING-SEELEY "CV" TYPE ELECTRIC TELEGAUGE

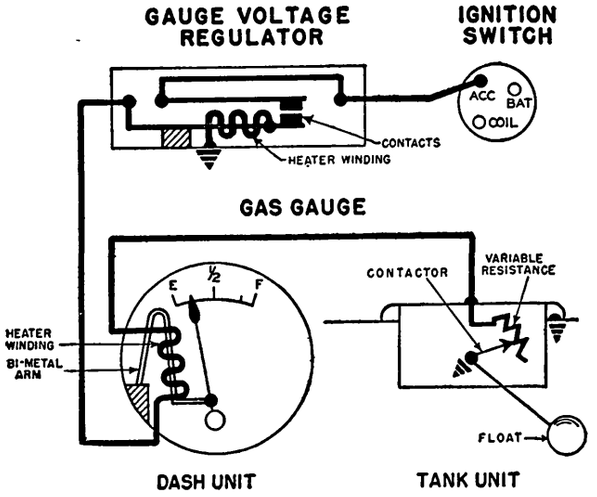
DESCRIPTION & OPERATION: King-Seeley "CV" or constant-voltage gauges differ from previous types in that the tank unit (sender) consists of a variable resistance (rheostat) which regulates the current in the heating coil of the receiver (dash unit) and controls the deflection of the bi-metal arm linked to the gauge pointer. All dash units are of similar design. The feature of these gauges is the "Gauge Voltage Regulator" which regulates input voltage in the gauge circuits and insures accurate gauge readings regardless of the line voltage fluctuations.

Gauge Voltage Regulator: Consists of a vibrating unit (contacts controlled by bi-metal arm on which a heater winder is located), connected in the line between the ignition switch and the gauge. Regulator produces a pulsating voltage, at an effective constant amperage value, of 5.0 volts for all normal input voltage variations (between 5.6 and 8.0 volts). Input voltages lower than 5.0 volts will result in proportionately lower gauge readings while voltages greater than 8.0 volts will not affect gauge accuracy but will overload regulator contacts and may cause premature wear. Regulator is temperature compensated and is intended to be mounted near the gauge dash unit and at approximately the same ambient temperature.

Gauge Indicator (Dash Unit): Gauge pointer is linked to a bi-metal arm on which a heater coil is wound. This coil is connected in series with the tank rheostat so that the gauge reading is in proportion to the current in the circuit (zero reading with maximum resistance and minimum current, high reading with minimum resistance and maximum current).

Fuel Tank Gauge Unit: The rheostat contactor acts as a ground for the gauge circuit and is linked to the gauge float so that it sweeps across the resistance as the float follows the level of fuel in tank. When tank is empty, entire resistance is in gauge circuit and current is at a minimum. When float rises as tank is filled, resistance is cut out of gauge circuit and the increase in current causes dash unit to read higher.

TROUBLE SHOOTING: Units should not be removed from car until testing has been done to determine which unit is defective. See Testing (following).
Gauge Reads Too High or Too Low—Gauge regulator defective (see Voltage Regulator below) or not properly grounded (regulator must be grounded). Battery voltage at regulator (or ignition switch) below 5.0 volts (check with voltmeter).



CAUTION—Gauge Voltage Regulator provides an intermittent voltage averaging 5.0 volts and regulator output voltage can not be tested with a voltmeter.

TESTING: Use a Fuel Level Gauge Tank Unit that is known to be OK, as a test unit. Connect one test lead to terminal on tank unit and a second lead to gauge case to act as a ground. (Gauge will not operate if not properly grounded.) Make test as follows.

Voltage Regulator: Requires use of an OK dash unit also. Connect these test units together in normal manner and ground tank unit. Connect the other dash unit terminal to the output terminal of voltage regulator. Check battery voltage (must be within operating limits). Hold tank unit float in EMPTY position, turn on ignition switch, note reading on test dash unit (should read EMPTY). Start engine and run at faster than normal idle speed. Gauge reading should not change if voltage regulator functioning normally. Move tank unit float to FULL position. Dash unit gauge should read FULL. If voltage regulator not operating correctly, replace unit.

Gauge Unit: Disconnect lead at tank unit on car and hook test unit in circuit at this point. (Make certain test unit is grounded). Move test unit float to EMPTY position, turn on ignition switch, note dash unit reading (gauge pointer should be at lower end of scale). Move float to FULL position, gauge pointer should then be at upper end of scale. If dash unit reads OK in both positions, replace original tank unit with correct type unit. If dash unit does not test OK, connect test unit directly to terminal on dash unit (eliminating the car wire). If dash unit then tests OK, check lead between dash unit and tank for broken wire or shorted wire. If dash unit still does not function normally, replace original dash unit with correct type unit.

REPAIRING UNIT: Repair or calibration of units is not practical in the field and defective units should be replaced.

ELECTRICAL INDEX

AUTRONIC EYE — Page
- 1952-53 1802
- 1954 1804
- 1955 1805

BATTERY CHARGE INDICATORS
- Cadillac, Oldsmobile Shunt Ammeter 1831
- Hudson Teleflash 1806

CAM ANGLES
- Auto-Lite 1809
- Delco-Remy 1809

DIRECTION SIGNALS
- Trouble Shooting 1806
- Wiring Diagrams 1807

DISTRIBUTORS
- Auto-Lite "IAR" & "IAP" 1809
- Auto-Lite "IAT" 1810
- Delco-Remy "Center Bearing" 1811
- Ford, Lincoln, Mercury "Loadomatic" 1812

FUEL PUMPS ..... See Carburetion Sect.

GAUGES
- Gasoline ..... See Carburetion Sect.
- Oil Pressure ..... See Miscellaneous Sect.
- Temperature ..... See Miscellaneous Sect.

GENERATORS (SPECIAL)
- Delco-Remy 1825

HEADLAMPS
- Sealed Beam Types 1808
- Autronic Eye Headlamp Control 1802
- Lincoln-Mercury Automatic Dimmer 1802

OVERDRIVE CONTROLS ..... See Transmission Sect.

REGULATORS
- Auto-Lite:
  - VAV (Not Temp. Comp.) 1815
  - VAV, VBA, VBE, VBF (Temp. Comp.) 1820
  - VRP, VRR, VRS, VRT, VRU, VRW, VRX 1815
  - VRP, VRX (Temp. Comp.) 1820
  - VRY 1822
- Delco-Remy:
  - 1118200 Series Single Core 1823
  - 1118300 & 1118700 Series 1826
  - 1118825 & 1118900 Series 1829
- Ford, Lincoln, Mercury 1832

RELAYS & SOLENOID — Pag
- Overdrive Control ..... See Transmission Sect.
- Transmission Control ..... See Transmission Sect.

SLOW CLOSING THROTTLES See Carburetion Sect.

STARTER CONTROLS
- Auto-Lite:
  - Magnetic Switch 1837
  - Manual Pinion Shift 1838
  - Solenoid Pinion Shift (With Relay) 1839
  - Solenoid Pinion Shift (No Relay) 1841
- Carter Car Starter 1847
- Delco-Remy:
  - Magnetic Switch 1842
  - Manual Pinion Shift 1842
  - Solenoid Pinion Shift (With Relay) 1843
  - Solenoid Pinion Shift (No Relay) 1844
  - Vacuum Starter Switch 1846

STARTER DRIVES
- Bendix Drives:
  - Standard Type 1836
  - Barrel Type 1835
  - Special Barrel Type 1836
  - Folo-Thru Type 1835
- Delco-Remy Automatic 1837

SEAT CONTROLS ..... See Miscellaneous Sect.

SWITCHES
- Kick-down:
  - Chrysler, DeSoto, Dodge 6 1849
  - Chrysler, DeSoto, Dodge V8 1850
- Lighting ..... See Car Model Pages
- Vacuum Starter Switches:
  - Carter Car Starter 1847
  - Delco-Remy 1846
  - Stromberg 1848

TOP CONTROLS ..... See Miscellaneous Sect.

TRANSMISSION CONTROLS ..... See Transmission Sect.

WINDOW REGULATORS ..... See Miscellaneous Sect.

WINDSHIELD WIPERS ..... See Miscellaneous Sect.

LINCOLN & MERCURY AUTOMATIC HEADLIGHT DIMMER

Linc In (1955)
Mercury (1955)

DESCRIPTION: The Automatic Headlight Dimmer is an electronic device that automatically switches headlamps between the upper and lower beams in response to light from an approaching car and to the tail lights on cars being overtaken. Unit consists of switch and control assemblies.

OPERATION: With headlights turned on, and the pilot light indicating automatic control, light striking the photo-multiplier tube of the control assembly causes generation of a weak electrical current. This current is electronically amplified and used to actuate relays in the switch assembly. The relays then switch headlights from high to low beam. When light source is removed, headlights return to high beam. Foot dimmer switch can be used to override automatic control at any time. When foot switch is pushed, the circuit switches off of automatic and green indicator light in control head goes out. Foot switch must be pushed again to return to automatic control. High beam indicator light indicates actual position of headlight beam whether circuit is on manual or automatic.

Switch Assembly: A three position switch, located on left side of control head assembly has positions marked "FAR", "NORM" and "NEAR". With switch on "NORM" position, working against standard rated oncoming bulbs on low beam, headlights will dim when approaching lights are 1100-1200 ft. away. Changing switch to either "FAR" or "NEAR" changes dimming distance by approximately 200 ft. in direction indicated.

OPERATIONAL CHECK: Switch the circuit to automatic (green pilot light on), block out light to control tube. *NOTE*–Light can be effectively blocked by covering control head lens with one hand and the opening about the "FAR-NORM-NEAR" switch with the other (this procedure will not work in bright sunlight as enough light passes through the hands to cause tube to hold headlights on low beam). With lens covered, headlamps will switch to high beam automatically. If they do not, unit is not functioning properly. *CAUTION*–Unit developes high operating voltages. Control head is normally grounded to prevent high voltage danger. Red wire at switch assembly connector must be disconnected before removing head, thus breaking ground connection.

TROUBLE DIAGNOSIS: Leveling–With headlight circuit on automatic, with dim and hold sensitivity adjustments correct, the head pointing downward will result in reduced dim and hold distances, and cause automatic circuit to hold low beam from reflection of its own headlights. If head aimed too high, dim and hold distances will be reduced, sensitivity to tail lights will be reduced and, in extreme cases, unit will not dim on tail lights.

Dim Sensitivity: With head properly leveled, insufficient dim sensitivity will result in reduced dimming distance. Too much dim sensitivity will result in increased dimming distance.

Hold Sensitivity: With head properly leveled, and dim sensitivity properly adjusted, insufficient hold sensitivity will result in excessive high beam operation and excessive hold sensitivity will cause automatic circuit to operate excessively on low beam and, in extreme cases, system will lock on low beam because of reflection from its own headlights.

TROUBLE SHOOTING: Unit Will Not Dim Within Range Of Dim Sensitivity Adjustment–Defective phototube (control assembly); defective control tube; defective circuit.

Unit Will Not Respond To Hold Adjustment: Defective control tube; defective circuit.

Unit Stays On Low Beam In Automatic Position: Head not level; fuse blown; vibrator, ballast tube, control head, or control tube defective.

Pilot Light In Head Inoperative: Light defective.

Unit Dims Automatically, Then Locks In Low Beam: Head not level; control tube defective, improper headlight alignment (dimming on vehicles own headlights).

►*CONTROL TUBE CHECK:* Disconnect red and green wires at switch assembly connector and use a 45 volt dry cell to make test. Ground positive battery terminal and connect negative terminal to switch assembly end of green lead with a jumper wire. If headlamps dim, switch assembly is satisfactory and control tube should be replaced. If lights do not dim, replace switch assembly.

ADJUSTMENTS: Service on the automatic headlight dimmer control is limited to leveling the control assembly, adjusting the dim and hold sensitivity within the switch assembly and elemental trouble shooting (see above). To make adjustments, follow procedures outlined in instructions accompanying the test equipment.

SERVICE PARTS: Indicated as follows:

Part	Part No.
Control Tube Assembly	FDK-13691-A
Ballast Tube Assembly	FDK-13692-A
Fuse, 5 Amp., Special	FDK-13693-A
Cover Assembly, Switch	FDK-13694-A
Gasket, Switch Cover	FDK-13695-A
Vibrator Assembly	FDK-18885-A
Screw, Cover	50145-S23
Switch Assembly	FDK-13532-A
Switch Assembly	FDL-13532-A
Control Assembly	FDL-13650-A
Control Assembly	FDK-13650-A
No. 82 Bulb	8A-13464
No. 51 Bulb	48-15021

1952-53 AUTRONIC EYE

Cadillac, All Models (1952-53)—Optional
Chevrolet, All Models (1952-53)—Optional
Oldsmobile, All Models (1952-53)—Optional
Pontiac, All Models (1952-53)—Optional

►**NOTE**—*All cars listed above had 6-volt in 1952. In 1953 Cadillac and Oldsmobile had 12-volt type, Chevrolet and Pontiac 6-volt type.*

►CHANGES, CAUTIONS, CORRECTIONS

►*PARTS INTERCHANGEABILITY CAUTION:* 6-Volt and 12-Volt Power Relay and Amplifier Unit assemblies are not interchangeable. When replacing parts be sure proper 6-volt or 12-volt types are used.

►*PONTIAC PHOTOTUBE HORIZONTAL AIM CORRECTION:* Phototube must be aimed parallel to centerline of car if switching from upper to lower beam is to be done at proper time. To check, place two pieces of tape 22" apart on wall at hood height. Position car 25-50 ft. back from wall with centerline of hood aimed at right hand tape. Sight down rib on top of Phototube Unit to see if it is pointing at left hand tape. If incorrectly aimed, remove Phototube Unit from instrument panel. Elongate upper or forward hole 1/8" maximum, in direction 45° to left of line through hole parallel to car centerline and toward left rear of car. Then elongate lower or rear hole 1/16" maximum in direction of line through hole parallel to car centerline and toward rear of car.

DESCRIPTION: The Autronic Eye is an electronic device that automatically switches headlamps between the upper and lower beams in response to light from the approaching car. It consists of a Phototube Unit, Amplifier Unit, Power Relay, and an auxiliary Foot Control Switch.

OPERATION: Headlamps are controlled automatically in only one position of standard beam selector switch. Other position of the switch provides lower beam only. The Auxiliary Foot Control Switch functions only in "automatic" position of standard beam selector switch. In "automatic" position the Autronic Eye provides complete automatic switching of headlight beams. Light from the headlamps of an approaching car strikes the Phototube Unit causing the Autronic Eye to switch headlamps to lower beam. At this time, if driver of approaching car had on upper beam, he would normally switch to lower beam; thus, greatly reducing amount of light falling on Phototube Unit. The Autronic Eye is designed to maintain headlamps on lower beam even with this reduction in light. When light is removed from Phototube Unit, the Autronic Eye returns its vehicle headlamps to upper beam. If approaching vehicle fails to switch to lower beam, Auxiliary Foot Control Switch may be operated to provide an upper beam for signalling purposes.

CHECKING AND TROUBLE DIAGNOSIS: To determine if difficulty is more serious than can be corrected by simple aiming and sensitivity adjustments pull light switch to full "on" position. With car in lighted area, headlamps should remain on lower beam, regardless of position of standard beam selector switch. Depress Auxiliary Foot Control Switch. Headlamps should change to upper beam, if standard beam selector switch is in "automatic" position. If not, trip standard beam selector switch and again depress auxiliary switch. Lights should now change to upper beam and back to lower beam when auxiliary switch is released. Next, cover

CONTINUED ON NEXT PAGE

1952-53 AUTRONIC EYE (C ntinu d)

Phototube Unit lens with a heavy black cloth. Headlamps should switch to upper beam and back to lower beam when cloth is removed, if standard beam selector switch is in "automatic" position. If lights do not operate as described above follow **"Minor Corrections"** and **"Trouble Diagnosis"** procedures outlined below.

Minor Corrections: ***CAUTION—Headlamps must be turned "OFF" before any connections are tightened, made or broken. Battery ground strap must be disconnected before removing or tightening Phototube Unit. This unit develops 1000 VOLTS.*** Check all external connections for tightness and correctness (be sure to check plug-in connections of Phototube Unit under instrument panel). Turn on headlamps and check amplifier for vibrator buzz. If vibrator does not buzz inspect for blown 14 amp. fuse. ***Do not use higher than 14 amp. fuse.*** Be sure that vibrator is firmly seated in socket. Replace vibrator with new 4 volt vibrator. ***Do not use standard radio 6 volt type vibrator.*** Inspect tube filaments for glowing (except Amperite and Phototube). Check or replace one tube at a time in amplifier with known good tube. ***If tube is replaced "Lower Beam" sensitivity must be rechecked.***

Trouble Diagnosis: To isolate trouble to one of the four major components of Autronic Eye before removing any units from car:

(1) Check units outside electronics circuits by removing fuse from Amplifier Unit. Headlamps should switch between upper and lower beams by operating standard beam selector switch. If not, trouble is in Power Relay, standard beam selector switch, or Amplifier Unit harness from standard beam selector switch to Power Relay.

(2) Check Amplifier Unit (150 volt section) by replacing fuse, disconnecting Phototube Unit and Auxiliary Foot Control Switch from Amplifier Unit. Headlamps should be on upper beam in "automatic" position of standard beam selector switch. If this test is satisfactory connect black wire to white wire in Amplifier Unit harness. Headlamps should remain on lower beam in both position of standard beam selector switch. If headlamps remain on lower beam connect red Amplifier Unit wire to ground (with black and white wires connected). Headlamps should switch to upper beam with standard beam selector switch in "automatic" position. If Autronic Eye fails in any of above steps trouble is usually in 150 volt section of Amplifier Unit.

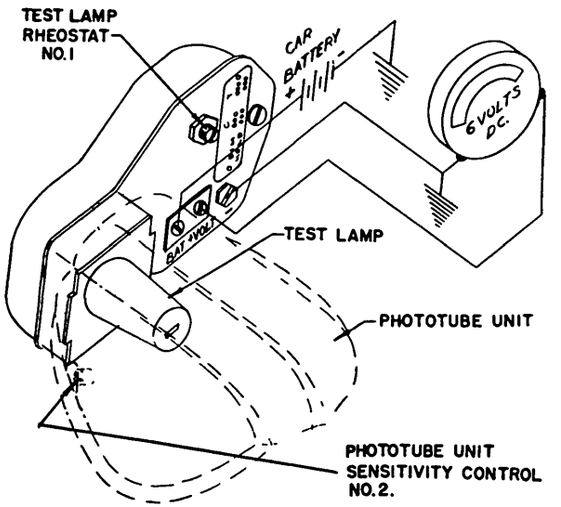
(3) Check Amplifier Unit (1000 volt section) by disconnecting Phototube Unit, connecting a 2 megohm resistor from black wire in Amplifier Unit harness to ground. With a 20,000 ohm per volt D.C. Voltmeter capable of measuring 1000 volts, voltage across 2 megohm resistor should be at least 850 volts. If not, trouble is probably in 1000 volt section of Amplifier Unit. NOTE—***If necessary seal on high voltage control inside amplifier may be broken and control adjusted to voltage marked inside cover.***

(4) Check Phototube Unit by connecting it to amplifier, if Amplifier Unit is functioning properly. With light entering Phototube Unit, headlamps should be on lower beam in both positions of standard beam selector switch. With no light entering Phototube Unit, headlamps should be on upper beam when standard beam selector switch is in "automatic." If not, trouble is in Phototube Unit.

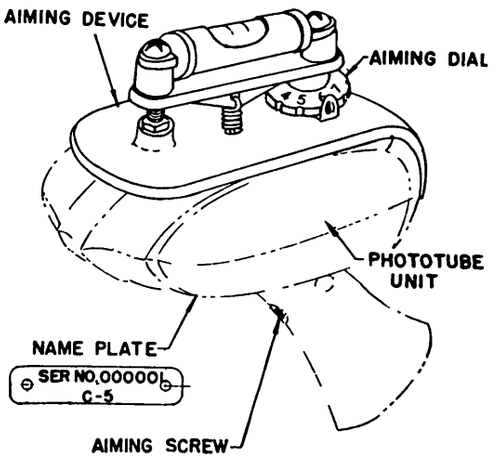
(5) Check Auxiliary Foot Control Switch by connecting it to Amplifier Unit. With light entering Phototube Unit, headlamps should be on lower beam in both positions of the standard beam selector switch. If above check is correct auxiliary foot switch should be depressed and should cause upper beam to be "on" in "automatic" position of standard beam selector switch.

(6) Defective Auxiliary Foot Control Switch or Power Relay should be replaced. Phototube Unit or Amplifier Unit should be removed from car and serviced if trouble is found in either.

(7) Conversion to operation of headlamps by standard selector switch can be accomplished by disconnecting wires 1, 2, and 3 (see diagram) from Power Relay and connecting them to their respective terminals on standard beam selector switch.



SENSITIVITY ADJ. EQUIPMENT



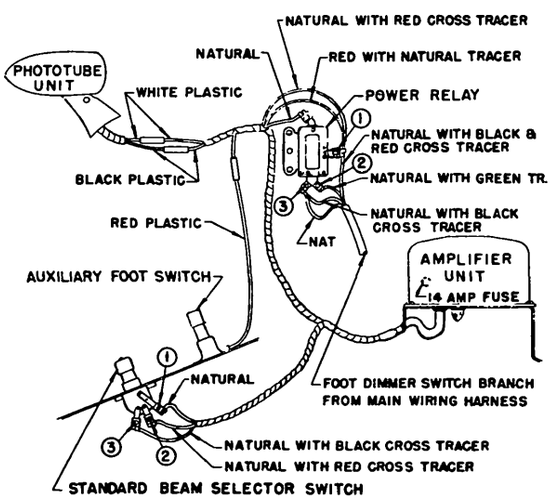
AIMING ADJ. EQUIPMENT

Phototube Unit Aiming Procedure: ***NOTE—Due to normal settling of car springs it is recommended that aiming procedure be followed at time of 2000 mile inspection.*** Car should be unloaded, trunk empty except for spart tire, tires at correct pressure, and gas tank at least half full. Place car on level floor (level within ¼" fore and aft). Rock car to normalize springs. Adjust dial on Aiming Device to number stamped on name plate on bottom side of Phototube Unit. Position Aiming Device on top of Phototube Unit, using care to center it on raised ridge. Then move it to rear until it contacts lens. Adjust Phototube Unit aiming screw until bubble is centered in level. If level floor is not available, perform operations above and mark location of front and rear wheels on floor. Turn car end for end, placing front wheels where rear wheels were, and rear wheels where front wheels were. Readjust aiming dial until bubble is centered in level. Difference in two readings made is twice error in floor level. Adjust aiming dial midway between the two readings and adjust phototube aiming screw until bubble is centered in level again. **NOTE—Phototube must be accurately aimed. If too low, back reflections from car on which Autronic Eye is installed will hold headlamps on lower beam. Also, unit must be aimed as low as possible to allow maximum tolerance for car loading.**

Sensitivity Adjustments: ***CAUTION—Autronic Eye develops 1000 VOLTS. Car lights must be turned "OFF" before removing cover from Phototube Unit.***

(1) **Lower Beam Sensitivity Adjustment:** Remove two oval head screws from bottom of Phototube Unit. Lift off cover, remove lens and replace with Test Lamp. Replace cover and screws. Connect a wire between "BAT" terminal of Test Lamp to positive (+) side of car battery. Connect a wire from "+ volt" terminal of Test Lamp to positive (+)

CONTINUED ON NEXT PAGE



AUTR NIC EYE WIRING DIAGRAM

1952-53 AUTRONIC EYE (Continued)

side of D.C. voltmeter. Connect a wire from one terminal of the Test Lamp to the minus (—) side of D.C. Voltmeter. From this same terminal of voltmeter attach a wire to ground. Turn Test Lamp rheostat (No. 1) all the way counterclockwise to obtain minimum voltage reading. Turn on headlights and set standard beam selector switch on "automatic." Wait at least one minute to allow amplifier to stabilize. Turn rheostat (No. 1) clockwise slowly just to point where headlamps switch to lower beam. Note voltage of Test Lamp. Turn rheostat (No. 1) counterclockwise slowly just to point where headlamps switch to upper beam. Note voltage of Test Lamp. Voltages noted should be within 0.2 volt of the values "Dim" and "Hold" marked on Test Lamp. NOTE—Use marking "C" for clear and "T" for tinted windshields. If "Lower Beam" sensitivity requires adjustment rotate Phototube Unit Sensitivity Control (No. 2) counterclockwise to end of adjustment, using screwdriver with 1/16" blade. Also rotate rheostat (No. 1) counterclockwise to end of adjustment so that headlights are on upper beam. Rotate rheostat (No. 1)clockwise to obtain voltage reading on voltmeter corresponding to "Dim" voltage reading marked on Test Lamp ("C" for clear and "T" for tinted windshields). Carefully and slowly turn phototube sensitivity control (No. 2) clockwise just to point where headlamps switch to lower beam. *Do not go beyond this setting.* Turn rheostat (No. 1) counterclockwise carefully and slowly just to point where headlamps switch to upper beam. Voltage should be within 0.2 volt of "Hold" voltage marked on Test Lamp. If not, adjust amplifier for "Holding" sensitivity.

(2) Holding Sensitivity Adjustment: *NOTE—This adjustment should not be made until "Lower Beam" sensitivity is adjusted correctly.* Turn off headlamps. Remove amplifier. Turn amplifier over and attach jumper wire between case of amplifier and ground on car. Turn "Hold" control (located on bottom side of Amplifier Unit) clockwise to end of adjustment. Use screwdriver with 1/16" blade. Do not remove acorn nut to adjust "Hold" control. Turn headlamps on and allow one minute for amplifier to stabilize. Rotate rheostat (No. 1) clockwise until headlamps switch to lower beam. Rotate rheostat (No. 1) counterclockwise to obtain voltage reading on voltmeter corresponding to "Hold" voltage marked on Test Lamp ("C" for clear and "T" for tinted windshields). Turn "Hold" control counterclockwise slowly to point where headlamps switch to upper beam. Turn off headlamps, remove jumper wire, and reinstall amplifier.

1954 AUTRONIC EYE

Cadillac (1954)
Chevrolet (1954)
Oldsmobile (1954)
Pontiac (1954)

▷CHANGES & CAUTIONS

▷*PARTS INTERCHANGEABILITY CAUTION:* 6-Volt and 12-Volt Power Relay and Amplifier Unit assemblies are not interchangeable. When replacing parts be sure proper 6-volt and 12-volt types are used.

▷*1954 FUSE ELIMINATION PRODUCTION CHANGE:* 14 ampere fuse used previously in Amplifier Unit no longer used.

▷*1954 TESTING EQUIPMENT CHANGE:* AE Tester replaces testing equipment previously used. Testing procedures are greatly simplified. Aiming element replaces Phototube Unit cover for testing purposes.

DESCRIPTION: Similar in design in 1952-53 models except that 14 ampere fuse has been eliminated.

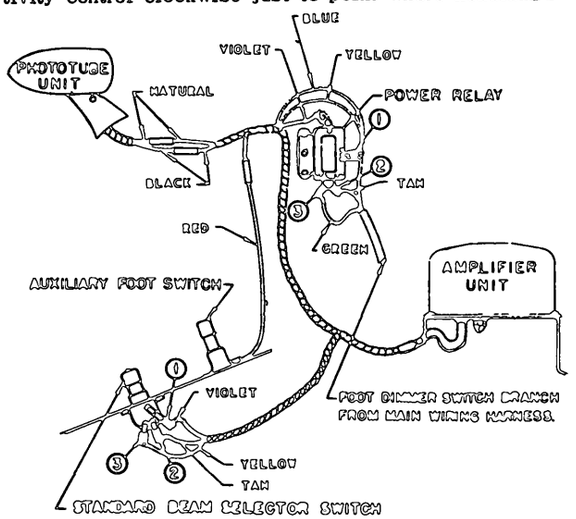
CHECKING & TROUBLE DIAGNOSIS: *Proceed as outlined under "1952-53 Autronic Eye" with following exceptions (USING SAE TESTER):*

Minor Corrections: If vibrator does not buzz be sure vibrator is firmly seated in socket. If so, replace vibrator with new 6 or 12 volt vibrator (DO NOT USE RADIO 6 OR 12 VOLT TYPE VIBRATOR).

Trouble Diagnosis: Instead of removing and replacing fuse as outlined, disconnect blue feed wire in amplifier unit in step (1), and replace same wire in step (2). In step (2), if initial test satisfactory, connect 2 megohm resistor between black wire and natural wire in amplifier unit harness instead of connecting black wire to white wire. Remainder of procedure remains unchanged.

Sensitivity Adjustments: Proceed as follows:

(1) Lower Beam Sensitivity Adjustment—With test lamp in place, turn headlamps "ON" for at least four minutes to allow amplifier to stabilize. On tester, turn zero corrector on face of meter until pointer on zero set line, turn intensity rheostat all the way counter-clockwise and selector switch to "DIM" position. (*NOTE*—Be sure to use correct "DIM" position for clear or tinted windshields). Insert Tester connector into cigar lighter receptacle (*CAUTION*—Push straight in). Check car battery voltage. If less than 6 volts (6 volt battery) or 12 volt (12 volt battery), operate engine at fast idle when making sensitivity adjustment. Turn intensity rheostat clockwise slowly just to point where headlamps switch to lower beam. Meter pointer should fall within "DIM" sensitivity adjustment line. If not, adjust rheostat to high side of "DIM" sensitivity adjustment line. Rotate phototube unit sens tivity control counterclockwise to end of adjustmert with special 1/16" screwdriver provided in Tester. Momentarily switch selector switch to "off" position so headlamps are on upper beam; then turn selector switch to "DIM" position. Carefully and slowly turn phototube unit sensitivity control clockwise just to point where headlamps



AUTRONIC EYE WIRING DIAGRAM

switch to lower beam. *Do not go beyond this setting.* Turn intensity rheostat all the way counter-clockwise, momentarily switch selector switch to "off" position and back to "DIM" position. Turn intensity rheostat clockwise slowly just to point where headlamps switch to lower beam. If "DIM" sensitivity has been adjusted correctly, meter pointer should fall within "DIM" sensitivity adjustment line. If not, repeat adjustment beginning with rotation of phototube unit sensitivity control.

(2) Holding Sensitivity Adjustment—Turn on headlamps and wait four minutes to allow amplifier to stabilize. Turn hold control on bottom (outside) of amplifier unit clockwise to end of adjustment (Use small offset screwdriver). Rotate intensity rheostat clockwise to end of adjustment. Turn selector switch to "DIM" momentarily to switch headlamps to lower beam; then switch selector switch to "HOLD" position. (*NOTE*—Be sure to use correct "DIM" position for clear or tinted windshields). Adjust intensity rheostat until meter pointer is in center of the "HOLD" sensitivity adjustment bar on meter scale. Turn "HOLD" control on amplifier counterclockwise slowly just to point where headlamps switch to upper beam. If headlamps do not switch to upper beam when the "HOLD" control is turned completely counterclockwise, rotate intensity rheostat counter-clockwise until headlamps switch to upper beam. If meter pointer is within "HOLD" sensitivity adjustment bar, amplifier unit is within tolerance. Again check "HOLD" sensitivity adjustment by rotating intensity rheostat clockwise to end of adjustment. Turn selector switch to "DIM" position momentarily to switch headlamps to lower beam, then turn selector switch to "HOLD" position (*NOTE*—Be sure to use correct "HOLD" position for clear or tinted windshields). Turn intensity rheostat counter-clockwise carefully and slowly just to point where headlamps switch to upper beam. Meter pointer should fall within the "HOLD" sensitivity adjustment bar on meter scale, if adjustment was made correctly. Turn off headlamps, disconnect Tester. Remove test lamp, replace lens, cover and screws.

▷*OTHER "AUTRONIC EYE" DATA:* See *"1952-53 Autronic Eye".*

1955 AUTRONIC EYE

Cadillac (1955)
Chevrolet (1955)
Oldsmobile (1955)
Pontiac (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*1955 AUTRONIC EYE PRODUCTION CHANGES:* Early in production, several major changes were made in the Autronic Eye. These changes include a completely new wiring circuit, Amplifier and Phototube unit Alternating instead of direct current is used. "Dim" and "Hold" adjustment knobs are now located on underside of amplifier (1954 and Early 1955 "Dim" adjustment was on phototube unit)

►*1955 ADJUSTMENT CAUTIONS:* Early 1955 "Dim" and "Hold" adjustments are made differently than later 1955 adjustments. *For early 1955 adjustments see "1954 Autronic Eye", later 1955 adjustments, see below.* *NOTE*—There is a possibility that minor circuit changes were made during the model year. It is suggested that reference be made to printed circuit diagram, located on inside of amplifier cover, before performing any service operations on the autronic eye.

DESCRIPTION: Similar in design and operation to previous models *See Changes above.*

TESTING: Test for "Hold" Sensitivity and "Dim" Sensitivity are made as follows:

►*NOTE: For early 1955 Autronic Eye Tests, see "1954 Autronic Eye". See Changes, Cautions, Corrections above*

Hold Sensitivity Test (Later Units): *CAUTION—The "Autronic Eye" develops 800 volts. Turn headlamps "OFF" before removing cover from Phototube unit*

1) Install Aiming Device AE-4.

2) Turn headlamps "ON" and **wait at least four minutes** for amplifier to stabilize. Set standard foot dimmer switch to "Automatic" position. *(NOTE*—Headlamp switch provides "Automatic" and "Manual" controls. With switch set to "Automatic" upper beam will be on).

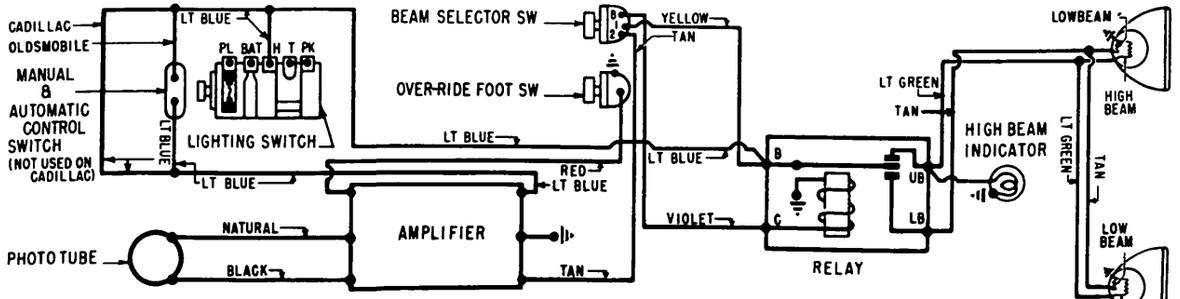
3) Turn Zero Corrector on face of meter until meter pointer is on zero set line. Turn Intensity Rheostat of tester counter-clockwise Insert tester connector into cigar lighter receptacle. *CAUTION*—Push straight in.

4) Check car battery voltage. If less than 12 volts, operate engine at fast idle while making sensitivity tests and adjustments.

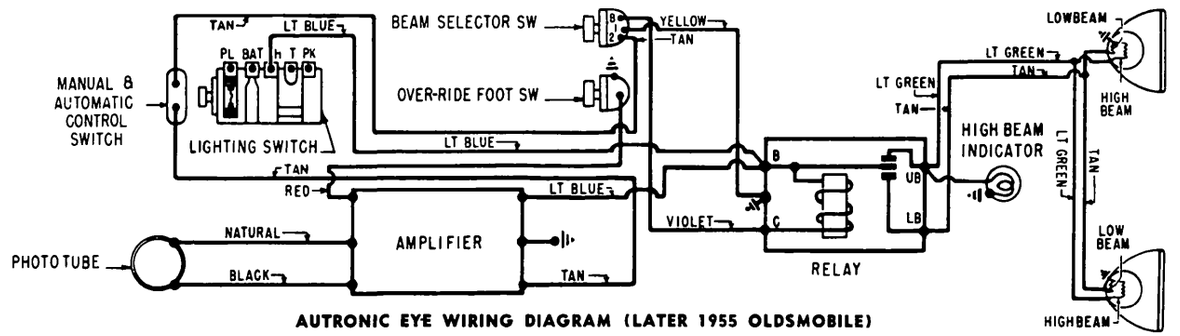
5) Turn tester Selector Switch to "Dim" position (Be sure to use proper "Dim" position for clear or tinted windshield) Turn Intensity Rheostat all the way clockwise to end of adjustment to obtain a lower beam. Turn tester Selector Switch to "Hold" position

6) **Slowly** turn Intensity Rheostat counter-clockwise just to point where headlamps switch to upper beam. Meter pointer should now read in the "Hold" Sensitivity Adjustment Bar on meter scale. To adjust, see "Hold Sensitivity Adjustment" below.

Dim S nsitivity T st (Later Units): 1) Rotate Intensity Rheostat completely counter-clockwise. Turn Selector Switch to "Dim" position. Headlamps should now be on upper beam.



AUTRONIC EYE WIRING DIAGRAM (CADILLAC, CHEVROLET, PONTIAC, EARLY OLDSM BILE)



AUTRONIC EYE WIRING DIAGRAM (LATER 1955 OLDSMOBILE)

2) Turn Intensity Rheostat **slowly** clockwise, stopping at the exact point where headlamps switch to lower beam. Meter pointer should read within "Dim" Sensitivity Adjustment Line To adjust, see "Dim Sensitivity Adjustment" below.

ADJUSTMENTS: *NOTE—For early 1955 "Dim" and "Hold" Sensitivity Adjustments, see "1954 Autronic Eye".*

Aiming Adjustments: Replace Phototube cover with Aiming Device AE-4 *(CAUTION*—Turn lights "OFF", before removing cover). With car at curb weight, tire pressures correct, place car on floor, level within ¼" fore and aft. To adjust vertically, adjust aiming dial to number stamped on name plate of Phototube unit, then adjust aiming screw until bubble is centered in level. To adjust horizontally, aim over sights of Phototube unit. Adjust unit so it is aimed at a point within 4" of line parallel to centerline of car with car 25 ft. from aiming point

Hold Sensitivity Adjustment (Later Units): *NOTE*—This adjustment must be made **before** the "Dim Sensitivity Adjustment" is made

1) Turn "Hold" Adjustment (on underside of amplifier) clockwise to end of adjustment. Rotate Intensity Rheostat all the way clockwise

2) Turn Selector Switch momentarily to "Dim" position to switch lights to lower beam, then switch back to "Hold" position *(NOTE*—If lights do not switch to lower beam, "Dim" control must be turned clockwise to end of adjustment and then readjusted after "Hold" adjustment is correct).

3) Adjust tester Intensity Rheostat until meter pointer is in center of "Hold" Sensitivity Bar.

4) Turn "Hold" control counter-clockwise **slowly** just to point where headlamps switch to upper beam.

5) Rotate tester Intensity Rheostat clockwise to end of travel, then turn Selector Switch momentarily to "Dim" position and back to "Hold" (Headlamps should now be on lower beam).

6) Recheck "Hold" adjustment by turning Intensity Rheostat **slowly** counter-clockwise just to point where lamps switch to upper beam. Meter pointer should now read in "Hold" Sensitivity Adjustment Bar if adjustment correct, If not, repeat procedure starting with with Step 1).

Dim Sensitivity Adjustment (Later Units): *NOTE*—"Hold Sensitivity Adjustment" must be made before making this adjustment

1) Rotate "Dim" control completely counter-clockwise.

2) Momentarily turn tester "OFF", then back to "Dim" position (Headlamps should now be on upper beam).

3) Adjust Intensity Rheostat until meter pointer reads in the right hand edge of the "Dim" Sensitivity Adjustment Line.

4) **Slowly** rotate "Dim" control clockwise just to point where headlamps switch to lower beam **D n t g beyond this setting.**

5) Turn tester Intensity Rheostat completely counter-clockwise, then momentarily turn tester "OFF" and back to "Dim" Rotate Intensity Rheostat **sl wly** clockwise just to point where headlamps switch to lower beam. If adjustment correct, meter pointer will read within "Dim" Sensitivity Adjustment Line. If not, repeat Steps above.

6) **Turn headlamps "OFF",** disconnect tester from cigar lighter receptacle. Remove tester and Aiming Device from Phototube unit. Replace lens, cover, and screws.

DIRECTION SIGNALS

GENERAL INFORMATION: Direction Signals consist of right and left Front and Rear flashing lamps which light up when steering column control switch is operated to indicate that a turn is to be made. These signals operate in conjunction with Pilot Indicator lights on instrument panel, or on control switch.
Front Direction Signals—The front parking lights with an additional 21 cp. bulb filament added (21-3 cp. bulb), or separate lights are used. When Direction Signals are installed on cars in service the parking lights are modified by installing a special new double filament socket, included in the kit.
Rear Direction Signals—Separate signal lights are used on some models, and others use the rear stop lights for this purpose. Where the stop light is used, the light on the side signalled flashes, while the other acts as a normal stop light.
Control Switch—On some cars the control switch is built into the upper end of the steering column, others using a side mounted switch, bolted or clamped to the column. Switch has three positions, Right, Left, and Off. On some accessory types all switch movement is made manually. On standard equipment types the switch is returned to the "Off" position automatically after the turn is made, by a cam and ratchet, or contact pin device mounted on the steering worm tube.
Wiring—*See individual car wiring diagrams in Car Model Section.*
Flasher—A flasher (sealed unit) acts as the circuit interrupter. It consists of two pairs of points operating together, one set for the signal lights, the other for the pilot indicator lights. Flasher unit flashes (with normal load) between 80 and 100 times a minute. Decreasing the load on the flasher causes it to operate more rapidly. Flasher units cannot be repaired; replace when defective.
Direction Signal Fuse and Circuit—In most cases current for Direction Signals is supplied from the Ignition Circuit when the ignition key is turned on. On some models a fused lead between the ignition switch and flasher unit is used; on others, it is connected to a circuit breaker. *See car wiring diagrams.*

Pilot Indicator Lights—Various hook-ups are used for these lights. These hook-ups are known as the single light type, two light parallel type, and two light cross-over type. See Diagram. On the cross-over type the pilot lights have insulated sockets. Pilot lights indicate Right or Left turn signal, as the case may be. On the cross-over type hook-up, the Left pilot light grounds through the Right side front signal light filament, and the Right Pilot grounds through the Left signal light. A burned out signal light bulb will cause the opposite pilot light to fail to light.

TESTING: Flasher Units. Connect the "Plus" terminal of flasher to positive side of a battery. Connect two 21 cp. bulbs in parallel between the negative side of a battery and the "L" terminal of the flasher. Connect a No. 55 2-cp. bulb between the negative terminal of battery and the "P" terminal of flasher. Lights should go on and off normally. Disconnect one 21 cp. bulb. The 2 cp. bulb should go out and the remaining 21 cp. bulb should flash much more rapidly than normal.

TROUBLE SHOOTING: A burned out signal light bulb will cause flasher to operate much more rapidly due to the decreased load. It is a good idea to check all bulbs first when shooting trouble, unless the trouble is very obvious. See that bulbs are good, and the correct type. On cars using the single pilot light, and where the pilot flashes just once and no more when the control switch is set to signal, it indicates a burned out bulb or open circuit to signal light on that side. In some cases the pilot may not light at all due to this condition. The same information applies to the two light, parallel type, except that only the pilot light on side affected will not operate. On cars with cross-over type pilot lights, if the Right front signal light is burned out it will cause the Left pilot light to fail to operate, and vice versa. See Pilot Indicator Lights above. If a rear bulb burns out both Pilot lights may flash in unison (dimly) at double speed.

HUDSON SIGNAL LIGHTS

DESCRIPTION: These signal lights consist of a Battery Charge Tell-tale and Oil Pressure Tell-tale on the instrument panel which are used instead of gauges to indicate when generator is charging battery and if oil pressure is satisfactory. They are regular lamp bulbs connected to the accessory terminal of the ignition switch (operative only with ignition switch turned 'on') and are controlled by the generator cutout relay and oil line check-valve as described below.

GENERATOR CHARGE TELL-TALE: The cutout relay is provided with an extra set of ground contacts above the armature and the tell-tale lamp lead is connected to this contact 'T' terminal on the regulator case. The lamp circuit is completed to ground through these contacts. See car wiring diagram on car model page for complete wiring circuits.

Operation:—The ground contacts are normally closed with the main contacts open and open when the main contacts close. When the ignition is turned on, the tell-tale lamp lights and remains lighted until the main contacts close and the generator begins to charge the battery. The lamp should not remain lighted after the car speed is brought up beyond the cut-in point (approximately 10 MPH).

Trouble Shooting:—If the tell-tale lamp does not light when ignition is turned on, ground tell-tale lamp lead 'T' terminal on regulator to the engine (not to 'B' terminal). If lamp does not light, check for burned out bulb or loose wiring connections (see car model page wiring diagram). If lamp lights (indicating that ground contacts open), main contacts are fused or armature spring is weak or broken. If tell-tale lamp does not go out at speeds above cut-in point, ground contacts are not opening when main contacts close. Check generator performance by connecting accurate test ammeter in charging line. If trouble in regulator, car manufacturer recommends that a new or replacement regulator be installed (regulator case is sealed, do not break seal).

OIL PRESSURE TELL-TALE (1948 & Earlier 6 Cyl.): Check valve on right of crankcase is provided with an insulated terminal pin which is grounded by the check-valve plunger when no pressure exists in the oil line. The oil pressure tell-tale lamp lead is connected to this terminal. A small hole in the check-valve plunger and a by-pass in the body allow the passage of sufficient oil so that the plunger alternately opens and closes the circuit at idling speeds, causing the tell-tale lamp to flash.

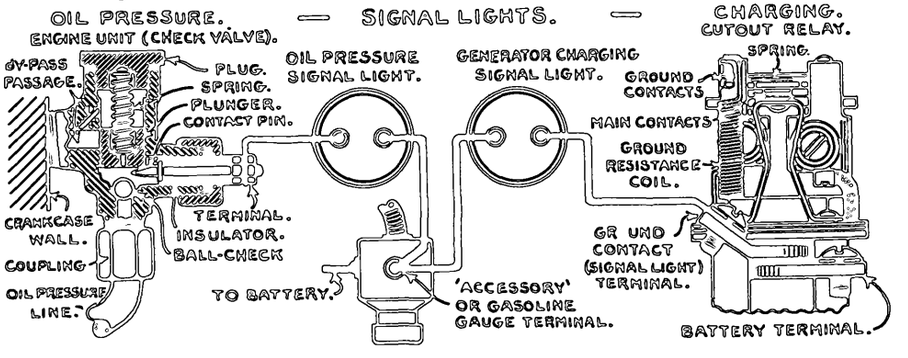
Operation:—The plunger rests normally against the pin when no pressure exists in the oil line so that the tell-tale lamp will light when the ignition is turned on. At idling speeds the plunger alternately opens and closes the circuit so that tell-tale lamp flashes. At speeds above idling (approximately 7 M.P.H.), the oil pressure holds the check-valve plunger off its seat so that the tell-tale lamp does not burn or flash.

Trouble Shooting:—If the tell-tale lamp does not light when the ignition is turned on, ground check-valve terminal to engine. If lamp does not light, replace bulb. If lamp does light, remove terminal pin and see that it is straight and clean. Take off plug on top of check-valve housing, remove plunger and see that it is clean and moves freely up and down. Examine spring above plunger. If tell-tale lamp does not flash at idling speeds, see that small hole in plunger is clean and open.

OIL PRESSURE TELL-TALE (1948 & Later 6 Cyl.): Operates in same manner as on other cars (above). A new unit (Carter No. A658S Oil Pressure Warning Switch) is used and this unit is mounted on engine separately from the check valve or oil pressure regulator.

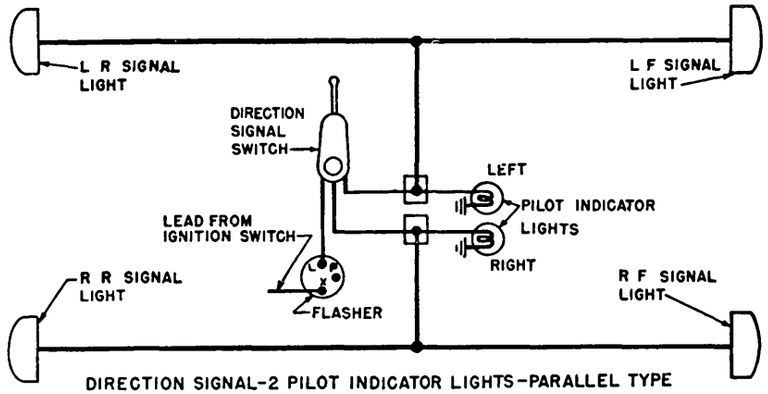
Trouble Shooting: Warning switch contacts open (causing oil pressure tell-tale lamp to go out) when oil pressure reaches normal operating pressure of 11-15 lbs.

▷*CAUTION—Warning Switch is set and sealed at the factory and no adjustments are necessary.*

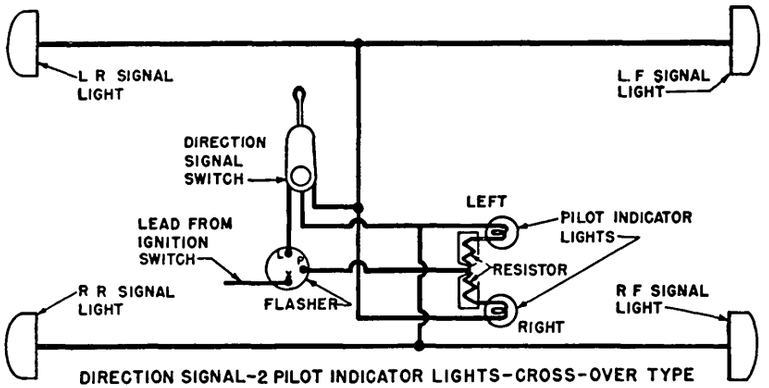


Form 38B—1956-M

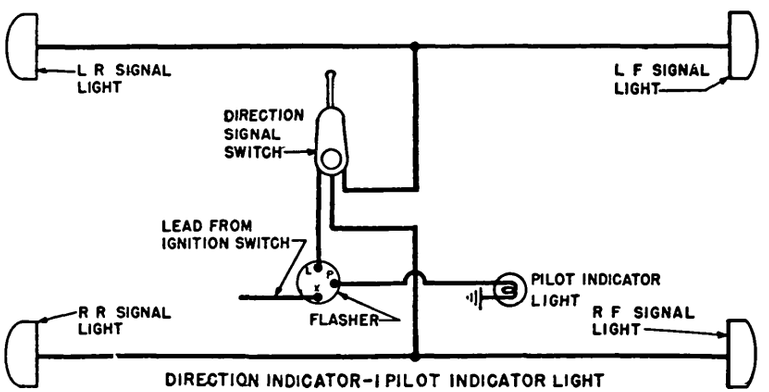
►***DIRECTIONAL SIGNAL NOTE:*** The schematic drawings that follow represent the various types of circuits used *For detailed circuit information for a specific car model see Car Model Page Wiring Diagram.*



DIRECTION SIGNAL-2 PILOT INDICATOR LIGHTS-PARALLEL TYPE

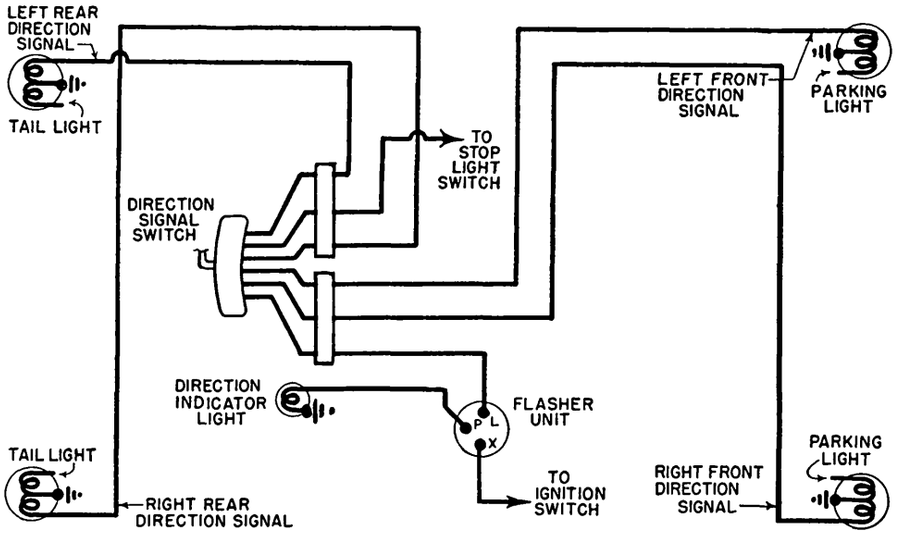


DIRECTION SIGNAL-2 PILOT INDICATOR LIGHTS-CROSS-OVER TYPE

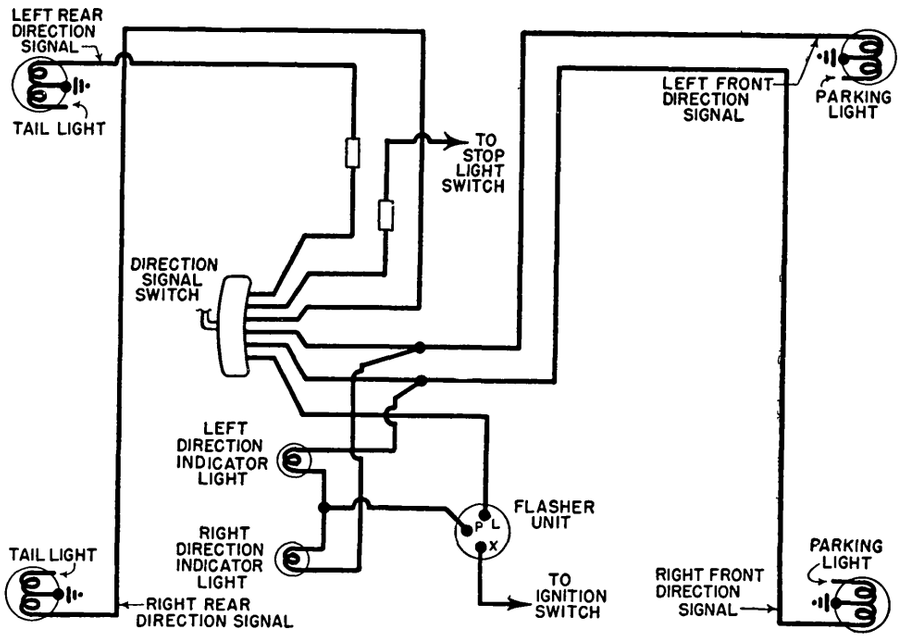


DIRECTION INDICATOR-1 PILOT INDICATOR LIGHT

DIRECTION SIGNAL PILOT INDICATOR LIGHT CIRCUITS



SIX WIRE TYPE SWITCH WITH SINGLE INDICATOR



SIX WIRE TYPE SWITCH WITH "CROSS-OVER" INDICATORS

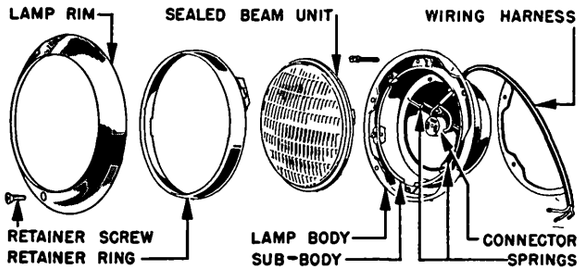
SEALED BEAM HEADLAMPS

REPLACEMENT NOTE: Three Types of Sealed Beam Lamp Units are available for replacement as follows:
1)—Composite type with metal reflector and glass lens (has conventional lamp bulb assembled in unit).
2)—All glass type with hard glass reflector and no lens (no lamp bulb used, filament mounted directly on reflector).
3)—New "Shielded Filament" type in which there is a metal shield over the filament which blocks light directed upward from filament. This type has increased wattage and projects passing beam a greater distance ahead. ***All types and all makes are fully interchangeable on all car models equipped with Sealed Beam Headlights.***

DESCRIPTION: Sealed Beam Headlamps, as used on cars so equipped, consist of a reflector, lens, and lamp filaments assembled as a single sealed unit. This excludes all dirt and moisture so that the original effciency of the lamp is retained throughout the life of the filaments. When replacement is required, the entire sealed beam unit is discarded and a new unit is installed. No attempt should be made to disassemble the sealed beam unit.

OPERATION: Sealed Beam lamps have double "bar" type filaments (filaments are parallel and slightly offset so that lower "Traffic" beam deflected slightly toward right side of road. Beams are controlled by a Beam Selector Switch on the toe-board in the usual manner.

INSTALLATION & REMOVAL: On all cars, a sub-body or housing is provided in the headlamp for the sealed beam unit mounting. This sub-body is retained in the headlamp by the two adjusting screws and by two sets of two springs which are hooked to the sub-body diametrically across from each screw. The sealed beam unit seats directly in the sub-body and is positioned by three heavy lugs which fit into slots in the sub-body. A retainer ring is fitted over the outer edge of the sealed beam unit. This retainer ring has three lugs which engage three clamp screws on the sub-body rim so that the retainer ring and sealed beam unit are securely clamped in place when the clamp screws are tightened (on some cars a gasket is used between the retainer ring and the sealed beam unit). A lamp rim which fits over the retainer ring in such a manner as to conceal the clamp screws and adjusting screws completes the assembly.



SEALED BEAM HEADLIGHT UNIT

Removing Sealed Beam Units—Remove headlamp rim (retained by screws and clips). Loosen but do not remove three clamp screws which engage retainer ring or remove spring (some models) which is attached to retainer ring. In first type rotate retainer ring to release retainer and in both types remove unit connector and unit.

Installing Sealed Beam Units—Terminal clips on sealed beam units and cable plug are designed so that plug can be connected only in correct position. Plug terminals (facing end of plug) are as follows: **Left Side**—Upper Country Beam. **Center (Top)**—Lower Traffic Beam. **Right Side**—Ground wire connected to lamp sub-body or lamp housing. When installing new sealed beam unit, connect plug, see that sealed beam unit lugs properly engage slots in sub-body, install retainer ring and rotate ring clockwise until lugs on ring engage under clamp screw heads on sub-body, or connect spring which secures retainer, tighten clamp screws securely. Then adjust headlamps as directed below.

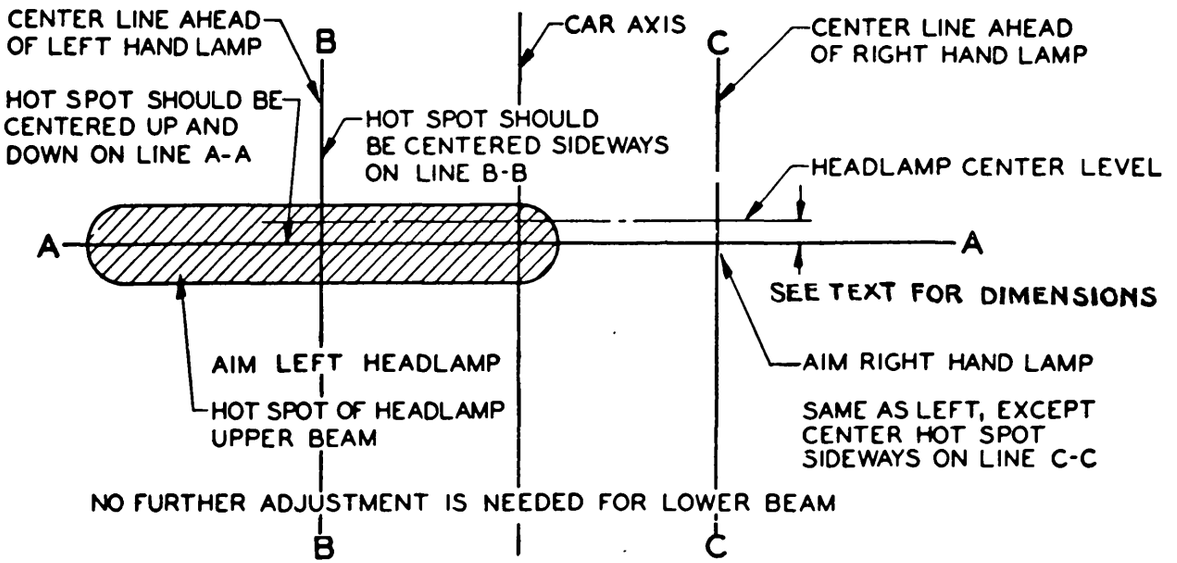
ADJUSTMENT: All sealed beam lamp units are "prefocused" type so that the only adjustment required is to aim the lamp beam for correct horizontal and vertical position.

Headlamp Adjustm nt (All Cars)—Use conventional headlamp adjusting screen with vertical lines drawn directly ahead of each lamp center-line and horizontal line drawn 3" below (except "Shielded Filament" type) 2" below "Shielded Filament" type, and parallel to lamps centerline. Place car at 25 feet distance from screen, turn on lights and make certain that Upper Country Beam (lower filament) is lighted. Aim each headlamp as follows:

Horizontal Adjustment—With headlamp rim removed, turn adjusting screw at one side of lamp sub-body (do not confuse with retainer ring clamp-screws) until hot spot is centered on vertical line directly ahead of this lamp. Adjust other headlamp in same manner (both lamps aimed straight ahead).

Vertical Adjustment—With headlamp rim removed, turn adjusting screw at top or bottom of lamp sub-body (do not confuse with retainer ring clamp-screws) until hot spot is centered on horizontal line specified above, below lamp center height. IMPORTANT—Beam may be directed downward as required by state laws, but should never be aimed higher than Specification above, below lamp center height.

►*SPECIAL AIMING EQUIPMENT NOTE:* T-3 Safety Aimer available for aiming "Shielded Filament" type units without use of screen. Follow Aimer Manufacturer instructions contained in Tool shipment when using this aimer.



SEALED BEAM HEADLAMP AIMING CHART

BREAKER POINT CAM ANGLE

CAM ANGLE (or DWELL): Cam Angle is the term used to indicate the number of degrees the distributor cam turns while the contact points are closed, during the ignition function for one cylinder of an engine. On a six cylinder distributor 60° covers the ignition function for one cylinder (1/6 of 360°), on an eight 45° (1/8 of 360°). On the six with a 36° cam angle this means the points are closed 36° (of the 60°) and open 24°. *See Diagram.* With the distributor in good condition the manufacturers specified point gap clearance provides the necessary cam angle for good coil operation throughout the speed range. Correct point closed period (cam angle) is important because it governs the time allowed for current to saturate the coil, which in turn governs coil output. As the speed of the engine increases the closed period time is also shortened, resulting in a weaker spark at high speeds. Although the coil output drops at high speeds there is sufficient spark strength to cover the engine requirements **providing the point gap and cam angle are set correctly.** At high speeds compression pressure tapers off due to decreased volumetric efficiency, and the weaker spark is still sufficiently strong enough to operate the engine satisfactorily.

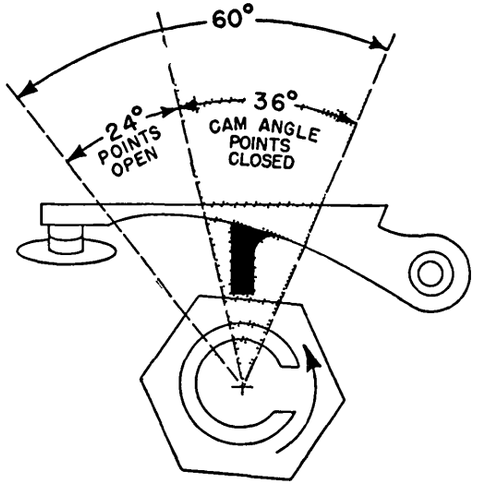
Changing the Cam Angle—Increasing the point gap setting decreases the cam angle, and vice versa. Worn distributor parts causing sloppy point action also decreases cam angle.

Checking Distributor Condition with the Cam Angle Meter—Cam angle readings should not vary over 2° when the engine is accelerated from idle to high speed. A greater variation indicates worn distributor parts, high resistance, weak breaker arm spring, sloppy breaker plate bearings, etc.

Setting Point Gaps—Setting points with a cam angle meter, disregarding gap clearance is not recommended due to the many variables affecting cam angle readings. Point gaps must be set within the manufacturers specified limits. Using a dial gauge clamped to the distributor housing with the dial pointer (in line with the contacts) resting on the breaker arm, is the most accurate method of measuring gap clearance. Feeler gauges can also be used, but are not as accurate as the dial gauge.

AUTO-LITE

AUTO-LITE CONTACT GAP SETTINGS: Auto-Lite contact gap settings generally include a range such as .013-.017". The preferred setting in this case would be .015". Where one figure only (for example .017") is given, this is the preferred setting. A .002" plus or minus deviation from this setting is permissible, to allow for distributor wear.



TYPICAL 6 CYL. CAM ANGLE

Installing New Points—To allow for wear-in of the breaker arm rubbing block an additional .002" wider gap (over the preferred setting) is recommended, when installing new points.

DELCO-REMY

CAM ANGLE: For greater accuracy Delco-Remy specifies a Cam Angle Range to be used in checking distributors. This cam angle varies with different distributors although the point gap setting may be the same.

Delco-Remy Cam Angle Specifications are listed as specifications covering the different distributors. The cam angle range shown in the table is broad enough to cover the variables affecting cam angle readings. The cam angle range shown is a test setting. With the specified point setting shown in the table the cam angle should be within the range shown in table.

►***Distributors that are set to the test point setting, and do not fall within the cam angle range specified should be removed and checked on a distributor testing machine for worn parts, weak breaker arm springs, high resistance, etc.***

►**Point Settings**—***The point settings given in the table are not the operating settings of the points, but are used for test purposes only.***

►***It is most important that the operating point gap be within limits specified by the manufacturer.***

Setting Point Gap—In setting the point gap a feeler gauge can be used, but use of a dial gauge is the most accurate method, clamping the gauge to the distributor housing with the dial pointer resting against the breaker arm in line with the contacts. It will be noted on some of the Car Pages that the operating point setting is shown as well as the test or range setting.

AUTO-LITE "IAR" & "IAP" DISTRIBUTORS

"IAP" & "IAR" CAP POPPING OFF CORRECTION

►**DISTRIBUTOR CAP POPPING OFF CORRECTION (Early "IAP" & "IAR" Distributors):** May be caused by one or both of the following conditions and can be corrected as indicated:

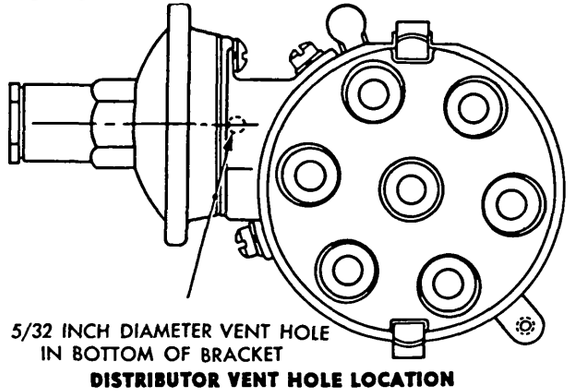
Distributor Cap Hold-down Spring Clips Incorrectly Formed—Lip at upper end of spring clip fitting into recess in cap may have too large a radius to permit spring to seat securely in cap recess. Correct by pinching the spring together at the end.

Ruptured Vacuum Control Unit Diaphragm (allowing fuel vapor to collect in distributor and blow cap off when ignited by spark)—Install new vacuum control unit and make certain that mounting bracket has ventilating hole on underside (see illustration). If bracket does not have this ventilating hole, **drill a 5/32" hole at this point.**

NOTE—This ventilating hole provided in production on later distributors.

DISTRIBUTOR PRODUCTION CHANGES

►**DISTRIBUTOR DRIVE SHAFT & CAM PRODUCTION CHANGE (All Distributors listed below):** A change was made in the following parts from staked to welded construction: **Drive Shaft & Weight Plate Assy.** and also **Distributor Cam Assembly.** Both type parts will be found in service and are interchangeable providing that correct washers (and anti-rattle spring in some cases) are used as listed below. When installing above parts, determine type of construction by inspection and select proper washers for use with these parts as follows:



DISTRIBUTOR VENT HOLE LOCATION

Thrust Washer Below Weight Plate①

Distributor	Staked Shaft	Welded Shaft
IGC, IGS, IGT, IGW	IG-90	IGS-104
IGB, IGC, IGP, IGR, IGS, IGT	IGB-162	IGS-104
IGW	IGW-46	IGS-104

Thrust Washer Abov Weight Plate②

IGC, IGP, IGR, IGS, IGT	IGK-26	IGS-99
IGW	IGW-36	IGW-92
IGW	IGW-59	IGW-92

Anti-rattle Spring

L.H. (all)	IGE-36	IGT-69
R.H. (all)	IGE-35	IGT-70

①—Between distributor base and weight plate on shaft.

②—Between weight plate on shaft and cam assembly.

Staked Cam & Welded Shaft—When installing welded shaft in distributor with staked cam, change both washers as indicated above.

W lded Cam with Staked or Welded Shaft—Change anti-rattle spring (if used) as indicated above.

AUTO-LITE "IAT" TYPE

▷EARLY "IAT" DISTRIBUTOR BREAKER PLATE BINDING (Causing Low Gas Mileage, Spark Knock, or Engine Noise): Caused by breaker plate ground wire screw being too long and binding on support plate (preventing proper advancing and retarding of breaker plate by the vacuum control unit). Correct this condition by removing ground screw and grinding off lower end sufficiently to provide clearance when screw tightened down.

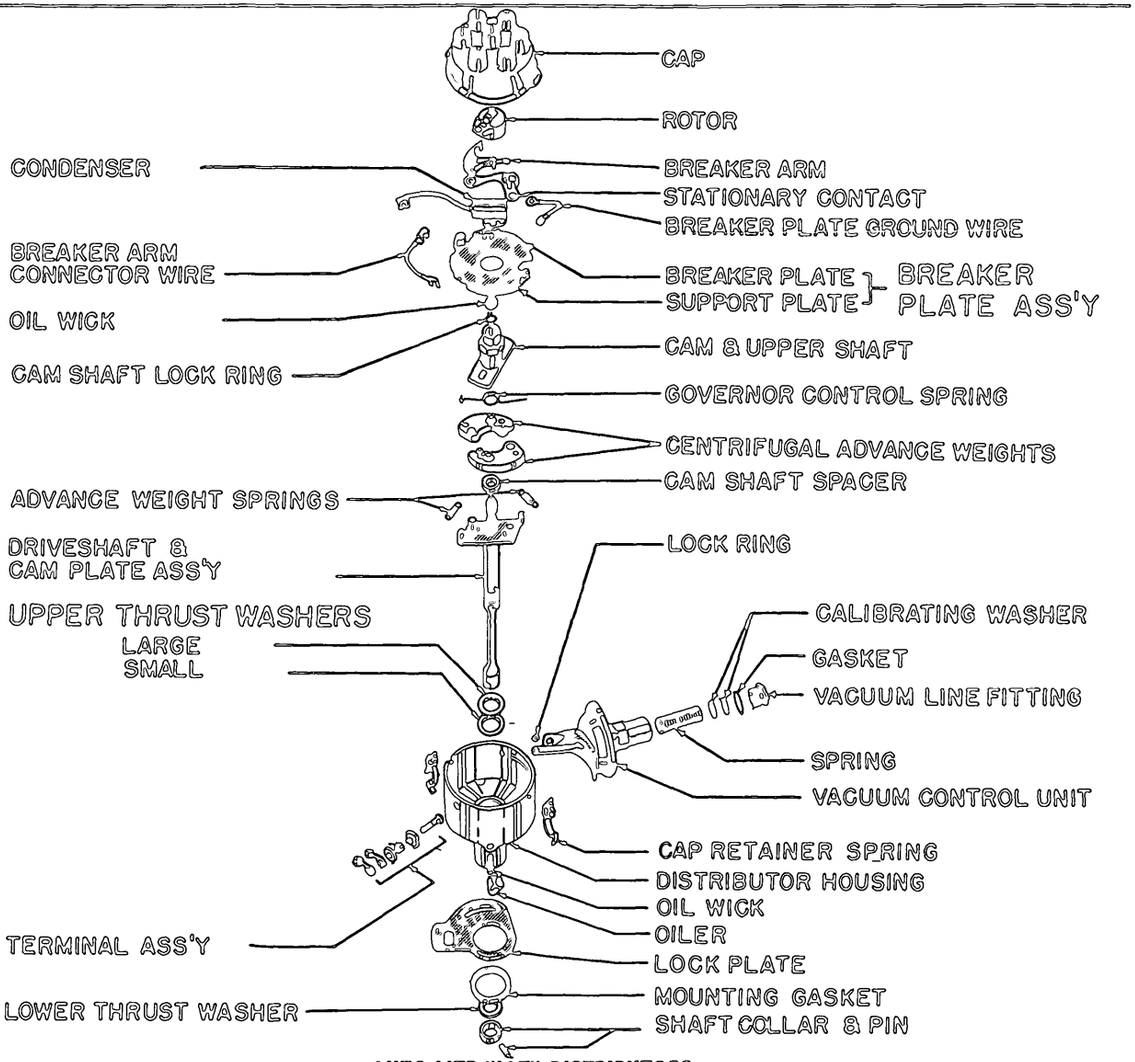
NOTE—Later "IAT" distributors have oblong slot in support plate at this breaker plate ground wire screw to provide clearance.

DESCRIPTION: Auto-Lite "IAT" distributors have new type breaker plate-and-support plate assembly for vacuum spark control (vacuum control unit mounted on distributor housing and linked directly to breaker plate). This assembly consists of a support plate rigidly mounted in the distributor housing and a separate breaker plate on which the contact assembly and condenser are mounted. Breaker plate is pivoted on support plate at a point under the condenser and rests on brass supports on the support plate. A tension spring on the underside of the support plate provides constant uniform friction between the two plates and governs the action of the vacuum unit in rotating the plate to advance or retard the spark.

▷*REPLACEMENT NOTE*—Breaker plate and support plate not furnished separately and must be replaced as an assembly if either part damaged or worn.

DISASSEMBLY: Remove distributor cap and rotor. Remove wire clip from vacuum unit link post on breaker plate, take out vacuum unit mounting screws on side of housing, tip vacuum unit to disengage link from breaker plate, remove unit (see Vacuum Unit data below for disassembly of this unit). Disassemble and remove terminal screw, take out three support plate mounting screws (including two cap spring clips), lift breaker plate assembly out. To disassemble breaker plate, remove terminal screw to disconnect connector wire and condenser pigtail, lift breaker arm off its pivot, take out condenser mounting screw and remove condenser, remove contact plate lockscrew and plain washer (this is also ground wire screw) and lift stationary contact plate off, disconnect ground wire from support plate (CAUTION—this completes breaker plate disassembly sinces plates not furnished separately). Remove oil wick from center of cam, remove spring lock from upper end of shaft (below wick in cam), lift cam out. Disconnect and remove weight control spring from cam, unhook both weight springs from anchor posts, lift advance weights out. Remove cam spacer from shaft. Drive out pin in collar at lower end of shaft, press shaft out of collar and housing. Remove upper and lower thrust washers.

OVERHAUL: Replace housing and bushings or install new bushings when shaft sideplay exceeds .005". Fit new bushings to .0005" maximum clearance. Use special tool (Auto-Lite LH-222) when installing upper bushing to insure proper positioning of the bushing in the housing bore and drill the oil feed hole at the oiler location through the bushing. Soak both bushings in engine oil for 15 minutes and drain before installing shaft. Shaft endplay should be .003" minimum, .010" maximum (with shaft collar riveted in place).



AUTO-LITE "IAT" DISTRIBUTORS

REASSEMBLY: Install all parts in reverse order of disassembly data above and note the following important points:

Lubrication—When assemblying parts, place a small amount of grease in bearing bore just above bearing and apply light film of grease to upper drive shaft washer, lubricate advance weight mechanism sparingly with medium engine oil, place one drop of light oil on each of the breaker plate support bearings and on pivot bearing (press on retainer spring under support plate to expose slight gap between spring and washer and apply drop of oil to washer). After assembly completed, place one drop of light oil on breaker arm pivot pin (operate arm several times, then remove excess oil), place 5 drops of medium oil on felt in center of cam and 3-5 drops in oiler on side of housing, apply light film of grease to breaker cam.

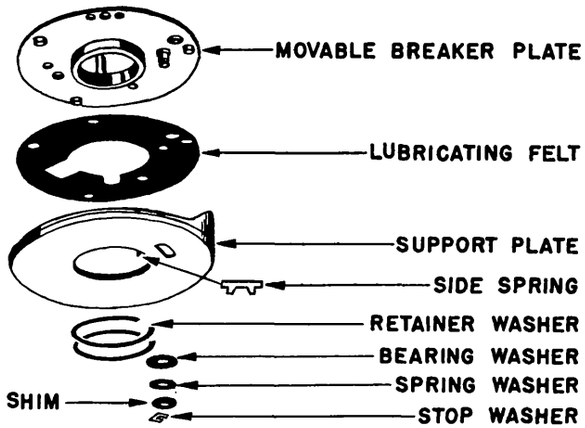
Cam & Advance Weight Installation—After advance weights and weight springs installed, install weight control spring on cam plate, position the cam on the shaft so that flat on cam is on same side as thicker portion on end of drive shaft and free end of weight control spring is against driving lug so that spring is under tension. Install spring lock on upper end of drive shaft to retain cam.

VACUUM CONTROL UNIT: Disassembly is limited to removal of the vacuum line fitting which will permit withdrawal of the calibrating washers and spring. Performance is controlled by the number and thickness of these calibrating washers which are furnished in thicknesses of .010", .032", .065". When reassembling unit, use same number and thickness of washers as were removed.

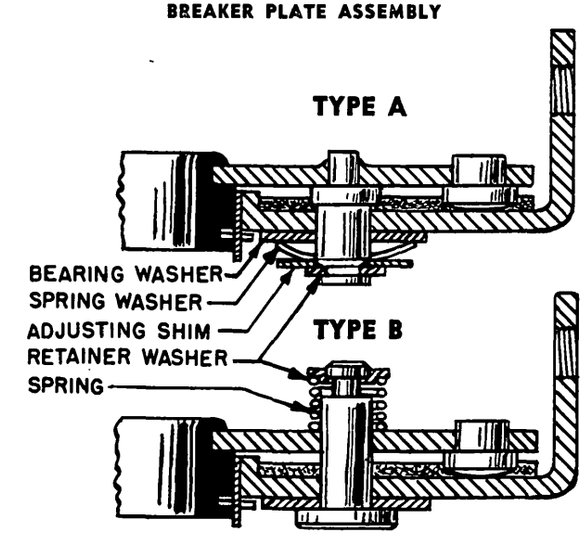
DELCO-REMY "CENTER-BEARING BREAKER PLATE" DISTRIBUTOR

	Distributor Nos.
BUICK	
1949-51	1110815
1952	1110832
1953 40 Series	1110838
1953 50, 70 Series	1110827
1954-55 All Series	1110849
CADILLAC	
1949	1110812
1950	1110819
1951	1110820
1952	1110829, 33
1953	1110835
1954 All	1110844
1955 All	1110852
CHEVROLET	
1955 V8 Pass. Cars	1110847
1955 Corvette V8	1110855
1954 Trks. (Exc. 261" Eng.)	1112388
1954 Trks. 261" Eng	1112392
1955 Trks. 235" Eng	1112403
1955 Trks. 261" Eng	1212407
1955 Trks. V8 Eng	1110847
HENRY J	
1952-55 4 Cyl	1110230
1952-55 6 Cyl	1110231
KAISER	
1951-53	1110224
1954 Darrin	1112316
1954 Special	1110224
1954 Manhattan	1110237
NASH	
1952-53 Statesman	1112382
1952-53 Ambassador	1110227
1954 Statesman	1112401
1954 Ambassador	1110226
1955 Statesman Powerflyte	1112382
1955 Statesman Dual Powerflyte	1112409
OLDSMOBILE	
1949-50 6 cyl.	1110221
1949-50 8 cyl.	1110817
1951-53	1110824
1954 All	1110843
1955 All	1110850
PACKARD	
1951-52	1110825
1953 Early	1110836
1953 Late	1110841
PONTIAC	
1949 6 cyl.	1110219
1949 8 cyl.	1110816
1950-52 6 cyl.	1110222
1950-51 8 cyl.	1110818
1952 8 cyl.	1110831
1953 6 cyl.	1110232
1953 8 cyl.	1110233
1954 6 Cyl. Synchro-mesh	1110235
1954 6 Cyl. Hydra-Matic	1110234
1954 V8	1110831
1955 All	1115087
RAMBLER	
1952-55	1112382
STUDEBAKER	
1950 17A	1110220
1951 V8 Comm.	1110822
1952 V8	1110826
1953-55 V8	1110839

DESCRIPTION: These vacuum spark control type distributors have new "center-bearing" breaker plate assembly which supersedes earlier type mounted on three balls. Breaker plate assembly consists of a support plate rigidly mounted in the distributor housing and a separate breaker plate on which the contact assembly and condenser are mounted. Breaker plate rests on three bakelite buttons which slide on support plate when breaker plate is rotated by vacuum control. An oil-soaked felt between the plates provides lubrication for the buttons and plates are held together by a breaker plate post which extends down through a slot in the support plate with washers and tension adjusting shims on the post below the support plate on the first design (type A), while in the later design (type B) the post extends up through both the plates and has tension spring on top of movable plate. An additional "side" spring in the inner rim of the support plate assists in preventing tipping of the breaker plate in service. Spiral spring used on type B in place of bearing and spring washers.



DELCO-REMY "CENTER BEARING" BREAKER PLATE ASSEMBLY



BREAKER PLATE SPRING POST ASSY. (TYPES A & B)

►*REPLACEMENT NOTE*—Breaker plate and support plate are not serviced separately and entire Breaker Plate Assembly should be replaced if either part worn or damaged.

LUBRICATION: In addition to normal distributor lubrication, apply 3-4 drops of light engine oil (SAE 10W) to felt between plates at 5000 mile intervals.

DISASSEMBLY OF BREAKER PLATE: With assembly removed from distributor housing, remove stop washer ("C" washer) from post extending through support plate, remove adjusting shim (see Adjustment data), spring washer and bearing washer. Remove retainer washers, lift off breaker plate and lubricating felt. *NOTE:* Do not remove "C" washer and spiral spring from type B while assembly is in distributor as post will drop down into distributor bowl. Examine parts for wear of bakelite buttons or for grooving of support plate under buttons.

REASSEMBLY—Reverse disassembly instructions. Check movement of base plate and support plate. See breaker plate tension.

►*REASSEMBLY CAUTION*—Make certain that side spring is in place in support plate recess, lubricate felt with light engine oil, install all parts in correct order (See Illustration).

BREAKER PLATE TENSION: Breaker plate must have sufficient tension on support plate to prevent tipping or side movement of the plate but friction between plates must not be excessive (will interfere with correct operation of vacuum control). Whenever distributor being serviced or breaker plate reassembled, check and adjust tension as follows:

Checking—With breaker plate assembly out of distributor housing, support assembly in hand, hook spring scale to vacuum unit link connector post on breaker plate, measure pull required to rotate breaker plate on support plate. Check vertical movement by applying a spring scale (use "C" hook) at the stabilizing spring post and note force required to start vertical movement of the post. Minimum force required to rotate movable plate on support plate type "A" 20 ounces, type "B" 15 ounces. Force required to move assembly vertically on stabilizing spring post type "A" from 32 to 56 ounces, type "B" from 18 to 24 ounces.

►*CAUTION—Spring scale must be held parallel to plane of breaker plate for true reading of breaker plate tension.*

Adjustment—To change tension on type "A" increase or decrease number of tension washers, on type "B" increase tension by carefully stretching spring or replace it.

►*NOTE*—Adjusting shims are .010" thick (Delco-Remy Part No. 1912225).

FORD, LINCOLN, MERCURY DISTRIBUTORS

	Distributor No.
FORD Pass. Cars	
1947-51 6 Cyl	7HA-12127
1952-53 Early 6 Cyl	FAA-12127A
1953 Late 6 Cyl	FAA-12127C
1954 6 Cyl	FAA-12127-C
1949-50 Early V8	①7RA-12127C
1950 Late-53 V8	①8BA-12127
1950 Late-53 V8	②OBA-12127
1954 V8	FAE-12127-E
1955 6 Cyl	B5A-12127-C
1955 272 V8 (Std 2-barrel Carb)	B5A-12127-B
1955 272 V8 (Special—4-barrel Carb) ④	⑥FEC-12127-A
1955 272 V8 (Special—4-barrel Carb) ⑤	⑦B5A-12127-F
1955 292 V8 (Interceptor) ④	⑥B5S-12127-D
1955 292 V8 (Interceptor) ⑤	⑦B5S-12127-E
FORD Trucks	
1947-51 6 Cyl "H"	7HA-12127
1950-53 6 Cyl "M"	8MTH-12127
1952-53 Early 6 Cyl "D"	FAA-12127A
1953 Late 6 Cyl "D"	FAA-12127C
1954 6 Cyl 223"	FAA-12127-C
1948-50 Early V8 "R"	①7RA-12127C
1950 Late-53 V8 "R"	①8BA-12127
1950 Late-53 V8 "R"	②OBA-12127
1954 V8 239"	FAE-12127-A
1954 V8 256"	FAD-12127-B
1955 223 Eng	B5A-12127-C
1955 239 Eng	B5C-12127-B
1955 256 Eng	FAD-12127-B
LINCOLN	
1950-51	OEL-12127
1952	FAB-12127
1953	FAF-12127A
1954 Early③	FAF-12127-B
1954 Late	FDD-12127-A
1955	FDL-12127-B
MERCURY	
1949-50 Early	①7RA-12127C
1950-52	①7RA-12127C
1950-52	②OCM-12127
1953	①7RA-12127D
1953	②OCM-12127B
1954 Early③	FAE-12127-C
1954 Late	FDC-12127-A
1955 ECK Eng	FDK-12127-C
1955 ECL Eng	FEC-12127-A

①—Used with Cast Iron front cover
②—Used with Aluminum front cover
③—See Production Change below
④—Early Cars ⑤—Later Cars
⑥—See Distributor Modification (below)
⑦—Modified Distributors (with new spring combination indicated in Distributor Modification)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*LINCOLN (FAF-12127-B), MERCURY (FAE-12127-C) DISTRIBUTOR OVER-ADVANCE WHEN ENGINE STARTED AT LOWER TEMPERATURE CORRECTION:* This condition noted when engine detonates excessively after starting under low temperature conditions Install new Pin & Post Assembly, Part No FDC-12357-A (as indicated below), which limits advance to 15°-15½° Earlier distributors that have been reworked in production are identified by the part number prefix "ED" *CAUTION—When calibrating a corrected distributor, refer to Automatic Advance Table FDD-12127-A (Lincoln), FDC-12127-A (Mercury).*

Pin & Post Assembly Installation—Remove distributor from engine Remove rotor and turn primary spring adjustment post (post farthest from diaphragm) counter-clockwise with Manzel Tool 12150-D, to remove all tension from spring and remove spring from post Support distributor in holding fixture and with a 1/16" pin punch, carefully remove fixed adjusting post Install new Pin & Post Assembly Part No 12357-A so that pin is parallel to breaker plate slot when in full advance position Attach primary spring and re-calibrate distributor to specification for FDD-12127-A (Lincoln), FDC-12127-A (Mercury) distributor *See Car Model pages for specifications.*

▷*FAA-12127-A DISTRIBUTOR PRODUCTION CHANGE (Converting No. FAA-12127-A to FAA-12127-C Distributor)*—To improve performance of 6 cylinder OHV 215 cu in engine Primary Spring, Part No 7HA-12225, on FAA-12127-A replaced by Primary Spring, Part No FAA-12225-A This change converts FAA-12127-A to FAA-12127-C New distributor must be calibrated to specifications below To identify, new spring has 5 coils instead of 7 When change made scribe or restamp suffix on identification plate to read "C" instead of "A"

▷*7RA-12127C DISTRIBUTOR CONVERSION TO LATER NO. 8BA-12127:* This change can be made by replacing the original No 7RA-12192 Distributor Primary Spring and the No 8BA-12225 Distributor Diaphragm Spring using TWO No 8EQ-12192 Distributor Primary Springs and adjusting the advance curve to the 8BA-12127 specifications See ADJUSTMENT data below When this change made, scribe or stamp "8BA" over the "7RA" designation on the distributor plate

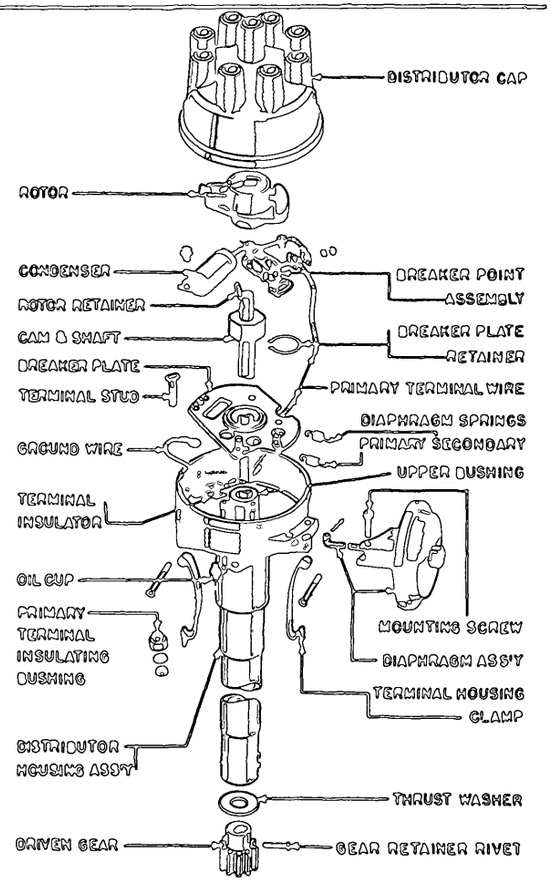
▷Ford & Mercury Distributor Replacement Note—When replacing distributors of the 8BA, 0BA, 7RA, and 0CM types proper Cylinder Front Cover Assemblies must be used (below) *CAUTION* Distributor No OBA-12127 has shorter housing and shaft has extension below drive gear which is piloted in machined hole in cover This distributor will not operate satisfactorily if installed in cast iron cover (no provision for lower bearing)

Distributor	Front Cover No.	Front Cover Composition
8BA-12127	8BA-6059	Cast Iron
0BA-12127	0BA-6059-A	Aluminum
7RA-12127-C & D	8BA-6059	Cast Iron
OCM-12127 & B	0BA-6059-A	Aluminum

▷Excessive Pinging Correction—May be caused by obstructions in vacuum passages in carburetor interfering with correct operation of distributor advance mechanism Correct by disconnecting vacuum line and cleaning out all passages.

▷Mercury Distributor Timing Caution—Clearance between distributor vacuum diaphragm housing and water pump outlet or fan belt on engine should be ¼" to preclude interference in service Distributors with less clearances should be replaced.

CAUTION—When setting ignition timing, initial setting should be as near as possible to specified setting (see Car Model Page for instructions) but AT LEAST ⅛" CLEARANCE must be maintained between vacuum diaphragm and water outlet or fan belt.



FORD V8, LINCOLN, MERCURY DISTRIBUTOR
(FORD 6 CYL. SIMILAR)

▷*DISTRIBUTOR MODIFICATION & PRODUCTION CHANGE (Distr. Nos. FEC-12127-A & B5S-12127-D on Early 272 Special and Interceptor 292 Engines)* To minimize detonation, particularly in areas where fuel octane rating is below average, above distributors can be modified by replacing secondary spring (nearest vacuum chamber) with new spring, No 8EQ-12225, and recalibrating distributor advance as indicated in MODIFIED Advance Performance Table See Car Model Page *NOTE*—Later B5A-12127-F & B5S-12127-E Distributors have this spring and MODIFIED advance performance

▷*CAUTION* Above modification must NOT be made on 272 Std Engine Distr B5A-12127-B (will result in excessive spark advance and cause detonation)

DESCRIPTION: This "Loadomatic" or Pressure Type distributor is a full-automatic advance type in which the entire advance is provided by action of the vacuum diaphragm unit linked to the breaker plate (no centrifugal weights used) This advance action is controlled by the two diaphragm springs on the breaker plate which oppose diaphragm

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY DISTRIBUTORS (C nt.)

movement. Springs may be of equal or unequal weight, but act together to produce the desired advance curve.

►*1953 LINCOLN DISTRIBUTOR:* This distributor has a DOUBLE diaphragm unit (units are in tandem and linked to breaker plate through a single link). Each carburetor port is connected to an individual vacuum diaphragm chamber through a separate vacuum line *See Diaphragm Testing data below.*

►*1955 LINCOLN & MERCURY DISTRIBUTOR:* A hex-type oil pump drive replaces the tang and slot drive used on previous models.

OPERATION: The diaphragm vacuum line is connected to the carburetor and terminates in two separate ports: 1) Upper Port in carburetor venturi tube, 2) Lower Port in carburetor throat just above throttle valve edge. Vacuum at these ports, and consequent suction in line, varies in accordance with engine operating conditions to provide correct advance as explained below. *NOTE*—On 1953 Lincoln with double diaphragm unit, the two carburetor ports are connected separately by individual lines to the Primary Distributor Vacuum Diaphragm (connection on end of unit), and to the Secondary Distributor Vacuum Diaphragm (connection on side of unit)

Idling Speed (Closed Throttle)—Vacuum is at minimum at both carburetor ports (lower port above throttle valve) and breaker plate is retarded by springs. Spark occurs at the initial timing point with no automatic advance.

Normal Driving (Part Throttle)—Vacuum is high at both carburetor ports and vacuum diaphragm unit advances timing progressively until maximum advance point is reached at 18-35 MPH.

Acceleration—Vacuum at upper (venturi) port is high but vacuum at lower (carburetor throat) port decreases under these conditions. This results in a lower vacuum at the diaphragm unit and timing is retarded by breaker plate springs from the normal road load point.

Wide open Throttle (High Speed): On 1952-55 Lincoln, and 1950-55 Mercury (1950 carburetors stamped "6-50" and later), a nylon ball check valve is located in the carburetor passage between the lower and upper ports (controls lower port only). At nearly wide open throttle, the ball will be drawn up and seated at the upper end of the passage which reduces the "bleed" effect of the lower port. This results in a higher distributor vacuum and maintains maximum spark advance.

►*SPARK CONTROL VALVE (1952-55 Lincoln, 1954-55 Ford & Mercury):* Spark control valve is normally closed whenever the engine is not running which closes off the lower (manifold vacuum) port in the carburetor from the distributor vacuum line (except for small by-pass passage in the valve which has a metering restriction). With the engine running at normal road load, manifold vacuum in sufficently high to overcome the valve spring tension (spring is calibrated to provide the correct vacuum) and the valve is normally open so that the distributor advance is controlled by the balanced action of the two ports (above). During acceleration when throttle valve is open wider than normal (for existing engine speed), the drop in manifold vacuum causes the spark control valve to close preventing excessive spark advance and engine ping.

TESTING

►*TEST EQUIPMENT NOTE:* Testing and adjustment of these distributors requires use of special test equipment which includes the following units:

(1) Vacuum Pump—Should be capable of producing vacuum up to 21" of mercury and have a control to regulate vacuum in the test line.

(2) Vacuum Gauge—Must be accurate to small readings required in checking vacuum advance and adjusting advance springs. Mercury manometer or other type gauge can be used.

(3) Tachometer.

(4) Distributor Test Fixture or Stroboscope—Must accurately indicate distributor advance performance.

Distributor Vacuum Line Test: This test can be made on the engine to determine if vacuum at distributor is within specified limits for proper operation of the distributor vacuum advance *(CAUTION*—This test can be made only if vacuum diaphragm test indicates no leaks exist—see above). Connect a "T" test fitting in vacuum line to distributor, connect vacuum gauge to this fitting, operate engine at speeds listed in table below and check vacuum reading. If vacuum readings not within limits shown, blocked passages in carburetor throttle body are indicated. *NOTE*—Carburetor idle mixture adjustment and ignition timing must be correctly set before test is made.

DISTRIBUTOR LINE VACUUM

Ford 6 Cyl. (1949-51)		Ford V8 (1949-53)	
Eng. RPM①	Vac. (" of HG)	Eng. RPM①	Vac. (" of HG)
800	.5-.7	800	2.0-2.9
1000	1.2-1.6	1000	3.5-4.8
2200	4.8-6.6	2200	4.7-6.4
2400	4.9-6.7	2400	4.6-6.2

Lincoln (1950-51)		Mercury (1949-51)	
Eng. RPM①②	Vac. (" of HG)	Eng. RPM①②	Vac. (" of HG)
800	0.25	800	0.95
1000	0.80	1000	2.25
1200	1.70	1200	3.30
1400	2.40	1400	4.15
1600	2.80	1600	5.10

①—"No load" operation.

②—Allowable variation plus or minus 0.5".

Vacuum Diaphragm Test: Operate vacuum pump and adjust line vacuum to exactly 7" (with line closed). Connect vacuum line to distributor vacuum unit connection. Vacuum gauge should indicate 7". Lower reading indicates leak in vacuum unit (punctured diaphragm etc.).

►*1953 LINCOLN "DOUBLE DIAPHRAGM" VACUUM UNIT CAUTION:* Test procedure and vacuum gauge reading (above) are correct when checking Primary Diaphragm Unit, connection on end of vacuum unit). When checking the Secondary Diaphragm Unit (connection on side of unit), vacuum reading should be **not less than 4"** (with closed line reading of 7"). This lower reading is caused by inherent leakage at the diaphragm rod seal and does not mean that the diaphragm unit should be replaced.

Distributor Advance Test: Install the distributor on the test fixture, connect vacuum pump line to distributor vacuum unit. Regulate distributor RPM. and vacuum, and check advance performance. If advance not correct, primary and secondary springs should be adjusted. See ADJUSTMENT data below.

►*SEE INDIVIDUAL CAR MODEL PAGES FOR ADVANCE DATA ON EACH DISTRIBUTOR MODEL.*

ADJUSTMENT

ADJUSTMENT: Distributor Breaker Gap, Contact Dwell, Spring Tension, and Advance Specifications *—See individual car model pages in Car Model Section*

►*CAUTION—Do not disturb spring tension adjustment (slotted eccentric spring posts on breaker plate) unless Stroboscope used to check advance performance.*

Automatic Advance Adjustment (All Models except 1953 Lincoln Double-Diaphragm Distributor): Install distributor on test fixture, adjust distributor speed to 200 RPM. Hold distributor breaker plate in full retard position against the stops and line up zero degree on scale with timing light flash, tighten distributor holding clamp. Release tension on both breaker plate springs by turning adjusting posts, then adjust Primary and Secondary Springs in order and exactly as follows. *NOTE—See illustration for location of Primary & Secondary Springs on each distributor.*

Primary & Secondary Spring Adjustment—*(NOTE —See Car Model pages for distributor vacuum and advance specifications).* Adjust the primary spring first, for the low vacuum setting, and the secondary spring last, for the high vacuum setting. *NOTE— If it is impossible to adjust both springs to give the correct spark advance throughout the range as specified on the Car Model page, one or both springs should be replaced and the spark advance readjusted.*

Final Performance Check—Check vacuum advance at various speeds. The degrees advance should be within the limits given in distributor specification tables *(see individual car models in Car Model Section).* If the spark advance is not within these limits at low vacuum, the primary spring is at fault. If not within limits under high vacuum, the secondary spring is at fault.

Automatic Advance Adjustment (1953 Lincoln Double-Diaphragm Distributor): *CAUTION—Spark control cable assembly must be removed from distributor (see OVERHAUL Note below) to prevent inaccurate spring adjustment due to breaker plate rubbing against cable.* Mount distributor on test fixture, connect vacuum line to PRIMARY diaphragm (fitting on end of unit). Regulate vacuum and distributor RPM. and adjust spring tension to secure the advance performance listed below. Then connect vacuum line to SECONDARY diaphragm (fitting on side of unit), and spot check the advance at several of the calibration points listed in the table. After adjustment completed, connect spark control cable and recheck distributor advance performance to insure that breaker plate does not bind or stick.

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FORD, LINCOLN, MERCURY DISTRIBUTORS (Cont.)

OVERHAUL

OVERHAUL: *NOTE*—Holding Fixture 12131-N or T52L-12132-CGD (Ford 6 Cyl.); T52T-12132-DJD (Ford 8 Cyl.); 12132-B (1950-51 Lincoln & Mercury); 12132-D (1953-55 Lincoln & Mercury is recommended to enable distributor to be clamped in vise for service work.

▷*1953 LINCOLN CAUTION*—This distributor has a spark control cable which must be disconnected and removed as follows: Rotate breaker plate clockwise to the stop position, use small screwdriver to pry end of cable from between two tines below breaker plate, loosen Allen setscrew at side of distributor housing, slide cable out.

Disassembly: Remove distributor point assembly and condenser. Release tension on breaker plate springs by turning spring adjustment posts counterclockwise (use tool 12150-N or 12150-D), unhook springs from fixed studs *(CAUTION*—Use care to avoid stretching or distorting springs). Remove hairpin retainer linking vacuum diaphragm rod to breaker plate and push rod end out of plate. Remove lock ring from groove in upper end of distributor shaft upper bushing, lift breaker plate out. File off peened end of distributor drive gear pin, support gear on suitable fixture *(See Holding Fixture Note above)* and drive pin out, remove gear from shaft (use puller if gear tight on shaft). *(NOTE*—On some distributors, remove collar pin and collar in same manner as for gear removal). Slide shaft assembly out through top of housing.

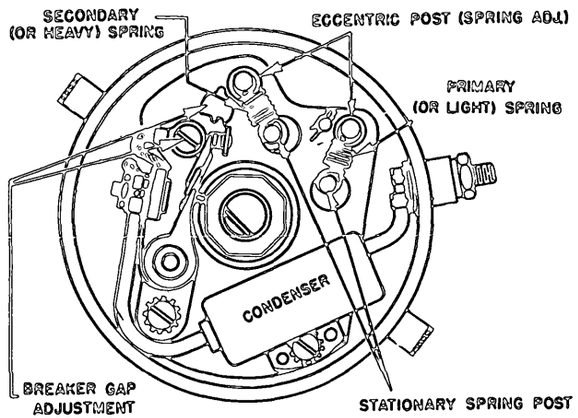
Bushing Replacement: If distributor shaft and bushings worn, replace bushings as follows:

Bushing Removal (All Distributors)—Use driver, Ford No. 12132 or 12132-B1, Lincoln & Mercury No. 12132-B1. On all distributors except 1952-55 Lincoln, insert driver through top bushing and drive lower bushing out through bottom of housing, then reverse housing and drive top bushing out through top of housing (upper bushing only on Lincoln 1952-55 distributor).

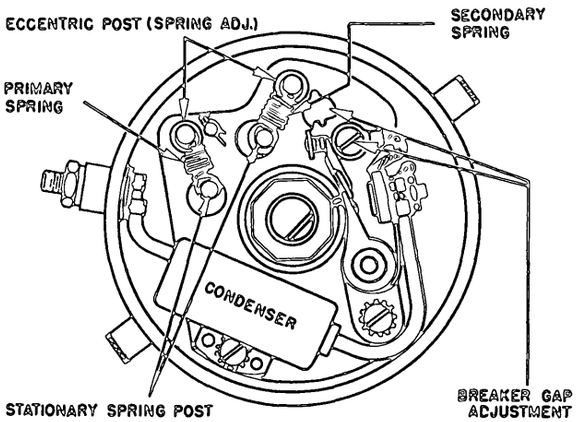
Bushing Installation (Except 1952-55 Lincoln)—Use installing tool, Ford No. 12132-P or 12132-A, Lincoln & Mercury No. 12132-A, to press lower bushing in until bottom of bushing flush with lower end of housing. Use same tool with correct spacer or adapter to install upper bushing (lock ring end up). The tool spacer will correctly position the bushing in the housing. Burnish new bearings to correct size using Burnisher Tool, Ford No. 12132-Q or 12132, Lincoln & Mercury No. 12132.

Bushing Installation (1952-55 Lincoln—Use tool 12132-A (see Tool Note below) to install new bushing in upper end of distributor housing. Tool will correctly position bushing. Burnish bushing to size with Burnisher Tool No. 12132.

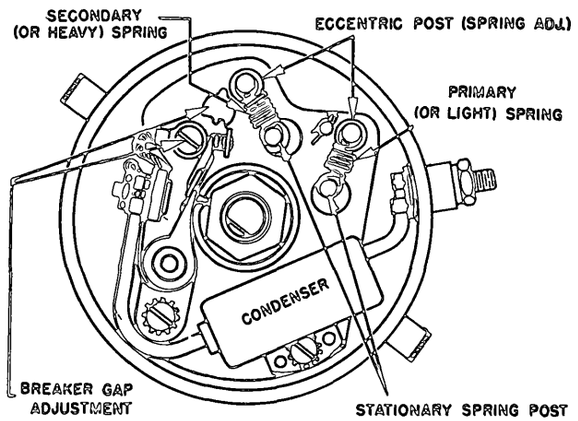
▷Bushing Installing Tool Note—Sleeve section of tool (which fits over bushing) must have 60° chamfer at lower end to allow it to bottom against distributor housing. Grind this 60° chamfer on sleeve before using it on this type distributor. Later tool sleeves have this chamfer.



1949-53 FORD & MERCURY, 1950-51 LINCOLN
1948-53 FORD TRUCKS
DISTRIBUTOR



1954 FORD & MERCURY, 1952-54 LINCOLN
(COUNTER-CLOCKWISE ROTATION)
DISTRIBUTOR



FORD 6 CYL. DISTRIBUTOR

Reassembly: Install all parts in reverse order of disassembly procedure above. If old shaft and gear being re-used, install as follows:

Distributors Without Shaft Collar & Pin—Press gear on shaft until hole in shaft and gear is aligned, install new pin and peen end of pin securely. Check endplay with feeler gauge inserted between gear thrust washer and distributor housing. Endplay should be .002-.005". If endplay not correct, new shaft must be installed.

Distributors With Shaft Collar & Pin—Press collar on shaft until hole in shaft and collar is aligned, install new pin and peen securely. Check endplay with feeler gauge inserted between collar and housing. Endplay should be .020-.024". If endplay not correct, new shaft must be installed. Align mark on gear with mark on shaft and press gear on until pin holes aligned, install pin and peen end of pin securely. Check gear position on shaft using Gauge 12390-D, or measure from bottom of gear to lower face of distributor mounting pad. This distance should be 4.991-4.996".

New Shaft & Gear Installation (Distributors Without Shaft Collar & Pin)—Align marks on gear and shaft, press gear on shaft until .002" feeler gauge is just tight between thrust washer and housing. Use a No. 30 drill (.1285") to drill new pin hole in shaft (drill half-way through from each side), install new pin and peen end of pin securely. Recheck endplay.

New Shaft & Gear Installation (Distributors With Shaft Collar & Pin): Attach distributor shaft supporting tool to distributor and place the assembly in holding fixture. Clamp it in vise. Insert a .020" feeler gauge between backing screw of holding fixture and end of distributor shaft. Tighten backing screw to remove all endplay. Remove gauge and allow shaft to rest on backing screw. Place collar in position on shaft, against the distributor housing and drill a ⅛" hole through shaft and collar using hole in collar as a pilot. Install pin and peen it securely in place. Check shaft endplay which should be .020" to .024". Before installing distributor gear, remove all endplay by tightening backing screw. Press gear on shaft until distance from bottom of gear to lower face of distributor mounting pad is 4.991-4.996", or use Gauge 12390-D to measure this distance. Drill a ⅛" hole through shaft using the pin hole in gear shoulder as a pilot. Drill only halfway through from each side. Install pin and peen securely.

Adjustment: Make all adjustments as listed under ADJUSTMENT above.

LUBRICATION: *CAUTION—Oil or grease on contacts usually caused by use of wrong type or excessive amount of lubricant.*

AUTO-LITE REGULATORS VAV, VRP, VRR, VRS, VRT, VRU, VRW, VRX TYPES EXCEPT "TEMPERATURE COMP. CURRENT REGULATOR"

VOLTAGE & CURRENT REGULATORS

Car Model	Regulator	Generator	Grd. Ter.
Chrysler, All Models (1940-51)	VRP-4001A	GDZ-4801A,B	Pos.
	VRP-4005A	GDZ-4801A,B	Pos.
	VRP-4005E	GEG-4818C	Neg.
	VRP-4401A	GDZ-4801A	Pos.
	VRP-4001B	GEB-4801A	Pos.
	VRP-4001F	GEG-4818A,B,C	Pos.
	VRP-4001F	GEG-4823A,B	Pos.
	VRP-4001-G	GFP-4801B	Pos.
	VRP-4005B	GEB-4801A	Neg.
	VRP-4005E	GEG-4818A,B,23B	Neg.
	VRP-4005E	GEG-4823A,B	Neg.
	VRP-4401B	GEG-4823A,B	Pos.
Crosley CD & Hotshot (1947-51)	VRP-4004F-2	GDZ-4806B	Po.s
DeSoto (1940-51)		See Chrysler above.	
Dodge (1940-51)		See Chrysler above.	
Frazer, All models (1947-51)	VRP-4004F-2	GDZ-4818A	Pos.
	VAV-4002C	GGU-6001B	Pos.
Frazer, All Models (Late 1951)	VRP-6001A	GDZ-6001F	Pos.
Henry J, All Models (1951-52)	VRP-6001A	GDZ-6001E	Pos.
Hudson ('40-42) Police & Spec. Equip.	VRP-4008A	GEG-4801A	Pos.
	VRP-4008B	GEA-4803B	Pos.
	VRP-4008C	GEB-4802A	Pos.
	VRP-4008D	GEB-4802B-2	Pos.
Hudson 6 & 8 Cyl. (1950)	VRP-6002A	GDZ-6001B	Pos.
Hudson 6 & 8 Cyl. (1951-53)	VRP-6101A, B	GDZ-6001B	Pos.
Kaiser, All models (1947-50)	VRP-4004F-2	GDZ-4818A	Pos.
Kaiser, All Models (1951)	VRP-6001A	GDZ-6001F	Pos.
	VAV-4002C	GGU-6001B	Pos.
Nash "600" (1946-47-48)	VRP-4004F-1	GDZ-4806A	Pos.
Nash Amb. Six (1941 to 1948)	VRP-4004F-1	GDZ-4806A	Pos.
Nash 4180 ('41), 4280 ('42)	VRP-4004F,F-1	GDZ-4803B	Pos.
Nash Statesman (1950-51)	VRP-6001A	GDZ-6002A	Pos.
Nash Rambler (1950-51)	VRP-6001A	GDZ-6002A	Pos.
Packard 1800, 1, 1A (1940)	①VRP-4002A	GEA-4801A	Pos.
Packard 1800,1,1A (Late '40)	VRP-4201A-1	GEA-4801A	Pos.
Packard 1803, 4, 5, 6, 7, 8 ('40)	VRP-4003A	GEA-4802A	Pos.
Packard 1803,4,5,6,7,8 (Late '40)	VRP-4202A-1	GEA-4802A	Pos.
Packard Six & Eight (1941 to 1947)	VRP-4002C	GDZ-4801F	Pos.
Police & Taxi	VRP-4002D	GEB-4802C-2	Pos.
Packard Super 8 (1941 to 1947)	VRP-4002C	GEA-4802A	Pos.
Packard "2200" 8 & Sup. 8 (1948-49)	VRP-4402A	GDZ-4801F,T	Pos.
Packard (1948-49)	VAV-4401A	GGJ-4804A	Pos.
Packard "2200" Cust. 8 (1948-49)	VRP-4402A	GDZ-4801G,V	Pos.
	VRP-4402B	GEG-4823F	Pos.
Packard "2300" 8 & Sup. 8 (1949-50)	VRP-4402C	GGW-6001E	Pos.
Packard "2300" Custom 8 (1949-50)	VRP-4402C	GGW-6001F	Pos.
Packard, All Series (1951)	VRP-4402C	GGW-6003A	Pos.
Plymouth (1940-51)		See Chrysler above.	
Studebaker Champ. 2G (1940)	VRP-4004A	GEA-4804A	Pos.
Studebak r 2G Police ('40)	VRP-4004C	GEB-4803A	Pos.
Studebak r Comm. 10A ('40)	VRP-4004A	GEA-4803A	Pos.

VOLTAGE & CURRENT REGULATORS (C nt.)

Car Model	Regulator	Generator	Grd. Ter.
Studebaker Champion (1941-51)	VRP-4004F	GDZ-4804A	Pos.
	VRP-6001A	GDZ-6001A	Pos.
	VRP-6005A	GDZ-6001A	Pos.
Studebaker Comm. (1941-49)	VRP-4004F	GDZ-4805A	Pos.
Special Equipment	VRP-4004C	GEB-4806D	Pos.
Studebaker Pres. 7C ('41), 8C ('42)	VRP-4004F	GDZ-4805A	Pos.
Willys Civ. Jeep CJ-2A (1946-49)	VRP-4007C-2	GDZ-4817A	Neg.
Willys, All Cars & Trucks (1946-49)	VRP-4007C-2	GDZ-4817A	Neg.
Willys, All Cars & Trucks (1950-53)	VRP-6003A	GDZ-4817A	Neg.
Willys, All Cars & Trucks (1950-53)	VRP-6003A	GDZ-6001D	Neg.

VOLTAGE REGULATORS

Hudson 40, 48 (1940)	②VRR-4001A, B	GDS-4801A	Pos.
Hudson 41, 43 (1940)	②VRR-4001A	GEC-4801A	Pos.
Hudson 44, 45, 47 (1940)	②VRR-4001A	GEC-4801A	Pos.
Hudson 10,18 ('41), 20,28 ('42)	VRR-4001A	GDS-4801A	P s.
Hudson All Other Models (1941-42)	VRR-4001A	GEC-4801A	Pos.
Hudson 6 & 8 All Models (1946-49)	VRR-4001A	GEC-4801A	Pos.
Willys Pass. Cars (1940-41-42)	VRR-4004A	GCJ-4811A	Neg.
Willys Comm'l. ('41-42)	VRR-4004A	GCJ-4811A	Neg.

①—VRB-4012B-1 used on first cars.

②—VRD-4008B used on first cars.

►CHANGES, CAUTIONS, CORRECTIONS

►**POLARIZING GENERATOR:** Generator should be polarized each time it has been disconnected before using. Connect jumper wire momentarily from starting switch battery connection to generator 'A' terminal (after all connections have been made). This momentary surge of current through generator windings will polarize generator for correct operation.

►**REGULATOR PRODUCTION CHANGES & NEW SPECIFICATIONS:** Changes made in production on various units as follows:

►"VRP" SERIES

►**"VRP" SERIES REGULATOR WIRING CHANGE**—New type current regulator winding (single heavy winding—see illustration) used on following regulators:

Beginning Dec. 1947 (Serial #12B Up)—VRP-4002B; 4004B, 4C, 4C-1, 4CX, 4D, 4E, 4G, 4H, 4K; 4005B, 5C, 5D; 4006A, 6AP, 6B, 6C, 6D, 6E, 6G; 4007A, 7D; 4009A, 9B, 9D; 4010A.

Beginning Sept. 1948 (Serial #9C Up)—VRP- 4001A, 1AX, 1B, 1C, 1D, 1E, 1F, 1G; 4002A, 2C, 2D; 4003A; 4004E, 4F, 4F-1, 4F-2, 4FX, 4J; 4007B, 7C, 7C-1, 7C-2; 4008A, 8B, 8C, 8D; 4009C; 4011; 4301AM; 4401C; 4402A, 2B; 4403A; 4404A; 4501C; 4502A, 4503A, 3AX.

All units of following models—VRP-4103A, 3B; 4104A, 4B, 4B-1; 4105A, 5AM; 4107A; 4302AM, 2BM; 4303AXM, 3BM; 4304AM; 4402C; 4405A; 4503B, 3BX, 3C; 6001A, 1B; 6002A.

All units of following models (with Single Resistor "R1")—VRP-4101A, 4102A, 4102AX, 4106A, 4106B.

►"VRR" SERIES

►**VRR-4006A, 7A Regulator Voltage Setting Caution**—Before testing or adjusting voltage regulator on these models, regular TC-51 resistor (1.85 ohms) should be replaced by TC-51T (20 ohm). CAUTION—Replace the regular TC-51 (1.85 ohm) resistor after adjustments completed.

DESCRIPTION

DESCRIPTION: These two-unit (VRR), and three-unit (VRP, VAV, VBA) regulators are similar in design to previous type regulators except for production changes (noted above) and following new features:

CONTINUED ON NEXT PAGE

AUTO-LITE REGULATORS VAV, VRP, VRR, VRS, VRT, VRU, VRW, VRX TYPES (Cont.)

Cutout Relay—New type armature with contact mounted on spring so that armature seals against yoke after contacts close. Designed to produce wiping action of contacts.

Current Regulator Winding—Single winding used on VRP-4100 Series, VRP-4302A, VRS Series, VRU Series, VRW Series. Two windings used (as shown in illustration) on VRP-4000, 4200, 4300 (except VRP-4302A), and VRX Series.

ARMATURE SPRINGS

Armature Springs (All Units)—Several different types of armature springs are used and correct type spring must be used on each unit as follows:

Model	Cutout Relay	Voltage Reg.	Current Reg.
"VAV" Series	10½ turns	14½ turns	⑥14½ turns
"VBA" Series	10¾ turns	14½ turns	14½ turns
"VRP" Series	①10¾ turns	14½ turns	②14½ turns
"VRR" Series	①10¾ turns	14½ turns	
"VRS" Series	①10¾ turns	14½ turns	②14½ turns
"VRT" Series	①10¾ turns	14½ turns	
"VRU" Series	①10¾ turns	14½ turns	⑤10¾ turns
"VRW" Series	①10¾ turns	14½ turns	③14½ turns
"VRX" Series	①10¾ turns	14½ turns	10¾ turns

①—Beginning Serial No. 12X-000001 (12¾ turns before this number).
②—Beginning Serial No. 8B-. 10¾ turns (Serial No. 12X- to 8B-), 12¾ turns (before Serial No. 12X-000001).
③—Beginning Serial No. 8B-. 10¾ turns (Serial No. 12T- to 8B-), 12¾ turns (before Serial No. 12T-000001).
⑤—On VRU-4001A, was 12¾ turns before Serial No. 12T-000001.
⑥ Before serial date 8B, was 10¾ turns.

CHECKING & ADJUSTMENT

CHECKING & ADJUSTMENT: Check each unit as directed below.

CUTOUT RELAY

Model	Voltage Winding Resistance	Contact Gap	Air-Gap
All VAV, VRP & VRR Series	29.8-33.0 ohms	.015"	②.031-.034"
All VRS 4000 to 6000 Series	118-132 ohms	.015"	.031-.034"
All VRT, VRU Series	118-132 ohms	.015"	.031-.034"
All VRW Series	29.8-33.0 ohms	.015"	.031-.034"
All VRX Series	111-132 ohms	.015"	.031-.034"

②—On VRP-4200 Series original Air Gap Setting was .034-.038".

Winding Resistance—Use Ohmeter (ST-284) to measure resistance directly, measure from regulator 'A' terminal to ground with voltage regulator lead disconnected from cutout relay yoke.

Air Gap—Use flat gauge ST-281-9 (.031-.034"), ST-281-3 (.034-.038"), ST-281-7 (.048-.052") to measure between magnet core and armature at point as close to armature hinge as possible with contacts open. Adjust by bending armature stop and make certain that stop does not rub against edge of armature.

NOTE—Armature 'seals' against yoke after contacts close and air gap must be measured with contacts open.

Contact Gap—.015" Min. (all models). Gap must not be less than .015" but may exceed this figure in service. With correct adjustment, contacts will close and armature will then 'seal' against yoke. CAUTION—If contact gap too large, contacts will not close before armature seals against yoke (armature must have further travel to effect this sealing).

Closing Voltage—Connect ammeter in charging line at regulator 'B' terminal, connect voltmeter between 'A' terminal and ground. Operate generator and increase speed slowly until contacts just close but without sealing against yoke, note voltmeter reading at this point (NOTE—a 2000 ohm earphone connected between 'B' terminal and ground may be used to check closing. a click will be heard as the contacts close). To adjust, use tool ST-283 and adjust armature spring tension by bending lower spring hanger. Increase spring tension to increase closing voltage, lower spring tension to decrease voltage. CAUTION—Closing voltage must always be set .5 volts less than Voltage Regulator setting

Opening Voltage or Amperage—Connect meters as for Closing Voltage Check (above), decrease generator speed slowly and note voltmeter (or ammeter) reading as contacts open. Adjust by changing contact gap (see above).

CUTOUT RELAY SETTING

Model	Contact Closing Voltage	Contact Opening Voltage
VBA-4001A	6.3-6.8	4.1-4.8
VAV-4000 to 7000 Series	6.3-6.8	③4.1-4.8
VRP-4000 to 8000 Series	6.3-6.8	③4.1-4.8
VRR-4000 to 5000 Series	6.3-6.8	③4.1-4.8
VRS-4000 to 6000 Series	⑤13.0-13.75	⑥8.2-9.3
VRT-4000 Series	⑤13.0-13.75	⑥8.2-9.3
VRT-4102A	12.8-13.5	⑥8.2-9.3
VRU-4000 to 5000 Series	⑤13.0-13.75	⑦8.2-9.5
VRW-4000 to 8000 Series	6.3-6.8	③4.1-4.8
VRX-4000 to 6000 Series	⑤13.0-13.75	⑨8.2-9.3

③—4 to 6 amps. approximate discharge current.
⑤—Operating range of the following units is 12.8-13.50 volts: VRS-4015AX, 4201A,AX, 6005AXT, VRU-4004AX, 5004AX, VRX-4001B,BX, 4003AX,BX,B,C, CX, 4004A,5A,5AX, 5003CX.
⑥—1.0-5.0 amps. approximate discharge current.
⑦—1.0-4.0 amps. approximate discharge current.
⑨—Contacts open 3 to 5 amperes discharge.

VOLTAGE REGULATOR

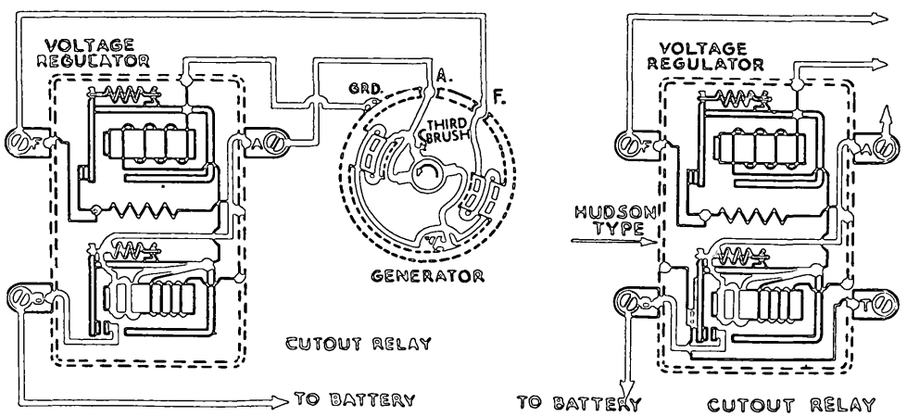
Model	Winding Resistance	Contact Gap	Air Gap
All 'VAV' & 'VBA' Types	10.8-12.0 ohms		.048-.052"
All 'VRP', 'VRR' Types	10.8-12.0 ohms	.012" Min.	.048-.052"
All 'VRS', 'VRT' Types	43.7-49.3 ohms		.048-.052"
All 'VRU' Types	43.7-49.3 ohms		.048-.052"
All 'VRW' Types	10.8-12.0 ohms		.048-.052"
All 'VRX' Types	43.7-49.3 ohms	.012" Min.	.048-.052"

Air Gap (All Series)—.048-.052" (pin gauge ST-281-7). Measure at stop pin on contact side with contacts just opening. Test air gap by connecting test lamp and battery between 'F' terminal and ground. Insert low limit pin gauge, depress armature by hand, lamp should dim or go out. Repeat test with high limit pin gauge. Lamp should remain lighted. To adjust air gap, loosen screw holding upper contact bracket, use tool ST-282 to raise bracket (to increase gap), tap top of bracket to lower contact (to decrease gap), tighten screw. See that contact spring is straight and parallel with armature.

Contact Gap (VRP & VRR Series)—.012" min. holding armature down against stop pin (CAUTION—do not press on contact spring, press down on armature evenly on both sides of spring). Gap may vary in service, if gap variation too great stop pin is wrong length and unit should be replaced.

Voltage Setting Check—Connect ammeter in charging line at regulator 'B' terminal (ammeter must read to 1 ampere and internal resistance must not

CONTINUED ON NEXT PAGE



VOLTAGE REGULATOR CIRCUITS

AUTO-LITE REGULATORS VAV, VRP, VRR, VRS, VRT, VRU, VRW, VRX TYPES (C nt.)

exceed .01 ohm, use short heavy leads for connections), connect voltmeter between regulator 'B' terminal and ground (meter must read to .1 volt). Make certain that car battery is fully charged with gravity reading of 1.275-1.280 (substitute fully charged battery if car battery run down). Run engine at speed equivalent to 30 MPH for at least 15 minutes with generator charging battery to bring regulator up to operating temperature. Then note voltmeter reading which should agree with table below.

Adjustment—Use tool ST-283 to vary armature spring tension by bending arm at lower end of spring. Increase spring tension to increase voltage, decrease tension to decrease voltage. Replace cover and recheck performance.

VOLTAGE REGULATOR SETTING

Model	Voltage Setting Table
VAV-4001A,2A,2B,2C	#3
VAV-4401A,B	#3
VBA-4001A	#5
VRP-4001A,B,C,D,E,F,G	#3
VRP-4001AX,4CX,4FX	#5
VRP-4002A,B,C,D,3A	#3
VRP-4004A,B,C,C-1,D,E	#3
VRP-4004F,-1,-2,-3	#3
VRP-4004FX	#5
VRP-4004G,H,J,K,L,P,P-1	#3
VRP-4005A,B,C,D,E	#3
VRP-4006A,AP,B,C,D,E,F	#3
VRP-4006G,H,J,K,L	#3
VRP-4007A,B,C,C-1,C-2,D,E	#3
VRP-4008A,B,C,D	#8
VRP-4009A,B,C,D,E,F	#3
VRP-4010A,11	#3
VRP-4101A,2A,3A,3B,4A,4B,4B-1	#3
VRP-4102AX	#5
VRP-4105A,AM,6A,6B,7A	#3
VRP-4201A-1, 2A-1	#4
VRP-4301AM,2AM,2BM,3AM,4AM	#3
VRP-4303AXM,4401AX	#5
VRP-4303BM,CM,DM,EM	#3
VRP-4304AM	#3
VRP-4401AX	#5
VRP-4401A,B,C,D,2A,2B,2C,2C-1	#3
VRS-6001AM,2AT,3AM,4AM	#7
VRS-6005AXT,6AXT	#1
VRT-4001A,2A,2A-1	#6
VRT-4003A-1,4A,5A	#6
VRT-4102A	#1
VRT-4103A,4A	#6
VRU-4001A,2A,4A	#7
VRU-4004AX	#1
VRU-4101AM,2AM,5004	#7
VRU-5004AX	#1
VRU-6001AM,BM,2AM	#7
VRW-4001A,2A,3A,4A,5A	#3
VRW-4001BX,3BX,3BXT,5B,5BX	#5
VRW-4101AM,2AM	#3
VRW-4005C	#3
VRW-4005DXT	#5
VRW-5003BX,BXT,5B,5BX	#5
VRW-5005C	#3
VRP-4403A,4A,5A	#3
VRP-6001A,A-2,AT,B,BT,2A	#3
VRP-6003A,AT,BT	#3
VRP-6005A,6A,7A	#3
VRP-6005BX	#5
VRP-6101A,B	#3
VRP-8003A,BT	#3
VRR-4001A,B,6A,7A	#8
VRR-4002A,2B,3A,4A,4B,5A	#3
VRR-4008A,AX,AX1	#5
VRR-4101A,AT,2A,2AT	#5
VRR-4102B,3B	#3
VRR-4103A,4A	#2
VRR-5008AX	#5
VRS-4001A,B,C,2A,3A	#7
VRS-4004A to 4H,5A to 5E	#7
VRS-4006A,6B,6C	#7
VRS-4007A,7A-1,7B,7C,7D	#7
VRS-4008A,9A,10A,10B,10C	#7
VRS-4012A,13A,14A	#7
VRS-4015AX	#1
VRS-4102AM to FM,FMT	#7
VRS-4103AM,BM	#7
VRS-4201A,AX	#7
VRS-5001,4C,10C	#7
VRS-5102FM,FMT	#7
VRS-5201A,AX	#1
VRW-5005DXT	#5
VRW-6001AX,AXT	#5
VRW-6001B,2A,2B,2C	#3
VRW-6002BX,BXT,DXT	#5
VRW-6003AB,BM,4AM,4BM	#2
VRW-6005AXT	#5
VRW-6006AM,7AM	#2
VRW-7005AXT	#5
VRW-8001AX,AXT,2BX,2BXT, 2DXT	#5
VRW-8002B,C	#3
VRX-4001A,2A,2B,3A	#6
VRX-4001B,BX,3AX,3B,3BX	#1
VRX-4003C,CX,4A,5A,5AX	#1
VRX-4003D,DT,6A	#6
VRX-4401A	#6
VRX-5003CX	#1
VRX-6002AT,4A	#6

VOLTAGE SETTING TABLES

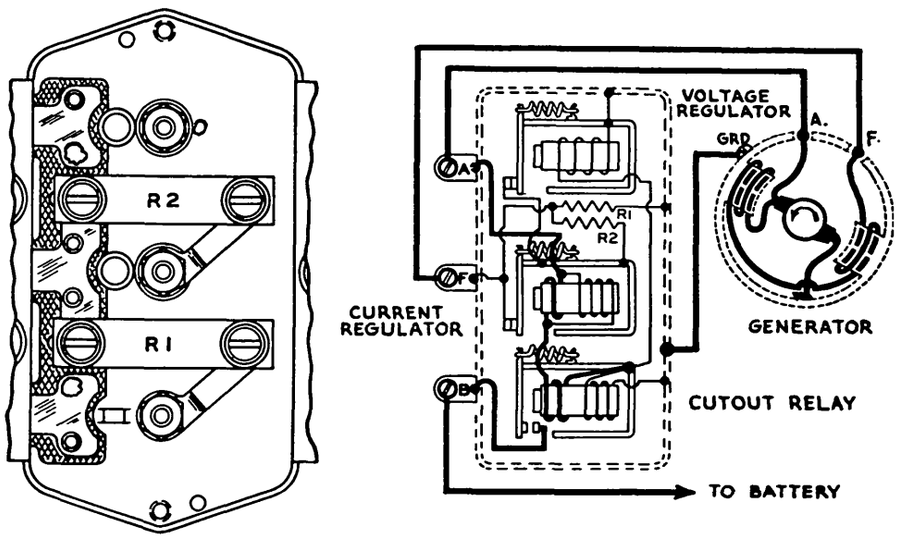
Table 1 Temp.	Volts	Table 2. Temp.	Volts	Table 3. Temp.	Volts	Table 4. Temp.	Volts
50°	14.29	50°	7.34	50°	7.41	50°	7.44
60°	14.25	60°	7.29	60°	7.38	60°	7.39
70°	14.20	70°	7.25	70°	7.35	70°	7.35
80°	14.16	80°	7.21	80°	7.32	80°	7.31
90°	14.12	90°	7.16	90°	7.29	90°	7.27
100°	14.07	100°	7.12	100°	7.27	100°	7.22
110°	14.03	110°	7.08	110°	7.24	110°	7.18
120°	13.99	120°	7.03	120°	7.21	120°	7.14

NOTE—Allowable voltage variation ± .20 volts (Table 1). ± .15 volts (Tables 2,3,4)

Table 5. Temp.	Volts	Table 6. Temp.	Volts	Table 7. Temp.	Volts	Table 8. Temp.	Volts
50°	7.16	50°	14.59	50°	14.54	50°	7.63
60°	7.13	60°	14.54	60°	14.52	60°	7.56
70°	7.10	70°	14.50	70°	14 50	70°	7.50
80°	7.07	70°	14.46	80°	14.43	80°	7.43
90°	7.04	90°	14.42	90°	14.37	90°	7.38
100°	7.02	100°	14.37	100°	14.30	100°	7.31
110°	6.99	110°	14.33	110°	14.24	110°	7.24
120°	6.96	120°	14.29	120°	14.17	120°	7.17

NOTE—Allowable voltage variation ± .1 volt (Table 5), ± .30 volt (Table 6), ± .25 volt (Table 7), ± .15 volt (Table 8).

CONTINUED ON NEXT PAGE



VOLTAGE & CURRENT REGULATOR

AUTO-LITE REGULATORS VAV, VRP, VRR, VRS, VRT, VRU, VRW, VRX TYPES (Cont.)

CURRENT REGULATOR TEST (Not Temperature Compensated): Connect test meters as directed for Voltage Regulator Check (above). Then connect load in excess rated capacity of regulator at point between regulator and battery (use bank of headlamp bulbs, or turn on all lights and accessories). Note ammeter reading with current regulator operating. Generator must be within 5% of rated capacity of regulator under test.

▷*CAUTION—All regulator tests must be made with regulator cover in place.*

▷NOTE—When adjusting current regulator, the voltage regulator can be prevented from operating by installing a jumper across the voltage regulator points.

CURRENT REGULATOR SPECIFICATIONS

Model	Current Setting	Contact Gap	Air Gap
All 'VBA' Types	See Table		.048-.052"
All 'VRP' Types	See Table	.012" Min.	①.048-.052"
All 'VAV' Types	See Table		.048-.052"
All 'VRS' Types	See Table		②.048-.052"
All 'VRU' Types	See Table		③.048-.052"
All 'VRW' Types	See Table		.048-.052"
All 'VRX' Types	See Table.	.012" Min.	.048-.052"

①—After Serial No. 5U-000001. Before this No., Air Gap was .034-.038".

②—After Serial No. 12T-000001. Before this No., Air Gap was .034-.038".

Armature Spring Note—Different springs used. See Armature Spring Table.
Contact Gap—Set in same manner as for Voltage Regulator.
Air Gap—To check air gap, use pin gauge ST-281-7 (.048-.052") or ST-281-6 (.034-.038"). Check and adjust gap in same manner as for Voltage Regulator.

FINAL "FLASH" TEST: After adjusting regulator, final flash test should be made after regulator cover replaced, by operating generator and noting regulator performance immediately.

CURRENT REGULATOR

NOTE—Data below applies to types with separate Current Regulator only.

CURRENT REGULATOR SETTING

Model	Max. Amperes
VAV-4001A, 2A, 2B	49-51
VAV-4002C	44-46
VAV-4401A	49-51
VAV-4401B	44-46
VBA-4001A	48-52
VRP-4001A, 1AX	34-36
VRP-4001B	31-33
VRP-4001C	27-29
VRP-4001D	29-31
VRP-4001E	24-26
VRP-4001F, 1G	39-41
VRP-4002A, 2C, 2D	34-36
VRP-4002B	27-29
VRP-4003A, 4A	34-36
VRP-4004B, 4H	29-31
VRP-4004C, 4C-1, 4CX	31-33
VRP-4004D	27-29
VRP-4004E, 4J	39-41
VRP-4004F, 4F-1,4F-2,4FX	34-36
VRP-4004F-3	34-36
VRP-4004H	29-31
VRP-4004G, 4K	24-26
VRP-4004J, P, P-1	39-41
VRP-4004L	19-21
VRP-4005A	34-36
VRP-4005B	31-33
VRP-4005C	24-26
VRP-4005D	27-29
VRP-4005E	39-41
VRP-4006A, 6AP, 6D	29-31
VRP-4006B, 6G	24-26
VRP-4006C	27-29
VRP-4006E	31-33
VRP-4006F, 6J	39-41
VRP-4006H	34-36
VRP-4006K, L, 7E	19-21
VRP-4007A	31-33
VRP-4007B	39-41
VRP-4007C, 7C-1, 7C-2	34-36
VRP-4007D	29-31
VRP-4008A	39-41
VRP-4008B, 8D	34-36
VRP-4008C	31-33
VRP-4009A	29-31
VRP-4009B	27-29
VRP-4009C, 11	39-41
VRP-4009D	24-26
VRP-4009E,F	19-21
VRP-4010A	31-33
VRP-4101A, 2A, 2AX	21-23
VRP-4103A,3B,4A,4B,4B-1	19-21
VRP-4105A, 5AM, 6A, 7A	19-21
VRP-4103B	21-23
VRP-4201A-1, 2A-1; 4301AM	34-36
VRP-4302AM, 2BM, 4AM	16-18
VRP-4303AXM	31-33

CURRENT REGULATOR SETTING (Continued)

Model	Max. Amperes
VRP-4303BM	24-26
VRP-4303CM	19-21
VRP-4303DM,EM,4AM	16-18
VRP-4401A, 1AX	34-36
VRP-4401B, 1C, 2B, 3A, 4A	39-41
VRP-4401D	31-33
VRP-4402A	34-36
VRP-4402B,C,C-1	39-41
VRP-4403A,4A	39-41
VRP-4405A	31-33
VRP-6001A, 2A, 3A, 3AT, 3BT	34-36
VRP-6001B	39-41
VRP-6005A, 6A, 7A, 6101B	39-41
VRP-6101A	34-36
VRP-6001A-2,AT	34-36
VRP-6001BT	39-41
VRP-6005BX	34-36
VRP-8003A,BT	34-36
VRS-4001A,2A,3A,4A	14-16
VRS-4001B, 4D, 4F	17-19
VRS-4001C, 4G	11-13
VRS-4004B,4C	16-18
VRS-4004E	9-11
VRS-4004H	19-21
VRS-4005A	14-16
VRS-4005B	16-18
VRS-4005C	19-21
VRS-4005D,6B	11-13
VRS-4005E	9-11
VRS-4006A,7A,7A-1,7C	14-16
VRS-4006C	16-18
VRS-4007B	9-11
VRS-4007D	19-21
VRS-4008A, 10B, 14A	14-16
VRS-4009A, 10A, 13A	17-19
VRS-4010C	11-13
VRS-4012A, 4102BM, 2EM	11-13
VRS-4015AX	19-21
VRS-4102AM, 2CM	17-19
VRS-4102DM	9-11
VRS-4102FM,FMT	16-18
VRS-4103AM	9-11
VRS-4201A	11-13
VRS-4201AX	11-13
VRS-5001, 4C	16-18
VRS-5010C	11-13
VRS-5102FM, FMT	16-16
VRS-5201, 1A, 1AX	11-13
VRS-6001AM	17-19
VRS-6002AT,AM,4AM	11-13
VRS-6006AXT	17-19
VRU-4001A, 2A, 4A, 4AX	7-9
VRU-4101AM, 2AM, 5004, 4AX	7-9
VRU-6001AM,2AM	7-9
VRU-6001BM	5-7
VRW-4001A	11-13
VRW-4001BX	16-18
VRW-4002A,3BX,3BXT	13-15
VRW-4005B,BX,BXT	13-15
VRW-4003A, 4A, 5A	15-17
VRW-4005C, 5DXT	16-18
VRW-4101AM, 2AM	13-15
VRW-5003BX, 3BXT, 5B, 5BX	13-15
VRW-5005C, DXT	16-18
VRW-6001AX,AXT	13-15
VRW-6001B,2A	15-17
VRW-6002B,BX,BXT	13-15
VRW-6002C,DXT	16-18
VRW-6003AM,4AM	13-15
VRW-6003BM,4BM	11-13
VRW-6005AXT	16-18
VRW-6006AM,7AM	15-17
VRW-7005AXT	16-18
VRW-8001AX,AXT,2B	13-15
VRW-8002BX,BXT	13-15
VRW-8002C,DXT	16-18
VRX-4001A, B, BX, 2A, 3C, 3CX	29-31
VRX-4002B,3B,3BX	25-27
VRX-4003D,DT	25-27
VRX-4003A, AX, 4401A	34-36
VRX-4004A, 5A, 5AX	29-31
VRX-4006A	29-31
VRX-5003CX	29-31
VRX-6002AT	34-36
VRX-6004A	25-37

REGULATOR RESISTORS: One resistance unit used on 'VRR' regulators, two used on 'VAV', 'VBA', 'VRP' models (see VRP illustration for resistor locations). Resistors should be checked for correct resistance by testing with ohm meter (ST-284).

VOLTAGE REGULATOR RESISTORS

Model	Mark	Ohms
VRR-4001A,2A,4B	30	28-32
VRR-4001B,2B	20	19-21
VRR-4003A	20	19-23
VRR-4004A,5A	20	19-21
VRR-4006A,7A	1.85①	1.85-2.10
VRR-4008A,AX,AX-1	20	19-23
VRR-4101A,AT,2A,AT	15	14-17.1
VRR-4102B,3A,4A	15	14-17.1
VRR-5008,AX	20	19-23
VRT-4001A,2A,2A-1	30	28-32
VRT-4003A-1	30	28-32
VRT-4004A	60	57-63
VRT-4005A	7	6.5-7.5
VRT-4102A	20②	19-23
VRT-4103A,4A	20	19-23

①—Install TC-51T 20 ohm for test
②—Before 1953 (Code Date 1H) marked 38 with 34.5-42 ohms.

CONTINUED ON NEXT PAGE

AUTO-LITE REGULATORS VAV, VRP, VRR, VRS, VRT, VRU, VRW, VRX TYPES (C nt.)

VOLTAGE-CURRENT REGULATOR RESISTORS

Model	Mark—R1—Ohms		Mark—R2—Ohms	
VAV-4001A,2A	38	36-40	7	6 5-7 5
VAV-4002B	38	57-63	15	13 5-16 5
VAV-4002C	60	57-70	15	14-17 1
VAV-4401A	38	34 5-42	7	6 5-8
VAV-4401B	60	57-70	15	14-17 1
VBA-4001A	60	57-63	7	6 5-7 5
VRP-4001A,AX	38	34 5-42	7	6 5-8
VRP-4001B,F	60	57-70	15①	14-17 1
VRP-4001C,2B	30	28-34 5	7	6 5-8
VRP-4001D,E	60	57-70	11	10-12 2
VRP-4001G	80	75-92	11	10-12 2
VRP-4002A,2C	38	36-40	7	6 5-8
VRP-4002D	60	57-70	15	14-17 1
VRP-4003A	38	34 5-42	7	6 5-8
VRP-4004A	38	36-40	7	6 5-7 5
VRP-4004B	60	57-70	11	10-12 2
VRP-4004C,-1,CX,E	60	57-70	15①	14-17 1
VRP-4004D,5D	30	28-34 5	7	6 5-8
VRP-4004F,-1,-2,-3,FX	38	34 5-42	7	6 5-8
VRP-4004G,H	38	34 5-42	7	6 5-8
VRP-4004J	80	75-92	11	10-12 2
VRP-4004K	15	14-17 1	7	6 5-8
VRP-4004L	60	57-70	30	28-34 5
VRP-4004P, -1	38	34 5-42	7	6 5-8
VRP-4005A	38	34 5-42	7	6 5-8
VRP-4005B	60	57-70	15①	14-17 1
VRP-4005C	60	57-70	11	10-12 2
VRP-4005D	30	28-34 5	7	6 5-8
VRP-4005E	60	57-70	15	
VRP-4006A,B,K	60	57-70	11	10-12 2
VRP-4006D	20	19-23	7	6 5-8
VRP-4006C,G	30	28-34 5	7	6 5-8
VRP-4006AP	60	57-63	11	10-12
VRP-4006E,F,7A,B	60	57-70	15①	14-17 1
VRP-4006H,J	38	34 5-42	7	6 5-8
VRP-4006L,7E	60	57-70	30	28-34 5
VRP-4007C,-1,-2,D	38	34 5-42	7	6 5-8
VRP-4008A,C,9C	60	57-70	15	14-17 1
VRP-4008B	38	34 5-42	7	6 5-8
VRP-4008D	60	57-70	15	14-17 1
VRP-4009A,E	60	57-70	11	10-12 2
VRP-4009B	30	28-32	7	6 5-7 5
VRP-4009D	30	28-34 5	7	6 5-8
VRP-4009F	60	57-70	30	28-34 5
VRP-4010A	60	57-70	15	14-17 1
VRP-4011	60	57-63	15	13 5-16 5
VRP-4101A,2A,AX,6A,B	30	28-34 5		
VRP-4103A,4A	60	57-63	11	10-12
VRP-4103B,4B,-1,5A,AM	60	57-63	30	28-32
VRP-4107A	60	57-63	30	28-32
VRP-4201A-1,2A-1	38	36-40	7	6 5-7 5
VRP-4301AM	38	34 5-42	7	6 5-8
VRP-4302AM,2BM	38	36-40	15①	13 5-16 5
VRP-4303AM,AXM	60	57-70	15	14-17 1
VRP-4303BM	15	14-17 1	7	6 5-8
VRP-4303CM	60	57-70	30	28-34 5
VRP-4303DM,EM	38	34 5-42	15	6 5-8
VRP-4304AM	38	34 5-42	15⑦	14-17 1
VRP-4401A,AX	38	36-40	7	6 5-7 5
VRP-4401B,D	60	57-63	15	13 5-16 5
VRP-4401C,-1	38	34 5-42	7⑥	6 5-8
VRP-4402A	38	34 5-42	7	6 5-8
VRP-4402B,3A,4A	60	57-70	15	14-17 1
VRP-4405A	60	57-70	15	14-17 1
VRP-6001A,B,2A	38	34 5-42	7	6 5-8
VRP-6001A-2,AT	38	34 5-42	7	6 5-8

VOLTAGE-CURRENT REGULATOR RESISTORS (Continued)

Model	Mark—R1—Ohms		Mark—R2—Ohms	
VRP-6001BT	38	34 5-42	7	6 5-8
VRP-6003A,AT,5A,BX	38	34 5-42	7	6 5-8
VRP-6003BT,7A	15	14-17 1	7	6 5-8
VRP-6006A	38	34 5-42	7	6 5-8
VRP-6101A,B	38	34 5-42	15⑦	6 5-8
VRP-8003A	38	34 5-42	7	6 5-8
VRP-8003BT	15	14-17 1	7	6 5-8
VRS-4001A,B,2A,3A,4A	60	57-70	30	28-34 5
VRS-4001C	38	34 5-42	20	19-23
VRS-4004B	60	57-63	30	28-32
VRS-4004C,D,E,H	80	75-92	30	28-34 5
VRS-4004F,G	60	57-70	30	28-34 5
VRS-4005A,B,C,D	60	57-70		
VRS-4005E	80	75-92		
VRS-4006A,B,C,7A,-1	60	57-70		
VRS-4007B,D,8A	60	57-70		
VRS-4007C	30	28-34 5		
VRS-4009A,10A,13A	60	57-70	30	28-34 5
VRS-4010B	30	28-34 5	30	28-34 5
VRS-4012A,AX	60	57-70		
VRS-4014A	30	28-34 5		
VRS-4102AM,CM,DM,EM	60	57-70	30	28-34 5
VRS-4102BM	60	57-63	30	28-32
VRS-4201A	60	57-70	30	28-34 5
VRS-5001,4C	80	75-92	30	28-34 5
VRS-5010C	30	28-34 5	30	28-34 5
VRS-5102FM,FMT	80	75-92	30	28-34 5
VRS-5201,A,AX	60	57-70	30	28-34 5
VRS-6001AM	80	77-92		
VRU-4001A,2A,4AX	38②	34 5-42	20②	19-23
VRU-4004A	38	36-40	20	19-21
VRU-4101AM	60	57-63	38	36-40
VRU-4102AM	60	57-70	30	28-34 5
VRU-5004	38	36-40	20	19-21
VRU-5004AX	38	34 5-42	20	19-23
VRW-4001A,BX,2A	30	28-34 5		
VRW-4003A,BX,BXT	30	28-32		
VRW-4005B,BX,C	30	28-32		
VRW-4004A③	38	36-40	20	19-21
VRW-4004A④	60	57-70	30	28-34 5
VRW-4005DXT,5005DXT	15	13 5-16 5		
VRW-4101AM,2AM	30	28-32		
VRW-5003BX,BXT,5B	30	28-32		
VRW-5005BX,C	30	28-32		
VRW-5005DXT	15	13 5-16 5		
VRW-6001AX,AXT,B,2A	30	28-34 5		
VRW-6002B,BX,BXT,C,DXT	30	28-34 5		
VRW-6003AM,BM,4AM,BM	30	28-34 5		
VRW-6005AXT	15	14-17 1		
VRW-6006AM,7AM	60	57-70	30	28-34 5
VRW-7005AXT	15	14-17 1		
VRW-8001AX,AXT,2B	30	28-34 5		
VRW-8002BX,BXT,C,DXT	30	28-34 5		
VRX-4001A,B,2A,B,3A,4	80	76-84	20	19-21
VRX-4003C,CX,D,DT,6A	80	76-84	30	28-32
VRX-4401A	60	57-63	20	19-21
VRX-5003CX	80	76-84	30	28-32
VRX-6002AT	80	75-92	32	28-34 5
VRX-6004A	60	57-70	30	28-34 5

①—After No. 6U-000001. Before this No. R2 was marked 11 (10-12 ohms).
②—On VRU-4001A before Serial No. 12T-000001 one resistor used only. This resistor marked 60 (57-63 ohms).
③—Before Serial No. 6U-000001. Use later type for replacement.
④—After Serial No. 6U-000001 and for replacement on all units.
⑥—After Serial Date 5C. Before this date, R1 marked 60, R2 marked 15.
⑦—After Serial Date 5E. Before this date, R2 marked 7.

AUTO-LITE REGULATORS VAV, VBA, VBE, VBF, VRP, VRX TYPES WITH "TEMPERATURE COMP. CURRENT REGULATORS"

CHRYSLER	Regulator	Generator	Grd. Ter.
1947-55	VAV-4404A	GGJ-6001A,B	Pos.
	VAV-4404B	GGU-6001A,E	Pos.
	VAV-6001A①	GGU-6001A,E,H	Pos.
	VAV-6001B⑤	GGU-6001G,H,R	Pos.
	VAV-6001B⑤	GGU-6001T	Pos
	VAV-6001B	GGU-6004A	Pos.
	VAV-6002B	GGU-6001G,H,R,T	Neg.
	VBA-4101A	GGJ-6001B,A	Pos.
	VBA-4101A②	GGU-6001A	Pos
	VBA-4101B③	GGU-6001A,E	Pos.
	VBA-4202A④	GGJ-6001A,B,F	Pos
	VBA-4202A④	GGJ-6001G	Pos.
	VBA-4202A④	GGJ-6003A	Pos
	VBA-4202A④	GGJ-6004A	Pos.
	VBE-6001A	GGW-6001J,K	Pos
	VBE-6001A	GGW-6007A,B	Pos
	VBE-6001A	GGW-6008B,D,G	Pos.
	VBF-6001A	GGJ-6001F,G	Pos.
	VBF-6001A	GGJ-6003A	Pos.
	VBF-6001A	GGJ-6004A	Pos.
	VBA-4204A	GGJ-6001A,F⑥	Neg.
	VBF-6001A	GGJ-6001F,G	Pos.
	VBF-6001A	GGJ-6004A,C,D	Pos.
	VBF-6002A	GGJ-6004A,C,D	Neg
	VAV-6001B	GGU-6001G,R,V	Pos.
	VAV-6001B	GGU-6006C,G	Pos.
	VAV-6002B	GGU Type	Neg.
	VRX-6003A	GHM-6002A,E	Pos.
	VRX-6003B	GHM-6003A	Pos
	VRP-4501A	GDZ-4801A	Pos.
	VRP-4501C	GEG-4823A,B	Pos
	VRP-4503H	GDZ-4801AR	Pos
	VRP-4503B	GDZ-6001ABD	Pos
	VRP-6004A	GGW-6001A,B,D,J	Pos
DE SOTO		See Chrysler above	
DODGE		See Chrysler above	
HUDSON			
1953	VBE-6104A	GGW-4802A	Pos.
1954	VBF-6003A	GGJ-6101E	Pos
1955	VBE-6101A	GGW-4801B, 02A	Pos
1952-55	VBE-6104A	GGW-4801F, 02B, 03A	Pos
KAISER			
1954-55	VBE-6105A	GGW-4801EN	Pos.
NASH			
1952-55	VRP-6005A	GDZ-6002A	Pos.
1955	VBE-6101A	GGW-4801F, 03A	Pos.
PACKARD			
1949-50	VBA-4103A	GGJ-4804A	Pos
1948-49	VAV-4401B	GGW-6001C	Pos
1949-50	VAV-4401B	GGU-6001C,D	Pos
1952-53	VBE-6102A	GGW-6003	Pos
1952-54	VBE-6102A	GGW-6003A	Pos
1955	VRX-6007A	GJC-6001A	Pos.
PLYMOUTH		See Chrysler above.	
STUDEBAKER			
1952-55	VBE-6101A	GGW-4801A, C, E	Pos.
WILLYS			
1953	VBA-4206A	GGU-6011A	Neg.
1953-55	VBE-6105A	GGW-4801D, EN	Neg.

①—For Negative Ground, use VAV-6002A.
②—For Negative Ground, use VBA-4104A.
③—For Negative Ground, use VBA-4104B
④—For Negative Ground, use VBA-4204A
⑤—For Negative Ground, use VAV-6002B
⑥—Replaced by VBF-6002A

►*6 & 12 VOLT REGULATOR NOTE:* Specifications and data for both 6 and 12 volt units is given below.

►*GENERATOR & REGULATOR POLARITY CAUTION:* Regulator and battery ground polarity must be the same. See individual car model table above for Generator and Regulator type and battery ground data

DESCRIPTION: The Regulators that follow are all of the "Temperature Compensated" type consisting of a CUT-OUT UNIT, a VOLTAGE CONTROL UNIT and a CURRENT REGULATING UNIT. When correctly adjusted, test readings will be the same as appear in the tables below.

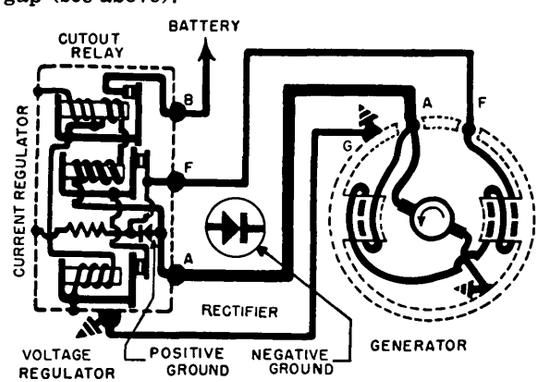
CHECKING & ADJUSTMENT (CUT-OUT RELAY): Check and adjust contact gap and air gap first before checking closing and opening voltage.

Air Gap: .031-.034" (All Models). Use flat gauge (ST-281-9—.031-.034") to measure between magnet core and armature at a point as close to armature hinge as possible **with contacts open.** Adjust by bending armature stop and make certain that stop does not rub against edge of armature.
NOTE—Armature 'seals' against yoke after contacts close (measure air gap with contacts open).

Contact Gap—.015" Min. (all models). Gap must not be less than .015" but may exceed this figure in service. With correct adjustment, contacts will close and armature will then 'seal' against yoke. CAUTION—If contact gap too large, contacts will not close before armature seals against yoke.

Closing Voltage—Connect ammeter in charging line at regulator 'B' terminal, connect voltmeter between 'A' terminal and ground. Operate generator and increase speed slowly until contacts just close **but without sealing against yoke,** note voltmeter reading at this point. To adjust, use Tool ST-283, adjust armature spring tension by bending lower spring hanger. *CAUTION*—Closing voltage must always be .5 volt less than voltage regulator setting.

Opening Voltage or Amperage—Connect meters as for Closing Voltage Check (above), decrease generator speed slowly and note voltmeter (or ammeter) reading as contacts open. Adjust by changing contact gap (see above).



"VBF" REGULATORS

Cutout Relay Settings

Model	Contact Closing Voltage	Contact Opening Voltage
VAV	6 3-6 8	4 1-4 8
VBA	6 3-6 8	4 1-4 8
VBE	6.3-6 8	4.1-4 8
VBF	6 3-6 8	4 1-4 8
VRP	6 3-6 8	4 1-4 8
VRX (12 Volt)	13.0-13.75	⑨8.2-9 3

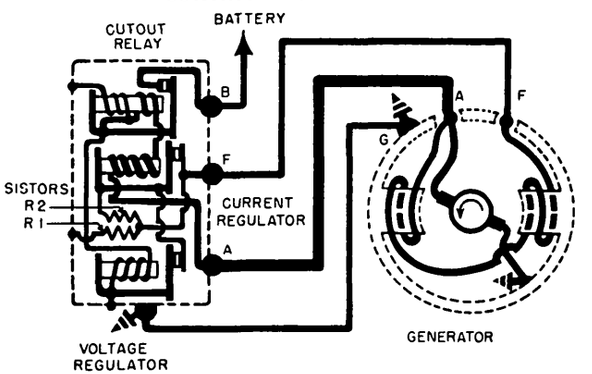
⑨—Contacts open 3 to 5 amperes discharge.

CHECK & ADJUST (VOLTAGE REGULATOR):

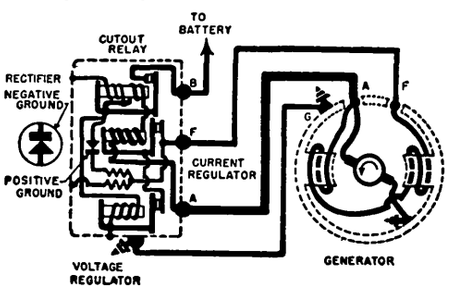
Air Gap (All Series)—.048-.052" (pin gauge ST-281-7). Measure at stop pin on contact side with contacts just opening. Test air gap by connecting test lamp and battery between 'F' terminal and ground. Insert low limit pin gauge, depress armature by hand, lamp should dim or go out. Repeat test with high limit pin gauge. Lamp should remain lighted. To adjust air gap, loosen screw holding upper contact bracket, raise bracket to increase gap, lower bracket and contact to decrease gap. Contact spring must be straight and parallel with armature.

Voltage Setting Check—Connect ammeter in charging line at regulator 'B' terminal (ammeter must read to 1 ampere and internal resistance must not exceed .01 ohm, use short heavy leads for connections), connect voltmeter between regulator 'B' terminal and ground (meter must read to .1 volt). car battery must be fully charged (substitute fully

CONTINUED ON NEXT PAGE



"VRP," "VAV," "VBE," "VRX" REGULATORS



"VBA" SERIES (WITH RECTIFIER)

AUTO-LITE VAV, VBA, VBE, VBF, VRP, VRX TYPES (Cont.)

charged battery if car battery run down). Run engine at speed equivalent to 30 MPH for at least 15 minutes with generator charging battery to bring regulator up to operating temperature Then note voltmeter reading (see voltage table below).

Adjustment—Use tool ST-283 to vary armature spring tension by bending arm at lower end of spring. Replace cover and recheck performance

Voltage Regulator Setting

Model	Voltage Setting Table
VAV	
4402A,3A,4A,4B	#3
4405A,B	#3
6001A,B,BF,2A,2B	#2
6003AT,AXT	#2
6004AXT	#5
6005A,BT,6AT	#2
7003AT, AXT, 5BT, 6AT	#2
7004AXT	#5
8003AT	#2
VBA	
4101A,B,2A,3A,4A,4B	#5
4202A,3A,3AF,4A	#2
4205A,6A,6AT,6B	#5
4207A,8A	#2
6001A,B,3A	#5
6002AM	#2
VBE	
6001A,AF,AT,3A,5AT	#2
6001AXT,2AXT,4AXT	#5
6101A,2A,3A,4A,5A,5AT	#3
VBF	
6001A,2A,3A	#2
VRP	
4501A,C,2A,3A,3B,3C	#3
4501AX,3AX,3BX	#5
6004A,B	#2
6005A	#3
6008A	#2
VRX	
6001A, 3A, 7A	#6

Voltage Setting Tables (Volts)

Temp.	Table 2	Table 3	Table 5	Table 6
50°	7 34	7 41	7 16	14 7
60°	7 29	7 38	7 13	
70°	7 25	7 35	7 10	
80°	7 21	7 32	7 07	14 5
90°	7 16	7 29	7 04	
100°	7 12	7 27	7 02	
110°	7 08	7 24	6 99	14 3
120°	7 03	7 21	6 96	
140°				14 1

NOTE—Allowable voltage variation ± 15 volt (Tables 2,3), ± 1 Volt (Table 5), ± 30 Volt (Table 6)

CHECK & ADJUST (CURRENT REGULATOR):

Air Gap (All Series): 048- 052" (pin gauge ST-281-7) Check and adjust as for voltage regulator (above)

Testing "Temperature Compensated" Current Regulators: *CAUTION—Tests are made in two steps "Test A" and "Test B" as listed below.* Connect test meters as directed for Voltage Regulator Check (above).

Test A—Operate generator for 15 minutes charging at ½ maximum rate (VAV, VBE, VBF, VRP Regulators), at 10 amperes (VBA, VRX Regulators), then note ammeter reading with current regulator operating Should agree with "Test A" figure in table below

NOTE—If regulator not cold at start of test, Test A reading may be slightly less than specified due to higher temperature.

►*TEMPERATURE CAUTION*—When checking regulator temperature with a thermometer, hold thermometer two inches away from regulator (must not touch regulator).

Test B—Add load on battery to hold voltage to "Test B" Table below to insure current Regulator operation Run generator for 15 minutes with current regulator operating, then note ammeter reading Should agree with "Test B" figure in Current Setting Table below

"B" Test Voltage.

Model	Volts
VAV, VBE	6 7 to 6 9
VBA	6 7
VBF, VRP	6 7 to 7 0
VRX	13 6 to 13 8

Current Regulator Setting "Temperature Compensated" Regulators

Regulator	Table No.	Regulator	Table No.
VAV		**VBA (Cont.)**	
4402A,3A,4A,4B	#1	6001A	#8
4405A,5B	#1	6001B,3A	#6
6001A,2A	#1	6002AM	#9
6001B,BF,2B	#2	**VBE**	
6003AT,AXT,4AXT	#6	6001A,AF,AT,AXT	#3
6005A	#2	6002AXT,3A,4AXT	#3
6005BT	#1	6005AT	#3
6006AT	#6	6101A,2A,3A	#3
7003AT,AXT	#6	6104A,5A,5AT	#3
7004AXT,6AT	#6	**VBF**	
7005BT	#1	6001A,2A,3A	#4
8003AT	#6	**VRP**	
VBA		4501A,AX,3A	#9
4101A,2A,3A,4A	#7	4503AX,3C	#9
4101B,4B	#8	4501C,2A 3B 3BX	#6
4202A,4B,5A	#7	6004A 6005A	#6
4203A,AF	#9	6004B,8A	#10
4206A,AT	#7	**VRX**	
4206B	#8	6001A	#12
4207A,8A	#7	6003A	#13
		6003B, 7A	#14

Current Setting Tables

Table No.②	Test	Operating Current at Test Temp.① 40°	60°	70°	80°	100°
1 (45 amps)	A	53	51	50	49	47
	B	46-50	44-48	43-47	42-46	40-44
2 (50 amps)	A	58	56	55	54	52
	B	51-55	49-53	48-52	47-51	45-49
3 (45 amps)	A	55	53	52	51	49
	B	46-50	44-48	43-47	42-46	40-44
4 (55 amps)	A	69	67	66	65	63
	B	56-60	54-58	53-57	52-56	50-54
5 (23 amps)	A	32	30	29	28	26
	B	24-28	22-26	21-25	20-24	18-22
6 (40 amps)	A	49	47	46	45	43
	B	41-45	39-43	38-42	37-41	35-39

Current Setting Tables (Cont.)

Table No.②	Test	Operating Current at Test Temp.① 40°	60°	70°	80°	100°
7 (50 amps)	A	59	57	56	55	53
	B	51-55	49-53	48-52	47-51	45-49
8 (45 amps)	A	54	52	51	50	48
	B	46-50	44-48	43-47	42-46	40-44
9 (35 amps)	A	45	43	42	41	39
	B	36-40	34-38	33-37	32-36	30-34
10 (25 amps)	A	35	33	32	31	29
	B	26-30	24-28	23-27	22-26	20-21
11 (25 amps)	A	34	32	31	30	28
	B	26-30	24-28	23-27	22-26	20-24
		50°	**70°**	**90°**	**110°**	**130°**
12 (23 amps)	A	31	29	27	25	23
	B	23-27	21-25	19-23	17-21	15-19
13 (25 amps)	A	33	31	29	27	25
	B	25-29	23-27	21-25	19-23	17-21
14 (30 amps)	A	38	36	34	32	30
	B	30-34	28-32	26-30	24-28	22-26

①—Test A amps maximum ②—Nominal Setting

Adjustment (All Current Regulators): Use tool ST-283 to vary armature spring tension by bending arm at lower end of spring Replace cover and recheck

REGULATOR RESISTORS: Resistors should be checked for correct resistance by testing with ohm meter (ST-284)

REGULATOR RESISTORS

Model	"R 1" Mark	"R 1" Ohms	"R 2" Mark	"R 2" Ohms
VAV				
4402A,4A	60	57-63	15	13 5-16 5
4403A,4B,5A,5B	60	57-70	15	14-17 1
6001A,B,BF,2A,B	60	57-70	15	14-17 1
6003AT,AXT,4AXT	38	34 5-42	7	6 5-8
6005A	60	57-70		
6005BT,6AT	38	34 5-42	7	6 5-8 0
7003AT,AXT,4AXT	38	34 5-42	7	6 5-8 0
7005BT,6AT	38	34 5-42	7	6 5-8 0
8003AT	38	34 5-42	7	6 5-8 0
VBA				
4101A,B	60	57-63	7	6 5-7 5
4102A,3A,4A,4B	60	57-63	7	6 5-7 5
4202A,3A,3AF	80	75-91		
4204A,5A,6A,AT,B	80	75-91		
4207A,8A	80	75-91		
6001A,B	80	75-91		
6002AM,3A	80	75-91		
VBE				
6001A,AF,AT,ATX	38	34 5-42	7	6 5-8 0
6002AXT,3A	38	34 5-42	7	6 5-8 0
6004AXT,5AT	38	34 5-42	7	6 5-8 0
6101A,2A,3A	38	34 5-42	7	6 5-8 0
6104A,5A,5AT	38	34 5-42	7	6 5-8 0
VBF				
6001A,2A,3A	80	75-91		
VRP				
4501A,AX	38	36-40	7	6 5-7 5
4501C,2A,3C	60	57-70	15	14-17 1
4503A,AX,B,BX	38	34 5-42	7	6 5-8 0
6004A,B,8A	38	34 5-42	7	6 5-8 0
6005A	38	34 5-42	7	6 5-8 0
VRX				
6001A	80	75-92	30	28-34 5
6003A	135	122-149	38	34 5-42
6007A	80	75-92	38	34 5-42

AUTO-LITE REGULATOR VRY TYPES

IMPORTANT SERVICE CAUTION: These regulators must always be used with th generators for which they are intended as these units are not wired in the same manner as other Auto-Lite units. Do not operate a regulator or generator of this type with other type units either on the car or on the test bench.

Regulator Model	Battery Ground Polarity
VRY-4101A; VRY-4201A, B, C; VRY-4202A	Positive
VRY-4203A, B, C, D, E, F, G; VRY-4204A	Negative

DESCRIPTION: Regulators are of the "three-unit" type (separate Cutout Relay, Voltage Regulator, and Current Regulator units). Units are similar design to other Auto-Lite regulator units but are wired differently. See car model pages for internal wiring diagram of regulator and generator. Regulators are designed for use with Positive or Negative battery ground

OPERATION: Similar to other three-unit regulator and shunt type generator installations except that the regulator "feeds" the generator field and the other end of the field winding is grounded to the generator frame. This is reversed from other types (where field "feed" is directly from the generator main brush and the field is grounded through the regulator) and is the reason these special type regulators and generators must always be used together. Regulators are vibrating type (current regulator has second winding to accelerate action of the current regulator armature). Voltage regulator is compensated for temperature (nickel-iron magnetic bypass type).

CHECKING & ADJUSTMENT: Before checking and adjusting the individual regulator units, make a complete visual inspection of the entire regulator and each unit as follows:

Regulator Inspection—Check for burning or other evidence of high temperature at coils, contacts, insulation, terminals, and other points. Check for loose connections, loose mounting nuts, rivets or screws, corrosion or other water damage, broken or incorrect resistors, loose or incorrect resistors, loose or incorrect wiring connections, defective gaskets.

Regulator Units Inspection—Check each unit for contact misalignment, burnt or dirty contact surfaces, bent armature or field yoke, bent or reversed armature hinges (bimetal hinges on Cutout Relay must be assembled with brass side up), broken leads, incorrect placing of shunt leads on Cutout Relay (these leads must not bind armature or touch tension spring).

CUTOUT RELAY

Model	Voltage Winding Resistance	Contact Gap	Air Gap
VRY-4101A	15.2-18.0 ohms	.015" Min.	.060-.065"
VRY-4200 Series	15.8-17.4 ohms	.025" Min.①	.0595-.0625"

①—Supersedes .015" originally specified for VRY-4201A, B.

Winding Resistance—Use accurate Ohmeter. Disconnect voltage winding ground connection and measure between this lead and stationary contact.

Air Gap—Check with flat feeler gauge inserted between contact side of brass pin in winding core and armature with contacts open. Adjust by raising or lowering the stop at the contact end of the armature.

Contact Gap—Check with flat feeler gauge inserted between both sets of contacts at the same time. Gap may be found to be larger than minimum specification (.015" or .025"—see table above). Adjust by bending supporting arms of stationary contacts. IMPORTANT—Adjust both sets of contacts exactly alike and make certain that they close at the same instant. Alignment can be checked with a straightedge across both contacts.

Cutout Relay Performance Specifications

Regulator Model	Contacts Close	Contacts Open
VRY-4101A	6.5-7.0 volts	0.5-4.0 amperes disch.
VRY-4200 Series	6.5-7.0 volts①	0.5-6.0 amperes disch.

①—Supersedes 6.4-6.6 volts originally specified for VRY-4201A, B.

Closing Voltage—Connect ammeter in charging line at regulator "B" terminal, connect voltmeter between regulator "A" terminal and ground. Operate generator for 15 minutes charging a battery to bring units up to operating temperature (regulator cover must be in place). Then slowly increase generator speed and note voltage reading at instant cutout relay contacts close (NOTE—a 2000 ohm earphone can be connected between regulator "A" and "B" terminal for accurate check—a click will be heard when contacts close). Adjust by turning screw at lower end of armature spring. Increase spring tension to raise closing voltage, decrease spring tension to lower closing voltage. IMPORTANT—Cutout relay closing voltage must always be 0.5 volts lower than voltage regulator operating voltage.

Opening Voltage or Amperage—With meters connected as for closing voltage check (above), decrease generator speed slowly and note voltmeter and ammeter readings as contacts open (ammeter reading will be "reverse" or discharge current). Adjust by varying relay contact gap by raising or lowering the stationary contact.

Final Flash Test—After all relay adjustments have been made, recheck relay performance by making a final flash test (operate generator and regulator, use test meters to check performance).

VOLTAGE REGULATOR

Regulator Model	Winding Resistance	Contact Gap	Air Gap
VRY-4101A	4.3-4.7 ohms	.010" Min.	.0395-.0425"
VRY-4200 Series	4.3-4.7 ohms	.010-.012"	.040-.042"

Winding Resistance—Use accurate Ohmeter. Disconnect both voltage regulator winding leads at the regulator base and check between these leads.

Air Gap—Check with pin gauge on contact side of brass armature stop pin in coil core with contacts just separating. Test air gap by connecting test lamp and battery between regulator "A" and "F" terminals. With low limit pin gauge in place between armature and core (use Gauge ST-281-1 for VRY-4200 Series Regulators), depress armature. Lamp should go out. Insert high limit pin gauge, depress armature. Lamp should remain lighted. Adjust by loosening screws holding stationary contact and raising or lowering the contact. CAUTION—Make certain that screws are properly tightened, that movable contact spring is straight and parallel with the armature.

Contact Gap—Check contact gap with a feeler gauge with armature held down against the stop pin (CAUTION—do not press on contact spring—press down on armature evenly on both sides of spring). If gap is too small, make certain that bridge carrying nickel-iron shunt was properly pushed down in assembly (if bridge up too high, armature rivets will strike it and prevent full armature travel). If gap varies widely from specifications, armature stop pin is wrong length and unit should be replaced.

Contact Spring Pressure—To check, disconnect spiral spring from armature, remove adjustable armature stop. Use spring scale hooked under contact spring, hold armature firmly, note scale reading at instant contacts open. Spring tension should be 7-8 ounces. NOTE—Make certain that fibre bumper block is in place when reassembling stop. With contact spring against the bumper block, gap between top of spring and armature stop should be .010-.016".

Voltage Regulator Performance Specifications

Operating Voltage (All VRY-4100 & 4200 Series)—7.41 volts (50°F), 7.38 volts (60°F), 7.35 volts (70°F), 7.32 volts (80°F), 7.29 volts (90°F), 7.26 volts (100°F), 7.23 volts (110°F), 7.20 volts (120°F).

NOTE—Allowable variation in operating voltage is plus or minus .15 volts.

Checking Voltage Setting—Connect test voltmeter between regulator "B" terminal and ground. Operate generator and note regulated voltage. To adjust, vary armature spring tension by turning adjusting screw at lower end of spring. Increase spring tension to increase operating voltage, decrease spring tension to decrease operating voltage.

Final Flash Test—After making adjustments, replace regulator cover, make flash test by stopping generator and then noting regulator operating voltage immediately after generator is restarted.

CURRENT REGULATOR

Regulator Model	Current Setting	Contact Gap	Air Gap
VRY-4101A	See Table	.010" Min.	.0465-.0495"
VRY-4200 Series	See Table	.030-.033"	.047-.049"

Air Gap, Contact Gap, Contact Spring Pressure—Check and adjust in same manner as for Voltage Regulator unit (above).

Current Regulator Performance Specifications

Model	Maximum Amperes	Model	Maximum Amperes
VRY-4101A	25-27	VRY-4202A	25-27
VRY-4201A, 1C	25-27	VRY-4203A,B,C,D,E,F,G	40-42
VRY-4201B	32-34	VRY-4204A	40-42

Checking Current Setting—Connect test ammeter in charging line at regulator "B" terminal. Connect load (lamp bank, or suitable resistance connected across battery) to cause current regulator to operate. Note ammeter reading. Reading should agree with rated capacity of regulator above (minus 0%, plus 10%). Adjust regulator and make final flash test as directed for voltage regulator

REGULATOR RESISTORS: Three resistors used on all models. (R1) and (R3) on all models are 76-84 ohms—marked "80". (R2) on VRY-4101A is 5.5-6.5 ohms—marked "6", (R2) on all VRY-4200 Series is 6.5-7.5 ohms—marked "7".

DELCO-REMY SINGLE CORE CURRENT & VOLTAGE REGULATORS

VOLTAGE & CURRENT REGULATORS

1942-48 CAR MODELS

Car Model	Regulator	Generator	Grd. Ter.
Buick 40, 50 (1942-48)	1118201	1102679	Neg.
Buick 60, 90 (1942)	1118201	1102668	Neg.
Buick 70 (1942-48)	1118201	1102668	Neg.
Buick 40, 50 ('42) City Police④	1118229	1106409	Neg.
Buick 60, 70, 90 ('42) City Police	1118229	1106404	Neg.
Buick All ('42) State Police	1118237	1105857	Neg.
Cadillac All (1942)	1118202	1102693	Pos.
	1118202	1102661	Pos.
Cadillac All (1942)③	1118202	1102694	Pos.
	1118202	1102686	Pos.
Cadillac All (1946-48)	1118242	1102693	Neg.
Cadillac All (1946-47)③	1118242	1102694	Neg.
Chevrolet All (1942-48)	1118201	1102667	Neg.
Chevrolet City Police (1942-47)	1118229	1106403	Neg.
	1118232	1106403	Pos.
Chevrolet State Police ('42)	1118237	1105856	Neg.
Chevrolet Door-to-Door Del. ('42-47)	1118233	1102677	Neg.
①Dodge City Police (1942)	1118232	1106403	Pos.
①Dodge State Police (1942)	1118238	1105856	Pos.
Nash '600' 4240 (1942)	1118202	1102684	Pos.
Nash All (1948)	1118202	1102702	Pos.
Oldsmobile All (1942-48)	1118242	1102664	Neg.
	1118201	1102664	Neg.
Oldsmobile All (1942-48)③	1118242	1102680	Neg.
	1118201	1102680	Neg.
Oldsmobile City Police ('42)	1118229	1106403	Neg.
Oldsmobile State Police ('42)	1118237	1105856	Neg.
Packard Six, 2000 ('42), 2100 ('46)	1118202	1102682	Pos.
Packard Six, 2100 (1947)	1118278	1102682	Pos.
Packard Eight (1947)	1118278	1102699	Pos.
Packard 8 & Super 8 (1948)	1118278	1102705	Pos.
①Plymouth City Police (1942)	1118232	1106403	Pos.
①Plymouth State Police (1942)	1118238	1105856	Pos.
Pontiac All (1942-47)	1118242	1102665	Neg.
	1118201	1102665	Neg.
Pontiac All (1948)	1118242	1102701	Neg.
Pontiac City Police (1942-48)	1118229	1106403	Neg.
Pontiac State Police (1942)	1118237	1105856	Neg.

►CHANGES, CAUTIONS, CORRECTIONS

►**1940 REGULATOR PRODUCTION CHANGE:** Regulator Springs. Two springs of different weights (one light spring, one heavy spring) used on 1940 Voltage Regulators (both springs same weight on Current Regulators). On all regulators with one light and one heavy spring, all adjustments should normally be made on the light spring only. If springs being replaced, or if correct adjustment cannot be secured by light spring adjustment, heavy spring should be adjusted (as directed under Spring Adjustment below). *See Special Note under Voltage Regulator Spring Adjustment instructions when adjusting the heavy spring on this type*

►**REGULATOR CHECKING CAUTIONS:** For unsatisfactory performance complaints. When checking regulators, and before making adjustments to correct complaints, note the following points:

High Charging Rate & High Voltage Complaints—May be caused by shorts or grounds in generator. Check for grounded field coils or grounded leads before changing regulator settings. To check, disconnect lead from regulator 'F' terminal with generator operating. If output drops off, trouble is in regulator. If output does not drop off, check generator for grounded field coils and leads.

Voltage Setting Change to Correct Continuous Battery Overcharge—Where overcharged battery condition encountered and regular voltage settings do not correct this condition (due to unusual operating conditions), voltage setting may be reduced to 6.9 volts min. (6 volt units), 13.7 volts min. (12 volt units). Cutout relay cut-in setting must also be reduced to 6.2 volts (6 volt units), 12.3 volts (12 volt units). Do not reduce voltag setting unless abs lutely necessary.

Open Circuit Caution—Generator must never be perated on open circuit which will damage Generator or Regulator and cause burnt generator windings or regulator windings, burnt field resistance, or fused contacts. If these conditions found in service, check wiring circuits for open circuits or high resistance

Regulator Seals—Regulator covers are sealed to indicate they are adjusted to original factory specifications. Warranty is void if unit is damaged by improper servicing (adjustments may be made by competent operators).

►**GROUND TERMINAL CAUTION:** Each regulator designed to be used with the particular battery terminal grounded as shown in table above. When installing regulator, make certain that correct battery terminal is grounded and always repolarize generator whenever generator or regulator has been disconnected.

►**POLARIZING GENERATOR:** After generator and regulator installed, connect jumper lead between regulator 'BAT' and 'GEN' terminals momentarily. This will allow momentary flow of current through generator windings and cause generator to assume correct polarity for operation on car.

DESCRIPTION: Single Core Regulators differ in design from previous Double Core Regulators (without "IGN" terminal) as follows:

Windings—All windings for each unit (Cutout Relay, Voltage Regulator, Current Regulator) are wound on a single core.

Cutout Relay—Has double contacts. Both sets of contacts must be set so as to open and close together.

Regulator Armature Springs—Two armature springs used (both springs same weight on Current Regulators & Voltage Regulators (except first 1940 units which had one light and one heavy spring on Voltage Regulators only).

TROUBLE SHOOTING:—To quickly locate trouble on the car, make the following tests before removing the generator or regulator for further testing and adjustment on the bench. Check battery condition with hydrometer, note whether battery low (discharged) or high (fully charged), operate engine and note charging rate as follows:

Fully Charged Battery & Low Charging Rate—This indicates that Voltage Regulator is operating normally. To check Current Regulator operation, connect test ammeter in charging line at regulator 'BAT' terminal, use starter motor to crank engine for about 15 seconds (disconnect high tension lead to prevent engine starting) to bring battery down, then run engine at medium speed, turn on all lights and accessories to start Current Regulator operating and note ammeter reading (see Current Regulator Setting Table below). Charging rate will taper off to original low rate after short period of time.

Fully Charged Battery & High Charging Rate—Check battery temperature (charging rate will be higher with hot battery). If charging rate xcessive, operate generator at medium speed with ammeter in charging line at regulator 'BAT' terminal and note ammeter reading as follows: Disconnect lead from regulator 'F' terminal. This opens field circuit and generator output should drop off (indicating that trouble is in regulator). If output does not drop off, disconnect this lead at generator 'F' terminal. If this causes output to drop off, this lead is grounded in harness and should be replaced. If output does not drop off, check generator for grounded field leads or windings. If trouble is located in regulator, reconnect field lead at regulator 'F' terminal, remove regulator cover, depress voltage regulator armature so as to open regulator contacts manually. If output drops off, regulator has not been functioning correctly and should be adjusted. If output does not drop off, check field circuit within regulator for shorts and grounds, see that all insulators in place and regulator contact support bushings and insulators are properly installed.

Discharged Battery & Low Charging Rate or No Output—Check entire charging circuit for loose connections, damaged or broken wires, and short-circuits. If entire charging circuit in good condition and no high resistance in circuit, ground regulator 'F' terminal and operate generator, increase speed slowly and note generator output (CAUTION—Do not operate generator at excessive speed —generator is operated with no regulation when 'F' terminal is grounded and output may cause generator to burn out if speed increased excessively). If output increases with speed, regulator is defective and should be checked for incorrect setting or dirty or burnt contacts. If output does not increase beyond a few amperes, check generator for grounded or open field coils, dirty or burnt commutator, defective armature or brushes. If no output is noted, quickly disconnect lead from regulator 'GEN' terminal and flash this lead to ground. If no spark is noted, generator is defective. If spark occurs, check Cutout Relay for burnt contacts, open shunt winding, high voltage setting or grounds.

CAUTION—Do not operate generator more than momentarily with lead disconnected from regulator 'GEN' terminal. This is open-circuit operation.

ADJUSTMENT: Check all specifications for each unit first, then adjust each unit as follows:

CUTOUT RELAY

Contact Gap—.020". Adjust by bending upper armature stop (see Air Gap Adjustment). Both contacts must have same gap to insure opening and closing together.

C NTINUED ON NEXT PAGE

DELCO-REMY SINGLE CORE CURRENT & VOLTAGE REGULATORS (Continued)

Air Gap—.020". To check, press armature down so contacts just close. If both contacts do not close simultaneously, bend spring fingers until they do. To adjust air gap, loosen two screws on hinge bracket at back of relay, raise or lower armature and hinge assembly.

Cut-in Voltage & Cut-out Amperage—To check, connect ammeter in charging line at regulator 'BAT' terminal, voltmeter between 'GEN' terminal and ground. Operate generator and gradually increase speed until relay contacts close, note voltmeter reading. Decrease speed slowly and note reverse current reading on ammeter when contacts open. To adjust closing voltage, bend spring post down (to decrease voltage), up (to increase voltage).

Cut-in Setting Note—Check only with unit HOT (at operating temperature).

CUTOUT RELAY SETTING

Model	Cut-In Voltage (Hot)
All 1118200 Six-volt Units (except as noted below)	6.2-6.7 volts
All 1118200 Twelve-volt Units (except as noted below)	12.4-13.4 volts

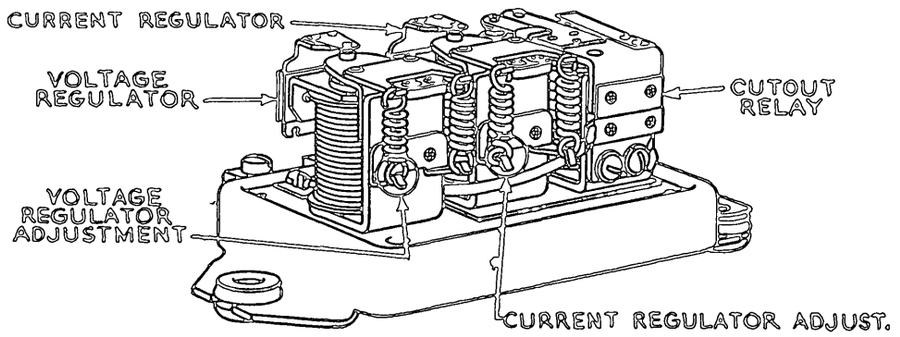
Other 1118200 6-volt Units

Model	Cut-In Voltage (Hot)
1118203, 4, 13	6.3-6.6 volts
1118224	6.3-6.9 volts
1118243	6.3-6.6 volts
1118244, 51	6.1-6.4 volts

Other 1118200 Units

Model	Cut-In Voltage (Hot)
1118255	17-20 volts
1118262	25.5-26.8 volts
1118281	24.8-26.0 volts
1118285	12.4-13.0 volts
1118286	12.4-13.0 volts

Torrid Climate Setting—To correct overcharged battery condition where regular atmospheric temperatures are 95° to 100° and above, adjust Cutout Relay to close at 6.4-6.6 volts (6 volt units).



DELCO-REMY SINGLE CORE CURRENT & VOLTAGE REGULATOR

VOLTAGE REGULATOR

VOLTAGE REGULATOR SETTING

Model	Volts (Hot)
1118201, 2, 5, 6	7.2-7.4
1118203, 4	7.0-7.1
1118207, 8	7.0-7.2
1118209, 10	14.0-14.2
1118211, 12	7.0-7.2
1118213	7.0-7.1
1118214	14.0-14.2
1118215, 16	7.0-7.2
1118217 to 20	14.0-14.2
1118221, 22, 23	7.0-7.2
1118224	7.4-7.6
1118225, 27, 28	14.0-14.2
1118226, 29, 30	7.0-7.2
1118231	7.2-7.4
1118232, 33, 34	7.0-7.2
1118235, 39	14.0-14.2
1118236, 37, 38	7.0-7.2
1118240	7.1-7.3
1118241	14.0-14.2
1118242	7.2-7.4
1118243	7.0-7.1
1118244	6.8-6.9
1118245, 46, 47, 48, 50	14.0-14.2
1118249, 53	7.0-7.2
1118251	6.8-6.9
1118252, 54	14.0-14.2
1118258 to 261	14.0-14.2
1118263, 64, 67	14.0-14.2
1118268, 71, 72, 76	7.0-7.2
1118269, 70, 73, 74, 77	14.0-14.2
1118278	7.2-7.4
1118279	14.0-14.2
1118280	14.0-14.2
1118281	27.1-27.7
1118282	14.0-14.2
1118285	13.6-13.8
1118286	13.6-13.8

Torrid Climate Setting—To correct overcharged battery condition where regular atmospheric temperatures are 95° to 100° and above, set Voltage Regulator to operate at 6.8-6.9 volts hot (see Cutout Relay setting note also).

Important Note—Regulator over-compensated for temperature and must be checked only when hot and with cover in place (setting higher when cold).

Checking Voltage Setting—Connect ammeter and variable resistance of 'AVR' set in charging line at regular 'BAT' terminal, or disconnect charging line and ground the 'BAT' terminal through ¾ ohm fixed resistance (6 volt units), 1½ ohm fixed resistance (12 volt units). Resistance must be capable of carrying 10 amperes and must not change in value during temperature changes. Connect voltmeter between 'BAT' terminal and ground. Operate generator and increase speed to point where rated output normally produced (see car model 'T&E' page for generator data), adjust variable resistance of 'AVR' set so that charging current is 8-10 amperes (not required if fixed resistance method used). When regulator reaches operating temperature (150° or very hot to the touch) with regulator cover in place, cycle generator by decreasing speed to point where relay contacts open, then increase speed to original figure and note voltmeter reading. Adjust regulator if voltage not correct as shown in table above.

CAUTION—Do not change setting to correct High Voltage without first checking generator for grounded fields—see 'Important Service Note' above.

Adjustment—Bend spring hanger at lower end of one spring only down to increase spring tension and raise voltage setting, or up to decrease tension and lower voltage setting. If correct adjustment can not be secured on one spring, or if new springs are being installed, adjust second spring as follows:

IMPORTANT NOTE—On types with one light and one heavy spring (early 1940), above adjustment should be made on the light spring only.

Spring Adjustment—With one spring disconnected, connect voltmeter between regulator 'GEN' terminal and ground. Open regulator contacts by hand (press down on regulator armature), operate generator and slowly increase speed until voltmeter reading is 3 volts (6 volt units), 6 volts (12 volt units), release armature. Adjust spring tension by bending hanger at lower end of spring which is connected until voltage is 4 volts (6 volt units). Then connect second spring and adjust this spring as directed under 'Adjustment' above (do not touch first spring when making this final adjustment).

IMPORTANT NOTE—On types with one light and one heavy spring (early 1940), above adjustment should be made on the heavy spring only (with light spring disconnected). Voltmeter reading should be 4.5-5.0 volts (6 volt units) 8.5-9.0 volts (12 volt units). Then connect light spring and complete adjustment by setting this spring as directed above.

Contact Servicing—Contact points must be clean (dirty or oxidized points will cause reduced generator output and rundown batteries). To clean or surface contacts, remove upper contact support and service each contact separately. Use a thin, fine-cut contact file and file each point separately using great care not to file smaller rounded point excessively. If flat point has a cavity, use a 'spoon' or 'riffler' file to clean cavity out so that good contact secured between contact points (do not file contact excessively to remove cavities). When reinstalling upper contact support, make certain that all insulators correctly installed and adjust air gap. CAUTION—Do not use sandpaper or emery cloth

Air Gap—.070" measured at center of core with contacts just closing.

Air Gap Adjustment—To check, press armature down and allow it to come back until contacts just close, measure air gap at center of core with armature in this position. To adjust, loosen two screws on upper contact support bracket, move bracket up or down being careful to keep contacts lined up.

CURRENT REGULATOR

NOTE—Data below applies only to 3 unit Regulators (with separate Current Regulator Unit). Disregard this current regulator data when adjusting 2 unit Regulators (no Current Regulator) used with third-brush generators.

Checking Current Setting—Remove regulator cover and connect short jumper from voltage regulator frame to upper contact support bracket (this will short out voltage regulator while current regulator being checked). Connect ammeter in charging circuit at regulator 'BAT' terminal. Turn on lights, radio and other accessories (to provide load which will bring current regulator into operation), operate generator and increase speed until output remains stationary. With regulator at operating temperature (150° or very hot to the touch) and cover in place, ammeter reading should agree with setting given above.

CAUTION—Do not change setting to correct High Charging Rate without checking generator first for grounded fields—See "Important Service Note" above.

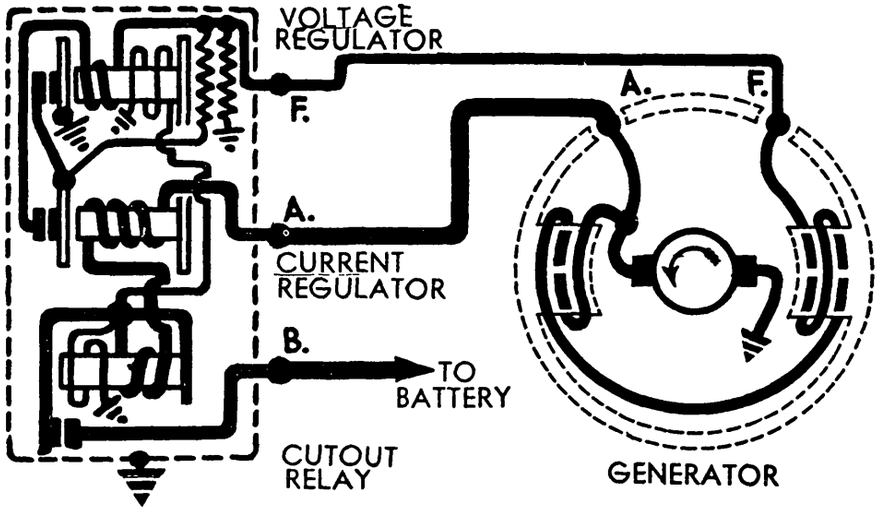
Adjustment—Bend spring hanger at lower end of one spring only down to increase tension and increase current setting, up to decrease tension and de-

CONTINUED ON NEXT PAGE

DELCO-REMY SINGLE CORE CURRENT & VOLTAGE REGULATORS (C ntinued)

crease current setting. If adjustment cannot be secured on one spring, or new springs are installed, proceed as follows:

Spring Adjustment—With one spring disconnected, operate generator at medium speed, adjust hanger at lower end of spring until output is regulated at approximately half rated output (17 amperes on 1118201,2). Then connect second spring and adjust this spring as directed above (do not touch first spring when making this final adjustment).



DELCO-REMY SINGLE CORE CURRENT & VOLTAGE REGULATOR CIRCUIT

Contact Servicing—Same as for Voltage Regulator (above).
Air Gap—.080" measured at center of core with contacts just closing.
Air Gap Adjustment—Same as for Voltage Regulator (above).

CURRENT REGULATOR SETTING

Model	Amperes	Model	Amperes
1118201, 2	①34-36	1118248	9-11
1118207, 8	28-30	1118249	14.5-15.5
1118209, 10	16-18	1118251	48-50
1118211, 12	38-40	1118252	24-26
1118214	24-26	1118253	28-30
1118215, 16	22-24	1118254	12-13
1118217	②18-20	1118258	16-18
1118218	7-9	1118259	11-13
1118219	24-26	1118260, 63	24-26
1118220	12-13	1118261	38-40
1118221	26-28	1118264	30-32
1118222, 23	34-36	1118267	34-36
1118224	12.5-13.5	1118268	26-28
1118225	14-16	1118269	16-18
1118226, 29	34-36	1118270, 71, 72	30-32
1118230	26-28	1118273	18-20
1118232	34-36	1118274	18-20
1118233, 34	24-26	1118276, 77	38-40
1118235, 39	9-11	1118278	34-36
1118236	26-28	1118279	50
1118237, 38	38-40	1118280	24-26
1118240	18-20	1118281	19-21
1118241	30-32	1118282	50
1118242	①34-36	1118285	24-26
1118244	48-50	1118286	16-18
1118245	38-40		

①—Supersedes original 32-34 ampere setting.
②—Supersedes original 19-21 ampere setting.

DELCO-REMY GENERATORS

"ALTERNATE WOUND" GENERATORS: Generators used on some 1951 and 1952 cars have armatures noted as "2½" or "3½" turn alternate wound types (3½ turn type consists of alternate 3 and 4 turn windings in adjacent slots).

►*TESTING CAUTION*—When these armatures are tested on a growler, a variation in readings will be noted from bar to bar consisting of two low readings and two high readings in succession around the commutator. This variation is normal for this type armature, and a damaged winding will cause a wide deviation from the regular pattern of readings. Also, after short usage, commutator bars may tend to blacken unevenly due to slight differences in voltage between the coils. This uneven discoloration will be noted only on new or newly cleaned commutators and color will be uniform after longer usage.

"EXTRUDED FRAME" GENERATORS: These generators differ in appearance from previous types in that the frame is not cut out at the commutator end and no commutator cover band is used. Brush holder assemblies are serviced through the open end of the generator frame. It will be necessary to remove the generator from the car for this work (end frame must be removed for access to brushes).

►***CAUTION—Generator Armature and Field terminals on Extruded Frame Generators are reversed from locations on previous type generators.***

Brush Spring Tension Check—Use a special spring scale (J-5184 etc.) with offset hook to engage brush tension arm next to brush while pull on scale is directly in line with brush holder.

GENERATOR SHORT-CIRCUIT CORRECTION: On late 1951 generators (Serial 1F1 to 1M1 stamped on nameplate), check positioning of field cross-over lead with relation to insulated brush holder and if this lead touches or nearly touches the brush holder, push the lead back toward the field coils (*CAUTION*—Lead must not touch the generator frame or armature). Contact between the cross-over lead and brush holder will result in a short-circuit causing excessive field current, burned regulator contacts, high cut-in speed, and a low or discharged battery. ***IF THIS CONDITION FOUND ON ANY GENERTOR, CHECK FOR BURNED REGULATOR CONTACTS AS FOLLOWS:***

►***CHECKING REGULATOR (for oxidized regulator contacts)***—Connect ammeter in charging line at regulator "BAT" terminal. Turn on headlamps to provide load, operate engine at speed which will provide charging current of approximately 5 amperes as noted on test meter. Ground regulator "F" terminal (use short test lead with clip to engage "F" terminal). If output increases more than 2 amperes, remove regulator, clean contacts, adjust settings.

See "Delco-Remy 1118300 & 1118700 Regulators" in previous release for complete data.

DELCO-REMY "1118300" & "1118700" REGULATORS

	Generator	Regulator
BUICK		
40 (1949)	1102679	1118301
50, 70 (1949)	1102708, 9	1118357
40, 50, 70 (1950-51)	1102709, 54	1118364
All (1952)	1102779	1118729
40 (1953)	1102798	1118729
50,70 (1953)	1102003,6,8	1118749
CADILLAC		
V8 Series (1949)	1102700	1118300
V8 Series (1950-51)	1102700	1118357
V8 Series (Late 1951)	1102770	1118727
V-8 Series (1952)	1102781	1118725
V-8 Series (1953)	1102002,7①	1118750
CHEVROLET		
Cars & Trks. (1949-51)	1102710,49	1118301
(1949-51)	1102761	1118301
(1952) Early	1102749	1118720
(1952) Late	1100013	1118720
(1953)	1100018	1118725
Can. Cars & Trks. (1949-50)	1102667	1118301
School Bus (1949-51)	1106757	1118390
Door to Door (1949-51)	1102677	1118349
	1102726	1118361
(1952-53)	1105002,9	1118721
H.D. Trks. (1952-53)	1106757	1118390
State Police (1949-51)	1106751,7	1118334
(1952-53)	1105001,8	1118722
City Police (1949-51)	1106752,8	1118343
(1952-53)	1105002,9	1118721
Taxi (1949-51)	1102729	1118300
(1952-53)	1102786,93	1118725
HENRY J		
1952-53	1102789	1118731
KAISER		
Model K-511 & K-512 (1951)	1102733	1118302
1952-53	1102782	1118392
NASH		
All Series (1949)	1102702	1118302
Rambler (1950-51)	1102730	1118302
Stsmn. & Amb. (1950-51)	1102712, 30	1118302
All (1951) Optl.	1102748	1118382
Rambler (1952)	1102776	1118731
Sts. & Amb. (1952-53)	1102777	1118732
Rambler (1953)	1100021	1118731
OLDSMOBILE		
All 6 Cyl. (1949-50)	1102706, 7	1118300
All 8 Cyl. (1949-51)	1102704	1118300
All 8 Cyl. (1949-51)	1102771	1118725
All Series (1952)	1102780	1118725
All Series (1953)	1102003	1118750
PACKARD		
"2200" 8 & Super 8 (1949-50)	1102705	1118331
"2300" 8 & Super 8 (1949-50)	1102715	1118360
"2400" All (1951)	1102745	1118360
All Series (1952-53)	1102773,8	1118726
PONTIAC		
6 & 8 Cyl. (1949-50)	1102711	1118301
6 & 8 Cyl. (Early 1951)	1102750	1118300
6 & 8 Cyl. (Late 1951)	1102775	1118725
Police Cars	1106403	1118352
6 & 8 Cyl. (1951) Late	1102757,77	1118725
Police Cars (1951-53)	1105900	1118722
6 & 8 Cyl. (1952)	1102769	1118725
6 & 8 Cyl. (1953)	1102794	1118725
STUDEBAKER		
Comm. 17A (1950)	1102728	1118380
Comm. H (1951)	1102700	1118392
8 Cyl. (1952-53)	1102778	1118730

①—1102005 is 1102002 less fan & pulley.

►**REGULATOR POLARITY CAUTION**—Regulator ground polarity and battery ground polarity must be the same. Regulator polarity is stamped on end of regulator base together with model number.

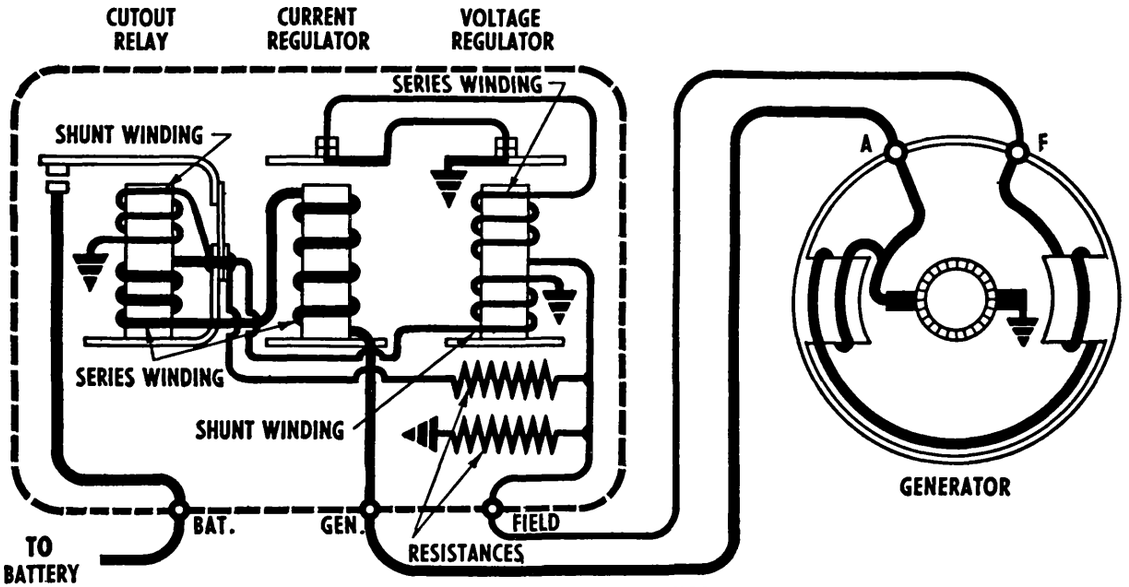
►***CAUTION—Regulator contacts will pit and will have short life if wrong polarity regulator is used.***

►**GENERATOR REPOLARIZING CAUTION**—Whenever regulator or generator leads disconnected, generator must be repolarized **after leads reconnected but before engin is run as follows:** Connect jumper wire between "GEN" and "BAT" terminals on regulator momentarily.

►***CAUTION—Failure to repolarise generator may cause severe damage (reversed polarity will cause vibration and arcing or burning of relay contact points).***

DESCRIPTION: "1118300" Series Regulators differ from previous designs in that adjusting screws for changing armature spring tension are provided, and resistor connections changed. *See illustration.*

CONTINUED ON NEXT PAGE



CUT-OUT RELAY SETTING

Regulator	Cut-In Voltage Setting	Operating Range
1118300, 1, 2, 3	6.4	5.9-6.7
1118304	12.8	11.8-13.6
1118307, 9, 10, 11	6.4	5.9-6.7
1118312	12.8	11.8-13.6
1118313, 14, 15	6.4	5.9-6.7
1118316, 17, 18, 19, 20	12.8	11.8-13.6
1118321, 22, 23, 25	12.8	11.8-13.6
1118324, 26	6.4	5.9-6.7
1118327	6.6	6.1-7.1
1118328, 29, 30	12.8	11.8-13.6
1118331, 32, 33, 34, 35, 36	6.4	5.9-6.7
1118337, 38, 39, 40, 41, 42	12.8	11.8-13.6
1118343, 44, 45, 49, 50	6.4	5.9-6.7
1118346, 47	25.5	24.0-27.0
1118348	12.8	11.8-13.6
1118351, 52	6.4	5.9-6.7
1118353, 54, 55, 58	12.8	11.8-13.6
1118356	10.5	9.0-11.5
1118357, 60	6.4	5.9-6.7
1118358	12 8	11.8-13.6
1118361, 63, 64, 66	6.4	5 9-6.7
1118362, 65, 67, 68, 70	12.8	11.8-13.6
1118369	6.2	5.7-6.6
1118371, 72, 73, 76	12.8	11.8-13.6
1118374, 77, 80	6.4	5 9-6.7
1118375	4.0	3.6-4.6
1118378, 79	25.5	24.0-27.0
1118382, 87, 90	6.4	5.9-6.7
1118383, 84, 85, 89	12.8	11.8-13.6
1118386	25.5	24.0-27.0
1118388	6.6	6.1-7.1
1118392, 93, 94, 95	6.4	5.9-6.7
1118396, 97, 98, 99	6.4	5.9-6.7
1118700, 3, 4, 6, 8, 9	12.8	11 8-13.6
1118701, 10	6.4	5.9-6.7
1118707	6.6	6.1-7.1
1118712, 13, 16	12.8	11.8-13.6
1118714, 17, 19, 20	6.4	5.9-6.7
1118721, 22, 23, 25	6.4	5.9-6.7
1118726, 27, 29, 30	6.4	5.9-6.7
1118731, 32, 33	6.4	5.9-6.7
1118734, 39, 40, 45	12.8	11 8-13.6
1118736, 38	6.4	5.9-6.7
1118737, 41	25.5	24.0-27.0
1118742, 48	4.0	3.6-4.6
1118743, 44, 46	6.4	5.9-6.7
1118749,50	12.8	11.8-13.6

DELCO-REMY "1118300" & "1118700" REGULATORS (C nt.)

TROUBLE SHOOTING: If generator and regulator operating satisfactorily, generator charging rate will be low when battery fully charged, and high when battery is discharged. If performance not correct, check as follows to determine trouble:

Fully Charged Battery & High Charging Rate—May be caused by defective regulator, incorrect voltage regulator setting, poor regulator ground, ground in field "F" lead, or high battery temperature.

NOTE—In testing for above conditions, run engine at medium speed, momentarily disconnect lead at regulator "F" terminal. If charging rate drops to zero, trouble is in regulator. If it remains high, field lead, "F" terminal, or field coils grounded.

Discharged Battery & Low Charging Rate or No General Output—May be caused by loose drive belt, low regulator settings, resistance in charging circuit, defective generator, or dirty regulator contacts.

NOTE—With drive belt adjusted and engine running at medium speed, momentarily ground generator "F" terminal. If charging rate increases to a high rate, trouble is in regulator or field lead is broken. If no charge, generator is defective.

Burnt Resistance, Windings, or Contacts—Caused by open circuit operation, open-circuited or broken resistors, or high resistance in circuit.

►***CAUTION—Do not replace regulator until above conditions have been corrected (will cause failure of replacement regulator also).***

CHECKING & ADJUSTMENT (CUT-OUT RELAY): Air Gap and Contact Gap should be checked and adjusted with battery disconnected.

Air Gap: Press on armature directly above core until contacts just close (CAUTION—both sets of contacts must close simultaneously—see Contact Gap data below), measure air gap between armature and center of core with a feeler gauge.

CUT-OUT RELAY AIR GAP

Models 1118346, 47, 78, 79, 86	.017"
Models 1118375	.013"
All Other "1118300" Series	.020"
Models 1118737, 41, 46	.017"
Models 1118742, 48	.013"
All Other "1118700" Series	.020"

Adjustment—Loosen two screws on armature hinge bracket at back of relay, raise or lower armature.

Contact Gap: Check contact gap for each set of contacts with armature at rest and up against armature stop. Contact gap must be correct as shown in table below and equal for both sets of contacts (both sets must close simultaneously).

CUT-OUT RELAY CONTACT GAP

Models 1118346, 47, 78, 79, 86	.032"
Model 1118375	.027"
All Other "1118300" Series	.020"
Models 1118737, 41, 46	.032"
Models 1118742, 48	.027"
All Other "1118700" Series	.020"

Adjustment—Bend upper armature stop up or down as required (use special bending tool). Equalize contact gaps by bending contact fingers.

Cut-In (Closing) Voltage: Connect regulator to proper generator and to battery with voltmeter connected between regulator "GEN" terminal and ground on regulator base, and ammeter in series in charging circuit at regulator "BAT" terminal. Increase generator speed slowly and note voltage at instant relay contacts close. Decrease generator speed until contacts have opened. Adjust and recheck.

Adjustment—Turn adjusting screw under end of armature spring clockwise for increased voltage, counter-clockwise for decreased voltage.

CHECKING & ADJUSTMENT (VOLTAGE REGULATOR:) Examine condition of regulator contacts and resurface if necessary (see Servicing data). Check and adjust Air Gap with battery disconnected (regulator off car), check and adjust voltage setting.

Air Gap: Press armature down toward core as far as possible, then allow armature to move upward until contacts just close. Measure air gap between armature and center of core (use wire feeler gauge).

VOLTAGE REGULATOR SETTING

Regulator	Regulator Voltage Setting	Operating Range
1118300, 1, 2, 9, 10	7.4	7.0-7.7
1118303, 11	7.2	6.8-7.5
1118304, 12	14.3	13.9-14.9
1118307	7.6	7.25-7.95
1118313, 14	7.2	6.8-7.5
1118315	7.4	7.0-7.7
1118316, 17, 18, 19, 20	14.3	13.9-14.9
1118321, 22, 23, 25	14.3	13.9-14.9
1118324, 26	7.2	6.8-7.5
1118327	7.5	7.2-7.9
1118328, 29, 30	14.3	13.9-14.9
1118331	7.4	7.0-7.7
1118332, 33, 34, 35, 36	7.2	6.8-7.5
1118337, 38, 39, 40	14.3	13.9-14.9
1118341, 42, 48	14.3	13.9-14.9
1118343, 44, 45, 49, 50	7.2	6.8-7.5
1118346, 47	28.5	27.5-29.5
1118351, 52	7.2	6.8-7.5
1118353, 54, 55, 58	14.3	13.9-14.9
1118356	14.0	13.5-14.9
1118357, 60	7.4	7.0-7.7
1118361, 63, 66	7.2	6.8-7.5
1118362, 65, 67, 68, 70	14.3	13.9-14.9
1118364	7.4	7.0-7.7
1118369	6.8	6.5-7.2
1118371, 72, 73, 76	14.3	13.9-14.9
1118374, 77	7.2	6.8-7.5
1118380	7.2	6.9-7.4
1118382, 87	7.2	6.8-7.5
1118383, 84, 85, 89	14.3	13.9-14.9
1118386	28.5	27.5-29.5
1118388	7.6	7.3-8.0
1118390, 95	7.2	6.8-7.4
1118392	7.4	7.2-7.7
1118393, 94, 96, 97, 98, 99	7.2	6.8-7.5
1118700, 3, 4, 6, 8, 9	14.3	13.9-14.9
1118701, 10	7.2	6.8-7.5
1118707	7.6	7.3-8.0
1118712, 13, 16	14.3	13.9-14.9
1118714, 20	7.4	7.0-7.7
1118717, 19, 21, 22, 23	7.2	6.8-7.5
1118725, 26, 27, 29	7.4	7.0-7.7
1118730	7.4	7.2-7.6
1118731, 32	7.4	7.0-7.7
1118733, 36	7.2	6.8-7.5
1118734, 39, 40, 45	14.3	13.9-14.9
1118737, 41, 46	28.5	27.5-29.5
1118738, 42, 44, 48	7.4	7.0-7.7
1118743	7.2	6.8-7.5
1118749,50	14.5	14.0-15.0

REGULATOR AIR GAP

All "1118300 Series" Regulators	.075"
Model 1118730	.068"
Other "1118700" Series Regulators	.075"

Adjustment—Loosen two stationary contact mounting screws (on front side of regulator frame), move contact bracket up or down as required.

Voltage Setting: ***CAUTION—Two different methods can be used to check voltage setting as follows:***

(1) Fixed Resistance Method—Disconnect charging line at regulator "BAT" terminal, connect special fixed resistance (see Note below) between this terminal and ground on regulator base, connect voltmeter between these same two points. With generator and **regulator at operating temperature, and with regulator cover in place,** run generator at speed 25% in excess of rated output speed (see generator data on individual car model pages), note voltmeter reading. If not within "operating range" figure in table below, adjust as directed under "Variable Resistance Method" following.

►**Resistance Note**—Resistance used when checking regulator by "fixed resistance method" above must be capable of carrying 10 amperes without change in resistance due to temperature increases and should have the following values:

Type of Regulator	Resistance Value
6 Volt (less than 15 amp. rating)	1½ Ohms
6 Volt (more than 15 amp. rating)	¾ Ohms
12 Volt (less than 15 amp. rating)	2¼ Ohms
12 Volt (more than 15 amp. rating)	1½ Ohms

(2) Variable Resistance Method—Connect ammeter and ¼-Ohm Variable Resistance in series in charging line at regulator "BAT" terminal (CAUTION—do not connect these units at "Gen" terminal which will affect generator output), connect voltmeter between regulator "BAT" terminal and ground on regulator base. With generator and **regulator at operating temperature, and with regulator cover in place,** run generator at speed 25% in excess of rated output speed (see generator data on individual car model pages). If output less than 8 amperes (4 amperes on units rated less than 15 amperes), turn on car lights which will increase output, then increase variable resistance until output is reduced to 8-10 amperes (4-6 amperes on units rated less than 15 amperes). With regulator at operating temperature, "cycle" generator by decreasing speed until cutout relay contacts open, then increase speed to former figure. Note voltmeter reading. If not within "operating range" figure in table below, adjust as follows:

Voltage Setting Adjustment—Turn adjusting screw on armature spring bracket clockwise to increase voltage, counter-clockwise to decrease voltage. Check voltage with cover in place. After adjusting, "cycle" generator and recheck setting.

CHECKING & ADJUSTMENT (CURRENT REGULATOR): Current regulator used only with "three-unit" type regulators (two-unit regulators use generator third-brush current control).

Air Gap: Checked and adjusted in same manner as Voltage Regulator (above).

REGULATOR AIR GAP

All "1118300" & "1118700 Series	.075"

CONTINUED N NEXT PAGE

DELCO-REMY "1118300 & 1118700" REGULATORS (Cont.)

Current Setting: ***CAUTION—Voltage regulator must be prevented from operating while checking current regulator. "Short out" voltage regulator as follows:***

(1) Insert screwdriver blade through slot in base of regulator (keep screwdriver at right angles to base) so that blade makes firm contact with base and with shield which protects resistor unit. This will short out voltage regulator.

(2) Remove regulator cover, connect short jumper across voltage regulator contacts (from armature to stationary contact bracket).

(3) Partially discharge battery by cranking engine for 30 seconds with ignition turned off.

(4) Connect 45 ampere load across battery (use carbon pile rheostat). This will prevent voltage regulator from operating.

Checking Current Setting—With voltage regulator shorted out (use any of above methods), connect ammeter in charging line at regulator "BAT" terminal, turn on car lights and accessories to prevent high voltage during test. With generator and **regulator at operating temperature,** run generator at speed 50% in excess of rated output speed (see generator data on individual car model pages), note ammeter reading. If not within "operating range" figure in table below, adjust as follows:

Current Setting Adjustment—Same as for Voltage Setting Adjustment (above). Turn screw clockwise to increase current setting, counter-clockwise to decrease current setting.

CLEANING REGULATOR CONTACTS: Clean up contacts when required with a contact file. Use a **spoon or riffler file on the flat contact** (flat contact is located on armature on all negative-ground regulators, on stationary contact bracket on all positive-ground regulators). Access to contacts is secured by loosening contact adjusting screws on stationary contact bracket and tilting or removing bracket. Adjust air gap after cleaning contacts.

►***CAUTION—Do not use emery cloth or sandpaper to clean contacts, do not use flat file on contacts.***

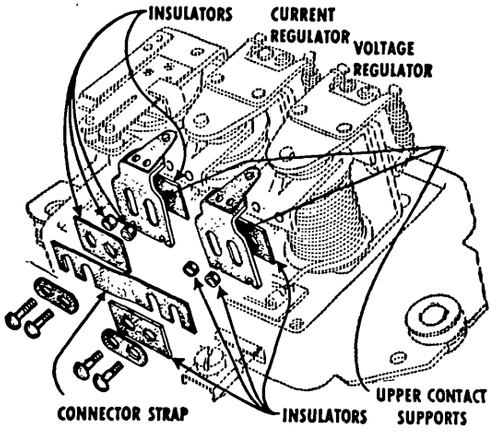
CONTACT SUPPORT BRACKET REPLACEMENT: Assemble brackets, insulators and bushings in order as shown on illustration. Always use new bushings.

REGULATOR SPRING REPLACEMENT: When installing new springs, first hook lower end of spring on lower spring support, then stretch spring until upper end can be hooked over armature lug. Check and adjust regulator setting after spring installed.

►***CAUTION—Do not pry spring into place—this may distort or damage spring support.***

CURRENT REGULATOR SETTING

Regulator	Setting	Regulator Amperes Operating Range
1118300	42	40-46
1118301, 02	36	32-40
1118303, 11	30	28-32
1118304, 12	17	15.5-18.5
1118313, 14	40	37-41
1118316, 17, 18	25	23-27
1118321	8.5	7-10
1118322, 23	12	10.5-13.5
1118324	19	17-21
1118325	35	33-37
1118326	27	25-29
1118327	13	11.5-14.5
1118328, 29	31	29-33
1118330	15	13.5-16.5
1118331	36	32-40
1118333, 34, 35, 36	50	48-52
1118337, 38	40	37-41
1118339, 40, 41	50	48-52
1118342, 48	17	15.5-18.5
1118343, 44	40	37-41
1118345	15	13-17
1118346	20	18-22
1118347, 53	10	8.5-11.5
1118348	17	15.5-18.5
1118349, 50, 58	25	23-27
1118351, 52	35	33-37
1118354, 55	19.5	17.5-21.5
1118357, 60, 64	42	40-46
1118358, 61, 67	25	23-27
1118362	19.5	17.5-21.5
1118365	12	10.5-13.5
1118366, 74	40	37-41
1118368	50	48-52
1118369	34	30-38
1118370	25	23-27
1118371	19.5	17.5-21.5
1118372	12	10.5-13.5
1118375	60	58-63
1118376	50	48-52
1118377	19	17-21
1118378	20	18-22
1118379	10	8.5-11.5
1118380	36	32-40
1118382	42	40-46
1118383	12	10.5-13.5
1118384	25	23-27
1118385	35	33-37
1118386	15	13.5-16.5
1118387	32	30-34
1118388	18	16.5-19.5
1118389, 96	40	37-41
1118390, 95	55	53-57
1118392, 93	42	40-46
1118394	50	48-52
1118397, 98	30	28-32
1118399	19	17-21
1118700, 3	19.5	17.5-21.5
1118701	25	23-27
1118704	35	33-37
1118706	50	48-52
1118707	20	18.25-21.5
1118708	10	8.5-11.5
1118709	31	29-33
1118710, 16	25	23-27
1118712, 13, 19	50	48-52
1118714	36	32-40
1118717	42	40-46
1118720	38	34-42
1118721, 23	42	40-46
1118722	50	48-52
1118725, 26, 27, 29, 30	47	45-51
1118731	38	34-42
1118732	47	45-51
1118733	42	40-46
1118734	40	37-41
1118736	32	30-34
1118737	20	18-22
1118738	36	32-40
1118739, 40, 45	40	37-41
1118741, 46	10	8.5-11.5
1118743	47	45-51
1118744	38	34-42
1118749,50	30	27-33



REGULATOR CONTACT ASSEMBLY

DELCO-REMY "1118825" & "1118900" SERIES REGULATOR

►*Data following covers both 6-volt and 12-volt Regulators.*

►*"1118825" & "1118900" SERIES REGULATOR NOTE:* Regulators of these series *with letter "B" following Model Number* differ from the "1118825" & "1118900" Series in that the direction of current flow through the Current Regulator Contacts has been reversed (see Wiring Diagram below). The molded insulator formerly located between connector strap and Current Regulator Support has been relocated between the attaching screw washer and the connector (both molded insulators are now on the same side of the connector strap).

►*ADJUSTMENT CAUTION:* When checking current regulators having the "B" suffix, DO NOT USE THE "Quick Check Method" outlined below for previous regulators of these series. Using a screwdriver inserted in hole in regulator base to short out voltage regulator will short out BOTH the voltage and current regulators and allow generator to operate without control.

DESCRIPTION: Regulators in series starting with Model 1118825 differ from previous models in that they do not include an accelerator or series winding on the voltage regulator unit. This difference makes necessary a different method of checking and adjusting voltage setting. "Circuit A" type regulators are used with generators having field insulated and grounded in Regulator.

TROUBLE SHOOTING: The existing conditions determine the "Normal" or "Abnormal" operation of Generator or Regulator as follows:

"Normal" Operation

1)–Battery fully charged and Low charging rate.

2)–Low battery and High charging rate.

"Abnormal" Operation

1)–Battery fully charged and High charging rate denotes defective or improperly adjusted Voltage Regulator unit, grounded field (Generator, Regulator, or Wiring), or high battery temperature permitting battery to accept high charging rate with "Normal" regulator setting.

2)–Low battery and low charging rate denotes loose connections or damaged wiring, defective battery, high circuit resistance, low regulator setting, oxidized Regulator points, defective Generator, Cutout Relay not closing, open series circuit in Regulator, or Generator, not properly polarized. Momentarily grounded "F" terminal. Generator O.K. if output increases with increased Generator speed.

3)–Burned Resistances, Windings, or Contact Points are caused by: Open circuit operation, open Resistance units or loose or intermittant connections in charging circuit. Check car wiring before installing new Regulator.

4)–Burned Relay Contact Points are due to reversed Generator polarity.

CHECKING & ADJUSTMENT

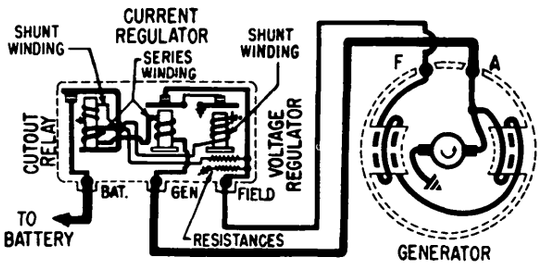
Regulator checks and adjustments should be made in the following sequence: Voltage Regulation, Cutout Relay Operation, and Current Regulation.

►*REGULATOR "NORMALIZING":* Before making any tests, it is important that regulator must be at **operating temperature.** Normalize regulator as follows: Connect ¼-Ohm resistor in series with battery (if variable resistor used, set to 1-10 ampere charging current), operate generator for 15 minutes at specified speed **with Voltage Regulator operating** (to normalize Voltage Regulator), or **with Current Regulator operating** (to normalize Temperature Compensated Current Regulators). This procedure not required for Non-temperature compensated Current Regulators.

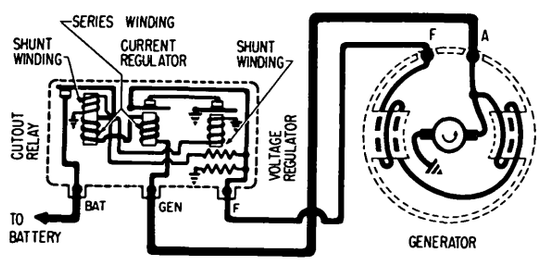
"Specified Speed" Note–Generator RPM for checking and adjusting regulators should be: **Voltage Regulator**-3500 RPM. (car & truck units), **Current Regulator**-sufficient speed to produce current in excess of specified current regulator setting.

►*GENERATOR REPOLARIZING CAUTION:* Repolarize generator each time regulator leads have been disconnected. Connect jumper lead momentarily between regulator "Bat" and "Gen" terminals. Incorrect polarity will cause vibration and arcing and burning of Cutout Relay contacts.

►*POLARITY CAUTION:* Regulators are designed for a particular battery ground polarity as stamped on end of regulator base. Use of wrong polarity regulator will cause pitting of regulator contacts and shorten regulator life.



DELCO-REMY "1118825" & "1118900" SERIES (NO SUFFIX LETTER) REGULATOR WIRING



DELCO-REMY "1118825" & "1118900" SERIES (WITH SUFFIX LETTER) REGULATOR WIRING

VOLTAGE REGULATOR: Make checks and adjustments in the following order:

Air Gap–.075" (All models except 1118942 & 1118947), .063" (1118942 & 1118947). To check, press down on armature so that contacts just touching, measure air gap between armature and core. To adjust, raise or lower mounting bracket.

Voltage Setting (6 & 12 volt units)–Use either method as follows:

Fixed ¼-Ohm Resistanc M th d

1)–Connect ¼ Ohm–25 watt (Min.) resistance in charging circuit at regulator "Bat" terminal **in s ri s with with battery.**

►*CAUTION: Battery must remain in charging circuit. DO NOT disconnect battery as in checking procedure for previous series regulators.*

2)–Connect voltmeter from "Bat" terminal to ground.

3)–Normalize regulator (see above). Limit electrical load to Ignition only.

4)–Cycle generator using either of the following methods: **(a)** Move voltmeter lead from "Bat" to "Gen" terminal of regulator, retard generator speed until generator voltage is reduced to 2 volts (6 volt units), 4 volts (12 volt units), then move voltmeter lead back to regulator "Bat" terminal, bring generator back to specified speed and note voltmeter reading. Or, **(b)** Connect variable resistance in field circuit (disconnect generator field lead at regulator "F" terminal, connect resistance between this lead and "F" terminal). With all resistance turned out, operate generator at specified speed, slowly increase resistance until generator voltage reduced to 2 volts (6 volt units), 4 volts (12 volt units), then turn out all resistance and note voltmeter reading. In each case, final voltage reading (after cycling generator) will be the voltage regulator setting.

5)–Adjust voltage regulator setting as follows: Remove cover, turn adjusting screw on armature spring lower support clockwise to increase voltage setting, or counter-clockwise to decrease setting. After making adjustment, replace cover, cycle generator (step 4 above), and recheck voltage setting.

►*CAUTION*–Final setting should always be made by **increasing** spring tension (never by decreasing tension). If voltage setting too high, decrease spring tension below desired setting, and then increase spring tension for desired setting. If spring support does not return when screw backed off, back off screw for clearance between screw head and support, then bend support up carefully until it contacts screw head.

►*VOLTAGE SETTING CORRECTION FOR TEMPERATURE:* See "Regulator Settings" table (below) for voltage regulator setting range. Any setting within the range indicated is satisfactory provided battery and voltage sensitive equipment is operating properly and without damage. Before operating voltage is compared with specifications in the table, allowances must be made for variation in temperature (see table following). For regulator ambient temperatures below 125° F. SUBTRACT from operating voltage. For ambient temperatures above 125°F. ADD to operating voltage. The

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DELCO-REMY "1118825" & "1118900" SERIES REGULATOR (C nt.)

adjusted operating voltage must be within the specified range indicated.

Voltag Allowances for Temperature

Ambi nt Temp ratur ①	6-Volt	12 Volt
55°	−.52	−1.05
65°	−.45	− .90
75°	−.37	− .75
85°	−.30	− .60
95°	−.22	− .45
105°	−.15	− .30
115°	−.07	− .15
125°	0	0
135°	+.07	+ .15
145°	+.15	+ .30
155°	+.22	+ .45
165°	+.30	+ .60

①AMBIENT TEMPERATURE is the temperature of the air surrounding the regulator approximately 1/4" from cover when regulator is at operating temperature ("Normalizing" procedure as given above should result in an ambient temperature of 125°F) and can be measured by placing a thermometer 1/4" from cover.

V ltag S ttings for Unusual Conditions: If battery is being **Ov rcharg d** (Using too much water) or stays **Und rcharg d** (¾ charge or less), vary specified voltage regulator setting as follows:

Ov rcharg d—Reduce Voltage Setting 0.1-0.2 volts and check after reasonable service period. Repeat until "Overcharge" corrected (water use normal). *NOTE*—Recheck cutout relay setting. Keep it 0.5 volts less than Voltage Regulator Setting.

Undercharg d—Increase Voltage Setting 0.1 volt and recheck and repeat as above until condition corrected.

►*CAUTION: Avoid s ttings so high that damage may be caus d to lights or other sensitive equipment during c ld weath r op ration. Before changing standard v ltag r gulator s tting, correct all battery conditions such as: Sulphat d Plates, Overheating due to operating locati n, r Damag caused by overheating.*

Variabl Resistance Method

1)—Connect variable resistance (25 watt Min.) and ammeter in series at "Bat" terminal of regulator and **in seri s with batt ry.**

►*CAUTION—Batt ry must remain in charging circuit. DO NOT disconn ct battery as in checking procedure for previous s ri s r gulators.*

2)—Operate generator and adjust resistance to 10 ampere charging rate. Operate generator for 15 minutes with regulator cover in place to attain operating temperature.

3)—Cycle generator and adjust regulator voltage in same manner as in "Fixed Resistance Method" (steps 4 & 5) above.

CUTOUT RELAY: Air Gap and Contact Gap should be checked and adjusted with "Bat" lead disconnected from regulator.

Air Gap—.030" (All Models). To check, press down on armature until contacts just close (both sets of contacts must close at same instant), measure gap between armature and center of core. To adjust, loosen two armature hinge screws on back of frame, raise or lower armature as required.

Contact Gap—.020" (All Models). Adjust by bending upper armature stop.

Closing (Cuts-in) Voltage—Connect regulator to proper generator and battery, connect Voltmeter between regulator "Gen" terminal and ground. Check closing voltage by either of the following methods: **(a)** Slowly increase generator speed and note voltmeter reading at instant points close, then decrease generator speed and make certain that points open. Or, **(b)** With same connections as above, connect a variable resistance in the field circuit (disconnect generator field lead at regulator "F" terminal, connect resistance between this lead and "F" terminal—see note below for resistance values), operate generator at medium speed with all resistance cut in field circuit, slowly cut out resistance until cutout relay points close, note voltmeter reading, then slowly cut in resistance to make certain that points open. Adjust cut-in voltage by turning adjusting screw under armature spring clockwise to increase cut-in voltage, or counter-clockwise to decrease cut-in voltage.

CURRENT REGULATOR: Make checks and adjustments in the following order:

Air Gap—.075" (All Models). Check and adjust in same manner as Voltage Regulator (above).

Current Setting—Any of the following methods can be used. All methods require that the Voltage Regulator be prevented from operating as detailed in the checking procedure.

Quick Check Method

►*CAUTION: Do not use this method on 1118825 and 1118900 Series Regulators with letter "B" following Model Number. See "Adjustment Caution" above.*

1)—Connect ammeter in charging circuit at regulator "Bat" terminal. Turn on all lights and accessories to provide load and cause current regulator to operate.

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Regulator Number	Cutout Relay Closing Volts	Voltage Reg. Volts	Current Reg. Amperes
1118825, 26	11.8-13.5	13.8-14.8	27-33
1118827, 28, 29	5.9-6.7	6.9-7.4	42-47
1118830, 31	5.9-6.7	6.9-7.4	27-42
1118832, 33	5.9-6.7	6.9-7.4	53-57
1118834	5.9-6.7	6.9-7.4	43-47
1118835	5.9-6.7	6.9-7.4	50-54
1118838	11.8-13.5	13.8-14.5	48-52
1118839	11.8-13.5	13.8-14.8	27-33
1118840	11.8-13.5	13.8-14.5	33-37
1118841	5.9-6.7	6.9-7.4	34-39
1118842, 43, 45, 46	5.9-6.7	6.9-7.4	37-42
1118847	5.9-6.7	6.9-7.4	38-42
111849, 50	5.9-6.7	6.9-7.4	43-47
1118852	5.9-6.7	6.9-7.4	42-47
1118854, 55, 56, 57	6.9-7.4	6.9-7.4	48-52
1118858	5.9-6.7	6.9-7.4	50-54
1118864	5.9-6.7	6.9-7.4	32-37
1118865, 66	5.9-6.7	6.9-7.4	33-37
1118867	5.9-6.7	6.9-7.4	30-34
1118869	5.9-6.7	6.9-7.4	28-32
1118870	5.9-6.7	6.9-7.4	25-29
1118871, 72	5.9-6.7	6.9-7.4	23-27
1118873	5.9-6.7	6.9-7.4	17.5-20.5
1118874	5.9-6.7	6.9-7.4	16.5-19.5
1118875	5.9-6.7	6.9-7.4	14-16
1118880, 81	11.8-13.5	13.8-14.5	48-52
1118882	11.8-13.5	13.8-14.8	18.5-21.5
1118883, 84	11.8-13.5	13.8-14.5	48-52
1118885, 86, 87	11.8-13.5	13.8-14.8	38-42
1118888, 89, 90	11.8-13.5	13.8-14.8	38-42
1118891, 92	11.8-13.5	13.8-14.8	33-37
1118893, 94, 95	11.8-13.5	13,8-14.8	29-33
1118896, 97, 98,99	11 8-13.5	13.8-14.8	23-27
1118900	11.8-13.5	13.8-14.8	23-27
1118901, 02, 03, 04	11.8-13.5	13.8-14.8	18.5-21.5

Regulator Number	Cutout Relay Closing Volts	Voltage Reg. Volts	Curr nt Reg. Amper s
1118905	11.8-13.5	13 8-14.8	15.5-18.5
1118906	11.8-13.5	13.8-14 8	14-16
1118907, 08, 09	11.8-13.5	13.8-14.8	11-13
1118910	11.8-13.5	13.8-14.8	9-11
1118911	11 8-13.5	13.8-14.8	8-9
1118912	5.9-6.7	6.9-7.4	50-54
1118913, 14, 15	5.9-6 7	6 9-7 4	42-47
1118916	5.9-6.7	6.9-7.4	38-42
1118917	5.9-6.7	6 9-7.4	43-47
1118918, 19	5 9-6.7	6.9-7.4	37-42
1118920, 21	5.9-6.7	6.9-7.4	34-39
1118922	5.9-6.7	6.9-7.4	32-37
1118923	5.9-6.7	6.9-7.4	28-32
1118924	5.9-6.7	6.9-7.4	23-27
1118925	5.9-6.7	6.9-7.4	17.5-20.5
1118926, 27, 28	11.8-13.5	13.8-14.5	48-52
1118929, 230	11.8-13.5	13.8-14.8	38-42
1118931	11.8-13.5	13.8-14.8	29-33
1118932, 33	11.8-13.5	13.8-14.8	23-27
1118934, 35, 36	11.8-13.5	13.8-14.8	18.5-21.5
1118937	11.8-13,5	13.8-14.8	11-13
1118938	11.8-13.5	13.8-14.8	9-11
1118939	11.8-13.5	13.8-14.5	53-57
1118940	11.8-13.5	13.8-14.5	48-52
1118941	11.8-13.5	13.8-14.8	15.5-18.5
1118942	5.7-6.9	6.8-7.2	52-58
1118943	5.7-6.9	6.9-7.4	42-47
1118944	5.7-6.9	6.9-7.4	37-42
1118945	11.8-13.5	13.8-14.8	23-27
1118946	5.7-6.9	6.9-7.4	17 5-20.5
1118947	5.7-6.5	6.8-7.2	52-58
1118948	11.5-13.0	13.6-14.3	37-42
1118950	5.9-6.7	6.9-7.4	42-47
1118953	11.8-13.5	13.8-14.8	27-33
1118956, 67	11.8-13.5	13.8-14.8	32-37

DELCO-REMY "1118825" & "1118900" SERIES REGULATOR (C nt.)

2)—Normalize regulator (see above). This procedure required for Temperature Compensated Current Regulators only (Non-temperature compensated units operate same cold or hot).

3)—Insert screwdriver blade through hole in regulator base and hold firmly with blade touching base and shield at same time. This will short out Voltage Regulator.

4)—Cycle generator (see Step 4 of Voltage Regulator Adjustment above), note ammeter reading which will be Current Setting.

5)—Adjust current regulator setting in same manner as voltage regulator (see Step 5 under Voltage Regulator above).

Load Method

1)—Connect ammeter in charging circuit at regulator "Bat" terminal. Connect load across battery equal to current regulator setting (use carbon pile or bank of lights).

2)—Normalize regulator (see above). This procedure required for Temperature Compensated Current Regulators only (Non-temperature compensated units operate same cold or hot).

3)—Cycle generator (see step 4 of Voltage Regulator Adjustment above), note ammeter reading which will be Current Setting.

4)—Adjust current regulator setting in same manner as voltage regulator (see Step 5 under Voltage Regulator above).

Jumper Lead Method

►*CAUTION—DO NOT use this method on Temperature Compensated Current Regulators.*

1)—Connect ammeter in charging circuit at regulator "Bat" terminal.

2)—Remove regulator cover and connect jumper lead across Voltage Regulator contacts (use short lead clipped to regulator armature and to stationary contact support).

3)—Turn on all lights and accessories, OR connect load across battery equal to current regulator setting (use carbon pile or bank of lights).

4)—Operate generator at specified speed and note ammeter reading which will be Current Setting.

5)—Adjust current regulator setting in same manner as voltage regulator (see Step 5 under Voltage Regulator above).

►*RADIO BY-PASS CONDENSER CAUTION:* Installation of such condensers on FIELD terminal of either the Regulator or Generator will cause regulator contacts to burn and oxidize which will reduce generator output. All such condensers should be disconnected and regulator contacts should be inspected and cleaned.

SHUNT TYPE AMMETER

Cadillac, All Series (1949)

Oldsmobile 6 & 8, All Models (1949-55)

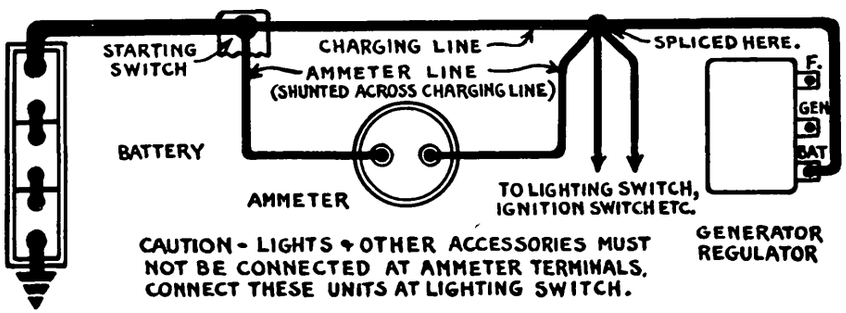
►***CAUTION—When testing voltage regulators on the above cars with shunt type ammeters, and the "BAT" lead is removed from the regulator for the test, it is of utmost importance that the other leads on same terminal be bolted to the "BAT" lead when it is removed. Failure to do this may result in burning up th wiring harness.***

IMPORTANT NOTE: Accessories must not be connected at ammeter terminals as ammeter circuit wires are inadequate to carry more than designed load and any change in ammeter circuit will cause ammeter to read incorrectly.

ACCESSORY CONNECTION CAUTION—When installing accessories, connect as directed in installation instructions in accessory package (should be connected to accessory terminal of lighting switch, gauge terminal of ignition switch, etc.). **Do not conneet accessories at ammeter terminals.**

DESCRIPTION: External shunt type ammeter with push-on type terminals This design lessens number of connections in generator charging circuit and results in better generator performance (less chance for loose or corroded connections and high resistance in circuit).

OPERATION: Ammeter operates in usual manner except only a portion of the charging current (approximately 10%) goes through the ammeter, remainder of charging current being 'shunted' around ammeter through regular charging line (see illustration). Ammeter dial is calibrated so that it indicates entire charging current (25-30 amperes) rather than current actually in ammeter circuit. Correct ammeter operation is dependent on proportional amount of current in each branch of the circuit (through ammeter and through the external shunt) and any disturbance of this balance (such as connection of accessories at ammeter terminals) will cause ammeter to read incorrectly.



FORD THREE-UNIT VOLTAGE-CURRENT REGULATORS

	Generator	Regulator
FORD (Pass. Cars)		
1946-47 6 Cyl. "G" Models	2GA-10000-A	01A-10505-C
1946-47 V8 Models	21A-10000	01A-10505-C
1947-48 6 Cyl. "H" Models	7HA-10001-B	01A-10505-C
1949-51 6 Cyl. & V8 Models	8BA-10002-A,D	51A-10505-A,H
	8BA-10002-A,D	①8M-10505-A
1949-51 Heavy Duty	8BA-10002-B	8L-10505
	8BA-10002-B	5EH-10505-C
1952 6 Cyl.	FAA-10002-B	FAC-10505-A1,A2
1953-55 6 Cyl.	FAA-10002-B	FAC-10505-A
1952 V8	FAA-10002-A	FAC-10505-A1,A2
1953 V8	FAA-10002-A	FAC-10505-A
1954 V8	FBC-10002-A	FAC-10505-A
1955 V8 272" Engine	FBC-10002-A	FAC-10505-A
1955 V8 292" Engine	B5A-10002-A	FAD-10505-A
1955 Thunderbird	B5A-10002-A	FAD-10505-A
FORD (Trucks)		
1946-47 6 Cyl. "G" Models	2GA-10000-A	01A-10505-C
1946-47 V8 Models	21A-10000	01A-10505-C
1947 6 Cyl. "H" Models	7HA-10001-B	01A-10505-C
1948-51 6 Cyl. & V8 Std.	8BA-10002-A,D	51A-10505-A,H
	8BA-10002-A,D	8M-10505-A
Special Equip.	8BA-10002-B	5EH-10505-C
	8BA-10002-B	8L-10505
1951 6 Cyl. "H" Models	0HA-10002-A	8M-10505-A
1951 6 Cyl. Parcel Del.	8HJ-10002-A	8M-10505-A
1951 6 Cyl. School Bus	0HA-10002-B	8L-10505
1952 V8	FAA-10002-A	FAC-10505-A
6 Cyl.	FAA-10002-B	FAC-10505-A
1953 All engine	FAA-10002-B	FAC-10505-A
All engine	④FAB-10002-C	FAD-10505-A
All engine	⑤FAB-10002-C	FAE-10505-A
215 engine	⑥FAF-10002-B	
239 engine	⑦FAF-10002-A	
239 engine	FAA-10002-A	FAA-10505-A
239 engine	8EL-10000-B	FAD-10505-A
239 engine	8EL-10000-B	FAE-10505-A
1954-55 6 Cyl.	FAA-10002-B	FAC-10505-A
1954-55 V8 239" & 256" Engines	FBC-10002-A	FAC-10505-A
1954-55 Optional	FBB-10002-A	FAD-10505-A
LINCOLN		
1946-48	21A-10000	01A-10505-C
1949-51	8EL-10002	5EH-10505-C
	8EL-10002	8L-10505
1952-53	FAB-10002-A	FAD-10505-A
1946-48	21A-10000	01A-10505-C
1949-51	8EL-10002	5EH-10505-C
	8EL-10002	8L-10505
1952-53	FAB-10002-A	FAD-10505-A
1954-55	FBB-10002-A	FAJ-10505
MERCURY		
1946-48	21A-10000	01A-10505-C
1949-51 Std.	8BA-10002-A,D	51A-10505-A
1949 Heavy Duty	8BA-10002-B	5EH-10505-C
	8BA-10002-B	8L-10505
1949-51 Heavy Duty	8EL-10002-A,B	8L-10505
	8EL-10002-A,B	8M-10505-A
1950-51 Spec. Equip.	0M-10002	8A-10505-A
1952-53	FAA-10002-A	FAC-10505-A
1954-55	B5A-10002-A	FAD-10505-A

①—Service Replacement for 51A-10505-C.
④—With 40 ampere output.
⑤—With 45 ampere output.
⑥—Use FAA-10002-B as service replacement.
⑦—Use FAA-10002-A as service replacement.

►CHANGES, CAUTIONS, CORRECTIONS

►**PRODUCTION CHANGE NOTE:** Regulators with several minor differences will be found in service as follows:

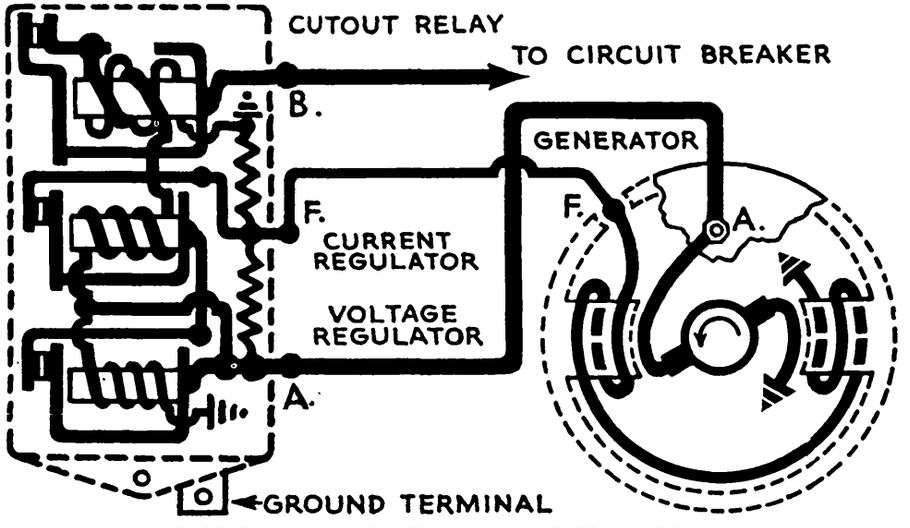
Regulator Ground Lead—On 1949 and earlier regulators, ground consists of braided pigtail connected to a lug on the regulator case by which the regulator is grounded directly to the engine dash. The regulator case ground lug is attached to the regulator case by the cover rivet and this ground connection is disturbed by removal of the regulator cover. On other regulators, the ground connection consists of a separate wire which is connected to the regulator case and grounded to a terminal screw on the generator frame. CAUTION—Ground lead must be in place when regulators are tested. If ground disturbed by removal of regulator cover, re-install ground lead before making regulator tests.

►**REPLACEMENT GENERATOR NOTE:** FAA-10002-A or B production generators replace generator 8BA-10002-A, 8BA-10002-B, 8BA-10002-D.

►**REGULATOR CONTACT DESIGN CHANGES:** Contact assemblies used on earlier regulators can be replaced with later design contacts as follows:

Current Regulator Later Design Contacts: Following parts required:
No. 01A-10551-A—Armature with silver contact.
No. 01A-10653-A—Contact screw with silver contact (screw .41" long).
No. 01A-10568-A—Spacer (additional spacer installed bet. armature & frame).

Voltage Regulator Later Design Contacts: Following parts required:
No. 01A-10551-B—Armature with tungsten contact (brass rivet under arm).
No. 01A-10653-B1 or B2—Contact screw with platinum contact.
No. 01A-10568-B—Spacer (replaces original spacer on box type shunt regulators, or used together with old spacer on old type voltage regulators).



FORD THREE-UNIT VOLTAGE-CURRENT REGULATOR CIRCUIT

See "CONTACT REPLACEMENT" following for installation of these parts.

►**REGULATOR & GENERATOR GROUND CAUTION:** Regulator and generator grounds must be in place when units operated (regulator may be grounded through mounting screw or separate ground lead). See car page wiring diagram for data.

DESCRIPTION

DESCRIPTION: 3 unit (Cutout Relay, Voltage Regulator, Current Regulator) regulator with separate voltage and current regulator units (these units were combined on previous 2-unit regulators). Regulators are vibrating type and charging rate is normally controlled by Voltage Regulator. Current Regulator operates when current reaches value in excess of rated capacity and limits current to this figure. Both regulators operate in the same manner by cutting the resistance in and out of the field circuit and control the generator output

CONTINUED ON NEXT PAGE

FORD, LINCOLN, MERCURY REGULATORS (C nt.)

by regulating the field current. Cutout Relay is compensated for temperature by means of a bi-metal clip on the armature spring (1949 and earlier).

►*CAUTION*—Ford Generators and Ford Regulators are not wired in the same manner as units of other makes and cannot be operated in conjunction with units of other makes. Always operate Ford Generators & Regulators together.

CHECKING GENERATING CIRCUIT

CHECKING GENERATING CIRCUIT: Preliminary check of Battery, Charging Circuit Resistance, and Generator Output should be made to locate trouble if generating circuit faulty.

Battery: If specific gravity below 1.250, recharge battery or install fully charged battery.

Generator Output: Connect jumper between "A" and "F" generator terminals. Connect ammeter in charging line at generator (see Ford Note below) by disconnecting lead at generator "A" terminal and connecting ammeter between this terminal and the lead. Run engine, increase engine speed to 1500 RPM. and note ammeter reading which should be at least 35 amperes (Ford & Mercury), 40 amperes (Lincoln). If output less than this figure, repair or replace generator.

Ford Testing Note—Generators can be tested without regulator and car wiring in circuit by disconnecting lead at regulator "ARM" terminal and leaving this lead disconnected during test. Connect negative lead of test ammeter to generator "A" terminal and **immediately after starting engine** connect ammeter positive lead to the battery. Generator will charge directly through the test ammeter to the battery. Disconnect ammeter as soon as engine is stopped to prevent battery discharging through generator windings.

►*CAUTION—Stop the engine and remove test leads as soon as test completed to prevent overheating of the generator (with above connections generator operates without regulation).*

Charging Circuit Resistance: Check for high resistance in charging circuit as detailed below (high resistance will reduce charging current to battery and may cause high voltage).

Ford Models—Connect voltmeter between generator "A" terminal and negative (ungrounded) battery post. Discharge battery partially by cranking engine for approximately 15 seconds with ignition switch OFF. Then run engine at 1500 RPM. and note voltmeter reading. Voltage drop in charging line should be less than 0.6 volt. If drop exceeds 0 6 volt, locate trouble by checking voltage drop between the following points (touch test leads to points indicated, voltmeter reading will be voltage drop in this part of circuit and should not exceed figure listed). Then check ground circuit.

1)—Generator "A" terminal & Regulator "ARM" terminal—0.1 volt max.

2)—Generator "A" terminal & Regulator "BAT" terminal—0 35 volt max.

Ground Circuit Resistance—After checking charging line resistance (above), connect voltmeter between battery positive (grounded) post and ground terminal on generator frame. Voltmeter reading should be less than 0.1 volt.

Lincoln & Mercury—Connect test ammeter in charging line at generator (disconnect lead at generator "A" terminal, connect ammeter between this lead and the terminal), connect voltmeter at charging lead (same point as ammeter connected) and to ungrounded battery post. Connect jumper wire between generator "A" and "F" terminals (will short out regulator). Run engine so that generator charges at exactly 35 amperes. Note voltmeter reading which will be voltage drop in charging circuit and should not be greater than 0.8 volts. If drop exceeds 0.8 volts, locate trouble by checking voltage drop between the following points (touch test leads to points indicated, voltmeter reading or voltage drop in this part of circuit should not exceed figure listed). Then check ground circuit.

1)—Generator charging line & Regulator "ARM" terminal—0.15 volt max.

2)—Regulator "ARM" terminal & Regulator "BAT" terminal—0.3 volt max.

3)—Regulator "BAT" terminal & Battery negative post—0.35 volt max.

4)—Generator "F" terminal & Regulator "F" terminal (jumper between generator "A" & "F" terminals removed)—very slight movement of pointer.

Ground Circuit Resistance—Connect ammeter in charging line at regulator (disconnect lead at regulator "BAT" terminal, connect ammeter between this lead and the terminal), connect voltmeter between grounded battery post and generator frame. Connect a jumper wire between generator "A" and "F" terminals. Operate engine and adjust speed so that the generator ouput is 35 amperes. Voltmeter reading should be less than 0.1 volt. If higher (indicating voltage drop in ground circuit), check generator mounting on bracket and bracket mounting on engine for poor electrical contact, check generator, regulator, and battery ground connections.

CHECKING & ADJUSTING REGULATOR

CHECKING & ADJUSTMENT OF REGULATOR: Use special test set (with an adjustable field rheostat—see Ford Test Note below). If separate test meters are used to check performance, a variable field rheostat should be used so that generator output can be varied when making tests.

Ford Test Note—Ford Test Set has a variable field rheostat (connected between regulator "F" terminal and generator field lead) and a ¾ ohm fixed resistance through which the generator charges (resistor and ammeter connected in series to regulator "B" terminal while regular charging line is disconnected from this terminal) and a carbon-pile rheostat (in parallel with the ¾ ohm fixed resistance) which can be cut in to the circuit by a push button to provide sufficient load to enable current regulator to be adjusted (carbon-pile rheostat is variable and resistance should be slowly decreased until current regulator operates). This enables all tests to be made with generator operating at 1500 RPM.

►*NOTE*—Regulator should be at normal operating temperature when checking regulator settings.

►*CAUTION*—Ground connection must be in place when generator and regulator are operated. If ground wire disturbed by removal of regulator cover, *make certain that regulator and generator are both grounded whenever these units are being operated.*

REGULATOR SETTINGS

Relay Cut-in Voltage—Connect ammeter in charging line at regulator "BAT" terminal (disconnect lead at this terminal, connect one ammeter lead to this lead, connect other ammeter lead to terminal). Connect voltmeter between regulator "ARM" terminal and ground on regulator base. Connect jumper wire between generator "A" and "F" terminals. Start engine and slowly increase speed until relay contacts close, note voltmeter reading (pointer will drop back slightly at this point). Cut-in voltage should be within limits shown in table below. To adjust, remove regulator cover, bend support at lower end of relay armature spring in to increase tension and raise cut-in voltage, bend support out to decrease tension and lower cut-in voltage.

Relay Cut-out Reverse Current—After checking cut-in voltage above, increase engine speed until generator charges at approximately 10 amperes, then slowly decrease engine speed and note reverse or discharge current reading on ammeter at instant relay contacts open. If this reverse current not within limits shown in table below, check relay air gap and armature stop setting (see Specifications below).

Cutout Relay Settings

Regulator Type	Cut-in Voltage	Cut-out Reverse Current
01A-10505-C, C4	6.4-6.9 volts	0-8 amperes
5EH-10505-C	6.6-7.0 volts	0-8 amperes
51A-10505-A1	6.6-7.0 volts	0-8 amperes
51A-10505-A2, B2, C2, D2	6.0-6 3 volts (Cold).	0-8 amperes
51A-10505-H, J	6.6-7.0 volts	0-8 amperes
8A-10505-A	6.0-6.6 volts	0-8 amperes
8L-10505	6.0-6.6 volts	0-8 amperes
8M-10505-A	6.0-6.6 volts	0-8 amperes
FAC-10505-A,A1,A2	6 0-6 6 volts	0-8 amperes
FAD-10505-A	6.0-6 6 volts	0-8 amperes
FAE-10505-A	6.0-6.6 volts	0-8 amperes
FAJ-10505	6.0-6.6 volts	0-8 amperes

►*IDLE SPEED NOTE*—If higher than cut-in point, it will be necessary to back off throttle stopscrew and bring idling speed below cut-in point.

Voltage Regulator Setting—Check with the cover in place and at 70-80°F. with the regulator at normal operating temperature (after operating for 30 minutes or having been heated on the test bench so temperature stabilized). Connect ammeter in charging line at regulator "BAT" terminal (disconnect lead on this terminal, connect ammeter to this lead and to the terminal), connect voltmeter between regulator "ARM" terminal and ground. Run engine at 1500 RPM., adjust charging rate to 8-10 amperes (if less than 8 amperes, turn

CONTINUED N NEXT PAGE

FORD, LINCOLN, MERCURY REGULATORS (Cont.)

on lights or other load; if more than 12 amperes, cut in resistance of the test set). Note voltmeter reading with generator output of 8-10 amperes (CAUTION —cover must be in place when making this reading). To adjust, remove regulator cover, bend spring adjustment (bending arm—see illustration) upward to increase spring tension and voltage setting, or down to decrease spring tension and voltage setting. Re-install cover and repeat test.

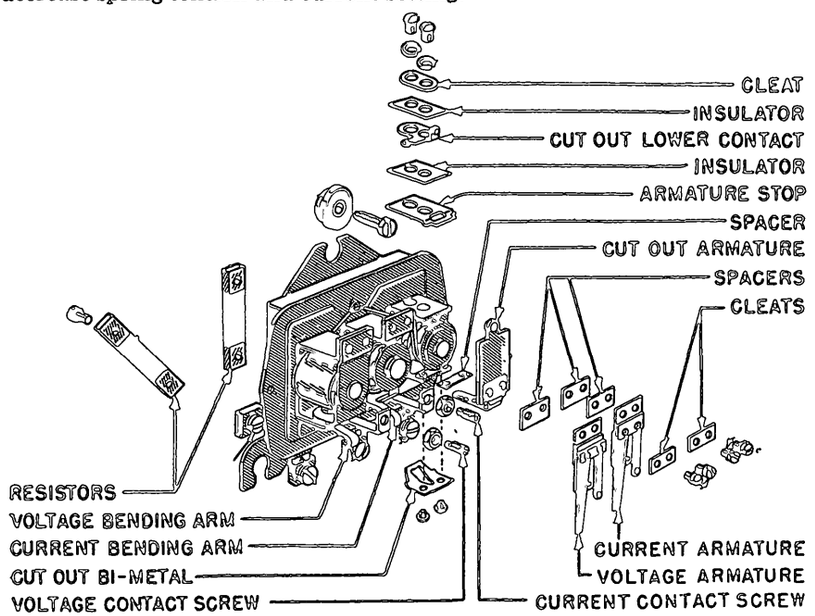
▷*CAUTION*—Voltage will drop approx. 0.2 volt when steel cover installed and should be allowed for when adjusting (aluminum covers do not change setting).

Voltage Regulator Setting

Regulator Type	Setting (Volts)
01A-10505-C, C4	7.2-7.6
5EH-10505-C	②7.2-7.6
51A-10505-A1 (Std. & Trop.)	7.2-7.6
51A-10505-A2, C2 (Std.)	①7.0-7.3
51A-10505-B2, D2 (Trop.)	①6.8-7.3
51A-10505-H (Std.)	7.2-7.6
51A-10505-J (Trop.)	7.0-7.4
8A-10505-A (Std.)	②7.2-7.6
8L-10505 (Std.)	②7.2-7.6
8M-10505-A (Std.)	②7.2-7.6
FAC-10505-A,A1,A2	③7.4-7.8
FAD-10505-A	③7.4-7.8
FAE-10505-A	③7.2-7.6
FAJ-10505	③7.1-7.3

①—Cold setting.
②—7.0-7.4 volts with regulator COLD.
③—With Ambient air temperature from 70 to 80°F.

Current Regulator Setting—After checking Voltage Regulator (above) re-install regulator cover if removed. Proceed as for voltage regulator check with engine running at 1500 RPM. (approx. 30 MPH.), use Battery-Starter Tester to increase load (or decrease resistance of carbon-pile regulator on Ford Test Set), note ammeter reading which should agree with current regulator setting below. To adjust, remove regulator cover, bend spring adjustment (bending arm—see illustration) upward to increase spring tension and current setting, or down to decrease spring tension and current setting.



REGULATOR CONTACT ASSY. (EARLY TYPE)

Current Regulator Setting

Regulator Type	Setting (Amperes)
01A-10505-C, C4	30-33
5EH-10505-C	38-42
51A-10505-A1	30-34
51A-10505-A2, B2, C2, D2	30-33
51A-10505-H, J	34-38
8A-10505-A	30-34
8L-10505	38-42
8M-10505-A	34-38
FAC-10505-A,A1,A2	34-38
FAD-10505-A	38-42
FAJ-10505	48-52

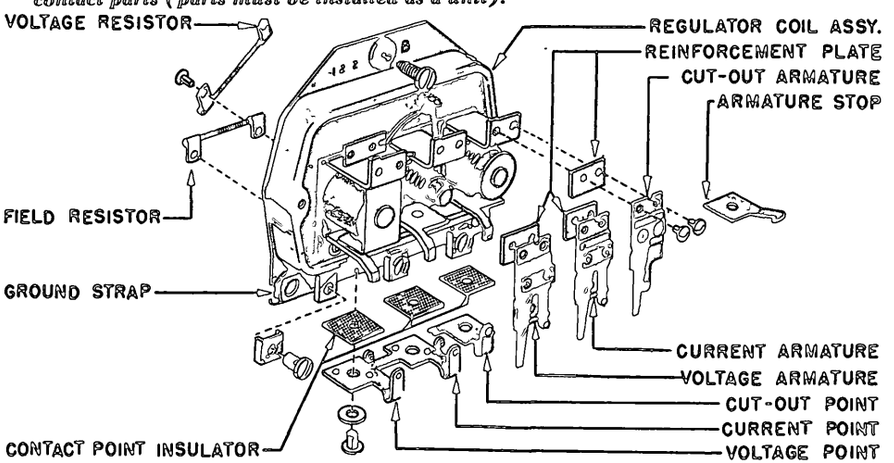
▷*CAUTION*—After tests completed, disconnect test meters, connect charging line to regulator "BAT" terminal. Make certain that jumper removed from generator "A" and "F" terminals.

REGULATOR SPECIFICATIONS

Cutout Relay Contact Gap—.010" with armature against stop.
Cutout Relay Air Gap—.014" between armature and core with contacts open.
Contact Gap and Air Gap Setting—Insert .014" feeler between armature and core. Then set contact gap to .010" using a feeler gauge, by lowering armature stop and raising the lower contact, tighten 2 lower contact screws.
▷*CAUTION*—Heel of armature must not touch relay frame.
Aligning Cutout Relay Contacts—Contacts must make and break squarely. If adjustment necessary, bend lower contact up or down, then check Air Gap and Contact Gap (may be disturbed by movement of lower contact).
Regulator Air Gap—.032-.035" between armature and core (contacts closed).
Setting Air Gap—Bend the spring adjustment (bending arm)—see illustration —to clear armature spring. Insert .035" gauge (round stock) between armature and core (*CAUTION*—On voltage regulator make certain gauge does not contact rivet on underside of armature). Press armature down, turn contact screw down to just touch armature contact, set contact screw with locknut. Realign contacts
Regulator Contact Spring Tension—5 ozs. minimum with contacts just opening.
Checking Contact Spring Tension—Use a spring scale to measure tension just as contacts open. Adjust upper contact screw after loosening locknut if pressure below limits listed above.
▷*Check Relay and Regulator Settings after completing above adjustments.*

CONTACT REPLACEMENT

CONTACT REPLACEMENT: *See illustrations for contact mounting details.*
Cutout Relay: *CAUTION*—Lower cutout contacts replaceable only on regulators where contact mounting secured by screws (if contact secured by rivets, regulator must be replaced if contacts damaged).
Voltage & Current Regulators: *See "Changes, Cautions, Corrections" for later design contact parts (parts must be installed as a unit).*



REGULATOR CONTACT ASSY. (LATER TYPE)

BARREL TYPE BENDIX

See Starter Drive listing on individual car model pages for type used.

DESCRIPTION: This drive retains Bendix inertia principle of engagement and free longitudinal movement to insure pinion mesh but has been redesigned so that all parts of drive mechanism except drive spring are located within the pinion barrel. The threaded sleeve is mounted loosely on an extension of the drive head (instead of directly on the starter shaft) and is retained by the stop nut which is screwed and staked in place on the outer end of the head. The pinion is integral with the barrel or drive sleeve and is mounted loosely on the starter shaft (not on threaded sleeve as in former types). Starter drive is through lugs on the control nut or driving ring on the screw shaft which engage slots in the end of the pinion barrel. Pinion barrel is held in place on control nut by a locking ring within the end of the barrel directly behind the driving lugs. A coil type anti-drift spring is mounted on the threaded sleeve ahead of the control nut and a meshing spring is located within the head of the barrel

BENDIX SPRINGS: Both Type "F" and "H" driving springs formed with special smaller diameter end coil designed to fit closely on shaft at ends. No spring clips used with these types. Springs may be identified by larger (3/8") spring eye. Spring eyes located on same side of coil (Type F), or 180° apart (Type H).

OPERATION: Pinion, barrel, and control nut operate as a unit and pinion is moved out into mesh with the flywheel as the control nut is threaded along the threaded sleeve. If the pinion teeth strike the ends of the flywheel teeth, the free longitudinal movement of the threaded sleeve on the drive head allows the pinion to turn slightly and mesh properly. This free movement important to insure correct meshing and prevent jammed pinion or damage to gear teeth.

SERVICING: No servicing required except cleaning and oiling of threaded sleeve and armature shaft under pinion when operation not satisfactory.

Armature Shaft:—Rotate pinion back to demeshed position, clean exposed portion of shaft with kerosene, lubricate lightly (Gredag 31¼ graphite grease).

Threaded Sleeve:—Rotate pinion forward to meshed position as far as possible, wipe threads clean with dry cloth or use kerosene sparingly (not gasoline). Do not wash entire drive in kerosene or grease installed under threaded sleeve at time of assembly will be removed (threaded sleeve cannot be removed to replace this lubricant). Lubricate threaded sleeve lightly with 10-W engine oil.

TROUBLE SHOOTING: If pinion jams or meshes improperly, check as follows:

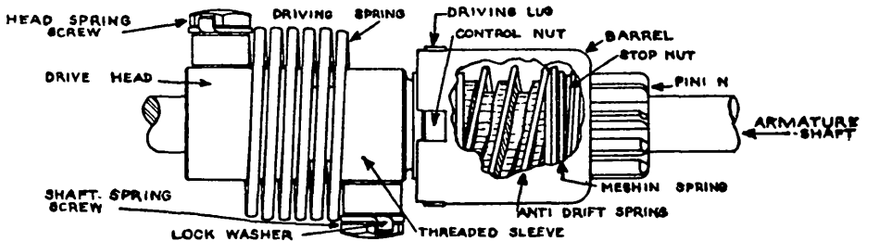
(1) Armature shaft rough or burred, dirty or rusty under threaded sleeve (first type only). Remove Bendix, clean and smooth shaft, lubricate shaft lightly with graphite grease Gredag 31¼ before replacing drive.

(2) Armature shaft rough, burred or dirty under Bendix pinion (all types). Thread pinion back on threaded sleeve (demeshed position), smooth shaft with emery cloth or clean with kerosene (do not use gasoline), lubricate shaft lightly with Gredag 31¼ graphite grease.

(3) Armature Shaft Bent. Remove Bendix drive. Check shaft and straighten

(4) Drive spring screw at threaded sleeve end too long. See that spring does not project through sleeve and bind on drive head extension (on first type screw will bind on armature shaft).

(5) Cocked or deformed drive spring. This will cause threaded sleeve to drag on armature shaft (first type) or on drive head extension (later types). Remove spring by taking out spring screws, examine spring, replace if necessary. Spring eye centers should be at right angles to spring axis (See Spring Note above). Use new lockwashers under spring screw heads when replacing screws and see that one lip of washer is turned down in spring eye gap and other lip turned up against screw head flat.



BARREL TYPE (SPRING SCREW TYPE) BENDIX DRIVE

BENDIX "FOLO-THRU" STARTER DRIVE

DESCRIPTION & OPERATION: The "Folo-Thru" Bendix Drive is similar to other Bendix Barrel-Anchor Plate types and operates in the same manner except for the Detent Pin action which prevents premature demeshing of the pinion from the flywheel ring gear as follows:

Detent Pin Operation—The detent pin consists of a spring-loaded plunger in the Control Nut which drops into notch in the screwshaft when the pinion is in the fully engaged position. The pin cannot be disengaged or the pinion moved manually from the engaged position and will only release when the pinion speed reaches 5800-7300 RPM. (at this point, centrifugal force moves the pin outward to free the pinion) and the pinion then is free to disengage from the flywheel ring gear. A ratchet clutch on the screwshaft (between the pinion and the drive spring) allows the pinion to overrun the starter armature shaft and prevents damage to the starter when the pinion is being driven by the engine. *NOTE*—An Anti-drift Spring (similar in appearance to the Detent Pin) is also located in the Control Nut. This anti-drift pin rides on the teeth of the screwshaft and prevents accidental engagement of the pinion due to vibration while the engine is running.

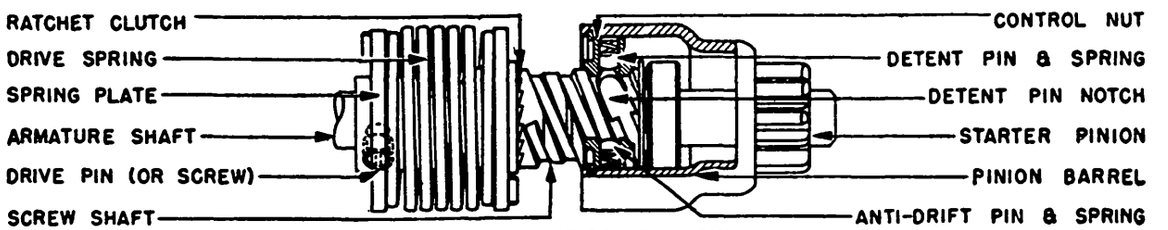
SERVICING: *Do not disassemble this drive* (furnished only as a complete unit due to calibration requirements of Detent and Anti-Drift Pin Springs). Service is limited to removal and installation of the drive or to cleaning when necessary (if drive fails to operate due to gummy deposit of oil or dirt).

Cleaning the Drive: Dip screwshaft and pinion assembly in clean kerosene or use brush to apply kerosene, run pinion back and forth on threads to remove all gum and grit, dry the drive with compressed air. No lubrication is recommended although a very light film of SAE 10W engine oil can be used on moving parts if desired. ***CAUTION—Too much oil on screwshaft will collect dust and produce a gummy condition which will interfere with drive operation.***

REMOVAL: To remove drive assembly from armature shaft, push spring plate toward drive pinion to expose the setscrew or pin mounting the drive on the armature shaft. Remove this screw or pin, slide drive off shaft. Do not disassemble the drive.

INSTALLATION: ***CAUTION—Drive cannot be moved manually from engaged to disengaged position, however drive can be installed on starter and starter installed on engine with drive in the engaged position.*** Slide drive assembly on armature shaft and align mounting screw hole in screwshaft with hole in armature shaft, compress spring plate and insert mounting screw or pin. Install starter on engine.

►*CAUTION*—If drive in "Engaged" position, make certain that pinion properly engaged in flywheel ring gear teeth and that starter seated solidly on its mounting flange before mounting screws are tightened. DO NOT FORCE STARTER INTO PLACE (will cause misalignment and binding of pinion teeth or drive).



BENDIX "FOL -THRU" STARTER DRIVE

STANDARD BENDIX DRIVE

DESCRIPTION: The Standard Bendix Drive consists of a counterweighted pinion loosely threaded on a screw sleeve driven by a drive spring bolted to the starter shaft. The pinion teeth are chamfered on one side and specially rounded for easy meshing with the flywheel gear. Drives are furnished for right and left rotation.

OPERATION: When the starter shaft turns, it drives the screw sleeve (through the drive spring) and the pinion being counterweighted and loosely threaded on the screw sleeve, tends to remain stationary. This causes the pinion to move along the sleeve and engage the flywheel. In the event the teeth butt, the threading action causes the sleeve to be pushed backwards against the compression of the drive spring, the longitudinal movement permitting the pinion to turn slightly further and enter the flywheel.

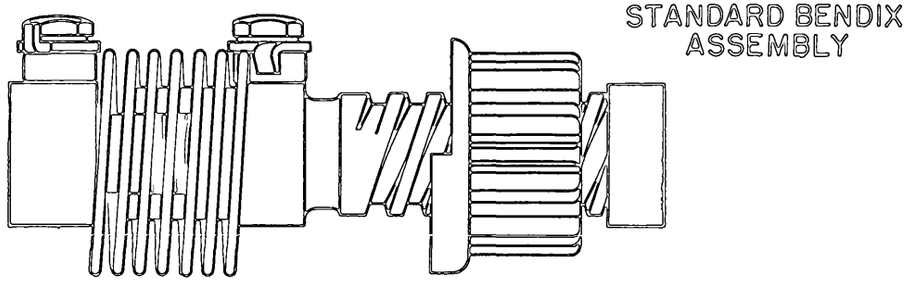
ADJUSTMENTS: With the drive assembled on the starter shaft and holding the drive spring compressed by hand, the distance between the end of the drive and the starter end plate should not exceed 3/8". If clearance is more than 3/8" a washer should be installed on the shaft between the drive and the end plate to obtain a clearance of 5/16" to 3/8". With the drive spring free this clearance should be 1/16". More than 1/16" will allow the pinion to ride too far through the gear which will cause the counterweight on the pinion to strike the flywheel, eventually breaking it loose from the pinion.

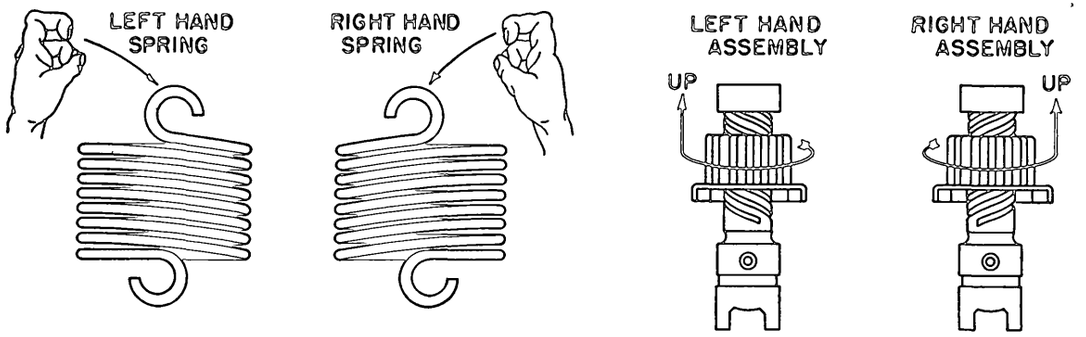
REPAIR: If the pinion teeth are worn or damaged it will be necessary to replace the pinion and sleeve assembly as pinions are not furnished separately.

RIGHT & LEFT HAND PARTS IDENTIFICATION: See illustrations for drive and spring identification.

Spring—Hold spring upright with spring loops toward you. Crook index finger as shown in illustration to conform with direction of upper spring loop. If left index finger conforms with loop, spring is Left Hand type. If right index finger conforms with loop, spring is Right Hand type.

Screw Shaft "SA" Assembly—Hold assembly upright, grasping the end on which spring is installed. Turn pinion so that it moves in forward (upward) direction on shaft. If pinion turns to left and pinion teeth are chamfered on left hand corner, assembly is Left Hand type. If pinion turns to right and teeth are chamfered on right hand corner, it is Right Hand type.





BENDIX DRIVE ASSEMBLY & PARTS IDENTIFICATION

SPECIAL BARREL TYPE BENDIX (NASH & STUDEBAKER)

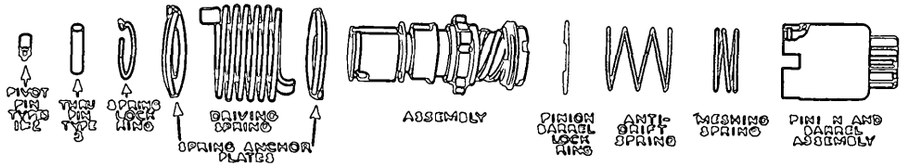
DESCRIPTION: Same as other Barrel Bendix Drives except that Drive Spring is anchored by two identical notched plates (instead of screws used on other types). Inner anchor plate retained by locking ring (Types 2 and 3 only) and anchor plates and drive spring can be taken off after locking ring removed.

REMOVAL & INSTALLATION: To remove drive from armature shaft, screw pinion and barrel assembly all the way back toward the drive spring, push head anchor plate in against drive spring compression to uncover pilot pin, remove pin, slide drive off shaft being careful not to lose woodruff key in shaft (Types 1 and 2). When installing drive, make certain that pilot hole in armature shaft is clean to permit full seating of pilot pin, install woodruff key in shaft, see that pilot pin tongue does not extend above the edge of the hole when installed and that the head anchor plate covers the top of the pin (this is important to prevent pin working out in service).

SERVICING: Disassembly. Remove locking ring within pinion barrel (drive spring end) by inserting screwdriver in lug recess in barrel nearest lock ring end and working ring out (be careful not to distort ring), remove pinion and barrel assembly from screw shaft. To remove anti-drift spring, pull spring back until end coil slips over stop nut shoulder (hook finger under spring 180° from end coil), remove spring taking care not to distort it.

Drive Spring & Anchor Plates (Types 2 and 3 only). Remove lock ring on screw shaft at outer end of anchor plate (use pliers and take care not to distort ring), slide head anchor plate and spring off. Do not remove shaft anchor plate (nearest barrel) unless necessary. If this anchor plate removed, install by cocking the fibre washer so that the edge projects through hole at point under spring slot in anchor plate, then feed it through hole in anchor plate carefully to avoid damage. When installing drive spring, see that dished faces of anchor plates face spring (see illustration), and that the anchor plate covers the top of the pilot pin. See that lock ring is properly seated in groove and spring opening is over the top of the pilot pin (important).

Drive Assembly. Check anti-drift spring clearance in pinion barrel (spring should fall into barrel freely, if either end binds, install new spring). To install spring hook end over stop nut and thread spring in until it strikes control nut, then push end over stop nut. Check by threading control nut half turn forward on screw sleeve and making certain that spring does not project beyond control nut or stop nut shoulder. See that meshing spring is in place in pinion barrel, install pinion barrel and lock ring. See that pinion and barrel assembly moves freely on screw sleeve. In fully demeshed position, pinion and barrel assembly should rethread itself (slight click will be evident) on all three screw sleeve threads with slight reverse rotation of barrel.



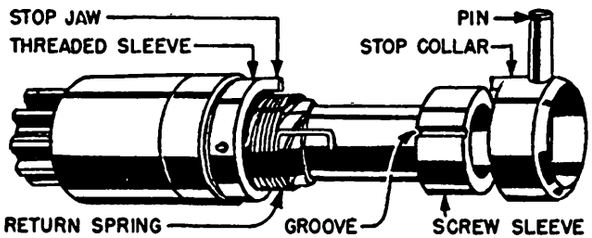
BARREL TYPE (ANCHOR PLATE TYPE) BENDIX DRIVE

DELCO-REMY AUTOMATIC DRIVE

DESCRIPTION: Delco Remy Automatic Drive operates on the principle of a screw shaft drive, as used on Bendix Drive. The pinion is spring loaded, and if tooth abutment occurs, continued rotation of the armature results in the pinion turning and meshing with the flywheel teeth. By this method cranking motor force is not applied against the face of the teeth until pinion is in cranking position. When pinion reaches cranking position, the spring-loaded detent plunger in the threaded sleeve drops into place and locks the pinion in this position. The starter armature drives the pinion through the drive spring in the threaded sleeve which absorbs the shock of engagement. When the engine starts to fire, the starter is driven at increased speed and at 4000 RPM. the centrifugal force lifts detent plunger out of engagement to unlock the pinion. The pinion moves out of mesh with the flywheel ring gear and in the "at rest" position the jaw on the pinion assembly comes up against the jaw on the stop collar.

INSTALLATION OR REPLACEMENT DRIVE: Furnished as a completely assembled unit ready for installation. Remove old drive by prying lock ring out of groove in stop collar and pushing pin out far enough to clear armature shaft (on first drives without this lock ring, pin is staked in place and must be driven out), then slide drive off shaft. Clean armature shaft thoroughly, coat shaft with film of 5W engine oil (if 5W not available use 10W plus 10% kerosene). Make certain that thrustwasher in place on shaft. Pry lock ring out of groove on new drive, slide pin out to clear shaft hole, install new drive on armature shaft, push pin through armature shaft hole (if pin tight, rotate shaft 180° and insert pin through opposite end of shaft hole), install lock ring. Rotate pinion into cranking position and check for proper operation of detent plunger (pinion should be locked in this position by plunger). Check and adjust endplay as follows:

Drive Endplay: .010-.035". To check endplay with pinion in cranking position (locked by detent plunger), pull pinion firmly back toward barrel until all endplay is taken up, measure clearance between end of pinion and face of thrustwasher with a feeler gauge. If clearance not .010-.035", remove drive and install service thrustwasher of correct thickness. Thrustwashers furnished as follows: No. 1914999 (.062" thick), No. 1917886 (.041" thick).



DELCO-REMY STARTER DRIVE

DISASSEMBLY: Pry lock ring out of groove in stop collar and push pin out far enough to clear armature shaft (on first drives without this lock ring, pin is staked in place and must be driven out), slide drive assembly off armature shaft. Pull pin out and remove stop collar. Slip end of return spring from notch in head of screw sleeve, thread the screw sleeve in a clockwise direction out of the pinion spring and collar assembly. Disengage the return spring from the hole in the threaded sleeve. This completes the disassembly.

REASSEMBLY: Install the short end of the return spring in the locating hole of the threaded sleeve. Align the milled groove in the threads of the screw sleeve with the detent plunger on the threaded sleeve, rotate screw sleeve in a countr-clockwise direction until it locks against the detent plunger, lift detent plunger, continue to rotate screw sleeve until it bottoms in the threaded sleeve. Rotate free end of return spring in direction to tighten spring until end lines up with groove in screw sleeve, engage spring end in groove, install stop collar on sleeve (will lock spring end in place) with stop jaw on collar in line with stop jaw on threaded sleeve, rotate threaded sleeve approximately ¼ turn clockwise to align hole in sleeve and hole in collar, insert pin through one side of collar and into screw sleeve hole (pin and lock ring will be finally installed when drive installed on starter).

Installation Note—See Installation of Replacement Drive above.

AUTO-LITE MAGNETIC STARTER SWITCHES

	Auto-Lite No.
CROSLEY	
1947-52	SS-4007
DODGE	
1946-50	SST-4001
1951-52	SST-4006
1953-55①	SST-4006A
1955③	SST-4013
FRAZER & KAISER	
1947-48	SS-4001
HUDSON	
1939-50	SS-4001
1951-53	SS-4030
HENRY J	
1951-52	SS-4014

	Auto-Lite No.
PACKARD	
1941 6 & 8	SS-4017
1942 6 & 8	②SS-4025
1946-50 6 & 8	②SS-4017
1948-50 Super 8	②SS-4017
1951-52 200, 250, 300	②SS-4017
1953 All Models	②SS-4017
1954	SST-4010
1955 (Early)	SSW-4101
PLYMOUTH	
1946-50	SST-4001
1953-55①	SST-4006
1955③	SST-4013
WILLYS	
1952-53 Utility	SS-4018
1952-53 Pass. Cars	SS-4018
1953-54 Pass. Cars	SST-4012

①—1955 Models with Std. Trans.

②—This switch used with Carter Car Starter. See separate article for data on Carter Car Starter.

③—With Automatic Transmission.

DESCRIPTION: Magnetic solenoid switches of conventional design mounted on the starter field frame and controlled by a pushbutton switch on the instrument panel. The feed wire for the switch solenoid is connected to the coil side of the ignition switch so that the starter is operative only with the ignition turned on. See car diagrams for wiring and connections of each installation.

OPERATION: Two springs are used in connection with solenoid coil to control the switch action. When the solenoid circuit is completed by pressing the pushbutton switch, the solenoid plunger is drawn into the coil against the tension of a light spring. After the main switch contacts close, the plunger compresses a second spring, insuring a positive connection at the switch contacts. When the pushbutton switch is released, breaking the sol noid circuit, this second spring quickly separates the main switch contacts, preventing arcing or burning of the contacts. The first spring then returns the solenoid plunger to the off position.

CHECKING & ADJUSTMENT: If switch does not operate satisfactorily, check performance specifications as given below. No adjustments are required in service.

PERFORMANCE SPECIFICATIONS:	**6 Volt Types**	**12 Volt Types**
Closing Voltage	3.0-4.0 volts	6.0-8.5 volts
Opening Voltage	0.5-1.25 volts	1.0-2.5 volts
Coil Draw (at 77°F)	①2.6-3.3 amperes	②1.43-1.62 amperes
Voltage Drop (with 100 amperes)	0.20 volts max.	0.20 volts max.

①—At 6.0 volts. ②—At 12.0 volts.

AUTO-LITE MANUAL PINION SHIFT STARTER SWITCHES

CROSLEY	Switch No.	Starter No.
1942	SW-3911	MZ-4101
DE SOTO		
1941	SW-2813	MAW-4019, A
1942	SW-2813	MAW-4026
DODGE		
1941	SW-2813	MZ-4089, A
1941 (Canada)	SW-2813	MAW-4019, A
1942	SW-2813	MAW-4026
PLYMOUTH		
1941	SW-2813	MZ-4089, A
1941 (Canada)	SW-2813	MAW-4019, A
1942	SW-2813	MZ-4105
1942 (Canada)	SW-2813	MAW-4026
WILLYS		
1946-50 Utility①	SW-2677A	MZ-4137
1950-52 Utility①	SW-2677A	MZ-4162

①—Except Jeep Models

►***PINION STOP & RETAINING RING WEAR & BREAKAGE (MCH-6106, MCH-6110, MCL-6110, MCL-6111 Starters with MCH-2070 Armature):*** On early starters noted above, failure of the starter may be caused by pinion stop and retaining ring moving on armature shaft Correct by installing new armature (with hardened shaft) and new retaining ring and pinion stop which have reduced clearances in shaft groove ***CAUTION***—"Pinion clearance when engaged" setting should be carefully adjusted to limits shown in ADJUSTMENTS below to prevent pounding of the stop when the pinion is engaged

DESCRIPTION & OPERATION Manually operated pinion shift and starting switch assembly with switch mounted on the starter field frame Shift lever is linked to starting pedal on toeboard and is operated by depressing the pedal First movement of the lever meshes the pinion with the flywheel ring gear and the switch is then closed by a lug on the lever (if pinion teeth butt against flywheel teeth, a spring permits further movement of the lever to close the switch, and the pinion is meshed by the spring as the armature starts to turn) An overrunning clutch in the starter drive prevents starter being driven at excessive speed when the engine begins to fire (pinion is demeshed by the return spring as soon as the pedal is released).

ADJUSTMENT: Check the following specifications and adjust as required·

Pinion Position when Disengaged: With starter at rest, the distance from the outer face of the pinion housing (face of starter mounting flange) to outer face of the pinion is shown in table below.

Pinion Position (Disengaged)

Starter Model	①Pinion Distance	Starter Model	①Pinion Distance
MAW (All Models)	1 11/32"	MCH (All Models)	1 317-1 467"
MAX (exc MAW-4009)	1 11/32"	MCL (All Models)	1 317-1 467"
MAX-4009 only	See Note	MZ (Exc MZ-4137, 4162)	1 11/32'
		MZ-4137 & 4162	25/32'

①—Variation of Plus 1/64" or Minus 5/32" is allowable.

MZ-4101 Note—With pinion at rest, distance from center of locating dowel hole to face of pinion should be 3½" with ⅛" clearance between pinion and flywheel. Pinion travel between at rest and fully meshed positions should be ½"
MAX-4009 Note—With pinion at rest, distance from center of locating dowel hole to outer face of pinion should be 2 11/32" plus 1/64" or minus 5/32"

Pinion Clearance when Engaged: With shift lever at end of the travel, clearance between outer face of pinion and thrust washer next to outer pinion bearing is shown in table below Adjust by pressing down on spring on switch plunger and turning button on outer end of plunger in or out The button is locked by the end of the spring

Pinion Clearance (Engaged)

Starter Model	①Pinion Clearance	Starter Model	①Pinion Clearance
MAW (All Models)	5/64"	MCL-6110, F, T, 6111, T	3/32"
MAX (All Models)	5/64"	MCL-6112	5/64"
MCH-6103	5/64"	MCL-6126	3/32"
MCH-6106, F, T, 6110	3/32"	MZ (Exc MZ-4137, 4162)	5/64"
MCL-6102, 6103	5/64"	MZ-4137, 4162	37/64"

①—Variation of plus or minus 1/64" is allowable

Switch Travel The full stroke or travel of the switch plunger should be approximately 5/32" (All MAW & MAX Starters, All MZ Starters except MZ-4137 & 4162), 3/16" (MZ-4137 & 4162), 3/16" (All MCH & MCL Starters) See pinion clearance data above

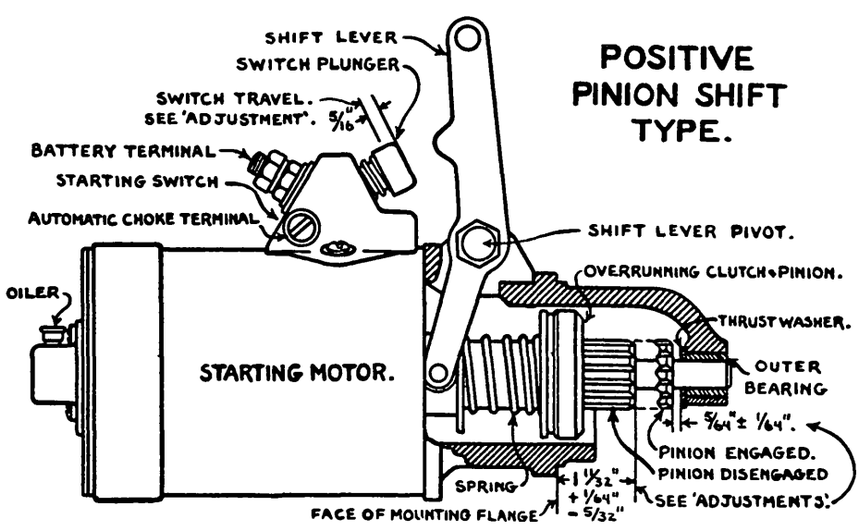
MAW-4019 & 4019A Note—Tension required to move yoke lever into contact with starting switch button should be 9-15 lbs at hole 3 3/16" from yoke pin

Checking Switch Action: Switch action can be checked by slipping a special steel spacer (square stock 1" wide, ¾" thick, with ⅝" slot in the 1" face) on armature shaft between pinion and thrust washer at pinion housing outer bearing. With spacer in place, switch should close when pressure applied to outer end of pinion shift lever.

MCH-6106, F, T; 6110 Note—When checking switch action on these models, use spacer block ½" thick instead of regular ¾" thick block mentioned above
MCL-6110. F, T: 6111, T; 6126 Note—When checking switch action on these models, use spacer block ½" thick instead of regular ¾' thick block mentioned above

MZ-4101 Note—When checking switch action on this model, use spacer block ⅜" thick instead of regular ¾" thick block mentioned above.

Armature Endplay: The armature endplay should be .005" minimum, .030" maximum Adjust by inserting MU-54 thrust washer of correct thickness between the MAD-96 thrust washer and the commutator end plate These thrust washers furnished in following thicknesses MU-54 or MU-54F—1/32", MU-54A or MU-54G—1/64", MU-54B or MU-54J—3/64", MU-54L—1/16", MU-54K—5/64"



AUTO-LITE SOLENOID STARTER SWITCHES (WITH RELAY)

CHRYSLER	Switch No.	Starter No.
1941 6 & 8	SS-4703	MAX-4045, A
1942-48 6 & 8	SS-4705	MAX-4050
1949-50 6 & 8	SS-4707	MCL-6101
1950 Late 6 & 8	SSX-4101	MCL-6108
DE SOTO		
1942 (Fluid Drive)	SS-4705	MAX-4050
1946-48	SS-4707	MAW-4025
1949-50	SS-4707	MCH-6102
1949-50 (Canada)	SS-4707	MAW-4055
PACKARD		
1941 Super 8	SS-4205	MAX-4041
1942-50 Super 8	SS-4205	MAX-4052
1948-50 Custom 8	SS-4205	MAX-4052
1951-52 400 Patrician	SSX-4102	MCL-6114
STUDEBAKER		
1941 7C President	SS-4702	MAX-4044
1942 8C President	SS-4702	MAX-4051

►**1946 PACKARD MAX-4052 STARTER CLUTCH REPLACEMENT:** When trouble encountered with the clutch on these starters, examine starter for yellow paint mark on pinion housing between frame and mounting face (mark indicates that latest type clutch installed) and INSTALL NEW CLUTCH on all starters not so paint marked. *CAUTION*—Install only latest type clutch, Part No. MAX-3075 **marked by yellow paint on pinion,** and use extreme care in adjusting the switch linkage so that correct synchronization of switch and pinion shaft linkage is secured. *See Adjustment data below.*

DESCRIPTION: This is a solenoid type combined starting switch and pinion shift mounted on the starter field frame. The solenoid plunger is connected to the pinion shift lever by an adjusting stud and link so that the pinion is engaged and the switch contacts closed when the solenoid is energized. The solenoid is controlled by a relay in the solenoid case which is operated by a pushbutton on the instrument panel or special controls as follows:

►**Packard Starting Switch Note**—Control switch is "Carter Car Starter" mounted on the carburetor and actuated by depressing the accelerator pedal. *See "Carter Car Starter" in this section for complete data on this unit.*

OPERATION: Feed wire for the starting pushbutton is normally connected to the ignition switch (or switch side of gasoline gauge) so that the starter can be operated only when the ignition is turned 'on'. The closing of the pushbutton contacts completes the solenoid relay circuit, energizing the relay and closing the relay contacts. This completes the solenoid circuit, allowing a current flow of approximately 65 amperes through the two (series and shunt) coils of the solenoid. The solenoid plunger is drawn into the solenoid coil, engaging the starter pinion with the flywheel and closing the main starting switch contacts. The series coil is short-circuited when the switch contacts close (being connected across the contacts), but a current of approximately 15 amperes continues to flow through the shunt coil which holds the plunger in so that the pinion remains in mesh and the switch contacts closed while the starter is cranking the engine. When the pushbutton is released, the solenoid relay circuit is broken, the relay contacts open, breaking the solenoid circuit, and interrupting the current flow through the shunt coil. The return spring on the shift lever then disengages the pinion from the flywheel and the starting switch contacts open.

An overrunning clutch is built into the starter pinion to prevent the starter being driven by the engine after the engine begins to fire and before the pushbutton is released. A spring between the shift lever collar on the armature shaft and the overrunning clutch housing is provided to assist in meshing the pinion.

ADJUSTMENT: The position of the pinion when disengaged (at rest), and clearance of pinion when fully meshed in the operating position, should be checked and adjusted as follows:

Pinion Position when Disengaged:—Distance from mounting face of pinion housing (face of starter mounting flange) to outer face of pinion is shown in table below. Measure this distance with the pinion at rest and the starter not operating. Adjust by changing armature endplay (see Armature Endplay data below).

Pinion Position (Disengaged)

Starter Model	①Pinion Distance	Starter Model	①Pinion Distance
MAW (All Models)	1 11/32"	MAX-4052	15/16"
MAX (Except following)	1 11/32"	MCH (All Models)	1.317-1.467"
MAX-4008, 4036, 4037	1 3/8"	MCL (Except following)	1.317-1.467"
MAX-4041	15/16"	MCL-6114	0.913-1.063"
MAX-4044, 4051	19/32"	MCL-6123T	1.475-1.627"

①A variation of Plus 1/64" or Minus 5/32" is allowed.

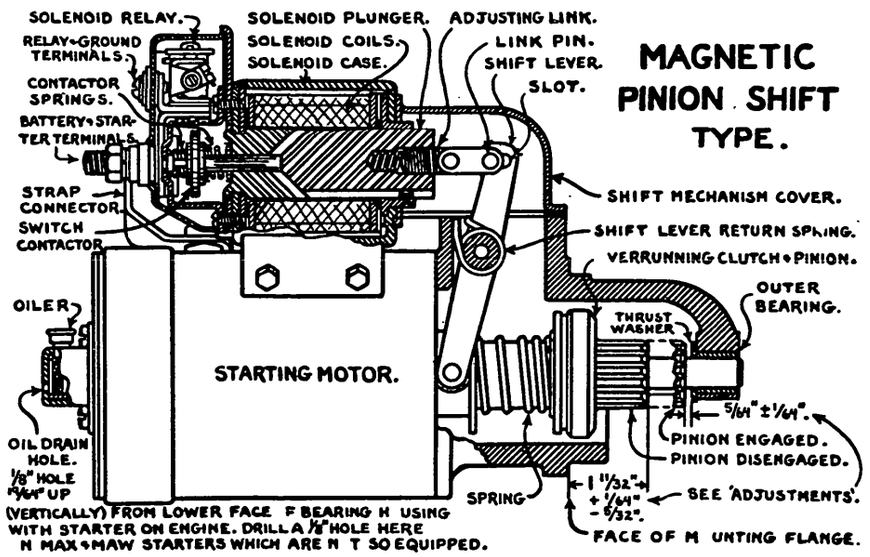
Pinion Clearance when Engaged:—With the plunger bottomed in the core, the clearance between the outer face of pinion and the thrust washer next to the pinion bearing in the outer housing is shown in table below. To check this clearance, press in on the plunger by hand until it bottoms (do not press on shift lever or pinion) or disconnect strap connector to starter terminal so that starter will not spin and connect battery to solenoid relay terminal and ground on starter field frame. Current flow through shunt coil will hold plunger in while adjustment is being made. Take out pin connecting shift lever and plunger link, turn adjusting stud in or out of plunger until pin can just be inserted with pinion in correct position. Pin should be against solenoid end of slot in upper end of shift lever. The endplay in the linkage provided by the slot is necessary for correct operation. *DO NOT take up endplay by pressing on shift lever or pinion.*

Pinion Clearance (Engaged)

Starter Model	①Pinion Clearance	Starter Model	①Pinion Clearance
MAW (All Models)	5/64"	MCH-6105, 6113, 6113A	3/32"
MAX (All Models)	5/64"	MCL-6101	5/64"
MCH-6102	5/64"	MCL (Except 6101)	3/32"

①—Variation of plus or minus 1/64" is allowable.

CONTINUED ON NEXT PAGE



AUTO-LITE SOLENOID STARTER SWITCHES (WITH RELAY) Continu d

NOTE—When operating switch, it will be noted that switch contact is made first and that a further travel of approximately 3/16" is required to bottom the plunger in the core (this will bring outer end approximately even with solenoid housing).

Starter Armature Endplay—Armature endplay must be held within limits of .005-.030" (All models except as noted below). Adjust by installing thrust washers between the MAD-96 thrust washer and the commutator end plate. These thrust washers furnished in following thicknesses: MU-54 & MU-54F—1/32", MU-54A & MU-54G—1/64", MU-54B & MU-54J—3/64", MU-54L—1/16", MU-54K—5/64".

►**MAX-4035, 4041, 4052 Armature Endplay Note**—On these models, endplay should be 1/16" maximum. On all other "MAX" starters, endplay is standard .005-.030".

SOLENOID & RELAY SPECIFICATIONS: Check solenoid performance and adjust relay settings as follows:

SOLENOID PERFORMANCE (6 Volt Types)

Series SS-4100, 4200, 4700 Solenoids

	Both Coils	Shunt Coil Only
SS-4100 Series	34.0-38.0 amps. at 3 volts	14.0-16.0 amps. at 6 volts
SS-4200 Series	34.0-38.0 amps. at 3 volts	7.0-8.0 amps. at 3 volts
SS-4700 S ries	45.0-50.0 amps. at 3 volts	7.0-8.0 amps. at 3 volts

Series SSX-4100 Solenoids

	Pull-In Coil	Hold-In Coil
Series SSX-4100	31.5-36.0 amps. at 3.0 volts	8.8-10.1 amps. at 3.0 volts

Solenoid Rel y: Control relay is built-in the solenoid housing at the starting switch end (see illustration). Relay specifications and performance are as follows:

SOLENOID RELAY PERFORMANCE

Series SS-4100, 4200, 4700 Relays

C ntacts Close—3.5-4.5 volts. Adjust by changing position of armature upper stop (contact gap adjustment). Increase gap to increase operating voltage or decrease gap to decrease voltage.

Contacts Open—1.5-2.5 volts. Adjust by changing armature spring tension. Increase spring tension to increase operating voltage or decrease spring tension to decrease voltage.

Contact Gap—.025-.035". Adjusted by changing position of armature upper stop (see closing adjustment above).

Air Gap—.005-.007" with contacts closed. Adjusted by changing position of lower armature stop.

Coil Resistance—7.5-8.3 ohms at 77°F.

Series SSX-4100 Relays

Contacts Close—1.5-3.0 volts. Armature "seals" to core at 4.0 volts.

Contacts Open—0.5 volts minimum from "sealed" position.

CHECKING SWITCH ACTION: The switch action can be checked by slipping a special steel spacer (make up from bar stock 1" wide with 5/8" slot in this 1" face and of correct thickness for each starter as listed below) on the armature shaft between the pinion and the thrust washer at the pinion housing outer bearing. With spacer in place, switch plunger should bottom and switch contacts should close with normal voltages.

Spacer Thickness

Starter Model	Spacer Thickness	Starter Model	Spacer Thickness
MAW (All Models)	3/4"	MCL (Except following)	1/2"
MAX (All Models)	3/4"	MCL-6101, 6107	3/4"
MCH-6102	3/4"	MCL-6123T	3/8"
MCH-6105, 6113, 6113A	1/2"		

TROUBLE SHOOTING: Pinion fails to engage or disengage properly. Check for interference between shift yoke and collar at open end of yoke where curved section passes over rim on collar. Binding of yoke on collar at this point should be corrected by filing yoke at point where interference occurs. Check for binding of yoke shoes on mounting pins which causes shoes to turn and bind in collar. Correct by cleaning all dirt from between shoes and yoke, lubricate shoe pins and make certain that yoke shoes installed with curved side toward pinion end of starter clutch. Check for binding of yoke assembly on yoke fulcrum pin due to paint or dirt on pin. Clean yoke pin and yoke sleeve thoroughly, examine return spring on pin. If this does not correct trouble, replace yoke assembly.

Flywheel ring gear teeth damaged by pinion. May be caused by too early closing of starting switch contacts which will result in starter operating before pinion has been meshed with flywheel. Check pinion position (see specifications above). Switch contacts should close approximately 3/16" plunger travel before plunger bottoms in solenoid core.

AUTO-LITE SOLENOID STARTER SWITCH (NO RELAY)

6 VOLT TYPES

CHRYSLER	Starter	Solenoid No.
1950-52 Six & Eight	MCL-6109	SSX-4001, 3
1951-52 Six (Hydraguide)	MCL-6117	SSX-4002
1952-53 Six & Eight	MCL-6116	SSX-4002
1953 C60	MCL-6117	SSX-4003
1953 Late C56, C58	MCL-6121, A	SSX-4004
1954 C-62	MCL-6117	SSX-4003
1954 C-63, C-64	MCL-6121A	SSX-4004
1955 (Exc C-70)	MCL-6304	SSX-4004
DE SOTO		
1950 Late Six	MCH-6105	SSX-4001
1951-52 Six	MCL-6109	SSX-4001, 3
1951-52 (Hydraguide)	MCL-6117	SSX-4002
1952-53 Six & Eight	MCL-6116	SSX-4002
1953 Late Six	MCH-6113, A	SSX-4004
1953 Late Taxicab	MCL-6121A	SSX-4004
1953 Eight	MCL-6117	SSX-4003
1954 S-19	MCH-6113A	SSX-4004
1954 S-20 (Exc. Taxi)	MCL-6117	SSX-4003
1954 Taxi	MCL-6121A	SSX-4004
1955 (All Models)	MCL-6304	SSX-4004
HUDSON		
1955 V8	MCL-6132	SSX-4003
NASH		
1955 V8	MCL-6132	SSX-4003
PACKARD		
1955 (Late)	MDF-6008	SAD-4101

12 VOLT TYPES

CHRYSLER	Starter	Solenoid No.
1953 C59 Eight	MDB-6001,A	SSY-4002
1954 C-66	MDB-6001A	SSY-4002
1955 C-70	MDB-6301	SSY-4002

►***PINION STOP & RETAINING RING WEAR & BREAKAGE (MCH-6105, MCL-6108, MCL-6109, MCL-6116, MCL-6117 Starters with MCH-2070 Armature):*** On early starters noted above, failure of the starter may be caused by pinion stop and retaining ring moving on armature shaft. Correct by installing new armature (with hardened shaft) and new retaining ring and pinion stop which have reduced clearances in shaft groove. ***CAUTION***—"Pinion clearance when engaged" setting should be carefully adjusted to limits shown in ADJUSTMENTS

DESCRIPTION: This combined starting switch and pinion shift solenoid is similar to earlier types except that no solenoid relay is used

OPERATION: Solenoid has two windings: (1) Series winding or "pull-in" coil, (2) Shunt winding or "hold-in" coil. Both windings are energized to engage the starter pinion with the flywheel and to close the main starting switch contacts. Series winding is short-circuited when the switch contacts close but shunt winding remains energized to hold contacts closed.

ADJUSTMENT: Pinion position when disengaged (at rest) and pinion clearance when engaged should be checked and adjusted as follows:

Pinion Position when Disengaged—Measure distance from face of mounting flange to outer face or edge of pinion in the "at rest" position with the armature end clearance taken up first in one direction and then in the opposite direction.

Pinion Position (Disengaged)

Starter Model	Pinion Position
MCH-6105, 6113, 6113A	1.317-1.467"
MCL-6109, 6116, 6117, 6121, 6121A	1.317-1.467"
MCL-6304	1 317-1 467"
MCL-6132	.834- 984"
MDF-6008	.834-.984"
MDB-6001, 6001A, 6301	1.317-1 467"

Pinion Clearance when Engaged—With the plunger bottomed in the core (see Note below) and with the armature endplay taken up at the commutator end, measure clearance between outer face or edge of pinion and pinion stop. If not correct, adjust by screwing the solenoid plunger or adjusting pin in or out as required after removing the pin linking the shift lever and the plunger link.

NOTE—Plunger can be bottomed in coil for above check by pressing in on plunger by hand (CAUTION —do not press on shift lever or pinion) or by disconnecting strap connector to starter terminal so that starter will not spin and then connecting battery to solenoid terminal and ground on starter field frame (coil will hold plunger in while adjustment being made).

Pinion Clearance (Engaged)

Starter Model	①Clearance
MCH-6105, 6113, 6113A	3/32"
MCL-6109, 6116, 6121, 6121A	3/32"
MCL-6132, 6304	3/32"
MDB-6001, 6001A, 6301	3/32"

①—Plus or minus 1/64".

Starter Armature Endplay—.005" minimum, .030" maximum. Adjust by installing MU-54 thrustwashers on armature shaft at commutator end plate (between the MCH-96 thrustwasher and the end plate).

PERFORMANCE: Current draw is as follows:

SOLENOID CURRENT DRAW

Series SSX-4001, 2, 3, 4 (6 Volt)

Pull-in Coil—31.5-36.0 amperes at 3.0 volts.
Hold-in Coil—8.8-10.1 amperes at 3.0 volts.

Series SAD-4101 (12 Volt)

Pull-in-Coil—28 6-32 9 amperes at 6.0 volts.
Hold-in Coil—10 2-11 8 amperes at 6 0 volts

Series SSY-4002 (12 Volt)

Pull-in Coil—17.0-19.4 amperes at 6 0 volts.
Hold-in Coil—4 8-5.5 amperes at 6.0 volts.

CHECKING SWITCH ACTION: Action can be checked by slipping special steel spacer (flat stock 1" wide, ½" thick, with ⅝" slot in the 1" face) on armature shaft at the outer end of the pinion. With spacer in place, switch plunger should bottom and switch contacts should close with normal voltages.

CONTROL RELAY SPECIFICATIONS

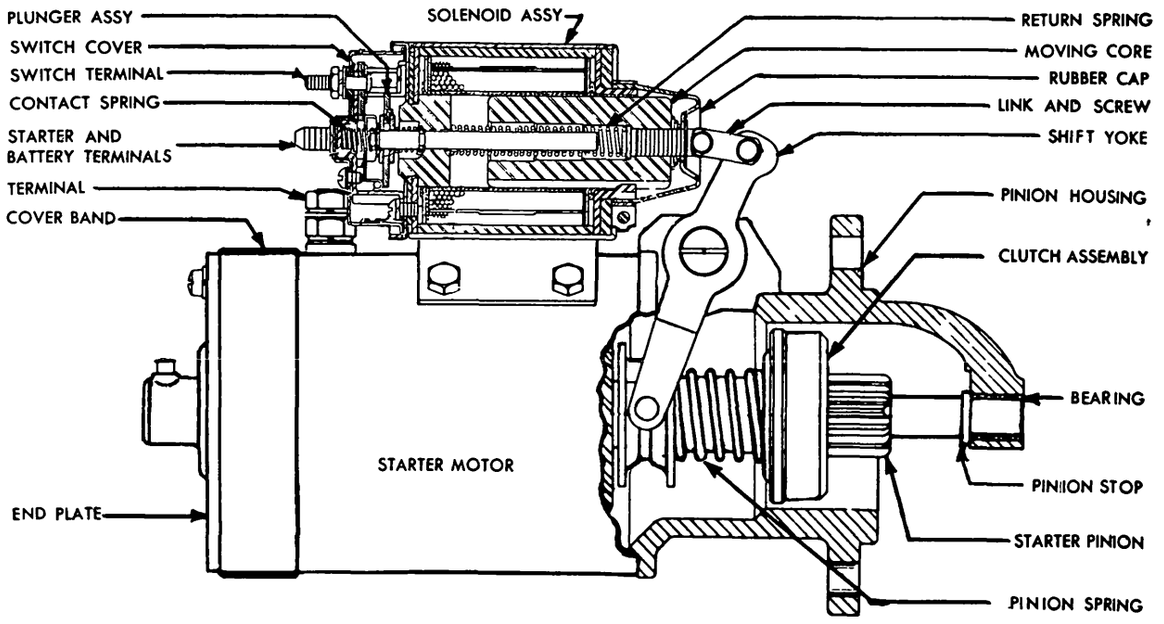
Model HRW-4001, 4001A (6 Volt Types)

Contact Closing Voltage—1.5-3.0 volts. Armature seals to core at 4.0 volts maximum
Contact Opening Voltage—0.5 volts minimum.
Contact Gap—.020-.040". Adjust by bending armature stop up or down.
Armature Air Gap—.012-.020" with contacts closed. Adjust by raising or lowering stationary contact.

Model RAA-4001, 4001A (12 Volt Type)

Contact Closing Voltage (4001)—3.0-6 0 volts; **(4001A)** 6 0-8 0 volts. Armature seals to core at 8 0 volts maximum.
Contact Opening Voltage—1.0 volts min. (4001); 1.0-4 0 volts (4001A).

Contact Gap—.020-.040". Adjust by bending armature stop up or down.
Armature Air Gap—.012-.020" with contacts closed. Adjust by raising or lowering stationary contact.



AUTO-LITE SOLENOID STARTER SWITCH (NO RELAY)

DELCO-REMY MAGNETIC STARTER SWITCHES

Car Model	Delco-Remy Switch No.
Rambler (1953-55) Hydra-Matic Cars	1465
Nash Statesman (1950-55) Hydra-Matic Cars	1465
Packard 8 & Super 8 (1947-50)	1452
Packard 200, 300 (1951)	1452
Packard 200, 250, 300 (1952-53)	1465

Packard Control Switch Note—Switch is Carter Car Starter mounted on the carburetor and operated by throttle valve shaft (accelerator pedal starting). Refer to Carter Car Starter article in this section for data.

DESCRIPTION: These switches are magnetic type mounted on the starter field frame. It is used in connection with a Bendix drive and does not include the pinion shifting mechanism of the previous models. It is operated by a 'remote control switch' or push-button starting switch connected to the ignition switch so that starter operative only when ignition turned on.

OPERATION: Switch has two windings (pull-in and hold-in coils) both connected to the switch terminal. Both coils are energized when the starting button circuit is closed so that a strong 'pull-in' action results. When the main switch contacts close, the pull-in coil is short-cricuited and the contact disc is held in by the hold-in coil only. Contact disc is returned to off position by the spring when the starting button is released.

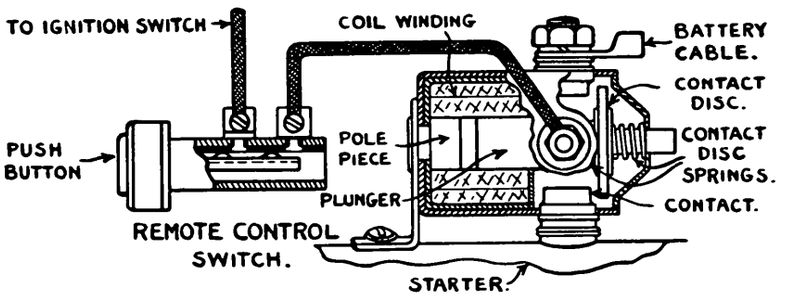
PERFORMANCE DATA: Check current draw of switch using ammeter connected in lead to the switch winding terminal (figure given below is for both windings which is current draw before switch contacts close).

Switch No.	②Current & Voltage
1452	3 1-3 7 amperes at 4 volts
1465	5 7-7 0 amperes at 6 volts

②—At room temperature of 80°F.

ADJUSTMENT: No adjustments provided on these switches.

NOTE—Switch can be operated by hand by pressing in on switch plunger on end of case after the small metal cap on the case has been removed



DELCO-REMY MAGNETIC STARTER SWITCH

DELCO-REMY MANUAL PINION SHIFT STARTER SWITCHES

Car Model	Delco-Remy Switch No.
Chevrolet, All Pass. Cars (1946-48)	820052
Chevrolet Trucks, 6 Cyl Exc. Fwd. Cont. & Hydra-Matic (1946-55)	820052
Oldsmobile 6 & 8, With Synchro-mesh Trans. (1946-48)	820052
Pontiac 6 & 8, All Models (1946-48)	820052

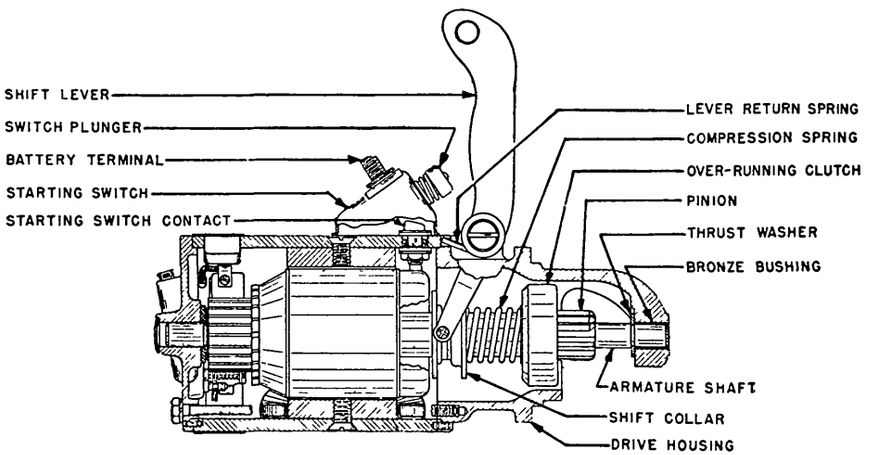
DESCRIPTION: Starters have a pinion assembly and shift lever similar to that used on Solenoid Pinion Shifts but the shift lever is connected through linkage to the starting pedal so that the pinion is positively engaged with the flywheel teeth when the starting pedal is depressed. The starting switch is mounted on the starter field frame and switch plunger is depressed by lug on shift lever to close switch contacts and operate starter after pinion has been meshed with the flywheel.

SERVICING: No service required and no adjustment provided. Switch contacts should not close until after pinion has been meshed (except when pinion teeth butt against flywheel teeth in which case compression of spring between shift collar and overrunning clutch on pinion sleeve will allow switch contacts to close and revolve pinion to meshing position). Return spring on shift lever must have sufficient tension to disengage pinion when pedal released.

Pinion Assembly & Spring (1946 & Later)— Pinion assembly used on these models may be identified by groove in pinion teeth approximately ⅛" from clutch shell. Compression spring must have tension of at least 34 lbs. when compressed to 1". To remove spring, press shift collar down on pinion ring. Spring and collar can be serviced but no attempt should be made to dismantle overrunning clutch mechanism. Clutch is packed with high melting point grease. Do not clean pinion assembly with solvents which may remove grease.

Shift Lever Return Spring—Return spring on shift lever should have tension of 9-12 lbs. (start of travel), 28-35 lbs. (end of travel). Weak spring may cause sluggish disengagement particularly in cold weather or if shaft is gummy.

Switch Test—Switch contacts are defective if voltage drop 0.5 volts or higher when checked with voltmeter at switch terminal with starter cranking engine.



DELCO-REMY MANUAL PINION SHIFT

DELCO-REMY SOLENOID STARTER SWITCHES (WITH RELAY)

SOLENOID SWITCHES (WITH PUSHBUTTON CONTROL)

Car Model	Year	Solenoid Switch	Starter	Pushbutton Switch
Cadillac V8, All Models	(1941)	1542	1107923	1996009
Cadillac V8, 75 RHD.	(1941)	1542	1107925	1996009
Cadillac V8, All Models	(1942-48)	1118102	1107931	1996009
Cadillac V8, All Models	(1949)	1118141	1107945	1996009
Chevrolet RHD. Pass. Cars	(1941)	1546	1107038	1996010
Chevrolet RHD.	(1942)	1118102	1107053	1996018
Chevrolet RHD Pass. Cars	(1946-47)	1118102	1107063	1996031
Chevrolet RHD Pass. Cars	(1948)	1118102	1107055, 76	1996031
Chevrolet Dubl-Duti Trk.	(1948)	1118102	1107055, 76	1385
Oldsmobile 8, 68, 78, 98 RHD	(1941)	1546	1107924	1996008
Oldsmobile 6, 66, 76 Optl.	(1942)	1118021	1107050	1996020, 21
Oldsmobile 8, 68, 78, 98	(1942)	1118021	1107930	1996020, 21
Oldsmobile 6 Optl. & RHD	(1946-47)	1118021	1107050	1996009
Oldsmobile 6 Optl.	(1948)	1118021	1107930	1996009
Oldsmobile 8, 68, 78, 98	(1946-48)	1118021	1107930	1996009
Pontiac 6 & 8, All RHD.	(1941)	1546	727-S	1996012
Pontiac 6 & 8, All RHD	(1942)	1118102	1107934	1996015
Pontiac 6 & 8, All RHD	(1946-48)	1118102	1107934	1996031

SOLENOID SWITCHES (WITH VACUUM SWITCH CONTROL)

Car Model	Year	Solenoid Switch	Starter	Vacuum Switch
Buick 41-40, 40A, 50	(1941)	1542	1107005	②1990127
Buick 41-60, 70, 90	(1941)	1542	1107908	②1990127
Buick 41-60, 70, 90 (RHD)	(1941)	1545	1107909	②1990127
Buick 40A, 40B, 50	(1942)	1118019	1107049	②1990127
Buick 60, 70, 90	(1942)	1118019	1107929	②1990127
Buick 40, 50	(1946-48)	1118019	1107049	③
Buick 40, 50 RHD	(1946-48)	1118019	1107057	③
Buick 70	(1946-48)	1118019	1107929	③
Buick 70 RHD	(1946-48)	1118019	1107935	③
Buick 40 LHD	(1949)	1118019	1107049	③
Buick 40 LHD	(1950)	1118019	1107078	③
Buick 50 LHD	(1949-50)	1118019	1107078	③
Buick 40, 50 RHD	(1949-50)	1118019	1107057	③
Buick 70 LHD	(1949-50)	1118019	1107953	③

②—Delco-Remy Vacuum Switch (Cars with Stromberg carburetor). Carter Car Starter is used on cars with Carter carburetor.

③—**Cars with Carter Carburetor**—Carter Car Starter.

Cars with Stromberg Carburetor—(1946-47) Delco-Remy No. 1990127 Vacuum Switch, (1948-50) Stromberg No. 385000 Starter Switch.

See data on each type unit in this section.

►**1946 BUICK STARTER PINION ENGAGEMENT & DISENGAGEMENT CORRECTION: If starter drive clutch pinion does not engage flywheel (on starters built before August 1, 1946)** replace Shift Lever, Part No. 1884808, with redesigned part of same number which may be identified by zinc-plated finish (original lever painted black) which will correct interference between shift lever and collar.

NOTE—Starters on which this correction has been made may be identified by spot of white paint on frame above name plate and by zinc-plated finish of lever. Starters built after Aug. 1, 1946 (Serials No. 6-H-1 up) have this new lever.

If Starter does not engage or cranks continuously (with new type shift lever described above)—Check for binding of solenoid contact disc and pushrod on terminal plate guide pin. Replace contact disc and pushrod assembly if guide hole in eccentric, straighten guide pin if it is bent.

DESCRIPTION:—Solenoid type combined starting switch and pinion shift (with control relay in solenoid case) mounted on the starter field frame with the solenoid plunger linked to the pinion shift lever.

OPERATION: When the pushbutton switch is closed, or accelerator pedal is depressed (vacuum switch type), with the ignition turned on, the solenoid relay circuit is completed, energizing the relay and closing the relay contacts. This completes the solenoid circuit. The solenoid plunger is drawn into the coil, meshing the starter pinion, and closing the starting switch contacts. When the engine begins to fire, the solenoid relay circuit is broken in one or more of the following ways:

(1) Operation of the vacuum switch. Caused by the vacuum built up in the intake manifold.

(2) By the rise in generator voltage. Where solenoid relay is grounded through generator main brushes or auxiliary contacts in cutout relay, the voltage built up by the generator opposes the current flow through the solenoid relay winding.

(3) By releasing the pushbutton switch or ignition key. On all car model installations where solenoid relay is grounded directly to starter field frame, the circuit will not be broken until the pushbutton is released.

(4) Through Neutral Safety Switch (automatic transmission cars).

When the solenoid relay circuit is broken, the relay contacts open, breaking the solenoid circuit. The starting pinion is demeshed by the shift return spring and the starting switch contacts are opened by the contact spring.

PERFORMANCE: Solenoid Switch. Solenoid should close (bottom in coil) against 70 lb. pull with ½" gap drawing 65-71 amperes at 5 volts. While closed, current should be 12-14 amperes (hold-in coil only).

SOLENOID RELAY SPECIFICATIONS

Solenoid 1542, 1545, 1546, 1547, 1548

Contacts Close—1.9 volts max. **Contacts Open**—1.0-1.2 volts.
Contact Gap—.035". **Air Gap**—.012" (contacts closed).

Solenoid 1118019, 1118021, 1118102, 1118141

Contacts Close—3.0 volts max. **Contacts Open**—1.9 volts.
Contact Gap—.025". **Air Gap**—.015" (contacts closed).

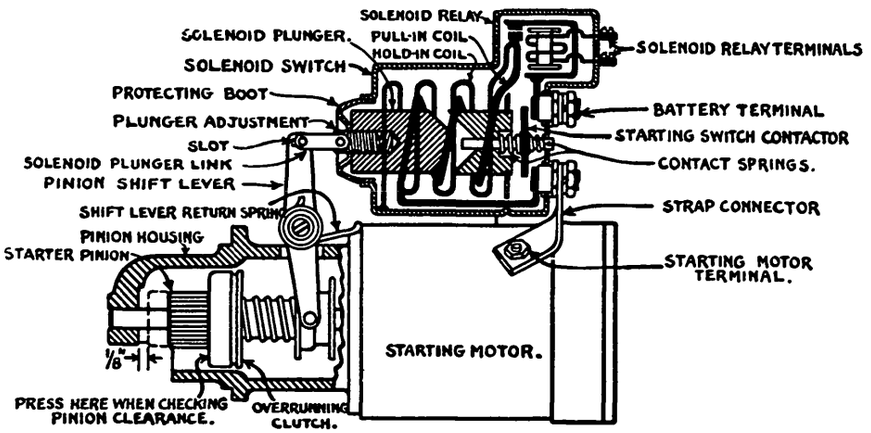
CHECKING & ADJUSTMENT: Check Solenoid and Relay performance (above). Adjust solenoid plunger link for correct pinion clearance as follows:

Solenoid Setting—Clearance between end of pinion and inner face of starter housing should be 3/16" (see Cadillac Note below) with the solenoid plunger bottomed in core. Adjustment will be simplified if lead disconnected at terminal on starter field frame (so starter will not spin) and relay contacts closed so that plunger is drawn into coil core. Press back on pinion to take up backlash. In overrunning clutch, remove solenoid plunger link pin, adjust link (by turning link stud in plunger) until pin can just be inserted at forward end of shift lever slot

Cadillac 1940-49 Note—On these starters, pinion travel (from disengaged or at rest position to fully engaged position with solenoid plunger bottomed in core) should be 23/32" to 25/32".

SERVICING: Pinion Assembly & Spring. Compression spring tension should be at least 34 lbs. at 1". To remove spring, press shift collar down on pinion sleeve to compress spring until lock ring on end of sleeve is exposed, remove lock ring. Spring and collar can be serviced but no attempt should be made to dismantle overrunning clutch mechanism. Clutch is packed with high melting point grease and pinion assembly should not be cleaned by any method which may remove this lubricant.

Shift Lever Return Spring—Return spring on shift lever should have tension of 9-12 lbs. (start of travel), 28-35 lbs. (end of travel). Weak spring may cause sluggish disengagement particularly in cold weather or if shaft is gummy.



DELCO-REMY S LEN ID STARTER SWITCH

DELCO-REMY SOLENOID STARTER SWITCHES (NO RELAY)

6 VOLT TYPES

	Starter	Solenoid
BUICK		
1951 40, 50	1107097	①1118148
1951 70	1107981	①1118148
1952 40, 50	1107110	①1118148
1952 70	1107981	①1118148
1953 40	1107110	①1118148
CADILLAC		
1950-52 V8	1107969	118148
CHEVROLET		
1949-51 Pass. Cars	1107075	1118135
1949-51 Fwd. Contr. Trk.	1107075	1118135
1949-51 RHD Trucks	1107075	1118135
1952-54 Pass. Cars④	1107109	1118135
1953-54 Corvette④		⑥1118135
1952-54 Fwd. Contr. Trk.	1107109	1118135
1952-54 RHD Trucks	1107109	1118135
1954 (Late) Pass. Cars	1108035	1118135
1954 (Late) Corvette	1108035	⑥1118135
HENRY J		
1952-53 4 Cyl. & 6 Cyl.	1107131	1118135
KAISER DARRIN		
1954	1107131	1118135
NASH		
1950-52 Ambassador②	1107965	1118136
1952-53 Ambassador②	1108007	1118136
OLDSMOBILE		
1949-50 Six 76	1107955	1118136
1949-50 Eight 88, 98	1107956	1118136
1951 Eight 88, 98	1107982	1118136
1952 Eight 88, 98	1107997	1118156
PACKARD		
1954	1108027	1118136
PONTIAC		
1949-51 Six	1107079	1118140
1949-51 Eight	1107957	1118140
1952 Eight	1107994	1118140
1953-54 Six	1107107	1118140
1952-54 (RHD)	1107934	1118102
1953-54 Eight	1107957	1118140

12 VOLT TYPES

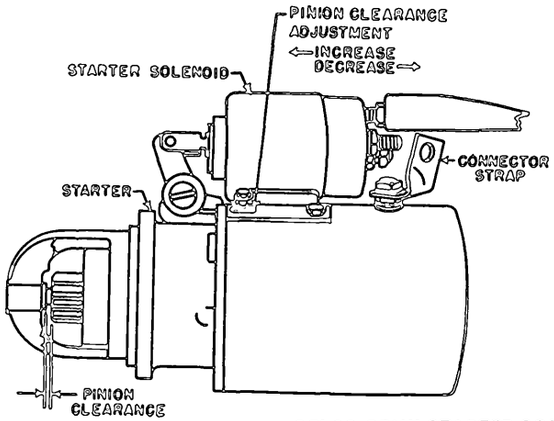
	Starter	Solenoid
BUICK		
1953 50, 70	1107601	③1116499
1954-55	1107621	③1119760
CADILLAC		
1953 V8	1107602	1118187
1954	1107622	1119761
1955	1107629	1119760
CHEVROLET		
1955 6 Cyl. Pass. Cars	1107626	1119767
1955 V8 Pass. Cars	1107627⑧	1119767
1955 Corvette	1107627⑦	1119767
1955 6 Cyl. Trucks⑨	1107633	1930496
1955 6 Cyl. Fwd. Contr.⑤	1107626	1119767
1955 V8 Trucks	1107627	1119767
OLDSMOBILE		
1953	1107603	1118188
1954-55	1107623	1119761
PONTIAC		
1955 Std.	1107631	1119760
1955 With Power Pack	1107632	1119760

①—With separate Relay No. 1116855.
②—Hydra-Matic Drive Cars only.
③—With separate Relay No. 1116876
④—Early 1954.
⑤—Exc. Hydra-Matic Drive models.
⑥—With separate Relay No. 1116886.
⑦—With separate Relay No. 1116904.
⑧—Starter No. 1107640 also used.
⑨—Models with Hydra-Matic Drive.

DESCRIPTION: This solenoid type combined Starting Switch and Pinion Shift is similar to type used on other cars except that solenoid link is non-adjustable (pinion position adjustable by shifting solenoid assembly on starter) and no relay is incorporated in the solenoid assembly (separate relay used on some cars). 6 Volt and 12 volt units are similar except that special "Ignition Terminal" used on 12 volt units (see Ignition Terminal Note below).

▷*IGNITION TERMINAL NOTE (12 Volt Solenoids)*—This special terminal provides an ignition feed which bypasses the ignition coil resistor when the starter is cranking (terminal connected to contact finger in switch which is "live" while switch contacts are closed). See individual car wiring diagrams for ignition coil connections.

▷*CONTROL RELAY NOTE: (Buick & Chevrolet Corvette)*—SEPARATE control relay is used in the solenoid control circuit. Relay is not part of solenoid assembly. See CONTROL RELAY data below for specifications and adjustment data. See Individual car wiring diagrams for relay internal circuits and circuit connections.



OPERATION: When the pushbutton is pressed, both solenoid windings are energized (pushbutton is special heavy-duty type designed to handle entire solenoid current). Solenoid plunger is drawn into coil, meshing starter pinion, and closing starting switch contacts (if teeth butt and prevent pinion meshing with flywheel, spring on shaft behind pinion is compressed and meshes the pinion as soon as starter armature shaft begins to rotate). Closing of the starter switch short-circuits the heavy solenoid winding (pull-in coil) and the lighter solenoid winding (hold-in coil) keeps the pinion in mesh until the pushbutton is released when the pinion is withdrawn by the return spring.

▷*CAUTION—See special Pinion Clearance Adjustment directions below.*

PERFORMANCE: Solenoid. Current draw below is measured from starter button terminal on solenoid to ground (see illustration). "Both-Coil" specification is with starting switch contacts open, "Hold-in Coil" specification with starting switch contacts closed and pull-in coil short-circuited. If solenoid does not test within limits shown, it should be replaced. *NOTE*—when checking solenoid current draw with solenoid mounted on starter, disconnect solenoid-to-starter connector and ground this solenoid terminal to the solenoid frame. Current draw measured at solenoid control terminal will then be the "Both Coil" draw. Remove the ground wire from the solenoid starter terminal and current will be the "Hold-in Coil" draw.

▷*CAUTION—Solenoid should be tested COLD (room temperature of 80°F.).*

SOLENOID CURRENT DRAW

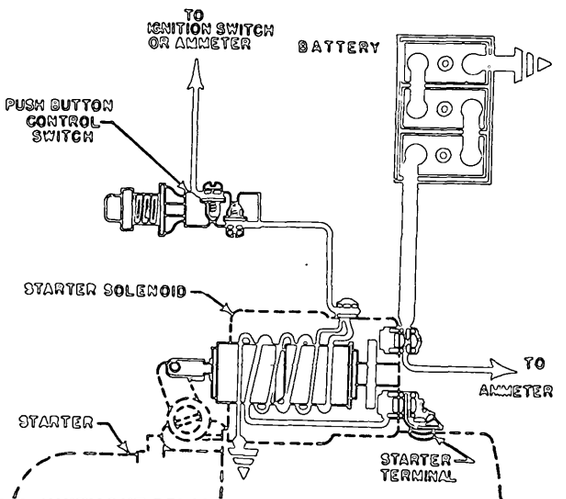
All 6 Volt Types

Both Coils—85-90 amperes, 5 volts, at 80°F.
Hold-in Coil—14-16 amperes, 5 volts, at 80°F.

All 12 Volt Types

Both Coils—72-76 amperes at 10.0 volts.
Hold-in Coil—18-20 amperes at 10.0 volts.

CONTINUED ON NEXT PAGE



DELCO-REMY STARTER SOLENOID (WITHOUT RELAY)

DELCO-REMY SOLENOID STARTER SWITCHES (NO RELAY) Continu d

Starter Pinion Overrunning Clutch: Clutch should transmit 50-60 ft.lbs. torque in drive direction without slipping, and should allow pinion to turn freely in overrunning direction.

Shift Lever Return Spring: Check spring tension with spring scale hooked in hole in upper end of shift lever. Pull at start of travel should be 9-12 lbs. and at end of travel should be 28-35 lbs.

ADJUSTMENT: ***CAUTION—It is recommended that starter be removed from engine for adjustment (will provide easier access to solenoid mounting screws).***

Pinion Clearance: ***NOTE—Clearance differs for each type starter end thrust device (see identification below) and is the only adjustment required.***

Pinion Clearance—Should be measured from end of pinion to face of drive housing with pinion in operating position. When measuring this clearance, press lightly on outer face of clutch shell to take up all backlash in linkage but DO NOT compress the drive spring.

Pinion Clearance (when engaged)

Car Model	Thrust Type	Clearance
Buick (1951-52)	①	3/16" ± 1/32"
Buick (1953)	②	1/8" ± 1/32"
Buick (1954-55)	③	010-.050"
Cadillac (1950-53)	③	1/32" — 3/32"
Cadillac (1954)	③	010-.050"
Cadillac (1955)	③	.010-.140"
Chevrolet (1949-54)	①	3/16" ± 1/32"
Chevrolet (1955)	③	010-.140"
Henry J (1952-54)	①	3/16" ± 1/32"
Kaiser Darrin (1954)	③	.010-.040"
Nash (1950-53)	①	3/16" ± 1/32"
Oldsmobile (1949-53)	①	3/16" ± 1/32"
Oldsmobile (1954-55)	③	.010-.040"
Packard (1954-55)	③	.010-.040"
Pontiac (1949-54)	①	3/16" ± 1/32"
Pontiac (1955)	③	.010-.040"

①—Thrust washer on end of armature shaft within pinion housing. Measure clearance between pinion and housing.

②—Thrust plug located ¼" within drive end housing nose with a pin across the shaft hole directly behind the plug. No thrust washer is used. Measure clearance between pinion and housing

③—Thrust washer located within pinion housing and clearance should be measured from face of pinion to this washer.

Pinion Clearance Adjustment—Disconnect solenoid to starter strap to prevent motor operating, place a gauge (see Clearance Specifications above) between pinion and housing or between face of pinion and thrust washer as indicated in table above. Connect battery between switch terminal of solenoid and ground (solenoid base) and push plunger in by hand so that pinion is moved out against gauge (battery current will hold solenoid in this position while adjustment is being made). On models without adjustable plunger link, loosen solenoid mounting screws and shift solenoid on starter so that all play in lever and clutch linkage is taken up. Tighten mounting screws. On models with adjustable plunger link, loosen screw and adjust length of link as necessary to remove all play.

►***CAUTION—Do not compress spring on shaft behind overrunning clutch when making above adjustment.***

CONTROL RELAY (BUICK): ***CAUTION—Both 6 Volt and 12 Volt units used. All relays are checked and adjusted alike but specifications are different as listed below.***

RELAY SPECIFICATIONS

6 Volt No. 1116855

Contact Closing Voltage—1.5-2.1 volts. Armature should "seal" to core at not more than 0.1 volt above closing voltage.

Contact Opening Voltage—Not less than 0 35 volt.

Contact Gap—.025" (020-.030").

Air Gap— 011" minimum with contacts closed.

6 Volt No. 1116886

Contact Closing Voltage—2.2-3.0. Armature should "seal" to core at not more than .01 volt above closing voltage.

Contact Gap—.025".

Air Gap—.018".

12 Volt No. 1116876 & 1116904

Contact Closing Voltage—3.8-5 0 volts. Armature should "seal" to core at not more than 0.2 volts above closing voltage.

Contact Opening Voltage—Not less than 0.6 volt.

Contact Gap—.025" (.020-.030").

Air Gap—.011" minimum with contacts closed.

CHECKING & ADJUSTMENT

Checking Operation—Use rheostat (must have 10 ohm resistance and 2 ampere capacity) and accurate low reading voltmeter. Connect rheostat to relay terminals #1 and #4 (CAUTION—rheostat must be turned to provide full resistance), connect voltmeter to relay terminals #3 and #4. Make certain that ignition switch turned OFF. Slowly decrease resistance by turning rheostat and note voltmeter reading at instant relay contacts close and solenoid switch operates (can be checked by test lamp connected between relay terminal #2 and ground). Voltage reading at this point should agree with "Contact Closing Voltage" in specifications above. Continue to decrease resistance until slight "click" occurs indicating that armature has sealed to the core. Voltage reading at this point should be not more than 0.1 volt higher (6 Volt Relay), 0.2 volt higher (12 Volt Relay) than contact closing voltage. Quickly cut out all resistance to saturate relay magnet core fully, then quickly increase resistance and note voltage reading at instant relay contacts open (if test lamp used, light will go out at this point). Voltage reading at this point should agree with "Contact Opening Voltage" in specifications above.

Relay Adjustment

Contact Closing Voltage—Bend armature spring post **down** (to increase spring tension and closing voltage) or **up** (to decrease spring tension and closing voltage).

Sealing Voltage & Contact Opening Voltage—Adjust by varying air gap (see below) or by changing the closing voltage (CAUTION—closing voltage must be kept within specifications).

Contact Gap—Adjust by bending upper armature stop.

Air Gap—Adjust by bending lower contact support (check air gap by pressing armature down until contacts just touch, then measure between armature and core with feeler gauge).

CHECKING & INSPECTING SOLENOID: If performance not satisfactory, check as follows:

Voltage Drop (High Resistance Check)—Disconnect ammeter lead from battery cable terminal on solenoid, connect voltmeter from battery terminal to starter terminal on solenoid. Use Remote Control Switch connected to pushbutton terminal on solenoid to operate starter motor ***(CAUTION***—On 12 volt solenoids with ignition coil terminal, lead must be disconnected from this terminal to prevent engine firing and control switch must NOT be connected to this ignition terminal). Voltage reading with starter cranking must not exceed 0.1 volt (6 volt system). If reading greater, disassemble and inspect solenoid (see below).

Solenoid Inspection—Take out cover retaining screw and remove cover ***(CAUTION***—use care not to damage solenoid winding lead. Check solenoid plunger for free movement without binding and see that plunger has sufficient travel for firm contact between the copper contact washer and the starter switch contacts. Make certain that full contact is secured and that contact surfaces are not burned or corroded. ***NOTE***—Contacts can be replaced—see OVERHAUL below.

OVERHAUL: Solenoid Contact Replacement: With solenoid removed from starter, remove solenoid plunger from solenoid body. Take out cover retaining screw and remove cover. Remove nuts, lockwashers, flat washers, and insulating washers from each terminal stud. Remove two terminal stud support plate-to-solenoid housing screws, remove support plate, insulating plate, one terminal stud and starter switch stud. Remove outer spring retainer and spring from solenoid plunger contact ring. Compress the contact ring spring, remove retainer, insulating washer, and contact ring from plunger; remove plunger from solenoid body. Unsolder solenoid coil lead from remaining terminal stud.

Reassembly—Place new contact ring and insulating washer on plunger, compress spring and install retainer with open side up ***(CAUTION***—Three lugs on bottom of contact ring must index with slots in lower insulating washer). Install solenoid plunger assembly in solenoid body, carefully solder solenoid lead to new terminal stud. Place solenoid plunger spring and outer spring retainer in position over end of solenoid plunger. Place terminal support insulator plate and support plate over the terminal stud soldered to the coil lead ***(CAUTION***—Lugs in terminal support plate must fit in holes in insulator). Place starter switch lead stud up through terminal insulator plate, index lugs on stud with slots in insulator plate, snap stud into place. Insert remaining terminal stud up through insulator plate and support plate, install terminal support plate-to-solenoid housing screws (with lockwashers) and tighten screws securely. Install insulating washers, flat washers, lockwashers, and nuts on terminal studs and tighten nuts securely. Install cover and cover attaching screw. Test solenoid for proper operation, install on starter, adjust pinion clearance (see ADJUSTMENT).

DELCO-REMY VACUUM STARTER SWITCH (1940-47 BUICK)

Delco-Remy No. Used On:

1990127—BUICK, ALL SERIES (1940 to 1947) ①

①—Front carburetor of Compound Carburetion installation.

NOTE: This switch used only on cars equipped with Stromberg carburetor. Switch is mounted on front carburetor of Compound Carburetion equipment.

DESCRIPTION: Vacuum switch is of the "direct operated type" with contact rotor mounted directly on end of throttle valve shaft within switch body (switch assembly mounted directly on carburetor casting at end of throttle shaft by two screws). Vacuum chamber is formed within top cover plate and is connected to the manifold below the throttle valve by a channel extending through the top cover, switch body, and carburetor casting. Diaphragm is clamped between switch body and top cover and consisted of a riveted assembly including spring cup (spring sits in cup and is positioned by recess in top cover) and combination guide pin and lockout plunger (which moves in guides formed in switch body). The internal circuit through the switch is completed from one contact spring through the contact rotor to the opposite contact spring (mounted on the lockout lever).

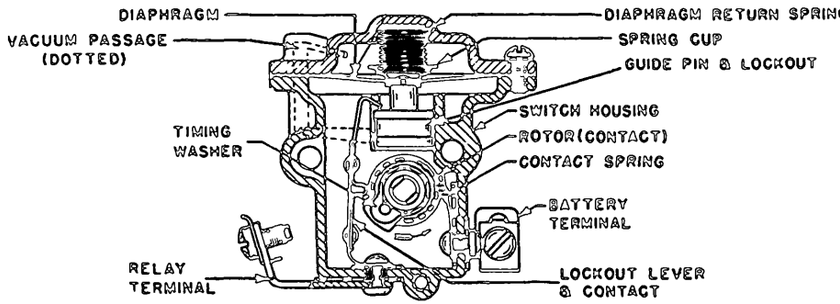
OPERATION: With the engine not running (no vacuum) and throttle valve closed, lockout will free lockout lever (diaphragm pressed down by return spring) but lockout lever and contact will be held away from contact plate on contact rotor by insulating knob on rotor. When the throttle is opened to start the engine, contact rotor turns with throttle valve shaft and as soon as insulating knob is turned away from the lockout lever, the contact spring on the lever contacts the rotor and completes the circuit through the switch. As soon as vacuum is developed in the manifold, diaphragm attempts to move upward but is prevented from doing so by hook on upper end of lockout lever which engages top of lockout plunger. When throttle is closed (to idle engine after it has started), insulating knob on contact rotor presses out on lockout lever and frees lockout plunger, diaphragm then moves up and lockout engages lockout lever so that the contact spring is held away from the contact rotor while the engine is running. When engine is stopped, the closing of the throttle valve lifts the lockout lever from the lockout (this Unlatch Action occurs 17-23° from closed throttle position) and diaphragm and lockout plunger drop down into position for a new start.

ADJUSTMENT: No adjustment ordinarily required. Switch "timed" for correct throttle position when contacts closed by timing washer assembled on face of contact rotor which positions rotor on throttle valve shaft. Timing can be checked, and new washers installed to change timing as follows:

Switch Timing Check:—See that carburetor throttle lever stopscrew set for correct 8 MPH. hot or slow idle speed. Take out screws and remove side cover plate on switch. Start engine, close throttle, then open throttle until clearance between throttle stopscrew and highest step of fast idle cam is ¼" (cam in fast idle position—engine must be cold), stop engine without disturbing throttle position. Place mirror so that switch guide pin and lockout visible from left side of car, close throttle slowly by lightly tapping on hand throttle lever until guide pin and lockout releases, then measure clearance between stopscrew and fast idle cam with cam in fast idle position. Clearance should be 3/64" minimum, 3/32" maximum. If less than 3/64" timing washer should be replaced by one having a higher number. If more than 3/32", timing washer should be replaced by one having lower number. See directions below.

Switch Action Check (On Car):—See that carburetor throttle lever stopscrew set for correct 8 MPH. hot or slow idle speed. Start engine, close throttle then open throttle until clearance between throttle stopscrew and highest step of fast idle cam is ¼" (cam in fast idle position—engine cold), stop engine. Tap throttle closed until clearance between stopscrew and cam is exactly 3/64" (use extreme care not to close throttle further, if clearance less than 3/64", repeat entire procedure). Start engine by opening throttle from this position. Repeat this test several times. Engine should start each time. If engine does not start more than once, timing washer should be replaced with one having a higher number. After making above test for minimum clearance between fast idle cam and stopscrew, check for maximum clearance as follows. Repeat test instructions given above except that clearance between fast idle cam and stopscrew should be set at not less than ⅛". Engine should not start from this position. If engine starts, timing washer should be replaced with one having a lower number and first test (for minimum clearance) should be repeated.

Timing Washers:—Washer has slot which engages flat on throttle shaft and lug which engages hole in contact rotor (rotor is free on shaft and is positioned by timing washer). Washer marked by number on side opposite rotor lug and furnished with lug in different positions for smaller or larger stopscrew-to-fast idle cam clearance (washer with higher number will increase clearance, lower number decrease clearance). Washer number indicates angular degrees of



DELCO-REMY VACUUM STARTER SWITCH (1940-47 BUICK)

throttle shaft rotation and washers are furnished in 3° steps. Select correct washer by means of tests given above and install washer as follows:

Timing Washer Installation. Take out screws in side cover on switch, remove cover and gasket. Remove nut on end of throttle valve shaft within switch, remove lockwasher and timing washer (if contact rotor removed, make certain that steel washer installed on shaft behind rotor). Install timing washer being careful to see that lug engages hole in contact rotor, install lockwasher and tighten nut, replace cover and gasket. Recheck switch timing.

CAUTION—Cover gasket is felt and is designed to provide necessary 'breathing' action required by diaphragm movement. This gasket must always be installed under side cover and no other type gasket should be used

SERVICING:—No servicing required. If top cover removed (for diaphragm replacement), make certain that return spring properly seated in cover recess and spring cup on diaphragm and that vacuum channel in top cover and switch body line up. When installing new parts, always check switch timing and install correct timing washer as directed above.

CAUTION:—Always connect wire with red cross tracers (hot lead) to terminal on front of switch to prevent lock-out lever being short-circuited if it should be bent back against housing during timing operation.

CARTER CAR STARTER

Car Model	Carter Carburetor
CARTER MODEL 192-11U	
Buick, 40, 50 (1946-47)	**WCD 608-S, SA, SC**
Buick, 70 (1946-47)	**WCD 609-S, SA, SC**
Buick 40, 50 (1948-49)	**WCD 663-S**
Buick 70 (1948-49)	**WCD 664-S**
Buick 40, 50 (1950-51)	**WCD 725S, SA; 882S**
Buick 70 (1950-51)	**WCD 726S, SA; 883S**
Buick 40, 50 (1951-52)	**WCD 882S, SA**
Buick 40 (1953)	**WCD 882SA**
Buick 50 (1953)	**WCD 2617S**
Buick 40, 50 (1954)	WCD 2081S, SA
Buick 40 (Early 1955)	WCD 2179S
Buick 40 (Late 1955)	WGD 2197S
Packard 6, All Models (1942 to 1947)	**WA1 530-S**
Packard 8, All Models (1942 to 1947)	**WDO 512-S**
Packard Super & Cust. Super 8 (1942 to 1947)	**WDO 531-S, SA**
Packard Eight, All Models (1948)	**WDO 644-S, SA**
Packard Eight, All Models (1949-50)	**WDO 644-SA, WGD 728-S, SA**
Packard Super 8, All Models (1948-50)	**WDO 643-S, SA**
Packard Custom 8, All Models (1948-50)	**WDO 531-S, SA**
Packard 200 (1951-52)	**WGD 784S**
Packard 250, 300, 400 (1951-52)	**WGD 767S, 928S**
Packard 2601, 2633 (1953)	**WGD 784S**
Packard 2611, 2613 (1953)	**WGD 928S**
CARTER MODEL 192-21U	
Buick 70 (1952)	**WCFB 894S, SA**
Buick 70 (1953)	**WCFB 996S, 2053S**
Buick 60, 70, M/100 (1954)	WCFB 2082S
Buick 50, 60, 70 (Early 1955)	WCFB 2197S
Buick 50, 60, 70 (Late 1955)	WCFB 2358S
Packard 2602, 6, 26, 31 (1953)	**②WCFB 985S, 2084S**

①—Used beginning Engine No. V-398711 (Cars with Dynaflow).
②—Complete Switch Unit for these models is Carter No. 192-28S.

OTHER CARBURETORS

Buick 40, 50 (1954)①	Stromberg AAVB-267, Code 7-96
Buick 60, 70, M/100 (1954)	Stromberg 4-AUV, Code 7-98
Buick 40 (1955)	Stromberg AAVB-267, Code 7-102
Buick 50, 60, 70 (1955)	Rochester 4GC, No. 7006200

►**SERVICE CAUTION:** Car Starter is built in carburetor throttle body casting and must be removed when carburetor is disassembled for servicing (carburetor throttle valve shaft cannot be taken out until switch dismantled and switch ball taken out). CAUTION—Use care not to lose small square switch adjusting shims when switch disassembled.

DESCRIPTION & OPERATION: Switch is plunger type mounted on carburetor casting and operated by steel ball which engages switch plunger and flat on carburetor throttle valve shaft when engine is not running. Depressing accelerator pedal to open throttle forces switch plunger up until 'W' shaped contact spring on upper end completes circuit between two brass contact blocks in the switch cap. When the engine begins to fire, switch ball is drawn up out of engagement by manifold vacuum (ball blocks vacuum passage as long as engine is running) so that switch is inoperative. When engine stops, throttle must be closed momentarily to allow switch ball to drop down between throttle shaft and switch plunger.

ADJUSTMENT: Vacuum Switch Timing Check. Use special Carter Tool T109-155S (see Note) consisting of scale clamped on choke housing and indicator arm fastened on throttle lever. Connect test lamp in switch circuit to check switch closing. Rotate fast idle cam to hot or slow idle position, back off throttle lever stopscrew so that throttle valves are tightly closed. Loosen setscrew and set indicator arm opposite '0' on correct scale of the gauge. Open throttle lever and note gauge reading when switch closes (test lamp will light). Gauge reading should be between 30° and 45°. Adjust by adding (if throttle opening more that 45°), removing (if throttle opening less than 30°) square brass adjusting shims located on bakelite guide block under 'W' shaped contact spring (these shims have square hole which engages tongue on guide block, do not confuse these shims with round spring seat washer which seats on middle leg of contact spring).

►*CAUTION—Do not use less than one No. 153-11 (.018") Shim or more than three No. 153-11 (.018") Shims plus two No. 153-12 (.006") Shims.*

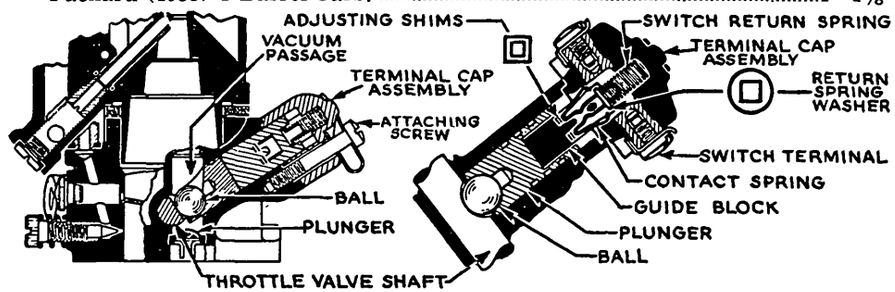
Carter Gauge T109-155S Note—Gauge has three separate dials marked "WCD & WDO', 'WA' and 'W1' and correct dial must be used in checking each carburetor model. Refer to Equipment List above for carburetor type used on each car.

Checking Switch Timing without gauge—If tool not available, timing can be checked on the car as follows:

1946 & Later (All Models)—Measure unloader arm travel (1954 & earlier cars), throttle arm travel (1955 cars) as follows: Back off throttle stopscrew, turn fast idle cam to slow or hot idle position, see that throttle valves are fully closed. On 1954 & earlier cars place a 6" scale against choke unloader arm and make a pencil mark on float bowl opposite edge of scale. On 1955 cars, hold scale against flat face of throttle lever lower arm which contacts the dashpot, so that scale rests on rocker arm cover. Make a pencil mark on rocker arm cover at front edge of scale. Turn ignition switch on (or use test lamp and battery connected to switch terminal to check switch closing), open throttle slowly while holding scale in position (as indicated above), until starter pinion just engages flywheel (or test lamp lights) indicating that switch contacts have closed. Make a second mark on float bowl (1954 & earlier), or rocker arm cover (1955), at same edge of scale. Measure distance between these marks which indicated unloader arm or throttle arm travel. See table below. See ADJUSTMENT data above for adjustable procedure. Reset engine idle speed.

Unloader or Throttle Arm Travel (for Switch Timing)

Car Model	Unloader or Throttle Arm Travel
Buick (1946-54) 2-Barrel Carb.	15/16 - 1 5/16"
Buick (1952-54) 4-Barrel Carb.	¾ - 1 1/16"
Buick (1955) 2-Barrel Carb.	29/32 - 1 7/16"
Buick (1955) 4-Barrel Carb.	9/16 - 15/16"
Packard (1953) 4-Barrel Carb.	1 - 1⅜"



CARTER CAR STARTER

REMOVAL & DISASSEMBLY: Disconnect and tape the leads on switch terminals (wire with red tracer on terminal nearest engine is 'hot' with ignition turned on). Remove switch terminal cap attaching screw, hold-down clip, switch cap, withdraw return spring, guide block and contact spring assembly, switch plunger and ball. Be careful not to lose spring seat washer (on contact spring) or adjusting shims (on guide block under contact spring).

Servicing. Clean switch ball, plunger, cylinder, carburetor vacuum chamber and inlet screen, throttle valve shaft flat with gasoline. Check 'W' contact spring and switch return spring. Replace these parts if dimensions incorrect. **'W' Contact Spring**—Distance across spring at widest part (across outer contact legs) should be 7/16" (plus 1/32", minus 0") with spring seat washer seated on middle leg of spring.

Return Spring—Free length of spring should be 11/16-¾" and pressure of 32 ozs. should be required to compress spring to length of 3/8".

REASSEMBLY: When installing switch plunger make certain that lip on inner end of plunger is down toward manifold (lip will prevent ball engaging on flat of shaft if installed incorrectly). See that adjusting shims are in place under contact spring, and spring seat washer seated on middle leg of contact spring. Coat contact surfaces of terminal cap lightly with Beacon M-285 lubricant or Rocker Arm Grease No. 1 (petroleum jelly can be used if other lubricants not available). *CAUTION*—Do not use other lubricants and do not lubricate switch ball or plunger. Make certain that return spring enters socket in switch cap and that cap is properly seated in counterbore in casting.

STROMBERG STARTER SWITCH

Car Model & Carb.	Stromberg Switch No.
Buick 40, 50, 70 (1948-52)	See Changes (below)
Buick 40 (1952-53) Code 7-90B	386030
Buick 50 (Late '52) Code 7-90B	386030
Buick 50 (1953) Code 7-95 & 7-95A	386030
Buick 70 (Early 1952) Code 7-92	385611
Buick 70 (Late 1952) Code 7-92B	386030
Buick 70 (1953) Code 7-94, A, B, C	386030

▷CHANGES, CAUTIONS, CORRECTIONS

▷*STARTER SWITCH CHANGES FOR IMPROVED PERFORMANCE:* Manufacturer recommends that whenever switch being serviced, new parts included in Change-over Kit No. 386260 or new type individual parts as listed below should be used. When these changes made or Replacement Switch installed, *CODE NUMBER should be changed as follows:*

Starter Switch Change

Buick Series	Carb. Code No. Orig.	Change To:	Starter Switch Orig.	Change To:
40, 50 ('48-49)	7-69,A	7-69B	385000	386032
70 ('48-49)	7-70,A	7-70B	385000	386032
40, 50 ('50-51)	7-88,A	7-88C	385000	386030
40, 50 ('50-51)	7-88B	7-88C	385611	386030
70 ('50-51)	7-89,A	7-89C	385000	386030
70 ('50-51)	7-89B	7-89C	385611	386030
40, 50 ('51-52)	7-90B		385611	386030
70 (Late '51)	7-91	7-91A	385611	386030

▷*STARTER SWITCH PRODUCTION CHANGES:* Several switch types have been used on production carburetors (see Starter Switch listing above). These switches have following features:

Switch Assy. No. 386032—Has light weight contact piston spring for use with carburetors WITHOUT Pump Lever Torsion Spring (Carb. Code 7-88 & 7-89) or WITH LIGHT WEIGHT Torsion Spring (Carb. Code 7-88A & 7-89A). *Switch identified by letter "B" stamped on switch housing.*

Switch Assy. No. 386030—Has heavy contact piston spring for use with carburetors having HEAVY Pump Lever Torsion Spring (Code 7-90 & 7-91). *Switch identified by "C" stamped on switch housing.*

▷*SWITCH PARTS CHANGES & SERVICE CAUTIONS:* New parts (furnished in Change-over Kit 386260 or separately) used for each switch as follows:

Starter Switch Parts Change

New Parts	Starter Switch No. 385000	385611
Assy. Housing & Seal	386033④	⑤386031
Vacuum Piston Seal	386025	386025
Air Screen Filter①	385015	385015
Air Screen Filter②	386028	386028
Air Screen Filter Washer	386027	386027
Switch Slide	386029	386029
Filter Screen Retainer③	386026	386026

①—Orig. Part. Used on Code 7-69, 7-69A, 7-70, 7-70A, 7-88, 7-88A, 7-88B, 7-89, 7-89A, 7-89B, 7-90, 7-90A, 7-91 carburetors.

②—New Felt Filter. Used only on 7-69B, 7-70B, 7-88C, 7-89C, 7-90B, 7-91A carburetors.

③—Used only on Code 7-69B, 7-70B, 7-88C, 7-89C, 7-90B, 7-91A carburetors.

④—Identified by letter "B" stamped on housing. Used also in Switch Assy. No. 386032.

⑤—Identified by letter "C" stamped on housing. Used also in Switch Assy. No. 386030.

DESCRIPTION & OPERATION: Switch is mounted on carburetor and is controlled by an operating lever on the throttle valve shaft (for accelerator pedal starting). The switch contact and slide assembly is spring-loaded and is held up in the "off" position by by the operating lever when the throttle valve is closed. A spring-loaded vacuum piston or slide "latch" is provided to hold the slide in this off position when the engine is running and to prevent the starter operating during closed throttle idling.

▷*NOTE—Switch must be "timed" to insure correct throttle opening when starter operates. See Adjustment data.*

ADJUSTMENT: *CAUTION—Switch timing must be checked and adjusted with carburetor on engine (switch can be timed approximately with carburetor off engine, but setting should be checked AFTER CARBURETOR INSTALLED ON ENGINE.*

Switch Timing (with carburetor on engine): Place transmission in neutral and apply parking brake firmly (to prevent car moving during tests). Set engine hot or slow idle speed at exactly 8 MPH. or 450 RPM. With engine not running, insert #65 drill or wire (such as small paper clip through vacuum piston screen to operate vacuum piston (CAUTION—do not remove screen). Then proceed as follows:
1)—Close throttle, press vacuum piston in as far as possible, open throttle and hold it open while completing steps 2) and 3). Remove wire (slide will drop down into shallow groove in piston and hold piston in as long as throttle is held open).
2)—Rotate fast idle cam to cold or fast idle position, place 5/64" spacer between throttle stopscrew and fast idle cam, close throttle sufficiently so that spacer is gripped between screw and cam. Turn ignition on, hold spacer in position by hand and open throttle. Starter should not crank engine. If starter does operate, see 4) for adjustment but do not make adjustments until after making test 3).
3)—Use a 3/64" spacer and repeat test procedure given in 2) above. Starter should crank engine. If starter does not operate, adjust as follows:
4)—Adjust by bending tang on operating lever on throttle valve shaft which contacts switch slide. Bend tang downward if starter cranks during test 2) above (with 5/64" spacer), bend tang upward if starter does not crank during test 3) above (with 3/64" spacer). *CAUTION—Bend tang only slight amount and repeat tests 2) and 3) until correct operation secured.*

Approximate Switch Timing (with carburetor off engine): Close throttle valve on a drill rod of correct size (see table below) placed between throttle valve edge and carburetor wall. Bend tang on operating lever until it just contacts switch slide.

▷*CAUTION—This approximate setting must be checked and readjusted after carburetor installed on engine.*

Throttle Opening (Approx. Switch Setting)

	Throttle Opening	Drill Rod
Series 40, 50 ('48-49)	.075-.085"	#45 to #43
Series 70 ('48-49)	.080-.100"	#39 to #42
Series 40 ('50-53)	.086-.096"	#43
Series 50 ('50-52)	.086-.096"	#43
Series 70 ('50-52)	.090-.100"	#41
Series 50 ('53)	.110-.120"	#34
Series 70 ('53)	100-.110"	#37

LUBRICATION: No lubrication is required in service. If switch has been disassembled, lubricate inside surface of terminal cap lightly with Beacon M-225 lubricant (Stromberg 385093) applied sparingly.

▷*CAUTION—Do not use other lubricant than specified above and DO NOT LUBRICATE SLIDE OR PISTON.*

DISASSEMBLY: Remove switch from carburetor by taking out two mounting screws. Remove terminal cap screw and clip, lift off cap and spring. Remove vacuum piston screen clip, remove washer and screen, move switch slide so that it does not interfere with piston, withdraw piston and piston spring.

▷*CAUTION—Do not interchange vacuum piston and switch contact guide springs (contact guide spring is HEAVIER).*

REASSEMBLY: Reverse disassembly directions given above and note the following important points:

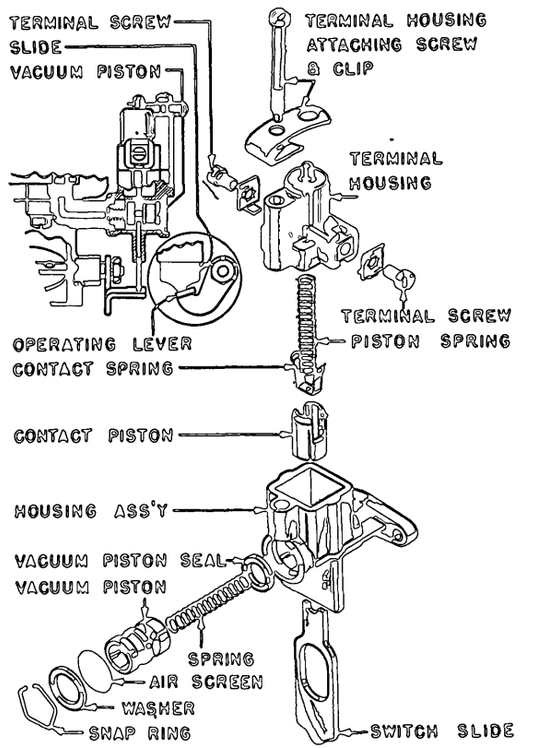
Vacuum Piston—Install with end having deep groove and tapered counterbore inward (toward seal). Piston spring must not be interchanged with contact guide spring (piston spring is LIGHTER).

Contact Spring—Use extreme care not to distort or change dimensions of spring (will affect switch operation). Contact width should be 9/16" over-all (outside to outside of spring at open end). Contact guide spring must not be interchanged with vacuum piston spring (contact guide spring is HEAVIER).

Switch Slide—Narrow projection on top of slide must enter slot in bottom of contact guide.

Mounting Gasket—Always use NEW gasket on mounting flange to insure vacuum-tight seal (vacuum passage terminates at port in flange).

▷*CAUTION—Switch will not operate satisfactorily if this vacuum channel is not open or if atmospheric leak exists at mounting flange.*



STROMBERG STARTER SWITCH

CHRYSLER, DE SOTO, DODGE KICK-DOWN SWITCH

FOR AUTOMATIC TRANSMISSION CONTROL

Car Model	Carburetor
Chrysler Six, C38 (1946-48)	Carter (B&B) EV1, EV2
Chrysler Six, C45, C48 (1949-50)	Carter (B&B) E7L1, L2, L3, L4
Chrysler Six, C51 (1951-52), C60 (1953)	Carter (B&B) E9A1
Chrysler Eight, C39, C40 (1946-48)	Carter (B&B) E7A1
Chrysler Eight, C39, C40 (1946-48)	①Stromberg AAVS-2
Chrysler Eight, C46, C47, C49, C50 (1949-50)	Carter (B&B) E7J1, J2, J3, J4
De Soto, Model S11 (1946-48)	Carter (B&B) EV1, EV2
DeSoto, Model S13, S14 (1949-50)	Carter (B&B) E7L1, L2, L3, L4
De Soto Six, S15 (1951-52), S18 (1953)	Carter (B&B) E9A1
Dodge Six, All Models (1949-53)	Carter (B&B) D6M1
Dodge Six, All Models (1949-53)	Stromberg BXVES-3
Dodge Six (1954), With Gyromatic	Carter (B&B) E9V1

①—Stromberg No. 384476 Kick-down Switch unit (separate unit).

►CHANGES, CAUTIONS, CORRECTIONS

►**Carter Kick-down Switch Parts Change (for Improved Performance):** Set of switch parts for improved operation furnished by Carter as Unitized Package No. 195-47U and should be used when reconditioning above Carter carburetors (except E7L4 and later carburetors).

Unitized Package No. 195-47U

Part No.	Part No.
63-98 Switch Piston Locator.	160-88S Switch Piston.
86-40 Terminal Washer.	184-53S Terminal Block Assy.
115-98U Pushrod Assy. & Spring.	101-36 Terminal Screw.

►**1949 Dodge Kick-down Switch Change for Improved Transmission Performance (Carter D6M1 & Stromberg BXVES-3 Code 3-95 & 3-95A Carburetors):** New kick-down switch springs furnished which raise kick-down speed limit from 40 to 43 MPH. **Carter and Stromberg spring not interchangeable** but can be identified as follows:

Carter—No. 61-399 (Dodge 1320082). Wire diameter .400", marked by blue dye (Stromberg spring also blue but lighter wire).

Stromberg—No. 385162 (Dodge 1320081). Wire diameter .350", marked by blue dye (Carter spring also blue but heavier wire). Spring free length 1 5/16". **This spring used in production on Code 3-95B carburetors.**

►*CODE 3-95C & LATER CARBURETOR CAUTION*—These carburetors have new type uncolored spring (free length 1⅜") and **should not be changed.**

DESCRIPTION & OPERATION: This unit is built-in carburetor (except Stromberg AAVS-2 which is mounted on the carburetor) for transmission control. It consists of a stationary contact connected to the transmission control solenoid, a movable contact mounted on a vacuum piston, and a switch plunger operated by the carburetor throttle valve lever which completes the circuit to ground (energizing the transmission solenoid) when the throttle valve is opened to slightly less than wide-open position. This action occurs at car speeds under approximately 27 MPH. (Low Range—for kick-down to First Gear), 53 MPH. (High Range—for kick-down to Third Gear). At higher car speeds, manifold vacuum pulls piston and movable contact up out of engagement so that plunger does not complete circuit to ground and kick-down does not occur.

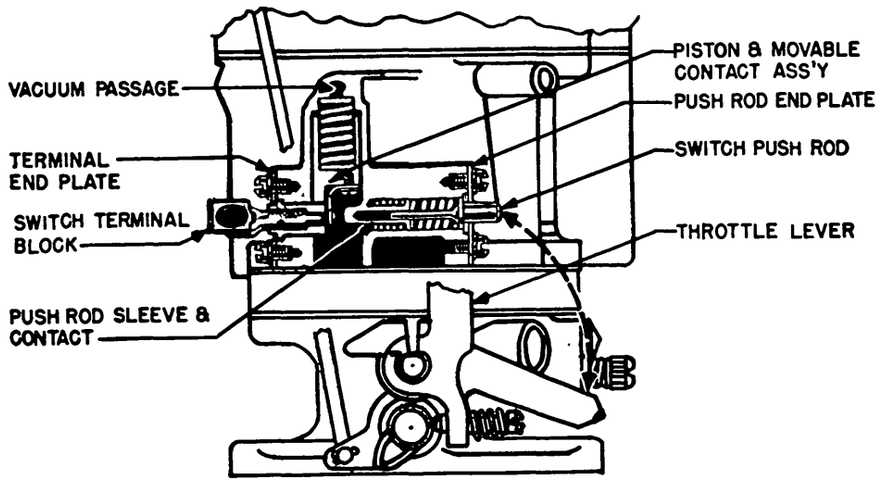
NOTE—Speeds listed above apply to Vacamatic and Simplimatic Transmissions. On hydraulically controlled transmissions, kick-down limit speeds are 40-45 MPH. (Chrysler), 38-40 MPH (De Soto) in High Range. Low Range limits are correspondingly lower.

DISASSEMBLY: To disassemble, remove two screws in switch plunger end plate and withdraw plunger. Insert small soft drift into vacuum chamber to hold vacuum piston in position against spring tension, then remove two screws in stationary contact end plate, remove end plate and contact assembly. Release pressure on vacuum piston, remove piston and spring. Movable contact can be removed by taking out mounting screw in end of piston. Clean all metal parts thoroughly, examine entire assembly for damage or wear. Reassemble switch.

REASSEMBLY CAUTION—See switch change notes (preceding) for switch parts change to improve switch operation and transmission performance.

Stromberg AAVS-2 Switch Mounting Note—Vacuum passage and air passage for switch operation terminate at holes in switch mounting flange. Make certain that these passages are clean and that air-tight joint secured when switch assembly mounted on carburetor (use special mounting gasket Stromberg No. 384468).

ADJUSTMENT: Stromberg BXVES-3 Kick-down Switch—Adjust by bending tang or ear on throttle lever which contacts switch plunger so that plunger travel is 5/32" minimum when throttle valve is in wide open position. Plunger must have a minimum of 1/64" over-travel in this position.



CARTER (B&B) KICK-DOWN SWITCH (STROMBERG BXVES-3 SIMILAR)

CHRYSLER, DE SOTO, DODGE V8 KICK-DOWN SWITCH

CHRYSLER & DE SOTO V8 (WITH CARTER "WCD" CARBURETOR)

Car Model	Kick-down Switch No.
Chrysler V8 (1951-53)	Carter No. 170-194S
DeSoto V8 (1952) ①	Carter No. 170-194S

①—Carter "WCD" Carburetors.

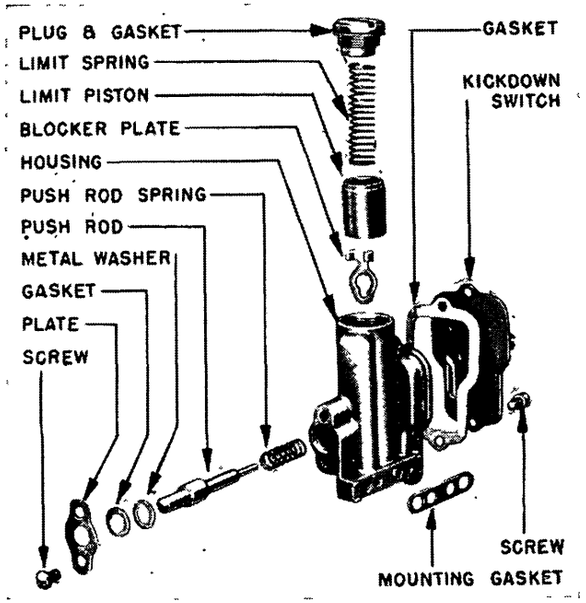
►*SWITCH NOTE: This switch has "Snap Action" type switch assembly mounted on side of housing.*

DESCRIPTION & OPERATION: Unit is mounted on carburetor throttle body and is vacuum controlled by a limit piston and blocker plate assembly. Switch can be operated only below 40 to 45 MPH. with wide open throttle. Above this speed, vacuum in main venturi moves the piston and blocker plate up, thus limiting travel of plunger so that snap action switch cannot be operated.

TROUBLE SHOOTING: If switch does not operate correctly, make following tests:

1) Disconnect wire at switch terminal, connect a 6 volt test lamp between this terminal and the negative terminal of the battery. Slowly push plunger in and listen for "click" of switch as it snaps to closed position. **Test lamp should light at same instant "click" is heard.** If lamp does not light, or considerable additional pressure required to light the lamp, switch is defective and should be replaced. If no "click" is heard and plunger travel is limited, piston and blocker plate are probably stuck in upper position and switch should be disassembled and cleaned.

2) If switch operates properly in test (1) above, operate switch by pressing accelerator pedal. Switch should click and test lamp light just before pedal reaches full travel. If excessive pressure (and compression of floor mat) required to operate switch, readjust throttle linkage, repeat test.



CHRYSLER & DE SOT V8 KICKDOWN SWITCH (WITH CARTER "WCD" CARBURETOR)

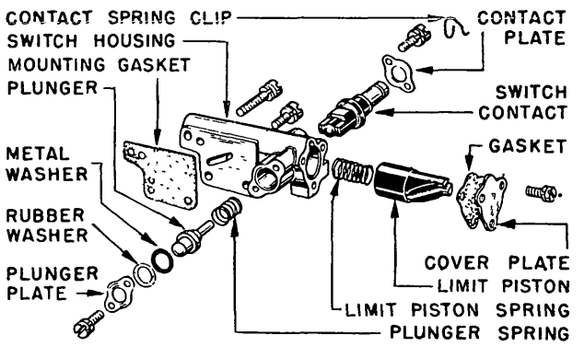
DISASSEMBLY: Remove kickdown push rod plate screws, lift out push rod, spring, metal washer, gasket, and plate as a unit. Remove limit piston plug and gasket from top of unit, lift out limit spring, piston and blocker plate *(NOTE*—Check piston for sticking before removal). Remove switch cover attaching screws, lift off switch assembly and gasket.

Cleaning & Inspection: Clean parts by immersing in solvent, dry with compressed air, inspect all parts for wear or damage. Check limit piston by installing piston and plug (omit spring), shake housing to make certain piston slides back and forth freely.

REASSEMBLY: Reverse disassembly procedure given above using new gaskets. When mounting unit on carburetor, blow out vacuum and vent passages in throttle body, use new switch mounting gasket and tighten mounting screws securely. Test switch as follows:

TESTING (After Installation): Connect 6 volt test lamp between switch terminal and negative side of battery. Slowly push plunger in, listening for the "click" of the switch and noting that lamp lights at same instant the "click" is heard.

Road Test of Switch Action—Check car on road to make certain switch operates below 45 MPH. but does not operate above 45 MPH. Test at 40, 45, and 50 MPH. by accelerating at ¾ throttle and pushing accelerator pedal down to kick-down position at speeds noted.



DODGE & DE SOTO V8 KICKDOWN SWITCH (DE SOTO WITH CARTER "BBD" CARBURETOR)

DODGE V8 & DE SOTO (WITH CARTER "BBD" CARBURETOR)

Car Model	Kick-down Switch No.
DeSoto V8 (1952-53) ②	Carter No. 170-231S
Dodge V8 (1953)	Stromberg No. 386190

②—Carter "BBD" Carburetors.

DESCRIPTION & OPERATION: Switch assembly is a separate unit mounted on the carburetor main body (vacuum and vent passages extend through switch mounting flange). Switch consists of a stationary contact or terminal and a movable contact located in the end of the limit piston. At car speeds below 45 MPH., these two contacts are aligned and the switch is closed by a spring-loaded plunger actuated by the throttle lever. At car speeds above 45 MPH., vacuum at carburetor main venturi is sufficient to pull limit piston in against spring tension, withdrawing the movable contact so that the plunger does not make contact.

TROUBLE SHOOTING: If switch does not operate correctly, make the following tests:

1) Disconnect wire at switch terminal, connect a 6 volt test lamp between this terminal and the negative terminal of the battery. Slowly push plunger in. Lamp should light. If lamp does not light with full plunger travel, limit piston may be stuck in inner position or contacts are dirty. Disassemble and clean switch.

2) If switch operates properly in test (1) above, operate switch by pressing accelerator pedal. Test lamp should light just before pedal reaches full travel. If lamp does not light, or if excessive pedal pressure required, readjust throttle linkage and repeat test.

3) Check car performance. See Testing (after Installation) below.

DISASSEMBLY: Remove plunger plate screws, lift out plate, washers, plunger, and spring as a unit. Remove switch contact plate screws, lift out terminal plate and contact. On DeSoto, unscrew limit piston plug; on Dodge, remove screws and lift off limit piston plate and gasket. Slide limit piston and spring out of cylinder.

Cleaning & Inspection: Clean parts by immersing in solvent, dry with compressed air. Inspect all parts for wear or damage. Check limit piston by installing piston in cylinder (without spring) and shaking housing with thumb held over opening. Piston should slide back and forth freely.

REASSEMBLY: Reverse disassembly procedure given above. Make certain that contact in limit piston faces toward fixed contact opening and that limit piston moves freely **after** terminal and contact assembly installed. When mounting unit on carburetor, use NEW switch mounting gasket and make certain mounting face on switch and carburetor are clean, tighten mounting screws securely. Test switch as follows:

TESTING (After Installation): Check switch performance as directed in tests (1) and (2) in TROUBLE SHOOTING above. Road test car as follows:

Road Test of Switch Action—Check car on road to make certain that switch operates below 40 MPH. but does not operate above 45 MPH. Test at 40, 45, and at 50 MPH. by accelerating car at ¾ throttle and pressing accelerator pedal down to kick-down position at speeds noted.

TYPE OF EQUIPMENT

BRAKES

	Pag
Anti-Creep	2003
Bendix Hydraulic, Single Anchor	2025
Bendix (Lockheed) Hydraulic Self-Centering	2029
Chrysler Disc Brake (With Spider)	2037
Chrysler Disc Brake (Without Spider)	2039
Chrysler (Lockheed) "Safeguard" Hydraulic	2036
Chevrolet (Own) Hydraulic	2043
Chevrolet Bendix Hydraulic	2045
Chevrolet Twinplex	2046
Ford-Lockheed Hydraulic, Ford & Mercury	2048
Ford-Bendix "Uni-Servo" Hydraulic	2049
Ford-Bendix Hydraulic (Ford, Lincoln, Mercury)	2050
Ford Truck Self-Centering	2052
Girling Hydraulic	2030
Goodyear-Hawley Hydra-Disc Hydraulic	2042
Hawley Mechanical Two-shoe Type	2041
Hill-Holder & No Roll	2034
Hudson Mechanical Follow-Up	2028
Lockheed Hydraulic Double Anchor	2033
Lockheed (Wagner) Hydraulic Self-Centering	2031
Wagner-Lockheed Self-Centering	2035

POWER BRAKES (BOOSTERS)

Bendix Power Unit	2004
Buick Power Unit	2008
Chrysler, DeSoto, Dodge, Plymouth, Power Unit	2016
Hydrovac Power Unit	2012
Midland Hy-Power Unit	2019
Moraine Power Unit	2020
Vacdraulic Power Unit	2014
Vacu-Ease Power Unit	2015

BRAKE SERVICING

Hydraulic Brake Trouble Shooting	2002

CAR APPLICATION

POWER BRAKES (BOOSTERS)

BUICK	Page
1953-54 Power Unit	2008
1955 Moraine Power Unit	2020
CADILLAC	
1954-55 Hydrovac	2012
CHEVROLET	
1946-55 Trucks (Hydrovac)	2012
1954-55 Pass. (Bendix)	2004
CHRYSLER	
1946-48 Vacdraulic	2014
1950-54 Vacu-Ease	2015
1955 Power Unit	2016
DESOTO & DODGE	
1950-54 Vacu-Ease	2015
1955 Power Unit	2016
FORD	
1948-55 Trucks (Midland)	2019
1953-55 Trucks (Hydrovac)	2012
1954-55 Pass. (Midland)	2019

HUDSON	Page
1955 Bendix	2004
LINCOLN & MERCURY	
1953-55 Bendix	2004
NASH	
1954-55 Bendix	2004
OLDSMOBILE	
1953-55 Bendix	2004
1955 Moraine Power Unit	2020
PACKARD	
1953-55 Bendix	2004
PLYMOUTH	
1955 Power Unit	2016
PONTIAC	
1954-55 Bendix	2004
1955 Moraine Power Unit	2020
STUDEBAKER	
1955 Hydrovac	2012

CAR APPLICATION

BRAKES

BUICK	Page
1946-55	2025
CADILLAC	
1946-55	2025
CHEVROLET CARS	
1946-50	2043
1951-55	2045
CHEVROLET TRUCKS	
1946-50 Trucks	2043
1951-52 ¾ & 1 ton	2043
1951-52 1½ & 2 ton (Front)	2043
1951-55 1½ & 2 ton (Rear)	2046
1951-55 ½ ton	2045
1953 ¾ & 1 ton	2045
1953-55 1½ & 2 ton (Front)	2045
CHRYSLER	
1946-55 Eight (Safeguard)	2036
1946-54 Six	2036
1949-52 (Disc with Spider)	2037
1953-55 (Disc without Spider)	2039
CROSLEY	
1947-48	2041
1949-50	2042
1950-52	2033
DESOTO	
1946-55 All	2036
DODGE	
1946-55 All	2036
FORD CARS	
1946-48	2048
1949-55	2050
FORD TRUCKS	
1939-48 Comm'l & Truck	2048
1948-55 F-1, 100 Truck	2050
1948-51 F-2, ¾ ton Truck	2048
1948-51 F-3, ¾ ton (Front)	2048
1951-52 F-2, 3 (Rear Wheels)	2050
1949-52 F-3 Par. Del.	2048
1951-52 Exc. Par. Del. (Front)	2049
1948-52 F4, 5, 6 Truck	2048
1953-55 F-250; F, P-350 Trucks (Rear)	2050
1953-55 F,C-700; F,C-750 (Front)	2048
1953 F-250, F, P-350, F, C, P-500, F, C-600 (Front)	2049
1954-55 F-250; F, P-350; B, C, F, P-500; B, C, F-600 (Front)	2049
1953-55 500, 600, 700, 750 Rear	2052

FRAZER	Pag
1947-51 Self-Centering	2029
1949-50 Some Cars, Self Adj.	2031
HENRY J	
1951-54 4 and 6 cyl.	2029
HUDSON	
1946-55 All Except Jets	2025
1953-54 Jet	2029
1954-55 Metropolitan	2030
1950-55 Rambler	2029
KAISER	
1947-55 Self-Centering	2029
1949-50 Some Cars, Self Adj.	2031
LINCOLN	
1946-55	2050
MERCURY	
1946-48	2048
1949-55	2050
METROPOLITAN	
1954-55	2030
NASH	
1946-47 "600"	2033
1946-55 Ambassador	2025
1948-49 "600"	2029
1954-55 Metropolitan	2030
1950-55 Rambler	2029
1950-54 Statesman	2029
1955 Statesman	2025
OLDSMOBILE	
1946-50 Six	2025
1946-55 Eight	2025
PACKARD	
1946-55 All	2025
PLYMOUTH	
1946-55	2036
PONTIAC	
1946-55	2025
RAMBLER	
1950-55	2029
STUDEBAKER	
1947-53 All	2031
1954-55 All	2035
WILLYS	
1946-53 Jeep	2033
1954-55 Jeep	2029
1947-55 Except Jeep	2029

HYDRAULIC BRAKE TROUBLE SHOOTING

Brake Pedal goes down to the floor:

1. Master cylinder empty. Refill and check for leaks in the brake system. If cylinder is completely dry it will be necessary to bleed the entire system, to remove air. After refilling and bleeding, apply the brakes and if pedal still goes down check for bad fluid leak. Examine bottom of each brake drum for fluid drip which would indicate a leaking wheel cylinder. Also look under car for leakage on floor from line leak, or from master cylinder (at boot), indicating worn master cylinder parts. If pedal action normal make further check for leakage by depressing pedal hard and holding it down for 2 or 3 minutes. After a minute or so it may start to go down slowly indicating a leak. NOTE—Pedal going down slowly can also be caused by a worn master cylinder cup allowing leakage past the piston. This would not cause an external leak as fluid would return to the master cylinder reservoir, through the intake port.
2. Excessive lining to drum clearance.
3. Air in the brake system.

Too Much Pedal Travel Before Brakes Are Applied (with Brakes Adjusted and Bled):—

1. Defective master cylinder check valve. Master cylinder check valve is designed to maintain 8 to 10 lbs. pressure on the brake system when brakes are released. If pressure is not maintained considerable pedal movement is used to develop line pressure before brakes operate.
2. Too much clearance between pedal rod and master cylinder.

One Wheel Locks When Brakes Are Applied:—

1. Grease, oil, or brake fluid on lining. NOTE—If lining is saturated with oil or fluid it should be replaced.
2. Improperly adjusted shoes.
3. Brake shoes installed incorrectly.
4. Brake shoe springs installed incorrectly.

Brakes Drag or do Not Release Properly:—

1. Improperly adjusted brake shoes.
2. Broken shoe return spring.
3. Wheel cylinder piston frozen.
4. Mineral oil in the brake system. This oil will cause rubber cups to swell up causing sluggish action. NOTE—When mineral oil is found in brake system, the wheel cylinders and master cylinder should be reconditioned, and the lines thoroughly flushed out with alcohol, or new fluid.
5. Master cylinder by-pass port plugged, or pedal to master cylinder rod not adjusted correctly, not allowing the master cylinder piston to return far enough to uncover the by-pass port. See Pedal Adjustment instructions for the particular car being repaired.

Brakes Go On By Themselves (locking all wheels) while driving:—

1. Condition shown in item 5 under "Brakes drag or do not release properly" apply to this trouble.

Car Pulls To One Side:—

1. Improper brake shoe adjustment.
2. Grease or oil on lining of one brake.
3. Plugged brake hose making one brake inoperative.

Brake Pedal Springy:—

1—Air in system. Bleed lines.
2. Brake shoe anchors incorrectly adjusted.
3. Thin brake drums, caused by machining too large oversize.

Brake Pedal 'Hard':—

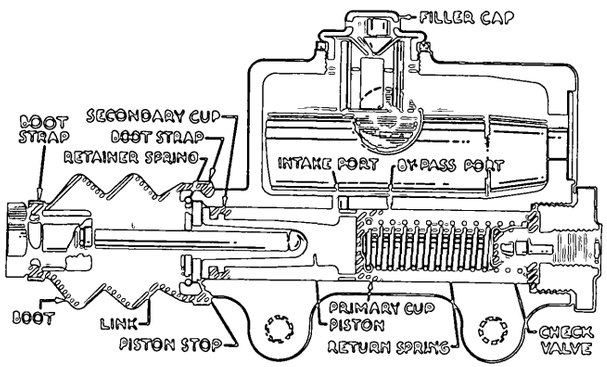
1—Improper adjustment.
2—Incorrect lining type.
3—Oily linings—replace or install new shoes.
4—Partial contact—high spots. Linings should be ground concentrically.

SERVICING NOTE:—See following article for directions for bleeding lines and servicing of master and wheel cylinders. See separate brake articles for brake shoe and brake pedal adjustment directions.

HYDRAULIC BRAKE SERVICING

BLEEDING BRAKE LINES:—Remove master cylinder supply tank filler cap, fill tank with genuine brake fluid, keep tank filled with fluid during entire bleeding operation (air will be drawn into brake lines if tank allowed to become dry). Remove screw in bleeder valve on wheel backing plate, install special fitting and hose connection. Submerge free end of hose in brake fluid in clean glass container. Unscrew bleeder valve ½-¾ turn, press brake pedal down by hand approximately half of travel, allow pedal to return slowly. Repeat operation until fluid flow from tube is completely free from any air bubbles, then close bleeder valve, remove hose connection and replace dustscrew. Bleed lines at each wheel in same manner.

CAUTION—Use extreme care not to allow supply tank to become dry during bleeding operation. If automatic refiller unit not used, supply tank should be filled after every 6-10 strokes of the brake pedal (automatic refiller will maintain level in supply tank without attention during bleeding operation).



DRAKE MASTER CYLINDER

Two Cylinder (Chrysler Type Front Wheel Brake). When bleeding these brakes, first attach bleeder line to lower cylinder bleeder connection, bleed this cylinder and the brake line as directed above. Then connect bleeder line to upper cylinder bleeder connection and bleed this cylinder and the line between the cylinders as directed above. Both cylinders must be bled in this manner to remove all air from the brake system.

Chrysler Disc Type. Bleed all four lower cylinders first, and then four upper cylinders. See Disc Type Brake for complete information.

Brakes with Power Units (Hydrovac, Midland, Vacdraulic, Vacu-Ease). See separate articles on these units for information about bleeding.

SERVICING:—Wheel Cylinders—To disassemble wheel cylinders, remove brake shoes, take out wheel cylinder mounting screws, withdraw cylinder through backing plate. Disconnect brake line, remove piston boots, withdraw pistons. Examine cylinder bore. If corroded or scored, cylinders can be lapped or honed and oversize pistons fitted. Piston clearance (metal piston) in cylinder should be .001-.003" and must never exceed .005". In assembling wheel cylinder, wash all parts in alcohol, dip rubber piston cups in Brake Fluid, and insert ahead of piston with lip in. Central return spring in stepped cylinders is tapered and should be installed with small end toward piston in smaller bore. Reconditioned cylinders should be tested for leakage in fixture under alcohol with 8 lbs. and 80 lbs. air pressure. Wheel must be bled when wheel cylinder reinstalled.

Piston Cup Expanders—Can be used with special return spring in wheel cylinders to correct leakage caused by piston cup contraction in extreme cold temperatures. Expander should have .005" clearance in cylinder and should fit into open end of piston cup with slight clearance. Install expanders with cupped face in and use special return spring which is ½ turn shorter than standard spring.

Chrysler Wheel Cylinder Pistons (with Rubber "Piston Ring"). On all Chrysler, DeSoto, Dodge, Plymouth separate piston cups are not used and the pistons are sealed by a rubber piston ring in a groove on the pistons. These piston rings are removed by rolling them off the end of the piston. Install piston rings with lip in toward inner end of cylinder. On two cylinder brakes (with single acting pistons), install piston spring with large end toward piston and smaller end in toward end of cylinder.

Master Cylinder:—To disassemble master cylinder, remove rubber boot and push rod or link, take out retainer spring and piston stop, withdraw piston. Examine cylinder. If corroded or scored, cylinder can be lapped or honed and oversize piston fitted. Clearance should be .001-.003". In reassembling, wash all parts in alcohol, dip in Brake Fluid, see that check valve is installed correctly and that thin washer is in place between piston and primary piston cup. Insert piston with lips on both primary and secondary cups in. Test for leaks in same manner as for wheel cylinders and bleed entire system when installed on car.

By-pass Port Note—By-pass or compensating port connecting supply tank and master cylinder must be uncovered with the master cylinder piston against its stop. When installing master cylinder piston assembly, hold piston against stop and make certain that this port is not covered by lip of primary cup.

CAUTION—When master cylinder installed on car, brake pedal must be adjusted for correct pedal clearance or free-travel to insure this by-pass port being uncovered with pedal released and master cylinder piston against its stop. Brakes will drag if this port is not open.

ANTI-CREEP

Studebaker 1950-55 Models with Auto. Trans.

►**ANTI-CREEP RELEASE SWITCH NOTE:** On 1950 Commander models, this switch also controls the engine idle speed and is called the "Carburetor Idle Speed Adjustment Screw Switch" (see illustration). On other models, switch is mounted as follows:

Champion—Release switch is mounted on accelerator cross shaft bracket on dash. Switch contacts are closed by the cross shaft lever when accelerator pedal is released (closed throttle), and open when the accelerator pedal is depressed to open the carburetor throttle.

1950 Commander—Release Switch or "Carburetor Idle Speed Adjustment Screw Switch" mounted on carburetor throttle lever and replaces the customary throttle idle speed stopscrew. When accelerator pedal is released, switch contacts are closed and the switch also positions the throttle valve for correct engine idle speed. When the accelerator pedal is depressed to open the carburetor throttle, the switch contacts open.

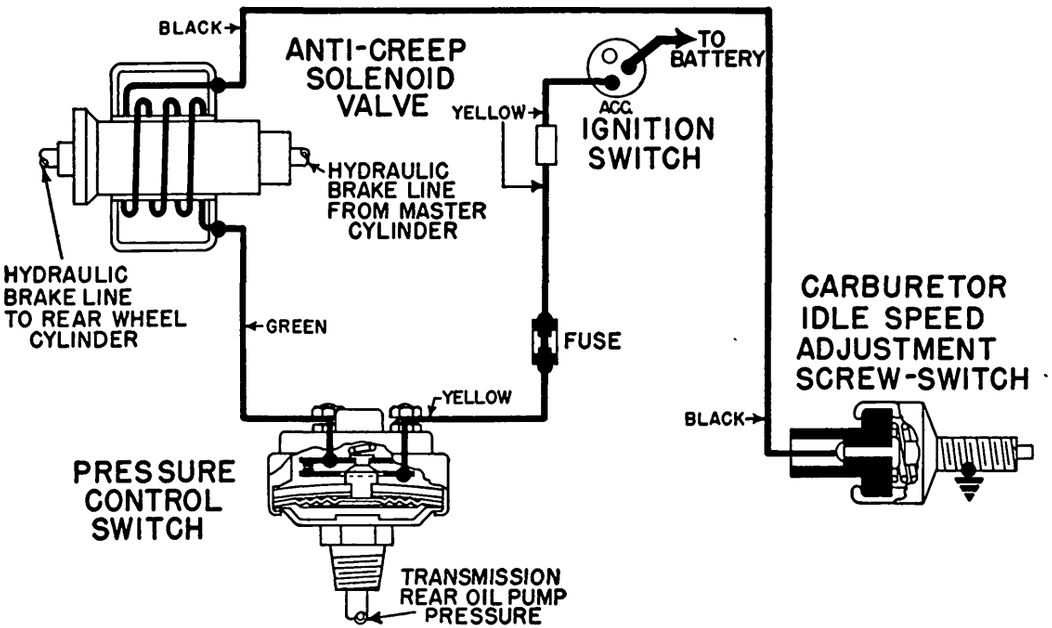
1951 & Later Commander & President—The release switch is mounted on accelerator cross-shaft bracket on dash (similar to Champion).

DESCRIPTION: System comprises a solenoid valve, pressure control switch and a release switch (see 1950 Commander data above). With ignition on, or when engine is idling and the car is not in motion and brakes are applied, the rear brakes will remain on, after releasing brake pedal, until accelerator is again depressed. With car in motion, system is inoperative and brakes function normally.

OPERATION: The solenoid valve mounted on rear of master cylinder holds brake pressure on the rear brakes whenever the Anti-Creep circuit is closed. The pressure control switch which is operated by automatic transmission rear pump pressure, opens the Anti-Creep circuit when the car is moving forward, and closes the circuit when the car is stationary, or moving in reverse. The release switch opens or closes the circuit as the accelerator is depressed or released. With the ignition "on", the accelerator released (release switch closed), and the car stationary (pressure control switch closed), the Anti-creep circuit is completed through these switches and the solenoid valve is energized. When the brakes are applied under these conditions, the anti-creep solenoid valve will retain approximately 200 pounds per square inch pressure at the rear wheel brakes to prevent "creeping." When the accelerator pedal is depressed, the circuit is open at the idle adjusting screw switch allowing the solenoid to de-energize thereby releasing the brakes instantly. When the car is moving forward, normal brake operation is not affected since the rear pump pressure holds open the Anti-Creep pressure control switch, preventing solenoid from energizing.

CONTROL UNITS REMOVAL & INSTALLATION: If operation not satisfactory and checking indicates units defective, remove and replace as follows:

Release Switch: To remove switch, disconnect switch lead, loosen locknut and unscrew switch from bracket (carburetor throttle lever on 1950 Commander).



ANTI-CREEP CONTROL UNIT WIRING DIAGRAM

►***CAUTION—Switch must be adjusted when re-installed on car.***

Pressure Control Switch—To remove, disconnect switch leads, unscrew switch from transmission case.

Solenoid Valve: To remove, disconnect all leads, disconnect brake line at solenoid valve outlet. Take out screw mounting solenoid valve on adapter, lift unit out. Install solenoid valve in same manner.

►***CAUTION—Bleed brakes after installing solenoid valve and connecting brake line.***

ADJUSTMENT: Release switch is only point requiring adjustment. Adjust switch, for each model, as follows:

1950 Commander Carburetor Idle Speed Adjustment Switch—Switch also controls engine idle speed and must be adjusted only with engine warm. With engine warmed up (choke valve wide open, fast idle inoperative), disconnect wire at switch on carburetor throttle lever, place selector lever in Neutral "N" position, turn switch in or out of carburetor lever until engine speed is 500-550 RPM.

Champion (All Models), Commander (1951-52)—After transmission linkage adjustment is completed, loosen switch locknut and screw switch into bracket until switch plunger just contacts plate. Connect switch wire, turn on ignition, screw switch in until an audible click is heard in the anti-creep solenoid. Tighten switch locknut.

Commander (1953 & Later), President—After carburetor and transmission linkage adjustments are completed, turn release switch into cross-shaft bracket until carburetor idle adjustment screw starts to break with low step of fast idle cam. Back off the anti-creep release switch three complete turns and secure with locknut. Install wire and test operation.

Linkage Adjustment: *See "Studebaker" Automatic Transmission in Transmission Section.*

CHECKING OPERATION: 1) While driving car at approximately 10 MPH, selector lever in "D" position, quickly apply and immediately release brakes. **Do not touch accelerator pedal.** Car should roll freely with no evidence of brake drag after brake pedal is released.

2) While driving car on level ground, release accelerator pedal and apply brakes, bringing car to complete stop. Car should not creep forward until accelerator pedal is depressed.

3) With car standing on level ground and engine idling, selector lever in one of "D" positions, and with anti-creep system preventing car from creeping, touch accelerator pedal lightly, then release it. Car should creep slowly from a standstill.

TROUBLE SHOOTING: Anti-Creep System Inoperative—Carburetor throttle valve sticking slightly open; release switch incorrectly adjusted; release switch sticking open; system fuse burned out; open circuit in ignition switch; open circuit between fuse and ignition switch; open circuit between pressure switch and fuse; pressure switch sticking open; open circuit between solenoid valve and pressure switch; open circuit or ground in coil winding of solenoid valve; open circuit betwen solenoid valve and release switch; check valves or gaskets allowing front pump pressure in rear pump line.

BENDIX POWER UNIT

Chevrolet Passenger Cars (1954-55)
Hudson (1955)
Lincoln (1953-55)
Mercury (1953-55)
Nash, Ambassador & Statesman (1954-55)
Oldsmobile (1953-55)①
Packard (1953-55)
Pontiac (1954-55)①

①—Moraine Brake Power Unit also used in 1955.

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 LINCOLN & MERCURY BRAKE PEDAL TRAVEL CAUTION:* A minimum of 1" (Lincoln), 1½" (Mercury) pedal to floor clearance must be maintained (engine running). If less, check brake adjustment and need for new brake linings.

►*1953 EXHAUSTION OF VACUUM SUPPLY CAUTION (Engine Stalled):* It is possible to exhaust vacuum supply with two applications of brake (engine stalled). *(NOTE–See Oldsmobile Production Change below).* With no vacuum assist pedal pressure required to stop vehicle is greatly increased. If engine stalls (or is parked) on steep grades, stop car completely, set hand brake firmly, turn off ignition, and place selector lever in "R" position. Before releasing hand brake be sure engine is running.

►*1953 OLDSMOBILE SOLENOID VALVE ADDITION & VACUUM RESERVE TANK PRODUCTION CHANGE:* A solenoid valve, mounted on top of an enlarged vacuum reserve tank, has been added to Power Brake Unit of late 1953 cars. Solenoid is connected into stoplight switch energized power assist to brakes is available and will permit 3 or 4 brake applications with engine off or stalled at coasting speeds below 20 MPH. **Oldsmobile Solenoid Valve Checking and Adjustment–** With transmission in neutral and engine stopped, coast 20-30 MPH and apply brakes. Brake operation should be smooth and the same as with engine running. If there is any catch or hard spot in pedal travel, the stop light switch should be adjusted as follows: Loosen stop light switch attaching screws, then adjust switch so that stop lights make contact with first 1/8"-1/4" of pedal travel. Tighten attaching screws, again check to be certain that stop lights go off when brake pedal is in fully released position. Re-check operation by coasting and applying brakes.

►*1953-54 LINCOLN & MERCURY BRAKE MASTER CYLINDER OPERATING LEVER BRACKET INSTALLATION CAUTION:* When installing Lever Bracket, Part No. LA-22519-A., into pedal support brace, it is necessary to install lower retaining bolts with head of bolt to inside of pedal support, with nut and lockwasher installed on outside. If installation made with nut to **inside** of pedal support, full travel of brake pedal will be restricted.

►*1955 CHEVROLET BRAKE BLEEDING CAUTION (To Prevent Trapping Air in System):* Since no bleeder is provided at forward end of power unit to permit trapped air to escape from forward end of unit (due to slight tilting above horizontal line from pushrod eye for design reasons) one of two following methods can be used to eliminate any air trapped in system:

Unit Off Car: Fill master cylinder approximately half full, with forward end of unit tilted down below a horizontal line from pushrod eye, before unit is installed in position on dash panel.

Unit On Car: Raise rear end of car until forward end of power unit is tilted below a horizontal line from pushrod eye.

►*1955 CHEVROLET SLOW BRAKE PEDAL RETURN CORRECTION:* Check to see that pushrod has been installed to **inboard** side of lever assembly at the pedal linkage instead of to outboard side; check rubber boot to see that bellows have been pulled through smaller hole in dash panel and mounting plate (This should be done at same time power unit is being assembled to mounting plate) and that bellows are not all gathered on front side of dash panel and mounting plate, causing bind on pushrod; check lubrication at pedal linkage. Lubriplate where necessary. On early cars, after checking as indicated above, and brake pedal return is still slow, remove power unit from front of dash. Remove rubber boot, and squirt some rubber lubricant between valve sleeve into which pushrod is assembled and sleeve bore in valve assembly (This will lubricate "O" ring seal in valve sleeve).

►*1955 CHEVROLET VACUUM LEAK CAUTION (Windshield Washer Installation):* Some V-8 engine cars equipped with power brakes and electric windshield wipers (early cars) did not have proper Tee connection at carburetor for washer installation. When washer being installed be sure proper fitting is in carburetor. If not, install Tee Part No. 3718911 to make washer connection. **Under no circumstances cut into power brake line at any point.**

DESCRIPTION: Self-contained hydraulic vacuum power braking device utilizing engine intake manifold vacuum and atmospheric pressure for its power. It consists of three separate units as follows:

Power Unit: Three elements are combined to make up this single unit, namely:

(1) Vacuum Power Cylinder comprising a cylinder power piston, and piston return spring.

(2) Hydraulic Master Cylinder containing an hydraulic plunger, compensating valve, residual check valve, and fluid reservoir.

(3) Control Valve, mechanically actuated, which controls degree of brake application or release in accordance with foot pressure applied to pedal.

Vacuum Reserve Tank provides vacuum assist for a limited time when engine stalls.

Manifold Check Valve, in vacuum source line, maintains vacuum in unit should engine stall.

OPERATION: With engine running, brakes unapplied, both sides of power piston are open to atomspheric pressure. Application of the brake pedal causes vacuum port to open, thus connecting the forward side of vacuum power piston and rear side of reaction diaphragm to engine vacuum. This pressure differential causes power piston to move forward, thereby exerting a thrust on the hydraulic plunger. This increases line pressure to the four wheels. Release of the brake pedal restores the pressure balance in the power cylinder.

CHECKING & ADJUSTMENT: Check all parts of the power brake system before disassembling the Power Brake Unit whenever brake trouble experienced.

Adjustments: None required. If unit becomes faulty, manufacturer recommends that unit be overhauled using Power Brake Repair Kit. *NOTE*–Use all parts in kit. *DISCARD ALL OLD RUBBER PARTS.*

Bleeding Brakes: Bleed in same manner as standard brake system. Do not use vacuum assist while bleeding. Engine should not be running and vacuum reserve should be reduced to zero by applying the brake several times before starting bleeding.

Air Cleaner: Clean twice a year. To clean, remove air cleaner and thoroughly wash in cleaning solvent. Allow cleaner to dry before reinstalling.

Refilling Fluid Reservoir: Check level every 1000 miles. If level not up to "L" mark on dipstick (Oldsmobile); ¼" from filler plug opening (Lincoln & Mercury), within ½" from filler plug opening (Others), add brake fluid.

Vacuum & Hydraulic Line Inspection: Every 5000 miles, check hose, tubing and connections. Replace deteriorated hose or damaged tubing.

TESTING: Road test brakes by making a brake application at about 20 MPH to determine if vehicle stops evenly and quickly. If pedal has a spongy feel when applying brakes, air may be present in hydraulic system. Bleed system as described above. When engine is stopped and transmission is in neutral, apply brakes several times to remove all vacuum in system. Depress brake pedal, hold light foot pressure on pedal and start engine. If vacuum system is operating, pedal will tend to fall away under foot pressure, and less pressure will be required to hold pedal in applied position. If no action is felt, vacuum system is not functioning. Stop engine and again remove all vacuum in system. Depress brake pedal and hold foot pressure on pedal. If pedal gradually falls away under foot pressure, hydraulic system is leaking. If brake pedal travels to within 1" of toeboard, brake shoes require adjustment or relining.

LUBRICATION: Piston packing seal is lubricated at time of assembly and requires no further lubrication *CAUTION–NEVER lubricate vacuum valve.*

TROUBLE SHOOTING: The following conditions apply to Power Brake operation. Be sure brake shoes, drums, linkage, and adjustments correct before repair of Power Brake System.

Hard Pedal: Vacuum failure due to faulty vacuum check valve, collapsed vacuum hose, plugged vacuum hose or fittings, leaking vacuum reservoir or vacuum hose and pipe connections; bound up pedal mechanism; glazed linings; grease, brake fluid, or water on linings; vacuum leak in unit between piston plates, past leather piston packing, between vacuum cylinder and master cylinder, or around hydraulic plunger seal; restricted air cleaner; jammed pushrod and valve plunger; broken counter-reaction spring; leak past atmospheric poppet; vacuum hose on piston loose or restricted.

"Grabby" or Severe Brakes: Grease or brake fluid on linings; scored drums; anchor pins loose; vacuum leak in the reaction diaphragm; sticking pushrod and valve

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BENDIX POWER UNIT (C nt.)

plunger; faulty pivot arm and vacuum poppet action; restricted diaphragm passage.

P dal Goes To Floor (Or Almost To Floor): Brakes require adjustment; air in hydraulic system; hydraulic leak in lines or at wheel cylinders; fluid reservoir needs replenishing; cracked drums or broken linings; hydraulic leakage at compensating valve, hydraulic plunger seal, compensating seal or outlet fitting seals.

Brakes Fail To Release (Or Slow Release): Anchor pins loose; bound up brake pedal linkage; brakes improperly adjusted; faulty residual check valve; excessive hydraulic plunger seal friction; faulty compensating valve; excessive piston packing friction; restricted air passage in piston plate; restricted air cleaner; sticky pushrod and valve plunger; broken piston return spring.

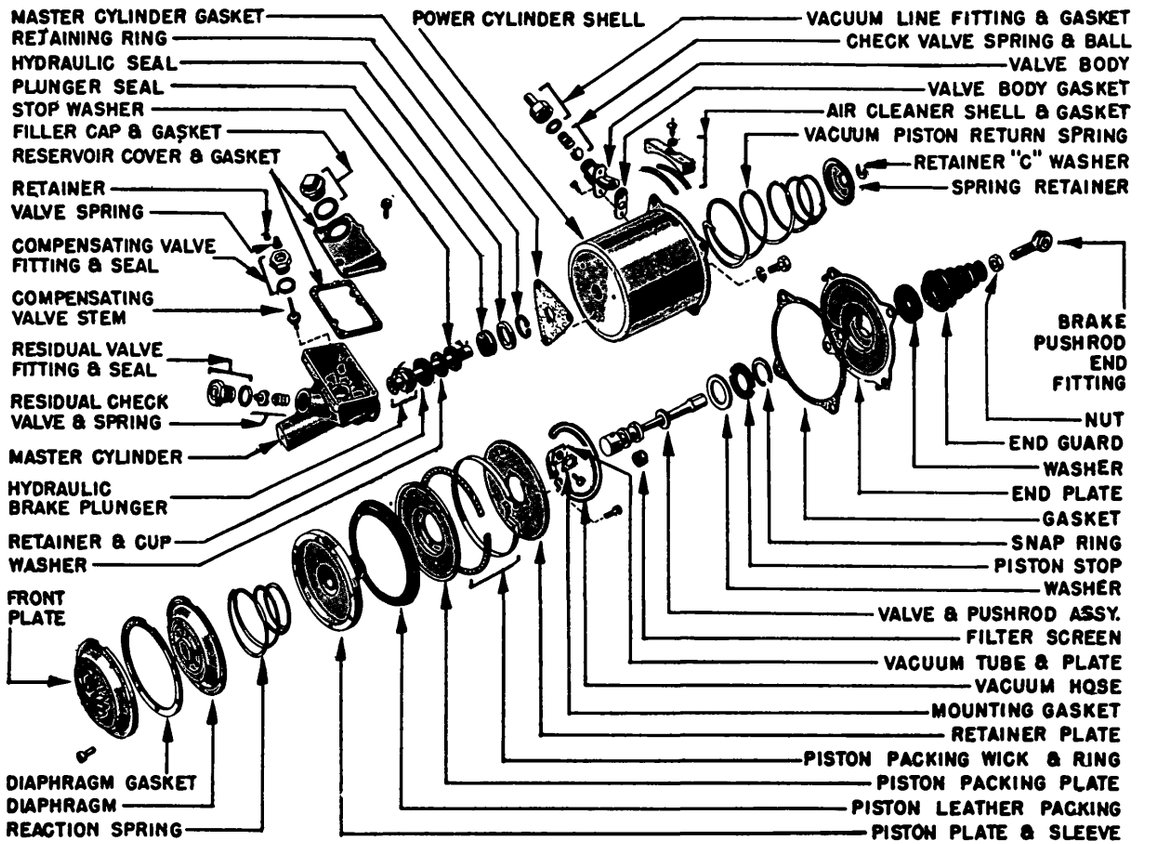
REMOVAL (CHEVROLET): From engine side of dash panel remove vacuum lines from vacuum inlet tube on intake manifold (top of engine on V8, left side center on 6 Cyl.). Remove vacuum line to vacuum reservoir. Remove stop light wire connection. Remove hydraulic line from hydraulic cylinder. From inside body remove lever to pushrod retaining bolt washer, lockwasher and nut and disengage pushrod from pushrod lever. Remove bolts and lockwashers retaining power brake unit to dash unit and remove unit from vehicle.

REMOVAL (LINCOLN & MERCURY): Disconnect pushrod from brake pedal. Remove master cylinder outlet fitting bolt (NOTE—It is not necessary to remove stop light switch wire or hose assembly from outlet fitting). Do not disturb outlet fitting in master cylinder. Loosen manifold hose clamp at check valve, remove hose from valve. Loosen vacuum reserve tank hose clamp at check valve and remove hose from valve. Remove bolts securing power brake assembly to bracket on dash panel, remove assembly.

REMOVAL (OLDSMOBILE): Disconnect hydraulic line at power brake master cylinder. Use care to prevent dirt entering hydraulic line and secure hose so that open end is above level of junction assembly to prevent loss of fluid. Plug master cylinder outlet with rubber stopper. Disconnect leads from stoplight switch and fold back floor mat. Remove three brake pedal bracket attaching bolts. Remove bracket and pedal assembly. Remove mast jacket grommet retainer clip and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws. Loosen speedometer cable hold down clip and slip cable from under clip, then remove speedometer cable and grommet from mast jacket cover plate. Remove two cover plate to power cylinder bolts, and remove cover plate while positioning power brake unit so it rests on edge of opening in toe pan. Disconnect vacuum hoses and remove power brake unit through toe pan opening.

►*INSTALLATION NOTE:* When reinstalling hoses, position clamps so screw heads may be reached from below car. Place 5/16" bead of 3M Sealer around entire toe pan groove.

REMOVAL (PACKARD): Disconnect vacuum, atmospheric, and hydraulic lines and stoplight wires from power unit (raise hydraulic line above level of junction assembly to prevent fluid leakage). Disconnect and remove brake and accelerator pedals. Remove steering column grommet retainers, slide grommet up out of way. Remove carpet retainers and fold back carpet. Remove cover plate screws, then remove power brake and cover as an assembly, take out mounting screws and remove power brake from cover.



1953-54 BENDIX BRAKE POWER UNIT

REMOVAL (PONTIAC): Disconnect vacuum hose from vacuum pipe leading to vacuum tee connector. Raise car and remove engine side apron from left side. Remove electrical cables from behind cable guide on reservoir cover of brake unit. Remove coiled hydraulic pipe from outlet fitting on hydraulic cylinder and from tee connector. Disconnect pushrod from pedal and wires from stoplight switch. Remove nuts from U-bolt retaining pedal pivot bracket to steering column; remove pedal and pivot bracket (with stoplight switch assembly attached). Remove accelerator pedal. Push rubber grommet up on steering column and move floor mat out of way. On Synchro-mesh cars, remove clutch pedal seal retainer and steering column seal retainer and remove seals. On Hydra-Matic equipped cars, remove screws retaining mounting plate to floor pan and remove mounting plate with power brake unit attached. On Synchro-mesh cars, remove screws retaining power brake unit to mounting plate (brake will rest on frame). Remove screws retaining mounting plate to floor pan and remove mounting plate, "jockeying" as necessary to clear clutch pedal. Remove power brake unit. *(CAUTION—Do not support or carry brake unit by pushrod since pushrod may be pulled out of plunger).* Remove mounting plate from brake unit, if not previously removed, and remove vacuum hose from vacuum cylinder inlet tube.

DISASSEMBLY: *CAUTION—Use extreme care to prevent hydraulic system parts coming in contact with mineral oil or grease.* Clean all dirt from outside of unit, using care not to allow dirt or solvent to enter unit. Remove fluid filler cap or dipstick and gasket then empty fluid out of reservoir. On Lincoln, remove screw that secures heat shield to booster body, remove shield by sliding it off hydraulic cylinder.

►*CAUTION: Before further disassembly, scratch alignment marks at the following points: (1) Vacuum cylinder shell and vacuum cylinder end plate. (2) Vacuum cylinder shell and hydraulic cylinder casting. (3) Reser-*

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BENDIX POWER UNIT (C nt.)

voir cover and hydraulic cylinder casting. (4) Tube fitting and hydraulic cylinder casting.

ALL MODELS

Hydraulic Unit: Place hydraulic unit in vise (lead jaws) at its normal mounting angle and remove the six cover screws, cover and gasket. Using a 1 1/8" (thin-wall) socket wrench, unscrew and remove compensator port and valve assembly. Remove rubber seal ring from port fitting. Unscrew hydraulic output fitting and remove fitting and take off rubber seal ring. Remove check valve assembly and valve spring. Separate check valve rubber cup and cup retainer. Remove unit from vise and empty remaining fluid. *NOTE*–Master cylinder piston assembly will be removed after vacuum cylinder is removed from hydraulic cylinder casting.

1953-54 MODELS

Vacuum Unit: Replace unit in vise. Release lip of valve rod boot from cylinder end plate and slip boot off over end of rod. Remove screws holding cylinder end plate and gasket and remove these parts. With a small-nose pliers compress ends of valve stop washer snap ring and pry out opposite side of snap ring. Remove snap ring, valve rod and valve assembly. Remove the screen from around vacuum valve. *(CAUTION*–Protect polished surface of vacuum valve assembly). Remove hose from vacuum inlet tube. Compress the vacuum piston into cylinder about ½" and remove inlet tube assembly and gasket. Lift out the piston assembly. Using care not to compress the master cylinder piston from its released position, compress the piston return spring about ½" and remove the return spring seat retainer, spring seat and return spring. Remove the three vacuum cylinder, mounting bolts and lockwashers. Remove vacuum cylinder, gasket, rubber seal ring and metal encased leather seal from hydraulic cylinder casting. Using special pliers, next remove master cylinder piston cup washer retainer ring and lift the master cylinder piston and seal parts as a unit from the hydraulic cylinder. *(CAUTION*–Protect polished surfaces of master cylinder piston). Remove the steel backup washer, phenolic guide washer, cylinder piston seal and seal retainer from the master cylinder piston.

Vacuum Piston: Scratch alignment marks on front and rear piston plates. Remove the piston steel and rubber stop washers. Remove the five packing plate screws, retainer plate, wick expander spring, wicking, vacuum piston seal retainer and seal. Turn unit over and remove the five piston plate screws and separate the front and rear piston plates, diaphragm assembly, counter reaction-spring, gasket and vacuum valve return spring.

1955 MODELS

Vacuum Unit: 1) Replace unit in vise. Release lip of valve rod boot from cylinder end plate and slip boot and felt off over end of rod. Bend up two tabs on end plate and separate end plate and end plate gasket from cylinder. Slide vacuum hose off vacuum tube attached to vacuum cylinder. Remove air cleaner screw and separate screw gasket, shell, hair and rubber seals from vacuum cylinder. Remove two vacuum tube attaching screws, vacuum tube and gasket. *(CAUTION*–Inspect inner surface of vacuum cylinder under holes for burring from attaching screws. Remove burrs to prevent damage to power piston assembly). Pull out piston assembly from vacuum cylinder.

2) Compress piston return spring about ½" and remove the return spring seat retainer, spring seat and return spring. Remove the three vacuum cylinder mounting bolts and lockwashers. Remove vacuum cylinder, gasket rubber seal ring and metal encased leather seal from hydraulic cylinder casting. Using special pliers, next remove master cylinder piston cup washer retainer ring and lift the master cylinder piston and seal parts as a unit from the hydraulic cylinder. *(CAUTION*–Protect polished surfaces of master cylinder piston). Remove the steel backup washer, phenolic guide washer, cylinder piston seal and seal retainer from the master cylinder piston.

Vacuum Piston Stop, Compensating Stem & Vacuum Hose: Remove vacuum hose from piston tube. Remove tube screw and separate tube and rubber seal from piston assembly. Visually inspect condition of rubber stop. If there is no evidence of wear or damage, remove screws and remove steel stop washer with rubber stop attached. If rubber stop warrants replacing, separate stop from steel washer before removing steel washer. Remove compensating stem diaphragm and compensating stem.

Vacuum Piston, Valve Pushrod & Plunger: Hold rear piston plate assembly in vise using care not to damage surface at vacuum tube port. Loosen five piston plate screws and separate front piston plate, gasket, diaphragm assembly and counter-reaction spring from rear piston plate assembly. Remove vacuum poppet spring screw, spring from rear piston plate. Using pliers, remove atmosphere poppet retaining clip. Break clip, if necessary, to remove from poppet stem. Separate atmosphere poppet spring and atmosphere poppet from piston plate. Remove pushrod and plunger, and vacuum poppet assembly from piston plate. From groove in bore of piston plate, remove plunger stop ring. Using sharp tool under end of Spirolox ring, remove ring from groove at end of plunger. Separate pivot washer and pivot arm from plunger. Remove clip and separate vacuum poppet from pivot arm. From recess around plunger remove flat rubber seal.

Rear Piston Plate Packing & Plates–Place rear piston plate on bench, with packing and plates facing upward. Remove six retainer plate attaching screws, retainer plate, ring wicking, piston packing plate and leather piston packing.

CLEANING & INSPECTION: Thoroughly wash all parts in diacetone alcohol. Use air hose to blow dirt and cleaning fluid out of recesses and internal passages. Remove rust or corrosion from bore of vacuum cylinder shell with fine emery cloth. Place all cleaned parts on clean paper or cloth to prevent possibility of dirt being assembled into power brake. Inspect all parts for wear or damage and replace as necessary. Particular attention should be given to following items:

Vacuum Cylinder Shell: Inspect shell for scores, pits, dents or nicks, or damaged threads in nuts or in mounting flanges.

Hydraulic Cylind r Casting: Examine bore down one inch from open end. For the hydraulic cup to seal properly, this portion of bore must be free from scores, deep scratches or corrosion. The sealing surfaces at the reservoir cover, compensating port, and hydraulic outlet port must be free of scoring, pitting, dents and nicked edges. Also check casting for cracks and damaged threads.

Hydraulic Port Fitting: The surface at the small end of the fitting must be free from scoring or corrosion which might prevent sealing with rubber cup of residual check valve.

Compensating Port Fitting: Inspect surface around port opening, inside threaded end of fitting, for scoring or corrosion which might prevent proper seating of compensating valve.

Valve Supply Tube: Make sure tube braze is secure and that tube plate is not distorted.

Piston Plates: Examine plates for cracks and damaged threads. Inspect plunger bore in rear piston plate and poppet seats for scratches and nicks. **Do not** attempt to refinish bore. Replace with new plate, if necessary.

Hydraulic Plunger & Washer Assembly: Inspect polished surface for scores, pits, or dents. **Do not** attempt to refinish plunger surface. Replace with new assembly, if necessary.

Pushrod & Plunger Assembly: Rod must pivot freely in plunger without any noticeable end play. Inspect plunger for scores, pits, or dents on outside diameter of polished surfaces. **Do not** attempt to refinish plunger surface. Replace with new assembly, if necessary.

Vacuum Cylinder End Plate: Examine for distortion.

REASSEMBLY: Before reassembly, make sure working area, parts, and tools are free of dirt, grease and oil.

1953-54 MODELS

Master Cylinder Piston: Dip piston and cup in hydraulic brake fluid. Install cup retainer on piston with small end of retainer toward washer on end of piston. Dip cup in brake fluid, then install lip side of cup on cup retainer. Place piston-retainer-cup sub-assembly in hydraulic cylinder. Take care not to damage lip of cup as it enters cylinder bore. Install the phenolic guide washer and piston cup steel stop washer in place and install the retaining ring. Hold master cylinder piston in its outward position and install leather seal (with lip toward hydraulic cylinder).

Vacuum Piston: Place rear piston plate on bench with rear side facing up. Install Vacuum Piston Packing Assembly Ring over the piston plate, then install leather piston packing seal, lip side up, until it seats in recess of piston plate. Install vacuum piston packing seal retainer, wicking, wick retaining expander spring, wick retaining plate, and install the five retaining screws *(CAUTION–Care must be taken when installing these screws to apply sufficient downward pressur on screwdriver to partially compress the packing s al and thoroughly engage screw threads to prevent stripping the threads).* Turn vacuum piston over and install Diaphragm Installation Guide Pins into screw holes, then place the counter-reaction spring, small end down, on piston plate, and install reaction diaphragm (with large diaphragm plate toward rear piston plate) and gasket, over pins. Align the two air passage cutouts. Install the valve return spring with small end into reaction diaphragm (this will be over the back of

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BENDIX POWER UNIT (C nt.)

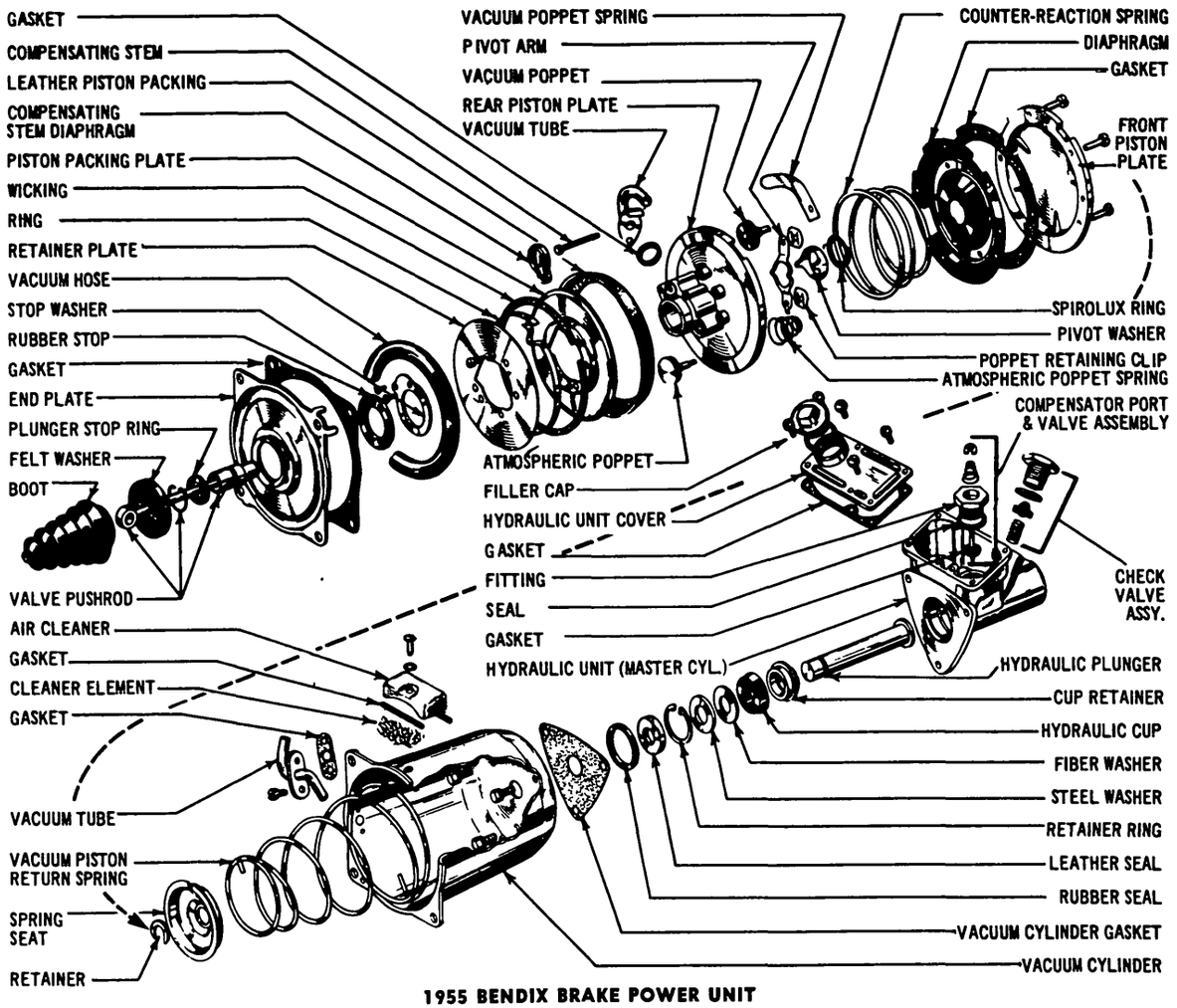
rubber pad). Install front piston plate, aligning the air passage cutouts or alignment marks. Press down front plate, compressing the spring, and remove one guide pin at a time, replacing each with a screw. Tighten screws uniformly. Saturate new wicking and wipe leather seal with a maximum of two teaspoons full of **shock absorber oil**. Fasten the vacuum tube and hose assembly and gasket to rear piston plate with two screws.

Vacuum Cylinder: Install master cylinder rubber seal ring and the cylinder gasket. Match aligning marks on vacuum cylinder and on hydraulic cylinder casting and install mounting bolts and lockwashers. Tighten to 4-5 ft. lbs. torque. Install the piston return spring engaging the hooked end of the large end of the spring between a mounting bolt and a small hump in the cylinder (any of the three). Place the spring retainer over the piston engaging hooked end of small end of spring in slot of retainer. Install retainer washer. Apply a thin coating of shock absorber oil to inside walls of vacuum cylinder and insert vacuum piston assembly into cylinder and align open end of hose with the center of the large elongated hole in vacuum cylinder. Push piston assembly into cylinder making sure that bore in vacuum piston front plate fits over master cylinder piston. Rotate piston assembly clockwise 20° to 30" and then 20° to 30° counter-clockwise. Move the piston through its full stroke a number of times to make certain open end of vacuum hose will be centered under elongated hole in vacuum cylinder after piston finds its normal working position. Install tube assembly, gasket and screw on vacuum cylinder. Tighten screw firmly and slip the hose on its connection. Again push piston into cylinder to its full stroke a number of times permitting it to return by itself and note if return spring causes piston to rotate. If it rotates enough to cause the coiled hose to rub against the inlet connection, remove piston and move piston return spring 120°.

Hydraulic Cylinder: Dip compensator rubber seal ring in brake fluid and install on compensator port fitting. While holding piston assembly forward in cylinder about ½", install port fitting and valve assembly and tighten securely. Dip line check valve rubber cup in brake fluid and assemble on cup retainer. Position spring and cup-retainer assembly on hydraulic output fitting lower face at small end of fitting. Invert the power unit and screw fitting into place, using care to see that parts remain in correct alignment. Tighten to 30-42 ft. lbs. torque. Assemble copper gasket, hydraulic tube fitting and the second copper gasket over fitting bolt. Screw assembly into outlet, aligning the marks previously made.

1955 MODELS

Compensating Valve: Insert stem of valve poppet assembly through hole in threaded end of fitting. Assemble large coil of poppet spring to fitting over end of poppet. Hold poppet on seat, compress spring, and insert "C" washer retainer in groove at end of stem. Crimp ends of "C" washer together to retain in place. Coat rubber seal with brake fluid and assemble over threads of fitting.



1955 BENDIX BRAKE POWER UNIT

Master Cylinder: 1) Coat residual check valve rubber seal with brake fluid and place over threads of hydraulic outlet fitting in inverted position, and insert cone end of cup and retainer assembly in end of fitting. Center check valve spring in recess of rubber cup. Hold master cylinder casting upside down and thread outlet fitting into hydraulic cylinder. Tighten to 50 ft. lbs.

2) Insert washer end of plunger into cylinder. Place cup retainer on plunger so that smaller inside diameter of retainer is toward plunger washer. Coat hydraulic cup with brake fluid and place over plunger; lip on cup must be toward cup retainer. Place Spauldite guide washer against cup. Place steel washer against guide washer. Slide all parts into bore of cylinder. *CAUTION*–Use care so as not to cut cup when placing on plunger and when inserting cup into bore of cylinder. It will be necessary to use a small screwdriver or similar tool having a smooth edge to start lip into bore.

3) Press parts into cylinder bore and insert snap ring using snap ring pliers. Be sure snap ring is engaged in recess. Push in on hydraulic plunger and then install compensating valve assembly into master cylinder. Pull back on plunger **to be sur** plunger washer tilts compensator valve. Tighten fitting to 15 ft. lbs. Place cover gasket on reservoir of cylinder. Align cover scribe marks and replace cover screws, with exception of rearmost screw on right hand side. Re-place filler cap or dipstick gasket, screw filler cap into cover or replace dipstick.

R ar Pist n Plate Packing & Plat s: Place piston assembly flat on work bench inside of piston assembly ring. Place leather packing against piston with lip up.

CONTINUED ON NEXT PAGE

BENDIX POWER UNIT (C nt.)

Place packing plate inside leather packing, with beveled edge of plate down against packing, so that "cutouts" and holes in plate are aligned with piston Coil wicking inside lip of leather packing Cut wicking to required size Remove wicking and dip in vacuum cylinder oil, let excess drip off and reinstall wicking Coil expander ring inside wicking with barbs pointing upward into wicking Engage notch at loop end of ring with hook at opposite end Replace and align wicking retainer plate Replace screws and tighten evenly

Vacuum Piston, Valv Pushrod & Plunger 1) Place stem of vacuum poppet in hole at rounded end of pivot arm and install two retaining clips making sure that clips are pushed down against pivot arm A piece of bar stock with 1/8 hole in end, or piece of brake pipe with flared end, facilitates installation Place rubber seal in recess of pushrod plunger with lip of seal toward pushrod Coat plunger with Lubriplate, place into bore of rear piston plate and engage snap ring in recess in bore of piston plate Place pivot arm vacuum poppet sub-assembly over end of plunger, insert pivot washer and engage Spiroluv ring into groove at end of plunger (Engage end of ring in groove and then screw into place) Place vacuum poppet spring into recess of piston plate and with end of spring over end of vacuum poppet stem, insert screw Place atmospheric poppet spring between pivot arm and piston plate with large coil of spring towards atmospheric port From opposite side of piston plate, place atmospheric poppet so that stem passes through plate, spring, and hole in pivot arm Install retainer clips on stem of poppet in same manner as before A length of round rod with a flat end can be used to back up atmosphere poppet when installing clips

2) Clamp rear piston plate assembly in vise and screw guide pins into place Place large end of counter-reaction spring in piston plate Place diaphragm over guide pins so that by-pass holes and notches in diaphragm and plate are aligned *NOTE*–When by-pass holes and notches are aligned, correct side of diaphragm will be toward piston plate

3) Move diaphragm downward until it seats on spring When properly seated, flange of metal ring will be within counter-reaction spring Place gasket and front piston plate over guide pins, making sure by-pass holes and notches are properly aligned

4) Apply force on front piston plate to compress counter-reaction spring until front piston plate rests on rear piston plate Loosely install two screws Remove guide pins, one at a time, and install remaining three screws, Tighten all screws evenly

Vacuum Piston Stop, Compensating Stem & Vacuum H se· Place vacuum poppet compensating stem into hole in recess in hub of piston plate Place compensating stem diaphragm in recess with "by-pass" slot of diaphragm outward and tab to left (when slot is toward you) Place steel stop washer over pushrod, align washer with hub of piston, replace two screws and tighten securely Soften coating of rubber stop (if stop was removed) with gasoline and cement to steel washer Position rubber seal in recess of piston, hook plate of tube to piston plate and replace screw, tighten screw securely Attach vacuum hose to tube and coil hose around hub of piston

Vacuum Cylinder: 1) Pull out hydraulic plunger, place Plunger Seal Installer (J-5405) over end of plunger, and assemble leather seal over seal tool with lip of seal toward master cylinder. Press seal into recess of master cylinder and then remove tool from plunger. Place rubber seal into master cylinder recess around leather seal. Align vacuum cylinder to master cylinder, and with gasket in place, insert three capscrews (and lockwashers), tighten to 6 ft. lbs

2) Place larger end of vacuum piston return spring in vacuum cylinder making certain hook on spring is between a screw head and a raised projection on end of cylinder. Assemble retainer plate over end of spring, aligning notch with hook on spring Compress spring, and with retainer plate over end of plunger, insert "C" washer into groove of plunger.

3) Apply thin film of vacuum cylinder oil to bore of vacuum cylinder and to lip of leather packing, insert piston into cylinder so that free end of vacuum hose is in line with center of hole. Push piston into cylinder, adjusting position slightly until hook seats between two web sections of front piston plate. Move piston 20-25° in both directions in cylinder and stroke piston against spring several times by hand, to allow piston to find its normal operating position. Check location of end of hose with respect to center of hole in cylinder Install tube and gasket and replace two screws. Slide end of hose onto vacuum tube approximately 5/8'. Operate piston by hand through its full stroke several times to make certain that hose does not rub against cylinder or piston. Should interference occur, remove and rotate piston to a new web position where interference does not occur.

Air Cleaner & End Plate: Place two rubber seals on bottom edges of air cleaner shell. Place hair in shell. Replace screw and gasket and attach air cleaner shell to vacuum cylinder. Be sure hair is under shell, a small steel scale or similar tool can be used to push hair under ends of shell. Align end plate gasket and end plate and place against vacuum cylinder. Bend over two tabs of end plate to secure plate to cylinder. Install rod guard felt in large end of boot. Dip small end of boot in brake fluid and place boot and felt over pushrod. Attach lip of boot to scallops at center of end plate.

INSTALLATION: To install power brake assembly reverse removal procedure and note the following

1953-54 MODELS

Vacuum Valve & Piston: *CAUTION–Check to see that movement of the vacuum piston is within 3/32" to 7/32" from its full released position. This movem nt should allow compensator valve to close. If this dimension does not check, unit is not assembled prop rly and should be rechecked.* If dimension checks install vacuum valve screen over the grooved port in vacuum valve and carefully insert the valve and rod assembly into vacuum piston (phenolic guide washer must be in place on rod) and install retainer snap ring. Install felt washer and rubber boot. Match fluid reservoir cover alignment marks and install cover and gasket, and filler cap and gasket.

1955 MODELS

Hudson & Nash: To prevent any contact during operation, a minimum of ¾" clearance must be maintained between centerline of pushrod-to-bell crank clevis pin and outer surface of front adjusting link locknut

Pontiac: There should be approximately 1/8' clearance between pushrod and bore of plunger at top or 12 o'clock position with brake pedal released. If improper clearance noted, loosen brake pedal pivot bracket and shift slightly to obtain clearance. *NOTE*– If clearance cannot be obtained, check for bent pushrod or bent mounting plate.

BUICK POWER UNIT

Buick (1953-54)

►CHANGES & CORRECTIONS

►*AIR-VACUUM CYLINDER PRODUCTION CHANGE Two types used, Series No. 2, identified by letter "K" in front of production date on head of unit, has no control or dampener springs on ends of reaction rod and stop and uses new type power piston and push rod. When overhauling Series No. 1 Power Brake Unit control and dampener springs must be discarded and new power piston and push rod installed. When changes made stamp or paint (use red or yellow) letter "K" on head of unit preceding date of manufacture.*

►*1953 POWER BRAKE VACUUM PUMP PRODUCTION CHANGE (To Provide Vacuum Reserve at Idle Speed)* —Effective October 1 1953 Vacuum Pump is part of power brake installation This unit may be installed on earlier cars *For data see "Description" below*

DESCRIPTION: Vacuum suspended type Self contained hydraulic vacuum power braking device utilizing engine intake manifold vacuum and atmospheric pressure for its power It consists of three separate units as follows

Power Unit: Three elements are combined to make up this single unit, namely
(1) **Air-Vacuum Cylinder** comprising a cylinder, power piston and piston return spring
(2) **Hydraulic Cylinder** containing an hydraulic plunger return spring, and compensating port
(3) **Control Valve,** mechanically actuated which controls degree of brake application or release in accordance with foot pressure applied to brake pedal It consists of a valve push rod, slide valve reaction rod, reaction spring assembly, and counter-acting spring

Hydraulic Fluid Reservoir· Mounted under hood

Manifold Check Valve: Located in vacuum source line Maintains vacuum in unit should engine stall

Power Brake Vacuum Pump: *NOTE—This unit part of Power Brake installation on all 1954 cars (and 1953 cars beginning Oct. 1, 1953).* Consists of a motor driven vacuum pump with a control relay (see Wiring Diagram) Control relay circuit is connected to

CONTINUED ON NEXT PAGE

BUICK POWER UNIT (C nt.)

accessory terminal of ignition switch (at the car fuse block) and is grounded through the generator main brush. The vacuum pump will operate whenever the engine speed is less than 250 RPM. with the ignition turned on, and supplies vacuum for the power brake operation. When the engine speed exceeds 250 RPM. (which is less than normal idle speed of 450 RPM.) the voltage developed by the generator causes the relay to open and cuts out the vacuum pump. At higher speeds manifold vacuum is sufficient to provide for brake power unit operation. The vacuum pump provides a "Stand-by" vacuum source in the event of engine stalling.

OPERATION: With engine running, brakes unapplied, full vacuum chamber of the unit (both sides of power piston) is held at engine manifold vacuum. Application of the brake pedal causes atmospheric port to open, admitting air to the cover side of the power piston, while full manifold vacuum is maintained on the cylinder side of piston. This pressure differential causes power piston to move forward, thereby exerting a thrust on the small piston in the hydraulic cylinder. This increases line pressure to the four wheels. Release of the brake pedal restores the vacuum balance in the power cylinder. Should failure in the vacuum power system occur, brakes can still be applied conventionally.

POWER BRAKE VACUUM PUMP: Used on all cars after Oct. 1, 1953. May be installed on earlier cars.

Servicing—No attention required other than pump lubrication. At 5000 mile intervals, remove filler screw from top of pump unit, fill as necessary with regular SAE 5 oil.

Specifications—Vacuum pump and motor assembly is Trico or Movac. Serviced as an assembly.

Control Relay—Delco-Remy No. 1116896. Contact gap should be .025" (.017-.033").

Contact Opening Voltage—5.7-7.2 volts.

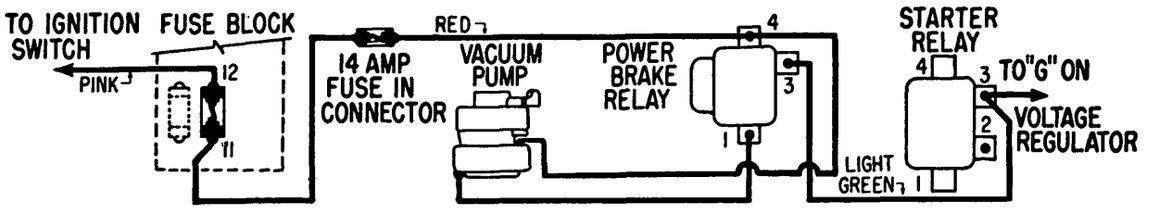
Contact Closing Voltage—Not more than 3 volts after excitation of 12-15 volts.

Fuse—14 ampere. In fuse holder in line between the car fuse block and the control relay.

CHECKING & ADJUSTMENT: Check all parts of the power brake system before disassembling the Power Brake Unit whenever trouble is experienced.

Pedal Linkage Adjustment: In cases where hard or sticky initial pedal pressure is encountered or where pedal fails to return to release position when foot removed, check for lack of lubrication of pedal shaft or binding of clevis pin due to rusting or chloride corrosion. To correct latter condition drive out pin and install new pin or clean up old pin. (Early production has no grease fitting at this point —late production has straight fitting). If no fitting in lever, remove engine splash pan, drill and tap lower end of lever with 1/4 x 28 thread and install a 90° grease fitting. Grease fitting should be turned toward rear of car to permit access to fitting with grease gun. Reinstall splash pin. If binding still occurs with joints lubricated, it may be caused by mis-alignment of pedal shaft with push rod. With push rod in position loosen bolts which attach pedal shaft bracket to frame and permit bracket to shift to a free position. Retighten bolts.

Pedal Stop Adjustment: With pushrod removed, adjust pedal stop bolt so that pedal grommet is compressed to ½" height (1953), ⅞" height (1954). Tighten locknut.



BUICK POWER BRAKE VACUUM PUMP WIRING DIAGRAM

Push Rod Adjustment: After adjusting pedal stop, install push rod and loosen adjusting jam nut. Holding pedal against stop, adjust push rod length to provide 1/16" clearance or lost motion in power cylinder. Note that in making adjustment only finger tip pressure should be used in pushing rod into power cylinder. Pressures above two pounds will start valve moving. The 1/16" clearance should be in addition to any movement of cylinder valve. ***CAUTION—Great care must be taken when installing push rod into valve body. Any pressure on push rod will open valve. An open valve will build up pressure in hydraulic system causing brakes to lock after a few miles of operation.*** Shorter adjustment safer as long as push rod will actuate brake valve even with brake pedal fully released.

Brake Shoe Adjustment & Pedal Height: Brake shoe settings and procedures same as for manual brakes. After brake shoes properly adjusted, pedal will have certain height which cannot be adjusted up or down. Normal pedal height from lower, back edge of pedal to floor mat is approximately 2".

BLEEDING HYDRAULIC SYSTEM: Using pressure bleeder attached to fluid reservoir under hood of car, bleed **first** the cylinder **end** bleeder until fluid runs clear, **second** at cylinder **flange** bleeder, and last at the four wheel bleeders. When fluid runs clear at all points, start car engine, pump brake pedal several times, and rebleed at two bleeder screws on unit. After bleeding completed, check for brake system leaks while applying heavy brake pressure, with car engine running.

TROUBLE SHOOTING: If operation unsatisfactory, check as follows:

Brake System Loses Fluid: Tighten all connections. If fluid loss still occurs, the trouble is probably worn or damaged primary cup, seal, reaction cup, or reaction "0" ring. If evidence of presence of abrasive material, polish out light scores with very fine polishing paper, then thoroughly wash parts before assembly. Use Kit in reassembly. NOTE—If heavy abrasive action has taken place due to severe contamination of brake fluid, install new power piston and sleeve assembly after thoroughly flushing reservoir and wheel cylinder lines.

Brakes do not Release Properly: Brake pedal arm, fulcrum or pushrod clevis may be binding; push rod adjustment too long; inspection screw and gasket loose or missing; excessive friction caused by "dry" leather piston cup in 6" diameter air-vacuum cylinder. To remedy the latter lubricate cup by oiling through inspection hole in head of unit, using only 2 or 3 ozs of special oil furnished in Kit. Then back off shoes and, with engine running, pump pedal several times until leather frees up. CAUTION—***Do not pour this special oil into reservoir. It will contaminate fluid.*** Other causes of above difficulty are plugged compensation holes near end of power piston sleeve, broken residual valve spring or power piston return spring, cylinder mis-alignment, damaged or weakened control spring or dampener spring in Series 1 units, or weak or damaged reaction rod spring in Series 2 units (Series 1 units have date only on head of unit, Series 2 units have date preceded by "K"—See Production Change above); excessively dry "0" ring on outside diameter of air valve seat (Series 2 units only). Use entire Kit when making replacements.

Power Unit does not Boost: To determine if unit operating, stop engine, then depress brake pedal several times to eliminate all vacuum from system. Apply brakes, and while holding foot pressure on pedal, start engine. If unit operating, pedal will move forward when vacuum power is added to pedal pressure. **If above check shows unit not operating** manifold check valve may be stuck in closed position; bent, broken, or obstructed vacuum source line from engine to check valve or check valve to unit; blocked air inlet to air cleaner cover; blocked air passage in guide sleeve under boot; jammed air valve seat in power piston due to foreign material becoming lodged in power piston air valve seat bore cavity. **If above test shows unit is operating** difficulty may be damaged secondary cup, insufficient fluid in system, glazed brake lining, grease or brake fluid on linings, bound up pedal fulcrum or push rod clevis. When replacing parts, use **entire kit.**

REMOVAL: Remove cranking motor splash pan. Disconnect return spring, remove clevis pin at front end, then remove brake pedal pushrod with cylinder pushrod attached. Disconnect breather tube which is clamped to inlet tube on power cylinder air cleaner cover. Disconnect hose and pipe from vacuum chamber (rear) end of power cylinder. Disconnect reservoir-to-hydraulic cylinder pipe, allow reservoir and pipe to drain. Disconnect distributor-to-cylinder pipe and allow to drain. **Discard old fluid** and cover pipe ends with tape to exclude dirt. Remove nuts and lockwashers attaching power cylinder to its support and remove cylinder from car.

INSTALLATION: To install, reverse removal procedure, except for installation of pushrod and splash pan. Adjust brake pedal stop and pushrod, then bleed hydraulic system.

DISASSEMBLY: Major Components.

Thoroughly clean entire exterior of Brake Power Unit, being careful not to allow dirt and solvent to enter unit. ***CAUTION—Use extreme care to prevent hydraulic system parts coming in contact with mineral oil or grease.***

1) Remove push rod boot and discard.
2) Clamp unit in vise with hydraulic cylinder end

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BUICK POWER UNIT (Cont.)

down. In clamping unit USE NO MORE PRESSURE THAN NECESSARY TO HOLD IN POSITION (to avoid cracking or distorting cylinder).

3) Remove air cleaner cover, lift out cleaner core.

4) Remove three head bolts and lockwashers, then insert screwdriver in slots in flange, twist, then remove head by tapping up evenly on flange, using screwdriver and heel of hand, or light hammer. CAUTION—Removing head releases return spring unless power piston held down during head removal. Remove return spring.

Vacuum Side of Unit: 1) If power piston and guide have been removed with head, set power piston assembly (with head) in holding fixture with power piston end down and guide end up, lift head off power piston guide. Remove "0" ring and bumper from outside diameter of head, discard.

2) Place head in arbor press with inside face up. Remove bearing, "0" ring, and guide seal. Discard "0" ring and guide seal, but not bearing.

3) With power piston assembly still in holding fixture, bend back lip of leather piston cup, remove wick and expander spring, discarding wick only.

4) Disassemble power piston and guide assembly by removing three bolts and lock washers, lift guide assembly off power piston. Discard "O" ring.

5) Remove floating control valve assembly from guide assembly, discard valve but not spring. Lift off leather piston cup and discard, lift air valve seat out of power piston and discard.

6) Lift out control spring (Series 1 only) and reaction rod spring from power piston, lift out reaction rod and stop assembly, lift out dampener spring (Series 1 only). *Discard Series 1 control and dampener springs* (See Production Change above). Remove washer from reaction rod and stop assembly, discard washer.

7) Insert drift pin into center of power piston, push out reaction rod piston assembly. Using *extreme care* to avoid marring piston, remove "0" ring and reaction cup from reaction rod piston, discard.

Hydraulic Cylinder: 1) Drain hydraulic cylinder thoroughly *(do not re-use fluid)*.

2) Set housing and cylinder assembly on bench, with cylinder end up, remove four hex nuts and lockwashers from cylinder flange, lift cylinder off housing, discard cylinder-to-housing "O" ring.

3) Place cylinder in vise with outlet end down and flange end up; *do not grip tightly*. Using wrench, remove cylinder plug assembly (turn counterclockwise). Disassemble cylinder plug assembly *by hand* by removing primary cup, retainer and seal. Discard cup and seal but not retainer.

4) Remove power piston bearing assembly. Be careful to avoid marring inside diameter of bearing. Withdraw bearing carefully. *CAUTION—Removal of bearing releases residual valve spring, which will fly out unless controlled.*

5) Remove secondary cup retainers and secondary cup. Discard cup but not retainers, remove "0" ring and discard. Unless damaged, do not remove blue steel secondary cup supporting washer. If necessary to remove, apply compressed air to a filler port on outside diameter of bearing.

6) Lift residual valve spring retainer off hydraulic cylinder, then lift spring and residual check valve assembly out of cylinder. Remove residual check valve assembly from end of spring by prying off with screwdriver, discard valve. Remove and discard rubber residual check valve seat (loosen from end of cylinder by prying with a screwdriver).

CLEANING & INSPECTION: Before any part of unit is reassembled, all parts must be thoroughly cleaned, using diacetone alcohol or clean brake fluid. Avoid allowing any dirt or grit to get into unit during assembly.

REASSEMBLY: *NOTE—The Power Brake Cylinder Overhaul Kit includes all necessary replacement parts for both vacuum and hydraulic elements. Whenever unit disassembled for service, all parts contained in Kit should be replaced, regardless of whether they show wear at the time. BEFORE REASSEMBLY, WET ALL "O" RINGS AND CUPS WITH BRAKE FLUID, EXCEPT PRE-GREASED "O" RINGS AND SEALS SUPPLIED.*

1953 MODELS

▷*VACUUM POWER CYLINDER PRODUCTION CHANGE: Series 1 & Series 2 Brake Power Unit Reassembly procedures different. See Changes & Corrections.*

Hydraulic Cylinder: 1) Clamp hydraulic cylinder in vise, flange end up. Drop new residual check valve seat in place (be sure it is nested properly in end of cylinder), assemble new residual check valve assembly onto small end of residual check valve spring; valve assembly will snap on to end of spring with hand pressure.

2) Insert valve and spring assembly into cylinder with valve end first (be sure valve rests against seat), then place spring retainer on upper end of spring small end up.

3) Reassemble bearing assembly by installing new "O" ring in groove on outside diameter of bearing; install blue support washer (if removed), new secondary cup and cup retainers in bearing.

4) Reassemble cylinder plug assembly by inserting new seal, seal retainer (flat side out), and primary cup in plug.

5) With cylinder still held in vise, flange end up, reassemble bearing assembly and plug assembly into cylinder. Lubricate "O" ring on bearing assembly with brake fluid, insert bearing into cylinder with cup retainer end down. Install cylinder plug assembly in same operation, using drift pin to hold residual check valve spring down; plug can then be turned by hand. Use wrench to tighten securely, *do not force.*

6) With housing resting on bench, cylinder end up, install new cylinder-to-housing "O" ring, then assemble cylinder to housing so that bleeders on cylinder are on opposite side from the vacuum inlet on housing. Assemble cylinder flange nuts and lockwashers to studs, *but do not tighten.* Place housing and cylinder assembly back in vise, cylinder end down, housing end up.

1954 MODELS

Hydraulic Cylinder: 1) Mount hydraulic cylinder in vise with flanged end up. Install spring, residual check valve with concave side outward, and head nut with new gasket, and check valve seat in hydraulic cylinder. Tighten nut securely.

2) Install secondary cup retainer in cylinder with notched edge inward, then install secondary cup with flat side outward, using care that cup lip is not turned back at any point. Place secondary cup support washer on piston bearing with brake fluid, install bearing with notched face outward, and center of bearing in cylinder bore.

3) Place primary cup spacer on piston bearing with notched edge down and center it on bearing so it will not be damaged when cylinder plug is installed.

4) Install a new seal into cylinder plug with flat side inward, seal retainer with flat side outward, and a new primary cup with flat side inward against retainer. Use finger to force outside lip of both seal and cup down and outward against bore of plug to insure sealing contact. Screw plug into hydraulic cylinder by hand, then tighten it firmly with a wrench but do not use force.

5) Place new "O" ring around cylinder plug, then install hydraulic cylinder on housing with head nut on opposite side from vacuum tube on housing. Install nuts on all studs but do not tighten.

ALL MODELS

Power Piston Guide Assembly: NOTE—Before reassembling Guide Assembly, inspect inner end of guide sleeve where it seats against air valve seat assembly. *This must be Smooth and Clean.*

1) Assemble expander spring to power piston guide assembly, with ends bent in. With power piston guide on bench, shaft end up, by hand place spring in groove so that approximate center of spring coincides with one of the four slots in power piston guide flange; insert wedge (supplied in Kit) through slot to hold spring in place. Next, wrap each end of spring around power piston guide, secure with wedges in two side slots, then complete wrap of spring, with ends overlapping under fourth slot, lock in place with fourth wedge. Remove first three wedges *(CAUTION—Final wedge will be removed in step 5—wedges must be removed at final assembly).*

2) Saturate wick in special oil supplied with Kit, assemble to power piston guide over expander spring with grain of felt running parallel to centerline of power piston. Be sure joints of wick and spring do not coincide.

3) Invert assembly and set in holding fixture, assemble new leather cup to power piston guide, then slide service ring down over leather cup. Be sure heel of leather cup does not ride over edge of power piston guide and flange lies flat against its face.

4) After wetting inside diameter of new floating control valve assembly with brake fluid, place spring on retainer. Press complete assembly down on power piston guide stop. Install new "O" ring on hub.

1953 MODELS

Power Piston, Guide & Reaction Rod Assembly: *NOTE—In reassembling all Series No. 1 units use new Power Piston and Push Rod. See Production Change above.*

1) Assemble new reaction cup and "O" ring on reaction rod piston, with lip of cup toward small end of piston. *Do not disturb silicone grease on ring.*

2) With power piston and sleeve assembly on bench, sleeve end up, and after wetting cup with brake fluid, assemble reaction rod piston assembly into power piston sleeve with lip of cup facing up. Invert assembly and place in holding fixture.

3 Install new stop washer over reaction rod and stop assembly so that it rests snugly against stop, drop assembly into power piston. Install reaction rod spring into inside of reaction rod stop.

4) Insert new rubber push rod bumper into air valve seat, nesting it snugly at bottom of push rod cavity; install new "O" ring in groove on outside of air valve seat, using care to preserve silicone grease; then

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BUICK POWER UNIT (C nt.)

install this air valve seat assembly into power piston over reaction rod stop. ***CAUTION—Steel air valve seat will damage aluminum vacuum valve seat unless inserted with extreme care.*** Test action of air valve seat against spring for freedom of movement.

5) With power piston and sleeve assembly still resting in holding fixture, assemble power piston guide assembly to power piston and sleeve assembly as follows: Insert push rod through power piston guide and into push rod cavity in center of air valve seat; hold air valve seat down against reaction rod spring, position guide on power piston, start bolts with lockwashers installed. Use three of six holes in guide (other three holes are air passages). After starting one bolt and lockwasher, ***remove remaining expander spring wedge,*** install remaining two bolts and lockwashers, tighten all three bolts using care not to strip threads, remove service ring.

Head, Bearing & Seal Assembly: 1) With cylinder head resting on bench, hub end up, insert bearing with flat side down, then press new "O" ring into bearing groove with finger. Insert new greased guide seal (felt side up), use care not to remove grease. 2) Using arbor press, apply load to **outside edge** of seal, press into position. Apply only enough pressure to bottom seal on bearing, ***do not crush.***

1954 MODELS

Power Piston, Guide, Reaction Rod & Head Assembly: 1) Install a new metering hole seal over end of reaction rod in bore of stop and press down firmly. Install a new stop washer over other end of rod and seat it firmly against the stop.

2) Install new "O" ring in groove of reaction rod, being careful to preserve silicone grease on "O" ring, then install reaction rod in piston with a twisting motion.

3) Install a new "O" ring in groove of reaction piston, being careful to preserve silicone grease on "O" ring, then install piston over end of reaction rod **with wide land inward,** and press it down into bore of power piston sleeve.

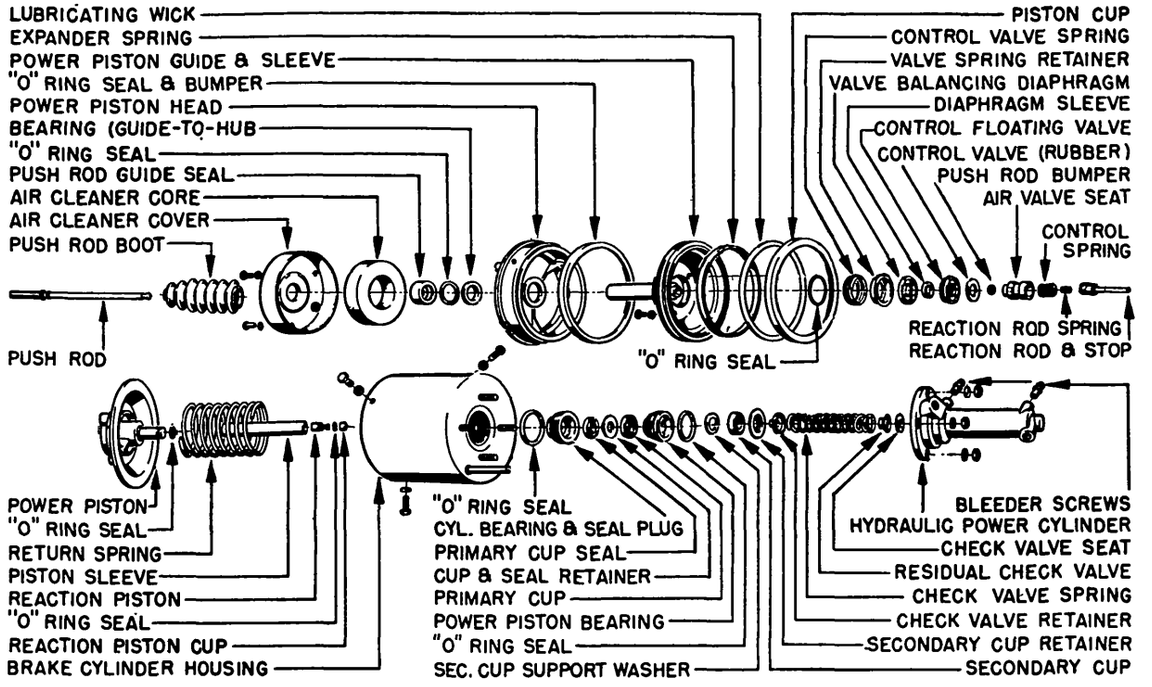
4) Wet a new reaction cup with brake fluid, place it over end of reaction rod with lip side outward and carefully push it down into bore of power piston sleeve. Install spring and retainer over end of reaction rod, compress spring and install a new cotter pin to retain these parts.

5) Mount piston on holding fixture with sleeve down, then install control spring around reaction rod stop.

6) Install new "O" ring in outside groove of air valve seat, being careful to preserve silicone grease on "O" ring, then install valve seat assembly in power piston above reaction rod. ***CAUTION***—Use care to avoid damaging vacuum valve seat on the aluminum piston.

7) Place piston guide over piston and insert push-rod through guide to hold air valve seat down against reaction rod spring while starting bolts with lockwashers. Use three equally spaced holes in guide (Other three holes are air passages). After starting one bolt, remove expander spring wedge, then install other bolts and tighten all securely, using care not to strip threads in aluminum piston. Remove service ring.

8) Place cylinder head on bench, hub end up. Insert new guide seal into hub between bronze bearing and flat wick retainer washer that are inside hub; lips of seal must be upward away from bearing. Slide wick retainer washer down against seal, install a new wick in hub between washer and outer lip of hub, then move washer up snug against wick. Apply any remaining grease in seal and wick packing envelopes to inside of hub.



TYPICAL BUICK BRAKE POWER UNIT ASSEMBLY

ALL MODELS

Complete Unit: 1) Install new rubber "O" ring and bumper on outside diameter of head, then wet outside diameter of rubber with oil supplied in Kit. Oil inside of vacuum cylinder and oil leather cup on outer diameter of power piston guide.

2) With housing and cylinder assembly held in vise, housing up, install return spring so that it nests inside the four cylinder flange head bolts.

3) Set power piston and guide assembly in place with retaining shoulder nesting in return spring, then press power piston and guide assembly down against return spring and into housing about two inches. Pour remaining special oil supplied in Kit (should be 1-2 ozs.) into housing on power piston assembly. ***Avoid pouring oil into air holes.***

4) While holding power piston down, assemble cylinder head assembly over power piston guide sleeve and into housing. Locate head with inspection screw hole on opposite side from bleeders on hydraulic cylinder (1953), on opposite side of unit from vacuum tube on other end of housing (1954).

5) Remove assembly from vise and press guide sleeve end down on bench to hold piston and guide in fully applied position while tightening hydraulic cylinder stud nuts evenly. Power piston must move freely when all nuts are tight.

6) Blow out or replace air cleaner core, install core and cover, placing air inlet tube on same side as hydraulic cylinder bleeders (1953), on same side as inspection hole screw in cylinder head (1954).

7) Install new boot on pushrod and install rod and boot, placing end of boot securely over flange on air cleaner cover.

HYDROVAC POWER UNIT

Cadillac (1954-55)
Ch vr l t Trucks (1946-55)
F rd Trucks (1953-55) ①
Stud bak r (1955)

①—Midland Hi-Power Unit also used.

►CHANGES & CORRECTIONS

►*1954 CADILLAC ACTUATING PISTON & CYLINDER ASSEMBLY PRODUCTION CHANGE:* **Starting with Engine Serial No. 54038 a new 3/8" Actuating Piston and Cylinder Assembly entered production replacing the earlier 5/16" piston and cylinder. Units with the later type piston and valve are identified by the number 377144 stamped on the brass identification tag. Units with the 5/16" assembly have number 376755 (production units), 376930 (replacement units) stamped on identification tag.**

►*1955 CADILLAC PRODUCTION CHANGES:* The following changes over previous models have been made in 1955 production: **(1)** ½" diameter control valve piston replaces smaller piston formerly used, thereby reducing pedal pressure required for brake assist. **(2)** Use of a smaller master cylinder boot and pedal shaft seal at toe-board have eliminated need for brake pedal retracting spring. **(3)** Residual check valve, formerly located in master cylinder, is now located in hydraulic cylinder end cap on power assembly.

►*1955 CHEVROLET PRODUCTION CHANGE:* Beginning with 2nd Series (Except Low Cab Forward) residual check valve has been incorporated in hydraulic cylinder end cap on power assembly.

►*1955 STUDEBAKER CONTROL VALVE PRODUCTION CHANGE (To Provide Softer Brake Fedal):* Beginning Serial Nos. G-1334649 (16G6), 8403935 (16G8), 7160012 (6HY), and 7160032 (6HC & K), a 7/16" control valve is used in place of 3/8" control valve formerly used. Kit, Part No. 537939, available to make installation on earlier cars. *CAUTION*—7/16" conversion kit is for use on 1955 Models **with factory installed** Power brake units only, it is not recommended for installation on any car with power brakes having the high (7 1 ratio) brake pedal.

DESCRIPTION: Bendix HYDROVAC Power Unit connected in hydraulic brake line between master cylinder and wheel cylinders (no mechanical connection).

OPERATION: As brake pedal is depressed, the hydraulic pressure developed in the master cylinder is transmitted to the power brake hydraulic cylinder and to the power brake hydraulic cylinder and to the hydraulic piston in the vacuum control valve. As the hydraulic piston in the power brake hydraulic cylinder is against the stop washer when pedal is first depressed, the check ball in the piston is held off its seat by the piston yoke. This allows fluid from the master cylinder to pass through the piston directly to wheel cylinders. This feature permits normal operation of brakes when engine is not running. Fluid under pressure is also directed to the hydraulic piston in the vacuum control valve. As fluid pressure moves this piston, it actuates the vacuum diaphragm control shaft and forces diaphragm against vacuum poppet valve sealing off atmospheric side of diaphragm from manifold vacuum. Continued movement of the piston and the diaphragm, forces the atmospheric poppet valve off its seat and admits air under atmospheric pressure to vacuum piston.

BLEEDING BRAKES (Except Cadillac): *(CAUTION—This operation must be done with engine stopped and no vacuum in the power brake system).* Attach bleeder hose to bleeder valve on control body, keep end of drain hose below surface of fluid in drain jar. Loosen bleeder valve ½-¾ turn. Depress brake pedal slowly by hand to expel air When pedal has reached toe board, close bleeder valve before returning pedal to released position Repeat this procedure until air bubbles cease to appear at the end of the bleeder drain hose in the jar and the stream is a solid fluid mass, then tighten bleeder valve and remove drain hose. *(NOTE*—**During the operation the brake master cylinder must be filled with fluid).** Following above procedure, bleed at bleeder valve on end cap of hydraulic cylinder, then proceed to bleed wheel cylinders in the usual manner.

BLEEDING BRAKES (Cadillac): Use same procedure as described above for cars other than Cadillac, except as follows: Bleed valve on end cap of hydraulic cylinder first, then valve on control valve body.

LUBRICATION: Remove screw plug on front end of vacuum cylinder and fill cylinder to level of hole (Studebaker 1 oz.) with Delco Shock Absorber Fluid or Bendix Hydraulic Cylinder Fluid as follows:
Cadillac: Once yearly.
Chevrolet: Every 10,000 miles.
Ford & Studebaker: Once yearly or every 20,000 miles.

TROUBLE SHOOTING: Before trying to determine cause of trouble, make certain that master cylinder reservoir is full, that brake system is free of air, that there are no binds in the brake linkage, that there are no air or fluid leaks to the master and wheel cylinders. Then proceed as follows:

Hissing Sound (Engine Running), Brakes Either On or Off: Caused by external leak on vacuum side of control diaphragm. Check and correct leak at control valve body, diaphragm, and gasket to end plate. Check and correct leak between vacuum cylinder and end plate.

Hissing Sound (Engine Running), Greater When Brakes Off: Caused by external leak on atmospheric side of control valve diaphragm. Check and correct leak at atmospheric poppet, external pipe and rubber tubing, and valve body screws.

Hissing Sound (Engine Running), Brakes On: Caused by internal vacuum leak, air entering through breather. Overhaul unit and check for leak at vacuum poppet, control diaphragm, or vacuum power piston.

Little or No Boost From Power Brake (May be Accompanied by a Hissing Sound or Loss of Brake Fluid):
1) Internal vacuum leak between atmospheric and vacuum side of power piston. Overhaul unit, and check for leak at vacuum poppet, control diaphragm, or vacuum power piston.
2) Internal hydraulic leak. Check for low brake fluid level. Overhaul unit and check for presence of brake fluid in inner side of vacuum cylinder, or inner side of control diaphragm. Check and correct leaks at control valve cup, control valve fitting "O" ring seal, vacuum piston push rod seals, or hydraulic power piston cup or ball check.
3) External hydraulic leak. Check and correct leak at point of origin.
4) Internal friction. Check and correct shock absorber fluid level in vacuum cylinder. If necessary, overhaul unit and check for rusty, dirty, or distorted vacuum cylinder wall, dry or worn vacuum piston leather packing, swollen rubber cups due to heat or wrong brake fluid, worn or damaged rubber cups, or dirt, rust, sludge, or foreign matter in power piston or control valve regions.

Booster Loses Effectiveness While Stopping (P dal Grows Harder or "Kicks Back"): Caused by internal hydraulic leak or internal or external vacuum leak. Overhaul unit and check for leaks at control valve, valve fitting, power piston, vacuum poppet, control diaphragm, or vacuum power piston. Check for sticking power piston, or restricted air cleaner (if so equipped).

Tendency To Over-Brake (Pedal drops under foot. May show up as slow operation of power brake): Restriction in atmospheric passage or sticky control valve. Clean air filter for restriction in atmospheric passage. If necessary, overhaul unit and check for misalignment of control valve assembly. Check for dirty or sticky vacuum or atmospheric poppet, as well as sticky control valve. NOTE—Above condition may also be caused by internal hydraulic leakage or internal friction. To correct, overhaul unit and check for leak at hydraulic power piston cup or ball check. Check for binding in power piston assembly. Check level of lubricant in vacuum cylinder.

Brakes Slow to Release (or fail to release complet ly): May be caused by sluggish control valve action or internal friction. Overhaul unit and check for weak vacuum power piston return spring or atmospheric poppet return spring. Check for dirty or sticky control valve. Check for power cylinder lubricant level. If necessary overhaul unit and check for binding in power piston assembly.

No Power Assist (on first application after engine shut off): Caused by an external vacuum leak or an internal vacuum leak in the check valve. Check and correct external leaks at valve body, external pipe, vacuum cylinder, and atmospheric poppet. For the internal leakage, overhaul or replace check valve assembly.

Brakes Apply When Engine Started: Caused by broken or improperly assembled atmospheric valve return spring or control valve diaphragm return spring, sticking control valve piston.

Air in Hydraulic System: Caused by an improperly assembled, defective or missing control valve piston secondary cup.

Grabbing Brakes: Caused by sticking control valve piston or sticking power piston.

Loss of Fluid from Brake System: Caused by defective hydraulic cylinder cup or seal, defective or damaged control valve piston cup (crack or split in lip at center of cup), dirt chips or other foreign matter under lip of piston cups, improperly tightened or defective gaskets or rubber seals.

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HYDROVAC POWER UNIT (C ntinued)

P wer Unit Fails to Operate: Low or no vacuum due to clogged or restricted lines, defective check valve, clogged air filter (if so equipped).

REMOVAL OF POWER BRAKE UNIT: Disconnect brake lines at cylinder end plate. Loosen vacuum line hose clamp at check valve and slide hose off. Remove three nuts and lockwashers from cylinder mounting bracket and remove unit from car. *NOTE*–Ford and Studebaker have stop light wires that must be disconnected before unit is removed.

DISASSEMBLY OF POWER BRAKE UNIT: When disassembling Power Brake use care in handling parts to prevent their coming in contact with mineral oil or greases. Do not handle hydraulic cups and seals with greasy hands.

Hydraulic Cylinder Assembly: 1) Loosen the cylinder nut and unscrew hydraulic cylinder assembly from end plate. Hold end cap in a vise and remove hydraulic cylinder from cap using an open end wrench on the flat part of cylinder. Remove gasket and bleeder fitting from end cap.

2) On 1954 Cadillac, Chevrolet 1955 1st Series and Earlier Trucks, and Studebaker, remove the bolt holding the hydraulic line end connection to the end cap and remove fitting and copper gaskets. Scribe line on cylinder shell and end plate so these parts can be reassembled in their original positions. Loosen hook bolts and remove cylinder shell, sliding tube out of rubber hose.

3) On 1955 Cadillac, 1955 Chevrolet 2nd Series Trucks, and Ford, remove residual check valve snap ring, spring seat, spring and residual check valve. Loosen hook bolts and remove cylinder shell, sliding connector pipe out of rubber hose.

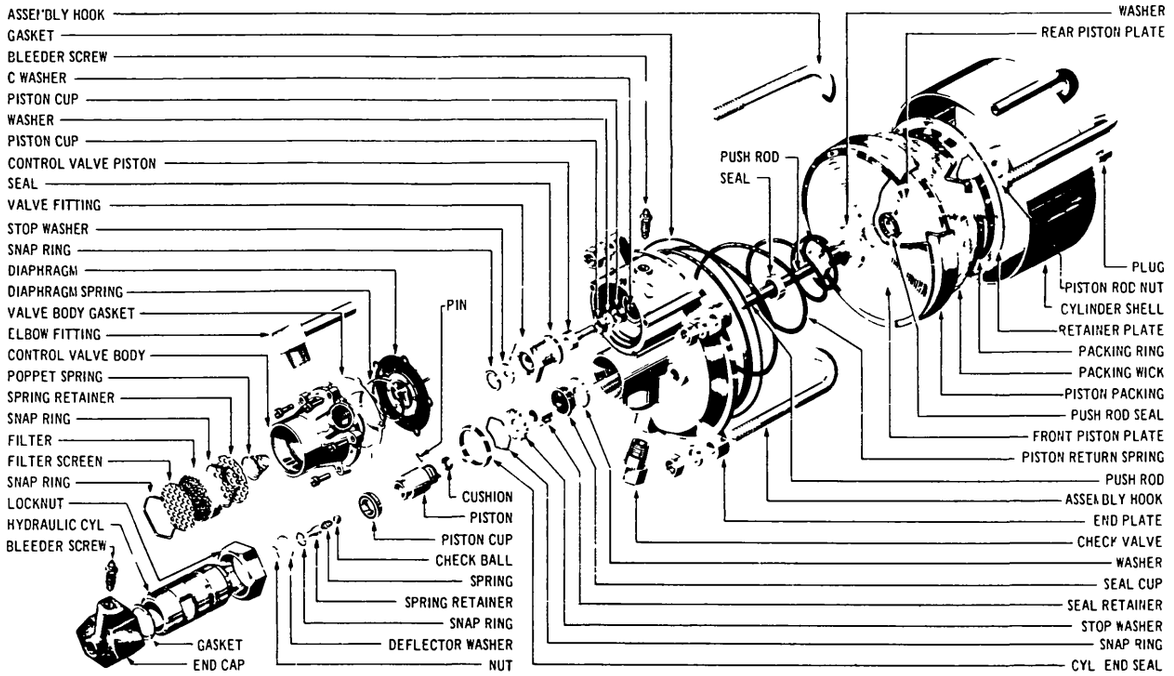
4) On all cars, compress piston spring by pressing down on end plate. Hold piston in position with Vacuum Piston Retaining Strap, Tool J-5650 (two wire hooks and a plate can readily be made to hold piston in position). Remove hydraulic piston assembly from pushrod by holding retaining spring back and removing small pin. Remove hydraulic piston cup from piston, remove snap ring, retainer, spring, and ball. Remove hydraulic cylinder and seal. Remove snap ring, then remove pushrod seal cup parts. Drive out pushrod leather retainer with a flat end rod or drift.

Vacuum Control Valve Assembly: 1) Scribe control valve body and end plate to insure proper location on reassembly. Remove control valve body screws and remove control valve assembly with diaphragm and gasket. Remove diaphragm from control valve body.

2) On Cadillac and Studebaker, remove air intake filter snap ring, screen and filter, and take out lower snap ring and screen.

3) On Chevrolet and Ford, remove snap ring which retains cover on control valve and poppet assembly and remove cover, valve spring and gasket,

4) On all cars, remove hydraulic control valve fitting from end plate. Push piston out of fitting and remove cups from piston (washer between cups on Chevrolet and Studebaker). Remove seal, retainer ring, and stop



HYDROVAC BRAKE POWER UNIT

washer from fitting.

Vacuum Piston: Remove nut from threaded end of push rod, retainer plate, packing, and expander ring. Remove small diameter piston plate with rubber seal ring. Remove leather packing, larger diameter piston plate, and washer from push rod.

Vacuum Piston Pushrod Assembly (Ford): Remove pushrod lock ring from groove in piston guide. Remove spring washer, then lift out pushrod, spring, bottom spring washer, and bottom lock ring.

Vacuum Piston Pushrod Guide (Ford): Clamp hexagonal section of guide sleeve in a vise. Remove guide sleeve to body gasket, washer, and nut. Loosen outer locknut, then remove assembly from vise. Remove locknut, gasket, and guide sleeve. Remove piston guide by drawing it into cylinder shell.

Check Valve (Cadillac & Studebaker): Remove assy. from elbow in end plate. Remove plug from bushing and bushing from check valve assembly. Remove snap ring, spring retainer, and spring with check ball. Remove spring from check ball.

REASSEMBLY OF POWER BRAKE UNIT: Before reassembling unit, clean all parts thoroughly, and after cleaning, wash all parts for hydraulic system in alcohol. Be careful not to get grease or oil on hydraulic parts. Use new rubber seals and cups when reassembling.

Vacuum Pist n: (*NOTE*–An assembly ring can be made by cutting a 1" section from end of a power cylinder). Place front (larger) piston plate in assembly ring with lip down. Place new leather packing on plate with lip up, place new rubber seal in center of plate. Install rear (smaller) piston plate with lip down. Coil new wick inside lip of packing and cut it to proper size. Soak wick in cylinder oil (not ordinary oil) and allow it to drain thoroughly. Install wick. Place packing ring inside wick with gripper points up, and engage notch at loop end of ring with hook at opposite end. Install wick retainer plate with cutout portion over loop of expander ring. Place flat washer over threaded end of pushrod (guide rod on Ford), insert pushrod (guide rod) through assembled piston parts, being careful not to damage inner seal ring. Large piston plate should rest against flat washer. Clamp hex on pushrod (guide rod) in a vise, being careful not to damage polished surfaces. Install nut and tighten securely, being careful not to allow either piston plate to rotate while nut is being tightened. Remove assembly ring. Stake nut with center punch.

Pushrod Assembly (Ford)–Clamp hexagonal section of guide rod firmly in a vise. Assemble pushrod attaching parts over beveled end of pushrod in following order: Lock ring, one spring retainer, spring (large end first), second spring retainer, snap ring (smaller). Use care in assembling smaller diameter snap ring in groove at lower end of pushrod, to avoid distorting ring. Insert end of pushrod in recess at end of guide rod. To attach pushrod to guide rod, compress spring and assemble to lock ring in groove of guide rod. Be sure lock ring is firmly seated in groove of guide rod.

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HYDROVAC POWER UNIT (Continued)

Vacuum Control Valve Assembly: 1) Install stop washer and retainer ring in hydraulic control valve fitting. 2) On Chevrolet and Studebaker, dip piston cups in brake fluid and install on piston with washer between cups. Install C-washer. Lips of both cups must point away from end of piston with hole in it.

3) On Cadillac and Ford, install new rubber cups on piston with lip of cups toward small end of piston. 4) On all cars, install piston in fitting with hole in end of piston next to stop washer. Install a new rubber seal gasket in groove in fitting. Install fitting in end plate and tighten securely.

5) On Cadillac and Studebaker, install poppet return spring with small end down, retainer and snap ring in control valve body. Install new filter, screen and outer snap ring.

6) On Chevrolet and Ford, install poppet return spring with small end down, gasket, end cover with air inlet tube, and secure in place with snap ring.

7) On all cars, place guide pins in control valve body screw holes in end plate (Guide pins can be made by cutting heads off three 8-32 x 2½" machine screws). Install gasket diaphragm, diaphragm spring (if so equipped), and control body on guide pins allowing cylinder tube to slide into connecting hose. *(CAUTION* —When assembling diaphragm, spring, and control valve body, extreme care should be taken not to distort the diaphragm when compressing the spring). Remove guide pins one at a time and install screws and lockwashers. Install hose clamps.

Cadillac Note—One side of valve body mounting flange is straight. This should be positioned next to hydraulic cylinder boss on end plate.

Hydraulic Cylinder Assembly: 1) Install new pushrod leather seal into end plate with lip of seal toward hydraulic cylinder side of end plate. Place end plate on bench and install stop washer with chamfered side down. Install seal cup with lip up and seal retainer with counterbored side next to cup (Cadillac & Studebaker), flat side next to cup (Chevrolet & Ford). On Ford and Chevrolet, next install spring with small end toward bore of end plate. (No spring on Cadillac and Studebaker). On all cars, next install stop washer and install snap ring in groove.

2) Place vacuum piston return spring over pushrod with small end of spring next to piston, carefully guide pushrod through seat in end plate. Compress spring. Use vacuum piston restraining strap or hook clamps to hold end plate and the cylinder together. Install ball, spring, retainer and snap ring in piston. On Cadillac and Studebaker, install deflector washer and nut.

3) Dip hydraulic piston cup in brake fluid and install in groove with lip of cup toward check valve end of piston. Dip hydraulic piston in brake fluid and assemble piston on push rod. Install retaining pin in hole in piston and rod. When pin is in position, retaining spring will hold it in position. Place end cap in vise and install bleeder screw, end cap gasket, hydraulic line connector with copper gaskets and retaining bolt.

4) On 1955 Cadillac, 1955 Chevrolet 2nd Series Trucks, and Ford, install residual check valve, spring, spring seat, and snap ring.

5) Thread hydraulic cylinder into end cap with milled flats next to end cap, and securely tighten cylinder. Thread check nut on cylinder to limit of threads. Install hydraulic cylinder end seal against shoulder in end plate. Guide lip of piston cup into cylinder carefully, and threaded cylinder into end plate until cylinder bottoms firmly against end seal. Tighten cylinder until bleed screw on end cap is aligned with bleed screw in end plate and tighten check nut securely.

6) Remove piston retaining strap or clamps. Place rubber gasket in groove on end plate. Saturate cotton wicking by dipping vacuum piston in Shock Absorber Fluid, and allow excess oil to drain off. In addition, coat inside of cylinder shell lightly with shock absorber fluid. Insert piston into shell by tipping piston and gradually working it down into shell. Align scribe marks on shell and end plate (if made) and attach hook bolts. Tighten each bolt evenly until all bolts are uniformly tight.

Check Valve (Cadillac & Studebaker): Install end of spring over check valve ball. Install spring retainer plate with depression in plate in end of spring, install snap ring. Install plug in check valve body. Install fitting in bushing and install valve assembly in elbow on end plate.

INSTALLATION OF POWER BRAKE UNIT: Position power brake unit on mounting bracket and install lockwashers and nuts. Connect vacuum hose to check valve on power brake and tighten hose clamp. Connect brake line fittings to end plate. On Ford and Studebaker, connect stop light wires. On all cars, bleed system (see above).

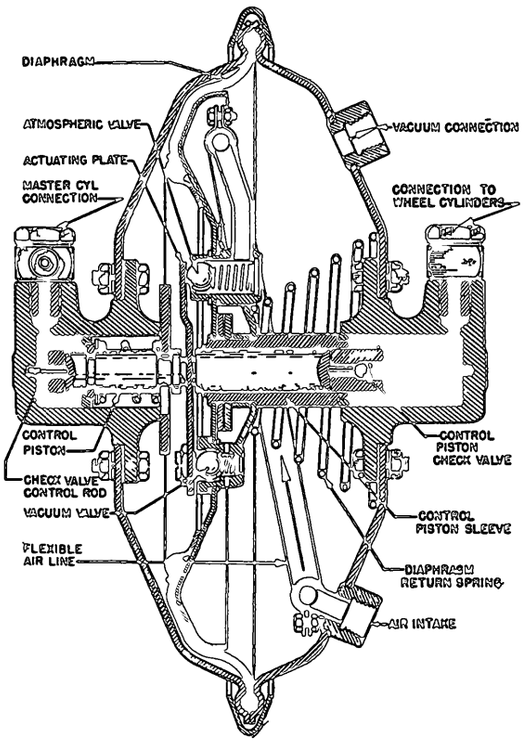
VACDRAULIC POWER UNIT

Chrysler Crown Imperial, C40 (1946-47-48)

DESCRIPTION: Vacdraulic is a self-contained diaphragm type power unit connected in the hydraulic brake line between the brake master cylinder and the wheel cylinders. The diaphragm type power piston is mounted directly on the control piston sleeve within the vacdraulic housing and includes the control valves (atmospheric air intake valve and vacuum valve), valve operating mechanism, and manifold vacuum connection (flexible line from vacuum connection on housing to vacuum valve). A control piston is located within the power piston control sleeve. This piston is hollow to permit brake fluid to flow freely through the unit when brakes are off (ball check valve in end of piston is held off its seat by a control rod in this position) and has a rubber "piston ring" type seal at each end.

OPERATION: Vacdraulic unit is "vacuum suspended" type with vacuum on both sides of diaphragm when brakes are released (vacuum valve open, atmospheric valve closed) and entire power piston assembly is held in the off position by a large return spring in the housing. When brake pedal is depressed to apply brakes, fluid flows freely through the unit to the wheel cylinders (control piston check valve open). As pressure in brake lines increases, the control piston tends to move within the control sleeve, closing the vacuum valve and opening the atmospheric valve. Atmospheric air pressure acting on one side of the diaphragm causes the power piston sleeve to move with the control piston to force fluid out through the lines to the wheel cylinders at a "boosted" pressure and with no loss of volume (check valve closes when piston starts to move). Whenever brake pedal movement stops (as when brakes held "on"), a balance is set up between the vacdraulic unit control piston and sleeve movement so that the atmospheric valve closes without the vacuum valve opening. This causes the power piston to remain stationary. When pedal released to release brakes, the vacuum valve opens and the return spring moves the power piston assembly to its "off" position. At this point the control piston check valve is positively opened by the rod to permit free fluid flow back to the master cylinder.

ADJUSTMENT: None required.



VACDRAULIC POWER BRAKE UNIT

CHRYSLER VACU-EASE BRAKE POWER UNIT

Chrysler Six & Eight (1949-54)
DeSoto Six (1950-54), Eight (1952-54)
Dodge Six (1950-54), Eight (1953-54)

►*PRODUCTION CHANGE NOTE:* Two types used.

Internal Valve—1949 and Early 1950.

External Valve—Late 1950-54.

DESCRIPTION: Internal Valve Type—This unit is similar in construction to the Vacdraulic Power Unit. Primary and secondary cylinders can be removed without disturbing the diaphragm housing, Fluid return system has outside cross-over line.

External Valve Type—The valve housing and cylinder unit are mounted as an assembly on one end of the main diaphragm housing. The valve housing assembly controls the relative air pressures on both sides of diaphragm. Fluid return system built-in. NOTE—The External Valve Type unit can be used to replace the Internal Valve Type by using an Adapter Kit, Chrysler Part No. 1321149.

ADJUSTMENT: None required.

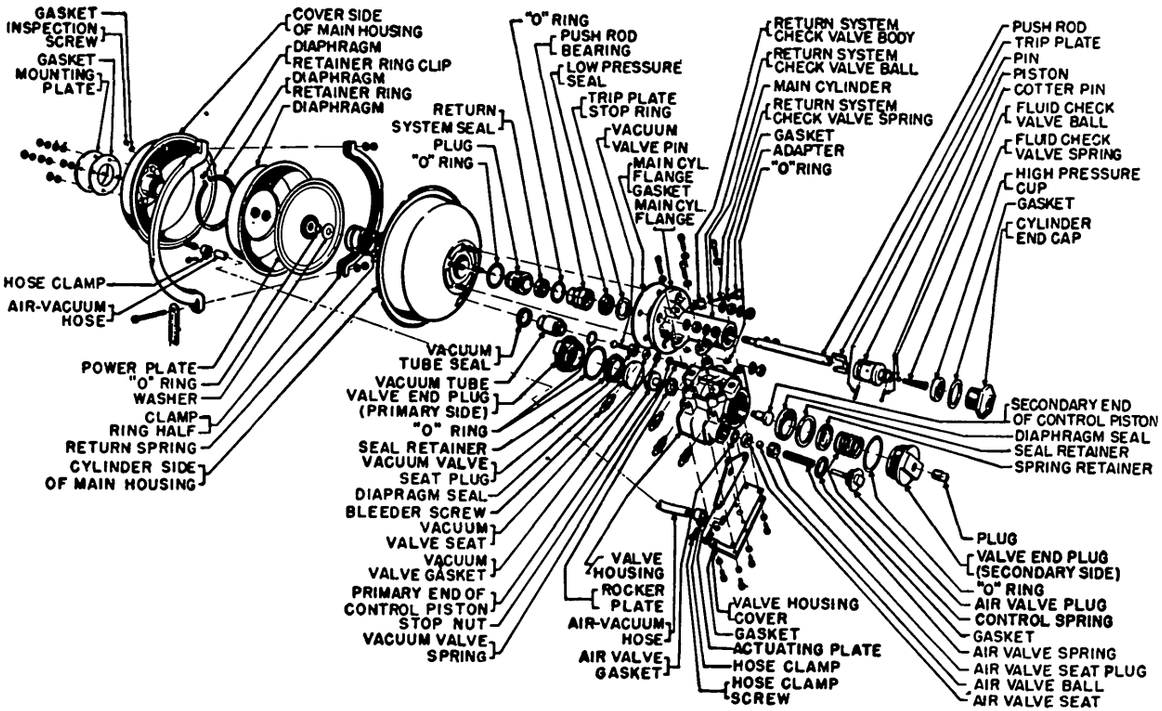
►*CAUTION:* Repair of the vacuum and air valves in the field is not recommended by the manufacturer, since these parts are specially calibrated.

INTERNAL VALVE TYPE UNIT OVERHAUL: All that is generally required is a minor overhaul as follows. ***Cleanliness is extremely important.***

Disassembly: After removing the unit from the car tape up the air and vacuum connections to keep out dirt. Remove the cross-over line and cylinder end caps. Mount the unit, primary end down, on a box or a short length of 4" pipe. Remove 4 nuts holding the secondary cylinder to housing. Remove cotter pin, fluid check valve ball, spring, and trip rod. Remove the cup retainer washer, secondary cup and spring. Remove the fluid seal with a hook, being careful not to scratch the control piston. Invert the unit and remove the primary cylinder. Remove the snap ring, cup retaining washer, primary retaining cup and piston ring. Using pliers and screwdriver remove the annealed ring from the end of the piston being careful not to damage the ring groove, and remove the seal with a hook. Examine parts for scores, chipping, or out-of-round. Always replace the cups and seals regardless of condition. Cylinders should be mirror smooth. Light scratches can be smoothed out with crocus cloth, but badly scored cylinders must be replaced.

Diaphragm Unit—To examine the diaphragm with the unit disassembled as above, mark both halves of the diaphragm housing, remove the clamp ring and unfasten the housing keys. Maintain pressure on the housing to keep the return spring under control. Housing should be dry inside. If wet with fluid, seals are leaking. Check diaphragm for cracks or leaks. When installing a new diaphragm, fit it snugly to the power piston flange, with the nub on the diaphragm fitting into the locating hole in piston. Connect hose to valve and inlet connections, holding power piston and diaphragm assembly so that locating tab on diaphragm is lined up with the locating slot in housing. This will prevent twisting the hose when assembling. Place housings together and install clamp ring, tapping ring all around with a rawhide mallet to seat ring, tighten all nuts.

Reassembly: Install the secondary end first. Lubricate the control piston and seal with silicone grease or castor oil. NOTE—The secondary seal has a ¾" inside diameter and the primary seal ½" inside diameter. Install the seal in the cylinder seat with the metal case down, lip up. Slide the piston ring, cup (with lip up), and retaining washer onto the end of the control piston. Drop the valve check ball into the end of the piston and install the ball spring (small end to ball). Install spring retaining cotter pin. Install new cylinder flange gasket, and apply a small amount of brake fluid on the cylinder wall and outer lip of the secondary cup. Install cylinder, aligning the elbow fitting with the inlet tube on housing. Install mounting nuts. Reach underneath and press the power piston up toward the secondary end to align the cylinder. Release the piston and tighten the cylinder nuts evenly to 150 inch pounds torque. Invert the unit and lubricate the piston and seal with silicone grease or castor oil. Install seal, with metal case down (lip up). Install annealed retaining ring in groove, using the minimum amount of pressure possible to close the ring. Install the primary piston ring, cup (with lip up), retaining washer, and snap ring. Lubricate cylinder wall and primary cup outer lip with brake fluid and assemble the primary clyinder as given for the secondary cylinder. Install trip rod in center of the control piston, insert copper gasket, trip rod stop plate, cap copper gasket, and cap. Mount the unit with the cap in the vise and tighten the other end cap to 80 ft. lbs. torque.



VACU-EASE BRAKE POWER UNIT (EXTERNAL VALVE TYPE)

EXTERNAL VALVE TYPE UNIT OVERHAUL: After removing the unit from the car, proceed as follows. ***Cleanliness is extremely important.***

Disassembly: Clamp unit in vise (grip four mounting screws). Loosen cylinder end cap and clamp on hose. Remove four Allen head screws holding valve housing to cylinder, and remove housing. Invert the unit, mark both halves of housing, remove clamp ring and disassemble cover side of main housing from cylinder side. Remove hex nut from center of power plate and lift off plate and diaphragm assembly. Remove small "O" ring and washer from end of push rod and remove return spring. Remove the four cylinder-to-main housing nuts, and remove cylinder. Clamp cylinder in vise with push rod end up. Screw special protective "thimble" (included in repair kit) on threads of push rod end, unscrew return system seal retaining plug and remove it. Pull the push rod out of the cylinder. Remove cylinder end cap and examine cylinder walls. Remove light scratches with crocus cloth, and clean with alcohol. Replace badly scored cylinders. Remove cotter pin, fluid check valve ball and spring, and bronze bearing from push rod.

Reassembly: Remove secondary cup from piston being careful not to scratch the anodized aluminum surface, and replace with a new one. Drop check valve ball in piston, install ball spring (small end to ball) and install cotter pin. Lubricate piston and cylinder with brake fluid, insert push rod and piston assembly from cap end of cylinder. Install cylinder cap with new copper gasket, finger tight. Clamp cylinder, push rod end up in vise, and install stop plate washer. Remove primary cup from inside

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VACU-EASE POWER UNIT (Continued)

bronze bearing, and "O" ring from outside of bronze bearing, and replace with new cup and ring. Lubricate bronze bearing and slide into cylinder over push rod with primary cup down. Press down lightly with thumb. Lubricate inner lip of retaining seal, slide seal and plug assembly over end of push rod. Screw retaining plug into cylinder and tighten. Place cylinder in vise and tighten end cap to 110 ft. lbs. torque. Remove special thimble nut from threads on push rod. Replace "O" ring seal, and cylinder flange gasket between cylinder and main housing. Remove cylinder from vise and assemble to main housing with flat side of cylinder facing the short studs. Install lock washers and nuts and tighten to 150 ft. lbs. torque. Clamp assembly in the vise with push rod end up, and install flat washer first, and a new small "O" ring on end of push rod. Install spring in boss of power plate and press plate and diaphragm down over end of push rod against spring. Secure assembly to push rod with nut and lock washer tightened to 40 inch pounds torque. Assemble the two halves of the housing (lining up marks). See that cross-over tube rests in slot in cylinder side of main housing. Install clamp ring. Tighten clamp ring bolts, being careful to center cross-over line between ears of clamp ring. Pull vacuum tube out of valve housing and replace "O" ring and rubber grommet. Lubricate "O" ring only, and re-install vacuum tube, "O" ring first, into valve housing. Replace "O" rings used between valve housing and cylinder. Reconnect housing hose. Fasten the valve housing to cylinder.

TROUBLE SHOOTING: **Brakes do not Release Properly**—With engine running, check the brakes for release. If not released, crack line from master cylinder to power unit. If this releases brakes, trouble is not in power unit. If brakes not released, crack hydraulic line at end of cylinder of power unit (line between power unit and wheel cylinders). If this releases brakes, power unit is at fault (missing inspection screw or gasket on main housing cover).

Unit does not Boost: With engine running, press the pedal down and listen for a rush of air through the power unit air cleaner. If no rush of air is heard, check if vacuum is present at the unit by disconnecting the line. If no vacuum is reaching the unit, check for plugged line, or defective vacuum check valve (at the engine manifold). If a rush of air is heard at the unit air cleaner when the pedal is depressed and booster still is inoperative, it indicates the fluid check valve is not seating properly. If with engine running, a continuous rush of air is heard, without operating the brake pedal, it indicates the diaphragm punctured or cross-over line between valve housing and cover is leaking.

1955 CHRYSLER, DE SOTO, DODGE, PLYMOUTH POWER UNIT

Chrysler & Imperial (1955)
DeSoto (1955)
Dodge (1955)
Plymouth (1955)

DESCRIPTION: Integral type, self-contained, vacuum-suspended, power braking device using engine intake manifold vacuum and atmospheric pressure for its power. Unit incorporates air-vacuum housing, hydraulic cylinder, fluid reservoir, air cleaner, and vacuum check valve. Unit is mounted on dash above brake pedal.

OPERATION: With engine running, brakes unapplied, both sides of power piston are under a vacuum. Application of brake pedal causes atmospheric port to open, forcing power piston forward and thereby exerting a thrust on hydraulic plunger. This increases line pressure to the four wheels. Release of brake pedal restores vacuum balance in power cylinder.

CHECKING & ADJUSTMENT: Check all parts of the power brake system before disassembling the Power Unit whenever brake trouble experienced.

Adjustments: No adjustment of Power Unit for free play or return stop is required. Unit has built-in pedal return spring and a pedal return stop. Pedal height and travel are determined by the combined length of the pushrod and pushrod end (clevis) which are adjustable.

Pedal Height & Travel Adjustment (Unit on Car)– Slide scale next to boot, inside of pedal bracket up to and against dash panel, and measure distance back to center line of clevis pin. Distance should be 8 57/64" (Chrysler), 8 23/32" (Others). If not, re-adjust clevis on rod, re-tighten clevis jam nut and re-check dimension.

Pedal Height & Travel Adjustment (Unit Off Car)– Measure from reinforcing plate mounted on unit to center line of hole in rod end (clevis). Dimension should be 8 61/64" (Chrysler), 8 25/32" (Others).

▷*PEDAL ADJUSTMENT NOTE:* It is suggested that for greatest braking efficiency, driving ease, and comfort, that brake shoes be kept well adjusted to maintain maximum pedal reserve with brakes applied.

BLEEDING BRAKES: Using a pressure bleeder attached to fluid reservoir of unit, bleed system from bleeder screw immediately forward of the reservoir on top of hydraulic cylinder of unit, then at the four wheel cylinders. When fluid runs clear at all points, start engine, pump brake several times, and then re-bleed system. After bleeding completed, check for leaks in brake system while applying heavy brake pressure with engine running. *NOTE*–After bleeding system, fill reservoir to no higher than 1/8" below filler cap neck.

LUBRICATION: Check level of brake fluid in reservoir every 1000 miles. Fill reservoir to no higher than 1/8" below filler cap neck.

TROUBLE SHOOTING: Before checking power brake unit for source of trouble check remainder of brake system.

Pedal Fails to Return: Overall width of pedal hub plus nylon bushing flanges exceeds length of pedal pivot spacer pinching the hub and bushings; bind of nylon bushings.

Brake System Loses Fluid: Loose or broken connections in brake hydraulic system; worn or damaged primary cup, primary cup seal and dome cup.

Brakes Do Not Release Properly: Pedal fails to return properly; plugged compensating holes in power piston sleeve; damaged or weak power piston return spring, air valve control spring, or reaction spring; excessively dry air valve "O" ring; brakes improperly adjusted; insufficient brake fluid in system; dust boot retainer on air cleaner cover is not concentric with power piston guide sleeve.

Unit Does Not Boost: (*NOTE*–To determine if unit operating, test as follows: With engine stopped, depress brake pedal several times to eliminate all vacuum from system. Apply brakes, and while holding foot pressure on brake pedal, start the engine. If unit operating, pedal will move forward when engine vacuum power is added to pedal pressure). Possible causes for brake not boosting: Bent, broken or obstructed vacuum source line from engine manifold to check valve, or a faulty vacuum check valve; blocked air passage in power piston guide sleeve or in air cleaner element; jammed air valve seat assembly in power piston due to foreign material becoming lodged in power piston air valve seat bore cavity; damaged secondary cup.

Loss of Pedal: Dirt or foreign material lodged between outside lip of secondary cup and cylinder bore.

Brakes "Touchy" or "Grabby": Inspection screw missing on air side of diaphragm; grease, fluid or moisture on brake linings; brakes improperly adjusted.

"Spongy" Pedal: Air in brake lines or in hydraulic cylinder on power unit.

Pedal Travel Too Great: Improperly adjusted brakes; air in brake system.

REMOVAL & INSTALLATION: Remove clevis pin attaching pushrod to power lever. Disconnect hydraulic line at power brake unit. Disconnect vacuum line at power brake unit. Disconnect stop light switch wires. From passenger compartment side, remove nuts from power brake unit two lower studs which extend from power brake unit through dash panel and pedal mounting bracket. Then remove four nuts on engine side of dash panel which hold reinforcement to dash panel. This will allow removal of reinforcement and power brake unit as an assembly. Remove power brake unit assembly from reinforcement by removing two upper stud nuts. At same time, this allows air cleaner cover and air cleaner to be removed. To install, reverse removal procedure. *NOTE*–Before reinstalling unit on car, check brake pedal linkage for freedom of movement. Refill master cylinder.

OVERHAUL: *NOTE*–After removing brake unit and before starting disassembly operations, remove reservoir filler cap and gasket, pour out brake fluid and discard it. Stroke unit at least two applications to dissipate vacuum and to pump out as much of remaining fluid as possible through wheel cylinder connection. Stop light switch in boss on bottom of hydraulic cylinder should not be removed except for replacement or to correct a fluid leak.

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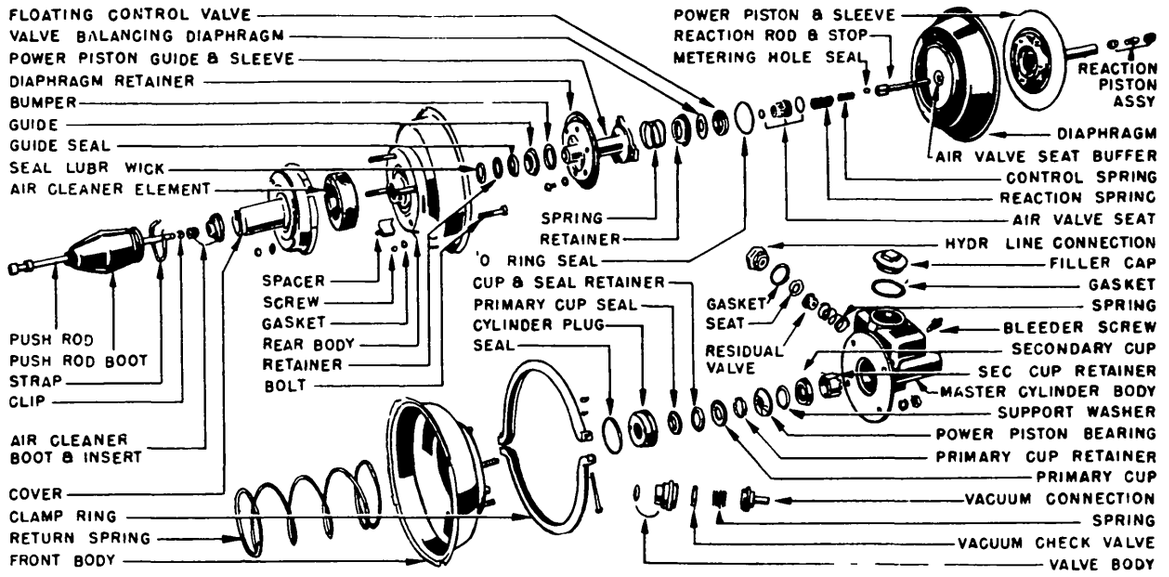
1955 CHRYSLER, DESOTO, DODGE PLYMOUTH POWER UNIT (Cont.)

Disassembly: Major Components–Remove pushrod from unit by sliding pushrod boot down on rod and clamping end of pushrod in vise, then, gripping lower unit firmly, pull it away from pushrod with a quick jerk. *(NOTE–* Pushrod is held in place by pushrod retainer clip, which cannot be re-used. Whenever pushrod removed from unit, new retainer clip must be used at reassembly). Open boot retainer strap and remove pushrod boot and air cleaner cover boot Discard retainer strap Clamp unit in vise with hydraulic cylinder end down. Vise should be clamped on hydraulic cylinder only tightly enough to hold securely, clamping too tightly will crack or distort cylinder Remove reinforcement plate, then air cleaner cover assembly by removing four hex nuts and lockwashers. With cover assembly removed, lift out four spacers and air cleaner core. Disassemble body assembly by removing two clamp rings. To facilitate correct reassembly, loosen both clamp ring screws but remove only one, keeping the two clamp ring parts held together in their proper relationship. *(CAUTION–* Be sure to lift straight up while holding power piston guide sleeve down against return spring. Valve side of body assembly should slide straight up and off of power piston guide sleeve). Remove power piston and guide assembly from body assembly by lifting straight up This is important to prevent damage to power piston sleeve and bearing. If edge of diaphragm did not free itself from flange of body assembly, hold power piston and guide down against return spring while loosening edge of diaphragm Then allow return spring to lift power piston and guide assembly. Remove return spring. Remove hydraulic cylinder assembly off of body assembly Remove and discard cylinder-to-body seal

Body Assembly (Cylinder Side)– Remove vacuum check valve assembly, then remove and discard check valve-to-body "O" ring. Position check valve assembly in vise clamping on large hex on body, to remove check valve body cap. Lift out check valve spring and floating valve assembly, but **do not** discard spring.

Body Assembly (Valve Side)–From hub of body assembly, valve side remove and discard guide seal and seal lubricating wick This can be done with small pointed pliers, using care not to damage guide bearing or wick retainer. Examine inspection screw and gasket, remove only if damaged or not sealing properly.

Power Piston & Guide Assembly–Place power piston and guide assembly in holding fixture, with power piston and guide end up. Lift guide return bumper from guide sleeve, and discard, but note its thickness It is important that the new bumper be the same thickness as the one removed (Except on very early production, the thicker bumper is smooth on both sides). Remove diaphragm retainer and diaphragm. Lift guide assembly off of power piston assembly, and remove and discard "O" ring seal from between these two assemblies. Remove and discard floating control valve assembly, and valve balancing diaphragm, but **d not** discard spring, or spring retainer. With power piston assembly still in holding fixture, lift out air valve seat assembly and discard. Lift out control spring and reaction spring. Lift out reaction rod assembly. Remove and discard metering hole seal and buffer. Remove power piston assembly from holding fixture, insert a drift pin into center of power piston, and push out reaction piston insert and dome cup assembly. Using extreme care to avoid marring reaction piston or dome cup insert, remove and discard reaction cup. Reaction piston and cup insert can be popped out of cup by pinching dome between thumb and forefinger.



CHRYSLER, DE SOTO, DODGE, PLYMOUTH BRAKE POWER UNIT

Hydraulic Cylinder Assembly–Place cylinder assembly in vise with flange end up. Do not clamp tightly. Using a face spanner wrench, remove cylinder plug assembly Disassemble cylinder plug assembly by hand by removing primary cup, retainer and primary cup seal from cylinder plug Primary cup is easily removed by gripping inner cup lip between thumb and forefinger. Discard cup and seal, **do not discard retainer.** From hydraulic cylinder, lift out primary cup retainer, power piston bearing, and secondary cup support washer. Then remove secondary cup only and lift out secondary cup retainer. With cylinder clamped in vise, remove secondary connection plug, and residual check valve seat. Then lift out residual check valve assembly and valve spring. Discard residual check valve assembly and seat

Cleaning & Inspection: Before any part of unit is reassembled, all metal parts must be thoroughly cleaned with diacetone alcohol or clean brake fluid and wiped dry. Avoid allowing dirt or grit to get into unit during reassembly. When assembling unit, be sure to discard all parts specified and other damaged parts, replacing them with NEW, clean parts.

Reassembly: Hydraulic Cylind r Ass mbly–1) Position hydraulic cylinder in vise with secondary connection boss facing up. Insert residual check valve spring and new residual check valve assembly. Place new residual check valve seat on residual check valve; center carefully. Assemble secondary connection plug and new gasket to hydraulic cylinder. Torque to 125 ft. lbs. Position hydraulic cylinder in vise with flange end up, and wet inside of cylinder with brake fluid. Then insert secondary cup retainer, small end up, being sure that it rests evenly on hydraulic cylinder bore. Then, after wetting new secondary cup with brake fluid, insert it into cylinder. Cup lips must be down, be sure that cup lip is not turned back at any point as cup slides into cylinder. Place secondary cup support washer in position on secondary cup.

2) Insert power piston bearing into cylinder on top of secondary cup support washer. Notched face of bearing must face up, and bearing must be centered in cylinder bore Place primary cup retainer, notched edge down in hydraulic cylinder, centering it on notched surface of power piston bearing *(This is v ry important).* Be sure that retainer is centered as closely as possible by eye, so it will not be damaged when cylinder plug assembly is installed.

3) Assemble cylinder plug assembly by inserting new seal, seal retainer flat side out, and new primary cup in that order. Both seal and cup must enter plug with lips facing out. Use finger to force outside lip of both seal and primary cup down and outward against bore of plug to insure sealing contact. Install cylinder plug assembly into hydraulic cylinder using a face spanner wrench. Torque to approximately 25 ft. lbs.

Guide Assembly–Inspect end of guide casting where it seats against air valve seat assembly. This must be smooth and clean. Position guide assembly in holding fixture with sleeve end down. Then assemble new valve balancing diaphragm on new floating control valve–after wetting outside diameter of diaphragm slightly with hydraulic brake fluid. Press spring retainer over diaphragm and floating valve assembly, us-

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1955 CHRYSLER, DESOTO, DODGE PLYMOUTH POWER UNIT (Cont.)

ing thumb pressure only. Then wet inside diameter of diaphragm slightly with hydraulic brake fluid and place spring on retainer. Press complete assembly down on power piston guide stop. Also install new power piston-to-guide "O" ring seal on power piston guide hub.

Power Piston & Guide—1) Assemble stainless steel reaction piston into bronze dome cup insert. Small diameter of bronze insert must be toward spherical end of reaction piston.

2) Assemble new pre-greased dome reaction cup over spherical end of reaction piston and insert assembly. Force cup back firmly to insure snug fit of cup bead in groove of insert. Place power piston and sleeve assembly on bench, sleeve end up, and after lubricating outside diameter of reaction cup with brake fluid, press reaction piston, insert end dome cup assembly into power piston sleeve, dome out. Use care to avoid damaging cup. Press down into sleeve firmly until it bottoms. Check to be sure that outside diameter of reaction cup is not obstructing compensating ports, and that all these port holes are open and clean.

3) Assemble new buffer and new metering hole seal to reaction rod and stop assembly. Invert power piston and sleeve assembly and place it holding fixture, sleeve end down, then drop complete reaction rod assembly into center of power piston.

4) Place reaction spring in center of reaction stop cavity, and control spring around outside of reaction stop, in power piston cavity.

5) Install new air valve seat "O" ring seal in groove on outside diameter of new air valve seat assembly using care to preserve silicone grease on seal (This seal is supplied pre-greased in cellophane envelope in kit).

6) Install complete air valve seat assembly in center of power piston cavity, over control spring reaction spring and reaction rod stop. Use a twisting motion as seal enters bore of power piston. Then use thumb pressure to test air valve seat springs for freedom of movement, *(NOTE*—Air valve seat is steel, power piston cavity is aluminum casting; use extreme care to avoid any damage or marking, especially on aluminum vacuum valve seat.).

7) Position diaphragm retainer over guide and sleeve assembly, with three of the six holes in the retainer lined up with three holes in guide. Position diaphragm on flange of power piston and sleeve assembly with flange of diaphragm down. Be sure that inside diameter of diaphragm is nested snugly all around in groove of power piston flange.

8) With power piston diaphragm retainer and guide assembly held directly above power piston assembly, insert pushrod without retaining clip through center bore of guide and into pushrod cavity in center of air valve seat assembly. Then, holding air valve seat down against control and reaction springs, position guide assembly so that three holes in guide line up with three holes (tapped) in power piston. Be sure that "O" ring seal is properly positioned between guide and power piston.

9) Install three lockwashers and hex bolts through holes in diaphragm retainer and into tapped holes in power piston. Tighten all three bolts evenly to torque of 90-100 **in. lbs.** Using pushrod, check for freedom of movement of air valve seat against control and reaction springs.

10) Place new rubber guide return bumper over guide sleeve and press firmly down on hub of guide. *NOTE*—A kit, available from Chrysler Corporation Parts Division, contains two guide return bumpers, each of a different thickness. It is important to install the bumper which is the same thickness as the one that was taken out of unit at disassembly.

Body Assembly (Valve Side)—With body assembly, valve side resting on bench, hub end up, insert new guide seal into hub, being sure that lips of seal are facing up, away from bearing, and that seal is installed between bearing and wick retainer which is inside hub. *(NOTE*—Seal will slip easily into place if held between thumb and forefinger, in an elliptical shape and inserted through hub of body. This seal is supplied pre-greased in a cellophane envelope in the repair kit). Insert new wick into hub in same manner as seal was inserted, using care to preserve grease on wick. After wick installed, be sure that wick retainer is positioned snugly against wick and away from cup lips. Apply any grease remaining in seal and wick envelopes to inside of hub, to provide maximum lubrication for seal, wick, and guide bearing. Check inspection screw and gasket to be sure they are tight.

Body Assembly (Cylinder Side)—Position vacuum check valve body in vise and insert new floating valve assembly, being sure that bonded rubber seal is facing down, against seat. Then assemble spring and cap.

Reassembly of Major Components—1) Place new cylinder-to-body seal in groove around cylinder plug assembly, being careful to avoid twisting seal.

2) Assemble hydraulic cylinder assembly to body. Position cylinder on body in such a way that, when viewing assembly from cylinder end, vacuum check valve is to left of hydraulic cylinder. Then assemble hex nuts and lockwashers to studs, finger tight only.

3) Position cylinder assembly with body assembly, cylinder side, in vise with cylinder end down and body assembly flange facing up. Place return spring in body assembly, centering it around cylinder plug assembly and inside the four cylinder flange bolt heads in housing.

4) Assemble power piston and guide assembly to body assembly, valve side, by inserting guide sleeve through hub of body assembly. Be careful to avoid damaging felt wick in hub.

5) Hold assembled power piston and guide assembly and body assembly, valve side, by guide sleeve, which now protrudes out of hub of body. Wipe power piston sleeve with brake fluid, then carefully position power piston on return spring so that spring nests around shoulder of power piston.

6) Press power piston and guide assembly down into unit against return spring, watching to avoid misalignment as power piston sleeve enters bore of cylinder plug assembly. Holding power piston and guide down against spring, place edge of diaphragm in groove on flange of body assembly, valve side, over edge of diaphragm and flange of body assembly, press firmly into position.

7) With two sides of body assembly properly mated, place two half-ring clamps over body flanges, being sure that flat portion of rings match cutaway portions of body flanges. Fasten half-ring clamps with two clamp ring screws, lockwashers and hex nuts. Tap ring clamps snugly into place with a rubber mallet, then tighten securely. "Do Not Lubricate" tag should be attached on either side of unit, under one of these two nuts. *(NOTE*—Two sides of body assembly must be assembled so that notches on one side mate with keys on other, and the cutaway portions of the flanges match).

8) Press power piston and guide assembly down as far as possible against return spring three or four times to be sure that power piston sleeve and hydraulic cylinder are properly centered. Remove unit from vise, invert, and while holding unit down to push power piston and guide assembly into fully applied position, tighten evenly the four cylinder flange nuts, using a torque of 180-200 **in. lbs.** After all flange nuts are tight, power piston and guide assembly must return freely to "off" position as soon as pressure is released. If power piston does not return freely, loosen cylinder flange nuts and re-align cylinder to housing; then retighten nuts and test again for free return.

9) Return unit to vise then blow out or replace air cleaner core, centering it around hub of body assembly. Then place one spacer around each of four mounting bolts.

10) Assemble air cleaner cover assembly to unit over air cleaner core and spacers, position cover so that air inlets will face down when unit is mounted in position on vehicle. Assemble reinforcement plate to unit over air cleaner cover assembly, positioning plate so that its longest dimension will be below unit when mounted in position on vehicle. Install four lockwashers and hex nuts and tighten securely to torque of 180-200 **in lbs.** Be sure guide sleeve and air cleaner cover sleeve are concentric. If necessary, tap cover sleeve lightly with rubber mallet to align.

11) Insert pushrod into pushrod boot, then into air cleaner cover boot, and insert assembly and snap NEW pushrod retainer clip into position on small end of pushrod. Be sure that small end of boot is nested snugly in groove on outer end of pushrod.

12) Holding boots back toward outer end of pushrod, press pushrod with retainer clip straight down through center of guide sleeve and into air valve seat cavity. Exert approximately 40 lbs. of pressure until end of pushrod snaps into place. When properly installed, pushrod is held securely enough in place so that it can be used to lift the weight of the unit.

13) Fit boots on flange of sleeve of air cleaner cover assembly, first the boot cover assembly, then the pushrod boot, being sure that they fit snugly. Then install new boot retainer strap. Reinstall bleeder screw and reservoir filler cap and gasket. Also reinstall stop light switch if it has been removed. Be sure all are in position and secure before reinstalling on vehicle.

MIDLAND POWER UNIT

Ford Trucks (1948-55)
Ford Passenger Cars (1954-55)
Ford "Thunderbird" (1955)

►CHANGES & CORRECTIONS

►*1955 500 & 600 SERIES TRUCK BRAKE PEDAL "KICK-BACK" CORRECTION:* An improved design brake booster hydraulic cylinder spring retainer has been released to prevent possibility of brake pedal "kick-back" This retainer has same number as earlier type (TEAA-2423-A) but is identified by code number (8-55) to right of word "retainer" on package

DESCRIPTION: Consists of a vacuum power chamber, hydraulically actuated vacuum control valve, and an hydraulic slave cylinder, all in a single sealed unit.

OPERATION: With engine running, brakes released, power diaphragm is vacuum suspended. Depressing pedal causes fluid to pass from master to slave cylinder, moving control valve piston, which admits atmospheric pressure to front of diaphragm As pushrod moves, check valve seals fluid in slave cylinder and hydraulic line pressure builds up to operate brakes

REMOVAL & INSTALLATION: Depress pedal a few times to relieve vacuum. Remove lines and attaching bolts To install, reverse removal procedure.

TROUBLE SHOOTING: Brake Pedal Kicks Back—Engine Running—Slave piston cups leaking, hydraulic check valve leak, intermittent vacuum leak in unit

Brakes Do Not Release—Engine Running: Control valve piston sticking, hydraulic (slave piston) sticking, valve spring broken, diaphragm body leaking

Vacuum Leak With Brakes Released—Engine Idles Normally: Defective "O" ring seal or body-to-slave cylinder gasket, dirt or worn atmospheric valve seal, defective or dirty vacuum check valve.

Vacuum Leak With Brakes Released—Rough Engine Idle: Leaking diaphragm in vacuum chamber, leaking control valve piston or diaphragm; leaking control valve vacuum valve seal.

Hard Pedal—Indicating Inoperative or Weak Booster: Clogged air cleaner element, sticking hydraulic (slave) cylinder piston, air leak at atmospheric valve seal, control valve diaphragm, control valve piston, or power chamber diaphragm.

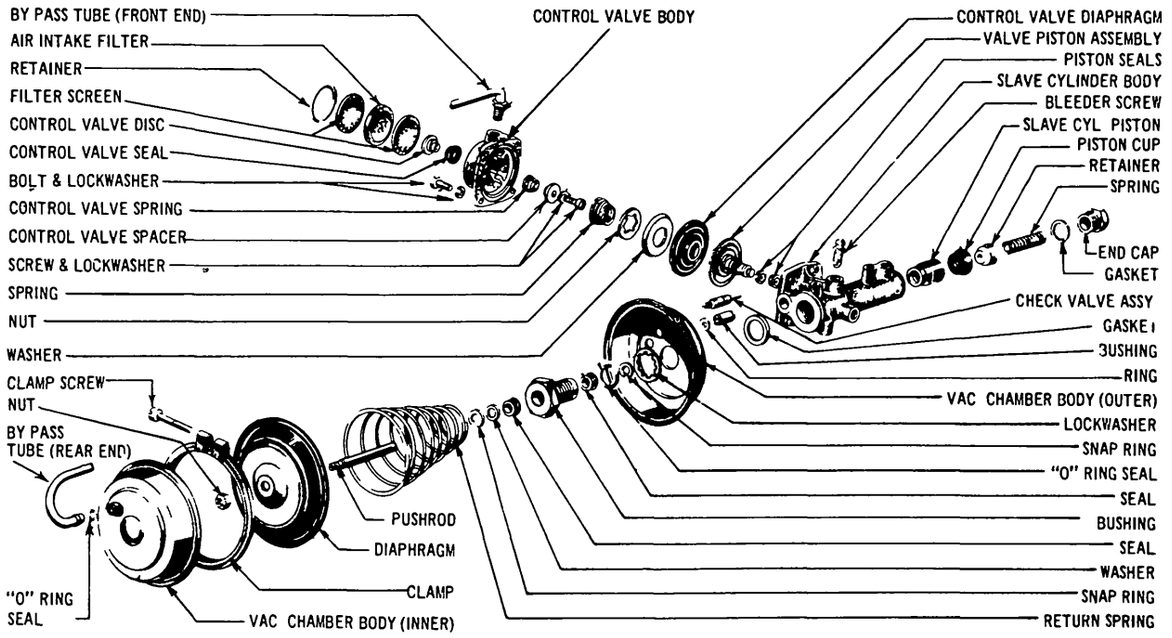
OVERHAUL: *TRUCK NOTE*—Do not remove breather in cab or controls mounted in engine compartment unless operating conditions indicate repairs are necessary.

Disassembly: 1) Remove control valve bypass tube from control valve and the body. Remove stop light switch. Mark both halves of body with a scriber, then mark flanges of control valve and slave cylinder so parts can be assembled in their original positions

2) Remove clamp then remove outer body and the diaphragm and pressure plate assembly with return spring. Remove vacuum check valve from inner body

3) Remove retainer and air intake hose fitting (or snap ring, screens, and filter) from control valve body. Remove control valve to slave cylinder attaching bolts and lockwashers Lift the control valve body, diaphragm spring, and the control valve piston and diaphragm assembly from slave cylinder body

4) Remove pushrod bushing, lockwasher, inner body, and gasket from slave cylinder body Remove transfer bushing and "O" ring seal from cylinder body.



TYPICAL MIDLAND BRAKE POWER UNIT

5) Remove end plug or cap, gasket, return spring and retainer, from end of slave cylinder. Remove slave cylinder piston cup and piston from cylinder. Remove inner and outer pushrod bushing seals.

6) Remove inner and outer seals from control valve piston. Remove control valve diaphragm plate and retaining nut by prying inner tangs of nut away from piston shaft. Separate the control valve disc and spacer by removing attaching screw and lockwasher. Then remove disc, seal, spring, and spacer from control valve body. Remove check valve retainer, check valve and return spring as an assembly from slave cylinder piston. Remove pushrod from diaphragm and disassemble check valve.

Inspection: Wash all metal parts in brake fluid and dry thoroughly. Use air to dry all internal passages. Replace all worn or damaged parts and if slave cylinder bores or control valve plunger show wear or evidence of corrosion, the slave cylinder body should be replaced. Replace pushrod if rough or damaged. If control valve seat is worn or damaged, replace control valve body.

Reassembly: 1) Assemble diaphragm on pushrod. After nut is tightened, coat threads with shellac to prevent leakage. Assemble control valve disc, seal, spring, and spacer in the control valve body with screw and lockwasher. Position control valve diaphragm and plate on control valve, and secure diaphragm and plate solidly in place with nut. Install control valve piston seals on piston

2) Insert check valve spring and valve and retainer in slave cylinder piston. Be sure check valve floats freely and does not bind in bore. Install the inner and outer pushrod bushing seals, and secure them in place with the retainers.

3) Coat the piston bores in slave cylinder body with hydraulic fluid. Dip slave cylinder piston, seal, retainer, and spring in fluid. Install piston in bore with recessed end toward pushrod bushing end of body Carefully position seal and retainer on top of piston Insert spring in retainer, and secure it in place with end plug or cap, using new gasket.

4) Place new gasket and inner body of vacuum power chamber on slave cylinder body. Make certain transfer bushing and "O" ring are in place before inner body is installed on cylinder body. Install pushrod bushing lockwasher over end of bushing. Thread bushing in place, be sure inner body seats squarely on cylinder body, then tighten bushing securely.

5) Dip control valve piston in hydraulic fluid, then install control valve. Position control valve spring on control valve diaphragm with small end of spring on diaphragm plate. Position control valve body over spring, align the scribe marks, then install control valve body-to-slave cylinder body attaching bolts and lockwashers. Tighten bolts solidly. Install air intake hose fitting (or screens, filter, and snap ring) on control valve body.

6) Place small end of diaphragm return spring on top of pushrod bushing. Carefully insert end of pushrod into bushing. Align diaphragm plate on large end of spring. Place outer body of vacuum power chamber on top of diaphragm with marks in alignment. Install clamp, making certain diaphragm head is properly positioned between two halves of chamber, then tighten clamp screw firmly.

7) Assemble check valve, then install it in inner body of chamber. Install a new seal on slip end of bypass tube, then install tube in outer body of chamber and control valve. Tighten nut on control valve body firmly.

MORAINE POWER UNIT

Buick (1955)
Oldsmobile (1955) ①
Pontiac (1955) ①

①—Bendix Brake Power Unit also used.

►CHANGES, CAUTIONS, CORRECTIONS

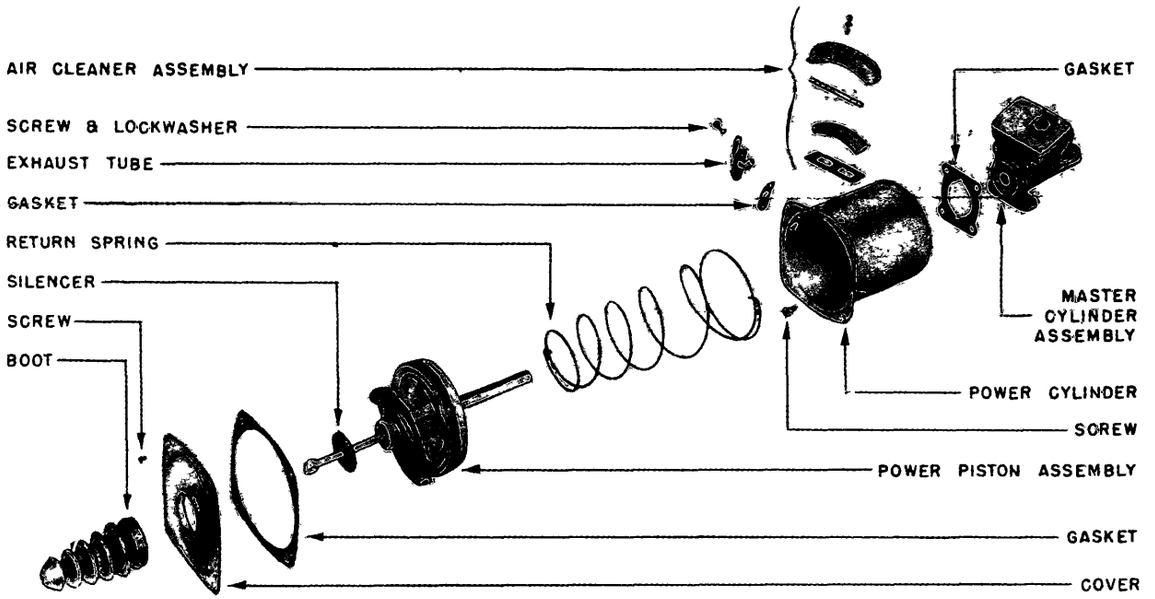
►*1955 BUICK CHECK VALVE NOISE CORRECTION (Caused by Vacuum Leak Between Check Valve & Vacuum Tank or in Check Valve):* (*NOTE*—Check valve chatter may be caused by riding brake pedal causing drain on vacuum supply). Make vacuum check, after making sure that brake pedal is in fully released position, properly adjusted and with no binds in it, and that the check valve is free of foreign material and operates freely. If vacuum assist still not obtained, replace check valve (NEW Part No. 5455046) as follows: Remove vacuum line from check valve to "T" connection. Remove cap from old valve body and remove spring and valve (*NOTE*—Leave valve body attached to frame). Discard valve and spring. Cut vacuum pipe just ahead of first bend (From "T" connection end). Install 3/8" pipe flare nut, flare pipe. Install new valve on end of pipe that was just cut off and flared. Replace old valve cap (without spring and valve). Install new valve and vacuum line as an assembly and make sure hose at "T" connection makes sufficient contact with new valve. Recheck vacuum assist.

►*1955 BUICK HYDRAULIC PISTON REACTION PLATE INSTALLATION CAUTION:* If reaction plate installed backwards, faulty brake operation will result and it will be difficult to select proper number of shims (See Overhaul below). Reaction plate should have concave side of rim toward shoulder of piston and rounded side of rim against reaction levers.

►*1955 PONTIAC MASTER CYLINDER SECONDARY CUP EXPANDER ASSEMBLY PRODUCTION CHANGE:* New finger type expander and spacer assembly, Part No. 5454862, now used in production, and replaces spring loaded expander used on early cars. Finger type expander requires a new spacer (identified by black oxide finish). *NOTE*—It is not necessary to add expander to early production units which did not originally have it.

DESCRIPTION: Self-contained, combined vacuum and hydraulic unit using intake manifold vacuum and atmospheric pressure for its pressure. In "brake-released" position power piston is balanced by atmospheric pressure on both sides of piston. Unit incorporates two main sections—vacuum power cylinder and hydraulic master cylinder. Unit replaces conventional master cylinder only. *NOTE*—On Buick master cylinder fluid reservoir is separate.

OPERATION: With engine running, brake unapplied, both sides of power piston are under atmospheric pressure. On application of brake pedal, intake manifold port opens and creates vacuum right side of power piston. Atmospheric pressure then moves power piston to right thereby exerting thrust on hydraulic plunger. This increases line pressure to four wheels. Release of brake pedal restores atmospheric pressure balance in power cylinder. In case of engine failure and consequent loss of engine vacuum, several applications of brake are possible by using vacuum supply in vacuum reservoir. In case of complete vacuum loss, brakes can be applied in conventional manner, although more effort is required due to loss of power assist.



POWER BRAKE ASSEMBLY

CHECKING & ADJUSTMENT: Check all parts of power brake system before disassembling Power Brake Unit whenever brake trouble experienced.

Adjustments: No special adjustments required. Anytime brake pedal goes to within 1". from floor (floor mat to underside of pedal pad), brakes should be adjusted. At time brakes adjusted, following inspections must be made:

1) Check vacuum lines and connections between intake manifold, check valve, vacuum reserve tank, and vacuum power cylinder for possible vacuum leaks.
2) Check fluid level in master cylinder reservoir. See Lubrication below.
3) Check condition of air cleaner element and insert clean element, if necessary.
4) Check steering column pedal plate for loose screws. Check for free operation of brake pedal. If binding exists, check for misalignment between pedal and vacuum cylinder pushrod.
5) Check stop light switch for proper operation.

Bleeding Brakes: Bleed in same manner as for standard brakes. Do not use vacuum assist while bleeding. Engine should not be running and vacuum reserve should be reduced to zero by applying brake several times before starting bleeding procedure. After power unit reinstalled, bleeding of power unit and flex line can be accomplished at junction block bleeder screw, provided remainder of system is free of air.

LUBRICATION: Check level of brake fluid in reservoir every 1000 miles. Refill to ½-1" from top of filler plug opening (Buick), high enough to register on dipstick (Oldsmobile), ½" from top of filler plug opening (Pontiac). *NOTE*—Reservoir is separate and under hood on Buick.

PERIODIC SERVICE: Intake manifold tee connector should be removed and cleaned Spring and Fall or every 10,000 miles.

TROUBLE SHOOTING: Before checking Power Brake Unit for source of trouble check remainder of brake system.

Hard Pedal: 1) Vacuum failure due to faulty vacuum check valve, collapsed vacuum hose, plugged vacuum fittings, hose or pipes, leak between vacuum power cylinder and hydraulic master cylinder.
2) Bound up pedal mechanism.
3) Power Brake unit trouble—internal vacuum hose loose or restricted; jammed sliding valve; vacuum leaks in unit caused by loose piston plate screws, loose piston packing, faulty master cylinder piston, vacuum seal, or leak between hydraulic master cylinder and vacuum power cylinder; defective diaphragm; restricted air cleaner.

Grabbing Brakes (Apparent Off-and-On Condition): Power Brake unit valve trouble—reaction diaphragm leakage, faulty rubber bumper pad in reaction diaphragm; sticking sliding valve reaction; restricted diaphragm passage; master cylinder piston binding in power piston guide.

P dal Goes to Floor (Or Almost to Floor): Brake adjustment; fluid reservoir needs replenishing, power brake hydraulic leakage—defective primary or secondary cup, defective vacuum seal, defective head nut or head

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MORAINE POWER UNIT (Cont.)

nut gasket, cracked master cylinder casting, leaks at wheel cylinders or in pipes, or in connections, defective "O" rings on cylinder plug.

Brakes Fail to Release (Or Slow Release): 1) Bound up brake pedal linkage.

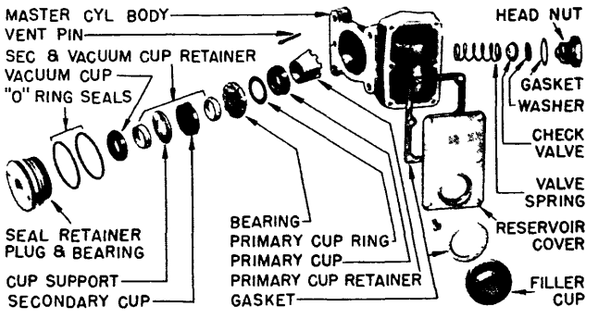
2) Weak brake shoe return springs, or rusty bosses on backing plate.

3) Faulty residual check valve, excessive hydraulic plunger seal friction, excessive piston packing friction, restricted air passage in vacuum piston, restricted air cleaner, sticky air valve, broken piston return spring, broken air valve return spring.

REMOVAL & INSTALLATION: Buick–Remove starter splash plan. Disconnect return spring, loosen locknut on cylinder pushrod, remove clevis pin at brake pedal, then unscrew pedal pushrod from cylinder pushrod. Disconnect air inlet hose at air filter on brake cylinder, and disconnect hoses from vacuum tee on opposite side of cylinder. Disconnect reservoir-to-hydraulic cylinder pipe, allow reservoir and pipe to drain. Disconnect distributor-to-cylinder pipe and allow to drain. **Discard old fluid** and cover pipe with tape to exclude dirt. Remove nuts and lockwashers attaching power cylinder to its support and remove cylinder from car. Install power cylinder by reversing removal procedure. Adjust pushrods by screwing cylinder pushrod in or out of pedal pushrod until pedal grommet is compressed to approximately ¾" after it contacts toeboard with pedal in released position.

Oldsmobile: Disconnect hydraulic line at power brake master cylinder (*NOTE*–Use care to prevent dirt entering hydraulic line and secure hose so open end is above level of junction assembly to prevent loss of fluid. Plug master cylinder outlet with rubber stopper). Disconnect stop light leads and fold back floor mat. Remove brake pedal bracket attaching bolts, then remove bracket and pedal assembly. Remove mast jacket grommet retainer and slide grommet up mast jacket. Remove mast jacket cover plate attaching screws. Loosen speedometer cable hold-down clip and slip cable from under clip, remove speedometer cable and grommet from mast jacket cover plate. Remove two cover plate-to-power cylinder bolts, and remove cover plate while positioning power brake unit so it rests on edge of opening in toe pan. Disconnect vacuum hoses and remove power brake unit through toe pan opening. To install, reverse removal procedures.

Pontiac: Disconnect vacuum hose from vacuum pipe running from vacuum tee connector, disconnect hydraulic pipe from outlet fitting on hydraulic cylinder. Disconnect pushrod from pedal and wires from stop light switch. Remove nuts from U-bolt retaining pedal pivot bracket (with stop light switch assembly attached). Remove clutch pedal seal retainer (Synchro-mesh cars) and steering column seal retainer, remove seals. On Hydra-Matic cars, remove screws in mounting plate, remove plate with power brake unit attached. On Synchro-mesh cars, remove screws which retain power brake unit to mounting plate (brake unit will rest on frame). Remove screws which retain mounting plate to floor pan and remove mounting plate "jockeying" as necessary to clear clutch pedal. Remove power brake



MASTER CYLINDER UNIT

unit (*CAUTION*–Do not support or carry brake unit by pushrod since pushrod may be pulled out of plunger). Remove mounting plate from brake unit, if not previously removed, and remove vacuum hose from vacuum cylinder inlet tube. To reinstall, reverse removal procedure (*NOTE*–Brake pedal pivot bracket has tang which mush fit in a hole in steering column). Fill reservoir, bleed system, test brakes. *NOTE*–In installed position there should be approximately 1/8" clearance between pushrod and bore of plunger.

OVERHAUL: *CAUTION: Use extreme care in the handling of hydraulic system parts to prevent their coming in contact with mineral oil or grease. DO NOT HANDLE HYDRAULIC PISTON CUPS OR SEALS WITH GREASY HANDS.*

Disassembly (Oldsmobile & Pontiac): Clean all dirt from outside of power brake unit Remove dipstick and gasket (Oldsmobile), filler cap and gasket (Pontiac), from master cylinder and pour brake fluid out of reservoir (*NOTE*–Operate pushrod by hand with unit upside down to pump fluid from cylinder bore). Clamp master cylinder end of unit in holding fixture J-5433 with adapter J-5796 and remove cable guide. Remove screw that holds air cleaner unit to outside of power cylinder. (*CAUTION*–Removal of air cleaner unit must precede disassembly of internal parts to avoid damage to large leather piston cup inside power cylinder housing). Remove boot and felt silencer from pushrod end of brake unit Remove end cover and gasket (held to power cylinder housing by two recessed flat head screws) Slip rubber exhaust hose from vacuum exhaust tube inside power cylinder housing (*NOTE*–Do not use compressed air to remove). Press power cylinder assembly back into power cylinder housing so that it does not rub against vacuum exhaust tube. Holding power piston in this position with one hand, remove two screws that hold vacuum exhaust tube to outside of power cylinder. Using fine emery cloth remove burrs from inside power cylinder housing at screw holes. Ease power piston out of power cylinder housing (There is a strong coil spring back of power piston assembly. Be careful to control piston by hand as it is removed from housing) Remove large coil spring from inside power cylinder housing. Remove hex head bolts at the inside base of power cylinder housing that hold it to master cylinder (*NOTE*–Power cylinder housing pilots on an extension of cylinder plug and should be removed carefully so as not to damage "O" ring on plug extension).

Air Cleaner Unit–Pull screw out through housing and assembled parts. Unseat rubber gasket from edges of housing, lift out element and hairpin spring.

Master Cylinder–Clamp master cylinder in fixture J-5433 with adapter J-5796 or in a vise in vertical position and remove cylinder plug assembly using special spanner wrench J-5794. Remove two "O" rings from outside diameter of plug. Remove secondary cup and washer from inside of plug. Inspect vacuum seal assembly in plug. If seal appears to be in good condition and there has been no indication of a vacuum leak, DO NOT attempt to remove vacuum seal assembly from cylinder plug. If vacuum seal defective, cylinder plug and vacuum seal must be replaced as an assembly. **On Oldsmobile,** from the bore of the master cylinder, lift out spacer, plunger bearing, primary cup washer, primary cup and retainer. **On Pontiac,** from the bore of the master cylinder, lift out expander, spacer, bearing, flat primary cup ring, primary cup and conical retainer. Reset master cylinder in vise or Tool J-5433 and remove head nut assembly and copper gasket (*NOTE*–Be careful so that check valve and check valve spring do not fall from hole as head nut is loosened). Remove rubber check valve seat washer which fits over button on head nut. Lift out check valve and check valve spring. **On Oldsmobile,** remove cover assembly. Note position of filler tube in relation to master cylinder body so that it may be installed in same position on reassembly. **On Pontiac,** inspect fluid reservoir through filler hole opening. If reservoir is dirty to the extent that it cannot be cleaned thoroughly through filler hole, remove reservoir cover and gasket. Make note of position of filler hole in relation to master cylinder body so that it may be installed in same position on reassembly. **On Oldsmobile and Pontiac,** inspect vent on underside of casting. (Vent pin is designed to keep this hold open). If hole clogged and cannot be cleaned out so that pin rides free, pin may be straightened and removed through counterbore end of vent hole.

Power Piston Assembly–Remove vacuum hose from power piston assembly if it is to be replaced (*NOTE*–Hose is cemented to tube). Carefully unseat triangular shaped lock ring with screw driver to permit removal of pushrod and air valve assembly. Use caution in removing lock ring so that it will not flip out and become lost or cause personal injury. Turn power piston assembly upside down. Stop plate washer will slide out of opening in power piston and down onto pushrod. Carefully pull out air valve and pushrod while holding piston in vertical position. Valve spring and shims will come out with air valve (*CAUTION*–Lift out spring and make note of number of shims which fit over valve shank and rest on valve shoulder). Remove "O" ring from air valve. (*NOTE*–It is not necessary to remove pushrod from air valve unless it is noisy or excessively loose). If necessary unseat snap ring by pinching snap ring with pliers J-5403. Pull out pushrod, remove rubber bumper from end of pushrod (ring and washer may be left on pushrod). Set power piston assembly on bench on hub end and loosen four screws that hold two halves of power piston assembly together. Before

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MORAINE POWER UNIT (Cont.)

completely removing screws press down on top half (power piston guide) with one hand. *(NOTE*–There is an internal spring between two halves that will have a tendency to part the two halves unless controlled by hand). Gently lift off power piston guide and master cylinder piston assembly. Turn upside down and remove "O" ring from pilot on power piston guide. Slide power piston guide off master cylinder plunger and remove "O" ring from master cylinder plunger. Examine reaction plate, which is held to end of master cylinder piston by small Truarc ring. If necessary to remove remove reaction plate, expand Truarc ring with special pliers J-4880 and lift off reaction plate. From counterbore of power piston, remove in order six fingers (or reaction levers), reaction spring, valve plate, and valve diaphragm spring. Carefully lift large leather cup off power piston. Keep in mind that underneath leather cup is a metal lip expander and wick assembly that has a tendency to uncoil when released. Wick and expander may be separated for inspection. Eject floating valve assembly from power piston by pulling out or by thumb press from hub end. If parts stick together and cannot be pressed out with fingers, pry gently from opposite end to loosen. Remove rubber power piston stop bumper from hub of power piston.

Floating Valve Assembly–Unseat cup-shaped valve spring retainer with small screw driver *(CAUTION*–Use care to prevent screw driver from damaging diaphragm). Press floating control valve through inner diameter of diaphragm. This also frees diaphragm retainer plate. Unseat rubber diaphragm from groove in diaphragm retainer ring.

Disassembly (Buick): Mount power brake cylinder in vise with hydraulic cylinder down, being careful not to damage the loose vent pin in flange of cylinder. Tighten vise only enough to hold cylinder firmly *(CAUTION*–Excessive tightening will distort or crack cylinder). Remove pushrod boot and retainer from housing cover. *Do not attempt to remove pushrod which is anchored in air valve by a spring type lock.* Remove housing cover bolts, cover, and gasket. While holding power piston down, disconnect vacuum hose from vacuum tee and gasket from housing. *Slowly* release power piston to control the pressure of piston return springs as piston and attached parts emerge from housing. Make sure that lip of leather piston cup does not catch in holes in housing. Remove power piston from air valve, then place valve and hydraulic piston assembly where polished surfaces of valve and piston will not be damaged by contact with other parts.

Air Cleaner Unit–Remove screw from air cleaner cover and assembled parts. Remove gasket, filter core, and spring from the cover.

Power Piston Assembly–Remove eight screws with lockwashers, piston guide, piston cup (leather), and the felt lubricating wick with expander spring from power piston. Remove rubber stop bumper but leave "O" ring inside piston hub and vacuum hose for later inspection.

Valve & Hydraulic Piston Assembly–Support valve and hydraulic piston assembly in an 8" length of 3" pipe, or its equivalent, with pushrod up. Remove snap ring, then lift air valve with attached control valve out of pivot plate and remove reaction spring. Remove lock ring, using ring pliers J-4880. Remove valve reaction plate, valve diaphragm spring, and control valve and diaphragm assembly from air valve. *(NOTE*–One to four spacers (washers) may be on the middle shoulder of air valve, but some assemblies require none. Note the number of any spacers present, then remove spacers from air valve). Remove diaphragm retainer from valve diaphragm, carefully pry off valve spring retainer, then remove diaphragm and retainer plate from control valve. Remove air valve return spring from bore of hydraulic piston. Remove snap ring, lift piston with cover out of pivot plate, and remove reaction levers. Remove snap ring, reaction plate, and cover from piston. Remove piston return springs from cylinder housing. Remove four nuts and lift housing from hydraulic cylinder. Remove gasket. Unscrew and remove cylinder plug from hydraulic cylinder body, using Spanner Wrench J-5794, then remove secondary cup, cup support retainer, and vacuum cup seal. Remove cup retainer, piston bearing, cup ring, primary cup, and primary cup retainer from cylinder body. Remove head nut with gasket, and check valve and spring from cylinder body.

Push Rod-Air Valve Assembly–*(CAUTION–Do not attempt to remove pushrod from air valve unless one part is damaged so that replacement is required).* To unlock pushrod, prepare a piece of 3/16" steel rod about 7" long by filing flats on one end to reduce size to 5/32", then use as a punch to bend both arms of pushrod lock. Grip hex of pushrod in vise and pull on air valve to separate these parts, then insert thin metal strips through air holes in valve to remove the lock. *Use care to avoid damaging annular seat on air valve.*

Cleaning & Inspection: Clean all parts in diacetone alcohol or clean brake fluid *(CAUTION–Do not use antifreeze alcohol, gasoline, kerosene, or any other cleaning fluid that might contain even a trace of mineral oil, as this could cause serious damage to all rubber parts in brake system).* Blow parts dry with air. As an aid in determining cause of power brake failure, carefully examine all rubber parts for nicks, cuts or other damage. After examination, discard these rubber parts if Overhaul Kit being used for repair. Blow dirt and cleaning fluid out of all internal passages. Make sure that small compensating ports in end of master cylinder plunger (hydraulic piston on Buick) are clear. If plugged, clean thoroughly and flush hydraulic system to remove all dirt. Outer surface of master cylinder plunger (hydraulic piston), bore of master cylinder (hydraulic cylinder on Buick) or vacuum cylinder, may be cleaned or reconditioned with fine crocus cloth if not too deeply pitted or scratched. If any parts indicate that heavy abrasive action has resulted from severe contamination of brake fluid, replace damaged parts and be sure to flush fluid reservoir and wheel cylinder lines thoroughly. Make sure that vent pin is properly retained in hole and that vent hole is clear. If using Overhaul Kit for repair of power brake use all new parts in kit regardless of whether old parts appear fit for use. The six reaction levers may be flattened with a wooden mallet if they are not badly distorted.

Reassembly (Oldsmobile & Pontiac): *CAUTION–During reassembly make certain that no grease or mineral oil comes in contact with internal parts of unit. Until used, keep cleaned parts on clean paper or cloth.* Master Cylinder–1) Drop check valve spring into place in 1" threaded opening in master cylinder casting. Seat check valve assembly into check valve spring. Button check valve seat washer onto head nut, and fit copper head nut gasket over threaded end of head nut. Screw head nut in place carefully to avoid binding check valve as it is depressed into hole in casting. A few drops of brake fluid on check valve seat washer will facilitate assembly. Torque to 80-90 ft. lbs. (Oldsmobile), 85-100 ft. lbs. (Pontiac).

2) Replace reservoir gasket and cover. Install all screws with exception of cable guide attaching screw (Pontiac). Be sure cover is installed with filler hole (Pontiac), filler tube (Oldsmobile), in proper position. Install filler cap and gasket loosely (Pontiac), or dipstick (Oldsmobile) to avoid danger of dirt entering reservoir during reassembly of unit.

3) Clamp master cylinder in fixture or vise, in vertical position, with large counterbore facing upward. Wipe counterbore and threads with very thin coating of brake fluid. Place conical primary cup retainer with notched end down into open end of bore. Press primary cup into hole (Note that outer lip of primary cup fits around and over small end of retainer when it is properly centered in hole). Place primary cup retainer (thin blued steel washer) in place on back of primary cup. Set bearing into bore with notched side up, making sure that hub of bearing fits into counterbore on back of primary cup. Place spacer on top of bearing. On Pontiac, place expander on top of spacer with fingers toward bearing. *(PONTIAC NOTE*–Early production units did not have an expander. If an expander is to be installed on these units a new spacer, with a 1/32" larger diameter, will be required. For a short time a a spring loaded expander was used in place of expander and spacer. In this case place spring on bearing and expander on spring).

4) Assemble cylinder plug assembly as follows: Seat vacuum cup seal with ribbed sides up into bottom of counterbore cylinder plug. Place spacer on top of vacuum cup (this spacer is smaller in diameter than secondary cup spacer), follow with secondary cup washer. Seat secondary cup with ribbed side up in large counterbore. Slip 1 51/64" "O" ring into first groove on outside diameter (nearest end of plug opposite threaded section), slip second 1 51/64" "O" ring over threaded end and seat on hub which has same diameter as first groove. *CAUTION*–No "O" ring should be placed in second groove that has four small through holes.

5) Screw cylinder plug assembly into place *(CAUTION*–On Oldsmobile, spacer must be properly centered on top of bearing, then carefully install plug assembly so that lip of secondary cup fits around spacer when plug is screwed into place. On Pontiac, spacer and expander must be centered properly on bearing so that lip of secondary cup fits around expander when plug is screwed into place). Use special Spanner Wrench J-5794 for tightening cylinder plug assembly (20-30 ft. lbs.).

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MORAINE POWER UNIT (C nt.)

6) If necessary, replace vent pin in vent hole and bend to approximately 45° to hold in place. Head of pin rides in counterbore of hole.

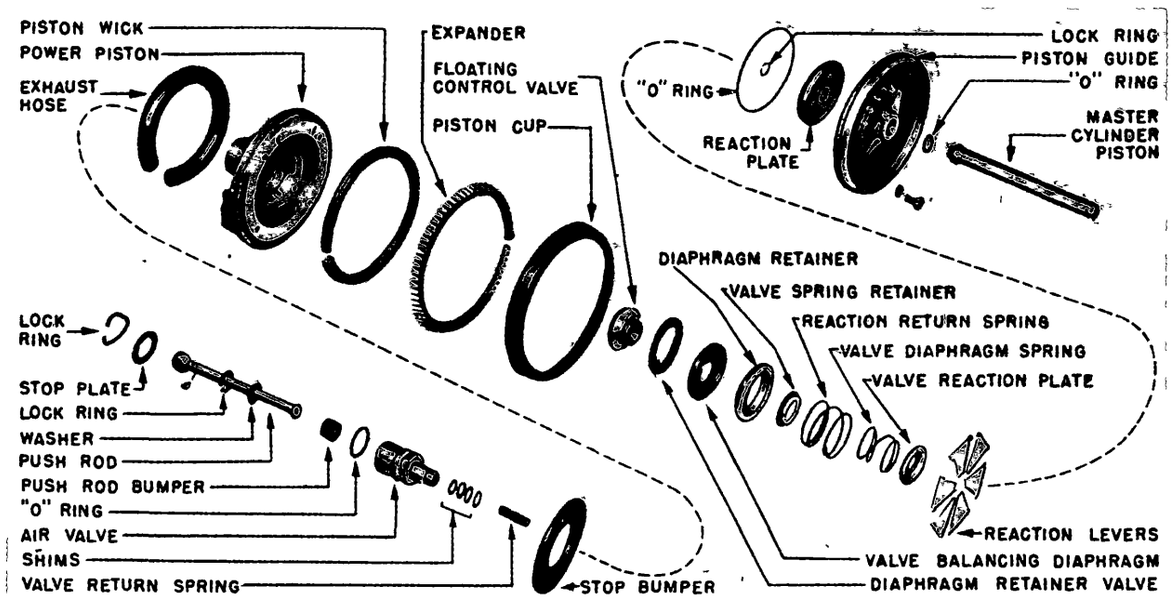
7) Assemble power cylinder housing to master cylinder with four 5/16" hex head screw and lockwasher assemblies (12-14 ft. lbs.). Be sure to install gasket between housing and master cylinder and position notch in gasket over vent hole in cylinder. The housing pilots on the extended portion of cylinder plug assembly. Assembly is facilitated by wiping bore of housing pilot hole with thin coat of brake or Hydra-Matic fluid. In assembling the housing be sure that two 3/8" air intake holes are on top (match reservoir cover side of master cylinder). Exercise care in installing housing so that "O" ring on cylinder plug extension is not damaged.

Floating Valve Assembly–Fit rubber diaphragm over small diameter of diaphragm retainer ring. Hold diaphragm retainer plate on back of diaphragm with one hand, flat side of plate adjacent to rubber; press floating control valve into place over retainer plate. The hub end of valve fits through the hole in the rubber diaphragm. Press cup shaped valve spring retainer over hub of floating valve and inner flange of diaphragm. Wipe outside diameter of floating valve with Hydra-Matic fluid or Dow Corning No. 4 Silicone Grease.

Power Piston–Set power piston casting on bench, hub end down. Press by hand the floating valve assembly, with rubber valve face down, into power piston counterbore. Assemble felt wick in channel of metal lip expander. *(NOTE*–If new wick is used, soak in Hydra-Matic or Shock Absorber fluid, allowing excess to run off). Install wick and expander assembly into outer groove of piston with expander fingers on outside and pointing toward hub end of power piston. Holding expander in place, slip rubber cup in place with lip also pointing toward hub end of piston. If new leather cup is installed use cardboard cylindrical retainer to confine cup during installation. This will avoid any sluggishness in operation during first few days of use or until leather becomes softened by fluid. Snap valve diaphragm spring in place over valve spring retainer. Seat valve plate on top of valve diaphragm spring so that center portion nests in spring. Place reaction spring around valve diaphragm spring and seat in recess of valve diaphragm retainer. Set six reaction levers in place. Ears on levers fit into mating slots in face of power piston. Small ends of levers will extend toward middle and rest of reaction spring.

Piston Guide–Place 5/8" "O" ring in groove of master cylinder plunger. Place reaction plate over small end of piston with raised edge extending outward. Retain reaction plate on plunger with Truarc snap ring using pliers J-4880. Lubricate lightly "O" ring and adjacent surface of master cylinder plunger with Dow Corning Valve Seal "A" or equivalent silicone grease. Fit 3½" "O" ring onto machined hub of piston guide.

Power Piston & Piston Guide–Holding master cylinder plunger assembly in one hand, in vertical position with reaction plate down start piston guide (ribbed side up) over upper end of plunger. Gently seat master cylinder plunger and reaction plate assembly onto reaction levers. Press down quickly and firmly until the six reaction levers are held in flat position. Be sure each lever is properly seated. Place hand on top of master cylinder plunger to hold in place. Gently slide piston guide into place indexing holes to match those in piston casting. Install four hex head ¼"screws and lockwashers to complete assembly (5-7 ft. lbs.) To assure that reaction levers are properly seated, check to see that master cylinder piston has slight movement in power piston assembly. Turn the assembled unit over and install rubber bumper in groove on hub of power piston.



VACUUM POWER PISTON UNIT

Air Valve & Pushrod–1) Assemble rubber bumper onto end of pushrod. Insert bumper and pushrod assembly into air valve. Allow metal washer on pushrod to seat on back of rubber pushrod bumper. Using special pliers J-5403, snap Truarc ring into groove in air valve. Check carefully to make sure that pushrod is firmly locked into air valve. Assemble 1" "O" ring in narrow groove on outside of air valve. Coat "O" ring and outside diameter of air valve with light coat of Dow Corning valve Seal "A" or equivalent silicone grease.

2) Place same number shims that were on air valve, on Tool J-5805. Invert power piston and insert gauge into bore of power piston. Shims and body of gauge will rest on valve plate and pin will extend through hole in valve and rest on end of master cylinder plunger. Turn power piston over so that gauge is on top and check position of pin in gauge body. Pin should be flush or slightly above gauge body. If pin is flush or less than .010" above body, no further adjusting is required. If pin is below top of gauge body, remove shims one at a time until pin is flush or not more than .010" above top of gauge body. If pin is more than .010" above top of gauge body, disassemble and inspect for bent reaction levers, reaction plate or valve plate. After proper number of shims have been added to small diameter of air valve, insert valve return spring hole in air valve.

3) Holding power piston and guide assembly with master cylinder plunger pointing upward, insert from below the air valve, spring, and pushrod assembly into hub end of power piston. *CAUTION*–Assemble in this manner to avoid dislodging shims and valve return spring.

4) Carefully turn power piston, guide, air valve and pushrod assembly over and insert stop plate and triangular lock ring which holds air valve in place. Lock ring may be assembled by using small screw driver. After being locked in place, the air valve will have approximately 1/32" travel against valve return spring before picking up floating valve load. *CAUTION*–Care should be exercised during this operation to avoid damage to master cylinder plunger. Never put master cylinder plunger in a vise.

Power Piston & Guide Assembly in Power Cylinder Housing–1) Lubricate lightly the large bore of power cylinder housing with Hydra-Matic or Shock Absorber fluid. Clamp the master cylinder in vise or Tool J-5433, in a vertical position with opening in housing extending upward. Place large coil return spring into housing with large diameter in bottom of housing. The tang on bottom of spring should be placed in narrow space between any one of hex bolt heads and closest locating dimple.

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MORAINE POWER UNIT (C nt.)

2) Wipe lip of leather cup with light coating of Hydra-Matic or Shock Absorber fluid to clean and lubricate. If rubber exhaust hose has been removed from power piston for replacement, coat exhaust tube with 3M Super Weatherstrip Cement and slip new hose on tube as far as it will go.

3) Place power piston and assembled parts on top of coil spring so that the boss plugged with the largest ball will enter housing below the exhaust tube hole in housing by approximately ¼". Press power piston assembly into housing. Depress power piston assembly into housing against coil spring load. This permits assembly of exhaust tube and gasket to outside of housing. Install tube in proper direction so that inside connection will assemble correctly with rubber exhaust hose (Two filister head screws). Slip rubber exhaust hose onto metal exhaust tube inside housing (approximately 1/2-5/8"). Permit power piston to ease back against exhaust tube connection. Install power cylinder cover and gasket using two flat head screws. Press cover down by hand in order to start screws into housing. Slip felt silencer and boot over p ushrod. Seat felt silencer against hub of power piston and fit boot snugly over flange on housing cover.

Air Clean r–Lay hairpin spring inside air cleaner cover. Lay filter element on top of hairpin spring. Place rubber gasket on filter element, depress spring and element so that edges of gasket can be fitted over flanges of air cleaner housing. Insert cover screw with gasket in place through assembled unit and screw into top housing. *CAUTION*–Air cleaner assembly must not be assembled to housing prior to this time, otherwise there is danger of damaging leather piston cup, because air cleaner cover screw extends through inside of housing.

R ass mbly (Buick): *CAUTION–During reassembly make certain that no grease or mineral oil comes in contact with internal parts of unit. Until used, keep cleaned parts on cle an paper or cloth.*

Valv & Hydraulic Piston Assembly–1) Mount hydraulic cylinder body in vise with flanged end up. Install new valve seat washer and new gasket on head nut. Place spring and new check valve (concave side outward) in cylinder body, then install head nut and tighten securely.

2) Place primary cup retainer in cylinder body with notched end inward. Dip new primary cup in clean brake fluid and install with flat side outward, using care that cup lip is not turned back at any point. Center the primary cup ring on cup and install piston bearing with notched face forward, pressing bearing down against shoulder in body. Dip new vacuum seal and secondary cup in clean brake fluid. Install seal in cylinder plug with flat side inward, center seal retainer in seal, then install cup support against shoulder in plug. Install secondary cup with flat side inward against the support. Place new "O" ring in the two outer grooves of plug and lightly coat them with silicone grease. Center secondary cup retainer on piston bearing and screw cylinder plug down into cylinder body, using care not to damage "O" ring or secondary cup. Tighten plug firmly, using Spanner Wrench J-5794.

3) With housing gasket placed on hydraulic cylinder so that one notch is at vent hole, install cylinder housing with two large holes for air cleaner on same side as head nut. Install four nuts and tighten securely.

4) Install new "O" rings on hydraulic piston and the reaction cover, lubricating both "O" rings and the bore of cover with silicone grease. Install piston reaction plate with **concave side of rim** toward shoulder of piston and install lock ring. Slide cover over piston with concave side toward reaction plate, using care to avoid damaging "O" rings.

5) Place six reaction levers in their slots in pivot plate. Install hydraulic piston and cover assembly in pivot plate and install snap ring. Install new rubber seal in groove in small end of pivot plate and lightly coat seal with silicone grease.

6) Check for number of spacers that may be required for proper location of valve reaction plate as follows: Support pivot plate in 3" pipe with hydraulic piston downward so that piston reaction plate rests against cover and all levers rest on plate. Center valve reaction plate on reaction levers with rounded side of rim against levers. Install Spacer Gauge J-5805 on reaction plate so that long end of plunger extends through to rest on upper end of hydraulic piston, then note whether upper ends of gauge plunger and sleeve are at same level. Any slight difference may be felt with a finger. If necessary install one or more spacers around plunger and between sleeve and reaction plate until plunger and sleeve are level. If exact level cannot be obtained, select the number of spacers that places plunger slightly **above** rather than below end of sleeve. Make note of number of spacers to be used for later installation.

7) Place **flat** side of retainer plate against **flat** side of valve diaphragm, push hub of floating control valve through plate and diaphragm, fitting flange of diaphragm into groove in valve, then press spring retainer over hub of valve. Slip outer flange of diaphragm over the smaller side of diaphragm retainer.

8) Place spacers selected in step **6)** on shoulder of air valve and install floating control valve and diaphragm assembly with rubber valve seat against seat on air valve. Place valve diaphragm spring over spring retainer, install valve reaction plate with **concave side of rim** against the spring, then depress these parts and install lock ring.

9) Place air valve return spring in bore of hydraulic piston and center the reaction spring on the reaction levers. Lubricate small stem of air valve and rim of rubber diaphragm with silicone grease, install air valve with control valve in pivot plate and install snap ring.

P w r Pist n–Coat vacuum hose tube of power piston with 3M Super Weatherstrip Adhesive, then push one end of vacuum hose all the way up on tube, turning hose so that it is flat against piston. Install rubber stop bumper in groove of piston hub. Place felt lubricating wick in the expander spring, saturate with Dynaflow fluid, then install in groove of power piston with spring fingers outward and pointing toward bumper end of piston. With rubber piston cup retained in the cardboard ring in which it was shipped, install cup over expander spring, making sure it is centered, then install piston guide and attaching screws with lockwashers. NOTE–Use of cardboard ring will confine cup during installation and avoid sluggishness during first few days of operation or until leather becomes softened by fluid.

Power Piston & Guide Assembly in Power Cylinder Housing–1) Install new "O" ring in largest groove inside hub of power piston, coat it with silicone grease and fill two outer grooves with this grease. Lightly coat rubber seat of control valve with same grease, then slide piston into place over air valve, using care to avoid damaging "O" ring.

2) Apply an even coating of Dynaflow oil to inside of cylinder housing, **being careful to keep this oil out of hydraulic cylinder.** Coat surface of the power piston leather cup with same oil.

3) Center small piston return spring in cylinder housing, then place large return spring around it with smaller end downward, locating the bent end of spring wire between one of bolt heads and adjacent dimple pressed in cylinder housing.

4) Wipe off hydraulic piston with a clean cloth to remove any oil or grease and apply a film of clean brake fluid to surface of this piston **only.** Remove cardboard retainer ring and place power piston and attached parts on large return spring so that bent end of spring wire rests between two of the round bosses on piston guide. Locate piston so that when it is pressed into housing the side of boss oppos te t!.e vacuum hose clears the vacuum tee hole in housing by approximately ¾". Push power piston down into cylinder housing, entering hydraulic piston into hydraulic cylinder, and hold piston down while installing vacuum tee with gasket and two screws. Push end of vacuum hose up on tee about 5/8".

5) Push power piston down and allow springs to return it several times to check for free operation and proper position on springs, then install gasket and cover on cylinder housing with four bolts, lockwashers, and nuts tightened securely.

Air Cleaner Unit–Place hairpin spring and filter core in air cleaner cover, snap the rubber gasket over flanged edge of cover, and install this assembly on housing with screw and gasket. The tube must point toward the air valve.

Pushrod–Air Valve Assembly–If pushrod was removed from air valve, place a new lock over ball end of pushrod and press parts into air valve until both ends of lock snap into place behind shoulder inside air valve. Install pushrod boot so that it fits in groove on rod and over flange on housing cover. Wrap retainer around boot where it fits over cover and lock in place.

BENDIX HYDRAULIC SINGLE ANCHOR

Buick, All Series (1946-55)
Cadillac, All Series (1946-55)
Hudson, All Series Exc Jet (1946-55)
Nash, Ambassador (1946-55)
Nash, Statesman (1955)
Oldsmobile, All Series (1946-55)
Packard, Clipper 6 (1946-47)
Packard 8, All Models (1946-55)
Pontiac, All Models (1946-55) ©

©—Pontiac 1946-48 Models used eccentric

►CHANGES, CAUTIONS, CORRECTIONS

►*1951 CADILLAC 61, 62, & 60S SELF-ADJUSTING ANCHOR NOTE* Shoes are automatically centered within drums to compensate for wear on linings *See Minor and Major Adjustments below*

►*1952 BUICK 70 FRONT BRAKE SHOE PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION* 1953 design FRONT brake shoes used on late 1952 cars beginning Serial No 16668190 (approx Sept 12 1952) These shoes have different geometry and are identified by heavier, more rounded corners at anchor pin and heavy boss or roll on edge of rib at adjusting screw end so that adjusting nut does not touch rib *ONLY NEW STYLE BRAKE SHOES FURNISHED FOR SERVICE AND NEW OFFSET ANCHOR PIN MUST BE USED WHEN THESE SHOES INSTALLED ON EARLIER CARS*

1952 Series 70 Brake Shoe & Lining Sets

	Std Size*	030" Oversize
Front	1391154 ©	② 1391153
Rear	1390830	1390831

©—Supersedes No 1390942
②—Supersedes No 1390941

►*CAUTION—When using above FRONT shoe assemblies to replace first type on early 1952 cars, install NEW OFFSET TYPE Anchor Pin No 1161604 (necessary to provide proper positioning of shoes)*

►*1950-54 PONTIAC BRAKE SILENCER SPRINGS (To Correct Brake "Squeak")* Brake Drum Silencer Spring Pkg No 514278 is available to correct above complaint To install make up four tools (see below) and install tools on four of the five wheel studs (use wheel nuts to hold tools in place) place spring on drum over the four tools roll spring on drum flange using large screwdriver to pry spring on drum at point between two wide spaced installing tools Install three clips approximately 120° apart to retain spring on drum Remove tools and re-install wheel

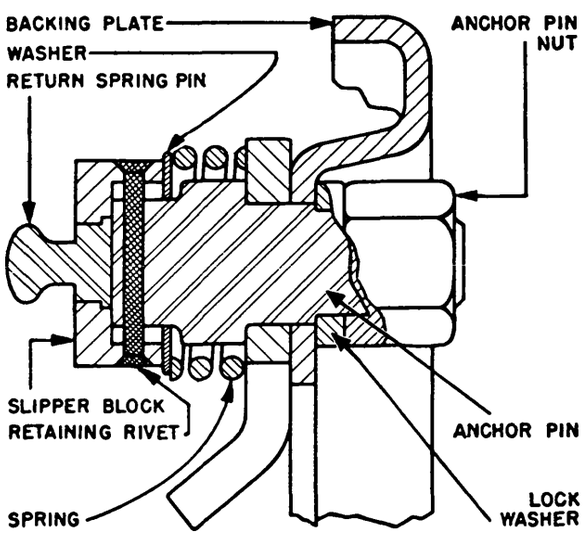
INSTALLATION TOOL NOTE—Make up tool from 1" wide strap iron with 17/32" hole centered on strap ¾" from one end (to engage wheel stud) Bend opposite end over in form of "U" 3¾" from center of hole and ¾" deep (return on end should be ½" long so as to fit over rim of brake drum)

►*1954 CADILLAC BRAKE PEDAL FREE TRAVEL CAUTION* The upper half of brake pedal for the standard brake is not the same as the one for power brakes Should the incorrect upper half be installed for the standard brake the **free travel** will not be correct, and full brake action cannot be obtained. The correct measurement (from carpet to lower edge of brake pedal plate) for standard brake is 5¾" (Power Brake 4 7/8"). NOTE—To obtain full brake pedal travel, the rubber grommet should rest against the bottom of toe-board when brake is fully released.

►*1953 CADILLAC BRAKE LINING MATERIAL AND DESIGN CHANGE* Late 1953 and 1954 cars are equipped with new material brake linings. New material, plus shorter linings on primary shoes, plus a ½" groove down the center from end to end of primary shoes, gives softer more positive pedal action, and better heat dissipation, with longer brake lining life

►*1954 OLDSMOBILE BRAKE RETRACTING SPRING CAUTION* Spring load specifications are important to obtain long life from linings. Spring load should be 45-55 lbs. when spring stretched to its normal length (4 7/8"). Free length should be 4½". Measure the distance from end of long hook to inside edge of other hook at opposite end. Replace spring when free length over 4½" or load not within specifications.

►*1955 BUICK 40 & 60 SERIES LONG BRAKE CABLE CORRECTION (Early Cars)* To correct, disconnect rear brake cable by removing nut and cable sheave Cut a piece of ¼ steel pipe or tubing that will slip closely over front cable rear shank to length necessary to get ample adjustment One inch length should be adequate Install this spacer on shank between rear cable sheave and adjusting nut Adjust cable to proper tension and lock adjusting nut by installing a plain 5/16 nut as a jam nut and tightening securely against adjusting nut Check with parking brake in fully applied position to be sure cable sheave does not come up to rubber grommet There should be at least ½ clearance If cable sheave within ½ of grommet in fully applied position, remove hand brake cable support (rubber covered bracket) and weld a new one, Part No 1311223, one or two inches farther ahead on torque tube Steel shank of front cable must ride in the grommet



CADILLAC 1951 "SELF-ADJUSTING" ANCHOR

►*BUICK UNEQUAL, ERRATIC, OR SQUEAKING BRAKE CORRECTION* To correct, proceed as follows **(1)** Air tires to 24 pounds Expand brake to a two hand drag in a forward direction (**Do not** tighten excessively so as to distort drum) **Do n t** attempt to expand brake by having another mechanic apply pressure to brake pedal **(2)** Make Anchor Pin Adjustment (See Adjustments below), and repeat adjustment until amount of drag remains constant **(3)** Make Major Brake Adjustment (See Adjustments below) **(4)** Repeat **(2)** and **(3)** above on all remaining wheels If any brake has noticeably more drag than others after releasing adjustment 6 notches, repeat anchor pin adjustment on that brake If still not comparable with others, remove wheel and check brake assembly and backing plate for cause of binding and correction condition If, during adjustments, anchor pins on one or more brakes were moved, car should be road tested Usually, during first few applications, original condition will return and then will gradually improve until, after 15 to 20 applications, brakes will begin to operate normally

►*1954 & EARLY 1955 CADILLAC EXCESSIVE PEDAL EFFORT CORRECTION* When checking for cause of excessive pedal effort on 1954 Series cars and 1955 Series Cars built prior to Engine No 22750, examine brake pedal position on shaft If pedal has moved out over lock ring to such an extent that it is binding, replace shaft and lock ring, using new shaft Part No 3510310, and new lock ring, Part No 1463434 New part numbers are applicable to 1950 through 1955 Series cars equipped with Hydra-Matic transmissions

►*1955 CADILLAC BRAKE PEDAL BINDING CORRECTION (Cars Built Prior To Engine No 12725)* To correct bind at clevis and bell crank linkage of brake pedal assembly, install a 1/8' flat washer between frame and master cylinder attaching bosses After installing washer, check linkage throughout its travel and shim further, if necessary

►*1955 CADILLAC WHEEL CYLINDER PRODUCTION CHANGE* Effective approximately Engine No 54000 a dish type metal expander is being used with wheel cylinder cups Expander minimizes contraction of cups due to variations in temperature and reduces possibility of air entering wheel cylinder when fluid cools and creates a slight vacuum in cylinder Wheel cylinders with expanders installed have copper plated bleed-

CONTINUED ON NEXT PAGE

BENDIX HYDRAULIC (Cont.)

er screw assembly. Early cars have a zinc dichromate plated bleeder screw assembly.

▷*1952-55 CADILLAC MASTER CYLINDER REPLACEMENT CAUTION:* Service replacement master cylinders for use on 1952-55 Series cars have filler cap designed for use with a remote filler reservoir. Drilled and tapped hole in center of cap for reservoir tube is plugged with red plastic cap. When replacing master cylinder on a 1954-55 Series car, plastic cap must be removed for attachment of remote filler pipe. When using a new master cylinder on a 1952-53 Series car without remote filler reservoir, filler cap must be discarded and filler cap from old master cylinder used.

▷*1955 HUDSON HORNET BRAKE PRODUCTION CHANGE & CORRECTION (To Eliminate Noise or "Clunk"):* Effective approximately October, 1955 a brake shoe return spring with greater tension (40 lbs.) will be incorporated in production to eliminate noise or "clunk" occurring during initial pedal application in reverse direction. New set, Part No. 3119175, including 4 springs (2 wheels), is available for installation on earlier cars.

▷*1955 HUDSON & NASH MASTER CYLINDER PRODUCTION CHANGE (To Correct "Spongy" Brake Pedal):* Master cylinder-to-pedal shaft brace, Part No. 3141435, may not fully engage groove at outer end of pedal shaft, permitting pedal shaft to flex within keyhole slot during application resulting in a "Spongy" brake pedal. Effective at following serial numbers, production enlarged two master cylinder attaching holes in brace to effect a full engagement of keyhole slot to groove in outer end of pedal shaft: Hudson Hornet V8, Y-1483; Hudson Hornet 6, X-1226; Hudson Wasp, W-1347; Nash Ambassador V8, V-1808, Nash Ambassador 6, R-743126; Nash Statesman, K-635418. At same time two original lockwashers on brace to master cylinder attaching screws were replaced with bite washers, Part No. 3138264. When condition occurs in field remove brace and elongate master cylinder attaching holes sufficiently to provide full engagement of keyhole slot to groove in outer end of pedal shaft. When reinstalling brace use two bite washers.

▷*1955 HUDSON WASP & NASH STATESMAN BRAKE CHATTER ON LIGHT PEDAL APPLICATION CORRECTION:* Chatter caused by drum distortion occuring when wheels secured to drums (ten wheel-to-hub contact ledges are not uniform in height). Generally, condition will improve with time and mileage. If chattering condition is severe, remove wheel and tire assemblies, and clean wheels as necessary. Color a 6½" square of plate glass with a bearing blue or colored crayon. Place the plate glass on the ten wheel-to-hub contact ledges, and oscillate the glass slightly to transfer coloring material to high ledges. With grinding equipment, gradually reduce high ledges to a point where it is not possible to place a .004" feeler gauge between plate glass and any one of the ten ledges. Repeat coloring operation as often as necessary. *Do not remove material in excess of .015" from any one of ledges.* If necessary, replace wheel. In cases where severe chattering is encountered it is possible that one or more drums have taken a permanent out-of-round set. Check drums, and in cases where out-of-round exists in excess of .005", a light cut be taken on drum lathe to bring drum within .005" out-of-round limit.

▷*1955 OLDSMOBILE BRAKE PRODUCTION CHANGE:* Beginning approximately May 15, a second type front and rear brake assembly was used in production. Primary change in new assembly is use of larger retracting spring and a new anchor pin. In rear brake assembly, new parking brake lever and pin assemblies are used to provide clearance for larger spring, and are held to the secondary shoe by a retaining clip. A new washer is also used in rear brake assemblies between parking brake lever and secondary shoe.

DESCRIPTION: Single anchor, hydraulic type. No eccentric used except on 1946-48 Pontiac models.

ADJUSTMENTS: Before attempting any adjustments, car should be placed on stands with wheels free. Brake pedal should operate freely and there should be no bind in hand brake lever or cables.

Brake Pedal Adjustment: This adjustment should conform with recommendations before any other adjustment is made. See Car Model below.

Buick—Clearance between pedal and underside of toeboard should be 1" (1946-54). 15/16" (1955).

Cadillac—Rubber grommet on pedal under toeboard should be compressed ⅜" (1946-48), just touch underside of toeboard (1949-55).

Hudson & Nash—Pedal free travel should be ¼-½" with master cylinder piston against stop. Adjust at master cylinder pushrod.

Oldsmobile—Adjust master cylinder pushrod to obtain a minimum of 3/16" free travel. Pedal rubber bumper should be compressed slightly.

Packard—Brake pedal should have ¼" free play with master cylinder piston against stop. Adjust at master cylinder pushrod.

Pontiac—Clearance from lower side of pedal pad to floor mat with master cylinder piston against stop should be 4¾" (Torpedo styles 1946-48), 5 3/16" (Streamliner styles 1946-48), 4 3/8-4 5/8" (All 1949-55).

▷*CAUTION:* On 1946-49 Cadillac and 1946-48 Packard, manufacturer recommends minor adjustment be made in same way as major adjustment (below). Minor adjustment only is made on 1955 Nash & Hudson models (anchor pin is fixed).

Hudson Mechanical Follow-Up Adjustment: *See "Hudson Mechanical Follow-Up".*

Minor Wear Adjustment (Exc. 1951 61, 62, & 60S Cadillac): Check and adjust brake pedal clearance, release hand brake lever, and see that cables are free and are not holding brake shoes against drum. At each wheel, expand brake shoes by turning adjusting screw up until wheel can just be turned by hand, adjust hand brake (cars where hand brake adjusted with shoes "expanded"-see Hand Brake Adjustment), then back off adjusting screw the number of notches or "clicks" as shown in table below. Check wheel for freedom of drag. If drag noted, tap backing plate to assist centralization of shoes, then recheck. If drag still exists, anchor pin adjustment may be in order. See Major adjustment.

1951 Cadillac 61, 62, 60S—Jack up car, remove adjusting hole cover from brake backing plate. Check wheel bearing adjustment and correct as necessary. Check to see that hand brake cables are not frozen in housing at rear wheels. Tighten ratchet adjustment until road wheel cannot be turned by hand, then back off ratchet 16 notches. Install adjusting hole cover. Adjust brake pedal free play.

Adjusting Screw Setting

Buick	① 15 notches
Cadillac (1946-49)	See Caution above
Cadillac (1950), 75 & 86 (1951)	12 notches
Cadillac 60S, 61, 62 (1951)	16 notches
Cadillac (1952-55)	14 notches
Hudson & Nash	14 notches
Oldsmobile	16 notches
Packard (1946-48)	See Caution above
Packard (1949-51)	16 notches
Packard (1952-55)	②
Pontiac (1946-48)	See below
Pontiac (1949-55)	14 notches

①—17 Notches maximum.

②—Turn brake adjusting screw up until wheel can just be turned by hand, then back off screw until wheel turns free.

1946-48 Pontiac Minor Wear Adjustment: (*NOTE*—Eccentric used). Loosen eccentric locknut on backing plate, rotate eccentric in direction of forward wheel rotation until .010" feeler is snug between lining and drum 1½" from each end of secondary shoe. Hold eccentric from turning, tighten locknut (*NOTE*—Clearance at both ends of shoe must be alike within .003" with smaller clearance at anchor end preferably. If not within clearance limits anchor must be relocated—See Major Adjustment below). Check for freedom from drag. Check brake equalization by depressing brake pedal until wheel with least drag can just be turned by hand, equalize by backing off adjusting screws not more than two or three notches. Do not tighten loose wheels.

Major Adjustment (For Now Shoes, Relined Brakes or when Minor adjustment not satisfactory): Jack up all four wheels, loosen or disconnect parking brake cables at equalizer or intermediate lever, remove adjusting hole covers on backing plate and inspection hole cover on drums (remove wheels for access). Check Pedal Clearance (see Brake Pedal Adjustment). Adjust each wheel brake as specified by car manufacturer, given below. *CAUTION*—If hand brake cables not disconnected or loosened, shoes may be held "ON" by cables (if adjusted too tight) so that correct adjustment cannot be secured.

Buick—Turn adjusting screw up to expand shoes until wheel can just be turned with both hands (if wheel off, drum should just turn with long bar). Back off 15

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BENDIX HYDRAULIC (C nt.)

notches. (Max. 17 notches). Wheels should be free at approximately 6 notches. If not it indicates need for anchor pin adjustment or tight parking brake cables.

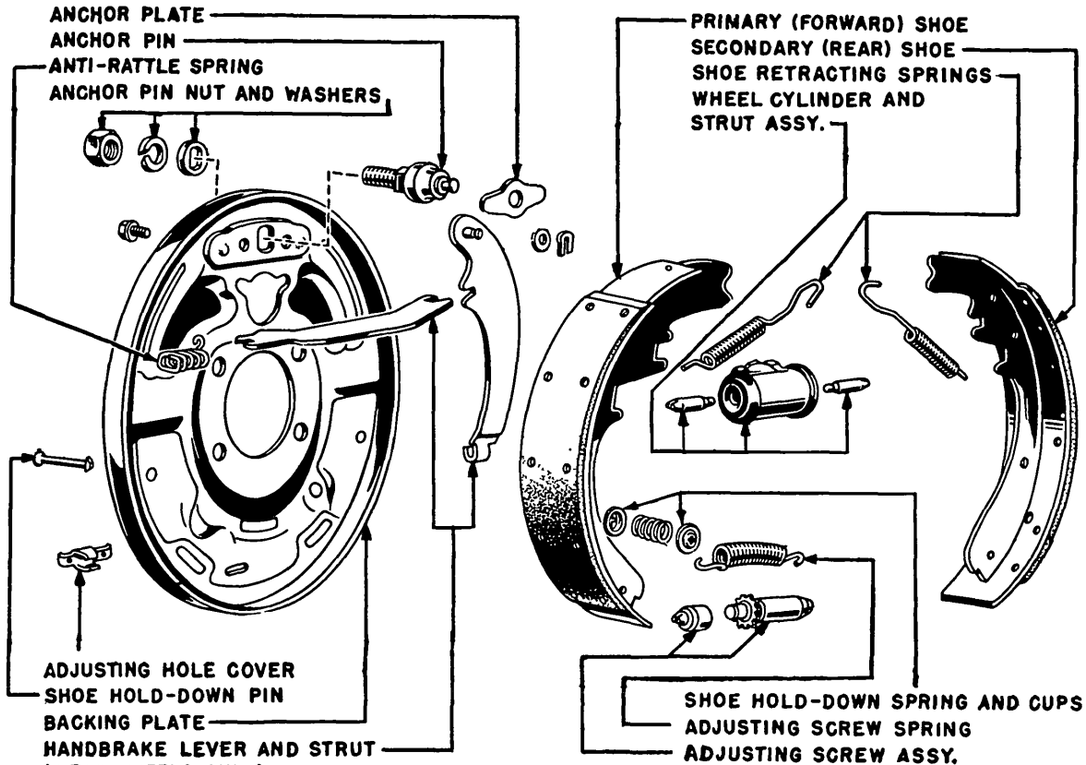
Anchor Pin Adjustment—Loosen anchor pin nut ½ turn just enough to permit anchor pin to slide in the slotted hole, *(CAUTION*—Loosening anchor pin nut too much will allow brake shoe spring to tilt pin), rap backing plate with hammer adjacent to anchor pin to insure anchor pin assuming central position between shoes, tighten anchor pin nut securely, then recheck drag. (If this has changed recheck anchor pin adjustment). Check and adjust hand brake (see Hand Brake Adjustment). Wheels should be free of any drag.

1952-55 Cadillac—Loosen anchor pin locknut ½ turn, tap anchor pin up with a hammer, then all the way down to bottom of its slot. Turn adjusting star wheel to expand brakes until wheel can just be turned with two hands. Tap backing plate near anchor pin to raise it to a central position between shoes. Check brake drag If centering of anchor pin has released brakes, increase expansion of shoes and reset anchor pin again. Repeat until there is no change in drag with change in anchor pin setting, then tighten anchor pin to 80-120 ft. lb. torque. Loosen star wheel 14 notches, plaoe .015" feeler through drum slot at bottom and rotate wheel until feeler is wedged between secondary shoe and drum. Primary shoe will be tight against drum for measuring secondary clearance. Reverse wheel rotation until .015" feeler is again at bottom and adjust star wheel to obtain .015" clearance. Clearance at top of shoe should now be .010". If upper clearance is greater or less than .010" loosen anchor pin locknut and reset anchor pin, tapping it up to increase clearance and down to decrease clearance. Reset clearance at lower end with star wheel and recheck upper clearance.

1951 Cadillac 61, 62, 60S—Loosen cable to hand brakes by loosening turn buckle at equalizer, just behind frame crossmember. Adjust brake pedal operating rod (free play). Then proceed as for Minor Adjustment above. Connect and adjust hand brake cables.

Cadillac (1946-50, 1951 75 & 86); Hudson & Nash (1946-54); Oldsmobile & Pontiac (1949-55)—Insert .015" feeler in slot 1½" from adjusting screw end of secondary shoe, turn screw up to expand shoes so feeler tightly gripped (to move primary shoe out against drum), then back off screw until only a slight drag is felt on the feeler gauge (will insure .015" clearance at this point). Check clearance at point 1½" from anchor pin end of this same secondary shoe. If .015" feeler does not have equal or slightly heavier drag at this point, adjust anchor pin (see notes below on slotted and eccentric type anchors) for correct .015" clearance at this point, tighten anchor pin nut to 75 ft. lbs. torque. Adjust hand brake, check and adjust brake pedal clearance (below).

Eccentric Anch r Pin— Pin has squared end. Can be turned with a wrench after nut has been loosened. Turn pin in direction of forward wheel rotation to decrease clearance. End of anchor pin is beveled and high point



BENDIX HYDRAULIC SINGLE ANCHOR BRAKE ASSY.

indicates high side of eccentric cam. Hold pin with wrench while tightening nut.

Slotted Anchor Pin Hole—Pin hole in the backing plate is slotted. To adjust, loosen anchor pin nut and tap pin out toward drum to decrease clearance.

1955 Hudson & Nash—No major adjustment. Anchor pin is fixed.

Packard—Insert a .015" feeler gauge through inspection hole in drum at point 1½" above lower end of secondary shoe. Expand the adjusting screw (star wheel) until a slight drag is felt on the feeler. Remove feeler and insert a .010" feeler through inspection hole in drum at a point 1½" from upper end of secondary shoe. If clearance not within limits, loosen anchor pin locknut and adjust anchor pin. Turn anchor in direction of forward wheel rotation to decrease clearance. At the same time readjust the adjusting screw to maintain .015" clearance at lower end of shoe. Hold anchor in set position and tighten locknut. Turn clearance adjusting screw (star wheel) until drum can just be turned with both hands, then back off screw 16 notches or "clicks" (1946-51), until drum turns freely (1952-55).

1946-48 P ntiac—*(NOTE*—Eccentric used). Loosen eccentric locknut, turn eccentric in direction of forward wheel rotation until .010" feeler is just snug at adjusting screw end of secondary shoe. Hold eccentric from turning, tighten locknut. Check clearance at anchor pin end of same shoe. If clearance not .010", adjust anchor pin (See Anchor Pin Notes above) until clearance at anchor pin end is exactly .010". Hold anchor pin from moving, and tighten locknut securely with 16" wrench. Recheck adjusting screw end clearance. Make any necessary readjustments at eccentric and anchor pin until .010" clearance secured at both ends of this shoe. Proceed as for Minor Adjustment (above).

Hand (Parking) Brake Adjustment: *CAUTION—Brake shoes must be expanded on some cars when adjusting hand brake cables.* Adjust each car as follows:

Buick—With rear wheel brake shoes xpand d so that wheels can just be turned by hand, place hand lever in fully released position, hold brake lever cable to prevent twisting and tighten nut at rear wheel cable sheave (under torque tube) to remove all slack from cables. Back off brake shoe adjusting screw 15 notches or "clicks" for correct shoe clearances and check wheel for drag.

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BENDIX HYDRAULIC (Cont.)

1946-48 Cadillac—Make sure service brakes are fully released. Loosen cables by loosening turnbuckle locknut at equalizer bar in X-member. With hand brake in fully released position, tighten turnbuckle until hand brake cable is taut. Tighten locknut. *CAUTION*—Do not change position of adjusting screw ("Star wheel") when adjusting hand brakes.

1949-55 Cadillac—Adjust locknut on equalizer link to obtain 1/8" clearance between the rear edge of the rear relay lever and end of slot in the frame X-member. **Do not expand rear brake shoes.** Adjust the equalizer lock nut until the rear brake cables are taut. Attach spring scale to hand brake lever and apply a pull of 50 lbs. Measure the distance the hand brake lever has moved from its fully released position. This should be 2 1/8-2 3/8". Readjust cable tension if necessary to obtain this amount of movement with 50 lb. pull. Recheck front cable for equalizer 1/8" clearance described above.

1946-54 Hudson—With brake shoes expanded so wheels can just be turned by hand, pull hand brake lever "ON" two notches and check clearance between hand brake cable lever and end of slot in lever guide plate on frame cross-member. If this clearance is not 1/8", loosen locknut and adjust hand brake cable clevis. Pull each rear brake cable taut and adjust clevis on forward end of cable so that clevis pin can just be inserted with all slack removed from cable. Connect cables, release hand brake lever, back off adjusting screw 14 notches for correct shoe clearance, check brake equalization.

1946-48 Nash—With rear brake shoes expanded against drum, pull hand lever "on" 2 notches, loosen two bolts on adjusting clamp (connecting lever and wheel cables), pull cables tight and tighten bolts. Return lever to "off" position. Back off adjusting screw in each wheel to free brakes and check equalization. See that hand brake lever on each wheel backing plate has 1/8" free travel with hand lever in off position. Equalize hand brakes by loosening rear bolt in cable adjusting clamp and applying hand brakes (this will allow cable to shift on adjusting clamp). Check position of hand brake cable guide on rear spring. Guide should be exactly 17½" to rear of spring front eyebolt centerline.

Nash Hand Brake Pull y Adjustment—When adjusting hand brake, first check position of hand lever cable pulley on front of dash (in engine compartment) and adjust cable position on pulley so that upper rear edge of pulley (segment type) is exactly 1 5/8" from top of pulley bracket upper mounting screw with hand brake lever in fully released position. Then adjust hand brake in usual manner (adjustment located at wheel cable equalizer clamp under car).

NOTE—On 4860 cars, and 4760 after Serial No. R-451662, an aligning pin hole is provided in the pulley bracket. The pulley can be correctly located by using J-1390 Gear Shift Aligning Pin.

1949 Nash—Pull hand lever "on" one notch. Remove all slack from cable at rear brake cable equalizer. Place hand lever in full "off" position and check rear wheel brakes for freedom from drag.

1950-54 Nash—**Do not expand shoes.** Pull hand lever "ON" exactly 3½" (measure from face of bracket to handle). At rear cable equalizer, loosen forward nut and tighten rear nut on hand brake lever cable fitting until rear brakes are fully applied, then tighten forward nut. Release hand brake lever and check brakes for freedom from drag.

1955 Hudson & Nash—Withdraw hand brake lever to rear to provide a 3½" clearance between hand brake lever handle and bracket face. With lever in this position, tighten hand brake cable at equalizer to a point where rear brakes are fully applied. This will prevent possible brake drag. To release parking brake, apply brake pedal pressure, turn parking brake handle counter-clockwise 70°, and push it into released position.

1946-52 Oldsmobile—Expand rear wheel shoes so that drums can just be turned, pull wheel cables forward to eliminate all slack, adjust clevises on forward ends of cables so that clevis pins can just be inserted with equalizer link held parallel to propeller shaft, connect cables (insert clevis pins with head toward top), back off adjusting screw in each wheel approximately 16 notches until wheels are free, check equalization.

1953-55 Oldsmobile—With hand lever **released** and service brakes properly adjusted, adjust hand brake front cable so that hand brake intermediate lever is held from seating itself on the end of the seat in the left "X" member by 1/32-3/32". Adjust rear cables to remove all possible slack without moving brake shoes from released position. Rear cables must not protrude into clevis more than ¾". The threaded part of front cable must extend entirely through front clevis. Distribute the adjustment between rear cables so that equalizer link is parallel to propeller shaft when clevis pin can just be dropped into place. Lock clevis jam nuts and insert clevis pins. Always install clevis pins with head on top.

Packard—Tighten adjusting screws until wheel can just be turned by hand. Pull hand lever to first notch on ratchet. Adjust clevis on hand brake cable so that the clevis pin can be easily installed without any slack in the cable. Release hand brake lever. Back off adjusting screw at each wheel 16 notches (1946-51), until wheel turns freely (1952 & Later). Apply hand brake and check equalization by turning each wheel by hand. If not equal, loosen adjusting screw on tighter brake. Replace hole covers and road test.

1946-48 Pontiac—Check brake cable tension by moving clevis pin at cross lever wheel cable spreader, pin should move up and down with thumb and finger pressure (hand lever in released position, rear wheel brake shoes not expanded), and both rear wheels should lock with hand lever in third notch. To adjust, remove cross lever clevis pin and engage pin in another of the several holes in the cable spreader (approximate setting), remove hand lever clevis pin and turn clevis on cable (exact setting) using extreme care not to twist the cable. To equalize wheel cables after adjusting, loosen clampscrews on wheel cable spreader at cross lever (if necessary pry clamp ears apart with a screwdriver so that cable free in spreader), apply brakes hard by pulling back on hand lever, tighten spreader clampscrews before releasing hand lever.

1949-55 Pontiac—Apply hand brake to fourth notch (1949-52), first notch (1953 & Later) and then check equalization. Loosen adjusting screw of tightest brake if not equal. If more than a few notches are required, loosen clamp screws on spreader and pull downward on the tight side of cable. This should equalize cable. Tighten spreader clamp screws while hand brake lever is still in the applied position. Brake cables are sufficiently tight if rear wheels can barely be turned by hand with lever in the fourth notch (1949-52), first notch (1953 & Later). When the lever is fully released, wheels should turn freely with cable pulled down approximately 1½" by gripping cable midway between conduit and clearance hole through frame X-member. When adjusting rear end of front cable for close adjustment for tension, be sure to turn clevis on or off cable end but do not twist cable. Coarse adjustment is secured by selecting the correct hole in the spreader.

RELINING BRAKES: Manufacturer recommends use of replacement shoes furnished with new linings. If shoes relined, use the same type lining as fitted originally (see Car Model page). Lining on primary and secondary shoes may be of different types (woven on primary, moulded on secondary, etc.) or of different lengths.

BRAKE DRUM GRINDING: If new .030" oversize shoe assemblies are to be installed, machining must not remove more than .030" on drum radius or .060" on diameter.

BLEEDING BRAKE SYSTEM OR OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing".*

TROUBLE SHOOTING: *See "Hydraulic Brake Troubl Shooting".*

HUDSON MECHANICAL FOLLOW-UP

Hudson, All Models Except Jet (1946-55)

DESCRIPTION & OPERATION: Consists of over-running mechanical linkage between brake pedal and hand lever equalizer bar plate or hand brake bellcrank, by which wheel brakes are set mechanically through hand lever linkage after movement of pedal is sufficient to operate brakes hydraulically. Acts as a reserve if hydraulic application fails or when pedal travel is excessive.

ADJUSTMENT: Adjust models as follows:

1946-47 Models—With master cylinder operating lever against stop (brake pedal stop), and rear brake cable equalizer bar plate against stop on bracket, loosen locknut on threaded follow-up rod below brake pedal, and turn adjusting nut until clearance between face of nut and front end of pushrod tube is 1¼", tighten locknut.

1948-54 Models—With brakes in fully released position, loosen locknut on threaded follow-up rod below brake pedal, and turn adjusting nut until clearance between rear side of brake pull rod slide link retainer pin and rear end of slot in slide link is 1¼", tighten locknut.

1955 Models—Disconnect cable from brake pedal and master cylinder piston pushrod from brake pedal. Place a 3½" spacer block between brake pedal rod pad and floor mat. Depress pedal rod until pad contacts spacer block; retain in that position and adjust mechanical follow-up cable length at clevis end so that clevis pin can be installed freely with no slack in cable.

BENDIX-LOCKHEED SELF-CENTERING

Frazer, All Models (1947-51)
Henry J, All Models (1951-54)
Hudson Jet (1953-54)
Kaiser, All Models (1947-55)
Nash "600", Series 4840 (1948)
Nash "600", Series 4940 (1949)
Nash Statesman (1950-54)
Nash Rambler (1950-55)
Willys, All Models exc. Jeep (1947-55)
Willys Jeep, CJ-3B & CJ-5 (1954-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1955 RAMBLER BRAKE SQUEAK CORRECTION (Due to Improper Lining-to-drum Contact):* If minor, sanding of lining surface to eliminate visible high spots, may eliminate condition If severe, shoe support plate contact area may be causing a rocking action on the three embossed ledges of support plate To correct, remove shoes from support plate and without use of return springs or hold down clips, place each shoe individually in its proper operating location on the three embossed ledges of support plate Check for any rocking action of shoe on support plate If found, grind off sufficient material from center of shoe contact edge to eliminate rocking action Grinding action should cover an area approximately 2" long on shoe edge where it contacts center embossed ledge of support plate It may also be necessary to **lightly** dress up the end shoe contact edges to provide proper shoe-to-support plate contact Lubriplate support plate embossed ledges and shoe pivot points Reinstall shoes Make anchor lip adjustment by bending anchor lip slightly toward brake support plate so that 15 lbs pressure is exerted by spring to retain shoes on support plate (this can be measured with spring scale hooked to end of shoe)

DESCRIPTION: These brakes are same design as other Lockheed Hydraulic Double Anchor types except for "self-centering" feature on each car as follows

Brake Shoe "Self-centering" Device—Each brake shoe fitted with rounded rocker on lower (anchor) end which bears against a solid block on the backing plate. This bearing block is machined with the rocker bearing surface aligned radially to the drum center so that shoes move radially out against the drum when brakes are applied and are automatically "centered with each brake application." Both shoes are held against the bearing block by a plain spring hooked in holes in each brake shoe web.

ADJUSTMENT: Before making adjustments, jack up all four wheels, check brake pedal clearance or free travel (see below), fully release hand brake and make certain that rear wheels are free, then adjust each wheel as follows.

►*CAUTION—Brake shoes must be "centralized" by several hard brake applications before adjusting.*

Brake Pedal Adjustment: Adjust master cylinder pushrod by loosening locknut and turning rod for following pedal free travel with master cylinder piston and pushrod back against stop.

Brake Pedal Free Travel

Frazer & Kaiser	½-¾"
Henry J	1-1¼"
Hudson Jet	¼-⅜"
Nash (All Models)	¼-½"
Rambler	¼-½"
Willys	½" min.

Brake Shoe Adjustment (For Wear or New Linings). Before making adjustments, centralize shoes by making a hard brake application (press firmly on brake pedal, then **release** pedal). At each wheel, adjust each brake shoe eccentric cam by turning cam out until shoe is tight in drum (with wrench installed on eccentric so that handle is upward, turn wrench away from wheel center-line), then back off eccentric until wheel just rotates freely without drag. Adjust each shoe eccentric in each wheel in this manner, then adjust parking brake (hand brake linkage) as directed below

►**Frazer, Hudson Jet, Kaiser Adjustment Note**—Eccentric cams have locknuts which must be loosened before adjustment can be made

Hand Brake Adjustment: *CAUTION—Adjust each model as follows*

Frazer & Kaiser (1947-48): After brake shoes adjusted, release hand lever, loosen locknut, turn clevis on rear end of lever cable at idler lever on frame cross-member to remove all slack from cables. When limit of adjustment reached, shift wheel equalizer-to-idler lever clevis pin to next set of holes in equalizer (three sets of holes), then make final adjustment at hand lever cable clevis as above. When properly adjusted, cables should have minimum slack without brake drag with hand lever in released position

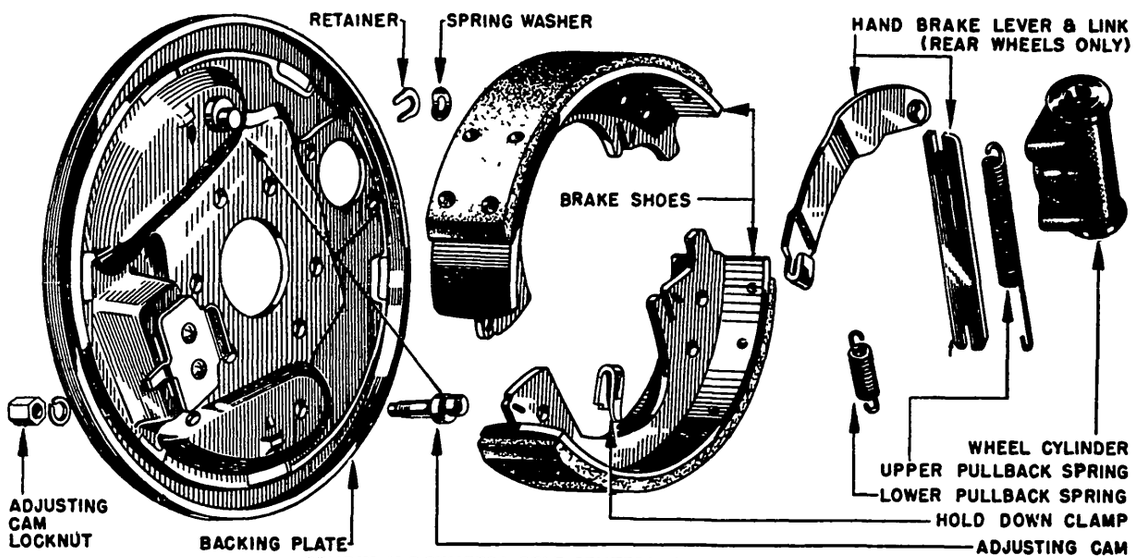
Frazer (1949-51), Kaiser (1949-53)—With hand lever in released position, back off locknut on front cable end fitting in front of wheel cable connector under car, tighten adjusting nut (back of wheel cable connector), to remove all slack from cables, tighten locknut

Henry J—Place hand lever in fully released position Tighten nut on rear end of **front** cable at intermediate lever on frame cross-member until perpendicular distance between front cable and rear cable rod is 4⅝-4¾". Then pull hand lever "on" three notches and tighten rear cable by taking up adjustment nut at cable equalizer on rear end of cable rod until slight drag secured at rear wheels Release hand lever, check wheels for freedom from drag.

Hudson Jet—Pull hand brake lever "on" one notch, loosen clevis locknut, remove clevis pin, then shorten brake cable until slight drag is felt at each rear wheel Tighten locknut, secure clevis pin with cotter pin, release hand brake lever fully and check rear wheels for freedom from drag

Nash "600" Model (1948): With hand brake lever released, check position of hand lever cable pulley on front of dash (in engine compartment) and adjust cable position on pulley so that upper rear edge of pulley (segment type) is exactly 1⅝" from top of pulley bracket upper mounting screw (see Note below) Pull hand lever two notches "on" and leave in this position while adjusting cables. Loosen locknut on cable connector at wheel cable equalizer under car, remove all slack from cables, tighten locknut Place hand lever in fully released position and make certain that rear wheels free of any drag. NOTE—On 4840 cars, and 4740 after Serial No. K-170055, aligning pin hole provided in pulley bracket and pulley can be correctly located by inserting a J-1390 Gear Shift Aligning Pin through this hole.

CONTINUED ON NEXT PAGE



BENDIX (LOCKHEED) SELF-CENTERING BRAKE ASSY.

BENDIX-LOCKHEED SELF-CENTERING (C nt.)

Nash "600" Model (1949): Pull hand brake lever "on" one notch. Loosen forward nut and tighten rear nut on front cable fitting at rear cable equalizer to remove all slack from cables. Tighten forward nut, release hand lever, check rear wheels for freedom from drag.

Nash Statesman—Pull hand brake handle "On" exactly 3½" (measure from face of bracket to handle). At rear wheel cable equalizer, loosen forward nut, tighten rear nut on front cable fitting until rear brakes are fully applied, then tighten front nut to lock adjustment. Release hand lever and check rear wheels for freedom from drag.

Rambler (1950-54)—Pull lever "on" two notches, loosen front nut on adjusting rod at rear cable equalizer, tighten rear nut to remove all slack from cables, then tighten front nut to lock adjustment. Release hand lever and check rear wheels for freedom from drag.

Rambler (1955)—Pull hand brake lever to rear to provide a 3½" clearance between hand brake lever handle and bracket face. With lever in this position, tighten the hand brake cable at equalizer to a point where rear brakes are fully applied. This will prevent possible brake drag.

Willys—Pull hand lever "on" three notches, loosen front nut on connecting link between intermediate lever on frame cross-member and rear cable equalizer, tighten rear nut on link until slight drag noted at each rear wheel, then tighten front nut to lock adjustment. Release hand lever and check rear wheels for freedom from drag.

CJ-3B, CJ-5 Jeep—Hand brake is independent type. Located on propeller shaft at rear of transmission and controlled by hand lever on floor board.

Hand Brake (Adjustment for Wear)—Make certain that hand brake cable and linkage operate freely. Lubricate if sticking or binding is evident. Place brake handle on instrument panel in "off" position. Rotate brake drum until one pair of adjusting holes (three pairs located on back face of drum) is opposite the adjusting screws (notched wheels) within the brake. Insert a screwdriver or adjusting tool through each hole and turn each adjusting screw equally until the brake shoes are snug against the drum (NOTE—with tool against edge of hole as a fulcrum, move outer end of tool out away from center of driveshaft to expand shoes). **Back off each adjusting screw 7 notches** to provide correct shoe clearance.

SERVICING (Master Cylinder & Wheel Cylinders): *See "Hydraulic Brake Servicing" for complete data.*

Bleeding Brake Lines: *See "Hydraulic Brake Servicing."*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting."*

GIRLING HYDRAULIC

Metropolitan, Nash & Hudson Models (1954-55)

►*BRAKE APPLICATION NOTE:* When brakes are applied simultaneously by both the foot pedal (hydraulic) and hand brake lever (mechanical), an instant back-pressure on the pedal will be noticed by the operator. This is caused by the fact that initial shoe contact is made by the primary shoe (hydraulic application), and by the secondary shoe (mechanical application).

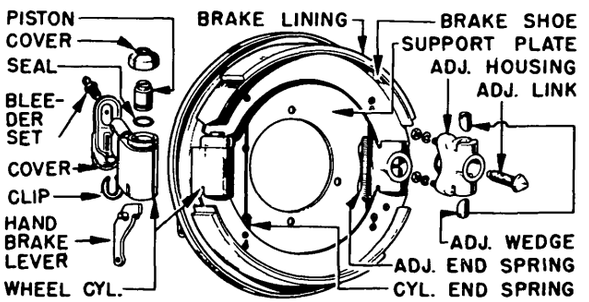
DESCRIPTION: Girling Hydraulic self centering with twin cylinders in front wheels and a single cylinder and an expanding wedge in rear wheels. Each front cylinder has locating slot for one shoe and its piston expands the other shoe. The rear wheel cylinder floats in the backing plate. The piston expands one shoe while movement of the cylinder body expands other shoe. Hand brake lever, in the rear brake assembly, pivots between secondary shoe and cylinder. Action of the lever on its pivot expands secondary shoe and moves cylinder and piston to expand primary shoe. Both front and rear brake shoe and lining assemblies rest on posts riveted to backing plates.

ADJUSTMENTS: There are four adjustments as follows:

Pedal Free Play—Raise car so all wheels are free and place hand brake lever in fully released position. Adjust pedal free play to 1/8" by adjusting length of master cylinder push rod.

Front Brakes—Back off both eccentric adjusters by turning them counter-clockwise. Turn one adjuster clockwise until brake shoe just drags and back off adjuster until wheel is free. Repeat this operation with other adjuster. Rotate wheel to be sure it is free of drag.

Rear Brakes—With hand brake fully released, turn square end of adjuster on each wheel backing plate clockwise until a slight drag is felt. Then loosen each adjuster two notches. Wheel should rotate freely.



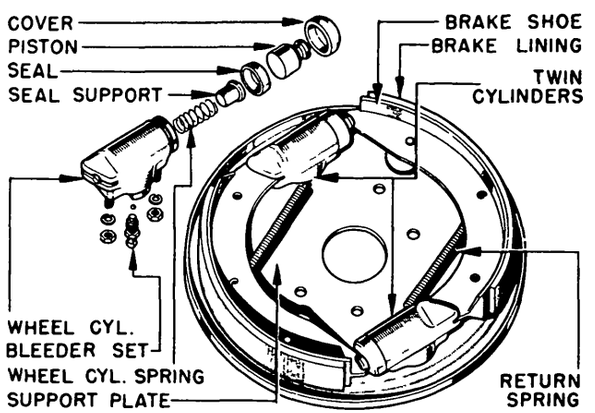
REAR BRAKE ASSEMBLY

Parking Brake—The parking brake adjustment is made on the cable connector where it is attached to hand brake lever. *NOTE*—Do not make brake adjustments by alteration of the parking brake cable. Place parking brake lever in fully released position, remove inspection plate on side sill and disconnect the connector from hand brake lever. Push back rubber insulator and release locknut. Remove slack in cable by rotating connector and locknut in a clockwise direction. Reinstall and check operation.

BRAKE SHOE REPLACEMENT: When making bonded brake shoe replacement, the factory recommends that replacement of the shoe return springs be made at the same time.

Front Brake Shoe Replacement—Place suitable clamp or rubber band to prevent wheel cylinder from expanding when shoes are removed. Lift one shoe out of abutment slot of wheel cylinder, then release the other end from the wheel cylinder piston slot. Repeat operation for second shoe. Check and lubricate adjusters, lubricate tops of rest posts, and operating and abutment ends of new shoes. Fit new springs to shoes, place hooked end in the shoe and opposite end in holes backing plate near the abutment end of the same shoe. Install wheels and drums and adjust brakes.

Rear Brake Shoe Replacement—The same as for the front except the difference in return spring location. When removing the rear shoes, lift one end out of slot in the adjuster link and the other from wheel cylinder piston. Both shoes can then be removed with the springs. Install new springs with the shorter spring at the adjuster end. Locate one shoe in the adjuster link and wheel cylinder slot, then pull the opposite shoe into position. Adjust both service and parking brake assemblies.



FR NT BRAKE ASSEMBLY

LOCKHEED (WAGNER) HYDRAULIC SELF-ADJUSTING

Frazer & Kaiser Models (1949-50)—Some Cars
Studebaker, All Models (1947-53)

►CHANGES, CAUTIONS, CORRECTIONS

►*1947-51 BRAKE SHOE RETRACTING SPRING INSTALLATION:* Retracting spring is hooked to both front (primary) and rear (secondary) shoes on front and rear brakes. No shoes are "floating." For adjustments see "Adjustment" below.

►*1952 BRAKE SHOE RETRACTING SPRING INSTALLATION CHANGE OVER PREVIOUS MODELS:* Retracting spring is hooked to front (primary) shoes only with other end hooked to backing plate. Rear (secondary) shoes are "floating" type and require no adjustment. For adjustments of primary shoes see "Adjustment" below.

►*1953 BRAKE SHOE RETRACTING SPRING INSTALLATION CHANGE OVER PREVIOUS MODELS:* On **rear** wheel brakes of all models, brake shoe retracting spring is hooked to **both** the front (primary) and Rear (secondary) shoe **requiring adjustment of both shoes in rear wheels only.** On **front** wheel brakes of all models, brake shoe retracting spring is hooked to front (primary) shoes only (same as in 1952). For adjustments see "Adjustment" below.

►*1953 STUDEBAKER REAR BRAKE DRAG (Due to Pinched Parking Brake cable on Early Cars)*—In cases where rear brake drag is found, it is possible rear brake cable is pinched under spacer tube at parking brake equalizer bar. To free cable, loosen nut and reposition cable so it is not pinched by spacer tube (not used on later 1953 cars), retighten nut.

►*1953 COMMANDER & LAND CRUISER BRAKE LINING CHANGE*—Marshall Eclipse 2201-H8 replaces Marshall Eclipse 2607 used on earlier cars and can be used for service replacement on earlier cars. New lining is identified by green and red marks along lining edge. New lining will minimize "grabbing" on initial brake application after car parked. *See Car Model pages for lining specifications.*

►*1953 STUDEBAKER NEW PARKING BRAKE CONTROL HANDLE & CABLE INSTALLATION CAUTION*—It may be found that cable cannot be installed in plunger guide on 1953 Hard-Top or 5-Passenger Coupe models. In such cases it will be necessary to file or grind a ½" wide, 5/32" deep slot at top of plunger guide 2 9/32" from end so that tang on ferrule of cable assembly can be bent up into place.

DESCRIPTION: Two-shoe, hydraulic type with "self-centering" and "self-adjusting" brake shoes.

1947 Type Contact Plug & Spring—Spring is simple spiral type located in contact plug stem (see illustration).

1948 & Later Contact Plug & Spring—Spring is torsion type and actuates contact plug through adjusting lever pin (see illustration). This spring also retains self-adjusting mechanism on brake shoe and eliminates use of two hairpin cotters used for this purpose in 1947 assembly.

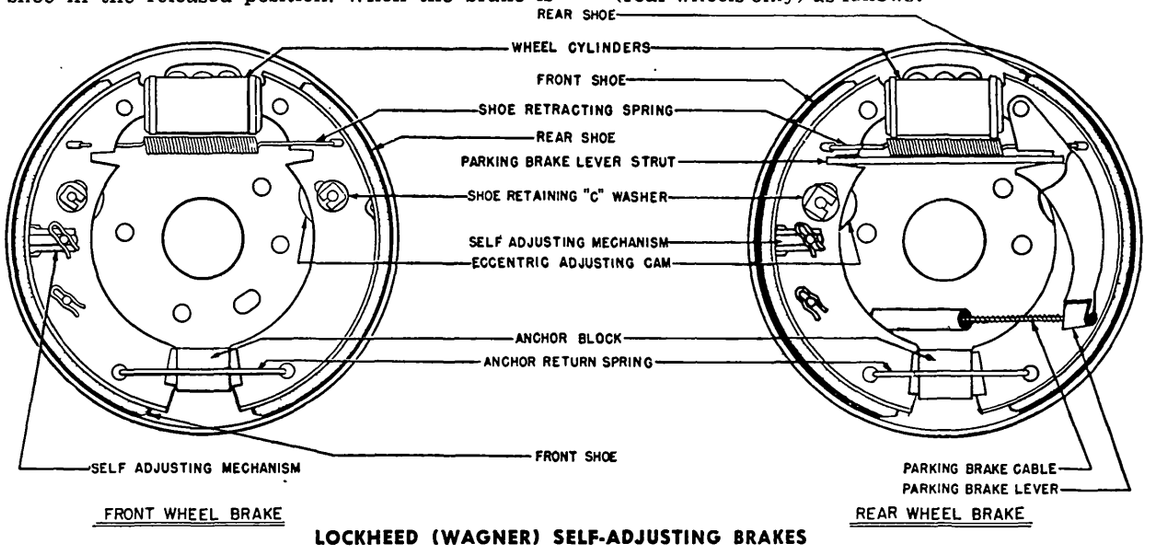
OPERATION: Self-centering Feature. Each brake shoe is fitted with a rounded rocker on the lower (anchor) end which bears against a solid block on the backing plate. This bearing block is machined with the rocker bearing surface aligned radially to the drum center so that the shoes move radially out against the drum when the brakes are applied and are automatically "centered" with each brake application. Both shoes are held against the bearing block by a plain spring hooked in holes in each brake shoe web.

Self-Adjusting Feature—Consists of an adjusting wedge and lever and contact plug assembly mounted on the shoe web of the **forward** brake shoe (rear shoe ordinarily does not require adjustment before relining of forward shoe is necessary and for this reason no automatic adjusting device is provided on this shoe). The contact plug (visible through the hole in the brake lining) is pinned on the adjusting lever which is pivoted on the shoe web. A spring-loaded adjusting wedge is mounted on the lever between the flat guide plate on the lever and the wedge guide on the shoe web. When the brake is released, the adjusting lever bears against the eccentric cam on the backing plate and holds the shoe in the released position. When the brake is applied, the entire mechanism moves out with the shoe until the contact plug strikes the brake drum. The contact plug and adjusting lever stop at this point and any additional movement of the brake shoe before the lining contacts the drum allows the spring to move the adjusting wedge inward to take up the clearance between the guide plate on the adjusting lever and the wedge guide on the shoe. This constitutes an "adjustment for wear" since the contact plug and adjusting lever have assumed a new relation with respect to the brake shoe and limit the movement of the shoe (when the brakes are released) to a position corresponding to the original drum clearance as set up by the initial adjustment of the eccentric cam when the shoes were installed. When the entire range of adjustment has been utilized, subsequent wear of the lining results in increased brake pedal travel which calls the operator's attention to need for relining of brakes.

1952-53 "Floating" Secondary Shoes—Brake shoe retracting spring is not hooked to the shoe (spring hooked to backing plate behind shoe) and the shoe is allowed to lie close to the drum at all times. A "spring" type washer has been installed under the C-washer retaining the brake shoe on the eccentric pin to provide additional friction and prevent the shoe from "jarring" away from the drum. The brake shoe adjusting eccentric remains in the "off" position at all times and is not used for adjusting the secondary shoe. *(CAUTION—If the brake shoe can be easily "jarred" away from the drum, replace the spring type washer).*

ADJUSTMENT: *CAUTION—Check operation of self-adjusting mechanism before making adjustments.*

Self-Adjusting Feature—An initial adjustment is required when new linings are installed. No further adjustment is required during the life of the lining (self-adjusting feature and self-centering feature automatically compensate for lining wear each time brakes are applied). After new or relined shoes are installed, check self-adjusting feature and adjust eccentric cams (all wheels) and parking brake (rear wheels only) as follows:



LOCKHEED (WAGNER) SELF-ADJUSTING BRAKES

Brake Pedal Clearance Adjustment: Pedal clearance or free travel must be correct to insure master cylinder pushrod being back against its stop for correct compensating action when brakes released. Adjust by loosening locknut on pedal connector rod and turning large adjusting nut.

Brake Pedal Clearance or Free Travel

Frazer & Kaiser	½-¾"
Studebaker (1947-51)	⅛-¼"
Studebaker (1952-53)	1/16-3/16"

Self-Adjusting Mechanism Check: With shoes completely assembled on the backing plate, press contact plug in and completely retract wedge (pull out on adjusting wedge until it is felt to strike the stop), release contact plug, then release adjusting wedge. Press in on contact plug and note wedge action. Wedge should move in to take up the clearance. Repeat this test. Check contact plug spring tension by pressing and releasing contact plug while holding adjusting wedge in retracted position. Both tests should reveal positive spring action. NOTE—Self-adjusting mechanism should be overhauled if parts do not function correctly. CAUTION—Adjusting wedge must be in fully retracted position (pulled

CONTINUED ON NEXT PAGE

LOCKHEED SELF-ADJUSTING (C nt.)

out against stop) after tests are made and before initial adjustment of brake shoes is attempted.

Initial (Eccentric Cam) Adjustment: *CAUTION—On 1952 models secondary (rear) shoe eccentric cams must be placed in the "OFF" position. No other adjustments required on these cams. On 1953 models secondary (rear) shoe eccentric cams, of FRONT WHEEL BRAKES ONLY, must be placed in the "OFF" position. No other adjustment required on secondary (rear) shoes of front wheel brakes.*

For all other shoes, make certain that hand brake lever fully released, then proceed as follows:

►*BRAKE ADJUSTING NOTE—If adjustment required in service (noted by loss of pedal reserve), check self-adjusting mechanism, then adjust as follows:*

Adjusting Forward Shoes (with Self-adjusting Feature). Place adjusting wrench on hexagonal head of eccentric cam adjuster with wrench handle upward. Turn brake drum in a forward direction and at the same time move wrench handle outward until shoe has a decided drag on the drum (this will permit shoe to center itself), then back off eccentric cam adjuster until wheel turns freely without drag.

NOTE—Eccentric cam adjuster is friction type and will slip on the shaft if excessive pressure is applied. This slippage is designed to prevent damage to the self-adjusting mechanism. CAUTION—If adjuster slips so freely on the shaft after extended service that the brakes cannot be adjusted properly, turn the eccentric cam by inserting a screwdriver blade in the slot in the end of the shaft.

Adjusting Rear (Secondary) Shoes (All 1951, Rear Wheel Only 1953)—Place adjusting wrench wrench handle upward. Turn brake drum in a backward direction and at the same time move wrench handle outward until shoe has a decided drag on the drum (this will permit shoe to center itself), then back off eccentric cam adjuster until wheel turns freely without any drag.

Adjusting Rear (Secondary) Shoes (All 1952, Front Wheel Only 1953)—See that adjusting eccentric is in full "OFF" position. These "floating" shoes REQUIRE NO ADJUSTMENT.

Parking Brake Adjustment: After adjusting brake shoes, adjust hand brake linkage as follows:

Frazer & Kaiser—With hand lever in released position, loosen locknut and tighten rear nut on forward cable fitting at wheel cable equalizer yoke to take up all slack in cables. Make certain that brakes do not drag.

Studebaker—Pull hand lever "on" four notches, back off front nut and tighten rear nut on cable clip under car until heavy drag noted at rear wheels, tighten front nut. Release hand lever and check wheels for freedom from drag.

Hill-Holder & Anti-creep Adjustment: If these units installed, see separate data on each type for adjustment instructions.

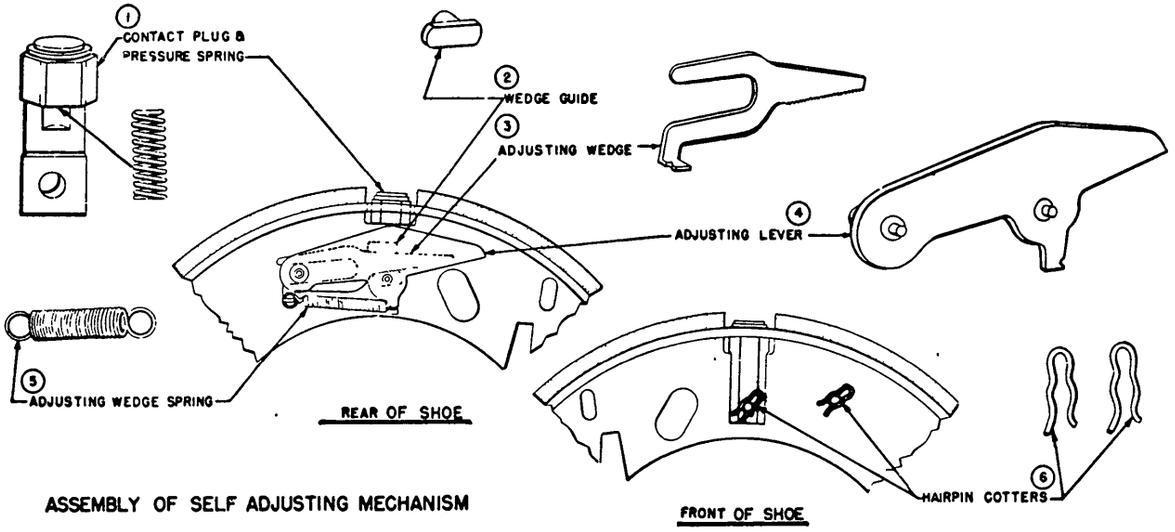
RELINING BRAKES: Brake shoes should be removed for relining when increased brake pedal travel indicates limit of automatic adjustment reached and satisfactory shoe adjustment not possible.

►*CAUTION—Continued use of brakes after self-adjusting mechanism has reached limit of travel will result in increased lining clearance and pedal travel and in wear of the contact plug tip.*

Brake Shoe Removal: Install clamp across brake cylinder boots in each wheel to retain wheel cylinder pistons. Remove shoe retracting spring and anchor return spring. On rear wheel brakes only, pull parking brake lever toward center of wheel and unhook cable. Remove "C" washers from end of eccentric cam adjuster shaft on each brake shoe web. Pull heel of shoe away from anchor block, lift up on shoe until it clears eccentric cam adjuster shaft, pull toe of shoe out to clear cylinder boot.

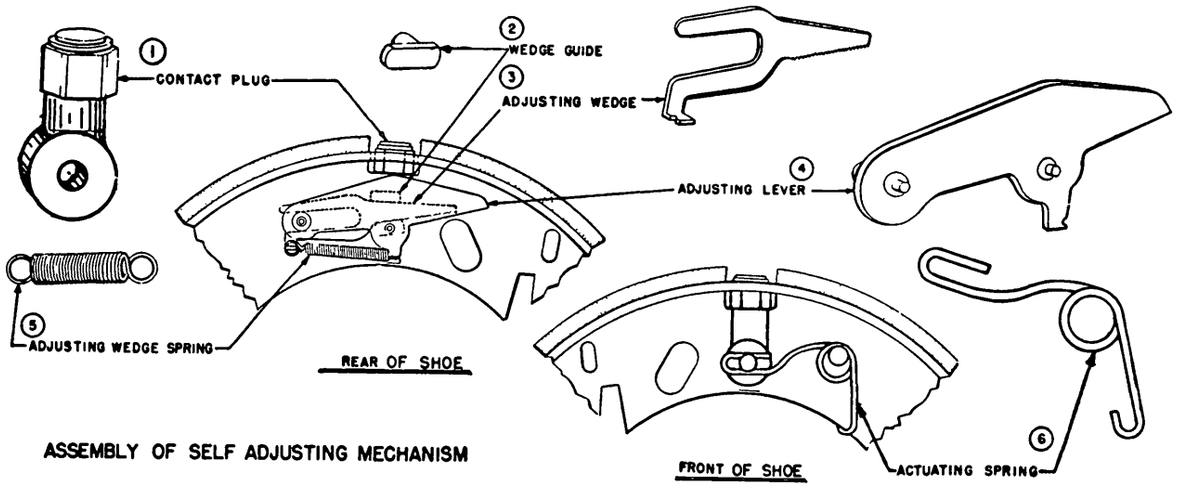
Self-adjusting Mechanism Disassembly—Remove two hairpin cotters (1947 Models), actuating spring (1948-53 Models) from adjusting lever pins on contacts shoe web and hold in this position, disconnect adjusting wedge spring, lift off adjusting lever, remove adjusting wedge, wedge guide, con-

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ASSEMBLY OF SELF ADJUSTING MECHANISM

1947 TYPE SELF-ADJUSTING MECHANISM



ASSEMBLY OF SELF ADJUSTING MECHANISM

1948 & LATER TYPE SELF-ADJUSTING MECHANISM

LOCKHEED SELF-ADJUSTING (Cont.)

tact plug (and spring on 1947 models). NOTE—Discard old plug and install new part when relined shoes are installed. All other self-adjusting device parts should be cleaned, inspected for wear, and reinstalled if not worn or damaged.

Relining Brake Shoes: Car manufacturer recommends that Lining Kits (with predrilled linings, new contact plugs, and plug adjusting gauge) be used when relining brake shoes. If predrilled linings not used, an accurately located ¾" hole for contact plug clearance must be drilled in lining for each forward brake shoe (high-speed edge hole saw recommended for this purpose) When riveting lining to shoe, make certain that there is a uniform clearance of 1/16" between the edge of the hole in the lining and the hole in the brake shoe.

►*CAUTION—If shoes ground after lining installed, do not install self-adjusting mechanism until after grinding completed.*

Self-Adjusting Mechanism Assembly: See illustration for proper location and order of installation of these parts. **Always use a new Contact Plug with new linings.** Press down on contact plug while installing adjusting wedge (pin on wedge must enter hole in contact plug) and make certain that lever is flat against shoe web. Push adjusting wedge in as far as possible while installing wedge-to-lever spring and use great care not to damage spring. After completing assembly, retract adjusting wedge (pull wedge out as far as possible), adjust contact plug:

►*CAUTION—Actuating spring must be installed as shown in order to provide proper tension on contact plug and to retain self-adjusting mechanism parts on shoe.*

Contact Plug Height Adjustment—Make certain that adjusting wedge fully retracted, clamp brake shoe assembly in vise with contact plug upward and vise jaws gripping adjusting lever so that contact plug cannot move inward, install gauge tool, FL-1047, on contact plug (gauge is .005" template designed to fit over end of contact plug), file end of contact plug down flush with face of gauge.

►*CAUTION—Contact plug must be depressed (flush or one notch below lining surface) when adjusting forward shoes (will cause over-adjustment of brake shoe on first application otherwise).*

Brake Shoe Installation & Adjustment: Do not lubricate any part of the brake. When installing shoes, turn eccentric cam adjuster to released or minimum adjustment position, make certain that adjusting wedge of self-adjusting mechanism is in fully retracted position, centralize shoes approximately (by hand) after shoe retracting springs are installed. Check self-adjusting mechanism and adjust each brake shoe. *For retracting spring installation see Installation Notes under "DESCRIPTION" and for adjustments see "ADJUSTMENT."*

SERVICING: Brake Shoes & Lining. *See Relining Brake data above.*

Master Cylinder & Wheel Cylinders: *See "Hydraulic Brake Servicing."*

Bleeding Brake Lines: *See "Hydraulic Brake Servicing."*

TROUBLE SHOOTING: *See "Hydraulic Brak Trouble Shooting."*

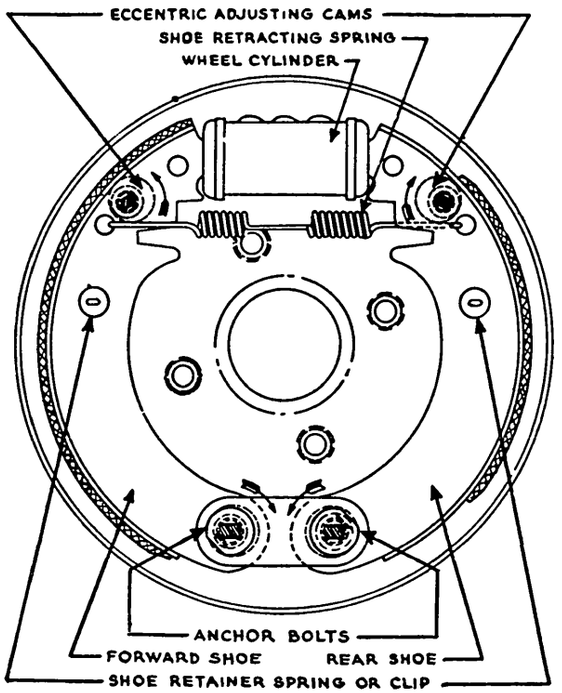
LOCKHEED HYDRAULIC DOUBLE ANCHOR

Crosley, CD & VC (1950-52)
Nash "600", All Models (1946-47)
Willys Jeep, CJ-2A, & 3A (1946-53)

Willys Model Note—Eccentric adjusting cams are fitted with locknuts which must be loosened before adjustments can be made (eccentrics held by spring tension on other models). Drums are provided with slots which are accessible after wheels removed so that lining clearances can be measured directly by inserting feeler gauge through slot.

DESCRIPTION & OPERATION: All Wheel Brakes. Two shoes per wheel, mounted on independent ec-eccentric anchor pins at the lower or "heel" end and bear directly against the opposed pistons of stationary wheel cylinder at the upper or 'toe' end. Shoes are forced out against drum at toe end by fluid displaced from master cylinder and flowing through brake lines to wheel cylinder when brake pedal is depressed. No self-energizing action is employed and self-energizing effect of forward brake shoe ordinarily offset by using longer length lining on this shoe or by using 'stepped' wheel cylinders with smaller diameter forward shoe piston and larger diameter piston for rear shoe. Brakes are returned to 'off' position against eccentric stops by retracting spring connected between shoes at toe end.

Wheel Cylinder:—Rigid type mounted on backing plate with opposed pistons bearing directly on toe ends of brake shoes. Pistons sealed by rubber caps held against piston head by central spring.



LOCKHEED DOUBLE ANCHOR BRAKE ASSY.

Master Cylinder:—Compensating type with integral supply tank. Supply tank is directly above master cylinder and is connected to it by two ports (1) bypass port uncovered when piston is in 'off' position so that fluid may flow freely in or out of master cylinder to compensate for any loss, and to prevent back-pressure due to expansion of fluid in system and (2) supply port by which additional fluid is drawn down and through holes in the piston and past the lip of the piston packing cup when brake pedal is released so that cylinder is always full of fluid and ready for repeated brake action even before fluid in system is returned to master cylinder by retracting wheel cylinder pistons caused by shoe springs. Master cylinder requires no attention other than keeping supply tank more than one half full of fluid at all times. Brake pedal clearance should be checked (see directions below) but will not change in service.

NOTE—Wheel cylinder must be 'bled' whenever brake line to that particular wheel is disconnected, and entire system (all four wheels) must be 'bled' whenever brake lines are disconnected at master cylinder to remove all air in system and correct springy brake action.

Bleeding Brake System—Refer to Hydraulic Brake Servicing data for complete information.

Hand Brake:—When incorporated in rear wheels consists of cable operated lever pivoted on one brake shoe and connected to other shoe through link or strut so that toes of both shoes are forced out against drum when hand lever is applied. Adjustment should be checked whenever brake adjustments are made.

ADJUSTMENT:—Before making adjustments, jack up all four wheels, check brake pedal clearance or free travel (See Brake Pedal Adjustment below), release hand brake and make certain that rear wheels are free, check pedal travel as follows·

Brake Pedal Adjustment:—Pedal clearance or free travel before master cylinder piston begins to move should be ¼-½" (see Notes below for special settings on some cars) to insure master cylinder piston being back against its stop for correct compensating action with brakes released. To adjust, remove clevis pin in pedal link, hold piston rod from turning with wrench on hexagonal end and loosen locknut on link, turn link in or out of piston rod.

Willys Jeep Model (1946 On). Pedal free travel should be ½" minimum. Adjust by disconnecting pedal rod at brake pedal, loosening locknut on opposite end of rod, and turning rod in or out of piston link in master cylinder.

Minor Adjustment (For Wear):—Jack up all four wheels, release hand lever, see that rear wheels are free. At each wheel, turn up eccentric on each shoe (move wrench toward wheel rim when installed on eccentric nut upward) until shoe contacts drum, then back off eccentric slightly until wheel rotates freely in both directions with no drag. Eccentric held in position by spring tension. Check hand brake setting and adjust if necessary.

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LOCKHEED HYDRAULIC (C nt.)

Willys Note—On this model, eccentric is locked by a locknut on the backing plate. Locknut should be loosened before eccentrics are adjusted. Hold eccentric from turning while tightening locknut after adjustment completed. On all other models, eccentrics are held in position by spring tension and locknuts are not used.

Major Adjustment (For New Linings):—With shoe and lining assemblies installed and brake drum in place, loosen anchor pin locknuts at bottom of backing plate, then turn eccentric anchor pins toward each other and down until shoes are set to proper clearance as determined by feeler gauges. Recommend shoe setting is .005" (.004" Nash) clearance at heel (lower end) and .008" at toe (upper end).

Willys Note—On early models, a slot was provided in brake drum for checking these clearances. This slot was eliminated in later models.

Parking Brake:—Adjust when service brakes are adjusted or new shoes installed. Adjust as follows:

Crosley—Pull hand brake half way on. Adjust hand brake linkage so clevis pins just enter clevises when all slack has been removed from cable. Release hand brake and check to see that rear wheels are free of any drag.

Nash—Set hand lever 2 notches "on", loosen locknuts on wheel cable spreader (hand lever cable connection), remove all slack from cables by pulling forward on wheel cables and to rear on hand lever cable, tighten locknuts. Release hand lever and check to see that rear wheels are free of drag.

Willys—Hand brake is independent type.

RELINING BRAKES:—See car model page for lining type and length and instructions where lining of unequal lengths used on forward and rear shoes in same wheel. Linings should be faced or ground concentrically after installation.

Sh e Removal:—Shoes held in place by coil spring retained by plain washer and 'C' type washer on each shoe. To remove shoes, pull out 'C' washer, disassemble plain washer and spring, take off return spring freeing shoes at toe end (use piston clamp on wheel cylinder and do not depress pedal with shoes disconnected). Remove 'C' washers on anchor pins, slide shoes off.

SERVICING: Master Cylinder & Wheel Cylinders. ***See "Hydraulic Brake Servicing" for complete data.***

Bleeding Brake Lines: ***See "Hydraulic Brake Servicing."***

TROUBLE SHOOTING: ***See "Hydraulic Brake Trouble Shooting."***

HILL-HOLDER & NOROL

Std. or Optl. Equipment On:

ALL CAR MODELS WITH HYDRAULIC BRAKES

DESCRIPTION:—These units consist of a gravity and clutch pedal controlled check valve in a housing which is ordinarily mounted directly on the end of the hydraulic brake Master Cylinder so that the check valve is in the brake line between the master cylinder and the wheel cylinders. The valve ball is free to roll endwise in the valve cage (when unit tilted by car being on an incline) while the valve cage itself is moved endwise by a cam lever linked to the clutch pedal.

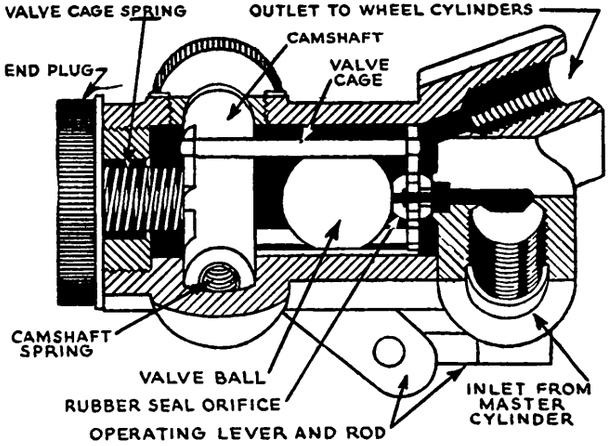
OPERATION:—The valve cage with the rubber seal orifice is normally held away from the valve seat by the clutch pedal controlled camshaft (with the clutch engaged) so that the valve is open and brake operation is conventional When the clutch is disengaged, the rotation of the camshaft permits the spring behind the valve cage to force the cage back so that the rubber seal seats against the valve seat If the car is pointed uphill, the ball within the valve cage rolls down against the rubber seal, closing the orifice within the seal so that the brake fluid in the lines is prevented from returning to the master cylinder and brakes are held 'on' even though brake pedal is released When the clutch is engaged, the valve cage is pulled away from the valve seat uncovering the return passage to the master cylinder and releasing the brakes If the car is on a level road or pointing downhill, the ball will not close the rubber seal orifice

ADJUSTMENT:—Operating lever position must be checked (to insure correct timing of brake release when clutch is engaged) whenever clutch pedal is adjusted See Clutch pedal adjustment instructions on car model page for special instructions Adjust as follows

Adjustment:—Check setting by applying brake on slight incline with clutch disengaged, then shift into low gear, engage clutch slowly and note point at which brakes release. If brakes release too soon and car has tendency to roll backward, loosen locknut and turn adjusting nut on end of control rod away from pedal to lengthen rod. If brakes release late and engine has tendency to stall, turn nut in to shorten rod. Tighten locknut and check setting.

Mounting:—The unit must be mounted in a level position on car frame. To check, place spirit level on bosses on top of hill-holder body casting with car standing on level floor. Unit must be leveled lengthwise (place spirit level on two bosses on top of unit), and crosswise (place spirit level crosswise on one boss).

SERVICING: Before disassembly, mark shaft and lever and replace in same position Remove ball chamber head plug and spring, withdraw camshaft being careful not to lose camshaft spring, withdraw ball cage assembly. In reassembling unit, see that ball cage is installed with two large ball rail rods underneath camshaft, and that camshaft spring is in place at inner end of camshaft



HILL-HOLDER & NO-ROL CONTROL UNIT

WAGNER-LOCKHEED SELF-CENTERING

Studebaker, All Models (1954-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*BRAKE LINING REPLACEMENT CAUTION:* On early production cars, some long and some short primary brake shoe linings were used on either front or rear wheel brakes. When it is necessary to replace primary shoe linings on a front or rear wheel, the other front or rear wheel should be inspected and the lining on the primary shoe also replaced, if necessary, to obtain same length primary lining on both front and rear wheels.

►*1954-55 PARKING BRAKE LEVER CLIP INSTALLATION CAUTION (To Prevent Breakage & Falling Off of Clip):* Above condition is partially result of assembling in reverse or incorrect order the springs that return the shoe assemblies. Assemble rear shoe return spring to the shoe and its spring retainer first, then assemble front shoe return spring.

DESCRIPTION: Wagner Lockheed Hydraulic self-centering and self-energizing type (with Bendix type brake shoe assemblies). Brakes are not self adjusting, and new adjustment procedure is required. New self-centering device used.

Self-centering Device—The upper (anchor pin end of each brake shoe rests against a wedge-shaped anchor block which is mounted on fixed brake anchor pin (shoes do not contact anchor pin directly) so that the shoes are free to move radially. The wide edge of the anchor block is toward the top. When the brakes are applied, the lining surface pressure tends to force the shoe to adjust its position on the block and center itself in the drum. This centering action takes place on light, or heavy brake application and is continuous with drum expansion. The anchor plate aids in keeping the shoes properly aligned at the self-centering block.

Adjusting Device—Consists of a "star wheel" adjusting screw and stud assembly mounted between the lower ends of the two brake shoes (similar to Bendix-Duo-servo brake shoe assemblies). Adjusting screw spring serves a dual purpose, holding the shoes against notches of adjusting screw, and binding against ratchet on screw to serve as a screw lock.

ADJUSTMENTS: Place car on stands so that all four wheels are free. Check master cylinder and see that fluid level is ½" below top of cylinder. Place parking brake handle in fully released position. Adjust as follows:

Brake Pedal Free Travel Adjustment: 1/4-3/8" pedal free travel measured at brake pedal pad. To adjust, loosen locknut on brake pedal-to-master cylinder rod and turn master cylinder push rod until 1/4-3/8" pedal free travel exists before the pressure stroke starts.

Brake Sh Adjustment: Remove adjusting hole cover from backing plate, insert screwdriver or special adjusting tool through adjusting hole and turn adjusting screw to expand shoes until drum is just locked (pivot tool on edge of slot, move handle upward to expand shoes). Then back off the adjusting screw 8 notches or "clicks" (more if necessary) until drum is free of any drag. Replace adjusting hole cover, adjust parking brake.

Parking Brake Adjustment: Set control handle four notches from the fully released position. Adjust rear wheel cables at equalizer on frame side rail by backing off front nut and tightening rear nut until all slack is removed from cables and a heavy drag noted when rotating rear wheels by hand, tighten front adjusting nut. Release control handle fully and see that wheels are free of any drag.

RELINING BRAKES: *See Replacement Caution above.*

BRAKE SHOE REMOVAL & INSTALLATION:

Front Brake Shoe Removal: Place wheel cylinder clamp across cylinder boots. Remove adjusting screw spring and assembly. Hold guide pin against backing plate and remove clip. (Clip on the shoe whose return spring is on top at the anchor pin). Pull shoe out at end away from cylinder to release shoe from cylinder push rod. Move shoe away from backing plate off anchor block to relieve spring tension. Remove spring and shoe. Repeat this operation for other shoe. If Tool J-1681 Remover and Replacer available, remove springs first, then clips, and spread shoes out of wheel cylind- push rods. Slip adjusting screw off shoes and remove adjusting screw spring.

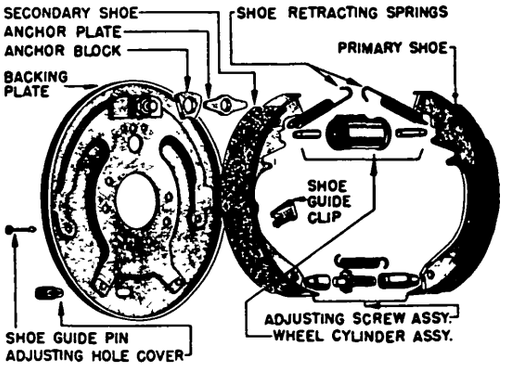
Front Brake Shoe Installation: Lubriplate wear surfaces by backing plate. Check anchor block installation. The curved side must contact primary shoe and arrow must point toward primary shoe. Hook return spring on shoe table, with outer other end of spring on anchor block pin and shoe against anchor block. Move shoe down to pivot on anchor block and pin, start web into cylinder push rod, push shoe toward backing plate, stretching spring. Align guide pin holes and install pin and clips, with pin seated in clip. Hook other spring on other shoe and anchor pin, placing shoe web above cylinder push rod. Pull lower end of shoe away from spindle and slide shoe down on anchor block behind anchor block guide, inserting web in cylinder push rod at the same time. Install guide pin and clip. Spread shoes and install adjusting screw assembly and install spring. If Tool J-1681 Remover and Replacer available, hook adjusting screw spring and adjusting screw in position. Place shoes on backing plate, engage webs in cylinder push rods, install guide pins and clips. Install anchor block and guide and use tool to install springs. Remove Cylinder clamps. Rotate adjusting screw to fully released position, center shoes to aid in brake drum installation. Install drum and adjust wheel bearings. Adjust clearance as shown in ADJUSTMENTS above.

Rear Brake Shoe Removal: Install cylinder clamps, pull parking brake lever toward axle shaft and unhook cable. Spread shoes, disengage parking brake link, remove link and anti-rattle spring. Then follow procedure listed above for front brake removal. To remove parking brake lever from hole, remove spring clip and slip lever pin out of web. *NOTE*—The lever is mounted on outer side of web (Champion) and inner side of web (Commander).

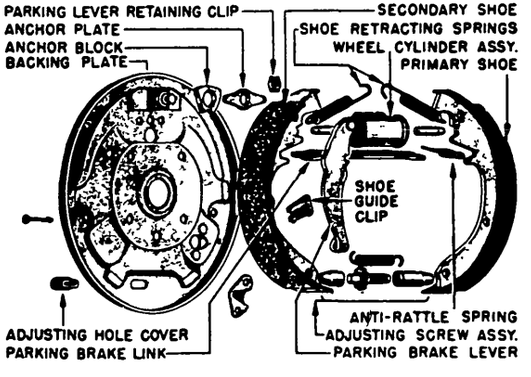
Rear Brake Shoe Installation: Install parking brake lever with clip securely in place. Then install shoes as described for front shoes above. Place anti-rattle spring in actuating link. *NOTE*—On Champion, spring installed on end of link with largest offset. Insert link between shoes engaging front shoe with end having anti-rattle spring. Connect cable, remove clamps, install drums and adjust clearance as shown in ADJUSTMENTS above.

BLEEDING BRAKE SYSTEM & OVERHAULING OF MASTER CYLINDER & WHEEL CYLINDERS: *See "Hydraulic Brake Servicing".*

TROUBLE SHOOTING: *See "Hydraulic Brak Troubl Shooting".*



REAR BRAKE ASSEMBLY



FRONT BRAKE ASSEMBLY

WAGNER-LOCKHEED SELF-CENTERIN BRAKES

CHRYSLER, DESOTO, DODGE, PLYMOUTH LOCKHEED "SAFEGUARD"

Chrysler 6, All Models (1946-54)
Chrysler 8, All Models (1946-48)
Chrysler 8, Exc. C47 Imperial (1949)
Chrysler 8, Exc. C49 Town & Country, C50 Imperial (1950).
Chrysler 8, Exc. C53, 59, 66, 70 Imperial (1951-55)
DeSoto, All Models (1946-55)
Dodge, All Models (1946-55)
Plymouth, All Models (1946-55)

►CAUTIONS & CORRECTIONS

►*1949-54 POWER BRAKE CAUTION:* Vacu-Ease Power Unit Standard or Optional on Chrysler (except Disc Brake equipped cars), DeSoto, Dodge, and later Plymouth cars. *See "Chrysler Vacu-Ease Power Unit".*

►*1955 POWER BRAKE CAUTION:* Power Brake Standard on all Chrysler Models except C-67 (Windsor). Optional on Chrysler Windsor, DeSoto, Dodge, and Plymouth Models. *See "Chrysler & Imperial, DeSoto, Dodge, Plymouth Power Unit".*

►*BRAKE SQUEAL OR ABNORMAL LINING WEAR: Cam pins which are too high will cause brake shoe misalignment causing brake squeal and abnormal lining wear. Correct as follows:*

Cam Pin Height Check & Correction—To check cam pin height alter brake adjusting Tool MT-19-L and follow procedure below.

1) To alter Tool MT-19-L, drill and tap gauge holder and install wing type screw so that gauge can be secured to the bushing adapter.

2) (Front wheel). Place gauge on spindle with shoe removed and set gauge to height of wheel cylinder anchor lug. Check height of cam against this gauge setting. Cam pin should be equal or less than this reading.

3) (Rear wheel). Place gauge on axle with shoe removed and set gauge to height of rear wheel brake support. Check cam pin height against this setting. Cam-pin should be equal or less this reading.

4) If cam pin height found to be more than height given above, raise brake shoe guide spring and file head of cam pin or replace pin with one of correct height.

To Low Cam Pin Correction—To help raise cam pin without distorting brake shoe support plate, use stand-C-clamp and Tool C-3248.

Dimpling of Brake Shoe For Pin Clearance—Support shoe on piece of pipe or socket wrench at point to be dimpled. Place ball end of a ball-peen hammer on web directly over pipe or socket. Using second ball-peen hammer, strike first hammer a few sharp blows, until enough metal is raised on reverse side of shoe web to reduce clearance. To increase clearance, strike shoe from reverse side so as to form a slight cavity in web directly above face of cam pin.

Grooving Brake Lining (See CAUTION below)—If above procedures do not correct squeaks (make certain that brake drum dampener spring are in place also), lining can be grooved to secure more perfect contact between lining and drum as follows: Clamp brake shoe in vise, scribe diagonal line on face of lining beginning at point 7/8" in from side at one end and 7/8" from opposite side at opposite end. Cut groove approximately .050" wide (use two fine hacksaw blades clamped together in holder) completely through lining to face of brake shoe.

►*CAUTION: Do not attempt to groove riveted lining or any of the edge-bonded, wire-backed, cycle-bonded linings.*

Slotting Brake Shoes (See CAUTION below)—If grooving does not correct squeaks, toe end of shoes can be slotted to depth of 1 3/8". Use hacksaw blade to cut web loose from shoe table (lining surface), cutting as close to table as possible.

►*CAUTION: Do not slot front brake shoes which have four 5/8" holes through the shoe table.*

DESCRIPTION: The "Safeguard" brake system consists of two-cylinder type hydraulic brake (front wheels), single double-acting cylinder type hydraulic brake (rear wheels):

Two-Cylinder (Front Wheel) Type—Consists of two independent single-acting brake cylinders mounted on the backing plate, each cylinder actuating one brake shoe. Each cylinder is mounted on the anchor pin of the other shoe (top cylinder mounted on rear shoe anchor pin and actuates forward shoe, bottom cylinder mounted on forward shoe anchor pin and actuates rear shoes). All shoes are "primary" or self-energizing type.

Single Cylinder (Rear Wheel) Type—Same as other "Lockheed Double Anchor Hydraulic" brake cylinders. Consists of single double-acting cylinder mounted at top of backing plate and actuating both brake shoes. Shoes are pivoted on anchors at bottom of backing plate.

►*CAUTION:* Before making any adjustment be sure anchor bolts are in correct position. Arrows must point **away** from the heels of shoes they control.

ADJUSTMENT: Before making adjustments, jack up all wheels, check brake pedal free travel (should be 1/8-1/4" to take up pushrod play) plus additional 5/8-3/4" (to close off master cylinder relief port) before brakes begin to be applied. Total pedal travel to apply brakes should be 1¾-2". If Minor Adjustment does not give correct pedal travel, or if relief port is cut off with less than ¾" pedal travel, check brake pedal free play

Brake Pedal Adjustment: Brake pedal must have 1/8-1/4" free travel. To adjust, loosen locknut on master cylinder end of pedal rod, turn large adjusting nut.

►*1955 PLYMOUTH NOTE:* Distance between brake pedal and pedal stop should be .015-.030", which will result in approximately 1/8" free play at pedal pad.

►*1955 POWER BRAKE NOTE:* Power Brake unit has built-in pedal return spring and a pedal return stop, and **requires no free play adjustment.**

Minor Wear Adjustment: Turn eccentric for each shoe out until shoe is solid against drum and wheel is locked, then back eccentric off until wheel is free.

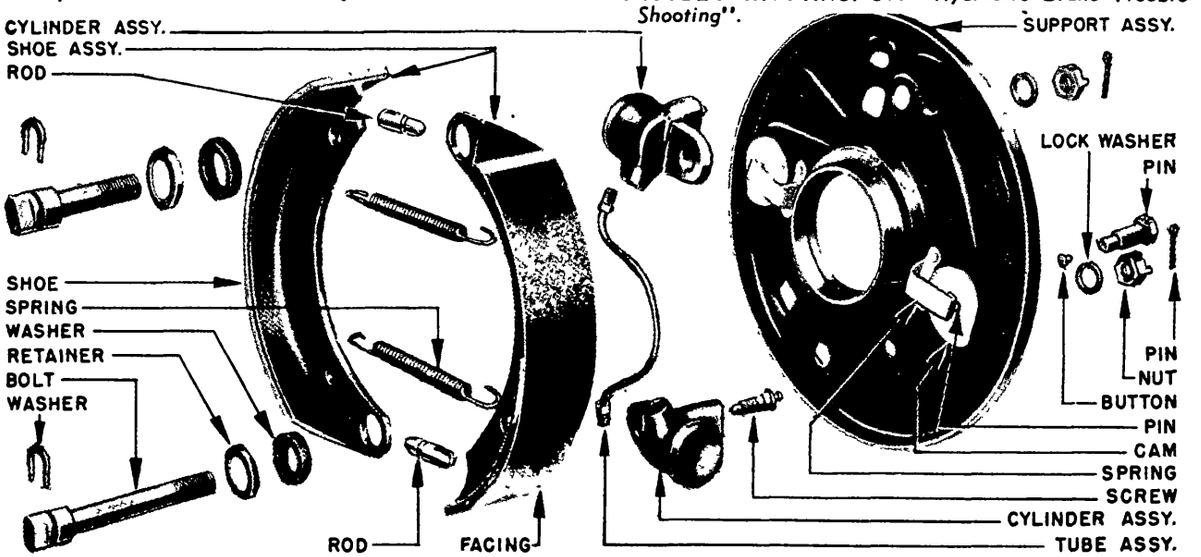
Major (New Lining) Adjustment: Use adjusting gauge MT-19-K or feeler gauges and cutaway drum and adjust eccentric and anchor pin for each shoe to obtain .006" clearance at both toe and heel, for all models.

►*CAUTION:* After adjusting brakes on one wheel, do not use same gauge setting for brakes on another wheel. Gauge must be reset according to inside diameter of brake drum of **each** wheel.

Hand Brake Adjustment: Hand Brake is independent type mounted on driveshaft at rear of transmission. *See Car Model Pages and individual model Special Data Pages.*

BLEEDING BRAKE SYSTEM & OVERHAULING BRAKE UNITS: *See "Hydraulic Brake Servicing".*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting".*



CHRYSLER "SAFEGUARD" FRONT (TWO CYL.) BRAKE ASSY.

CHRYSLER DISC BRAKE (WITH SPIDER)

Chrysler Town & Country C49-3 (1950)
Chrysler Crown Imp. C47 (1949), C50 (1950)
Chrysler Crown Imperial, C-53 (1951-52)

►CHANGES & CORRECTIONS

►*1952 BRAKE SUPPORT SPIDER PRODUCTION CHANGE*—New type brake support spider Chrysler Part **No. 1533209** (Left Front C-53 & 54); **No. 1533208** (Right Front C-53 & 54); **No. 1533211** (Left Rear C-54); **No. 1533210** (Right Rear C-54); **No. 1533215** (Left Rear C-53); **No. 1533214** (Right Rear C-53) replace type previously used. Early type spiders not available for service.

►*SUPPORT SPIDER REPLACEMENT CAUTION—New type spiders must be installed in pairs (both front wheels or both rear wheels).*

►**WHEEL CYLINDER PISTON CUP REPLACEMENT CAUTION**—Piston cups, Part No. 77526, bearing the letters "AA" or "DT" must be used. **Do not use cups bearing letters "BQ."**

►*BRAKE FLUID CAUTION—Do not use fluid from a pressure type filler or container that has been opened more than a few hours.*

DESCRIPTION

DESCRIPTION: The Chrysler Disc Brake is hydraulically operated, self-energizing. The brake assembly which is enclosed in a rotating housing, utilizes two lined pressure plates in the form of annular rings which move apart, contacting the inner surfaces of the rotating housing. The housing is split and is held together by 10 bolts around the outside. The plate assembly, which carries two hydraulic cylinders, is mounted on a spider attached to the front wheel spindle body and the rear brake spider on the rear axle housing flange. Automatic brake adjusters are built into the assembly. Brake lining segments are used, bonded to the outer surface of each pressure plate. Two hydraulic wheel cylinders move push rods operating against bosses on the outer plate to provide plate movement. 1¼" cylinders are used on the front brakes and 1" cylinders on the rear brakes.

OPERATION: When the outer plate is rotated with respect to the inner plate by movement of the wheel cylinder push rods, steel balls between the pressure plates are forced up on ramps located on the inside surfaces of the plates. The movement of the balls up the ramps forces the pressure plates apart and contact is made between the lining and the inner surfaces of the brake housing.

Self-Energization: The self-energization action is obtained by utilizing the friction force that tends to rotate the pressure plates in the direction of brake housing rotation when contact is established between the linings and the brake housing. When the brakes are applied, the outer plate is rotated forward by the action of the brake cylinder push rods and the plates are separated. During forward motion of the car, the inner plate is held rigid. Therefore, when the linings contact the housing, only the outer plate is free to move. The resulting additional forward movement of the outer plate, with respect to the inner plate, forces the balls higher on the ramps and consequently provides greater pressure contact between the plates and the housing. Thus some of the energy due to forward motion of the car is used to increase the braking effect. When the car is in reverse, the outer plate becomes the fixed plate on the rear wheels, and self-energization is provided by the movement of the inner plate when it contacts the housing. The front wheel brakes are not self-energizing when in reverse, as the inner plate is still the fixed plate.

Automatic Brake Adjusters: (NOTE—It is not necessary to remove automatic adjusters unless new plates are installed. However an inspection should be made to determine if correct adjuster pins are used and to see that pins are not scored or brinneled from the adjuster balls).

Adjuster Rod Identification: Rods that do not come within the following specifications should not be used.

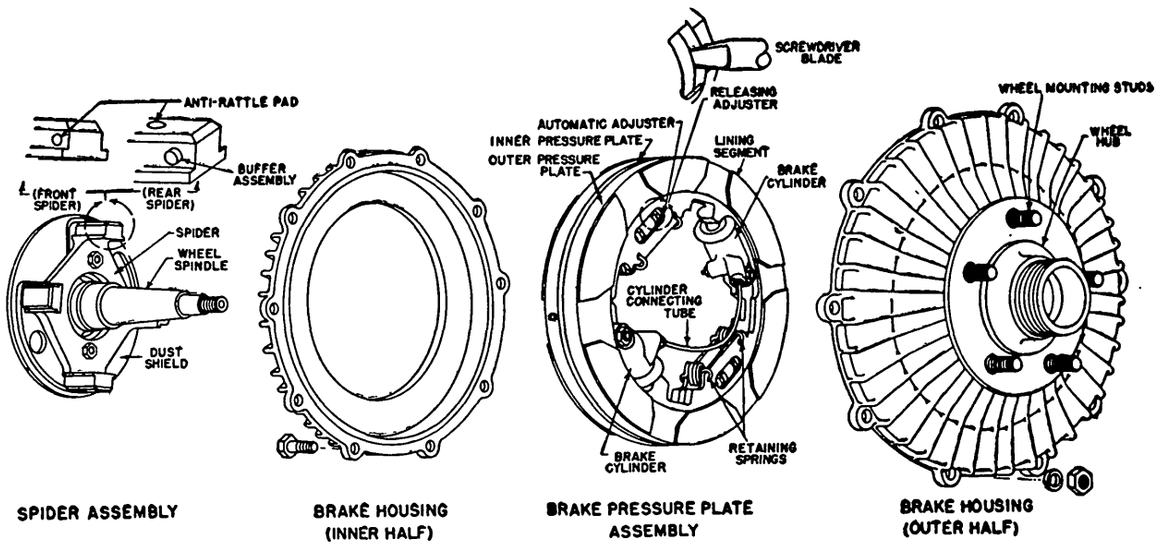
(1)—Radial groove machined near one end of rod.

(2)—Purple dye on surface of rod.

(3)—Rod length is 2.445" to 2.446".

Adjusting Rod Inspection: Insert a small screwdriver between adjuster bushing and bracket to release adjuster balls. Move rod to one end. Wipe off pin surface and inspect, then move pin to other end and inspect. If pin is scored or brinneled, replace pin.

Wheel Brake Adjuster Operation—This self-adjusting mechanism automatically compensates for lining wear. Thus, the desired clearance is maintained at all times between the pressure plates and the brake housing, and full pedal effectiveness is provided. Two identical automatic adjusters are mounted opposite each other on the inside surface of each inner pressure plate. The adjusters are identical in operation for either front or rear brakes. Two lugs are provided on the inside surface of each outer pressure plate, and are placed so as to straddle the automatic adjusters. Refer to Illustr. Each self-adjusting unit is composed of a bracket (which is riveted to the inner pressure plate) with two guide flanges, a rod, a lubricating washer, 11 steel adjuster balls, an adjuster washer, a bushing and a sleeve. When the brakes are applied, the outer plate is rotated with respect to the inner plate and lug contacts the adjuster rod. Refer to Illust. If the brake linings are new, the linings contact the brake housing before the adjuster rod is pushed forward. However, if the linings have worn, the lug pushes the adjuster rod through the bracket guide flanges until the linings contact the brake housing, and the relative rotation of the outer plate stops. When the brakes are released, the brake return springs cause the outer plate to tend to return to its former position with respect to the inner plate. However, when lug on other end of rod contacts adjuster rod, the locking action provided by the automatic adjuster prevents the adjuster rod from being pushed back, and the outer plate cannot return completely to its former position. Because the difference between the length of the rod and the distance between the finished surfaces of the lugs has been calculated to provide the desired clearance between the linings and the housing when the brakes are released, proper clearance is maintained regardless of the wear on the linings.



CHRYSLER DISC BRAKE ASSY.

ADJUSTMENTS

ADJUSTMENT: Self-adjusters are used and no service adjustments are necessary.

Brake Pedal: ⅛-¼" free travel. Adjust by loosening locknut on master cylinder end of pedal rod and turning large adjusting nut.

Parking (Hand) Brake: Independent type. See Car Model pages for adjustment data.

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CHRYSLER DISC BRAKE (WITH SPIDER) Cont.

OVERHAUL

REPAIR DATA: ***CAUTION—None of the parts on four wheel disc brake assemblies are interchangeable. When more than one assembly is being serviced at one time, care should therefore be taken to keep the parts of each assembly separated from the others.***

Wheel Brak Cylinders: Front brake cylinders are 1¼" diameter and rear cylinders are 1" diameter. Two cylinders are used on each brake.

Bleeding Brakes: While bleeding brakes it is important to keep the master cylinder full of fluid. A long rubber hose must be used on bleeding screw while bleeding screw is open. Bleed only one cylinder at a time. Best results are obtained by bleeding all four lower cylinders first and then bleeding all four upper cylinders.

ADJUSTING BRAKES (After Bleeding or Overhaul): After bleeding or reassembly brake pedal will be very low. To build up pedal pressure and adjust pressure plates to housings, drive car forward very slowly, depressing and releasing brake pedal slowly as car moves forward. After pedal has built up to approximately ¾ of its full height, recheck fluid level in master cylinder. Drive car on road for at least five miles, applying brakes at intervals, until there is no pull to right or left when brakes are thoroughly warm and a severe brake application is made.

►**BRAKE MASTER CYLINDER NOTE**—The master cylinder must be assembled from the pushrod end —never from the plug end—otherwise damage will occur to valve seal ring. Be sure valve seal ring is in position before installing valve and spring. Note carefully that the valve seal seats directly on the end plug and valve part is held against seal by the return spring.

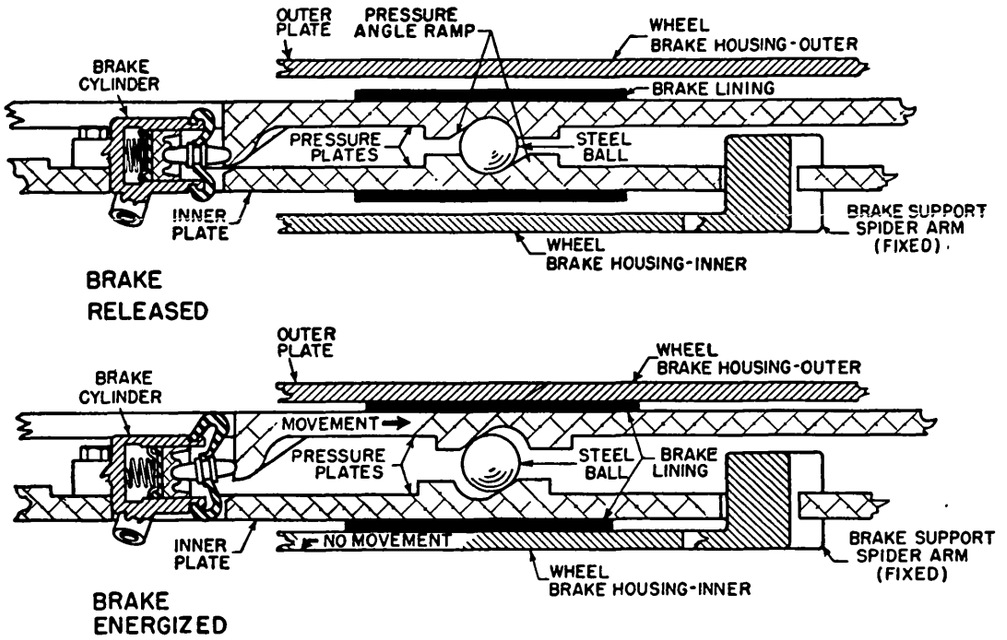
BRAKE LINING: To replace the lining it is necessary to remove the plate assembly. See disassembly procedure following. Segment type brake lining is used, bonded to the pressure plates.

►***CAUTION: When new linings have been installed, erratic operation may prevail for a few miles of operation. Car should be driven and brakes operated until normal brake applications result in smooth straight stops. This may take up to twenty-five or thirty miles of driving.***

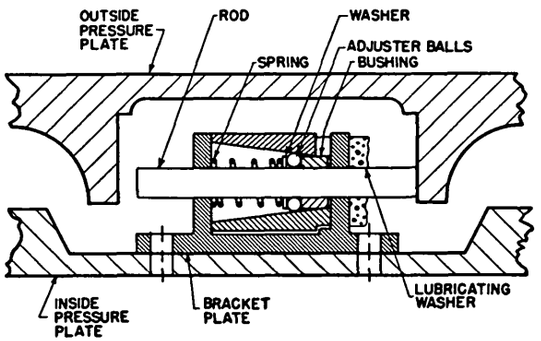
BRAKE SUPPORT SPIDER INSPECTION & SERVICING: If brinneling or scoring is evident on the brake pressure plates caused by spider anti-rattle pads, it is advisable to replace the early type spider with the improved later type (See Production Change above).

Fitting Pressure Plate to New Type Spider: When installing the new type spider it is not necessary to replace the pressure plates unless the condition of the lining segments indicate replacement. If the same pressure plates are installed, the spider indexing surfaces of pressure plate must be free from brinneling or scoring. If these surfaces are not smooth they may be dressed with a strip of fine abrasive cloth backed with a flat file.

Fitting Pressure Plate to Early Type Spider: Examine the four spider indexing slots in inner pressure plate. Sides and outer surfaces of these slots must not be scored or show deep indentations made by anti-rattlers in spider. With spider mounted steering knuckle or axle housing, place inner pressure plate in its proper position on spider. While holding



PRESSURE PLATE ASSEMBLY RELEASED & ENERGIZED



AUTOMATIC ADJUSTER

pressure plate in position, move it back and forth on spider. There should be slight resistance to this movement and no binding of plate on spider. If binding is evident remove a slight amount of metal from the **pressure plate indexing slots**, not from spider legs. Use a strip of fine abrasive paper backed up with a flat file to smooth sides of indexing surfaces, and a half-round file for the slightly rounded surfaces. Never use a file alone as it will leave a rough surface. Apply a coating of chalk to outer surfaces of spider legs to check for high spots or place of binding. Anti-rattle pads should bear against indexing slots of pressure plate with a slight pressure. Reduce excessive pressure by dressing down anti-rattle pads with fine abrasive paper backed up with a flat file ***(CAUTION—Do not remove excessive metal from anti-rattle pads).*** Examine ball ramps and if light scoring is present, these may be lightly polished with a small piece of fine abrasive paper applied with the finger tip. If deep brinneling present, replace pressure plate. The removal of excessive metal at this point will cause brake to rattle in service.

Disassembly of the Front Disc Brake: Remove dampener spring and clips. Remove the ten bolts around brake housing. The inner and outer housings are matched sets. A cut-out is cast in each housing so that both halves can be mated to their original position. Remove dust cap and wheel bearing nut. Separate inner and outer housings by tapping lightly, at one of the attaching bolt hole flanges, with a fibre-nose hammer. When housings separate, remove outer wheel bearing. Pull off the hub and outer brake housing. Disconnect front brake hose from the tube at frame connection. The hose should be held down to drain fluid. Remove the brake tube dust grommet (2 metal screws) from the dust shield and slide the grommet off the brake tube. (On late C-47 and on all C-49 Town and Country and C-50 models, the dust grommet will not have to be removed from dust shield.) Cover open end of brake tube with absorbent cloth to prevent brake fluid leakage on brake parts. Remove brake pressure plate assembly. Place the assembly on a clean surface or cloth on the bench. Keep plates and lining clean.

Assembly of the Front Disc Brake: Install inner half of brake housing. Prior to installing pressure plate assembly, release both self-adjusters. Release automatic adjusters by inserting a thin shank screwdriver between the release sleeve in the automatic adjuster and the adjuster guide of each adjuster, and then twisting both screwdrivers. See Illustr.. The pressure plates will then snap back into fully released position. Install brake pressure plate as-

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CHRYSLER DISC BRAKE (WITH SPIDER) C nt.

sembly. Install brake tube dust grommet. Connect brake tube to frame connection. Install assembly of hub and outer brake housing. Inner and outer brake housing are matched and balanced as an assembly so that it is necessary to line up the mating cutout or marks on each housing. Install outer wheel bearing, washer, and nut. Adjust bearing, install cotter pin and replace dust cap. Install the ten housing bolts, lock washers and nuts. Install dampener spring and clips.

Disassembly of the Rear Disc Brake: Disassembly procedure for the rear brake is similar to the front brake procedure, except as follows: After removing the 10 housing bolts, remove the outer housing with a hub puller. Remove axle key to prevent scoring the oil seals. When the pressure plates are removed two buffer assemblies mounted in the brake spider will fall out.

Assembly of the Rear Disc Brake: Rear brake assembly procedure is similar to the front brake procedure except as follows: Before installing the spider, check the inside face of the seal assembly. It must be flush with the inside face of the spider. Wrap a piece of wax paper over axle shaft to cover key slot. This will prevent cutting the seal lip. Then install spider and seal assembly in correct position—aligning buffer loading pin holes in spider to correspond with holes in dust shield. Install inner half of brake housing. Prior to installing pressure plate assembly, release both self-adjusters. (See Assembly of the Front Disc Brake.) Insert the two buffer assemblies in spider anchors. **NOTE: Be sure lock groove in buffer is facing dust shield.** Using a pair of water pump pliers, hold buffer in compressed position, in spider leg, and while fully compressed insert lock pin (round stock 3/16" dia. by 1½" long with blunt ends) through hole in dust shield, so the buffer will remain in compressed position when pliers are released. Install brake pressure plate assembly. After brake pressure plate assembly is in position, remove buffer lock pins. Install brake tube dust grommet (C-47 only) and connect brake hose to the tube at axle housing connection. Place hub and outer brake housing assembly in position on axle shaft, and line up key way. Insert key and drive into position with fibre-tipped hammer.

Disassembly of Inner and Outer Pressure Plates: Release automatic adjusters. By inserting a thin shank screwdriver between the release sleeve in the automatic adjuster and the adjuster guide of each adjuster, and then twisting both screwdrivers, the pressure plates will snap back into fully released position. (See Illustr.) Remove the four pressure plate retaining springs. These coil springs perform the same function as the return spring in the shoe-type brake in that they pull the pressure plates together when hydraulic pressure is released and prevent the plates from maintaining friction contact with the brake housing. A "V" slot cut into one side of a screwdriver will greatly assist in spring removal. The discs can now be separated.

Assembly of Inner and Outer Pressure Plates: With the wheel cylinders and automatic adjusters properly installed on the inner pressure plate, place the six steel pressure expanding balls (7/8" dia.) in the six ramps. Place outer plate into position in inner plate. It will be necessary to cock the wheel cylinder push rods slightly when positioning the outer plate. Automatic adjuster rods must also be centered so that operating lugs on the outer plate will straddle the rods. Install the four pressure plate retaining springs.

Disassembly of Automatic Adjuster: (See Illustr.) The rod in the automatic adjuster will only move in one direction and can be pulled out by hand. The adjuster sleeve can then be removed by sliding the sleeve out from between the bracket guides. It is not necessary to remove the bracket from inner pressure plate.

►***CAUTION: Hold a finger over each end of the sleeve during removal so that steel balls, washers, etc. inside will not be lost.***

Assembly of Automatic Adjuster: To assemble the automatic adjuster, it will be necessary to make a dummy shaft out of round stock ¼" in diameter by ¾" long chamfered on one end to use in place of the adjuster rod which is installed later. Place adjuster sleeve (slotted end down) upright on finger and insert dummy shaft (chamfered end up) in sleeve. Place bushing over dummy shaft. NOTE: Dummy shaft and bushing can be held in proper positions by placing the large end of a common paper clip around the shaft at the slotted end of the adjuster sleeve. Install the eleven adjuster balls around dummy shaft. Tap lightly to position balls. Install adjuster washer on top of balls. Place the adjuster spring over the shaft above washer. Holding thumb over spring, carefully remove paper clip, holding dummy shaft. Continue to hold pressure on spring —compress sufficiently to slide sleeve into position on the bracket. NOTE: The sleeve is grooved and the bracket is stepped, so that installation can be made the right way only. Align sleeve assembly so that dummy shaft is in line with the holes in the bracket guides. Insert the adjuster rod into the stepped end of bracket and force dummy shaft out. Push the adjuster rod through the adjuster until adjuster is in the center of the rod. Install lubricating washer on adjuster rod at stepped end of adjuster bracket.

Buffer Assemblies: The buffers which are used on the rear brakes only, control the clocking motion of the outer pressure plate.

►***CAUTION: Buffer assemblies are calibrated units. If defective replace the complete buffer assembly. When intalling buffers in the spider arm be sure the lock groove in buffer faces the dust shield (backing plate).***

CHRYSLER DISC BRAKE (WITHOUT SPIDER)

Chrysler Crown Imperial C59, 66, 70 (1953-55)

►*1954 ADJUSTER ROD PRODUCTION & CLEARANCE CHANGE:* The automatic adjuster rod-to-outer pressure plate clearance has been increased from .005-.010" to .015-.020". The rod length is reduced from 2.445-2.446" to 2.435-2.436".

DESCRIPTION: The Chrysler Disc Brake is hydraulically operated, self-energizing. The brake assembly, enclosed in a rotating housing, utilizes two lined pressure plates in the form of annular rings which move apart, contacting the inner surfaces of the rotating housing, when brake application is made. The housing is split and held together by 10 bolts around the outside edge. The pressure plate assembly rests on a duster located at the bottom of each brake housing. Automatic brake adjusters are built into the assembly. Brake lining segments are used, bonded to the outer surface of each pressure plate. Two hydraulic cylinders, mounted on steering knuckle in front and on the rear axle flange, move push rods operating against bosses on the pressure plates.

OPERATION: When the outer plate is rotated with respect to inner plate through action of the wheel cylinder push rods, steel balls between the pressure plates are forced up on ramps located on the inside surfaces of the plates. The movement of the balls up the ramps forces the pressure plates apart and contact is made between the lining and the inner surfaces of the brake housing.

Wheel Brake Automatic Adjuster: The self-adjusting mechanism automatically compensates for lining wear. Desired clearance is maintained, at all times, between pressure plates and brake housing. Two identical automatic adjusters are mounted, one on each plate, operating at 180° to each other, and are identical in operation for either front or rear brakes. Two lugs are provided on each of the two pressure plates, placed to straddle automatic adjusters. Each self-adjusting unit comprises a bracket (integral to the individual pressure plate) with two guide flanges, rod, lubricating washer, 11 steel adjuster balls, adjuster washer, bushing and sleeve. When brakes are applied, outer plate is rotated with respect to inner plate and lug contacts adjuster rod. If brake linings are new, linings contact housing before rod is pushed forward. If linings are worn, lug pushes adjuster rod through bracket guide flanges until linings contact brake housing and relative rotation of outer plate stops. When brakes are released, brake return springs cause outer plate to tend to return to former position. When lug on opposite end of rod comes into contact with the rod, the locking action (provided by the automatic adjuster) prevents adjuster rod from being pushed back, and outer plate cannot return completely to former position. Because difference between length of rod and distance between finished surfaces of lugs has been calculated to provide desired clearance between linings and housing when brakes are released, proper clearance is maintained regardless of wear on linings.

ADJUSTMENT: Self-adjusters used and no service adjustment to compensate for lining wear required during useful life of linings. Manufacturer recommends that plate assemblies be switched from front to rear every 15,000 miles to obtain maximum brake lining life.

Brake Pedal: ⅛-¼" free travel. Adjust by loosening locknut on master cylinder end of pedal rod and turning large adjusting nut.

Parking (Hand) Brake: Independent, internal expanding type. *See Car Model pages for adjustment data.*

REPAIR DATA: ***CAUTION—Inner and outer housings are balanced as an assembly and should be assembled accordingly. Further, do not install left pressure plates or wheel cylinders on right side or vice versa.***

Wheel Brake Cylinders: Front brake cylinders are 1¼" diameter and rear cylinders are 1" diameter. ***NOTE—Because there is no direct connection between pressure plate and wheel cylinders, brake assemblies can be removed as a unit from car without opening housings or disrupting hydraulic system.*** Normal inspection or replacement of front brake cylinder parts does not require removal of cylinder from steering knuckle.

CONTINUED N NEXT PAGE

CHRYSLER DISC BRAKE (WITHOUT SPIDER) Cont.

Bleeding Brakes: *CAUTION—Do not use fluid from pressure type filler or a container that has been open more than a few hours.* Connect hoses at each wheel position. Fill master cylinder with a bottle type filler with fluid from newly opened, sealed container. Bleed lower cylinder on each wheel first—do by hand, not with pressure bleeder—then refill master cylinder reservoir after bleeding each cylinder. After bleeding all four lower wheel cylinders, bleed four upper cylinders.

▷*CAUTION—A short section of bleeder hose should be placed over bleeder valve before opening bleeder. If not done, it is possible for fluid to seep inside housings, contaminating linings.* Bleed only one cylinder at a time. Be very sure all air is expelled from brake lines and wheel cylinders.

▷*CAUTION—After brakes are thoroughly bled, brake pedal will be very low. Drive car forward very slowly depressing and releasing brake pedal slowly as car moves forward. After pedal has built up to approximately ¾ of its full height recheck fluid level in master cylinder. Car should then be driven five miles applying brakes at intervals. There should be no brake dive or pulling to one side when brakes are applied.*

Brake Liming: Molded asbestos, segment type lining used, Cyclebonded. Thickness 5/32". Clearance between lining and housing—Self-adjusting.

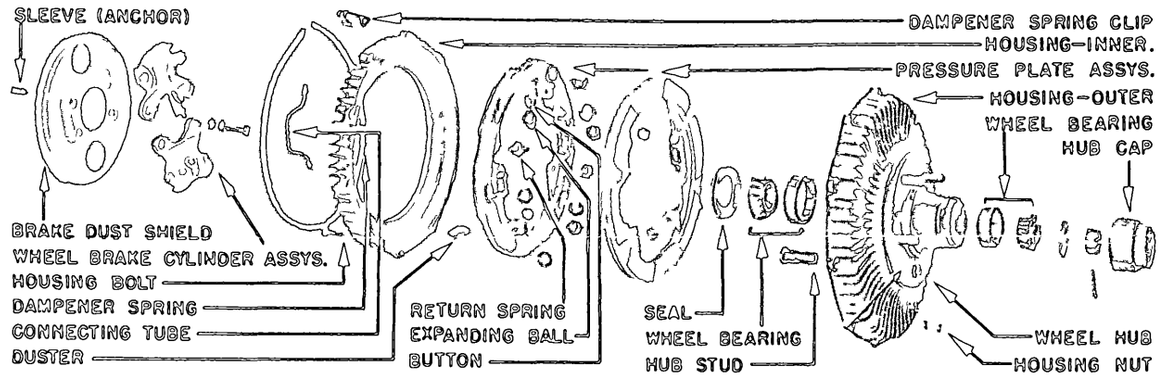
▷*CAUTION—With new linings, erratic operation may result for a few miles of operation. Normal brake operation should occur after not more than 25 or 30 miles of driving.*

DISASSEMBLY: *NOTE—Brake assemblies can be removed from car as a unit without opening housings or disrupting hydraulic system.*

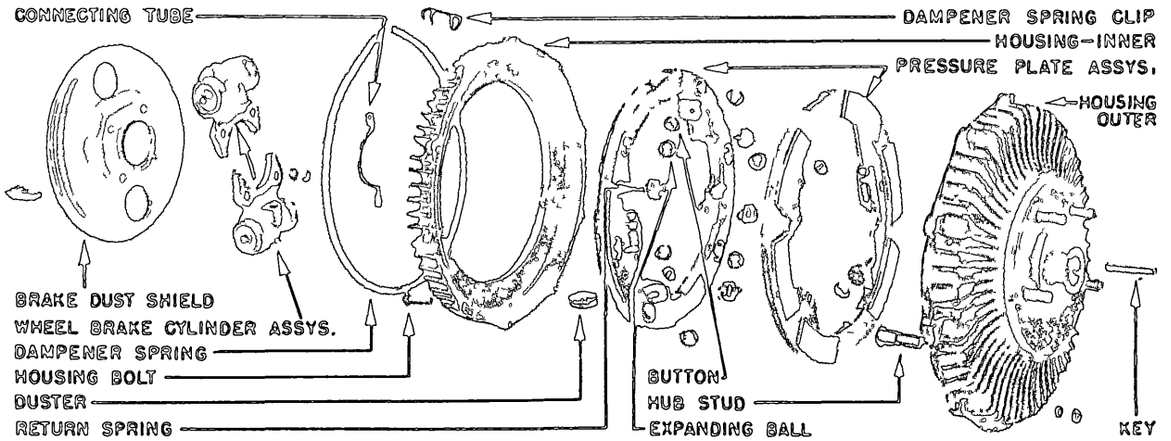
Front Disc Brake: Remove hub cap, cotter key spindle nut, then complete brake assembly from steering knuckle. Transfer assembly to clean bench with assembly resting on outer hub section. Remove damper spring and clips, then housing attaching bolts. Check to see that there are cast cut-outs in each housing (these cut-outs must be matched on reassembly). If no cut-outs, mark. Separate inner and outer housings by tapping lightly, at one of the attaching bolt hole flanges, with fibrenose hammer. Remove pressure plate assemblies *(do not lose duster at bottom of each housing).* Place brake pressure plate assembly on clean surface or cloth (to avoid contamination of lining segments).

Rear Disc Brake: Remove cotter pin, axle nut and washer. Install Wheel Puller C-844, remove brake housing, pressure plate and hub assembly. Remove axle shaft key, dampener spring and clips, then remove housing attaching bolts (Check to see that there are cast cut-outs in each housing. These cut-outs must be matched on reassembly. If no cut-outs, mark). Separate inner and outer housings by tapping lightly, at one of attaching bolt hole flanges, with fibrenose hammer Remove outer brake housing pressure plate and hub assembly *(do not lose duster at bottom of each housing).* Place brake pressure plate assembly on clean surface or cloth (to avoid contamination of lining segments).

Inner & Outer Pressure Plates: Release automatic adjusters. (By inserting a thin shank screwdriver between release sleeve in automatic adjuster and adjuster guide, then twisting screwdriver, pressure plates will snap back into fully released position). Remove four pressure plate retaining springs ("V" slot cut into one side of a screwdriver will facilitate removal). Separate discs.



FRONT BRAKE



REAR BRAKE

CHRYSLER DISC BRAKE ASSY. (WITHOUT SPIDER)

Automatic Adjuster: Push or pull rod out by hand (moves in one direction only). Slide sleeve out from between pressure plate lugs. *CAUTION—Hold finger over each end of sleeve during removal so contents are not lost.*

INSPECTION & CLEANING: Proceed as follows:

Wheel Cylinders: Examine bores and pistons for score marks or pits. Replace if necessary. Replace piston cups with new ones. *CAUTION—Only front wheel cylinder piston cups Part No. 77526 bearing letters "AA" or "DT" should be used. Do not use cups bearing letters "BQ".* Reassemble wheel cylinders using new dust boots.

Automatic Self-Adjusters: *NOTE—It is not necessary to remove adjusters unless new pressure plates to be installed.* Inspect adjuster rods to determine if correct rods are present and for scoring or brinelling from adjuster balls.

Adjuster Rod Identification—Rod has radial groove machined at one end. Length of rod is 2.445-2.446" (1953), 2.435-2.436" (1954-55).

Scoring & Brinelling Inspection—Insert small screwdriver between adjuster bushing and bracket to release adjuster balls. Move rod to one end. Wipe off pin surface and inspect. Move pin to opposite extreme to inspect other end. Pin should be free of scoring or brinelling. *Do not lubricate automatic adjusters.*

Brake Housings: Inspect for cracks. If found, replace. Light radial marks on surface of housing may be polished out with fine emery cloth. Similarly with bluish heat spots. *NOTE—Do not mate 40-fin housing with 60-fin housing on opposite side of car.*

Pressure Plate Expanding Balls: Should be clean and free of flat spots, rust or nicks. Dull coating on balls is not reason for rejection. This is protective coating and does not affect operation. Rusted balls may be cleaned by placing in cloth bag partially filled with sand and shaking vigorously.

Master Cylinder: Remove from car. Clean and inspect for pits and scores. Replace if found. Reassemble using new valve and cups. *CAUTION—Assemble from*

CONTINUED ON NEXT PAGE

CHRYSLER DISC BRAKE (WITHOUT SPIDER) C nt.

push rod end to prevent damage to valve seal ring. Be sure valve seal ring in position before installing valve and spring. Note carefully that valve seal, Part No. 1318447 seats directly on the end plug and the valve, Part No. 1318446, is held against this seal by return spring.

REASSEMBLY: ***NOTE—Inner and outer housings are balanced as an assembly and should be assembled accordingly. Do not install left pressure plates or wheel cylinders on right side or vice versa.***

Disc Brake: Release both automatic adjusters, install brake pressure plate assembly in outer housing half, place duster in "down" position at bottom of pressure plate. Install inner housing and line up aligning marks (cut-outs) in each housing, tighten 10 attaching bolts, install dampener spring and clips. Apply pressure on push rods of wheel cylinders to facilitate pressure plate installation. ***NOTE—It may be necessary to open bleeder screws to allow pistons to retract. Manufacturer recommends that bleeder screws be tightened with pistons retracted. This holds pistons in position desired until pressure plates installed.*** With pressure plates in down position and duster in position, proceed as follows:

Front Brake—Position housing pressure plate and hub assembly, then slip complete assembly over steering knuckle and wheel cylinders making sure plates are piloted properly over wheel cylinders to avoid damaging or dislocating boots Install outer bearing, spacer washer, nut, and adjust wheel bearings. Install cotter key, hub cap, and wheel assembly.

Rear Brake—Mount housing and pressure plate assembly to axle shaft making sure that plates are piloted properly over wheel cylinders to avoid damaging or dislocating boots. Position key-way, install key, washer and nut. Tighten axle shaft nut to 140 ft. lbs. minimum, then install cotter key, tire, and wheel assembly.

Inner and Outer Pressure Plates: With automatic adjuster properly installed on each of pressure plates, place the six steel pressure expanding balls (7/8" diameter) in the six ramps. Place outer plate in position on inner plate. Automatic adjuster rods must also be centered so that operating lugs on the matching plate will straddle rods. Install four pressure plate retaining springs.

Automatic Adjuster: Make dummy shaft out of round stock 1/4" in diameter and 3/4" long, chamfered on one end. Place adjuster sleeve (slotted end down) upright on finger and insert dummy shaft (chamfered end up) in sleeve. Position bushing over dummy shaft. Hold shaft and bushing in position with large end of common paper clip. Install 11 adjuster balls. Tap lightly to position balls, install adjuster washer, position adjuster spring in sleeve. Holding thumb over spring, carefully remove paper clip. Continue to hold pressure on spring-compress sufficiently to slide sleeve into position on bracket. NOTE—Sleeve is grooved and pressure plate stepped so that installation can only be made right way. Align sleeve assembly so that dummy shaft is in line with holes in pressure plate. Insert adjuster rod in pressure plate hole and force dummy shaft out. Center adjuster rod as nearly as possible. Install lubricating washer on adjuster rod at stepped end of adjuster bracket.

HAWLEY MECHANICAL TWO-SHOE TYPE

Crosley, Model CC (1947-48)

TYPE: Two-shoe, four-wheel, mechanically operated (cable) type.

DESCRIPTION & OPERATION: Wheel Brakes—Two shoes per wheel, anchored at adjusting screw end and operated by cam at opposite end. Shoes are held against adjusting screw and cam by coiled springs hooked between the shoes (lighter spring at adjusting screw end, heavier spring at cam end of shoes).

Linkage: Wheel brakes operated by cables linked between cam operating levers on backing plates and levers on main cross-shaft on frame. Cables are enclosed in conduits at wheel ends and have adjusting clevises at cross-shaft ends.

Hand Brake: Parking brake handle on floor board in front of driver's seat linked directly to lever on main cross-shaft and applies all four service brakes. No adjustment is required.

ADJUSTMENT: Jack up all four wheels securely. Remove cotter pins and clevis pins from all four wheel cables at brake cross-shaft. Adjust as follows:

Brake Shoe Adjustment: Jack up all wheels, disconnect wheel cables by removing cotter pins and clevis pins from levers at each end of cross-shaft. Install cross-shaft spacer (see Spacer Note below) on each side of cross-shaft bearing at each end of shaft. Check brake pedal linkage adjustment and make certain that both upper and lower rods act on cross-shaft simultaneously. At each wheel, loosen adjusting screw locknut on backing plate, tighten adjusting screw (turn screw counter-clockwise) until brakes begin to drag, then back off screw (approximately ¼ turn) until wheel turns freely, tighten locknut.

Cross-shaft Spacer Note—Spacers consist of piece of bar stock, 3/16" thick, ½" wide, 3" long, with 30° bend at center (included angle 150°).

Brake Linkage Adjustment: After adjusting brake shoes (above), depress brake pedal 1" and hold it in this position by pulling hand brake lever "on". Adjust each wheel cable by loosening clevis locknut and turning clevis until wheel brake drags slightly when cable connected to cross-shaft lever. With all cables adjusted and connected, pull hand lever "on" for considerable brake drag, check all wheels for equal drag. Equalize by readjusting cables. Push brake pedal down hard, hold in this position by pulling hand lever "on". Check each wheel to see that all wheels are locked and that reserve cable travel (distance from clevis to brake cable clamp on backing plate) is ½" minimum. **Remove spacers from cross-shaft bearings.**

Hand Brake: No adjustment required.

SERVICING: Brake Lining Replacement—Manufacturer recommends that factory replacement shoes (with lining installed) be used. Lining is molded type and is ground concentrically after installation on shoes. CAUTION—Keep paired brake shoes together.

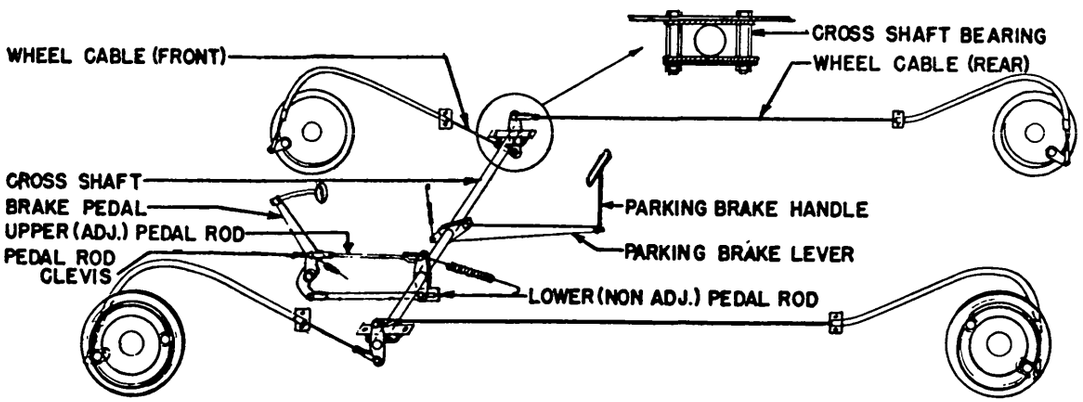
Brake Shoe Installation—Install heavier retracting spring on cam end of brake shoes with spring hooks inward toward backing plate, install lighter spring on adjusting screw end of brake shoes with spring hooks outward or away from backing plate.

CAUTION—Replacement brake shoes are ground in pairs and paired shoes should be kept together and installed on same wheel.

Cross-shaft Installation: Bearings must be assembled on cross-shaft when shaft installed on car. Insert bolts with head on inside of frame, install flat fabric bearing on bolts next to frame, place spacer on each bolt, install second flat fabric bearing, bearing plate, lockwashers and bolt nuts. Before tightening nuts, install cross-shaft spacer at each cross-shaft bearing (see Cross-shaft Spacer Note under Brake Shoe Adjustment above), to center the shaft, then tighten bolt nuts. Adjust the brakes.

►***CAUTION—See that cross-shaft remains centered in the slotted bearings while connecting cables and adjusting brakes.***

Brake Pedal Linkage Adjustment: With the brake pedal against the floor board stop, rotate the cross-shaft until lower bracket pin is against the front end of the slot in the lower (non-adjustable) brake pedal rod. Hold cross-shaft in this position, adjust clevis on forward end of upper brake pedal rod until upper bracket pin on cross-shaft is against the rear end of slot in upper pedal rod. This setting does not change in service and no adjustment is required when brakes are adjusted.



HAWLEY MECHANICAL BRAKE SYSTEM

GOODYEAR-HAWLEY HYDRA-DISC HYDRAULIC

Crosley, Model CD & Hotshot (1949-50)

►**WHEEL HUB REMOVAL CAUTION**—Wheel brake unit must be disassembled before wheel hub and brake disc can be removed. See Wheel Brake disassembly data below.

DESCRIPTION: Goodyear-Hawley hydraulic disc have new type wheel brakes as follows:

Wheel Brakes: Consists of an inboard housing containing the single acting hydraulic cylinder with circular lining mounted directly on the end of the hydraulic cylinder piston, and an outboard housing on which a second circular lining is mounted directly. These housings are bolted together by tie bolts and mounted on the dust cover so that they straddle the brake disc which is integral with the wheel hub. In operation, the piston moves out to bring the lining in contact with the disc and the reaction in the opposite direction causes the entire assembly to move inward so that the outer lining is likewise brought into contact with the drum and the disc is gripped between the two linings. When brakes are released, return springs return the piston and entire assembly to their original positions.

Hand Brake: Consists of a cam lever in each rear wheel brake which applies the brakes mechanically (operation is similar to hydraulic actuation). These levers are linked to the hand lever at the driver's seat by a rod and cable linkage.

Master Cylinder: Conventional type. Similar to design used with other hydraulic brake systems.

ADJUSTMENT: Wheel Brakes. Jack up all four wheels, loosen locknut on compensating screw on inner housing (CAUTION—locknut has left-hand threads). Turn compensating screw clockwise until wheel is locked, then back off compensating screw ¼ turn. Tighten locknut (CAUTION—see that compensating screw does not turn while tightening locknut). Adjust all four wheels in this manner.

Hand (Parking) Brake Adjustment: Should not require adjustment (automatically taken up when wheel brakes adjusted). If hand lever travel excessive, tighten clevis at rear end of hand lever rod or tighten clevis at left wheel end of wheel cable.

►*CAUTION*—Do not move parking brake cam lever (in rear wheel brakes) away from released position when adjusting hand brake cable.

Brak Pedal Adjustment: Pedal should have ¼" free travel in released position with master cylinder pushrod against its stop. Adjust by loosening locknut and turning pushrod.

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" for complete data.*

BLEEDING BRAKE SYSTEM: Loosen brake hose at wheel unit ½ turn (CAUTION—do not attempt to disconnect hose without removing brake unit). Tighten hose after bleeding operation completed.

See "Hydraulic Brake Servicing" for complete bleeding instructions.

►*CAUTION*—Use only Lockheed #21 Brake Fluid.

REMOVAL & INSTALLATION OF WHEEL UNIT: *Necessary for servicing of unit and for wheel hub removal.*

Removal: Loosen brake hose at wheel cylinder (CAUTION—do not attempt to remove hose). Take out tie bolt lockplate screw (Phillips head screw on outer housing), remove lockplate, unscrew both tie bolts, lift off outer housing. Remove four Phillips head screws in torque plate, slide inner housing assembly out. Hold brake hose and unscrew brake unit from hose.

Installation: Screw inner housing unit on brake hose snugly. Position unit on mounting bracket and install four torque plate screws. Install outer housing, screw both tie bolts in finger-tight (see Compensating Screw Setting below) and back screws off to nearest flat which will allow lockplate to be installed, install tie bolt lockplate and lockplate screw. Bleed brakes, then tighten brake hose, and adjust brakes.

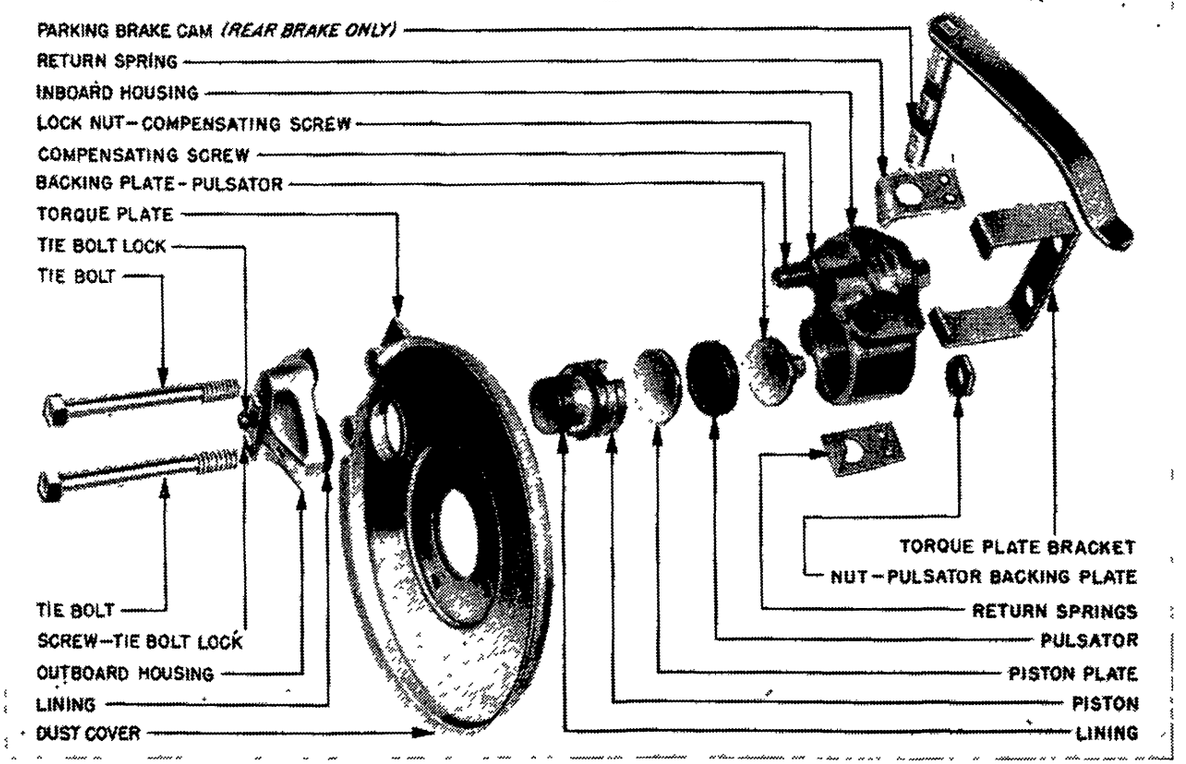
►**Compensating Screw Setting**—Compensating screw must contact outer housing with approximately 1/16" clearance between lining and disc. Adjust by turning compensating screw before tie bolts are started in threads.

DISASSEMBLY & REASSEMBLY OF WHEEL UNIT: *For replacement of Pulsator or other service operations.*

Front Wheel Unit: With wheel unit removed from car, remove return springs by taking out attaching screws, remove piston. Insert a screw in the threaded hole on the side of the cylinder, remove lockring from groove in cylinder. Remove nut on back of inner housing, push piston plate, pulsator, and pulsator backing plate out of cylinder. Remove pulsator from backing plate and wash all parts in alcohol. When reassembling, place new pulsator on backing plate and install these parts in cylinder (CAUTION—Keep oil and grease off pulsator and make certain it does not catch in lockring groove and peel back over backing plate), tighten backing plate nut on housing loosely. Install piston plate and lockring, position lockring gap approximately 1" from threaded hole in cylinder. Install piston and return springs, then tighten backing plate nut securely.

Rear Wheel Unit: With wheel unit removed from car, remove return springs by taking out attaching screws, remove piston. Lift out parking brake cam and lever assembly. Remove nut on back of inner housing, push piston plate, pulsator, and backing plate out of cylinder. Remove pulsator from backing plate and wash all parts in alcohol. When reassembling, place new pulsator on backing plate, install in cylinder (CAUTION—Keep oil and grease off pulsator), tighten backing plate nut on housing loosely. Install piston plate, insert parking brake cam and lever (see illustration for correct position), install piston making certain that groove engages parking brake cam. Install return springs, then tighten backing plate nut securely.

RELINING BRAKES: Lining is riveted to piston and on outer housing. When installing new lining, make certain that lining is seated on lockpin.



O DYEAR-HAWLEY HYDRA-DISC BRAKE (REAR BRAKE SHOWN—
FR NT BRAKE SAME EXCEPT PARKING BRAKE CAM MITTED)

CHEVROLET (OWN) HYDRAULIC

Passenger Cars, All Models (1937-50)
Comm'l & Trucks, All Models (1937-50)
Trucks, ¾ & 1 Ton (1951-52)
Trucks, 1½ & 2 Ton (1951-52) Front Only

►*1½ & 2 Ton NOTE—See "Chevrolet Twinplex" for rear brakes on these trucks.*

►CHANGES, CAUTIONS, CORRECTIONS

►**TRUCK BRAKE BOOSTER NOTE:** Hydrovac Power Unit Std. or Optl. on 1, 1½ & 2 Ton Trucks. *See "Hydrovac Power Unit" for complete data.*

►*CAUTION*—On trucks with Hydrovac, special brake system bleeding procedure is required. See special bleeding instructions under "Servicing" below.

►**1½ & 2 TON BRAKE CABLE CHANGE (1939-48 for Increased Clearance between Tires and Cable):** Approximately 1" additional clearance between tires and brake cables can be secured by installation of following parts:

Hand Brake Cable Axle Bracket—Brackets approximately 1" longer than original type furnished under Part No. 3686657 (R. H.), 3686658 (L. H.) for all 1937-47 Trucks.

Hand Brake Cable & Clamp Assembly—New design assembly which holds cable inward after it leaves cable frame bracket furnished for all models as follows: 1939-46 Utility Models—3651403 (R. H.), 3651404 (L. H.). 1947-48 Half-Ton Comm'l—3686522. 1947-48 ¾ Ton Comm'l—3676305. 1947-48 One-Ton Comm'l—3684247. 1947-48 1½ & 2 Ton (137" & 161" WB)—3686686. 1947-48 2 Ton C-O-E (110" WB)—3686727. 1947-48 1½ & 2 Ton School Bus & 2 Ton C-O-E (134" & 158" WB)—3686685.

►**BRAKE SHOE INSTALLATION CHANGE (To Correct Erratic Brake Action When Wet Complaints):** Brake lining on front wheels must be Inlite 599849 or Marshall Eclipse 3682131 (see identification data below). Manhattan 475518 lining (also furnished in Pkg. No. 603872) must not be used on front wheels.

NOTE—All service packages with Manhattan lining now stamped "Use on Rear Brakes only."

Lining Identification—Inlite lining has blue identification on side, Marshall Eclipse has orange identification mark. Manhattan lining not marked but packages will be marked as above.

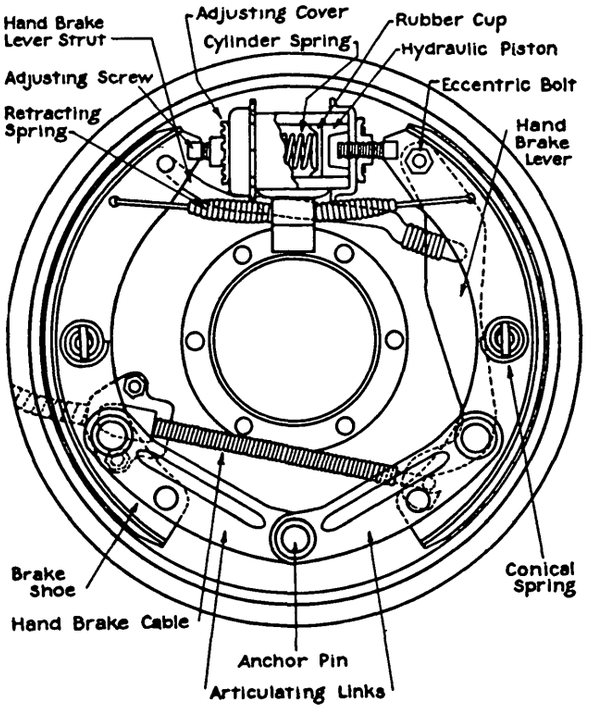
►*CAUTION—Manhattan lining must be used on rear wheels only. Inlite & Marshall Eclipse lining can be used on either front or rear brakes.*

DESCRIPTION

DESCRIPTION & OPERATION: Wheel Brakes. Two shoes per wheel similar to previous design in that shoes are mounted on articulating links at anchor pin end with upper end bearing directly on wheel cylinder piston adjusting screws. Rigid type hydraulic wheel cylinder mounted on backing plate between shoes. Shoes are forced out in contact with drum by piston movement when fluid displaced from master cylinder by pedal application flows through lines to wheel cylinder. Articulating links result in uniform shoe contact with drum and only one adjustment (at piston) provided. Shoes returned to off position when pedal released by single retracting spring linked between shoes.

Adjustment Note (1940 On). Slots provided in front wheel backing plates (closed by snap covers) on all models so that brakes can be adjusted without removing wheels.

Hand Brake:—Hand lever applies rear wheel service shoes through cable actuated lever pivoted on one shoe and linked to other shoe by strut (passenger cars) or lever and link (1½ ton truck).



REAR BRAKE ASSY. (FRONT SAME EXCEPT HAND BRAKE LINKAGE OMITTED)

Hand Brake (Passenger Cars 1940 On):—Cars have idler lever mounted on bracket welded to second cross-member (at rear of transmission) and linked to each rear wheel by cable with adjustment on each cable at idler lever end (see Adjustment data below).

Parking Brake (1947-50 ½ & ¾ Ton Trucks)—Rear wheel brakes are applied by a foot-operated pedal and released by a button under the instrument panel. See Parking Brake adjustment data below.

Master Cylinder:—Compensating type similar in design to type used on other brake systems. *See "Hydraulic Brake Servicing" for complete data.*

BLEEDING BRAKE SYSTEM: Required when lines disconnected, to remove wrong type fluid if used in system, or to remove air from lines caused by allowing master cylinder supply tank to become dry or by disconnecting lines.

All Pass. Cars (and Trucks without Hydrovac): *See "Hydraulic Brake Servicing" for complete data.*

►**Trucks with Hydrovac Brak System**—When bleeding entire brake system, Hydrovac unit must first be bled at tw points before bleeding the lines and wheel cylinders. Bleed the entire system exactly as detailed below (CAUTION—Engine must not be running and there must not be any vacuum in the Hydrovac system while bleeding these brakes).

Hydrovac P int #1—Remove bleeder valve screw on side of control valve housing on Hydrovac endplate, attach bleeder hose and submerge end of hose in brake fluid in a clean drain jar. Fill brake master cylinder reservoir with fluid, open bleeder valve ½-¾ turn, depress brake pedal slowly by hand, close bleeder valve before releasing pedal. Repeat these operations until fluid flows from the hose in a solid stream without bubbles, then close bleeder valve, remove hose, install valve screw.

Hydrovac Point #2—Attach bleeder hose at bleeder valve on side of Hydrovac unit outlet fitting (point at which brake lines to wheels connected). Bleed system at this point in exactly same manner as detailed for Point #1 (above).

Wheel Cylinders—After bleeding Hydrovac unit, proceed to bleed lines and wheel cylinders at each wheel in the usual manner.

BRAKE PEDAL ADJUSTMENT

Pedal Clearance Note: Clearance between pedal and underside of toeboard must be correct to insure master cylinder piston being back against its stop for correct compensating action when brakes released (clearance between edge of master cylinder piston primary cup and center of compensating port must be .035" minimum).

Adjustment—Adjust each model as follows:

Passenger Cars (With mechanically operated St p Light Switch). Clearance between upper face of pedal and first toe-board re-inforcing rib below pedal rod must be 7/16". Adjust in same manner as previous models by loosening locknut on eccentric pedal bolt and turning bolt. Tighten locknut to 20-25 ft. lbs. after adjusting.

►*CAUTION*—If correct 7/16" clearance cannot be secured by turning eccentric bolt, adjust by installing shims under front or rear master cylinder mounting bolts.

Trucks (1937-47). Loosen clevis locknut on rear end of master cylinder pushrod, turn pushrod until correct clearance of ¼" is secured between pedal and underside of toeboard with pedal released, tighten locknut after adjusting.

Trucks (1947-52). Clearance between top of pedal arm and underside of depression in toe pan at pedal must be 13/16" with pedal released and master cylinder piston against its stop. To adjust, loosen locknut at pushrod clevis, turn pushrod (knurled section provided on rod for this purpose), tighten locknut after adjusting.

BRAKE SHOE ADJUSTMENT

►*CAUTION*—Before adjusting, jack up all wheels, disconnect hand brake cables at idler lever on cross-member (Pass. Cars, Half-Ton, & Forward Control trucks), or at cross-shaft idler levers (other trucks). Remove adjusting cover on backing plate at each end of wheel cylinder (not necessary for rear wheels on 1½ & 2 Ton or 1 Ton after 1947). Adjust each wheel as directed below. If brake drums have been removed previously, apply brakes firmly to align articulating pins before adjusting.

CAUTION—Hand brake cables or rods must be disconnected to eliminate possibility of shoes being held on which would result in incorrect adjustment.

CONTINUED ON NEXT PAGE

CHEVROLET (OWN) HYDRAULIC (Continued)

Pass. Cars & Half-Ton (Front & Rear Wheels): Insert point of screwdriver in slot on backing plate at each end of wheel cylinder so as to engage notched adjusting covers on cylinder, turn adjusting covers until shoe has slight drag on drum, then back cover off exactly 4 notches (Pass. Cars & 1939-47 Half-Ton), 5 notches (Half-Ton beginning 1948) for correct shoe clearance. Adjust all wheels in this manner, then adjust parking brake and check brake pedal clearance.

Trucks (except Half-Ton): *CAUTION—Front and rear wheels adjusted differently as follows:*

Front Wheels (All Trucks)—Insert point of screwdriver in slot on backing plate at each end of wheel cylinder so as to engage notched adjusting covers on cylinder (adjusting cover at each of cylinder controls one shoe), turn adjusting covers until shoe has slight drag on drum, then back cover off exactly 5 notches for correct shoe clearance. Adjust both wheels in this manner.

Rear Wheels (All ¾ Ton & 1941-47 1 Ton)—Adjust in same manner as front wheels (above), backing cover off 5 notches for correct shoe clearance.

Rear Wheels (1948-52 1 Ton, 1939-50 1½ & 2 Ton). Use an open-end wrench to turn the hexagonal headed pinion shaft on brake backing plate (shaft turns adjusting covers through gear engagement). Turn pinion shaft clockwise (looking out toward backing plate) until shoe drags slightly, then back pinion shaft off 2/3 turn (four sides of hexagonal head) for correct running clearance. Adjust parking brake (see below) and check brake pedal clearance.

HAND BRAKE ADJUSTMENT

Parking Brake Adjustment Caution: Different types of linkages used. Adjust each model as follows:

Passenger Cars (All Models): Place the hand lever in fully released position. Loosen both checknuts on each wheel cable at idler lever on frame cross-member (forward end of cables), pull cables forward out of conduit until definite stop is felt, hold cable in this position and tighten both checknuts on each cable so that cable is locked to idler lever toggle. Make certain that rear wheels are free.

Trucks (1939-47): Place hand lever in fully released position. Pull wheel cable end fitting (at front of rear frame cross-member) forward until a definite stop is felt, hold cable in this position, turn nut on forward rod down until it contacts (turn by hand only, do not use wrench), lock cable by turning rear nut up securely. Check equalization and make any necessary re-adjustment by loosening wheel cable slightly (do not change wheel cylinder adjusting cover setting).

½-Ton (1947-50), ¾ & 1-Ton Fwd. Control (1947-52) Pedal Type. Adjusted in same manner as other trucks (following). Also check release rod handle (under instrument panel) for ½" minimum clearance at support bracket. Adjustment provided at lower end of rod. CAUTION—This clearance necessary for correct locking action of pedal lock bar.

¾ & 1-Ton (1947-52 Exc. Fwd. Control), 1½ & 2-Ton (1947-50). After brakes are adjusted, fully release hand brake lever. Disconnect cables at cross-shaft levers on frame by removing clevis pins, pull cable out of conduit by hand until a positive stop is felt, adjust clevis on end of cable by loosening locknut and turning clevis until clevis pin can just be inserted in lever. Tighten locknut and connect cables. Check for drag and equalization. Correct by readjusting cables.

▷*CAUTION—Do not attempt to equalize parking brakes by changing wheel cylinder brake shoe adjustment.*

Toggle Lever Adjustment—This adjustment must be made whenever new rear brake shoes installed. After adjusting service (hydraulic) brakes, remove brake drum, loosen eccentric bolt locknut (lever pivot on shoe web below right end of hydraulic cylinder), hold toggle lever against shoe, turn eccentric bolt until only slight clearance between lever and bottom of slot in hand brake extension link, tighten locknut, recheck clearance. Adjust hand brake as directed above. This toggle lever is not used on 1½ and 2 Ton Trucks.

1½ & 2-Ton (1951-53). Rear wheel brakes are "Twinplex" type (see separate data on Twinplex Brakes) and parking brake is independent type on propeller shaft at rear of transmission.

RELINING BRAKES: Manufacturer recommends installation of replacement shoes furnished with linings. Hard (semi-moulded or moulded) lining used which will have glazed appearance when burnished. See Car Model page for specifications for each model. Wheel cylinder piston clamp should be installed on piston when shoes removed.

Brake Shoe Removal: With wheels and drums removed (see Brake Drum Notes below), remove shoe return spring & hold-down springs. On rear brakes remove toggle lever eccentric bolt and nut from rear brake shoe. Remove articulating link friction spring pin lock, pin and spring. Take out pin lock and pin on each shoe and remove articulating link.

NOTE—In assembling toggle lever on new shoes, see that high side of eccentric bolt is toward shoe in minimum adjustment position (high side indicated by flat ground in bolt head). Toggle lever adjusted as directed above under Hand Brake.

▷Brake Drum Removal Note—Remove drums for access to brake shoes as follows:

Passenger Cars—Rear brake drums are held on axle shaft flange by wheel mounting nuts and two screws (Zipon nuts beginning 1940). To remove drums, remove wheel and then take out screws or remove the zipon nuts on two of the wheel studs. When installing drums, see that extra hole in drum and gaskets is lined up with notch in axle shaft flange to provide oil drainage hole (or tongue on web section of drum extending into drain hole in axle shaft flange on 1942 and later models).

½, ¾, 1 Ton Truck Models—Rear brake drums are held on rear axle hub flange by two slotted screws and can be removed by taking out these screws without disturbing hub or wheel bearing adjustment.

1½ & 2 Ton Truck Models. Wheels, brake drums, and wheel hubs must be removed for access to brake shoes. This will make it necessary to adjust wheel bearings when wheels re-installed (see car model page for wheel bearing instructions).

NOTE—Brake shoes on these truck models have individual anchors.

Brake Shoe Installation: When installing shoes, see that they contact all pads on anchor plate (3 pads for each shoe) by checking clearance at each pad with .002" feeler gauge. If shoes do not touch all pads, bend anchor plate.

SERVICING: Brake Linkage (Pass. Cars). Brake cables are interchangeable (left and right).

1½ & 2 Ton Truck—Rear brake cables on these models are not interchangeable (left and right) and may be identified by string tracer woven under cable wire shield of left hand cable. *See 1½ & 2 Ton Brake Cable Change data above.*

Master Cylinder:—Piston clearance in cylinder must be .001-.005". When reassembled clearance between lip on primary piston cup and center of compensating by-pass port should be .035". *See "Hydraulic Brake Servicing" for complete data.*

Wheel Cylinders:—To disassemble wheel cylinders, with brake line disconnected and return spring on shoes removed, take out two mounting screws on backing plate. Remove cylinder, lift off adjusting cover and screw assemblies, withdraw pistons, piston cups and return spring. Examine bore. Piston clearance in cylinder should be .002-.004". Line must be bled when reinstalled.

NOTE—Wheel cylinders for front and rear wheels are of different bore and must be replaced in same wheel. No part of assembly interchangeable (see Car Model page for specifications).

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" for complete data.*

CHEVROLET-BENDIX HYDRAULIC

Chevrolet, Pass. Cars, All Models (1951-55)
Chevrolet Corvette (1953-55)
Chevrolet, ½ Ton Trucks (1951-55)
Chevrolet Trucks, All Models except 1½ & 2 Ton Rear Brakes (1953-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1955 CHEVROLET BRAKE DESIGN CHANGE (Pass. Cars & ½ Ton Trucks):* Brake anchor adjustment has been eliminated. To compensate for this adjustment, brake shoes have been made .057-.087" smaller in diameter than drum. When a bench mounted shoe grinder is used, shoes should be ground to **undersizes** indicated above. When spindle mounted type shoe grinder is used, shoes should be ground to **actual drum diameter.**

►*POWER BRAKE NOTE:* Bendix Power Unit optional on passenger cars. Hydrovac Power Unit optional on trucks. *See "Bendix Power Unit" or "Hydrovac Power Unit" under Power Brakes.*

DESCRIPTION: Duo-Servo, single anchor, hydraulic type without eccentric adjustment.

ADJUSTMENT: Adjustments are made differently for wear (Minor Adjustment) and for new lining or shoe assemblies (Major Adjustment). Major adjustment should also be made whenever a minor adjustment is not satisfactory.

Brake Pedal Adjustment (1951-54): 7/16" (Cars), 13/16" (Trucks except Fwd. Control), 1" (Fwd. Control) between top of pedal arm and toe pan with brakes released and master cylinder pushrod against its stop. Adjust as follows:

Pass. Cars–Loosen check nut on eccentric pedal bolt, turn bolt, tighten check nut to 20-25 ft. lbs.

►*CAUTION:* If correct 7/16" clearance cannot be secured by turning eccentric bolt, adjust by installing shims under front or rear master cylinder bolts.

Trucks (Exc. Fwd. Control)–Loosen locknut at pushrod clevis, turn pushrod, tighten locknut against clevis. *NOTE*–Hold pushrod while tightening locknut.

Trucks (Fwd. Control)–Remove floor pan and cotter and clevis pins from upper end of brake pedal lever rod. Adjust for proper clearance, install upper end to brake pedal, inserting clevis and cotter pins, replace pan.

Brake Pedal Adjustment (1955): Before adjustments made, make sure pedal returns to fully released position freely, with no binding, and that pedal retracting spring has not lost its tension.

Passenger Cars–1/16" pedal movement before contact of pushrod and main cylinder piston. To adjust, loosen check nut on clevis. Turn pushrod in proper direction to secure adjustment. Tighten check nut on clevis.

Trucks (Forward Control)–¾" clearance between top of pedal arm and toe board. To adjust, loosen check nut at rear of clevis on main cylinder pushrod. Turn main cylinder pushrod by knurled portion ahead of boot, in proper direction to secure desired clearance. Tighten check nut.

Trucks (Others)– 1¾" (Low Cab Forward), 11/16" (Others except Fwd. Control), clearance between upper corner of lower pedal arm and seal around upper pedal arm in toe board. To adjust, remove cotter pin and loosen castle nut on adjusting bolt, then rotate adjusting bolt in required direction to obtain desired clearance, tighten adjusting bolt nut, recheck clearance, reinstall cotter pin in adjusting bolt nut.

Minor Adjustment (For Wear): Jack all wheels clear of floor. On passenger cars, loosen check nut at brake cable equalizer to remove tension from brake cable. On trucks, disassemble clevis of parking brake pull rod. On all cars and trucks, remove adjusting hole covers from flange plates. Expand brake shoes by turning adjusting screw with Tool J-4707 until a light uniform drag is felt on brake drum (move outer end of tool toward center of wheel to expand shoes). On passenger cars and ½ Ton truck, turn adjusting screw in opposite direction 7 notches to relieve brake drag. On all other truck models, back off adjusting screw just enough to eliminate drum drag (not to exceed 7 notches). *(NOTE*–If more than 7 notches required to eliminate drag, a Major Adjustment is required). Replace adjusting hole covers. Reconnect and adjust parking brake (see Hand (Parking) Brake below). Check brake pedal clearance (see above).

Major Adjustment (New or Relined Shoes): 1955 Pass. Cars & ½ Ton Trucks and Trucks (other than ½ Ton) adjusted differently. *See 1955 Brake Design Change above.*

1955 Pass. Cars & ½ Ton Trucks–Same as Minor Adjustment above. *See 1955 Brake Design Change above.*

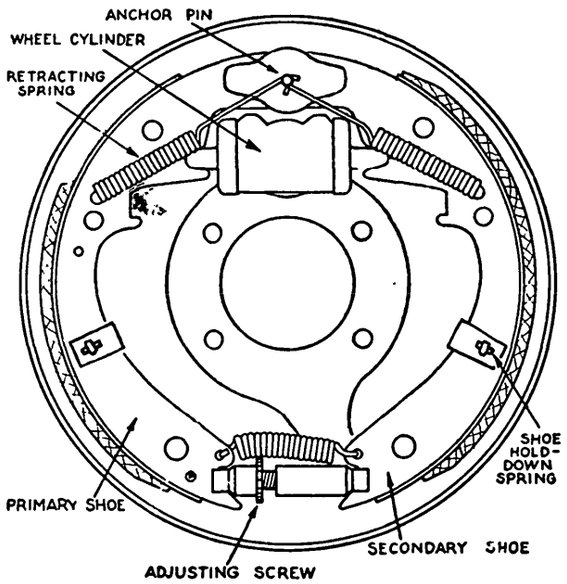
1951-54 Pass. & ½ Ton, All ¼ & 1 Ton, 1½ & 2 Ton (Front Brakes): Loosen anchor pin nut just enough so that pin can be rotated (*CAUTION*–if nut loosened too much, brake springs will tilt anchor pin). With tool J-4707, turn brake adjusting screw to expand brake shoes until a heavy drag is felt on the drum. Tap brake flange plate and turn eccentric pin in direction tending to reduce drag by allowing shoes to center in drum. If drag on drum is reduced, expand shoes by tightening adjusting screw several more notches and again turn eccentric anchor pin while tapping brake flange plate. Repeat this operation until drag remains constant. Then tighten anchor pin nut to 60-85 ft. lbs. (Pass., ½ & ¾ Ton Front & Rear Brakes, 1 Ton Front Brakes), 125-150 ft. lbs. (1 Ton Rear Brakes, 1½ & 2 Ton Front Brakes). Back off adjusting screw just enough to eliminate drag but **not more than 7 notches.** If more than 7 notches required to eliminate drag, repeat adjustment procedure. Adjust parking brake (below). *NOTE*–If heavy intermittent drag noted, brake drums should be rebored and new linings installed.

HAND (PARKING) BRAKE ADJUSTMENT: Passenger Cars and Trucks adjusted differently. 1½, 2 and some ¾ & 1 Ton Trucks (1955) have propeller shaft mounted parking brakes. *CAUTION*–Service brakes must be properly adjusted before making parking brake adjustment.

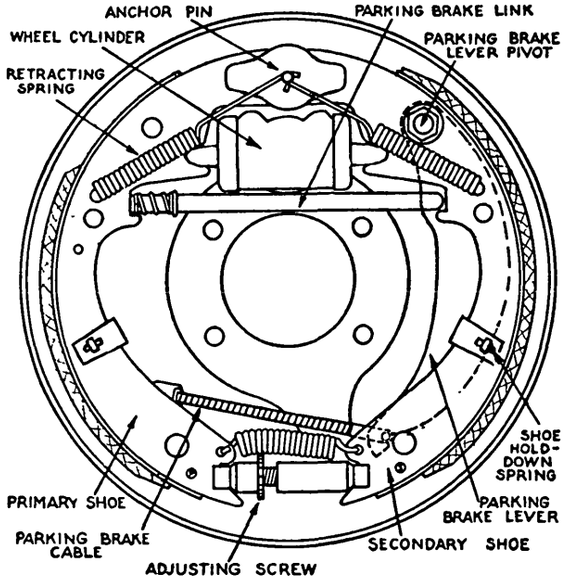
1951-54 MODELS

Adjustment (Pass. Cars): Pull hand brake handle "on" 7 clicks of the pawls *(CAUTION*–this is not 7 notches). Loosen both check nuts at forward end of each wheel cable, tighten front nuts against clevis plates to tighten each cable until moderate drag secured at each rear wheel, tighten rear nuts securely to lock adjustment. Set hand brake handle 2 clicks from fully released position. No brake drag should be noticed.

CONTINUED ON NEXT PAGE



FR NT BRAKE ASSY.



REAR BRAKE ASSY.

CHEVROLET-BENDIX HYDRAULIC (Continued)

Adjustment (½ Ton Truck): Set parking brake foot pedal in fully released position. Adjust pedal pull rod clevis so that clearance between brake cross-shaft and frame crossmember at center is 1/8". Depress foot pedal 1½". Pull each wheel cable forward out of the conduit as far as possible, loosen locknut and adjust clevis on forward end of cable until hole in clevis lines up with hole in cross-shaft outer lever, connect cables. Depress foot pedal until heavy drag noted, check both wheels for equal drag. readjust wheel cable clevis as necessary. Release foot pedal, check clearance between release rod handle and rod support bracket. This clearance should be ½", correct by adjusting handle.

Adjustment (¾ & 1 Ton Truck): With parking brake pedal pedal in fully released position, adjust brake pedal pull rod clevis for correct position of cross-shaft outer levers. Center of hole in end of lever should be to rear of center-line of cross-shaft the following distance on each model: 29/32" (¾ Ton exc. Fwd. Control), ¾" (¾ Ton Fwd. Control), 11/32" (1 Ton exc. Fwd. Control), 19/32" (1 Ton Fwd. Control). Then adjust wheel cables in same manner as on Half-Ton (above).

Adjustment (1½ & 2 Ton Truck): Parking brake is independent type on propeller shaft at rear of transmission. See *"Chevrolet Twinplex" Brakes.*

1955 MODELS

Adjustment (Pass. Cars): Jack up both rear wheels. Check clearance between idler lever and mounting bracket at equalizer (approximately ¼"). To correct, disconnect equalizer, tighten check nuts on forward cable. Pull hand brake out 7 "clicks" (not same as notches). Loosen forward check nuts on equalizer and tighten rear one until there is a slight drag on both rear wheels when rotating drums. Tighten check nuts securely. Set parking lever back to 2 clicks from full release position, at which point no brake shoe drag should be felt.

Adjustment (½ & ¾ Ton Trucks using cable connected to rear wheel service brakes): Jack up both rear wheels. If clevis of parking brake disassembled, place parking brake lever in fully released position, then install clevis to brake pull rod to obtain a dimension of 1 7/16" from end of pull rod to centerline of clevis. With parking brake lever in fully released position and pull back spring in place, adjust parking brake cable at idler lever to obtain a clearance of ¼" between idler lever and rear end of slot in guide. Pull hand brake lever back four notches from fully released position. Pull cables out of conduits by hand as far as possible and assemble cables into idler lever links. Tighten nuts and locknuts. Pull back hand lever until heavy drag is felt at one wheel. Check other wheel for drag, and if any difference is noted, loosen tight wheel until equal drag is obtained. With hand lever pulled out nine notches both rear wheels should be locked so that they cannot be turned by hand. *NOTE*–If more than nine notches are required to lock brakes, check service brake adjustment.

Adjustment (¾ & 1 Ton Trucks using propeller shaft mounted parking brakes): Place the hand brake lever in fully released noteh of ratchet sector. Loosen locknut on brake pull rod. Remove cotter pin from clevis pin holding brake rod to brake cam (leave loose). Set brake cam rest flat on upper brake band bracket. Back off adjusting nuts (at lower end of spring) and adjusting nut at top of adjusting bolt (bolt joins lower part of band to bracket). *(CAUTION*–Do not remove nuts, loosen only). Remove lock wire from anchor screw. Adjust anchor screw until there is .010-.015" clearance between lining and drum at anchor screw. Tighten adjusting bolt (bolt without spring) until there is .020" clearance between drum and lower end of brake band. Tighten locknut. Tighten adjusting nut at lower end of spring until there is .020" clearance between drum and upper end of brake band. Tighten locknut. Adjust brake pull rod so clevis pin can be installed while brake cam rests flat on upper brake band bracket. Install cotter pin in clevis pin of brake pull rod and tighten locknut on brake pull rod. Install lock wire on anchor screw. Recheck all points of facing for correct clearances.

Adjustment (1½ & 2 Ton Trucks): Use independent type. *See "Chevrolet Twinplex" for data.*

BLEEDING BRAKE SYSTEM: *See "Hydraulic Brake Servicing" for complete data.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" for complete data.*

BRAKE SHOE REPLACEMENT: Bonded linings used. Factory bonded shoes are recommended.

Removal: Loosen or disconnect parking brake cables. Remove brake drums. Unhook brake shoe retracting springs from anchor pin (KM0526 tool), remove brake shoe hold-down pins and springs (J-4712 tool). Spread shoes to free them from wheel cylinder connecting links, lift shoe assembly off *(CAUTION*–stops on backing plate will prevent wheel cylinder pistons coming out but brake pedal must not be depressed with brake drum off). Remove adjusting screw and spring to separate shoes. Remove parking brake strut, remove parking brake lever from secondary (rear) shoe of rear wheel brakes.

Installation: On rear wheels only, lubricate parking brake cables, lubricate fulcrum end of parking brake lever and bolt with Lubriplate or brake lube, mount lever on secondary (rear) shoe and make certain that lever moves freely. Lubricate adjusting screw threads and socket end, assemble adjusting screw and spring on shoes *(CAUTION*–adjusting screw and socket must be adjacent to primary or front shoe on **left side**, adjacent to secondary or rear shoe on **right side** for correct alignment with adjusting hole in backing plate). Install shoe assembly on backing plate, engage shoes with wheel cylinder connecting links, and connect hold-down pins and springs *(CAUTION*–Primary shoe which has shorter lining must be toward front of car. On rear brakes, connect cable to parking brake lever and install strut between lever and primary shoe as shoes are installed. Install brake shoe retracting springs *(CAUTION*–use new springs if old springs nicked, distorted, or weak). Pull shoes away from backing plate and lubricate contact surfaces with thin coat of Lubriplate or brake lube. After drums installed, make Major Adjustment (see above).

OVERHAUL: Brake Drums–Rebore brake drums if more than .010" out-of-round. Manufacturer recommends reboring to .060" oversize and use of .030" oversize lining (max. available oversize). Drum runout must not exceed .005".

Cable Lubrication–Lubricate cables when making major adjustment or if cables sticky. Use hand gun only and remove rear brake drums to make sure lubricant not being forced into brake assembly.

Master Cylinder & Wheel Cylinder–*See "Hydraulic Brake Servicing" for complete data.*

CHEVROLET TRUCK TWINPLEX

Chevrolet Trucks, 1½ & 2 Ton Rear Brakes (1951-55)

►*FRONT WHEEL BRAKE NOTE:* Front wheel brakes are Chevrolet Hydraulic (1951-52), Chevrolet Bendix (1953-55).

►*BRAKE BOOSTER NOTE:* Hydrovac Power Unit is Standard or Optional on all models.

DESCRIPTION: Two cylinder, four anchor type (each shoe anchored at each end and linked to wheel cylinder at each end). Brakes are radially self-centering.

ADJUSTMENT: Each shoe has one adjustment (adjusting screw at adjustable anchor end). Adjustment is same for both wear and for new or relined shoe clearance.

Brake Pedal Adjustment: *See "Chevrolet-Bendix Hydraulic" for data.*

Brake Shoe Adjustment: Jack up both rear wheels, remove adjusting hole covers from backing plates (two holes at each wheel–one for each shoe). Use tool J-4707 or screwdriver inserted through rear (lower shoe) adjusting hole and turn adjusting screw up (move outer end of tool toward center of wheel) until light brake drag is felt on wheel, then back off adjusting screw 3 notches for correct running clearance. Adjust upper shoe similarly by inserting tool through front adjusting hole.

Parking (Hand Brake) Adjustment: Parking brake is independent type mounted on propeller shaft at rear of transmission.

1½ & 2 Ton–Fully release brake lever. Loosen locknut on outer shoe adjusting screw then tighten to secure a clearance of .010" to .015" measured at point directly above screw. Tighten locknut. Loosen locknut on link between hand brake lever and shoe actuating lever. Tighten adjusting nut on link to secure a clearance of .010" to .015" between inner shoe and drum. Tighten locknut.

BLEEDING BRAKE SYSTEM: Pressure or manual methods can be used.

Pressure Bleeding: 1) Back off adjusting screw all the way on upper shoes of both rear wheels. Fill master cylinder reservoir to top of filler plug opening. Connect pressure bleeder to master cylinder and open valve in bleeder tank line. *(NOTE*–Bleeder tank should be charged with 25-35 lbs. air pressure and kept at approx-

CONTINUED ON NEXT PAGE

CHEVROLET TWINPLEX (C nt.)

imately this pressure during bleeding operation. End of bleeder tube must be in a bleeder jar or bottle and covered with fluid while performing all bleeding operations).

2) Connect bleeder tube to bleeder valves in following sequence, open bleeder valve and bleed until all air bubbles disappear, then close bleeder valve. Sequence as follows:

a) Hydrovac slave cylinder (No. 2 bleeder valve on end cap). *NOTE*—Will take approximately ½ pt. of fluid.
b) Hydrovac valve (No. 1 bleeder valve on top of control valve).
c) Front, rear wheel cylinder on left side.
d) Front, rear wheel cylinder on right side.
) Left front wheel cylinder (one only).
f) Right front wheel cylinder (one only).

3) Adjust upper shoe on each rear wheel with pressure tank still connected. Push down hard on brake pedal several times to centralize shoes. Disconnect pressure tank and readjust all brake shoes..

4) Apply approximately 75 lbs. pressure on brake pedal and check pedal clearance from toe board to forward edge of pedal pad. Clearance should be a minimum of 5" with floor mat removed. If reserve less than 5", rebleed Hydrovac and rear brakes in sequence outlined above.

Manual Bleeding: 1) Install adapter and automatic filler J-713. Connect bleeder tube to Hydrovac bleeder valve No. 2 (on end cap). Place end of tube in container having sufficient fluid to cover end of tube.

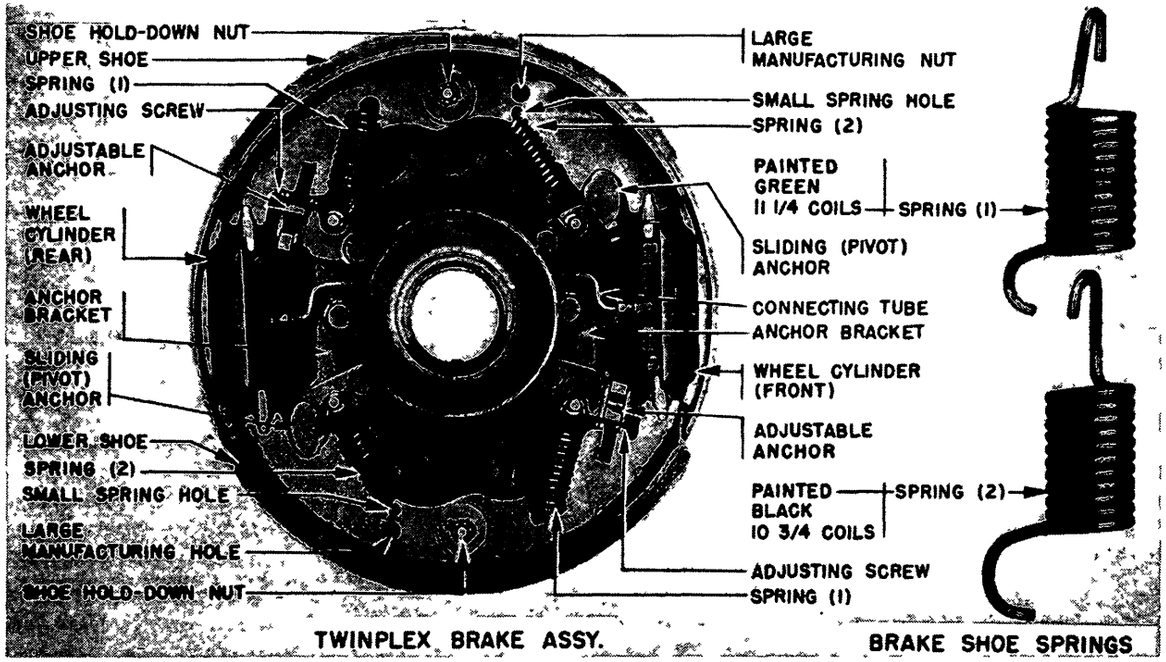
2) Open bleeder valve approximately ¾ of a turn, depress brake pedal a full stroke and allow it to return slowly, making sure end of tube is under surface of liquid in container. Continue operating pedal, refilling jar at master cylinder when necessary, until liquid emerging from bleeder tube is air bubble free. Close bleeder valve. Proceed to bleed system as outlined in steps **2) b)** through **f), 3) and 4)** under "Pressure Bleeding" above, using automatic filler in place of pressure tank.

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" for complete data.*

BRAKE SHOE REPLACEMENT: Brake linings are riveted type and can be installed in the field after shoes have been removed.

R moval: Support rear end of truck on stands, remove rear wheels, back off adjusting screw for each shoe (two per wheel), remove brake drums by taking out 3 retaining screws on face of drum. Disconnect and remove all shoe pull back springs, remove hold-down nut on washer on web of each shoe. Disengage shoes from cylinder links, lift shoes out.

►*CAUTION: Stops on backing plat will prev nt wheel cylind r pistons from coming out but brak p dal must n t b d pr ssed when drums ar ff.*



CHEVROLET TWINPLEX BRAKE ASSY.

Installation: Lubricate shoe primary (sliding pivot) anchors and all shoe bearing surfaces on brake flange plate with light film of Lubriplate or Brake Lube. Install shoes, engaging ends of shoes with anchors and slotted ends of wheel cylinder links, and making certain that hold-down bolt enters hole in shoe web. Lubricate hold-down bolts and washers lightly with Lubriplate or Brake Lube, install washer and nut on each hold-down bolt and tighten nuts loosely. Install shoe pull back springs (*CAUTION*—see illustration and Note below for correct spring installation). Tighten each hold-down bolt nut until clearance between edge of shoe and contact face on flange plate is .010" (measure with feeler gauge). Install drums and adjust brakes.

►*BRAKE SHOE PULL BACK SPRING NOTE:* Different spring used at each end of shoes. Install springs thus: **Spring at Primary (Sliding Pivot) Anchor End of Shoe**— 10¾ coil, 90 lb. type, painted BLACK for identification, with LARGE hook at shoe end of spring. Install spring with this large hook engaging small hole in shoe web.

►*CAUTION: This spring must not be engaged in larger manufacturing hole in web adjacent to spring hole.*

Spring at Secondary (Adjustable) Anchor End of Shoe— 11¼ coil, 70 lb. type, painted GREEN for identification, with SMALL hook at shoe end of spring. Install this spring with this smaller hook engaging the large hole in the shoe web adjacent to the shoe adjusting wheel.

►*CAUTION: Interchanging springs or incorrect installation will result in unev n brak shoe w ar and unsatisfactory brake operation.*

OVERHAUL: Brake Drums—Rebore brake drums if more than .010" out-of-round. Manufacturer recommends reboring to .060" oversize and use of .030" oversize lining (max. available oversize). Drum runout must not exceed .005".

Master Cylinder: *See "Hydraulic Brake Servicing".*

Wheel Cylinders: To remove wheel cylinders, first remove brake shoes, then take out capscrews holding wheel cylinder on backing plate and remove **both cylinders and connecting lin as a unit.**

Disassembly—Disconnect line linking the two cylinders, remove rubber boots and shoe connecting links, withdraw pistons and rubber cups and springs from cylinder. *CAUTION—Do not r mov rubber cups (piston rings) from grooves in pistons unl ss th s cups being replaced.*

Inspection & Repair—Inspect cylinders for scores, scratches, and corrosion. Light scratches or lightly corroded areas may be cleaned up with crocus cloth, replace cylinder if these cannot be polished out. (*CAUTION*—Honing cylinders not recommended). Replace piston cups and cylinder boots if swollen or damaged. Piston clearance in cylinder .002-.004".

Reassembly—Dip all parts in brake fluid. Install piston and cup assemblies with cupped side toward spring or inward. (*CAUTION*—use care not to damage edges of cups). If new cups being installed, use tool J-4705 and install cups with open end toward flat end of piston.

FORD-LOCKHEED HYDRAULIC
FORD & MERCURY

Ford 6 & V8 Pass. Car Models (1946-48)
Ford Comm'l & Truck, All Models (1939-48)
Ford F-2 ¾ Ton Truck (1948-51)—See Note
Ford F-3 ¾ Ton Spec. Trk. (1948-51)—See Note
Ford F-3 Parcel Del. (1949-51)—See Note
Ford F-3 Truck Parcel Del. (1948-Early 1951 All Whls., Late 1951-52 Front Whls. Only)
Ford F-4, 5, 6 Trucks (1948-52)
Ford F, C-700; F, C-750 Trucks 1953-55 Front Wheels)
Mercury, All Models (1946-48)

►*1955 MASTER CYLINDER PUSHROD INSTALLATION CAUTION:* Master cylinder pushrod and clevis pin are installed in lower hole in brake pedal on all models

►**BRAKE TYPE NOTE: Ford & Mercury 1946 & Later Passenger Cars.** The brakes on these models are "self-centering" type and do not have adjustable anchor pins.

Series F-2 (Front & Rear), F-3 (Front)—Lockheed "self-centering" hydraulic type without anchor pin adjustment (eccentric adjustment only).

Series F-3 Parcel Delivery (Front & Rear)—Brakes are double-anchor hydraulic type with eccentric and anchor pin adjustments. Late 1951 model has Ford-Bendix hydraulic brakes on rear wheels only.

Series F-3 (Rear only), F-5 & F-6 (Front & Rear): Lockheed double-anchor hydraulic type with eccentric and anchor pin adjustments.

DESCRIPTION & OPERATION: Lockheed two shoe, double anchor type. **Two shoes per wheel, each mounted on individual eccentric anchor pin at lower or 'heel' end and bearing directly against opposed pistons of stationary wheel cylinder at upper or 'toe' end.**

Anchor Pins (All Ford & Mercury Self-centering type Brakes). On these models, anchor pins are fixed on backing plate and have special elongated washers which engage elongated holes in brake shoe web. With this mounting, shoes tend to "center" themselves in drum when brakes are applied.

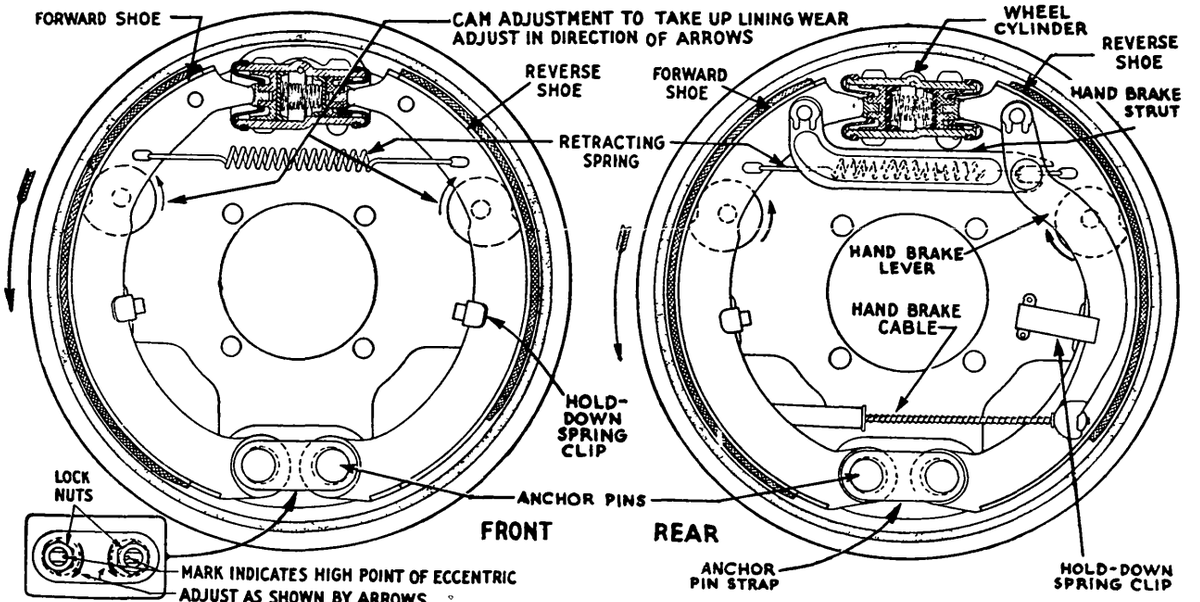
Wheel Cylinders:—Rigid type mounted on backing plate with opposed pistons which bear directly against toes of brake shoes. Pistons are sealed by rubber cups held against piston heads by central spring and dirt is excluded from cylinder by rubber boot fitting over end of cylinder and brake shoe.

Master Cylinder:—Compensating type with integral supply tank. Similar in design to type used on other Lockheed Hydraulic Brake applications.

Parking Brake: On Pass. Cars, ½ and the 1949-50 & early 1951 ¾ Trucks (exc. Par. Del.) hand lever applies rear service brakes through cables. On other truck models, hand lever applies independent brake mounted on propeller shaft at rear of transmission.

BLEEDING BRAKE SYSTEM: *See "Midland Hy-Power" Power Brakes for procedure with Power Brakes and "Hydraulic Brake Servicing" for brakes without booster.*

Brake Pedal Adjustment:—Brake pedal must have ¼-½" free movement (measured at pedal pad). This movement is the movement of the pedal before the push rod touches master cylinder piston. To adjust, loosen locknut on brake pedal-to-master cylinder rod, rotate push rod until pedal free play is within limits. Tighten locknut.



FORD-LOCKHEED BRAKE ASSY.

►*CAUTION—Do not make cables too tight or the rear brake shoes will be pulled off their anchors.*

►*ADJUSTMENT CAUTION:* **First jack up all four wheels, remove one front wheel and inspect lining (to determine if new linings required), re-install wheel. Check front wheel bearing adjustment, spring shackles, shock absorber links, and radius rod mountings, tighten steering connections. Place hand lever in released position. Adjust each wheel as follows:**

Minor Adjustment (For Wear):—Install wrench on eccentric adjusting cam on backing plate with wrench handle upward, turn cam by moving wrench handle out toward wheel rim until shoe is tight in drum, then turn cam back until wheel just turns freely without drag (do not turn cam back more than enough to free wheel, desired setting is with least possible amount of clearance). After adjusting forward shoe, repeat adjustment on rear shoe, then adjust all other wheels in same manner. Check pedal reserve, if reserve less than half total travel, repeat adjustment (if pedal is 'spongy', bleed lines).

►*CAUTION—Clearance between shoes and drum should be least amount possible without drag (no specific clearance specified).*

Major Adjustment (For relined brakes, etc.):—NOTE *This adjustment not required on 1946-48 Pass. Cars and Light Trucks with "self-centering" type brakes.*

Before installing brake drums, loosen eccentric anchor pin locknuts and turn each anchor pin so that marks on flatted ends of pins are together (marks indicate 'high' side of eccentric and in this minimum position will allow drums to be installed over new linings), turn eccentric adjusting cam for each shoe to minimum position. With drums installed, turn eccentric anchor pin toward adjacent anchor pin (wrench handle upward) until brake shoe is tight against drum, then back anchor pin off slightly until wheel turns freely without any drag. Hold anchor pin from turning and tighten locknut securely. Then adjust eccentric adjusting cam (see Minor Adjustment above) for correct toe clearance of the brake shoe. Adjust both shoes in each wheel in this manner, then adjust hand brake.

	Heel	Toe
Brake Shoe Clearance	.007"	.010"

Parking Brake Adjustment Caution: Different types of linkages used. Adjust each model as follows:

Passenger Cars—Place hand brake control lever in fully released position. Depress the brake pedal until rear brake shoes applied firmly against drums, leave pedal in this position while adjustment being made. Pull forward on cables to remove all slack, adjust clevis on end of hand brake cable so that, with foot brake applied as above, end of hand lever has ½" travel before slack in cables is taken up. Release foot brake pedal. With hand lever in released position, check that rear wheels are free of any brake drag.

F-1 ½ Ton, F-2, 3 ¾ Ton (1948-Early 1950)—After adjusting service brakes, place hand lever in fully released position. Apply enough pressure to depress brake pedal until rear brake shoes are applied firmly. Adjust each wheel cable at equalizer lever on frame cross-member by taking out clevis pin, loosening locknut, and turning clevis on cable end fitting until all slack is removed from cables and mounting bolt is centered in slot in equalizer plate. Adjust hand lever cable by taking out clevis pin, loosening locknut, and turning clevis on cable end fitting until hand lever has approximately ½" movement (with brake shoes applied as above). Release pedal, make certain rear wheels free of drag.

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FORD-LOCKHEED HYDRAULIC (C nt.)

F-2, 3 ¾ Ton (Late 1951), F-3 Parcel Del. (1949-51), F-4 1 Ton, F-5 1½ Ton & F-6 2 Ton (1948-52)—Hand brake is independent contracting band type operating on drum on propeller shaft at rear of transmission *See 1½ & 2 Ton adjustment instructions following:*

1½ & 2 Ton Truck Models (1948-52)—Release hand brake lever. See that flat of cam rests on brake band ear (if not, remove clevis pin from rod above cam and adjust clevis as necessary so that flat of cam rests on ear of band, install clevis pin. Remove lockwire and turn anchor screw (on bracket on left side) in until clearance between lining and drum is .010" at this point, replace lockwire. Loosen locknut and turn bracket adjusting screw nut (on right side, adjusting screw head on bracket is slotted) until clearance between lining on lower half of band and drum is .010", tighten locknut. Then tighten nut on lower end of band adjusting rod (below ear on lower end of band) until clearance between lining on upper half of band and drum is likewise .010". Recheck rod linking cam and brake lever. Make certain that adjusting nuts are secured with lockwire.

OVERHAUL: *NOTE.* Factory recommends installation **of factory reconditioned brake shoes (with new lining installed) whenever lining worn so that replacement required. Before removing brake shoes, install clamp on wheel cylinders (to retain wheel cylinder pistons) and be careful not to depress brake pedal with shoes off. This will eliminate necessity of bleeding lines when shoes installed.**

Brake Shoe Removal: Remove each type as follows

Self-centering Type Shoes—Remove brake shoe return spring, take out anchor pin cotter pins, remove anchor pin plate Remove brake shoes, anchor pin washers, and anchor pin bushings On rear brakes, unhook parking brake cable, remove parking brake link and lever.

Adjustable Anchor Type Shoes—Remove brake shoe return spring, remove nuts and lockwashers on anchor pins. Remove anchor pins and anchor pin plate. Remove brake shoes and anchor pin bushings On rear brakes, disconnect parking brake cable and remove parking brake link and lever.

Relining Brake Shoes: Lining should be replaced when worn to point where rivet head less than 1/32" below surface of lining. Inspect shoes for distortion or looseness between rim and web. Clean shoe rim and remove all burrs or high spots before installing new lining After riveting, new lining must be snug against shoe with not more than .005" separation midway between rivets.

►*BRAKE LINING NOTE*—Lining furnished in brake lining kits is ground in production and does not require grinding after installation.

Brake Shoe Installation:—Assemble retracting spring to shoes (and hand brake lever and link parts for rear wheels). Turn eccentric adjusting cams to minimum position. Hold shoes so that anchor pin ends overlap and upper ends spread sufficiently to enter wheel cylinder pistons, engage shoes in piston slots, spread lower ends of shoes until they are engaged under flat lip of hold-down springs. Install anchor pins making certain that eccentric is in place in hole in brake shoe and that anchor pin engages eccentric. Turn anchor pins so that notch in flatted end of each pin is lined up with notch in opposite pin, install anchor pin locknuts, connect hand brake cable to lever. Adjust shoes as directed in Major Adjustment above.

Master Cylinder & Wheel Cylinder Disassembly and Overhaul:—All service operations same as on other Lockheed brake installations. *See "Hydraulic Brake Servicing" for complete data.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" for complete data.*

FORD TRUCK BENDIX UNI-SERVO

Ford Trucks—F-2 & F-3 exc. Parcel Del. (1951-52). Front Wheels Only.

Ford Trucks—F-250; F, P-350, F, C, P-500, F, C-600 (1953). Front Wheels Only.

Ford Trucks—F-250, F, P-350; B, C, F, P-500, B, C, F-600 (1954-55). Front Wheels Only.

►*REAR BRAKE CAUTION· Different type brakes used on rear wheels as follows·*

F-2, 3, F-250, F, P-350—Ford-Bendix Hydraulic, Duo-Servo type *See "Ford, Lincoln, Mercury Bendix".*

B, C, F, P-500; B, C, F-600—Ford "Self-Centering" type. *See "Ford Truck Self-Centering".*

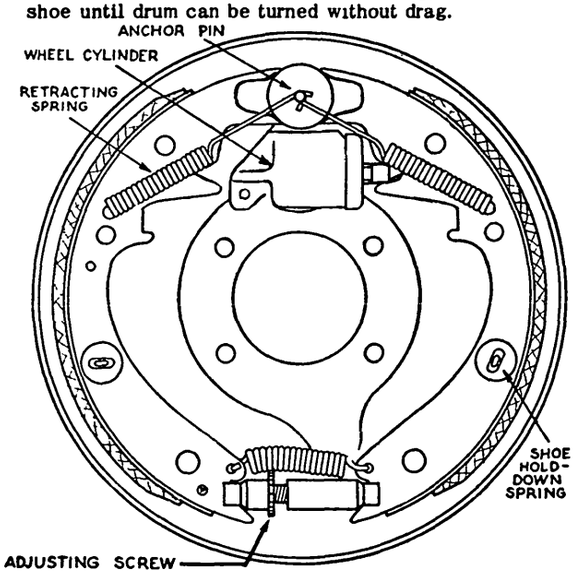
►*POWER BRAKE NOTE "Hydrovac" or "Midland Hi-Power" Standard or Optional on these trucks. See "Hydrovac" or "Midland Hi-Power" under Power Brakes.*

►*1955 MASTER CYLINDER PUSHROD INSTALLATION CAUTION:* On F-100 Trucks master cylinder pushrod and clevis pin are installed in upper hole in brake pedal, on F-250, F-350 and F, B-500 pushrod and clevis pin are installed in upper hole with conventional brakes, and in lower hole with booster brakes, on B, C, F-600 pin and pushrod are installed in lower hole of brake pedal for both conventional and booster brakes.

DESCRIPTION: Bendix "Uni-Servo" single anchor, hydraulic type with single-acting wheel cylinder mounted on the backing plate and actuating the primary shoe through a strut (no direct connection to secondary shoe). Brake shoes are conventional Bendix type (joined by adjusting screw at lower end, single anchor between shoes at upper end with retracting springs hooked to each shoe and anchor pin). Wheel cylinder has single piston and cup with a return spring seated in the end of the cylinder.

ADJUSTMENTS: Make adjustments with brake drums at normal temperature and with wheels either jacked up or contacting road (if wheels on road so they cannot be checked for drag, make this check by striking drum with a hammer—sound will be deadened if shoes contacting drum).

Minor Adjustment: Remove adjustment hole cover from brake carrier plate. Rotate adjusting screw, with a suitable tool, until shoe begins to drag, then back off shoe until drum can be turned without drag.



UNI-SERVO BRAKE ASSY.

Major Adjustment: Wedge primary shoe against the drum by inserting a .010" feeler gauge through slot in drum at center of secondary shoe and expand shoes by turning adjusting screw. Then adjust adjusting screw and anchor pin (slotted type) for .010' clearance at each end of secondary shoe (measure 1½" from each end of shoe).

Brake Pedal Adjustment: Brake pedal free travel should not be less than 3/16" nor more than 3/8" before push-rod touches master cylinder piston. Adjustable at master cylinder pushrod.

Parking Brake Adjustment: Set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, then adjust clevis rod to allow flat portion of cam to rest on brake band bracket. Install clevis pin and cotter pin. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until clearance of .010" is established between brake lining and brake drum at anchor bracket. Loosen locknut on adjusting screw for lower half of brake band, adjust screw to establish .010" between brake lining and drum at lower half of brake band. Tighten locknut. Turn upper band adjusting nut until .010" clearance established between upper half of band and drum. Be sure to install lock wire in anchor adjusting screw.

BLEEDING BRAKE SYSTEM: *See "Hydraulic Brake Servicing"*

BRAKE SHOE & DRUM REPLACEMENT: *See "Ford, Lincoln, Mercury Bendix"*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting"*

OVERHAUL: Master Cylinder & Whe l Cylind rs—*See "Hydraulic Brake Servicing"*

FORD, LINCOLN, MERCURY BENDIX HYDRAULIC

Ford Pass. Cars (1949-55)
Ford F-1, 100 Truck (1948-55)
Ford F-2, 3 Truck (Late 1951-52)—Rear Wheels
Ford F-250; F, P-350 Trucks (1953-55)—Rear Wheels
Lincoln, All Models (1946-55)
Mercury, All Models (1949-55)
Thunderbird (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*POWER BRAKE NOTE: Power Brake units standard or optional as follows (See Power Brakes):*
Ford—"Hydrovac" or "Midland" Brake Power Unit.
Lincoln & Mercury—Bendix Brake Power Unit.

►*FORD TRUCK FRONT BRAKE CAUTION:* Ford-Bendix "Uni-Servo" used on front wheels of above listed trucks except F-1, 100.

►*1949-52 HAND BRAKE CABLE INTERFERENCE CORRECTION & PRODUCTION CHANGE*—If cable or conduit rubs on rear tires, correct as follows:

Ford Pass. Cars—Remove cable conduit clip on frame, revolve conduit toward center of car (twist conduit at carrier plate if necessary), re-install clip. A new parking brake assembly (Ford No. AB-2275-E) entered production Aug. 19, 1952. Assembly is shorter and prevents conduit rubbing on rear tires, and is interchangeable on earlier cars.

Mercury—A new hand brake cable rear bracket, Mercury Part No. MA-2530-B (Right), and MA-2531-B (Left) entered production April 7, 1952. New brackets are interchangeable with earlier type brackets.

►*FORD HAND BRAKE LINKAGE CHANGE (To lessen effort required to set hand brake on First Cars):* On creased by drilling new hole in equalizer lever and shifting wheel cable connector to this new hole.

Passenger Cars—Drill new 5/16" hole 13/32" from existing hole toward pivot end of lever.

Station Wagon & Convertible—Drill new 5/16" hole at point 9/16" from center of existing hole toward pivot end of lever (new hole center will be 1¼" from center of pivoting notch in lever).

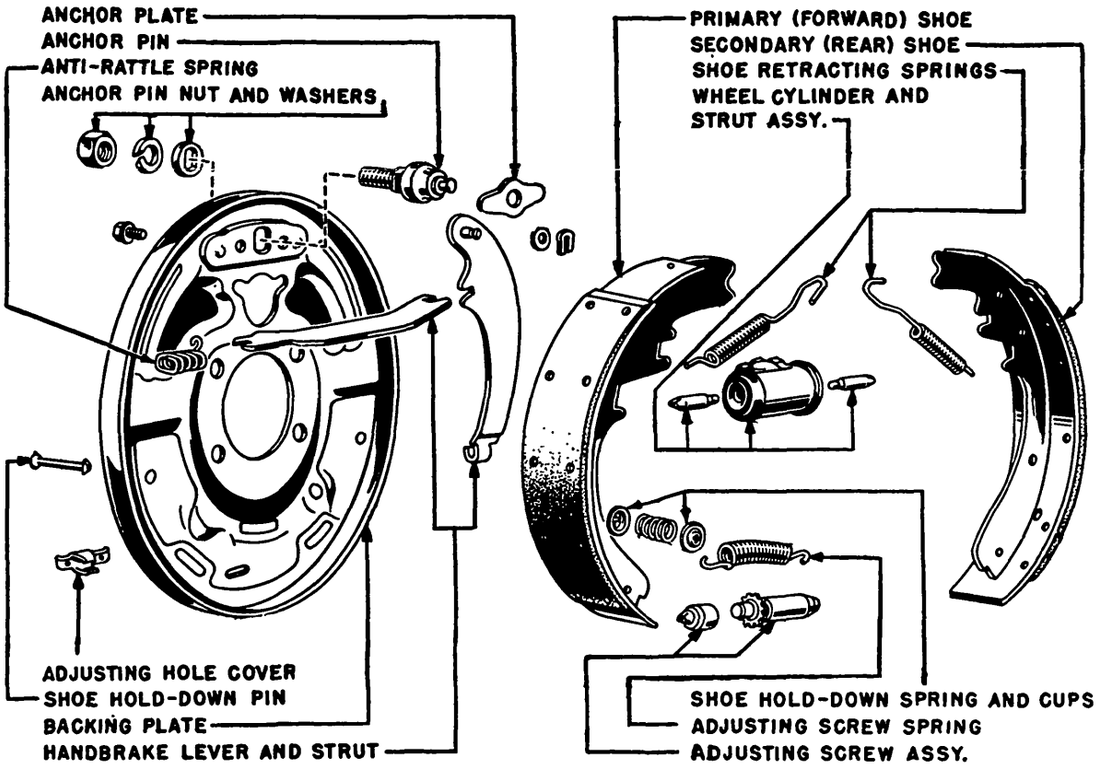
►*NOTE—This change made in production on later cars.*

►*CAUTION*—If above procedure does not correct complaints of hand brake being hard to apply, remove hand lever assembly, check for burrs on hand brake shaft, clean up shaft with round file, apply light film of lubricant when reassembling.

►*LINCOLN & MERCURY HAND BRAKE LINKAGE CHANGE (for improved operation on First Cars):*

Re-route Brake Cable. Disconnect cable at lever, remove all clips down to spring clip at center of frame "X" member (do not disturb this clip), re-route cable and install new clips as follows: Install No. E.D. 11A-17278 clip at transmission case bottom rear shifter cover bolt, E.D. 353364-SB at brake master cylinder front bolt (route cable over top of steering column tube, install clip E.D. 353364-SA at upper rear corner of front fender apron (on Lincoln 121" WB, use clip 11A-14598 installed on fender apron 1½" to rear of wiring harness clip), route cable through hole in dash (use 91A-14602-A1 rubber grommet) attach cable and adjust hand brake.

►***CAUTION—Avoid all sharp bends and kinks when installing the brake cable. Tape brak cable and hood latch control cables together to prevent rattles.***



FORD-BENDIX REAR BRAKE ASSEMBLY
(FRONT BRAKE SAME EXCEPT HANDBRAKE PARTS NOT USED)

Re-locate Cable Connection on Hand Lever (Mercury only)—Drill new 5/16" hole in hand brake lever at point 1.38" from center of pivot hole in lever and shift cable connection to this new hole to improve leverage.

Lubricate Hand Brake Control—Lubricate following points with Lubriplate or equivalent (use sparingly): 1. Lever Pivot at ratchet bar, 2. Ratchet Bar, 3. Dash Hinge Bracket, 4. hand lever and body bracket Bolt & Contact Surface.

Align Hand Brake Control—To insure alignment, first attach hand brake lever at body bracket, second attach ratchet bar housing assembly to instrument panel with hand lever in fully released position.

►*1949-54 MERCURY BRAKE "SQUEAL" CORRECTION:* Brake Drum Silencer Spring, Part No. OM-1140 furnished for all 1949-54 Models. To install, proceed as follows:

Drums with Circumferential Grooves—Hook ends of spring together and roll onto drum, stopping next to raised rib near open end of drum.

Drums without Grooves—Hook ends of spring together and roll onto drum, stopping next to raised rib near open end of drum. Use a 5/16" round-nosed chisel and raise metal against spring in four places equally spaced around drum to retain spring in position.

►*BRAKE PEDAL BINDING CORRECTION*—Remove master cylinder pushrod-to-pedal eccentric bolt and bushings. Dip bushings in light engine oil and re-install.

►*1954 DESIGN & ADJUSTMENT CHANGE:* Front brakes of all 1954 Passenger cars have eccentric adjustment. Position of front brake assembly has been rotated to give access to anchor pin. A secondary shoe adjusting spring holds secondary shoe in released position. An eccentric, located behind secondary shoe, provides the stop. See Major & Minor Adjustments (With Eccentric) for adjustment procedures. Rear wheel brakes remain the same as previous models (without eccentric adjustment).

►*1955 FORD TRUCK MASTER CYLINDER PUSHROD INSTALLATION CAUTION:* On F-100 Trucks master cylinder pushrod and clevis pin are installed in upper hole in brake pedal for both conventional and booster type brakes; on others, master cylinder pushrod and clevis pin are installed in upper hole

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FORD, LINCOLN, MERCURY BENDIX (Cont.)

in brake pedal for trucks with conventional brakes and in lower hole for trucks with booster brakes.

►*1955 FORD PASS. CAR BRAKE LINING PRODUCTION CHANGE:* Effective approximately August 1, 1955, under-ground brake lining became effective in production. Adjustment procedures for both underground and uniform-ground linings are the same.

►*1954 FORD P-350 TRUCK HAND BRAKE CABLE INTERFERENCE CORRECTION:* To prevent interference between hand brake cable and clutch pedal, attach one clip, Part No. 91A-2279, to upper bolt in seam of left front wheel splash shield, and another clip, Part No. 352605-S8, to boss at top left rear corner of cylinder block. Cable should pass from hand brake lever to 91A-2279 clip, then up to 352605-S8 clip on engine. Be sure cable is positioned between steering column and sheet metal.

►*BRAKE SHOE RETRACTING SPRING PRODUCTION CHANGE & REPLACEMENT CAUTION (Pass. Cars):* Effective production Aug. 24, 1955 a new oil tempered brake retracting spring, Part No. B5A-2035-A, has been used to improve brake life and performance, and should be installed on units produced prior to above date. When installing spring, avoid bending end hooks or stretching beyond attaching point.

►*1955 FORD PASS. CAR PRIMARY BRAKE LINING & SHOE PRODUCTION CHANGE:* A new primary brake lining and modified brake shoe has been released for front and rear wheels. New lining is shorter in length, and is intended to reduce "pulling or diving" on brake application. **New linings may be installed on earlier type shoes**, and earlier type linings may be used on the new type shoes. In either case, two new holes must be drilled in the shoes using the holes in the lining as a template. *NOTE*—Shortened end of primary linings must be located at anchor (upper) end of shoe. When installing new linings on earlier type shoes, two holes must be drilled at anchor end. When relining brakes, make sure new type (shorter) and old type linings are not mixed.

Lining Kits

Car Model	Front Wheel Kit	Rear Wheel Kit
Car	B5A-2007-G	B5A-2007-H
Car (Hvy. Duty)	B5A-2007-L	B5A-2007-M
Sta. Wgn., Sed. Del.	B5A-2007-J	B5A-2007-K
Thunderbird	B5S-2007-B①	

①—Lining kit for both front and rear wheels.

►*1955 FORD PASSENGER CAR ADJUSTMENT CHANGE:* Eccentric is located on primary shoe. Initial adjustments made on primary instead of secondary shoe. Adjusting spring is no longer used.

►*1955 FORD PASS. CAR BRAKE LINE INTERFERENCE WITH OIL FILTER CORRECTION:* Clip, Part No. B4A-2244-A, and attaching screw, Part No. 39883-S7, now available to secure brake line to rear side of No. 2 crossmember. On vehicles not equipped with additional clip (now used in production), and on which interference is encountered, proceed with installation of additional clip as follows: Locate and mark spot on No. 2 crossmember 4½" to left, and 4 15/16" up from center of existing clip at left hand rear side of crossmember. Drill 9/32" hole at this spot. Position brake line on crossmember, and secure line with clip and screw. *NOTE*—Brake line will move far enough to permit installation without bending or crimping line.

►*1955 LINCOLN & MERCURY FRONT BRAKE PRODUCTION CHANGE:* Front brake eccentric adjuster has been eliminated on later cars and no eccentric adjustment is required. See Adjustments below.

►*1955 LINCOLN & MERCURY BRAKE ADJUSTMENT CHANGE:* Adjustment procedures are affected in that eccentric cam is now spring loaded, which eliminates need for lockout to retain it in position. See Adjustments below and also Production Change above.

DESCRIPTION

DESCRIPTION: Duo-Servo, single anchor, hydraulic type. *NOTE*—Eccentric used **on front wheels** of all 1954 models, 1955 Ford Passenger Car models, and early 1955 Lincoln and Mercury models. All 1946-53 models and late 1955 Lincoln and Mercury models do not use eccentric

ADJUSTMENTS

ADJUSTMENTS: Before making any adjustments, jack up all four wheels, check brake pedal clearance (see below), fully release hand brake lever and make certain that all wheels turn free. Then adjust as directed below.

BRAKE PEDAL ADJUSTMENT

Brake Pedal Adjustment: Pedal must have more than ¼" but less than 7/16" free travel (Ford Pass. Cars, Lincoln, Mercury), more than 3/16" but less than ⅜" free travel (Ford Trucks) before master cylinder piston begins to move.

Ford (Pass. Cars), Lincoln, Mercury—Loosen locknut on eccentric bolt attaching brake pedal to master cylinder pushrod, and turn bolt for desired free play.

Ford (Trucks)—Loosen locknut on master cylinder pushrod, remove clevis pin at brake pedal, turn pushrod in or out as necessary, tighten locknut.

MINOR ADJUSTMENT

Minor Adjustment (Except 1954-55 Ford Pass. Cars):
Ford—Turn adjusting screw for each wheel (accessible through slot in backing plate) until drum can just be turned by hand, then back off adjusting screw until shoes are just free and wheel revolves without drag.
Lincoln & Mercury—Use feeler gauge to set shoe clearance to .010". See Major adjustment for data.

Minor Adjustment (1954-55 Ford Pass. Rear Wheels): Disconnect parking brake cable at equalizer clevis pin. Turn adjusting screw (toward axle) until wheel can just be turned by hand. Back off adjusting screw 10 to 14 notches (away from axle). Wheel should rotate freely. If drag felt, Major Adjustment is required. Connect parking brake cable and adjust. Apply brakes and measure distance from pedal pad to floor board. If distance less than ½ of total travel, Major Adjustment is required. *NOTE*—If car has booster brakes, check must be made with engine running.

Minor Adjustment (Lincoln & Mercury Front Wheels): Two adjustments required as follows:
Eccentric Cam Adjustment—Raise car and remove front wheels. Insert .010" feeler gauge through drum slot and check clearance at lower end of secondary shoe. Feeler gauge should be just snug. To adjust clearance, rotate cam adjusting stud in direction of forward wheel rotation to decrease clearance. To increase clearance, rotate cam in opposite direction. Check clearance at upper end of secondary shoe (.010"). The clearance at both ends should be same within .003". Where variation is greater, make Major Adjustment.
Adjusting Screw Adjustment—Remove adjusting hole cover and insert .010" feeler between lining and drum near lower end of primary shoe. Hold primary shoe snug against feeler. To decrease secondary shoe clearance, rotate adjusting screw from top to bottom, and to increase secondary shoe clearance rotate adjusting screw from bottom to top. Then recheck clearance at both ends of primary and secondary shoes. Check that all brake drums are free of lining drag.

Minor Adjustment (1954-55 Ford Pass. Car Front Wheels): Check anchor pin with 16" wrench (if loose, Major Adjustment is necessary). Expand brake shoes by turning adjusting screw (star wheel) toward center of brake until it is just possible to rotate drum. Back off adjusting screw 10 to 14 notches. While slowly rotating drum, turn eccentric cam in direction of forward rotation until slight drag is felt, then back off eccentric cam to have a freely rotating drum. *NOTE*—Tap backing plate with hammer when backing off eccentric cam to center shoes. If drum does not rotate freely after backing off adjusting screw and carefully setting eccentric cam, a Major Adjustment is required.

MAJOR ADJUSTMENT

Major Adjustment (Except 1954-55 Ford Pass: Cars):
►*CAUTION: Recommended procedure for Ford is not the same as for Lincoln & Mercury.*
Ford—Wedge the primary shoe out against the drum by inserting a .010" feeler gauge through the slot in the drum at the center of secondary shoe and expand shoes by turning adjusting screw. Then adjust adjusting screw and anchor pin (slotted type) for .010" clearance at each end of secondary shoe (measure 1½" from each end of shoe).
Lincoln & Mercury—The shoe clearance should be .010" at all points. Check by inserting .010" feeler through slot in brake drum and measuring clearance at several points. Adjust by turning adjusting screw (accessible through slot in backing plate) and by shifting anchor pin if necessary (pin hole is slotted and will allow an up-and-down shifting of anchor pin to correctly center shoes). Torque anchor pin nuts to 80-120 ft. lbs.

Major Adjustment (1954-55 Ford Pass. Car Rear Wheels): Adjust in manner similar to front brakes, omitting eccentric cam adjustment. Connect parking brake cable and adjust.

Major Adjustment (Lincoln & Mercury Front Wheels):
NOTE: Major adjustment performed only if Minor Adjustment unsatisfactory, or that upper end of anchor has less clearance than lower end.
Anchor Pin-Eccentric Adjustment—Complete operations of rotating Cam Adjusting Stud for secondary shoe clearance as shown in Minor Adjustment. Then adjust anchor pin and eccentric to obtain .010" clearance at each end of secondary shoe. To adjust anchor pin end, loosen anchor pin nut one full turn, tap pin lightly upward, with soft hammer, to decrease clearance or downward to in-

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FORD, LINCOLN, MERCURY BENDIX (Cont.)

crease clearance. Recheck lower clearance to insure that anchor pin adjustment did not alter lower end of secondary shoe clearance. If lower secondary shoe clearance not correct insert .010" feeler between lining and drum of primary shoe at lower end of shoe and with shoe snug against feeler turn adjusting screw from top to bottom to decrease secondary shoe clearance and from bottom to top to increase clearance. Recheck all clearances and repeat anchor pin adjustment if necessary to maintain a greater clearance at anchor pin end not to exceed .003". Recheck all clearances, replace wheels and road test. Torque anchor pin nuts to 80-120 ft. lbs.

Major Adjustment (1954 Ford Pass. Car Front Wheels): Expand brake shoe by turning adjusting screw (star wheel) toward center of brake until it is just possible to rotate drum. Back off screw 10 to 14 notches. Position drum so inspection slot is within 1" of upper end of secondary rear lining. Insert a .010" feeler between lining and drum at this point. Loosen anchor pin nut one turn and tap with a soft hammer to establish a .010" clearance. Do not tighten anchor pin locknut at this time. Insert .010" feeler 1" from adjusting screw end of secondary lining. Adjust eccentric to obtain .010" clearance. Recheck clearance at anchor end of secondary lining. After clearance has equalized at .010" at both ends of lining, tighten anchor pin locknut to 65-85 ft. lbs. Recheck clearance on secondary shoe to make sure anchor pin has not moved. Check clearance at center of primary lining with .010" feeler. Turn adjusting screw (star wheel) to obtain a .010" clearance on primary lining.

Major Adjustment (1955 Ford Pass. Car Front Wheels): Turn adjusting screw toward center of brake until shoes are tight in drum. Push adjusting screw star wheel toward primary shoe lining. Position drum so inspection hole is within 1" of upper end of secondary (rear) shoe lining. Insert a .010" feeler between lining and drum at this point. Push secondary shoe against feeler by pushing on adjusting screw star wheel. Remove feeler, rotate drum until slot is 1" above lower end of secondary shoe. Do not force shoe out of position. Check clearance at this point with feeler gauge. If greater or less than .010", loosen anchor nut approximately 1 turn. Tap anchor pin in direction of greater clearance (up or down) with soft hammer. After clearance of secondary shoes have been equalized at .010" at both ends, tighten anchor pin nut to 65-85 ft. lbs. Recheck clearance on secondary shoe to be sure anchor pin did not shift. Rotate drum so slot is over any part of primary shoe lining. Insert a .010" feeler between drum and lining. With feeler in place, move drum back and forth keeping inspection slot and feeler over primary shoe lining, at same time rotating eccentric cam in same direction as forward wheel rotation, until a .010" clearance is established between closest point of lining and drum. This should provide clearance for both shoes. If any drag noted, adjusting screw may be backed off another 1 or 2 notches.

HAND BRAKE ADJUSTMENT

Hand Brake Adjustment: Ford (Pass. Cars), Lincoln, Mercury. Be sure service brakes fully released. Place parking brake control lever in fully applied position. Check position of parking brake equalizer lever with respect to frame cross-member. If lever touching frame, adjust control hand-to-equalizer lever cable by fully releasing parking brake control lever and rotating equalizer lever nut to adjust length of cable. Apply parking brake and check adjustment. If there is slack in brake cables when parking control handle is in fully released position, loosen locknut on equalizer rod, then tighten adjusting nut just enough to remove slack from cables. Tighten locknut securely. *CAUTION*—Adjust service brakes before attempting to adjust parking brake cable.

►***CAUTION: Make certain that rear brake shoes are not pulled away from anchors and that brakes do not drag with brake lever fully released.***

Ford F-1, 100 Truck—Place hand lever in full released position and check wheel cables for excessive slack. Adjust by loosening locknut and turning adjusting nut on front cable fitting at rear wheel cable equalizer connection. Cable should be tight enough to insure full application of rear wheel brakes, and loose enough for complete brake release when parking handle in "off" position. *CAUTION*—Adjust service brakes before attempting to adjust parking brake cable.

Ford F-2, F-3, F-250, F-350, P-350 Trucks—These models have independent brake on propeller shaft behind transmission. *See "Ford Truck Bendix Uni-Servo" for data.*

OVERHAUL

BLEEDING BRAKE SYSTEM: *See complete "Hydraulic Brake Servicing" for bleeding instructions.*

TROUBLE SHOOTING: *See "Hydraulic Brake Trouble Shooting" for complete data.*

BRAKE DRUM REPLACEMENT: Brake drums are "demountable" type (removable without disturbing wheel hub) on all models except Ford Pass. Car & Station Wagon **front wheels**. To remove brake drums take off nuts or remove capscrews or bolts holding drum on wheel hub or axle shaft flange. **Drum Regrinding Note**—When refinishing drums, inside diameter must not be increased more than .060" (not more than .030" removed from drum wall).

BRAKE SHOE REPLACEMENT: With wheels and brake drums removed, brake shoes are removed and replaced as follows:

Removal: Disconnect brake shoe return springs at anchor pin, remove hold-down cup, spring, and pin on each shoe. Disconnect hand brake cable at lever on rear wheel brake rear shoe. Pull shoes out at top to free wheel cylinder piston links, lift shoe assembly out, lift out hand brake strut and anti-rattle spring on rear wheel brakes. Disassemble shoes by removing adjusting screw spring (free spring by moving anchor pin end of shoes together) and lifting off adjusting screw assembly.

Relining Brake Shoes: Lining should be replaced when worn to point where rivet head less than 1/32" below surface of lining. Inspect shoes for distortion or looseness between rim and web. Clean shoe rim and remove all burrs or high spots before installing new lining. After riveting, new lining must be snug against shoe with not more than .005" separation midway between rivets.

►*BRAKE LINING NOTE*—Lining furnished in brake lining kits is ground in production and does not require grinding after installation.

Installation: Lubricate all points of contact between brake shoes and other brake parts with Lubriplate. Assemble both brake shoes with adjusting screw and spring (see illustration). On rear wheel brakes, assemble parking brake lever on rear (secondary) shoe and install link. Install shoe assembly on backing plate, install hold-down cups and springs, install return spring. Install drums and adjust brakes.

OVERHAUL: Master Cylinder & Wheel Cylinders. *See "Hydraulic Brake Servicing" for complete data.*

►***BRAKE OVERHAUL NOTE: When overhauling front wheel brake assemblies with eccentric cam adjustment, it is necessary to remove eccentric spring before removing shoe. Replace spring after shoe installed.***

FORD TRUCK SELF-CENTERING

Ford Truck, 500, 600, 700, 750 Series (1953-55). Rear Brakes Only.

►***FRONT WHEEL BRAKE CAUTION: Different front wheel brakes used on these models as follows:***
500 & 600 Series—Ford-Bendix "Uni-Servo."
700 & 750 Series—Ford-Lockheed Double Anchor

►***POWER BRAKE NOTE:*** "Hydrovac" or "Midland" Standard or Optional on these trucks.

►***1955 500 & 600 SERIES TRUCK REAR WHEEL BRAKE CYLINDER LEAKAGE CORRECTION (Due to Excessive Depth of Counterbore):*** To correct, install **two** 91A-2152 gaskets between brake pipe connector and wheel cylinder body.

►***1953-55 500 SERIES & T-700 TRUCK REAR WHEEL BRAKE CYLINDER LEAKAGE CORRECTION:*** New brake cylinder assemblies and a conversion kit are available to correct above condition. The B5T-2222-A Conversion Kit is used to convert brake cylinders now in service. New rear brake cylinder assembly parts are as follows:

Part	Application	Old Part No.	New Part No.
Brake Cyl. Assy. Upper		B4T-2261-A	B5T-2261-A
Brake Cyl. Assy. Lower		B4T-2262-A	B5T-2262-A
Link			B5T-2042-A
Kit, Conversion	Both		B5T-2222-A

►***500 & 600 SERIES TRUCK ERRATIC BRAKE OPERATION CORRECTION (Due to Improper Return of Rear Brake Shoes After Application):*** Clearance between brake shoes and brake carrier plate at hold-down bolt should be .025". Adjust hold-down bolt to obtain proper clearance. *NOTE*—Gauge surface is machined boss on carrier plate which is in line with hold-down bolt.

►***1955 MASTER CYLINDER PUSHROD INSTALLATION CAUTION:*** On F, B-500 Trucks master cylinder pushrod and clevis pin are installed in upper hole

CONTINUED ON NEXT PAGE

FORD TRUCK SELF-CENTERING (C ntinu d)

in brake pedal on trucks with conventional brakes and in lower hole on trucks with booster brakes; on other trucks pushrod and clevis pin are installed in lower hole in brake pedal.

DESCRIPTION: Two-cylinder, two-shoe, four-anchor type hydraulic brakes. Each shoe is anchored at each end and linked to wheel cylinder at each end so that all shoes are self-energizing for both forward and reverse motion. All shoes are radially self-centering. ***CAUTION—TWO differently adjusted brake designs used. See Adjustment data.***

ADJUSTMENT: Make adjustments with brake drums at normal temperature and with wheels either jacked up or contacting road (if wheels on road so they cannot be turned to check for drag, make this check by striking drum with a hammer—sound will be deadened if shoes contacting drum). ***ADJUST EACH TYPE AS FOLLOWS:***

500 & 600 Series Adjustment: Proceed as follows:

Minor Adjustment (For Wear)—Remove two adjusting hole covers on backing plate (adjacent to right hand anchor bolt at each wheel cylinder), insert tool through slot and turn notched adjusting screw or "star wheel" until lining drags on drum, then back off adjusting screw until wheel is free of drag. Depress brake pedal to centralize shoes and recheck wheels. Adjust each shoe in each wheel in this manner.

Major Adjustment (Relined Brakes)—Proceed as in Minor Adjustment (above), then adjust brake shoe hold-down bolt for clearance of .025" from brake shoe to gauge surface on plate (gauge surface is machined boss on brake plate in line with hold-down bolt).

700 & 750 Series Truck Adjustment: Remove the two adjusting hole covers on backing plate (adjacent to right hand anchor bolt at each wheel cylinder), use Allen wrench inserted through hole to turn adjusting worm in direction of FORWARD wheel rotation to move brake shoe out until it drags on drum, then turn wrench in opposite direction until drag is relieved. Depress brake pedal to center brake shoes in drum, then turn wrench one additional turn to provide working clearance. Adjust each shoe in each wheel in this manner. This is the only adjustment required.

Brake Pedal Adjustment: Pedal must have at least 3/16" but not more than 3/8", free travel measured at pedal pad before master cylinder piston begins to move. To adjust, loosen locknut on brake pedal to master cylinder pushrod, rotate rod until free travel within limits, tighten locknut.

Parking Brake Adjustment: On cable controlled parking brakes, move parking brake lever to fully released position. On transmission mounted parking brake levers, set lever to first notch. Observe position of cam to make sure flat portion is resting on brake band bracket. If cam not flat with bracket, remove clevis pin from upper part of cam, then adjust clevis rod to allow flat portion of cam to rest on brake band bracket. Install clevis pin and cotter pin. Remove lock wire from anchor adjusting screw, turn adjusting screw clockwise until clearance of .010" is established between brake lining and brake drum at anchor bracket. Loosen lock nut on adjusting screw for lower half of brake band, adjust screw to establish .010" between brake lining and drum at lower half of brake band. Tighten lock nut. Turn upper band adjusting nut until .010" clearance established between upper half of band and drum. Be sure to install lock wire in anchor adjusting screw.

DISASSEMBLY: NOTE—Brakes can be serviced without removing hubs or disturbing wheel bearings. Remove wheels, then screws holding drum to hub (mark drum and hub to insure correct assembly). ***CAUTION—If wheel cylinder connecting tubes and bleeder screws removed, mark ports to which tubes attached to assure correct reassembly.*** Disassemble brakes as follows:

500 & 600 Series—Remove retracting springs with Tool 2035-N. Remove brake shoe hold-down screw, then brake shoes.

700 & 750 Series—Remove brake shoe retracting springs by removing shoe guide bolt nut, lockwasher, and washer holding shoe in place, then remove shoes. To remove adjusting mechanism, rotate adjusting worm, threading it free of worm wheel. Remove worm retainer snap ring from shoe, then end thrust washers, sleeve and worm, worm wheel.

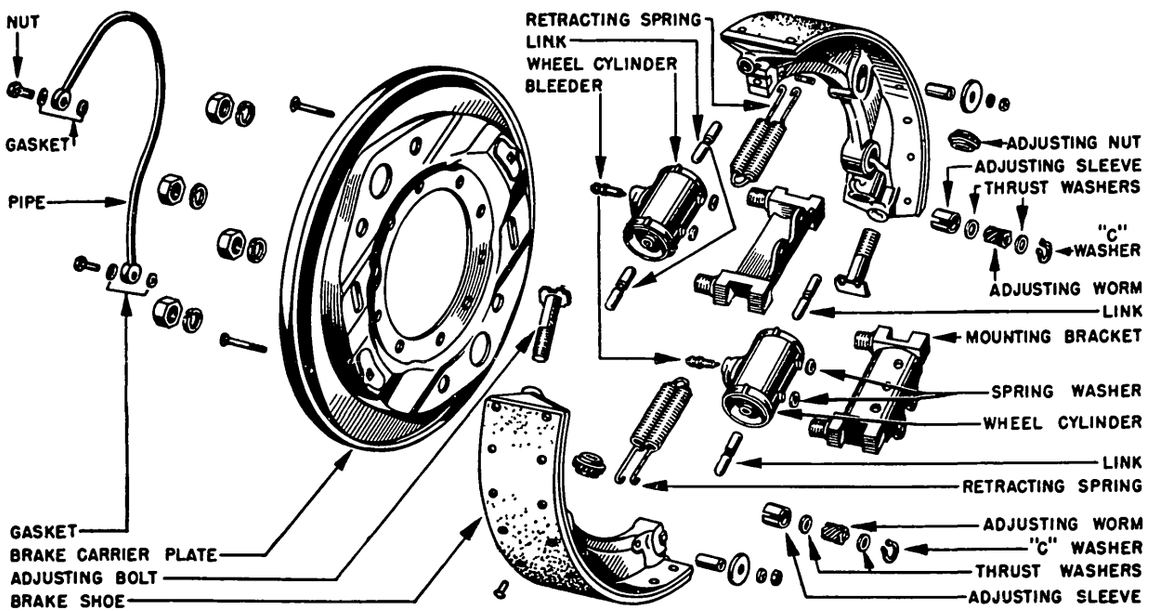
REASSEMBLY: (NOTE—For best results, new shoe and lining assemblies should have the lining of correct thickness ground to proper radius concentric with brake drum. If linings are not ground, it may be necessary to readjust the lining after linings have "worn in." Make sure no nicks or burrs are on shoe edge at point of contact with brake plate).

500 & 600 Series—Place light film of Lubriplate on primary (sliding pivot) anchor and shoe bearing surfaces on brake plate. Position brake shoes in anchors and in slotted ends of wheel cylinder. Apply light film of Lubriplate to hold-down screw, then install hold-down screw, washer and nut. Tighten hold-down nut until there is a clearance of .025" between center (of three) machined bosses on plate and edge of shoe. This clearance necessary to hold shoe parallel to drum or prevent shoe from binding against outer machined bosses. Install retracting springs (Tool 2035N), wheel cylinder brake pipe, drum assembly, wheel. Adjust brakes.

700 & 750 Series—(NOTE—***Assemble all parts dry.***) Assemble adjusting mechanism (thrust washers, sleeve, worm and worm wheel). The sleeve slot must face worm wheel to allow worm and wheel to mesh. Install worm retainer snap ring into groove in shoe. Install adjusting worm in worm wheel, and adjust to full "OFF" position. ***(CAUTION***—Curved side of pad on adjusting screw must be in proper position to permit it to rock on anchor block when shoes are installed on backing plate). Install one shoe on backing plate making sure adjusting worm is aligned with the adjustment slot in backing plate. (CAUTION—It is possible to install shoe in reverse position. If so installed, brake **cannot** be adjusted). Install shoe guide sleeve on guide bolt and assemble guide washer, lockwasher and locknut, tighten locknut. Repeat above procedure for other shoe. Install shoe retracting springs. Adjust brakes.

BLEEDING BRAKE SYSTEM: Bleed **top** wheel cylinder **first**, then lower. If power unit used, unit must be bled before wheel cylinders, with engine off and no vacuum in power unit system. ***See "Hydraulic Brake Servicing" preceding for bleeding data.***

TROUBLE SHOOTING: ***See "Hydraulic Brake Trouble Shooting" preceding for data.***



FORD TRUCK SELF-CENTERING BRAKE ASSY.

CLUTCH & CONTROL INDEX

TYPE F EQUIPMENT

CLUTCHES

	Page
Auburn (Atwood)	2107
Borg & Beck	
8.5A6, 10A6, 11A6	2108
8A7, 9A7, 10A7, 11A7	2108
9.5E, 10E	2110
Long	
9.5CF, 10CF, 10NC, 11CF	2112
Buick (Own) Single Plate	2106
Buick (Own) Crown Spring	2105
Chevrolet (Own)	2111
Hudson (Own)	2115
Inland	2114
Rockford	2116

CLUTCH CONTROLS

Hudson Vacumotive Drive 1948-51	2102
Packard Electromatic 1946-50	2104

CLUTCH FACING, REMOVAL, PEDAL ADJUSTMENT

See Individual Car Model Pages.

CAR APPLICATION

CLUTCHES

BUICK	Page
1946-55 Series 40	2105
1946-52 Series 50	2105
1946-48 Series 70	2106
1953-55 Series 50	2106
1954-55 Series 60	2106
CADILLAC	
1946 (B & B)	2108
1946-53 (Long)	2111
CHEVROLET	
1946-55 (Own)	2111
1955 (B & B) Trucks	2108
CHRYSLER	
1946-54 Six	
Exc. Torque Converter	2108
1951-53	
Torque Converter	2110
1946-50 Eight	2108
1951-53 Eight	2110
1955 C67	2108
CROSLEY	
1939-50 (Rockford)	2116
DESOTO	
1946-54 Six	
Exc. Torque Converter	2108
1953 Six	
Torque Converter	2110
1952-55 V8	
Exc. Torque Converter or F.D.	2108
1952-53 V8	
Torque Converter or F.D.	2110
DODGE	
1950-55 Six (Auburn)	2107
1946-55 Six (B & B)	2108
1953-55 V8	
Exc. Torque Converter	2108
1953 V8	
Torque Converter	2110
FORD	
1946-55 (Long)	2112
FRAZER	
1947-51 (Auburn)	2107
1947-51 (B & B)	2108
HENRY J	
1951-54 (Auburn)	2107
1951-54 (Rockford)	2116

HUDSON	Pag
1946-54 (Own) Exc. Jet	2115
1953-54 Jet (B & B)	2108
1950-55 Rambler (B & B)	2108
1954-55 Metropolitan (B & B)	2108
1955 Wasp & Hornet (B & B)	2108
KAISER	
1947-55 (B & B)	2108
1947-55 (Auburn)	2107
LINCOLN	
1946-54 (Long)	2112
METROPOLITAN	
1954-55 (B & B)	2108
MERCURY	
1946-48 (Long)	2112
1948-55 (B & B)	2108
1951-52 (Long)	2112
NASH	
1946-49 "600" (B & B)	2108
1946-55 Statesman (B & B)	2108
1946-55 Ambassador (B & B)	2108
1950-55 Rambler (B & B)	2108
1954-55 Metropolitan (B & B)	2108
OLDSMOBILE	
1940-50 Six (B & B)	2108
1940-48 Eight (B & B)	2108
1949-55 (Long)	2112
PACKARD	
1946-55 (Long)	2112
PLYMOUTH	
1947-55 (Auburn)	2107
1946-55 Six (B & B)	2108
1955 Eight (B & B)	2108
PONTIAC	
1946-55 (Inland)	2114
RAMBLER	
1950-55 (B & B)	2108
STUDEBAKER	
1946-55 (B & B)	2108
WILLYS	
1946-55 (Auburn)	2107
1946-55 (Rockford)	2116
1954-55 (B & B)	2108

CLUTCH CONTROLS

HUDSON	Page
1948-51 Vacumotive Drive	2102

PACKARD	Page
1946-50 Electromatic	2104

1948-51 HUDSON VACUMOTIVE DRIVE

Hudson 6 & 8, All Models (1948-51) Optl.

▷DRIVE-MASTER & SUPERMATIC DRIVE NOTE: Vacumotive Drive is incorporated as a part of Drive-Master and Supermatic Drive installations and when used with these transmissions is similar to the separate unit below except that an additional "Throttle Lock" unit is used which is mounted on the Vacumotive power cylinder.

See "Hudson Drive-Master" in Transmission Section for Throttle Lock data.

▷DRIVE-MASTER FUSE CHANGE: 10 ampere fuse used on first cars should be replaced with 15 ampere fuse as used on later cars. This fuse located in lead to control switch (1948), on back of switch (1949-50).

DESCRIPTION & OPERATION: Vacumotive Drive on these cars is similar to design used on previous models except for relocation of units and linkage (see illustration) and new type wiring harness with plug connectors at each unit (plug-and-socket connectors eliminate possibility of wrong connections).

ADJUSTMENT: *Before adjusting Vacumotive Drive units, make all "Engine Adjustments" listed below, then make "Vacumotive Drive Adjustments in order and exactly as listed:*

Engine Adjustments: Make sure that engine properly tuned up, and clutch linkage adjusted, by checking and adjusting following points:

Engine Idle Speed—Must be set at 580-600 RPM. hot or slow idle speed. NOTE—Check with Vacumotive Drive control button on instrument panel "on".

Clutch Pedal Clearance—Clearance between underside of toeboard and upper (rear) face of clutch pedal shank must be 1½" with clutch engaged (to insure full disengagement when pedal depressed). Adjust by loosening locknut and turning clevis at lower end of connector link.

NOTE—On 1950 Pacemaker, and all 1951 models, clevis yoke has two holes to provide for greater range of adjustment. Clevis pin can be installed in either hole.

Starter Switch Note—On Drive-Master and Supermatic Drive cars, Starter should be operative when clutch pedal depressed to point not less than 2" from toeboard. To check, hold starter button in, turn on ignition, slowly press in on clutch pedal, and note point at which starter begins to operate.

Accelerator Linkage—See that entire linkage (both accelerator and vacumotive drive system) works freely without binding. Lubricate all linkage joints and bellcranks and correct any binding. Check system by opening throttle slightly and releasing very slowly with control switch "off". Accelerator bellcrank arm should come back solidly against its stop.

Accelerator Pedal Adjustment—Adjust accelerator pedal rod (two nuts on forward end of rod at accelerator bellcrank) for correct travel on each model as follows:

1948-49 Models—With accelerator pedal released, distance from underside of pedal tip to floor mat should be 4 31/32", and throttle valves must be wide open when accelerator pedal fully depressed.

1950-51 Pacemaker (without Overdrive)—Adjust rod so that throttle valve is wide open at point just before accelerator pedal tip strikes the floor mat.

1950-51 Models with Overdrive or Drive-Master—Adjust rod so that carburetor throttle valves are in wide open position when pedal depressed to point just before it contacts overdrive kick-down switch plunger on toeboard (or pedal stop located at same point on cars without overdrive).

Accelerator Switch Adjustment—With accelerator pedal released, see that accelerator bellcrank against stop (see illustration), loosen accelerator switch mounting screws and position switch on mounting bracket so that switch arm is solidly against stop on switch, tighten the mounting screws. Press down on accelerator, release slowly, check to see that accelerator switch lever and bell crank lever solidly contact their stops.

Vacumotive Drive Adjustments: Set brakes (to prevent car moving while making adjustments), place shift lever in neutral position, depress clutch pedal and start engine, hold clutch pedal down until Vacumotive Drive takes over and holds clutch disengaged. Run engine until normal operating temperature reached and engine idles at 580-600 RPM., then make following adjustments in order given:

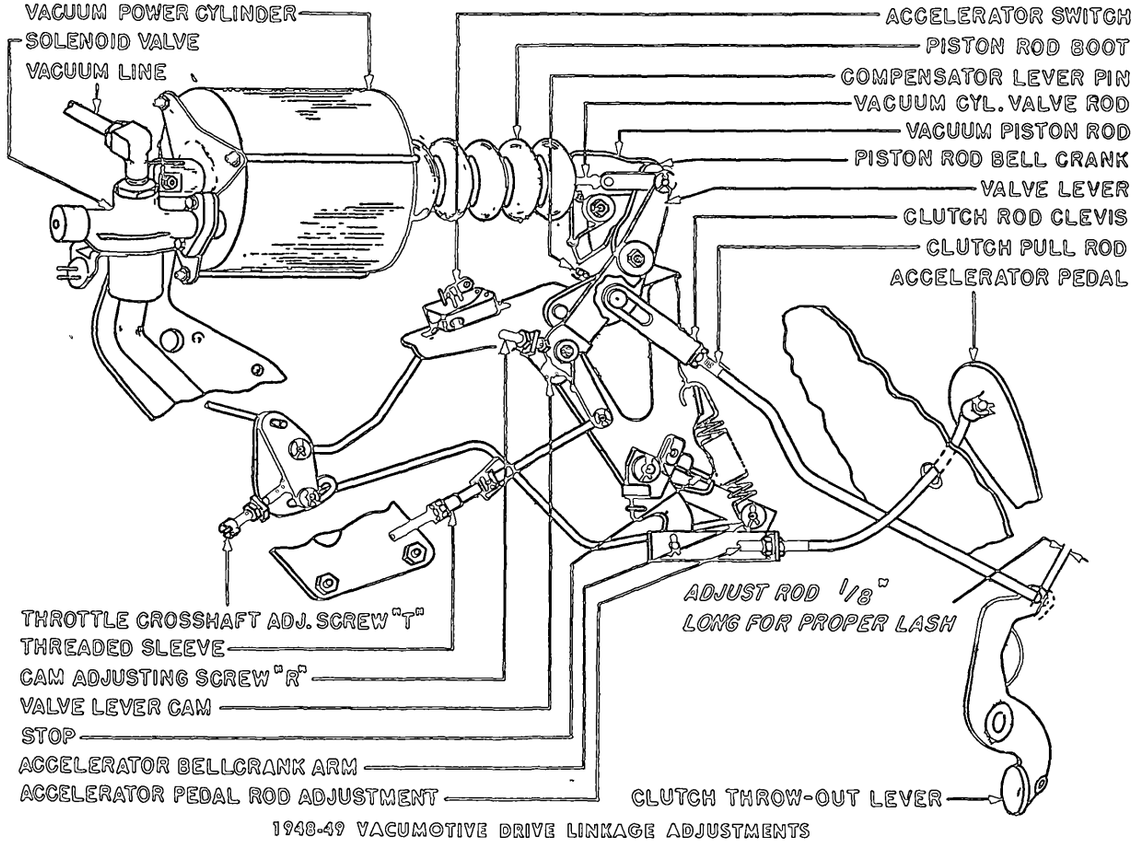
▷*CAUTION—Compensator lever must be in upward position (starting position) when making adjustments. Lever will be correctly positioned for each adjustment if adjustments made exactly as follows:*

1) Piston Travel—With engine idling to provide vacuum, check piston position by pressing in on valve lever and then releasing lever. Piston should be ½" back from extreme forward position and should return to this position when lever released. Adjust by loosening locknut and turning threaded sleeve (see illustration for location on 1948-49 cars —on 1950-51 cars with redesigned threaded sleeve rod, adjustment is located on rear end of rod in back of cam lever).

▷*NOTE*—Pushing lever down to normal running position will cause piston to move forward (if piston moves backward, eccentric is upside down).

2) Piston Valve Rod Check—The center line of the pin (in end of valve operating link at valve lever) should line up with center line of piston rod pivot bolt. The valve rod can be adjusted by loosening locknut and turning valve rod in or out of the threaded trunnion. NOTE—This adjustment is made in production and normally should not be required unless rod adjustment has been disturbed.

3) Clutch Pull Rod Adjustment. Stop engine. With engine not running, pull vacuum piston rod out fully (to rear), check clutch pull-rod for required ⅛" free play or lash by pulling rod forward and up. With correct lash, forward end of pull-rod clevis will just contact compensator lever pin. Adjust by loos-



1948-49 VACUMOTIVE DRIVE LINKAGE ADJUSTMENTS

CONTINUED ON NEXT PAGE

HUDSON VACUMOTIVE DRIVE 1948-51 (Continued)

ening locknut and adjusting clevis on forward end of pull-rod.

4) Throttle Adjustment—Back out cam adjusting screw until there is ½" gap between cam and screw. Depress clutch pedal (IMPORTANT) and start engine. Hold clutch pedal down until clutch control unit cylinder takes up the load. DO NOT RACE THE ENGINE. Put transmission in 2nd gear and release the brakes. Slowly rotate the throttle bell crank until clutch drags. Adjust the throttle cross-shaft adjusting screw "T" (see Note below) until there is a slight increase in engine speed (to 625-750 RPM) when the car begins to move forward.

Adjusting Screw Note—See illustration for location of this "T" adjusting screw on all models except Pacemaker. On Pacemaker models, screw is located on cylinder head.

▷*CAUTION—The above adjustment should be made with the compensator in the starting position, trip lever pin forward or away from valve lever.*

5) Cam adjusting Screw (Cushion Point)—Stop the engine. Depress clutch pedal manually and start engine. Engage transmission Second Gear, set brakes firmly to prevent car moving. Turn Cam Adjusting Screw "R" in fully, press valve lever cam forward against the cam adjusting screw and back screw out until engine stalls. NOTE—Final adjustment of this screw is made during "Fast Start" part of Final Road Test following.

▷*NEW TYPE CUSHION POINT SCREW:* To provide better contact area. New type Part No. 302098 has screw driver slot in small end, and larger hexagon head. New screw in installed so that the hexagon head contacts the cam, instead of the small end of bolt as used previously.

6) Final Road Test—Check performance by road testing car and make necessary re-adjustments for Slow & Fast Starts as follows:

Slow Start—Start car up normally except that accelerator pedal should be depressed very slowly to put car in motion. Engine speed should increase slightly just before car starts to move. Adjust throttle cross-shaft adjusting screw "T" as necessary (see adjustment 4 above).

Fast Start—Start car up normally except that accelerator pedal should be rapidly pressed halfway to floor. Car should move forward smoothly without excessive clutch slippage. Turn cam adjusting screw "R" in or out as necessary (see adjustment 5 above) but do not turn screw in more than 2 turns from original (5) setting.

▷*CAUTION—Do not turn screw in more than 2 turns from initial setting (5 above) when making this final adjustment.*

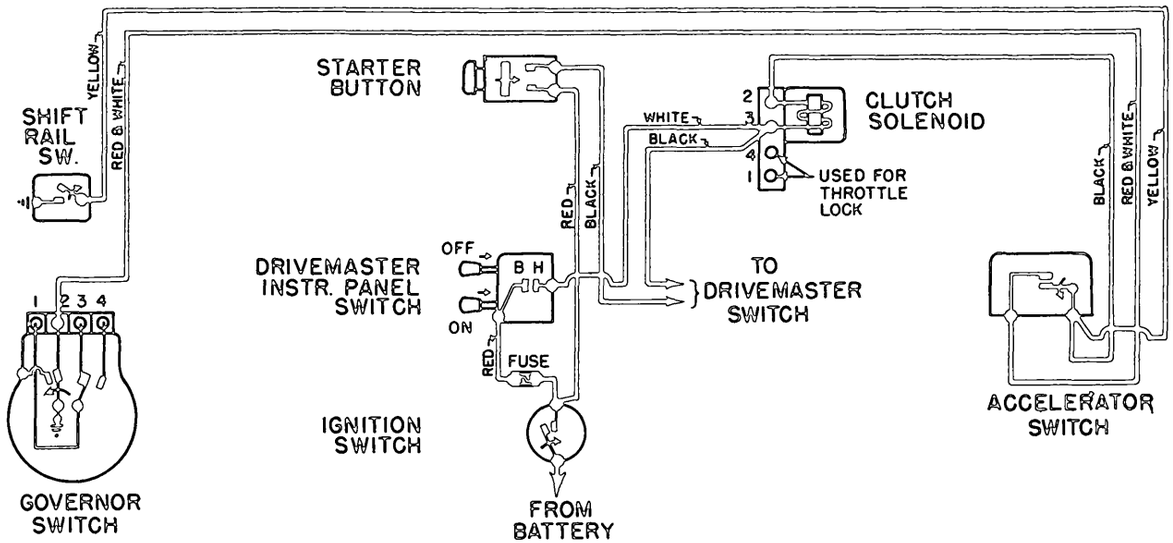
LUBRICATION: Linkage and power cylinder should be lubricated at regular intervals as follows:

1000 Miles—Oil all pivot points in Vacumotive Clutch Mechanism with light engine oil.

CAUTION—Make certain that several drops of oil placed in piston rod bellcrank oil hole.

10000 Miles—Remove pipe plug in end of power cylinder, spray one oz. of Hudson Shock Absorber fluid through this hole.

TESTING CONTROL UNITS: Use a test lamp to check circuits through switches and other electrical units. Make tests as follows:



VACUMOTIVE DRIVE WIRING DIAGRAM

Wiring—Wire connections at control units are made by means of plug-and-socket connectors to eliminate possibility of wrong connections. See 1947 Vacumotive Drive for wiring diagram.

Vacumotive Drive Switch—With ignition switch on, and vacumotive drive switch turned to the on (right) position, ground one test lamp lead and touch other lead to #1 (Brown wire) switch terminal. Lamp should light. If lamp does not light, switch is open.

Accelerator Switch—Remove connector plug on switch. Connect jumper wire between #2 prong (Yellow wire) on switch and ground. Connect one test lamp lead to ungrounded battery terminal, touch other test lamp lead to #1 prong (Red wire) on switch. Lamp should light. Move lever 10° from stop, lamp should go out. Move test lamp lead to #3 prong (Black wire) on switch. Lamp should light with switch lever against stop. Move lever approximately 2/3 of travel from stop, lamp should go out.

Shift Rail Switch—Connect one test lamp lead to ungrounded terminal on battery, connect other lead to #2 socket (Yellow wire) of cable at accelerator switch. Move gearshift lever to High Gear position. Lamp should not be lighted. Move gearshift lever to other gear positions. Lamp should be lighted in all positions except High Gear.

Valve Solenoid—Remove connector socket. Connect jumper between solenoid #2 prong (Black wire) and ground. Connect one test lamp lead to ungrounded terminal of battery, connect other lamp lead to #1 prong (Brown wire) on solenoid. Solenoid should operate and lamp should light with dim glow.

Governor—Can be checked by noting performance during road test. See that Red wire of Vacumotive Drive harness connected to governor terminal (or to #2 prong on governor on Drive-Master cars). Drive car on road and accelerate to 30 MPH., then release accelerator pedal and allow car to coast down in high gear. Clutch should release at 16-21 MPH. (noted by resting foot lightly on pedal).

SERVICING: All Vacumotive Drive units should be serviced by replacement if tests indicate that they are defective. Do not attempt to repair units.

REMOVAL & INSTALLATION: *Power Cylinder and Mounting Bracket are removed and installed separately*

Power Cylinder: Removal. Disconnect air intake pipe and vacuum line at solenoid valve. Remove valve lever eccentric bushing nut, pull bellcrank lever out to allow clearance for removal of valve rod link. Take out cotter pin in pivot bolt at upper end of valve lever, disconnect lever link from bellcrank, remove pivot bolt. Take out two Throttle Lock bracket attaching screws at clutch power unit cylinder, disconnect throttle lock vacuum line. Take out two bolts attaching solenoid valve to clutch power unit cylinder, remove solenoid (and throttle lock solenoid if used) as a unit. Remove palnut and regular nut and remove bolt attaching clutch power cylinder to mounting bracket, remove cylinder as a unit with rod, and piston valve rod and link.

Installation—Install power cylinder by reversing removal procedure given above. Adjust.

▷*CAUTION—Make certain that solenoid ground wire (pigtail lead at rear of solenoid case) not broken.*

Mounting Bracket: Removal. Remove two bolts attaching rear end of bracket to throttle bellcrank bracket. Disconnect air intake pipe and vacuum line at clutch power unit solenoid. Remove two bolts attaching mounting bracket to support bracket, and one bolt attaching mounting bracket to throttle cross rod mounting bracket. Remove palnut and regular nut and remove bolt attaching clutch power cylinder to mounting bracket. Disconnect accelerator switch operating rod at accelerator lever. Pull complete bracket toward fender for clearance and remove cotter pin, washer, spacer washers, and spring washer attaching bellcrank support pin to mounting bracket. Slide bracket out toward engine and remove from car.

Installation—Install mounting bracket by reversing removal procedure as given above. After installation completed, check to make certain that throttle cross rod not binding in mounting bracket.

1946-50 PACKARD ELECTROMATIC

"2100" Series, All Models (1946-47)
"2200" & "2200-9" Series, All Models (1948-49)
"2300" & "2300-5" Series, All Models (1949-50)
Not used on Ultramatic Drive Cars.

▷NEW TYPE CONTROL VALVE SEAT: Part No. 410505. Use to replace earlier type seats which have loosened up and moved out of position. This seat has oversize diameter and is pressed in.
CAUTION—Clutch control valves calibrated for each particular model. Use only type specified for that model when replacing unit.

▷NEW CLUTCH PEDAL TO RELAY LEVER LINK: Part No. 418534 (superseding solid non-adjustable type). Use to provide for full clutch pedal retraction. When installing this new link, adjust length so that distance between outer ends of slotted holes measures 9 25/32", check clutch pedal action. If pedal does not fully retract, lengthen link until proper pedal retraction secured.

DESCRIPTION & OPERATION: Electromatic clutch on these cars is similar to design used on previous models except for simplified control mechanism (see illustration) and operates as follows:

Power Cylinder: Diaphragm type mounted on left side of engine and linked to clutch relay lever by pulley and cable mechanism (pulley mounted on lever, free end of cable anchored to bracket on starter). Rear chamber in cylinder is open to atmospheric pressure (through air cleaner) at all times. Front chamber is controlled by Control Valve and is connected to manifold vacuum (for clutch disengagement) or to the atmospheric pressure (for clutch engagement).

Control Valve Assembly: Consists of a hollow piston type valve controlling air-and-vacuum admission to forward chamber of power cylinder. A regulating diaphragm unit and accelerating linkage connection control the valve piston through a fulcrum lever linkage to provide correct clutch engagement under all operating conditions.

Lockout Solenoid Valve: This valve controls the vacuum line between the manifold and the Electromatic Clutch so that electromatic clutch is operative only with valve open. Valve is spring-loaded so that it is closed when solenoid is not energized (Lockout Switch "off"). Pressing the lockout switch (switch "on") energizes the solenoid and opens the valve whenever the circuit is completed to ground through the Direct Speed Switch, Accelerator Switch or Governor.

Direct Speed Switch—Mounted on bracket to rear of power cylinder and actuated by idler lever of transmission shift linkage. Switch contacts are open with transmission in high gear (Electromatic clutch inoperative unless circuit completed by other controls) and are closed with transmission in neutral or any other gear (electromatic clutch operative regardless of position of any other controls).

Accelerator Switch—Mounted on dash and connected to accelerator pedal linkage. This switch is connected in series with governor and is effective only at low speeds (below governor cut-out point). Switch contacts are closed only with accelerator pedal released and prevents clutch disengagement with accelerator pedal depressed and engine running at more than idle speed (with transmission in high gear—when any other gear engaged, clutch operation is controlled by Direct Speed Switch

Governor—Mounted at rear of Overdrive. "EC" contacts control electromatic clutch operation ("AD" contacts control Overdrive) and are closed at car speeds below 22 MPH. completing lockout solenoid circuit so that electromatic clutch is operative (accelerator switch contacts must also be closed for clutch disengagement—see above). At speeds above 22 MPH., governor contacts remain open so that clutch does not disengage when accelerator pedal is released (with transmission in high gear—when any other gear engaged, clutch operation is controlled by Direct Speed Switch (above).

ADJUSTMENT: *CAUTION—Make all adjustments in order and exactly as follows:*

1) Clutch Pedal Free Play—Check and adjust free play to 1½" (see car model pages for instructions).

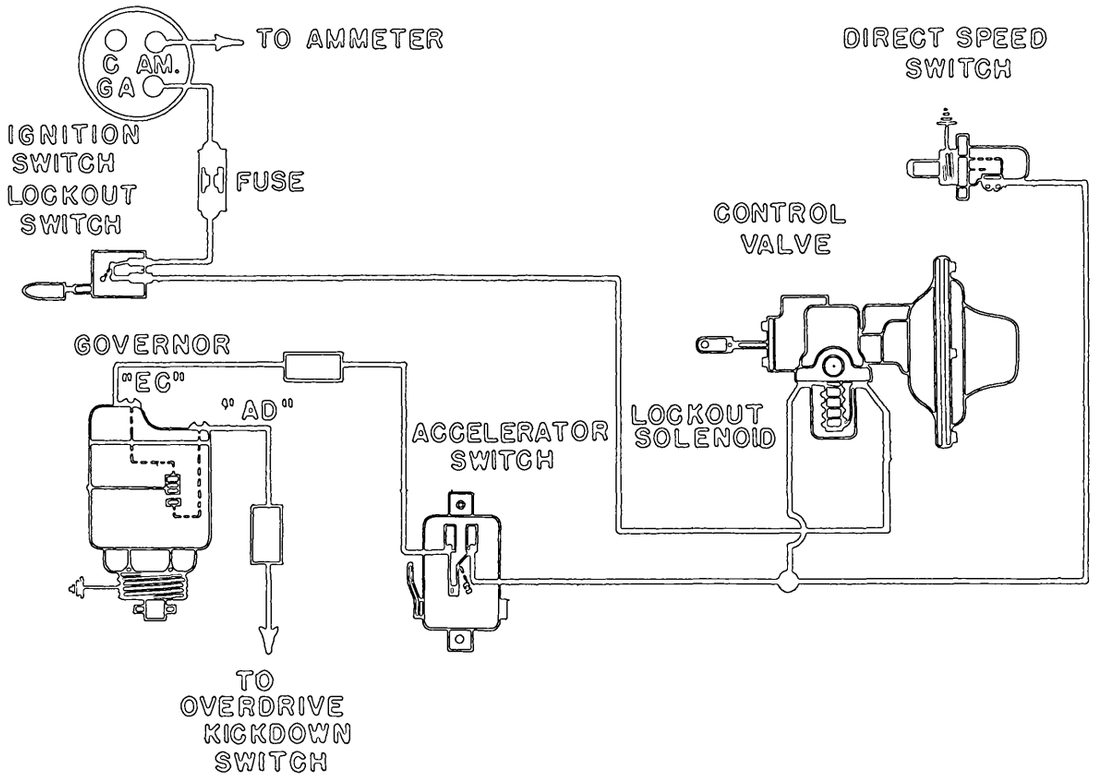
▷Pedal Link Change—See "New Clutch pedal to Relay Lever Link" data above if clutch pedal does not retract fully.

2) Power Cylinder Operating Cable—Check adjustment by depressing clutch pedal to toeboard (engine must be running and Electromatic clutch "on"). Pressure required to depress pedal should be very light to within ½" of toeboard, and pressure for final ½" movement of pedal should be same as required with Electromatic Clutch "off". If this ½" final travel with increased pressure not noted, adjust cable by backing off adjusting nut at anchor bracket on starter (see Note), tighten second nut on cable fitting, recheck operation.

▷Adjusting Note—If range of adjustment on cable fitting insufficient, grind off face of cable eye on bracket (Eight & Super Eight), shift bracket on starter (Custom Eight).

3) Accelerator Linkage—Adjust to remove excessive free play in linkage between accelerator pedal and carburetor throttle. Adjust carburetor-to-cross shaft link clevis for 1/16" clearance between throttle operating lever and stop on electromatic control valve bracket with carburetor throttle stopscrew against stop with fast idle cam in slow or hot idle position. Adjust accelerator-to-electromatic clutch operating lever rod (adjusting nut at control valve end of rod) so that pin enters hole in operating lever. Check to make certain that the valve operating lever rotates clockwise to the wide-open throttle position when accelerator pedal is depressed to point where accelerator bellcrank contacts overdrive kick-down switch plunger.

4) Control Valve Engine Speed Screw & Operating Rod—Operating rod requires adjustment only if engine speed screw adjustment not sufficient.



1946-50 ELECTROMATIC CLUTCH WIRING DIAGRAM

CONTINUED ON NEXT PAGE

1946-50 PACKARD ELECTROMATIC (C ntinu d)

Engine Speed Screw—Engine must be thoroughly warmed up and idling at hot or slow idle speed for this adjustment. With engine idling, place car on level floor, engage transmission Second Gear. Adjust engine speed screw so that car will just move when valve operating lever is brought up against the engine speed screw. If screw does not have sufficient range for correct adjustment (turns completely in or out before correct setting secured), operating rod as directed below. Normal gap between engine speed screw and operating lever should be approximately 7/32".

Operating Rod—Engine must be warmed up and idling at hot or slow idle speed for this adjustment. Turn engine speed adjusting screw in to midpoint of travel, disconnect valve rod link at valve operating lever, hold throttle operating lever against stop on bracket. Position valve operating lever so that clearance between lever and stop is ⅛" and **hold lever in this position.** Move valve rod in slowly until power cylinder operating cable just starts to move out and hold valve rod in this position. Adjust clevis on forward end of valve rod until operating link can be engaged, secure link with spring clip lock. Then check and adjust Engine Speed Screw.

5) Direct Speed Switch—Disconnect lead at switch terminal, connect test light and battery between this terminal and ground. Place gear shift lever in High Gear position. **Lamp should not light.** Move gearshift lever toward neutral. **Lamp should light** when lost motion in linkage is taken up but before transmission shifter fork moves out of detent. Adjust switch by loosening clamp bolt and shifting bracket on mounting stud until correct performance secured.

6) Accelerator Switch—Disconnect both leads at switch terminals, ground one terminal, connect test lamp and battery to other terminal. With accelerator pedal released, **lamp should be lighted.** Depress accelerator pedal slowly until valve operating lever just contacts engine speed screw, **lamp should go out at this point.** If lamp remains lighted, loosen locknut and turn adjusting screw on face of switch until lamp goes out. Release accelerator pedal, lamp should light. Recheck setting, tighten adjusting screw locknut.

7) Governor—No adjustment provided. Governor should be replaced if operation unsatisfactory. See Testing of Control Switches (below).

8) Road Test & Fast Start at Full Throttle Setting: After preceding adjustments completed, road test car and make necessary adjustments for special fast starting with full throttle performance as follows:

Fast Start-with-Full Throttle Setting—Check performance by making fast starts (full throttle) in second gear. Clutch should engage as rapidly as possible without causing engine to stumble. To adjust, turn valve rod stop screw (on rear face of control valve diaphragm cover) out until screw head extends 1¼" from diaphragm cover (will cause very rapid clutch engagement on fast starts), then turn screw in or clockwise ¼ turn at a time and repeat tests until satisfactory clutch engagement is secured without excessive slippage.

►*CAUTION—Do not allow clutch to become overheated through excessive slippage while adjusting.*

Final Road Test Check—Test electromatic clutch operation under normal driving conditions. Readjust as required if clutch slippage is excessive or if engagement too severe under driving conditions.

TESTING ELECTRICAL UNITS: To check switches and other control units, use test lamp as directed

►*CAUTION—Check Electromatic Clutch Fuse first (in line between ignition switch and lockout switch) before making additional tests.*

Direct Speed Switch: See 5) under Adjustm't (above).

Accelerator Switch: See 6) under Adjustm't (above).

Lockout Switch: Disconnect red wire at Lockout Solenoid, connect one test lamp lead to this wire, ground other test lamp lead. Turn ignition switch "on". Press Lockout Switch knob for alternate "on" and "off" positions. Lamp should light with switch on, and should not be lighted with switch off. If lamp does not light with switch on, check for blown fuse and check line between ignition switch and lockout switch for open-circuits, replace switch. If lamp does not go out with switch off, switch is shorted and should be replaced.

Lockout Solenoid: Disconnect both wires at Lockout Solenoid terminals. Ground one terminal. Connect one test lamp lead to other terminal, connect other test lamp lead to ungrounded terminal of battery. Lamp should light. If lamp does not light, solenoid winding is open.

Governor: Connect one test lamp lead to ungrounded terminal of battery. Connect other test lamp lead to each governor terminal in turn. Lamp should light when connected to "EC" terminal (electromatic clutch contacts), and should not light when connected to "AD" terminal (Overdrive contacts).

SERVICING: Correct deficiencies as follows:

Accelerator & Throttle Linkage: To permit accelerator linkage to return to its closed throttle position as quickly as possible after release of accelerator pedal, apply Lubriplate to all friction surfaces *except the valve operating rod* (after cleaning and inspecting for worn parts). Lubriplate on valve operating rod would cause "gumming" between rod and valve guide sleeves.

Control Valve Air Cleaner: *Do not oil or wash.* Cotton element is not replaceable. Air cleaner should be replaced when clogged with accumulated dirt.

Hose & Steel Lines: Replace any deteriorated, collapsed, or damaged rubber hose. Check all tubing connections for tightness and inspect lines for kinks or breaks. Replace damaged tubing.

Power Cylinder: Check to see that joint between the two shells of power cylinder is tight and cable connection threads are not stripped. Replace diaphragm, if damaged.

Clutch Control Valve: *(CAUTION—Control valves are carefully calibrated for particular models on which they are installed. Never install a clutch control valve on a model other than that for which it was intended).* If Electromatic Clutch performance remains rough and erratic after all adjustments have been properly made, it is probable that the control valve is at fault. It should be removed, cleaned, inspected, and replaced if necessary.

BUICK (OWN) CROWN SPRING

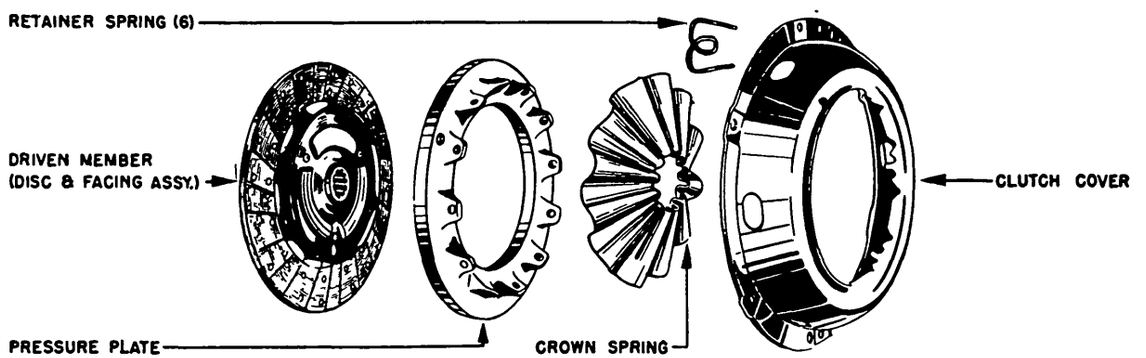
1946-55 Series 40 (Synchro-mesh Cars)
1946-52 Series 50 (Synchro-mesh Cars)

►CHANGES, CAUTIONS, CORRECTIONS

►**Excessive Pedal Pressure and Noisy Clutch Disengagement Correction:** If the clutch pedal pressure required to disengage clutch exceeds 35 lbs., check for dry release linkage and apply small amount of Lubriplate to clutch spring disc at points where it contacts cover. Check clutch release bearing support for correct assembly, brush Lubriplate on bearing surface between bearing retainer and support.

►**Clutch Dragging Correction:** If drag not caused by pedal free travel adjustment, remove clutch housing lower cover, hold pedal in disengaged position and check for clearance between crown spring disc and edge of cover with feeler gauge. Spring must contact cover at all points (clutch will not disengage

CONTINUED ON NEXT PA E



BUICK "CROWN SPRING" CLUTCH

BUICK (CROWN SPRING) (CONTINUED)

properly unless firm bearing secured at all points). To correct this condition, disassemble clutch, place cover assembly on surface plate, check height of six ears to which retainer springs are hooked and bend ears so that distance from surface plate to upper edge of each ear is exactly 1⅝". Replace retainer springs if they are weak or distorted. CAUTION—Replace springs as complete set only (necessary to assure even spring tension).

DESCRIPTION: Single plate, dry disc, of new design with corrugated spring disc which replaces both pressure springs and release levers used on former clutch. Corrugations on disc engage ears on inner rim of clutch cover and lugs on pressure plate. Disc pivots on cover plate ears when it is flexed to release clutch, relieving pressure on pressure plate which is then pulled away from driven member by hairpin type retainer springs which pass through holes in pressure plate lugs and are hooked over cover ears.

REMOVAL: *See "Clutch" on car model page.*

DISASSEMBLY: Mark pressure plate, spring disc and cover. Use tool J-1039-2 to unhook retainer springs from the clutch cover ears working springs slightly toward center to permit tool engagement (do not hammer on tool which will distort cover), lift clutch cover off. Unhook retainer springs from spring disc by working one leg of each spring in through pressure plate lug toward center of clutch and other leg out, lift off spring disc, remove retainer springs from pressure plate lugs.

Clutch Cover Inspection—Check height of spring retainer ears by placing cover on flat surface and measuring from surface to top surface of each ear. Distance should be 1 5/8". Correct by bending the ears *(CAUTION*—use care not to crack or distort cover). Replace cover if cracked or distorted.

Crown Spring Inspection—Check for excessive flattening of the spring due to taking on a permanent set, by placing spring on flat surface and measuring height of top surface of spring at inner rim. Normal height is 1 13/16" and height should not be less than 1 11/16"

REASSEMBLY: Install the retainer springs in pressure plate lugs with curved legs of springs up toward spring disc (push one leg of each spring in toward center of clutch and position the other spring leg that it is just entered in hole in lug). Apply 'Lubriplate' lightly on spring disc at points where it contacts pressure plate and retainer springs (excess will ruin clutch facings), place spring disc on pressure plate, maneuver retainer spring loops over disc by turning springs so that they are properly aligned. Install cover, use special tools to engage retainer spring loops on cover ears. Make certain that marks on pressure plate, spring disc, and cover are lined up. This completes clutch assembly (no release lever adjustment, etc. required).

DRIVEN MEMBER: Both Borg & Beck and Long Driven Members used. Driven members serviced as an assembly and parts not furnished separately. When installing driven members, see that large washer or oil baffle is toward transmission.

See Borg & Beck and Long "CF" clutches for complete driven member data.

BUICK (OWN) SINGLE PLATE

1946-48 Series 70 (Synchro-mesh Cars)
1953-55 Series 50 (Synchro-mesh Cars)
1954-55 Series 60 (Synchro-mesh Cars)

▷CHANGES, CAUTIONS, CORRECTIONS

▷Excessive Pedal Pressure and Noisy Clutch Disengagement Correction: If the clutch pedal pressure required to disengage clutch exceeds 28 lbs., check for dry release linkage and lubricate clutch pressure plate driving lugs as follows: Remove clutch housing lower cover, turn clutch so that driving lug is at bottom, brush small amount of 'Lubriplate' on each lug as pedal is being operated (lubricate all 3 lugs in same manner). If clutch still noisy, check clutch release bearing support for correct assembly, brush Lubriplate on bearing surface between release bearing retainer and support. Release lever pins that are dry and noisy can be corrected by spraying dry powdered graphite into pressure plate assembly (graphite will work into bearing when clutch is operated).

▷Clutch Rattle Correction: Rattles when the engine accelerated with clutch disengaged (similar to noise caused by loose connecting rods or pistons) may be caused by excessive clearance between pressure plate driving lugs and cover. To correct this condition, remove lower cover, turn clutch so that driving lug is down, hold clutch pedal in disengaged position, prick punch trailing edge of lug in 3 places so as to swell lug and take up clearance. Clearance between lug and cover should be .005-.008". Correct each lug in same manner.

DESCRIPTION: Single plate, dry disc type. Clutch mounted in slight recess in face of flywheel with pressure plate lugs in grooves cut in flywheel rim so that drive transmitted directly from flywheel to plate. Clutch is actuated by three release levers pivoted on adjusting bolts in cover plate and linked to pressure plate by pins in lugs on plate. Servicing directions below apply to pressure plate assembly and need not be followed unless pressure plate, springs, or release levers to be examined or replaced.

REMOVAL: *See "Clutch" on car model pages.*

OVERHAUL: Mark all parts before dismantling and reassemble in same position to maintain balance.

Disassembly: Place pressure plate assembly on arbor press, place block on cover (clearing release lever adjusting nuts) to take pressure, compress cover slightly, remove adjusting nuts, release pressure slowly. Lift off cover. This will expose all parts for inspection. Replace worn parts, check clutch springs.

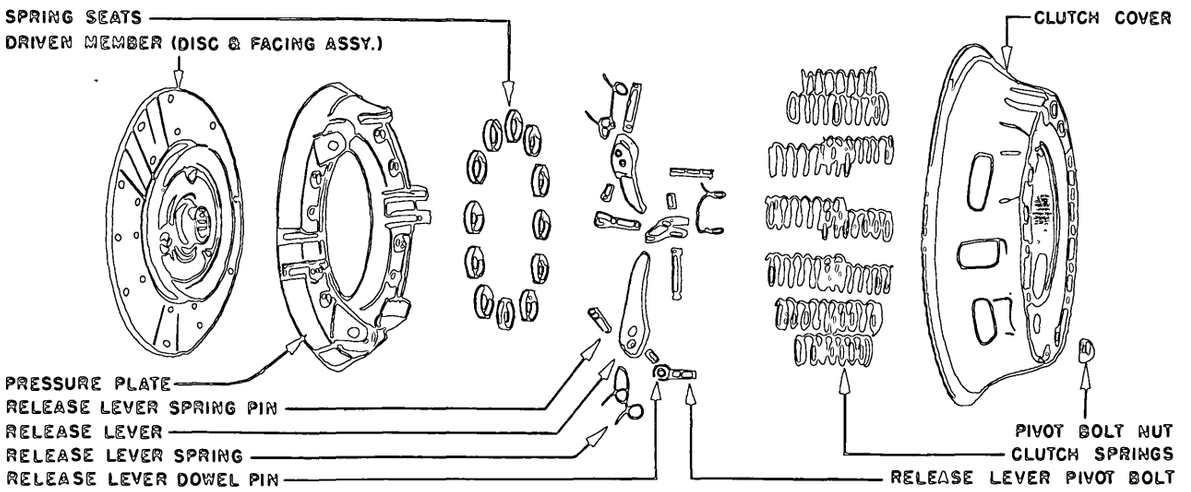
Clutch Springs: Check spring pressure and replace if weak or burned. Twelve springs (3 groups of 4) used. Spring Pressure—135-145 lbs. at 1¾" spring length.

Assembling:—Place pressure plate on arbor press. Install pressure springs on plate. Place cover in position on springs, install guide pins on release lever adjusting bolts. Compress cover slightly guiding adjusting bolts through holes in cover, install adjusting nuts on bolts, remove assembly from arbor press.

Release Lever Height Adjustment:—Assemble gauge plate in flywheel in place of driven member, centering gauge in clutch with lugs on plate under release levers. Place short straightedge on top of gauge hub, or use dial indicator & service tool J-1013 mounting indicator on clutch so as to contact release lever tips. Turn adjusting nut until release lever just contacts straightedge or dial indicator and all levers are equal within .005", lock adjusting nut by crimping thin edge against flat on screws, using large pliers.

Gauge Plate—No. J-1036.

DRIVEN MEMBER: Spring dampener type hub used on all models. When replacing facings, drill out old rivets to avoid distorting clutch disc when removing old facings. Both Borglite type and new Long type Driven Members are used. Both types have woven facings which are grooved for quicker release. Driven members are balanced by use of extra rivets or clips on driven member hubs and these balance weights should not be removed. Driven members are serviced as an assembly (parts not furnished separately). CAUTION—Install driven member with large oil baffle toward transmission.



BUICK "SINGLE PLATE" CLUTCH

AUBURN (ATWOOD)

DODGE	Auburn Clutch No.
All 6 Cyl Models (1950-54)①	9251-12
All 6 Cyl Models (1955)①	100052-2
FRAZER & KAISER	
All (1947-50)①	9251-15
All (1951-55)①	9251-18
HENRY J	
All (1951-52)②	8501-37
All (1953-54)②	100001-1
PLYMOUTH	
All (1947-48)①	9251-11
All (1949-54)①	9251
All 6 Cyl Models (1955)①	100052-2
WILLYS	
Universal Jeep CJ-2A & 3A (1946-50)②	8501-23
Sta Wgn & Sedan Del 4-63 (1946-50)②	8501-19
Truck Models 2WD & 4WD (1947-50)②	8501-23
Jeepster VJ-2 & VJ-3 (1948-50)②	8501-19
6 Cyl Sta Sed 6-63 (1948-50)②	8501-19
4 Whl Dr Sta Wgn 4x4-63 (1949-50)②	8501-23
All (1950-52)②	8501-36
All (1953-54)①②	8501-39
All (6-226 Eng) (1955)①	9251
All (Exc 6-226 Eng) (1955)①②	8501-39

①—Borg & Beck Clutch also used

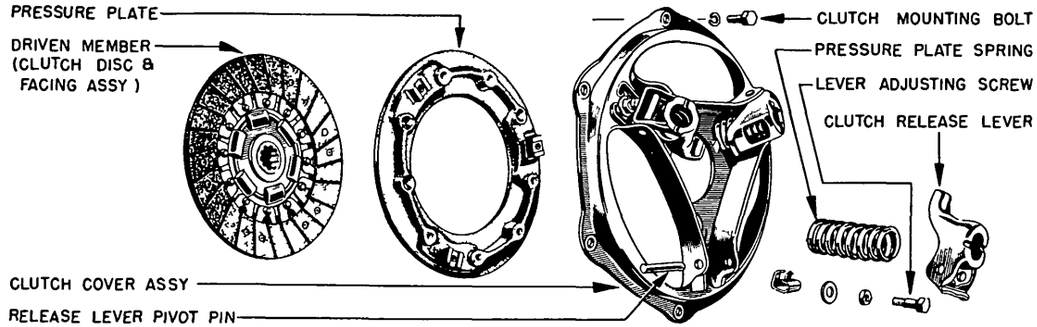
②—Rockford Clutch also used

AUBURN-ATWOOD NOTE: Clutches made by Auburn Company and formerly listed as "Atwood" now called "Auburn" clutches

►**RELEASE LEVER INTERFERENCE (causing premature clutch wear on first CJ-3A Jeeps):** On these cars and other models, check for interference between edges of clutch release lever and lever opening in bell housing which prevent full clutch engagement and cause premature wear of the clutch facings If interference noted, enlarge opening in bell housing by using a 1/8" or 3/16" drill to drill line of holes vertically 3" forward of rear edge of original opening and horizontally 3/16" above top edge, and 1/8" below lower edge of original opening, joining the vertical line of holes with the original opening Break out section of metal within this area with a wrench or drift

WILLYS DRIVEN MEMBER NOTE: Borg & Beck driven members used on all models *See Borg & Beck Type "A" Clutches*

DESCRIPTION: Clutch is single plate dry disc type Cover consists of a three-legged spider with channel section legs in which the clutch springs and release levers are mounted Release levers pivot on pins riveted in cover legs and actuate pressure plate through adjustable screws in pressure plate under outer end of each lever Springs are mounted in cups on cover under each lever Hairpin type retracting springs are mounted on each adjusting screw and are retained by the adjusting screw locknut



AUBURN CLUTCH

Willys Pressure Plate Assembly (8501-19 Clutch) Has neoprene rubber inserts at sides of pressure plate plate driving lugs (to prevent rattling or fizzing noise when disengaged) and flat Return Clip Spring on each release lever (to insure full disengagement)

REMOVAL OF CLUTCH: *See "Clutch" on car page*

SERVICING (Fixture C-585): Disassembly—Place cover support plate over main screw of fixture Install clutch cover assembly on Fixture C-585 Mark cover and pressure plate with punch and install compression washer and fully compress fingers Remove adjusting screw, washer and plate return spring or clip Place ½" steel block under outer end of each finger Back off compression nut slowly until release levers rise and contact steel blocks Remove nut and compression washer, lift off cover To remove release levers from cover, grind off one end of pin and drive out pin

Clutch Springs: Three springs used Spring pressure should be as follows

Dodge (9251-12)	251 lbs at 1 13/16"
Dodge & Plymouth (100052-2)	254-280 lbs at 1 1/16"
Frazer & Kaiser	251 lbs at 1 13/16"
Henry J (different type springs used)	
Blue Spring	230 lbs at 1 9/16"
Pink or Black Spring	211 lbs at 1 9/16"
Plymouth (9251)	222-246 lbs at 1 13/16"
Willys (Exc 8501-36, 39)	180-195 lbs at 1 9/16"
Willys (8501-36, 39)	180-203 lbs at 1 9/16"
Willys (6-226 4WD)	220-230 lbs at 1 9/16"
Willys (6-226 2WD)	239-264 lbs at 1 13/16"

Reassembly. Assemble levers to cover, peen over ends of lever pins Install pressure spring between lever and cover Make sure springs rest on bosses of cover and are seated in the embossed seats of levers Press down on release lever and then insert steel blocks under outer ends of levers Place pressure plate on fixture and place cover assembly over the pressure plate Match up punch marks so parts are in original positions Place spacer (see below) on center screw of fixture Install compression plate self-aligning washer, thrust washer and compression nut on center screw Tighten compression nut on fixture Install washers and adjusting screws in pressure plate Release fixture compression nut slowly and install pressure plate return springs

Release Lever Setting. Install the clutch cover plate assembly on fixture and make certain that housing clamps line up with holes With the spacer (see below), compression washer, self-aligning washer, and compression nut installed, tighten nut until release levers are completely compressed Install clutch housing clamps and tighten securely Adjust clutch release levers until each of the three feeler gauges has the same slight drag when being pushed in and out Tighten release lever screws to decrease drag or loosen them to increase drag Recheck adjustment of each lever tighten locknuts

Lever Setting (C-585 Fixture)

Car Model	C-585 Spacer
Dodge, Frazer, Kaiser, Plymouth	20
Henry J, Willys (Exc 6-226)	17
Willys (6-226)	20

Willys Return Clip Spring Installation—Engage slot on flat end of spring under head of release lever adjusting screw, engage loop on curved end of spring over ridge on outer end of release lever

►*INSTALLATION ON CLUTCHES IN SERVICE:* Clips can be installed by working through inspection hole in bell housing without dismantling clutch *CAUTION*—Use string attached to clip to prevent it dropping down into bell housing during installation

DRIVEN MEMBER: *See Car Model pages for Part Nos or facing specifications*

BORG & BECK MODELS

	Mod I	Ass mbly
CADILLAC		
V8 Models—Some Cars (1946)	11A6	945
CHEVROLET TRUCKS		
2nd Series, V8 (1955)	11A7	③ 3837155
CHRYSLER		
Six, C38 (1946-48) Exc Fl Dr	10A7	930
Six, C38 (1946-48) Fl Dr	9A7	953
Six, Fleet & Taxi (1946-54)	11A6	929
Six All (1949-51) S-M	10A7	930
Six, All (1949-51) Fl Dr	9A7	953
Six, All (1952-54) S-M	10A7	1331
Six All (1951-53) Fluid Drive	9A7	1329
Six, Heavy Duty (1954)	11A6	1330
Six Police & Taxi (1951-54)	11A6	929
Eight, All (1946-50)	10A6	961
Eight, Windsor C67 (1955)	10A7	1376
DESOTO		
Taxi (1946-48)	11A6	931
Taxi (1948-51)	11A6	994
Six All (1946-50) S-M	10A7	957
Six, All (1946-50) Fluid Drive	9A7	952
Six, All (1951-54) S-M	10A7	930
Six, All (1951) Fluid Drive	9A7	953
Six, All (1952-53) Fluid Drive	9A7	1329
Taxi (1952-55)	11A6	1330
Six, Heavy Duty (1952-54)	11A6	929
Eight, All (1952) S-M	10A7	930
Eight, All (1953) S-M	10A6	1335
Eight, All (1954) S-M	10A6	1353
Eight S21 (1955) S-M	10A6	1353
Eight, S22 (1955) S-M	10A7	1368
DODGE		
Six, All (1946-54) S-M ②	10A7	957
Six All (1946-54) Fluid Drive	9A7	952
Six Taxi & Heavy Duty (1946-54)	11A6	931
Six, Heavy Duty (1955)	11A6	929
Six All (1955)	9A7	1373
Eight, All (1953-54) S-M	10A7	1331
Eight All (1955)	10A7	1368
Eight, Heavy Duty (1954-55)	11A6	929
FRAZER		
All Models (1947-51) ②	9A7	951
HUDSON		
Jet (1953-54)	9A7	1361
Wasp (1955)	9A7	1361
Hornet (1955)	10A6	1354
KAISER		
All Models (1947-55)	9A7	951
Taxi (1949-51)	10A7	948
MERCURY		
All Models (1948-50)	10A7	1310
All Models (1951-53) S-M	10A7	1319
All Models (1954) S-M	10A6	1349
All Models (1955) S-M	10A6	1354
METROPOLITAN		
All Models (1954-55)	8A7	987
NASH		
600 (1946-48)	8A7	975
600 (1949)	8A7	987
Ambassador (1946-55)	10A7	950
Statesman (1949-55)	8A7	987
OLDSMOBILE		
Six, All (1940-48)	9A7	924
Six, All (1949-50)	10A7	927
Eight, All (1940-48)	10A7	927
PLYMOUTH		
All Models (1946-Early 1954) S-M ②	9A7	926
All Models (Late 1954) ②	9A7	951
Automatic Trans (1953)	8 5A6	1340
Automatic Trans (1954)	8 5A6	1369
Six, All (1955) S-M	9A7	1373
Six Heavy Duty (1955)	10A7	1368
Eight, All (1955) S-M	10A7	1368
Eight, Heavy Duty (1955)	11A6	929
RAMBLER		
All Models (1950-55)	8A7	987
STUDEBAKER		
Champion, All (1946-54) S-M	8A7	980
Commander, All (1947-51) S-M	9A7	943
Commander, All (1951-Early 1955) S-M	9A7	926
Champion All (1955) S-M	9A7	1365
Commander, All (Late 1955) S-M	10A7	1371
President, All (1955)	10A7	1371
WILLYS		
Pass , 6 Cyl (6-226) (1954-55) ②	9A7	951
Utility , 6 Cyl (6-226) (1955) ②	10A7	982

②—Auburn Clutch also used
③—Chevrolet Part No
S-M—Synchro-mesh transmission

ASSEMBLY NUMBER NOTE: This number stamped on clutch cover Can be used to identify each model

►**Borg-Warner UF-300, 400 Fixtures:** Recommended by manufacturer for use in servicing clutch Fixtures consist of surface plate (duplicates the driving surface of flywheel) clamp screws to clamp clutch cover against plate, arbor press to compress springs in dismantling clutch, and gauge standard for use in setting up release levers

►**Borg & Beck Driven Members (with other Clutches):** Driven member data below applies to the following car models which use Borg & Beck Driven Member with clutches of other makes

Borg & Beck Driven Members

	Part No.
Buick 40 (1946-55)	CD890 or 381776
Buick 50 (1946-52)	CD890 or 381776
Buick 50, 60 (1953-55)	CD873 or 382213
Buick 70 (1946-48)	CD873 or CD724
Willys, 4 Cyl Utility (1946-54)	381580
Willys, 4 Cyl Utility (1955)	382298
Willys, 6 Cyl Sta Wgn (1954)	382231
Willys, 6 Cyl Others (Exc 6-226) (1948-55)	382213

►**Oldsmobile Throw-out Bearing Lubrication:** Bearing is special carbor (graphite) disc type and is impregnated with petrolatum On cars where clutch disengaged frequently, bearing should be lubricated at 5000 mile intervals using petrolatum or vaseline only in a small high pressure grease gun and filling through grease fitting on bearing until lubricant appears at vent hole at top *CAUTION*—Do not use any other lubricant than petrolatum or vaseline with high melting point (130°F)

DESCRIPTION: Single plate, dry disc Three release levers mounted on bolts piloted in pressure plate and held in clutch cover, actuate clutch through struts which provide 'knife-edge' action

Pressure Plate Baffle—Used on some Chrysler, DeSoto, Dodge, Plymouth, Nash, Oldsmobile Consists of a thin cupped steel disc assembled on pressure plate to prevent oil working in on facings When baffle plate used, release levers must be set higher

REMOVAL: *See "Clutch" on car model pages*

OVERHAUL. Mark all parts before dismantling clutch and reassemble in same position (necessary to maintain balance) Replace grooved, checked or warped pressure plates Replace springs when pressure plate discolored from heat (test springs as directed below)

DISASSEMBLY

Disassembly: Place clutch on fixture or arbor press (support pressure plate under release levers), place block across cover resting on spring bosses, compress cover slightly, remove metal staking in adjusting nuts by running hacksaw blade through slot remove nuts release pressure slowly remove cover and springs Remove release levers by grasping lever and eyebolt between thumb and forefinger so that inner end of lever and upper end of eyebolt are pressed together Lift strut over ridge in end of lever (press lower end back against lug), lift lever and eyebolt out

REASSEMBLY

Assembly: Place pressure plate on fixture or arbor press supporting plate under release lever lugs Install baffle plate (some models only—see Note below), install lever, eye bolt, and strut assemblies by reversing removal procedure Place pressure plate springs on the plate, and install the anti-rattler springs in the cover, place cover on pressure plate Make certain that springs are seated in cover recesses and anti-rattler springs in place on release levers Compress cover slowly and guide eyebolts through holes in cover If assembly made in fixture use clamps to clamp cover flange to plate at mounting holes Install eye bolt nuts and turn nuts down flush with head of bolt Compress and release clutch several times to seat all working parts Then adjust release lever heights

Clutch Grease Pad Installation (if used)—Three special grease-soaked pads installed on top of driving lugs on pressure plate When assembling clutch, make certain that holes in pads are over eye bolts If pads dry, dip them in good quality high-melting point grease which has been heated Allow pads to dry before installing Pads not furnished for service

Baffle Plate Installation Note (if used)—Place baffle plate on the clutch pressure plate with baffle plate ears on the special low spring seat ribs (adjacent to release lever lug on plate) in counter-clockwise direction so that flanged edge of baffle fits depressions in pressure plate at base of each lug and baffle is retained by springs (which seat on ears) when installed See that baffle plate ears are flat on spring seat ribs and that baffle seats fully in machined recess in plate (Straighten ears if bent by handling) *NOTE*—On 11A6 Clutch baffle ears must be seated on spring seats adjacent to lugs in **clockwise** direction

CONTINUED ON NEXT PAGE

BORG & BECK MODELS (Continu d)

Clutch Springs: Note spring color and install in same relative position (groups of two different springs used on some clutch models) Springs should check with table below Replace springs if weak or burned or if clutch has been subjected to excessive heat

Clutch Spring Assemblies

Clutch Assy.	No. Used—Spring—Part No.
924	9 4190
926	9 4308
927	9 4214
929	① (6) 3816 & (6) 3951
930	9 4039
931	① (4) 3817 & (8) 3814
943	9 4331
945	① (6) 3814 & (6) 3951
948	9 4039
951, 952	9 4190
953	9 4211
950, 957	9 3951
961	12 4039
975, 987	6 4446
980	① (3) 4211 & (3) 4446
982	9 4214
994	① (8) 3814 & (4) 3817
1310	6 305992
1319	9 4039
1329	① (6) 4446 & (3) 4190
1330	① (8) 3814 & (4) 4039
1331	9 4215
1335	12 4039
1340	① (6) 4446 & (6) 305955
1349	12 4214
1353	12 4039
1354	① (6) 3031 & (6) 3817
1361	① (3) 4446 & (3) 305955
1365	① (3) 4211 & (3) 305955
1368	9 3031
1369	12 305979
1371	9 4214
1373	① (3) 305955 & (3) 305979
1376	9 305992
3837155 ③	9 ②

①—Two different springs used together
②—Two different colored springs used on some models
③—Chevrolet Part No

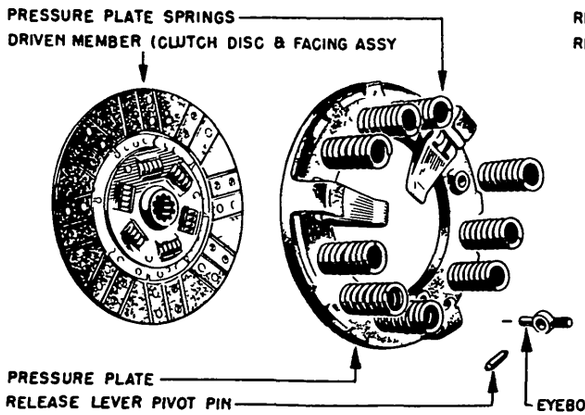
Spring Specifications

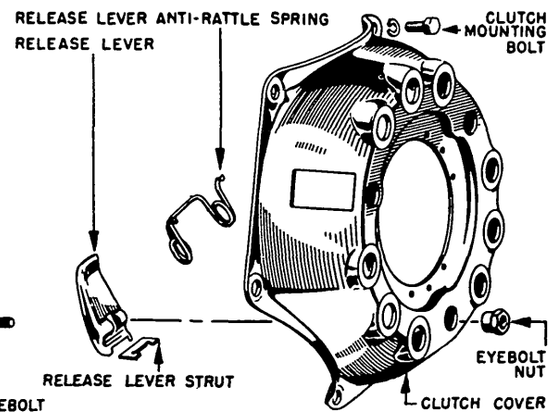
Part No.	①Pressure & Length	Color
3031	② 190 lbs at 1 11/16"	Dark Blue
3814	135 lbs at 1 11/16"	Purple
3817	110 lbs at 1 11/16"	Green
3951	155 lbs at 1 11/16"	None
4039	165 lbs at 1 11/16"	Light Blue
4190	160 lbs at 1½"	Tan
4211	170 lbs at 1½"	Orange
4214	175 lbs at 1 11/16"	Light Green
4308	150 lbs at 1½"	Lavender
4331	140 lbs at 1½"	Yellow
4446	③ 195 lbs at 1½"	Red
305955	② 230 lbs at 1½"	Black
305979	③ 245 lbs at 1½"	White
305992	③ 230 lbs at 1 11/16"	Brown

①—Pressures are plus or minus 5 lbs except as noted
②—Plus or minus 7 lbs
③—Plus or minus 6 lbs

RELEASE LEVER ADJUSTMENT

Release Lever Adjustment (On Borg-Warner Universal Fixtures UF-300, 400): Special lands must be installed on fixture under pressure plate lever lugs (all models with 3 levers—space lands equally on 4 lever types) Set adjusting arm on adjusting sleeve so that height of lower side arm above bottom of sleeve is correct for each model (see table below), install indicating plate on levers (see special note below on Models 9A7, 10A7 with new duckbill release levers) Adjust each lever so that it just contacts indicating plate or adjusting arm, lock lever adjusting nuts by peening nut against notches in eyebolt





B RG & BECK 8.5A6, 8A7, 9A7, 10A6, 10A7, 11A6 CLUTCH

Release Lever Settings

Clutch Assy.	Lever Height
MODEL 8.5A6	
1340	2 1/4"
1369	2 1/4"
MODEL 8A7	
980	2 1/16"
975 ①	2 3/16"
987	2 9/32"
MODEL 9A7	
924	See 9A Note
926, 943, 951, 952, 953, 1329	2 3/16"
1361	2 3/16"
1365	
1373	
MODEL 10A6	
961, 1330	2 1/8"
1335	2 1/8"
1349	2 1/4"
1353	2 1/8"
1354	2 1/4"
MODEL 10A7	
927	See 10A7 Note
930	② 2 1/8"
950	2 5/32"
957	② 2 1/8"
982	2 1/16"
1310	2 3/16"
1319	2 3/16"
1331	2 1/8"
1368	
1371	2 1/16"
1376	
MODEL 11A6	
929, 931, 945	② 2 1/8"
941 (Use 929)	② 2 1/8"
994	2 1/8"
MODEL 11A7	
3837155 (Chevrolet V8 Trucks)	

①—Used only with No 381558 Driven Member
②—1/16" higher with baffle

9A7, 10A7 Note—These models with 'duckbill' type release levers must be adjusted in special manner (longer length of levers makes it impossible to install height sleeve on fixture) With clutch mounted on fixture, place special extension sleeve '3Z' on spindle (this sleeve correct height for lever adjustment), place indicating plate on levers with counterbored side up Set adjusting arm flush with bottom of calibrated adjusting sleeve, install sleeve on spindle, adjust release levers in usual manner

RELEASE LEVER ADJUSTMENT (Using Gauge Plat)

Use gauge plate indicated in table below and install clutch on flywheel with gauge plate in place of regular driven member with lugs on gauge directly under release levers Use short straightedge placed on edge on gauge plate hub and adjust release levers so they just contact edge of straightedge for all models marked "flush" in table (If lever setting marked "high" a

CONTINUED ON NEXT PAGE

BORG & BECK MODELS (C n.inued)

cut-out or step must be made in edge of straightedge at one end so that levers can be set higher than hub, if lever setting marked "low" cut-out or step should be cut in gauge hub end of straightedge so that end extends below hub Cut-out or step should be in the amount "high" or "low" indicated in table) Lock adjustment by peening nut into notches in eyebolt

R l ase L ver Settings (Using Gauge Plate)

Car M d l	Gauge Plate	Lever Setting
Chevrolet V8 Truck	J-1048	1/8" High
Hudson Jet	J-5490	Flush
Hudson Wasp	J-5490	1/16" Low
Hudson Hornet	J-5490	1/32" High
Nash Ambassador	J-1507	Flush
Nash Statesman	J-5490	1/32" High
Metropolitan	J-5567	Flush
Rambler	J-5490	1/32" High
Oldsmobile	J-1048	Flush
Studebaker	J-4708	Flush

RELEASE LEVER ADJUSTMENT (C-585 & C-585A Fixture)

With C-585 & C-585A Clutch Fixture—On this fixture, feeler gauges are located in base of fixture under the clutch assembly Install the clutch assembly on fixture with release levers directly above feeler gauges (on 4-lever type 11" clutches, install clutch with two levers directly over two of the feeler gauges, adjust these levers, then rotate clutch so that other levers are over feelers and adjust these levers) Place correct spacers on center screw of fixture (see table below) install compression plate on center screw making certain that it rests directly against all release fingers (plate can be reversed to provide proper clearance on all models), install self-aligning washer, plain washer, and compression nut Tighten compression nut until clutch fully compressed, install clutch housing clamps over cover bolt holes and tighten clamps securely Adjust each release lever adjusting nut until slight drag secured on each feeler (all feelers alike), lock adjusting nuts and recheck adjustment

L ver Setting (C-585 & C-585A Fixture)

Clutch Assy. No.	C-585 Spacer
926, 948, 951, 952, 953, 961, 982, 1373	20
929	19, 20, or 21
930, 957, 1329, 1330, 1335, 1353	21
931, 994	19
1331, 1368, 1376	44
1340, 1369	18

DRIVEN MEMBER

Driv n M mber Replac m nt Note: *Manufacturer recommends installation of new driven member with new facings rather than relining plate Driven member hub (Spring Dampener) cannot b serviced in the field*

"Spring-Flex" Borglite Driven Member: A composite plate consisting of a small diameter disc with separate clock-spring type cushion segments (to which facings are riveted) riveted to outer rim Segments are dishes to provide soft engagement This type of construction results in less weight at rim of driven member (which reduces spinning and allows quiet fast gear shifting) without loss of strength in plate Plate is balanced by additional rivets placed at rim of disc

Facings are riveted individually on segments by one or two rivets

To Remove Facings—Drill out rivets to remove old facings Do not punch out rivets as this will distort disc and damage tongues

Installing Facings—Insert rivets on facing side (head in countersunk hole of facing) Roll rivets on plate side—do not use split rivets Each facing must be riveted individually with facing drilled to permit working through facing to head rivets for facing in opposite side

BORG & BECK MODELS 9.5E, 10E

	Borg & Beck Nos. Model	Assy. No.①
CHRYSLER		
1952-53 Six (Torque Converter)	9 5E	1220
1951-53 V8 C53, 58, 59 (F D)	10E	1211
1951-53 V8 C52, 54, 55, 56 (F D)	9 5E	1213
1951-53 V8 C52, 54, 55, 56 (T C)	10E	1211
DESOTO		
1952 V8 S17 (12½" T C)	10E	1222
1952-53 V8 S16, 17 (11¾" T C)	9 5E	1221
1952-53 V8 S16, 17 (Fluid Drive)	9 5E	1215
1953 Six S18 (Torque Converter)	9 5E	1220
DODGE		
1953 V8 (Fluid Drive)	9 5E	1214
1953 V8 (Torque Converter)	9 5E	1220

(F D)—Fluid Drive
(T C.)—Torque Converter

①—Assy. No. stamped on cover for identification.

DESCRIPTION: Single plate dry disc type. Similar in design to Borg & Beck "A" type clutches except for the "Strap Drive" which consists of flat straps within the cover which are riveted at one end to the cover and bolted at the other end to the pressure plate. The straps deflect during pressure plate movement (for disengagement and engagement of the clutch) without rubbing contact and provide positive drive without friction or noise.

REMOVAL: *See "Clutch" on car model page.*

DISASSEMBLY & REASSEMBLY: Same as for Borg & Beck "A" clutches except that capscrews and washers in the drive straps which retain the pressure plate within the cover must also be removed to permit the cover to be lifted off (these screws accessible through holes in cover). Use the following specifications for these clutch models:

Clutch Spring Specifications

Clutch Assy.	Spring No. & Color	Pressure & Lgth.
1211	12—Dark Grey	250 lbs. @ 1 7"
1213	6—Orange	170 lbs. @ 1½"
	6—Red	195 lbs @ 1½"
1214	6—Red	195 lbs @ 1½"
	3—Yellow	140 lbs @ 1½"
1215	12—Lavender	150 lbs @ 1½"
1220	6—Tan	160 lbs @ 1½"
	6—White	245 lbs @ 1½"
1221	12—Black	230 lbs @ 1½"
1222	6—Dark Blue	190 lbs @ 1 11/16"
	6—Dark Grey	250 lbs. @1 7"

Spring pressures are plus or minus 5 lbs

Release Lever Setting (For use with Borg-Warner Fixtures UF-300, 400)

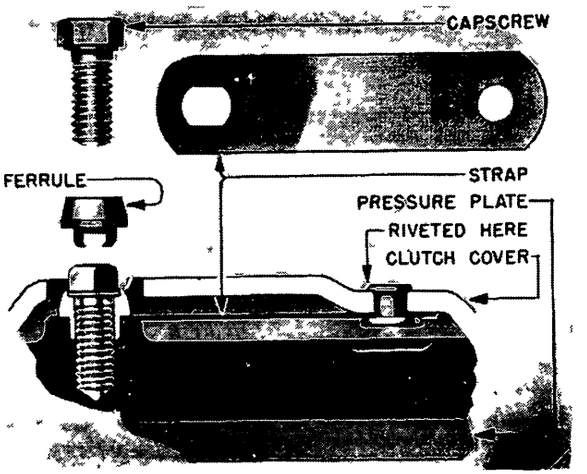
Clutch Assy.	Lever Height
1211, 1222	2 7/32"
1213, 1215, 1220, 1221	2¼"
1214	2 3/16"

Release Lever Setting (Using Chrysler C-585 Clutch Fixture)

Clutch Assy.	Spacer No.
1211	#42
1213	#43
1214	#18
1215, 1222	#21
1220	#43

DRIVEN MEMBER: *See car model page for facing specifications.*

Clutch Assy.	Driven Member	Borg & Beck No.
1211, 1222		382067
1213, 1215, 1221		381957
1214		382005
1220 (Chrysler & DeSoto 6)		381957
1220 (Dodge V8)		382005



BORG & BECK 9.5E & 10E PRESSURE PLATE DRIVE STRAPS

CHEVROLET (OWN)

CHEVROLET	Clutch Assy. No.
1946-53 Pass., ½ Ton (Exc Heavy Duty)	3836003
1946-53 Other Trucks	3836004
1946-53 Pass , ½ Ton (Heavy Duty)	3836004
1954-55 Pass., 6 Cyl	3836715
1954-55 Pass., 6 Cyl.	3836715
1954-55 Comm (Exc Heavy Duty, D-D)	ℂ 3836715
1954-55 Comm (Hvy. Duty)	ℂ 3836719
1955 Pass (Heavy Duty)	3836719
1955 Pass., 8 Cyl. (Exc. Heavy Duty)	3836217

ℂ–Borg & Beck Clutch used on 1955 2nd Series V8 Trucks

►**CLUTCH TYPES:** Two sizes used, 9" on Passenger Cars and Half Ton, 11" on all other trucks. Both types are same design and serviced in same manner but must not be interchanged. Clutch assemblies and parts (Cover and Pressure Plate) can be identified as follows:

Clutch Part Numbers

Clutch Assy.	Clutch Cover	Pressure Plate
3836003	3836005	3836008 ℂ
3836004 (1946-52)	3836007	838949 ℂ
3836004 (1953)	3836007	3836009 ℂ
3836217	3836218	3704776 ℂ
3836715	3704773	3704776 ℂ
3836719	3702405	3702402 ②

ℂ–This part number cast in plate
②–2402 cast in plate

►CHANGES, CAUTIONS, CORRECTIONS

►**Clutch Rattles at Idling Speed (Pedal Depressed & Clutch Disengaged) Correction:** May be due to insufficient tension of retracting springs and can be corrected without removing clutch from engine as follows: Remove clutch housing underpan, turn flywheel until one retracting spring is at bottom, remove bolt (work through hole in side of cover), withdraw spring, install new spring in same manner. Replace all three retracting springs in this way. If new springs do not correct rattles, check clearance between pressure plate lugs and edge of clutch cover slot. Clearance should be .002-.008" and clutch cover assembly or pressure plate should be replaced if clearance exceeds .010".

►**Clutch Balance Caution:** When installing pressure plate make certain that '0' marks on one lug of plate and on clutch cover flange are lined up. When installing clutch in engine, line up 'X' marks on clutch cover and flywheel. This is necessary to maintain clutch balance.

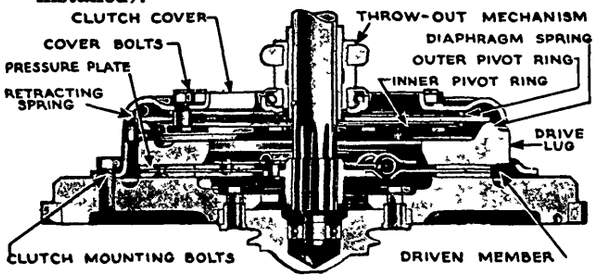
DESCRIPTION: Single plate dry disc type with diaphragm spring (replacing conventional clutch release spring and release levers. Diaphragm spring is shaped like dished washer with inner rim slotted to form 18 release fingers and is pivoted on inner and outer pivot rings mounted on 9 bolts in clutch cover.

REMOVAL: *See "Clutch' on car model pages.*

OVERHAUL: Manufacturer recommends the use of Clutch Pilot Tool K-411, to support clutch during disassembly, and Clutch Assembling Fixture J-1113, to compress diaphragm spring when disassembling and assembling pressure plate and cover assembly.

Retracting Spring Replacement. Does not require dismantling clutch. Remove clutch housing underpan, crank engine over until retracting spring bolt appears in lower opening, remove bolt, withdraw retracting spring, install new spring in same manner. Replace other retracting springs (3 used) in same manner.

Clutch Fork Removal. Can be removed without disturbing transmission. Remove flywheel underpan, disconnect clutch fork from pedal, use ⅞" and ¾" wrench to remove fork mounting, withdraw fork, remove ball retainer spring, ball retainer, ball. Pack ball seat in fork with high-melting point grease. NOTE—Install ball retainer spring with upturned ends down in ball retainer opening (will not seat in machined groove in fork if incorrectly installed).



Clutch Fork Installation—If retainer in groove in fork is worn, install new retainer being certain that high side of retainer is up (away from bottom of ball opening), and open end of retainer on the horizontal.

Clutch Fork & Bearing Installation. Pack ball seat in fork with small amount of high melting point grease. Install new retainer in clutch fork groove if old retainer worn, making certain that retainer installed with high side UP (away from bottom of bearing) and open end of retainer horizontal. Pack recess within throw-out bearing collar and coat throw-out fork groove lightly with high melting point grease before assembling to fork.

Disassembly: Take out screws and remove the three retracting springs through slots in cover (screws accessible through holes in side of cover), make certain that one pressure plate lug and cover marked to insure correct reassembly, remove pressure plate. On 1939 & later types, this completes disassembly operation (cover assembly, riveted and can not be dismantled.

Servicing: Wash all parts except the throw-out bearing in gasoline (see Caution below), examine pressure plate and flywheel face for scored or rough surface, check pressure plate drive lugs for burrs, see that lugs move freely in cover slots and that clearance in slots is .002-.008" (replace pressure plate or cover if clearance exceeds .010"). Check diaphragm spring and pivot rings for distortion or cracks. See that throw-out bearing is not rough and moves freely on clutch shaft sleeves, check transmission pilot hole in housing for run-out (must be less than .008"). Check clutch fork ball seat and ball fit, check driven disc and clutch shaft splines (replace disc if splines worn).

CAUTION—Throw-out bearing permanently lubricated and must not be soaked in gasoline which may dissolve lubricant on balls.

Reassembly: Reverse disassembly directions. Coat the special washers with graphite grease before installing. Make certain that lugs on pivot rings engage bolts (three pairs of lugs on each ring which must be placed at three of the bolts to prevent ring rotating). Install diaphragm spring with convex side up and compress spring so that it is flat while tightening bolt nuts on cover. Line up marks on pressure plate lug and cover when installing plate in cover assembly. See that cover plate nuts and retracting spring screws are tightened securely.

DRIVEN MEMBER: Two types used: 9" Type on Passenger Cars & Half-Ton, 10¾" Type on other trucks (this type Optl. on Pass. Cars & Half-Ton).

►***CAUTION—Two different clutch sizes used and parts (including driven member) not interchangeable.***

Driven Member (Disc & Facings)

Pass. Car	Part No.
1946-54 Std.	ℂ 3835343 or ② 3835216
1946-52 Heavy Duty (10¼")	② 3835453
1946-53 Heavy Duty (10")	③ 3834778
1954-55 Heavy Duty (10"-red hub)	ℂ 3836119
1955 Six Cyl.	ℂ 3836121 or ② 3836103
1955 V8 (exc. O.D.)	ℂ 3836708 or ② 3836534
1955 V8 (O.D. Cars)	② 3720227
Half-Ton	
1946-53 Std.	ℂ 3835343 or ② 3835216
1946-53 Heavy Duty (10¾")	② 3835453
1954-55 Std.	ℂ3836119 or ② 3835216
1954-55 Heavy Duty (11"-pink hub)	ℂ 3836021
Trucks (except Half-Ton)	
1946-53 Std.	② 3835453
1946-53 With 235" Engine	ℂ 3835454
1954-55 (Exc. Fwd. Contr.)	ℂ 3836119
1954-55 Heavy Duty (11"-pink hub)	ℂ 3836021

ℂ–Woven facing. ②–Molded facing.

Facing Installation—Drill old rivets out from head side. Use riveting fixture to install new facings (fixture will flatten rivets exact correct amount of 7/32"), and reverse rivets in pairs (two each way).

INSTALLATION: Remove and repack clutch bearing before installing clutch (see instructions below). Line up 'x' marks on flywheel and clutch cover, install cover bolts and tighten all bolts evenly, one turn at a time, to prevent distorting cover. Pack recess within clutch throw-out collar with high melting point lubricant and coat throw-out fork groove with lubricant before installing throw-out assembly. Make certain that throw-out fork ball is snug fit in fork without endplay (install new ball if scored or worn), pack seat with high melting point grease, make certain that upturned ends of ball seat retainer spring point down in ball retainer opening (retainer will not seat in groove in fork if spring installed incorrectly), install fork and tighten ball retainer securely.

Clutch Pilot Bearing—Clutch pilot bearing is an oil impregnated type bearing pressed into the crankshaft. This bearing requires attention only when the clutch is removed from the vehicle, at which time it should be cleaned and inspected for excessive wear or damage and should be replaced if necessary. To remove, install pilot bearing puller J-1448 and remove bearing from crankshaft. In replacing this bearing, use clutch pilot bearing driver J-1522. Place bearing on pilot of tool with radius in bore of bearing next to shoulder of tool and drive into crankshaft.

LONG "CF" & "NC"

	Clutch Model	Cover Assy. No.
CADILLAC		
1946-53 V8	11CF	L5167
1946-53 Commercial	11CF	267953
FORD		
1946-48 6 & 8 Cyl. Pass	10CF	L5222
1949-55 6 Cyl. Pass.	9½CF	268594
1949-53 8 Cyl. Pass.	9½CF	268594
1954 8 Cyl. Pass.	10CF	L5222
1954-55 8 Cyl. Pass.	10NC	263934
1954-55 Police	11CF	261981
1955 Thunderbird	11CF	261981
1950-52 All Police & Taxi	10CF	L5222
1946-51 All School Buses	11CF	L1478
1946-55 8 Cyl. ½ T., 3-Spd.	10CF	L5222
1946-55 All ½ T., 4-Spd.	11CF	L1440
1946-55 All ½,¾ T. Pkg. Del.	11CF	L1440
1946-55 6 Cyl. ¾ & 1 Ton	10CF	L5222
1946-55 All 1½, 2 T., 4-Spd.	11CF	L1440
LINCOLN		
1046-48 12 Cyl. Models	10CF	L5222
1948-54 8 Cyl. Models	11CF	267044
MERCURY		
1946-48, Some 1951-52	10CF	L5222
OLDSMOBILE		
1949-55 All Models	11CF	L5167
1949-55 Pol., Taxi, H.D.	11CF	262832
PACKARD		
1946-47 6 Cyl. 2100	9½CF	L5385
1946-47 8 Cyl. 2101-11	10CF	L5389
1946-47 8 Cyl. 2103-06-23	11CF	L5391
1948-51 2206-26-33, 2326-33	11CF	267953
1948-50 2222-32, 2332, 2401	11CF	268349
1952 2401 (2467-69)	11CF	268349
1952 2401 (2462-65-92-95-98)	10CF	267954
1948-55 2202, 2302, 2402, 2502-31, 2611-26-31, 5402-11-26-31, 5540, 5560	11CF	268349
1948-54 2201, 2301, 2401, 2501, 2601-33, 5401-33	10CF	267954
1952-54 Overdrive 2501, 2601-33, 5401-33	10CF	267954
1952 Overdrive 2501 (300 Eng.), 2502-06-30	11CF	268349
1953-54 Overdrive 2602-11-26-31, 5402-11-26	11CF	268349

►CHANGES, CAUTIONS, CORRECTIONS

►**Ford, Lincoln, Mercury & Long Clutch Part Nos.:** Ford, Lincoln, & Mercury Part Nos. for each Long Clutch Cover Assembly and Driven Member are as follows:

Long N.	Clutch Cover Assembly Ford, Lincoln, Mercury Part No.
261981	Ford B5S-7563-A
263934	Ford B5A-7563-A
268594	Ford 1A-7563-A
L1440	Ford 51-7563-A
L1478	Ford 8MTH-7563-A
L5222	Ford AB-7563-C
L5222	Lincoln
L5222	Mercury 1CM-7563
267044	Lincoln 8EL-7563

Long Cover Assy. No.	Driven Member Number Long	Ford, Lincoln, Mercury
261981 (Thunderbird)	281982	B5S-7550-A
263934 (Ford)	281978	B5A-7550-A
268594 (Ford 6 Cyl.)	288824	8HA-7550-B
268594 (Ford 8 Cyl.)	288825	8BA-7550-A
L1440 (Ford)	CD606	81T-7550
L1478 (Ford)	CD607	59T-7550-B
L5222 (Ford V8-1954)	281978	B5A-7550-A
L5222 (Ford 1946-48)	CD870	51A-7550-A
L5222 (Ford Pol., Taxi-1950-52)	280520	8HA-7550-C
L5222 (Lincoln)	CD887	
L5222 (Mercury)	280520	1CM-7550-A
267044 (Lincoln)	287045	8EL-7550

Long Driven Member (except Ford, Lincoln, Mercury): Long Driven Members for cars other than Ford, Lincoln, Mercury (listed above), and for cars using a Long Driven Member with other clutch models are as follows:

Car Model	Long Cover Assy.	Long Driven Member
Cadillac	L5167	CD852
Cadillac	267953	CD851
Oldsmobile	L5167	289960
Oldsmobile	262832	282687
Packard	L5385	CD638
Packard	L5389	CD538
Packard	L5391	CD689
Packard	267953	287141
Packard (Standard)	267954	287952
Packard (Overdrive)	267954	282106
Packard (5540)	268349	284339
Packard (5560)	268349	284340
Packard (Standard)	268349	287951
Packard (Overdrive)	268349	282105

Driven Member Only

Buick 40 (1947-55)	CD890
Buick 50 (1947-52)	CD890
Buick 50, 60 (1953-55)	CD873
Buick 70 (1946-48)	CD724 or CD873
Pontiac 6 Cyl. (1946-54)	CD874
Pontiac 8 Cyl. (1946-49)	CD875
Pontiac 8 Cyl. (1950-54)	289257
Pontiac 8 Cyl. (1955)	284585
Pontiac 6 Cyl. Taxi (1946-49)	CD682
Pontiac 8 Cyl. Taxi (1949)	289257
Pontiac All Taxi (1950-54)	289257

►**1946 & Later Pontiac Driven Member Note**—Driven members on 1946-49 Six & Eight are same size (9½") but must not be interchanged. Standard and Heavy Duty assemblies can be identified as follows:

Six Cyl. Types—Torsional springs in hub painted Dark Blue & Orange. Facings stenciled "Six 41-49" (Std.). "Six" without year mark (10" Heavy Duty).

Eight Cyl. Types—Torsional springs in hub painted Dark Blue & Brown. Facings stenciled "Eight 41-49" (Std.). "Eight" without year mark (10" Heavy Duty).

DESCRIPTION: Single plate, dry disc type. Release levers formed with weight on outer end which increase pressure on driven member as engine speed increases. Levers pivoted on pressure plate on needle bearings with fulcrum located in yoke support on cover plate. Hardened-steel screw contact provided on lever tips. These screws staked in place and should be disturbed only when release lever adjustment (for new or relined driven plate) is to be made. Servicing directions below apply to pressure plate assembly. See Driven Member Section below if pressure plate not to be dismantled and rebuilt.

REMOVAL: *See "Clutch" on car model page.*

OVERHAUL: Mark all parts before dismantling and reassemble in same position. Replace grooved, warped, or checked pressure plates. Replace springs if pressure plate discolored from heat.

Clutch Fixture Note:—Manufacturer recommends use of Borg-Warner Universal Clutch Fixture UF-300 or UF-400 for all servicing and rebuilding operations.

DISASSEMBLY

Disassembly: Place clutch on fixture (supporting pressure plate on special lands under lugs) or arbor press. Compress cover plate slightly, take out assembly screws (lever yoke mounting screws) on cover, release pressure on cover plate slowly, lift off plate. Note whether washers used on yokes under assembly screws (these washers must be reinstalled if old pressure plate used again). See special directions below on removing and reinstalling release levers. Remove and test clutch springs.

Pressure Plate:—Pressure plate refacing by grinding or turning down on lathe will throw release levers out of adjustment. If pressure plate being refinished, remove .020" from face and install spacer washer .015" thick on release lever yoke under cover.

NOTE—If washers are found on release lever yokes under cover when clutch disassembled, replace these washers (if old pressure plate used) or discard washers (if new pressure plate installed).

Clutch Springs:—Pressure springs should check with table below. Replace springs if weak or burned or if clutch has been subjected to excessive heat.

Clutch Spring Assemblies

Clutch Assy.	No. Used	Spring—Part No.
L1440	9	C-2045
L1478	9	C-4873 (was C-3529)
L5167	9	C-2686
L5222	9	209254 (was C-5333)
L5385	6	C-4905
L5389	9	C-2096
L5391	9	C-4905
267044	9	C-2686
267953	12	207419
267954	9	C-3431
268349	9(3)	211366, (6) 208516①
268594	6	211366 (was 208516)
263934	9	209254
261981	9	201983
262832	9	207419

①—Was 9-C4905 & 203494.

CONTINUED ON NEXT PAGE

LONG "CF" & "NC" (C nt.)

Spring Specifications

Spring Number	Pressure at 1 9/16"	No. of Coils	Color Mark
C-2045	110-120 lbs	8.8	Gray
C-2096	125-130 lbs	8¾	Red
C-2686	145-150 lbs	8¾	Yellow
C-3431	150-160 lbs	8½	Pink
C-3529	130-140 lbs	8½	None
C-4873	145-153 lbs	8¼	Brown
C-4905	158-168 lbs	8¼	Tan
C-5333	125-135 lbs	8¾	Blue
207419	170-180 lbs.	7.8	Orange
208516	170-180 lbs.①	9	Pea Green
201983	154-164 lbs ④	9.65	Brown & White
209254	137-147 lbs ②	9 3	Bronze
211366	200-210 lbs ③	9	Aluminum

①—Pressure at height of 1 762".
②—Pressure at height of 1 747".
③—Pressure at height of 1 751"
④—Pressure at height of 1 736".

Release Lever Assembly:—Mount lever yoke on release lever, fasten by inserting flat-sided lever pin (flat side out or toward cover) and roller (place roller on flat side of pin). Insert lever in pressure plate lug, use roller pin sawed off to length of lever width as a guide and insert needle bearings, insert roller pin, pushing guide pin out, lock both lever pins with cotter pins. Thread release lever adjusting screws in ends of levers, turning screws down completely.

REASSEMBLY

Assembling:—Place pressure plate on fixture or arbor press. Assemble pressure springs, locator washers or insulator washers on plate, place washers on lever yokes (if washers used previously and old pressure plate being used). Place cover plate in position (lining up marks made before dismantling), compress cover slowly guiding lever weights through holes in cover and lining up yokes under cover plate holes. See that pressure springs are seated, insert cover screws in yokes, using lockwasher under screw head, tighten screws down securely. Compress and release clutch several times (using weight on release levers) to seat all parts. Then adjust release lever heights.

Release Lever Settings

9½ CF TYPES

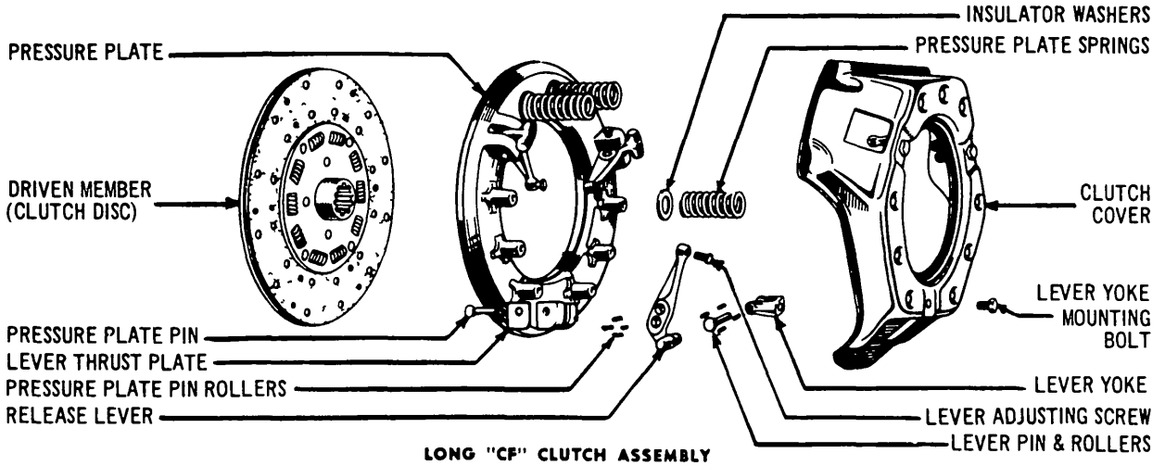
Clutch No.	Lever Height
L5385	①2"
268594	②1 13/16"

10 CF TYPES

L5222	1 13/16"
L5389	2⅛"
267954	1⅞"

10 NC TYPES

263934	



LONG "CF" CLUTCH ASSEMBLY

11 CF TYPES

L1440, L1478, L5391	2 7/32"
L5167, 262832	1⅞"
261981, 267044	1¾"
267953, 268349	1 15/16"

①—Lever setting 2½" if dial indicator (and special gauge plate) used See data below

②—Lever setting 2 5/16" if dial indicator (and special gauge plate) used. See data below.

RELEASE LEVER ADJUSTMENT

Release Lever Adjustment (on Fixture):—Place special lands on fixture under pressure plate lugs, assemble lever adjusting arm and sleeve setting bottom of adjusting arm correct distance as showr in table above (all figures plus or minus 1/32") above bottom of sleeve and lock the adjusting arm with the thumbscrew. Swing arm over each release lever in turn, back off adjusting screw on tip of lever until rounded screw head just contacts arm, lock screws by inverting clutch so that screw head is supported and stake or peen lever into adjusting screw slot. Do not disturb lever yoke screws when making this adjustment.

Release Lever Adjustment (without Fixture):—Assemble the special lever setting disc or gauge on the flywheel in place of driven member, placing gauge so that lugs are under release levers and gauge is centered in clutch. Tighten all clutch cover bolts evenly. Place short straightedge on edge on top of gauge shoulder, turn adjusting screws at tips of release levers up or down until they contact straightedge, lock screws by peening metal of lever into screw slot. Lever heights must be equal within .005".

Release Lever Adjustment (Dial Indicator): When using dial indicator to set release levers, special indicating plate must be installed on levers and lever setting with this plate in place should be 2 5/16" on 9½CF No 268594 and 2½" on 9½CF No. L5385. Lever heights should be equal within .005". This indicating plate not used on other clutches.

DRIVEN MEMBER

NOTE: Clutch manufacturer recommends installation of new driven member with new clutch facings rather than relining clutch. Driven plate hub (Spring dampener) cannot be serviced in the field. Cushioning springs used under facing on pressure plate side of disc only.

To Remove Facings:—Drill out 12 iron rivets mounting cushion springs on plate (two rivets radially at center of each spring), remove spring and facing assembly, drill out rivets to remove springs from facing (replace springs as complete sets). Then drill out rivets mounting other facing on plate. Do not punch out rivets.

To Install Facings:—Install facings on flywheel side inserting brass rivets with heads in countersunk holes in facing and roll rivets on plate side (rivets staggered in inner and outer holes alternately around facing or placed two in a row radially). Place cushion springs on second facing with clearance at center between spring and facing, insert brass rivets with head in countersunk holes in facing and roll on spring side. Rivet layout same as for first facing except that rivets staggered in pposite direction or radial rows offset from rivets for first facing. Brass rivets must not project more than 1/32" when rolled (plate and spring cutaway to provide clearance). Place cushion spring and facing assembly on plate, insert iron rivets through holes in plate and spring, roll rivets (work through holes in facing). Driven member should be balanced after new facings installed.

Installing Driven Member:—Install with hub nuts on flywheel side and cushioned facing toward transmission.

INLAND

Pontiac 6 & 8 Cyl. Models (1946-55)

▷CHANGES, CAUTIONS, CORRECTIONS

▷1946-55 Models (except 1946-49 Taxi & Heavy Duty) Clutch Service—Pressure plate permanently assembled as part of cover assembly by four shallow 'U' shaped segments of flat spring steel riveted to pressure plate at center and to clutch cover flange at ends. These spring segments replace driving lugs and separate retracting springs.

▷Pontiac Clutch Poor Release Complaints—May be caused by the anti-rattle spring wearing into plate and binding at end of spring. To correct this condition, examine pressure plate and spring for indication of interference. Smooth up pressure plate to provide good bearing surface for face of spring. See that spring does not have end thrust on pressure plate lug (shorten end of spring if necessary). Lubricate spring with Lubriplate when reassembling. CAUTION—Driving lug slots must not be widened to correct poor release. Clearance in excess of .005" at either side of lug will cause clutch noise and roughness. When installing clutch, make certain that dowel in flywheel engages hole in cover (cover will be distorted and clutch out-of-balance if installed in any other position).

▷Pontiac Clutch Release Noises—If clucking noise noted when pedal depressed to release clutch, examine felts at each end of clutch control countershaft (clutch linkage cross-shaft) and lubricate if dry. IMPORTANT—These felts should be lubricated at regular lubrication periods

▷Pontiac Clutch Intermittent Buzzing Noise—Noise at about 28 MPH. which is not continuous may be caused by loose dampener spring in clutch driven member hub.

▷Pontiac 1946 Clutch Release Bearing Noise Correction—May be caused by excessive bearing clearance on first type support tube. See Clutch Notes in Pontiac Shop Notes in car model section for recommended correction.

▷Pontiac 1946 Release Bearing Support (New Type and recommended change on early 1946 cars). See Clutch Notes in Pontiac Shop Notes in car model section for complete data.

▷Pontiac 1946 & Later Driven Member Caution—Same size used for both 6 & 8 Cyl. cars (9½" Std., 10" Heavy Duty Taxicab & Sedan Delivery) but must not be interchanged and can be identified by hub spring color. *See Driven Member data.*

▷1950-55 Pontiac 8 Clutch: Larger 10" type (may be identified by greater diameter and six mounting bolt holes in cover *Can be used to replace 1946-49 Heavy Duty (10") clutch as an assembly (Cover & Pressure Plate Assy. and Driven Plate Assy.).*

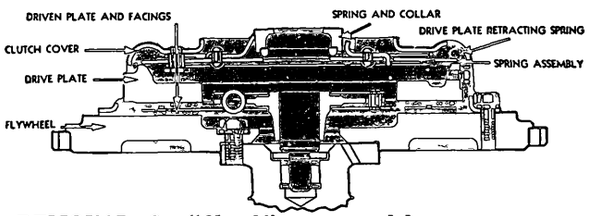
DESCRIPTION: Single plate, dry disc, with diaphragm spring disc which takes the place of both pressure plate springs and release levers. Diaphragm spring is shaped like dished washer with inner rim slotted to form 18 segments or release fingers and is pivoted on inner and outer pivot rings assembled on inner surface of clutch cover by nine rivets. Diaphragm and pressure plate are linked by three tension or retracting springs mounted on edge of pressure plate by capscrews (springs and mounting screws visible through slots in cover). When diaphragm spring fingers depressed to release clutch, diaphragm pivots on inner pivot ring and resulting flexing action causes outer rim to move out relieving pressure on pressure plate and withdrawing plate from driven member. When diaphragm released to engage clutch, diaphragm flexs in opposite direction (pivoting on outer pivot ring) Pressure plate driving torque taken by three lugs on outer rim of plate which engage slots in cover

Pontiac Anti-Rattle Spring—Consists of a flat spring installed between the pressure plate and the clutch cover in one of the cover holes adjacent to the '0' balance marked lug hole. This anti-rattle spring should be wired in place before pressure plate is removed and must not be installed in any other position. CAUTION—Changing position of anti-rattle spring will upset clutch balance.

Clutch Applications

	Pontiac Cover Assy. Part No.
1946-49 Taxicab & Heavy Duty	①
1950-54 Sed Del, Taxi, Heavy Duty	758645
1946-54 6 Cyl (Std)	755959
1946-49 8 Cyl (Std)	755959
1950-54 8 Cyl (Std)	757370
1955 8 Cyl (Std)	758513

①—Clutch Cover No 753412, Pressure Plate No 753802



REMOVAL: *See "Clutch" on car model page.*

OVERHAUL: *CAUTION—Clutch (except on 1946-49 Taxicab & Heavy Duty) cannot be disassembled (riveted construction).* To disassemble clutch pressure plate and cover assembly on 1946-49 Taxicab & Heavy Duty models proceed as follows

▷Clutch Handling Caution—Pressure plate must not hang on retracting springs in clutch cover. When handling clutch cover assembly, support pressure plate by hand or invert assembly so that pressure plate is up.

Disassembly—Remove three screws holding three flat pressure plate retracting springs to pressure plate, remove pressure plate from clutch cover *CAUTION—Use care so as not to damage clutch pressure or driving plate retracting springs by dropping clutch assembly with pressure plate face down. Lay clutch assembly on bench with pressure plate face up.*

Inspection—Inspect clutch driven plate for broken or distorted torsion springs, worn or loose facings, oil on facings, and damaged spline which could cause binding If any of above defects noted, replace driven plate with new assembly Inspect pressure plate and cover assembly to see that it is free of oil and grease Check to see that diaphragm spring is not broken and fingers of spring are not distorted Examine release bearing support flange for distortion and that it seats fully into recess in clutch housing Examine support for burrs on outer surface which pilots clutch release bearing and on surface which contacts clutch housing counterbore at paper gasket surfaces If slight step found in clutch housing which prevents seating of bearing support flange chamfer, edge of support flange to allow it to seat, remove any burrs on edge of flange Check release bearing on bearing support for binding Check release bearing by placing thrust load on bearing by hand and turning bearing race. Replace if bearing feels rough when turning *CAUTION—Do not place bearing in degreasing solvent as this will wash lubricant out of bearing. Bearing is lubricated for life and sealed at factory.*

Assembly—Lay clutch cover and spring assembly with front side of cover up Apply light coating of high melting point grease to circular ridge on back of pressure plate against which outer edge of diaphragm spring seats and also to sides of three drive lugs on pressure plate Position pressure plate in clutch cover making sure "0" stamped on cover is in line with "0" stamped on one of drive lugs of pressure plate This is necessary to insure balance of complete assembly Install three flat pressure plate retracting springs See that shakeproof lockwasher is installed under each spring retaining bolt

DRIVEN MEMBER: Long "CF" type used on all models. *See "Long CF" Clutch data.*

	Pontiac Driven Member Part No. ①
1946-49 6 Cyl Sed Del, Taxi, Heavy Duty	502834
1950-54 6 Cyl Sed Del, Taxi, Heavy Duty	513582
1946-54 6 Cyl (Std.)	508403
1949 8 Cyl Sed. Del, Taxi, Heavy Duty	513583
1946-49 8 Cyl (Std)	505473
1950-54 8 Cyl. (Std)	513583
1955 8 Cyl (Std)	518130

Driven Member Servicing: Manufacturer recommends replacement of driven member when torsion springs distorted, facings worn or loose, oil present on facings, spline damaged

▷1946 & Later Pontiac Driven Member Note—Driven members on 1946-49 Six & Eight are same size (9½") but must not be interchanged. Standard and Heavy Duty assemblies can be identified as follows:

Six Cyl. Types—Torsional springs in hub painted Dark Blue & Orange. Facings stenciled "Six 41-49" (Std.), "Six" without year mark (10" Heavy Duty).

Eight Cyl. Types—Torsional springs in hub painted Dark Blue & Brown. Facings stenciled "Eight 41-49" (Std), "Eight" without year mark (10" Heavy Duty).

HUDSON (OWN)

All Models (1946-52)
All Models Except 1C, 2C, 1D, 2D, 3D (1953-54)

►***CLUTCH CAUTION:*** Two different sizes used (9" and 10") and correct driven member must be used with each size clutch. ***See Driven Member data.***

	Clutch Part Numbers		
Clutch Assy.	Cover	Press. Plate	Driven Member
303200 (9")	303201	166247	303342
301251 (10")	166338	303766	304885

DESCRIPTION: Single plate cork insert type operating in oil. Mounted on flywheel by 16 capscrews in cover flange. Gasket used under cover flange to secure oil-tight joint and oil seal mounted on throw-out collar to retain clutch lubricant. Clutch actuated by 3 clutch fingers pivoted on retainers bolted to cover and linked to pressure plate by pins.

REMOVAL: *See "Clutch" on car model page.*

OVERHAUL: Clutch cover need not be dismantled when replacing driven member unless springs are to be tested or replaced, pressure plate replaced, or other service work required. ***Check cover to determine whether disassembly required as follows:***

Checking Cover Assembly—Mount cover on flywheel or base plate with standard driven member (.200-.213" thick) and one gasket (.028-.032" uncompressed thickness) under flange (CAUTION—cover must be held by pressure on flange—not on cover flat or hub). Measure distance from contact surface of lowest clutch finger to top edge of cover hub. This distance should be 1¼-1½". If less than 1¼", clutch will perform satisfactorily if all fingers clear hub by at least ⅛". If distance greater than 1½", cover is distorted or fingers and retainers are worn. Dismantle for inspection as follows:

Dismantling:—Check punch marks near outer edge of pressure plate in line with mark on cover flange or make new marks to insure reassembly in same position. Place clutch assembly on special clutch fixture (#J-298-H) or in arbor press supporting pressure plate so that cover is free. Compress cover slightly, take off 3 nuts on clutch finger retainer bolts on cover, release pressure slowly, lift cover off.

Clutch Cover: Inner surface must be flat and free from scores at finger retainer holes. Front face must be flat within .005" when checked on a surface plate. Measure distance from face of cover flange (mounting face) to retainer washer seat on inner face of cover. This distance must be 2.350" minimum, 2.370" maximum, and equal within .008", measured ⅛" from edge of finger retainer holes. Straighten or replace cover if outside these limits.

►***CAUTION—If cover hub bore considerably worn or scored, check engine rear support plate, flywheel, and bell housing for misalignment or shaft eccentricity.***

Clutch Fingers & Retainers: Check fingers at contact points and pin bore for wear or uneven bearing surfaces. Check retainers for wear at finger contact point in slot. Replace retainers if bearing area grooved deeper than .005". NOTE—Retainers can be continued in service by rotating them 180° when installing so that unworn portion contacts finger lobe.

Pressure Plate:—Examine plate, replace if scored. Check for warping (particularly if plate 'blued' due to overheating). Replace if warped more than .010".

Clutch Springs:—Special combinations of large (outer) and small (inner) springs used on different models (inner springs not used on all models). Check springs and replace if pressure less than service limit in table below. Springs should be replaced if pressure plate 'blued' indicating overheating in service.

SPRING SPECIFICATIONS

Spring Part No.	①Pressure & Length
155224 (Inner)	75-85 lbs. at 1⅝"
166250, 51 (Outer)	130-140 lbs. at 1⅝"

1946-47 Models

		Outer—Springs—Inner		
Car Model	No.	Part No.	No.	Part No.
51, 52, 171, 172 Std.①	9	166251	6	155224
51, 52, 171, 172 Optl.③	12	166251		None
58, 178 Std.②	12	166251		None
53, 54, 173, 174②	12	166251	3	155224

1948-49 Models

	Outer—Springs—Inner			
Car Model	No.	Part No.	No.	Part No.
All Models②	12	166251	3	155224

1950-54 Models

	Outer—Springs—Inner			
Car Model	No.	Part No.	No.	Part No.
Pacemaker 500, 50A, 4A & B①	9	166250	6	155224
Wasp 4C & D①	9	166250	6	155224
Optl Pacemaker, 4C & D③	12	166251	3	155224
All Others②	12	166251	3	155224

①—9" Clutch. ②—10" Clutch.
③—10" Clutch used on cars with Vacumotive Drive, Overdrive, Drive-Master, or Supermatic Drive.

Assembling:—Check clutch throw-out fingers, see that they are straight and do not show wear at tip or retainer lug. Replace retainer washers if necessary. Place pressure plate on fixture with face down. Assemble springs, clutch fingers, retainers and retainer washers on plate. Place cover on top of pressure plate assembly (lining up marks on cover and plate), compress cover slowly, guiding retainer bolts through holes in cover, install lockwashers and nuts on each finger retainer, tighten retainer nuts evenly to 40-45 ft. lbs. after cover has been fully compressed. Remove assembly from fixture and check alignment of clutch fingers in retainers, turn retainers with heavy duty end wrench until fingers centered sideways in retainer slots. See that shoulder on retainers fully seated on wall of cover. Check clutch finger heights with clutch installed on flywheel (below).

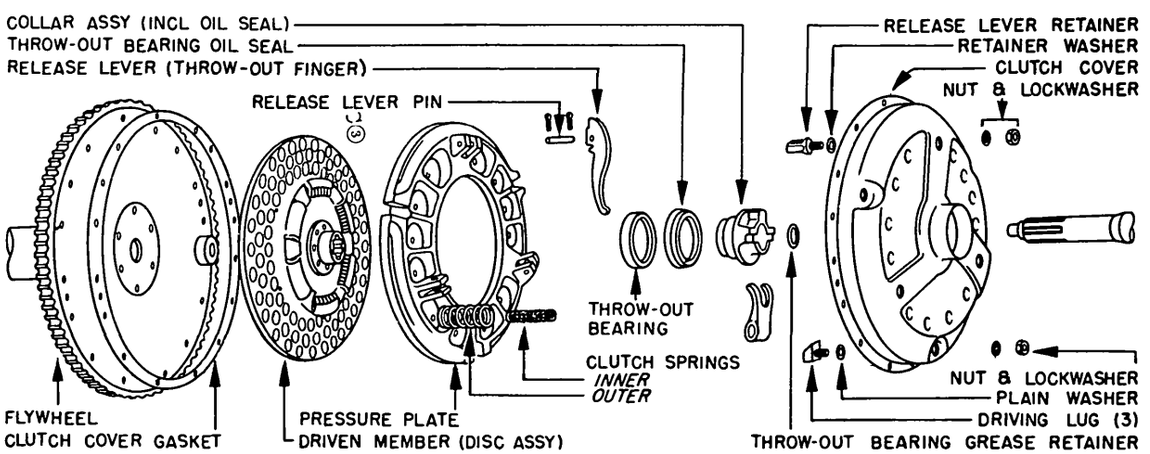
►***CAUTION—Retainer washers (copper or steel washer between retainer and cover) act as oil seals and must be flat and free from scores.***

INSTALLATION & ADJUSTMENT: Shellac new gasket on cover flange face, see that flywheel face is smooth and clean, use a clutch aligning arbor inserted through the clutch cover and driven plate to align driven plate, mount clutch assembly on flywheel (engaging two locating dowel pins on flywheel), install 16 cover screws, tighten screws evenly to 20-25 ft. lbs. (tighten screws diametrically opposite together to avoid distorting cover). Then align clutch fingers.

►***CAUTION—Use of more than one gasket (1/32" thick) between clutch cover and flywheel will reduce effective pressure of clutch springs equally.***

Clutch Finger Alignment: With clutch installed on flywheel, check distance from contact end of lowest clutch finger to top edge of cover hub. This distance should be within 1¼" to 1½". If less than 1¼", clutch will operate satisfactorily providing fingers clear cover hub by at least ⅛". If distance greater than 1½", check cover for distortion (see Clutch Cover). Adjust all clutch fingers as follows:

CONTINUED ON NEXT PAGE



HUDS N (OWN) CLUTCH

HUDSON (C nt.)

Clutch Finger Adjustment—Use special finger adjusting gauge (#J-774) resting gauge on clutch cover so that pin is directly above clutch finger tip. Turn thumbscrew down until pin contacts finger. Repeat at other clutch fingers to secure final gauge setting equal to lowest finger. If any finger more than .030" higher than others, adjust by installing thin (.005") washer between cover and retainer for this finger. If fingers more than .010" but less than .029" higher than others, turn gauge to higher finger, strike end of retainer bolt with soft hammer until gauge bar rests squarely on cover hub. With final setting, gauge bar should rest squarely on hub over all fingers and clearance between pin and end of thumbscrew must be less than .010" (all fingers equal within this amount—check with feeler gauge).

Throw- ut Bearing & Oil Seal:—Insert 1/3 pint Hudsonite through clutch hub before installing throwout collar assembly. Oil seal is pressed on collar behind throw-out bearing. When installing new oil seal, press firmly near inner diameter (pressure at point near rim may distort outer stamping and allow inner stamping and oil seal leather to revolve with shaft, this will cause noise similar to noisy throw-out bearing). Use arbor press to install throwout bearing (do not drive on). See that bearing revolves smoothly and that oil seal inner stamping is tight in outer stamping before installing collar in clutch cover.

CAUTION—Install new grease retainer in annular recess in throw-out bearing when assembling bearing on collar. Soak this retainer and oil seal in engine oil for at least 30 minutes before installing.

DRIVEN PLATE: Plate has a spring-dampener **type hub and facing consisting of cork inserts. Examine driven member, see that plate runs true and do not have appreciable free play. See that hub is not warped or distorted, and that springs in hub splines are not worn and are free from burrs. Corks must be in good condition. Black glaze indicates use of wrong lubricant. Soak driven plate in Hudsonite and clean corks, or replace driven member.**

1946-47 Driven Member Specifications

Car Model	Outside Diameter	No. of Corks
6 Cyl. Pass. Cars Std.	9"	90
6 Cyl. Pass. Cars Overdrive	10"	108
6 Cyl. Business Cars	10"	108
8 Cyl. All Cars	10"	108

1948-49 Driven Member Specifications

Car Model	Outside Diameter	No. of Corks
All Models	10"	108

1950-54 Driven Member Specifications

Car Model	Outside Diameter	No. of Corks
Pacemaker 500, 50A, 4A & B	9"	90
Wasp 4C & D	9"	90
Optl Pacemaker, 4C & D	10"	108
All Others	10"	108

ROCKFORD 8½RM

MODEL 8½RM

HENRY J	Rockford No.
All Models (1951-54)①	165264
WILLYS	
All Models Exc 6-226 Eng (1946-55)	②165317

①—Auburn Clutch also used

②—Can also use Clutch Assembly R3030 or 165264 from 1946 through 1952.

DESCRIPTION: Single plate, dry disc type. Clutch is three-lever type with six springs mounted in pairs adjacent to levers.

REMOVAL: *See "Clutch" on car model pages.*

OVERHAUL: Clutch cover and pressure plate assembly need not be disassembled when replacing driven member unless springs are to be replaced or other service work performed.

Disassembly: Place cover assembly in arbor press, compress cover slightly, remove release lever pivot pins, unhook lever springs, remove levers. Release pressure slowly, lift off cover.

Clutch Springs: Check springs and replace if weak or burnt. Springs should check as follows:

Spring Specifications

Cover Assy.	Spring Part No.	Pressure & Length
R3030	M-2317-4	140-150 lbs at 1 7/16"
165264	M-2317-9	170-180 lbs at 1 7/16"
165317	105348	

Reassembly: Reverse disassembly procedure, make certain that pressure plate springs seated in pressure plate and cover and that lever springs correctly installed. Check lever heights after assembly completed.

Release Lever Setting: Manufacturer recommends use of Borg-Warner Fixture UF-300 or 400 for lever adjustment. Lever setting should be as follows·

Release Lever Setting

Clutch Assy.	Release Lever Height
R3030	2 13/32"
165264	①1 25/32"
165317	②2 5/16"

①—Dial indicator only

②—Use only 3 clamps on UF-300 Fixture

DRIVEN MEMBER: Borg & Beck "Borglite" type with spring dampener hub. *See car model page for facing specifications.*

Borg & Beck Driven Member

Car Model	Borg & Beck Part No.
Henry J 4 Cyl	382000
Henry J 6 Cyl	381947
Willys 4 Cyl	381580
Willys 6 Cyl	382113

ROCKFORD 6TS & 6½TS

Assy. No. MODEL 6TS

R-4608—Crosley, All Models (1939 to 1950)

MODEL 6½TS

165299—Crosley, All (Late 1950, 1951-52)

►**6TS & 6½TS Production Change Note**—Model 6½TS is larger clutch and was used on 1950 cars beginning with Serial No. CD-205500 & VC-20783.

DESCRIPTION: Single plate, dry disc type. Clutch assembly consists of 3 fulcrum brackets (mounting brackets) which are bolted individually on the flywheel. Release levers are pivoted on pins in fulcrum brackets and engage lugs on pressure plate with pressure spring mounted on pressure plate under each lever (3 springs used).

REMOVAL: *See "Clutch" on car model pages.*

OVERHAUL: Disassembly. Take out cotter pin and remove pin linking release lever to fulcrum bracket, remove release lever and spring. Repeat this operation at each of the three fulcrum brackets.

Assembly—Install fulcrum bracket on pressure plate lug, install spring, place release lever in position with hole in lever and fulcrum bracket lined up, install pin and secure with cotter pin.

Spring Pressures

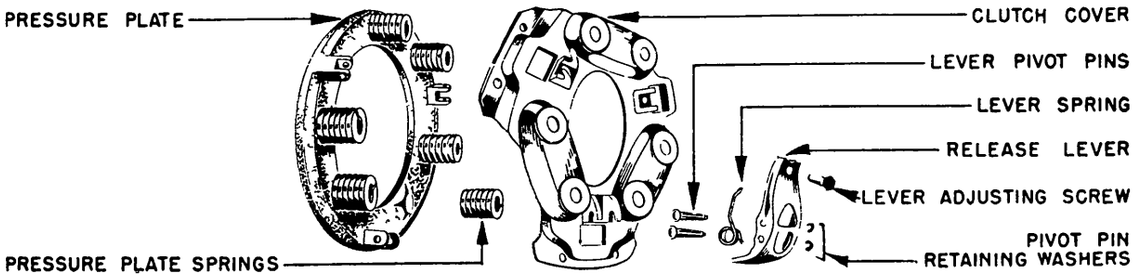
Clutch Type	Pressure & Length
6TS	52½ lbs at 13/16"
6½TS	67½ lbs at 1⅛"

Release Lever Setting: (6TS) None required. (6½TS) 9/32" or 1 23/32" from surface plate

DRIVEN MEMBER: Consists of steel disc with slotted rim on which linings are riveted in four separate segments. Each lining segment retained by three rivets with rivet heads reversed on alternate segments (rivet heads toward flywheel on adjacent segments).

Servicing—Facings not furnished separately and driven member should be serviced by replacem nt.

CLUTCH THROWOUT BEARING: Throwout bearing is sealed with lubricant during assembly and need not be refilled Should clutch fail to disengage when clutch pedal is pushed down to floor, clevis which attaches to bottom of yoke can be adjusted to correct this difficulty



ROCKFORD "RM" CLUTCH

REAR AXLE & REAR SUSPENSION INDEX

REAR AXLES

BUICK Page
1946-54 . 2208
1955 . 2212

CADILLAC
1946-55 2215

CHEVROLET
1946-54 Pass. Cars 2216
1946-54 ½-Ton Truck 2216
1946-55 Trucks(Exc.½-Ton) 2219
1947-55 Truck 2-Spd 2223
1955 Pass. Cars 2218
1955 ½-Ton Truck 2218
1955 2-Ton Truck 2219
1955 1½ & 2-Ton (2nd Series) 2225

CHRYSLER Page
1946-54 Six 2230
1946-54 Six T&C & 8 Pass. 2227
1946-50 Eight (Exc.Crown Imp.) 2230
1946-50 Eight Crown Imp. 2227
1951-55 V-8 2227

CROSLEY
1946-52 (Spicer) . 2202

DE SOTO
1946-54 Six (Exc.Est.Wgn. & 8 Pass.) 2230
1951-54 Six Est.Wgn. & 8 Pass. 2227
1952-55 V-8 2227

CAR APPLICATION

REAR SUSPENSION

BUICK Page
1946-55 . 2211

HUDSON
1955 Wasp & Hornet 2249

NASH Page
1946-49 "600" . 2249
1950-55 Statesman 2249
1949-55 Ambassador 2249

OLDSMOBILE
1946-51 2258

TYPE OF EQUIPMENT

REAR AXLES

Page
Spicer Full-Floating 2203
Spicer Spiral Bevel 2202
Spicer Hypoid Semi-Floating Models 23 & 41 2203
Spicer Hypoid Semi-Floating Model 44 & 53 . 2205
Timken Semi-Floating 2207

REAR AXLE SERVICING

Spiral Bevel & Hypoid Gear Adjustments .. 2202

REAR AXLES

CAR APPLICATION

REAR AXLES

DODGE Page
1946-55 Six . 2230
1953-55 V8 (Exc.Auto.Trans.) 2230
1953-55 V8 (Auto. Trans.) 2227
1955 Six (Auto.Trans.) 2227

FORD
1941-48 Pass. Cars 2232
1949-55 Pass Cars 2235
1949-55 Station Wagon . 2233
1949-51 Sedan Del. 2235
1952-55 Sedan Del. . 2233
1941-47 ½-Ton Truck . 2232
1948-55 ½-Ton Truck 2233
1940-47 Truck, (Exc. ½-Ton) 2234
1948-52 F2,3,4,5 & F6 Sch.Bus 2234
1950-53 F6 (Exc.Sch.Bus) . 2242
1946-55 Truck (2-Speed) . 2238
1953-55 F-250 2241
1953-55 P-350 Par Del. 2241
1953-55 F-350 2242
1953-55 F-500 & 600 2243
1955 F-250 P-350 (Par Del) . 2233
1955 Thunderbird & Interceptor 2233

FRAZER
1947-51 (Spicer) 2203

HENRY J
1951-54 (Spicer) . 2203

HUDSON
1946-47 . 2245
1948-52 2246
1952-54 (Spicer) 2205
1955 2253

KAISER
1947-51 (Spicer) . 2203
1951-55 (Spicer) . 2205

LINCOLN
1941-48 2232
1949-55 2233

METROPOLITAN
1954-55 2247

MERCURY
1941-48 2232
1949-51 Pass. Cars 2233
1949-55 Station Wagon 2233
1952-54 Pass. Cars . 2235
1955 Pass. Cars 2233

NASH Pag
1946-49 "600" 2250
1946-48 Ambassador 2248
1949-54 Ambassador 2250
1950-54 Statesman . 2250
1955 (All) 2253

OLDSMOBILE
1947-55 2255

PACKARD
1946-52 2258
1953-55 2260

PLYMOUTH
1946-55 2230

PONTIAC
1947-55 2261

RAMBLER
1950-54 . 2250
1955 2253

STUDEBAKER
1946-55 Champion 2203
1946-50 Commander 2203
1951-54 Commander 2205
1955 Comm.(Exc.Sta.Wagon) 2203
1955 Comm. Sta. Wagon 2205
1955 President 2205

WILLYS
1946-49 Jeep 2203
1946-52 Sedan Del. 2203
1946-55 Sta. Wgn. (2-Whl.Dr.) 2203
1947-50 Truck (Timken) 2207
1948-52 Jeepster 2203
1949-50 Sta Wgn (4-Whl Dr) . 2203
1950 Truck (Spicer) 2203
1950-55 Truck (Spicer) 2205
1950-55 Truck (Timken) . 2207
1950-55 Jeep 2205
1952-55 Sta Wgn (4-Whl Dr) 2205
1952-54 Pass Car . 2203
1954-55 Pass Car (6-226 Eng) 2205
1954-55 Truck (6-226 Eng.) 2205

SPIRAL BEVEL & HYPOID GEAR ADJUSTMENT (ALL MAKES)

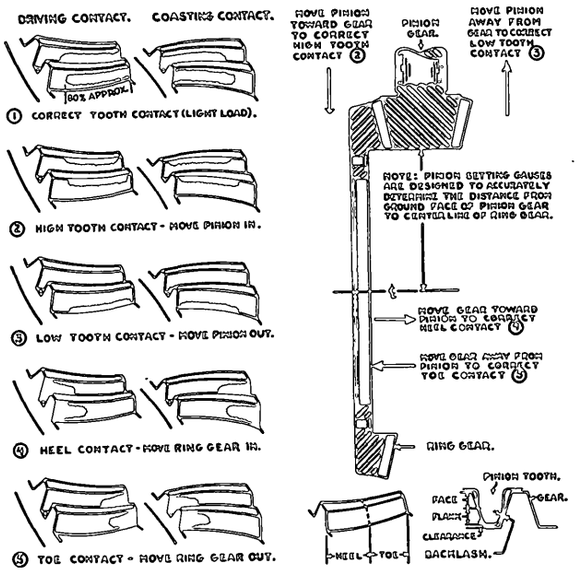
NOTE ON PINION SETTING GAUGES: These gauges are designed to locate the pinion gear (with respect to ring gear center line) so as to duplicate the factory set up when the gears were burnished or run in. Mated gears of this type will run quieter and give more satisfactory service in this position and other settings should not be used. See separate articles for each type axle and complete instructions and specifications for use of these gauges.

RING AND PINION GEAR MESH: To check gears, paint a number of ring gear teeth with some suitable indicator such as Prussian Blue or red lead mixed with oil. Rotate ring gear by hand applying tension on pinion shaft flange with a block of wood to simulate load. Indicator will be wiped off on teeth in area of tooth contact so that mesh can be judged. See illustration (No. 1) for desired tooth contact and possible variations which should be corrected as directed below. If desired, gears can be turned over a few times by the engine with the rear wheels jacked up and brakes applied for load (preliminary inspection of mesh should be made by turning gears by hand to avoid damage caused by running gears under load when badly meshed).

High Tooth Contact (Illustration No. 2):—Will be noisy and cause gear teeth to roll over at top if run for any length of time. To correct, move pinion in toward ring gear. If backlash is then insufficient, move ring gear away from pinion.

Low Tooth Contact (Illustration No. 3):—Will be noisy and gear teeth will groove or score if run with this setting. To correct, move pinion out or away from ring gear. If backlash is then excessive, move ring gear in toward pinion to decrease backlash.

Heel Contact (Illustration No. 4):—Will be noisy and cause excessive wear, chipping, and tooth breakage. To correct, move ring gear in toward pinion. If backlash is then insufficient, move pinion out or away from ring gear to increase backlash.



Toe Contact (Illustration No. 5):—Will be noisy and cause excessive wear due to small contact area, chipping, and tooth breakage. To correct, move ring gear away from pinion. If backlash then excessive, move pinion in toward ring gear.

Backlash Specifications:—See individual Rear Axle articles for recommended backlash for each axle type and complete directions on moving pinion and ring gears to secure above adjustments.

TROUBLE SHOOTING: Before attempting to classify rear axle trouble from noise (hum or growl), eliminate other sources such as tires, engine, transmission as follows:

Tire Noise. Will change on different road surfaces and continue as speed decreases, will be more noticeable with low pressures. To check, coast car with gears in neutral from speed of 30 M.P.H. down. Rear axle noise will ordinarily disappear, tire noise will continue with lower tone as speed decreases.

Engine & Transmission. With car stationary, hold clutch disengaged, operate engine and vary speed through range in which noise previously noticed, check for similar sound. Then repeat test, engaging clutch to note transmission idling noises (gears in neutral). This will also check for muffler and exhaust noise.

REAR AXLE TROUBLE SHOOTING TABLE

REAR AXLE NOISY

1. Drive Noise. Most pronounced when car accelerated at constant rate from 15 to 45 M.P.H. Pinion should be moved in toward ring gear slightly.
2. Coasting Noise. Most evident when car allowed to coast from 45 M.P.H. down to 15 M.P.H. with throttle closed and clutch engaged. Pinion should be moved out or away from ring gear slightly.
3. Float Noise. Most evident when speed held constant at close intervals between 15 and 45 M.P.H. Correct by same adjustment as for coasting noise above, or by changing backlash slightly.
4. Continuous Noise. Check axle shaft bearing, differential bearing, pinion bearing adjustment. Check ring and pinion gear for incorrect adjustment, not matched or defective, gear teeth badly worn, scuffed or chipped. Backlash may be excessive or insufficient.
5. Noisy on Turns. Check for tight, binding, chipped, scuffed differential pinion gears or side gears, worn or rough thrust washers, excessive differential gear backlash, excessive axle shaft endplay.
6. Intermittent Noise. Check for sprung or warped differential case, excessive ring gear runout, loose or broken differential bearings.

REAR WHEELS DO NOT TURN

If rear wheels do not turn with engine running, transmission in gear, and propeller shaft rotating, check the following points:

1. Axle Shaft—Shaft broken or key sheared.
2. Ring & Pinion Gear—Teeth stripped, pinion gear shaft key (Hotchkiss Drive), pin (torque tube drive) sheared.
3. Differential—Side gear or pinion teeth stripped, differential pinion shaft or spider broken.

SPICER SPIRAL BEVEL

Car Model	Spicer Model
Crosley, All Models (1941-52)	11

▷CROSLEY NOTE: Crosley axle is new design with Torque Tube Drive. Serviced in same manner as other Spicer models after Torque Tube has been removed. 1946-47 Torque Tube modified type for new universal joint mounting (in adapter at rear end of transmission case). *Refer to Crosley Shop Notes in Car Model Section for torque tube data.*

DESCRIPTION: Spiral bevel, semi-floating type with Hotchkiss Drive.

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: When replacing an axle shaft, check endplay. Total endplay between shafts and spacer in differential which transmits thrust from one shaft to the other should be .002-.007" except as noted in the table below. Adjust endplay by removing shims between backing plate and axle housing flange (at one wheel if clearance less than maximum, both wheels if greater). Shims furnished .003", .005", .010", .030" thick.

Car Model	Axle Shaft Endplay
Crosley	.002-.007"
All Other Cars	.002-.007"

OVERHAUL: Disassembly—To remove differential assembly (with axle shafts out), take out bearing cap screws, make certain that bearing caps marked to insure correct reassembly, remove bearing caps, pry differential assembly out of housing. Remove nut on end of pinion shaft, pull rear universal joint companion flange, press or drive pinion out at rear of housing (use brass drift on end of shaft), note number and thickness of shims between spacer on shaft and front bearing cone (these shims control bearing adjustment). Use puller to remove pinion rear bearing cup from housing, note number and thickness of shims located in bearing cup recess in housing (these shims control pinion setting). Remove oil seal from front of housing, drive pinion front bearing cup out. Disassemble and service sub-assemblies as follows:

Pinion Bearing Assembly & Adjustment: When dismantling pinion assembly, pinion should be pressed out (to avoid damaging forward bearing) and oil seal should be pried out. Use new oil seal when reassembling if old seal damaged by removal. To adjust bearings, add or remove shims between forward bearing cone and spacer (or shoulder on pinion shaft on types where no spacer used), install universal joint flange and tighten nut securely. Pinion should rotate with slight drag (approximately .002" tight). Shims furnished .003", .005", .010", .030" thick.

Pinion Setting:—Use special pinion setting gauge, Salisbury No. J-772 or Studebaker No. HMJ-589, set gauge for correct zero position for each axle type or car model as shown in table below (correct for pinions marked 'O'). Figure etched on end of each pinion indicates amount in thousandths which pinion should be set ahead (plus figures) or in back (minus figures) of this zero position. Install gauge in axle housing in place of differential assembly, adjust pinion position by adding or removing shims

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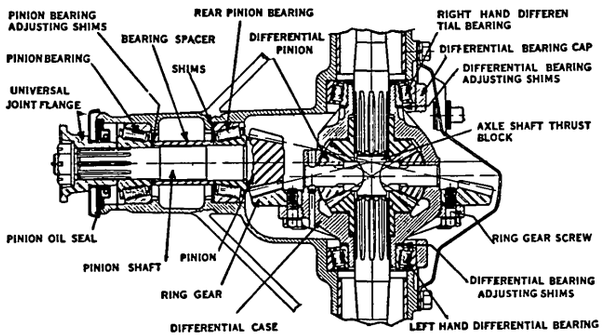
SPICER SPIRAL BEVEL (Cont.)

between rear pinion bearing cup and shoulder in housing until correct gauge reading is secured (see note below for hypoid axles). Recheck pinion bearing adjustment (disturbed by pinion setting adjustment). Shims furnished .003", .005", .010" thick.

Axle Type.	Pinion Zero Setting.
11	See Model 11 Note

Model 11 Note—This is special small axle and the regular pinion setting gauge cannot be used. Car manufacturer recommends that gear mesh be checked by painting the gears and turning them by hand.

Differential Bearing Adjustment:—Shims installed between bearing cones and differential case on each side. To adjust bearings, take out axle shafts, take off rear cover, remove capscrews and lift off differential bearing caps, then pull out differential assembly. Remove bearing cones, add or remove shims installed between bearing cone and case on each side until assembly will just slide into place in axle housing, then add additional shim thickness of .003-.006" (.008-.010" on Studebaker models), install



assembly, tighten bearing caps. Ring gear should have fairly heavy drag when revolved by hand. Shims furnished .003", .005", .010", .030" thick.
NOTE—Early models fitted with adjusting nut at each bearing. These types adjusted by removing locks, loosening bearing caps, and turning up adjusting nuts to secure desired bearing adjustment.

Ring & Pinion Gear Adjustment: Paint gears to check mesh or check pinion setting (see directions below). Backlash should be .004-.008" on all cars except as noted in table below. Adjust backlash by shifting differential bearing adjusting shims from one side to the other (total shim thickness must not be changed to avoid disturbing differential bearing adjustment). See Pinion Setting and Differential Bearing Adjustment below.

Ring-and-Pinion Gear Backlash

Car Model	Backlash
Crosley	.003-.008"

Ring Gear Backlash:—Adjusted by transfering shims from behind left hand bearing to right hand bearing (to increase backlash), or from right to left (to decrease backlash). Total shim thickness must not be changed to maintain bearing adjustment. Moving ring gear .005" changes backlash .0035".

SPICER FULL-FLOATING FRONT & REAR AXLE

REAR AXLE

Car Model	Spicer Model
Willys Jeep, Model CJ-2A (Early 1946)	23-2

FRONT AXLE

Car Model	Spicer Model
Willys Jeep CJ-2A (1946-48)	25
Willys Jeep CJ-3A (1948-53)	25
Willys, 4x4 Station Wagon (1949-50)	25
Willys, 4x4 Truck (1947-50)	25

►CHANGES, CAUTIONS, CORRECTIONS

►*1946 WILLYS JEEP NOTE:* Full-floating type rear axle used only on first 1946 Jeeps. Later models have semi-floating type. See "Spicer Hypoid Semi-Floating" type following.

►*4WD FRONT AXLE PRODUCTION CHANGE:* Effective Serial No. 37549 (CJ-3A) and No. 14284 (4x4 Truck & Station Wagon) front axle shaft outer splined end floats in wheel driving flange and is not retained by nut and lockwasher. It is no longer necessary to install shims between driving flange and wheel hub to provide correct end float of axle shaft universal joint.

►*1953 FRONT AXLE (RZEPPA TYPE UNIVERSALS) NOTE:* The inner shaft retainer and three screws have been eliminated making it possible to pull shaft end from joint without dismantling joint.

DESCRIPTION: Hypoid Gear, full-floating type, with Hotchkiss Drive. These axles similar to Spicer semi-floating type except for axle shaft and wheel bearings (wheel bearings on rear axle are double opposed taper roller bearing type which take thrust in both directions) so that no thrust block used at inner end of axle shafts.

REAR AXLE (MODEL 23-2) NOTE: Differential assembly is same as that used in Model 25 Front Axle and all data below on Disassembly, Pinion Bearing Assembly and Pinion Setting, Differential Bearing Adjustment, and Ring Gear Backlash, apply to this model also. *See Willys Jeep car page for data on wheel bearing adjustment.*

REMOVAL OF AXLE: *See Car Model Pages.*

AXLE SHAFT REMOVAL & WHEEL BEARING & END-PLAY ADJUSTMENT: *See Car Model Pages.*

OVERHAUL & ADJUSTMENT: *Follow procedur s outlined under "Spicer Hypoid Semi-Floating-Models 23, 23-1, 23-6, 41-2, 41-6, 41-7" and note the following:*

Pinion Setting With Special Pini n Setting Gauge W-99: Use Master Gauge Blocks as follows:

Car Model	Master Gaug Bl ck
CJ-2A (Front Axles)	D
CJ-2A (Rear Axles to Serial No. 13454)	D
CJ-3A (To Serial No. 62488)	B
Trucks & Station Wagons	B

SPICER HYPOID SEMI-FLOATING MODELS 23, 41

FRAZER	Spicer Model No.
1947-Early 1951	41-2
HENRY J	
1951-54	23-6
KAISER	
1947-Early 1951 (Synchro-mesh)	41-2
1951 Early (Hydramatic)	41-7
STUDEBAKER	
1946-50 Champion	23
1951-55 Champion	23-1
1946-50 Commander (Synchro-mesh)	41-2
1950 Commander (Auto. Trans.)	41-7
1955 Commander (Exc. Sta. Wgn.)	23-1
WILLYS	
1946-49 Jeep CJ-2A (See Note)	41-2
1949-Early 1950 Jeep CJ-3A	41-2
1946-50 4 Cyl. Station Wagon 4-63	23-1
1950-52 4 Cyl. Station Wagon, 473SW	23-1
1946-52 Sedan Del. 4-63 & 473SD	23-1
1948-50 6 Cyl. Station Wagon 6-63	23-1
1950-51 6 Cyl. Station Wagon 673-SW	23-1
1952-55 6 Cyl. Sta. Wgn. 685	23-1
1953-55 Sta. Wgn. & Sed. Del. 475	23-1
1948-52 Jeepster Models	23-1
1949-Early 1950 4-Whl. Dr. Sta. Wgn.	41-2
1950 Early 473 HT Truck	41-6
1952-54 Aero Pass. Cars 675, 685	23-1

►CHANGES & CORRECTIONS

►*1953 TYPE 23-1 PINION SHAFT PRODUCTION CHANGE:* Late type pinion shaft has square shoulder added at inner end of spline shaft (early type has very noticeable radius at this point) eliminating need for pinion bearing spacer. Early and late type pinions have same part number and are interchangeable. When installing early type drive pinion with radius, pinion bearing spacer must be used.

CAUTION—Location of pinion bearing adjustment shims are different on the two types of pinion shafts. *See "Pinion Bearing Adjustment" below.*

►**Willys Jeep CJ-2A 1946 Production Change.** Full-floating Spicer Model 23-2 Rear Axle used on cars before Serial No. 13453. *See Spicer Full-floating Rear Axle.*

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss Drive. Hypoid gear pinion is integral with the pinion shaft and is mounted on taper roller bearings which seat directly against shoulders in housing.

AXLE SHAFT REMOVAL & WHEEL BEARING & ENDPLAY ADJUSTMENT: *See Car Model Page.*

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

OVERHAUL: Disassembly. To remove differential assembly (with axle shafts out), take out bearing cap screws, make certain that bearing caps marked to insure correct reassembly, install spreader tool on axle housing (Kaiser-Frazer & Willys No. W-129) to facilitate differential assembly removal, or pry assembly out using a pry bar on each side of differential case. Remove nut on end of pinion shaft, pull rear universal joint companion flange, press or drive pinion out at rear of housing (use brass drift on end of shaft), note number and thickness of shims between spacer on shaft and front bearing cone (spacer not used on late 1953 and later axles). Spacer eliminated, and shims located between front

CONTINUED ON NEXT PAGE

SPICER HYPOID (C nt.) (MODELS 23, 41)

bearing cone and shoulder on pinion shaft), these shims control pinion bearing adjustment Use puller to remove rear bearing cup from housing, **note number and thickness of shims** located in bearing cup recess in housing, these shims control pinion gear setting Remove oil seal from front of housing, drive front pinion bearing cup out

Pinion Bearing Assembly:—Make certain that pinion setting shims installed in housing ahead of rear bearing cup, insert pinion and rear bearing cone in housing from rear, install spacer (except Late 1953 and later axles), and pinion bearing adjusting shims on pinion shaft, tap front bearing cone on pinion shaft, assemble universal joint flange, tighten nut securely (if bearing adjustment to be checked, oil seal assembly may be left out until adjustment is completed)

Pinion Bearing Adjustment. With pinion shaft nut tight, pinion should rotate with slight drag (no endplay). Adjust by removing front bearing cone and adding or removing shims between cone and spacer r shoulder on shaft. Shims furnished .003," .005", .010", .030" thick.

►**Frazer & Kaiser Note—Above setting will be secured with .003" tight fit of pinion bearings (.003" additional thickness of shims after all endplay removed from pinion bearings).**

Pinion Setting With Special Pinion Setting Gauge Salisbury No. J-722 (Studebaker Tool No. J-589-D): Set micrometer gauge to correct figure for each axle model (see table below—this figure correct for standard pinions marked 'O' on end) and correct micrometer for each pinion as follows: Figures etched on pinion indicates amount (in thousandths) that pinion should be set in toward ring gear (— figures) or out away from gear (+ figures). Install gauge in axle housing in place of differential assembly with side discs seated in differential bearing bores (different size discs used for Champion and Commander), add or remove shims located between rear bearing cup and shoulder in housing until micrometer pointer just contacts ground face of adapter. Pinion setting shims are .003", .005", .010" thick.

Studebaker Model	Pinion Zero Setting
1946-54 Champion	719"
1955 Champion (Exc 3 54 ratio)	719"
1955 Champion (3 54 ratio)	625"
1946-50 Commander	719"
1955 Commander (Exc 3 54-1 ratio)	719"
1955 Commander (3 54 ratio)	625"

►**Pinion Setting Note—The above "Pinion Zero Setting' figure should be corrected by adding (when Pinions marked —), or subtracting (when pinions marked +), shim thickness equal in thousandths of inch to the figure stamped on the pinion immediately following + or — mark.**

Pinion Setting With Special Pinion Setting Gauge W-99): This gauge consists of a dial indicator and mounting fixture designed to be mounted on rear face of pinion (held in place by "C" clamp which is part of gauge). Before using this gauge, dial indicator must be set at zero through use of a "master gauge" supplied with this equipment. Set the dial indicator at zero with gauge pin resting on correct lobe of master gauge and with one-half turn tension on the gauge pin (master gauge table below). With pinion installed in axle housing (spacer tool W-126-6 can be installed on shaft in place of universal joint yoke), and with pinion setting gauge in place, dial reading should be ZERO for pinions marked "O", and should read PLUS (for pinions marked +) or MINUS (for pinions marked —) by an amount equal to the figure following this + or — sign on the pinion. Adjust by adding or removing shims from behind rear bearing cup in housing and repeat test until correct dial reading is secured.

Pinion Gauge Zero Setting

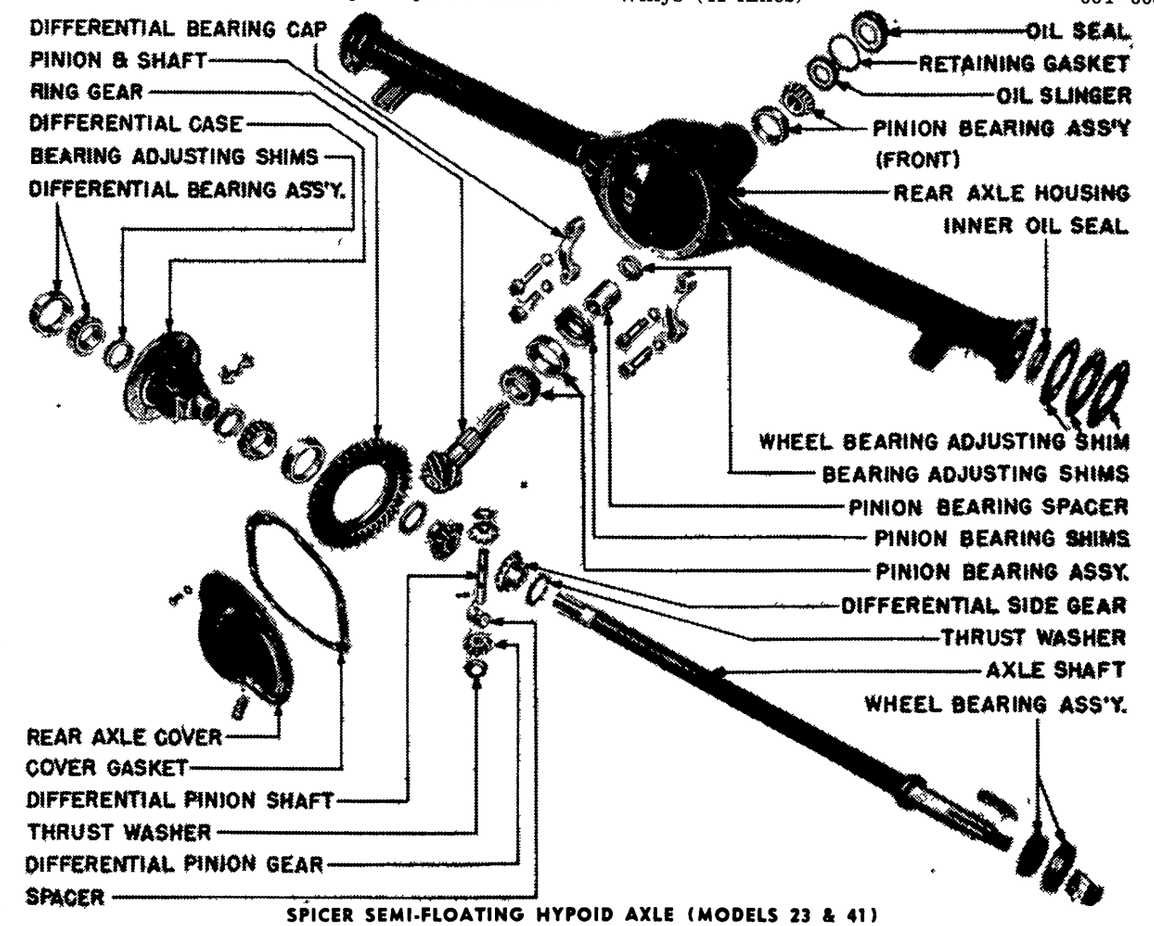
Car Model	Master Gauge Block
Henry J	D
Frazer & Kaiser	B
Willys CJ-2A Jeep (To No 13454)	D
Willys CJ-2A Jeep (From No 13454)	B
Willys CJ-3A Jeep (To No 62488)	B
Willys, Others	B

Differential Bearing Adjustment:—Shims installed on differential case hub at inner end of each bearing cone. To adjust differential bearings (with axle dismantled), remove bearing cones, add or remove shims until differential assembly will just slide into housing (no endplay when installed). then add additional 008" of shims for correct pre-load Shims furnished .003", .005", .010", .030" thick. With correct adjustment, fairly heavy drag should be felt when ring gear revolved by hand (test preferably with pinion out to avoid added drag of pinion bearings and oil seal). When installing differential assembly, tighten bearing cap screws securely.

Ring & Pinion Gear Adjustment: Paint gears to check mesh, or check pinion setting Back lash should be as indicated in table below Adjust by shifting differential bearing adjusting shims from one side of differential case to the other See Differential Bearing Adjustment above *(CAUTION*—Total number of shims must not be changed in making this adjustment—would affect differential bearing adjustment) Shifting ring gear 005' will change backlash approximately 0035"

Ring & Pinion Gear Backlash

Car Model	Backlash
Frazer, Henry J, Kaiser	003- 006"
Studebaker	003- 006"
Willys (23 Axles)	004- 009"
Willys (41 Axles)	004- 008"



SPICER SEMI-FLOATING HYPOID AXLE (MODELS 23 & 41)

SPICER HYPOID SEMI-FLOATING MODELS 44 & 53

	Spicer Model No.
HUDSON	
1952①	44-2
1953-54	44-2
KAISER	
Late 1951-55	44-2
STUDEBAKER	
1951-54 Commander	44-3
1955 Commander Sta Wgn.	44-3
1955 President	44-3
WILLYS	
Late 1950-51 473 HT Truck	44-4
1952 4x473 Sta. Wgn & Sed. Del.	44-2
1952 473-4WD Truck①	53-2
1953 4x475 Sta Wgn. & Sed. Del	44-2
1953 475-4WD Truck①	53-2
Late 1950-55 Jeep CJ-3A, CJ-3B, CJ-5	44-2
1954-55 6-226 4x4 Sta Wgn & Sed Del.	44-2
1954-55 6-226 2x4 Sta Wgn. & Sed Del	44-2
1954-55 6-226 Pass Car	44-2
1954-55 6-226-4WD Truck①	53-2

①—This axle used optionally with "Timken Semi-Floating" Rear Axle since August, 1951.

①—Late 1952 Cars with "Dual-Range" Hydra-Matic Transmission

►*NOTE—See Separate article for Model 23 & 41 Spicer Rear Axles.*

►CHANGES, CAUTIONS, CORRECTIONS

►***LINCOLN, MERCURY, FORD STATION WAGON, FORD SEDAN DELIVERY & F-1 TRUCK—See Ford, Lincoln, Mercury Rear Axle.***

►***WILLYS 4WD FRONT AXLE OVERHAUL NOTE***—Overhaul procedures outlined below for Rear Axles apply equally to Willys 4WD Front Axles.

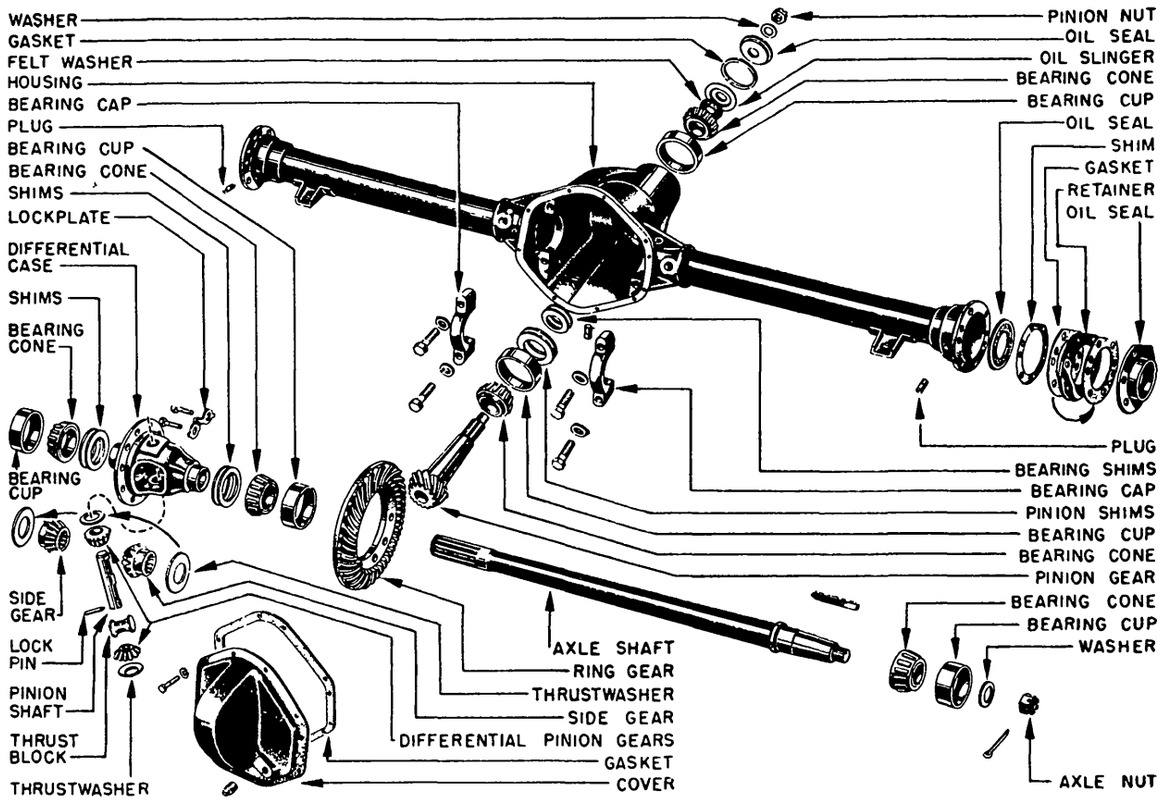
►***WILLYS FRONT AXLE (RZEPPA TYPE) NOTE***—The inner shaft retainer and three screws have been eliminated, making it possible to pull the shaft end from the joint without dismantling joint.

►***AXLE RATIO CHANGE CAUTION—Use correct differential case if gear and pinion ratios changed.***

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss Drive of same design used beginning 1946.

►***REAR AXLE NOTE:*** These axles differ from previous axles in the size of the ring gear and pinion, shape of axle housing, and the elimination of the pinion bearing spacer. Axle housing cover is flat on two sides and rounded on other two, or hexagonal in shape

AXLE SHAFT REMOVAL & WHEEL BEARING ADJUSTMENT: Bearing adjustment (endplay) can be made without removing axle shafts (see below). **Axle Shaft Removal**—Remove wheel, take off axle shaft nut and washer, use puller to remove hub and brake drum assembly. Disconnect brake line and cables take out bolts mounting oil seal assembly and backing plate on axle housing flange and remove backing plate (do not lose wheel bearing shims), pull axle shaft and bearing assembly out Use bearing puller and remove bearing from shaft. **Axle Shaft Endplay**—Total endplay for both shafts should be as noted below. Endplay controlled by shims placed between axle housing flange and brake backing plate (right side only). Left side of axle housing has a permanent shim pack of .060", or housing has been machined .060" longer for inside centering of axle shaft in spacer block. (NOTE—



SPICER SEMI-FLOATING HYPOID AXLE

If shims are not found on left side at disassembly, housing is the machined type and shims are not required). Adjust endplay by adding or removing shims (shims are .003", .005", .010", .030" thickness), from right side only.

Axle Shaft Endplay

Car Model	Endplay
Hudson	.001-.004"
Kaiser	.001- 006"
Studebaker	.003- 006"
Willys	.003-.007"

REMOVAL OF AXLE: *See "Rear Axle" on Car Model pages.*

OVERHAUL: *See "Spicer (Salisbury) Hypoid Semi-Floating Rear Axle" in Manual and note the following:*

►***PINION BEARING ADJUSTING SHIM CAUTION:*** On these axles shims are placed between front bearing cone and shoulder of pinion shaft.

Pinion Bearing Adjustment: Pinion bearing adjustment is made after pinion setting has been established, and pinion setting washer installed between rear bearing cone and pinion shaft gear, and before front oil seal installed.

Willys & Studebaker—With pinion shaft nut tightened to 150 ft lbs, pinion should rotate with slight drag and with no endplay. Adjust by removing front bearing cone and adding or removing shims between bearing cone and shoulder on pinion shaft.

Hudson—With pinion nut tightened to 200 ft. lbs. (180-200 ft lbs. Jet), use a spring scale on flange holding tool J-2637 and check torque required to turn pinion Turning torque should be 17-32 in. lbs. (10-20 in. lbs. Jet). Adjust by adding or removing shims between front bearing cone and shoulder on pinion shaft Shims are available in .003", .005", .010", .030" thickness.

Kaiser—With pinion nut tightened to 140-150 ft. lbs. torque, connect spring scale C-690 to one of the holes in companion flange or yoke, then, with pinion shaft in vertical position, rotate pinion by pulling on scale and note the reading. Torque should be 7-12 lbs. Adjust by adding or removing shims between front bearing cone and shoulder on pinion shaft. Shims are available in .003", .005", .010", .030" thicknesses.

Pinion Setting (Hudson All Models): ***(CAUTION—Hudson Jet pinion depth is different than other Hudson Models. See Pinion Depth table below).*** Using Pinion Setting Gauge No. J-5223 (consisting of gauge arbor and discs to fit differential bearing bores, clamps, and gauge block), determine pinion depth as follows: Mount discs on gauge arbor and install in differential bearing bores of axle housing. Place differential bearing caps in position and tighten

CONTINUED ON NEXT PAGE

SPICER HYPOID (Cont.)
MODELS 44 & 53

bolts finger tight. With gauge block held in position against end of drive pinion by clamp screw, loosen thumb screw in end of gauge block and move plunger out of block until head contacts gauge arbor, then lock plunger in place with thumb screw, using care not to disturb plunger position. Remove gauge block holding clamp and remove gauge block. Measure distance from anvil to top of gauge plunger. Reading on micrometer, for "0" pinion (pinion having a "0" mark, or one without a depth mark) should be same as indicated in table below, according to car model and gear ratio. For pinions marked (+) micrometer reading should be less; pinions marked (—) should be greater than the reading for "0" (standard pinions). Adjust pinion by adding or removing shims behind rear pinion bearing cup in housing and repeat test until correct micrometer measurement is secured.

Car Model	Axle Ratio	①Pinion Depth
Hudson Jet	4.10-1 (41-10)	2.250"
Hudson Jet	(Except Above)	2.343"
Hudson (Exc. Jet)	All	2.625"

①—Pinion Depth for "0" (Standard Pinion).

▷1953 Hudson Jet Pinion Setting Gauge Adapter (Part No. J-5223-50) Correction (for use on 4.1 ratio rear axles)—To permit checking distance between rear end of drive pinion and center of axle, drill out small stop pin (discard), remove plunger, and grind sufficient metal off small end of gauge to permit it to close up to dimension required (2.250").

Pinion Setting (Kaiser & Willys): Gauge No. W-99. Consists of dial indicator and fixture designed to be mounted on rear face of pinion (held in place by "C" clamp which is part of gauge). Gauge measures distance from face of pinion to differential side bearing bore in housing and dial reading should be ZERO before using this gauge (set with master gauge furnished with equipment). Set the dial indicator at ZERO with gauge pin resting on correct lobe of master gauge and with one-half turn tension on the gauge pin (master gauge table below). With pinion installed in axle housing (spacer Tool W-126-6 can be installed on pinion shaft in place of universal joint yoke), and with pinion setting gauge in place, dial reading should be ZERO for pinions marked "0", and should read PLUS (for pinions marked (+) or MINUS for pinions marked (—) by an amount equal to the figure following this + or — sign on the pinion. Adjust by adding or removing shims from behind rear bearing cup in housing, repeat test until correct reading secured.

Pinion Gauge Zero Setting

Axle Model	Master Gauge Lobe
44-2, 44-4	E
53-2	None

Pinion Setting (Studebaker): Pinion Setting Gauge Studebaker No. J-589-D.

▷*COMMANDER PINION SETTING CAUTION—The following setting for "0" pinions supersedes previous setting of .719" for Model 44 axles on 1951 & 1952 cars. Use Step Plate, Part J-589-10-2 for setting Model 44 Commander & President pinions.* Set micrometer gauge to correct figure for each axle model (see table below—this figure correct for pinions marked "0" on end) and correct micrometer for each pinion as follows: Figures etched on end of pinion indicates amount (in thousandths) that pinion should be set in toward ring gear (— figures) or out away from gear (+ figures). Install gauge in axle housing in place of differential assembly with side discs seated in differential bearing bores (different size discs used for Champion and Commander), add or remove shims located between rear bearing cup and shoulder in housing until micrometer pointer just contacts ground face of adapter. Pinion setting shims are .003", .005", .010" thick.

Axle Model	Pinion Zero Setting
44-3	.344"

Pinion Setting Note—The above "Pinion Zero Setting" figure should be corrected by ADDING (when pinions marked —), or SUBTRACTING (when pinions marked +), shim thickness equal in thousandths of inch to the figure stamped on the pinion immediately following the PLUS or MINUS mark.

Differential Endplay (All Models): The total amount of endplay in housing must be determined before installing drive pinion. Determine the total endplay as follows: Install side bearing cones on differential case (without shim packs), fully seating cones against differential case, then install bearing cups, and install differential assembly in axle housing. Mount dial indicator on axle housing with indicator contact button against back face of ring gear, and with two screw drivers, force differential case endwise as far as possible to seat bearing cup in housing. Adjust dial indicator to zero. Force differential case toward opposite end until bearing cup is seated in housing. Note reading on indicator. This reading indicates the shim thickness required to eliminate all differential endplay in housing.

Differential Bearing Preload & Gear Backlash Adjustment: With drive pinion installed and adjusted, adjust differential bearing preload and gear backlash as follows:

Hudson & Kaiser (All Models)—Install differential assembly (without shim pack) in axle housing. Install bearing caps and tighten bolts finger tight. Insert screw drivers and force differential assembly away from pinion until bearing cup is seated against housing, then force differential case in opposite direction until ring gear teeth contacts pinion teeth. From the endplay shim requirement (above), place shims between bearing cups and axle housing, forcing their edges in on both sides until total amount of shims have been used, and gears have no backlash. Remove differential assembly from housing (keeping shims for each side of case together). Remove side bearing cones and cups and install shims between cones and differential case, on their respective sides. Add an additional .015" shim on drive gear tooth side to give proper amount of housing spread and gear backlash. Spread axle housing with Spreader Tool W-129 (Henry J & Kaiser); J-5372 (Hudson), and install differential assembly, shims, bearing cones and cups, and install bearing caps in their original positions (Caps, bearings, & case marked at disassembly). Tighten bearing cap bolts to 70-90 ft. lbs. torque. Recheck ring gear backlash to following specifications:

Kaiser & Hudson (Exc. Hudson Jet)—.003-.006".

Hudson Jet—.002-.006".

Studebaker—Install differential assembly, (without shim pack), in housing. Mount a dial indicator on housing with indicator contact button resting against back face of ring gear. With two screw drivers, force differential assembly away from pinion until bearing cup is seated against housing. Set indicator to zero, then force differential assembly toward pinion until ring gear teeth contact pinion gear. Reading on dial indicator, less .003", denotes the shim pack required between differential case and bearing cone on ring gear side. Shims for the opposite side are determined by subtracting the amount of shims used on ring gear side from the total amount (determined above—see Differential Endplay), and adding .008", which provides the necessary bearing preload.

Backlash (Studebaker)—Mount dial indicator on housing with contact button against one of the ring gear teeth. Move ring gear by hand and check amount of backlash, which should be .003-.006". Adjust backlash by moving the necessary number of shims from one side of differential case to the other. (NOTE—Backlash will be changed approximately 2/3 of thickness of shims transferred).

Willys—Install differential assembly and side bearings (without shims) in axle housing. Force assembly to one side until bearing cups are seated in housing, then with a feeler gauge, measure the distance between opposite bearing cup and axle housing. After clearance has been determined, add .008" (to provide bearing preload). Remove differential side bearings from case and install one-half total thickness of shims on each side and replace bearings. Install housing spreader Tool W-129 and spread the axle housing about .020", and install differential case. Install bearing cups, and bearing caps. Tighten cap bolts to 38-42 ft. lbs. torque.

Backlash (Willys)—Mount dial indicator on axle housing with indicator contact button against corner of ring gear tooth. Check backlash, which should be as indicated in table below. Adjust by moving necessary number of shims from one side of differential case to the other. (NOTE—Backlash will be changed approximately .0035" by transferring a .005" shim to the opposite side).

Ring-and-Pinion Gear Backlash

Car Model	①Backlash
Kaiser	.003-.006"
Hudson Jet	.002-.006"
Hudson (Exc. Jet)	.003-.006"
Studebaker	.003-.006"
Willys (44)	.004-.008"
Willys (53)	.003-.006"

①—Movement of ring gear with pinion gear held stationary.

TIMKEN SEMI-FLOATING

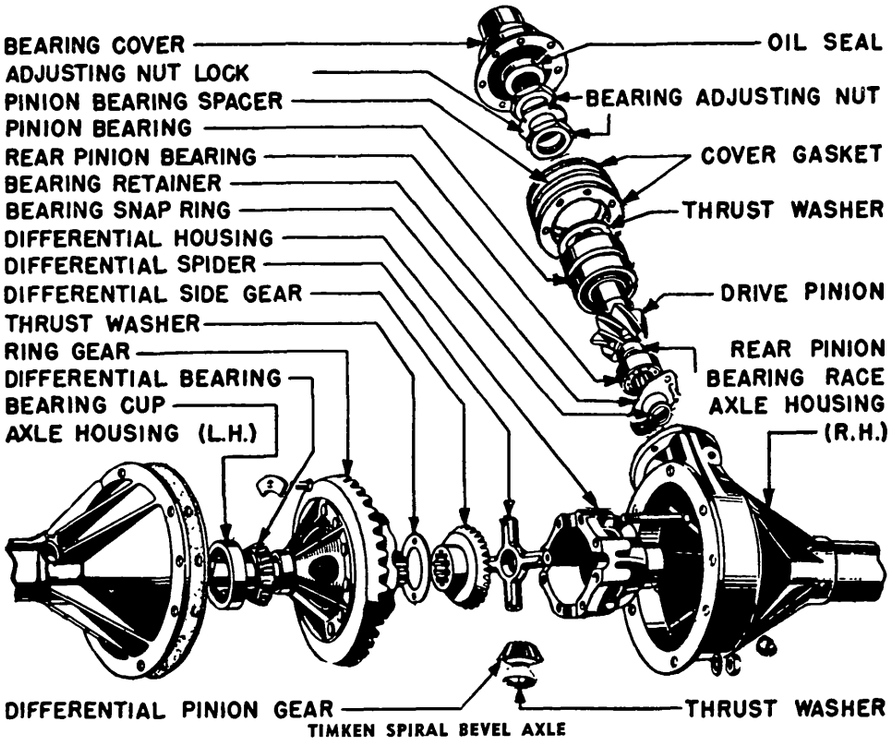
TIMKEN MODEL NO. 51540
Willys, Truck, Models 2WD, 4WD (1947-50)
Willys, Truck, Model 473-4WD (1950-51)①
Willys, Truck, Model 475-4WD (1952-55)①
Willys, Truck, Model 6-226-4WD (1954-55)①

①–This axle used optionally with "Spicer Semi-Floating (Model 53-2)" Rear Axle since August, 1951.

DESCRIPTION: Spiral bevel, semi-floating type with Hotchkiss Drive. Axle housing is "split" type with one differential side bearing cup seated in recess in each half. Pinion is mounted on taper roller bearings in housing integral with right hand axle housing. Pinion bearing assembly is special type with a single outer race (bearing cup) for both roller bearings. Axle shafts are mounted on single taper roller bearing at each wheel, each bearing taking thrust in one direction while the thrust in the opposite direction is transmitted to the opposite bearing through the axle shafts.

AXLE SHAFT REMOVAL & WHEEL BEARING ADJUSTMENT: Same as for other Willys models. See Spicer Hypoid Semi-floating axle for complete data.

REAR AXLE DISASSEMBLY & REASSEMBLY: Remove eleven screws holding axle housing halves together, slide left housing half away (axle shaft will pull out of differential gear splines). Lift out differential assembly (pull out toward left so that right axle shaft is disengaged from differential gear splines). To remove side bearings, use Puller Tool No. W-104-20 to remove roller and cone assemblies from differential case shoulders, Tool W-200 to pull bearing cups from axle housing. To remove pinion assembly, take out bolts in housing holding bearing retainer (spacer) and cover, lift off cover and oil seal assembly, bearing retainer, and gaskets. Assemble Puller W-203 on end of pinion shaft, pull pinion and bearing assembly out toward front. See Pinion Assembly data below for disassembly of this unit.



TIMKEN SPIRAL BEVEL AXLE

Pinion Bearing Assembly: To dismantle this assembly, clamp pinion in vise (use brass jaws), bend up lips on locking washer, remove pinion locking nut, washer, and adjusting nut. Lift off front bearing cone and roller assembly, (slip fit on shaft), and bearing cup. Use Puller No. W-104-32 to remove rear bearing cone and rollers. To remove pinion bearing from housing, drive out two brass rivets in retaining plate from front of housing, remove plate, drive bearing out using a brass drift. To reassemble, install pilot bearing retainer, drive pilot bearing in place using Tool W-207, press pilot bearing inner cup on end of pinion shaft and install lockring (NOTE—New pinions furnished with cup and snap ring installed). Press rear pinion bearing cone and roller assembly firmly against pinion using Tool W-205, install bearing cup and front bearing cone and rollers, install washer, adjusting nut, locking washer, and locknut. Adjust pinion bearing pre-load (see below), securely tighten locknut and bend locking washer lip against nut. Install pinion assembly in housing using Installer Tool W-203. (CAUTION—Make certain pinion shaft enters pilot bearing in housing.) Check oil seal in pinion shaft cover (install new seal, if required, with Tool W-199). Install bearing retainer and cover assembly on housing using new gaskets (CAUTION—Align oil drain hole with opening in housing), install retainer bolts and tighten securely.

Pinion Bearing Pre-load Adjustm nt: With pinion bearings assembled on pinion shaft, tighten adjusting nut to preload bearings so that torque required to turn pinion shaft is 12-18 in. lbs. Locknut must be tight when checking this pre-load.

Pinion Setting: Pinion position is not adjustable. Ring gear and pinion are furnished only in matched sets and ring-and-pinion gear mesh will be satisfactory if axle correctly assembled and backlash is within limits of .004-.008".

Differential Assembly: To dismantle assembly for replacement of parts, cut lockwire, remove nine screws, separate differential case halves. Replace Differential Pinions, Pinion Thrustwashers, Side Gears, and Gear Thrustwashers as **matched sets.**
CAUTION—Use of mixed new and old parts will result in premature failure. Make certain that differential case screws are secured with lockwire when reassembling. Use Tool W-206 to install side bearing cone and roller assemblies on case, Tool W-204 to install bearing cups in housing. Before reassembling axle, examine ring gear thrust plate for wear and replace if necessary (plate is riveted in left hand housing)

Ring & Pinion Gear Backlash: .004-.018". Check backlash after axle completely reassembled.

1946-54 BUICK HYPOID

All Series (1946-54)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1953 REAR AXLE HOUSING PRODUCTION CHANGE CAUTION: (Two Different Housing & Carrier Assemblies Used Requiring Different Pinion Settings).* For identification and service procedures see "Overhaul."

▷*1953 PINION SHAFT OIL SEAL PRODUCTION CHANGE: See "Overhaul" for complete data.*

▷REAR AXLE LEAKAGE CAUTION: Oil leaks may occur at front pinion bearing unless following precautions observed:

Oil Leakage into Propeller Shaft (causing shaft unbalance)—Can be prevented by properly sealing pinion shaft when propeller shaft installed. *See Pinion & Propeller Shaft Assembly below.*

Oil Leakage into Torque Tube (and transmission)—Can be corrected by installing special oil seal in front of pinion front bearing. *See Pinion Bearing Oil Seal Installation below.*

Oil Leakage at Torque Tube & Housing Mounting Flange—Correct by disconnecting torque tube and installing new gasket (gasket is made of special material—DO NOT use any substitutes for this gasket).

▷*CAUTION*—Do not remove torque tube from carrier housing for any other reason than gasket replacement to correct oil leakage. These parts are matched and aligned during manufacture and are not furnished separately.

▷LATE 1948 PINION BEARING CHANGE: Late 1948 cars (1949-54) have two pinion roller bearings (rear bearing) installed side by side on rear end of pinion shaft. See data on these bearings below.

▷*IDENTIFICATION NOTE*—1948 axles with two pinion roller bearings stamped "BB" on bottom center of axle housing.

▷*REAR AXLE BREATHER PRODUCTION CHANGE:* A breather has been installed on the rear axle housing to eliminate the possibility of leakage. The new breather, Part No. 3700490 can be installed on axles not so equipped as follows: Remove left axle shaft, and ring gear. Drill a .359-.369" diameter hole on top of the housing approximately 14" from center line of carrier and drive breather into place *CAUTION*—Place a greased rag in axle housing to prevent any chips entering. Make sure that axle is clean of all foreign material before reassembling ring gear and axle shaft.

▷*1953 PINION BEARING OIL SCOOP PRODUCTION CHANGE:* On axles with 3.6-1 and 3.9-1 axle ratios (Rear Axle Housings With Wide Carrier) an oil scoop, Part No. 1391836 has been added to provide more positive lubrication. *When installing new gears or bearings n 1953 cars with the wide carrier, this scoop should als be installed* as follows: Remove differential ring assembly, pinion, and drive shaft, and wipe carrier housing dry. Insert lip of scoop in oil passage and rotate scoop toward the right side of the housing so hole in scoop is approximately on the center line of the two upper carrier bearing cap bolt holes. Note the position of top rib on front face of housing and try and line up hole in scoop so that when hole is drilled through housing, it will enter rib and not break through housing. With scoop in position, tilting downward toward oil passage hole, scribe the outline of the hole in scoop on carrier housing. Center punch this hole and with an 11/16" drill, drill a hole ½" deep, perpendicular to the housing surface (*CAUTION*—If hole breaks through case, be sure and coat threads of screw before installing). Tap screw hole with a 12-24 tap. Install pinion assembly and install the scoop. Reassemble ring gear assembly and check clearance between ring gear and scoop. Replace the old rear axle housing cover with Part No. 1391835 (having a filler plug and plug gasket).

DESCRIPTION: Hypoid gear, semi-floating type with torque tube drive.

REMOVAL OF AXLE: *See "Rear Axle" on Car Model pgs.*

AXLE SHAFT REPLACEMENT: Axle shaft retained by "C" washer at inner end. To remove axle shaft take out locking pin, remove differential pinion shaft and spacer block, push axle in and remove "C" washer at inner end within differential side gear, (use tool J-1515 to drive washer from shaft slot), pull shaft out (wheel bearing inner race is press fit on shaft and will be removed with it, outer race is light press fit in axle housing and can be removed with puller J-528-B Puller).

NOTE—Right hand axle shafts are longer than left hand shafts and must not be interchanged.

Axle Shaft Endplay—Controlled by spacer block between axle ends in differential case and should be .000" minimum, .008" maximum. Four block sizes used in production, replacement blocks ground on all sides for min. and max. production sizes.

Important—New bronze side gear thrust washers should be installed back of differential side gears before new axle shaft spacer block installed to correct excessive endplay.

PROPELLER SHAFT & FRONT BEARING: Propeller shaft is part of pinion & shaft assembly (see Overhaul data following).

▷*TORQUE TUBE CAUTION*—Torque tube is bolted to carrier but DO NOT DISTURB connection between torque tube flange and carrier flange unless installation of new gasket required to stop oil leaks (special gasket required). Torque tube and carrier are matched and aligned at factory.

OVERHAUL: After removal of axle shafts, differential side bearings and thrust washers.

▷*1953 REAR AXLE HOUSING & CARRIER PRODUCTION CHANGE:* New housing with wider ring gear saddles entered production March 1, 1953. Different pinion settings and Pinion Gauge rework required. Housing Identification—New type housing reinforcing ribs on forward side of housing are longer and extend from rear flange of housing to front torque tube flange (older type housing reinforcing ribs are shorter and terminate midway between the two flanges).

▷*1953 PINION SHAFT OIL SEAL PRODUCTION CHANGE:* Starting with March 16, 1953 production a new seal is used to provide positive piloting and to prevent cocking of seal. The pinion nut is also revised and can be used with either new or old type seals; however, OLD TYPE NUT CANNOT BE USED WITH NEW SEAL. New seal and nut are furnished in Kit, Part No. 1393999.

▷*1952 PINION & PROPELLER SHAFT REMOVAL NOTE (Dynaflow Drive cars & Synchro-mesh cars equipped with 3.6 or 3.9 ratio rear axles)*—It will be necessary to remove the rear axle in order to remove the propeller shaft and pinion. This will not be necessary on Synchro-mesh cars having 4.1 axle ratio, as a puller is available and the propeller shaft spline seal is not used.

▷*1953-54 PINION & PROPELLER SHAFT REMOVAL:* With the type seal used in these cars, it is possible to remove and replace pinion and propeller shaft without disconnecting from torque ball. CAUTION—Care must be taken when installing the propeller shaft with the axle in the car to start propeller shaft in through seal gently to avoid striking seal retainer, as damage will result. Press propeller shaft and pinion assembly into carrier, as driving it in can cause damage to front bearing.

▷*PINION PRESS, TOOL J-1292-E, REWORK (Supersedes Rework of Yoke Screws J-1292-36):* To use new type yokes, J-1292-40 and J-1292-41 which are wider than yokes previously furnished with press, it will be necessary to rework the press as follows: Remove the shoulders at each end of propeller shaft support (adjacent to tool side rails) so that surfaces of support between the support slot and the side rails are parallel to top of side rails. Weld casting to side rails and a point below support slot, both at front and rear of the support. *Do not weld upper surface of support at junction with side rails.* It is suggested that if Yoke Screws J-1296-36 were previously reworked, that new screws be secured. New yokes and screws are available in Conversion Kit J-1292-43.

Disassembly: Mark differential bearing caps so they can be installed in original positions. Remove bearing adjuster locks, loosen one adjuster, support differential gear and case assembly while removing bearing caps and adjusters, then lift differential assembly and bearing races out of carrier.

Pinion & Propeller Shaft Removal & Disassembly—(NOTE—Before removing pinion and shaft, the pinion shaft bearing wear can be determined by mounting a dial indicator, with 1¼" extension, to bear vertically against center drilling in pinion gear. Pry up on pinion gear with a bar a number of times and check indicator reading. Reading should be less than .0015". If greater, the bearing is worn and should be replaced). Loosen locknuts and remove three pinion bearing sleeve screws from housing. Pull pinion and shaft assembly, using Pinion Shaft Puller. Remove all pinion bearing shims from propeller shaft and third member housing to prevent damage. Mark pinion and propeller shaft so that parts are reassembled in same position. File or cut off end of propeller shaft coupling pin and drive out pin, then pull propeller shaft from pinion using Press J-1292-E. Drive up staked section of pinion bearing lock nut with cape chisel, and remove nut, gripping pinion shaft on splined end in vise. Do not grip pinion gear in vise, even though soft jaws are used. Press off pinion front bearing using blocks under outer race of bearing, then remove all other parts from pinion shaft. NOTE—The double row front bearing is preloaded and will have a slight drag when installed on pinion.

Pinion Shaft Reassembly & Installation—Install parts on pinion shaft in following order: rear bearing spacer, two rear bearings, bearing lock sleeve

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1946-54 BUICK HYPOID (C nt.)

with chambered end toward spline, front bearing with shielded side toward spline. Press front bearing solidly against shoulder on pinion shaft, using a tube of proper size to bear against inner race only. Make certain that outer surface of pinion bearing lock nut is clean and free of nicks or burrs, then install new bearing oil seal with spring loaded edge pointing away from hex nut. Install lock nut on pinion with seal toward ball bearing. While gripping splined end of pinion in vise (with soft jaws), tighten nut to minimum of 150 ft. lbs. torque. Stake outer edge of lock nut down into notch in pinion. Push oil seal flat against bearing. Coat splined end of pinion with white lead, then press pinion into propeller shaft until coupling pin holes are aligned, using Press J-1292-E. Pinion must not be a loose fit on shaft. Install a new coupling pin and solidly rivet both ends. ***CAUTION—Whenever a pinion and propeller shaft are assembled together the complete assembly must be checked for straightness. See "Propeller Shaft Runout" below.***

Installation—Place original number and thicknesses of pinion bearing shims over propeller shaft and against front bearing. Use axle lubricant to thoroughly lubricate bearing and to coat outer surfaces of oil seal. As pinion and shaft assembly is inserted into third member housing, turn pinion front bearing outer race so that ball loading groove will be straight up. As pinion bearing enters third member housing, place pinion bearing spacer (see note below) between bearing and pinion gear so that bearing can be pushed into place without binding against spacer on pinion. Push pinion into housing until shims and front bearing are seated, using a jack or other means of applying steady pressure to avoid possibility of damaging front bearing. Align holes in bearing lock sleeve with tapped holes in carrier and install three sleeve lock screws. Tighten each lock screw just a little at a time until lock sleeve and pinion front bearing are solidly seated and screws are uniformly tightened to 35-40 ft. lbs. torque. Tighten lock nuts to 15-20 ft. lbs. torque; excessive tightening of lock screws may withdraw lock screws sufficiently to allow end play of pinion bearing. Check pinion setting. See "Pinion Setting" below.

►***CAUTION—Unless new thrust washers used, new spacer block alone will not secure correct .008" max. endplay (if old washers worn).***

Pinion Bearing Assembly:—Bearings should be press fit on pinion shaft (use tubing of correct diameter to engage inner race when pressing bearings on shaft). No inner race used for rear pinion bearing (outer race and rollers furnished as assembly) and spacer must be installed between rollers and pinion to prevent creeping. Tighten pinion bearing nut securely and stake into notch on shaft. Assemble pinion to propeller shaft riveting pin to prevent it loosening in service (see propeller shaft straightening below). When installing assembly in housing, tap outer race of rear bearing in against shoulder in housing or against bearing collar to prevent the race rubbing on pinion (use Pinion Bearing Spacer J-1192-B or J-5499—See Note below). Make certain that adjusting shims installed ahead of front bearing, tighten setscrews and locknuts securely.

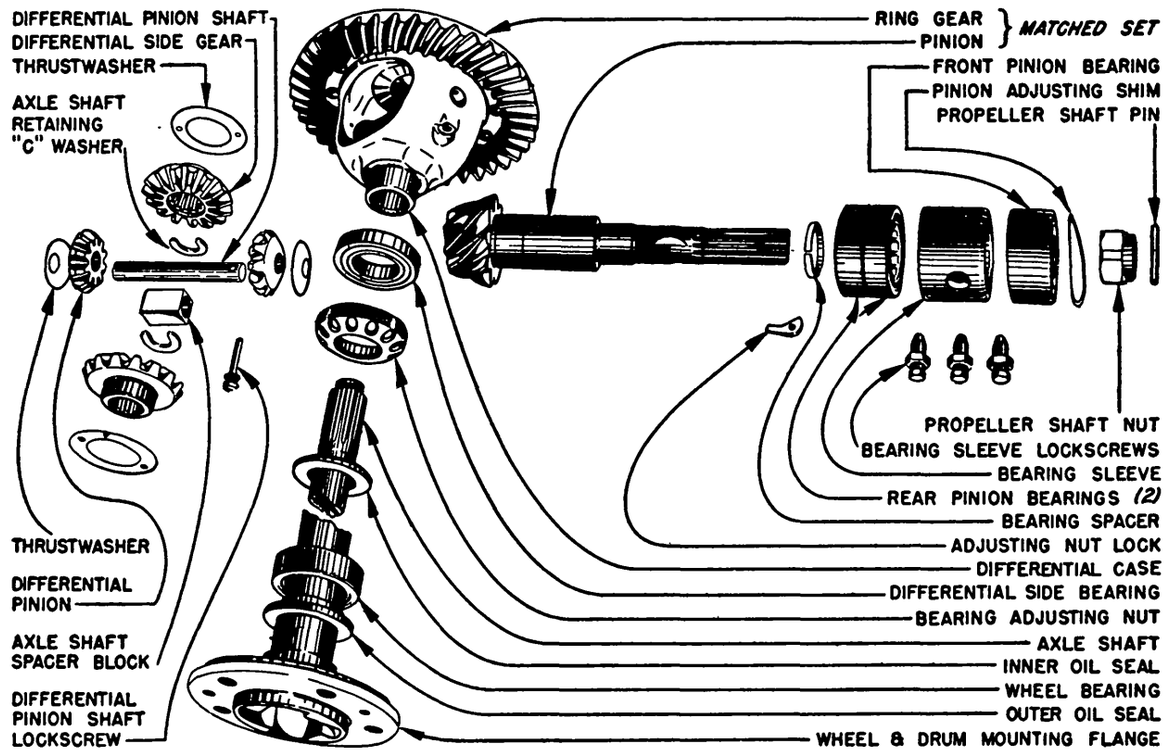
Pinion Rear Roller Bearings—Clearance between bearing rollers and pinion shaft should be .0005" (desired), .0014" (maximum allowable). Check bearings for wear by measuring thickness of roller and outer race at four or five points around bearing (use a micrometer and make certain bearing is absolutely clean). Micrometer reading should be .6756" min., .67605" max. Replace bearing if less than .6756". Bearing can also be checked for wear by using paper strip .0015" (measure with micrometer) between pinion shaft and one roller of the bearing. Bearing should hang on paper strip and strip should not pull out (if bearing drops off strip of own weight or if strip can be pulled out, bearing should be replaced. **Pinion Bearing Spacer Tool Note**—Consists of a horseshoe shaped spacer which should be inserted between pinion and rear bearing when tapping on face of pinion to seat bearings in carrier (use bronze driving block on pinion, remove tool after installation completed), Spacer tool is No. J-1192-B (1946-Early 1953 with First type pinion gear), J-5499 (Late 1953-54 with later type pinion).

►**Pinion Sealing Note**—Splined joint must be sealed to prevent lubricant entering propeller shaft and causing unbalanced condition. Seal shaft by dipping end in Presstite Sealer (Permatex or white lead may also be used) before assembling propeller shaft. Pinion shaft MUST NOT be a loose fit in propeller shaft.

Propeller Shaft Run-out: ***Assembly must be checked for straightness whenever pinion and shaft installed regardless of whether new or old parts used.***

Checking & Straightening (Using V-blocks)—Support pinion and shaft assembly on V-blocks at each end (forward block just to rear of splines at forward end of shaft, rear block under pinion rear roller bearing race). Use dial indicator to measure run-out at points 3" in from each end of shaft tube (CAUTION—do not allow unevenness of tube surface to cause indicator to bounce indicating wrong reading). If run-out not within .005" at these two points, straighten tube by exerting pressure on center of tube (support tube at same point at front end and under bearing lock sleeve at rear for straightening). Then check run-out at center of shaft tube. If run-out exceeds .010" at this point, straighten tube while supporting it on blocks at tube weld point at each end. Then check run-out at pinion front ball bearing. If run-out exceeds .001", support shaft at forward V-block and at bearing lock sleeve at rear end, exert pressure at weld points on rear end of tube. Recheck all run-out points, then check run-out at extreme forward end

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BUICK HYPOID DIFFERENTIAL GEAR & PINION ASSEMBLY

1946-54 BUICK HYPOID (Cont.)

of shaft. Run-out at this point should be less than .002" total indicator reading.

▷*CAUTION—More than .002" run-out at forward end of shaft will cause rapid wear of universal joint bushing and possible leakage of transmission case lubricant into rear axle.*

Pinion Bearing Oil Seal Installation: This oil seal furnished in kit, Part No. 1393999 (seal and special pinion nut), and can be installed on all 1940 and later cars to correct oil seepage from rear axle into torque tube or propeller shaft. Installation of oil seal on 1950 and previous cars requires fitting of the seal as follows:

1946-50 Cars—Fitting of the seal will be easier if holding tool made up of 3 1/16" diameter hardwood block approximately 14" long with 2 7/8" circular depression 1/16" deep on end used (place seal in recess, use wood screw and 2" diameter washer to hold seal in place on end of block). Drive seal lightly into carrier bore (CAUTION—do not use excessive force). If seal will not start in carrier bore, reduce outside diameter of seal slightly by light filing or emery cloth (CAUTION—remove all filings and emery dust by thorough washing). After seal driven into carrier bore, remove and check for proper fit (outer surface should show light scratch marks evenly around entire circumference). If seal loose (not marked as above), expand seal by denting bead on rear side at six evenly spaced points using a light hammer (CAUTION—retain original bead height as much as possible since bead spaces seal from front bearing shield). After seal properly fitted, install seal on pinion nut with lip of leather seal pointing away from hexagonal portion of nut. Assemble pinion and propeller shaft in usual manner.

CAUTION—If seal has been fitted by denting bead, apply sealing compound (Permatex No. 2) to outer surface and allow to dry until gummy just prior to final installation of assembly in carrier Avoid excessive use of sealer (must not be allowed to get down between shims and affect pinion position).

1951-54 Cars—Make certain that outer surface of pinion bearing locknut is clean and free of nicks or burrs, then install new bearing oil seal with spring-loaded edge pointing away from hexagonal portion of nut. Assemble pinion and propeller shaft in usual manner.

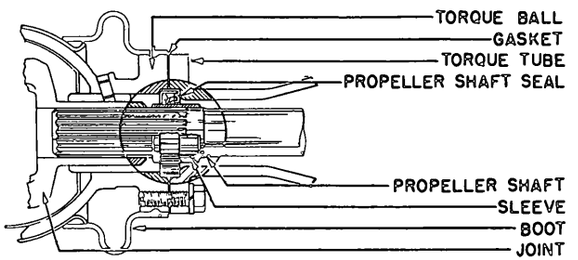
Ring Gear Installation: Ring and pinion gears furnished in matched sets only.

Ring Gear Replacement—To remove old gear, drill old rivets ½" deep with ¼" drill on ring gear side, drive rivets out with a punch inserted in drilled hole. Check gear mounting face of case for burrs, check run-out which must not exceed .002". Mount new ring gear on case with 11 5/16" x 1½" bolts with 3/8" SAE nuts placed in rivet hole counterbores to act as spacers. Check bolted assembly for runout with dial indicator on back face of ring gear. If run-out less than .003", use Riveting Jig J-2196-A to install rivets. Use correct rivets (which allow 5/16" shank length for heading), install rivets from gear side, use 8 tons pressure to head rivets cold. Install rivets in diametrically opposite progression, removing only one bolt at a time. Recheck run-out after all rivets installed. Run-out must not exceed .003".

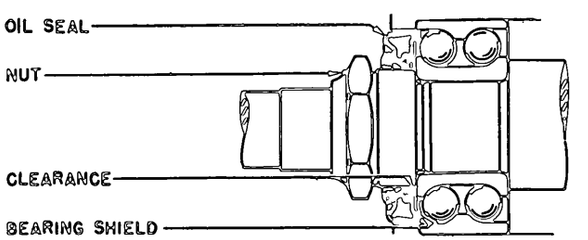
▷*PINION SETTING GAUGES J-2197, J-681-A, & ADAPTER J-2197-9 REWORK FOR USE WITH 1953 & 1954 REAR AXLE ASSEMBLIES (WITH WIDE SADDLE CARRIERS):* Adapter J-2197-9 Rework—Increase width of the cavity cast into the adapter from 2" to 2⅜".

Pinion Setting Gauges J-2197 & J-681-A Rework: Remove the collar on the short side of the cross bar and increase the depth of the counterbore ¼". Replace collar on cross bar.

Pinion Setting (Using J-681-A Pinion Setting Gauge): Pinions marked on rear face of two teeth by an etched figure and plus or minus sign for necessary correction of standard setting (micrometer reading for standard settings given below). Plus sign indicates that pinion should be moved away from axle shaft center-line, minus sign toward axle center-line, the amount (in thousandths) of the figure following this plus or minus sign. Use J-681-A Pinion Setting Gauge, check micrometer '0' on test fixture, set micrometer to standard figure (as given in table below for each model, turn micrometer pointer in (for plus figure) or out (for minus figure) the amount stamped on face of pinion, install gauge in axle housing (with differential carrier removed) seating gauge rings on differential bearing posts, add or remove shims (furnished in .001" steps from .010" to .019" thick) between pinion front bearing and shoulder in housing. Center adapter on end of pinion and rotate it so the ground indicating surface is to the left of the pinion vertical center line so that the micrometer contacts the center portion of the surface when it is swung through its arc. Use gauge adapter J-681-37-1 with pinions mounted in narrow saddle carriers. Use gauge adapter J-2197-9 (reworked—see above) with pinions mounted in wide saddle carriers. The reworked gauge adapter J-2197-9 must be held in position with clamp supplied in Pinion Setting Kit J-2197-15.



1953-54 PROPELLER SHAFT SPLINE SEAL



1951-54 PINION SHAFT OIL SEAL

Standard Pinion Setting①
(Gauge J-681-A)

Model	Gauge Setting
1946-52	.379"
1953 (Early Type)	.379"
1953-54 (Later Type)	.317"

①—Nominal setting for "O" pinion gear.

Pinion Setting (Using J-2197 Pinion Setting Gauge:

▷*NOTE: See "Pinion Setting Gauges Rework" above for 1953-54 pinions mounted in wide saddle carriers.*

This new type gauge similar to previous type, J-681A, except that micrometer scale markings are reversed. This gauge is used in same manner as previous type (gauge rings seated in side bearing bores, micrometer set so that pointer contacts adapter plate on face of pinion gear) except that "nominal" or standard readings are new (see below) and that corrections for pinions marked (+) must be added, and corrections for pinions marked (—) must be subtracted from the nominal micrometer reading when this J-2197 gauge is used.

▷1946 (& Later) Pinion Setting Note—Pinions are ground on face and one gauge reading will be sufficient to check pinion setting (not necessary to "average" two readings as for previous type).

Standard Pinion Setting①
(Gauge J-2197)

Model	Gauge Setting
1946-52	.802"
1953 (Early Type)	.802"
1953-54 (Later Type)	.864"

①—Nominal setting for "0" pinion gear.

Differential Bearing Adjustment:—Remove adjusting nut locks, mark adjusting nuts, loosen right bearing capscrews ¾ turn and tap cap lightly to free nut, back off right hand nut slowly and note point where bearing race stops turning with nut, mark this new position, return nut to original position and repeat check. Race should stop turning at same point and number of notches nut has been turned is 'notches tight' of old setting. Correct setting is 2½-3 notches tight (1946-Early 1953 with First type housing and carrier), 2-3 notches tight (1953-54 with Later housing and carrier) with the adjusting nut turned in this amount from the free position noted above. Tighten both bearing nuts securely, check ring gear backlash. After all adjustments, install adjusting nut locks.

Ring & Pinion Gear Adjustment: Check pinion setting (see instructions above) or paint gears to check mesh. Backlash should be .006-.011" for new gears (slightly more for worn gears) with .007-.009" preferred. Lash must not vary more than .003" around the ring gear. If original gear set is being installed, original gear lash should be maintained.

Ring Gear Backlash Adjustment. When adjusting ring gear backlash, make certain that differential side bearing adjustment not disturbed (back off one nut and tighten opposite nut equally). Check bearing adjustment. If adjusting nuts marked before dismantling, setting nuts up to original marks should give correct ring gear position.

NOTE—Backing off one nut and tightening other nut one notch will change backlash approximately .0035".

BUICK REAR SUSPENSION

All Series (1946-55)

DESCRIPTION: Coil spring type.

TRIM DIMENSION: Before measuring rear spring trim dimensions, bounce rear end of car up and down several times to make certain suspension is not binding and to allow springs to assume natural position. Then measure from top of axle housing to top of bumper clip on frame side rail to rear of bumper. If trim dimension not correct with car at curb weight, replace spring.

TRIM DIMENSIONS
(Heights are for Standard Springs)

1948 Models	Height
40	5½-6¼"
50, 70	6½-7¼"
1949 Models	**Height**
56C, 76C	5 9/16-6 5/16"
All Others	5 13/16"-6 9/16"
1950 Models	**Height**
56C, 75R, 76C, 76R	5½-6¼"
56R, 59, 79	5⅝-6⅜"
All Others	5 13/16"-6 9/16"
1951 Models	**Height**
46C, 56C, 76C, 76R	5½-6¼"
56R, 59, 79	5⅝-6⅜"
All Others	5 13/16"-6 9/16"
1952 Models	**Height**
46C, 56C, 76C	5½-6¼"
56R, 59, 76R, 79R	5⅝-6⅜"
All Others	5 13/16"-6 9/16"
1953 Models	**Height**
46C, 56C, 76C	5⅝-6⅛"
59, 79R	5¾-6¼"
76X	5-5½"
All Others	5 15/16-6 7/16"
1954 Models	Height
46C, 56C, 76C, 100	5¼-6"
All Other Models	5½-6¼"
1955 Models	Height
46C, 46R, 56C, 56R, 66C, 66R, 76C, 76R	4¼-5¼"
All Other Models	5½-6½"

REAR AXLE RADIUS ROD: Radius rod need not be removed for rear axle removal (disconnect rod at right hand end) but should be removed and checked for straightness and twist when new bushings installed.

Removal—Support rear end of car on jacks under axle housing so that weight of car is on springs. Take off nuts and washers on radius rod pins (at each end of rod), remove pin support at right end and frame bracket brace (pin support on 40 series) at left end of rod. Remove rod and bushings from pin on frame bracket.

Installation—Reverse removal procedure, using new rubber bushings. **Car weight must be on rear springs when tightening pin nuts** (to insure that rubber bushings will be clamped in neutral position).

REAR AXLE STRUT ROD REPLACEMENT CAUTION: Replacement torque tubes are furnished without holes drilled for strut rod rivets in the mounting bracket. Drill these holes only after rear axle housing, torque tube, and strut rods have been assembled. With strut rods in normal position (without up or down strain), drill bracket to match holes in strut rod with ½" drill, then drill through strut rods and bracket with 9/16" drill, install No. 1312923 bolts with lockwashers and thin nuts.

SPRING SPECIFICATIONS: Special 200 lb. and 500 lb. Overload Rear Springs are available for use with trailers or when heavy loads carried in car.

NOTE—To determine overload, weigh rear end of car at curb weight (no load except full fuel tank and spare tire and wheel in trunk), attach trailer and re-weigh rear end (difference is Overload).

►*CAUTION—Manufacturer does not recommend overloading rear axle in excess of 500 lbs.*

1946-48 Std. & Optl. Springs

41	1324554	1312433
46S	1324553	1315047
51, 56C '47-48	1322284	1324556
56S, 56C '46	1324559	1323977
59	1331207	
71, 76C	1323977	1324557
76S	1322284	1324556
79	1331207	

1949 Std. & Optl. Springs

Model	Standard	Optl. (High)
41	1324554	1312433
46S	1324553	1315047
51, 56C	1334699	1334700
56S	1324554	1324561
59, 79	1315233	
71, 76C, 76R		
76S	1334699	1334700

1950 Std. Springs①

Model	Std. Spring Part No.
41, 43	1340742
41D, 43D②	1341972
46, 46S	1340741
46D②	1341973
51, 56C, 56R	1341972
52	1341973④
59	1315231
71, 75R, 76R②	1341974
71, 75R, 76R③	1341975
72, 76C	1341974⑤
76S	1341975
79	1315233
50 & 70⑥	1336960

1951 Std. Springs①

Model	Std. Spring Part No.
40	1343328
51, 56R	1343329
52, 56C	1341972
56S	1343328
59	1315231
73R, 76C	1341974
76R	1341975
79	1315233
50 & 70⑥	1336960

①—Optl. "High" springs not furnished.
②—Early cars. ③—Later cars.
④—No. 1341974 on early model 52 cars.
⑤—No. 1341976 on early model 72 cars.
⑥—Ambulance and Funeral cars.

1952 Std. Springs①

Model	Std. Spring Part No.
40 (All Models)	1341972
52, 56C	1341972
56R	1343329
59	1315231
72R, 76C	1341974
76R	1341975
79R	1315233
50, 70 (Amb. & Fnrl)	1336960

①—Optl. "High" springs not furnished.

1953 Std. Springs①

Model	Std. Spring Part No.
59, 79R②	1341972
All Other Models②	1315231

①—Optl. "High" springs not furnished.
②—Use Spring No. 1341974 for cars with Air Conditioning.

1946-48 Heavy Duty Springs

Model	200 Lb. Type	500 Lb. Type
41	1310399	1315233
46S	1312433	1315233
51	1324557	1324555
56S, 56C, '46	1324556	1331207
56C '47-48	1324557	1324555
59	1324555	
71	1331207	1324555
76S, 76C '46	1324557	1324555
76C '47-48	1331207	1324555
79	1324555	

1949 Heavy Duty Springs

Model	200 Lb. Type	500 Lb. Type
41	1310399	1315233
46S	1312433	1315233
51, 56S, 56C		1315233
71, 76R, 76S, 76C		1315233

1950 Heavy Duty Springs

Model	200 Lb.	500 Lb.
All Models (Exc. Following)	1341974	1315231
52	①	1315233
56S	1341974	1315231
71, 75R, 76R	①	1315233
72, 76C, 76S	①	1315233
79	①	①
50 & 70②	①	①

1951 Heavy Duty Springs

Model	200 Lb.	500 Lb.
40, 51, 56R	1341974	1315231
52	1341976	1315233
56C, 56S	1341974	1315231
59	1315233	①
73R	1310399	①
76C, 76R	1341976	①
79	①	①
50 & 70②	①	①

①—Not furnished.
②—Ambulance & Funeral cars.

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BUICK REAR SUSPENSION (C nt.)

1952 Heavy Duty Springs

Model	200 Lb.	500 Lb.
40 (All Models)	1341574	1315231
56C, 56R	1341574	1315231
52, 76C, 76R	1341976	1315233
59	1315233	①
72R	1311399	1315233
79R	①	①
Ambulance & Funeral	①	①

①—Heavy Duty Springs not furnished for these models.

1953 Heavy Duty Springs

Model	200 Lb.	500 Lb.
40 (All Models)	1341974	1315231
50 & 70 (Exc. 59, 76R)	1341976.	1315233
59 & 79R	1315233.	

NOTE—When installing these Heavy Duty Springs, rear trim dimension must not be increased more than 1" over trim dimension limits (see Trim Dimension data). Springs can be changed in pairs at front or rear, or at both ends of the car. See Buick Front Suspension article for front spring data.

1954 Std. & Overload Springs

Mdl	Std.	200 lb.	500 lb.
40	1342972	1165116	1315231
41D ①	1341974	1165116	1315231
49	1315231	1315233	
50 (Exc. 56R) ②	1165116	1334701	1315233
56R ②	1341974	1334701	1315231
60	1341972	1165116	1315231
61 ①	1341974	1165116	1315231
69	1315231	1315233	
70 ②	1165116	1334701	1315233
100	1341974	1165116	1315231

①—With Air Conditioning.
②—Use No. 1334701 on Air Conditioned Cars.

1955 Std. & Overload Springs

Model	Std.	100 lb.	200 lb.	500 lb.
41,43,48	1341972		1165116	1315231
46C	1168769	1341972	1165116	1315231
46R	1168766	1341972	1165116	1315231
49	1315231		1315233	1315231
52	1165116		1334701	1315233
56C	1168767	1165116	1334701	1315233
56R	1168766	1341974	1334701	1315233
61, 63	1341972		1165116	1315231
69	1315231		1315233	1315231
66C	1168769	1341972	1165116	1315231
66R	1168766	1341972	1165116	1315231
72	1165116		1334701	1315233
76C, 76R	1168767	1165116	1334701	1315231

1955 BUICK HYPOID

ALL SERIES (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*RING GEAR & DIFFERENTIAL CASE PRODUCTION CHANGE:* Early type ring gear is riveted to differential case. Later type is bolted to case, using 12 special 3/8"-24, 300M bolts *(CAUTION—These bolts should not be replaced with any other kind under any circumstances).* The special bolts are identified by six straight lines around bolt head center and in some cases a manufacturers trade mark may also be in center of head. If the bolted type ring gear used to replace early riveted type, the differential case must also be replaced. *DO NOT rework the old case for use with the new ring gear.*

►*1955 DOUBLE ROW RADIAL THRUST BALL BEARING INSTALLATION ON EARLIER MODEL CAUTION:* The new oil seal, Part No. 1339437 must be used to avoid interference with nut hex when bearing, Part No. 954919 is used.

►*REAR AXLE HOUSING FILLER PLUG BREAKING CORRECTION:* Plugs will break if over-torqued. Tighten plug to 20-30 ft. lbs.

►*REAR AXLE CARRIER PRODUCTION CHANGE:* Carrier bolting flange has been increased in thickness from .620" to .800", and reinforcing ribs have been extended to the outer circumference of the bolting flange. Carrier attaching bolts (to rear axle housing) have been eliminated and studs, pressed into housing,have been substituted.

►*PINION GEAR PRODUCTION CHANGE:* A new tapered gear (tapered on back of pinion) replaces the early type. A new spacer also entered production at the same time to compensate for changes in pinion.

►*PINION GEAR INSTALLATION IN CARRIER CAUTION:* Different pinion bearing spacer tools are required for early and later type (tapered) pinion installation. *See "Pinion & Propeller Shaft Installation" below.*

►*PINION BEARING REPLACEMENT CAUTION:* If the 1955 bearing arrangement (one rear roller bearing) is to be installed in a rear axle in which the old arrangement (double rear roller bearing) has previously been run, *a new gear set MUST be used.* The ridge formed between the two radial bearings would cause rapid wear of the new single bearing.

DESCRIPTION: Hypoid gear, semi-floating type with torque tube drive. The pinion is supported in carrier by one roller bearing (rear), and a double row radial thrust ball bearing (front).

REMOVAL OF AXLE: *See "Rear Axle" on Car Model pages.*

AXLE SHAFT REPLACEMENT: Raise rear of car and place on stands. Clean rear end of chassis and all parts surrounding axle housing. Remove wheel and brake drum, drain rear axle housing and remove cover. Remove side pinion shaft lock screw and push pinion shaft from differential case, and remove spacers and pinions. Push axle shaft inward and drive the horseshoe shaped washer from grooved inner end of axle shaft, using tool J-1515. Support axle shaft while pulling it out of axle housing to avoid damaging bearing oil seals. *CAUTION—Do not allow axle to rest on oil seals during repairs.*

Axle Shaft Endplay: Controlled by spacer block between axle ends in differential case. Endplay should be .000" to .008" maximum. Replacement spacers are furnished standard size, and in two oversizes, each spacer having two dimensions for selective fitting. Install spacer between axle shafts and with both shafts pulled out as far as possible, check clearance between axle and spacer. If clearance exceeds .008", turn spacer ¼ turn and test clearance again. If unable to adjust endplay to .008", replace spacer with an oversize, or install new bronze thrust washers between side gears and differential case.

Wheel Bearing & Seal Replacement: After removal of axle shaft, disconnect link from shock absorber arm. Disconnect brake pipe from wheel cylinder and plug openings. Remove entire brake assembly from axle, supporting brake out of way to prevent damage to brake cable. Remove outer seal and roller bearing, then remove inner oil seal, using Remover J-1436 (sliding hammer & puller). If inner bearing race on axle shaft is to be replaced, grind part way through race and split it off shaft. Press a new bearing race into place against shoulder on shaft. Drive a new inner seal squarely and lightly into axle housing using care to avoid distorting seal. Install bearing into housing by tapping with a light drift on alternate sides of bearing *(CAUTION—Do not tap on rollers).* Install new seal and complete installation by reversing removal procedure.

PROPELLER SHAFT & FRONT BEARING: Propeller shaft is part of pinion & shaft assembly. *See "Overhaul" below.*

►*TORQUE TUBE CAUTION: Torque tube and carrier flanges are matched and aligned at the factory and should not be disturbed except for installation of a new gasket (to prevent leakage) or for replacement of either of the two parts.*

OVERHAUL: After removal of axle shafts, differential side bearings and thrust washers, proceed as indicated below:

►*RING GEAR & DIFFERENTIAL CASE PRODUCTION CHANGE:* Early type ring gear is riveted to differential case. Later type is bolted to case, using 12 special 3/8"-24, 300M bolts *(CAUTION—Thes bolts should*

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1955 BUICK HYPOID (Cont.)

not be replaced by any other kind under any circumstances). The special bolts are identified by six straight lines around bolt head center and in some cases a manufacturers trade mark may also be in center of head. If bolted type ring gear is used to replace the early riveted type, the differential case must also be replaced. *DO NOT rework the old case for use with the new ring gear.*

►*REAR AXLE CARRIER PRODUCTION CHANGE:* Carrier bolting flange has been increased in thickness from .720" to .800", and reinforcing rubs have been extended to the outer circumference of the bolting flange. Carrier attaching bolts (to rear axle housing) have been eliminated and studs, pressed into axle housing, have been substituted.

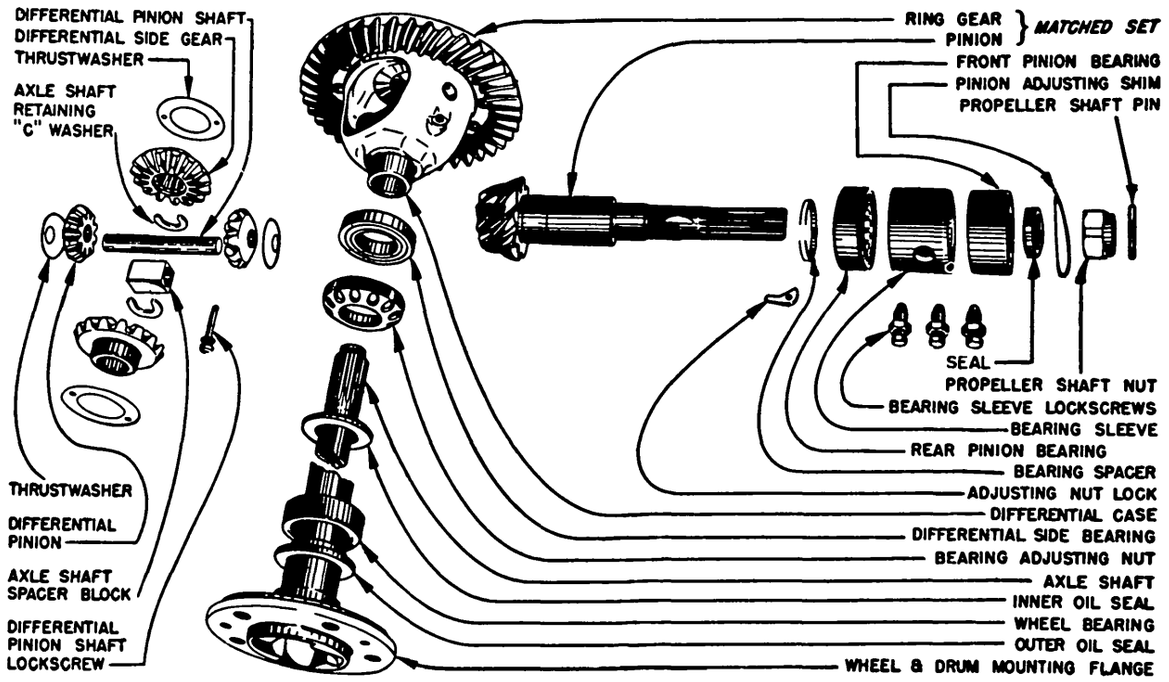
►*PINION GEAR & SPACER PRODUCTION CHANGE:* A new tapered gear (tapered on back of pinion) replaces the early type. A thicker spacer is used with the new gear to compensate for changes in design.

►*PINION GEAR INSTALLATION IN CARRIER CAUTION:* Different pinion bearing spacer tools are required for early and later type (tapered) pinion installation. *See "Pinion & Propeller Shaft Installation" below.*

►*PINION BEARING REPLACEMENT CAUTION:* If the 1955 bearing arrangement (one rear roller bearing) is to be installed in a rear axle in which the old arrangement (double rear roller bearing) has previously been run, *a new gear set MUST be used.* The ridge formed between the two radial bearings on the old shaft would cause rapid wear of the new single bearing.

Disassembly: *(NOTE—Before removing differential assembly, check the gear lash with a dial indicator. See "Differential Case, Ring Gear, & Bearing Installation" below).* After removal of both axle shafts, remove differential side gears and thrust washers from case. Mark differential bearing caps so they can be reinstalled in original positions on carrier. Mark both differential bearing adjusters for location, then remove locks and check the bearing adjustment *(See "Reassembly" below).* Remove ring gear and case assembly from carrier, keeping each bearing race with its original bearing.

Pinion & Propeller Shaft Removal & Disassembly—*(NOTE—*Before removing pinion and shaft, the pinion shaft wear can be determined by mounting a dial indicator, with 1¼" extension, to bear vertically against drill center in pinion gear. Pry up on pinion gear with a bar a number of times and check indicator reading. Reading should be less than .0015". If greater, the bearing is worn and should be replaced). Loosen locknuts and remove three bearing sleeve screws from housing. Pull pinion and shaft assembly, using Pinion Shaft Puller J-5502. Remove all pinion bearing shims from propeller shaft and carrier housing to prevent loss or damage. Mark pinion and propeller shaft so that parts can be reassembled in the same relative position. File or cut off end of propeller shaft coupling pin and drive out pin, then pull propeller shaft from pinion using Press J-1292-C. Drive up staked section of pinion bearing lock nut and remove nut, gripping pinion shaft on splined end in vise. *Do not grip pinion gear in vise even though soft jaws are used.* Press off pinion front bearing using Bearing Remover Plates J-5737-6 installed in Press Plate Holder J-358-1 with recessed side upward. *NOTE—*The double row ball bearing will have a slight drag when installed on pinion due to being preloaded.



BUICK HYPOID DIFFERENTIAL & PINION GEAR ASSEMBLY

Differential Case, Ring Gear, & Bearings—*(NOTE—Early type ring gear is riveted to case. Later type is bolted. See Production Change above).* Remove all bolts from ring gear (if bolted type) and separated gear from case. If necessary to replace early (riveted type ring gear) type ring gear, drill ½" hole into rivets using a ¼" drill **on ring gear side,** drive out rivets with a punch inserted in drilled hole. Check gear mounting face for burrs around bolt holes and remove burrs with a mill file. Mount case in differential carrier with a dial indicator set to check runout of machined flange surface. If runout exceeds .002", flange must be trued up. To remove differential bearings, pull bearings from case using Puller J-2241 (the ends of puller fit into notches in differential case so that pressure can be applied to bearing inner race). DO NOT PULL ON ROLLERS.

Reassembly: *NOTE—Propeller shaft & pinion gear assembly must be checked for runout whenever pinion and shaft installed regardless of whether new or old parts used.*

►*RING GEAR & DIFFERENTIAL CASE PRODUCTION CHANGES: See Production Change above for installation of later type assembly on early models.*

Differential Case, Ring Gear, & Bearings—Check matching numbers on new ring gear and pinion (if being used). Bolt gear to differential case (if later bolter bolted type) using 12 special 3/8"-24, 300M bolts, Part No. 186627 *(these bolts are identified by six radial lines around bolt cent er).* Install bolts **with ut lockwashers** and tighten bolts on opposite sides of case to 25-30 ft. lbs., then tighten in same manner to 50-60 ft. lbs. On early type (riveted ring gear), use Riveting Jig J-2196-A to install rivets. Use correct rivets which allow 5/16" shank length for heading. Install rivets from ring gear side and use 8 ton pressure to head rivets cold. Install rivets in diametrically opposite positions until all rivets are installed. Recheck gear runout after all rivets installed. Examine bearing seat on differential case for burrs or scores and remove all high metal with a mill file. Coat bearing seat with engine oil or white lead and install bearing using Replacer J-2242, which is designed to pilot in the case and bear squarely against bearing inner race. Press bearing into position (do not hammer it in).

Pinion & Propeller Shaft Reassembly—Install parts on pinion shaft in the following order: Rear bearing spacer (small O.D. spacer with early type pinion, and large O.D. spacer with later "tapered" pinion), rear roller bearing, bearing lock sleeve *(with thin edge toward roller bearing),* and front ball bearing (with ball loading groove toward spacer). Press front bearing solidly against shoulder on pinion using Bearing Replacer Plate J-5737-7 in Plate Holder J-358-1 *(CAUTION—Do not hammer bearing into place as Brinelling will result).* Make certain that outer surface of bearing locknut is clean and free of nicks and burrs, then install

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1955 BUICK HYPOID (C nt.)

a new bearing oil seal with spring loaded edge pointing away from hex on nut. Install locknut on pinion with seal toward ball bearing. While gripping **splined end** of pinion in vise (with soft jaws), tighten nut to a minimum of 150 ft. lbs. Stake outer edge of locknut down into notch in pinion and push oil seal flat against bearing. Coat splined end of pinion with white lead to facilitate assembly, then press pinion into propeller shaft until coupling pin holes are aligned, using Press J-1292-C and correct yokes. Make sure that pinion is a tight fit in propeller shaft. Install a new coupling pin and solidly rivet both ends.

Ch cking & Straight ning (Using V-blocks)—Support pinion and shaft assembly on V-blocks at each end (forward block just to rear of splines at forward end of shaft, rear block under pinion rear roller bearing race). Use dial indicator to measure run-out at points 3" in from each end of shaft tube *(CAUTION*—do not allow unevenness of tube surface to cause indicator to bounce indicating wrong reading). If run-out not within .005" at these two points, straighten tube by exerting pressure on center of tube (support tube at same point at front end and under bearing lock sleeve at rear for straightening). Then check run-out at center of shaft tube. If run-out exceeds .010" at this point, straighten tube while supporting it on blocks at tube weld point at each end. Then check run-out at pinion front ball bearing. If run-out exceeds .001", support shaft at forward V-block and at bearing lock sleeve at rear end, exert pressure at weld points on rear end of tube. Recheck all run-out points, then check run-out at extreme forward end of shaft (must be less than .002").

►*CAUTION: More than .002" run-out at forward end of shaft will cause rapid wear of universal joint bushing and leakage of transmission oil into rear axle.*

Pini n & Prop ll r Shaft Installation—*(CAUTION—Two different pinion shafts and gear assemblies used during production. Different spacer tools are required for correct installation of the pinions. See "Production Changes" above).* Before installation of pinion and propeller shaft assembly make sure that all parts are clean and dry and that bearing shims are not crimped or buckled. Place the original number and thickness of pinion bearing shims over propeller shaft and against front bearing. Use rear axle lubricant to thoroughly lubricate bearings and coat outer surface of oil seal to aid installation. Lightly coat shims to hold them in place. As pinion and propeller shaft assembly is inserted into carrier, turn propeller shaft to engage splined front end in universal joint *(CAUTION*—Be very careful to start shaft through front seal in torque tube without damaging the seal retainer. If axle assembly is under car, the universal joint yoke will guide propeller shaft so that sleeve will enter seal centrally. If axle is not under car, a second man should guide shaft as sleeve enters seal. As pinion bearing enters carrier, place spacer tool (J-5905 for first type pinion, and J-5973 for second type "tapered" pinion. *See "Production Changes" abov),* between bearing and pinion gear. These spacer tools allow bearing to be pushed into place without binding. Mount Replacer J-5502 on carrier and press shaft and pinion forward until shims and front bearing are firmly seated. Align holes in pinion bearing lock sleeve with tapped holes in carrier and install the three sleeve lock screws. Tighten each lock screw a little at a time until lock sleeve is solidly seated and screws are uniformly tightened to 35-40 ft. lbs. Tighten lock nuts to 12-15 ft. lbs. *(CAUTION*—Excessive tightening of locknuts will cause lock screws to withdraw sufficiently to allow end play of pinion bearing). Remove spacer tool J-5905 or J-5973.

Differential Case, Ring Gear & Bearing Installation—Mount ring gear and case assembly in carrier with a dial indicator set to check runout of gear. Runout should not exceed .003'. Correct as necessary. Place outer races on differential bearings but do not oil bearings as this would interfere with bearing adjustment. Install gear and case assembly and slide bearing adjusters into position so that threads are properly engaged in threads in carrier pedestal. Install bearing caps with bolts, *(CAUTION—Make sure that caps are installed in original position marked before removal).* Turn bearing adjusters to engage threads. Tighten cap bolts to 20 ft. lbs., and then back off bolts ¼ turn. Using Adjuster Wrench J-1365-A turn adjusters as required to set ring gear lash at approximately .010" with both adjusters in contacts with bearings. *(CAUTION—Do not use punch and hammer to turn adjusters as this will distort adjusters and a proper bearing adjustment cannot be made).* Back off one adjuster (preferably the left) while observing bearing rollers and outer race, until rollers and race just stop turning, then tighten adjuster 4 to 5 notches to properly seat bearings and adjusters. Slowly back off adjuster until bearing outer race just stops turning. Recheck for this "free position" at least once to make sure of proper position. From the "free position" tighten adjusting nut 2 to 3 notches to preload the bearings, then tighten all four cap bolts to 100-120 ft. lbs. Mount a dial indicator to bear against a ring gear tooth so that contact can be made near heel end of tooth. Check gear backlash. On a new gear set, the lash should not be less than .006" nor more than .011", with .007-.009" preferred. If original gear set is being installed, the original gear backlash should be maintained. If backlash is not within limits, move ring gear to right or left as required to secure proper backlash. To move ring gear, loosen all four bearing cap bolts ¼ turn, loosen one notch on bearing adjuster on side toward which gear is to be moved and tighten one notch on opposite side. *(CAUTION*—When one adjuster is loosened, always tighten opposite adjuster the same amount in order to maintain the bearing preload adjustment). One notch change of both adjusters in the same direction will result in changing gear lash approximately .0035". Always tighten all bearing caps to 100-120 ft. lbs. after adjusters have been moved and recheck lash with dial indicator. When lash is properly set, install both bearing adjuster locks. Install differential side gears and thrust washers in case, lubricate bearings and install axle shafts.

Pinion Setting (Using J-681-A & J-2197 Pinion Setting Gauges): *Se 1951 or Later Manual editions.*

Pinion Setting (Using J-5647 Gauge): This pinion setting gauge consists of a "master gauge" and an "indicator gauge" upon which Dial Indicator KMO-5647 is mounted. Make certain that gauge parts are clean, particularly the center and discs on indicator gauge and the centering holes, indicator pads and the disc pads on the master gauge. Install the small contact button on stem of dial indicator and mount dial indicator on indicator gauge of tool. Place the indicator gauge on master gauge so that spring loaded center is engaged in centering hole corresponding to the indicator pad "B" (which is used for any of the following gear ratios stamped on pinion 43-11, 43-12, 41-12, 42-13. *NOTE—Pad "A" is used for certain previous models.* Center the indicator contact button on specified indicator contact button on specified indicator pad and lock indicator by tightening lock screw. Hold yoke down firmly, with both discs contacting the horizontal and vertical pads on master gauge, and set dial indicator at "zero". Place transmission in "neutral" Make certain that differential bearing seats in carrier are clean and free of burrs, and that center in pinion is also clean. Rotate pinion until blank tooth between the matching numbers and the pinion setting mark is slightly counterclockwise of top center (at 11 o'clock). This tooth is called the gauging tooth (used for locating and gauging during production) and should be used for gauging Place indicator gauge in carrier with discs seated in bearing seats (clear of threads and inner edges), with gauge center engaged in center of pinion, and with contact button having good contact on gauging tooth of pinion. Press gauge yoke firmly inward toward pinion and read dial indicator noting whether it is plus (+) or minus (-), as indicated by arrows on surface of yoke. Recheck indicator zero setting on master gauge to make sure it was not changed in handling. If the old ring and pinion gear set is being reinstalled and it had been in use long enough to establish a wear pattern on teeth, the original setting found at time of removal should be maintained. If the ring gear and pinion set is new or has not been in use long enough to establish a wear pattern on teeth, the dial indicator reading should be within .001' of pinion setting marked on pinion.

Pinion Adjustment· Remove pinion and propeller shaft assembly and remove all pinion bearing shims from shaft or from carrier housing. Wipe shims dry, and measure the total thickness with a micrometer. Increase or decrease total thickness of shims to obtain proper pinion setting, by using a different combination of shims *(NOTE*—These shims are furnished in thickness ranging from .010' to .019' in increments in .001'). As an example, if pinion is marked + 8, but dial indicator reads +6, decrease total thickness of shims by 002' (if the above marking and dial reading were "minus", shims would be increased in thickness). If dial reading were to read +10 for the above marked pinion, increase total thickness of shims by .002". Install pinion and propeller shaft assembly with a new combination of shims and be sure to tighten the three bearing sleeve locks uniformly to 35-40 ft. lbs., and lock nuts to 15-20 ft. lbs. Check pinion setting with gauge. Setting must be within .001" of setting marked on pinion.

1946-55 CADILLAC HYPOID

Cadillac V8 (1946-55)

►1949-55 **AXLE SHAFT NOTE:** Shafts on all series, except Commercial Chassis are integral flanged type.

►CHANGES, CAUTIONS, CORRECTIONS

►**REAR AXLE SERVICE CAUTION—Manufacturer recommends that all service on the Differential Carrier Assembly other than oil seal or universal joint yoke replacement (and necessary pinion bearing pre-load adjustment) be handled by replacement of the complete assembly.** ***No disassembly or adjustment of this unit should be attempted in the field.***

►**REAR AXLE IDENTIFICATION MARK:** Gear ratio of axles is indicated by marking stamped on bottom of differential case beneath center of pinion shaft. See Car Model pages for ratios and markings.

►**PINION BEARING ADJUSTMENT CAUTION: Pinion bearing adjustment (pre-load) controlled by rear universal yoke nut which compresses spacer or sleeve between pinion bearings.**

►***CAUTION*—Loosening or removal of the pinion shaft nut (for oil seal or yoke replacement) will disturb pinion bearing pre-load and exact procedure detailed below must be followed to avoid overloading bearings or collapsing bearing spacer.**

DESCRIPTION: Hypoid gear with Hotchkiss drive. Differential housing is barrel type with provision made to remove and install pinions and side gears through right hand end (case closed by end cap screwed in housing and retained by locking screw or taper locking pin installed from outside of case. Differential assembly mounted on taper roller bearings (bearing cups seated in ends of differential housing) with threaded sleeve type adjusting nut at outer end of each bearing. Adjusting sleeves are locked by clamp bolt in each bearing post. Several types of pinion mountings used as follows:

REMOVAL OF AXLE: ***See Rear Axle on car model page.***

PINION OIL SEAL OR UNIVERSAL YOKE REPLACEMENT:

►***CAUTION—Pinion bearing pre-load (turning torque) must be measured before pinion shaft nut loosened.***

Pinion Bearing Pre-load Measurement: With rear wheels and brake drums removed and propeller shaft disconnected at rear universal, drain axle lubricant, measure inch-pounds torque required to turn pinion shaft using a 50-inch pound torque wrench with special socket J-2571-1 and Adapter J-2571-2 on pinion shaft nut. Before taking a torque wrench reading, rotate pinion shaft ¼ turn in each direction (to free pinion and overcome initial high starting torque), then note torque reading while rotating shaft at least ½ turn and record this torque reading. Repeat above check at least eight times to insure accurate check over entire circumference of ring gear, calculate the average of all torque readings for use when retightening nut.

Removal of Yoke & Oil Seal: Mark yoke and pinion shaft with a punch for re-installation of yoke in same position on shaft. Install Yoke Holding Tool J-2659, insert special socket J-2571-1 through hole in holding tool, use ¾" drive wrench to remove pinion nut. Drive yoke off pinion shaft splines (1946-52); use puller J-5514 (later). Use Seal Remover J-2623 to remove oil seal. Remove staking burrs from pinion shaft with small file or ⅞"x14 thread die (CAUTION—Protect bearings from chips by wrapping cloth around shaft). Try new pinion nut for free turning.

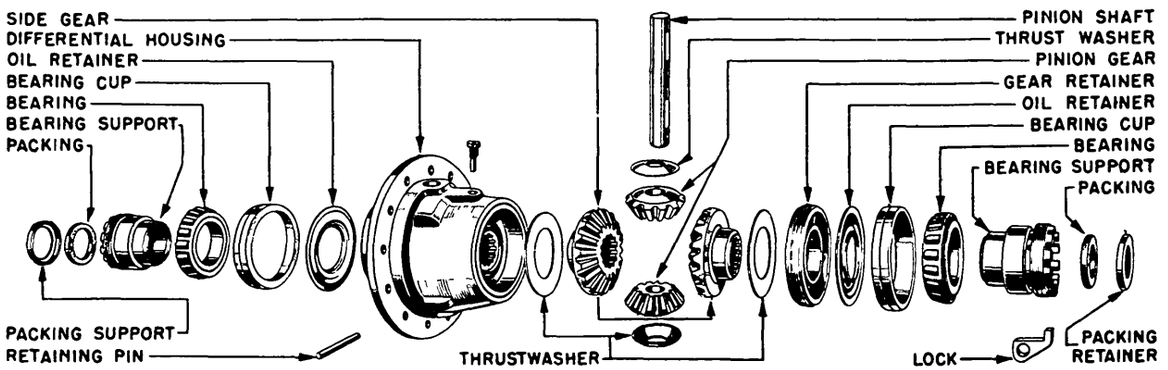
Installation of Oil Seal: Coat outer edge of seal and retainer with good sealer, use Oil Seal Installer Tool J-1357 to drive seal into carrier. Install yoke (CAUTION—line up marks made before disassembly), install new pinion nut. Hold yoke with tool J-2659. tighten pinion nut to 225 ft. lbs., measure and adjust bearing pre-load or turning torque as follows:

Pinion Bearing Pre-load Adjustment: After pinion nut tightened to 225 ft. lbs. (above), measure pinion **bearing pre-load in exactly the same manner as followed before pinion nut loosened (see directions above). Average turning torque (for all readings) at this time should be 5 inch-pounds ±2 lbs. greater than average turning torque recorded before nut loosened. If turning torque too low, tighten nut approximately 30° (⅓ one flat), and again measure turning torque. Repeat this procedure until correct torque obtained, then stake pinion shaft into nut.**

►***CAUTION—Do not overtighten pinion nut and never back off nut to reduce the pre-load.***

Pinion Bearing Pre-load·
(Pinion shaft Turning Torque)

New Assembly	50 in. lbs. max.
After 1000 miles (used Oil Seal)	15 in. lbs. max.
After 1000 miles (new Oil Seal)	20 in. lbs. max.



CADILLAC REAR AXLE ASSEMBLY

AXLE SHAFT REPLACEMENT: 1949-55 Axle Shaft is new "flanged" type which does not have separate wheel hub (brake drum and wheel bolted directly to shaft flange). Install new oil seal whenever seal removed.

1946-48 Axle Shaft Removal & Installation—Use puller such as S-4567 five-jaw type to remove wheel hub and brake drum assembly, disconnect brake line, remove dust shield (backing plate assembly) by taking off nuts on mounting bolts. Use puller J-838 to remove axle shaft and bearing using great care not to damage oil seal.

Wheel Bearing Replacement—When replacing axle shaft oil seal, inspect wheel bearing for loss of lubricant (bearings are "sealed type" and lubricant may have been washed out by axle lubricant leaking past oil seal). If wheel bearing spins freely (indicating lack of lubricant), replace bearing.

1949-55 Axle Shaft Removal & Installation—With wheel off, take out retaining screws and remove brake drum. Remove nuts and lockwashers mounting bearing retainer and backing plate on rear axle housing. Use puller J-942-1 (with slide hammer tool J-2619) to remove axle shaft using great care not to damage oil seal or disturb position of backing plate.

Wheel Bearing Replacement—Bearings are sealed type and should be inspected for loss of lubricant. A bearing that spins freely should be replaced.

Bearing Removal & Installation—Use cold chisel and hammer to nick spacer next to bearing (not necessary to split spacer), slip spacer off shaft. Use special Bearing Remover & Replacer Tool J-2986 (place "U" shaped part of tool under bearing, place square part of tool around bearing to prevent it exploding), press bearing off shaft in arbor press. Install new bearing on shaft with same tool, pressing bearing on until it not quite touches shoulder on shaft, then press new spacer on shaft against bearing.

Axle Shaft Oil Seal Replacement—Make certain that all nicks and burrs removed from counterbore into which seal fits, polish shaft on which seal leather bears. Dip new seals in clean engine oil, coat inner surface of oil seal leather with chassis lubricant, coat outer suface of oil seal metal shell with sealer compound. Use tool J-1355A (axles with separate wheel hub), J-3069 (axles with flanged shaft without wheel hub) to install seal in housing.

DIFFERENTIAL CARRIER ASSEMBLY OVERHAUL: Manufacturer recommends that all services other than oil seal or universal joint yoke replacement (above) should be handled by replacement of the assembly. No attempt should be made to disassemble or adjust the carrier assembly in the field.

Carrier Assembly Installation—When installing carrier, tighten capscrews to 30-35 ft. lbs. If oil leaks noted between carrier flange and housing, correct by installing extra gasket at this point with sealing compound on gaskets. **Do not tighten capscrews excessively to correct oil leaks.**

Checking Backlash—Raise car on hoist and fasten one end of piece of bar stock to yoke on pinion shaft and the other end to frame side rail by means of "C" clamps to prevent rotation of drive shaft. Apply emergency brake cable on one wheel to hold wheel stationary, and measure backlash in inches at outer circumference of tire tread. A stiff wire pointer fastened to fender of car will aid in this measurement. Maximum backlash at wheel should not exceed ½".

1946-54 CHEVROLET HYPOID (SEMI-FLOATING)

Passenger Cars (1946-54)
Half-Ton Trucks (1946-54)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*PROPELLER SHAFT COUPLING FIT PRODUCTION CHANGE—See "Overhaul" below.*

▷*1952 PINION BEARING PRODUCTION CHANGE*—A new "W" type double row bearing, New Departure No. ND 5306W, replaces Pinion Bearing, Chev. No. 954394 and 954533. When installing "W" type bearings, the bearing loading slot must be installed toward pinion.

▷PINION BEARING LOCK SLEEVE LOCKSCREW INSTALLATION CAUTION: Both sleeve face and tapered end of Lockscrew should be coated with Rear Axle Lubricant when these parts installed to prevent screw cutting or scoring face of sleeve when screws are tightened. CAUTION—If these parts not lubricated, and screw cuts face of lock sleeve, screw may bottom without forcing sleeve into position against bearing which may cause failure of pinion bearings or ring and pinion gear due to incorrect adjustment.

▷REVACYCLE DIFFERENTIAL PIN & SIDE GEARS (Not used on Half-Ton Truck Models)—Revacycle gears must be used together and must not be interchanged singly with other type gears.

▷INSTALLATION OF 1950 TYPE TORQUE TUBE BUSHINGS (Propeller shaft front bearing) on Previous Models: New press-fit type bushings (not pinned may be installed in 1940-50 Passenger Cars and 1939-50 Half-Ton but must be tight fit (if fit doubtful, pin should be installed). *See Propeller Shaft & Front Bearing data below.*

▷UNIVERSAL JOINT & PROPELLER SHAFT BUSHING LUBRICATION CAUTION (Powerglide Cars): These parts lubricated from Powerglide transmission output shaft through oil passage in special drilled universal joint retaining bolt No. 3690869 (bolt drilled completely through and has special flat head nail inserted in hole to keep oil passage open). If universal joint or bushing lubrication troubles experienced, make certain that drilled bolt used and that nail is free in oil passage (1/32-1/16" clearance between head of nail and head of bolt).

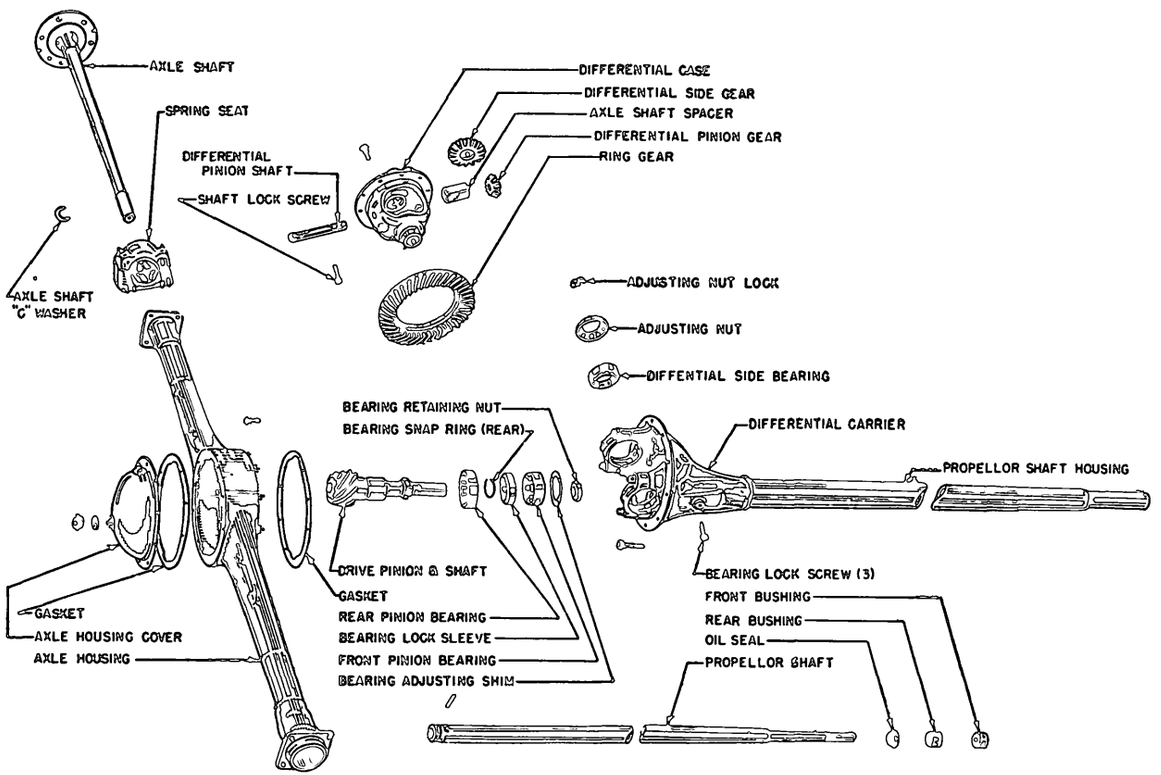
▷*CAUTION—Plain bolt used for transmission run-in at factory must be replaced by this special drilled bolt when transmission installed in car.*

▷AXLE IDENTIFICATION & RATIO NOTE—See Chevrolet Car Model pages for axle ratios and identification.

DESCRIPTION: Hypoid gear, semi-floating type with torque tube drive.

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT: Check endplay when installing axle shafts (see below).



CHEVROLET HYPOID SEMI-FLOATING AXLE

Axle Shaft Removal—Remove wheels, take out both 'zipon' nuts mounting brake drum to axle shaft flange and remove drum. Remove axle housing rear cover, take out pinion shaft screw, withdraw pinion shaft, lift out axle spacer block. Push shafts in toward center of housing, remove "C" washers at inner ends within differential side gears, withdraw axle shafts. When replacing shafts, check endplay.

Axle Shaft Note—Axle shafts are of unequal length. *See Chevrolet Special Data in car model section for shaft part numbers and identification marks.*

CAUTION—Install longer axle shaft on right side.

New Axle Shaft Installation. Wheel hub bolts are press fit in axle flange and must be installed in new shafts (these bolts hold oil deflector assembly on flange). Coat new gasket with heavy shellac or paint, install gasket and oil deflector on flange lining up oil holes (extra center hole of three closest together should be lined up with notch in flange, oil pocket in deflector should also line up with this notch), insert special wheel bolts and force heads down to deflector, peen shoulder on bolts into countersink around bolt holes in flange (this is very important). Check shaft endplay.

Axle Shaft Endplay (Passenger Cars)—Controlled by spacer assembled on differential pinion shaft between inner ends of axle shafts. Endplay should be from a free fit to .014" maximum. Select correct spacer block (see data below) to give this endplay. Install spacer block with ground faces of block toward axle shaft ends. NOTE—Medium spacer block ground on all four sides and may be installed either way to secure either of these two sizes.

Part No.	Pass. Car Spacer Blocks	Size
597251		Narrow (1.012")
473603		(1.0195" & 1.0295")
597254①		Wide (1.0345")

Axle Shaft Endplay (Trucks)—Same as for Passenger Car (above) except that spacer blocks furnished in two types for three sizes as listed below (wide block ground on all four sides, may be installed either way).

Part No.	Truck Spacer Blocks	Size
370217		Narrow (1.1485")
372515		Wide (1.1575" & 1.1675")

Axle Bearing & Oil Seal Installation—Before installing new parts, make certain that axle housing is clean and smooth (remove old staking marks), coat outer diameter of seal retainer lightly with Permatex (use care not to get Permatex on seal). Assemble bearing, retainer, and oil seal on end of driver, seat parts in place in housing with few light blows of a hammer on the driver. Remove tool, stake oil seal in place with a prick punch. NOTE—Spring-loaded type seals are not staked.

PROPELLER SHAFT & FRONT BEARING: Propeller shaft is part of pinion and shaft assembly (see "Overhaul" data following).

Propeller Shaft Bushings: *CAUTION—Both "doweled" type and "press fit" bushings have been used as follows:*

"Doweled" Bushings (Early 1950 & Previous Models)—Doweled type replacement bushings (see listing below) must be used on these models where doweled bushings used originally to prevent possibility of interference between torque tube and torque ball sleeve (tube may be expanded by installation of bushing). *These bushings removed and installed in same manner as on previous models.*

"Press Fit" Bushings (1950-54 Models)—These

CONTINUED ON NEXT PAGE

1946-54 CHEVROLET HYPOID SEMI-FLOATING (Continued)

bushings used in production and torque tube finish-ground after installation to prevent possibility of interference mentioned above. Use press fit type replacement bushings (see listing below) for these models and remove and install these bushings as follows:

"Press Fit" Bushing Removal & Installation—Use special Puller J-4258 (see note for 1951 models below) to remove both bushings and oil seal from torque tube. Install new parts in following order: Oil Seal (use Driver J-968, placing seal on driver with free side of leather toward head of driver), Rear Bushing (use Driver J-4259 with spacer washer on driver), Front Bushing (use Driver J-4290). Drive bushings in until stop on driver is against end of torque tube. Drivers will position bushings correctly.

►*CAUTION—If new bushings are not tight fit in old torque tube, bushings should be drilled and dowel pins installed (see "Dowel Pinned" bearing data).*

►**Bushing Puller J-4258 Note**—This tool designed originally for 1950 type pressed bushings and interference will be noted if used in later bushings (bushings have larger O.D. for use in new larger-diameater and thinner-wall torque tube) unless sleeve diameter of tool increased .040" (increase I.D. of sleeve from 1.750" to 1.795" ± .005"). New tools will have this increased sleeve diameter.

Replacement Torque Tube Bushings

Car Model	Front No.	Rear No.
"Doweled" Type		
1946-50 Pass. Cars	3652601	3652328
1946-50 Half-Ton	595007	②3652328
"Press Fit" Type		
1950 Pass. Cars	3691484	3691475
1950 Half-Ton	3691490	3691475
1951-54 Pass. Cars	3694732	3694733
1951-54 Half-Ton	3694761	3694733

②—Except 1947 No. 3686064.

►**Oil Seal on Powerglide Cars**—Special rubber-encased seal used to prevent oil leaks around outer diameter of seal retainer. This seal is Part No. 3691457 and is used in this 3.55-1 Ratio axle only.

OVERHAUL: Disassembly—Drain lubricant and remove rear housing cover. Remove axle shafts (see data above). Remove nuts retaining torque tube on axle housing, remove torque tube, propeller shaft and pinion assembly. Remove adjusting nut locks on differential side bearing caps, remove bearing cap screws. Remove bearing caps and adjusting nuts, lift differential assembly out. Dismantle and service sub-assemblies as follows:

►**1952 Pinion Bearing Production Change**—A new "W" type double row bearing, New Departure No. ND 5306W, replaces pinion bearing, Chev. No. 954394 and 954533. When installing "W" type bearings, the bearing loading slot must be installed toward pinion.

Pinion Bearing & Propeller Shaft Assembly: To remove from torque tube, loosen locknuts and take out retaining screws on side of housing, withdraw assembly from torque tube. To dismantle assembly, drill out head of rivet pin in propeller shaft, loosen pinion bearing locknut, disassemble pinion from propeller shaft. Use J-996 pinion bearing remover to press double row ball bearing from pinion shaft. remove locking sleeve or bearing retaining collar, remove lock ring from pinion shaft, take off roller bearing. Front double row ball bearing must have no perceptible endplay (new bearings may be .001" tight or have some drag). Assemble in reverse order making certain that lock ring installed on shaft ahead of roller bearing (to prevent rollers creeping) and that locking sleeve installed with beveled edge towards pinion. Tighten bearing locknut to 200-240 ft. lbs., stake nut in shaft slot. Use new rivet pin when assembling pinion and propeller shaft and rivet both ends of pin securely. Make certain that pinion setting shims installed in housing (see Pinion Setting below), insert propeller shaft assembly with spacer J-4050 between pinion and roller bearing to maintain proper pinion-to-bearing clearance, drive assembly down to seat bearings properly (use drift in hole in end of pinion, do not drive on end of pinion teeth). Make certain that locking sleeve down against front bearing, install the three tapered lockscrews, tighten these screws evenly and securely, tighten locknuts.

►*CAUTION*—Coat beveled face of pinion bearing lock sleeve and tapered ends of lockscrews with rear axle lubricant before installing to prevent screws cutting or scoring sleeve which would cause incorrect axle adjustment and early failure of bearings and gears.

Pinion Bearing Assembly Note (½ Ton 1941 & Later). To install pinion bearings on shaft, install rear roller bearing and lock ring, then thread pinion front bearing oil retainer on shaft with bevel of large diameter of retainer toward pinion, assemble bearing lock sleeve with bevel side toward pinion, install front double row ball bearing and bearing retainer nut. All other assembly and adjustment instructions same as for passenger car models.

Pinion Setting:—Pinion position controlled by shims installed in housing ahead of front bearing. Standard assembly .033" shim thickness (one .015" shim, one .018" shim) and should be used for new gears. Shim pack can be varied from .024" to .042" and shims are furnished as follows:

Part No.	Pinion Setting Shims Thickness
3657740	.012"
3657741	.015"
3657742	.018"
3657743	.021"

Differential Bearing Assembly:—Use special puller to remove bearings from differential case hubs (notches provided in case for puller so that pressure applied to inner races only). Use J-994 bearing replacer to install bearings. When installing differential assembly in carrier (third member), make certain that marks on bearing caps and carrier line up

Differential Bearing Adjustment:—With carrier or third member assembly out of axle housing, tighten differential bearing cap screws until lockwashers are just flattened, turn right hand adjusting nut up until it is just snug, then turn nut additional 1-2 notches to locking position, tighten bearing cap screws evenly to 65-80 ft. lbs. (Pass. Cars), 115-135 ft. lbs. (Half-Ton), install adjusting nut locks.

Ring Gear Backlash Adjustment. To set up differential assembly for correct backlash when installing assembly in carrier, turn left hand adjusting nut in slowly until all backlash between ring gear and pinion taken up (revolve ring gear while making this adjustment), then back adjusting nut off one notch. Adjust differential bearings by turning right hand adjusting nut as directed above. This setting should give correct backlash of .005-.007". After bearing adjustment completed, recheck backlash and if not correct, adjust by backing off one adjusting nut and tightening opposite nut exactly the same amount to avoid disturbing bearing adjustment.

Ring Gear Replacement:—Run-out of differential case flange must not exceed .001" with ring gear removed. When installing ring gear, use guide pins in alternate bolt holes to position gear while bolts are being installed, use new lockwashers under bolt heads, tighten all bolts evenly to 40-60 ft. lbs. (Pass. Cars), 85-95 ft. lbs. (Half-Ton). Check ring gear run-out which should not exceed .0035" (measured on back face of gear).

1955 CHEVROLET HYPOID (HOTCHKISS DRIVE)

Ch vr l t Pass. Cars & S d. Del. (1955)
Ch vr l t ½-T on Trucks (1955)

DESCRIPTION: Semi-floating, hypoid gear type with hotchkiss drive. The drive pinion is mounted on preloaded tapered roller bearings.

►*PINION BEARING PRELOAD CAUTION:* Pinion bearing preload must be adjusted whenever universal flange nut on pinion shaft loosened (preload controlled by this nut and will be disturbed when nut loosened).

REAR AXLE ASSEMBLY REMOVAL: *See "Rear Axle" on Car Mod l pages.*

AXLE SHAFT REPLACEMENT: Removal–Raise rear of car and place jack stands under rear axle housing. Remove hub nuts and remove tire and wheel. Remove brake drum and gasket. Remove nuts and lockwashers from bearing retaining bolts on inside of axle flange. Attach axle puller J-5748 with slide hammer to hub nuts and remove axle and bearing assembly, being careful not to disturb backing plate (*NOTE*–If bearing retainer and parking brake strut interefere, raise strut slightly for clearance). Install bolt and nut to hold backing plate on axle housing.

B aring or Oil Seal R placement–Using a hammer and chisel, nick the soft ring next to bearing and remove ring (*NOTE*–It is not necessary to split the ring completely for removal). Install press plate J-5741 between axle flange and bearing with the land of the plates against bearing and inside the retainer. Install bolts in plates. Press bearing from shaft with press plate parting line resting on press bed (*CAUTION–Press plates must be supported at parting line).* To replace seal, pry out old seal being careful not to damage bearing races. Install new seal using guide tool J-5747. Tap seal in place with a plastic hammer. Install new bearing or resealed old bearing with installer tool J-5746 so bearing seats on shaft against shoulder. (*CAUTION*–Bearing retainer must be on shaft before bearing installed). Install new axle shaft bearing retaining ring on shaft with tool J-5746 to seat ring against bearing (chamfered side of ring must be against bearing).

►*AXLE SHAFT REPLACEMENT NOTE:* If a new shaft is being installed, insert the five new special bolts and force heads down to flange on axle. Peen end of shoulder on bolts into countersink around holes in flange using tool J-554. Install new bearing (see above).

Installation: Replace bearing "O" ring seal. Remove temporary nut and bolt holding brake backing plate in place. Install new retainer gasket and install axle shaft in housing using axle shaft tool J-5748 and slide hammer. Rotate shaft to align splines of shaft and differential side gear. Outer race of bearing must seat against shoulder in axle housing. Install nuts and lockwashers on bearing retainer bolts and tighten securely. Install brake drum gasket, drum, wheel and hub nuts.

COMPANION FLANGE, OIL DEFLECTOR OR SEAL REPLACEMENT: Removal–Raise one rear wheel off floor with jack stand placed under frame side rail. *(NOTE–This is to lock one rear wheel and obtain differential to body clearance. If operation is to be performed on a hoist, support frame on jack stands, allow axle to drop for clearance and expand brake shoes on one wheel to lock it securely).*

1) Check free wheel for freedom of rotation. Separate rear universal joint, tape trunnion bearings to joint and drop propeller shaft to floor.

2) Using an inch-pound torque wrench on the companion flange nut, rotate pinion through several complete revolutions and record the torque required to keep pinion and flange for reassembly in the same relative position.

3) Hold drive flange using tool J-2637-A, remove companion flange nut and special washer. Discard nut and use a new one at reassembly. Remove drive flange using tool J-820-A bolted over holding tool J-2637-A. Pry oil seal out using a screwdriver or hammer and chisel. Inspect drive flange for smooth oil seal surface or worn drive splines. On new flanges or old flanges with damaged deflectors, install new deflector, using tool J-5749.

4) Soak new seal in light engine oil for 10 minutes before installation. Wipe outer diameter of seal and then coat outer diameter with Permatex No. 3 or similar sealer. Install seal using tool J-5154.

5) Install drive flange, aligning marks on pinion and flange if old flange is being used. If flange does not go on shaft easily, use tool J-5780 to pull it on.

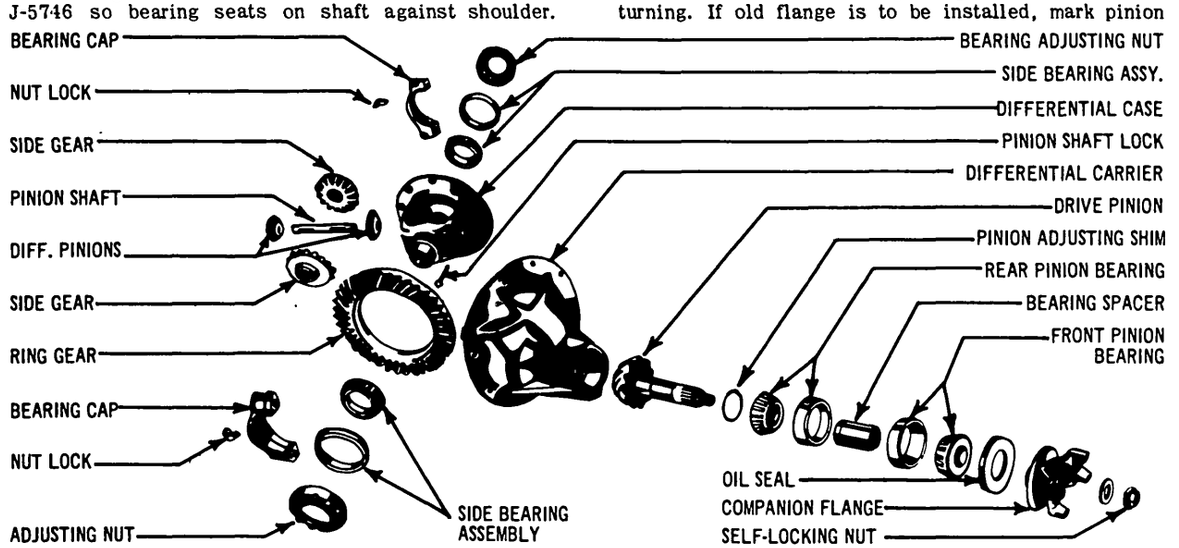
►*CAUTION: Do not hammer flange on pinion shaft as damage to ring gear and pinion will result.*

6) Install washer and a new self-locking nut. Tighten nut to remove endplay and continue alternately tightening in small increments and checking preload torque with inch-pound torque wrench until it is the same as recorded at disassembly. Readjust brake if it was expanded to hold wheel.

DIFFERENTIAL CARRIER: Removal–Clean dirt from area around carrier and housing joint and remove axle shafts (see above), pulling them out only far enough to clear carrier. Disconnect rear universal joint and lower propeller shaft to floor. Remove nuts and copper washers attaching carrier to rear axle housing. Place a drip pan under carrier and slightly separate carrier and housing and allow lubricant to drain out. Remove differential carrier assembly.

Disassembly: Mount carrier assembly in a vise or fixture J-3289. Mark caps and carrier for reassembly in same position. Remove differential adjusting nut locks and bearing cap bolts. Remove bearing caps and adjusting nuts by tapping on bosses of caps until free from dowels. (*CAUTION*–Do not pry caps off as this may damage machined face of cap). Remove differential and ring gear assembly from carrier housing being careful not to drop side bearing outer races. Remove differential pinion shaft screw and lockwasher and differential pinion shaft from case, and remove pinions and side gears. Hold companion flange from turning with tool J-2637-A and remove propeller shaft pinion flange nut and washer. Remove flange with tool J-820-A, bolted to flange with holding tool in place. Remove pinion from carrier by tapping on front end with soft hammer. Remove pinion shaft oil seal, pinion front bearing and bearing spacer from carrier. (*NOTE*–Some axles may have a 1/16" shim located behind spacer. This is a production item only and should be discarded).

Inspection: Wash all parts in cleaning solvent and thoroughly clean axle housing. Inspect all bearing cups, cones and rollers for chipping or evidence of excessive wear. On pinion bearing rollers, inspect large end of rollers for wear (*NOTE*–The pinion bearings are preloaded, and the natural wear pattern is a frosted condition with occasional slight scratches on races



CHEVR LET HYP ID REAR AXLE (HOTCHKISS DRIVE)

CONTINUED ON NEXT PAGE

1955 CHEVROLET HYPOID (HOTCHKISS DRIVE) (Cont.)

or rollers. This does not indicate a defective bearing). Inspect oil seal for wear or damage and pinion shaft splines and flange for excessive wear. Inspect ring gear and pinion teeth for scoring, cracking or chipping and differential case for cracks or scores on side gear and pinion thrust faces. Check fit of differential side gears in case and fit on axle shaft splines. Inspect differential pinion shaft for scoring or evidence of excessive wear. Inspect carrier for cracks or crossed threads on bearing caps and bosses.

Drive Pinion Bearing Replacement: Remove front and rear bearing outer races from carrier with a brass drift. Install new bearing cups in carrier using tool J-270-6 on front cup and J-270-14 on rear cup, driving bearing races in until they seat against shoulders in housing. Remove rear pinion bearing inner cone and roller assembly using tool J-5740 press plate, in an arbor press *(CAUTION–Note size of shim removed from between cone and gear).* If original ring gear and pinion are being reinstalled in the original carrier, install the original shim pack. If a new ring gear and pinion, or a new carrier is being installed, *see "Pinion Gear Setting" below.*

Pinion Gear Setting: When installing a new pinion gear or differential carrier, determine the correct amount of shims to install between pinion gear and bearing by checking the markings on end of pinion gear and on carrier flange face, and then referring to Pinion Shim Table below. Carrier is marked S-1, D-1 etc., and pinion gear is marked +1, -1 etc. As an example, a +1 pinion in a S-1 carrier should have a .030" shim.

Pinion Shim Table

Pinion Mark	Carrier Mark S-3	S-2	S-1	0	D-1	D-2	D-3
-5	.024"	.024"	.024"	.027"	.027"	.027"	.027"
-4	.024"	.024"	.024"	.027"	.027"	.027"	.030"
-3	.024"	.024"	.027"	.027"	.027"	.030"	.030"
-2	.024"	.027"	.027"	.027"	.030"	.030"	.030"
-1	.027"	.027"	.027"	.030"	.030"	.030"	.033"
0	.027"	.027"	.030"	.030"	.030"	.033"	.033"
+1	.027"	.030"	.030"	.030"	.033"	.033"	.033"
+2	.030"	.030"	.030"	.033"	.033"	.033"	.036"
+3	.030"	.030"	.033"	.033"	.033"	.036"	.036"
+4	.030"	.033"	.033"	.033"	.036"	.036"	.036"
+5	.033"	.033"	.033"	.036"	.036"	.036"	

Differential Bearing Replacement: Install differential bearing puller TR-278-R, making sure that puller legs are fitted securely and retaining yoke is tight. Tighten puller screw and remove bearing. Install a new bearing on hub with the thick side of inner race toward case and drive in place with tool J-5768 *(NOTE–*This tool is counterbored and has a pilot to assure proper installation and seating of bearing).

Ring Gear & Differential Case Replacement: Remove ring gear bolts and lockwashers and using a soft hammer, tap ring gear off the case. Install guide pins made from 3/8"-24x1½" long capscrews with heads cut off and ends slotted, in alternate bolt holes in ring gear. Make sure back face of ring gear and face of case are free of dirt and burrs. Mount case on "V" blocks placed at side bearings and check face runout with a dial indicator. This should not exceed .003". Drop ring gear over pilot diameter of the case, then install every other ring gear bolt and lockwasher and draw them up evenly and snugly so that ring gear face is flush with face of case. Remove guide pins and install remaining bolts. Tighten all bolts to 40-60 ft. lbs.

Differential Carrier Reassembly: Mount carrier in a vise or holding fixture. Lubricate pinion bearings with hypoid lubricant and install pinion in carrier. Install pinion bearing spacer with large end toward gear (use a new spacer). Install front pinion bearing cone and roller assembly on pinion shaft. Soak a new oil seal for 10 minutes in light engine oil. Wipe outer diameter of seal dry then coat outer diameter with Permatex No. 3. Install seal using J-5154. Install pinion flange and deflector assembly using tool J-5780 and J-2637-A. Install special washer and new self-locking nut. Tighten pinion flange nut, holding companion flange with tool J-2637-A. until torque required to keep pinion rotating is 15 to 25 inch pounds (this may require a nut torque of as much as 350 ft. lbs. A torque wrench or a scale may be used to determine preload. A scale should read 1 7/8 to 3 1/8 pounds when applied at an 8" radius. *(CAUTION–When checking turning torque, make sure that there is no contact between deflector and carrier).* Install differential assembly in carrier and install outer races and adjusting nuts *(CAUTION–Carefully slide adjusting nuts alongside bearing so that threads on nuts fit into threads in carrier).* Install bearing caps, aligning marks on cap with marks on carrier. Install and tighten capscrews snugly (these will be retightened after ring gear and pinion are adjusted). Lubricate hubs of differential side gears with hypoid lubricant and install them in differential case. Roll the two differential pinions into position and install pinion gear shaft and shaft lockscrew.

Ring Gear & Pinion Adjustment: Loosen right hand adjusting nut and tighten left hand adjusting nut using wrench J-972 while turning ring gear. Tighten left hand nut until all lash is removed, then back off the left hand nut one notch to a locking position. Tighten right hand nut to force left hand bearing firmly into contact with left adjusting nut. Then loosen the right hand nut and again tighten snugly against the bearing *(NOTE–Nut will be snug against b aring when rollers begin to move when contact is made).* Tighten right hand nut a minimum of **on additi nal notch,** to a **maximum of two notches further** to a locking position. Mount a dial indicator on carrier and check backlash between ring gear and pinion. Backlash should be .005-.008". Correct by moving each adjustment nut an equal amount in the same direction to retain preload and change backlash. Tighten bearing cap bolts to 70-75 ft. lbs. Recheck backlash and install both adjusting nut locks.

Differential Carrier Installati n: Clean out axle housing thoroughly and place new gasket over carrier mounting bolts. Assemble differential carrier assembly to axle housing, install new copper washers and nuts and tighten securely. Connect rear universal joint.

CHEVROLET TRUCK HYPOID FULL-FLOATING

¾ & 1 Ton Trucks, All Models (1946-55)
1½ Ton, C-O-E & School Bus (1946-55)②
2 Ton Truck, All Models (1946-54)
2 Ton Truck, Except Low Cab Forward (1955)①②

①—"Chevrolet Truck (Heavy Duty)" Rear Axle is Standard on Low Cab Forward Models and Optional on others.

②—"Chevrolet Truck 2-Speed" Rear Axle is Optional on 1½ and 2-Ton Trucks.

►CHANGES, CAUTIONS, CORRECTIONS

►*1954-55 2-TON TRUCK REAR AXLE HOUSING NOTE:* Two interchangeable housings used concurrently

►*1954-55 2-TON TRUCK REPLACEMENT PARTS CAUTION:* Because of heavier design, the parts are not interchangeable with corresponding previous models.

►*1952 & LATER 2-TON TRUCK DIFFERENTIAL ASSEMBLY:* "Revacycle" type side and pinion gears used. .060" thrust washers are used. These gears must not be interchanged with "Involute" type gears used on earlier models and on ½, ¾, 1, and 1½ ton trucks.

"Revacycle" Side Gear Identification—Gear has 29 splines and 18 teeth.

"Revacycle" Pinion Gear Identification—Gear has 10 gear teeth ("Involute" type has 11 teeth).

►*AXLE IDENTIFICATION MARKING:* Ratio indicated by axle serial number prefix stamped on housing. See "Rear Axle" on individual truck model pages.

►*BRAKE DRUM (¾ & 1 TON) NOTE:* Brake drum is held to hub with two slotted screws. A soft paper gasket is used between drum and hub.

►*1946-50 BRAKE DRUM (1½ & 2 TON) NOTE:* Brake drum is held to hub by hub bolts which must be pressed out of the hub or driven out with a hammer. Gasket between inside of brake drum and oil deflector should be coated with heavy shellac or paint on both sides to prevent oil leaking onto braking surface of drum. Small hole in gasket and channel in oil deflector must be lined up with relief hole in drum.

►*1951 & LATER BRAKE DRUM (1½ & 2 TON) NOTE:* Brake drum is held to hub by three slotted screws making it unnecessary to remove hub before removing drum. A soft paper gasket is used between drum and hub.

DESCRIPTION: Hypoid gear, full-floating type with Hotchkiss drive. Pinion shaft is straddle mounted, being supported at rear by a roller bearing and at front by a double row ball bearing (1½ & 2 Ton), double row roller bearing (¾ & 1 Ton).

1947 & Later Splined Axle Shaft (1½ & 2 Ton): This type axle shaft has involute splines on flange at outer end of shaft which engage similar splines in wheel hub (concealed by hub cap retained by five capscrews.

¾ & 1 Ton Pinion Bearing (Front)—Bearing consists of a double opposed taper roller bearing (separate roller and cone assemblies in a single bearing

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CHEVROLET TRUCK HYPOID FULL-FLOATING (Continued)

cup). A special spacer is used on the pinion shaft between the bearing cones. This spacer will provide correct bearing adjustment when the pinion shaft flange nut properly tightened (160-280 ft. lbs.).

CAUTION—Correct spacer must be used with each bearing assembly. This bearing is furnished as an assembly consisting of: One double outer race, two inner race and roller assemblies, one special spacer).

¾ & 1 Ton Pinion Setting Adjustment Shims—Pinion position controlled by shims in pinion bearing counterbore of carrier. Average shim pack is .033". Shims furnished .012", .015", .018", .021".

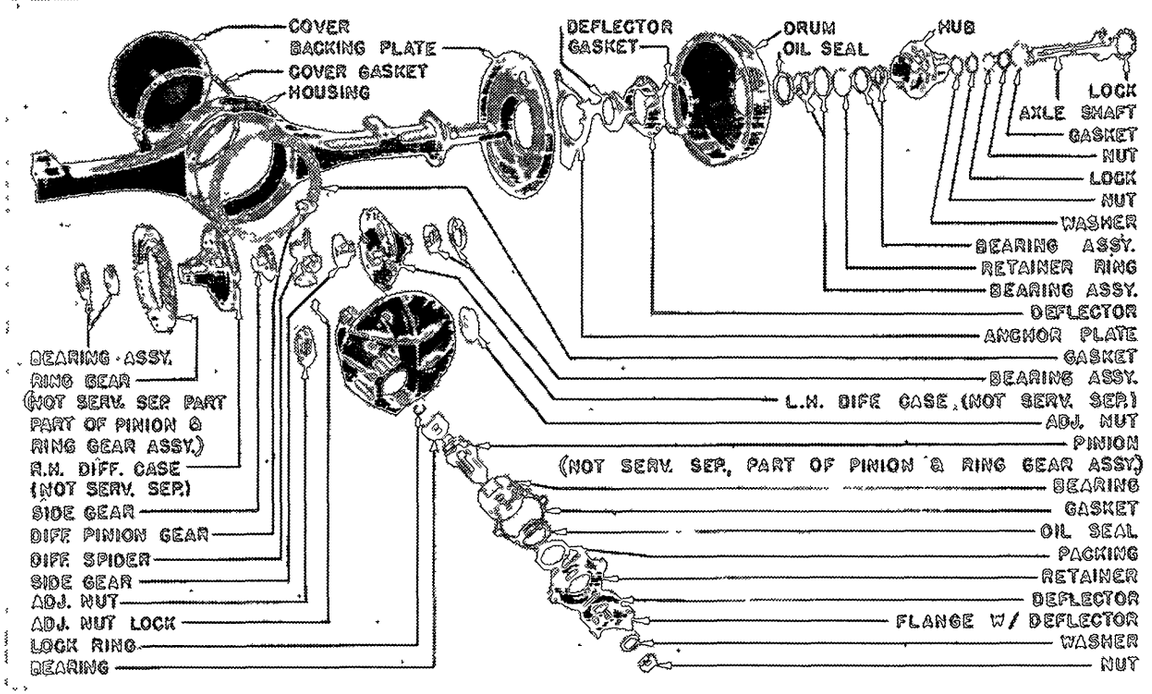
REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REMOVAL & WHEEL BEARING ADJUSTMENT: Axle shafts can be removed and replaced without disturbing wheel bearings as follows:

Axle Shaft & Wheel Bearings (¾ & 1 Ton): To remove axle shaft, remove eight capscrews and lockwashers from axle shaft flange on wheel hub, install two ½"-13 capscrews in tapped holes in flange (between mounting screw holes), turn these screws up evenly to loosen axle shaft, withdraw shaft, discard old aluminum gasket. To install shaft, thoroughly clean axle shaft flange and end of wheel hub, use new aluminum gasket. Tighten all flange capscrews alternately and evenly to 85-95 ft. lbs.

NOTE—To correct complaints of leakage around flange bolts, coat bolt threads lightly with sealing compound. CAUTION— Keep sealer out of bearing.

Wheel Bearing Assembly (¾ & 1 Ton Trucks). To remove wheel bearings, remove axle shaft and wheel. Raise lip of adjusting nut lock, use wrench J-2222 to remove locknut, lock, inner adjusting nut, and lockwasher. Remove hub and drum assembly. Install clamp on wheel brake cylinder. Remove inner bearing and oil seal from hub with driver J-2232 (install driver, then press assembly out in an arbor press). To remove outer bearing, tap outer race away from snap ring, remove snap ring, press bearing from hub using bearing remover J-2230. Wash bearings in cleaning solvent, lubricate with engine oil and check for roughness, damaged rollers or retainers, cracked, chipped, or worn races. Pack the roller bearings with soft smooth cup grease. To install bearings, place inner race and roller assembly of outer bearing in wheel hub, install outer race with thin edge toward outer end of hub, press race into hub with replacer J-2223 until it clears snap ring groove, install snap ring, then press race back in positive contact with snap ring using J-2230 bearing remover inserted through bolt holes in outer end of hub. Install outer race of inner bearing in hub (wide edge of race inward) with replacer J-872-1 pressing race in against seat in hub. Install inner race and roller assembly, install oil seal using replacer J-2221. Lock seal in place by prick punching at three equally spaced points. Install wheel hub and drum (turn wheel to align bearing rollers), install thrustwasher and adjusting nut, adjust bearings, install lock and locknut.



CHEVROLET TRUCK HYPOID GEAR, FULL-FLOATING

Wheel Bearing Adjustment—Remove axle shafts (above), remove adjusting nut locknut and lock (within wheel hub), use special wrench J-2222, turn adjusting nut up tight, then back nut off ⅛ turn while rotating wheel by hand to see that it turns freely. Install lock and see that tangs line up with slots in adjusting nut, bend lock tang into slot in nut. Install and tighten outer locknut, bend lock tang into notch in nut. Replace axle shaft.

Axle Shaft & Wheel Bearings (1½ & 2 Ton Trucks with Bolted-on Type Axle Shaft): See ¾ & 1 Ton data (preceding).

Wheel Bearing Assembly & Adjustment—See 1½ and 2 Ton Splined Type Axle Shaft data below.

Axle Shaft & Wheel Bearings (1½ & 2 Ton Trucks with Splined Axle Shaft): Axle shaft flange has involute splines which engage similar splines in wheel hub. Shaft splines are tight fit (shaft removal requires use of puller) and shaft retained by hub cap (spacer in hub outside outer bearing race prevents shaft moving inward). To remove axle shaft, take out five screws, remove hub cap and gasket. Install special adapter J-1436-8 on regular J-1436 Rear Axle Shaft Bearing & Oil Seal Remover (remove puller jaws), thread adapter in hole in end of axle, pull axle shaft. Install axle shaft by indexing shaft and hub splines (may be necessary to move truck slightly to align splines in hub and differential side gears), tap shaft into place. Clean mating faces of hub and hub cap, use new gasket on hub cap, tighten hub cap screws securely.

Wheel Bearing Assembly—Removal—Remove axle shaft. Remove hub and drum assembly using special wrench J-870 (J-5670 on 1954 and later 2 Ton models) to remove adjusting nut and locknut. Remove inner bearing and oil seal with puller J-918-A (with spacer J-918-17 on 1954 and later 2 Ton models). Remove outer bearing, first tap outer race to relieve tension on snap ring, then remove snap ring from inside the hub. Remove bearings by driving on axle shaft spacer using an end cut off an old axle shaft. This will also bring out inner race and roller assembly. *(NOTE*—Care must be taken to engage edge of spacer and not damage bearing seat in housing. Race must also be driven out evenly).

Cleaning & Inspection—Wash bearings thoroughly in cleaning solvent. Inspect races for cracks, chips and wear. Inspect rollers and retainers for any damage. Lubricate bearings with engine oil and check them for roughness.

Installation—Pack bearing assemblies with soft smooth cup grease. To replace outer bearing, place axle shaft spacer and outer bearing (with thin edge of outer race downward) into wheel hub. Use bearing replacer J-872-1 (J-5698 on 1954 and later 2 Ton models) to press bearing into hub *(CAUTION* —Press race only far enough to install snap ring. This operation should be done in an arbor press). Install snap ring in groove on inside of hub. Using long ⅛" punch inserted through splines in hub drive on axle shaft spacer to force outer race into positive contact with snap ring. To replace inner bearing, place outer race of bearing in wheel hub with wide side of race down. Use driver J-872-4 (J-5669 on 1954 and later 2 Ton models) to press race against its seat. Install inner race and roller assembly. Press oil seal, coated with a light coat of Permatex, into place with oil seal replacer J-3067 (J-5669 on 1954 and later 2 Ton models). Stake oil seal in

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CHEVROLET TRUCK HYPOID FULL-FLOATING (C nt.)

place by prick punching at three equally spaced points on edge. Install wheel hub and drum assembly. Rotate assembly to line up bearings. Install thrust washer and adjusting nut.

Wheel Bearing Adjustment—Remove axle shafts (above). Using special wrench J-870 (J-5670 on 1954 and Later 2 Ton models) remove adjusting nut locknut and lock, then with same wrench, turn up adjusting nut until it is tight, then back off adjusting nut 45° (⅛ turn). Rotate the wheel by hand to see that it turns freely. Install adjusting nut lock and align nearest slot in nut with a tang on lock and bend tang into slot in nut. Install locknut and tighten securely, then lock into position by bending a tang of the lock into a slot in the locknut. Install axle shaft.

REAR AXLE OVERHAUL: Disassembly & Reassembly (All Truck)—Take out the mounting capscrews and remove differential carrier assembly from axle housing, loosen thrust pad locknut and remove ring gear thrust pad. Remove adjusting nut locks, bearing cap bolts and lockwashers. Remove bearing caps by tapping on cap bosses to free caps from locating dowels (CAUTION—do not pry on cap which may damage machined face), remove adjusting nuts. Lift differential and ring gear assembly from carrier. Remove bolts attaching pinion bearing retainer on carrier, remove pinion and shaft assembly from carrier (if necessary, use brass drift against pilot end of pinion shaft to drive assembly out of housing). On ¾ and 1 Ton Axle, remove shims from inside of carrier housing and note number and thickness of these shims (shims control pinion setting and must be replaced when axle reassembled). Overhaul axle sub-assemblies as follows:

Pinion Bearing Assembly (All 1½ & 2 Ton Trucks): Remove nut on end of pinion shaft, remove universal joint and bearing retainer and oil seal from shaft. To remove rear pinion bearing, remove lock ring, use special press plate J-1453 to press shaft and pinion out of bearing (CAUTION—make certain that raised portion of plate against bearing inner race to avoid damage to bearing). Use special pinion bearing remover J-1439 (6 tooth pinion), J-1440 (7 tooth pinion) installed over pinion so that it engages inner race of double row ball bearing, press shaft and pinion out of bearing. Wash all parts in gasoline, inspect for wear or damage. To reassemble, press front double row ball bearing on shaft making certain that extended portion of bearing inner race is toward gear teeth (CAUTION—If bearing not installed in this manner, rapid wear and gear failure will result). Press rear bearing on end of shaft with chamfered side of inner race toward pinion and install lock ring. Install pinion bearing retainer and oil seal on hub of universal joint flange, install assembly on pinion shaft, install washer and nut on shaft, tighten nut to 160-280 ft. lbs., install cotter pin.

Bearing Retainer Oil Seal—If oil seal being replaced, soak new seal in light engine oil for one hour, install felt packing in bottom on seal recess, then install seal with open end of leather toward pinion bearing and press seal down against felt packing using J-2231 Oil Seal Replacer.

Pinion Bearing Assembly (¾ & 1 Ton Trucks): Remove cotter pin, nut, and washer from end of pinion shaft, remove universal joint flange, bearing retainer and oil seal. Remove rear bearing snap ring, press bearing off shaft using J-2229 press plate. Install pinion bearing remover J-2224 (¾ Ton truck), J-2225 (1 Ton Truck) over pinion teeth, press front bearing off shaft. Wash all parts in cleaning solvent, examine bearing rollers and races for cracks, chips, and wear.

►*CAUTION*—Spacer installed on shaft between bearing inner races must be kept with bearing and reinstalled if bearing re-used (special spacer furnished with each bearing is designed to provide correct bearing pre-load when pinion shaft flange nut is properly tightened. This spacer furnished as part of pinion bearing assembly (assembly consists of: One Double Outer Race, Two Inner Race & Roller Assemblies, One Spacer).

To reassemble the bearings on the pinion shaft, press one inner race and roller assembly on shaft until it seats against pinion, install spacer on shaft, lubricate bearing rollers with engine oil, install outer race, press front inner race and roller assembly on shaft. Lubricate rear roller bearing, press bearing in place on end of pinion shaft using driver part of J-769 lock ring installer, install lock ring (thread ring on tapered pilot of lock ring installer, center pilot in end of pinion shaft, press ring off pilot and into groove in shaft). Install spacer on front end of pinion shaft, position pinion bearing retainer on hub of pinion shaft flange and install assembly on pinion shaft, assemble shaft washer and nut, tighten nut to 160-280 ft. lbs. (use torque wrench), install cotter pin.

Bearing Retainer Oil Seal—To replace oil seal, soak new oil seal and packing in engine oil, make certain that lip of leather seal is in toward pinion bearing, press seal and packing in place in retainer using J-2231 Oil Seal Replacer.

Pinion Setting (All 1½ & 2 Ton Trucks): Pinion position not adjustable. Double row ball bearing seats against shoulder in carrier and is retained by bearing retainer. *CAUTION*—Bearing must be installed so that extended portion of inner race is toward back of the pinion gear teeth.

Pinion Setting (¾ & 1 Ton Trucks): Pinion position controlled by shims installed in pinion bearing counterbore in carrier. When disassembling axle, note number and thickness of shims installed and re-install same number and thickness of shims if old ring and pinion gear being re-used. If new gears being installed, use one .015" shim, one .018" shim (.033" total which is average shim thickness) as a standard starting set-up, check gear mesh when axle completely reassembled. Shims furnished in thicknesses of .012", .015", .018", .021".

Differential Bearing Assembly:—Bearings are press fit on differential case hubs. Use special puller to remove bearings (puller fingers must fit in notches in case so that pressure applied to inner races only). Mark differential case halves before dis-assembly to insure reassembling in same position—this is very important. Remove twelve ½" bolts holding case halves and ring gear together, lift off case cover, remove differential pinions and side gears, tap ring gear off case with soft-faced hammer. When reassembling, oil pinions and side gears and install in left side of case, assemble right side of case being careful to line up marks made before disassembly, install guide pins in two opposite bolt holes (guide pins can be made up of two #3652253 ring gear screws with heads removed and end slotted to permit removal). Make certain that ring gear seat on case is clean and not burred, install ring gear on guide pins, install bolts in all holes (except guide pin holes), tighten all bolts evenly and securely until ring gear face is flush with flange on case, remove guide pins, install remaining bolts and tighten all bolts with a torque wrench to 85-95 ft. lbs. Use special driver J-2226 (¾ & 1 Ton), J-1488 (Other Trucks) to install differential side bearings on case hubs (wide side of inner race in).

Differential Bearing Adjustment:—When installing differential assembly in carrier, make certain that bearing cap marks line up with marks n carrier. tighten bearing capscrews until lock washers just flatten out, screw both bearing adjusting nuts up until snug to seat bearings. Back off right hand adjusting nut, tighten left hand nut until all clearance or backlash between ring gear and pinion is just taken up, then back off adjusting nut two notches to locking position (slot in nut in line with lock). Tighten right hand adjusting nut solidly, back nut off until free of bearing, then tighten right hand adjusting nut until all play in bearing is taken up, and then tighten nut one to two notches more to locking position, tighten bearing cap screws with a torque wrench to 95-105 ft. lbs. (¾ & 1 Ton), 130-160 ft. lbs. (Other Trucks), install adjusting nut locks. Check ring gear backlash as follows:

Ring Gear Backlash Adjustment—If backlash not correct after setting up bearings as directed above, loosen left hand adjusting nut one notch and tighten right hand nut one notch if backlash less than .005", or loosen right hand nut one notch and tighten left hand nut if backlash exceeds .008". In making backlash adjustments, both adjusting nuts must be turned an exactly even number of notches (in an opposite direction) to avoid disturbing bearing adjustment.

Ring Gear Thrust Pad Adjustment:—Examine bronze tip on ring gear thrust pad and replace if worn. To adjust, tighten thrust pad adjusting screw until bronze tip engages back of ring gear lightly (turn gear while making adjustment), then back screw off 1/12 turn, hold screw from turning and tighten locknut. This adjustment will give clearance of .005-.007" between thrust pad and ring gear.

CHEVROLET TRUCK (HEAVY DUTY)

2-T n L w Cab F rward Models (1955). Std.
2-T n (Exc. L w Cab F rward) (1955). Optl.

DESCRIPTION: Full-floating, hypoid gear type with roller bearing mounted pinion shaft, and Hotchkiss drive.

REAR AXLE ASSEMBLY REMOVAL: *See "Rear Axle" n Truck Mod l pag s.*

AXLE SHAFT REMOVAL: *See "Rear Axle" on Truck M d l pages.*

►*REAR AXLE OVERHAUL NOTE: Repairs and adjustments can b mad without removing complete ass mbly from truck.*

DIFFERENTIAL CARRIER ASSEMBLY: Removal–Drain lubricant from axle housing and remove housing cover and axle shafts (see "Axle Shaft Removal" on Truck Model pages). Remove two trunnion bearing "U" bolts from rear axle yoke and split the rear universal joint (tape bearings in place). Swing propeller shaft to one side and tie to frame side rail. Remove bolts and lockwashers retaining carrier assembly to axle housing. Support carrier assembly with a floor jack and roll from under truck.

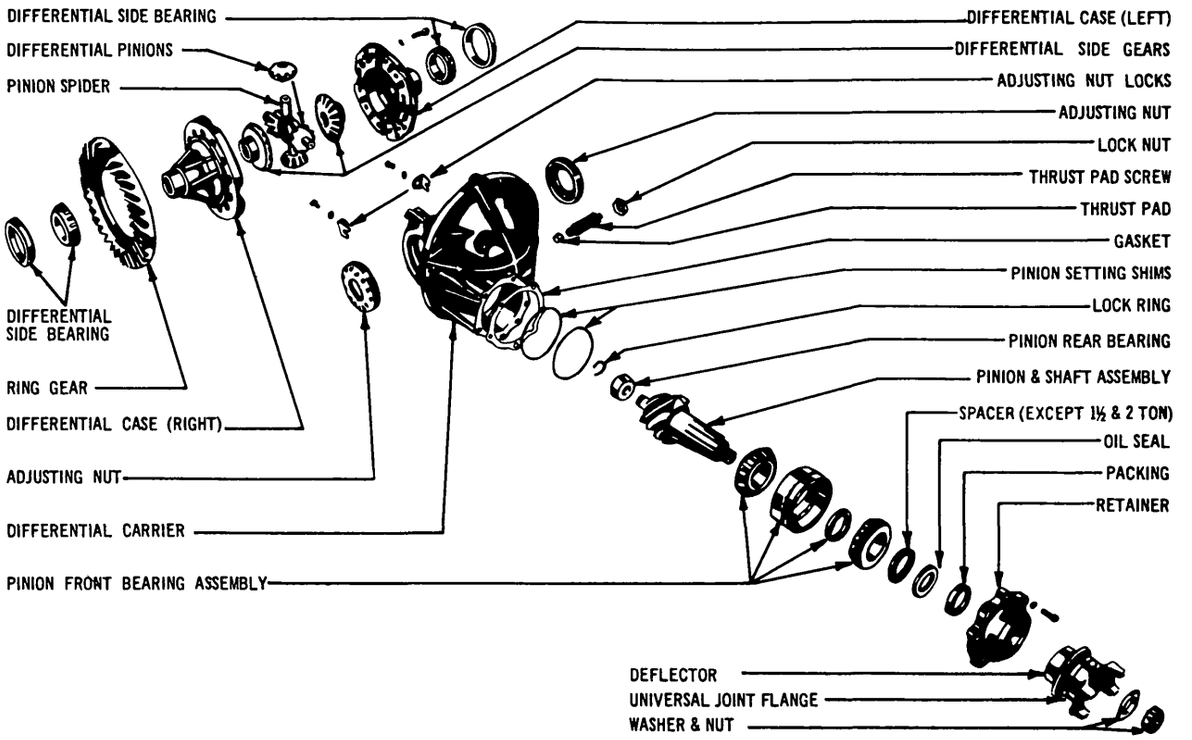
DIFFERENTIAL CARRIER ASSEMBLY: Disassembly–Mount the assembly in a bench vise or holding fixture and\proceed as follows:

Diff r ntial & Ring G ar: Removal–Loosen ring gear thrust pad locknut and remove thrust pad. Remove differential adjusting nut locks, bearing cap bolts and lockwashers. Remove bearing caps and adjusting nuts by tapping on bosses of caps until free of dowels. *(CAUTION*–Do not use screwdriver to pry caps off as this may damage machined face of cap). Remove differential and ring gear from carrier.

Disassembly–Install differential bearing puller TR-278-R making sure that puller legs are fitted securely in case and that retaining yoke is tight. Remove bearings. Check differential case to make sure that both halves are marked so they can be reinstalled in the same relative position. Remove twelve bolts holding both halves together *(NOTE*–Ring gear is mounted on one half of case), and remove differential side gears, thrust washers, differential pinion gears, thrust washers and differential pinion spider.

Pini n G ar & Shaft: R m val–Remove bolts attaching pinion bearing retainer to carrier housing. Tap on universal joint flange while oil seal retainer bolts are being loosened to gradually bring pinion assembly out of housing (or use adapter J-6187 and sliding hammer after cotter pin, nut and flat washer are removed from pinion). Remove shims from housing.

Disass mbly–Clamp pinion shaft drive flange in bench vise and remove cotterpin, nut, and flat washer from end of pinion shaft. Remove drive flange and bearing retainer assembly from shaft. Drive out old seal from retainer housing and remove felt packing. Press off double row thrust bearing using tool J-6203 on 6 tooth pinion and J-6171 on 5 tooth pinion. Press off rear inner race from end of pinion shaft using press plate holder J-358-1 and remover plate J-1453.



CHEVROLET TRUCK (HEAVY DUTY) HYPOID REAR AXLE

DIFFERENTIAL CARRIER ASSEMBLY: Inspection, Reassembly and Installation–Proceed as follows:

Pinion Gear & Shaft: Inspection–Wash all parts in solvent. Inspect splines of shaft for wear and pinion teeth for scoring, cracked or chipped teeth. Inspect double thrust bearing and rear pinion bearing for roughness. Inspect deflector on "U" joint flange for distortion or looseness.

Reassembly–Press on rear inner race and double thrust bearing. Install new felt packing and oil seal in bearing retainer using Installer tool J-6078 *(CAUTION*–Soak new seal and felt packing in engine oil to provide initial lubrication). Install new deflector on "U" joint flange (if necessary), using tool J-6081. Install bearing retainer on pinion shaft. Place "U" joint drive flange on pinion shaft and place the assembly in a bench vise. Install the flat washer and nut retaining flange to pinion shaft and tighten nut to 160-280 ft. lbs. *(CAUTION–Do not back off nut to install cotter pin).*

Installation–Install same amount of shims as removed, in differential carrier housing *(NOTE–If new pinion and gear set, or old pinion requires r s tting, see "Pinion Setting" below).* Install pinion assembly and new gasket in carrier housing by tapping on "U" joint drive flange at the same time as bearing retainer bolts are being installed and screwed into carrier housing. Tighten all bearing retainer bolts to 85-90 ft. lbs.

Differential & Ring Gear: Inspection–Wash all parts in clean solvent and inspect ring gear for cracked or worn teeth. Inspect case and cover, side gears and thrust washers, differential pinion gears and thrust washers for scoring or wear. Check fit of side gear hubs in case and cover, and check splines of side gears for excessive wear. Inspect side gears and pinions for worn, cracked or chipped teeth. Inspect spider for scoring and check pinion fit on spider hubs. Inspect differential case bearings for cracked or checked, scored or broken races and rollers. Check bearings for roughness.

Reassembly–If ring gear has been removed from differential case, install two guide pins (9/16"-18x2" long cap screws with heads cut off and end slotted) to ring gear diametrically opposite each other. Start guide pins through case flange holes and tap ring gear on to case. Lubricate differential side gears and pinions and place differential pinions on spider. Assemble side gears and pinions and spider to left half of differential case. Assemble right half of case to left half, being sure to line up aligning marks. Install differential-to-ring gear bolts and lockwashers and tighten evenly until ring gear is flush with case flange. Remove guide pins and install two remaining bolts. Tighten all bolts to 150-170 ft. lbs. Place differential side bearing on hub with thick side of inner race toward case and drive

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CHEVROLET TRUCK HEAVY DUTY (C nt.)

in place using bearing driver J-6080 *(NOTE*–This tool is counterbored and has a pilot to assure proper installation and seating of bearing).

Installation–Position differential side bearing outer races on differential bearings and place differential assembly in bosses of differential carrier housing. Install left and right adjusting nuts *(CAUTION–Carefully slide nuts alongside the bearings so that threads on nuts fit into threads in carrier).* Install differential bearing caps making sure that marks on cap are aligned with marks on carrier. Install bearing cap bolts and lockwashers and tighten until lockwashers just flatten out *(NOTE–Bolts will be retightened to correct torque after backlash and pinion setting is checked and adjusted).*

Backlash Adjustment: Loosen right hand adjusting nut and tighten left hand adjusting nut using wrench J-972 while returning ring gear. Continue tightening left hand nut until all backlash between ring gear and pinion is removed . Back off left hand nut approximately two notches to point where notch in nut is aligned with lock. Tighten right hand nut firmly to force differential in solid contact with left hand nut. Loosen right hand nut until it is free of its bearing; then tighten right hand nut from one to two notches more to a position in which a notch is nut aligns with lock *(NOTE–The above procedure provides the proper preload on the differential side bearings).* Mount a dial indicator on carrier and check the backlash between ring gear and pinion. Correct backlash is .005-.008". If backlash is more than .008" loosen the right hand adjusting nut one notch and tighten left hand nut one notch. If backlash less than .005" loosen the left hand adjusting nut one notch and tighten the right hand nut one notch.

Pinion Setting: Coat ring gear teeth lightly with red lead or Prussian blue, then turn the pinion shaft several revolutions in both directions to establish a gear pattern on the ring gear. Examine pattern on ring gear teeth. If pinion depth is correct, the tooth pattern will be centered on the pitch line and toward toe of ring gear. If pattern is below pitch line on ring gear teeth, the pinion is too deep and it will be necessary to remove pinion and **increase** the shim thickness between pinion bearing and differential carrier housing. If the pattern is above pitch line, it will be necessary to **decrease** shim thickness in carrier housing. *(NOTE–*Changing the pinion depth will make some change in backlash and it may be necessary to readjust the backlash (see above). Tighten bearing capscrews to 130-160 ft. lbs. Recheck backlash and install adjusting nut locks.

Thrust Pad Adjustment: Install thrust pad and tighten screw until bronze tip engages back face of ring gear until rotating gear. Back off screw one twelfth (1/12) turn and tighten locknut. *NOTE*–Make sure screw does not change while tightening locknut. This adjustment provides .005-.007" clearance between thrust pad and ring gear face.

1947-55 CHEVROLET TRUCK TWO-SPEED HYPOID GEAR

1½ & 2 Ton Truck Models (1947-55)①. Optional.

①—1955 1st Series Trucks only. "1955 Chevrolet Truck 2-Speed" used on 1955 2nd Series Trucks.

►**Axle Shaft Differential Side Gear Note**—Beginning with 1952 production, axle shaft and differential side gears have 27 splines and are interchangeable with axle shafts on 1952 Two-Ton Single Speed Axle.

►CHANGES & CORRECTIONS

►**DIFFERENTIAL & AXLE PRODUCTION CHANGE (Late 1952)**—Starting with rear axle No. VN-414, differential spider replaced with heavier type unit, Part No. 3699589. Later type unit requires different right hand axle shaft than earlier type. Later type axles and spider gears can be used as service replacement on 1946-51 Two-Speed axles by changing spider and both axle shafts.

BRAKE DRUM REPLACEMENT: (1947-50 Models)—Brake drum held to hub by bolts which must be pressed out or driven out with a hammer. When replacing drum or hub, gasket between inside of brake drum and oil deflector must be coated with heavy shellac or paint on both sides to prevent oil leaking onto braking surface of drum. Small hole in gasket and channel in oil deflector must be lined up with oil relief hole in drum. When installing new bolts, press bolts in until they have bottomed and have locked tight in drum. CAUTION—Check to make sure bolts will not turn in holes.

1951-55 Trucks—Brake drum is held to hub by three slotted screws which can be removed and replaced with a screw driver. Be sure to place soft paper gasket between hub and drum.

►**REPLACEMENT REDUCTION GEAR INSTALLATION CAUTION:** Reduction gear mounting bolt holes in replacement differential case and cover are drilled undersize (35/64" drill) and must be reamed at assembly with a 9/16" reamer using the gear as a pilot. Ream one hole, then install bolt to hold gear and case or cover in correct position while reaming remaining holes. **When replacing reduction gear,** install all bolts which can be inserted without forcing, then ream remaining holes with 9/16" reamer, using gear holes as pilot for reamer.

DESCRIPTION: Hypoid Gear, double-reduction type with conventional first reduction hypoid ring and pinion gear and a second reduction consisting of two helical gears on the ring gear shaft (short separate shaft in front of differential case and axle shafts) which mesh with two larger gears on the differential case. These second reduction gears are constant-mesh type and one set at a time is engaged by the shifting sleeve on the ring gear shaft between the gears. Shifting sleeve locks the gear to the shaft and is actuated by the Vacuum Shift Control diaphragm as follows:

Vacuum Shift Control: Consists of a double-acting diaphragm type vacuum power cylinder mounted on axle carrier housing and linked directly to the double reduction gear shifter sleeve. Diaphragm pushrod is spring-loaded in the piston rod with spacers and stopwashers which limit pushrod travel. This enables the gear ratio to be "pre-selected" by movement of the selector valve on the instrument panel. When selector valve is moved to "Lo" or "Hi" range, a corresponding movement of the diaphragm and pushrod compresses the spring, and as soon as torque is relieved (by momentary letting up on accelerator pedal), the spring moves the piston rod and completes the shift. Shifting sleeve is centered in "Lo" and "Hi" positions by 3 spring-loaded poppet balls in the sleeve hub.

REMOVAL OF AXLE: ***See "Rear Axle" on car model page for removal of carrier assembly from truck.***

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: Same as for full-floating truck axle. ***See "Chevrolet Truck Hypoid (Full-floating)" Rear Axle.***

VACUUM SHIFT CONTROL: Following operations can be performed without disassembling rear axle:

Vacuum Cylinder Diaphragm Replacement: Disconnect hoses at fittings on vacuum cylinder. Remove bolts holding two cylinder halves together, lift off outer half. Remove outer nut on pushrod **while holding inner nut stationary** with ½" wrench. Remove diaphragm plates and diaphragm. Reassemble new diaphragm in same manner using Permatex around pushrod hole in diaphragm plates to insure a good seal at this point. Check shifting operation in "Lo" and "Hi" range after unit reassembled.

►***CAUTION—Do not transpose hose connections.***

Oil Seal Replacement: Dismantle vacuum cylinder and remove diaphragm (see above). Remove nuts and washers on two mounting studs, lift inner half of vacuum cylinder off axle housing, drive old oil seal out. Soak new seal in engine oil, coat outer diameter of seal with permatex and install in cylinder with free side of leather down (in), press seal in place with tool J-968. Install inner half of cylinder on axle housing, reassemble diaphragm.

Shifter Spring Replacement: Dismantle vacuum cylinder and remove diaphragm (see Diaphragm Replacement above). Press in on end of pushrod to relieve spring pressure, remove snap ring from inner rim of piston rod, withdraw pushrod assembly. Clamp head of pushrod bolt in vise, remove two nuts, short spacer, stop washer, spring, long spacer, and stop washer from pushrod bolt. Reinstall parts in same order using a new spring. Tighten adjusting nut on pushrod until distance between outer faces of stop washers is 3½", install and tighten locknut being careful not to change adjustment. Lubricate inside of piston rod with engine oil, install pushrod and replace snap ring. Reassemble vacuum control.

DIFFERENTIAL CARRIER DISASSEMBLY: Mark differential bearing caps and carrier to insure reassembly in same position. Remove adjusting nut locks, adjusting nuts, and bearing caps, lift differential assembly out of carrier. Remove nuts on pinion cage mounting studs, take out lubrication plug. Install two 3/8" bolts in tapped holes in pinion cage flange, turn nuts up evenly to remove cage assembly. **Note number and thickness of shims under carrier flange** (these shims control pinion mesh). Loosen locknut on bolt attaching shifter fork to vacuum control piston rod, remove bolt. Remove nuts on vacuum cylinder mounting studs, remove cylinder, piston rod, mounting sleeve and shims (tap on end of piston rod to free it from shifter fork). Remove nuts on double reduction shaft bearing caps, remove caps and shims (use

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1947-55 CHEVROLET TRUCK TWO-SPEED HYPOID GEAR (Cont.)

two 3/8" capscrews in tapped holes in left bearing cap to remove cap), note number and thickness of shims removed at each bearing cap (these shims control ring-and-pinion gear backlash and bearing adjustment). Slide double reduction shaft assembly to left and pull ring gear end to rear to clear differential bearing support, remove shaft assembly. Remove right bearing outer race by driving race through into carrier with driver J-872-1. Do not remove left bearing race (race is pressed in bearing cap and these parts furnished as an assembly). Disassemble and service the major sub-assemblies as follows:

Pinion Cage Disassembly & Reassembly: Remove nut on end of pinion shaft, remove universal joint flange. Support carrier end of pinion cage in arbor press, press pinion and rear bearing out of cage, remove bearing spacer from pinion shaft. Press front bearing and oil seal out of cage. To remove bearing from pinion shaft, use Pinion Bearing Remover J-2228 to prevent damage to bearing while pressing shaft out. Use long drift to drive bearing outer races out of pinion cage. Install new races in cage using special driver J-5676 (front race), J-5677 (rear race). Lubricate all parts before re-installing, make certain that bearing spacer in place on shaft between bearings, install universal flange but do not install oil seal until after bearing pre-load adjusted, tighten pinion nut to 75-150 ft. lbs., check and adjust bearing pre-load as directed below. After pre-load adjusted, soak new oil seal in engine oil, install oil seal with driver J-971 with free edge of seal toward bearing. Re-install universal flange, install cotter pin (CAUTION—do not back nut off washer, and nut, tighten nut to 75-150 ft. lbs. and to align cotter pin hole, stop tightening the nut at point where slot lines up with hole).

Pinion Bearing Pre-load Adjustment—Check pre-load by clamping pinion cage flange in vise and using spring scale and rod to measure torque required to turn pinion (pinion nut must first be correctly tightened to 75-150 ft. lbs.). Turning torque should be 12-18 in. lbs. (or 1-1½ ft. lbs.). Adjust by installing spacer or shims of correct thickness on shaft between bearings (thinner shims will increase turning torque, thicker shims decrease turning torque). These adjusting shims furnished in seven thicknesses as listed below and combinations of two shims will provide necessary range of adjustment from .316" to .354" in .002" steps.

Adjusting Shim Part Nos.—3847424—.157", 3847425—.159", 3847426—.163", 3847427—.167", 3847428—.171", 3847429—.175", 3847430—.177".

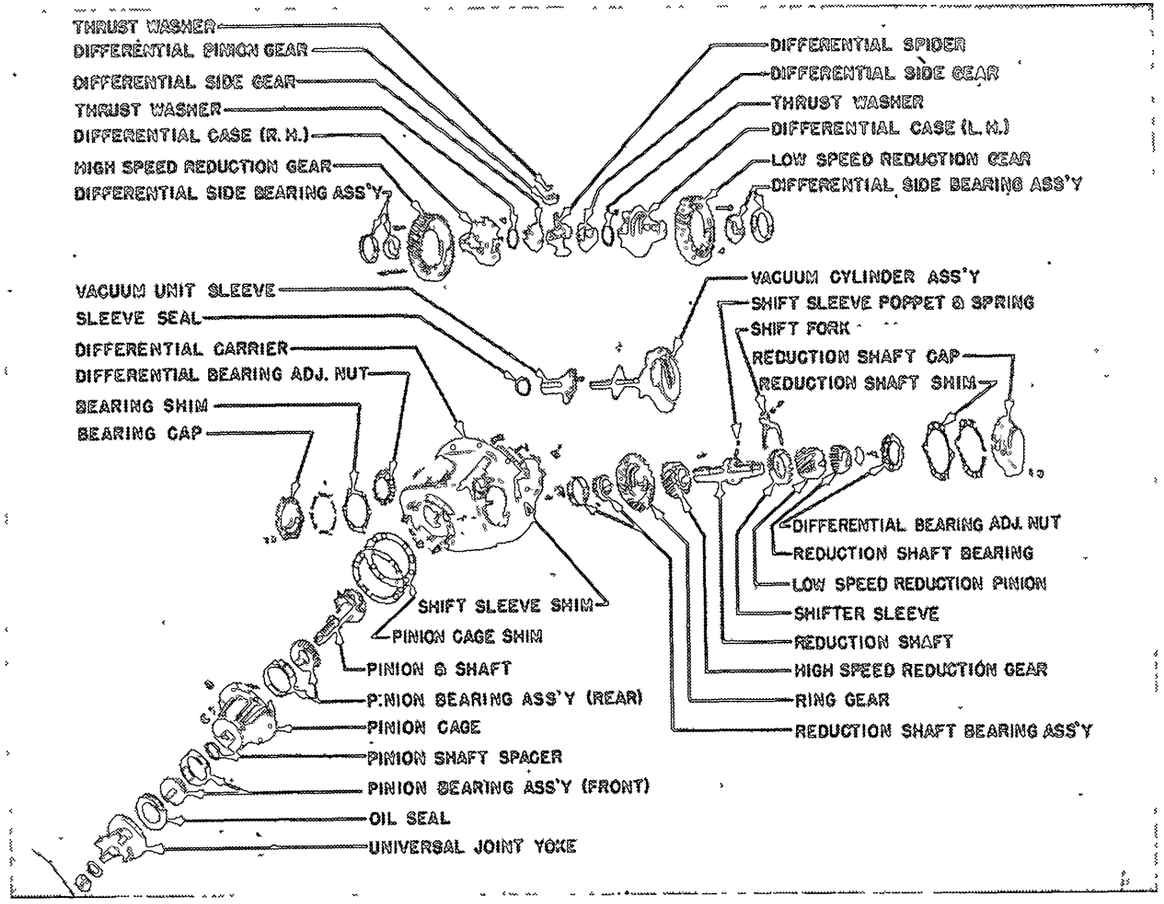
Double Reduction Shaft Disassembly & Reassembly: Remove capscrew and bearing retainer washer on each end of shaft, support tooth side of ring gear on hardwood blocks in arbor press, press shaft out of ring gear and bearing. Remove high speed pinion, shifter sleeve and poppet balls and springs (CAUTION—balls and springs will fly out as sleeve is removed). Replace sleeve on shaft with tapered side against pinion, support sleeve on hardwood blocks in arbor press, press shaft out of bearing, lift off bearing and low speed pinion. When reassembling, lubricate all parts for initial lubrication, install high speed pinion with clutch teeth toward splines on shaft, see that ring gear key in place in shaft, press shaft in gear until shoulder on shaft is against gear, press bearing on shaft against gear, install bearing retainer washer and capscrews, tighten capscrews to 37-46 ft. lbs. and secure with lockwire. Install poppet springs and balls in shaft holes, install shifter sleeve on shaft with heavy tapered end of sleeve toward ring gear and three tapered teeth on sleeve in line with poppet balls. Install low speed pinion, press bearing on shaft firmly against shoulder, install bearing retainer washer and capscrews, tighten capscrews to 37-46 ft. lbs. and secure with lockwire.

Differential Disassembly & Reassembly: Mark halves of case to insure correct reassembly. Remove nuts on eight long through-bolts, separate differential case halves, remove differential side gears, pinions, and thrust washers. To remove side bearing cone and roller assemblies, install J-1318 Differential Bearing Puller on bearing, support differential case in arbor press with bearing puller down, use drift inserted through case to press puller and bearing down off case hub. Press new bearings on hub firmly against shoulder on case using J-1312 Bearing Replacer. To replace double reduction gears, remove gear mounting nuts and bolts, tap gear off case, make certain that mating flanges of case and new gear are clean and smooth, tap gear in place, tighten mounting bolt nuts evenly to 70-110 ft. lbs. and secure with lockwire.

CAUTION—Double reduction gear mounting bolt nuts should be at inner face of differential case halves, nuts on long through-bolts should be on left side or AWAY from ring gear.

DIFFERENTIAL CARRIER REASSEMBLY: Reverse disassembly directions and make the following adjustments during the reassembly operations:

Double Reduction Shaft Bearing Adjustment: Install assembly with same thickness of shims under each bearing cap as were removed during disassembly (install left cap first, tighten mounting stud nuts securely). With correct bearing adjustment, shaft should rotate with slight drag (bearing pre-load only—pinion must be out so that no pinion drag added). Adjust by adding or removing shims at right or left bearing cap (shims will be transferred from one side to the other during ring-and-pinion



CHEVROLET TRUCK TWO-SPEED HYPOID GEAR AXLE—WITH VACUUM CONTROL

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1947-55 CHEVROLET TRUCK TWO-SPEED HYPOID (Cont.)

gear backlash adjustment). After backlash adjusted, tighten all bearing cap nuts to 75-95 ft. lbs.

Ring-and-Pinion Gear Mesh (Pinion Setting Adjustment): Install pinion cage in carrier with same thickness of shims under cage flange as were removed during disassembly, install nuts on 3 equally spaced mounting studs and tighten nuts securely. Check gear mesh by painting ring gear teeth with red lead or Prussian blue, rotate pinion by hand in both directions while pressing on back of ring gear to apply a load. Make necessary adjustment of pinion position for correct mesh by adding shims (to move pinion out), or removing shims (to move pinion in) from beneath pinion cage flange. These shims furnished .003", .005" thick. After adjusting pinion position and backlash (see below), install all pinion cage mounting stud nuts and tighten evenly to 115-130 ft. lbs.

Ring-and-Pinion Gear Backlash: Check backlash with dial indicator mounted on carrier. Backlash should be .008-.013". Adjust by transferring shims from under one double reduction shaft bearing cap to the other keeping total shim thickness constant to avoid disturbing bearing adjustment (move shims from left to right side to increase backlash, from right to left side to decrease backlash). These shims furnished .003", .005" thick. After adjustments completed, tighten bearing cap nuts to 75-95 ft. lbs.

Two-speed Shifter Mechanism Installation: With shifter sleeve in low-speed position, install shifter fork in sleeve with lock bolt hole toward rear of carrier. Place rubber oil seal on vacuum unit mounting sleeve and install sleeve in carrier with same thickness of shims under sleeve flange as were removed when unit disassembled. Use new gasket on vacuum cylinder piston rod, insert rod and cylinder assembly in sleeve, enter end of rod in shifter fork and line up hole in rod and fork, install taper bolt and tighten locknut securely. Tighten cylinder mounting stud nuts. Check assembly as follows:

Shifter Mechanism Adjustment—With shifter sleeve in low-speed position, check clearance at each side of shifter fork with a feeler gauge. If clearance less than .010" at either side of fork, loosen vacuum cylinder mounting nuts, add or remove shims from under mounting sleeve flange (shims slotted, not necessary to remove cylinder or sleeve), tighten nuts and recheck shifter fork clearance.

Differential Bearing Adjustment: When installing differential assembly, assemble adjusting nuts and bearing caps in accordance with marks. Tighten bearing cap stud nuts just snug. Shift differential to right or left (by turning up one adjusting nut and backing off opposite nut) until double reduction gears and pinions are centered. Position one adjusting nut in a locking position (slot in line with lock tang), tighten opposite adjusting nut until all clearance or endplay just removed, then tighten each adjusting nut one additional notch for correct bearing pre-load. Tighten bearing cap stud nuts evenly to 150-170 ft. lbs., install adjusting nut locks, secure bearing cap nuts with lockwire.

1955 CHEVROLET TRUCK TWO-SPEED HYPOID GEAR

Chevrolet 2nd Series 1½ & 2-Ton Trucks (1955) Optl.

DESCRIPTION: Vacuum controlled 2-speed planetary-reduction type with hypoid primary gears and four planetary pinions. A five tooth and a six tooth drive pinion are used with a correct mating ring gear to furnish two different ratios.

OPERATION: In low range operation the primary (hypoid) reduction is multiplied by a planetary system reduction of approximately 1.36-1 for final drive. The secondary reduction occurs only when the sun gear is held stationary, the four planets then being driven around the sun gear by internal teeth in the large case bolted to the ring gear. Planet journals are integral with the planet support and the differential and planet support cover. The orbit speed of the planets is conveyed to rear wheels through cover, differential pinions, differential side gear and axle shafts. Control of the sleeved sun gear is through lateral movement of a coaxial "shifter sleeve" splined over the sun gear. Left hand movement of shift collar and sleeve causes sun gear to stop when dove-tail teeth in an anchor ring attached to housing engage similar teeth on approaching face of shifter sleeve. Right hand movement of shifter collar and sleeve by the vacuum control mechanism results in release from the anchor ring. Clutching teeth on opposite face of shifter sleeve then mesh with dove-tail teeth projecting from differential and planet support case and ring gear assembly. Thus engaged, the sun gear must turn at speed of ring gear, the planets are locked in place and only the reduction afforded by primary drive gears determine rear wheel speed. A positive, quick acting, two way vacuum system actuates the shift collar and sleeve. The hand control is located on the gear shift lever.

DIFFERENTIAL CARRIER ASSEMBLY: Removal—Drain rear axle housing and remove hub caps. Remove jaws from Sliding Hammer J-1436 (Rear Axle Shaft Bearing & Oil Seal Remover) and install adapter J-1436-8 to puller handle. Install axle shaft puller into hole provided in end of axle shaft and pull shaft (both sides) out about 8" to clear differential. Remove clamps and hose assembly at vacuum cylinder and slip hoses off fittings. Split rear universal joint by removing trunnion bearing "U" bolts from rear flange. Slide propeller shaft assembly forward and tape universal joint bearing to prevent bearings falling out. Swing propeller shaft to one side and tie it to frame side rail. Remove capscrews attaching differential planet and carrier to axle housing *(NOTE*—Before removing last capscrew, place a long drift punch through upper hole in assembly to give it support during removal). Place a roller jack under assembly using a wood block as necessary to support the unit. Work assembly forward until it clears housing, then remove it from under truck.

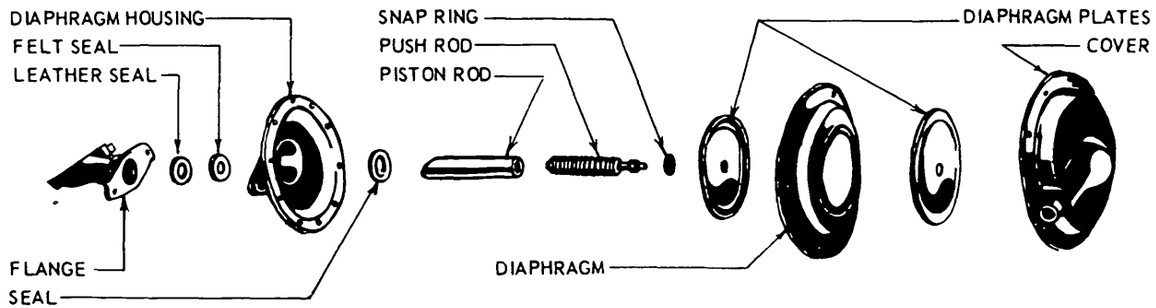
DIFFERENTIAL CARRIER ASSEMBLY: Disassembly—Proceed as indicated below.

Vacuum Cylinder: Removal—Remove three bolts and lockwashers securing cylinder assembly to carrier housing and remove cylinder assembly.

Disassembly—Remove two nuts and bolts retaining diaphragm housing to flange and separate housing from flange. Unscrew screws and self-locking nuts securing diaphragm cover to housing and separate cover and housing. Using two half inch open end wrenches, remove nut securing diaphragm plates and diaphragm to pushrod assembly. Separate plates and diaphragm. To disassemble pushrod assembly, compress spring of pushrod, remove snap ring from inside diameter of piston rod, and pull pushrod out of piston rod.

Differential & Planet Unit: Removal—Remove differential and planet assembly anchor from left side of assembly. Loosen locknut on ring gear thrust pad and remove pad. Drive out shifter yoke shaft using a drift punch and a hammer. Slide shifter yoke and sleeve to left and remove from end of sun gear. Remove retaining bolts and washers from adjusting nut locks and remove locks from both sides. To remove oil trough, bend tabs downward, remove two bolts and remove trough and locking plate. Remove bolts and lockwashers securing bearing caps and tap caps off dowels in mounting bosses with a soft hammer. Remove adjusting nuts. Lift differential and planet assembly out of carrier housing using extreme care not to drop side bearing outer races.

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CHEVR LET 2-SPEED AXLE SHIFT ASSEMBLY

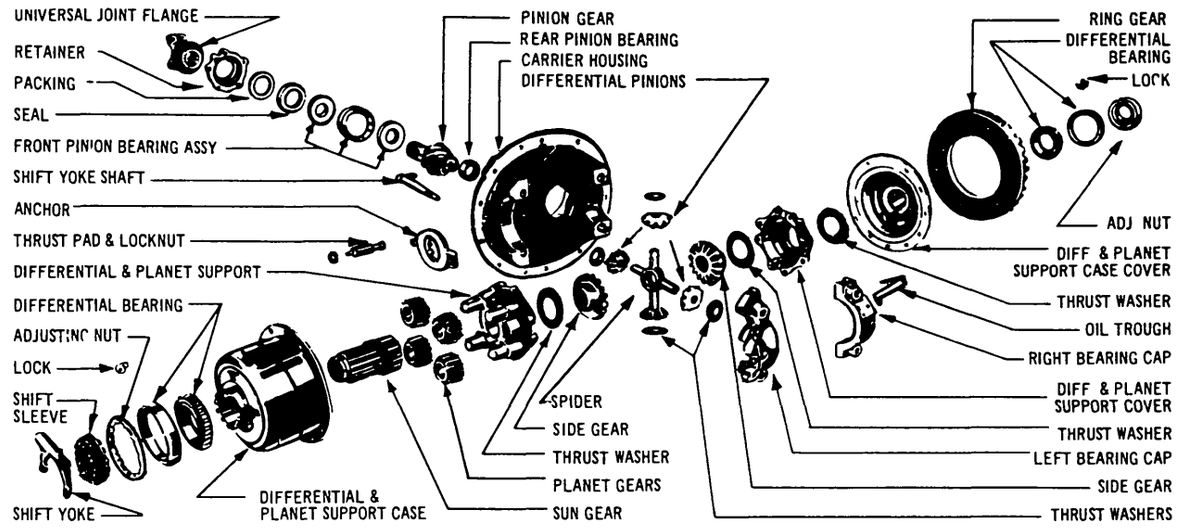
1955 CHEVROLET TRUCK TWO-SPEED (Cont.)

Disassembly–Mark ring gear, support case and case cover for alignment by scribing lines on case, cover and gear. Remove the twelve bolts retaining ring gear, case, and cover and lift off case assembly. Remove sun gear and planet gears *(CAUTION–Mark or tag all gears so they may be reassembled exactly as removed. If necessary to replace planet gears, the complete set of gears must be replaced).* Lift differential and planet support off case cover. Remove the eight bolts and lockwashers connecting planet support and cover and separate the two parts *(NOTE*–The support and cover are stamped on all four sides with matching numbers to aid in reassembly).. Remove spider, pinion gear and thrust washers, and tag all parts as removed. Remove right and left hand side gears and thrust washers from each side of housing. Remove differential bearings from differential and planet support case and case cover.

Pinion Gear & Shaft: Removal–Loosen bolts and lockwashers securing pinion assembly to differential carrier until bolt heads contact the universal joint flange. Gradually tap pinion assembly outward while loosening bolts to avoid interference with companion flange *(NOTE*–If universal joint flange is removed from pinion assembly, the pinion assembly can be removed by using adapter J-6187 with Slide Hammer J-1436). **Disassembly**–Remove shims from differential housing and note the amount used to assure reinstallation of the same number. Remove rear bearing from differential. Place universal joint flange in a vise and remove cotter pin, nut and flat washer securing flange to pinion and remove flange. Drive oil seal out of retainer housing and remove felt washer (discard oil seal). Press inner race off end of pinion using tool J-1453 and holder J-358-1. Using tool J-6171 (5 tooth pinion), or J-6079 (6 tooth pinion), press double thrust bearing off pinion with an arbor press.

DIFFERENTIAL CARRIER ASSEMBLY: Inspection, Reassembly & Installation–Proceed as follows

Pinion Gear & Shaft: Inspection–Wash all parts in solvent. Examine pinion teeth for chips, cracks, and wear and check splines for wear. Check thrust bearing for worn or pitted rollers or bearing race. Inspect universal joint flange for cracks or worn splines and examine oil seal retainer housing for cracks and defective sealing surface. *NOTE*–If oil seal removed, replace with a new seal. Check rear bearing for worn or pitted rollers. Inspect oil deflector on universal joint flange for bends or other damage. Replace if necessary. **Reassembly**–Install inner race on end of pinion shaft. Lubricate and press double thrust bearing onto pinion shaft. Install new felt washer and seal in pinion bearing oil seal retainer using Seal Installer J-6078. Place rear pinion bearing in differential carrier housing. If oil deflector on universal joint flange requires replacement, tap off old deflector and install a new one, using Installer J-6081. Install oil seal retainer on pinion shaft. Insert a bolt and lockwasher through each hole in oil seal retainer and then position universal joint flange on pinion shaft. With universal joint flange in a vise, install flat washer and nut on pinion and tighten to 180-250 ft. lbs., and install cotter pin *(CAUTION–Do not back off nut to install cotter pin).*



CHEVROLET TRUCK 2-SPEED REAR AXLE

Installation–Install rear pinion bearing in carrier housing and install same amount of shims as removed against shoulder in carrier housing *(NOTE–If new pinion and gear set to be installed, or old pinion requires resetting, see "Pinion Setting" below).* Position pinion assembly in carrier housing and tap inward with a soft hammer until retaining bolts can be started in housing. Tighten retaining bolts to 85-95 ft. lbs.

Differential & Planet Unit: Inspection–Wash all parts in solvent (do not use air to dry bearings). Inspect ring gear, planet gears, differential pinion gears, and sun gear for damaged teeth or excessive wear. Inspect thrust washers for excessive wear. Inspect spider for wear or scored pinion bearing area. Inspect differential side gears and thrust washers for damaged teeth or excessive wear.

►*PARTS REPLACEMENT CAUTION:* If necessary to replace any single component in the following groups, all parts in each group must be replaced· (a) Sun gear and four planet gears. (b) Spider, four differential pinion gears, and thrust washers. (c) Ring gear and pinion. (d) Differential bearing and race.

Reassembly–Install differential bearings on differential and planet support case and case cover. Use Bearing Installer J-6080 to install bearing on case cover, and J-6175 to install bearing on case. Position side gear thrust washers on hubs of side gears and install one side gear in differential and planet support and one in differential and planet support cover *(NOTE–Gear with the longer hub is installed in the cover).* Assemble the four pinion gears and thrust washers on the spider, being sure to reinstall gears in their original positions. Install the assembled spider and gears in differential and planet support so that identification numbers on spider and planet support match. Lubricate gears and thrust washers with SAE 90 Multi-purpose gear lubricant. Position support cover with matching identification marks aligned and install eight bolts and lockwashers. Tighten bolts to 70-110 ft. lbs. Install four planet gears on journals of differential and planet support *(CAUTION–Gears must be installed with radius on gears toward the planet support).* Mesh sun gear in planet gears. Place ring gear, teeth down on wood block and install four Guide Pins J-6154 in every third hole of the ring gear. With the assembly marks aligned, install differential and planet support case cover onto guide pins. Position support cover thrust washer on hub of side gear, then place planet assembly in differential and planet support case cover, with sun and planet gears upward. Install planet support case over guide pins, making sure that alignment marks are in line, and loosely install eight of the twelve retaining bolts. Remove guide pins and install the other four bolts. Tighten all bolts in rotation to 85-95 ft. lbs.

Installation–Position differential side bearing outer races on differential bearings and place differential and planet assembly in bosses of differential carrier housing. Install left and right adjusting nuts. Tap bearing caps onto dowels in bosses of differential carrier housing and then secure with bolts and lockwashers. Tighten bolts until lockwashers just flattened *(CAUTION*–Bolts will be retightened to correct torque after backlash and pinion setting is checked and adjusted).

Backlash Adjustment–Loosen right hand adjusting nut and tighten left hand nut, Use Differential Adjusting Wrench J-972 on the right side and a drift and hammer on the left side. *(NOTE*–Left side nut has internal notched teeth so that adjusting wrench cannot be used). Continue tightening left hand nut until all backlash is removed between pinion and ring gear. Back off left hand nut approximately 2 notches to a point where notch in nut is aligned with lock. Tighten

CONTINUED ON NEXT PAGE

1955 CHEVROLET TRUCK TWO-SPEED (Cont.)

right hand nut firmly to force differential and planet assembly in solid contact with left hand nut. Loosen right hand nut until it is free of its bearing, then tighten nut snugly against bearing. **Tighten right hand nut from ne to 2 notches more** to a point where notch in nut aligns with lock (*NOTE*–This procedure provides for proper preload on bearings). Mount a dial indicator on housing so indicator button contacts tooth on ring gear, and check ring gear backlash. Backlash should be .005-.008". If backlash greater than .008", loosen right hand adjusting nut one notch and tighten left hand nut one notch. If backlash less than .005", loosen left hand nut one notch and tighten right nut one notch. Check and adjust pinion setting as indicated below.

Pinion Setting–Coat ring gear teeth lightly with red lead or Prussian blue, then turn the pinion shaft several revolutions in both directions to establish a gear pattern on the ring gear. Examine pattern on the right gear teeth. If pinion depth is correct, the tooth pattern will be centered on the pitch line and toward toe of ring gear. If pattern is below pitch line on ring gear teeth, the pinion is too deep and it will be necessary to remove pinion and **increase** the shim thickness between pinion bearing and differential carrier housing. If pattern is above the pitch line, the pinion is too shallow and it will be necessary to **decrease** shim thickness in carrier housing. *NOTE*–Changing the pinion depth will make some change in backlash and it may be necessary to readjust the backlash (see above). Tighten bearing capscrews to 130-160 ft. lbs. Recheck backlash and install adjusting nut locks.

Thrust Pad Adjustment: Check bronze tip on thrust pad and replace if worn. Install thrust pad and tighten until pad contacts ring gear, then back off 30° to obtain a clearance of .005-.007". Tighten locknut.

Vacuum Cylinder: Inspection–Clean all metal parts with solvent and blow dry with air. Inspect diaphragm for loss of resiliency and punctures. Check spring of pushrod for breaks or distortion. Check mating surfaces of diaphragm housing and cover by placing the two parts in their assembled position and checking for deformation or burrs. Inspect piston rod outer surfaces for burrs as these can cause leaks at leather and felt seals.

Reassembly–Insert pushrod in piston rod and compress rod spring and install snap ring. Apply Permatex to ridges and around the center hole of diaphragm plates. Position diaphragm between the two plates and install plates and diaphragm on pushrod assembly. Install a new oil seal in diaphragm housing using Seal Installer J-968 (soak seal in oil prior to installation and coat outer radius with Permatex to assure a tight seal). Oil and install new leather and felt seals in diaphragm attaching flange. Insert pushrod assembly with attached diaphragm into housing. Align holes in diaphragm and housing and install housing cover.

Installati n–Install vacuum cylinder assembly on differential carrier housing with three bolts and lockwashers.

CHRYSLER, DE SOTO, DODGE "BARREL" TYPE HYPOID

CHRYSLER MODELS

Six, Auto. Trans. Exc. Town & Country and 8 Pass. (1953-54)②③
Six, Town & Country and 8 Pass. (1951-54)①
Eight, Crown Imperial (1946-50)①
V8, All Models (1951-54)①. ***See "Differential Case Note" below.***
V8, C67 with PowerFlite exc. Est. Wgn. (1955)②
V8, C67 Est. Wgn. (1955)①
V8, C68, C69, C70, C300 All Models (1955)①

DESOTO MODELS

Six, Estate Wagon, & 8 Pass. (1951-54)①
V8, All Models (1952-54)①
V8, S21 All Models (1955)①
V8, S22 with PowerFlite exc. Est. Wgn. (1955)②
V8, S22 Estate Wagon (1955)①

DODGE MODELS

V8, Auto. Trans. (1953-55)②③
Six, All Models with PowerFlite (1955)②

①—Pinion bearings adjusted by bearing adjuster washer between shoulder on pinion shaft and front bearing cone.

②—Pinion bearings adjusted by shims placed between bearing spacer and front bearing cone. No shoulder on pinion shaft.

③—Ring gear thrust pad and screw used on 1953 Cars with Torque Converter. Not used on cars equipped with PowerFlite.

►*DIFFERENTIAL PINION GEAR NOTE:* Two or four differential pinion gears used. Overhaul and adjustment are the same except where noted.

►*OTHER MODELS NOTE:* All other Chrysler, DeSoto & Dodge Models use "Cage Type" Hypoid. ***See "Chrysler, DeSoto, Dodge & Plymouth Cage Type" Rear Axle.***

►***DIFFERENTIAL CASE NOTE—"Screwed Type" and "Bolted Type" Differential carrier caps used. Different disassembly & reassembly procedures required for each type. See "Differential Case Disassembly" below.***

►***EARLY 1952 DE SOTO V-8 NOTE—First cars used "Screwed Barrel Type" differential case.***

►*1955 PINION NUT TIGHTENING CAUTION:* A convex (Belleville Lockwasher) is used on some models. It is important that this washer be installed with the convex side contacting the companion flange nut. Tighten pinion nut as follows when this washer used. 240 ft. lbs. min. (Chrysler Windsor), 250 ft. lbs. min. (Other Chrysler Models) 300-330 ft. lbs. (DeSoto Models).

DESCRIPTION: Hypoid gear, semi-floating type with either "Screwed" or "Bolted" barrel type differential case. Two different types of pinion shaft assemblies requiring different overhaul and adjustment procedures.

REMOVAL OF AXLE: ***See "Rear Axle" on Car Model pages.***

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: Remove rear wheels and hub and drum assembly using Tool C-845 (CAUTION—Do not strike end of axle shaft to loosen hub). Block brake pedal so it cannot be depressed and disconnect brake line at wheel cylinders. Remove rear axle drive shaft key and install sleeve Tool C-757 in axle bearing outer seal before removing brake support plate from axle housing. Remove shims from each end of axle housing and keep each set separate for reassembly. Remove axle shafts and bearings from housing using Tool C-499. Remove rear axle shaft inner oil seal.

Installation & Adjustment—Install axle shaft inner oil seal using Tool C-241. Insert axle shaft in housing making sure shaft and differential side gear splines are in alignment. Install axle shaft outer bearing (if removed) using Tool C-413. Install sleeve Tool C-757 in outer bearing oil seal before mounting brake support plate to axle housing to protect seal. Install brake support plate and tighten nuts to 30-35 ft. lbs. Connect brake tubes and bleed brakes. NOTE—If new axle shaft installed, it will be necessary to adjust the end play and center the axle. See Endplay Adjustment following.

Endplay Adjustment—Remove wheel and hub and tighten brake backing plate securely. Rap each axle shaft to be sure bearings and cups are seated, then place a dial indicator on axle drive shaft and housing in such a way to measure endplay of shaft. Check the endplay by moving axle shaft in and out. If endplay is not between .003" to .008", remove brake support plate and add or remove shims as required.

►*CAUTION*—When making adjustment of endplay, equal thicknesses of shims should be removed or installed on both right and left sides of axle housing, so as to retain central position of axle shaft thrust block.

Centralizing Rear Axles (Initial Installation of New Axle Shaft)—Install left axle shaft and bearing cone assembly (without grease). Drive bearing cup in as far as it will go using Tool C-413 to prevent damage to axle housing. Rear axle thrust block will be removed as far to the right as possible. With left bearing cup remaining at its innermost position, lay a straightedge across end of axle housing. Measure distance from straightedge to bearing cup face, to nearest 1/64". One-eighth inch minus the above measurement gives the thickness of shims required at left end to center the thrust block, (it is best to use a shim about .020" less than that required to center thrust block). Remove the left axle shaft, grease the bearing and reinstall bearing and shaft. Using the correct thickness of shims as determined above, install the support plate. Do not drive bearing cup in all the way (as the brake backing plate, when it is drawn up tight will push the bearing cup into the correct position). Install the right axle shaft and bearing (bearing should be clean and dry). Using Tool C-413, drive bearing cup in as far as it will go, meanwhile rotating axle shafts to seat bearings, (Right bearing cup should protrude beyond housing end). Hold straightedge firmly across outer face of right bearing cup. Using a set of feeler gauges, measure accurately the distance between housing face and straightedge. This measurement gives thickness of shims that would give zero endplay if it were used. The shim thickness to be used is obtained by adding .003" to above measurement. If this gives a thickness that cannot be built up from existing shims, use the next larger shim combination. Remove the right axle shaft and grease the bearing and reinstall shaft and bearing and shim pack (as determined above), and complete the assembly.

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CHRYSLER, DE SOTO, DODGE "BARREL" TYPE HYPOID (Cont.)

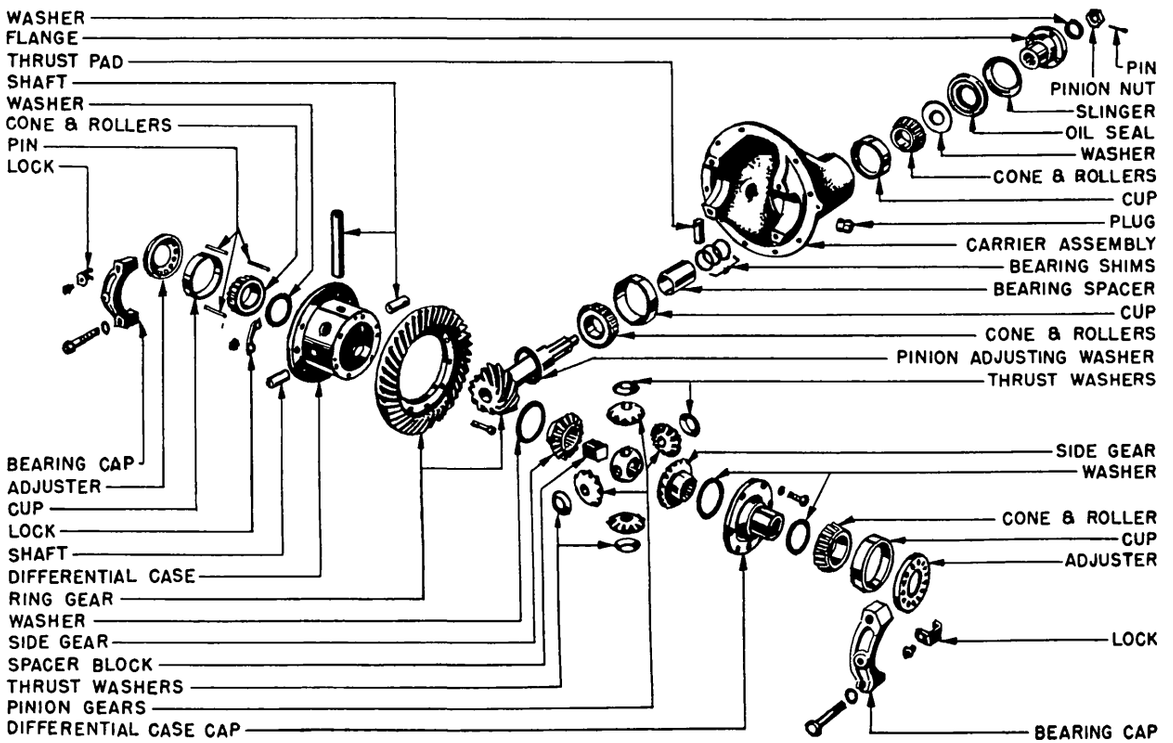
OVERHAUL: (Disassembly)—Mount carrier assembly in stand, then mark both differential bearing adjusters and caps to insure reinstallation in correct position. Remove adjusting nut locks, back off adjusting nuts, take out bearing cap screws, remove bearing caps, and lift differential assembly out of carrier. Remove drive pinion shaft nut, pull universal joint drive pinion flange, and remove pinion shaft through rear end of carrier. Use puller C-293-C to remove rear bearing from shaft.
NOTE—Front oil seal can be replaced without dismantling carrier.

Differential Disassembly (Bolted Barrel Type): Place differential case in large vise with jaw protectors in place. Bend down tabs and remove drive gear to differential case attaching nuts and bolts. Tap drive gear off case with a fibre hammer. Mount case, bearings and cup assembly in carrier and check drive gear flange run-out which should not exceed .003". Remove case from carrier and remove differential case bearings with puller C-293 and No. 18 plates. Remove the six bolts attaching case cap to case, then remove three differential pinion shaft lock pins by driving them out of case. Drive long pinion shaft out of case with a brass drift and hammer, and remove axle shaft thrust block. Drive the short pinion shafts out of case and remove pinion shaft block. Remove pinion gears, side gears and thrust washers.

Differential Disassembly (Screwed Barrel Type): Mount differential case drive gear flange in large vise with jaw protectors, then remove differential case bearings with puller DD-914-89. Remove the differential case cap locking pins by center punching and drilling. Remove shell of pin in hole with punch. Heat outside of case with a torch DO NOT HEAT CAP, to a temperature of **not more than 360°-400°F.** (Check heat by means of a piece of soft solder, which will just start to melt when case is hot enough). Unscrew cap with special wrench DD-921 (start cover by jarring wrench handle with heavy hammer blow). Cool parts in oil and proceed with disassembly. Drive out the pinion shaft retaining pin, and with a hammer and drift, drive the long pinion shaft from case, and remove thrust block. Now drive the short pinion shafts from case and lift out pinion shaft block. Remove differential pinion gears, side gears and thrust washers from bottom of case.

►***DIFFERENTIAL CASE REASSEMBLY NOTE—Assembly of "Bolted Type" differential is identical to assembly of "Screwed Type," except that heating the case for cap installation is not necessary.***

Differential Case Reassembly (Bolted & Screwed Barrel Type): Place thrust washer over hub of differential side gear and lay in position in case. Line up the locking pin hole in long pinion shaft, with the hole in differential pinion boss (opposite boss has no pinion hole) and drive the pinion shaft in until it protrudes about 1/16" on inside of case. Place a pinion gear thrust washer on pinion so the side with indents faces pinion, then install pinion gear and washer on end of shaft that protrudes. Tap shaft and hold pinion until end of shaft is even with edge of pinion. Insert the pinion shaft block with punch marked sides facing the short pinion shaft holes and the side marked "1" facing up. Install thrust block and pinion shaft block. Install the opposite pinion gear and thrust washer, then drive shaft into final position. Drive one of the short pinion shafts into either of remaining holes until shaft protrudes 1/16" on inside of case. (Make sure lock pin holes line up). Install pinion gear and thrust washer and continue to drive until shaft enters hole in pinion shaft block. Install other short pinion shaft, washer and gear in same manner. Lock pinion shafts in place by installing three new locking pins in the holes and peen over.
("Screwed Barrel Type")—Clamp complete assembly in vise and heat outside surface of threaded portion of case with a torch flame as indicated in disassembly procedure. Dip threaded portion of cap in gear oil, and then assemble thrust washer and side gear in cap and screw into differential case with wrench DD-921. Tighten securely with blunt drift and hammer. Drive three new case cap lock pins 1/16" below surface of case and peen metal of case over pins with a ball end punch.
("Bolted Barrel Type")—Assemble a thrust washer and remaining side gear in cap. Using two of the attaching bolts as guides, position differential cap on case, then tap into place using a soft hammer. Tighten cap retaining bolts to 35-40 ft. lbs. Install ring gear on flange, then place locking tabs in position and install gear retaining nuts. Tighten nuts to 35-40 ft. lbs., and bend up tabs to lock nuts in position.



CHRYSLER, DE SOTO, DODGE "BOLTED TYPE" HYPOID

Pinion Bearing Preload: Preload check is made with Tool C-758-D which replaces pinion gear and shaft in housing when making check. Pinion adjusting shims or spacers are placed as indicated in model application above.

Pinion Bearing Preload

Car Model	In. Lbs.
1946-48 Chrysler 8, Crown Imperial	10-15
1949-50 Chrysler 8, Crown Imperial	15-25
1951-54 Chrysler 6, Twn.&Ctry.,8 Pass	25-35
1953-54 Chrysler 6, Exc T & C, 8 Pass.	15-25
1951-55 Chrysler V8, All Models	25-35
1951 DeSoto 6, Est. Wgn. & 8 Pass.	15-25
1952-53 DeSoto V8, All Models	25-35
1952-53 DeSoto 6, Est. Wgn. & 8 Pass.	25-35
1954-55 DeSoto V8, S19 & S21	25-35
1954 DeSoto 6, S20	20-30
1955 DeSoto V8, S22	20-30
1953 Dodge V8, Auto. Trans.	35-45
1954 Dodge V8, Auto. Trans.	20-30
1955 Dodge 6 & V8, Auto. Trans.	20-30

Pinion Preload Check (Pinions With Wide Spacer and Shim Pack)—Adjust pinion bearing preload BEFORE pinion gear setting is made. Coat drive pinion with hypoid lubricant, and assemble the

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CHRYSLER, DE SOTO, DODGE "BARREL" TYPE HYPOID (Cont.)

drive pinion shaft rear bearing on main body of Tool C-758-D. Slide sleeve SP-1730, drive pinion bearing spacer and bearing adjusting shims over tool and insert the assembly into carrier. Slide front pinion bearing over tool and down into position in bearing cup. Slide compression sleeve SP-535 and centralizing washer over tool and down into position and install the compression nut. Tighten tool nut to torque indicated in "Tightening Torques" table below. Turn tool with a speed wrench to seat bearings, then check preload with an inch-pound torque wrench. Readings should be as indicated in table above If adjustment does not conform to above readings, increase size of shim pack to **decrease** reading; decrease size of shim pack to **increase** reading. After correct preload setting has been obtained, leave tool in place for pinion setting.

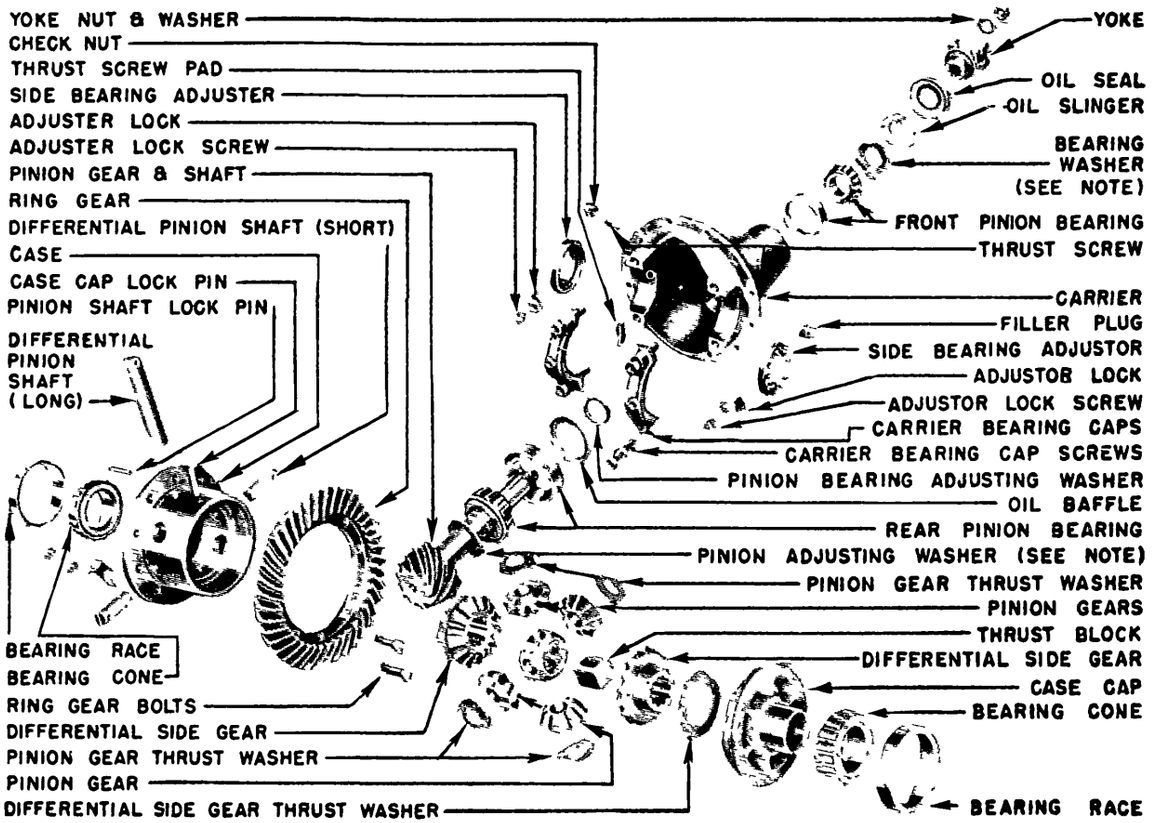
Pinion Preload Check (Pinions With Single Narrow Spacer and Shoulder on Pinion Shaft)—*Pinion bearing preload must be checked AFTER pinion gear setting is made.* Install pinion shaft adjusting washer and tool spacer SP-1371 over main body of Tool C-758-D with pinion shaft adjusting washer away from gear end of tool, then install pinion shaft rear bearing, and tool spacer SP-1370 and the pinion bearing adjusting spacer (that was removed from axle at disassembly). Insert assembly into carrier housing, then install front bearing onto shaft and into position in cup. Install compression spacer, centralizing washer and compression nut. Tighten nut to the torque indicated in "Tightening Torques" table below. Turn tool with speed wrench to seat bearings, then check bearing preload with an inch-pound wrench. Readings should be as indicated in table above. Increase size of spacer if reading is greater than upper limit, or decrease size of spacer if reading is less than lower limit. When reading is correct, remove tool and reassemble bearings and spacers to pinion shaft and install in housing.

Pinion Bearing Spacers—Spacers are available in sizes from .175" to .203" in steps of .002".

Pinion Bearing Carrier Assembly—After correct shims or spacer has been selected, disassemble Tool C-758-D and install pinion shaft adjusting spacer over pinion shaft and down against the machined surface of drive pinion. Install drive pinion rear bearing on pinion shaft and press it into place with Tool C-996. Slide bearing spacer and shim pack into position against rear bearing (if pinion shaft has a shoulder and narrow type spacer, install this narrow type spacer which was selected for correct bearing preload) Insert assembly into carrier housing (lubricate all parts with hypoid lubricant). Slide front bearing over pinion shaft and into position in bearing cup, then install bearing oil slinger. Install new seal over pinion shaft and drive into position using Tool C-359. Install companion flange on shaft and install washer and nut. Tighten nut to torque indicated in "Tightening Torques" table below.

Pinion Nut Tightening Torque
(Axles with Wide Spacer & Shim Pack)

Chrysler	Torque (Ft. Lbs.)
1953-54 6, A.T., Exc. T&C, 8 Pass.	180-320
1955 C67, A.T., Exc. Est. Wgn.	240 min.
DeSoto	
1955 S22, A.T., Exc. Est. Wgn.	300-330



CHRYSLER, DE SOTO, DODGE "SCREWED BARREL TYPE" HYPOID

Dodge	
1953-55 V8, A.T.	180-200
1955 6, A T.	180-200
(Axles with Single Narrow Spacer)	
Chrysler	
1951-54 6, Twn. & Cntry., 8 Pass.	180-320
1946-50 8, Crown Imperial	180-320
1951-54 8, All Models	180-320
1955, C67 Est. Wgn..	250 min.
1955, C68, C69, C70, C300	250 min.
DeSoto	
1951-54 6, Est. Wgn. & 8 Pass.	180-320
1952-54 8, All Models	180-320
1955, S21, All Models	300-330
1955, S22 Est. Wgn.	300-330

A.T.—Automatic Transmission.

Pinion Setting: (Without Tool C-758-D)—Pinions are marked "0" (standard) or "+" or "—" followed by figure (1 to 4 indicating necessary correction for other than standard "0" pinions). When installing new pinion of same marking as old pinion, use same spacer thickness for this new pinion. If new pinion marked "+" or "—" used to replace "0" standard pinion, use thinner washer (+ pinion), thicker washer (— pinion) than the washer used with the original pinion. The difference in thickness from the original washer should be equal in thousandths to the figure following the + or — mark on the pinion. Pinion position is controlled by spacer, installed on shaft between pinion and rear bearing. Pinion must be removed from carrier housing and bearings removed from shaft to change washer (or shims as used on some models) to correct pinion setting and gear mesh. See Ring & Pinion Gear Adjustment below also.

Washer Note—Pinion adjusting washers furnished in following thicknesses: .088", .090", .092", .094". Shims (when used) furnished .010", .0125", .015", .018" thick.

►*PINION SETTING NOTE*—Install Tool C-758-D as follows before setting pinion.

Chrysler 6 & Dodge V8 With Torque Converter—Install tool in same manner as that used for Pinion Bearing Preload (See above).

Other Models—Assemble spacer SP-1371 to main section of Tool C-758-D, then install spacer SP-1370 and slide pinion rear bearing over spacer SP-1370 and up against spacer SP-1371. Insert tool as assembled into carrier housing and install front bearing over tool shaft and into position in bearing cup. Tighten tool compression nut so torque required to

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CHRYSLER, DE SOTO, DODGE "BARREL" TYPE HYPOID (Cont.)

rotate tool assembly is as indicated in Pinion Bearing Preload table above, with bearing lubricated with hypoid gear oil

Pinion Setting (With Tool C-758-D): Fasten Gauge Block SP-528 to rear end of main tool body, and place Arbor SP-561 in differential carrier bearing supports Install bearing caps and bolts and tighten bolts to 10 ft lbs (NOTE—Remove all burrs and foreign material in bearing bores before installing arbor) Select a pinion washer that will just pass between arbor and gauge block (For an example if a 090" can be inserted but a 092" cannot be forced between the two surfaces by hand, the 90" washer should be used even though it feels loose) Check pinion shaft end as it may indicate the amount that should be added or subtracted from the washer in the above check (If mark on shaft indicated a +2, a 002" thinner washer should be used for final assembly If a —2 were indicated, then 002" should be added to washer initially selected) When correct washer has been selected for the drive pinion, disassemble tool and proceed with pinion shaft installation (See Pinion Bearing Carrier Assembly above)

Spacer Washer Note—Spacers furnished in sizes from 084" to 100" thick, in steps of 002"

Differential Case Disassembly: Remove right hand differential side bearing roller and cone assembly (use Puller C-293-C). Center punch and drill out the cap locking pins (pins on rim of differential case which lock cap in place), remove remaining pieces of pins with punch Mount the case in a vise and carefully heat the case by playing a torch flame around the outside (Do not heat the cap) to a temperature of not more than 360-400°F. NOTE—Check heat by means of a piece of ordinary soft solder, when case is hot enough, solder will just start to melt. Unscrew cap with special wrench DD-921 (start cover by jarring wrench handle with heavy hammer blow) or use a blunt drift and heavy hammer Cool parts in oil and proceed with disassembly.

Differential Gear Removal (from case)—Remove the differential pinion shaft locking pin (three lock pins on 1951 and later) by driving from case with hammer and punch Push differential pinion shaft out of case (on 1951 and later, first drive the long pinion shaft out of case then drive out the two short pinion shafts Lift out the center block, pinions and thrust washers Then remove the differential side gear and thrust washer from bottom of case). The gears, thrust washers and axle shaft thrust block will then be loose and fall out of case.

Differential Gear Assembly (into case): 1950 & Earlier

1. Reverse removal procedure, note the following: Coat parts with differential lubricant to help hold them in place during assembly of thrust block and differential pinion shaft Heat case as outlined for removal and install cap, tightening it with DD-921 if available or with a drift punch and hammer. Drill new ¼" holes through cap and install new locking pins.

1951 and Later—If new differential side gears are to be installed, place a new thrust washer over hub of gear and lay gear in differential case.

2. Line up locking pin hole in long pinion shaft with hole in differential case pinion boss (opposite boss has no pinion hole) and drive pinion shaft in until it protrudes about 1/16" on inside of case

3. Place pinion thrust washer on pinion so that the side with indents faces pinion and install pinion Insert pinion shaft block with punch marked sides facing short shaft holes and side marked (1) facing up, and continue driving long shaft through block Install the opposite pinion and thrust washer and drive shaft into final position.

4. Drive one of the short pinion shafts into either of the remaining holes until shaft protrudes 1/16" on inside of case Be sure lock pins line up. Then install thrust washer and gear and continue driving short shaft until shaft enters the hole in pinion shaft block Install the other short shaft, washer and gear in same manner.

5. Lock the three pinion shafts to the case by installing three new locking pins in the holes and peen over

6. Clamp the assembly by the drive gear flange between copper jaws of a heavy vice and heat the outside surface of the threaded portion of case with a torch flame as outlined in disassembly procedure

7. Dip the threaded portion of cap in gear oil, assemble the thrust washer and differential side gear in the cap and screw the cap into differential case with Wrench DD-921 Then, tighten securely in position with blunt punch and heavy hammer.

8. Drive in three new differential case cap lock pins 1/16" below surface of case and peen surface of case over the pins with a ball end punch Blow air through the assembly to remove all drill cuttings.

Differential Bearing Preload & Backlash Adjustment: When installing differential carrier assembly, turn adjusting nuts up to marks made before disassembly, then check bearing adjustment as follows Check drive gear for runout Gear should be true within 004" Screw out bearing adjusting nut at back face of drive gear, and screw in the opposite nut until ample backlash is obtained Tighten lower cap bolts to 90 ft lbs, leaving the top bolts fairly loose Screw out adjusting nut on tooth side of drive gear, until nut clears cup Screw in opposite adjusting nut until there is only a little backlash Turn drive gear a few times by hand to seat bearings With a dial indicator, find the point of least backlash on drive gear at 90° intervals At the point of least backlash, screw in adjusting nut at back face of drive gear until 001" shows on indicator Turn in adjusting nut on tooth side until indicator shows 006" Lock adjusting nuts in place and tighten both top cap bolts to 90 ft lbs

Ring Gear Thrust Pad Adjustment: Clearance between thrust pad and rear face of ring gear should be 006-008" To adjust, loosen locknut on left side of carrier housing (nut and screw are tack welded together) Turn stud up finger tight, and back off so there is 006-008" clearance between thrust pad and drive gear

CHRYSLER, DE SOTO, DODGE, PLYMOUTH "CAGE" TYPE HYPOID

CHRYSLER MODELS

Six, Exc. 1953-54 Auto. Trans. Cars, Town & Country Wagon, & 8 Pass. Models (1946-54)
Eight, All Models Exc. Crown Imperial (1946-50)

DESOTO MODELS

Six, All Models Exc. 1951-54 Estate Wagon & 8 Pass. Models (1946-54)

DODGE MODELS

Six & Eight, All Models Exc. 1953-55 V8 & 1955 Six with Auto. Trans. (1946-55)

PLYMOUTH MODELS

Six & Eight, All Models (1946-55)

▷OTHER MODELS NOTE—All other Chrysler, DeSoto, Dodge, Plymouth Models use "Barrel Type" Hypoid *See "Chrysler, DeSoto, Dodge Barrel Type" Rear Axle, preceding.*

▷CHANGES, CAUTIONS, CORRECTIONS

▷RING & PINION GEAR CAUTION: Both "Formate" and "Generated" type gears used. Both types of gears are interchangeable in matched sets only. Gears can be identified by part number (stamped on all gears) or by word "FORMATE" stamped on all formate gears and pinions. Gears and pinions of "Generated" type have part number only.

▷*CAUTION—Ring and pinion gears should be installed as matched sets and both gears must be of same type (Formate or Generated).*

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss Drive

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: To remove shaft, remove wheel, shaft nut, hub and brake drum assembly (use special hub puller C-675), disconnect brake line at wheel cylinder, take out stud nuts and remove oil seal and backing plate, remove and save wheel bearing adjusting shims, use puller C-499 to remove axle shaft and bearing assembly To remove bearing from shaft, use puller C-293-C When replacing shaft, check wheel bearing adjustment (endplay) as directed below

Wheel Bearing Oil Seal—Use special seal puller C-358 or C-748 to remove oil seal from housing. NOTE—If new oil seals installed, soak in thin oil for 30 minutes, roll seal with smooth bar before installing and use special tool C-201 (6 Cyl. cars), C-241 (8 Cyl. cars) to install seals.

Axle Shaft Endplay—Should be .003-.008". When dismantling axle, make certain that shims installed between backing plate and axle housing flange are saved and replaced when axle reassembled. If new shaft installed, adjust shim thickness for correct endplay as noted above (adjust equally at both wheels) Shims furnished in thicknesses of 005", 010", 0125", 015', 030'

OVERHAUL: Disassembly. With differential carrier out of axle housing, mark both bearing adjuster nuts and bearing caps so that they can be installed in correct position and approximately right adjustment, remove bearing cap screws, lift out differential and ring gear assembly. To remove pinion, take off nut on end of pinion shaft, use tool C-452 to pull pinion flange. Pull pinion out through rear end of carrier housing Use special puller C-293-C to remove bearing from pinion shaft Reassemble by reversing disassembly procedures Use tool C-496 to install pinion shaft flange

Pinion Shaft Oil Seal. Can be removed and installed without removing differential bearing assembly or pinion. To remove, take off nut on end of pinion shaft, remove rear universal yoke flange, use

CONTINUED ON NEXT PAGE

CHRYSLER, DE SOTO, DODGE, PLYMOUTH "CAGE" TYPE HYPOID (Continued)

puller C-358 or C-748 to remove oil seal. Soak new oil seals in thin engine oil for 30 minutes (seal leather must be soft and pliable), **use special tool C-359 to install oil seal in carrier housing.**

Pinion Bearing Preload: 15-25 in. lbs. (1955 Plymouth 20-30 in. lbs.) turning torque measured **without oil seal** but with pinion completely assembled in carrier.

Pinion Bearing Adjustment (With Dial Indicator): Completely assemble pinion in carrier housing but do not install oil seal, then check pinion shaft **endplay with dial indicator. If no endplay, take off pinion shaft nut, pull oil seal (see below), remove front bearing, add shims to give positive endplay reading, reassemble and check endplay (universal yoke flange must be in place and nut on shaft tight). Remove shims equal to observed endplay** plus .002" shim thickness which will give correct bearing draw or pre-load. Check pre-load with torque wrench noting turning torque required to rotate shaft which should be 15-25 in. lbs. (20-30 in. lbs. on 1955 Plymouth). After adjustment completed and oil seal has been installed, tighten companion flange nut to 175 ft. lbs. (1946-50 Chrysler & DeSoto), 180-320 ft. lbs. (1946-54 Plymouth & 1951-54 Chrysler & DeSoto), 250-280 ft. lbs. (1955 Plymouth), 180-200 ft. lbs. (Dodge).

NOTE—These shims furnished in thicknesses of .010", .0125", .015", .018".

Pinion Bearing Pre-load Check (With Tool C-758-D): With bearing cups installed in carrier housing, slide rear bearing and spacer over main body of C-758-D tool and insert in carrier. Install adjusting shims and front bearing on end of tool, install compression sleeve, centralizing washer, and compression nut over main body and tighten to 180-320 ft. lbs. (use holding tool C-784 and torque wrench). Spin main body in carrier to seat bearings. Then use in. lb-reading torque wrench to turn main body and note wrench reading which should be 15-25 in. lbs. Adjust by adding or removing shims until correct reading secured. **Adjust Pinion Setting (following) before removing tool.**

Pinion Setting: Pinions marked "0" (standard) or "+" or "—" followed by figure (1 to 4) indicating necessary correction for other than standard "0" pinions. When installing new pinion of same marking as old pinion, use same spacer thickness for this new pinion. If new pinion marked "+" or "—" used to replace "0" standard pinion, use thinner washer (+ pinion), thicker washer (— pinion) than the washer used with the original pinion. The difference in thickness from the original washer should be equal in thousandths to the figure following the + or — mark on the pinion. Pinion position is controlled by spacer, installed on shaft between pinion and rear bearing. **Pinion must be removed from carrier housing and bearings removed from shaft to change** washer (or shims as used on some models) **to correct pinion setting and gear mesh. See Ring & Pinion Gear Adjustment below also.**

Washer Note—Pinion adjusting washers furnished .084" to .100" thick in .002" steps. Shims (when used) furnished .010", .0125", .015", .018" thick.

Pinion Setting (With Tool C-758-D)—After checking pinion bearing pre-load (above) and **without removing tool,** place gauge block on top of tool body and tighten in place (gauge block takes place of pinion). Assemble cross bore gauge bar in carrier in place of carrier assembly, tighten adjusting nut capscrews to hold bar in place. Select spacer washer equal in thickness to clearance between gauge block and gauge bar. This is correct thickness for standard pinion (see Pinion Setting data above). Install this spacer washer on pinion shaft (or correct spacer thickness in accordance with pinion marking) when installing pinion in carrier.

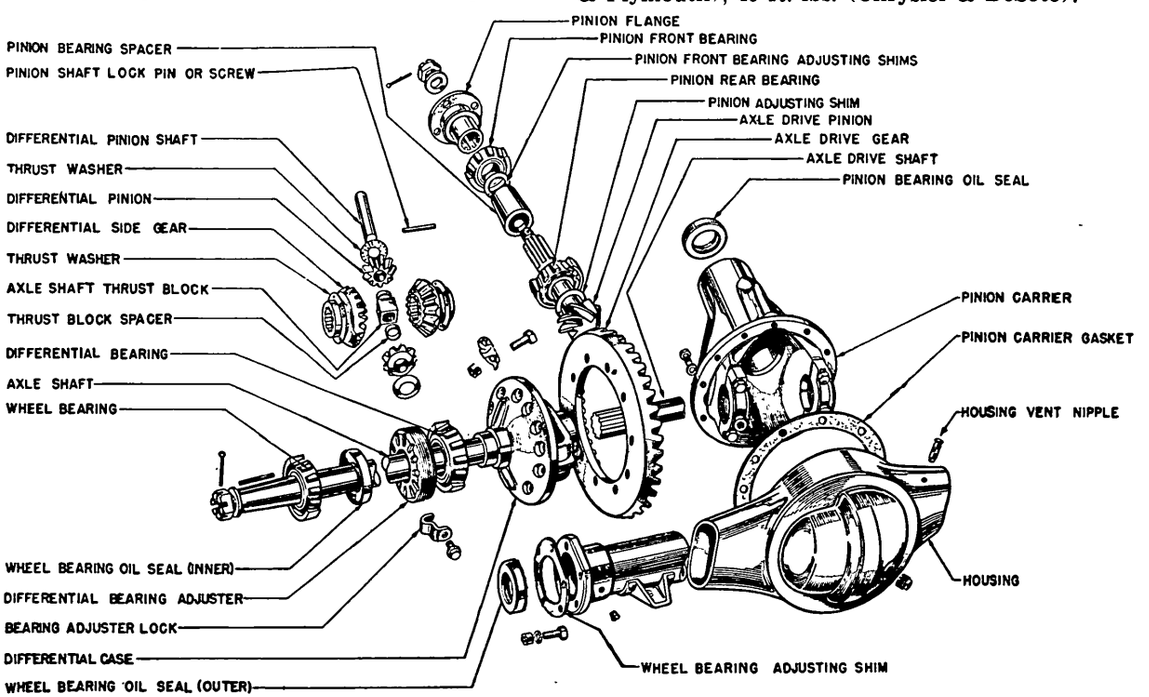
Differential Gear Assembly: The differential pinion gear shaft **retained by pin or lockscrew. Clearance between differential side gears and pinions should be .004-.012" (controlled by thrust washer in back of each side gear). When assembling differential gears, make certain that thrust washer installed in back of each differential pinion and side gear, thrust block installed on pinion shaft at center, and that spacer installed between thrust block and each differential pinion. CAUTION—Thrust block must be properly centered in differential carrier. This block transmits end thrust from one axle shaft to the other.**

Differential Bearing Adjustment:—Bearings **should be just tight enough to cause slight drag when ring gear revolved by hand (assembly must not spin). Mark adjusting nuts and bearing caps before dismantling differential assembly to allow replacement in correct position. When installing assembly, tighten adjusting nuts with sufficient force to seat bearing cups solidly against shoulder in bore, back off right hand nut, tighten left hand nut until ring gear has slight backlash, turn gear several rotations to seat bearings, check backlash with dial indicator. At point of minimum backlash (check at four points 90° apart), turn left hand adjusting nut in or out until backlash is exactly .001", then turn right hand adjusting nut in until backlash shown on dial indicator has increased to exactly .006". Tighten adjusting nut capscrews and install adjusting nut locks. This procedure will provide correct bearing pre-load and correct ring and pinion gear backlash in one operation.** Check gear mesh by painting gears.

Ring & Pinion Gear Adjustment: Paint gears to check mesh. Backlash should be .006-.008" (Chrysler & DeSoto), .006-.010" (Dodge & Plymouth). Adjusted by backing off one differential bearing adjusting nut and tightening opposite nut equally. See Pinion Setting and Differential Bearing Adjustment above.

Ring Gear Backlash Adjustment. Check with dial indicator. To adjust, back off one differential bearing adjusting nut, tighten opposite nut equally. Check differential bearing adjustment.

Ring Gear Replacement:—Ring gear is press fit on differential case and is held in place by bolts or by capscrews. Tighten all evenly to 35-40 ft. lbs. (Dodge & Plymouth), 40 ft. lbs. (Chrysler & DeSoto).



CHRYSLER, DE SOTO, DODGE, PLYMOUTH "CAGE TYPE" HYPOID

1941-48 FORD & MERCURY

Ford, Passenger Car Models (1941-48)
Ford, Half-Ton Truck Models (1941-47)
Mercury, All Models (1941-48)

▷COMM'L AXLE NOTE (1942 & Later): The rear axles on these models are similar to passenger car axles, except that Hotchkiss Drive is used. Pinion assembly is retained by a Pinion Bearing Retainer and Pinion Grease Retainer Support bolted on front face of pinion housing (in place of torque tube) and a rear universal joint yoke is bolted directly on the end of the pinion shaft. These axles serviced in same manner as passenger car types except that data on torque tube should be disregarded.

DESCRIPTION: Spiral bevel gear, ¾ floating type with torque tube drive & straddle mounted pinion. Pinion mounted on double roller bearing (straddle mounted with additional roller bearing behind pinion).

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT: Remove axle shaft from inner end after axle dismantled and differential case bolts removed (side gears integral with shafts). When installing axles see that free travel or play at wheel keyway does not exceed .010" or endplay exceed .015". If play excessive, check differential gears for wear (pinion clearance .005" maximum).

PROPELLER SHAFT: Propeller shaft is part of rear axle assembly (pinned to pinion shaft). See overhaul data below. Propeller shaft bearings in torque tube are serviced as follows:

Propeller Shaft Forward Bearing:—In forward end of torque tube behind speedometer drive gear. Two types used (use B-4645-A roller assembly with split sleeve, 68-4645 with small rollers with solid sleeve). Use special puller SV-245 to remove solid sleeve from torque tube. Install new grease retainer (use tool A-310) with sharp edge of leather toward universal joint.

Propeller Shaft Center Bearing:—In torque tube at center. On types with solid propeller shaft, front bearing sleeve must be removed before center bearing can be removed with SV-186 tool (see above).

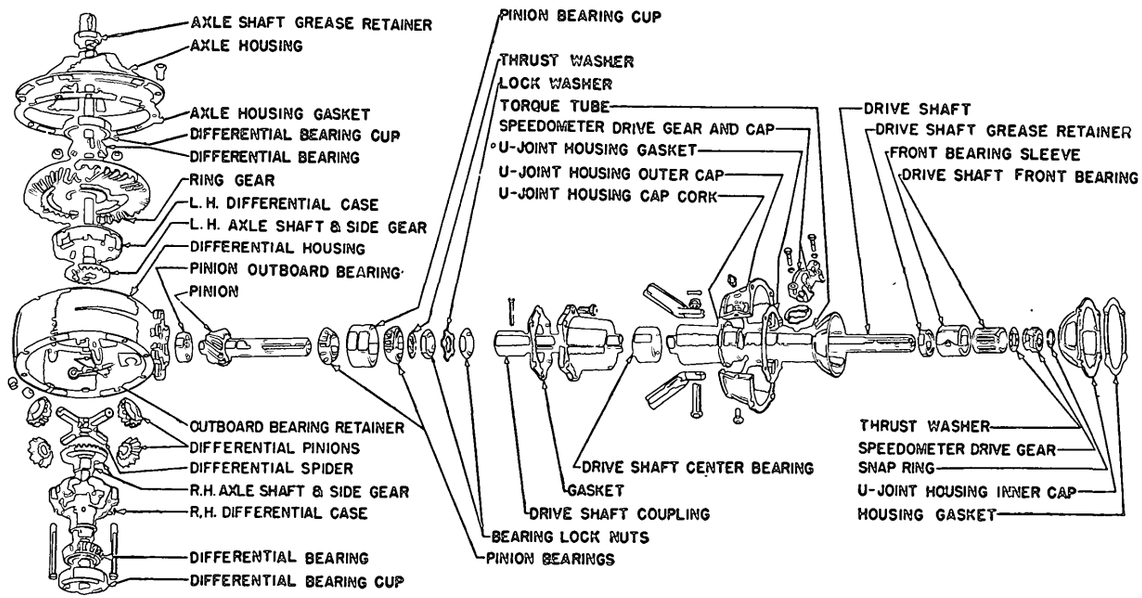
OVERHAUL: Disassembly. Remove speedometer driven gear assembly. Remove snap ring on forward end of propeller shaft, withdraw speedometer drive gear and thrust washer. Take out flange mounting screws at rear of torque tube, withdraw propeller shaft from tube toward rear. Drive out rivet in coupling, disconnect propeller shaft from pinion. Use AATA-1 driver to remove pinion assembly from housing, BV-92 puller to remove bearings.

Pinion Bearing Assembly:—Assemble bearings on pinion shaft (see illustration), tighten bearing locknuts so that bearing cup turns on cones with heavy drag. Heat housing (use approved heater or immerse housing neck in boiling water or hot oil for 1-2 minutes), install outboard bearing (use BV-94 driver), then with housing still hot install pinion assembly making certain that bearing cup is against shoulder in housing. Check pinion bearing adjustment only after installed in housing.

Pinion Bearing Adjustment:—Use approved gauge ABV-129 to check bearing adjustment. The setting (torque required to turn pinion) should be 12-17 in.lbs. To adjust, tighten pinion bearing nut until correct gauge reading secured (check only after pinion assembly installed in axle housing), then tighten locknut securely and turn lockwasher ears over on nuts to prevent nuts loosening in service.

Differential Bearing Adjustment:—Assemble axle housings with gasket thickness of .008-.010" between right and left hand axle housing and pinion housing. Check bearing adjustment by rotating both axle shafts simultaneously (rotating one shaft will not turn differential assembly). Differential assembly should turn with a heavy drag. If clearance too great, replace gasket between right hand axle housing and pinion housing with one thinner gasket (B-4035-B) .004" thick. Check backlash.

Ring & Pinion Gear Backlash: Use a dial indicator to show pinion gear shaft movement with ring gear stationary. Backlash .012" max. (Ford), .010" max. (Lincoln-Mercury). To adjust, increase or decrease maximum. Adjust by increasing or decreasing thickness of gasket between left hand axle housing and pinion housing. Total gasket thickness must not be changed in order not to disturb bearing adjustment (increase or decrease right hand gasket thickness equally).



FORD, LINCOLN-ZEPHYR, MERCURY (PASS. CAR) SPIRAL BEVEL GEAR AXLE

LINCOLN (ZEPHYR) HYPOID

Zephyr, Cont'l, & Custom Models (1941-48)

DESCRIPTION: Hypoid gear, ¾-floating, with torque tube drive. Same design as used on previous model (see Ford, Lincoln, Mercury Rear Axle) except for pinion mounting as follows:

Pinion Assembly:—Pinion integral with shaft and mounted on taper roller bearings. Bearing cups seated directly against shoulders in housing. Bearing cones positioned on shaft by spacer

Replacement Exchange Axle Assemblies—Assemblies consisting of differential housing (axle housing center section) with pinion gear installed (and set up for correct bearing adjustment and pinion gear mesh), and mated ring gear are furnished for all models as Part No. 86H-4020 (except 1942 models without Liquamatic Drive), No. 26H-4020 (1942 models without Liquamatic Drive only).

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

OVERHAUL: Manufacturer recommends that Axle Assembly (Differential housing with Pinion installed) not be dismantled and should be serviced by Axle Assembly Exchange (Assembly furnished with Pinion installed, bearings adjusted, and set for marked backlash with mated Ring Gear).

Differential Bearing & Ring Gear Backlash Adjustment—Gaskets for installation between differential housing and right and left axle housings furnished in three thicknesses as follows: .008-.010" (86H-4035-A), .004-.006" (86H-4035-B), .013-.018" (86H-4035-C). Normal gasket thickness (for correct backlash and differential bearing adjustment) is .005-.008" at each side of differential housing. Vary thickness at left hand housing to adjust backlash (keep total thickness for both sides same to avoid disturbing differential bearing adjustment), vary thickness at right hand side to adjust differential bearings (without changing backlash).
Ring Gear Backlash—Should be .002-.004". Ring gears marked with etched figure indicating correct clearance for each ring and pinion gear set.

FORD, LINCOLN, MERCURY "INTEGRAL CARRIER TYPE" HYPOID

Ford, Station Wagon (1949-55)
Ford, Sedan Delivery (1952-55)
Ford, ½-Ton, F-1, F-100 Trucks (1948-55)
Ford, F-250 Trucks (Late 1955)
Ford, P-350 Parcel Delivery (Late 1955)
Ford, Thunderbird & Interceptor (1955)
Lincoln, All Models (1949-55)
Mercury, Pass. Cars (1949-51 & 1955)
Mercury, Station Wagon (1949-55)

NOTE—See "Ford & Mercury Hypoid (Separate Carrier)" for other Ford & Mercury applications.

►CHANGES, CAUTIONS, CORRECTIONS

►**1951-52 FORD STATION WAGON & F-1 TRUCK DIFFERENTIAL GEAR & PINION PRODUCTION CHANGE (Used for Short Time Only):** Gears and pinions used in production between approximately Dec. 26, 1951 and March 1, 1952 differed from previous and later types by having a special gear tooth chordal thickness (gear tooth thickness increased .003", pinion tooth thickness decreased .003"). After March 1, 1952, the previous type gears were again used. GEAR & PINION TYPES MUST NOT BE INTERCHANGED (will result in binding or excessive back lash depending on combination). *CAUTION—These gear and pinion types must be used together. If necessary to replace gears or pinions in these axles (Dec. 1951 to Mar. 1952), install complete set of gears and pinions from service stock.*

►**1950 REAR AXLE PRODUCTION CHANGE (Except Lincoln & Cosmopolitan)**—Entered production (Mercury) June 1950, (Ford F-1 Truck) Late 1950, (Ford Station Wagon) Start of production 1951. Ring gear diameter changed from 9¼" to 8½". Bolt circle changed from 5⅝" to 6⅝". Axle ratios remain approximately the same although number of teeth on ring gear and pinion have been decreased. Housing has also been changed. Parts are not interchangeable with previous axle.

►**1949 RING GEAR MOUNTING BOLT PRODUCTION CHANGE:** New type bolts No. 350634-S, used to mount ring gear on differential case, beginning Jan. 1949. When installing new parts on axles prior to this date, change ring gear bolts to new type (can be done by working through inspection cover hole and changing two bolts at a time).

►*MOUNTING BOLT IDENTIFICATION NOTE*—New type bolts (above) can be identified by following marks on head: "A" or "F" in circle, "H" (plain letter), "C" with radiating lines, or radiating lines without a letter. All other marked bolts are old type.

►**REAR AXLE IDENTIFICATION NOTE**—Metal tag attached to one axle housing cover screw stamped with number of ring gear and pinion teeth.

►*CAUTION—Re-install identification tag when housing cover replaced.*

►**1955 FORD REAR AXLE PRODUCTION CHANGES (Applies to all previous "Integral Carrier" type rear axles):** Lock straps not required on ring gear-to-case capscrews (torque to 40-50 ft. lbs.). Differential bearings capscrew lockwashers no longer used (torque to 70-90 ft. lbs.). Pinion shaft oil slinger no longer used.

DECRIPTION: Semi-floating, hypoid gear, Hotchkiss drive type. **This axle does not have a s parate differential carrier assembly.**

AXLE SHAFT REPLACEMENT: Remove wheel, remove brake drum by taking out tinnerman nuts securing drum to axle flange. Rotate axle shaft until hole in shaft flange lines up with one of four bolts mounting backing plate and bearing retainer on housing, remove all bolts. Use Tool 4235A (sliding hammer) to remove axle shaft and bearing assembly from housing. Use care not to dislodge the brake backing plate or damage the oil seal in the housing. *NOTE—If oil seal being replaced, disconnect brake tube from backing plate. Plate can be laid on floor without disconnecting brake cable.*

Wheel Bearing Replacement: Cut bearing retainer ring with chisel, slide ring off shaft, use Tool 4234 to press bearing off shaft in arbor press. When cleaning parts, DO NOT wash pre-lubricated wheel bearing with solvents (will remove lubricant) Press bearing on shaft, using Tool 4234, then press on new wheel bearing retainer ring. (CAUTION—do not attempt to press bearing and retainer on in one operation).

Oil Seal Replacement: Use Tool 4235-B to install seal in housing. Use great care to keep seal square with housing while installing. Seat seal **lightly** against shoulder in housing. Apply cup grease to seal surface before installing axle shaft.

Axle Shaft Installation: Use care not to damage oil seal when installing axle shaft. Tighten bearing retainer and backing plate bolts to 30-35 ft. lbs. Install brake drum and secure to axle flange with tinnerman nuts. CAUTION—If brake tube removed, reconnect and bleed brakes.

Drive Pinion Oil Seal Replacement: (Without removing Differential Carrier): Disconnect drive shaft at rear universal joint. Mark position of universal joint flange, nut & shaft with a punch, to insure installing at the same position. Remove pinion shaft nut and pull flange with Tool 4858-Q. Install an oil seal puller and pull seal from housing. To install, position seal in housing and drive into place with Tool 4676. Install flange on pinion shaft with marks in line, and install pinion shaft nut and tighten until it is tight on shaft with marks on flange, shaft, and nut aligned.

REMOVAL OF AXLE: *See "Rear Axle" on Car Model page.*

REAR AXLE (Disassembly): Remove axle shafts (see Axle Shaft Removal above).

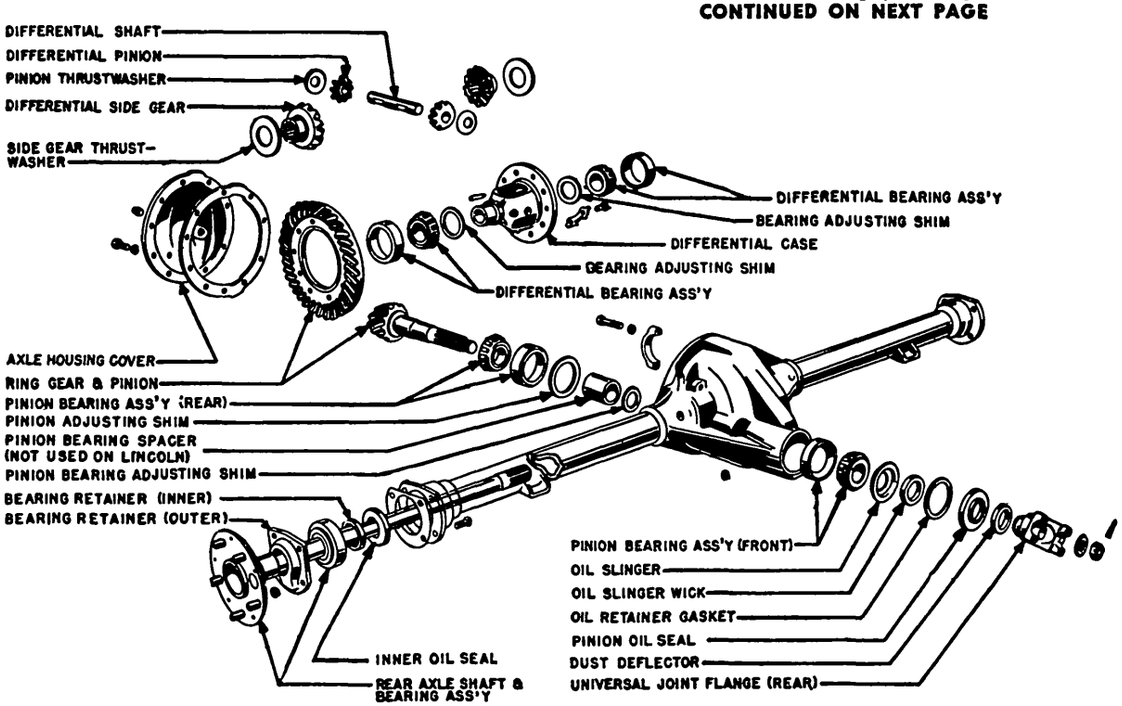
1)—Remove cover assembly and gasket and install axle housing spreader Tool 4000-A and spread axle housing not more than .015".

►*CAUTION—When using axl spreader tool to spread axle housing, do not spread more than .015" which is necessary for differential removal, and remove spreader immediately to avoid housing taking on permanent "set."*

2)—Mark differential side bearing caps to insure correct reassembly (NOTE—Lincoln bearing caps are marked at factory with a letter or a figure stamped on cap, and on the housing at a point adjacent to the cap. Left side marks are horizontal and right side marks are vertical). Remove bearing caps and pry differential assembly loose from housing and lift assembly out.

3)—Remove nut from pinion shaft, holding the flange with Tool 4851-C. Remove flange with Tool 4858-D (Lincoln & Mercury), 4858-Q (Ford). Drive

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LINCOLN, MERCURY, FORD "INTEGRAL CARRIER" HYPOID AXLE

FORD, LINCOLN, MERCURY "INTEGRAL CARRIER" TYPE (Continued)

pinion toward rear of housing with Tool 4201, and withdraw pinion and rear bearing cone and roller assembly.
4)—Remove oil seal from front end of housing with Tool 1175-B. Lift out pinion shaft ring gasket, wick, slinger and front bearing cone and roller assembly.
5)—Remove pinion front bearing cup with Tool 4628-B, and rear bearing cup with Tool 4628-D.
CAUTION—Do not loose shims located in housing back of rear bearing cup. If pinion is not to be replaced, these shims will be installed at reassembly.

Differential Disassembly: Remove differential side bearings with Tool 4221-C, and remove shims located between bearings and carrier (Note the number and thickness of shims behind each bearing as these shims must be replaced unless new parts are to be installed). Pry ring gear bolt locking tabs away from bolt heads and remove capscrews and ring gear. Drive out pin securing differential pinion shaft in case and take out shaft, pinion, side gears, and thrust washers.

Differential Assembly: Lubricate all parts with differential lubricant. Install side gears and thrust washers, pinion gears and thrust washers and the differential pinion shaft. Secure pinion shaft with locking pin (stake pin in place to avoid having it fall out). Position the ring gear on the case and secure in place with capscrews and new lockwashers. Tighten capscrews to 50-60 ft. lbs. Bend tangs of lockwashers up against capscrews.

▷*REPLACEMENT DIFFERENTIAL GEAR & PINION CAUTION: See Parts Production Change above for different type gears and pinions which must be used together.*

Differential Bearing & Ring Gear Backlash Adjustment: Install side bearings on differential assembly without shims. Install differential assembly in housing (without pinion shaft) and use dial indicator to measure total endplay of unit and note this figure. Select shims (furnished .003", .005", .010", thick for Ford; .0025-.0035", .0045-.0055", .009-.011", .027-.033" for Lincoln & Mercury) equal to this amount plus shims equal to desired bearing preload which is TOTAL SHIM PACK for the differential assembly (total for installation on both sides of case). After pinion installed (see below) in housing, re-install differential assembly without shims and measure endplay from point where ring gear and pinion backlash is zero to point where differential assembly is solidly against left hand bearing (mount dial indicator at back face of ring gear, slide carrier back and forth). Select shims equal to this indicator reading less .005" for desired backlash from the total shim pack (above) and install these shims back of left hand differential assembly side bearing cone, install remaining shims of total shim pack behind right hand differential assembly side bearing cone. See "Rear Axle Assembly" below, for installation of differential assembly.

Car Model	Pinion Preload Shims Shim Thickness
Ford (1948-54)	007-.009"
Ford (1955)	.004-.009"
Lincoln (1949-55)	.005-.009"
Mercury (1949-54)	.005 .009"
Mercury (1955)	.010"

▷*1955 LINCOLN & MERCURY TOOL NOTE:* Tool 4205-A is available for use on 1955 Lincoln & Mercury Rear Axles. Tool consists of two dummy bearings which replace differential case side bearings in making adjustments as outlined above. Procedures remain the same.

Ring Gear Backlash & Gear Mesh: Measure backlash with a dial indicator. If not within limits of .003-.006" (Ford Truck), .003-.008" (Others), adjust by shifting shims behind side bearing cups from one side of the carrier to the other but do not change total shim thickness which would affect bearing pre-load above. Check backlash at four equal spaced points around ring gear. Backlash must be within limits and must not vary more than .002" between these checking points.

REAR AXLE (Assembly): Assemble rear axle in the following sequence:

Pinion Bearing Assembly Installation: Lubricate all bearings and thrust washers with differential lubricant before installation. Install front and rear bearing cups in housing using Tool 4628-D (Lincoln & Mercury), Tool 4628-N (Ford) for rear bearing cup; Tool 4628-B (Lincoln & Mercury, Tool 4628-N (Ford) for front bearing cup *(CAUTION*—Re-install shims behind rear bearing cup. If new parts being used, install approximately .030" shim thickness to check pinion setting). Install rear bearing cone and bearing assembly on pinion shaft, insert pinion in housing and check pinion setting (below) to determine correct thickness of shims required. If correction required, remove rear bearing cup from housing and re-install with correct number and thickness of shims behind bearing cup. Lubricate bearings and insert pinion in housing, place bearing spacer on shaft (spacer not used on Lincoln), re-install bearing adjusting shims on shaft (same thickness as removed unless new parts installed, in which case install approximately .065" shim thickness to check bearing adjustment). Install pinion shaft front bearing cone and roller assembly with Tool 4858-B and tighten tool nut to torque indicated in "Tightening Torques" table below. Check pinion bearing preload (see below) and add or remove shims from shaft behind front bearing cone until correct bearing pre-load secured. Remove tool, install oil slinger, wick, and gasket, and oil seal (use Tool 4676). See that oil deflector on companion flange is in good condition (new deflector can be installed with Tool 4859), install companion flange with Tool 4858-B tighten companion flange nut to torque indicated

Pinion Nut Tightening Torque	
1948-54 Ford	140-180 ft lbs.
1955 Ford	200-220 ft. lbs.
1949-54 Lincoln & Mercury	100-150 ft. lbs.
1955 Lincoln & Mercury	180-200 ft. lbs.

Pinion Bearing Preload: Turning torque with pinion rotating should be as indicated in table below (disregard torque required to start pinion) with nut on end of pinion shaft properly tightened to torque indicated in "Tightening Torques" table above. To check preload, position axle so that pinion shaft is vertical, use torque indicator (with Tool 4858-B) and note indicator reading with shaft rotating.
Adjustment—If torque reading low, remove shims from shaft behind front bearing cone; if reading high, add shims at this point Shims furnished .003", .005", 010", .030" thick.

Car Model	Pinion Bearing Preload Preload (In. lbs.)
Ford (1948-54)	8-12
Ford (1955)	10-30
Lincoln & Mercury (1949-54 old bearings)	8-12
Lincoln & Mercury (1955 old bearings)	10-20
Lincoln & Mercury (new bearings)	18-20

Pinion Setting: Pinion position must be checked when new parts installed or when same number and thickness of shims, as removed from behind rear bearing cup, not re-installed. Check pinion position with Pinion Depth Gauge Tool 4020-A (Ford), 4020-B (Lincoln & Mercury) as follows: With pinion inserted in housing, install gauge in differential side bearing bores (use large diameter rings of Tool 4020-B for Lincoln, and small rings for Mercury). Install bearing caps and torque capscrews to 60-70 ft. lbs. Bolt anvil clamp on axle housing flange directly over pinion, install anvil under clamp so that anvil rests on face of pinion and contacts gauge micrometer (Lincoln & Mercury). Check micrometer reading (Micrometer is part of Tool 4020-B. Outside type micrometers must be used with Tool 4020-A) which should agree with table below for all standard pinions marked "0." If micrometer reading greater than figure in table, subtract equal thickness of shims from .030" shim pack installed behind pinion rear bearing cup; if micrometer reading less than figure in table, add equal thickness of shims as above; and finally correct this shim thickness for all pinions marked other than standard "0" pinion as follows:
Pinion Marking Note—Standard pinions are marked "0." When installing a "—" (minus) pinion ADD shims equal in thousandths to the figure following this minus sign on the pinion; for "+" (plus) pinions, SUBTRACT shims similarly from the standard shim thickness (for pinions marked "0"). These shims furnished in thicknesses of .003", .005", .010" (Ford), .0025-.0035", .0045-.0055", .009-.011", .027-.033" (Lincoln & Mercury).
▷*CAUTION—Changing shim thickness to adjust pinion position will disturb bearing adjustment unless same shim thickness is added or removed from shaft at front bearing cone*

Pinion Gauge Setting (Gauge 4020-B)
(For Standard Pinions Marked "0")

LINCOLN	
1949-55 (All Ratios)	.562"
MERCURY	
1949-50① (4.27-1, 4.55-1)	500"
1949-50① (3.91-1)	593"
1950-53 (With 8½" Ring Gear)	.625"
1954-55 (All Ratios)	.562"

Pinion Gauge Setting (Gauge 4020-A)
(For Standard Pinions Marked "0")

FORD	
1949-51 Sta. Wgn. (3.91-1)	1.657"
1949-51 Sta. Wgn. (4.27-1)	1.750"
1948-51 ½-Ton & F-1 Trucks	1.750"
1952-55 (All Ratios)②	1.625"

①—Early 1950. Later 1950 used 8½" ring gear.
②—With 8½" ring gear.

FORD & MERCURY "SEPARATE CARRIER TYPE" HYPOID

Ford, Pass. Car Exc. Sta. Wgn. (1949-55)
Ford, Sedan Delivery (1949-51)
Mercury, Except Sta. Wgn. (1952-54)

►*NOTE: See "Ford, Lincoln, Mercury Hypoid (Integral Carrier)" for other Ford & Mercury applications.*

►CHANGES, CAUTIONS, CORRECTIONS

►*REAR AXLE LUBRICATION CAUTION: If necessary to change rear axle lubricant before 5000 miles, refill axle with M-4642-A or B lubricant. After 5000 miles of operation, Multi-Purpose type gear lubricant can be used for refilling.*

►*1949 PINION GEAR PRODUCTION CHANGE:* Early 1949 rear axle pinions had shims placed between rear bearing cup and carrier housing. Later type has shims placed between shoulder on pinion gear and rear bearing cone. Later type pinion can be used as replacement for earlier type (ring gear and pinion in matched sets).

►*1951-54 DIFFERENTIAL GEAR CASE CAUTION:* Differential Gear Case, Part No. 1A-4205 (Painted Red), used with 3.31-1 ratio carrier and gear assembly. Part No. 8A-4205 used with other ratios. THESE CASES ARE NOT INTERCHANGEABLE.

►*1952-54 MERCURY REAR AXLE "CLINK" CORRECTION:* Hardened, phosphate coated slinger, Part No. MA-4670-A, has been released to alleviate above condition, replacing Part No. 0A-4670. To install proceed as follows: Remove drive shaft assembly. Remove companion flange only from rear axle. Polish end of companion flange where it contacts slinger, with fine crocus cloth. Reassemble companion flange, torque pinion nut to 150 ft. lbs. Install drive assembly.

DESCRIPTION: Semi-floating hypoid gear, Hotchkiss drive, with separate differential carrier assembly which can be removed for work.

AXLE SHAFT REPLACEMENT: Remove wheel and tire assembly, then remove the Tinnerman nuts that secure brake drum to axle flange. Remove brake drum. Working through the hole provided in axle shaft flange, remove nuts securing brake carrier plate to axle housing. Pull axle shaft assembly out of housing with Axle Shaft Puller Tool. 4235-N (Ford), 4235-A (Mercury). Do not dislodge brake plate or damage oil seal in housing. Install one nut to hold brake plate in place.

Wheel Bearing Replacement (Ford): Remove bearing retainer from shaft with Tool 2240-N. Use puller to remove bearing or grind through both races and lift off bearing *(CAUTION–Do not re-use bearing).* To install bearing, place retainer plate on shaft, using Tool 1225-N to press new bearing firmly in place against shoulder on shaft. Press retainer ring firmly against bearing.

Wheel Bearing Replacement (Mercury): Cut wheel bearing retainer with chisel, then remove bearing with Tool 1225-C. Use Tool 1225-B to replace bearing. Press into place. Use same tool to press on bearing retainer.

►*CAUTION: Use extreme care not to damage oil seal bearing surface on axle.*

Oil Seal Replacement–Soak new seal in engine oil for at least ½ hour. Use Tool 4235-N or A to drive seal into place against shoulder in housing. Check fit of seal in housing to prevent oil leaks around seal.

REAR AXLE ASSEMBLY REMOVAL: *See "Rear Axle" on Car Model pages.*

REAR AXLE OVERHAUL: *(NOTE–It is not necessary to remove rear axle assembly from car for overhaul).* After axle shafts removed, proceed as follows:

Differential Carrier: Removal–Disconnect propeller shaft rear universal joint. Drain lubricant from housing and remove carrier to housing nuts. Remove carrier from housing.

Disassembly–Before disassembling carrier, clean thoroughly and inspect drive pinion, drive gear, and case assembly for endplay. Inspect gear tooth pattern to determine if gears are worn, defective, or out of adjustment. Check backlash and drive gear runout. Mark differential bearing caps and carrier supports with matching numbers to insure proper reassembly. Remove differential adjusting nut locks, bearing caps and adjusting nuts. Lift differential assembly out of carrier. Remove universal joint flange nut and washer, then pull flange off drive pinion. Lift drive pinion, rear bearing and bearing spacer out of carrier. Remove oil seal using Tool 1175-H or B, and lift oil slinger and bearing out of case. Drive pinion bearing cups out of carrier with a brass drift, or use Tool 4628-P or F.

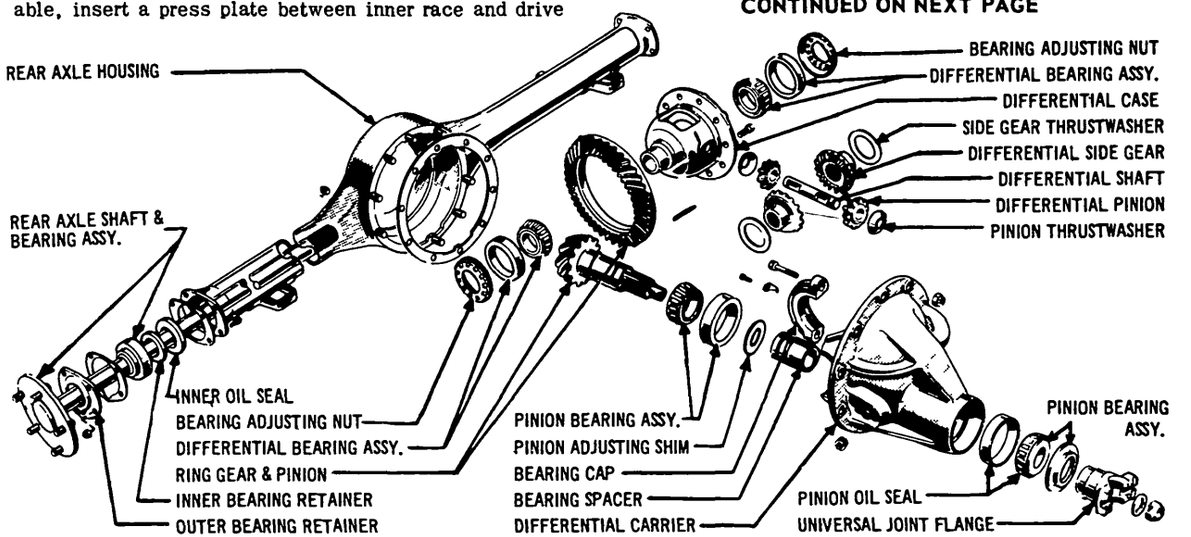
Differential Case Disassembly–Remove differential bearings with Puller 4221-N or C. Remove capscrews attaching drive gear to differential case and tap gear off case with a soft hammer. Drive pinion shaft locking pin out of case with a drift, working from the drive gear side of case. Remove pinion shaft and remove differential pinions, side gears, and thrust washers.

Drive Pinion Disassembly–Remove rear bearing from drive pinion with Puller 4221-N or C. If tool not available, insert a press plate between inner race and drive pinion out of bearing. Remove shims from drive pinion, noting total thickness of shim pack for use at reassembly.

Differential Carrier: Reassembly–If replacement of drive pinion or drive gear is necessary, both parts must be replaced. When differential case is being replaced, be sure that the new case is the same as the original case. Coat all parts with differential lubricant before installation and use new gaskets.

Drive Pinion Adjustment (Master Pinion Tool Method)–Make sure that bores in carrier are free of burrs and metal chips, then install drive pinion bearing cups in carrier using an arbor press and a suitable driver. Slide drive pinion rear bearing on Master Pinion Tool 4610-CC, then position tool in carrier. Install front bearing on tool, then install universal joint flange, washer, and nut using Tool 4858-P or E. Oil bearings then tighten nut until bearing preload is 15-20 inch pounds. Check preload with Tool 4610-N. *(NOTE–Alternately turn drive pinion while tightening nut to properly seat bearings).* Install Pinion Depth Gauge 4610-A or 4610-P. Measure distance between depth gauge and pinion with a 2-3" micrometer. Remove pinion depth gauge and master pinion tool from carrier. Check number etched on end of pinion to be installed. With this number and the micrometer reading, select total shim thickness requirement (see "Pinion Setting Shim Table". As an example, a reading of 2.531" from Tool 4610-A *(reading from Tool 4610-P would be .500" less)* with a pinion marked "17", requires .033" in shims. Shims are available in .010", .011", .012", .013", and .016". Install proper shims on pinion shaft, then press the rear bearing on pinion until it is seated against shims *(CAUTION–When checking pinion depth, always use the same bearings that are to be used for service in the axle).* Install pinion assembly in carrier, then install a new bearing spacer and front bearing. Place the oil slinger and seal on pinion shaft, and

CONTINUED ON NEXT PAGE



FORD PASS. CAR REAR AXLE (SEPARATE CARRIER)

FORD & MERCURY HYPOID "SEPARATE CARRIER TYPE" (C ntinued)

drive seal into place with Tool 4676-A. Install universal joint flange with Tool 4858-P or E, and install washer and nut. Alternately turn the pinion while tightening nut until bearing preload is 22-28 inch pounds (new bearings), or 13-18 inch pounds (used bearings).

PINION SETTING SHIM TABLE

Micrometer Reading Using Tool 4610-P	Micrometer Reading Using Tool 4610-A	Pinion Marking								
		12	13	14	15	16	17	18	19	20
2.025	2.525	.022	.023	.024	.025	.026	.027	.028	.029	.030
2.026	2.526	.023	.024	.025	.026	.027	.028	.029	.030	.031
2.027	2.527	.024	.025	.026	.027	.028	.029	.030	.031	.032
2.028	2.528	.025	.026	.027	.028	.029	.030	.031	.032	.033
2.029	2.529	.026	.027	.028	.029	.030	.031	.032	.033	.034
2.030	2.530	.027	.028	.029	.030	.031	.032	.033	.034	.035
2.031	2.531	.028	.029	.030	.031	.032	.033	.034	.035	.036
2.032	2.532	.029	.030	.031	.032	.033	.034	.035	.036	.037
2.033	2.533	.030	.031	.032	.033	.034	.035	.036	.037	.038
2.034	2.534	.031	.032	.033	.034	.035	.036	.037	.038	.039
2.035	2.535	.032	.033	.034	.035	.036	.037	.038	.039	.040

Driv Pini n Adjustment (Tooth Pattern Method)–Make sure bores in carrier are free of burrs and metal chips, then install drive pinion bearing cups in carrier. If the original drive pinion is being used, install the original shim pack on drive pinion. If a new pinion is being installed, and the drive pinion marking is the same as the old pinion, install original shims. However, a thicker shim pack is necessary if the number on the pinion is greater, or a thinner shim pack if the number is smaller. For instance, if the number on the old pinion was "15", and the number of the new pinion is "17", install a .002" thicker shim pack. Conversely, a .002" thinner shim pack should be used if the new pinion number is "13". If the old bearings are to be used, increase the shim pack thickness .002". If the old shims are not available, use a shim pack .030" to .032" thick for a trial build up. Install the shim pack, then install the pinion rear bearing. Install drive pinion assembly in carrier, install a new bearing spacer, then install pinion front bearing. Install oil slinger on top of front bearing. Place oil seal over end of drive pinion shaft, then drive oil seal into place with Tool 4676-A. Install universal joint flange with Tool 4858-P or E. Install the flange washer and a new nut. Alternately turn the pinion while tightening the the nut. *(CAUTION–Do not damage the spacer on drive pinion by over-tightening the drive pinion nut).* If new drive pinion bearings and a new oil seal have been installed, tighten drive pinion nut until bearing preload is 22-28 inch pounds (new bearings), 13-18 inch pounds (old bearing).

Diff r ntial Cas R ass mbly–Install differential side gears, pinions, and thrust washers in differential case. Install pinion shaft and pinion shaft lock pin. Position ring gear on case and install the drive gear capscrews and tighten screws to 35-40 ft. lbs. Drive differential bearings on case hubs with Replacer Tool 4222-N or H, until they are flush with shoulder on case.

Installation–Place differential side bearing cups on bearings and position differential case assembly in carrier so the adjusting nuts will engage approximately the same amount of threads at each end of case. Thread adjusting nuts in carrier against bearing cups. Be sure that nut threads index with carrier threads. Carefully position the bearing caps on adjusting nuts, aligning marks made during disassembly. Be sure bearing cap threads index with adjusting nut threads. Install bearing cap bolts and tighten bolts until snug (final tightening will be made after ring gear and pinion tooth contact pattern is adjusted). Turn adjusting nuts while tightening bolts, to make sure threads are aligned. Back off the bolts ¼ turn to allow cups to move. Make sure the right hand adjusting nut is loose, then tighten the left hand nut (gear side of differential) until drive gear meshes with drive pinion. Feel the backlash as the nut is being tightened. Continue tightening the nut until no backlash is evident. Tighten the left hand nut **two additional notches** to properly seal and align the bearing cup. Loosen the nut until it just contacts the bearing cup when the backlash is zero. Tighten the right hand adjusting nut until it contacts the bearing cup, then tighten the right hand nut an additional 3 to 3½ notches to properly preload the differential side bearings. Tighten bearing caps to 75-80 ft. lbs. Install a dial indicator and measure the backlash in several locations *(CAUTION–*If backlash readings vary more than .003", the runout of the gear is excessive). The correct backlash is .003-.008". If not within limits, loosen bearing cap bolts ¼ turn, and move drive gear and case assembly as required. To move the case assembly, loosen one adjusting nut one notch and tighten the other adjusting nut one notch.

Gear Tooth Contact–*(NOTE–New gear sets have a heavy-load tooth contact pattern rolled on the gear teeth with a special machine. When a new set of gears is installed, duplicate this pattern as closely as possible).* Paint gear teeth with a suitable gear marking compound, place a load on the pinion flange and turn drive gear back and forth until a clear contact pattern is obtained. Compare this pattern with the tooth patterns shown in Rear Axle Section of Manual. *CAUTION–Whenever the drive pinion position is changed a new bearing spacer must be used to establish the correct preload.*

Differential Carrier Installation: Place a new gasket on rear axle housing studs, then position carrier assembly on housing. Install axle ratio identification tag on one of the upper carrier studs. Install all stud nuts and tighten to 30-35 ft. lbs. Fill axle housing to a level of the filler plug hole with rear axle lubricant.

FORD TRUCK FULL-FLOATING SPIRAL BEVEL (HOTCHKISS DRIVE)

Ford Truck, All exc. Half-Ton (1940-47)
F-2, F-3, F-4, F-5, F-6 School Bus (1948-52)

►**1950 F-4, F-5 PINION SHAFT PRODUCTION CHANGE**—Two different pinion shaft assemblies used. Early type has tapered shaft, later type has splined shaft.

DESCRIPTION: Spiral bevel gear, full-floating type with Hotchkiss drive. Similar to axle on previous truck models except that no torque tube is used.

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: This work can be done without disturbing wheels and hubs as follows:

Axle Shafts—Shafts can be removed without disturbing wheels and hubs as follows: Take out two screws in hub cap, remove cap. Remove nuts on 8 studs on axle shaft flange, turn two bolts (located between studs) in evenly to loosen axle shaft flange from hub. Then back off these two bolts, strike sharp blow on center of axle shaft flange to loosen locking cones on studs. Remove locking cones, pull shaft out. When installing shaft, see that new gasket in place under axle shaft flange, back off loosening bolts sufficiently to allow axle shaft to seat on hub, install locking cones on studs, tighten stud nuts evenly, then tighten two loosening bolts.

Wheel Bearing Adjustment—Remove axle shaft (above), remove outer locknut, lockplate, and grease retainer (except on ¾ and 1 Ton). Turn inner bearing adjusting nut up tight, then back nut off ⅛ turn, install lockplate being certain that locking pin in nut engages notch in lockplate (except ¾ & 1 Ton), bend lockplate tang against nut (¾ & 1 Ton). Install outer locknut and tighten securely. Rotate wheel by hand and see that it turns freely.

Wheel Bearing Assembly—To disassemble wheel bearings, remove axle shafts, remove outer locknut, grease retainer, lockplate and inner adjusting nut, remove wheel hub. Remove snap ring in inner end of hub. Use brass drift to tap inner bearing out until grease retainer comes out of hub, lift out bearing cone and roller assembly. Use puller 1239-Q to remove bearing cups from hub. Re-install parts in same manner using replacer 1239-P to install bearing cups and grease retainer in hub. Make certain that grease retainer snap ring installed, adjust wheel bearings after hub installed on axle (above).

RING GEAR BACKLASH: .004-.018". No adjustment.

OVERHAUL: Disassembly—Remove axle shafts and wheel hubs, take out capscrews holding left hand axle housing on right hand housing, remove left hand housing using care not to lose thrust pin and plate. Withdraw ring gear and differential assembly from housing (differential side bearing roller and cone assembly will come out on differential case hubs, bearing cones will remain in housing halves). Remove and service pinion assembly and differential assembly as directed below.

Pinion Bearing Assembly (Flanged Sleeve Type): To disassemble, take out screws mounting grease retainer and pinion sleeve flange on forward end of axle housing, lift off oil seal retainer. Remove pinion assembly using puller 4609-P and adapter 4609-P-4 (screw adapter on end of pinion shaft, mount puller on axle housing with mounting bolts passing

CONTINUED ON NEXT PA E

FORD TRUCK FULL-FLOATING SPIRAL BEVEL (C ntinu d)

through holes in pinion sleeve flange). Clamp pinion assembly in vise, remove locknut, lockwasher, adjusting nut, and thrust washer, lift pinion sleeve off (rear roller bearing roller and cone assembly will remain on shaft). Use puller 4221-A to remove and install this rear roller bearing on pinion shaft. To replace pinion shaft rear (pilot) bearing, remove inner race from end of pinion shaft by removing lock ring. Remove outer race and roller assembly from housing with replacer 4625-P, install new bearing with same tool and spacer 4625-P-7. To remove bearing cups from pinion bearing sleeve, use puller 4616-P. Install bearing cups with replacer 4616-Q and make certain that cups are flush with shoulder in sleeve. When assembling pinion, lubricate bearings with thin film of grease, insert pinion shaft and inner roller bearing in sleeve, install outer roller bearing ,thrust washer, and adjusting nut. Tighten adjusting nut until force required to turn pinion shaft is 12-16 in.lbs. which is correct bearing pre-load, install lockwasher and locknut.

Pinion Bearing Assembly Installation—Make certain that axle housing face and pinion sleeve flange are clean and smooth, align dowel pin in sleeve flange and hole in housing, press pinion assembly into housing until flange seats solidly, install new cork gasket in groove in sleeve flange, install oil seal retainer (see oil seal data below), install six capscrews and tighten screws securely.

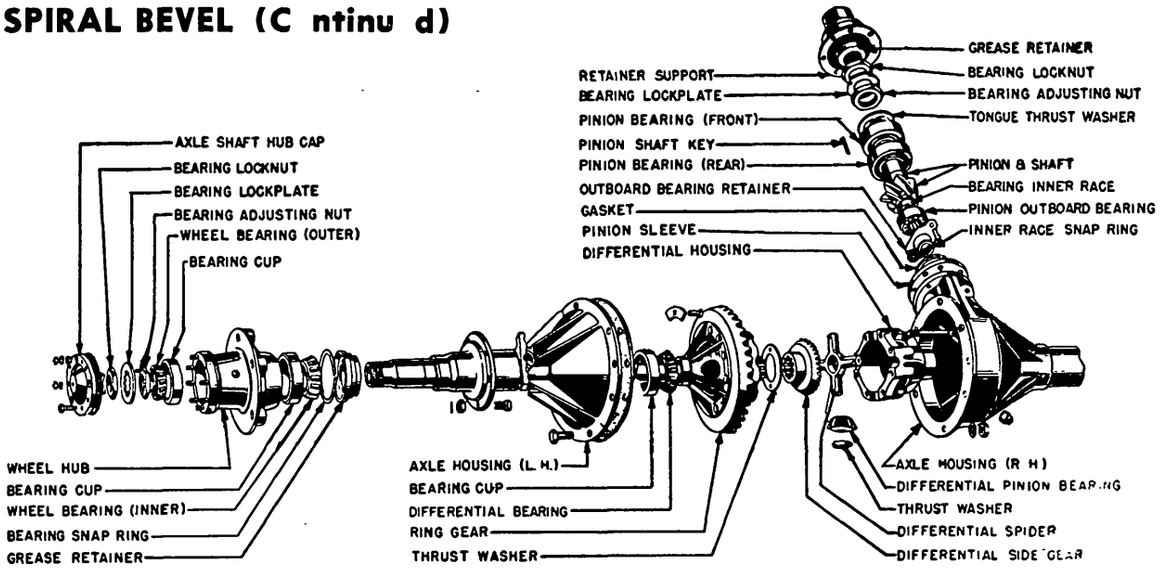
Pinion Oil Seal—To replace oil seal, press old seal out of retainer using driver 4674-P-2 with adapter 4674-P-1. Install new seal with same tools. Make certain that sharp edge of seal leather faces toward inner end of retainer.

Pinion Bearing Assembly (Double Bearing Cup Type): Pinion bearing sleeve is not flanged (sleeve forms pinion bearing cups) and is retained in axle housing by separate pinion bearing retainer. Pinion bearing assembly is serviced in same manner as Flanged Sleeve Type and requires same special tools except that special adapter 4609-T-1 should be screwed on pinion shaft when pulling assembly out of housing. When assembling pinion, tighten adjusting nut until force required to turn pinion shaft is 12-16 ft. lbs.

Pinion Bearing Assembly Installation—Same as for other trucks (above) except that oil return hole in pinion bearing retainer must be aligned with oil hole in housing. **Pinion Oil Seal**—See above.

Pinion Setting: Pinion position not adjustable.

F-4, F-5 SPLINED PINION SHAFT (1950-51): Disassembly—Hold universal joint flange with Tool 4851, then remove cotter pin, nut and washer from drive pinion shaft. Remove flange using Tool 4858-Q. Remove bearing cover and oil seal assembly and take out pinion and cage assembly, using puller screws in holes provided in cage. Tap drive pinion out of cage, then remove outer bearing from cage. Remove bearing spacer from pinion and remove rear pinion bearing. Remove pilot bearing, using Tool 4625-D. Remove oil seal assembly from bearing cover, then remove bearing cups from cage assembly.



FORD TRUCK SPIRAL BEVEL GEAR, FULL-FLOATING AXLE (HOTCHKISS DRIVE)

Reassembly—Press pilot bearing on end of shaft, using a sleeve that applies pressure evenly to inner race of bearing. Install pilot bearing lock ring and press firmly into groove. Press bearing cups into cage until seated against shoulders. Lubricate with rear axle lubricant. Install rear bearing on shaft and insert pinion and bearing assembly into bearing cage. Install spacer or spacer combination on pinion shaft, press front bearing against spacer.

Preload Check—Place pinion and cage assembly in vise and intall universal joint flange and tighten to 300-400 ft. lbs. torque. Wrap a soft wire around pinion bearing cage, and using a pound-pull scale, pull on a horizontal line. If rotating torque is not 12-18 inch lbs., install a thinner spacer to increase the preload, or a thicker spacer to decrease the preload. Install a new oil seal bearing cover. Position pinion and cage assembly over studs on housing and tap into place with a soft hammer. Tighten nuts to 70-90 ft. lbs.

Differential Assembly:—To disassemble take out capscrews holding right hand half of differential case on left hand half, remove right half of case and lift out differential gears, pinions and pinion shaft. To remove differential bearing rollers and cones from differential case hubs, use special puller 4221-A with 4221-A-5 adapter. Replace these bearings with driver 4221-T (¾ & 1 Ton), 4221-P (Other Trucks). Use puller 4616-P (¾ & 1 Ton), 1239-Q (Other Trucks) to remove bearing cups from axle housings, replacer 4222-P to install these bearing cups. Ring gear is serviced as a unit with differential case and should not be removed. Replace differential spider if worn to diameter less than .745" (¾ & 1 Ton), .868" (Other Trucks), at gear bearing surfaces, replace spider gears if inside diameter worn to more than .758" (¾ & 1 Ton), .881" (Other Trucks). Replace side gears if splines worn so that backlash of new axle shaft in gear is more than .004". Replace spider gear thrust washers if worn to thickness of less than .025" (all models), side gear thrust washers if thickness less than .057" (¾ & 1 Ton), .055" (Other Trucks). No adjustment.

Ring & Pinion Gear Backlash: .004-.018".

Assembly Note:—When reassembling axle, see that thrust block and thrust pin not worn and properly installed in left hand axle housing, use one 61-4035 gasket (¾ & 1 Ton), BB-4035 gasket (Others) between axle housing halves.

Ring Gear Thrust Block: Thrust block can be removed by driving out retaining pin using a long nosed drift to drive pin out of left hand axle housing. Install new thrust block in same manner making certain that pin is seated firmly in housing.

FORD TRUCK TWO-SPEED

Trucks, 1½ & 2-Ton; F-5, 6; F-500, 600 (1946-55) Optional Equipment.

▷*AXLE RATIO NOTE:* This axle provides ratio of 5.83-1 for speed with reduced engine RPM (planetary gears locked out) and a ratio of 8.11-1 for power (with planetary gears operating). 6.33-1 to 8.81-1 ratio is also available since 1950.

▷*CONTROL NOTE:* Planetary system vacuum controlled 1946-52, electrically controlled 1953 and later.

DESCRIPTION: Two-speed planetary type, with spiral bevel type ring gear and pinion. Axle is full-floating type with Hotchkiss Drive.

CONTROL UNITS (Vacuum & Electrical): *See "Control Units" below.*

REMOVAL OF AXLE: *See "Rear Axle" on Car Model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: Same as for full-floating truck axle. *See "Ford Truck Full-floating" Rear Axle.*

REAR AXLE OVERHAUL: Carrier—Proceed as follows:

Disassembly: Remove oil distributor locating screw and lockwasher from top of carrier (to left of oil filler plug), remove oil distributor plug and gasket, pull oil distributor and spring out of housing. Take out four capscrews and lockwashers retaining shift fork cover (CAUTION—Note location of the one longer capscrew and re-install this in same hole when reassembling axle), remove cover and gasket, remove plunger and spring from shift fork, pull shift lever out of shift fork (do not remove felt washer and retainer unless worn and require replacing), slide shift fork from housing, pull sliding clutch gear out. Mark right and left hand bearing adjusters and bearing caps to insure correct reassembly, remove lock wires, take out bearing cap bolts, remove bearing caps, adjusting nuts, and locks. Lift differential assembly out of carrier. Remove lock wire and bolts from ring gear, remove right hand gear support case by tapping gear with a brass hammer, remove left hand gear support case, high speed clutch plate thrust washer, and oil collector drum. Slide ring gear off differential and planetary gear case. To disassemble differential and planetary gear assembly, remove high speed clutch plate by tapping with a soft hammer (strike alternately and evenly on each side). Remove planetary gears and planetary gear bronze pins. Take out 12 capscrews in differential case, separate right and left halves of case, lift out differential side gear and thrust washers, pinions and thrust washers, and spider. To remove drive pinion assembly, remove cotter pin and nut on end of shaft, pull or drive universal shaft flange off end of shaft, take out six capscrews in pinion retainer. Drive pinion assembly out of housing using a soft brass drift to drive on inner end of shaft.

Pinion Bearing Assembly: To disassemble, clamp assembly in a vise, bend lockwasher ears away from pinion bearing nuts, remove nuts and lockwasher. Lift pinion sleeve (including bearing cup and spacer) off shaft. To replace pinion bearings, use puller to remove bearing cups from pinion sleeve or insert bar 3 7/16" long through hole in side of sleeve so that it rests on inner end of one bearing cup and press cup out in an arbor press, remove second cup similarly. Remove bearing roller and cone assemblies from pinion shaft with a puller. To remove rear (pilot) bearing, remove lockring on pinion end of bearing using a sharp screwdriver blade, slide outer race off, remove bearing rollers, press inner race off end of shaft. Press new rear bearing on shaft and stake bearing at four points (place a steel ball on end of shaft at inner race, strike ball with a hammer). Press bearing cups in pinion sleeve until they seat solidly against shoulder, press one roller and cone assembly on pinion shaft, insert pinion shaft in sleeve, place bearing adjustment spacer on shaft (see Pinion Bearing Adjustment below), install second roller and cone assembly, install bearing nut, lockwasher, locknut (bend lockwasher ears over nuts after bearing adjustment checked).

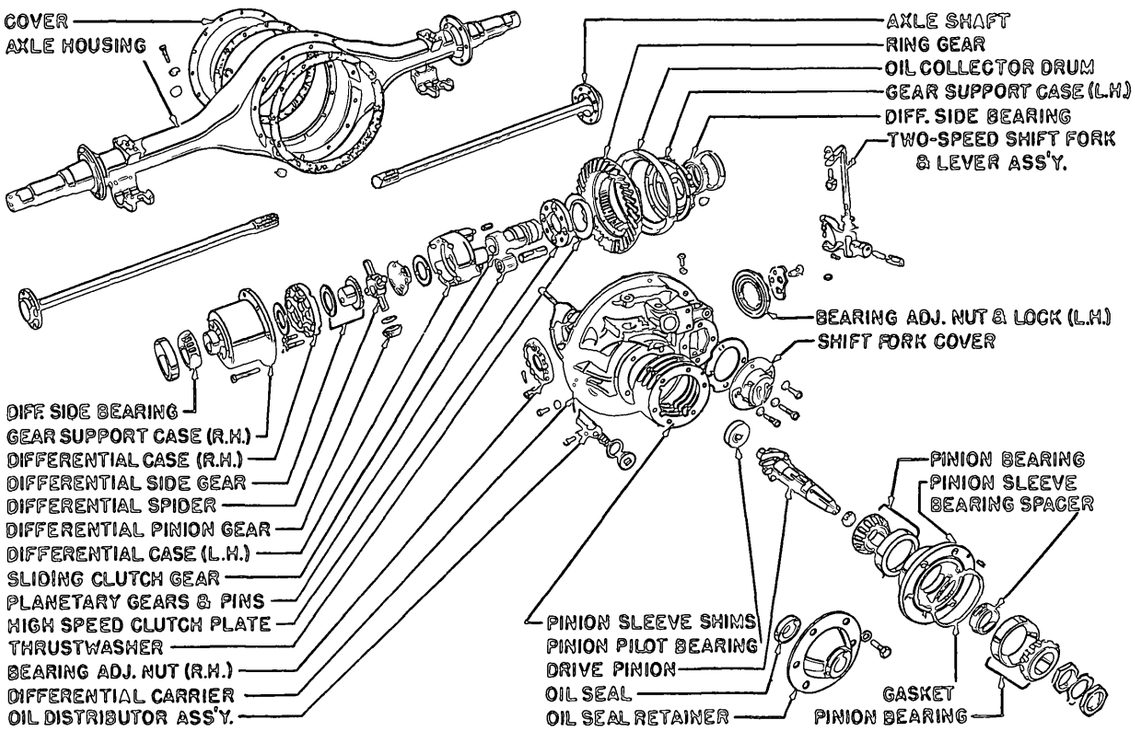
Pinion Bearing Adjustment—With pinion nut tight, force required to turn pinion shaft should be 12-16 in. lbs. If bearing adjustment not correct, install spacer of different thickness on pinion shaft between bearing cones. This spacer furnished in 12 different thicknesses from .513"/.514" thick (min.) to .543"/.544" thick (max.) for bearing adjustment.

Pinion Oil Seal—To replace oil seal, drive old seal out with a small punch, install new seal with Driver 4674-P-2 and Adapter 4674-P-1. Seal must be installed with sharp edge of leather facing inner end of retainer.

Pinion Setting: Pinion position controlled by shims installed between pinion sleeve flange and mating face of carrier. When installing pinion assembly, make certain that these faces are clean and smooth, install same thickness of shims between carrier face and pinion sleeve flange as removed when axle disassembled, line up dowel pin in sleeve with hole in carrier, drive assembly in until it seats solidly. Install new cork gasket in pinion sleeve groove, install oil seal retainer taking care that seal leather not damaged by keyway in shaft. Install and tighten six capscrews and lockwashers. After completely assembling axle, check ring and pinion gear mesh. Pinion position can be adjusted by changing shim thickness under sleeve flange. These shims furnished in four thicknesses from .00975"/.01025" (min.) to .028"/.032" (max.) for this adjustment.

Differential Gear & Bearing Assembly: To remove differential side bearings, tap old bearing roller and cone assemblies off drive gear case hubs using a drift inserted through holes in case back of each bearing (drive alternately and evenly through both holes). Press new bearings on hubs. Replace differential spider if worn to diameter of less than .934" at gear bearing surfaces, replace spider gears if inside diameter worn to more than .944". Replace side gears if splines worn so that backlash of new axle shaft in gear is more than .004". Replace spider gear thrust washers if thickness less than .025", side gear thrust washers if thickness less than .058". When reassembling unit, lubricate gears and thrust washers, make certain that long and short bolts installed in proper holes (8 long, 4 short), lock bolts with lockwire after properly tightened. Install planetary gear pins in holes in differential case, in-

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1946-52 FORD TRUCK TWO-SPEED REAR AXLE

FORD TRUCK TWO-SPEED (C nt.)

stall gears, install high speed clutch plate on planetary gear pins with chamfered teeth in toward planetary gears, tap plate in place with a brass hammer. Place right hand gear support case on bench with open end up, lubricate and install thrust washer in case, install differential assembly with planetary gears upward, install ring gear with teeth facing downward and mesh internal gear teeth with planetary gears, line up bolt holes in gear with bolt holes in case. Place oil collector drum on ring gear with open side toward gear and engage tongues on drum in gear recesses. Lubricate high speed clutch plate thrust washer and install it on high speed clutch plate. Install left hand gear support case, install six bolts with heads against flange of right hand gear support case, tighten all bolt nuts securely and secure nuts with lockwire.

Differential Bearing Adjustment—When installing differential assembly in carrier, lubricate bearings with thin film of grease, install bearing cups and adjusters, hold adjuster away from threads in carrier until bearing cap bolts are started, then lower cap and adjuster into mesh with carrier threads. Make certain that adjuster properly meshed in both cap and carrier before tightening cap bolts. Turn left hand adjuster up until ring and pinion gears mesh loosely, tighten right hand adjuster up as tightly as possible, then back off adjuster one notch. This setting will give correct bearing pre-load. After checking ring and pinion gear backlash, tighten both bearing cap bolts very tight, secure bolts with lockwire, install adjuster locks.

Ring Gear Backlash Adjustment: Back off the right hand differential bearing adjusting nut and turn up left hand nut until backlash between gears is .004-.018" (measured at gear teeth). Paint gears to check mesh, adjust ring gear position for correct lengthwise contact, adjust pinion position for correct contact on tooth. Then adjust bearings.

TWO-SPEED CONTROL UNIT

VACUUM CONTROL UNIT OPERATION: High Speed Range—When the control knob on dash is pulled out, control lever is pulled downward causing control valve and seat to make an air tight seal and creating an opening through control valve body that is entirely sealed off from any air leaks Since check valve ball is spring-loaded, ball immediately seats itself if vacuum draw drops below compression strength of spring With ball seated, system is vacuum tight (This condition exists when system is under vacuum and throttle is held wide open) Air is drawn from the front side of diaphragm of the axle shift diaphragm assembly by manifold vacuum Atmospheric pressure behind the diaphragm causes it to move forward compressing push-rod spring The pushrod, attached to the diaphragm, actuates clutch shaft lever of axle through clevis and pin A speedometer adapter and diaphragm assembly mounted on rear of speedometer head compensates for variations in speed of drive shaft between high and low speed range of axle

Low Speed Range—When control knob on dash is pushed in, control lever is pulled upward lifting plunger off valve seat and air enters system through an air filter Disc on bottom of plunger fills bore of check valve body and seals off passage of air to intake manifold When system is filled with air, pressure on both sides of shift diaphragm is balanced and push-rod spring exerts enough pressure from its compressed position to shift axle into low range

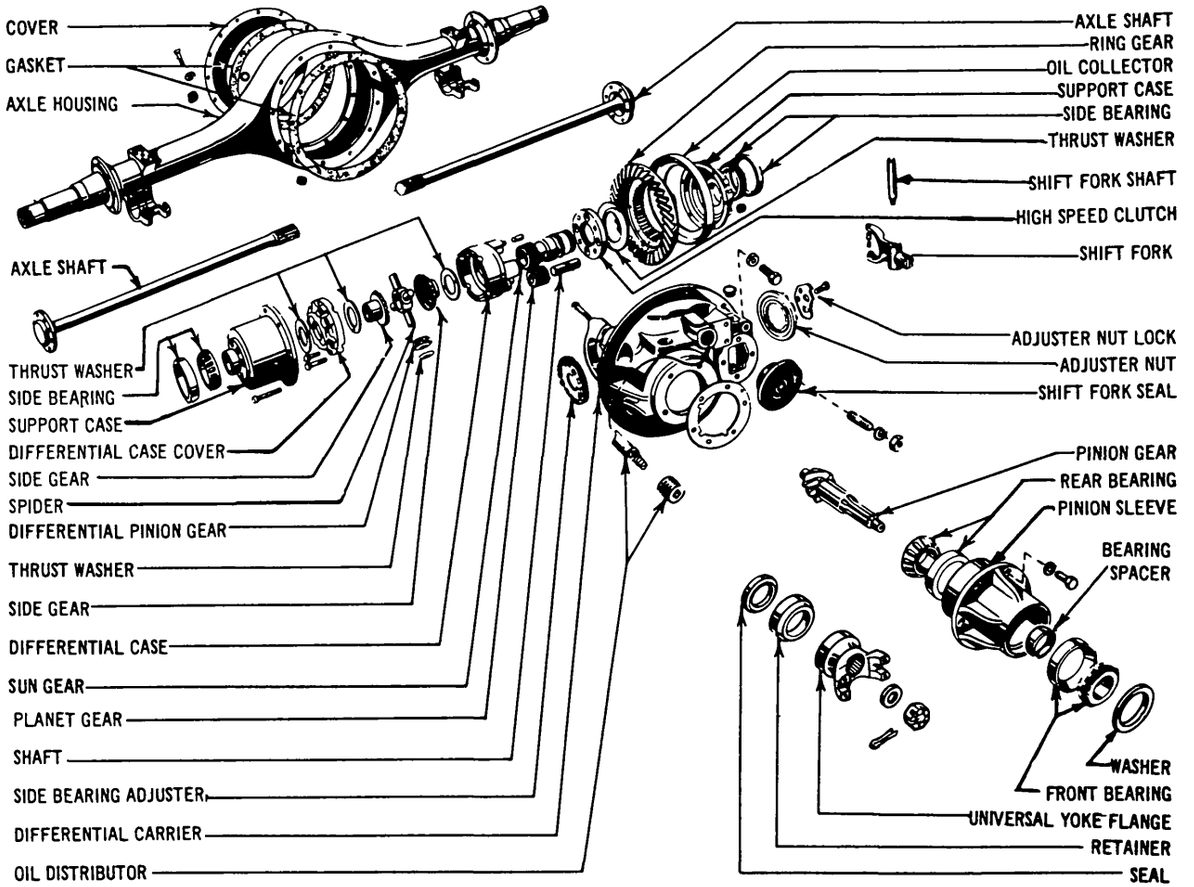
ELECTRIC CONTROL UNIT OPERATION: High Speed Range—With control button on gear shift lever in upper position, current is supplied to the motor in the rear axle shift unit, causing motor to rotate in a clockwise direction and move drive screw assembly nut toward bottom of screw When nut has traveled far enough to wind the torsion spring, a contact bumper on the nut breaks electrical connection on automatic switch and stops the motor The nut is held at the end of its travel by a ball screw detent spring mounted on front cover As nut is moved downward, a spring winding lever, which pivots on a pin in the nut, winds the torsion spring The axle is ready to shift into high range as soon as the load on the rear axle gears is relieved The torsion spring is assembled in the unit under 50 to 80 lbs pressure When spring is wound, the tension is increased to 90 to 150 lbs. This additional pressure is used to shift the axle. When shift is completed, the ends of the spring come together, leaving the original tension in the spring This preload tension holds the axle in either range.

Low Speed Range—When button is placed in the down position, current is supplied to opposite field of motor and to speedometer adapter (adapter is mounted on speedometer and compensates for variation in speed of drive shaft between high and low ranges of the axle). Motor rotates in opposite direction (counter-clockwise) to that of high range operation, causing the drive screw assembly nut to travel toward top of screw Torsion spring is wound for a shift to low range which is accomplished in the same manner as for high range.

Electric Control Unit Lubrication—Change oil in unit every 10,000 miles using SAE 10W engine oil

VACUUM CONTROL UNIT OVERHAUL: Vacuum Control & Check Valve Removal—Remove cotter pin secur-

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1953-55 FORD TRUCK TWO-SPEED REAR AXLE

FORD TRUCK TWO-SPEED CONTROL UNIT (C nt.)

ing control wire to control lever. Loosen lockscrew, remove control wire and conduit from valve body. Disconnect vacuum line from check valve body, disconnect vacuum line. Remove control valve from mounting bracket. Remove speedometer adapter line from valve.

Disass mbly—Remove cotter pins from control lever, remove lever. Remove snap ring, plunger, screen, and plunger seal. Remove check valve body from control valve body, then remove check valve ball, seat, spring, and spring retainer. Remove control valve air filter cover from control valve body. Remove filter element and screen.

Insp ction & Parts R placement—Clean check valve ball seat, inspect seat for wear or deterioration. Test tension of check valve ball spring (spring should be just strong enough to hold ball up against ball seat). Clean and inspect control valve plunger seat. Clean air filter element in cleaning solvent, then allow element to dry before installation. Bores of control valve body and valve seats must be free of dirt before valve seats are installed.

Reass mbly—Place check valve ball seat in control valve body bore, chamfered side down. Lay ball on seat, then position spring seat on ball. Position check valve body over spring, thread body carefully into control valve body to prevent cocking of spring. Place control valve plunger seal in control valve body, chamfered side down. Then proceed, reversing removal procedure. With control lever in high range there should be a slight preload on lever spring. Lever spring can be bent slightly to increase preload.

Installati n—Reverse removal procedure.

Axle Shift Diaphragm Assembly Removal: Loosen hose clamp, then disconnect hose from assembly. Remove cotter pin and clevis, shift rod boot and snap ring which retains diaphragm assembly.

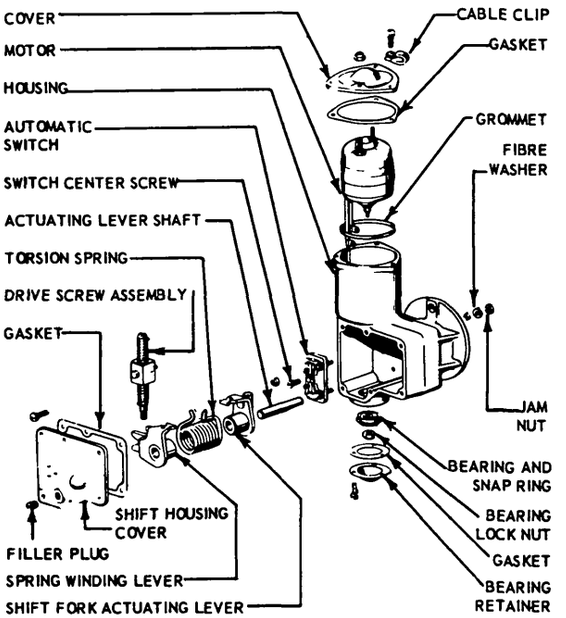
Installati n—To install, reverse removal procedure, check over-travel of hole in shift rod in relation to hole in clutch shaft. Travel of shift rod should exceed travel of clutch shaft by approximately a half hole in both high and low range.

Speed m ter Adapt r & Diaphragm Assembly: Replace diaphragm if it fails to shift adapter to high range. Replace spring if diaphragm fails to shift adapter into low range.

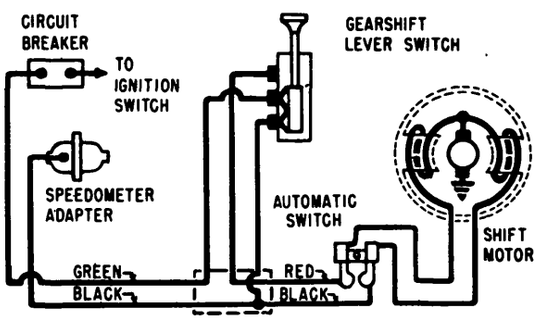
ELECTRIC CONTROL UNIT OVERHAUL: *(NOTE—Speedometer adapter, circuit breaker, and control switch cannot be repaired and must be replaced if failur occurs).*

R moval: Disconnect one of the battery cables. Remove two shift housing to carrier stud nuts and lockwashers and remove unit from carrier.

Disassembly: Remove front cover and drain the lubricant. Turn drive screw until nut is in the center of the screw *(CAUTION—This is important to avoid damage to drive nut contact bumper).* Pull shaft out of tension spring assembly and remove assembly from housing. Remove screws and lockwashers which attach drive screw bearing cover to housing, then remove cover and gasket. Push down on screw assembly until the bearing is forced out of housing. Remove bearing retainer nut and bearing (hold shaft with a screwdriver inserted in drive slot). Remove locknuts from automatic switch terminals and remove motor wires from terminals. Remove motor cover screws and remove motor, cover, and gasket from housing. Remove jam nuts and fibre washers from terminals at rear of housing. Remove automatic switch center screw and lift switch out of housing. Mount torsion spring and lever assembly in a vise. Turn spring winding lever clockwise, and pull outward to disengage spring from lever.



1953-55 FORD 2-SPEED AXLE SHIFT ASSY.



1953-55 SHIFT CONTROL WIRING DIAGRAM

Inspection: Wash all parts except motor in cleaning solvent. Check all parts for signs of failure. Check automatic switch points for cleanliness and free movement. Make sure that points will close firmly under spring tension. Check operation of drive screw by rotating screw while holding nut. The screw must turn freely. When nut reaches end of screw, the screw should continue to turn but nut should not jam or run off end of screw. Turn screw in opposite direction and check operation at top end of screw. The fibre bumper in nut should be a tight press fit. Check stall torque of shift motor as follows: Place a wrench on rectangular drive of motor shaft. Hold wrench in one hand, hold motor itself in vise. Connect one motor wire to battery terminal and connect motor housing to other terminal. The wrench should tend to turn with a pull of about six inch pounds. Allow the wrench to turn very slowly, making sure that this torque is present for the full 360° turn of the wrench. *(NOTE—While testing the motor, do not allow it to overheat).* Check rubber diaphragm and make sure that spring clamp is in position in diaphragm groove and that it clamps diaphragm tightly around shift fork. Replace diaphragm if it is not in good condition or if it is not tight on shift fork.

Reassembly: Position rubber diaphragm on shift shaft (refer to lettering on face of diaphragm for correct position). If torsion spring assembly was disassembled, locate parts in the correct position and turn spring clockwise until end of spring is past the shift fork operating lever, then push lever inward until spring is locked in place. Position automatic switch in housing, then install switch attaching screw. Install fibre washers and jam nuts on the switch terminals at rear of housing. Place motor cover gasket on housing, then install motor and cover on housing. Install cover screws. Position motor wires on automatic switch terminals and install locknuts. Place drive screw assembly in housing and install drive screw bearing and bearing retainer nut. Tap bearing into seat in housing and install cover and gasket. Center drive screw nut on drive screw, making sure the contact bumper on nut is toward automatic switch. Position torsion spring assembly in housing and install shaft. Install housing cover and gasket and tighten attaching screws securely. Install lead wires on housing terminals with the **red wire on the bott m terminal.**

Installation: Position shift unit on carrier studs with the torsion spring swivel block installed in shift fork slot, then install nuts and lockwashers. Tighten nuts to 50-70 ft. lbs. Fill shift unit to level of filler plug with SAE 10W engine oil.

FORD TRUCK HYPOID "SPLIT HOUSING" TYPE

F-250, All Models (1953-Early 1955)

P-350, Parcel Delivery (1953-Early 1955)

►*NOTE:* "Ford, Lincoln, Mercury Hypoid (Integral Carrier)" Rear Axle used beginning Late 1955.

DESCRIPTION: Full-floating hypoid gear type with Hotchkiss drive. Axle housing is of split type, each half consisting of a steel tube riveted into a cast housing. Rear spring seats are welded to tops of axle housing tubes. Outer ends of tubes are machined for installation of wheel bearings and are threaded for installation of wheel bearing adjusting nuts. Flanges, forged integral with housing tubes, provide facilities for installation of brake carrier plates. Differential side bearing cups are pressed into machined bores in axle housing. Differential case is single piece type with two pinion gears.

REMOVAL OF AXLE: *See "Rear Axle" on Car Model pages.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: This work can be done without removing wheels and hubs, as follows:

Axle Shaft Removal—Drain lubricant from housing, remove axle shaft stud nuts and washers. Tap center of axle shaft flange to loosen tapered dowels, and remove the dowels. Remove axle shaft and gasket from housing.

Axle Shaft Installation—Install brake carrier plate, then hub and drum assembly, place new gasket on hub. Insert axle shaft in housing, lining up shaft splines with differential side gear splines. Install tapered dowels, lockwashers, and nuts on studs. Tighten nuts to 50-70 ft. lbs. torque.

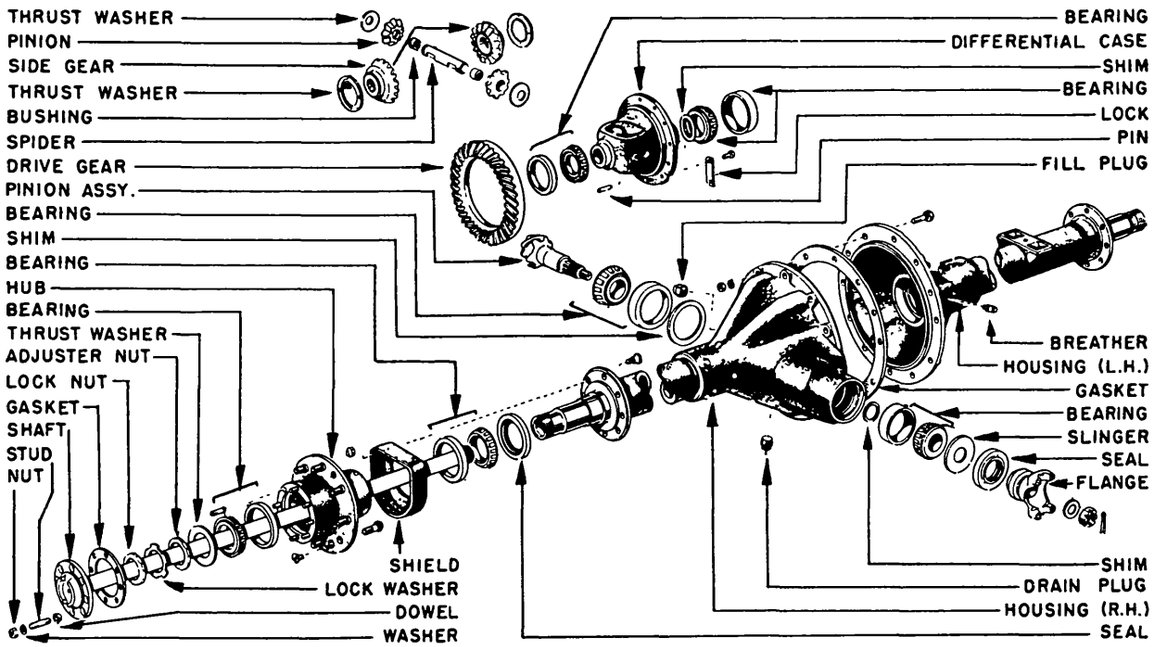
Wheel Bearing Adjustment—Remove axle shaft (above), bearing locknut and washer. Tighten wheel bearing adjusting nut while rotating wheel back and forth, until a noticeable drag is felt, then back off adjusting nut ⅛ turn. Install bearing lock washer and locknut, and bend one tab of lock washer over adjusting nut and one tab over locknut. Install axle shafts.

OVERHAUL: Before disassembling axle, check drive gear backlash and record the reading for reference when reassembling axle. *See "Backlash Checking & Adjusting (below).*

Disassembly: Remove wheels, axle shafts (see "Axle Shaft Removal" above). Remove hub and drum assemblies and brake backing plates.

Differential Removal—Insert a piece of pipe slightly smaller than axle shaft splines, approximately two-thirds way through housing from the differential case side to prevent differential assembly from dropping. Remove nuts, washers, and bolts securing the two halves of axle housing together, and separate the axle housing. Remove differential assembly and pipe from housing. Remove differential side bearing cups from housing with Tool T53T-4222-A.

Differential Disassembly—Mark ring gear and differential case to insure reassembly in same position. Remove bolts and lock plate holding ring gear to differential case and remove the gear. Remove lock pin securing spider shaft in differential case with a long pin punch, then remove spider shaft, pinions, side gears and thrust washers. Remove differential side bearings with Tool T53T-4242-F (Be sure the side bearing cups are clamped in place over bearings when using the tool). Remove side bearing shims.



FORD TRUCK "SPLIT HOUSING" HYPOID AXLE

Drive Pinion Disassembly—Remove drive pinion shaft cotter pin. Hold universal joint with Tool T53T-4851-E, and remove nut and washer from drive pinion shaft. Remove flange from drive pinion shaft with Tool T53T-4851-A. Remove drive pinion from axle housing by rotating shaft while driving it from housing with a soft hammer. Remove drive pinion oil seal, oil slinger, and drive pinion outer bearing from housing. Remove outer bearing cup with Tool T53T-4621-A. Tap inner bearing cup and adjusting shims from axle housing with a soft drift. CAUTION—Measure and note thickness of shims found behind inner bearing cup. Remove the pinion bearing shims from pinion shaft, then press inner bearing from shaft with Tool T53T-4629-A.

Reassembly & Adjustment: Inspect gear teeth, bearings and bearing cups for signs of galling, pitting or wear, and replace any parts found to be defective. Clean all parts and blow dry with air.

Differential Reassembly—Lubricate all differential parts with gear lubricant, then position the thrust washers and pinion gears in case, and install differential side gears and differential spider. Install the lock pin that secures spider to differential case, and stake the lock pin in place. Align the marks (made at disassembly) on drive gear and differential case, then position drive gear on case. Be sure drive gear is properly seated, then install bolts and lock plates securing gear to case. Tighten bolts to 40-50 ft. lbs. torque. Press differential side gears on case with Tool T53T-4221-A, and arbor press. *(CAUTION—Do not install bearing shims at this time).* Install differential side bearing cups in each half of axle housing, using Tool T53T-4242-B (left side), and Tool T53T-4242-A (right side).

Differential Side Bearing Preload Adjustment—Position differential assembly in housing, using a piece of pipe to support assembly. Place new axle housing gasket on housing flange, then bring housing halves together. Install alternate housing bolts, washers, and nuts, and tighten bolts to 20-26 ft. lbs. Install a dial indicator on left-hand axle housing so that indicator stem enters access hole and contacts back face of drive gear. Push drive gear from side to side to check differential endplay. Rotate drive gear to several positions, and check endplay at each position. Remove differential from housing, and add shims behind side bearings necessary to bring differential preload within range .001-.005" (.003" preferred). *(NOTE*—Shim thickness should be equal to endplay plus .003".) Split shim pack equally and install shims behind both side bearings. Install differential in axle housing, and tighten alternate bolts to 20-26 ft. lbs. Install dial indicator stem against back face of drive gear. Rotate drive gear and recheck the runout. Maximum drive gear runout is .005".

Drive Pinion Assembly—Press the inner bearing on drive pinion shaft, using Tool 4615-A and arbor press.

Drive Pinion Installation—Position the original

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FORD TRUCK HYPOID "SPLIT HOUSING" (Cont.)

shims in axle housing, then install inner and outer bearing cups with Tool T53T-4616-A. Install shims on pinion shaft, then position pinion in axle housing. Install outer bearing on pinion shaft with Tool T53T-4261-A. Install universal joint flange with Tool T53T-4851-B. Hold flange with holding tool, then install flange nut and washers. Tighten nut to 200-250 ft. lbs. torque.

Pinion Bearing Preload Check—(With Differential Assembly Removed). Wrap a heavy twine several turns around shank of companion flange and attach scale Tool 6110-A. By pulling horizontally on scale check torque required to rotate assembly. If torque is not within 12 to 18 inch pounds, remove pinion shaft and add or remove shims from pinion shaft to bring torque within specified limits. Removing shims INCREASES torque, adding shims DECREASES torque. Reassemble pinion and recheck preload.

Differential Installation & Adjustment—Paint 12 drive gear teeth with red lead.. Insert pipe, used in axle disassembly, through housing half, then position differential assembly in housing. Install axle housing gasket, and bring both housing halves together. Install alternate bolts and nuts, then tighten bolts to 20-26 ft. lbs. torque. Install a dial indicator so contact arm rests against pinion shaft companion flange (on long side, opposite center of bolt hole) and check backlash between drive gear and drive pinion teeth. Rotate companion flange away from indicator until contact between gear teeth is felt. Set dial indicator at zero, rotate the flange against contact stem until all backlash is removed, then note reading on indicator. This reading will be exactly 1½ times the amount of backlash between gears. The correct lash is .008-.013" (dial indicator will read .012-.020"). If backlash is not within limits, add or remove shims behind pinion inner bearing cup until correct backlash is obtained.

Check Gear Tooth Contact—Insert axle shafts in housing. Hold axle shaft to impose a load on the gears, and turn universal joint flange several times in both directions to obtain tooth pattern. Disassemble axle and check tooth contact pattern (pattern should be fairly well centered on tooth, and slightly toward inner diameter, with ends of tooth not indicating a contact pattern). Add or remove shims from behind drive pinion inner bearing cup to correct depth for proper tooth pattern (CAUTION—Add or Remove the same amount of shims from pinion shaft outer bearing so pinion bearing preload will not change). When correct tooth pattern obtained, install remaining bolts, washers and nuts, and tighten nuts to 20-26 ft. lbs.

Drive Pinion Oil Seal Installation—Remove the universal joint flange after completing preload, ring gear tooth pattern, and backlash checks. Place oil slinger on pinion shaft, then install drive pinion oil seal with Tool T53T-4676-A. Install flange, washer and nut and tighten nut to 200-250 ft. lbs. torque. Install cotter pin.

FORD TRUCK HEAVY DUTY "SPLIT HOUSING" HYPOID

Ford Truck, F-6 Exc. School Bus (1950-52)
Ford Truck, F-350 Exc. Parcel Del. (1953-55)

DESCRIPTION: Hypoid gear type with full-floating axles and Hotchkiss drive, similar to SPIRAL BEVEL rear axle.

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: It is not necessary to remove wheels and hubs.

Axle Shafts—Remove axle shaft stud nuts and lock washers. Turn two shaft pulling bolts (located between stud hole) in evenly to loosen axle shaft from hub. Tap axle shaft in center of flange to loosen dowels and remove dowels. Pull shaft from housing. To install, place new gasket on hub and install axle shaft in housing, rotating axle to line up spline with splines in side gears. Install tapered dowels, lock washers and nuts on studs and tighten to 50-70 ft. lbs. (F-350), 84-93 ft. lbs. (F-6).

Wheel Bearing Adjustment—Remove axle shaft (above) bearing lock nut and lock washer. Tighten wheel bearing adjusting nut while rotating wheel back and forth, until a noticeable drag is felt. Back off adjusting nut ⅛ turn. Install bearing lock washer (NOTE—If adjusting nut is equipped with a dowel, make sure lock washer fits over dowel). Install bearing lock nut and tighten. If flange type lock washer is used, bend one flange over adjusting nut and one over lock nut. Install axle shafts.

Wheel Bearing Assembly—To disassemble, remove axle shaft, adjusting locknut, washer and adjusting nut. Remove wheel hub. Tap out inner bearing cone and grease retainer. Bearing races may be tapped out, using a brass drift. To re-assemble, install inner bearing race and bearing cone, install oil seal. Install outer race and bearing cone. Install axle on hub and adjust bearings (see above).

RING GEAR BACKLASH: .006-.012". Adjustment by shims behind bearing cups in axle housing.

OVERHAUL OF REAR AXLE ASSEMBLY:

Disassembly: Remove axle shafts and wheel hubs. Insert a length of pipe slightly smaller than axle shaft in left axle tube (facing front of truck) so as to engage differential case to prevent it dropping. Remove nuts and bolts from housing and separate it. Remove differential assembly, and pipe from housing.

Differential Disassembly—Mark differential case halves with a punch. Cut lock wires, remove nuts and separate case. Remove spider, pinions, side gears and thrust washers. Remove differential bearings using Tool 4221-K. Centerpunch rivet heads and drill through heads with a drill 1/32" smaller than rivet body. Press rivets out and remove ring gear. Using a suitable puller, remove bearing cups from each side of axle housing. *(CAUTION—Keep spacers found behind each cup together, and wire them to their respective axle housing half).*

Drive Pinion Cage Assembly Removal—Hold universal joint flange with Tool 4851, and remove nut and washer from pinion shaft. Use a suitable puller and remove universal joint flange. Remove drive pinion bearing cover and oil seal assembly. Remove drive pinion and cage assembly, using puller screws in holes provided in cage.

▷*CAUTION—Do not drive pinion from inner end as this will damage bearing lock ring groove.*

Drive Pinion and Cage Disassembly—Tap or press drive pinion from cage assembly. Remove outer bearing from cage and remove spacer or spacer combination from pinion. On F-350 Trucks, remove drive pinion rear bearing with Tool T53T-4242-F, then remove pilot bearing snap ring from inner end of drive pinion. Position pinion in press and remove pilot bearing. On F-6 Trucks, remove rear thrust bearing, then remove pilot bearing with Tool 4625-D and arbor press. Remove oil seal assembly from bearing cover. Remove bearing cups from cage assembly. *NOTE*—Tool T53T-4616-E can be used to remove outer cup on F-350 Trucks, then inner cup can be removed with a drift.

Reassembly of Rear Axle:

Drive Pinion Cage Reassembly—Press pilot bearing on end of pinion shaft, using a sleeve to apply pressure evenly to bearing inner race. Install snap ring and press into groove securely. Install bearing cups in bearing cage and press to seat them on cage shoulders. Lubricate bearings and cups with light oil and install rear bearing on pinion shank and insert drive pinion and bearing assembly in bearing cage. Install spacer or spacer combination on pinion shank and press front bearing firmly against spacer.

Drive Pinion Bearing Pre-Load Check—Install a sleeve on drive pinion shank that will apply pressure to pinion bearing inner race. Place pinion and cage assembly in a press and apply 25,000 lbs. pressure on the bearing. Wrap a soft wire around the cage and attach a pound-pull scale to wire. Pull on the scale on a horizontal line. It should require 12-18 inch lbs. to keep the cage rotating. If rotating torque is not between 12-18 inch lbs., install a thinner spacer to increase or a thicker spacer to decrease the pre-load. If a press is not available, the yoke may be installed and the pinion nut tightened to 300-400 ft. lbs., for checking the pre-load. After preload is checked and is satisfactory, install new oil seal in drive pinion bearing cover, using Tool 1175-D (F-6). Tool T53T-4676-B (F-350). *(NOTE—Soak new seal in oil at least one-half hour before installing).* Install drive pinion bearing cover, yoke, nut, and washer. Tighten nut to 300-400 ft. lbs. and install cotter pin.

Differential Reassembly—Position ring gear on case, making sure it is tight on case pilot. Install rivets and upset them cold. Head should be ⅛" larger than rivet hole, after forming. Formed head of rivet should be at least 1/16" smaller in diameter than performed head. Excess pressure will distort case and result in gear eccentricity. Lubricate all parts with gear lubricant. Position a thrust washer and side gear in ring gear half of differential case assembly. Place spider with the pinions and thrust washers in position on the side gear. Install remain-

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FORD TRUCK HEAVY DUTY "SPLIT HOUSING" (C ntinued)

ing side gear and thrust washer. Align marks on each half of case and place two halves together. Install the bolts and nuts and tighten to 80-110 ft. lbs. Lock nuts with lock wire. Install differential case bearings, using a press or suitable driver.

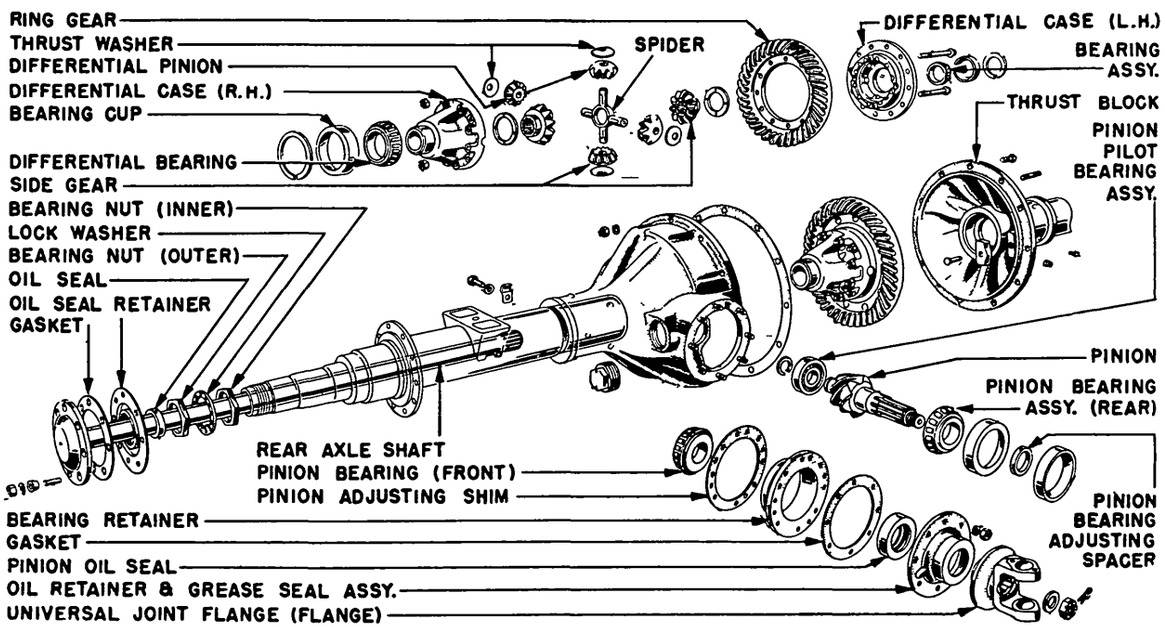
Differential Bearing Pre-Load Adjustment—Remove thrust block from housing. Install differential bearing cups and spacers in their original position in differential housing. *(CAUTION—Install spacers with chamfered edge toward machined surface in housing).* Insert pipe used in disassembly through the housing half. Place differential and gear assembly over the pipe and slide assembly into position in housing. Install new flange gasket and position the other half of housing half in place and secure the two halves together with 6 bolts evenly spaced. Install dial indicator on housing so that dial shaft extends through thrust block pin hole and contacts ring gear. Using two screw drivers, check differential assembly end play. Should be 0.000-0.005".

NOTE—Both the differential bearing pre-load and gear lash are controlled by selective spacers, available in .004" thickness, which are installed between bearing cups and axle housing halves).

It is necessary to separate the housing halves and remove the differential bearing cups each time spacer thickness is changed. The gear may be moved toward the pinion, to decrease gear lash, by decreasing spacer thickness in case half and increasing spacer thickness in cover half. Reversing this procedure will move gear away from pinion to increase gear lash. **(IMPORTANT**—Increase or decrease thickness of spacer used in COVER half of housing to obtain a free rotating gear with from .000-.005" end play. AFTER END PLAY HAS BEEN ESTABLISHED, add spacer to equal .008" **PLUS THE END PLAY).** After endplay has been established, separate axle housing and move differential assembly out on support far enough to permit installation of drive pinion and cage assembly. Install the thrust block.

Pinion Cage Installation—Position drive pinion and cage assembly on rear axle housing studs and tap cage into place with soft hammer. Install lock washers and stud nuts or capscrews. Tighten to 70-90 ft. lbs (F-6). 25-30 ft. lbs. (F-350).

Gear Backlash Check—After correct preload has been established, install six bolts evenly spaced in housing and tighten to 85-95 ft. lbs. Install a dial indicator so indicator shaft will rest on one side of universal joint yoke approximately 2" from centerline of pinion shaft. Check movement for backlash. The amount indicated at this point will be double the actual amount. Shift the spacer used in back of the differential bearing cups in axle housing, DECREASING the thickness of spacer used, on side TOWARD which gear is to be moved, and increasing the thickness of the opposite spacer EXACTLY the same amount as required to obtain a backlash of .006-.012" (dial will read .012-.024"). After correct backlash is obtained, install remaining housing bolts and tighten to 85-95 ft. lbs.



FORD TRUCK HEAVY DUTY "SPLIT HOUSING" HYPOID AXLE

FORD TRUCK HYPOID "BANJO HOUSING" TYPE

Ford Truck, 500 & 600 Series (1953-55)

►*NOTE—Different axle assemblies used for each series. Except for minor structural differences and variation in size of parts; the two axle assemblies are identical. The service procedures apply to both assemblies unless otherwise noted.*

DESCRIPTION: Full-floating, hypoid gear type with Banjo Type housing and Hotchkiss drive.

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: This work can be done without removing wheels and hubs, as follows:

Axle Shafts—Drain lubricant from housing, then remove axle shaft stud nuts and washers. Tap center of axle shaft flange to loosen tapered dowels, and remove the dowels. Remove axle shaft and gasket from housing. To install, place new gasket on hub and install axle shaft in housing, rotating axle to line up axle splines with splines in gear. Install tapered dowels, lock washers, and nuts on studs and tighten to 50-70 ft. lbs torque.

Wheel Bearing Adjustment—Remove axle shaft (above), bearing locknut and washer. Tighten wheel bearing adjusting nut while rotating wheel back and forth, until a noticeable drag is felt, then back off adjusting nut ⅛ turn. Install bearing lock washer and lock nut, and bend one tab of lock washer over adjusting nut and one tab over locknut. Install axle shafts.

►*OVERHAUL NOTE—Axle assemblies are different for the F-500 & F-600 Trucks, in parts sizes and structural variation.*

OVERHAUL (ALL 500 SERIES, 1953-54 600 SERIES): The following service procedures apply to both series trucks except where noted. *See "Overhaul (1955 600 Series)" for differences which apply to the later 600 Series Rear Axle.*

Disassembly: Remove wheels, axle shafts (see "Axle Shaft Removal" above). Remove hub and drum assemblies and brake backing plates.

Differential Carrier Removal—Support carrier assembly with a roller jack and remove carrier-to-housing nuts and lockwashers. Tighten the puller screws provided in carrier, until carrier is loosened from housing. Carefully withdraw carrier assembly from axle housing, then back off puller screws. Remove and discard axle housing gasket. Position carrier in transmission stand or on open end of oil drum, for further work.

Differential Carrier Disassembly—Loosen thrust block screw (used on Series F-500 only), then back out thrust screw to provide clearance between thrust block and ring gear, when differential is removed. Mark differential bearing caps and carrier legs to insure reassembly in same position. Remove the adjuster locks, bearing cap bolts and caps. Remove side bearing adjuster, then lift differential assembly out of carrier. Remove ring gear thrust block from carrier.

Differential Disassembly—Clamp assembly in a vise equipped with brass jaws, then remove differential side bearings. *(CAUTION—Make sure bearing cap is clamped tightly on bearing)* with Tool T53T-4242-F. Mark the differential case halves with a punch to insure aligning case when reassembling. Cut the

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FORD TRUCK HYPOID "BANJO HOUSING" (Cont.)

lock wires and remove differential case bolts and nuts (F-600), or cap screws (F-500). Separate case halves, using a brass hammer if necessary, then remove side gears, spider, pinions and thrust washers. Center punch the drive gear rivet heads and then drill through the rivet heads using a drill 1/32" smaller than rivet body. Press out the rivets, then tap drive gear off case with a soft hammer.

Drive Pinion Removal—Hold universal joint flange with Tool T53T-4851-E, then remove cotter pin, nut and washer from drive pinion shaft. Remove flange with Tool T53T-4851-A. Remove nuts or bolts and lockwashers attaching oil seal retainer and pinion bearing sleeve to differential carrier. Remove pinion and sleeve from carrier with a soft hammer.

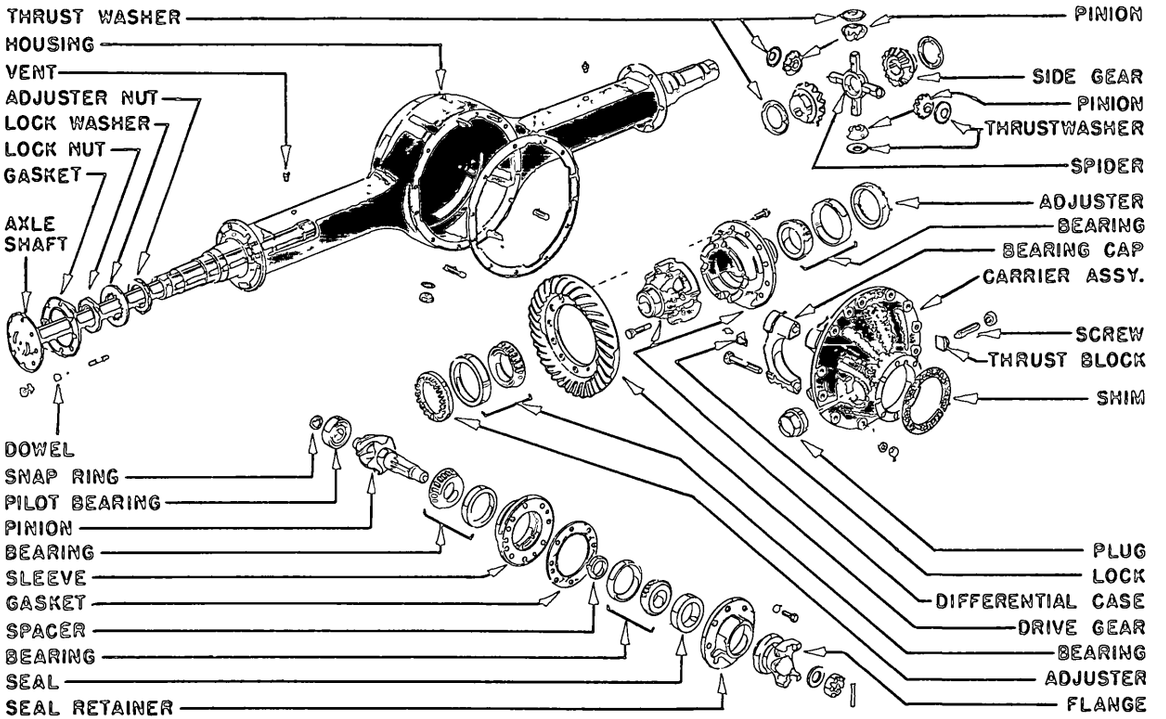
Drive Pinion Disassembly—Remove pinion bearing sleeve shims noting quantity and thicknesses used. Remove oil seal retainer. Remove universal joint flange thrust washer (F-600). Remove front pinion bearing and spacer from sleeve. Tap or press drive pinion out of bearing sleeve. Press drive pinion rear bearing off shaft with Tool T53T-4242-F. Remove pilot bearing snap ring, then remove pilot bearing with Tool T53T-4625-A and arbor press. Remove pinion bearing cups from sleeve.

Reassembly & Adjustment: Inspect gear teeth, bearings and bearing cups for signs of galling, pitting or wear, and replace any parts found to be defective. Clean all parts and blow dry with air.

Drive Pinion Reassembly & Preload Adjustment—Press drive pinion pilot bearing on pinion, then install snap ring. Press pinion rear bearing on shaft until seated against back face of pinion gear. Press pinion bearing cups in sleeve, then insert drive pinion, and install pinion bearing spacer. Install front bearing in sleeve.

Preload Checking & Adjustment—Install a sleeve on the pinion shank that will apply pressure to pinion inner race. Place drive pinion and cage assembly in a press and apply 25,000 lbs., pressure on bearing. Wrap a soft wire around cage and attach a pound pull scale to wire. Pull on scale in a horizontal line and note pull required to keep cage rotating. If rotating torque is not between 12 to 18 inch lbs., install a thicker washer to decrease or thinner washer to increase the preload. (NOTE—If a press is not available, install the universal joint flange, tighten nut to 300-350 ft. lbs., then check the preload. After correct preload has been obtained, remove universal joint flange).

Installation in Carrier—Install a new oil seal in drive pinion bearing cover with Tool T53T-4676-B (F-500), or Tool T53T-4676-C (F-600). *(NOTE—Soak new oil seals in oil for one-half hour before installation).* Position the universal joint flange thrust washer (F-600 only), bearing cover, universal joint flange, washer and nut on drive pinion. Hold flange with holding tool and tighten nut to 300-350 ft. lbs. torque. Install cotter pin. Place the original pinion bearing shims on differential carrier, then place drive pinion and cage assembly in carrier. Tap assembly into place with soft hammer and install capscrews or nuts, and lockwashers. Tighten capscrews (F-500) to 25-30 ft. lbs., and tighten nuts (F-600) to 55-75 ft. lbs. torque.



FORD TRUCK "BANJO HOUSING" HYPOID AXLE

Differential Reassembly—Position drive gear on differential case, making sure that drive gear and differential case are clean, then rivet gear to case. Assemble pinions, side gears, spider, and thrust washers in drive gear half of differential case. Install other half of case, making sure the punch marks on case halves are aligned. Install differential case bolts and nuts (F-600) or capscrews (F-500). Tighten capscrews (F-500) to 45-50 ft. lbs., or nuts (F-600) to 95-105 ft. lbs. Install lock wires.

Differential Installation & Backlash Adjustment—Install thrust block screw in axle housing, then place thrust block on screw (F-500 only). Place side bearing cups over side bearings, then position differential assembly in carrier. Position bearing adjusters in carrier, making sure adjuster threads mesh with threads in carrier. Install bearing caps in their original position using alignment marks as guide. Tighten bearing cap bolts enough to hold adjusters snug but still permit rotation. Tighten adjusters hand tight against side bearing cups. Turn left hand adjuster until drive gear is loosely meshed with pinion gear. Mount a dial indicator so contact stem bears against back face of drive gear, then loosen right hand adjuster just enough to notice endplay on indicator. Tighten this adjuster until .000" endplay is obtained. Check drive gear runout. If runout exceeds .008" remove differential and check cause. TIGHTEN EACH ADJUSTER ONE NOTCH FROM .000" POSITION to preload differential bearings.

Backlash Adjustment—Mount dial indicator on carrier with contact stem of indicator bearing against face of one tooth on drive gear, then adjust drive gear to obtain .006-.012" backlash. To reduce the backlash, loosen right hand adjuster and tighten left hand adjuster the same number of notches. To increase, perform the same operation in reverse. Check pinion gear setting (below) and if correct, tighten bearing cap bolts to 80-100 ft. lbs. (F-500), or 120-140 ft. lbs. (F-600). Install adjuster locks, tighten lock bolts to 15-20 ft. lbs. torque, then install lock wires.

Pinion Gear Setting—Check gear tooth contact pattern by coating a number of ring gear teeth with red lead, and rotating the pinion shaft back and forth while maintaining a slight pressure on ring gear. Pressure pattern should be uniform and centered slightly toward inner side of tooth center. If adjustment is necessary, pinion position can be changed by varying thickness of shim pack between pinion cage and carrier.

Thrust Pad Adjustment (F-500)—Tighten thrust block screw until thrust block just touches drive gear. Back off screw at least 1/6 turn but not more than 1/4 turn to provide proper clearance between block and drive gear. Tighten thrust block lock screw while holding screw in this position.

CONTINUED ON NEXT PAGE

FORD TRUCK HYPOID "BANJO HOUSING" (Cont.)

Differential Carrier Installation—Place a new carrier-to-housing gasket on axle housing studs, making sure puller bolt holes in gasket are aligned with holes in housing. Place differential carrier on roller jack, then roll assembly into position. Start carrier into housing with four nuts evenly spaced. Tighten nuts alternately to draw carrier squarely into housing. Install remaining nuts and lockwashers and tighten nuts to 55-75 ft. lbs. torque.

OVERHAUL (1955 600 SERIES): Procedures for overhaul are the same as for All 500 Series and 1953-54 600 Series Rear Axles except as noted below:

Disassembly: Differential Carrier Removal—Remove rear axle housing cover and gasket, then remove differential carrier from housing.

Differential Dissassembly—Differential case halves are held together by capscrews.

Drive Pinion Disassembly—Grind peened portion off of drive pinion, then press pinion out of pilot bearing. Remove pinion bearing cup from sleeve.

Reassembly & Adjustment: Drive Pinion Reassembly & Preload Adjustment—Press pilot bearing on drive pinion, then peen or stake end of drive pinion to secure pilot bearing in place.

Preload Checking & Adjustment—Rotating torque should be 18-25 in. lbs.

Installation in carrier—Install new felt grease seal with Tool T53T-4676-C. Make certain that gasket groove in face of pinion sleeve flange is clean, then install a new cork gasket, which has been soaked in water, in the groove. Tighten capscrews to 25-30 ft. lbs. Tighten nuts to 85-95 ft. lbs.

Differential Reassembly—Tighten differential case capscrews to 50-70 ft. lbs.

Differential Installation & Backlash Adjustment—Runout should not exceed .006".

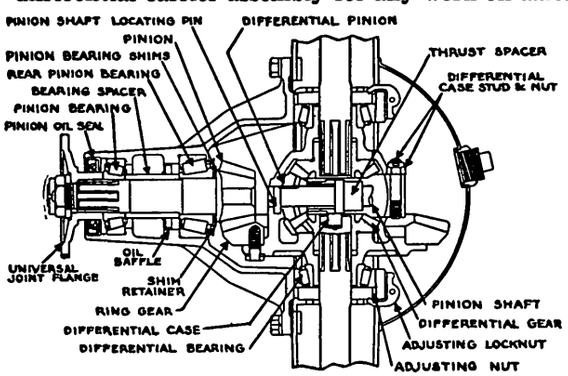
Backlash Adjustment—Tighten bearing cap bolts to 160-175 ft. lbs.

Differential Carrier Installation—Install new cover gasket and cover with capscrews and new lockwashers. Torque capscrews to 50-70 ft. lbs.

HUDSON SPIRAL BEVEL

Six & Eight, All Models (1946-47)

DESCRIPTION: Spiral bevel, semi-floating type. Rear cover welded in place requiring removal of differential carrier assembly for any work on axle.



REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: Check and adjust bearings whenever axle shaft is replaced.

Axle Shaft Replacement. Remove rear wheels, axle shaft nut and washer, use wheel puller to remove hub and brake drum assembly (do not use knock-out type puller). Take off 4 nuts on wheel bearing adjusting cap, remove cap and bearing adjusting shims, use puller J-352 to remove shaft and bearing assembly. Use bearing remover to remove bearing cone and rollers from shaft, and special tool to re-install bearing.

Oil Seals—Use oil seal replacer tool J-353-1 to install new oil seal in bearing adjusting cap. Use tool HM-555 to remove old seal from axle housing, and use driver J-353-2 to install new seal assembly.

Wheel Bearing Adjustment Note—When installing axle shaft (above), adjust end play by installing correct shim thickness between bearing adjusting cap and backing plate so that shaft endplay is .002-.004". Adjustment should be made equally at both wheels.

Axle Shaft Thrust Button Renewal. Thrust button consists of hardened steel plug in inner end of axle shaft. To remove button, grind end flush with shaft, center punch button and drill through center with 11/32" drill, tap hole with 3/8-16 tap, screw in 3/8-16 capscrew, place head of screw in vise and tap end of shaft with soft hammer to remove button. Drive new button into place in shaft.

OVERHAUL: Disassembly. Mark differential bearing caps and adjusting nut positions (to facilitate reassembly), remove bearing caps and lift out ring gear and differential assembly. Use special puller J-354-A to remove differential bearing cones from differential case hubs making certain that puller fingers installed in notches in case so that they engage bearing cone. Remove bolts and lockwashers to remove ring gear. To disassemble differential gears, remove cotter pins and nuts and separate right and left halves of differential case. When reassembling differential gears, select thrust washers of correct thickness so that gears have no appreciable endplay when installed (it should be possible to turn gears by hand by grasping axle shafts). Install thrust washers with smooth side toward gears and rough side toward case.

Pinion Bearing Assembly:—To disassemble pinion and bearings from carrier, remove nut and washer on end of shaft, pull rear universal joint companion flange using puller J-456, withdraw pinion, spacer, and shims through rear of carrier. Use tool J-489 to remove oil seal from carrier, lift out front bearing cone, use tool HM-63 to remove bearing cups from carrier bore. Use tool J-1301 to remove rear bearing cone from pinion shaft. When reassembling, seat bearing cups in carrier with tool J-270-H, insert front bearing cone, install new oil seal with replacer tool J-353-1 (see Note below), install pinion, spacer and adjusting shims (see Bearing Adjustment and Pinion Setting below), install companion flange and tighten nut with torque wrench to 200 ft. lbs. while holding flange with special tool J-789.

Oil Seal Note—Two types used (with concave or flat outer surface). Both types installed in same manner but clearance must be maintained between edge of dust shield on companion flange and oil seal (will cause noise if there is contact at this point).

Pinion Bearing Adjustment—Re-install same pinion bearing adjustment shims between bearing spacer and front bearing cone, tighten pinion shaft nut securely with rear universal joint flange in place, check bearing adjustment. It should be just possible to turn pinion shaft with one hand. Add thin shim if bearings too tight. Pinion bearing endplay should be .000-.001".

Pinion Setting:—When reassembling pinion install same shim thickness between pinion and rear bearing cone to retain correct pinion position. Adjust pinion by adding or removing shims at this point NOTE—Standard pinion setting shim pack thickness is .006" (all models).

Differential Bearing Adjustment:—To set up bearings when installing differential carrier, tighten differential bearing cap capscrews finger tight, turn left hand adjusting nut in until all play eliminated between pinion and ring gear, then tighten right hand adjusting nut securely. Set up dial indicator to check gear backlash, back off left hand adjusting nut one half notch and tighten right hand nut equal amount until gear backlash is .0005-.0035". Tighten bearing capscrews securely on left hand adjusting nut, turn right hand adjusting nut in one additional notch to secure correct bearing pre-load of .009" bearing tension. Tighten right hand bearing capscrews securely and install locks on both nuts.

Ring & Pinion Gear Adjustment: Paint gears to check gear mesh. Pinion position controlled by shims between pinion and rear bearing cone. Backlash should be .0005-.003". Adjusted by backing off one differential bearing adjusting nut and tightening opposite nut equally. See Pinion Setting and Differential Bearing Adjustment above.

Ring Gear Replacement:—With gear removed, runout of gear mounting flange on differential case should not exceed .002". When installing gear, see that gear and case are clean and smooth and not nicked or burred. Use lockwashers on all gear mounting screws and tighten all screws uniformly

1948-52 HUDSON HYPOID

Six & Eight, All Models (1948-52) See Production Change (following).

▷*1952 REAR AXLE PRODUCTION CHANGE: Late 1952 Cars with "Dual Range Hydra-Matic Drive" use a different axle. See "Spicer Rear Axle".*

▷REAR AXLE IDENTIFICATION: Differential case part number and axle ratio indicated by marking on right front side of carrier flange:

Model	Axle Ratio	Marking
1948-52	4 1/10-1	1-10
1948-52	4 5/9-1	5-9
1950	3 9/11-1	①9-11
1951-52	3 7/12-1	①7-12

①—See Differential Case Assembly Caution (following):

▷DIFFERENTIAL CASE ASSEMBLY CAUTION 3 9/11-1 & 3 7/12-1 RATIO REAR AXLES)—Ring gear mounting flange on these carriers is machined to .062" greater depth (to allow for greater pinion diameter on these axles) and this deeper machined carrier must be used for these two ratios only. There is a ⅛"x 1/32" chamfer on outer corner of ring gear mounting face (chamfer not found on first units).

▷PINION OIL SEAL CHANGE: Several types have been used and must be installed as unit assemblies with correct type Dirt Shield & Universal Joint Flange. See Pinion Oil Seal data.

DESCRIPTION: New semi-floating, hypoid gear, Hotchkiss drive type with separate differential carrier assembly. Carrier assembly should be removed for all work.

AXLE SHAFT REPLACEMENT: Remove rear wheel, use puller to remove wheel hub and brake drum. Take off nuts on bearing adjusting cap studs, remove cap and oil seal assembly, remove bearing shims. Pull axle shaft and bearing assembly out of housing. Use bearing remover to remove bearing cone and rollers from shaft, and special tool to reinstall bearing. Adjust bearings when re-installing

Wheel Bearing Adjustment: Shaft endplay should be .001-.004". Adjust endplay by installing correct shim thickness under bearing adjusting cap (shims furnished .003", .005", .015" thick) when replacing axle shaft. Adjust endplay equally at both wheel bearings to maintain centered position of spacer block on differential pinion shaft

REAR AXLE DISASSEMBLY & OVERHAUL: With carrier assembly removed from housing, mark both bearing caps and adjusting nuts to insure reassembly in same relative positions. Remove bearing capscrews, lift off bearing caps, remove adjusting nuts, lift differential assembly out of carrier. To remove drive pinion, remove nut on pinion shaft at universal joint flange, pull flange, remove pinion, rear bearing cone and rollers, and bearing spacer out through rear of carrier (CAUTION—Do not lose bearing shims located on shaft between spacer and front bearing cone). Remove front oil seal, lift out front bearing cone and roller assembly. Use special tools to remove bearing cups from carrier. Use puller to remove rear bearing cone and roller assembly from pinion shaft (CAUTION—Do not lose pinion adjusting shims located on shaft behind rear bearing cone)

Pinion Bearing Assembly: Use special tools to seat pinion bearing cups in carrier bore. Insert bearing adjusting shims (see Pinion Bearing Adjustment below), front bearing cone and roller assembly, install oil washer and oil seal (see below). Place pinion shims on shaft (see Pinion Setting below), install rear pinion bearing cone and roller assembly using special tool to seat cone against shims, place bearing spacer on shaft, insert assembly in carrier. Install universal joint flange (with dirt shield on hub), tighten pinion shaft nut to 200 ft. lbs.

▷Pinion Oil Seal Installation—*CAUTION—Several types used.* Each type seal designed to be used with special design Dirt Shield (& Universal Joint Companion Flange) and parts should be matched when installed as follows:

Oil Seal Part No.	Dirt Shield & Flange No.
300312	161012 or 301817
301959①	301817 or 300308
303843	303842

①—This seal can be used with new type 303842 Dirt Shield & Flange but is not recommended (will not provide improved sealing of new 303843 Oil Seal).

Pinion Setting: Pinion position and gear mesh controlled by shims between pinion and rear bearing cone. When re-installing pinions, make certain that same number and thickness of shims (furnished .002", .003" thick), installed at this point as were removed when axle disassembled. Adjust pinion to obtain proper tooth contact by adding or removing shims at this point.

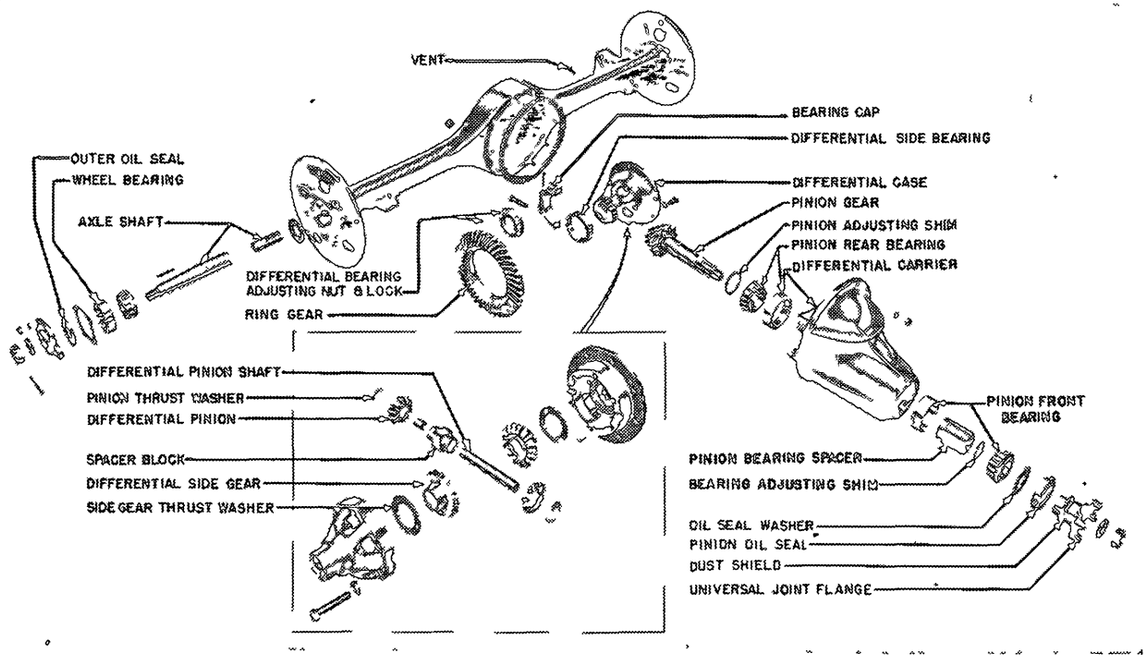
Pinion Bearing Adjustment: Bearing pre-load controlled by shims between spacer on shaft and front bearing cone. When re-installing pinion and bearings, make certain that same number and thickness of shims (furnished .002", .003", .004" thick) installed at this point as were removed when axle disassembled. Bearing resistance torque 27-32 in. lbs. (torque required to rotate pinion shaft).

Differential Assembly: To dismantle assembly, remove ring gear capscrews, press off ring gear, take out capscrews and separate differential case halves, lift out differential side gears, pinions, thrust washers, shaft, and thrust block. Use special puller to remove side bearing cone and rollers. When reassembling, see that ring gear seat on case is clean and free from burrs, use internal-tooth lockwashers on mounting screws, tighten screws evenly to 50 foot lbs. torque. Install brass thrust washer behind each differential pinion, see that locating pin in shaft engages hole in case and that thrust block in place on center of shaft. Install bakelite thrust washer behind each side gear (these washers control backlash and are furnished .031", .036", .041", .046", .051", .056" thick for selective fit). Use special driver to install differential side bearing cone and rollers.

▷NOTE—Ring gear should be heated in water to approx. 200°F. to facilitate installation.

Differential Bearing Adjustment & Ring Gear Backlash: When installing differential assembly in carrier, install adjusting nuts and bearing caps according to previous markings, tighten bearing capscrews finger tight. Turn left hand adjusting nut in until all backlash between ring and pinion gears is taken up, then tighten right hand adjusting nut tight. Set up dial indicator to check backlash, back off left hand adjusting nut and tighten right hand nut equally until correct backlash of .004-.006" is secured. Tighten left hand bearing cap screws to 55-65 ft. lbs. Turn right hand adjusting nut in one full notch to provide necessary .008-.012" spread for correct bearing pre-load, tighten bearing cap screws to 55-65 ft. lbs., install adjusting nut locks.

Carrier Assembly Installation: Tighten carrier to axle housing nuts to 35-40 ft. lbs.



1948-52 HUDSON HYPOID REAR AXLE

METROPOLITAN (NASH & HUDSON) HYPOID

Metr p litan, Nash & Huds n Mod ls (1954-55)

DESCRIPTION: Three-Quarter floating, hypoid gear, Hotchkiss drive, with separate differential carrier.

REMOVAL OF AXLE: *Carrier assembly or complete axle assembly can be removed as follows:*

Carrier Assembly–Raise rear end of car, drain axle housing and remove axle shafts (see Axle Shaft Removal). Disconnect propeller shaft at rear universal companion flange and remove shaft. Remove nuts attaching carrier to housing and remove carrier.

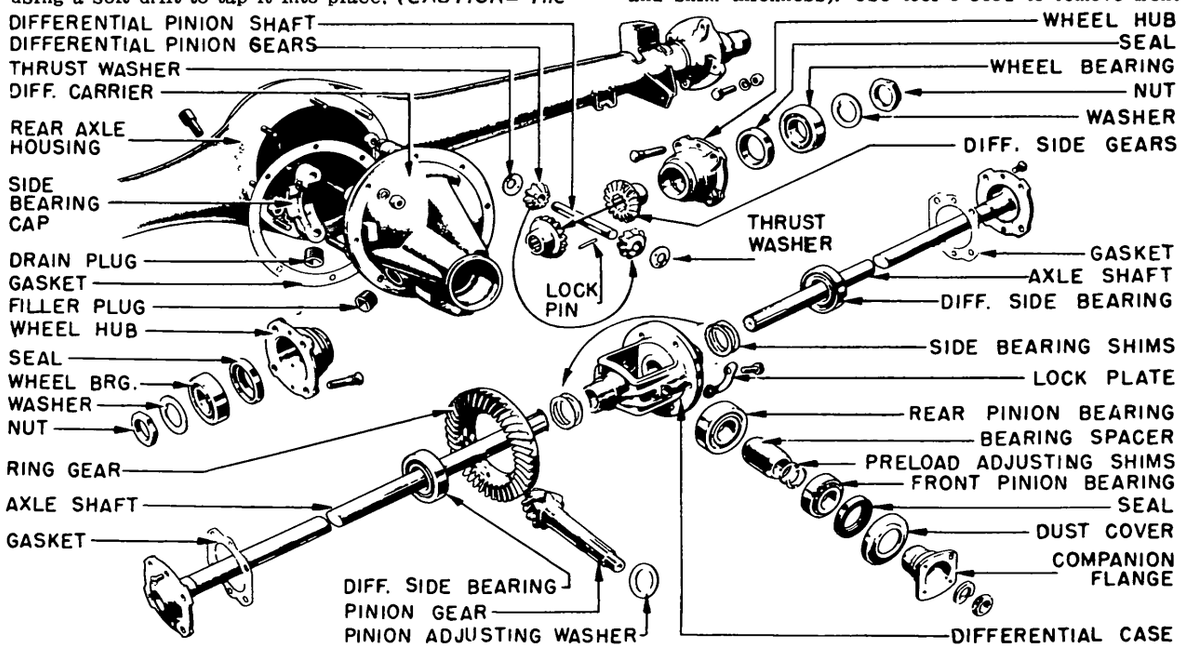
Axle Assembly–Disconnect brake cable at balance lever and brake hose at "tee" fitting. Disconnect propeller shaft at rear universal joint companion flange and remove shaft. Disconnect rear springs by removing "U" bolts at spring seats and remove assembly from beneath car.

AXLE SHAFT REMOVAL: Raise car, drain rear axle, and remove the wheel. Release hand brake and make certain the linings are not binding on drum. Remove drum locating screw and tap drum off hub. Remove axle shaft retaining screw (counter-sunk screw between axle flange studs), and pull axle from housing.

REAR WHEEL HUB (Removal): With wheel, drum, and axle shaft removed, bend up the lockwasher tabs locking nut in position and remove nut. Remove hub with Puller J-1644-B and Thrust Block J-1644-3. The hub, ball bearing, and seal will come off as an assembly. Tap bearing and seal out of hub using a soft drift.

Installation–Install a new oil seal into position in hub with seal lip toward bearing, then install the bearing using a soft drift to tap it into place. *(CAUTION– The face of b aring outer race should protrude .001-.004" beyond face of hub with rear wheel hub gasket in place when bearing is seated in hub. This insures that bearing is correctly placed between shoulder abutment in hub and the flange of the axle shaft).* Pack bearing and hub with wheel bearing lubricant before assembling to axle housing. Install hub assembly on axle housing with tool J-2995 (Transmission Clutch Shaft Snap Ring Installer).

DISASSEMBLY (Carrier Removed From Axle Housing): Remove differential side bearings, noting that cap and housing half of bearing seat are marked with numerals to indicate correct location at reassembly. Lift differential case from carrier. Use a suitable bearing puller installed so that it pulls on inner bearing race (case is recessed to provide puller clearance). As each bearing is removed, measure the thickness of shims found between bearing and case. The thickness of these shims is determined at the factory for a .002" bearing preload and must not be changed. Mark the ring gear and case to insure assembly in the same location and tap ring gear from case with a brass drift, after removing the capscrews and lock plates. With a 1/8" diameter drift, 3" long, drive out the pinion shaft lockpin, and drive out pinion shaft. Roll differential pinions and thrust washers around on the side gears until they can be removed from case, then remove side gears. Use tool J-1412 (Companion Flange Puller) and remove flange from pinion shaft. Tap pinion shaft lightly to free front bearing cone and remove bearing. Remove pinion shaft and rear bearing as an assembly from rear of housing (note shims and spacer location and shim thickness). Use tool J-5691 to remove front bearing cup, and tool J-5690 to remove rear cup. Remove pinion rear bearing with tool J-358-1 and plate J-5550, pressing bearing off pinion in an arbor press. Remove adjusting washer found between bearing and gear.



METR P LITAN HYPOID REAR AXLE ASSEMBLY

REASSEMBLY: Before reassembling, inspect all parts for wear, nicks, burrs, and cracks. Replace defective or damaged parts.

Differential Case Reassembly: Install side gears in bores of case. Install the thrust washers behind differential pinion gears and mesh the gears with pinion gears so the holes are opposite and in line with each other. Roll the gears around until gear holes are aligned with holes in differential case and install pinion on the pinion shaft with the lock pin hole in line with lock pin hole in differential. Install ring gear on case, aligning the marks made at disassembly. Make sure that face of gear and face of case are clean and that there are no nicks or burrs on either that would prevent gear seating on case. Install attaching capscrews and lock plates, tightening screws evenly in a diagonal pattern to 28-30 ft. lbs. torque. Check ring gear runout before locking the capscrews with the lock plates.

Ring Gear Run-out Check–Place differential case in a set of "vee" blocks or in carrier (with side bearings installed) and check runout with a dial indicator in in position against face of gear. Runout should not exceed .002". If greater, remove gear from case and check face of case. If this runout exceeds .002", replace differential case. If runout is indicated in the ring gear, replace ring gear and pinion as a set.

Side Bearing Installation–Replace original shim pack under their respective bearings (as noted at disassembly), and install side bearings with tool J-2995, making sure that side of bearings marked "Thrust" is toward outside of case. *CAUTION–The shim pack behind th side bearings is predetermined at th factory to provide a .002" preload and it is v ry important that th total shim pack not be changed. Adjustment of shims from one side to the other for ring gear backlash can b made as indicated in "Backlash Adjustment" b low.*

Pinion Shaft Reassembly & Installati n: Install pinion bearing cups in carrier housing as follows: Center rear cup in bore and install tool J-5559-10, install front cup and install tool J-5559-11. These tools will seat in inner angles of cups. Insert tool J-5559 through the cup and tool assembly and draw cups down into bores until cups are seated on shoulders in bore. Check to make sure that cups are properly seated. (If new ring gear & pinion is being installed, see "Pinion Depth Adjustment" below), proceed as follows: Install pinion depth adjusting washer on pinion shaft next to gear (use the same washer as removed or a new one of the same thickness). Install bearing with large diameter toward gear, pressing it into place with tool J-1416. Make sure it is tight against washer and gear. Install pinion shaft shim pack (controls pinion bearing preload), and spacer on pinion shaft and install the assembly in housing. Install front bearing tapping it into place. Install companion flange with tool J-1375 (do not install oil seal at this time). Check pinion bearing preload (see below) and adjust as necessary. Remove pinion shaft

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METROPOLITAN (NASH & HUDSON) HYPOID (Continued)

nut and install oil seal, then install lock washer and nut and tighten nut to 140-150 ft. lbs. torque.

Pinion Depth Adjustment: (Without Nash Tool J-2499)—Note the inspection marks on the old and new piston gears and measure the thickness of the old depth adjustment washer (located between rear bearing and pinion gear). Install a new depth washer of correct thickness to compensate for any differences between inspection marks on old and new pinion gear. As an example: If old pinion is marked "minus 2", and the newgear is marked "plus 2", there is a difference of .004" in the two pinion gears. Therefore, the new depth adjustment washer must be .004" thicker than the old one. Depth adjustment washers are furnished in sizes from .116" to .130" in .002" variations.

Pinion Depth Adjustment: (With Nash Tool J-2499)—Place rear pinion bearing cone in cup. Press the cone and revolve it to set the rollers. Bolt gauge plate over bearing so that it does not touch housing at any point (the bolt runs down through bearing and is secured at forward end of housing with a cross-piece and thumb screw). Install dial indicator to tool J-2499, with indicator button on gauge pin. Set dial indicator to "zero" under tension. Install tool with correct size adapters squarely seated in the side bearing bores in housing. Swing gauge point across plate until the highest reading is obtained. This reading subtracted from the constant of .140" will give the standard adjustment washer thickness for that housing. Using this figure, add or subtract according to the marking on the pinion to determine correct adjustment washer. For example: If a gauge reading of .014" obtained, subtracting this figure from .140" will give a standard of .126". This means using a standard "O" pinion, an adjusting washer of .126" would be required. However, if a pinion marking reads "minus 2", the .002" must be subtracted from the .126" which would mean an adjusting washer of .124" is required.

Pinion Bearing Preload Adjustment: With pinion shaft assembly installed (including preload adjusting shim pack and spacer found at disassembly), install companion flange and pinion nut and tighten nut to 140-150 ft. lbs. (do not install seal). Place carrier assembly in in a vertical position and using a socket wrench to fit the pinion nut and a "tee" handle, measure the amount of pull required to rotate the pinion by attaching a spring scale to "tee" handle at a point 4" from center of pinion shaft. Note the reading on the spring scale as the pinion starts to move, and multiply this reading by four to determine the inch pounds required to turn shaft. The specified bearing preload is 12 to 14 inch pounds *(NOTE—This setting supersedes the previous setting of 3 to 4 inch pounds).* Adjust the preload by removing or inserting shims between pinion bearing spacer and the front pinion bearing.

Differential Case Installation in Carrier: Install differential case assembly in carrier bearing seats and install the bearing caps (note that caps are stamped on one side, and when installing, this stamp should be on same side as corresponding stamp on leg of carrier housing bearing seat). Tighten bearing cap stud nut to 50-55 ft. lbs. torque.

Ring Gear & Pinion Backlash Adjustment: *(CAUTION—Gear backlash should be .005" to .008". The recommended backlash for each individual ring gear and pinion set is etched on the back face of the ring gear).* Measure the backlash with a dial indicator mounted so the indicator button is against a tooth of the ring gear. Rock the ring gear with the pinion held stationary and note the amount of movement. Adjust the backlash by moving one or more shims located behind side bearings, from one side to the other *(CAUTION—Do not change thickness of TOTAL bearing shim pack as predetermined at factory to provide .002" bearing preload).*

Carrier Assembly Installation: Reverse the removal procedure and torque the stud nuts to 30 ft. lbs.

1946-48 NASH AMBASSADOR HYPOID

Nash Ambassador Six. All Models (1946-48)

▷REAR AXLE IDENTIFICATION TAG: Ring & pinion gear ratio stamped on tag attached to axle by one of differential housing cover bolts.

▷*CAUTION—Tag should be kept with axle parts and reinstalled when axle reassembled. Install new tag when gear ratios changed (tag furnished with gears).*

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss drive. Pinion and shaft mounted on taper roller bearings seated directly in housing with spacer on shaft between bearing cones. Shims for bearing adjustment located between spacer and front bearing cone, washer for pinion setting adjustment between pinion and rear bearing cone. Differential assembly mounted on taper roller bearings seated directly in housing with adjusting nut at right hand bearing cap only (shims installed between left bearing cup and housing for backlash adjustment).

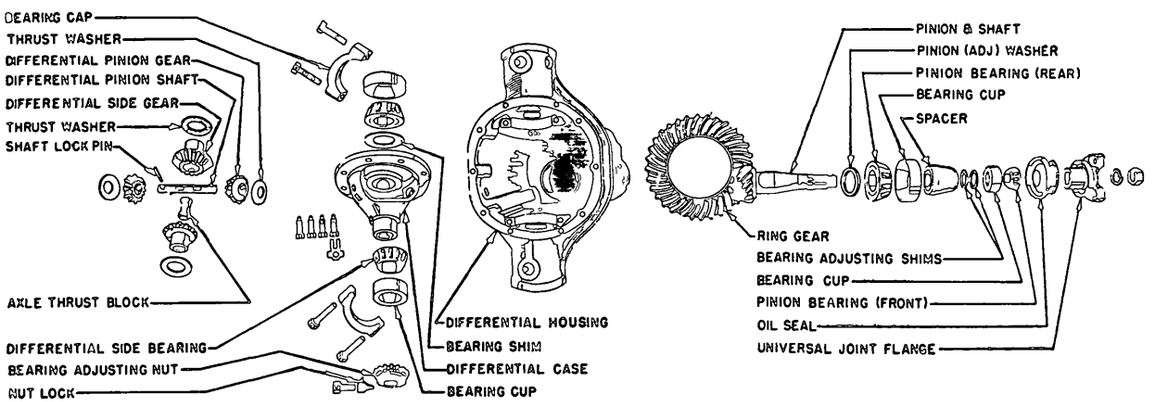
REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: To remove axle shaft after the wheel and hub removed, take off nuts on bearing retainer (rear brake support plate), remove oil seal, retainer plate, bearing adjusting shims, then pull axle shaft and bearing assembly. When installing shaft, add or remove shims between retainer plate and axle housing flange to secure desired axle shaft endplay of .002-.004". When installing shafts, bearing cup should be allowed to project slightly so that cup will be properly located by brake support plate as it is tightened in place. NOTE—Cars are assembled at factory with .046" shim thickness between right axle tube and brake support plate, and sufficient shim thickness on left side for desired axle shaft endplay of .002-.004". This allows endplay adjustment to be made at each wheel.

OVERHAUL: Disassembly. With axle shafts out, remove rear housing cover, mark adjusting nut on right hand differential side bearing to insure replacing in same position, back adjusting nut off, remove bearing cap bolts and bearing caps, lift differential assembly out. To remove pinion, remove nut on end of pinion shaft, pull universal joint flange using puller J-1412. Remove pinion shaft oil seal (discard seal and install new seal when reassembling axle). Tap end of pinion shaft with soft hammer to loosen front bearing cone, remove bearing cone and roller assembly, remove shims located behind bearing cone, note number and thickness of these shims which control bearing adjustment. Remove pinion and rear bearing assembly through rear of housing. Use long drift to drive pinion bearing cups from housing (recess provided behind each cup for this purpose). Use pinion bearing tool J-2245 to remove rear bearing from pinion shaft, note number and thickness of washer or shims on shaft behind bearing which control pinion setting (gear mesh). To remove differential side bearing cone and roller assemblies, use special puller J-2497 being careful that puller does not contact roller cage or damage shims in back of left hand bearing (these shims control ring and pinion gear backlash).

Pinion Bearing Assembly:—Bearing adjustment controlled by shims located on pinion shaft between spacer and forward bearing cone. When installing pinion, install correct washer and shim pack for

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NASH HYPOID GEAR AXLE (HOTCHKISS DRIVE)

1946-48 NASH AMBASSADOR HYPOID (Cont.)

correct pinion mesh (see Pinion Setting below) on shaft against pinion, install rear bearing cone and bearing spacer. Install sufficient shims on shaft in front of spacer to insure positive endplay of shaft when installed in housing, install front bearing cone, universal joint companion flange, or special tool (splined sleeve) and tighten nut on shaft securely. Then check bearing adjustment as directed below. NOTE—Do not install oil seal until after bearing adjustment has been made.

Pinion Bearing Adjustment: Use a dial indicator to check pinion shaft endplay with companion flange nut securely tightened (oscillate shaft in both directions while applying end pressure to insure bearings seated). Disassemble pinion shaft and remove shims from between spacer and front bearing cone equal to the observed endplay **plus .003"** to insure correct bearing pre-load or set (.003" tight).

Pinion Bearing Pre-Load Adjustment with Tool J-2496: With pinion installed in axle housing (make certain that spacer and bearing adjusting shims in place on shaft between bearing cones), install tool on end of shaft in place of universal joint flange, tighten pinion shaft nut securely. Attach spring scale to exact center of tool handle (will provide 6" arm), check torque required to turn pinion shaft. Desired torque is 15-18 in. lbs. (spring scale reading x 6) for .003" bearing pre-load. If less than 15 in. lbs., **remove** shims from between spacer and front bearing cone; if more than 18 in. lbs., **add** shims at this point. When bearing adjustment completed, install new oil seal using Tool J-1556, install universal joint companion flange using Tool J-1375, tighten pinion shaft nut to 105-110 ft. lbs.

Pinion Setting Without Gauge—If new pinion being installed and pinion setting gauge not available, note washer and shim thickness used for old pinion, secure standard washer thickness for this housing by adding (if pinion marked +), subtracting (if pinion marked —) shims equal to figure following this plus or minus mark on the old pinion, finally correct this standard washer thickness in accordance with new pinion marking as directed under Pinion Setting above.

Pinion Setting using Rear Axle Drive Pinion Gauge No. J-2499: With rear pinion bearing cup installed in housing, place bearing cone and roller assembly in cup, press in and revolve bearing cone so that rollers are properly seated. Bolt special gauge plate on bearing cone (thread bolt through housing and secure in place with cross-piece and thumbnut at forward end), make certain **that gauge plate does not contact housing** at any point. Mount dial indicator on tool with indicator button on top of gauge pin, set dial indicator at "0" with tension on gauge pin. Install tool in housing with **larger** diameter of adapter rings seated in side bearing seats (install adapters on tool with larger diameter rings outward). Swing gauge point across gauge plate and note highest reading of dial indicator, **subtract this** on end), add (if pinion marked —), or subtract (if **reading from .140"** and resulting figure will be washer thickness required for a standard "0" pinion. If pinion is not standard (marked by — or + figure pinion marked +) from the standard washer thickness an amount equal in thousandths to the figure following this — or + sign.

Differential Bearing Assembly: Use special puller J-2497 to remove bearing cone and roller assemblies from differential case. Note number and thickness of shims located behind left hand bearing cone (these shims control ring and pinion gear backlash). When installing bearings, make certain that same number and thickness of shims installed behind left hand bearing as were removed (place thickest shims against case), do not install any shims behind right hand bearing.

Differential Gear Assembly—To disassemble the differential gear assembly, drive out pin in differential pinion shaft, remove shaft, axle shaft thrust block, pinions, side gears and thrust washers. When reassembling, make certain that thrust washers installed in back of each side gear and pinion and that thrust block is installed on pinion shaft (this block transmits thrust from one shaft to the other).

►*CAUTION*—Always use new thrust washers for side gears and pinions. Install washers with oil pocket (pitted side) toward gears.

Differential Bearing Adjustment:—With lock on right hand bearing adjusting nut removed, and bearing cap loosened so that adjusting nut can be turned, turn adjusting nut up until all bearing endplay is just removed and notch on nut is in line with lock on bearing cap, then tighten adjusting nut **additional 1-2 notches** so that correct bearing pre-load of .004-.006" is secured. Tighten bearing cap screws to 105-110 ft. lbs., install adjusting nut lock. Recheck ring and pinion gear backlash.

Ring & Pinion Gear Adjustment: Gear mesh should be correct if pinion setting properly made (see above). Check gear tooth contact by painting gears. Check backlash as follows:

Ring Gear Backlash Adjustment—Check backlash with dial indicator at several points around ring gear. If backlash not within limits of .004-.006", dismantle axle, remove left hand differential side bearing, add or remove shims on hub behind bearing (add shims to decrease backlash, remove shims to increase backlash), reassemble axle, readjust differential bearings.

HUDSON & NASH REAR SUSPENSION

Nash "600", All Series (1946-49)
Nash Statesman (1950-55)
Nash Ambassador (1949-55)
Hudson Wasp & Hornet (1955)

►*1946-48 AMBASSADOR & 1950-55 RAMBLER NOTE:* Rear suspension on these models is conventional type with leaf type springs and Hotchkiss drive.

DESCRIPTION: Special coil spring type with springs insulated by rubber cushions at top (in body) and at lower end (at spring seat on axle housing). Direct acting shock absorbers are mounted within springs and Stabilizer is used to maintain alignment.

REMOVAL OF SPRING & SHOCK ABSORBER: Lift rear of body until all weight removed from springs, remove two nuts on shock absorber bolts at rear axle. Lift rear of body sufficiently to free shock absorber bolts from axle housing, remove lower spring saddle. Swing spring, shock absorber, and lower spring seat to one side, lower spring and lift out. To remove shock absorber after spring removed, remove nuts and rubber grommets on upper mounting stud within body, lower shock absorber and remove from below.

INSTALLATION OF SPRING & SHOCK ABSORBER: Install grommets and nuts on upper end of shock absorber in body, assemble bolts, bushings and spacer on lower end of shock absorber. Install upper rubber cushion on spring by placing projection or tab on cushion between stationary end coil of spring and first movable coil and rotating cushion until flat end of stationary coil is tight against shoulder of tapered projection on spring (CAUTION—positioning necessary to prevent contact between first closed coils of spring in operation). Install lower spring cushion similarly.

SPRINGS: Springs are ground flat at upper and lower ends. Same type springs used on all models.

Rear Spring Specifications

	Free Height	Load Height
1946-49 All (Std.)	16¾"	① 9 13/16"
1950-51 Statsmn.(Std.)	16¾"	① 9 13/16"
1950-51 Amb. (Std.)	17 7/8"	① 10 9/16"
1952-54 All (Std.)	17 7/8"	① 10 9/16"
1955 All Models (Standard)		
Less Wheel Carrier	17 7/8"	① 10 9/16"
With Wheel Carrier	17 7/8"	② 10 7/16"
1952-54 Heavy Duty	15 1/2"	① 10 17/32"
1955 Heavy Duty	16 3/4" min.	① 11 1/4"

①—With load of 870 lbs. ± 25 lbs.
②—With load of 940 lbs. ± 25 lbs.

►*NOTE*—When heavy duty rear springs are installed, heavy duty shock absorbers must be installed in both front and rear.

1946-54 NASH HYPOID

Nash "600" Series (1946-49)
Nash Rambler & Statesman (1950-54)
Nash Ambassador (1949-54)

►**REAR AXLE IDENTIFICATION TAG:** Ring and pinion gear ratio stamped on tag attached to axle housing by one differential housing cover bolt.

►***CAUTION—Tag should be kept with axle parts and re-installed when axle reassembled. Install new tag (furnished with gear sets) when axle ratios changed.***

►CHANGES, CAUTIONS, CORRECTIONS

►*1952-53 RAMBLER AXLE HOUSING ASSEMBLY REPLACEMENT CAUTION*—Rear Axle Housing, Part No. 3113924 is being supplied for service replacement for all cars (Std. O.D. & Hydra-Matic), and Rear Axle Assemblies, Part Nos. 3112932 and 3114542 (Std. & O.D. Equipped cars) on cars built after Serial Nos. Kenosha D-99819 and El Segundo DC-7584. When installing above parts it may be necessary to remove shock mounting stud boss to provide room for shock absorber.

►*1953 STATESMAN PROPELLER SHAFT COUPLING PRODUCTION CHANGE—"Slip-Type" coupling replaces "Lock-nut Type" formerly used. New type coupling can be used on all Series 40 cars (1941-53).*

►**1951 AMBASSADOR DIFFERENTIAL SIDE BEARING ADJUSTMENT PRODUCTION CHANGE:** Effective with car serial No. R-601152 (11-39 ratio), R-601349 (9-40 ratio) and R-606549 (10-41 ratio) side bearing adjusting nut has been eliminated. Adjustment is now made in same manner as Statesman & Rambler Rear Axles.

►**1950-51 PINION SHAFT PRODUCTION CHANGE:** Effective with following car serial Nos. Statesman K-376736 (8-35 ratio), K-380141 (8-39 ratio), Ambassador R-607425 (11-39 ratio), R-610875 (9-40 ratio), and R-619089 (10-41 ratio), a new type pinion gear is used. Pinion bearing spacer has been eliminated. *See "Pinion Bearing Preload Adjustment"*

►**1950 REAR AXLE VENT PRODUCTION CHANGE:** Rear axle is now vented by a .067" diameter hole located on rear side of rear axle tube. Previous vent was under rear spring seat. ***Where there is evidence of water entering previous type axle, seal the hole with body sealer around spring locating pin, drill a new hole in rear side of tube approx 8⅞" from brake backing plate. Use No. 51 drill.***

►**1950 DIFFERENTIAL CAP SCREW LOCK WIRES ELIMINATED:** Wires have been replaced by shakeproof lock washers.

►**1951 HYDRA-MATIC CARS PROPELLER SHAFT:** Beginning with 1951 production a solid one-piece shaft is used and the center-bearing is eliminated.

DESCRIPTION: Semi-floating, hypoid gear, Torque Tube Drive with Coil Springs (All Models except Rambler), Hotchkiss Drive with Semi-elliptical springs (Rambler).

Universal Joint Spring ("600" & Statesman)—Coil spring backed by welded plug in the forward end of universal joint so that spring engages end of transmission driveshaft and assures correct location of universal joint. This spring must be in place when universal joint and propeller shaft assembly is installed.

AXLE REMOVAL: *See "Rear Axle" on car model page.*

PROPELLER SHAFT (RAMBLER): **Removal**—Loosen coupling nut on rear end of rear universal joint yoke, use soft hammer to tap universal joint and propeller shaft off pinion shaft.

Installation Caution—Make certain that universal joint yoke lined up with pinion shaft when tapping yoke on shaft, tighten coupling nut securely.

►*RAMBLER 108" WHEELBASE MODEL PROPELLER SHAFT REMOVAL & DISASSEMBLY:* **(Removal)**—Remove propeller shaft coupling nut from coupling and tap coupling off pinion shaft with a soft hammer. Remove nuts from propeller shaft center bearing retainer studs and disconnect cross member from support brackets at side rail. Remove cross member and propeller shafts from car.

TORQUE TUBE & PROPELLER SHAFT (EXCEPT RAMBLER): These units not same design on all models.

"600" & Statesman—(Exc. Statesman with Overdrive & Hydra-Matic)—Torque tube drive type with rear end of propeller shaft connected to drive pinion ("600" & 1950-Early 1953 Statesman) by coupling and nut, and by a "Slip-Type" coupling (Late 1953). A single propeller shaft bearing (Bushing Assembly on 1941-48 "600") is used.

Statesman & 1949 "600"—(Overdrive Trans.)—Same as for synchro-mesh cars except that **two propeller shaft bearings used.**

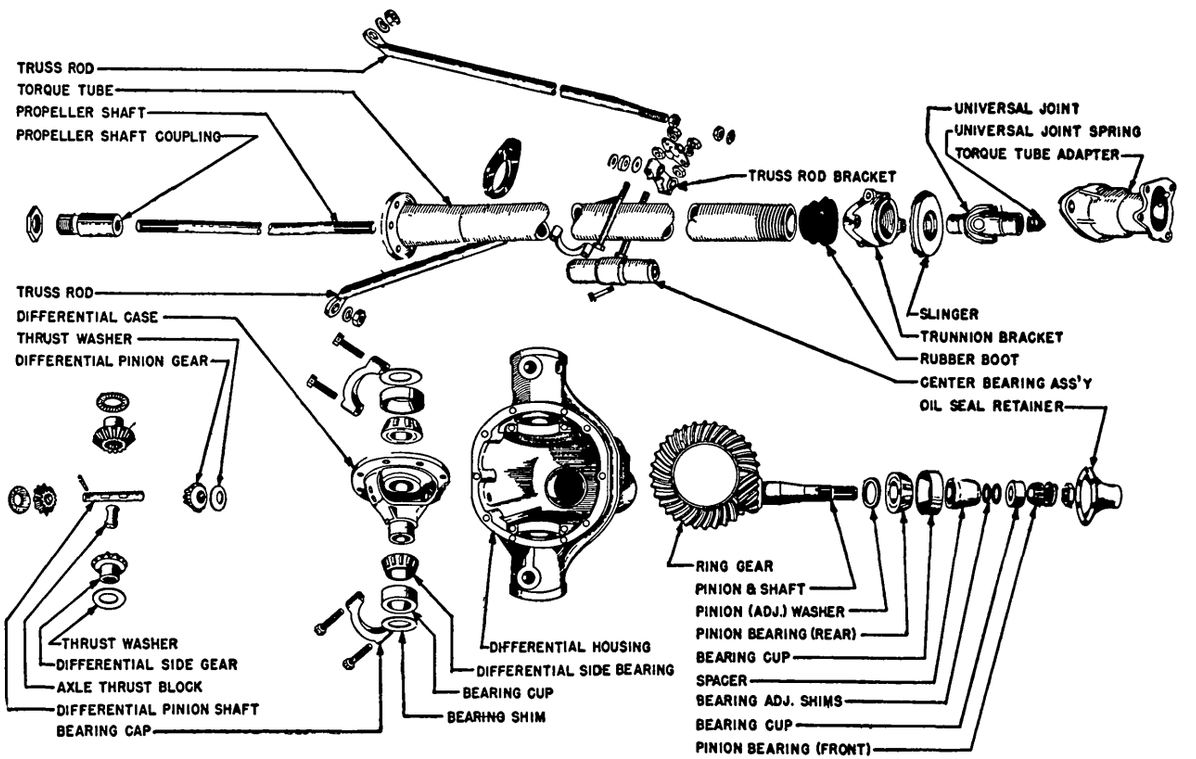
Statesman (Hydra-Matic)—Torque tube drive type with rear end of propeller shaft connected to drive pinion by flange type coupling (same as Ambassador). No propeller shaft center bearing used.

Ambassador (All Models)—Torque tube drive with propeller shaft connected to drive pinion by flange type coupling. Single propeller shaft center bearing (Exc. Hydra-Matic Drive Cars). No bearing used with Hydra-Matic Drive.

►**Center Bearing Lubrication Note**—Center bearing on 1949-53 models is prelubricated and does not require servicing. 1941-48 "600" Models have a bushing assembly requiring lubrication every 5000 miles as follows: Take out locating screw at top side of upper clamp on torque tube at front end of truss rods, fill with light engine oil to overflowing in screw hole, replace screw and wire in place. ***CAUTION—Do not turn propeller shaft or rear wheels with bearing locating screw removed (bearing assembly will move out of place).***

Removal: (All Models)—Disconnect truss rods at center bracket ("600" & Statesman); center bracket and axle housing (Ambassador). Pry universal joint off forward end of propeller shaft (joint is light press fit). Disconnect torque tube from rear

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NASH "600" HYPOID GEAR AXLE (TORQUE TUBE DRIVE)

1946-54 NASH HYPOID (C nt.)

axle housing, move tube forward to expose shaft coupling, loosen coupling nut or remove bolts from coupling flange, and lift off torque tube and propeller shaft.

Propeller Shaft Center Bearing (Not used On All Models): Prelubricated type ball bearing retained on propeller shaft by snap ring on each side and rubber mounted in torque tube. To remove bearing take out snap ring, drive bearing off **toward front end** of shaft (forward end of shaft .003" undersize to facilitate removal & installation). Install new bearing in same manner and see that new snap rings properly seated to hold bearing in position.

Propeller Shaft Coupling Installation ("600" & Statesman "Coupling & Nut Type"): When assembling propeller shaft to pinion shaft, align both shafts and **support propeller shaft for its full length to maintain this alignment** while coupling nut is being tightened. Tighten coupling nut to 250-300 ft. lbs. torque.

►*1953 STATESMAN PROPELLER SHAFT COUPLING PRODUCTION CHANGE—A new "Slip-Type" coupling is used on Synchro-mesh or Overdrive equipped cars (See Illustration).*

►**1946-54 "600" & Statesman Propeller Shaft Coupling Service Replacement**—New type coupling can be used for service replacement on these cars (see Installation procedure below and note the Replacement Caution).

Propeller Shaft Coupling Installation (All "600" & Statesman Models with "Slip-Type" Coupling): Install propeller shaft oil seal Part No. 3138146, on propeller shaft. Butt the propeller shaft at forward end against a wood block and drive the coupling Part No. 3138142 on propeller shaft with a lead or soft face hammer. Tap retainer and oil seal on coupling (CAUTION—Do not install seal and retainer on coupling prior to its installation on propeller shaft as seal will be damaged). Coupling must be driven on propeller shaft to the shoulder or splined area inside coupling. Install Spacer, Part No. 3138466. Install torque tube rear oil seal Part No. 3138166, and retainer Part No. 3138144. Propeller shaft with coupling can now be installed on pinion shaft. Lubricate ground surface on coupling and torque tube rear oil seal with rear axle lubricant. DO NOT CRIMP LIP OF SEAL.

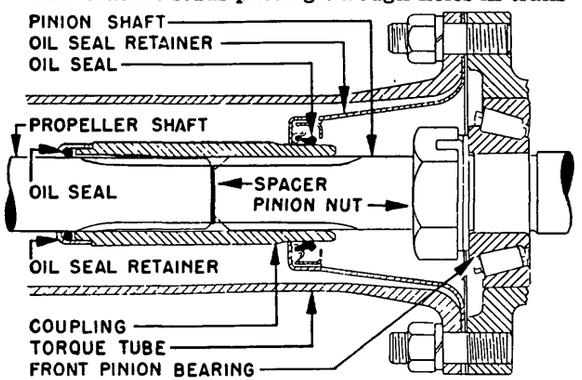
►*SLIP TYPE COUPLING REPLACEMENT CAUTION (EARLIER MODELS)—If pinion shaft spline is slightly worn, DO NOT REPLACE ORIGINAL COUPLING WITH "SLIP-TYPE" COUPLING.*

Torque Tube Trunnion Bracket ("600" & Statesman): On front end of torque tube and must be properly installed and adjusted when rear axle installed on car as follows:

Trunnion Bracket Adjustment—With axle completely assembled (rear end of propeller shaft against pinion shaft, torque tube assembled on housing), position trunnion bracket on torque tube so that front end of propeller shaft projects ⅛" to ¼" beyond the face of trunnion bracket. After bracket properly positioned, adjust clampscrew on underside of bracket to remove all excess clearance between threads on bracket and tube without setting up excessive friction. Bracket must be free to move on threaded tube. Lock clampscrew nut with cotter pin. Rubber boot must be installed behind bracket to protect threads on tube from road dirt. Threaded parts require no lubrication except at time of assembly. Lubricate these parts sparingly.

►*CAUTION—If propeller shaft extends less than ⅛" beyond face of trunnion bracket, universal joint slinger may rub on bracket. If shaft extends more than ¼", effectiveness of slinger will be reduced.*

Trunnion Bracket Installation on Car: After bracket position adjusted (above), torque tube and rear axle assembly can be assembled to transmission as follows: Thread 2 special trunnion bracket studs (with tapered ends to rear) on trunnion bracket and lock with nuts and lock washers. Assemble plain stamped steel retainer, rubber cushion block (with small extension to front), steel retainer with pilot flange over extension on rubber block, on each stud. Install torque tube and rear axle assembly with trunnion bracket studs passing through holes in transmission (or overdrive) rear bearing retainer. Assemble steel retainer with pilot flange to rear, rubber block with extension to rear, and plain steel retainer on front end of studs. Tighten retainer nuts on studs until rubber cushions held under slight tension. Lock nuts with 'palnuts'.



STATESMAN "SLIP TYPE" PROPELLER SHAFT COUPLING

REAR AXLE OVERHAUL: With torque tube and propeller shaft removed (see above), use stand to support axle and proceed as follows:

Disassembly: On Ambassador models (1949 through Early 1950), one differential adjusting nut is used (right hand side), and adjusting nut should be backed off before differential assembly is removed. On other models no adjusting nut is provided and the differential assembly is positioned in axle housing by shims between differential bearing cup and housing at each side. To disassemble differential, mark bearing caps to insure correct reassembly, remove bearing caps, pry differential assembly out using care not to damage bearings or shims. When reassembling, place bearing cups and shims in position on bearings, tilt bearing cups slightly so that they enter seat in housing, force assembly into place in housing which will cause bearing cups to straighten on bearing rollers. If shims project, tap shims into place, install bearing cups and tighten bolts securely.

Pinion Bearing Disassembly: Before pinion shaft can be removed, propeller shaft must be disconnected by loosening coupling nut on rear end of shaft. Then remove the oil seal from housing, bend back lip of pinion nut locking plate, loosen nut. On Ambassador models, remove nut on forward end of pinion shaft at coupling flange, pull coupling flange from shaft, lift off oil seal (held in place by torque tube flange).

Pinion Disassembly—Tap on pinion shaft with soft hammer to loosen front bearing cone, remove bearing cone and roller assembly, remove shims located behind bearing cone, **note number and thickness of these shims** which control bearing adjustment. Remove pinion and rear bearing assembly through rear of housing. Use long drift to drive pinion bearing cups from housing (recess provided behind each cup for this purpose). Use pinion bearing tool J-2244 (600 & Statesman), tool J-2245 (all Amb. models) to remove rear bearing from pinion shaft, **note number and thickness of washer or shims on shaft behind bearing** which control pinion setting (gear mesh). To remove differential side bearing cone and roller assemblies, use special puller J-2497 being careful that puller does not contact roller cage or damage shims in back of left hand bearing (these shims control ring and pinion gear backlash).

Pinion Bearing Reassembly: Assemble each model as follows:

Rambler—Install pinion, shims, and rear bearing) through rear of housing, then install bearing adjusting shims (same thickness as were removed when axle disassembled) and front bearing on forward end of shaft. Install bearing washer and pinion nut but **do not install oil seal,** tighten pinion nut to 90-95 ft. lbs. Check and adjust bearing pre-load. After bearing adjustment completed, lock pinion nut to prevent loosening, install oil seal (use installer J-4485).

All Models except Rambler—Bearing adjustment controlled by shims on the pinion shaft between spacer and forward cone (A production change in late 1950 eliminated the spacer. Shims are placed between front bearing and shoulder on pinion shaft). When installing pinion, install correct washer and shim pack for correct pinion mesh (see Pinion Setting below) on shaft against pinion, install rear bearing cone and bearing spacer. Install sufficient shims on shaft in front of spacer (or against shoulder) to insure positive endplay of shaft when installed in housing, install front bearing cone, shaft coupling flange (Ambassador) or special tool (splined sleeve) and tighten nut on shaft securely. Then check bearing adjustment as directed below. NOTE—Do not install oil seal until adjustment has been made.

Pinion Bearing Pre-load Adjustment:

Rambler Bearing Pre-load—Pre-load controlled by shims on pinion shaft behind front bearing cone. use **two** shims only, varying thickness of each shim to secure total thickness of..106" to .138" for correct .003" tight bearing adjustment and 12-14 in. lbs. pre-load. If pre-load less than 12 in. lbs., decrease shim thickness. If pre-load greater than 14 in. lbs., increase shim thickness.

►**Bearing Adjusting Shim Note**—These shims furnished in following thicknesses (combination of two shims provide range of .106" to .138" in .001" steps): .053", .054", .056", .058", .059", .063", .064", .066", .068", .069".

All Models exc. Rambler Bearing Pre-load (Tool J-2496: With pinion installed in axle housing (make certain that spacer and bearing adjusting shims in place on shaft between bearing cones), install tool on end of shaft in place of the coupling flange,

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1946-54 NASH HYPOID (Cont.)

tighten pinion shaft nut securely. Attach spring scale to exact center of tool handle (will provide 6" arm), check torque required to turn pinion shaft. See table below for desired torque reading. If less than lower figure, remove shims from between spacer and front bearing cone, if greater than higher figure, add shims at this same point. When bearing adjustment completed, install new oil seal, install coupling flange (Ambassador), see that pinion nut tightened to 105-110 ft. lbs.

Pinion Bearing Pre-load

Model	Pinion Shaft Turning Torque
Rambler & Statesman	12-14 in. lbs.
Ambassador (Early type)	15-18 in. lbs.
Ambassador (Late type)	15-20 in. lbs.

Pinion Setting: Pinion depth and consequent ring and pinion gear mesh is controlled by spacer washer or shims installed on pinion shaft between rear bearing cone and pinion. Must be adjusted when new gears or other parts installed.

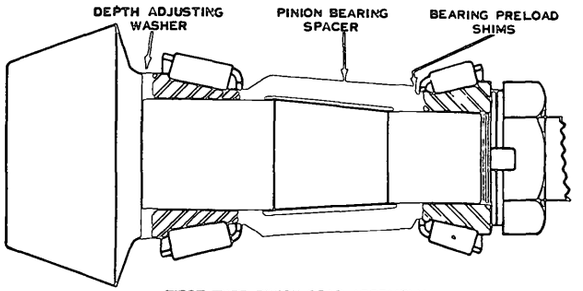
Pinion Setting without Gauge—If new pinion being installed and pinion setting gauge not available, note washer and shim thickness used for old pinion, secure standard washer thickness for this housing by adding (if pinion marked +), subtracting (if pinion marked —) shims equal to figure following this plus or minus mark on the old pinion, finally correct this standard washer thickness in accordance with new pinion marking as directed under Pinion Setting above.

Pinion Setting using Rear Axle Drive Pinion Gauge No. J-2499: With rear pinion bearing cup installed in housing, place bearing cone and roller assembly in cup, press in and revolve bearing cone so that rollers are properly seated. Bolt special gauge plate on bearing cone (thread bolt through housing and secure in place with cross-piece and thumbnut at forward end), make certain that gauge plate does not contact housing at any point. Mount dial indicator on tool with indicator button on top of gauge pin, set dial indicator at Zero with tension on gauge pin. Install tool in axle housing with larger diameter of adapter rings seated in side bearing seats (install adapters on tool with larger diameter rings outward for Ambassador, small diameter outward for 600). Swing gauge point across gauge plate and note highest reading of dial indicator, subtract this reading from .140" and resulting figure will be washer thickness required for a standard "0" pinion. If pinion is not standard (marked by — or + figure on end), add (if pinion marked —), or subtract (if pinion marked +) from the standard washer thickness an amount equal in thousandths to the figure following this — or + sign.

Differential Disassembly: Use Puller Tool J-2497 to remove bearing cone and roller assemblies from differential case. Note number and thickness of shims located behind each bearing cone. These shims control ring and pinion gear backlash and differential bearing preload. Remove capscrews attaching ring gear to differential case (be sure and mark ring gear and case to retain same location when reassembled). Using a brass drift, tap ring gear from case. (CAUTION—Do not chisel or wedge ring gear from case). Use a 3/16" diameter drift at least 3" long to drive out the lock pin holding differential pinion shaft in place. Pinion shaft can then be removed, and the thrust block can then be dropped out through differential side gear. Roll differential pinion gears around on side gears until they can be lifted out through holes in case, then lift out side gears and thrust washers.

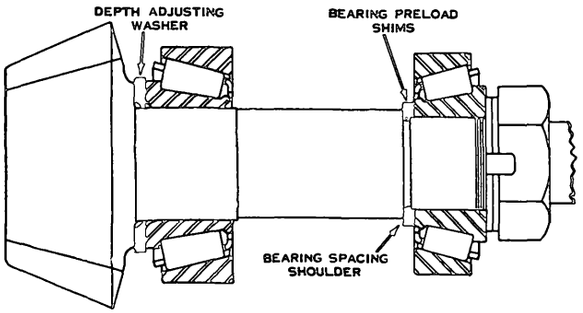
Inspection: Clean all parts and blow dry with air. Check gears for worn, cracked, chipped, or scuffed teeth. Check thrust washers and oil seal surfaces for wear or roughness, and check bearings for roughness or wear. Replace defective parts.

Differential Reassembly: Install thrust washers on side gears, with oil pocket toward gear, and install



FIRST TYPE PINION GEAR ASSEMBLY

NASH PINION GEAR ASSEMBLY
(EARLY TYPE WITH SPACER)



NASH PINION GEAR ASSEMBLY
(LATE TYPE WITHOUT SPACER)

gears in bores of differential case. Install thrust washers behind differential pinion gears and mesh gears with side gears so the holes are opposite and in line with each other. Roll gears around until gear holes are aligned with differential pinion shaft hole in case. Install pinion gear shaft with the lock pin hole in line with the lock pin hole in differential case. Before pressing differential pinion shaft in place, install the thrust block through side gear, aligning hole in block with differential pinion shaft. Press differential pinion shaft in place and measure the clearance between differential side gear and case. This clearance should not be more than .010" (side gears should not fit tight enough to require more than 8 ft. lbs. to turn differential gears). Check by installing on axle shaft and using a torque wrench to turn shaft. Drive lock pin in place. Press differential side bearings on case using Tool J-2104 (Ambassador); J-2100 (Statesman).

▷1951 AMBASSADOR DIFFERENTIAL SIDE BEARING ADJUSTMENT PRODUCTION CHANGE—Effective with car serial No. R-601152 (11-39 ratio), R-601349 (9-40 ratio) and R-606549 (10-41 ratio) side bearing adjusting nut has been eliminated. Adjustment is now made in same manner as Statesman & '600' rear axles.

Differential Bearing Adjustment (600, Statesman 1941 & Later, Ambassador 1950 & Later): See Note. Bearing pre-load should be .004-.006" and this is controlled by shims between the side bearing cups and axle housing at each side. To determine shim thickness, install carrier in housing with one .075" shim at each side, check endplay. If endplay noted, install next thicker shim on each side and recheck. With endplay just taken up, install .005" thicker shim on right hand side which will provide correct bearing pre-load of .004-.006". Tighten bearing cap screws to 55-60 ft. lbs. Check ring gear backlash with a dial indicator, finally check gear mesh by painting gear teeth with red lead and rotating gears.

Differential Bearing Adjusting Shim Note—These shims furnished in thicknesses of .075", .080", .085", .090", .095".

Differential Bearing Adjustment (Ambassador, Before Early 1950): Install differential assembly in housing (with correct shims in place between left hand bearing and case), install bearing caps and tighten screws to point where they just grip lock washers (right hand bearing cap must not prevent turning of adjusting nut), turn adjusting nut up until all bearing endplay has just been removed and notch on nut is in line with adjusting nut lock, then tighten adjusting nut 1-2 notches additional to provide correct bearing pre-load of .004-.006". Tighten bearing capscrews to 105-110 ft. lbs. and install adjusting nut lock.

Ring & Pinion Gear Adjustment: Gear mesh should be correct if pinion setting properly made (see above). Check gear mesh after all adjustments made by painting 8-10 teeth of ring gear with red lead and rotating gears by hand (turn pinion shaft with wrench while supplying drag on ring gear with the hand). Check backlash and adjust as follows:

Ring Gear Backlash Adjustment—Should be .004-.006". Measure with dial indicator. Adjust by adding or removing shims located between left hand differential bearing cup and housing ('600', Statesman and Late 1950 & Later Ambassador), and between bearing cone and case (Ambassador before Late 1950). On cars without adjusting nut, total shim thickness must not be changed and any shim change on left hand side must be offset by corresponding shim change on right hand side (to maintain bearing pre-load).

▷*CAUTION—Total shim thickness must not be changed when adjusting backlash (will disturb bearing adjustment).*

1955 HUDSON & NASH HYPOID

Hudson Wasp (1955)
Hudson Hornet (1955)
Nash Statesman (1955)
Nash Ambassador (1955)
Rambler (1955)

►*REAR AXLE ASSEMBLY NOTE: The assemblies used on all series cars are similar and overhaul procedures are the same except where noted.*

►*HUDSON HORNET V8 & NASH AMBASSADOR V8 PROPELLER DRIVE SHAFT NOISE CORRECTION & PRODUCTION CHANGE:* A noise developing at 58-62 MPH under light throttle pressure, either pull or coast (similar to rear axle gear noise) may be caused by drive shaft and can be corrected by installing a two piece shaft, Part No. 3145400. The later two-piece shaft replaced the former one-piece shaft in production at Car Serial V-8235 (Nash), Y-5887 (Hudson).

DESCRIPTION: Semi-floating, hypoid gear type with torque tube drive and coil springs (exc. Rambler). Hotchkiss drive and semi-eliptical springs (Rambler).

AXLE ASSEMBLY REMOVAL (Exc. Rambler): Raise and support rear of body. Disconnect hand brake cable at bellcrank and hand cable brake housing at bracket. Disconnect torque tube from transmission, rear brake hose at bracket on body floor pan, rear springs and shock absorbers from the axle tube, and the rear axle stabilizer bar at axle tube. Roll axle free from under car and disconnect truss rods, torque tube and propeller shaft from rear axle assembly.

AXLE ASSEMBLY REMOVAL (Rambler): Raise and support rear of body. Remove rear wheels and hubs, then disconnect and remove hand brake cables from brake assemblies. Remove propeller shaft using Coupling Nut Wrenches J-4486 (the coupling nut dust shield will serve as a puller to partially remove propeller shaft from rear axle pinion). Disconnect rear shocks, rear brake line on body floor pan, and rear springs from body. Remove axle and springs from under car as an assembly.

AXLE SHAFT: Removal—Remove wheel and with Rear Hub Puller J-1644-B or J-736-B attached to rear wheel hub, remove hub from axle *(CAUTION—Do not use "knock-out" type axle pullers).* Check axle shaft endplay using Endplay Checking Tool J-2092 and note endplay for use at reassembly. Remove capscrews attaching brake support plate to axle tube. Slide oil seal, support plate and shims off axle (the oil seal on Rambler Models is located between support plate and axle tube). Measure shims with a micrometer to determine amount to be used at reassembly. Attach Axle Shaft Puller J-2498-A to axle and pull shaft out of housing. Slip bearing cup off axle and press bearing cone off axle shaft.

Installation: Press axle shaft bearing onto axle shaft with small diameter of cone toward outer tapered end of shaft using Replacer J-2995. Soak new inner axle oil seal in light engine oil and install seal using Replacer J-2539. Install axle shaft, indexing splined end with differential side gears *(NOTE—Hornet & Ambassador right hand axle shaft is 1½" longer than left hand shaft).* Install outer bearing cup using Replacer J-1433-1. Install original shims onto axle with the drain holes aligned with hole in axle tube (if endplay was checked at time of disassembly and required correction, adjust the shim pack as necessary for correct axle shaft endplay of .002-.004"). Install brake support plate, spacer and oil seal (Rambler oil seal is installed behind brake support plate). Tighten support plate bolts to 50-55 ft. lbs. (Hornet & Ambassador), 30-35 lbs. (Other Series). Check and adjust axle shaft endplay (see below). Inspect wheel hub key for a snug fit in keyway of shaft and hub. *(NOTE—*On Rambler, install wheel hubs after axle assembly installed in car). Slide hub onto axle shaft aligning the keyways. Install key and press hub onto shaft. Key must be flush with hub. Install thrust washer and axle nut and tighten to 180-190 ft. lbs. (Hornet & Ambassador), 160-165 ft. lbs. (Other Series). Install cotter pins.

TORQUE TUBE & PROPELLER SHAFT (Exc. Wasp & Statesman with Standard & Overdrive Transmission): Removal—Raise and support rear end of body. Disconnect hand brake cable at equalizer and remove hand brake bellcrank assembly from torque tube. Disconnect rear stabilizer bar at rear axle tube. Remove truss rods at axle tubes and at center bracket on torque tube. Disconnect torque tube from transmission adapter and move axle assembly and tube to the rear to disengage propeller shaft from transmission. Disconnect rear of torque tube from rear axle housing and move tube forward sufficiently to expose coupling. Disconnect coupling flange and remove torque tube and propeller shaft. Remove pinion flange with Puller J-2984.

Installation—Reverse removal procedure and note the following: On Hornet & Ambassador use new locks on companion flange nut. On Wasp, support pinion from the rear while pressing on companion flange. Tighten flange nuts to 30-35 ft. lbs.

TORQUE TUBE & PROPELLER SHAFT (Wasp & Statesman with Standard & Overdrive Transmission): Removal—Raise and support rear end of body. Disconnect hand brake cable at equalizer and remove hand brake bellcrank assembly from torque tube. Disconnect rear stabilizer bar at rear axle tube. Disconnect truss rods at center bracket. Disconnect trunnion bracket from the adapter by removing rear nuts from dowel studs. Move torque tube and rear axle to rear to clear studs. Disconnect torque tube from rear axle housing and move tube forward. The coupling is a slip fit on the pinion shaft and a press fit on the propeller shaft. Slide coupling off pinion shaft. Place propeller shaft in a vise and drive coupling off shaft with a lead hammer.

Installation—Reverse removal procedure and note the following: Install propeller shaft oil seal and retainer on propeller shaft. Butt propeller shaft at forward end against a wood block and drive the coupling on the shaft with a lead hammer. *(CAUTION—*Do not install the seal and retainer on the coupling prior to its installation on the propeller shaft). Coupling must be driven on shaft to the shoulder on the splined area inside coupling. Install the spacer. Lubricate the ground surface on the coupling and the torque tube rear oil seal with rear axle lubricant. The propeller shaft with coupling can now be installed on pinion shaft (do not crimp lip of oil seal). Make sure that the torque tube seal contacts coupling on the ground surface of coupling.

PROPELLER SHAFT (Rambler 100" Wheelbase & 108" Wheelbase with Hydramatic): Removal—Raise and support rear of body at the side sills and the rear axle at center of housing. Loosen propeller shaft coupling using Propeller Shaft Coupling Wrenches J-4486. Disconnect rear shocks at the axle tubes, hand brake cable at adjusting yoke, and rear brake hose clip from body floor pan. Remove rear spring front bracket attaching nuts and lower the rear axle, continuing to support the body, thus lowering rear spring front brackets from the floor pan. Move axle assembly to the rear sliding propeller shaft yoke of transmission main shaft splines. Remove propeller shaft from pinion shaft.

Installation—To permit correct location of propeller shaft when assembling on the car, slide shaft onto transmission main shaft until it is bottomed. Mark propeller shaft front yoke adjacent to the oil seal and remove shaft. Install propeller shaft on rear axle pinion shaft. Move rear axle assembly to rear and slide the front universal joint yoke onto transmission main shaft. Loosen rear spring front eye bolt and tilt front bracket so that rear holes are aligned with studs in floor pan. Raise rear axle assembly aligning rear spring front bracket with studs, and tighten. Reinstall brake hose clip, hand brake cable, and rear shocks. Permit rear axle assembly to hang freely, the shocks fully extended, and move the shaft to the front or rear to locate the mark on the propeller shaft 5/32" to rear of transmission oil seal. Tighten propeller shaft coupling nut to 300 ft. lbs.

PROPELLER SHAFT (Rambler 108" Wheelbase with Standard & Overdrive Transmission): Removal—Remove propeller shaft coupling nut from coupling and tap coupling off pinion shaft splines with a soft faced hammer. Remove nuts from propeller shaft center bearing retainer studs. Disconnect crossmember from support brackets at side sills and remove crossmember. Remove assembly from car. Place propeller shaft in a vise and turn back propeller shaft bearing lock to allow propeller shaft center locknut to be removed. The rear shaft can now be removed by sliding the splined slip joint from front propeller shaft, (the locknut will remain on splined slip joint). Remove felt washer and felt washer retainers, and remove the nut. Remove propeller shaft center bearing spacer, cover, center bearing and retainer, bearing cover, and dust shield. Remove center bearing from retainer with a brass drift.

Installation—Reverse removal procedure and note the following: Yokes of universal joints must be in alignment when installed.

TORQUE TUBE TRUNNION BRACKET ADJUSTMENT (Wasp & Statesman): Tighten trunnion bracket clampscrew enough to remove excess clearance without setting up friction and so trunnion bracket is free to move on torque tube. When rear end of propeller shaft is against pinion shaft and torque tube is secured to axle housing, the front end of the propeller shaft must protrude from 1/8" to 1/4" beyond front face of trunnion bracket (except Hydra-Matic Drive models). On Hydra-Matic Drive models, adjust trunnion bracket so forward edge of dust shield is in alignment with centerline of universal joint bearing cups. Connect bracket bolts to transmission adapter.

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1955 HUDSON & NASH (Cont.)

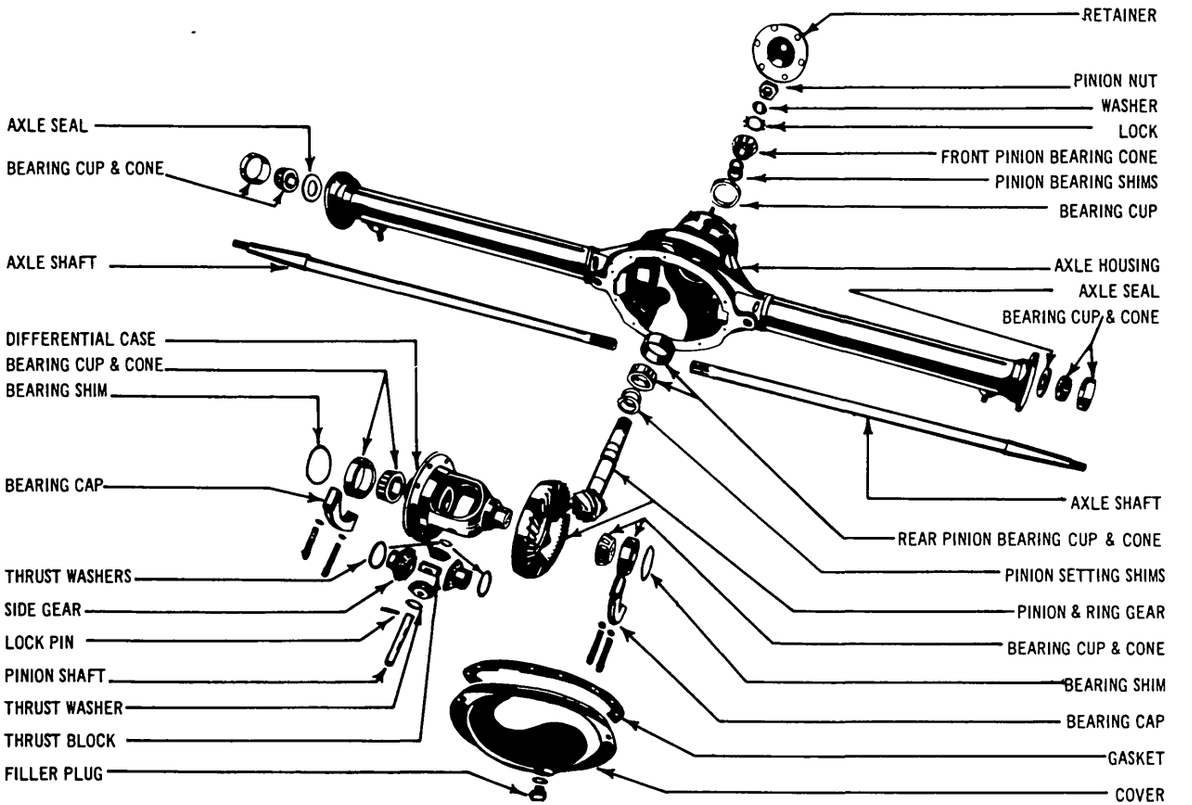
REAR AXLE OVERHAUL: With rear axle assembly removed from car and with axle shafts removed, proceed as follows:

Diff rential Removal & Disassembly: Remove cover bolts (note ratio tag on one of bolts which should be retained for installation after overhaul), mark differential side bearing caps with a center punch to assure correct reassembly, and remove bearing caps from housing. With a pry bar inserted from each side of differential case adjacent to pinions, pry against housing and lift case assembly out. *(CAUTION–*Take care to prevent damage to bearings and shims). Tie side bearing shims to their respective bearing caps and cups to prevent misplacement. Install Bearing Puller J-2497 on bearings in such a manner as to leave rollers free, and remove bearings from case. Remove capscrews attaching ring gear to differential case, and using a brass drift, tap ring gear from case. *(CAUTION–Do not chisel or wedge the ring gear from case).* Use a 3/16" diameter drift at least 3" long to drive out the lock pin holding differential pinion shaft in place. Drive out pinion shaft, dropping the thrust block out through differential side gear. Roll differential pinion gears around on side gears until they can be lifted out through holes in case, then lift out side gears and thrust washers.

Insp cti n–Inspect all parts for distortion, cracks, and excessive wear. Inspect all bearing surfaces for nicks and burrs and dress down small nicks or burrs with a smooth file or stone. Check fit of differential pinion shaft in case. Shaft should be a press fit to .010" loose. Inspect fit of differential side gears in differential case bore. This clearance should not exceed .007". Clearance between side gear and case should be .000" to .008" with .004" preferred. Where differential assembly is a tight fit, it will be acceptable if not more than 8 ft. lbs. of torque applied to either side gear will rotate the internal gears. If gears need replacement, pinion and side gears should be replaced as a set. Inspect ring gear and if tooth pattern indicates pinion and ring gear have not been meshing correctly, replace both gears. Inspect ring gear attaching bolts for elongation and replace any bolts that are defective.

Pini n Shaft R moval & Disassembly: Remove companion flange or coupling from pinion shaft (see "Torque Tube & Propeller Shaft" above). Tap end of pinion shaft slightly with a fibre hammer to free front bearing cone from pinion shaft and remove bearing. Retain shim located between bearing and shoulder on pinion shaft (this shim controls bearing preload) and tag it for use at reassembly. Remove pinion and shaft assembly from rear of housing. Drive bearing cups out of rear axle housing using a drift inserted in recess in housing. Keep cups square in the bore to prevent damaging bores. Remove rear bearing from pinion shaft using Pinion Bearing Remover J-2245-A (Hornet & Ambassadore), J-2244 (Wasp, Statesman & Rambler) and an arbor press. Remove pinion bearing adjusting washer located between bearing and pinion gear. Tag and retain this washer for use at reassembly (washer is used to adjust pinion depth in housing).

Insp cti n–Check to see that ring gear and pinion are matched sets (numbers or marks are etched in rear face of pinion gear and the edge of ring gear). Inspect oil seal surface for wear or roughness and pinion splines for damage caused by worn or loose coupling. Inspect pinion gear teeth. Inspect bearings, cones, cups and rollers for excessive wear, overheating, or scoring. If replacement required replace bearing cone and cup.



HUDSON & NASH HYPOID REAR AXLE

Differential Reassembly & Side Bearing Adjustment: Install new thrust washers on side gears with oil pockets on washer toward gear, and install gears in bores of differential case. Install new thrust washers behind differential pinion gears and mesh gears with side gears so holes are opposite and in line with each other. Roll gears around until gear holes are aligned with differential pinion shaft holes in case. Install pinion gear shaft with the lock pin hole in line with lock pin hole in case, partially into case. Install thrust block through side gear, aligning hole in block with pinion shaft. Press pinion shaft into place and measure clearance between differential side gear and case. This clearance should not exceed .008". (see "Differential Inspection" above to check tightness of side gears). Drive lock pin into place to secure pinion shaft. Press differential side bearings into place on case using Side Bearing Replacer J-2646 (Hornet & Ambassador), J-5364 and handle J-875-5 (Other models). Place bearing cup over each side bearing and install differential case assembly in axle housing (ring gear not installed on case and drive pinion not installed in housing). Install a .070" shim (Hornet & Ambassador), .075" shim (Other Series) on each side between bearing cup and housing. Test assembly for side play by rotating it, and install progressively greater shims to eliminate all side play. Hornet & Ambassador Series shims are available in thicknesses from .070" to .100" in .002" increments. Other Series are available in thicknesses from .075" to .098' in .002" increments. *(NOTE–*If additional thickness of shims is required to eliminate side play on Hornet & Ambassador, thin shims .003", .005", or .010" may be installed between bearing cone and differential case. For other series, use Hornet & Ambassador pinion depth adjusting shims in the same manner). When side play is eliminated, a slight bearing drag is noted. Install respective bearing caps and tighten cap bolts to 105-110 ft. lbs., (Hornet & Ambassador), 55-60 ft. lbs., (Other Models). Recheck differential for excessive bearing drag. Attach a dial indicator to axle housing and check ring gear face of differential case for runout. Runout should not exceed .002'. Remove

CONTINUED ON NEXT PAGE

1955 HUDSON & NASH (C nt.)

case from housing, **retaining shims used to liminate side play.** Install ring gear on differential case and bolt gear to case with capscrews and new locks. If necessary, two 3/8"-24X1" capscrews installed in opposite holes may be used as guides to pull gear into position. Tighten capscrews to 50-55 ft. lbs. and install locks.

Pinion Shaft Reassembly & Installation: Install rear bearing cup in axle housing with Installer J-2533 (Hornet & Wasp), J-5367 (Other Series). Install front bearing cup with Installer J-2531 (Hornet & Ambassador), J-2532 (Other Series), being careful to drive all bearing cups straight into clean bores. Slide proper depth washer and new shims that have been selected (if old pinion and ring gear being reinstalled, use same washer and shims pack found under rear bearing at time of removal. If a new pinion and ring gear or new bearings being installed, adjust pinion depth as indicated below. *See "Pinion Setting").* Use bearing Installer J-2995 (Wasp, Statesman, Rambler) and press bearing tight against washer and gear. On Hornet & Ambassador, a piece of steel tubing 1 11/16" I.D. about 8" long may be used to install pinion gear assembly in housing. Install same thickness of shims as removed and install front bearing. If adjusting washer thickness was changed, add the necessary shims to compensate for the change. On Hornet & Ambassador use pinion holding and spacer tool J-2496 and install spacer in place of the companion flange. Tighten pinion nut to 125-150 ft. lbs. On other series, install pinion nut, thrust washer, and lockwasher. Tighten nut to 90-100 ft. lbs. Adjust pinion bearing preload as indicated below.

Pinion Bearing Preload: Install Pinion Holding Tool & Spacer J-2496 on pinion shaft. Attach a spring scale to center of handle and pull tool in a circular motion. Note reading on scale and multiply it by six to determine the inch pounds of torque required to rotate pinion shaft *(NOTE*—For a more accurate reading, turn axle up so pulling effort is on a horizontal plane). Pinion bearing preload is 15-18 inch pounds (Hornet & Ambassador), 12-14 inch pounds (Other Series). If preload is too high, **increase** shim thickness behind front bearing. If too low, **decrease shim thickness.** Complete installation as indicated below.

Hornet & Ambassador—Remove spacer tool and install a new oil seal. Install companion flange using Tool J-1375. Install lockwasher and pinion nut and tighten to 125-150 ft. lbs.

Wasp, Statesman & Rambler (Exc. Wasp with Hydra-Matic)— Install lockwasher next to bearing then the plain washer and nut. Tighten nut to 90-100 ft. lbs. Install pinion oil seal on Wasp and Statesman. Use Tool J-4485 to install pinion oil seal on Rambler.

Wasp (With Hydra-Matic)—Press pinion shaft companion flange onto pinion shaft while supporting shaft from the rear to prevent damage to bearings or axle housing.

►*PINION BEARING PRELOAD ADJUSTING SHIM NOTE:* A thickness range of .106" to .138" in .001" increments can be obtained by using a combination of two of the following size shims which are supplied for service installation. .053", .054", .056", .058", .059", .063", .064", .066", .068", .069".

Pinion Setting (With Pinion Setting Gauge J-2499): Place rear pinion bearing cone in bearing cup and revolve it using a little pressure to "set" the rollers. Bolt gauge plate over bearing cone so that it does not touch housing at any point (the bolt runs down through housing and is secured at pinion end). Attach a dial indicator to tool. With indicator button on top of the gauge pin, set dial indicator, under tension, to zero. Install tool with adapter squarely seated in side bearing bores in housing (Large diameter of adapter is used for Hornet & Ambassador, and small diameter is used for other models). Swing gauge point across plate until highest reading is obtained. This reading subtracted from a constant of .140" will give the standard adjusting washer thickness for that particular housing. Using this figure, add or subtract according to marking on pinion to determine correct adjusting washer thickness. For example: When gauge point is moved across plate and a reading of .015" is obtained, subtracting this figure from the constant of .140" will give a standard of .125". That means, using a standard "O" pinion, and adjusting washer of .125" thickness would be required. However, if pinion marking read -3 (meaning that it is .003" away from ring gear) it would be necessary to **add** this .003" to the standard. Thus the adjusting washer and shim combination would be .128".

Pinion Setting (Without Pinion Setting Gauge): Note pinion marking on old pinion and new pinion gears and measure the thickness of the old depth washer and shims. Compensate for the difference in the old and new pinion markings and correct the depth washer and shim thickness. As an example: If old pinion is marked +2 and the new pinion is marked -3, there is a difference of .005" (indicating new pinion .005" further away from ring gear than old pinion). If old washer is .123", the new washer and shim pack must be .128". In In this case use a .125" washer and a .003" shim.

Ring Gear & Pinion Backlash Adjustment: Install differential assembly in housing using the shims selected to remove side play (see above). Tighten bearing caps to 105-110 ft. lbs. (Hornet & Ambassador), 55-60 ft. lbs. (Other Series). Attach a dial indicator to housing with the button contacting drive side of a tooth on ring gear and at right angles to it. "Rock" the ring gear and note dial reading. The backlash should be .002-.006" (.004" preferred). To increase backlash, install a thinner shim on ring gear side and a thicker shim on opposite side. To decrease backlash, reverse the procedure. *(CAUTION—Total thickness of shim pack must not be changed from those selected to remove all sideplay).*

Differential Side Bearing Preload: Increase shim pack (selected to remove sideplay) by adding a .004" to .008" thicker shim. These additional shims can be installed on one side only, or divided equally and installed on both sides.

Differential Assembly Installation: Assemble side bearing cups and shims on side bearings (make sure that bearing cups completely cover rollers of side bearings). Lower assembly into axle housing until bottom edge of bearing cups and shims are started in bearing bore. Keep differential assembly square in housing and push it down as far as possible. Using a soft hammer, tap outer edge of bearing cups until seated in housing *(CAUTION—Do not distort shims by hammering them into housing).* Install bearing caps and tighten to 105-110 ft. lbs. (Hornet & Ambassador), 55-60 ft. lbs. (Other Series). Recheck ring gear and pinion backlash and correct as necessary. Coat eight or ten teeth of ring gear with red lead in oil and check tooth contact pattern. *See "Hypoid Gear Adjustment" in Manual.* Install axle shafts, *see "Axle Shafts" above.*

AXLE ASSEMBLY INSTALLATION: *See "Torque Tube & Propeller Shaft" and "Axle Assembly Removal" above and reverse the removal procedures outlined.*

OLDSMOBILE HYPOID

Six & Eight, All Models (1947-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 PINION BEARING SPACER PRODUCTION CHANGE:* A new spacer that cannot become "cocked" during installation is used in production, replacing the former type. Later type spacer **cannot** be used for service replacement of first type spacer.

►*1953 & LATER PEDESTAL CAP SPREADING GAUGE CAUTION:* 1953 and Later Rear Axle Assemblies require a new gauge, Tool J-5340. DO NOT USE GAUGE SUPPLIED FOR PREVIOUS MODELS.

►*1949 & LATER "PILOTED" DIFFERENTIAL CARRIERS & AXLE HOUSINGS—(All Eight Cyl. Models & Six Cyl. Models using 3.9-1 ratio Rear Axle Assemblies)* —Except for machined pilot surfaces on pedestal caps, all differential carrier assemblies are alike, and the piloted carriers will fit into non-piloted housings, however, **non-piloted carriers cannot be installed in piloted housings** because of interference between housing supports and the non-machined pedestal caps. *CAUTION*—Only housings with welded supports and carriers with machined pedestal caps can be used on all eight cylinder models and on 6 cylinder models with 3.9-1 rear axle ratios.

►***CARRIER & HOUSING INSTALLATION CAUTION: On all cars with "Piloted" type carrier and housing, special differential side bearing adjustment and carrier installation procedure required. See data below.***

►**PINION BEARING PRE-LOAD CAUTION: Pinion bearing pre-load must be adjusted whenever universal joint companion flange nut on pinion shaft loosened (pre-load controlled by this nut and will be disturbed when nut loosened for any reason).**

►**DIFFERENTIAL GEAR THRUST WASHER CHANGE (Installation of 1950 Washers on previous cars): New Parco-lubricated metal thrustwashers as used on 1950 cars should be installed to replace previous type fiber washers whenever axles being rebuilt. These new washers furnished Standard & Oversize as Part No. 513714 (Side Gear Washer), No. 500517 (Pinion Washer).**

►**PINION BEARING SPACER SERVICE REPLACE-**

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OLDSMOBILE HYPOID (Cont.)

MENT—Two piece type spacer furnished for service replacement. Two piece spacer consists of spacer & collar, and is installed with collar toward front pinion bearing.

AXLE IDENTIFICATION (1947-49): Number stamped on upper surface of differential carrier (1947); on under side of carrier housing at right horizontal bottom rib (beginning 1948) indicates ratio (number of teeth in ring & pinion gear) as follows: 39:10 (3.9-1 ratio), 40:11 (3.64-1 ratio), 41:9 (4.56-1 ratio), 41:10 (4.1-1 ratio), 41:12 (3.42-1 ratio), 42:13 (3.23-1 ratio), 43:10 (4.3-1 ratio).

1950-55—Rear axle ratios and date of manufacture stamped on underside of differential housing. First digit designates ratio (see table below), second digit designates month ("A" for January, "B" for February, etc.). Last digit is year ("0"—1950 etc.).

Code	Ratio	Code	Ratio
0	3.07-1 (40-13)	4	3.90-1 (39-10)
1	5.55-1 (41-9)	6	3.64-1 (40-11)
2	4.30-1 (43-10)	8	3.42-1 (41-12)
3	4.10-1 (41-10)	9	3.23-1 (42-13)

Piloted Axle Housing Identification—Housing with pedestal cap supports (welded on inner face of carrier mounting flange on each side) must only be used with special piloted carrier (with machined bearing caps).

DESCRIPTION: Semi-floating hypoid gear type of same design used on previous models except for new adjustable pinion bearing mounting:

Pinion Shaft & Bearings—Pinion mounted on taper roller bearings (front and rear) and bearings are adjustable by tightening universal joint companion flange nut (see Servicing data below). Front and rear bearing cups are seated against shoulders in carrier housing and a compressible spacer is used on the pinion shaft between the bearing cones. Pinion position is adjusted by means of shims between rear bearing cup and carrier (standard shim thickness changed from previous models).

▷1949-50 Axle Design Changes

Carrier Assembly Mounting Capscrews—Increased to 7/16" (were 3/8") and must be tightened to torque of 40-45 ft.lbs. NOTE—New gasket, No. 556042, with larger bolt holes must be used.

Pedestal Bearing Cap Screw Lockwashers—NO lockwashers used beginning 1949 (to insure more permanent setting of capscrews). Screws should be tightened to 70-75 ft. lbs. torque.

▷1953 Axle Design Changes—Axle assembly has heavier construction than previous type and adjustment specifications are different.

REMOVAL OF AXLE: *See Rear Axle on car model page.*

PINION SHAFT OIL SEAL RENEWAL (Without Disassembly of Rear Axle): Mark pinion shaft nut before loosening it and retighten to exact same position after oil seal installed (see oil seal data below). This will avoid necessity of resetting the pinion bearing pre-load. If new companion flange being installed, see Pinion Bearing Pre-load Adjustment Oil Seal Installation—Always install new oil seal (old seal will be damaged by removal). Lubricate seal leather with oil and coat outer diameter of seal with Permatex No. 3 or similar sealer, tap seal in place in housing bore using Driver J-5395.

AXLE SHAFT REPLACEMENT: Wheel bearings not adjustable (ball bearings). Replace shafts as follows:

Axle Shaft Removal—Remove wheel and brake drum, remove nuts from four bolts attaching brake backing plate on axle housing, use puller J-492 to withdraw axle shaft and bearing assembly.

▷*CAUTION—Use care not to dislodge backing plate which will damage brake line, or to drag shaft on oil seal which will damage or distort seal.*

Wheel Bearing Note—New wheel bearings are built with .012-.015" endplay between balls and races and should not be rejected unless endplay is greater than .020" or there is definite roughness between ball and race.

Wheel Bearings & Oil Seal. Bearings are shielded type (lubricated at factory) and pressed on axle shaft against shoulder at wheel end of shaft. Remove bearings only when new bearings installed (see Bearing Collar Note below). To remove, use tool J-947-2 (to prevent bursting of race), and plate J-947-1 and press bearing off shaft in arbor press. Install new bearings in same manner using tool J-947-3 and plate J-947-1 to insure pressure being applied to inner race only. Before installing shaft, make certain that double feather edge of leather oil seal is in good condition or install new seal (See Installation Note below). Coat outer rim of seal with Permatex or white lead to prevent oil leaks between seal and housing.

Bearing Collar Note—On all models, collar is installed on shaft behind bearing. Collar must be split with chisel before bearing removed. After new bearing installed, press new collar on shaft firmly against bearing with tapered end toward bearing.

Rear Axle Shaft Oil Seal Installation—Install seal using Tool J-5818 to insure seal being driven in squarely and to proper depth. *NOTE*—An adapter is provided with this tool for use on 1954 and earlier rear axle shaft oil seal installation.

▷IMPORTANT SERVICE CAUTION: Pinion bearing pre-load is controlled by universal joint companion flange nut on pinion shaft and bearing adjustment will be disturbed when this nut is loosened. Pinion bearings must be adjusted each time companion flange nut is disturbed.

DISASSEMBLY: With rear axle removed from car, remove axle shaft, take out mounting screws and remove carrier assembly. Disassemble carrier assembly as follows: Mark differential bearing caps and adjusting nuts to insure reassembling parts in same relative positions and to same settings. Remove the differential bearing caps and adjuster nuts, lift differential case and ring gear assembly out. Remove universal joint companion flange nut (use holding tool J-2933 and 1" socket wrench 1947-52, tool J-5293 and 1¼" socket wrench 1953 and later), pull companion flange with tool J-962 (and adapter J-5294 1953 and later) taking care that pinion does not fall out. Remove the pinion through rear of the carrier using care not to damage shaft threads or oil seal (if pinion does not slide out, tap pinion out with a soft hammer, or press pinion out in an arbor press), lift compressible spacer and shim from pinion shaft. (NOTE—On some cars, a shim .037-.045" thick may be found between spacer and front bearing cone, this shim must be re-installed if same spacer used when axle reassembled). Remove oil seal, lift front bearing cone and roller assembly out. Press front and rear bearing cups out of housing in an arbor press (use Front Pinion Bearing Race Remover J-2938 & Removable Handle J-2940; Rear Pinion Bearing Race Remover J-2936 & Removable Handle J-2940). Lift pinion adjusting shims out of housing (located behind rear bearing cup). To dismantle differential gears, remove locking screw, slide pinion shaft out, lift out gears, pinions, and thrust washers.

REASSEMBLY: Re-install and adjust parts as follows:

Pinion Bearing Assembly: Pinion bearing cups are press fit in housing. Rear pinion bearing cone is press fit on pinion shaft, front bearing cone is light press fit to close sliding fit on shaft. Replace bearings if rough when rotated with hand pressure. Use J-2934 Pinion Bearing Removing Plates and J-358-1 Holder in an arbor press to remove rear bearing cone and roller assembly, J-2935 Installing Plate and same holder to install new bearing (bearing must seat solidly against shoulder on shaft). Install correct pinion adjusting shim pack (see Pinion Setting data below) against shoulder of rear bearing bore in carrier, press rear bearing cup in place using J-2937 Rear Pinion Bearing Outer Race Installer and J-2940 Handle, then install front bearing cup using J-2939 Front Pinion Bearing Outer Rate Installer and J-2940 Handle. Place compressible spacer (and shim—see note below) or new type two-piece spacer (see Spacer Note below) on the pinion shaft, insert pinion in carrier, install front bearing cone and roller assembly (use arbor press if bearing is press fit). Install oil seal (oil the seal leather and outer diameter of seal with Permatex No. 3 or similar compound, tap seal in place using Bearing Installing Plate J-2935 to protect seal), install companion flange, oil the pinion shaft threads and face of the nut, turn nut on shaft loosely, then adjust bearing pre-load by tightening nut (below).

Pinion Bearing Preload Adjustment: Use J-2933 Companion Flange Holding Tool on flange, tighten nut on pinion shaft until bearing endplay is taken up (companion flange is felt to contact spacer) then tighten nut slowly (not more than 1/6 turns at a time), turning pinion shaft frequently to seat bearing rollers, and check bearing preload by measuring the pull required to turn the pinion shaft in inch-lbs., (use torque indicating wrench or spring scale, J-544-A attached to companion flange holding tool). Tighten nut only until correct bearing preload is secured as listed below After completing preload adjustment, secure the nut by staking end of pinion into nut recesses

Pinion Bearing Pre-load Setting
(1947-52 Models)

Pinion Bearings	Bearing Pre-load
New Bearings	27-37 in. lbs.
Old Bearings①	15-20 in lbs.

1953-55 Models

New Bearings	24-32 in. lbs.
Old Bearings①	15-20 in lbs.

①—After several thousand miles usage.

▷*CAUTION*—Do not exceed maximum preload specification when adjusting pinion. If this maximum figure exceeded by tightening nut excessively, disassemble axle and install new spacer.

▷Two-Piece Pinion Bearing Spacer Installation—1947-52 Models—Place compressible inner spacer (Part No. 510424, outer spacer (Part No 510425) and shims, if used, over pinion shaft Keeping pinion assembly in a vertical position, place assembly in carrier and slide front bearing over pinion shaft.

1953-55 Models—Place compressible inner spacer (Part No. 516760, outer spacer (Part No. 510425) and shim, if used over pinion shaft. If pinion shaft

CONTINUED ON NEXT PAGE

OLDSMOBILE HYPOID (C nt.)

is a sliding fit in front bearing, turn carrier in a horizontal position, then place pinion assembly into position in carrier and slide front bearing over pinion shaft.

All Models—If pinion shaft is a press fit in front bearing, use an arbor press to install the bearing. Use small end of a discarded compressible spacer as a tool to press bearing onto shaft while supporting pinion gear.

►**Pinion Bearing Spacer Shim Note**—A shim (.037" to .045" thick) is used between spacer and front bearing cone on some axles. This **shim must be reinstalled** if same spacer is re-used (discard shim if new spacer used). A new spacer must be used when: 1) New Ring Gear & Pinion set installed, 2) Any part of either pinion bearing is changed, 3) New Carrier casting installed, or 4) Pinion adjusting shim thickness increased.

Pinion Setting: Standard shim thickness for each carrier is indicated by mark on carrier flange as follows: D5—.015", D4—.014", D3—.013", D2—.012", D1—.011", 0 (Std.)—.010", S1—.009", S2—.008", S3—.007", S4—.006", S5—.005", (NOTE—"D" indicates carrier deeper, "S" that carrier shallower than standard). To this standard shim thickness (which is correct for all standard or unmarked pinions), add additional shims (when pinion marked +) or subtract shims (when pinion marked —) equal in amount to the figure following this + or — mark on end of the pinion (figures indicate shim thickness in thousandths). This total shim thickness will correctly position pinion for proper mesh with ring gear and shims should be installed in carrier ahead of rear pinion bearing cup. Shims are furnished in sizes listed below and should be used in combination for required thickness.

Shim Thickness	Part No.	Identification Color
.002"	509263	Plain
.003"	509264	①Blue
.004"	509265	②Copper
.005"	509266	Plain
.010"	509267	Plain

①—Or plain color with **one** punched hole.
②—Or plain color with **two** punched holes.

Differential Bearing Assembly: Bearing cones must be a heavy press fit on differential case hubs. Replace bearings if loose or if bearing feels rough when rotated by hand. Use T-278-R Differential Side Bearing Remover to remove old bearing roller and cone assemblies. J-941 Replacer to install new bearings. When reassembling axle, place ring gear and differential assembly in carrier so that backlash between ring gear and pinion is just taken up, place bearing adjusting nuts squarely against bearing cups, install bearing caps and tighten capscrews lightly (make certain that adjusting nut threads not crossed), then check differential bearing adjustment (below). If no new parts being installed, tighten bearing nuts to original position (as marked before disassembly).

Differential Bearing Adjustment: ***CAUTION—On "Piloted" type carriers, Pedestal Cap Clearance must also be checked and adjusted.***

Bearing Adjustment—With differential assembly installed in carrier, tighten bearing cap screws (CAUTION—no lockwashers used with these screws) so that adjusting nuts can just be turned, turn nuts in to original markings, or if not marked proceed as follows: Back off right hand nut 4 turns, tighten left hand nut until all backlash removed from ring and pinion gear, then back this left hand nut off 4 turns to position where slot in nut lines up with screw hole for lock. Tighten right hand adjusting nut slowly until bearing race just starts to turn with nut, tighten nut **additional 2-4 notches** for correct bearing pre-load and see that slot in nut lines up with screw hole for lock. Tighten all bearing cap screws to 70-75 ft.lbs. Check gear backlash with a dial indicator. If backlash is not .003-.006" (1947-52), .004-.006" (1953 & Later), adjust by backing off one of the adjusting nuts and tightening the opposite nut an exactly equal amount to avoid disturbing bearing pre-load. Check pedestal spread (see below) and if clearance not correct, adjust right hand adjusting nut one notch at a time (loosen or tighten as necessary), repeating check each time until correct clearance is secured. **Adjusting nut must not be tightened less than 2. or more than 4 notches.** On "Piloted" Carriers, check pedestal cap clearance as follows:

Pedestal Cap Clearance (All "Piloted" Carriers): After differential bearing adjustment completed and with bearing capscrews correctly tightened to 70-75 ft. lbs., install special ring gauge, Tool BT-23 (1949-52), J-5340 (Later), over pedestal caps so that it rests on machined surface at outer side of each cap, measure clearance between gauge and opposite cap with a feeler gauge. Clearance at this point must be .008" (1949-52), .004-.012" (Later). Correct this clearance by adjusting differential bearings (above).

►*NOTE*—If correct bearing clearance cannot be secured within range of bearing adjusting nut, loosen bearing capscrews and tap bearing caps lightly in or out with a hammer.

►*CAUTION*—Bearing caps must be loosened to allow adjusting nuts to be turned and must always be tightened to 70-75 ft. lbs. before checking clearance.

Piloted Carrier Installation in Axle Housing:

►***CAUTION—Piloted carriers must be installed as follows due to close fit between carrier pedestal caps and support plates in housing.***

1—Carefully clean mounting face of carrier and housing, install new gasket (No. 556042).

2—Install three pilot studs, Tool BT-24, in two bottom holes and one top hole of housing.

►***1953 NOTE—Pilot studs not necessary on this axle assembly. Pedestal bearing caps will seat down onto carrier pedestals with proper alignment of threads if adjusting nuts are properly seated, threads not crossed, or pedestal caps interchanged.***

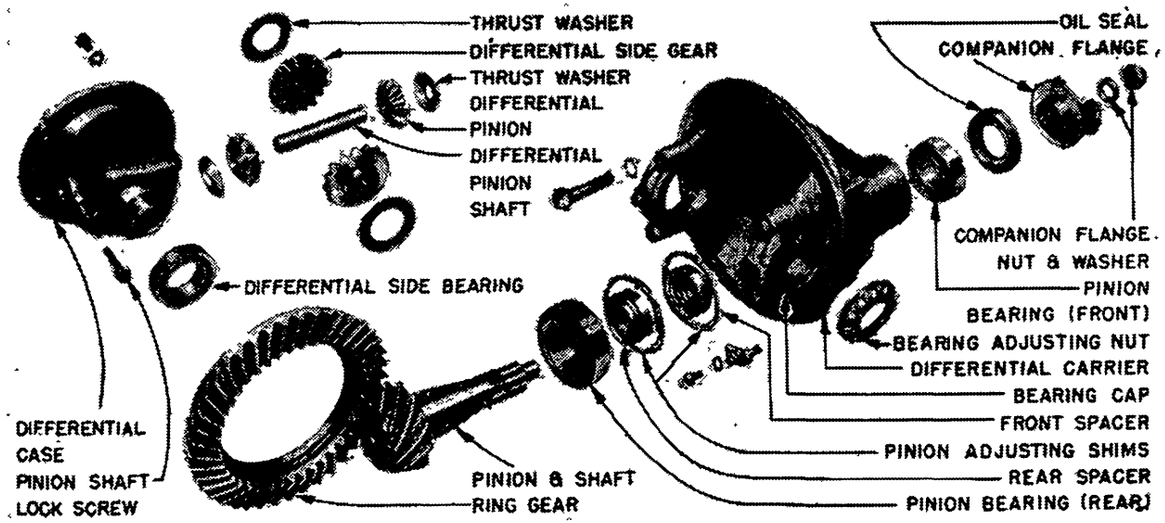
3—Install carrier over pilot studs. Use four 7/16"—20x1½" capscrews (install two on each side of housing) to draw carrier into place in housing.

4—Remove pilot studs, install six regular 7/16"x1" carrier mounting capscrews, then remove temporary screws and install four regular capscrews in these holes.

5—Tighten all mounting screws evenly to 70-75 ft. lbs.

Ring & Pinion Gear Backlash Adjustment: Backlash should be .003-.006" (1947-52), .004-.006" (Later). Adjust by backing off one differential bearing adjusting nut and tightening opposite nut exactly and equal amount to avoid disturbing differential bearing adjustment. See Pinion Setting and Differential Bearing Adjustment Data

NOTE—Bearing adjusting nut locks can be bent slightly, if necessary, to engage slot in nut if nut not exactly aligned with lock after backlash and bearing adjustment correctly set.



OLDSMOBILE HYPOID AXLE (WITH TWO-PIECE PINION SPACER)

OLDSMOBILE REAR SUSPENSION (COIL SPRING TYPE)

Six & Eight, All Models (1946-50)
Eight, Series 88 (1951)

DESCRIPTION: Coil spring type with support arms (used with Hotchkiss Drive Rear Axle).

Spring & Support Arm Axle Mounting—Mounting consists of an insulator bracket on the axle housing, insulators installed in upper and lower faces of bracket, insulator cups on outer ends of insulators, and spacer extending through entire assembly. This assembly is clamped between spring mounting plate (top) and support arm (bottom) by two bolts. Lower end of coil spring is clamped on this top spring mounting plate by the rear bolt (bolt threads into lower spring clamp).

Coil Springs—Springs have small curled ends and may be installed with either end up unless one end coil has straight portion (this end must be installed at top). See Spring Installation.

Shock Absorbers—Shock absorbers now mounted on brake backing plates and linked to frame.

SUSPENSION UNIT REMOVAL & INSTALLATION:

Spring Removal: Disconnect hydraulic brake hose at axle, disconnect propeller shaft at rear universal joint and remove, disconnect shock absorber arms from links. Remove upper spring bolt and axle housing rear insulator bolt (this bolt threads into lower spring clamp and anchors lower end of spring). Raise car to remove weight from spring, remove spring and upper insulator washer. CAUTION—Although rear springs can be removed by raising rear end of car until flexible brake connection is just taut (without disconnecting brake line), this method not recommended.

Spring Installation:—Spring must be installed with curled end of small diameter end coil at bottom (if both ends curled, spring may be installed either end up—some springs may have straight end which must be installed at top). Install spring with curled end of coil to rear and 1/16" to right of center-line through support arm. With spring in position, install insulator washer on top of spring and spring clamps in upper and lower end coils (lower clamp has grommet nut, upper clamp does not have nut which is located in frame side rail). Turn clamps so that they grip end coils snugly (clamps are cam shaped—assembly will be facilitated if clamps taped to spring). Line up holes in clamp and frame, lower car slightly to hold spring in place, install upper clamp bolt, thread rear insulator bolt up through insulator assembly and in to lower spring clamp, tighten both clamp bolts securely. CAUTION—See that spring clamps are seated snugly in springs and that spring does not ride on raised portion of mounting plate.

Axle Housing Insulators & Bolts:—See 'Spring & Support Arm Axle Mounting' description above for insulator assembly details. Upper and lower insulator halves are different sizes (upper half is longer) and must not be interchanged. Insulators are marked by words 'upper' and 'lower' molded in the rubber. Front axle housing insulator bolt is 5⅜" long with right hand thread and should be installed with hexagon head at top. Rear bolt is 6" long with left hand thread and should be installed with hexagon head at bottom (bolt threads into lower spring clamp—no separate nut used).

CAUTION—Both insulator bolts should be tightened uniformly. Do not tighten bolts singly.

Support Arms:—To remove support arms, proceed as directed for spring removal above (do not disturb spring upper clamp bolt), removing both axle housing insulator bolts, push lower end of coil spring out of the way and remove insulators, plates, and cups. Free forward end of support arm from frame and remove arm. Install arm in same manner.

Track Bar:—Mounted on rubber bushings at each end. To remove bar, remove nut on stud at axle end, pry forward on arm to loosen serrated bolt, disconnect bar from frame cross-member bracket, rotate plate on frame end of track bar and remove bar.

REAR SPRINGS: May be identified by color mark (daub of paint) or Part Number stamped on outside of one end coil.

CAUTION—Part No. may be at top or bottom of spring and may not be visible with spring installed on car (remove spring to check number).

1946-48 Rear Spring Specifications

Car Model	Part No.	Color Mark
66, 68 Sdns. & Convt.	417920	Grey
66, 68 Club Sdn. & Convt.	417866	Yellow & Rust
66, 68 Sta. Wgn.	1310399	Red
76, 78 (All)	415472	Green & Yellow
98 Club Sedan	415472	Green & Yellow
98 (Others)	416401	Green & Grey

1949 Rear Spring Specifications

Car Model	Part Number	Color Mark
76 & 88 Club Coupe & Sedan	417865	Green-Orange
76 & 88 Sedans & Convt.	557585	Yellow-Brown
76 & 88 Station Wagon	1310399	Red
98 Club Sedan	415472	Green-Yellow
98 Sedan & Convt.	416401	Green-Gray

1950-51 Rear Spring Specifications
76 & 98 (1950), 88 (1950-51)

Car Model	Part Number	Color Mark
76 & 88 4-Dr. Sdns.	557585	Yellow & Brown
76 & 88 Convt. & Holiday	557585	Yellow & Brown
76 & 88 Station Wagon	1310399	Red
76 & 88 Other Models	417865	Green & Orange
76 & 88 Export Optl.	1317790	Red & Brown
98 except Convt.	1340742	Rust
98—Convertible	558829	Green & Yellow

1946-52 PACKARD HYPOID

Six & Eight, All Models (1946-52)

▷CHANGES, CAUTIONS, CORRECTIONS

▷PINION BEARING PRE-LOAD CHANGE—30-35 in. lb. pinion bearing pre-load supersedes previous specifications. See Pinion Bearing Pre-load.

▷REAR AXLE OIL SEAL LEAKAGE CORRECTION: *When replacing axle shaft oil seals to correct complaints of oil or grease on rear brake linings, check the following points:*

▷Axle Housing Vent—*Must be kept open to prevent pressure building up in housing and forcing lubricant out.* Vent consists of drilled hole through screw attaching brake line tube junction on left side of axle housing.

▷Brake Support Plate Drain Holes—*Must be kept open to prevent oil or grease passing oil seal from being thrown on brake lining.*

▷Excessive Shaft Endplay—*Will cause seal wear and lubricant leakage.* Check and adjust endplay to .004-.007". When installing shaft, do not allow shaft to hang or drag on oil seal which may scuff seal or distort retainer.

▷Oil Seal Installation Cautions—Before installing new seal, check old seal for proper contact on shaft and leakage around outer rim, check shaft for roughness at seal bearing surface. If inner edge (lip) of seal has not been in contact with shaft due to extending too far into housing, shim out new seal by installing special spacer (can be made by cutting a single coil from a horn ring spring) in housing back of seal. To correct oil leakage around rim of seal, apply light film of gasket paste in housing bore before installing seal.
CAUTION—Apply gasket paste only at point where seal contacts housing and use sparingly.

▷PINION BEARING SPACER CAUTION (Some 2103, 2106, 2126 Cars): On these cars with rear axle carrier marked by two "8s" stamped in 1½" square pad on top of carrier, special 1/16" spacer used between pinion rear bearing cup and bearing cup shoulder in carrier. This spacer must always be used with these marked carriers.

▷*CAUTION—Rear axle will be noisy due to incorrect ring and pinion gear mesh if spacer omitted.*

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss drive.

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT & WHEEL BEARING ADJUSTMENT: See Oil Seal Leakage Correction above when replacing axle shafts. Use care not to damage oil seal.

Axle Shaft Replacement. To remove axle shaft, remove wheel, take off axle shaft nut and washer, remove hub and brake drum assembly (use puller), disconnect brake line, take out nuts in backing plate, remove seal guard, gasket, retainer, oil seal, backing plate, and bearing adjusting shims. Use puller J-2552 to remove axle shaft and bearing.

▷*CAUTION—Support weight of shaft while it is being withdrawn. Do not allow shaft to drag on inner oil seal (will damage or distort seal and cause oil leaks).*

Wheel Bearing Adjustment. Endplay up to .050" can be taken up by removing shims between backing plate and axle housing flange on one side. If endplay greater than .050", remove shims at both wheels equally for desired endplay of .004-.007".

CONTINUED ON NEXT PAGE

1946-52 PACKARD HYPOID (Continued)

NOTE—These shims furnished in thicknesses of .005", .007", .020".

DISASSEMBLY & OVERHAUL: With carrier assembly removed from axle housing, mark both bearing caps, adjusting nuts and pedestals to insure correct reassembly. Remove adjusting nut locks, loosen bearing cap stud nuts, back off adjusting nuts, remove bearing caps, lift out differential assembly. Remove nut on end of pinion shaft, use puller J-2576 to remove universal joint flange from shaft. Use a soft hammer to drive pinion, rear bearing, and sleeve out through rear of carrier. Remove pinion shaft oil seal, lift out front bearing cone and roller assembly. Do not remove pinion bearing cups from carrier unless replacement is required (CAUTION—If rear bearing cup removed, see Pinion Bearing Spacer Caution above for spacer used on some axles). If pinion rear bearing being replaced, use Adapter Plate J-2574 to press bearing off in arbor press.

Pinion Bearing Assembly (1946 & Later): Press or tap pinion bearing cups in place in carrier bore (CAUTION—See Pinion Bearing Spacer Caution note above for spacer used on some axles). Press rear bearing cone and roller assembly on pinion shaft until tight against shoulder on shaft. Insert pinion in carrier, install spacer and front bearing cone and roller assembly on shaft. Install universal joint flange spacer (separate spacer used on some models only), lubricate new pinion bearing oil seal with engine oil, tap seal in place. Coat shaft splines with Lubriplate, install universal joint flange, dust shield, flange washer, and nut. Adjust bearings by tightening nut as follows:

Pinion Setting: Pinion position is not adjustable.

Pinion Bearing Pre-load: 30-35 in. lbs. turning torque to rotate pinion shaft only (ring gear out of carrier). Check pre-load and adjust bearings as follows:

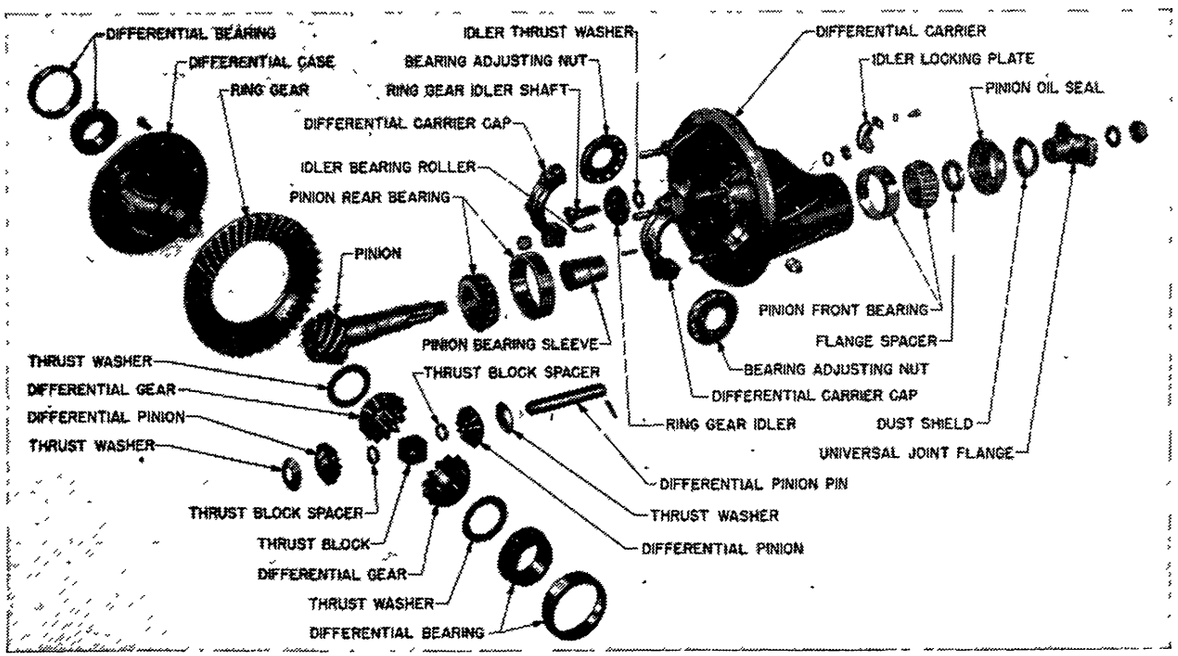
CAUTION—This 30-35 in. lbs. pre-loud supersedes earlier specifications and it is recommended that pre-load be set at upper limit of 35 in. lbs. to compensate for any slight drop-off after car returned to service.

Pinion Bearing Pre-load Adjustment—With pinion completely assembled in carrier, but with ring gear out, tighten nut on end of pinion shaft finger tight. With torque wrench and adapter J-2571-B and socket J-2571-A check amount of torque required to rotate pinion. **This indicates the amount of drag caused by pinion shaft oil seal, and must be subtracted from final torque reading.** Tighten universal joint flange nut until corrected torque of 30-35 in. lbs. (final torque reading **minus** oil seal drag) is obtained.

Collapsible Pinion Bearing Sleeve—If new sleeve being used, collapse sleeve first by tightening nut until torque required to turn nut suddenly falls off. Then check pinion pre-load (see above).

Pinion Staking Note—Replace flat type nut with Hug-Lock (staking not required). If flat type must be used, stake in two places.

Differential Gear Assembly:—Differential side gear endplay should be .002-.005". Adjust by installing thrust washer of correct thickness between side gear and differential case. These washers furnished in various thicknesses as follows: .031" (No. 330797), .036" (324583), .041" (324584), .046" (324585). When assembling differential gears, make certain that thrust block and spacers (spacer on each side of block) installed on differential pinion pin between pinions. Lock the pinion pin in place by installing lockpin through hole in case and stake the edge of the hole to prevent pin working out in service.



1947-52 PACKARD HYPOID REAR AXLE

Differential Bearing Assembly: Use puller TR-278R to remove side bearings from case. Bearing cones should be .001-.002" tight (if new bearing loose, replace case). Adjust bearings after assembly installed in carrier as follows:

Differential Bearing Adjustment—Bearings should be pre-loaded so that "spread" of bearing support pedestals of .010-.012" is secured. To make this adjustment, free adjusting nut locks. Loosen bearing cap nuts slightly to free adjusting nuts, make certain that there is some backlash between ring gear and pinion and clearance between ring gear and support roller (when used). Then back off right hand bearing adjusting nut until ring gear and differential assembly is loose in its bearings. Use accurate caliper and set caliper so that it will just slide over differential carrier with one leg resting on machined boss (adjusting nut lock pin boss) on each side of carrier **with .010" feeler between boss and caliper on one side.** Remove feeler, tighten right hand adjusting nut until caliper will just slide in place with the feeler removed (pedestals will have 'spread' this .010"). Correct pedestal spread should be .010-.012". After bearings adjusted and ring gear backlash checked (below), tighten bearing cap stud nuts to 65-70 ft. lbs. or bearing cap screws to 55-60 ft. lbs. and install adjusting nut locks. Adjust ring gear support roller clearance.

Ring Gear Support Roller Adjustment (Some Models only)—After adjusting ring gear backlash and differential bearing pre-load, adjust ring gear support roller by loosening lockscrew on roller stud sector plate and turning roller stud so that clearance between roller and back face of ring gear is .005". Make certain that sector plate and lockscrew are tight after making adjustment.

►***CAUTION—Rotate ring gear and make certain that mounting screw lock wires do not interfere with support roller.***

Ring Gear Backlash Adjustment: Backlash should be .004-.006". Adjust by backing off one bearing adjusting nut and tightening opposite nut exactly same number of notches to avoid disturbing bearing adjustment. NOTE—Backing off one nut and tightening opposite nut **one notch each** will change backlash approximately .004".

Ring Gear Replacement: When installing new gear, see that back face of gear and mounting face on differential case are clean and free from burrs. Check ring gear flange and pilot run-out on case which must not exceed .001". Install ring gear mounting screws, tighten screws evenly to 50-55 ft. lbs. (3/8"-24 screws), 70-80 ft. lbs. (7/16"-20 screws). Secure the mounting screws in pairs with lock wire through screw heads (CAUTION—see that lock wire does not interfere with support roller). Check ring gear for run-out after assembly mounted in carrier. Run-out at back face of ring gear must not exceed .004".

Lateral Stabilizer Installation (Clipper Models). The stabilizer must be installed in such a position that the air dome on the shock absorber (at one end of the stabilizer) is upward. Shock absorber rod guide and seal assembly (at piston rod end of shock absorber cylinder) must be turned so that wrench slots are at 45° to the air dome so air vent groove in guide will be at uppermost point in cylinder.

1953-55 PACKARD HYPOID

All Models (1953-55)

▷*REAR AXLE ASSEMBLY NOTE: Axle similar in design to previous types, but with heavier construction. Housing is heavier, bearings are larger, and axle shafts are larger.*

▷*PINION BEARING PRE-LOAD CAUTION: Adjustment procedure and settings changed. See OVERHAUL data below.*

DESCRIPTION: Hypoid gear, semi-floating type with Hotchkiss drive.

REMOVAL OF AXLE: *See "Rear Axle" on Car Model page.*

AXLE SHAFT REPLACEMENT & ENDPLAY ADJUSTMENT: Raise car and place stand under each side of frame near rear spring front hanger. Remove rear wheel from hub and drum, then raise rear axle housing and place stands under housing near outer end. Remove hub and drum assembly using puller J-4153 (*CAUTION—Do not use "knock-off" type puller*). Disconnect hydraulic brake line from wheel cylinder. Remove brake support attaching nuts and lock washers. Remove seal guard, gasket, retainer, oil seal, brake support, and axle shaft bearing adjusting shims. Remove axle shaft and bearing using puller J-2552. *CAUTION*—Be careful that the axle shaft splines do not damage inner seal. To install axle, reverse the removal procedure. Adjust endplay by installing Tool J-2560, then with axle shaft forced in toward differential, turn long adjusting screw to bear aaginst backing plate, and then pull shaft outward. Check with feeler gauge to determine clearance which should be .004-.007". Add or remove shims at backing plate to obtain specified clearance.

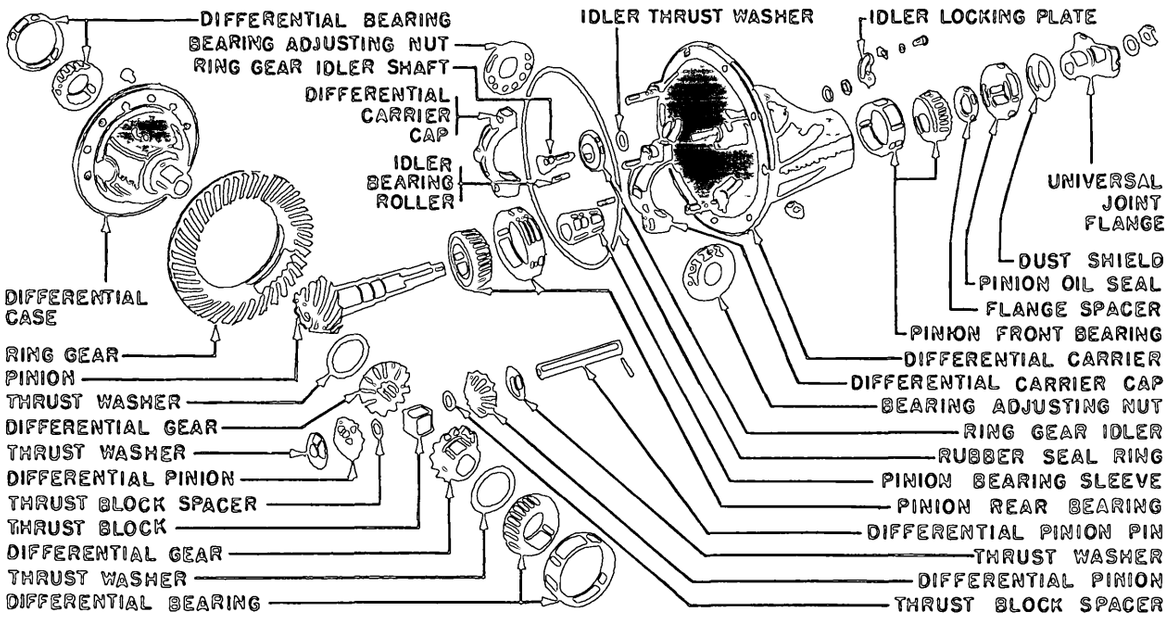
OVERHAUL: Carrier can be removed from rear axle housing without removing axle assembly from car.

Carrier Removal: Remove axle shafts (see above), and disconnect propeller shaft at rear universal joint by removing screws and lock plates (On Ultramatic Drive cars, the universal joint is disconnected by removing bearings and cross from yoke). Prop propeller shaft up against floor with block of wood under it at "X" member. Drain lubricant from housing, and clean area around carrier gasket, then remove carrier and gasket from axle housing.

Carrier Disassembly: Securely clamp carrier flange in a soft jawed vise. Measure differential case run-out and replace if run-out exceeds .004". Mark carrier side bearing caps, bearing adjusting nuts, and pedestals with punch marks to insure correct installation. Remove carrier bearing capscrews. Hold ring gear and differential case in place with one hand and lightly tap bearing caps loose with hammer. Lift off differential case bearings, bearing cups, adjusting nuts and caps. (CAUTION—Bearing cap, bearing cup, and adjusting nut should be kept together until reassembly.)

Differential Disassembly: Remove ring gear attaching cap screws, tap the outside of ring gear with a soft hammer and loosen it. Remove ring gear from case. Drive out the differential pinion shaft lock pin, using a pin punch and hammer. Drive out pinion shaft. Remove differential pinions, pinion thrust washers, axle shaft thrust block, and spacers, differential side gears and thrust washers. Differential side bearings may be removed if necessary, using Tool J-3250, and adapter plate J-3250-4.

Pinion Shaft Removal: Remove universal joint flange nut using socket wrench J-5512, while holding flange from turning with Tool J-2659. Drive universal joint flange from shaft using a soft hammer. Drive out pinion, sleeve, and rear bearing using a soft hammer, then drive out pinion oil seal and front bearing in the same manner. Drive out front bearing cups from housing using Tool J-872-5, and Tools J-3235-A (front bearing cup), or J-5521 (rear bearing cup). Remove pinion rear bearing using Plate Holder J-2574 and Remover P-5508 in arbor press.



PACKARD HYPOID REAR AXLE

Pinion Shaft Installation: Install pinion bearing cups using Tool J-872-5 and Tools J-3230-A (rear cup), J-5506 (front cup). Press the pinion rear bearing onto pinion shaft until inner race is tight against shoulder. Install the pinion shaft collapsible spacer on shaft with large diameter of spacer toward rear bearing, then install assembly in carrier. Lubricate and install front bearing and tap into place on shaft. Lubricate pinion oil seal and install it in carrier using Tool J-3244. Coat splines of shaft with oil and install universal joint flange or yoke, dust shield, washer, and a new nut.

Pinion Bearing Preload Adjustment: (With carrier assembly out of car and with differential assembly removed)—Lock universal joint flange in vise and tighten flange nut with socket wrench J-5512 and a long handle wrench until only a slight amount of endplay can be felt in pinion shaft. *(NOTE—If a new collapsible sleeve is being used, a great amount of turning effort on the wrench will be required to buckle the sleeve).* Using a preload indicator wrench and adapter Tool J-2571-B and socket J-5512, notice the amount of torque required to rotate the pinion. This indicates the amount of drag caused by pinion seal. After seal drag torque is obtained, continue tightening the flange nut until pinion bearing preload is correct, the torque reading on the preload indicating wrench will read 2½ to 3 ft. lbs. PLUS the amount of torque that was required to overcome the oil seal drag (above). *(For example, if the oil seal drag was 2 ft. lbs., the reading on the indicating wrench should be 4½ to 5 ft. lbs.).*

Pinion Bearing Preload Adjustment: (With carrier and axle assembly in car)—Raise rear of car so that wheels are off floor. Be sure rear brakes are not dragging (it may be necessary to loosen rear wheel brake adjustments). Disconnect rear universal joint from pinion flange. Loosen the pinion flange nut (with Tool J-5512) and tap pinion shaft lightly to insure removing all preload on bearings. With preload indicating wrench and socket (J-5512), measure the amount of torque required to turn pinion shaft, differential, and rear wheels (rotate pinion shaft a few turns before taking torque reading). While holding universal joint flange with a large wrench, or applying the brakes, tighten pinion shaft nut until preload of 15 ft. lbs. is obtained, PLUS the amount of torque required to overcome drag of rear wheels, differential and pinion shaft (above). While pinion bearings are under the 15 ft. lbs. preload, strike the differential carrier a couple of sharp blows directly over front and rear bearing cups with a brass hammer. *(CAUTION*—Do not operate car at this high pinion bearing preload). Loosen pinion shaft nut until pinion shaft turns free, then retighten nut to obtain 2½ to 3 ft. lbs. torque on pinion bearings PLUS the amount required to overcome drag of rear wheels, differential and pinion shaft (above). Connect rear universal joint to pinion flange, and adjust the rear brakes.

Differential Reassembly: Install differential side bearings using Tool J-5507 and Handle J-872-5. Install differential side gear thrust washers on hubs of

CONTINUED ON NEXT PAGE

1953-55 PACKARD HYPOID (Continued)

side gears, sticking them in place with cup grease. Install differential side gears and thrust washers in case. Coat cupped side of differential pinion thrust washers with grease and stick them to outer end of pinions, then place pinions in mesh with side gears, opposite each other, and rotate the side gears with the pinions until bore in pinions line up with pin bore in differential case. Start pinion pin into differential case so lockpin hole will line up with lockpin hole in case. As the pinion pin is pushed into case, install the thrust washer. Push pinion pin all the way in until lockpin hole registers with hole in case. (CAUTION—Measure the endplay of each side gear with feeler gauge placed between gear and thrust washer. If endplay not within .0015-.003" replace thrust washers with washers of correct thickness which are furnished in the following sizes: .031", .036", .041" & .046"). When correct endplay is obtained, and pinion pin installed, drive in the lockpin and stake edge of lockpin hole in case. Install ring gear on differential case and tighten capscrews evenly to 50-55 ft. lbs. Lubricate differential side bearings and place cups on bearings. Install differential assembly in carrier and install side bearing adjusting nuts and turn it in to make sure it is threading properly. Install bearing caps, lining them up with marks made at disassembly. Tighten capscrews enough to hold adjusting nuts in place and allow them to be turned. Temporarily adjust ring gear to pinion lash to approx. .010".

Differential Bearing Preload & Backlash Adjustment: Bearing preload is determined by measuring spread of carriers with a large outside caliper and a .010" feeler gauge. Back off side bearing adjusting nut on ring gear side one full turn so a little endplay can be felt in differential case. Place caliper and .010" feeler gauge against boss on pedestal cap and adjust caliper so jaw contacts pedestal boss on other side of differential case, to determine distance from outside of one pedestal to outside of other pedestal. Lock jaws of caliper in place so they will not be disturbed. Tighten the side bearing adjusting nut on ring gear side one full turn (previously backed off). Tighten adjusting nut opposite from ring gear side until caliper jaws will just contact both pedestal cap bosses **without** feeler gauge. (CAUTION—recheck pedestal spread).

Backlash Adjustment—Mount a dial indicator on carrier flange with indicator contact resting on face of ring gear tooth. Backlash should be .004-.008". By turning BOTH side bearing adjusting nuts in the same direction, ring gear can be moved toward or away from ring gear without disturbing side bearing preload. (NOTE—Moving both side bearing adjusting nuts in the same direction ONE NOTCH changes backlash .004"). Tighten side bearing cap bolts, recheck backlash.

Carrier Installation: Install new carrier sealing ring holding it in place with heavy grease. Install plastic seals on carrier studs and install carrier in axle housing. Tighten all carrier nuts to 35-40 ft. lbs.

Pedestal Set Screw Adjustment—(PRODUCTION CHANGE NOTE—Two set screws on early type; one set screw on ring gear side, later type). Tighten set screws in rear of axle housing to 2 ft. lbs. (Early type—two set screws). 2 to 3 ft. lbs. (Later type—one set screw). Hold screw with Allen wrench and tighten locknut.

PONTIAC HYPOID

Six & Eight, All Models (1947-55)

►CHANGES, CAUTIONS, CORRECTIONS

►**PINION BEARING PRE-LOAD CAUTION: Pinion bearing pre-load must be adjusted** whenever universal joint companion flange nut on pinion shaft loosened (pre-load controlled by this nut and will be disturbed whenever nut loosened for any reason). See Pinion Bearing Pre-load data.

►**1952 & LATER DIFFERENTIAL CASE ASSEMBLY CAUTION (3.08-1 RATIO)**—New and larger differential case and carrier assembly required with this ratio. NOT INTERCHANGEABLE WITH OTHER RATIOS.

►**1952 REAR AXLE SHAFT TEMPORARY PRODUCTION CHANGE**—A modified axle shaft having an oil reservoir built into the outer bearing retainer (does not have axle housing oil deflector or brake drum oil deflector) was used for a short period during production. This axle can be identified by the spring nuts on two opposite wheel studs. If axle shaft is to be replaced, the regular service axle shaft and components should be used.

►**1952 RING GEAR BOLT PRODUCTION CHANGE**—Bolts now being used in production do not require lock washers. Machined area around bolt holes has been increased for use of a socket wrench. New style bolts should be tightened to 55-60 ft. lbs. torque. When using old style bolts for replacement, lock washers must be used, and bolts tightened to 35-40 ft. lbs. torque.

►**REPLACEMENT AXLE SHAFT CAUTION**—Axle shafts are covered with a protective coating of rust inhibiting grease. This grease must be completely removed before shaft installed in car (particularly between axle flange and oil guard flange) to prevent grease melting and running out on brakes.

►*1955 SPACER PRODUCTION CHANGE:* Early production differential have a two-piece spacer which fits over pinion stem and bears against inner races of pinion bearings. Late production differentials have a one-piece spacer which fits over pinion stem and bears against a shoulder on drive pinion and inner race of front bearing. **New spacer is not serviced. Ue new two-piece spacer for replacement of one-piece or two-piece spacer.**

AXLE IDENTIFICATION: Color identification markings are found on end of axle shaft and code number is stamped on pad on differential carrier.

Ratio	Code Number	Color
3.08-1 (40-13)	0	Yellow
5.55-1 (41-9)	1	
4.3-1 (43-10)	2	White
4.1-1 (41-10)	3	Green
3.90-1 (39-10)	4	Red
3.64-1 (40-11)	6	Blue
3.42-1 (41-12)	8	Aluminum
3.23-1 (42 13). . . .	9	Brown

DESCRIPTION: New hypoid gear, semi-floating type. Design similar to axle used on previous models except for new pinion bearing assembly and other points listed below.

Differential Side Gears & Pinions—Gears are new type with "crowned" teeth to insure tooth bearing at center. Gears and pinions are interchangeable with previous type in complete sets only (individual gears and pinions must not be interchanged).

REMOVAL OF AXLE: *See "Rear Axle" on car model page.*

AXLE SHAFT REPLACEMENT: Wheel bearings not adjustable (ball bearings). Replace shafts as follows:

Axle Shaft Replacement. Wheel mounting flange integral with axle shaft. Bearings are special shielded type (lubricated at factory) pressed on axle shaft and held by retainer collar pressed on shaft. To remove shaft, remove wheel and brake drum, remove nuts from four bolts holding backing plate on housing, withdraw axle shaft (use puller J-942) taking care not to drag shaft on oil seal or to dislodge backing plate which will damage brake line. New bearings must be installed whenever removed from shaft. To remove bearings, use chisel to split retainer, press bearing off using special tool J-947 on outer race (pressure exerted on outer race which may burst if tool not used). Use same tool to install new bearing (pressure on inner race only) and retainer, pressing bearing on shaft against shoulder. Install shaft with left hand wheel studs on left hand side of car, shaft with right hand studs on right side of car. To renew oil seal, use tool J-943 to remove seal assembly, lubricate new seal with oil and coat outside rim of retainer with Permatex, use J-5818 to install seal assembly. *NOTE*—Adapter is furnished with tool for use in installing seals on 1954 and earlier rear axle shaft oil seals.

►***CAUTION—Use care not to dislodge backing plate which will damage brake line, or to drag shaft on oil seal which will damage or distort seal.***

►**IMPORTANT SERVICE CAUTION:** Pinion bearing pre-load is controlled by universal joint companion flange nut on pinion shaft and bearing adjustment will be disturbed when this nut is loosened. **Pinion bearings must be adjusted each time companion flange nut is disturbed.**

DISASSEMBLY: With rear axle removed from car, remove axle shaft, take out mounting screws and remove carrier assembly. Disassemble carrier assembly as follows: Mark differential bearing caps and adjusting nuts to insure reassembling parts in same relative positions and to same settings. Remove the differential bearing caps and adjuster nuts, lift differential case and ring gear assembly out. Remove universal joint companion flange nut (use holding tool J-2933 and 1" socket wrench), pull companion flange (tool J962) taking care that pinion does not fall out. Remove pinion through rear of carrier using care not to damage pinion shaft threads or oil seal (if pinion does not slide out, tap pinion out with a soft hammer, or press pinion out in an arbor press), lift compressible spacer and shim from pinion shaft (NOTE—On some cars, a shim .037-.045" thick may be found between spacer and front bearing cone, this **shim must be re-installed** if same spacer used when axle reassembled). Remove oil seal, lift front bearing cone and roller assembly out. Press front and rear bearing cups out of housing in an arbor press (use Front Pinion Bearing Race Remover J-2938 & Removable Handle J-2940; Rear Pinion Bearing Race Remover J-2936 & Removable Handle J-2940). Lift pinion adjusting shims out of housing

CONTINUED ON NEXT PAGE

PONTIAC HYPOID (Cont.)

(located behind rear bearing cup). To dismantle differential gears, remove locking screw, slide pinion shaft out, lift out gears, pinions, and thrust washers.

REASSEMBLY: Re-install and adjust parts as follows:

Pinion Bearing Assembly: Pinion bearing cups are press fit in housing. Rear pinion bearing cone is press fit on pinion shaft, front bearing cone is light press fit to close sliding fit on shaft. Replace bearings if rough when rotated with hand pressure. Use J-2934 Pinion Bearing Removing Plates and J-358-1 Holder in an arbor press to remove rear bearing cone and roller assembly. J-2935 Installing Plate and same holder to install new bearing (bearing must seat solidly against shoulder on shaft). Install correct pinion adjusting shim pack (see Pinion Setting data below) against shoulder of rear bearing bore in carrier, press rear bearing cup in place using J-2937 Rear Pinion Bearing Outer Race Installer and J-2940 Handle, then install front bearing cup using J-2939 Front Pinion Bearing Outer Race Installer and J-2940 Handle. Place compressible spacer (and shim—see note below) or new type two-piece spacer (see Spacer Note below) on the pinion shaft, insert pinion in carrier, install front bearing cone and roller assembly (use arbor press if press fit). Install oil seal, first oiling seal leather and coating outer diameter of seal with Permatex 3 or similar compound, tap seal in place using Bearing Installing Plate J-2935 to protect seal, install companion flange, oil the pinion shaft threads and face of the nut, turn nut on shaft loosely, then adjust bearing pre-load by tightening nut (below).

▷Two-Piece Pinion Bearing Spacer Installation—Place compressible inner spacer (Part No. 510424), outer spacer (Part No. 510425), and shims (if used) over pinion shaft. If pinion shaft is sliding fit in front bearing, turn carrier in a horizontal position, then place pinion assembly into position in carrier and slide front bearing over pinion shaft. If pinion shaft is a press fit in front bearing, use an arbor press to install bearing. Use small end of a discarded compressible spacer as a tool to press bearing onto pinion shaft while supporting pinion gear.

▷Pinion Bearing Spacer Shim Note—A shim (.037" to .045" thick) is used between spacer and front bearing cone on some axles. This shim must be re-installed if the same spacer is re-used (discard shim if new spacer is used). A new spacer must be used when: 1) New Ring Gear & Pinion set installed, 2) Any part of either pinion bearing is changed, 3) New Carrier casting installed, 4) Pinion adjusting shim thickness increased.

Pinion Bearing Pre-load Adjustment: Use J-2933 Companion Flange Holding Tool on flange, tighten nut on pinion shaft until bearing endplay is taken up (companion flange is felt to contact spacer), then tighten nut slowly, turning pinion shaft frequently to seat bearing rollers, and check bearing pre-load by measuring the pull required to turn the pinion shaft in inch-pounds (use torque indicating wrench or spring scale attached to companion flange holding tool). Tighten nut only until correct bearing pre-load is secured as listed below. After completing pre-load adjustment, secure the nut by staking end of pinion shaft into nut recesses.

Pinion Bearing Pre-load Setting

Pinion Bearings	Bearing Pre-load
New Bearings	27-37 in. lbs.
Old Bearings①	②10-12 in. lbs.

①—After several thousand miles usage.
②—Supersedes original specification of 15-20 in. lbs.

▷*CAUTION*—When adjusting bearing pre-load, do not exceed maximum (37 inch-pound) specification. If this figure exceeded by tightening nut excessively, disassemble axle and install new spacer.

Pinion Setting: Standard shim thickness for each carrier is indicated by mark on carrier flange as follows: D5—.015", D4—.014", D3—.013", D2—.012", D1—.011", 0 (Std.)—.010", S1—.009", S2—.008", S3—.007", S4—.006", S5—.005" (NOTE—"D" indicates carrier deeper, "S" that carrier shallower than standard). To this standard shim thickness (which is correct for all standard or unmarked pinions), add additional shims (when pinion marked +) or subtract shims (when pinion marked —) equal in amount to the figure following this + or — mark on end of the pinion (figures indicate shim thickness in thousandths). This total shim thickness will correctly position pinion for proper mesh with ring gear and shims should be installed in carrier ahead of rear pinion bearing cup. Shims are furnished in sizes listed below and should be used in combination for required thickness.

Shim Thickness	Part No.	Identification Color
.002"	509263	Plain
.003"	509264	①Blue
.004"	509265	②Copper
.005"	509266	Plain
.010"	509267	Plain

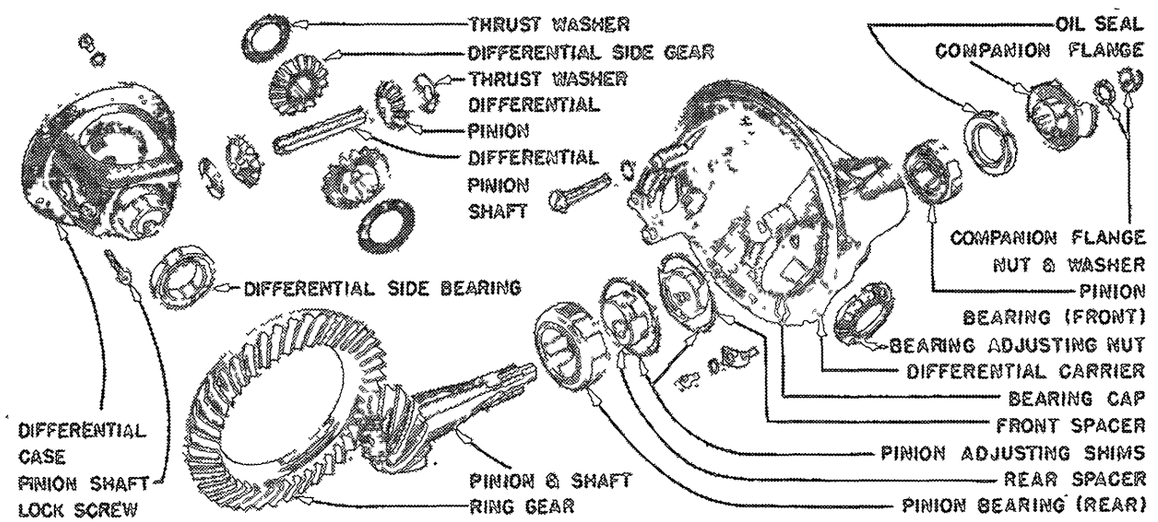
①—Or plain color with one punched hole.
②—Or plain color with two punched holes.

Differential Bearing Assembly: Bearing cones must be a heavy press fit on differential case hubs. Replace bearings if loose or if bearing feels rough when rotated by hand. Use TR-278-R Differential Side Bearing Remover to remove old bearing roller and cone assemblies, J-941 Replacer to install new bearings. When reassembling axle, place ring gear and differential assembly in carrier so that backlash between ring gear and pinion is just taken up, place bearing adjusting nuts squarely against bearing cups, install bearing caps and tighten capscrews lightly (make certain that adjusting nut threads not crossed), then check differential bearing adjustment (below). If no new parts being installed, tighten bearing nuts to original position (as marked before disassembly).

Differential Bearing Adjustment: With adjusting nut locks removed and bearing capscrews loose enough so that bearing adjusting nuts can be turned, mark position of both adjusting nuts, back off right hand nut slowly to point where right bearing cup stops turning with the nut, mark this new position (amount the nut turned between these two points is "notches tight" of original setting and should be 2½ minimum, 4 maximum). If bearing cup did not turn with the nut when the nut was loosened, or if "notches tight" of original setting incorrect, adjust bearings by turning right hand adjusting nut up until bearing cup just begins to turn with nut, then tighten nut not less than 2½ notches, or more than 4 notches, additional. Check ring gear backlash (see note below), tighten bearing capscrews securely, install adjusting nut locks.

Ring & Pinion Gear Backlash: .003-.012". Adjust by backing off one differential bearing adjusting nut and tightening opposite nut exactly equal amount (to avoid disturbing differential bearing adjustment). See Pinion Setting and Differential Bearing Adjustment data.

▷Ring Gear Backlash Adjustment Note—When adjusting differential bearings (above), if ring gear has slight backlash (.005"), equalize differential bearing adjustment by tightening each adjusting nut 1½-2 notches (do not make entire adjustment at right hand nut). Backlash can be adjusted without disturbing differential bearing adjustment by backing off one bearing adjusting nut and tightening opposite nut exactly same number of notches.



PONTIAC HYPOID REAR AXLE (WITH TWO-PIECE SPACER)

SUSPENSION & WHEEL ALIGNMENT INDEX

CAR APPLICATION

BUICK — Page
- 1946-53 ... 2302
- 1954-55 ... 2303

CADILLAC
- 1941-49 ... 2305
- 1950-55 ... 2306

CHEVROLET
- 1941-48 ... 2308
- 1949-54 ... 2309
- 1955 ... 2311

CHRYSLER
- 1946-55 ... 2312

DESOTO
- 1946-55 ... 2312

DODGE
- 1946-55 ... 2312

FORD
- 1949-53 ... 2318
- 1954-55 ... 2321

FRAZER
- 1947-51 ... 2328

HENRY J
- 1951-54 ... 2324

HUDSON
- 1946-54 Except Jets ... 2325
- 1953-54 Jets ... 2327
- 1950-51 Rambler ... 2329
- 1952-55 Rambler ... 2332
- 1954-55 Metropolitan ... 2330
- 1955 Wasp & Hornet ... 2332

KAISER
- 1947-55 ... 2328

LINCOLN
- 1949-51 ... 2318
- 1952-55 ... 2321

MERCURY
- 1949-53 ... 2318
- 1954-55 ... 2321

METROPOLITAN — Page
- 1954-55 ... 2330

NASH
- 1946-48 Ambassador ... 2332
- 1949-51 Ambassador ... 2331
- 1952-55 Ambassador ... 2332
- 1950-51 Rambler ... 2329
- 1952-55 Rambler ... 2332
- 1946-49 "600" ... 2331
- 1950-51 Statesman ... 2331
- 1952-55 Statesman ... 2332
- 1954-55 Metropolitan ... 2330

OLDSMOBILE
- 1946-54 ... 2334
- 1955 ... 2335

PACKARD
- 1941-50 Eight ... 2337
- 1951-54 All ... 2338
- 1955 5540 ... 2338
- 1955 5560, 5580
  - Front Suspension ... 2338
  - Torsion Level Susp. ... 2339

PLYMOUTH
- 1946-55 ... 2312

PONTIAC
- 1946-48 ... 2341
- 1949-52 ... 2341
- 1953-55 ... 2343

RAMBLER
- 1950-51 ... 2329
- 1952-55 ... 2332

STUDEBAKER
- 1947-49 Champion ... 2345
- 1947-49 Comm. & Land Cruiser ... 2345
- 1950-55 All ... 2346

WILLYS
- 1946-55 2WD Sta. Wgn. ... 2349
- 1946-55 2WD Sed. Del. ... 2349
- 1952-55 Pass. Cars ... 2350
- 1948-51 Jeepster ... 2349

1946-53 BUICK

ALL SERIES (1946-53)

►*1952 SERIES 40, 50 (LATE) CASTER PRODUCTION CHANGE:* Beginning with Oct. 20, 1952 production, all Series 40 & 50 cars have the new "zero" caster knuckle (Caster setting changed to 0°; Limits Pos. ¾° to Neg. ½°) *CAUTION—Zero caster cannot be readily achieved on Early 1952 Series 40 & 50 prior to the above production change as these models do not have the required adjustment range. IT IS ADVISABLE TO SET CASTER AS LOW AS POSSIBLE ON THESE MODELS.*

►*1953 LOWER CONTROL ARM AND SHAFT ASSEMBLY PRODUCTION CHANGE:* Lower control arm and shaft assembly (Buick Part No. 1391188) replaces the right and left lower control arms previously used. The new arm will have the two outer rivets omitted, and bolts, washers and nuts will be included for installation of bumper retainer with the stabilizer connection on either side.

►CHANGES & CORRECTIONS

►**1949 Type Upper Pivot Pin & Bushing Installation on 1939-48 Series 40, 50, 70 Cars**—New type pivot pin with greater eccentricity, providing 50% greater range of Camber adjustment, can be installed on these earlier cars as complete set with bushings.

►***CAUTION—1949 Pivot Pin and Bushings must be used together (do not install separately).***

DESCRIPTION: Independent, linked parallelogram type with coil springs. Shock absorber is part of upper control arm assembly.

CHECKING & ADJUSTMENT: Before checking front end, check and adjust front wheel bearings, wheel run-out, tire inflation, and front end trim dimension, and see that car is at curb weight.

Tire Inflation—Inflate tires evenly as follows:
1946-47—25 lbs. (Cold), 28 lbs. (Warm) all tires.
1948-49—(Series 40 & 79 Estate Wagon) 25 lbs. Cold, 29 lbs. Warm (Series 50), 24 lbs. Cold, 27 lbs. Warm. (Series 70 exc. 79) 22 lbs. Cold, 25 lbs. Warm.
1950-53—(All Series) 24 lbs. Cold (after standing for 3 hours or driven less than 1 mile), 26 lbs. (after car driven more than 3 miles at less than 40 MPH), 28 lbs. (after car driven 3 miles at more than 40 MPH).

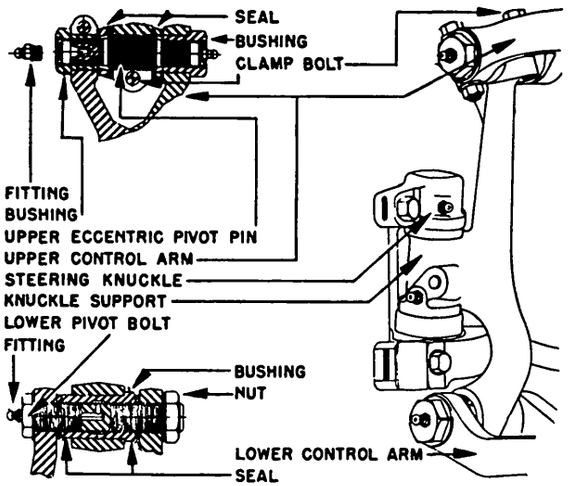
Kingpin Inclination—4¼° with camber of ⅜°.

Trim (Front Spring) Dimension: Bounce front end of car up and down several times to check for binding in suspension system, allow springs to assume natural position. With car at curb weight, measure from lower edge of frame cross-member (at bumper bracket) vertically to top edge of lower control arm. Trim dimension should be within limits shown below and lower control arm heights should be same on both sides of car. NOTE—1950 & Later cars have ¼" higher front springs for increased road clearance and Opt'l high springs have been discontinued as a factory option (these springs available for service installation in field).

►**Trim Dimension Correction**—If trim dimension not within limits, install special shims on low springs or replace springs. See Spring data.

①1948-53 Front Trim Dimensions

1948 All Series	3¾"
1949 50 (Exc. 56C)	4"
1949 70 (Exc. 76C)	4"
1949 56C & 76C	3¾"
1950-51 56C, 56R③	②3¾"



BUICK FRONT SUSPENSION

1948-53 Front Trim Dimensions (Cont.)

1950-51 75R, 76C, 76R③	②3¾"
1950-51 (All Others)③	②4"
1952 (Exc. 46C, 56C, 76C③	②4"
1952 46C, 56C, 76C③	②3¾"
1953 40 & 50 (Exc. 46C, 56C)④	②4"
1953 46C & 56C④	②3¾"
1953 70 (Exc. 76C, 76X)④	②3¾"
1953 76C④	②3⅜"
1953 76X④	②3½"

①—All specifications are plus or minus ¼".
②—Optl. High Springs not used on 1950 cars.
③—New cars will be 3/16" higher.
④—New cars will be ¼" higher.

Caster: *CAUTION—See 1952 Caster Production Change above.* Caster on both sides of car must be equal within ½°.

Caster	Desired	Limits
1946-47	Pos. ⅜°	0° to Pos. 1⅛°
1948-1952 (Early)	Pos. ¾°	Pos. ¼° to Pos. 1½°
1952 (Late)—1953	0°	Pos. ¾° to Neg. ½°

Adjustment—Remove lubricant fitting from bushing at outer end of upper suspension arm, (front bushing on right side, rear bushing on left side of car), loosen clamp bolt in upper end of knuckle support, insert Allen wrench through lubricant fitting hole, turn pivot pin to adjust caster (CAUTION—Camber will be changed unless pin rotated in complete turns only, check camber after adjusting caster), and toe-in if caster changed more than ¼°.

Camber: Positive ⅜° desired (Limits ⅞° Pos. to ⅝° Neg.) and equal within ¾° on both sides of car.

To Adjust—Same as for Caster adjustment (see above). Entire range of camber adjustment is obtainable within ½ turn of eccentric pin in either direction. CAUTION—Turning eccentric pin changes both Caster and Camber settings. Adjust both caster and camber together and "average" settings (both settings as near desired setting as possible and within limits).

Toe In: 1/16-⅛" (measure between marked points on tires at front of wheel, then roll car ahead ½ revolution and measure between same points at rear. **Adjustment**—Loosen clamp bolt at outer end of each tie rod, turn adjusting sleeve in outer end of each tie rod equally (⅜ turn of adjusting sleeve on each sid changes toe-in ⅛").

►*CAUTION*—When tightening clamp bolts, see that clamps are within ⅛" of rod ends and that ear of clamp overlaps slot in tube by not less than 1/16".

Steering Geometry: With outer wheel turned 20°, inner wheel should be turned 21½° plus or minus ¾°.

SPRINGS: Optl. High Spr'g Note. These springs higher, can be installed to correct excessive bottoming.

►*1950 & LATER SPRING CHANGES*—Springs have same part number as former springs but are ¼" higher (front), ¾" higher (rear) for increased road clearance and to prevent bottoming. Opt'l. high springs are continued for service replacement only.

1946-47 Spring Specifications

Car Model	Std. Springs	Optl. High Spring
41, 46S	1324479	1335808
51, 56C, 56S, 59	1314950	1335808
71, 76C, 76S, 79	1337574	1335809

1948-49 Spring Specifications

41, 46S	1314950	1335808
51, 56C, 56S, 59①	1314950	1335808
51, 56C, 56S, 59②	1335808	
71, 76C, 76S, 79	1337574	1335809

1950-51 Spring Specifications

Car Model	③Std. Spring
41, 41D, 43, 43D, 46, 46S, 46D①	1314950
41, 41D, 43, 43D, 46, 46S, 46D②	1335808
51, 52, 56C, 56R, 56S, 59①	1314950
51, 52, 56C, 56R, 56S, 59②	1335808
71, 72, 76C, 76R, 76S, 79	1340981

①—Cars with Synchro-mesh Transmission.
②—Cars with Dynaflow Drive Transmission.
③—1950 & Later Springs ¼" higher than former springs of same number. Opt'l. High springs not used.

1952 Front Springs

Car Model	Spring Part No.
40 (Dynaflow)	1314950
40 (Synchro-mesh)	1324479
50 (Dynaflow)	1335808
50 (Synchro-mesh)	1314950
70 (Exc. Amb. & Funeral)	1340981
50 & 70 (Ambulance & Funeral Cars)	1336961

1953 Front Springs

Car Model	Spring Part No.
40 (All—Synchro-mesh)	1324479
40 (All—Dynaflow)	1314950
50 (All—Synchro-mesh)①	1314950
52, 56R (Synchro-mesh)②	1335808
50 (All—Dynaflow)①	1335808
52, 56R (Dynaflow)②	1340981
70 (Exc 76X) (Dynaflow)①	1163279
76X (Dynaflow)	1335808
76X (Export—High Springs)	1163279
72R, 76R (Dynaflow)②	1340981

①—Without Air-Conditioning.
②—With Air-Conditioning.

Spring Height Correction—If spring too low (trim dimension not within limits), special shims (⅛" thick) may be installed on upper end of spring.

►*CAUTION*—If more than three shims required to correct spring height, replace spring.

►**Rear Spring Note**—*See "Buick Rear Suspension" in Rear Axle Section for Std. and special Rear Springs.*

C NTINUED ON NEXT PAGE

1946-53 BUICK (Cont.)

FRONT SPRING REPLACEMENT: (Removal)—Place jack under lower control arm, raise wheel off floor and remove wheel and tire. Disconnect stabilizer link from lower control arm and disconnect outer end of tie rod from steering arm. Remove lower pivot pin nut, pivot pin, washer and dirt seals. Support car frame by another jack and slowly lower the jack under the lower control arm. This will allow lower control arm to drop low enough to remove chassis spring.

Installation—Before installation of front spring, check the part number which is stamped on one end coil to make sure that spring is correct (See Front Spring Table above), for car model. Make sure that rubberized fabric insulation is in place around the spring center cup on frame, and is in good condition. Place small end coil of spring over the center cup and as lower control arm is raised, position lower end of spring so that end coil seats in the recess provided in spring seat. Support lower control arm on jack. Slip the lower pivot pin dirt seals over outer ends of lower control arm. Centralize lower end of knuckle support between outer ends of lower control arm, then install lower pivot pin and lockwasher from front side and tighten securely. Install and tighten nut. Snap dirt seals into place over pivot pin. Connect tie rod outer end to steering arm, and connect stabilizer link to lower control arm. Adjust stabilizer link grommets by tightening grommet retainer nuts to secure a measurement of 1 11/16" between top of upper grommet retainer and bottom of lower grommet retainer. Make this adjustment on each end of link. Install wheel and tire assembly, then check front end alignment.

SHOCK ABSORBERS: Double acting opposed piston (front), and double acting parallel piston (rear). Front shocks mounted on top of frame front cross-member, and rear shocks mounted on brake backing plates.

Filling Shock Absorbers: Remove filler plugs and add fluid until it overflows, using only G.M. or Delco Shock Absorber Fluid. Install plugs loosely to exclude dirt and bounce front or rear of car up and down to force air out of cylinders. Repeat addition of fluid until no more fluid can be added (front shock); or until fluid level is 1/2" to 23/32" below filler openings (rear shocks). *NOTE*—Air space is provided in cover of front shocks, but fluid level must be below filler opening on the rear shocks. Shock Absorber Filler Gun KMO-1026 should be used to fill rear shocks, and then apply Adapter J-1611 to gun to suck out surplus fluid.

Removal (Front Shock Absorber): Place jack under lower control arm, raise wheel off floor and remove tire and wheel assembly. Remove pivot pin bushing clamp bolt in upper control arm, then remove both pivot pin bushings from upper control arm, and remove rubber seals. Loosen clamp bolt in knuckle support and remove pivot pin, using 1/4" Allen wrench. ***(NOTE—Tie steering knuckle support to upper control arm to prevent damage to brake hose.)*** Remove the three shock absorber attaching bolts. The outer bolt (located at upper end of chassis spring) may be removed with a socket wrench and an extension through opening in lower control arm spring seat.

Installation—Reverse the removal procedure and check camber, caster, and toe-in.

LOWER CONTROL ARM ASSEMBLY: (Removal)—Remove chassis front spring and remove lower control arm assembly from frame front cross member.

Bushing & Shaft Removal & Installation—Unscrew bushings and remove shaft from control arm. Check distance between inner ends of control arm. Distance should be 11¼" ± ¼", from inside to inside. Install a rubber seal over each threaded end of new control arm shaft, with large ball ends of seals outward toward ends of shaft. Insert one end of shaft with seal in place in one control arm end and force opposite end of shaft into other control arm end. A piece of wood approximately 1¼" x 2½" x 24" long can be used as a pry. Fasten control arm securely in vise close to one end to prevent springing or distortion. (NOTE—Apply a liberal amount of white lead or Lubriplate to both bushings before installing). Start first bushing on shaft and into control arm at same time. Turn bushing until head is against arm and tighten to 100 ft. lbs. torque. Center shaft between arms and install second bushing in same manner first bushings were installed, turning shaft as required to thread bushing so that no binds exist.

Lower Control Arm Assembly Installation: Before installing lower control arm and shaft assembly, turn shaft to locate the bolt holes at both ends so they are equally distant from inside surface of control arms, then bolt shaft to frame front cross-member. Install chassis front spring and other parts. Check and adjust front end alignment.

UPPER PIVOT PIN & BUSHING REPLACEMENT: (Removal)—Place jack under lower control arm, raise wheel off floor, and remove wheel and tire assembly. Remove pivot pin bushing clamp bolt in upper control arm, then remove both pivot pin bushings from upper control arm, and remove rubber seals. Loosen clamp bolt in knuckle support and remove pivot pin using a ¼" Allen wrench.

Installation—Hold knuckle support in line with hole through control arm and screw pivot pin into knuckle support, with adjusting wrench hole in pin toward split side of control arm. Turn pivot pin until large diameter section is centralized in knuckle support and tighten clamp bolt. Install rubber seals in both ends of pivot pin. Centralize knuckle boss in upper control arm yoke and start the externally threaded bushing on threads of pivot pin and into threads of control arm. Start the plain (grooved) bushing on threads of pivot pin, then turn until hex is just clear of control arm, then install and tighten clamp bolts. Check and adjust front end alignment.

1954-55 BUICK

All Series (1954-55)

►CHANGES & CORRECTIONS

►*STABILIZER BAR INTERFERENCE CORRECTION:* If water outlet hose on radiator contacts the stabilizer bar, insert a spacer under left hand stabilizer bracket to provide a minimum of 3/16" clearance between hose and stabilizer.

►*1955 LOWER CONTROL ARM OUTER PIVOT PIN & BUSHING POSITION CHANGE:* Head of bushing has been reversed so it will be toward front of car on right side, and toward rear on left side.

►*1955 BRAKE PIPE INTERFERENCE WITH UPPER CONTROL ARM CORRECTION:* A clip, Part No. 1334584 should be installed over brake pipe and secured to right frame side rail to hold brake pipe away from upper control arm. Bend pipe away from contact with control arm.

DESCRIPTION: New design with Direct Acting Shock Absorbers and Upper Support Arm pivoted on bracket shaft mounted on frame front cross-member as follows:

Front Shock Absorbers—Delco direct acting hydraulic type located within the coil springs. Upper end is mounted in tower bracket on frame cross-member (bayonet type end with rubber grommets in bracket), lower end is bolted to bracket bolted on underside of spring seat on lower support arm ("eye") type with rubber grommets on mounting bolt). Shock absorbers are interchangeable from right-to-left and can be removed and installed without disturbing suspension.

►*CAUTION—Shock absorber calibrations differ in some models and are not interchangeable from one car to another.*

Upper Support Arm—New assembly (furnished with shaft, bushings, and dirt seals) mounted at inner end on frame cross-member by two bolts in pivot shaft. Shaft and bushings can be replaced separately.

CHECKING & ADJUSTING: Check front wheel bearings, wheel runout, tire inflation, and front end trim dimensions, and see that car is at curb weight before checking front end alignment.

Tire Inflation—24 lbs. cold (after standing for more than 3 hours or driven less than 1 mile), **26 lbs.,** (after car driven more than 3 miles at less than 40 MPH), **28 lbs.** (after car driven more than 3 miles at more than 40 MPH).

Trim Dimension (Front Springs): Before measuring, bounce both ends of car up and down several times to make sure there is no bind in suspension members, and to let springs take a natural position. When car is at rest, measure the trim height between top side of lower control arm and underside of frame cross-member (at bumper bracket). Trim dimension should be within limits shown in table below and lower control arm heights should be same on both sides of car.

►**Trim Dimension Correction**—If trim dimension is less than specified, or additional height is required to prevent "bottoming", install additional spring insulators, divided between upper and lower ends of spring. If more than three additional shims required, replace the spring. NOTE—New springs should not increase the trim dimension more than 1" over specified maximum limit.

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1954-55 BUICK (C nt.)

Front Trim Dimensions

46C 56C, 76C, 100	3½-4"
All Other Models	3¾-4¼"

Kingpin Inclination: 0° crosswise with 7/8° camber Not adjustable.

Caster· Neg ¼° desired (Limits Pos ½° to Neg ¾°) Both sides of the car should be equal within ½°

Adjustment—Remove lubricant fitting from bushing at outer end of upper support arm (front bushing right side, rear bushing left side), loosen clamp bolt in upper end of knuckle support, use Allen wrench inserted through lubricant fitting hole and turn pivot pin to adjust caster *CAUTION*—Camber will be changed unless pivot pin rotated in complete turns only—check camber after adjusting caster

Camber· Pos 3/8° desired (Limits Pos 7/8° to Neg 5/8°) Both sides of the car should be equal within ¾°

Adjustment—Adjust in same manner as Caster (above) except that eccentric pin should be turned only slightly from point where correct caster secured (entire range of adjustment secured in ½ turn)

To -In: 0" to 1/16" (1954) 1/16" to 1/8" (1955)

Adjustment—Loosen clamp bolt at each end of adjusting sleeve at outer end of **each tie rod,** turn each adjusting sleeve equally to adjust toe-in *NOTE*—Threads at each end of the sleeve should be equal and slots in sleeve and clamp should be aligned

T e-Out n Turns· Inner wheel turns 22½° ±¾° with outer wheel turned 20° No adjustment

►*DYNAFLOW CARS (WITH POWER STEERING) NOTE A special shim, Part No 1290142, is used on the upper end of LEFT front spring between spring and insulator*

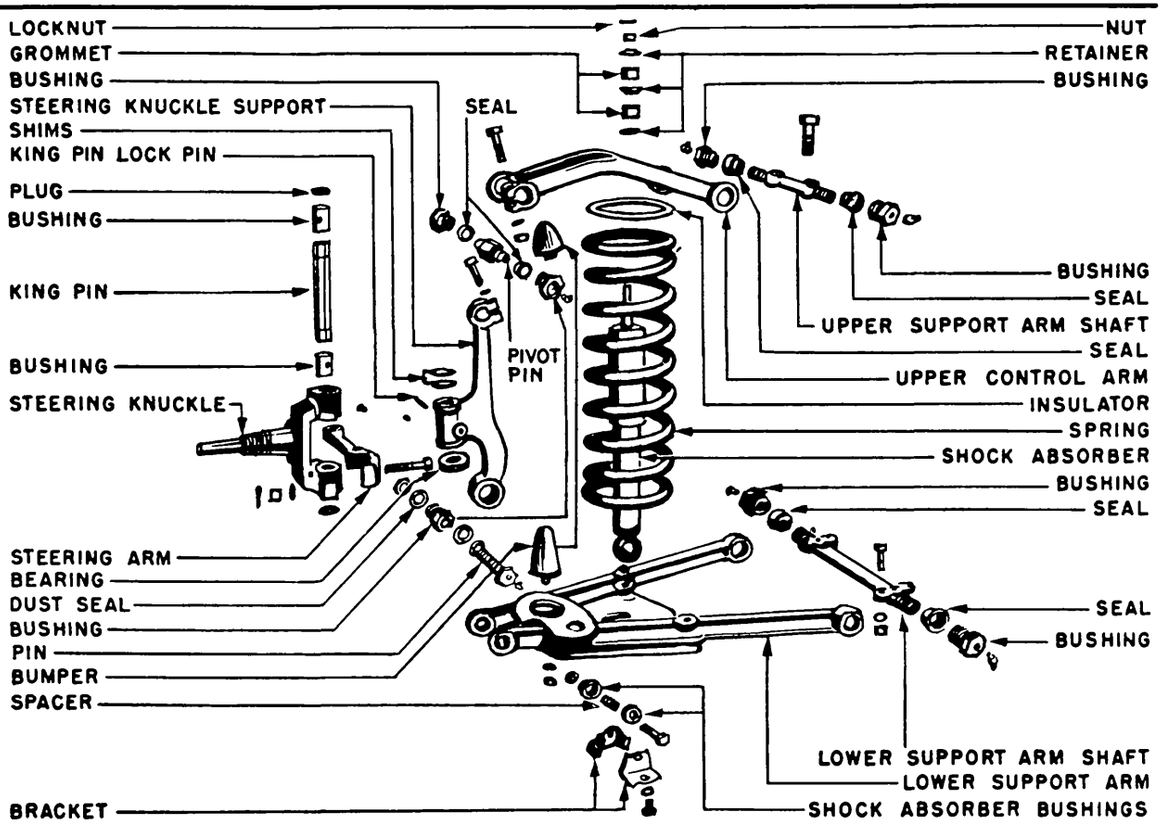
►*REAR SPRING NOTE—See "Buick Rear Suspension" in Rear Axle S ction for standard and special rear springs*

Front Spring Application

S ri s	Standard	Air Conditioned
40, 60 (1954 Synchro-mesh)	1165046①	1165048
40, 60 (1955 Synchro-mesh)	1167272④	1165048
50 (1954 Synchro-mesh)	1165047②	1165049
50 (1955 Synchro-mesh)	1167273②	1165049
40, 60 (1954 Dynaflow)	1165047③	1165049
40, 60 (1955 Dynaflow)	1167273②	1165049
50 (1954-55 Dynaflow)	1165048③	1165050
70 (1954-55 Dynaflow)	1165049	1165050
100 (1954)	1165049	

①—No 1165047 200 lb overload (Except Series 40 Convertible & Series 60 Estate Wagon)
②—No 1165048 200 lb overload
③—No 1165049 200 lb overload
④—No 1167273 200 lb overload (Except Series 40 Convertible & Series 60 Estate Wagon)

FRONT SPRING REPLACEMENT (Removal): Place jack under lower control arm and raise sufficiently to remove wheel Disconnect stabilizer link from lower control arm and outer end of tie rod from steering arm Remove shock absorber and remove lower pivot pin nut, pivot pin nut, pivot pin, lock washer, and dust seals Support car frame with another jack, then slowly lower jack under lower control arm, and remove spring



1954-55 BUICK FRONT SUSPENSION

Installation· Before installing front spring, check the spring part number to make sure it is the correct spring (See "Front Spring" Table above). Make sure that rubberized fabric spring insulator is around spring centering flange on frame and is in good condition. Place one end of spring over centering flange, and as lower control arm is raised, position lower end of spring so that end coil seats in recess in spring seat Support lower control arm on a jack Slip lower pivot pin dirt seals over outer ends of lower control arm Centralize lower end of knuckle support between outer ends of lower control arm, then install lower pivot pin and lock washer from front side and tighten securely Install and tighten nut Snap dirt seals into place over pivot pin Connect tie rod outer end to steering arm, and connect stabilizer link to lower control arm (NOTE—When stabilizer rod nut is tightened, the overall length of each grommet assembly should be 1 11/16' Adjust nut as necessary to obtain this dimension) Reinstall shock absorber and wheel Adjust front end alignment

SHOCK ABSORBER REPLACEMENT Not necessary to disturb front suspension assembly

R m val· Hold upper mounting stem with a wrench, remove palnut and retaining nut (on top of shock absorber mounting bracket in engine compartment), lift off upper retainer and rubber grommet Remove bolts and lockwashers attaching lower mounting bracket to underside of spring seat on lower support arm, pull shock absorber and mounting bracket assembly down through opening in spring seat Do not lose retainer and grommet on shock absorber mounting stem To remove shock absorber from lower mounting bracket, remove pivot bolt and nut, pull bracket off, remove rubber grommets and spacer from shock absorber eye

Installation: Check to make sure the correct shock absorber is being installed *(See "Shock Absorbers" on Car Model page)*, then reverse the removal procedure as given above

UPPER SUPPORT ARM REPLACEMENT (Removal)· Remove generator and engine front mounting nuts, and raise engine just enough to allow removal of support upper arm shaft bolts Remove pivot pin and bushings from support arm by taking out the pivot pin clamp bolt and turning bushings out of support arm Remove rubber seals Loosen clamp bolt in knuckle support and remove pivot pin, using a ½' hex Allen wrench Remove support arm shaft attaching bolts and remove support arm assembly from car Unscrew shaft bushings and remove shaft and seals from arm

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1954-55 BUICK (C nt.)

Installation: (*CAUTION—Before installing any new parts, check the distance between the two shaft bosses at inner end of support arm assembly—this distance should be 6 5/16" ± .020").* Install a rubber seal over each end of upper arm shaft, with large or bell end of seal outward. Insert one end of shaft with a seal, in one end of upper arm, and force other end of shaft into opposite end of arm. Fasten upper control arm securely in vise (close to one end of arm to avoid spring or distortion). Apply a liberal amount of white lead or Lubriplate to both bushings before installing. Start first bushing on shaft and into upper support arm at same time. Turn bushing until head is tight against arm, then tighten to a minimum of 100 ft. lbs. torque. Center the shaft between ends of arm and install second bushing in same manner as first bushing, tightening the second bushing so that no binding exists. Before installing support arm, turn the shaft to locate the bolt holes equally distant from ends of arm, then bolt shaft to frame front front cross member. Lower engine and tighten front mounting nuts. Reinstall upper pivot assembly as follows: Hold knuckle support in line with hole through support arm and screw pivot pin into knuckle support, with adjusting wrench hole in pin toward split side of control arm. Turn pivot pin until large diameter section is centralized in knuckle support and tighten clamp bolt. Install rubber seals on both ends of pivot pin. Centralize knuckle support boss in support upper arm yoke and start the externally threaded bushing on threads of pivot pin and into threads of control arm. Start the plain (grooved) bushing on threads of pivot pin, then turn the opposite bushing up tight. Turn plain bushing until hex is just clear of arm, then install and tighten clamp bolts. Check and adjust front end alignment.

LOWER CONTROL ARM REPLACEMENT (Removal): Remove front chassis spring, then remove lower control arm assembly from frame front cross member.

Bushing Replacement: (*CAUTION—Before installing any new parts, check the distance between the two shaft bosses at inner end of support arm assembly (this distance should be 11¼" ± 1/32").* Install a rubber seal over each threaded end of new control arm shaft, with the large or bell ends of seals outward toward ends of shafts. Insert one end of shaft with a seal in place in one control arm end and force opposite end of shaft into other control arm end (a piece of wood approximately 1¼" x 2½" x 24" can be used as a pry). Fasten control arm securely in a vise (close to one end of arm to avoid spring or distortion). Apply a liberal amount of white lead or Lubriplate to both bushings before installing. Start first bushing on shaft and into control arm at same time. Turn bushing until head is tight against arm and tighten to 100 ft. lbs. torque. Center shaft between arms and install the second bushing, turning shaft as required to thread into bushing so that no binding exists.

Installation: Before installing lower control arm and shaft assembly, turn shaft to locate bolt holes at both ends so they are equally distant from the inside surface of arms, then bolt shaft to frame front cross member. Install chassis spring and other parts, and check and adjust front end alignment.

STEERING KNUCKLE REPLACEMENT (Removal): Remove front wheel with hub and drum assembly. Remove brake backing plate and steering arm from steering knuckle (Do not disconnect brake hose but support backing plate out of way to avoid strain on hose). Drive out kingpin lockpin. Remove upper welch plug from knuckle by piercing with a sharp pointed punch and prying out. Drive kingpin down and out, which will drive lower welch plug from knuckle. Remove thrust bearings and shims.

Installation: Reverse removal procedure and use shims as required between knuckle support and upper boss of knuckle to provide .003" endplay of knuckle on support. Use new welch plugs at each end of kingpin. Check and adjust front end alignment.

1941-49 CADILLAC

Cadillac V8, All Series (1941 to 1949)

DESCRIPTION: Independent linked parallelogram type with coil springs.

ADJUSTMENT: Before making adjustments, check wheels for balance, run-out and tracking; check wheel bearing adjustment and see that all front end parts operate freely.

Tire Inflation—Check tires and inflate as follows:

Tire Inflation Pressure

60S, 61, 62 (1946-48)	28 lbs.
60S, 61 62 (1949)	24 lbs.
67, 75 (1941-42)	(Frt) 24, (R) 32 lbs.
75 (1946-49)	(Frt) 24, (R) 32 lbs.
76, 86 Comm'l (1948-49)	(Frt) 34, (R) 36 lbs.

Wheel & Tire Run-Out—Check wheels for run-out and mark high point on tire. Place this mark vertically (at top of wheel) when checking Toe-in and Toe-out, horizontally (at one side of wheel) when checking Caster, Camber and Kingpin Inclination.

Kingpin Inclination—Crosswise inclination with specified Camber as follows:

Kingpin Inclination

All Models (1941-49)	5°51' (0° Camber)

Caster: As shown below. Must be equal on both sides of car within ½°. NOTE—Negative figures indicate Reverse Caster.

Caster Specifications

1941-47 (All Models)	Neg. 1¾° to Neg. 2¾°
1948-49 (All Models)	Neg. ½° to Pos. ½°

To Adjust (All Series)—Loosen the clampscrew in upper end of knuckle support, remove lubrication fitting in front bushing of upper control arm, insert Allen wrench, Tool J-720, through lubricant fitting hole, turn eccentric upper support pin in complete turns only, clockwise to increase caster, counter-clockwise to decrease caster. IMPORTANT—Camber will be disturbed unless pin turned in complete turns only.

Caster Adjustment Note—If correct caster adjustment cannot be secured within limits of turning of the upper support eccentric pin, greater range of adjustment can be secured by disconnecting lower support arm inner mounting shaft at frame crossmember and turning shaft in arms (screwing shaft to rear which will move support arms forward increases Caster).

Camber: 0° ± ⅜°, and equal within 1°.

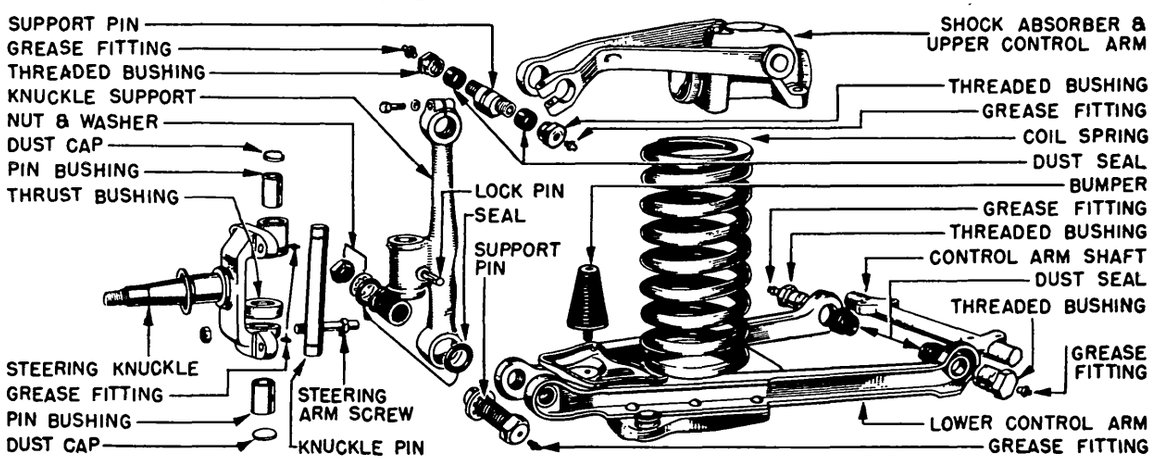
To Adjust (All Series)—Same as for caster adjustment, except that entire adjustment secured within ½ turn of eccentric pin.

Toe-in:—Should be 0-1/16" (car in motion), 1/32-3/32", car at rest) for all models. Measure with 'high' point of tire run-out in vertical position at top of wheel.

To Adjust (All Series)—Loosen the clamp bolts and turn tie rod adjuster (at wheel end of each tie rod) equally on both sides of car (to maintain correct position of steering gear).

Steering Geometry (Toe-out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned exact amount shown in table below. Check

CONTINUED ON NEXT PAGE



1941-49 CADILLAC FR NT SUSPENSION

1941-49 CADILLAC (C nt.)

for bent steering arms if incorrect. NOTE—On 1946-49 cars, inner wheel turning angle differs for right and left turns as shown.

1941-49 Steering Geometry

Car Model	Inner Wheel① Right Turn	Left Turn
60S, 61, 62, 63 ('41-42)	24°42'	25°25'
67, 75 ('41-42)	23°6'	24° 7'
67, 75 Comm'l ('41-42)	23°6'	24° 7'
60S, 61, 62 ('46-48)	24°42'	25°25'
60S, 61, 62 (1946-49)	24°42'	25°25'
75, 75 Comm'l (1946-47)	23°6'	24° 7'
75, 76 Comm'l (1948)	23°6'	24° 7'
75, 86 Comm'l (1949)	23°6'	24° 7'

①—With outer wheel turned exactly 20°.

SERVICING (1940-49 Cars): Lower Control Arm and Knuckle Support Pin—Control arm mounted on inner frame bracket shaft by threaded bushings (bushings threaded on shaft and in control arms) with rubber seals on shaft. Shaft can be removed from control arms after bushings have been removed. Support pin at outer end of control arm is threaded through both control arms and bushing in lower end of knuckle support and has nut on rear end. Rubber seal is installed on support pin at front end of bushing (between knuckle support and front control arm).

Upper Control Arm Support Pin—This eccentric pin is threaded in bushings in each upper control arm and in upper end of knuckle support (rear bushing is threaded type and is screwed in control arm, front bushing is plain type and is locked in control arm by clamp bolt). A clampscrew in the upper end of the knuckle support locks the pin in the support to maintain caster and camber setting.

SPRINGS: Part number is stamped on end coil of each spring. When installing springs see that insulator at top and bottom of each spring.

1946-47 Spring Specifications

Car Model	Part No.	Color Mark
75 Comm'l	1428429	Yellow
60S, 62	1428433	Orange
61	1428432	None
75	1428434	Pink
61, 62 exc. Conv't	1428433	Orange
62 Conv't	1428434	Pink
60S, 75	1428434	Pink
76 Comm'l	1428429	Yellow

1948-49 Spring Specifications

Car Model	Part No.	Color Mark
61, 62 exc. Conv't	1455406	None
60S, 62 Conv't	1455407	Gray
75	1428434	Pink
86 Comm'l	1428429	Yellow

Spring Heights—4½-5¼" measured from center of lower rivet on front side of bumper bracket on frame cross-member to top of lower spring seat adjacent to lower bumper. Springs on both sides of car should be equal within ⅜". Correct by installing spacer under low spring.

1950-55 CADILLAC

All Series (1950-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 DRAG LINK TO TIE ROD INTERFERENCE CORRECTION:* This interference is on the right side and is generally caused by the idler arm being too high. Correct by loosening the idler arm support-to-frame screws and rotate the idler arm down and forward as far as possible, then tighten screws. In addition, the idler arm should be backed out of its bushing in the support a total of 2½ turns, instead of the 1½ turns previously recommended.

►*1954 COMMERCIAL CHASSIS FRONT WHEEL RUBBING FENDER CORRECTION (On Extreme Right or Left Turns):* Check the special steering arm-to-knuckle screw which incorporates the wheel stop. A 1/16" washer should be between the head of the screw and the steering knuckle. If this washer in place, the trouble lies in excessive weight on the front springs and can be corrected by installing front spring shims, Part No. 1457838 on TOP of each spring, or installing heavy duty front springs. To determine if heavy duty springs are required, proceed as follows: Weigh front end of car (with total load carried at time of complaint, and with vehicle level). If weight exceeds 3200 lbs., heavy duty springs are indicated. These springs, Part No. 1460998 are available for service replacement. *NOTE—Heavy duty Rear Springs, Part No. 1460931 are also available if rear end weight exceeds 3900 lbs., under the same conditions as above.*

►*1954 KINGPIN LUBRICATION FITTING INTERFERENCE CORRECTION (Fitting Strikes Steering Knuckle Support and is Damaged):* If difficulty is encountered getting grease through this fitting, remove the fitting and counterbore the original tapped hole to a depth of 3/32"-1/8", using a ½" drill ground at 140° included angle. Run a ¼"-28 tap through to clean the threads, then install a new fitting.

►*1955 FRONT WHEEL BEARING NOISE CORRECTION:* On cars between Engine No. 33512 and 34344, there is the possibility that oversize bearing cones were installed. Check bearing cone to shaft clearance as the oversize cone will have in excess of 1/32" clearance.

►*1955 EL DORADO FRONT & REAR SPRING PRODUCTION CHANGE:* At Engine No. 41150 the overall height of the Eldorado has been lowered 1" by the use of different springs, as follows: No. 1461008 (Front), No. 1460932 (Rear).

►*1955 STABILIZER LINK PRODUCTION CHANGE & INSTALLATION CAUTION:* At Engine No. 70000, a shorter link (6⅜"), and spacer (2½") replaced the early link (7"), and spacer (3⅛"). Either the short or long link may be used but it is important that links on both ends of the front stabilizer be of the same length.

►*1955 FRONT COIL SPRING PRODUCTION CHANGE:* Later cars do not have a spring lower insulator and the front springs have been increased slightly in length. When installing the later type front spring, the lower insulator should be discarded.

►*FRONT SPRING NOISE CORRECTION:* If click, scrape or grind noted (particularly on low speed brake application) correct as follows:

Seating Spring in Upp r Seat—Drive car at moderate speed and apply brakes sharply (will cause spring to center itself in upper seat) or use pry bar to push upper end of spring onto its seat.

Insufficient Clearance at Lower Cross-Member flanged opening—After spring seated properly, check clearance between spring and lip of flanged opening in lower cross-member. Correct by bending lip on flange (CAUTION—do not use heat and bend lip only in area where contact occurs).

DESCRIPTION: New design independent "parallelogram" type with coil springs and direct acting shock absorbers mounted independently of upper control arm. Upper control arm is new design mounted on frame bracket shaft in same manner as lower control arm. Shock absorbers can be removed and installed without disturbing upper control arm assembly.

ADJUSTMENT: Before making adjustments, check tire pressures (see data below), front wheel bearing adjustment, check for run-out and high spots (3/64" maximum in each case), wheel and tire balance, and spring height. Make certain that entire suspension system operates freely without binding or excessive play, place wheels in straight-ahead position and see that car is at curb weight. Then check and adjust following points in order:

Tire Inflation—(60S, 61, 62) 24 lbs. front and rear, (75) 28 lbs. front and rear, (86 Comm'l) 24 lbs. front, 30 lbs. rear.

Full Spring Height—See that car is at curb weight (full tank of gasoline, no load in trunk or car), normalize spring position by working bumper up and down and release slowly so that car assumes normal position. Then check distance from center of front lower rivet on rubber bumper bracket on frame to top surface of lower control arm spring seat directly below this rivet. Correct heights are listed in table below and should be equal on both sides of car within ⅜". Correct height by installing shim between bottom of spring and spring seat on low side of car or replace springs. See Spring data.

►***CAUTION—Do not replace springs to correct excessive height during first 2000 miles (springs settle considerably during this period).***

1950-53 Front Spring Heights

Car Model	Spring Height
60S, 61, 62 Sedan	4¾-5½"
75 Sedan	5⅜-6⅛"
86 Comm'l	5⅜-6⅛"

1954-55 Front Spring Heights

Car Model	Spring Height
All Models (Exc. 75 & 85)	4½-5¼"
75	5 3/8-6 1/8"
85 (Commercial)	5½-6¼"

Rear Spring Height—Measure at point 3¼" forward from center of lower rivet in frame side bar above rear axle (make chalk mark on frame at this point). Measure vertical distance from top of spring U-bolt to chalk mark on frame. Correct height as listed in table below and should be equal on both sides of car within ½".

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1950-55 CADILLAC (C nt.)

1950-53 Rear Spring Heights

Car Model	Spring Height
60S, 61, 62 Sedan	5¾-7⅛"
75 Sedan	6-7½"
86 Commercial	6-7½"

1954-55 Rear Spring Heights

Car Model	Spring Heights
All Models (Exc. 75 & 85)	8¾-9½"
75	10-10¾"
85 (Commercial)	9 5/8-10 3/8"

Front Wheel Run-out—Mark point of maximum run-out on tire, turn wheel so that this mark is at front or rear when checking Caster and Camber, at top or bottom when checking Toe-In and Toe-Out.

Kingpin Inclination: 5°51' crosswise, all models.

Caster: 0°±½° (Neg. ½° to Pos. ½°) (1950-53), 0° to Neg 1° (1954-55). Must be equal on both sides of car within ½°.

Adjustment—Loosen clampscrew in upper end of knuckle support, use special wrench, Adjusting Tool KMO-366 or J-4691 (see Tool Note), to turn eccentric bushing on pivot pin. (NOTE—hexagonal head on bushing for wrench engagement located at rear end of bushing on early 1950 cars, front end on later cars). Turn eccentric bushing in complete turns only until correct caster secured, tighten clampscrew.

►**Adjusting Tool Note**—KMO-366 is special thin open-end wrench, J-4691 is special "crow-foot" wrench with square drive opening and can be used on all cars (regardless of bushing head location).

►***CAUTION—Camber will be disturbed unless bushing rotated in complete turns only.***

►***ADDITIONAL RANGE OF ADJUSTMENT***—If correct caster cannot be secured within limits of eccentric bushing rotation, additional range of adjustment can be secured by disconnecting lower support arm inner mounting shaft at frame cross-member and turning shaft in the arm (moving shaft to rear will increase positive caster).

Camber: 0°±⅜° (Neg. ⅜° to Pos. ⅜°) and equal on both sides of car within ½° (1950-53). Pos. 3/16° on left wheel, Neg. 3/16° on right wheel desired with limits Neg ⅜° to Pos ⅜° and ¼° to ½° more positive camber on left wheel (1954-55).

Adjustment—Same as for Caster (above). Turn eccentric bushing not more than ½ turn in either direction from point where correct caster is secured.

►***CAUTION—Entire range of camber adjustment secured in ½ turn of the eccentric bushing.***

Toe-In: 1/32-3/32" (1950-53), 3/16-¼" (1954-55) with car at rest. Check with wheels in straight-ahead position and point of maximum wheel run-out vertically up or down

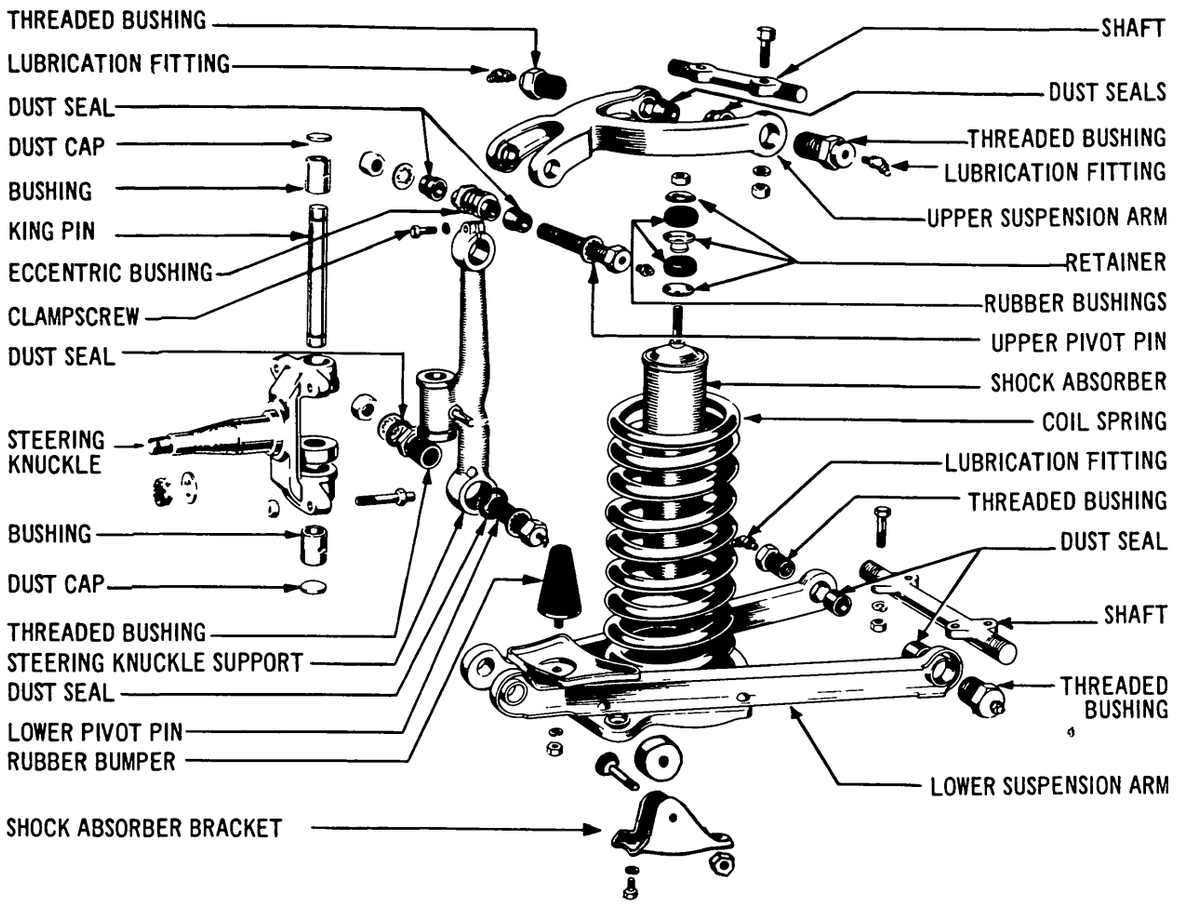
Adjustment—Loosen clampscrews and turn Adjuster at outer end of each tie-rod equally (turning adjuster in direction of forward wheel rotation will decrease toe-in). Tighten clampscrews.

►***CAUTION—Open side of adjuster clamps must be over open side of adjuster when clampscrews tightened.***

Toe-Out on Turns: With outer wheel turned 20°. Inner wheel should be turned as follows:

1950-53 Series—	Left Turn	Right Turn
60S, 61, 62	25°25'	24°42'
75, 86	24°7'	23°6'

1954-55 Series (All)—With outer wheel turned 20°, inner wheel should be 22°40'.



1950-55 CADILLAC FRONT SUSPENSION

SHOCK ABSORBER REPLACEMENT: ***Not necessary to disturb Front Suspension Assembly.*** Remove upper retaining nut, retainer, and rubber grommet from upper spring seat tower in engine compartment (NOTE—use wrench on squared upper stem of shock absorber to prevent it turning while loosening nut). Remove two bolts retaining lower shock absorber bracket on lower face of spring seat on lower control arm, then withdraw shock absorber and bracket assembly through hole in spring seat. Remove lower bracket by taking off retaining nut, grommets and retainers from shock absorber stem.

►**Installation Note**—See illustration for correct assembly of grommets and retainers on shock absorber stem. Use wrench on squared upper stem of shock absorber to prevent unit turning while tightening retaining nuts.

COIL SPRING REPLACEMENT: Support front end of car on jack under center of front cross-member, use second jack under suspension arm to support spring which is being removed. Disconnect front stabilizer link on same side of car. Remove shock absorber (see data above). Remove nut on lower pivot pin, unscrew pin from lower control arm and knuckle support. Lower jack under suspension arm until spring tension relieved, remove jack, lift spring out. Install spring by reversing this procedure.

►**Spring Installation Caution**—Install spring with open (tanged) end upward and seated in upper seat so that tang parallel with raised area on cross-member and visible through correct hole in the cross-member (right front spring tang visible through rear hole, left front spring tang visible through front hole). Hold spring in this position while raising lower suspension arm, drive or pry bottom of spring into its seat on lower arm (will not seat freely with arm lowered and spring fully extended).

FRONT STABILIZER REMOVAL & INSTALLATION: Disconnect link by removing nut on lower end and withdrawing link bolt from above (CAUTION—note location of retainers and grommets at upper and lower ends of link and replace in exact same order). Remove bolts from two frame mounting brackets,

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1950-55 CADILLAC (Cont.)

remove stabilizer. Remove rubber bushings from stabilizer brackets and bar (these bushings serviced separately). Install stabilizer by reversing above procedure.

SPRINGS: Part number is stamped on end coil and springs are color-marked for identification.

1950-52 Spring Specifications

Car Model	Part No.	Color Mark
60S, 62 Convt.	1456022	White
61	1456017	None
62 exc. Convt.	1456018	Green
75	1456020	Pink
86 Comm'l.	1456021	Yellow

Spring Height Adjusting Shim—No. 1457838.

1953 Spring Specifications

Model	Color Code	Spring Part No.
6019, 6267①	Tan	1456026
6019, 6219, 37, 37D②	Dark Blue	⑤1456028
6219, 6237, 37D①	Green	1456025
6267S③	Dark Red	1456024
6267S④	Yellow	1460190
7523, 7533①	Purple	1456027
7523, 7533②	Orange	⑤1460188
Commercial Chassis	None	1460189

①—Without Air Conditioner.
②—With Air Conditioner.
③—First 30,871 cars.
④—After 30,872 cars.
⑤—Shim (Part No. 1457838) to be used on right hand side only when equipped with air conditioner.

1954 Spring Specifications④

Car Model	Color Code	Part No.
6019①	Lt. Blue	1460194
6219, 37, & 37D①	Green	1460193
6267, 6267S①	Pink	1460195
6019, 6219, 37, & 37D②	Pink	1460195
7523, 7533①	Purple	1460191
7523, 7533②	Orange	1460192
86	None	③1460189

①—Without Air-Conditioning.
②—With Air-Conditioning.
③—See "FRONT WHEEL RUBBING CORRECTION" above for Heavy Duty Springs available.
④—Spring part number is stamped on an end coil.

1955 Spring Specifications①

Car Model	Early – Part No. – Late
6019②	1460194 – 1461000
6219, 37, & 37D②	1460193 – 1461001
6267, 6267S②	1460195 – 1461002
6019, 6219, 37, & 37D③	1460195 – 1461002
7523, 7533②	1460191 – 1461003
7523, 7433③	1460192 – 1461005
86	1460189 – 1461004
60S, 62 (Heavy Duty)	1460999 – 1461007
86 (Heavy Duty)	1461006

①—Spring part number is stamped on an end coil.
②—Without Air Conditioning.
③—With Air Conditioning.

1941-48 CHEVROLET

All Passenger Car Models (1941-48)

▷EXCESSIVE BUMPING CORRECTION (Cars operated on rough roads or in heavy service): Check front end to make certain that the lower control arm rubber bumpers are in place and replace any missing bumpers. Install heavy duty shock absorbers, or heavy duty front springs (see Springs).

▷SUSPENSION UNIT REMOVAL NOTE—Entire suspension unit assembly (consisting of frame crossmember and both control arm assemblies) may be removed from car as an assembly for overhaul or replacement if desired. See Service data below.

DESCRIPTION: "S.L.A." (short and long arm) type. Shock absorbers are 'parallel cylinder' type (unit with upper control arms).

CHECKING & ADJUSTMENT:—Check first:

Tire Inflation: Check for correct pressures before checking front end specifications:
Std. 6.00x16 Tires (Front) 26 lbs. (Rear) 28 lbs.
Optl. 6.70x15 Tires (Front & Rear) 24 lbs.

Wheel Runout—Check and adjust front wheel bearings. Check wheel for tire and rim runout and eccentricity. Mark tire midway between high and low spots (mean point) and place this mark at top (vertically) when checking Camber, at side (horizontally) when checking Toe In.

Frame Height—Install special gauges at front and rear ends of car to level frame when checking or bounce car up and down several times to insure that it is in normal position. See Spring data for spring height check to detect sagging or unequal springs.

NOTE—Make all checks with car weight on wheels

Kingpin Inclination:—4¾° plus or minus ½°.

Caster:—0° plus or minus ½°. Adjusted by turning knuckle support eccentric upper pivot pin (same adjustment same as for Camber (below).

Camber:—Neg. ⅛° ± ½° (wheel tilts in at top).

Adjustment—Remove lubricant fitting on knuckle support upper pivot pin front bushing, loosen clamp bolt in upper end of knuckle support which clamps pivot pin. Insert ⅛" Allen wrench through lubricant fitting hole in bushing to engage pivot pin, turn pivot pin clockwise to increase caster, counter-clockwise to decrease caster (pin is eccentric and this same movement will change Camber from minimum to maximum every half turn of the pin) until both caster and camber are correct within limits given above, tighten clamp bolt and replace lubricant fitting. One half-turn of pivot pin will change caster angle 39' and change camber angle from 0° to 1°2' depending upon position of pin.

Toe-In: (1939-42) 0" to 1/16" (1946-48) 0" to 1/8".

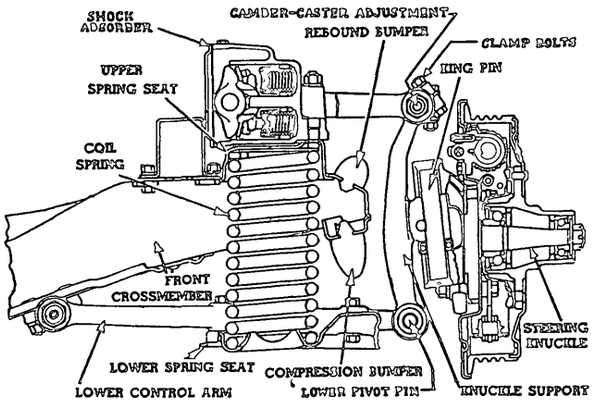
Adjustment—Loosen the clamp bolt at each end and turn left hand (short) tie rod. When tightening clamp bolts, make certain that both tie rod ends are in alignment with the ball studs.

NOTE—Right hand (long) tie rod is not adjustable.

Steering Geometry (Toe out on Turns)—Outer wheel turned in 20°, Inner wheel turned 24° plus or minus 2°. Not adjustable (replace steering arm).

SERVICING: Suspension Unit Assembly Removal—Remove Front Fenders, Radiator, and Radiator Grille Assembly as a unit (see Chevrolet Shop Notes Car Model Section for data). Remove front bumper disconnect stabilizer from frame horns, remove pitman arm from steering gear. Take out bolts holding front cross-member to frame side rails, slide suspension unit assembly off over frame side rails at forward end. Install in same manner.

Upper Control Arm Pivot Pin:—To remove pin, raise car with chain hoist, place jack under spring seat so that it takes weight of car, remove wheel and tire assembly. Unscrew rear (threaded) bushing, remove front bushing clamp bolt, remove bushing. Loosen clamp bolt in upper end of knuckle support, unscrew pivot pin (use Allen wrench).



Assembly—Place Neoprene seal over end of each upper control arm (so seals will be out of the way while installing pivot pin). With knuckle in upper arm yoke, enter pivot pin through eye in control arm and screw pin in knuckle support (with Allen wrench socket hole in pin toward front of car) until larger diameter center section is centered in knuckle support. Hold knuckle support centered in control arm, thread rear bushing in control arm eye and on pivot pin, tighten bushing securely and make certain that support still centered in control arm yoke. Screw front bushing in on pivot pin until clearance between head of bushing and face of control arm is .020-.040". Use a wire hook to pull Neoprene bushings down over the ends of control arm so that they seat on pivot pin. Install front bushing clamp bolt. Adjust Caster and Camber (see instructions above).

Lower Control Arm Pivot Pin:—To remove, raise car install jack stand under inner side of lower spring seat, remove wheel and tire assembly, unscrew pivot pin (use socket wrench, remove pin through front arm), turn wheel to extreme outward position (will prevent knuckle support moving out at bottom), install block between upper control arm and cross-member to raise lower end of knuckle support clear of control arm yoke, unscrew bushing.

Assembly—Screw bushing securely in knuckle support from front end. Place new Neoprene seal on end of front lower control arm (so that it will be out of the way while installing pivot pin), place second seal on exposed end of bushing at rear of knuckle support. Thread pivot pin through front control arm, knuckle support bushing, and rear control arm while holding knuckle support centered in control arm yoke (if threads on pin and control arms do not index correctly, use 'C' clamp to compress arms slightly until pin enters rear control arm). Tighten pin securely. Pull Neoprene

CONTINUED ON NEXT PAGE

1941-48 CHEVROLET (Cont.)

seals down so that they are seated on pivot pin.

Lower Control Arm Shaft (Frame Support):—To remove, disconnect stabilizer link at lower spring seat, remove front spring (see Spring Removal below), remove lower control arm pivot pin (see directions above), remove lower control arm assembly. Place assembly in vise, remove front and rear control arm shaft bushings. Take out two bolts mounting front control arm, remove arm and shaft.

Assembly (1939-40)—Install retainer cups on ends of shaft with cupped shaped ends out, install new Neoprene seal on shaft next to each retainer, install shaft in control arm assembly with letter 'F' (forged on one bracket) toward front of car, bolt front control arm securely to spring seat (screw pivot pin through both control arm eyes first to maintain alignment while spring seat bolts are being tightened). Hold shaft centered between control arms, screw front and rear bushings on shaft and in control arms, tighten bushings securely.

Assembly (1941-48)—Install Neoprene seal on end of shaft so that seals seat in recess at shoulder on shaft, install shaft in control arm assembly with letter 'F' (forged on one bracket) toward front.

Front Stabilizer Shaft:—To remove, disconnect links by removing nut on upper end of link bolts and withdrawing bolts, then remove bolts from frame mounting brackets. To install stabilizer, make certain that steel spacer installed between frame and bracket, bolt bracket loosely to frame, install links, tighten bolts only with car weight on wheels.

SPRING HEIGHT CHECK: To check spring height, insert steel scale inside spring with upper end of scale against center of upper spring seat, place straight edge diametrically across lower face of lower spring seat (line straight edge up with drain hole in seat). Reading on scale at straight edge should be 9 29/32" plus or minus 1/16" on 1946-47 cars.

Spring Height Correction—Spring height can be increased by installing **not more than two Part No.** 599810 Front Spring Shims between top of spring and upper spring seat. These shims are 1/16" thick.

SPRINGS:—**Removal**—Disconnect stabilizer link from lower spring seat, support weight of car on stand jack at inner side of lower spring seat, remove cotter pins and nuts from lower control arm shaft bracket bolts, drive out bolts and install long drift punch through bolt hole in bracket and cross-member to maintain alignment, raise car with chain hoist to remove spring pressure. Remove jack from beneath lower control arm allowing control arm and spring seat to drop down to free spring.

Assembly—Make certain that spring installed with ground end (flat surface) up and that lower end-coil of spring fits in recess in spring seat. Reverse removal directions given above.

Heavy Duty Springs—Use only for severe operation. Will prevent spring bottoming and provide more clearance at front end. Install No. 5245543 to correct severe bumping, No. 5246233 in extreme cases.

Spring Specifications

Car Model	Color Mark	Part No.
1941-48	Green	3664086
1941-48 (Heavy Duty)	Black	3694210

Spring Shim Note—To compensate for variation in springs, one shim should be used with all springs marked by green dot on top coil, two shims with springs marked by yellow dot on top coil.

1949-54 CHEVROLET

All Passenger Car Models (1949-54)

►**FRONT SUSPENSION UNIT ASSEMBLY REMOVAL:** Entire assembly is mounted on special cross-member bolted to frame side rails and can be removed as a unit for servicing and overhaul by taking out these mounting bolts.

►CHANGES, CAUTIONS, CORRECTIONS

►**LOWER CONTROL ARM ASSEMBLY PRODUCTION CHANGE:** Two types of arms used on 1949 cars can be identified as follows:

First Type—Does not have re-inforced control shaft bushing hole at inner end. Special bushings and locknuts must be used with this arm.

Later Type—Has welded re-inforcement plate on inner face of arm at each control shaft bushing hole (locknuts not used with bushings with this type arm). Replacement arms have burnished threads for bushings and control shaft used with this arm has thread starts matched with those in arm.

NOTE—Second type control shaft can be used with first type control arm and bushings but other parts are not interchangeable.

►*REPLACEMENT PARTS PACKAGE CAUTION*—Different parts packages required for cars with each type control arm as follows:

Service Pkg. No. 3690685
(For First Type Control Arm)

Lower Control Arm Shaft	3687664
Shaft Bushing (2 used)	3687638
Bushing Locknut (2 used)	3687637
Bushing Seal (2 used)	599180

Service Pkg. No. 3693459
(For Later Type Control Arm)

Lower Control Arm Shaft	3691468
Shaft Bushing (2 used)	3691454
Bushing Seal (2 used)	599180

►**UPPER CONTROL ARM SHAFT PARTS & INSTALLATION CHANGE (To correct loosening of shaft in spring tower):** Minimum driving torque when installing this shaft has been raised to 75 ft. lbs. (with lubricated threads) to prevent shaft loosening and turning in tower. **If required installation torque less than 75 ft. lbs., install oversize shaft** (.008" Oversize). Shafts can be identified as follows:

Upper Control Arm Shaft

Size	Part No.	①Identification Mark
Standard		Drill Point
.008" Oversize	3693693	"◎" or "+"

①—In "V" section on rear end of shaft.

DESCRIPTION: New design; independent, linked parallelogram type with direct acting shock absorbers, coil springs, and new type upper control arm (not part of shock absorber assembly). Cross-member on which suspension unit mounted has new "tower type" bracket at each end for spring housing, shock absorber mounting, and upper control arm shaft mounting.

CHECKING & ADJUSTMENT: First check entire front end for excessive play and wear, check steering gear adjustment, wheel bearing adjustment, tire inflation pressure (see data below), wheel balance and run-out (run-out should not exceed 1/16"), then place car on level floor and check front end specifications as follows:

Tire Inflation Pressure: For each type tire (Cold): **Pass. Cars** (6.70x15—4 ply)—24 lbs. frt. & rear. **Station Wagon & Sedan Delivery** (6.70x15—6 ply) 26 lbs. front, 30 lbs. rear.

Riding (Spring) Height: Rock car sidewise several times and allow it to settle, then measure vertical distance from center of pivot pin at each end of lower control arm to floor. Difference between these two measurements should be 1⅝" ± ¼". If difference between measurements less than this amount, or if unequal on both sides of car, install spring shims or replace springs (see Spring data).

Kingpin Inclination: 4° ± ½° crosswise.

Caster: Pos. ½° ± ½°.

Adjustment—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting from rear bushing at outer end of upper control arm, insert Allen wrench through hole, turn pivot bolt until exact caster setting secured, then adjust camber.

►*CAUTION—Caster adjustment will change camber unless pivot bolt rotated in full turns only.*

Camber: Pos. ½° ± ½°.

Adjustment—After adjusting Caster (above), rotate pivot bolt not more than ½ turn in either direction to secure correct camber. Entire range of adjustment is secured in ½ turn of the pivot bolt.

Toe-In: 0-1/8" (1949-52), 1/4"±1/16" (1953), 1/8"± 1/16" (1954).

Adjustment—Loosen clamp bolts at each end of **left hand tie rod** and turn rod (right hand tie rod is one-piece non-adjustable type), tighten clamp bolts to 8-12 ft. lbs.

►*CAUTION—Align tie rod ends before tightening clamp bolts (ball studs will bind if not aligned).*

Toe-Out on Turns: With inner wheel turned 20°, outer wheel should be turned 17°40'. No adjustment, replace steering arm if incorrect.

SHOCK ABSORBER REPLACEMENT: *Not necessary to disturb Front Suspension Assembly.* Remove nut on shock absorber upper threaded end while holding stem from turning with ¼" wrench (this nut located on top of spring housing tower), lift off grommet retainer and grommet. Remove nut and lockwasher from shock absorber lower mounting bracket stud (on underside of lower spring seat), lower shock absorber and mounting bracket assembly down and out through hole in spring seat.

►**Installation Note**—When installing rubber grommet assemblies on shock absorber threaded ends, hold end from turning with a ¼" open-end wrench, tighten nut on stem until it bottoms on shoulder. This will provide correct compression of grommets.

COIL SPRING REPLACEMENT: Disconnect stabilizer link at lower control arm bracket, remove shock absorber on side on which spring being removed. Support car on jack stands placed under frame side rails. Place hydraulic jack under lower control arm inner shaft, remove nuts and lockwashers from

CONTINUED ON NEXT PAGE

1949-54 CHEVROLET (C nt.)

control shaft bracket bolts, drive out bolts, lower arm slowly to relieve spring pressure, lift spring out (CAUTION—remove all shims used with old spring). Install spring by reversing this procedure.

►**Spring Installation Caution**—Service replacement springs are checked for height and are furnished with necessary shims wired to the spring.

►***CAUTION—These shims must be installed on top of the spring to insure correct riding height of the car.***

LOWER CONTROL ARM REPLACEMENT: Lower control arm assembly must be removed from the car for replacement of arm, inner shaft, or shaft bushings. Other operations can be performed without removing the assembly.

Removal—Remove wheel and tire assembly, remove front spring (see Coil Spring Replacement), disconnect tie rod from steering arm, remove nut on forward end of lower control arm pivot bolt, unscrew pivot bolt, lift control arm assembly out.

1st. Type Lower Control Shaft & Bushing Installation: Hold control shaft in vise, place new seals on each end of shaft (push seals onto shaft shoulders to permit bushing installation), install bushing locknuts on shaft ends with chamfered side of nuts out toward ends of shaft. Position control arm on shaft, thread bushings on shaft and through control arm, turn locknuts loosely on bushing ends. Install Lower Control Arm Assembly Gauge J-3184 on shaft within arm (tool pin should index with bolt hole in shaft), tighten bushing until inner face of arm contacts end of gauge. Tighten locknut securely, then hold locknut with wrench and tighten bushing to 150-200 ft. lbs. using a torque wrench. Slip seals off shaft shoulders and down into their seats.

Later Type Lower Control Shaft & Bushing Installation: Hold control shaft in vise, place new seals on each end of shaft (push seals up onto shaft shoulders). Position control arm on shaft using a scale to center arm on shaft (CAUTION—Gauge J-3184 cannot be used due to welded re-inforcement plate on inner face of arms). Thread bushings on shaft and into control arm making certain that threads on bushing index with threads in arm and engage properly. Tighten bushings to 85-100 ft. lbs. using a torque wrench. Slip seals down into place.

Lower Pivot Bolt & Bushings: Bushing in lower end of knuckle support should be installed from rear-to-front and tightened to 150-170 ft. lbs. Place new seals over exposed ends of bushing, position control arm so that knuckle support is centered in outer end of arm, start pivot bolt through arm from rear-to-front, thread bolt through knuckle support bushing using care not to disturb centered position of support in control arm, continue to screw pivot bolt in and through opposite eye of control arm until bolt head firmly contacts rear face of arm (NOTE—If bolt threads do not index properly with threads in opposite eye of arm, use "C" clamp to compress ends of arm slightly until threads index and bolt can be turned through arm freely). Tighten pivot bolt to 100-200 ft. lbs., then install locknut on end of bolt and tighten nut to 90-120 ft. lbs. Use wire hook to slip seals down off ends of bushing into their seats.

UPPER CONTROL ARM REPLACEMENT: Control arm should be assembled on control shaft in crossmember tower bracket and checked for free movement throughout entire range before connecting knuckle support.

Removal—Support car on jack stand placed under lower spring seat (to keep spring compressed and lower control arm in place), remove wheel and tire assembly. Take out lubricant fitting in rear bushing at outer end of control arm, unscrew both front and rear bushings from arm, remove seals from pivot pin ends. Take out clamp bolt in upper end of knuckle support, slide pivot pin out (use ¼" Allen wrench in pin recess to assist in removal), swing knuckle support out and free of upper control arm. Unscrew front and rear bushings from control arm at inner control shaft (NOTE—On left side of car, remove sheet metal splash guard over steering gear housing for access to rear bushing), lift control arm off shaft. To remove shaft from frame bracket, use Remover & Replacer Tool J-2958 and pull shaft out toward front of car.

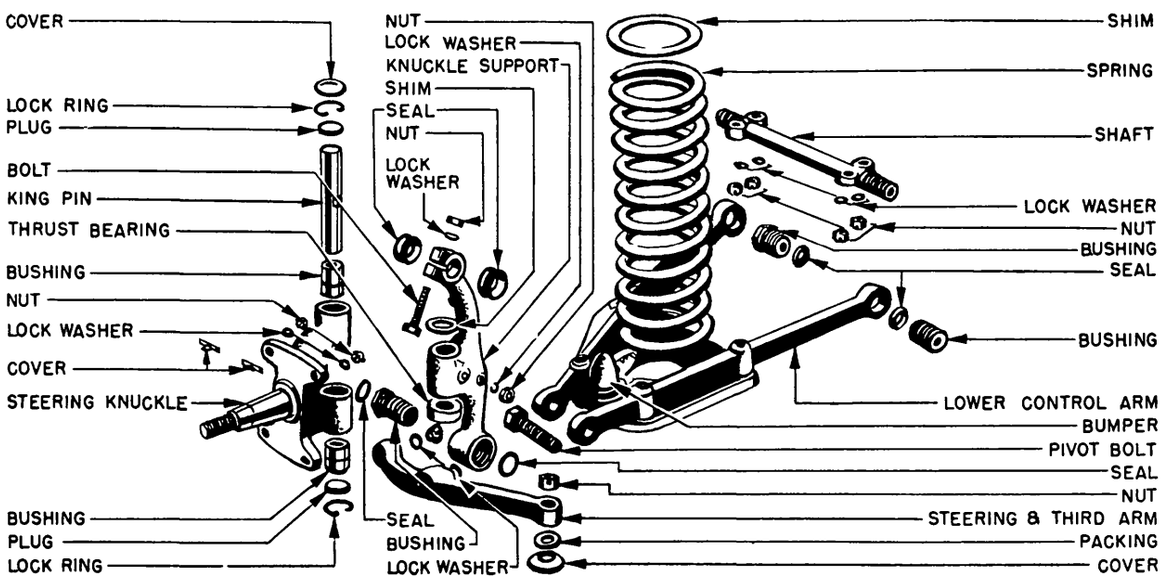
►**Replacement Control Arm Note**—Arms furnished with threads in bushing holes slightly undersize to insure snug bushing fit when new arm installed.

►**Replacement Control Shaft Note**—New shafts are marked by "F" on end to insure correct installation ("F" end toward front of car) and diameter of threads which screw into spring housing tower are oversize to insure correct fit (CAUTION—these threads must be lubricated when installing new shaft to avoid tearing threads). *See "Upper Control Arm Shaft Parts & Installation Change" data for shaft sizes and installation precautions.*

Upper Control Shaft & Bushing Installation: Lubricate threads on new shaft to avoid tearing during installation, see that shaft end marked "F" (larger diameter end) toward front of car, use Remover & Replacer Tool J-2598 to install shaft from front-to-rear of spring housing until rear end projects exactly 1⅛" back of housing (CAUTION—Do not back shaft out which will leave shaft loose in housing—rear end is smaller diameter and threads are tapered). Install new seals on ends of shaft, position control arm on shaft using a scale. Lubricate the bushing inner and outer threads, start both front and rear bushings on shaft and into arm (CAUTION—see that control arm not moved out of position more than necessary to start bushing threads—see Caster Adjustment Caution below), turn bushings in until head seats against arm, then tighten bushings to 30-40 ft. lbs. (CAUTION—this is new specification to prevent stripping of threads and distortion and binding of arms). See that seals seated on their seats, install lubricant fittings in bushings, lubricate arm. Check installation for free movement throughout entire range with rubber bumper removed (arm should fall of own weight).

►**Caster Adjustment Caution**—The thread starting points for control arm and shaft are not controlled and it may be necessary to move arm out of centered position by ½ thread pitch or 3/64" to start bushings in arm. This will require correction by Caster Adjustment after suspension assembly completed.

Upper Pivot Pin & Bushings: Position control arm on upper end of knuckle support, install pivot bolt through arm and knuckle support with Allen wrench hole toward rear of car, center bolt in support, install lock bolt in support and tighten to 30-35 ft. lbs. Place new seal on each end of pivot bolt. Lubricate both inner and outer threads of bushing. Thread front bushing on pivot bolt, center knuckle support in arm, thread bushing into arm (CAUTION



1949-54 CHEVROLET FRONT SUSPENSION

CONTINUED ON NEXT PAGE

1949-54 CHEVROLET (Cont.)

—carefully index threads on bushing and arm and see that support does not move out of centered position when starting threads in arm). Install rear bushing similarly. Screw both bushings in until heads seat against arm, then tighten bushings to 30-40 ft. lbs. (CAUTION—this is new specification to prevent stripping of threads and distortion and binding of arms).

KINGPIN BUSHING REPLACEMENT: ***Not necessary to remove knuckle support from car (bushings are "floating" type).*** New bushings are machined to finished size and do not require reaming.

Removal—Support car with jack under lower spring seat, remove wheel and tire assembly. Remove kingpin lock pin, upper bearing plug cover, upper and lower lock rings, and lubrication fittings. Drive sharp drift punch through lower plug, drive kingpin up until upper plug is forced out, then drive kingpin down and remove from below. Lift off steering knuckle and thrust bearing, remove floating bushings from knuckle support.

Installation—Install new bushings in knuckle support (CAUTION—oil grooves in bushing must line up with lubricant fitting hole in knuckle and bushings must be free in knuckle support and on kingpin). Install thrust bearing between lower yoke of steering knuckle and support with shield on bearing upward, install kingpin from below lining up lockpin slot with hole in support. Check knuckle endplay with a feeler gauge, install steel shim between support and top of steering knuckle if this clearance exceeds .006". Install kingpin lock pin, bearing plugs, lock rings, and bearing plug cover.

SPRINGS: Springs have one end ground flat which should be placed at top with shim (when used) between top of spring and spring seat in cross-member. Lower end is not ground and should be fitted in recess in spring seat on lower control arm.

1949-52 Spring Specifications

Model	Color Mark	Part No.
1949 (All)	Yellow	3694612
1950-52 (Convt.)	Black	3694210
1950-52 (Other Synchro-mesh)	Yellow	3694612
1950-52 (Powerglide)	Black	3694210

1953-54 Spring Specifications

Model	Color Mark	Part No.
Convertible	Black	3703787
Others (Synchro-mesh)	Black	3703788
All-Powerglide	Black	3703787

Spring Height Correction—If spring height too low (riding height less than 15⅜"), install not more than two 599810 Shims (1/16" thick) on top of spring.

►*CAUTION*—If more than two shims required to secure correct riding height, replace spring (additional shims will cause spring coils to bottom before rubber bumper on lower control arm stops arm.

►*REPLACEMENT SPRING CAUTION*—Shims furnished with new springs (wired to spring) must be installed with the spring (riding height will not be correct if shims omitted).

1955 CHEVROLET

Chevrolet Passenger Cars (1955)

DESCRIPTION: Front suspension utilizes short and long arms with spherical type joints connecting control arms and steering knuckles. Coil springs and direct acting shock absorbers are mounted between spring seats on lower control arms and spring pockets in front cross member. Inner ends of upper and lower control arms are mounted on rubber torsion bushings which, in turn, are on forged steel shafts bolted to front cross member (no lubrication required).

ADJUSTMENT: Before making adjustments of front suspension steering geometry check for following: Loose or improperly adjusted steering gear, steering gear housing loose at frame, play or excessive wear in spherical joints, loose tie rod or steering connections, improper front spring heights (see below), underinflated or unbalanced tires, wheel bearings improperly adjusted, shock absorbers not operating properly. *Make adjustments at curb weight.*

Caster & Camber: Caster should be 0°±½°, camber Pos. ½°±½°. Adjustments made by means of shims between upper control arm inner support shaft and support bracket attached to frame side rail. Shims may be changed at either front of shaft or rear of shaft to change caster, or at both points equally to change camber. Addition of shims at front bolt or removal of shims at rear bolt will decrease positive caster. A 1/32" shim difference will change caster ¼°. Adding shims at both front and rear of support shaft will decrease positive camber. A 1/32" shim change will move camber 1/6°. To adjust, loosen upper support shaft-to-bracket bolts, add or remove shims as required, tighten bolts. (*NOTE*—Both caster and camber can be adjusted in one operation).

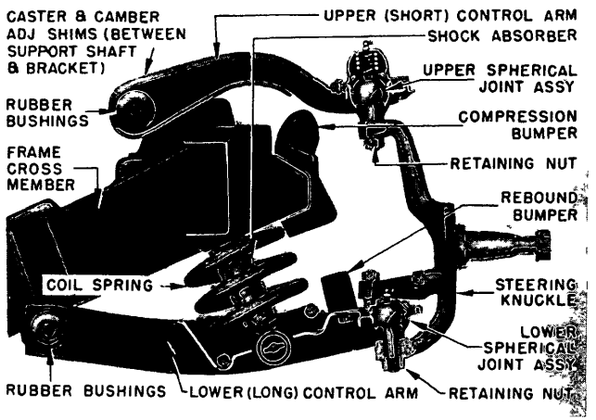
Steering Axis Inclination: Correct steering axis inclination should be Pos. 3½° plus or minus ½°. The addition of camber and steering axis inclination should be Pos. 4° plus or minus ½°. If not within these limits, knuckle is bent and should be replaced. If new knuckle installed, caster, camber, and toe-in must be readjusted.

Toe-In: 1/8-3/16". Adjust by loosening clamp bolts at each end of each tie rod and turning each tie rod equally to increase or decrease as necessary.

Toe-Out on Turns: Not adjustable. With outside wheel 20°, inside wheel should be 22½° plus or minus 2°. If not within these limits, replace steering arm on wheel side that does not come within limits.

Coil Spring Height: Not adjustable. To check, position car on smooth, level floor. Bounce and rock car several times and allow it to settle to normal height. Measure distance from floor to center of front inner pivot of lower control arm. Record this measurement. Measure distance from floor to lower face of lower steering knuckle boss for spherical joint on same side of vehicle. Record this measurement. Difference between these two measurements should be 2½-3", with vehicle at curb weight. Measure opposite side of vehicle in same manner. It is essential that the two differences be close. To correct height, springs must be replaced. *NOTE*—These springs do not have flat ends and shims should not be used.

FRONT SHOCK ABSORBER REPLACEMENT: With ¼° open end wrench, hold upper stem from turning and remove upper stem retaining nut, grommet retainer and grommet. Remove two bolts retaining lower shock absorber pivot to lower control arm and pull absorber assembly and mounting out at bottom of spring housing. Inspect rubber grommets and, if necessary, replace. To install, place rubber grommet retainer and grommet on upper stem of shock absorber and install shock absorber up through lower control arm and spring housing. Index upper stud through mounting hole in top of spring housing. Install retainer nut to upper shock absorber stem and holding stem with ¼" wrench, tighten nut until it bottoms on shoulder of stem. Tighten to 4-6 ft. lbs. torque and stake in place. Install pivot bolts through lower pivot to lower control arm and tighten securely.



1955 CHEVROLET FRONT SUSPENSION

FRONT SPRING REPLACEMENT: Remove front shock absorber on side spring to be replaced (see above). Raise front end of car off floor and place stand jacks under frame side rails. Lower car on jacks. Remove tire and wheel assembly (*NOTE*—To avoid damage to spherical joints during spring operations). Remove four lower control arm cross shaft bushing bolts. Install Spring Compressor J-5817 through shock absorber mounting hole in front cross member and through spring. Install plate, thrust washer and nut and tighten to slightly compress spring. Remove lower spherical joint cotter pin and nut. Loosen stud by hammering on side of steering knuckle joint boss, backing up steering knuckle with heavy hammer. Remove upper spherical joint stud from knuckle in similar manner, and hang drum and knuckle assembly without loading brake hose. Remove four lower control arm inner shaft-to-cross member nuts and bolts. Unscrew spring compressor nut and remove spring. To install, reverse removal procedure. Rotate spring to make certain it fits helical seats in both cross member and lower control arm.

LOWER CONTROL ARM SPHERICAL JOINT, CROSS

CONTINUED ON NEXT PAGE

1955 CHEVROLET (C nt.)

SHAFT OR BUSHINGS REPLACEMENT: Remove lower control arm (See Front Spring Removal above).

Sph rical Joint R placement: Chisel or drill heads of rivets retaining spherical joint to control arm and drive out rivets Discard spherical joint and seal Install new joint with flange against underside of control arm and retain joint in place with special bolts and nuts supplied with new joint. *CAUTION*–Use only alloy bolts supplied for this operation

Cr ss Shaft r Bushing R placement: Remove bolt, lock lockwasher and collar from each end of cross shaft Install three-piece spacer of J-5888 Bushing Remover and Installer in control arm. Thread a 7/16"-20 capscrew (furnished with J-5888) to bottom of threads in one end of cross-shaft. Support control arm in an arbor press, on support detail of Tool J-5888. (*CAUTION*–Be sure bushing flange does not contact support). Press on capscrew until bushing is free of control arm. Discard bushing. Remove capscrew, insert capscrew in other end of shaft and repeat above operation. To install, coat outside sleeve of bushing sparingly with a lubricant (*CAUTION*–Avoid getting lubricant on rubber bushing). With cross-shaft in control arm and three-piece spacer in place, place control arm on support Hand start bushing into control arm and over end of cross-shaft (*CAUTION*–End of shaft with greatest distance from end of shaft to bolt holes should be toward front of control arm). Install collar of Tool J-5888 over bushing. Be sure three-piece spacer is not over-lapping bushing holes in control arm Press bushing into control arm until flange contacts control arm. Invert arm in press, and repeat above operation on other bushing. After installation, cross-shaft should be able to be rotated by hand. Install collar, lockwasher, and capscrew in each end of cross-shaft but do not tighten.

L w r C ntr l Arm Installation: See "Front Spring - Installation" above. Tighten bushing collar bolts to 45-55 ft. lbs.

UPPER CONTROL ARM SPHERICAL JOINT, CROSS-SHAFT OR BUSHINGS REPLACEMENT: Support vehicle weight at outer end of lower control arm. Remove wheel and tire assembly. Remove cotter pin and nut from upper control arm ball stud. Loosen stud by hammering on side of steering knuckle joint boss, backing up knuckle with heavy hammer. Remove two nuts retaining upper control arm shaft to front crossmember. *Note number of shims at each bolt.* Remove upper control arm from vehicle.

Sph rical J int R plac ment: Same as spherical joint replacement for lower control arm (above), except that flange of joint is installed on topside of upper control arm and a shield is installed around joint on underside of control arm.

Cr ss-Shaft r Bushing R placement: Same as cross-shaft and bushing replacement for lower control arm, except that one-piece spacer instead of three-piece spacer of Tool J-5888 used and 3/8"-24 capscrew (furnished with J-5888) instead of 7/16"-20 capscrew.

Upp r C ntr l Arm Installati n: Reverse removal procedure. Tighten bushing collar bolts to 35-40 ft. lbs

1946-55 CHRYSLER, DE SOTO, DODGE, PLYMOUTH

All Models (1946-55)

►CHANGES & CORRECTIONS

►*1952 FRONT WHEEL SHIMMY CORRECTION (Power Steering Cars): Upper needle bearing in steering knuckle must be removed and replaced with bushings, as follows.*

Cars With Conventional Brakes–Remove needle bearing assembly in upper boss and install bushing Part No. 1483005 (C51 & C55), Part No 871297 (C52, C53, C54) Install bushing with wide open end of lubrication groove toward welch plug Alteration of bushing not required.

Cars With Disc Brakes–Remove steering knuckles, (*CAUTION*–Do not remove disc brakes as an assembly). Separate housing and remove pressure plate assembly. Press needle bearings from upper boss of knuckles. Install bushing Part No. 1408012. *NOTE*–If bushing Part No. 1408012 not available, use Part No. 871297 and rework by removing 5/32" from end of bushing having open end lubrication groove. Remove 1/8" from opposite end. Do not remove entire 9/32" from one end.

DESCRIPTION: Independent "Parallelogram" type with coil springs. 1955 Models have shock absorbers mounted inside front springs.

CHECKING & ADJUSTMENT: Before adjustments made, check wheel and tire balance and run-out, front wheel bearing adjustment and king pin bushing clearance, steering gear adjustment, and shock absorbers. See that springs and shock absorbers in normal position (grasp bumper and work front end of car up and down several times). Then check following points first:

Front Spring Height: With car on level floor, tires inflated to recommended pressure, measure vertical distance from inner and outer ends of lower control arm to floor (center of control arm pin at outer end, center of grease fitting in control arm pivot bar on inner end). See table below for allowable variations. Make measurements at right and left sides of car and compare. If the measurements differ more than ¼', check each front spring for correct installation at top and bottom If springs are correctly installed and measurements made at left and right sides still differ by more than ¼", insert spacers at top of spring between seat and silencer *If more than two spacers required to make correction for a spring, replace spring.* If measurements taken above for allowable difference as shown in table below are not within limits, check rear end of car for unequal spring heights by measuring from spring plate to frame on each side (front spring height will be affected if rear spring heights differ more than ¾")

►*NOTE*· In the following table a plus (+) sign indicates the inner end of lower arm is higher than outer end and a minus (-) sign indicates that it is lower.

CHRYSLER	All wabl Diff renc
1946-48 (All Models)	+1½" to -0"
1949 C45	+¾" to -¾"
1949 C46	+0" to -1¼"
1949 C47	+½" to -1½"

CHRYSLER (Continued)	Allowable Differenc
1950 C48 (Exc 8 Pass)	+½" to -½"
1950 C48 (8 Pass)	+¾" to -¼"
1950 C49	+¼" to -¾"
1950 C50	+¾" to -¼"
1951 C51 (Exc 8 Pass.)	+¼" to -¾"
1951 C51 (8 Pass)	+½" to -½"
1951-52 C52	-¼" to -1¼"
1951-52 C53	+½" to -½"
1951-52 C54	-¼" to -1¼"
1951-52 C55 (Exc 8 Pass)	+¼" to -¾"
1951-52 C55 (8 Pass)	+½" to -½"
1953 C56 Sedan & Coupe	+½" to -½"
1953 C56 Town & Country, 8 Pass	+¾" to -¼"
1953 C58	+0" to -1"
1953 C59	+¾" to -¼"
1953 C60	+¾" to -¼"
1954-55 C62, C67 (Exc 8 Pass)	+1¼" to -¼"
1954-55 C62, C67 (8 Pass)	+¾" to -¼"
1954-55 C63, C68 Sedan & Coupe	+1" to -0"
1954-55 C63, C68 Town & Country	+1¼" to -¼"
1954-55 C63, C68 8 Pass.	+¾" to -¼"
1954-55 C64, C69	+0" to -1"
1954-55 C66, C70	+¾" to -¼"
1955 C300	+1¼" to -¼"

DESOTO	Allowable Difference
1946-48 (All Models)	+1½" to -0"
1949 (All Models)	+¾" to -¾"
1950-51 (All Models)	+¾" to -½"
1952 (All Models)	+½" to -½"
1953 (All Models)	+¾" to -¼"
1954 S19, 6 Pass Sed , Cpe	+1" to -0"
1954 S20, 6 Pass Sed , Cpe	+1¼" to +¼"
1954 Sta. Wgn & 8 Pass Sed	+¾" to -¼"
1955 6 Pass, Sed, & Cpe	+1" to -0"
1955 Station Wagon	+1¼" to +¼"

DODGE	Allowable Difference
1946-48 (All Models)	+1½ to 0
1949 (All Models)	+¾ to -¾'
1950 D33 (Early)	+½' to -½'
1950 D33 (Late)	-1¼' to -1¼'
1950 D34 (Early)	+1' to -0
1950 D34 (Late)	+¼ to -¾
1951-52 D41	-¼ to -1¼'
1951-52 D42	+¼' to -¾
1953 D47	+1½' to +½
1953 D44, D46 D48	+1¼' to +¼
1954 (All Models)	+1¼' to +¼
1955 D55, D56 (Exc Suburban)	+0' to -1
1955 D55 D56 Suburban	-¼' to -1¼

PLYMOUTH	Allowable Difference
All Models	C

①—No allowable variation given Follow procedure as given above (except for allowable variations)

Tire Inflation (1946-47) Check and inflate to 28 lbs front and rear (all models) except as follows Chrysler Six DeSoto, Dodge, Plymouth 7 Pass models–30 lbs (32 lbs with larger 18" wheels)

CONTINUED ON NEXT PAGE

1946-55 CHRYSLER, DE SOTO, DODGE, PLYMOUTH (C nt.)

Tire Inflation (1948): Check and inflate to correct pressure for each type tire (below) before checking front end specifications

All Cars with Std. Tires—28 lbs (except DeSoto & & Dodge long-wheelbase cars with 6.50x16 Tires—30 lbs.)

All Cars with Super Cushion Tires—24 lbs. cold

Tire Inflation (1949-55): Check and inflate tires to 24 lbs. (Cold), 27 lbs. (Warm) on all models before checking front end specifications.

Kingpin Inclination

1946-48 (All Models)	4¾-6°
1949-50 (6 Cyl.)	4¾-6°
1949-50 (8 Cyl.)	6¼-7½°
1951-55 (Exc. Chrysler C53, 59, 66, 67, 70)	5-6½°
1951-55 (Chrysler C53, 59, 66, 70)	6½-8°
1955 (Chrysler C67)	5½°

NOTE—Car weight must be on wheels when checking adjustments.

Caster: *CAUTION—All models not set alike.*

1946-48 (All Models)—0° preferred, Limits Neg. 1° to Pos 1°.

1949-54 (Chrysler & DeSoto)—Neg. 2° preferred, Limits Neg. 1° to Neg 3°.

1949-54 (Plymouth & Dodge)—0° preferred, Limits Neg. 1° to Pos. 1°.

1955 (All Cars)—Neg. 2° to 0° (Neg. 2° preferred with manual steering, 0° preferred with power steering). Left side should be 0° to ¾° greater than right side within these limits.

To Adjust—Caster controlled by distance knuckle support upper pivot pin bushing (eccentric camber adjustment) turned in on upper control arm. See Camber Adjustment.

Camber (1946-50): Pos. ¼° preferred. Limits 0° to Pos. ¾°. See Note.

1951-54—Neg. 3/8° to Pos. 3/8°. See Note.

1955 (Chrysler & Plymouth)—Neg 1/8° to Pos. 5/8° (Left side Pos. 1/2°, Right side 0° preferred).

1955 (DeSoto & Dodge)—Pos. 1/4°±3/8° (Left side Pos. 1/2°, Right side 0° preferred).

►*NOTE*· 1949 & Later cars Camber on left side of car should be ¼-½° **greater** than on right side of car

►*TOOL NOTE* Special tool (narrow wrench designed to fit between knuckle support and upper control arm fork so as to engage eccentric bushing) must be used for camber adjustment Tool No C-829 (1 7/16"), C-830 (1½"), or MT-269 (1 5/16") are used with any standard ½" square socket wrench extension

To Adjust—Loosen clampscrew in upper end of knuckle support, turn eccentric bushing in upper end of knuckle support not more than ½ revolution from place where correct caster is secured (bushing eccentric and entire range of adjustment secured in ½ turn) Bushing must not be turned so as to bind on upper control arm

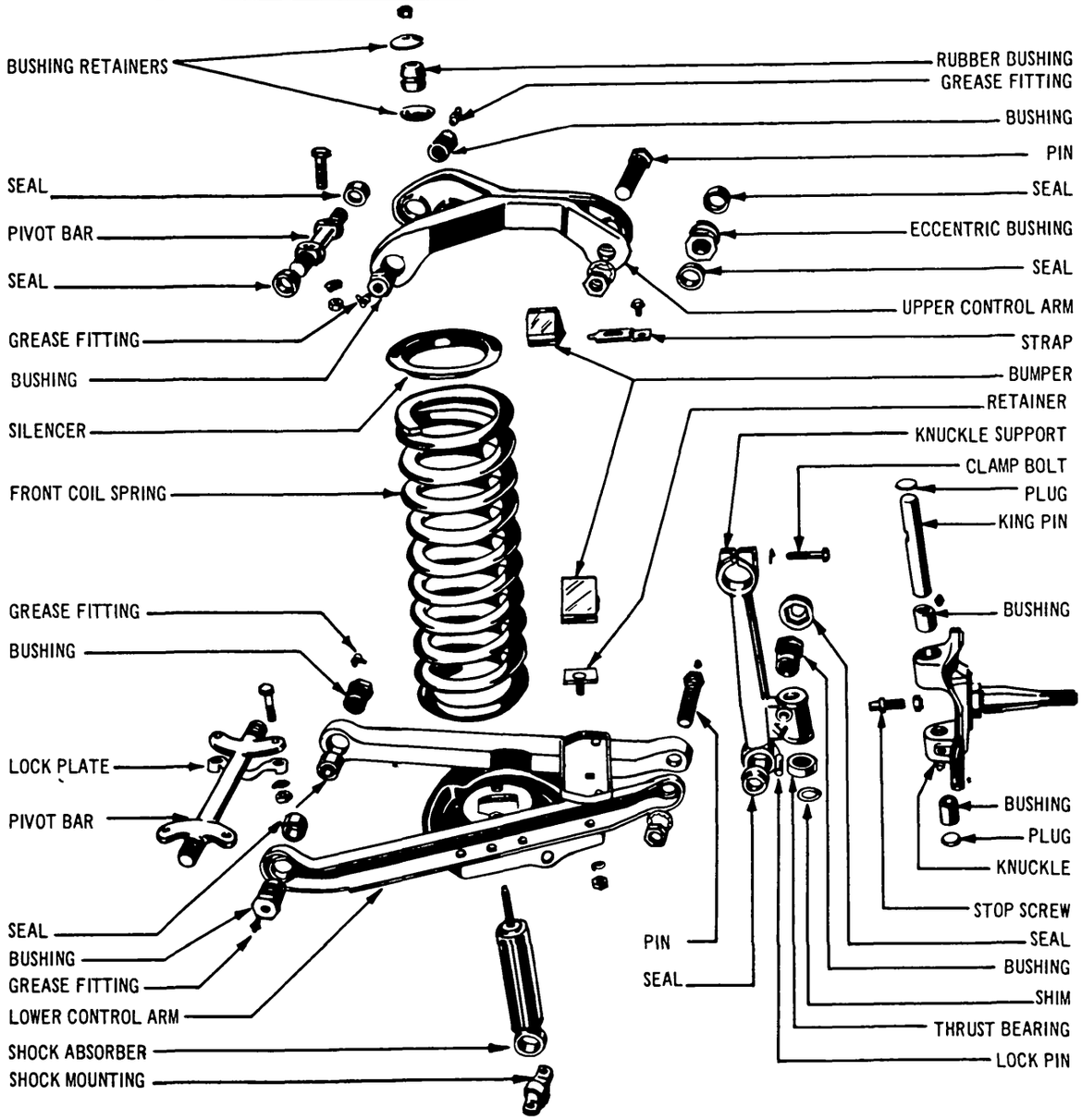
►*CAUTION* Bushing must not be turned so as to bind against either side of upper control arm (keep bushing centered in control arm as nearly as possible)

►*ADDITIONAL RANGE OF ADJUSTMENT* If correct camber cannot be secured by turning eccentric bushing within limits given above, not more than two spacer shims can be installed at top of each front spring Each shim will increase camber approximately ½°

Toe-In: 0" preferred with limits 0" to 1/16" (except 1953 and later Plymouth) 1/8" (1953 and later Plymouth) Check toe-in with wheels turned to straight-ahead position, measure between center of tire treads, hub high, at front and rear of wheels.

T Adjust—Loosen clamp bolts on each tie rod (long rod right side, shot rod left side, or both rods of equal length), turn both tie rods equally. Make certain that ball studs at each end of rod are against same side (to permit angular rotation of rod on ball studs when making turns), and see that clamp bolt on inner (left) end of long tie rod is beneath the rod (to prevent interference on turns)

Toe-Out on Turns: (All Models)—With outer wheel turned



CHRYSLER, DE SOTO, DODGE, PLYMOUTH FRONT SUSPENSION (TYPICAL)

CONTINUED ON NEXT PAGE

1946-55 CHRYSLER, DE SOTO, DODGE, PLYMOUTH (C nt.)

20° inner wheel should be turned 21½°±1° No adjustment provided Check for bent steering arms if incorrect

OVERHAUL: Ste ring Knuckle & Kingpin Bushings—To remove remove wheel and hub assembly Block brake pedal so it cannot be depressed then remove nuts and bolts that fasten brake support to steering knuckle remove steering knuckle arm from steering knuckle Remove brake hose and connections lift off brake support (*CAUTION*—Do not allow brake support and shoe assembly to be supported by flexible brake hose) Remove kingpin locking pin Drive a punch into upper steering knuckle welch plug and pry out of steering knuckle Drive kingpin downward forcing out lower welch plug (*NOTE*—A soft brass drift should be used when driving against head of kingpin) Remove steering knuckle upper bearing or bushing with Tool C 328 Remove steering knuckle lower bushing with same tool if of stationary type (See Note below) Install new lower bushing and line ream with special tool using pilot in place of upper bearing (When upper bushing not used) If upper bushing used install bushing from top making sure slot or identification line is between outer end and grease fitting and line-ream both bushings at same time Install upper bearings from top with trade mark at top and oil hole in bearing lined up with oil hole in steering knuckle Lower bushings should be installed with oil hole in bushing lined up with oil hole in steering knuckle (*NOTE*—On cars equipped with Power Steering and Disc Brakes kingpin bushings should be installed with open end of oil groove leading toward "O" ring seals)

►*FLOATING TYPE BUSHING NOTE* Used at lower end of kingpin on some models These bushings are pre-reamed and should be installed with open end of oil groove upward and with oil hole lined up with oil hole in steering knuckle

Upp r Contr l Arm & Bushings. Install as follows Use new bushings when installing pivot bar and use special spreader tool C-608 to maintain correct control arm spread while bushing being installed Install pivot bar (with seal on each end of bar) in control arm, install spreader tool on inner ends of control arm and bolt pivot bar to tool using two capscrews and nuts (*CAUTION*—Spreader tool has two sets of mounting holes to accommodate all sizes of pivot bars—make certain that correct holes used) Make certain that spreader tool jaws seat firmly against inner faces of control arm ends expand tool until it is just snug against inside of the control arm Start bushings on both ends of the pivot bar lubricate bushings with tapping compound or other suitable lubricants (bushings cut own threads), turn bushings in until shoulder of bushings contact surface of control arm on car With pivot bar correctly installed, only a moderate grip should be required to turn it To correct slight centering error, the pivot bar may be rotated one turn in either direction

Knuckl Supp rt Upper Piv t Pin—Consists of a bolt threaded through both eyes of upper control arm from rear with nut on forward end Seals are installed on pin at each side of eccentric bushing which is threaded on pin within control arm fork (bushing is clamped in upper end of knuckle support by clampscrew) With pin installed, over-all width of control arm fork (from front face of front eye to rear face of rear eye) should be 3 1/8" on all models Eccentric bushing should be centered in fork on all models

Lower Control Arm & Bushings: Control arms and spring seat are riveted assembly Bushings at inner end (frame connection) are self-threading type and new bushings should be used when a new control arm assembly is installed as follows

Control Arm Pivot Bar Bushings—(*NOTE*—Due to relocation of lower control arm pivot bar mounting bolt locations beginning 1955, Tool C-594 cannot be used for centering lower pivot bar, but can be used to maintain set dimension of control arm On 1946-54 models, tool can be used to center the bar) Install dust seals on pivot bar and position bar in control arm Assemble Tool C-594 to bar (*NOTE*—When Tool C-594 used on 1955 models remove guide studs from tool) Lubricate self-threading bushings with light oil, start on both ends of pivot bar, and thread into control arm until shoulders of bushings contact Torque to 165 ft lbs minimum (1946-54), 180 ft lbs minimum (1955) Check pivot bar for free movement *NOTE*—Rotating pivot bar will change setting However, on 1955 models bar can be rotated one turn in either direction to correct a slight centering error For correct centered position of arm as measured from rear face of arm to centerline of rear pivot bar mounting hole, see table below

Knuckle Support Lower Pivot Pin & Bushing—Tighten pin nut to 100 ft lbs minimum Install bushing in knuckle support (head to rear), then position knuckle support so that distance from rear face of support to rear face of support pin boss on rear arm is as shown in table below

Car Model	Arm Centered Position	Support Position
1946-54 (Exc 8 Cyl & 8 Pass)	2 5/32"	15/16"
1946-54 (8 Cyl & 8 Pass)	2 7/32"	1 1/32"
1955 (Exc Chrysler C69,70 8 Pass)	1 11/16'	15/16"
1955 (Chrysler C69 70, All 8 Pass)	1 74"	1 1/32"

FRONT SPRING: Removal—Raise front of car and place stands under frame side members behind suspension arm. Remove shock absorbers (see below) and place jack under lower control arm pivot bar where it is attached to frame crossmember. Raise jack and relieve pressure on pivot bar bolts and remove bolts (place tapered drift in each hole to keep pivot bar lined up until bolts are removed). Lower jack slowly allowing lower control arm to come down, and remove front spring.

Installation—Place spring on end in lower control arm spring seat (flat end up) Lay upper silencer on spring and install lower silencer (if so equipped) Install spring and upper silencer in frame crossmember turn spring until it indexes with lower spring seat and bring lower control arm up to hold it in position (*NOTE*—Some models have lower end coil ground flat and have flat spring seat) *Look up through spring, using a bright light, to see if upper end of spring is positioned correctly Also determin (by feel) if lower end is in position* Raise jack to align pivot bar and frame bolt holes and attach bar to frame Tighten nuts to 60 ft lbs

FRONT SHOCK ABSORBER (1946-54): Removal—Remove nuts from upper and lower mounting studs and remove shock absorber

Installation—Assemble new bushings in shock absorber eyes and install inner bushing retainers Install shock absorber on studs assemble outer bushing retainers and stud nuts Tighten nuts to 60 ft lbs

FRONT SHOCK ABSORBER (1955): Removal—Disconnect end of shock absorber pushrod, and lower mounting. Pull assembly, with lower bushing washer, out through lower control arm. To remove mounting assembly from lower shock absorber eye, place mounting assembly in in Tool C-3413, and using a vise, press out the assembly *NOTE*—The mounting assembly is serviced as a complete unit

Installation—If it is necessary to install a new upper rod mounting bushing, wet the bushing, press it into place and install spacer To install lower mounting assembly in shock absorber eye, position assembly so that mounting holes are at right angles with shock absorber With Tool C-3413, and a vise, press assembly into eye until centered (*CAUTION—To avoid damaging the assembly, always press against steel sleev*). Place lower mounting washer on rod of shock absorber and push shock into position from lower side. Install upper washer and nut, and tighten down to spacer. Install lower mounting screws and tighten to 35 ft. lbs.

►*SPRING IDENTIFICATION NOTE* Part number stamped on all springs (last digit of number indicated by like number of grind marks)

1946-48 SPRING SPECIFICATIONS

Car Model	Chrysler Models	⑧Part No.
C38 exc. 7 Pass. & Limo.①		⑨956773
C38 exc. 7 Pass & Limo.②		1115444
C38 7 Pass. & Limo.①③		1123625
C38 7 Pass. & Limo.②		957005
C39 exc. Convertibles①③		1123625
C39③		957005
C39 Convertibles④③		1123625
C39 Convertibles⑤		1125025
C40		1125026
	De Soto Models	
S11 First Cars exc. 7 Pass. & Limo.⑥		⑨956772
S11 RIGHT SIDE exc. 7 Pass. & Limo.⑦		956772
S11 LEFT SIDE exc. 7 Pass. & Limo.⑦		⑩956773
S11 exc. 7 Pass. & Limo.②		1115444
S11 7 Pass., Limo., Sub. Sedan①		1123624
S11 7 Pass., Limo., Sub. Sedan②		957005
Car Model	**Dodge Models**	**⑧Part N .**
D24 exc. 7 Pass. & Limo.①		864845
D24 exc. 7 Pass. & Limo.②		1115443
D24 7 Pass. & Limo.①		1115433
D24 7 Pass. & Limo.②		1115445
	Plymouth Models	
P15 Std. Service		⑨1115244
P15 Extreme Duty & Comm'l		1115441

①—Standard service. ②—Extreme Duty & Comm'l.
③—When replacing a spring on cars before Serial No. 70,020,626 (C38S), 70,539,294 (C38W), 6,765,652

CONTINUED ON NEXT PAGE

1946-55 CHRYSLER, DE SOTO, DODGE, PLYMOUTH (Cont.)

1946-48 SPRING SPECIFICATIONS (Cont.)

(C39K), 7,029,641 (C39N), 7,400,509 (Town & Country), replace both front springs.

④—C39 Convertible Coupe up to Serial 7,051,679 & C39 Town & Country Conv. up to No. 7,403,744.

⑤—C39 Convertibles after above Serial Nos.

⑥—Up to Serial No. 6,171,445 (S11S), 5,820,938 (S11C).

⑦—S11S & S11C after above Serial Nos.

⑧—With Spacer No. 657770 on driver's side only and Silencer No. 691144 (Upper), 854105 (Lower). On springs with lower end ground flat, use Spacer No. 691144 at top and bottom.

⑨—Include No. 657770 Spacer with spring for left side of car.

⑩—Spacer No. 657770 not used with this spring.

1949 SPRING SPECIFICATIONS

Car Model	Chrysler Models	Part No.
C45S,W 4-Dr. Sdn. & Club Coupe ①		1134312
Above Models②	(RH) 1318185, (LH)	1318186
C45 Convertible③		1140283
C45 Convertible④		1140286
C45 Convertible⑤	(RH) 1140283, (LH)	1140284
C45 7-Pass. & Limo.		1139007
C45 Station Wagon	(RH) 1141014, (LH)	1141015
C45 Heavy Duty (4-Dr., Coupe, Convt.)		1141016
C45 Heavy Duty (7-Pass. & Limo.)		1138944
C46 4-Dr. Sdn. & Club Coupe⑥		1127985
C46 4-Dr. Sdn. & Club Coupe⑦		1127983
C46 Convt. & T&C. Convt.⑧		1134324
C46 Convt. & T&C. Convt.⑨		1139007
C46 T&C. Club Coupe		1127983
C46 Heavy Duty (4-Dr., Coupe, T&C.)		1138943
C46 Heavy Duty (Convt. & T&C. Convt.)		1138944
C47	1134327 (Std.),	1138947 (H.D.)

1949 DeSoto Models

S13 4-Dr. Sdn. & Club Coupe	1141014
S13 Club Coupe Comm'l & H.D.	1141015
S13 7-Pass., Comm'l & H.D.	1138943
S13 Station Wagon	1141015
S13 Convertible	1134313

1949 Dodge Models

D29 & D30 4-Dr. Sdn., D30 Club Coupe	864845
D29 & D30 4-Dr., Club Coupe Comm'l & H.D.	1139002
D30 Convertible	1134312
D30 Comm'l & H.D., D30 Sta. Wgn.	1141014
D30 7-Pass.	1140286

1949 Plymouth Models

All	1123244 (Std.), 1139001 (H.D.)

①—Before No. (C45S) 70045592 (C45W) 70747768.
②—After above Serial Numbers.
③—Before Serial No. 70737891.
④—Serial No. 70737891 to 70748355.
⑤—After Serial No. 70748355.
⑥—Before No. (C46K) 6772870, (C46N) 7071928.
⑦—After above Serial Numbers.
⑧—Before No. (Convt.) 7102223, (T&C) 7410003.
⑨—After above Serial Numbers.

1950 SPRING SPECIFICATIONS

1950 Chrysler Models

Car Model	Left	Right
C48 Sedan & Club Coupe	1318187	1318186
C48 Spec. Club Coupe & Convt.	1140284	1140283
C48 Station Wagon	1140284	1140283
C48 7 Pass. Models	1127983	1127983
C49 All Models	1127983	1127983
C50 All Models	1134324	1134324

1950 DeSoto Models

S14 Sedan, Club Coupe, Carryall	1318186	1318185
S14 Spec. Club Coupe & Convt.	1140283	1140283
S14 Station Wagon	1140283	1140283
S14 7 Pass. Sedan	1127983	1127981
S14 7 Pass. Suburban	1138943	1138942

1950 Dodge Models

D33	1123243	1123242
D34 Sedan & Club Coupe	864845	864844
D34 Spec. Club Coupe & Convt.	1318185	1318185
D34 Station Wagon	1318185	1318185
D34 7 Pass. Sedan	1127981	1127981

1950 Plymouth Models

P19 exc. Suburban	1123242	1123241
P19 Suburban (15" Whls)	1123243	1123242
P20 exc. Convt.	1123244	1123243
P20 Convt. Coupe	1123244	1123244

1951 SPRING SPECIFICATIONS

1951 Chrysler Models

Model	Left	Right
C51 Sedan & Club Coupe	1318186	1318185
C51 Spec. Club Coupe & Convt.	1140283	1140282
C51 Station Wagon	1140283	1140282
C51 Heavy Duty on above	1141016	1141015
C51 8 Pass. & Limo. Std.	1127984	1127983
C51 8 Pass. & Limo. H.D.	1138944	1138943
C52 Sedan & Club Coupe	1127983	1127982
C52 Spec. Club Coupe & Convt.	1127984	1127983
C53 All Models	1134324	1134323
C54 All Models	1127984	1127983
C52 & C54 Heavy Duty	1138944	1138943
C53 Heavy Duty	1138945	1138945

1951 De Soto Models

S15 Sedan, Club Coupe, Carryall	1318185	1318184
S15 Spec. Club Coupe & Convt.	1140282	1140282
S15 Station Wagon	1140282	1140282
S15 Heavy Duty on above	1141016	1141015
S15 8 Pass. Sedan	1127983	1127982
S15 Suburban	1138942	1138942
S15 8 Pass. & Subn. H.D.	1138944	1138943

1951 Dodge Models

D41 Std.	1123242	1123241
D41 Heavy Duty	1139002	1139001
D42 Sedan & Club Coupe	864844	864843
D42 Spec. Club Cpe. & Sta. Wgn.	1318184	1318184
D42 Heavy Duty on above	1141014	1141013
D42 8 Pass. Sedan	1127982	1127981
D42 8 Pass. Heavy Duty	1138943	1138942

1951 Plymouth Models

P22 exc. Subn. with 18" Whls.	1123241	1123241
P22 Heavy Duty on above	1139001	1139001
P22 Suburban with 18" Whls.	1139001	1139001
P23 except Convt.	1123243	1123242
P23 Convt.	1123244	1123243
P23 Heavy Duty	1139002	1139001

1952 SPRING SPECIFICATIONS

Chrysler C-51

4-Dr., Cpe., & Trav.①	1318186	1318185
4-Dr., Cpe., & Trav.②	1318187	1318186
Sp. Cpe., Conv., & Est. Wgn.①	1140283	1140282
Sp. Cpe., Conv., & Est. Wgn.②	1140284	1140283
8-Pass. & Limo.①	1127984	1127983
8-Pass. & Limo②	1127985	1127984
Hvy. Duty, exc. 8-Pass. & Limo.	1141015	1141015
Heavy Duty, 8-Pass.	1138944	1138943

①—Before Serial No. 70085076 (C-51W), 70915246 (C-51W DeLuxe).
②—After Serial Nos. listed in ① above.

Chrysler C-52
(Without Torque Converter)

4-Dr. & Cl. Cpe.①	1127983	1127982
4-Dr. & Cl. Cpe.②	1127984	1127983
Sp. Cl. Cpe. & Conv.①	1127984	1127983
Sp. Cl. Cpe. & Conv.②	1127985	1127984
Estate Wagon	1127985	1127984
Heavy Duty③	1138944	1138943

(With Torque Converter)

4-Dr. & Cl. Cpe.①	1127984	1127983
4-Dr. & Cl. Cpe.②	1127985	1127984
Sp. Cl. Cpe. & Conv.①	1127985	1127984
Sp. Cl. Cpe. & Conv.②	1127986	1127985

①—Before Serial No. 7173603.
②—After Serial No. 7173603.
③—Optional on all models with or without Torque Converter.

Chrysler C-53

Model	Left	Right
All Models①	1134325	1134324
All Models②	1134325	1134325
Heavy Duty	1138946	1138946

①—Before Serial No. 7814596.
②—After Serial No. 7814596.

Chrysler C-54
(Without Torque Converter)

Model	Left	Right
4-Dr. & Cl. Cpe.①	1127984	1127983
4-Dr. & Cl. Cpe.②	1127985	1127984
Sp. Cl. Cpe. & Conv.①	1127985	1127984
Sp. Cl. Cpe. & Conv.②	1127986	1127985
Heavy Duty③	1138944	1138943

Chrysler C-54
(With Torque Converter)

	Left	Right
4-Dr. & Cl. Cpe.①	1127985	1127984
4-Dr. & Cl. Cpe.②	1127986	1127985
Sp. Cl. Cpe. & Conv.①	1127986	1127985
Sp. Cl. Cpe. & Conv.②	1127986	1127986

①—Before Serial No. 7739794.
②—After Serial No. 7739794.
③—Optl. with or without Torque Converter.

Chrysler C-55
(Without Torque Converter)

Model	L ft	Right
4-Dr. & Cl. Cpe.	1127984	1127983
8-Pass.	1127986	1127986
Estate Wagon	1127985	1127984
Heavy Duty exc. 8-Pass.①	1138944	1138943
Heavy Duty 8-Pass.①	1138946	1138945

CONTINUED N NEXT PAGE

1946-55 CHRYSLER, DE SOTO, DODGE, PLYMOUTH (Cont.)

1952 SPRING SPECIFICATIONS (Cont.)

Chrysler C-55
(With Torque Converter)

Model	Left	Right
4-Dr. & Cl. Cpe.	1127985	1127984
8-Pass.	1134325	1134325
Estate Wagon	1127986	1127985

①—Optl. with or without Torque Converter.

DeSoto S-15

Model	Left	Right
4-Dr. Cl. Cpe. & Carryall①	1318186	②1318185
4-Dr. Cl. Cpe. & Carryall③	1318187	1318187
Sp. Cl. Cpe., Conv. & Est. Wgn.④	1140283	1140282
Sp. Cl. Cpe., Conv. & Est. Wgn.⑤	1140284	1140283
Sp. Cl. Cpe., Conv. & Est. Wgn.⑥	1140285	1140284
8-Pass.⑦	1127983	1127982
8-Pass.⑧	1127984	1127983
Suburban⑨	1138942	1138942
Suburban⑩	1138943	1138942
Heavy Duty exc. 8-Pass.	1141015	1141015
Heavy Duty, 8-Pass.	1138944	1138943

①—Before Serial No. 6281248 (S-15S) and 50201573 (S-15C).
②—Used on these models from Serial No. 6281248 to 6284173 (S-15S), and from 50201573 to 50239914 (S-15C).
③—After Serial No. 6284173 (S-15S) and 50239914 (S-15C).
④—Before Serial No. 50204179.
⑤—After Serial No. 50204179 to No. 50248839.
⑥—After Serial No. 50248839.
⑦—Before Serial No. 6282105 (S-15S), and 50206209 (S-15C).
⑧—After Serial Nos. listed in ⑦ above.
⑨—Before Serial No. 50209756.
⑩—After Serial No. 50209756.

Dodge

Model	Left	Right
D-41 Std.①	1123242	1123241
D-41 Std.②	1123243	1123242
D-41 Heavy Duty	1139002	1139001
D-42 4-Dr. & Cl. Cpe.③	864844	864843
D-42 4-Dr. & Cl. Cpe.④	864845	864844
D-42 4-Dr. & Cl. Cpe.⑤	1330844	1330843
D-42 Sp. Cl. Cpe. & Est. Wgn.⑥	1318184	1318184
D-42 Sp. Cl. Cpe. & Est. Wgn.⑦	1318185	1318184
D-42 8-Pass.	1127982	1127981
D-42 Heavy Duty exc. 8-Pass.	1141014	1141013
D-42 Heavy Duty 8-Pass.	1139943	1138942

①—Before Serial No. 37151658 Detroit built cars. 48506531 Los Angeles built cars.
②—After Serial Nos. listed in ① above.
③—Before Serial No. 31734696.
④—After Serial No. 31734696 to No. 31801981.
⑤—After Serial No. 31801981.
⑥—Before Serial No. 31751792 Detroit built cars. Before No. 45085606 San Leandro built cars. Before No. 4552404 Los Angeles built cars.
⑦—After Serial Nos. listed in ⑥ above.

Plymouth P22

Model	Left	Right
Exc. Subn. with 18" wheels①	1123242	1123241
Exc. Subn. with 18" wheels②	1123243	1123242
Suburban with 18" wheels	1139001	1139001
Heavy Duty	1139001	1139001

①—Before Serial No. 18142592, and from 18142601 thru 18142700, and from 18142801 thru 18142828 Detroit built cars. Before No. 24046032 Evansville built cars. Before No. 28515027 San Leandro built cars. Before No. 28012678 (2-Door Sedan), Before No. 28013073 (Suburban) Los Angeles built cars.
②—After Serial Nos. listed above ①.

Plymouth P23

Model	Left	Right
Exc. Conv. Cpe.①②	1123244	1123243
Exc. Conv. Cpe③	1123245	1123244
Convertible Cpe.④	1123245	1123244
Convertible Cpe.⑤	1123245	1123245
Heavy Duty	1139001	1139002

①—**Cambridge Models**—Before Serial No. 15487969, and from 15488001 thru 15488013 Detroit built cars. Before No. 22139796 Evansville built cars. Before No. 26042176 Los Angeles built cars. Before No. 26514277 San Leandro built cars.
②—**Cranbrook Models**—Before Serial No. 12699736, and from 12699801 thru 12699880 Detroit built cars. Before No. 20451401 Evansville built cars. Before No. 25117260 Los Angeles built cars. Before No. 25536681 San Leandro built cars.
③—After Serial Nos. listed above.
④—Before Serial No. 12699736.
⑤—After Serial No. 12699736.

1953 SPRING SPECIFICATIONS

Chrysler C-60
(Without Torque Converter)

	Right	Left
Sp. Cl. Cpe., Conv., Est. Wgn.	1140284	1140285
4-Dr. & Coupe	1127984	1127985
8-Pass.	1127984	1127985
Hvy. Duty (Exc. 8-Pass.)①	1141015	1141016
Hvy. Duty (8-Pass.)①	1138944	1138945

(With Torque Converter)

	Right	Left
Sp. Cl. Cpe., Conv., Est. Wgn.	1127986	1127986
4-Dr. & Coupe	1127984	1127985
8-Pass.	1127986	1127986

①—Optional with or without torque converter.

Chrysler C-56
(Without Torque Converter)

	Right	Left
4-Dr. & Cl. Cpe.	1127984	1127985
Sp. Cl. Cpe. & Conv.	1127985	1127986
Estate Wagon	1127985	1127986
8-Pass.	1127986	1127986
Heavy Duty (Exc. 8-Pass.)①	1138943	1138945
Heavy Duty (8-Pass.)①	1138945	1138946

(With Torque Converter)

	Right	Left
4-Dr. & Cl. Cpe.	1127985	1127986
Sp. Cl. Cpe. & Conv.	1127986	1127986
Estate Wagon	1127986	1127986
Heavy Duty (Exc. 8-Pass.)①	1138943	1138944
Heavy Duty (8-Pass.)①	1138945	1138946

Chrysler C-58
(Without Torque Converter)

4-Dr. & Cl. Cpe.	1127984	1127985
Town Sedan	1127986	1127986
Heavy Duty	1138944	1138945

(With Torque Converter)

All Models	1127984	1127985
Heavy Duty	1138944	1138945

Chrysler C-59

All Models	1404154	1404154
Heavy Duty	1138947	1138947

De Soto S-18

	Right	Left
4-Dr. & Cl. Cpe.	1318187	1318187
Sp. Cl. Cpe. & Est. Wgn.	1140284	1140285
8-Pass.	1127984	1127985
Heavy Duty (Exc. 8-Pass.)	1141015	1141016
Heavy Duty (8-Pass.)	1138944	1138945

DeSoto S-16
(Without Torque Converter)

	Right	Left
4-Dr. & Cl. Cpe.	1127982	1127983
Sp. Cl. Cpe. & Conv.	1127983	1127984
Estate Wagon	1127983	1127984
8-Pass.	1127985	1127986
Heavy Duty (Exc. 8-Pass.)①	1138942	1138943
Heavy Duty (8-Pass.)①	1138944	1138945

(With Torque Converter)

	Right	Left
4-Dr. & Cl. Cpe.	1127984	1127985
Sp. Cl. Cpe. & Conv.	1127985	1127986
Estate Wagon	1127985	1127986
8-Pass.	1127985	1127986
Heavy Duty (Exc. 8-Pass.)①	1138942	1138943

Dodge Six

D-46	1319186	1318187
D-47 (Est. Wgn.)	864845	864845
D-46 (Heavy Duty)	1141014	1141015
D-47 (Heavy Duty)	1139003	1139003

Dodge V8

All Models	1140284	1140285
Heavy Duty	1141016	1141016

Plymouth

All Models (Exc. Conv.)	864845	864845
Convertible (First Cars)	864846	864846
Convertible (Later Cars)	1318186	1318187

①—Optional with or without Torque Converter.

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1946-55 CHRYSLER, DE SOTO, DODGE, PLYMOUTH (Con..)

1954 SPRING SPECIFICATIONS

Chrysler C-62
(Without Torque Converter)

Model	Right	Left
4-Dr , Cpe., Sp Cpe.	1127982	1127983
Estate Wagon	1127982	1127983
Convertible	1127983	1127984
8-Pass ①	1127985	1127986
Hvy. Duty (Exc. 8-Pass.)	1138942	1138943
Hvy Duty (8-Pass)	1138944	1138945
(With Torque Converter)		
4-Dr., Cpe , Sp. Cpe	1127983	1127984
8-Passenger①	1127986	1127986

①—With Air-Conditioning, use 1127986. (Right & Left).

Chrysler C-63
(Without Air-Conditioner)

	Right	Left
4-Dr., Cpe., Sp. Cpe	1134323	1134324
Estate Wagon	1134323	1134324
Convertible	1134324	1134325
8-Pass	1404153	1404153
(With Air Conditioner)		
4-Dr. Cpe., Sp. Cpe	1134323	1134325
8-Pass	1404153	1404154

Chrysler C-64
(Without Air-Conditioner)

All Models	1127985	1127986
All Models (Heavy Duty)	1138944	1138945
(With Air-Conditioner)		
All Models	1127985	1127986

Chrysler C-66
(Without Air-Conditioner)

All Models	1404154	1404155
All Models (Heavy Duty)	1534005	1534005
(With Air-Conditioner)		
All Models	1404155	1404155

DeSoto S-20
(Without Air-Conditioner)

4-Dr., Cpe., Sp. Cpe	1127982	1127983
Estate Wagon	1127982	1127983
8-Pass	1127984	1127985
Hvy Duty (Exc. 8-Pass)	1138942	1138943
Hvy. Duty (8-Pass)	1138943	1138944
(With Air-Conditioner)		
	Right	Left
4-Dr , Cpe., Sp. Cpe	1127983	1127984
8-Pass	1127985	1127986

D S t S-19
(With ut Air-C ndition r)

4-Dr., Cpe , Sp Cpe.	1134323	1134323
Convertible	1134323	1134324
8-Pass	1134324	1134325
Hvy. Duty (Exc. 8-Pass)	1138943	1138944
Hvy. Duty (8-Pass)	1138944	1138945
(With Air-Conditioner)		
4-Dr., Cpe , Sp. Cpe	1134323	1134324
8-Pass	1134325	1134325

Dodge 6

4-Dr., Cpe., Sp Cpe	1318186	1318187
2-Dr. Suburban	864845	864846
4-Dr Suburban	1318186	1318187
Hvy Duty (Exc Sub)	1141014	1141015
Hvy Duty (Suburban)	1127981	1127981

Dodge 8

All Models (Exc. Below)	1140284	1140285
4-Dr. Sub. & Conv	1140285	1140286
Hvy Duty	1141016	1141016
All Models (With Air Cond.)	1140286	1140286

Plymouth

Bus. Cpe. 2-Dr., & Sub	864844	864845
4-Dr. & Cl. Cpe.	864845	864846
Convertible	1318186	1318187
Hvy. Duty	1127981	1127981

1955 SPRING SPECIFICATIONS

Chrysler C-67

Model	Right	Left
4 Dr., Sp. Cl. Cpe. (Early)①	1611575	1611575
4 Dr., Sp. Cl. Cpe. (Late)②	1611575	1611576
Convertible (Early)③	1611575	1611576
Convertible (Late)④	1611576	1611577
Estate Wagon (Early)⑤	1557865	1557865
Estate Wagon (Late)⑥	1557865	1557866
Heavy Duty (Estate Wagon)	1618086	1619087
Heavy Duty (Exc Estate Wagon)	1618083	1618083
Air Conditioned Cars	1611575	1611576

①—Before Serial No. W55-38193.
②—After Serial No. W55-38193.
③—Before Serial No. W55-42723.
④—After Serial No. W55-42723.
⑤—Before Serial No. W55-38093.
⑥—After Serial No W55-38093.

Chrysler C-68

Model	Right	Left
4 Dr., Sp. Cl. Cpe	1611576	1611577
Convertible	1611577	1611577
Estate Wagon	1557866	1557867
Heavy Duty (Est Wgn.)	1618087	1618087
Heavy Duty (Exc Est Wgn.)	1618084	1618085
Air Conditioned Cars	1611577	1611577

Chrysl r C-69

M d l	Right	L ft
All Models	1557865	1557866
Heavy Duty (All Models)	1618087	1618087
Air Conditioned Cars	1557866	1518867

Chrysler C-70

Model	Right	L ft
All Models	1611796	1611796
Heavy Duty (All Models)	1534008	1534008
Air Conditioned Cars	1611796	1611797

DeSoto S-21, S-22

Model	Right	L ft
4 Dr., Sp. Cl. Cpe.	1611575	1611575
Convertible	1611575	1611576
Estate Wagon (S-22)	1557865	1557865
Heavy Duty (Exc. Estate Wagon)	1618083	1618083
Heavy Duty (Estate Wagon)	1618085	1618086
Air Conditioned Cars	1611575	1611576

Dodg 6 & V8

Model	Right	L ft
6 Cyl. All Models	1618754	1618754
V8 All Models	1615194	1615194
V8 Convertible	1615194	1615195
Heavy Duty (6 Cyl.)	1617014	1617014
Heavy Duty (V8)	1630164	1630164
Air Conditioned Cars (V8)	1615194	1615195

Plymouth 6 Cyl.

Model	Right	Left
3 Pass. Cpe. & Sub. (Early)①	1618524	1618524
3 Pass. Cpe. & Sub. (Late)②	1618524	1618525
4 Dr , Cl. Cpe (Early)③	1618524	1618525
Sp. Cl. Cpe. (Early) ③	1618524	1618525
4 Dr., Cl. Cpe. (Late)④	1618525	1618526
Sp. Cl. Cpe. (Late) ④	1618525	1618526
Heavy Duty	1618043	1618043

①—Before Serial No. 13865035 (Detroit), No. 20745183 (Evansville), No. 25181187 (Los Angeles).
②—After Serial Numbers in item ① above.
③—Before Serial No. 13837019 (Detroit), No. 20745183 (Evansville), No. 25180156 (Los Angeles).
④—After Serial Numbers in item ③ above.

Plymouth V8

Model	Right	L ft
All Models (Exc. Conv.)	1618754	1618755
Convertible	1618755	1618755
Heavy Duty	1617014	1617014
Air Conditioned Cars	1618755	1618756

1949-53 FORD PASS. CARS, LINCOLN & MERCURY

Ford Pass. Cars (1949-53)
Lincoln & Cosmopolitan (1949-51) See Note.
Mercury V8 Models (1949-53)

▷*1952-53 LINCOLN NOTE—New "Ball Joint" type front suspension system. See "1952-53 Lincoln" for complete data.*

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1952-53 FORD & MERCURY CAUTION—Suspension system is similar to previous models in basic design, but due to dimensional differences, parts are not interchangeable.*

1953 FORD PARTS REPLACEMENT CAUTION—Front Suspension Lower Arm Assembly Part No. MA-3078A and Front Suspension Lower Arm Bumper Part No. AB-3019B MUST NOT BE INTERCHANGED WITH PREVIOUS MODEL ASSEMBLIES. Lower Arm Bumper Cup Part No. 8A-3028 is discontinued and should not be used with Lower Arm Bumper, Part No. AB-3019B.

▷1952 FORD IDLER ARM STRIKING BUMPER ON LEFT TURN CORRECTION—Check grease fitting installation (nipple must face front of car). Adjust torque of idler arm bushing in steering arm-to-idler rod to 85-100 ft. lbs. Grind off any excess weld build-up where inner and outer frame side rails are welded together.

▷Ford Parts Production Change & New Front End Specifications: Ford cars after March 1, 1949 have new design IDLER ARM BRACKET AND PITMAN ARM which requires new Front End Specifications, (Toe-In) as listed below.

▷*CAUTION—These new design parts must be used together. Under no circumstances should the new and old design parts be used together on the same car.*

New Part Identification—Can be distinguished by differences in dimensions when compared with old parts as follows:

New Idler Arm Bracket No. 8A-3351-C. Supersedes old design bracket 8A-3351-B. New design bracket is longer (5¼" overall changed from 5 1/16"), thinner (5/16" thick changed from 3/8"), and has nut at lower mounting hole (old design had capscrew thread at this mounting hole).

New Pitman Arm No. 8A-3590-B. Supersedes old design arm No. 8A-3590-A. New design arm has greater offset of ½" between flat surfaces of the bolt holes in the ends of the arm (changed from 3/16" offset of old design).

▷New Front End Specifications—New Toe-In setting required for all cars with new design parts as listed above. *See Camber, Caster, Toe-In data following.*

▷1949-51 Ford Front Suspension Noise Correction—Popping noise (when brakes applied) or chucking noise in front end may be caused by incorrect Caster adjustment resulting in caster adjusting bushing striking lower support arm.

▷1949 Ford Riding Height & Car Leveling Correction—Incorrect height or list to one side may be caused by use of unmatched springs or incorrect spring height. Check spring height *(see "Spring Height" & "Springs" following for specifications and correction procedure).*

▷FORD, LINCOLN, MERCURY FRONT SPRING PRODUCTION CHANGES: *See Spring data below.*

▷FORD STABILIZER ASSEMBLY PRODUCTION CHANGE 1950—New design, and can be installed on 1949 cars. *See Front Stabilizer data below.*

DESCRIPTION: Independent, linked parallelogram type with coil springs, and independent shock absorbers.

CHECKING & ADJUSTING: First check wheel bearing adjustment, wheel spindle wear, tire inflation pressure (see data below), wheel run-out and balance (run-out should not exceed ⅛"), steering linkage and steering gear for excessive looseness or play, then place car on level floor and check front end specifications with car at curb weight as follows:

Tire Inflation Pressures (Cold)

Ford—	Size	Ply	Frt.	Rear
Exc. Sta. Wgn. & Sed. Del.	6:00x16	4	28 lbs.	25 lbs.
Exc. Sta. Wgn. & Sed. Del.	6:70x15	4	26 lbs.	23 lbs.
Exc. Sta. Wgn. & Sed. Del.	7:10x15	4	24 lbs.	21 lbs.
Sta. Wgn. & Sed. Del.	7:10x15	4	23 lbs.	26 lbs.
Sta. Wgn. & Sed. Del.	7:10x15	6	25 lbs.	30 lbs.
Mercury—				
Exc. Sta. Wgn. & Conv.	7:10x15	4	26 lbs.	22 lbs.
Station Wagon	7:60x15	4	24 lbs.	24 lbs.
Convertible	7:60x15	4	24 lbs.	22 lbs.

Ford Riding Height (Frame Height at Curb Weight): Before checking front end specifications, check frame height on level floor at curb weight (full tank of fuel but no passenger load) as follows:

Front End Height—Lightly jounce rear end of car several times to allow car to assume natural position. Measure from floor to center of lower support arm pivot pins at inner and outer ends of arm on each side of car. Height at inner end of arm should be ⅛" to 1" greater than height at outer end. If inner end ⅛" greater to ⅛" less than outer end, install shim on spring (see Springs). If inner end more than ⅛" less than outer end, replace spring (see Springs).

Rear End Height—Lightly jounce front end of car several times to allow car to assume natural position. Measure vertical distance from top of axle inner "U" bolt to underside of frame alongside bumper on each side of car (see "Frame Height" in table below). If distance not correct, check for correct spring (Part No. stamped on bottom of shortest leaf under clip plate) and replace spring if it has developed a "set".

Rear Frame Height

Model	Frame Height	Spring No.
3-Pass. Coupe	4 7/8"-6 1/16"	8A-5560-B
5 Pass. Coupe & Sedans	5 7/8"-7 3/8"	8A-5560-D
Convertible	5½"-7"	8A-5560-D
Station Wagon	7 7/8"-7 3/8"	8A-5560-F

Lincoln & Mercury Riding Height: With car at curb weight, measure distance from floor to center of lower control arm pivot pins at inner and outer ends of arm. Height at outer end of arm should be 1" less than at inner end of arm and measurement should be same on both sides of car. If distance not correct, or unequal, correct by shimming or replacing springs (see Springs).

Kingpin Inclination:
(Ford)—5¼° crosswise.
(Lincoln & Mercury)—5° with ¾° camber.

Camber: (Ford) Pos. ⅛° to Pos. ¾° preferred (limits 0° to Pos. 1°) with maximum variation between wheels of ¼°.
(Lincoln & Mercury)—0° to Pos. ¾° with maximum variation between wheels of ¼°.

▷*FORD CAMBER NOTE—Above specifications correct for old and new design parts (see Ford Production Change Note) and supersede earlier specifications.*

Adjustment—Must be made exactly as follows to avoid possibility of binding and noise in front suspension system (as stated in Noise Correction Note above):

1) Back off clampscrew in upper end of spindle support one turn to free the bushing.
2) Install tool No. 3046-N on hexagonal head of bushing in upper end of spindle support, use wrench engaging boss on tool to turn bushing for desired camber.
3) See that support is against shoulder on bushing. When making minimum or maximum camber adjustment, back bushing off slightly to permit free-floating of clampscrew in groove in bushing.
4) Tighten clampscrew to 25-32 ft. lbs.

▷*CAUTION—Clampscrew must not bind on side of groove in bushing (will prevent bushing being held securely and kept from moving in service).*

NOTE—Bushing is eccentric and entire range of adjustment should be secured within ½ turn.

▷*CAUTION—If correct setting not obtained within range of camber bushing movement (½ turn), check all suspension parts for misalignment or wear.*

Caster: (1949-51 Ford Exc. Sta. Wgn.)—Pos. ½° to Neg. 1° with maximum variation between wheels of ½°.

1949-51 Ford Sta. Wgn.—Neg. ¼° preferred (limits Neg. ¼° to Neg. 1¾°) with maximum variation between wheels of ½°.

1949-51 Lincoln & Mercury—Pos. ½° to Neg. 1° with maximum variation between wheels of ½°.

1952-53 Mercury—0° to Neg. 1½°. Must not vary more than ½° between wheels.

▷*FORD CASTER NOTE—Above specifications correct for old & new design parts (see Ford Production Change Note) and supersede earlier specifications.*

Adjustment—Must be made exactly as follows to avoid possibility of binding and noise in front suspension system (as stated in Noise Correction Note above):

1) Back off clampscrew in lower end of spindle support one turn to free the bushing.
2) Install tool No. 3089-N on hexagonal head of bushing in lower end of spindle support, use wrench engaging boss on tool to turn bushing for desired caster.
3) See that support is against shoulder on bushing and that clearance between bushing and arm is at least .045" (if bushing strikes arm when making maximum caster adjustment, back off bushing a minimum of ½ revolution for above clearance).
4) Tighten clampscrew to 25-32 ft. lbs.

▷*CAUTION—Clampscrew must not bind on side of groove in bushing (binding will prevent clampscrew gripping bushing securely to prevent movement of bushing when screw tightened to recommended 25-32 ft. lbs.).*

▷*CAUTION—If correct setting not obtained within range of caster bushing movement (⅛" either way), check all suspension parts for misalignment or wear.*

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1949-53 FORD PASS. CARS, LINCOLN & MERCURY (Cont.)

►**Toe-In:** CAUTION—Two settings on Ford follow: **Ford (With Old Design Parts—Before Mar. 1, 1949) 1/8" Toe-out to 3/16" Toe-out.**

Ford (With New Design Parts—After Mar. 1, 1949) 1/16" Toe-in to 1/8" Toe-in.

Lincoln & Mercury—3/32" to 5/32" Toe-in.

►***FORD TOE-IN CAUTION—Correct setting must be used for cars with OLD and NEW design parts (as listed in Ford Production Change Note). Settings listed above supersede earlier specifications.***

Adjustment—With steering wheel turned to center position and with both front wheels positioned "straight-ahead", loosen clamp bolts on adjusting sleeve at outer end of each tie rod, **turn both adjusting sleeves equally to set toe-in.**

►***FORD ADJUSTMENT NOTE***—If steering wheel spoke not horizontal with wheels "straight-ahead," shorten one tie rod and lengthen opposite rod to align steering wheel and adjust toe-in.

Steering Geometry (Toe-out on Turns): On Lincoln & Mercury, with outer wheel turned exactly 20°, inner wheel should be turned 23½° ± ½°. No adjustment provided. Check suspension system for bent parts if incorrect.

Ford Front Stabilizer: New design clamped directly to each lower control arm at two points (no frame connection).

Removal & Installation—Take out two stabilizer retainer-to-control arm bolts on each arm, remove retainers, lift stabilizer assembly off, slide insulators off stabilizer bar. When assembling stabilzer, use hydraulic brake fluid on insulators when sliding insulators on bar.

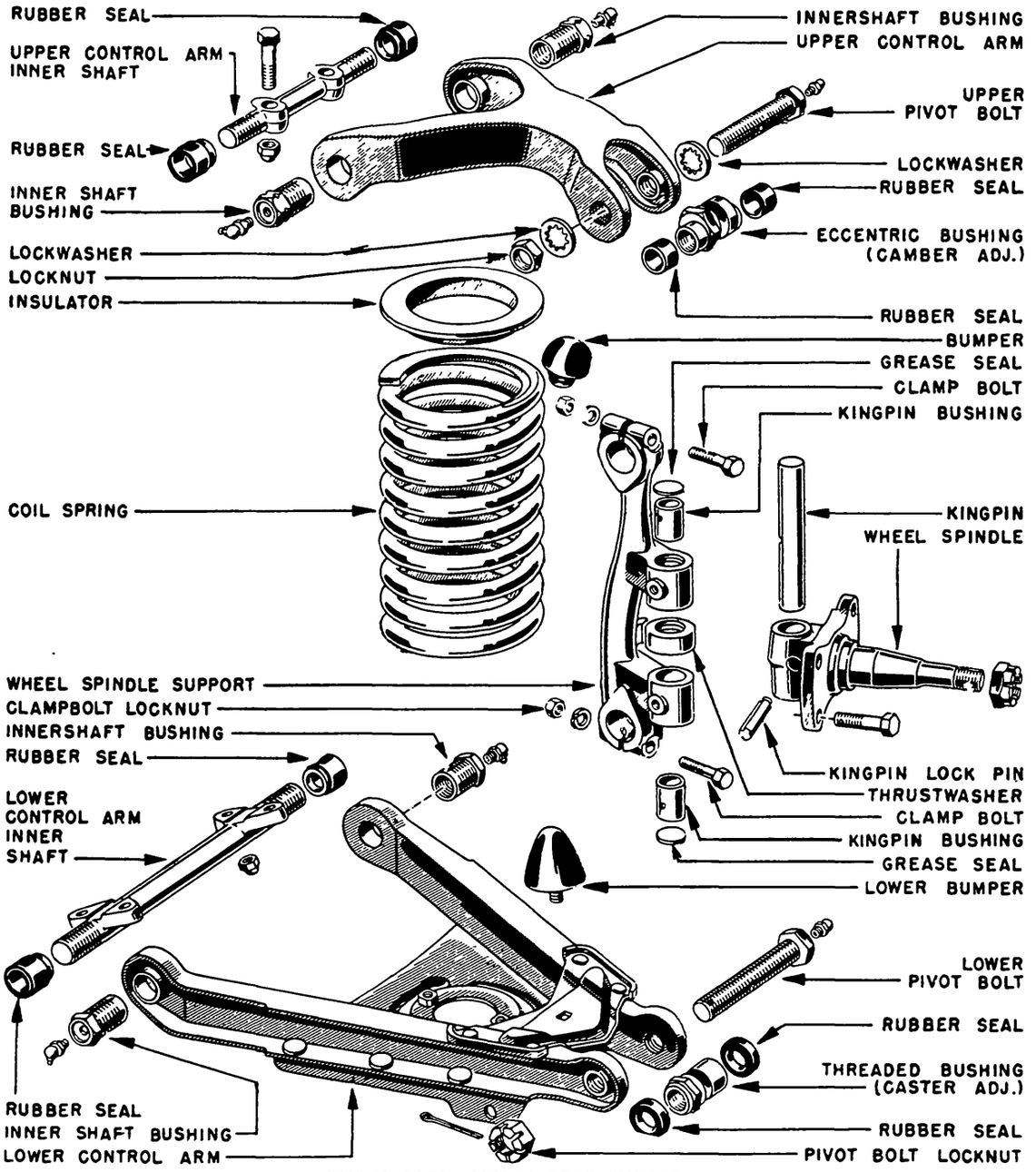
►**Installing 1950-51 Stabilizer on 1949 Cars**—Remove and discard old stabilizer. Drill .32" hole (#11 drill) in web of each lower arm assembly at point .78" up from lower face of arm and 7/8" out from outer face of lower spring seat flange. Position stabilizer on lower control arms with **offset upward** (to provide clearance), make certain that projections on clamps engage drilled holes in arms and that clamp bolts are at top. Install outer retainers with bolt hole at the bottom.

SHOCK ABSORBER REPLACEMENT: ***Not necessary to disturb front suspension assembly.*** Remove two capscrews (Ford), nuts on two mounting studs (Lincoln & Mercury) which hold shock absorber mounting plate on underside of spring seat on lower control arm. Remove nut on mounting stud at upper end of shock absorber, lower unit through hole in spring seat.

COIL SPRING REPLACEMENT: Support car on jack under frame. Remove shock absorber (see above). Disconnect stabilizer by removing end clip. Use a jack under the lower control arm inner shaft to hold shaft against cross-member, take out four mounting bolts in shaft. Lower jack slowly until spring tension is relieved, with spring fully extended, lift spring out. Install spring in same manner. See that flat end of spring is up, install insulator on top of spring (all models), and bottom of spring (Lincoln & Mercury only). Make certain that bottom of spring is properly seated in recess in spring seat on lower control arm. See "Springs" (below) for specifications.

LOWER CONTROL ARM REPLACEMENT: Remove coil spring (see above), remove nut on bolt linking control arm to wheel spindle support, unscrew bolt from arm and support bushing. Install arm in same manner. Hold support and bushing assembly centered in control arm while screwing bolt through bushing. Install new rubber seals on bolt (each side of support).

CONTINUED ON NEXT PAGE



1949-51 FORD—1952-53 FORD SIMILAR

1949-53 FORD PASS. CARS, LINCOLN & MERCURY (C nt.)

►**Lincoln & Mercury Lower Support Arm Frame Mounting Bolt Nut Change**—Nuts on bolts mounting inner shaft on frame were MARSDEN type (Part No. 34397-S) on first cars and **should be changed to** HUGLOCK type (Part No. 34447-S) whenever found in service.

UPPER CONTROL ARM REPLACEMENT: Raise car with a jack under the lower control arm spring seat. Remove wheel. Wire upper end of wheel spindle support to frame (to avoid movement of the support and damage to brake line when arm removed). Remove two capscrews mounting pivot shaft at inner end of control arm on frame. Remove nut on bolt linking upper arm to upper end of wheel spindle support, unscrew bolt from arm and support bushing, lift arm out. Install control arm in same manner. Hold support and bushing assembly centered in control arm while screwing bolt through bushing. Install new rubber seals on bolt (each side of support).

WHEEL SPINDLE SUPPORT REPLACEMENT: Raise car with a jack under the lower control arm spring seat. Remove wheel and brake drum assembly. Take out mounting bolts in backing plate, hang backing plate up on frame (to avoid disconnecting brake line). Drive out kingpin locking pin. Pry out grease seal plug in support above kingpin, drive kingpin down and out of support and wheel spindle (pin will force out lower grease seal plug). Remove nuts on bolts at upper and lower ends of support, unscrew bolts from control arms and support bushings. Lift out support. Bushings can be removed from support by removing clampscrew and pressing bushings out. Install support in same manner.

KINGPIN BUSHING REPLACEMENT: Bushings can be r placed without removing wheel spindle support from the car. Remove wheel spindle (**see Wheel Spindle Support Removal**), **press old bushings out,** press new bushings in and **ream bushings to size** listed below.

Kingpin Bushing—Maximum inside diameter of new bushings: (Ford) .8125-.8135", (Lincoln & Mercury) .9380-.9385". Wear limit inside diameter of old bushings: (Ford) .8185", (Lincoln & Mercury) .9435".
Kingpin—Maximum diameter of new kingpin: (Ford) .8115-.8120", (Lincoln & Mercury) .9365-.9370". Wear limit diameter of old kingpin: (Ford) .8170", (Lincoln & Mercury) .942".
Kingpin Cl aranc in Bushing—New limits (Ford) .0005-.002", (Lincoln & Mercury) .001-.002". Worn limits .009" for all models.

SPRINGS: Springs have upper end ground flat and are marked for identification as follows:
Part No. & Color Marks—Part number marked on outer diameter of flat end of spring coil and spring also paint marked (one or more daubs of special color) as listed in Spring table below.

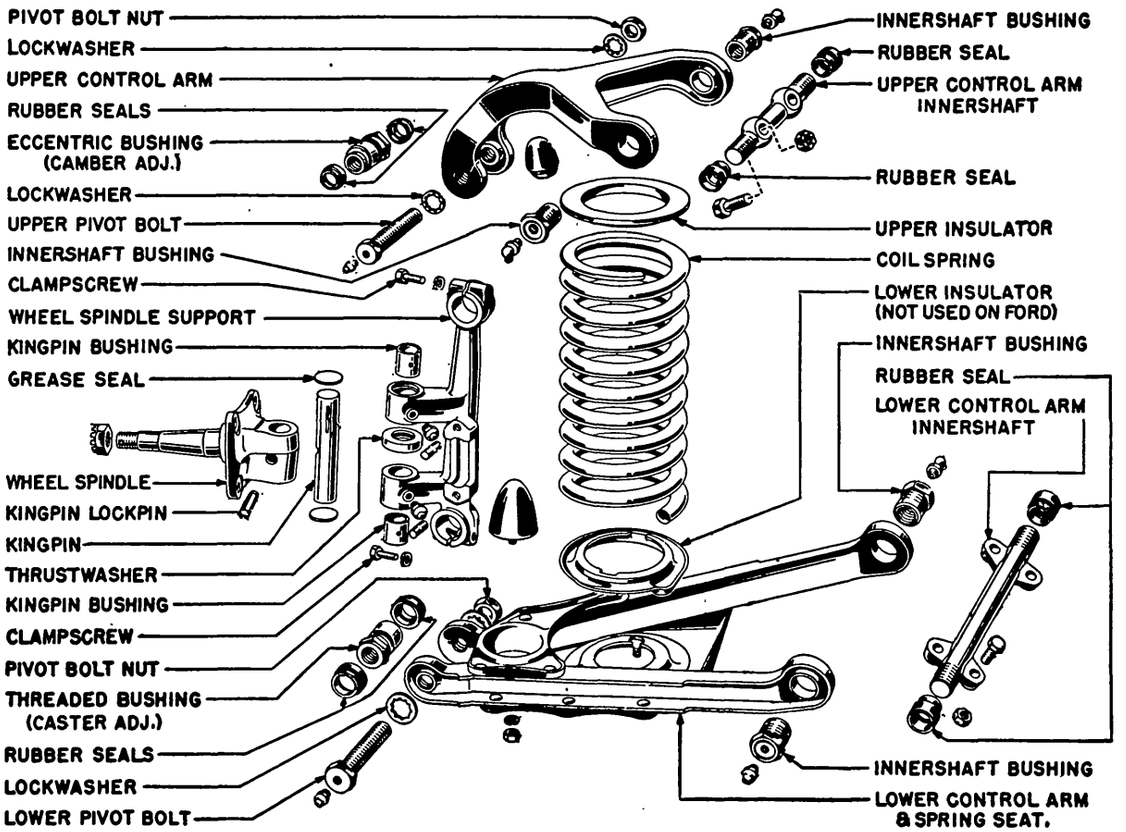
►**Ford Spring Production Change Mark**—No. 8A-5310-B spring used on first cars has loaded height of 9.2" and is marked by 2-daubs of white paint. Spring used on later cars has loaded height of 9.5" and is marked by 4-daubs of white paint.

►***CAUTION—These springs must not be mixed (use springs with same marking on both sides of car).***
Low & High Limit Spring Marks—Springs are graded in low and high limit groups and marked by a ½" white paint stripe over a minimum of four coils, for mean to low level springs, no white paint stripe for mean to high level springs.

►***SPRING INSTALLATION CAUTION—Springs on both sides of car must be matched (both springs same—Low Limit or High Limit). Car will have visible list toward low limit spring side and camber adjustment will be difficult if unlike springs used.***

Ford Spring Shim Installation (to correct Riding Height): If riding height not correct (see Riding Height data) but within limits which can be corrected by installation of shim, install one shim (Part No. 8A-5355) between top of spring and spring insulator on low side of car.

►***CAUTION—Do not install more than ONE shim on the spring (spring will not be held in place if more than one shim used).***



1949-51 LINCOLN, MERCURY, 1952-53 MERCURY SIMILAR

1949 SPRING SPECIFICATIONS

Ford Models

Car Model	Part No.	Color Mark
Std. (exc. Convt.)	8A-5310-B	③White
Std. (Convt.)	8A-5310-C	④Blue
H.D. (exc. Convt.)	8A-5310-D	Yellow
H.D. (Convt.)	8AF-5310-A	Red

Lincoln & Cosmopolitan

Lincoln (exc. Convt.)	8L-5310-A⑤	Red
Lincoln (Convt.)	8H-5310-B	White
Cosmpltn (Early)	8L-5310-A⑤	Red
Cosmpltn (Later)	8H-5310-B	White
All H.D.	8L-5310-B⑤	Blue

Mercury Models

Std. (Early)①	8M-5310-A	Yellow
Std. (exc. Sta. Wgn.)②	8M-5310-C	Yellow
Sta. Wgn	8M-5310-D	Green
H.D. (Early)①	8M-5310-B	Green
H.D. (Later)②	8M-5310-D	Green

①—First 2600 cars (used with two 8M-5355 shims).
②—After 2600 cars (no shims used).
③—First type marked by 2-daubs of white paint (loaded height 9.2"), Later type marked by 4-daubs of white paint (loaded height 9.5").

CONTINUED ON NEXT PAGE

1949-53 FORD PASS. CARS, LINCOLN & MERCURY (C nt.)

④—First springs marked by Yellow paint, changed to 2-daubs of BLUE paint to avoid confusion with Mercury springs.

⑤—Part No. 8M-5355 used between spring upper insulator and seat on first 1000 cars

1950-51 SPRING SPECIFICATIONS

Ford Models

	Part No.①	Color Mark
1950 Std (exc Convt)	8A-5310-B 8A-5310-D	White 3 Yellow
1950 Convt (First)	8A-5310-C	②
1950 Convt (Later)	0A-5310	3 Aluminum
1950 H D (exc Convt)	8A-5310-F	3 Red
1951 Std (exc below)	1A-5310-A	Yellow
1951 Convt	1A-5310-B	Red
1951 Station Wagon	1A-5310-C	Blue
1951 H D (exc Convt)	1A-5310-C	Blue
Lincoln 0L & 1L		
1950-51 Std	8L-5310-A	Red
1950-51 H D	8L-5310-B	Blue
Lincoln & Cosmopolitan 0H & 1H		
1950 Std (exc. Convt)	8H-5310-B	White
1950 Convt.	0H-5310-A	Orange
1950-51 H D	8L-5310-B	Blue
1951 Std (exc Convt)	1H-5310-A	Gray
1951 H D (exc Convt)	1H-5310-B	Brown
1951 Convt Std	1H-5310-C	Orange
1951 Convt H D	1H-5310-D	Purple
Mercury Models		
1950-51 Std (exc Sta Wgn)	8M-5310-C	Yellow
1950-51 Station Wagon	8M-5310-D	Green
1950-51 H D	8M-5310-D	Green

①—Number and color of paint marks

②—2 Yellow or Blue marks This spring superseded by No 0A-5310 in pairs only

1952-53 SPRING SPECIFICATIONS

Ford Models

Model	Spring No.	Color
Sedan & Coupe 6 Cyl	AB-5310C	Brown
Fordomatic	AB-5310-J	Green
Sedan & Coupe 8 Cyl	AB-5310J	Green
Fordomatic	AB-5310F	Red
Convertible & Victoria 8 Cyl	AB-5310F	Red
Fordomatic	AB-5310K	Alum
Courier & Ranch Wagon 6 Cyl	AB-5310G	Blue
Courier & Ranch Wagon 8 Cyl	AB-5310H	Orange
Country Squire & Sedan 8 Cyl	AB-5310H	Orange

►***HEAVY DUTY SPRING NOTE—AB-5310G may be used in place of AB-5310C or J. AB-5310H may be used in place of AB-5310F or K.***

Mercury Models

Model	Spring No.	Color
Exc Sta Wgn & Conv	AB-5310F	Red
Station Wagon	MA-5310E	Purple
Convertible	AB-5310K	Alum.

1952-55 FORD PASS. CARS, LINCOLN, MERCURY

Ford Pass. Cars, Sta Wgn. & Sed. Del. (1954-55)
Lincoln, All Models (1952-55)
Mercury, All Models (1954-55)
Thunderbird (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 FORD LOWER ARM BUMPER ASSEMBLY INSTALLATION CAUTION* Bumpers are supplied as right-hand (AD-3019-B) and left-hand (AD-3020-B) and are designed to point slightly inboard when correctly installed If right-hand bumper installed on left side or vice versa, bumper will not contact frame on rebound and serious damage to the suspension may result

►*1955 FORD CAR & THUNDERBIRD LOWER ARM MOUNTING BOLT BUSHING INSTALLATION CAUTION* Double-shoulder front suspension lower arm mounting bolt bushing (Part No B4A-3069-D) was released for use on Ford cars and Thunderbird but **was not** used in production Bushing used in production is single-shouldered The front bushing is pressed in from the inside of the lower arm front leg

►*1955 FORD FRONT SPRING SHIM INSTALLATION (When Air Conditioning Unit Installed)* Spring shim and rubber insulator (Part No AD-5355-A) should be installed on top of front springs when air conditioning unit is installed in the field in order to maintain front end and ride height

►*1955 FORD STABILIZER & SHOCK ABSORBER LOCKNUT PRODUCTION CHANGE* To prevent possibility of locknut (45218-S) from coming loose from stabilizer link and shock absorbers, locknut has been eliminated and a lockwasher (34920-S7) has been added Torque nut and lockwasher to 15-25 ft lbs Specification for locknut (45218-S) remains 25-35 ft lbs

►*LUBRICATION CAUTION* DO NOT use any type of lubricant on rubber bushings at inner ends of upper and lower control arms Upper and lower ball joint assemblies are only points requiring lubrication

DESCRIPTION: Front suspension is "Ball-Joint" type similar to design used on Lincoln beginning 1952. With this type design, no Wheel Spindle Support is used and the wheel spindle is connected directly to the upper and lower support arms by Ball-Joint assemblies (ball-joint provided for both wheels turning and up-and-down movement of the suspension) Shock absorbers are direct acting type mounted within the coil springs

CHECKING & ADJUSTMENT: Check wheel bearing adjustment, wheel spindle wear, tire inflation pressure, wheel runout and balance Check steering linkage, and steering gear for excessive looseness or play, then place car on level floor and check front end specifications with car at curb weight

►*ADJUSTMENT CAUTION Due to differences in mounting of upper support arm shaft and location of adjusting shims, all models are not adjusted exactly alike. See Adjustment data following:*

Tire Inflation Pressure For each tire size and model (Cold)

FORD

Model	Tire Size	Lbs. Pressure Front	Rear
Conv with Fordomatic (1954)	7 10x15-4	24	21
Victoria, Fordomatic (1954)	7 10x15-4	24	21
Fairlane 8, Fordo (1955)	6 00x16-4	28	25
Fairlane 8, Fordo (1955)	7 10x15-4	26	23
Pass (Except above) (1954)	6 70x15-6	30	27
Pass (Exc above) (1954-55)	6 70x15 4	26	23
Courier (1954-55)	6 70x15 4	23	26
Ranch Wgn & Cour (1954-55)	7 10x15-4	23	26
Sta Wgn & Cour (1954-55)	7 10x15-6	25	30
Sta Wgn (1955)	6 00x16-4	28	25
Thunderbird (1955)	6 70x15-4	24 C	C 24
LINCOLN			
Closed Cars (1952-55)	8 00x15	26	22
Convertible (1952-55)	8 20x15	24	22
MERCURY			
Convertible (1954-55)	7 60x15-4	24	22
Station Wagon (1954-55)	7 60x15-4	24	24
Others (1954-55)	7 10x15-4	26	22

C—30 lbs at sustained high speed

Kingpin Inclination: (Ford) 6-7°, (Lincoln) 7°10' with ¾° Camber, (Mercury) 7° with ¾° Camber No Adjustment

Caster: (Ford) 0° to Pos 1°, (Lincoln & Mercury) 0° to Neg. 1½°. Both sides of the car should be equal within ½°

Adjustment (Ford)—Loosen two bolts attaching upper support arm shaft to frame bracket, remove or insert shims at one or the other mounting bolt **This shims located between inner side of shaft and frame bracket.** To INCREASE POSITIVE CASTER, add shim at front bolt or remove shim at rear bolt. To INCREASE NEGATIVE CASTER, remove shim at front bolt or add shim at rear bolt. A 1/16" shim thickness change at either point will change caster ½°. Shims furnished in thicknesses of 1/32" & 1/16". Check Camber. After adjustments completed, tighten shaft bolts to 65-90 ft. lbs.

►*CAUTION—Difference in thickness of shim pack at front and rear bolts must not exceed 1/8".*

Adjustment (Lincoln & Mercury)—Loosen two bolts attaching upper support arm shaft to frame bracket, insert shims at one or the other mounting bolt **This shims located between outer side of shaft and frame bracket.** For POSITIVE CASTER INCREASE, add shim at rear bolt (or remove shim at front bolt), for NEGATIVE CASTER INCREASE, add shim at front bolt (or remove shim at rear bolt) A 1/16" shim thickness change will change caster ½° Shims furnished in thicknesses of 1/32" and 1/8" (also 1/64" and 1/16" for Lincoln) Check Camber After adjustments completed, tighten shaft bolts to 75-90 ft lbs (Lincoln), 70-80 ft lbs (Mercury)

Camber: (Ford) Pos ¼° to Pos 1¼°, (Lincoln & Mercury) 0° to Pos ¾° Both sides of the car should be equal within ¼°

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1952-55 FORD PASS. CARS, LINCOLN & MERCURY (Cont.)

Adjustm nt (F rd)—Procedure is same as for Caster Adjustment above **xc pt** that shims should be added or removed equally at **both** front and rear bolts. For POSITIVE CAMBER INCREASE, add shims equally at both bolts; for NEGATIVE CAMBER INCREASE, remove shims equally at both bolts. A 1/16" shim thickness change will change camber ¼°. After adjustment completed, tighten shaft bolts to 65-90 ft. lbs. torque.

►*CAUTION—Total shim pack thickness at each bolt should not xc d 9/16".*

Adjustm nt (Linc ln & Mercury)—Procedure is same as for Caster Adjustment above **except** that shims should be added or removed equally at **both** front and rear bolts. For POSITIVE CAMBER INCREASE, remove shims equally at both bolts; for NEGATIVE CAMBER INCREASE, add shims equally at both bolts. A 1/16" shim thickness change will change camber ¼°. After adjustment completed, tighten shaft bolts to 75-90 ft. lbs. (Lincoln), 70-80 ft. lbs. (Mercury).

T -ln: (Ford) 1/16-1/8", (Lincoln & Mercury) 3/32"-5/32".

Adjustm nt (All M d ls)—Loosen clamp bolts on adjusting sleeve at outer end of each tie rod, **turn both adjusting sl v s qually** for correct toe-in (turn sleeves in opposite directions).

►*CAUTION—On Pow r Steering cars, run engine while adjusting to -in to insur control valve being properly cent r d in pitman arm nd of steering arm-to-idler arm rod.*

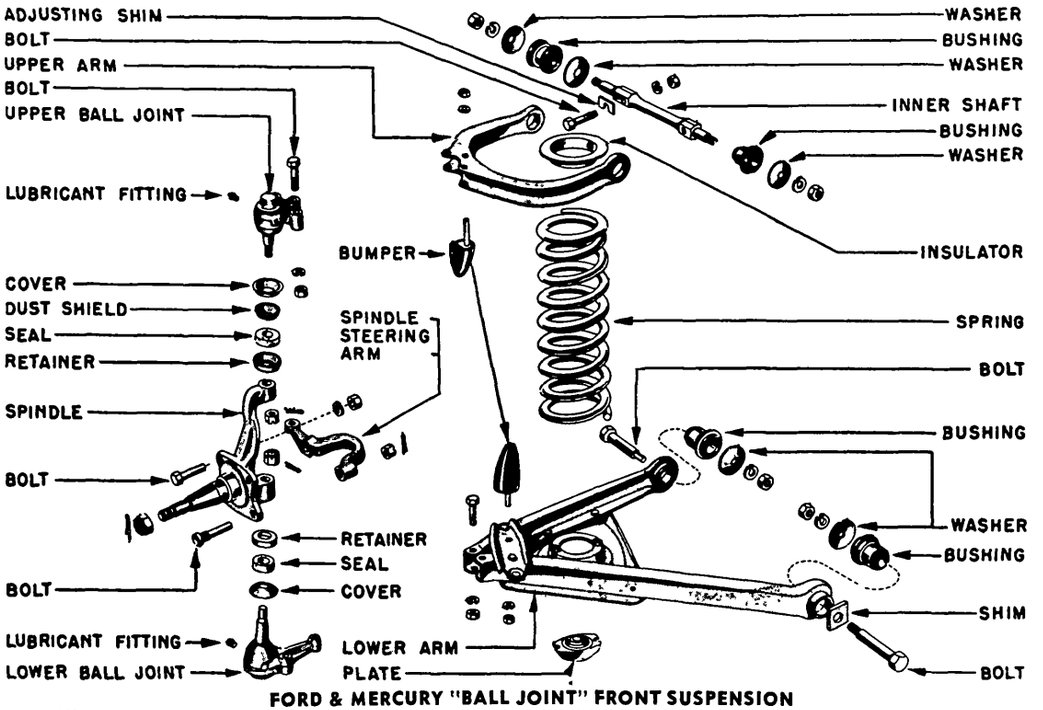
T -Out n Turns: Inner and outer wheel angles are shown below. No adjustment.

	Inner Wheel	Outer Wheel
Lincoln (1952-53)	36°	26°20'
Lincoln (1954-55)	23½°	20°
Mercury (1954)	24°	20°
Mercury (1955)	24°9'	20°

SHOCK ABSORBER REPLACEMENT: Not necessary to disturb front suspension assembly. Remove two nuts on mounting studs which hold shock absorber mounting plate on under side of spring seat on lower control arm. Remove nut on shock absorber stud at upper end of shock absorber, lower shock through hole in spring seat.

Installati n: Reverse removal procedure. Make certain that rubber bushings and washers installed in correct position, tighten shock absorber stud nuts to 20-35 ft. lbs. (Ford), 20-30 ft. lbs. (Lincoln & Mercury). Tighten shock absorber mounting plate-to-lower support arm capscrews to 12-20 ft. lbs. (Ford), 13-18 ft. lbs. (Lincoln & Mercury).

COIL SPRING & LOWER SUSPENSION ARM REPLACEMENT (Rem val): Raise front of car and place support stand under each frame side rail to rear of lower suspension arm. Remove front wheel, hub, and drum as an assembly. Remove shock absorber (above), disconnect stabilizer bar from lower suspension arm. Loosen lower ball-joint to wheel spindle stud nut approximately two turns and loosen ball-joint (see "Ball-Joint Removal" below). Place a jack under lower suspension arm and raise arm until rebound bumper on upper arm is clear of the frame. Remove nut from lower ball-joint stud and lift wheel spindle up and off the stud. Lower jack until spring tension is relieved and spring can be removed. Remove coil spring, rubber insulator and retainer ring (Note location of these parts to insure correct reassembly). To remove lower suspension arm, take out the two bolts attaching arm to frame. Inspect bushings on inner end of each member and replace if necessary.



FORD & MERCURY "BALL JOINT" FRONT SUSPENSION

Bushing Replacement (Lincoln & Mercury)—Position Split Adapter Ring Tool 3069-F on inside of inner end of rear (short) arm and place Tool 3069 to fit into groove of Tool 3069-F. Place Tool 3069-G over the bushing. Press bushing from arm with an arbor press to remove bushing from the front (long) arm, position flange of inner bushing in Tool 3069 and place Tool 3069-G over the bushing. Press bushing from arm. To install bushings, center bushings in arm hole and place bushing flange on Tool 3069-A (Lincoln), 3069-E (Mercury), then place Tool 3069 over arm. Press bushings in place Tool 3069 over the arm Press bushings into place until shoulder ribs of bushing bottom on suspension arm (do not attempt to press bushing beyond edge of shoulder ribs or raised section of outer sleeve as distortion will result). *CAUTION—Under no circumstances should only one bushing be replaced.*

Bushing Installation (Ford)—Use Tool T54P-3044 to install bushings (this tool is composed of a number of various parts and each part is referred to as a "Detail #6" etc.). Position both halves of Detail #12 on inside of inner end of rear (short) arm and place Detail #6 to fit into groove of Detail #12. Place Detail #5 over the bushing and press bushing from arm with an arbor press. To remove bushing from front (long) arm, position flange of inner bushing in Detail #6 and place Detail #5 over bushing and press bushing from arm. To install bushings, center the bushings in the arm hole and place bushing flange on Detail #7, and then place Detail #6 over the arm. Press bushing into place until shoulder ribs of bushing bottom on suspension arm (Do not attempt to press bushing beyond edge of shoulder ribs or raised section of outer sleeve as distortion will result). *CAUTION—Under no circumstances should only one bushing be replaced.*

Installation: Install the lower arm rear leg to frame cross member and tighten attaching nuts to 55-75 ft. lbs. torque. Add enough shims between forward arm and frame to fill the existing space, and tighten nut finger tight. Loosen nut on rear arm and run it up finger tight. With the arm in curb load position (approximately horizontal with outer ends slightly lower than inner) torque the attaching nuts to 55-75 ft. lbs. Place coil spring and upper rubber insulator in position. With a jack under the lower suspension arm, raise arm to compress coil spring. Care must be taken so that both upper and lower ends of spring are properly seated. Guide the spindle boss over ball joint stud. Install nut and torque to 100 ft. lbs., continue to tighten until cotter pin hole is lined up. install cotter pin. Remove jack from under suspension arm, and install shock absorber. Secure stabilizer to lower suspension arm with spacer, insulator, washers, and bolt. Install wheel and hub assembly and adjust front wheel alignment.

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1952-55 FORD PASS. CARS, LINCOLN & MERCURY (Cont.)

BALL-JOINT REMOVAL (Upper & Lower): Ball-joints are furnished as assemblies except for seals and related parts assembled on ball-joint stud. Raise front of car with a jack placed under lower control arm, then place a support under frame side rail to rear of suspension arm. Remove front wheel and remove cotter pin in ball-joint stud (NOTE—If both ball-joints are to be removed, free the lower stud first). Loosen stud hex nut approximately 2 turns and install Tool 3006-A with the screw end resting against lower stud nut. Turn screw of tool and apply sufficient pressure to place ball-joint under tension. Strike the spindle sharply at a point opposite the stud bore to pop it loose. Increase tension and strike again if necessary *(CAUTION—Spindle or tool may be damaged if pressure only is used to free stud).* Repeat this procedure with other stud if it is to be removed. Ball-joint assembly can be removed from suspension arm by taking out the three attaching bolts.

Servicing—Remove retainer, seal, and covers from stud, inspect parts for wear or damage and replace if necessary. If new rubber seals being installed, see that they are pushed down into retainer cup before cup is installed on stud. Reassemble all seal parts in original position.

►*CAUTION—Do not wash ball-joint assemblies with solvent which may remove lubricant.*

Installation—Reverse removal procedure as given above. Tighten to following torques:

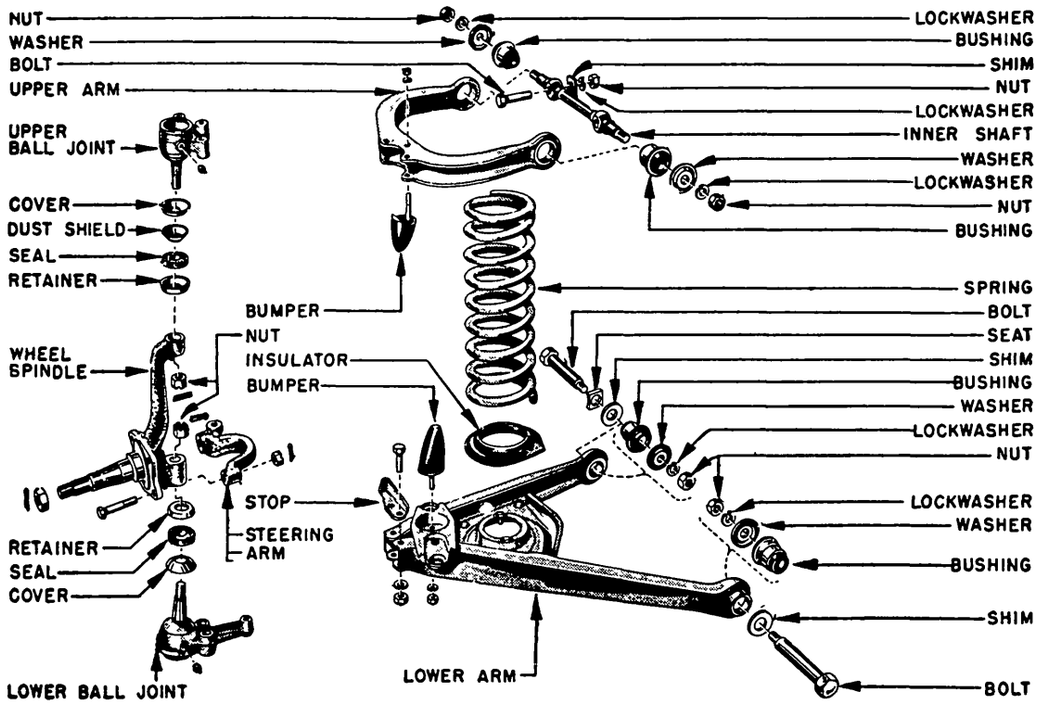
Ball-Joint Assembly Mounting Bolts

Car	Upper	Lower
Ford	28-43 ft. lbs.	65-90 ft. lbs.
Lincoln & Mercury	30-40 ft. lbs.	70-90 ft. lbs.

Ball-Joint Mounting Stud Nuts—Tighten stud nuts to minimum torque of 80 ft. lbs. (upper ball-joint), 100 ft. lbs. (lower ball-joint), and then continue to tighten until cotter pin holes line up.

UPPER SUSPENSION ARM REPLACEMENT (Removal): Place jack under lower suspension arm near ball joint mounting and raise lower arm until some of the tension has been removed from the upper bumper. Remove wheel and tire assembly. Wire spindle to frame to avoid damage to brake hose. Remove cotter pin from ball-joint stud and loosen nut approximately two turns. Loosen ball-joint stud (see "Ball-Joint Removal" above), then remove ball-joint stud hex nut. Remove the two bolts securing inner shaft to frame (NOTE—Check the number of shims removed from between shaft and frame (Lincoln & Mercury), or between nut and frame (Ford), at each end of bolt locations). Remove upper suspension arm.

Bushing Replacement (Lincoln & Mercury)—Install Tool 3044-B on the inner shaft and place Tool 3069 over bushing. Press bushing from arm. Remove inner shaft and steel washer. To remove the opposite (double shoulder) bushing, on the rear upper arm, insert Tool 3069-F into flange of arm, then place Tool 3069 over bushing and into recess of Tool 3069-F. Center bushing over Tool 3069-G and press out. (NOTE—Tool 3069-G will shear rubber until steel shell is contacted). To install double shouldered bushing in rear of upper arm, lubricate rubber portion of bushing for easier installation. Position Tool 3069 on inner side of rear arm. Install bushing in hole from outer side of arm, position tool 3068 (Lincoln), 3068-C (Mercury) over bushing. Press bushing into arm to shoulder stop. Install long machined end of inner shaft, with washer on shaft, into bushing. Install bushing on front arm, positioning it over end of shaft and pressing it into place with Tool 3068. With both bushings in place, install washer and nut on each end of shaft and tighten finger tight. Position shaft in suspension arm so that holes are parallel with shaft and tighten nuts to 55-75 ft. lbs. torque. *CAUTION—Under no circumstances should only one bushing be replaced.*



LINCOLN "BALL JOINT" FRONT SUSPENSION

►*FORD TOOL T54P-3044-A (Detail #10) REWORK TO AVOID INTERFERENCE:* If interference between upper suspension arm rod and "Detail#10", correct by grinding a 1/8" radius on bottom inner edge of each half of tool, blending it into the flat portion of tool. A pencil type grinder should be used for this purpose.

Bushing Replacement (Ford)—Remove front bushing first. Install Tool 3044-A Detail #10 (see Note above) on the inner shaft and place Detail #6 over bushing. Press bushing from arm. Remove inner shaft and steel washer. To remove opposite (double shoulder) bushing, on the rear upper arm, install Detail #6 over bushing and center bushing over Detail #9. Press bushing from arm. To install double shouldered bushing in rear of upper arm, install Detail #6 on inner side of rear arm. Install bushing in hole (entering it from outer side of arm), and position Detail #9 over bushing. Press bushing into arm until shoulder stop is reached. Install long machined end of inner shaft, with washer on shaft, into bushing. Install bushing on front arm, positioning it over end of shaft and pressing it into place with Detail #8. With both bushings in place, install washer and nut on each end of shaft and tighten finger tight. Position shaft in suspension arm so that holes are parallel with shaft and tighten nuts to 55-75 ft. lbs. torque. *CAUTION—Under no circumstanc s should only one bushing be replaced.*

Installation: Position the upper suspension arm on frame cross member. Install inner shaft-to-frame bolts and insert the same number of shims that were originally used between shaft and frame cross member (Lincoln & Mercury), between inner shaft attaching nut and frame cross member (Ford). Tighten bolts to 70-90 ft. lbs. torque. Place ball joint stud in spindle and install the the nut. Tighten to 80 ft. lbs. minimum, then continue to tighten until cotter pin holes line up.

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1952-55 FORD PASS. CARS, LINCOLN, MERCURY (Cont.)

FRONT SPRING APPLICATION

1954 Ford 6 Cyl.

Model	Spring No.	Color Mark
All (Exc Sta Wgn & Sed Del) ①	AD-5310-D	Brown
All (Exc Sta Wgn & Sed Del) ②	AD-5310-E	Green
Sta Wgn & Sed Del	AD-5310-H	Blue
Heavy Duty ③	AD-5310-H	Blue

1955 Ford 6 Cyl.

Model	Spring No.	Color Mark
2 Dr & 4 Dr ①	AD-5310-E	
2 Dr. & 4 Dr. ②	AD-5310-F	Red
Sunliner, Victoria, Skyliner ①	AD-5310-F	Red
Sunliner, Victoria, Skyliner ②	AD-5310-G	Alum
Ranch Wagon & Sed Del	AD-5310-H	Blue
2 Dr & 4 Dr, Heavy Duty	AD-5310-J	Orange
Country Sedan & Country Squire	AD-5310-J	Orange

1954 Ford 8 Cyl

Model	Spring No.	Color Mark
2-Dr, 4-Dr, Cl Cpe, Bus Cpe ①	AD-5310-E	Green
Conv, Victoria, Skyliner ①	AD-5310-F	Red
2-Dr, 4-Dr, Cl Cpe, Bus Cpe ②	AD-5310-F	Red
Conv, Victoria, Skyliner ③	AD-5310-G	Alum
Sta Wgn & Sed Del	AD-5310-J	Orange
Heavy Duty ③	AD-5310-J	Orange

①—With Manual Shift Trans

②—With Fordomatic Trans

③—Use on 2-Dr, 4-Dr, Cl Cpe, & Bus Cpe, with Manual Shaft Trans

1955 Ford 8 Cyl

Model	Spring No.	Color Mark
2 Dr & 4 Dr ①	AD 5310 F	Red
Sunliner, Victoria Skyliner ①	AD 5310 G	Alum
2 Dr & 4 Dr ②	AD-5310-G	Alum
Sedan Delivery	AD-5310-H	Blue
Ranch Wagon	AD-5310-J	Orange
Sunliner, Victoria, Skyliner ②	B5A-5310-C	
2 Dr, 4 Dr, Pol Int H D	B5A-5310-D	
Thunderbird	B5S-5310 B	

1954-55 Mercury

All (Exc Conv & Sta Wgn)	MB-5310-D	Yellow
Convertible	MB-5310-E	Orange
Sta Wgn	MB-5310-F	Bronze
All (Exc Conv & S W) 1955 only	AD 5310-G	Alum

1952-55 Lincoln

All (Exc Conv)	LA-5310-A	Pink
Convertible	LA-5310-C	Blue
Heavy Duty	LA-5310-D	Gray

HENRY J

All Models (1951-54)

DESCRIPTION: Independent, linked parallelogram type with coil springs, and direct acting shock absorbers mounted within the springs

CHECKING & ADJUSTING: Before checking alignment, make sure that front wheel bearing adjustment is correct, and check spindle wear, tire inflation pressure, wheel runout and balance Check steering linkage and steering gear for excessive wear or looseness, then place car on level floor and check front end alignment with car at curb weight as follows.

Tire Inflation Pressure: 24 lbs. (front), 20 lbs (rear), with tires cold

Front Spring Deflection: Before checking springs make sure front suspension is well lubricated, then bounce front end of car up and down several times Measure at each lower arm from top of arm near outer end, upward to top face of frame side rail. Be sure to measure at identical spots on both sides of vehicle to obtain comparable measurements The two measurements must be the same within 3/8" Weak springs are indicated when the outer end of both control arms are slightly above horizontal with respect to the inner ends when vehicle is at curb weight (no one inside). If this condition exists, replace both springs.

Caster: 0° preferred. (Limits Pos. 1° to Neg 1°).

Adjustment—1/16" or 1/8" shims are installed between front suspension lower arm inner pivot and frame at either the rear or front portion of the inner pivot. Excessive negative caster is corrected by placing a shim under the rear end of pivot Excessive positive caster is corrected by shimming under forward end.

Camber: Pos. ½° preferred. (Limits Pos. ¼° to Pos 1°).

Adjustment—Install or remove shims between the upper support arm inner pivot and the shock absorber support. Installing a shim will decrease camber. Removing shims will increase camber

Kingpin Inclination: 4½° preferred (Limits 4° to 4¾°) Not adjustable.

Toe-In: ¼" preferred. (Limits 3/16" to 1/4").

Adjustment—Shorten or lengthen the tie rods Loosen the two clamps on tie rod adjusting link and turn link to adjust rod length as required. Tighten clamps to lock adjustment

Toe-Out On Turns: With inner wheel turned 20°, outer wheel should be 17½° Not adjustable If not correct, replace steering arms

UPPER CONTROL ARM REPLACEMENT: To remove control arm, raise front of car with a jack under frame side rail until front wheel is off floor Remove front wheel and tire Place another jack or block under lower control arm to hold arm and spring in position while upper arm is being removed Place a block under brake drum, or fasten steering knuckle support to coil spring with a strong wire, to hold support upright when upper control arm is removed. Remove bolts and washers attaching inner pivot to shock absorber support If shims are used between pivot and support, set them aside and be sure and use them in the same location when installing control arm Remove nut and pivot bolt from upper end of steering knuckle support, remove seals and lift off upper control arm. Do not remove bushings from steering knuckle support unless it is worn or loose.

Installation—Fit upper control arm in place so outer end, curving downward, straddles steering knuckle support while inner end fits against shock absorber support. Install same shims, if any were removed, between inner pivot and support to make proper camber adjustment possible Install bolts and lockwashers to attach pivot to shock absorber support Tighten to 70-80 ft lbs torque Fit rubber seal in place between each side of steering knuckle support and control arm. Insert outer pivot bolt through the front side of arm, threading it through steering knuckle support. Install pivot nut and tighten to 165 ft lbs torque. Install lubrication fitting in head of pivot bolt. Remove block from under brake drum or wire holding steering knuckle support upright Install wheel and tire and remove jack. After upper control arm is installed, check and adjust front end alignment.

LOWER CONTROL ARM REPLACEMENT: To remove lower control arm, disconnect and remove sway eliminator bar from lower control arms. Raise vehicle with a jack under frame side rail until front wheel off floor. Remove front wheel and tire. Remove shock absorber lower retainer nut, retainer, cushion and cushion seat Place another jack under spring seat on lower control arm Use a wood block between jack and spring seat to prevent slipping Raise jack to support arm firmly when it is detached from front cross-member Remove control arm inner pivot attaching bolts and reinforcements from front cross-member If shims are installed under inner pivot, they should be set aside and used in the same location when installing control arm. Carefully lower jack to relieve front coil spring compression and remove coil spring Remove nut and pivot bolt from lower end of steering knuckle support and remove lower control arm. Do not remove bushing from steering knuckle support unless it is worn or loose.

Installation—Fit lower control arm with spring seat on bottom side of arm in place so outer end straddles lower end of steering knuckle support. Insert a rubber seal between each end of bushing (in the steering knuckle support) and control arm Insert outer pivot through front side of arm, and into bushing in steering knuckle support. Be sure support and bushing are centered between side of arm before pivot is started into bushing Install pivot nut and tighten to 165 ft lbs. torque Install lubrication fitting in pivot bolt Install coil spring with spring and shock absorber attaching parts in proper position (see illustration) Swing lower control arm upward into place on coil spring and shock absorber. Jack up lower control arm until inner pivot seats against front cross-member Install inner pivot reinforcements and attaching bolts and remove jack. Attach lower end of shock absorber to control arm, remove jack under frame side rail and connect sway bar to lower control arm. Check and adjust front end alignment.

STEERING KNUCKLE SUPPORT (Removal): Raise vehicle and remove front wheel and tire, and support the lower control arm to relieve spring pressure Remove wheel hub and brake assembly, brake support plate (brake line does not have to be disconnected), and tie brake support plate to frame Disconnect tie rod end from steering knuckle If

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HENRY J (C nt.)

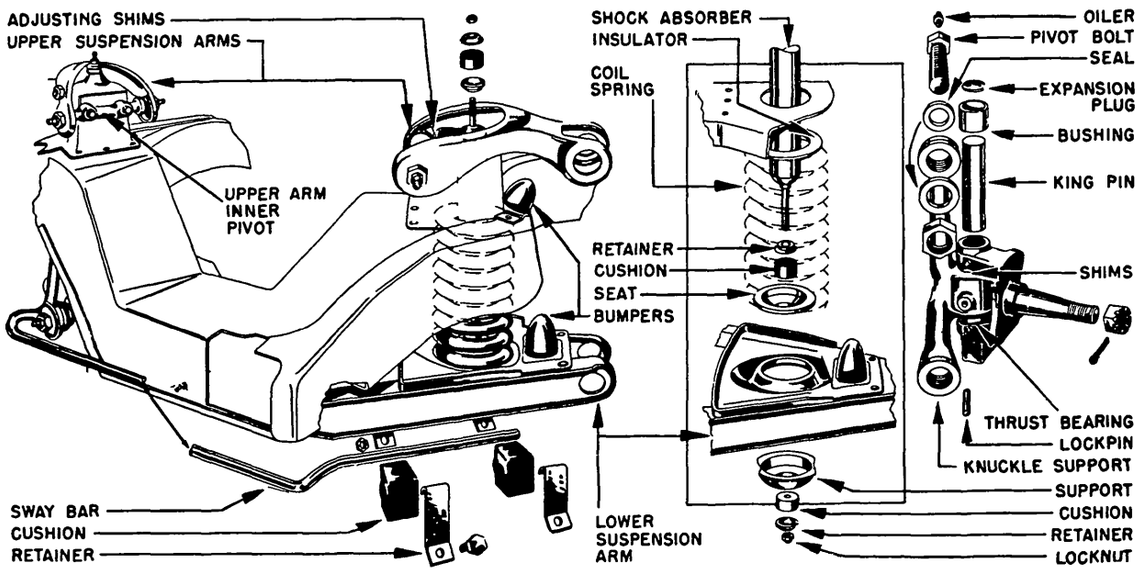
steering knuckle and support are to be removed as a unit, remove nuts and pivot bolts connecting ends of support to upper and lower control arms. If steering knuckle is to be removed separately, or is to be disassembled from steering knuckle support, drive out kingpin lockpin from rear side of support. Remove expansion plug from top of steering knuckle by drilling a hole in center of plug and prying plug out with punch. Remove kingpin from knuckle and support by driving it out with a suitable drift against top end. Lower expansion plug will be pushed out ahead of kingpin. Remove steering knuckle, thrust bearing and shims. Remove arm from steering knuckle.

Installation—If steering knuckle and support were both removed, they should be assembled prior to installation on vehicle, as follows: Hold steering knuckle on support. Insert thrust bearing between lower face of support and steering knuckle with open side down. Carefully align bores in knuckle, support, shims and bearing, then drive kingpin into place using a soft drift and hammer. The groove on side of kingpin must align with lockpin hole in support when kingpin is installed. Check fit of steering knuckle on kingpin. A spring scale attached to cotter pin hole in end of wheel spindle should measure not more than 5 lbs. pull to swing knuckle. The vertical movement of knuckle on kingpin should not exceed .002". Add or remove shims between top face of support and steering knuckle as required to maintain vertical clearance of .002". When proper fit is obtained, install kingpin lockpin from front side of support, using a threaded service replacement pin. Install lock washer and nut on threaded end of pin. Install expansion plug in steering knuckle at top end of kingpin and another plug at bottom of kingpin. Expand plugs to fit tightly in knuckle by holding round end of drift against plug and hitting with a hammer. Stake each plug at four places to prevent plug loosening. Install lubrication fitting in steering knuckle. Fit knuckle and support assembly into place on outer ends of control arms. Insert rubber seal between each end of control arm bushings and suspension arms and install pivot bolt through front side of arm and into bushing in support. Install pivot nut and tighten to 165 ft. lbs. torque. Remove jack from under lower control arm, then install steering arm to steering arm. Install brake support plate, wheel hub and brake drum assembly. Install front wheel and tire. Remove jack and check front end alignment.

COIL SPRING REPLACEMENT: See procedure for Lower Control Arm Replacement (above).

►*FRONT SPRING REPLACEMENT NOTE*—Service replacement springs with the same part number which may differ in load rate between limits. Due to this variation, it is possible to match springs by selection for use in service. Replacement springs are marked on the bottom coil with paint—those with a load rate toward the high side of permissable limits are marked with RED, those toward the lower side of permissable limits are marked with WHITE. When using RED and WHITE marked springs together, install the red spring on the left side. Two red or two white springs may be used together provided their load rates differ sufficently to have the front end level after installation.

►*HEAVY DUTY SPRING NOTE*—Heavy duty springs are available for service replacement. These springs are marked by blue paint on center coils, with either red or white marking on the bottom coil to identify load rate. These springs must be used in pairs and heavy duty front shocks must be installed.



HENRY J FRONT SUSPENSION

1946-54 HUDSON (EXCEPT JET MODELS)

All Models (Except Jet) 1946-54

DESCRIPTION: Conventional type with knuckle support pivoted on outer ends of upper and lower support arms. Knuckle support upper pivot is an eccentric bushing (for Camber and Caster adjustments).

CHECKING & ADJUSTMENT: Before checking specifications and making adjustments, always perform the following operations first:
Wheels & Tires—Check wheels and tires for balance and runout, correct if required. Inflate all tires to correct pressure. Check front wheel bearings and adjust if loose. Runout must not exceed 1/16-3/32".
Steering Linkage & Kingpin Looseness—Check kingpin bushings, drag link and connecting rod ends, and steering gear for looseness. Adjust steering gear and replace worn bushings and end joints.
Frame Level and Spring Height—Level car by rocking car sideways (not endwise) several times and allowing it to come to rest. Check spring height at each side of car. If heights not equal within ½", replace or shim low spring (see Springs below)

Kingpin Inclination: Should be equal on both sides of car within ½°.

Kingpin Inclination

1946-47	4° 36' Crosswise
1948-54	3°36' Crosswise

NOTE—Kingpin inclination affected by Camber Adjustment (decreases as Camber increased).

Camber: As listed below. Should be equal within ½° on both sides of car. NOTE—Toe-in setting depends on Camber (check when camber adjusted).

Camber Specification

1946-47	Pos. ¼° to Pos. ¾°
1948-54	Pos. ½° to Pos. 1½°

To Adjust—Adjusted by turning knuckle support upper eccentric pivot pin (Same as Caster Adjustment). See Caster Adjustment below and turn eccentric bushing not more than ½ turn from point where correct caster is secured.

Caster: As listed below. Should be equal within ½° on both sides of car.

Caster Specification

1946-47	0° plus or minus ½°
1948-54	1° (limits) Pos. ½° to 1½°

To Adjust—Loosen clamp bolt in upper end of knuckle support, turn eccentric bushing into support to increase caster, out of support to decrease caster. One complete turn of bushing will change caster ½°. Correct caster of 0° should be secured with center of knuckle support (clamp bolt center) exactly 1 11/32" ahead of face of upper support arm. After correct caster secured, turn bushing not more than ½ turn in either direction to adjust Camber (½ turn will give maximum camber adjustment of plus or minus ½°). Tighten clamp bolt

Toe-In: As listed below. Measure at wheel rim with wheels set straight ahead and intermediate steering arm centered with tool J-1442.

Toe-In Specification

1940-47	0" to 1/16"
1948-51	1/32" (Limits 0" to 1/16")
1952-54	0" to 1/16"

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1946-54 HUDSON (exc. Jet) (C nt.)

To Adjust—Loosen clamp bolts and turn both tie rods equally. NOTE—Tie rod lengths must be equal **Steering Ge metry:—With inner wheel turned 30°, outer wheel should be turned exactly 25°.** Allowable variation ½°. No adjustment provided.

Lower Support Arm Pivot & Bushing: (Removal)—Raise front wheels clear of floor and place jack stand under inner side of lower support arm. Remove front and rear bushings of lower support arm pivot and remove the four bolts holding lower pivot to front cross-member, then remove pivot.

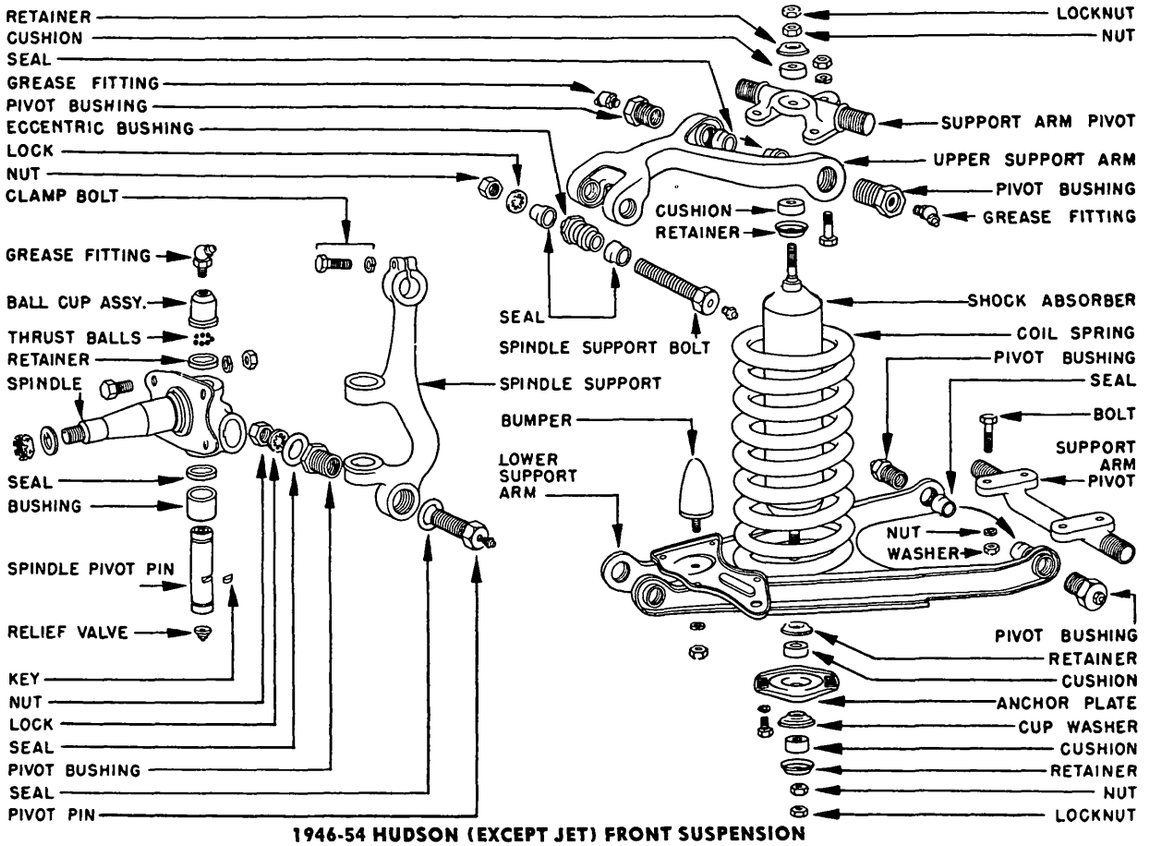
Installation—Install lower support pivot (NOTE—Lower support arms are identical on right and left sides except that diameter of threaded bosses through which lower support bolt passes, boss facing front of car being threaded .010" larger than ones at rear. A ¼" hole is punched in top plate of left arm assembly for identification). Install coil spring, and lower support arm pivot-to-frame bolts. Use tool J-1052 to maintain exact distance of 11½" between inner faces of support arm and the exact distance of 1½" between inner face of support arm and centerline of the nuts holding pivot to frame cross-member. (NOTE—A .010" oversize lower support arm-to-support bolt bushing is available for wear of steering spindle support. Install shock absorber, mounting plate, rubber bushings, retainers and retainer nuts.

Steering Spindle Support Lower Pivot Pin & Bushing: (Removal)—Raise car with jack under lower support arm and remove cotter key, nut, and washer from lower support arm-to-pivot pin and remove pin and bushing.

Installation—Install bushing in spindle support. Hold steering spindle support squarely between yoke of lower support arm and install lower pivot pin (index the pin so that spindle support is centralized between inner faces of lower support arm). Install washer, nut and cotter pin.

Upper Steering Spindle Support Pivot & Bushing: Raise car so wheels clear floor and remove upper support arm pivot bolt, pivot and bushing. Screw bushing out of upper control arm.

Installation—(NOTE—Upper support arm pivot is self threading). Install tool J-1360 on outer stud of pivot and install pivot so that it is central with the tool. Install spreader tool J-1860 so that the two ends of the tool rest against inner faces of upper support arms and the flange of the support arm fits in the slots machined in ends of spreader tool. Turn hexagon portion of tool until gauge rests against outer surface of arms. This will spread arms 1/16". Start bushings on both ends of pivot. Lubricate them with a lapping compound such as lard oil which will allow bushing to cut their own threads in support arm without scoring. Install upper support arm pivot centering gauge J-1860-2. Thread bushings into support arm until head seats, then tighten to 110 ft. lbs. torque. CAUTION—Upper support arm must have free movement so it will drop of its own weight, plus not more than 5 lbs. pressure from a horizontal position.



1946-54 HUDSON (EXCEPT JET) FRONT SUSPENSION

Eccentric Bushing: (Removal)—Place jack under lower support arm and raise car off floor. Remove eccentric lock screw and washer, cotter pin, nut, and eccentric bushing pivot bolt. Remove eccentric bushing seals and remove bushing from steering spindle support using adjusting wrench KMO-366.

Installation—Install eccentric bushings into steering spindle support with hexagonal head of bushing toward front. Install eccentric bushing lock screw, but do not tighten. Hold steering spindle support in center of upper support arm and install pivot bolt, turn bolt until head seats securely.

SPRINGS: Install with flat end up and silencer on upper end. Shims can be installed on top of low spring to correct minor height differences.

Spring Replacement: Raise car and place jack stands under inner end of lower control arm. Remove wheel. Remove shock absorber upper stud nut and palnut. Remove shock absorber lower mounting nuts and washers. Turn shock absorber ¼ turn and remove through opening. Remove lower support arm pivot-to-frame bolts. Raise car allowing coils to expand, remove spring.

►**Spring Installation Caution—Use High Limit Springs on driver's side of car.**

1946-47 Spring Specifications

Car Model	Spring Color Mark
51, 52 ('46), 171, 172 ('47)	Bronze
53, 54 ('46), 173, 174 ('47)	Orange, Violet, Cream
58 ('46), 178 ('47)	Yellow, White, Green

1948-51 Spring Specifications

Car Model	Color & Part No.
All 6 & 8 (Std.-Light Scale)	Pink—300442
All 6 & 8 (Optl.-Heavy Scale)	Red—301621

1952-54 Spring Specifications

Car Model	Part No.	①Color Mark
All (Right Side)	307193②	White
All (Left Side)	307194②	Red
All (Heavy Duty)	301621	

①—Paint daub across two center coils.
②—Superseding No. 300442 at Car No. 175108.

Spring Identification Note—Springs are paint marked (on two center coils) for identification and have part number stamped on flat end of spring together with Brinell mark and limit marks as follows:

Low Limit Spring Mark—1 Grind Mark or daub of White Paint on lower coil.

High Limit Spring Mark—2 Grind Marks or daub of Red Paint on lower coil.

SHOCK ABSORBER REPLACEMENT: *See "Spring Replacement" above.*

1953-54 HUDSON JET

Jet & Super Jet Models (1953-54)

DESCRIPTION: Independent linked parallelogram type with coil springs and direct acting shock absorbers. Shock absorbers are mounted inside coil springs.

CHECKING & ADJUSTMENT: Before checking alignment and making adjustments, check the front suspension system as follows:

Wheels & Tires—Check wheels and tires for run-out and balance, correct if required. Inflate all tires to correct pressure. Check front wheel bearings and adjust if loose.

Tire Inflation Pressure—5.90 x 15—24 lbs. (front & rear); 6.40 x 16—24 lbs. (front), 22 lbs. (rear).

Steering Linkage & Kingpin—Check all linkage and kingpins for looseness. Check steering gear for looseness. Adjust steering gear and replace worn bushings and end joints.

Frame Level & Spring Height—Rock car sideways several times and allow car to settle. Measure the distance from lower support arm (at a point in center of arm close to the inside, or inner pivot pin side, of the lower support arm bumper), to the bottom of the upper rebound bracket which should be 4 5/32". Measurement between right and left side must not vary more than ½". Replace springs if variation greater.

►***CAUTION—Car must be at curb weight when checking Frame Level & Spring Height.***

Riding Height—Rear—Measure distance from top of rear axle housing tube to UPPER edge of rear axle bumper. The distance should be 6 1/16" with car at curb weight (no passengers).

Camber: Pos. ¼° to 1¼°. Maximum variation between wheels ½°.

Adjustment—Camber adjustment is provided by shims placed between upper control arm inner pivot and the No. 2 cross-member. Three thicknesses of shims are available (1/32", 1/16", ⅛"). Adding shims will **decrease** positive camber, and removing shims will **increase** positive camber. ***CAUTION—Equal amounts of shims must be installed or removed from both the front and rear bolts of inner pivot.***

Caster: 0° ± ½°. Maximum variation between wheels ½°.

Adjustment—Altering the shim pack between the front or rear pivot attaching bolt changes the caster adjustment. By **adding** shims at the **front** pivot bolt and **removing** shims at the **rear** pivot bolt, **positive caster is decreased. Removing** shims from the **front** pivot attaching bolt and **adding** to the **rear** pivot bolt, **increases positive caster.**

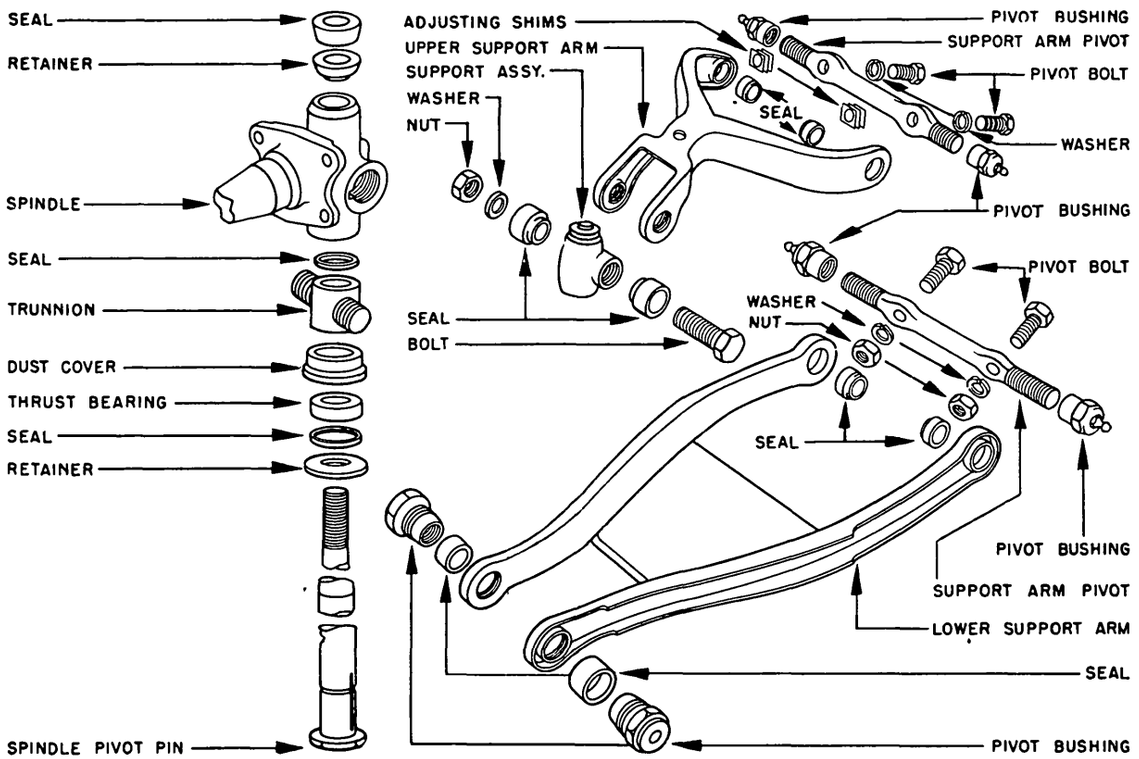
Kingpin Inclination—3°58'. Not adjustable

Toe-In: 0"-1/16". Measured at wheel rim.

Adjustment—Two tie rods. Adjust by loosening clamp bolts and turning tie-rod. Adjust both tie-rods alike.

Toe-Out On Turns: With inner wheel turned 30°, outer wheel should be 25°. Not adjustable, replace steering arms if not correct.

FRONT SUSPENSION REMOVAL (RIGHT OR LEFT): Raise car and place jack stands under inner ends of lower control arms. Remove wheel and tire assembly, and on left side remove fender side shield and battery. Remove shock absorber anchor plate bolts, nuts and washers. Turn anchor plate ¼ turn and push upward to clear spring seat. Disconnect stabilizer connector link from lower spring seat. Remove lower control arm pivot to frame bolts, nuts and washers. ***(CAUTION—Coil springs are under extreme tension and care must be used while removing springs to avoid damage or injury).*** Disconnect outer tie rod end from outer steering arm using tool J-2791. Remove four bolts from brake backing plate and attach brake backing plate under fender to avoid strain on brake hose. Remove upper control arm pivot to frame bolts. Remove front suspension assembly. Wire shim packs together to assure replacement in the same position.



HUDSON JET FRONT SUSPENSION

Installation—Reverse the removal procedure (above) and note the following:

Lower Control Arm—Maintain exact distance of 9½" between inner faces of the control arm while installing bushings. The arm must be centered on the cross-member. The exact distance between the inner face of the control arm and the center line of the bolts holding the pivot to the cross-member should be 1½". These distances must be maintained.

Upper Control Arm—The upper control arm bushing is self-threading in the control arm. In assembling the upper control arm pivot and bushing it is necessary to maintain a proper spread of the pressed steel control arm to insure correct tension on the threads of the pivot after bushings have been installed. Install spreader tool J-3957 with the slotted ends fitting against the inner face of the upper control arm. Turn the hex portion of the spreader tool until the outer surfaces of the control arm measure 7¼" apart. Install the pivot so it is centralized in the control arm. Start the bushings at both ends of pivot. Lubricate them with a tapping compound such as lard oil which will permit bushings to cut their own threads in control arm without scoring. Thread the bushing into control arm and tighten to 110 ft. lbs. torque. (NOTE—The control arm assembly must be free to move from a horizontal position by its own weight plus a pressure no greater than 5 lbs., applied to the arm.) Assemble the upper control arm and pivot to the frame and tighten attaching bolts to 60-70 ft. lbs. torque.

FRONT SPRINGS: Flat end of spring must be installed toward top. Bottom must rest in lower control arm spring seat. Make certain that silencer is in upper spring seat.

Spring Specifications

Car Model	Part No.	Color Mark
Std. (Low Limit	309780	White
Optl. (High Limit)	311046	Red
Heavy Duty	309864	

►**Spring Note**—High & Low Limit springs are available. Spring color mark is located near lower end.

KAISER & FRAZER

Frazer, All Models (1947-51)
Kaiser, All Models (1947-55)
Darrin (1954)

▷INSTALLATION OF 1949 SPRINGS ON 1947-48 CARS: 1949 type higher load rate springs can be installed on these cars. See SPRINGS below.

DESCRIPTION: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.

CHECKING & ADJUSTMENT: Check front wheel bearing adjustment, tire inflation pressure, steering linkage for correct adjustment.

Tire Inflation: Check and inflate tires to following pressures (Cold) before checking front end:
6.50x15 Tires—28 lbs. front & rear.
6.70x15 & 7.10x15—24 lbs. front & rear.

Spring Deflection (Frame Height): Bounce front end of car up and down several times to check for binding in suspension system, then measure from top edge of lower control arm vertically upward to lower face of frame side rail at same point on each side of car. Measurements must be equal within ⅜". If difference more than ⅜", install shim on spring (low one), or replace spring (see Spring data).

Kingpin Inclination: 5½°. Limits 4¾-5¾° crosswise.

Caster: 0° desired, limits Neg. 1° to Pos. 1°.

▷*POWER STEERING NOTE*—Caster on Power Steering equipped cars should be 0° to 1° (½° preferred).

▷*CAUTION*—After adjusting, check control arm for clearance at each side of support. This clearance necessary to prevent binding.

Adjustment—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting from front bushing at outer end of upper control arm, use wrench KF-25 (Allen wrench) inserted through fitting hole to turn upper pivot pin in complete revolutions only (to avoid disturbing camber adjustment). Check Camber.

Camber: (1947-50)—Pos. ¼° desired; (1951-55)—½° desired. Limits Pos. 0° to ¾°.

Adjustment—Same as for Caster (above) except that eccentric pivot pin should be turned not more than ½ revolution from point where correct caster secured (entire range of adjustment secured in ½ revolution of the pin).

Toe-In: (1947-50)—0" desired. Limits 0" to 1/16". (1951-55)—⅛" desired. Limits 1/16" to ⅛".

Adjustment—Loosen clamp bolts at each end of both tie rods, turn both tie rods equally.

Toe-Out On Turns:	Inner Wheel	Outer Wheel
Right Turn (Power Strg.)	20°	17½°
Left Turn (Power Strg.)	20°	18½°
Right & Left Turn (Others)	20°	17°

SHOCK ABSORBER REPLACEMENT: Raise front of car and disconnect shock absorbers. Compress shock and remove support through spring coils. Remove shock through hole in spring seat. Replace in same manner.

UPPER CONTROL ARM REPLACEMENT: Support car on jacks under frame, remove front wheel. Install jack under spring seat to hold spring and lower arm. Remove lockscrew in upper end of knuckle support. Remove bushings in outer end of upper control arm, use Allen wrench to unscrew eccentric pin from knuckle support. Take out mounting screws in pivot shaft at inner end of control arm,

▷*CAUTION—Do not lose camber adjustment shims under pivot shaft. These shims must be re-installed to maintain correct camber (not used on first cars).*

LOWER CONTROL ARM REPLACEMENT: Support car with jack under frame to rear to suspension unit. Disconnect front sway-eliminator link at spring seat, remove shock absorber (see above). Place jack under lower spring seat to support arm and spring. Take out pivot shaft mounting screws at inner end of arm. Relieve spring tension by lowering jack under spring seat. Disconnect control arm at knuckle support by unscrewing bolt from knuckle support bushing and arm. Lift out arm, spring, spring insulators.

▷*CAUTION—Do not disturb bushing in lower end of knuckle support unless this bushing being replaced.*

SPRINGS: 1949 and later springs have lighter load rate than previous types (can be installed on 1947-48 cars if special instructions given below are followed).

1947-48 Spring Specifications

Car Model	Spring Part No.
All Models	201111

NOTE—1947-48 springs installed with Insulator No. 201112 (Upper), 202245 (Lower) in spring seats.

1949-50 Spring Specifications

Model	Color Mark	Part No.
All 4-Dr. Sdn.	Green	204354
Heavy Duty & Exp.	Yellow	203466
Convertible	Orange	205776
Utility & Virginian	Brown	206363
Taxicab	Yellow	203466

1951 Spring Specifications

Model	Color Mark	Part No.
Kaiser①	Brown	206363
Kaiser②	White	208368
Heavy Duty	Red	209781

①—Up to Serial No. 511-1212, 512-1009.
②—After Serial No. 511-1212, 512-1009.

1952-55 Spring Specifications

Model	Color Mark	Part No.
Kaiser, All Models	White	208368
Kaiser, Heavy Duty	Red	209781
Darrin		215223

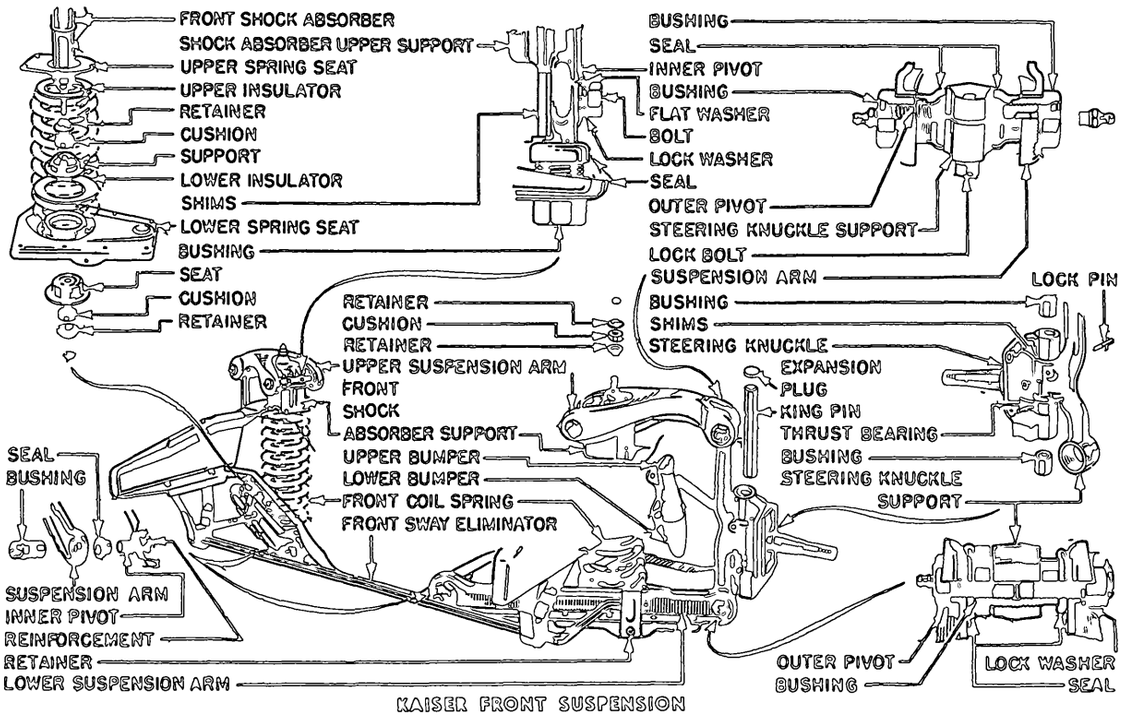
▷Installation of 1949 Springs on 1947-48 Cars—1949 higher load rate springs can be installed on these cars in pairs without other change. If one spring installed, car will appear to sag on opposite side (due to greater stiffness of 1949 spring). This condition can be corrected by installing 1949 type modified upper spring seat and spacer on upper end of original spring.

▷*CAUTION*—Spacer can not be used on spring on 1947-48 cars unless new 1949 type upper spring seat installed (will allow upper end of spring to slip out of position on spring seat).

Spacer Installation (to correct Spring Height): Spacer can be installed between upper end of spring and spring seat of low springs to correct spring deflection on 1949 & later cars only (these cars have modified upper spring seat).

COIL SPRING REPLACEMENT: Disconnect sway bar at lower suspension arm. Raise vehicle with a jack placed under frame side rail until wheel is off floor. Remove wheel and tire. Remove shock absorber retaining nut, retainer, cushion, and cushion seat from under side of lower suspension arm. Hold shock absorber from turning while loosening nut (by inserting pliers through coils and holding shock body). Place another jack under lower spring seat on lower suspension arm. Use a wood block between

CONTINUED ON NEXT PAGE



KAISER FRONT SUSPENSION

KAISER & FRAZER (C nt.)

jack and frame to avoid slipping Raise jack to support arm firmly when it is detached at front cross-member Remove the four nuts and bolts attaching suspension arm inner pivot and the two reinforcements to front cross-member Then carefully lower jack to relieve all compression on front spring. When coil spring is loose, remove spring, upper insulators, shock absorber cushion support, cushion, and cushion retainer

Installation—Fit coil spring insulators into upper and lower spring seats Install front coil spring (flat or finished end into upper spring seat) Install cushion retainer, shock absorber cushion and cushion support over lower end of shock absorber. Move suspension arm up into place, fitting the lower end of shock absorber through spring seat and the ends of the spring into position in spring seats Place jack with wooden block, under lower spring seat on suspension arm Raise jack to compress coil spring until inner pivot seats against underside of front cross-member. Use a drift to line up holes in inner pivot with holes in cross-member and install two reinforcements and four nuts and bolts to attach inner pivot to cross-member. Remove jack from under lower suspension arm. Install cushion seat, shock absorber cushion, cushion retainer and retainer nut on lower end of shock absorber at underside of lower spring seat Install wheel and tire Remove jack from under lower frame side rail Connect sway eliminator bar Check and adjust front end alignment

FRONT SHOCK ABSORBER REPLACEMENT: ***Front shock absorbers can be replaced without removing front springs.*** Raise front end of car with a jack placed at center of front cross-member to relieve tension on spring Remove nut, retainer, cushion, and cushion seat from lower end of shock absorber at underside of lower spring seat Compress shock absorber until stud in lower end clears spring seat and shock lower support Remove the support which rests on top of spring seat by pulling it out through spring coils This will permit withdrawal of the shock absorber through opening in lower seat when retaining nut is removed from top end, (slot in shock stud in upper end permits use of screwdriver to prevent shock turning while removing the nut)

Installation—Install retainer and rubber cushion on upper stud of shock absorber Insert shock through opening in lower spring seat and into place inside front coil spring, with stud with screwdriver slot at top end inserted through hole in shock absorber support Install lower retainer, rubber cushion, and upper retainer and self-locking nut and tighten nut to attach shock solidly to support Fit retainer and rubber cushion onto lower end of shock absorber Compress shock until lower end is raised high enough to permit sliding shock lower support between coils and onto top of lower spring seat Release shock so lower stud fits down through hole in support Install cushion seat, rubber cushion, retainer and self-locking nut on stud from underside of lower spring seat Tighten nut securely.

1950-51 NASH RAMBLER

Nash Rambler (1950-51)

►**FRONT SUSPENSION BRACE PRODUCTION CHANGE:** Beginning with car Serial No. D-66777 (1951) a brace connecting the two lower control arms entered production.

►**FRONT SUSPENSION BRACE INSTALLATION ON CARS BEFORE SERIAL NO. D-66777**—Front Suspension Brace Package, Part No. 3115311 contains all parts necessary for installation of brace on earlier cars.

►**LOWER CONTROL ARM RATTLE CORRECTION**—To prevent lower control arm rattle, a taper shim, Part No. 3111287 must be installed on each side of the lower control arm yoke. The shims are installed with the thick side to the top, between the control arm yoke and the lower control arm. This installation does not affect camber and caster adjustments.

►**CASTER AND CAMBER SHIM LOCATION CHANGE**—Shims have been relocated between the body bracket and spacers. The old location between pivot bar and spacers allowed a loss of torque on pivot bar bolts.

DESCRIPTION: Independent linked parallelogram type with new type coil spring and shock absorber mounting as follows:

►**CONTROL ARM ASSY. INTERCHANGEABILITY CAUTION:** Upper and Lower Control Arm Assemblies are interchangeable from right to left **except that front and rear horizontal arms are not interchangeable** (have 2° twist at inner end) and must be installed in pairs (one stamped "R", one stamped "L").

►**CHECKING GAUGE NOTE:** Flat gauge points provided on knuckle support pin for mounting of Gauge J-1377 to check Caster and Camber.

CHECKING & ADJUSTMENT: First check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, wheel and tire balance and run-out, then place car on level floor and check following specifications:

Kingpin Inclination: 8½° crosswise. No adjustment.

Caster: 1° desired. Limits Pos. ¾° to Pos. 1¼°.
Adjustment—Loosen nuts on **lower** control arm frame mounted pivot bar bolts, add shims to pack on **rear mounting bolt to decrease caster, or front mounting bolt to increase caster.**

Camber: ½° desired. Limits Pos. ¼° to Pos. ¾°.
Adjustment—Adjust in same manner as Caster (above), except that shims should be **added or removed at both bolts equally** (to avoid disturbing caster). Add shims at both bolts equally to increase camber, remove shims to decrease camber.

Toe-In: ¼" desired. Limits ⅛" to ¼".
Adjustment—Loosen clamp bolts at each end of adjusting tube on outer end of **each tie rod,** turn both adjusting tubes equally.

Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be turned 22½°, plus ½°, minus 0°. Check for bent steering arm if incorrect.

SHOCK ABSORBER REPLACEMENT: ***Not necessary to disturb Front Suspension Assembly.*** Remove bolts in upper and lower control arms which pass through shock absorber eyes, remove shock absorber.

COIL SPRING REPLACEMENT: Use Front Spring Compressor Set J-1608 or KMO-735 (same tools used on "600" suspension springs). Install compressor on spring with car weight on wheels, then raise front end of car so that suspension unit assembly drops down and frees spring, lift spring out.

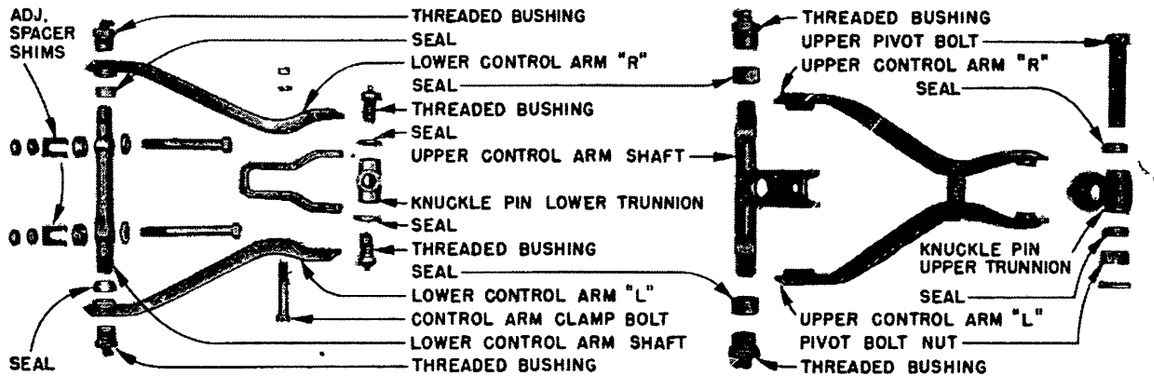
KNUCKLE SUPPORT PIN ASSEMBLY: Bolt spring seat to upper trunnion first, tightening retaining bolt securely. Screw knuckle support into trunnion until it is tight, **then back knuckle support out one complete turn** to prevent pin bottoming in trunnion when front wheels turned). Screw knuckle support into lower trunnion until clearance of approximately ¼" is provided between upper edge of seal seat on support and trunnion.

Upper Control Arm Trunnion Screw: The upper control arm marked 'R' has a larger pitch diameter thread than the arm marked 'L'. The trunnion screw is provided with a corresponding increase in thread pitch diameter. **At time of installation, the trunnion screw must always be started in the control arm marked 'R', first.**

SPRINGS: Heavier spring used on left side of car.

Spring Specifications

	Load	Height
Right (3129503)	755 lbs. ±20 lbs.	10⅜"
Left (3129502)	810 lbs. ±22 lbs.	10⅜"



RAMBLER CONTROL ARM ASSEMBLIES

METROPOLITAN (NASH & HUDSON)

Metropolitan (1954-55)

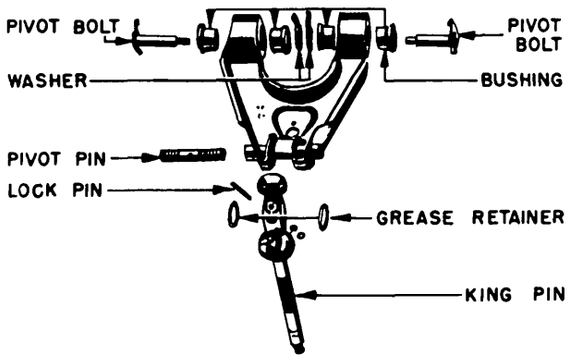
DESCRIPTION: Independent linked parallelogram type with coil spring mounted between upper arm and spring seat in wheelhouse panel. Front shock absorber mounted between lower control arm and bracket on wheelhouse panel.

CHECKING & ADJUSTING: Check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, wheel and tire balance and runout, then with car in a level position, check following specifications.

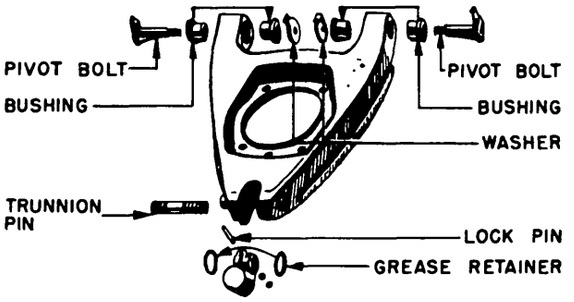
Tir Inflation Pressure: 24 lbs. (front), 22 lbs. (rear), cold.

Kingpin Inclinati n: 6½° Crosswise.
Cast r: Pos. 2° to Pos. 3°. Not adjustable.
Camb r: Pos. ½° to Pos. 1½°. Not adjustable.
T -In: 0-1/16". Adjust center tie rod (between steering gear idler arm and pitman arm).

UPPER & LOWER CONTROL ARMS: Inner ends of control arms are attached to mounting brackets with special bolts and are insulated from mounting brackets with rubber bushings installed in sleeves in control arm. The upper control arm is attached to steering kingpin, and lower control arm is attached to kingpin trunnion at lower end.



UPPER CONTROL ARM ASSEMBLY

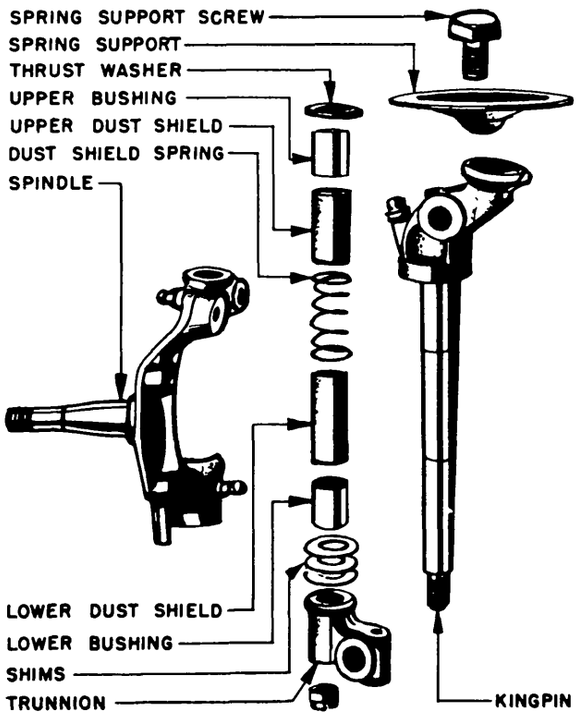


LOWER C NTR L ARM ASSEMBLY

Removal: Remove wheel and spring (See "Spring Removal" below), and disconnect tie rod from steering arm, and shock absorber from lower mounting. Remove the two lower control arm mounting bolts noting location of washers, and take out front and rear rubber bushings in mounting bracket. Support wheel spindle and remove nut on lower end of kingpin. Slide lower control arm trunnion off kingpin and remove lower control arm. The upper control arm is removed in the same manner after wheel spindle is removed (See "Kingpin & Wheel Spindle Removal" below).

Installation: Lubricate control arm bracket with Lubriplate and install inner bushings in control arm. Install one side of control arm in bracket and with a large screwdriver, pry between bracket and control arm to compress the bushings and slide control arm into position. Install outer bushings through large holes in bracket and install special pivot bolts, washers, and nuts. Do not tighten pivot bolt nuts until wheel spindle and lower trunnion installed.

LOWER TRUNNION REPLACEMENT (Removal): Remove nut on lower trunnion lockpin and drive pin out of trunnion. Remove grease fitting from end of trunnion pin and screw pin out of trunnion from opposite end.



METR POLITAN FRONT SUSPENSION

Installati n: Reverse the removal procedure, making sure the cutout on trunnion pin is aligned with lockpin hole.

NOTE—If new trunnion pin is a loose fit in the control arm, the control arm should be replaced.

STEERING KINGPIN & SPINDLE REPLACEMENT (R - moval): Remove wheel, spring (See "Spring Removal" below), hub and brake support. Disconnect tie rod from steering arm and shock absorber from lower mounting. Disconnect control arm trunnion from kingpin and slip trunnion off pin. Slip spindle, shims, dust shield assembly, and thrust washer off kingpin. Remove nut from upper pivot pin lockpin and drive lockpin out. Unscrew upper pivot pin and remove kingpin from upper control arm.

Installation: Place a grease retainer on each side of pivot pin bore in kingpin and install kingpin in upper control arm. Install pivot pin and lock in place with lockpin and lockpin nut. Install thrust washer with grooved side upward and install spindle assembly with dust shields and spring on kingpin. Install a sufficient amount of shims between lower shoulder of spindle and trunnion to provide a free turning fit with a minimum amount of endplay. These shims are furnished in .002", .005", .010" thicknesses.

King Pin Bushing Replacement: Use a standard bushing drive to remove and install bushings in spindle. Drive the new bushings in until top of bushing is flush with top of bore in spindle, Make sure lubrication holes in bushing are aligned with holes in spindle. Finish ream bushings with piloted reamers to the following sizes:

Upper Bushing—..6875 to .6880". **Lower Bushing**—6250" to .6255".

COIL SPRING REPLACEMENT (Removal): Raise front of car and support at body side sills. Install **two** front coil spring compressors, Tool KMO-735, enclosing **nine** coils, and compress the spring evenly until it can be removed from car.

►*COIL SPRING COMPRESSOR NOTE:* If a new spring is to be installed, an additional compressor to aid in removing and installing coil spring on tool KMO-735 can be made from two Ambassador lower spring seats drilled through the center with an 11/16" hole, and an 18" long rod threaded 12" on one end and 1" on the other. Install one spring seat on 1" threaded end and secure with a nut. Insert rod through length of spring and install the other drilled spring seat and nut. Spring can then be compressed for removal or installation of tool KMO-735.

Installation: Install spring seat and cushion on each end of spring (cushion with bumper attached is installed at top of spring), and install the entire assembly into position in spring seats in upper control arm and in wheelhousing. CAUTION—Lip of lower spring seat must engage seat in control arm to prevent spring slipping out of position.

Spring Applicati n: (All Models) Part No. 8110335.

1946-51 NASH

"600", All Series 1946-49)
Statesman Series, (1950-51)
Ambassador Series, (1949-51)

►**FRONT SUSPENSION ASSEMBLY UNIT REMOVAL:** If required for overhaul or repair, entire front suspension assembly can be removed as a unit by taking out four bolts which hold the unit on the right and left body sills.

►*CAUTION*—All parts of the rubber insulated mounting bolts must be correctly assembled when installing suspension assembly.

►**STEERING KNUCKLE PIN PRODUCTION CHANGE**—Beginning with Statesman Serial No. K-479398 (Hydra-matic), K-479418 (Synchro-mesh); Ambassador Serial No. R-631514, the steering knuckle pin has been revised to incorporate needle bearings in lower control arm trunnion.

►**1951 AMBASSADOR STEERING ARM PRODUCTION CHANGE**—Effective at Serial No. R-627607, steering arms have been increased in length from 8" to 8 17/32" (measured from center to center on holes). INCORRECT STEERING GEOMETRY WILL RESULT IF CORRECT STEERING ARM IS NOT USED.

DESCRIPTION: Linked parallelogram type with coil springs and independent shock absorbers.

CHECKING & ADJUSTMENT: First check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, (see data below).

Tire Inflation Pressure: 25 lbs. (1946-47), 24 lbs. (1948-51) front and rear.

Kingpin Inclination: 7½° crosswise (1946-48), 8½° crosswise (1949-51). No adjustment.

Caster: Pos. ¼° to Pos. ¾° (1946-48), 0° to Pos. ½° (1949-51).

Adjustment—Loosen nuts at inner ends of upper control arm pivot bar frame mounting bolts, insert "C" washers between frame bracket and pivot bar at front bolt to decrease caster, or at rear bolt to increase caster. Check camber after completing adjustment.

►**Adjusting "C" Washer Note**—These washers furnished 1/16" and 1/8" thick. One 1/16" washer will change caster approximately 1/3°.

Camber: Pos. ¼° to Pos. ¾° (1946-48), 0° desired with limits of Neg. ¼° to Pos. ¼° (1949-51).

NOTE—Machined bosses provided on steering knuckle pin for mounting of J-1377 Caster & Camber Gauge.

Adjustment—Adjust in same manner as Caster (above) except that washers should be added (to increase Camber) or removed (to decrease Camber) **equally at front and rear pivot bar bolts** to avoid disturbing caster setting.

Toe-In: 1/8 to 3/16".

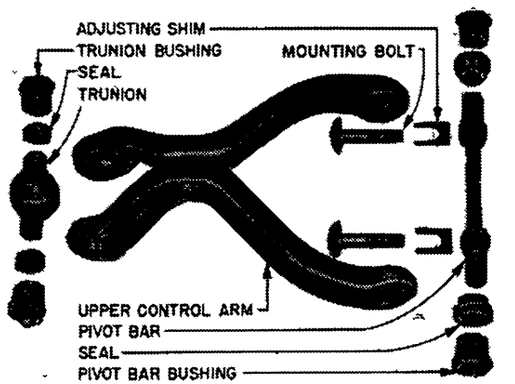
Adjustment—Loosen clamp bolt at each end of adjusting sleeves on both tie rods, turn adjusting sleeves on **both tie rods equally.**

Steering Geometry (Toe-out on turns): With outer wheel turned 20°, inner wheel should be turned 23¼° (600 '46-48), 23½° (600 '49 & Statesman '50-51), 23° (Amb. '49-51 See Steering Arm Change Note below), plus ½°, minus 0°. Check for bent steering arms if incorrect.

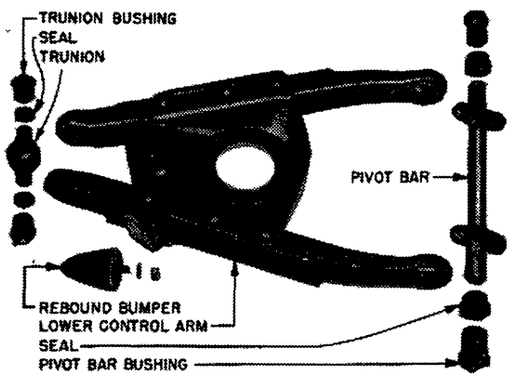
Steering Arm Check—Place straightedge across back of brake support plate, measure from this straightedge to center of steering arm ball stud. Should be 4 3/16" (600 & Statesman), 4 5/16" (Ambassador). Replace arm if incorrect.

►**1951 AMBASSADOR STEERING ARM PRODUCTION CHANGE**—Effective at Serial No. R-627607, steering arms have been increased in length from 8" to 8 17/32" (measured from center to center on holes). INCORRECT STEERING GEOMETRY WILL RESULT IF CORRECT STEERING ARM IS NOT USED.

SHOCK ABSORBER REPLACEMENT: *Not necessary to disturb Front Suspension Assembly.* Disconnect shocks, remove lower shock mounting bracket and remove shock from below.



UPPER CONTROL ARM ASSEMBLY



LOWER CONTROL ARM ASSEMBLY

COIL SPRING REPLACEMENT: Disconnect stabilizer arm link at lower control arm (Amb. only), remove shock absorber (see data above). Install jack under spring seat on lower control arm. Disconnect lower control arm from cross-member at inner control shaft. Raise car by means of a chain hoist until spring pressure relieved. Remove jack under spring seat, lower the lower control arm and lift spring out.

UPPER & LOWER CONTROL ARM REPLACEMENT: Pivot bar at inner end and trunnion at outer end of each arm have threaded bushings and rubber seals which should be installed as follows:

Outer Trunnion: Install new rubber seal on each end of trunnion, center trunnion in outer end of control arm (use Gauge J-2625 to center trunnion in lower control arm), thread bushings in through eyes in control arm and on trunnion ends, use extreme care that trunnion does not move out of centered position, tighten bushings to 125 ft. lbs.

Inner Pivot Bar: Install new rubber seal on each end of pivot bar, center pivot bar in inner end of control arm, thread bushings in through eyes of control arm and on bar ends, use care that bar does not move out of centered position, tighten bushings to 125 ft. lbs.

STEERING KNUCKLE PIN REPLACEMENT: Can be removed without disturbing caster and camber adjustment or other parts of suspension assembly as follows:

Removal: Install spring holding hooks J-2981 to keep front spring compressed (pull car down until hook can be engaged in hole in front suspension extension and in lower control arm). Support front end of car, remove wheel assembly, brake backing plate, and wheel spindle. Remove nut on lower end of knuckle pin, remove large washer, seal, and thrust bearing. Lift knuckle pin up and free of lower control arm, unscrew upper end from upper trunnion.

►***CAUTION—Do not lose spring in upper trunnion above knuckle pin.***

Installation: Use new rubber seals and position knuckle pin as follows:

Upper End—Place seal on pin with open cupped end upward, see that spring in place in trunnion, screw pin in trunnion until distance from top face of seal shoulder on pin to lower face of trunnion is ¼".

►***CAUTION—This ¼" clearance necessary to prevent binding and compression of the grease seal.***

Lower End—Place new seal ring on knuckle pin, insert lower end of pin down through lower trunnion bushing, install thrust bearing, large washer (with new seal ring in groove on rim of washer), and nut. Secure nut with cotter pin.

SPRINGS: ***CAUTION—Springs used on each series have special load rating and are not interchangeable between series.***

►**1951 FRONT SPRING PRODUCTION CHANGE**—Effective with Statesman (serial No. K-503238); Ambassador (serial No. R-649215), spring specifications were changed. *See Late 1951 Specifications below.*

1946-48 Spring Specifications

Car Model	Part No.
"600"	3121238

1949 Spring Specifications

	Free Height	Loaded Height①
"600" 4940	13 1/16"	9" (1640 lbs.)
Amb. 4960	13 3/8"	9" (1830 lbs.)

1950 Spring Specifications
1950 & Early 1951 Spring Specifications

Statesman	13 1/16"	9"②
Ambassador	13 5/8"	9"③

Late 1951 Spring Specifications

Statesman	13⅞"	9¼"④
Ambassador	14¼"	9¼"⑤

①—Indicated loads are plus or minus 40 lbs.
②—Load of 1640 lbs. (RH), 1830 lbs. (LH) ± 40 lbs.
③—Load of 1830 lbs. (RH), 1990 lbs. (LH) ± 45 lbs.
④—Load of 1830 lbs. (RH & LH) ± 45 lbs.
⑤—Load of 1990 lbs. (RH & LH) ± 49 lbs.

Spring Marking Note—Springs are graded and marked by grind mark on end coil as follows:
Low Limit—1 grind mark.
High Limit—2 grind marks.

►***INSTALLATION CAUTION***—**If one Low Limit, and one High Limit spring, installed on same car, install High Limit spring on left (driver's) side of car.**

1946-48 NASH AMBASSADOR

Nash Ambassador Six, All Models (1946-48)

DESCRIPTION: Linked parallelogram type with vertical knuckle support linked to short upper control arms.

CHECKING & ADJUSTMENT: Always check following points first before making any adjustments: CAUTION—Always place 2" blocks, Tool J-886, between frame top flange and front suspension upper control arms before jacking up car so as to remove weight from front wheels. Wheels must not be allowed to hang on control arms without these blocks being installed first.

Tire Inflation—Check tires and inflate to pressure of 28 lbs. (1946-47), 24 lbs. (1948).

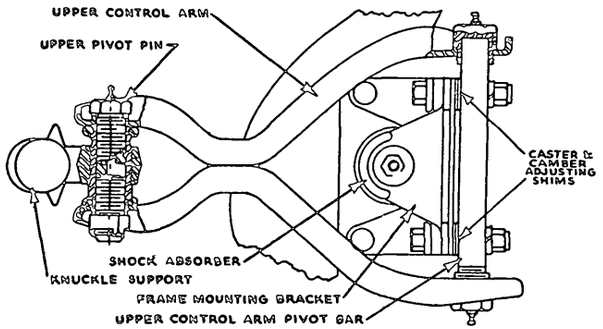
Wheel & Tire Balance & Runout—Check wheel and tire assemblies for balance. Check front wheels for runout which must not exceed ⅛".

Kingpin Inclination: 4½° crosswise. No adjustment.

Caster: 0° to Negative ½° with car weight on wheels.

Adjustment (1946-48)—Adjusting "C" washers installed on upper control arm pivot bar mounting bolts (between bar and frame bracket). These washers furnished 1/16" thick (equal to 1/3°). To adjust Caster, loosen pivot bar mounting bolts, add shim at front mounting bolt to increase Caster, add shim at rear mounting bolt to decrease Caster, tighten pivot bar bolts. Check Camber.

Camber:—Should be Positive ¼° to Positive ¾° for all models with car weight on wheels and car level



AMBASSADOR UPPER CONTROL ARM

Adjustment (1946-48)—Uses the same "C" washers used for Caster setting (see Caster Adjustment above). To adjust Camber, 'C' washers should be added (to decrease Camber), removed (to increase Camber) equally at both pivot bar mounting bolts. One 1/16" thick 'C' washer will change Camber by 1/3° (normal factory installation consists of two 1/16" washers).

Toe-In: Measure 10" up from floor with wheels set in straight-ahead position.

Toe-In Specifications

1946-48 Amb. Models	1/16—3/16"

Adjustment—Loosen clamp bolts and turn each outer tie rod equally toward front of car to decrease toe-in, toward rear to increase toe-in. Center connecting rod is not adjustable.

Toe-out (Steering Geometry):—With outer wheel turned 20°, inner wheel should be turned exactly as listed below. No adjustment provided. If toe-out incorrect, check for bent steering arms.

Toe-Out Specifications

1946-48 Amb. Models	21½°

SPRINGS: Check spring height on car with special height gauge Tool J-709, which should fit between spring seat on lower control arm and lower face of frame front cross-member. If spring height not correct, replace spring or install ¼" spacer under spring.

1946-47 Spring Specifications

Car Model	Free Length	Part No.
4660, 4760	14 13/16"	①3111316

1948 Spring Specifications

Car Model	Free Length	Part No.
4860	14 13/16"	①3111316

①—Spacer No. 3104309 (⅓" thick) used with this spring.

Spring Identification Note—Springs are graded for load rate and may be identified by grind marks on end coil as follows: 1 Grind Mark—Low Limit, 2 Grind Marks—High Limit. Same type springs should be installed on both sides of car.

1952-55 NASH & HUDSON

Nash (Except Metr politan) 1952-55
Hudson (Except Metropolitan) 1955
Rambler (Hudson & Nash Models) 1952-55

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1953 RAMBLER FRONT SPRING CHANGE (STD & OVERDRIVE TRANS. CARS):* Effective Car Serial No. D-153414 (Kenosha) and DC-12126 (El Segundo) Front Spring No. 3138301 replaces Front Spring Nos. 3129502 (left) and 3129503 (right). Identified by yellow paint 2" wide entire length of spring.

▷*1955 ALL CARS (EXC. RAMBLER) FRONT SUSPENSION CROSSMEMBER INSTALLATION CAUTION:* Reinstallation of the crossmember after removal for service operations requires special attention to proper spacing of the suspension brackets as follows: There should be 19½" between the centers of the front and rear inner crossmember-to-mounting bolt bracket holes to insure maintaining the front wheel alignment.

▷*1955 ALL CARS (EXC. RAMBLER) ECCENTRIC BOLT NUT BOTTOMING ON SHOULDER OF ECCENTRIC BOLT CORRECTION & PARTS PRODUCTION CHANGE:* Eccentric bolt will not tighten sufficiently to prevent eccentric bolt from turning. On early cars install a 5/8" I.D. washer between nut and eccentric washer. At Car Serial V-1511 (Ambassador V8); R-743047 (Ambassador 6 Cyl.); K-635286 (Statesman); Y-1292 (Hornet V8); X-1152 (Hornet 6 Cyl.); W-1200 (Wasp); the counterbore of the eccentric bolt nut has been increased to 3/16".

▷*1955 CASTER & CAMBER ADJUSTMENT (EXC. RAMBLER):* Lower control arm attaching bolts are provided with eccentric washers (one attached to bolt and the other keyed to the threaded end of the bolt). Loosening attaching bolt nut will permit turning the bolt and the eccentrics to provide adjustment for caster and camber.

▷*1955 CASTER & CAMBER ADJUSTMENT (RAMBLER):* "C" type spacers are installed between lower control arm pivot bar and shoulder of mounting stud. Increasing or decreasing the number or thickness of spacers at either front or rear mounting studs permits caster adjustment. Increasing or decreasing equally at both the front and rear will change camber angle for adjustment.

DESCRIPTION: Independent linked parallelogram type with new type coil spring and shock absorber mounting as follows

Coil Springs—Mounted above upper control arm with lower end piloted in spring seat mounted on knuckle support upper trunnion and upper end piloted on spring seat in frame.

Shock Absorber—Upper end mounted on bracket (part of upper control arm pivot bar—Rambler).

▷*NOTE: Front Suspension Systems are similar, but parts are not interchangeable.*

▷*CONTROL ARM ASSEMBLY INTERCHANGEABILITY CAUTION:* Upper Control Arm and Lower Control Arm assemblies *are interchangeable from right t left n Rambler Series only.* Statesman & Ambassador require different control arms for right and left and for front and rear arms.

CHECKING & ADJUSTMENT: Check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, wheel and tire balance and runout, then place car on level floor, check as follows·

Kingpin Inclination: 8½° (Rambler), 6½° (Statesman & Ambassador), 3°36" (Wasp & Hornet). Not adjustable.

Camber: Rambler—Pos. ¼° to Pos. ¾° (½° preferred). Others—Neg. ¼° to Pos. ¼° (0° preferred).

▷*NOTE: Loosen the front suspension brace before adjusting Caster or Camber.*

Adjustment (1952-54)—Add or remove "C" washers equally at both studs, as required, between lower support at both studs, as required between lower support arm pivot bar and frame bracket. Adding washers will increase Camber angle. Removing washers will decrease Camber angle.

▷*CAUTION: "C" Washers of equal thickness must be removed or installed from each end of control arm pivot bar OR CASTER WILL BE CHANGED.*

Adjustment (1955)—Rambler—"C" type spacers are installed between lower control arm pivot bar and shoulder of mounting stud Increase or decrease number of spacers equally at both ends for camber adjustment.

Others—Lower control arms attaching bolts are provided with eccentric washers (one attached to bolt and other keyed to threaded end of the bolt). Loosen-

CONTINUED ON NEXT PAGE

1952-55 NASH & HUDSON (Continued)

ing attaching bolt nut will permit turning the bolt to provide adjustment for caster and camber.

Caster: (Manual Steering, Exc. Rambler)—Pos. ½° preferred (limits 0° to Pos. ½°).

Caster: (Power Steering)—Pos. 1° preferred (limits Pos. ½° to Pos. 1°).

Caster: (Rambler)—Pos. 1° preferred (limits Pos. ¾° to Pos. 1¼°).

Adjustment (1952-54)—Add or remove "C" washers between lower control arm pivot bar and frame mounting bracket as follows: To increase Caster, ADD "C" washer at FRONT end of pivot bar. To decrease Caster, ADD "C" washer at REAR end of pivot bar.

Adjustment (1955)—Rambler—"C" type spacers are installed between lower control arm pivot bar and shoulder of mounting stud. Increasing or decreasing number or thickness of spacers at either front or rear mounting studs permits caster adjustment.

Others—See Caster Adjustment (1955) above.

Toe-In: Rambler—1/8" to 1/4" (1/4" preferred).

Others—1/16" to 3/16".

Adjustment—Measured at a point 8" above floor with the wheels set in straight-ahead position. Loosen tie rod adjusting tube clamps and turn the adjusting tubes equally in opposite directions.

►*NOTE: Before tightening tie rod clamp bolts, square up the ball joints on their studs.*

Toe-Out on Turns (1952-54): With outer wheel turned 20°, inner wheel should be 22½° plus ½° minus 0° (Rambler), 23° plus ½° minus 0° (Ambassador). 23½° plus ½° minus 0° (Statesman).

Toe-Out on Turns (1955): With inner wheel turned as indicated in table below, outer wheel should be

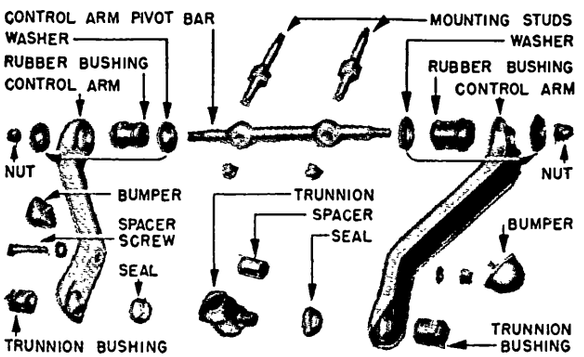
Car Model	Inner Wheel	Outer Wheel
Hornet	26°	20°
Wasp	24°	20°
Ambassador	25°	Ⓒ
Statesman	25°	20¾°
Rambler	25°	21½°

Ⓒ—20¼° (exc. V8 Pwr. Str.), 21¾° (V8 Pwr.Strg.).

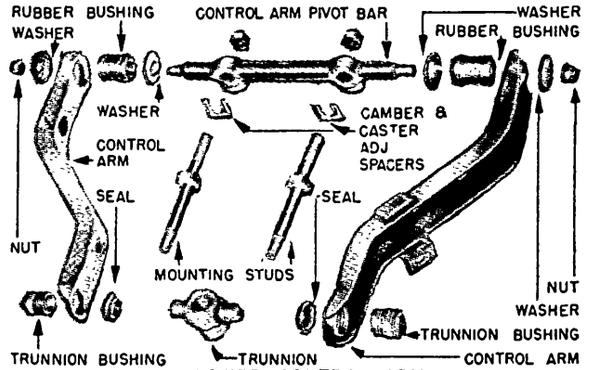
UPPER & LOWER CONTROL ARMS: Control arms are attached to pivot bars by rubber insulated bushings. Outer end of control arm is attached to trunnions by threaded bushings, except the upper trunnion on Rambler which is attached with a screw and locked in place with a nut and lockwasher.

Removal: Remove the Harris type rubber bushings by driving them straight out of control arm. Do not turn or twist (bushings must be tight press fit).

Installation: Rubber bushings can be installed into the control arms by using two inner bearing cones of suitable size (Statesman or Rambler rear axle rear pinion bearing inner cone is right size) as pressing tools. Place control arm in arbor press and start bushing into flanged side of control arm. Install pivot bar inner washer over bushing and place cups in position (one over washer and the other on the under side of control arm to provide clearance in press). Press bushing into control arm until bushing is ½" from arm.



UPPER CONTROL ARM



LOWER CONTROL ARM

NASH STATESMAN & AMBASSADOR CONTROL ARM ASSYS.

Steering Knuckle Pin Installation (Lower): Screw knuckle pin into lower trunnion until there is approximately ¼" clearance between shoulder on knuckle pin and trunnion.

Steering Knuckle Pin Installation (Upper—Ambassador, Statesman, Wasp, Hornet): Upper control arm trunnion incorporates needle bearings and is retained on knuckle pin by a castellated nut and pin. A thrust bearing installed on knuckle pin between lower side of upper trunnion and a shoulder on knuckle pin absorbs the end thrust of the knuckle pin.

Steering Knuckle Pin Installation (Upper—Rambler): On 1952-54 models bolt spring seat to trunnion prior to installation of knuckle pin into trunnion, then proceed as for lower knuckle pin (above). 1955 models are same as for Ambassador, Statesman, Hornet and Wasp above. *NOTE*—On 1955 models two self-tapping screws must be removed to permit removal of lock pin.

Front Suspension Tightening Specifications: *NOTE*—It is very important that tightness of front suspension system be maintained. The following torque values will insure correct tightness.

	Ft. Lbs.
Pivot Bar Bushing Retaining Nut	50-55
Lower Shock Mounting	90-95
Upper Control Arm Spacer Nut Screw	50-55
Lower Mounting Stud to Sill	75-85
Upper Mounting Stud to Sill	35-45
Upper Pivot Bar to Mounting Stud Nut	75-80
Lower Pivot Bar to Mounting Stud Nut	75-85

COIL SPRING REPLACEMENT: (*NOTE*—Two front coil spring compressors used (KMO-735 for Rambler, J-5224 for Others). Remove two rebound bumpers from upper control arms and raise front end of car to permit spring to extend to its full rebound position. Install upper section of one compressor on highest coil of spring and lower section of other compressor on lowest coil. Lower front end of car to partially compress spring with car weight (Maintain support under front end). Install remaining sections of compressors enclosing the five (Rambler), nine (Others) coils. Raise front of car and remove wheel, hub, and drum as an assembly. Tighten compressors evenly until spring can be removed.

►*CAUTION:* Lip of lower spring seat must engage upper end of knuckle pin to prevent spring slipping off pin.

►*SPRING REMOVAL NOTE: To facilitate installation and removal of spring compressor tools, a spring compressor can be made from two Ambassador Series lower spring retainers and a 5/8" bolt 18" long threaded at both ends. Insert bolt through spring and install spring retainers, then draw spring together by turning nuts on bolt.*

Spring Free Height	
Rambler, 100" W.B. (Early Type Spring)	18"
Rambler, 100" W.B. (Later Spr., Std. & O.D.)	16 7/8"
Rambler, 100" W.B. (Hydra-Matic)	18"
Rambler, 108" W.B. (Std. & O.D.)	18"
Rambler, 108" W.B. (Hydra-Matic)	18 3/8"
Ambassador & Hornet 6	17½-18"
Ambassador & Hornet V8	18¼"
Statesman & Wasp	17 3/16-18 5/8"

►*SPRING HEIGHT NOTE:* Low limit springs identified with one grind mark or white paint, high limit springs identified with one grind mark or white paint, high limit springs with two grind marks or red paint on flat section of end coil.

Spring Application Rambler	Part No.
1952 (Left)	3129502
1952 (Right)	3129503
1953 (Except Hydra-Matic)	3138301
1953 (Hydra-Matic)	3129502
1954 100" W.B. (Hydra-Matic)	3129502
1954 108" W.B. (Hydra-Matic)	3139055
1954 100" W.B. Exc. 2-Dr.Sed. (S-M)	3138301
1954 100" W.B. 2-Dr. Sed. (S-M)	3129503
1954 108" W.B. (S-M)	3129502
1955 Hydra-Matic (Without Air Cond.)	3129502
1955 Hydra-Matic (With Air Cond.)	3139055
1955 Synchro-mesh (Without Air Cond.)	3129503
1955 Synchro-mesh (With Air Cond.)	3129502
1955 Overdrive (Without Air Cond.)	3129503
1955 Overdrive (With Air Cond.)	3139055

Hudson & Nash	Part No.
Wasp & Statesman	3133526
Hornet 6 & Ambassador 6	3133545
Hornet V8 & Ambassador V8Ⓒ	3143348

Ⓒ—Used intermittently in production with Spring, Part No. 3143889. Diameter of wire is different as follows: .586" (3143348); .610" (3143889).

1946-54 OLDSMOBILE

All Series (1946-54)

DESCRIPTION: Independent linked parallelogram type with double acting shock absorbers integral with upper control arm assembly.

CHECKING & ADJUSTMENT: Check & adjust front wheel bearings, check kingpins for looseness, check shock absorbers and following points:

Tire Inflation—Check tires and inflate to following pressures:

Model	Front	Rear
All Series (Exc. 98) 1946-47	28 lbs.	28 lbs.
Series 98, 1946-47	24 lbs.	24 lbs.
All Models 1948-51	①	①
All Models (Exc. 98 Convt.) 1952	24 lbs.	24 lbs.
98 Convt. 1952	22 lbs.	22 lbs.
All Models (1953) ②	24 lbs.	22 lbs.
All Models (1953) ③	26 lbs.	22 lbs.
All Models (1954)	24 lbs.	22 lbs.

①—6.00x16, 6.50x16, 6.50x15 (28 lbs.). 7.60x15, 8 00x15 (22 lbs.). 8.20x15 (22 lbs.).
②—Models without Air-Conditioning.
③—Models with Air-Conditioning.

Wheel Runout—Check wheels and tires for run-out. Must not exceed ⅛". Mark 'high' point on tire and place this mark at top (vertically) when checking Toe-in and Toe-out, at one side (horizontally) to check Caster, Camber & Kingpin Inclination.

Frame Height—Raise and lower front end of car several times by grasping front bumper to allow frame to come to normal level.

NOTE—Car weight must be on wheels and wheels should be set in straight ahead position when checking adjustment.

Kingpin Inclination—4°51'10" (All 1941-48), 4°29'47" (1949-52), 4°55'13" (1953), 5°51'10" (1954) crosswise. Not adjustable.

Caster: Must be equal within ½° on both sides. Machined bosses provided on front side of knuckle support for protractor mounting.

Caster Specifications

Oldsmobile (All Models) ..... 0° to Neg. ¾°

To Adjust—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting on front bushing of upper support pivot pin, insert Allen wrench J-720 through lubricant fitting hole and turn upper pivot pin clockwise to increase caster, counter-clockwise to decrease caster. CAUTION—Pin must always be turned in complete turns only to avoid disturbing camber adjustment (below).

Camber: Camber adjustment (upper pivot pin) eccentricity is 1/16". 3/32" pin is available from the Parts Dept. and can be installed if regular 1/16" pin does not give sufficient range of adjustment.

Camber Specifications

1946-48	Neg. ¼° to Pos. ¾°
1949-54	①Neg. ¾° to Pos. ¾°

①—New Car limits Neg. ¼° to Pos. ¾°.

To Adjust—Same as for Caster (above) except that entire range of adjustment secured in ½ turn of eccentric pivot pin. CAUTION—Do not turn pin more than ½ turn when adjusting camber to avoid disturbing caster adjustment.

Toe-In: Measure 9-10" above floor with wheels turned straight ahead.

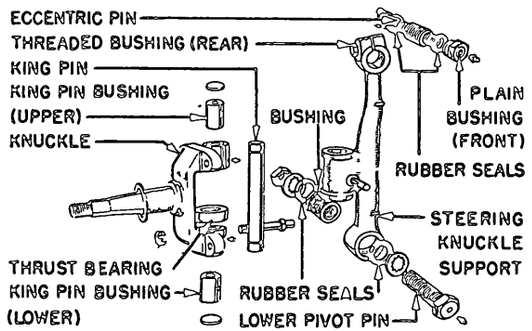
Toe-In Specification

Oldsmobile (All Models) ..... 1/16-1/8"

To Adjust—Loosen clamp bolts at wheel end of each tie rod, turn tie rod adjuster on each rod equally. On Oldsmobile, turn both adjusters in direction opposite to that in which wheel revolves to increase toe-in.

Toe-Out on Turns: With outer wheel turned exactly 20°, inner wheel 23° ± ½°. No adjustment.

SERVICING: Lower Control Arm & Pivot Shaft. Serviced as an assembly and not interchangeable on right and left sides of car. Pivot shaft at inner ends of control arms can be removed by taking out bushing in each arm. To install shaft, install tool J-1052 or block between arms adjacent to shaft eyes so that distance between inner faces of arms at shaft eyes is exactly 11½" (necessary to prevent distortion of arms when bushings installed). Install shaft with seal on each end adjacent to mounting bracket, thread bushing in on shaft and in arm simultaneously (new bushings cut their own thread in arm as they are turned in), tighten bushings with 150 lb. pull on 16" wrench (200 lbs. on 12" wrench) so that there is no clearance between bushing flange and control arm. See that distance between shaft bracket mounting holes and inner face of control arm is exactly 1½" at each end (turn shaft to centralize), and that seal ends lap over bushings.



OLDSMOBILE FRONT SUSPENSION

Knuckle Support Lower Pivot Pin—To install pin, slip rubber seal over outer end of each lower control arm, center knuckle support between lower control arms (approximately ⅛" between end of bushing and front arm, same distance between head of bushing and rear arm). Screw pivot pin through front arm, knuckle support bushing, rear arm, install nut on rear end of pin. Pull seals down over end of arms so that they seat on pin between arm and bushing at each side.

Knuckle Support Upper Pivot Pin—To install, center knuckle support in upper control arm yoke, screw pivot pin in until larger center section is centered in knuckle support, tighten clamp bolt. Install seal on pin at each side, start front bushing in on pin, then screw rear bushing in control arm and on pin and tighten securely. Turn front bushing in until clearance between front face or arm and head of bushing 1/32", tighten clamp bolt.

Kingpin Installation (Oldsmobile)—Bushings should be installed with oil hole lined up with oil hole in knuckle support and short groove on inner surface leading from oil hole to outer end of bushing (up on top bushing, down on lower bushing). Bushings should be burnished with Tool Set J-1061 and line-reamed to size with Tool HM-592.

SPRINGS: Lower end of spring not ground flat and must be installed with end coil fitted into recess in lower spring seat. Upper end of spring is ground flat. CAUTION—Spring must be installed with flat (ground) end up and lower end fitted in spring seat.

Car Model	1946-47 Oldsmobile Springs	Part No.
66	(exc. Bus. Coupe & Convertible)	419273
66	(Business Coupe)	419798
66	(Convertible)	419276
66	(Station Wagon)	417864
76		418782
78, 98	(2-door Club Sedan)	418783
98	(4-door Sedan)	419540
98	(Convertible)	419534

1948 Oldsmobile Springs

Car Model	Color Mark & Part No.
66 exc. Sta. Wgn. & Conv.	Green & Blue—419273
66 Station Wagon	Green & Yellow—417864
66 Convertible	Green & Red—419276
76	Yellow & Rust—418782
68 exc. Sta. Wgn. & Conv.	Green & Rust—554166
68 Station Wagon	Brown—417862
78 (All) & 68 Convertible	Green & Gray—418783
98 except Convertible	Green—419534
98 Convertible	Yellow & Brown—554955

1949 Oldsmobile Springs

76 exc. Sta. Wgn. & Convt.	Red—509040
76 Sta. Wgn. & Convt.	Grey & Yellow—511138
88 exc. Sta. Wgn. & Convt.	Grey & Yellow—511138
88 Sta. Wgn.	Red & Blue—419540
88 Convt.	Green—419534
98 exc. Convt.	Green—419534
98 Convt.	Yellow & Brown—554995

1950 Oldsmobile Springs

76 exc. Sta. Wgn. & Convt.	Red—509040
76 Sta. Wgn. & Convt.	Grey & Yellow—511138
88 exc. Sta. Wgn. & Convt.	Grey & Yellow—511138
88 Station Wagon	Red & Blue—558864
88 Convertible	Yellow & Brown—558865
98 exc. Holiday & Convt.	Green & Aluminum—558789
98 Holiday Coupe	Green & Blue—55879(
98 Convertible	Yellow & Aluminum—559362

1951 Spring Specifications

88 (all)	Grey & Yellow—511138
Super 88 exc. Convt.	Red & Yellow—511755
Super 88 Convt.	Blue & Yellow—512928
98 Sedan	Green & Aluminum—558789
98 Holiday Coupe	Blue & Green—558790
98 Convt.	Red & Aluminum—559362

1952 Springs

Series	Color Mark	Part No.
88 (Exc. Convt.)	Grey & Yellow	511138
88 (Convt.)	Blue & Yellow	512928
98 (Exc. Convt.)	Red & Yellow	511755
98 (Convt.)	Yellow	561982

1953 Springs

88 (Without Air Cond.) 1st type	511755
88 (Without Air Cond.) 2nd type	564666
88 (With Air Cond.)	561982
Super 88 Exc. Conv. 1st type	511755
Super 88 Exc. Conv. 2nd type	564666
Super 88 Conv.	561982
Super 88 (With Air Cond.)	561982
98 Exc. Conv. (Without Air Cond.)	512928
98 Conv. (Exc. Fiesta)	565505
98 Fiesta Conv.	563982
98 (With Air Cond.)	565505

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1946-54 OLDSMOBILE (C nt.)

1954 Springs

88 (Without Air Cond.)	565270
88 (With Air Cond.)	564262
Super 88 Exc. Conv. (Without Air Cond.)	564234
Super 88 Conv.	565271
Super 88 (With Air Cond.)	564262
98 Exc. Conv. (Without Air Cond.)	564235
98 Conv.	565271
98 (With Air Cond.)	566550

Part Number Location—Stamped on lower end of coil.

Color Mark—Consists of one or two paint daubs on one spring coil.

COIL SPRING REPLACEMENT: Support car frame with car stands, center jack under lower control arm pivot shaft and disconnect stabilizer link. Disconnect pivot shaft from front cross-member. Lower jack from under pivot shaft, allowing control arm to drop out of position, and remove spring.

Installation—Reverse removal procedure and be sure that flattened top coil is toward top and centralized by four lugs on cross-member. Bottom must index with hole in spring seat.

SHOCK ABSORBER REPLACEMENT: Place jack under knuckle support and raise car and remove wheel. Remove upper pivot pin. Remove the four shock absorber mounting bolts (nuts inside cross-member must be held from turning). Remove shock absorber.

Servicing (Front Shock Absorbers): Unsatisfactory ride control may be due to lack of fluid or malfunction of shock absorber. (NOTE—Presence of an appreciable amount of oil under shaft bearings on outside of shock absorber usually indicates shaft bushings are worn or oil seal has failed. In either case, unit should be replaced without further examination). To test shock absorber action without removing from car, proceed as follows: Be sure shock absorber is securely mounted, then disconnect shock absorber arm at upper pivot pin. Holding shock absorber at approximately the same angle as installed on car, move shock absorber through complete travel. There should be no free travel in shock absorber arm and amount of force required to move arm up and down should be almost equal. If control of shock absorber defective, fluid level should be checked and shock filled if found to be low (See Filling Front Shock Absorber below). If fluid is at proper level, replace shock absorber. NOTE—If shock absorbers checked while removed from car, they should be checked in same position as when mounted.

Filling Front Shock Absorber: If shock absorber off car, place shock absorber on mounting block with filler plug tilted upwards approximately 15° from horizontal position. Remove filler plug and make sure shock is completely full of fluid.

CAUTION—It is important that front shock absorber be filled through filler plug with shock in above position, otherwise air may be locked in shock absorber.

Installation—Reverse removal procedure and check front end alignment.

1955 OLDSMOBILE

All Series (1955)

►CHANGES & CORRECTIONS

►*1955 PIVOT PIN PRODUCTION CHANGE (To Eliminate Need for Lockwashers):* Effective approximately July 1, 1955 new upper and lower pivot pins are used in production. New pins have head of bolt undercut, and a higher pitch thread diameter is used immediately under the head of the bolt. Changes cause locking action when bolt is tightened and eliminate need for lockwashers.

DESCRIPTION: New design independent "parallelogram" type with shock absorbers mounted within front coil springs. Shock absorbers are independent of upper control arm and can be removed and installed without disturbing upper control arm assembly.

ADJUSTMENT: Before checking and adjusting front wheel alignment, inflate tires to recommended pressure. Check front wheel bearings for proper preload. Check front wheel and tire assemblies for radial and lateral run-out. Grasp front bumper in center and raise and lower front end several times to allow frame to come to its normal level. Check front shock absorber action All specifications below, are for car at curb weight.

Tire Inflation Pressure: 24 lbs. (front), 22 lbs (rear).

Kingpin Inclination: 5°51'10" at 0° Camber. Not adjustable.

Caster: 0° to Neg. ¾°. Variation between wheels should not exceed ½°.

Adjustment—Loosen clamp bolt at upper end of steering knuckle support and using special wrench J-5343, turn eccentric bushing in a clockwise direction to increase caster, and in a counter-clockwise direction to decrease caster. *NOTE*—Before tightening clamp bolt, adjust camber (see below).

Camber: Neg. ¾° to Pos. ¾°. Variation between wheels should not exceed ½°.

Adjustment—Same as for caster (above). Turn eccentric bushing not more than ½ turn in either direction from point where correct caster secured. *NOTE—The entire range of camber adjustment is secured within ½ turn of eccentric bolt.*

Toe-In: 1/16" to 1/8".

Adjustment—Loosen clamp bolts at each end of steering tie rod adjustable sleeves. With steering wheel set in straight ahead position, turn tie rod adjusting sleeves to obtain the proper toe-in adjustment. *CAUTION*—After adjustment completed and tie rod end ball studs are square in their seats, position tie rod-to-relay rod ball studs to bottom of slot in relay, then position clamps so bolts are below upper surface of adjusting sleeves. End of clamp must not be in slot.

Toe-Out on Turns: With outer wheels turned 20°, inner wheel should be 23°±½°. Not adjustable.

SHOCK ABSORBER REPLACEMENT: *NOTE—It is not necessary to disturb front suspension assembly.*

Rem val—Remove nut and jam nut on upper end of shock absorber *(CAUTION—Flats are provided on upper stud so it can be held while loosening the nuts).* Remove three capscrews and lockwashers attaching shock absorber bracket to lower control arm, and remove shock absorber out through lower control arm spring seat.

Installation—Reverse removal procedure.

FRONT STABILIZER: Rem val—Disconnect stabilizer linkage, each side, by removing nut from top of link-bolt. Pull out bolt from bottom of linkage, and remove retainers, grommets, and spacer. Remove stabilizer bracket to frame bolts and remove stabilizer bar, rubber bushings and brackets.

Installation—Reverse removal procedure and note the the following: Rubber bushings should be positioned squarely in brackets and the nut retaining the stabilizer link assembly should be drawn down to the limit of the threads. *CAUTION—Never lubricate stabilizer bushings.*

COIL SPRINGS: Removal—Support car with floor stands. Disconnect stabilizer link from lower control arm and remove rubber bumper from lower control arm. Remove shock absorber (see above). Center jack pad under lower control arm pivot shaft and raise jack until it just contacts shaft, then disconnect pivot shaft from front crossmember. Lower jack slowly, allowing control arm to drop out of position until spring is fully extended and remove spring.

Installation—Place jack pad under lower control arm pivot shaft. Position rubber insulator over pilot in crossmember. Hold the upper end (flat end) of coil spring in crossmember and raise lower control arm until spring seat contacts lower coil of spring, then rotate spring so end of bottom coil will index in hole provided in spring seat. Raise control arm gradually, checking to see that spring is seated correctly top and bottom, and insulator is in place. Use a drift punch to line up pivot shaft with bolt holes in crossmember and install bolts. Tighten to 55-60 ft. lbs. Connect stabilizer link, and install shock absorber

►*COIL SPRING IDENTIFICATION NOTE:* Spring part number is stamped on the outside of one of the end coils.

Series	1955 Springs Spring Part N .
88 (Without Air Cond.) Synchro-mesh	566124
88 (Without Air. Cond.) Hydra-Matic	566125
88 (With Air Cond.)	566127
Super 88 Exc. Conv. (Without A.C.) S-M	566124
Super 88 Exc. Conv. (Without A.C.) H-M	566125
Super 88 Conv.	566127
Super 88 (With Air Cond.)	566127
98 Exc. Conv. (Without Air Cond.)	566126
98 Conv.	566127
98 (With Air Cond.)	566559

UPPER PIVOT PIN & ECCENTRIC BUSHING: R m val—Place jack under lower control arm and raise wheel off floor. Remove wheel and loosen knuckle support clamp bolt. Remove nut and washer from front end of pivot pin and remove threaded pivot pin. *(CAUTION*—To prevent damage to brake hose, fasten knuckle support to upper control arm with a short piece of wire). Remove threaded eccentric bushing from knuckle support (eccentric has left hand thread).

Installati n—Position pivot pin rubber seal over the outer ends of upper control arm to facilitate their in-

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1955 OLDSMOBILE (C nt.)

stallation over the pivot pin after assembly. Install eccentric bushing from front into knuckle support so that the threaded outer diameter of bushing is centralized; then tighten clamp bolt to keep bushing from turning. Centralize knuckle support between forked ends of upper control arm and install pivot pin with shake-proof lock washer from rear. Install nut and tighten to 50-60 ft. lbs. Check to be sure pivot pin bolt head and nut are tightened securely against metal of control arm. Using a heavy wire or other hooked tool, snap rubber seals over end of control arm and into place on pivot pin. Lubricate pivot pin, install wheel, and check front end alignment.

►*PIVOT PIN NOTE: See Production Change above.*

LOWER PIVOT PIN & BUSHING: Removal–Place jack under lower arm, raise wheel off floor, and remove wheel. Remove nut and lockwasher from front end of lower pivot pin. Remove pin and bushing (use a long handle socket wrench to remove bushing and bear down with other hand on brake drum hub when working on left hand side).

Installation–Position pivot pin rubber seals over forked outer ends of lower control arm. Install bushing into front of knuckle support and seat tightly. Centralize lower pivot pin bushing with knuckle support between forked ends of lower control arm and install pivot pin with shake-proof washer from the rear and tighten to 50-60 ft. lbs. *(NOTE*–When knuckle support is properly spaced between ends of lower control arm there should be approximately 1/8" clearance between ends of bushing and inner surface of the front and rear control arm). Install a shake-proof washer and pivot pin nut and tighten securely.

►*PIVOT PIN NOTE: See Production Change above.*

LOWER CONTROL ARM PIVOT SHAFT: Removal–Remove front coil spring (see above). *(NOTE–Before removing pivot shaft, loosen the bushings).* Unscrew pivot shaft bushings and remove shaft from lower control arm assembly. *NOTE*–The lower control arm pivot shaft bushings have threads on the inside and outside of the bushing. The inside of the bushing threads onto the pivot shaft, but the bushing cuts its own threads in the lower control arm

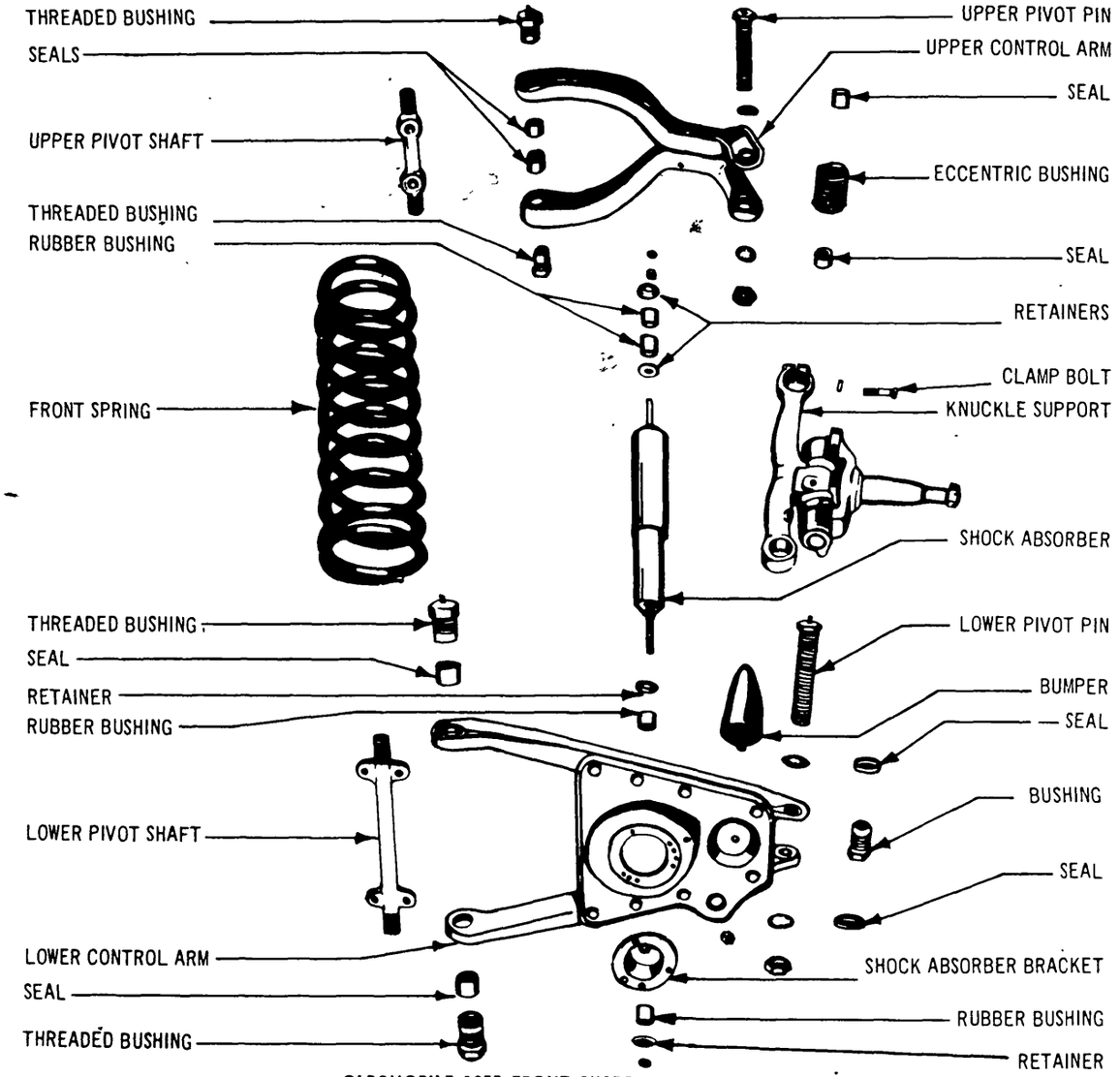
Installation–Install rubber seals on ends of pivot shaft and place shaft in lower control arm assembly. Start bushing on pivot shaft and into arm at same time, tighten bushing in place. Center pivot shaft between control arms and install the other bushing as above, being sure threads index so there is no bind. The distance between the center of the pivot shaft bolt holes and the inside face of the arm should be 1½" at each end. Turn pivot shaft as necessary to centralize. Position front coil spring on spring seat and complete assembly (see Coil Springs above).

LOWER CONTROL ARM: Removal–Remove coil spring (see above). Remove lower pivot pin and remove pivot shaft bushings and shaft.

New C ntr l Arm–Place tool J-1052 in position between forks of control arm, and expand until there is a distance of 11½" between inside surface of inner ends of control arm. Apply chassis lubricant to pivot shaft threads and install rubber seals on shaft. Position pivot shaft in control arm and while holding shaft centered, start bushings on shaft and into arms. Tighten bushings until they are solidly seated against the shoulder. Remove expander tool and turn shaft, as necessary, to centralize. Install lower pivot pin. Install coil spring (see above).

UPPER CONTROL ARM & PIVOT SHAFT: Removal–Remove upper pivot pin (see above). Remove two bolts holding upper control arm to frame and remove shaft and control arm assembly. Flat washers and self-locking nuts on lower end of bolts can be reached through access hole in bottom of front crossmember. Remove threaded pivot shaft bushings and shaft

New Control Arm–Place tool J-5799 in position between forks of control arm, and expand until there is a distance of 6 9/16" between inside surface of inner ends of control arm. Apply chassis lubricant to pivot shaft threads, and install rubber seals on shaft. Position pivot shaft in control arm and while holding shaft centered, start bushings on shaft and into arms. Tighten bushings until they are solidly seated against the shoulder. Remove expander tool and turn shaft, as necessary, to centralize. Complete assembly by reversing removal procedure.



OLDSMOBILE 1955 FRONT SUSPENSION ASSEMBLY

1946-50 PACKARD

Clipper Eight, Model 1951 (1941)
Six, 2000, 2010 (1942); 2100, 2130 (1946-47)
Eight, 2001, 2011 (1942), 2101, 2111 (1946-47)
Eight, "2200" & "2300" Series (1948-50)
Super Eight, 2003 (1942), 2103, 2123 (1946-47)
Super Eight, "2200" & "2300" Series (1948-50)
Custom Super 8, 2006 (1942), 2106, 2126 (1946-47)
Cust. Eight, "2200" & "2300" Series (1948-50)

TYPE: Independent 'parallelogram' type with coil springs. Design not like that used on other Packard models in that torque arm not used. Lower control arm consists of a double arm pivoted on a bracket shaft bolted on the front frame cross-member near the center with the lower spring seat riveted on the arms. Spring seat also serves as a mounting for the lower rubber bumper and has a connection for the front stabilizer bar link.

CHECKING & ADJUSTMENT: Check front wheel bearings and adjust if necessary, check wheels and tires for balance and run-out, check shock absorber action. Set front wheels in straight ahead position and check following points first:

Tire Inflation (1941-47)—Inflate tires to 26 lbs. (Front—Six), 28 lbs. (Rear—Six), 28 lbs. Front & Rear (All Other Models).

Tire Inflation (1948)—Inflate tires (front & rear) to following pressures (cold):

2201 & 2211 (exc. St. Sedan), 2206, 2240	28 lbs.
2201 & 2211 Station Sedans	26 lbs.
2202, 2232, 2233	26 lbs.
2220, 2222, 2226	32 lbs.

Tire Inflation (1949-50)—Inflate all tires (cold) to 24 lbs. (except Super 8 7 Pass.), 26 lbs. (Super 8 7 Pass. only).

Frame Height—Car must be loaded or pulled down to correct riding height when checking front end specifications as follows:
Front End—3½" from lower face of frame side rail to top of lower control arm.
Rear End—5" from lower face of frame side rail to top of rear axle housing.

Kingpin Inclination: As follows:

1941-47 All Models	5°35' Crosswise
1948 2232 & 2233 Convertibles	5°35' Crosswise
1948 2226 & 2213 Custom	2°30' Crosswise
1948 All Other Models	5°50' Crosswise
1949-50 All Models	5°50' Crosswise

Caster: As listed below with correct Frame Height.

Caster Specifications

1941-47 All Six & Eight	Neg. 1° ± ½°
1942-47 All Super & Cust. Super 8	Neg. 2° ± ½°
1948 Six 2220	Neg. 2° ± ½°
1948 Six 2240 & Eight 2201, 2211	Neg. 1° ± ½°
1948 Super 8 2202, 2232	Neg. 1° ± ½°
1948 Super 8 2222	Neg. 2° ± ½°
1948 Custom 8 (All Models)	Neg. 2° ± ½°
1949-50 Eight	Neg. 1° ± ½°
1949-50 Super 8 exc. 7 Pass.	Neg. 1° ± ½°
1949-50 Super 8 7 Pass.	Neg. 2° ± ½°
1949-50 Custom 8	Neg. 2° ± ½°

To Adjust Caster—Loosen clamp bolt in upper end of knuckle support, remove lubrication fitting in front bushing at outer end of upper control arm, install Allen type wrench, special tool No. KMO-487, through lubrication fitting hole so as to engage socket in end of upper pivot pin, turn this eccentric pin clockwise to increase caster, counter-clockwise to decrease caster in complete turns only, tighten clamp bolt and re-install lubrication fitting. NOTE —This pin also controls camber and camber will be disturbed unless pin turned in complete turns only

Camber: 0° plus or minus ½° (All Models).

To Adjust Camber—Adjusted in same manner as Caster (above) except that entire range of adjustment secured in ½ turn of the eccentric pin. NOTE —This adjustment affects Caster and will be satisfactory if pin turned not more than ½ turn from point where correct caster adjustment is secured.

Toe-In:—0-1/16" (all models). Measure between tires 10" above floor. When checking toe-in, first set wheels straight ahead and correct tie rod lengths, if required, as follows: With wheels straight ahead, line up mark on steering gear case with mark on roller cross-shaft to insure roller being on high midpoint of worm, install Center Gauge J-2556 on frame cross-member, adjust tie rods (lengthen one rod, shorten opposite rod) until distance from mark on gauge to brake backing plate is same on both sides of car. CAUTION—See that steering marks kept in alignment while making this adjustment.

To Adjust Toe-In—Loosen clamp bolts on adjusting sleeve at outer end of each tie rod, turn both adjusting sleeves equally (to avoid disturbing steering gear position). Make certain that ball joint socket is horizontal or square with ball stud when tightening adjusting sleeve clamp bolts. NOTE—If correct toe-in adjustment cannot be secured by turning both tie rods equally within ½ turn (tie rod lengths equal within ½") without turning steering gear off high point of worm, steering gear pitman arm should be relocated on cross-shaft.

Steering Geometry:—With outer wheel turned exactly 20°, inner wheel should be turned 23° plus or minus ½°. No adjustment is provided. Check for incorrect Caster or bent steering arms if incorrect.

SERVICING: Knuckle Support Upper Pivot Pin & Bushings—To assemble knuckle support and upper control arm, thread eccentric pivot pin in upper end of knuckle support until larger center section is centered in support with adjusting wrench socket toward front of car (approximately two threads exposed at rear of support), install clamp bolt in support and tighten securely, install seals on each end of pin (front seal approximately ⅛" shorter than rear). Hold knuckle support centered in end of upper control arm, thread rear bushing in arm and on pin partially, start front bushing on pin, then tighten rear bushing securely to 90-100 ft. lbs. Turn front bushing in until clearance between hexagonal head of bushing and front face of control arm is 1/32", install clamp bolt in front eye of control arm and tighten this clamp bolt securely.

Knuckl Support Low r Pivot Pin—Consists of a bolt threaded through eyes at outer end of lower control arm and a bushing which is threaded in knuckle support and on the bolt. Bolt is retained by a nut on the rear end. To assemble, install bushing in knuckle support, tighten bushing to 145-155 ft. lbs. Slip rubber seal over each end of bushing, hold knuckle support and bushing centered in lower control arm, thread bolt through arm and knuckle support bushing from front, install nut and washer on rear end of bolt, snap seals down over bushing and into place on the bolt at each end of bushing. NOTE—Clearance between inner face of control arm and end of knuckle support bushing should be ⅛".

Lower Control Arm Frame M unting Pivot Shaft—Control arm is pivoted on shaft bolted to frame cross-member by bushings which are threaded in arm and on shaft. Shaft can be removed from arm by removing bushings. New bushings cut their own thread in the arm and must be installed as follows: Install special spreader tool J-1052 between inner ends of lower control arm to maintain correct distance of 11½" (plus or minus 3/64") between inner faces of control arm while bushings being installed (expand tool until correct distance of 11½" is secured). Hold pivot shaft centered in end of control arm so that distance from center-line of frame mounting holes to inner face of arm is 1½" at each end, see that seals installed on each end of shaft. Start bushing on shaft and in arm at same time, tighten bushings securely to 145-155 ft. lbs. Check to see that arm pivots freely on shaft and that 1½" dimension at each end is maintained (shaft can be rotated to centralize it in arm).

SPRINGS: Removal & Installation—To remove spring, support car with jack under lower control arm, raise wheel 3-4" off floor, place jack stand under frame side rail, disconnect stabilizer link at lower control arm, install jack under lower control arm frame mounting bar (inner end), take out mounting bar bolts and nuts, lower jack slowly to relieve spring tension, lift spring out.

Installation. Install in same manner paying particular attention to spring marks (see Note below). Make certain that flattened (ground) end of spring is upward and centralized by four lugs on cross-member, see that lower end of spring indexes with hole in spring seat (lower end not flattened and must be properly installed in spring seat recess).

1946-47 Spring Specifications

Car Model	U. S.—Part No.	Can. & Exp.
2100	367653	387864
2101, 2111	373862	387865
2103, 2106	367740	387866
2126	387552	

1948 Spring Specifications

Car Model	Color Mark & Part No.
2201, 2, 11	Orange & Brown—395720
2232	Red—367740
2206, 33	Orange & Silver—395721
2213	Red & Purple—382980
2222, 26	Orange & Yellow—387552

1948 Export Springs

2201, 2, 11, 32	Red & White—395723
2206, 33	Brown—384857
2222, 26	Orange & Yellow—387552

1951-55 PACKARD

All Models (1951-54)
5540 Series, Clipper (1955)

▷*SERIES 5560 (CLIPPER DELUXE) & SERIES 5580 (PACKARD) NOTE:* "Torsion Level" Suspension used on these models. Front End Alignment (as indicated below) is the same for both types of suspension.

DESCRIPTION: Independent, parallelogram "Broad-Beam" type with new design Upper Support Arm and Direct Acting Shock Absorbers.

CHECKING & ADJUSTMENT: First check and adjust front wheel bearings, wheel and tire balance and run-out, and tire inflation. Place car on level floor and check following:

Tire Inflation (1951): 24 lbs., front and rear.

Tire Inflation (1952): (2513) 30 lbs. front, 40 lbs. rear. (Others) 24 lbs, front and rear.

Tire Inflation (1953): 24 lbs., (Exc. 2626, 2613, & 2633).
2626 Series—26 lbs., front & rear.
2633 Series—36 lbs, front & rear.
2613 Series—30 lbs., front, 40 lbs., rear.

Tire Inflation (1954): As follows:
5413—30 lbs. front, 40 lbs. rear.
5426—26 lbs., front and rear.
5433—36 lbs., front and rear.
Others—(With Conventional Steering) 24 lbs. front, 20 lbs. rear. (With Power Steering) 22 lbs. front, 20 lbs. rear.

Tire Inflation (1955): 24 lbs., front and rear. *NOTE*—If more than four passengers, inflate to 26 lbs., front and rear.

Kingpin Inclination: (2513, 2613, 2633, 5413, 5433) 2°30'. (Others) 5°50'.

Caster: (2513, 2613, 2633, 5413, 5433) Neg. 2° ± ½°. (Others) Neg. 1° ± ½°.
Adjustment—Remove lubrication fitting in bushing at forward end of upper support arm outer pivot pin, use Allen wrench inserted through this hole to turn the pivot pin in complete revolutions only.

▷*CAUTION—Pin is eccentric and will disturb camber setting unless it is rotated in full turns only.*

Camber: (1951)—0° ± ½°. (limits Neg. ½° to Pos. ½°.)

Camber (1952-55): 0° plus ¾°, minus ¼°.
Adjustment—Same as for Caster (above) except that eccentric pin should be turned not more than one-half revolution from point where correct caster setting secured. Entire range of adjustment is secured in ½ turn of the pin.

▷*CAUTION—Caster will be disturbed if pin turned more than one-half revolution.*

Toe-In: 0", plus 1/16", minus 0" (0" to 1/16" range). Adjustment—Loosen clamp bolts at each end of adjusting sleeve at outer end of each tie rod, turn adjusting sleeves on both tie rods equally.

Toe-Out on Turns: With outer wheel at 20°, inner wheel should be 23° ± 1° (1951-53), 23 ¾° (1954-55). No adjustment (check for bent steering arms).

SHOCK ABSORBER REPLACEMENT: Raise car until there is sufficient clearance to permit shock absorber to be removed through hole in bottom of lower support arm. Using an offset screw driver, insert the tool in slot of shock absorber extension. While holding top of shock absorber extension, remove shock absorber nut, washer, grommet. From underneath lower support arm, remove nuts holding shock absorber retainer bracket to bottom of lower spring seat, and remove shock absorber.

Installation—Reverse the removal procedure. Tighten shock absorber stud nut to 12-18 ft. lbs., and the lower retaining bracket nuts to 15-18 ft. lbs.

▷*CAUTION—Make certain that rubber grommets and cup-shaped washers correctly assembled on upper and lower mounting studs.*

COIL SPRING REPLACEMENT: Raise front end of car and place a jack stand under frame side rail to rear of suspension cross-member. Remove stabilizer to frame horn attaching nuts. Disconnect stabilizer end from lower support arm and remove shock absorber. Remove the front wheel and place a jack under outer end of lower support arm and raise just enough to relieve pressure on lower support pivot pin. Remove the pivot pin nut and screw out the pivot pin. Lower jack slowly to allow support arm to go down, then remove coil spring.

Installation—Position spring in lower support arm with the flattened end of spring upward. Place jack under lower support arm near outer end, and raise jack until holes in outer end of support arm are in line with holes in knuckle vertical support lower bushing. Centralize knuckle support in support arm (there should be approximately ⅛" clearance between inner face of arm and each bushing). Install lower pivot pin in through the front of support arm and tighten to 85 to 95 ft. lbs. torque. Position end of front stabilizer rod in lower support arm. Insert "ears" of the stabilizer attaching clips in holes of support arm, and spring the clip over bottom edge with tool J-4654. Install shock absorber through bottom frame front cross-member opening with the extension extending out through top of cross-member. Slip the rubber grommet and washer over top end of shock absorber and install the nut. Tighten retaining nut to 12-18 ft. lbs. torque. Install front wheel, remove stand from under car and lower car to floor.

▷*SPRING INSTALLATION CAUTION*—Flattened end of spring must be upward and end of lower coil must be seated in recess in lower spring seat so as to cover the drain hole in the spring seat.

1951 Spring Identification

SPRINGS:	Part No.	Load Rating
200 exc. Convt.	395720	2040x90
200 Convt.	382374	2180x90
300 & 400	382374	2180x90

1952 Spring Identification

Model	Syn. Mesh & O.D.	Ultramatic
200 (All Models)	387806	395720
250 (Sport Coupe)	387806	395720
250 (Convertible)	395720	382374
300 (All Models)	395720	382374
400 (All Models)		382374
Commercial	395726	395726

1953 Spring Identification

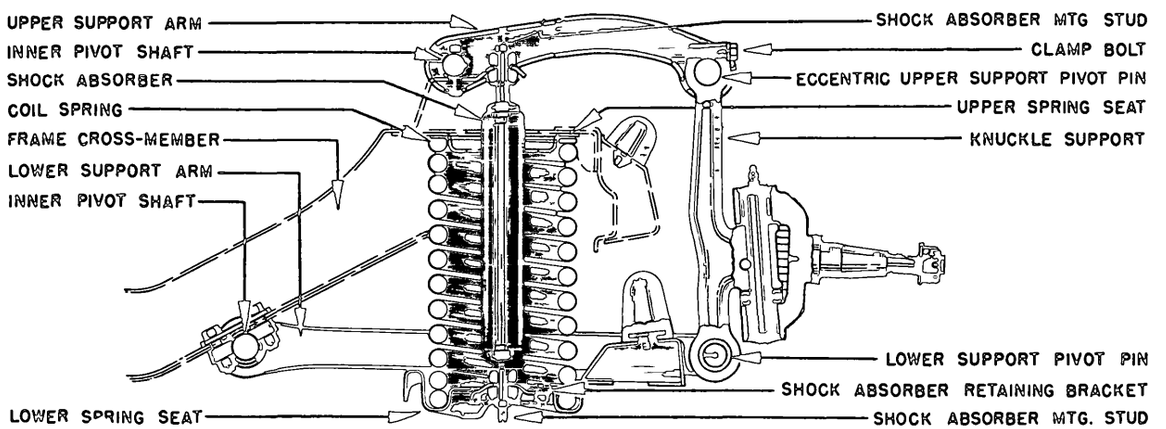
Model	Syn. Mesh & O.D.	Ultramatic
2601	446570	446442
2611	446570	446442
2602	446443	446444
2631 Convertible	446443	446444
2631 Mayfair	446442	446443
2606		446447
2626	387552	387552
2633 Commercial	446208	387866
2613 Commercial	395726	

UPPER SUPPORT ARM REPLACEMENT: Support front end on jack placed under lower support arm, remove wheel and tire assembly. Unscrew front and rear bushings on outer pivot pin. Remove clamp bolt from upper end of knuckle support, unscrew pivot pin from support. Remove two mounting bolts from support arm inner shaft, lift support arm assembly off. To remove shaft from support arm, unscrew bushing from arm at each end of shaft.

▷*INSTALLATION CAUTION*—When installing inner pivot shaft bushings in arm, use Spreader Tool J-3957 to maintain arm alignment while screwing bushings in. After installing support arm on frame, hold knuckle support centered in arm while screwing bushings in arm and on pivot pin. Make certain rubber seals installed at inner end of each bushing.

LOWER SUPPORT ARM REPLACEMENT: Remove shock absorber and coil spring (see directions above). Remove nut and lockwasher from rear end of lower pivot bolt at outer end of arm, unscrew bolt from knuckle support and support arm, lift support arm assembly off. Remove pivot shaft by unscrewing bushing from arm at each end of shaft.

▷*INSTALLATION CAUTION*—When installing pivot shaft bushings in arm, use Spreader Tool J-1052 to maintain support alignment. Install rubber seal at inner end of each bushing.



PACKARD FRONT SUSPENSION

PACKARD "TORSION LEVEL" SUSPENSION

5560 Series (Clipper DeLuxe) (1955)
5580 Series (Packard) (1955)

► CAUTIONS

►*FRONT END ALIGNMENT NOTE: Alignment specifications are the same for "Conventional" & "Torsion Level" type suspensions. See "Packard (Conventional)" Front Suspension for data.*

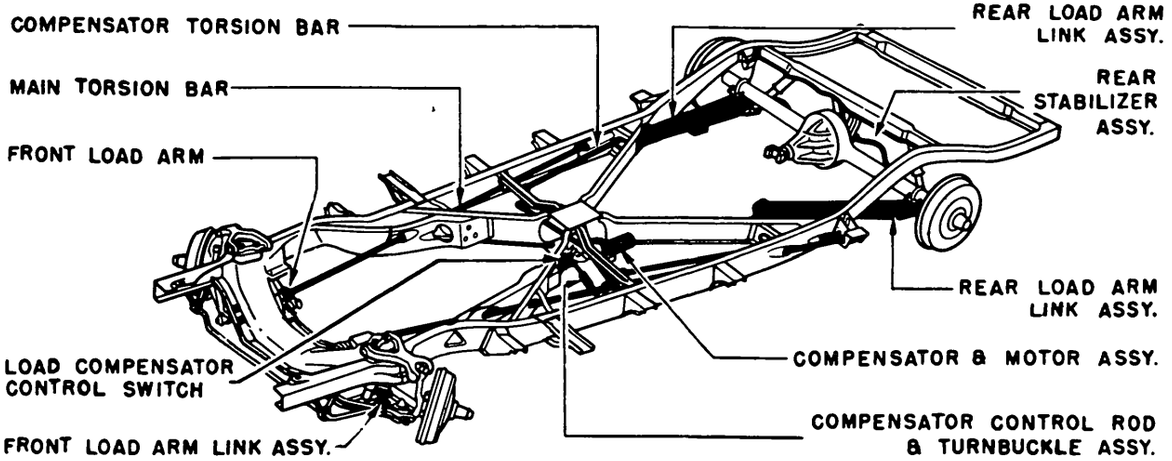
►*SERVICING CAUTION: The "On-Off" Switch located below the instrument panel must be in the "OFF" position when cars "jacked-up" for service operations. DO NOT place jack or hoist under rear load arms as these may become disconnected.*

DESCRIPTION: Two long, torsionally flexible bars (running generally fore and aft along frame side rails) have hexagonal ends which fit into load arms (one at each end of each bar) which are hexagonally broached at one end. Front load arms pivot on anti-friction needle type bearings on brackets mounted on frame front cross member. Rear load arms also pivot on needle type bearings in brackets attached to frame side rails. Front arms are loaded against anti-friction links which seat in front suspension lower support arms. Rear arms are loaded against stirrup type links suspended from driving torque arms. Arms on each side are installed in such a manner that loaded ends are pointing in opposite directions (loaded end of front arm is pointing away from center of car whereas loaded end of rear arm is pointing toward center of car). Initial loading of arms is accomplished by "winding up" or twisting torsion bar during its assembly in chassis. Operating in conjunction with Torsion Level Suspension is a levelizing or compensating mechanism which automatically keeps car level and approximately at its designed height regardless of load.

Front Suspension: Except for minor design changes, the independent parallelogram type front suspension remains unchanged. Major change is elimination of coil springs.

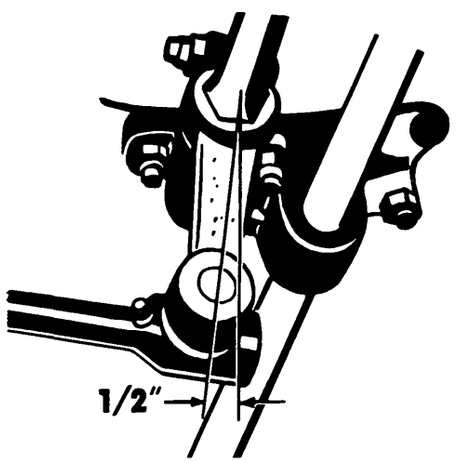
Rear Suspension: Thrust of rear axle to frame, in order to move car, is accomplished by two driving torque arms, one at each side of frame, attached to frame at forward end by rubber cored bushings. Arms are also insulated by rubber at points of attachment to rear axle housing, permitting free movement of axle. Transverse or side-to-side movement of rear axle is controlled by two waved stabilizer bars which permit true vertical movement of rear axle. Rubber grommets, at ends of bars, insulate wheel shocks from frame.

Compensator: Basically, compensator consists of torsion bars approximately four feet long, connected by means of levers and links to a two-way motor with reduction gearing. Forward end of compensator bars rotate in bearings attached to frame. Hexagonal rear end of bars fit into rear load arms in milled hexagonal openings adjacent to main torsion bar openings. Bar type links are connected to the compensator gear box at their inner ends and, at their outer ends, to levers attached to front end of compensator bars. Six switches are used in compensator electrical system to control its operation. Control switch assembly is attached to frame forward of compensator motor. A lever in switch assembly is linked to a lever clamped to left main torsion bar near center of bar.



PACKARD TORSION LEVEL SUSPENSION ASSEMBLY

OPERATION: Torsion Level Suspension—Vertical wheel movement causes link end of load arms to move vertically. Vertical movement of either arm increases or decreases the amount of twist in the torsion bar which in turn transmits this twisting force to the arm on the opposite end of the bar and the load on the link end of this arm then is increased or decreased. The force beapplied to move front load arm is in an upward direction. The force opposing the movement of the rear load arm may be thought of as being in an upward direction. Therefore, the arms are being loaded against each other with the bar absorbing the torsional load. In addition to absorbing the torsional stresses created by road irregularities the load arms and torsion bars also function in a manner which raises or lowers the car, front and rear, on the side where road irregularity is encountered.



COMPENSATOR BAR "NO LOAD" POSITION

Compensator: With front and rear of car equally loaded, center section of main torsion bar has no rotation due to equal twisting forces being applied at each end of bar. When loading at either end of car is increased or decreased, center section of main torsion bar will rotate causing control switch to make contact and "make" and "break" circuit to compensator motor. This causes connecting links to move inward or outward to rotate compensator bars. The bars, in turn, cause rear load arms to pivot and either raise or lower rear end of car to make it level with front end. Thus, regardless of weight distribution, car remains level to road, front and rear, with very little change in car height. It should be remembered that compensator functions only when loading of car is changed and does not function to compensate for road irregularities. *NOTE*—Control switch has approximately a seven second delayed action to prevent motor from operating each time wheels pass over an irregularity in road.

Switches—Six switches used to control compensator as follows:

"On-Off" Switch—Located below instrument panel to left of steering column.

►*CAUTION: This switch is normally in "ON" position and is moved to "OFF" position to prevent compensator from operating when car is raised for service operations.*

Stop Light Switch—A three terminal two-way stop light switch is used to prevent compensator operation during brake application.

Control Switch—Used to energize compensator motor when car load is increased or decreased.

Limit Switch—Employed to permit compensator motor to operate only within a predetermined range in accordance with load changes in car.

Solenoid Switches—Two used to complete electrical circuit to compensator motor, one for each direction of rotation of the motor.

CONTINUED N NEXT PAGE

PACKARD "TORSION LEVEL" SUSPENSION (C nt.)

ADJUSTMENT: C mp nsator Linkage–Set car on its wheels. If rear end of car is too high, shorten compensator switch turnbuckle. If rear end too low, lengthen link.

LUBRICATION: Incorporates ten lubrication points which should be lubricated every 1000 miles with pressure gun grease. Whenever torsion bars are replaced or unloaded for other service operations, link seats should be lubricated with a special grease.

►*SERVICING CAUTION: Car should never be jacked in rear with jack r h ist under rear load arms as the rear l ad arm link may b com disconnected.*

TROUBLE SHOOTING (Electrical System): *NOTE–Two separat fuses ar used (one for leveling motor circuit, on for control circuit) and blown fuse in ither circuit will pr vent operation of compensator system.* If compensator does not operate, check as follows:

1)–Check control circuit fuse as follows: With dash compensator switch "On", apply the brakes. Stop lamps should light. If not, switch is disconnected or fuse is blown. *NOTE*–This fuse is the only 20 ampere fuse on the Fuse Block located under instrument panel near plenum chamber (fuse sizes are marked on holders).

2)–Check motor fuse as follows: Ground the "A". or "B" terminal on Compensator Switch mounted on left side of X-member directly forward of the leveling motor assembly (this switch has three terminals: "BAT", "A", "B"). Grounding of one terminal should cause motor to operate (grounding "A" terminal should lower rear end of car, grounding "B" terminal should raise rear end of car–see Note below). If motor does not operate in either direction, check for blown fuse. *NOTE*–This fuse is 20 ampere and located in cartridge type holder in lead near starter motor.

L v ling M t r N t –If compensator at limit of travel up or down, circuit will be broken by limit switch and grounding of compensator switch terminal will not cause motor to operate beyond this point. However, grounding of the other compensator switch terminal should cause motor to operate in opposite direction.

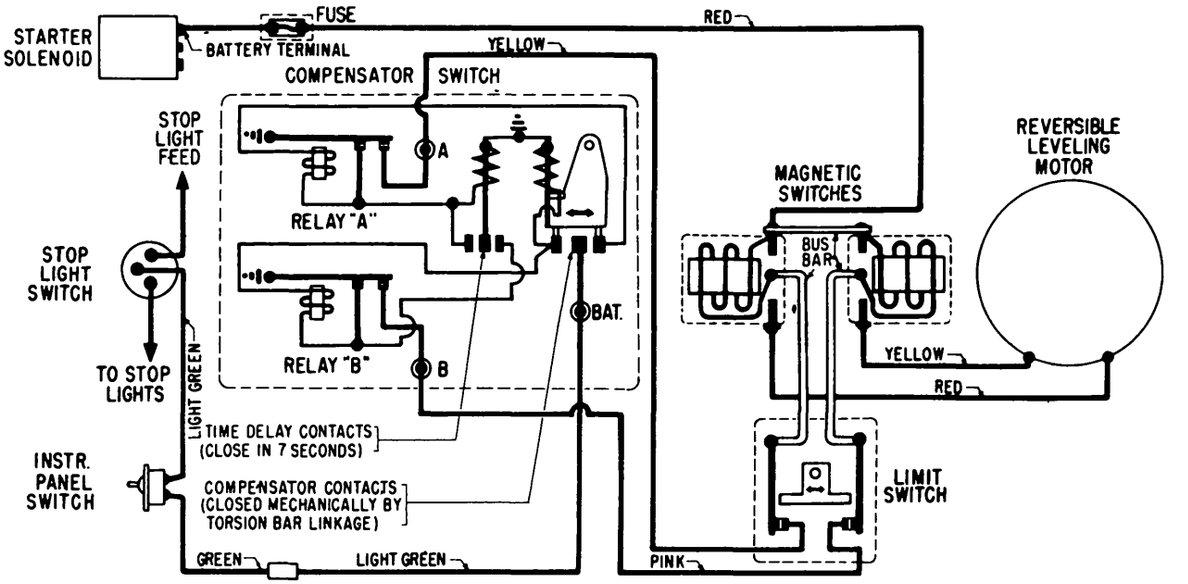
3)–Check wiring (see wiring diagram) and make certain that all connections are tight.

4)–If above checks indicate that trouble caused by malfunctioning Compensator Switch, Limit Switch, or motor control magnetic switches, replace units as required. Do not attempt to repair these parts.

L v ling M t r N t –Motor brushes and commutator can be serviced in same manner as for starter motors.

TORSION BAR REMOVAL: Position car on hoist and move the "on-off" switch, located under instrument panel to left of steering column, to the "off" position. Raise car and remove rear wheel on side from which torsion bar is to be removed. Proceed as follows:

1)–If a frame contact type hoist is used, place the high-jacks under rear axle housing and under the outer ends of front lower supports. On other type hoists, place the high-jacks at all four corners, front and rear, then extend jacks so that pads contact the frame.



TORSION LEVEL SUSPENSION CONTROL WIRING DIAGRAM

2)–Note position of compensator bar lever in illustration, as this is the position in which no load is being transmitted through the bar. Bar should be just off vertical toward the center. Move levers as necessary by grounding a terminal at the limit switch. Grounding rear terminal will move lever outward, front terminal will move lever inward.

3)–Remove nuts retaining rubber guide bearing and compensator retainer bracket to cross member and remove these parts. (*NOTE–If left tension bar is being removed, detach compensator link from compensator link from compensator bar).*

4)–Loosen rear load arm clamping bolt using an 11/16" socket and offset handle. Tap compensator bar forward and out of load arm. Slightly raise or lower rear hoist lift if required to centralize hex in arm with hole in bracket.

5)–Attach Load Arm Centering Tool J-6045 with piloting shoulder of tool in hole in bracket and opposite end of tool installed in elongated hole above compensating bar hole in bracket, tighten the locknut.

6)–Attach clamping detail of Torsion Bar Loading and Unloading Tool J-5954 at inner end of load arm and then install jack attachment to clamping detail. The hole in frame for attaching jack attachment is in line with the front of the brake drum. Operate jack to move inner end of load arm upward far enough to centralize the pivot bolt in bracket (pin is located between load bar and compensator bar holes in bracket). Use a brass drift and tap pivot bolt out of bracket.

7)–Tighten jack to move inner end of arm upward to clear load arm link and then move load arm link inward-Place a four inch block between rear axle case and bottom of frame "kick-up". While holding link inward, reverse tool ratchet and lower inner end of arm to relieve load on bar.

8)–Remove clamp from load lever and attach Removing Tool J-6046 to bar forward of bracket. Strike tool with a hammer and drive bar toward rear. Remove tool and push bar out toward rear.

TORSION BAR INSTALLATION: *CAUTION–An arrow is stamped in end of bar denoting direction in which bar must be "wound up". The three digits stamped in end of bar are the last three digits of bar part numb r.*

1)–Insert rear load arm in bracket and feed bar through bracket and load arm (if left bar being installed, feed bar through compensator link also), and into front load arm making sure that front load arm link is in correct position and that rear load arm is nearly vertical with clamping detail of Torsion Bar Loading and Unloading Tool J-5954, and Centering Tool J-6045 in place. Distance from rear end of torsion bar in load arm to rear face of bracket should be ¾" with rear load arm centered in bracket.

2)–Place special lubricant in seat in load arm link and connect tool jack to clamp on load arm. Operate jack and draw load arm up into position where pivot hole in arm lines up with pivot hole in bracket, and then insert pivot pin.

3)–Continue to draw upward while holding link inward until link can be swung outward under arm, then back off jack to seat arm.

4)–Position compensator bar in rear load arm and attach bearing at front of arm to frame (seal between bearing and lever should not be squeezed together but should contact both the bearing and lever). Tighten clamp nut in rear load arm. Remove clamp, jack, and centering tools.

5)–If left torsion bar replaced, attach compensator motor linkage so that rear edge of clamp lever is ¾" from front edge of rubber guide bearing retainer. Adjust compensator linkage (see above).

1946-48 PONTIAC

Six & Eight, All Models (1941-48)

DESCRIPTION: Linked parallelogram type with coil springs, and integral double acting shock absorbers.

CHECKING & ADJUSTMENT: Check and adjust front wheel bearings, check kingpins for looseness, check shock absorber action. Then check and adjust following points:

Tire Inflation: Check and inflate tires:

	Front	Rear
Pontiac All ('41-42)	28 lbs	28 lbs
Pontiac ('42)①	24 lbs	24 lbs.
Pontiac All ('46-48)②	28 lbs	28 lbs.
Pontiac All ('46-48)①	26 lbs	26 lbs.
Pontiac Sta. Wgn. ('46-47)③	32 lbs	32 lbs.
Pontiac Sta. Wgn. ('48) ③	27 lbs	36 lbs.

①—6.50x16 Tires. ②—6.00x16 Tires.
③—6 Ply 6.50x16 Tires.

Wheel Run-out: Wheel and tire run-out must not exceed ⅛". Mark "high" point of tire and place this mark at top (vertically) when checking toe-in and toe-out, place mark at one side when checking Caster, Camber, and Kingpin Inclination.

Kingpin Inclination: 5½-6° crosswise

Frame Height: Raise and lower front end of car several times to allow frame to assume normal level
NOTE—Car weight must be on wheels and wheels must be set in straight-ahead position when checking following specifications.

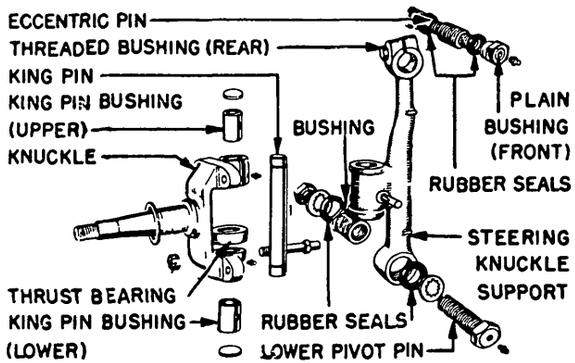
Caster: Neg. ¾° (Neg. ½° to Neg. 1°) and equal within ½° on both sides.
To Adjust—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting on front bushing of upper support pivot pin, insert Allen wrench J-720 through lubricant fitting hole and turn upper pivot pin clockwise to increase caster, counter-clockwise to decrease caster. CAUTION—Pin must always be turned in complete turns only to avoid disturbing camber adjustment (below).

Camber: 0°. Limits Neg ¼° to Pos ¼°
To Adjust—Same as for Caster (above) except that entire range of adjustment secured in ½ turn of eccentric pivot pin. CAUTION—Do not turn pin more than ½ turn when adjusting camber to avoid disturbing caster adjustment.

Toe-In: 0" to 1/16" measured 9-10" above floor.
To Adjust: Loosen clamp bolts at wheel end of each tie rod, turn adjuster on each rod equally and in opposite directions

Steering Geometry (toe-out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned 23° ± ½°. No adjustment

SERVICING: Lower Control Arm & Pivot Shaft. Serviced as an assembly and not interchangeable on right and left sides of car. Pivot shaft at inner ends of control arms can be removed by taking out bushing in each arm. To install shaft, install tool J-1052 or block between arms adjacent to shaft eyes so that distance between inner faces of arms at shaft eyes is exactly 11½" (necessary to prevent distortion of arms when bushings installed). Install shaft with seal on each end adjacent to mounting bracket, thread bushing in on shaft and in arm simultaneously (new bushings cut their own thread in arm as they are turned in), tighten bushings with 150 lb. pull on 16" wrench (200 lbs. on 12" wrench) so that there is no clearance between bushing flange and control arm. See that distance between shaft bracket mounting holes and inner face of control arm is exactly 1½" at each end (turn shaft to centralize), and that seal ends lap over bushings.



Knuckle Support Lower Pivot Pin—To install pin, slip rubber seal over outer end of each lower control arm center knuckle support between lower control arms (approximately ⅛" between end of bushing and front arm, same distance between head of bushing and rear arm). Screw pivot pin through front arm, knuckle support bushing, rear arm, install nut on rear end of pin. Pull seals down over end of arms so that they seat on pin between arm and bushing at each side.

Knuckle Support Upper Pivot Pin—To install, center knuckle support in upper control arm yoke, screw pivot pin in until larger center section is centered in knuckle support, tighten clamp bolt. Install seal on pin at each side, start front bushing in on pin, then screw rear bushing in control arm and on pin and tighten securely. Turn front bushing in until clearance between front face or arm and head of bushing 1/32", tighten clamp bolt.

Kingpin Installation—Bushings are floating type and should be installed with lubrication groove on inner face leading toward outer end of bushings (up on top bushing, down on lower).

SPRINGS:—Lower end of spring not ground flat and must be installed with end coil fitted into recess in lower spring seat. Upper end of spring is ground flat. CAUTION—Spring must be installed with flat (ground) end up and lower end fitted in spring seat.

1941 Spring Specifications

Car Model	Spring Part No.
24, 26, 27 (exc. Sta. Wgn.)	509039
24 Station Wagon	509040
25 (exc Taxicab)	509037
25 Taxicab	509039
26 Taxicab	509040
28, 29	509040

1942-48 Spring Specifications

25 Torpedo 6 (except Convt. & Taxi)	509037
26 Strmlnr. 6 (exc. Sta. Wgn. & Taxi)	509039
27 Torpedo 8 (except Convt.)	509039
28 Strmlnr. 8 (except Sta. Wgn.)	509040
25 & 27 Convertibles	509038
25 Taxicab	509039
26 Taxicab	509040
26 & 28 Station Wagon	508116

1949-52 PONTIAC

All Models (1949-52)

►*1949-52 REBOUND NOISE CORRECTION*—If upper control arm strikes frame on extreme rebounds (causing loud metallic noise), replace standard bumper with higher bumper to prevent this contact (NOTE—Change bumpers on both sides)

Upper Control Arm Bumper

Standard (1¾" long) ..... **Part No. 1298323**
Special (2¼" long) ..... **Part No. 3687670**

DESCRIPTION: "Wishbone," independent, and linked parallelogram type with direct acting shock absorbers mounted within the coil springs, and new type upper control arm (not part of shock absorber assembly). Cross-member on which suspension unit mounted has separate brackets for upper control arm shaft mounting, for shock absorber mounting.

CHECKING & ADJUSTMENT: First check entire front end for wear and excessive play, inflate tires to correct pressures (see data below), check steering gear adjustment, wheel bearing adjustment, wheel and tire balance and run-out (run-out should not exceed 1/8"). Place car on level floor, "jounce" car at rear and front (see Leveling instructions) and check frame height. Then check and adjust all front end specifications in following order:

Leveling Frame: Jounce the car at the rear and then at the front end by grasping the bumper and raising and lowering the car violently at beginning to loosen up the suspension action and then with diminishing pressure until it finally comes to rest. Then measure frame height.
Frame Height—Measure vertical distance from underside of frame rail to top of lower control arm on each side of car. Distance should be the same on on each side of car. Unequal heights indicate sagged springs. See spring data.

Tire Inflation Pressure: For each tire size (Cold)
7.10x15 (Std.)—24 lbs. Front & Rear.
7.60x15 (Optl.)—22 lbs. Front, 20 lbs. Rear.
7.10x15 (Sta. Wgn. & Sedan Del.)—28 lbs. Front, 30 lbs. Rear.

Kingpin Inclination: 5° at 0° camber

Caster: Neg. ¾° ± ½°.
Adjustment—Loosen clamp bolt in upper end of knuckle support, use special wrench J-2998 to engage hexagonal head of bushing on pivot bolt in upper end of support, adjust caster by turning bushing in complete turns only to avoid disturbing camber.
►***CAUTION*—Clearance must be maintained between ends of bushing and control arm throughout suspension unit travel. Check for binding when adjusting caster.**

Camber: 0° ± ½°.

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1949-52 PONTIAC (Cont.)

Adjustment—Same as for Caster (above) except that eccentric bushing should be turned not more than ½ revolution from point where correct caster secured (entire range of adjustment secured in ½ revolution of the bushing).

▷*ADDITIONAL RANGE OF ADJUSTMENT*—If correct camber cannot be secured by above adjustment, greater range of adjustment can be secured by taking out mounting capscrews in upper control arm shaft (on frame bracket at inner end of arm) and turning shaft over so that offset mounting holes tend to move shaft and control arm outward. This will provide approximately 2/3° additional camber.

▷*NOTE*—Control arm shaft is installed at factory with notch on side of shaft toward engine. When shaft turned over for increased camber, notch will be outward or toward wheel.

Toe-In: 0" to 1/16" measured 9" above floor.

Adjustment—Loosen clamp bolts at each end of adjusting sleeve at outer end of each tie rod, turn adjusting sleeves on both tie rods equally.

Toe-out on Turns: With inner wheel turned exactly 20°, outer wheel should be turned 18-19°. No adjustment. Check for bent steering arm if not correct.

SHOCK ABSORBER REPLACEMENT: *Not necessary to disturb Front Suspension Assembly.* Shock absorbers can be removed from below or above as desired.

Removal (from below)—Remove locknut and retainer nut on shock absorber upper stem at mounting bracket on frame, lift off upper grommet retainer and upper grommet (*NOTE*—If shock absorber turns when removing retainer nut, remove unit from above—see directions below). Remove three screws holding shock absorber lower mounting bracket on underside of spring seat on lower control arm, lower shock absorber and mounting bracket assembly out through hole in spring seat.

Removal (from above)—Jack up car, remove locknut and retainer nut from shock absorber lower stem at mounting bracket on underside of lower control arm (use pliers inserted through spring coil to keep shock absorber from turning), remove lower grommet retainer and lower grommet. Remove two nuts on shock absorber upper mounting bracket studs, lift shock absorber and upper mounting bracket assembly up and out through opening in frame above front wheel.

▷*INSTALLATION CAUTION*—Hold shock absorber from turning (with pliers inserted between spring coils) when tightening mounting nuts.

UPPER CONTROL ARM REPLACEMENT: *Upper pivot pin and eccentric bushing can be replaced without removing control arm from car.*

Removal: Support car with jack placed under lower control arm, remove wheel and tire. Remove shock absorber and upper bracket (see Shock Absorber Replacement). Take off nut on rear end of upper pivot pin, unscrew threaded pivot pin from knuckle support and control arm (CAUTION—wire knuckle support to frame to prevent damage to brake hose). Loosen clamp bolt in knuckle support, unscrew eccentric bushing from support. Take out two bolts mounting inner control arm shaft on frame, lift off control arm and shaft assembly.

▷*NOTE:* Note position of notch in shaft before removing shaft from control arm so that new shaft can be installed in same position.

Pivot Shaft Installation: Use spreader tool J-4251 to expand inner end of control arm to 7½" (measured between outer faces of arm). Position pivot shaft (with new rubber seal on each end) in control arm, lubricate shaft threads with chassis lubricant, start bushing on shaft and into eye in arm at same time, tighten bushing to 326-380 ft.lbs. torque and make certain that bushing flange firmly seated against arm. Center pivot shaft in arm (distance from shaft mounting hole center to outer face of arm should be 2" ± 3/64" at each end). Install second bushing. Remove tool and check control arm dimension (7½ ± 1/16" between outer faces of arm at pivot shaft), check pivot shaft position and center shaft by rotating it in the bushings. Check pivot shaft for freedom of movement (frictional drag of shaft should not exceed 12 in. lbs.). Position upper control arm and shaft on frame crossmember and install two bolts and self-locking nuts. Torque nuts to 60-65 ft. lbs.

Upper Pivot Pin & Eccentric Bushing Installation: Install new rubber seal on inner face of control arm eyes (slip end of seal over boss, double other end back to allow clearance for assembly). Install eccentric bushing in knuckle support. Hold knuckle support centered in upper control arm, thread pivot pin through control arm and bushing (coat pin threads with chassis lubricant, see that one lockwasher placed under head of pin) and tighten pin against arm with 50-55 ft. lbs. torque, then install pivot pin nut and lockwasher with 50-55 ft. lbs. torque. Turn ends of seals back to cover pivot pin threads.

Control Arm Installation: Notch on side of inner pivot shaft should face toward center of car (camber will be increased 2/3° if shaft turned over—see Camber Adjustment). Tighten pivot shaft mounting bolt nuts to 60-65 ft.lbs. torque.

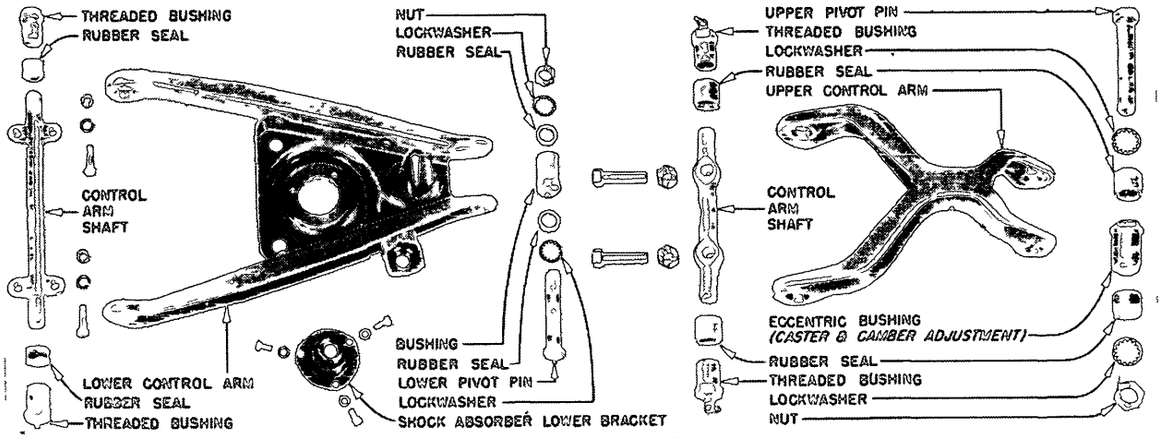
LOWER CONTROL ARM REPLACEMENT: *Lower pivot pin and bushing can be replaced without removing control arm from car.*

Removal: Remove shock absorber (see shock absorber data), then proceed as for front spring removal (above). After spring removed, remove nut on rear end of lower pivot pin, unscrew pivot pin from knuckle support and control arm, lift control arm and pivot shaft assembly out.

Pivot Shaft Installation: Use spreader tool J-1052 to expand inner end of control arm to 11½" (measured between inner faces of arm). Position pivot shaft (with new rubber seal on each end) in control arm, lubricate shaft threads with chassis lubricant, start one bushing on shaft and into threads in arm at same time, tighten bushing to 385-455 ft.lbs. torque and make certain that bushing flange firmly seated against arm. Center shaft in arm (distance from shaft mounting hole centers to inner face of arm should be 1½" ± 3/64" at each end). Install second bushing similarly. Remove tool and check control arm dimension (11½"±3/32" between inner faces of arm at pivot shaft), check pivot shaft position and centralize it by rotating shaft in bushings.

Lower Pivot Pin & Bushing Installation: Install new bushing in lower end of knuckle support and tighten to 250 ft.lbs. (CAUTION—Bushings must be firmly tightened and bushing shoulder must be seated against support). Position new rubber seal on each end of bushing, hold knuckle support centered in lower control arm, thread pivot pin through control arm and bushing (coat pin threads with chassis lubricant, see that one lockwasher placed under head of pin), tighten pin against arm with 50-55 ft. lbs. torque, then install pivot pin nut and lockwasher, tighten nut to 50-55 ft. lbs. torque. Check knuckle support for centralized position (distance from end

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PONTIAC CONTROL ARM ASSY.

1949-52 PONTIAC (C nt.)

of bushing to inner face of control arm must be equal within one thread or ⅛" at each end of bushing).

KNUCKLE SUPPORT REMOVAL (For Kingpin Bushing Replacement): Take out brake backing plate mounting bolts and hang backing plate up out of the way (not necessary to disconnect brake line). Then remove upper and lower pivot pins (see Upper & Lower Control Arm replacement data).

SPRINGS: Springs have upper end flattened and lower end must be fitted in recess in lower seat. Color marks located on outside surface of spring center coil (if service springs not color marked, part number will be found on outside surface within 8" of top end measured on outer circumference).

1949-51 Spring Specifications

Car Model	Synchro-mesh Trans. Cars Color Mark
6 Cyl. Sedans, Sedan & Bus. Coupe	Red
6 Cyl. Convertible	Gray
6 Cyl. Sta. Wgn. & Sedan Del.	Green
6 Cyl. Taxicab & Police	Red & Yellow
8 Cyl. Sedans, Sedan & Bus. Coupe	Gray
8 Cyl. Convertible	Green & Brown
8 Cyl. Sta. Wgn. & Sedan Del.	Gray & Yellow
8 Cyl. Taxicab & Police	Blue & Yellow
Hydra-Matic Drive Cars	
6 Cyl. Sedans, Sedan & Bus. Coupe	Gray
6 Cyl. Convertible	Green & Brown
6 Cyl. Sta. Wgn. & Sedan Del.	Blue & Yellow
8 Cyl. Sedans, Sedan & Bus. Coupe	Green & Brown
8 Cyl. Convertible	Blue & Yellow
8 Cyl. Sta. Wgn. & Sed. Del.	Red & Yellow

1952 Spring Specifications
Synchro-mesh Transmission Cars

Car Model	Color Mark	Part No.
6 Cyl. Sed. & Catalina Cpe	Red	509040
6 Cyl. Convertible	Grey	511135
6 Cyl. Sta. Wgn. & Sed Del.	Green	508116
8 Cyl. Sed. & Catalina Cpe	Grey	511135
8 Cyl. Convertible	Green	512927
8 Cyl. Sta. Wgn. & Sed Del.	Grey & Yellow	511138
Hydra-Matic Drive Cars		
6 Cyl. Sed. & Catalina Cpe	Grey	511135
6 Cyl. Convertible	Green & Brown	512927
6 Cyl. Sta. Wgn. & Sed Del.	Grey & Yellow	511138
8 Cyl. Sed. & Catalina Cpe	Green & Brown	512927
8 Cyl. Convertible	Blue & Yellow	512928
8 Cyl. Sta. Wgn. & Sed Del.	Red & Yellow	511755

COIL SPRING REPLACEMENT: Disconnect lower end of stabilizer link and remove shock absorber on side on which spring being removed. Lift front end of car with chain hoist or with jacks placed under frame side rails. Place additional jack under lower spring seat on control arm. Disconnect lower control arm from knuckle support by removing locknut and unscrewing lower pivot bolt. Lift car slowly (or lower jack under control arm) to relieve spring tension, lift spring out.

►***INSTALLATION CAUTION***—Install spring with flatted end at top and centered within positioning lugs on cross-member. See that end coil at bottom is fitted into spring recess in lower spring seat.

1953-55 PONTIAC

All Models (1953-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 & LATER PARTS REPLACEMENT CAUTION:* Front suspension parts are not interchangeable with previous model cars.

►*1953 FRONT SHOCK ABSORBER UPPER BRACKET MOUNTING CAUTION:* A few cars built prior to January 15, 1953 have one inch bolts installed to attach upper bracket to frame. Use of bolts longer than ¾" will cause interference with top coil of front spring causing squeak or failure of spring to seat properly. When these complaints encountered replace incorrect bolts with cadmium plated 5/16"–24x3/4" hex. head bolts, Part No. 181595.

DESCRIPTION: Independent linked parallelogram with direct acting shock absorbers mounted within coil springs.

CHECKING & ADJUSTING: Check entire front end for wear and excessive play, inflate tires to correct pressures, check steering gear adjustment, wheel bearing adjustment, wheel & tire balance and run-out (run-out should not exceed 1/8"). With car on level floor, jounce both ends (see Leveling instructions) and check frame height. Check and adjust front suspension assembly in following order:

Leveling Frame: Jounce car at the rear and then at the front and allow car to settle to normal operating position. Measure frame height.

Frame Height—Measure vertical distance from underside of frame side rail to top of lower control arm on each side of car. Distance should be the same on both sides of car. Unequal heights indicate sagged springs. See Spring Data below.

Tire Inflation Pressure: With tires COLD inflate to following pressures:

7.10 x 15 – 24 lbs.. Front & Rear.
7.60 x 15 – 22 lbs., Front 20 lbs., Rear.
7.10 x 15 (Sta. Wgn.)–28 lbs., Front. 30 lbs., Rear.
7.60-15 (Sta. Wgn.)–26 lbs., front and rear.
7.60-16 (With Air Cond.)–24 lbs. front, 20 lbs. rear.

Kingpin Inclination: 4½° at ½° camber (1953-54), 1°20' (1955).

Caster: 0°±½° (1953-54), Neg. 1°±½° (1955).

Adjustment—Loosen clamp bolt in upper end of knuckle support, use special wrench J-5343 to engage hexagonal head of bushing on pivot bolt in upper end of support, adjust caster by turning bushing in **complete turns only to avoid disturbing camber.**

►*CAUTION:* Clearance must be maintained between ends of bushing and control arm throughout suspension unit travel. Check for binding when adjusting caster.

Camber: Pos. ½°±½°.

Adjustment—Same as for Caster (above) except that eccentric bushing should be turned not more than ½ revolution from point where correct caster secured, (entire range of adjustment secured in ½ revolution of bushing).

Toe-In: 0" to 1/16" measured 9" from floor.

Adjustment—Loosen clamp bolts at each end of adjusting sleeve at outer end of each tie rod, turn adjusting sleeves **on both rods equally.**

Toe-Out on Turns: With inner wheel turned 20°, outer wheel should be 18-19°.

SHOCK ABSORBER REPLACEMENT: *Not necessary to disturb front suspension assembly.* Shocks remove from above upper control arm. Raise car so weight is off front wheels. Remove nut from bottom stud on shock absorber (hold shock with water pump pliers). Remove grommet and retainer and compress shock as far as possible by pushing lower section up. Remove two nuts holding shock bracket to frame (on left side of car, remove bracket from shock first). Shock can be removed through hole in frame. Install shock absorber with shock compressed, into spring, then extend shock so nuts and grommet can be installed on lower end.

UPPER CONTROL ARM REPLACEMENT: *Upper pivot pin and eccentric bushing can be replaced without removing control arm from car.*

Removal: Support car with jack placed under lower control arm and remove wheel. Remove shock absorber and upper bracket (see Shock Absorber). Take off nut on rear end of upper pivot pin, unscrew threaded pivot pin from knuckle support and control arm (CAUTION—Wire knuckle support to frame to prevent damage to brake hose). Loosen clamp bolt in knuckle support, and unscrew eccentric bushing. Take out two bolts mounting inner control arm shaft to frame (the nuts can be reached through access hole in front cross member).

Pivot Shaft Installation: Use spreader tool J-5324 to expand inner end of control arm to 6 9/16" (measured between inner faces of arm). Place pivot shaft with new rubber seals in position in control arm. After lubricating pivot shaft threads with chassis grease, start bushing on pivot shaft and into arm at same time. Tighten so bushing flange is firmly seated against control arm (326-380 ft. lbs. torque). Center pivot shaft in control arm and start other bushing being sure threads index so there is no bind. Tighten in same manner as other bushing. Remove spreader tool. Check to see that distance between inner faces of control arm is 6 9/16". Rotate shaft to centralize it so that bolt hole at each end of shaft is an equal distance from arm. *NOTE*–Frictional drag of shaft in bushings should not exceed 12 in. lbs.

Upper Pivot Pin & Eccentric Bushing Installati n: Install new rubber seal on inner face of control arm eyes (slip end of rubber seal over boss, double other end back to allow clearance for assembly). Install eccentric bushing in knuckle support. Hold knuckle support centered in upper control arm, thread pivot pin through control arm and bushing (coat pin threads with chassis lubricant, see that one lockwasher placed under head of pin) and tighten pin against arm with 50-55 ft. lbs. torque, then install pivot pin nut and lockwasher and tighten to 50-55 ft. lbs. torque. Turn pivot pin seals back to cover pivot pin threads.

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1953-55 PONTIAC (C nt.)

C ntr l Arm Installati n: Position upper control arm on frame cross member and install bolts and nuts. Tighten nuts to 80-85 ft. lbs. torque (nuts are self-locking and must be tightened with an extension inserted through hole in front cross member).

LOWER CONTROL ARM REPLACEMENT: *Lower pivot pin and bushing can be replaced without removing control arm from car.*

R m val: Remove shock absorber (see Shock Absorber data) then proceed as with Front Spring Removal. After spring removed, remove nuts and lock washers holding lower control arm shaft to frame cross member and remove control arm and shaft assembly. Remove shaft from control arm by removing front and rear threaded bushings from shaft and control arm.

Pivot Shaft Installation: Use Spreader Tool J-1052 to expand inner end of control arm to 11½" (measured from inner faces of arm). Position pivot shaft (with new rubber seals) in control arm, lubricate shaft threads with chassis lubricant, start one bushing on shaft and into threads in arm at the same time, tightening bushing to 385-455 ft. lbs. torque and firmly seated against arm. Center shaft in arm (distance from shaft mounting hole centers to inner face of arm should be 1½"±3/64" at each end). Install second bushing similarly. Remove tool and check control arm dimension (11½"±3/32" between inner faces of arm at pivot shaft), recheck pivot shaft position and centralize it by rotating shaft if necessary.

L w r Pivot Pin & Bushing Installation: Install new bushing in lower end of knuckle support and tighten to 250 ft. lbs.(CAUTION—Bushings must be firmly tightened and bushing shoulder must be seated against support). Position new rubber seal on each end of bushing, hold knuckle support centered in lower control arm, thread pivot pin through control arm and bushing (coat pin threads with chassis lubricant, see that one lock washer placed under head of pin) and tighten pin against arm with 50-55 ft. lbs. torque, install pivot pin nut and lockwasher, tighten to 50-55 ft. lbs. torque. Check knuckle support for centralized position (distance from end of bushing to inner face of control arm must be equal within one thread or 1/8" at each end of bushing).

KNUCKLE SUPPORT REMOVAL (For Kingpin Bushing Replacement): Remove brake backing plate and hang plate up out of way (not necessary to disconnect brake line). Remove upper and lower pivot pins (see Upper and Lower Control Arm data above).

SPRINGS: Upper end of springs are flattened and lower end must be fitted in recess in lower seat. Color marks located on outside surface of spring center coil

1953-54 Spring Application
Synchro-mesh Transmission Cars

Car Model	Color Mark	Part No.
6 Cyl. Sed. & Catalina	Red	516432
6 Cyl. Other Models	Grey	516433
8 Cyl. Sed. & Catalina	Grey	516433
8 Cyl. Other Models	Grn. & Brn.	516434
Heavy Duty (All Models)	Red & Blue	516730

Hydra-Matic Drive Cars

Car Model	Color Mark	Part No.
6 Cyl. Sed. & Catalina	Grey	516433
6 Cyl. Police & Taxi	Grey	516433
6 Cyl. Other Models	Grn. & Brn.	516434
8 Cyl. Sed. & Catalina	Grn. & Brn.	516434
8 Cyl. Convertible	Grey & Ylw.	516435
Heavy Duty (All Models)	Red & Blue	516730

1955 Spring Application
Synchro-Mesh Trans. Cars

Model	Color Mark	Part No.
Chieftain, 2 Dr. & Catalina	Grey	①516433
Star Chief, Catalina Custom	Grey	①516433
Chieftain, Sta. Wgn. ②	Grn. & Brn	516434
Star Chief, Convertible ②		520926
Police & Taxi	Grn & Brn	516434

Hydra-Matic Driv Cars

Model	C lor Mark	Part N .
Chieftain, All Models ②	Grn & Brn	516434
Star Chief Convertible②		520925
Star Chief Sedan ②	Grn & Brn	516434
All Models③	Yel & Orange	518776
Police & Taxi	Grn & Brn	516434

①—Same spring used with air conditioned cars.
②—Cars without Air Conditioning.
③—Cars with Air Conditioning.

COIL SPRING REPLACEMENT: Disconnect lower end of stabilizer link and remove shock absorber on side on which spring being removed. Lift front end of car with chain hoist, or with jacks placed under frame side rails. Place additional jack under lower spring seat on control arm. Disconnect lower control arm from knuckle support by removing locknut and unscrewing lower pivot bolt. Lift car slowly (or lower jack under control arm) to relieve spring tension, lift spring out.

►*FRONT SWAY BAR INSTALLATION CAUTION:* Sway bar must be installed with the proper side up or grommets may be damaged due to improper contact with eye in bar.

►*1953 FRONT SPRING RATTLE CORRECTION:* Check by striking spring with rubber hammer while pushing up and down on front of car. Rattle will be found at only one spring height. To correct, remove spring and cut semi-circular strip from 1/8" rubber about 3 long, the same shape as top of the spring coil. Clean all paint and grease off lower side of top coil and apply Plio-bond No. 30 to this surface and to surface of rubber strip, and apply strip to point where spring has been vibrating (shiny spot on spring).

1947-49 STUDEBAKER PLANAR

Champion, 6G (1947), 7G (1948), 8G (1949)
Commander & Land Cruiser, 14A (1947), 15A (1948) 16A (1949)

►CHANGES & CORRECTIONS

►***1947-48 PRODUCTION CHANGES: Due to production changes as listed below, indicated parts not interchangeable on cars produced before and after these changes. Serial number should be noted when ordering these parts:***

►**Champion 7G (1948) Steering Knuckle & Wheel Bearing Change:** Following parts changed at Serial No. G-337,462 (South Bend) and **not interchangeable with parts on earlier cars:** Steering Knuckle (Right & Left), Front Wheel Hub and Drum (Right & Left), Inner & Outer Wheel Bearing Assemblies (Bearing Cup, Cone & Rollers), Brake Drum Oil Catcher, Felt Grease Washer & Retainer Assembly.

►**Commander 14A (1947) Caster Change:** Caster changed to —2° to —3° beginning with following numbers:
Comm. 14A—Serial No. 4,276,243 (South Bend) & 4,819,208 (Los Angeles).
Comm. 14A Convertible—4,276,102 (South Bend).
Land Cruiser 14AY—4,276,053 (South Bend), & 4,819,188 (Los Angeles).
Other Cars—Following cars also have new Caster specification: 4819196, 4819200, 4819201, 4819177, 4819180, 4819185.

►**Commander 14A (1947) Front Suspension Parts Change:** At same time Caster changed (see above) parts listed below were changed and **are not interchangeable with parts used on earlier cars:** Steering Knuckle (Right & Left), Steering Knuckle Shims, Steering Knuckle Arm (Right & Left), Steering Knuckle Upper Bushing (Early Cars) and Bearing Rollers (Later Cars), Steering Knuckle Upper Control Arm Support (Right & Left), King Pin (Right & Left), and King Pin Thrust Bearing.

DESCRIPTION: Planar type independent suspension with transverse spring. Design changed from type used on 1946 Champion and previous Studebaker models.

CHECKING & ADJUSTMENT: Check front wheel bearing adjustment, tire inflation pressure, steering gear adjustment, shock absorber action, and steering linkage. Then check front suspension as follows:

Tire Inflation Pressures: For each tire size (Cold):
Champion—(5.50x15 & 5.50x16) 30 lbs. Front, 28 lbs. Rear. (6.00x15) 28 lbs. Front, 26 lbs. Rear. (6.40x15) 28 lbs. Front, 24 lbs. Rear.
Commander—(6.50x15) 26 lbs. Front, 22 lbs. Rear.

Kingpin Inclination—5½° crosswise.

Camber: (1947-48) ½° plus or minus ¼°.
(1949) 0° to Pos. 1° with ½° greater camber for left wheel than for right wheel.
Camber is controlled by number and thickness of slotted shims installed between each upper control arm bracket and frame.
To Adjust—Loosen upper control arm mounting bracket bolts, add shims (to increase camber), remove shims (to decrease camber) **equally at each bracket.** One thin shim will change camber approximately ¼° (thick shim equal to 4 thin shims).
CAUTION—Number and thickness of shims at each contr l arm bracket must be kept equal.

Caster: Not adjustable. Incorrect caster indicates bent parts or incorrect assembly (kingpin support not properly centered in control arms etc.).

►***PRODUCTION CHANGE NOTE—See 1947-48 Production Change Note for new parts and changed specifications.***

Caster Specifications

1947-48 Champion 6G & 7G	0° to Pos.1°
1949 Champion 8G	Pos. ½° to Pos. 1½°
1947 Early Comm. & Land Cr. 14A	0° to Pos. 1°
①1947 Later Comm. & Land Cr. 14A	Neg. 2° to Neg. 3°
①1948 Comm. & Land Cruiser 15A	Neg. 2° to Neg. 3°
1949 Comm. & Land Cr. 16A	Neg. 2° to Neg. 3°

①—See 1947 Production Change Note for Serial Nos. at which this change made.

Toe In: 1/16-⅛". Do not adjust toe-in until wheels correctly positioned and entire steering linkage checked and adjusted as follows:

►**1947-48 Adjustment Procedure:**

1). Left Hand Tie Rod Adjustment—Place steering wheel in straight-ahead position with cam lever studs on "high" points of cam, then line up left front wheel by stretching string between front and rear bumpers so that string contacts 1⅛" block (Champion), ½" block (Commander) placed against side of tire on rear wheel, adjust **left hand** tie rod so that front tire contacts string at front and rear of wheel, tighten tie rod clamp bolts. CAUTION—Do not disturb wheel position or this tie rod setting during remander of adjustment.

2). Center (Auxiliary) Tie Rod Adjustment—Adjust rod so that over-all length between centers of ball ends is equal to distance from lubricant fitting in auxiliary steering arm support to center of steering gear cam lever shaft (Champion), or to distance between lubricant fittings on the two steering bellcranks (Commander), tighten tie rod clamp bolts.

3). Toe-In (Right hand Tie Rod) Adjustment—Adjust right hand tie rod so that right wheel toed-in correct amount (1/16-⅛") with left wheel straight-ahead (see 1) above), tighten tie rod clamp bolts. CAUTION—On Champion, all tie rod clamp bolts must be positioned so that they are horizontal and below tie rods to prevent interference.

Right-hand Drive Car Note—Reverse above directions for toe-in adjustment on these cars (set right hand tie rod first, adjust toe-in at left hand tie rod).

►**1949 Adjustment Procedure:**

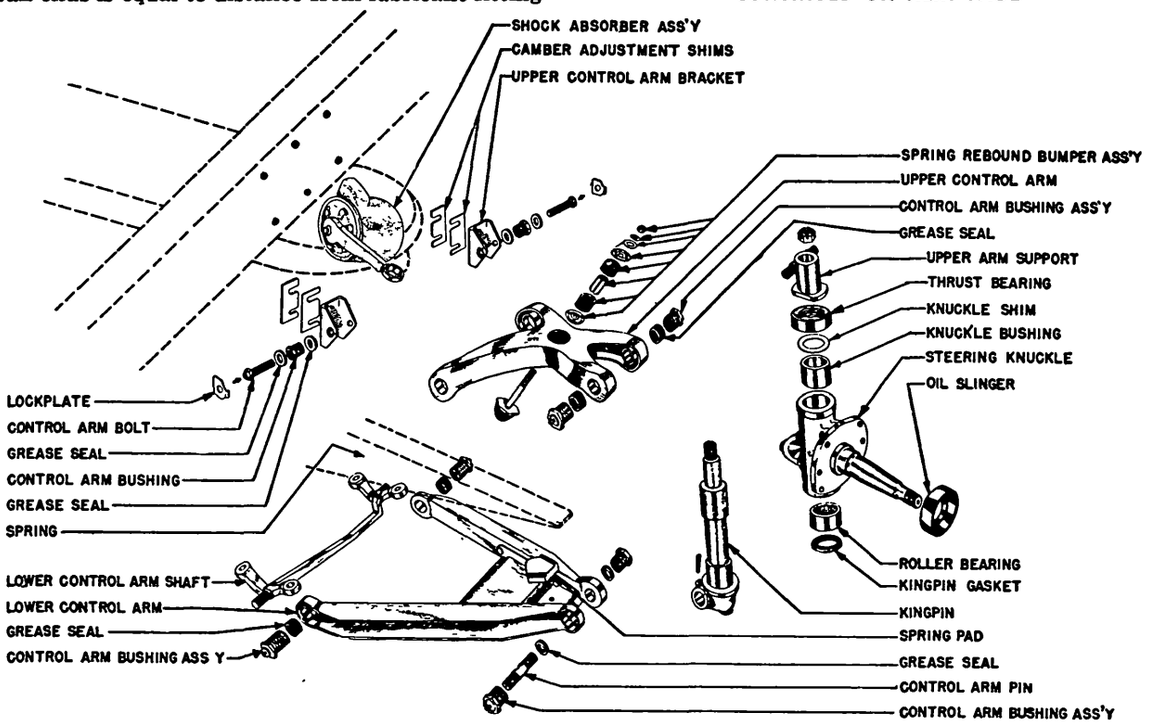
(1) Left Hand Tie Rod—Set steering wheel in center "straight-ahead" position with levers on high midpoints of cam. Adjust left hand tie rod so that left wheel points straight ahead.

(2) Right Hand Tie Rod—Adjust right hand tie rod to same length as left hand rod (on Champion, measure between ball stud centers at ends of rod; on Commander, measure between lubricant fittings on ends of rod).

(3) Center (Auxiliary) Tie Rod—Adjust toe-in by loosening clamp bolts and turning this center rod.

Steering Knuckle Stopscrew Setting—Adjust stopscrews for correct clearance with full right and left hand turns on each model as follows:
Champion—⅛" clearance between left hand back-

CONTINUED ON NEXT PAGE



1947-49 STUDEBAKER FRONT SUSPENSION

1947-49 STUDEBAKER (C nt.)

ing plate and control arms for full left turn, ⅛" clearance between steering gear arm and frame on full right turn.

Commander—⅛" clearance between backing plate and control arms for full right and left turns.

SPRINGS: Front spring is transverse leaf type with spring cover. Spring does not have conventional eyes (ends rest on spring pads on lower control arms). Removal and installation of spring requires special procedure and tools as follows:

Spring Removal: Raise front end of car, remove wheel and tire assembly, unhook outer end of one outer tie rod from steering arm. Place spring unloader puller plate (HM-925-19) across top outer end of front frame cross-member, attach puller arms and nuts (HM-925-17). Place guide plate center pad (HM-925-18) on underside of spring directly below puller plate, hook puller (HM-925) to puller arms. Tighten puller to compress spring until lower control arm relieved of spring pressure, take out four bolts in lower control arm inner shaft, swing control arm down out of the way. Remove six bolts mounting front spring plate on front frame cross-member. Relieve spring tension and remove puller. Slide spring out over opposite lower control arm inner shaft. Remove front spring plate from spring by taking off nuts on four U-bolts.

Spring Installation—Install spring by reversing removal directions above and note the following points: Tighten nuts on U-bolts just enough to hold spring plate in place on spring. With spring in place under car, align two holes in spring plate with two holes in cross-member nearest lower control arm which is assembled to cross-member (use two punches). Compress spring using puller assembly, install all six bolts mounting front spring plate on front cross-member. After connecting lower control arm and removing puller, and **with car weight on wheels, tighten the four U-bolt nuts to 75-80 ft. lbs. (Champion), 80-85 ft. lbs. (Commander).**

1947-49 Spring Specifications

Car Model	Spring Part No.
Ch. 6G ('47) Std. (10 Leaf) ①	520045
Ch. 6G ('47) Std. (11 Leaf) ②	520046
Ch. 6G ('47) Heavy Duty (11 Leaf)	520046
Ch. 7G (Early '48) Std. (10 Leaf) ①③	523775
Ch. 7G (Early '48) Std. (11 Leaf) ②⑤	523776
Ch. 7G (Later '48) Std. (10 Leaf) ①④	525146
Ch. 7G (Later '48) Std. (11 Leaf) ②⑥	525148
Ch. 7G (Early '48) Heavy Duty ⑤	523776
Ch. 7G (Later '48) Heavy Duty ⑥	525148
Ch. 8G ('49) Std.	525616
Ch. 8G ('49) Heavy Duty	525148
Comm. All exc. Convt. ('47-48-49) Std.	525154
Comm. Convt. ('47-48-49) Std.	525153
Land Cruiser ('47-48-49) Std.	525154
Comm. & Land Cr. ('47-48-49) Heavy Duty	525153

①—Std. with 5.50x15 Tires.
②—Std. with 5.50x16 & 6.00x15 Tires.
③—Before Serial No. G-374479 (South Bend), and G-835852 (Los Angeles).
④—After ③ Serial Nos. above.
⑤—Before Serial No. G-378304 (South Bend), and G-835852 (Los Angeles).
⑥—After ⑤ Serial Nos. above.

1950-55 STUDEBAKER

All Models (1950-55)

►CHANGES & CORRECTIONS

►*1955 CHUCKLING OR CRACKLING NOISE AT FRONT END CORRECTION:* Check lower support arm inner shaft attaching bolt nuts for tightness (black paint around inner shaft to crossmember contact area may be worn off or marked). Correct by removing the hug nuts one at a time. Place a hardened washer, Part No. 1539073 against the inner shaft boss and install new hug nuts. Tighten to 60-65 ft. lbs.

►*1955 SPEEDSTER MODEL FRONT SPRING SPACER PRODUCTION CHANGE:* Beginning with Car Serial No. 7166614, two spacers, Part No. 526830, are being installed on the left hand front spring as follows, to compensate for the greater load on that side. Install one spacer between front spring insulator and lower suspension arm. The other spring is installed between upper insulator and frame.

DESCRIPTION: Independent, parallelogram type with coil springs. Shock absorbers are direct acting type mounted within coil spring (except 1950 Commander—Rotary type).

►*1953 DESIGN CHANGE NOTE—Inner pivot shafts are mounted to upper and lower control arms with rubber type bushings. No lubrication required.*

CHECKING & ADJUSTMENT: First check (and adjust if necessary) front wheel bearings, steering gear, shock absorber action, steering arm and tie rod ends for looseness. Inflate tires to correct pressure. Place car on level floor when checking following specifications:

Tire Inflation: Different tires used on each model.
Champion (1950-55)—26 lbs. front, 24 lbs. rear.
Commander (1950)—24 lbs. front, 20 lbs. rear.
Commander (1951-53)—26 lbs. front, 22 lbs. rear.
Commander Exc. Sta. Wgn. (1954-55)—26 lbs. front, 22 lbs. rear.
Commander, Sta. Wgn. (1954-55)—26 lbs. front, 24 lbs. rear.
President (1955)—26 lbs. front, 22 lbs. rear.

Kingpin Inclination: 5¼° crosswise. Check camber if kingpin inclination not correct.

Caster: As indicated below: *CAUTION—Maximum variation between wheels must not exceed ¾°.*

Model	Caster
Champion (1950)	Neg. ½° ± ½°
Champion (1951)	Neg. 2° ± ½°
Commander (1950-51)	Neg. 2° ± ½°
All Models (1952-55)	Neg 1° to Neg. 2½°

Adjustment—Loosen clamp bolt in kingpin (knuckle support) at upper control arm pivot pin, remove lubrication fitting from front bushing of upper control arm outer pivot pin, insert Allen wrench through fitting hole and turn pivot pin until exact caster setting secured. Then adjust camber.

►*CAUTION—Camber will be disturbed by caster adjustment unless pivot pin rotated in complete turns only.*

Camber: 0° to Positive 1° (all models).

►*CAUTION—Manufacturer recommends ½° more camber on driver's side of car than on opposite side.*

Adjustment—After adjusting Caster (above), rotate pivot pin not more than ½ turn in either direction to secure correct camber. Recheck caster after camber adjusted (caster will be slightly changed but should be within limits specified).

►*CAUTION—Entire range of camber adjustment secured within ½ turn of pivot pin.*

Toe-In: 1/16/ to ⅛" (all models).

►*CAUTION—Tie rods must be adjusted in following order when making toe-in adjustment.*

(1) Left Hand Tie Rod (Wheel straight-ahead position). Turn steering wheel so that cam lever shaft is on "high" mid-point of cam (midway between end positions). If steering wheel spokes not horizontal in this position, remove and reposition wheel on shaft. Check left hand front wheel for straight ahead position by stretching string between front and rear bumpers on left side of car with 1 7/32" block (1950 Champion), ¾" block (1950 Commander), 1¼" block (All 1951 models) between sidewall of rear tire and string to compensate for difference in tread of rear wheel. If string does not contact tire sidewall at front and rear of front wheel, adjust left tie rod as required until wheel points straight ahead.

(2) Right Hand Tie Rod (Toe-In adjustment)—Without disturbing position of left hand wheel, check toe-in and adjust right tie rod for correct 1/16-1/8" toe-in.

►*RHD. CAR NOTE*—On right hand drive cars, reverse above instructions, setting right wheel in straight ahead position, and adjusting toe-in on left wheel.

Toe-Out on Turns: With outer wheel at 20°, inner wheel should be 23½°±1° (1950-54). With outer wheel at 20°, inner wheel should be 22½-23½° (1955). No adjustment. If incorrect, check for bent steering arm.

SHOCK ABSORBER REPLACEMENT: Can be removed and installed without disturbing other parts of front suspension system as follows:

All Models (Except Commander 1950): Remove lock and retaining nut at upper end of shock absorber. To prevent turning of shock absorber while removing, hold shock with wrench at small flats on end of shock absorber shaft. Remove grommet retainer, grommet and grommet seat. Remove two mounting plate retaining bolts, and thread the shock absorber out of spring.

►*CAUTION—There are no dust covers used on front shocks, therefore do not grasp exposed portion of shaft with tools, or mar the surface.*

Installation—Reverse removal procedure and note the following:

Retaining Nut Tightening—When properly tightened the retaining nuts should be flush with ends of threads on shaft.

Commander (1950): Remove shock absorber link nut at lower end of link arm (on inner side of frame side rail), free link from bolt and remove washers, rubber grommets, spacer, and grommet retainers (CAUTION—note location of these parts to insure re-installation in same order). Remove two bolts mounting shock absorber on end of upper control arm, remove shock absorber and cork grease seal. Install shock absorber in same manner.

COIL SPRING REPLACEMENT: To remove spring, raise front end of car and support it on jacks under frame side rails to rear of engine support cross-member. Place a hydraulic jack under mounting shaft at inner end of lower control arm. Disconnect stabilizer shaft at lower control arm, remove rubber bumper from arm (to prevent interference with

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1950-55 STUDEBAKER (Cont.)

spring). Remove front shock absorber (except on 1950 Commander—see Shock Absorber Replacement above). **Take out four bolts mounting lower control arm shaft on cross-member (jack will hold arm in place), lower the jack until spring tension is relieved, remove jack, swing lower control arm out of the way, remove spring. Remove upper and lower spring pads.**

Installation—Be sure shock absorber mounting bolts are in place in control arm. Place lower spring pad on control arm seat. Position spring on upper spring seat. Hold spring so it remains seated and upper spring pad is not allowed to slip, then swing control arm inward seating the spring on control arm seat. Position pad of jack under inner shaft and slowly raise inner end of control arm and compress the spring. As the spring nears the cross-member, align holes of inner shaft and holes in flange of cross-member with a drift, then continue to lift inner shaft. With inner shaft held in position with jack, install the four retaining bolts and nuts and tighten securely.

LOWER CONTROL ARM REPLACEMENT: *NOTE*—1953 & Later Inner Pivot Shaft attached to control arm with rubber type bushings. Service procedures are different than on earlier types. See "1953 & Later Inner Pivot Shaft Removal & Installation" below.

Removal: Remove shock absorber and coil spring (see data above). Unscrew threaded bushings from outer end of control arm, drive out lockpin in lower support which locks pivot pin, then drive pivot pin out of support and lower control arm (CAUTION—use brass drift to avoid damaging pivot pin). Remove lower control arm and inner shaft assembly, clamp assembly in vise, unscrew inner shaft bushings, remove inner shaft and seals from arm.

Pivot Shaft Installation (1950-52 Models): Install new seal on each end of pivot shaft and position shaft in end of control arm. Use spreader tool J-2043 (1950), J-4677 (1951-52) installed on inner end of control arm to spread arm .015" (turn tool up finger tight, then turn ½ additional turn which will spread arms .015"). Hold shaft centered in arms and install bushings, tighten bushings to 170 ft. lbs. minimum torque. Remove tool and check to see that arm turns freely on shaft.

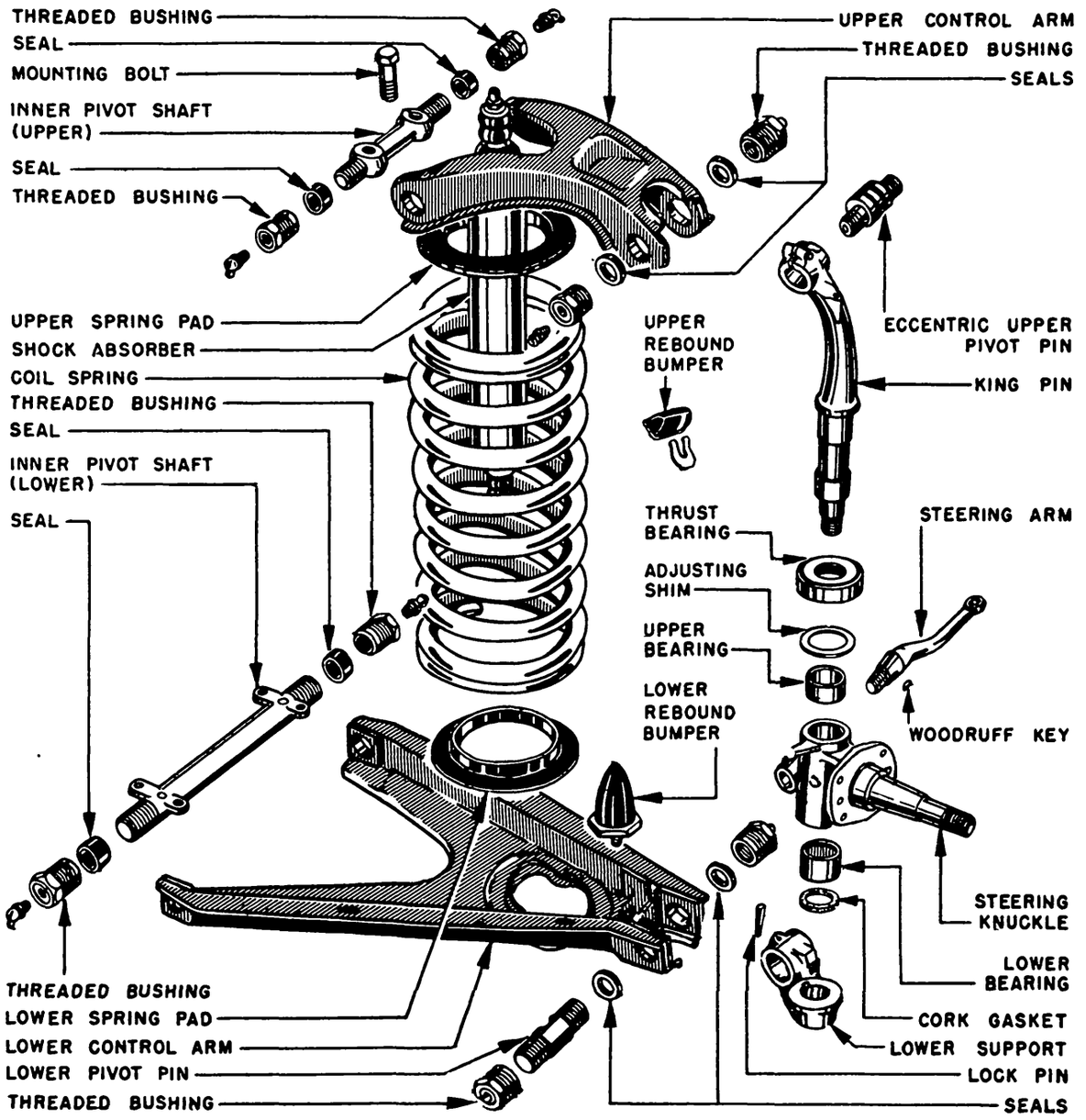
Pivot Pin Installation: Outer end of control arm must also be spread .015" when installing bushings (see Control Arm Reassembly following).

Reassembly & Installation: Establish desired dimension at outer end of control arm by measuring between outer faces of arm with calipers with .015" feeler placed between arm and one leg of calipers, lock calipers for use in checking arm after spreading. Position arm on lower end of knuckle support, install pivot pin in support with new seal on each end of pin, align slot in pin with lock pin hole in support (end of pin slotted for screwdriver blade), install lock pin. Use spreader tool J-2044 to spread outer end of arm until calipers just slip over arm without the .015" feeler gauge. Install bushings and tighten to 170 ft. lbs. minimum torque. Remove tool and check to see that arm turns freely on pin.

UPPER CONTROL ARM REPLACEMENT: *NOTE*—1953 & Later Inner Pivot Shaft attached to control arm with rubber type bushings. Service procedures are different than on earlier types. See "1953 & Later Inner Pivot Shaft Removal & Installation" below.

Removal: On 1950 Commander, disconnect shock absorber arm from frame bracket. Support car on jack under outer end of lower control arm. Remove wheel and tire. Unscrew both threaded bushings from outer end of control arm. On 1950 models, remove clamp bolt in upper end of knuckle support and remove pivot pin (not necessary on 1951-52 cars where arm can be maneuvered off over ends of pin). Mark top front end of inner pivot shaft to insure re-installation in same position, take out shaft mounting bolts and washers, lift control arm and shaft assembly off car. Clamp control arm in vise. On 1950 Commander, take out mounting bolts and remove shock absorber and cork gasket from arm.

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1950-52 STUDEBAKER FRONT SUSPENSION

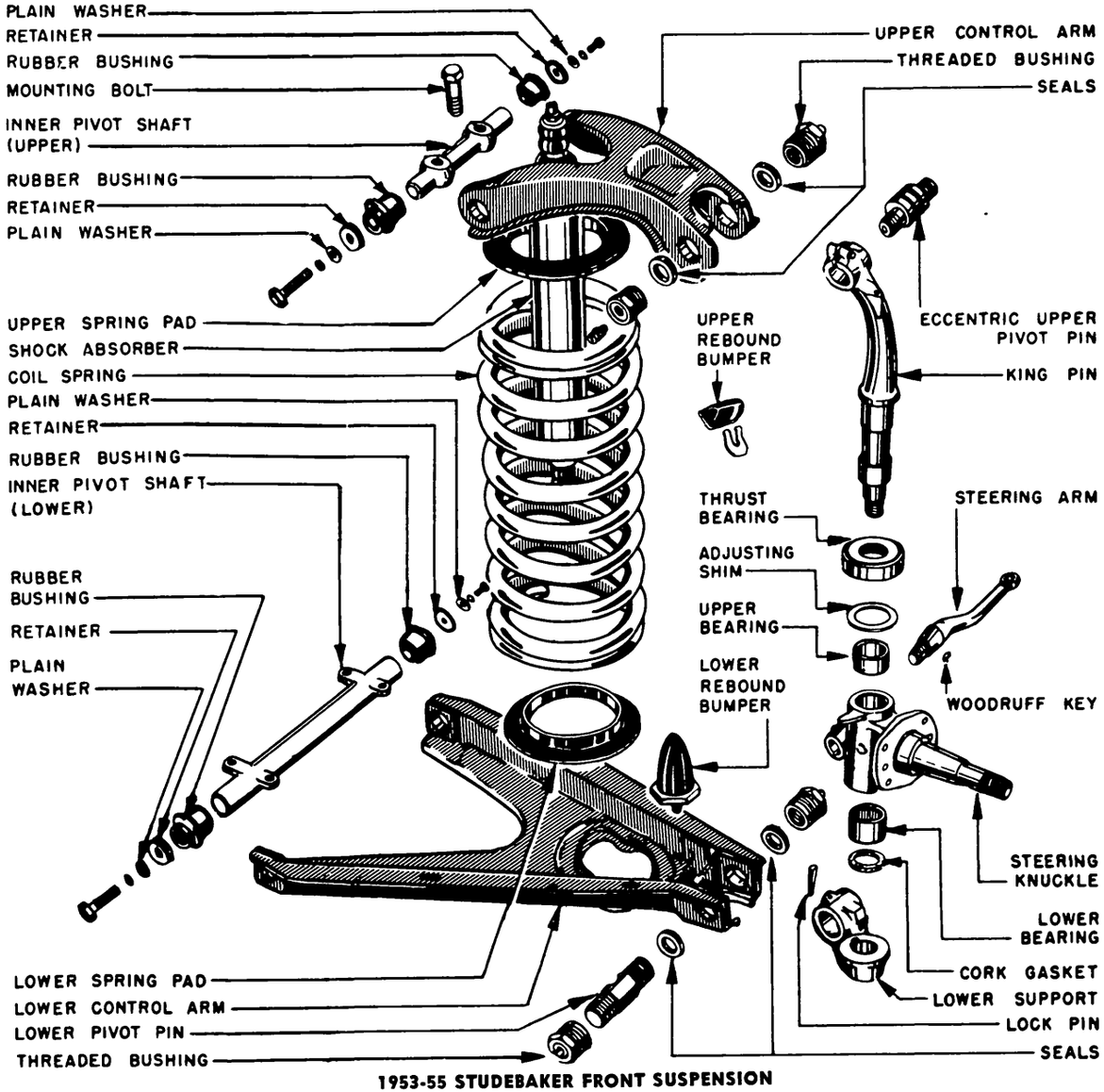
1950-55 STUDEBAKER (Cont.)

On all models, unscrew both pivot shaft bushings, lift out pivot shaft and seals.

Pivot Shaft Installation (1950-52 Models): Install new seal on each end of pivot shaft and position shaft in control arm. Use spreader tool J-3957 (with adapter blocks J-3957-7 & J-3957-8 on 1951-52 cars). On 1950 cars, tighten tool hand tight, then turn hex. one complete turn additional to spread arm .090". On 1951-52 cars, tighten tool hand tight, then turn tool hex ⅓ (two flats) additional turn to spread arm .015". Hold shaft centered in arm with marked end in same relative position as originally, install both bushings, tighten bushings to 170 ft. lbs. minimum torque. Remove tool and make certain arm moves freely on shaft.

Pivot Pin Installation: Outer end of control arm must also be spread .015" when installing bushings (see Control Arm Reassembly following).

Reassembly & Installation: Install control arm and pivot shaft on frame making certain that shaft installed in exactly same position as originally (in accordance with marks made before removal). Spread outer end of control arm .015" using Spreader Tool J-2044 and calipers in same procedure as for lower control arm (see Lower Control Reassembly & Installation above). Insert pivot pin in upper end of knuckle support (hexagonal socket for adjusting wrench toward front of car) with new seal on each end of pin, align clamp bolt groove in pin with hole in support, install clamp bolt and tighten securely. Hold knuckle support centered in control arm, install bushings, tighten bushings securely to 170 ft. lbs. minimum torque. On 1950 Commander, install shock absorber making certain that cork gasket is in place, connect shock absorber arm link to frame bracket.



1953-55 STUDEBAKER FRONT SUSPENSION

1953 & Later Inner Pivot Shaft Removal & Installation (Rubber Type Bushings): Inner pivot shafts are mounted to control arms. No lubrication required.

Removal—Use Tool J-5472 to remove inner shaft control arm bushings, then remove inner shaft.

Pivot Shaft Installation (In Lower Control Arm): Insert one end of pivot shaft in member of control arm and push it as far as possible into member so opposite end of shaft can be swung into position and inserted in other member of control arm. Place J-5472-6 (Large Spacer) in position between ends of control arm. Start rubber bushings in holes at either end of control arm, then place J-5472-1 (Large Installer) in position on each bushing and, using an arbor press, force bushings into place until shoulder on outer sleeve of bushing is seated against control arm *(CAUTION*—Do not attempt to seat flange of bushing on control arm). Install bushing cap, flat washer, lockwasher, and capscrew. After control arm has been installed in car and with weight of car on springs, tighten the capscrews to 65 ft. lbs.

Pivot Shaft Installation (In Upper Control Arm): Insert one end of pivot shaft in member of the control arm and push it as far as possible into member so opposite end of shaft can be swung into position and inserted in other member of control arm. Place J-5472-5 (Small Spacer) in position between ends of control arm. Start rubber bushings in holes at either end of control arm then place J-5472-2 (Small Installer) in position on each bushing and, using an arbor press, force bushings into place until shoulder on outer sleeve of bushing is seated against control arm *(CAUTION*—Do not attempt to seat flange of bushing on control arm). Install bushing cap, flat washer, lockwasher, and capscrew. After control arm has been installed in car and with weight of car on springs, tighten the capscrews to 35 ft. lbs.

SPRINGS: Springs are installed with rubber pad in spring seat recess in front cross-member (upper) and lower control arm (lower).

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1950-55 STUDEBAKER (C nt.)

Spring Identification

Model	①Part No.
Champion (1950-52) Std.	526120
Champion (1950-52) Hvy. Duty	526122
Champion—Sedan (1953) Std.	526120
Champion—Sedan (1953) Hvy. Duty	526122
Champion—Cpe & Conv. (1953) Std	526128
Champion—Cpe. & Conv. (1953) Hvy. Duty	526129
Champion—Exc. Sta. Wgn. (1954-55) Std.	526128
Champion—Sta. Wgn. (1954-55) Std.	526133
Champion—Exc. Sta. Wgn. (1954-55) H.D.	526129
Commander (1950) Std	526121
Commander (1950) Hvy Duty	526123
Commander (1951-52) Std.	526124
Commander (1951-52) Hvy. Duty	526125
Commander—Sedan (1953) Std.	526126
Commander—Sedan (1953) H.D.	526125
Commander—Cpe. & Conv. (1953) Std.	526127
Commander—Cpe. & Conv. (1953) H.D.	526130
Commander—2 & 4-Dr. Sed. (1954) Std.	526126
Commander—2 & 4-Dr. Sed. (1955) Std.	526134
Commander—Coupe, Hardtop (1954-55) Std.	526127
Commander—Station Wagon (1954-55) Std.	526130
Commander—2 & 4-Dr. Sed. (1954-55) H.D.	526125
Commander—Coupe, Hardtop (1954-55) H.D.	526130
President—4-Dr. Sedan (1955) Std	526134
President—Coupe, Hardtop (1955) Std.	526127
President—4-Dr. Sedan (1955) H.D.	526125
President—Coupe, Hardtop (1955) H.D.	526130

①—Spring Part No. is stamped on top coil.

Spring Free Height

Part No.	①Free Height
526120, 526122	14¼"
526121	15¼"
526123	15"
526124	14½"
526125	13⅝"
526126	14⅜"
526127	14"
526128, 526129	13⅞"
526130	13⅝"
526133	13"
526134	14"

①—Plus or minus 5/32".

1946-55 WILLYS PLANADYNE

2-Wheel Dr. Sta. Wgn. (Exc. 6-226) 1946-55
2-Wheel Dr. Sed. Del. (Exc. 6-226) 1946-55
Jeepster 1948-51

►CHANGES, CAUTIONS, CORRECTIONS

►**SPRING MOUNTING PRODUCTION CHANGE (4-63 & 6-63):** Effective Serial No 65974 (4-63) and Serial No. 12098 (6-63) front spring clip plate changed. Parallel plate and two spring clip plates were added. Clip plates fit over ends of "U" bolts and are held in place by the downward projecting edges of parallel plate preventing side movement of spring and any change in camber.

►**REPLACEMENT SPRING CAUTION (4-63 & 6-63):** Manufacturer recommends that whenever front spring replacement required, special **Heavy Duty Spring** be installed on assumption that car is subjected to overloads or operated on rough roads. When these springs installed, other parts should also be installed as follows:

Replacement Spring Parts

Heavy Duty (Export) Front Spring	No. 646855
Spring Clip (2 required)	No. 646813
Spring Bumper (2 required)	No. 645763
Spring Clip Plate (2 required)	No. 641020
Front Shock Absorber	See Note

►**TOE-IN CAUTIONS TO PREVENT UNDUE TIRE WEAR:** Excessive tire wear may be caused by incorrect toe-in due to following causes:

Bent Tie-Rods—May be caused by tie rods contacting rails of "free-wheel type" lift and weight of wheels hanging on tie rods in this position.

CAUTION—Wheels should be blocked up when car raised on this type lift.

Incorrect Toe-In Adjustment Procedure—Toe-in changes with load and must be set exactly as specified under Toe-in below.

►**KNUCKLE SUPPORT INSTALLATION CAUTION:** on right & left side similar in appearance but must **not be interchanged** (results in wrong camber causing unstable steering). These parts marked for identification as follows:

Left Knuckle Support—Has part number—641026 (early cars) or letter "L" stamped on front face at center (later cars).

Right Knuckle Support—Has part number—641027 (early cars) or letter "R" stamped on front face at center (later cars).

DESCRIPTION: Planadyne independent suspension **with transverse spring serving as lower control arm (spring is "Dow" type with second leaf wrapped around spring eye in main leaf for safety). Short upper control arm is mounted at frame end on rubber bushings (movement of arm on frame bracket shaft permitted by flexing of rubber bushings). Direct acting type shock absorber is linked to spring pivot pin (lower end) and special mounting stud at midpoint of upper control arm (upper end).**

CHECKING & ADJUSTMENT: Check front wheel bearing adjustment, tire inflation pressure, steering gear adjustment, shock absorber action, and steering linkage for correct adjustment and freedom of movement first, then check front suspension system as follows:

Tire Inflation: Check and inflate each size tire as follows:
(6.00x15 & 6.50x15)—24 lbs. frt., 28 lbs. rear.
(6.70-15)—20 lbs. front, 24 lbs. rear.

Kingpin Inclination: 5° crosswise.

Caster: 1°. No adjustment (determined by design of front suspension units—correct by replacing necessary parts).

Camber: 1¼-1¾° (4-63, 6-63), 1° (Others). Controlled by shims under each control arm mounting bracket.

►*CAUTION*—Number and thickness of shims under both brackets on same side of car must be equal.

To Adjust—Loosen upper control arm frame bracket mounting screws, remove shims from between bracket and frame (to decrease camber), add shims (to increase camber) **equally at each bracket.** Shims are furnished in thicknesses of .060" and .120" and are slotted to facilitate adjustment (bolts need not be completely removed).

Toe-In: 1/16-1/8" at curb weight (car ready for road with full tank of fuel and spare tire, but without load)

►*CAUTION—Toe-in varies slightly with load and should be checked and adjusted exactly as follows:*

To Check Toe-In: Jack up front wheels, chalk center of tread over entire circumference of both front tires, use pencil to scribe a line at exact center of tread over entire circumference of tires (hold pencil on steady rest while rotating tire). Turn wheels to straight ahead position with steering gear on high midpoint of cam and steering wheel spoke parallel to windshield, lower car so that weight rests on wheels and load or weight down the front end of the car so that the **front spring main leaf is flat** (measure with straightedge below leaf). Roll car forward and backward to allow all parts to assume natural position. Check distance between marks on tires at front and rear of wheels and adjust to ZERO TOE-IN (equal distances at front and rear) under these conditions. NOTE—With toe-in set at ZERO under above loading conditions, toe-in will be 1/16" to 1/8" when load removed (dependent on arch of front spring).

To Adjust Toe-In: Loosen clamps on adjusting sleeve on each tie rod and turn adjusting sleeves on **both tie rods equally** when setting toe-in.

SPRINGS: ***CAUTION—See "Replacement Spring Caution" above for recommended replacement spring and other changes necessary when this spring installed.***

Standard Spring—"Dow" type with rubber inserts in forged cups at ends of spring leaves (spring movement flexes these rubber inserts).

Heavy Duty (Export) Springs—Not "Dow" type (no rubber inserts) but spring assembled with graphited compound between spring leaves. Both first and second leaves are wrapped around spring eyes for greater safety, and four additional clips are used to distribute rebound stress of main leaf throughout spring. NOTE—This spring is recommended as replacement for standard spring above.

SUSPENSION ASSEMBLY: When disassembling suspension system for renewal of parts, assemble as follows:

Upper Support Arm & Knuckle Support: Upper support arm is mounted on rubber bushings at inner (frame) end and on pivot bolt threaded through eyes in arm and in bushing in knuckle support at outer end.

Frame Support Bushings—Install bushing half in each side of frame bracket, install plain washer, lockwasher, and nut on support arm bar, tighten nut securely (shoulder on bar limits compression of rubber bushings).

Knuckle Support Pivot Bolt—Install threaded bushing in support with head toward front, tighten bushing to 175 ft. lbs. Place rubber seal on each end of bushing, hold knuckle support centered in end of support arm and thread pivot bolt in from front through support arm eye and knuckle support bushing, install nut on rear end of bolt

Knuckle Support & Spring Pivot Bolt: When installing support on car, hold support centered on spring eye while installing pivot bolt.

►***CAUTION—Knuckle support must be centered on spring (at bottom) and on support arm (at top) to insure correct Caster specification.***

1952-55 WILLYS PASSENGER CARS

All Models (1952-55)

▷CHANGES & CORRECTIONS

▷*1954 DESIGN CHANGES:* On 1954 & Later front suspensions the thickness of the lower pivot shaft and steering knuckle support are increased. Lower control arm trunnion was modified to provide a straight through trunnion bolt. Distance from center of upper trunnion bolt to center of lower trunnion bolt was changed from 10¾" to 11 5/16". The capacity of the front shock absorbers was increased and its position and action reversed. Front coil spring free length was increased from 17½" to 18½". Parts are not interchangeable with earlier type parts unless entire suspension assembly (both sides of car) is changed.

▷*1955 6-226 SPINDLE & TRUNNION KIT (To Insure Correct Thread Fit):* Kit, Part No. 910936, has been released. Kit consists of one spindle support, one upper and one lower trunnion, thread fits of which have been selectively fitted.

▷*1953 FRONT SUSPENSION PRODUCTION CHANGE:* A new cross-member, connecting right and left front suspension assemblies is used on later cars. Cross-member Kit, Part No. 809562 is available for installation on earlier cars.

▷*1953 LOWER CONTROL ARM TRUNNION PRODUCTION CHANGE:* Trunnion (0°), Part No. 806651 supersedes the previous trunnion Part No. 803215. When replacement is necessary, replace both trunnions with the later type. Reset camber and caster when new type trunnions are installed.

▷*1953 NOISY TRUNNION CORRECTION*—May be caused by overtightening bolt and nut holding lower end of shock absorber. To correct, loosen nut, then work suspension up and down until bind works free. Torque tighten nut to 50-55 ft. lbs. If noise persists, place .005" spacer washer on bolt between shock absorber bushing spacer and control arm yoke. Tighten nut to 50-55 ft. lbs. torque.

DESCRIPTION: Independent linked parallelogram, with new type coil spring mounting, and direct acting shock absorbers.

Shock Absorber—(1952-53) Upper end mounted on bracket on frame member, lower end connected to lower control arm. (1954 & Later) Upper end connected to upper control arm, lower end mounted on bracket on frame member.

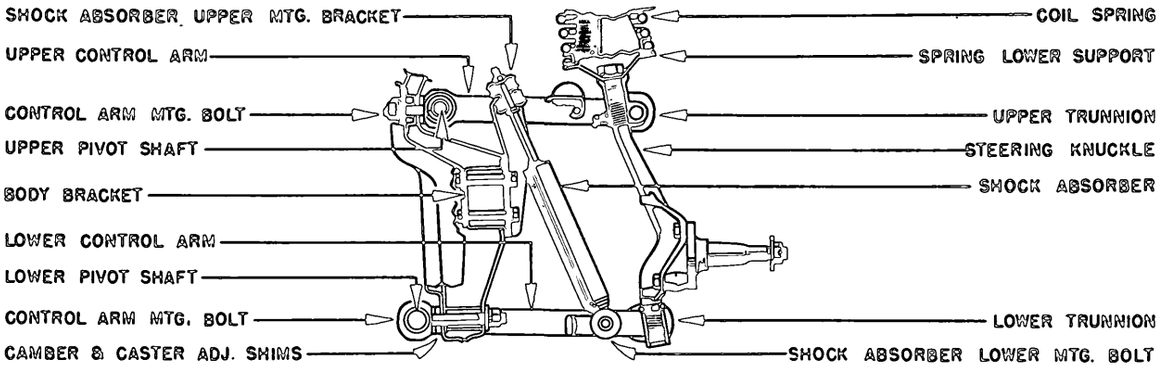
CHECKING & ADJUSTING: Before making adjustments to front suspension system, check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, wheel balance and tire run-out, then place car on level floor and check following specifications:

Kingpin Inclination: (1952-53) 8° crosswise. (1954 & Later) 6° crosswise.

Camber: (1952-53) Pos. 1° ± ¼°. (1954 & Later) Pos. ¾° to Pos. 1¼°.

Adjustment—Adjusting shims are located between lower control arm shaft eye bolts and frame, and camber adjustment is made by adding or removing an equal amount of shims at this point on both front and rear eye bolts—⅛" shims equal to ½°, 1/16" shims equal to ¼° of camber.

▷*SHIM NOTE—Caster will be affected if shims are not removed or replaced in equal thicknesses on the two eye bolts.*



1952-53 WILLYS PASS. CAR FRONT SUSPENSION

Caster: (1952-53) Pos. 1° ± ½°. (1954 & Later) Pos. ½° to Pos. 1½°.

Adjustment—Adjusting shims are located in same place as camber shims (above). Adding shims to the front mounting eye bolt provides Positive Caster. Adding shims to rear mounting bolt provides Negative caster.

ADJUSTMENT NOTE—It is recommended that caster adjustment be set to high limit.

Toe-In: 3/32" to 5/32".

Adjustment—With wheels set in a straight ahead position, and car at curb weight, loosen adjusting sleeve clampscrews on both adjusting sleeves and turn adjusting sleeves equally to get desired adjustment.

COIL SPRING REPLACEMENT (Removal): Disconnect brake line at wheel, and remove wheel, hub and drum as an assembly. Install the pair of spring clamps Tool W-235 on the coil spring (clamps opposite each other) and screw up on each clamp evenly until coil spring is compressed sufficiently for removal. Place jack under side of body and raise sufficiently to remove the spring from body and lower spring support. Install spring compressor Tool W-235 in spring and tighten enough to free spring clamps. Remove clamps and unscrew spring compressor.

Installation—Compress the coil spring with spring compressor Tool W-235 to a suitable length to install the spring clamps, then remove the compressor tool. Align the front spring lower support in control arm with spring well in wheelhouse, and install spring. Make sure that spring does not distort or bow.

SHOCK ABSORBER REPLACEMENT: On 1952-53 Models remove nut from top of shock absorber stem above bracket and remove rubber insulating pad. Push shock absorber stem down through bracket and free. Remove lower shock mounting bolt in lower control arm and remove shock absorber. On 1954 & Later Models remove nuts and bolts and each end of shock, then remove shock absorber. To install, reverse removal procedure. *NOTE*—On 1952-53 Models shock absorber stem is smoothly machined to work through tight seal in upper end of piston. Do not roughen stem with pliers or similar tools. Lubricate lower shock absorber bushing with liquid soap to facilitate installation of bolt.

CONTROL ARM ASSEMBLY REMOVAL: Upper control arm, lower control arm, shock absorber, and steering knuckle support is removed as an assembly, by removing coil spring (see above), and then remove nuts securing upper and lower control arms to frame brackets. *CAUTION*—Remove shims from lower control arm eye bolts, noting their thickness and position. These shims control camber and caster, and must be reinstalled in their respective positions when control arms are reassembled.

▷*NOTE:* On 1954 & Later Models crossmember must be removed before control arms can be removed.

Reassembly—Install trunnion in upper and lower control arms. Trunnion must be centered accurately by using a feeler gauge inserted between trunnion and control arm (push rubber seal aside). Make sure trunnion does not bind at any point and then tighten nuts securely against lockwashers. To install pivot shafts, Special Tools W-232 (upper Control Arm), and W-233 (Lower Control Arm) must be used to avoid distortion of control arms and for correct spacing of pivot shaft. Place control arm in vise with pivot shaft end upward. Install pivot shaft assembly and rubber seals (install seals on pivot shaft using liquid soap) in control arm and install special tool (see above) between ends of control arm pivot shaft and control arm. Install end bushing bolts and tighten to 65-80 ft.lbs. torque. Screw steering knuckle support into lower control arm trunnion until rubber bushing is positioned to seal the joint. *Do not screw support into trunnion enough to distort the bushing.* Install steering knuckle arm, and brake backing plate, then screw the upper trunnion on steering knuckle support until the distance from center of grease fitting in upper control arm to center of grease fitting in lower control arm is 10¾" (1952-53), 11 15/16" (1954 & Later). Attach spring lower support to upper control arm trunnion.

Installation—Reverse the removal procedure outlined above and install the same number and size shims on the same bolts from which they were removed. Install coil springs (see above) and check front suspension alignment.

SPRINGS: Free Length—(1952-53) 17½". (1954 & Later) 18½".

STEERING GEAR INDEX

TYPE OF EQUIPMENT

STEERING GEARS

Chevrolet — Page
- Special Saginaw (1946-48) 2478
- Special Saginaw (1949-54) 2479

Ford, 1949-51 Worm & Roller 2468

Gemmer
- Worm & Roller, Types 330, 370 2467
- Worm & Roller, Types 305, 335, 375 2461

Ross
- Cam & Lever 2470
- Cam & Twin Lever 2469

Saginaw (G.M.)
- Worm & Roller (Chevrolet 1946-48) 2478
- Worm & Roller (Chevrolet 1949-54) 2479
- Worm & Roller (Special Studebaker) 2480
- Worm & Roller (Others) 2471
- Ball Bearing Worm & Nut 2473

Studebaker, Special Saginaw 2480

POWER STEERING GEARS

Bendix
- Linkage (Ford & Mercury) 2416
- Linkage (Others) 2419

Chrysler, Co-axial 2435

Gemmer Hydraguide
- (External Oil Passage) 2423
- (Internal Oil Passage) 2432

Monroe, Linkage Type 2408

Ross, Linkage Type 2414

Saginaw
- Linkage Type 2412
- Integral Type 2446

Studebaker, Mechanical Type 2459

POWER STEERING PUMPS

Chrysler (Hydraguide)
- Single & Double Rotor 2430

Chrysler (Co-axial)
- Single Rotor 2444

Eaton Rotor Type 2421

Vickers Vane Type 2421

CAR APPLICATION

POWER STEERING

BUICK — Page
- 1952-55 (Saginaw) 2446

CADILLAC
- 1952-55 (Saginaw) 2446

CHEVROLET
- 1953-54 (Saginaw) 2446
- 1955 (Linkage Type) 2407

CHRYSLER
- 1951-53 (Hydraguide) 2423
- 1953-54 (Hydraguide) 2432
- 1954-55 (Co-axial) 2436

DE SOTO
- 1952-53 (Hydraguide) 2423
- 1954 (Hydraguide) 2432
- 1954-55 (Co-axial) 2436

DODGE
- 1954 Six (Monroe Linkage) 2408
- 1954 V8 (Ross Linkage) 2414
- 1955 All (Co-axial) 2436

FORD
- 1953-55 (Bendix Linkage) 2416

HUDSON
- 1954-55 Wasp (Monroe Linkage) .. 2408
- 1954 Hornet (Saginaw Linkage) 2412
- 1955 Hornet (Monroe Linkage) 2408

KAISER
- 1953-55 (Monroe Linkage) 2408

LINCOLN
- 1953-55 (Saginaw) 2446

MERCURY
- 1953-55 (Bendix Linkage) 2416

NASH
- 1953-55 Amb. 6 (Bendix Linkage) 2419
- 1954-55 Stsmn. (Monroe Linkage) .. 2408
- 1955 Amb. V8 (Monroe Linkage) ... 2408

OLDSMOBILE
- 1952-55 (Saginaw) 2446

PACKARD
- 1953-54 All (Bendix Linkage) 2419
- 1955 5540 (Monroe Linkage) 2408
- 1955 5560, 80 (Bendix Linkage) .. 2419

PLYMOUTH
- 1954 (Monroe Linkage) 2408
- 1955 (Co-axial) 2436

PONTIAC
- 1953-55 (Saginaw) 2446

STUDEBAKER
- 1953 (Mechanical) 2459
- 1953-55 (Saginaw) 2446

WILLYS
- 1954-55 Pass. Cars (Monroe) 2408

STEERING GEARS

BUICK — Page
- 1946-55 2473

CADILLAC
- 1946-53 2473

CHEVROLET
- 1946-48 Pass. Cars 2478
- 1949-54 Pass. Cars 2479
- 1955 Pass. Cars 2473
- 1946-55 Trucks 2473

CHRYSLER
- 1946-55 2461

CROSLEY
- 1946-52 2470

DE SOTO
- 1946-52 2461

DODGE
- 1946-55 2461

FORD
- 1946-48 Pass. Cars 2461
- 1949-51 Pass. Cars 2468
- 1952-55 Pass. Cars 2461
- 1946-55 Trucks 2461
- 1941-48 Bus 2467
- 1949-50 Bus 2461

FRAZER
- 1947-51 2461

HENRY J
- 1951-54 2461

HUDSON
- 1946-55 2461

KAISER
- 1947-55 2461

LINCOLN
- 1946-48 2467
- 1949-55 2461

MERCURY
- 1946-55 2461

METROPOLITAN
- 1954-55 2470

NASH
- 1946-55 2461

OLDSMOBILE
- 1946-48 2471
- 1950-51 (Except 98) 2471
- 1950-51 (98) 2473
- 1952-55 2473

PACKARD
- 1946-55 2461

PLYMOUTH
- 1946-55 2461

PONTIAC
- 1946-54 2471
- 1955 2473

RAMBLER
- 1950-55 2461

STUDEBAKER
- 1946-55 (Ross) 2469
- 1952-55 (Saginaw) 2480

WILLYS
- 1946-55 (Gemmer) 2461
- 1946-55 (Ross) 2469

STEERING LINKAGE

BUICK — Page
- 1946-55 2402

CADILLAC
- 1950-55 2402

CHEVROLET
- 1946-48 Pass. Cars 2478
- 1949-54 Pass. Cars 2402
- 1955 Pass. Cars 2403
- 1948-55 Trucks 2403
- Power Steering Linkage 2406

CHRYSLER
- 1946-55 2403

DE SOTO & DODGE
- 1946-55 2403
- Power Steering Linkage 2406

FORD
- 1949-51 Pass. Cars 2468
- 1952-55 Pass. Cars 2404
- 1949-55 Trucks 2404
- Power Steering Linkage 2406

HENRY J
- 1951-54 2405

HUDSON
- 1948-55 2405
- Power Steering Linkage 2406

KAISER & FRAZER
- 1947-55 2405
- Power Steering Linkage 2406

LINCOLN & MERCURY
- 1949-55 2405
- Power Steering Linkage 2406

METROPOLITAN
- 1954-55 2405

NASH
- 1950-55 2405
- Power Steering Linkage 2406

OLDSMOBILE
- 1950-55 2405

PACKARD
- 1946-55 2405
- Power Steering Linkage 2406

PLYMOUTH
- 1946-55 2403
- Power Steering Linkage 2406

PONTIAC
- 1949-55 2406

RAMBLER
- 1950-55 2405

STUDEBAKER
- 1951-55 2406

WILLYS
- 1946-55 2406

STEERING LINKAGE (MANUAL STEERING GEARS)

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 NASH "RAMBLER" STEERING LINKAGE INTERFERENCE CORRECTION & PRODUCTION CHANGE:* To eliminate steering linkage interference, all "Rambler" Series cars after Serial No. D-179972, and prior to D-181012 (with Idler Arm No. 3116777), MUST HAVE THE IDLER ARM SPACER, Part No. 3140214, installed on idler arm bushing between head of bushing and the idler arm. Effective at "Rambler" Serial No. D-189717, the Idler Arm (Part No. 3117263), has been revised, eliminating need for above spacer.

►*1954 NASH IDLER ARM "RATTLE" CORRECTION:* To correct rattles proceed as follows: **1) Steering Linkage Ball S at**—Loosen adjusting plug several turns, retighten until it is up solid, then loosen plug to first cotter pin hole but not more than 90° maximum. **2) Ti Rod Ball Stud**—Center in opening of cross tube with tie rod square with steering arm by loosening one of clamps on adjusting tube and rotating tie rod to a position where stud will not contact side of cross tube opening (This practice should always be followed when adjusting toe-in). **3) Steering Worm & Cr ss Shaft**—Should be adjusted if there is evidence of clearance while wheels are in straight-ahead position on worm "high point". **4) Front Wheel B arings**—Adjust for minimum clearance by tightening until there is a slight drag noted, then loosen to first castellation. *(NOTE*—Looseness in wheel bearings can be felt by shaking wheel vertically—top and bottom).

►*1954-55 OLDSMOBILE STEERING TIE-ROD STRIKING OIL PAN CORRECTION:* To prevent tie-rod from striking oil pan on extreme turns, place a 7/16" flat washer under head of wheel stop bolt on steering knuckle support so that stop bolt protrudes a minimum of 1". If this does not provide at least 1/8" clearance between tie-rod and pan, reform pan slightly as necessary. *CAUTION* - Be careful not to puncture oil pan.

►*1955 F-100 & 250 FORD TRUCK DRAG LINK INSTALLATION CAUTION:* Due to design of drag link (THAA-3305-A), it is possible to install drag link in reverse position, causing steering interference. When properly installed, offset end of drag link is attached to sector shaft arm, and lubrication fitting will be at bottom side of link.

STEERING LINKAGE & ADJUSTMENT: Special linkage and adjustment on cars and trucks as follows:

1946-53 BUICK

Buick: Linkag - Direct center point steering type. Long right hand tie rod is located between steering arm and right wheel. Short left hand rod is located between other tie rod and left wheel. Right tie rod is joined to left tie rod and to pitman arm by a ball stud and spring-loaded bearing connections.

Toe-In Adjustm nt (1946-49) - Loosen clamp bolts. To increase toe-in, turn adjusting sleeves in same direction as wheels rotate when moving forward; to decrease toe-in, turn sleeves in opposite direction. *CAUTION*—Both sleeves must be turned *qual am unts in sam dir ction* in order not to disturb straight-ahead wheel position. After adjustment completed make sure tie rod clamps are within 1/8" of end rods and that ear of clamp overlaps slot in tube not less than 1/16".

Toe-In Adjustment (1950-53) - Loosen clamp bolts, then proceed as follows:

Series 40 & 50 - *Decrease* toe-in by turning *left* sleeve in same direction as wheel rotates moving forward and turn *right* sleeve in opposite direction. Increase toe-in by turning both sleeves in opposite direction.

Series 70 - *Increase* toe-in by turning *left* sleeve in same direction as wheel rotates moving forward and turn *right* sleeve in opposite direction. Decrease toe-in by turning both sleeves in opposite direction.

►*CAUTION* - Left and right adjusting sleeves must be turned exactly the *same amount but in opposite directions* in order to maintain front wheel straight-ahead position. On Series 70, make sure that tie rod clamps are within 1/8" of end of rods and that ear of clamp overlaps slot in tube not less than 1/16".

Tie Rod Plug Adjustment - Turn tie rod plug up solid, then back off two turns and install cotter pin.

1954-55 BUICK

Buick: Linkage—Consists of an intermediate rod between steering gear pitman arm and idler lever on right side of frame, and individual tie rods between intermediate rod and each wheel. Adjustable sleeves provided at end of each tie rod for toe-in adjustment.

Toe-In Adjustment—Turn steering wheel until lower spoke is vertical, with front wheels in straight-ahead position. Measure horizontal distance from near edge of front boss of lower control arm shaft to front edge of brake backing plate, on each side. Adjust tie rods, if necessary, to make measurements equal on both sides. To adjust toe-in, loosen clamp bolts and turn adjusting sleeves at tie rod ends as required. Decrease toe-in by turning left sleeve in same direction as wheel rotation when moving forward and turn right sleeve in opposite direction. To increase toe-in reverse direction of sleeve movement given above. *CAUTION*—Right and left sleeves must be turned equal amounts but in opposite directions when changing toe-in, in order not to disturb straight-ahead position of front wheels. Before tightening sleeve clamps, have slots in sleeve and clamps aligned.

Idler Lever & Support Adjustment—In order that idler lever ball stud is kept level with pitman arm ball stud, thread support into idler arm bushing until distance from center of support lower bolt hole to nearest face of idler lever is 2 21/32" to 2 3/4".

Intermediate Rod End Plug Adjustment—On idler lever end of rod, turn end plug up tight then back off 1/4-1/2 turn (1/2 turn preferred) and install cotter pin. On pitman arm end of rod, tighten end plug to 20-25 ft. lbs. torque, then back off 1 7/8—2 1/8 turns and install cotter pin.

1950-55 CADILLAC

Cadillac: Linkage—Consists of a drag link between steering gear pitman arm and idler arm mounted on right frame side rail, and individual tie rods between drag link and each wheel. Adjustable sleeves provided at outside ends of tie rods for toe-in adjustment.

Toe-In Adjustment—Loosen clamp screws on adjusting sleeves. Turning adjusting sleeves in direction of forward wheel rotation decreases toe-in. Turn sleeves equal amounts so that relation of steering gear high spot to straight-ahead position of front wheels will not be changed. When tightening clamp screws, be sure open side of clamp is over open side of adjusting sleeve.

Drag Link Adjustment—Place straight bar across two adjustable jacks, directly below drag link. Adjust height of jacks so that distance from top of bar to flat spot on frame is equal on both sides (Adjusting jacks to even number of inches will facilitate measurements). Measure distance from top of bar to bottom of drag link on both sides. Difference in measurement between 1st measurement (top of bar to flat spot on frame) and 2nd measurement (top of bar to bottom of drag link) should be 4-5/16" (1950-53), 4-7/8" (1954-55) and equal at both ends of drag link within 1/8" (MEASURE TO SEE THAT DRAG LINK IS PARALLEL TO FRAME WITHIN 1/8"). If idler arm end of drag link not within limits, remove idler arm support mounting screws on frame side bar, and screw idler arm in or out of bushing until correct height obtained. *(CAUTION*—When turning idler arm into bushing to raise drag link, be sure idler arm is at least 1/2 turn off base to prevent interference on turns. When turning idler arm out of bushing, do not unscrew more than 2 1/2 turns from base or excessive play will result). If proper height cannot be obtained with this adjustment, replace idler arm. If pitman arm end of drag link is not within limits, pitman arm must be removed and bent as required.

Drag Link Plug Adjustments—Install end plug in pitman arm end of drag link and adjust by turning down tight and backing plug off 1/2 to 5/8 turn. Install cotter pin. Install right end plug and adjust by turning down tight and backing off 1/4 to 1/2 turn. Install cotter pin.

Idler Arm Support Adjustment—Turn idler arm support with seal into idler arm bushing until it bottoms, and then back off 1/2 to 1 1/2 turns.

1949-54 CHEVROLET PASS. CARS

Chevrolet Passenger Cars: Linkage—Consists of steering idler and third arm mounted on frame cross member and linked to each front wheel by separate tie rods (adjustable rod on left side, non-adjustable rod on right side). Idler arm is linked to steering gear pitman arm by steering connecting rod (adjustable for length to enable maintaining high point of steering gear adjustment with front wheels straight-ahead).

Toe-In Adjustment—Loosen clamp bolts at each end of left hand tie rod and turn rod to increase or decrease its length as necessary, until proper toe-in is secured. Before locking clamp bolts, make sure tie rod ends are in alignment with their ball studs.

St ring C nn cting R d Adjustm nt—If wheels not in straight-ahead position with steering gear on high point, set front wheels in straight-ahead position

CONTINUED ON NEXT PAGE

(MANUAL STEERING GEARS) (Continued)

(can be checked by measuring distance between lubrication fitting on lower control arm shaft and the wheel fellow on each side). Remove ornamental cap or horn button and check position of mark on end of worm shaft designating gear high point (mark should be at top of shaft). If gear has been moved off high point when setting wheels in straight-ahead position, loosen steering connecting rod adjuster clamps and adjust as necessary to bring gear back on high point.

Idler & Third Arm Pivot Pin Bushings Replacement–Drive out old bushings using K-318 steering knuckle bushing driver. Press new bushings in bracket using Tool K-318. Ream bushings to .922- 923" using J-3189 bushing reamer.

Idler & Third Arm Clearance Adjustment–If clearance between idler and third arm and bracket exceeds .006", when measured with a feeler gauge, install shim, Part No. 3687657, between bracket and lower face of idler and third arm assembly. If clearance between front suspension cross member and bracket at upper mounting hole exceeds .008", when measured with feeler gauge, add shims as necessary to bring space within allowable limits (.010" shims available).

1955 CHEVROLET PASS. CARS

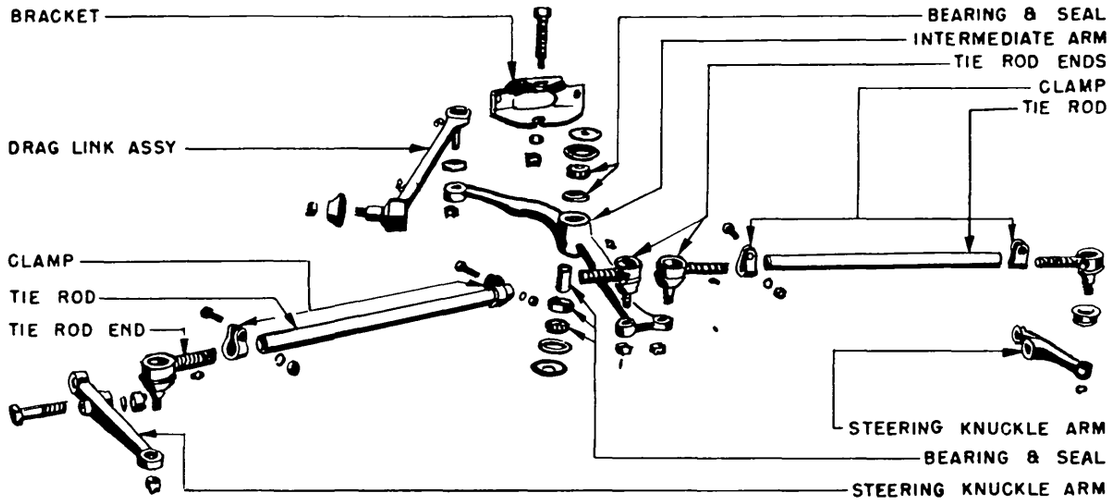
Chevrolet Passenger Cars: Linkage–Consists of steering connecting rod between pitman arm and idler arm, bracketed on right frame side rail, and individual adjustable tie rods between steering connecting rod and each front wheel. Tie rods have adjusting sleeves at outer ends for making toe-in adjustment

Toe-In Adjustment–Set steering gear on high point of worm, with mark on top end of steering mainshaft in vertical position and steering wheel positioned for straight ahead driving Loosen clamp bolt at each end of each tie rod and adjust them individually for desired toe-in Position tie-rod clamp bosses below the tie rod to avoid frame interference,

Steering Wheel Alignment & High Point Centering - Remove steering wheel ornamental cap or horn button and wheel retaining nut. Set front wheels in straight-ahead position. Check position of mark on end of worm-shaft designating steering gear high point (Mark should be at top of shaft and aligned with mark on steering wheel). Remove steering wheel, if necessary, and align mark on wheel with mark on end of wormshaft. If gear has been moved off high point when setting wheels in straight-ahead position, loosen adjusting sleeve clamps on both right and left hand tie rods, then turn each sleeve an **equal amount in same direction** to bring gear back on high point.

1948-55 CHEVROLET TRUCKS

Chevrolet Trucks: Linkage–Consists of three-piece tie rod (rod and two tie rod end assemblies) between front wheels. Tie rod end assemblies have right and left hand threads to facilitate toe-in adjustment. A connecting rod, between steering third arm (on left wheel) and pitman arm, has permanently installed studs in ends. Ends of studs are threaded and are attached to steering third arm and pitman arm with a nut and cotter pin.



1946-54 CHRYSLER & DESOTO STEERING LINKAGE

Toe-In Adjustment–Loosen clamp at each end of tie rod and turn tie rod to increase or decrease its length until proper toe-in is secured. Before locking clamps, be sure tie rod ends are in alignment with studs.

1946-54 CHRYSLER & DESOTO

Chrysler & DeSoto: Linkage–Consists of steering gear intermediate arm mounted on frame cross member which transmits motion from steering gear, through drag link, to each front wheel, through independent tie rods. Both tie rods are adjustable.

Toe-In Adjustment–Loosen clamps on ends of tie rods. Adjust both tie rods equally. Lengths of tie rods should be equal after adjustment to insure correct steering gear position (intermediate arm should be on center-line of car when wheels are in straight-ahead position). When threading tie rod ends into tie rod, thread ends evenly to have a tie rod nominal length of 23" (center to center). *NOTE*–Steering wheel hub, gear arm, tube and steering gear roller shaft are machined with master serrations to place wheels in straight-ahead position when steering wheel is in center position. No attempt should be made to change relative position of these parts by altering master serrations. Improper positioning of steering wheel should be corrected only by adjusting tie rods. Make certain clamping bolts on bottom of tie rods, then tightened.

Drag Link Installation–Whenever drag link removed, care must be taken to insure proper reinstallation in order to provide clearance on extreme turns. It will be noted that one end of drag link is offset slightly, while other end is straight. Offset end should be connected to steering gear arm. On most cars, the drag link is marked "Rear" on the ball retainer expansion plug at rear end to insure proper installation.

Intermediate Arm Bearing Adjustment–Insert sufficient number of shims between upper bearing race and arm spacer so that when assembly is clamped in vise, arm can be rotated with a pull of approximately 1 lb. at end of arm (drag link end).

1946-55 DODGE 6 & PLYMOUTH 6

Dodge 6 & Plymouth 6: Linkag –Consists of long and short tie rods (both adjustable) attached directly to steering gear arm

Toe-In Adjustment–Place front wheels in a straight-ahead position, loosen clamps on ends of tie rods, adjust tie rods an equal amount in opposite directions until desired toe-in is obtained. If steering wheel center spoke does not point straight downward, adjust both tie rods an equal amount in same direction until steering wheel centered. When adjustment correct, pivot ends of tie rods on ball studs so they are both against front or back sides of studs, then tighten clamp bolts with clamping bolt on left end of long tie rod beneath tie rod to prevent interference on turns. *NOTE*–Steering wheel hub, steering gear arm, steering tube and steering gear sector shaft are machined with master serrations for a definite location. No attempt should be made to change relative position of these parts by altering master serrations. Improper positioning of steering wheel should be corrected only by adjustment of tie rods.

1955 CHRYSLER, DESOTO & PLYMOUTH 8 1954-55 DODGE V8

Chrysler, DeSoto, Dodge V8, Plym uth V8: Linkage–Consists of idler arm bracketed to right frame side side member and connected to right end of drag link Pitman arm is connected to left end of drag link Individual tie rods, connected to drag link near its center, have sleeve adjustment for toe-in at outside ends

Toe-In Adjustment–Loosen clamp bolts at each end of adjusting sleeves. Ends should be threaded evenly into tube sleeves to have a nominal length (center to center) of 21-3/8". When tightening sleeve clamps, make sure bolts are beneath tie rods to prevent interference on turns. *NOTE*–Steering wheel hub, steer-

CONTINUED ON NEXT PAGE

(MANUAL STEERING GEARS) (Continued)

ing gear arm, steering tube and steering gear sector shaft are machined with master serrations for a definite location. No attempt should be made to change relative position of these parts by altering master serrations. Improper steering wheel positioning should be corrected only by adjustment of tie rods.

Idler Arm Clearance Adjustment–Screw idler arm support bracket into bushing until it bottoms. Then back off approximately one full turn of idler arm or, until a clearance of 1 7/16" plus or minus 1/16" has been obtained between shoulder of bracket and flat surface of arm.

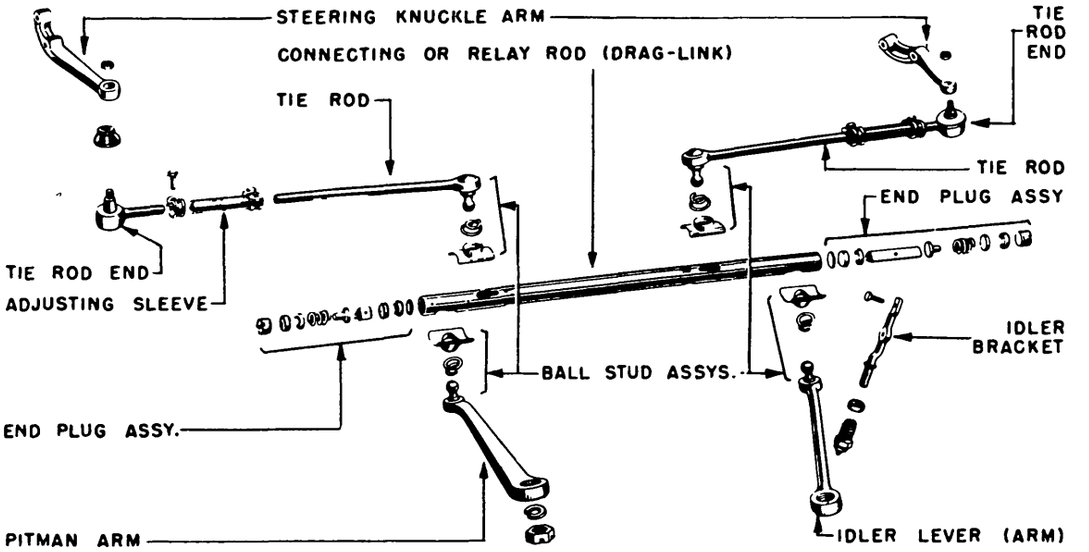
Idler Arm Bushing Replacement–If idler arm bushing play exceeds 1/8" when idler arm is moved up or down or, if noise has developed in steering linkage a new idler arm bushing, support bracket or both should be installed as follows: Remove cotter pin, nut and spacer that holds drag link end ball stud to idler arm. Insert pry bar between idler arm and drag link. Jar drag link ball stud loose by driving on end of link. Separate link and arm, then remove seal. Remove two bolts and lockwashers that attach idler arm support bracket to frame side rail. Remove support bracket, idler arm and bushing as a unit. Unscrew idler arm support bracket from idler arm bushing, then remove seal. Clamp end of idler arm bushing in a vise and remove locknut. Now, unscrew idler arm from bushing. (NOTE–Before removing idler arm from bushing, mark flat of arm to indicate up or down side. Arm has tapered hole for ball stud and can only be installed in one position). To install, reverse removal procedure, noting "Idler Arm Clearance Adjustment" above. If straight fitting (lubrication) found on end of bushing, replace with a 60° or 90° fitting for ease in lubrication.

1952-55 FORD PASS CARS

Ford Passenger Cars: Linkage–Consists of steering arm-to-idler arm rod which transmits motion from steering gear through steering arm, attached to left end of steering arm-to-idler arm rod, to front wheels through spindle connecting rods (tie rods). Spindle connecting rods have adjustable sleeves on outside ends for toe-in adjustment. Idler arm attached to right frame side rail and to right end of steering arm-to-idler arm rod.

Toe-In Adjustment–(*NOTE*–Steering arm (pitman arm) should be pointing straight-ahead when steering wheel spokes are in horizontal position and steering gear worm is at mid-point of travel). To adjust toe-in, adjust sleeves equally. When tightening clamp bolts, make sure bolts are below top of tie rods.

Idler Arm & Bracket Adjustments–Steering idler designed to operate with 1/8" vertical free play. To reduce, proceed as follows (same procedure used when replacing idler arm or bushings): Remove bracket from frame side rail. Thread bracket and bushing off idler arm, then remove idler arm from steering arm-to-idler arm rod. Remove bushings from idler arm bracket and steering arm-to-idler arm rod, remove



CADILLAC, 1955 CHEVROLET, OLDSMOBILE, PONTIAC STEERING LINKAGE—TYPICAL OF BUICK

lubrication fittings from bushings. Check face of side rail for squareness by placing car on level floor, then measure distance from each side rail to floor. If distances unequal, jack up lower side rail until even with other rail. Place spirit level against inside surface of right hand side rail, adjacent to idler arm position, then establish true perpendicular. Measure distance between edge of level and side rail. Distance represents amount of spacing washers that must be installed between bracket and side rail to correctly position idler arm bracket. Check idler arm bracket for 92° included angle (between inside faces of bracket) and correct if necessary. Replace bushings in bracket and in steering arm-to-idler arm rod. Tighten bushings to 85-100 ft. lbs. torque. Reinstall grease fittings. Place new seals on idler arm. Thread idler arm into idler arm rod bushing until shoulder on arm is 11/16" plus or minus 3/64" from top face of rod when arm is in straight-ahead position. Thread bracket and bushing assembly onto idler arm until shoulder on arm is 19/32" plus or minus 3/64" below bottom side of bracket when bracket is parallel to frame side rail. Mount bracket on frame side rail, installing necessary number of washers between bracket and frame. Tighten attaching bolts to 30-35 ft. lbs. torque.

Ball Socket Adjustment–Whenever steering arm ball stud found to have play in socket, remove cotter pin from end of rod, tighten threaded plug in end of socket until all ball stud end play removed, then back off plug approximately 1 1/2 turns, install new cotter pin. Test adjustment by turning steering arm-to-idler arm rod by hand. Rod must move freely, but there should be no end play at ball stud.

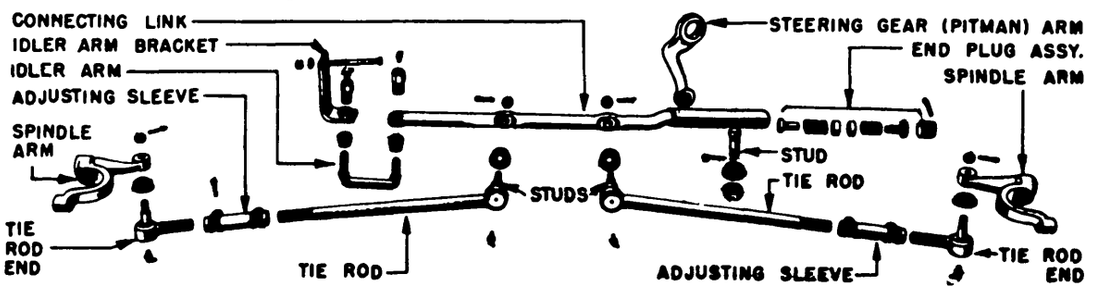
1949-55 FORD TRUCKS

Ford Trucks: Linkage–Consists of a connecting rod between front wheels. Rod has adjustable features at both ends. Spindle arm, attached to connecting rod at its left end, is in turn attached to a one-piece drag link with manual adjustment features at both ends. Rear of drag link is attached to sector shaft arm (pitman arm).

Toe-In Adjustment–Loosen clamp nut at each end of connecting rod, turn connecting rod to lengthen or shorten to obtain desired toe-in.

Drag Link Adjustment–Remove cotter pins from each

CONTINUED ON NEXT PAGE



LINCOLN & MERCURY STEERING LINKAGE—TYPICAL OF FORD

(MANUAL STEERING GEARS)
(C ntinued)

end of drag link. Tighten each drag link plug until drag link ball springs are fully compressed. Back off each plug to first cotter pin hole, then install new cotter pins.

1951-54 HENRY J

H nry J: Linkage—Consists of pitman arm, connected directly to right (long) tie rod. Left (short) tie rod attaches to right tie rod. Tie rods have adjusting links at outside ends for toe-in adjustment.

Toe-In Adjustment—Loosen two clamps on adjusting links at end of each tie rod and turn link to adjust rod length as required.

1948-54 HUDSON (EXC. METROPOLITAN)
1953-54 HUDSON JET

Hudson (Exc. Metropolitan), Jet: Linkage—Consists of center steering arm on frame cross member, linked to each front wheel by adjustable tie rods and to pitman arm by a short drag link.

Toe-In Adjustment—Loosen clamps on end of tie rods. With wheels in straight-ahead position and steering gear on high point, lengthen or shorten tie rods equally until proper toe-in is obtained. Tighten clamps.

Center Steering Arm Adjustments—Using Tool J-2953 adjust arm for centered position as follows: Remove center steering arm nut and front bolt from arm support bracket, install gauge clamp over steering arm, install gauge. Insert bolt at front of gauge in hole in bracket from which bolt removed. Attach screw in center steering arm shaft, adjust gauge rods to contact both sides of front wheel evenly. Repeat procedure for opposite wheel, adjust tie rods equally until reading is same on both sides.

Center Steering Arm Pivot Shaft Replacement Adjustment—Press new shaft in place maintaining the 2.052-2.055" dimension from top of upper spacer and top of lower spacer before drilling and reaming hole for No. 5 taper pin.

1955 HUDSON (EXC. METROPOLITAN)

Hudson (Exc. Metropolitan): See Nash below.

1947-55 KAISER
1947-51 FRAZER

Kaiser & Frazer: Linkage - Idler lever is attached to frame crossmember and linked to each front wheel by adjustable tie rods.

Toe-In Adjustment—Loosen clamps on ends of tie rods, lengthen or shorten tie rods equally until desired toe-in is obtained. Check for binding at rod ends caused by cocking of ball seat in relation to stud.

Ball Socket Adjustment (Drag Link)—Remove cotter pin from end of socket and tighten end plug to remove all end play. Back off plug 1/2 turn and install cotter pin. Ball seats must be tight enough to prevent end play and loose enough to permit free movement.

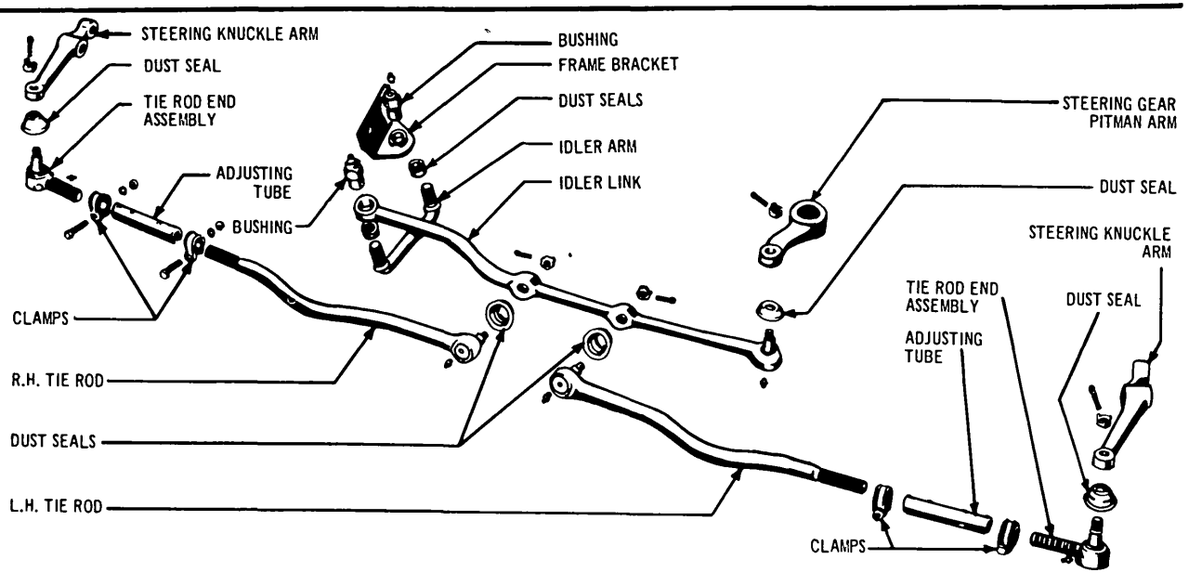
Idler Lever Adjustment—Attach spring scale in hole in idler lever into which drag link connects. Tighten bolt to adjust idler lever bearings until a pull of 8-16 ozs. on spring scale is required to move lever.

1949-55 LINCOLN & MERCURY

Linc ln & M rcury: Linkag —Consists of steering connecting link between steering gear arm (pitman arm) and idler arm, mounted on right frame side rail, and adjustable tie rods between connecting link and each front wheel. Adjustable sleeves provided at outside ends of tie rods for toe-in adjustment.

Toe-In Adjustment—Loosen clamp bolts on adjustable sleeves. Adjust sleeves equally until proper toe-in obtained.

Connecting Link Plug Adjustment—Screw plug in left end of connecting link until it bottoms, back off 2½ turns ± 1/8 turn (1952-53), 1½ turns (1954-55 Mercury), 2-2½ turns ± 1/8 turn (1954-55 Lincoln), align cotter pin holes, install cotter pin.



1955 CHRYSLER, DE SOTO, DODGE V8, PLYMOUTH V8 STEERING LINKAGE

1954-55 METROPOLITAN

Metropolitan, Hudson & Nash Models: Linkage—Consists of adjustable cross tube (for toe-in adjustment). Idler assembly is attached to body sill at right of car and has a double arm, with front arm attached to cross tube and rear arm attached to right tie rod. Steering gear pitman arm is double-levered, with front lever attached to left of cross tube and rear lever attached to left tie rod. Idler assembly is not adjustable.

Toe-In Adjustment—Loosen lock nuts on ends of cross tube, lengthen or shorten cross tube until proper toe-in secured. Tighten lock nuts.

Cross Tube Plug Adjustment—Remove cotter pin, lightly screw plug in as far as it will go, back off to first cotter pin hole in alignment with castellation.

1950-55 NASH (EXC. METROPOLITAN)
1950-55 RAMBLER

Nash (Exc. Metropolitan), Rambler: Consists of steering linkage cross tube between steering gear pitman arm and idler arm, bracketed on right frame side rail. Individual adjustable tie rods are attached to ends of cross tube. Adjusting tubes at outer ends of tie rods provide for toe-in adjustment.

Toe-In Adjustment—Loosen clamps on ends of tubes on tie rods. Turn tubes equally in opposite directions until desired toe-in obtained. Before tightening clamps on adjusting tubes, square ball joints on their studs to prevent excessive steering linkage friction or wear.

1949-55 OLDSMOBILE

Oldsmobile: Linkage—Consists of steering relay rod between pitman arm and idler arm, bracketed to right frame side rail. Individual, adjustable tie rods are attached to center portion of steering relay rod and are provided with adjustable sleeves for toe-in adjustment.

Toe-In Adjustment—Loosen clamp bolts at each end of steering tie rod adjustable sleeves. With steering wheel in straight-ahead position turn tie rod adjusting sleeves to obtain proper toe-in adjustment. Insure that tie rod end ball seats are riding squarely in their seats, then position tie rod to relay rod ball studs to bottom of slot in relay rod. Position clamps on adjusting sleeves so that bolts are below upper surface of adjusting sleeves with edges of clamp **out of slot**, tighten clamp bolts.

Relay Rod Plug Adjustm nt—Draw nut tight, then back off 1/4-3/4 turn, install cotter pin.

Idler Lever & Support Adjustment—Whenever idler arm is disassembled from idler arm support, reassemble so that there is a dimension of 23/32" between upper face of idler arm and shoulder on support.

1946-55 PACKARD

Packard: Linkage—Consists of steering connecting rod between pitman arm and idler lever, bracketed to right frame side member, and individual tie rods (steering cross tubes) between steering connecting rod and each wheel. Adjusting sleeves at outer ends of cross tubes provide means for toe-in adjustment.

CONTINUED ON NEXT PAGE

(MANUAL STEERING GEARS) (C ntinued)

Toe-In Adjustment—Loosen clamps on adjusting sleeves at ends of tie rods. Turn sleeves equally until desired toe-in obtained. Before tightening clamps on sleeves, check each cross tube outer ball socket for being properly centralized.

Conn cting Rod End Plug Adjustment—Draw plugs up tight, then back up 1/4-1/2 turn to align slot with cotter pin hole.

1949-55 PONTIAC

Pontiac: Linkage—Consists of steering connecting rod between pitman arm and idler arm, bracketed on right frame side rail, and individual, adjustable tie rods between steering connecting rod and each front wheel. Tie rods have adjusting sleeves at outer ends for making toe-in adjustment.

Toe-In Adjustm nt—Remove horn button and set gear on high point of worm by turning steering wheel until mark on shaft is exactly at top. Loosen tie rod end clamp bolts and turn tie rod adjusting sleeves equally until desired toe-in is obtained. Turn right tie rod in direction of rotation of wheels to increase toe-in, turn left tie rod in opposite direction to increase toe-in. If front wheels not in straight-ahead position turn both tie rods in same direction (so as not to change toe-in) until error corrected. Tighten clamps on adjusting sleeves with slots in sleeve toward bolts in clamp.

Idl r Lever & Supp rt Adjustment—With lever and support off car, thread idle lever support into bushing until distance between upper face of lever and shoulder on support is approximately 23/32".

St ering Conn cting R d Plug Adjustment—Screw end plugs in until tight, then back off to nearest cotter pin hole alignment and insert new cotter pins (1953-1955), back off 1/4-1/2 turn (1949-52).

1951-55 STUDEBAKER

Studebak r: Linkag—Consists of two adjustable tie rods attached to bell crank mounted at center of frame cross member. Bell crank is attached to steering gear pitman arm by a reach rod (drag link).

T e-In Adjustm nt—If tie rods disassembled, count number of turns when unscrewing tie rod ends from rod to facilitate reassembly. To adjust toe-in, adjust right tie rod (left tie rod on right-hand control cars). When tightened, inner tie rod bolts should be at bottom and horizontal.

Bell Crank Bearing Adjustment—Insert shims between lower thrust washer and shaft until there is no end play. Shaft should, however, turn freely in bearings. Lock nut securely with cotter pin.

1952-55 WILLYS PASS. CARS

Willys Passenger Cars: Linkage—Consists of steering cross tube between pitman arm and idler arm on right frame side rail, and individual, adjustable tie rods between cross tube and each front wheel.

Toe-In Adjustment—Place steering gear pitman arm in straight-ahead position. Since front tread is 58" and rear 57" place straightedge 1/2" out from rear wheels and against front wheels. Adjust tie rods so that both front and rear of front wheels touch straightedge. Correct adjustment will require approximately 1/4 turn of adjusting sleeve of each tie rod.

1946-55 WILLYS UTILITY

Willys Utility: Linkage—Bell crank on frame cross member, linked to each front wheel by adjustable tie rods and to steering gear pitman arm by a steering connecting rod (drag link).

Toe-In Adjustment—Set tie rod end of steering bell crank at right angles to front axle, place straightedge or line against left rear wheel and left front wheel to determine if wheels in straight-ahead position. If front wheel tire does not touch straightedge both at front and rear, adjust left tie rod by loosening clamps on each end and turning tie rod until tire touches straightedge. Check right side in same manner and adjust right tie rod. Adjust toe-in by shortening each tie rod 1/2 turn.

STEERING LINKAGE (POWER STEERING)

Steering linkage on cars equipped with power steering is essentially the same as for manual steering except as noted for "linkage" types below:

BENDIX LINKAGE TYPE

Ford & Mercury (1953-55): One end of power cylinder is bracketed to right frame side rail and the other to steering pitman-to-idler arm rod. Control valve is mounted on right end of steering pitman arm-to-idler arm rod. Rubber bushings are used at each pivot point.

Nash Ambassador 6 (1953-55): Power cylinder replaces cross tube and is bracketed at right body side sill.

Packard (All Models 1953-54; 5560 & 5580 Series 1955): Power cylinder is bracketed at right frame side rail and attached to connecting rod at center between tie rod studs.

MONROE LINKAGE TYPE

Dodge 6 & Plymouth (1954): Power cylinder bracketed to right frame side rail at one end. Cylinder serves as cross tube with steering arm pivoted at left end of power cylinder. Tie rods are pivoted at points near center of power cylinder.

Hudson Wasp & Super Wasp (1954): Power cylinder connects steering gear to center steering arm through medium of a drag link and ball stud in power cylinder unit.

Hudson Wasp & Hornet 6 & 8 (1955), Nash Statesman (1954-55), Nash Ambassador V8 (1955): Power cylinder replaces conventional cross tube and is bracketed to right body side sill.

Kaiser (1953-55): Power cylinder replaces conventional drag link.

Packard 5540 Series (1955): Power cylinder is bracketed at left frame side rail and replaces conventional connecting rod.

Willys Pass. Cars (1954-55): Power cylinder replaces conventional drag link.

ROSS LINKAGE TYPE

Dodge V8 (1954): Power cylinder bracketed to right frame sill and other end attached to steering gear arm. Tie rods are attached to power cylinder near center of cylinder.

SAGINAW LINKAGE TYPE

Hudson Hornet (1954): Power cylinder connects steering gear to center steering arm through medium of a drag link and ball stud in power cylinder unit. Power cylinder is bracketed at right of frame crossmember.

CHEVROLET LINKAGE TYPE

Chevrolet Passenger Cars (1955): Power cylinder is connected to steering relay rod and piston rod is connected to bracket on right frame side rail.

Chevrolet Trucks (1955): Power cylinder is anchored to front axle and piston rod is attached to steering cross rod.

CHEVROLET LINKAGE TYPE

Ch vr l t (1955)

DESCRIPTION: Hydraulic linkage type. Hydraulic power cylinder assembly is mounted on a bracket on the relay rod at one end and to bracket on frame at other end. Hydraulic control valve is attached to left end of steering relay rod and is operated by pitman arm acting on spool valve assembly, through valve shaft. Spool is restricted to a .050" travel to right and left from centered position. Spool valve is normally centered (straight –ahead position) and in this position oil from hydraulic pump flows through center passage of valve body, through annular grooves in spool to annular passages in housing and back to pump. When axial movement of spool occurs with a 3 lb. effort on steering wheel, direct circuit of pump is interrupted by shutting off both direct return passages. Oil is then forced to travel to one end of power cylinder to move cylinder axially on piston shaft. At same time opposite end of power cylinder is open to hydraulic pump return line and permits oil at this end to return through control valve to pump reservoir. Manual steering is possible when hydraulic power not available.

Hydraulic Pump & Reservoir Assembly: Vane type oil pump is mounted on commutator end frame of generator and driven by a splined extension of the special generator armature shaft. Pump contains a combination overload relief valve, which is set to open at 750 psi. at 170°F. and a flow control valve which recirculates oil within pump as required to regulate output volume between 1.1 gallons at idling speed to 1.8 gallons per minute at approximately 3600 RPM. Reservoir encloses pump cover assembly and provides a reserve supply of oil to assure complete filling of hydraulic system. An air chamber in upper part of reservoir and a vented cover attachment provide for the escape of any air that may be introduced into system.

BELT ADJUSTMENT: Loosen outer bracket-to-generator bolt and retaining bolt on generator rear brace. Pull generator out from engine with all slack taken out of belt. Tighten retaining bolts. Push in on belt midway between water pump and generator pulleys with light push. If tension correct there will be 5/16" (6 Cyl.), 13/16" (8 Cyl.), deflection at this point with light push.

LUBRICATION: Checking Fluid Level–Check oil level in reservoir by removing dipstick. Fill to indicated level using Automatic Transmission Fluid "Type A" bearing an "AQ-ATF" number.

Refilling System (After Units Removed or Disconnected): Fill oil reservoir to proper level and let oil remain undisturbed for about two minutes. Raise front end of vehicle so that wheels are off ground. Start engine and run at idle for two minutes. Increase engine speed to approximately 1500 RPM. Turn wheels (off ground) right and left, lightly contacting stops. Lower car and turn wheels right and left on ground. Recheck for leaks. Check oil level and refill as required.

Checking Pump Pressure: Disconnect pressure line at pump connection (smallest, top line). *(CAUTION–* Some fluid will leak out when line is disconnected so provision must be made to collect this drainage). Install checking gauge tool J-5176 (with gauge valve closed) on pump and hose connection *(NOTE–*Adapter Kit J-5900 must be used to adapt pressure gauge to pump). Open gauge valve and run engine at idle. Turn wheels (on ground) against stops. Pressure should not be less than 750 psi. If pressure less than 750 psi., slowly close gauge valve observing gauge for pressure increase. Pressure will increase as valve is closed if pump is good. *(CAUTION–*Do not leave valve closed for more than 15 seconds). If pressure does not increase when valve is closed, difficulty is in pump, which must be removed for service. Shut engine off, remove gauge and valve, reconnect hose to pump if pressure satisfactory. Bleed hydraulic system of air (see above).

HYDRAULIC PUMP: (Removal)–On 6 Cyl. cars, loosen generator-to-bracket retaining bolts and remove fan belt. Pull generator all the way out from engine. On all models, place container under pump and disconnect hydraulic lines from pump allowing oil to drain out of reservoir into container. Remove retaining bolts from pump-to-generator and generator rear brace (V8 models), and remove pump. Complete draining remaining oil from pump reservoir before disassembly.

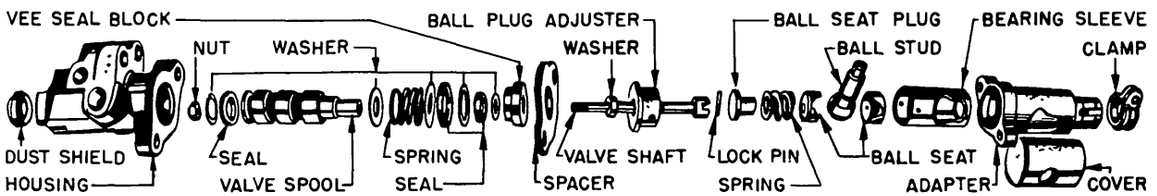
Disassembly: Remove retaining bolts and sealing washers from pump reservoir-to-pump cover assembly, and remove reservoir. Remove oil filter spring retainer from pump cover assembly. Remove cover plate spring and cover plate and then remove plug and "O" ring, flow spring and pressure relief valve assembly from pump cover assembly. Remove the three retaining bolts from pump cover assembly and remove pump cover from pump body. Remove oil filter and retainer. Remove cam ring, pump rotor and vanes. Remove and discard "O" rings from pump body, cover and cam ring. Remove and discard generator shaft oil seal from pump body.

Inspection: Wash all parts in solvent and dry with a lint free cloth. Check fit of vanes in rotor. Vanes must slide freely, but snugly in slots. Inspect flat face of pressure plate, cam ring, cover, rotor and pump body. If necessary, lap these parts for a good fit. Check surface of pressure relief valve and check fit of valve in pump cover. Correct slight irregularities by polishing.

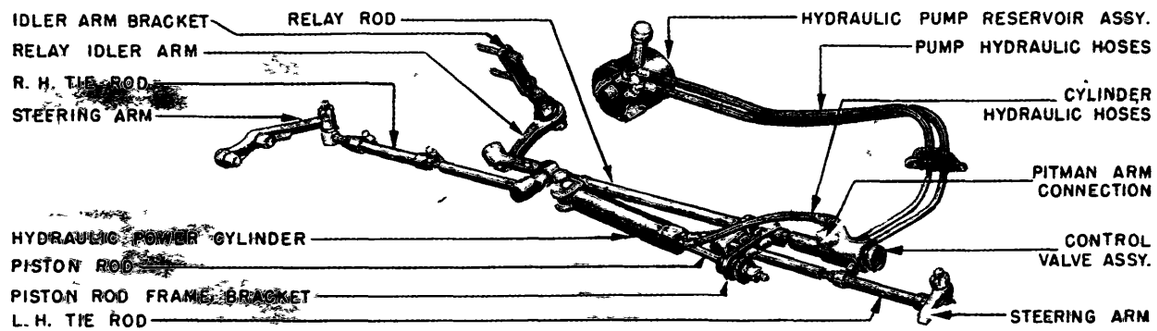
Reassembly: Coat new "O" rings with Lubriplate and install in pump cover, cam ring and pump body. Install rotor and vanes in pump body with wear pattern or beveled edge of vanes against cam ring inner diameter. Install alignment sleeve in cam ring and install cam ring on pump body *(CAUTION–Wid r edg of cam ring should be installed toward pump body. Be c rtain to align bolt holes in cam ring to body bolt holes. Install rotor with rounded side of splin s toward gen rator end of pump).* Install pressure plate in pump cover and install filter retainer and oil filter. Install cover assembly to pump body, then install plunger and flow spring. Install plug and *"O" ring* assembly, cover plate, and retainer spring. Install filter retainer spring in cover assembly, and install reservoir, retaining bolts and sealing washers.

►*BRASS FITTING SEAT NOTE:* The seats of the brass fittings are the pressed in type and can be replaced in event of a fitting leak by tapping hole in the seat and then pulling the seat by using a bolt threaded into the tapped out seat and a flat washer and nut as an extractor. When installing new seats, align seat in its bore and press it into place by using the correct hose or tube fitting as a pressure tool.

Installati n: Reverse removal procedure.



POWER STEERING CONTROL VALVE ASSEMBLY



CHEVROLET POWER STEERING ASSEMBLY

CONTINUED ON NEXT PAGE

CHEVROLET LINKAGE TYPE

(C ntinu d)

CONTROL VALVE: (R m val)—Raise front of car and place it on stands. Loosen relay rod to control valve clamp and disconnect the two pump to control valve hose connections. Drain fluid into a container and then disconnect the two remaining valve to power cylinder hoses. Remove the retaining nut from the ball stud to pitman arm connection and disconnect control valve from pitman arm. Turn pitman arm to right to clear control valve and unscrew control valve from relay rod. Remove control valve.

Disass mbly: Remove dust shield from control valve housing and remove retaining pin and nut from valve shaft. Remove retaining bolts connecting valve assembly housing to adapter assembly housing and separate the two assemblies. *(NOTE*—Valve spool remains in housing when the two assemblies are separated. The seal at the end of the spool makes it necessary that spool be removed from the end of the housing). Remove spring thrust washer, spring, flat washer, "V" seal assembly, flat washer and spacer from valve shaft. Remove ball stud cover from adapter assembly housing. Push ball stud to the end of the adapter housing and remove lockpin. Remove threaded ball plug adjuster and valve shaft. Remove ball seat plug, spring, ball seats and ball stud. Remove bearing sleeve.

Insp ction: Wash all parts in solvent and dry with a lint free cloth. Inspect all parts for scratches, burrs, distortion, evidence of wear, and replace all parts that are worn or damaged, including mating parts where necessary. Replace all seals, gaskets and covers.

Reassembly: Place ball seat in bearing sleeve and insert sleeve in housing. Insert ball stud in sleeve. Install the remaining ball seat, spring and spring seat in bearing sleeve *(CAUTION—This is the heavier of the two springs used in the control valve).* Install valve shaft in adjuster and screw adjuster into sleeve. Tighten adjuster until it bottoms, and then back if off ¼ turn, plus or minus the amount necessary to install lockpin in nearest hole *(CAUTION*—Be sure ball seats remain in correct position, otherwise there will be insufficient clearance to correctly install retaining pin). Install ball stud cover and install washer and annulus spacer on the valve shaft. Install "V" seal block and ring assembly. Install the annulus washer, spring and spring thrust washer with chamfered side of thrust washer toward spool side. Install spool valve assembly and retaining nut *(CAUTION*—Install spool valve with the "V" seal at the threaded end of valve shaft). Tighten the retaining nut to 25 inch lbs. with a torque wrench and install retaining clip. Make sure that all parts are correctly located before tightening. Insert the assembled valve and adapter assembly into valve housing and install retaining bolts and lockwashers. Fill the end area with GM 4617-M grease and install valve housing dust cover.

Installati n: Install control valve on relay rod so that distance from center of control valve ball stud to center of tie rod end ball stud measures approximately 3 5/8". Tighten control valve clamp *(NOTE*—The clamp securing control valve to relay rod end should be positioned before tightening so that it will not interfere with steering linkage. Reconnect the four hydraulic hoses to control valve and fill system with Automatic Transmission Fluid Type "A".

POWER CYLINDER: (Removal)—Disconnect hydraulic lines connected to cylinder and drain fluid into a container. Remove retaining nut, washer, and rubber grommet from cylinder rod to brace attached to frame. Remove cotter pin, retaining nut, flat washer and bolt from end of power cylinder where it is fastened to relay rod bracket. Remove power cylinder.

Inspection: Inspect seals for leaks around cylinder rod and if leaks are present, replace the seals as follows: Use a hook tool and remove retaining ring. Remove wiper ring, backup washer, backup seal ring and seal *(NOTE*—Piston rod should not be removed unless there are signs of leakage along piston shaft at the shaft seal). Examine brass fitted hose connection seats for cracks or damage and replace if necessary. If other service required on power cylinder, replace the unit.

Installation: Install power cylinder by reversing the reversing the removal procedure. Reconnect the hydraulic lines and fill system with Automatic Transmission Fluid Type "A".

MONROE LINKAGE TYPE

Dodg 6, M d l D51 (1954)
Huds n Wasp (1954-55)
Hudson Hornet (1955)
Kais r, All M d ls (1953-55)
Nash Statesman (1954-55)
Nash Ambassador V8 (1955)
Packard 5540 Seri s (1955)
Plymouth, All M d ls (1954)
Willys, Pass. Cars (1954-55)

►CHANGES & CORRECTIONS

►*1955 HUDSON WASP & HORNET 6 PUMP PULLEY & BELT PRODUCTION CHANGE (To Increase Pump Spe d):* Effective with Serial No. W-7746 (Wasp), X-7519 (Hornet 6), Power Steering Pump Pulley, Part No. 3145367 (5" diameter), replaces Pulley, Part No. 3143342 (6½" diameter) in order to increase pump speed and oil flow. Belt No. 3145381 (Wasp), No. 3145382 (Hornet 6) must be used with new pulley.

►*1955 HUDSON & NASH V8 PUMP SUPPORT PRODUCTION CHANGE (To Lessen Pump Vibration On Air Conditioned Cars):* Effective Serial No. Y-6374 (Hornet), V-9917, (Ambassador) Power Steering Pump Brace Part No. 3146406, has been incorporated in production to alleviate power steering pump vibration, and is available for use on earlier models. Greater offset end of brace is attached to pump by upper right pump cover cap screw. Pump mounting bracket is also secured at this point. Lockwasher, Part No. GM-114606, must also be used. Discard original pump bracket mounting screw and use Screw, Part No. GM-179841, to secure pump brace to cylinder head. It is necessary to remove power steering pump pulley to remove pump cover cap screw. Prior to loosening pump and compressor drive belt, use belt to hold pulley while loosening screw.

►*1955 HUDSON V8 PUMP RESERVOIR COVER PRODUCTION CHANGE (To Correct Oil Leaks):* Effective Serial Number Y-6448 (Hornet V8) an improved Power Steering Reservoir Cover, Part No. 3119155, became effective in production. New cover incorporates a large inner baffle to correct leaks at cover vent.

DESCRIPTION: Monroe Power Steering is of the "Linkage Type". The power mechanism is built into the steering linkage and is used in conjunction with a standard steering gear. Power steering system consists of the following units:

Hydraulic Pump & Reservoir Assembly: On Dodge and Plymouth, the pump and reservoir assembly is mounted at rear of generator and driven by generator armature shaft. On others, assembly is mounted on engine and is belt-driven by crankshaft. Consists of rotor type pump with built-in relief valve (pre-set to specified limits - See "Testing Hydraulic Oil Pressure" below). A flow control valve limits maximum volume, at high engine speeds, to steering gear requirements.

P w r Link: Serves as drag link in steering linkage. Double-acting piston type. Piston rod is anchored to bracket on right frame side rail, with tie rods connected to ball studs which are firmly attached to the cylinder of the Power Link. The control valve body is an integral part of the Power Link, and moves with the Power Link cylinder. Precision type spool valve is centered in valve body by springs at either end. Stud, attached to pitman arm, extends through valve body, and can be moved in either direction to change position of valve spool thereby actuating Power Link.

►*ADJUSTMENT CAUTION—Whenever hydraulic system disturbed (by disconnecting lines, removal or installation of units, etc.) hydraulic system must be bled to remove air. See Bleeding Hydraulic System below.*

PUMP BELT ADJUSTMENT: (Dodge & Plymouth) Install adjusting tool C-3379 and torque wrench C-3005. Pull torque wrench to 15 ft. lbs. torque and tighten adjusting strap bolt and generator-to-generator bracket bolts. (Hudson 6, Kaiser, Willys) At proper tension, belt should not deflect more than 1/4" when thumb pressure exerted midway between power steering pump and water pump pulleys. (Nash) Tension should be sufficient to prevent belt slippage.

POWER LINK ADJUSTMENT: When it has been determined that valve spool in Power Link is not adjusted properly, adjustment can be made by turning plug in valve end of Power Link in or out, as required, 1/6 turn at a time. In no case should it be necessary to turn it a total of more than 1/2 turn to have a correct adjustment. Road test car and turn plug **IN** if left turn too hard, right turn too easy, poor recovery after

CONTINUED ON NEXT PAGE

MONROE LINKAGE TYPE (Con.inued)

right turns with good recovery after left turns, tendency of vehicle to wander to the right. Turn plug **OUT** if one or more conditions opposite the above exist. Proceed with adjustment of the link valve as follows: Scribe mark on plug in valve end of power link to indicate original position of plug. Remove cotter pin, turn plug in or out 1/6 turn (as determined by symptoms above). If plug held by wire and lead seal, remove seal and after adjustment, replace with cotter pin. Road test vehicle, then if steering action improved but still not correct turn plug an additional 1/6 turn, then road test vehicle again. If necessary, plug can once more be turned an additional 1/6 turn. When steering action is proper, install cotter pin to lock plug in position. If steering action still not correct after plug moved 1/2 of a full turn replace power link.

STEERING GEAR ADJUSTMENTS: Due to reduction of friction and wear, adjustments are made to minimum limits as follows:

Dodge: Remove steering gear chuck from vehicle. Torque required, pulling at 90° to spoke at rim of wheel, should be 1-4 ozs. with no endplay in bearing when roller tooth shaft (steering gear arm) is not assembled in housing. After shaft assembled, pull required to rotate wheel through center position should be 4-8 ozs., with no backlash in the worm and roller shaft at that point.

Hudson, Nash, Plymouth: *See "Gemmer Worm & Roller" in Steering Section.*

Kaiser: The pull at 90° to spoke at rim of wheel should be 1/4 lb. for worm bearing adjustment and 1 lb. pull for worm-to-roller backlash adjustment.

Willys: *See "Ross Cam & Lever" in Steering Section.*

FRONT END ALIGNMENT: All front end adjustments must be set with extreme accuracy due to sensitivity of power steering. Alignments for power steering are:

Hudson Wasp & Hornet (1955): Kingpin Inclination - 3°36'.
Caster - ½° to 1° (1° desired).
Camber - ¼° Neg. to ¼° Pos. (0° desired).
Toe-In - 1/16" to 3/16".

Kaiser: Kingpin Inclination—4-3/4° to 5-1/2°, 5° preferred.
Caster—0° to 1°, 1/2° preferred.
Camber—0° to 3/4°, 1/2° preferred.
Toe-In—1/8" total (1/16" at each wheel).
Toe-Out on Right Turn—Inner wheel 20°, outer 17-1/2°.
Toe-Out on Left Turn—Inner wheel 20°, outer 18-1/2°.

Nash Ambassador V8 & Statesman: Kingpin Inclination-6½°.
Caster—1/2° to 1°, 1° preferred.
Camber—1/4° Neg. to 1/4° Pos., 0° preferred.
Toe-In—1/16" to 3/16".

Willys: Kingpin Inclination - 8¼° crosswise.
Caster - Pos. 1° ± ½°.
Camber - Pos. 1° ± ¼°.
Toe-In - 3/32" to 5/32".

Oth rs: *S e Front Suspension Section on Car Mod l page.*

PITMAN ARM STOP SCREW ADJUSTMENT: Proceed as follows:

Huds n (1954): Turn steering wheel to full right turn and place a 1/16" shim between the stop on the right hand outer steering arm and the stop on the spindle support. With shim in place, adjust the stop screw at pitman arm stop bracket until screw just touches pitman arm, then tighten lock nut securely.

Kaiser: Stops are located on pitman arm and on a bracket on frame side rail. Whenever toe-in adjustment made or any part of steering linkage disturbed pitman arm stops should be adjusted as follows: Loosen lock nuts and turn pitman arm stops in a few turns, turn steering wheel **(without power assistance)** to maximum right turn position until right steering arm touches lower suspension arm outer pivot. Turn adjusting screw in frame bracket out against pitman arm until steering arm is moved approximately 1/8" away from lower suspension arm outer pivot. Tighten lock nut, then repeat this operation for full left turn, adjusting stop screw in pitman arm.

HUDSON (1954) DRAG LINK ADJUSTMENT: Disconnect drag link at stud which extends through valve portion of power cylinder. Set front wheels in straight-ahead position with steering gear on the high point (steering wheel spokes in horizontal position). If drag link will not enter over stud freely, loosen clamp screw and turn drag link arm in or out as required. After adjustment, securely tighten clamp screw and valve stud nut. *NOTE*—If adjusted properly, drag link and stud fit snugly on power cylinder without bind. It is essential that drag link and stud be able to move a few thousandths inch sideways to operate power cylinder. Maintain the 1.990" plus or minus .010" dimension between inner face of thrust washers. If drag link and stud drawn down too tightly on power link, steering effort will increase and wheels will not return properly after a turn. It may be necessary to disengage drag link from stud and remove one of two metal washers on stud and rubber cushion and the drag link. If this does not correct condition, it may be necessary to replace stud or drag link.

LUBRICATION: *CAUTION—Power Steering Unit and Steering Gear are lubricated separately with DIFFERENT lubricants:*

Power Steering System: Check fluid level every 2,000 miles (Dodge & Plymouth 1000 miles), maintain at indicated level near top of reservoir (Dodge & Plymouth 1/2" above highest point of filter element). Check for leaks before adding fluid to system. Capacity of system is 3 pints.

Recommended Fluid—(Dodge & Plymouth) SAE 10-W Engine Oil when temperatures consistently above 10° F. above zero, and SAE 5-W when temperatures reach 10° F. below zero and remain consistently below 10° F. above zero. At extreme high temperatures use SAE 30 Engine Oil. (Others) Automatic Transmission Fluid (Type A—AQ-ATF).

Draining System (Dodge & Plymouth): *(NOTE—Extreme care should be exercised to prevent dirt from nt ring res rvoir while cover is removed. To prevent damage to filter element, do not insert sharp objects into reservoir. Do n t disturb filter lem nt as periodic changes of this unit are not required.)* Disconnect high pressure (small) hose at power steering unit, place end of hose in suitable container. While holding hose in container start engine and allow to idle until all fluid is forced from unit (CAUTION—Do not run engine above idle speed). As soon as fluid starts to show great quantities of air bubbles, stop engine. Reconnect high pressure hose, refill.

BLEEDING (REFILLING) HYDRAULIC SYSTEM (HUDSON): *Loosen hose connections at booster cylinder* valve; with hoses disconnected at pump, fill hoses with fluid (Type A—AQ-ATF) until fluid runs out at the hose connections at booster cylinder free of air bubbles; then tighten connections at booster cylinder, while keeping hoses full of liquid. Install hose connections at oil pump and tighten securely. Fill oil pump reservoir to mark with recommended fluid. Fill cooling system. Start engine and run at idle speed for approximately 10 minutes to allow hydraulic system to clear itself of air that may be trapped in the system. *(CAUTION—Do not turn th steering wheel during this 10 minute p riod).* Recheck oil level. Install reservoir gasket, cover, cover attaching screw, flat washer and lock washer (use new gasket). Check all hose connections for leaks. *NOTE*—If oil pump is noisy and fluid level is up to mark in reservoir and all connections are tight, place car in service. Noise will disappear after three or four days usage. Pump noise is caused by air forced into the oil. The air will be gradually dissipated during usage. If care is taken during filling and while connecting hoses, condition should not occur.

BLEEDING (REFILLING) HYDRAULIC SYSTEM (OTHERS): Fill reservoir to within one inch of top (Dodge & Plymouth slightly above normal). Start engine and allow to run for a short time to circulate oil through hoses. With engine running at idle speed, turn steering wheel back and forth several times from extreme positions to bleed any remaining air out of system. Check oil level in reservoir, refill to proper level.

TESTING: If Power Steering operation is unsatisfactory and before making any tests be sure pump belt tension is correct, fluid level proper, leaks eliminated; that wheel alignment, pressure and condition of tires and shock absorbers are satisfactory. Then make tests as follows:

Steering Effort: Start engine. With engine running at idle speed (Automatic Transmission in neutral), front wheels on dry, smooth concrete (or smooth steel plates), a 3-10 lb. pull should be sufficient to turn steering wheel one full turn in either direction from center. If otherwise see "Trouble Shooting" below.

Hydraulic Pressure (Dodg & Plym uth): With engine turned off, connect pressure gauge in pressure line between pump and hose with shut-off valve open. Start engine. If, when turning steering wheel to either extreme position, the gauge does not show 500 lbs. per square inch, slowly close valve. If pressure does not gradually increase as the valve is closed, flow control valve may be stuck in open position or drive coupling may be broken. *(NOTE*—If gauge not available, a fairly accurate way of making test is as follows: Start engine and turn wheel to both extreme

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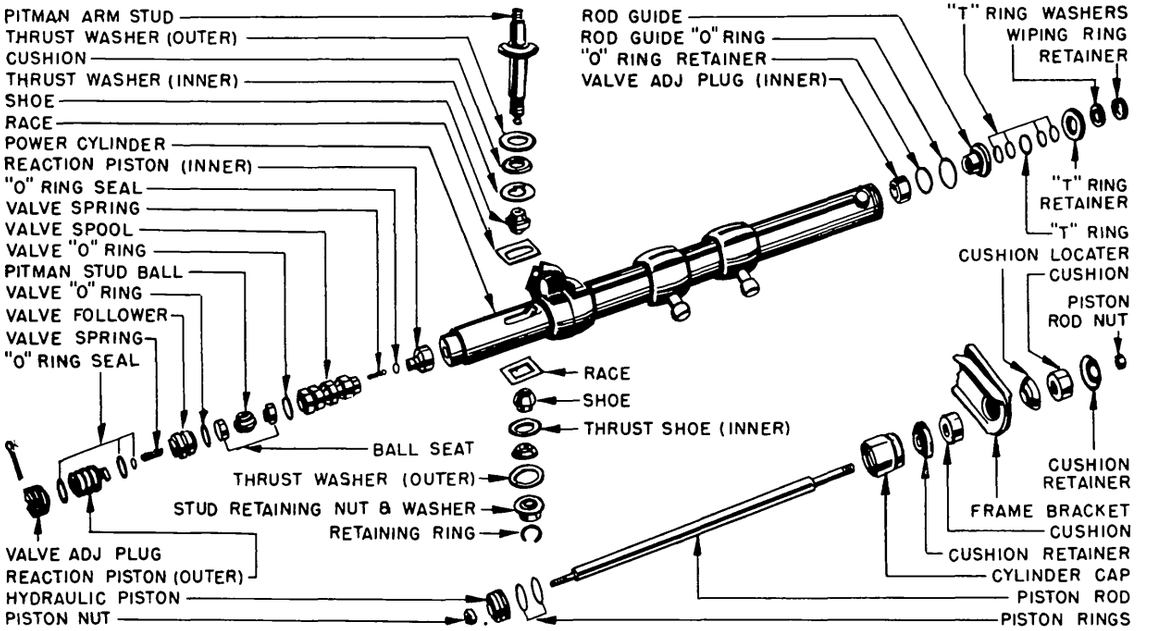
MONROE LINKAGE TYPE
(C ntinu d)

positions. If high pressure hose flexes, pump is in good condition. If high pressure hose does not flex, lack of pressure from pump is indicated.) Turn engine off, and remove reservoir cover. Restart engine and turn steering wheel. If oil flows through filter, flow control valve plunger is stuck. Turn engine off and remove gauge. Insert a 1/4" blunt probe against valve plunger. If valve moves inward, it was stuck. Recheck pressure and if gauge registers less than 500 lbs. per square inch, a broken coupling is indicated and must be replaced. Remove pump from generator. If either coupling is broken, turn pump shaft by hand at least ten revolutions. If shaft turns freely, install a new coupling on both the pump and generator shafts. If pump shaft binds when turned by hand, replace both pump and couplings. If generator armature shaft is damaged, replace necessary parts.

Hydraulic Pressur (Oth rs): With engine turned off, connect pressure gauge in pressure line at pump, turn gauge to open position. Start engine and idle for approximately two minutes for fluid to reach operating temperature. With gauge valve open, turn wheels against a curb or other suitable object, maintain sufficient force on steering wheel to keep hydraulic power applied to steering linkage and front wheels. Note pressure on gauge, then release steering wheel. *CAUTION–Do not maintain force on steering wheel for any xt nded p riod of time to avoid undue wear in hydraulic system.* If pressure noted was 500-800 psi., power link and pump are operating properly and it is unnecessary to continue further. If less than 500 psi. close gauge valve and note pressure developed by pump, then open gauge valve. *CAUTION–Do not leave gauge valve closed for more than 3 or 4 seconds.* If pressure developed by pump increases to 500-800 psi. (650-900 psi. on Ambassador V8 & Hornet V8) fault is in Power Link. Check the pitman arm for binding on valve body. If pitman arm not binding, remove Power Link piston and rod assembly. Check piston and rings, replace if necessary. Make another pressure check and if pressure still low, replace Power Link. If pressure does not increase to 500-800 psi. (650-900 psi. on Ambassador V8 & Hornet V8) replace relief valve spring and flow control valve spring. If pressure still low, pump must be removed and overhauled. If pressure ever exceeds 800 psi. (900 psi. on Ambassador V8 and Hornet V8), replace relief and flow control valve unit.

TROUBLE SHOOTING: *Diagnose trouble as follows:*

Hard Ste ring in B th Directions: **1)** Leak in system, fluid level low, insufficient fluid flow in system due to plugged flow restrictor or hoses.
2) Steering gear and linkage not lubricated, pitman arm and stud binding on power link, bend in power link piston rod, bind in steering column or gear.
3) Low pump pressure caused by stuck relief and flow control valve, weak or broken flow control valve spring, weak or broken relief valve spring, rotors not turning, rotors worn, pump body or cover worn.
4) Loss of pressure in power link caused by internal fluid leak past piston or valve.



MONROE LINKAGE TYPE POWER STEERING UNIT

5) Valve in power link misaligned or sticking.
6) Tire pressure too low, improper front end alignment.
7) Pump belt slipping or broken.

Hard Steering in one Direction Only: **1)** Valve in power link misaligned or sticking.
2) Tire pressure too low, improper front end alignment.
3) Bend in power link piston rod, bind in steering column or gear.

Poor Recovery on Turns: **1)** Tire pressure too low, improper front end alignment.
2) Pitman arm and stud binding on power link, bind in steering column or gear, bind in steering knuckles.
3) Bend in power link piston rod, or valve in power link misaligned or sticking.

Vehicle Attempts to Turn unless Force Applied to hold Steering Wheel: **1)** Tire pressure uneven.
2) Pitman arm and stud binding on power link.
3) Valve in power link misaligned or sticking.

Noise: **1)** Pump belt tension is incorrect, pump drive pulley retaining bolt loose, pump drive pulley key does not fit, pump shaft bearing worn, worn bushings in pump body or cover.
2) Low fluid level, dirt and sludge in pump.
3) Pitman arm stud loose, tie rod clamps tightened in wrong position, power link bracket on frame hitting lower suspension arm.
4) Restricted air vent in reservoir cover.
5) Noise in power link valve.

REMOVAL & INSTALLATION OF VALVE & POWER CYLINDER (POWER LINK): Proceed as follows:

D dg & Plym uth: Raise vehicle (preferably with hoist). Remove right and left tie rod ends at steering knuckle arms. Place drain pan beneath power unit at hose fittings. Disconnect hoses, plug hose fittings and cap fittings on unit. *(CAUTION–After fittings on unit have been capped, care should be exercised to prevent movement of the unit on piston rod. If steering wheel is turned or if other force is put on unit, seals can be blown. Do not start engine after removing hoses and putting plugs in lines.)* Disconnect power unit from steering arm at steering arm attaching stud. *(CAUTION–Power steering unit should be prevented from dropping by either holding or tying in place. Tap on steering arm, not on attaching stud and do not pry between valve and steering gear arm).* Holding piston rod at flat section with 9/16" open end wrench, remove piston rod attaching nut. Remove outer linkage bracket cushion retainer and cushion. Disconnect piston rod from frame bracket. Remove tie rods from power unit if necessary and replace before installing in vehicle. To install, reverse removal procedure. Tighten nuts to 45-75 ft. lbs. torque. Check oil level in reservoir and refill (see Lubrication above) as necessary.

Hudson (1954): Turn front wheels full left. Remove cotter pin from drag link ball stud at valve shaft and remove castle nut (7/8" wrench). Remove drag link ball stud from valve stud, using Tool J-2781. Remove cotter pin, end plug, safety plug, spring and ball seat, then disconnect valve and cylinder from center steering arm. Raise car and place on stand jacks. Disconnect piston rod at support bracket at No. 3 crossmember by removing cotter pin and lock nut (3/4" wrench) and push the piston rod through bracket and remove piston shaft washers, rubber bushings

CONTINUED ON NEXT PAGE

MONROE LINKAGE TYPE (Continu d)

and retaining washers. Disconnect hoses at oil pump and lift valve and power cylinder up through engine compartment. To install, connect piston to frame bracket and tighten castellated nut until **two full threads** of piston rod extend beyond top of nut. (DO NOT exceed this limit). Assemble drag link onto valve stud and install nut and cotter pin. Tighten drag link arm-to-valve stud nut to 50-60 ft. lbs. torque, then tighten other valve stud nut to give equal compression of rubber cushion against power cylinder. It is essential that valve and drag link are able to move a few thousandths of an inch sideways to operate power cylinder spool valve. (CAUTION—Maintain the 1.990" plus or minus .010" dimension between inner face of thrust washers. If this dimension not held, drag link and stud may be drawn down too tightly on power cylinder, increasing steering effort so that wheels will not return properly after making a turn. Install washers in sequence (reverse to that in which removed). It may be necessary to remove one of metal thrust washers to correct an overtight condition). Assemble steering arm ball (center) into slot in unit and install ball seat, spring and spring seat plug. Install hoses, but do not tighten. Fill hoses with fluid until fluid runs out at hose connections at booster cylinder free of air bubbles, then tighten connections at booster cylinder, while keeping hoses full of fluid. Install hose connections and tighten securely. Refill system (See Bleeding (Refilling) Hydraulic System (Hudson) above).

Hudson (1955), Nash: Disconnect oil hoses from the unit, and disconnect rod from side sill bracket. Disconnect tie rods from cylinder and valve assembly. Remove pitman arm stud adjusting nuts, washers, cushions and spacers and remove cylinder and valve assembly from pitman arm. To install, reverse the removal procedure. Tighten inner nut on pitman arm stud until there is sufficient tension on rubber cushions to prevent rattles and grease leakage and still permit free movement of the stud.

Kaiser & Willys: Raise the vehicle on hoist, remove cotter pins, then back out plugs in ends of tie rods to disconnect tie rods from ball studs of power link. Disconnect hoses at power link, after noting position of hose connectors so they can be replaced in same position. Cap hose ends and install plugs in power link. Remove cotter pin and nut attaching pitman arm to stud in power link. Tap on side of pitman arm with hammer to loosen stud. Do not pry between pitman arm and valve as this may damage washers on stud. Remove cotter pin, nut, retainers, and insulator from end of piston rod to disconnect piston rod from frame bracket, remove power link. To install, reverse removal procedures. Make certain dirt does not enter fluid lines when installing unit. Use torque wrench to tighten pitman arm stud nut to 55-65 ft. lbs. torque. Pitman arm and stud should fit snugly on power link but not bind. It is essential that pitman arm and stud are able to move a few thousandths inch sideways to operate power link valve. Lubricate stud. Install tie rods to power link, turn plugs in tight, then back out 1/4 to 1/2 turn. Check and adjust toe-in and steering wheel alignment if tie rod length was disturbed. Bleed system, check for leaks, then check operation.

VALVE & POWER CYLINDER (POWER LINK) OVERHAUL: Valve Disassembly: Remove valve and power cylinder assembly from vehicle (See Removal & Installation above), then proceed as follows:

Dodge & Plymouth - Clean outside of the valve and cylinder assembly in suitable solvent. Remove cotter pin from outer adjusting plug. Using a scribe, mark the location of the adjusting plug (to assist in making final adjustment *(CAUTION—Do not use center punch for marking).* Count number of turns, turning adjusting plug in until it bottoms, and record. *(CAUTION—Do not bottom adjusting plug unless attaching stud has been left assembled through ball, otherwise damage to ball may result from crushing.)* Remove outer adjusting plug. Note air vent in plug to see that it is open. Disassemble and remove steering arm stud. Using attaching stud, or brass rod, inserted through steering arm ball pull the right turn (outer) reaction piston, spring, follower and ball seat toward outer end of valve bore as far as possible. Remove attaching stud and ball. Insert finger in valve bore and push out assembly. Remove valve spool by tapping valve end on wooden bench or block of wood. Remove spring and left turn (inner) reaction piston.

Hudson, Kaiser, Nash, Willys - *(NOTE* - Kaiser recommends that spool valve springs and parts inside valve body **not** be removed or replaced. These parts are selectively fit at time of manufacture). On Hudson, disconnect hoses from power cylinder and valve. Remove cotter pin and outside spring seat plug to disconnect unit from center steering arm. All cars, clean outside of valve and cylinder assembly thoroughly. Punch mark adjusting plug to insure accurate reassembly, remove plug, then remove the valve spring, follower (or retainer), ball and ball seat. Hold unit in vertical position and tap valve end lightly on wooden bench or block to allow valve spool to slide out of valve body. Remove inside valve spring. *NOTE*—Inner adjusting plug is staked in position and cannot be removed. On Hornet and Ambassador V8, valve spool inner components may be replaced as well as "O" rings. Valve spool is not supplied for service due to possibility of improper spool to port alignment of replacement part. On Statesman, valve parts are supplied only with cylinder and valve assembly as total length of components must be held to close tolerances to maintain correct valve spool port alignment.

Cylinder Disassembly: Remove cylinder cap (or unscrew cylinder plug) from cylinder. Pull out on piston rod to remove piston and guide assembly. *(CAUTION—Except on Kaiser and Willys, rod guide should not be disassembled unless unit has been leaking at that point).* To disassemble rod guide (except Kaiser and Willys), use screwdriver to separate "T" ring retainer from rod guide. Remove two outer phenolic rings, "T" ring and two inner phenolic rings. Remove large "O" ring from piston rod guide and discard. Disassemble "T" ring retainer only when wiper needs replacement. Using screwdriver, remove wiping ring from "T" ring retainer. To reassemble rod guide, reverse removal procedure (Lubricate rings with Lubriplate or equivalent).

Inspection: Thoroughly clean all parts in suitable solvent. Remove "O" rings and discard. Inspect all parts for nicks, scores, and burrs. (NOTE—Valve spool not replaceable as separate item, due to close fits). Small scores and burrs can be removed with crocus cloth, if used carefully. Make sure rings rotate freely in piston ring grooves. (NOTE—Piston and rod replaceable as an assembly).

Valve Reassembly (Dodge & Plymouth): Reverse the removal procedures. Lubricate new "O" rings with Lubriplate or equivalent. To facilitate assembly, place inner reaction piston spring in recess in spool and hold with Lubriplate or equivalent. Back off adjusting plug same number of turns as recorded when valve disassembled. Check valve assembly operation by placing a long pin through ball, you should be able to slightly move valve assembly back and forth in bore. Do not install cotter pin until unit has been installed in vehicle and power link adjustment checked. NOTE—Overtightening of steering arm stud will create an increase in steering effort and cause poor recovery from turns.

Valve Reassembly (Hudson, Kaiser, Nash, Willys): Reverse removal procedures. Line up adjusting plug punch mark made at disassembly.

Cylinder Reassembly: Reverse removal procedures. Lubricate rings with Lubriplate or equivalent. Be sure rings locked in position and staggered. Wet "T" ring seals (where applicable) with power steering fluid.

PUMP OVERHAUL: References are as follows:

Dodge & Plymouth: *See "Gemmer Hydraguid".*

Hudson Wasp & Hornet 6: *See Vickers Pump data under "Eaton & Vickers Hydraulic Power Pumps".*

Hudson Hornet 8, Nash, Kaiser, Willys: *See Eaton Pump data under "Eaton & Vickers Hydraulic Power Pumps".*

STEERING LINKAGE : *See "Steering Linkage".*

SAGINAW LINKAGE TYPE

Hudson Hornet, Model 7D (1954)

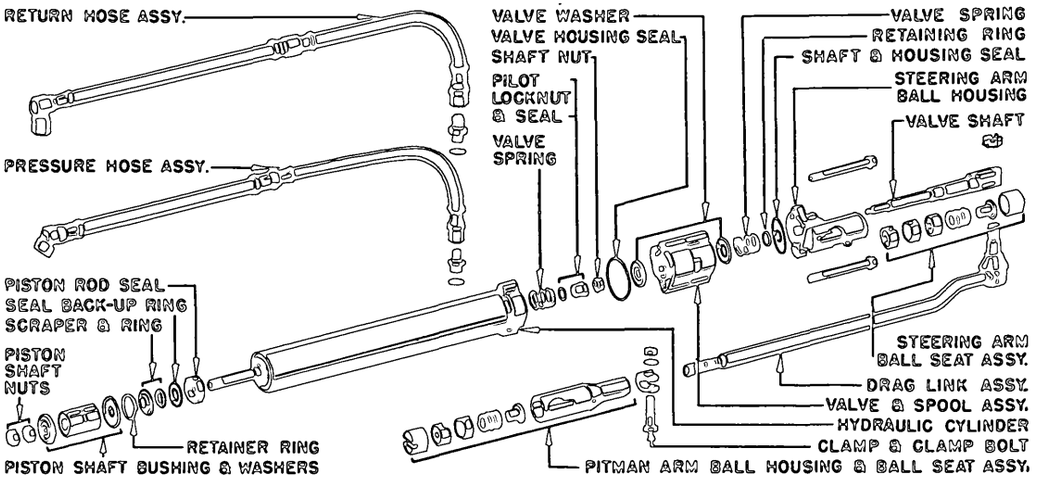
DESCRIPTION: Hydraulic linkage type. Power unit is a complete assembly with control valve built-in the end of the hydraulic power cylinder. The unit is connected in the steering linkage between the drag link and the center steering arm on the frame front cross-member (drag link connected to spool valve stem, center steering arm connected directly to same end of power cylinder) so that steering wheel motion is transmitted to the wheels mechanically to permit manual steering when hydraulic power is not available. Power unit piston rod is attached to a bracket on the frame so that hydraulic pressure tends to move the hydraulic cylinder on the stationary piston. Hydraulic application is controlled by the spool valve which is connected directly to the drag link.

Hydraulic Pump & Reservoir Assembly: Vickers vane type hydraulic pump. *See "Vickers & Eaton Hydraulic Power Pumps" in Power Steering Section*

BELT ADJUSTMENT: Loosen two bolts attaching pump to mounting bracket, move pump upward until belt deflection midway between fan and pump pulleys is ¼" with thumb pressure, tighten attaching bolts to 25-30 ft. lbs.

POWER CYLINDER ADJUSTMENT: Remove Power Cylinder Assembly (See Removal & Installation below). Clamp head of valve shaft in vise so that shaft is in a vertical position. While holding spool shaft nut, remove pilot lock nut and loosen shaft nut. Tighten shaft nut until a definite resistance is met, then back off nut ½ turn. A minimum of 5/16" thread should be showing beyond nut. (*NOTE*—If there is less than 5/16" thread, the inner valve washer has caught on the spool shoulder and is not centralized on valve shaft). After determining that 5/16" dimension is correct, screw on pilot lock nut by hand. Using the two valve body-to-cylinder attaching screws and two 3/8"-16 nuts, assemble the valve body and shaft assembly together (tighten to 12-15 ft. lbs. torque). Tighten valve shaft nut to 9-11 ft. lbs. torque. Release tension and tighten to 3-5 ft. lbs. torque. While holding valve shaft nut against turning, tighten pilot lock nut to 5-10 ft. lbs. After final tightening, use a fine punch and working through one of the small holes in the pilot lock nut, make a punch mark to stake lock nut to valve shaft. Place power cylinder on valve assembly and install attaching screws (dip threads in sealer). (CAUTION—Do not gouge or slice pilot lock nut seal when assembling cylinder to valve assembly). Tighten valve housing attaching screws to 12-15 ft. lbs. torque. Install valve fittings and seals in their proper places. Assemble pressure and return hoses to their proper fittings on valve body assembly. Install assembly on car (See Removal & Installation below).

STEERING LINKAGE ADJUSTMENTS: Pitman Arm & Stop Screw—Turn steering wheel to full right hand turn, place a 1/16" shim between stop on right hand outer steering arm and stop on spindle support. With shim in place, adjust stop screw at pitman arm stop bracket until screw just touches pitman arm, then tighten lock nut securely.



SAGINAW LINKAGE TYPE POWER STEERING UNIT

Drag Link—Set front wheel in straight-ahead position with steering gear on high point (steering wheel spokes in horizontal position). Drag link stud should hole in valve shaft freely. If not, disconnect drag link at pitman arm, loosen clamp at junction of male and female connection of drag link and turn drag link in or out as required. After adjustment, tighten clamp screw securely. Adjust drag link end plug by tightening plug to end of travel and back off to nearest cotter pin hole. Install and secure cotter pin. Install drag link, nut and cotter pin to valve shaft.

LUBRICATION: *CAUTION—Power Steering System and Steering Gear are lubricated separately and with different lubricants:*

Power Steering System: Check fluid level in reservoir every 2000 miles, add fluid to maintain level.

Checking Fluid Level—Thoroughly clean top of reservoir, remove cover, maintain fluid level even with mark near top of reservoir. Use Automatic Transmission Fluid Type A.

Refilling System (After units removed or disconnected)—*CAUTION—Fill exactly as follows to prevent air entering the system which will cause pump to be noisy:*

1) With both hydraulic hoses disconnected from the pump, loosen hose connection at the power unit, fill the hoses with fluid and allow it to run out at the power cylinder end until it is free of air bubbles, tighten connections at power cylinder end, connect hoses to pump. *CAUTION*—keep hoses filled with fluid while making the connections.

2) Fill oil pump reservoir to the full mark. Start the engine and run it at idle speed for approximately 10 minutes to remove air which may be trapped in system. *CAUTION—DO NOT TURN STEERING WHEEL DURING THIS PERIOD.*

3) Recheck fluid level, add fluid as required. Install reservoir cover. Check all connections for leaks.

NOTE—If pump is noisy after system has been refilled exactly as noted above, this noise should disappear after several days useage when air in fluid should be dissipated.

BLEEDING HYDRAULIC SYSTEM: Follow steps 2) and 3) of "Refilling System" under LUBRICATION above.

TESTING: If power steering operation is unsatisfactory and cause unknown, refer to "Trouble Shooting" below, and starting with easiest operations first continue to check until trouble found.

Steering Effort: Attach spring scale to spoke near rim of steering wheel. With engine running at idle speed and transmission in neutral, and with front wheels on dry, smooth concrete floor or smooth steel plates, a 3-8 lb. pull should be sufficient to turn wheel one full turn in either direction from center. If steering effort in both directions greater than 8 lbs. at rim of steering wheel, it indicates hard steering. (See "Hard Steering in Both Directions" in Trouble Shooting). If steering effort is more than 8 lbs. in one direction only and very low in other direction refer to "Hard Steering in One Direction Only" in Trouble Shooting for possible causes.

Hydraulic Pressure: If "Trouble Shooting" of items in system other than pump does not disclose trouble, difficulty may lie in pump. To check pump proceed as follows: With engine off, install pressure gauge in pressure line. Turn gauge valve to open position. Start engine and let it idle for approximately two minutes to permit fluid to reach operating temperature. With gauge valve open, turn wheels against a curb or other suitable object and maintain sufficient force on steering wheel to keep hydraulic pressure applied to steering linkage and front wheels. Note pressure shown on gauge, then release steering wheel. (*CAUTION—Do not maintain force on steering wheel for any extended period of time, as this may cause undue wear in hydraulic system).* If pressure reading above is 500-800 psi., the power cylinder and pump are operating properly and it is unnecessary to continue further. If reading less than 500 psi., close gauge valve and note pressure developed by pump, then open gauge valve (*CAUTION—Do not leave gauge valve closed for more than 3 or 4 seconds).* If pressure reading increases to 500-800 psi., pump is delivering sufficient pressure and

CONTINUED ON NEXT PAGE

SAGINAW LINKAGE TYPE (Continued)

fault is in power cylinder (See Power Cylinder Check below). If pressure did not increase to 500-800 psi., replace relief and flow control valve unit and flow control spring. If pressure still low, pump must be removed and overhauled. If pressure ever exceeds 800 psi., replace relief and flow control valve unit.

POWER CYLINDER CHECK: Check drag link and stud to make sure it does not bind on valve body. Correct if necessary (See Steering Linkage Adjustment above). If drag link is not binding, remove power cylinder piston and rod assembly. Check piston and rings and replace if necessary. Make another pressure test and, if pressure still low, replace power cylinder.

TROUBLE SHOOTING: *Diagnose trouble as follows:*

Hard Steering in Both Directions—Leak in steering system, pump belt slipping or broken, fluid level low, steering gear and linkage not lubricated, tire pressure low, drag link and stud binding on power cylinder, power cylinder piston rod bent, low pump pressure, loss of pressure in power cylinder, insufficient fluid in system, bind in steering column or gear, improper front end alignment, valve in power cylinder misaligned or sticking.

Leaks: At hose fittings, pump body, valve end; around piston rod on power cylinder.

Hard Steering in One Direction Only: Tire pressure too low, power cylinder piston rod bent, bind in steering column or gear, improper front end alignment, valve in power cylinder misaligned or sticking.

Car Attempts to Turn Unless Force Applied to Hold Steering Wheel: Tire pressure uneven, drag link and stud binding on power cylinder, valve in power cylinder misaligned or sticking.

Poor Recovery on Turns: Tire pressure too low, drag link and stud binding on power cylinder, bind in steering column or gear, bind in power cylinder piston rod, improper front end alignment, valve in power cylinder misaligned or sticking.

Noise—Pump belt tension incorrect, fluid level low, pump drive pulley retaining bolt loose, pump drive pulley key does not fit properly, pump shaft bearing worn, bushings worn in pump body or cover, dirt and sludge in pump, drag link stud loose.

REMOVAL & INSTALLATION: Proceed as follows:

Reservoir & Pump Assembly: Removal—Raise hood and drain radiator by opening cock at lower right side of radiator. Remove upper radiator hose. Disconnect hydraulic hoses at unions on pump (*NOTE*—Secure ends of hoses in raised position at pump unions to prevent oil drainage). Remove drive pulley attaching nut, lockwasher and flat washer (¾" wrench). Loosen two pump-to-bracket screws (9/16" wrench). Slide pump toward engine and remove pulley belt. Remove pump pulley by tapping lightly on back face with a soft hammer. Remove two screws attaching pump to bracket (9/16" wrench). Remove reservoir and pump assembly to bench for draining and repair.

Installation—Reverse removal procedure. Adjust belt tension, then follow procedure outlined for "Refilling System" under LUBRICATION.

Valve & Power Cylinder: Removal—Turn front wheels fully to left. Remove cotter pin from drag link ball stud at valve shaft and remove castle nut (7/8" wrench). Remove drag link ball stud from valve shaft with Tool J-2781. Remove cotter pin, end plug, safety plug, spring and ball seat and disconnect valve and cylinder assembly from center steering arm. Raise car and place on stand jacks. Disconnect piston rod at support bracket at No. 3 crossmember by removing lock nut and retaining nut (¾" wrench) and push the piston rod through bracket. Remove piston shaft washers, rubber bushings and retaining washers. Disconnect hoses at oil pump and lift valve and power cylinder up through engine compartment (*NOTE*—Use screw caps to plug both hoses and both pump fittings to keep oil from draining out).

Installation—Enter complete assembly through hood opening. Attach piston rod to bracket at No. 3 crossmember; assemble one piston shaft washer, one rubber bushing and one rubber bushing retainer on each side of bracket. Cupped portions of washers should be toward rubber bushings. Install one attaching nut and compress rubber bushing to 1 11/16-1 3/4". Tighten securely. Install second nut and tighten securely. Second nut must be flush with end of shaft. Attach steering arm ball stud housing to center steering arm. Install ball seat on side of center steering arm. Enter steering arm ball, ball seat, dust seal, spring, safety plug and end plug. Adjust end plug by tightening plug to end of travel and backing off to nearest cotter pin hole. Install and secure cotter pin. Install drag link, nut and cotter pin to valve shaft. Refill system following procedure outlined for "Refilling System" under LUBRICATION.

VALVE & POWER CYLINDER OVERHAUL: Disassembly—Clean outside of valve and cylinder assembly thoroughly. Remove both hoses from valve body and inspect hoses for wear or cracks. Replace if necessary (13/16" and 7/8" fittings). Remove two screws attaching steering arm ball housing and the valve and spool assembly to hydraulic cylinder assembly (*CAUTION—This is a spring loaded assembly and screws should be loosened equally until spring is relieved).* Overhaul components as follows:

Hydraulic Cylinder: Hydraulic cylinder serviced only as an assembly. Following parts **only** are furnished separately: Retaining lock ring, scraper back-up ring scraper, seal back-up ring, piston rod seal.

Piston Rod Seal—(*NOTE—Piston seal should not be removed unless there are signs of leakage around the piston shaft seal).* To replace seal, proceed as follows: Use a hook tool or screwdriver and remove retaining lock ring. Remove scraper back-up ring, scraper, seal back-up ring and piston rod seal (*CAUTION—When removing seal do not damage piston rod).* Install NEW oil seal, reversing removal procedure.

Valve: Remove valve centering spring. Remove "O" ring from pilot lock nut. While holding spool shaft nut, remove pilot lock nut (11/16" wrench). Remove control valve assembly with spools from valve shaft. Remove valve washer from valve shaft. Remove "O" ring seals from each end of valve body. Remove spools from valve housing, being careful not to damage or drop either the spools or housing (*NOTE*—Check spools and housing bore for excessive wear). Remove pressure and return fittings and seals from valve housing. DO NOT place housing in vise. Remove valve washer and valve return spring. Push valve shaft through steering arm ball housing so that valve shaft "O" ring seal may be accessible. Remove shaft retaining ring and seal. Remove valve shaft from steering arm ball stud housing. Clean all parts in a clean solvent and blow dry with compressed air.

Reassembly: Valve & Power Cylinder—Clamp head of valve shaft in a vise so that shaft is in a vertical position, install steering arm ball housing over valve shaft. Install new valve shaft "O" ring and spiral retaining ring. Place valve return spring and valve washer over valve shaft and into steering arm ball housing (*NOTE*—Install valve washers with machined surfaces toward valve spools). Assemble valve spools into valve housing. Insert largest diameter spool in end of housing having three small holes (*CAUTION*—Use care to prevent scratching or nicking spools or bore in housing). Install "O" ring seal in circular housing groove. Slide valve housing and spool assembly carefully over valve shaft. The three holes in the valve housing should point up toward threaded end of valve shaft. Install valve washer over valve shaft. Apply Lubriplate to valve shaft threads. Install shaft nut until a definite resistance is felt. Back off ½ turn. A minimum of 5/16" thread should be showing beyond nut. (*NOTE*—If there is less than 5/16" thread, the inner valve washer has caught on spool shoulder and is not centralized on valve shaft). After determining that 5/16" dimension is correct, screw on pilot lock nut **by hand.** Using the two valve body-to-cylinder attaching screws and two 3/8"-16 nuts, assemble valve body and shaft together (tighten to 12-15 ft. lbs. torque). Tighten valve shaft nut to 9-11 ft. lbs. torque. Release tension and re-tighten to 3-5 ft. lbs. torque. While holding valve shaft nut against turning, tighten pilot lock nut to 5-10 ft. lbs. torque. After final tightening, use a fine punch and working through one of the small holes in the pilot lock nut, make a punch mark to stake lock nut to valve shaft. Install "O" ring seal on pilot lock nut. Remove two cap screws and nuts used to assemble valve body and shaft together. Install valve spring. Insert housing seal in the contoured ring groove in valve housing. Place power cylinder on valve assembly and install attaching screws(dip threads in sealer). (*CAUTION*—Do not gouge or slice pilot lock nut seal when assembling cylinder to valve assembly) Tighten valve housing attaching screws to 12-15 ft. lbs. torque. Install valve fittings and seals in their proper places. Assemble pressure and return hoses to their proper fittings on valve body assembly.

HYDRAULIC PUMP OVERHAUL: *See Vickers Pump data under "Vickers & Eaton Hydraulic Power Pumps"*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemmer Worm & Roller"*

ROSS LINKAGE TYPE

Dodge V8 (1954)

DESCRIPTION: Ross "Hydrapower" hydraulic, linkage type power unit (power cylinder and control valve assembly). Power unit is an integral part of the steering linkage and transmits steering wheel motion to the wheels mechanically which permits manual steering when hydraulic power not available. Steering gear pitman arm is connected to spool valve in control valve assembly (bolted on side of power cylinder) with a reactor link extending from the opposite end of the control valve to a mounting bolt at opposite end of power cylinder. Two ball stud joints are mounted at center of reactor link for right and left tie rod connection. Spool valve is normally centered in valve housing (by spring at each end) so that pressures are equalized throughout the system. Whenever steering wheel pull exceeds 2 lbs. spool valve moves off center so that hydraulic pressure directed to one end of cylinder and other end opened directly to the reservoir. This causes the power cylinder to move in correct direction to provide power assistance. As soon as steering wheel pull drops below 2 lbs., spool valve returns to centered position and power assistance ceases.

Hydraulic Pump & Reservoir Assembly: "Single Rotor" type hydraulic pump and reservoir assembly mounted on generator. *See Hydraulic Pump data in "Gemmer Hydraguide" in Power Steering Section.*

►*ADJUSTMENT CAUTION: Whenever hydraulic system disturbed (by disconnecting lines, removal or installation of units, etc.) hydraulic system must be bled to remove air. See Bleeding Hydraulic System below.*

BELT ADJUSTMENT: *CAUTION–Pump is driven by fan belt and belt should be checked frequently and adjusted exactly as follows:* Use special tool C-3379 with a torque wrench. Hook tool over generator frame at the adjusting strap bolt lug, loosen strap bolts and bracket bolts, pull outward on torque wrench until indicated torque is 15 ft. lbs., tighten adjusting strap bolts before slackening off on wrench, tighten bracket bolts.

OTHER ADJUSTMENTS: No adjustments required in service.

►*STEERING GEAR ADJUSTMENT NOTE:* If steering gear chuck replaced due to accident or extremely high mileages, make check as follows: Remove chuck from vehicle. Torque required to rotate wheel (with scale pulled 90° to spoke of wheel at rim) when roller tooth (steering gear arm) shaft is not assembled in housing, should be 1-4 ozs. with no endplay in bearing. Then, after roller tooth shaft has been assembled, additional pull is required, making a total of 6-10 ozs. pull at rim to rotate steering wheel through mid-position, with no backlash in the worm and roller shaft at that point.

FRONT END ALIGNMENT: Same as for Manual Steering Gear. *See "Front Suspension" on Car Model Page.*

LUBRICATION: *CAUTION–Power Steering System and Steering Gear are lubricated separately and with different lubricants as follows:*

Power Steering System: Check fluid level in reservoir every 1000 miles, add fluid to maintain correct level. **Checking Fluid Level**–If dipstick provided in reservoir cover, maintain fluid level at mark on dipstick. If no dipstick provided, thoroughly clean top of reservoir, remove cover, maintain fluid level at least 1/2" above filter element in reservoir. Use SAE 10-W engine oil (5-W for temperatures consistently below 10°F).

Draining System–*CAUTION–Extreme care should be taken to prevent dirt from entering reservoir while cover is removed. To prevent damage to filter element, do not insert sharp objects into reservoir. Do not disturb filter element as periodic changes of this element are not required.* Disconnect high pressure (small) hose at booster. Place hose in suitable container. While holding hose in container start engine and allow to idle until all fluid is forced from unit. *(CAUTION–Do not run engine above idle speed).* As soon as fluid starts to show great quantities of air bubbles, stop engine. Reconnect high pressure hose.

Refilling System (after units removed or disconnected)–Fill reservoir to higher level than normal. Start engine and allow it to idle for short time to circulate oil through system. With engine idling, turn steering wheel through entire travel (from extreme right to extreme left) several times to bleed air out of system. Check oil level in reservoir, add oil as necessary. **Capacity**–3 pints.

Steering Gear: Same type as used on cars without power steering and lubricated similarly.

BLEEDING HYDRAULIC SYSTEM: With engine running at idle speed, turn steering wheel back and forth several times from extreme right to left to bleed any air out of system. Check oil level in reservoir. Add oil as necessary to bring level to "Full" mark.

TESTING: Should lack of steering assistance be encountered and other checks have been made (See Trouble Shooting below), a pressure check should be made to determine if pump is at fault.

Hydraulic Pressure Check: 1) Connect gauge C-3102 in pressure line between pump and hose with shut-off valve on gauge in open position. Start engine and turn steering wheel. If gauge does not show at least 400 lbs. pressure when steering wheel is in either extreme position, check pump by turning valve of gauge to closed position. If pressure does not gradually increase as valve is closed, flow control valve in pump may be stuck in open position, or drive coupling may be broken. See step 2) below. If 400 lbs. pressure does show on gauge with engine idling, pump is in good condition (Look for trouble as indicated in Trouble Shooting below). Remove gauge and connect high pressure hose to pump.

►*NOTE:* If gauge not available, a fairly accurate way of making test is as follows: Start engine and turn wheel to both extreme positions. If high pressure hose flexes, pump is in good condition. If high pressure hose does not flex, lack of pressure from pump is indicated. Shut off engine and check pump as follows: 2) Remove cover from reservoir, start engine and turn steering wheel. If oil flows through filter, a stuck flow control valve plunger is indicated. Shut off engine, remove high pressure hose at pump fitting and insert a 1/4" clean, blunt probe against valve plunger. If plunger moves inward 3/16-1/4", plunger was stuck and will probably function properly next time.

3) Recheck pressure. If it still registers less than 400 lbs. and if oil still flows through filter but does not flex pressure line, remove flow control valve plunger and clean thoroughly. If this does not correct condition, install a new pump assembly.

4) If oil does not flow through reservoir filter in above test, a broken coupling is indicated. Remove pump from generator. If either coupling is broken turn pump shaft by hand at least ten revolutions. If shaft turns freely, install new couplings on both pump and generator shafts. If pump shaft binds when turned by hand, replace both pump and couplings. If generator armature shaft is damaged, replace necessary parts. *(CAUTION–*Service package, Part No. 1450759 has been made available to prevent mixing of new coupling Part No. 1552859 with OTHER couplings in field). Reinstall pump on generator.

TROUBLE SHOOTING: *Diagnose trouble as follows:*

Hard Steering in Both Directions: Leak in system, pump belt slipping or broken, fluid level low, steering gear and linkage not lubricated, tire pressure too low, anti-roll bracket and pin binding, bend in power unit piston rod, low pump pressure, loss of pressure in power unit, insufficient fluid flow in system, bind in steering column or gear, improper front end alignment, valve in power unit sticking.

Smaller Turning Radius in One Direction: Wheel stops not adjusted properly.

Hydraulic Fluid Leaks (Locations): At hose adapters, pump body, valve assembly, valve spool assembly, reservoir cover gasket; around piston rod on power unit; between control valve body and cylinder head.

Hard Steering in One Direction Only: Tire pressure too low, bend in power unit piston rod, bind in steering column or gear, improper front end alignment, bind in control valve assembly.

Poor Recovery on Turns: Tire pressure too low, bind in valve assembly, bind in steering column or gear, bind in steering knuckles, bend in power unit piston rod, improper front end alignment, anti-roll pin and bracket binding.

Noise: Fan belt tension incorrect, low fluid level, pump shaft bearing worn, bushings worn in pump body or cover, dirt and sludge in pump, reactor link loose, tie rod clamps tightened in wrong position, steering gear arm adapter to valve spool loose or worn, steering gear arm nut loose, frame bracket cushion retainers striking frame bracket, position of clamp interfering with left tie rod.

REMOVAL & INSTALLATION: Proceed as follows:

Reactor Link Assembly (Unit in Car): Removal–Raise vehicle (preferably with hoist). Remove tie rods from reactor link assembly by removing cotter pins and nuts holding tie rods to threaded ends of the reactor link ball studs. Note position of clamp assembly (to prevent interference on turns), then loosen.

CONTINUED ON NEXT PAGE

ROSS LINKAGE TYPE
(Continued)

Remove reactor link-to-cylinder mounting bolt and lockwasher. Lift reactor link assembly over dowel ring (at mounting bolt end) and slide out of cover reducer end of control valve assembly. *NOTE–Dowel ring may remain in link or cylinder.*

Installation–Place dowel ring in position in cylinder. Install tie rod dust seals and lubrication fittings into reactor link assembly. Install clamp assembly (if removed), then slide reactor link assembly into cap reducer end of the control valve assembly, and position over dowel ring. Install mounting bolt and lockwasher, torque to 45-55 ft. lbs. Position clamp assembly for maximum clearance with tie rod ends, torque to 15-20 ft. lbs. Lubricate fittings and road test.

Power Steering Assembly: Removal–Raise vehicle (preferably on a hoist). Place drain pan beneath power unit at hose fittings, disconnect both hydraulic lines (pressure and return) from power unit. Remove tie rods from reactor link assembly by removing cotter pins and nuts which hold tie rods to threaded ends of the reactor link ball studs. Disconnect piston rod boot at frame bracket end. Holding flattened section of piston rod with 9/16" open end wrench, remove piston rod-to-frame bracket retaining nut. Remove outer linkage bracket cushion retainer and cushion, disconnect piston rod from frame bracket. *(CAUTION*–Booster unit should be prevented from dropping by either holding or tying in place). Disconnect steering gear arm from steering gear arm adapter by removing cotter pin and nut. *(CAUTION*–Tap on steering gear arm and not adapter stud). Remove unit. Then proceed with Bench Operation below.

Bench Operation–Remove piston rod cushion locator, cushion and inner cushion retainer from piston rod. Remove piston rod boot from piston rod bearing retainer. Carefully fold back rubber boot over anti-roll pin and bracket. Remove the two anti-roll bracket retaining nuts and lockwasher. Remove anti-roll bracket from valve and cylinder assembly. Remove anti-roll pin (stud), which clamps steering gear arm adapter to valve spool. Holding valve spool by flats provided for this purpose, remove steering gear arm adapter from control valve assembly by unscrewing adapter from threaded end of valve spool. Remove dust seal from threaded end of valve spool.

Installation–Reverse steps given in **Bench Operation** above. Install inner linkage bracket cushion retainer, cushion and cushion locator on piston rod. Place piston rod through frame bracket and install the cushion, outer retainer and nut. Holding piston rod by flattened section with 9/16" open end wrench, tighten nut to 55-65 ft. lbs. torque. Place steering gear arm adapter stud in steering gear arm and install nut–tighten to 55-65 ft. lbs. torque, replace cotter pin. Connect piston rod boot at frame bracket. Place tie rods on reactor link assembly ball studs and install nuts–tighten to 55-65 ft. lbs. torque, replace cotter pins. Install hydraulic lines to power unit assembly. Refill reservoir (see Lubrication above). It will be necessary to recheck front end and steering wheel alignment, if tie rods have been changed. (see (See "Front Suspension" on Car Model page). Road test.

OVERHAUL: *CAUTION*–Cleanliness through all phases ov overhaul cannot be overemphasized. Unit should be thoroughly cleaned in a suitable solvent when removed from vehicle. When disassembling, each part should be placed in the solvent, washed, then dried with compressed air. Careful handling of parts must be exercised to avoid occurence of nicks and burrs. Crocus cloth may be used to remove small nicks and burrs provided it is used carefully. When used on valve spool, **use extreme care not to round off the sharp edge portion. The sharp edge portion is vitally important to this type of valve.** It helps to prevent dirt and foreign matter from getting between valve and bore, thus reducing possibilities of sticking. Remove and discard all "O" ring seals, and seals, using new ones lubricated with Lubriplate when reassembling.

Disassembly of Power Steering Unit Assembly (Into Major Components): Note position (to prevent interference on turns) of clamp assembly on reactor link then loosen nut. Remove reactor link mounting screw and lockwasher and slide link assembly from end cover. Remove dowel from cylinder. Scribe a line across valve body and cylinder head to show position of parts when reassembled. *(CAUTION*–There is only one correct position of control valve on cylinder head which will permit proper alignment of the four oil passages. Should valve be incorrectly assembled, unit will not function). Remove the four valve body-to-cylinder head mounting bolts, nuts and lockwashers and separate valve body from cylinder. Note two different length bolts used. Power Unit is now set up into three serviceable items–Reactor Link Assembly, Control Valve, and Power Cylinder. Disassemble these components and inspect as follows:

Reactor Link Assembly–Assembly is self-contained unit. Check ball studs for wear. If studs are loose in ball sockets, replace reactor link assembly.

Control Valve–*NOTE*–Since this unit works in oil during operation, very little wear is anticipated on any of moving parts. The major component parts of valve are machined to very close limits and selectively fitted. Use extreme caution when handling these parts as damaged sealing edges or burrs will not permit unit to function properly. It is not practical to service valve body or spool separately. Because of their selective fit and difference in size, gland and reaction rings will be referred to as **Left** and **Right.** This identification has reference to position of parts relative to their position in the vehicle and **not** to the direction of steering wheel turn. These parts are not interchangeable. **Always note their position when disassembling** so their position is not changed when reassembling. The largest gland and reaction ring are the parts for the left side and **must** be installed in the steering gear arm end of the valve. Glands and reaction rings are serviced in matched sets. Disassemble as follows: Using screwdriver or punch, unlock end cover caps by straightening lock ring tabs. Unscrew and remove both end covers from valve body. *(CAUTION*–Use extreme care so as not to damage mating surfaces on valve body when removing caps. Also the use of a strap wrench will prevent damage to exterior finish of caps). Remove lock rings. Remove right gland and spring by slightly pushing on threaded end of valve spool. Remove "O" ring from end of valve spool (end from which gland was just removed). Remove left gland and spring by pulling on threaded end of valve spool. When removing spool, one reaction ring will probably remain in valve body and can easily be removed. The other ring remains on spool. Remove remaining "O" ring and reaction ring from valve spool. Match reaction rings with their respective glands. Remove "O" rings from glands.

Inspection–Since very little wear is contemplated on any of moving parts of control valve, the only parts that may need replacement, in addition to "O" rings, are centering springs, lock rings, and occasionally an end cover or clamp assembly. Inspect valve spool and bore for nicks, burrs, and scoring. If used carefully, crocus cloth may be used to remove slight score marks. *CAUTION–Do not round off sharp edge portion of spool when using crocus cloth.*

Cylinder–Drain oil from cylinder assembly by moving piston rod in and out from one extreme end of its travel to the other. Remove four "O" ring seals from cylinder head. Note position of piston rod bearing retainer snap ring in end of cylinder (retainer locks snap ring into position). Using punch, straighten tang on retainer and remove snap ring with tool C-3106. Remove piston, rod, bearing and seal assembly from cylinder. *(CAUTION*–Do not clamp or mark sealing surface of piston rod as damage will result to seals. When removing parts from piston rod, always slide them off piston end of rod). Holding piston rod at flattened section at frame bracket end of piston rod, remove cotter pin, nut and backup washer (steel). Remove piston and rings, piston rod bearing, and "O" ring seal from outer diameter of bearing. Remove oil seal from inside of bearing. Remove piston rod bearing backup washer (steel). Remove plastic shims (Note number removed). Slide piston rod seal retainer and spline seal from piston rod.

Inspection–Inspect all parts closely for damage and wear. Check for nicks, burrs, and scores. Crocus cloth may be used (carefully) to remove slight nicks, burrs, and scores.

Reassembly: *(CAUTION*–Be sure all parts washed in suitable solvent and dried with compressed air. Use new "O" rings, seals. Use extreme care in handling parts to avoid damaging sealing edges or causing burrs). Reassemble components on Steering Gear Unit Assembly as follows:

Control Valve–Lubricate valve spool with SAE 10W engine oil, then with twisting motion slide spool (threaded end toward steering gear arm) into valve body. Push spool through body sufficiently to install

CONTINUED ON NEXT PAGE

ROSS LINKAGE TYPE
(Continued)

right reaction ring (check marks made during disassembly for identification). Lubricate new "O" ring seal with Lubriplate and install on valve spool. Install left reaction ring on threaded end of valve spool followed by a new "O" ring seal lubricated with Lubriplate. Place springs (one on each end) into position in valve body. Lubricate new "O" ring seals with Lubriplate and install on glands. Install glands (identified as right and left at disassembly) into their respective positions in valve body. Position lock rings over threaded ends of valve body. *(CAUTION*–Make sure tangs on lock rings mate with grooves on valve body). Start end cover reducer (one with clamp assembly) on valve body (opposite threaded portion on valve spool), then start other end cover, draw down evenly and tighten. Using small punch and hammer, stake lock rings to end cover and reducer. *CAUTION*–Use extreme care so as not to damage mating surfaces on valve body when installing end covers.

Cylinder–*(CAUTION*–It is suggested that assembly be made from piston end of rod to prevent damage to any of parts). Lubricate new splined seal with Lubriplate and install in retainer, (tapered side of seal to correspond with concave of retainer). Slide splined seal and retainer (seal side of retainer up, so it faces to inside of cylinder down on to piston rod). Install plastic shims (same number as removed). *(NOTE*–The number of shims used will vary. They may also be added or removed without completely disassembling cylinder by cutting and placing them around piston rod. These shims are used to control the amount of end play between piston rod bearing retainer snap ring and bearing seat in cylinder. A maximum of .005" end play is permissible after shimming. Shims available .005", .010", .015" thick). Install piston rod bearing backup washer (steel). Using a vise with protective jaws, press new seal (lip of seal first) into piston rod bearing. Lubricate new "O" ring seal with Lubriplate and install on outer diameter of piston rod bearing. Slide piston rod bearing assembly (seal end first) onto piston rod. Install piston rings on piston, making sure they are free to rotate in glands. Install piston and backup washer (steel) on piston rod. (NOTE–Inside of piston tapered). Install nut (castle), then holding piston rod by flats provided on opposite end, use tool C-3005 and tighten nut to 35-45 ft. lbs. torque. (CAUTION–Always use torque wrench to avoid any possibility of over-tightening which might cause piston to swell and prevent assembly entering cylinder). Install cotter pin. Lubricate piston rings with Lubriplate and stagger ring gaps. Use extreme care, insert piston and rod assembly into cylinder, compressing rings with fingers. Push assembly gently (to insure compressing rings and avoid scoring of cylinder wall) into cylinder as far as it will go. Position piston rod bearing retainer in cylinder (opening in snap ring to line up with tang on retainer and hole in cylinder) and install snap ring. Make sure snap ring is seated properly. Check end play between retainer and snap ring, if .005" or less use punch and lock retainer in place. If more than .005" end play exists unit will have to be disassembled sufficiently to permit plastic washer of greater thickness to be installed. Move piston rod in and out of cylinder to make sure it does not bind. Cylinder and control valve can now be assembled.

Cylinder & Control Valve–Lubricate new "O" ring seals (4) with Lubriplate and position around oil passages on cylinder head. Check markings on control valve and cylinder head, then position valve on head. *(CAUTION*–Make certain oil passages in control valve housing match those in cylinder head). Install four mounting bolts, lockwashers and nuts. *(CAUTION*–*DO NOT TIGHTEN NUTS.* The two long bolts are used in the outer holes adjacent to threaded end of valve spool for retaining anti-roll bracket). Install tie rod dust seals and lubrication fittings (if removed) into reactor link. Place clamp assembly on end cover reducer (if removed) and install dowel ring in cylinder casting. Install reactor link into end cover reducer and position other end of link over dowel. Install reactor link mounting bolt and lockwasher. Draw four control valve mounting bolts down evenly, then, using tool C-3005, tighten to 15-20 ft. lbs. torque. Using tool C-3005, tighten reactor link mounting stud to 45-55 ft. lbs. torque. *(CAUTION*–Tightening in above manner assures alignment between control valve and reactor link mountings). Position clamp assembly for maximum clearance with tie rod, then tighten to 15-20 ft. lbs. torque. Install dust seal over threaded portion of valve spool and down against end cover. Holding valve spool by means of flats provided for this purpose, screw steering gear arm adapter onto valve spool until it bottoms against end of threaded section of spool. Install anti-roll stud, then place anti-roll boot over anti-roll stud and fold back to install anti-roll bracket, tighten bracket retaining nuts to 15-20 ft. lbs. torque. Check alignment of anti-roll stud in slot of anti-roll bracket. The centerline of stud should be approximately in the center of the slot. The center of the barrel section of the anti-roll stud should line up with the mid point of the thickness of the bracket. A standard flat washer may be added, if necessary, beneath anti-roll stud shoulder to obtain this alignment. Fill anti-roll boot with chassis lubricant and snap into position on bracket. Install piston rod boot over piston rod bearing retainer. Power Steering Unit Assembly is now ready for installation in car (See Steering Gear Installation above).

HYDRAULIC PUMP REMOVAL & INSTALLATION: *See "Hydraulic Pump Overhaul" under "Gemmer Hydraguide"*

HYDRAULIC PUMP OVERHAUL: *See "Hydraulic Pump Overhaul" under "Gemmer Hydraguide"*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemmer Worm & Roller"*

STEERING GEAR LINKAGE ADJUSTMENT: *See "Gemmer Worm & Roller".*

FORD & MERCURY BENDIX POWER STEERING

Ford, All Models (1953-55)
Thunderbird (1955)
Mercury, All Models (1953-55)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1953 FORD SPINDLE CONNECTING ROD END CLAMP INSTALLATION CAUTION:* Left hand spindle connecting rod end must be installed on sleeve with ears on forward side of connecting rod and bolts in a vertical position. This position will prevent interference of ears with centering spring cover.

▷*PUMP ROTOR SHAFT BEARING REPLACEMENT CAUTION:* When replacing power steering pump rotor shaft bearing, use only replacement bearing 7RA-10094-A with neoprene grease retaining seal. Do not use bearing 7RA-10094-B with nylon grease retaining seal. Tests show that operating conditions in pump cause nylon seal to wrinkle and become rigid, allowing bearing grease to escape. Neoprene seal does not react this way and provides better sealing conditions.

▷*1954 FORD 6 CYL. PUMP LEAKAGE CORRECTION:* To minimize leakage at unused return port on pump, a plug (B4A-3569-A) and gasket (B4A-3592-A) are available for service and should be used to replace cup type plug used on earlier models if leakage is encountered.

▷*1955 FORD PRESSURE CHECK GAUGE ADAPTER KIT CHANGE:* Due to pump design change in May, 1955 it is necessary to use new adapters for pump fittings. Fittings can be made up using 5/8" inverted male connector (87974-S), 2¼" inverted female connectors (87200-S), 3⅝" inverted flare nuts (87953-S), a 5/8" short nut (87424-S), a 5/8" male connector (87234-S) and two pieces of soft copper tube 2½" long, 3/8" O.D.

▷*1955 MERCURY PUMP PRODUCTION CHANGE:* New pump differs from earlier type in that return port has been moved from pump body to a position on side of reservoir near bottom. Adapter, No. 3500-C must be used with Pressure Check Gauge No. 3500 when checking pressures. See Ford Pressure Check Gauge Adapter Kit Change (above).

▷*1953-55 MERCURY POWER CYLINDER & CONTROL VALVE REPAIR KITS:* The following repair kits are available for power cylinder and control valve repair: Drag Link Ball Stud Repair (MDK-3312-C), Power Steering Cylinder Seal (B3A-3315-A), Control Valve Seals (B3A-3316-A), Control Valve Centering Spring Repair (B3A-3317-A).

DESCRIPTION: Ford and Mercury "Linkage Type" Power Steering has its power mechanism built into the steering linkage (or attached to it) and is used in conjunction with a standard steering gear (with special ratio to take care of added power). Power steering system consists of the following units:

Hydraulic Pump & Reservoir Assy.—Mounted on engine and belt-driven from crankshaft. Consists of an Eaton rotor type pump with a built-in Relief Valve (pre-set to 700-900 psi.) and Flow Control Valve (limits maximum volume at high engine speeds to steering gear requirements).

Control Valve—Spool type valve located in end of steering drag link with valve spool directly con-

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FORD & MERCURY (C nt.)

nected to pitman arm. Valve is actuated by pitman arm (when steering wheel turned) and directs fluid pressure to one end of power cylinder and at same time vents the opposite end of the cylinder to the reservoir. Control valve also has a ball check valve in a by-pass passage in the valve housing to permit manual steering with power off.

Power Cylinder—Double-acting piston type. Piston rod is anchored to frame side rail and cylinder is connected to drag link so that power application tends to move the drag link in the same direction in which it is being moved by the steering wheel.

ADJUSTMENT: Proceed as follows:

►***ADJUSTMENT CAUTION—Whenever hydraulic system disturbed (by disconnecting lines, removal or installation of units, etc.) hydraulic system must be bled to remove air. See Bleeding Hydraulic System below.***

Pump Drive Belt Adjustment: Check tension of the pump belt by having another person bring wheels against stop and hold for a few seconds. Observe if pump pulley slows down or stops. If it does a loose belt is indicated. Belt tension should be 5-7 lbs. with ¼" deflection at center of belt.

►***1954-55 FORD V8 & THUNDERBIRD PUMP BELT ADJUSTMENT NOTE:*** To prevent slippage of belt on hard right and left turns, belt must be adjusted so that torque of 14-16 ft. lbs. is required to slip pulley against the belt tension. To check, install a torque wrench on pump pulley-to-rotor shaft bolt and check torque required to slip the pulley. If torque is not 14-16 ft. lbs., install a 2½" heavy duty "C" clamp so end of clamp is positioned against lower edge of pump-to-cylinder head bracket, and screw of clamp is against top edge of movable pump bracket. Loosen the four attaching bolts and tighten "C" clamp screw to increase belt tension to obtain a torque of 14-16 ft. lbs., required to slip pulley against belt. Tighten pump attaching bolts and remove "C" clamp.

LUBRICATION: ***CAUTION—Power Steering Unit and Steering Gear are lubricated separately with DIFFERENT lubricants as follows:***

Power Steering System: Maintain fluid level in reservoir at full mark as indicated on dipstick. Use Automatic Transmission Fluid Type "A".

Steering Gear: Check at 1000 mile intervals. Keep filled to level of filler plug with SAE 90 Mild EP. gear oil.

BLEEDING HYDRAULIC SYSTEM: Fill reservoir to full mark (indicated on dipstick) with Automatic Transmission Fluid Type "A." Start engine and run at idle speed for two minutes. Recheck fluid level and inspect hose connections for leaks. Increase engine speed to 1000 RPM. and turn wheels from right to left five or six times. DO NOT HIT STOPS. Recheck for leaks. Check oil level and refill as required.

TESTING: When operation of the system is unsatisfactory and before performing any tests be sure pump belt tension is correct, fluid level is proper, and oil leaks eliminated. Before testing Power Steering unit be sure that wheel alignment, pressure and condition of tires and shock absorbers are satisfactory. Then make tests as follows:

Steering Effort: Set the hand brake, start engine, and rotate steering wheel to left and right to warm up oil. DO NOT turn wheel to limit of its travel (to prevent unnecessary strain on system). Hook 15 lb. scale to rim of steering wheel and measure the pull it takes to turn wheel. If pull on the wheel is between 7 and 12 pounds, on a dry concrete floor with engine at idle speed, unit is working properly.

Hydraulic Pressure: First remove the pressure hose from pump, connect gauge between pressure fitting on pump and pressure hose that leads from pump to power unit. Let engine idle until oil reaches operating temperature. Then turn wheel for a full right or full left turn. The gauge should read between 700 and 900 psi. If pressure less than 700 psi., close the valve at gauge and note pump pressure. If low with valve closed, pump is not operating properly. If pressure goes up with valve closed, it indicates that low pressure in system is due to internal leakage in power unit, providing all connections are tight.

TROUBLE SHOOTING: ***Diagnose trouble as follows:***

Sticky Feeling Off-center, or Poor Recovery:
1) Steering wheel bind at steering column, or steering gear shaft bind in column; steering linkage bind.
2) Excessive gear mesh preload.
3) Interference of pitman arm and valve sleeve at ball stud connection or of ball stud in T-slot of valve sleeve; ball stud adjustment too tight; damaged sleeve.
4) Valve spool bolt adjustment too tight or binding valve spool.
5) Excessive break away friction of cylinder rod seal.

Excessive Free Play or Lost Motion in Steering:
1) Improper sector shaft or mesh preload.
2) Improper adjustment of valve sleeve ball, or valve spool.
3) Excessive play in steering linkage or excessive negative caster.
4) Defective valve center spring.

Loss of Power Assistance: 1) Inoperative pump or damaged or leaking lines.
2) Internal parts of power cylinder broken or damaged.
3) Extreme maladjustment of valve spool.

Loss of Power Assistance—In One Direction Only:
1) Incorrect adjustment of valve spool in valve.
2) Inoperative by-pass check valve.

Oil Leaks: 1) Loose or damaged hose connections.
2) Leaking valve or cylinder seals.
3) Loose or defective cylinder bleed line or fittings.

Hard Steering: 1) Low pump output.
2) Improper gear mesh preload, lubrication. valve spool adjustment, or ball stud adjustment.
3) Excessive valve or cylinder leakage; sticky valve; loose cylinder housing.
4) Linkage bind.

REMOVAL & INSTALLATION: Proceed as follows:

Control Valve: Removal—Remove the filler cap from reservoir, with suction gun remove as much oil as possible from reservoir. Raise car on hoist and drain remaining fluid by disconnecting valve-to-cylinder hoses at valve (to insure complete drainage, move wheels to left and right several times). Disconnect pressure and return lines from valve, drive locking pin up into steering arm rod just far enough to clear threads. ***CAUTION—Do not drive pin all the way into rod as damage to threads on opposite side of valve will result.*** Loosen sleeve clamping bolt. Remove cotter pin and nut that retain pitman arm to ball stud of valve, loosen pitman arm on stud using remover tool. Raise valve and move ball stud forward to clear pitman arm. Turn wheels to full left turn, then turn valve counterclockwise to remove valve from steering arm-to-idler arm rod. Drive roll pin completely out of steering arm rod.
Installation—Screw valve clockwise on steering arm rod until approximately four threads are showing on rod. Install ball stud in pitman arm and check distance between ball stud of valve and inner ball stud on left steering spindle arm connecting rod. (See table below for dimensions). Adjust valve, clockwise to reduce distance and counterclockwise to increase distance, until desired dimension obtained. Line slot in sleeve with hole in steering arm rod, lock valve in this position with locking pin. Tighten sleeve clamp bolt to 30-35 ft. lbs. (Ford), 25-30 ft. lbs. (Mercury). Install ball stud nut and tighten to 50-60 ft. lbs. (Ford), 60-65 ft. lbs. (Mercury), lock nut with cotter pin. Install pressure and return lines. Install short valve-to-cylinder hose first, with tube end of hose toward cylinder. This hose is installed in forward hole of cylinder and lower hole of valve. Then install longer hose with tube end toward cylinder, in rearward hole of cylinder and upper hole of valve. Lower car, then visually check straight ahead position of steering wheel. Make necessary adjustment of steering wheel or front wheels at tie rod ends. Check toe-in and correct, if necessary. Fill reservoir and bleed system (See Bleeding Hydraulic System). Check steering effort (See Steering Effort under Adjustments).

Car Model	Ball Stud Dimension
1953 Ford & Mercury	5⅛"
1954-55 Ford & Mercury	9"
1955 Thunderbird	9 9/16" ± 1/32"

Power Cylinder Assembly: Removal—First remove the filter cap from reservoir and with suction pump drain as much oil as possible from reservoir. Raise car on hoist, drain remaining fluid by disconnecting valve-to-cylinder hoses at cylinder (to insure complete drainage of system move wheels right and left several times). Remove palnut and nut that secure piston rod to mounting bracket on frame. Remove cup washer and rubber bushing. Next, remove palnut and nut that secures cylinder to stud on idler arm rod. Remove cup washer and rubber bushing, remove cylinder.
Installation—Place cup washer and rubber bushing on piston rod, insert piston rod through hole in frame bracket. With low pressure seal bleed line at top and forward of cylinder, place end of cylinder on steering pitman-to-idler arm rod stud. ***CAUTION: With cylinder in position on car, low pressure seal bleed line must be at top and forward of cylinder.*** Place rubber bushing and cup washer on steering pitman to idler arm rod stud. Install nut and tighten until it bottoms. Install palnut finger tight plus 1/3 turn. Place rubber bushing and cup washer on piston rod. Install nut and tighten until it bottoms. Install palnut finger tight plus 1/3 turn. Install valve to cylinder hoses, short hose in forward hole of cylinder, long hose in rear hole. Fill reservoir and bleed system (See Bleeding Hydraulic System).

Reservoir & Pump Assembly: Removal—First remove the filler cap and with a suction pump remove as

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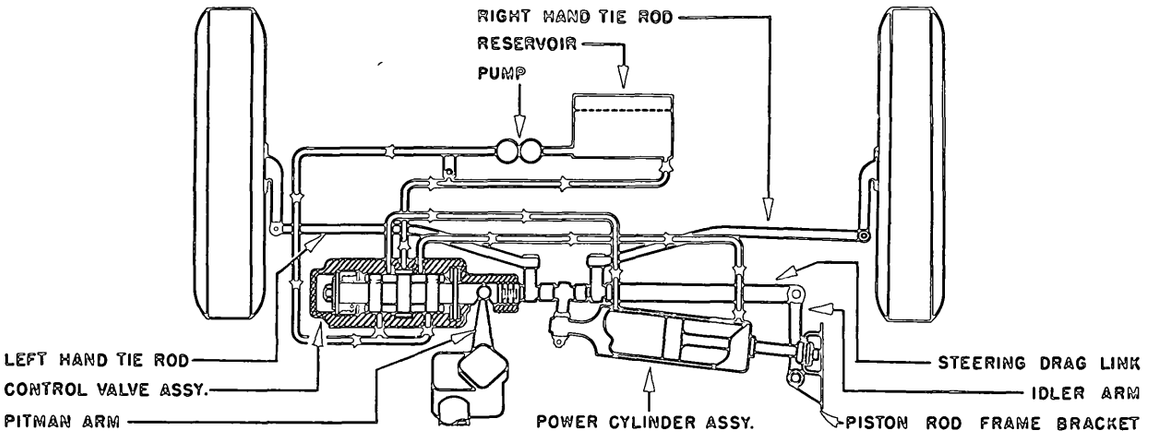
FORD & MERCURY (Cont.)

much oil as possible from reservoir. Disconnect hoses at unions on pump assembly, place ends of hoses in raised position to prevent drainage of oil. Loosen belt tension bolt, remove pump belt. Remove pivot cap screw and adjustment bolt that secure pump mounting bracket to engine bracket. Remove reservoir, pump and pump bracket as an assembly. Installation—Reverse removal procedure (above). Torque pivot screw to 20-25 ft. lbs., hose fittings to 35-50 lbs. Adjust belt tension (See Adjustments). Torque tighten belt adjusting bolt to 20-25 ft. lbs. Fill reservoir and bleed system (See Bleeding Hydraulic System).

CONTROL VALVE OVERHAUL: Disassembly—Install brass jaws on vise, place valve in vise. *CAUTION—Do not tighten vise too tightly.* Cut and remove safety wires located at each end of valve housing, remove two cap screws that secure centering spring cover to valve body, then remove centering spring cover. Remove spool adjustment nut, small washer, large washer, centering spring, spring spacer, and large washer. Remove adapter plate and seal retainer. Remove two cap screws that secure sleeve and ball stud assembly to valve housing, remove sleeve and ball stud from valve housing. Remove valve spool from housing by pressing spool toward spool adjustment end of housing, remove seal from spool. Remove retainer spacer, bushing, and seal from sleeve end of valve housing.

Cleaning & Inspection: Wash all parts in suitable solvent, wipe dry with clean lint-free cloth. Check condition of all parts. Inspect valve spool to be sure it is free from burrs and not scored or damaged in any way. Remove burrs by carefully using fine crocus cloth. *CAUTION—Do not round sharp corners of spool.* Inspect valve housing for burrs, scored, or damaged condition. Remove burrs by carefully using fine crocus cloth. If check valve needs replaceing proceed as follows: Remove return line fitting seat by tapping existing hole in seat with 3/8" starting tap. Remove all tapping chips. Using 3/8" bolt, a large washer (large enough to fit over port), and a nut as a puller tool, remove fitting seat. Remove check valve retainer with screw driver, remove spring and ball. Inspect and replace defective parts, then install ball, spring, and valve retainer. Place fitting seat in place in port. Screw a 5/8"-18 bolt in port, and tighten sufficiently to seat fitting seat. All fitting seats in valve housing except pressure line port can be removed at outlined above. Pressure port has smaller diameter seat hole (3/16").

Reassembly: Put light film of Automatic Transmission Oil Type "A" on spool and slide spool, while rotating, into housing. *CAUTION—Install spool with large diameter end of spool toward small end of housing.* Lubricate and install small seal over small diameter end of spool. With small screwdriver CAREFULLY work seal into housing. Install bushing and retainer spacer in sleeve end of housing, seat retainer spacer in housing. Lubricate and install large seal over large diameter end of spool and CAREFULLY work seal into housing. Install adapter plate on small end of valve housing, check valve spool for freedom of movement. Install valve bolt of sleeve and ball stud assembly through spool in valve housing. Position sleeve so that ball stud is in line with three ports in valve housing. Install two cap screws and tighten to 25-30 ft. lbs. torque. Install large washer, spring spacer, large washer, and small washer on valve bolt. Compress spring and install adjusting nut. Tighten nut until solid, then back off 1/4 turn. Check valve spool for freedom of movement, by moving ball stud back and forth along sleeve. Movement should be approximately .060" travel. Install centering spring cover and retain with two cap screws, tighten to 12-15 ft. lbs. torque. Install locking wire between two centering spring cover cap screws, similarly between sleeve cap screws. NOTE—Lock wire on sleeve cap screws should be located on side opposite from dust shield. Check freedom of movement of valve by installing castle nut on ball stud and placing nut in vise. Actuate valve by pushing center spring cover end of valve housing toward ball stud. Then rotate valve 180° and push sleeve end toward ball stud.



FORD & MERCURY "LINKAGE TYPE" POWER STEERING SYSTEM

POWER CYLINDER ASSEMBLY OVERHAUL: Construction of power cylinder is such that repair of piston and rod is not feasible. If failure of cylinder occurs, it must be replaced as a complete assembly. However, seal and scraper at piston rod end of cylinder can be replaced if there is indication of leakage (see below). Bleed line can be replaced if damaged. Fitting seats located in ports at end of cylinder can also be replaced (see below).

Cylinder Rod End Seal Replacement—Remove cylinder from car (see Removal above). Place end of cylinder in vise, clamping on eye end, remove snap ring from cylinder rod end with special pliers. Remove scraper by pulling piston rod outward. If scraper does not come out in this manner use a prick punch. Remove seal using prick punch. Lubricate new seal, install seal and scraper. Seat seal and scraper using a 7/8" deep well socket, install lock ring. Install cylinder on car (see Installation above).

Replacement of Fitting Seats—Remove cylinder from car (see Removal above). Tap existing hole in seat using 3/8" starting tap. *CAUTION—Be sure all chips are removed after tapping.* Using a 3/8" bolt, a large washer (larger enough to fit over port) and a nut as a puller tool, remove fitting seat. Place fitting seat in place in port, screw a 5/8"-18 bolt in port, then tighten sufficiently to seat fitting seat. Install cylinder on car (see Installation above).

SLEEVE ASSEMBLY OVERHAUL: Disassembly—Place stop screw in vise, pull valve bolt out from sleeve to take up slack, drive pin from stop screw. Remove sleeve from stop screw by turning sleeve counter-clockwise. Remove valve bolt from stop screw, then remove dust shield. Move ball stud toward enlarged portion of hole in sleeve, remove ball stud, socket tube, plug, springs, and ball stud seats.

Cleaning & Inspection: Wash all parts in suitable solvent, wipe dry with clean lint-free cloth. Inspect condition of each part, replace any damaged parts.

Reassembly: Place ball stud seats, spring, plug and socket tube in sleeve housing. Insert ball stud through enlarged opening of sleeve housing. *CAUTION—Be sure ball joint seats are properly aligned.* Install stop screw with valve bolt in place. Tighten screw until solid, then back off to nearest hole. Align slot in valve bolt head with hole in stop screw, install pin. Install dust shield.

PUMP OVERHAUL: *See Eaton Pump data under "Power Steering Hydraulic Pumps" for complete data.*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemmer 305, 335, 375" Steering Gears for complete data.*

STEERING LINKAGE: *See "Steering Linkage."*

BENDIX POWER STEERING

Nash Ambassador 6 (1953-55)
Packard, All Models (1953-54)
Packard, Series 5560, 5580 (1955)

DESCRIPTION: This "Linkage Type" Power Steering differs from other types in that the power mechanism is built in the steering linkage (or attached to it) and is used in conjunction with a standard steering gear (gear has special ratio to take advantage of added power). Power steering system consists of the following units:

Hydraulic Pump & Reservoir Assy.—Mounted on the engine and belt-driven from the crankshaft. Consists of an Eaton rotor type pump with a built-in Relief Valve (pre-set to specified limits—See Testing Hydraulic Oil Pressure below) and Flow Control Valve (limits maximum volume, at high engine speed, to steering gear requirements.

Control Valve—Spool type valve located in end of steering drag link with valve spool directly connected to pitman arm. Valve is actuated by pitman arm (when steering wheel turned) and directs fluid pressure to one end of the power cylinder and at the same time vents the opposite end of the cylinder to the reservoir. Control valve also has a ball check valve in a by-pass passage in the valve housing to permit manual steering with the power off.

Power Cylinder—Double-acting piston type. Piston rod is anchored to frame side rail and cylinder is connected to the drag link so that power application tends to move the drag link in the same direction in which it is being moved by the steering wheel. Cylinder is double-acting (with fluid pressure in one end of cylinder, opposite end is vented to the reservoir through the control valve).

PUMP DRIVE BELT ADJUSTMENT: (Nash) Adjust pump drive belt sufficently tight to prevent slippage. (Packard) Adjust belt to 26-28 ft. lbs. torque. Make certain belt pulleys are in alignment.

►***ADJUSTMENT CAUTION—Whenever hydraulic system disturbed (by disconnecting lines, removal or installation of units ,etc.) hydraulic system must be bled to remove air. See Bleeding Hydraulic System.***

LUBRICATION: ***CAUTION—Power Steering System and Steering Gear are lubricated separately and with DIFFERENT lubricants as follows:***

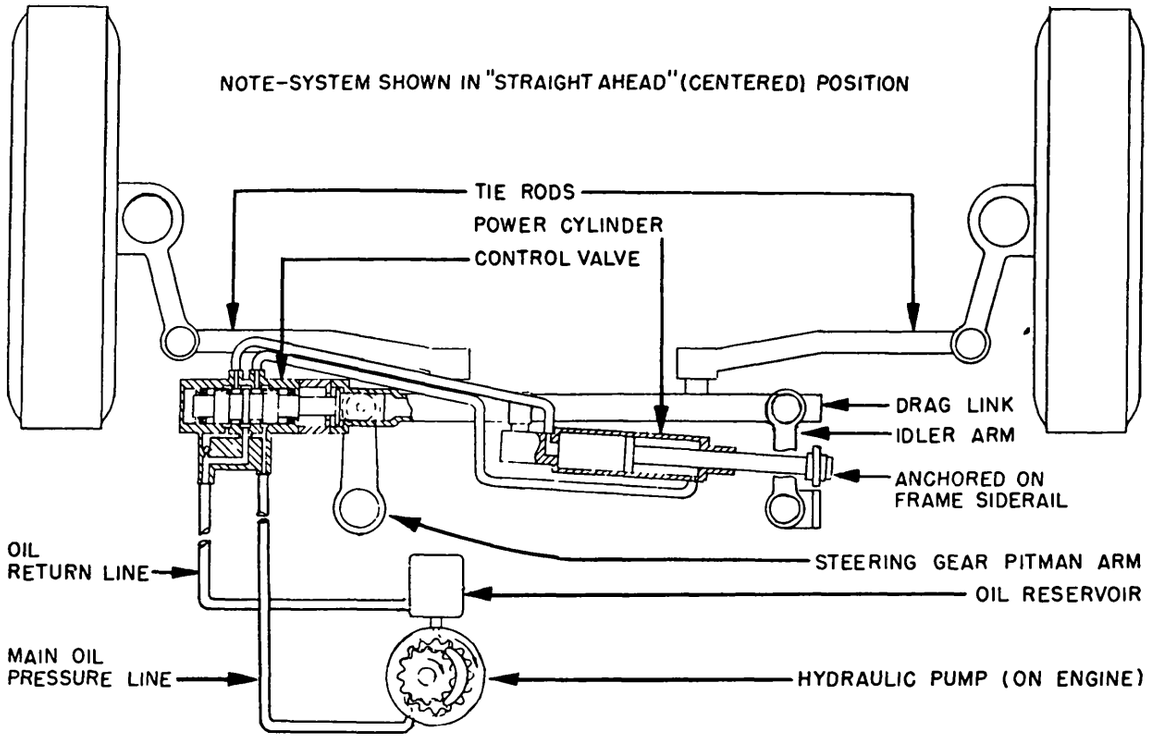
Power Steering System: Check fluid level in reservoir at 1000 miles intervals (remove reservoir cover). Maintain level at 1" below top edge of reservoir. Use recommended fluid as follows:
Nash—Hydra-Matic Transmission Fluid (Automatic Trans. Fluid Type A in "AQ-ATF" container).
Packard—Ultramatic Drive Fluid (if not available, use Automatic Trans. Fluid Type A).

Steering Gear: Check lubricant level every 3000 miles and maintain even with filler plug hole. Use SAE. No. 90 Steering Gear Oil.

BLEEDING HYDRAULIC SYSTEM: Whenever lines disconnected, or units disturbed, bleed system by making complete right and left power turns, then recheck oil level in reservoir.

TROUBLE SHOOTING: ***If operation not satisfactory, diagnose trouble as follows:***

HARD STEERING: 1) Pump failure, loose or broken belt.



NASH & PACKARD "LINKAGE TYPE" POWER STEERING SYSTEM

2) Broken or weak relief valve spring, sticking relief valve.
3) Low pump pressure, line leakage, or low fluid in system.
4) Under-inflated tires.
5) Bent linkage, steering tube mis-alignment, improper wheel alignment.
6) Steering adjustment tight.
7) Improper lubrication.
8) Leakage in power cylinder past piston ring.
9) Air in system.
10) Pump control valve sticking.
11) Control valve spool out-of-round or damaged.

STEERING TOO SENSITIVE: 1) Overinflated tires.
2) Pump pressure too high.
3) Flow control valve stuck in closed position.

LOOSE STEERING: 1) Wheels out of alignment, bearings loose or worn.
2) Loose ball joints, steering knuckle pins, steering gear-to-frame bolts, pitman arm, or lash in linkage.
3) Air in system.

POOR CENTERING: 1) Faulty or binding control valve spool or power cylinder.
2) Control valve spool nut too loose or too tight.
3) Steering misalignment, one tire underinflated, loose wheel bearings.

POOR RECOVERY: 1) Steering gear adjusted too tight, improper caster adjustment.
2) Lack of lubrication of linkage, low tire pressure.
3) Stop nut pin installed in wrong hole causing spool assembly to bind in bore.

PUMP NOISE: 1) Improper fluid level, loose return hose connection, clogged intake line or filter, improper fluid.
2) Pump belt squeal, hose rubbing against other parts, loose pulley, mechanical trouble in pump, relief valve chattering.
3) Wheels held at stops too long, overheating pump.

LOW PRESSURE (When Tested With Gauge):
1) Low fluid level, external or internal leakage.
2) Slipping belt or pump mechanical trouble.
3) Pump relief valve weak or stuck open, flow control valve struck open.

NO POWER ON STEERING GEAR (Engine Running): 1) No pressure at pump. Items 1) to 3) for Low Oil Pressure (above) apply.

CHUCKLE OR RATTLE IN STEERING: 1) Too much back lash in steering, worn or loose parts, ball socket or studs loose.
2) Control valve improperly adjusted.

SHIMMY: 1) Lash in linkage, worn or loose steering parts, wheels out of balance.

OIL LEAKS (PUMP): 1) Loose or defective connections, defective "O" ring seals between reservoir and pump, or between connections.

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BENDIX POWER STEERING (Cont.)

2) Defective seal on pump shaft or between cover and body, hose leaks.

OIL LEAKS (POWER CYLINDER): 1) Loose or defective connections.
2) Defective seals between cylinder flange and body.
3) Defective spring loaded metal encased seal on shaft, scored shaft.

OIL LEAKS (CONTROL VALVE): 1) Worn seals on end of spool.
2) Drippage of fluid from ball stud section indicates seals on spool are passing fluid.

CONTROL VALVE NOISE: 1) Spool bolt nut loose, causing spool flutter.

STEERING WHEEL DOES NOT CONTROL OPERATION OF POWER STEERING (After Assembly To Car): 1) Improper hose connections.

TESTING HYDRAULIC OIL PRESSURE (NASH): Check reservoir for correct fluid level. If low, fill to proper level with Hydra-Matic Transmission Fluid. Inspect all hoses and connections for evidence of external leaks. Test as follows:

(1) Install Oil Pressure Gauge J-5548 in main oil pressure line at control valve. Start engine, allow oil to circulate for several minutes to warm oil in reservoir.

(2) With car standing on dry, rough concrete, make complete turn in each direction. Observe oil pressure gauge during this operation. Gauge should indicate 450-550 P.S.I. If oil pressure low, pump operation or oil leakage is cause. If pressure varies more than 100 P.S.I. in either direction, internal leakage is cause.

(3) Check oil pump pressure output and relief valve operation by disconnecting pressure gauge from control valve and capping pump pressure line so pump will develop maximum pressure. Plug control valve to prevent excessive oil loss. With engin. idling, gauge should indicate 700-900 P.S.I. If pressure low or erratic, pump belt may be loose. Watch pump pulley for smooth operation. If pump belt not slipping pump is at fault.

(4) After pump checked and operation satisfactory, reconnect gauge to control valve, disconnect two lines to power cylinder, plug two ports in control valve using special plugs. With engine idling, steer car in both directions observing pressure. Pressure should be 700-900 P.S.I. If pressure low turning one way and correct the other, inspect control valve spool spacer sleeve for correct length (41/64"). Low pressure turning both ways indicates internal leakage in control valve.

(5) If pump pressure check and inspection of control valve shows both units operating satisfactorily, then power cylinder is cause of the difficulty.

TESTING HYDRAULIC OIL PRESSURE (PACKARD): Remove reservoir clamp, cover and gasket. Using suction pump, remove oil from reservoir. If suction pump not available, disconnect pump hose at control valve and drain oil from pump. If last method used, after oil drained, reconnect and tighten hose to control valve. Test as follows:

(1) Disconnect pressure hose at union on right side of pump, install pump pressure Gauge Hose and Valve PK-13 on union at pump with hand valve open. Connect pressure hose to fitting on hand valve side of gauge. Refill reservoir to proper oil level.

(2) Run engine until warmed up, then turn wheels from full right to full left position to bleed air from system. Add oil as required to bring fluid to proper level. After engine warmed up and idled at 375 RPM., wheels should be resting on ground in straight-ahead position. Close gauge hand valve and observe gauge reading. Reading should be approximately 650 P.S.I. Gauge will oscillate several hundred P.S.I. on gauge dial. Center reading will be approximately 650 P.S.I. if pump at maximum efficency. If average reading below 550 P.S.I. pump needs repair. *CAUTION—Do not keep gauge hand valve closed any longer than necessary to read gauge.*

(3) Turn steering wheel toward either of wheel stops. As wheel is turned from straight-ahead position, pressure will start increasing until it reaches wheel stops where pressure should be 600-650 P.S.I. If pressure less than 600 P.S.I. trouble lies in control valve or power cylinder.

(4) After completing above tests, shut engine off, drain reservoir. Disconnect and remove gauge hose and valve from pump and pump pressure line. Reconnect pump pressure line to pump, tighten hose-to-pump connector. Fill reservoir to level mark with Ultra-matic Drive Fluid, start engine. Turn wheels from full left to full right position several times to bleed system of air. Add oil as required. Check pump pressure line at pump for fluid leakage. Install reservoir gasket, cover, clamp and clamp screw on reservoir, tighten screw.

REMOVAL & INSTALLATION: Proceed as follows:

▷*CAUTION—Before removing assemblies thoroughly clean the assembly and surrounding parts to prevent dirt from entering assemblies.*

NASH Control Valve Removal From Car: Disconnect oil pressure and return hoses at control valve and two lines connecting valve to power cylinder. Remove cap and gasket from outer end of control valve, then remove self-locking nut and special washer located under cap. Remove two valve-to-linkage attaching bolts, then remove control valve.

Installation: Slide control valve spacer and control valve assembly on bolt of linkage. Be sure spacer sleeve is in place on special bolt. Install special flat washer and a new self-locking nut on end of bolt at outer end of control valve. Adjust nut until there is just a slight amount of play. NOTE—If nut too tight, spool may bind in housing, if too loose, there will be excessive lost motion before spool moves. Reinstall gasket, cap and oil lines.

PACKARD Control Valve Removal From Car: Remove cotter pin and ball stud nut attaching forward end of pitman arm to control valve. Using tool No. PK-11, Ball Stud Remover, install jaw of tool between pitman arm and ball stud in control valve. If dust cap spring is under jaws of tool, pry it up before inserting tool. After ball stud loosened, push up on linkage to release ball stud and control valve from pitman arm. Disconnect reservoir port hole at left end fitting on control valve. Drain fluid. Cap or plug hose fitting to prevent fluid from dripping and dirt getting into hose line. Disconnect pump port hose at connector on valve (second connection from left end). Disconnect left turn hose at connector on valve (connection farthest to right). Using calipers or a rule measure distance between end of control valve and center of connecting rod ball stud (control valve on reinstallation threaded on end of steering connecting rod to exact position from which removed). Unscrew and remove zerk grease fitting from control valve. Loosen bolt in clamp on end of control valve, turn valve to provide room for tools used for disconnecting hose. Disconnect right turn hose at fitting (center front of valve body). Plug or cap hoses to prevent dripping. Unscrew control valve from end of connecting rod.

Installation: Thread control valve onto end of steering connecting rod. Check measurement with a rule or calipers to make sure valve is in identical position from which removed. Tighten locking clamp bolt to 25-30 ft. lbs. Install zerk fitting. Position control valve ball stud in pitman arm, install attaching nut and tighten to 45-50 ft. lbs. Install new cotter pin. Install hoses, tighten.

POWER CYLINDER REMOVAL: Disconnect hoses at power cylinder. Secure hoses in an upright position and cap or plug ends to prevent fluid from dripping and dirt entering hoses. Disconnect power cylinder from frame bracket and piston rod from steering linkage connecting rod, remove power cylinder.

Installation: To install Power Cylinder reverse removal procedures. Tighten attaching nuts to 45-50 ft. lbs. torque.

OIL PUMP REMOVAL: Disconnect oil lines from pump, drain oil into container. Cap or plug fittings of pump. Release pump belt tension, remove pump belt from pulley. Remove pulley, then pump and reservoir.

Installation: To install pump, reverse removal procedures. Tighten pulley to 15-18 ft. lbs. torque.

CONTROL VALVE OVERHAUL: Disassembly—Mark or scribe control valve housing flange to assure proper reassembly. (Packard) Remove capscrews holding control valve cap and gasket to end of control valve spool housing, remove these parts. Remove nut and washer from valve spool bolt. Remove attaching capscrews holding valve spool housing and adaptors to flange end of sleeve and flange assembly, then separate spool housing, adapters, spool washer and spacer from valve spool bolt. Using small punch, push out pin that locks socket tube, stop screw and valve spool bolt together as unit. Unscrew stop screw from socket tube. Remove ball seat spring, ball seats and ball stud from ball socket tube. Remove socket tube from bore of sleeve and flange assembly. (All) Valve spool bushings have "push fit." To remove spool, use round piece of brass rod slightly smaller in diameter than spool stem, tap lightly until bushing free from spool housing bore. This method may be used at either end of spool housing. After removing bushing and spool, bushing at other end may be tapped out.

Inspection & Cleaning: Inspect packings on inner and outer diameters of valve spool bushing for damage or excessive wear. Inspect lands of spool for nicks and burrs. Clean with crocus cloth if necessary. Inspect valve spool housing bore and adaptor bore for wear, cracks, or scoring. Examine valve spool to see if bent. Check condition of ball

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BENDIX POWER STEERING (Cont.)

seat spring. Replace as required. Wash all parts with carbon tetrachloride or suitable cleaner, blow out passageways with compressed air. Use new packing rings on reassembly.

Reassembly: Install control valve spool in housing. Using seal guide tools install bushings (large bushing on large stem end of spool). Check movement of spool in housing for free operation. (Nash) Slide control valve spacer and control valve assembly onto bolt of linkage. Be sure spacer sleeve is in place on special bolt. Install and tighten attaching bolts. Install special flat washer and new self-locking nut on end of bolt at outer end of control valve. Tighten nut to provide just a **slight** amount of side play. (Packard) Install ball seats in ball socket tube, insert assembly into sleeve and flange assembly. Install ball stud and ball seat spring. Slide stop screw over valve spool bolt, tighten stop screw into ball socket tube which has been assembled into sleeve and flange assembly. Back off stop screw to nearest hole and where stop screw lines up with hole in spool bolt and socket tube. If spool bolt can be rotated, install stop screw pin. Install adapters, spool washer, spool spacer on valve spool bolt. Assemble these parts with capscrews to valve spool housing making certain alignment marks are lined up. Tighten capscrews to 25-30 ft. lbs. Install washer and nut on valve spool bolt and tighten nut so that there is just a **slight** amount of slide play. Center ball stud in socket tube. Check operation of control valve spool in housing by moving stud. Install valve spool body end gasket, cover and capscrews. Torque tighten to 12-15 ft. lbs.

POWER CYLINDER OVERHAUL: Disassembly—Mark or scribe flanges of power cylinder. Remove fluid communication tube from cylinder. Remove adapter assembly from cylinder, then piston rod from bore. Remove scraper washer and seals from adapter and bore.

Inspection & Cleaning: Wash all parts with carbon tetrachloride or suitable cleaner, blow parts dry with air. Inspect cylinder rod end of casting and bore of cylinder body for cracks, dents, wear, broken welds, and excessive scratching. Inspect threads of fittings, examine piston rod to see if bent or threads damaged. Examine ball stud on piston rod for excessive wear and damaged threads. Replace as required. Replace ring packing and seals.

Reassembly: Install seals in adaptor assembly and bore. Install scraper washer. Lubricate piston rod with oil (Hydra-Matic or Ultramatic). With piston rod guide insert piston rod through seals into adaptor housing bore. Install piston assembly in bore (Nash has two rings with end gap .001-.007", sideplay .001-.003". Packard one ring with not more than .016" gap and free movement in groove). Realign scribe marks on flanges, torque tighten attaching bolts to 15-18 ft. lbs. Install oil communcations tube, tighten. Install hoses in fittings of power cylinder, tighten.

PUMP OVERHAUL: *See Eaton Pump data under "Power Steering Hydraulic Pumps" for complete data.*

STEERING GEAR ADJUSTMENT & OVERHAUL: *See "Gemmer Worm & Roller' Steering Gears.*

VICKERS & EATON HYDRAULIC POWER PUMPS

HYDRAULIC PUMP OVERHAUL

►***OIL PUMP CAUTION—Always cap or plug all pump ports whenever oil lines disconnected and use extreme care to keep dirt out of pump and to keep all pump parts clean.***

EATON OIL PUMP: Disassembly. Thoroughly clean exterior of pump before removing plugs or disassembling parts. Then proceed as follows:

1) Remove reservoir cover and gasket, then drain reservoir. Remove filters, reservoir, then separate pump cover from pump body. *(CAUTION*—Before removing cover place pump with shaft end down to prevent falling out of rollers).

2) Turn pump body over and slowly rotate shaft so that rotors fall free, remove rotors and drive key from shaft. Remove "O" ring seals from pump body.

3) Remove bearing snap ring from recess in body using snap ring pliers, tap lightly on end of shaft, remove shaft and bearing assembly from pump body. Remove inlet fitting and seal from pump body and valve cap adapter seal and orifice plate from cover, then remove flow control valve spring and damper by depressing relief valve slightly and removing snap ring with snap ring pliers.

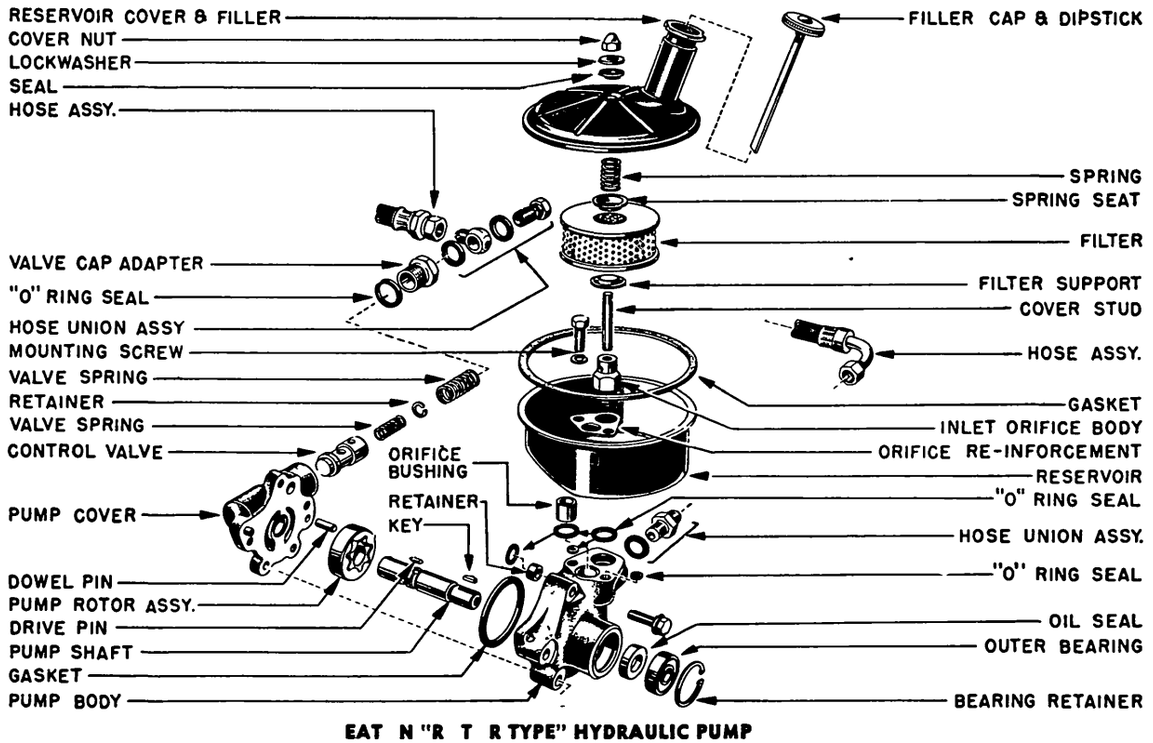
4) Remove spring, relief valve and flow control valve from cover *(CAUTION*—Place parts where they will not be damaged).

Cleaning & Inspection: *CAUTION*—Do not wash shaft and bearing assembly in cleaning solvent which may wash lubricant out of sealed bearing (wipe bearing and shaft assembly with clean cloth only). Clean all other parts with clean kerosene or solvent, wipe dry with clean lint-free cloths. Inspect bearing in cover and replace if worn or noisy. Inspect shaft for wear and bearing for wear, roughness, or noisy operation (if either part requires replacement, press bearing off and on shaft in an arbor press). Inspect shaft seal in pump body for wear or damage (if seal requires replacement, drive old seal out with a punch, press new seal squarely into place with spring-loaded edge inward). Inspect valves for nicks, scores, or scratches and also inspect valve bores in pump cover (minor nicks may be removed by stoning). Check valve clearance in cover, valves should be free in bores and clearance must not exceed .0025". Inspect valve springs and replace if weak or distorted. Inspect cover and body for wear caused by rotors, replace if surfaces scored or worn. Inspect both rotors as detailed below and replace **both** rotors if either part worn or scored (rotors furnished as matched sets).

Inner & Outer Rotor Clearance—With one tooth of inner rotor fully meshed in outer rotor, measure clearance between rotors at opposite inner rotor tooth using a feeler gauge. Repeat this check for each rotor tooth. Replace rotors if clearance exceeds .006" (Packard), .008" (Others).

Outer Rotor Clearance in Pump Body—Insert outer rotor in pump body, check clearance between

CONTINUED ON NEXT PAGE



EAT N "R T R TYPE" HYDRAULIC PUMP

HYDRAULIC PUMPS (Cont.)

outer diameter and bushing in body with feeler gauge. Replace pump body if clearance exceeds .006" (Kaiser), .008" (Others).

Rotor Side Clearance—Install both rotors in pump body, place straightedge across face of pump, use feeler gauge to measure clearance between rotors and straightedge. Replace pump body if clearance exceeds .0025".

Spring Tension (Relief Valve) 32 lbs. at 1.18".

Spring Tension (Flow Control Valve)—16 lbs. pull plus or minus 1½ lbs. at 1.20".

Reassembly—If removed, install new oil seal in pump body bore with lip toward rotors. If ball bearing removed from pump new bearing should be pressed on with arbor press until it butts against shoulder on pump shaft. Using all NEW seals and gaskets and lubricating all moving parts with Automatic Transmission Fluid Type A, proceed as follows:

1) Install assembly of pump shaft and bearing in pump body bore. Install ball bearing retainer. Position drive pin or key in pump shaft slot.

2) Install rotor assembly. If valve subassembly disassembled, install relief valve spring, relief valve, and retaining ring in flow control valve body. Compress assembly into body until there is sufficient room for installing ring in valve body groove, install retaining ring.

3) Install orifice plate in pump body bore. Install flow control valve spring. Install new gasket on hose adaptor valve cap, install and tighten cap. Install new gasket at pump body pressure port and a pump body-to-cover gasket.

4) Install pump cover on pump body. Install screws and torque tighten to 30-35 ft. lbs. (Nash & Packard 25-30 ft. lbs.) Install new "O" ring gaskets on top of pump body, install reservoir and filter.

VICKERS OIL PUMP: Disassembly. Thoroughly clean exterior of pump before removing plugs or disassembling parts. Then proceed as follows:

1) Remove reservoir cover and gasket, then drain reservoir. Remove four reservoir-to-pump mounting screws, then remove reservoir, gaskets, and spacers. Remove pump cover-to-body attaching bolts, then cover assembly with control valve assembly and spring. Discard cover "O" ring seal.

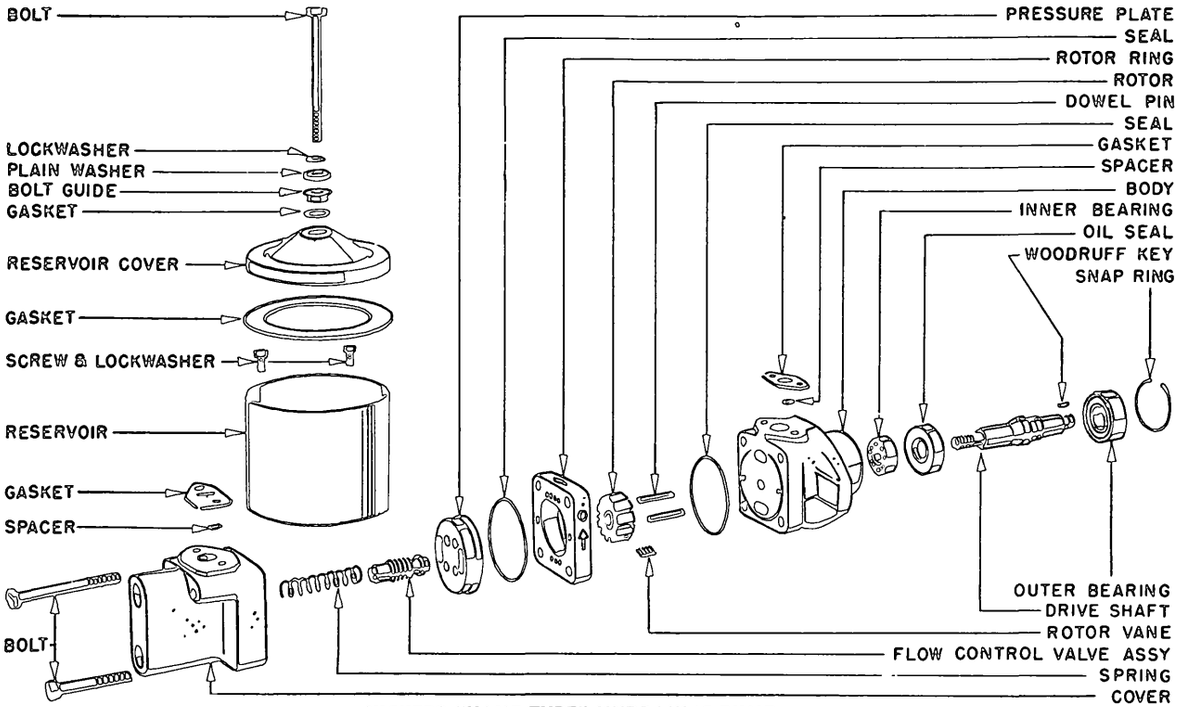
2) Remove pressure and return line unions with "O" rings from pump cover, discard "O" rings. Push spring retainer plug (between pressure and return line unions in cover) inward to remove. Discard "O" ring seal, remove plug snap ring. *NOTE—It is not necessary to remove plug, "O" ring and snap ring to service remainder of pump. Remove only if evidence of leakage at this point.*

3) To disassemble control valve assembly, remove end screws with spacers, relief ball, relief spring guide and relief spring.

4) Lift pressure plate off dowel pins which extend through pump ring, remove pump ring from dowel pins in body. Remove rotor with vanes from body, discard "O" ring from groove in pump body. Remove bearing retainer snap ring from front face of pump body.

5) Remove drive shaft and outer bearing assembly from pump body; press outer bearing off drive shaft over threaded end of shaft, after removing woodruff key from shaft.

6) Using punch, tap drive shaft seal and inner bearing from pump body *(CAUTION*—Seal must be removed first to permit removal of bearing).



VICKERS "VANE TYPE" HYDRAULIC PUMP

▷*HANDLING CAUTION—Use care when handling pump body especially when removing drive shaft and inner bearing with seal to prevent marring or scarring finished surface which mates with cam ring on reassembly of pump.*

Cleaning & Inspection: *CAUTION*—Do not wash large sealed bearing in cleaning solvent which may wash lubricant out of bearing (wipe bearing and shaft assembly with clean cloth only). Clean all other parts with clean kerosene or solvent, wipe dry with clean lint-free cloths. Inspect both bearings for wear or roughness, inspect shaft for wear. Check fit of pump vanes in rotor slots (vanes should be snug but must slide freely in slots), replace rotor if vanes excessively loose, replace vanes if worn or scored. Inspect all ground surfaces of cam ring for roughness or wear (slight irregularities can be stoned out), replace ring if inner cam surface scored or worn. Inspect flat surfaces of pressure plate and body for wear or scoring (faces may be trued up by lapping until smooth and flat) *CAUTION*—all traces of lapping compound must be cleaned out. Inspect relief valve poppet and flow control valve plunger for wear or scoring paying particular attention to seating surfaces. Clean out all passages in pump cover and body.

Reassembly: Use all NEW seals and gaskets. Lubricate all moving parts with clean engine oil and install parts in reverse order of disassembly procedure (above) with particular attention to the following points:

Shaft Seal Installation—After the inner ball bearing is installed in pump body, install seal with the two 1/16" holes in casing toward outside and use a tube or shaft 1 3/4" in diameter to apply pressure on outer edge of seal to seat it in body.

Bearing Installation—Large sealed bearing should be installed with stamped face of inner race toward threaded end of shaft, small bearing with stamped face of inner race toward splined end of shaft. Press on inner race only when installing bearings.

Cam Ring Installation Caution—Install ring with marks made during disassembly lined up and make certain that arrows on ring point in direction of pump rotation (clockwise viewed from front or shaft end of pump).

Rotor & Vane Installation—Install vanes with rounded (radius edge) outward toward cam ring.

Relief Valve Assembly Installation—Make certain that all of the original shim washers are re-installed in the valve plug (these shims control oil pressure). If any of the relief valve parts are replaced, valve operation must be tested and adjusted after pump installed on car as follows:

Relief Valve Testing & Adjustment—Use Gauge J-5176 to check pump pressure. See Testing Hydraulic Oil Pressure (above). Relief valve should start to open (will be indicated by slight buzzing noise in pump) at pressure of 700 lbs. or slightly higher and maximum pump pressure should not exceed 900 lbs. with engine speed increased above idle. If pressure not correct, adjust number of shims in relief valve plug for correct performance (add shims to increase pressure, remove shims to lower pressure).

Final Assembly Test—After assembly completed, rotate pump shaft by hand and make certain pump has free movement. Plug or cap all hose connections to keep dirt out of pump until lines connected.

GEMMER HYDRAGUIDE (CHRYSLER & DE SOTO) (EXTERNAL OIL PASSAGE TYPE)

Chrysler Imperial C53 (1951)—Std.
Chrysler Imperial C54 (1951)—Optl.
Chrysler New Yorker C52 (1951)—Optl.
Chrysler Imperial (1952-Early 1953)—Std. See Note.
Chrysler, Other Models (1952-Early 1953)—Optl. See Note.
DeSoto 6 & 8 (1952-53)—Optl.

►**Late 1953 Note**—*See "Gemmer Hydraguide (Internal Oil Passage Type)" for late 1953 Models.*

►CHANGES, CAUTIONS, CORRECTIONS

►*1951-52 FRONT WHEEL SHIMMY CORRECTION (Power Steering Cars):* If shimmy noted at speed in excess of 25 MPH. when one front wheel hits a chuck hole (especially when right front wheel hits a hole on a curve in the road), correct by replacing steering knuckle upper needle bearing with a **bushing.** *See Chrysler, DeSoto, Dodge, Plymouth Front Suspension data for installation instructions.*

►*REPLACEMENT OF RESERVOIR FILTER (For more efficient operation on early 1951 cars):* Later production type **shorter** filter element should be installed on first cars equipped with original **longer** filter (will correct tendency of pump to lower oil level to such an extent as to pull air into system and cause noisy operation in cold weather). When making this change, ALL OF THE FOLLOWING PARTS should be installed as a unit (includes heavier relief valve spring, top sealing cup with larger flow area, and new lower sealing cup so that filter can be installed either way): No. 1405639 Filter, 1405832 Upper Sealing Cup, 1405833 Lower Sealing Cup, 1405831 Relief Valve Spring, 1405827 Retaining Bolt, 107761 Cotter Pin.

FILTER IDENTIFICATION—Top of new **shorter** filter should be approximately ½" below fluid level in reservoir (original filter extended above fluid).

►*1952 RESERVOIR & OIL RETURN LINE PRODUCTION CHANGE:* **Steel base** reservoir used on later cars (superseding **Aluminum** reservoirs). Same filter cartridge (see above) used for both types and both reservoirs may be interchanged on all Hydraguide pumps. Steel reservoir has oil level mark stamped on inside of case but oil level is same for both types (½" above filter cartridge). New oil return hose and adapter can be used with both reservoirs but **hose and adapter must be used together.**

►*1953 "HIGH SPOT" OR "LUMPY FEELING" AT OR NEAR STRAIGHT AHEAD POSITION (Or feeling of oversteering when turning from center to right or left):* Check and adjust Cross-shaft Backlash and check Steering Tube-and-Column Alignment EXACTLY as detailed below. NOTE—See 1953 Steering Column Jacket Bearing Spring Change (below).

►*1953 ERRATIC STEERING (Normal Operation when cool with gradual loss of steering wheel "feel" with tendency to oversteer as steering unit temperature rises):* To correct this complaint, carefully adjust steering gear and check alignment as listed below.

1) Adjust Cross Shaft (Roller Tooth & Worm Gear Mesh), and Spur Gear (Valve Operating Gear Backlash) in order. See Adjustment. ROAD TEST CAR.

2) Check and adjust VERTICAL alignment of steering gear chuck and steering column. See Steering Gear Alignment. ROAD TEST CAR.

3) Check and adjust HORIZONTAL alignment of steering gear chuck and bracket. See Steering Gear Alignment. ROAD TEST CAR.

►*ROAD TEST CAUTION*—Steering system oil must be at normal operating temperature when road testing car (drive car for sufficient distance to bring oil up to normal operating temperature). OIL TEMPERATURE IS IMPORTANT AND HAS CONSIDERABLE BEARING ON PERFORMANCE.

►*CAUTION*—Hydraguide and steering column alignment is extremely important for correct operation and should be checked whenever mounting bolts found loose (loose bolts will cause misalignment). See Steering Gear Alignment.

►*1953 STEERING COLUMN JACKET BEARING SPRING PRODUCTION CHANGE (To correct slight "lumpy" feeling): New spring, Part No. 1488451 is 2⅞" long and has 8 coils, older spring is shorter and has 5½ coils. See "Lumpy Feeling" Correction above.*

►*1953 STEERING GEAR PUMP-GENERATOR COUPLING FLANGE PRODUCTION CHANGE*—Coupling Flange Part No. 1404025 (Early Type), replaced by Part No. 1552859 (Later Type). CAUTION—Do not interchange these parts except in pairs, or damage to pump and generator can result. Both halves of coupling MUST be of same thickness.

►*1953 HYDRAGUIDE HOUSING-TO-BRACKET LOCKWASHER PRODUCTION CHANGE (To prevent housing loosening and misalignment):* New "Cone Type" lockwasher Part No. 1531726 (9/16"), and Part No. 1531725 (7/16"). When installing new lockwashers, the (concave) indented side should be placed toward the bracket, and all bolts tightened to their proper torque. *CAUTION—Do not use a flat or any type of lockwasher above or below the "Cone Type" washer.*

►*HYDRAGUIDE OIL LEAKAGE CORRECTION:* If leakage of hydraulic oil into steering gear housing noted (10W oil with heavier steering gear grease in housing), or if oil leaks noted at cross-shaft seal, install latest type oil seals as listed below and install seals exactly as specified.

►*REPLACEMENT OIL SEAL CHANGES AND INSTALLATION CAUTIONS:* Install only LATEST type oil seals when overhauling steering gear or to correct oil leaks as follows:

Oil Seal Inspection & Installation—Before using seals, inspect carefully for nicks, cuts, scores, or untrue surfaces at any point and particularly at sealing lip surface and do not use such seals. Inspect the metal-backed Cross Shaft Seals (inner and outer) for a true, flat surface of the sealing face which rests in recess counterbore in housing (must be perfectly flat and approximately 1/16" in width). This face must not be chamfered at inner or outer edges (*NOTE*—On seals which do not have metal back, a very slightly rounded face at the counterbore sealing surface is permissable). All seals must be thoroughly lubricated, internally and externally, with Lubriplate when being installed.

Steering Gear Worm Shaft Seal—No. 1483929 (DO NOT use No. 1316799 or No. 1409491). Identify seal by part number (embossed on seal) and by spring-loaded seal lip. Install with sealing lip **facing valve body.**

Steering Gear Tube Seal—No. 1316788 (all models). Install with sealing lip facing in **toward valv body.** *CAUTION*—Coupling bolt must be tight (gear will be noisy if this bolt loose).

Steering Gear Cross Shaft Seals: Use latest type metal-backed seals as listed below. Leading inner edge of seal is a rubber bead which must be compressed against shoulder in housing to prevent leakage around the outer diameter of the seal. See installation data following.

Cross Shaft Outer Seal—No. 1483930 (DO NOT use No. 1329946 or 1407753). Remove old seal with tool C3137 *(CAUTION*—use care not to damage cross shaft). If bearing being replaced, see Cross Shaft Bearing note below. Clean seal cavity thoroughly with solvent. Wrap exposed end of shaft with cellophane tape to protect seal lip, lubricate seal and slide it over shaft with spring-loaded **lip inward.** Tap seal into place with tool C3136 *(CAUTION*—tap seal only—do not drive on seal). Install snap ring with tapered surface outward (if ring can not be installed without forcing, reduce thickness by rubbing **flat** side on abrasive paper on flat surface). Snap ring should exert slight inward thrust on seal. If snap ring does not exert slight pressure on seal (depth of shoulder too great), install thin washer between seal and snap ring.

Cross Shaft Outer Bearing Note—If new bearing being installed, use tool C3113 to install bearing .005" inward from flat surface of seal recess.

Cross Shaft Inner Seal: *Different types required as follows:*

(1) Steering Gears marked 365/1-1 to 379/5-2 (seal recess ⅜" deep)—No. 1407752 (DO NOT use No. 1316799). Identify seal by part number embossed on outer surface and seal width of 3/16". This seal does not have spring-loaded lip or metal covering. Install with seal lip facing cylinder housing (use tool C3142).

(2) Steering Gears marked 379/5-2 & Up (seal r - cess ½" deep)—No. 1483931. Identify seal by seal width of ⅜", metal covering, and spring-loaded seal lip. Install with seal lip facing cylinder housing (use tool C3142).

►*REPLACEMENT SEAL RING CAUTION*—Use all NEW "O" ring seals whenever steering gear disassembled. Complete set of rings is furnished in Package No. 1450085. Lubricate all rings and seals with Lubriplate when being installed.

►*POWER CYLINDER PISTON RING CAUTION*—Rings furnished in package, No. 1316803, containing 4 phenolic rings and 1 rubber "T" ring (two packages required). **Use only set in which the rubber "T" ring is marked by spot of red dye embedded in the rubber.** *CAUTION*—If rings replaced because of breakage, clean oil pump and reservoir to remove all ring particles (may damage pump). *See Lubrication.*

►*INTERMEDIATE STEERING ARM CAUTION:* Two different types used which must not be interchanged (car will not make complete turn if wrong type installed). Identify arms as follows:

(1) All 6 Cyl. Cars & 8 Cyl. WITH Hydraguide—Arm has straight section immediately adjacent to drag link end.

(2) 8 Cyl. Cars WITHOUT Hydraguide—Arm has extra bend toward bracket at drag link end (other arm does not have this bend).

►*REPLACEMENT STEERING CHUCK (GEAR HOUS-*

C NTINUED N NEXT PA E

HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

ING) CAUTION: **TWO DIFFERENT types of POWER STEERING CHUCKS (gear housing) and BRACKETS (frame mounting bracket) have been used in production as listed below. Location of chuck-to-bracket holes differs on each type and correct type chuck and bracket must be used together. When replacing either part, identify type by measurements as detailed below and use same type replacement part.**

Power Steering Chuck—Both types same except for location of chuck-to-bracket bolt holes (all internal parts interchangeable for both types).

Identification of Steering Chuck—Place steel scale on flat surface of chuck body directly below filler plug and at right angles to worm shaft center-line (*NOTE*—Some late steering chucks DO NOT have this flat surface and are so identified as being Type "B"). Use second scale placed at right angles to first scale to measure distance up to center of bolt in frame bracket. Measurement will be as follows: Type "A"—⅝". Type "B"—1⅛".

Frame Bracket—Both types have identical bracket-to-frame bolt hole locations so that either type Steering Chuck can be installed provided that correct bracket used with it.

Identification of Frame Bracket—Place 12" scale across center-line of lower and upper chuck mounting bolt holes. Measurement from center-to-center of these two bolt holes will be as follows: Type "A"—6½". Type "B"—7".

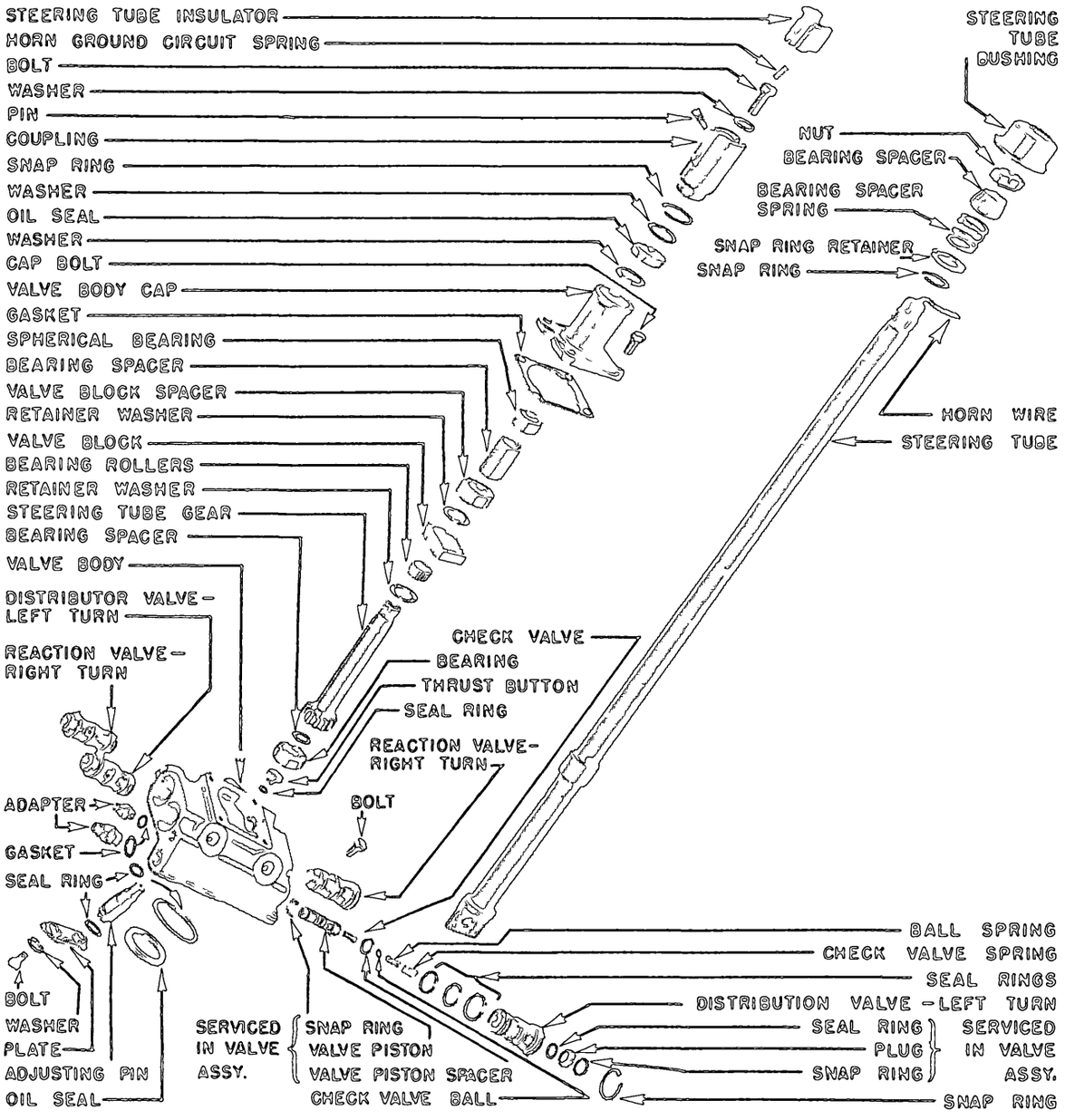
DESCRIPTION

DESCRIPTION: Consists of a conventional Worm-and-Roller type steering gear with a hydraulic power system (right and left turn pistons) and a hydraulic control system (right and left turn distributing valves and reaction valves) built in the steering gear housing. Hydraulic pressure for this system is supplied by a combined oil pump and reservoir mounted on the generator commutator end plate and driven by the generator armature shaft. Units are same as used on 1951 Chrysler except for production changes noted above.

ADJUSTMENT

▷*ADJUSTMENT NOTE—Following adjustments may be made without removing steering gear from the car:*

Spur Gear Adjustment (Valve Operating Gear Backlash)—Make adjustment for each 30° turn of the steering wheel. There are twelve teeth on each of spur gears, each corresponding tooth position must be checked for clearance. When adjusting spur gear, care must be taken to see that steering wheel when released will drop in each of positions. Backlash must be adjusted on tightest point of contact. With engine running, pull steering wheel upward and release it. If wheel will not drop in each of 12 positions, spur gear adjustment is too tight. From under hood, loosen adjusting plate lock bolt. Then, with steering wheel held in pulled-up position by tight spot, turn adjusting plate in counter-clockwise direction until wheel will drop. Retighten lock screw and recheck steering wheel in all positions. If adjusting plate is turned as far as it will go from prior adjustment, remove bolt, withdraw adjusting plate and move it to its next serration. Then adjust as outlined above.



HYDRAGUIDE CONTROL VALVE & STEERING SHAFT ASSEMBLY
(VALVE BLOCK SPACER & BEARING SPACER NOT USED IN 1953)

Roller Tooth & Worm Gear Mesh—Due to light loads on worm and roller, an adjustment will be rarely necessary. When required, as when there is a complaint of "lumpy" or "high spot" feeling in steering at or near straight-ahead position, proceed as follows:

1. Disconnect drag link from steering gear arm, remove drain plug, loosen piston arm set screw lock nut and completely remove the (allen) set screw.

2. While one man turns steering wheel to various positions another "feels" (See below) the clearance of roller to worm gear by moving steering arm and making cross shaft adjustment.

CONTINUED ON NEXT PAGE

HYDRAGUIDE (C nt.) (EXTERNAL OIL PASSAGE)

►*"FEEL" CAUTION—To get the "feel" of the actual lash between roller and worm gear it is necessary to first grasp the steering arm and shake it vigorously back and forth, then by using fingers and a light touch (wrist action only) feel clearance or lash. Increased effort to move the arm will result in movement of other parts of the gear and give a false impression of the true lash or clearance.*

3. After making checks at center and turning steering wheel to right and left until proper lash obtained, adjust cross shaft as follows: Remove cross shaft adjustment screw lock cap, move star washer away from gear so that screw may be turned. Loosen adjustment screw until lash felt **with steering wheel in center** position (See "Feel" Caution above). Adjust screw so that lash is just taken out at center. Install and tighten locknut on adjustment screw. Recheck adjustment as tightening of nut may effect final adjustment. Turn steering wheel ⅛ (45°) turn in either direction and check for lash. At ⅛ turn there should be a very slight amount of lash and at ¼ turn some lash should be felt. Install (allen) set screw and tighten securely. Tighten set screw lock nut securely, install drain plug. Connect drag link, fill system with oil and bleed gear by turning steering wheel from one side to other for approximately 10 complete turns.

►*CAUTION—Steering gear hydraulic system must be bled of all air. See Bleeding Instructions below.*

BLEEDING HYDRAULIC SYSTEM: *CAUTION—Before removing reservoir cover, carefully clean cover and adjacent surfaces to prevent possibility of dirt entering the system.*

1. Fill reservoir slightly higher than normal, place cover on reservoir.
2. Start engine and allow to run for short time to circulate oil through hoses and chuck, stop engine and refill reservoir to proper level (see below). NOTE —If gear chuck contained no oil, filling operation may have to be repeated until level remains constant.
3. With engine running at idle speed, turn steering wheel back and forth several times from extreme right to left.
4. Refill reservoir to proper level (see below).
5. Re-install reservoir cover.

LUBRICATION

LUBRICATION: Power Steering Hydraulic System. Check oil level every 1000 miles. *CAUTION*—Do not remove reservoir cap or filler plug with engine running and use extreme care to prevent dirt getting into system when reservoir open.

Recommended Oil—SAE 10W Engine oil (use SAE 5W for temperatures under 10°F. or dilute regular oil with approximately 8 oz. of kerosene).

Oil Level in Reservoir—Maintain oil level ½" above top of filter element (oil level mark is stamped on inside of steel reservoirs — aluminum type not marked). *CAUTION*—This level supersedes previous specifications.

Cleaning Oil Pump & Reservoir—*to remove foreign materials which may damage pump (must be done when power cylinder repaired or when broken power cylinder piston rings noted):*

1. Remove both oil lines completely and blow out lines thoroughly with air. *CAUTION*—lines must be re-installed correctly (reversing lines will cause damage to steering gear seals).
2. Remove pump and reservoir assembly from generator but **do not disassemble pump or remove reservoir from pump body.**
3. Remove reservoir cover and filter element, drain reservoir. *CAUTION*—Use care not to allow dirt and foreign material which collects in center of filter element to fall down into pump passages.
4. Remove flow control (divider) valve and pressure relief valves from pump body, remove passage plug from bottom of pump body.
5. Blow out all passages with air *(CAUTION*—use air that is free from moisture and be careful that dirt does not enter pump).

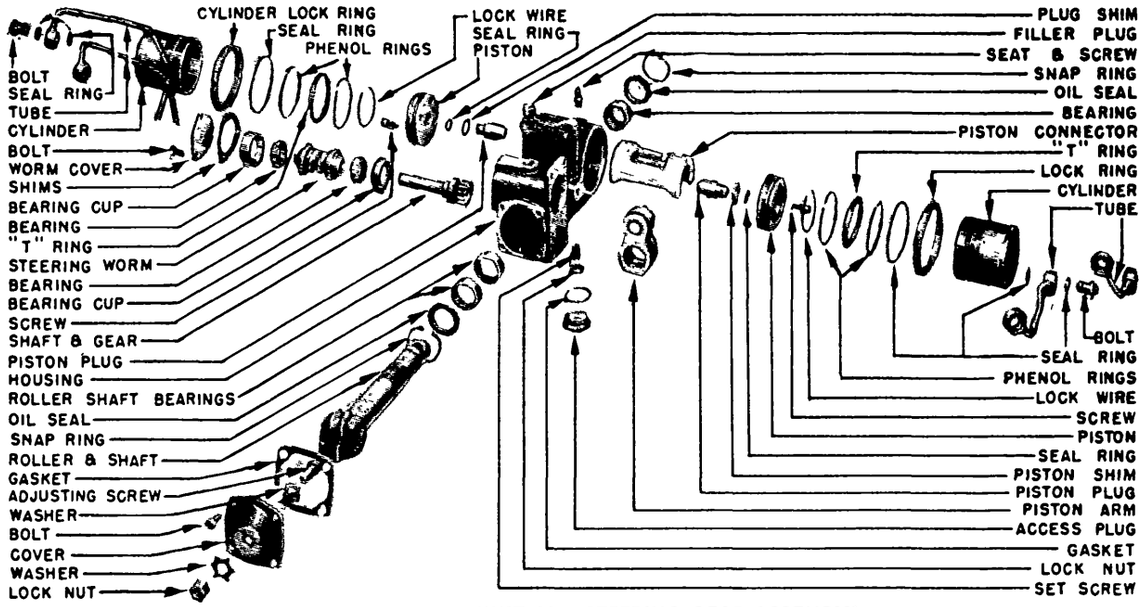
CAUTION—Make certain that four small drill passages in center of reservoir are thoroughly cleaned out (small pieces of phenolic or "T" rings may lodge in these passages). If these passages not clear, oil return from gear chuck will be restricted causing high pressures within the steering gear.

6. Inspect filter element *(NOTE*—foreign material entering filter from hydraulic system will be trapped inside element). Clean or replace filter element.

►*CAUTION—Do not wash or immerse filter element or pump in solvents or other cleaning material which may cause damage.*

7. Inspect flow control valve and pressure relief valve and carefully remove all burrs.
8. Reassemble valves in pump body, install pump and reservoir on generator and connect oil lines *(CAUTION*—Do not interchange lines which would cause damage to steering gear seals), fill reservoir with CLEAN oil, bleed system (see Bleeding data).

Steering Gear Worm & Roller Assembly: Check at 1000 mile intervals. Fill to level of filler plug hole with steering gear grease. *(CAUTION*—do not use pressure gun).



HYDRAGUIDE POWER UNIT AND STEERING GEAR ASSEMBLY

NOTE—SAE 90 Gear Oil used in first steering gears should be replaced with heavier steering gear grease.

TESTING

HYDRAULIC PRESSURE TEST: Use special gauge C-3102 assembly which is designed to be connected to pressure hose connection at pump so that pressure can be checked while unit is operating.

1. Connect gauge C-3102 in the pressure line between pump and hose. Start engine and turn steering wheel. If gauge does not show at least 500 lbs. pressure when steering wheel is in either extreme position, check the pump by turning the shut-off valve to its closed position. If the pressure does not gradually increase as the valve is closed, the flow control valve in the pump may be stuck in an open position or the drive coupling may be broken, *See PUMP below.* If 500 lbs. pressure does show on gauge with engine idling, the pump is in good condition; and trouble is probably in steering gear assembly.

►*TESTING NOTE*—If a gauge is not available, a fairly accurate way of making the test is as follows: Start the engine and turn the wheel to both extreme positions. If the high pressure hose flexes, the pump is in good condition. Look for trouble in the gear assembly. If the high pressure hose does not flex, lack of pump pressure is indicated. See below.

TROUBLE SHOOTING

NO POWER ASSISTANCE (with engine running):

1. **Hydraulic Pressure**—Check hydraulic pressure (see Testing above).
2. **Pump**—Remove reservoir cover and **with plug or finger held over center hol at top of filter start** engine and turn steering wheel. If oil flows through filter, stuck flow control valve plunger is indicated. Shut off engine and free the valve as follows: Disconnect high pressure hose at the pump fitting and insert a ¼" clean blunt probe against valve.

CONTINUED N NEXT PAGE

HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

If valve moves inward 3/16" to ¼", then it was stuck open. Remove valve and clean with crocus cloth to remove foreign material or scores; reinstall and test. Pressure should be obtained on extreme turns of 500 lbs. on gauge, or without gauge, the high pressure line should flex. If this does not correct condition, check coupling.

3. Coupling—Remove pump and coupling from generator. Remove snap ring that attaches coupling to pump shaft and remove coupling. If coupling is damaged, turn pump drive shaft at least ten revolutions. If shaft turns freely, install a new coupling on pump. Insert tongue of pump shaft into slot of coupling and fasten with snap ring. Then reinstall pump. If pump shaft binds when turned by hand, replace both pump and coupling. If generator shaft is damaged, repair generator.

4. Drive Belt—Check condition of the fan and generator drive belts and pulleys. Check belt adjustment. See Generator Belt Adjustment on car model page.

5. Steering Gear Assembly—Erratic lack of steering assistance (occasionally or repeatedly) may be due to broken power cylinder piston rings (phenolic rings or rubber "T" rings). Replace piston ring assemblies.

▷*CAUTION—If broken rings found, or if pieces of ring noted when draining system, Oil Pump and Reservoir should be cleaned (see LUBRICATION above).*

POWER ASSISTANCE LACKING IN ONE DIRECTION (Car steers easily in one direction but greater effort required to turn in opposite direction):

1. Steering Gear Misalignment—Check and correct alignment of steering gear and steering column jacket. *See Steering Gear Alignment.*

2. Control Valve Assembly—Check all reaction and distribution valves for correct assembly and installation. Make certain all valves are clean and that bleeder hole in check valve is open.

SENSITIVE STEERING (Too much assistance—front wheels tend to turn too far or too quickly): Can be detected without turning wheels by tendency of engine to slow down, and pressure hose from pump expanding when engine accelerated (hose may also show some seepage). Test as follows:

1. Install gauge and valve (see No Power Assistance Test above). Without turning wheels, accelerate engine and note pressure. If pressure excessive (300-400 lbs.), flow control valve sticking in closed position is indicated. Correct as follows:

2. Remove flow control valve (directly behind large plug to which high pressure hose connected), clean out all foreign material and polish valve with crocus cloth. Re-install valve and check for free movement.

3. Recheck pressure. Gauge should show 30-60 lbs. when engine accelerated.

NOISY OPERATION:

1. Low Oil Level—If steering wheel is turned while engine is not running, oil will be lost through reservoir vent and air will be drawn into system resulting in noisy operation. Replenish oil supply and bleed system. *See BLEEDING HYDRAULIC SYSTEM above.*

2. Singing Relief Valve—Indicates that the steering wheel is being held in either extreme position, or against curb. Release steering wheel.

▷*CAUTION: Do not hold steering gear in either extreme position and accelerate engine at same time. Excessive heat will be generated and may cause damage to pump.*

3. Banging or Cracking Noise or Thump when turning corners—Indicates loose clamp bolt on steering arm (tighten to 120 ft.lbs. using a torque wrench), loose mounting bolts, or misalignment between steering column jacket bearing and steering tube. *CAUTION*—when tightening steering gear-to-bracket bolts or bracket-to-frame bolts, alignment must be checked. *See Steering Gear Alignment.*

4. Valve operating gears out of adjustment. *See Spur Gear Adjustment.*

5. Rubber insulator between steering gear and steering column jacket worn or out of place.

LEAKS:

1. Between Reservoir and Pump—Remove lower plug on pump and drain reservoir. Check to see that the four reservoir to pump screws are tight. If they are tight, the leak is probably due to "O" rings not sealing. Remove the four screws and lift reservoir from pump. Replace all six "O" rings in proper position and examine pump and reservoir surfaces for flatness and freedom from surface defects. Tighten screws to 7-12 ft. lbs. torque.

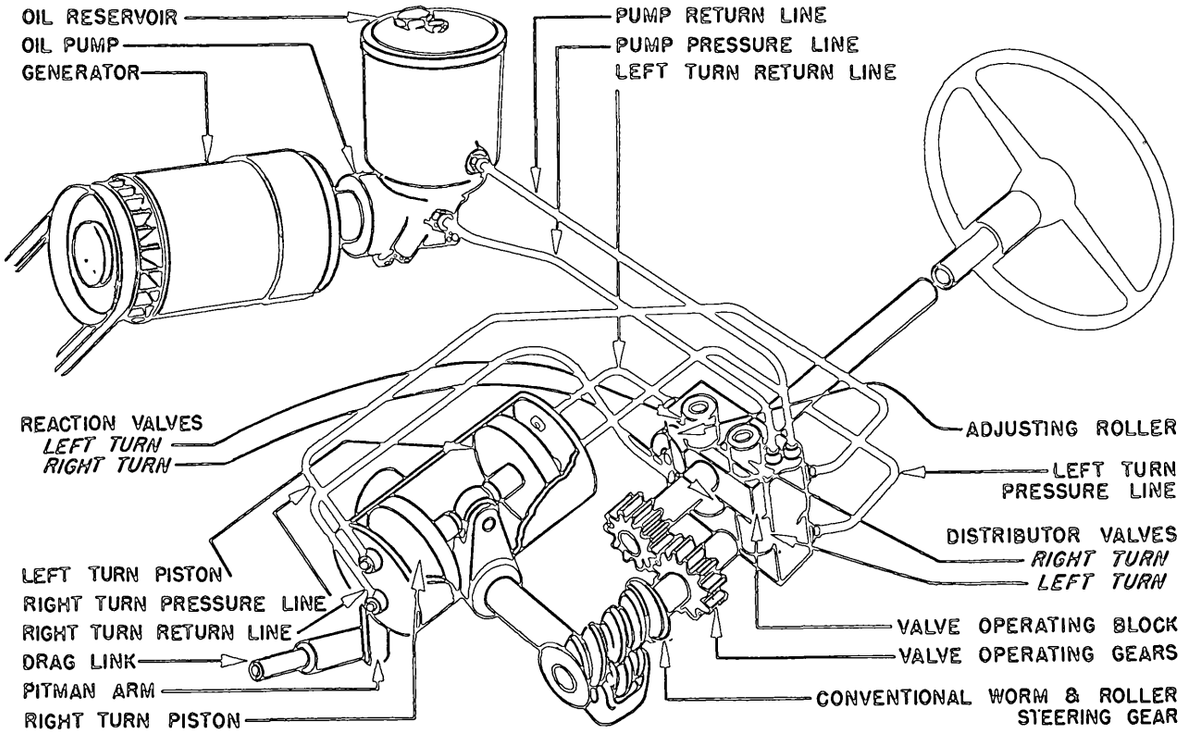
2. At Banjo Fittings—Cross-over lever on gearshift may interfere with fluid lines going to gear assembly and cause leaks at banjo fittings. Loosen banjo fittings. Pry between the lines and gearshift lever rod and force lines and rods apart, allowing fitting to move a little. While holding lines apart, tighten fittings to 16-20 ft. lbs. torque.

3. Between Cylinder Mounting Lock Rings & Housing: Replace "O" ring gaskets as follows: Back off lock ring far enough to permit removal of old "O" ring, disconnect banjo oil line connections on cylinder, slip new "O" ring (use two rings if necessary) under pipe connections and stretch ring over lock ring. Apply lubriplate to "O" ring and tighten lock ring to 35-45 ft.lbs. torque.

EXCESSIVE PLAY IN STEERING WHEEL:

1. Check and adjust valve operating gears (spur gears) and steering gear worm and roller. *See ADJUSTMENT.*

2. Tighten steering gear-to-bracket bolts to 65-75 ft.lbs. torque and bracket-to-frame bolts to 50-56 ft.lbs. torque with a torque wrench. *See Hydraguide Mounting Bolt Loosening Correction.*



HYDRAGUIDE STEERING GEAR HYDRAULIC CIRCUITS

REMOVAL

Chrysler (1951-52), DeSoto (1952-53):

1. Center steering gear in straight ahead position.

2. Remove horn blowing ring ornament by pushing in and turning to left. Remove ornament retainer spring and pad. Remove three attaching screws holding horn blowing ring in place and remove ring. Disconnect wire from terminal on travel plate and insulator assembly. Remove bushing, travel plate, horn blowing contact ring spring and triangular ground ring. Then curl wire into steering gear tube to make room for pilot of steering wheel puller. Remove nut and pull wheel with Tool C-612.

3. Remove clutch, brake and accelerator pads and remove shrouds around hand brake and at bottom

CONTINUED ON NEXT PAGE

HYDRAGUIDE (C nt.) (EXTERNAL OIL PASSAGE)

of steering gear column jacket. Fold carpet back away from pedals and steering column and remove three screws and draft pad from around steering column.
4. Disconnect accelerator rod from bell crank just behind engine at fire wall. Then remove screws from the section of floor board around pedals and steering column, and remove floor board, accelerator pedal and rod as an assembly.
5. Disconnect transmission cross-over rod by removing retainer clip.
6. Disconnect horn wire from steering column jacket connector. Then remove two attaching screws and remove connector from steering column jacket. ***(CAUTION—Remove connector from steering column tube BEFORE jacket assembly is withdrawn from tube.)*** Disconnect the six turn signal wires by pulling three wires out of each connector plug.
7. Slip vacuum hose clamp off of hose and disconnect hose from vacuum line (if brake booster used).
8. Disconnect transmission shift rod from shift lever control arm. Remove the two top capscrews attaching steering gear assembly to frame (leave the bottom screw in place until after drag link is disconnected).
9. Raise front of car and from underneath, disconnect the drag link from the steering arm. Disconnect cable and remove starter. Disconnect the two clips holding vacuum line to frame so line can drop down (cars with brake booster only). Remove bolts attaching master cylinder push rod to brake pedal. Remove brake pedal bushing lock and slide pedal outward on shaft far enough to clear pedal return stop screw. Then move pedal backward toward seat.
10. From under hood, disconnect pressure and return hoses running between gear housing valve body assembly and the pump and reservoir. Disconnect hoses at housing valve body and tie up out of way to avoid dripping oil. Install caps on the two hose fittings on housing valve assembly.
11. Reach through floor board opening from front compartment and loosen the remaining capscrews holding gear assembly to frame. ***Do not remove screw.*** From behind instrument panel, remove the 5/16" nuts from two studs holding steering column jacket upper shroud to instrument panel.
12. Lower steering column jacket and shroud assembly until studs are free. The entire column assembly and gear housing pivots on the remaining housing to frame bracket capscrew. Pull entire column jacket and shroud assembly off steering gear tube. Remove the insulator pin that connects steering tube to tube coupling on housing assembly and remove tube.
13. Remove the remaining housing to frame capscrew and withdraw the steering gear assembly out through the front compartment.

Chrysler (1953):
1. Remove horn blowing ring, turn steering wheel to extreme left position (to allow for removal of drag link), remove steering wheel.
2. Remove steering column jacket toe pad, floor mat, clutch and brake pedal pads. Remove the two steering column to instrument panel screws and clutch and brake pedal floor pan toe board cover.
3. Remove clutch pedal shaft horseshoe lock and slide pedal sideways and toward rear of car to allow clearance for steering gear assembly removal.
4. Remove shift linkage clevis pins from bell crank assembly in engine compartment, disconnect directional signal inidcator wires and pressure and return hoses from steering column assembly.
5. Raise car off floor, remove left front wheel and drag link. Remove side shield, then steering gear attaching bolts.
6. Reinstall front wheel, lower car and remove steering gear assembly through toe board opening.

STEERING GEAR OVERHAUL

►***OVERHAUL NOTE*—The Gear Housing, Valve Body, and the Pump and Reservoir Assembly comprise the three major units of Hydraguide. Overhaul of each unit is outlined separately below.**

►***CAUTION—Cleanliness is extremely important in overhauling the steering gear to prevent entrance of dirt into hydraulic system. Thoroughly clean entire assembly before disassembling any parts and use great care to keep dirt out of the hydraulic system.***

VALVE BODY OVERHAUL: Removal from Gear Housing: Remove clamp bolt from steering arm, remove arm from shaft using puller C-143.
1. Remove piston arm access plug from bottom center of cylinder housing, and drain unit by turning so that oil will run out of all hose connections. Remove filler plug in worm gear housing and drain thoroughly.
2. Loosen the power arm adjusting screw locknut and remove adjusting screw with an Allen wrench. Remove bolt from steering gear arm and remove arm from cross-shaft (if not removed previously).
3. Remove tube fitting bolts ***(using a socket and not an open end wrench).*** Remove the long hydraulic tube first, then the short one and then the other two. ***CAUTION—Remove the two "0" rings from each fitting to avoid losing them.***
4. Remove the four capscrews holding valve body worm and roller shaft and cylinder housing, separate valve body housing from cylinder housing.

Disassembly of Valve Body:
1. Remove snap ring from each valve using snap ring pliers Tool C-3106. Withdraw each valve assembly from valve body. Remove worm gear seal and large and small "0" rings.

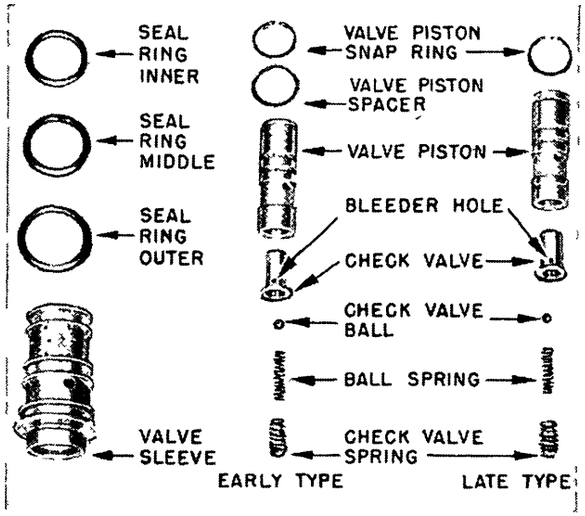
►***CAUTION—Mark each valve assembly to insure correct reassembly. When valves are disassembled for cleaning and inspection, keep the component parts of each valve together. THESE PARTS NOT INTERCHANGEABLE.***
2. Clean all valves thoroughly in solvent, then remove free floating check valve from each valve sleeve and check the bleeder hole. If hole is plugged make sure it is cleaned out. A plugged hole will cause faulty steering. Blow dry with compressed air reassemble check valve and piston on valve sleeve.

►***REPLACEMENT VALVE CAUTION*—Two types of distribution and Reaction Valves have been used (see illustration). When replacing early type valve VALVES MUST BE REPLACED IN PAIRS (both Distribution or both Reaction valves must be same type).**
3. Remove the four capscrews attaching the valve body cap to the valve body, lift out the steering gear tube gear and cap assembly. Disassemble as follows:

Valve Body Cap Disassembly: Clamp steering tube coupling in a vise. ***CAUTION—Do not clamp the tube gear or valve cap casting in the vise which might damage these parts.***
1. Remove bolt holding coupling to the tube gear.
2. Mount puller Tool C-3112 (adapted to C-293 puller stand) on valve cap and steering tube assembly in order to pull coupling from shaft, then slide tube gear, valve block, valve block spacer and steering tube bearing out of valve body cap.
3. Remove oil seal snap ring, then lift out the outer washer. Drift out the inner washer and oil seal using a drift of suitable size.

NOTE—Check steering gear tube gear oil seal for leakage and inspect tube gear, bearing rollers and valve block for damage or wear.

Valve Body Cap Reassembly: Install inner oil seal washer against shoulder in cap, then install oil seal using Tool C-3143 ***(oil seal lip inward)***, far enough to allow installation of outer washer and snap ring. Install outer washer and insert snap ring. Position steering tube gear assembly in cap, then install coupling on tube gear and secure with bolt and washer. Tighten to 20 ft. lbs. torque.



CONTROL VALVE ASSY. CHANGES

Valve Block Adjusting Pin: Evidence of leakage around the valve block adjusting pin, or a bent adjusting plate, indicates that the steering gear has been turned while the hydraulic line fittings were capped or that the lines to the pump were cross-connected. Remove adjusting pin and install new oil seal as follows:

►***PRODUCTION CHANGE CAUTION—On later models, adjusting pin is retained by snap ring and pin is removed differently (see 1B below).***

1A. On early cars (without adjusting pin snap ring), remove adjusting plate bolt and washer using care not to disengage plate from adjusting pin splines, pull out on plate and rotate it back and forth at same time to withdraw pin from the valve body.

1B. On later cars (with adjusting pin r tained by snap ring), remove adjusting plate bolt and washer, remove plate, remove snap ring retaining adjusting pin, remove pin.
2. Remove spur gear thrust button and seal, spacer, and adjusting pin roller assembly from within the valve body.

CONTINUED N NEXT PAGE

HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

3. Inspect needle bearings in adjusting pin roller for wear or damage and replace if required. Use tool C-3141 to drive out old bearing and opposite end of tool to install new bearing in roller.
4. Install a new seal ring on spur gear thrust button, then install thrust button, spacer, and roller assembly within valve body.
5. Install new seal on adjusting pin, insert pin into valve body from outside and make certain that it engages roller assembly and spacer. On later cars, install pin retaining snap ring, install adjusting plate on splines of adjusting pin so that space is provided to allow plate to swing in a clockwise direction for adjustment after steering gear reassembled, install adjusting plate bolt and washer.

Reassembly of Valve Body: Use all NEW "O" ring seals and gaskets, lubricate all seals with Lubriplate
1. Insert steering tube gear and cap assembly in valve body using a new gasket, tighten four cap bolts to 16-20 ft. lbs. torque.
2. Install the four valve assemblies in valve body *(CAUTION—each assembly must be returned to same cylinder from which removed)*. Secure valve assembly with snap ring installed with beveled edge out.
3. Install large and small seal rings in valve body.
NOTE—Worm gear seal should be installed during valve body installation on gear housing (see below).
4. Remove valve block adjusting plate bolt and turn adjusting plate counter-clockwise (necessary to permit installation of valve body on housing.
AFTER worm gear and cylinder body reassembled, install valve body on gear housing. See "Valve Body Installation on Gear Housing" (below).

WORM GEAR & CYLINDER BODY: *CAUTION*—Before disassembly, scribe index marks on both cylinders and body to insure reassembly in same positions (mark one cylinder with single line, and other cylinder with double line to prevent interchanging cylinders). DO NOT punchmark cylinders.

Disassembly of Power Cylinders & Pistons:
1. Loosen both cylinder lock rings with spanner Tool C-3107, back rings off several turns. Then install two special studs, Tool C-3108, into tube fitting holes of cylinder and insert pry bar between studs and loosen cylinder in housing (DO NOT REMOVE CYLINDER). Loosen other cylinder in like manner.
2. After loosening cylinders, unscrew and remove BOTH CYLINDERS AT THE SAME TIME. *(CAUTION—If both cylinders are not removed at the same time, damage to piston rings may result).*
3. Pry the lockwire from the end of one piston with a screw driver. Remove Allen head screws from piston, then slide piston away from connector, and remove from cylinder.
4. Swing piston arm and roller against plug of remaining piston by turning the worm gear. Piston and connector assembly can then be removed from cylinder body.
5. Examine the cylinder bores and pistons for score marks. (Very light scoring or scratches can be removed with crocus cloth). Replace any part that shows excessive wear or damage. Check phenol rings and rubber "T" rings and replace if necessary.

▷*PISTON RING REPLACEMENT CAUTION*—Use only piston ring sets (No. 1316803, containing 4 phenolic rings and 1 rubber "T" ring) in which rubber "T" ring is marked by spot of red dye imbedded in the rubber. *See Power Cylinder Piston Ring Caution in CHANGES & CORRECTIONS (above).*

Disassembly of Steering Gear Shaft & Worm Shaft:
1. Remove snap ring retaining steering gear shaft outer oil seal and remove seal using Tool C-3137.
2. Remove steering gear shaft adjusting screw locknut and star washer. Turn shaft to center position. Next, remove the four shaft cover bolts and push out shaft to allow removal of cover. Turn adjusting screw in and then slide screw and cover out of slot in end of shaft.
3. Withdraw steering gear shaft from piston arm and housing, remove piston arm from housing.
4. Remove the three worm cover bolts and lift off cover and shims. *(Retain shims together for reassembly).* Remove worm gear lower bearing cup, bearing and worm from housing.
5. Check roller tooth on steering gear shaft for free movement. If there is side play or sticking bearings, install a new shaft and roller assembly.

Steering Gear Shaft Roller Bearing Replacement: Inspect the three roller bearings that support steering gear shaft. If they are damaged or have no end play, or not free, install new bearings:
1. Remove steering gear shaft inner oil seal snapring, and pry out inner oil seal with a screw driver.
2. Remove steering gear shaft inner and center bearings using Tool C-3114, remove outer bearing using Tool C-3113.
3. Install new center bearing using Tool C-3114 (place tool against lettered side of bearing), then install new inner bearing using the same tool.
4. Install inner bearing oil seal (see Caution below) using Tool C-3142 with *lip of seal toward inside.* Use tool C-760 to install inner bearing oil seal snap ring. Make certain that ring is seated in groove and that *beveled edge of ring is outward.*

▷*REPLACEMENT OIL SEAL CAUTION—Use only LATEST type oil seals. See Replacement Oil Seal Caution in CHANGES & CORRECTIONS (above).*
5. Install outer bearing using Tool C-3113.
NOTE—Outer bearing oil seal is installed as part of reassembly procedure AFTER steering gear shaft installed in housing.

Reassembly & Adjustment of Worm & Roller Shaft: Install the worm assembly in the housing, install lower cover with all original shims, tighten cover bolts securely. Turn worm gear throughout entire range and check for binding or excessive free play. Worm should turn with slight drag but no binding. If worm binds, ADD shims under cover; if worm is too free, REMOVE shims from under cover. When correct adjustment secured, use sealer on cover bolts and tighten evenly to 17 ft. lbs. torque.
ADJUSTING SHIM NOTE—Adjusting shims color-marked for identification and furnished in following thickness: .003"—White, .006"—Red, .011"—Gray.

Adjustment of Power Piston Clearance: BEFORE installing power cylinder parts, complete the power piston assembly out of the housing by mounting both pistons and plugs on piston connector and placing the piston arm roller in position between the piston plugs. Then check clearance between piston arm roller and piston plugs with a feeler gauge. This clearance should be as close to ZERO as possible. Adjust by varying thickness of shims between each piston and its plug. After this adjustment completed, remove one piston from connector (for installation) but keep piston and adjusting shims together to insure correct assembly.
ADJUSTING SHIM NOTE—Adjusting shims furnished in following sizes: .107", .109", .111", .113", .115", .117", .119".

Steering Cross Shaft Installation:
1. Install the steering shaft and piston arm in the housing so that shaft splines mesh with piston arm splines. Install steering gear shaft cover and adjusting screw to slot in end of shaft. Turn adjusting screw counter-clockwise to draw shaft cover up to the housing. Coat cover bolts with suitable sealer and install. Tighten bolts securely.
2. Install steering gear shaft outer oil seal with lip to the inside. Use Tool C-3136. Install outer snap ring with beveled side out, and eyes in ring toward bottom of unit. Snap ring in this position will aid in removing ring when steering gear assembly is installed in car.

▷*REPLACEMENT OIL SEAL CAUTION—Use only LATEST type oil seals and observe cautions listed in Replacement Oil Seal Caution in CHANGES & CORRECTIONS (above).*
3. Install pitman arm on roller shaft and tighten clamp bolt to 100-120 ft. lbs. torque.
4. Set the worm gear at center position (mark on worm gear must be at top of gear) and pointing toward top center of gear housing. Then with one hand on pitman arm, turn worm gear to check backlash between worm and roller. Turn shaft adjusting screw so that there will be no backlash felt while the worm gear is turned between approximately 90° either side of center line. Now install the star washer and locknut on shaft adjusting screw.

▷*CAUTION—DO NOT tighten piston arm-to-steering cross shaft Allen set screw until AFTER Power Cylinders installed and adjusted.*

Power Cylinder Installation & Adjustment:

▷*CAUTION—Procedure below supersedes previous recomendations and will prevent piston ring breakage when adjusting cylinders for correct piston travel.*
1. With piston arm roller turned to either extreme position, install piston and piston connector assembly to the housing with the piston plug bearing against piston arm roller. Then, by turning the worm gear, piston arm will swing back to center as the piston assembly is pushed in. Assemble the other piston and plug assembly to opposite side of piston connector and reinstall Allen head screws *(CAUTION*—make certain that adjusting shims installed between piston and plug), tighten Allen head screws in both piston heads to correct torque, install piston lock wires.
2. Center the piston assembly so that pistons extend an equal amount on both sides of the housing. Lubricate cylinder bores with engine oil, lubricate piston "T" rings and phenolic rings with Lubriplate or engine oil.
3. Install both cylinders over the pistons using extreme care not to crack or distort piston rings as they enter the cylinder bores (CAUTION—install cylinder on same end of housing from which they were removed). AFTER both cylinders started on the pistons, thread BOTH cylinders into housing simultaneously until both cylinders bottom in housing.
4. Turn the worm shaft gear to the left and at the

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HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

same time unscrew the upper cylinder *(CAUTION—*keep piston head against or very close to top of cylinder during this opeartion), continue to turn worm shaft to a total of EXACTLY 1⅝ turns from the beginning center position *(CAUTION—*DO NOT exceed 1⅝ turns with piston bottomed in the cylinder. If scribe marks made before disassembly do not line up at this point, turn the cylinder IN *(CAUTION—*NEVER turn cylinder farther out) to align hydraulic tube fitting holes in cylinder and disregard scribe marks (may require turning cylinder in as much as ½ turn from scribe marks). After cylinder adjusted, return worm shaft to center position.

5. Adjust opposite (right turn) cylinder by repeating step 4 (above) and turning the worm shaft to the right exactly 1⅝ turns.

6. After both cylinders correctly adjusted, recheck rotation of worm shaft gear. Shaft rotation MUST NOT EXCEED 1⅝ turns to left or right from center position to the point where piston contacts cylinder head.

7. Install special studs, Tool C-3108, in tube fitting holes in cylinder, place a bar between the studs to hold the cylinder from turning, tighten cylinder lock ring to 35-45 ft. lbs. torque. Tighten both cylinders in this manner.

8. After both cylinders installed and adjusted, turn worm shaft to center position, install Allen set screw in piston arm and tighten screw to 30-35 ft. lbs. torque (weld 2" length of ¼" Allen wrench in a socket to enable use of torque wrench in tightening this screw). Tighten locknut to 16-20 ft. lbs. torque. Install access plug in housing using a new gasket. ***CAUTION—A loose piston arm set screw will result in a lumpy or catching feel in the steering gear.***

Valve Body Installation on Gear Housing:

1. Install worm shaft gear seal as follows: lubricate seal thoroughly with Lubriplate (internally and externally). Slide seal over worm shaft gear carefully to avoid damaging seal lip on gear teeth with **sealing lip facing valve body,** make certain that seal fits in slight recess in gear body and that lip bears on journal of worm shaft gear.

2. Coat valve body-to-gear chuck "O" ring with Lubriplate and install this ring.

3. Turn worm gear to center position (mark on worm gear must be at top and pointing toward top center of gear housing), turn spur shaft gear so that slot in steering tube connector is parallel to valve assemblies, mesh gears and install valve body on gear housing. Install two capscrews at opposite corners of valve body and tighten these screws evenly to gently draw valve body into position against gear housing *(CAUTION—*see that seal enters recess in valve body and use extreme care not to damage seal as the two bodies are drawn together). AFTER valve body seated firmly on gear housing, install remaining two capscrews, tighten all screws evenly (tighten opposing screws together) to correct torque of 16-20 ft. lbs.

CAUTION—If valve body not installed exactly as detailed above, valve housing may be distorted or seal cocked in its recess.

4. Eliminate backlash between the worm spur gear and the tube spur gear by making a preliminary adjustment of the valve block adjusting plate as follows: turn adjusting plate clockwise until all backlash is taken up at the coupling. Install adjusting plate bolt and tighten securely. *NOTE—*Further adjustment may be required after steering gear has been installed in the car. *See ADJUSTMENT.*

5. Coat new seal rings with Lubriplate, insert rings in hydraulic tube fitting, install tubes in reverse order of disassembly (install second longest tube from lower reaction valve to right cylinder first, then install shortest tube from upper reaction valve to left cylinder, finally install remaining tubes). Tighten tube fitting bolts to 16-20 ft. lbs. torque. ***STEERING GEAR ASSEMBLY IS NOW READY FOR INSTALLATION IN CAR.***

INSTALLATION

►**1953 Valve Block and Bearing Spacer Note**—Valve block spacer and bearing spacer used on 1951 & 1952 Models is not used on 1953 Models with redesigned valve body cap.

►**1953 Change—Bleeder Hole** has been eliminated from top center of power cylinder.

*CAUTION—*It is very important to remove shipping caps from fittings on any gear assembly received for replacement, before turning the coupling. Seals at cross-shaft will be upset if caps are not removed.

1. Install steering gear arm to steering gear assembly with curve of arm toward the assembly. (If not already installed). Tighten to 100-120 ft. lbs. torque.

2. Remove caps from pressure and return hose connections on the assembly and turn steering gear tube coupling to extreme right or left position. Then turn coupling back approximately 1¾ turns to center position, and then place punch mark on solid part of coupling to indicate center position.

3. Install steering gear assembly through floor board opening. Using a screw driver, hold lower bolt hole of assembly in alignment with hole in frame bracket and install cap screw. NOTE—Tighten bolt sufficiently to hold assembly rigid for installation of steering tube and jacket, however, leave screw just loose enough so that gear assembly can be pivoted up and down after steering tube and jacket are installed.

►***CAUTION—Before installing steering gear tube, make sure that the small coil spring is positioned in the rubber insulator at the end of tube. Also make certain that the steering tube snap ring retainer is cupped over the snap ring and not over the column jacket bearing spring.***

4. Check to see that snap ring, ring retainer, column jacket bearing spring and bearing spacer are installed in that order on upper end of steering tube. (Refer to illustration).

5. Install rubber chuck-to-jacket insulator over upper casting of chuck.

6. Install steering gear tube by indexing the insulated tongue into the slot of the tube connector in such a way that the punch marks on coupling and the master serration for steering wheel on upper end of tube are in alignment. Then connect tube to coupling by installing the tube insulator pin and peen both ends of pin.

NOTE—Proceed as follows for steering column alignment.

Chrysler (1951-52) & DeSoto 6 (1953)

7. Install steering column jacket assembly by sliding downward over steering tube. Install a ¼" thick spacer Tool C-3109 between the flanged end of jacket and the rubber insulator on steering gear chuck. As the jacket is pushed down against the spacer, the collar at upper end of chuck will engage the spun-in collar on inside of jacket to form a rigid connection between the jacket and chuck. The purpose of the spacer is to align the jacket with gear housing so that the entire assembly can be lined with center of instrument panel opening.

8. Pivot steering gear and column jacket assembly upward so that studs on jacket shroud will enter holes in instrument panel, and place rubber insulater between jacket shroud and instrument panel.

9. From under hood, install the other two cap screws that attach upper side of gear assembly to frame bracket. Then tighten all three cap screws to 75 ft. lbs. torque.

10. Carefully check to see if center line of jacket and shroud assembly line up with center line of opening in instrument panel. If it does not line up, loosen the two upper bracket-to-frame screws from under hood and move entire gear and jacket assembly either to right or left as necessary. Retighten screws to 50-65 ft. lbs. torque. Remove alignment spacer installed in step 7 and push jacket downward against chuck insulator. Then proceed with Item 11 under "All Models" below.

Chrysler (1953) & DeSoto 8 (1952-53)

7. Install steering column jacket and shift tube assembly over steering tube.

8. Install both halves of column shroud on column jacket.

9. Push down on column assembly until the column jacket bottoms on rubber grommet on face of the rear chuck valve body.

►*NOTE—*Steering column assembly contains a spring which forces upward on column jacket. When assembling column jacket assembly to valve body grommet, pressure must be applied to column assembly to push column jacket downward to allow grommet and column to go all the way down on valve body.

10. Tighten shroud to instrument panel screws while holding jacket down.

►*ALIGNMENT NOTE—*Spacing at bottom of column where it enters grommet on valve body will indicate in which direction the steering gear chuck should be moved (horizontally or vertically) to bring column into alignment with gear chuck assembly. The column jacket flange and grommet at base of column should be equally spaced all the way around entire circumference of valve body. See "Horizontal & Vertical Alignment" below.

All Models

11. Adjust the insulated wedge that slides between the jacket shroud and the lower instrument panel so that jacket shroud will fit tightly against both the lower instrument panel and the instrument cluster panel when the stud nuts are installed. *(NOTE—*This wedge is not used on C-53 models).

12. Install stud nuts from behind lower instrument panel. Install horn contact to jacket with two screws, connect horn wire to connector terminal and connect the six wires to turn signal connector. Connect transmission cross-over rod with retainer clip.

13. Connect vacuum line and fasten it to frame with two clips (cars with booster brakes only). Slide brake pedal back into position and secure with new bushing lock.

14. Connect master cylinder push rod to brake

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HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

pedal by installing bolt through push rod end and brake pedal extension. Secure with nut, washer and cotter pin.

15. From under the hood, remove the plugs from pressure and return fittings on gear housing valve body assembly and connect the hoses from pump and reservoir to fittings on assembly. Both hoses have connections of equal size at their pump and reservoir ends. Hook them up so that the line with the small fittings at its gear assembly end is connected to the pump, and the line with the large fitting at its gear end is connected to the reservoir.

16. Connect drag link to steering gear arm and lower car to floor.

17. Remove reservoir cover and add SAE 10-W to level of gasket and reinstall cover. Slip steering wheel on steering tube, start engine and while it is running turn wheel to both extremes. Shut engine off, remove cap from reservoir and fill to 1½" below gasket with oil. *CAUTION—Be sure engine is not running when reservoir cap is removed. Oil will spill into engine compartment.*

18. Replace reservoir cap and start engine. Run until oil becomes warm (5-10 minutes). Turn steering wheel to both extreme positions, hold momentarily and check for leaks. Open bleeder screw at top center of power cylinder until oil flows, tighten screw and shut off engine.

▷*CAUTION—Do not hold steering wheel in extreme travel for more than one minute. Engine should be idling during this operation.*

19. Connect transmission shift rod to shift lever control arm with washer, lock washer and nut.

20. Reconnect vacuum hose to line and secure with clamp (cars with booster brake).

21. Reinstall floor board and accelerator rod as an assembly, holding rod up against floor board as it is put in place so that rod goes beneath the offset crook in gearshift control rods. Then from under the hood, connect the opposite end of rod to bell crank behind engine at firewall. Secure floor board in place with screws. Fold mat back in place and install the clutch, brake and accelerator pads.

22. Install shrouds at bottom of steering column jacket and around hand brake.

23. With steering wheel on bench, install component parts of horn blowing mechanism into steering wheel hub in the following order:

(a) Triangular ground ring. Position ring so that screw holes line up with holes in steering wheel hub and with red dot on ring toward top of hub.

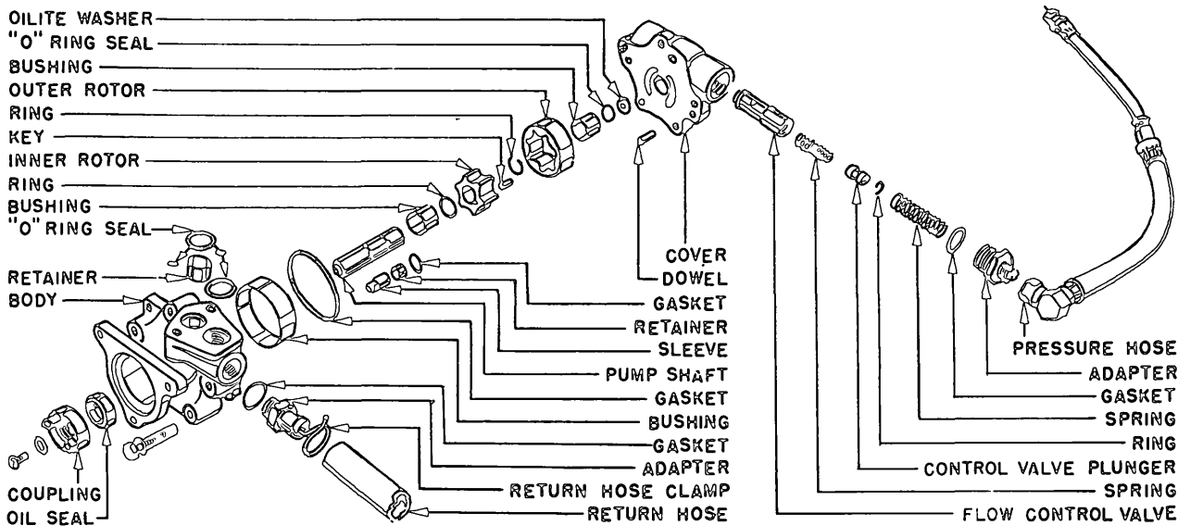
(b) Contact ring spring. Install with concave side down.

(c) Travel plate. Install so that screw holes are in proper alignment with holes in wheel hub.

(d) Install horn ring so that three screw holes also line up with holes in wheel hub. Then install three screws with fibre and rubber insulators.

24. With wheels in straight ahead position, slide steering wheel assembly into place on steering tube making sure that master groove on wheel indexes with master serration on tube.

25. Install steering wheel nut and tighten to 35-40 ft. lbs. Pull horn wire from steering tube, install bushing and connect wire to terminal on travel plate. Lay the ornament retaining spring in place, concave side down. Position ornament with three legs indexing with three slots in horn ring, push down and turn clockwise.



HYDRAGUIDE HYDRAULIC PUMP (SINGLE ROTOR TYPE)

STEERING COLUMN HORIZONTAL & VERTICAL ALIGNMENT: If spacing between column and chuck is not equal, loosen bracket-to-frame bolts and shift chuck and bracket in required direction to equalize the spacing between column jacket base, grommet, and valve body face. *CAUTION*—In some instances it may be necessary to install shims between bracket and frame to obtain sufficient movement of gear for proper alignment. Shims should be "U" shaped or flat washers and placed around bracket-to-frame bolts. *DO NOT PLACE SHIMS BETWEEN GEAR AND BRACKET.*

HYDRAULIC PUMP OVERHAUL

▷*1953 HYDRAULIC PUMP-GENERATOR COUPLING FLANGE PRODUCTION CHANGE*—Coupling flange, Part No. 1404025 (Early Type), replaced by Part No. 1552859 (Later Type). *CAUTION*—Do not interchange these parts except in pairs or damage to pump and generator can result. Both halves of coupling must be of same thickness.

▷*PUMP COUPLING NOTE*—Two different types of pump drive coupling have been used and special Pump and Generator must be used with each type coupling (special shaft used with each coupling).

1) Rubber Insulated Coupling—Oilite coupling flanges are pressed on generator and pump shafts and retained by special "thread locking" type capscrew and plain washer (lockwashers should not be used with these screws). A rubber insulator and insulator sleeve are installed between the coupling flanges to transmit the drive.

2) Metal Tongue Coupling—Tongue-and-slot type metal coupling. Coupling members are retained on shaft ends by a retaining ring and slide off after ring removed.

▷*HYDRAULIC PUMP NOTE—"Double Rotor" type pump used 1951-52. "Single Rotor" type used 1953. Removal & Installation procedures are same for both type pumps. Overhaul procedure is different as indicated below.*

HYDRAULIC PUMP REMOVAL: Disconnect the two hoses from pump reservoir assembly and catch oil from pump in a drain pan. Tie the loose ends of hoses out of the way above steering gear assembly to prevent loss of oil. Cover the ends of both hoses. Remove the three pump-to-generator screws and remove pump (*CAUTION*—do not lose coupling insulator and sleeve on pumps with rubber coupling).

Removal of Reservoir From Pump:

1. Remove cover assembly from reservoir, lift out filter element and drain oil from reservoir.
2. Install the small tapered plug Tool C-3117 and the large tapered plug Tool C-3118, into the two holes that permit passage of oil to pump (this will prevent dirt entering pump).
3. Remove the four reservoir-to-pump attaching screws and lift reservoir from pump, being sure not to lose one large rubber "O" ring and five small rubber "O" rings which are used as gaskets between pump and reservoir.

OVERHAUL OF PUMP: *CAUTION*—Cleanliness is extremely important when working on hydraulic pump. Pump should be thoroughly cleaned before disassembling, work bench should be covered with clean paper, and all parts should be kept in clean kerosene until reassembled to protect them from dirt and corrosion.

Disassembly ("Double Rotor" type): Remove drive coupling from shaft and remove drain tube from mounting flange. Then proceed as follows:

1. Remove five through-bolts and lockwashers holding pump assembly together, remove pump rear cover. Remove and discard "O" ring seal from spacer cavity.
2. Remove rear bearing snap ring from shaft. Tap side of rear spacer with a soft hammer to loosen it from locating dowels in pump body, then slide spacer and bearing off pump shaft. Remove "O"

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HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

ring seal from pump body and discard this seal.

3. Hold pump body upright with rear rotors downward and shake body to disengage rotors *(CAUTION*—hold hand under pump to catch rotors). If inner rotor remains on shaft, hook fingers under edges of rotor to pull rotor off shaft and lift out drive key as soon as it is exposed. If outer rotor remains in body, use wire hooks to lift rotor out. LIFT ROTOR OUT EVENLY TO AVOID BINDING WHICH MIGHT DAMAGE BABBITT RING.

►***CAUTION—DO NOT pry rotors out which might cause damage to rotors or babbitt ring. These individual parts NOT furnished for service. Keep each rotor set separate and re-install in same position in pump.***

4. Lift pump body off shaft and away from mounting flange, disengage dowels in flange from the body *(CAUTION*—Front rotors may remain in body and must not be allowed to drop out which may cause them to be damaged). If outer rotor remains in body, lift rotor out with wire hooks. LIFT ROTOR OUT EVENLY TO AVOID BINDING WHICH MIGHT DAMAGE BABBITT RING. If inner rotor remains on shaft, tap shaft and rotor out of bearing in mounting flange, then remove rotor from shaft and lift out drive key.

►***CAUTION—Keep each rotor set separate and re-install in same position when reassembling pump.***

5. Remove small bleed hole seal ring and large seal ring on mounting face of pump body. Discard these seals.
6. Remove bearing seals and bearing from mounting flange and rear bearing from pump spacer using Tool C-3129. Discard the oil seals.
7. **Pressure Relief Valve**—Remove 1¼" plug from bottom of pump body, lift out spring and plunger (if plunger sticks in body, rap body on wooden block to dislodge plunger).
8. **Flow Divider Valve**—Remove 1½" plug from end of pump body, remove valve spring, remove valve by inserting finger in valve skirt and pulling valve out.
9. Remove two 1" plugs and gaskets which close drilled oil passages.

Disassembly ("Single Rotor" type): Remove coupling lock screw, then remove coupling. Install pump in vise with protective copper jaws. Remove five body-to-cover attaching bolts, then remove cover. Remove shaft and rotor assembly, then "O" ring seal and "oilite" thrust washer in bottom of pump shaft hole.

Bushing & Seal Replacement—NOTE—New seal should always be installed whenever bushing replaced. Replace bushing and seals as follows:

Pump Cover Shaft Bushing—Place pump body in vise with protective copper jaws, install Tool C-3185, tap threads into bushing with outer section of tool, using an open end or adjustable wrench. After tool threaded into bushing sufficiently, screw T handle section of tool into hole until tool bottoms in cover, remove bushing. To install, drift bushing into place with Tool C-3233.

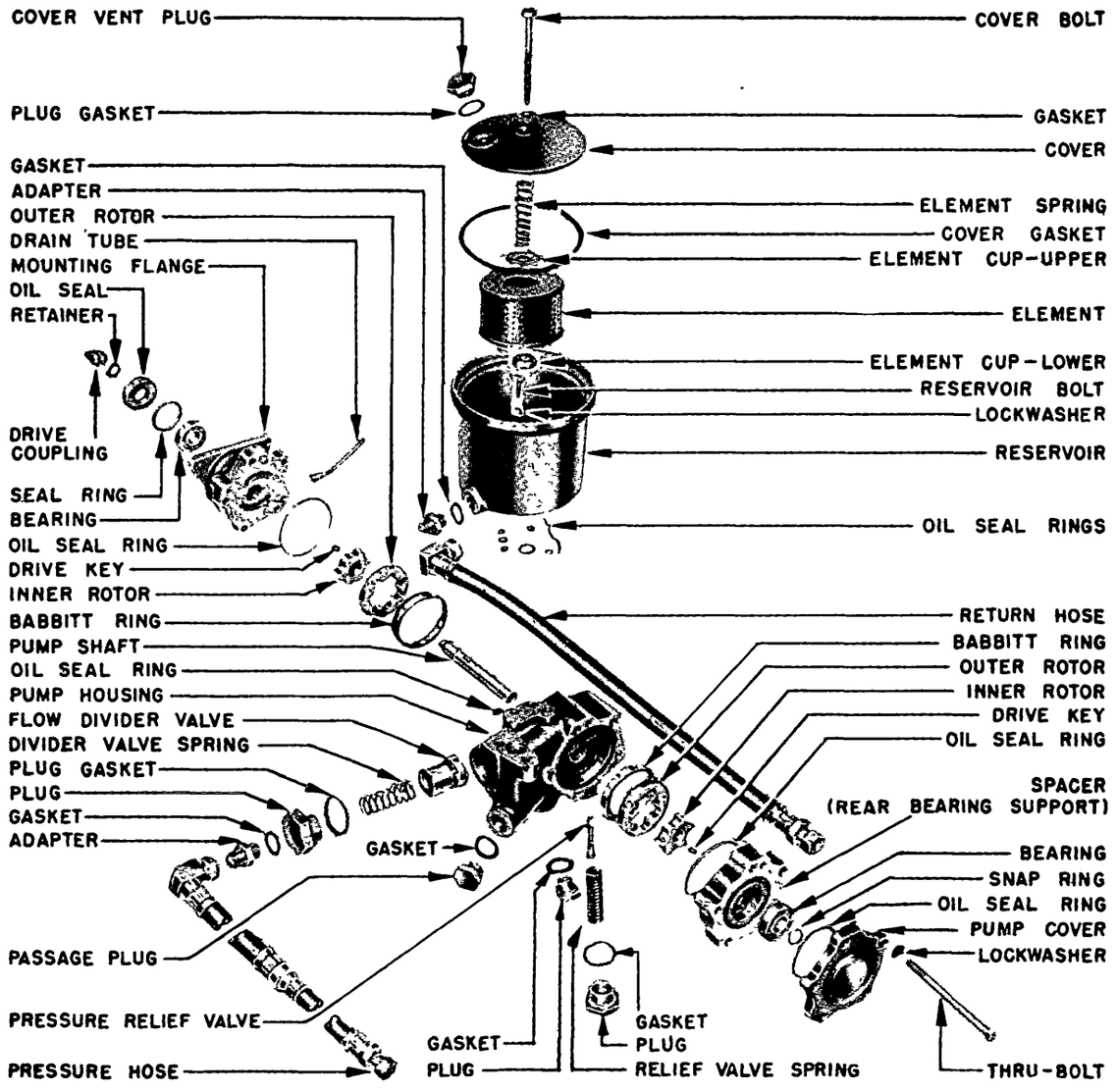
Pump Body Shaft Bushing—Place pump body in vise with protective copper jaws, mount pump cover to pump body, install attaching bolts. Install Tool C-3185 in cover bushing hole, thread tool into housing bushing, remove bushing and seal. To install, mount bushing to Tool C-3235 and drift bushing into place.

Outer Rotor Babbitt Bushing—Remove pump cover from pump body. Thread Tool C-3214 into pump body using adapter Tool C-3234, remove bushing. To install, drift bushing into place with Tool C-3251.

Pump Shaft Oil Seal Replacement—With pump body securely clamped in vise with protective copper jaws, mount seal to Tool C-3230, drive seal into place.

Cleaning & Inspection: Clean all parts thoroughly in solvent and blow dry with compressed air. Wash bearings in clean kerosene and dry by blowing air through bearing *(CAUTION*—do not spin bearing with air). Inspect bearings for wear or roughness and replace if they do not rotate freely. Inspect babbitt rings in pump body for wear or scoring. Inspect rotors and pump shaft for wear, scoring, or burrs (remove burrs with a fine stone or crocus cloth). Check end clearance of rotors by installing them in pump body and using a feeler gauge to measure clearance from rotor to straightedge placed on face of body. End clearance limits are .001-.0017" (outer rotor of double rotor pump, and rotor of sin-

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HYDRAGUIDE HYDRAULIC PUMP (DOUBLE ROTOR) AND RESERVOIR

HYDRAGUIDE (Cont.) (EXTERNAL OIL PASSAGE)

gle rotor pump), .0013-.002" (inner rotor). Check valve plunger.

NOTE—If rotors badly scored, or worn beyond limits given above, install complete new pump assembly.

Reassembly ("Double Rotor" type): Use all NEW "O" ring seals and gaskets. Lubricate bearings and all moving parts with clean SAE 10W engine oil, coat all seal rings and seals with Lubriplate when assembling. Assemble pump in following order:

1. Install front bearing in mounting flange using Tool C-3129, install oil seal ring over bearing, then drive oil seal into position over bearing and seal ring using Tool C-3129.
2. Install rear bearing in pump rear spacer using Tool C-3129.
3. Install two 1" plugs and gaskets in drilled oil passages in pump body and tighten securely.
4. Install flow divider valve plunger in pump body with ported end inward, insert spring, install plug and gasket, tighten plug to 45-50 ft.lbs.
5. Install relief valve plunger with small end inward, insert spring, install plug and gasket, tighten plug to 45-50 ft.lbs.
6. Invert pump body so that bleed hole is upward, carefully install front outer rotor *(CAUTION*—use care not to damage babbitt ring), install pump shaft with drive tongue upward through rotor and into pump body so that drive key slot is exposed above rotor, slide front inner rotor over shaft and install drive key so that rotor engages key, turn shaft until rotors mesh, slide shaft in pump body until key is centered in inner rotor.
7. Install new bleed hole seal ring and large seal ring in proper position on pump body.
8. Insert Protector Thimble, Tool C-3130, through front face of mounting flange and into front bearing oil seal until it bottoms in the flange. Install mounting flange and thimble on front of pump body *(CAUTION*—make certain that shaft engages thimble, then slide mounting flange down against pump body and remove protector thimble from end of shaft. Align locating dowel pins with holes in body and tap mounting flange with soft hammer to seat it against the pump body.
9. Turn pump over and install rear outer rotor *(CAUTION*—use care not to damage babbitt ring), slide inner rotor over end of shaft and place drive key in position in shaft slot so that rotor engages key and meshs with outer rotor.
10. Install new seal ring on pump body, slide rear spacer and bearing assembly down over shaft, align dowel pins with dowel holes and tap spacer with a soft hammer to seat it against the pump body. Install snap ring in shaft groove using Tool C-3128.
11. Install new seal ring on spacer, place rear cover in position on spacer, install through-bolts and lockwashers and tighten evenly to 15-20 ft.lbs.
12. Install coupling chamber drain tube in bottom of mounting flange, tightening the nut finger-tight and ½-¾ turns additional.
13. Install drive coupling as follows:

Rubber Type Coupling—Install driving flange on pump shaft using 5/8" diameter steel rod to seat flange *(CAUTION*—do not hammer on drive lugs). Install special lock screw and plain washer (do not use lockwasher), tighten screw to 10-15 ft.lbs.

Metal Tongue Type Coupling—Install drive coupling on shaft, install retaining ring.

Reassembly ("Single Rotor" type): Use NEW "O" ring seals and gaskets. Lubricate all parts with clean SAE 10W engine oil, coat "O" ring seals with Lubriplate. Assemble pump as follows: Install flow divider valve (ported end first) into pump body. Insert small spring plunger and ring, using Tool C-3229. Install large spring, gasket and adapter. Tighten adapter to 45-50 ft. lbs. torque. Install shaft protector thimble Tool C-3228 in pump body until tool bottoms, install rotor shaft assembly, using care not to damage babbitt bushings when installing rotor. Position "O" ring seal in body. Place cover in position, installing attaching bolts and washers. Tighten bolts to 15-20 ft. lbs. torque. Install coupling flange on pump shaft, then special lock screw and washer. Hold coupling with Tool C-3227 and tighten to 10-12 ft. lbs. torque.

Installation of Reservoir on Pump: Install one large circular section "0" ring, and five (5) small "0" rings which are used as gaskets between reservoir and pump. Install small tapered plug, Tool C-3117 and large tapered plug, Tool C-3118 into the two passage holes in bottom of reservoir. Insert the two pilots, Tool C-3116 into matching screw holes of reservoir and pump and install reservoir to pump. Install the four attaching screws and tighten to 7-12 ft. lbs. torque.

HYDRAULIC PUMP INSTALLATION:

▷*PUMP DRIVE COUPLING CAUTION*—Make certain that pump and generator have same type drive coupling. Couplings are not interchangeable and SAME TYPE PUMP AND GENERATOR MUST BE USED TOGETHER. When installing pump with rubber type coupling, make certain that rubber insulator and sleeve installed in generator drive flange.

1. Attach pump and reservoir assembly to generator, using care to index pump shaft tongue into groove of generator coupling. Tighten three pump-to-generator mounting screws to 12-17 ft. lbs. torque.
2. Attach the two hoses, using ⅜-⅝ of a turn after initial finger tightening. The constant section hose is the return line and connects to the reservoir fitting. The dual diameter hose is the pressure line and connects to the pump body fitting. *If* the hose connectors are ever removed, they should be tightened to 25-30 ft. lbs. torque.
3. Clean out reservoir with lint free, clean cloth before removing tapered plugs, Tools C-3117 & 3118. Install filter element in reservoir, and fill with SAE 10-W engine oil to 1½" below gasket seat. *See BLEEDING above.*
4. AFTER bleeding of the system completed and reservoir refilled to correct level, install reservoir cover and gasket and tighten cover bolt to 5-8 ft.lbs.

NOTE—If relief valve assembly cap removed, tighten to 5-8 ft.lbs. torque.

GEMMER HYDRAGUIDE (CHRYSLER & DESOTO) (INTERNAL OIL PASSAGE TYPE)

Chrysler, All Models (Late 1953-54)
DeSoto, All Models (1954)

▷CHANGES & CORRECTIONS

▷*1954 "HIGH SPOT" OR "LUMPY FEELING" AT OR NEAR STRAIGHT AHEAD POSITION (Or feeling of oversteering when turning from center to right or left):* Check and adjust Cross-shaft Backlash and check Steering Tube-and-Column Alignment EXACTLY as detailed below. NOTE—See 1953 Steering Column Jacket Bearing Spring Change (below).

▷*1953 STEERING COLUMN JACKET BEARING SPRING PRODUCTION CHANGE (To correct slight "lumpy" feeling): New spring, Part No. 1488451 is 2⅞" long and has 8 coils, older spring is shorter and has 5½ coils. See "Lumpy Feeling" Correction above.*

DESCRIPTION

DESCRIPTION: The "Internal Oil Passage" Power Steering Gear is of the same basic design and operates on the same principle as the previous Gemmer Hydraguide type. The new type has numerous structural changes:

Gear Housing—Cast aluminum (was malleable iron). Oil passages are provided in the housing and all external oil tubing and connections have been eliminated.

Power Cylinders—Cylinders are gray iron castings with integral mounting flange and are attached by capscrews. No piston travel adjustment is required.

Valve Body & Valve Body Cap—Both parts are die-cast aluminum. Valve identification is stamped on valve body above each valve cylinder.

Power Piston Assembly—Two piece aluminum die-cast type with new seal ring assemblies (rectangular section rubber seal ring backed up by molded nylon ring). *NOTE*—Piston assembly is interchangeable with previous type used in earlier model steering gears.

Worm Adjustment—Threaded type adjustment screw and locknut provided in worm shaft lower cover (replaces adjusting shims).

Worm Lubrication—Entire steering gear (including worm and roller now lubricated by SAE 10-W Engine Oil (used for both lubrication and hydraulic power). Nylon Elastic Stop Nuts and nylon washers are used on both the worm and shaft adjusting screws for sealing at these points.

▷*INSTALLATION OF INTERNAL OIL PASSAGE STEERING GEAR ON PREVIOUS CHRYSLER MODELS:* This gear can be installed on early 1953 cars by installing a new bracket or by shimming or reworking the present bracket to eliminate interference under extreme alignment conditions. *THIS GEAR CANNOT BE USED ON CARS PRIOR TO 1953 MODELS.*

Hydraulic Pump & Reservoir Assembly: "Single Rotor" type mounted on generator and driven by armature shaft. *See Hydraulic pump data in "Gemmer Hydraguide (External Oil Passage Type)".*

LUBRICATION: *CAUTION—New "Internal Oil Passage" type is lubricated entirely by the hydraulic pressure oil supply and special lubricant not required for steering gear worm-and-roller (as on previous External Oil Tube type).*

Checking Fluid Level: Check at 1000 mile intervals or every 30 days. Thoroughly clean top of reservoir,

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HYDRAGUIDE (C nt.) (INTERNAL OIL PASSAGE)

remove cover. Add oil as required to maintain level even with mark stamped on inside of reservoir or ½" above top of filter element.

Recommended Oil—SAE. 10W (MM or MS). For temperatures below —10°F., use SAE. 5W.

BLEEDING HYDRAULIC SYSTEM: *See ADJUSTMENTS under "Gemmer Hydraguide (External Oil Passage Type)."*

HYDRAULIC PRESSURE TEST: *See "Gemmer Hydraguide (External Oil Passage Type)".*

BELT ADJUSTMENT: Keep generator drive belt in adjustment (¾" deflection midway between fan and generator pulleys).

ADJUSTMENT

All adjustments are made with Steering Gear Unit off car. *See "Overhaul" for adjustments with Steering Gear off Car.*

STEERING COLUMN HORIZONTAL & VERTICAL ALIGNMENT: If spacing between column and chuck is not equal, loosen bracket-to-frame bolts and shift chuck and bracket in required direction to equalize the spacing between column jacket base, grommet, and valve body face. *CAUTION*—In some instances it may be necessary to install shims between bracket and frame to obtain sufficient movement of gear for proper alignment. Shims should be "U" shaped or flat washers and placed around bracket-to-frame bolts. *DO NOT PLACE SHIMS BETWEEN GEAR AND BRACKET.*

TROUBLE SHOOTING: *See "Gemmer Hydraguide (External Oil Passage Type)"*

STEERING GEAR REMOVAL

STEERING WHEEL & HORN BUTTON REMOVAL: Disconnect battery, center steering wheel in straight-ahead position. Press down on horn blowing ring ornament and turn counter-clockwise. Lift out ornament retaining spring and pad. Disconnect horn wire from terminal on travel plate and insulator assembly. Remove bushing, travel plate, horn blowing contact ring spring and triangular ground plate. Curl and push horn wire into steering gear tube to make room for steering wheel puller pilot. Remove steering wheel nut. Attach puller Tool C-612 and remove steering wheel.

STEERING GEAR ASSEMBLY REMOVAL: (1)—Remove horn blowing ring, turn steering wheel to extreme left position, and remove steering wheel. Remove transmission position indicator lamp housing from gearshift lever housing. Remove snap ring retaining turn signal and carefully work turn signal switch housing upward until it clears column jacket. Remove cross head screws retaining upper and lower halves of shifting yoke collars together and lift off upper collar. Remove large Oilite bearing with care. Remove snap ring retaining shift lever yoke and bushings in gear shift tube.

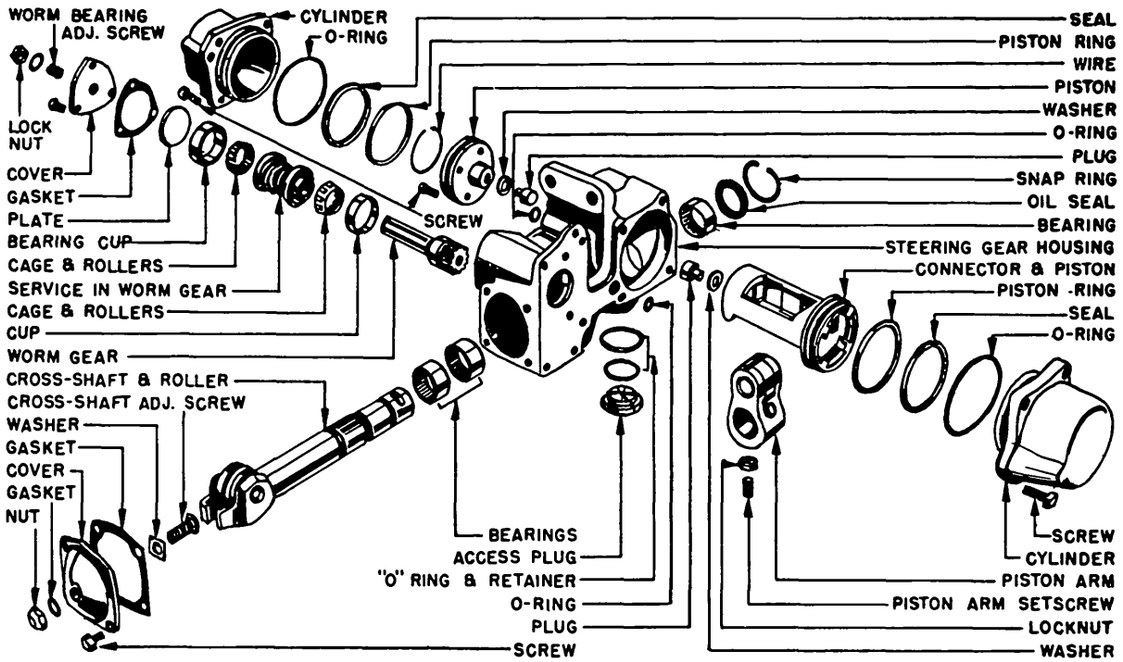
(2)—Lift shift lever yoke upward and out of housing. Do not drop yoke bushings in tube. Otherwise it will be necessary to disassemble column jacket in order to recover bushings. Remove lower collar from steering column jacket.

(3)—Remove steering column jacket toe pad, floor mat, clutch, and brake pedal pads. Remove clutch and brake pedal floor pan toe board cover. Remove clutch pedal horseshoe lock, slide pedal sideways and toward rear of car to allow for clearance of steering assembly removal.

(4)—Remove shift linkage clevis pin from bellcrank assembly in engine compartment. Disconnect directional signal indicator wires and remove horn wire connector from steering column. Remove two steering column to instrument panel screws.

(5)—Remove column jacket shroud assembly by removing column and shroud assembly down and away from gear chuck. Disconnect pressure and return hose from steering gear housing assembly, and cap the fittings.

(6)—Raise car off floor and remove left front wheel and drag link. Remove fender side shield. Remove steering gear chuck-to-frame bracket attaching capscrews. Install front wheel, lower car and remove steering gear assembly through toe board opening.



GEMMER HYDRAGUIDE STEERING GEAR & POWER UNIT

STEERING GEAR OVERHAUL

►*DISASSEMBLY NOTE*—Drain assembly by removing piston arm screw access plug at bottom center of cylinder housing. Remove caps from inlet and outlet oil passages. Turn steering gear coupling to extreme right and left, while draining oil, to force out all oil. Thoroughly clean all surfaces of unit.

DISASSEMBLY (Valve Assembly & Steering Gear Tube): (1)—Remove capscrew from steering arm and remove arm from steering cross shaft. Remove four bolts attaching valve body and valve cap assembly to housing, and lift valve body and cap from housing. *(CAUTION*—Valve body is made of die-cast aluminum and must be handled carefully to prevent damage to cover or its mating surfaces). Remove five "O" ring oil seals from valve body face.

►*VALVE REMOVAL CAUTION*—Each valve body port boss is marked to aid in reassembly of valves in correct position. Work carefully when removing valves, as internal parts of valves may become loose and fall into housing. To prevent improper assembly, units of valve assemblies should be cleaned separately and placed in separate containers. *Valve parts are a select fit with each other and are not interchangeable.*

(2)—Remove outer snap ring retaining each valve assembly in valve body, and pry out each valve assembly.

►*VALVE POSITION IDENTIFICATION MARK CAUTION*—Valve position identification marks on valve body port bosses indicate the number of "O" ring seals used on each valve as follows: (a) Right Turn Reaction Valve (Lower Right)—two "O" rings. (b) Left Turn Distributor Valve (Lower Left)—three "O" rings. (c) Left Turn Reaction Valve (Upper Right)—two "O" rings. (d) Right Turn Distributor Valve (Upper Left)—three "O" rings.

►*VALVE INTERCHANGE NOTE*—Right and left valves are interchangeable as an assembly, if correct number of "O" ring seals are installed on valves for each location.

(3) Remove valve piston assembly from valve sleeve and remove check valve. Inspect valve balls, springs and valve body bleed holes for obstructions. Clean all parts in solvent and replace "O" ring oil seals. Assemble valves in sleeves, making sure each valve is clean and is assembled in its respective position in valve sleeve. Remove the six valve body cap recessed head screws and star washers. Remove valve body cap and gasket from valve body housing.

(4)—Clamp steering tube coupling in vise and remove capscrew and washer holding coupling to

CONTINUED ON NEXT PA E

HYDRAGUIDE (Cont.) (INTERNAL OIL PASSAGE)

steering shaft.

▷*CAUTION—Do not clamp tube gear or valve cap body casting in vise. Clamp only the coupling to prevent damaging the assembly.*

(5)—Mount Puller Tool C-3132 (adapted to C-293 puller stand) to valve body cap and steering gear tube coupling assembly. Clamp puller in vise and remove coupling from gear tube. Slide steering gear tube and valve block assembly out of valve body cap. Remove oil seal snap ring and lift out oil seal outer washer.

(6)—With Remover & Installer Tool C-3269, drive the spherical bearing, steering gear tube oil seal and inner washer from valve body cap. Inspect bearing, roller, and valve block for damage, and wear. Clean all parts with solvent and blow dry with air.

Steering Gear Cylinders and Power Pistons: (1)—Remove cylinder-to-housing attaching capscrews. Thread cylinder removing studs, Tool C-3336 evenly into threaded cylinder flange holes until studs bottom in housing. Continue threading studs inward, evenly, until cylinder is free from housing. Remove large "O" ring seal from outer machined surface of cylinders, and small "O" ring seals from steering gear housing face.

(2)—Center piston arm in center of steering housing and remove piston screw retaining wire from pistons. Remove three piston-to-connector attaching capscrews and remove piston from connector. Remove connector and piston assembly from housing. Remove the neoprene seals and nylon thrust rings frim pistons. Carefully inspect rings for damage.

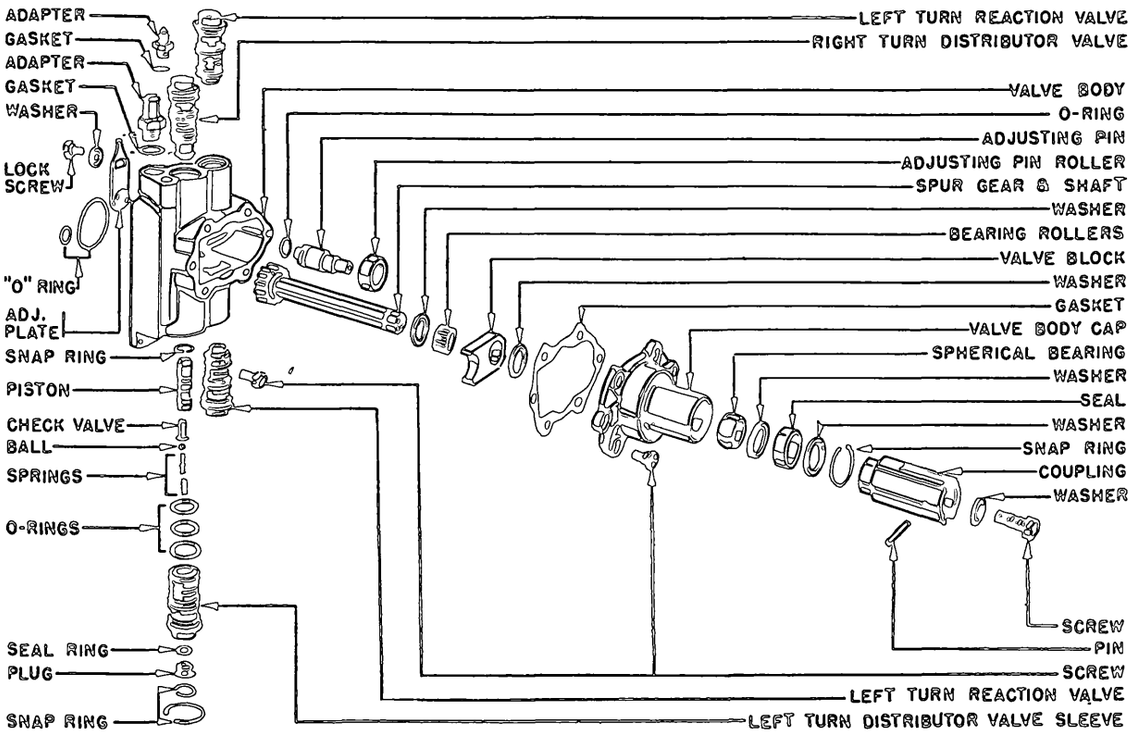
▷*PISTON RING CAUTION—If piston rings are damaged or appear to be in doubtful condition, rings should be replaced.*

(3)—Loosen piston setscrew locknut and remove setscrew. Remove steering gear shaft cover adjusting screw locknut and nylon washer. Turn steering gear shaft to center position. Remove the four shaft cover attaching capscrews and copper sealing washers. Withdraw steering shaft from housing sufficiently to allow for removal of cover. Turn shaft cover adjusting screw in. Slide adjusting screw and cover out of slot in end of shaft. Remove cover and gasket. NOTE—A nylon washer is being used instead of the adjusting screw star washer.

(4)—Withdraw steering shaft from piston arm and remove piston arm assembly from steering gear housing. Loosen worm gear shaft cover adjusting screw locknut. Remove the three cover attaching screws and lift cover and screws from housing. Remove the steering gear shaft outer oil seal retaining snap ring with Remover Tool C-3137. Remove outer oil seal.

(5)—Remove the thrust pad, cup bearing, and worm assembly from housing. Remove adjusting screw locknut, nylon washer, and adjusting screw from worm cover. Clean housing and parts thoroughly in solvent and blow dry with air. Inspect worm shaft and gear, bearings, cups, bearing rollers, and other parts.

(6)—Inspect the three steering shaft needle bearings in housing. If rollers do not rotate freely, or if bearings are damaged, remove steering shaft center and inner bearings by driving bearings toward outer bearing with Tool C-3114. Remove outer bearing by driving bearing toward inside of steering gear with Driver Tool C-3113.



GEMMER HYDRAGUIDE CONTROL VALVE ASSEMBLY

REASSEMBLY (Steering Gear Cylinders and Power Pistons): (1)—When installing steering gear shaft bearings in steering housing, bearings should be always driven against lettered end of bearing cage. Install center bearing in housing from steering gear arm side of housing. Drive bearing into housing with Driver Tool C-3114, until bearing is flush with inner face of housing.

(2)—Install shaft outer bearing, drive bearing with Driver C-3113, until bearing is approximately .050" below outer seal counter bore of housing.

(3)—Lubricate worm gear bearings and cups with lubriplate. Install worm gear, outer bearing, cup and thrust pad in housing. Lubricate gasket with Lubriplate and install gasket in position in housing. Remove adjusting screw from worm gear cover and place cover on steering housing. Install the three cover attaching capscrews, with copper sealing washers under screw heads. Tighten to 20 ft. lbs. Install adjusting screw in cover, nylon washer and locknut on adjusting screw. Turn locknut down until it barely touches the washer.

Worm Shaft Bearing Adjustment—Turn adjusting screw clockwise until worm rotates freely without binding from one extreme to opposite extreme. *(CAUTION—The worm gear when properly adjusted, should rotate freely in bearing cones without binding, and should also be sufficiently tight to eliminate any free play between shaft and bearings).* Hold adjusting screw and tighten locknut to 25 ft. lbs. Recheck worm shaft bearing adjustment after tightening adjusting screw and locknut.

Checking Piston Arm and Plug Clearance—Assemble piston on piston connector outside of steering housing. Check clearance between piston plugs and piston arm roller. *It is important that this clearance be held as close to zero as possible.* This can be controlled by various thickness of shims inserted between piston and piston plugs. These shims are available for service in a number of sizes varying in steps of .001" thickness. After checking the above clearance, disassemble piston and connector, leaving plugs in piston. Remove connector from piston arm.

(4)—Make sure steering shaft rollers rotate freely and that the housing oil passages and piston arm are clean. Place piston arm in position in housing so that splines on shaft will mesh with splines on piston arm. Insert steering shaft into piston arm until shaft is positioned in housing.

(5)—Install steering gear shaft cover gasket on housing after coating with Lubriplate. Install steering gear shaft cover and adjusting screw assembly in slot in end of shaft. Turn adjusting screw counter-clockwise to draw shaft cover up to housing. When cover is properly seated on housing, install the four cover attaching capscrews and copper sealing washers under head of each screw. Tighten screws evenly to 20 ft. lbs. Install nylon washer and locknut on shaft adjusting screw until nut barely touches nylon washer. Install gear shaft outer oil seal (lip of seal facing inside housing) with Sleeve

CONTINUED ON NEXT PAGE

HYDRAGUIDE (C nt.) (INTERNAL OIL PASSAGE)

Tool C-3136. Install outer seal snap ring (beveled side out). Position snap ring so that ring opening is pointing downward toward bottom of unit so that snap ring can be removed readily from under car when necessary. Make sure snap ring is properly seated in groove. Install steering gear arm on steering shaft. Tighten arm clamp bolt to 200 ft. lbs.

Steering Gear Shaft Adjustment—***(CAUTION—When making cross shaft adjustment, always remove power arm access plug and loosen power arm set screw before attempting to adjust cross shaft).*** Set worm gear and piston arm at center position. Hold worm at center with one hand. With other hand on pitman arm, check backlash between gear and worm in both directions. Turn shaft adjusting screws so that no backlash will be felt while worm is turned approximately 45 degrees, either side of center line.

►***CAUTION: Clearance should be at a minimum at the degree positions without binding. Do not adjust cross shaft roller and worm too tightly.***

Hold adjusting screw in the adjusted position and tighten locknut to 20-25 ft. lbs. Install piston arm adjusting lock screw and locknut. Tighten screw to 30-35 ft. lbs. and tighten locknut to 20 ft. lbs. Lubricate and install a new "O" ring seal on access plug, and tighten plug to 35 ft. lbs.

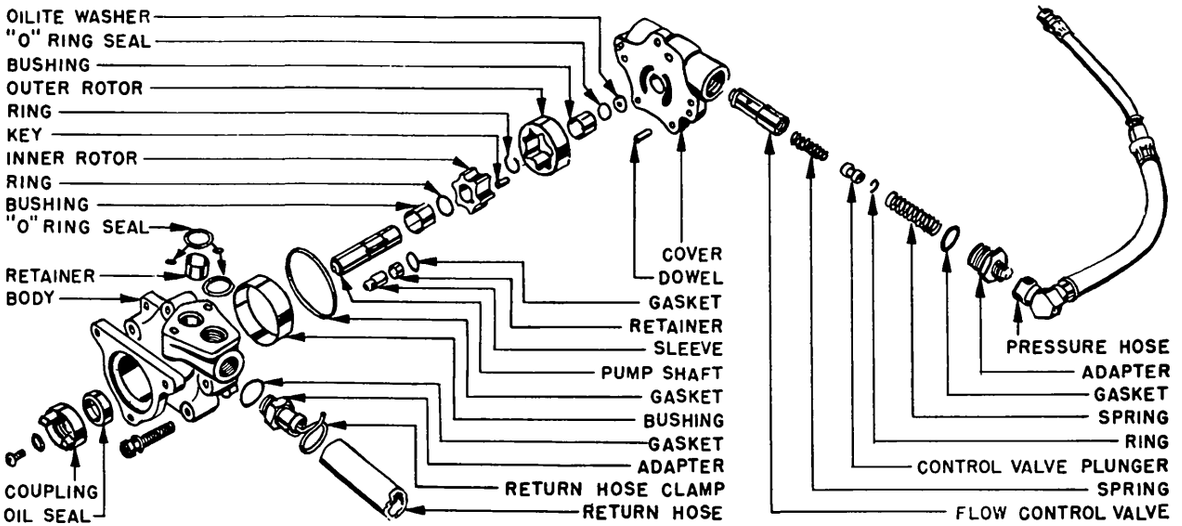
(6)—Center piston arm in steering housing. Install piston and piston connector assembly in housing, with piston plug bearing against piston arm and roller. Assemble the removed piston and plug assembly to opposite side of piston connector. Tighten Allen screws to 16-20 ft. lbs. Install piston screw retaining lock wires. *CAUTION*—New "O" ring seals, gaskets, copper and nylon washers should be used each time unit is disassembled.

(7)—Lubricate neoprene "D" ring (cross section of ring is shaped like a "D"), and nylon thrust rings on piston with Lubriplate. Make sure that tapered side of thrust ring fits against tapered side of piston ring groove.

►***NOTE: Tapered side of thrust ring fits against tapered side of piston ring groove.***

(8)—Remove cylinder removal screws from cylinder flange, check face for burrs, clean and lubricate cylinder bores. Lubricate cylinder "O" ring with Lubriplate and install ring on outer machined section of cylinder. Install oil passage "O" rings on housing-to-cylinder oil passages. With pistons located in center of housing, place cylinders in position on housing. Work carefully to avoid damaging "O" rings during installation. Align cylinder holes with holes in housing. Install capscrews and tighten screws evenly to 30-40 ft. lbs.

Valve Assembly & Steering Gear Tube: (1) Install spherical bearing in valve body cap and place oil seal inner washer in body against bearing. Lubricate steering tube gear oil seal with Lubriplate and install seal in valve body (with lip of seal inward). Using Remover & Installer Tool C-3269, drive seal in valve body cap sufficiently to allow for installation of outer washer and snap ring. Install oil seal outer washer and snap ring, making sure snap ring is properly seated in valve body cap. Place steering gear tube and valve block assembly in valve body cap. Install coupling on steering tube gear and secure with capscrew and washer. Tighten screw to 20 ft. lbs.



HYDRAGUIDE HYDRAULIC PUMP (SINGLE ROTOR TYPE)

►***VALVE BLOCK ADJUSTING PIN NOTE***—To replace or inspect needle roller bearings in adjustment pin roller, lift bearing and roller off pin as an assembly from shaft. To replace needle bearing in roller, use one end of Driver Tool C-3141 to remove bearing and the other end to install bearing. If leakage around valve block adjusting pin is apparent, remove adjusting plate capscrew, washer and adjusting plate. Remove valve block adjusting pin from inside valve body and remove "O" ring seal from adjusting pin. Lubricate new ring seal with Lubriplate and install ring on adjusting pin. Install pin in valve body. Do not damage ring when installing. ***(CAUTION—When assembling valve block adjusting pin in valve body, locate offset side of pin away from steering tube gear. The adjusting plate should not be installed on adjusting pin until unit is completely assembled).*** Inspect steering tube gear thrust button located in valve body for wear and replace if necessary.

(2)—Place adjusting pin roller on pin and lubricate valve body cap gasket. Install valve body cap assembly on valve body. Install the six recessed head screws and star washers in valve body cap. Tighten screws to 20 ft. lbs.

(3)—Lubricate "O" rings on valve assemblies with Lubriplate and install valves as indicated on valve body ports. Install snap rings with beveled edge out. Make sure snap rings are properly seated in grooves. Lubricate the five valve body-to-housing "O" ring seals and locate them in valve body.

(4)—Set worm gear and piston arm to center position. Locate steering tube coupling slot in vertical position and assemble valve body to steering gear housing. Install valve body to housing attaching screws and lockwashers. Tighten screws to 40 ft. lbs.

Spur Gear Adjustment (Unit off Car)—With worm gear and piston arm centered, turn tube coupling slot in vertical position. Install adjusting plate on adjusting pin. Rotate adjusting pin and plate until no backlash is felt at steering tube coupling. Hold lock plate in adjusted position. Install and tighten capscrew to 12 ft. lbs.

STEERING GEAR INSTALLATION

STEERING GEAR ASSEMBLY INSTALLATION: Reverse removal procedures.

HYDRAULIC PUMP OVERHAUL

HYDRAULIC PUMP REMOVAL: Disconnect the two hoses from pump reservoir assembly and catch oil from pump in a drain pan. Tie the loose ends of hoses out of the way above steering gear assembly to prevent loss of oil. Cover the ends of both hoses. Remove the three pump-to-generator screws and remove pump (*CAUTION*—do not lose coupling insulator and sleeve on pumps with rubber coupling).

Removal of Reservoir From Pump:

1. Remove cover assembly from reservoir, lift out filter element and drain oil from reservoir.
2. Install the small tapered plug Tool C-3117 and the large tapered plug Tool C-3118, into the two holes that permit passage of oil to pump (this will prevent dirt entering pump).
3. Remove the four reservoir-to-pump attaching screws and lift reservoir from pump, being sure not to lose one large rubber "O" ring and five small rubber "O" rings which are used as gaskets between pump and reservoir.

OVERHAUL OF PUMP: *CAUTION*—Cleanliness is extremely important when working on hydraulic pump. Pump should be thoroughly cleaned before disassembling, work bench should be covered with clean paper, and all parts should be kept in clean kerosene until reassembled to protect them from dirt and corrosion.

Disassembly ("Single Rotor" type): Remove coupling lock screw, then remove coupling. Install pump in vise with protective copper jaws. Remove five body-

CONTINUED ON NEXT PA E

HYDRAGUIDE (Cont.) (INTERNAL OIL PASSAGE)

to-cover attaching bolts, then remove cover. Remove shaft and rotor assembly, then "O" ring seal and "oilite" thrust washer in bottom of pump shaft hole.

Bushing & Seal Replacement—NOTE—New seal should always be installed whenever bushing replaced. Replace bushing and seals as follows:

Pump Cover Shaft Bushing—Place pump body in vise with protective copper jaws, install Tool C-3185, tap threads into bushing with outer section of tool, using an open end or adjustable wrench. After tool threaded into bushing sufficiently, screw T handle section of tool into hole until tool bottoms in cover, remove bushing. To install, drift bushing into place with Tool C-3233.

Pump Body Shaft Bushing—Place pump body in vise with protective copper jaws, mount pump cover to pump body, install attaching bolts. Install Tool C-3185 in cover bushing hole, thread tool into housing bushing, remove bushing and seal. To install, mount bushing to Tool C-3235 and drift bushing into place.

Outer Rotor Babbitt Bushing—Remove pump cover from pump body. Thread Tool C-3214 into pump body using adapter Tool C-3234, remove bushing. To install, drift bushing into place with Tool C-3251.

Pump Shaft Oil Seal Replacement—With pump body securely clamped in vise with protective copper jaws, mount seal to Tool C-3230, drive seal into place.

Cleaning & Inspection: Clean all parts thoroughly in solvent and blow dry with compressed air. Wash bearings in clean kerosene and dry by blowing air through bearing *(CAUTION—do not spin bearing with air)*. Inspect bearings for wear or roughness and replace if they do not rotate freely. Inspect babbitt rings in pump body for wear or scoring. Inspect rotors and pump shaft for wear, scoring, or burrs (remove burrs with a fine stone or crocus cloth). Check end clearance of rotors by installing them in pump body and using a feeler gauge to measure clearance from rotor to straightedge placed on face of body. End clearance limits are .001-.0017" (outer rotor of double rotor pump, and rotor of single rotor pump), .0013-.002" (inner rotor). Check valve plunger.

NOTE—If rotors badly scored, or worn beyond limits given above, install complete new pump assembly.

Reassembly ("Single Rotor" type): Use NEW "O" ring seals and gaskets. Lubricate all parts with clean SAE 10W engine oil, coat "O" ring seals with Lubriplate. Assemble pump as follows: Install flow divider valve (ported end first) into pump body. Insert small spring plunger and ring, using Tool C-3229. Install large spring, gasket and adapter. Tighten adapter to 45-50 ft. lbs. torque. Install shaft protector thimble Tool C-3228 in pump body until tool bottoms, install rotor shaft assembly, using care not to damage babbitt bushings when installing rotor. Position "O" ring seal in body. Place cover in position, installing attaching bolts and washers. Tighten bolts to 15-20 ft. lbs. torque. Install coupling flange on pump shaft, then special lock screw and washer. Hold coupling with Tool C-3227 and tighten to 10-12 ft. lbs. torque.

Installation of Reservoir on Pump: Install one large circular section "O" ring, and five (5) small "O" rings which are used as gaskets between reservoir and pump. Install small tapered plug, Tool C-3117 and large tapered plug, Tool C-3118 into the two passage holes in bottom of reservoir. Insert the two pilots, Tool C-3116 into matching screw holes of reservoir and pump and install reservoir to pump. Install the four attaching screws and tighten to 7-12 ft. lbs. torque.

HYDRAULIC PUMP INSTALLATION:

▷*PUMP DRIVE COUPLING CAUTION*—Make certain that pump and generator have same type drive coupling. Couplings are not interchangeable and SAME TYPE PUMP AND GENERATOR MUST BE USED TOGETHER. When installing pump with rubber type coupling, make certain that rubber insulator and sleeve installed in generator drive flange.

1. Attach pump and reservoir assembly to generator, using care to index pump shaft tongue into groove of generator coupling. Tighten three pump-to-generator mounting screws to 12-17 ft. lbs. torque.

2. Attach the two hoses, using ⅜-⅝ of a turn after initial finger tightening. The constant section hose is the return line and connects to the reservoir fitting. The dual diameter hose is the pressure line and connects to the pump body fitting. If the hose connectors are ever removed, they should be tightened to 25-30 ft. lbs. torque.

3. Clean out reservoir with lint free, clean cloth before removing tapered plugs, Tools C-3117 & 3118. Install filter element in reservoir, and fill with SAE 10-W engine oil to 1½" below gasket seat. *See BLEEDING above.*

4. AFTER bleeding of the system completed and reservoir refilled to correct level, install reservoir cover and gasket and tighten cover bolt to 5-8 ft.lbs.

NOTE—If relief valve assembly cap removed, tighten to 5-8 ft.lbs. torque.

CHRYSLER, DE SOTO, DODGE, PLYMOUTH "CO-AXIAL"

Chrysler (1954-55)
DeSoto (1954-55)
Dodge (1955)
Plymouth (1955)

▷CHANGES & CORRECTIONS

▷*GEARSHAFT PRODUCTION CHANGE & ADJUSTMENT CAUTION:* Early cars (prior to approximately Jan. 1955) have a gearshaft with teeth having unequal widths. Later cars, have a gearshaft with teeth of equal width. The later type shaft is identified by a "O" stamped on the steering arm end of the shaft, and is adjusted in a different manner than the early type shaft.

▷*1955 POWER STEERING PISTON PRODUCTION CHANGE:* Effective production March 18, 1955 a new type piston has been used. New piston has a narrow ring groove, a "D" type ring seal, Part No. 1634561, and eliminates the use of a steel ring. Kit, Part No. 1692656, is available to service earlier type piston with "L" type piston ring and steel ring. New "D" type seal should be used to correct a "lack of feel" condition.

▷*1955 DODGE JERKY OPERATION OF POWER STEERING GEAR CORRECTION:* After generator drive belt has been adjusted (See Generator on Car Page), adjust fan drive belt so that a maximum of 1/4" deflection is obtained when applying a 10 lb. pull with spring scale at middle of widest belt span.

DESCRIPTION

Components of this system have been fitted into an elongated, tubular-shaped housing, concentrically located about the axis of the steering column. Unit fastens to steering column at underside of instrument panel and extends down through firewall to a bracket bolted to top of frame. System incorporates a worm and worm connector and a rack and sector gear. Worm and worm connector acts in a manner similar to a bolt and nut assembly with left hand threads. Rotation of the worm causes linear (axial) motion of the worm connector. Fastened to worm connector, in succession, are an upper piston rod, piston, and a lower piston rod, all concentric to the steering column axis. A rack, machined in the lower portion of the lower piston rod, meshes with a sector gear. This combination produces rotation of the steering gear arm, actuating steering linkage. The conventional system of steering linkage is used. Hydraulic elements of the system include:

Hydraulic Power Mechanism—Consists of a double-acting piston, a spool valve (which fits inside the piston), and an hydraulic reaction chamber (which gives the driver the "feel" of the road). Axial positioning of the valve directs high pressure oil to one side or the other of the double-acting piston. At the same time, valve movement opens an oil return line which carries oil from low pressure side of the piston to the oil reservoir. The direction of oil flow (which depends on direction of steering wheel rotation) is such that hydraulic force is added to the driver's effort and is transmitted through the rack and sector gear to the steering gear arm.

Pump and Reservoir Assembly—Consists of generator driven oil pump with pressure relief valve and flow control valve, and a filter with oil reservoir. Flow control valve limits oil flow to a predetermined maximum (2 gallons per minute) and thus holds the horsepower required to drive the oil pump to a minimum.

ADJUSTMENT

SELECTOR LEVER & TRANSMISSION SHAFT LINKAGE: Loosen gear shift rod lever clamp bolt. Position

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinued)

selector lever in low or reverse, then holding the gear shift rod lever and spacer flush against gear housing, tighten nut. Place selector lever pointer lever in neutral position on indicator dial at top of steering column. Disconnect gearshift control rod at bellcrank on transmission. Make sure manual control lever (at the transmission) is in neutral position (second detent position from rear of vehicle). With selector lever pointer still in neutral position, adjust the gearshift control rod to the required length for a free fit in the lever of the bellcrank, then reinstall rod. Operate selector lever through all indicator positions. Road test vehicle.

1954 MODELS

GEAR SHAFT ONLY (UNIT IN VEHICLE): Remove drag link from steering gear arm. One man should be seated in vehicle to turn steering wheel and record positions while the other does the adjusting. Start engine and turn steering wheel from one extreme position to the other, and count the number of turns (this should be approximately 3 3/4 turns). Then, starting with steering wheel setting at one end of the travel, turn it back approximately 1 7/8 turns (center position). The steering gear shaft, when correctly adjusted, will have an arc of no backlash for at least 300° but less than 340° (or 150° either side of center). When making this adjustment, it has been found to be more accurate to turn the gear into a backlash position and adjust gear mesh to a point where backlash disappears. As an aid in establishing the 150° positions of the steering wheel when making the gear shaft adjustment, it is suggested that the clock system be used. In using system 12 o'clock would represent center position and each hour would represent 30°; therefore the 150° position would be at 5 o'clock if steering wheel was turned to right (clockwise). If turned in the opposite direction (counter-clockwise) from 12 o'clock, the 150° point would be at 7 o'clock. With steering gear in centered position, turn steering wheel to 150° (5 o'clock) and adjust, if necessary, into a backlash position. Then, using steering gear arm for checking, reduce backlash to zero at the 150° (5 o'clock) point.

►*CAUTION: When checking for no backlash, use a very light (feather) touch with a slight wrist motion. Greater effort to move the steering gear arm back and forth when checking may result in moving other parts of the gear and give a false sense of true gear shaft to rack clearances. To further aid the sense of touch, a pair of vise grips may be clamped onto the steering gear arm.*

Again with steering gear in centered position, turn the steering wheel in the opposite direction (counter-clockwise) past the 150° (7 o'clock) point into backlash position. Then turning the steering wheel back slowly toward center and using steering gear arm, check for point at which backlash disappears. If it disappears at the 150° (7 o'clock) point, the steering gear is properly centered and adjusted to the center of no backlash arc. If backlash did not disappear until after the 150° (7 o'clock) point, the steering gear is too loose and gear not properly centered to no backlash arc. To center a gear in this condition with the center of no backlash arc, the jacket and shroud assembly will have to be removed and position of tube coupling on worm shaft changed as follows: Turn coupling back to center position. Then divide the difference of 60° (2 hours 7 to 9) in half, which would be 30° (1 hour). Since the shorter distance of no backlash travel was in a counter-clockwise direction, remove coupling from worm shaft and turn it clockwise 30° (1 hour) so that when reinstalled the slot in the coupling will be 1 o'clock. Then turn coupling to 12 o'clock and gear will be centered to center of no backlash arc. Again starting from center, turn the coupling to 150° (5 o'clock) and adjust into a backlash position. Then, using steering gear arm for checking, reduce backlash to zero at the 150° (5 o'clock) point.

►*CAUTION: Too loose adjustment will result in free play and a noisy gear. Too tight an adjustment will affect recoverability and will cause excessive wear of the gear teeth.*

Recheck adjustment by turning coupling counter-clockwise past the 150° (7 o'clock) point in the backlash position. Turn coupling back slowly toward center and backlash will disappear at the 150° (7 o'clock) point if coupling was properly centered to center of no backlash arc. (NOTE—If backlash had disappeared at 6 o'clock instead of 7 o'clock it would have indicated 330° of no backlash arc, which is permissible, and position of coupling would not necessarily have to be changed. Should it be desired that the position be changed, make sure that slot in coupling, when installed, is relative to the center of no backlash arc and not the overall travel (3 3/4 turns of the steering gear). When adjustment is completed, stop engine and tighten adjusting screw locknut to 40 ft. lbs. torque. Install drag link to steering gear arm and tighten nut to 45-75 ft. lbs. torque. Check centered position of steering wheel with straight-ahead position of front wheel. If not centered properly, correct by adjusting tie rod ends.

CONTROL VALVE: *CAUTION—Since considerable effort is involved in adjusting the control valve, it is suggested that it be certain that the difficulty lies within the control valve before making the adjustment. If diagnosis indicates that gear assembly is not centered hydraulically, and all other possibilities have been checked, then proceed as follows:*

1) Remove steering gear assembly (See "Removal & Installation").

2) Remove worm housing filler plug and drain lubricant through filler hole. Attach holding fixture C-3323 to unit and place in vise. Remove tube coupling screw, lockwasher and washer from center of coupling. Using tool C-3392, remove coupling from worm shaft. (*NOTE*—Tool C-3112 may also be used to remove coupling. However, to accomplish this, necessitates the cutting of one adapter plate SP-1409 in half and using the two pieces instead of the two plates). Remove worm housing oil seal.

3) Unlock bearing adjusting nut by bending tang of lockwasher. (NOTE—Only one tang locks nut in position). Place tool C-3320 over worm shaft followed by C-3319. Holding worm stationary remove worm bearing adjusting nut, lockwasher and thrust washer. Remove worm outer bearing race and bearing roller from worm. Remove the three worm-to-gear housing screws and belleville washers. (NOTE—Concave side of washers are against housing when installed). Remove worm housing and "O" ring.

►*CAUTION: Do not bottom w rm shaft in th outward direction when removing or installing. Bott ming the worm shaft may damage the ball guid s which would result in a tight or rough p rating worm.*

4) Remove the two worm connector ball guide clamp screws and lockwashers. Remove guide clamp. Using care not to lose any of the worm balls, carefully remove ball guide from the worm connector.

►*CAUTION: Balls used in worm conn ctor are a sel ct fit with each other. If any are lost or damaged, it is recommended that a complet s t (40) b install d.*

5) Turn worm connector over and carefully thread the remaining worm balls out of the worm connector by turning the worm in and out. Remove worm from connector.

►*CAUTION: If housing head has becom separated from gear housing, make sure th "O" ring is in position between housing h ad and gear housing.*

6) Secure housing head to gear housing by guiding tool C-3324 (Dummy Housing) over rails on worm connector until it is flush with gear housing. Install the three washers and screws, draw down evenly and tighten to 25-30 ft. lbs. torque.

7) Secure steering gear arm from stock or remove the one from vehicle. Install steering gear arm, lockwasher and nut. Tighten nut to 30-40 ft. lbs. torque. Install the 3/4" hose adapter fitting in the return outlet of the gear housing. Connect return hose (large diameter) C-3318 to the 3/4" adapter fitting. Connect small end of C-3211 hose to the 5/16" adapter (pressure) in gear housing. Install pressure gauge C-3309 in pressure side of pump. Connect the pressure hose C-3211 to fitting at the shut off valve. Connect the return hose C-3318 to reservoir and tighten all fittings. Thoroughly clean the outside of the reservoir and remove cover or filler cap.

8) To maintain oil in the reservoir to normal level while hydraulically centering the steering, add sufficient oil over and above the normal oil level of the reservoir to approximate the volume in the test hoses.

9) Open the shut off valve at the gauge and start engine. Allow engine to operate long enough for pump to circulate oil through steering gear assembly and test hoses.

10) Place alignment cap and dial SP-2619, which is part of tool C-3325, over worm connector and lock in position by tigntening thumb screw Insert extension rod SP-2621 through alignment cap and over valve adjusting rod in bottom of worm connector. Tap extension rod lightly so that it is a tight fit on valve adjusting rodl Position adjusting handle SP-2620 on extension rod so there is approximately 1/16"

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"CO-AXIAL" (C ntinu d)

clearance between handle and alignment cap, then lock in place by tightening set screw in handle Adjust valve by turning handle until the pump pressure registered on the gauge is at a minimum.

►*CAUTION: Do not apply heavy pressure on the adjusting tool as valve rod may twist off in assembly.*

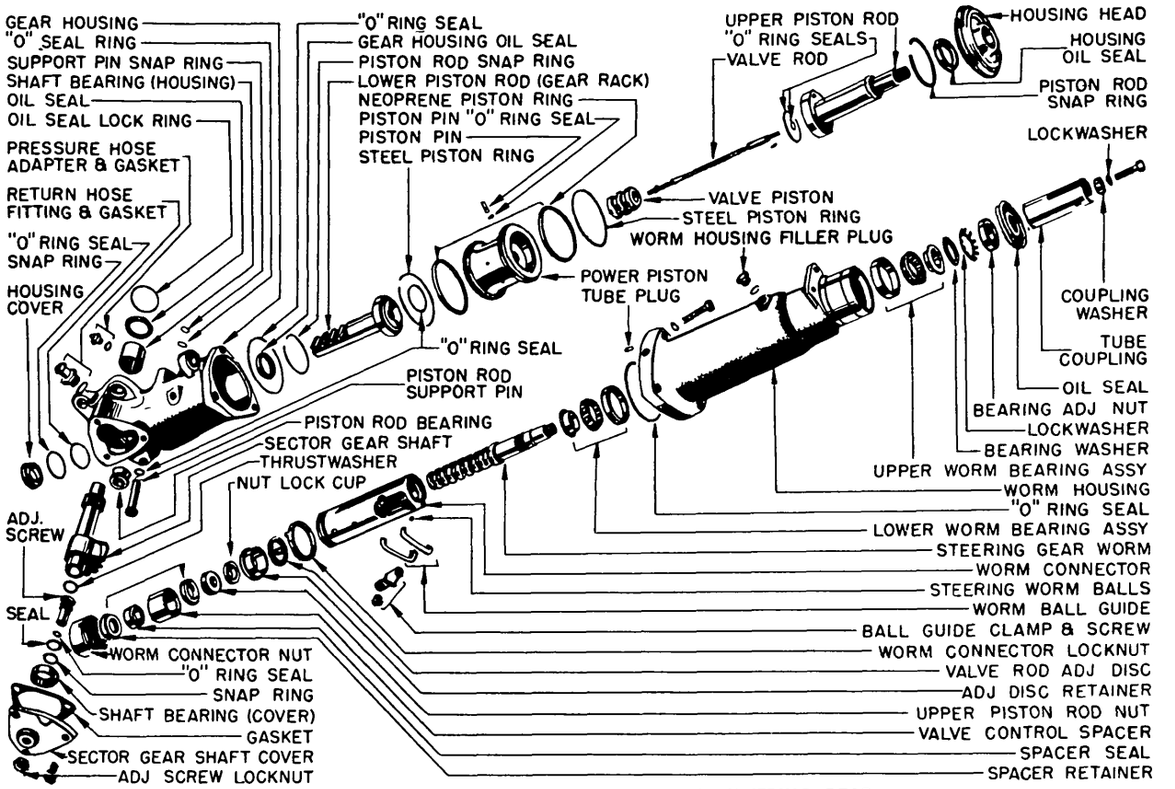
11) Carefully rotate valve adjusting handle SP-2620 to the right until the piston bottoms in the gear housing. Then, rotate valve adjusting handle to the left until the piston bottoms in the opposite direction. Repeat the rotation of the valve adjusting handle first to the right and then to the left until piston bottoms each time. This operation purges the air from the gear housing.

12) Check the oil level in the reservoir and refill to the required level.

13) With engine idling, close the shut off valve and check pump pressure. The gauge should read approximately 750 psi. **Op n shut off valve.**

Cent ring C ntr l Valv –Turn valve adjusting handle SP-2620 until the steering gear arm reaches approximately the center of its travel and minimum pressure is again noted *(CAUTION–Adjust the gear shaft into a backlash condition at center of gear travel. Make sure that extension rod and tool handle fit tight on the adjusting rod. Turn valve adjusting handle in one direction until the steering gear arm just starts to move. Note degree of valve adjusting handle on dial. Th n, without removing handle, turn it in the opposite direction until steering gear arm starts to move at the same rate of speed in the opposite direction and again note the degree of valve adjusting handle on dial. Next, turn valve adjusting handle to cent r of th degrees required to move arm in both directions. R check to make sure adjustment is corr ct).* Stop engine, remove valve adjusting handle, extension and alignment cap. *(CAUTION–Do not change position of valv adjusting rod when removing tool. Do not disconnect test hoses at this time).* Remove the three screws from tool C-3324 (Dummy Housing), and carefully slide tool from worm connector assembly.

R quir d R -Ass mbly Operations After Adjusting C ntr l Valv –Insert worm shaft into connector and visually align the **upp r** portion of the spiral grooves with the ball guide holes. Insert 30 balls into lower hole by tapping them gently (use rubber end of a lead pencil or similar object) while slightly oscillating the worm. *(NOTE–*When the 30 have been inserted, they should be visible in the other hole). Place the remaining balls (10) in either half of the worm connector ball guide. Grease end balls to help hold them in place and add other half of ball guide assembly. Insert assembly into holes until it seats on worm connector. Place ball guide clamp into position on ball guide and install the two lockwashers and screws. Tighten to 10-12 ft. lbs. torque. Check operation of worm making sure it is free to oscillate. Caution should be exercised not to bottom worm in the outward direction, otherwise damage to the ball return guide may result and cause a rough or tight operating



1954-55 CHRYSLER & DESOTO "CO-AXIAL" POWER STEERING GEAR

worm. Lubricate worm connector rails with Lubriplate. Lubricate housing head "O" ring with Lubriplate and install on housing head pilot opposite piston side. Drop inner bearing into housing and hold in place, rotate connector so ball guide is in downward position and pilot worm housing over rails on worm connector until flush with gear housing.

►*CAUTION: Worm housing cannot be installed if bearing is installed on worm shaft prior to installing housing.*

Install the three screws and belleville washers, draw down evenly and tighten to 25-30 ft. lbs. torque. Lubricate worm outer bearing roller with Lubriplate and install in bearing cup. Slide thrust washer over worm and against outer bearing race and follow with worm bearing nut lockwasher. Turn worm shaft out until lower race seats in bearing. Install worm housing bearing adjusting nut (tapered end first). Place tool C-3320 over worm shaft followed by tool C-3319. Then using tool C-3319, with a torque wrench, turn worm shaft in a clockwise direction to 20 ft. lbs. torque against inner bearing. While holding worm shaft at this point against inner bearing, use tool C-3320 with another torque wrench and tighten adjusting nut to 15 ft. lbs. torque. Rotate worm shaft several times to insure proper seating of bearings. Next, loosen adjusting nut and again using tool C-3319 with torque wrench, hold shaft at 5 ft. lbs. torque (clockwise direction) against inner bearing and retighten adjusting nut to **5 inch pounds torque.** Lock adjusting nut in position by bending tang of lockwasher to index with slot in the nut. (NOTE–Only one tang needed to lock adjusting nut).

►*CAUTION: Too loose adjustment will result in fre play before steering is accomplished. Too tight an adjustment will result in erratic steering and lack of returnability.*

Using driver C-3317, drive worm housing oil seal (lip of seal in) until it is seated against worm housing. Add 18 ounces of SAE-10W oil to the worm housing through worm bearing filler hole. Keep gear assembly in a level position to facilitate filling. Install worm housing filler plug and tighten to **50 inch pounds torque.**

►*CAUTION: It is very important that the worm housing be filled since there is no hydraulic connection between the worm and gear housings.*

CENTERING STEERING TUBE COUPLING & ADJUSTING BACKLASH BETWEEN GEAR SHAFT & RACK TEETH: With unit off car, turn worm shaft from one extreme of its travel to the other and count the number of turns; this should be approximately 3 3/4 turns.

CONTINUED ON NEXT PAGE

"CO-AXIAL" (Continued)

Then starting with the worm shaft setting at one end of travel, turn it back 1 7/8 turns (approximately center position). With steering gear centered as above, install the tube coupling with the slot in a vertical plane in the installed position of the gear assembly. **Do not install screw and washer at this time.** Then proceed as for adjustment of "Gear Shaft Only (Unit in Vehicle)" above noting the following

1) Slot in coupling, when installed, must be relative to the center of no backlash arc and not the overall travel (3 3/4 turns of the steering gear). If installed incorrectly, and the steering gear is installed in vehicle, the jacket and shroud assembly will have to be removed in order to correct.

2) When adjustment completed, stop engine and tighten adjusting screw locknut to 40 ft. lbs. torque. Install coupling screw and lockwasher and tighten to 15-20 ft. lbs. torque.

3) Disconnect C-3211 and C-3318 hoses and remove adapters from gear housing. Install pressure hose connector and gasket, tighten to 18-22 ft. lbs. torque. Install return hose connector and copper gasket, tighten to 25-30 ft. lbs. torque. Cap fittings to prevent loss of oil.

4) Remove steering gear arm (to permit installation of unit in vehicle).

5) Remove holding fixture C-3323.

6) Refer to "Required Re-Assembly Operations After Adjusting Control Valve" above.

1955 MODELS

GEARSHAFT ADJUSTMENT *(Early Cars–See Production Change & Adjustment Caution above)*–Check steering for being properly centered by turning the coupling in each direction from center Pitman arm backlash should become evident at equal distances in both directions when turning from center It may be necessary to reposition the coupling to obtain equal travel in both directions in which case it will be necessary to readjust pitman arm backlash *See "Installing Coupling at Center" (below)*

GEARSHAFT ADJUSTMENT: *(Later Cars–See Production Change & Adjustment Caution above)*–Center the steering tube coupling or steering wheel to the overall travel of the steering gear *With gear in center position* loosen adjustment screw in end of shaft opposite pitman arm until there is some backlash Slowly turn adjusting screw in until the backlash disappears **Turn the adjusting screw in ¼ of a turn and lock in position** *(CAUTION–Use a very light touch on steering wheel when checking for backlash)*

►*LATER TYPE GEARSHAFT INSTALLATION ON EARLY MODELS WITH FIRST TYPE GEARSHAFT* Later type gearshaft can be installed on early cars without changing the lower piston rod If new shaft is used, the later type adjustment must also be used

►*IDENTIFICATION OF EARLY CARS WITH LATER TYPE GEARSHAFT (Installed in field)* If difficulty is experienced in adjusting the gearshaft on early cars, the following check may be made to determine if later type gearshaft installed Center steering wheel and tighten adjusting screw until a small amount of backlash is felt, then turn coupling or wheel to either extreme limit If backlash increases, it is the early type gearshaft

Installing Coupling at Center: Install steering tube coupling with slot in coupling in the vertical plane There are no master serrations on either worm shaft or the coupling *A mark is scribed on the coupling which* must be set at 12 o'clock when the steering worm shaft is at center so that the steering tube master serration will be in position to allow for proper installation of steering wheel

MANUAL CONTROL VALVE NEUTRAL POSITION ADJUSTMENT (Power Steering Unit Removed): With unit secured in a vise or suitable fixture, connect test hoses to hydraulic pump on car and to steering assembly Remove oil reservoir cover Start engine and operate at idle Fill reservoir to level mark and allow system to warm up *(CAUTION–Oil level must be maintained above filter while hydraulically centering valve)* Insert manual control valve centering tool C-3445 (slotted end first) into worm shaft and engage slot in tool with tang on control valve operating rod (tool can be rotated by using a tap wrench) *If pitman arm moves to one extreme or the other and stays there, rotate tool in either direction until arm starts to move Slightly rotate tool in opposite direction until arm stops moving.* Install a 1 7/16" socket on a torque wrench and place on pitman arm retaining nut Rotate gear shaft in both directions from one extreme to the other The torque required should be the same in both directions Where torque is higher in one direction than in the opposite rotate the valve adjusting tool slightly in the opposite direction to the direction in which the pitman arm has the highest torque reading *(Change valve position in slight variations to prevent over adjusting).* When torque is the same in both directions, remove tool

MANUAL CONTROL VALVE NEUTRAL POSITION ADJUSTMENT (Power Steering Unit in Car): *(NOTE–The following procedure can be used when it is difficult to rotate the steering wheel in one direction but not in the other, or where the wheels turn of their own accord Before proceeding with the adjustment, make sure that unequal tire pressure is not the cause of steering wheel turning hard in one direction).* Remove all parts, as necessary to gain access to steering tube coupling Remove coupling retaining screw, lockwasher and plain washer from worn shaft Insert manual control valve centering tool C-3445, slotted end first into worm shaft and engage tool with tang on control valve operating rod *(NOTE–Two men are required to* center the valve) Move pitman arm through its travel from one direction to the other with a torque wrench and a 1 7/16" socket, observing the torque reading The torque should be the same in both directions Turn adjusting rod as required until an equal torque reading is obtained *(NOTE–Where gearshaft requires more* than 40 ft lbs to rotate it, or where torque is uneven at any point through the full shaft travel, check for cocked gear shaft cover, dirt in unit, or recirculating balls are defective or improperly installed)

PUMP DRIVE BELT ADJUSTMENT: Sufficiendy tight to prevent slipping.

HYDRAULIC PRESSURE TEST

Connect Gauge C-3309 in pressure line between pump and hose Refill reservoir to proper level Open valve on gauge, start engine, and run until power steering oil pump reaches operating temperature With engine at normal operating speed, turn shut-off valve on gauge to its closed position *(CAUTION–Do not keep valve closed more than a few seconds or accelerate engine with valve closed)* If pressure does not gradually increase to 700 lbs pressure (Chrysler & DeSoto), 600 lbs pressure (Dodge), 750-800 lbs pressure (Plymouth), it is possibly due to fan belt slipping, or flow control valve stuck in the open position or a broken drive coupling If the above pressures are indicated on the gauge, pump is in operating condition

►*TESTING NOTE*–If gauge not available, a fairly accurate way of making the test is as follows Start engine and turn the wheel to both extreme positions. If the high pressure hose flexes, the pump is in good condition. If hose does not flex, lack of pressure from pump is indicated. Shut off engine and check pump as indicated below.

PUMP CHECK: *Remove cover from reservoir start engine* and turn steering wheel If oil does not flow through filter a stuck flow control valve is indicated Shut off engine Remove high pressure hose at pump fitting and insert a ¼' blunt probe against valve plunger If plunger moves inward 3/16-1/4", plunger was stuck and will probably function properly next time Recheck pressure and if found to be below normal (see above), remove flow control valve and clean thoroughly If this does not correct the condition, remove and repair pump assembly If oil does not flow through reservoir filter in above test, check for broken filter or slipping fan belt Check shaft rotation by hand if coupling found to be broken If shaft turns freely install new couplings on both pump and generator shaft If pump shaft binds when turned by hand, replace both pump and couplings If armature shaft is damaged, replace necessary parts

TROUBLE SHOOTING

HARD STEERING IN BOTH DIRECTIONS: **1)** Leak in steering system, pump belt slipping or broken, fluid level low.

2) Steering gear linkage not lubricated, tire pressure too low, bind in steering column or gear, improper front end alignment.

3) Low pump pressure (see Hydraulic Pressure Test above) with particular attention to following Relief and flow control valve, rotors (not turning or worn), pump body or cover worn.

4) Loss of pressure in power unit (see Hydraulic Pressure Test above).

SMALLER TURNING RADIUS IN ONE DIRECTION: **1)** Wheel stops not adjusted properly.

HYDRAULIC LEAKS: **1)** Check for leaks at hose adapters, pump body, between gear and worm housings, and gear shaft oil seal.

HARD STEERING IN ONE DIRECTION ONLY: **1)** Tire pressure too low.

2) Control valve maladjusted.

3) Bind in steering column or gear, improper front end alignment.

CONTINUED ON NEXT PAGE

"CO-AXIAL" (Continued)

VEHICLE ATTEMPTS TO TURN UNLESS FORCE APPLIED TO HOLD STEERING WHEEL: 1) Tire pressure uneven.
2) Control valve maladjusted.

POOR RECOVERY ON TURNS: 1) Tire pressure too low, improper front end alignment.
2) Gear shaft adjustment too tight, worm bearing adjustment too tight.
3) Balls in worm connector binding, fit too tight.
4) Bind in steering column or gear, bind in steering knuckles.

NOISE IN CHUCK ASSEMBLY: Check belt adjustment. Check for vibrating condition set up by control shaft rod. Remove unit and install a new valve rod adjusting disc.

HISSING NOISE (NO LOAD): Caused by low oil pressure or improper operation of back pressure valve.

HISSING NOISE (RIGHT TURN ONLY): Caused by oil leaking past lower piston rod gear housing seal.

HISSING NOISE & LOSS OF OIL THROUGH UPPER HOUSING VENT (LEFT TURN ONLY): Caused by oil leaking past upper piston rod housing head oil seal.

CREAKING NOISE ON TURNS: Check for loose gear-to-frame mounting bolts. If noise persists after tightening gear-to-frame bolts, install a new equal tooth sector or gear shaft.

SNAPPING NOISE: Tighten gear-to-frame mounting bolts. Check coupling screw for tightness. Check lower piston rod bushing dowel pin for being too high. Check bushing for seating properly. Check lower piston rod for tight fit at piston.

CHUCKLE NOISE: Check as follows: Steering arm nut loose on gearshaft. Loose front wheel bearing. Gearshaft adjustment too loose. Excessive kingpin endplay. Steering tube coupling screw loose. Worm bearing preload adjustment too loose. Excessive worm shaft endplay.

WANDER (STEERING WHEEL FREEPLAY): Check steering wheel freeplay which should not exceed 5/8". If freeplay excessive (without moving steering linkage), check in same manner as for "Chuckle" above, and also check steering linkage and front wheel alignment.

POOR RETURNABILITY (BOTH DIRECTIONS): Check torque required to turn gearshaft from one extreme to the other with torque wrench on steering gear arm nut (linkage disconnected from steering arm). Torque should not exceed 40 ft. lbs., ± 10 lbs. If torque reading not excessive, check wheel alignment and steering linkage. If torque excessive, check steering column jacket bearing. Check gearshaft adjustment. Check worm shaft bearing preload. Check wormshaft for binding in connector.

POOR RETURNABILITY (ONE DIRECTION ONLY): Check tire pressure. Center control valve (see Adjustment). Check gearshaft adjustment.

UNEQUAL STEERING EFFORT: Check control valve adjustment. Check for upper piston rod movement in piston. Check worm shaft connector nut for tightness. Check control valve rod for looseness in valve. Check upper piston rod nut for looseness. Check upper piston rod for being scored at reaction seal retainer. If the above fails to correct unequal steering effort, replace all reaction parts.

UNABLE TO MAINTAIN CONTROL VALVE ADJUSTMENT: This may be caused by reaction spacer being too short or too long, or by burrs or out of squareness. Check valve control rod for looseness in disc, or control valve looseness on rod. Upper piston rod nut may be loose, or upper piston rod may be loose in piston.

LACK OF ASSIST (ONE DIRECTION): Check for damaged neoprene piston ring. Check for damaged or improperly seated housing head oil seal. Valve rod lower "O" ring may be damaged, or piston rod "O" rings may be damaged.

LACK OF ASSIST (BOTH DIRECTIONS): Check the following: Low tire pressure. Drive belts slipping. Low oil pressure.

LUBRICATION

Since there is no hydraulic connection between the worm and gear housing, the Power Steering has two separate fluid levels. Lubricate as follows:

Reservoir—Check every 1000 miles or every 30 days. Reservoir is mounted at rear of generator. Make sure top of reservoir is absolutely clean. Then, remove cover or filler cap and check oil level. Oil level should be 1/2" above filter element (if reservoir is tilted, oil level should be 1/2" above highest point of filter element). (NOTE—An oil level mark is stamped on the inside of the reservoir or on the dipstick on type using a filler cap). Replenish as necessary with SAE-10W engine oil. When temperatures are constantly below minus (-) 10° F., drain hydraulic system and refill with SAE-5W engine oil (see Draining and Refilling Hydraulic System below). When temperatures are consistently above minus (-) 10° F., drain the lighter lubricant which may have been added and replace with SAE-10W engine oil. Should the vehicle be operated at extremely high temperatures, it may be necessary to drain and replace the SAE-10W oil with SAE-30 oil for the time it is being operated in these extremely high temperatures. NOTE—When temperature is below minus (-) 10° F. run engine for at least three minutes before putting car in motion or turning steering wheel. Capacity is approximately 2 quarts.

Worm Housing—(*NOTE*—It is not necessary to change oil in worm housing due to temperature). Worm housing does not require periodic checks (unless leakage occurs). However, should the steering gear assembly be removed for any reason, it is recommended it be checked at that time. The oil should be level with the filler plug opening when the gear assembly is in an installed position. Replenish as necessary with SAE-10W engine oil.

DRAINING HYDRAULIC SYSTEM: *(CAUTION—Extreme care should be taken to prevent dirt from entering reservoir while cover or filler cap is removed. To prevent damage to filter element, do not insert sharp objects into reversoir. Do not disturb filter element as periodic changes of this unit are not required).* Disconnect high pressure (small) hose at the gear housing and jack up front end of car sufficiently to raise wheels off floor. Place hose in suitable container. While holding hose in container start engine and allow to idle, turn steering wheel from one extreme to the other until all fluid is forced from unit. *(CAUTION—Do not run engine above idle speed. As soon as fluid starts to show great quantities of air bubbles, stop engine).* Reconnect high pressure hose and refill.

REFILLING HYDRAULIC SYSTEM: Bleed steering gear as follows: Fill reservoir slightly higher than normal. Start engine and run for a short time to circulate oil through hoses. With engine running at idle speed, turn steering wheel back and forth several times from extreme right to left to bleed any remaining air out of system. Check oil level in reservoir. Add oil to reach level mark. Capacity is approximately 2 quarts.

REMOVAL & INSTALLATION

1954 MODELS

REMOVAL: Turn steering wheel to extreme left position to allow for removal of steering gear arm and drag link. Remove horn control ring ornament, cushion and spring. Disconnect horn wire and remove steering wheel nut and wheel. (NOTE—Horn control ring and contact plates will have to be removed if puller C-612 used to remove wheel. See below). Remove steering wheel column jacket bearing spring and spacer (cone shaped). Remove three shroud-to-toe board cover screws, then remove cover from the shroud. Remove accelerator and brake pedal pads and floor mat. Remove steering column jacket toe pad screws (6) and slide toe pad up on jacket assembly. Remove floor pan pedal opening cover screws, remove cover. Remove directional signal indicator, horn and selector lever indicator light wires. Disconnect pressure and return hose from steering gear housing and cap fittings.

Steering Wheel & Horn Button Removal (Using Puller C-612): Disconnect battery, center steering wheel in straight-ahead position. Press down on horn blowing ring ornament and turn counter-clockwise. Lift out ornament retaining spring and pad. Disconnect horn wire from terminal on travel plate and insulator assembly. Remove bushing, travel plate, horn blowing contact ring spring and triangular ground plate. Curl and push horn wire into steering gear tube to make room for steering wheel puller pilot. Remove steering wheel nut. Attach puller Tool C-612 and remove wheel.

▷*CAUTION: Fasten ends of hose above level of reservoir to prevent further loss of oil.*

Remove cotter pin and disconnect gearshift control rod from gearshift rod lever. Remove steering gear arm nut, then using tool C-143 with short puller screw SP-2623, remove steering gear arm and drag link. Remove access cover in left front fender shield and remove front lever steering gear assembly to bracket screw, washer and spacer (convex). Note position of wedge between bracket and gear housing. Remove front upper and rear steering gear assembly to bracket screws, washers and spacers (convex) through opening in toe board.

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinu d)

►*CAUTION: Do not lose spacers or wedge.*
Holding jacket and shroud assembly in position, remove the two steering column to instrument panel screws.

►*CAUTION: Steering column to instrument panel screw retaining plate and anti-squeak pad may fall from behind instrument panel when screws are removed.*
Lower jacket and shroud assembly, then remove insulator collar. Slightly push the steering gear column jacket and shroud assembly toward passenger side of vehicle (to permit gear shaft to clear frame bracket) and remove assembly through toe board opening. Place assembly on bench, loosen gear shift rod lever nut and slide lever and spacer (oilite) off gear shift rod. Loosen two nuts on the jacket clamp assembly and slide the jacket and shroud assembly from worm housing. (NOTE–Spring and spring seats (2) may fall from gear shift rod when jacket and shroud assembly is removed). Remove steering gear tube insulator pin, then remove tube and insulator from coupling.

INSTALLATION & ALIGNMENT: Center gear to center of no backlash arc (slot in coupling vertical). Place steering gear tube insulator on tube and position tube and insulator (master serration on steering wheel end of tube in "UP" position) in coupling. Install pin. The horn connector which is located on the jacket assembly is spring loaded. Because of this, the contact point will have to be raised to permit clearance with contact ring on steering tube when jacket and shroud assembly is installed. To accomplish this, bend one end of a piece of wire in the shape of a hook to raise contact point, then bend other end over shroud to hold it in raised position while being installed.

►*CAUTION: In some instances it will be necessary to remove lower half of shroud from jacket assembly and remove horn connector from jacket. Install jacket assembly over steering gear tube, then install horn connector on jacket and reassemble.*
Place gear shift rod spring seats in position in spring (flange portions of seats facing to inside of spring), slide spring and seats over gear shift rod. With horn contact held in raised position by piece of wire and holding spring and seats on gear shift rod, slide jacket and shroud assembly over steering gear tube, guiding gear shift rod into bushing on gear housing. Tighten the two nuts on the jacket clamp assembly and remove piece of wire which was used for holding the horn contact point. Install steering gear assembly through toe board opening pushing column jacket and shroud assembly slightly toward passenger side of vehicle to permit gear shaft to clear frame bracket. Install front upper and rear steering gear housing to bracket spacers (convex), screws and washers through opening in floor pan. Tighten (snugly), then back each one off one turn. Position insulator collar on upper shroud and align the jacket and shroud assembly to instrument panel. Install the two screws, tighten securely. Tighten front upper and rear steering gear housing to bracket screws to 70 ft. lbs. torque (ones that were loosened one turn). Install front lower steering gear housing to bracket spacer (convex), washer and screw **but do not tighten.** Tap wedge into position (over front lower gear to bracket screw) and between bracket and gear housing.

►*CAUTION: Make definitely sure wedge is positioned properly. Tap wedge lightly but do not drive.*
With wedge in position, tighten front lower steering gear housing to bracket screw to 70 ft. lbs. torque. Replace access cover in left front fender shield. Install steering gear arm and drag link, tighten steering gear arm nut to 100-120 ft. lbs. torque. Connect direction signal indicator, horn and selector lever indicator light wires. Install steering column jacket bearing spacer (cone shaped) and spring. Install steering wheel, tighten nut securely (install horn contact plates and control ring, if removed) and connect horn wire. Install horn control spring, cushion and ornament. Check clearance between steering wheel and direction signal housing. If clearance is more or less than 1/8" loosen the two column jacket to instrument panel screws slightly, then, loosen the two nuts on the jacket clamp assembly at top of worm housing and slide steering column jacket upward or downward to allow for proper clearance. Retighten jacket clamp assembly nuts and column jacket to instrument panel screws. Slide gear shift rod lever spacer (oilite) and lever on rod. Position selector lever in low or reverse, then holding the gear shift rod lever and spacer flush against gear housing, tighten nut.

►*CAUTION: Make definitely sure the selector lever remains in the low or reverse position while tightening nut. This procedure necessary to obtain the proper selector lever gate clearances. Check operation by shifting selector lever to all positions.*
Connect gear shift control rod to lever and install cotter pin. Remove the protective caps from fittings in gear housing and connect the pressure and return hoses. Remove reservoir cover or filler cap and fill reservoir to proper level. Start engine and turn steering wheel from one extreme of its travel to the other several times to purge air from system and note operation of steering. If steering seems to operate properly, install the floor pan pedal opening cover and tighten screws securely. Slide the steering column jacket toe pad down into position and install screws (6). Install floor mat, accelerator and brake pedal pads. Place cover on shroud and install screws (3). Recheck oil in reservoir and fill to proper level. Place selector lever pointer in neutral (N) position. Disconnect gear shift control rod at bellcrank located on transmission. Make sure manual control lever (at transmission) is in neutral (N) position (second detent position from rear of vehicle). With selector lever pointer still in neutral (N) position, adjust the gear shift control rod to the required length for a free fit in the lever of the bellcrank, then re-install rod. Operate selector lever through all indicator positions. Road test vehicle.

1955 MODELS

REMOVAL: Remove horn ring and ornament from steering wheel. Disconnect horn wire and remove horn ring. Remove steering wheel with puller C-612, and remove signal lever and plate. Loosen steering column to instrument panel bracket. Loosen steering column jacket clamp screws and raise front of car. Disengage drag link from pitman arm and pull pitman arm with Tool C-3402. Loosen three gear housing to frame attaching bolts. Remove floor mat retaining plate and rubber dust pad. Disconnect pressure and return hoses and drain gear assembly by slowly rotating steering wheel until all oil is expelled from unit. Fasten disconnected ends of hoses above oil level in reservoir to prevent loss of oil and cap hose ends to prevent dirt entering. Remove gear housing to frame bolts and alignment wedge and remove gear assembly from lower side of car.

Steering Wheel & Horn Button Removal (Using Puller C-612): *See 1954 Removal & Installation.*

INSTALLATION & ALIGNMENT: Install steering gear assembly from under the car and up through the dash panel into the jacket. Install housing to frame attaching bolts, flat washers, swivel washers and nuts, but do not tighten (swivel washers permit alignment to dash). Slide steering column jacket down over worm housing. Install turn signal lever, being sure column jacket does not restrict lever. Tighten jacket to steering gear housing clamp. Connect turn signal wires. Install steering column to instrument panel bracket and install steering wheel. If clearance between steering column jacket and steering wheel is less than 1/8", adjust steering column jacket to provide proper clearance. Install dust pads and retaining plates. Tighten front upper and lower gear housing to frame attaching bolts to 20 ft. lbs. Install wedge over rear bolt between housing and frame, so that tapered surfaces match, tapping it lightly in place. Tighten three attaching bolts to 70 ft. lbs. Install horn ring and horn wire in steering wheel and install horn ring ornament. Connect hoses from steering gear to hydraulic pump.

STEERING GEAR OVERHAUL

►*CAUTION:* Cleanliness in executing all overhaul procedures cannot be over-emphasized. Unit should be thoroughly cleaned in a suitable solvent when removed from vehicle. When disassembling, each part should be placed in the solvent, washed, then dried with compressed air. Careful handling of parts is necessary to avoid occurrence of nicks and burrs. Crocus cloth may be used to remove small nicks and burrs provided it is used carefully. When used on valve spool, use extreme care not to round off sharp edge portion. (NOTE–Sharp edge portion helps prevent dirt and foreign matter from getting between the valve and bore, thus reducing possibilities of sticking). Remove and discard all "O" ring seals, and seals, using new ones lubricated with Lubriplate when reassembling.

DISASSEMBLY & INSPECTION: Proceed as follows:
Removing Worm Gear using: 1) Drain lower portion of steering gear through pressure and

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinued)

return connections, by turning steering tube coupling from one extreme of travel to the other. Using a 3/16" allen wrench, remove worm housing filler plug and drain worm (upper) housing.
2) Attach holding fixture C-3323 to unit and place in vise.
3) Remove tube coupling screw, lockwasher, and washer from center of coupling. Using tool C-3392, remove coupling from worm shaft. (NOTE—Tool C-3112 may also be used to remove coupling. However, to accomplish this, it will be necessary to cut one adapter plate SP-1409 in half and using these two parts instead of the two plates).
4) Using extreme care and a screwdriver, remove worm housing oil seal from housing and worm shaft.
5) Unlock bearing adjusting nut by bending tang of lockwasher. (NOTE—Only one tang locks nut in position). Place tool C-3320 over worm shaft followed by C-3319. Holding the worm stationary remove worm bearing adjusting nut, lockwasher, and thrust washer (NOTE—Worm bearing adjusting nut tapered on one side).
6) Remove worm outer bearing race and bearing roller from worm. Inspect bearing roller for wear or pitting.
7) Remove three worm to gear housing screws and belleville washers (Note installed position of washers on screws. Concave side of washers fit against housing). Remove worm housing. (NOTE—It may be necessary to tap housing lightly due to interference of "O" ring seal between housing head and housing.
8) Remove inner bearing race from worm shaft and inspect for wear or pits.
9) Remove lower bearing. roller from housing. Inspect bearing roller and the upper and lower bearing cups in housing. **Do not r move bearing cups unless insp ction r v als it is necessary to do so.** To remove upper and lower bearing cups use tool C-3322.

R moval f Worm Connect r: 1) Remove housing head "O" ring and discard (Use new rings when assembling). Unlock worm connector nut lock and slide lock back sufficiently to loosen worm connector nut.
2) With tool C-3321 attached to worm connector, remove connector nut using tool C-3326 (NOTE—It may be necessary to rotate steering gear shaft to raise worm connector and permit installation of tool C-3326).
3) Slide worm connector assembly from valve control spacer.

Disass mbly of W rm C nnector—*(CAUTION—Do not bottom worm shaft in the outward direction upon disassembly or assembly. Bottoming the worm shaft may damage the ball guides and cause a tight and rough operating worm).*
1) Remove the two worm connector ball guide clamp screws and lockwashers. Remove guide clamp.
2) Using care not to lose any of the worm balls, carefully remove the ball guide from the worm connector. *CAUTION—Worm balls are a select fit with each other. If any of them are damaged and require replacing, it is recommended that a complete set (40) be installed.*
3) Turn worm connector over and carefully thread the remaining worm balls out of the worm connector by turning worm in and out. Count the worm balls which were removed so that the same number can be installed. There should be (40).
4) Remove worm from connector, slide connector nut lock from connector.
5) Inspect guide rails on connector for nicks and burrs.

Removal of Piston & Rods from Gear Housing: 1) Remove pressure and return hose adapters and copper gaskets.
2) Remove steering gear shaft oil seal lock ring (circular section), then, using tool C-3350, remove steering gear shaft oil seal.
3) Remove lock nut from shaft adjusting screw.
4) Remove three cover screws, belleville washers, and neoprene seals.
5) Remove steering gear shaft cover from housing by turning adjusting screw in. Remove cover gasket and discard (use new gasket when reassembling).
6) Using steering arm (if necessary) align steering gear shaft with cover opening in housing. Remove steering gear shaft assembly from gear housing by using a fiber hammer and tapping lightly.
7) Using tool C-3229, remove adjusting screw retaining snap ring. Remove adjusting screw, thrust washer and washer from steering gear shaft. Remove adjusting screw "O" ring.
8) Inspect needle bearings in cover for broken needles and inspect bearing surface on shaft for scoring or pitting. *CAUTION—Do not remove bearing from cover as bearing and cover are serviced as an assembly. Inspect condition of teeth on shaft.*
9) Using C-760 pliers remove gear housing cover snap ring (tapered) at bottom of housing, remove housing cover. Remove "O" ring from housing and discard (use new ring on reassembly).
10) Place a suitable container under the assembly (to catch trapped oil), then slide piston assembly and rods from gear housing. *CAUTION—Use extreme care in handling so as not to damage the sealing surfaces on housing head.*

Disassembly of Piston & Rods— 1) Remove valve rod adjusting disc from valve rod, slide valve rod adjusting disc retainer from upper piston rod, remove upper piston rod nut lock cap.
2) Using tool C-3328, remove upper piston rod nut. *CAUTION—Support upper piston rod on block of wood to help prevent damaging housing head when removing nut. Assembly may also be supported by wrapping several layers of masking tape around the rack teeth and sealing surfaces of lower piston rod and clamping it in a vise equipped with protective jaws.*
3) Slide valve control spacer, seal assembly, upper and lower valve control spacer seal retainers from upper piston rod. Remove spacer retainers from spacer, slide seal assembly from valve control spacer.
4) Remove worm connector nut from upper piston rod, slide housing head off upper piston rod. Remove housing head "O" ring and discard (use new ring on reassembly).
5) Using suitable drift, remove upper piston rod seal (lip type) from housing head.
6) Remove two backup (steel) and "D" type (neoprene) piston rings from piston.
7) Using C-760 pliers, remove lower piston rod snap ring and slide lower piston rod from piston.
8) Using care not to bend valve adjusting rod, slide valve assembly from piston assembly.
9) Using a 1/4" punch, drive piston pin into upper piston rod, then using C-760 pliers, remove upper piston rod snap ring. **Note position and constructi n of snap ring.**
10) Remove upper piston rod from piston. Using a wire hook, remove piston pin and "O" ring from piston rod, discard "O" ring (use new ring on reassembly). Make sure oil passage is open. Inspect sealing surface on piston rod for scoring. Remove the two valve rod "O" rings (one in each end of upper piston rod) remove upper piston rod "O" ring (discard rings, use new rings on reassembly).
11) Remove lower piston rod "O" ring (discard and use new ring on reassembly). Inspect rack teeth and sealing surfaces on lower piston rod. Make sure oil return hole is open.
12) Inspect piston for nicks and burrs. Make sure all oil passages are open and free of dirt.

Removal of Relief Valve Assembly: Thread a ¼"-28 bolt into threads provided in plug. Clamp bolt in vise and pull on lower piston rod to remove plug. If end plug is seized in rod, tap on retaining flange at lower end of piston with a fibre hammer. Inspect piston for nicks and burrs. Make sure all passages are open and free from dirt.

Disassembly of Steering Gear Housing: 1) Using C-3128 pliers, remove piston rod bearing support pin snap ring. Slide bearing support pin out of gear housing and remove roller support assembly. Inspect roller and needle bearings. Inspect bearing support pin for wear or scoring. Remove two bearing support pin "O" rings located in each side of gear housing and discard (use new rings on reassembly).

2) Inspect steering gear shaft needle bearing in gear housing for broken or rough needles. **Do not remov bearing unless inspection reveals it is necessary to do so.**

3) Using driver C-3333, drive steering gear housing shaft needle bearing from inside gear housing. Remove lower piston rod seal (lip type) from housing.

REASSEMBLY & ADJUSTMENT:-Proceed as follows:

Steering Gear Housing: 1) Remove garter spring from a **new** piston rod seal (to prevent being damaged by tool when installing) and position seal over driver C-3331 (position seal so lip will be facing up or to inside of cylinder when installed). Insert seal aligning pilot of tool in end of driver and drive lower piston rod seal into position in gear housing. *CAUTION—Replace garter spring in piston rod seal.*

2) Using driver C-3333, install housing shaft needle bearing assembly into gear housing until driver marking on driver is even with side of housing. *CAUTION—Always drive on letter side of b aring, otherwis damage to bearing may result.*

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinued)

3) Lubricate the two **new** piston rod bearing support pin "O" rings with Lubriplate and install into gear housing at outer edge of bearing support pin holes. Make sure they are properly seated in housing.

4) Start piston rod bearing support pin through hole in cover side of housing. Place roller support assembly into position in housing and push support pin through roller assembly until it protrudes sufficiently on opposite side of housing to install snap ring. Using C-3128 pliers, install snap ring, making sure it is properly seated.

Piston & Rods 1) Insert relief valve spring followed by plunger into valve body and insert assembly (milled end first) into lower piston rod. Press end plug into lower piston sufficiently to seat against relief valve body *(NOTE*–A suitable adapter will be requiredto press end plug into place. Otherwise, damage to rod will result. If plug is not pressed in far enough to properly seat against the valve body, it will produce a rattling or clattering sound when hydraulic pressure is applied. If the plug is pressed in too tightly, it will cause relief valve ports in valve body to collapse, restricting the plunger and creating high back pressure, resulting in lack of steering assistance). Lubricate the two **new** valve rod "O" rings with Lubriplate and install one in each end of piston rod. Make sure the rings are seated properly.

2) Lubricate the two **new** large "O" rings with Lubriplate and install one on each upper and lower piston rod. Make sure rings seat properly in ring grooves.

3) Install lower piston rod (with rack) into end of piston assembly opposite piston pin hole and using C-760 pliers, install snap ring. *CAUTION–When installing snap ring, minimum gap opening of 25/64" is specified. Care should be exercised to locate the gap at the middle port of the five ports without obstructing the middle port or adjacent ports with snap ring ends. Make sure snap ring is seated properly.*

4) Lubricate valve assembly with Lubriplate and slide into piston assembly. Using care not to damage "O" rings, slide upper piston rod over valve rod, aligning piston pin hole in the piston assembly with the hole in the upper piston rod.

5) Lubricate **new** piston pin "O" ring with Lubriplate and install on piston pin. With piston pin holes aligned in both the piston and upper piston rod, position piston pin (tapered end first) in piston. Using a 1/4" punch and hammer, tap lightly until piston pin is flush with bottom of piston pin groove. Using C-760 pliers, install upper piston rod snap ring. S *CAUTION under 3) above.*

6) Remove garter spring from a n w upper piston rod seal (to prevent being damaged when installing seal) and position seal on driver C-3331 (lip of seal facing tool). Insert seal aligning pilot of tool in end of driver. Drive upper piston rod seal (lip of seal out) into position in housing head. Replace garter spring and lubricate seal with Lubriplate. Install housing head assembly (sealing lip first) onto upper piston rod. *CAUTION– Use extreme care to protect sealing surfaces on housing head.*

7) Slide connector nut onto upper piston rod with open threaded end away from piston.

8) Lubricate the valve control spacer seal (new) with Lubriplate and install in center of valve control spacer. *CAUTION–Should it be necessary to replace the valve control spacer or upper piston rod for any reason, always select a spacer to match. The length of the valve control spacer selected, must be identical to the distance between the seat of the valve control spacer seal retainer and the seated upper piston rod nut.*

9) Slide one of the valve control spacer retainers (large diameter first) on upper piston rod. Lubricate with Lubriplate. Place tool C-3329 over threaded end of upper piston rod. Lubricate the valve control spacer retainer with Lubriplate and place into position (small diameter first) so it nests in valve control spacer. Slide spacer, seal and retainer over tool C-3329 and into position on piston rod, remove tool.

10) Install upper piston rod nut and using tool C-3328, tighten securely (25-30 ft. lbs. torque). Lock in place using piston rod nut lock by tapping outer diameter of lock into nut recess.

11) Slide valve rod adjusting disc retainer (largest diameter first) over end of upper piston rod. Thread valve rod disc (extended lock thread section being outward) onto valve rod until approximately three threads show (for aid in later adjustment).

12) Place lock ring on worm connector (tang of ring toward threaded end). Slide worm connector (less ball bearings and worm shaft) over valve control spacer, then screw worm connector nut onto connector. Hold worm connector with tool C-3321, then using tool C-3326, tighten nut. Stake ring with punch.

13) Lubricate the two "D" type (neoprene) piston rings with Lubriplate and install on piston. To aid in installation of rings, first slide rings over ring lands and to center of piston with lips facing away from each other. Next, slide rings into position in ring lands. Install backup (steel) rings one on each end of the piston, in extreme position from the center of the piston.

Installati n f Pist n & R d Ass mbly int Gear H using: 1) Lubricate lower piston rod, teeth of rack and tool C-3391 with Lubriplate, then position tool in teeth of rack.

2) Place ring compressing tool C-3344 on gear housing. Position piston and rod assembly so teeth on rack are 180° from roller support assembly and install into gear housing. *CAUTION–Us extrem care when performing this operation so as not to damag gear housing oil seal or piston rings. Do not us screwdriver to compress piston rings. To further aid in installation, piston and cylinder may be lubricated with Lubriplate. If rack is not posirion d properly when it is installed, it may be correct d by rotating the lower piston rod with a scr wdriver through op ning in end of gear housing.* Remove ring compressing tool C-3344, and tool C-3391 from teeth of rack through opening in gear housing.

3) Lubricate large **new** "O" ring with Lubriplate and install on the side of housing head which faces piston assembly.

4) Carefully slide tool C-3324 (dummy housing) over worm connector and secure housing head to gear housing, tighten the three screws to 25-30 ft. lbs torque.

5) Install thrust washer on gear shaft adjusting screw and position tool C-3401 over thread of screw. Lubricate adjusting screw "O" ring with Lubriplate and slide over tool and into position on adjusting screw. Remove tool and insert adjusting screw thrust washer into gear end of steering gear shaft. Insert adjusting screw assembly into gear shaft and lock into position by inserting internal snap ring. Use C-3229 pliers and make sure snap ring is properly seated. Screw shaft adjusting screw with gear attached into the gear shaft cover assembly as far as possible.

6) Center the second tooth of the rack over center line of piston rod bearing support pin.

7) Lubricate a **new** gear shaft cover gasket with Lubriplate (to help hold it in place) and position it on cover of housing.

8) Center the center line of the middle tooth on gear shaft with second tooth **spac** from end of rack. Insert gear shaft assembly with cover attached into gear housing, tap lightly into position. Place belleville washers and new seals on screws and secure cover to gear housing. Draw down evenly and tighten to 25-30 ft. lbs. torque.

9) Lubricate **new** gear housing cover "O" ring with Lubriplate and install on housing cover. Push assembly (seal end first) into housing and install snap ring.

10) Before attempting to install a n w seal, thoroughly clean sealing surface on the gear shaft and counterbore of steering gear housing. Lubricate a **new** steering gear shaft oil seal with Lubriplate and place (lip of seal down) on a piece of clean paper. **Carefully** install tapered end of sleeve (part of tool C-3350) in seal and slide seal back approximately 1/4" on

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"CO-AXIAL" (Continued)

sleeve. Install this assembly (lip of seal toward housing) over steering gear shaft until seal contacts counterbore in housing. Push seal into position by installing adapter over sleeve, and installing coupling nut on shaft threads until shoulder of adapter contacts housing. Remove nut and adapter. Wrap a new piece of friction tape around sleeve to provide a firm grip and with a turning motion, remove sleeve from seal and gear shaft. Seal is then positioned properly. Install oil seal lock ring (circular section) and make sure it is properly seated. Install gear shaft adjusting screw lock nut, but do not tighten.

11) Secure steering gear arm from stock or remove one from vehicle. Install steering gear arm, lockwasher and nut, and tighten nut from 30-40 ft. lbs. torque (low torque reading for checking purposes only). Work steering arm back and forth forcing piston to its full length of travel. Adjust gear, if necessary, into a backlash position, then tighten lock nut.

CAUTION–This adjustment necessary before hydraulically centering gear assembly and is not to be considered a final adjustment.

12) Proceed as indicated under steps **7)** through **13)**, Centering Control Valve, and Required Re-Assembly Operations After Adjusting Control Valve, outlined under "Control Valve" in ADJUSTMENT section above.

13) For final gear adjustment proceed as outlined under "Centering Steering Tube Coupling & Adjusting Backlash Between Gear Shaft & Rack Teeth" in ADJUSTMENT section above.

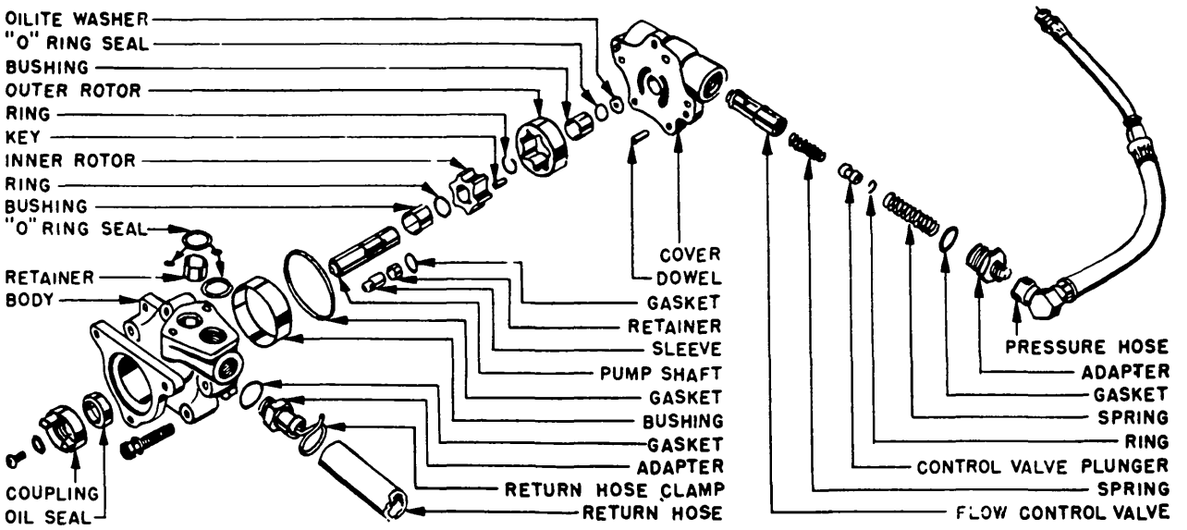
HYDRAULIC PUMP

►*PUMP COUPLING NOTE:* Two different types of pump drive coupling have been used and special Pump and Generator must be used with each type coupling (special shaft used with each coupling).

1) Rubber Insulated Coupling–Oilite coupling flanges are pressed on generator and pump shafts and retained by special "thread locking" type capscrew and plain washer (lockwashers should not be used with these screws). A rubber insulator and insulator sleeve are installed between the coupling flanges to transmit the drive.

2) Metal Tongue Coupling–Tongue-and-slot type metal coupling. Coupling members are retained on shaft ends by a retaining ring and slide off after ring removed.

HYDRAULIC PUMP REMOVAL: Disconnect the two hoses from pump reservoir assembly and catch oil from pump in a drain pan. Tie the loose ends of hoses out of the way above steering gear assembly to prevent loss of oil. Cover the ends of both hoses. Remove the three pump-to-generator screws and remove pump (*CAUTION*–do not lose coupling insulator and sleeve on pumps with rubber coupling).



HYDRAULIC PUMP (SINGLE ROTOR TYPE)

Removal of Reservoir From Pump:

1) Remove cover assembly from reservoir, lift out filter element and drain oil from reservoir.

2) Install the small tapered plug Tool C-3117 and the large tapered plug Tool C-3118, into the two holes that permit passage of oil to pump (this will prevent dirt entering pump).

3) Remove the four reservoir-to-pump attaching screws and lift reservoir from pump, being sure not to lose one large rubber "O" ring and five small rubber "O" rings which are used as gaskets between pump and reservoir.

OVERHAUL OF PUMP: *CAUTION*–Cleanliness is extremely important when working on hydraulic pump. Pump should be thoroughly cleaned before disassembling, work bench should be covered with clean paper, and all parts should be kept in clean kerosene until reassembled to protect them from dirt and corrosion.

Disassembly ("Single Rotor" type): Remove coupling lock screw, then remove coupling. Install pump in vise with protective copper jaws. Remove five body-to-cover attaching bolts, then remove cover. Remove shaft and rotor assembly, then "O" ring seal and "oilite" thrust washer in bottom of pump shaft hole.

Bushing & Seal Replacement–*NOTE*–New seal should always be installed whenever bushing replaced. Replace bushing and seals as follows:

Pump Cover Shaft Bushing–Place pump body in vise with protective copper jaws, install Tool C-3185, tap threads into bushing with outer section of tool, using an open end or adjustable wrench. After tool threaded into bushing sufficiently, screw T handle section of tool into hole until tool bottoms in cover, remove bushing. To install, drift bushing into place with Tool C-3233.

Pump Body Shaft Bushing–Place pump body in vise with protective copper jaws, mount pump cover to pump cover to pump body, install attaching bolts. Install Tool C-3185 in cover bushing hole, thread tool into housing bushing, remove bushing and seal. To install, mount bushing to Tool C-3235 and drift bushing into place.

Outer Rotor Babbitt Bushing–Remove pump cover from pump body. Thread Tool C-3214 into pump body using adapter Tool C-3234, remove bushing. To install, drift bushing into place with Tool C-3251.

Pump Shaft Oil Seal Replacement–With pump body securely clamped in vise with protective copper jaws, mount seal to Tool C-3230, drive seal into place.

Cleaning & Inspection: Clean all parts thoroughly in solvent and blow dry with compressed air. Wash bearings in clean kerosene and dry by blowing air through bearing (*CAUTION*–do not spin bearing with air). Inspect bearings for wear or roughness and replace if they do not rotate freely. Inspect babbitt rings in pump body for wear or scoring. Inspect rotors and pump shaft for wear, scoring, or burrs (remove burrs with a fine stone or crocus cloth). Check end clearance of rotors by installing them in pump body and using a feeler gauge to measure clearance from rotor to straightedge placed on face of body. End clearance limits are .001-.0017". Check valve plunger.

CONTINUED ON NEXT PAGE

"CO-AXIAL" (C ntinued)

►*NOTE:* If rotors badly scored, or worn beyond limits given above, install complete new pump assembly.

R assembly ("Single Rotor" type): Use NEW "O" ring seals and gaskets. Lubricate all parts with clean SAE 10W engine oil, coat "O" ring seals with Lubriplate. Assemble pump as follows: Install flow divider valve (ported end first) into pump body. Insert small spring plunger and ring, using Tool C-3229. Install large spring, gasket and adapter. Tighten adapter to 45-50 ft. lbs. torque. Install shaft protector thimble Tool C-3228 in pump body until tool bottoms, install rotor shaft assembly, using care not to damage babbitt bushings when installing rotor. Position "O" ring seal in body. Place cover in position, installing attaching bolts and washers. Tighten bolts to not more than 17 ft. lbs. Install coupling flange on pump shaft, then special lock screw and washer. Hold coupling with Tool C-3227 and tighten to 10-12 ft. lbs. torque.

Installati n f Res rv ir n Pump: Install one large circular section "O" ring, and five (5) small "O" rings which are used as gaskets between reservoir and pump. Install small tapered plug, Tool C-3117 and large tapered plug, Tool C-3118, into the two passage holes in bottom of reservoir. Insert the two pilots, Tool C-3116, into matching screw holes of reservoir and pump and install reservoir to pump. Install the four attaching screws and tighten to 7-12 ft. lbs. torque.

HYDRAULIC PUMP INSTALLATION:

►*PUMP DRIVE COUPLING CAUTION:* Make certain that pump and generator have same type drive coupling. Couplings are not interchangeable and SAME TYPE PUMP AND GENERATOR MUST BE USED TOGETHER. When installing pump with rubber type coupling, make certain that rubber insulator and sleeve installed in generator drive flange.

1) Attach pump and reservoir assembly to generator, using care to index pump shaft tongue into groove of generator coupling. Tighten three pump-to-generator mounting screws to 12-17 ft. lbs. torque.

2) Attach the two hoses, using 3/8-5/8 of a turn after initial finger tightening. The constant section hose is the return line and connects to the reservoir fitting. The dual diameter hose is the pressure line and connects to the pump body fitting. If the hose connectors are ever removed, they should be tightened to 25-30 ft. lbs. torque.

3) Clean out reservoir with lint free, clean cloth before removing tapered plugs, Tools C-3117 & 3118. Install filter element in reservoir, and fill with SAE 10-W engine oil to 1½" below gasket seat. See *BLEEDING* above.

4) AFTER bleeding of the system completed and reservoir refilled to correct level, install reservoir cover and gasket and tighten cover bolt to 5-8 ft. lbs.

NOTE–If relief valve assembly cap removed, tighten to 5-8 ft. lbs. torque.

SAGINAW (G. M.)

Buick, Series 70 (1952)
Buick, All Seri s (1953-55)
Cadillac, All Seri s (1952-55)
Chevr let (1953-54)
Lincoln (1953-55)
Oldsm bil , Super 88 & 98 (1952)
Oldsm bil , All S ries (1953-55)
Pontiac (1953-55)
Studebaker (1953-55) ①

① - Studebaker Mechanical Type Optional on 1953 Commander & Land Cruiser.

►CHANGES, CAUTIONS, CORRECTIONS

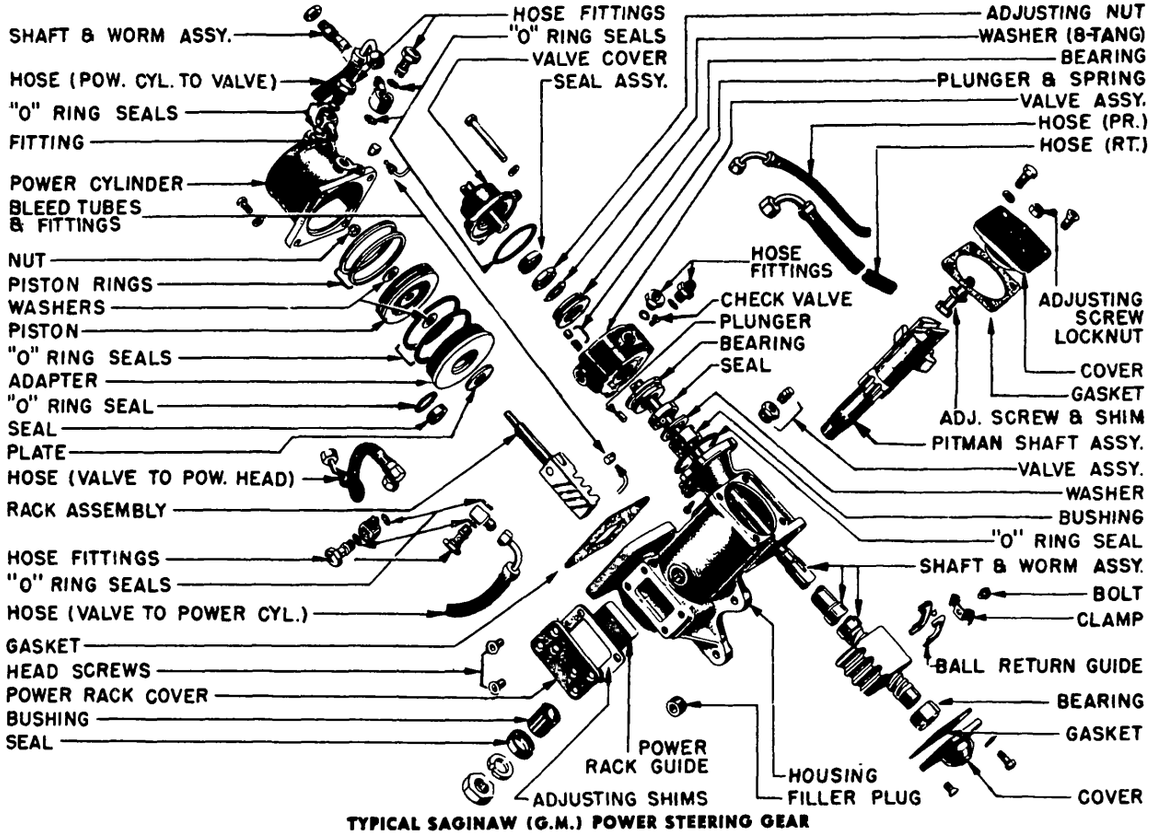
►***1952-53 BUICK STEERING SHAFT BEARING CAUTION:*** The 1952 bearing, Part No. 5663863, MUST NOT be used on 1953 steering gears. Use of this bearing may result in rattles and slight shaft looseness. ***Use 1953 bearing, No. 5664839, on 1953 gears.***

►***1953 CADILLAC "CHATTER" CORRECTION:*** To eliminate "chatter" requires modified worm thrust bearing adjustment. Replace old locknut with stake type nut, Part No. 5664762, **and do not use tanged washer.** ***Nut must spin on threads freely with no binding.*** Tighten staking nut to 10 ft. lbs., loosen nut and retighten to exactly 30 in. lbs. Check pull at steering wheel rim required to rotate wheel in **off-center** range and adjust as required for pull of ½-1 lb. Check to see that nut has not moved, then stake securely into keyway with rounded drift punch. After reassembly, recheck off-center drag. There may be an increase of ⅛-¼ lb. due to seal.

►***1952 CADILLAC STEERING GEAR DRAG LINK INTERFERENCE CORRECTION:*** If steering linkage contacts left exhaust pipe or engine oil pan in extreme turn positions (will be noted as vibration with wheels turned against stops), determine point of contact and correct as follows:

Interference between Drag Link & Left Exhaust Pipe—Turn wheels to extreme left turn position, mark point on exhaust pipe where drag link contact occurs. Cut away asbestos covering on exhaust pipe in this area for additional clearance. If interference still continues, make a flat dent in the exhaust pipe approximately 1¼" in diameter at this point. ***(CAUTION***—do not dent pipe so much as to interfere with flow of exhaust gases).

Interference with Oil Pan—If drag link contacts oil pan, correct as follows:
(1) Check and correct drag link height. ***See Steering Gear Adjustment (below).***



TYPICAL SAGINAW (G.M.) POWER STEERING GEAR

(2) If step (1) does not correct interference, loosen all three engine supports and shift engine to rear as far as possible. ***CAUTION***—After moving engine, check and adjust accelerator pedal linkage and check clearance between Hydra-Matic filler tube and cowl assembly.
(3) If steps (1) and (2) do not correct interference, decrease turning angle of wheel by installing flat washers under head of wheel stop screw as follows: Remove wheel and drum, remove stopscrew and reinstall with flat washer under screw head. Recheck drag link clearance in extreme turn position, add additional washers until clearance is obtained. ***CAUTION***—This correction will increase turning radius and should only be made if clearance not obtained otherwise.

►***1953 CADILLAC POWER STEERING PUMP OIL SEAL PRODUCTION CHANGE (To prevent leaks at pump shaft)***—Starting with Engine No. 98475, a new seal with "garter" type spring replaces seal formerly used. New seal is interchangeable with previous type and should be used for replacement. Pumps equipped with new type seal are identifed by a daub of green paint on machined surface of pump between mounting bracket and pulley.

►***1952 CADILLAC POWER STEERING PUMP KIT CHANGE:*** Kit, Part No. 3630359, replaces kit formerly used for pump replacement on 1952 cars. New kit contains 1953 pump with return line reducing union and seal required for adaption to 1952 cars.

►***1953 CADILLAC VALVE BODY PRODUCTION CHANGE:*** Valve body now positively aligned to cover and gear housing by machined counterbores in cover and housing, eliminating need for Aligning Tool J-5283.

►***1953 PONTIAC POWER STEERING PUMP NOISE CORRECTION:*** Trouble may usually be traced to worn pump pulley-to-shaft keyway and key. To check, tighten attaching bolt to 15 ft. lbs. torque. If noise eliminated or changed, remove pulley, inspect key and shaft for wear. Replace with shaft and bearing assembly, pulley, key, bolt, plain washer and lockwasher contained in Shaft and Pulley Kit No. 517896. New bolt, Part No. 181636 (⅜"-24 x ⅞") must be tightened to 50-55 ft. lbs. torque.

►***1953 PONTIAC HYDRAULIC PUMP CHANGE***—Changed to Vickers (Vane Type) Pump with early September, 1953 production.

►***1953 PONTIAC PUMP BRACKET INTERFERENCE CORRECTION: (Pump Belt Tension Cannot Be Properly Adjusted)***—This condition may be due to interference between pump bracket and pump body. To correct, loosen pump body and allow it to fall free. Grind point of interference on bracket to give necessary clearance between bracket and body.

►***1953 STUDEBAKER POWER STEERING GEAR REPLACEMENT BALL SET:*** A ball set kit, Part No. 534858 containing 30 matched balls for use in servicing shaft and worm nut is available. It is important that matched sets of balls be used for replacement rather than single balls.

►*1954 VICKERS PUMP FRONT SHAFT SEAL PRODUCTION CHANGE (To Reduce Leaks):* Front shaft seal, Part No. 5681410, replaces Vickers Seal, Part No. 5665833, used in early production. New seal has greater lip pressure than previous one. A hardened shaft, Part No. 5681681, **must** be used with new seal

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SAGINAW (G.M.) C nt.

and may be used with old type seal. New shaft and seal are carried in package, Part No. 5681951. Pumps with new seal have smaller reservoir and are marked with daub of green paint on front of hub body instead of yellow daub at same place on earlier pumps. New hardened shaft is identified by a daub of green paint on threaded end of shaft or by a machined groove on the .75" diameter adjacent to splined end of shaft. To service pumps built after change use Master Kit, Part No. 5681964, and for those built prior to change use Master Kit, Part No. 5682130 (includes new shaft and seal).

►*1954 CADILLAC "CHATTER" CORRECTION:* Some cases of chatter (not chuckle) may be noted on cars built previous to Engine No. 01688 when making light turns or parking. Noise is particularly noticeable after reversing direction of steering wheel rotation when backing into a parking space. To correct, replace valve body assembly.

►*1953 PONTIAC WORM BEARING THRUST NUT CHANGE:* Tanged washer and locknut have been replaced by stake type nut.Adjustments remain unchanged.

►*1954 CHEVROLET LEAD OR WANDER CORRECTION:* Generally can be attributed to improper assembly of valve body assembly or improper usage of "O" ring seals. Trouble in valve body assembly can be checked by end motion of steering shaft with respect to its housing while oscillating pitman arm between right and left turn positions. Measurement in excess of .002" indicates that valve has excessive free movement in the valve body and can be allowing fluid to pass to power cylinder. If in excess of .002" check valve spool for proper installation and check for proper "O" ring usage. Turn valve spool over and recheck. If endplay still excessive, replace valve body assembly.

►*1953-54 LINCOLN ROTOR SHAFT BEARING INSTALLATION CAUTION:* Two types of bearings presently available. Use only Part No. 7RA-10094-A as a replacement instead of 7RA-10094-B. Nylon grease retainer in "B" design bearing wrinkles and becomes rigid allowing grease to escape. In "A" design (neoprene) this does not occur. Bearings are interchangeable when used on electric generator assemblies.

►*1953 OLDSMOBILE VALVE BODY "O" RING SEAL PRODUCTION CHANGE:* 1953 "O" ring seals are smaller in cross-sectional area than on previous models. If used on earlier models leaks will occur.

►*1954 PONTIAC BELT ADJUSTMENT CORRECTION:* In some cases it is not possible to adjust belt tension as specified due to interference between pump body and bracket. If belt is in good condition, place flat washer on each of three mounting studs, under bracket, to raise bracket and pump.

►*1953 STUDEBAKER RESERVOIR GASKET CHANGE:* New gasket, Part No. 534705 (same number as previous gasket), made of light tan, paper-like material, replaces gasket made of synthetic rubber and cork, of dark color and granular texture. Old type was subject to cutting on reservoir wall when cover tightened and did not provide a good seal when used more than once.

►*CADILLAC (1952-55) BLEEDING OF POWER STEERING SYSTEM PROCEDURE CHANGE:* The following procedure supersedes previous instructions for bleeding the system: Raise front end of car and place on jack stands. Remove tank cover holddown screw and remove tank cover and gasket. Fill oil tank to proper level and turn steering wheel from left to right to expel air from internal circuits (*CAUTION*–Do not force wheel against stops). Start engine and run at 1500 RPM for two minutes. Turn wheels from left to right, being careful not to force wheels against stops. Recheck fluid level and fill as required. Lower front end of car and turn wheels from left to right and inspect gear, pump hoses and connections for leaks. Stop engine, recheck oil level, install tank cover and gasket.

►*1955 BUICK STEERING SHAFT BUSHING PRODUCTION CHANGE & STEERING SHAFT RATTLE CORRECTION:* A new nylon, spring loaded, steering shaft upper bearing, Part No. 1169623, is used in production and is available for service replacement. Replace the former fabric bearing, Part No. 5664839 to eliminate steering shaft rattle and chucking noises.

►*1955 PONTIAC POWER ST. NOISE CORRECTION:* Noise may be caused by the power steering pump, or air in the system. Should the fluid appear cloudy, it is an indication of water in the system. Correct by replacing the fluid as follows: Remove pump return pipe and pump system as clear as possible. Fill with new fluid and cycle the steering from extreme right to extreme left until fluid being pumped through return hose is clear. Reconnect hose, fill reservoir and again cycle unit while pump is operating until there is no evidence of air bubbles in the reservoir. Fill reservoir and install cover.

►*1955 PONTIAC POWER ST. VALVE CENTERING SPRINGS & PLUNGER PRODUCTION CHANGE:* Early type springs are shorter (.660") and are plated. Plungers are grooved. Later type springs (.760") are plain steel (not plated), and plungers do not have a groove. These parts are interchangeable in complete sets only.

►*1955 BUICK GEAR VALVE-TO-CYLINDER TUBE UNIVERSAL FITTING ELBOW PRODUCTION CHANGE:* 90° universal fitting elbow and bolt previously used at valve end has been changed to a straight in type fitting. Fitting change required reforming of tubes by adding a bend to accommodate the straight in type fitting. Since serial number change points are not available, it will be necessary to determine type fitting on valve when ordering replacement part. Use of the 90° universal fitting bolt at other locations in the steering gear are not affected by this change.

DESCRIPTION

Steering Gear consists of a conventional Saginaw "re-circulating ball bearing worm-and-nut" type steering gear with addition of a hydraulic power mechanism to assist the manual operation so that the turning effort required at the steering wheel is greatly reduced. The hydraulic assist action begins when the turning effort at the rim of the steering wheel becomes 3-4 lbs. and provides a proportional share of the turning effort so that the pull required on the steering wheel rim should not exceed 8-9 lbs. for all normal operation. Since the hydraulic assist is only effective when a pull of 3-4 lbs. or greater is being exerted at the steering wheel rim, the driver retains the normal "feel" of steering and the steering action is conventional except for lesser effort required. Hydraulic elements are:

Hydraulic Power Mechanism—Consists of a single double-acting cylinder with the piston rod linked to a power rack meshing with a gear sector on the steering gear pitman arm. Cylinder assembly is mounted on steering gear housing (directly above or to one side of worm shaft) with an adapter closing the open or mounting end of the cylinder (adapter has "O" ring type seals on its outer circumference and a spring-loaded type piston rod seal). A rack-and-gear adjustment is provided consisting of a shim pack installed between the power rack cover and the housing to regulate the clearance between rack and guide on inner side of cover.

Control Valve Assembly—Located within valve housing directly above steering gear worm housing. Consists of a valve spool mounted concentrically on the worm shaft between two thrust washers which allow an up-and-down movement of the shaft of approximately .030" to actuate the valve. Spool is normally centered in the housing by five sets of centering plungers (set consists of two plungers with heavy coil spring between them) which contact the inner races of the thrust bearings and the ends of the valve housing. Whenever the thrust load on the worm shaft is sufficient to overcome the spring tension (as when pull on rim of steering wheel exceeds 3-4 lbs.), the worm shaft moves endwise and the valve spool directs oil pressure to proper end of power cylinder to provide hydraulic assistance (spool also opens return line from opposite end of cylinder so that displaced oil can return to reservoir). A check valve mounted in the valve housing allows the steering gear to be operated manually when the engine is not running (valve allows oil to bypass pump and flow freely from one end of the cylinder to the other).

Pump & Reservoir Assembly—Hydraulic pump is belt driven from the engine crankshaft and supplies oil pressure for the hydraulic assist cylinder. Pump operates continuously when the engine is running but a flow control valve recirculates oil within the pump when it is not needed for hydraulic assist operation. A relief valve is also provided to limit pump pressure. The reservoir is mounted directly above pump and supplies oil as needed.

Pump Note—Both Eaton (Rotor type) and Vickers (Vane type) pumps are used. Both pumps operate similarly but overhaul procedure is different.

ADJUSTMENT

►***ADJUSTMENT CAUTION—Whenever hydraulic system disturbed (by disconnecting lines, removal or installation of units, etc.), hydraulic system must be bled to remove air. See Bleeding Hydraulic System.***

1952-54 MODELS

►*LINCOLN ADJUSTMENT NOTE:* All adjustments of steering gear are to be made with unit removed from vehicle and disassembled. *See Overhaul.*

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SAGINAW (G.M.) Cont.

▷*OLDSMOBILE & STUDEBAKER ADJUSTMENT NOTE:* All adjustments of steering gear, except high spot adjustment, are to be made with unit out of car. *See Overhaul.*

Adjustments on Car: *CAUTION—BEFORE MAKING ADJUSTMENTS,* disconnect drag link at pitman arm, check tightness of pitman arm nut, check steering gear for binding by turning steering wheel slowly from one end position to the other *(CAUTION*—Do not turn steering gear hard against stops in end position to avoid damage to ball nut mechanism). Correct any binding due to misalignment before attempting to adjust steering gear.

Cadillac Alignment Note—Check alignment as follows: Loosen all three gear-to-frame mounting screws, tighten front screw only, check clearance between housing and frame at rear mounting screws and shim as required to fill the gap. If no clearance noted at rear screws, loosen front screw and tighten rear screws. Check clearance at front screw and shim as required to fill the gap. Tighten all three screws to 40-50 ft. lbs. torque. Recheck steering gear for freedom from binding.

Off-Center Pre-load Check (Unit on Car)— Proceed as follows:

Buick—Disconnect pitman arm from intermediate tie rod, then loosen four corner bolts of the power rack guide cover about 1/2 turn or just enough to assure lash between power rack and pitman shaft sector (NOTE—If bolts loosened too much, rack will bind on sector teeth). Turn steering wheel 2-3/4 turns from either extreme position to center ball nut on the central "high point" of pitman shaft sector (At this position center spoke of wheel should be straight down). Turn pitman shaft adjusting screw clockwise until lash between pitman shaft sector and ball nut is just removed (check by working pitman arm), then tighten locknut. Turn steering wheel two turns either way from central position and check pull with scale at rim of wheel and pulling at 90° to spoke. This should be 3/8-3/4 lb. (1952-53), 1/2-1 lb. (1954).

Cadillac—Disconnect drag link at pitman arm. Back off power rack and pitman shaft adjusting screws at least 1/2 turn. Using spring scale, check "off-center" pull through at rim of steering wheel. This should be 7/8-1 1/8 lbs. (1952-53), 3/8-3/4 lb. (1954).

▷*NOTE*—If readings outside above limits it will be necessary to remove unit from car.

Pitman Shaft Adjustments—*Two separate adjustments required as f ll ws:*

Oldsmobile & Pontiac Adjustment Note—Special "offset" screwdriver required for this adjustment.

Studebaker Adjustment Note—Steering Gear Adjusting Tool J-5563 is used in lieu of steering wheel for pitman shaft adjustment.

1) High Spot or Pitman Shaft-to-Ball Nut Lash (Pitman Shaft Endplay)—Loosen power rack cover bolts. Turn steering wheel slowly through its full range to check for freedom of movement, then turn wheel back to midway position to center ball nut on central high point of pitman shaft. Turn steering wheel shaft 45° right or left of center. Place spring scale on spoke of wheel at rim and pull on scale, at a 90° angle to spoke, to turn steering wheel. Adjust pitman shaft adjusting screw so that pull on 9" radius to turn wheel smoothly over center high spot is:

Buick—1/2-3/4 lb. higher than in "Off-Center Pre-Load Check".

Cadillac—1/2-1 lb. higher than in "Off-Center Pre-Load Check".

Chevrolet—1 1/8—1 1/2 lbs.

Oldsmobile—1 3/4 lbs. maximum.

Pontiac—1-1 1/2 lbs.

Studebaker—1/2-1 lb.

Note—Lincoln "High Spot" adjustment included in overhaul.

Record reading for Power Rack Guide adjustment.

2) Pitman Shaft-to-Power Rack Lash (Power Rack Guide Adjustment)—Tighten power rack cover bolts. Turn steering wheel slowly through its full range to check for freedom of movement, then turn wheel back to center position. Turn steering wheel shaft 45° right or left of center. Place spring scale on spoke of wheel at rim and pull on scale, at a 90° angle to spoke, to turn steering wheel. If power rack cover shims have been selected properly there will be a preload in addition to over-center or pitman shaft adjustment when column shaft is rotated past center high spot as follows:

Buick—1/4-1/2 lb. higher than in 1) or 1 1/4—2 1/4 lbs.

Cadillac—1/8-1/4 lb. higher than in 1) or 1 1/4—2 lbs.

Chevrolet—1/8 lb.

Pontiac—No increase.

Note—Lincoln, Oldsmobile, and Studebaker "Power Rack Guide Adjustment" included in overhaul.

If adjustment is above or below that specified, add or subtract shims. Subtracting shims will decrease reading and adding shims will increase reading.

NOTE—Add or subtract one .003" shim (.003", .005", and .010" available) at a time until desired reading is reached. After all adjustments made, there should be no perceptible backlash in sector shaft when column shaft is rotated 30° either side of center. Recheck of over-center adjustment after complete assembly of column jacket, gear one turn off center, and pitman arm disconnected, should give following minimum to maximum readings:

Buick—1 1/8—2 lbs.

Cadillac—1-2 lbs.

Chevrolet—1-5/8 lbs. maximum.

Pontiac—1—1 1/2 lbs.

Worm Thrust Bearing Adjustment—This adjustment normally made when assembling steering gear and can only be made with steering gear out of car. If adjustment required in service, remove steering gear from car. *For adjustment procedure see Steering Gear Overhaul (following).*

PUMP DRIVE BELT ADJUSTMENT:

Buick—Belt should have 3/8" deflection with thumb pressure applied midway between pulleys. To adjust, loosen pump mounting bolts and shift pump horizontally (bolt holes in bracket slotted).

Cadillac—If belt squeals on hard turns, belt is too loose. Adjust by loosening pump to bracket screws and moving pump outward to torque wrench reading of 13-15 ft. lbs. Tighten screws to 25-29 ft. lbs.

Chevrolet—Loosen inner bracket to pump and outer bracket to pump fixed mounting bolts. Insert Belt Tension Adjusting Tool J-5470 between pulley and pump with inner end of tool resting under pulley hub and not in tool over head of outer fixed mounting bolt. Pull outward on torque wrench until a torque of 14 ft. lbs. is obtained. Tighten mounting bolt at slotted hole, remove tool and torque wrench, then tighten fixed mounting bolt.

Lincoln—Lift up on pulley to tighten belt. Do not lift on reservoir. Belt tension should have 5-7 lbs. pull at 1/4" deflection. Torque 35-50 ft. lbs.

Oldsmobile—Use Belt Tension Adjusting Tool J-5192 and Torque Wrench. Loosen inner and outer bracket-to-pump mounting screws (inner screw hole slotted), insert adjusting tool between pulley and pump with inner end of tool under smaller diameter of pulley hub and notch in tool over head of outer mounting screw. Pull outward on torque wrench until reading of 30 ft. lbs. (new belt), 20 ft. lbs. (broken-in belt) obtained, tighten mounting screws before slacking off on wrench. This setting corresponds to belt deflection of 7/8" with 25 lbs. pressure midway between pump and fan pulleys.

Pontiac—Loosen pump to bracket attaching bolts two full turns so pump falls free of own weight. Place pump belt tightener J-5452 (Eaton type pump); J-5574 (Vickers type pump) over head of upper bolt so that curved portion of tool fits under pulley. Using 1/2" drive 0-100 ft. lbs. torque wrench perpendicular to tool, apply torque of 43-45 ft. lbs. (Eaton Pump); 58-65 ft. lbs. (Vickers Pump—New belt); 51-53 ft. lbs. (Vickers Pump—Used belt). Tighten lower pump to bracket attaching bolt. Remove tool and tighten upper attaching bolt.

▷1953 Pontiac Pump Bracket Interference Correction (Pump Belt Tension Cannot be Properly Adjusted)—This condition can be due to interference between pump bracket and pump body. To correct, loosen pump body and allow it to fall free. Grind off point of interference on bracket to give necessary clearance between bracket and body.

Studebaker—Belt deflection should be 1/4-3/8" with pull of four lbs. at point midway between pump and crankshaft pulleys. Slots provided at mounting screws in bracket to permit shifting pump body to secure proper belt tension.

1955 MODELS

ADJUSTMENT: (ON CAR)—Before making adjustments, disconnect drag link at pitman arm, check tightness of pitman arm nut, and check steering gear for binding by turning steering wheel slowly from extreme right to extreme left *(CAUTION*—Do not turn steering wheel hard against stops in end position to avoid damage to the assembly). Correct any binding due to misalignment before making adjustments. Loosen four corner bolts of power rack guide cover about one-half turn or just enough for lash between rack and sector.

▷*BLEEDING HYDRAULIC SYSTEM NOTE: System must be bled to remove air whenever lines are disconnected or units removed and installed.*

CONTINUED ON NEXT PAGE

SAGINAW (G.M.) C nt.

High Spot Adjustment (Pitman Shaft Sector-to-Ball Nut Lash): As follows:

Buick—Turn wheel to extreme right or left position. Attach scale J-544-A to a spoke at rim of wheel and, while pulling scale at 90° to spoke, check pull required to turn wheel steadily in the range where lash normally exists between pitman shaft sector and ball nut (lash range is 1/8 turn of steering wheel from either extreme position). Reading on scale should be between 1/2 and 7/8 lbs. (If not within these limits, check steering column alignment at frame mounting bolts, faulty steering shaft upper bearing, or worm thrust bearing adjustment). If reading within limits, turn steering wheel 2¾ turns from either extreme position to center ball nut on "high-spot" of sector (center spoke of wheel should be straight down). Turn pitman shaft adjusting screw clockwise until lash between sector and ball nut is removed (check by working pitman arm), then tighten locknut. Turn steering wheel 2 turns in either direction from center position and check pull with scale. This should be between 1/2 and 7/8 lb., record this reading for reference. Turn steering wheel back to near center position and check pull required to turn wheel through "high spot". Turn pitman adjusting screw clockwise as required to obtain a scale reading ½-¾ lb. higher than that obtained at end position of travel, after locknut tightened. Record this latest scale reading for "Power Rack Adjustment" reference, below.

Cadillac—Check flexible steering shaft coupling for distortion and correct as necessary. Using spring scale J-544-A, check the "off-center" pull through at rim of steering wheel which should be 3/8 to 3/4 lb. (If reading not within these limits, remove steering gear and check thrust bearing locknut torque which should be 30 ft. lbs.). Check for binding or rough bearings in upper and lower thrust bearing retainers. Adjust pitman shaft endplay screw until pull through center is ½-1 lb. greater than pull at one full turn off center.

Lincoln—Adjustments on car are not recommended, and should be performed when steering gear is removed for overhaul or when being installed.

Oldsmobile—Turn steering wheel through full range (5½ turns), to check for free action; then, turn wheel back one full turn from right or left position. This positions wheel in middle of lash range. Attach spring scale J-544-A to spoke of wheel at the rim, and while pulling on scale steadily at 90° to spoke, observe amount of pull required to turn wheel through lash range (record this reading for reference). Turn wheel to center position (2¾ turns from full right or full left) and observe the amount of pull required to turn wheel through the "high spot" (center) range. This should be 5/8 lb. more than the amount recorded in lash range. Adjust pitman shaft adjusting screw to obtain the correct amount of pull at the "high-spot" and tighten adjusting screw locknut.

P ntiac—Loosen pitman shaft adjusting screw locknut and back off adjusting screw a few turns, using an offset screwdriver. With steering gear on "high-spot" (center position), adjust pitman shaft thrust screw so that pulling on steering wheel rim through a 3" arc using J-544-A spring scale, is 1-1¾ lbs., through the center "high-spot". Tighten locknut and recheck pull through "high-spot".

Studebaker—The "high -spot" and power rack adjustments should be made while steering unit is out of car, although minor changes can be made in "high-spot" adjustment with the unit installed.

Power Rack Guide Adjustment: This adjustment must be made after "High Spot" Adjustment completed.

Buick—Tighten the four power rack guide cover bolts and recheck pull through the "high spot". The scale reading should be ¼ to ½ lb. higher than the final reading taken in "High Spot" Adjustment (above), or between 1 1/8 & 2 lbs. If reading is not within these limits, add or remove shims as required to obtain the specified pull through the "high spot". Guide cover shims are available in .003" and .005" thicknesses.

Cadillac—Using tool J-5648, tighten the power rack adjusting screw so that "high spot" pull through (see above), is 1/8 to 1/4 lb. higher than that obtained in "High Spot" Adjustment. This should be measured at rim of wheel through an arc not exceeding 3".

Lincoln—Adjustments on car are not recommended, and should be performed when steering gear is removed for overhaul or when being installed.

Oldsmobile—Tighten power rack guide cover bolts evenly, being sure that bolt threads do not pick up shims when tightening cover to housing. Attach spring scale to wheel rim and check pull through "high spot". If pull is increased over the final reading taken in "High Spot" Adjustment (above), add shims of .003" thickness, one at a time until pull decreased to original reading. If pull remains the same as final reading, remove shims of .003" thickness, one at a time, until pull is increased above original amount, then add one .003" shim. Recheck pull through the "no lash" range which should not be more than 1¼ lbs. Pull required in pull through "High spot" should not be greater than 1¾ lbs.

Pontiac—Tighten four power rack guide cover bolts evenly. Recheck pull through "high spot" position which should be 1½ lbs. maximum. If "high spot" pull increased after power rack guide cover bolts tightened. above the maximum (1½ lbs.), add .003" shims under cover until last shim added decreases the load. If pull through "high spot" remains the same after cover bolts tightened, remove .003" shims until load increases above that obtained in final check of "High Spot" Adjustment. Then add one .003" shim.

Studebaker—The "high spot" and power rack adjustments should be made while steering unit is out of car.

Worm Thrust Bearing Adjustment: This adjustment made with steering gear out of car. If adjustment required in service, remove steering gear. See "Steering Gear Overhaul" below, for adjustment procedure.

Pump Drive Belt Adjustment: Proceed as follows:

Buick—Adjust belt tension so that pulley will slip in belt when 40-45 ft. lbs. (new belt), 30-35 ft. lbs. (used belt), is applied to pulley nut with a torque wrench.

Cadillac—Loosen pump to mounting bracket screws and move pump outward until belt is tight. With shift lever in "N" race engine while turning steering wheel. If belt squeals, it is too loose and must be retightened.

Linc ln—Belt tension should be 5-7 lbs. pull with ¼" belt deflection.

Oldsm bile—Loosen pump to bracket attaching bolts and place tool J-5398 under pump pulley and over attaching bolts, With torque wrench, adjust drive belt tension to 30 ft. lbs. This adjustment corresponds to a belt deflection of 7/8" with 25 lbs. pull applied midway between pump pulley and fan.

Pontiac—Loosen pump to bracket bolts two full turns so pump falls of its own weight. Place pump belt tightener J-5574, over head of hinge bolt, and using a torque wrench perpendicular to tool, tighten belt to 58-65 ft. lbs. (new), 51-53 ft. lbs. (used). Tighten clamp bolt.

Studebaker—With spring scale at right angles to belt, pull on scale should be 4 lbs., with a belt deflection of 1/4" to 3/8". Slots are provided at mounting bracket screws in bracket to permit shifting pump body for proper tension.

HYDRAULIC PRESSURE TESTS

Disconnect hose at lower pump union (nearest engine). Install Gauge J-5176 (Lincoln Gauge No. 3500), with gauge valve closed. Connect hose to fitting on valve side of gauge. **Open gaug valve** and run engine at idle speed. Test as follows:

1) With gauge valve open and engine idling, turn steering wheel through entire travel from one end position to the other with the wheels on the ground *(CAUTION—* Do not hold steering wheel in extreme position for extended period). Oil pressure on gauge should not be less than indicated in table below. If pressure is less than indicated in table, test as outlined in **(2)** below.

Car	Engine RPM	①Pump Pr ssure
Buick	450	700 lbs.
Cadillac (1952-53)	400	700 lbs.
Cadillac (1954-55)	400	900 lbs.
Chevrolet	475	750 lbs.
Lincoln (1953)	400-425	700 lbs.
Lincoln (1954-55)	425-450	700 - 900 lbs.
Oldsmobile	400	650 lbs.
Pontiac	375	650 lbs.

①—Maximum pressure should not be less than lowest indicated pressure.

2) If pressure low in test above, slowly close gauge valve and make quick test of pump pressure *(CAUTION—*Do not leave valve closed more than 15 seconds). If pressure increases to, or is greater than the pressures indicated in table (above), pump is alright and trouble is in steering gear or in oil lines. If pressure equally low in both tests (or not more than 50 lbs. increase in test **(2)**, trouble is in oil pump. If pressure increases more than 50 lbs. in test **(2)** but is still below normal, both pump and steering gear or oil lines are faulty.

TROUBLE SHOOTING

If operation not satisfactory, check as follows:

HARD STEERING (Particularly When Parking): Check to make certain that hard steering exists by measuring steering wheel pull under extreme conditions as follows: With car parked, apply brakes, idle engine, turn steering wheel from side to side to bring oil temperature up to 170°F. (similar to condition existing

CONTINUED ON NEXT PAGE

SAGINAW (G.M.) C nt.

after excessive turning or on hot days). Use 15 lb spring scale (Tool J-5178) hooked to wheel rim at spoke to check pull required to rotate wheel steadily (measure pull at 90° to spoke). If pull exceeds 10 lbs., check following causes:

1) Pump drive belt loose or pump defective. Adjust drive belt and test pump pressure. See Testing Hydraulic Oil Pressure.
2) Low Oil Level in Reservoir. Check and fill reservoir to proper level. If oil level low, check entire system for evidence of leakage.
3) Air in Hydraulic System (may be noted by noisy pump action). Tighten valve cover screws and all hydraulic line connections. Bleed system.
4) Steering gear not properly lubricated or adjustments too tight. See Lubrication and Adjustment.
5) Steering tube misaligned or tight upper bearing See Steering Gear alignment (under Adjustment).
6) Linkage too tight, bent, or misaligned.
7) Tires under-inflated
8) Low oil pressure. See Testing Hydraulic Oil Pressure.

EXCESSIVE PLAY OR LOOSENESS (May cause Front Wheel Shimmy or whe l kickback):

1) Excessive lash in steering gear (between pitman shaft gear sector and ball nut or power rack) or in steering linkage. See Adjustment.
2) Loose worm thrust bearing adjustment (see Adjustment) or valve spool sticking in housing.
3) Air in hydraulic system (may be noted by noisy pump action). Tighten valve cover screws and all hydraulic line connections. Bleed system.

POOR CENTERING OF STEERING WHEEL OR RECOVERY FROM TURNS:

1) Binding of steering shaft due to misalignment or tight bearings. Check alignment and adjustments.
2) Valve spool sticking in valve housing or defective valve centering plunger springs.
3) One front tire under-inflated.

STEERING GEAR NOISY:

1) Loose pitman shaft adjustments (excessive lash at ball nut or power rack). See Adjustment.
2) Loose worm thrust bearing. See Adjustment.
3) Loose power piston-to-power rack pin.
4) Steering gear mounting loose (noisy on turns).

HYDRAULIC PUMP NOISY:

1) Air in system due to low oil level, loose intake hose connections, defective shaft or steering gear seals.
2) Pump drive belt too tight. See Belt Adjustment
3) Oil hoses grounded against engine. Check and reroute hoses to provide clearance.
4) Reservoir air vent clogged, clogged intake line or filter, sludge or dirt in pump, oil too heavy. Clean out pump and reservoir and refill with correct oil
5) Pump bearings, shaft, or other parts worn. Pump vanes sticking (Vickers Pump).
6) Relief valve chattering Check for sticking valve, clean and free up valve.

LOW OIL PRESSURE: S T sting (following).

1) Drive belt loose or worn See Belt Adjustment.
2) Oil level too low or wrong type oil (too light).
3) Pump worn or defective Pump relief valve stuck open or spring weak. Flow control valve stuck open.
4) Oil filter clogged (cars with Eaton pump).
5) Internal or external oil leaks (following)

OIL LEAKAGE:

1) Defective "O" ring seals due to over-torquing, burrs in recesses, cocked seals, unclean bores, seals not protected from threads on shafts, sharp edges.
2) Loose connections or worn hoses
3) Oil pump shaft seal installed backwards (install with two holes in seal casing toward front or outside of pump (pulley end)
4) Improper installation of plug and "O" ring (Vickers Pump). Must be installed to pump cover flow control valve from rear (chamfer end) until end of plug is just past snap ring groove
5) Hydraulic oil leaking into steering gear housing, upper housing seal or cylinder adapter seal (piston rod seal) leaking.

LUBRICATION

Power Steering Hydraulic System: (Checking Fluid Level)—Check at 1000 mile intervals (2000 miles on Cadillac, 5000 miles on Studebaker)

Buick—Thoroughly clean area around filler plug in top of reservoir, remove filler plug (has dipstick underneath), insert dipstick in reservoir with **plug seated on edge of filler opening,** add oil as required to bring level up to mark on dipstick

Cadillac, Chevrolet, Oldsmobile, Pontiac - Clean reservoir cover area, remove cover and gasket. Oil level should be at oil level mark on side of reservoir (1" below top edge of reservoir), Add oil as required. Torque cover screws to 20 ft lbs. (On Pontiac replace cover and retaining ring).

Lincoln—With engine off, remove reservoir dipstick by turning counter-clockwise and pulling out. Level of fluid should be to the line marked "full" on the stick. *Do not overfill.*

Studebaker—Maintain fluid level at mark indicated on side of reservoir.

Recommended Oil—Use same oil as used in the automatic transmission on the car (Dynaflow Drive Fluid, Hydra-Matic Drive Fluid, or Automatic Transmission Fluid Type A with AQ-ATF No.).

Steering Gear (Worm & Ball Nut): Check at 1000 mile intervals (2000 on Cadillac, 5000 on Studebaker) Maintain lubricant level at filler plug hole. **Do not** use pressure gun to add lubricant (will damage worm and power piston rod seals). Use lubricants:

Buick & Studebaker—Multipurpose gear lubricant SAE 90 (same as for synchro-mesh transmission).

Lincoln—Ford Motor Company Specification M-4738 **or its absolute equivalent.**

Others—Approved steering gear lubricant.

BLEEDING HYDRAULIC SYSTEM: *Required whenever hydraulic system disturbed (by disconnecting lines, removal or installation of units, etc.).*

Buick—Fill reservoir to proper level (see Lubrication). On cars with Vickers (vane type) pump, remove pipe plug from top of pump manifold until oil begins to flow from this opening, then install plug just tight enough to prevent oil flowing out. Allow car to stand for 5 minutes Start engine and run at approximately 1000 RPM for 2-3 minutes, then turn steering wheel from wheel from left to right extreme position to work air out of power cylinder. Repeat as necessary until all air worked out (pump will quiet down as air removed). Tighten plug in pump manifold, recheck oil level. Road test car with some parking and high speed driving, if possible.

Cadillac, Chevrolet, Oldsmobile, Pontiac - Fill reservoir. Let car stand for two minutes. Crank engine with ignition off and turn steering wheel at the same time to eliminate air pockets from power cylinder while maintaining oil level in reservoir. Start engine and run at idle speed for 2 minutes. Check oil level and inspect entire system for leaks. Increase engine speed to 1500 RPM and run it at this speed until air bubbles cease to appear in reservoir (turn wheels from side to side to assist process, lightly contacting stops). Recheck oil level and refill as required.

Lincoln—Fill oil reservoir to proper level (see Lubrication). Start engine and run at idle speed for two minutes. Recheck fluid level and inspect hoses and connections for leaks. Increase engine speed to 1000 RPM and turn wheels from right to left five or six times. DO NOT HIT STOPS. Recheck for leaks. Check oil level and refill as required.

Oldsmobile—Fill reservoir to proper level and maintain level during bleeding operation. Run engine at idle speed for 30 seconds, then increase speed to 1500 RPM for 1 minute. Raise front end of car and rotate steering wheel through its full travel several times to eliminate air from system Recheck fluid level in reservoir

REMOVAL & INSTALLATION

1953 BUICK SERIES 40

BUICK (Series 40) Steering Gear Removal: Disconnect pitman arm from steering tie rod, remove pitman arm from steering shaft using Puller J-1025. Remove air cleaner assembly, disconnect fuel and vacuum lines from carburetor and carefully move them out of the way. Disconnect clutch linkage anti-rattle spring from idler lever pin bracket and disconnect upper shift rod from control shaft lower lever. Disconnect wires from horn cable connector, back-up light switch, and neutral safety switch. Pull speedometer cable from clip and remove horn cable connector from column jacket. Disconnect one end of cross-brace at cutout in cowl and swing brace to one side. Move front seat all the way back for clearance. Remove dash insulator retainer and steering column pad, remove pedal plate attached to toe panel (under floor mat). Remove steering wheel (see data below), upper bearing spring and spring seat, shift control lever and direction signal lever. Disconnect direction signal switch wires from fuse block terminals. Remove steering column bracket (*CAUTION*—save all spacers located between bracket and support bracket on instrument panel—these must be re-installed). Remove screws attaching front end of left air intake duct to fender skirt, coat rubber grommet on duct with Lubriplate (to aid in pulling it through hole in skirt), disconnect the flexible hose at the clamp, remove bolt attaching rear end of duct to rear fender skirt (remove

CONTINUED ON NEXT PAGE

SAGINAW (G.M.) C nt.

from inside hose), remove air duct. Disconnect pressure and return line hydraulic hoses at the pump *(CAUTION*—cap pump fittings and plug hoses to prevent oil spilling out). Remove steering gear-to-frame bolts and clamps *(CAUTION*—support column to prevent damage to column jacket). Move steering gear assembly to rear as far as possible, turn assembly so that pitman arm shaft upward, lift forward end up between engine and fender and move it forward and out of the car *(CAUTION*—a helper should guide column jacket and signal switch housing through cutout in cowl panel to avoid damaging these parts).

Steering Wheel Removal—On solid spoke steering wheel, pry out horn button cap, remove contact cup, spring, and contact plate (attached to wheel hub by three screws and spacer bushings). On flexible steering wheel, pry off monogram and bezel assembly, remove horn button operating wheel (attached by three screws). On all models, set direction signal in "off" position. Flatten lockwasher tab and back off steering wheel nut several turns but **do not remove nut.** Use Puller J-1566 and adapter to pull wheel back to the nut *(CAUTION*—if wheel hub tight on shaft, apply moderate strain with puller, tap end of puller screw to break hub loose—this will prevent distorting wheel hub). Remove puller, remove steering wheel nut, lift steering wheel off.

Installation: Install steering gear in car by reversing removal procedure (above) with particular attention to the following points:

Tightening Mounting Bolts—Install frame bracket bolts but leave these bolts loose until after steering column bracket and ALL ORIGINAL SPACERS installed, center the steering column in the dash cutout and tighten bracket bolts securely, then tighten frame bracket bolts to 30-35 ft.lbs. torque.

Installation Check—After steering gear installed, install steering wheel, turn wheel slowly from one extreme end position to the other to make sure no bind exists at any point. If bind noted, re-align steering gear in mounting brackets.

Oil Line Connections—Oil line hoses are marked (at pump end) and hose connections at pump have same marks: Pressure Line "PR," Return Line "RT."

►***CAUTION—Hose connection locations on Vickers and Eaton Pumps are reversed ("PR" connection nearest engine on Eaton pump, farthest from engine on Vickers.***

1952-53 BUICK SERIES 70
1953 BUICK SERIES 50

BUICK (Series 50 & 70) Steering Gear Removal: Remove battery cables from battery, then remove battery and battery heat deflector. Remove selector control rod from arm on shift safety switch. Remove bolts securing metal strip at rear end of fender skirt in wheel housing. Remove pitman arm-shaft nut, disconnect arm from shaft. Remove two bolts from upper clamp that secures steering gear to frame bracket. Remove hydraulic lines at pump, drain, then cap lines and ports in pump *(CAUTION*—Capping of lines and ports necessary to keep dirt out of pump and lines). Remove horn contact button, connection of backup light-safety starting switch from mast jacket, direction signal wires from fuse panel. Remove screws that secure mast jacket rubber retainer, pull retainer up about one foot on jacket. Remove metal section of floor board under brake pedal. Remove steering wheel (see data below). Loosen bolt from clamp securing mast jacket to hydraulic valve cover, then remove two bolts securing jacket to instrument panel *(CAUTION*—save all spacers located between bracket and support bracket on instrument panel—these must be re-installed). Cap steering shaft using Part No. J-5159 or cover with masking tape. Remove mast jacket from steering shaft by lifting jacket into car. Remove power steering unit by lifting up and forward into engine compartment.

Steering Wheel Removal—*See Buick Series 40 "Steering Wheel Removal" above.*

Installation: Install steering gear in car by reversing removal procedure (above) with particular attention to the following points:

Tightening Mounting Bolts—Before actually installing steering gear see that lower clamp securing gear to frame is in place but loose. Place two upper clamp bolts in position, then install only outer half of upper clamp securing gear to frame bracket. Replace gear in position, then install other half of upper clamp. Hold in position by installing nuts on clamp bolts but do not tighten at this time. When tightened, torque to 30-35 ft. lbs.

Installation Check & Oil Line Connections—See Buick Series 40 "Installation" above.

1954-55 BUICK, ALL SERIES

Removal: Remove battery and battery shield. Disconnect pressure and return line hoses from hydraulic pump and immediately install shipping caps on pump fittings to retain oil in pump. Drain hoses and install plugs in hose ends. Disconnect transmission shift rod from control shaft lower lever. On synchro-mesh cars only, remove selector lever from clamp on jacket by removing retainer and spring washer. Loosen bolt in clamp which secures column jacket to short tube in gear housing. Move front seal all the way back. Disconnect and remove horn cable connector from steering column jacket. On Dynaflow cars, disconnect wires from neutral safety switch and remove speed ratio dial light bulb holder from support on steering column jacket. On all cars, remove signal switch wires from fuse block under cowl. Cover steering column jacket with masking tape to prevent damage to finish. Remove steering wheel and upper bearing spring and spring seats. Cover the horn contact and threaded end of steering shaft with masking tape. Remove signal switch and transmission shift control levers. Detach the rubber insulator retainer from dash mat and pull it up about a foot on column jacket. Remove jute column pad. Measure vertical clearance between column jacket and lower surface of instrument panel and record this dimension so column can be installed in same position. Remove bolts holding cap to steering column bracket and disconnect bracket from instrument panel, then pull upward on column jacket to free it from steering gear. Remove cranking motor splash pan from car frame. Remove steering gear to frame lower bolts and clamps, then loosen upper bolts enough so that gear can be tilted sideways to provide room for pitman arm puller. Remove pitman arm. With another man inside the car to guide column and prevent damage, carefully lift steering gear assembly up and forward out of engine compartment, leaving column jacket assembly in car.

INSTALLATION: Reverse the removal procedure and note the following: When installing column jacket assembly over steering shaft, place Bearing Protector J-5159 over serrated end of shaft to avoid damage to shaft upper bearing in jacket (slot in lower end of jacket must engage dowel pin in hydraulic valve cover). When mounting the gear and jacket assembly in brackets, make certain that column is properly positioned at instrument panel and tighten column bracket before tightening gear housing to frame, then check for bind as follows: Temporarily install steering wheel and use scale J-544-A to check pull required to turn wheel steadily through high point or no lash range. The pull should not be more than ¼ lb. more than before installation. If greater, check upper bearing in jacket. Connect pressure hose to lower union on pump, and return line hose to upper union.

STEERING WHEEL & HORN BUTTON OR RING REMOVAL: *See "1953 Buick Series 40" (abov).*

1952-54 CADILLAC

CADILLAC Steering Gear Removal from Car—Support front end of car on stands placed near outer ends of lower suspension arms with wheels approximately 10" off floor. Remove steering wheel (see data below), remove steering column upper and lower covers. Take out screws in steering column support bracket at instrument panel, and two screws attaching horn contact assembly to column jacket under instrument panel. Take out three screws in steering column cover on toeboard. Remove heater blower motor from heater and remove flexible air intake hose. Disconnect both oil line hoses at power unit *(CAUTION*—cap the hose connections and plug the hoses to prevent oil spilling out). Loosen steering column lower jacket clamp. Disconnect steering connecting rod at pitman arm. Remove left exhaust pipe at manifold. Remove three bolts attaching steering gear to frame side rail *(CAUTION*—save all shims found at these mounting bolts—these shims necessary to align steering gear). Carefully slide steering gear down and out of upper jacket and remove assembly from the car *(CAUTION*—use extreme care not to damage upper housing tube bearing).

Steering Wheel Removal—Disconnect horn wire from horn contact assembly on upper steering cover beneath instrument panel. Depress horn button and turn counter-clockwise to release locking ears. Remove button assembly and horn button spring. Remove steering wheel hub nut, then remove horn ring retainer, cushion, and horn ring. Mark steering wheel hub and shaft (to insure correct re-installations), use Puller J-1859 to remove steering wheel.

Steering Linkage Removal & Disassembly—Disconnect tie rod ends. Remove idler arm support screws from frame side member, pitman arm from shaft (Puller J-2162), and connecting link with tie rods, idler arm support, idler arm, and pitman arm attached. Remove cotter pin, adjusting and stop plugs, spring and ball seat, from left end of connecting link. Remove pitman arm. Remove inside ball seat, spring stop plug, spacer, and tie rod outer ball seat, to remove left tie rod. Remove cotter pin, plug, and outer ball seat from right end of connecting link. Remove idler arm. Remove inner ball seat, spring, stop plug, long spacer, cover, and ball seat

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SAGINAW (G.M.) Cont.

to remove right tie rod. Loosen clamp screws, unscrew tie rod or tie rod end from clamp. Unscrew idler arm support from bushing.

Installation: Install steering gear in car by reversing removal procedure (above) with particular attention to the following points:

Steering Linkage - Install drag link end plugs tightly. Back off left end plug ¼-½ turn and right plug 7/8-1 turn (1952-53), back off left end plug 1/2-5/8 turn and right plug 1/4-1/2 turn (1954). Install idler arm support with seal until it bottoms, then back off 1/2-1½ turns, depending on position of bushing in idler arm. Connect pitman arm to steering connecting rod, turning end nut up tight and backing it off 1/2-5/8 turn. Torque pitman arm on shaft to 125-150 ft. lbs., idler arm support on frame side bar to 30 ft. lbs., tie rods to steering arms to 50-55 ft. lbs. Adjust toe-in, and drag link height. *NOTE* - Be sure open side of clamps are over open side of adjuster before tightening clamp nuts.

Worm Shaft Seal Protector Caution—Install Seal Protector J-5159 on upper end of steering shaft to prevent damage to upper housing tube bearing when sliding steering gear up into position.

Steering Gear Alignment—Install steering gear frame mounting bolts with same number and thickness of shims as were removed from between steering gear and frame, tighten mounting bolts to 40-50 ft.lbs. torque. Check upper steering column alignment in instrument panel recess and adjust, as necessary by adding or removing shims at frame mounting holes.

Steering Wheel Installation—Install wheel with marks on hub and shaft lined up, tighten nut to 45-50 ft.lbs. torque and stake nut to shaft to prevent loosening. Measure gap between bottom edge of horn ring and upper edge of direction signal switch carrier and slide steering jacket up or down as required to secure 3/16" gap at this point with horn ring in released position.

Oil Line Connections—Connect hose from upper "RT" fitting on pump to large union on steering gear valve body which is nearest frame side rail, connect hose from "PR" fitting to small union, on valve body, closest to exhaust manifold.

1955 CADILLAC

REMOVAL: (Gear Assembly)—Disconnect hoses from valve body on gear housing. Cap ends of hose to prevent loss of oil. Remove return port (large) fitting from valve body. Raise front end of car and place jack stands near outer ends of lower suspension arms. Disconnect pitman arm from drag link. Remove lower flange to coupling screws. (*NOTE*—Scribe marks on coupling and flange to assure correct positioning of steering wheel at assembly). Remove gear housing to frame side bar screws and remove gear housing.

INSTALLATION: (Gear Assembly)—Place assembly on frame side bar, guiding the lower flange onto coupling, and install gear to frame screws. (*NOTE*—Make certain that scribe marks on coupling and upper steering tube flange are aligned). Install lower flange to coupling nuts. (*NOTE*—After installing gear, check the flexible coupling for distortion. The coupling must rest flat with no visible bend or twist. If it is distorted, remove the lower steering column cover and lower clamp to jacket screw. Loosen steering jacket clamp screws at instrument panel, and slide complete steering jacket assembly up or down as required. Redrill lower clamp and jacket if necessary to install screw). Connect pitman arm to drag link.

REMOVAL: (Upper Steering Shaft)—Remove steering gear assembly (above). Disconnect battery ground strap and remove neutral safety switch and horn contact Remove horn button and spring and remove steering wheel hub nut. Remove horn retainer and horn ring. Remove steering wheel using Puller J-1859. Remove steering jacket tensioner spring and split ring Loosen lower steering jacket clamp, pry lower bearing retainer out of steering jacket and remove upper steering shaft through bottom of jacket

Upper Steering Shaft Lower Bearing Removal & Installation: With upper steering shaft removed, use a soldering iron, and remove upper tip on horn contact wire and remove plastic insulator. Pull the wire down through shaft and out opening at horn contact bushing. Remove bushing with wire from shaft Slide bearing retainer from shaft and press bearing from retainer To install, reverse removal procedure.

INSTALLATION: (Upper Steering Shaft)—Slide upper shaft into steering jacket, insert lower bearing retainer into jacket until retainer flange is tight against bottom of shaft, and temporarily tighten lower clamp. Install split ring and steering shaft tensioner spring over end of steering shaft Install steering wheel over splines on shaft with punch marks lined up. Install horn ring retainer and horn ring in position on steering wheel. Install steering wheel hub nut and tighten to 45-50 ft. lbs. Stake nut to shaft. Install spring and horn button. Loosen lower steering jacket clamp and work lower bearing retainer flange down from end of jacket until 3/16" clearance is obtained between horn ring and directional signal switch carrier. (*NOTE*—To obtain clearance, insert a screwdriver between lower bearing retainer and jacket. Twist screwdriver to move retainer down). Hold lower bearing retainer in position while tightening lower jacket clamp, making certain that lower edge of clamp is as close as possible to lower end of jacket.

STEERING SHAFT UPPER BEARING REMOVAL: Remove neutral safety switch and horn contact from lower steering column. Remove cotter key, dust shield and horseshoe retainer at lower shift lever on steering jacket and then disengage shift lever from shifter tube. Remove steering wheel, tensioner spring and split ring, and direction signal switch (see Upper Steering Shaft Removal above). Remove capscrews holding upper bearing retainer to steering jacket. Remove steering column lower cover. Remove Hydra-Matic shift dial indicator. Pull shifter tube out of steering jacket until shift detent on bearing retainer clears jacket, then screw bearing retainer from shifter tube. Press upper bearing from retainer.

REMOVAL: (Steering Column Assembly)— (*NOTE—Removal of the complete steering column assembly is only necessary when both upper and lower bearings must be replaced or if lower shift lever must be replaced).* Disconnect battery ground strap and remove direction signal switch and horn contact from lower steering jacket Remove brake pedal retaining screw. Raise car Disconnect manual control rod from lower shift lever Scribe marks on coupling and flange to assure correct positioning on assembly, then remove coupling to lower flange nuts. Remove brake pedal Loosen carpet on left front side and pull back from steering column toe plate and remove plate to floor board screws Remove stop light switch screws Remove steering jacket lower cover and remove Hydra-Matic indicator pointer. Disconnect direction signal switch wires at connector. Remove the small screw at bottom of steering jacket-to-instrument panel clamp and remove the two instrument panel to steering column clamp nuts Remove steering column assembly.

INSTALLATION: Reverse the removal procedure.

STEERING WHEEL & HORN BUTTON OR RING REMOVAL: *See "1952-54 Cadillac" (above).*

1953-54 CHEVROLET

CHEVROLET Steering Gear Removal: Remove steering wheel (see data below). Remove upper control shaft clamp bolt from shaft connector, disconnect horn wire at connector under instrument panel near point where wire comes from mast jacket. Remove mast jacket toe board grommet and seal from toe board Remove nuts and lockwashers from instrument panel-to-mast jacket clamp. (*CAUTION*—save all spacers located between bracket and support bracket on instrument panel—these must be re-installed), remove clamp. Remove two clutch head screws that attach gearshift control upper support to mast jacket. Pull upper control shaft and upper support up and out of engagement with shaft connector. Remove clamp bolt nuts and clamp retaining shifter housing to mast jacket, then rotate shifter housing with lower control shaft and control rods attached away from mast jacket Disconnect steering connecting rod at pitman arm (*CAUTION*—Carefully note relative position of steering connecting rod parts before disturbing them) Disconnect pump hoses at valve body unit (*CAUTION*—cap lines and ports to prevent spilling of oil or secure ends of hoses in raised position). Remove nuts, bolts and lockwashers attaching steering gear housing to steering support bracket. Remove left air duct, then rotate gear assembly to clear fender skirt. Raise gear assembly up and forward to remove from engine compartment.

Steering Wheel Removal—Pry out horn button or ornamental cap, remove steering wheel retaining nut. Remove wheel with Puller J-2927-A.

Installation—Install steering gear in car by reversing removal procedure (above) with particular attention to the following points:

Tightening Mounting Bolts—Install bolts, lockwashers, and nuts retaining housing to support brackets. Tighten mast jacket securely, then torque housing-to-bracket nuts to 27-40 ft. lbs.

Steering Wheel Installation—With steering gear on high point, install steering wheel with spokes horizontal Install washer and nut, torque to 35-40 ft.lbs.

1953 LINCOLN

LINCOLN Steering Gear Removal: Remove front seat cushion from vehicle. Remove steering wheel (see data below), disconnect steering column electrical connections. Remove accelerator from pushrod. Re-

CONTINUED ON NEXT PAGE

SAGINAW (G.M.) (Continued)

move bolt and clevis pin securing brake pedal, remove brake pedal. Remove carpeting from floor pan opening, then three screws securing column insulator to opening cover plates. Remove two screws securing upper floor pan opening cover to floor pan, remove cover. Remove seven screws securing lower floor pan opening cover, disconnect speedometer drive cable from instrument panel and pull through lower floor pan opening cover, remove cover. Remove two screws securing steering column support brackets to instrument panel, remove bracket. Remove clamp securing power brake reservoir hose to fire wall, then clamp securing hose to power brake fitting on power brake vacuum tank. Pull hose to engine side of floor pan opening cover to provide clearance. Remove cotter pins and release shift rod from steering column shift arm. Loosen clamp on lower steering column at steering gear housing, raise column sufficiently to disconnect wires at neutral switch. Remove steering column tube from steering shaft through inside of car. Disconnect hydraulic hoses at valve housing *(CAUTION*—Cap fittings and plug hoses to prevent oil leakage or place hoses in upward position). Raise front of car, remove nut securing pitman arm, remove arm using Tool 3590. **Loosen** three bolts securing steering gear assembly to frame *(CAUTION* —Remove shims, if any, then mark holes requiring shims to facilitate reassembly). With one man in car and another under car remove three bolts securing steering gear assembly. Remove assembly through passenger compartment.

Steering Wheel Removal—Remove cap and emblem assembly by grasping with hand and pulling outward from steering wheel hub. Remove steering shaft nut, then steering wheel using Tool 3600-D. If necessary to remove horn ring, remove three screws that hold horn ring securing plate to steering wheel. Remove horn ring securing plate, gasket and spring.

Installation: Install steering gear in car by reversing removal procedure (above) with particular attention to following points:

Tightening Mounting Bolts—With shims, if any, in place, install steering gear-to-frame attaching bolts loosely until steering column tube is rigidly in place. When tightened, torque to 30-35 ft. lbs.

Steering Wheel Installation—Clearance between wheel and tube flange should be approximately .12". Tighten steering wheel nut to 60-70 ft. lbs.

CAUTION—When installing horn ring spring make sure spring ends are properly seated in spring stops.

Oil Line Connections—Connect pressure hose (nearest engine) to fitting marked "PR" on valve housing assembly, secure return hose to fitting marked "RT" on valve housing assembly.

1954-55 LINCOLN

REMOVAL: *(NOTE*—On cars with power brakes, remove clamp securing reservoir hose to power brake fitting on vacuum cylinder, and remove clamp securing power brake reservoir hose to fire wall. Pull hose to engine side of floor pan opening cover to provide sufficient clearance). Remove front seat cushion. Remove steering wheel with tool No. 3600-D. Disconnect steering column electrical connections. Remove accelerator pedal from pushrod and remove brake pedal from pedal support bracket. Remove carpeting from floor pan opening. Disconnect speedometer drive cable from instrument panel and remove cover from floor pan opening. Remove support bracket from instrument panel. Disconnect shift rod from steering column shift arm. Loosen clamp on lower steering column at gear housing and raise column sufficiently to disconnect wires at neutral switch. Remove steering column tube from steering shaft through inside of car. Disconnect pressure and return hydraulic hoses at gear valve housing and place hoses in upward position to prevent leakage. Raise front of car and remove pitman arm using tool No. 3590. Disconnect steering gear assembly from frame side rail *(CAUTION—Remove shims, if any, located between mounting bolts and frame side rail. Mark bolt holes and number of shims required, and mark shims for identification with bolt holes).* With one man inside car and another under the car, remove the three bolts securing gear assembly to frame side rail and remove the unit through passenger compartment.

INSTALLATION: Replace steering gear in car and install loosely to frame side rail with the three attaching bolts (longest bolt to rear). Connect hydraulic hoses to valve assembly. Slide steering column tube on steering shaft with column clamp in place (do not tighten clamp). Secure column support to instrument panel bracket with two bolts and tighten finger tight. Tighten bolts securing gear housing to frame side rail *(CAUTION*—Replace shims, if any, in the exact position noted at time of removal). Complete the installation by reversing removal procedure making sure that steering wheel is in center position with wheels straight ahead before pitman arm is installed.

1952-55 OLDSMOBILE

OLDSMOBILE Steering Gear Removal: Disconnect battery, drain fluid reservoir on pump, disconnect hoses at gear and pump. Cover openings. Loosen mast jacket-to-steering gear housing clamp, remove steering wheel (see data below), install Tool J-5210 on end of worm shaft. Mask steering column for about 2" above instrument panel bracket. Loosen steering column in bracket, remove floor mat and floor pan plate attaching screws. Pull mast jacket up. Place 2" block between left front shock absorber arm and frame. Jack front end of car up at least 10", place car stand under frame. Remove left side filler plate and pitman arm from shaft. Remove starting motor and wire guide bracket, three steering gear-to-frame bolts. Remove steering gear by pulling it down and out of mast jacket carefully turning gear as it is removed so that all fittings and pipes clear frame and lower control arms.

Steering Wheel Removal—Disconnect horn wire at relay. On Standard wheel insert sharp instrument underneath edge of horn button and pry upward. Remove steering wheel nut, then horn contact assembly. On Deluxe wheel use small screwdriver to relieve spring tension on one end of spring clips holding horn button in place. Clips are accessible from underside of wheel. Remove steering wheel nut, contact plate and horn ring assembly. Using wheel puller, remove steering wheel.

Installation: Install steering gear in car by reversing removal procedure (above) with particular attention to the following points:

Tightening Mounting Bolts—Install three steering gear-to-frame bolts but do not tighten until mast jacket securely in place. When tightened, torque bolts to 35-40 ft. lbs.

Mast Jacket Location—Locate mast jacket to provide ¼-3/16" clearance between wheel and collar.

Oil Line Connections—Pressure Line "PR" farthest from engine, return line "RT" nearest engine.

1953-55 PONTIAC

REMOVAL: *(NOTE—If car is equipped with power brakes, remove power brake unit).* Hook front suspension in 5-passenger load position using tool J-5571 (front suspension hold down hook). Remove steering wheel using puller J-3044. Remove direction signal switch handle and gearshift lever and remove steering column to instrument panel bracket cap. Slide rubber grommet up column jacket. Roll back floor mat and remove pedal plates from floor. Remove neutral safety switch. Disconnect gearshift and selector rods, and direction signal wires. Disconnect oil lines at steering gear and secure lines high enough to prevent oil leakage. Raise car on hoist and remove starting motor, pitman arm, and left side tie rod end. Remove engine side apron on left side. Remove brake pedal hairpin spring retainer and slide pedal to right as far as it will go. If car is on a twin post hoist, it will be necessary to place stands under both front frame ends and lower front post approximately three feet to allow steering assembly to clear hoist. Push steering connecting linkage down and toward rear of car, remove steering assembly to frame attaching bolts, removing the upper bolt last, and lower assembly between lower control arm and steering connecting linkage *(CAUTION—Identify and retain any shims found between gear housing and frame as these must be returned to the same location for proper alignment of steering gear).*

INSTALLATION: Push steering connecting linkage down and toward rear and install steering gear assembly by guiding between lower control arm and connecting linkage. Remove hold down hook. Install front gear housing to frame bolt with lockwasher, finger tight *(CAUTION—Be sure to install shims in the same locations as removed from).* Install steering column lower bracket with lockwashers and bolts to upper bracket on instrument panel. Install two remaining gear housing to frame bolts, and tighten all three bolts. Check for correct shimming of steering gear housing to frame by seeing if steering column aligns with upper bracket when bracket bolts are loosened. If alignment is correct, tighten steering column bracket bolts *(NOTE—If* misalignment exists, it will be necessary to change housing to frame shims to correct alignment). Complete installation by reversing removal procedure.

STEERING WHEEL & HORN BUTTON OR RING REMOVAL: Remove deluxe horn ring button by turning counter-clockwise. Remove standard horn button by pressing down on one side, inserting screwdriver underneath opposite edge of button, and prying upward. Remove locknut, washer, horn ring, horn insulator and contact assembly. Remove steering wheel using puller J-3044. To install, reverse above procedure, making sure wheel is in straight ahead position (spokes horizontal and mark on steering shaft upward). Tighten

CONTINUED ON NEXT PAGE

SAGINAW (G.M.) C nt.

steering wheel nut to 25-30 ft. lbs. Tighten locknut finger tight plus 1/4 turn.

1953-55 STUDEBAKER

REMOVAL: Disconnect and remove battery (on coupe and hardtop, remove battery box). Remove steering post collar screws and slip collar up out of the way. Disconnect horn wire and on automatic transmission cars, disconnect quadrant light and starter cutout switch cables. Disconnect direction signal cables and shift lever rods. Loosen jacket clamp bolt at lower end of jacket. Remove steering wheel using puller J-5473, and remove jacket spring. Loosen jacket to instrument panel bracket clamp screw and remove jacket to instrument panel bracket screws and shims (if shims are used). Slip jacket off column. Remove the four steering post coupling nuts, separate coupling, keeping collector ring and insulators intact, and remove post assembly. Tape coupling studs to prevent damaging threads when removing the unit. On sedan and station wagon models, remove the left hand valve rocker arm cover. Disconnect tie rod from pitman arm and remove the pitman arm clamp bolt. Move fender gravel deflector out of the way and remove the three steering gear housing to mounting bracket bolts. On sedan models it may be necessary to shift the unit against the fender apron for clearance to remove pitman arm, then remove pitman arm. Disconnect hoses at pump and tape all openings. Shift unit rearward, inserting top end of unit through opening in firewall. Lift lower end of unit, turn it as necessary to gain clearance past fender apron and battery box, and lift unit out of car.

INSTALLATION: Reverse removal procedure and note the following: With gear in mid-position (high-spot) punch mark on end of worm shaft should be at top and "T" stamped on coupling should also be at top, with wheels in the straight ahead position.

STEERING WHEEL & HORN BUTTON OR RING REMOVAL:

Champi n & C mmander (Custom & Deluxe): Remove horn button assembly by pushing down on button and at same time turning button 1/3 of a turn. Remove wheel retainer and lockplate. Place puller center adapter in end of steering post and remove steering wheel with puller J-5473. To install, reverse removal procedure, tightening nut to 23-27 ft. lbs.

Champi n & C mmand r (Regal), President: Remove button from steering wheel by inserting knife blade under edge of button and forcing button up and out. Remove horn ring retaining screws and remove ring and rubber shock pad. Remove steering wheel retaining nut and lockplate. Place puller center adapter in end of steering post and remove steering wheel with puller J-5473. To install reverse removal procedure, tightening nut to 23-27 ft. lbs.

STEERING GEAR OVERHAUL

OVERHAUL: Ste ring G ar Disass mbly—Thoroughly clean steering gear (mast jacket removed). Place steering gear on holding fixture, then proceed to disassemble as follows:

1) Remove plugs (if hoses removed) from gear housing and attach hoses. Place ends of lines in container and drain gear as much as possible by turning steering wheel two or three times through full range. Remove oil lines between power cylinder and hydraulic control valve housing. Remove small bleed line between power cylinder and hydraulic control valve housing, then the two flexible hoses. (NOTE—Unless "O" ring seals are to be replaced, do not loosen swivel fittings, since they will aid when reassembling oil lines). Remove filler plug with vent.

2) Mark power rack cover and housing, then remove FOUR CORNER BOLTS from guide cover assembly (DO NOT REMOVE THE TWO CENTER BOLTS). Remove cover and guide assembly with all shims.

3) Mark side cover for ease when reassembling, then remove four side cover bolts. Then, tapping on end of pitman shaft with soft hammer, remove pitman shaft, side cover, and gasket as an assembly.

4) On Buick, measure from end of hydraulic valve cover to nearest edge of horn cable contact. On all cars except 1955 Cadillac, remove horn wire and contact from steering column. Turn steering gear to a horizontal position, mark control valve cover, control valve housing and gear housing to facilitate reassembly. Remove steering wheel, place special tool over threads of steering shaft to protect seal in valve cover when removing cover. On 1955 Cadillac, remove coupling flange-to-steering shaft dowel pin, supporting flange from below to prevent shock damage to thrust bearings. Remove flange from splined shaft. Remove felt washer.

5) Remove three valve cover attaching bolts. Carefully slide valve cover from steering shaft. Except on 1955 Cadillac, remove special tool from threads on steering shaft.

6) Mark power cylinder and housing for assembly purposes, then remove four power cylinder-to-housing attaching bolts. Remove power cylinder with gasket.

7) Straighten bent-over tangs on worm bearing adjusting nut lock. Use steering wheel on steering shaft to hold shaft and loosen worm bearing adjusting nut and lock. (NOTE—Deep chamfered side of nut is toward lock). Remove steering wheel, worm bearing adjusting nut and lock.

8) With steering gear still in horizontal position, carefully remove the control valve assembly from steering shaft, using care to keep spool, plungers and centering springs from falling out. *(CAUTION*—Do not lay control valve assembly where it is apt to pick up lint of dirt. Lay the control valve assembly on a piece of clean paper). Remove control valve lower thrust washer assembly from shaft (NOTE—Thrust washer assemblies are interchangeable). Place special tool on threads of steering shaft to protect worm bearing seal in housing, while removing shaft.

9) Remove three end cover attaching bolts and then remove end cover and gasket from housing. Carefully slide steering shaft and ball nut assembly through housing. Holding on to upper end of shaft, to take weight off worm bearing seal, will help to protect seal.

Individual Unit Disass mbly & R ass mbly—Proceed as follows:

Pitman Shaft & Sid C v r—*(NOTE—Lincoln adjusting screw endplay established at time of manufacture. Screw is fixed in end of pitman shaft and cannot b adjusted).* Turn adjusting screw down through side cover and remove side cover from pitman shaft. Remove adjusting screw and shim from slot in pitman shaft (except Lincoln). Clean all parts in suitable solvent. Inspect bushing in side cover for excessive wear. If damaged or worn excessively, replace side cover and bushing. Inspect pitman shaft sector teeth. If pitted, worn excessively or scored, or if pitman shaft serrations twisted, replace shaft. To reassemble (except Lincoln), check fit of pitman shaft adjusting screw shim in slot, in end of pitman shaft. With shim in place, screw head must be free to turn in slot, with no perceptible endplay to .002" loose. If endplay excessive, fit new shim (furnished in four thicknesses). Position adjusting screw, with selected shim, into slot in pitman shaft. (All Cars) Assemble side cover to shaft by turning adjusting screw counterclockwise until side cover seats firmly on housing. Start adjusting screw lock nut over threads of adjusting screw and leave finger tight.

Power Cylinder—Remove gasket and hold power cylinder in vise clamping power rack between brass jaws *(CAUTION—DO NOT place machined surfac s of rack in jaws).* Push power cylinder up to the rack and pull sharply away from rack to hammer adapter against piston (It may be necessary to repeat several times to break grip of rubber seals between adapter and cylinder). Remove safety nut, and piston with one spacer washer from each side of piston. Place Tool J-5293 (Lincoln 33568) over threads of piston rod to protect packing seal in adapter against damage. Remove adapter and large spacer washer from piston rod. (NOTE—Piston, rings, rod, pin and power rack are serviced separately. Adapter "O" Ring Seals are serviced separately or in kit with packing seal). Inspect power rack teeth for burrs, scores or excessive wear. Inspect power cylinder for scores. Inspect "O" ring seals and piston rings. Replace where necessary. Make sure that all parts are clean. Lubricate parts before reassembly. To reassemble, position large spacer washer over rod against power rack. With Tool J-5153 (Lincoln 33568) over threads on rod, install adapter. Install new "O" ring seals on adapter. Remove Tool J-5153 (Lincoln 33568). Install power piston (either side out) having one spacer washer on each side of piston, then install and tighten safety nut. Using ring compressor J-5186 (Lincoln 33569) to compress piston rings, install power cylinder over piston and adapter. It may be necessary to tap cylinder with soft mallet until flush with adapter flange.

Steering Shaft & Ball Nut—Remove clamp and ball return guides from ball nut. Remove sixty (60) steel balls, then carefully remove ball nut from shaft. Wash all parts in clean kerosene or other cleaning solvent. Inspect steering shaft for wear or brinelling in ball and needle bearing races (replace if worn or brinelled). Check shaft to make sure it is straight. Inspect teeth

C NTINUED N NEXT PAGE

SAGINAW (G.M.) C nt.

of ball nut and worm of steering shaft. If teeth pitted, worn or scored, replace part. Before reassembling be sure parts are absolutely clean and lubricated with clean engine oil. To reassemble, place steering shaft on bench with upper end to your right. Install ball nut on worm so that when teeth are facing up, deeper side of teeth are toward you. Install 21 or 22 steel balls in each circuit of the worm and ball nut. Install 8 or 9 steel balls in each guide. Holding halves of guide together to prevent the balls from falling out, push guides with balls over each circuit in ball nut. Install clamp and tighten in place. Run ball nut to upper and lower end of worm to check for freeness.

Valve Body–*(CAUTION–Spool and plungers are a very close fit in housing and must be removed and replaced carefully. They must be started carefully to avoid jamming and must not be forced into place).* Carefully remove spool, plungers and springs from valve body. Remove check valve *(CAUTION–Use care not to score or cut bore with screwdriver).* Inspect spool and plungers for scores, nicks, or burred edges. Test check valve by blowing through both ends. Ball should seat when blowing through small end, and allow air to pass when blowing through slotted end. Control valve body and spool are serviced as a unit. Plungers, springs and check valve are serviced separately. Replace damaged parts and make certain they are oiled before reassembly, so that spool and plungers slide freely in housing. To reassemble, install check valve in housing. Assemble spool into housing with counter-bored end up. Install compression springs and plungers.

Inspection & Reconditioning of Steering Gear Housing & Covers–Clean machined surfaces of housing of all gasket material. Inspect mating surfaces for burrs, and remove any burrs with flat stone. Inspect bushings and bearings for scored or worn condition, and replace if required. The following procedures cover the replacement of all bushings, bearings and seals in housing and covers. To replace, proceed as follows:

Steering Gear Housing Worm Bearing & Seal–On Lincoln, place Worm Bearing and Seal Remover Tool-3517 through steering gear end cover opening and drive the seal, washer and bearing from housing. On other cars, remove worm bearing seal by carefully tapping an "offset" screwdriver between seal and shoulder in housing, then pry lightly around seal to remove. Roller bearing is removed with a punch and should not be removed unless replacement is necessary, as removal will damage bearing. To install bearing, use Tool J-5189 (Lincoln Tool 3517-A). Bearing should rest on Shoulder in housing. (NOTE–Stamped end of bearing is against shoulder of installing tool, unstamped end enters housing first). On Lincoln, place washer on bearing so that when seal is installed washer will be between seal and bearing. On all cars, place new seal with lip (spring end) outward toward Bearing Seal installing Tool J-5189 ("Seal" end) (Lincoln 33560) and drive into steering gear housing to point where seal seats on shoulder of housing. *NOTE*–Lubricate feather edges of seal before installing.

Steering Gear Sector Shaft Bearing, Bushing & Seal–*(NOTE–Power Steering Gears on Lincoln Cars built after January 4, 1954 will not have steering gear sector shaft bearing. For those prior to above proceed as indicated below).* To replace bearing on Lincoln cars, turn shaft of Tool 3770-A counter-clockwise until jaws are flush with housing. Insert tool in steering gear housing and turn shaft clockwise until bearing is removed (NOTE–Be sure jaws of tool grip back of bearing). Inspect bearing for binds and freedom of movement. Lubricate bearing with M-4738 lubricant and place on Steering Gear Sector Shaft Bearing Installer Tool 3770, lettered end toward tool, and press carefully into steering gear housing. Recheck bearing for freedom of movement. To remove bushing and seal on Buick, Cadillac, Chevrolet, and Lincoln (On other cars, bushing and housing serviced as an assembly), support steering gear housing in an arbor press and press sector shaft bushing, seal (and retainer, if used) from housing using Tool J-1614 (Lincoln 3353.) Press new bushing into position using bushing driver J-1614 (Lincoln 3353 with adapter 3553-1). Soak new seal in oil, install in new packing retainer (if used) and press into housing (Lincoln use Tool 33587). On Lincoln, seal is installed with lip out. To replace packing or seal only, pry seal (and retainer, if used) out of housing. Soak new seal in engine oil, install in new retainer (if used) and press into housing.

Steering Gear End Cover Worm Bearing–Make sure bore in end cover is absolutely clean and that roller bearing is clean. Grip end cover lightly in vise. Insert Removing Tool J-5190 (Lincoln 33551) into bearing and turn screw, which will expand two plates under bearing and will then force tool and bearing out of cover. Use Installing Tool J-5191 (Lincoln 33551-A, Oldsmobile J-5255) to install new bearing. This tool has shoulder to locate bearing at proper depth. Place stamped end of bearing against shoulder of tool so that unstamped end enters bore first. Lubricate bearing with clean automatic transmission fluid.

Hydraulic Valve Cover Seal–Remove seal from valve cover by carefully inserting an "offset" screwdriver between seal and shoulder in cover, and prying lightly around seal. Place a new seal on Tool J-5188 (Lincoln 33562, Oldsmobile J-5254–large end) having spring side (lip side) to shoulder of installing tool. Drive new seal down to shoulder in cover. NOTE–Always lubricate feather edges of seal with clean automatic transmission fluid to facilitate breaking-in the new seal.

Steering Gear Reassembly: Be sure all parts are absolutely clean and lubricated with clean engine oil during reassembly. Proceed as follows:

Linc In–*(CAUTION–Before installing pitman shaft, tap s rrat d nd of shaft to assure no damage to s ctor housing nd seal.)* Install pitman shaft and cover assembly with new gasket, aligning side cover and steering gear housing marks .scribed. when disassembled. Secure with two capscrews and two Allen head screws. Loosen adjusting screw locknut. Turn sector shaft upper teeth (nearest side cover) as far as possible toward opening of the steering gear end cover. Turn steering shaft ball nut to top of ball nut race (nearest steering wheel end of shaft). Place Tool 33562-B on steering wheel end of shaft, and slide shaft through steering gear housing cover opening, holding up on shaft to take weight off seal while inserting. Insert first tooth of ball nut into first tooth showing on pitman shaft. Push lightly on ball nut end of steering shaft so as to turn teeth on pitman shaft, meshing them with teeth on ball nut. Install steering gear housing end cover and new gasket with two capscrews and two Allen head screws. (NOTE–If steering gear housing end cover fails to fit snugly against housing, turn shaft slowly to left and right to seat shaft in end cover bearing. DO NOT FORCE.) Install thrust bearing assembly with small race toward gear housing (Thrust bearing assemblies are interchangeable). Place new "O" ring seal in groove in face of housing. Turn holding fixture so that shaft is horizontal. Carefully install control control valve assembly with letter "B" marked on assembly toward housing. Turn steering gear to vertical position, move valve housing around to make sure thrust bearing balls are seated in race, then align marks on valve assembly and steering gear housing. Place Adapter Ring Tool 33577 over valve assembly and secure with three bolts. Center valve spool around worm shaft and tighten bolts evenly and securely. Install upper thrust bearing assembly with large race toward valve spool. Install new worm bearing tab lockwasher making sure inside lock tang slides freely in keyway of shaft, so lockwasher rests flat against upper thrust bearing race. Position locknut over shaft, having deeper chamfer toward tab lockwasher and start nut on threads just far enough so that it is left loose against face of tab lockwasher. Make worm bearing adjustment (see below).

Other Cars - **1)** Run ball nut to upper end of worm.

2) On 1955 Cadillac, replace felt washer, reinstall flange on splined shaft, replace coupling flange-to-steering shaft dowel pin.

3) On other cars, place gear housing in horizontal position. Place tool over threads of steering shaft to protect worm seal in housing. Slide shaft through housing, holding up on shaft to take weight off feather edge of seal while shaft is passing through seal.

4) On all cars, install end cover with gasket, tightening in place with bolts and lockwashers.

5) Install lower thrust bearing assembly with large race outward (toward spool). Carefully install control valve assembly (NOTE–Hydraulic connection bosses on control valve housing are identified with embossed letters. The side with identification should be facing up toward steering wheel). Turn steering gear to vertical position, move valve housing around to make sure thrust bearing balls are seated in race, then align chalk marks. Install Adapter Tool J-5182 with valve cover bolts and tighten bolts to 15-20 ft. lbs. torque. Install upper thrust bearing assembly

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SAGINAW (G.M.) Cont.

with large race toward valve spool. Install new worm bearing lock nut, and tanged washer (if used) making sure inside lock tang slides freely in keyway of shaft, so lock rests flat against upper race. Position locknut over shaft, having deep chamfer toward lock, and start nut on threads just far enough so it is left loose against face of lock (Nut must spin on threads freely without bind). Make worm bearing adjustment (see below).

Worm Thrust Bearing Adjustment—Temporarily install steering wheel (Studebaker Tool J-5563) after removing special tool from end of steering shaft (or tape from pitman shaft). Turn wheel counter-clockwise to extreme left (Chevrolet right) position so that valve centering plunger springs are fully compressed. Hold wheel in this position and tighten bearing locknut as follows:

▷*NOTE:* On 1955 Cadillac, when making this adjustment, use flange and suitable lever to hold shaft stationary.

Buick—Tighten nut just enough to seat thrust bearings against valve spool. Pull at rim required to rotate wheel in off-center range steadily should be 1/2-3/4 lb.

Cadillac—Tighten locknut to 30 ft. lbs. torque, then back off 1/4 turn. Pull at rim required to rotate wheel steadily in off-center range should be 3/8-3/4 lb.

Chevrolet—Tighten locknut firmly. Back off nut and retighten lightly. Pull at rim required to rotate wheel steadily in off-center range should be 1/4-1/2 lb.

Lincoln—Tighten locknut firmly, then back off nut and retighten lightly. Release wheel (make sure nut exerts pressure against spring-loaded plungers). Adjust to get pull at steering wheel rim of 1/4-5/8 lb.

Oldsmobile—Tighten nut just enough to seat thrust bearings against valve spool, then back off nut 1/16-3/32" measured at one corner of nut hex. Pull at rim required to rotate wheel steadily through off-center range should not exceed 3/8 lb.

Pontiac—Tighten locknut firmly, then back off nut and retighten lightly. Release wheel so that plunger spring pressure is against retaining collar J-5182. Thrust bearing nut should have no lash. Adjust to get pull at steering wheel rim of 1/4-1/2 lb.

Studebaker—Tighten locknut firmly. Turn shaft back to relieve pressure on springs, then, while holding shaft, back off nut until outer race of upper thrust bearing can be turned with a heavy drag.

On all car models, lock the nut by staking nut into shaft keyway (or bend lockwasher tangs against nut flat) using care not to disturb nut position. Remove Adapter Tool. Install new "O" ring seal in cover, use protective thimble on steering shaft to prevent damage to cover seals, install valve cover making certain that aligning marks are lined up, tighten cover screws with torque wrench as follows:

Buick, Pontiac—Securely.
Cadillac—25-29 ft. lbs.
Lincoln—17-22 ft. lbs.
Chevrolet, Oldsmobile, Studebaker - 15 - 20 ft. lbs.

NOTE—It is very important that all cover bolts be tightened as closely as possible to exactly the same torque.

Having completed worm thrust bearing adjustment proceed as follows:

Buick—Place adjusting screw and shim in slot of pitman shaft, install side cover with new gasket, and install lock nut finger tight on screw. Place gear assembly on left side, turn steering shaft until ball nut teeth are centered on pitman shaft bushings, and tilt nut slightly toward side cover opening. Hold pitman shaft with gear sectors straight down as it is installed in gear housing; use care to avoid damaging pitman shaft seal in gear housing as shaft is pushed through it. Install side cover and tighten bolts securely. Adjust pitman shaft as follows:

Buick Pitman Shaft High Point Adjustment—Install steering wheel and turn slowly through full range to check for free action, then turn wheel back to center position (2-3/4 turns) to center ball nut on central "high point" of pitman shaft sector. Turn pitman shaft adjusting screw clockwise until lash between ball nut and pitman shaft sector is just removed, tighten lock nut. Turn steering wheel two turns right or left from center. Pull at rim to rotate wheel in range where lash normally exists should be 1/2-3/4 lb. (1952-54), 1/2-7/8 (1955). Place wheel near center position, again check pull required to rotate wheel through "high point". This should be 1/2 - 3/4 lb. greater than pull in lash range. Turn adjusting screw as required to obtain this reading after locknut tightened. Record this reading for later use.

Cadillac, Chevrolet, Pontiac, Studebaker—Place gasket on cylinder and guide power rack through opening in gear housing with teeth on rack pointing toward center of housing. With scribe marks on cylinder and housing aligned, install cylinder-to-housing mounting bolts and tighten securely. Install pitman shaft and engage tapered teeth with ball nut and power rack as follows:

Cadillac—Be sure scribed marks on ball nut and power rack are aligned. Engage teeth of gear with power rack and ball nut.

Chevrolet—Turn steering wheel right or left until center groove of ball nut is in line with center of pitman shaft bushing. Position power rack so that center groove (third groove from piston end) is in line with center of pitman shaft bushing. Install pitman shaft so that center tooth in each set of sector gear teeth meshes with center grooves of ball nut and power rack.

Pontiac—Turn steering wheel clockwise to run ball nut to upper end of its travel. Install pitman shaft in housing with tapered teeth contacting ball nut, engage first tooth of gear with first tooth of power rack and worm gear ball nut.

Studebaker—Same as Chevrolet above.

Lincoln—Proceed with pitman shaft high point adjustment as follows:

Lincoln Pitman Shaft High Point Adjustment—Install steering wheel. Turn steering wheel slowly through full range to check for freedom of movement, then turn wheel back to midway position to center ball nut on central high point of pitman shaft. Turn steering shaft 45° right or left from center. Pull at rim of wheel required to rotate wheel smoothly over center high spot should be 3/4—1 5/8 lbs. Adjust pitman shaft adjusting screw to bring pull within this range. Difference between worm bearing preload (see Worm Bearing Adjustment above) and total preload must not be greater than 1 lb. on 9" radius. Record this reading for use in Power Rack Adjustment below. Tighten adjusting screw locknut to secure adjustment. Recheck adjustment after tightening locknut.

Buick & Lincoln—On Buick, turn steering shaft clockwise to limit of travel. On Lincoln, turn steering wheel until lower pitman shaft teeth are turned completely toward power cylinder opening. On both cars, position power cylinder assembly and new gasket with power rack all the way in cylinder. Align power cylinder and steering gear housing scribe marks. On Buick, mesh end tooth of rack between two end teeth in pitman shaft sector. On Lincoln, mesh first tooth on pitman shaft into first groove on power rack. Torque power cylinder attaching bolts securely (Lincoln 17-22 ft. lbs.)

Oldsmobile—Install steering wheel and turn it right or left until center groove in ball nut is in line with center of pitman shaft bushing. Place pitman shaft with cover and gasket into housing. *CAUTION—Teeth that engage ball nut are tapered.* Align center tooth of tapered sector with center groove of ball nut, tap side cover lightly until cover and gasket are flush against housing. Turn steering wheel clockwise all the way. Position power cylinder assembly, with marks aligned, into housing, engaging first tooth on rack into first groove (TOP GROOVE) on sector. Tighten power cylinder attaching bolts evenly and securely.

All Cars—Oil face of power rack and guide, then position power rack cover and guide assembly with all shims onto housing (CAUTION—Use care when holding shims in position to avoid any thin shims catching in bolt threads and face of housing). On Buick and Lincoln, install cover attaching bolts and tighten evenly and securely. On other cars, just start cover bolts with lockwashers through cover. These bolts must be left loose until Over-Center Adjustment has been checked and adjusted. See Over-Center Adjustment below.

Over-Center (Pitman Shaft-to-Ball Nut Lash—Cadillac, Chevrolet, Oldsmobile, Pontiac, Studebaker) Adjustment—With power rack cover bolts loose, turn steering wheel slowly through its full range to check for freedom of movement, then turn wheel back to midway position to center ball nut on central high point of pitman shaft. Turn steering wheel shaft 45° right or left of center. Place spring scale on spoke of wheel at rim and pull on scale, at a 90° angle to spoke, to turn steering wheel. Adjust pitman shaft adjusting screw so that pull on 9" radius to turn wheel smoothly over center high spot is:

CONTINUED ON NEXT PAGE

SAGINAW (G.M.) (C ntinu d)

Cadillac–1 1/8–1 3/4 lbs.
Chevrolet–1 1/8–1 1/2 lbs.
Oldsmobile–5/8 lb. greater than in lash range (1/2–1 1/4 lbs).
Pontiac–1–1 1/2 lbs.
Studebaker–1/2-1 lb.

Power Rack Guide (Pitman Shaft-to-Power Rack Lash–All Cars) Adjustment–Tighten power rack cover bolts evenly and securely. Turn steering wheel slowly through its full range to check for freedom of movement, then turn wheel back to center position. Turn steering wheel shaft 45° right or left of center. Place spring scale on spoke of wheel at rim and pull on scale, at a 90° angle to spoke, to turn steering wheel. If power rack cover shims have been selected properly there will be a preload in addition to over-center or pitman shaft adjustment when column shaft is rotated past center high spot as follows:
Buick–1/4-1/2 lb. increase or 1 1/4–2 1/4 lbs. total.
Cadillac–1/8-1/4 lb. increase or 1 1/4–2 lbs. total.
Chevrolet–1/8 lb. increase or 1 1/4–1 5/8 lbs. total.
Lincoln–1/32-3/16 lb. increase or 25/32–1 13/16 lbs. total.
Oldsmobile–No increase or 1–1 3/4 lbs. total.
Pontiac–No increase or 1/2-1 lb. total.
Studebaker–1/8 lb. increase or 1 1/4 lbs. maximum.
This completes the overhaul. Reinstall horn wire and contact where necessary. Install steering gear in car (See Removal & Installation above).

HYDRAULIC PUMP OVERHAUL

►***OIL PUMP CAUTION—Always cap or plug all pump ports whenever oil lines disconnected and use extreme care to keep dirt out of pump and to keep all pump parts clean.***

EATON OIL PUMP: Disassembly. Thoroughly clean exterior of pump before removing plugs or disassembling parts. Then proceed as follows:

1) Remove reservoir cover and gasket, then drain reservoir. Remove filters, reservoir, then separate pump cover from pump body. *(CAUTION*—Before removing cover place pump with shaft end down to prevent falling out of rollers).

2) Turn pump body over and slowly rotate shaft so that rotors fall free, remove rotors and drive key from shaft. Remove "O" ring seals from pump body.

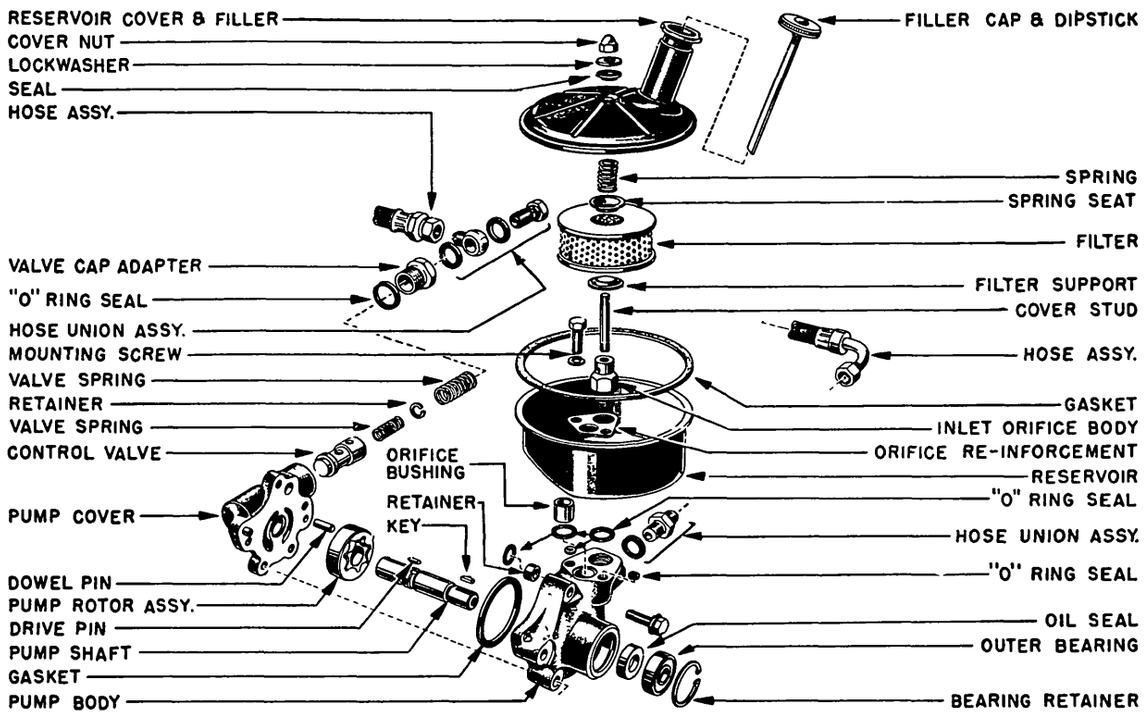
3) Remove bearing snap ring from recess in body using snap ring pliers, tap lightly on end of shaft, remove shaft and bearing assembly from pump body. Remove inlet fitting and seal from pump body and valve cap adapter seal and orifice plate from cover, then remove flow control valve spring and damper by depressing relief valve slightly and removing snap ring with snap ring pliers.

4) Remove spring, relief valve and flow control valve from cover *(CAUTION*—Place parts where they will not be damaged).

Cleaning & Inspection: *CAUTION*—Do not wash shaft and bearing assembly in cleaning solvent which may wash lubricant out of sealed bearing (wipe bearing and shaft assembly with clean cloth only). Clean all other parts with clean kerosene or solvent, wipe dry with clean lint-free cloths. Inspect bearing in cover and replace if worn or noisy. Inspect shaft for wear and bearing for wear, roughness, or noisy operation (if either part requires replacement, press bearing off and on shaft in an arbor press). Inspect shaft seal in pump body for wear or damage (if seal requires replacement, drive old seal out with a punch, press new seal squarely into place with spring-loaded edge inward). Inspect valves for nicks, scores, or scratches and also inspect valve bores in pump cover (minor nicks may be removed by stoning). Check valve clearance in cover, valves should be free in bores and clearance must not exceed .0025". Inspect valve springs and replace if weak or distorted. Inspect cover and body for wear caused by rotors, replace if surfaces scored or worn. Inspect both rotors as detailed below and replace **both** rotors if either part worn or scored (rotors furnished as matched sets).

Inner & Outer Rotor Clearance—With one tooth of inner rotor fully meshed in outer rotor, measure clearance between rotors at opposite inner rotor tooth using a feeler gauge. Repeat this check for each rotor tooth. Replace rotors if clearance exceeds .006" (Packard), .008" (Others).

Outer Rotor Clearance in Pump Body—Insert outer rotor in pump body, check clearance between outer diameter and bushing in body with feeler gauge. Replace pump body if clearance exceeds .006" (Kaiser), .008" (Others).



EATON "ROTOR TYPE" HYDRAULIC PUMP

Rotor Side Clearance—Install both rotors in pump body, place straightedge across face of pump, use feeler gauge to measure clearance between rotors and straightedge. Replace pump body if clearance exceeds .0025".

Spring Tension (Relief Valve) 32 lbs. at 1.18".

Spring Tension (Flow Control Valv)—16 lbs. pull plus or minus 1½ lbs. at 1.20".

Reassembly—If removed, install new oil seal in pump body bore with lip toward rotors. If ball bearing removed from pump new bearing should be pressed on with arbor press until it butts against shoulder on pump shaft. Using all NEW seals and gaskets and lubricating all moving parts with Automatic Transmission Fluid Type A, proceed as follows:

1) Install assembly of pump shaft and bearing in pump body bore. Install ball bearing retainer. Position drive pin or key in pump shaft slot.

2) Install rotor assembly. If valve subassembly disassembled, install relief valve spring, relief valve, and retaining ring in flow control valve body. Compress assembly into body until there is sufficient room for installing ring in valve body groove, install retaining ring.

3) Install orifice plate in pump body bore. Install flow control valve spring. Install new gasket on hose adaptor valve cap, install and tighten cap. Install new gasket at pump body pressure port and a pump body-to-cover gasket.

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HYDRAULIC PUMPS (Cont.)

4) Install pump cover on pump body. Install screws and torque tighten to 30-35 ft. lbs. (Nash & Packard 25-30 ft. lbs.) Install new "O" ring gaskets on top of pump body, install reservoir and filter.

VICKERS OIL PUMP: Disassembly. Thoroughly clean exterior of pump before removing plugs or disassembling parts. Then proceed as follows:

1) Remove reservoir cover and gasket, then drain reservoir. Remove four reservoir-to-pump mounting screws, then remove reservoir, gaskets, and spacers. Remove pump cover-to-body attaching bolts, then cover assembly with control valve assembly and spring. Discard cover "O" ring seal.

2) Remove pressure and return line unions with "O" rings from pump cover, discard "O" rings. Push spring retainer plug (between pressure and return line unions in cover) inward to remove. Discard "O" ring seal, remove plug snap ring. *NOTE—It is not necessary to remove plug, "O" ring and snap ring to service remainder of pump. Remove only if evidence of leakage at this point.*

3) To disassemble control valve assembly, remove end screws with spacers, relief ball, relief spring guide and relief spring.

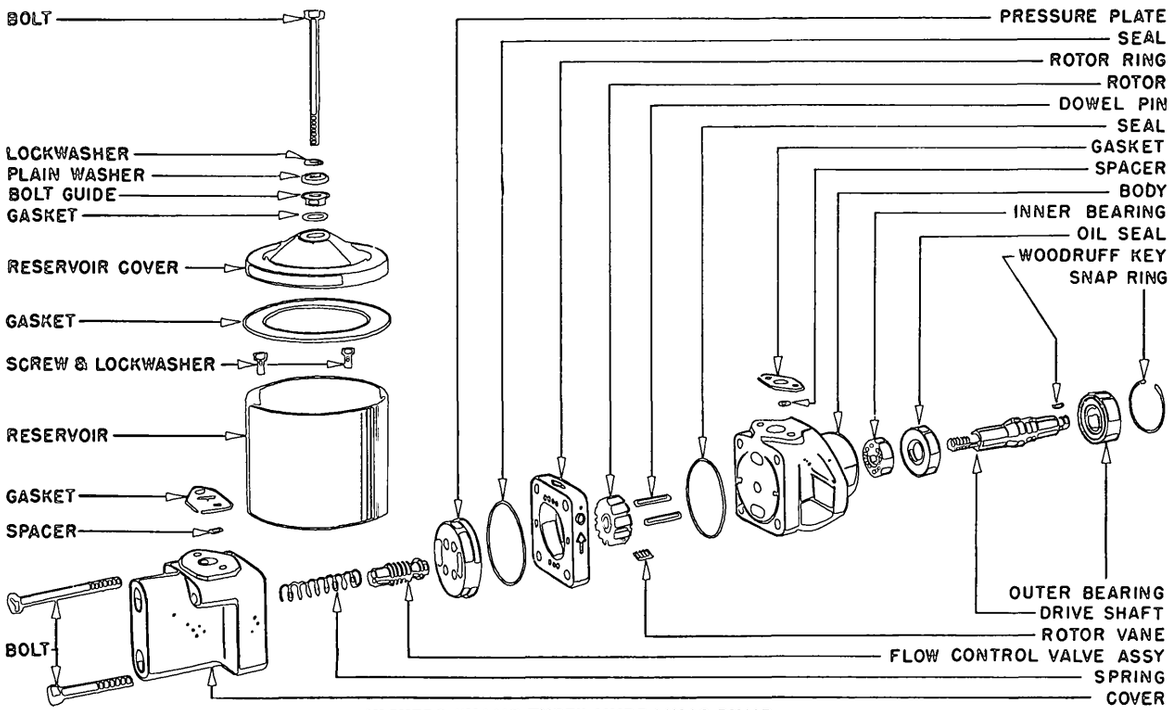
4) Lift pressure plate off dowel pins which extend through pump ring, remove pump ring from dowel pins in body. Remove rotor with vanes from body, discard "O" ring from groove in pump body. Remove bearing retainer snap ring from front face of pump body.

5) Remove drive shaft and outer bearing assembly from pump body, press outer bearing off drive shaft over threaded end of shaft, after removing woodruff key from shaft.

6) Using punch, tap drive shaft seal and inner bearing from pump body *(CAUTION—*Seal must be removed first to permit removal of bearing).

▷*HANDLING CAUTION—Use care when handling pump body especially when removing drive shaft and inner bearing with seal to prevent marring or scarring finished surface which mates with cam ring on reassembly of pump.*

Cleaning & Inspection: *CAUTION—*Do not wash large sealed bearing in cleaning solvent which may wash lubricant out of bearing (wipe bearing and shaft assembly with clean cloth only). Clean all other parts with clean kerosene or solvent, wipe dry with clean lint-free cloths. Inspect both bearings for wear or roughness, inspect shaft for wear. Check fit of pump vanes in rotor slots (vanes should be snug but must slide freely in slots), replace rotor if vanes excessively loose, replace vanes if worn or scored. Inspect all ground surfaces of cam ring for roughness or wear (slight irregularities can be stoned out), replace ring if inner cam surface scored or worn. Inspect flat surfaces of pressure plate and body for wear or scoring (faces may be trued up by lapping until smooth and flat) *CAUTION—*all traces of lapping compound must be cleaned out. Inspect relief valve poppet and flow control valve plunger for wear or scoring paying particular attention to seating surfaces. Clean out all passages in pump cover and body.



VICKERS "VANE TYPE" HYDRAULIC PUMP

Reassembly: Use all NEW seals and gaskets. Lubricate all moving parts with clean engine oil and install parts in reverse order of disassembly procedure (above) with particular attention to the following points:

Shaft Seal Installation—After the inner ball bearing is installed in pump body, install seal with the two 1/16" holes in casing toward outside and use a tube or shaft 1 3/4" in diameter to apply pressure on outer edge of seal to seat it in body.

Bearing Installation—Large sealed bearing should be installed with stamped face of inner race toward threaded end of shaft, small bearing with stamped face of inner race toward splined end of shaft. Press on inner race only when installing bearings.

Cam Ring Installation Caution—Install ring with marks made during disassembly lined up and make certain that arrows on ring point in direction of pump rotation (clockwise viewed from front or shaft end of pump).

Rotor & Vane Installation—Install vanes with rounded (radius edge) outward toward cam ring.

Relief Valve Assembly Installation—Make certain that all of the original shim washers are re-installed in the valve plug (these shims control oil pressure). If any of the relief valve parts are replaced, valve operation must be tested and adjusted after pump installed on car as follows:

Relief Valve Testing & Adjustment—Use Gauge J-5176 to check pump pressure. See Testing Hydraulic Oil Pressure (above). Relief valve should start to open (will be indicated by slight buzzing noise in pump) at pressure of 700 lbs. or slightly higher and maximum pump pressure should not exceed 900 lbs. with engine speed increased above idle. If pressure not correct, adjust number of shims in relief valve plug for correct performance (add shims to increase pressure, remove shims to lower pressure).

Final Assembly Test—After assembly completed, rotate pump shaft by hand and make certain pump has free movement. Plug or cap all hose connections to keep dirt out of pump until lines connected.

STUDEBAKER MECHANICAL TYPE

Studebaker, Comm. & Land Cruiser 4H (1953) Optl.

►*SAGINAW (G.M.) POWER STEERING used on later cars.*

DESCRIPTION: The mechanical power steering unit consists of a belt driven shaft and pulley assembly rotating two multiple disc clutches in opposite directions through a drum and pinion gear assembly. A clutch activating hub and plate controlled by the steering shaft activates either of the multiple disc clutches for directional power control. The steering gear shaft is direct acting upon the steering gear unit and steering is not affected in the event of power failure. With power off, a ratcheting sound will be heard when the steering wheel is rotated. This sound is normal and will disappear when power is applied. The driven pulley and bearing assembly is mounted in a spring loaded bracket, and a power load in excess of the pre-determined amount will cause the spring to depress and allow the belt to slip, preventing undue strain on the steering gear.

ADJUSTMENTS: Proceed as follows:

ADJUSTMENT NOTE—No adjustment of Power Steering Unit required in service other than Belt Adjustment (see below).

Belt Adjustment: Loosen capscrew at the adjusting arm and raise drive pulley and bearing assembly until the plain washer under the castellated nut is just loose and free, then tighten adjusting arm capscrew.

Steering Gear: *CAUTION—Make adjustments with load removed from front wheels (pitman arm disconnected or front wheels free of the floor with front end supported at outer ends of lower control arms). Adjust in following order:*

End Play Adjustment—*Disconnect and remove Power Steering Unit (see Removal data below).* Loosen locknut and back off Cam Lever Shaft Adjusting Screw (on side cover) to provide clearance and remove any cam lever shaft drag. Install tool J-5486 on steering gear, hook spring scale (scale must be calibrated in ounces) to hole in arm of tool. Measure pull required to turn steering gear shaft *(CAUTION* —pull must be at right angles to tool or tangent to turning circle). Shaft should turn smoothly with steady pull of 10-18 ounces. If pull not within limits, adjust by loosening steering post jacket clamp, removing lower cover screws, and adding or removing shims located between lower cover and housing until correct pull secured *(CAUTION*—lower cover screws must be tight when checking this turning pull). Then adjust High Spot (following).

High Spot Adjustment—*Not necessary to remove Power Steering Unit but engine must be idling at normal operating temperature.* Place steering wheel in center position (midway between end positions) with front wheels straight ahead. Loosen locknut on adjusting screw on side cover, turn adjusting screw in until all play removed, then back screw off, finally turn screw in until it just contacts the lever shaft. Turn steering wheel back-and-forth over the center of travel or high spot of the steering gear cam and turn the adjusting screw in until a slight drag is felt, then tighten adjusting screw locknut being careful not to change the adjusting screw position. Check adjustment by hooking spring scale (scale must be calibrated in ounces) to rim of steering wheel and measure pull required to rotate wheel through center high spot. Scale heading should be 16-24 ounces. Readjust adjusting screw, as required, to secure this pull. Recheck pull after adjusting screw locknut tightened.

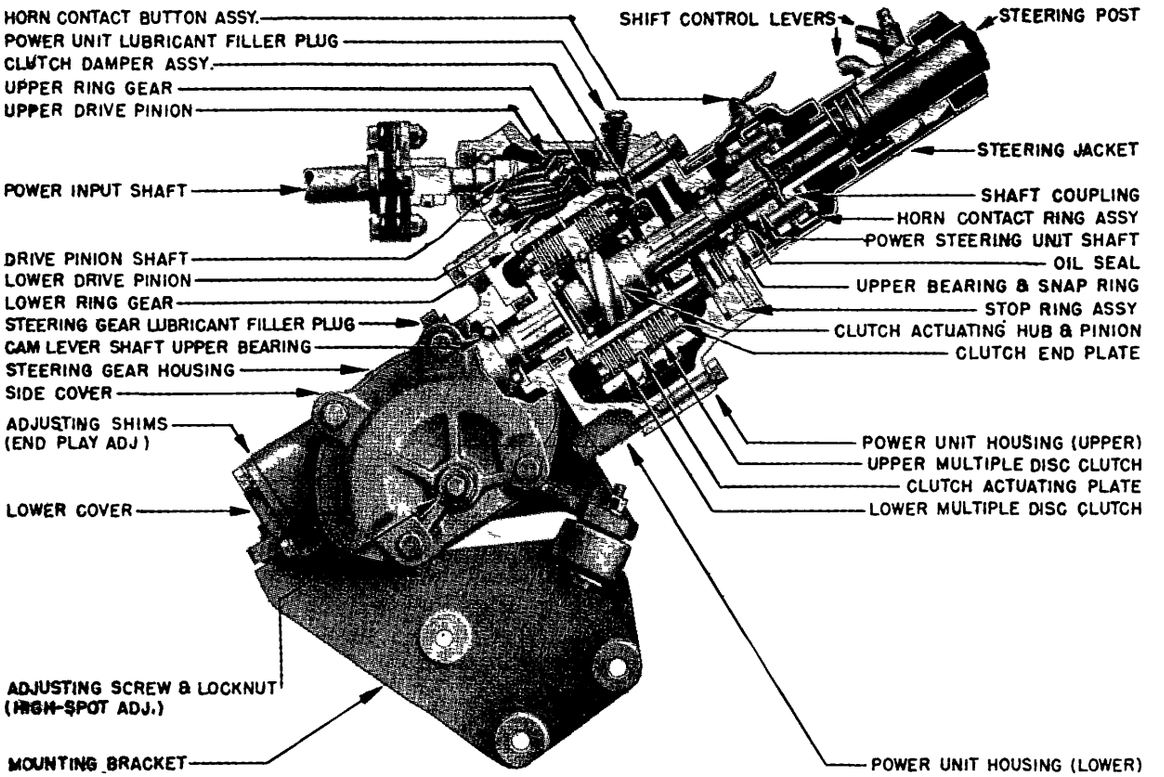
NOTE—With steering wheel in center high spot position, **left** front wheel should be in straight-ahead position. Correct as necessary by adjusting **left hand tie rod.** Then set toe-in by adjusting **right hand tie rod only.**

LUBRICATION: *CAUTION— Power Steering Unit and Steering Gear are lubricated separately with DIFFERENT lubricants as follows:*

Power Steering Unit: Use only Studebaker Steering Power Unit Fluid AC-2407. Check level every 1000 miles, drain and refill every 10,000 miles. Maintain level even with inspection plug on left or right side of housing, add fluid through filler plug opening on top of housing.

►*LUBRICATION NOTE—If Studebaker Fluid AC-2407 not available, good quality SAE 10W ngine oil may be used. Unit may be noisy if engine oil used and regular AC-2407 Fluid should be installed at first opportunity.*

Steering Gear: Check at 5000 mile intervals. Maintain level at filler plug hole on top of case. Use only approved steering gear lubricant.



STUDEBAKER MECHANICAL TYPE POWER STEERING GEAR

REMOVAL & INSTALLATION:

Removal: 1) Remove steering wheel.

2) Disconnect battery cable and remove battery.

3) Disconnect quadrant light cable and starter cut-out switch cable (cars with Automatic Trans.), disconnect horn wire at terminal on steering jacket.

4) Disconnect shift lever rods from steering column levers, loosen jacket clamp bolt.

5) Loosen jacket bracket-to-instrument panel capscrew, slip steering jacket up on steering post as an assembly to proper clearance for steering unit removal.

6) Remove four nuts from bolts attaching steering post collar-to-collar on power steering units shaft *(CAUTION*—Do not re-use elastic stop nuts—use new nuts when re-installing power unit). Slide steering post, rubber insulator, and metal plate out of the way (plate and collar cannot be removed without removing jacket from steering post).

7) Disconnect horn wire from collector ring, then remove upper rubber insulator, horn collector ring, and lower rubber insulator.

8) Disconnect power input shaft by taking out two bolts in coupling at power steering unit end of shaft, position shaft out of the way.

CONTINUED ON NEXT PAGE

STUDEBAKER MECHANICAL (CONTINUED)

9) Take out four capscrews attaching power steering unit to steering gear housing, remove power steering unit from beneath car. Remove intermediate drive shaft hub from pinion drive shaft.

Installation: Reverse the removal procedure given above.

OVERHAUL: Thoroughly clean outside of Power Steering Unit, then proceed as follows:

1) Using an awl or similar sharp pointed tool, pry out drive shaft oil seal, remove power input shaft snap ring with small screwdriver, slip power input shaft and ratchet assembly from housing as a unit.

2) Remove the three capscrews which join the two sections of the housing. Use a suitable drift to drive out taper pin. Using awl or similar sharp pointed tool, remove oil seal. Then, with small screwdriver, remove snap ring from steering column main shaft.

3) Separate upper housing from lower housing. When pulling housings apart, be careful not to drop pinion gears and needle bearings (each pinion assembly consists of a pinion gear, gear shaft, pinion bearing spacers, and 19 needle bearings). Slip clutch assembly, mainshaft, and upper ring gear as an assembly from the housing, lift upper ring gear off the assembly, remove housing gasket and discard.

4) Place main shaft and clutch in a vise equipped with copper jaws. Remove damper hub retaining snap ring. Lift damper hub from assembly, then remove clutch lock plate and screw. Unscrew clutch end plate, remove from assembly.

5) Lift off clutch discs and clutch friction plates as an assembly (5 clutch discs, 5 clutch friction plates), slip ring gear thrust washer from clutch actuating plate.

6) Remove damper hub lower retaining snap ring from main shaft, then with screwdriver remove outer ball race snap ring, lift outer ball race from main shaft, remove ball bearing.

7) Holding clutch actuating plate with one hand and grasping main shaft, lift parts out of clutch hub as a unit. ***Do not allow shaft or plate to turn as this will permit steel balls to fall out of grooves of the two parts*** (six balls used in assembly). Holding assembly over a bench to prevent losing balls as units are separated, turn shaft out of actuating plate.

8) Remove the ball bearing, lower clutch discs and friction plates assembly. If it is necessary to remove lower assembly end plate, count number of turns so it can be assembled in like manner. Method of removal is same as for upper plate.

9) Remove 4 cap screws from upper housing retainer. Turn housing over and with suitable drift drive out upper retainer. To remove sealing ring around retainer, pick ring out of groove and remove ring from retainer.

10) If it is necessary to remove the ball bearing, first remove upper retainer bearing snap ring, then slip bearing out of upper retainer, lift stop ring assembly out of housing.

Inspection: Inspect all parts for damage or wear, repair or replace where necessary.

Reassembly: 1) Install stop ring assembly in housing. Turn stop plate against one of stops, install new sealing ring in upper retainer, install upper retainer. Install four cap screws, tighten securely.

2) With clutch hub in vise install lower clutch assembly. Reoil clutch assembly if cleaned for any reason. Install clutch disc (driven) first and alternate with clutch friction plate (drive).

3) Install lower ball bearing with ball cage to top, slip clutch actuating plate over clutch hub, grease steel balls in place on plate. Insert steering column mainshaft, turn shaft clockwise just enough to locate balls on worm. Turn shaft counter-clockwise start balls on worm.

4) Install ball bearing with ball cage against top shoulder of worm, slip outer ball race over shaft and place it over the bearing being sure it is seated properly, install outer ball race snap ring, slip ring gear thrust washer over clutch hub.

5) Install upper clutch assembly, first installing a clutch friction plate and alternating with a clutch disc.

6) Screw end plate in place, tighten finger tight. Slip damper hub and retainer assembly on steering column main shaft. Install snap ring, then place collar of power steering unit shaft (steering post end) over main shaft. With normal amount of effort turn shaft until a definite stop is felt. Mark on damper hub should now line up with edge of clutch hub. Turning shaft in a clockwise direction will lock upper set of clutches. Lower set can now be turned freely. Turn adjusting collar in opposite direction until mark on damper hub lines up with edge of clutch hub. This locks lower set of clutches. Upper set of clutches can now be turned freely.

7) If either set of clutches do not lock by lining up mark on damper hub with end of clutch hub it will be necessary to loosen or tighten clutch end plate and repeat adjustment for both upper and lower sets of clutches.

8) Install end plate lock, install snap ring, align clutch discs.

9) Install ring gear into lower housing, being sure wide shoulder is to bottom of housing. Install pinion shaft (before installing push pin to one side). Slip pinion bearing spacer over pinion shaft, install lower pinion gear, insert needle bearings in place, slip pinion bearing spacer over end of pinion gear shaft. Install upper pinion in same manner as described for lower pinion.

10) With clutch assembly held securely in place, align clutch friction plates, then install into the lower housing meshing clutch friction plates with ring gear.

11) Place new gasket in position on housing, slip upper ring gear in place, slip upper housing into place over main shaft and clutch assembly. Install retaining snap ring. Install three retaining cap screws, tighten snugly. Install taper pin, tighten cap screws securely. Slip power input and ratchet assembly into housing as a unit. Install snap ring and new oil seals. Turn steering column shaft from against stop to center position before installing unit in car.

GEMMER WORM & ROLLER

Chrysler, D Sot , Dodge (1946-55)
Ford Pass Cars (1946-48, 1952-55)①
Ford Trucks (1946-55)
Ford Bus Models (1949-50)
Frazer (1947-51)
Henry J (1951-54)
Hudson, Exc Metropolitan (1946-55)
Kaiser (1947-55)
Lincoln (1949-55)
Mercury (1946-55)
Nash, Exc Metropolitan (1946-55)
Packard (1946-55)
Plymouth (1946-55)
Rambler (1950-55)
Willys, Pass Cars②

①—Different steering gear used on 1949 51 models See "1949-51 Ford Pass Car Worm & Roller"
②—Ross Cam & Twin Lever also used

►CHANGES, CAUTIONS, CORRECTIONS

►*WILLYS STEERING KNUCKLE ARM INSTALLATION CAUTION* Ross & Gemmer steering gears used on Passenger Cars require different steering knuckle arms (not interchangeable)

►*1955 FORD STEERING LINKAGE ALIGNMENT CAUTION (Victoria & Sunliner)* An 11/32" spacer is used between steering column bracket and instrument panel If spacer omitted binding or hard steering condition may result due to misalignment

►*1955 FORD PASS CAR & COURIER STEERING WHEEL ATTACHING NUT INSTALLATION CAUTION* Nut should be torqued to 40-60 ft lbs and staked once with prick punch to prevent nut from loosening

►*1955 FORD PASS CAR SECTOR SHAFT BEARING PRODUCTION CHANGE* Since approximately June 27 1955 a spacer (AD 3567-A) has been used in production to assure correct positioning of sector shaft bearings and should be installed on earlier production units whenever it becomes necessary to replace the bearings Install spacer between the two bearings on the sector shaft Bearings should be installed with Tool T52L 3576 AAD

►*1955 FORD F-100, 250 TRUCK DRAG LINK INSTALLATION CAUTION* It is possible to install drag link in reversed position When properly installed offset end of drag link is attached to sector shaft arm and the lubrication fittings will be on the bottom side of the link

►*1952 53 LINCOLN & MERCURY CONTINUOUS BLOWING OF HORN OR FAILURE TO BLOW CORRECTION (Due to Steering Column Movement)* An improperly tightened lower steering column tube clamp may cause the above condition To properly set horn ring air gap proceed as follows Remove steering wheel assembly check horn wire contact ring in tube to make sure it is properly seated Replace steering wheel Loosen steering column bracket-to-dash screws and clamp at lower end of column Depress one horn ring spoke 3/16 1/4" below steering wheel spoke and slide steering column tube so horn will blow at this setting Tighten column bracket-to-dash screws to 12-15 ft lbs Check setting at opposite ring spoke required to blow horn (3/16"-1/4") Torque 3/8" clamp screw at lower end of steering column to 30-35 ft lbs (45-50 ft lbs if 7/16" bolt installed with improved clamp) Improved clamps are FDD-3507-A (Lincoln with Power Steering), FDD-3507-B (Lincoln with Std Steering) FDC-3507-A (Mercury)

►*1954 (& EARLIER)–1955 NASH AMBASSADOR & STATESMAN DIRECTION SIGNAL SWITCH & CAM INSTALLATION CAUTION* 1954 & Earlier Switch Part No 3131527 and Cam Part No 3113966 (including Cam Springs Part No 3130161) should be pressed onto steering column tube 3¼" ±1/16" to Serial No R664004 (Ambassador) K530456(Statesman) and 3 7/16+1/16" after above numbers Insert two 1/8" cotter pins through cam spring loops With pliers compress springs several times to the limit permitted by diameter of cotter pins Remove cotter pins Apply lubriplate to springs and openings On 1955 models using Switch Part No 3144224 and Cam Part No 3144225 cam should be pressed onto steering column 3 7/32"±1/16"

►*1954 NASH STATESMAN & AMBASSADOR OVERDRIVE KICKDOWN SWITCH "SQUEAK" CORRECTION* Coat embossed end of Kickdown Switch Contact Bar with solder

►*1954 RAMBLER INTERMITTENT OR LACK OF HORN OPERATION CORRECTION* May be due to poor ground circuit between horn button retaining contact plate and chassis through steering worm tube To correct remove horn button cap and spring Strip 2" of No 14 wire of insulation and twist strands together Loosen one of Phillips head screws which hold lower spring retainer to wheel hub Loop one end of bared wire under Phillips head screw and tighten it in place Loosen steering wheel nut and loop other end of bared wire beneath it Tighten steering wheel nut securely

►*1954 RAMBLER STEERING LINKAGE PRODUCTION CHANGE (To Eliminate Interference)* Pitman Arm Part No 3138741 and Idler Arm Part No 3116777 became effective in production beginning Serial No D 179973

DESCRIPTION Consists of "hour glass" type worm mounted on steering shaft and carried on roller bearings at top and bottom Chrysler & DeSoto models are of "straddle" design with added bushing at adjusting screw end of shaft within side cover

ADJUSTMENT. Before making adjustments, align steering gear as follows Loosen gear-to-frame bracket bolts (on some models, also loosen dash bracket bolts) Allow gear to align itself, then tighten gear-to-frame bolts If necessary, shim dash bracket, or elongate mounting holes so column will not be sprung when bracket bolts are tightened

Worm Bearing Adjustment (In Car): Chrysler, DeSoto, Dodge, Plymouth–If excessive endplay exists, remove steering gear pitman arms, drain housing, and disconnect horn wire at connector between steering gear and horn Remove capscrews holding grease retainer cover at bottom of housing Remove shims of sufficient thickness to eliminate endplay in worm, but not enough to cause binding when cover is bolted tightly in place Turn steering wheel from extreme right to left If any stiffness exists, too many shims have been removed

Ford (Pass.), Lincoln & Mercury–Disconnect sector shaft from steering arm to idler arm rod Turn steering wheel two complete turns from straight ahead position (spokes in a horizontal position) with steering gear arm pointing directly forward) Hook a spring scale to steering wheel spoke at wheel rim and rotate wheel at least one complete turn noting the pull required to keep wheel moving which should be 1/8 to 5/8 lb If necessary to adjust, add or remove shims as follows Remove screws securing steering gear housing upper cap to housing and work cap and column jacket upward to allow clearance (if additional working clearance required, remove steering wheel) To add a shim split shim at one point then install the shim with the split in the upward position (make sure that split ends do not overlap To remove shims, separate shims from shim pack with a knife blade, passing knife blade all the way around shim pack being careful not to damage shim pack Remove one shim at a time, checking bearing preload after each variation in shim pack *NOTE*–Steering column and housing upper cap must be assembled on steering gear housing each time preload is checked

Ford Trucks–Align steering gear assembly as indicated above Reposition column tube if necessary so that 1/16" clearance exists between upper edge of steering column tube and shoulder of steering wheel Disconnect pitman arm from sector shaft and loosen locknut on sector shaft adjusting screw Turn adjusting screw counter-clockwise to remove load from worm Turn steering wheel in one direction to limit of its travel, and using a scale, measure pull required at rim of wheel to keep the wheel rotating The pull required should be ¼ ¾ lb (F-1 2 3 100 250 350 ½ & ¾ Ton Trucks) ½-1 lb (Other Trucks) Adjust preload by adding or removing shims from underneath steering gear housing end plate

Frazer, Henry J, Kaiser–Disconnect tie rod from pitman arm Turn steering wheel to extreme right or left then back off about 1/8 turn With spring scale attached to spoke of wheel at rim pull required to turn wheel should be ½-1 lb (1947-48 Models) ¼ ¾ lb (1949 & Later Models) To adjust remove housing end cover drain lubricant from housing and add or remove shims between housing and cover as necessary

Hudson, Nash, Rambler, & Willys–Turn steering wheel about one turn from straight ahead position and secure wheel to prevent movement Shake front wheel sideways noting any end movement that may be felt between steering hub and jacket tube *(CAUTION*–Be careful that movement noted is not caused by steering jacket tube bearing) Adjust endplay by loosening the four cover capscrews about 1/8" Add or remove shims as necessary *(NOTE*–Remove shims by separating with a knife being careful not to damage shim pack Shims can be added by splitting shims and inserting in place with split toward the top)

Packard–Remove pitman arm from cross shaft Turn steering wheel to extreme right or left and back up 1/8 turn With spring scale attached to spoke of wheel

CONTINUED ON NEXT PAGE

GEMMER WORM & ROLLER (Continued)

at rim, pull required to turn wheel should not be less than ½ lb. or more than 1 lb. Add or remove shims in same manner as for Hudson, Nash, Rambler (above).

Worm & Roller Mesh Adjustment (In Car): Chrysler, DeSoto, Dodge, Plymouth—Remove pitman arm from shaft and install another arm for use during adjustments. Turn steering wheel to mid-position (high spot). Check movement of steering pitman arm back and forth to determine amount of backlash. If any backlash exists, adjust as follows: Remove roller tooth shaft adjusting screw locknut and slide lock plate off far enough to clear lock boss on roller tooth shaft cover. Tighten roller tooth shaft adjusting screw enough to eliminate freeplay between roller tooth shaft and worm, *but it must not bind.* Slide lock plate in position against roller tooth shaft cover and lock it. Install and tighten adjustment screw locknut. Check steering gear operation and adjust if necessary.

Ford Pass. Car, Ford Truck, Lincoln & Mercury—On Passenger Cars, disconnect sector shaft arm from steering arm to idler arm rod. On Truck Models, disconnect steering sector arm (pitman arm) from the sector shaft. Attach a spring scale to steering wheel rim and pull the wheel through the "high spot" (straight ahead position), and note reading on scale.

Ford Pass. Cars—Reading should be at least ½ lb. above worm bearing preload, but total reading must not exceed 1 5/8 lbs. To adjust, remove adjusting screw cover and locknut. Rotate adjusting screw clockwise while moving steering gear arm back and forth until all backlash has been removed.

Ford Trucks—Reading should be 1-2 lbs. (F-1, 2, 3, 100, 250, 350, 1/2 & 3/4 Ton) 1 1/2-2 1/2 lbs. (Others). To adjust, remove adjusting screw cover and locknut. Center steering wheel, turn adjusting screw in a clockwise direction until all endplay is removed from sector shaft.

Lincoln & Mercury—Reading should be 1-1 5/8 lbs. To adjust, turn sector shaft adjusting screw in if reading is less than 1 lb., loosen screw if reading is greater than 1 5/8 lb.

Frazer, Henry J, Kaiser—With pitman arm disconnected, place steering wheel in centered position. Turn wheel approximately 30° either way from centered position. With spring scale attached to spoke at rim, pull required to pull wheel through centered position should be 1½-2½ lbs. (1947-48 Models), ¼-¾ lb. (1949 & Later Models). To adjust, tighten adjusting screw down snug, turning it clockwise, then back off adjusting screw not more than 1/8 turn. Install lock plate and nut on adjusting screw.

Hudson, Nash, Rambler & Willys—With pitman arm disconnected place steering wheel in center position ("high spot"). If steering wheel removed, the wide flute on upper end of worm tube should be centered at the bottom. Shake pitman arm sideways to determine amount of clearance between worm and cross shaft roller. A movement in excess of 1/32" indicates adjustment required. Remove locking cap from external adjusting screw and remove star washer. Tighten the external screw, but do not overtighten, until sideplay is less than 1/32". Install star washer and locking cap.

Packard—With pitman arm removed from cross shaft and steering wheel in straight ahead position (on "high spot"), attach scale to rim of steering wheel and note pull required to move steering wheel through the "high spot". The pull should be ¾ lb., greater than that of worm bearing preload (see above), but not more than 2 lbs. To adjust, place steering wheel on the "high spot" and remove cross shaft adjusting screw locknut. Raise lockplate enough to clear jaws on cross shaft cover and turn adjusting screw until effort required to pull steering wheel through "high spot" is 1½ to 2 lbs. Install locknut and tighten.

STEERING WHEEL POSITION: With steering at mid-point (roller on high point of worm), intermediate steering arm (when used) should be on center line of car, wheels should point straight ahead, and steering wheel position should be correct as noted below. Check steering wheel position as follows:

Chrysler, DeSoto, Dodge, Plymouth: Steering wheel hub, gear arm, tube, and gear roller shaft are machined with master serrations to place wheels straight-ahead when steering wheel is in its center position. No attempt should be made to change relative position of these parts by altering master serrations. Improper positioning of steering wheel should be corrected only by adjusting tie rods.

Ford Pass. Cars: When steering wheel is on the high point, the front wheels should be in a straight ahead position, spokes of steering wheel horizontal and steering gear arm pointing directly forward. Check steering wheel spoke position while driving car straight ahead. If spokes not in horizontal position, adjust as follows: Set steering wheel spoke in horizontal position. Scratch a mark on each steering arm connecting rod sleeve and the spindle connecting rod tube, then loosen sleeve clamp bolts. If left-hand steering wheel spoke was below horizontal when checked, turn both connecting rod sleeves downward the same amount. One complete turn of sleeve equals approximately one inch of steering wheel rim travel. Turn connecting rod sleeves upward if left-hand wheel spoke was above horizontal. Tighten sleeve clamp bolts to 12-15 ft. lbs. torque.

Ford Trucks: Place front wheels in straight-ahead position, place steering wheel on steering shaft with single spoke facing straight down. Using a wood block, tap steering wheel in center of hub until firmly seated on steering shaft.

Frazer, Henry J. Kaiser: Column shaft and steering wheel serrations have "flats" which must be matched when wheel installed. If wheel spokes not horizontal with front wheels straight ahead, adjust as follows: Disconnect drag link, locate steering wheel in center position (turn wheel back ½ full travel from either end position) with steering gear roller on "high" mid-point of worm and wheel spokes horizontal, set front wheels in straight ahead position. Adjust both tie rods for correct toe-in and with idler lever in centered position. Then adjust drag link until it can be re-connected without disturbing position of steering wheel or front wheels.

Lincoln & Mercury: To align steering wheel disconnect connecting link at steering gear arm, locate steering wheel in center position (turn wheel back ½ full travel from either end position) with steering gear roller on "high" mid-point of worm and wheel spokes horizontal, set front wheel in straight-ahead position. Adjust both tie rods equally until connecting link can be reconnected to steering gear arm without disturbing position of steering wheel and front wheels.

▷*CAUTION*: Both tie rods must be adjusted equally (turn both adjusters equally in opposite direction) to avoid disturbing original toe-in setting. Recheck toe-in after adjustments have been made.

Hudson 6 & 8 (1946-54): Notch in end of shaft should point straight down (visible with horn button and contact plate removed) and steering wheel spokes should be horizontal with roller on "high" mid-point of worm. If wheel position not correct, adjust by shifting shims from one ball seat to the other in the steering arm end of drag link.

Hudson (1955), Nash, Rambler: Steering wheel marked on underside of hub. Install steering wheel with this mark straight down and in line with wide serration on upper end of steering gear tube. In this position, steering gear roller should be on "high" mid-point of worm and front wheels should point straight ahead.

Packard: Place steering wheel in straight-ahead position and center steering gear on high spot. Adjust steering cross tube sleeves until wheels are in the straight-ahead position.

Willys, Pass. Cars: With steering gear in mid-position and wheels in straight-ahead position (lever arm installed on lever shaft), install steering wheel with spokes of wheel positioned parallel with vehicle floor.

STEERING WHEEL & HORN RING OR BUTTON REMOVAL

▷*INSTALLATION NOTE—Where installation instructions are omitted (below); reverse removal procedure. Special instructions are not required.*

Chrysler, 1946-51 All Models Except Hydraguide:

Horn Ring Removal—Disconnect horn wire at bottom of steering gear. Remove screws from underside of horn ring and remove cover, horn ring and ring retainer. Remove screws attaching contact ring and spring retainer to wheel hub and remove these parts. Pull horn wire out of steering tube.

Steering Wheel Removal—Remove steering wheel nut and install steering wheel puller Tool C-612 and pull wheel from shaft.

Chrysler, 1952-55 All Models Except Hydraguide:

Horn Ring Removal—Disconnect battery and center steering wheel in straight ahead position. Press down on horn ring ornament and turn counterclockwise. Lift out ornament retaining spring and pad. Disconnect horn wire from terminal on travel plate and insulator assembly. Remove bushing, travel plate, horn blowing contact ring spring and triangular ground plate. Curl and push wire into steering tube to make room for steering wheel puller pilot.

Steering Wheel Removal—Remove steering wheel nut and install steering wheel puller Tool C-612 (1952-54), Tool C-3428 (1955) and pull wheel from shaft.

CONTINUED ON NEXT PAGE

GEMMER WORM & ROLLER
(Con.inued)

DeSoto, 1946-55 All Models Except Hydraguide: Same as Chrysler instructions

Dodge, 1946-48 All Models:

Horn Ring Removal—Disconnect wire at connector below gear, then remove screws from underside of wheel hub and lift off horn ring and cover Remove screws attaching top plate to hub (if any) and remove plate Pull wire from steering tube

Dodge, 1949-50 All Models

Horn Button Removal—Disconnect wire below steering gear, on some models, or at horn relay On 1949 models remove the screws from underside of wheel hub and remove medallion and horn ring On 1950 models, pry up the medallion and bezel and remove screws holding horn blowing ring Remove screws holding contact plate and wire to hub Lift off plate and wire, then remove spring.

Dodge, 1951-54 Except Some 6 Cyl. Models: See below

Horn Ring Removal—Disconnect horn wire at connector near bottom of steering column, push down on horn blowing ring medallion, turn clockwise and remove medallion, retainer spring and cushion Loosen and remove the three horn ring retainer screws and spacer bushings, then lift out horn ring, travel plate and insulator assembly, wire, contact spring plate and ground plate

Horn Button Removal (Some 6 Cyl. Models)—Disconnect horn wire at connector near bottom of steering column, turn horn button medallion retainer ⅛ turn counter-clockwise, lift off horn button, horn button retainer, contact spring and plate Pull out horn wire and spacer bushing from center of steering tube After removing steering wheel nut, lift out horn button contact cup, remove screw holding horn button retainer fastening plate and base to steering wheel

Installation—Be sure contact spring plate, on models with horn blowing ring, is installed with colored dot appearing on top side On all models, align master serration on steering tube with serration on steering wheel hub before installing

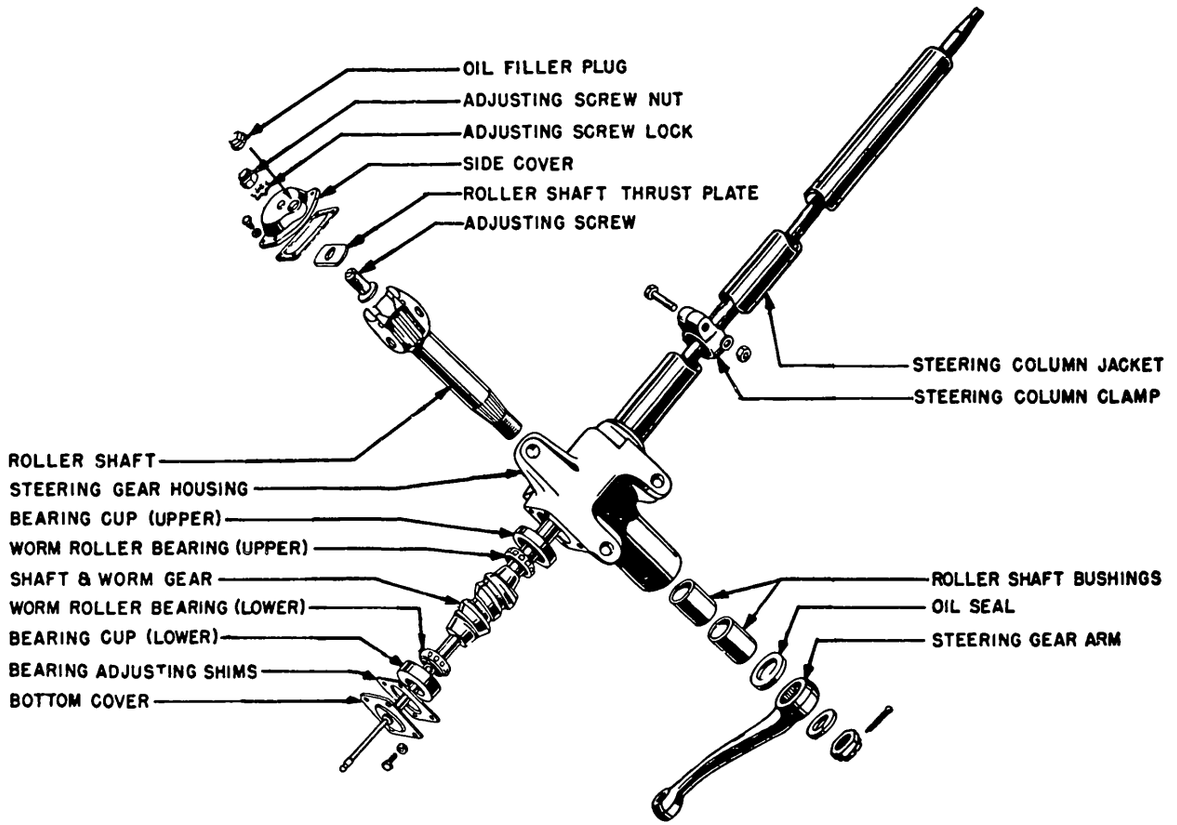
Dodge, 1955 All Models.

Horn Ring Removal—Disconnect battery and center wheel in straight-ahead position Remove two screws from underside of the medallion and remove medallion Disconnect horn wire from terminal on travel plate and insulator and remove horn ring, travel plate, and insulator assembly, contact spring and ground plate Push horn wire down into steering tube

Steering Wheel Removal (All Dodge Models)—Remove wheel nut and washer Attach wheel puller Tool C-612 by means of the threaded holes in steering wheel hub and remove wheel *NOTE*—When installing steering wheel, be sure that master serrations are in line and the direction signal cancelling cam on bottom of wheel is inserted between switch levers

Ford, 1946-48 Passenger Car Models:

Horn Ring & Horn Button Removal—Disconnect wire below steering gear Press down on button or ring and turn counter-clockwise and remove Take out spring



GEMMER MODEL 305 & 335 STEERING GEAR

Steering Wheel Removal—Remove steering wheel nut, install steering wheel puller Tool 3600-N and remove wheel from shaft.

Ford, 1952-55 Passenger Car Models:

Horn Ring or Button Removal—Disconnect horn wire from connector at bottom of steering gear housing Remove horn button or ring by pressing down and turning counter-clockwise Lift spring from steering wheel hub Pull horn wire and contact assembly out of steering shaft

Steering Wheel Removal—Remove steering wheel nut and remove wheel with Puller 3590-N

Installation—Align master splines, tighten nut to 50-60 ft lbs

Ford Trucks, 1946-55. See Passenger Car instructions and note the following

Steering Wheel Installation (Trucks)—Place front wheels in straight-ahead position, place steering wheel on shaft with single spoke facing down Using wood block, tap steering wheel in center of hub until firmly seated Stake end of shaft to nut at one point

Frazer, 1947-50 Except Manhattan

Horn Button Removal—See Kaiser 1947-48 (below)
Steering Wheel Removal—Remove nut and install steering wheel puller (1947-48) C-232; (1949-50) KF-26, and remove wheel.

Frazer, Manhattan 1947-50 & All Models 1951

Horn Ring Removal—See Kaiser Deluxe 1949-50 (below).

Steering Wheel Removal—Remove steering wheel nut and install steering wheel puller KF-26 and remove wheel.

Henry J, 1951-54:

Horn Button & Horn Ring Removal—Carefully pry medallion out of horn ring or horn bezel Turn contact plate one-third of a turn and lift it out of spacer Disconnect horn cable assembly from inside engine compartment and pull it out through top end of steering column tube Remove steering wheel nut and remove ground cup Lift horn bezel or horn ring from steering wheel and remove rubber cushion ring

Steering Wheel Removal—Pull steering wheel off with Puller C-232

Hudson, 1946-47 All Models:

Horn Button Removal—Push down and rotate horn button to release it from retainer. Disconnect horn wire at lower end of column and pull wire up slightly, then push wire sleeve up into large opening of

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GEMMER WORM & ROLLER (Continued)

contact cap. Remove contact cup from retainer. Remove steering wheel nut to remove retainer.

Horn Ring Removal—Remove two screws from underside of wheel and one sheet metal screw from bezel. Remove bezel and take out wheel to horn wire strip. Remove horn ring spring retainer screw, lockwasher and silencer rubber. Remove ring ornament spring nuts, contact clip, contact strip and bakelite spacer. Remove ring spacer upper spacer screw. Remove ring spring retainer and lift out spring. Remove horn wire, upper terminal, insulator, rubber sleeve and lower terminal. Lower spring retainer is held by wheel nut.

Steering Wheel Removal—Remove wheel nut and install steering wheel puller Tool J-739 and adapter J-739-7, and remove wheel.

Steering Gear Installation—Spokes of wheel should be horizontal with front wheel pointing straight ahead. Notch in steering shaft will be pointing down.

Hudson, 1948-54 Except Jet Models:

Horn Button Removal—Push down on button and rotate to release from retainer. Pull wire up slightly and push wire sleeve into large opening of contactor. Lift out contact cup and remove horn wire.

Horn Ring Removal—Disconnect horn wire at horn relay. Pry ornament and ring assembly out of steering wheel spoke cover. Remove three screws attaching horn ring insulator to horn ring. Remove insulator ring, contact cup and wire.

Steering Wheel Removal—Place adapter Tool J-739-10 around jacket tube with small diameter of adapter under steering wheel hub. Position foot of puller J-739-B around outside diameter of adapter. With steering wheel nut partially threaded on the column tube, run puller screw down tight against the wheel nut to release steering wheel.

Steering Wheel Installation—Install wheel on shaft with two spokes horizontal and notch in steering shaft pointing straight down. On wheels with three spokes, third spoke should point down. Torque nut to 20-30 ft. lbs.

Hudson Jet, 1953-54:

Horn Button Removal—Disconnect horn wire at horn relay and push down on horn button, rotate to release and remove button. Remove horn wire assembly.

Steering Wheel Removal—Remove steering wheel nut and pull steering wheel, using Puller J-3044.

Steering Wheel Installation—Same as other Hudson models. See above.

Hudson, 1955 All Models: See Nash & Rambler, 1949-55.

Kaiser, 1947-48 All Models & 1949-50 Kaiser Special

Horn Ring Removal—Insert a screw driver between medallion and wheel hub and gradually work the medallion out. Disconnect horn wire at lower end of steering gear. Remove two screws attaching contact plate in steering wheel to horn ring. Remove horn ring by pulling it away from underside of wheel. Remove the three screws attaching contact plate to wheel and take out insulators and washers. Pull horn wire through steering column and remove rubber pad.

Steering Wheel Removal—Remove nut and install steering wheel puller (1947-48) C-232; (1949-50) KF-26, and remove wheel.

Steering Wheel Installation—Install wheel with wide flutes or flat spots in hub or shaft serrations matching. Push wheel down and install nut. Tighten to 10-15 ft. lbs.

Kaiser Deluxe 1949-50

Horn Ring Removal—Disconnect horn wire below steering gear. Remove screws from underside of spokes and lift off medallion and retainer. Remove steering wheel (see below) and disassemble horn from wheel by removing necessary screws.

Steering Wheel Removal—Remove steering wheel nut and install puller Tool KF-26, remove wheel.

Steering Wheel Installation—Install wheel with the wide flutes or flat spots in the serrations in wheel hub and steering shaft matching. Push wheel down and install nut. Tighten to 10-15 ft. lbs.

Kaiser, 1951-55 All Models:

Horn Ring Removal—Press down on medallion and turn counter-clockwise to loosen. Remove medallion and rubber pad from wheel. Disconnect horn button at bottom end of steering gear, then remove insulator sleeve fitted into top end of steering column. Remove steering wheel to shaft nut and take off the horn bezel, or horn ring. Remove rubber contact pad (and ground spring and plate on some cars). Remove screws from contact plate and separate parts from bezel or horn ring.

Steering Wheel Removal—Install steering gear puller KF-26 and remove wheel.

Steering Wheel Installation—Install wheel with flat spots in hub serrations matching with flat spot in shaft serrations. Push wheel down as far as it will go and install horn parts and shaft nut. Tighten nut to 10-15 ft. lbs.

Lincoln & Mercury, 1946-48 All Models: See 1946-48 Ford Passenger Car instructions.

Lincoln & Mercury, 1949-51 All Models

Horn Ring Removal—Remove cap and emblem assembly from retaining clips in steering wheel (Lincoln); remove two screws from underside of steering wheel (Mercury). Remove horn ring spring and take out contact plate and horn contact parts.

Steering Wheel Removal—Remove steering shaft nut and install Tool 3600-D. Remove wheel.

Lincoln, 1952-55:

Horn Ring Removal—Remove cap and emblem assembly by grasping with the hand and pulling outward from steering wheel hub. Remove three screws holding horn ring securing plate to steering wheel. Remove horn ring securing plate, gasket and spring.

Steering Wheel Removal—Remove steering shaft nut. Install Tool 3600-D and remove steering wheel.

Mercury, 1952-55:

Horn Ring Removal—Remove cap and emblem assembly from steering column head by rotating cap counterclockwise with palm of the hand. Remove three screws holding horn ring retainer plate to steering wheel. Remove horn ring, retaining plate and spring.

Installation Note—When installing horn ring spring, be sure that spring ends are properly seated in spring stops.

Steering Wheel Removal—See Lincoln, above.

Nash & Rambler, 1949-55 All Models:

Horn Ring Removal—Rotate steering wheel medallion counter-clockwise to remove. Remove horn contact plate and insulators. Remove wheel (see below). Remove horn ring after wheel removed.

Steering Wheel Removal—Remove steering wheel nut and install steering wheel puller Tool J-2982.

Packard, 1946-55 All Models:

Horn Ring Removal—Depress medallion slightly, rotate counter-clockwise until it pops up (do not pry up). Remove horn ring assembly and contact plates.

Steering Wheel Removal—Remove steering wheel nut and install steering wheel puller Tool J-2557 and remove wheel.

Plymouth, 1946-55:

Horn Button or Horn Ring Removal—On models with a horn button, remove screws from underside of wheel and remove horn button retainer. Lift out button, spring base assembly. Contact cup can be removed after steering wheel removed. On models with horn ring assembly, two types are used. With the "one-piece" type, depress the ornament carefully and rotate it counter-clockwise. Remove ornament, spring and rubber grommet. Remove the three retainer screws and lift off ring. With the "two-piece" type, the ornament is held with four clips in hub cover. Pry hub cover upwards and remove the three retainer screws. Remove horn ring retainer and horn ring.

Steering Wheel Removal—Remove nut and install puller C-612 and pull wheel from steering tube.

Willys, 1952-55 Passenger Cars:

Horn Ring Removal—Disconnect horn wire at connection just below steering gear housing. Remove steering wheel hub cover by turning counter-clockwise ⅛ turn and disengaging. Remove flat springs from slots in horn ring cup. Pull up horn wire sufficiently to remove contact button, sleeve, spring and cup.

STEERING GEAR REMOVAL & INSTALLATION

▷*INSTALLATION NOTE—Installation procedures are the reverse of those for removal.*

Chrysler & DeSoto, 1946-48: Removal—Remove steering wheel. Remove screws holding column to instrument panel and screws on steering column at gearshift bracket. Disconnect direction signal control wires at instrument panel (two of these wires pull out of connectors and third is unscrewed from flasher unit terminal). Remove cover plate from bottom of direction signal control housing. This allows control unit to be removed directly while pulling wires up through jacket tube. Remove screws from rubber draft pad. Remove nut from lower end of gearshift rod and pull out rod and shift lever. Remove brake cable clamp and selector lever from steering column. Disconnect steering pitman arm (Puller C-143). Remove cap bolts attaching steering gear housing to frame, and remove left engine splash pan. Steering gear assembly can then be removed by lowering housing out through opening between engine and frame.

Chrysler & DeSoto, 1949-50: Removal—See Removal for 1946-48 Models above and note the following: Remove steering gear away from starter to permit

CONTINUED ON NEXT PAGE

GEMMER WORM & ROLLER (Continued)

removal of pitman arm. Steering gear assembly is then removed from above through hole in toeboard.

Chrysler & DeSoto, 1951-54: Removal—Remove clutch, brake, and accelerator pads, then remove shroud from bottom of steering column jacket and hand brake. Fold carpet back out of way from pedals and steering column, remove steering column draft pads. Disconnect accelerator rod from bell crank just behind firewall in engine compartment. Remove screws from floor board, accelerator pedal and rod assembly. Remove hairpin clip, disengage rod from transmission cross-over lever, disconnect horn wire from its connector. Disconnect six turn signal wires by pulling three wires out of each connector plug. Disconnect transmission shaft rod from shaft lever control arm. Three bolts attach steering gear assembly to frame bracket. REMOVE ONLY TWO TOP BOLTS which can be reached from under hood. Remove drag link, starting motor, and steering arm (Tool C-143). Remove bolt that attaches master cylinder pushrod to brake pedal. Remove brake pedal bushing lock and slide pedal outward on shaft far enough to clear pedal return stop screw. Move pedal back toward rear of car, allowing sufficient clearance between clutch and brake pedal in order to install Steering Chuck Assembly. Reach through floor board opening (from front compartment), remove lower bolt that holds gear assembly to lower end of frame bracket. Remove steering column shroud to instrument panel screws, remove steering assembly.

Chrysler & DeSoto, 1955: Removal—*(NOTE*—It is not necessary to remove the complete steering column and mast assembly from the car for servicing gear chuck and worm shaft). Remove steering wheel (see above). Loosen jacket bracket bolts at instrument panel. Remove dust pad retaining screws. Raise front of car and remove steering gear (pitman) arm from gear shaft. Loosen jacket-to-gear chuck clamp bolt. Remove gear chuck-to-frame attaching bolts and work gear chuck and shaft assembly out of jacket. Remove assembly from lower side of car.

Dodge, 1946-54: Removal—Remove steering wheel, jack up front of car and remove left front wheel. Remove front seat cushions and floor mat after sliding draft pad up column, then remove floor pan pedal opening cover. Disconnect directional signal control wires (if so equipped) at connections under instrument panel. Remove transmission shifting mechanism at steering column, remove bolts holding steering gear to frame. Remove pitman arm with Tool C-143. Remove steering gear post bracket cap at instrument panel. Remove steering gear assembly from top side of car by lifting up as far as possible then withdrawing from right side of car. **Removal Note**—If car is equipped with direction signals, time will be saved if length of wire is attached to loose end of control wires before withdrawing through jacket tube. This will enable all wires to be drawn back through tube at reassembly.

Dodge, 1955: Removal—Proceed as for 1946-54 Models but remove steering gear assembly by withdrawing it from underside of car. *(NOTE*—If steering column is to be removed, it must be removed from top side of car).

Ford Passenger Cars, 1952-55 (Except Thunderbird): Removal—Remove steering wheel (see above), then disconnect the steering column from the instrument panel and gearshift lever from gearshift rods. Remove cap screw from bracket that secures gearshift tube to steering column tube, remove bracket. Remove gearshift tube pin and gearshift levers. Loosen steering column clamp, pull steering column tube assembly off shaft. Disconnect steering arm-to-idler arm rod. Remove steering arm, then three bolts that secure steering gear housing to frame side rail, remove steering gear. NOTE—It may be necessary to raise car to remove gear.

Ford Thunderbird (1955): Removal—Disconnect wires at bottom of steering gear housing. Loosen the lower steering column clamp and remove the two screws from upper steering column bracket. Remove horn ring from steering wheel, and remove upper steering column, upper steering shaft, and steering wheel as an assembly from the car. Raise front of car and remove steering sector shaft arm from sector shaft, then remove bolts holding steering gear housing on frame side member. Remove lower steering gear assembly from car.

Ford Trucks (1946-55): Removal—Remove steering wheel. Remove steering column and brake pedal plate, remove bolt that secures steering gear arm to steering gear sector shaft. Remove the three bolts that secure steering gear housing to frame. Remove the clamp holding steering gear column tube to instrument panel bracket. Remove steering gear from underneath truck. *NOTE*—On some models it may be necessary to raise front end of truck to remove steering gear, and it may also be necessary to remove oil filters or filter adapters.

Henry J, 1951-54: Removal—Disconnect shifting rods from lower shifting levers mounted on steering column jacket in engine compartment. Loosen clamp that holds gearshift lower lever housing and steering gear housing on steering gear housing. **Do not remove screws.** Remove steering wheel, pull back floor mat, remove floor plate and seals around foot pedals and steering column. Remove steering column support bracket clamp and attaching bolts at instrument panel, remove spring and bearing spacer from upper end of steering column jacket. Work lower end of steering column jacket loose from steering column by pulling upward, inside the body. Shift levers must be carefully worked through floor pan opening as jacket is pulled upward. Disconnect tie rod from pitman arm, remove pitman arm nut and lockwasher. With Puller KF-119 remove arm from shaft. Remove steering gear-to-frame mounting bolts and shims (if used). Remove filler plug, invert gear, allow lubricant to drain. Remove steering gear by moving it forward and upward to clear other units.

Hudson, 1946-47: Removal—Disconnect battery cable at negative battery post and remove cable clip bolt and nut on fender. Disconnect horn wire at lower end of steering column. Remove steering gear jacket tube, clamp bolt and nut. Disconnect handy shift control wire, control tube rod, and remove tube lower bracket clamp bolt. Disconnect drag link at pitman arm and remove pitman arm with Puller J-1374. Remove horn button and wire, and remove steering wheel. Remove jacket tube bracket cap and bolts. Remove shift control tube upper bracket clamp bolt and ring. Slide jacket tube off steering gear main column tube and out of jacket tube clamp and control tube lower bracket. Remove shift control tube by working the lower lever up through hole in toe board. Disconnect radiator sway rod at dash and push out of way. Disconnect hood hinge at hood on right side. Remove steering gear housing mounting studs and remove steering gear by raising lower end up over engine and out of right hand side. This can be done by turning lower end frequently to obtain clearance.

Hudson, 1948-54: Removal—Remove left front wheel and fender side dust shield, remove left frame-to-cowl brace, then remove steering wheel and horn wire. Next, remove steering gear jacket tube by removing bearing spring and spacer, remote control tube (upper), direction indicator switch assembly (if so equipped), steering column bracket cap at instrument panel, then loosening control tube bracket (lower) and jacket tube clamp at steering gear, remove jacket tube. Remove three bolts attaching steering gear to frame side rail, remove key and plug from drag link at pitman arm, disconnect drag link. Slide steering gear forward on frame and rotate to left until pitman arm is clear, remove steering gear through opening in left front fender.

Hudson Jet, 1953-54: Removal—Remove battery, steering wheel and horn wire. Remove steering gear jacket tube by removing bearing spring and spacer, directional indicator switch assembly, steering column bracket cap at instrument panel, then loosening remote control tube bracket (lower) and jacket tube clamp at steering gear, remove jacket tube. Remove three bolts attaching steering gear to frame and nut at rear end of drag link, press ball stud out of pitman arm, using Puller J-1374. Slide steering gear forward on frame, remove steering gear by pulling chuck upward through engine compartment.

Hudson (Wasp & Hornet), 1955—See Nash Ambassador & Statesman, 1955.

Kaiser, 1947-55; Frazer, 1947-51: Removal—Disconnect battery cables at battery, remove battery to provide clearance for steering gear removal. Disconnect two shifting rods at shifting levers mounted on steering column jacket in engine compartment. On Frazer, loosen the clamp which clamps split lower end of steering column jacket onto steering gear housing. Remove steering wheel, then column jacket cover on those vehicles in which cover removal is necessary for access to column support at instrument panel. Disconnect horn wire at connector, and directional signal switch wiring at instrument panel junction block. Remove front floor mat and floor plate and gasket around pedals and steering column at toeboard. Remove steering column support bracket, clamp and attaching bolts at instrument panel, then spring and bearing spacer from around steering column in upper end of jacket. Leave bearing in jacket. On Frazer, work lower end of steering column jacket loose from steering gear housing. Then pulling upward inside body, slip the jacket, with gear shifting mechanism still attached to it, from upper end of steering column. The shifting levers must be carefully manipulated through the opening in the toeboard as the jacket is pulled upward. Remove splash pan from be-

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GEMMER WORM & ROLLER (Continued)

neath pitman arm. On Kaiser, detach shift mechanism from jacket. Remove arm nut and lockwasher. Using puller KF-2 remove lever arm from steering gear shaft. Remove steering gear to frame attaching bolts and shims (if used). Remove filler plug, invert steering gear, drain lubricant. Then, while supporting steering gear assembly, move it forward in engine compartment, raising housing end to clear adjacent units and radiator shroud, and at same time pulling steering column out through opening in toe board. When worked clear lift steering gear out of engine compartment.

Lincoln & Mercury, 1949-53: Removal—Remove pitman arm using Tool 3590. Remove steering wheel, then necessary floor covering and steering column-to- dash cover plate. Disconnect steering column electrical connections at junction points. Remove cotter pins, release shift rod from steering column shift arm. Remove two bolts on clamp that secure steering column housing assembly to steering column bracket assembly (secured to brake pedal support bracket). Loosen clamp on lower steering column at steering gear housing, remove steering shaft nut, spring, and sleeve from upper steering column. Remove steering column tube from steering shaft. On Lincoln, raise car, remove oil filter assembly, screw that secures clips holding heater tube, spark plug cables, and oil sending wire to engine block. Remove steering gear housing-to-frame bolts, then assembly through engine compartment from under car.

Lincoln & Mercury (1954-55): Removal—On models with Power Brakes, remove clamps that secure reservoir hose to fitting on brake booster cylinder and to the dash panel. Move the hose away from the steering column opening in the dash panel. On Lincoln, remove front seat cushion from vehicle and cover seat back to protect upholstery. On Mercury, move front seat to extreme rear position and cover seat and seat back to protect upholstery. On all cars, remove steering wheel with Tool 3600-D. Disconnect steering column electrical connections. Remove accelerator pedal from accelerator push rod. Remove brake and clutch pedals. Pull floor covering away from dash panel opening. On Lincoln, disconnect speedometer drive cable from instrument panel and pull through lower floor pan opening cover. On all cars, remove insulator and floor pan opening cover plates. Remove two capscrews that secure steering column bracket to instrument panel and pedal support bracket. Remove cotter pin(s) and release shift rod(s) from steering column shift arm(s). Loosen clamp on lower steering column at steering gear housing. Raise column sufficiently to disconnect wires at neutral switch on Automatic Transmission equipped models only. Remove steering column tube from steering shaft through inside of vehicle. Raise front of car and remove nut securing pitman arm to steering sector shaft. Remove steering gear arm (pitman) from sector shaft, using Tool 3590. Loosen three bolts that secure steering gear assembly to frame side rail. *(CAUTION—Remove shims, if any, located between mounting bolts and frame side rail. Mark bolt holes and number of shims required, to facilitate assembly. Mark shims for identification with bolt holes).* With helper in passenger compartment and another under vehicle, remove the three bolts that secure steering gear assembly to frame side rail, and remove unit through passenger compartment. CAUTION—Mask lower portion of instrument panel for protective purposes when removing unit.

Nash (Ambassador & Statesman) 1949-51: Removal—Remove steering wheel using puller J-2982. Remove shift rods from shift levers, and remove left heat deflector and control knob bracket. Disconnect steering jacket tube bracket at instrument panel, and loosen clamp bolt at lower end of jacket tube. With jacket tube loosened, turn it approximately 90° to the right to prevent contact with instrument panel while withdrawing the gear. Disconnect pitman arm from steering gear cross shaft, and tie rod on left side. With front of car in raised position, disconnect steering gear housing from body side sill and remove steering gear assembly from below.

Nash (Ambassador & Statesman) 1952-54: Removal—With standard gear puller, remove pitman arm from cross shaft. Disconnect gear shift rods from operating levers and steering gear housing from body side sill. Remove horn ring and horn blowing parts as an assembly, pull steering wheel. Disconnect all wires under dash attached to jacket tube (tag wires for reassembly). Slide rubber grommet up on jacket tube, fold floor mat toward center of floor, slide rubber insulator up to rubber grommet. Remove screws from clutch and brake pedal opening cover, slide cover up on pedal shafts. Loosen cap screws attaching pedal shafts to levers, remove pedal shafts and opening cover. Disconnect jacket tube from instrument panel. Loosen clamp bolt at end of jacket tube, slide steering gear from jacket tube.

Nash (Rambler) 1950-54: Removal—Remove horn ring and horn blowing parts as an assembly, pull steering wheel. Disconnect pitman arm from cross shaft and tie rod from left steering arm. Drain cooling system, remove radiator to water pump tube. Loosen clamp on lower end of steering jacket tube, remove steering gear mounting bolts from body side sill. Remove gear from under car over lower control arm.

Nash (Ambassador & Statesman) 1955: Removal—Disconnect shift rods at shift levers and pitman arm from shaft. Remove mounting bolts at steering gear housing and disconnect at the instrument panel bracket. Remove steering wheel. Disconnect all wires under dash that are connected to jacket tube. Remove complete assembly through access opening in toeboard.

Rambler (1955): Steering gear is removed from bottom of car without removing jacket tube. Remove steering wheel and drain cooling system. Remove radiator to water pump coolant line.

Packard, 1948-55: Removal—Disconnect horn button cable at bottom of steering gear case. Remove horn button and horn blowing ring. Disconnect directional switch cable connector and windshield wiper cable control at wiper motor. Remove steering wheel. Remove gear shift lever by disconnecting at its pivot pin. Remove clutch and brake pedal pads. Raise steering column grommets and left front corner of floor mat. Remove clutch and brake pedal cover plate. Disconnect low and reverse, second and direct shifting rods from levers at lower end of gear shaft. Remove gearshift to frame attaching bolts, then remove steering column-to-instrument panel bracket cap. Lift steering column and shroud assembly up through opening in floor board. Remove steering gear-to-frame attaching screws, remove steering gear from under bonnet.

Plymouth 1946-55: Removal—Remove steering wheel. Loosen toe board assembly, then remove lower half of instrument panel bracket, loosen steering column jacket clamp. Disconnect pitman arm, remove housing bolts at frame. Hold steering column jacket, slide gear assembly out from below, leaving jacket and gear shift controls inside car.

Willys (Pass. Cars) 1952-55 : Removal—Remove steering wheel lower housing, remote control shift lever and steering column trim cover. If equipped with directional signals, unscrew signal lever from switch, remove two switch mounting screws, disconnect wires and remove switch. Remove instrument panel to steering column bracket. Pull floor mat forward, remove toe board cover plate and heater grille and heater (if so equipped). Raise front end of vehicle 18", detach two remote control rods from clutch levers by removing cotter pins and washers from control rod trunnions. Remove nut from pitman arm, remove arm from shaft. Remove three mounting bolts from steering gear housing, remove steering gear and column from beneath car.

STEERING GEAR OVERHAUL

OVERHAUL (STEERING GEAR ASSEMBLY): Clean the outside surfaces of steering gear assembly thoroughly. Then mount assembly in vise, clamping the housing so both shaft and roller cover and the housing end cover are accessible.

Disassembly (Shaft and Roller Assembly): Remove shaft and roller adjusting screw, locknut and lockplate, then remove bolts attaching shaft and roller cover plate to housing. Turn adjusting screw clockwise to raise cover away from housing to allow adjusting screw to slide out of slotted end of shaft and roller assembly. Remove cover screw and gasket and disassemble adjusting screw and thrust washer from cover. Push upward on lower end of roller shaft and lift shaft and roller assembly from housing. *CAUTION—Do not try to disassemble roller from shaft as these parts are replaceable only as an assembly.*

Housing Cover Plate and Shims—Remove housing cover attaching bolts and take off cover, and shims used to adjust worm bearing *(Check total thickness of shims with a micrometer so it will be possible to use same thickness when assembling steering gear).*

Worm and Bearings—Remove lower worm bearing cup, lower bearing, and the worm and steering column assembly, and upper bearing. (The lower bearing cup can be loosened by tapping lightly on end of steering shaft with hammer). Remove upper bearing cup from housing by carefully driving it out with a brass drift. Remove roller shaft oil seal only if it needs replacement or if the roller shaft bushings are to be replaced.

Cleaning and Inspection—Clean all lubricant from parts and housing, using a stiff brush to clean bearings and worm and roller teeth. Check all parts for wear, pitting, chipping or scoring. Replace parts as necessary. Check fit of roller shaft in housing bushings. The shaft must not be loose, but it must not bind in bushings. Check shaft for roughness or wear. (See Bushing replacement below). Check con-

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GEMMER WORM & ROLLER (Continued)

dition of shaft and roller adjusting screw thread With the adjusting screw and thrust washer inserted in slotted end of roller shaft, clearance between head of screw and bottom of slot should not exceed 002" Replace adjusting screw and or thrust washer to obtain right clearance Roller on shaft must rotate freely If rotation is rough, if roller is loose or if there is endplay, shaft and roller assembly must be replaced Be sure there is no indication of twisting or distortion of roller shaft Steering column (shaft) run-out at upper end should not be greater than 250"

Bushing Removal and Replacement—Press old bushings from housing and install new bushings, pressing them into the same position as old bushings Line ream bushings after installation to 1 125-1 1255" Check roller shaft in bushings to make sure it is free Install a new roller shaft oil seal with correct side toward outside of housing

Reassembly (Worm and Bearings): Install upper worm bearing cup, driving it carefully into counterbore in housing, wide face of cup toward bottom of counterbore Do not cock in counterbore and make sure it is seated fully Apply steering gear lubricant to worm bearings, bearing cups and on the worm threads before installing in housing Fit upper worm bearing into place over end of steering column shaft and onto bearing surface at end of worm Install worm and shaft into housing so that bearing fits into bearing cup Fit lower bearing onto bearing surface on ower end of worm and install the lower bearing cup in housing, with tapered part of cup toward worm bearing

Housing Cover Plate and Shims—Select shims totalling same thickness as previously used, or use old shims if in good condition (Shims 002" 005" 010" are available as service parts) Install shims and cover on housing and tighten bolts to 10-15 ft lbs torque Steering column shaft should rotate freely and smoothly without binding and without endplay (See Adjustment below)

Shaft and Roller Assembly—Lubricate roller, roller shaft, and bushings with steering gear lubricant Then install assembly in steering gear housing being careful not to damage oil seal when passing shaft through seal Turn steering column shaft to mesh teeth of roller at center of worm Assemble thrust washer on roller shaft adjusting screw and turn screw into roller shaft cover Install this assembly and cover gasket on steering gear housing, fit head of adjusting screw and thrust washer into slot in roller shaft Turn screw counter-clockwise to seat cover against housing Install cover bolts and tighten securely

STEERING LINKAGE · *See "Steering Linkage."*

GEMMER WORM & ROLLER TYPES 330, 370

Car Model	Gemmer Model
Ford, All Bus Models (1941-48)	370
Lincoln, All Models (1941-48)	330

DESCRIPTION:—Consists of 'hour glass' type worm mounted on steering shaft and carried on roller bearings at top and bottom.

Model 370—Roller cross-shaft on this model is straddle mounted with additional bearing in side cover. Serviced in same manner as other types.

Lincoln Model 330—Steering gear has a straddle mounted roller shaft with additional shaft bushing mounted in side cover on housing. Adjusted in same manner as other models.

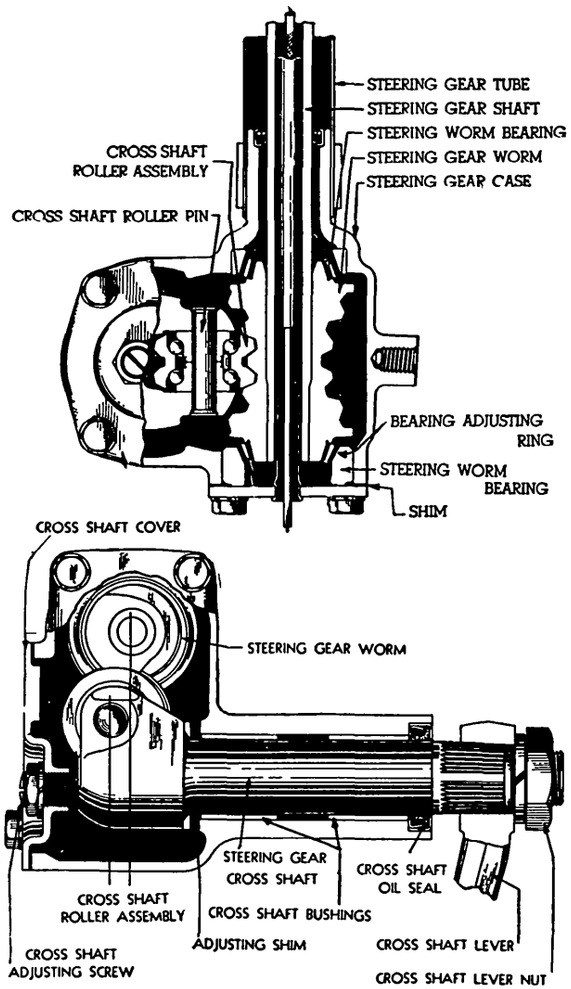
ADJUSTMENT:—Before making adjustments jack up front wheels and disconnect drag link to free steering gear (front wheels should turn freely with not more than 10 lbs. pull on drag link in either direction).

Worm Bearing Endplay:—Evidenced as up-and-down play of steering wheel. Check by turning wheel one turn to right from center 'straight ahead position', secure wheel, shake front wheels, note endplay. To adjust all models with shims under lower cover (see Note below for spring-loaded type), loosen four screws on lower cover, separate top shim, clip shim and remove using care not to damage other shims. Tighten cover screws and check adjustment. Wheel should turn freely without any stiffness or appreciable endplay

Spring Loaded Type—On this type gear, a spring washer is located under the lower worm bearing cup so as to control worm shaft endplay. Requires no adjustment. If this type gear develops endplay, remove lower cover and examine spring washer, replace if broken.

Roller Shaft (Cross-Shaft) Endplay:—Turn steering wheel to extreme end position and then back ⅛ turn. Check cross-shaft endplay at steering arm hub. To adjust, loosen locknut, turn up adjusting screw in inner cover until shaft turns freely with no endplay, tighten locknut.

Roller Mesh in Worm:—Turn steering wheel to center 'straight ahead position,' shake steering arm to determine play or backlash. If this exceeds 1/32", steering gear must be removed from car and roller shaft position adjusted. With gear out of car and held in vise, take off steering arm nut, remove steering arm, take off side cover, remove roller and cross-shaft. See that all shims on shaft behind roller are removed from housing. Remove steering jacket, replace wheel on steering shaft, check worm shaft bearing adjustment. Remove one shim, reinstall roller shaft, assembling roller shaft thrust washer with chamfered side next to roller shaft



thrust face. Check by turning steering wheel nearly to extreme left position, hold roller shaft in against worm, turn wheel to center position, check play at splined end of roller shaft. If play apparent, remove additional shim and repeat test. Replace housing cover, reassemble steering arm (drive arm in roller shaft), adjust roller shaft endplay (see above). If adjustments have been made correctly, play at ball end of steering arm should be .006" and wheel should turn throughout range without heavy drag.

CAUTION—Make certain that thick thrust washer (between adjusting shims and shoulder on roller shaft) is installed with bevel face or chamfer toward roller (away from splined end of shaft).

1949-51 FORD PASS. CAR WORM & ROLLER

Ford 6 Cyl. & V8 Pass. Car Models (1949-51)

▷STEERING LINKAGE PRODUCTION CHANGE (New Idler Arm Bracket & Pitman Arm) On Cars *After March 1, 1949: See Ford Passenger Car Front Suspension data for identification of these parts and NEW Front Suspension Settings required when they are used.*

▷*CAUTION—These new parts must be used together.*

▷STEERING IDLER ARM LOOSENESS COMPLAINTS: May be caused by incorrect adjustment. *See Idler Arm Adjustment under Steering Linkage.*

DESCRIPTION: Worm-and-roller type with worm gear on steering column shaft meshing with double-tooth roller on cross-shaft (sector shaft) on which the pitman arm is mounted.

ADJUSTMENT: Adjust exactly as follows:

Worm Shaft Endplay (Bearing Pre-load): Before checking, disconnect steering linkage at pitman arm and back off cross-shaft (sector shaft) adjustment (see below) so that the true bearing pre-load can be measured. Attach spring scale to wheel spoke at steering wheel rim, check turning pull.

Bearing Pre-load—½-1¼ lbs. turning pull.

Adjustment—Loosen steering column jacket clamp at bottom of instrument panel. Remove capscrews in top cover on steering column housing. Work cap and column jacket upward sufficiently to provide access to adjusting shims located between cap and housing, carefully separate first shim from remainder of shim pack, clip and remove shim (see Shim Note below). Work cap down on housing, re-install capscrews, recheck bearing pre-load. Repeat adjustment until correct bearing pre-load secured.

▷*CAUTION—Do not exceed bearing pre-load specifications and see that wheel turns freely throughout travel without binding or stiffness.*

▷Adjusting Shim Note—These shims furnished in four thicknesses as follows: Part B-3593A (.002"), B-3593B (.005"), B-3593C (.010"), B-3593D (.020").

Worm-and-Roller Mesh (Backlash): Check with steering wheel turned to center "straight-ahead" position (mid-point of travel at which backlash is at a minimum). Attach spring scale to wheel spoke at wheel rim, check pull required to turn wheel.

Backlash Setting—1¾-2 lbs. measured as above (this figure includes worm bearing pre-load of ½-1¼ lbs. adjusted previously).

Adjustment—Loosen sector shaft housing (bottom cover) capscrews (NOTE—not necessary to remove screws—screw holes slotted to permit this adjustment). Rotate housing in a clockwise or right hand direction until all backlash is just removed, tighten cover screws, recheck backlash setting (above). Repeat adjustment, as required, until correct backlash setting is secured. Make certain that square washer (adjusting slot cover plate) and lockwasher in place on cover screws and screws securely tightened.

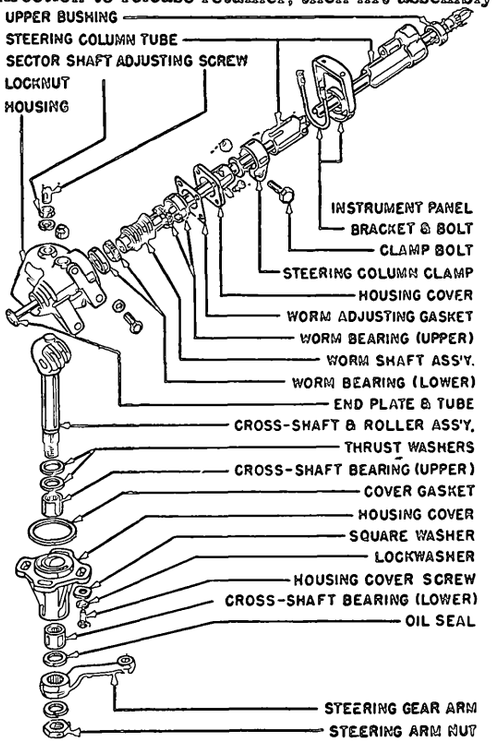
▷*CAUTION—See that wheel turns freely through entire travel without binding or stiffness.*

Cross-shaft (Sector Shaft) Endplay: Loosen locknut on sector shaft adjusting screw (on top of housing), turn screw in (clockwise) until all endplay in shaft has been taken up without causing any binding as shaft is rotated, tighten locknut.

STEERING WHEEL REMOVAL: Remove horn button and ring assembly (see below), remove nut on steering column shaft, pull wheel.

Installation—Shaft and wheel hub have "master spline" so that wheel can only be installed in correct position. Pitman arm and steering gear cross-shaft have similar master spline to insure correct positioning of arm.

Horn Button & Ring Assembly Removal: Press down evenly on horn button and turn assembly in either direction to release retainer, then lift assembly out.



1949-51 FORD PASS. CAR STEERING GEARS

STEERING GEAR REMOVAL: Remove steering wheel and then remove steering column from instrument panel. Disconnect the lower gearshift levers from gearshift rod adjustment nuts. Remove cap screw from bracket that secures gearshift tube to steering column tube and remove bracket. Remove gearshift tube pin and gearshift levers. Loosen steering column clamp and pull steering column tube assembly off steering gear shaft. Remove steering gear pitman arm using Tool 3590-N. Remove three bolts securing steering gear housing to frame side rail. Remove steering gear from underside of car. *NOTE*—It may be necessary to raise car to remove gear.

STEERING GEAR OVERHAUL: Drain lubricant from housing and remove all dirt from outside of housing before starting disassembly.

Disassembly: Scribe an alignment mark on steering gear and sector housing to insure correct reassembly. Remove sector shaft housing screws, then remove sector shaft and housing. Remove two spacers from sector shaft and gasket from housing. Remove steering gear housing capscrews and slide cap off steering gear shaft. Pull steering gear shaft and gear assembly out of housing. Slide the steering gear upper cap gaskets (shim pack), bearing cup, and worm upper bearing off shaft. Tie gaskets together for use when assembling gear. Lift lower worm bearing and cup from housing. Press the sector shaft needle bearings, spacer and oil seal out.

Inspection: Clean all parts thoroughly, then inspect the worm and roller for scores, cracks, or for signs of chipping. Inspect steering shaft bearing cups and bearings for wear, cracks or damage.

Reassembly: Press bearings into sector shaft housing, one from each end, and install oil seal. Install the upper worm bearing, bearing cup and steering gear housing upper cap gaskets on worm and shaft assembly. Slide steering gear housing upper cap on steering shaft. Install lower worm bearing cup in steering gear housing, then position gear shaft and worm assembly in steering gear housing and install capscrews. Place the two thrust washers on sector shaft and worm assembly, then slide the shaft and worm assembly into steering sector shaft housing cover. Position steering sector shaft housing gasket on steering gear housing, then install the steering sector shaft housing cover on the steering gear housing with the marks in alignment.

STEERING GEAR INSTALLATION: From underneath car, position steering gear assembly on frame, and install but do not tighten mounting bolts and nuts. Install steering column tube assembly on steering shaft and secure steering column tube bracket to instrument panel. Tighten the steering column clamp, and then tighten the steering gear housing to frame bolts to 30-36 ft. lbs. torque. Install pin and lower gearshift levers. Place the gearshift tube bracket in position and secure tube in place with capscrew. Connect gear shift levers to the rod adjusting nut, install steering wheel. Position steering gear arm (pitman arm) on the sector shaft. (*CAUTION*—The arm should be installed pointing straight back when the wheel spokes are in a horizontal position and the worm is at mid point of travel). Install the lockwasher and nut, tighten to 110-130 ft. lbs. torque.

STEERING LINKAGE: Consists of an intermediate rod linked between the steering gear pitman arm and an idler arm pivoted on a bracket on the right side of the frame with individual tie rods.

After March 1, 1949: See Ford Passenger Car Front Suspension data for identification of these parts and NEW Front Suspension Settings required

Steering Linkage Adjustment: If linkage disconnected or out of adjustment, set linkage up as follows to insure correct steering wheel position: With linkage connected, and idler arm correctly adjusted (see below), turn steering wheel to center mid-point of travel (turn wheel from one end position to the other, counting the turns, then turn wheel back from end position one-half this number of turns) with spokes horizontal. Loosen clamp bolts on each tie rod and turn each tie rod adjuster, as necessary, so that both front wheels are in "straight-ahead" position. Then adjust toe-in or toe-out by turning each tie rod adjuster equally.

Steering Idler Arm Adjustment: Check idler arm for excessive looseness and adjust as follows: Remove bolts mounting idler arm bracket on frame. Tighten idler arm bushing in bracket to 85-100 ft. lbs. Turn idler arm bracket and bushing assembly down on arm until it is tight (this is left hand thread), then back arm and bushing off approximately 1 turn, re-install bracket mounting bolts.

ROSS CAM & TWIN LEVER

Studebaker, All Models (1946-55)①
Willys, Pass. Cars (1952-55)②
Willys, Utility (1946-55)

①—Saginaw Worm and Roller also used.
②—Gemmer Worm and Roller also used.

DESCRIPTION:—Consists of a worm-shaped cam mounted on the steering column shaft engaging two tapered studs mounted on the inner end of the cross-shaft lever. Cross-shaft is mounted on plain bushings and is adjustable for end-play. Cam is mounted on ball thrust bearings at upper and lower ends and bearing clearance or endplay is adjustable. Stud track in cam is grooved deeper at ends to provide minimum clearance at each stud in 'straight ahead' position. All adjustments must be made with wheel in straight ahead position.

ADJUSTMENT

ADJUSTMENT:—Before making adjustments, free steering gear from load by jacking up front wheels or disconnecting drag link. Check the gear alignment. If stiffness evident with instrument panel bracket clamp tight, align steering gear as follows: Loosen steering gear frame bracket bolts to allow gear to shift on frame, retighten frame bolts. Loosen instrument panel bracket bolts to allow bracket to shift into alignment with steering column, tighten bracket bolts (if bracket position not adjustable, shim or otherwise change bracket position so that column not sprung when bracket bolts tightened).

Cam Endplay Adjustment—Check up-and-down movement of steering wheel and shaft in steering column jacket. If adjustment required, first loosen locknut and back off adjusting screw on housing side cover to relieve bearings of side thrust. Then remove four retaining screws in top cover on upper end of steering gear housing, move cover up on column jacket as far as possible (about ¼"), clip and remove a thin shim in shim pack under cover (shims are installed between paper gaskets and are .003", .010", .030" or .002", .003", .010" thick), using extreme care not damage remaining shims and paper gaskets. Re-install cover, tighten cover screws, check adjustment. Wheel should turn with barely perceptible drag (4-7 ozs. pull on steering wheel rim) and should have no up-and-down movement. Then adjust Cam and Lever Backlash.

Cam and Lever Backlash—Check end-play or lost-motion of lever shaft at pitman arm with steering gear turned to center position with lever studs on high points of cam. If play evident, adjust by loosening locknut on steering gear housing side cover and turning adjusting screw in until play just taken up and steering wheel turns freely throughout entire range with drag at center high point 16-24 ozs. at steering wheel rim. Hold adjusting screw and tighten locknut.

►*CAUTION*—This adjustment must be made only with lever studs on high points of cam (straight ahead position). If adjusted in any other position, gear will bind at this center point.

STEERING WHEEL POSITION: Check steering wheel for correct installation as follows:

Studebaker Models—Steering wheel center spoke (3 spoke types) should point straight down, or spokes should be horizontal (2 spoke type) with steering gear in straight-ahead position and lever studs on high points of cam. To check, count number of turns of the wheel from one extreme end position to the other, then turn wheel back exactly one-half this number of turns. If steering wheel spoke position not correct, remove wheel and re-install on shaft in correct position. See Linkage data under "Steering Linkage."

Willys Models—With steering gear in mid-position and wheels in straight-ahead position (steering arm installed on lever shaft), install steering wheel with spokes positioned parallel with vehicle floor.

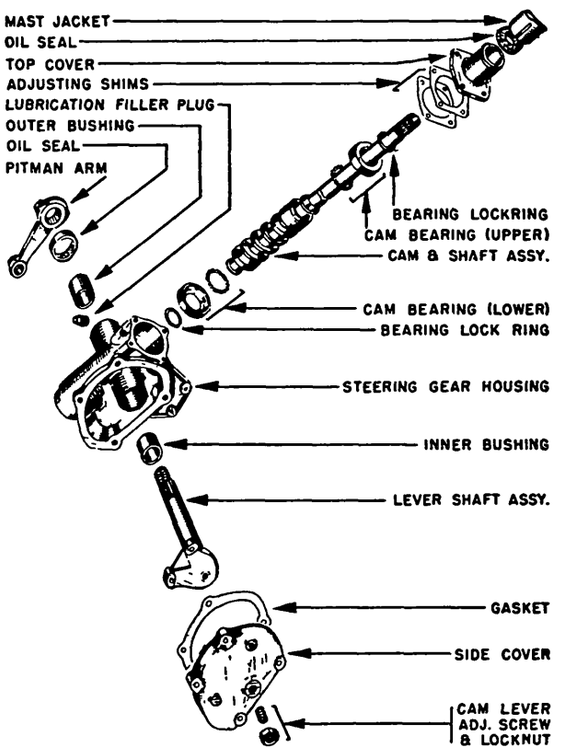
STEERING WHEEL & HORN RING OR BUTTON REMOVAL

Studebaker (All Models):

1946-49 All Models—(See Note Below for Deluxe Steering Wheel). Remove horn button or ring by holding steering wheel stationary and turning button or ring 1/3 of a turn. Remove wheel retaining nut and install steering wheel puller Tool J-1594, remove wheel.

Installation—Rotate steering shaft through the entire travel and count number of revolutions. Then rotate shaft in opposite direction 1/2 the total amount of travel. Replace steering wheel with two spokes horizontal and install wheel.

►**Deluxe Steering Wheel Note**—To remove horn ring, pry horn button out of wheel and remove the three screws in horn ring, remove ring, sponge rubber pad and three insulators. Install by reversing removal procedure.



ROSS CAM & TWIN LEVER STEERING EAR

1950-51 All Models—Remove horn button or horn ring (See instructions above, horn button removal is the same). Then proceed as follows:

1950-51 All Models (Except 1950 Champ. & 1951 Champ. Custom)—Remove horn ring or bar and the rubber shock pad. Remove steering wheel retaining nut. Install the two halves of adapter plate J-4146-9 at base of steering wheel. Place adapter in the end of steering shaft, being sure horn wire is in slot provided in adapter. Install puller cross-bar and screw and remove steering wheel.

1950 Champion & 1951 Champion Custom—Install steering wheel puller J-1594 below wheel hub. Remove steering wheel retaining nut and install puller HM-925 and remove wheel.

Installation 1950-51 All Models—Align mark on top of steering wheel hub and mark on end of steering shaft and install wheel. Install retaining nut and tighten to 23-27 ft. lbs.

1952-55 Champion (Custom & Deluxe): Removal Remove horn button or ring by holding steering wheel stationary and turning button or ring one-third turn. Remove steering wheel nut, install puller J-5473, remove steering wheel.

1953-55 Champion & Commander (Regal), All President Models: Removal—Pry horn button out of wheel, remove three screws in horn ring, remove ring and sponge rubber pad. Remove steering wheel nut and lock plate. Install adapter in end of steering post, install puller J-5473, remove steering wheel.

Installation (All 1953-55 Models)—Align marks on top of steering wheel hub and mark on end of steering shaft, install wheel. Tighten retaining nut to 23-27 ft. lbs. torque. To install horn ring or button, reverse removal procedure.

Willys (1947-55): Removal—Disconnect horn wire at slip connection just below steering gear housing. Remove steering wheel hub cover by turning counter-clockwise ⅛ turn and disengaging. Remove flat spring from slots in horn ring cup. Pull up horn wire sufficiently to remove contact button, sleeve, spring and cup. Remove steering wheel nut, install puller W-227, remove steering wheel.

STEERING GEAR REMOVAL & INSTALLATION

Studebaker (1950-54): 1. Remove the horn button and the steering wheel, remove front seat cushion. Disconnect and remove battery. If equipped with Automatic Drive, disconnect quadrant light and starter cut-out switch cable. Disconnect shift lever rod or rods, loosen jacket clamp bolt. Remove jacket bracket retaining bolts from instrument panel, loosen jacket bracket clamp screw, turn bracket to avoid hitting instrument panel when removing jacket. Slip jacket off steering post as an assembly into inside of car. Disconnect reach rod from pitman arm, remove steering gear housing-to-frame bolts. Tip upper end of steering post down, remove steering gear assembly from engine side of cowl. Wrap cloth around top of housing top cover to prevent spilling of lubricant, then lift housing end of assembly up and remove it from chassis.

2. Before installing the jacket and gearshift shaft assembly, install housing-to-frame bolts but do not tighten until jacket and jacket-to-instrument panel bracket bolts have been installed.

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ROSS CAM & TWIN LEVER (Continued)

3. Position jacket and gear shift shaft assembly so shift rods are aligned with hole of shift lever. Install gear shift control box clamp and key on the Commander. On Champion tighten steering post jacket clamp. Remove aligning gauge and install plug in cover.
4. Check alignment of housing mounting face flange with frame side rail. Insert spacing washers as necessary to secure proper alignment.

Studebaker (1955): Disconnect battery and disconnect horn switch wire at connector. On Commander & President models, also disconnect battery cable at starter switch. On Commander and President Convertible (Hardtop) and Coupe models, remove battery and battery box. Remove steering wheel and steering post jacket assembly (*NOTE*—Steering gear housing, steering post jacket, and steering wheel can be removed as an assembly. However, on Commander & President Convertible (Hardtop) and Coupe models, it will be necessary to remove left front engine support cushion and raise left front corner of engine approximately 2"). Remove pitman arm using puller J-5664, then remove steering gear housing-to-frame bolts and remove steering gear through hole in dash and into car. Wrap a cloth around steering gear housing top cover to prevent spilling lubricant during removal. To install, reverse removal procedure. Before installing jacket and gearshift shaft assembly, install housing-to-frame bolts but do not tighten until jacket and jacket-to-instrument panel bracket bolts have been installed. Check alignment of housing mounting flange face with frame side rail, inserting washers as necessary to secure proper alignment and high spot adjustment.

Willys Utility Models (1946-55): It is necessary on these models to pass the steering gear down through floor pan (on all Jeeps, remove left front fender). Disconnect remote control rods from transmission control levers on models with remote control. Remove horn button and steering wheel and remove steering post bracket at instrument panel. Remove gear shift levers on cars with remote control. Remove exhaust pipe from manifold. Remove steering column cover plate on toe board, and take out the two screws attaching remote control housing to steering column. Remove horn wire contact brush CJ-2A Jeep) or disconnect horn wire. Remove the remote control assembly through floor pan (CJ-2A). Remove steering connecting rod from steering gear ball arm and take out steering gear housing-to-frame bolts. Remove steering gear assembly by bringing it down through floor pan and over the outside of the frame side rail.

Willys Pass. Cars (1952-55): Remove the steering wheel lower housing, remote control shift lever and steering column trim cover. If equipped with directional signals, unscrew signal lever from switch, remove two switch mounting screws, disconnect wires and remove switch. Remove instrument panel to steering column bracket. Pull floor mat forward, remove toe board cover plate and heater grille and heater (if so equipped). Raise front end of vehicle 18", detach two remote control rods from clutch levers by removing cotter pins and washers from control rod trunnions. Remove nut from pitman arm, remove arm from shaft. Remove three mounting bolts from steering gear housing, remove steering gear from beneath car.

OVERHAUL (STEERING GEAR ASSEMBLY): Disassembly—Loosen cam lever adjusting screw locknut, back off adjusting screw two turns. Remove side cover screws and washers, remove side cover, drain lubricant from housing. Remove pitman arm, then cam lever shaft from housing. Remove upper plate cover screws, then remove cover, lower oil seal, and adjusting shims. Withdraw post and cam assembly from housing. Remove ring from lower end of cam to permit removal of lower cup and ball bearings. Remove upper bearing cup ring, bearing cup, and ball bearings. Remove oil seal and gasket from cam lever shaft bore and, using a suitable arbor, press inner and outer bushings out.

Reassembly: With suitable arbor, press bushings into place in cam lever shaft bore of housing. Bushings should be line-reamed to fit cam lever shaft. Assemble cam bearings, cup, and rings on cam and post assembly, install assembly in housing. Assemble top cover and shims on housing, check bearing adjustment, remove or add shims as required. Install cam lever shaft, housing cover gasket, and cover, tighten cover screws securely. Install lever shaft gasket and oil seal, install pitman arm.

STEERING LINKAGE: *See "Steering Linkage."*

ROSS CAM-AND-LEVER

Crosley, All Models (1946-52).
Metropolitan, Hudson & Nash Models (1954-55).

DESCRIPTION: Consists of a worm-like cam mounted on steering wheel shaft engaging a tapered stud mounted on inner end of cross-shaft lever.

ADJUSTMENT: Free steering gear from load by disconnecting drag link or jacking up front end of car. Loosen instrument board bracket clamp, loosen jacket tube clamp screw (if no clamp screw used, jacket tube is press-fit in adjusting plug and will turn with plug). Make adjustments in order:

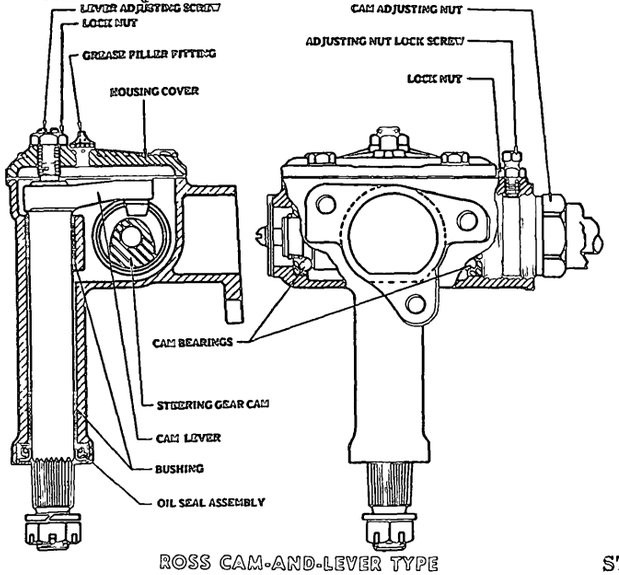
Cam Endplay (Shim Type):—Unscrew four clamp screws in upper cover, move cover up as far as possible (about ¼"). Separate top (.003") shim from remainder, clip and remove. Replace upper cover screws and tighten securely. Check adjustment. Wheel should turn freely (with light grip on rim) without any up-and-down movement with barely perceptible drag at mid-point.

Lever Shaft Endplay (Steering Wheel Backlash):—Turn wheel to straight ahead position so that stud at high point of cam. Never adjust with stud at other points. This will cause binding at center position. Loosen locknut on side cover adjusting screw (on inner cover plate), turn screw up until slight drag felt at center position when wheel turned from one extreme to other, tighten locknut. Drag must be slight and perceptible only in midposition.

STEERING WHEEL POSITION:

Metropolitan, Nash & Hudson Models—Steering wheel spokes should have equal angles to the horizontal with wheels in straight-ahead position and lever stud on high point of cam. If steering wheel not correct, remove and install without disturbing position of front wheels and lever stud.

STEERING WHEEL & HORN BUTTON REMOVAL: Metropolitan, Hudson & Nash Models: Loosen three set screws in the steering wheel hub and remove direction switch and horn button assembly from steering wheel. (NOTE—When removing steering wheel use puller J-1270-N.



ROSS CAM-AND-LEVER TYPE

STEERING GEAR REMOVAL & INSTALLATION: Metropolitan, Nash & Hudson Models: Remove radiator, air cleaner, intake manifold drain line, and top brace for carburetor air cleaner. Disconnect and mark direction signal switch and horn wires at plug-in type connectors in engine compartment. Disconnect shift rods from gear shift operating levers. Remove steering gear support bracket from inner wheelhouse panel, and from steering gear. Remove nut, ball, and gear shift knob from gear shift lever, then remove gear shift lever, shift shaft, operating levers and bracket as an assembly. Remove direction signal switch and horn button assembly and steering wheel (see above). Remove steering jacket tube upper support cushion and retainer attaching screws. Disconnect left hand instrument panel-to-dash brace at panel, and remove lower left instrument panel attaching screw. Remove pitman arm nut with remover J-5566. (*NOTE*—It is not necessary to remove steering linkage from arm.) Remove steering gear attaching bolts. Move steering gear housing toward center of car and pull it as far forward as possible. Pull instrument panel away from dash until upper end of steering worm tube and jacket tube clear hole in panel. Remove gear shift lever mounting bracket, rubber cushion, cushion retainer, and jacket tube rubber grommet from steering jacket tube. Move steering gear forward, guiding it around engine manifolds and fuel pump, until gear housing contacts grille. Lower upper end of jacket tube and slip it under steering linkage across tube and floor panel. Move steering gear out to rear

STEERING LINKAGE: *See "Steering Linkage."*

SAGINAW WORM & ROLLER

Oldsmobile 6 & 8, All Models (1946-49)
Oldsmobile 6 (1950)
Oldsmobile 8, Except Series 98 (1950-51)
Pontiac 6 & 8, All Models (1946-54)

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 PONTIAC PITMAN ARM IDENTIFICATION NOTE*—Power Steering and Standard Steering Pitman Arms are not interchangeable (Power Steering Arms ⅜" longer). Power Steering Arms have No. 5665954, Standard have 5663355 (forged on underside of rear of arm).

►*1953 PONTIAC HORN BLOWING ON ROUGH ROAD & STICKING HORN BUTTON CORRECTION*—Caused by horn button contact grounding on flat washer under steering wheel nut. Replace washer with new flat washer No. 5665807 (1/64" smaller diameter).

►**1946-48 Pontiac Deluxe—Installation of Ground Plate to correct complaints of Horn not operating or "shocks" when horn button depressed. Caused by misalignment of metal cup insert in hub so that no contact secured with coiled ground spring. Correct by installing two new ground plates, No. 509553, as follows: Remove sponge rubber ring, install two ground plates diametrically opposite each other with longer leg upright against hub, replace sponge rubber ring. NOTE—These ground plates will be used to service the coiled ground spring No. 507960.**

DESCRIPTION: Hour-glass type worm and double tooth roller of same design used on previous models.

ADJUSTMENT

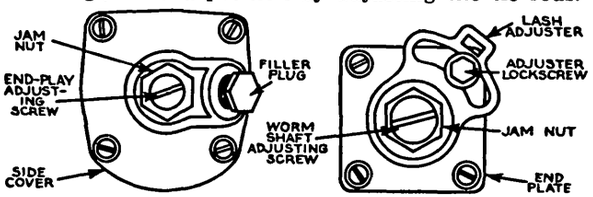
ADJUSTMENT: Disconnect steering connecting rod from pitman arm. Torque pitman arm nut to 110-125 ft. lbs. Loosen steering post bracket to be sure it is not sprung. If misaligned, shim at steering gear housing-to-frame bolts, tighten bracket.

Roller Shaft Endplay: Tighten four side cover-to-housing bolts, loosen adjusting screw jam nut, turn steering wheel to end position, then tighten adjusting screw securely, using offset screwdriver. Back off adjusting screw until it is free, then again turn it in until screw can just be felt to be bearing against shaft. Keep screw from turning, tighten jam nut. Test for endplay. No endplay should be felt when attempting to move pitman arm in or out but arm should be free without bind when moved radially.

Worm Shaft Endplay: Tighten three bolts holding end plate to housing. Do not tighten adjuster lock bolt. Loosen worm thrust screw nut. With steering gear turned to end position, near but not against stops, tighten worm thrust screw to obtain a pull at steering gear rim as indicated in following table. Tighten lock nut.

Car Model	Worm Bearing Setting
Oldsmobile 1946-48	1-1½ lbs.
Oldsmobile 1949-51	½-⅞ lb.
Pontiac 1946-54	⅜-⅝ lb.

Worm & Roller Backlash: Disconnect drag link from pitman arm. Loosen lash adjuster lock bolt (in the slot through adjuster). Center the steering gear so steering wheel in straight ahead position. Tap lash adjuster plate lightly to turn it in direction of arrow until a pull is secured at steering wheel rim as indicated in following table. CAUTION—Lash adjuster plate should not be moved more than 1/16" (in relation to lock bolt) at a time and in no case should a tighter adjustment than maximum limits in table below be made as damage to gear may result). Tighten lash adjuster lock bolt securely. Check adjustment. Move steering wheel through entire travel right and left to check for tight spots. If tight spots found on both sides of central position, loosen lash adjuster lock bolt, tap lash adjuster plate opposite direction of arrow just enough to bring pull at tightest point between limits indicated in table. If tight spot only on one side of wheel center position, adjust gear for maximum pull (see table) through tight spot. Then with wheel in center of the high spot, remove wheel and reinstall it with spokes in straight ahead position (must not vary more than 5 degrees from horizontal when front wheels straight ahead). Reconnect drag link to pitman arm keeping steering wheel in straight ahead position and worm on high spot. Place wheels in straight ahead position by adjusting the tie rods.



SAGINAW WORM-AND-ROLLER TYPE ADJUSTMENTS

Car Model	Backlash Setting
Oldsmobile 1946-48	1¾-2¼ lbs.
Oldsmobile 1949-51	1½-2 lbs.
Pontiac 1946-54	1¼-1¾ lbs.

STEERING WHEEL POSITION: See Front Suspension Section for tie rod adjustment to correct intermediate steering arm position.

STEERING WHEEL & HORN RING OR BUTTON REMOVAL

Oldsmobile, All Models 1946-48.

Horn Button Removal—Insert sharp instrument under edge of button and pry upwards. Remove contact assembly after steering gear is removed.

Horn Ring Removal— Remove emblem by taking out two screws in outer edge. Remove two screws holding contact plate to ring and remove ring. Horn contact assembly is removed after steering gear removal.

Installation Note—When installing horn ring, see that contact plate guide is located in wheel puller holes and hook horn ring over lower extension of contact plate.

Steering Wheel Removal—Remove steering wheel retaining nut and install steering wheel puller Tool J-1262 with puller screws inserted in holes provided in steering wheel hub. Remove wheel.

Installation—Install wheel on steering shaft with spoke next to horn button connector opening straight down (with front wheel pointing straight ahead). Wheel retaining nut should be "staked" in position after tightening securely.

Oldsmobile 1949-51 (Except 1950-51 Series 98).

Horn Button Removal (Standard Wheel)—Button is held in position by means of three dimples on button retainer cup, inside steering wheel hub and the rubber ring in horn button. Insert a sharp instrument underneath adge of horn button and pry upward. Remove wheel to remove contact assembly.

Horn Button Removal (Deluxe Wheel)—Place palm of hand squarely on horn button, press firmly, and turn slightly in counter-clockwise direction. Remove horn button and rubber cushion. Remove wheel to remove contact assembly.

Steering Wheel Removal—Remove wheel retaining nut and install steering wheel puller Tool J-1262 with puller screws inserted into holes in wheel hub. Remove wheel.

Installation—Position car wheels straight ahead. Place steering wheel on steering shaft with center spoke pointing straight down on 1949 Models; and with mark on steering wheel hub and mark on end of steering shaft lined up in the straight up position on 1950-51 Models.

Pontiac 1946-48.

Horn Button Removal (Sounding Keys on Spokes). Disconnect horn wire from lower terminal on horn relay. Remove steering wheel cap by pressing on cap and tilting so a screwdriver can be inserted, then carefully pry off. Remove two screws, one at each end of trim strip, after which sounding key and trim strip can be removed. Remove rubber pad holding contact strip against connecting strip and remove contact strip. Remove wheel to remove rest of assembly.

Installation—Insert contact strip in spoke slot with dimple protruding down. Install rubber pad on top of contact strip and connecting strip. Install trim strip with sounding key in place, and attach with machine screw at rim end and the wood screw at hub end.

Steering Wheel Removal—See 1949-54 data below.

Pontiac 1949-54.

Horn Button Removal (Plain Button Type). Press down on one side of button which will cause opposite side to rise. Insert screwdriver and remove button.

Horn Button Removal (Ring Type). Disconnect horn wire at relay. Remove horn button cap by lifting out of wheel, then remove steering wheel nut and washer. Remove horn sounding ring assembly from steering gear.

Installation—Assemble horn ring assembly in steering wheel by tilting the top end down so that upper rubber spacer engages retaining lug in steering wheel hub, then pull lower end of ring down into position by sighting through cap hole. Particular care should be taken to locate the pilot hole in contact onto shoulder provided in the insulated connector. Install steering wheel nut and lockwasher and push button cap into position. Connect horn button wire.

Horn Ring Removal (1949-54 Deluxe Type)—Remove horn ring cap by turning slightly to left and lifting out. Remove steering wheel locknut and lift out horn ring assembly, then remove horn insulator and contact and spring assembly.

Steering Wheel Removal—Install puller J-452 (1946-48), J-3034 (1949-54) and remove wheel.

Steering Wheel Installation: Reverse removal procedure. Torque wheel nut to 25-30 ft. lbs. and locknut finger tight plus ¼ turn.

STEERING GEAR REMOVAL

►**STEERING GEAR REMOVAL NOTE** (Oldsmobile 1949 & Early 1950 Series 88 Cars): Remove left front

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SAGINAW WORM & ROLLER (Continued)

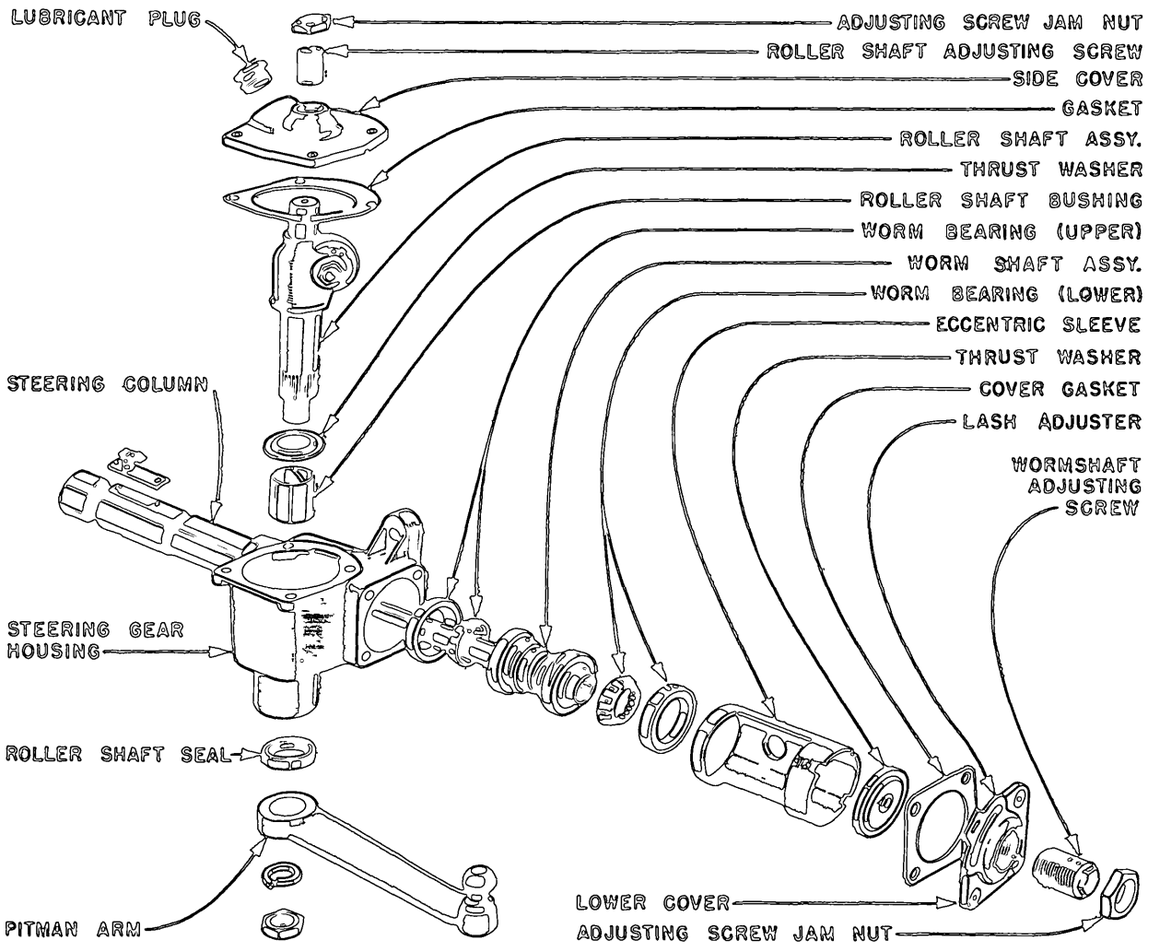
coil spring and swing lower control arm out of place in order to remove steering gear. Hole through cowl on later production cars has been enlarged so gear can be removed through driving compartment.

Pontiac, All Models (1946-48): Remove battery front compartment mat, clutch and brake pedal, toe plates and felts. Disconnect horn wire and remove steering wheel. Remove shift lever (use Tool J-1143), then remove pin which holds selector lever and idler to safety-shift lower support, allowing selector lever and idler to remain attached to selector rod. Remove screw at lower end of control shaft and slide off sleeve, control lever and idler lever, leaving the control shaft lever attached to shifter rod. Loosen instrument panel bracket clamp screw, then remove pitman arm, using Tool J-1025, and remove steering gear to frame bolts. Now remove the steering column to instrument panel attaching screw, slide bracket to upper support on steering column and pull gear out through hole in left fender skirt.

Pontiac, All Models (1949-54):

1. Remove steering wheel and horn button. If directional signal is used, disconnect wiring harness at multiple connector plug under instrument panel, (On 1949-52 Models, loosen directional signal housing clamp screw and lift signal assembly from steering column. Then remove steering column lower finish plate.
2. Roll back floor mat to right, and remove steering column and pedal upper and lower plates, felts, and felt retainer plate. Remove horn wire and neutralizer switch wire (Hydra-Matic). Remove gearshift lever except that on 1949-52 remove gearshift linkage as follows in Steps 3 through 5, then disconnect gearshift and selector rods from levers on steering column.
3. Remove selector lever pivot pin. This will allow selector lever and selector control idler lever to be removed from lower support together while remaining attached to transmission selector rod (adjustment is not disturbed this way). Remove control shaft return spring.
4. Remove bolt holding collar to control shaft and remove collar and shaft return spring clip. It is now possible to remove control shaft lever and control shaft idler lever together while remaining attached to transmission control rod (adjustment is not disturbed this way).
5. Remove two gear shift control upper support screws and remove control shaft, gear shift lever and upper support by pulling it into car. Remove nuts from U-bolt holding control shaft lower support to steering column and remove support.
6. On all cars, place supports under BOTH LOWER CONTROL ARMS so as to provide clearance for removing steering gear. Remove left side apron, then remove pitman arm from shaft using puller Tool J-1025. Loosen three bolts holding steering gear to frame, then remove two bolts, leaving the front upper bolt to support steering gear.
7. Remove bolts holding steering column lower bracket to upper bracket on instrument panel and also remove rubber grommet.
8. Remove remaining steering gear housing to frame bolt and remove steering gear by bringing it down through floorboard and over steering linkage toward right front wheel. If car is equipped with NO-ROL, it will be necessary to remove steering gear by bringing it up through floorboard moving upper end toward left front door and passing pitman arm shaft through between pedals. In this case Step 7 above should be performed after removing the three steering gear to frame bolts.

NOTE—Be sure to save shims found between frame and housing and re-install in same position.



SAGINAW WORM & ROLLER STEERING GEAR

STEERING GEAR OVERHAUL

Disassembly: Remove pitman arm using puller No. C-47. Remove side cover plate from housing and take out pitman shaft, then loosen "jam nut" and back out worm shaft adjusting screw from end of worm shaft. Remove endplate from housing and push worm and shaft assembly down through bottom of housing, removing eccentric sleeve, worm and bearings.

Inspection and Cleaning: Wash all parts in clean solvent and inspect for wear, pitting, or roughness.

Reassembly: Assemble two tapered roller bearings on worm shaft and eccentric sleeve over bearings. Put lower thrust washer in place inside eccentric sleeve to hold bearings in place. Start worm shaft adjusting screw into endplate, then install endplate on housing and attach with four capscrews. (NOTE—Worm shaft adjusting screw should be screwed in just enough at this time to hold bearings in place. Proper adjustment will be made later). Slide pitman arm shaft in place and attach side plate to housing. Install endplay adjusting screw and locknut.

Testing & Adjusting on Bench: Secure steering gear in vise and place steering wheel on shaft. Turn steering gear from one extreme to opposite to make certain there are no unusual binds. Adjust steering gear as outlined under ADJUSTMENT above.

STEERING GEAR INSTALLATION

Pontiac, All Models (1949-54):

1. Install steering gear assembly in car following same path used for removal.
2. Install top front steering gear housing to frame

CONTINUED ON NEXT PAGE

SAGINAW WORM & ROLLER (Continued)

bolt with lockwasher finger tight. ***(CAUTION—BE SURE TO INSTALL SHIMS WHICH WERE FOUND BETWEEN STEERING GEAR HOUSING AND FRAME ON REMOVAL).*** Install rubber grommet on steering column.

NOTE—On 1949-52 Hydra-Matic Cars install gearshift shaft and indicator assembly.

3. Install steering column lower bracket, bolts and lockwashers on upper bracket at instrument panel. Tighten bolts snugly but not to final tightness. Install two remaining steering gear housing to frame bolts with plain and lockwashers. Tighten all three housing to frame bolts.

4. Check for correct shimming of steering gear housing to frame by seeing if steering column aligns with bracket when bracket bolts are loosened. NOTE—If misalignment exists, it will be necessary to change steering gear housing to frame shims to correct alignment. (If steering gear alignment is satisfactory, tighten steering column bracket bolts).

5. Install pitman arm on pitman shaft. Make sure lockwasher is in good condition and is installed under pitman shaft nut. Tighten nut to 110-125 ft. lbs. Install left side apron. Install gearshift linkage. On 1949-52 models proceed as in Step 6.

6. Install steering column and pedal upper and lower plates, felts and felt retainer plate. Install control shaft, gearshift lever and upper support by sliding assembly down into place from inside car. Insert upper support screws but do not tighten. Coat hole in control shaft lower support with Lubriplate and slip lower support over control shaft and secure on steering column by installing U-bolt, nuts and lockwashers. Tighten control shaft upper support screws and install column lower finish plate.

7. On 1949-52 Models, install direction signal on steering column, tighten clamp screw. On all models, install direction signal lever and connect direction signal and horn wiring under instrument panel.

8. Install steering wheel. See that wheel spokes are in straight ahead position when steering gear is on high point of cam with mark on steering shaft up and wheels are in straight ahead position (see Adjustment). Tighten wheel nut to 25-30 ft. lbs. and locknut finger tight plus ¼ turn. On 1949-52 Models proceed as follows in Steps 9 and 10.

9. Install control shaft lever and idler lever, return spring clip, lockwasher, and collar on control shaft by properly positioning these parts and inserting retaining bolt and washer and tightening.

10. Install control shaft return spring. Install selector control lever and selector control idler lever by positioning the selector control lever in collar and inserting lever pivot pin. Coat collar surface contacting selector lever with Lubriplate.

11. On all models, connect horn wire and neutralizer switch (Hydra-Matic).

STEERING LINKAGE: *See "Steering Linkage."*

SAGINAW BALL BEARING WORM & NUT

Buick, All Series (1946-55)
Cadillac V8, All Series (1946-53)
Cadillac, Series 86 Only (1954)
Chevrolet, Pass. Cars (1955)
Chevrolet, Trucks (1946-55)
Oldsmobile, Series 98 (1950-51)
Oldsmobile, All Series (1952-55)
Pontiac, All Models (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 BUICK STEERING COLUMN RATTLE CORRECTION:* Effective May 1954 production, a new anti-rattle spring, Part No. 561362, is being installed to eliminate shift tube rattles in steering column. This new, heavier spring, may be installed on earlier 1954 cars where these shift tube rattles have been noted.

►*1955 BUICK STEERING COLUMN RATTLES (Caused By Shift Control Linkage):* An anti-rattle spring, Part No. 1169208 has been released for service to eliminate this condition. To install spring, remove steering wheel and horn ring. Loosen directional signal wiring at lower steering column and remove switch and housing. Remove three bolts from mast jacket to control lever housing support. Place control lever in "Park" position and remove control lever. Remove support and install spring with large end of spring around control lever housing and small end of spring hooked around edge of mast jacket. *NOTE*—On some cars it may be necessary to remove die flash on control lever housing in order to install spring.

►*1955 OLDSMOBILE STEERING COLUMN RATTLE CORRECTION*—Check steering column upper bushing for looseness. Make sure that the three upper bearing retainer screws are tight before replacing bushing.

DESCRIPTION: Recirculating ball nut type. Nut mounted on worm and driven through steel balls which circulate in helical grooves in both worm and nut. Return guides attached to nut serve to recirculate the two sets of balls through grooves. Gear teeth on nut mesh with sector teeth on cross-shaft so that cross-shaft (and steering gear pitman arm) rotate as steering wheel is turned causing nut to move up and down.

ADJUSTMENT

ADJUSTMENT: Adjust in following sequence.

Steering Gear Alignment: Before any adjustments are made to steering gear check for binding at frame bracket mounting bolts and at instrument panel bracket. Note clearance between steering gear and frame or bracket. If clearance exists loosen mounting bolts to permit steering gear to shift on frame to align with column bracket, or shim bracket.

Buick Note—Steering gear is trunnion mounted on bracket so that it is free to swing in both directions when bracket mounting bolts are loosened. Front lower bolt serves as pivot and other three bolts pass through slotted holes in frame bracket and side rail to provide for vertical adjustment. Clamps bear against cylindrical extension of housing so that it can be turned in clamps for sideways adjustment.

Worm Shaft Endplay: Disconnect pitman arm from steering shaft or rod, check tightness of pitman arm nut with 18" wrench. Loosen pitman shaft adjusting screw locknut, back off adjusting screw a few turns. With spring scale at rim of steering wheel, measure pull required to keep wheel in motion at about 30° off center. Pull should be as shown in table below. If not, loosen lock at end of worm shaft and turn adjusting screw required amount with Tool KMO-695 to bring spring pull within limits. When adjustment correct, retighten locknut, recheck preload.

Car Model	Worm Bearing Setting
Buick	7/8-1 1/8 lbs.
Cadillac (1946-51)	ℂ 1-1 1/4 lbs.
Cadillac (1952-53)	1-1 1/8 lbs.
Cadillac (1954)	1-1 1/4 lbs.
Chevrolet Pass. Car	3/8-5/8 lbs.
Chevrolet Truck	1-1 1/2 lbs.
Oldsmobile	1/2-7/8 lbs.
Pontiac	3/8-7/8 lbs.

ℂ— 1 1/8-1 1/2 lbs. on cars driven less than 1000 miles.

Pitman Shaft Endplay (Nut & Sector Mesh Adjustment): Turn wheel to center position with nut on high point of gear. Tighten pitman shaft adjusting nut on lower side cover until pull at wheel rim required to turn wheel through center high point as measured on scale at wheel rim, is correct (see table below), hold adjusting nut, tighten locknut.

Car Model	Backlash Setting
Buick	2-2 1/4 lbs.
Cadillac	ℂ 1 1/2-2 lbs.
Chevrolet Pass. Car	7/8-1 1/2 lbs.
Chevrolet Truck	2-2 1/2 lbs.
Oldsmobile	1 1/2-2 lbs.
Pontiac	1-2 lbs.

ℂ—2-2½ lbs. on cars driven less than 1000 miles.

►*ADJUSTMENT CAUTION: This is push-pull type adjustment and controls pitman arm shaft endplay as well as gear mesh.*

STEERING WHEEL POSITION: Buick—With steering wheel properly installed, front wheels in straight ahead position and steering gear on "high spot", steering wheel lower spoke should be in a vertical position.

Buick (1948) Steering Wheel Height—Wheel cannot be raised but may be lowered approximately 11/16" by installation of two special spacers between steering column bracket and lower flange of instrument panel (requires use of longer bolts). Spacers are No. 1321253, bolts are No. 1325016—4 3/16" long (Right Side 40, 50; Left Side 70), No. 1325013—4 11/16" long (Left Side 40, 50), No. 1324888—3 11/16" long (Right Side 70).

Buick (1949) Steering Wheel Height—Series 50 wheel can be raised approximately 11/16" by substituting Series 70 steering column bracket and spacers and column-to-instrument panel grommet. Series 70 wheel can be raised approximately ½" by removing the two 3/16" spacers located between steering column bracket and instrument panel (this may cause some buckling

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SAGINAW WORM & NUT (C ntinued)

of steering column-to-instrument panel grommet). Series 70 wheel can be lowered approximately 11/16" by substituting Series 50 steering column bracket, bracket bolts, and steering column-to-instrument panel grommet.

Buick (1950) Steering Wheel Height—Series 40-50 steering wheels may be raised or lowered, Series 70 wheel can only be lowered, from standard height. Alteration is effected by changing number of spacers between steering column bracket and support bracket on instrument panel, and by substituting longer bolts and different steering column bracket when required See table below

Adjustment	Bracket	Spacer	Bolt
Series 40 (Early)			
Lower 1/2"	Production	(2) 1332163	(2) 107241
Lower 3/4"	Production	(3) 1332163	(2) 107241
Raise 3/8"	1322944	None	Production
Raise 3/4"	1322950	(1) 1339597	Production
Series 40 (Later), 50			
Lower 1/4"	Production	(3) 1332163	(2) 107241
Raise 1/2"	Production	Remove all	Production
Raise 7/8"	1322944	Remove all	Production
Series 70			
Lower 1/2"	1323729	None	Production
Lower 1"	1323729	(2) 1332163	107241

Buick (1954-55) St ring Wheel Height—Distance from column bracket to lower surface of instrument panel for normal steering wheel height is 5/8-3/4" (Series 40 & 60); 3/8-1/2" (Series 50 & 70). Height of steering wheel may be set as much as ¾" above or below normal height to suit drivers needs. S *"Buick Note" under "Adjustment" above.*

Cadillac—Position wheel so middle spoke is vertical on three spoke types or both spokes horizontal on two spoke types with nut on high center point of worm and front wheels pointing straight-ahead. Steering wheel and shaft are notched.

Ch vrol t Pass. Cars & Trucks—With steering wheel properly installed, front wheels in straight ahead position, and steering gear on "high spot", steering wheel mark on end of wormshaft should be at top of shaft and aligned with mark on steering wheel.

Ch vr l t Pass. Car St ering Wheel & Mast Jacket Cl aranc—Gap between top edge of direction signal housing and bottom outer edge of steering wheel should be 1/32-9/64".

Oldsmobil—With marks on steering wheel and hub aligned, center spoke should be in a vertical position (1950-52), spokes should be horizontal (1953 & Later), when front wheels are in a straight-ahead position and steering gear is on "high spot".

Oldsm bil Steering Whe l & Mast Jacket Clearance (1953 & Later)—Clearance between lower edge of steering wheel and direction signal housing should be 1/8-3/16"

Pontiac—With steering wheel properly installed, front wheels in straight ahead position and steering gear on "high spot", steering wheel spokes should be horizontal and mark on steering shaft should be at top.

STEERING WHEEL & HORN BUTTON AND RING REMOVAL & INSTALLATION

NOTE—Proceed as follows for each model Reverse removal procedure for installation except as noted.

Buick, All Models:

Horn Button Removal (Solid Spoke Type Wheel)—Pry button carefully out of wheel.

Horn Button Removal (Flexible Spoke Type Wheel)—Pry off monogram and bezel assembly, take out mounting screws, remove button operating ring.

Steering Wheel Removal—Remove horn button or operating ring and replace steering wheel nut, leaving it backed off several turns. Set direction signal switch in "OFF" position Install Puller J-1120 (1946-47), J-1566 (1948-54), J-3274 (1955) and pull wheel back to nut Remove puller, nut, and steering wheel When reinstalling wheel *be sure direction signal switch is in "OFF" position.*

Cadillac, All Models 1946-51:

Horn Button Removal—Hold wheel stationary, depress button and turn counter-clockwise to release. Lift button out and remove horn button retainer ring and spring On Special Model, remove horn ring, take out three screws holding retainer and rubber gasket to horn ring and remove parts

Steering Wheel Removal—Remove steering wheel retaining nut and install steering wheel puller Tool J-1859 and remove wheel

Cadillac, All Models 1952-53, Series 86 1954:

Horn Button & Horn Ring Removal—Disconnect horn wire from terminal at lower end of steering column, depress horn button, turn counter-clockwise until locking ears are released, remove button and horn button spring. Remove steering wheel nuts, then remove horn ring retainer, cushion, and horn ring.

Steering Wheel Removal—Remove horn button, then wheel nut. Install Puller J-1859 and remove wheel.

Chevrolet Pass. Cars:

Horn Button Removal—Pry off horn button or ornamental cap.

Steering Wheel Removal—Remove horn button or ornamental cap and remove steering wheel nut and washer from end of steering shaft. Remove wheel with Puller J-2927-A.

Chevrolet Truck:

Horn Button Removal—Insert screwdriver between button and wheel, gently pry button out.

Steering Wheel Removal—Remove steering wheel nut, install Puller J-1618 (1946-51), J-2927A (1952-55), remove steering wheel.

Oldsmobile, Series 98, 1950-51:

Horn Button Removal—Place palm of hand squarely on horn button, press firmly and turn slightly in counter-clockwise direction. Remove horn button and rubber cushion. Remove wheel to remove contact assembly.

Installation Note—Make sure that both horn button cushions are in place. Upper cushion should be installed flat face upward, and the three projections on opposite end should lie on horn contact retainer depressions.

Ste ring Whe l Removal—Remove wheel retainer nut and install steering wheel puller Tool J-1262 with puller screws inserted into holes in wheel hub Remove wheel

Oldsm bil , All Series 1952-55: Disconnect horn wire at relay, then proceed as follows:

Horn Button Removal (1952 DeLuxe)—Same as 1950-51 Series 98

Horn Button Removal (Std.)—Insert sharp instrument underneath edge of horn button, pry button upward and out. Remove steering wheel nut, then contact assembly.

Horn Ring Removal (DeLuxe)—Two spring clips on ends of horn button engage horn ring hub. To remove horn button use small screwdriver to relieve spring tension on one end, lift button from seat. Remove wheel nut, then contact plate, horn ring.

Steering Wheel Removal—Install puller J-1262, remove steering wheel.

Pontiac, All Models:

Horn Button Removal—On standard steering wheel, press down on one side of horn button and insert screwdriver under other edge and pry up. On deluxe steering wheel, rotate horn ring button counter-clockwise.

Steering Wheel Removal—Remove locknut, nut, washer, horn ring, horn insulator and contact assembly. Remove steering wheel with Puller J-3044.

STEERING GEAR REMOVAL & INSTALLATION

Buick, All Models 1948-49 (Removal): 1) Disconnect pitman arm from steering tie rod by unscrewing tie-rod plug until bearings will release ball stud

2) *On Series 70 only,* remove air cleaner assembly Disconnect fuel and vacuum lines from carburetor and move them out of the way.

3) Remove windshield wiper and bracket.

4) Disconnect transmission selector rod from selector control lever and unhook anti-rattle spring Disconnect upper shift rod from control shaft lower lever Disconnect clutch linkage and anti-rattle spring from shift idler lever pin

5) Disconnect wires from horn cable connector back-up light switch and neutral safety switch (Dynaflow cars only). Pull speedometer cable from clip and then remove horn cable connector from column jacket to avoid damage during removal of gear.

6) Disconnect one end of cross brace at cutout in cowl and swing brace to one side

7) Remove dash insulator retainer and steering column pad Pull back floor mat and remove pedal plate attached to toe panel.

8) Remove steering wheel and the upper bearing spring and spring seat. Remove gear shift control lever and signal switch control lever Remove front seat cushion

9) Disconnect direction signal switch wires from terminals on instrument panel

10) Remove steering column bracket On 1949 models remove the steering column to instrument panel grommet

11) Remove steering gear to frame bolts and clamps, then carefully support steering column to avoid damaging column jacket. Move gear assembly to rear as far as possible, turn assembly over so that pitman arm is uppermost, then lift forward end up toward engine and fender and move forward to remove gear assembly from car. It is advisable to have a helper guide the column

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SAGINAW WORM & NUT (C ntinued)

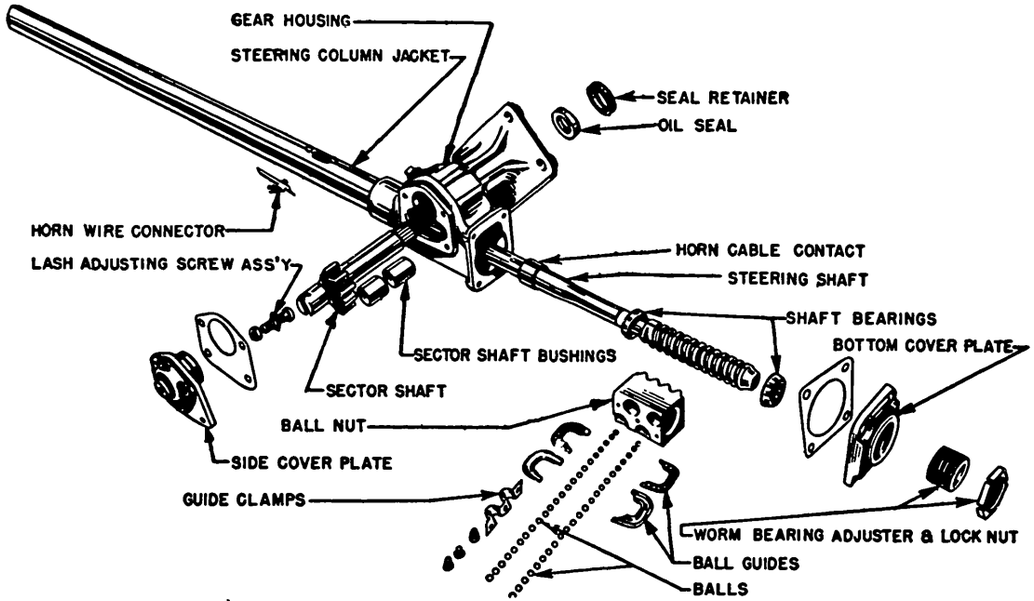
jacket and signal switch housing through cutout in cowl panel to avoid damaging finish of these parts.

Buick, 1950-53: Steering gear removal is the same as for 1948-49 models except for the spacers located between bracket and support on instrument panel.

Buick 1954-55 (Removal): Disconnect transmission shift rod from control shaft lower lever & selector lever (synchro-mesh only), then loosen bolt in clamp which secures column jacket to short tube in gear housing. Disconnect and remove horn cable connection from steering column jacket. Move front seat all the way back and cover seat and back. Cover steering column jacket with masking tape. Remove steering wheel and the upper bearing spring and spring seat. Cover horn contact and threaded end of steering shaft with masking tape. Remove signal switch and transmission shift control levers. Disconnect wires from neutral safety switch and disconnect wires (signal) from fuse block. Detach rubber insulator retainer from dash mat and pull it a foot up on column jacket. Remove jute column pad. Measure and record vertical distance between column jacket and lower surface of instrument panel so column can be reinstalled in same position. This dimension affects steering wheel height, which may have been changed from normal height to suit driver of car. Remove bolts holding cap to steering column bracket, disconnect bracket from instrument panel, then pull upward on column jacket to free it from steering gear. Remove starter splash pan from car frame. Remove steering gear-to-frame lower bolts and clamps, then loosen upper bolts enough so that gear can be tilted sideways to provide room for pitman arm puller. Remove nut and lockwasher, then remove pitman arm from pitman shaft, using suitable puller. With another man inside car to guide steering column and prevent damage to column jacket and front seat, carefully lift steering gear assembly up and forward out of engine compartment, leaving column jacket assembly in body.

Cadillac, All Models 1948-53, Series 86 1954 (Removal): Raise front of car so wheels are 6" off floor. Remove steering wheel and anti-rattle spring under steering wheel. On 1951 and later models, remove upper and lower column covers. Remove horn wire from terminal at lower end of steering column. Loosen clamp holding lower steering jacket to upper jacket. Tap clamp down over lower jacket. Disconnect steering connecting rod at pitman arm and remove bolts holding steering gear to frame side rail (On 1951 and later cars remove any shims found at upper housing mounting bolts). Strike housing firmly a few times with a lead hammer to drive lower steering column jacket down out of upper jacket. Remove steering gear, lower jacket, and steering column from below car.

Ch vrolet Pass. Car (Removal): Disconnect all electrical connections and remove the back-up light switch (where installed), from mast jacket *(NOTE—*A combination Neutral Safety & Back-up Light Switch is used on Powerglide models). Remove two rubber cover fasteners from inside of dash panel at mast jacket opening. Pry off horn button and remove steering wheel. Slide rubber seal away from covers, and remove lower



SAGINAW BALL BEARING WORM & NUT STEERING GEAR

cover retaining screw and washer and lower and upper covers. On Powerglide models only, disconnect ends of indicator rod from indicator lever and shifter tube and remove rod. Remove neutral safety switch, and remove transmission control selector plate from lower end of steering column. On all models, remove clamp bolt from dash panel attaching bracket. Disconnect transmission control linkage from shift levers at swivels and remove swivels. Remove clamp and rubber shims from bottom of instrument panel. From inside car, pull mast jacket assembly off steering shaft, rotating as necessary to clear dash clamp. Work shift levers through seal by stretching seal to clear levers. Remove pitman arm from sector shaft using Puller J-5504 (see Puller J-5504 Rework for use on Early Cars, below). On Power Steering models, remove the generator-to-support and generator brace bolts and move generator and pump assembly out of position (without disconnecting hoses) to obtain clearance to remove steering gear assembly. Remove nuts and lockwashers from steering gear to frame bolts, shims (where installed), and steering gear. Remove the four felt seals from mainshaft of steering gear assembly.

►**Puller Tool J-5504 Rework (For use on Early Cars):** Grind off 5/16" lip of tool to permit installation between pitman arm and gear housing.

Installation—Reverse the removal procedure and note "Steering Wheel Position" and "Steering Gear Alignment" above.

Chevr let Trucks 1946-53 (Conventional Models):

1) Remove horn button and steering wheel. Remove seat cushion.

2) Remove steering mast jacket to instrument panel bracket screws, bracket and grommet. Disconnect horn wire and remove cover plate from steering mast jacket.

3) Remove two sheet metal screws attaching steering mast jacket toe board grommet and seal to toe board plate. Slide toe board grommet and seal up mast jacket and remove toe board plate.

4) Disconnect pitman arm using Tool J-1025, and remove all steering gear housing to frame mounting bolts. From inside cab remove three bolts attaching rear of left front fender skirt to toe board, and remove six bolts attaching fender skirt to ledge.

5) Remove fender to dash brace rod and disconnect horn wire from horn. Working under fender, pry rear of fender skirt forward and outward until it rests on the outside toe board flange.

6) Working over fender, pry fender skirt outward along frame at steering gear housing to provide clearance between frame and fender skirt.

7) Slide steering gear assembly slightly upward toward toe board. Then rotate until attaching flange is up. Raise slightly and slide forward removing assembly over front of front fender.

Chevrolet Trucks 1954-55 (Conv nti nal Mod ls):

1. Disconnect horn wire, remove wire retainer from steering mast jacket. Remove horn button and steering wheel, then remove steering mast jacket-to-instrument panel bolts, bracket and grommet.

2. On ½ and ¾ ton trucks, disconnect gearshift upper control shaft support from mast jacket, then separate upper steering control shaft from lower shaft by removing lower bolt from both shaft clamps.

3. Remove sheet metal screws attaching steering mast jacket toe-board grommet and seal to toe-board plate. Slide toe-board grommet and seal up mast jacket, remove toe-board plate.

4. On Forward Control models, hoist front end of vehicle, remove mast jacket opening cover

CONTINUED ON NEXT PAGE

SAGINAW WORM & NUT (C ntinued)

5. On ½ and ¾ ton trucks, remove bolts and clamp attaching gearshift control housing to steering column mast jacket
6 Disconnect pitman arm, using puller J-1025, then remove gear housing-to-frame mounting bolts
7. On Forward Control models, remove steering gear by moving forward, down, and out of vehicle
8. On models other than Forward Control, from inside cab remove three bolts attaching rear of left front fender skirt to toe-board, remove six bolts attaching fender skirt to fender ledge, then remove fender-to-dash brace rod, disconnect horn wire.
9. Working under fender pry rear of fender skirt forward and outward until it rests on outside toeboard flange, then, working over fender, pry fender skirt outward along frame at steering gear housing to provide proper clearance between frame and opening in fender skirt
10. Slide steering gear assembly slightly upward toward toe-board, then rotate until attaching flange is up Raise slightly and slide forward, removing assembly over front of front fender

Ch vr l t Trucks, Cab-Over-Engine & Low-Cab-Forward Mod ls (R m val):

1. Remove steering wheel and disconnect dash mounting bracket Remove left hand floor pan and steering column grommet Disconnect horn wire Remove fender skirt bolts and remove skirt
2. Remove pitman arm using Tool J-1025, and remove steering gear to frame mounting bolts
3. Move gear back to clear radiator grille side baffle assembly It will then be possible to drop gear down through fender skirt opening, pulling the steering column through opening in floor

Oldsmobile, All S ri s (R moval):

1, Disconnect horn wire at relay, remove steering wheel assembly Remove floor mat, and remove mast jacket cover attaching screws Loosen upper and lower mast jacket clamps
2. Hoist car and remove engine filler plate. Remove pitman arm and steering gear to frame mounting bolts Remove steering gear by pulling it down and out of mast jacket

Pontiac (R moval):

1. Remove steering wheel If car is equipped with power brakes, remove power brake unit. Disconnect direction signal wires at connector under instrument panel Remove signal lever
2. Remove steering column lower finish plate and remove steering column and pedal plate, felts, and retainer plate
3. Disconnect horn wire and neutralizer switch Remove gearshift lever and disconnect selector rods from levers on steering column
4. Raise car on hoist and remove engine side apron Remove pitman arm with Puller J-5504 and remove steering gear housing to frame bolts, leaving the forward bolt in place to support steering gear Remove steering column lower bracket to upper bracket bolts
5. Remove remaining steering gear housing to frame attaching bolt and remove steering gear by bringing it through floor board and over steering linkage toward right fender Save shims found between housing and frame

STEERING GEAR OVERHAUL

STEERING GEAR OVERHAUL: Disassembly—With steering gear removed, remove the pitman arm with a suitable puller (CAUTION—Do not drive pitman arm from cross shaft as damage to worm and ball nut will result) Loosen adjusting screw lock nut, then remove housing side cover with pitman shaft attached, remove gasket Separate pitman shaft from side cover by unscrewing the adjusting screw Loosen lock nut and back off worm thrust bearing adjuster several turns, then remove housing end cover and gasket Remove lower thrust bearing, steering shaft, and upper bearing from housing (NOTE—Manufacturer recommends that ball nut NOT be disassembled, however, if it is necessary to disassemble ball nut, proceed as follows) Remove ball return guide clamps and guides from ball nut, turn ball nut over to remove balls (Caution—Hold shaft and ball nut assembly over a wide pan while disassembling to retain all balls It is very important that balls be counted, and the same number of balls reinstalled when gear is assembled) Remove ball nut from steering shaft

Reassembly: (Ball Nut)—Place worm shaft flat on bench and slip nut over worm with ball guide holes up and shallow end of rack teeth to left from steering wheel position Align grooves in worm and nut by sighting through guide holes Count out one-half the number of balls removed at disassembly, and drop them into one of the guide holes while turning the worm gradually away from the hole, until guide hole is full from bottom of one guide hole to the bottom of the other (in cases where balls are stopped by end of worm, hold down the balls already dropped into hole and rotate worm back and forth) Lay one-half of guide, groove up, on the bench and place remaining half of balls in it These remaining balls should fill it Close this half of guide with other half Hold both halves of guide together and plug each end with vaseline to hold balls in place Push guide into holes of nut, completing one circuit Repeat same operation with other circuit Then assemble ball guide clamp to nut with lockwashers under clamp screws and tighten screws securely

Steering Gear—Place worm shaft and nut assembly into housing and place upper roller bearing over worm shaft Place new housing end cover gasket over end of worm shaft, make sure horn wire is through opening in mast jacket, then slide housing end cover over worm shaft and assemble it to housing Install lower roller bearing, worm bearing adjuster and lock nut in lower end of housing Assemble lash adjuster with shim in slot in end of sector shaft Check end clearance which should not be greater than .002" Adjust end clearance with shims as required Start sector shaft pilot into bushing in side cover Then, using a screwdriver through hole in cover, turn lash adjuster in counter-clockwise direction to pull sector shaft pilot into its bushing as far as it will go Rotate worm shaft by hand until ball nut is at center of travel Place a new gasket on side cover, then push side cover assembly including sector shaft into place After making sure there is some play between rack and sector teeth, assemble and tighten side cover bolts Install steering gear in car (see instructions below), and adjust steering gear See ADJUSTMENTS above

STEERING GEAR INSTALLATION

Buick, 1948-53:

1. Install steering gear assembly by reversing sequence for removal and note following
2. Leave frame bracket bolts loose until steering column bracket and any original spacers are installed Center steering column in cutout in dash panel and tighten the column bracket bolts, then tighten the frame bracket bolts
3. Connect signal switch wires at fuse block
4. Before installing transmission control lever, coat inner end and the socket in selector rod (synchro-mesh) or stop pin (Dynaflow) with Lubriplate If a new bearing is installed on control lever, the large diameter of bearing must be toward lever knob. During installation of lever be careful to draw housing nut tight so that shoulder in nut will bear against bearing seat flange, lock seat in place
5. Install steering wheel with location marks in line (See Steering Wheel Installation above)

Buick, 1954-55:

1) Install steering gear assembly by reversing removal procedures and note the following

2) Place control shaft return spring over lower end of control shaft before inserting steering shaft into control shaft

3) Measure vertical distance between column jacket and lower surface of instrument panel See "Steering Wheel Height" under STEERING WHEEL POSITION

4) When connecting intermediate rod to pitman arm, tighten end plug to 20-25 ft lbs then back off 2±1/8 turns and install cotter pin

5) After installation of horn operating ring adjust steering column jacket on tube of gear housing as required to provide a clearance of .150" between operating ring and signal switch housing

6) Install steering wheel with marks in line

Cadillac, All Models 1948-53, Series 86 1954:

Upper end of lower steering jacket must be smooth and free from burrs and lower end of upper jacket smooth on the inside Make sure cross-over spring, seat and washer for cars with synchro-mesh transmissions, are in place in lower jacket Then slide steering gear assembly up inside upper jacket Use a lead hammer to drive gear housing up until bolt holes in steering gear housing line up with hole in frame side bar Install three mounting bolts and tighten lower bolt Slide steering jacket clamp up onto upper jacket and tighten clamp bolt Align steering gear by checking space between rear housing and frame side bar and install proper thickness shims to fill gap at two rear mounting screws If there is no space at rear, loosen the front screw and tighten the two rear screws Check space at front of gear and add shims to fill gaps at this point Tighten and torque three mounting screws to 40-45 ft lbs Connect pitman arm to steering connecting rod, turning end nut up tight and backing it off ½ to ¾ turn Install horn wire on terminal on lower steering jacket Install steering wheel

Chevrolet Passenger Cars, 1955:

1) Place the four felt seals over mainshaft and slide against steering gear housing Insert end of mainshaft through dash panel opening and position steering gear

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SAGINAW WORM & NUT (Continued)

assembly on frame. Install bolts, lockwashers and nuts through bracket. *NOTE*—Shims may be placed between steering gear and frame to center steering shaft in dash panel opening.

2) Connect pitman arm to pitman shaft. Install mast jacket and shifter tube assembly as described below. Install generator, and pump assembly on Power Steering models.

3) Slip assembled mast jacket over steering shaft, rotating as required to provide clearance for the shifter levers and other projections at dash panel. *(NOTE*—Rubber seal at dash panel must be stretched to clear shifter levers).

4) Position upper mast jacket clamp with upper and lower rubber shims installed over retaining bolts so that key in clamp engages keyway in bottom of mast jacket and clamp is centered in dash panel opening. Install clamp washers and nuts and tighten nut just enough to hold key in keyway and still permit mast jacket to be moved along steering shaft.

5) Install steering wheel, horn mechanism and horn button or ornamental cap, aligning steering wheel with mark on end of steering shaft.

6) Grasp mast jacket assembly and pull assembly back along steering shaft toward steering wheel. Locate assembly 1/16" from steering wheel (use feeler gauge between top edge of direction signal housing and bottom outer edge of steering wheel). Tighten clamp nuts below instrument panel.

7) Install dash panel attaching bracket clamp bolt, washers and nut.

8) With shift lever in neutral, check to see if steering gear shaft is centered in mast jacket assembly. If shaft is not centered, loosen dash panel bracket clamp bolt and two lower bracket retaining bolts. With shimming tool or drill rods installed (rods evenly spaced around steering shaft), securely tighten first the upper clamp bolt, then the two lower bracket bolts.

9) Connect transmission control rods to shifter levers. On Powerglide models, install the transmission control selector plate. With shift lever in neutral position, install back-up light and neutral safety switch.

10) Position rubber seal and cover to dash panel and install upper fasteners. Connect horn wire, direction signal, back-up light and neutral safety switch wiring.

Chevrolet Trucks, Conventional Models, 1946-53:

1. Place steering gear assembly back in vehicle and align housing and bracket to frame. Install all mounting bolts and tighten securely.
2. Push fender skirt in place and start all bolts in position (do not tighten at this time). After all bolts are in place start tightening bolts from front to rear. Assemble pitman arm, lockwasher and nut, and tighten securely. ***CAUTION—Do not pound on pitman arm as this may cause internal damage.***
3. Install toe board plate. Attach a piece of wire to end of horn wire that enters the mast jacket, then push the horn wire inside the opening in the jacket. Slide jacket toe board seal and grommet over jacket. Place floor mat in position, making sure edge of opening for jacket is between grommet and seal.
4. Pull horn wire through opening in mast jacket and install cover plate.
5. Install jacket to instrument panel grommet, bracket and screws (make sure it is not necessary to force jacket in place to install clamp). If necessary, adjust dash mounting bracket to fit, and tighten.
6. Install steering shaft upper bearing spring seat (with flared end up) and spring. Install steering wheel and insert horn button insulator, contact and spring assembly in opening provided in steering wheel hub, making sure the contact brush (solid end) is in the downward position. Install contact cup, positioning the tang on the lower side.
7. Install steering wheel washer and nut and tighten. Install horn button and connect horn wire.

NOTE—On models where it was necessary to remove clamp holding vacuum lines, align the vacuum lines to their proper position and install clamp.

Chevrolet Trucks, Conventional Models, 1954-55:

1) To install steering gear assembly, reverse removal procedures and note the following.

2) Torque pitman arm nut to 100 ft. lbs., then tighten to next notch for insertion of cotter pin. **Do not pound on pitman arm.**

3) On ½ and ¾ ton, install gearshift control housing on mast jacket using caution to locate dowel on housing in slot of mast jacket. Do not tighten clamp bolts. Check clearance between gearshift lever and gearshift upper control shaft support. Clearance as measured from lower edge of gearshift lever to top of upper support should be 3/32" to 1/8". To correct this clearance, remove upper bolt from upper and lower control shaft clamp and remove two screws holding upper support to steering gear housing and remove upper control shaft assembly. Screw upper support up or down to get required clearance. Replace upper control shaft, tighten clamp bolt, and replace upper support screws.

4) Clearance between end of gearshift lever and lower edge of steering wheel rim should be 2 13/16"±1/8" on all models except ¾ ton forward control, which should be 2 9/16"±1/8". To correct this clearance, loosen two gearshift control shaft and housing assembly clamp bolts and move housing assembly with upper and lower control shafts and gearshift lever up or down to obtain necessary clearance. Tighten housing assembly clamp bolts.

Chevrolet Trucks, Cab-Over-Engine & Low-Cab-Forward Models:

1. Place steering assembly back in vehicle and align housing and bracket to frame. Start all bolts and tighten securely. Replace fender skirt.
2. Assemble pitman arm, lockwasher and nut and tighten securely.
3. Install mast jacket to instrument panel clamp making sure it is not necessary to force mast jacket in place to install clamp. If necessary, adjust dash mounting bracket to fit and tighten.
4. Replace left hand floor pan and steering column grommet. Install steering wheel, horn contact and retaining nut and tighten securely; then install horn button cap and connect horn wire.

Oldsmobile, All Series:

To install steering gear assembly, reverse removal procedure. *NOTE*—Tighten upper mast jacket clamp before tightening steering gear-to-frame bolts.

Pontiac, 1955:

To install steering gear assembly, reverse removal procedure.

MAST JACKET UPPER BEARING REPLACEMENT (Chevrolet Trucks 1947-55)

1. Remove steering wheel. Disconnect horn wire at connector and remove cover plate from mast jacket. Attach a piece of wire to the end of horn wire which enters mast jacket.
2. Screw bearing puller Tool J-2565 into top bearing. Tightening the center screw in puller removes bearing from mast jacket.
3. Transfer tie wire to end of wire attached to new bearing assembly. Start bearing assembly into mast jacket and drive it into place with special driver Tool J-2565. Pull wire through mast jacket and install cover.
4. Install steering shaft upper bearing spring seat (with flared end up) and spring. Install steering wheel, horn assembly and steering wheel retainer lockwasher and nut. Tighten securely.

SAGINAW (CHEVROLET TYPE) 1948 & EARLIER

WORM-AND-ROLLER TYPE

Pass. Cars & Sedan Del. All Models (1939-48)

►CHANGES, CAUTIONS, CORRECTIONS

►**Rubber-cushioned Steering Gear Arm Note:** Will affect steering stability (increased looseness) if bushings become oil-soaked. See Steering Linkage section (below) for bushing renewal instructions.

►**Tie-Rod Packing Fitting Note:** Packing must be correctly fitted when tie rod ball ends installed to insure good seal and prevent entrance of dirt which will cause excessive wear. When installing tie rod ends, place ball stud end of tie rod in steering arm with a hand push fit (omit packing), mark ball stud flush with bottom of steering arm. Remove ball stud, measure from mark to top of dust cover, select correct packing in accordance with this distance (see table) install packing, re-install ball stud.

Tie Rod Ball Stud Packing

Ball Stud Measurement①	Packing No.	Thickness
3/32-1/8"	3658604	1/8"
1/8-3/16"	599247	3/16"
3/16-1/4"	599836	1/4"

①—If measurement less than 3/32" or more than 1/4", replace worn or damaged knuckle arm, pitman arm, tie rod or tie rod end.

►**Horn Blowing Cap Change (Late '46-47 Stylemaster Cars & Trucks & Replacement on 1941-42 Models).** New type horn blowing cap assembly used which has plate to lock cap securely in place. Removal and installation of cap will be made easier by using Brake Main Cylinder Inspection Cover No. 592865 as a tool.

DESCRIPTION: Roller sector type with an hour glass worm. The sector roller rotates on a double row of ball bearings.

ADJUSTMENT

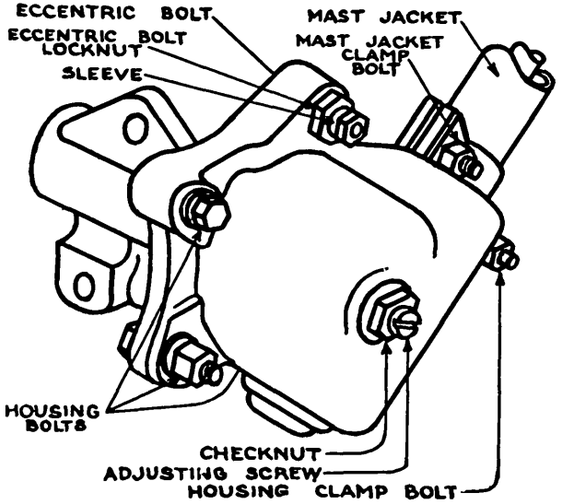
ADJUSTMENT: Jack up front wheels, remove drag link and steering pitman arm before making any adjustments to steering gear.

Worm Shaft Endplay (1939-48): Adjusting nut on steering gear housing is provided with hexagonal head so that adjustment simplified and should be made as follows: Loosen mast jacket clamp bolt (on lower end of jacket above housing, loosen housing clamp bolt (to free adjuster), use 1 9/16" wrench to turn adjuster at upper end of housing clockwise until all endplay removed and steering gear turns freely, tighten housing clamp bolt and mast jacket clamp bolt (not necessary to loosen instrument panel bracket clamp, do not turn mast jacket clamp when making adjustment as was required on previous models. Check adjustment by noting pull required to turn wheel (use spring scale attached to wheel rim). Pull should be ½ lb. Recheck adjustment if incorrect.

CAUTION—Some backlash must exist between worm and roller when making above adjustment.

Roll r Shaft Endplay:—Loosen locknut on engine side of steering gear housing, turn adjusting screw in until endplay has just been removed (or turn screw in until tight, back screw off until it is free, finally turn screw in until it just contacts end of roller shaft), hold adjusting screw from turning and tighten locknut.

Worm and Roller Backlash:—Turn steering wheel to center r straight ahead position (turn wheel back one half total number of turns from either end position). Loosen three housing-to-bracket bolts,



SAGINAW (CHEVROLET PASS. CAR) TYPE

check backlash or play at pitman arm, loosen eccentric bolt locknut one half turn, turn eccentric bolt and eccentric sleeve equally in opposite directions until all backlash removed (approximately ⅛ turn should be sufficient). Tighten eccentric bolt locknut and housing bolts, check adjustment by noting pull at wheel rim required to turn wheel through center position. Should be 1⅜ lbs. measured at rim of wheel. With correct adjustment, wheel should turn freely through entire range and should have no backlash at center position. CAUTION—When making this adjustment, use extreme care not to turn eccentric bolt and sleeve more than necessary to take up play, any excess will damage steering gear.

STEERING GEAR REMOVAL & INSTALLATION

1939-48 All Models. Remove horn button or ornamental cap (cars with horn ring) and install steering wheel puller Tool J-1618. Thread puller anchor screws into holes provided in steering wheel hub; turn center screw down against centering adapter and strike puller screw head a light blow with a hammer. Remove nuts from mast jacket to instrument panel "U" bolt. Remove the nut from sector shaft and remove pitman arm using puller Tool J-1025. Remove bolt from mast jacket clamp at steering gear housing end and slide clamp up on mast jacket. Remove steering gear mounting bolts and pull steering gear out at bottom.

REMOVAL & INSTALLATION NOTE—It is not necessary to remove vacuum shift or disturb shift adjustments. Raise front end of car about 6" to allow steering gear assembly to clear when being removed from below. Installation should be made from below

Installation—Reverse the instructions given for removal. Note the following:

Mast Jacket Position—When replacing the steering gear in the chassis, the distance from the horn contact ring at top of mast jacket to the shoulder on steering worm shaft should be 1¼". Move mast jacket up or down to secure the measurement, then tighten mast jacket clamp.

Horn Blowing Ring Adjustment—On models with horn blowing ring, adjust contact by loosening horn ring clamp screw at bottom of steering gear hub, and turning the hub housing as necessary until the desired horn ring contact is secured, then tighten clamp screw. Tension of the horn blowing ring may be adjusted by removing the ornamental cap in center of wheel, and turning the two screws as necessary.

STEERING GEAR OVERHAUL

Disassembly: Remove steering gear housing cover bolts and take out sector shaft and roller assembly. Remove wormshaft adjusting sleeve clamp bolt, then pry slot in housing apart with a screw driver and remove adjusting sleeve. Remove wormshaft. Remove wormshaft roller bearings from shaft and steering gear housing.

Sector Shaft Bushings—Remove sector shaft bushings by pressing them out of housing using Sector Shaft Bushing Driver Tool J-762. To install bushings in housing, press one bushing in each end of housing using Bushing Driver Tool J-762. Open end of oil groove in bushing should be toward inside of housing where oil pocket is formed by space between bushings. Ream bushing with special piloted reamer No. 1.125. This piloted reamer reams both bushings in same operation assuring accurate alignment for sector shaft.

Reassembly: Dip lower wormshaft roller bearing in lubricant and install in gear housing. Install wormshaft assembly in housing and then dip upper bearing in lubricant and thread it over wormshaft. Install the adjuster over wormshaft and screw it into housing until all wormshaft end-play is removed. ***(NOTE—Roll wormshaft back and forth while adjusting bearing to make sure roller races are in alignment).*** Install sector shaft and roller assembly in housing. Lubricate sector shaft bushings and install gasket and steering gear housing cover. *(CAUTION*—Make sure sector shaft adjusting screw is backed out and that housing cover is installed in such a way that there is clearance between worm and sector roller). Install housing cover bolts, eccentric bolt and eccentric sleeve in housing. See Adjustment (above).

STEERING LINKAGE

Master Deluxe 1939-41, Special Deluxe 1940-41, All Cars beginning 1942. Cars have individual tie rods between special rubber-cushioned steering gear pitman arm and each wheel. Long right hand tie rod is non-adjustable and toe-in adjustments should be made by turning short left hand tie rod which will insure steering gear roller being on high point of worm with wheels in straight ahead position. NOTE—Make certain that both tie rod ends square on ball studs when clamp bolts tightened.

Rubber-cushioned Pitman Arm Servicing—Replace rubber bushings if oil-soaked. To dismantle assembly, clamp Pitman arm plate (steering arm) in vise, remove cotter pins, nuts, lockwashers from each stud, remove retainer plate, Pitman arm, and bushings. Install new bushing on each stud (metal insert toward plate), install Pitman arm, place additional bushing on each stud (metal insert out toward retainer plate), install retainer plate, lockwashers, and nuts. Tighten nuts evenly to 30-40 ft. lbs. torque, install cotter pins.

1949-54 SAGINAW (CHEVROLET) PASS. CARS

Chevrolet Pass. Car Models (1949-54)

►*1949-52 ROAD SHOCK CORRECTION (Rotation of Steering Wheel):* To correct, install a 3/16" washer between crossmember and upper leg of third arm bracket. Installation of this washer will lower position of third arm ball slightly making it necessary to recheck toe-in and correct as necessary. Also, steering wheel cross bar will be positioned off horizontal requiring the readjustment of the steering connecting rod to maintain steering high spot with wheels in straight-ahead position.

DESCRIPTION: Hour-glass worm and roller sector type with worm gear on steering column shaft meshing with double-tooth roller on cross-shaft (sector shaft).

ADJUSTMENT

ADJUSTMENTS: *NOTE*—Before disconnecting steering connecting rod from pitman arm, take care to note relative positions of steering connecting rod parts before disturbing them. Then proceed as follows:

Worm Shaft Endplay: Remove sheet metal splash guard covering steering gear housing, disconnect connecting rod from pitman arm (CAUTION—note relative positions of connecting rod end parts to insure correct reassembly). Loosen adjusting screw locknut on housing cover, back off lash adjuster screw several turns to provide clearance between worm and roller. Turn steering wheel to within one turn of either end position (turn wheel as far as possible, then turn wheel in opposite direction about one turn). Use spring scale (J-544-A Checking Scale) hooked to wheel spoke at rim to measure pull required to keep wheel in motion.

Bearing Pre-load—⅜-⅝ lb. turning pull (above).

Adjustment—Loosen large adjusting cup locknut on lower end of steering gear housing, turn adjusting cup in until worm shaft has no perceptible endplay. Check pull required to turn wheel (above), tighten locknut when turning pull of ⅜-⅝ lb. is secured.

CAUTION—Recheck pull after locknut tightened.

Worm & Roller Mesh (Backlash): Place steering wheel in exact center of travel with roller on minimum-lash point of worm (count number of turns of wheel from one end position to the other, then turn wheel back ½ this number of turns, remove horn button and make certain that mark on end of shaft points upward, mark steering wheel for reference while making adjustments). Turn lash adjuster screw on housing cover clockwise until all lash removed from worm and roller (NOTE—this screw was loosened in making worm shaft endplay adjustment above), then tighten adjuster screw locknut to 10-15 ft. lbs. Check adjustment by turning wheel one half turn off center "high" spot, attach spring scale at wheel rim and note pull required to turn wheel through the center position.

Backlash Setting—⅞-1⅞ lbs. pull to turn steering wheel through center position (measured as above).

Adjustment—With steering wheel turned one-half turn off center "high" position, loosen lash adjuster screw locknut, turn lash adjuster screw on housing cover clockwise to decrease backlash (and increase required pull), or counter-clockwise to increase backlash (and decrease required pull), tighten locknut, connect steering connecting rod.

CAUTION—Final steering gear setting must be within ⅞-1⅞ lbs. pull (measured as above).

Horn Button Removal: On models equipped with horn button, pry off horn button or ornamental cap.

Horn Ring Removal: On models equipped with horn ring, remove screws holding pivot ring, then remove pivot ring, lock ring and horn blowing spring washer.

Steering Wheel Removal: Remove steering wheel nut and washer. Using steering wheel puller J-2927, thread puller anchor screws into threaded holes provided in steering wheel hub.

Steering Wheel Installation: With steering gear on high point, install steering wheel, with spokes horizontal. Install washer and nut, torque tighten to 25-30 ft. lbs.

STEERING GEAR REMOVAL

REMOVAL OF STEERING GEAR: Remove horn button or cap in center of steering wheel, remove wheel retainer nut and washer from upper end of shaft. If car equipped with horn blowing ring, take out screws holding pivot ring, remove pivot ring, lock ring, and horn blowing spring washer. Use Puller J-2927 (has anchor screws which thread into holes in wheel hub) to remove steering wheel. Remove upper control shaft clamp bolt from shaft connector, remove toeboard grommet and seal. Remove instrument panel mast jacket clamp by taking out nuts and lockwashers. Remove two clutch-head screws attaching gearshift control upper support to mast jacket, pull upper control shaft and support up to disengage shaft connector and remove these parts. Remove clamp bolt nuts and clamp retaining shifter housing on mast jacket, rotate shifter housing assembly away from mast jacket. Remove sheet metal splash guard over steering gear housing, remove steering gear mounting bolts. Remove air duct by taking out sheet metal screws attaching duct to left fender skirt. Rotate steering gear to clear fender skirt, then raise assembly up and forward and remove it from engine compartment.

►**Installation Note**—Reverse removal directions given above and note following points:

Steering Gear Mounting Bolts—Tighten housing to frame side rail bolts to 27-40 ft. lbs.

Steering Wheel Position—Turn shaft to center "high" point with mark on end of shaft upward, install steering wheel with spokes horizontal, tighten retainer nut on shaft to 25-30 ft. lbs.

STEERING GEAR OVERHAUL

Disassembly: Remove nut and lockwasher on end of sector shaft, use Puller J-1025 to remove pitman arm. Loosen lash adjuster screw locknut and turn adjuster screw several turns counter-clockwise, loosen worm bearing adjuster cup locknut and turn adjuster cup several turns counter-clockwise to remove load from bearings. Take out housing side cover attaching bolts, remove cover as an assembly with the sector shaft and roller (NOTE—If roller does not clear opening in housing, turn worm shaft by hand until roller lines up with notch). Remove worm bearing adjuster cup, withdraw lower bearing, pull worm and shaft out through lower end of housing (CAUTION—protect worm from damage). Remove locknut from lash adjuster screw, remove screw from side cover, slide screw out of slot in end of sector shaft.

Inspection & Repair: Wash all parts in cleaning solvent. Inspect roller bearings, bearing cups, worm, and roller for cracks, pits, roughness and wear.

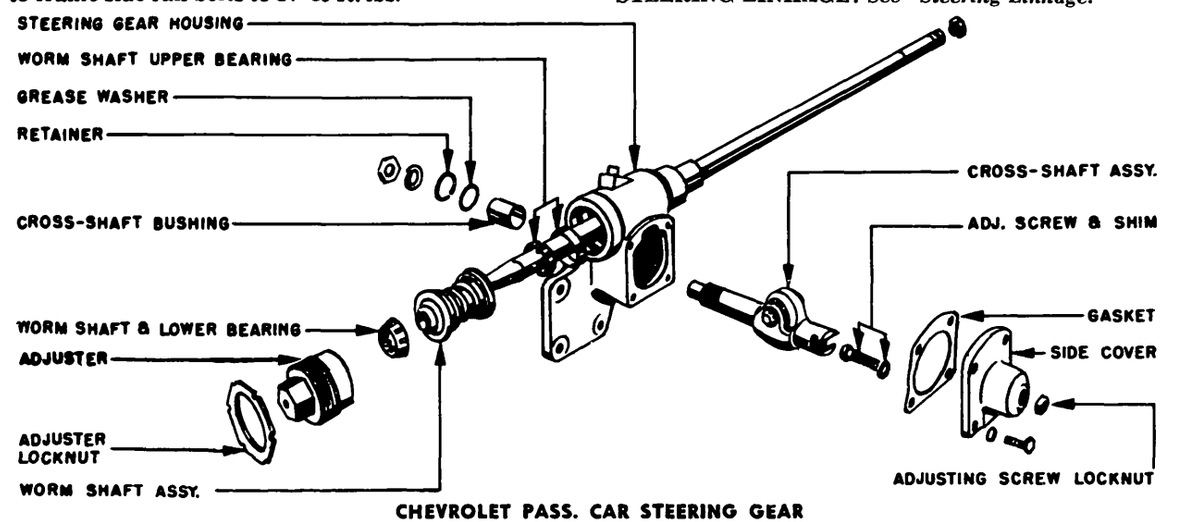
Sector Shaft Bushing & Packing Replacement—To replace bushing, press bushing, packing, and retainer out of housing in an arbor press using J-1614 driver. Press new bushing in place using same driver. Soak new packing in engine oil, install packing in retainer, press assembly into housing.

Wormshaft Bearing Cup Replacement—Use Mainshaft Bearing Cup Remover J-3183 to pull cup from steering gear housing and from worm bearing adjuster cup. Install new bearing cups with Bearing Cup Replacer J-3182 (install cup on tool and drive into place using great care not to crack cups).

Lash Adjuster Screw Clearance Adjustment—With screw and shim assembled in slot in end of sector shaft, check end clearance of screw in slot with a feeler gauge. If clearance greater than .002", adjust by installing shim of correct thickness.

Reassembly: Reverse disassembly directions given above.

STEERING LINKAGE: *See "Steering Linkage."*



CHEVROLET PASS. CAR STEERING GEAR

SAGINAW (STUDEBAKER) WORM & ROLLER

Studebaker, All Models (1952-55)

►*1953 STEERING REACH ROD LUBRICATION FITTING CHANGE (COMMANDER 4H, C, & K MODELS ONLY):* To make lubrication easier, a 90° fitting has replaced the straight fitting used on the steering reach rod of early production Commander 5-passenger coupe and hard-top. Should interference between the 90° fitting and frame side rail flange occur, install a straight fitting in place of the interfering 90° fitting.

DESCRIPTION: Hour-glass worm and roller sector type with worm gear on steering column shaft meshing with double-tooth roller on cross-shaft.

ADJUSTMENT: Two adjustments required (complete procedure must be followed). Proceed as follows:

Worm Shaft Endplay: Disconnect steering reach rod from pitman arm, loosen steering post jacket bracket-to-instrument panel bolts. Loosen lock nut and turn adjusting screw a few turns counterclockwise to remove load from worm shaft bearings. Turn steering wheel **gently** in one direction until stopped by gear, then back away one turn. Attach spring scale to rim of steering wheel, measure pull required to turn wheel. Pull tangent to rim of wheel should be 6-10 ozs. To adjust shaft bearing, loosen lock nut, turn bearing adjuster clockwise to increase drag and counterclockwise to decrease it. Tighten lock nut, recheck adjustment. Then tighten jacket bracket-to-instrument panel bolts, recheck adjustment to be sure bind was not imposed.

Worm & Roller Mesh (Backlash): Turn steering wheel **gently** through entire range of travel, carefully counting number of turns. Turn wheel back exactly half way to center position. Turn adjusting screw clockwise to take all lash in gear teeth, tighten locknut. Check pull at wheel with spring scale. Pull tangent to rim of wheel should be 14-30 ozs. If necessary, readjust screw to get proper pull.

STEERING WHEEL POSITION: Steering wheel center spoke (3 spoke type) should point straight down, or spokes should be horizontal (2 spoke type) with steering gear in straight-ahead position and on center high point.

STEERING WHEEL & HORN RING OR BUTTON REMOVAL:

1952-55 Champion (Custom & Deluxe): Removal —Remove horn button or ring by holding steering wheel stationary and turning button or ring 1/3 turn. Remove steering wheel nut, install puller J-5473, remove steering wheel.

1953-55 Champion, Commander (Regal), President Models: Removal—Pry horn button out of wheel, remove three screws in horn ring, remove ring and sponge rubber pad. Remove steering wheel nut. Install adapter in end of steering post, install puller J-5473, remove steering wheel.

Installation (All 1953-55): Align mark on steering wheel hub and mark on end of steering shaft, install wheel. Tighten retaining nut to 23-27 ft. lbs.

STEERING GEAR REMOVAL & INSTALLATION: Removal (1952-54)—Remove horn button assembly and steering wheel. Disconnect and remove battery, disconnect quadrant light cable and starter cut-out switch cables if equipped with Automatic Drive. Disconnect shift lever rod or rods, loosen jacket clamp bolt. Remove jacket bracket retaining bolts from instrument panel, loosen jacket bracket clamp screw and turn bracket to avoid hitting instrument panel when removing jacket. Slip steering jacket off steering post as an assembly into inside of car. Remove front seat cushion. Disconnect reach rod from pitman arm, remove steering gear housing-to-frame bolts. Tip upper end of steering post down, then remove steering gear assembly from engine side of cowl. Wrap cloth around top of housing to prevent spilling of lubricant. Lift housing end of assembly up and remove from chassis.

Installation—To install, reverse removal procedure.

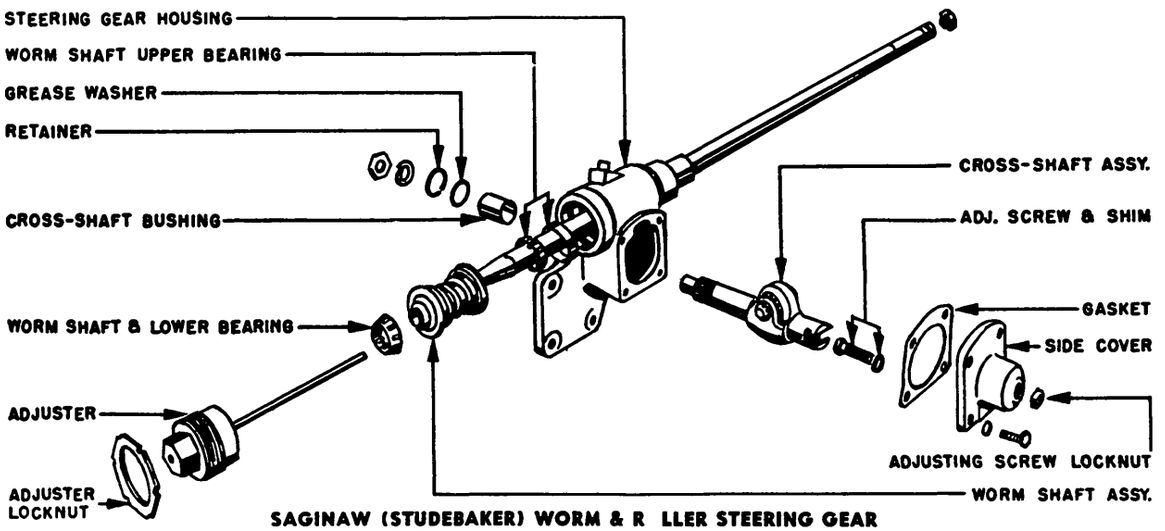
Removal (1955)—Disconnect battery and disconnect horn switch wire at connector. On Commander & President models, also disconnect battery cable at starter switch. On Commander and President Convertible (Hardtop) and Coupe models, remove battery and battery box. Remove steering wheel and steering post jacket assembly. *(NOTE*—Steering gear housing, steering post jacket, and steering wheel can be removed as an assembly. However, on Commander & President Convertible (Hardtop) and Coupe models, it will be necessary to remove left front engine support cushion and raise left front corner of engine approximately 2"). Remove pitman arm using puller J-5664, then remove steering gear housing-to-frame bolts and remove steering gear through hole in dash and into car.

Installation—To install, reverse removal procedure.

OVERHAUL (STEERING GEAR ASSEMBLY): Disassembly—Remove pitman arm retaining nut and lockwasher from cross-shaft. Punch locating marks on pitman arm and end of crossshaft, remove pitman arm. Remove adjusting screw locknut, then turn adjusting screw out one or two turns thereby relieving bushings and bearing of loads. Remove four side cover retaining screws and lockwashers, pull side cover and cross-shaft assembly from housing. If there is interference between housing and cross-shaft roller, turn cross-shaft slightly so that roller wil clear housing. Remove cross-shaft assembly from side cover by screwing adjusting screw through cover. Slide adjusting screw out of slot in end of cross-shaft, remove shim from adjusting screw. Remove worm shaft bearing adjuster assembly and worm shaft lower bearing. Mark directional signal cam and worm shaft for reassembly. Loosen two set screws which hold directional signal cam to upper end of worm shaft, remove cam. Pull worm shaft out of housing, remove worm shaft upper bearing. Pry grease washer retainer out of housing, remove grease washer. With arbor press, press cross-shaft bushing out of housing.

Reassembly: With arbor, press cross-shaft bushing into housing until outer end of bushing is 1/32" below shoulder of housing bore. Install upper bearing cup with hard wood block or lead mallet (avoid tilting in bore), bottom cup against shoulder of bore. Soak new grease washer in engine oil, install it in new retainer, then press retainer and washer into housing until retainer bottoms on shoulder of bore. Place worm shaft upper bearing on worm shaft, slide worm shaft assembly into housing. Upper and lower bearings are interchangeable when new, old bearings should not be interchanged. Install worm shaft lower bearings and bearing adjuster assembly. Adjust bearings so there is no end play. Install bearing adjuster lock nut. Place adjusting screw shim on adjusting screw, slide head of screw into slot in end of cross-shaft. Check clearance between head of screw and bottom of slot. Clearance should not exceed .002". If clearance too great, add next thickest shim (available in sizes .063", .065", .067", .069"). When clearance adjusted, start crossshaft into cover. Insert screwdriver through adjusting screw hole in side cover, screw adjusting screw through side cover as far as cross-shaft will go. Place new gasket on side cover, assemble cross-shaft and side cover to housing. Make sure there is clearance between worm and roller, install and tighten side cover retaining screw and lockwashers. Adjust cross-shaft so there is no clearance between roller and worm when roller on high spot, install adjusting screw locknut. Install pitman arm on cross shaft (marks aligned). Install pitman arm retaining nut and lockwasher, tighten nut to 90-100 ft. lbs. torque. Install directional signal cam on upper end of worm shaft (marks aligned), tighten set screws.

STEERING LINKAGE: *See "Steering Linkage"*



SAGINAW (STUDEBAKER) WORM & R LLER STEERING GEAR

TRANSMISSION—TRANSMISSION CONTROL—OVERDRIVE INDEX

TYPE OF EQUIPMENT

TRANSMISSIONS

SPICER — Page
- Transfer Case (Jeep) ... 2531

WARNER
- Transfer Case (Jeep) ... 2531
- 1946-55 (Without Overdrive) ... 2532
- 1946-55 (With R10 Overdrive) ... 2532

AUTOMATIC TRANSMISSIONS & DRIVES

- Chrysler Hydraulic (1946-48) ... 2664
- Dynaflow (1948-52) ... 2585
- Dynaflow (1953-54) ... 2600
- Dynaflow (1955) ... 2613
- Fluid Drive (1941-53) ... 2560
- Fluid-Matic (1949-53) ... 2667
- Fluid Torque Drive (Combined) ... 2672
- Fluid Torque Drive (Separate) ... 2674
- Fordomatic (1951-53) ... 2693
- Fordomatic (1954-55) ... 2709
- Gyromatic (1949-53) ... 2667
- Hydra-Matic (1946-51) ... 2729
- Hydra-Matic (1952-55) ... 2743
- Hy-Drive (1953) ... 2564
- Mercomatic (1951-53) ... 2693
- Mercomatic (1954-55) ... 2709
- Powerflite (1954-55) ... 2677
- Powerglide (1950-52) ... 2626
- Powerglide (1953-54) ... 2638
- Powerglide (1955) ... 2652
- Prestomatic (1949-53) ... 2667
- Studebaker Automatic (Detroit) ... 2797
- Super-Matic Drive (1950-51) ... 2577
- Tip-Toe Shift (1946-48) ... 2664
- Tip-Toe Shift (1949-53) ... 2667
- Turbo-Drive (1955) ... 2709
- Ultramatic (1949-54) ... 2775
- Ultramatic (Twin) (1954-55) ... 2786

OVERDRIVES

SPICER
- 2 Speed Transfer Case (Jeep) ... 2531

WARNER
- R9 ... 2535
- R10 ... 2538
- Special R-10 (1941-48 Lincoln) ... 2566
- Special R10 (1949-55 Ford, Lincoln, Mercury) ... 2570
- Special R10 (1952-55 De Soto, Dodge, Plymouth) ... 2563
- R11 ... 2540
- Chevrolet (1955) ... 2554

OVERDRIVE CONTROLS

WARNER
- R9 ... 2536
- R10 & R11 ... 2542
- Special R10 (1941-48 Lincoln) ... 2566
- Push Button (1952-53 Nash Ambassador) ... 2545
- Push Button (1954-55 Nash Ambassador & Statesman) ... 2546

CAR APPLICATION

	TRANSMISSION Page	TRANS. CONTROL Pag	OVERDRIVE Pag
BUICK			
1946-52 Series 40, 50	2548	2504	
1946-48 Series 70	2547	2504	
1953-55 Series 40	2548	2504	
1953-55 Series 50	2547	2504	
1948-52 (Dynaflow)	2585	2585	
1953-54 (Dynaflow)	2600	2600	
1955 (Dynaflow)	2613	2613	
CADILLAC			
1942-48 (Synchro-mesh)	2550	2505	
1949-53 (Synchro-mesh)	2550	2506	
1946-51 (Hydra-Matic)	2729	2729	
1952-55 (Hydra-Matic)	2743	2743	
1953 (Dynaflow)	2600	2600	
CHEVROLET (PASS. CARS)			
1946-48 (Synchro-mesh)	2551	2506	
1949-54 (Synchro-mesh)	2551	2508	
1950-52 (Powerglide)	2626	2626	
1953-54 (Powerglide)	2638	2638	
1955 (Synchro-mesh)	2553	2509	2554
1955 (Powerglide)	2652	2652	
1955 6 & 8 (Warner R10 & R11 O. D. Control)			2542
CHEVROLET (TRUCKS)			
1947 (4 Speed)	2559		
1947-55 (3 Speed)	2551	2508	
1948-55 (4 Speed)	2557		
1955 Late (3 Speed)	2553	2508	2554
1954-55 (3 Speed H.D.)	2556	2508	
CHRYSLER			
1946-53 (Fluid Drive)	2560		
1946-55 (Synchro-mesh)	2561	2510	
1946-48 (Automatic Trans.)	2664	2664	
1949-53 (Automatic Trans.)	2667	2667	
1951-53 V8 (Fluid Torque Drive, Separate)	2674		
1952-53 6 Cyl. (Fluid Torque Dr., Comb.)	2672		
1954-55 (Powerflite)	2677	2677	
CROSLEY			
1946-51 (Warner)	2532		
DE SOTO			
1946-55 (Synchro-mesh)	2561	2510	
1946-48 (Tip-Toe Shift)	2664	2664	
1946-53 (Fluid Drive)	2560		
1949-53 (Tip-Toe Shift)	2667	2667	
1952-53 V8 (Fluid Torque Dr., Comb.)	2672		
1952 V8 (Fluid Torque Dr., Separate)	2674		
1952-55 (Warner R10) Special			2563
1952-55 (Warner R10, R11 O.D.) Control			2542
1954-55 (Powerflite)	2677	2677	

CONTINUED N NEXT PAGE

TRANSMISSION—TRANSMISSION CONTROL—OVERDRIVE INDEX

CAR APPLICATION

	TRANSMISSION Page	TRANS. CONTROL Page	OVERDRIVE Page
DODGE			
1946-55 (Synchro-mesh)	2561	2510	
1946-54 (Fluid Drive)	2560		
1949-53 (Gyromatic)	2667	2667	
1953 (Fluid Torque Drive, Combined)	2672		
1953-55 (Warner R10) Special			2563
1953-55 (Warner R10, R11 O.D.) Control			2542
1954-55 (P werflit)	2677	2677	
FORD (PASS. CARS)			
1941-48	2564	2511	
1949-51 (Own Warner R10 O.D.)	2567	2511	2570
1952-55 (Own Warner R10 O.D.)	2569	2511	2570
1951-53 (F rdomatic)	2693	2693	
1949-55 (Warner R10, R11 O.D.) Control			2542
1954-55 (Fordomatic)	2709	2709	
FORD (TRUCKS)			
1941-47 ½-Ton (3 Speed)	2564		
1948-55 ½-Ton (3 Speed)	2571	2511	
1948-55 ½-Ton (3 Speed H.D.)	2573	2511	
1941-53 ½-Ton (4 Speed)	2564		
1941-47 ¾ & 1-Ton (3 Speed)	2564		
1948-53 ¾ & 1-Ton (3 Speed H.D.)	2573		
1941-52 F2, F3 (4 Speed Spur)	2574		
1953 F250, F350 (4 Speed S-M)	2575		
1950-52 Par. Del. ¾ & 1-Ton (3 Speed H.D.)	2573	2513	
1953-55 Par. Del.	2573	2511	
1953 F100 (Fordomatic)	2693	2693	
1954-55 F100, F250, F350, P350 (Fordomatic)	2709	2709	
1951-55 All (Exc. ½ & ¾ Ton) 4 Speed	2575		
1951-52 F4, F5, F6 (4 Speed & S.M.)	2575		
1953-55 F500, F600, F700 (4 Speed S.M.)	2575		
1952 F4, F5 (3 Speed H.D.) Opt.	2573		
1953 F500 (3 Speed H.D.) Opt.	2573		
FRAZER			
1947-51 (Warner R10 O.D.)	2532	2519	2538
194[illegible] (Warner R10, R11 O.D.) Control			2542
193[illegible] (Hydra-Matic)	2729	2729	
HENRY J.			
1951-54 (Warner R10 O.D.)	2532	2520	2538
1951-54 (Warner R10, R11 O.D.) Control			2542
HUDSON			
1941-47 (Own - Warner R9 O.D.)	2576	2516	2535
1946-49 (Warner R9 O.D.) Control			2536
1950-55 (Warner R10 O.D.) Control			2542
1948-52 (Own - Warner R10 O.D.)	2577	2517	2538
1948-51 (Drive-Master R10 O.D.)	2577	2514	2538
1950-51 (Super-Matic R10 O.D.)	2577	2514	2538
1950-51 (Hydra-Matic)	2729	2729	
1952-55 (Hydra-Matic)	2743	2743	
1952-54 (Warner R10 O.D.)	2532	2518	2538
1953-54 Jet (Warner R10 O.D.)	2532	2516	2538

CAR APPLICATION

	TRANSMISSION Page	TRANS. CONTROL Page	OVERDRIVE Page
HUDSON (Cont.)			
1955 Exc. Rambler	2532	2521	2538
1950-53 Rambler	2532	2522	2538
1953 Late, 55 Rambler	2581	2522	2538
1955 V8 (Ultramatic)	2786	2786	
JEEP			
1942-55 Transfer Case	2531		
1942-55 Transmission (Warner)	2532		
KAISER			
1947-50 (Warner R10 O.D.)	2532	2519	2538
1951-55 (Warner R10 O.D.)	2532	2520	2538
1947-55 (Warner R10, R11 O.D.) Control			2542
1951 (Hydra-Matic)	2729	2729	
1952-55 (Hydra-Matic)	2743	2743	
LINCOLN			
1941-48 (Own Warner R10 O.D.)	2564	2510	2566
1941-48 (Lincoln O.D.) Control			2566
1949-51 (Warner R10 O.D.)	2567	2512	2570
1941-51 (Warner R10 O.D.) Control			2542
1949-51 (Hydra-Matic)	2729	2729	
1952-54 (Hydra-Matic)	2743	2743	
1955 (Turbo-Drive)	2709	2709	
MERCURY			
1941-48	2564	2510	
1949-51 (Own Warner R10 O.D.)	2567	2512	2570
1952-55 (Own Warner R10 O.D.)	2569	2512	2570
1949-55 (Warner R10 O.D.) Control			2542
1951-53 (Mercomatic)	2693	2693	
1954-55 (Mercomatic)	2709	2709	
METROPOLITAN			
1954-55 (Nash & Hudson)	2579	2522	
NASH			
1941-46 Early Ambassador	2582	2520	
1946-48 Ambassador 6 (Warner R10 O.D.)	2582	2520	2538
1946-48 "600" (Warner R10 O.D.)	2581	2520	2538
1949 "600" (Warner R10 O.D.)	2581	2521	2538
1949 Early 4960	2582	2521	
1949-55 Ambassador (Warner R10 O.D.)	2532	2521	2538
1950-53 Rambler (Warner R10 O.D.)	2532	2522	2538
1953 Late, '54-55 Rambler (War, R10 O.D.)	2581	2522	2538
1946-55 (Warner R10 O.D.) Control			2542
1950-55 Statesman (Warner R10 O.D.)	2581	2521	2538
1952-53 Ambassador (O.D. Push Button Control)			2545
1950-51 (Hydra-Matic)	2729	2729	
1952-55 (Hydra-Matic)	2743	2743	
1954-55 Amb. & Stsmn (O.D. Push Button Control)			2546
1955 Nash V8 (Ultramatic)	2786	2786	

C NTINUED ON NEXT PAGE

TRANSMISSION—TRANSMISSION CONTROL—OVERDRIVE INDEX

CAR APPLICATION	TRANSMISSION Page	TRANS. CONTROL Page	OVERDRIVE Page
OLDSMOBILE			
1940-48 6 & 8 (Synchro-mesh)	2548	2523	
1946-51 (Hydra-Matic)	2729	2729	
1952-55 (Hydra-Matic)	2743	2743	
1949-50 6 (Synchro-mesh)	2548	2523	
1949 8 (Synchro-mesh)	2548	2523	
1950 8 (Synchro-mesh)	2550	2524	
1951-55 8 (Synchro-mesh)	2547	2522	
1953 (Dynaflow)	2600	2600	
PACKARD			
1940-49 (Warner R9 O.D.)	2584	2525	2535
1941-48 (Warner R9 O.D.) Control			2536
1949-50 (Warner R11 O.D.)	2584	2525	2540
1951-55 (Warner R11 O.D.)	2584	2524	2540
1949-55 (Warner R10, R11 O.D.) Control			2542
1949-54 (Ultramatic)	2775	2775	
1954-55 (Ultramatic) Twin	2786	2786	
PLYMOUTH			
1946-55 (Synchro-mesh)	2561	2510	
1952-55 (Warner R10) Special			2563
1952-55 (Warner R10 O.D.) Control			2542
1953 (Fluid Torque Drive)	2672		
1953-54 (Hy-Drive)	2564		
1954-55 (Powerflite)	2677	2677	

CAR APPLICATION	TRANSMISSION Page	TRANS. CONTROL Pag	OVERDRIVE Page
PONTIAC			
1946-52 (Synchro-mesh)	2548	2525	
1948-51 (Hydra-Matic)	2729	2729	
1953-55 (Synchro-mesh)	2548	2526	
1953 (Powerglide)	2638	2638	
1952-55 (Hydra-Matic)	2743	2743	
RAMBLER			
1950-53	2532	2522	2538
1953 Late, '54-55	2581	2522	2538
1950-53 (Warner R10 O.D.) Control			2542
STUDEBAKER			
1946 Champion	2532	2527	
1947-50 (Warner R10 O.D.)	2532	2527	2538
1950-55 (Automatic Transmission)	2797	2797	
1951-52 (Warner R10 O.D.)	2532	2528	2538
1953-55 (Warner R10 O.D.)	2532	2529	2538
1947-55 (Warner R10, R11 O.D.) Control			2542
WILLYS			
1946-55 Jeep Transmission (Warner)	2532		
1946-55 Jeep Transfer Case	2531		
1946-55 (Warner R10 O.D.)	2532	2530	2538
1946-55 (Warner R10, R11 O.D.) Control			2542
1953-55 (Hydra-Matic)	2743	2743	

1946-55 BUICK

1946-55, All Series with Synchro-mesh Trans.

▷*NOTE—This control not used with Dynaflow Drive.*

DESCRIPTION: Remote control type with steering column mounted gearshift lever. Design used on these cars has following features:

Gearshift Lever—Lever pivot or bearing formed in housing by fabricated bushing installed in inserted bearing seat and held in place by control housing cap or nut.

Control Shaft—Consists of a tube concentric with steering gear shaft with lower lever welded in place on lower end of tube and control lever housing keyed and clamped on upper end of tube. Tube is mounted on bearing in steering gear housing at lower end and on metal and fabric bearing in direction switch housing at upper end.

Selector Rod—Consists of a square rod within the steering column jacket which is pinned to the selector control lever pivoted on the steering column jacket at the lower end of the rod.

Steering Gear Jacket—Two piece type with flanged slot at point where control shaft lower lever emerges. Upper section has mounting bracket for selector control lever and thrust washer assembly consisting of upper fabric and lower plain steel washer for control shaft end thrust installed in lower end. Lower section has bearing for lower end of shift rod and shedder to exclude dirt.

ADJUSTMENT: Adjust selector control rod and shift rod separately as directed below.

▷*CAUTION*—Inspect all rubber insulations in shift levers and replace if worn. Make certain that selector rod and shaft in transmission moves freely and that return spring has sufficient tension to pull selector control up so that gear shift control lever held down on second speed side.

Selector Rod—Shift transmission to neutral. Disconnect selector rod at selector control lever on steering column, move rod to rear as far as possible, adjust trunnion position on forward end of rod so that trunnion pin engages bushing in selector control lever without disturbing position of lever or gearshift lever, connect rod with fiber washer on each side of insulator, install cotter pin.

Control Shaft Shift Rod — Shift transmission to Second Gear position, disconnect lower adjustable shifter rod at idler lever on steering column, loosen locknut at adjusting clevis on forward end of rod, pull forward on rod to insure full engagement of transmission gears. Adjust clevis on rod so that clearance between shift control lever and upper edge of opening in steering column jacket is ⅛" with rod connected to lever. Tighten locknut and connect rod. Shift transmission gears to Third Gear position, check clearance between shift control lever housing and lower edge of opening in steering column jacket is likewise ⅛".

▷*CAUTION—This clearance of approximately ⅛" must be maintained between control lever housing and column jacket in each of the gear positions.*

DISASSEMBLY: Gearshift Lever & Bearing. Remove housing nut, withdraw lever, bearing, and bearing seat. When installing lever, see that new bearing installed with large diameter toward lever knob, and that anti-rattle grommet installed in groove on inner end of lever. Coat inner end of lever and socket in selector rod with Lubriplate, see that plunger spring and plunger in place in upper end of selector rod. After lever installed, tighten housing nut securely so that shoulder in nut seats against flange on bearing seat to lock seat in place.

Shifter Rod Idler Lever: Idler lever on steering column is fitted with a bushing and pivots on a bolt on the idler lever bracket. When installing lever, make certain that spring washer and plain washer are in place between lever bushing and head of bolt to prevent rattles. Lubricate idler lever at regular intervals (lubricant fitting on bolt).

REPLACEMENT OF SHIFT CONTROL (Steering Column Units): Gearshift lever and bearing, and control shaft upper bearings can be replaced without removing steering gear. Replacement of selector rod, control shaft, or lower bearings require removal or loosening of steering gear to provide access for column jacket removal.

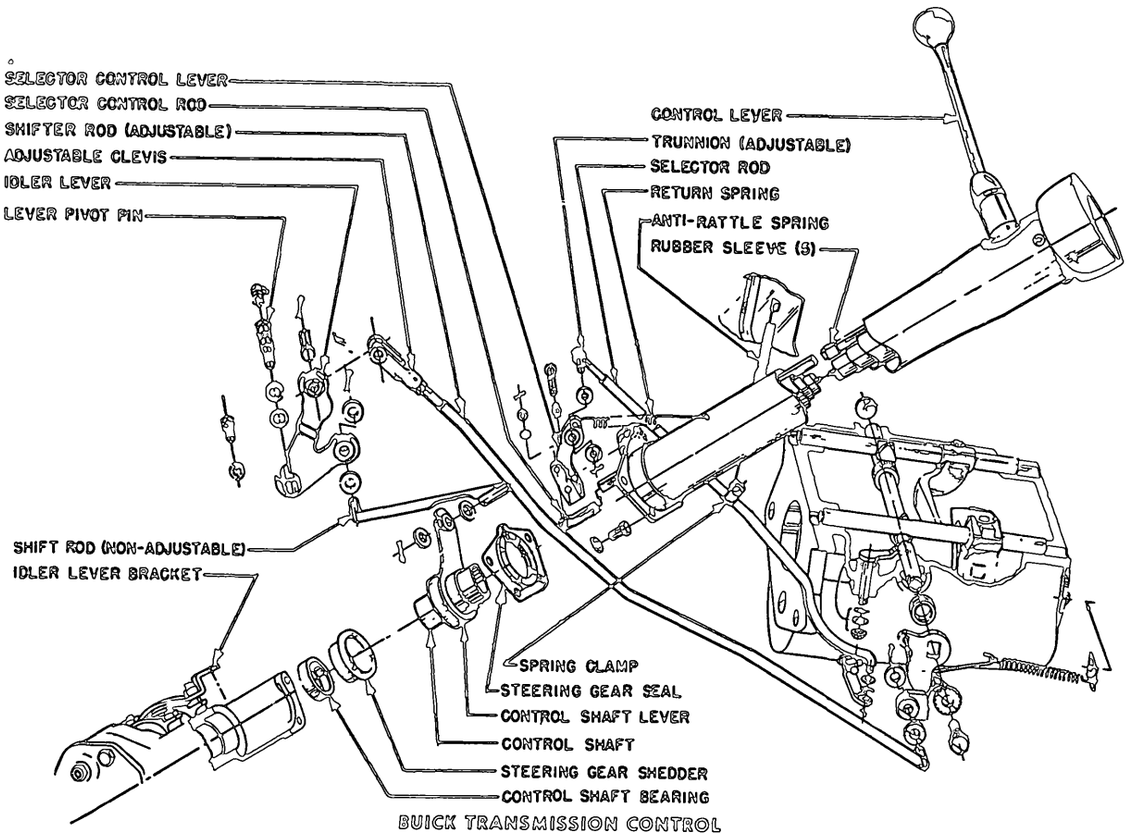
Control Shaft Upper Bearing: Metal and fabric bearing pressed on upper end of control shaft lever housing in directional switch housing with a flat fabric upper thrust washer, plain steel washer, and spring washer assembled above bearing in that order. To replace bearing, first disconnect all Direction Signal Switch wires at terminals on instrument panel, remove steering wheel (see Steering Gear data), steering shaft upper bearing spring and spring seat. Remove direction signal switch housing from steering column jacket (pull wires up far enough in jacket so that underside of switch housing is accessible for work). Pry out old shift control shaft bearing from bottom of switch housing, withdraw thrust washer, plain washer, and spring washer. Inspect and re-install or replace these parts, then install new control shaft bearing using Replacer J1585 (1949 and before) or piece of heavy wall 1 11/16" O.D. tubing (1950-55) to drive bearing in housing.

▷*CAUTION—Use care not to score bearing (relatively soft fabric type) which will cause hard shifting.*

Control Shaft Lower Bearing: Bushing pressed in upper end of the steering column lower mast jacket with a flanged shedder pressed in the housing above the bearing (shedder fits within cup formed on lower end of control shaft lower lever so that dirt and water excluded from bearing). To replace this bearing with steering gear removed and disassembled (see Steering Gear data), use Remover J1583 to remove old bearing from upper end of steering gear housing, install new bearing with Replacer J1587 (1949 and before) or piece of heavy wall 1⅝" O.D. tubing (1950-53) to drive bearing in housing.

▷*CAUTION—Use care not to score bearing (relatively soft fabric type) which will cause hard shifting.*

TRANSMISSION CASE SHIFTER MECHANISM: *See Buick-Olds-Pontiac Synchro-mesh Transmission.*



BUICK TRANSMISSION CONTROL

1942-48 CADILLAC

All Series (1942-48) With Synchro-mesh Trans.

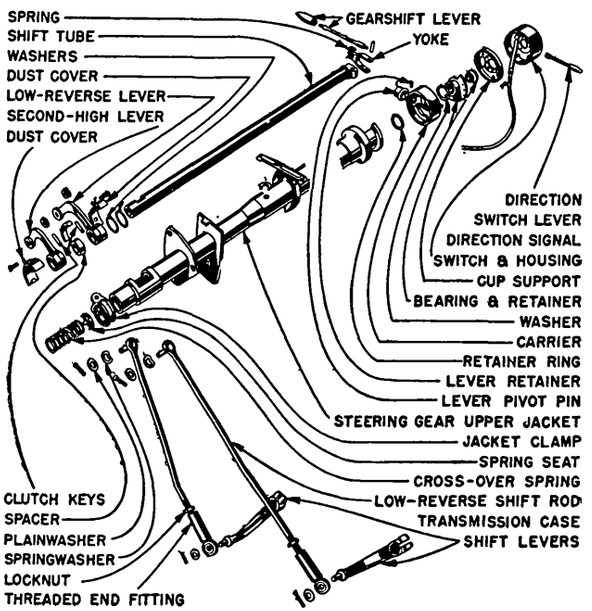
►**HYDRA-MATIC DRIVE NOTE**—See separate article on Cadillac Hydra-matic Drive for adjustment directions on control lever and linkage used on cars with Hydra-matic Drive. Data below applies to cars with Std. 3 speed transmission only.

DESCRIPTION: Remote control type with steering column mounted gearshift lever. Gearshift lever is pivoted in carrier mounted on upper end of steering jacket and engages shifter tube within steering gear jacket (jacket is notched out for shifter levers on lower end of shifter tube). A single shifter tube is used and normally engages Second-High shifter lever (lower lever) being held in this position by the cross-over spring installed in the jacket at the lower end of the shifter tube. Raising up on gearshift lever causes shifter tube to move down in jacket so as to engage Low-Reverse shifter lever (upper lever). Engagement is by means of shifter keys which engage the levers and tube (keys separated by spacer on tube). Rods connecting shifter levers on steering column and shifter shaft levers on transmission case are adjustable.

ADJUSTMENT: Place gearshift lever in neutral position on Second-High side (normal position). Disconnect Low-Reverse shifter rod at lever on transmission case (rear lever), adjust length of rod so that gearshift lever can be lifted freely into Low-Reverse position with rod connected and without disturbing neutral position of transmission shifter lever and shaft. Adjust Second-High shifter rod (connected to forward lever on transmission case) in same manner. With correct adjustment, cross-over at neutral from Low-Reverse to Second-High positions of gearshift lever should be made freely and without disturbing neutral position of transmission gears and shifter shaft levers.

DISASSEMBLY (1942-47): Loosen clamp holding lower steering column jacket to upper jacket, remove steering gear column and lower jacket as a unit. Remove cross-over spring, seat, and washer from upper end of lower jacket. Remove 4 screws holding Direction Signal Switch and housing in cup support, pull switch, feed wire, and housing off cup, take out 4 Phillips Head screws holding cup and retainer on jacket flange, remove cup. Remove dust shields on lower shifter levers, remove bolts holding cross-over keys in position and slide keys toward outer ends of levers, remove metal dustcover between keys. Slide bearing retainer carrier and shift tube out through upper end of jacket as an assembly. Remove spacer bushing between shifter levers, pull Second-High lever up until lever bushing clears lower edge of slot in jacket, remove lever. Push Low-Reverse lever down until lever bushing clears upper edge of slot in jacket, remove lever. Remove two anti-rattle spring washers from Low-Reverse lever bushings, slide cross-over keys out of slots in both levers. Remove rubber trim pad and insulator from steering column jacket. Remove carrier and bearing retainer from end of shift yoke on upper end of shifter tube, remove retainer ring holding bearing retainer to carrier and remove bearing retainer with bearing and thrust washer.

DISASSEMBLY (1948): Remove steering wheel. Remove upper bearing spring and seat, and cap over end of selector lever at carrier. Drive pin out of carrier boss, remove selector lever. Unscrew and remove direction signal lever. Remove steering column cover panel. Disconnect direction signal switch leads at connectors near steering jacket. Take out four screws, pull switch, wires and housing off cup support (CAUTION—Attach string to wires at lower end housing before pulling wires out, string can be used to pull wires back in). Remove four screws mounting cup support and bearing retainer on jacket flange, remove cup support. Disconnect horn wire at terminal on steering jacket. Remove dust shields over lower shifting levers, and dust cover between levers. Remove bolts holding cross-over keys in levers, slide keys toward outer end of levers. Slide bearing retainer carrier and shift tube out of steering jacket upper end as a unit. Disconnect control rods from shift levers at lower end of steering column, loosen clamp holding lower and upper steering jackets. Raise front end of car and disconnect rod at pitman arm. Take out steering gear mounting bolts. Lower steering gear housing and shaft out of car. Remove spacer bushing between shift levers. Pull Second-and-High lever up until lever bushing clears slot in jacket, remove lever. Push Low-and-Reverse lever down until lever bushing clears slot in jacket, remove lever, remove two anti-rattle spring washers from lever bushings. Remove carrier and bearing retainer from end of shift yoke on upper end of shift tube. Remove retaining ring holding bearing retainer to carrier and remove retainer with bearing and thrustwasher.



CADILLAC 1942-48 TRANSMISSION CONTROL

REASSEMBLY (ALL CARS): Reverse disassembly directions (above) and note the following points when assembling shifter mechanism:

Shift Lever Cross-over Keys—Install keys with tapered ends toward jacket end of levers and with small ends of tapers toward bottom of lever slots.

Low-Reverse Lever Anti-rattle Springs—Install both washers so that they are nested together with concave side up toward upper end of jacket.

Shifter Lever Endplay—After installing shift levers and spacer bushing, check for endplay in levers and remove excessive play by installing shims.

Steering Jacket (1942-47): When installing upper jacket and steering mechanism, see that upper jacket laps over lower jacket approximately 1½", tighten clamp snug but not tight.

Steering Wheel Clearance (1948): When installing steering wheel and horn ring, see that clearance between top of housing and face of wheel hub is 1/16-3/32" (standard wheel). Clearance between top of housing and bottom of horn ring should be 1/32" (Special wheel), when horn ring is depressed so that it strikes steering wheel spoke.

Shifter Rod Connection—Rods should be installed on top of lever with two anti-rattle washers nested together with convex side up (install washers on bottom side of lever).

TROUBLE SHOOTING: If transmission gear engagement not satisfactory, check as follows:

Hard Shifting Complaints:

(1) Check and adjust shift linkage.

(2) Check clutch pedal free play adjustment (set for minimum free travel of 7/8" if clutch dragging). If clutch still drags, check for warped driven member and binding of driven member on shaft.

(3) Check transmission for damaged or tight gears, worn synchronizing drums, broken synchronizer detent springs.

Slipping out of Gear Complaints:

(1) Check and adjust shift linkage. See that control rod rubber bushings not binding (bronze-lined rubber bushings at outer ends of shift levers must not bind on levers—disassemble levers, free bushings, lubricate thoroughly with Lubriplate).

(2) Check Second-speed gear for looseness on shaft or wear in gear or clutch sleeve (slipping out of Second Gear).

(3) Check for misalignment of transmission mounting screw holes, warped or misaligned flywheel housing or transmission case, shim mounting if matching faces run-out more than .003" (slipping out of High Gear).

1949-53 CADILLAC

ALL SERIES (1949-53) with Synchro-mesh Trans.

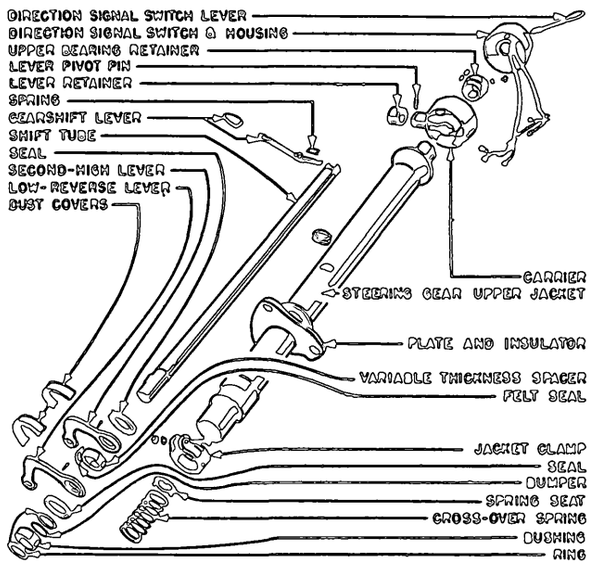
▷HYDRA-MATIC DRIVE NOTE—Data below applies only to cars with 3-speed synchro-mesh transmission. *See Cadillac Hydra-Matic Drive Transmission for Hydra-Matic Drive control linkage adjustment.*

DESCRIPTION: Remote control type with steering column mounted gearshift lever. Design changed from type used on previous models and new shifter tube and new shift levers are used. Shifter tube has single engaging key which engages keyway in Second-High (upper) or Low-reverse (lower) shift lever. Tube is normally held in upper Second-High position by cross-over spring at lower end and is moved down to engage Low-reverse lever by lifting up on gearshift lever (key disengages from one lever in picking up the other lever).

▷*CAUTION—Shifter levers on steering column are reversed from position on previous car models (Second-High UPPER lever, Low-Reverse LOWER lever).*

ADJUSTMENT: With gearshift lever in Neutral, lift lever up to mid-point of cross-over travel and wedge lever in this position by inserting screw-driver blade between shift lever and pivot pin retainer. Disconnect both shift rods at levers on side of transmission case, see that transmission levers are in neutral position (can be determined by feel of detent engagement). Adjust threaded ends on both shift rods so that rods can be connected without disturbing lever positions, connect rods. Remove wedge from gearshift lever and check lever "feel" at neutral cross-over. If any interference is felt in cross-over position, re-adjust Low-reverse rod slightly (approximately ½-2 turns) until clean cross-over is secured.

DISASSEMBLY: Remove steering wheel (see Steering Gear data), remove upper bearing spring and seat. Unscrew and remove gearshift lever retainer cap, place lever in neutral position, drive pin out of lever boss on carrier, withdraw gearshift lever. Unscrew and remove direction switch lever, disconnect direction signal feed wires at connectors near steering column, attach fishing wire to these feed wires (pull fishing wire into column as feed wires pulled out and leave this wire in column for use in re-installing feed wires). Take out four screws retaining direction signal switch and housing on upper bearing retainer, pull switch feed wires and housing off. Take out three capscrews retaining carrier assembly on jacket, remove carrier, remove bearing and retainer by rotating them counter-clockwise. Remove cotter pins and dustcovers from lower shifter levers on steering column, remove felt dust seal, slide shifter tube up and out of upper steering column jacket. Disconnect shifter levers from control rods, loosen clamp holding upper and lower steering column jackets. Raise front end of car, disconnect steering rod at pitman arm, take out steering gear-to-frame bolts. Lower the steering gear housing and shaft (with cross-over spring and seat) out of steering column. Lift low-reverse lever out of jacket, remove fiber spacer from between levers, turn second-high lever for clearance and remove from slot in jacket. Remove felt washer from recess above and below shift lever opening in jacket. Inspect lower bushing, bumpers, and washers for wear and remove and replace if necessary.



1949-53 CADILLAC TRANSMISSION CONTROL

REASSEMBLY: Install all parts in reverse order of disassembly as given above and note the following precautions and adjustments:

Sealing Ring & Shifter Lever Lubrication—Saturate rings with engine oil and lubricate levers with Lubriplate before installation

Fiber Spacer Installation—Lubricate spacer before installation, see that notch in spacer in line with back edge of levers (to align slot in spacer with slots in levers to permit key on shift tube to be entered when tube installed) and make certain notched face of spacer is toward low-reverse lever.

Endplay Adjustment (Lower End Assy.)—After fiber spacer installed (above), check endplay of lower end assembly. If greater than .005", select and install thicker spacer No. 1455215—.585", 1455216—.591", 1455217—.597", 1455218—.603".

Upper Bearing Retainer—Lubricate retainer threads with Lubriplate, screw retainer into carrier until top face of retainer is 21/32" above shoulder on rim of carrier, install carrier over shift tube so that shoulder on retainer seated against upper end of outer jacket, tighten retainer screws to 7-9 ft. lbs.

Gearshift Lever Bumper Screw Installation & Adjustment—With gearshift lever installed and ball end of lever engaged in hole in upper end of shift tube, depress lever until shift tube key clears low-reverse lever, rotate lever so that keyway is out of line with key, pull up on gearshift lever until key contacts face of low-reverse lever. Install rubber bumper in bumper screw (bumper must be completely seated in screw), turn screw in until bumper just contacts pad on lever (check by shaking outer end of lever and tightening screw until all longitudinal play eliminated), then back off screw ½-turn and lock screw by staking carrier metal into screw slot.

Steering Wheel Clearance—Clearance between top of housing and face of standard steering wheel hub should be 1/16-3/32". On special steering wheel, clearance between top of housing and bottom of horn ring should be 3/16" with horn ring depressed so that it strikes steering wheel spoke.

1940-48 CHEVROLET

All Pass. Cars & Sedan Del. (1940 to 1948)

▷CHANGES, CAUTIONS, CORRECTIONS

▷Gearshift Lever Rattle Correction: Caused by play at swivel in upper support and should be correct as follows: Install special Gearshift Control Anti-rattle Spring, #606418, by snapping spring over gearshift control shaft and steering mast jacket at point immediately below instrument panel mast jacket clamp. This 'S' shaped spring will correct rattle without causing drag on control shaft.

▷Gearshift Lever Flutter (Idle or High Speed) Correction—May cause jumping out of High Gear at high speed. To correct, install Vacuum Cyl. Valve Friction Spring, No. 3655072, as follows: Slip forward end of rubber boot off rear end of metal boot over reactionary levers, take out two bolts fastening halves of metal boot together and remove top half. Remove piston rod yoke clevis pin and disconnect piston rod yoke and valve link from reactionary levers. Pull out vacuum cylinder valve rod, snap friction spring in place on rod about midway between valve and valve rod guide with spring 'prongs' pointing out toward clevis pin yoke, reassemble rods and boot.

▷Cabriolet Cars (1941-42) Vacuum Cylinder Tubing. An "S" shaped piece of tubing was used to connect vacuum lines near the X-member to prevent interference and damage to vacuum line at this point on these models only and rubber hoses must be cemented to this tube (no cement used on first 1941 cars). When installing units, use sufficient cement (Chevrolet #378727—Meiflex or U. S. Rubber Cement Type M-5036, #121177—Inter-coastal SMR-2218) to provide good seal at both ends of tube and rotate tube so that no interference exists before cement sets.

CAUTION—Cement tube on all early 1941 cars which were not cemented in production.

DESCRIPTION

DESCRIPTION: Vacuum assistor, with gearshift lever mounted on steering column and vacuum power cylinder mounted on bracket at left side of transmission case. Design changed from type used on 1939 models as follows (new vacuum cylinder mounting used on 1942 and later models only):

Gearshift Lever (Steering Column Unit)—One shaft only is used (in tubular housing on steering column) and operates both selector (cross-shift) rod and gear engagement (vacuum cylinder) rod. Gearshift lever is new type and lifts up on control shaft when lever lifted into Low-Reverse position.

Vacuum Cylinder & Linkage—Reactionary lever assembly now riveted together and covered by metal boot. Mounting changed to provide for new type side-mounted transmission shift mechanism. Vacuum cylinder operates in same manner as 1939 type.

Transmission Case Shifter Mechanism—New type shifter mechanism mounted in side cover on transmission case. See Chevrolet Transmission article for shifter servicing data.

CONTINUED ON NEXT PAGE

1940-48 CHEVROLET (C nt.)

ADJUSTMENT: If operation unsatisfactory or shift mechanism dismantled for servicing, adjust as follows:

Selector Rod—Loosen check nut on selector rod adjustment (at lower end of steering column), pull selector rod forward as far as possible, adjust swivel on rod by screwing it up or down on rod so that distance between lower side of steering wheel and top of gearshift lever is 1 27/32" with selector rod connected to selector control lever. Install washer and cotter pin on swivel pivot and lock adjustment by tightening selector rod check nut.

Control Rod (Gear Engagement Rod)—Set gearshift lever in horizontal position, loosen checknut on control rod. Push control rod to rear until all clearance has been taken up and note location of swivel with reference to shift control lever, then pull rod forward until all clearance has been taken up and again note swivel location. Neutral valve position is midway these two positions. Hold control rod in this neutral position, adjust swivel position on control rod (screw swivel up or down on rod) until swivel pivot just enters hole in shift control lever. Install flat washer and cotter pin on swivel pivot, lock adjustment by tightening control rod check nut.

STEERING COLUMN UNIT DISASSEMBLY & REASSEMBLY: The gearshift lever can be removed without completely disassembling unit as follows:

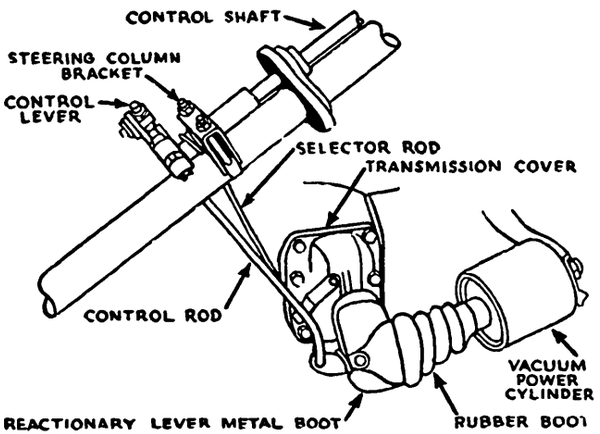
Gearshift Lever Removal—Place shift lever in Reverse, depressing pivot pins 3/32" and then lifting up and out on lever. To remove anti-rattle spring and pivot pin spring, compress legs of pivot pin spring and lift up. When reassembling gearshift lever, coat control shaft ball with graphite grease, install anti-rattle spring in control shaft ball and over neck of control shaft, thread pivot pins on ends of spring and in holes in gearshift lever swivel, thread gearshift lever over this assembly, compress pivot pins and press down on top of lever until pivot pins snap into place.

Disassembly—Disconnect gear engagement control rod and selector rod at lower end of steering column by taking out cotter pins and removing flat washers. Remove clamp bolt on shift lever at lower end of control shaft, remove lever and spring. Remove horn button and steering wheel nut, pull steering wheel (use puller J-1618 to protect shaft threads). Remove instrument panel steering column jacket clamp. Take out two screws in upper support on steering column jacket, pull control shaft and upper support up and out of lower support. If gearshift lever to be removed, see preceding paragraph for directions.

Lower Support Bushing Servicing—If bushing worn, press old bushing out, press new bushing in until distance from face of support to lower end of bushing is 19/64".

Reassembly—Screw gearshift lever swivel into upper support until shoulder on swivel extends approximately ⅛" above support. Install control shaft by threading it through upper support and swivel. Install gearshift lever (see above). Install lower support on steering column jacket and see that key engages slot, tighten clamp bolts just snug (excessive tightening will collapse jacket). Screw upper support up or down on swivel until clearance between lower edge of gearshift lever and top of support is 3/32-⅛". Thread toeboard grommet over control shaft, install control shaft through lower support and attach upper support to steering column by installing two screws. Install spring and lever on lower end of control shaft making certain that end of selector operating lever is engaged in slot on control shaft lever, install clamp bolt and tighten securely. With steering wheel removed, check distance from top of horn blowing ring on mast jacket to top of shoulder on steer-gear shaft. Distance should be 1¼" (plus 1/32", minus 0"). If not correct, loosen mast jacket clamp at steering gear housing, move mast jacket up or down as required, tighten clamp. Adjust Control Rod and Selector Rod (see Adjustment above). Check distance from upper face of control shaft lever to lower face of lower support bracket on steering column. If this distance not ¾", adjust by loosening lower support clamp bolts and moving support up or down on steering column.

CAUTION—Do not tighten support clamp bolts excessively which will collapse steering column jacket.



TRANSMISSION LEVER LINKAGE DISASSEMBLY:

Note—Reactionary lever assembly is of riveted construction and cannot be disassembled (service as an assembly).

Disassembly—Disconnect shift control rod from reactionary lever assembly, remove vacuum hose from vacuum inlet stack and slip forward end of rubber boot off rear end of metal boot. Remove two screws holding metal boot halves together, lift off outer half of boot. Take out piston rod yoke clevis pin, push cylinder rod into cylinder to disconnect it from reactionary lever, then re-install clevis pin to prevent valve adjustment being disturbed. Loosen operating lever clamp bolt, pull reactionary lever assembly off operating lever shaft, remove second half of metal boot.

Servicing—Clean reactionary lever assembly with clean gasoline, examine rubber seal at front of metal boot and replace if damaged.

Reassembly—Coat reactionary levers lightly with graphite grease, place inner half of metal boot on operating lever shaft, thread rubber seal over idler lever, install reactionary lever assembly on operating lever shaft to point just beyond chamfered end of shaft and tighten clamp bolt. Pull piston rod forward and connect yoke and valve link to reactionary levers, install piston rod valve clevis pin. Assemble outer half of metal boot and install the two retaining screws. Slip end of rubber boot over rear end of metal boot, install vacuum hose and shift control rod.

VACUUM CYLINDER REMOVAL: Disconnect both the vacuum and air hoses, remove outer half of the metal boot and disconnect piston rod and valve links from reactionary levers (see Servicing Transmission Lever Linkage above for directions). Take off cotter pin and nut on cylinder mounting stud, remove vacuum cylinder.

Installation—Install rubber cushion and steel retainer on mounting stud, insert stud through hole in bracket, install steel retainer, rubber cushion, flat washer and nut on stud, tighten nut just sufficiently to allow cotterpin to be installed (mounting must be flexible). Connect piston rod yoke and valve link to reactionary levers, install vacuum and air hoses.

Vacuum Cylinder Lubrication:—Must be removed from car as directed above (cannot be lubricated on car). Stand the cylinder on the mounting end, pull valve link forward to open valve, pour ½ oz. shock absorber insulating fluid into cylinder through vacuum inlet stack. Push valve rod into cylinder as far as possible, pour additional ½ oz. of fluid into vacuum inlet stack. Allow time for fluid to flow into cylinder, then work piston rod in and out several times and turn rod at same time to spread fluid over cylinder walls and piston leather. NOTE—Cylinder can be washed out by following directions given above using 2 ozs. of fluid and draining fluid by inverting cylinder and moving valve rod until fluid flows out. Repeat until fluid drained from cylinder is clean (cylinder need not be lubricated after this process completed).

Vacuum Cylinder Valve Adjustment:—If vacuum valve adjustment disturbed by dismantling or servicing operations, adjust as follows: Disconnect piston rod and valve link from reactionary levers (see Servicing Transmission Lever Linkage above for directions). Install special adjusting bushing J1452-5 within valve link and re-install clevis pin. Run engine to provide vacuum source. Move valve link out or away from cylinder until all clearance between link and adjusting bushing is toward front of car, piston rod should move out of cylinder slowly in this position. Then move link in toward cylinder until all clearance between link and adjusting bushing toward rear of car, piston rod should move into cylinder in this position. If piston rod moves out but does not move in, valve link should be screwed out on valve rod. If piston rod moves in but does not move out, valve link should be screwed in on valve rod. To adjust, remove clevis pin and change valve link position ½ turn at a time until correct operation is secured.

Valve Friction Spring Installation:—To install spring, remove outer half of reactionary lever boot and disconnect reactionary levers from vacuum cylinder (see Transmission Lever Linkage Disassembly directions above), pull out on valve rod in vacuum cylinder, snap friction spring in place on rod midway between valve and valve rod guide with closed end of spring toward back of cylinder, push valve rod back into place, connect reactionary levers and replace metal boot.

NOTE—This spring necessary to prevent 'flutter' in gearshift lever at idling speed.

Air Clean r Servicing:—At 10000 mile intervals, remove cleaner, wash in gasoline, and dip in engine oil before re-installing.

1949-54 CHEVROLET PASS. CARS & 1947-55 TRUCKS

Pass. Cars (1949-54) Synchro-mesh Trans.
Half-Ton & ¾-Ton Trucks (1947-55)
Forward Control Trucks (1948-55)

▷POWER GLIDE AUTOMATIC TRANSMISSION NOTE—Control linkage is adjusted differently. *See Chevrolet Powerglide Automatic Transmission data for linkage adjustment.*

▷GEARSHIFT CONTROL LEVER RATTLE (Early 1949 Pass. Cars): Rattles in High Gear position, or on deceleration in 50-30 MPH. range, may be corrected as follows:

High Gear Rattle Correction—Check fit of shift lever on threaded swivel. If loose, remove lever and squeeze sides together for snug fit on swivel.

Deceleration Rattle—If lever snug fit on swivel (above) and rattle persists, replace original Part No. 3686805 Control Shaft Spring with new type spring No. 3692295. This spring is installed in gearshift control shaft housing at lower end of steering mast jacket ahead of dash and is hooked over second-and-high control lever to steady control lever in high gear and to counterbalance gearshift lever.

DESCRIPTION: Remote control type with gearshift lever mounted on steering column. Gearshift lever is pivoted in mounting bracket on upper end of steering column and has engaging dog or lug on lower end of control shaft which engages one or the other of the two "inner levers" in the housing at the lower end of the steering column.

Passenger Car Gearshift Control & Shifter Mechanism: Gearshift control is manual type (no vacuum cylinder) of same design as used on truck models. Control levers on lower end of steering column unit are linked directly to shifter levers on transmission case and no idler bell crank used. Shifter mechanism on transmission case is new type with individual shifter levers and shafts for Low-Reverse and Second-High speeds (see illustration).

Forward Control Truck Gearshift Control & Shifter Mechanism: Same design as other trucks (above) except that both control rods have idler bell cranks mounted on flywheel housing.

GEARSHIFT CONTROL ADJUSTMENT: Adjust all models as follows:

▷Dubl-Duti (Forward Control) Adjustment Note—Front floor pan must be removed for access to control rod swivels as follows: Take out pan attaching screws, disconnect wiring to stop light switch, disconnect accelerator pedal rod, remove pan.

1—Clearance between lower edge of steering col. shift lever and top edge of upper support below lever should be 3/32"—1/8". To adjust, remove upper bolt from shaft clamp on steering column (connecting upper and lower control shafts), take out two screws in upper support just below lever, remove shift lever and upper control shaft assembly. Screw upper support up or down for correct 3/32"—1/8" clearance, re-install assembly on steering column.

2—Clearance between end of gearshift lever and underside of steering wheel rim is shown in table below. To adjust, loosen two housing assembly clamp bolts at lower end of steering column mast jacket, raise or lower assembly (with control shafts and gearshift lever at upper end) until clearance is correct, tighten clamp bolts.

Gearshift Lever-&-Wheel Clearance

1947-48 Trucks	2 9/16" ± 1/8"
1949-53 Trucks	2 13/16" ± 1/8"
1949-54 Pass. Cars	2¾" ± ¼"
1954-55 Trucks (Exc. ¾-Ton F.C.)	2 13/16" ± 1/8"
1954-55 ¾-Ton Forward Control	2 9/16" ± 1/8"

3—Gearshift lever should be horizontal with transmission in neutral. To adjust, disconnect the 2nd & High control rod swivel (1947-48 Trucks), or loosen the swivel clamp (Others) at the housing outer lever (lower lever on steering column). Move this lever as required to set the gearshift lever in a horizontal position, then adjust swivel on end of rod so that gearshift lever position will not be disturbed when rod connected. Connect rod or tighten swivel clamp.

4—Check shifter gate alignment on inner levers in housing on steering column (visible when cover on housing removed). This alignment is necessary to insure smooth cross-over in neutral. To adjust, disconnect the 1st & Reverse control rod swivel (1947-48 Trucks), or loosen the swivel clamp (Others) at the housing outer lever (upper lever on steering column). Move the outer lever as required to align the upper shifter gate with the lower shifter gate in the housing, then adjust swivel on end of rod so that lever position will not be disturbed when rod connected. Connect rod or tighten swivel clamp.

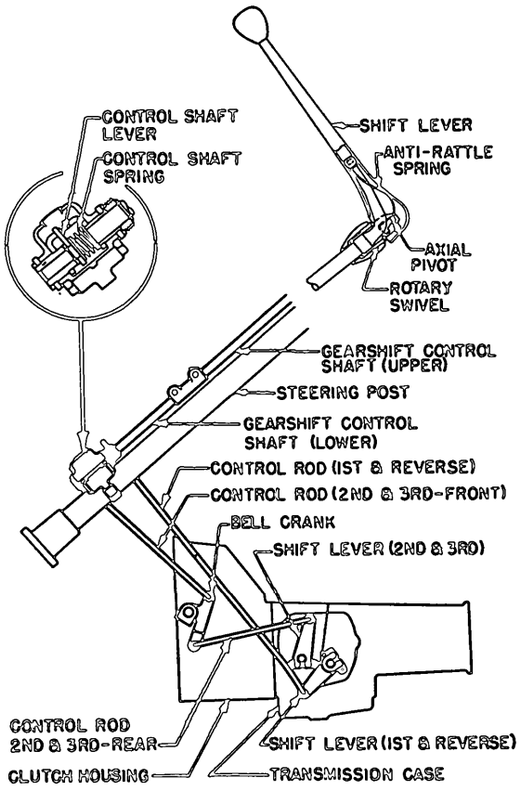
TRANSMISSION SHIFTER DISASSEMBLY: Cover on side of transmission case must be removed as follows: Disconnect shifter rods, drain lubricant, take out shift lever lock bolts, and pull lever off each shifter shaft. Remove cover from transmission. Take out shifter interlock retainer capscrews or nuts and locks on studs, remove retainer. This will permit removal of shifter shafts and fork assemblies, shaft seals, poppets, springs, and interlock.

▷*TRANSMISSION SHIFT LEVER REPLACEMENT CAUTION:* Do not replace transmission shifter levers without removing cover assembly from transmission. When replacing shift levers on shifter fork shafts without removing cover, shifter fork shafts will be forced against gears and it will be impossible or difficult to shift gears due to interference.

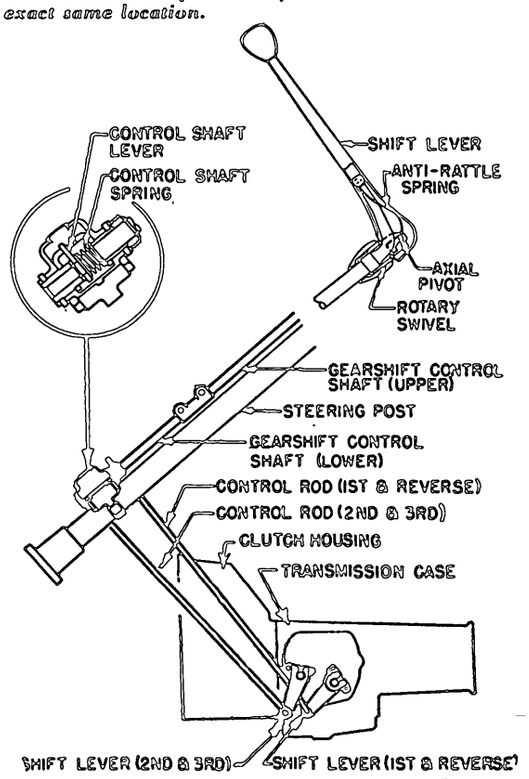
DUEL-DUTI (FORWARD CONTROL) CONTROL RODS: Consist of upper rods (from steering column to idler levers on flywheel housing), and lower rods (from idler levers to transmission case levers).

Disassembly of Control Rods: Remove front floor pan (take out attaching screws, disconnect wiring to stop light switch, disconnect accelerator pedal rod, remove pan). Disconnect rods by removing cotter pins, flat washers, and springs at each end (remove upper rods and swivels as an assembly).

▷*CAUTION—Note position of each rod and re-install in exact same location.*



1949-55 ½ & ¾ TON TRUCK TYPE



1949-54 PASSENGER CAR TYPE

1955 CHEVROLET PASS. CARS

Pass. Cars (1955)

►*1955 HARD SHIFTING CORRECTION.* Install Transmission Control Conversion Kit, Part No 3731061 in mast jacket & shifter shaft assembly, and install new type 1st & Reverse gear, counter gear, and reverse idler gear. *See "1955 Chevrolet Transmission" for installation of these new parts.*

DESCRIPTION: Remote control type with gearshift lever mounted on steering column and connected to a shifter tube within the steering column Shift levers at lower end of steering column are actuated by a shifting key on the shift tube.

GEARSHIFT LEVER ADJUSTMENT: Loosen shifter rod locknuts on transmission shift levers at lower end of steering column Move the shifter rods through swivels until transmission is in neutral and the first & reverse lever (lower lever) is at the midpoint of its travel (center of slot). Align second & third shift lever (upper lever) with the first & reverse lever and tighten swivel fitting locknuts. *CAUTION–Shifter tube levers must be in alignment or key will not enter keyway in levers.*

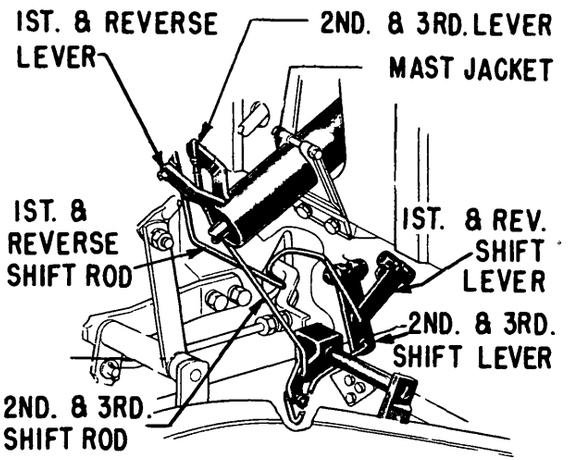
►*TRANSMISSION SHIFT LEVER REPLACEMENT CAUTION:* Do not replace transmission shift levers without removing cover assembly from transmission. When replacing shift levers on shifter fork shafts without removing cover, shifter fork shafts will be forced against gear and it will be impossible or difficult to shift gears due to interference.

SHIFTER TUBE & MAST JACKET OVERHAUL: (Removal)–Disconnect all electrical connections and remove the back-up light switch (where installed), from mast jacket. Remove two rubber cover upper fasteners from inside of dash panel at mast jacket opening. Pry off horn button or ornamental cap and remove horn mechanism Slide rubber seal away from covers, then remove lower cover retaining screw and washer and remove lower and upper covers. Remove steering wheel nut and washer from end of steering gear shaft and remove steering wheel from column using Wheel Puller J-2927-A. Remove spring and spring seat from end of steering shaft. Remove nut, washers and clamp bolt from dash panel attaching bracket. Disconnect transmission control linkage from shifter levers at swivels. Remove swivels from shifter levers. Remove nuts and washers retaining clamp to bottom of instrument panel and remove clamp and rubber shims. From inside car, pull mast jacket assembly carefully off steering shaft, rotating as necessary to clear dash clamp. Work shift levers through dash seal by stretching the seal to clear levers.

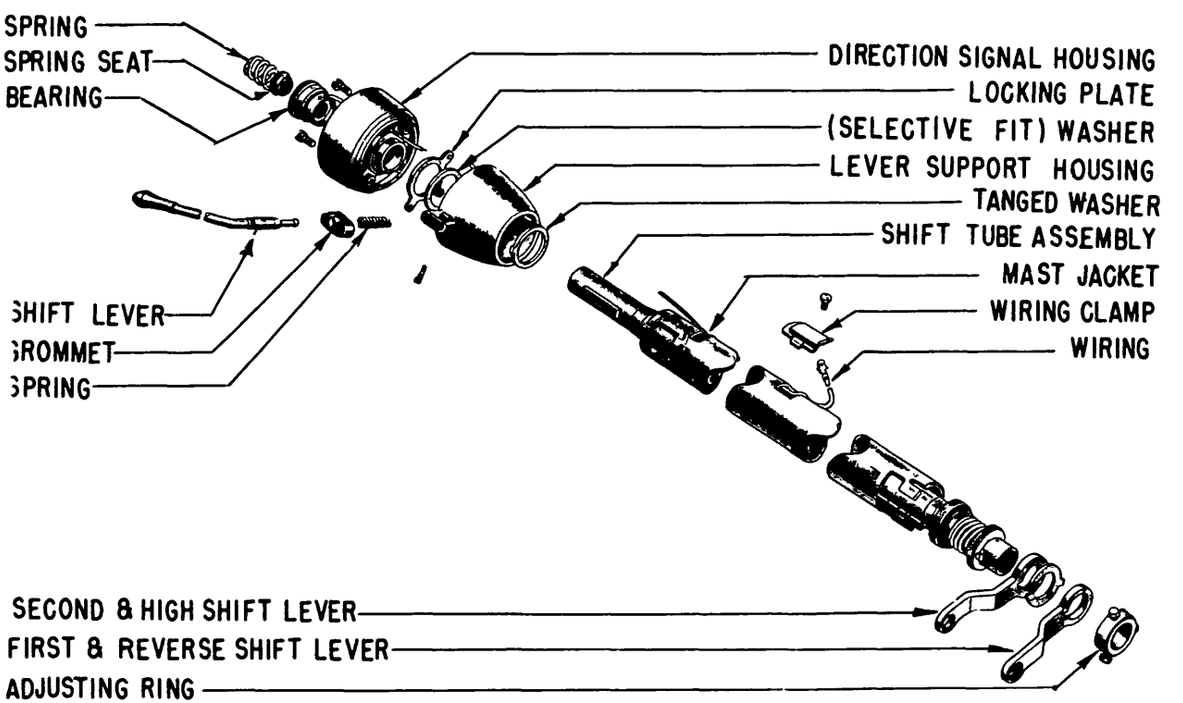
Disassembly: Slide rubber grommet back from lever support housing and drive out shift lever pin. Remove shift lever and anti-rattle spring. Remove single screw and clamp where wire enters mast jacket Remove direction signal housing retaining screws at top of steering column and remove housing (*NOTE*–It will be necessary to shift position of direction signal controls to gain access to the retaining screws). When removing housing be careful not to damage horn and direction signal wiring connections. Remove locking plate and washer. Remove shift lever support housing then remove the tanged washer from mast jacket. Reverse mast jacket and loosen retaining bolts on adjusting ring while holding ring to release compression of spring slowly. Remove adjusting ring. Remove the two shift levers from lower end of steering column. Retain the spacer located between the shift levers. Remove shifter assembly by pulling it out of mast jacket

Reassembly: Reverse the disassembly procedure above, and note the following: Upper shift lever is stamped "U" and lower shift lever is stamped "L" Lubriplate and install shift levers on shifter tube after tube is inserted in mast jacket. Place a .010" feeler gauge between the second & third shift lever and spacer, then apply a force sufficient to push the adjusting ring into mast jacket and up against the feeler While holding in this position, tighten the three adjusting ring bolts. Remove feeler gauge. When direction signal housing installed, check endplay between lever support housing and direction signal housing. If not within specified limits of .004- 009", remove direction signal housing and locking plate and install proper size spacer washer for correct endplay (*NOTE*–Four thicknesses of spacer washers are available. .035", .039", .043", .047").

Installation: Reverse removal procedure above, and note the following: Before tightening mast jacket clamp bolts, install the steering wheel and position mast jacket so there is 1/16" clearance between steering wheel and mast jacket by placing a 1/16" feeler between top edge of direction signal housing and bottom outer edge of steering wheel. Tighten mast jacket clamp bolt. After installation completed, adjust shift levers as indicated above.



TRANSMISSION SHIFT LINKAGE



1955 CHEVROLET TRANSMISSION CONTROLS

1946-55 CHRYSLER, DESOTO, DODGE & PLYMOUTH

All Models (1946-55 With Synchro-mesh Trans.)

▷Hydraulically Controlled Transmissions—Special controls are used in conjunction with these optional transmissions. See articles on these transmissions for control data.

▷*1955 PLYMOUTH GEARSHIFT LINKAGE RATTLE CORRECTION:* To correct gearshift lever shake, remove gearshift bellcrank and turn it 180°. Assemble the shift control rod in smaller hole of bellcrank to reduce looseness. Add as many anti-rattle washers on bellcrank stud and on clevis pin (if clevis loose on bellcrank), as possible

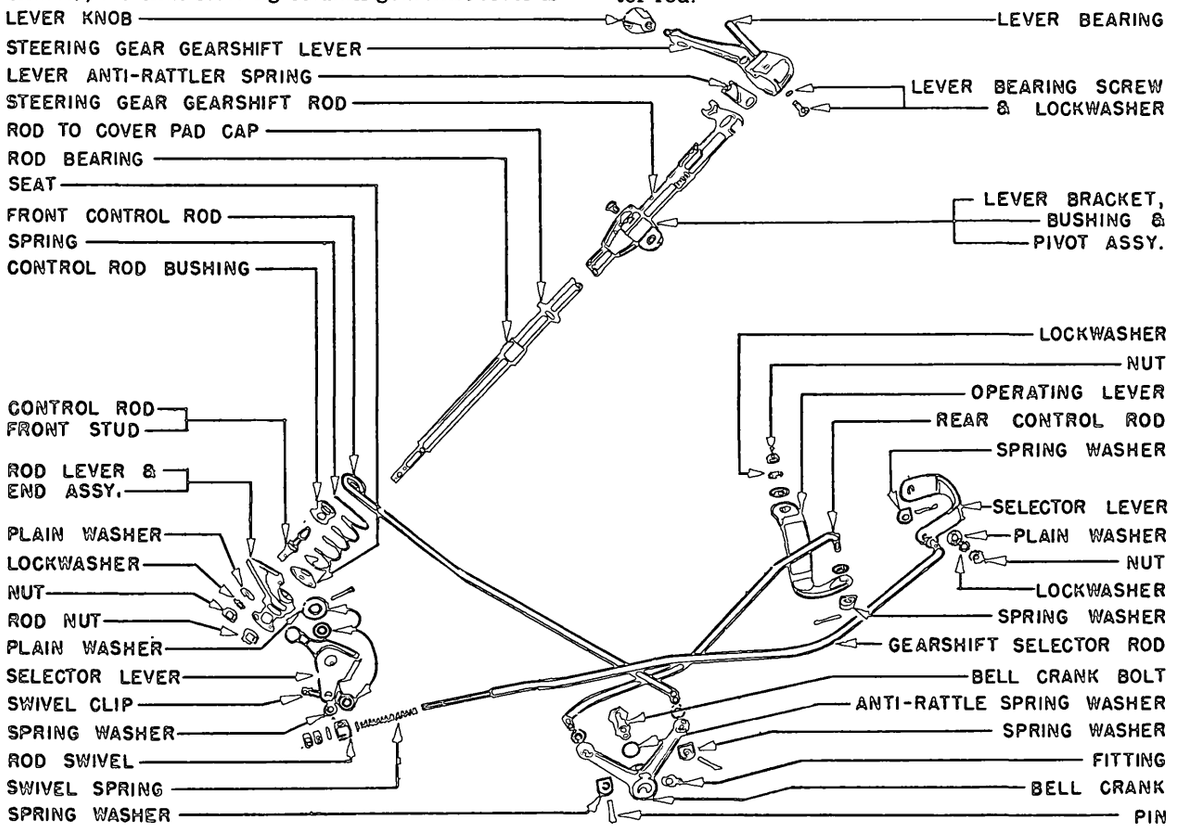
DESCRIPTION: Remote control with gearshift lever mounted on steering column.

Transmission Case Shifter Mechanism—Refer to Chrysler Transmission article for complete data.

ADJUSTMENT: Control Rod (Gear Engagement): Loosen nut on control rod connector stud on lever at lower end of steering column control rod, make certain that transmission gears and shift lever are in neutral position (can be determined by feel of detent balls engaging neutral notches in shifter shafts), see that steering column gearshift lever is horizontal, tighten stud nut securely (stud hole in lever is slotted to permit adjustment). *NOTE*—On 1955 Dodge & Plymouth, adjustment is at lower end of control rod.

Selector rod (1946-55 Exc. 1953-55 Chrysler & Dodge)—See that transmission gears are in neutral position. Adjust selector rods as follows: Loosen locknut on forward end of selector rod at trunnion on steering column selector lever, tighten adjusting nut until all play removed from rod and lever, then back nut off one-half turn to provide correct clearance, tighten locknut. *NOTE*—1953-55 Plymouth have adjustment at lower end of rod.

Selector Rod (1953-55 Chrysler & Dodge)—Set shift rod in its normal raised position. Adjust crossover linkage to secure ⅜-⅝" free play movement of gear shift knob when transmission is in high gear position by adjusting selector rod so swivel at rear end of selector rod can be placed freely in selector lever hole (rear lever on transmission), when selector lever is 1/32" back from contact with shift fork. There should be no tension or compression on selector rod.



1946-55 CHRYSLER, DESOTO, DODGE, PLYMOUTH TRANSMISSION CONTROLS

DISASSEMBLY: Remove the horn button, horn wire and steering wheel. Disconnect selector rod and gearshift rod at steering column. Take off nut on lower end of control rod and remove rod end (selector lever collar), lever and spring from lower end of rod. Take out two screws attaching gearshift lever pivot bracket to steering column (except Plymouth). Gearshift lever and control rod can then be withdrawn at upper end of steering column except that on 1941-42 DeSoto & Dodge cars, remove attaching bolts and separate steering column bracket at dash, then withdraw gearshift lever and control rod as an assembly. On Plymouth models, remove gearshift lever (see below), then withdraw control rod at upper end without disturbing lever pivot bracket. Install control rod in same manner and adjust rods as directed above.

Gearshift Lever Removal—To remove lever from control rod, remove shift lever bearing and screw from lever and pivot bracket. Press down on end of lever so that end clears control rod, then pull lever out to disengage lever pin from fork on rod. Install lever in same manner.

Idler Lever Lubrication—Idler lever on bracket on left hand side of clutch housing has regular lubrication fitting and should be lubricated at 6000 mile intervals with semi-fluid chassis lubricant to prevent lever sticking which will cause hard shifting.

REASSEMBLY: Reverse the disassembly procedure as given above.

1940-48 FORD, LINCOLN, MERCURY

All Pass. Car Models (1940-48)

DESCRIPTION: Remote control with steering column mounted gearshift.

ADJUSTMENT: Adjustment should be checked whenever steering column position is changed or when linkage disconnected. Before making adjustments, make certain that both shift levers on transmission case are in neutral with detent balls engaging neutral notch in shifter shaft sectors (can be determined by feel with control rods disconnected). Disconnect Low-Reverse control rod at adjustment end (see Note), loosen locknut and adjust clevis on end of rod so that gearshift lever moves up and down freely (cross-shift at neutral) with control rod connected. Second-High control rod will not ordinarily require adjustment. Make certain that gearshift lever has full travel in both directions so that gears are fully engaged (detent balls should engage end notches in shifter shaft sectors with gears engaged).

DISASSEMBLY (Steering Column Unit): This entire unit is mounted on steering column by retainer clamped in bracket bolted on column and can be dismantled after bracket has been loosened and retainer setscrew removed. Gearshift lever is pivoted on pin in control tube elbow and inner end engages fulcrum pin within upper end of control tube. If assembly dismantled, make certain that spring installed at lower end of fulcrum pin and that bushing and boot installed on upper end of fulcrum pin when it is reassembled.

1949-55 FORD PASS. CARS & F-1, F-100 TRUCKS

Pass. Car, All Models (1949-55)
F-1 Truck (Late 1950-52)
F-100, 250, 350; P-350, 500 Truck (1953-55)

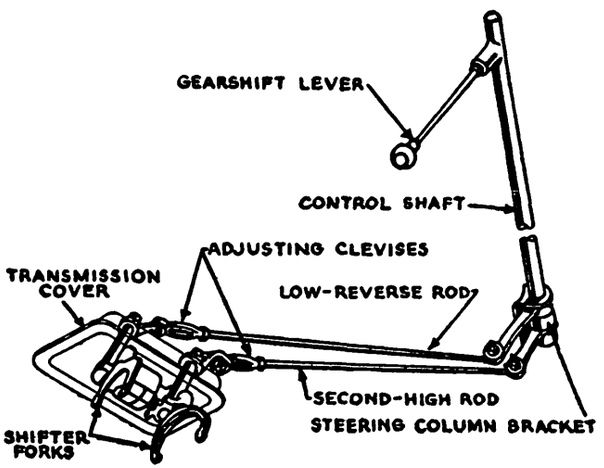
►**FORD TRUCK NOTE**—This type control used on all F-1, and F-100 Trucks with 3-Speed Std. Trans. or with 3-Speed Heavy Duty Trans.

►*HARD SHIFTING CORRECTION (1953-55 Trucks with H.D. 3 speed Trans.):* To correct this condition install longer levers B5C-7285-B, 7290-B and 7303-A; and stronger rods B5C-7326-A and 7328-A.

►*GEAR SHIFT BIND CORRECTION (1955 Police Interceptor):* To correct binding condition in transmission gear shift levers, weld 5/16" flat washer Ford No. 44722-S8, on each rod 5/8" from center of hole in end of rod to face of washer.

►*SECOND & HIGH GEAR SLIP-OUT CORRECTION (1955 Pass. Cars & F-100 Trucks):* Slip-out can be caused by—Improper alignment of shift rods; excessive wear at ends of shift rods; or interference between clutch release rod and second and high shifter rod or interference between floor panel and shift rod. To correct this condition proceed as follows:
1) If bent correct contour of second and high shift rod to match new rod or replace rod.
2) If rod wear causes interference with floor pan replace with new rod.
3) Interference between clutch and shift rods can be corrected by removing stock from threaded end of clutch release rod to relieve clearance when clutch is released.

►*GEAR SHIFT LEVER TO TUBE SOCKET ASSEMBLY PRODUCTION CHANGE (1955 Trucks):* When necessary to install new lever on an old tube & socket assembly, drill the tube and socket hole larger (13/64" drill) to provide for installation of the roll pin now used to attach lever to tube.



FORD, LINCOLN, MERCURY 1940-48 TRANSMISSI N CONTR L

DESCRIPTION: Remote control with steering column mounted gearshift lever. Design is similar to type used on previous models except for mounting and other detail changes (see illustration).

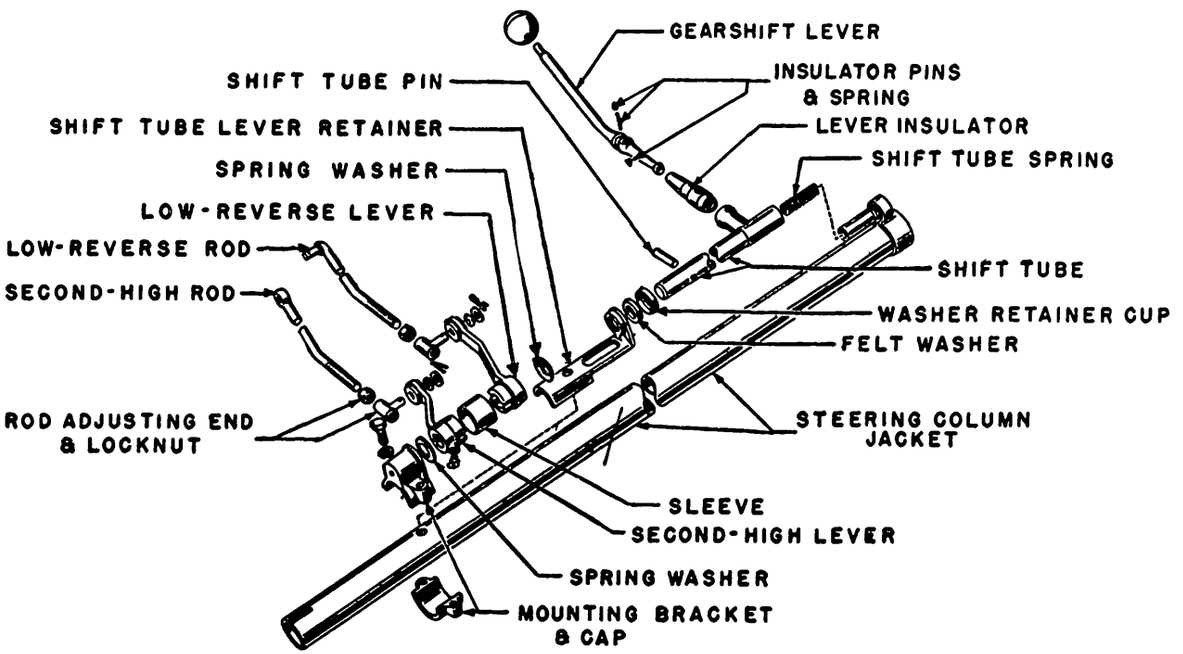
ADJUSTMENT (1949-51 Pass. Cars, Late 1950-52 F-1 Trucks): Required whenever steering column position changed or linkage disconnected. Place gearshift lever in neutral position, disconnect both shift levers at lower end of steering column, align shift levers so that gearshift lever freely moves up and down in neutral. Make certain that both transmission case levers are in neutral (can be determined by feel of detent balls engaging neutral notch in shifter shaft cams). Adjust each shift rod by loosening locknut and turning adjusting end on rod until rod can be connected to lever without disturbing position of either lever. Connect rods and check for smooth easy cross-over (up-and-down movement) of gearshift lever in neutral.

Pass. Cars (1952-55); F-100, F-250, F-350, P-350 & P-500 Series Trucks (1953-55)—Place lever in neutral. Remove cotter pins and flat washers from the shift rod ends, then pull rod ends out of gearshift levers. Rotate rod ends either clockwise or counter-clockwise enough to place gearshift levers in same plane when rod ends are assembled to levers. Check gearshift lever for free movement. Position rod ends in levers and install spring washers, flat washers and cotter pins.

Gearshift Lever Position (F-1 Truck)—Check clearance between gearshift lever ball and face of instrument panel in 2nd gear position. This clearance should be 1¾" (in 2nd gear plus overshift movement). If clearance not correct, adjust length of Second-High control rod by turning clevis on end of rod, then recheck shifter lever movement in neutral and make any necessary adjustment to secure smooth cross-over or up-and-down movement of the lever by adjusting the clevis on the Low-Reverse control rod.
►*CAUTION—Do not change length of Second-High Control rod after adjusting gearshift lever position.*

DISASSEMBLY: Disconnect shift rods at levers on steering column. Remove capscrews from bracket securing shift levers and lower end of shift tube assembly on steering column, remove bracket, spring washer, lower (second-high) lever, and spacer from shift tube. Remove shift tube pin, then remove upper (low-reverse) lever, spring washer, shift tube lever retainer, felt washer and washer retainer from shift tube. Move shift tube down until it clears upper bracket on steering column jacket (CAUTION—do not lose spring in upper end of tube), remove shift tube and gearshift lever from car.

REASSEMBLY: Lubricate felt washer with engine oil, assemble all parts by reversing disassembly order. Lubricate levers through fitting in lower (second-high) lever. Adjust control rods after reassembly.
TRANSMISSION CASE SHIFTER MECHANISM: *See "Ford, Lincoln, Mercury" Transmission data.*



TYPICAL 1949-55 PASS. CAR & F-1, F-100 TRUCK TRANS. C NTROL

1949-55 LINCOLN & MERCURY

All Lincoln, Cosmopolitan, & Mercury (1949-51)
Mercury, All Models (1952-55)

▷CHANGES & CORRECTIONS

▷TRANSMISSION GEAR LOCKING COMPLAINT—(First 1949 Cars): To correct first cars without Neutral Spring, this spring should be installed on lower end of steering column to center low-reverse shift lever. Dust shield over low-reverse shift lever hub must first be removed (accessible through cut-out on steering column tube for levers, cut across shield with a chisel and pull shield out of column tube with pliers). Install Neutral Spring as directed under REASSEMBLY data below.

▷HARD SHIFTING COMPLAINTS—May be caused by shift levers out of adjustment (see ADJUSTMENT below), or by interference between low-reverse shift lever and fuel line bracket screw on dash (first cars), or by low-reverse control rod striking flange on dash (first Cosmopolitan cars). Correct by adjusting levers and providing clearance at any point of interference.

▷GEARSHIFT LEVER HINGE PIN CHANGE—If first type pin falls out allowing gearshift lever to come out of shifter sleeve, install latest type grooved pin which is case-hardened (can be identified by fact pins are file-hard).

▷HYDRA-MATIC DRIVE NOTE—Data below applies only to 3-spd. Synchro-mesh transmission cars.

See Lincoln Hydra-Matic Drive Transmission for Hydra-Matic Drive control linkage adjustment.

DESCRIPTION: Remote control with steering column mounted gearshift lever. Design similar to type used on previous models except for assembly of steering column unit (see illustration).

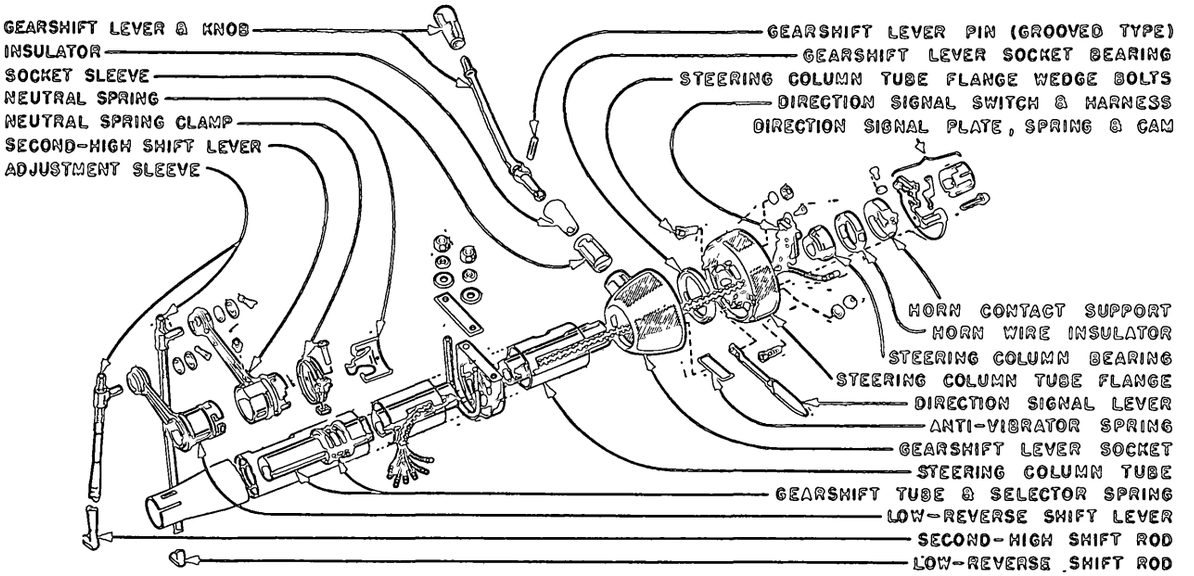
▷1950 Steering Column Lower Gearshift Lever Assembly Change—Transmission selector spring is no longer on gearshift tube assembly. See illustration.

ADJUSTMENT (1949-51): Place gearshift lever in neutral, check for free cross-over (up-and-down) movement of the lever and see that both shift levers on lower end of steering column are in line and centered in opening in steering column. If adjustment required, disconnect both shift rods from shift levers at steering column, see that transmission gears in neutral (can be determined by feel of detent balls engaging notches in shifter cams). See that both shift levers on steering column in alignment and centrally located in column opening, adjust threaded sleeve on end of each rod so that rods can be connected without disturbing position of levers or transmission gears. Connect rods and check gearshift lever action.

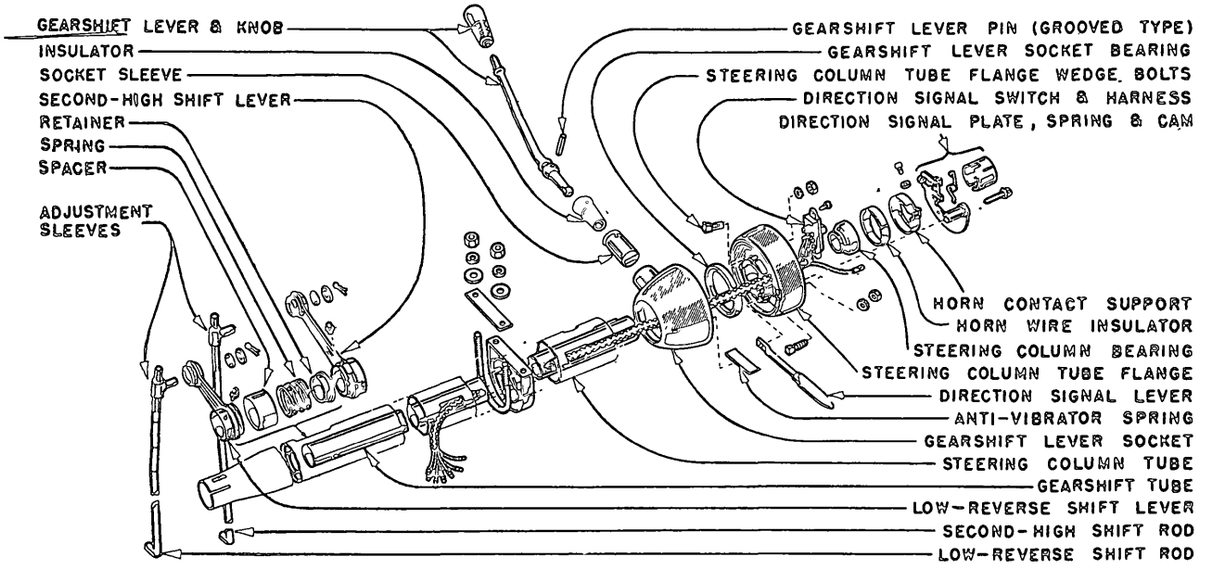
1952-55 Mercury—Place gearshift lever in neutral. Remove cotter pins, flat washers, and spring washers from shift rod ends, then pull rod ends out of steering column gearshift levers. Rotate the rod ends either clockwise or counter-clockwise enough to place steering column gearshift levers in same plane when rods assembled to levers, then install spring washers, flat washers, and cotter pins. Gearshift selector levers should be free to move upward or downward in neutral without binding.

DISASSEMBLY: Disconnect both shift rods at shift levers on lower end of steering column. Remove steering wheel (see Steering Gear data), take out woodruff key and spring in steering column, remove horn contact ring and insulator. Remove screw retaining direction signal switch plate and lever, remove handle, lift switch plate out. Loosen, but do not remove nuts on two wedge bolts, push wedge bolts down as far as possible to free flange, lift flange assembly from steering column, pull wiring cable out far enough so that flange can be lifted over steering shaft, lift out bearing sleeve. Drive out grooved pin retaining gearshift lever, remove lever, pull shift tube from steering column. Remove socket assembly sleeve with special tool 7224. Disconnect wires from Direction Signal Switch and horn contact ring, pull wires into steering column, slide socket assembly from tube.

CONTINUED ON NEXT PAGE



1949 LINCOLN & MERCURY TRANSMISSION CONTROL



1950-51 LINCOLN & 1950-55 MERCURY TRANSMISSION CONTROL

1949-55 LINCOLN & MERCURY (Continued)

Shift Lever Removal—Requires removal of steering column tube as follows: Remove pitman arm (puller 3590), roll back floor covering and remove steering column-to-dash cover plates, disconnect direction signal and horn wire connections, free U-bolt and steering column from dash, loosen steering column clamp at steering gear housing, loosen three steering gear-to-frame mounting bolts, slide steering column tube from steering shaft. Remove shift levers from tube.

REASSEMBLY: Install all parts in reverse order of disassembly procedure and note the following precautions and adjustments:

Shift Lever Lubrication—Coat bearing surfaces of both levers with Lubriplate before installation. After assembly completed, lubricate levers through lubricant fitting in upper low-reverse lever.

Steering Column Socket Lubrication—Apply light coat Lubriplate on surface of steering column tube where lower portion of socket assembly contacts tube before installing socket.

►*CAUTION—Lubriplate should not contact pre-lubricated socket bearing.*

Gearshift Lever Socket Sleeve—Install sleeve to retain socket. Sleeve is light press fit and should be tapped into place with blunt driver.

►*CAUTION—Holes in sleeve must line up with holes in socket (for installation of gearshift lever pin).*

Steering Column Shift Tube & Gearshift Lever—When installing tube, turn tube so that lugs enter slots in shift levers. Install gearshift lever and see that lever engages shift tube. Use only latest type grooved pin to retain gearshift lever.

►*CAUTION—Use only case-hardened grooved type pin at this point (replaces original solid pin).*

Neutral Spring Installation (1949 Cars—see Correction note above)—With both the shift levers aligned one above the other, and centrally located in steering column opening, place neutral spring on column tube when center prong in slot of low-reverse lever and side prongs contacting upper edge of column tube opening. Clamp spring in this position with a hose clamp (B-8287-A) or use regular backing light switch clamp.

►*CAUTION—Center prong on spring must be free.*

Steering Column Tube Flange—Press two wedge bolts down which will spread wedges and permit flange to slide on steering column. Tighten wedge bolts lightly.

►*CAUTION—Overtightening wedge bolts will cause the wedges to damage assembly.*

Horn Insulator & Contact Ring—Insulator must be positioned in tube cutout and tab on contact ring must enter cutout in insulator. Tighten retaining screw only enough to hold ring in position (overtightening screw will distort ring).

Steering Wheel Clearance—After wheel installed, check clearance between wheel and steering column tube flange. If not exactly 1/16", loosen clamp at instrument panel, move column for correct clearance (do not tighten clamp at lower end of steering column tube until this adjustment made).

Shift Lever Adjustment—See ADJUSTMENT above.

TRANSMISSION CASE SHIFTER MECHANISM: *See "Ford, Lincoln, Mercury" Transmission data.*

FORD PARCEL DELIVERY TRUCKS

Ford Parcel Delivery, All Models (1950-52)

►**TRANSMISSION CONTROL NOTE**—Control used on these trucks is not same as used on F-1, F-100 Trucks.

DESCRIPTION: Remote control type with gearshift lever on steering column pivoted in socket on upper end of single shift tube mounted in brackets on steering column. Shift tube has loose gear selector lever (positioned by upper and lower sleeves riveted on tube) so that up-and-down movement of the gearshift lever actuates the gear selector lever on the transmission case cover (through selector bell-crank and selector rod).

ADJUSTMENT: *Two separate adjustments required:*

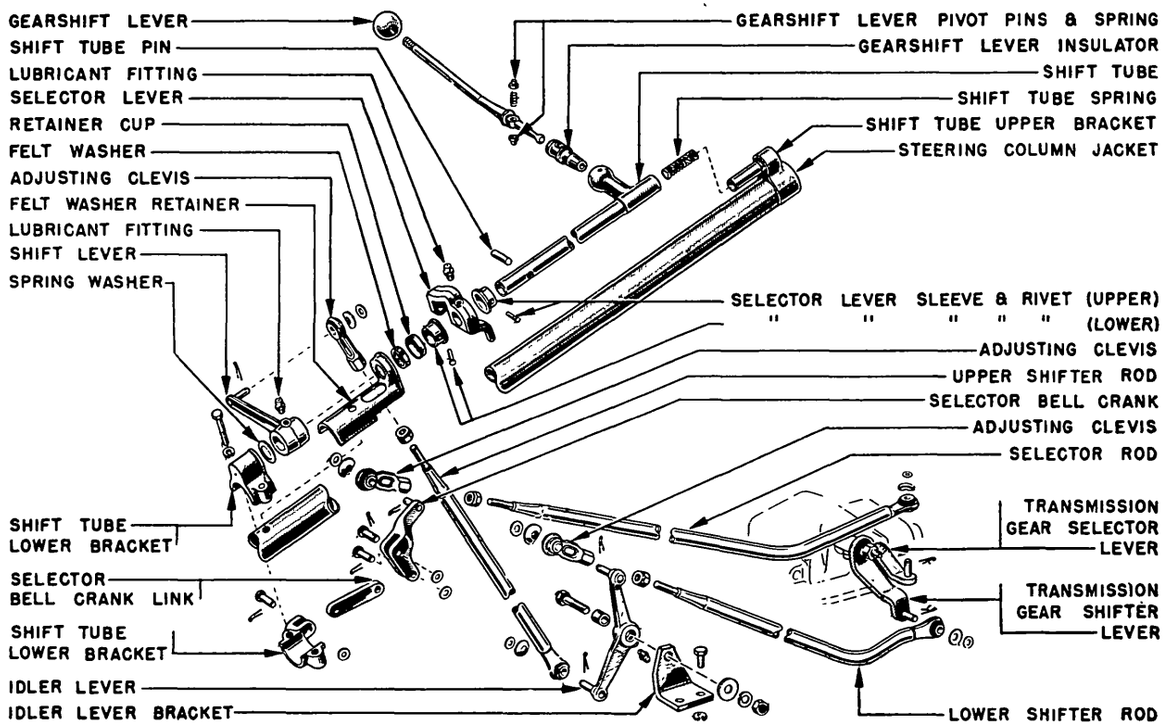
1) Shift Rod Adjustment—Place gearshift lever on steering column in neutral position. Disconnect lower (adjustable) shift rod at idler lever on left frame side rail. Make certain that transmission gear shifter lever is in neutral position (can be determined by feel of detent poppet balls engaging notches in shifter rail). Adjust clevis on idler lever end of lower shift rod until pin on idler lever enters hole in clevis freely without disturbing position of transmission gear shifter lever or idler lever. Tighten clevis locknut and connect rod.

2) Selector Rod Adjustment—Move gearshift lever on steering column up-and-down in neutral (cross-shaft travel) and measure travel of gear selector lever and shifter shaft in transmission case cover. This travel must be .23" minimum from full "in" to full "out" position. To adjust, disconnect selector rod at selector bell crank on steering column, adjust clevis on rod until correct travel secured.

DISASSEMBLY: Disconnect selector rod and upper shifter rod at levers on steering column, disconnect and remove selector bell crank link. Remove cap-screws from shift tube lower bracket, remove bracket (lift off lower half, raise upper half up slightly to disengage dowel from hole in steering column jacket and then slide bracket off end of shift tube). Remove spring washer from end of shift tube, remove shift tube pin from shift lever, then remove following parts from shift tube: shift lever, felt washer retainer, felt washer, and retainer cup. Remove selector lever sleeve rivets, slide sleeves and selector lever off lower end of shift tube. Move shift tube down until it clears upper bracket (CAUTION—do not lose spring in upper end of tube), remove shift tube and gearshift lever assembly.

REASSEMBLY: Lubricate felt washer with engine oil, assemble all parts by reversing disassembly order. Lubricate shift lever and selector lever through lubricant fittings on levers. Adjust control (see Adjustment above).

TRANSMISSION CASE SHIFTER MECHANISM: *See "Ford Truck 3-Speed Heavy Duty" Transmission Data.*



1950-52 TYPICAL FORD PARCEL DELIVERY TRUCK TRANS. CONTROL

1948-51 HUDSON DRIVE-MASTER

6 & 8, All Models (1948-49-50)
Pacemaker 4A & Super Six 5A (1951)

▷DRIVE-MASTER FUSE CHANGE: 15 ampere fuse should be used on all cars (replacing 10 ampere type used on first cars). This fuse located on back of control switch (1948-49), in switch lead (beginning 1950).

▷OVERDRIVE TRANSMISSION NOTE: Overdrive is separate option and may be found installed on cars with Drive-Master Transmission. Overdrive unit is Warner Type R10D. *See Warner Type R10 Overdrive*

DESCRIPTION: Drive-Master transmission consists of a conventional 3-speed transmission with automatic controls as follows:

Vacumotive Drive: Automatic clutch control similar to type used on cars without Drive-Master except for Throttle Lock for which adjustments are given below. *See Hudson Vacumotive Drive data.*

Drive-Master Control Units: Similar to design used on previous Hudson models except for different mounting of units and linkage changes as follows:

Transmission Power Unit—Complete unit (Power Cylinder, Transfer Diaphragm Cylinder, and Solenoid Valves) mounted on bracket bolted on left side of engine block.

Transmission Switch—Mounted on power unit mounting bracket on left side of engine.

Transfer Mechanism—Mounted on bracket on rear of power unit mounting. Unit is new design three-lever type with power lever (inner) linked to power cylinder by non-adjustable strap, manual lever (outer) linked to gearshift lever on steering column, and center gear engagement lever linked to shift lever on transmission case by new adjustable rod. This center lever has transfer key (operated by Transfer Diaphragm Cylinder) by which lever is locked to inner lever (for automatic shifting), or outer lever (for manual shifting). Detent ball and spring is provided for both inner and outer levers to positively locate them in each gear position.

Instrument Panel Control Switch (1948-49): Rotary type on instrument panel (center "off" with right and left "on" positions).

Center "Off" Position—Manual gear shifting and clutch operation.

Left "On" Position—Manual gear shifting with automatic clutch operation (Vacumotive Drive on).

Right "On" Position—Automatic gear shifting and clutch operation (Drive-Master & Vacumotive Drive on).

Instrument Panel Control Switch (1950 & Later): Two button type on instrument panel with separate "on" and "off" buttons.

Left "OFF" Button—Pressing button in provides manual gearshifting and clutch operation.

Right "HDM" Button—Pressing button in provides automatic gearshifting and clutch operation.

Drive-Master Fuse: Located on back of switch (1948-49), in cartridge type holder in control switch lead (beginning 1950).

Fuse Capacity—15 amperes.

▷*CAUTION—15 ampere fuse replaces 10 ampere fuse used originally on 1948-49 cars.*

OPERATION: All units operate in exactly same manner as on previous models. Shifting limits are as follows:

Automatic Second-to-High Shift—9.5 to 14 MPH.

Automatic High-to-Second Shift—9 to 12 MPH.

Vacumotive Drive Cutout (In High Gear)—16 MPH. (minimum), 21 MPH. (maximum) and must be inoperative at all higher speeds.

CHECKING & ADJUSTMENT: Check all of the following points before making any Drive-Master adjustments:

1. Engine Performance—Must be properly tuned up with idle speed set at 580-600 RPM. with Drive-Master "on" button pressed in. Engine vacuum reading must be at least 17-18" to insure proper engine performance and Drive-Master operation.

2. Vacuum Connections—Check lines for leaks.

3. Battery—In good condition and not discharged (gravity reading of not less than 1225).

4. All Electrical Connections Clean & Tight—Check following plug connectors particularly: Clutch Power Unit Solenoids, Accelerator Switch, Transmission Power Unit, Transmission Switch, Governor, and Shift Rail Terminal.

5. Accelerator Linkage—Must work freely and return solidly against stop on accelerator switch when accelerator pedal is released. This is important to insure clutch release for Drive-Master operation. Adjust accelerator pedal rod so that carburetor throttle valve is wide open just before accelerator pedal touches stop (cars without overdrive), stem of kick-down switch (cars with overdrive), or tip of pedal strikes floor mat (Pacemaker without overdrive).

6. Clutch Pedal Free Travel—Must be 1½". Starter switch should become operative (starter will crank with starting button depressed) before pedal is within 2" of floor.

7. Vacumotive Drive & Drive-Master Linkage—Must work freely without binding at joints. Check with control switch "off" by opening throttle slightly and releasing pedal slowly. Accelerator bellcrank arm must return solidly against stop on bracket.

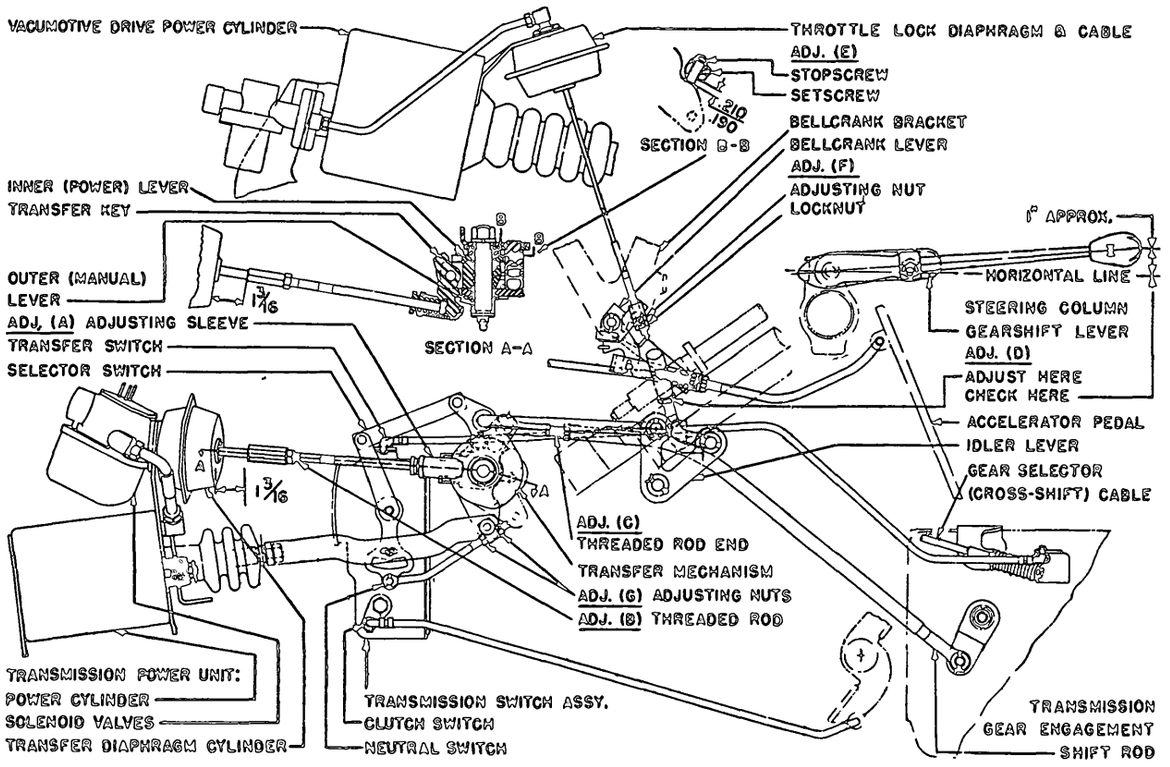
8. Vacumotive Drive Adjustments—Check operation and make all necessary adjustments.

See Hudson Vacumotive Drive in Clutch Section.

9. Drive-Master Adjustment—After all above points checked, adjust Drive-Master units as follows:

(A) Transfer Key Ball Joint: Joint at transfer key end of diaphragm cylinder rod must operate freely without any perceptible endplay. To adjust, loosen lock-

CONTINUED ON NEXT PAGE



1948-49 DRIVE-MASTER ASSEMBLY

1948-51 HUDSON DRIVE-MASTER (C nt.)

nut on rod, turn adjusting sleeve inward to take up all play. Ball joint must work freely.

Lubrication Note—Lubricate with viscous chassis lubricant through grease fitting on transfer key (pull diaphragm rod forward for clearance).

(B) Transfer Diaphragm Rod (1948-49): With steering column shift lever and outer lever of transfer mechanism in neutral, check distance from rear face of diaphragm cylinder to front face of rod end (round portion of rod), which should be 1 3/16". To adjust, hold diaphragm rod from turning with wrench on hexagonal end, loosen locknut, turn outer rod in or out (knurled section provided for gripping with pliers).

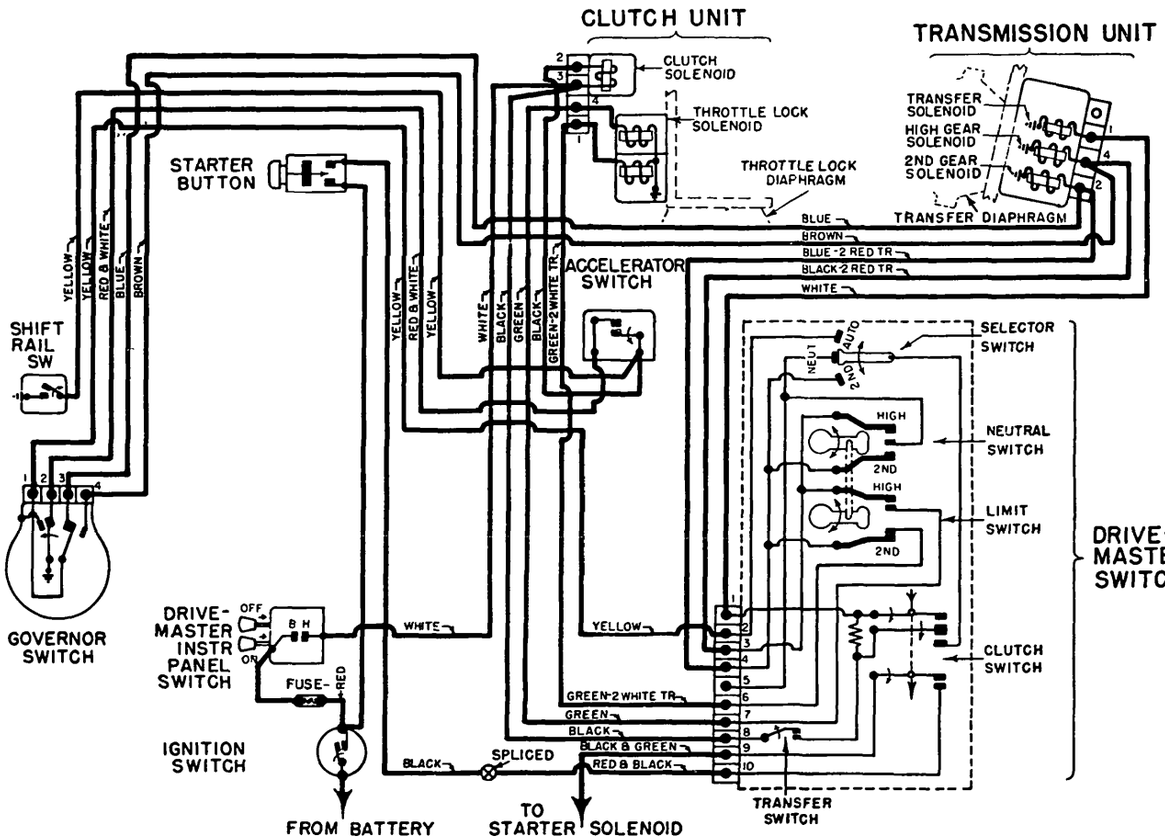
(1950 & Later)—With engine not running, place steering column shift lever in High Gear, adjust length of selector diaphragm rod by loosening locknut and turning rod (knurled section provided for gripping rod with pliers) until selector key bottoms solidly in slot in hand shift lever. Check this adjustment by starting engine and shifting transmission to Neutral—selector key should bottom solidly in slot in power shift lever.

►***CAUTION—Do not allow diaphragm rod to turn when adjusting (will damage diaphragm).***

(C) Transmission Shift Rod (All Car Models except Pacemaker): See that the transmission gears are in neutral, disconnect shift rod front end (center lever connection at transfer mechanism). Push or pull slightly on rod until neutral cross-over action is free, see that gear engagement lever is in neutral position (jiggle lever to engage neutral detent), adjust rod length by loosening locknut and turning end fitting so rod can be connected without disturbing position of transmission shift lever or transfer gear engagement lever. Connect rod and recheck cross-over action. Re-adjust by shortening or lengthening rod ½-turn at a time until action is free.

Pacemaker Models—Check in same manner as the others (above), adjust by backing off one nut tightening opposite nut at end fitting on forward end of rod.

(D) Manual Lever (Gearshift Lever Position): Adjust rod linking shifter shaft on steering column to idler lever at lower end of column (loosen locknut and turn rod in end fitting) until gearshift lever under steering wheel is approximately 1" above a horizontal position in neutral.



DRIVE-MASTER WIRING DIA RAM

(E) P wer Lever Stop: Run the engine for vacuum, place control switch in HDM position (right hand "on" position), shift to second gear. Turn stopscrew on transfer mechanism down until it just contacts power lever (inner lever), then turn stopscrew down additional ½-turn, tighten Allen head setscrew to lock stopscrew in this position.

(F) Throttle Lock: Run engine and connect jumper wire from battery negative post or other hot terminal to either of the two upper throttle lock solenoid terminal pins (lower pin not used) to cause throttle lock to operate. Loosen locknut and turn adjusting nut on threaded fitting at lower end of throttle lock cable until accelerator pedal bellcrank lever is held solidly against stop on bellcrank bracket when accelerator pedal is depressed, tighten locknut.

►***CAUTION—Cable must not be adjusted so short that accelerator cross-shaft is deflected when throttle lock operates.***

(G) Neutral Switch: Run engine with control switch HDM position, shift transmission to neutral. Disconnect transmission shift rod at forward end (center lever of transfer mechanism), move gear shift lever on steering column to Second Gear position, then back to Neutral position. Jiggle shift rod until cross-over action in transmission is free. Check length of shift lever rod in relation to position of transfer mechanism lever from which it was disconnected but do not chang adjustment f this rod. Adjust neutral switch rod length (see below), then repeat test procedure (move gearshift lever to Second, back to Neutral, check rod length), until gear shift rod can be connected without disturbing position of levers.

►***CAUTION—Do not change transmission shift rod length when making this adjustment.***

Neutral Switch Rod Adjustment—Adjust by backing off one nut, and tightening opposite nut, on threaded end of neutral switch rod at transfer mechanism center lever. If transmission shift rod appeared to be too short when making above test, shorten neutral switch rod by turning up rear nut, if shift rod appeared to be too long, lengthen neutral switch rod by turning up front nut. Tighten opposite nut to lock adjustment in each case.

Final Performance Check: After all adjustments completed, check for free cross-over action (gear shift lever must return to second-high side from any position in neutral) and transfer key should move from engagement with power lever to engagement with manual lever as steering column gear shift lever is moved upward in neutral.

►***NOTE***—If cross-over action not free, recheck Transmission Shift Rod Adjustment (C) and Power Lever Stop Adjustment (E) above. See that cross-over switch rod is centered in clip at clutch housing.

DRIVE-MASTER SERVICING: All units which do not operate satisfactorily after adjustment should be replaced.

TRANSMISSION SERVICING: ***See Hudson Transmission.***

REMOVAL & INSTALLATION OF DRIVE-MASTER: Units can be removed separately as follows:

Power Cylinder & Transfer Diaphragm: Disconnect diaphragm engaging rod from rod end, disconnect shift strap by removing bolt attaching strap to power cylinder. Disconnect battery cables, remove battery and battery tray and support. Disconnect vacuum lines at transfer diaphragm solenoids. Re-

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1948-51 HUDSON DRIVE-MASTER (Cont.)

move cotter pins, nuts, ferrules, washers, and rubber bushings from power cylinder mounting studs, remove power cylinder and diaphragm assembly.

▷*INSTALLATION CAUTION*—Adjust Transfer Key Ball Joint (Adjustment A), and Transfer Diaphragm Rod (Adjustment B) after unit re-installed.

Power Unit Mounting Bracket: To remove this bracket from the engine, first remove power unit and transmission control switch (see above), disconnect shift rod and cross-over rod at power shift and at manual shift bell-crank, disconnect clutch rod at transmission control switch. Remove two bolts at lower bracket support, one bolt at oil pan at forward end, two nuts and lockwashers at side of cylinder block. Lift off bracket with power shift shaft and shift levers as an assembly.

Transmission Control Switch: Remove distributor (6 Cyl. models only). Disconnect clutch operating rod, transfer switch rod, neutral and limit switch rod, and selector switch rod. Disconnect wiring harness plug. Remove bolt, lockwasher, and nut at top and bottom of switch, remove switch from mounting bracket.

Drive-Master Shift Shaft & Shift Shaft Levers: Remove shift shaft nut at rear of support bracket (disconnect transfer switch rod at switch for wrench clearance). Disconnect power shift rod by taking out cotter pin and clevis pin. Slide shift shaft out toward fender (CAUTION—use care not to lose detent balls and springs which may fall out of retainers).

▷*INSTALLATION CAUTION*—When re-installing shift shaft, lubricate detent balls with water-resistant grease and make certain detent ball springs correctly positioned as follows:

Hand Shift Lever Detent Ball Spring—Part No. 163442 (19 pound tension when compressed to 11/16"). Install this spring in Drive-Master mounting bracket pin for hand shift lever assembly.

Power Shift Lever Detent Ball Spring—Part No. 41236 (30 pound tension when compressed to 13/16"). Install this spring in shift shaft mounting bracket recess.

▷*TRANSFER KEY HUB BUSHING REPLACEMENT*—If replacement of this bushing necessary, remove old bushing with driver having .625" pilot. Install new bushing (bushing inside diameter after assembly must be .625-.626").

NOTE—Shift shaft bushings also have inside diameter of .625-.626" to allow shaft clearance of .0023-.0035".

1941-47 HUDSON HANDI-SHIFT

Six, All Models (1941 to 1947)
Eight, All Models (1941 to 1947)

DESCRIPTION: Remote control type with steering column mounted gearshift lever.

Steering Column Unit—Cross-shift control cable ends protected by boots at both steering column and transmission case ends. Operating rod (gear engagement rod) has new type ends with adjusting clevis at forward (steering column) end of rod.

Transmission Case Shifter Mechanism — New type design used in conjunction with new synchromesh transmission. Gears are engaged by lever on inner end of shaft in side of transmission case which engages upper or lower shifter rail in case. This shaft and lever are shifted in or out (for cross-shift at neutral) by an inner lever on a vertical cross-shift shaft. Selector cable is connected to outer lever on this vertical shaft.

ADJUSTMENT: Operating Rod (Gear Engagement)—With gearshift lever and transmission gears in neutral position, disconnect operating rod at lever on steering column by removing cotter pin and clevis pin, loosen locknut and turn clevis on rod until clevis pin can just be installed without disturbing position of transmission case shift lever and with gearshift lever in neutral and at right angles to centerline of car. Tighten locknut and connect rod.

Selector Cable (Cross-shift)—Place steering column shift lever in Low-Reverse or 'up' position at neutral and block in this position while adjustment being made. Loosen selector cable conduit bracket capscrew at lower end of steering column and move conduit bracket up until all slack removed from cable and shift lever at transmission case is fully over in Low-reverse position (lever to rear), tighten bracket capscrew securely. See that anchor on steering column end of cable (at lower end of control lever pushrod) has clearance at top and bottom of travel.

SERVICING: Removal of steering column unit requires that horn button and steering wheel be removed first. Steering column can then be serviced as follows:

Gearshift Lever Removal—Remove control tube upper bracket clamp bolt (use Phillips type screwdriver), remove upper bracket and fulcrum bracket ring. Use Allen wrench (1941-42), or conventional wrench (1946-47) to remove the control lever fulcrum, withdraw control lever & anti-rattle washer. Remove selector cable anchor (at lower end of steering column unit), push end of pushrod up for access to control lever upper end. Assemble in same manner applying small amount of viscous chassis grease to bracket before installing.

NOTE—On 1946-47 cars, shift lever mounting bracket screws are self-locking, dowel type. Point of screw enters hole in jacket tube to positively anchor the bracket.

Steering Column Unit—Remove front seat cushion, accelerator pedal, floor mat, transmission opening cover, horn button and steering wheel. Disconnect control rod at steering column end, remove selector cable anchor bracket bolt, remove cable anchor and jacket tube bracket cap, pull jacket tube and control tube off steering column tube. Remove control tube upper bracket clamp bolt (Phillips type screw-driver), bracket, and bracket ring. Remove gearshift lever (see above). Remove fulcrum bracket setscrew, mark control tube and fulcrum bracket (to insure reassembly in same relative positions), press tube out of bracket. To remove lower bracket, remove clamp bolt and slide bracket off. Reassemble in same manner being careful to line up marks on control tube and fulcrum bracket. Adjust control rod and selector cable as directed above.

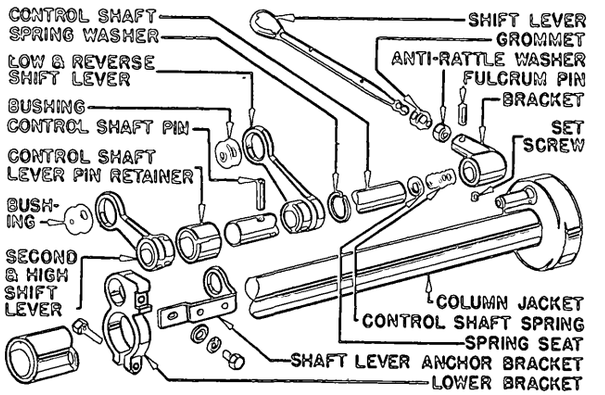
Transmission Case Shifter Mechanism—Refer t Hudson Transmission article for servicing data.

1953-54 HUDSON JET

Hudson Jet, All Models (1953-54)

DESCRIPTION: Remote control with steering column mounted gearshift lever of a design different than other Hudson Models.

ADJUSTMENT: Place gearshift lever in neutral, loosen both trunnion nuts on each shift rod at levers on lower end of steering column so that rods are free. Make certain that each gearshift lever (on transmission) is in neutral position by feel of plunger engaging notches in shifter shaft sectors. Tighten both trunnion nuts on each shift rod against trunnion, being careful not to change position of rods or shift levers. *CAUTION*—Place gearshift lever in each position and make certain that pin does not bottom in groove of either lever in any shift position. If pin bottoms, adjust anchor bracket as necessary.



HUDSON JET TRANSMISSION CONTROL

REMOVAL OF CONTROL SHAFT & LEVERS: Disconnect low & reverse and second & high shifter rods at control shaft levers by removing cotter pins and flat washers. Remove control arm fulcrum pin in gear shift lever at top of column. Remove shift lever grommet, silencer, and take out shift lever. Loosen the Allen screw at control shaft lower bracket attaching Handi-shift control shaft to steering column jacket tube and slide bracket and levers down on tube approximately 2¼" to clear control shaft pilot at steering column jacket tube housing. Remove screw, lockwasher and plain washer attaching control shaft lever anchor bracket to control shaft lower bracket. While holding control shaft remove second & high shift lever, control shaft drive pin retainer, drive pin, low & reverse shift lever, spring washer, and control shaft lever anchor bracket from lower end of control shaft. Control shaft and fulcrum bracket can now be removed by pulling control shaft away from jacket tube. CAUTION—Do not lose the pilot compression spring and flat washer when removing control tube assembly.

INSTALLATION OF CONTROL SHAFT & LEVERS: Install spring and washer into fulcrum bracket and install fulcrum and shift control shaft over pilot. Install control lever silencer, control lever grommet. Insert control lever through grommet, silencer, fulcrum bracket and in socket of pivot. Insert lock pin, using care not to damage fulcrum bracket. Place spring washer, low & reverse lever on control shaft.

1948-EARLY 1952 HUDSON HANDI-SHIFT (USED WITH OWN MAKE TRANSMISSION)

6 & 8, All Models (1948-52)—See Note

►**Transmission Control Note**—Used with Hudson Own Make transmission. See "Late 1952-53 Hudson Handi-Shift" for models with Warner Transmissions.

►**DRIVE-MASTER CAUTION:** Handy-shift control used on Drive-master cars but should be adjusted in conjunction with other Drive-master units. *See "Hudson Drive-Master" data in this section.*

DESCRIPTION: Remote control with steering column mounted gearshift lever. Design is same as used on previous Hudson models except for new gear engagement linkage as follows:

Gear Engagement Rods & Lever—New idler lever or bellcrank is pivoted on stud on steering gear mounting flange with forward rod extending from bellcrank to control tube on steering column, and rear rod extending from bellcrank to shift lever on transmission case. Linkage is adjusted by means of an adjusting clevis on the bellcrank end of the rear rod.

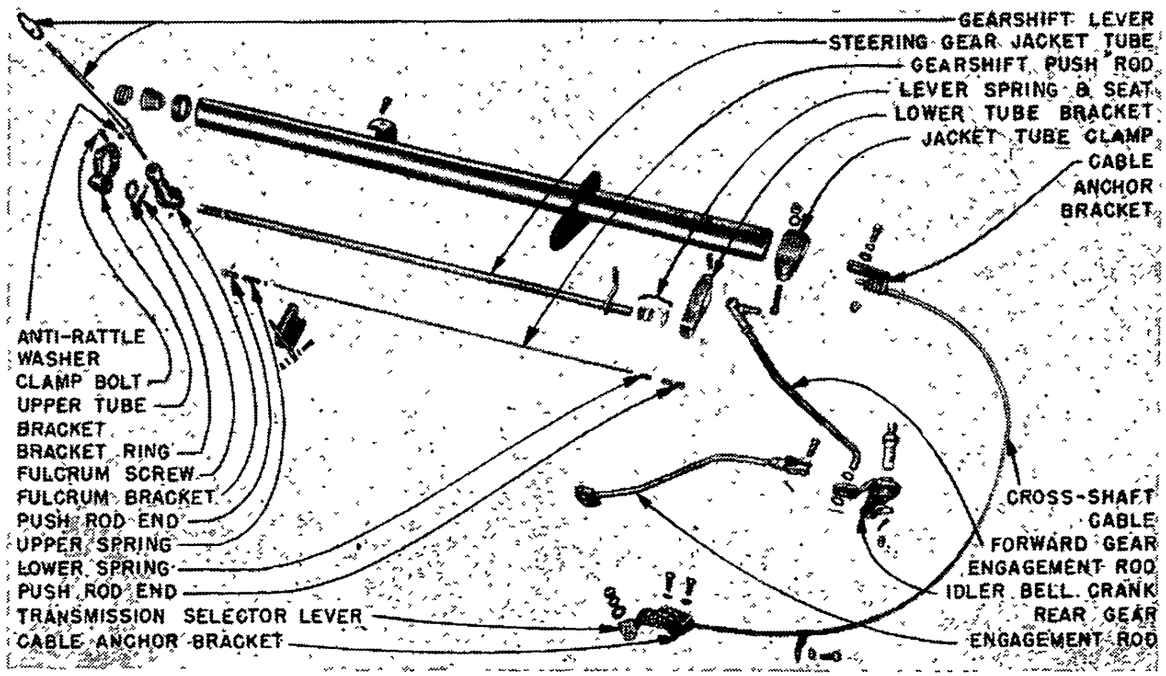
ADJUSTMENT: Check and adjust linkage in order as follows (Selector cable should only require adjustment if hard shifting, particularly in Second Gear, has been noted):

Gearshift Lever Position—Lever should be in crosswise (horizontal) position in neutral. If lever position not correct, remove clevis pin and adjust clevis on forward end of rear control rod at bellcrank on steering gear.

Gear Engagement Rod—Disconnect rear control rod at bellcrank on steering gear by removing clevis pin. Place gearshift lever in neutral position (see above). Make certain that the shift lever on side of transmission is in neutral (can be determined by feel), loosen locknut and adjust clevis on forward end of rear rod until clevis pin can just be inserted in clevis and bellcrank without disturbing position of gearshift lever or transmission shift lever.

Selector Cable (Cross-shift)—Move gearshift lever to extreme upper (Low-Reverse) position in neutral and block or hold lever in this position while adjusting. Loosen cable casing anchor bracket capscrew on steering column, pull anchor bracket up (screw hole slotted to permit this adjustment) until all slack removed from casing and shifter shaft inner lever on transmission case is fully over in the "Low-Reverse" position. Tighten anchor bracket capscrew and see that anchor has clearance at top bottom of travel.

►*CAUTION*—Make certain that shift selector lever on transmission case (to which selector cable attached) is tight on its shaft and that bracket is tight on transmission case.



1948-EARLY 1952 HUDSON HANDI-SHIFT TRANS. CONTROL (USED WITH OWN MAKE TRANSMISSI N)

REMOVAL & INSTALLATION OF CONTROL UNITS: Gearshift pushrod (cross-shift selector cable rod) can be removed separately, or entire steering column gearshift unit can be removed as follows:

Gearshift Pushrod Removal: Remove steering wheel. Take out clamp bolt and remove control tube upper bracket and fulcrum bracket ring. Remove fulcrum screw from gearshift lever, remove lever and anti-rattle spring washer. Disconnect cross-shift cable at lower end of steering column unit by removing hairpin clip. Remove anchor bracket capscrew, pull pushrod down far enough to remove key attaching pushrod to pushrod upper end fitting, remove this end fitting, use a wire hook to remove compression spring and seat at upper end of pushrod. Pushrod can then be withdrawn from control tube.

Installation—Coat pushrod end fittings with viscous chassis lubricant when installing them in control tube, assemble parts by reversing removal instructions.

Gearshift Assembly Removal: Remove horn ring and steering wheel. Lift carpet around steering column, remove metal and rubber dustcovers at floor opening. Remove setscrew from gearshift lever fulcrum bracket and clamp bolt from control tube upper bracket. Remove retainer plate and steering jacket tube clamp at instrument panel. Disconnect cross-shift cable from pushrod at lower end of control tube by taking out hairpin clip. Free cable anchor bracket by taking out capscrew. Disconnect gear engagement rod (forward rod) at lever on lower end of control tube. Remove compression spring and spring seat washer from lower end of control tube. Control tube assembly can then be removed.

►**Steering Gear Jacket Tube Removal Note**—This tube can be removed as a unit with gearshift control tube attached by loosening steering gear housing mounting bolts to allow steering gear to drop sufficiently for clearance. Then loosen jacket tube clamp at steering gear housing, lift jacket tube by swinging the lever up and to the right and out through opening at floor cover. When installing jacket tube, reverse this procedure.

Installation: Assemble all parts by reversing removal instructions (above). Before installing control tube upper bracket, check condition of spacer ring (between gearshift lever fulcrum bracket and upper bracket) and replace ring if less than .025" thick. Adjust controls after installation completed.

►**Anchor Bracket & Cross-shift Cable Installation**

Caution—These parts must be correctly positioned during installation as follows: Move gearshift lever to extreme upper position (Low-Reverse side in neutral) and hold in this position, pull selector cable bracket and tube upward until all slack removed from casing and control wire with transmission case shift lever fully over on Low-Reverse side. Tighten anchor bracket capscrew and make certain that anchor has clearance at top and bottom of travel.

Transmission Case Shifter M chanism: *See "Hudson Transmission data.*

LATE 1952-54 HUDSON HANDI-SHIFT (USED WITH WARNER TRANS.)

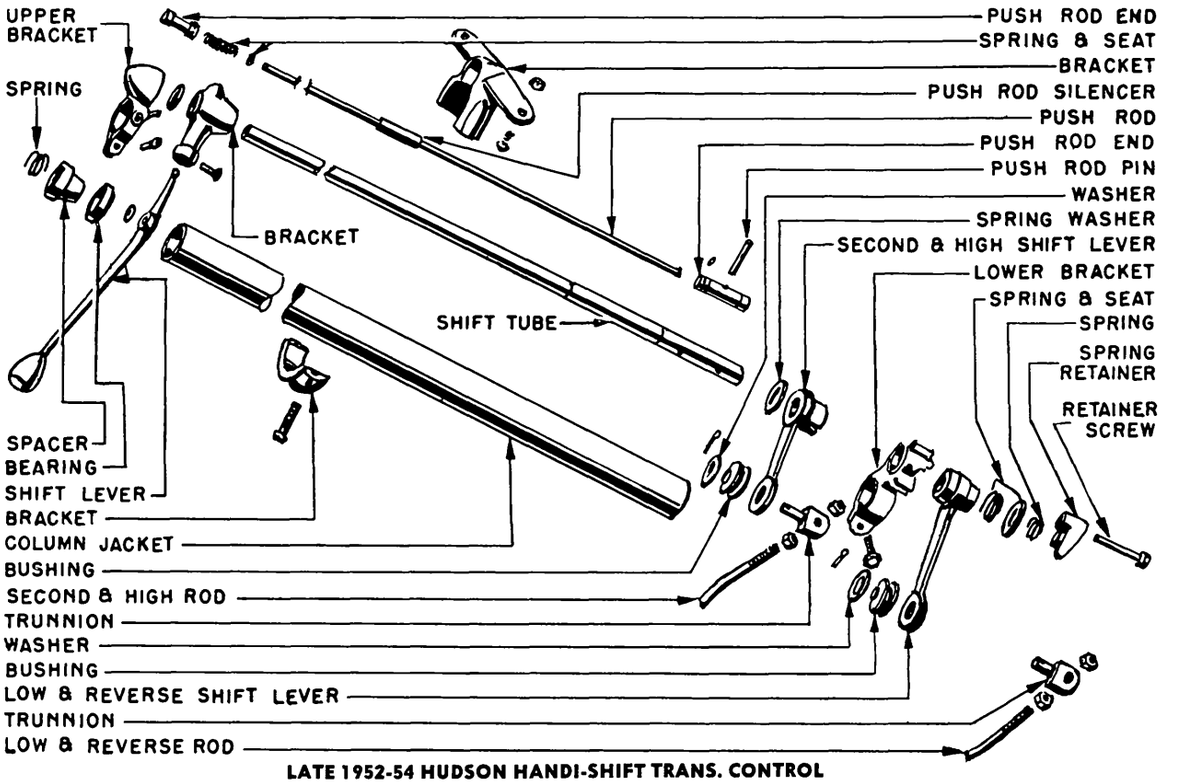
6 & 8, All Models Exc. Jet (1952-54) See Note.

►**Transmission Control Note**—Used with Warner type transmissions. See "1948-52 Hudson Handi-Shift" for models with Hudson Type Transmission.

DESCRIPTION: Remote control with steering column mounted gearshift lever. Shift levers at lower end of steering column directly connected to transmission shift levers. Cross-over cable not used as on previous models.

ADJUSTMENT: Before making any adjustments, be sure that Handi-Shift control tube is parallel to steering column jacket. If not parallel, loosen clamp in control tube lower bracket and move bracket until proper alignment is obtained. Be sure bracket is centrally located between second & high, and low & reverse. Check adjustment of spring retainer at lower end of steering column. With springs compressed, distance between spring retainer and fibre washer should be 27/64". Adjust by turning lower retainer bolt as necessary. With control lever in neutral, loosen low & reverse and second & high shift rod nuts at trunnion on shift levers. Back off nuts on each side of trunnion and insert a ¼" diameter rod about 4" long through holes in shift levers (holes located at end of levers closest to shift control tube), engaging slot in control tube lower bracket. This locks the levers in neutral position. Move the two outer shift levers on transmission by hand to make sure lock balls are fully seated in neutral detents in transmission shift shafts. Turn nuts on shift rods until they contact each side of trunnion and tighten nuts using care not to disturb position of rods or transmission shift lever. Remove ¼" rod from shift levers. Check manual shift cross-over by moving lever up and down. If cross-over is not smooth, shorten or lengthen low & reverse shift rod by adjusting nuts at trunnion ¼ turn at a time until smooth action is obtained. Check gear shifting for smooth action.

REMOVAL & INSTALLATION OF CONTROL ASSEMBLY: Remove control lever fulcrum screw, lockwasher and anti-rattle washer from upper fulcrum bracket and take out control lever. Remove dowel screw and loosen clamp screw at control tube upper lever bracket and take off bracket and thrust washer. Remove screws holding steering column bracket cap to bracket and remove cap. Remove cotter pins and trunnions from shift levers at lower end of steering column. Remove bolt, spring retainer, compression spring, fibre washer and upper compression spring. Slide low & reverse shift lever off end of control tube. Pull control tube out of lower bracket and push out control tube operating lever pin. **Do not loosen clamp bolt or alter position of bracket.** Remove second & high shift lever from tube.



LATE 1952-54 HUDSON HANDI-SHIFT TRANS. CONTROL (USED WITH WARNER TRANSMISSION)

Control Tube Disassembly—Push upward on lower end of lower pushrod end, exposing upper end of pushrod and pushrod end. Remove upper pushrod end key and remove end. Remove pushrod lower end assembly from bottom of control tube and take off lower rod end key and remove end from rod. Remove seat, pushrod upper compression spring and silencer from inside of tube. Remove second & high lever retaining ring from tube.

Installation: Reverse control assembly removal and note the following: When installing spring retainer, adjust bolt so there will be 27/64" space between fibre washer and top of the retainer. Be sure lower tube bracket is centrally located between second & high and low & reverse levers. See Adjustment (above).

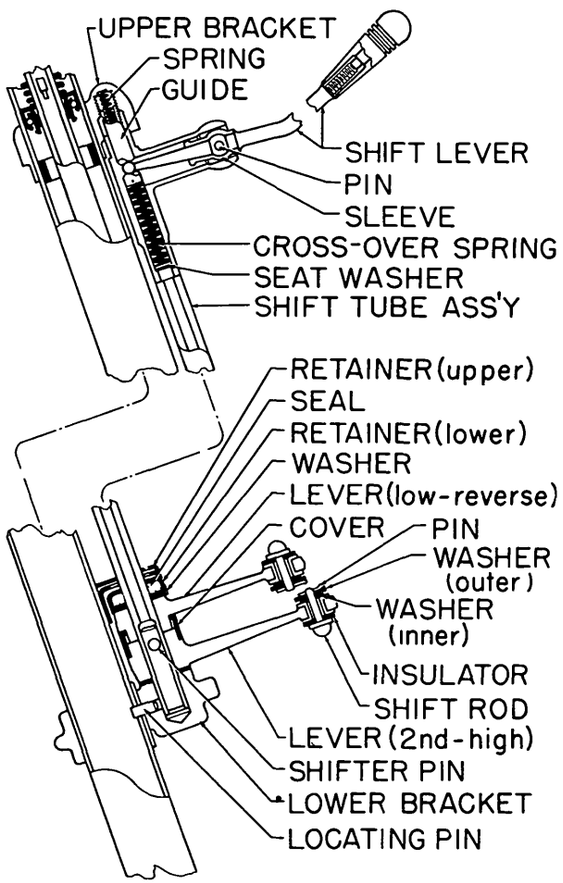
1947-48 FRAZER & KAISER

Frazer & Kaiser, All Models (1947-48)

DESCRIPTION: Remote control with steering column mounted gearshift lever under the steering wheel.

ADJUSTMENT: With gearshift lever in neutral, disconnect control rods at transmission case, align levers at lower end of steering column by installing aligning pin (¼" drill rod) through hole in each lever and hole in bracket. See that each of the shifter shafts on the transmission is in neutral position (can be determined by feel of detents engaging neutral notch in shaft). Adjust each rod at transmission end by means of clevises provided so that shifter shafts will be in neutral position with steering column levers aligned with aligning pin. After adjustment completed, remove aligning pin from steering column levers.

►*CAUTION—Make certain that control rods do not extend through clevises far enough to bind on levers when operating control (correct this condition by shortening rods).*



1947-48 FRAZER & KAISER TRANSMISSION CONTR L

1949-51 FRAZER & KAISER

Frazer, All Models (1949-50-51)
Kaiser, All Models (1949-50)

DESCRIPTION: Remote control with steering column mounted gearshift lever. Design changed from that used on 1947-48 models in the following particulars:

Gearshift Lever & Upper Gearshift Bracket—New mounting bracket bolted on steering column tube with gearshift lever arm linked to shift shaft by drive pin in shaft. Cross-over spring which holds shaft and lever in lower (second-high) position located at lower end of shift shaft (no springs at upper end).

Shift Levers & Lower Gearshift Bracket—Similar to type used on previous cars except that cross-over spring located in bracket socket below shift shaft and levers **reversed from previous location** (second-high lever is UPPER lever).

Shift Rods & Idler Bellcrank—Idler bellcranks mounted on shaft on left frame side rail with upper (non-adjustable) shift rods linked to steering column shift rods, and lower (adjustable) rods linked to transmission case shift levers.

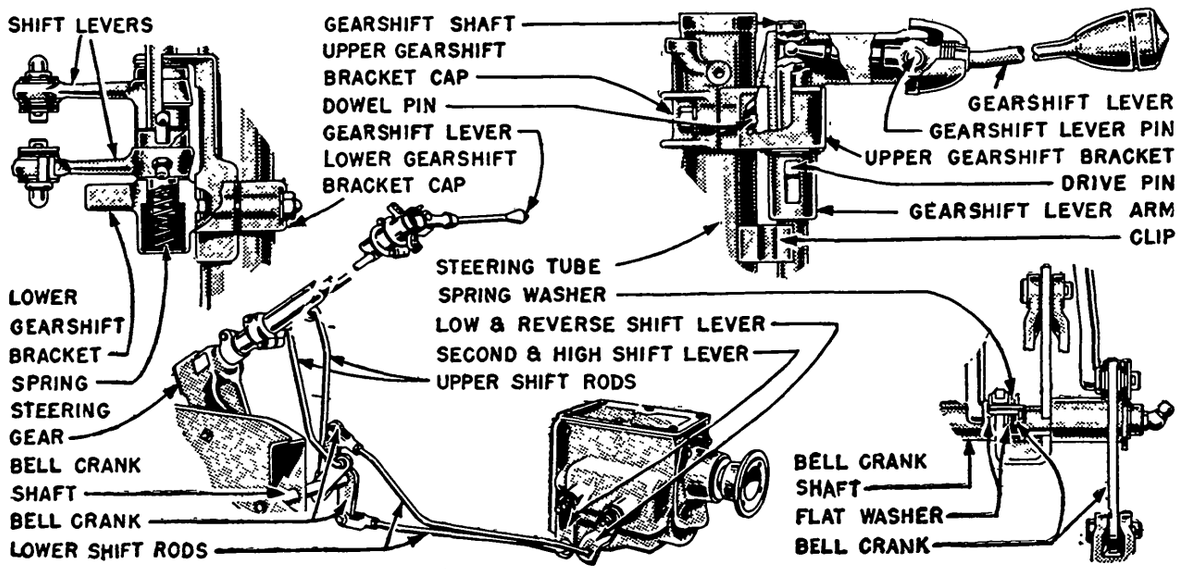
ADJUSTMENT: Shift Rods—Disconnect rear (adjustable) shift rods at idler bellcranks on left frame side rail, place gearshift lever in neutral position. Align lower shift levers and lock in this position by inserting ¼" drill rod through hole in each lever and locating hole in lower bracket. Check gearshift lever for free up-and-down movement in neutral to insure that shift shaft pin does not bind in shift lever slots. See that transmission gears and shift levers in neutral (can be determined by feel of detent poppet balls engaging neutral notches in shifter shaft cams). Adjust clevis on forward end of each rear shift rod so that rods can be connected without disturbing position of transmission gears and levers. Connect rods and remove locking rod from steering column levers.

Gearshift Lever Travel—Travel must be checked and adjusted to insure full gear engagement. Disconnect second-high shift rod at forward lever on transmission case, shift transmission into second gear by moving this lever to the forward position. Move gearshift lever and upper shift lever on steering column to second gear position (as far as possible upward). Check position of rod end in relation to hole in lever on transmission case. Rod end should be slightly short of lever hole to insure full engagement of gears before gearshift lever reaches end of travel. Do not change rod adjustment unless it is too long, or more than slightly short of lever hole. Repeat this check in each gear position (rod should be **slightly short** in Second & Reverse, **slightly long** in Low & High). Connect rods and recheck shift rod adjustment to see that gearshift lever has free up-and-down travel in neutral.

DISASSEMBLY: Disconnect shift rods at levers on lower end of steering column. Entire steering column unit can be freed from steering column tube by taking out upper and lower bracket bolts (steering column jacket cover can be removed for access to upper bracket by removing steering wheel and taking out attaching screws holding the two jacket cover sections together).

REASSEMBLY: Assemble parts by reversing disassembly order. When installing brackets on steering column, make certain that locating dowels enter holes in steering column tube.

TRANSMISSION CASE SHIFTER MECHANISM: *See Warner Transmission data.*



1949-51 FRAZER & 1949-50 KAISER TRANSMISSION C NTR L

1951-55 KAISER & HENRY J

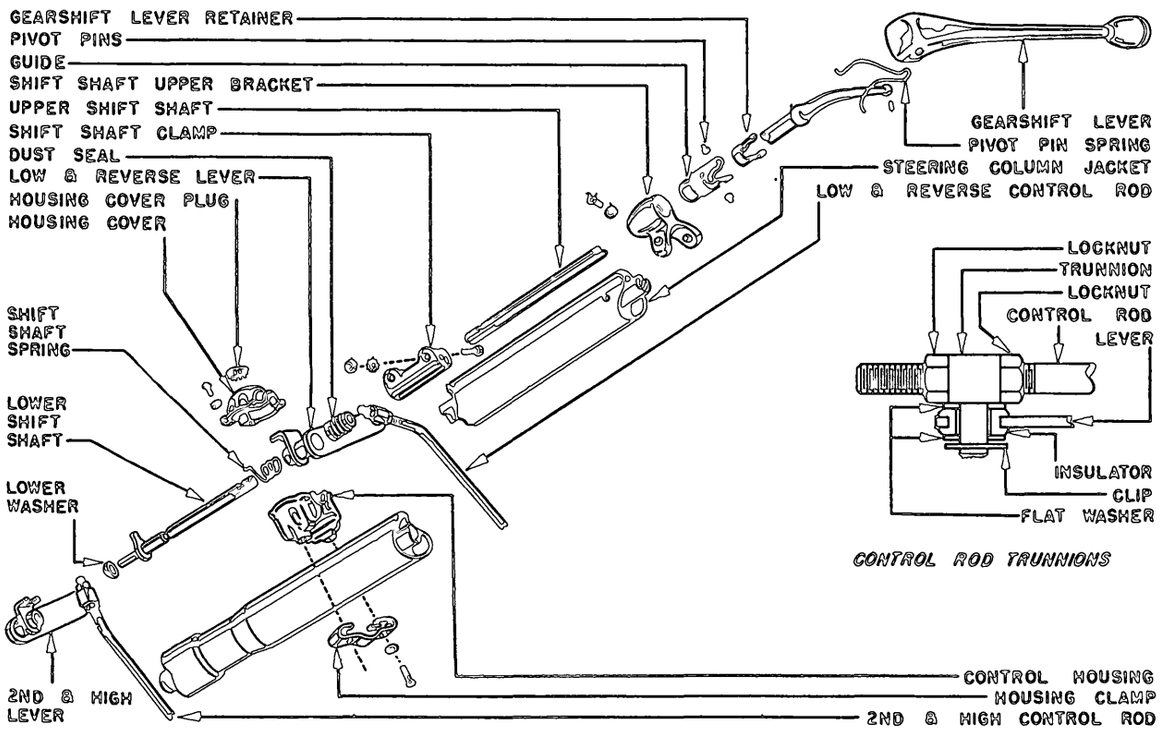
Henry J, All Models (1951-53)
Kaiser, All Models (1951-55)

DESCRIPTION: Remote control type with gearshift lever mounted on steering column. Gearshift lever is pivoted in mounting bracket on upper end of steering column and has engaging dog or lug on lower end of control shaft which engages one or the other of the two "inner levers" in the housing at the lower end of the steering column. These inner levers are linked to the shifter levers on the side of the transmission case by means of adjustable rods (see Adjustment below). Gearshift lever is normally in the "Second-High" (lower) position in which it is held by a spring at the lower end of the control shaft and must be raised, against spring tension, to shift lug into engagement with the "Low-Reverse" lever and rod (upper position).

ADJUSTMENT: Place gearshift lever in neutral position, loosen both trunnion nuts on each shift rod at levers on lower end of steering column so that rods are free. Remove inspection cap on control housing cover, install special aligning plug Gauge KF-69 through this hole (gauge will align gates in inner levers in neutral position). Make certain that each transmission case shift lever is in neutral position (can be determined by feel of detent plungers engaging notches in shifter shaft sectors). Tighten both trunnion nuts on each shift rod securely against trunnion using care not to change rod and transmission lever positions or to spring control levers.

REMOVAL: Disconnect both shift rods at control housing levers on steering column by taking out trunnion pin cotter pins. Take out two mounting screws in gearshift lever housing bracket under steering wheel, remove two capscrews in shift control housing bracket at lower end of steering column, remove bracket cap. Control shaft can be split at coupling above lower shift control housing and each section lifted out separately.

TRANSMISSION CASE SHIFTER MECHANISM: *See Warner Transmission data.*



1951-55 KAISER & HENRY J TRANSMISSION CONTROL

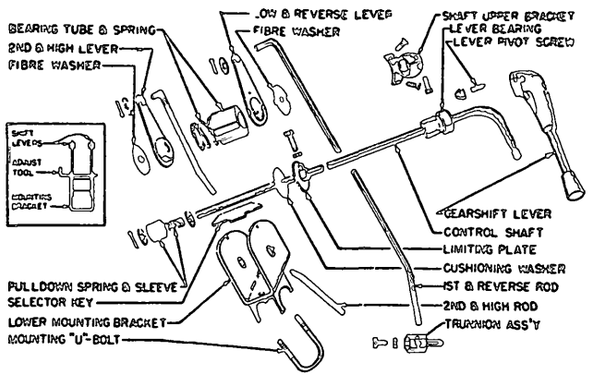
CONTROL ROD TRUNNIONS

1941-48 NASH

"600" Six, All Models (1941 to 1948)
Ambassador Six, All Models (1940 to 1948)
Ambassador Eight, All Models (1941-42)

DESCRIPTION: Remote control type with steering column mounted gearshift lever.

ADJUSTMENT: With gearshift lever in neutral, install special aligning pin J-1390 through holes in both flanges of steering column lower bracket and through holes in both levers so that levers are aligned in this neutral position. Loosen locknut and back off setscrew on each rod trunnion on transmission case shifter shaft levers. Carefully position each shifter shaft so that gears are in neutral (can be determined by feel of detents engaging neutral notch in sector on inner end of shafts), tighten setscrews & locknuts, remove aligning pin.



NASH 1941-48 TRANSMISSION CONTROL

REMOVAL & DISASSEMBLY: Steering column unit must be disassembled to permit removal as follows:

Steering Column Unit—Disconnect rods at levers on steering column, remove cotter pin in lower end of control shaft, remove plain washer, pull-down spring, rubber sleeve, and second washer from end of shaft. Remove lower mounting bracket "U" bolt, free mounting bracket locating dowel from hole in steering column. Rotate control shaft until selector key lines up with notch in mounting bracket, work bracket assembly down and off shaft (shifter levers, washers, bearing tube and spring will come off with bracket as an assembly). Lift out selector key (1940-42 cars—not necessary on later cars). Remove setscrew in limiting plate, slide plate and rubber washer off lower end of shaft.

Gearshift Lever, Shaft, & Upper Bracket—Take out gearshift lever pivot screw and pin, remove lever. Loosen upper bracket clampscrew, remove bearing hub from bracket. Remove two bracket capscrews (see CAUTION below), lift out shaft and bracket assembly

▷*CAUTION*—Bracket screws must be removed as follows to prevent displacing split ring within column jacket: Remove top screw, loosen bottom screw, then insert small drift in upper screw hole to hold

CONTINUED ON NEXT PAGE

1941-48 NASH (C nt.)

split ring while bottom screw being removed. Remove bracket, replace one screw to hold ring in position until bracket re-installed.

INSTALLATION: Reverse the removal & disassembly directions above and note following points:

Gearshift Lever & Upper Bracket—Apply light film of Lubriplate to shaft and threaded part of bearing hub, screw bearing down in bracket so that clearance will exist between shift lever and bracket with lever in Low-Reverse position.

Limiting Plate Adjustment—Must be adjusted so that control shaft selector key does not rub on lower flange of mounting bracket. To adjust, loosen locknut and back off adjusting setscrew. Engage control shaft with Second-High lever fully, then raise shaft slightly to provide clearance between key and lower flange of bracket, position limiting plate so that rubber cushioning washer is against bracket top flange, tighten setscrew and locknut

1949-55 NASH & 1955 HUDSON (EXC. RAMBLER & METROPOLITAN)

Hudson, Exc. Rambler (1955)
Nash, Exc Metropolitan & Rambler (1949-55)

►*HUDSON & NASH RAMBLER, NASH METROPOLITAN NOTE. See Hudson & Nash Rambler, Nash Metropolitan (1950-55)*

►*HYDRA-MATIC DRIVE CONTROL NOTE· See Hydra-Matic Drive Transmission data for control adjustment on Hydra-Matic Drive cars,*

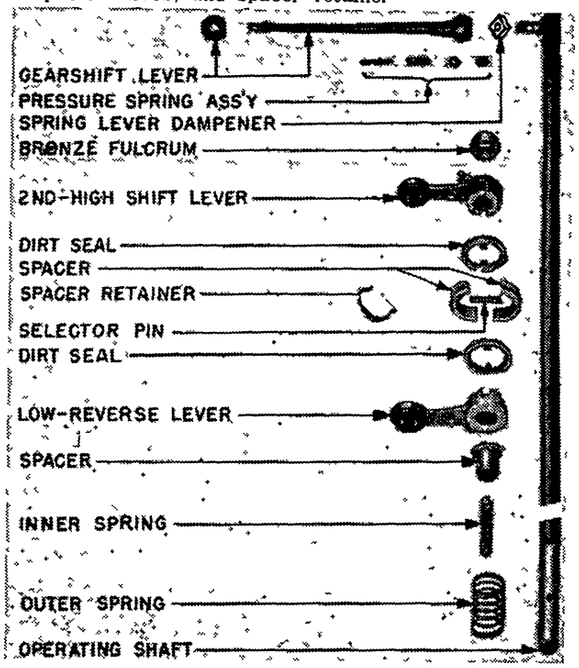
DESCRIPTION: Remote control type with steering column mounted gearshift lever Design similar to previous models except that entire steering column unit is enclosed within steering gear jacket tube

ADJUSTMENT: Place gearshift lever in neutral lock shift levers at lower end of steering column by inserting J-1390 Aligning Tool through hole in mounting bracket and hole in each lever Disconnect shift rods at levers on side of transmission case, check to see that transmission gears and shifter levers in neutral (can be determined by feel of detent balls engaging neutral notches of shifter shaft cams) Adjust transmission end of each shift rod so that rods can be connected without disturbing position of levers, connect rods remove aligning tool from steering column levers, check gearshift lever for smooth up-and-down (cross-over) action in neutral

DISASSEMBLY: (Ambassador, Statesman 1949-51): Place shift lever in neutral, disconnect both shift rods at shift levers on steering column Remove steering wheel (see steering gear), remove ignition switch mounting bolt (1949 models only) and three screws mounting bearing retainer on steering column tube, lift bearing retainer out Remove gearshift lever knob, use wrench flat on lever to unscrew lever *(NOTE*—On 1949 cars where this flat is not provided, screw two nuts on outer end of lever and lock nuts together, then use wrench on inner nut to unscrew lever), remove lever from housing Remove dirt seal spacer retainer from between the shift levers at lower end of steering column and remove both halves of the spacer Push selector pin in shifter operating shaft out and remove pin from beneath shaft Pull operating shaft out through upper end of steering jacket tube *(CAUTION*—Inner spring in lower end of operating shaft will come out with the shaft) Remove large Outer Spring and Spacer from below low-reverse shift lever, then remove shift levers dirt seals and bronze fulcrum from opening in jacket tube

DISASSEMBLY: Ambassador & Statesman (1952-55). Hornet & Wasp (1955)—Remove horn blowing parts and steering wheel Remove metal screws holding bearing retainer If equipped with directional signals, disconnect the six wire terminals under dash (tag each wire for identification) Slide rubber grommet upward on jacket tube and fold mat over toward center of floor Then slide rubber insulator pad up to rubber grommet *Remove rubber screws from clutch* and brake pedal opening cover, slide cover up on pedal shafts Loosen pedal capscrews and remove pedals and cover Disconnect gearshift rods from operating levers Loosen clamp bolt at lower end of jacket tube and steering gear housing On Ambassador & Hornet, remove upper and lower front steering gear mounting bolts Loosen lower bolt two turns, **but do not remove.** On Statesman & Wasp, remove three upper bolts and loosen the lower bolt Disconnect steering jacket tube bracket at instrument panel, and remove jacket tube and shifting assembly by lifting it through floor opening and over steering gear tube With jacket tube assembly on a cloth covered bench, remove dirt seal spacer retainer (clamp at lower end of steering column), remove the two halves of dirt seal spacers Turn operating levers upward, and then with a small punch, push selector pin out of operating shaft, turn levers down and remove pin from other operating lever *(NOTE*—Selector pin can only be removed through machined notch on second and high operating lever, this lever has lubricating fitting) Remove gearshift lever knob and remove gearshift operating lever by lifting it out of jacket tube Operating levers, outer spring, and spacer will remain in bearing housing at lower end of jacket tube after operating shaft is removed Lower spring may also remain in lower end of operating lever Remove dirt seals from operating levers and bearing housing from jacket tube

REASSEMBLY: (Ambassador, Statesman 1949-51): On both of these models, insert the operating shaft through upper end of column jacket tube until end just visible in shift lever opening, lubricate bronze fulcrum and install on tube, install inner spring in end of tube. Place rubber dirt seal on hub of second-high operating lever with metal side of tongue facing down (to provide seat for selector pin), install lever on operating shaft with notch for selector pin downward Place rubber dirt seal on low-reverse lever and install lever similarly except that metal tongue on seal and selector pin notch on this lever should face upward toward pin Install spacer and large spring over lower end of operating shaft and push shaft down into place in tube Turn shaft so that selector pin hole indexes with notches in shift levers, install selector pin, spacer halves, and spacer retainer



TYPICAL TRANSMISSION CONTROL

REASSEMBLY: Ambassador & Stat sman (1952-55), Hornet & Wasp (1955)—Install the bearing housing jacket tube *Replace dirt seals on both gearshift* operating levers locating the metal side of seal toward selector pin groove. Apply a coat of Lubriplate to to bronze fulcrum and place it in bearing housing, then insert the second & high, and low & reverse operating levers, outer spring, and spacer in bearing housing Install inner spring (holding it in place with Lubriplate) in lower end of operating shaft and insert shaft, from top of tube, down through bronze fulcrum and shift levers Align operating shaft selector pin hole with slot in second & high shift lever, and insert selector pin Install dirt seal spacers and seal retainer spring Apply Lubriplate to pressure spring pin and to ball end of gearshift lever and tighten lever to operating shaft Apply a thin coating of Lubriplate to rubber grommet at lower end of jacket tube, and install jacket tube in car Align jacket tube assembly and attach bracket to instrument panel Tighten clamp bolt at lower end of jacket tube and steering gear housing Install shifter rods to gear shift operating levers, then install bearing retainer, steering wheel and horn blowing parts. Replace clutch and brake pedal assembly, floor mat and rubber grommets.

1950-55 RAMBLER & 1954-55 METROPOLITAN (NASH & HUDSON)

Rambler (1950-55)
Metropolitan (1954-55)

DESCRIPTION: Remote control type with gearshift lever under steering wheel pivoted in lower edge of instrument panel to right of steering column (chrome ball in panel opening serves as pilot). Steering column unit is attached to steering column tube at lower end by a bracket and clamp.

ADJUSTMENT: Place shift lever in neutral, disconnect shift rods at swivel end of rods, place 3/16" (.1875") diameter rod through small holes in gear shift operating levers and grooves in bearing housing. With tool in position adjust trunnions at lower end of rods to permit trunnion pins to enter grommet in transmission lever freely. Remove aligning tool and check for free operation of both levers.

DISASSEMBLY: Remove gear shift lever knob and nut, push lever toward dash panel to loosen chrome ball so will slide off lever. Disconnect gear shift rods from levers at lower end of steering column, remove dirt seal spacer retainer from between operating levers and remove two halves of spacer. Remove two cap screws from body bracket and remove operating lever bearing assembly housing. Lower assembly into engine compartment, remove selector pin and remove housing assembly from operating shaft. With housing assembly in a vise, remove large outer spring and spacer, and remove both operating levers, bronze fulcrum and inner spring. The gear shift lever and operating shaft may be removed from passenger compartment. *CAUTION*—Note position of spring retainer, spring and washer before removing from shifting lever.

REASSEMBLY: With operating housing in vise, apply small amount of lubriplate to bronze fulcrum and insert in housing. Install rubber dirt shield on both gear shift levers with metal side of seal toward the selector pin groove, to provide hard surface for pin. Place operating levers in bearing housing and install large outer spring and spacer against the low and reverse operating lever. Line up holes in operating levers and bronze fulcrum with hole in bearing housing to provide ease of assembly on the operating shaft. Install operating shaft and lever assembly through hole in floor board and rubber dirt seal. Apply lubriplate to small inner spring, install spring in end of operating shaft, then assemble bearing housing to operating shaft. Turn operating shaft so that hole in shaft will index with notches in operating levers and install pin. Install two halves of dirt spacers, secure with dirt seal spacer retainer. *Note*—Start each half of spacer by turning end into groove. Install gear shift lever spring washer, pressure spring and spring retainer on gear shift lever and guide lever through hole in instrument panel. Lubriplate chrome ball, install ball, lever nut, and gear shift lever ball. Secure bearing housing assembly on body bracket. Fastening bracket has elongated holes for alignment. Centralize the shifting lever between the steering wheel and instrument panel with the shifting lever in the second and high speed position.

1951-55 OLDSMOBILE

8 Cyl., All Models (1951-55) with Synchro-mesh Trans.

►***This control not like type used on 1950 Series (requires different adjustment and disassembly procedure).***

DESCRIPTION: Remote control type with steering column mounted gearshift lever. Control mechanism in steering column is similar to type used on Oldsmobile prior to 1950 (not same as 1950 type) with separate gear engagement lever and gear selector lever on lower end of steering column (see illustration).

ADJUSTMENT: ***Two separate adjustments required.***

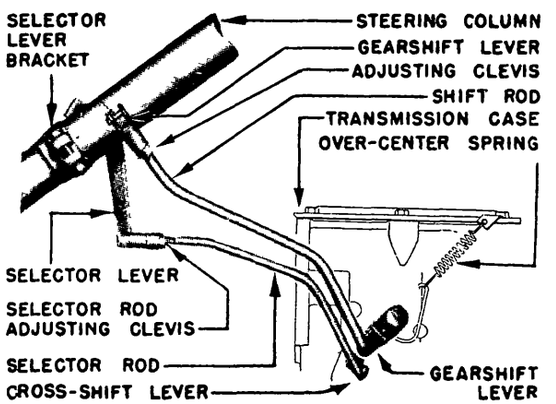
Shift Rod (Gear Engagement) Linkage—Set transmission case shift lever in neutral position. Measure horizontal distance from center of gearshift lever knob to horizontal centerline of steering wheel. If this distance is not 1¼" (1951-53), 2" (1954), 2 11/16" (1955), adjust by removing clevis pin on forward end of shift rod and adjust clevis on rod.

Selector Rod (Cross-shift) Linkage—Place gearshift lever in neutral position, disconnect selector rod at cross-shift lever on steering column, make certain that selector lever on transmission case is fully back against its rear stop. Adjust clevis on forward end of selector rod so that clevis pin enters clevis and cross-shift lever holes freely, **then lengthen rod by turning clevis three full turns,** connect rod by installing clevis pin. *NOTE*—This setting will provide correct clearance between gearshift knob and steering wheel.

DISASSEMBLY (1951-53): Disconnect battery cable and horn wire. Loosen all the steering gear-to-frame bolts. Remove filler plate screws on underside of floor panel at steering column. Disconnect shift rod from shifter lever on steering column. Remove selector lever from bracket on steering column, loosen selector lever bracket bolt, slide bracket down off upper jacket onto lower jacket. Remove nut and washer attaching brake pedal and rod to brake arm. Remove horn button and steering wheel (see Steering Gear data), remove spring and spring seat located directly below steering wheel. Remove gearshift lever. Turn back floor mat, remove brake pedal, take out remaining screws attaching filler pans to floor board, remove filler pans. Disconnect direction signal wires at connectors. Remove steering column-to-instrument panel bracket. Slide complete upper jacket assembly up off lower jacket and into driving compartment, remove this assembly from car. Remove ball stud from upper end of shift tube. Remove retainer ring at lower end of upper jacket assembly, slide shift tube and following parts out of upper jacket: large flat washer, rubber bumper, two small flat washers, coil spring, and spring retainer.

DISASSEMBLY (1954-55): Remove mast jacket—See Steering Assembly Removal. Remove turn signal wire retainer from side of mast jacket. Loosen turn signal housing mounting screws, remove housing and wire assembly. *NOTE*—Hold lower end of horn wire to prevent it from being pulled into mast jacket along with turn signal wires. Pull rubber boot back from shift lever retaining nut, unscrew and remove retaining nut and spring from shifter bowl. Remove shift lever, seat and anti-rattle spring, shifter stud, snap ring wave washer, flat washer, shifter bowl and special washer from end of mast jacket and slide shifter tube assembly out lower end of mast jacket. On 1955 models it is not necessary to remove horn contact bushing unless a new bushing is to be installed.

►*NOTE*—When installing special wave washer on mast jacket the relieved edge of washer should face the shoulder of the mast jacket.



1951-55 OLDSMOBILE TRANS. CONTROL

REASSEMBLY: Install all parts by reversing the disassembly procedure and note the following clearances:

Upper Jacket—Position upper jacket so that clearance between steering wheel and direction signal housing is 1/8-3/16".

Selector Lever Bracket—Position bracket so that clearance between bracket and lower shift lever is 1/16" with lever in its lowest position, then tighten bracket clamp bolt.

1940-50 OLDSMOBILE HANDI-SHIFT

Six, All Models (1940 to 1950)

Eight, All Models (1940 to 1949)

►**HYDRA-MATIC DRIVE NOTE:** Control data below applies to Synchro-mesh transmission cars only. Hydra-Matic Drive control is of different design and adjusted differently. *See Hydra-Matic Drive Transmission data.*

DESCRIPTION: Remote control with steering column mounted gearshift lever. Design on all models is similar except for following changes:

1940 & Later Gearshift Lever & Selector Linkage: Changed from previous design as follows:

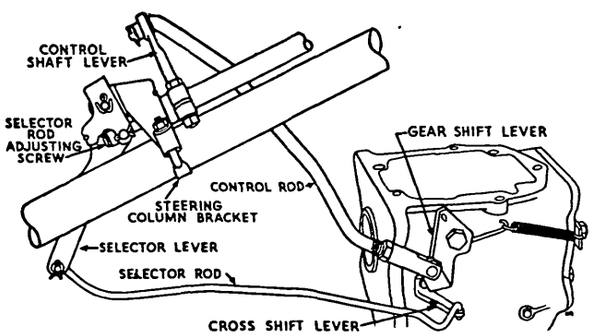
Gearshift Lever—Lever now pivoted on plain pin in control shaft bracket. Pin is retained by retainer ring and entire shift lever pivot assembly is enclosed by rubber boot.

Selector Rod & Lever Assembly—Selector control rod in control shaft on steering column now connected to new type selector lever and shaft assembly in transmission by connecting rod (no cable used). Adjustment provided on lower end of selector control rod at connection to lever.

1941 & Later Control Rod Linkage: New idler lever and redesigned linkage used as follows:

Control Rod (Gear Engagement) Linkage—New relay lever (idler lever) mounted on left side of engine with front non-adjustable rod connected between this idler lever and lever on steering column and additional rear adjustable rod connected between idler lever and gear shift lever on transmission case. Rear rod has adjusting clevis on transmission case end.

1949-50 Steering Column Unit: Design changed to new gearshift tube which is concentric with steering gear shaft in steering column and with different type shift levers and control rods (see illustration).



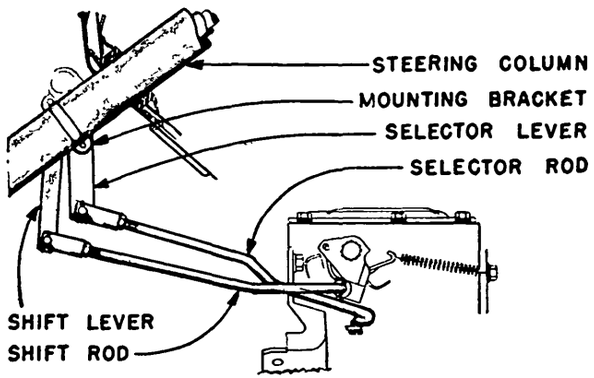
LDSM BILE 1940-48 HANDI-SHIFT

ADJUSTMENT (ALL 1940-48 MODELS): *Two separate adjustments required:*

Selector Rod (Cross-shift) Linkage—See that both shift lever and transmission gears in neutral, check vertical distance from top of gearshift lever to lower face of steering wheel rim. This distance should be 2 11/16—2 13/16". To adjust, remove cotter pin and take out lock pin in lever which engages adjusting screw on lower end of selector rod, turn adjusting screw up to reduce lever-to-wheel distance, down to increase this distance. Install lock pin from engine side making certain that it passes through waved spring washer on inside of lever, install cotter pin.

Control Rod (Gear Engagement)—With transmission gears in neutral, gearshift lever should be 1½" (1940), ½" (1941-47) above the horizontal. To adjust, disconnect shift rod at lever on transmission case (upper gear engagement lever), see that this lever in neutral position (can be determined by feel of detent balls engaging notches in shifter shafts). Install aligning gauge J-1445 (1940), J-1609 (1941 on see Note) on lower end of control shaft and steering column so notch in gauge engages control shaft lever. Gauge will hold lever in correct neutral position 1½" (1940), ½" (1941 on) above the horizontal. Loosen locknut and turn adjusting clevis on transmission end of shift rod until clevis pin can just be inserted without disturbing position of transmission shift lever. Tighten locknut and connect rod, remove gauge. NOTE—This adjustment should be made each time shift rod is disconnected at either end. Improper adjustment may cause interference with brake pedal.

Aligning Gauge Note—New Part No. J-1872 gauge required for Series 66, 68 Convertible Models and all Series 98 Models which have larger (1¾") diameter steering column.



OLDSMOBILE 1949 HANDI-SHIFT

ADJUSTMENT (ALL 1949 & 1950 6 Cyl.): *Two separate adjustments required:*

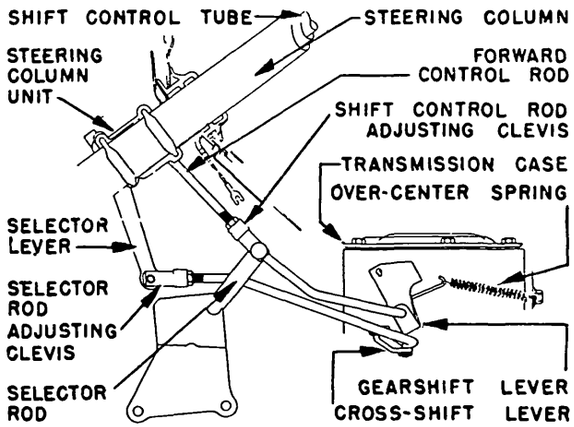
(1) Selector Rod (Cross-shift) Linkage—Place gearshift lever in neutral, disconnect selector rod from selector lever on steering column (upper lever), loosen locknut and adjust clevis at forward end of selector rod so clevis pin can just be inserted when vertical distance from top of steering wheel rim to top of gearshift lever knob is exactly 2 11/16". Tighten clevis locknut and connect rod.

(2) Shift Control Rod (Gear Engagement) Linkage—Place gearshift lever in neutral, disconnect shift rod from shift lever on steering column (lower lever), make certain that transmission gears in neutral, loosen locknut and adjust clevis at forward end of shift rod so that clevis pin can just be inserted when horizontal distance of gearshift lever knob center-line is exactly 1 3/16" above steering wheel horizontal center-line. Tighten clevis locknut and connect rod.

DISASSEMBLY & REMOVAL: As follows:

Gearshift Lever Removal—To remove lever, slide rubber cover toward outer edge to expose retainer ring, remove retainer ring, take out shift lever pivot pin, remove lever being careful not to lose shims and washers between lever and bracket. When reinstalling lever, make certain that anti-rattle spring in place on inner end of lever and that spring washer installed on pin on one side of lever and install shims (as required) on opposite side of lever so that lever operates freely without excessive sideplay or rattles.

Transmission Case Shifter Mechanism—Selector shaft and shifter shafts (for gear engagement) are same design as used on previous models. See Transmission article for dismantling and servicing directions. CAUTION—Selector shaft must be removed through right side of case and installed on left side to avoid damage to oil seal. Lower lever must be removed from vertical cross-shift shaft before selector shaft is driven out (to permit upper lever on shaft to disengage from selector shaft).



LDSM BILE 1950 6 CYL. HANDI-SHIFT

1950 OLDSMOBILE 8

8 Cyl. Series 88 & 98 (1950)

▷*This control not like type used on 1950 6 Cyl. or previous 8 Cyl. models.*

DESCRIPTION: Remote control type with steering column mounted gearshift lever.

ADJUSTMENT: *Horizontal adjustment only is required unless shift lever bowl (gearshift lever carrier) has been disturbed.*

Horizontal Adjustment—With both rods dis-connected at transmission case shift levers, move selector lever to Neutral, lift lever up midway through cross-over travel (shifter key will lock both lower shifter levers), move shift lever so that knob approximately 1 3/16" above steering wheel horizontal center-line, hold lever in this position while adjusting. Place both transmission case shift levers in neutral, adjust clevis on each rod so that rods can just be connected without disturbing lever positions, connect rods, check operation. If selector lever travel in neutral not smooth, or interference noted during the cross-over, recheck adjustment. Readjust either rod slightly to secure smooth cross-over.

Vertical Adjustment (when selector lever bowl removed or disturbed)—Disconnect both rods at shift levers on transmission case, allow lower (Low & Reverse) lever to swing counter-clockwise as far as possible (so that keyway out of alignment with key on shift tube). Remove horn button, steering wheel and direction signal switch assembly. Press shift lever tube assembly down until key contacts lower shift lever (pull up on selector lever in neutral), turn adjusting screw directly above selector lever in until it is tight against lever, then back screw off ½ turn, stake screw to prevent loosening in service.

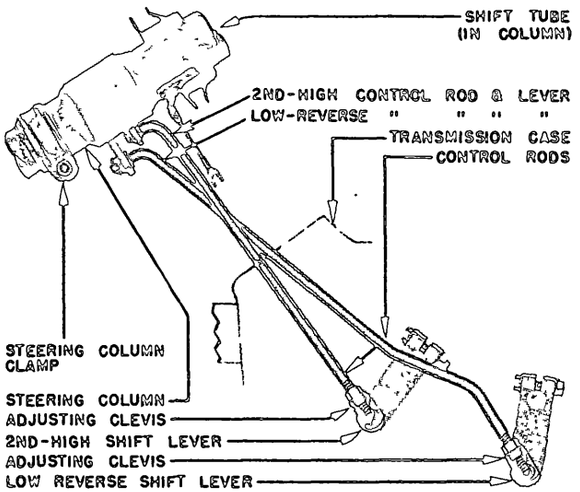
NOTE—This setting will position selector lever for vertical clearance of approximately 2 31/32" from top edge of steering wheel to center line of lever knob with lever at rest in neutral (1/64" clearance between key in shift tube and lower lever).

DISASSEMBLY: Remove steering wheel (see Steering Gear data), remove upper bearing spring and seat. Unscrew and remove gearshift lever retainer cap, place lever in neutral position, drive pin out of lever boss on carrier, withdraw gearshift lever.. Unscrew and remove direction switch lever, disconnect direction signal feed wires at connectors near steering column, attach fishing wire to these feed wires (pull fishing wire into column as feed wires pulled out and leave this wire in column for use in re-installing feed wires). Take out four screws retaining direction signal switch and housing on upper bearing retainer, pull switch feed wires and housing off. Take out three capscrews retaining carrier assembly on jacket, remove carrier, remove bearing and retainer by rotating them counter-clockwise. Remove cotter pins and dustcovers from lower shift levers on steering column, remove felt dust seal, slide shifter tube up and out of upper steering column jacket. Disconnect shifter levers from control rods, loosen clamp holding upper and lower steering column jackets. Raise front end of car, disconnect steering rod at pitman arm, take out steering gear-to-frame bolts. Lower the steering gear housing and shaft (with cross-over spring and seat) out of steering column. Lift low-reverse lever out of jacket, remove fiber spacer from between levers, turn second-high lever for clearance and remove from slot in jacket. Remove felt washer from recess above and below shift lever opening in jacket. Inspect lower bushing, bumpers, and washers for wear and remove and replace if necessary.

REASSEMBLY: Install all parts in reverse order of disassembly as given above and note the following precautions and adjustments:

Sealing Ring & Shifter Lever Lubrication—Saturate rings with engine oil and lubricate levers with Lubriplate before installation.

Fiber Spacer Installation—Lubricate spacer before installation, see that notch in spacer in line with back edge of levers (to align slot in spacer with slots in lever to permit key on shift tube to be entered when tube installed).



OLDSMOBILE 1950 8 CYL. TRANS. CONTROL

Upper Bearing Retainer—Lubricate retainer threads with Lubriplate, screw retainer into carrier until top face of retainer is 21/32" above shoulder on rim of carrier, install carrier over shift tube so that shoulder on retainer seated against upper end of outer jacket, tighten retainer screws to 7-9 ft.lbs.

Gearshift Lever Bumper Screw Installation & Adjustment—With gearshift lever installed and ball end of lever engaged in hole in upper end of shift tube ,depress lever until shift tube key clears low-reverse lever, rotate lever so that keyway is out of line with key, pull up on gearshift lever until key contacts face of low-reverse lever. Install rubber bumper in bumper screw (bumper must be completely seated in screw), turn screw in until bumper just contacts pad on lever (check by shaking outer end of lever and tightening screw until all longitudinal play eliminated), then back off screw ½-turn and lock screw by staking carrier metal into screw slot.

1951-55 PACKARD

All Series (1951-55)

DESCRIPTION: Remote control type with steering column mounted gearshift lever. Design same as used on previous Packard models except for new idler lever assembly as follows:

Idler Lever Assembly—Idler levers mounted on horizontal shaft on left side of engine (inner end of shaft mounted on engine flywheel housing, outer end in bracket on top of left frame side rail).

Shift Lever Rods—Forward rods (from steering column levers to idler levers) have adjusting trunnion on forward end at steering column levers. Rear rods (from idler levers to transmission shifter levers) are non-adjustable.

ADJUSTMENT: Disconnect both forward shift rods at idler levers on left side of engine. Place gearshift lever in neutral, install ⅛" pin or drill rod through holes in both levers on steering column to maintain this alignment during adjustment. Make certain that both transmission shifter levers are in neutral (can be determined by feel of detent ball engaging center notch on shifter lever shaft sector). Adjust each forward rod (loosen locknuts and turn turnbuckle) until rod end enters hole in idler lever freely without disturbing rod and lever positions. Connect rods and remove alignment pin from levers.

REMOVAL: Remove horn ring and steering wheel (see Steering Gear data). Lift front floor mat for access to area around steering column. Remove steering gear-and-brake pedal floor opening cover. Disconnect both shift rods at levers on steering column. Loosen steering column U-clamp at steering gear housing, remove steering column bracket cap at instrument panel. Disconnect direction signal switch cables. Remove steering column jacket and shroud assembly.

DISASSEMBLY: Remove U-clamp at gearshift shaft lower pivot, remove lower pivot by unscrewing it from the end of the shaft. Remove lower gearshift shaft lever, drive out selector pin, remove selector and selector rod spring, remove upper gearshift shaft lever. Remove direction signal switch and windshield wiper control from steering column shroud. Remove gearshift lever. Slide draft pads off over end of steering column. Remove gearshift shaft upper spring lock from upper end of shroud, take out shroud-to-jacket attaching screws. Remove shroud and gearshift shaft from steering column jacket, remove shaft from shroud. Withdraw selector rod from within gearshift shaft.

REASSEMBLY: Lubricate all moving parts with Lubriplate. Assembly parts by reversing the disassembly procedure and note the following points:

Gearshift Shaft—When installing gearshift shaft and shroud over steering column jacket, make certain that shaft enters bearing in jacket.

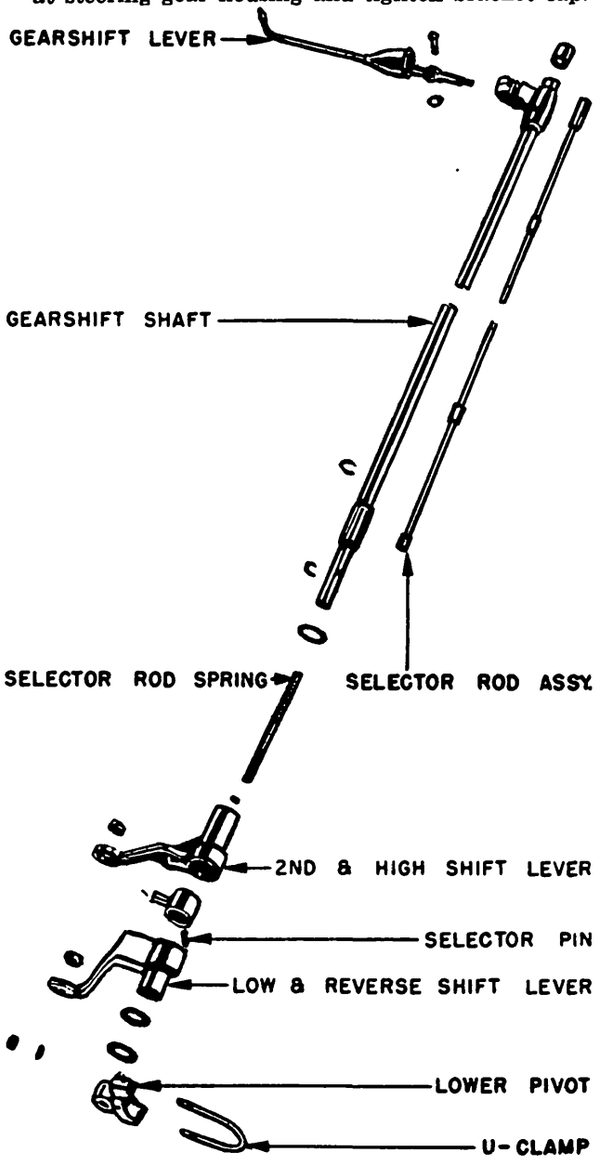
Selector Pin—After installing selector rod spring, spacer, and selector, hold spring compressed and drive pin into selector. Lubricate selector and shaft levers with Lubriplate.

Gearshift Shaft Lower Pivot—After installing lower lever and washer, lubricate lower pivot and thread it on end of gearshift shaft until clearance at lower shaft lever is .025". Engage pivot dowel in locating hole in column jacket and install the U-clamp.

CONTINUED ON NEXT PAGE

1951-55 PACKARD (C nt.)

INSTALLATION: Install steering column jacket and shroud assembly in car, install bracket cap but **do not tighten cap at this point.** Connect direction signal cable and windshield wiper control. Install steering wheel and horn ring. Adjust position of steering column jacket and shroud assembly so that clearance between wheel and shroud is approximately 1/16", then tighten U-clamp on jacket at steering gear housing and tighten bracket cap.



PACKARD HANDI-SHIFT

1941-50 PACKARD "CLIPPERS"

ALL "CLIPPER" MODELS (1941-50)

►**Shifter Shaft Rattle Correction (1948 Cars)**—To correct complaints of shifter shaft rattles noted within steering column shroud, Anti-rattle Spring No. 377870, and Anti-rattle Spring Plug No. 338043, can be installed as follows: Remove steering wheel, install plug in end of shifter shaft, install spring by placing center of spring in groove around plug and snapping ends of spring in against re-inforcing wall of steering column wheel web cup.

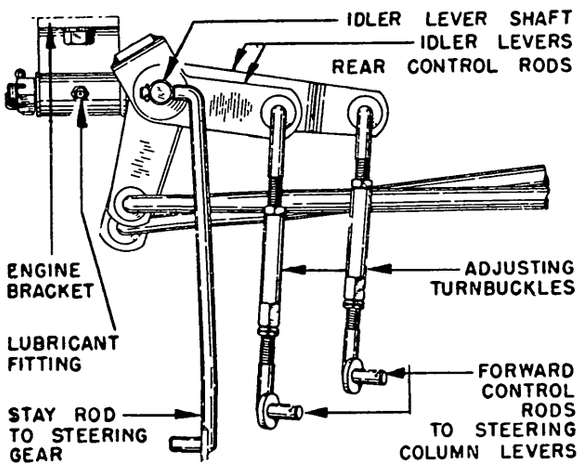
NOTE—This spring and plug installed in production on later 1948 cars.

DESCRIPTION: Handi-shift, remote control with steering column mounted gearshift lever. Gearshift control is same design as used on previous models. Idler lever assembly and control rod linkage has been changed as follows:

Idler Lever Assembly (Clipper Models)—Idler levers mounted on hinged bracket on engine with stay rod connecting top of idler lever shaft to steering gear case. No assist spring used. Lubricant fitting on idler lever hinge should be lubricated with chassis lubricant at 1000 mile intervals (idler levers packed with lubricant and require no attention). **Shift Lever Rods**—Forward rods (steering column levers to idler levers) have adjusting turnbuckle on rod. Rear rods (from idler levers to transmission shifter levers) are non-adjustable.

ADJUSTMENT: Disconnect both forward shift rods at idler levers on left side of engine. Place gearshift lever in neutral, install 3/16" pin or drill rod through holes in both levers on steering column to maintain this alignment during adjustment. Make certain that both transmission shifter levers are in neutral (can be determined by feel of detent ball engaging center notch on shifter lever shaft sector). Adjust each forward rod (loosen locknuts and turn turnbuckle) until rod end enters hole in idler lever freely without disturbing rod and lever positions. Connect rods and remove alignment pin from levers.

DISASSEMBLY & REASSEMBLY: Control mechanism on steering column is same design used on 1951 cars. *See Packard 1951 control for all data.*



PACKARD CLIPPER IDLER LEVER ASSY.

1940-52 PONTIAC SAFETY SHIFT

6 & 8 Cyl., All Models (1953) With Synchro-mesh Transmission.

DESCRIPTION: Concentric tube type remote control with steering column mounted gearshift. The gearshift lever engages a concentric tube within steering column and movement of shift lever rotates the tube or moves it up and down. A gear-

►**1941 Control Rod Production Change (except Deluxe Models)**—A single shifter rod between steering column lever and shift lever on transmission case was used beginning with the following serial nos.

	Pontiac	Linden	South Gate
41-24	P6JB-25488	L6JB-6379	C6JB-4044
41-26	P6JC-4884	L6JC-2404	C6JC-1789
41-28	P8JB-19031	L8JB-4349	C8JB-3246
41-29	P8JC-7794	L8JC-3274	C8JC-1957

►**Installing Single Rod on First 1941 Cars**—New single rod furnished for service replacement on all cars. When installing new single rod on first cars (with front and rear rods and intermediate idler lever), proceed as follows: Remove clutch and brake pedal toe plate, cut off shifter rod idler lever bracket and re-install plate. Install the following new parts—506712 Gearshift Control Rod, 506713 Transmission Shifter Lever, 505760 Gearshift Control Shaft Idler Lever (these are levers to which rod attaches at front and rear ends). Discard old parts.

►**Hard Shifting Complaints**—To correct complaints, examine linkage and make following corrections:

Binding or Sticking of Clutch Driven Plate—Check for driven member hub binding on main drive gear splines, sticking of driven member to flywheel or pressure plate (caused by oil on facings resulting from oil leak at rear main bearing or at transmission case front bearing oil seal), or sticking of driven member facings due to vacuum between facings and flywheel or pressure plate. Correct by cleaning all mating surfaces (CAUTION—do not use petroleum products which may leave film). Facings on 6 Cyl. clutch driven members may be grooved to correct sticking due to vacuum (use 1950 8 Cyl. facings as guide in grooving facings).

Rear Shift Rod Alignment—On cars with front and rear control rods and intermediate idler lever, check rear shift rod and see that ends are parallel so that rod does not bind in transmission shift lever as gears engaged. See note above for installation of new type single rod to replace this double rod and idler lever assembly.

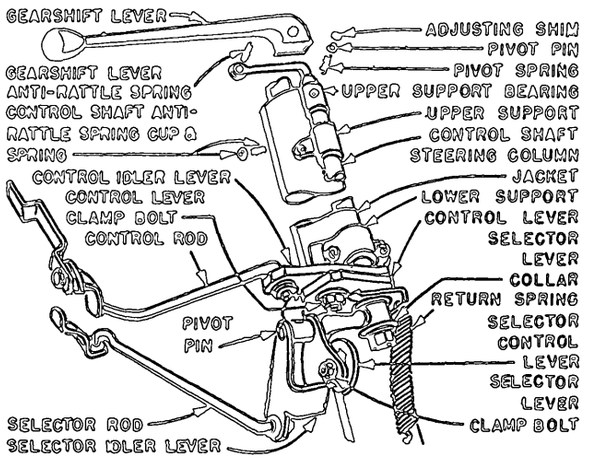
Idler Lever Bracket—Check idler lever bracket for looseness allowing lever to bind on rods. If bracket loose at mounting rivets, remove toe plate and securely weld bracket or remove idler lever and install new type single rod.

Control Shaft Toeboard Grommet—See that rubber grommet on steering column and shift control shaft at toeboard does not bind on shaft and prevent free up-and-down movement (required for cross-shift at neutral). Correct by trimming rubber at point where bind occurs and applying few drops of brake fluid to shaft.

CONTINUED N NEXT PAGE

1940-52 PONTIAC SAFETY SHIFT (Cont.)

Control Shaft & Gearshift Lever Clearance—If shoulders on shaft not machined low enough, they will strike gear shift lever fulcrum cups and prevent full Low and Reverse gear engagement causing hard shifting. To check this dimension, remove control shaft, place small square on shaft so that upper edge even with tops of shoulders on shaft, measure perpendicular distance from top of square to bottom of fulcrum ball on end of shaft. Distance should be 1 1/16". If incorrect, rework shaft as follows: If over-all length of shaft (from lower end to tops of shoulders at upper end) is more than 32 11/32" ± 1/32", file shoulders down to secure correct 1 1/16" fulcrum ball height. If over-all length of shaft within limits given above, bend ball end of shaft to secure correct fulcrum ball height.



1940-52 PONTIAC SAFETY SHIFT

DESCRIPTION: Remote control with steering column mounted gearshift lever. Same design as used on previous models except for new Selector Rod and Lever Assembly as follows (see Production Change Note above for different type used on late 1941 and and all later car models).

ADJUSTMENT: Gearshift Lever Clearance. Clearance between upper edge of control shaft upper support and shoulder on upper control shaft bearing which is screwed in the bracket must be ⅛" (1/8" min., 5/32" max.) to avoid interference when engaging gears. If clearance incorrect, remove gearshift lever (see Disassembly data), adjust by screwing bearing in or out of support bracket (½ turn of the bearing will change clearance 1/32").

Selector Rod (Cross-shift)—With gearshift lever in neutral on Second-High side (normal position), distance from lower edge of steering wheel rim to upper edge of gearshift lever should be 2 7/8" ± 1/8" (1940-48), 2¾" ± ⅛" (1949 on). To adjust with the shift lever in neutral, loosen clamp bolt holding selector control lever and selector control idler lever together (these are levers pivoted on lower suport bracket on steering column), see that selector rod and levers are in Second-High position (rod moved to rear as far as possible), place gearshift lever in correct position and tighten lever clamp bolt.

Control Rod (Gear Engagement)—With gearshift lever in neutral, lever should be approximately horizontal but can be varied approximately 1½" to suit individual operators. To adjust, loosen clamp bolt holding control shaft lever and control shaft idler lever together (these are levers mounted on lower end of control shaft on steering column), see that control rod and transmission case shifter lever are in neutral, move gearshift lever to desired position and tighten lever clamp bolt. Check to make certain that gearshift lever has full travel required for gear engagement without interference after making this adjustment.

REMOVAL & DISASSEMBLY: Remove front compartment floor mat and center floor panel. Remove horn button and steering wheel (see Steering Gear data). Disconnect return spring from lower end of control shaft, remove pivot pin from selector control lever and idler lever (CAUTION—do not loosen clamp bolts holding levers together which would disturb adjustment). Take out screw in lower end of control shaft, remove selector lever collar from shaft. Take out two screws (Phillips #2 screwdriver), pull upper support and control assembly straight up parallel to steering column CAUTION—do not lose anti-rattle spring and cup located in hole in underside of upper support). Remove gearshift lever using tool J-1044 to remove shift lever pins and springs. Unscrew upper bearing from upper support.

REASSEMBLY: Assemble all parts in reverse order of disassembly data above noting the special points listed below. Adjust gearshift lever position by screwing bearing in or out of bearing support (see Adjustment data above) before assembling the gearshift lever. Adjust control rods after assembly completed.

Lubrication of Moving Parts—Coat following parts and bearing points with Lubriplate before assembling: Control Shaft Upper Support Bearing, Anti-rattle Spring Cup, Gearshift Lever Pivot Pins, Springs & Shims, and inner surface of gearshift lever, Control Shaft flats and ball end, Anti-rattle Spring in ball end, Control Shaft bearing hole in lower support, and Selector Collar surface which contacts selector lever.

Gearshift Lever Assembly—One anti-rattle spring washer must always be used on gearshift lever pivot pin and shims should be installed as required to take up excessive clearance so that lever operates freely without excessive play or rattles. Re-install all shims found at this point and check lever after assembly completed. See Adjustment data for correct gearshift lever position.

Transmission Case Shifter Mechanism—Refer to Pontiac Transmission article for dismantling and servicing directions. CAUTION—Selector shaft must be removed through right side of case and installed on left side to avoid damage to oil seal. Lower lever must be removed from vertical cross-shift shaft before the selector shaft is driven out (to permit upper lever on shaft to disengage from selector shaft).

1953-55 PONTIAC SAFETY SHIFT

6 & 8 Cyl., All Models (1953-55) with Synchro-mesh Trans.

DESCRIPTION: Concentric tube type remote control with steering column mounted gearshift. The gearshift lever engages a concentric tube within steering column and movement of shift lever rotates the tube or moves it up and down.

ADJUSTMENT: (Gearshift Lever Position)—When gearshift lever is in neutral position, clearance between lever and steering wheel should be approximately 3 7/16" (1953-54), 3½" (1955). To adjust, hold transmission selector rod in its rearmost position (2nd & 3rd normal position) and adjust selector rod trunnion for proper gearshift lever position by shortening or lengthening selector rod. Neutral position of gearshift lever should be 9° (1953-54), 18° (1955) above horizontal. To raise or lower lever, adjust length of gearshift control rod (trunnion connected to upper shift lever at bottom of steering column) as necessary.

REMOVAL OF STEERING COLUMN SHIFT ASSEMBLY: 1—Remove horn button and steering wheel. Disconnect direction signal wires, horn wire from steering column brace. Remove steering wheel hub cover or directional signal housing by removing two attaching screws. Use care when withdrawing harness from opening in steering column. Using a 7/16" wrench remove four special screws which fasten gearshift lever bearing support to steering column. Remove gearshift lever rubber cover by pulling it over ridge.

2—Remove gearshift lever fulcrum pin retaining ring and pin and remove gearshift lever, being careful to catch anti-rattle shims which may be between shift lever and shift lever support. Remove anti-rattle spring from end of control lever (NOTE—Retainer spring on tube yoke pin which shift lever slot engages is used to keep pin from dropping out during assembly).

3—Remove gearshift lever support and bearing assembly from steering column by turning bearing support slightly to free horn contact wire, then pull assembly straight out. Remove horn contact and cable assembly from bearing support by prying gently with a screwdriver. Unscrew bearing support from gearshift lever support. If steering shaft upper bearing is to be replaced, remove it from bearing support by pushing it out with a tool that can be inserted through end of bearing support.

4—If disassembly is being made with steering column assembly in car, it will be necessary to remove left engine splash apron so that lower end of steering column jacket can be reached from beneath car.

5—Remove transmission control rods from levers and remove gearshift lever (selector) and bracket and remove pivot pin. Remove shift lever from tube yoke by loosening screw about ⅛" with an open end wrench and moving it down and out. Gearshift tube can be held down with a screw driver inserted through selector lever opening. Attaching screw need not be completely removed from bracket.

6—Gearshift tube can now be removed from top of steering column jacket. Insulating pads will come

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1953-55 PONTIAC SAFETY SHIFT (Cont.)

out with shift tube. Remove gearshift return spring, lower seal retainer and seal if they are to be replaced.

INSTALLATION OF STEERING COLUMN SHIFT ASSEMBLY:

1—Slide lower felt seal and retainer down inside steering column jacket against shift tube lower bearing plate. Coat both ends of shift tube return spring with Lubriplate and drop it down steering column jacket into place against lower seal retainer with large end down.

2—Apply a thin coating of Lubriplate to bearing surfaces at both ends of concentric gearshift tube including upper yoke pin and selector collar groove in which selector pin rides. Position insulating pads around shift tube beneath retainer plate and install shift tube in steering column with gearshift yoke facing opening in upper end of steering column.

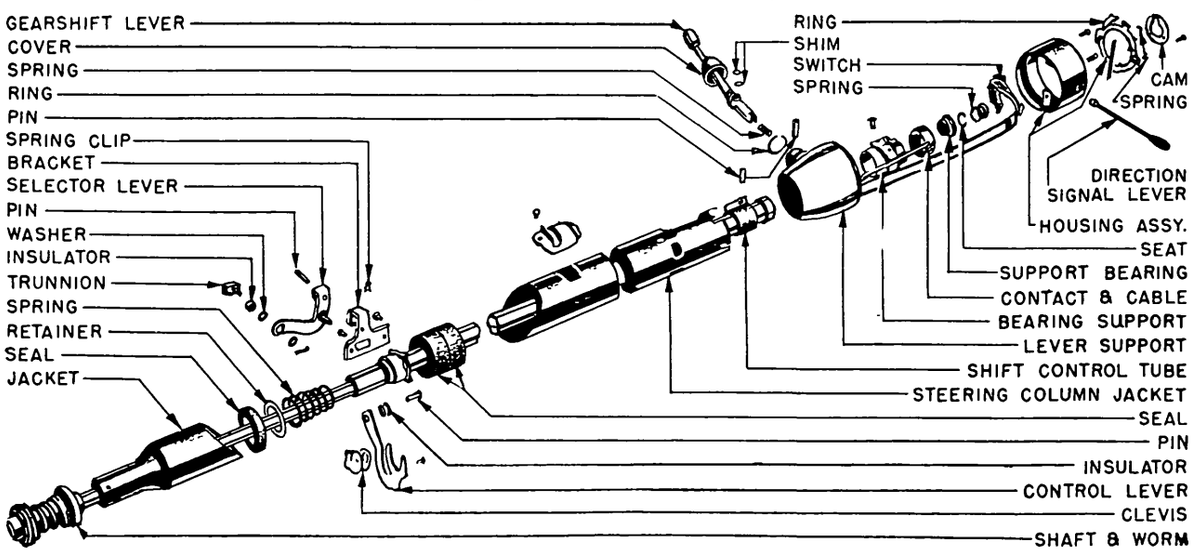
3—With screw started in gearshift lower lever, position lever against bottom of lower lever drive plate engaging driving lugs and tighten cap securely. Shift tube can be held down with screwdriver inserted through selector lever opening. Coat selector lever pin with Lubriplate and assemble selector lever to bracket. Install pivot pin so hairpin retainer is on side which will be against steering column jacket. Place selector lever and bracket assembly on steering column jacket making sure selector pin engages collar on gearshift tube. Install attaching screws.

4—Connect selector rod trunnion and shift rod clevis to their respective levers using a flat washer on each side of insulator. Replace engine splash apron if unit is being assembled in car.

5—If steering shaft upper bearing was removed from bearing support, press new bearing in until flush (if on Power Steering equipped car, press in until flush with counter-bore). Screw bearing support (die cast) on bearing in gearshift lever support until bearing and support are flush at bottom end with gap in bearing support flange toward gearshift lever support. This adjustment determines clearance between gearshift lever support assembly and steering wheel hub cover or directional signal housing. Clearance should be approximately ⅛". Set steering wheel hub cover or direction signal housing on bearing support to check clearance before proceeding. If clearance not correct, turn bearing in complete turns as necessary for proper clearance.

6—Press horn contact and cable assembly in place over annular grooves in upper end of bearing support. Cable should lay in slot in upper end of bearing support. Install gearshift lever support and bearing assembly indexing gearshift tube yoke with lever support and indexing bearing support with attaching screw holes in steering column. While gearshift lever support is being lowered into position, guide horn wire into steering column jacket through openings, and back out of steering column jacket through hole just below column upper bracket. Clamp horn wire in position.

7—Install four bearing support attaching screws and tighten. Position gearshift lever anti-rattle spring (coil spring) in bore in lever and position lever in its support. Replace anti-rattle shims between lever and support and install gearshift lever fulcrum pin and retaining ring. Install gearshift control rubber cover making certain it is properly seated in groove. Install hub cover or direction signal housing with two attaching screws. To simplify installation of direction signal wiring, tape loose end with scotch tape so they will be easily guided through openings in jacket. Direction signal wire should be directed in to mast jacket through opening just below steering column upper bracket. Install steering wheel and horn button.



1953-55 PONTIAC SAFETY SHIFT

1947-50 STUDEBAKER

Champion, All Models (1947 to 1950)
Commander & Land Cruiser, All (1947 to 1950)

►**SPECIAL SERVICE TOOL NOTE:** New Gauge J-1308-B required for transmission control adjustment on these cars. Old type Gauge J-1308-A (1940-46 cars) can be reworked for use on these 1947 & later cars by milling out a section of the tool handle 7/16" by 1 3/8" long (at right angles to plane of gauge prongs) to provide clearance when gauge inserted in shift control box on steering column.

DESCRIPTION: Remote control with gearshift lever on steering column below steering wheel. Shift lever is pivoted at inner end in pin screwed in upper bracket and is linked to control shaft by fulcrum pin so that up-and-down movement of the lever (for cross-shift) lifts the entire control shaft; and backward-and-forward movement (for gear engagement) rotates the shaft. An integral lug or lever on the lower end of the control shaft (within control housing on steering column) engages a fork attached to the lower control lever (second-high) and is lifted to engage the fork attached to the upper control lever (Low-reverse) when shift lever is lifted up toward steering wheel (lug normally held down in second-high position by spring on lower end of control shaft below control housing). Control levers are connected to shift levers on side of transmission case by adjustable rods (forward lever for second-high, rear lever for low-reverse). Control housing is entirely enclosed and provided with lubricant fitting so that it can be kept filled with chassis lubricant.

ADJUSTMENT: Disconnect both shift rods at shifter levers on side of transmission case. Pry out inspection plug on control box cover on steering column, install special gauge J-1308-B (see Service Tool Note above) through plug hole to align control housing forks and levers in neutral. Make certain that both shift levers on transmission case are in neutral (can be determined by feel of detent plungers engaging notches in shift shaft sectors). Adjust each rod by turning clevis at transmission end of rod in **complete turns only** (required by shape of clevis) until rod can be connected without disturbing position of transmission levers. Connect rods, remove adjusting gauge, re-install control box plug.

REMOVAL: ***Procedure same for Champion & Commander except as noted:***

1) Disconnect battery cable (and horn wire on Champion).
2) Remove steering wheel (see Steering Gear data), remove steering post jacket bearing spring (and spring seat on Commander).
3) Remove gearshift lever ball cap, withdraw shift lever assembly from gearshift shaft. If shift lever to be disassembled, remove lever knob, retaining spring, and knob ferrule; then slide ball cap, spring retainer, and ball spring off lever; remove ball seat off opposite end of lever.
4) On Champion only, loosen gearshift shaft upper bracket clamp screw, remove bracket from post jacket, unscrew upper bracket pin, remove spring from within bracket, slip felt washer off pin. Remove lower half of steering post bracket, take out

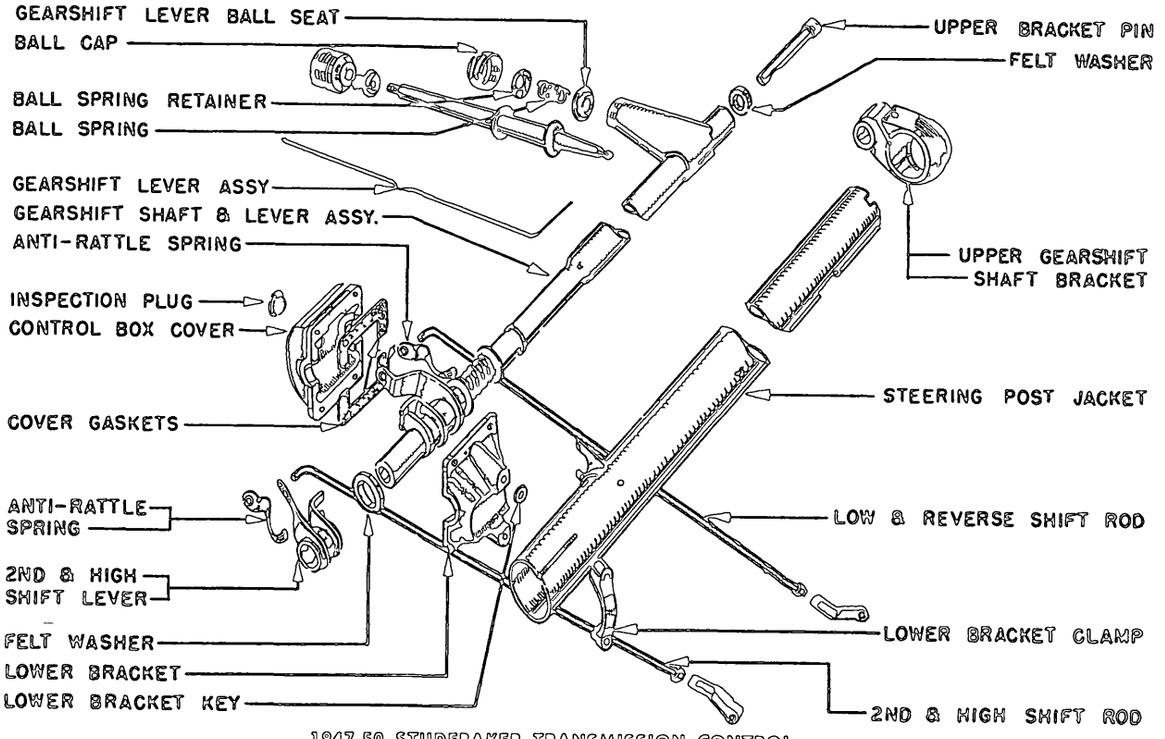
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1947-50 STUDEBAKER (Cont.)

bolt and capscrew holding upper half of bracket on instrument panel, remove bracket, spacer, and anti-squeak pad. Remove steering post collar screws, slide collar and grommet up to end of jacket.
5) On Commander only, remove gearshift shaft upper bracket screws, remove bracket from post jacket. Unscrew upper bracket pin, remove felt washer from pin. Remove jacket bearing from bracket, remove spring from within end of shift shaft.
6) Disconnect both shift rods from control box levers on steering column.
7) On Champion only, loosen steering post jacket clamp, turn jacket and shift assembly so that control box is on left side of column, then pull entire assembly up through floor opening and into the car, slip jacket off steering post and remove assembly from the car.
8) On Commander only, remove control box upper clamp screw and key, loosen lower clamp screw, loosen steering gear housing-to-frame bolts. Remove lower half of steering post bracket, remove steering post collar screws, slide collar and grommet up on the jacket. Tip upper end of steering post down, slide jacket and shift assembly up and turn as necessary so that control box clears floor opening. Slide grommet and collar over control box, remove assembly from steering post, and lift out of the car.

DISASSEMBLY: *Procedure same for Champion and Commander except as noted:*
1) Remove control box clamp screws and clamp (and key on Champion).
2) On Champion only, lift shift shaft assembly out of jacket, remove jacket from collar and grommet. Remove collar and grommet from shift shaft using care not to tear rubber collar (use liquid soap).
3) On Commander only, remove rubber boot from upper end of shift shaft. Remove jacket lower plate screws, move plate toward control box and remove it from the shaft. Remove control box and shaft assembly from the jacket by pulling it out through lower hole in the jacket. Remove felt washer.
4) Remove inspection hole plug from control box cover, take out four screws and remove cover and gaskets. Lift shaft and lever assembly out of control box, slide second-and-high lever off end of shaft, remove lower felt washer from shaft.
NOTE—Shift shaft and low-and-reverse shift lever are serviced as an assembly (together with spring and washers on Champion).

REASSEMBLY & INSTALLATION: Assemble parts and install gearshift control in reverse order of removal and disassembly procedure (above). Note following points when installing assembly in car:
Gearshift Shaft Upper Bracket Pin Installation: Screw pin in tight and then back pin off about ½ turn so that hole in pin will face shaft lever opening in shaft when installed.
Collar & Grommet and Rubber Boot Installation: Use liquid soap to facilitate installation and to avoid tearing these parts during installation.
Shift Control Adjustment: Adjust shift rods after installation completed. See Adjustment (above).



1947-50 STUDEBAKER TRANSMISSION CONTROL

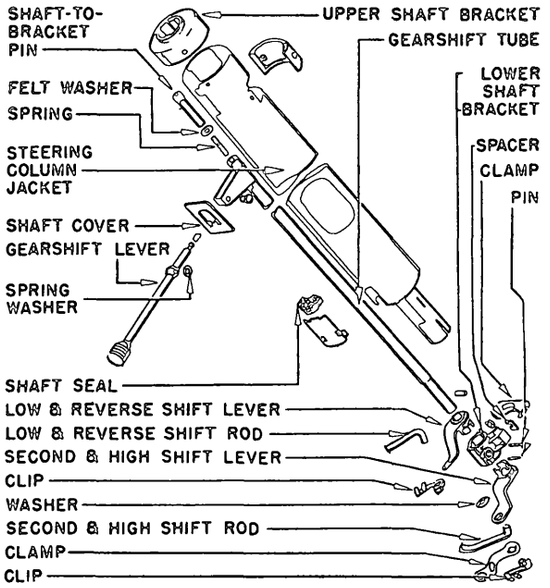
1951-52 STUDEBAKER

Champion, Models 10G, 12G (1951-52)
Commander & Landcruiser V8 (1951-52)

▷SPECIAL SERVICE TOOL NOTE—New Transmission Shift Rod Adjusting Gauge No. J-4690 required for these models due to redesigned control box housing. Previous type gauges cannot be used.

DESCRIPTION: Remote control type of same design used on previous models except for new Control Box design (on steering column) requiring new Adjusting Gauge and different disassembly procedure.

ADJUSTMENT: Disconnect both shift rods at shift levers on side of transmission case. Place gearshift lever in neutral, remove lubrication fitting from control box housing on steering column, insert Transmission Shift Rod Adjusting Gauge No. J-4690 through lubricant fitting hole, engaging the flat on the tool with flats on shift levers, so that levers are



1951-52 STUDEBAKER TRANS. CONTROL

aligned in neutral position. Make certain that transmission shift levers are in neutral (can be determined by feel of detent plungers engaging notches in shift lever shaft sectors). Adjust each rod by turning clevis on rear end of rod in complete turns only (required due to shape of clevis) until rods can be connected without disturbing lever position. Connect rods, remove adjusting gauge, replace lubricant fitting in control box housing.

REMOVAL: *Procedure for all models is same except as noted:*
1) Disconnect battery cable (and horn wire on Champion Custom models).
2) Remove steering wheel (see Steering Gear data), remove steering post jacket bearing spring (and spring seat on all models except Champion Custom).
3) Take out gearshift lever screw, withdraw lever assembly from shift shaft.

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1951-52 STUDEBAKER (C nt.)

4) On Champion Custom only, loosen gearshift shaft upper bracket clamp screw, remove bracket from post jacket, unscrew upper bracket pin, remove spring from within bracket, slip felt washer off pin. Remove lower half of steering post bracket, take out bolt and capscrew holding upper half of bracket on instrument panel, remove bracket, spacer, and anti-squeak pad. Remove steering post collar screws, slide collar and grommet up to end of jacket.
5) On all models except Champion Custom, remove gearshift shaft upper bracket screws, remove bracket from post jacket, unscrew pin from bracket, remove felt washer from pin. Remove jacket bearing from bracket and remove spring from within end of shift shaft.
6) Disconnect both shift rods from control box levers on steering column.
7) On Champion Custom only, loosen steering post jacket clamp and turn jacket so that control box assembly is on left side of column, then pull entire assembly up through floor opening and into the car, slip jacket off steering post, remove assembly from the car.
8) On all models except Champion Custom, loosen steering post jacket lower clamp and steering gear housing-to-frame bolts. Remove lower half of steering post bracket, remove collar screws and slide collar and grommet up on jacket. Tip upper end of steering post down, slide jacket and shift assembly up and turn as necessary so that control box clears floor opening. Slide grommet and collar over control box, remove assembly from steering post and lift it out of the car.

DISASSEMBLY: ***Procedure for all models is same except as noted:***

1) Remove control box clamp screws and clamp (and key on Champion).
2) On Champion Custom only, lift shift shaft assembly out of the jacket, remove jacket from collar and grommet. Remove collar and grommet from shift shaft using care not to tear the rubber collar (use liquid soap on collar to slide it off shaft).
3) On all models except Champion Custom, remove jacket lower plate screws, move plate toward control box and remove it from the shaft. Remove control box and shaft assembly from jacket by pulling it out through the lower hole in the jacket.
4) Use a small drift to drive out the second-and-high lever retaining pin (lower pin on side of control box housing), slide lever off shaft and out of control box housing. Drive out low-and-reverse lever retaining pin (upper pin), slide lever and shaft assembly out of control box housing. If low-and-reverse lever to be removed, press shift control pin out of shaft, slide lever off end of shaft.

REASSEMBLY & INSTALLATION: Assemble parts and install gearshift control in reverse order of removal and disassembly procedure (above). Note the following points when installing assembly in car:

Gearshift Shaft Upper Bracket Pin Installation: Screw pin in tight and then back pin off about ½ turn so that hole in pin will face shift lever opening in shaft when installed.

Collar & Grommet Installation: Use liquid soap to facilitate installation and avoid tearing the rubber collar during installation.

Shift Control Adjustment: Adjust shift rods after installation completed. See Adjustment (above).

1953-55 STUDEBAKER

Champion, All Models (1953-55) With Synchro-mesh Trans.

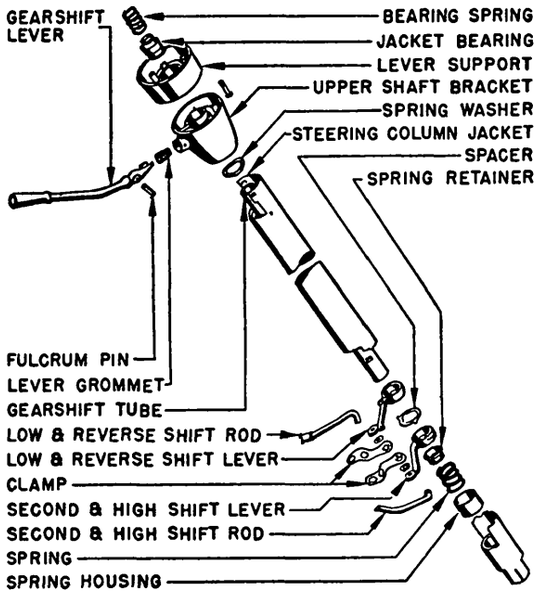
Commander & President, All Models (1953-55) With Synchro-mesh Trans.

►*REMOTE CONTROL LOOSENESS OR POOR ADJUSTMENT CORRECTION:* When end play or looseness in remote control results in poor shift adjustment it can be corrected by installing a thicker remote control shift lever spacer (was .0478-.058" now .062") Studebaker Part No. 532554.

DESCRIPTION: Remote control gearshift with steering column mounted gearshift lever. Gearshift tube is concentric with steering gear shaft which operates within shift tube.

ADJUSTMENT: Disconnect both transmission gearshift rods at transmission. Place transmission shift levers in neutral (can be determined by feel of detent plungers engaging notches in shaft sectors). Index hand lever support by placing a pencil mark above hand lever support socket. Locate center of travel of gearshift hand lever by moving lever to extreme left and pencil mark steering column upper bracket opposite index mark on lever support. Move lever to extreme right and mark in same manner as above. Place hand lever index mark at the mid-position between the two marks on upper bracket and mark this position on upper bracket to indicate neutral. With an assistant holding the hand lever in neutral and the low-reverse gearshift lever engaged (hand lever toward steering wheel) adjust the low and reverse gearshift rod toward short side so there is no free play in rod and clevis pin will enter shift lever with a slight drag on forward side of hole. Secure all clevis pins and secure and tighten locknut. If interference is still encountered at the cross-over point from low to second due to high tolerances of levers and rods and engine movement, the low and reverse rod may be shortened an additional one or two turns.

REMOVAL OF GEARSHIFT CONTROL: Disconnect battery cable and remove steering wheel (see Steering Gear Section). Remove two nuts holding upper bracket in place. Slip bracket off post and remove bolts. Pull control tube, lever support and lever out of steering jacket as an assembly. To remove the lever, use a suitable drift and drive out the pin holding lever in lever support and pull lever out of support, then slip support off control tube. Disconnect shift rods at levers at bottom of steering column, and loosen clamp bolt at lower end of jacket. Remove jacket bracket retaining bolts at instrument panel and loosen jacket bracket clamp screw and turn bracket to avoid hitting instrument panel when removing jacket. Slip jacket off steering post as an assembly into inside of car. Remove 1st & reverse shift lever, spacer, 2nd & high shift lever, spring retainer, spring, and spring housing from steering jacket.



1953-55 STUDEBAKER TRANS. CONTROL

INSTALLATION OF GEARSHIFT CONTROL: Insert 1st & reverse shift lever, spacer, 2nd & high shift lever, spring retainer, spring, and spring housing in steering jacket. Install control tube into steering post jacket and engage key on tube with keyway of 1st & reverse shift lever, spacer, and 2nd & high shift lever. From inside car, slide jacket assembly down over steering post, turning as necessary to get shift levers through firewall. Connect shift lever rods to shift levers and install spring clamps. Leaving steering column jacket bolt loose, position jacket so shift levers can be operated in all positions of full travel, then tighten clamp bolt. Install jacket bracket-to-instrument panel clamp and tighten clamp bolt. Place spring washer in position and slip steering jacket lever support on steering jacket. Insert lever into lever support and install lever retaining pin. Slip bolts through holes of upper bracket and start nuts on bolts. Push down and shift nuts inward so that head of bolt will be shifted away from center of bracket, and slip bracket into place. With bracket in place, pull up on nuts which will allow heads of bolts to slip toward center into elongated slots of jacket. Tighten nuts securely. Install steering wheel.

1946-55 WILLYS

All Models (1946-55 With Steering Column Mounted Gearshift).

▷Hard Shifting & Gearshift Rattle Complaints on First Cars—If shift does not operate smoothly and positively, or rattles noted, correct as follows:

Shift Not Smooth & Positive—Check linkage and adjust control rods (see Adjustment).

Shift Sticks or does not Disengage—Check adjustment. If this does not correct trouble, check Clutch Clearance (see Removal & Installation data below), adjust clearance or replace Clutch Lever and Housing assembly.

Gearshift Rattles—Check Gearshift Lever Clearance and Control Shaft Dampener installation (see Removal & Installation data below).

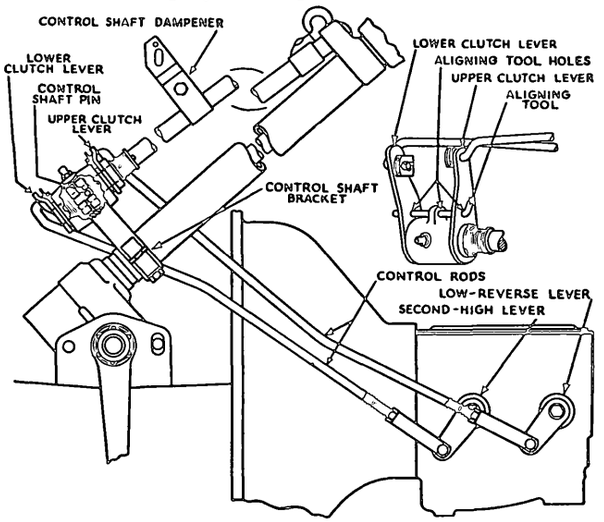
NOTE—If gearshift lever is found to break at the weld (first cars only) and lever can not be welded, install new Control Shaft Assy. 638022.

DESCRIPTION: Remote control with shift lever on control shaft under steering wheel. Shaft has dog clutch at lower end (pin in shaft engages slots in levers) by which it is engaged with upper lever (connected to rear lever on transmission case) for Low-Reverse, or lower lever (connected to front lever on transmission case) for Second-High engagement. Control rods connecting steering column levers and transmission case levers have adjusting clevises at transmission case end.

ADJUSTMENT: Place shift lever in neutral position. Disconnect both control rods at the transmission levers. On all cars except 6-226, install ¼" rod through aligning holes in steering column. On 6-226 position Tool W-259 on slot and insert 3/16" rod through steering column shift levers and index rod in slot at top of gauge. On all cars, now adjust steering column end of shift rods so that lower ends will enter transmission levers freely. If shift pin strikes edges of slot in lever clutches, disconnect low and reverse control lever at transmission lever (rear lever) and lengthen or shorten rod slightly so that pin will engage both slots freely.

REMOVAL (Except 1952-55 Pass. Cars): To remove shift assembly from steering column, remove steering wheel and remove floor boards. Disconnect control shaft dampener at cowl. Assembly can then be removed by taking out gearshift lever and freeing housing assembly clamp bracket at lower end of steering column.

REMOVAL (1952-55 Passenger Cars): Unscrew the chrome ball cover at base of shift lever and pull out lever. Remove steering column cover and remove the two bolts from bracket attaching steering column to instrument panel and remove bracket. Remove heater grill on dash. Rubber seal at base of steering column must be slit in the space between steering column and remote control shaft. Remove heater and pull back floor mat. Remove control shaft damper. Remove two bolts from cross-shift bracket assembly and remove both shift control rods from levers at end of steering column. Raise front of car about 18" and remove remote control clutch housing and shaft from end of steering column by working them down through toe-panel and past steering gear housing. Remove upper and lower clutch levers from remote control clutch housing by turning counter-clockwise.



TYPICAL WILLYS TRANSMISSION CONTROL

Clutch Clearance—Clearance between faces of shift clutches must be .015-.031" (1/64" to 1/32"). Can be checked by removing lubrication fitting on clutch housing and inserting narrow feeler gauge through this hole. If clearance not correct or if clutch assembly has been dismantled, check clutch pin clearance in slots (must not exceed .009"—replace Clutch Lever and Housing Assembly #116221 if clearance excessive) and set up levers as follows: Screw upper clutch lever in housing as far as possible, then back lever out one full turn until alignment holes line up. Then screw lower clutch lever into housing until clutch face contacts upper clutch lever face, then back lever off ½ turn max. which will give correct clearance of .015-.031" between clutch faces. If alignment holes do not line up in this position, remove lower clutch lever and grind off clutch face squarely not more than .015". It is very important that lower clutch lever be backed off exactly ¼ turn from position where it contacts upper clutch lever and that alignment holes line up in this position. If correct clearance between clutch faces cannot be secured by this method, or if control shaft clutch pin has more than .009" clearance in clutch slots, replace entire clutch lever and housing assembly.

Control Shaft Bracket Position—When installing steering column assembly, see that steering gear outer casing or jacket is positioned so that gear shift control shaft clutch pin bottoms in upper clutch slot when gear shift lever and shaft is in the uppermost position (Low-Reverse). If jacket and brackets installed too far down on steering gear shaft, gear shift control shaft will bottom in upper bracket and prevent clutch pin fully disengaging from lower (Second-High) clutch slots.

Gearshift Lever Clearance—Lever sideplay at fulcrum pin must not exceed .005" (excessive play will cause rattles). To reduce sideplay, add thin washer (.005-.010") under head of fulcrum pin or grind down shoulder on pin so that it will squeeze stamping closer to lever when installed. Also see that anti-rattle trigger spring on gearshift lever has sufficient tension on lever to dampen rattles.

Control Shaft Dampener—When installing dampener, see that it is positioned on cowl so that tension applied to shaft and that dampener cross bolt spacer short enough so that slight drag results on shaft when cross bolt is tightened.

WARNER & SPICER TRANSFER CASE

Willys, All Models with 4-Wheel Drive (1946-55)

►*WARNER TRANSFER CASE NOTE—Both Warner and Spicer Transfer Cases used in production beginning in 1952. Design and repair procedures are similar.*

►**LUBRICATION CIRCULATION BETWEEN TRANSMISSION & TRANSFER CASE CHANGE**—Beginning with CJ-2A Serial Number 24196 (and all later models), two 7/16" holes and two 1/4" holes drilled on rear face of transmission case and two 7/16" holes drilled on front face of transfer case to provide circulation of lubricant between transmission and transfer case.

►***CAUTION—Correct gasket must be used to insure these lubrication holes being open.***

DESCRIPTION: Transfer case consists of an auxiliary transmission bolted on the rear face of the regular transmission and performing these functions:

1) Provides auxiliary speed range (Low & High) controlled by right hand shift lever (Low range useable only when Front Wheel Drive engaged).

2) Enables Front Wheel Drive to be engaged or disengaged (controlled by left hand shift lever).

3) Provides offset drive for front wheels to clear engine (drive for front and rear wheels taken from shaft at right of transfer case).

►***CAUTION—Manufacturer recommends that front-wheel drive not be used on dry hard-surfaced roads (will cause rapid tire wear and hard shifting of gears).***

REMOVAL: Transfer case is removed as a unit with transmission (see Transmission Removal data on car model page). Then separate transfer case from transmission as follows: Take out screws and remove rear cover, remove nut on end of shaft and pull gear off end of mainshaft, remove five transfer case mounting screws, pull transfer case off transmission while tapping on end of mainshaft with a soft hammer (CAUTION—Do not allow mainshaft to pull out of transmission case, this would allow transmission synchronizer parts to fall down in transmission case) leaving mainshaft and rear bearing in transmission, place transfer case on bench.

DISASSEMBLY: Take out four screws and remove rear propeller shaft universal yoke, hand brake assembly and brake linkage. Remove transfer case lower cover. Take out retaining screw and remove intermediate shaft lockplate (on rear face of case), drive intermediate shaft out toward rear of case, withdraw intermediate gear, thrust washers, and roller bearing from case. Take out plugs and remove detent poppet balls and springs from both shift rails, move front wheel drive shift rail to engaged (forward) position. Take out mounting screws and remove front output bearing cap and shaft assembly (see disassembly note below) taking care not to lose shift rail interlock plunger. Remove output shaft snap ring and thrust washer. Take out mounting screws and remove rear output bearing cap and shaft assembly (see disassembly note below) which will allow sliding gear and constant mesh gear to be removed from bottom of case. Remove setscrew in sliding gear shift fork, remove shift rail and lift out shift fork.

Front Output Bearing Cap Disassembly Note—Remove nut on end of shaft, pull universal joint yoke, remove oil seal. Take out setscrew in shift fork, remove front drive clutch gear and fork as a unit. Remove output shaft through rear of cap, pressing the shaft out of the bearing using care not to damage bearing. Remove bearing snap ring, remove bearing through rear of cap.

Rear Output Bearing Cap Disassembly Note—Remove nut on end of shaft, pull universal joint companion flange, remove oil seal. Remove speedometer driven gear assembly. Withdraw output shaft through inner end of cap. NOTE—Bearing cone is press fit on shaft and can be pressed off if necessary.

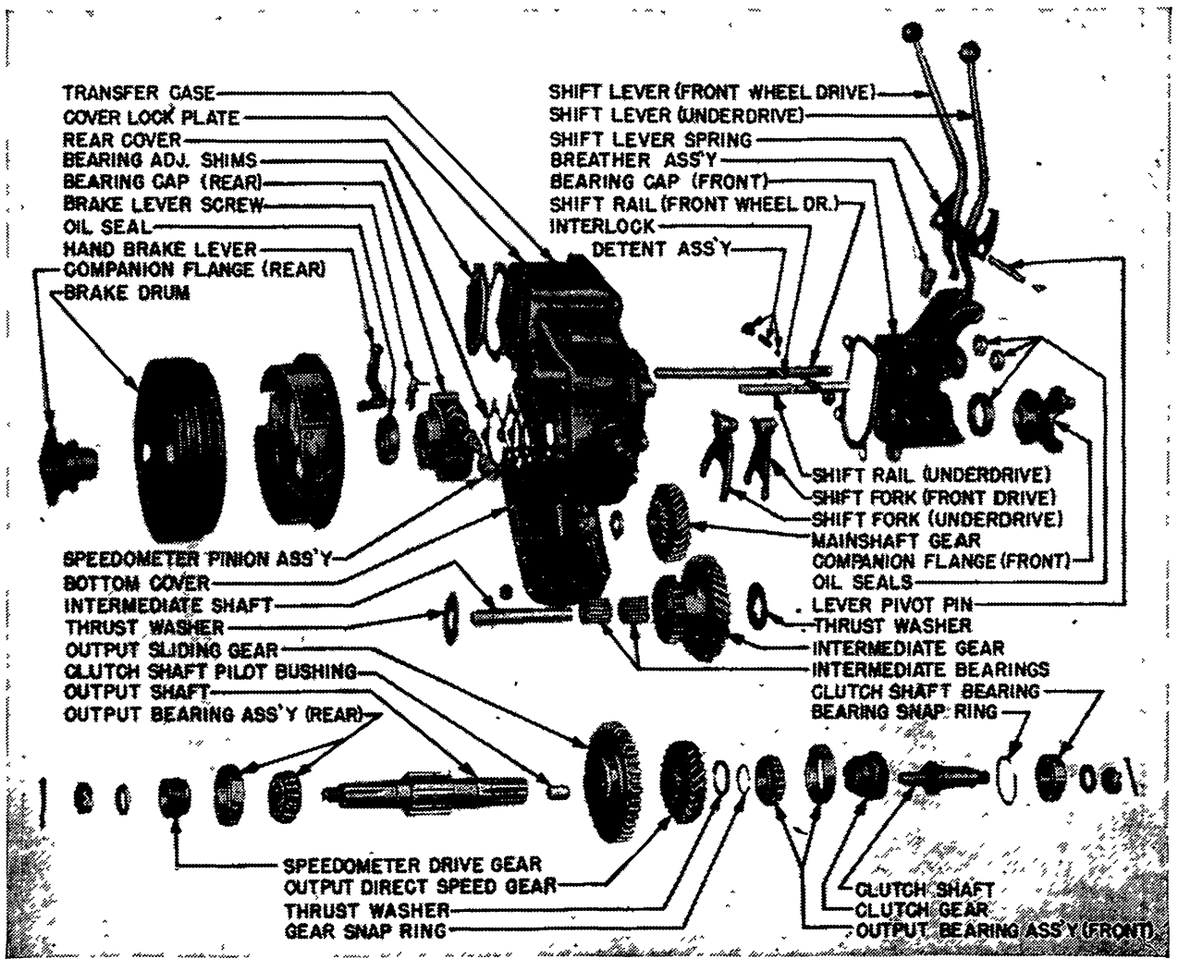
REASSEMBLY: Assemble parts in reverse order of disassembly directions given above and note the following points:

Output Shaft Bearing Adjustment—Install shims between rear output shaft bearing cap and transfer case, as necessary, so that shaft endplay is .004-.008" with front and rear bearing cap mounting screws tight.

Transfer Case Mounting n Transmissi n—Make certain that countershaft and reverse idler shaft lockplate (on rear face of transmission case) is properly positioned so that it fits into recess in front face of transfer case when transfer case installed.

Lubricating Hole Check—When replacing either transmission or transfer case, check for lubricating holes (see Lubrication Circulation Change above), use matching parts (drilled or undrilled) and correct gasket.

►***CAUTION—Gasket used with these drilled cases must have matching holes at these oil circulation holes.***



TYPICAL TRANSFER CASE (FOR FOUR WHEEL DRIVE)

1946-55 WARNER TRANSMISSIONS

(WITHOUT OVERDRIVE)

CR SLEY
1946-51 ..... AS1-T92

HENRY J
1951-54 4 Cyl. & 6 Cyl.

FRAZER
1947-48 ..... AS11-T86E
1949-50 ..... AS23-T86E
1951 ..... AS49-T86E

HUDSON
1C, 2C (1953) AS63-T86E
1D, 2D, 3D (1954) AS63-T86E
4B, 5B, 6B (1952) ⑥ AS63-T86E
4C, 5C (1953) AS63-T86E
7B, 7C (1952-53) ⑥ AS65-T86E
4D, 5D (1954) AS63-T86E
7D (1954) AS65-T86E
Wasp (1955) AS63-T86E
Hornet Six (1955) AS65-T86E

KAISER
1947-48 ..... AS11-T86E
1949-50 ..... AS23-T86E
1951-55 ..... AS49-T86E

NASH
Ambassador (1949-55) AS25-T86E

RAMBLER
1950-53⑦ AS35-T96

STUDEBAKER
Champion (1947-55) AS1-T96
Commander (1947-50) AS1-T86E
Commander (1951-55) AS53-T86E
President (1955) AS53-T86E

WILLYS
Jeep CJ-2A, 3A (1947-52) ③AS1-T90C
Jeep CJ-3B (1953-55) ⑧ ③AS1-T90C
Jeep CJ-5 (1955) ⑧ ③AS1-T90C
Sta. Wgn. 4-63, 6-63 (1946-50) ③AS1-T90C
Sta. Wgn. 473-SW, 673-SW (1950-51) AS37-T96
Sta. Wgn. 475, 675 (1952-53) AS30-T96
Sta. Wgn. 475-485 (1954-55) ⑨ AS30-T96
Sta. Wgn. 6-226 2x4 (1954-55) ⑨ AS49-T86E
Sta. Wgn. 4-Whl. Dr. 4x463 (1949) ③AS1-T90C
Sta. Wgn. 4-Whl. Dr. 4x473 (1950-51) ③AS1-T90C
Sta. Wgn. 4x475 (1952-54) ⑧ ③AS1-T90C
Sta. Wgn. 4x6-226 (1954) ⑧ ③AS1-T90J
Sta. Wgn. 6-226 4x4 (1955) ⑧ ③AS1-T90J

Sed. Del. 4-63 (1946-50) AS1-T90E
Sed. Del. 473-SD (1950-51) AS37-T96
Sed. Del. 475 (1952-53) AS30-T96
Sed. Del. 475-685 (1954-55) ⑨ AS30-T96
Sed. Del. 6-226 2x4 (1955) ⑨ AS49-T86E
Sed. Del. 4x475 (1953-54) ⑧ ③AS1-T90C
Sed. Del. 4x6-226 (1954) ⑧ ③AS1-T90J
Sed. Del. 6-226 4x4 (1955) ⑧ ③AS1-T90J
Jeepster VJ-2, VJ-3 (1948-50) AS1-T96E
Jeepster 473-VJ, 673-VJ (1950-51) AS37-T96
Truck 2T & 2WD (1947-50) ④AS1-T90E
Truck 4T & 4WD (1947-50) ⑤AS1-T90A
Truck 473-HT (1950-51) AS39-T96
Truck 473-4WD (1950-51) ③AS1-T90C
Truck 475-4WD (1953-55) ⑧ ③AS1-T90C
Truck 6-226 4WD (1954-55) ⑧ ③AS1-T90J
Aero Pass. Cars (1952-55) AS55-T96

(WITH OVERDRIVE)

HENRY J
1951-54 4 Cyl. & 6 Cyl. (1952-54) ①AS41-T96

FRAZER
1947-48 ..... AS12-T86E
1949-50 ..... AS24-T86E
1951 ..... AS50-T86E

HUDSON
1C, 2C (1953) AS64-T86E
1D, 2D, 3D (1954) AS64-T86E
4B, 5B, 6B (1952) AS64-T86E
4C, 5C (1953) AS64-T86E
7B, 7C (1952-53) AS64-T86E
4D, 5D, 7D (1954) AS64-T86E
Wasp & Hornet Six (1955) AS64-T86E

KAISER
1947-48 ..... AS12-T86E
1949-50 ..... AS24-T86E
1951-55 ..... AS50-T86E

NASH
Ambassador (Late 1950-55) ①AS46-T86E

RAMBLER
1950-53⑦ AS36-T96

STUDEBAKER
Champion (1947-49) AS2-T96
Champion (1950-55) ①AS24-T96
Commander (1947-49) AS2-T86E
Commander (1949-50) ①AS32-T86E
Commander (1951-55) ①AS54-T86E
President (1955) ①AS54-T86E

WILLYS
Sta. Wgn. 4-63 (1947-49) AS12-T96
Sta. Wgn. 6-63 (1948-49) AS20-T96
Sta. Wgn. 4-63 & 6-63 (1949-50) ①AS28-T96
Sta. Wgn. 473-SW & 673-SW (1950-51) ①AS28-T96
Sta. Wgn. 475 (1952-53) ①AS28-T96
Sta. Wgn. 475, 485 (1954-55) ①AS28-T96
Sta. Wgn. 6-226 2x4 (1954-55) ①AS50-T86E
Jeepster VJ-2 (1948-49) AS18-T96
Jeepster VJ-2 & VJ-3 (1949-50) ①AS30-T96
Jeepster 473-VJ & 673-VJ (1950-51) ①AS30-T96
Aero Pass. Cars (1952-55) ①AS50-T96

①—Overdrive with "Centered Ring Gear".
②—Steering column mounted gearshift.
③—Floor mounted gearshift.
④—AS1-T90D (with floor mounted gearshift) used beginning Serial No. 22536.
⑤—AS1-T90C (with floor mounted gearshift) used beginning Serial No. 34787.
⑥—Used beginning late 1952. See "Hudson Transmission" for earlier models.
⑦—Statesman type transmission used after 1953 Serial No. D150580.
⑧—With 4-Wheel Drive.
⑨—With 2-Wheel Drive.

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 RAMBLER TRANSMISSION PRODUCTION CHANGE—"Statesman" Series standard transmission replaced "Warner" type at Car Serial No. D-150580.*

►*1953 RAMBLER & STATESMAN TRANSMISSION SYNCHRONIZER CLUTCH PRODUCTION CHANGE*—"Nash Type" synchronizer clutch replaced "Warner" type temporarily between Car Serial Nos. K-601840 & K-613887 (Statesman); Nos. D-152241 & D-172945 (Rambler). *"Nash Type" & "Warner Type" synchronizer clutch parts are not interchangeable.* If it is necessary to change from one type to the other, it will be necessary to also change the following parts: Clutch Shaft, Second Speed Gear, Shifter Fork (Second & High), Shifter Fork Shoe, and the complete Synchronizer Clutch.

►*HUDSON (EARLY 1952) TRANSMISSION—See "Hudson" transmission data.*

►**"CENTERED RING GEAR" TYPE OVERDRIVE:** These units do not have driveshaft front bearing (see illustration for location of this bearing) and shaft is piloted at the planetary ring gear in a flange which is integral with overdrive case.

►**Willys 4-Wheel Drive Transfer Case**—Two-speed Spicer or Warner Transfer Case mounted on transmission with transmission mainshaft rear bearing mounted in transfer case housing. See "Warner & Spicer Transfer Case" for data.

►*CAUTION—Transfer case must be partially dismantled before it can be removed from transmission.*

DESCRIPTION: 3-Speed, all helical gear type (except Willys 4-Whl. Dr. & Truck—See Note). Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Synchronizers are double blocker, double spring type.

Willys 4-Whl. Drive & Truck Note—Transmission has spur type sliding gear and floor-mounted gearshift (entire gearshift mechanism lifts off as unit with top cover). Transfer case is mounted on rear end.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY OF TRANSMISSION (With Overdrive) Remove overdrive case *(see "Warner R-10 Overdrive" following)*, and then proceed as outlined in DISASSEMBLY OF TRANSMISSION (Without Overdrive), below.

►**LOW & REVERSE SHIFTER FORK REMOVAL & INSTALLATION CAUTION**—Mark position of shifter fork to indicate if "offset" of fork is to front or rear, and install fork in transmission in same position at reassembly.

DISASSEMBLY OF TRANSMISSION (Without Overdrive): Take out cover screws, remove cover and gasket. Mark synchronizer parts (rings, sleeve, hub) to insure reassembly in same relative positions. Take out capscrews and remove bearing retainer on front of case. On Studebaker & Nash, take out bearing snap rings on bearing and shaft, install special Synchronizer Ring Protector J-3042 (Nash Ambassador), J-1525 (Stude. Champ. 1946), J-2040 (Nash Rambler 1950-55 & Stude. Champ 1947-55), J-2039 (Stude. Comm.) to prevent damage to synchronizer, use Puller HM-925 and Adapter Plate J-1298 (Studebaker), and Puller J-1298N (Nash) to remove bearing from shaft. (NOTE—on other cars, gear and bearing assembly can be removed after counter-

CONTINUED ON NEXT PAGE

1946-55
WARNER TRANSMISSIONS (C nt.)

gear cluster has been dropped to provide clearance). Take out rear bearing retainer capscrews, remove bearing retainer from shaft (on models where bearing mounted in recess in retainer, pry retainer out so that puller can be engaged, and use puller to remove retainer). Slide speedometer gear off main shaft (if gear does not come out with retainer and bearing assembly). Tip main shaft toward right as far as possible (on models where rear bearing mounted directly in case, move shaft to rear until bearing clears case), disengage Second & High Speed Shift Fork and Low & Reverse Shift Shoe *(CAUTION—Mark Low & Reverse Shift Shoe so that "offset" in shoe can be installed in correct position at reassembly)*, and lift these parts out. On models where opening in rear of case permits, withdraw complete main shaft assembly through this rear opening. On other models, remove main drive gear and lift it through top of case if bearing removed previously (otherwise tap it out through front of case using a soft drift, being careful not to damage gear teeth). If main shaft can not be removed as an assembly, remove snap ring from groove at forward end of shaft, slide synchronizer assembly, second speed gear, and sliding gear off shaft (lift these parts out through top of case). Lift out counter-gear assembly. Drive reverse idler shaft out through rear of case, using brass drift, and lift gear and bushing out. To remove shifter shaft assemblies, remove levers on outer ends of shafts, drive out lockpins in shaft bosses on side of case, push shaft and lever assemblies through and remove from case. (CAUTION—do not lose detent balls, springs and interlock plunger located in boss in case between lever sectors).

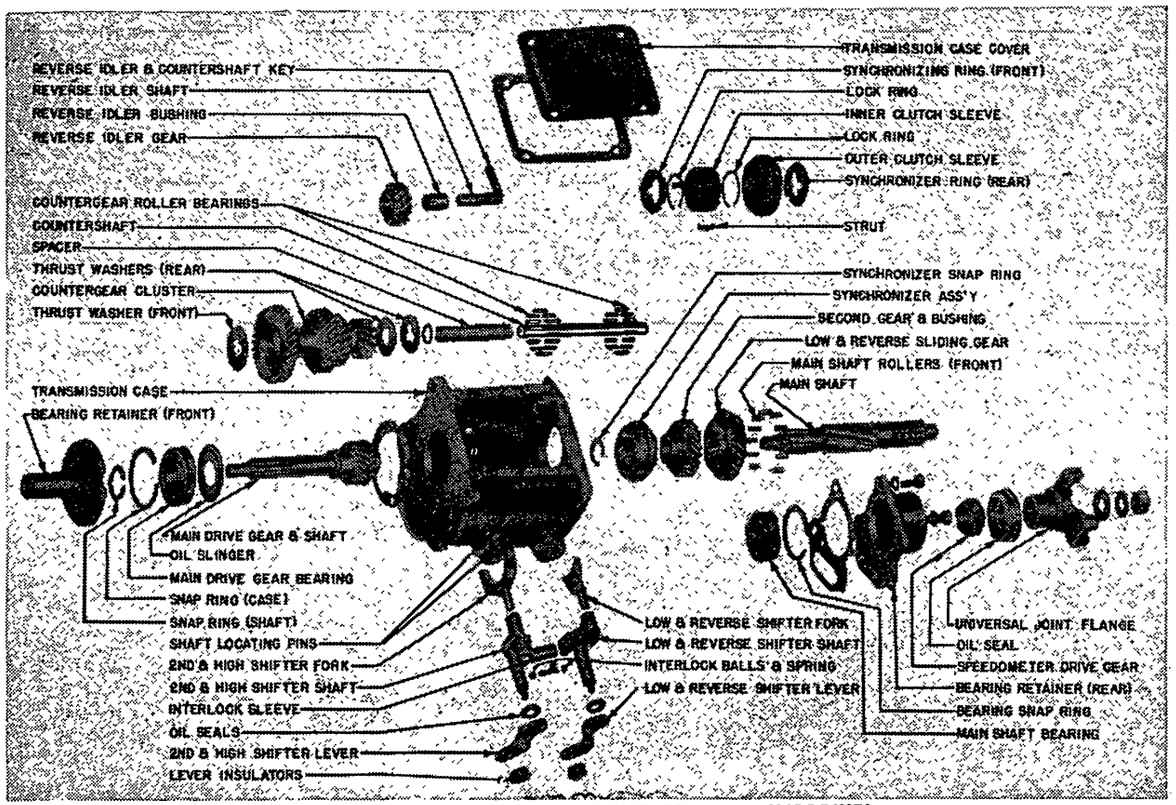
►**Nash Mainshaft & Bearing Retainer Disassembly Note**—To remove shaft from retainer (extension housing), remove bearing snap ring from groove in retainer, press shaft out toward front (bearing and speedometer gear will come out with shaft). To remove bearing from shaft, remove snap ring at rear of speedometer gear, remove gear, remove woodruff key from slot in shaft, then press bearing off shaft.

REASSEMBLY OF TRANSMISSION: Reverse the disassembly directions given above and note special data on all sub-assemblies as follows:

Shift Mechanism: Install complete detent and interlock assembly (plunger, spring, poppet balls, and spacer pin on Kaiser) in the boss in the case, insert shift shaft and levers from within, insert shift shaft lockpins loosely in holes in case to hold levers in place, check and adjust interlock plunger clearance (see below), then drive shaft lockpins down into place, install new oil seal on outer end of each shaft, install outer levers.

►***LOW & REVERSE SHIFTER FORK INSTALLATION CAUTION—Make sure that the Low & Reverse Shifter Fork is installed with the "offset" in the correct direction (as marked at removal).***

Interlock Plunger Clearance—.001-.007" (Willys & Nash), .001-.005" (All Others) clearance between end of plunger and shift lever sector with one lever in neutral and other lever in any gear. To check, place one lever in neutral, move other lever to any gear position, use feeler gauge between end of plunger and lever sector. Adjust by installing plunger of correct length. Plunger furnished in five lengths and marked for identification as follows: Unmarked —1.299", A—1.295", B—1.291", D—1.303".



TYPICAL 1946-55 WARNER TRANSMISSION (NO OVERDRIVE)

Reverse Idler Gear & Shaft: Position gear with offset (longer end of hub) toward front of case, drive shaft in until lockplate slot lines up with rear face of case.

Countergear Cluster: To assemble, install dummy shaft and spacer in gear cluster, install bearing rollers and bearing retainer washer in each end of gear, using grease to retain parts (see Willys note below), install bronze thrust washer on each end with tongue of front washer forward (to engage notch in case), tongue of rear washer forward (to engage notch in gear), install steel thrust washer on rear and install entire assembly in case. Drive countershaft in from rear (pushing dummy shaft out at forward end) until lockplate slot lines up with rear face of case. Check countergear endplay which should be .002-.006" (Kaiser), .006-.016" (Hudson), .004-.018" (Stude. Champ.), .005-.017" (Stude. Comm.), .012-.018" (Willys Jeep & Trucks). Install lockplate to retain counter shaft and reverse idler shaft.

Willys Jeep & 4-Whl. Dr. Truck Bearings—Countershaft has double bearings (two sets of bearing rollers in tandem) at each end of countergear. Install one set of bearing rollers, bearing washer, second set of rollers, second washer at each end.

Main Drive Gear Assembly: If removed and installed as an assembly, this assembly must be re-installed before countershaft inserted (countergear cluster at bottom of case to provide clearance). Use driver to install bearing on shaft. On Nash & Studebaker, install gear without bearing using Synchronizer Protector Ring J-3042 (Nash Ambassador), J-1525 (Stude. Champ. 1946), J-2040 (Stude. Champ. 1947-55, and Rambler 1950-51), J-2039 (Stude. Comm.) when driving bearing on shaft and into case. Select snap rings (large ring on bearing, small ring on shaft) for snug fit without endplay. Bearing snap rings furnished .086", .089", .092", .095" thick. With main drive gear installed in case select gasket of correct thickness (furnished in four thicknesses) so that retainer will be tight fit on case when installed.

►***CAUTION—Bearing must not have any endplay.***

Mainshaft Assembly: When installing mainshaft in case, make certain that pilot bearing rollers in place in recess of main drive gear (use cup grease to hold rollers until shaft inserted). Install sliding gear with shift fork channel toward rear (Studebaker Champion, Willys (Exc. 4-Whl. Dr.), Hudson Jet, Nash Rambler, and Henry J); toward front (All Others), engage shifter shoe in gear (shifter shoe offset should be toward front or rear in relation to gear channel above). Install second speed gear with clutch teeth toward front, install syn-

CONTINUED ON NEXT PAGE

1946-55
WARNER TRANSMISSIONS (Cont.)

chronizer (see data below) with clutch sleeve offset toward front, install snap ring in shaft groove to retain these assemblies. Engage second-high shifter fork in channel of synchronizer sleeve.

Synchronizer Assembly—If synchronizer dismantled, assemble parts according to marks made previously. Install spring in each end of hub with free end of each spring engaging the same strut and springs pointing in opposite directions. Make certain that struts engage slots in synchronizer rings. Install snap ring in groove at forward end of shaft. Check endplay of synchronizer and second speed gear assembly with a feeler gauge between back face of gear and shoulder on shaft. Endplay should be .003-.014" (Kaiser), .003-.010" (Nash), .003-.016" (Hudson & Studebaker Commander), .003-.012" (Studebaker Champion), controlled by snap ring thickness.

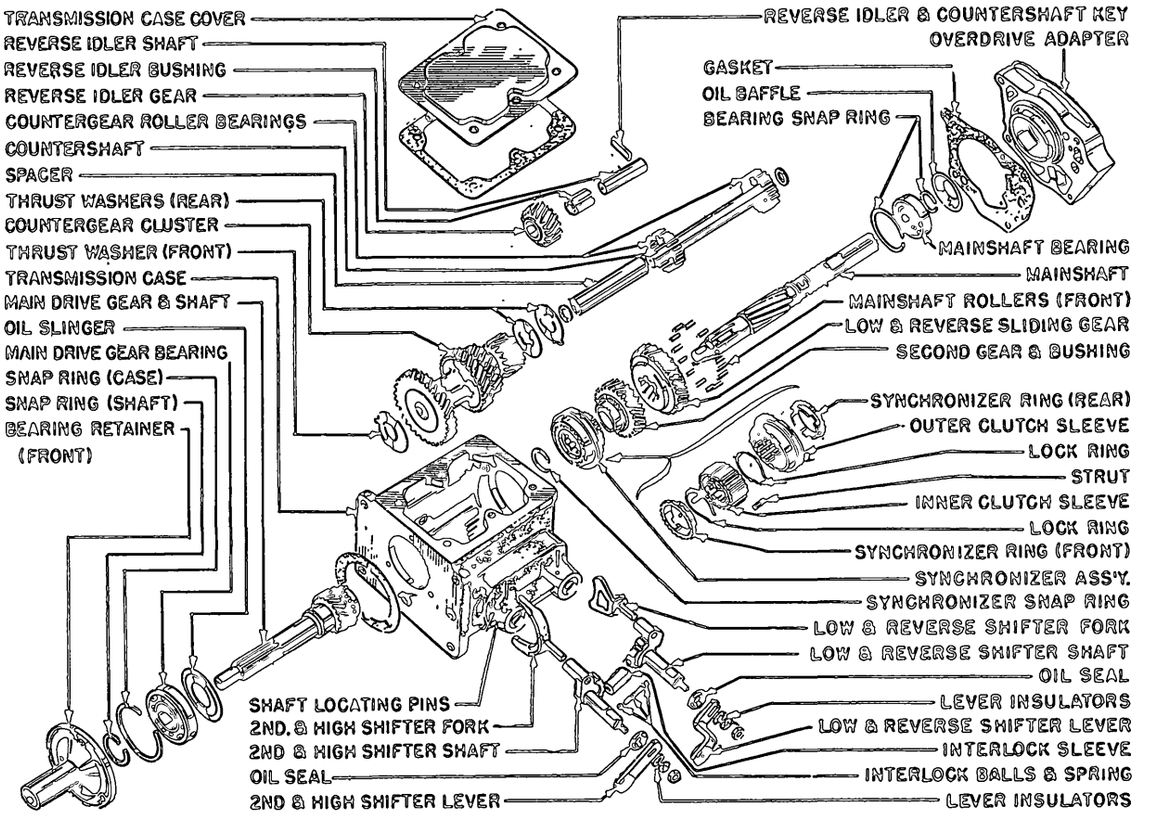
Transmission Mainshaft Rear Bearing—To remove mainshaft and rear bearing from adapter plate, remove bearing snap ring from groove in front face of adapter. Use a soft hammer on rear end of shaft to tap shaft and bearing out, lift off oil baffle, remove bearing snap ring from groove in shaft, use puller to remove bearing from shaft.

Mainshaft Installation: When installing mainshaft in case, make certain that pilot bearing rollers in place in recess in main drive gear (use grease to hold rollers until mainshaft inserted). Engage Low & Reverse Shifter Shoe in sliding gear with offset in same direction as channel in gear (see above), engage Second & High Shifter Fork in synchronizer sleeve channel.

Rear Bearing Retainer: On models where rear bearing mounted in retainer, bearing can be lifted out after snap ring removed (speedometer gear accessible with bearing out). Oil seal should be replaced with special driver. When reassembling, make certain that bearing snap ring is snug fit in groove (furnished .086", .089", .092", .095" thick). When installing retainer, use new gasket, tap retainer in place on shaft with special driver (see special Nash Note below), install universal joint companion flange, flat washer, lockwasher, and nut. Tighten nut securely (90-100 ft. lbs.—Hudson).

▷*CAUTION—Speedometer drive gear will slip if companion flange nut not securely tightened.*

▷Nash Bearing Retainer Note—Bearing retainer has extension housing with additional driveshaft bearing (Oilite bushing) in front of oil seal at rear end of housing. To replace bushing (with oil seal removed), assemble felt oil ring on bushing, press bushing in from rear end of housing until shoulder on bushing is ¼" from shoulder in bearing cap (CAUTION—this clearance necessary to prevent compressing oil ring). To assemble retainer, install bearing on mainshaft, install speedometer gear (CAUTION—see that woodruff key in place in shaft groove within gear), install snap ring in shaft groove selecting ring for snug fit so that bearing is tight on shaft. Install shaft assembly in bearing retainer and install snap ring to retain bearing selecting snap ring for snug fit so that shaft and bearing do not have any endplay in retainer.



TYPICAL 1946-55 WARNER TRANSMISSION (WITH OVERDRIVE)

Transmission Cover & Gasket Installation: Some transmissions are vented by means of holes in cover and gasket. Install these parts as follows:

Nash—Gasket and cover marked "FRONT". Install with marks toward engine.

Studebaker & Hudson—Install gasket with two holes toward rear of case, cover with single hole toward front.

▷*CAUTION—Gasket and cover must be correctly installed to prevent lubricant loss through this vent.*

WARNER R9 OVERDRIVE

Car Model	Warner Model
Hudson 6 & 8, All Models (1946-49)	①AS1-R9
Packard 6, All Models (1941-48)	①AS2-R9
Packard 8, All Models (1941-49) ③	①AS2-R9
Packard Super 8, All (1940-49) ④	①AS1-R9A
Packard Cust. 8, All (1940-49) ⑤	①AS1-R9A

①—Overdrive only (used with own transmission).
②—Part of T86D-R9C Transmission & Overdrive.
③—R11 Overdrive also used on Eng. Nos. 272006 to 285157 and on all later cars.
④—R11 Overdrive also used on Eng. Nos. 424978 to 427710 and on all later cars.
⑤—R11 Overdrive also used on Eng. Nos. 610359 to 611500 and on all later cars

►CHANGES & CORRECTIONS

►**INSTALLATION OF R11 OVERDRIVE ON PACKARD CARS WITH R9 OVERDRIVE**—R9 Overdrive ASSEMBLIES not available (except as noted below—individual parts still available), and new R11 Overdrive Assembly is furnished for these cars in special kit containing necessary installation parts. **R11 Installation data**—See "Warner R11 Overdrive." *NOTE*—R9 Transmission & Overdrive Assembly, Part No. 901147, is available for "2000" & "2100" Series Packard Super Eight.

DESCRIPTION: Simplified overdrive without centrifugal clutch pawls.

REMOVAL OF OVERDRIVE: *See "Overdrive" on car model page.*

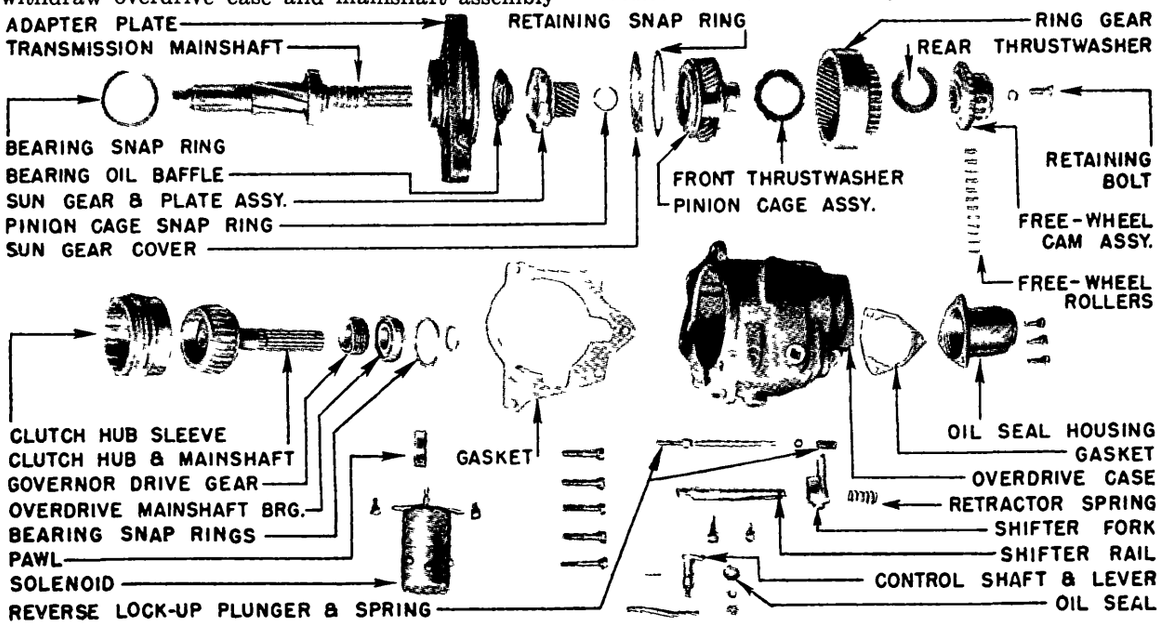
TROUBLE SHOOTING & TESTING: *See Warner R9 Overdrive Control data (following).*

DISASSEMBLY: After transmission and overdrive assembly removed from car, take out five bolts attaching overdrive case and adapter to transmission case, separate overdrive case from adapter, withdraw overdrive case and mainshaft assembly (CAUTION—free-wheel rollers will drop out, make certain that all of the 12 rollers are accounted for). Take out free-wheel cam retaining bolt (in rear end of mainshaft), remove lockwasher and retaining washer, then slide free-wheel cam assembly off shaft. Remove clutch hub rear thrustwasher from shaft. Remove clutch hub, ring gear, and pinion cage assembly as a unit (CAUTION—Split pinions will unwind if these parts separated). Remove pinion cage snap ring from groove in shaft, remove sun gear cover snap ring from groove in adapter plate, slide oil collector ring and cover off, remove sun gear assembly (gear, plate, and balk ring). Adapter plate and rear bearing are removed as an assembly with the transmission mainshaft (see Transmission disassembly data). Disasemble all sub-assemblies as follows:

Sun Gear & Plate Disassembly—Remove snap ring from sun gear plate, slide gear out of plate (CAUTION—do not attempt to remove balk ring from plate). Check balk ring friction drag on plate by mounting plate in vise and using spring scale to check pull required to rotate ring on plate (spring hooked to step in balk ring and parallel with step). Pull should be 8-10 lbs. (with ring rotating—greater pull required to start ring moving).

Hub, Ring Gear, & Pinion Cage Disassembly—Pull pinion cage assembly out of ring gear (split pinions will unwind as they are freed from ring gear). Remove ring gear snap ring, withdraw clutch hub from ring gear. Inspect clutch hub bushing. If bushing requires replacement, use Bushing Remover & Replacer J-1568 (Hudson) to install new bushing.

►*CAUTION—Pinions must be properly wound up when reassembled. See Reassembly data.*



WARNER TYPE R9 VERDRIVE

Free-wheel Cam Disassembly—Remove cam roller retainer snap ring, pull roller retainer partly off cam for access to retainer spring, pull end of spring out of hole in free-wheel cam, free second spring in same manner, remove retainer and springs from cam. Mainshaft pilot bushing is light press fit in cam and can be removed and replaced if required.

Overdrive Mainshaft Disassembly—Unscrew governor and remove from case. Remove nut and washers on rear end of shaft, use puller to remove universal joint companion flange from shaft. Pull mainshaft out through forward end of case (CAUTION—Clutch hub sleeve and governor drive gear will remain in case and should be lifted out after mainshaft removed). Take out mainshaft bearing inner snap ring, tap bearing out toward front of case, drive oil seal out toward rear of case.

Shift Control Disassembly—Remove nut and washers on outer end of control shaft, take off control lever. Remove control shaft setscrew, withdraw control shaft from case. Remove plug on side of case, use socket wrench inserted through plug hole to remove shifter head screw and lockwasher. Remove shifter rail stopscrew, withdraw shifter rail, retractor spring, and fork.

Adapter Plate Disassembly—After transmission disassembled, adapter plate parts can be removed as follows: Take out rear bearing snap ring, withdraw transmission mainshaft and bearing assembly. Take out two solenoid base-to-adapter screws, withdraw solenoid, solenoid base, and pawl. To remove interlock plungers, drive out expansion plugs in adapter at end of each plunger hole. To remove interlock lever, drive out lever fulcrum pin.

►*CAUTION—Interlock plungers furnished in different lengths and must be selected for correct reverse gear lock-out. See Reassembly data.*

REASSEMBLY: Reassemble all sub-assemblies and install these parts in case in reverse order of disassembly data and note the following:

Sun Gear Pawl Interlock Plunger (Hudson)—Consists of two plungers and an intermediate lever installed in the adapter plate flange so that one plunger engages the shifter rail and forces the other plunger into engagement with the sun gear pawl with the overdrive locked out which prevents the pawl operating. Long plunger (shift rail plunger) furnished in six different lengths. Install plunger of correct length so that clearance between lower end of plunger and tip of interlock intermediate lever is .008-.021" with long plunger in shift rail groove and top of short plunger against the sun gear pawl.

►*CAUTION—See Overdrive Installation data (at end) for special procedure to insure correct operation of interlock in service.*

Sun Gear & Plate Assembly Installation—Assemble sun gear in plate with two oil slots in gear aligned with slots in plate, install snap ring in plate to retain gear. When installing this assembly in adapter, make certain that solenoid pawl properly positioned in slot in balk ring.

Solenoid & Pawl Assembly—Install solenoid base and solenoid with one gasket between base and adapter, and one gasket between solenoid and base. After solenoid installed, check clearance between end of pawl and step on balk ring with pawl out to end of solenoid plunger maximum travel. Clearance must be .015". Adjust by using not more than two

CONTINUED N NEXT PA E

WARNER R9 OVERDRIVE (Continued)

gaskets between solenoid and base. *See Warner R9 Overdrive Control (following) for solenoid data.*

Shift Control Installation—Place shifter rail retractor spring and fork in case before inserting shift rail, make certain that wide groove in rail is in line with stopscrew hole in case. Install new control oil seal before installing control shaft. Make certain that shifter rail fork guide pin engages notch in shifter fork when installing this pin.

Overdrive Mainshaft Installation—When installing rear bearing, select snap ring for snug fit in groove. This ring furnished in five thicknesses for selective fit on Hudson (see Packard Note below). Install new oil seal in rear end of case (on Hudson, seal should protrude 9/32" beyond rear face of case). Make certain that clutch hub sleeve installed with shallow groove to front and that shifter rail fork engaged in fork groove in sleeve. Install speedometer gear with shoulder toward rear.

Free-wheel Cam & Roller Installation—If roller retainer removed, insert springs in retainer with ends pointing in clockwise direction, install retainer on cam, use small screwdriver to work springs around cam and insert ends in holes in cam. Install retainer snap ring (on Hudson, use Snap Ring Replacer J-1499 with Pilot J-1499-2). Use grease to hold free-wheel rollers in retainer until assembly inserted in pocket in mainshaft.

Hub, Ring Gear, & Pinion Gear Installation—After sun gear assembly installed, install pinion cage assembly and clutch hub front thrustwasher (CAUTION—lip on washer must be engaged in cutout in pinion cage on sun gear and washer should be coated with grease). Lock transmission gears (to facilitate winding up pinions), and use a punch or wedge inserted through side of pinion cage assembly to lock the forward halves of the three split pinions. Install ring gear to point where it engages the rear or narrow halves of all three pinions, then wind up pinions by rotating ring gear clockwise 1½ teeth (teeth on narrow half pass 1½ teeth on wide half of pinions) so that marked pinion teeth line up, push ring gear fully into place so that it meshes with both halves of all pinions. Remove wedges. Complete assembly by installing clutch hub rear thrustwasher (coat washer with grease) and free-wheel cam assembly, then install retaining washer, lockwasher, and bolt.

OVERDRIVE INSTALLATION (On Transmission Case): Use new gasket between overdrive case and adapter. Make certain that solenoid and pawl assembly correctly installed (pawl must engage notch in balk ring). Move shift control lever to forward position, tilt overdrive case at slight angle and rotate overdrive mainshaft in counter-clockwise direction while pushing case forward into position (CAUTION—this procedure necessary to enter free-wheel cam rollers in pocket in mainshaft). Align overdrive case, adapter, and transmission (see Hudson Note below), install and tighten all overdrive case-to-transmission bolts.

WARNER R9 OVERDRIVE CONTROL

Hudson 6 & 8, All Models (1941 to 1947)
Hudson 6 & 8, All Models (1948-49)
Packard 6 & 8, All Models (1940 to 1948)
Packard Super & Cust. 8, All (1940 to 1948)
Studebaker Pres., 8C (1942) No. 7147625 Up

▷NOTE: Hudson 1948-49 models have new R10 Overdrive, but use Warner R9 Overdrive Control.

DESCRIPTION: Special design, electrical control with 'kick-down' direct drive feature. New type Transmission Solenoid is 'push type' and pushes pawl in to engage sun gear mounting plate slot (to hold sun gear stationary for overdrive) when solenoid is energized. Spring in solenoid case pulls pawl

ADJUSTMENT: Lock-out Control Button Linkage. Button should clear bracket by ⅛" when pushed in to insure full travel of control travel on overdrive case. To adjust, loosen control cable at binding screw on lever on left side of overdrive case, push control button in as far as possible, then pull button out ⅛" (all models except Hudson), ½" (Hudson). Move the control lever on overdrive case to rear as far as possible, then move lever forward until a resistance just felt, tighten binding screw.

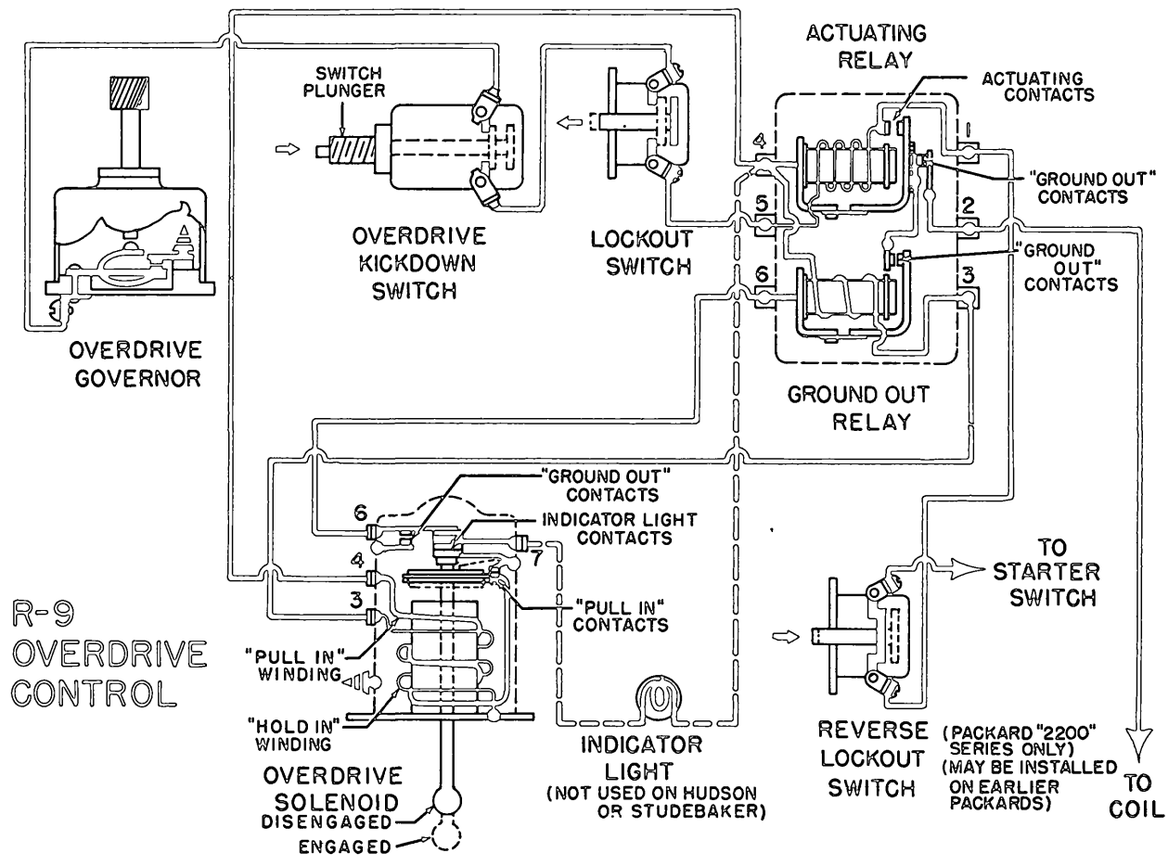
Throttle Kick-down Switch Adjustment:

Hudson Throttle Switch (1942-49). Switch must open and relay operate just after throttle is fully open. If relay does not operate, loosen locknut and adjust throttle switch up under accelerator pedal until pedal just contacts switch plunger with throttle wide open. If relay does not operate when pedal depressed beyond wide open throttle position, replace throttle switch.

Packard Throttle Switch—Should be adjusted whenever carburetor linkage adjusted or disconnected. To check setting, remove air cleaner (to observe throttle valve), open throttle until valve is just wide open. If tappet screw on accelerator link lever does not contact throttle switch plunger at this point, adjust by loosening locknut and turning screw in or out of lever.

Studebaker Throttle Switch—Depress accelerator pedal until throttle valve is wide open and throttle lever contacts wide open throttle stop, hold in this position, loosen locknut on switch mounting stud, adjust switch on mounting bracket until end of accelerator rod just contacts switch plunger.

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R9 OVERDRIVE CONTROL WIRING DIAGRAM

WARNER R9 OVERDRIVE CONTROL (C nt.)

G vernor: Mounted on rear end of overdrive case and driven from final driveshaft. Controls cut-in speed

►*CAUTION—Governor is not adjustable.*

Car Model	Cut-in Speed
Hudson (All Models)	22 MPH.
Packard '41-48 (Overdrive Only)	22 MPH.
Packard '41-42 (Electromatic Clutch)	20 MPH.
Studebaker '42	20 MPH.

FUSES: Hudson—No fuse is used.
Packard—30 ampere. Located in a fuse container in the line between the starting switch and the Solenoid Relay '1' terminal. Do not use fuse of any other capacity at this point.
Studebaker. Fuse is located in socket on side of control relay mounted on front of dash.

TROUBLE SHOOTING: Failure of the overdrive to operate satisfactorily may be caused by mechanical failure (of overdrive unit or control units) or by electrical failure (of control units and wiring).

OVERDRIVE DOES NOT ENGAGE

1. **Mechanical Causes:**
   1) Sun Gear Pawl sticking or broken, or Interlock Plungers sticking and locking pawl in outer position. Remove solenoid (see Solenoid Testing data), check pawl for free operation. *NOTE*—Overdrive must be disassembled for pawl removal.
   2) Solenoid Plunger sticking, Pawl Rod out of adjustment. Check for correct installation and adjustment. See Solenoid adjustment data.
   3) Balk Ring faulty or incorrectly installed (may be indicated by spasmodic or harsh engagement).
2. **Electrical Causes:**
   1) Fuse blown or open-circuit in control wiring.
   2) Governor, Relay, or Lock-out Switch defective (contacts sticking open). See Control Unit Testing (following).
   3) Solenoid defective (pull-in or hold-in coil open, pull-in coil contacts sticking open). See Control Unit Testing (following).

OVERDRIVE DOES NOT DISENGAGE OR NO "KICK-DOWN"

1. **Mechanical Causes:**
   1) Sun Gear Pawl sticking or broken. Remove solenoid (see Solenoid Testing data), check pawl for free operation and correct engagement with pawl rod ball end. *NOTE*—Overdrive must be disassembled for pawl removal.
2. **Electrical Causes:**
   1) Governor or Relay defective (contacts sticking closed). See Control Unit Testing (following).
   2) Ignition cut-out or ground wire open-circuited or disconnected at ignition coil or distributor.

OVERDRIVE CANNOT BE LOCKED OUT

1. **Mechanical Causes**—Shift control cable out of adjustment, disconnected, or broken. Shift control mechanism in overdrive case incorrectly assembled.
2. **Electrical Causes**—Lock-out Switch shorted.

OVERDRIVE NOT LOCKED OUT IN REVERSE

►*CAUTION*—Above condition may result in transmission being in two gears at once (overdrive and reverse) and this "lock up" will cause damage to overdrive mainshaft if engine power applied.

1. **Mechanical Causes:**
   1) Lock-out collar sticking. May be caused by wrong type or cold lubricant (drain and refill with correct type lubricant).
   2) Burred or worn splines on free-wheel clutch cam, overdrive mainshaft, or in lock-out collar. Check for free movement of lock-out collar by disconnecting control cable at shift control lever on overdrive case and operating control by hand.
   3) Sun Gear Pawl sticking, broken, or not properly engaged on pawl rod. Remove solenoid (see Solenoid Testing data), check pawl for free operation. NOTE—Overdrive must be disassembled for pawl removal.
   4) Solenoid Plunger sticking or Pawl Rod out of adjustment. Check for correct installation and adjustment. See Solenoid Testing & Adjustment data.
2. **Electrical Causes:**
   1) Governor or Relay contacts sticking in closed position.
   2) Control wiring or control unit terminals grounded.
   3) Lock-out Switch or Kick-down Switch grounded.

►*PACKARD REVERSE SWITCH NOTE*—This switch used on "2200" Series and can be installed on previous series cars to prevent locking up of transmission in reverse. *See Change & Correction data.*

TESTING & ADJUSTMENT (Control Units): Switches and Governor should be serviced by replacement. Relays and Solenoids should be checked and adjusted as follows:

Control Relay (Hudson & Packard Models): Delco-Remy No. 1116823 (std. 6 volt), 1116802 (Exp.12 volt). Relay is special two-unit type (Control Relay and Timing Relay) and each unit is adjusted differently as follows:

Control Relay

Air Gap—.012" (lower contacts closed), .032" (lower contacts open). Check first with armature held down so lower contacts closed, adjust by loosening two screws on hinge bracket on back of relay and raising or lowering armature, see that gap uniform across whole surface of core. Then check air gap with armature released (upper contacts closed), adjust by bending upper contact support—do not loosen hinge bracket screws.

Contact Gap—.022" (top contacts) with lower contacts held closed. Should be correct if air gaps correct (above) and contact spring not bent.

Closing Voltage—3.4-4.0 (6 volt units), 6.8-8.0 volts (12 volt units). CAUTION—This voltage will attract armature and close lower contacts (upper contacts open as lower contacts close). To check closing, connect battery and variable rheostat to relay terminals #1 and 5, increase voltage and note when contacts close. To adjust, bend spring hanger at upper and lower end of spiral armature spring.

Timing Relay

Air Gap—.031" with contacts open. Adjust by bending upper armature stop—do not disturb armature hinge bracket mounting screws.

Contact Gap—.022". Adjust by bending lower contact support.

Closing Voltage—.6-1.1 volt (6 volt units), 1.2-2.2 volts (12 volt units). To check closing, connect battery and variable rheostat to terminals #3 and 4, increase voltage and note when contacts close.

'Time Delay' Action—.1-.2 seconds (between instant current flow through winding is stopped and opening of contacts). To check timing action on car, operate engine at medium speed, close control relay lower contacts by hand (timing relay contacts will close), release control relay contacts and note interval before timing relay contacts open (lag should be noticeable). Adjust by bending spring hangers on upper and lower end of spiral armature spring (increase spring tension to shorten time interval).

Control Relay (Studebaker): Auto-Lite Model HRB-4301. This is a conventional single unit relay (similar to horn relays, etc.).

Contact Gap—.034-.038" (bend armature stop).

Air Gap—.012-.017" with contacts closed. Adjust by raising or lowering stationary contact support.

Closing Voltage—2.8-3.6 volts. Adjust by changing armature spring tension (bend lower sprg. hanger).

Coil Winding Current—.44-.46 amperes at 6.0 volts (coil winding resistance 12.9-13.5 ohms).

Transmission Solenoid (All Models): Delco-Remy No. 1118005 (Std. 6 volt), 1118007 (Export 12 volts). Solenoid cover can be removed for inspection and servicing by removing two nuts on studs on cover.

CAUTION—Pawl rod must not be forced into solenoid with cover removed. This will damage the contact plate flat springs.

►***SOLENOID REMOVAL (for Checking & Adjustment):*** The solenoid can be removed without disassembling the overdrive by following procedure: With ignition switch turned on and overdrive control button pushed in, ground the overdrive control terminal on the governor ("AD" terminal on Packard, Cadmium plated terminal on Hudson) which will energize the solenoid and extend the solenoid plunger. Take out two solenoid mounting screws, tilt solenoid to rear to disengage ball end on pawl rod from milled slot in pawl. Disconnect solenoid leads, withdraw solenoid assembly. **Installation Note**—Reverse the above procedure and energize the solenoid after the leads have been connected to facilitate engaging ball in pawl slot.

Solenoid Operation Test—Plunger actuating voltage should be 4.9 volts (6 volt units), 6.8 volts (12 volt units) max. at room temperature. To check performance, block pawl rod so that it cannot move out of solenoid when plunger is actuated, remove solenoid cover, connect voltmeter, battery, and variable rheostat between terminals #3 and 4 (connect these terminals together) and ground on solenoid case. Increase voltage and note voltage reading at point where plunger is actuated.

Pull-in Coil Contact Gap—With solenoid bottomed in coil, pull-in coil contact gap should be .018-.040". Remove solenoid cover to check these contacts. See Pawl Rod Adjustment below.

Solenoid Current Draw—To check current connect battery and ammeter between #4 terminal and ground on solenoid case (Pull-in Coil), or #3 terminal and case (Hold-in Coil). This check must be made at specified voltage. 'Both Coil' figure below is for both Pull-in and Hold-in Coil together, 'Hold-in Coil' figure is for Hold-in coil only.

6 Volt Units

Both Coils	31.0-36.0 amperes at 6.0 volts.
Hold-in Coil	1.4-1.6 amperes at 6.0 volts.

Pawl Rod Adjustment—With pawl rod assembly removed from solenoid, check length from lower face of adjusting nut on upper end of pawl rod to lower edge of plunger. This distance should be 2.022-2.037". To adjust, press down on locking spring below adjusting nut so that prong on spring clears notch in nut, turn nut on plunger. CAUTION—Use care not to distort locking spring and see that prong on spring engages notch in nut after adjustment completed.

WARNER R10 OVERDRIVE

TRANSMISSION WITH OVERDRIVE

FRAZER	Warner Model
1947-48	AS12-T86E
1949-50	AS24-T86E
1951	①AS50-T86E
HENRY J	
1951-54 4 Cyl. & 6 Cyl. (1952-54)	①AS41-T96
HUDSON	
1C, 2C (1953)	AS64-T86E
1D, 2D, 3D (1954)	AS64-T86E
4B, 5B, 6B (1952) ②	AS64-T86E
4C, 5C (1953)	AS64-T86E
7B, 7C (1952-53)	AS64-T86E
4D, 5D, 7D (1954)	AS64-T86E
Wasp & Hornet Six (1955)	AS64-T86E
KAISER	
1947-48	AS12-T86E
1949-50	AS24-T86E
1951-55	①AS50-T86E
NASH	
Rambler (1950-53) ③	①AS36-T96
Ambassador (1949-50)	AS26-T86E
Ambassador (Late 1950-55)	①AS46-T86E
RAMBLER	
1950-53 ③	①AS36-T96
STUDEBAKER	
Champion (1947-49)	AS2-T96
Champion (1949-55)	①AS24-T96
Commander (1947-49)	AS2-T86E
Commander (1949-50)	①AS32-T86E
Commander (1950-55)	①AS54-T86E
President (1955)	①AS54-T86E
WILLYS	
Sta. Wgn. 4-63 (1947-49) ④	AS12-T96
Sta. Wgn. 6-63 (1948-49) ⑤	AS20-T96
Sta. Wgn. 4-63, 473SW (1949-51)	①AS28-T96
Sta. Wgn. 6-63, 673SW (1949-51)	①AS28-T96
Sta. Wgn. 475 (1952-53)	①AS28-T96
Sta. Wgn. 475 & 685 (1954-55)	①AS28-T96
Sta. Wgn. 6-226 2x4 (1954-55)	①AS50-T86E
Jeepster VJ-2 (1948-49)	AS18-T96
Jeepster VJ-3 (1949-50)	①AS30-T96
Jeepster 473-VJ, 674-VJ (1950-51)	①AS30-T96
Aero Pass. Cars (1952-55)	①AS50-T96

OVERDRIVE UNIT ONLY

HUDSON	⑥Warner Model
All (1948-49)	AS1-R10D
All (Early 1950)	AS2-R10D
All (Late 1950-Early 1952) ⑦	①AS3-R10D
NASH	
"600" (1947-48)	AS1-R10B
"600" (1949)	AS6-R10B
Rambler (Late 1953-55) ⑧	①AS8-R10B
Statesman (Late 1950-55)	①AS8-R10B
Ambassador (1946-48) ⑨	AS2-R10B
Ambassador (Early 1949)	AS5-R10B

①—Overdrive with "Centered" ring gear.
②—Used beginning Late 1952. Own transmission used on earlier models.
③—Statesman type transmission used after 1953 Serial No. 150580.
④—Up to Serial No. 91904 in 1949.
⑤—Up to Serial No. 14822 in 1949.
⑥—Overdrive unit only (used with transmission furnished by manufacturer).
⑦—Warner Overdrive Transmission used beginning late 1952.
⑧—Used with "Statesman" transmission after D-150580 (1953).
⑨—Beginning 1946 Service Serial No. N6-120026.

►CHANGES, CAUTIONS, CORRECTIONS

►**1949-55 FORD, LINCOLN, MERCURY OVERDRIVE:** See "Ford, Lincoln, Mercury Overdrive" (Warner R10).

►**1953-55 DESOTO, DODGE, PLYMOUTH**—*See DeSoto, Dodge, Plymouth (Warner R10)" Overdrive.*

►**1955 CHEVROLET OVERDRIVE:** *See "Chevrolet Overdrive" (Warner R10).*

DESCRIPTION: Overdrive is solenoid operated type (no centrifugal pawls) with governor control and accelerator controlled "kick-down."

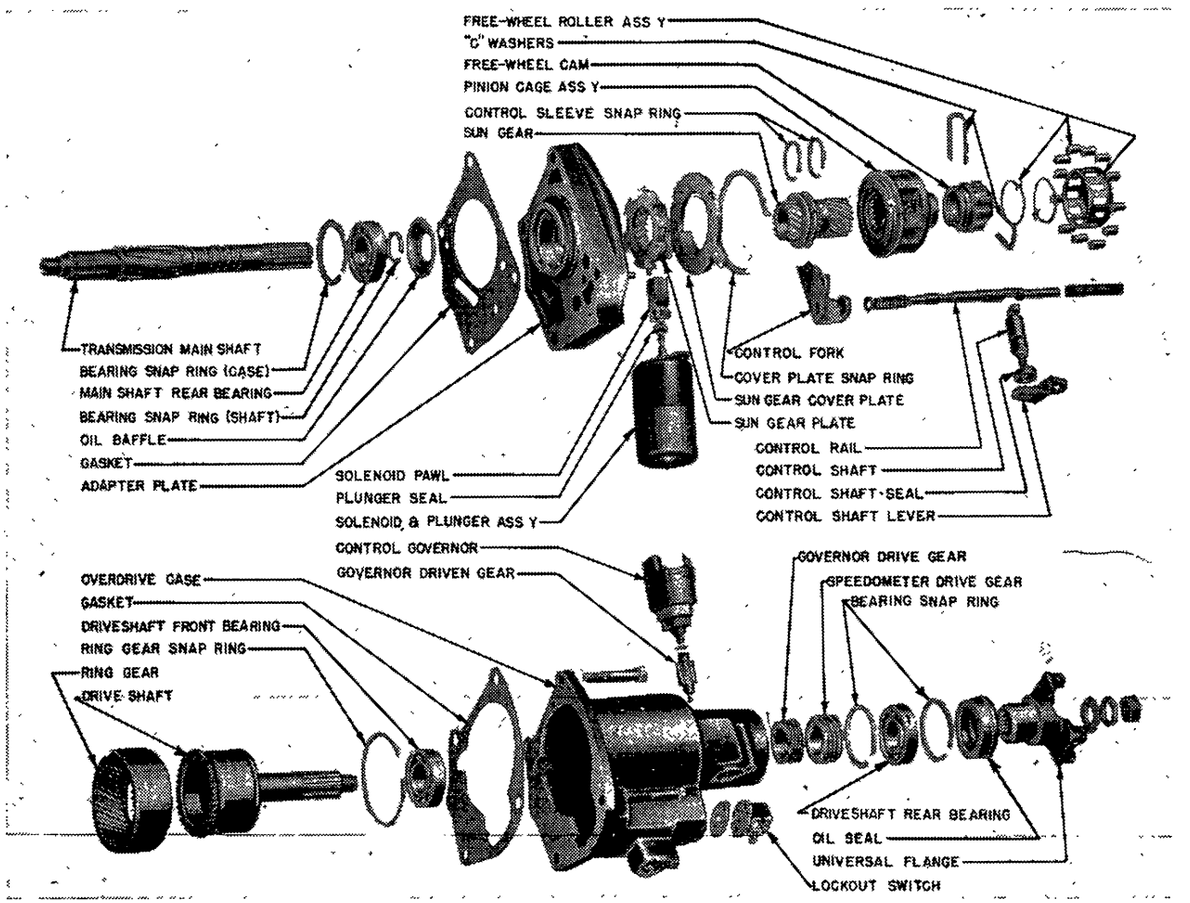
►**CENTERED RING GEAR ON OVERDRIVE OUTPUT SHAFT:** Overdrive has one bearing on output shaft. Shaft is piloted at planetary ring gear in a machined flange integral with overdrive housing.

REMOVAL OF OVERDRIVE: *See car model page.*

TROUBLE SHOOTING & TESTING: *See "Warner R10 & R11 Overdrive Control" following.*

DISASSEMBLY OF OVERDRIVE: Remove Lock-out Switch, remove governor by unscrewing it from housing. On Nash models, take out mounting screws and remove Torque Tube Adapter, remove oil seal with Puller J-2497, then remove snap ring from shaft directly in back of driveshaft rear bearing. On all other cars, remove nut on rear end of shaft, use puller to remove universal joint companion flange. Drive out tapered pin holding control lever shaft in overdrive case, pull shaft out as far as possible to disengage operating cam from shift rail. Remove four mounting screws holding overdrive case on transmission case, withdraw case while tapping on rear end of shaft with a soft hammer to prevent the shaft coming off with the housing (this would

CONTINUED ON NEXT PAGE



WARNER TYPE R10 OVERDRIVE (FIRST TYPE—N T CENTERED RING GEAR)

WARNER R10 OVERDRIVE (C nt.)

allow free-wheel rollers to drop out). Then disassemble each part of the overdrive as follows:

Overdrive Solenoid—Remove mounting capscrews and lockwashers at mounting flange, rotate solenoid clockwise ¼ turn to disengage plunger from pawl, withdraw solenoid and plunger assembly.

Overdrive Case (incl. control parts)—Remove reverse lock-up spring from housing, take off nut and remove control lever from shaft, remove control shaft from within case, remove shaft oil seal. If both bearings remain within case (see "Driveshaft Bearing Change" above), use brass drift to tap front bearing out, lift out speedometer and governor drive gears, remove oil seal from rear of case, take out rear bearing rear snap ring, use brass drift to tap bearing out at rear of case.

Driveshaft & Planetary Gears—Install one screw to hold adapter plate in position on transmission case. Pull driveshaft off to rear (CAUTION—catch free-wheel rollers as they fall out). Ring gear can be removed from driveshaft by taking out snap ring at rear end of gear. Remove retaining clip ("C" washer) from shaft at rear of free-wheel cam, slide free-wheel unit and pinion cage assembly off rear of shaft (these units can be separated by taking out retaining clip or "C" washer at rear of pinion cage). Remove overdrive sun gear and shift rail assembly as a unit by sliding them off rear of shaft.

Adapter Plate Sun Gear Parts—Remove large snap ring from adapter plate (in front of sun gear cover plate), withdraw sun gear cover plate, sun gear blocker assembly (with balk ring), and solenoid pawl. NOTE—Adapter plate is removed as a unit with transmission mainshaft, gears, and synchronizer. Do not disturb adapter plate unless transmission being disassembled.

REASSEMBLY OF OVERDRIVE: Assemble parts in reverse order from disassembly directions (above) and note the following important points:

Transmission Mainshaft Rear Bearing Installation—After installing bearing on shaft, select proper thickness snap ring so that bearing will have no endplay when snap ring installed in shaft groove. Insert baffle in adapter, install mainshaft and bearing, select snap ring of correct thickness (furnished in various thicknesses) so that there will be no clearance between ring and bearing when snap ring installed in adapter groove.

►*CAUTION—Bearing must not have endplay on shaft or in adapter plate.*

Sun Gear Balk Ring—With sun gear assembly removed, check friction drag of balk ring on plate by clamping the plate in a vise and using a spring scale hooked to the step on the balk ring (scale held parallel to step) to measure the pull required to rotate the ring on the plate. This pull should be 4-6 lbs. (new ring—may fall to 1-1½ lbs. after ring thoroughly broken in) with the ring turning (greater pull will be required to start ring rotating). Replace balk ring if friction drag not correct.

Sun Gear Blocker, Pawl & Solenoid—Install pawl with notched side upward, rotate blocker assembly so that opening in balk ring is opposite pawl. When installing solenoid, insert plunger stem with solenoid turned 90° from mounting position, then rotate solenoid 90° counter-clockwise to engage pawl and install mounting screws.

►**Hudson Interlock Plunger Note**—Interlock plunger must engage notch on side of pawl. This plunger furnished in six lengths for selective fitting so that clearance between end of plunger and side of pawl should be .008-.021" with opposite end of plunger contacting shifter rail (not sleeve). Check with pawl fully engaged in slot in sun gear.

Free-Wheel Assembly—If free-wheel cam retainer and springs removed from free-wheel cam, first note position of springs and replace in exactly same positions. Springs must plac tension on cam so that it is held normally in a counter-clockwise position (viewed from rear) in retainer with rollers on "high" ends of cam ramps (outward or engaged position).

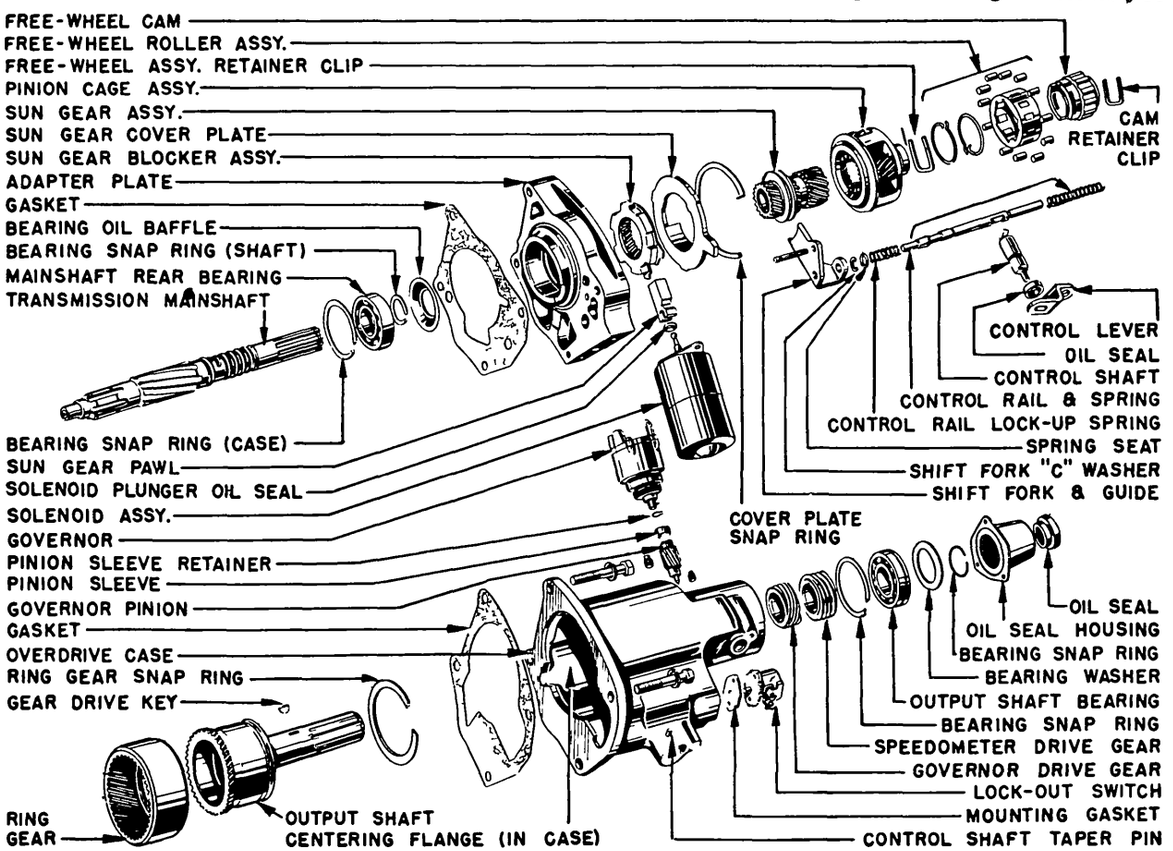
Overdrive Pinion & Free-Wheel Installation—With these parts installed on shaft, and retaining clips ("C" washers) properly installed, insert free-wheeling rollers in cage and use heavy grease to hold them in position, turn cage and rollers counter-clockwise to low or disengaged position (use a rubber band looped around assembly to provide sufficient pressure on rollers to hold them in this position against the spring tension), then install driveshaft and ring gear assembly.

Overdrive Case and Control Mechanism—Make certain that rear bearing snap rings are properly seated and snug in grooves (rear snap ring furnished in various thicknesses). On Nash, install front bearing and speedometer and governor drive gears on driveshaft (CAUTION—make certain that woodruff key in place in shaft to position both gears). On other cars, install speedometer and governor gears in rear end of case, then tap front bearing in place. Install new shifter shaft oil seal in recess in case, then install shifter shaft from within case. When installing case, see that shift fork properly engaged in sun gear shifting collar and that shift rail parts correctly assembled. After case installed, push shifter shaft in to engage notch in shift rail, install shifter shaft lockpin, check operation of shift mechanism for correct operation without binding. On Nash, install snap ring in driveshaft groove directly back of rear bearing, install oil seal. On all models except Nash, install universal companion flange, tighten nut on end of shaft securely.

►*CAUTION—Universal companion flange nut must be securely tightened to prevent governor and speedometer drive gears slipping on shaft.*

OVERDRIVE CONTROL: *See Warner Type R10 & R11 Overdrive control data (following).*

TRANSMISSION DISASSEMBLY & REASSEMBLY: *See Warner Overdrive Transmission data.*



WARNER TYPE R10 OVERDRIVE (LATER—CENTERED RING GEAR)

WARNER R11 OVERDRIVE

PACKARD	①Warner Models
Eight, "2200" Series (1949)②	AS3-R11
Super 8, "2200" Series (1949)③	AS4-R11
Cust. 8, "2200" Series (1949)④	AS4-R11
Eight, "2300" & "2300-5" (1949-50)	AS3-R11
Super 8, "2300" & "2300-5" (1949-50)	AS4-R11
200 & 300 "2400" Series (1951)	AS6-R11
2500 Series (1952), 2600 Series (1953)	AS8-R11
5400 Series (1954), 5500 Series (1955)	AS8-R11

①—Overdrive unit only (used with Packard Transmission.

②—Beginning Engine No. 285157 (both R9 & R11 Overdrives used from Eng. No. 272006 to 285157).

③—Beginning Engine No. 427710 (both R9 & R11 Overdrives used from Eng. No. 424978 to 427710).

④—Beginning Engine No. 611500 (both R9 & R11 Overdrives used from Eng. No. 610359 to 611500).

▷CHANGES, CAUTIONS, CORRECTIONS

▷PACKARD OVERDRIVE FAILURE TO ENGAGE (First cars with R11 Overdrive)—Caused by incorrect length of Overdrive Reverse Plunger (Overdrive will not engage in 2nd. or High—may be engaged in Low), or of Overdrive Shift Rail (Overdrive will not engage in Low). After determining exact cause by road-testing car (make certain that electrical control system not at fault if overdrive will not engage in any gear), correct trouble as follows:

Will not engage in 2nd. & High—Remove transmission case cover, grind approximately .020" from face of left hand pad on Low-Reverse Shifter Fork to permit full forward travel of overdrive reverse plunger.

Will not engage in Low—If this condition not caused by failure of electrical control system, disassemble overdrive and check overdrive shifter rail to make certain that rail moves far enough forward so that undercut in rail aligns with solenoid pawl (to permit pawl to operate). If not, grind approximately .020" off end of shifter rail.

▷INSTALLATION OF R11 OVERDRIVE ON PREVIOUS MODELS (to replace original R9 Assembly)—R11 Overdrive Assembly and other necessary parts furnished in kits (Part No. 410603 for 2201, 02, 11, 22, 32; No. 410604 for 2206, 13, 26, 33). Install these assemblies as follows:

"2100" Series Cars

1. Remove transmission cover and change Direct & Second Speed Shifter Fork Shaft. Install new shaft No. 379004 or remove shaft from old cover and install in new one.

2. Install Overdrive Assembly and control units in same manner as on "2200" series (following).

"2200" Series Cars

1. Remove old Overdrive Relay. Cut off all six wires close to harness and tape wire ends.

2. Drill 9/64" hole at point 1½" toward center of car from outer attaching screw hole of relay, use rubber spacer at this hole and install new Relay.

3. Remove old Kick-down Switch. Cut off wires and tape wire ends. Install new Kick-down Switch.

4. Install new Wiring Harness along main wiring harness and attach with strap clamps (8 provided). Connect harness wires at relay, starter, ignition coil, kickdown switch, ignition switch and lockout switch.

See Warner R11 Overdrive Wiring diagram on following page.

5. Check type of front universal joint and if car equipped with Spicer Universal, remove flange from old overdrive and install this flange on new R11 overdrive (Overdrive furnished with flange for Mechanics Universal—not necessary to make this change if car has Mechanics universals).

6. Install R11 Transmission and Overdrive assembly. Re-install rear engine support channel turned end-for-end so that lockout cable bracket holes are on left side.

7. Cut solenoid wires and governor OVERDRIVE wire close to old harness and tape wire ends. Do not cut governor ELECTROMATIC CLUTCH wire. Connect wires in new auxiliary harness to solenoid and governor, connect Electromatic Clutch wire in old harness to governor.

▷*CAUTION—Do not disturb Electromatic Clutch wire in old harness. This wire must be connected to governor.*

8. Replace original speedometer pinion with correct replacement type: No. 412442 (17 tooth), No. 412443 (18 tooth), No. 412444 (19 tooth).

▷*CAUTION—Speedometer gear in R11 overdrive is different than R9 type and will not operate with R9 pinion.*

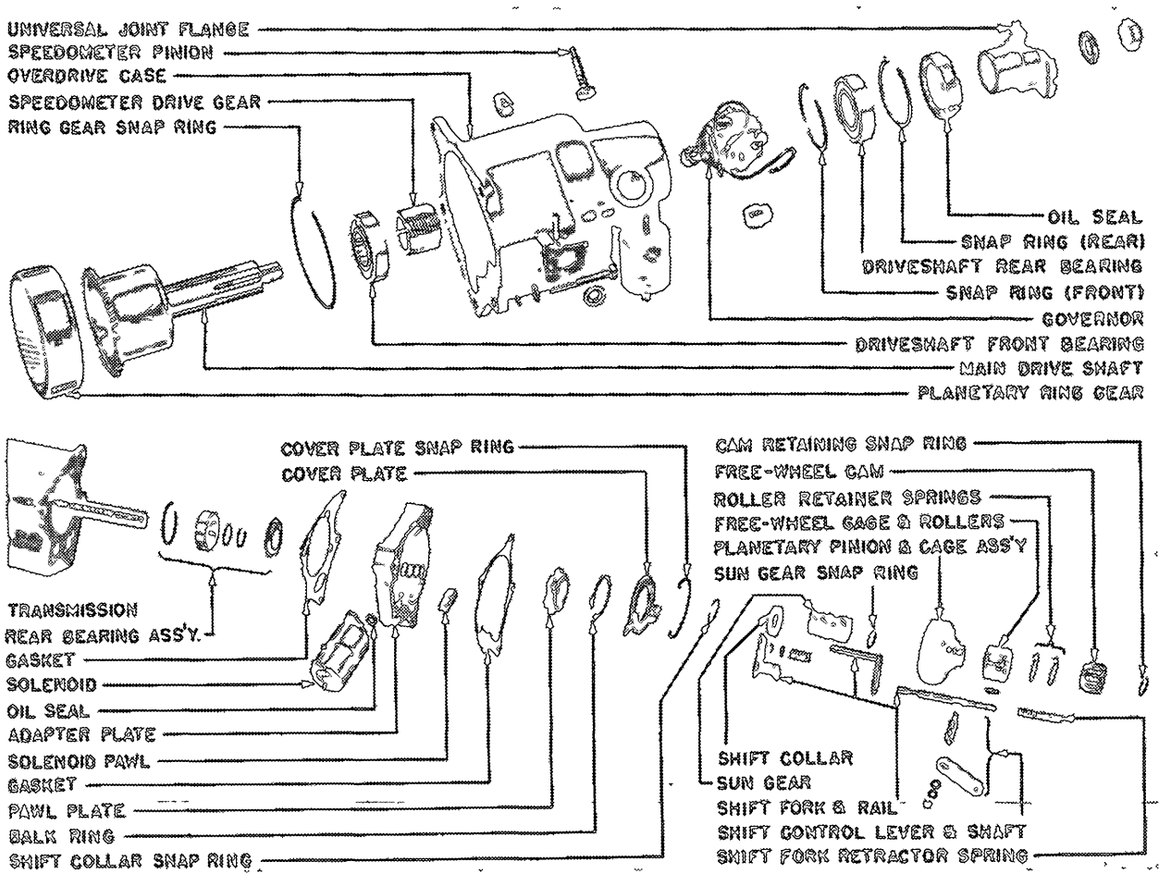
9. Move overdrive lockout cable to left side of engine and install new cable bracket and clamp at support channel mounting holes. Install cable clamps at Electromatic Clutch control valve rear mounting screw hole and at lower flywheel cover mounting screw hole.

DESCRIPTION: The R11 overdrive differs from the R9 overdrive used on previous models as follows:

Overdrive Lockout Shift Mechanism—Overdrive is locked out by shifting the sun gear to the rear, out of engagement with the stationary sun gear plate, and into engagement with planetary pinion cage assembly, so that the gears are locked together. No separate shift collar is used.

Sun Gear Pawl Lockout Mechanism—Pawl is held

CONTINUED ON NEXT PAGE



WARNER R11 OVERDRIVE

WARNER R11 OVERDRIVE (C nt.)

in disengaged position (for Reverse and when overdrive locked out) by engagement of the shift rail in a notch on the side of the pawl (no interlock plungers used).

Control System—New two-terminal solenoid and single unit relay used with simplified circuits. *See wiring diagram for units and connections.*

REMOVAL OF OVERDRIVE: *See "Overdrive" on car model page.*

TROUBLE SHOOTING & TESTING: *See "Warner R10 & R11 Overdrive Control" following.*

DISASSEMBLY OF OVERDRIVE: Remove governor (special wrench J3227), remove solenoid by taking out two retaining screws and rotating solenoid approximately ¼ turn clockwise to disengage plunger from pawl. Drive tapered pin retaining control shaft up and out of boss in case, work shaft and lever outward as far as possible to disengage shaft from shifter rail. Take out five overdrive case-to-adapter mounting screws CAUTION—do not disturb two screws retaining adapter on transmission). Remove overdrive case and drive shaft by pulling to rear away from the adapter (CAUTION—do not lose shift rail retractor spring or free-wheel rollers which may drop down into case). Then disassemble all parts of overdrive as follows:

Overdrive Case (including Control Parts)—Remove nut retaining universal joint flange on rear end of shaft, use puller J2576 to remove flange from shaft. Remove shaft through forward end of case by tapping on rear end with soft hammer to free shaft from bearing. Drive front bearing out of case using a brass drift inserted through rear bearing. Lift speedometer gear out. Pull oil seal at rear end of housing (Axle Shaft Oil Seal Remover J943-B may be used by grinding down tool legs to engage retainer). Remove rear bearing rear snap ring from housing, drive rear bearing out through rear of case. Remove control lever retaining nut, remove lever from shaft, work shaft through into case and remove. Remove large snap ring at rear of planetary ring gear, remove gear from shaft hub.

Planetary Gears & Free-wheel Parts—Remove snap ring which retains free-wheel cam on mainshaft, slide free-wheel roller retainer and cam assembly, and planetary pinion and cage assembly, off shaft (CAUTION—see that none of the 12 free-wheel rollers are lost). Remove forward pinion cage assembly retaining snap ring from shaft (CAUTION—mark this ring to insure re-installation of same ring or similar thickness—this ring thickness not variable). Pull reverse plunger, shift fork, and shift fork assembly out of adapter and at same time slide sun gear to rear and off end of shaft.

Adapter Plate Sun Gear Parts—Remove snap ring retaining stationary sun gear plate cover in adapter, remove cover, sun gear plate and balk ring, and pawl.

REASSEMBLY OF OVERDRIVE: Wash all parts thoroughly in kerosene and check for broken, chipped, or scored gear teeth; nicked or burred splines; rough bearings; roughness or flat spots on free-wheel rollers. Lubricate all parts with transmission oil and reassemble in reverse order of disassembly, noting the following important points:

Sun Gear Balk Ring—See that ring installed on gear plate with chamfered side of ring toward slotted hub on plate. Check balk ring friction or drag by lubricating plate and ring with transmission oil and using spring scale hooked to balk ring step. Pull required to turn ring on plate (scale held parallel to step on ring) should be 3½-5½ lbs. (CAUTION—this is pull while turning ring—greater pull may be required to start ring turning).

Stationary Sun Gear Assembly—Install sun gear plate, then install pawl with groove upward, install sun gear plate cover, install retaining ring of correct thickness so that plate held tightly against seat in adapter (this ring furnished .062", .066", .070"), install solenoid (see note below). Engage shift fork in sun gear groove, then install reverse plunger, shift rail, shift fork, and sun gear as an assembly.

Solenoid Installation Note—Insert plunger in adapter with solenoid turned ¼-turn to right or clockwise from normal mounting position, push solenoid in until plunger engages pawl, then rotate solenoid ¼-turn counter-clockwise to lock plunger in pawl, install and tighten solenoid mounting screws.

►*CAUTION—Solenoid terminal screws must be toward rear (toward overdrive case) when installed.*

Planetary Gears & Free-wheel Assembly—Install marked pinion cage assembly retaining snap ring in groove in shaft behind sun gear (CAUTION—If same ring as marked during disassembly not re-installed, use new ring .062" ± .002" thick at this point). After installing pinion and cage assembly and the free-wheel cam assembly, install retaining snap ring in groove in shaft, selecting ring of correct thickness to prevent any endplay of pinion or free-wheel cam assembly on shaft (this ring furnished .062", .068", .074" thick). Install free-wheel rollers in retainer, use rubber band looped around retainer to hold them in place, rotate retainer to left or counter-clockwise so that rollers on lowest point of cam.

Overdriv Case & Drive Shaft—Parts are first assembled in case and then installed as follows: **Assembly**—Install lockout lever shaft from within case, turn shaft so that cam on inner end upward, install lever on shaft in overdrive position (nearly against bottom of stop on case. Press rear bearing into case or tap bearing in with brass or fiber drift until bearing seated against forward snap ring (NOTE—if this front snap ring removed, use ring .087" ± .002" thick at this point). Install bearing rear retaining snap ring, selecting ring of correct thickness so that bearing held tightly against front ring (this ring furnished .087", .090", .093", .096" thick). Install new oil seal in rear of case, pressing seal in until shoulder on seal retainer is flush with end of case. Insert speedometer driving gear through front end of case, press or tap front bearing in place in case. Assemble planetary ring gear on drive shaft hub, selecting retaining snap ring of correct thickness so that ring gear has no endplay (this ring furnished .055", .057", .059" thick). Coat bearing and seal surfaces on drive shaft with Lubriplate, install shaft through front end of case (align speedometer gear with finger inserted through rear of case to permit entering shaft). Install universal joint flange, tighten retaining nut to 200-225 ft. lbs. Install governor and speedometer pinion and shaft.

Installation—Work lockout shaft and lever as far as possible out of case, install shift rail retractor spring on end of shift rail, place new gasket on face of adapter. Install case assembly (may be necessary to turn mainshaft to line up pinions and ring gear, or to rotate case slightly to permit shift rail to enter pilot hole in case). Do not attempt to remove rubber band from free-wheel rollers (band will be pushed off by roller race and will be dissolved by lubricant). Install and tighten overdrive case retainer screws (CAUTION—use copper gasket between case and washer on screws having drilled heads—these screws must be secured with lockwire). Push lockout shaft and lever inward to engage shift rail, install tapered retaining pin to lock shaft in position.

►*CAUTION—Universal companion flange nut must be securely tightened (200-225 ft. lbs.) to prevent speedometer drive gear slipping on shaft which would cause faulty overdrive action (this gear drives governor) as well as speedometer fluctuation.*

OVERDRIVE CONTROL: *See "Warner Type R10 & R11 Overdrive Control" data.*

►*WIRING DIAGRAM NOTE—See wiring diagram on this page for connections when installing this R11 Overdrive on previous Packard models.*

TRANSMISSION DISASSEMBLY & REASSEMBLY: *See Packard Transmission data.*

WARNER R10 & R11 OVERDRIVE CONTROL

Chevrolet 6 & 8 (1955)①
DeSoto 6 & 8 (1952-55)
Dodge 6 & 8 (1953-55)
Ford 6 & 8 (1949-55)②
Frazer (1947-51)
Hudson 6 & 8 (1950-55)⑥
Henry J (1951-54)
Kaiser (1947-55)
Lincoln & Cosmopolitan (1949-51)
Mercury (1949-55)②
Nash (1946-55)③⑤
Packard (1949-55)
Plymouth (1952-55)
Rambler (1950-55)③
Studebaker (1947-55)④
Willys (1946-55)

①—Lockout Switch not used.
②—Lockout Switch not used after Early 1951.
③—Lockout Switch not used after Late 1953.
④—Lockout Switch not used after Early 1955.
⑤—For Nash models with "Pushbutton Kickdown Switch" *see Warner Overdrive Control "Pushbutton" Type.*
⑥—With simplified control. *See "Warner R9 Overdrive Control" for data on 1948-49 models.*

▷1941-48 LINCOLN—*See "1941-48 Lincoln Overdrive Control" for 1941-48 Special R10 control data.*

▷CHANGES, CAUTIONS, CORRECTIONS

▷*LOCKOUT SWITCH SERVICE REPLACEMENT NOTE:* If lockout switch defective on units where switch installed originally, both switch wires should be detached and connected together so that switch is eliminated from circuit (*CAUTION*—Wires should be soldered together and taped for protection from moisture and grease). Leave switch installed to act as cover for switch mounting hole. If switch cannot be used for this purpose, make up sheet metal cover for installation over switch mounting hole.

▷*1955 FORD OVERDRIVE SOLENOID FAILURE NOTE:* Solenoid failure may be caused by excessive resistance in wire leading to solenoid. To correct, parallel the existing 14 gauge wire from ignition switch to relay and from relay to solenoid with a 12 gauge wire. Attach both wires to a common-terminal at ignition switch, "IGN" terminal of relay, and "SOL" terminal of relay. Replace the single "bullet" connector at solenoid with a double "bullet" connector and attach both the 14 gauge and 12 gauge wires.

▷Hudson R10 Overdrive Control Production Change: Simplified control system described below used only on 1950 and later Hudson cars. 1948-49 cars with R10 Overdrive have same type control used with previous R9 Overdrive. *See "Warner R9 Overdrive Control" for data on 1948-49 cars.*

▷Ford, Lincoln, Mercury Prolonged Shorting-out of Ignition on Kick-down: See "Ford, Lincoln, Mercury Overdrive" for instructions on installation of insulating strip in solenoid cover.

▷Ford & Mercury Overdrive Production Change (Elimination of Lock-out Switch): Ford Overdrives (beginning with 1951 production) and Mercury Overdrives (beginning January 1951) do not have any provision for Lock-out Switch and Governor is connected to "A" terminal on Kick-down Switch.

▷Ford Overdrive Governor Production Change: First type governor superseded by later type which is interchangeable with first type on all cars except Convertible. Identify governors as follows:
First Type—Unpainted body with Bakelite top.
Later Type—Body painted Black, top unpainted.

▷Overdrive failure to engage or improper cut-in and cut-out speed Correction Caution: Before replacing governor to correct this condition, make certain that companion flange nut on rear end of overdrive mainshaft is tight (looseness of this nut will allow governor drive gear to slip on shaft).

DESCRIPTION: Control units consist of a Governor (cut-in speed controlled by closing of governor contacts, cut-out speed by opening of contacts), Solenoid (solenoid pushes pawl in to engage overdrive, return spring on solenoid plunger pulls pawl out to disengage overdrive). Throttle Kick-down Switch (switch breaks solenoid circuit when accelerator pedal fully depressed causing overdrive to disengage for "kick-down" direct drive), Control Relay, and Lock-out Switch (switch mounted on overdrive case and actuated by control shaft to open governor circuit when overdrive "locked out" by control button on instrument panel.

TROUBLE SHOOTING: Failure of the overdrive to operate satisfactorily may be caused by mechanical failure (of overdrive unit or control units), or by electrical failure (of control units and wiring).

OVERDRIVE DOES NOT ENGAGE

1. Mechanical Causes:
1) Dash control out-of-adjustment or not correctly positioned (control button on instrument panel should be ¼" out with shift lever on overdrive case in extreme rear position).
2) Shift Rail (in overdrive case) binding due to incorrect assembly or housing misalignment.
3) Balk ring faulty or incorrectly installed (may be indicated by spasmodic or harsh engagement). Check balk ring friction drag (see Disassembly data above). Make certain that sun gear plate and balk ring correctly installed with pawl in slot in balk ring (overdrive cannot engage if pawl rides on solid portion of ring).
4) Sun gear pawl broken, sticking or incorrectly installed. Remove solenoid (see Solenoid Testing) and check pawl for free operation.
5) Solenoid plunger sticking. See Solenoid Testing.
6) Governor drive pinion broken, driving gear on overdrive mainshaft loose.

2. Electrical Causes:
1) Fuse blown or open circuit between governor and relay, control wiring incorrect, loose connections or broken wires.
2) Governor, Relay, Lock-out Switch, or Kick-down Switch defective or plunger sticking.
3) Solenoid defective (pull-in or hold-in coil open, pull-in coil contacts sticking open). See Solenoid Testing.

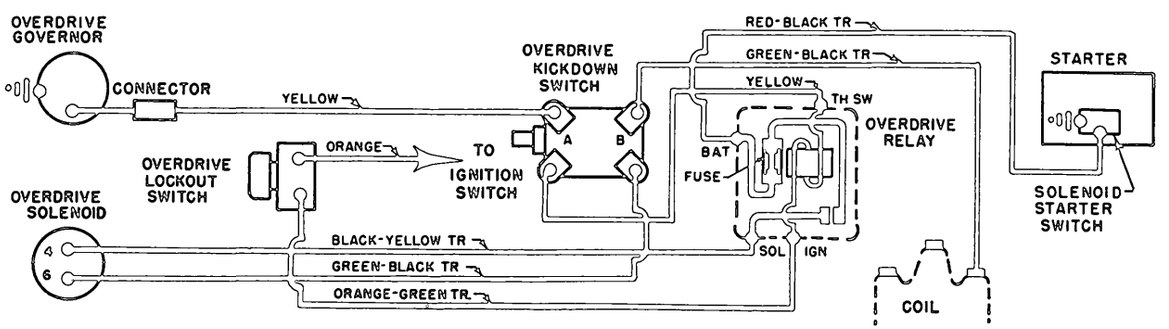
OVERDRIVE DOES NOT DISENGAGE OR NO "KICK-DOWN"

1. Mechanical Causes:
1) Solenoid incorrectly installed (jamming pawl in overdrive position) or solenoid pawl rod sticking. Plunger spring weak or broken.
2) Sun gear pawl sticking, broken, or not properly engaged on pawl rod ball end. Remove solenoid and check pawl for free operation.
2. Electrical Causes:
1) Governor, Relay, or Kick-down Switch defective. Control wiring incorrect. Kick-down Switch out of adjustment.
2) Ignition cut-out or ground wire broken or disconnected (between Solenoid terminal #6 and kick-down switch, or between kick-down switch and distributor or ignition coil).

ENGINE STALLS ON "KICK-DOWN"

1. Electrical Causes:
1) Solenoid defective. Ignition ground contacts sticking closed or grounded.
2) Ignition cut-out or ground wire between Solenoid terminal #6 and kick-down switch.

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WARNER R11 OVERDRIVE CONTROL WIRING

WARNER R10 & R11 OVERDRIVE CONTROL (C nt.)

3) Kick-down Switch defective (ignition cut-out terminals grounded).

ENGINE DOES NOT DRIVE CAR IN OVERDRIVE POSITION (Drives only when Overdrive locked out).
1. Mechanical Causes: Free-wheel clutch rollers broken, roller cage sticking in disengaged position, clutch cam or rollers worn.

TESTING & ADJUSTMENT OF CONTROL UNITS: Control units should be serviced by replacement.
Governor: Governor should be replaced if operation unsatisfactory or cut-in and cut-out speeds not correct. See CAUTION below before replacing unit.

►***CAUTION—Before replacing governor*** **(if overdrive does not engage, or if cut-in and cut-out speeds not correct, make certain that universal joint companion flange nut on rear end of overdrive driveshaft is tight. Looseness of this nut will allow governor and speedometer drive gears to slip on overdrive shaft.**

Overdrive Control Governor

Model	Governor No.
Chevrolet (1955)	Chev. No. 3712702
DeSoto (1952, Early 1953)	A-L No. TGE-4008
DeSoto (Late 1953-55)	A-L No TGE-4010
Dodge (Early 1953)	A-L No. TGE-4008
Dodge (Late 1953-55)	A-L No. TGE-4010
Ford & Mercury (1949-55)	①A-L No TGE-4006
Frazer (1947-51)	K-F No. 200908
Henry J (1951-54)	K-F No. 212385
Hudson, All Models (1950)②	Hud. No. 165829
Hudson (1951) ③	Hud. No. 165829
Hudson (1950-51)④	Hud. No. 164415
Hudson (1950-51)⑤	Hud. No. 303291
Hudson (1951-52) ⑥⑦	Hud. No. 305244
Hudson (1952)⑧	Hud No. 306861
Hudson (1953-54)	Hud. No 307772
Hudson (1955)	Hud. No. 3112914
Kaiser (1947-50)	K-F No. 200908
Kaiser (1951-55)	K-F No. 209507
Lincoln (1949-51)	A-L No. TGE-4006
Nash Amb. (1947-49)	A-L No. TGE-4001
Nash "600" (1948, Early 1949)	A-L No. TGE-4005
Nash "600" (Late 1949)	A-L No TGE-4001
Nash Amb. & Stsmn. (Early 1950)	A-L No. TGE-4001
Nash Amb. & Stsmn (Late 1950-55)	A-L No. TGE-4005
Packard (1949-55)	A-L No TGA-4004
Plymouth (1952, Early 1953)	A-L No TGE-4008
Plymouth (Late 1953-55)	A-L No TGE-4010
Rambler (1950-55)	A-L No. TGE-4005
Studebaker (1947-53)	A-L No. TGE-4003
Studebaker Comm. (1954-55)	A-L No. TGE-4011
Studebaker Champ. (1954-55)	A-L No. TGE-4012
Willys (1946-52)	A-L No. TGE-4002
Willys 4 Cyl. (1953-55)	A-L No. TGE-4002
Willys 6 Cyl (1953-55)	A-L No TGE-4005

①—Ford No. 8M-6943
②—Without Super-Matic Drive.
③—Pacemaker Models without Super-Matic Drive
④—Pacemaker Models with Super-Matic Drive.
⑤—Exc. Pacemaker Models, with Super-Matic Drive.
⑥—Exc 1951 Pacemaker, without Super-Matic Drive.
⑦—Models with Hudson type transmission.
⑧—Models with Warner type transmission.

Governor Testing—Governors can be tested by being driven on the bench and the RPM. noted at which the contacts close (on acceleration) and open (on deceleration). Contact closing and opening RPM. should be correct and the difference between these two points must not be less than the "Min. Diff." figure listed in the table below. Parts are not furnished for service and defective governors should be replaced.

►***CAUTION—On some governors, one set of contacts open and second set of contacts close AT THE SAME RPM.***

Governor Specifications

Auto-Lite Model No.	Contacts Close (Max. RPM)	Contacts Open (Min. RPM)	①Diff.
TGA-4001	740②	535③	80
TGA-4002	740④	535⑤	80
TGA-4004	460⑥	353⑦	63
TGA-4005	740	535	80
TGB-4003	⑧	⑨	⑩
TGB-4004	430⑥	323⑦	63
TGE-4001	632	463	90
TGE-4002, 3	840	680	90
TGE-4005	740	535	80
TGE-4006	531	410	63
TGE-4007	1055	780	90
TGE-4008, 9	625	477	90
TGE-4010	575	440	90
TGE-4011	631	477	90
TGE-4012	731	571	90

①—Minimum difference between closing and opening.
②—Makes contact (cadmium plate terminal) and breaks contact (copper plate terminal).
③—Breaks contacts (cadmium plate terminal) and makes contact (copper plate terminal).
④—Makes contact (terminal with 5/32" hole) and breaks contact (terminal with 3/16" hole).
⑤—Breaks contact (terminal with 5/32" hole) and makes contact (terminal with 3/16" hole)
⑥—Yellow lead makes contact with ground and green lead breaks contact.
⑦—Yellow lead breaks contact with ground and green lead makes contact.
⑧—Circuit "A" opens and "C" closes at 430 RPM Max. Circuit "B" opens and "D" closes at 700 RPM Max
⑨—Circuit "A" closes and "C" opens at 300 RPM Min. Circuit "B" closes and "D" opens at 535 RPM Min.
⑩—Circuits "A" & "C" 30 RPM Min. Circuits "B" & "D" 80 RPM Min

Solenoid: Various types used as listed below.

►***SOLENOID REMOVAL CAUTION***—**Solenoid must be disengaged from pawl for removal as follows: Take out two mounting capscrews, rotate solenoid clockwise ½-turn to disengage plunger from pawl (will align plunger flats with pawl slot), withdraw solenoid and plunger assembly.**

Overdrive Solenoid

Mod l	Delco-Remy N .
Chevrolet Pass. Cars (1955)③	1119772
Chevrolet Trucks (1955)③	1119777
DeSoto (1952-55)	1118155
Dodge (1953-55)	1118155
Ford (1949-51)①	⑩1118132, 55
Ford (1949-50) ②	⑤1118138
Ford (1952-55)	⑥1118168
Frazer (1947-51)	1118132
Henry J (1951-54)	1118155
Hudson (1950-51)	1119134, 47, 55
Hudson (1952-55)	1118164
Kaiser (1947-50)	1118132
Kaiser (1951-55)	1118155
Lincoln, Mercury (1949-51)	④1118132, 55
Mercury (1952-55)	⑥1118168
Nash (1947-50)	1118132
Nash (1950-55)	1118155
Packard (1949-50)	1118005
Packard (1951-54)	1118155
Packard (1955)③	1119779
Plymouth (1952-55)	1118155
Rambler (1950-55)	1118155
Studebaker (1947-50)	1118132
Studebaker (1951-55)	1118155
Willys (1947-50)	1118132
Willys (1951-55)	1118155

①—Except Station Wagon & Convertible.
②—Station Wagon & Convertible.
③—12 Volt.
④—Ford & Mercury No. 8M-6916B.
⑤—Ford & Mercury No. 8A-6916C.
⑥—Ford & Mercury No. FAA-6916A.

Solenoid Testing—Solenoid can be tested on the bench (after removal from transmission) as follows:

Solenoid Winding—Connect battery to solenoid terminal #4, ground other battery terminal to solenoid mounting flange (meters can be used to check winding current draw—see specifications below). With solenoid energized, solenoid pawl rod should move out and hold in the outward position. If pawl does not move out, coils are defective. If pawl chatters, hold-in coil is defective.

Ignition Grounding Contacts—With solenoid energized as for coil test (above), connect test lamp between battery terminal and solenoid terminal #6. Lamp should light indicating that ignition ground contacts are closed. Disconnect battery lead at solenoid #4 terminal. Pawl rod should snap in and test lamp should go out (indicating that ignition ground contacts have opened).

Solenoid Specifications
(6 Volt)

Current Draw (Both Coils)—26.2-28.4 amperes at 5 volts.

CONTINUED ON NEXT PAGE

WARNER R10 & R11 OVERDRIVE CONTROL (C nt.)

Current Draw (Hold-in Coil—Pawl rod in Overdrive Position)—1 2-1 4 amperes at 5 volts.

Contact Opening (on case and coil assy.)— 022-.040" with plunger against stop.

(12 Volt)

Current Draw (Both Coils)—17 2-18 3 Amps at 10 volts

Current Draw (Hold-in Coil—Pawl Rod in Overdrive Position)— 81- 85 amp at 10 volts

Control Relay

Model	Relay Part No.
Chevrolet (1955)	D-R No 1116904
DeSoto (Early 1952)	A-L No HRT-4001
DeSoto (Late 1952-55)	A-L No HRT-4001A
Dodge (1953-55)	A-L No HRT-4001A
Ford (1949-51)	Ford No 8M-6915
Ford (1952-55)	Ford No 1M-6915A
Frazer (1947-51)	A-L No HRT-4001, 4001A
Henry J (1951-54)	A-L No HRT-4001
Hudson (1950-54)	Hud No 303107
Hudson (1955)	Hud No 3145512
Kaiser (1947-55)	A-L No HRT-4001, 4001A
Lincoln, Mercury (1949-51)	Ford No 8M-6915
Mercury (1952-55)	Ford No 1M-6915A
Nash (1947-48)	A-L No HRT-4101
Nash (1949-55)①	Nash No 3136172
Nash (1952-55)②	Nash No 3123721
Packard (1949-51)	RBM No 3600-2
Packard (1952-55)	Packard No 403940
Plymouth (Early 1952)	A-L No HRT-4001
Plymouth (Late 1952-55)	A-L No HRT-4001A
Studebaker (1947-51)	A-L No HRT-4001
Studebaker (1952-55)	Stude No 523297
Willys (1946-55)	A-L No HRT-4001

①—Also used on 1952-55 Models with "Pushbutton Control" having kickdown switch on steering wheel spoke

②—Used on 1952-55 Models with "Pushbutton Control" having kickdown switch in cap

Control Relay Specifications (Auto-Lite HRT-4001, 4001A, 4101)

Contacts Close—4 0 volts maximum. Adjust by bending lower spring hanger to change spring tension

Contacts Open—.6-1.0 volt. Adjust by varying height of stationary contact

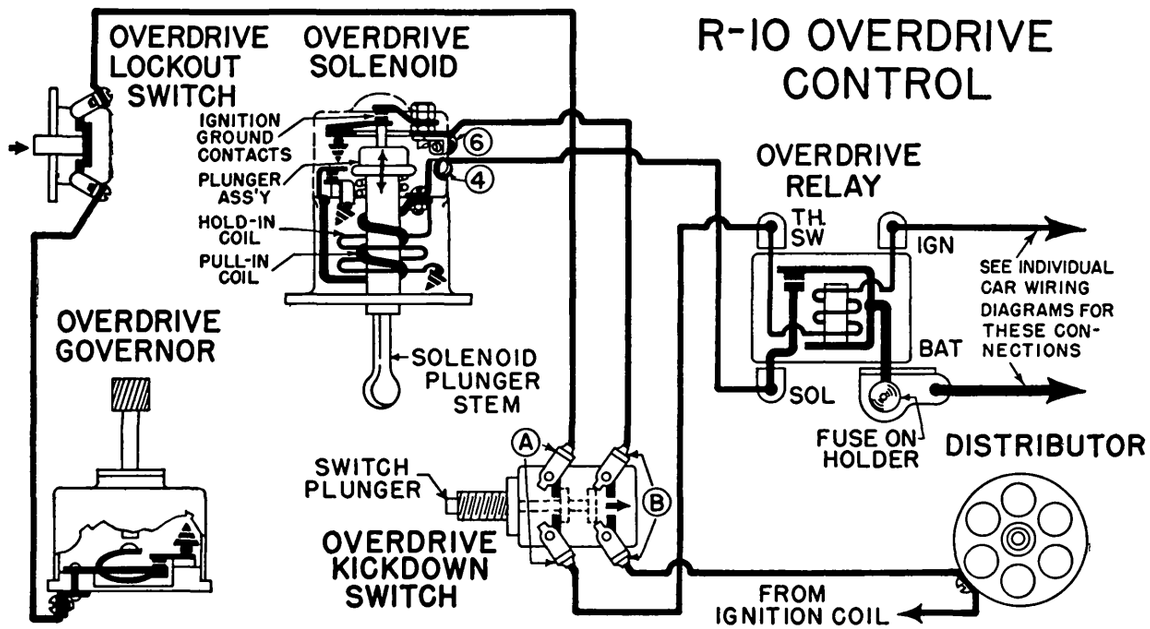
Contact Gap— 015" minimum.

Air Gap—.031-.034" with contacts open. Adjust by bending armature stop.

Overdrive Fuse: In cartridge type holder or on fuse block attached to control relay on all cars.

Fuse Capacity

DeSoto, Dodge, Plymouth	20 amperes
Ford	30 amperes
Frazer, Henry J, Kaiser	20 amperes
Hudson	30 amperes
Lincoln & Mercury	30 amperes
Nash (1949 & earlier)	20 amperes
Nash (1950 & later)	30 amperes
Packard	30 amperes
Studebaker	20 amperes
Willys	20 amperes



WARNER R10 OVERDRIVE CONTROL WIRING

1952-53 WARNER OVERDRIVE CONTROL "PUSH BUTTON" TYPE

Nash Ambassador (Dual Jet Fire Series) 1952-53

►***LOCKOUT SWITCH PRODUCTION CHANGE***—Lockout switch eliminated in later production cars. If switch in early cars becomes defective, disconnect both wires from switch terminals and reconnect them to one terminal, bypassing switch. Cover plate No. 3136445 can be installed to replace switch.

DESCRIPTION: ***NOTE—Mechanical control of overdrive is same as used on other cars with Warner R10 & R11 Overdrives.*** The electrical control is different, having a new type Overdrive Relay which permits instant "kick-down" control by use of a pushbutton on steering wheel. An Indicator Light and Relay is incorporated in the electrical control system to indicate "overdrive" and "conventional" positions. A Vacuum Control Switch located in the interrupter circuit between ignition coil and Overdrive Relay prevents ignition interruption during deceleration.

OPERATION (Electrical Controls): With engine running and overdrive control on dash pushed in for overdrive operation (closing lockout switch), battery voltage is supplied to relay armature coil. When car speed of 29-30 MPH is reached, overdrive governor contacts close. This completes governor to ground circuit and energizes relay armature. Lower overdrive relay contacts close supplying battery voltage through 30-ampere fuse to overdrive solenoid terminal No. 4, energizing overdrive solenoid, permitting overdrive engagement with momentary release of throttle. At same time, upper contacts of overdrive relay open, breaking ignition interrupter circuit between ignition coil and interrupter points (No. 6) of overdrive solenoid, which close to ground on overdrive engagement. Closing the lower overdrive relay contacts also energizes armature coil of indicator light relay, closing indicator light relay points, completing the circuit between grounded solenoid interrupter points and one side of indicator light. Since indicator light is connected across overdrive relay terminal "NO" and terminal "NC", circuit is completed to ground, and indicator bulb lights. For kick-down operation, pressing steering wheel pushbutton bypasses to ground, overdrive terminal post No. 2, de-energizing overdrive relay armature coil, and opening lower relay contacts which in turn de-energizes overdrive solenoid, and opens upper overdrive relay contacts. This completes ignition interrupter circuit, opening points in indicator light relay, causing indicator light to go out. Car is now in conventional gear.

TROUBLE SHOOTING (Electrical Controls): ***NOTE—For Mechanical Trouble shooting see "Warner R10 & R11 Overdrives."***

OVERDRIVE DOES NOT ENGAGE—

(1) Fuse blown or open circuit between governor and relay, control wiring incorrect, loose connections or broken wires.

(2) Governor, relay, lockout switch, or kick-down switch defective. Solenoid plunger sticking.

(3) Solenoid defective (pull-in or hold-in coil open, contacts sticking open). See Solenoid Testing.

OVERDRIVE DOES NOT DISENGAGE OR NO "KICK-DOWN"—

(1) Governor, relay, vacuum switch, or pushbutton switch defective. Control wiring incorrect.

(2) Ignition cut-out or ground wire broken or disconnected (between solenoid and relay terminals, between relay terminal and vacuum switch, or between vacuum switch and ignition coil).

(3) Ignition ground contacts in solenoid sticking open or broken (indicator light on instrument panel will not light when overdrive is engaged if ignition ground contacts in solenoid stuck or broken).

(4) Throttle not open far enough at time of kick-down to allow vacuum switch to close.

ENGINE STALLS ON KICK-DOWN—

(1) Solenoid defective. Ignition ground contacts sticking closed or grounded.

TESTING CONTROL UNITS: Service by replacement.

Governor: Replace if cut-in or cut-out not correct.

Overdrive Control Governor
A-L No. TGE-4005; Nash No. 3112914

Test	Cut-In Speed	Cut-Out Speed
In Car	29-30 MPH	(Approx.) 25 MPH
On Bench	740-RPM	535 RPM

Testing—Test by checking governor cut-in and cut-out speed (distributor tester can be used). Opening and closing should be correct (see table above) and there must not be less than **80 RPM difference** between contact closing and opening.

Solenoid: Delco-Remy No. 1118155. Nash No. 3123433.

►***SOLENOID REMOVAL CAUTION***—Solenoid must be disengaged from pawl for removal as follows: Take out two mounting cap screws, rotate solenoid clockwise ¼ turn, to disengage plunger from pawl (will align pawl flats with pawl slot), withdraw solenoid

Solenoid Testing—Test on bench as follows:

Winding—Connect battery to No. 4 terminal, ground other battery terminal to solenoid mounting flange (meters can be used to test winding current draw—See specifications below). With solenoid energized, solenoid pawl rod should move out and hold in the outward position. If pawl does not move out, coils are defective. If pawl chatters, hold-in coil is defective.

Ignition Grounding Contacts—With solenoid as for coil test (above), connect test lamp between battery terminal and No. 6 terminal on solenoid. Lamp should light indicating that ignition ground contacts are closed. Disconnect battery lead at solenoid terminal No. 4. Pawl rod should snap in and test lamp should go out (indicating that ignition ground contacts have opened).

Solenoid Specifications

Current Draw (Both Coils)—26.2-28.4 amps. 5.0 V.

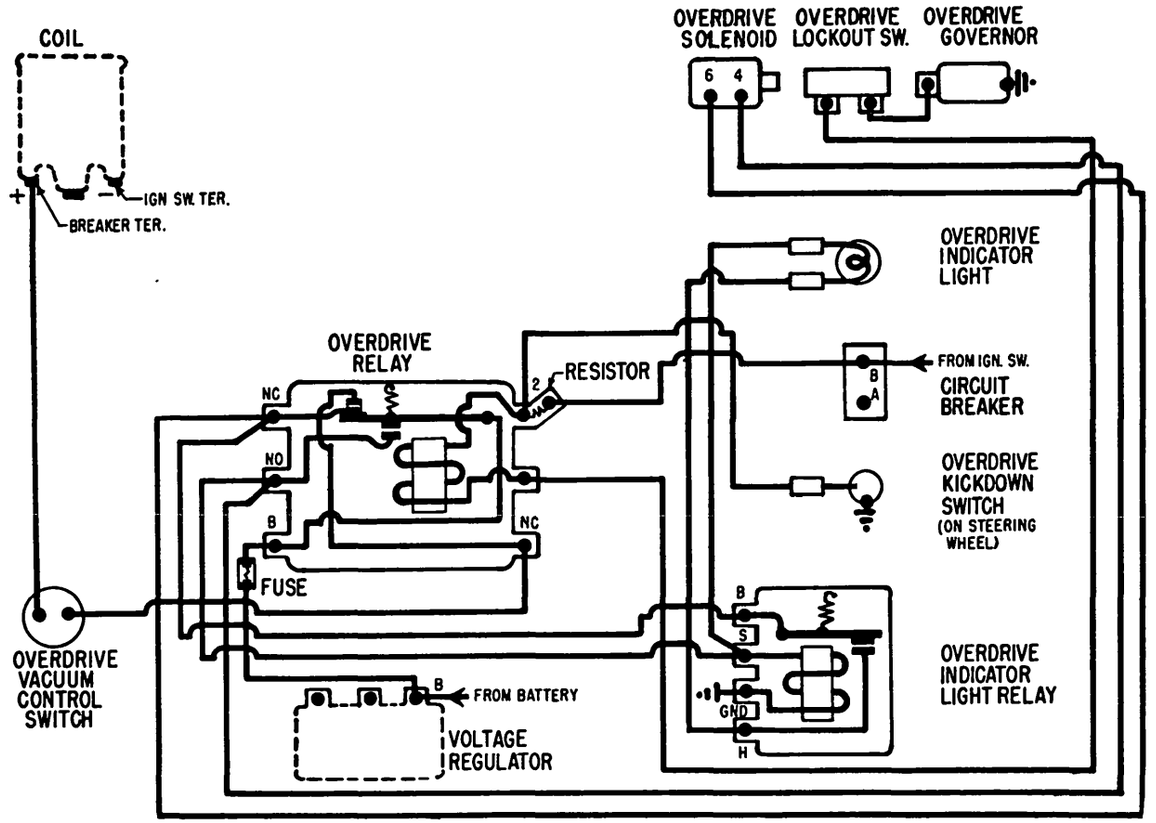
Current Draw—Hold-in Coil (Pawl Rod in Overdrive Position)—1.2-1.4 amperes at 5.0 volts.

Overdrive Control Relay—Nash No. 3136172.

Light Indicator Relay—3136173.

Vacuum Control Switch—Delco-Remy No. 1997900.

Overdrive Fuse—30 amps. Cartridge in feed wire.



1952-53 WARNER OVERDRIVE "PUSH BUTTON" CONTROL WIRING

1954-55 WARNER OVERDRIVE CONTROL "PUSH-BUTTON" TYPE

Nash Ambassador & Stat sman (1954-55)

DESCRIPTION: *NOTE–Mechanical control of overdrive is sam as us d on oth r cars with Warner R10 and R11 Ov rdriv s.* Electrical control is different, having Overdrive Relay which permits instant "kick-down" control by either a pushbutton on steering wheel or by the conventional pedal control. A vacuum control switch located in the interrupter circuit, between ignition coil and overdrive relay prevents ignition interruption during deceleration.

OPERATION (ELECTRICAL CONTROLS): With engine running and overdrive control pushed in for overdrive operation, battery voltage is supplied to relay armature coil. When car speed of 29-30 MPH is reached, overdrive governor contacts close. This completes governor to ground circuit and energizes relay armature. Lower overdrive relay contacts closed supplying battery voltage, through 30 ampere fuse, to overdrive solenoid terminal No. 4, energizing overdrive solenoid, and permitting overdrive engagement with momentary release of throttle. At same time, upper contacts of overdrive relay open, breaking ignition interrupter circuit between ignition coil and interrupter points (No. 6) of overdrive solenoid, which close to ground on overdrive engagement. For kick-down operation, pressing steering wheel button or by conventional pedal operation, system bypasses to ground overdrive terminal post No. 2, de-energizing overdrive relay armature coil, and opening lower relay contacts which in turn de-energize overdrive solenoid, and open upper overdrive relay contacts. This completes ignition interrupter circuit. Car is now in conventional gear.

TROUBLE SHOOTING (ELECTRICAL CONTROLS): *NOTE–For Mechanical Trouble Shooting see "Warner R10 & R11 Overdrives".*

OVERDRIVE DOES NOT ENGAGE–(1) Fuse blown or open circuit between governor and relay, control wiring incorrect, loose connections or broken wires.
(2) Governor, relay, or kick-down switch defective. Solenoid plunger sticking.
(3) Solenoid defective (pull-in or hold-in coil open, contacts sticking open). See Solenoid Testing.

OVERDRIVE DOES NOT DISENGAGE OR NO "KICK-DOWN"–(1) Governor, relay, vacuum switch, control switch (pushbutton or pedal) defective. Control wiring incorrect.
(2) Ignition cut-out or ground wire broken or disconnected (between solenoid and relay terminals, between relay terminal and vacuum switch, or between vacuum switch and ignition coil).
(3) Ignition ground contacts in solenoid sticking open or broken.
(4) Throttle not open far enough at time of kick-down to allow vacuum switch to close.

ENGINE STALLS ON "KICK-DOWN"– (1) Solenoid defective, ignition ground contacts sticking closed or grounded.

TESTING CONTROL UNITS: Serviced by replacement.

Governor: Replace if cut-in or cut-out not correct.

Governor
Auto-Lite TGE-4005, Nash No. 3112914

Test	Cut-In Speed	Cut-Out Speed
In Car	29-30 MPH	25 MPH (Approx.)
On Bench	740 RPM	535 RPM.

Testing—Test by checking governor cut-in and cut-out speed (distributor tester can be used). Opening and closing should be correct (see table above) and there must not be less than 80 RPM difference between contact closing and opening.

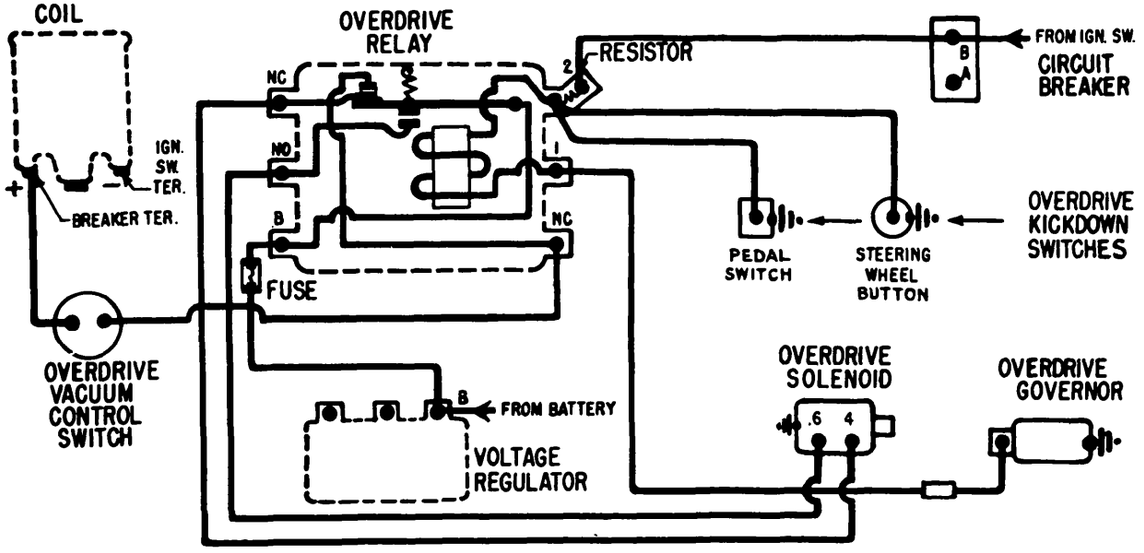
Solenoid: Delco-Remy No. 1118155, Nash No. 3114537.

► *SOLENOID REMOVAL CAUTION:* Solenoid must be disengaged from pawl for removal as follows: Take out two mounting capscrews, rotate solenoid clockwise ¼ turn (to disengage plunger from pawl—will align pawl flats with pawl slot) withdraw solenoid.

Testing—Test on bench as follows:

Winding—Connect battery to No. 4 terminal, ground other battery terminal to solenoid mounting flange (meters can be used to test winding current draw—see specifications below). With solenoid energized, solenoid pawl rod should move out and hold in out ward position. If pawl does not move out, coils are defective If pawl chatters, hold-in coil is defective.

Ignition Grounding Contacts—With solenoid as for coil test (above), connect test lamp between battery terminal and No. 6 terminal on solenoid. Disconnect battery lead at solenoid terminal No. 4. Pawl rod should snap in and test lamp should go out (indicating that ignition ground contacts have opened).



1954-55 NASH OVERDRIVE CONTROL "PUSH BUTTON" TYPE WIRING

Solenoid Specifications

Current Draw (Both Coils)—26.2-28.4 amperes at 5.0 volts.
Current Draw of Hold-In Coil (Pawl Rod in Overdriv Position)—1.2-1.4 amperes at 5.0 volts.
Overdrive Control Relay: (With Pushbutton) Nash No. 3136172.
Vacuum Control Switch: (Early) Nash No. 3132550, (Later) Nash No. 3139862.
Overdrive Fuse—30 ampere. Cartridge in feed wire.

1946-48 BUICK 70 & 1953-55 BUICK 50, 1951-55 OLDSMOBILE

Buick, Series 70 (1946-48)
Buick, Series 50 (1953-55)
Oldsmobile, Series 88 & 98 (1951-55)

►***OPTIONAL TRANSMISSION NOTE: Dynaflow Drive optional on Buick and 1953 Oldsmobile. Hydra-Matic Drive optional on Oldsmobile.***
See "Buick Dynaflow Drive" or "Hydra-Matic Transmission" for data.

►CHANGES, CAUTIONS, CORRECTIONS

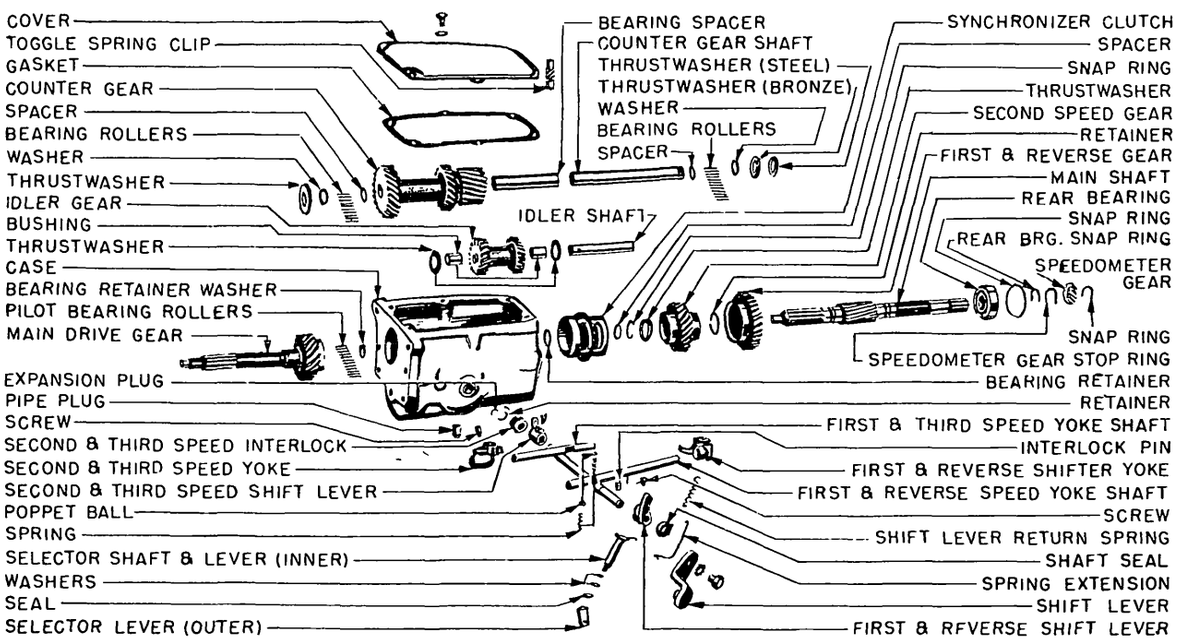
►*1954 OLDSMOBILE TRANSMISSION LEAK CORRECTION:* **Leak at Front Face of Transmission**—Caused by transmission to clutch housing gasket not being compressed sufficiently. Correct by installing TWO gaskets, Part No. 1308193, at this point, and sealing around lip of the Main Drive Shaft Sleeve, where it contacts clutch housing. Use P.O.B. #2 sealer.

Leak Into Clutch—This leak is caused by excessive clearance between mainshaft and bearing retainer sleeve and is noticed on cars driven at high speeds. check the clearance between Main Drive Shaft and Main Drive Shaft Sleeve by mounting a dial indicator on the case with indicator button contacting the sleeve, then move sleeve up and down. The clearance should not be greater than .012". Also check six points on sleeve (marked with chalk 30° apart) to determine if sleeve is out-of-round. If clearance not within limits at all points install a new sleeve, Part No. 560770, and seal around lip of retainer with P.O.B. #2 Sealer.

DESCRIPTION: Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse). Transmission shift levers mounted on side of case.

DISASSEMBLY: (1)—Remove transmission cover and gasket, shift lever, toggle spring, spring clip and spring extension. Remove speedometer gear (driven). **On Oldsmobile** remove rear bearing retainer and gasket. **On Buick 50** mark top edge of outer retainer so that it can be reinstalled in original position. Remove thrust plate and gasket, retainers, shims and torque ball from rear bearing retainer. Remove retaining bolt and washer, then pull universal joint from mainshaft, using Puller J-682A. To use puller, install pressure plug in transmission mainshaft, insert puller body in universal joint rear yoke and install "C" washer in groove in puller body on front side of yoke, turn screw handle clockwise. Remove universal joint spacer from mainshaft. Remove transmission rear bearings snap ring. Tap rear of mainshaft with soft hammer or hardwood block, remove mainshaft and bearing.
(2)—Shift transmission gears to second speed. Move mainshaft back until rear bearing clears case. Disengage shifter yoke from synchronizer. Lift front end of mainshaft up and slide synchronizer assembly from shaft.

(3)—Remove snap ring retaining 2nd speed gear on shaft. Line up small wire spacer ring in bottom of snap ring groove with thrust washer key and remove thrust washer and second speed gear. Remove snap ring retaining sliding gear, slide gear off shaft as shaft is withdrawn through rear of case.



BUICK 70 (1946-48), BUICK 50 (1953-55), OLDSMOBILE (1951-55) SYNCHRO-MESH

(4)—Place transmission shift levers in neutral, remove set screws retaining shifter yokes and lever on shafts. Slide shifter lever and interlock away from second-and-high yoke shaft, and remove interlock retainer from groove in right end of selector shaft. Remove outer shift lever and lockwasher from left end selector shaft. With transmission shift mechanism in neutral drive shaft out through right side of transmission case using a soft hammer (welch plug in case will be driven out with shaft), taking care not allow shifter levers and interlock to drop into case.
(5)—Push second-and-high shifter yoke shaft out through **rear** end of transmission case ***(CAUTION—do not allow poppet balls and spring to fly out)***, lift out shifter yoke, poppet balls and spring. Remove low-and-reverse shifter yoke shaft similarly through **rear** end of transmission case.
(6)—Drive countershaft lock pin in until it is completely within shaft, use Bearing Loader Tool J-1001 to drive shaft out through rear of case ***(CAUTION***—allow tool to remain within gear cluster to retain bearing rollers and thrust washers). Remove snap ring from main drive gear bearing, tap drive gear and bearing assembly into case and lift out.
(7)—Lift out counter gear assembly taking care not to lose washers and bearing rollers within gear cluster ***(CAUTION***—note location of each type thrust washer to insure correct assembly). Remove nut and lockwasher and take off outer selector lever, remove inner lever and shaft (with spring washer and oil seal) from within case. Drive locking pin completely into idler gear shaft, remove shaft through rear of case, lift out idler and thrust washers.

OVERHAUL (Component Parts after Disassembly):
Countershaft Assembly—Remove countershaft removing Tool J-1001 and remove roller bearings, thrust washers, retaining washers and bearing spacer. To reassemble, place countershaft removing Tool J-1001 into cluster gear and install bearing spacer tube and bearing inner retainer washers over the tool. Assemble a sufficient number of bearings under end of tool so it is evenly spaced in bore of gear. Finish assembling a total of 26 bearings at each end of gear. Leave Tool J-1001 in place until gear is assembled in transmission case.
Main Drive Gear—Remove snap ring and washer holding main drive gear bearing to gear. Remove bearing by jarring shaft on block of wood. Remove wire lock ring, washer and 14 roller bearings from counterbore in gear. To replace, reverse removal procedure ***(CAUTION***—Press on inner race of bearing when installing).
Main Shaft—Remove rear bearing snap ring. Remove speedometer using Tool J-4390 and remove gear spacer. (NOTE—If flange at inside diameter of each plate is too thick to slide easily between speedometer gear and bearing, grind down at this point to permit free movement). To assemble, install bearing up against shoulder (pressing on inner race). Install snap ring and speedometer gear on shaft. Press or tap speedometer drive gear on shaft against spacer, using Tool J-4390.
Rear Bearing Retainer Bushing (Oldsmobile)—Remove old bushing with Tool J-1450-4. Install new bushing using Tool J-1450-4 and Stop Guide Tool J-1450-5. Assemble reamer pilot into rear end of retainer housing. (NOTE—Pilot has two diameters; select pilot diameter which fits tightly into hous-

CONTINUED ON NEXT PAGE

1946-48 BUICK 70 & 1953-55 BUICK 50, 1951-55 OLDSMOBILE (Cont.)

ing). Place reamer J-1450 into housing and assemble Front Pilot J-1450-9 over shaft down into counterbore of housing. Tighten pilot in place with clamps J-1450-8. Ream inside diameter of bushing.

Rear Bearing Retainer Seal & Shield (Oldsmobile)—Remove seal from retainer. Line up new seal over bore in housing and tap lightly on outer edge to just start seal in place. Finish driving seal into retainer housing with Tool J-1354.

Synchronizing Clutch—Assembly cannot be dismantled and should be replaced as a unit. Synchronized springs are furnished and can be replaced as follows: Remove old springs by prying spring loose from gear and pushing it out of groove, then place new spring over clutch and pull synchronizer coupling up into place over spring.

REASSEMBLY: (1)—Install reverse idler gear, bronze thrust washer and shaft into transmission case. *Note that set of teeth with chamfers at hub should be at rear of case when replaced.* Make sure that end of shaft with larger diameter is at rear when replaced and that small hole in opposite end lines up with lock pin hole in transmission case. Install a new lock pin 1" below surface of boss on case.

(2)—Place spring washer, flat washer, and oil seal on selector shaft in order named, with crowned side of spring washer against flat washer. Apply lubriplate to shaft and assemble into transmission case. Install outer selector lever.

(3)—Lay countergear assembly (gear, bearings, spacer, and Bearing Loader Tool J-1001) into bottom of transmission case. Install small diameter bronze washer and a steel washer at rear of gear (with bronze washer next to gear) and a larger bronze washer at front.

(4)—Install main drive gear into front wall of transmission case and install snap ring. Mesh teeth of countergear with teeth on main drive gear and reverse idler gear. Drive countershaft into place from rear of transmission, being careful that it closely follows Bearing Loader Tool J-1001 so that bearings and washers are held in proper position. Be sure that larger end of shaft is in rear wall of transmission when assembled and that lock pin holes in shaft and transmission case are in line. Install new countershaft lock pin coated with white lead, drive pin in flush with surface of case.

(5)—Replace poppet ball and spring, interlock pin, and low-and-reverse shaft with yoke. Place both yoke shafts in neutral position (NOTE—Each yoke shaft is in neutral when notch for shifter lever is directly over selector shaft bore in case). Install a new welch plug (coat with white lead) in case.

(6)—Raise low-and-reverse interlock pin into groove in yoke shaft, then from left side of case install selector shaft. Place low-and-reverse shifter lever on shaft, making sure selector lever engages notch in bottom of shifter lever. Install second-and-high shifter lever and interlock on shaft. Install new second-and-high interlock retainer on shaft.

Torque Ball Installation & Adjustment (Buick)—*See Buick Special Data.*

1946-55 BUICK, OLDSMOBILE, PONTIAC SYNCHRO-MESH

BUICK MODELS

Series 40 & 50 (1946-52)
Series 40 (1953-55)

OLDSMOBILE MODELS

Six, All Models (1946-50)
Eight, All Models (1946-49)

PONTIAC MODELS

Six & Eight, All Models (1946-55)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1954 PONTIAC MAINSHAFT PRODUCTION CHANGE.* A new mainshaft with a 1/32" wider second speed sleeve snap ring groove and a heavier snap ring is now used in production and for service replacement on all 1954 transmissions. The heavier snap ring, Part No. 1321312 must be used in conjunction with the new shaft, Part No. 1166418.

▷*OPTIONAL TRANSMISSION NOTE: Dynaflow Drive optional on Buick and 1953 Oldsmobile. Chevrolet Powerglide optional on 1953 Pontiac. Hydra-Matic Drive optional on Oldsmobile & Pontiac.* *See "Buick Dynaflow Drive," "Chevrolet Powerglide" or "Hydra-Matic Drive."*

▷*1953 BUICK SERIES 40 TRANSMISSION INTERCHANGE NOTE*—The 1953 transmission is not interchangable with previous model transmissions.

DESCRIPTION: Constant-mesh, synchro-mesh (2nd. & High), sliding gear (Low & Reverse), all helical gear type. Same design as used on preceding car models except for the following changes:

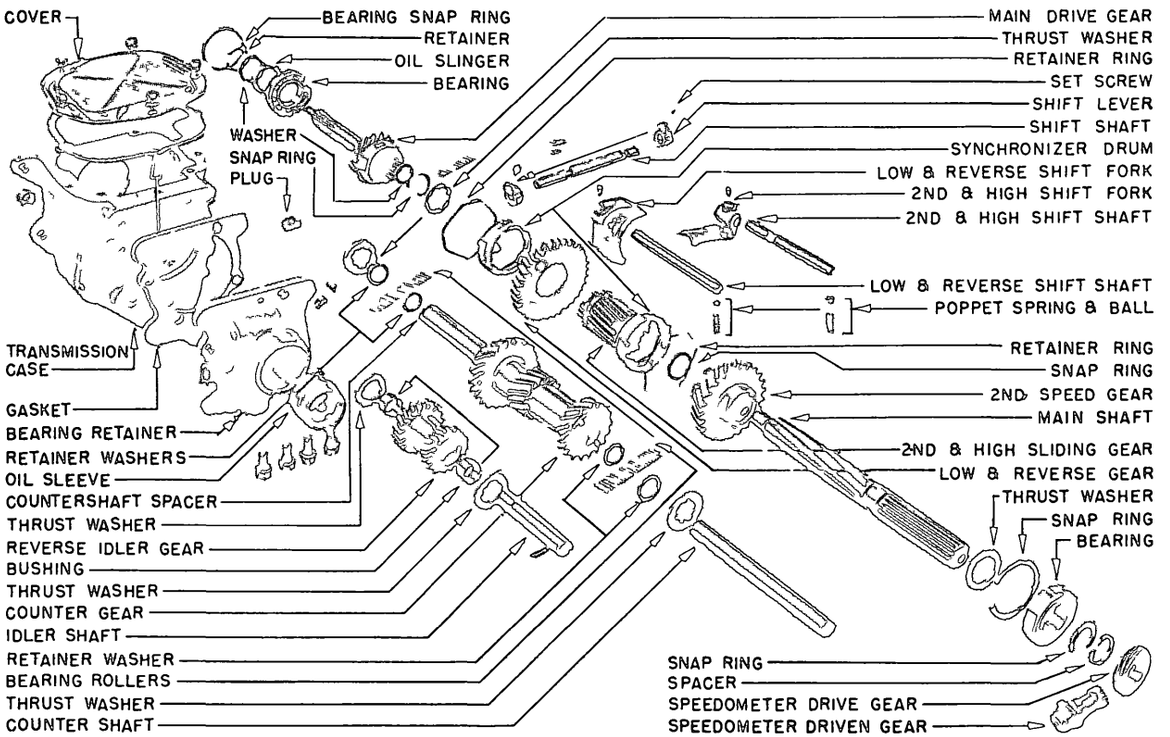
Shifter Mechanism—New cross-shift mechanism consisting of a vertical shaft on side of transmission case with inner lever at upper end engaging selector shaft so that movement of selector lever on transmission case (small forward lever) shifts the selector shaft sideways in the transmission to engage the Low-Reverse or Second-High shifter rail.

Countershaft Bearings—Countergear cluster now mounted on roller bearings (loose rollers) at either end with spacer on shaft between bearings. Special service tool (dummy shaft) must be used when removing countershaft to retain bearing rollers.

Synchronizer Cones & Gears (Buick only)—Synchronizing cones have 8° angle and must be used with new gears marked '8' (do not confuse these gears with gears used on previous models). Bronze cones must always be used with Second Speed Gear.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

CONTINUED ON NEXT PAGE



TYPICAL BUICK, OLDSMOBILE, PONTIAC SYNCHRO-MESH TRANSMISSION

1946-55 BUICK, OLDSMOBILE, PONTIAC SYNCHRO-MESH (Con.inued)

DISASSEMBLY: Remove transmission cover and speedometer driven gear assembly. Disconnect spring on shifter lever on left side of case. Take out rear bearing retainer screws, set transmission in high gear position (to prevent sliding sleeve and low speed gear from dropping down into case), withdraw bearing retainer, second speed gear, and mainshaft assembly through rear of case. Remove setscrews from shifter forks and selector shaft cams (tool J-2895 or KMO-244), take out screw and remove lever from left end of selector shaft, remove lever from lower end of vertical shaft (necessary to permit inner lever on upper end of shaft to disengage from selector shaft), drive selector shaft out through right side of case (this is important to prevent damage to oil seal on lever end of shaft), remove selector cams from case. Remove shifter rails at front of case (on Buick & Oldsmobile, plug at front end of Second-High rail must be removed—see Note), through rear of case (Pontiac), do not lose the detent balls and springs which are located under rails on all models. Lift out shifter forks, sliding sleeve and low speed gear. Use special tool (arbor or dummy shaft) J-1334 (Buick & Pontiac), J-1449 (Oldsmobile) to drive countershaft out through rear of case, leaving tool within counter gear cluster to retain bearing rollers until shaft is replaced. Remove snap ring on main drive gear bearing (on front of case), tap main drive gear and bearing through into case and lift out. Lift countergear cluster out being careful not to lose thrust washers on either end of cluster or bearing rollers. To remove reverse idler, drive locking pin into shaft, drive shaft out, remove gear.

►**Buick & Oldsmobile Shifter Rail Note**—Forks can be removed without entirely removing shifter rails by pushing rails toward back of case sufficiently to slip forks off (will not disturb poppet balls and springs or second-high rail welch plug).

REASSEMBLY: Reverse disassembly directions above and note following data on servicing of sub-assemblies.

Synchronizing Unit:—No detent springs used. Synchronizer drums are retained on gears by snap rings (remove by releasing snap rings).

Buick Note—Make certain that drum used on second speed gear is Bronze (aluminum drums used on some models for high gear).

Mainshaft & Rear Bearing Assembly: To disassemble parts, remove second speed synchronizing drum by prying retainer over shoulder on gear (leave retainer in drum). Remove snap ring from shaft, using Remover Tool J-1019 (Buick), J-1130 (Oldsmobile & Pontiac), remove thrustwasher and second speed gear. On Buick models, remove retaining bolt and washer on end of shaft and use Puller J-682-A to remove universal joint (install pressure plug in rear end of shaft, insert puller body in universal rear yoke and install "C" washer in puller groove ahead of yoke to take thrust). On all models, remove rear bearing snap ring, remove mainshaft and bearing from retainer or extension housing by tapping rear end of shaft with soft hammer or wooden block. To remove bearing from shaft, press or pull speedometer gear off shaft, remove spacer, use tool J-1041 to remove bearing rear snap ring ("C" type ring used on Oldsmobile and Pontiac only), press or pull bearing off shaft. Install bearing with shielded side forward or toward second speed gear. Bearing should be .0007" tight to .0002" loose on shaft and .0011" tight to .0005" loose in housing.

Oldsmobile Extension Housing: The housing has steel-backed, bronze bushing at rear to support mainshaft. Bushing can be replaced after oil seal removed from housing by using tool J-1450 and new bushing installed with same tool. Bushing must be reamed after installation using reamer which is part of J-1450 tool to provide .0025-.004" clearance on shaft.

►***CAUTION—Tool J-1450 must be used to ream bushing accurately (tool pilots in ends of housing).***

IMPORTANT INSTALLATION NOTE (OLDSMOBILE)—When transmission installed on above models, fill the transmission rear bearing housing assembly with ½ pint transmission lubricant after transmission has been installed in car.

Rear Oil Seal (Oldsmobile)—New oil seal must be installed in rear end of rear bearing retainer whenever oil seal removed. Soak new seals in engine oil for 5 minutes, install seal with felt to rear using tool J-1050. NOTE—New type oil seal shoulder for locating it in retainer. See that housing vent is open.

Pontiac Extension Housing (1949-55): Housing has graphite-bronze bushing (1.159" x 1 5/16" x 1 1/4") at rear end to support mainshaft. This bushing located in housing directly in front of oil seal.

Rear Oil Seal (Pontiac)—Oil seal can be removed by prying with a screwdriver. Use tool J-1323 to install new oil seals (seal has extension rim which will be damaged if tool not used). Oil the felt of the new oil seal, and coat inner surface of housing and outer rim of seal with Permatex No. 3 or other sealer before installing it in housing.

Main Drive Gear & Bearing: Bearing can be removed from shaft after lock ring has been removed by tapping end of shaft on wooden block. When installing bearing, see that shielded side is toward gear. Bearing should be .0003" tight to .0007" loose on shaft and .0002" tight to .001" loose in case.

Pilot Bearing (Oldsmobile Models)—Pilot bearing in flywheel consists of special Durex bushing installed with flat end in (no felt used on 1942 models—front wheel bearing lubricant used in reservoir). Bushing is retained by special sheet metal retainer pressed in end of crankshaft. To replace bearing, use puller J-1448 to remove old bushing, clean out all old lubricant, use tool J-1329 to install new bushing (install bushing with flat end in), use adapter J-1329-2 on tool J-1329 to install new retainer, insert ¼ oz. front wheel bearing lubricant in recess in front of bushing.

NOTE—An oil-soaked felt is installed in recess in back of bushing on Oldsmobile 1940-41 cars. Soak felt in #30 SAE. engine oil before installation. This felt not used on later cars.

Pontiac Main Drive Gear Oil Slinger and Oil Seal (1946 On)—An oil slinger and spring washer are installed on main drive gear hub ahead of the bearing (retained by bearing snap ring). Install new felt oil seal (lubricate felt with engine oil) against shoulder on shaft directly forward of oil slinger each time transmission is installed in car.

►***CAUTION*—Do not install oil seal in groove in main drive gear shaft (on 1946-47 cars—seal location changed from this groove). Later gears do not have this groove.**

Second Speed Gear: Gear clearance on mainshaft should be .001-.028" (Buick), .0005-.0027" (1946-48 Pontiac), .0012-.0028" (1949-54 Pontiac), .0015-.003" (1955 Pontiac). Gear endplay should be .000-.010" (Buick & 1946-48 Pontiac), .0001-.0231" (1949-54 Pontiac), .0061-.0261" (1955 Pontiac). When installing gear, coat thrust washer with lubricant and install against gear, use Tool J-1130 to install retaining snap ring.

Countergear Assembly:—If rollers removed from gear cluster, use arbor as assembly tool, make certain that spacer and thrust washers assembled in gear cluster, then install rollers, using grease to retain them in place. Install assembly in case, making certain that small steel thrust washer installed next to bearing rollers and large bronze thrust washer between gear cluster and case at each end, insert countershaft from rear and push arbor out through front of case. See that lock ball in place in rear end of shaft and that ball engages groove in case to prevent shaft from turning. Countergear clearance should be .0005-.0024". Endplay should be .0176-.0296" (Buick), .009-.021" (Pontiac 1940-48), .0176-.0306" (Pontiac 1949 on).

Reverse Idler Gear Assembly:—Remove old lockpin from reverse idler gear shaft and discard pin (use new pin for reassembly). Idler gear bushing clearance on shaft should be .0002-.0042". When installing gear, line up lock pin hole in shaft and case and install NEW lock pin as follows:

Lock Pin Installation—Use new lock pin, coat pin with white lead or other sealing compound, drive pin in until head of pin is correct distance below surface of boss on case:

Buick—(1946-47) ⅝-¾", (1948 & Later) 25/32".
Oldsmobile—¾".
Pontiac—(1946-48) ¾", (1949 & Later) 25/32".

Shifter Mechanism: Selector shaft must be removed when transmission disassembled (see disassembly instructions above). To remove shaft, use KMO-244 or J-2895 tool to remove cam setscrews, remove lever on left end of shaft by taking out retainer screw, remove lever on lower end of cross-shift shaft (necessary to allow inner selector lever on upper end of shaft to disengage from selector shaft). Drive selector shaft out through right side of case (this is important to avoid damge to oil seal on lever end of shaft). With selector shaft out, inner selector lever and shaft can be lifted out. See that this shaft and hole in case are clean, lubricate with Lubriplate when shaft replaced, being certain that spring washer, plain washer and seal installed on upper end of shaft within case. Install selector shaft through left side of case and install new welch plug to close hole on right side (use white lead or other sealing compound to seal plug).

►***CAUTION*—When installing lever on selector shaft, hold shaft with wrench to avoid damaging selector cams. Make certain that lockwasher installed on lever retainer screw.**

1941-53 CADILLAC, 1950 OLDSMOBILE SYNCHRO-MESH

Cadillac V8, All Series (1941-53)
Oldsmobile 8, Series 88 & 98 (1950)

▷CHANGES, CAUTIONS, CORRECTIONS

▷Cadillac & Oldsmobile Optl. Hydra-Matic Drive Transmission—Data below applies only to standard synchro-mesh transmission. *See "Hydra-Matic Drive" transmission.*

▷Cadillac 1941 Extension Housing Change—See Extension Housing data for special type used on first Housing data below for special type used on first 1941 cars which must be replaced to allow installation of special speedometer gears if optional ratio rear axles being installed on these cars.

DESCRIPTION: Constant-mesh, synchro-mesh, all helical gears (low & reverse sliding gear).

Synchronizing Unit. Consists of two synchronizing drums mounted on the ends of three pin cams which extend through cam holes in the center ring of the clutch sleeve. Synchronizing drum assembly is centered on the clutch sleeve by detent springs which engage the notches in the pin cams. The entire assembly moves as a unit when the clutch sleeve is shifted until the synchronizing drums and cones engage, synchronizing unit then rotates (relative to clutch sleeve) until cam surfaces on clutch ring engage pin cams. Drums are driven through this engagement until synchronization is completed.

Interlock Assembly—Ball seat tube installed in interlock boss in transmission case (spring located within tube interlock ball in tube at each end). When gear is engaged, shoulder on shifter shaft quadrant forces tube toward opposite quadrant so that lock ball seated in end of tube and prevents from releasing this shifter shaft.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY (1941-48): Remove speedometer gear adapter housing and gear assembly. If universal joint flange not removed previously with propeller shaft, slide flange off rear end of extension shaft. Take out extension housing mounting capscrews and remove extension housing. Remove bottom cover from transmission case. Remove countershaft through rear end of case, lift out gear cluster and thrust washers (CAUTION—do not lose bearing rollers and spacer). Remove lockscrews on front of case, pry main drive gear and bearing assembly out through front of case. Slide the clutch sleeve and synchronizer assembly off front end of mainshaft and lift out. Use tool J-1007 to free second speed gear lock ring. Tap mainshaft and bearing assembly out of rear end of case and remove while sliding the second speed gear and low & reverse sliding gear off forward end of shaft (lift these gears out through opening in case). Tap reverse idler gear out through rear of case, lift out reverse idler gear and thrust bearings. Remove shifter levers on outside of case, remove shifter lever shafts from within the case (CAUTION—use care not to lose interlock spring, balls, or tubes).

DISASSEMBLY (1949 ON): Remove the speedometer driven gear and sleeve assembly. Take out extension housing capscrews, remove housing and bushing assembly. Remove transmission lower cover (CAUTION—note location of two longer screws which lock countershaft and reverse idler shaft). Check cluster gear endplay with feeler gauge (for selection of correct thrustwashers when re-installing gears). Push countershaft out through rear of case with tool J-1184 leaving tool in cluster gear to retain bearing roller assembly. Remove cluster gear assembly and thrustwashers from case. Take out lockscrew on front of case, remove bearing lock ring from drive gear bearing outer race. Slide mainshaft and rear bearing out through rear of case as far as possible and tip assembly to one side to provide clearance. Tap drive gear and bearing back into transmission case and remove through opening in case (CAUTION—use care not to damage mainshaft assembly). Slide synchronizer unit off end of mainshaft and remove from case. Remove second speed gear lock ring from mainshaft groove, slide second speed gear, thrustwasher, and low speed gear off shaft while withdrawing mainshaft and rear bearing through rear of case. Lift out second speed gear and low speed gear (turn gear to free it from shifting lever shoe). To remove reverse idler gear, tap shaft out through back of case (or use tool J-1010 to push shaft out), lift out reverse idler gear and thrustwashers. Remove shifter levers from outer driven gear and sleeve assembly. Take out extension ends of shifter shafts, remove shifter lever shafts from within case.

▷*CAUTION—Do not lose interlock springs, balls, or tubes when removing shifter shafts.*

REASSEMBLY: Reverse disassembly directions and note following data on sub-assemblies:

Mainshaft Rear Bearing: If bearing being replaced, use tool J-4390 to remove speedometer drive gear from shaft, remove bearing snap ring, remove bearing by jarring end of shaft on wood block or press bearing off in arbor press. Use tool J-4390 to press or tap new bearing against shoulder on shaft, install snap ring, then install speedometer drive gear similarly.

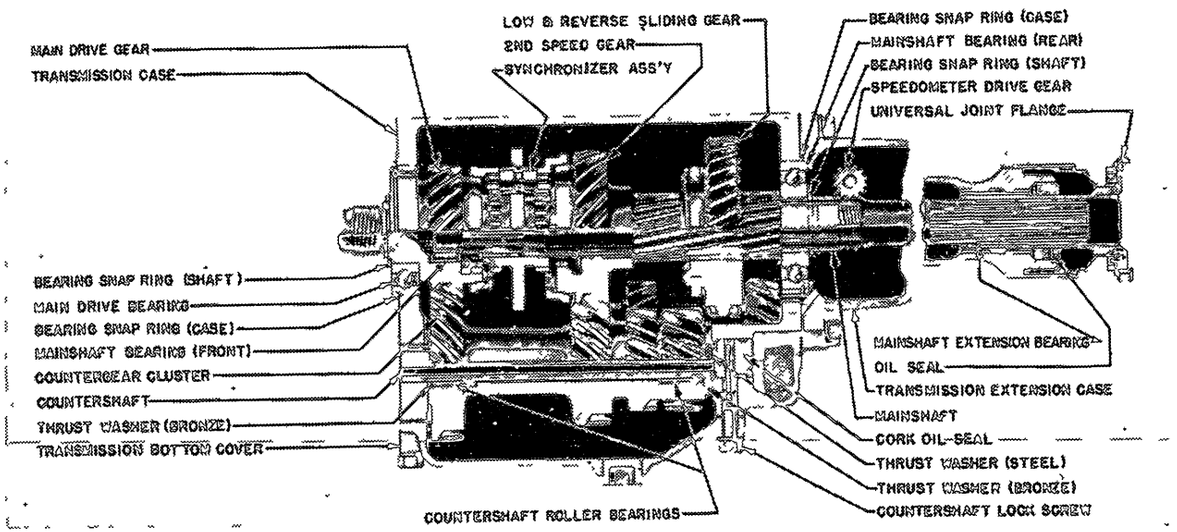
Mainshaft & Second Speed Gear Assembly. Cannot be installed as an assembly (to install, reverse disassembly directions above). See that second speed gear thrustwasher installed with key engaged in groove in shaft. Use new lock ring to retain second speed gear (install ring with J-1466A pliers). Low gear backlash on mainshaft splines should be .004-.007" (new), .010" (worn limit). Synchronizer hub backlash on mainshaft splines should be .0005-.001" (new), .003" (worn limit). Second speed gear clearance on mainshaft should be .001-.0015" (new), .00175" (worn limit), and endplay should be .004-.008" (new), .012" (worn limit).

Shifter Shaft Assembly: Install the second & high lever and shaft in neutral position making certain that shoe is properly located. Install interlock ball, tubes, and spring assembly in case with counterbored end of tube toward ball, compress the spring and locking balls with tool J-1168, install low-and-reverse shaft with sector in neutral position making certain that shoe is in place. Install new cork seals on outer ends of shafts (use tool J-1169), tap shifter levers into place on shafts (brace inner ends).

Synchronizing Unit:—Should not be dismantled and cannot be serviced except for removal of detent springs (installed directly below each pin cam and accessible without dismantling unit. To remove detent spring, pry top edge of spring out of gear, push spring out of groove. Install new springs with long end of spring facing long end of gear, pull coupling up in place over springs.

Main Drive Gear & Clutch Shaft Bearing:—Bearing is press fit on shaft. To replace bearing, remove snap ring from shaft groove, jar end of shaft on

CONTINUED ON NEXT PAGE



CADILLAC, OLDSMOBILE, SYNCHRO-MESH TRANSMISSION

CADILLAC & OLDSMOBILE (Continued)

wood block to remove bearing or press shaft off in arbor press. Press new bearing on shaft (CAUTION —press on inner race only), install snap ring. To remove mainshaft pilot bearing rollers from drive gear recess, remove and discard locking ring (use new locking ring when installing rollers).

Counter Gear Cluster: Needle bearings are loose and will fall out when shaft removed unless a dummy shaft or Tool J-1184 used to retain them. Use this special tool J-1184 to assemble bearings (rollers, spacer, and the retaining washer at each end) before installing counter gear. Leave tool in gear until it is pushed out by countershaft when shaft inserted. Install thrust washer at each end with steel spacer between thrust washer and case at rear. See that locking screw hole in countershaft lines up with cover screw hole so that shaft will be locked in place when cover screws installed and that new cork seal installed in groove near rear end of shaft to prevent oil leaks. Countergear endplay should be .005-.012" (new), .018" (worn limit).

NOTE—If endplay exceeds .018", install special oversize thrust washers.

Reverse Idler Gear:—Clearance on shaft should be .005-.010" (new), .015" (worn limit). When installing shaft, use special tool J-1010 to align front thrust washer (on 1939 and later models, thrust washers are steel-backed, babbitt faced type), see that thrust washers installed at each end of shaft with prongs on washers engaging slots in case, use new cork seal in groove on rear end of shaft to prevent oil leaks, align locking screw hole in shaft and case (shaft locked by cover screw). Endplay should be .005-.010" (new), .015" (worn limit).

Extension Housing & Oil Seal (Cadillac): Install extension housing on transmission case and tighten screws securely. Then install oil seal in rear end of housing using tool J-1942. Extension housing bushings are not furnished separately and housing should be replaced if bushing requires replacing. NOTE—Extension housing used on approximately first 3500 cars in 1941 permits use of speedometer pinion for standard rear axle ratio only and housing must be replaced if optional rear axle installed. Second type housing (with provision for installation of optional axle ratio speedometer drive pinions) only is furnished for service and is marked 'R' on case under speedometer cable opening. *See Cadillac Special Data in Car Model Section.*

Extension Housing & Oil Seal (Oldsmobile): Bronze bushing in housing is furnished separately and can be replaced. Remove old bushing with tool J-1150-4, install new bushing using same tool and adapter J-1150-5 (stop guide which will position bushing correctly). **New bushing must be reamed** using Reamer Tool J-1450 and pilots J-1450-2 (rear) and J-1450-7 (front—this pilot must be tightened in place with clamps J-1450-8).

Oil Seal Replacement—Pry old seal out, start new seal squarely in bore by tapping lightly on outer edge, then drive seal into place with tool J-1354.

1946-54 CHEVROLET 3-SPEED

Pass. Cars & Sed. Delivery (1946-54)
Half-Ton & ¾-Ton Trucks (1947-54)
Half-Ton & ¾-Ton Trucks (1st Series 1955)
One-Ton Trucks (1947)

►CHANGES, CAUTIONS, CORRECTIONS

►*1952 COUNTERSHAFT PRODUCTION CHANGE:* Beginning with 1952 Transmission Serial No. JA-14026, countershaft changed to include a 60° notch cut into top side of front counter gear shaft hole boss in transmission case, and a 3/16" angular hole drilled in countershaft to align with notch. These changes provide better lubrication. Old and new type transmission parts have same part numbers.

►*1949-52 HIGH GEAR DISENGAGEMENT CORRECTION:* Correct by installing either the "First Design" or "Second Design" 1953 parts listed below. *CAUTION—All 1st or 2nd design parts listed must be used together.*

Transmission Part Nos. (1st Design)

Part No.	Passenger	Commercial
Trans. Main Drive Gear	3699250	3699251
Rollers (24 each)	7450247	7450247
Mainshaft	3699258	3699259
Spacer (Front)	591851	591851
(Rear)	591852	591852

NOTE—Front bearing unchanged (14 rollers—3/16" x 33/64"). New bearing has 24 rollers (⅛" x ½").

►*1953 PASS. CARS & COMM'L. TRANSMISSION GEAR RATTLE IN LOW & REVERSE CORRECTION (Cars before Transmission Serial Nos. M8-18 & S8-26):* Gear tolerances and lash were reduced and other changes in design were made (as required by addition of two teeth in Synchronizing Rings) on transmissions beginning with above serial numbers. If later design parts (as listed in "Transmission Second Design Parts" below) are installed on earlier transmissions, all parts listed must be installed as a unit.

Transmission Part Nos. (2nd Design)

Part	Pass. Cars	Comm'l.
Main Drive Gear	3705066	3705067
Second Spd. Gear	591877	591889
Clutch (2nd & 3rd)	3705112	3705112
Synchronizer Ring	591886	591886

►*1955 PASS. CAR HARD SHIFTING CORRECTION:* Install the three new gears listed below, which have a greater tooth chamfer, a new Transmission Conversion Kit, Part No. 3731061. *See "Transmission Control" for installation of the conversion kit.*

Description	Old No.	New No.
1st & Reverse Gear	3845056	3725646
Counter Gear	3845051	3845201
Reverse Idler Gear	3845052	3845203

►*SHIFT LEVER RATTLE CORRECTION*—Rattle may be caused by a small hour-glass shaped spring in lever working loose from ball on end of gear shift control lever. To correct, remove shift lever and spring, install a #6 x ½" sheet metal screw in lower side of lever at point 3 3/16" from pivot hole toward outer end of lever. Screw will provide seat for spring and prevent disengagement NOTE—Gearshift lever on later 1953 cars has metal tang at this point to provide a spring seat and does not require reworking.

►*1953 MAINSHAFT PILOT BEARING CHANGE*—Pilot bearing on 1953 models consists of two separate roller assemblies in main drive gear recess. Forward bearing is positioned by spacer fitting against shoulder on mainshaft, rear bearing is positioned by snap ring in groove in main drive gear directly ahead of the bearing.

DESCRIPTION: Constant Mesh, Synchro-mesh, (second & high), sliding gear (low & reverse), all helical gear type.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY: On all Pass. Cars and trucks (1948 & later), remove screws and take off cover on side of case (see Shifter data). On earlier trucks, take out screws and remove gear shift lever and transmission cover assembly (turn screws out evenly to relieve spring pressure), remove shifter shafts and forks (see Shifter servicing data below). On all models, remove universal joint capscrew and washer, slide joint off shaft. Remove drive gear bearing retainer screws on front of case, take off retainer. Mark main drive gear, second speed gear, and both synchronizing rings to insure reassembly in same relative positions. Use special puller, J-937, to remove main drive gear and drive gear bearing, take out 14 loose rollers (mainshaft front bearing). Use special tool, J-938, installed on back of transmission case and push mainshaft out toward front (IMPORTANT—front synchronizer ring must be turned so that lugs line up with slots in splines on mainshaft to avoid damage to lugs and splines), remove mainshaft from front end. Engage second speed gear and clutch sleeve, remove clutch sleeve assembly, low and reverse gear, second speed gear thrustwasher. Remove rear bearing support assembly, remove speedometer drive gear and gear spacer from shaft. Expand rear bearing lock ring into case (use tool J-3185), tap bearing out toward front (bearing must be removed before countershaft can be removed). Drive countershaft out toward front. To remove reverse idler, drive idler shaft lockpin into shaft (pin shorter than shaft diameter), drive out expansion plug at rear of case, remove idler shaft through this hole.

REASSEMBLY: Reverse disassembly directions (above) and note following data on servicing of all sub-assemblies.

Main Drive Gear & Clutch Shaft Bearing: Bearing retaining nut and oil slinger are single unit with a left hand thread and are staked in hole in shaft. Clamp shaft in vise, remove nut with wrench J-933. Use special press-plate J-936 to press bearing on or off shaft. Bearing retainer mounting holes on front of case spaced irregularly to insure assembly in correct position (to align oil return holes). NOTE—Special Malleable Iron Clutch Gear Bearing Retainer, No. 604932, available for installation on all 1940 and later 3-speed transmissions for severe service (will prevent lubricant loss due to cracked retainers).

Clutch Sleeve & Synchronizing Rings:—To disassemble rings, turn ring until ends of ring retainer is visible through slot in sleeve, insert special pliers J-932 in slot, expand retainer to free ring, pull ring out. See that synchronizing cones are tight in sleeve (replace clutch sleeve and cone assembly if cones loose or worn). Check rings to see that they do not rock in cones.

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1946-54 CHEVROLET 3-SPEED (Continued)

Energizing Springs:—Use new spring whenever spring is removed. When installing springs, do not expand more than necessary to clear clutch teeth. Install springs with offset end between third and fourth teeth of any bank of the clutch teeth (offset prevents spring rotation).

Mainshaft & Rear Bearing:—To install bearing, first install bearing lock ring in case, expand lock ring with tool J-3185, tap bearing outer race with soft steel drift until it is halfway in case, release snap ring, continue to tap bearing until lock ring engages slot in bearing race. Lubricate second speed area of mainshaft, install shaft with lugs on front synchronizer aligned with slots in mainshaft spline (to avoid damage to lugs and splines), use replacing tool J-938 to pull shaft into place. Second speed gear endplay should be .010" with shaft installed.

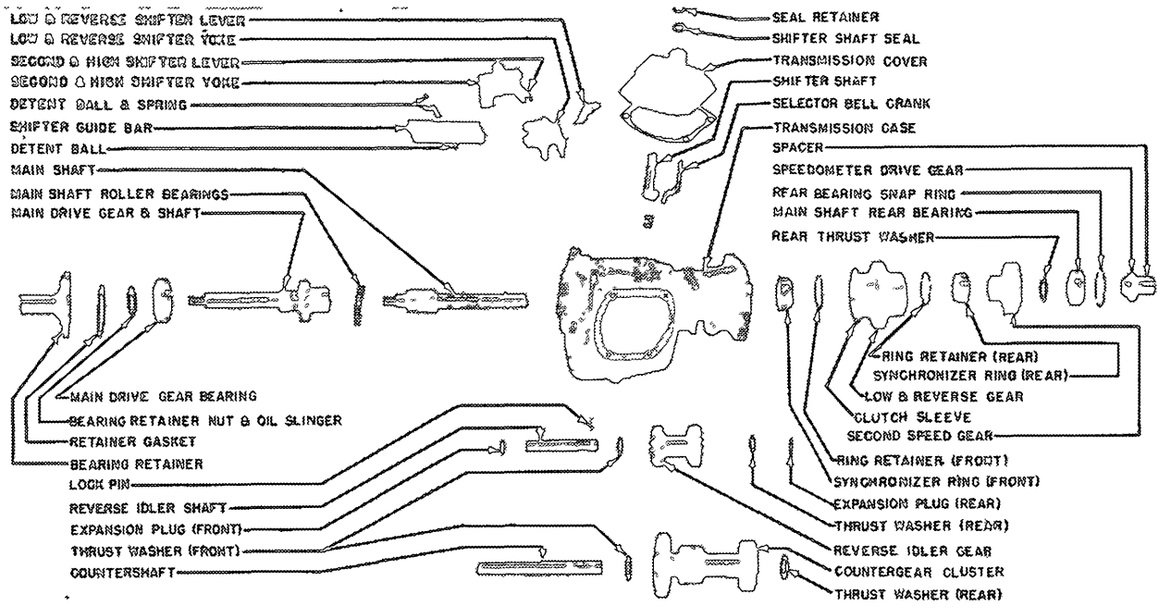
Rear Bearing Support (Truck 1948 On): Support and bushing furnished as an assembly to maintain the transmission alignment. Replacement of bushing requires replacement of complete Support as follows: Split universal joint, take out transmission support to frame bolts, push front end of propeller shaft up out of the way. Remove universal capscrew and take off yoke. Remove Support Pipe Plug from case and pull Support out through rear of case with hook puller. When installing Support, align pipe plug hole in support with tapped hole in case.

▷*CAUTION—Speedometer Drive Gear Spacer installed* ahead of speedometer drive gear on these trucks.

Counter Gear Cluster:—Bushings staked in place and clearance on shaft is .002-.004". When installing countershaft, see that thrust washers are in place at each end of counter gear cluster and that flat on forward end of shaft is horizontal and on top (flat engages clutch housing to prevent shaft turning, transmission cannot be installed unless flat properly located).

Countergear Cluster Bushing Installation—Rear bushing must not close up rear holes in countergear cluster (hole opening must be 3/32" minimum—bushing must project partly over hole to permit staking it in place). These openings necessary to permit oil circulation around shaft for lubrication. When bushings installed, stake bushings in place by expanding bushings into the front and rear holes in countergear cluster. Check rear bushing and if hole opening is not 3/32" minimum, drill 1/8" hole in bushing at each rear hole (drill at front edge of countergear cluster hole to avoid disturbing bushing stakings).

Roller Bearing Type—Used on trucks and furnished as service replacement on Passenger cars (Carburized Gear type). To install bearing rollers, install shaft in countergear cluster, coat roller recess with cup grease, install 25 rollers in each end, remove countershaft and install gear cluster in transmission case. Install forward thrust washer between gears and case (lubricate washer), feed assembly tool T-1617 in from front end (tapered end first), lubricate countershaft and install at front end and pushing assembly tool out at rear end (lubricate rear thrust washer and install in case before assembly tool reaches this point). See that flat on forward end of shaft is horizontal and flush with case (not more than 1/64" below face).



TYPICAL CHEVROLET 3-SPEED SYNCHRO-MESH TRANSMISSION

▷1953 Countershaft Note—Countershaft has 60° notch cut into top side of front counter gear shaft hole boss in transmission case, and a 3/16" angular hole drilled in countershaft to align with notch.

▷1953 Mainshaft Pilot Bearing—Two separate roller bearings used. Front bearing and spacer must be installed first in drive gear recess, then rear bearing snap ring installed in groove in recess and rear bearing rollers installed. Mainshaft pilot must be inserted through rear bearing rollers, spacer, and front bearing rollers.

Reverse Idler Gear:—Remove old lockpin from shaft before installing, line up holes in case and shaft, use new lockpin and drive pin in so that head is approximately 1/16" beyond surface of case, peen hole to prevent pin coming out. Pin must be tight in hole to prevent oil leaks. Install new expansion plug in shaft hole in rear of case.

Reassembly—Install long shifter fork on guide bar with fork end toward nearest mounting screw hole, line up lock ball recess in fork with hole in guide bar, install one lock ball and spring in hole, start opposite shifter fork on guide bar, assemble other lock ball on spring, use flat tool to compress spring and slide fork into position over lock ball. Check operating shaft cork seal and retainer, replace if worn. Install operating shaft in cover, assemble anti-rattle spring and shifter yoke lever on bell crank end of operating lever, move selector (cross-shift) bell crank over center of shifter yoke lever. Press on outer end of operating shaft so that shifter yoke lever held firmly against selector lever bell crank, make certain that both shifter forks in neutral position on guide bar, then assemble guide bar and shifter fork assembly on cover with low-reverse shifter fork toward bottom (narrow side) of cover. Make certain that selector lever bell crank engages slots in shifter forks and that pins in forks engage slots in end of shifter yoke lever. Bolt guide bar to cover. CAUTION—Low-reverse sliding gear and clutch sleeve must be in neutral position when shifter mechanism installed on transmission case. See Chevrolet Vacuum Power Transmission Control for gearshift lever adjustment on the car.

Shifter Mechanism (1948 & Later Trucks, 1949 & Later Pass. Cars): In transmission cover. Requires removal of cover as follows: Drain transmission, take out shift lever lock bolts, and pull lever off each shifter shaft. Remove cover from transmission. Take out shifter interlock retainer nuts and locks, remove shifter interlock retainer, then remove shifter shaft and fork assemblies, shaft seals, poppets and springs, or interlock from cover.

Cover Installation—Hump on side of First and Reverse Shifter Fork must be toward rear of transmission. Install cover (using new cover gasket) with gears and shifter forks in neutral. Install shift lever on each shifter shaft and tighten lock bolts.

Universal Joint Ball Adjustment: Should be checked each time propeller shaft disconnected (before transmission reinstalled). Remove ball housing from torque tube, clean ball with cleaning solvent, check for roughness and clean up with emery cloth, see that torque tube is clean. Install new torque ball outer retainer seal and packing. Assemble ball housing on back of transmission using four new shims for a trial fit, tighten attaching capscrews securely. Check adjustment by moving rear end of ball housing. If adjustment correct, torque tube ball should be snug fit but should move with hand pressure. If ball housing cannot be moved, add shims under ball retainer flange, if ball housing moves very freely, remove shims at this point until correct adjustment secured.

1955 CHEVROLET 3-SPEED

Pass. Cars & S dan Deliv ry (1955)
Half-Ton & 3/4-Ton Trucks (1955 Second Series)

►*OVERDRIVE TRANSMISSION OVERHAUL NOTE: Transmission overhaul is the same with or without overdrive. See "Chevrolet Overdrive" for removal of overdrive unit.*

DESCRIPTION: Constant mesh, synchro-mesh (second & high), sliding gear (low & reverse), all helical gear, similar in design to previous transmission.

TRANSMISSION REMOVAL: *See Car Model pages.*

TRANSMISSION DISASSEMBLY: **1)** Remove capscrews from transmission side cover and remove cover and gasket. *NOTE–Under ordinary circumstances it is not necessary to disassemble cover assembly.*

2) Remove four clutch gear bearing retainer screws and shakeproof washers and remove the retainer. Install clutch gear and bearing puller J-937 by screwing the threaded sleeve (left hand thread) onto clutch gear shaft, and remove gear and bearing.

3) Remove 24 roller rear pilot bearings, 2 washers and 14 front roller bearings. Remove extension to transmission case bolts and lockwashers and pull extension and mainshaft out of transmission case, leaving second and third speed clutch assembly and first and reverse gears in case. Do not force mainshaft. Rotate mainshaft and second and third speed clutch gear to obtain alignment of clutching teeth and splines.

4) Remove second and third speed clutch sleeve assembly and first and reverse gear through side opening in transmission case. Remove counter-shaft by driving it from the front to rear of case, using a soft steel drift. Remove countergear rollers and front and rear thrust washers. *NOTE*–Countergear must be removed before removing reverse idler shaft.

5) Drive idler shaft lock pin into shaft (pin is shorter than diameter of shaft so shaft may be slipped out when pin driven in). Using a drift pin, tap rear of shaft to drive plug ahead of shaft *(CAUTION*–Do not rotate shaft while driving it out as lock pin may drop down between idler gear bushings). Remove reverse idler gear and thrust washers.

6) To remove mainshaft from extension, expand snap ring and tap rear of shaft with a soft hammer to bring shaft, speedometer gear, second speed gear and bearings as an assembly forward out of extension.

SUB-ASSEMBLY OVERHAUL: Wash all parts thoroughly. Inspect case for cracks and check front face of case for burrs. Check gears and shafts for wear or damage. Check first and reverse sliding gear for free movement on clutch sleeve. Check clutch sleeve for free movement on mainshaft.

Mainshaft, Rear Bearing, Second Speed Gear & Speedometer Gear: Disassembly–Press speedometer drive gear off mainshaft, using a suitable split plate in an arbor press. Remove bearing to mainshaft snap ring and press bearing off shaft. Remove second speed gear thrust washer, pull drive pin out of shaft and remove second speed gear.

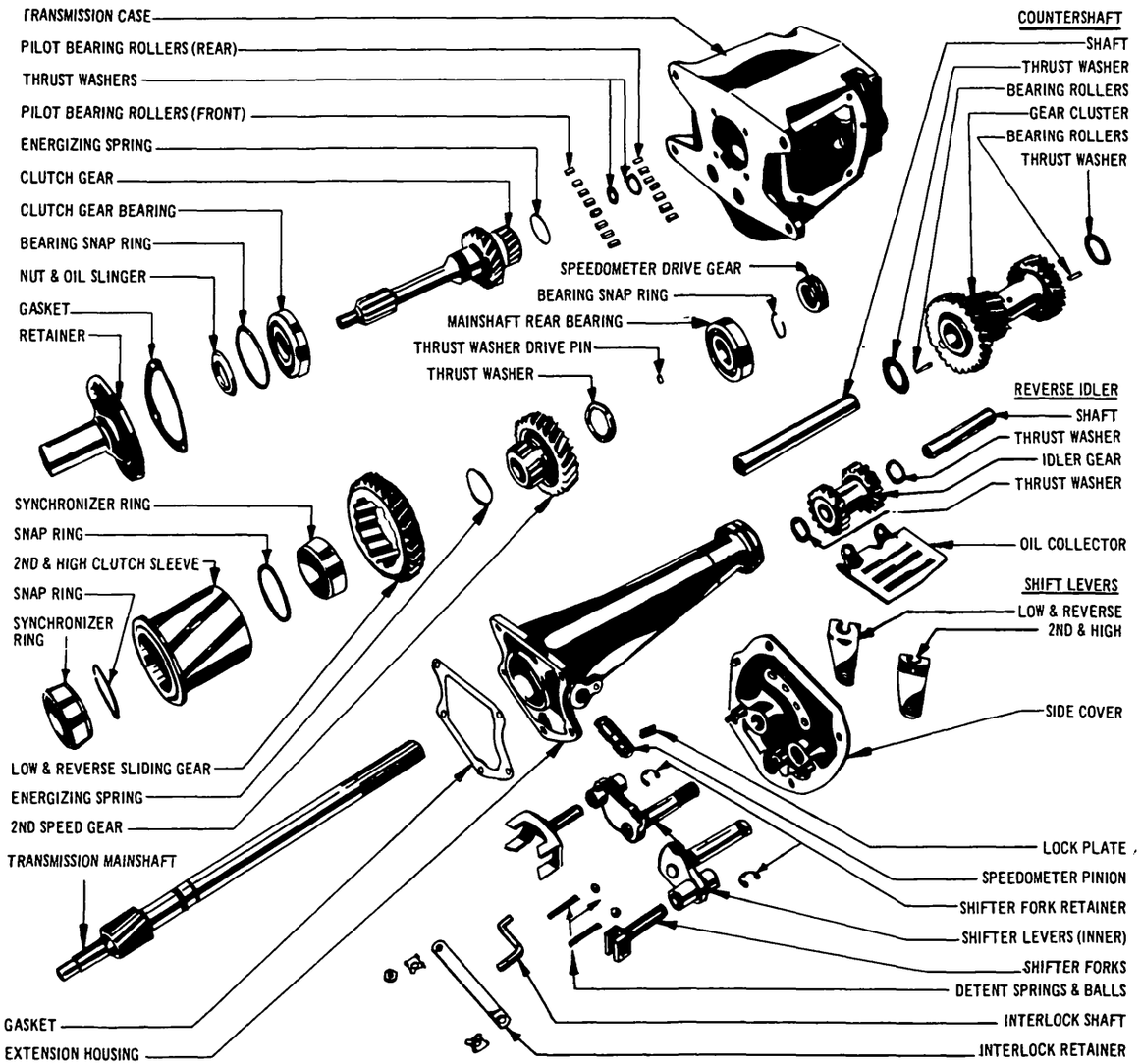
Reass mbly–Slide second speed gear on mainshaft, insert drive pin in shaft and install thrustwasher against gear. Install new bearing (groove in bearing toward second speed gear). Select one of four selective fit snap rings (see table below) so endplay of bearing on shaft is a maximum of .004" (this may be determined by installing successively larger rings. Use the thickest ring that will enter snap ring groove on shaft). Start speedometer drive gear on shaft with the chamfered inside diameter of gear toward bearing. Press gear on shaft until forward face of gear is 7/8" from rear face of bearing.

R ar B aring Snap Rings

Thickn ss	Part N .
.086-.088"	3707188
.089-.091"	3707189
.092-.094"	3707190
.095"-.097"	3707191

Clutch Gear Bearing: Removal–Place clutch gear in a vise with soft jaws, and remove bearing retainer nut and oil slinger, using special wrench J-933. The retaining nut and oil slinger is a one-piece steel casting machined with a left handed thread and is locked in place on clutch gearshaft by being staked into a hole

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CHEVR LET "SYNCHRO-MESH" TRANSMISSI N (EXPLODED VIEW)

1955 CHEVROLET 3-SPEED (C ntinued)

provided for that purpose. To remove clutch gear bearing place the special press plate J-936 over gear and against bearing. Using an arbor press, press shaft out of bearing. *CAUTION–Do not attempt to drive shaft out of bearing or bearing will be damaged.*

Installati n–Using an arbor press, press clutch gear bearing on clutch gear with the locating ring toward front of the gearshaft so that bearing will enter case to maximum possible depth. Install combination clutch bearing retainer nut and oil slinger on clutch gearshaft and draw it up tight, using special wrench J-933. Lock the retainer nut oil slinger in place by staking it into hole with a center punch, being careful not to damage threads on shaft. *CAUTION–The bearing must turn as freely after it is installed on the shaft as it did before b ing placed on shaft.*

Clutch Sl eve & Synchronizer Rings: Disassembly–Remove first and reverse sliding gear. Turn synchronizer ring in clutch sleeve until ends of synchronizer ring retainer can be seen through slots in clutch sleeve. Using special pliers J-932, expand the retainer into counterbore in clutch sleeve. This raises the retainer from groove in ring so ring may be easily slipped out. Check synchronizer cones for wear or being loose in clutch sleeve. If cones are damaged, it will be necessary to replace the clutch sleeve assembly and both synchronizer rings. Inspect synchronizer rings for smoothness. Place rings in synchronizer cones and check with thumbs to see that rings do not rock. Excessive rocking indicates a poor fit between rings and cone, which will not permit proper synchronization of gears during shifting.

R assembly–Install synchronizer ring retainers in counterbores in ends of clutch sleeve. Using special pliers J-932 in slot in clutch sleeve, expand each retainer in counterbore, lubricate each synchronizer ring with light oil and install clutch sleeve. (make sure retainers seat in groove all the way around rings so rings will turn freely). Install first and reverse sliding gear on clutch sleeve.

►*SYNCHRONIZER ENERGIZING SPRING REPLACEMENT CAUTION:* It will be noticed that one end of these springs is slightly offset. Each spring must be assembled in its groove in the clutch gear and the second speed gear with the offset or locking end between the third and fourth teeth of either of the two banks of teeth on these gears, thus keeping the spring from turning in its groove. It should not be necessary to replace these springs, however, if spring is removed, a new spring should be installed. The spring may be removed by slipping a thin blade under the spring and raising it sufficiently to slide it over clutch gear teeth. *CAUTION–*In replacing either energizing spring, be very careful not to distort it when slipping it over clutch teeth.

►*REVERSE IDLER GEAR INSPECTION NOTE:* Check bushing for excessive wear by using a narrow feeler gauge between shaft and bushing. The proper clearance is .002-.004". *Reverse idler gear bushings are not serviced separately.*

Side Cover & Shift Shafts: Disassembly–Remove cover assembly from transmission and remove outer shift lever clamp bolts. Pull levers from shafts. Remove nuts and locks and remove shifter interlock retainer. Remove shifter shaft and fork assemblies, poppets and springs, or interlock from cover.

Reassembly–*(CAUTION–Side cover must be removed to install shifter levers to shift fork shafts in side cover. If shift levers are installed with the side cover on on transmission, shifter forks will be forced against gears causing hard shifting).* Install shifter interlock retainer. Install outer shifter levers on shafts and install clamp bolts. With transmission gears in neutral and shifter forks in neutral, install cover to transmission using a new gasket.

►*CAUTION: The hump on the first and reverse shifter fork must be toward rear of transmission when installed.*

TRANSMISSION REASSEMBLY: 1) Lubricate the reverse idler thrustwashers and install gear and thrustwashers in transmission case with the gear having the chamfered teeth to rear of case. Install idler shaft, making sure that lockpin hole in shaft lines up with hole in case at same angle.

2) Using a new idler shaft lock pin, coat pin with Permatex and drive it in approximately 1/16" beyond flush-with-case position. Peen hole slightly to retain it in position. *(CAUTION–This lock pin must be a tight fit in case to prevent oil leaks).* Install idler shaft expansion plug in case, using a new plug when possible.

3) Place some cup grease on roller bearing area in each end of countergear and install the 25 rollers in each end, (the grease will hold rollers in place during installation). Install countergear assembly tool J-5777 in countergear. Lubricate thrustwashers with grease and place one at each end of gear. Insert countergear (with Tool J-5777) in transmission case and align tool with countergear holes in case. Lubricate countershaft and insert it in rear of case, pushing assembly tool out front of case. Turn countershaft so flat on end of shaft is horizontal and at bottom of shaft. Make sure front end of shaft is in line with hole in front of case and drive shaft in until flat on shaft is flush with rear of case.

►*CAUTION:* Flat on bottom of shaft must be horizontal and at BOTTOM or the transmission case extension cannot be assembled to transmission case. On OVERDRIVE equipped transmissions, flat must be horizontal and at TOP of shaft to engage overdrive adapter.

4) Install synchronizing clutch sleeve assembly, with first and reverse sliding gear, in transmission case. Install mainshaft assembly in transmission case or in overdrive adapter. Install transmission case gasket.

5) Align lugs on synchronizer rings with slots in mainshaft helical spline, and turn second speed gear on mainshaft so lugs on synchronizer rings slide in slots on gear. Push shaft into clutch sleeve until transmission case extension (or overdrive adapter) is tight against case. Install bolts and lockwashers.

6) Lubricate mainshaft pilot hole in clutch gear with cup grease and install the two groups of roller bearings (install the 14 group and small spacer, then the large spacer and the 24 group). After being assembled in pilot hole, these bearings will lock themselves in place and cannot fall out. Install clutch gear in transmission case.

7) Using a brass drift, tap outer race of clutch gear bearing until bearing locating ring seats against case, being careful to drive the assembly straight to prevent damage to mainshaft pilot and pilot bearing. *CAUTION–*During this operation make sure that synchronizer ring lugs line up with slots between clutch teeth on clutch gear.

8) Install clutch gear bearing retainer and gasket, making sure that oil slot in retainer lines up with oil slot in front face of case. Do not allow gasket to protrude beyond edge of retainer. Install retainer screws, using special shakeproof washers. Tighten retaining capscrews to 10-12 ft. lbs.

CHEVROLET OVERDRIVE

Pass. Car & Sedan Delivery (1955)
Half-T n Truck (1955 Sec nd Series)

►*OVERDRIVE TRANSMISSION OVERHAUL NOTE: Transmission overhaul is the same with or without verdriv . S "1955 Ch vrolet 3-Speed Synchro-mesh" f r transmissi n ov rhaul.*

DESCRIPTION: Solenoid operated type (no centrifugal pawls) with governor control and accelerator controlled "kickdown". Engagement and disengagement of overdrive is made by movement of the sun gear pawl. The solenoid plunger pushes the pawl in to engage sun gear for overdrive and withdraws the pawl for direct drive (direct drive below cut-in speed and "kick-down" direct drive). *See "Chevrolet Overdrive Control".*

►*OVERDRIVE REMOVAL NOTE:* Due to interference of X-member on convertible models, transmission and overdrive must be removed as an assembly for repairs. On other models all repairs to overdrive except those involving transmission mainshaft, overdrive adapter, or transmission rear bearing, can be made under the car with overdrive housing removed.

OVERDRIVE HOUSING: R moval–1) Place car on jack stands, remove drain plugs and drain transmission and overdrive. Disconnect wires from solenoid and governor switch. Disconnect cable from speedometer driven gear fitting.

2) Remove nuts and U-bolt retaining rear universal joint trunnion bearings to drive flange. Lower rear of propeller shaft and slide shaft to rear to remove universal joint front flange from output shaft. Remove speedometer driven gear fitting, gear and shaft.

3) Disconnect control cable from control lever. Drive

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CHEVROLET OVERDRIVE (C nt.)

out control shaft tapered pin and pull control shaft out.

4) Remove bolts and lockwashers attaching overdrive housing to transmission case and adapter and pull overdrive housing including overdrive output shaft and ring gear assembly to rear *(CAUTION–Be careful to keep adapter from pulling away from transmission case. If this happens, transmission mainshaft pilot bearings will drop out of clutch gear and necessitate disassembly of transmission).* As output shaft is pulled toward rear, catch the clutch rollers as they drop out of retainer.

5) Remove gasket from adapter and install one bolt removed from housing to hold the adapter plate to transmission housing.

OVERDRIVE DISASSEMBLY: 1) Remove governor and pinion if not previously removed. Pierce plug in rear bearing snap ring access hole in top of housing and pry out the plug.

2) Spread rear bearing snap ring with snap ring pliers and lightly tap end of shaft with a soft hammer to free bearing from snap ring, then pull shaft, including ring gear, speedometer drive gear and rear bearing from housing.

3) Remove shift rail retractor spring from housing and output shaft rear bearing snap ring. Press bushing from rear of housing, using tool J-5778.

4) Remove ring gear snap ring (large) and slide ring gear off shaft, (the oil collector ring is spun to shaft to provide an oil tight seal). Remove speedometer snap ring (small) from output shaft.

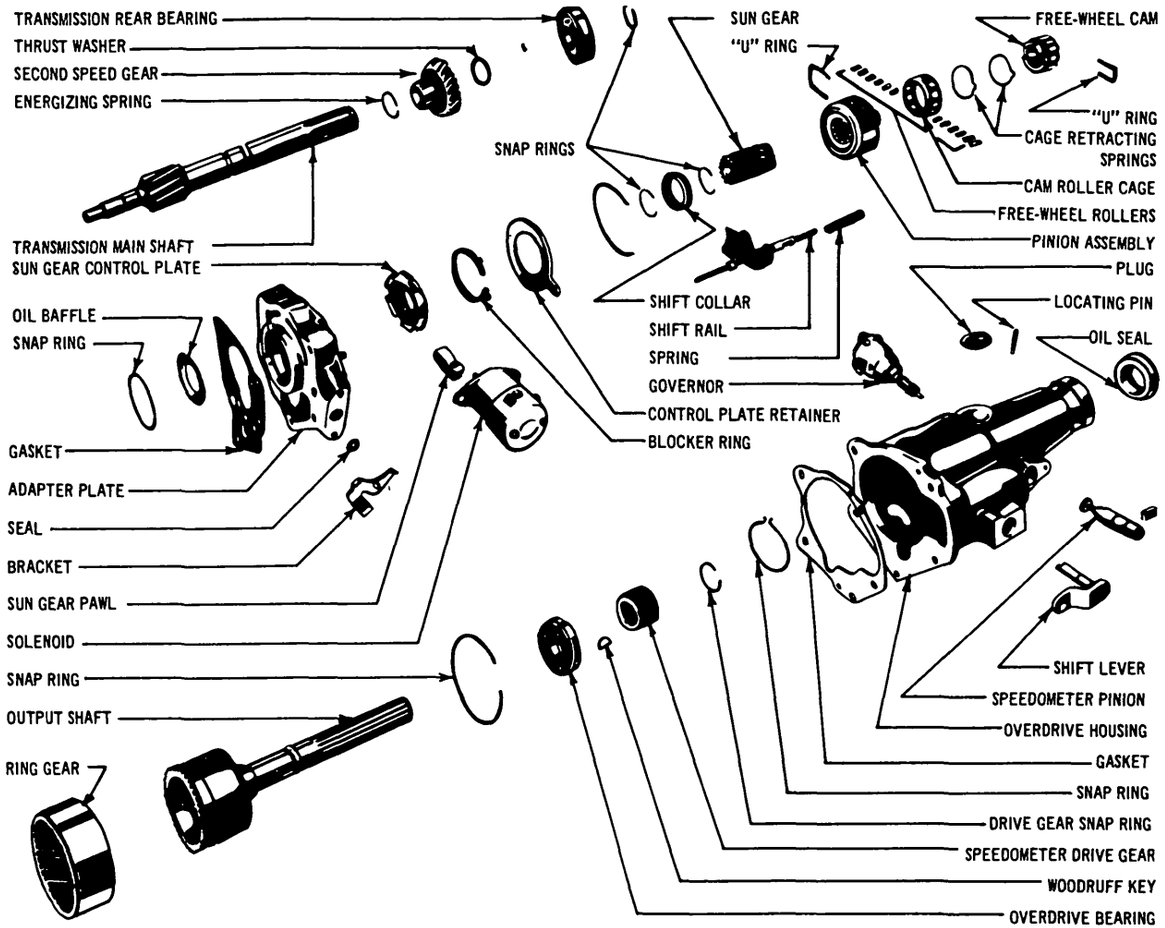
5) Support front face of bearing and tap end of shaft to start speedometer drive gear off shaft. *If necessary to use arbor press to start gear do not press shaft more than 3/8" through bearing or woodruff key in shaft may damage bearing.* Remove woodruff key and slide bearing off.

6) Disassemble parts remaining on transmission mainshaft as follows: Pull the "U" clips at each end of clutch cam and slide cam and roller retainer from pinion cage hub and transmission shaft. If roller retainer or cam is to be replaced, separate these pieces by pulling retainer out until hooked ends of spring can be pulled out of holes in cam.

7) Slide pinion cage assembly off sun gear and mainshaft. Remove sun gear and shift rail assemblies from shaft. Shift rail collar may be separated from sun gear by removing snap rings at either end of collar. Shift rail, fork, and spring may be separated by removing snap ring between cupped washer and shift fork.

8) Remove sun gear solenoid, oil seal and cable bracket. Remove large snap ring from adapter and remove sun gear control plate retainer. Then slide control plate and blocker ring out of adapter. If control plate or blocker ring is to be replaced they may be separated by pulling blocker ring off plate. Lift sun gear pawl out of adapter.

CLEANING & INSPECTION: Wash all parts thoroughly in solvent and blow dry with air. Inspect housing, shift rail retractor spring, snap rings, gears and bearings for cracks, defects or damage and substitute new



CHEVROLET OVERDRIVE (EXPLODED VIEW)

parts where necessary. If clutch rollers show surface markings of any kind, they should be replaced. Inspect "U" clips, control plate retainer, control plate, blocker ring and pawl for defects or damage.

Blocker Ring Fit & Tension on Hub–Push one end of ring toward the other. The ring should grip and hold to the hub. If ring does not hold when correctly installed (flat surface of ring facing out), it should be replaced. Push one end of ring away from opposite end and check frictional drag required to slide ring around hub as follows: (a) Hold one lug of control plate in a soft jawed vise and hook a spring scale into the notch of the nearest blocker ring lug. (b) Measure pull required to rotate ring after it has started moving. The pull should be 4-6 lbs. on new parts, which will fall to 1-1½ lbs. when thoroughly broken in. While low friction may be corrected by squeezing the ring together for a tight fit, installation of new parts is recommended.

Clutch Cam–Inspect clutch cam and if the 12 flat surfaces show slight lengthwise indentations, replace the cam. If rollers show markings of any kind, they should all be replaced. Test tension of cam retaining springs after the assembly has been thoroughly washed. *(NOTE–*The springs are designed to twist the cam to return the rollers to high side of the cam). Hold hub of cam and turn roller retainer counter-clockwise, then release retainer. The retainer should snap back quickly. If the action is slow or retarded, replace springs or the complete assembly. *(CAUTION–*If spring tension is weak or retarded, the unit will free-wheel at all times). When installing springs be sure both springs are coiled in the same direction (clockwise when looking toward flanged end of retainer), with "S" of springs hooked into holes in retainer and opposite ends hooked into holes in cam.

OVERDRIVE REASSEMBLY: 1) Insert sun gear pawl in adapter with notched side up. If blocker ring was removed from control plate, position ring on plate with

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CHEVROLET OVERDRIVE (Cont.)

surface of ring facing out, then start assembly over transmission mainshaft with ring toward rear. Slide the assembly into position with slot in ring toward sun gear pawl.

2) Slide control plate retainer over mainshaft against control plate and install snap ring in adapter. Install solenoid oil seal, solenoid and cable bracket.

3) Start the sun gear onto mainshaft. Hold shift rail so arm of fork fits in collar on sun gear and forward end of shift rail enters opening in adapter and transmission case. Slide both assemblies forward so pin in adapter locates the fork, and sun gear engages control plate.

4) Install pinion cage assembly over mainshaft and sun gear, turning cage assembly clockwise to engage sun gear. If free wheeling cam and roller retainer were separated, assemble these parts by positioning springs so both are coiled clockwise when looking at flanged end of retainer then place retainer over slotted end of cam, hook free ends of springs in holes in cam, turn retainer clockwise and push springs into place around cam.

5) Slide cam and roller retainer assembly over mainshaft and pinion cage hub. Install "U" clips at each end of free wheeling cam.

6) To reassemble overdrive housing, slide rear bearing straight on shaft with snap ring slot in bearing closer to ring gear end of shaft. Install woodruff key in shaft, start speedometer drive gear onto shaft and align keyway in gear with key in shaft. Tap gear tight against bearing and install small snap ring.

7) Engage ring gear on teeth of overdrive shaft and install large snap ring in ring gear. Using tool J-5778, install bushing into housing so it is flush with bore for seal.

8) Install output shaft rear bearing snap ring in slot in housing. Install shift rail retractor spring inside housing and insert a long 3/8" drift pin through spring to align spring with holes in housing. Slide output shaft assembly into housing until rear bearing contacts snap ring. Spread snap ring and push shaft in until snap ring engages bearing. Install new plug in snap ring access hole in top of housing.

OVERDRIVE HOUSING: Installation—1) Snap a tight fitting rubber band around clutch cam roller retainer, insert rollers under rubber band in retainer and, with low gear of transmission engaged, turn retainer and rollers counter-clockwise until rollers are in their low position.

2) Remove the one bolt holding adapter to transmission case and install gasket on case. Position shift rail so flat for control shaft faces outward, then start housing, output shaft and ring gear assembly into place with shift rail entering spring in housing. Slide housing against adapter. Install seven bolts and lockwashers to adapter and case.

3) Install control shaft lever oil seal, shaft and lever and connect control cable to lever. Install governor assembly and speedometer driven gear, shaft and fitting. Install propeller shaft.

OVERDRIVE CONTROL: *See "Warner R10 & R11 Overdrive Control" in 1954 Annual Data.*

CHEVROLET TRUCK 3-SPEED (HEAVY DUTY)

Half-Ton & 3/4-Ton Trucks (1954-55) Opt.
1-Ton Trucks (1954-55) Opt.

DESCRIPTION: Constant mesh synchro-mesh (second & high), sliding gear (low & reverse). Gears are helical design (except low & reverse).

REMOVAL OF TRANSMISSION: *See "Transmission" on Truck Model pages.*

DISASSEMBLY: 1) Secure transmission in heavy vise and remove the screws attaching side cover assembly to case and remove cover, shifting forks and gasket.

2) Place transmission in two gears at once to lock mainshaft and remove universal joint or yoke retaining capscrew, lockwasher and on ¾ & 1-Ton models, special washer. Slide yoke, speedometer driven gear and spacer from mainshaft. On ¾ & 1-Ton models, remove bearing support and rear oil seal from rear extension.

3) Remove clutch gear bearing retainer screws and washers and remove retainer and gasket. Remove bolts from rear extension and move extension away from case approximately ½", then rotate rear retainer to permit removal of countershaft.

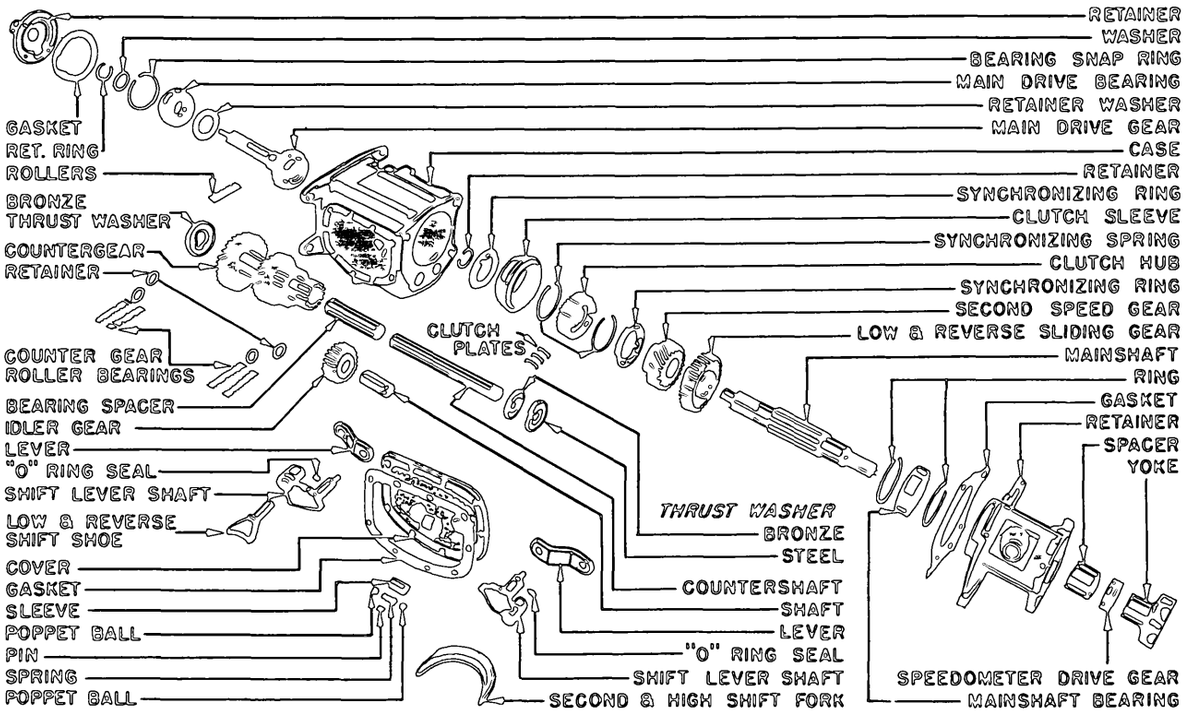
4) From front of transmission, drive countershaft to rear with tool J-5589 (NOTE—When rear end of countershaft clears case, remove the woodruff key to allow countershaft to clear rear bearing retainer). Remove countergear and leave tool J-5589 in the countergear to retain roller bearings.

5) Drop countergear down in case and remove rear bearing retainer, gasket and mainshaft assembly from rear of case. Remove snap ring from clutch shaft and press the clutch gear out of bearing. Remove oil retaining washer from clutch gear shaft, being careful not to lose the 14 roller bearings from gear end of clutch shaft. Remove snap ring from clutch gear bearing and tap bearing out through front of case.

6) Drive reverse idler gear to rear of transmission case and remove woodruff key, shaft and idler gear. Remove countergear assembly and thrust washers from case (CAUTION—Use care when removing countergear to prevent possible loss or damage of roller bearings). Remove roller bearings (80), bearing retainers and spacer from countergear.

Mainshaft & Rear Bearing Retainer Disassembly: Remove clutch hub retaining snap ring from end of mainshaft, and take off third speed synchronizer ring. Remove synchronizer sleeve from clutch hub and remove hub from mainshaft *(CAUTION—If relation of clutch hub and sleeve are not already marked, mark clearly to insure reassembly in the same location).* Remove the two synchronizer springs and the three clutch plates from hub. Remove synchronizer ring and second speed gear and low & reverse sliding gear from shaft. Remove mainshaft bearing snap ring and press shaft from bearing.

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CHEVROLET TRUCK 3-SPEED (HEAVY DUTY) SYNCHRO-MESH

CHEVROLET TRUCK 3-SPEED (HEAVY DUTY) (Continued)

►*REASSEMBLY NOTE:* Clean and inspect all transmission parts for wear or damage. If the second speed gear and idler gear bushings are worn or damaged, replace the complete assembly as the bushings are not furnished separately. Lubricate all parts before reassembly.

Mainshaft & Rear Bearing Retainer Reassembly: Press bearing on mainshaft with outer raised section of oil retainer toward front of shaft. Install bearing snap ring into rear retainer and install mainshaft and bearing assembly into rear retainer, securing it in position with the bearing front snap ring *(CAUTION– Make sure the front snap ring is a tight fit in groove. These snap rings are furnished in the following sizes for selective fitting: .088", .091", .094", .100").* Install speedometer gear spacer and speedometer driven gear. Install oil seal in rear bearing support with tool J-5154 and install bearing support to rear retainer on ¾ & 1-Ton models (oil slot in support goes toward bottom of retainer). Install sliding gear and second speed gear on mainshaft. Assemble synchronizer springs to hub with one end of each spring in same slot and outer end free. Install the three clutch plates to hub. Align marks made at disassembly on hub and sleeve and push synchronizer sleeve over clutch hub. Place synchronizer rings on the assembly, making sure slots are in line with the clutch plates, and place synchronizer assembly on the mainshaft. Install snap ring and check to see that gears rotate freely in synchronizer.

Side Cover Disassembly: Remove shifter forks from shift lever assembly and remove nut and lockwasher from each shift lever shaft. Remove outer levers and lightly tap shift lever shafts from assembly. Remove two steel balls, poppet springs, interlock pin and interlock sleeve from housing. Remove "O" ring seals from shift lever shafts.

Side Cover Reassembly: Install new "O" ring seals to shift lever shafts and install low and reverse shift lever to cover. Place shift lever in neutral position, middle detent, and install interlock sleeve, ball, poppet spring and interlock pin. Install remaining poppet ball and spring and then install second and third speed shift lever. Check clearance between end of interlock sleeve and shift lever cams when one lever is in neutral and the other is shifted into gear position. Clearance should be .001" to .007". Interlock sleeves are available in the following sizes to provide proper clearance: 1.0235", 1.0185", 1.0135" & 1.0085". Install outer shift levers to shafts with lockwashers and nuts and install forks to shift levers.

REASSEMBLY: 1) Insert spacer and countershaft assembly tool J-5589 into countergear. Install a double row of roller bearings (20 rollers in each row) and bearing retainers at each end of countergear. Place front and rear tabbed BRONZE washers on countergear. Place transmission in vise and install countergear in case through gearshift control housing opening (install large end first). Install a tabbed STEEL washer at rear of countergear between bronze thrust washer and case, and allow entire assembly to rest in bottom of case.

2) Install transmission case front bearing from front of case and install snap ring. Install the 14 roller bearings in mainshaft pilot recess in main driveshaft, retaining in place with a solidified lubricant. Install oil retainer washer next to gear on shaft, and install assembly into front case bearing by pressing or driving into place with tool J-5590. Install main drive gear special washer and snap ring on main drive shaft making sure that snap ring is a good fit in groove (six sizes of snap rings are available as follows for selective fitting: .086-..088"; .089-.091"; .092-.094"; .095-.097"; .098-.100"; .101-.103").

3) From rear of case, install idler gear, shaft and woodruff key. Install complete mainshaft assembly *(CAUTION–When installing mainshaft assembly make sure the pilot bearings in main drive gear remain in place and that one is not forced up into lubrication hole in in gear).*

4) Turn transmission over in vise and install countershaft and woodruff key from rear of case, driving it into position in countergear, forcing countergear tool J-5589 out front of case. Use care to avoid damage to thrust washers on countershaft.

5) Install maindrive gear retainer on front of case and check clearance between retainer and case to determine thickness of gaskets necessary to seal retainer to case (front retainer gaskets are furnished in .010" and .015" thicknesses and may be used in combination to provide a seal). Align rear extension with case and install lockwashers and capscrews.

6) Place synchronizer assembly in neutral position and low and reverse sliding gear in neutral position. Install side cover to case and at the same time enter second & high shifter fork in groove of synchronizer sleeve, and low and reverse shifter shoe in groove of sliding gear. Install a couple of side cover capscrews and check shifting operation. If operation all right, install remaining capscrews and tighten.

CHEVROLET 4-SPEED HELICAL GEAR (SYNCHRO-MESH)

1, 1½, 2-Ton Trucks (1948-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1952 REVERSE IDLER LEVER PRODUCTION CHANGE (For Eccentric Adjustment of Reverse Idler Gear)*—Transmission now includes an eccentric adjustment for positioning reverse idler gear. See "Reassembly" below for Gear Adjustment.

►*1952 & EARLIER ADJUSTABLE TYPE REVERSE IDLER GEAR LEVERS*—1948-Early 1952 4-Speed Synchro-mesh transmissions can be reworked to include eccentric adjustment for Reverse Idler Gear. Ream out the ½"—13 threaded hole at reverse shifter lever pivot to .500"—.503" diameter and install Eccentric Kit No. 3704888, consisting of Reverse Shifter Lever, Part No. 591949; Eccentric Bolt, Part No. 591950; Special Slotted Hex Nut, Part No. 591951; and Bolt Lock Nut, Part No. 591952. Eccentric is installed with nut and lock on outside of transmission case.

►*1953 4-SPEED TRANSMISSION PRODUCTION CHANGE:* To eliminate gear rattle, beginning with Transmission No. WP-34257 a .120-.125" annular groove in splined inside diameter which accomodates synthetic rubber friction strip and steel friction ring has been added to first and reverse sliding gear hub. Some transmissions prior to No. WP-34257 have groove, and ring and strip can be installed. Parts are available as follows: 1st & rev. Sliding Gear Assy., No. 3705458, Friction Ring, No. 591956, and Friction Strip No. 591955.

►**GEAR DISENGAGEMENT (1ST, 2ND, REVERSE) & HIGH GEAR NOISE (15-40 MPH):** May be caused by excessive clearance between splines of First & Reverse Sliding Gear and mainshaft. Check clearance when this trouble experienced, or when new parts installed, as follows: Disassemble transmission, re-install universal joint yoke on rear end of mainshaft and tighten attaching bolt. Clamp yoke in vise with shaft vertical. Slide gear on shaft splines, shifting gear on shaft to obtain best possible fit, position gear in approximate first-speed position on shaft (CAUTION—see that energizing lugs are not touching mainshaft), place a supporting block of wood under one side of gear. Mount dial indicator so that it contacts upper edge of gear at shifter yoke groove on opposite (unsupported) side of gear. Hold supported side of gear tightly against block, lift gear at point under dial indicator so that total play or rocking motion of gear indicated. This play or movement must not exceed .017". If gear fit satisfactory, mark matching splines on gear and shaft to insure installation in this position.

►**SHIFTER HEAD & YOKE PRODUCTION CHANGE:** Beginning Transmission No. RC-53869, mating tongues and grooves in Reverse Shifter Head and First-&-Second Shifter Yoke were removed and new type parts used as follows:

Reverse Shifter Head.....No. 591905
First-&-Second Shifter Yoke.....No. 591906

***INTERCHANGEABILITY OF PARTS*—New type yoke can be used in earlier transmissions with first type shifter head. If new type shifter head installed, new type yoke must also be used.**

►**LOCKING IN 3RD OR 4TH GEAR (Transmissi n before Serial No. SC-103207):** Caused by overshift condition permitting clutch keys to cock and ride up on bronze synchronizer cone. Correct by installing new design 3rd. & 4th. Speed Clutch Hub and Clutch Keys as listed below. On these parts, key slots in hub are machined at outer edges to provide shoulders to retain keys and prevent endwise cocking. Keys used with this hub do not have hump at sides and new square section retainer spring is also used. Install all new type parts as an assembly as follows:

Clutch Hub .....No. 591912
Clutch Key (3 used) .....N . 591913
Clutch Key Retainer Spring (2 used).....No. 591914

DESCRIPTION: Four speed type with helical con-

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CHEVROLET 4-SPEED HELICAL GEAR (SYNCHRO-MESH) (Continued)

stant-mesh, synchro-mesh gears (2nd, 3rd, 4th), sliding spur gears (1st & Reverse). Sliding 1st speed gear serves as the clutch member for engaging the 2nd Speed Gear.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

TRANSMISSION DISASSEMBLY: Remove transmission cover assembly (with complete gearshift mechanism) by lifting straight up off case. Take out Reverse Shifter Lever (remove nut, screw bolt out of case, remove lever, bolt spacer, and large flat washer). Remove clutch gear bearing retainer on front end of case, remove clutch gear using J-2669 Remover (CAUTION—index cutout section of clutch gear with countershaft driven gear for clearance). Remove synchronizer ring and roller bearing spacer from end of mainshaft. Remove speedometer pinion from rear bearing retainer. Lock mainshaft by shifting into two gears at once, remove universal flange retaining screw, lockwasher, plain washer, and flange. Take out retaining screws and remove rear bearing retainer. Install J-2667 Remover on rear end of mainshaft and pull shaft to the rear until rear bearing is free of case, use J-1619 Remover to remove bearing from shaft, then remove shaft and gear assembly through top of case (tilt forward end of shaft up, move 1st speed gear as far forward on shaft as possible). Drive reverse gear shaft locking pin through into the shaft (use small punch), then drive shaft out toward rear of case, lift reverse idler gear out of case. To remove countershaft, drive punch through front bearing spacer and pry spacer out. Use brass drift on forward end of countershaft and drive shaft to rear until rear bearing is free of case. Take out rear bearing retainer screws, lift off lock plate and retainer, use TR-278-R (Differential Side Bearing Puller) to remove bearing and oil deflector from shaft. Raise front end of countershaft and remove assembly through top of case. Remove chip collector from bottom of case.

Main Drive Gear (Clutch Gear) & Shaft: Lift out mainshaft pilot bearing rollers and roller retainer from recess in shaft. Mount shaft in vise, use special spanner wrench J-2670 to remove retaining nut, remove oil slinger and oil deflector. To remove bearing, use J-2228 press plate mounted in holder to press gear and shaft out of bearing. Install bearing with J-1453 press plate. CAUTION—Make certain oil deflector centered around retainer nut and stake nut after it has been securely tightened.

Mainshaft Assembly: To disassemble, remove retainer ring from pilot end of mainshaft, support assembly on 1st speed sliding gear in arbor press, press shaft out of gear cluster. Remove synchronizer key springs from synchronizer hub, remove outer sleeve from hub (CAUTION—do not lose the 3 keys). Remove synchronizer ring from 3rd speed gear, lift off gear, 2nd speed gear thrust washer, and 2nd speed gear. Remove synchronizing ring retainer from 1st speed gear, remove synchronizing ring. Wash all parts in cleaning solvent and inspect as follows:

Synchronizer—Outer sleeve should slide freely on hub but hub should be snug fit on shaft splines. Synchronizer rings and cones must not be scored, excessively worn, or damaged.

3rd Speed Gear—Gear should be running fit on bushing and bushing must be press fit on shaft. Thrust surfaces must not be scored or worn.

2nd Speed Gear & Thrustwasher—Washer and gear must not be scored or worn excessively on thrust surfaces. Replace synchronizer springs if broken or loose (use special rivets). Replace gear if bushing worn excessively. Inspect synchronizing ring for wear and scoring.

1st Speed Gear—Gear must be sliding fit on mainshaft splines. Synchronizer cone in gear must not be scored or worn excessively.

Countershaft Assembly: Gears can be removed from shaft by removing lockring on forward end and pressing shaft out in an arbor press. Install gears on shaft as follows: 2nd Speed Gear (radius end toward rear or low speed gear end), 3rd Speed Gear (may be installed either way), Revere Gear (chamfered end of teeth forward or toward driven gear), Spacer, Driven Gear. Use new Countershaft Drive Pins when installing gears, after all gears in place, drive pins 1/32" past flush with shoulder on driven gear hub. Select lock ring of correct thickness and install on shaft to retain gears.

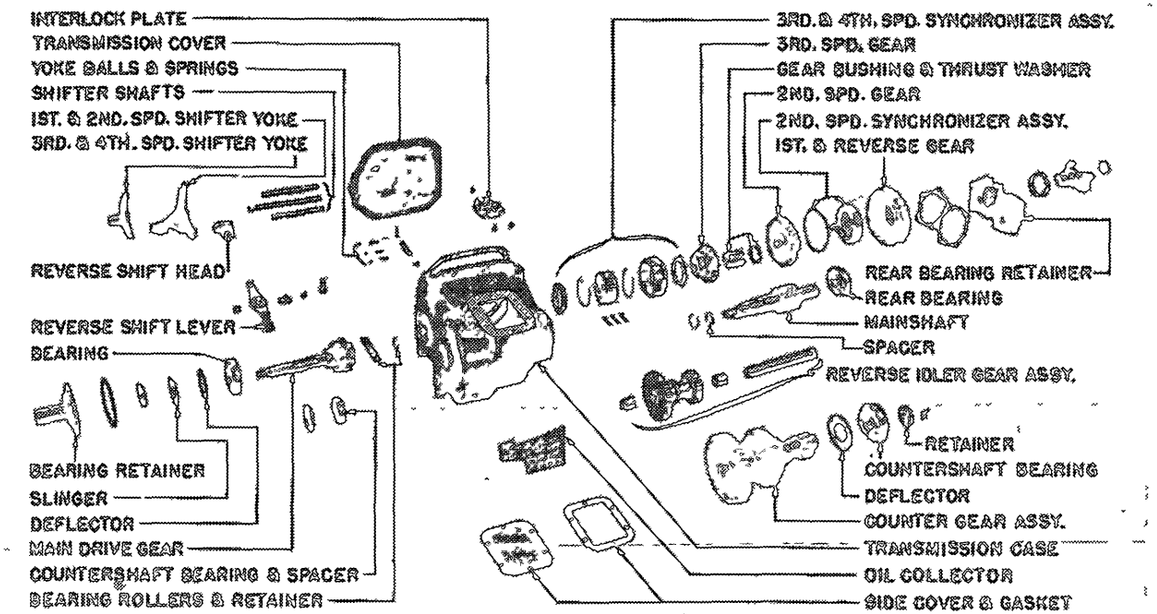
Countershaft Front Bearing—Press fit in case. To remove bearing for replacement, drive old bearing through into case using J-994 Differential Side Bearing Replacer. Drive new bearing in using same tool until it is flush with inner face of case.

Reverse Idler Gears: Replace bushings if worn. Remove old bushings with tool J-1614 (Pitman Shaft Bushing Remover). Press new bushings in (using same tool) until flush with ends of gear. Stake bushings in place with tool J-2680. (CAUTION—bushings are split type and may creep in service if not properly staked). Line ream bushings using J-2668 Reamer.

TRANSMISSION REASSEMBLY: Assemble in reverse order of disassembly, and note following:

Mainshaft Assembly: Install 1st speed gear on shaft with 2nd speed synchronizer forward (synchronizer ring must be held in gear hub by retainer ring), install 2nd speed gear with synchronizer springs toward synchronizer ring and prongs aligned with slots in gear hub, install thrust washer. Press 3rd speed gear bushing on shaft until it bottoms on thrustwasher. Check 2nd speed gear endplay which must be .012" plus or minus .003". Install synchronizer assembly (see data below), pressing clutch hub on shaft until it bottoms against shoulder on shaft. Check 3rd speed gear endplay which must be .012" plus or minus .002". Select lockring of correct thickness and install on forward end of shaft to retain assemblies. NOTE—This lockring furnished in four thicknesses and marked for identification as follows: .083",.087"—Red, .091"—Blue, .095"—Yellow.

Synchronizer Assembly—Install outer sleeve on hub with taper on sleeve toward long shoulder on hub, slip three synchronizer keys in slots, install spring on each side of hub to hold keys out against sleeve (CAUTION—Both springs must be installed in same relative position so that even tension applied on keys). When installing assembly on mainshaft, long shoulder on hub should be out toward pilot end of shaft and synchronizer keys must index with slots in synchronizer rings.



CHEVROLET TRUCK 4-SPEED SYNCHRO-MESH TRANSMISSION

CONTINUED ON NEXT PAGE

CHEVROLET 4-SPEED HELICAL GEAR (Cont.)

Reverse Idler Shaft & Lockpin: Drive shaft in from rear, aligning lockpin hole in shaft with hole in case Install lockpin to retain shaft

Main Drive Gear Bearing Retainer: When installing gear, align cutout portion of clutch gear teeth for clearance with countershaft driven gear Use new gasket under bearing retainer, use Permatex or other sealing compound on retainer screw threads and tighten these screws to 15-18 ft lbs

Mainshaft Rear Bearing Retainer: Use new gasket Coat retainer screw threads with Permatex or other sealing compound tighten screws to 20-25 ft lbs

Reverse Shifter Lever: Lever bolt has sleeve which acts as shoulder for lever to pivot on and must be installed as follows· Place reverse shifter lever in position, thread bolt with sleeve and flat washer through lever and into case from inside Tighten bolt to 25-30 ft lbs in case, then install bolt nut and tighten nut to 60-65 ft lbs

►*REVERSE IDLER GEAR ECCENTRIC ADJUSTMENT (1953 & Earlier Models with Eccentric Adjustment)*· Fully assemble transmission except for power take-off cover Proceed as follows Loosen eccentric nut, rotate eccentric using screw driver in slot in outer end of eccentric, until dot on end of eccentric bolt is to rear Shift transmission into 2nd gear Check for interference between reverse idler and 1st & reverse gear If interference exists, rotate eccentric in counter-clockwise direction to obtain approximately 1/32 running clearance (clearance can be observed through power take-off opening) Shift transmission into reverse and check for clearance between reverse idler gear and transmission case at rear If necessary, rotate eccentric an additional amount in counter-clockwise direction to obtain running clearance at this point Tighten eccentric to 40 ft lbs , and to next lock index

GEARSHIFT LEVER & COVER ASSY.: Gearshift lever assembly and transmission cover can be removed without removing transmission as follows

Gearshift Lever Removal: See Cab-Over-Engine Note below On all models, slide open side of K-353 Gearshift Lever Remover & Replacer over the lever and engage lugs on tool in open slot of retainer Press down on tool and rotate it to left to disengage lugs on retainer, lift lever out of cover Install lever by reversing this procedure

Cab-Over-Engine Truck Note—For access to lever, disconnect gearshift lever from top of engine cover, lower cloth boot wire and raise boot above transmission tower, remove nut from stub gearshift lever, raise lever link assembly from top of lever

Transmission Cover Removal (Except C-O-E): Remove accelerator pedal, floor mat and cover from body floor On forward control models, remove front floor pan Remove gearshift lever (see above) Take out capscrews and remove transmission cover

CHEVROLET TRUCK 4-SPEED (SPUR GEAR)

1½ & 2-Ton Trucks (1947)
Cab-Over-Engine Trucks (1947)

DESCRIPTION: Four speed, spur gear. Clutch shaft and main drive gear mounted on ball bearing at front end of transmission case. Mainshaft mounted on roller bearing at front, ball bearing at rear.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY (1947): Remove the gearshift lever using K-353 remover tool, engaging tool lugs in gearshift lever retainer slot and turning tool counter-clockwise to disengage retainer, lift lever out (see Cab-Over-Engine Note below). Remove transmission cover assembly. Lock transmission mainshaft by engaging two gears at once, remove speedometer driven gear, remove universal joint retaining screw on rear end of mainshaft, pull universal joint on ½ & ¾ Ton Models (on 1½ Ton model, take out bearing retainer screws and remove universal joint yoke and bearing retainer as an assembly—necessary because speedometer pinion installed on front end of yoke will not permit yoke to be pulled out through oil seal). Remove screws in main drive gear bearing retainer on front end of case, remove retainer, tap drive gear and bearing out through front of case (use soft steel drift to avoid damage to gear teeth). Remove mainshaft pilot bearing from front end of shaft, drive mainshaft and bearing out through rear end of case slipping the sliding gears off the shaft and removing these gears through top of case. Drive reverse gear idler shaft out through rear of case, remove idler gear. Drive counter gear assembly to rear until rear bearing and retainer clear rear of case, remove bearing and retainer, remove countergear through top of case. Drive out front bearing and retainer by tapping around bearing outer race

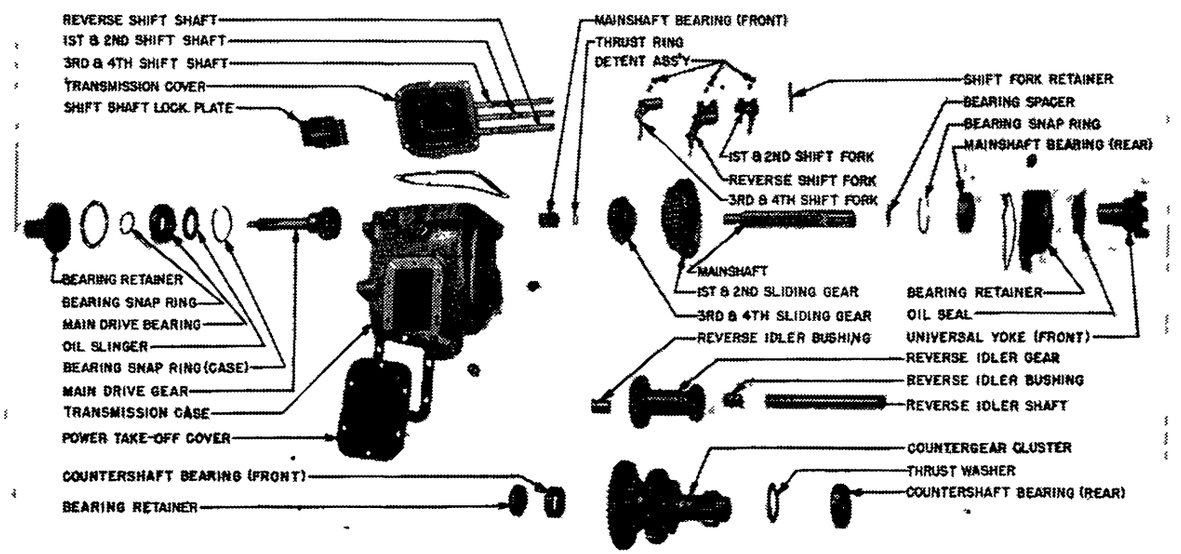
REASSEMBLY: Reverse disassembly directions and note following data on sub-assemblies:

Main Drive Gear & Mainshaft Bearings:—Bearings are press fit on shafts and should be removed and installed in an arbor press (remove snap ring from gear hub in front of bearing before pressing bearing off drive gear). When reassembling transmission, see that snap rings are in place in each end of case to retain bearings.

Countergear Assembly:—Low speed gear is integral with shaft, other gears are keyed on shaft with spacers to position each gear. If gears removed from shaft, assemble gears and spacers in this order: Second Speed Gear (chamfered side toward low speed gear), ¼" Spacer, Third Speed Gear (chamfered side away from second speed gear), ⅞" Spacer, Reverse Gear (chamfered side toward third speed gear—chamfered sides of these two gears face each other), 5/32" Spacer, Counter Drive Gear. The round keys should be used to keep keyways lined up while pressing gears on shaft. After gears installed, drive keys down 1/32" below flush with gear, prick-punch keys and remove all burrs

Countergear Endplay—When installing countergear, check clearance between rear thrust washer and shoulder on gear. Endplay should be .015-.045" If clearance greater than .045", install shims between front bearing and retainer.

Reverse Idler Gear & Bushings:—Use special tool J-1662 to remove old bushings and install new bushings in idler gear. Ream new bushings with KMO-349 Reamer to provide minimum shaft clearance of .002" (bushing size .877-.878").



CHEVROLET TRUCK 4-SPEED SPUR GEAR TRANSMISSION

CHRYSLER, DESOTO, DODGE FLUID DRIVE

Chrysler 6, DeSoto (1946-53)
Chrysler 8 (1946-53)
Dodge 6 (1946-54)

▷*NOTE: Not used when Fluid-Torque Unit installed.*

▷INSTALLATION OF FLUID DRIVE SEAL DAMPER (To correct squeal on Early 1946 Chrysler 6 & 8, DeSoto, & Dodge Cars with carbon type seal). To correct complaints of a "squeal" in this seal, install seal damper as follows: With Fluid Drive unit removed from car (see directions below), remove clutch plate nut using tool C-607. Pull clutch plate using tool C-665. Remove snap ring and seal spring (use sleeve C-613 and clutch plate nut to relieve spring tension). Install damper (consists of a ribbed sleeve) on inner end of spring, re-install spring, spring retainer, and snap ring. Reassemble fluid drive unit and re-install in car.

▷FLUID DRIVE SEAL NOTE: Both "Bellows Type" and "Housing Type" seals have been used. *See illustration and seal installation data.*

DESCRIPTION & OPERATION: The Fluid Drive (Fluid Coupling) Assembly consists of a self-contained, factory-sealed assembly which is mounted on the rear end of the crankshaft in place of the conventional flywheel (unit has ring gear for starter mesh on outer rim and separate clutch driving plate for clutch mounting bolted on end of runner shaft at rear end). The case and integral 'driver' vanes rotate with the crankshaft and transmit power to the 'runner' or free vane assembly within the case without any mechanical connection through the oil with which the case is filled. The 'Runner' is integral with the hub (short hollow shaft extending through rear of case with clutch driving shaft mounted on rear end) and is mounted on a large ball bearing within the fluid drive case at the forward end and piloted on the clutch shaft at the rear end (clutch shaft mounted on needle bearings within runner hub at each end). Oil leakage is prevented by spring-loaded Sylphon Assembly and Sealing Ring.

1946 & Later Note—A Driver Flange Plug is installed in the forward end of the driver hub (or the fluid drive case is continuous at this point) to prevent leakage and no rubber grommets are required on the mounting bolts. Fluid drive housing is provided with cooling fins.

Chrysler 6, DeSoto, Dodge Note—On these cars, Runner Hub Nut, which retains clutch driving plate is threaded in end of hub (no leather oil seal used). A leather type oil seal is installed within the retainer nut on Chrysler 8 Cylinder cars to prevent leakage at this point.

FLUID DRIVE ASSEMBLY REMOVAL & INSTALLATION: Unit should be removed as an assembly and all service work performed on the bench.

Removal (All Models): Remove transmission (see Transmission Removal on car model pages), remove clutch release bearing, clutch housing pan, and dust shield. Remove clutch (see Clutch Removal on car model pages). Take off nuts on mounting bolts on front face of crankshaft flange (use special box wrench C-589), pull fluid drive unit back free of the crankshaft flange and remove from below.

Installation (1946 & Later Cars): Clean back face of crankshaft flange and mating face of fluid drive unit thoroughly (remove all burrs, dirt and other particles), place fluid drive unit in position on crankshaft flange and install mounting nuts, tighten nuts evenly to torque of 135-145 ft. lbs.

SERVICING:—Unit is sealed and no adjustment required. Service operations are restricted to keeping unit filled with oil (inspect at end of first 1000 miles and at 10000 mile intervals in service) and renewal of seal parts to correct leakage.

Checking Oil Level: Fluid drive case filled to 80% volume and level should be checked as follows to prevent overfilling. Turn crankshaft until one fluid drive filler (2 plugs—180° apart) is at filler hole in upper right hand surface of clutch housing, remove filler plug. Fluid level should be even with bottom of filler plug opening. Add fluid as required

▷*CAUTION: Always check fluid with unit COLD.*
Capacity—Approx. 8 qts. (8's), 6 qts. (6's).
NOTE—Use only Mopar Fluid Drive Fluid.

Bellows Type Seal Ring & Sylphon Assembly Renewal: Remove fluid drive unit (see Removal) and drain. Bend down tab on lockwasher, use special socket wrench C-607 (Chrysler 6, DeSoto, Dodge), C-541 (Chrysler 8) and remove clutch driving plate retainer nut. Mark one spline on runner hub and mating spline on clutch driving plate (to insure reassembly in correct position), use special puller C-665 (Chrysler 6, DeSoto, Dodge), C-692 (Chrysler 8) to remove clutch driving plate. Use special bellows seal spring compressing sleeve C-613 (Chrysler 6, DeSoto, Dodge), C-614 (Chrysler 8) to compress spring within bellows (use clutch driving plate retainer nut to push sleeve in to compress spring), remove spring retainer snap ring, remove nut, sleeve, and spring (CAUTION—Spring must be removed before bellows seal removed or seal will be damaged). Use special spanner wrench C-545 to unscrew bellows seal, remove bellows seal and floating seal ring.

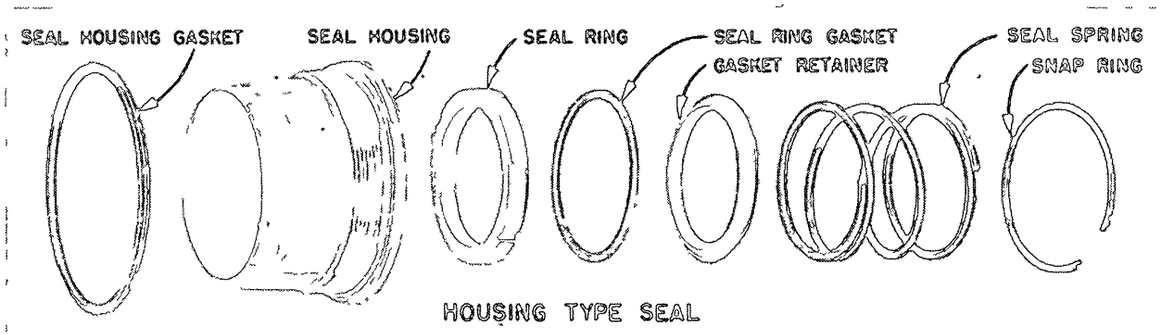
IMPORTANT NOTE—Bearing surfaces on Sylphon and Sealing Ring must be smooth and show continuous line of contact over entire circumference. Replace Sylphon and Sealing Ring if surfaces damaged in any manner (rough, scratched, or marred).

Installation—Install sealing ring and sylphon seal (see that gasket in place), tighten bellows retainer securely. Install seal spring (and damper—see Seal Spring Damper Note below), and retaining snap ring (use sleeve to compress spring so that retainer can be installed), install clutch driving plate making certain that marks on plate and runner hub are lined up, tighten clutch driving plate retainer nut securely. Fill unit with fluid (see directions above. Install Fluid Drive unit on car.

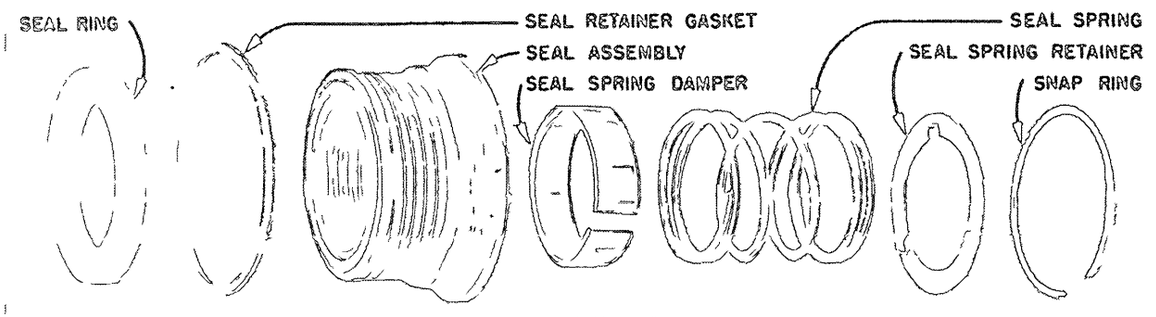
Seal Spring Damper Note (All Cars with Carbon type Seal)—Damper consists of a ribbed sleeve which should be installed on inner end of spring before spring is installed in bellows, and this assembly should be rotated counter-clockwise while it is being installed.

Housing Type Seal Ring Assembly Renewal: Remove fluid drive unit (see Removal) and drain unit. Bend

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HOUSING TYPE SEAL



BELLOWS TYPE SEAL

CHRYSLER, DESOTO, DODGE FLUID DRIVE (Cont.)

back tab on lockwasher, use special socket wrench C-607 to remove drive plate retainer nut, use Puller C-665 to remove drive plate (CAUTION—remove key). Clean area on fluid drive adjacent to seal ring. Use towel or other cloth to protect hands while prying out snap ring (CAUTION—spring will spring out if not restrained), remove snap ring and spring. Use special Spanner Wrench C-545 to unscrew seal housing (screw retainer nut on hub above wrench to hold wrench in place), lift out seal housing, seal ring gasket, and seal ring gasket retainer. Lift out seal ring (use two pieces of wire bent to form hooks).

►*CAUTION: Use care not to scratch or damage sealing faces and do not attempt to remove seal housing without first removing snap ring and spring.*

Installation—Make certain that sealing surfaces are clean and free from scratches, **replace seal ring** if surface is damaged (surfaces can be cleaned with cloth followed by chamois applied with soft pressure preferably eraser end of a pencil but no attempt should be made to recondition these surfaces.) Remove all burrs from spanner wrench slots, chamfer, top edge of bore, and snap ring groove. Screw seal housing in place finger tight so that gasket contacts seal housing flange and machined face on back plate. Wipe seal ring clean with chamois and install ring using tools SP-788 and SP-791 (place seal ring squarely on locators of aligning tool SP-791, insert in seal housing with button on tool aligned with wrench slot nearest center punch mark, slide pilot sleeve down inside tool and push seal ring off onto the two small indentations at the bottom of the seal housing), remove installing tools. Install seal ring gasket, gasket retainer (angular face down), and spring. Use special tool C-884 to compress spring and install snap ring. Tighten seal housing with spanner wrench to 270 ft. lbs. torque. Install drive plate and key, tighten retainer nut securely and lock nut by bending edge of washer up and center-punching washer at drive plate hole.

Fluid Drive Bushing Replacement: Remove old bushings by first removing the clutch driving plate nut (special socket wrench C-607). **Do not remove clutch driving plate.** Pull outer hub bushing with special puller, sleeve, and expansion jaw (C-680 tool kit). Remove inner bushing similarly using puller and expansion jaw without sleeve. Clean inside of hub thoroughly.

Bushing Installation—Place new Inner and Outer Oilite Bushings on special drift C-708. Position drift in fluid drive hub, drive bushings into hub with a mallet until bushings are firmly seated. Bushings will be burnished by the tool as it is withdrawn. Reinstall clutch driving plate nut, tighten nut securely and lock it by bending edge of washer up. CAUTION—Use only Oilite bushings for replacement.

Fluid Drive Bearing Replacement: When replacing needle roller bearings (used on some cars), install new Oilite bushings as replacement. See Bushing data above.

FLUID DRIVE SLIPPAGE TEST: To determine definitely if fluid drive coupling slipping, connect one wire of motor analyzer tachometer to distributor and other wire to a good ground. With engine properly tuned, apply hand brake and foot brake firmly, place transmission in direct drive, operate engine with wide open throttle and note speed. (CAUTION—Above test should not take more than one minute. If test prolonged seal may blow off and leakage result.) If engine speed excessive (1100 RPM De Soto and Dodge), slipping is occuring. Check fluid level in coupling. (CAUTION—Do not check level until coupling has cooled off.) Fill to correct level, repeat test. Check for oil leaks if fluid level found low.

STARTER RING GEAR REPLACEMENT ON FLUID DRIVE: Removing Old Ring Gear—With fluid drive unit removed from car, use hacksaw to cut six weld spots around ring gear parallel with back face of gear and to within 1/16-1/32" of the housing using care **not to cut too deep.** Scribe a line around housing at back face of gear (for use is positioning new gear), drive ring gear off using a heavy drift and hammer with fluid drive unit resting face down on bench. Remove all remaining weld material from housing with a bastard file (CAUTION—do not file more than necessary to remove weld material).

Installing New Ring Gear—Heat new ring gear to uniform temperature of not more than 212°F. (see Heating Note below), place gear on fluid coupling with chamfered teeth up (pointing to front), use rawhide mallet or fibre block to drive gear down until scribed mark on housing is just visible above gear. Check gear position with aligning gauge C-896 placed in crankshaft counterbore. Clearance between gauging leg and face of gear should be uniform and should not exceed .020" (use .020" feeler gauge as "No Go"). Adjust by tapping gear up or down on housing. Reweld ring gear at same spots used previously applying **equal amount of welding material at each point to maintain balance and using ARC welding equipment only.**

►*CAUTION—Arc should be directed at approximately 45 angle from face of gear to avoid burning through housing, and GAS WELDING EQUIPMENT MUST NEVER BE USED.*

Heating Note—Use Oven C-794 or submerge gear in boiling water for approximately 5 minutes. If torch used, direct flame at outer face of ring gear at inner diameter **not on the gear teeth** and use drops of water on ring gear to check temperature (gear will probably be expanded enough for installation before water begins to boil).

CHRYSLER, DESOTO, DODGE, PLYMOUTH SYNCHRO-MESH

Chrysler, DeSoto, Dodge, Plymouth—All Models with Synchro-mesh Trans. (1946-55)—See Note.

Chrysler 6 & 8, DeSoto (1946-48)—*See "Chrysler Hydraulically Operated, DeSoto Tip Toe Shift Transmission.*

Chrysler 6 & 8, DeSoto, Dodge (1949-53)—*See "Chrysler Prestomatic & Fluidmatic," "DeSoto Tip-Toe Shift," "Dodge Gyromatic" Transmissions.*

Chrysler, DeSoto, Dodge, Plymouth (1954-55)—*See "PowerFlite" Transmission.*

►*1953 PLYMOUTH HY-DRIVE NOTE*—Transmission used with Hy-Drive is similar to, but not interchangeable with this standard synchro-mesh transmission.

►*1955 PLYMOUTH TRANSMISSION PRODUCTION CHANGE (Some P-26 & P-27 Models):* A three-speed transmission identified by the letters "CK" stamped on the left side of the case (following date) has different gear ratios for increased speed in second gear. *NOTE—Some parts in this transmission are not interchangeable with the other model transmissions.*

►*PIN-TYPE SYNCHRONIZER NOTE*—This type assembly, Part No. 1326778, used on some transmissions (in place of "Plate Type" Synchronizer). Transmissions with Pin-Type Synchronizer can be identified by letters "PT" on date line of transmission case. See "Synchronizer Assembly" below.

►**HARD SHIFTING CORRECTION:** If hard shifting complaints can not be corrected by transmission control adjustment, replace original type stamped synchronizer plates with new solid machined type plates (furnished in package with needed springs). *See Transmission Disassembly and Reassembly data below.*

DESCRIPTION: Own Make, constant-mesh synchro-mesh, all helical gear type (sliding gear for low-reverse).

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

OVERDRIVE DISASSEMBLY NOTE: When used, overdrive adapter plate is fastened to overdrive case by special screws installed in recesses in front face of adapter plate. Overdrive and adapter must be removed as an assembly (after taking out capscrews mounting adapter on rear of transmission case) before adapter plate can be removed (use special wrench C-577 to remove the three screws which mount the adapter plate on the overdrive case. *See Warner Overdrive for all Overdrive data.*

DISASSEMBLY OF TRANSMISSION: On cars with Power Shift, disconnect link and remove power shift assembly. Then remove speedometer drive pinion, remove nut on rear end of driveshaft. pull universal joint yoke flange and brake drum assembly. Take out two plugs on transmission side cover, remove detent balls and springs, remove cover and gear selector assembly. Unscrew shifter fork guide rail and remove guide rail through front end of case. See that gears in neutral, take out lockscrews holding shifter forks on shift rails, remove welch plug in lower shifter rail hole on front of case (collapse plug by striking in center with punch), remove shifter rails through front of case, lift out shifter forks (use care not to lose gear selector balls). Remove interlock plug on top of case (drive plug down into interlock hole), lift out the interlock plunger. Take out the four capscrews in extension housing on transmission case, remove extension and mainshaft assembly through rear of case using care that synchronizer assembly does not slide off shaft. Use special arbor C-578 and soft hammer to drive countershaft out toward rear of

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CHRYSLER, DESOTO, DODGE, PLYMOUTH SYNCHRO-MESH (Continued)

case (remove locking key from shaft as soon as it is exposed at rear of case), allowing counter gear cluster to drop down in case. Take out mounting screws and remove main drive gear bearing retainer from front end of case, pull main drive gear and bearing assembly out toward front. Lift counter gear cluster, thrust washers, and bearing rollers out of case. To remove reverse idler, drive shaft out toward rear using special arbor C-464 to retain bearing rollers in gear (remove locking key from shaft when exposed at rear of case), lift out idler gear thrust washers, and bearing rollers.

REASSEMBLY OF TRANSMISSION: Reverse disassembly directions (above) and note following data on servicing of sub-assemblies.

Mainshaft & Bearing Assembly:—To remove mainshaft from extension housing, take out snap ring at forward end of synchronizer unit, remove synchronizer assembly, second speed gear, and low speed gear from shaft. Remove snap ring in housing in front of bearing outer race, withdraw shaft from housing, then remove bearing, spacer, and speedometer drive gear from housing. Remove oil seal and bearing from rear end of housing (bearing is press fit in housing and is positioned by spacer on shaft—no snap rings used). When reassembling mainshaft, use new snap rings. If oil seal being replaced, soak leather in thin oil for 30 minutes and work leather with smooth bar. Seal must protrude 7/32" from end of case (use C-579 drift to install seal) to prevent damage to seal and bearing.

Plate Type Synchronizer Assembly: Install struts or shifting plates in slots in inner clutch sleeve with open face of strut in, assemble outer clutch sleeve and synchronizer springs making certain that hooked ends of both springs engage same strut, install synchronizer rings with notches engaging ends of struts. Synchronizer assembly is retained on shaft with second speed gear by single snap ring.

Pin-Type Synchronizer Assembly: Index etched mark on clutch gear with mark on clutch gear sleeve. (CAUTION—these parts selectively fitted and alignment necessary to insure free sliding fit). Install Stop Ring Inner Assembly with pins extending through holes in sleeve, then place assembly on transmission mainshaft with flat face of clutch gear toward second speed gear (opposite face has raised surface), install Stop Ring Outer Assembly with pins extending through the second set of holes in sleeve. When assembling transmission make certain that Spreader Spring is correctly installed.

Second Speed Gear:—Gear endplay on shaft should be .003" min., .008" max. To install gear, place gear on shaft, install synchronizer assembly, install snap ring in groove in shaft in front of synchronizer.

Main Drive Gear & Bearing:—Bearing retained on shaft by snap ring and can be removed after snap ring taken out and thrust washer removed. Use new snap ring when re-installing bearing. Mainshaft pilot bearing rollers are retained in drive gear recess by snap ring. Use cup grease to hold rollers in position until mainshaft is installed.

Counter Gear Cluster:—When replacing this assembly, use arbor C-578 to position bearing rollers and pack rollers with cup grease to hold rollers in place. Install steel washer next to gear cluster at each end and bronze thrust washer between steel washer and case. Endplay should be .002" min., .008" max. Adjust by selecting washers of correct thickness (furnished in three thicknesses—'A' thinnest, 'B', 'C' thickest). Make certain that locking key is in place in slot in rear end of countershaft.

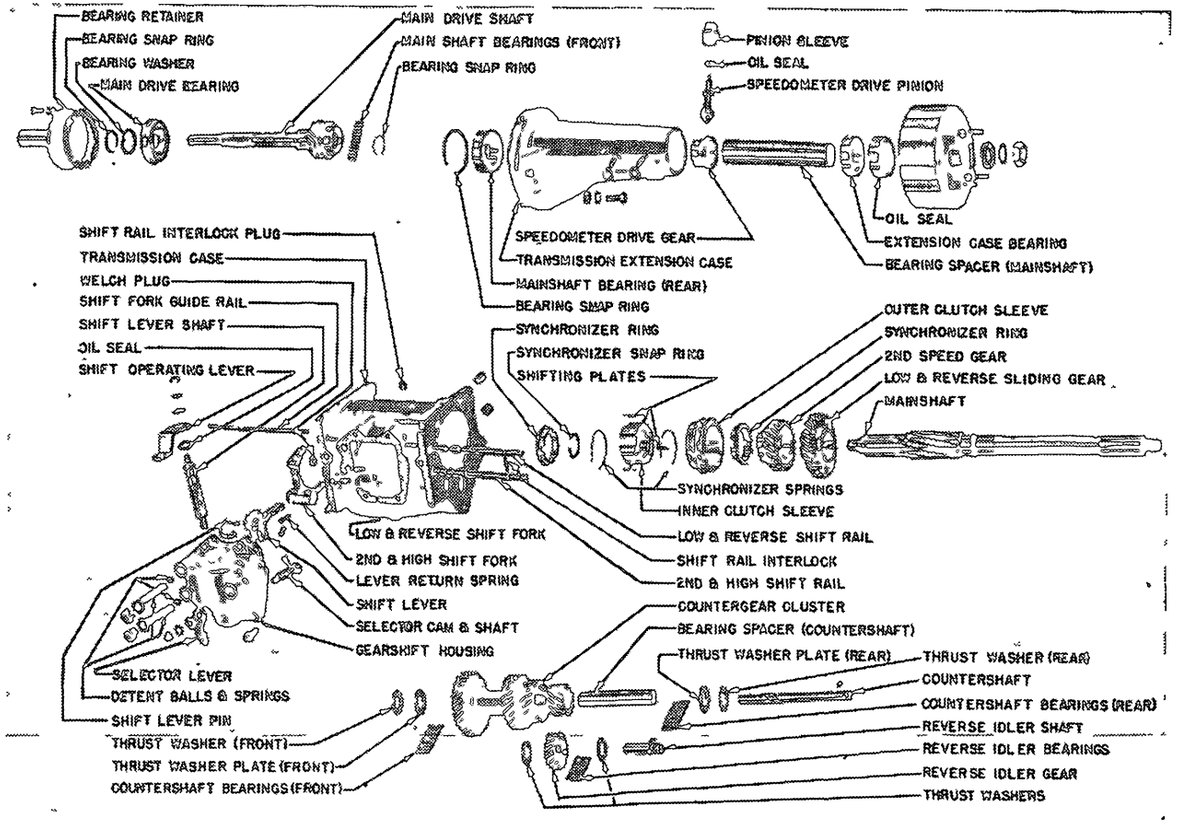
Reverse Idler Gear:—Use C-464 arbor to retain bearing rollers when idler gear being installed. See that thrust washer installed at each end of gear and that locking key is in place in rear end of shaft.

Oil Seal Replacement: Use Puller C-497 to remove old seal and special drift to install new seal. This drift will locate seal in correct position (protruding 7/32" from housing).

Gearshift Mechanism:—To assemble gearshift mechanism, hold shifter forks in position and insert guide rail through front end of case. Install lower shift rail, insert interlock plunger down through hole in top of case so that plunger engages groove in shift rail, then install upper shift rail (see Note below). Lock shifter forks to rails by installing lockscrews and locknuts, make certain that locking washers are crimped in place. Install welch plug in forward end of lower shift rail. CAUTION—This hole is below lubricant level and plug must be installed tightly to prevent lubricant loss. Install two C-590 cover locating pilots in cover screw holes on case, install cover and gear selector assembly, making certain that selector lever enters shifter fork slots. Install two cover capscrews, remove pilots, install remaining cover screws. Install detent balls and springs, tighten retaining plugs. Install new plug in interlock plunger hole (cup shaped plug), driving the plug in with a hammer.

See Chrysler Transmission Control articles for adjustment directions when transmission installed on car.

Shift Rail Note—Rails are similar in appearance but Low-Reverse rail has detent grooves farther apart. This rail should be installed on top.



CHRYSLER, DE SOTO, DODGE, PLYMOUTH SYNCHRO-MESH TRANSMISSION

DESOTO, DODGE, PLYMOUTH (WARNER R10) OVERDRIVE

DeSoto, Plymouth (1952-55)
Dodge (1953-55)

DESCRIPTION: Similar to other Warner R10 Overdrives.

►***DISASSEMBLY CAUTION—To disassemble overdrive, standard transmission must be disassembled to gain access to screws holding adapter plate to O.D. housing.***

REMOVAL: *See "Overdrive" on car model page.*

OVERDRIVE DISASSEMBLY: Remove handbrake drum, gearshift housing, shift forks, and rail guide from standard transmission. Remove governor, lockout switch, and speedometer pinion from overdrive housing. Remove four screws that hold overdrive unit and adapter plate to transmission. Tap adapter plate with rawhide hammer to loosen it from transmission. Drive tapered pin from overdrive housing. Pull control shaft out as far as possible to disengage it from shift rail. Rotate shaft ¼ turn counter-clockwise to hold it in position. Remove two recessed screws and lockwashers from front face of adapter plate. Tap end of overdrive mainshaft with soft hammer to free it from bearing. Separate overdrive unit assembly from overdrive case by carefully sliding housing from overdrive mainshaft to prevent spilling overrunning clutch rollers. Remove retractor spring and sleeve from housing. Disassemble units as follows:

Rear Bearing Oil Seal: Use Puller C-748 to remove seal from housing. Use Tool C-579 to install new seal. Seal must extend 9/32" from end of housing.

Rear Bearing: Remove front and rear snap ring, drive bearing from housing with driver C-3204. Install bearing open end first, with driver C-3204. Use new, selective fit, snap rings to eliminate endplay.

Control Shaft Oil Seal: Remove control lever from control shaft, pull shaft out from inside housing. Pry out seal, install new seal with tool C-3198.

Mainshaft & Ring Gear Assembly: Carefully remove ring gear and shaft assembly from over-running clutch to avoid spilling rollers. If necessary to replace outer race or ring gear, pry off snap ring and remove ring gear from outer race.

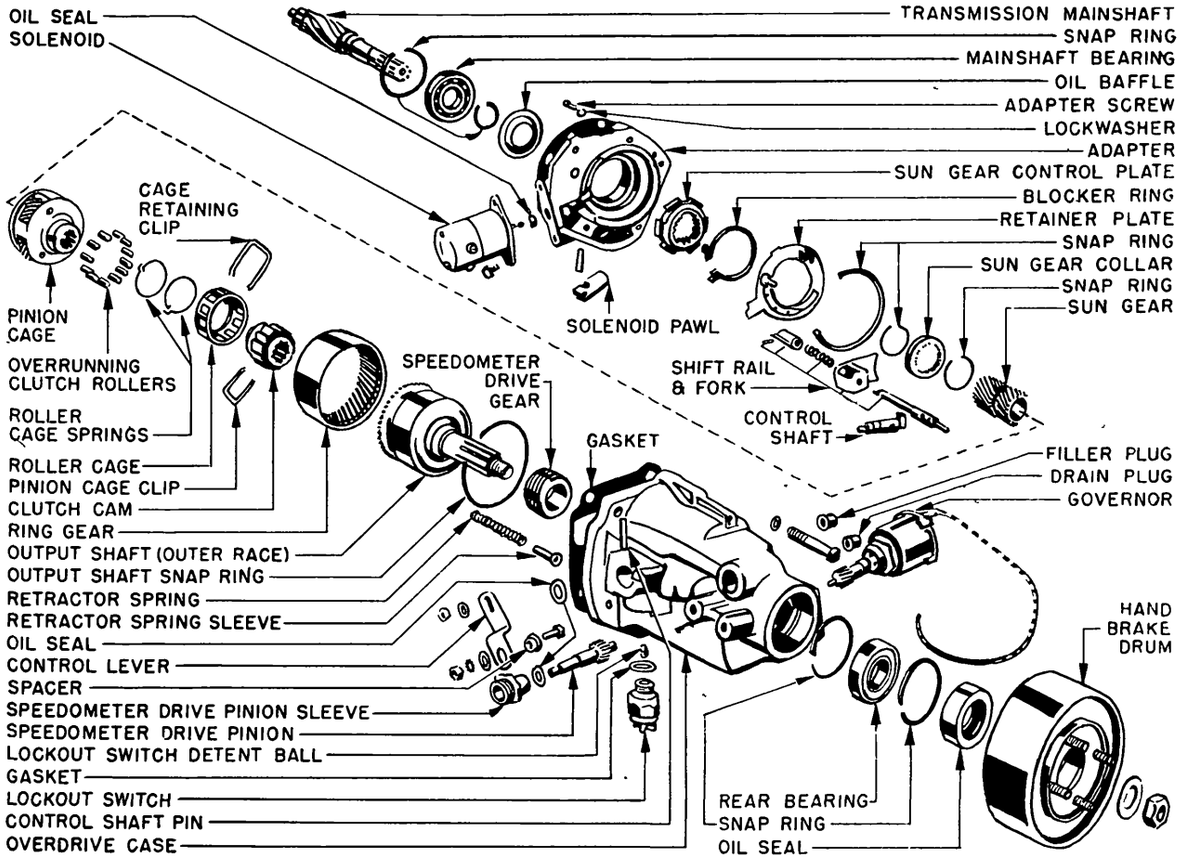
Pinion Cage & Over-running Clutch: Remove clutch cam retaining clip, slide clutch and pinion cage assembly from transmission mainshaft splines. Pry off pinion cage retaining clip. If necessary to replace rollers, replace all (12). Replace clutch cam if any marks or indentations. Do not separate cam from retainer unless necessary for parts replacement. Pinion cage cannot be disassembled.

Pawl Rod Oil Seal: Remove old seal with screwdriver. Install new seal with driver C-3207.

Sun Gear & Manual Control Fork: Slide gear and fork from mainshaft at same time. Pry off forward snap ring, remove shift collar from sun gear.

Sun Gear Control Plate & Balk Ring: Remove adapter snap ring and retainer plate from adapter. Test balk ring spring tension by hooking scale on one finger of balk ring (should be 3½-5½ lbs. with ring moving). To install, place embossed face forward against control place. Install assembly in adapter plate. Control pawl should index exactly with notch in both fingers of balk ring.

Adapter Bearing: Remove snap ring holding bearing in adapter plate. Remove mainshaft, bearing and oil baffle, then small snap ring. Press bearing from shaft. Install bearing with tool C-3194.



DE SOTO, DODGE, PLYMOUTH OVERDRIVE ASSEMBLY

OVERDRIVE REASSEMBLY: Assemble as follows:

Adapter Plate: Install oil baffle in adapter with pressed out section toward rear. Install transmission mainshaft and bearing in adapter plate, secure assembly with selective fit snap ring **(loose bearing may result in partial engagement or interlocking gears).** Install interlock plunger in adapter and control pawl in cavity (notched side up) to engage plunger. Slide sun gear control plate and balk ring into position **with engaging end of locking pawl between open ends of balk ring.** Slide retainer plate over mainshaft into position in adapter **with ear of plate in slot provided.** Secure with new snap ring.

Sun Gear & Shift Fork: Slide gear on transmission mainshaft. Engage shift fork in sun gear shift collar. Guide shift rail into its hole in adapter and mesh sun gear with control plate.

Pinion Cage & Over-running Clutch: Assemble clutch cam and roller cage to pinion cage retaining clip. Slide assembly on splines of mainshaft, install clutch cam retaining clip. Be sure clip notches into groove at end of mainshaft. Apply grease to pockets of roller retainer, insert 12 rollers.

Mainshaft & Ring Gear Assembly: Hold mainshaft with one hand. With other hand turn shaft counter-clockwise, push ring gear into mesh with pinions. *CAUTION—Do not force mainshaft. Roller may be dislodged causing damage to unit.*

Retractor Spring & Control Lever: Slide tool C-3195 into manual control shaft oil seal from outside case. Insert control shaft from inside case, cam pointing up. Push shaft into tool, through oil seal and out of case as far as possible. Remove tool, slide control lever on end of control shaft (offset away from case, pointing down). Install washer and nut. With control shaft pulled away from case as far as possible, install retractor spring and sleeve.

Overdrive Case: Install new gasket, guide case over end of mainshaft. Ease shift rail through hole in case and retractor spring. Line up gasket, secure assembly with adapter screws and lockwashers. Position control shaft, check shift rail for free operation (work manual lever). Drive retaining pin in from top.

LUBRICATION: First fill overdrive unit with good grade S.A.E. 80 transmission gear lubricant, then fill transmission. Recheck both levels. *CAUTION—Do not use extreme pressure lubricant in unit.*

OVERDRIVE CONTROL: *See Warner Type R10 & R11 Overdrive Control data.*

TRANSMISSION OVERHAUL: *See "Chrysler, DeSoto, Dodge, Plymouth Synchro-mesh Transmission" data.*

PLYMOUTH HY-DRIVE

Plymouth (1953-54)

▷*1953 TURBINE SHAFT & REACTION SHAFT PRODUCTION CHANGE:* Turbine Shaft, Part No. 1552121 and Reaction Shaft, Part No. 1538866 replaces old type Turbine Shaft, Part No. 1408449, and Reaction Shaft, Part No. 1486732. New type Turbine Shaft does not have ring land used on previous assembly and MUST be used when new type Reaction Shaft installed to prevent interference between front oil ring lands of old turbine and inside diameter of reaction shaft. A new type Turbine Shaft can be installed with the old type Reaction Shaft. The front turbine shaft oil seal ring is also omitted on the new Turbine Shaft assembly. This ring need not be installed on torque converters built prior to this change.

▷*"PIN TYPE" TRANSMISSION SYNCHRONIZER PRODUCTION CHANGE:* Some "Hydrive" transmissions are now equipped with "Pin Type" synchronizer. See complete "Chrysler, DeSoto, Dodge, Plymouth Synchro-mesh Transmission" for complete data.

DESCRIPTION: This transmission consists of the conventional torque converter used on Chrysler, De Soto, and Dodge cars combined with a three-speed, constant-mesh, synchro-mesh type transmission modified to absorb the added Hy-Drive torque. Transmission is similar to but not interchangeable with standard synchro-mesh transmission.

▷*PARKING CARS WITH "HY-DRIVE" CAUTION—When parking cars with "Hy-drive" Transmission it is very important to set the Parking Brake as there is no solid connection between engine and rear wheels.*

REMOVAL: Disconnect battery cables and two wires leading to transmission neutral safety switch, drain crankcase and torque converter. Then proceed as follows:

1) Remove transmission. *See "Transmission Removal" on car model page.*

2) Remove clutch release fork, pull back spring and disconnect rear end of clutch fork rod assembly. Remove pivot bracket assembly from clutch housing, then remove torque shaft.

3) Remove rear engine-to-crossmember bolts, install engine support fixture Tool C-3162. Insert hooks of fixture firmly into holes on either side of frame sub side rails with support ends up against underside of cylinder block. Adjust support fixture adjusting bolt so it will support engine while removing rear engine crossmember. Remove crossmember-to-frame bolts, remove crossmember. Lower engine approximately 3 or 4 inches to permit access to upper clutch housing-to-torque converter housing bolts. Remove bolts and carefully remove clutch housing from underneath car.

▷*CAUTION—Do not pry between housing flanges or pound housing to loosen. This would distort housing and result in misalignment.*

4) Punch mark clutch cover and clutch driving plate to insure reinstallation in same position. Remove clutch cover and pressure plate assembly and clutch disc from clutch driving plate.

▷*CAUTION—Torque converter housing and clutch housing machined as assembly. If necessary to replace one or the other, replace both housings.*

5) Remove torque converter housing-to-adapter plate bolts and lockwashers. Three bolts are located on engine side of adapter plate. Housing is doweled to adapter plate and care should be exercised when removing housing. Do not pry between flanges to loosen as this will distort metal and result in misalignment. Carefully move housing straight back to avoid damage to torque converter impeller hub oil seal and turbine shaft oil seal ring. Remove seal rings between converter housing and adapter plate. Inspect mating surfaces of adapter plate and torque converter housing, remove burrs or rough spots with emery cloth.

6) Remove six bolts that hold metal dust shield to adapter plate, lift shield out. Remove eight nuts and lockwashers that hold converter unit to crankshaft (use Tool C-811). *The torque converter assembly is a welded unit and cannot be serviced except as an assembly.*

7) Remove bolts which hold adapter plate to engine block, carefully remove adapter plate. *Do not pry or pound on adapter plate to loosen it.* Remove oil rings and thoroughly inspect mating surfaces of adapter plate and engine block. Remove burrs and rough spots with emery cloth.

CONVERTER DISASSEMBLY & REASSEMBLY:

See "Chrysler, DeSoto, Dodge, Plymouth Fluid Torque Drive" for complete data.

INSTALLATION: To reinstall, reverse removal procedures and note the following:

Tightening Torques: Converter unit-crankshaft flange nuts should be tightened to 55-60 ft. lbs. torque. Clutch housing-torque converter housing bolts should be tightened to 25 ft. lbs. torque.

Converter Hub Runout: Should be checked with dial indicator with indicator plunger bearing on hub of converter ¼ inch forward of rear edge. Runout should not exceed .008".

Mating Surfaces: All mating surfaces must be clean and free of rough spots or burrs, otherwise excessive converter runout will result.

Torque Converter Housing: Extreme care must be exercised when installing torque converter housing to prevent damage to turbine shaft and reaction shaft splines, the impeller hub oil seal and oil seal ring. *Use gentle pressure and not force.*

TRANSMISSION OVERHAUL: *See complete "Chrysler, DeSoto, Dodge, Plymouth (Synchro-mesh) Transmission for complete data. See Gear Ratio Note below.*

Gear Ratio Note: Hy-Drive Transmission has heavier gear teeth in order to transmit greater torque loads. Gear ratios are: First Gear—2.37:1, Second Gear—1.68:1, Third Gear—1:1, Reverse Gear—3.46:1.

1941-48 FORD, LINCOLN, MERCURY SYNCHRO-MESH
1941-47 FORD TRUCK

Ford Pass. Cars (1941-48)
Ford ½-Ton Truck (1941-47)
Ford ¾-Ton Truck (1941-47)
Ford 1-Ton Truck (1941-47)
Lincoln, All Models (1941-48)
Mercury, All Models (1941-48)

▷NOTES, CAUTIONS, & CHANGES

▷Ford Truck Optl. Transmission—Four-speed type optional on these truck models. *See preceding pages for 4-Speed Transmission data.*

▷Lincoln 1941-48 Overdrive—*Special Warner Optl. See "1941-48 Lincoln Overdrive" for complete data.*

DESCRIPTION: Constant-mesh, synchro-mesh, helical gear (Second & High), sliding gear (Low & Reverse). Main drive gear mounted on ball bearing in case. Mainshaft mounted on roller bearing (front), ball bearing (rear). Countershaft mounted on roller bearings on stationary countershaft with thrust washer at each end. Gears are engaged by a sliding clutch sleeve (outer sleeve of synchronizing unit) which engages clutch teeth on the main drive gear and second speed gear hubs.

Synchronizing Unit: Various types used as follows:

Ball & Strut Type Blocking Synchronizer—With this type synchronizer unit, both synchronizer rings are loose in ends of clutch sleeve and are actuated by struts assembled in slots in inner clutch sleeve and engaging notches in synchronizer rings. Struts are centralized in clutch sleeve assembly by the regular poppet balls and springs so that struts move with the outer clutch sleeve during initial movement to engage the synchronizer rings with the cones on the gear hubs. Teeth on outer rim of synchronizer rings block or prevent gear engagement until synchronization completed when the final movement of the outer clutch sleeve causes the clutch teeth on the inner rim of the sleeve to slide through the synchronizer ring teeth to engage clutch teeth on gear hubs. Inner clutch sleeve is stationary on mainshaft (retained as unit with second speed gear by snap ring in groove on shaft). NOTE—This Ball & Strut type synchronizer can be distinguished from Wire-Bound Strut type synchronizer (below) by absence of shoulder on second speed gear end of outer clutch sleeve.

Wire Bound Strut Type Blocking Synchronizer—Both synchronizer rings are loose in ends of clutch sleeve and are actuated by struts assembled in slots in inner clutch sleeve and engaging notches in synchronizer rings. Struts are centralized in clutch sleeve assembly by lock ring or wire installed in outer clutch sleeve which engages notches on struts. Struts move with the outer clutch sleeve during initial movement to engage synchronizer rings with cones on gear hubs. Teeth on outer rim of rings "block" or prevent gear engagement until synchronization completed when the final movement of the clutch sleeve causes clutch teeth on sleeve to slide through the synchronizer ring teeth to engage clutch teeth on gear hubs.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

CONTINUED ON NEXT PAGE

1941-48 FORD, LINCOLN, MERCURY (Cont.)

DISASSEMBLY (1941-48 All Models): Remove the transmission side cover and shifter mechanism as an assembly. Take out capscrews in universal joint front yoke and remove yoke from shaft. Remove universal joint housing on rear of transmission case. Remove locking pin and drive out countershaft. Take out bearing retainer screws on front of transmission case, withdraw clutch shaft main drive gear and bearing assembly (On 1942 & later Lincoln, gear can be removed without dropping counter gear by turning drive gear until "cutout" section of clutch teeth provide clearance for counter gear). Tap mainshaft back in case until rear bearing clears rear face of case, remove snap ring from bearing. Tap mainshaft forward until bearing clears inner face of case, remove mainshaft, synchronizer, and gears from case as an assembly (lift out bearing end of shaft first). Lift out countergear cluster and thrustwashers. If reverse idler gear to be removed, tap shaft out rear end of case (retained by same lockpin as countershaft), lift gear out.

REASSEMBLY: Reverse disassembly instructions above and note following points:

Mainshaft Assembly: See Synchronizer, Second Speed Gear, and Sliding Gear for removal and installation of these parts. Rear bearing should be replaced as follows:

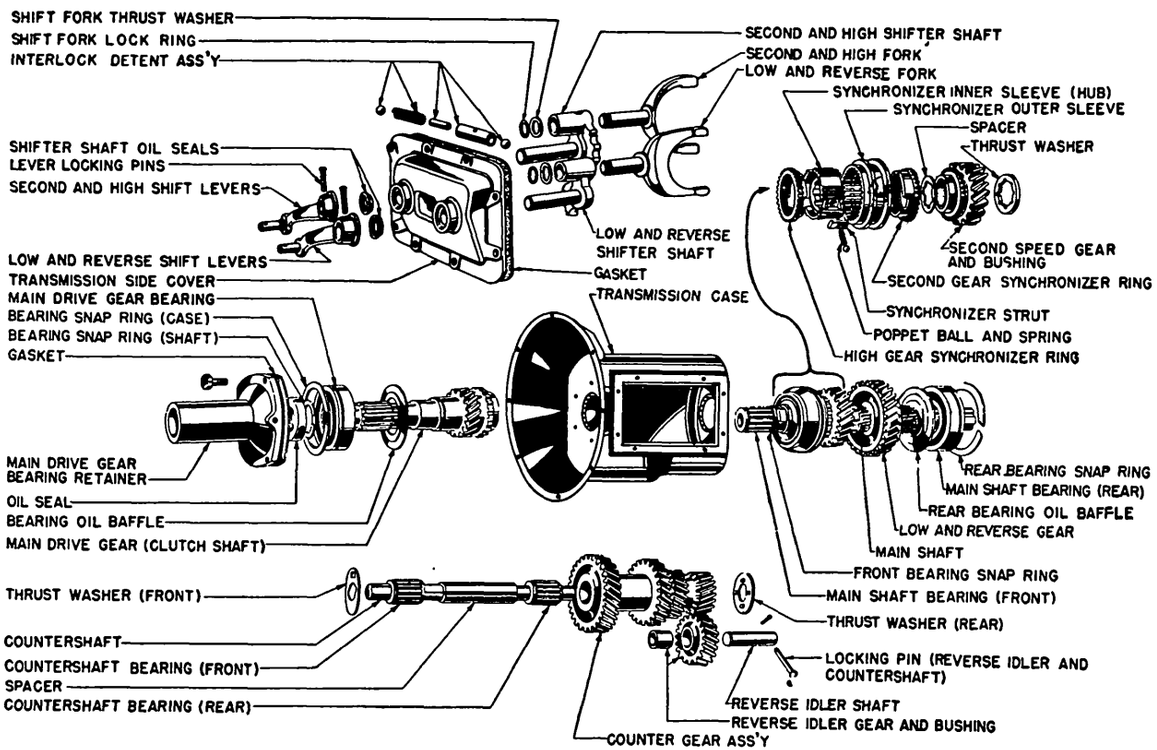
Mainshaft Rear Bearing—Press old bearing off shaft. Install oil baffle on shaft with outer edge of baffle away from bearing, press new bearing on shaft until seated against shoulder.

Synchronizing Unit: Can be removed from front end of mainshaft without dismantling. Mark both rings as well as inner and outer clutch sleeves before disassembly to insure reassembly in same relative position. When installing struts, make certain that they engage poppet balls.

Second Speed Gear Assembly (With Blocker Type Synchronizer): Gear and inner sleeve or hub of synchronizer are mounted as an assembly on the mainshaft with a thrustwasher (spacer) between the gear and synchronizer. Assembly is retained on shaft by snap ring at forward end of synchronizer clutch sleeve. To dismantle assembly, remove snap ring from groove at forward end of shaft, withdraw synchronizer assembly, thrustwasher, and second speed gear. NOTE—Gear and bushing are furnished as an assembly.

Gear Endplay—.004-.008" (new), .020" (worn). Install spacer (front thrustwasher) of the correct thickness for this endplay as follows:

81A-7069-A—.0630-.06355" (new), .060" (worn limit).
81A-7069-B—.068-.071" (new), .066" (worn limit).



1941-48 FORD, LINCOLN, MERCURY SYNCHRO-MESH TRANSMISSION

Rear thrustwasher furnished in one thickness only: 81A-7071—.184-.185" (new), .179" (worn limit).

with spacer on shaft between bearings. When installing gear cluster, make certain that tongue on thrust washer at forward end engages slot in case and that rear thrust washer prongs engage gear.

NOTE—On '60' models, floating bushings are used. Spacer (74-7115) installed between bushings.

Countergear Assembly:—Counter shaft is retained by locking pin driven in through hole in case and rear end of shaft (pin also locks reverse idler gear shaft in place) and shaft can be driven out after pin removed. Gear cluster is mounted on roller bearings

Countergear Endplay—Endplay must not exceed following specifications (replace thrustwashers if excessive):

1941-48 Pass. Cars —.005-.015" (new), .025 (worn).
1941-47 Trucks—.005-.017" (new), .025" (worn).

Reverse Idler Gear:—Shaft retained by countershaft locking pin, may be removed after pin driven out. Install gear with shoulder toward rear of case. See that locking pin hole in shaft lined up with hole in case and install locking pin after countershaft installed (same pin locks both shafts).

GEARSHIFT ASSEMBLY (Pass. Cars): To dismantle shift assembly, remove lockrings on shifter shaft ends of forks, remove forks from shifter shafts. Drive out locking pins in lever at outer ends of shifter shafts, withdraw shafts from inside of cover using extreme care not to lose detent balls, spring, and plunger. Reassemble shifter mechanism in same manner. See that oil seal in recess in cover at outer end of each shifter shaft is in good condition. See Ford & Lincoln Transmission Control articles for adjustment directions.

1941-48 LINCOLN OVERDRIVE (SPECIAL WARNER R10)

Car Model	Warner Model
Lincoln, All Models (1941-42)	AS1-R10
Lincoln, All Models (1946-47)	AS2-R10
Lincoln, All Models (1947-48)①	AS3-R10

①—After approximately March 1, 1947.

DESCRIPTION: Warner special R10. New design overdrive unit with solenoid control (no centrifugal clutch pawls). This R10 type similar to Type R9 (Hudson, Packard models) except for control circuits and lockout mechanism which are entirely new design as described below. Solenoid pushes sun gear pawl in (to engage Overdrive), withdraws pawl (for Direct Drive). Solenoid is controlled by Governor Switch (Overdrive does not engage above cut-in speed until accelerator pedal released momentarily) and has 'kick-down' direct drive feature.

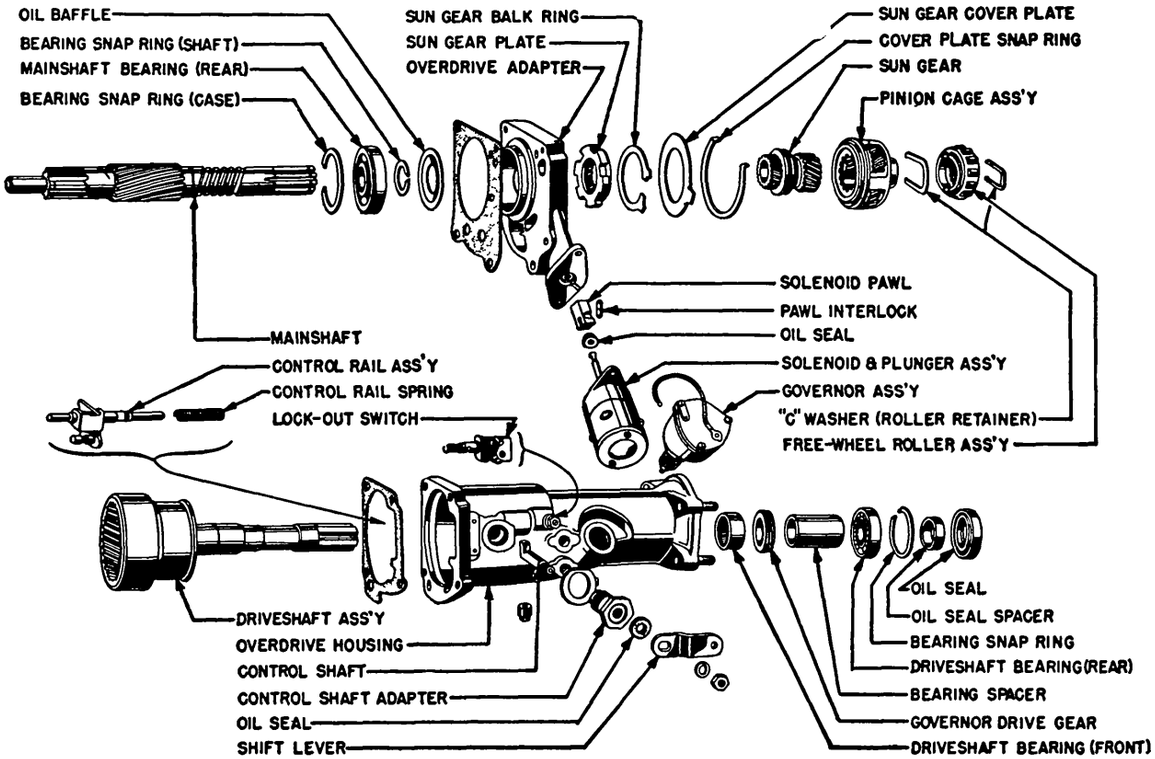
REMOVAL OF OVERDRIVE: *See "Overdrive" on car model page.*

TRANSMISSION DISASSEMBLY & REASSEMBLY: See "Ford-Lincoln-Mercury 3-Speed" Transmission (transmission is same as std. type without overdrive) except that mainshaft is extended back into overdrive case and has pinion assembly and freewheel cam mounted on this extension.

SOLENOID REMOVAL & INSTALLATION: Disconnect wires at terminals, take out mounting screws in base flange, **rotate solenoid approximately 60° to right** to disengage pawl rod from pawl (this will line up flats on end of rod with slot in pawl), withdraw solenoid and pawl rod assembly. To install solenoid, insert pawl rod in adapter with flats horizontal, make certain that short pilot on end of solenoid body enters counterbore in adapter casting, **rotate solenoid approximately 60° to left to engage pawl rod end in pawl** and line up solenoid flange with mounting holes. Check engagement of pawl rod and pawl by attempting to pull solenoid off (solenoid should not come out and resistance of solenoid spring should be felt). Install solenoid mounting screws and connect wires at terminals.

CAUTION—Solenoid must be installed with wire terminals "up".

ASSEMBLY OF OVERDRIVE: Install rear bearing on transmission shaft, install bearing lock ring (see end play note below), install oil baffle, transmission shaft and bearing in adapter plate, install bearing snap ring (see bearing endplay note below), install sun gear plate and balk ring assembly in adapter, install pawl in adapter slot. Install cover plate with tongue over pawl, install cover plate snap ring. Install interlock plunger in hole between pawl and shifter shaft, install shifter shaft assembly. Slide sun gear in place on transmission shaft and enter shifting fork in sun gear groove. Assemble overrunning clutch on pinion cage assembly and fasten with retainer, then install assembly on rear end of transmission shaft and install retainer on rear end of overrunning clutch. Install rear shaft assembly over pinion cage assembly and push it forward until overrunning clutch enters its outer race (use a rubber band to hold clutch rollers in place and rotate shaft counter-clockwise to facilitate assembly). Install shifter shaft retractor spring in housing, install housing and attach to adapter plate using gasket 16H-7661. Install governor gear and spacer



1941-48 LINCOLN OVERDRIVE (SPECIAL WARNER R10)

on shaft. Install rear bearing and bearing snap ring (see Overdrive rear bearing endplay note below). Install oil seal and spacer at rear of case. Install universal joint yoke and tighten mounting screw securely. Install governor, lock-out switch (fasten with setscrew), and solenoid grease retainer. Install shift lever in bushing, install grease retainer in hexagonal end of bushing, place lever in position and install in overdrive case with lever "up." Install solenoid (see Solenoid data above).

Transmission Rear Bearing Endplay—When installing bearing on shaft, select snap ring of correct clearance so that there is no endplay but bearing turns freely. Snap ring supplied in following thicknesses: .087"—16H-7667A, .090"—16H-7667B, .093"—16H-7667C, .096"—16H-7667D, .102"—16H-7667E. Snap ring which retains this bearing in adapter plate should also be selected to control endplay and is furnished in following thicknesses: .087"—16H-7669A, .090"—16H-7669B, .093"—16H-7669C, .096"—16H-7669D.

Solenoid Pawl Interlock—Consists of a short plunger installed in hole in adapter plate between pawl and shifter shaft. Install plunger in hole before installing shifter shaft assembly.

Overdrive Rear Bearing Endplay—Endplay is controlled by thickness of snap ring which retains bearing in overdrive case. Snap rings furnished as follows: .062"—16H-7656A, .065"—16H-7656B, .068"—16H-7656C, .071"—16H-7656D.

Governor Drive Gear—Gear is free on overdrive shaft and will turn with universal joint yoke not tightened on shaft (gear clamped in place by yoke when yoke retaining screw is properly tightened)

1941-48 LINCOLN OVERDRIVE CONTROL

Lincoln, All Models (1941 to 1948)

DESCRIPTION: Note—Overdrive operates similarly to R9 type with "push type" solenoid controlled by Governor Switch and throttle operated kick-down switch as described below. A lock-out switch is also provided which is operated by the overdrive lock-out mechanism.

OPERATION & ADJUSTMENT:—Lockout Control—If dash control button is to be pulled out (to lockout overdrive), accelerator pedal should first be fully depressed (to place overdrive in direct drive), button then pulled out, and accelerator pedal released. NOTE—Lockout will not engage unless overdrive in direct drive (sun gear teeth will strike lock plate clutch teeth causing 'buzzing' sound) and accelera-

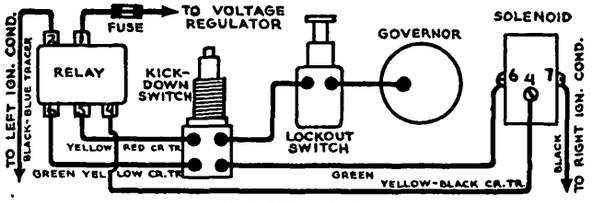
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1941-48 LINCOLN OVERDRIVE CONTROL (C nt.)

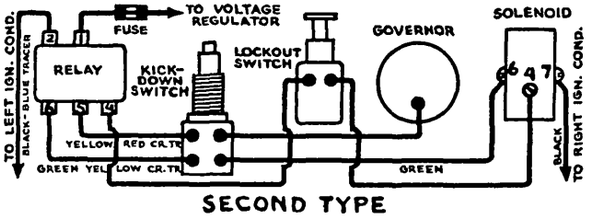
tor pedal must be fully depressed to complete lock-out engagement.

Adjustment—If dash control button cable is adjusted too short, buzzing sound will be noticed when button pushed all the way in. Noise will disappear when operated with engine pulling car below cut-in speed and will reappear when accelerator pedal released. To adjust cable, turn adjusting nuts at end of cable where it is attached to lever.

Cut-in Speed—25 MPH (governor switch contacts close). Overdrive does not engage until accelerator pedal released momentarily. Overdrive cuts out at 22 MPH (or at any speed if 'kick-down' operated). No cut-in speed adjustment provided.



FIRST TYPE



SECOND TYPE

TROUBLE SHOOTING:—If overdrive does not operate satisfactorily after adjustments have been made correctly, determine trouble as follows:

Overdrive remains engaged, Will not 'kick-down', Car will not roll backward in Neutral—Caused by ground in lead between #5 relay terminal and governor switch. Check by disconnecting lead at #5 terminal and noting if relay 'clicks' when wire touched to terminal (click indicates ground or other defect). Check lead, relay terminals, and kickdown switch for grounds (see Special Service Notes above). To check relay, remove fuse. If relay 'clicks' as fuse removed, relay is defective.

IMPORTANT NOTE—If attempt made to reverse car under above conditions (ground in #5 circuit), overdrive unit may be seriously damaged.

Ignition Cuts Out—If left cylinder bank cuts out when idling, check for grounded relay (internally or at terminals #2 & 6), ground between #6 relay terminal and kickdown switch or in kickdown switch, ground in lead between #2 terminal and distributor or within distributor (if ignition restored when lead disconnected from #2 relay terminal, this lead and distributor are not at fault). If right cylinder bank cuts out when idling, check for ground in lead between #7 solenoid terminal and distributor, in solenoid, and in distributor (if ignition restored when lead disconnected from #7 solenoid terminal, this lead and distributor not at fault). If one bank of cylinders cuts out when overdrive engaged, check for defective solenoid or ground between solenoid terminal #6 and kick-down switch lower terminals.

Overdrive will not engage—Check for open-circuit between relay terminal #5 and governor switch. Check by grounding #5 relay terminal (relay and solenoid should 'click' simultaneously). If relay does not click, check for blown fuse or defective relay. If relay clicks but solenoid does not, check for defective relay, defective solenoid or open-circuit between #4 relay and solenoid terminals. If both relay and solenoid click but overdrive will not engage, check for jammed solenoid or damage within overdrive unit.

Overdrive will not kick-down—Check for ground between relay and kick-down switch or at upper terminals of kickdown switch (see Special Service Note above). Check for open-circuit between relay terminal #2 and ignition condenser, solenoid terminal #7 and ignition condenser, solenoid terminal #6 and kick-down switch, relay terminal #6 and kick-down switch, or within relay. Check for defective kick-down switch.

FUSE:—15 ampere. In connector in control relay lead. Serviced with 20 ampere capacity fuse.

1949-51 FORD, LINCOLN, MERCURY SYNCHRO-MESH

Ford, 6 Cyl. & V8 Pass. Car Models (1949-51)
Lincoln & Cosmopolitan Models (1949-51)
Mercury, V8 Models (1949-51)

►CHANGES, CAUTIONS, CORRECTIONS

►**Lincoln Transmission Note**—Transmission is Warner Type AS1-T85B (No Overdrive), AS2-T85B (With Overdrive. *Data below applies to these transmissions.*

►**Elimination of Overdrive Lock-out Switch (1949-50 Cars)**—Switch not furnished for service and can be wired out of control circuit if defective. *See Ford, Lincoln, Mercury Overdrive data.*

►**Transmission Jumping out of Low Gear (1951 Ford & Mercury Cars)**—May be caused by excessive clearance between major diameters of mainshaft splines and internal splines on low and reverse sliding gear. This clearance should be .000-.0015". To correct this complaint, measure outside diameter of splines on mainshaft with a micrometer. If shaft does not check to 1.6235-1.6240", replace the shaft. If outside diameter is correct, replace the low and reverse sliding gear. If shaft clearance is correct (.000-.0015"), slight pressure should be required to push the sliding gear on the shaft.

►**Ford Transmission Locking In Reverse Complaints (Transmission without Overdrive)**—May be caused by mainshaft drive gear snap ring or mainshaft rear bearing snap ring not correctly installed (see illustration). Correct by disassembling transmission (remove mainshaft assembly from extension housing) and checking these snap rings.

See Disassembly & Reassembly data below.

►**Ford Overdrive Transmission on First Cars Inoperative in Reverse (Reverse Lock-out Inoperative)**—May be due to use of wrong Reverse Shifter Fork Cam & Shaft (8A-7282-A instead of 8A-7282-B). Check and correct this condition as follows:

To Check—Place gearshift lever in Reverse position. Release hand brake. Push car **forward.** If car rolls freely, this indicates wrong cam installed.

To Correct—Disassemble Overdrive and install new No. 8A-7282-B Reverse Shifter Fork Cam & Shaft which provides automatic lock-out for Reverse Gear.

See "Ford, Lincoln, Mercury Overdrive" (following) for disassembly directions.

►**Ford Overdrive Transmission Noisy in Operation**—May be caused by interference between overdrive case and rear engine support. Correct as follows:

(1) Interference between Rear Engine Support Bolt and Overdrive Case—Correct by grinding off head of bolt for clearance. Thin head bolt No. 355519-S2 used at this point on later cars.

►*CAUTION—Bolt head thickness must be at least ⅛".*

(2) Interference between Rear Engine Support & Overdrive Case—Case is grooved for clearance at flanges on support. If grooves in case not deep enough (particularly at ends where casting flash protrudes), clean up this flash and deepen grooves by filing.

DESCRIPTION: Three-speed, all helical gear type with constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). Overdrive is optional. Std. transmission has extension housing at rear which has rear engine mounting. Mainshaft extends through extension housing with splines at rear end for propeller shaft engagement (front universal yoke hub slides on shaft—no slip-joint used on propeller shaft).

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

OVERDRIVE SERVICING NOTE: On transmission with Overdrive, overdrive unit can be disassembled separately without disturbing transmission.
See "Ford, Lincoln, Mercury Overdrive" (following).

TRANSMISSION DISASSEMBLY: Take out mounting screws and remove gearshift housing (side cover) assembly. Drive countershaft and reverse idler shaft pin out through case side (Ford & Mercury, Lincoln shafts locked by separate key in rear end of each shaft). Take out extension housing screws, rotate extension housing ¼ turn to expose end of countershaft, drive countershaft to rear until it clears front of case, use Tool 7121-N (or counter shaft cut to length of countergear cluster) to push countershaft out through rear of case (leave tool or dummy shaft in gear cluster to retain bearing rollers), drop gear cluster to bottom of case. Tap lightly on extension housing to loosen it from case, withdraw housing and mainshaft assembly from case (CAUTION—use care not to lose mainshaft pilot bearing rollers). Lift countergear cluster and

CONTINUED ON NEXT PAGE

1949-51 FORD, LINCOLN, MERCURY SYNCHRO-MESH (Cont.)

thrustwashers from case, remove tool and take out bearing retainers, rollers, and spacer. Take out capscrews in bearing retainer on front of case, remove retainer and gasket. Tap main drive gear assembly out through front of case, using a soft hammer. To remove reverse idler gear, use brass drift to drive shaft out, lift gear out. Disassemble and service subassemblies as follows:

Mainshaft & Extension Housing Assembly: Remove snap ring in front of rear bearing in extension housing, use a soft hammer to tap mainshaft and bearing out of housing. Remove snap ring on forward end of mainshaft, pull or press synchronizer assembly, 2nd speed gear, and sliding gear off shaft. On Lincoln, remove speedometer gear snap rings, remove speedometer gear and woodruff key. On all models, remove bearing snap ring from groove in shaft (on Ford & Mercury, this snap ring retains speedometer gear also—note position of shoulder on gear to insure correct reassembly—remove gear and woodruff key). Press rear bearing off shaft.

Extension Housing Oil Seal & Bushing: Oil seal and bushing can be replaced after mainshaft removed from housing.

TRANSMISSION REASSEMBLY: Assemble all subassemblies as noted below and install in transmission by reversing the disassembly directions given above.

Reverse Idler Gear: Ford & Mercury gear has bushing, Lincoln gear has 25 bearing rollers and thrust washer at each end. Install gear with chamfered end of teeth forward, see that locking pin hole in line with hole in case (Ford & Mercury), install key in slot in rear end of shaft (Lincoln).

Countergear Cluster: Place bearing spacer in gear cluster, insert tool 7121-N (or dummy countershaft cut to length of gear cluster), install bearing rollers in each end (on Lincoln, two sets of 20 bearing rollers used at each end with retainer washer at outer end of each set). Coat thrustwashers with grease to hold them in position, install bearing retainer in each end of gear cluster. Install front thrust washer so that tongue will enter groove in case when assembly installed, place rear thrust washer with slotted hole on gear cluster with babbitted face out toward steel washer which must be next to case. Place this assembly in the case and after mainshaft installed, raise assembly and insert countershaft from rear, pushing dummy shaft out at front of case. On Ford & Mercury, align locking pin hole in shaft with hole in case, install locking pin through reverse idler and countershafts. On Lincoln, install locking key in slot in rear end of shaft before shaft fully inserted in case. On Ford & Mercury, countergear endplay should be .0045-.0185"

Main Drive Gear Assembly: Install oil baffle and drive gear bearing on shaft, press bearing in place firmly, install snap ring in shaft groove (see Lincoln Note below). Install snap ring in groove in bearing. Install main drive gear in case. Use new gasket with retainer (Lincoln gasket furnished in thicknesses of .010", .015", .020", .025" for selective fitting), make certain oil drain groove in retainer is at bottom.

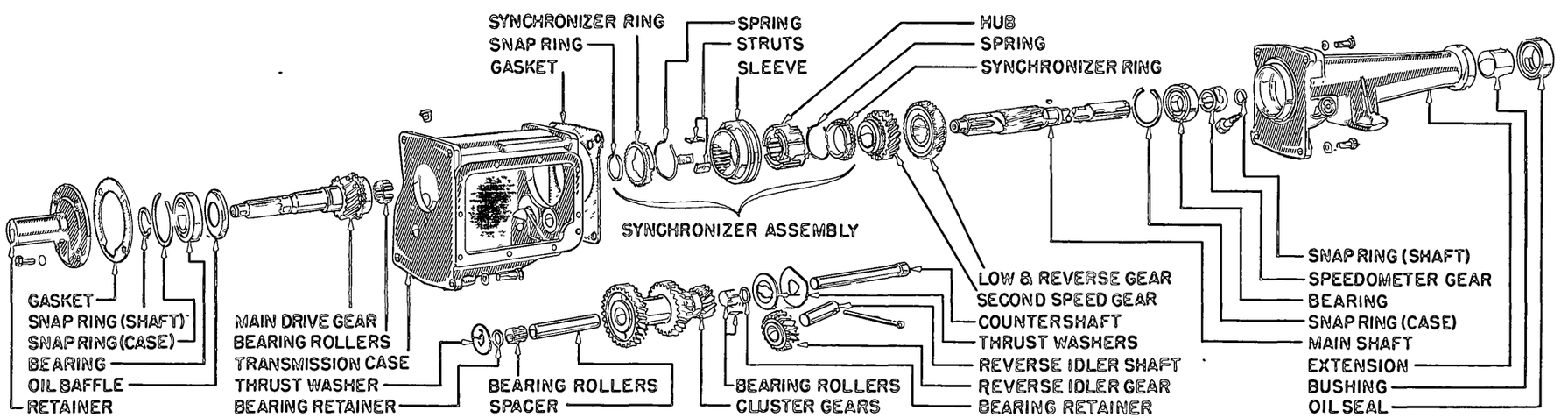
Lincoln Snap Ring Note—This shaft snap ring furnished in thicknesses of .086-.088", .089-.091", .092-.094", .095-.097" for selective fitting).

Synchronizer Assembly: Install synchronizer springs at each end of hub with spring openings staggered. Install three struts on hub, slide outer clutch sleeve over the assembly. Place synchronizer ring on each end of assembly making certain that struts engage slots in rings. Backlash of synchronizer sleeve on hub must not exceed .001".

Mainshaft Assembly: Use special press tool 7699-N to install new bushing in rear end of extension housing, install oil seal. Press rear bearing in place on mainshaft. On Ford & Mercury, install speedometer gear key and gear (on Lincoln, speedometer gear is mounted separately on shaft). Select snap ring of correct thickness and install in groove in shaft. This snap ring furnished in following thicknesses: (Ford & Mercury) .090", .093", .096", .100". On Lincoln, install speedometer gear on shaft with woodruff key in gear and snap ring in shaft groove. Install sliding gear, 2nd. speed gear, and synchronizer assembly on shaft, install snap ring in shaft groove to retain assemblies. Check 2nd. speed gear endplay which should be .002-.011" on Ford & Mercury. Clearance between outside diameter of splines on mainshaft and internal splines on low and reverse gear should be .000-.0015" and shaft or gear should be replaced if clearance exceeds .002" (see Transmission jumping out of Low Gear Correction above).

Mainshaft & Extension Housing Installation: Install mainshaft assembly in extension housing, seating rear bearing firmly in housing recess (Ford and Mercury), against bearing rear snap ring (Lincoln). Select snap ring for correct fit—this ring furnished in following sizes (Ford & Mercury) Thin .086-.088", Medium .089-.091", Thick .092-.094", Extra Thick .095-.097", (Lincoln) .087-.089", .090-.092", .093-.095", .096-.098", .099-.101" for selective fitting, install ring in housing to retain bearing. Make certain pilot bearing rollers in place in recess in main drive gear (use cup grease to hold rollers in place), use new gasket on extension housing, insert mainshaft assembly through rear of case and enter shaft in pilot bearing. Turn extension housing to permit countershaft to be installed (see Countergear Cluster above), install extension case washers and capscrews.

▷*CAUTION—On Ford & Mercury, use lead washers on two lower extension case capscrews and secure these screws with lockwire.*



1949-51 FORD & MERCURY TRANSMISSION (LINCOLN SIMILAR)

1952-55 FORD & MERCURY 3-SPEED SYNCHRO-MESH

Ford & Mercury (1952-55)

►***SYNCHRO-MESH TRANSMISSION CHANGE (To prevent possibility of shifting into two gears at once):*** Interlock Pin, Part No. 01A-7235 can be installed inside Interlock Plunger Spring between shifter cams.

DESCRIPTION: Three-speed, all helical gear type with constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

►***1954 FORD INTERMEDIATE GEAR PRODUCTION CHANGE:*** The design of the intermediate gear is changed eliminating the bushing used in earlier cars. The later gear, Part No. 1A-7102-A2 is interchangeable with the earlier type.

►***1955 FORD LOW GEAR JUMP-OUT OR PREMATURE LOW GEAR WEAR CORRECTION (Station Wagon, Thunderbird, & Sedan Delivery):*** This may be due to insufficient clearance between detent boss on transmission side cover and the low gear shift cam. Correct as follows: Remove side cover, and grind corner of detent boss to provide sufficient clearance between shift cam and detent boss.

►***1955 FORD PASS. CARS & F-100 TRUCKS INTERMEDIATE & HIGH GEAR JUMP-OUT NOTE:*** Before attempting to overhaul transmission to correct the above condition. Check alignment of transmission shift rods, wear at ends of rods and interference between clutch release rod and high and intermediate shift rods.

►***1952-54 SERVICE REPLACEMENT OUTPUT SHAFT NOTE:*** When installing the later type shaft, Part No. AF-7061-D (Service Part No. B6A-7061-A) it will also be necessary to change the speedometer gear and retaining lock rings.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

►***OVERDRIVE DISASSEMBLY NOTE:*** Overdrive can be disassembled separately without disturbing transmission.
See "Ford & Mercury Overdrive" (following).

TRANSMISSION DISASSEMBLY: Take out mounting screws and remove gearshift housing (side cover) assembly. Drive countershaft and reverse idler shaft pin out through case side. Take out extension housing screws, rotate extension housing ¼ turn to expose end of countershaft, drive countershaft to rear until it clears front of case, use cluster gear roller retainer shaft tool or a countershaft cut to the length of the countershaft cluster gear to push countershaft out through rear of case (Leave cluster gear and dummy shaft in case). Remove extension and mainshaft assembly from rear of transmission case. Drive reverse idler gear out of case with brass drift, then remove reverse idler gear. Remove capscrews that secure drive gear bearing retainer to transmission, then remove retainer and gasket. Tap drive gear assembly out through front of transmission case with soft hammer. Disassemble sub-assemblies as follows:

Mainshaft Assembly: Remove snap ring that holds mainshaft assembly in extension. Tap mainshaft out of extension with soft hammer. Remove transmission mainshaft synchronizer snap ring and pull or press the synchronizer assembly, intermediate gear, and sliding gear off the mainshaft. Remove snap ring that secures speedometer driving gear on mainshaft, then remove gear. Remove speedometer gear key. Press mainshaft rear bearing off mainshaft. Remove oil seal and rear bushing from transmission extension.

Synchronizer Assembly: Push synchronizer hub out of sleeve. This releases three synchronizer blocks. Remove synchronizer block springs from each end of synchronizer hub.

Main Drive Gear Assembly: Remove snap ring that secures bearing on shaft, press bearing off shaft. Remove oil baffle from shaft.

Countershaft Gear Assembly: Remove countershaft gear, thrust washers, and tool from transmission case. Remove bearing retainers, bearing rollers, spacers, and dummy shaft from countershaft gear.

Gearshift Housing Assembly: Remove shift levers from camshafts. Remove camshaft retaining pins and pull shifter fork and cams out of gearshift housing. With cams removed, the interlock balls, retainer, and spring will fall out of gearshift housing. Pull shifter forks out of cams, then remove seal rings from cams. *See NOTE following.*

NOTE—Condition of housing parts can be determined without removing gearshift housing assembly. Observe condition of shift levers and forks for evidence of binding or possibility of shifting into two gears at once when lever operated.

Transmission Extension Housing: Using Tool T52P-7000-GAE (Ford) or Tool 7041 (Mercury) remove oil seal and bushing from housing.

CLEANING, INSPECTION & ADJUSTMENT:

Cleaning: Wash all parts with suitable cleaning fluid.

Inspection: Inspect transmission parts before installation as follows:

Transmission Case—Inspect for cracks, worn bearing bores, damaged threads or other damage. Replace case if any of above conditions found.

Gears & Shafts—Inspect gears for excessive wear and chipped or cracked teeth. Replace as necessary.

1) Check endplay between cluster gear and thrust surfaces of transmission case. Replace cluster gear if endplay not between .004-.018".

2) Check intermediate gear endplay. Replace gear if endplay not between .002-.011".

3) Check fit of low and reverse sliding gear. Replace gear or mainshaft if outside diameter fit of helical splines exceeds .002".

4) Inspect idler gear bushing for wear. Replace if worn excessively.

5) Check bearing surfaces of all shafts for wear. Replace if worn excessively.

Bearings—Inspect for loose races, discoloration due to overheating, and free rotation on mating shafts. Replace as necessary.

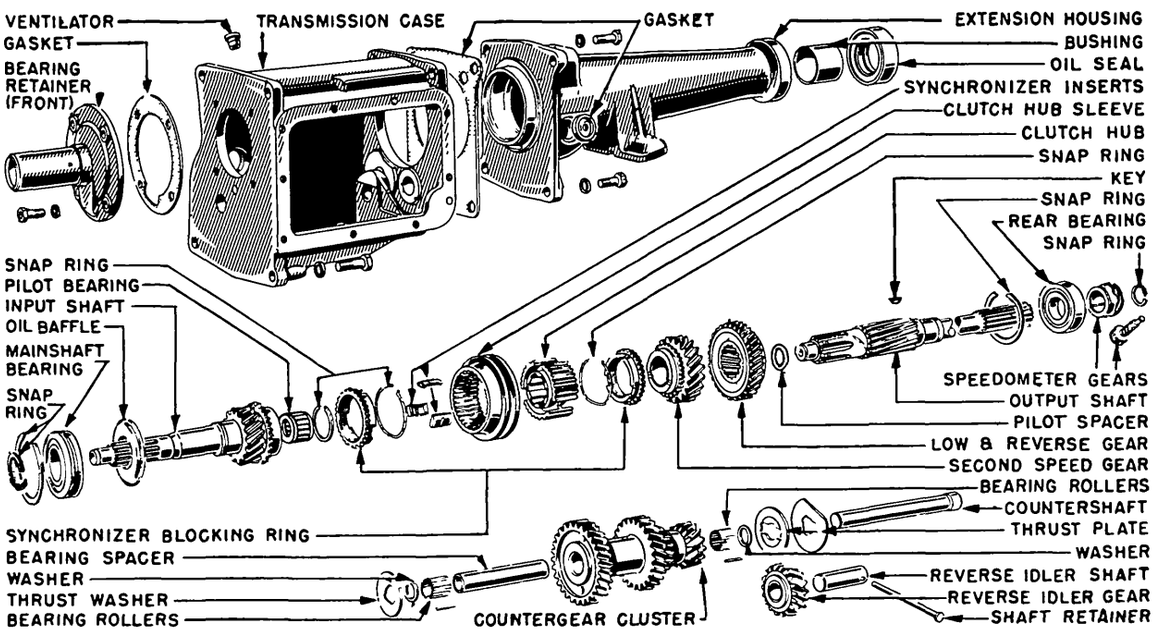
Adjustments: Flywheel housing must be accurately aligned with crankshaft. Face of housing must be parallel with flywheel to within .007" and bore concentric with centerline of crankshaft to within .010". Use dial indicator to measure runout. If highest point of parallel runout exceeds .007" install shims of required thickness between housing and cylinder block. If highest point on cencentricity with centerline of crankshaft exceeds .010" housing should be replaced.

NOTE—If shims used, small amount of gasket-forming cement may be used to eliminate air gaps between shims.

TRANSMISSION SUB-ASSEMBLY REASSEMBLY: During assembly of transmission, each splined shaft and its mating parts should be carefully selected to obtain sliding fit with no backlash. Assemble sub-assemblies as follows:

Countershaft Gear: Position countershaft bearing spacer in countershaft gear. Insert countershaft gear roller retainer shaft tool (or dummy counter-

CONTINUED N NEXT PAGE



1952-55 FORD & MERCURY SYNCHRO-MESH TRANSMISSION

1952-55 FORD & MERCURY SYNCHRO-MESH (Cont.)

shaft cut to length of gear cluster) in countershaft gear assembly. Install rollers in each end of gear cluster. Coat bearing retainers and thrust washers with grease to hold in position. Install bearing retainer at each end of countershaft gear. Place thrust washer with slotted hole next to cluster assembly, with babbitt side toward steel washer and steel thrust washer next to transmission case. Install front thrust washer between transmission case and cluster making sure tongue on thrust washer is entered in groove provided in case. Place cluster gear assembly with dummy shaft in place in transmission case, allowing it to rest on bottom of case.

Main Drive Gear: Install oil baffle and drive gear bearing on drive gear shaft. Press bearing into place, applying pressure to inner race. Install snap ring on shaft to secure bearing. Install snap ring on drive gear bearing. Coat mainshaft front bearing rollers with cup grease, install rollers in main drive gear shaft.

Synchronizer: Install synchronizer snap ring at each end of hub with ends of springs between same two inserts. Place synchronizer inserts on synchronizer hub. Align etch mark on sleeve and push hub inside synchronizer sleeve. If new hub or sleeve installed, be sure backlash between hub and sleeve does not exceed .001". Place synchronizer ring on synchronizer assembly, making sure slots in line with synchronizer inserts.

Mainshaft: Using Tool T52P-7000-HAE (Ford) or Tool 7041 (Mercury) install extension rear bushing, install oil seal. Install mainshaft rear bearing on shaft, press into place. Install speedometer gear key in shaft, install speedometer gear on shaft, secure with largest snap ring that will enter groove. Install sliding gear, intermediate gear, and synchronizer assembly on mainshaft, secure with snap ring.

Housing: Install new seal rings in grooves in shifter cams. Place one cam assembly in position in gearshift housing, install retaining pin. Assemble interlock spring and balls in interlock and install assembly in gearshift housing. Place other cam assembly in position in housing, install retaining pin. Install gearshift levers on camshafts, assemble shifter forks to cams.

TRANSMISSION REASSEMBLY: Place reverse idler gear in position in transmission case, install reverse idler gear shaft, making sure to align retainer pin hole with hole in transmission case. Position main drive gear in front of transmission case, making sure snap ring on bearing is firmly seated against case. Install retainer with new gasket, on main drive gear shaft with drain groove at bottom. Install cap screws and lock washers that secure retainer to transmission case. Install mainshaft assembly in transmission extension, securing it with snap ring. Place new gasket on front of extension, install mainshaft assembly and extension on transmission case. Use care not to displace rollers when entering front end of main drive gear shaft. Turn extension to provide access to countershaft, raise countershaft gear assembly and thrust washers into position, install countershaft from rear of case, pushing dummy shaft out front of case. *CAUTION—Great care must be exercised when installing countershaft to avoid damaging thrust washers, bearing spacer, or bearing rollers.* Align retainer pin hole with hole in case, install countershaft and reverse idler shaft retainer pin. Turn extension on transmission case, aligning capscrew holes. Install washer and capscrews, using internal tooth lock washers on two lower capscrews. Install gearshift housing on transmission case, using new gasket, secure with lock washers and capscrews.

1949-55 FORD, LINCOLN, MERCURY (WARNER) OVERDRIVE

Car Model	Warner Model
Ford 6 Cyl. & V8 Pass. Cars (1949-50)	AS1-R10E
Ford 6 Cyl. & V8 Pass. Cars (1951)	②AS4-R10E
Ford Sta. Wgn. & Convt. (1949-51)	AS3-R10E
Ford, All Models (1952-55)	AS1-R10F
Lincoln & Cosmopolitan (1949-51)	①AS2-T85B
Mercury, V8 Models (1949-50)	AS1-R10C
Mercury, V8 Models (Early 1951)	AS1-R10E
Mercury, V8 Models (Late 1951)	②AS4-R10E
Mercury, All Models (1952-55)	AS1-R10F

①—Transmission & R10 Overdrive Assembly.
②—New type without Lock-out Switch.

▷CHANGES, CAUTIONS, CORRECTIONS

▷FORD & MERCURY OVERDRIVE LOCK-OUT SWITCH PRODUCTION CHANGE: Ford Overdrives (beginning with 1951 production) and Mercury Overdrives (beginning January 1951) do not have any provision for Lock-out Switch and Governor is connected to "A" terminal on Kick-down Switch.

▷FORD, LINCOLN, MERCURY OVERDRIVE LOCK-OUT SWITCH REMOVAL: If Lock-out Switch defective on early overdrive units where this switch installed originally (see Production Change above), both switch wires should be detached and connected together so that switch eliminated from the circuit (CAUTION—wires should be soldered together for good connection and taped for protection from moisture and grease). Leave switch installed to act as cover for switch mounting hole (if switch cannot be used for this purpose, make up sheet metal cover for installation over switch mounting hole).

OVERDRIVE NOISE (EARLY 1949 CARS): Can be caused by Overdrive case interference at Rear Engine Support at two points as follows:
1)—Rear Engine Support Bolt. Head of bolt may be interfering with underside of Overdrive Case. Correct by grinding off head of bolt (do not grind head to less than ⅛" thick). Thin head bolt No. 355519-S2 used on later cars in production.
2)—Overdrive Case. Grooves on underside of case at engine mounting too shallow so that flanges on engine support interferes with Overdrive case at this point. Correct by filing grooves in case and cleaning up ends of grooves if casting flash evident.

▷PROLONGED SHORTING OF IGNITION CORRECTION: If shorting out of ignition during Overdrive Kick-down is prolonged (normal shorting out period is very brief), correct by installing insulator inside solenoid cover as follows: Make up insulator strip from treated paper .03" thick, .76" wide, 2.38" long with hole for cover screw .25" from each end. To install insulator, remove terminal screws, nuts, and lockwashers on side of cover, remove cover, place insulator over cover studs, re-install cover.

▷OVERDRIVE NOT ENGAGING CORRECTION (Convertible Models): Check sliding pawl operating rod lever (in adapter) for binding or sticking. If this condition noted, remove solenoid and adapter, disassemble linkage, polish pins and pawl operating rod to provide free movement of rod through seals in plate.

▷OVERDRIVE GOVERNOR PRODUCTION CHANGE: New type governor used which is interchangeable with first type except on Convertibles. Governors can be distinguished as follows:
First Type—Unpainted Body with Bakelite Top.
Later Type—Body painted Black, Top unpainted.

▷*CAUTION—Later type governor cannot be installed on Convertible models (will not clear X-member).*

DESCRIPTION: Solenoid operated type similar in design to other Warner Type R10 Overdrives

REMOVAL OF OVERDRIVE: *See "Overdrive" on car model page.*

DISASSEMBLY OF OVERDRIVE: Remove Lock-out Switch and switch operating balls, remove governor and speedometer drive pinion. Remove solenoid by taking out mounting screws and rotating solenoid clockwise to disengage plunger from pawl, then pull solenoid and plunger out. Drive out tapered pin holding control lever shaft in overdrive case, pull shaft out as far as possible to disengage operating cam from shift rail. Take out four mounting screws holding overdrive case and adapter on transmission case. Remove small rectangular cover plate on top of case by taking out two screws. Working through slot under this plate, spread bearing snap ring with special pliers 7059-N to free rear bearing. Withdraw overdrive case while pressing forward on rear end of shaft to prevent shaft coming off with housing. CAUTION—Do not allow adapter plate to separate from transmission case. Disassemble.

Overdrive Case & Control Mechanism: Remove reverse lock-up spring from case. Remove lever on end of control shaft, push shaft through and remove from within housing, remove shaft oil seal from case. Compress rear bearing snap ring (insert pliers through slot in case), remove ring. Bushing and oil seal at rear end of case are similar to regular transmission. *See Extension Housing data in Ford-Lincoln-Mercury Transmission article.*

Driveshaft & Gear Assembly: Install one screw to retain adapter plate on transmission case, pull driveshaft off to rear (CAUTION—catch free-wheel rollers as they drop out). If bearing to be removed from shaft, take out snap ring and remove speedometer gear taking care not to lose woodruff key from gear (on Lincoln, remove both speedometer gear snap rings and additional snap ring at rear of bearing), remove bearing. Take out retaining clip ("C" washer) at rear of free-wheel cam, withdraw free-wheel unit and pinion assembly (these two parts can be separated by removing "C" washer ahead of free wheel cam). Remove overdrive sun gear and shift rail assembly as a unit by sliding them off rear of shaft.

Adapter Plate & Sun Gear Mounting: Remove large snap ring from adapter plate, withdraw sun gear cover plate, balk ring blocker assy., solenoid pawl. NOTE—Adapter plate is removed as a unit with transmission mainshaft. Do not disturb unless transmission being disassembled.

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1949-55 FORD, LINCOLN MERCURY OVERDRIVE (C nt.)

Checking Balk Ring Tension: Place balk ring and gear plate assembly in vise. Place hook of scale on shoulder of balk ring. Pull in direction of drag should be 3½-5½ lbs. Reading should be taken while balk ring turning as initial effort may give reading considerably higher than specified. Replace assembly if not within specifications.

REASSEMBLY OF OVERDRIVE: Assemble in reverse order of disassembly. Note following:

Sun Gear Balk Ring, Pawl & Solenoid: After balk ring installed, insert pawl with notch on side downward (Ford), upward (Lincoln & Mercury—on Mercury, interlock plunger engages this notch), position cover plate with tongue over pawl, install large snap ring (this ring furnished in three thicknesses for selective fitting). When installing solenoid (after assembly completed), insert plunger stem with solenoid rotated clockwise 55° (85° on Convertible & Station Wagon) from mounted position to align plunger flats with pawl slot, then rotate solenoid counter-clockwise until mounting screw holes aligned. This will engage plunger in pawl.

Free-wheel Assembly: If free-wheel roller retainer and springs removed from cam, first note position of springs and replace in exact same positions. Springs must place tension on cam so that it is normally rotated counter-clockwise in retainer (viewed from rear) with rollers on "high" ends of cam ramps (outward or engaged position).

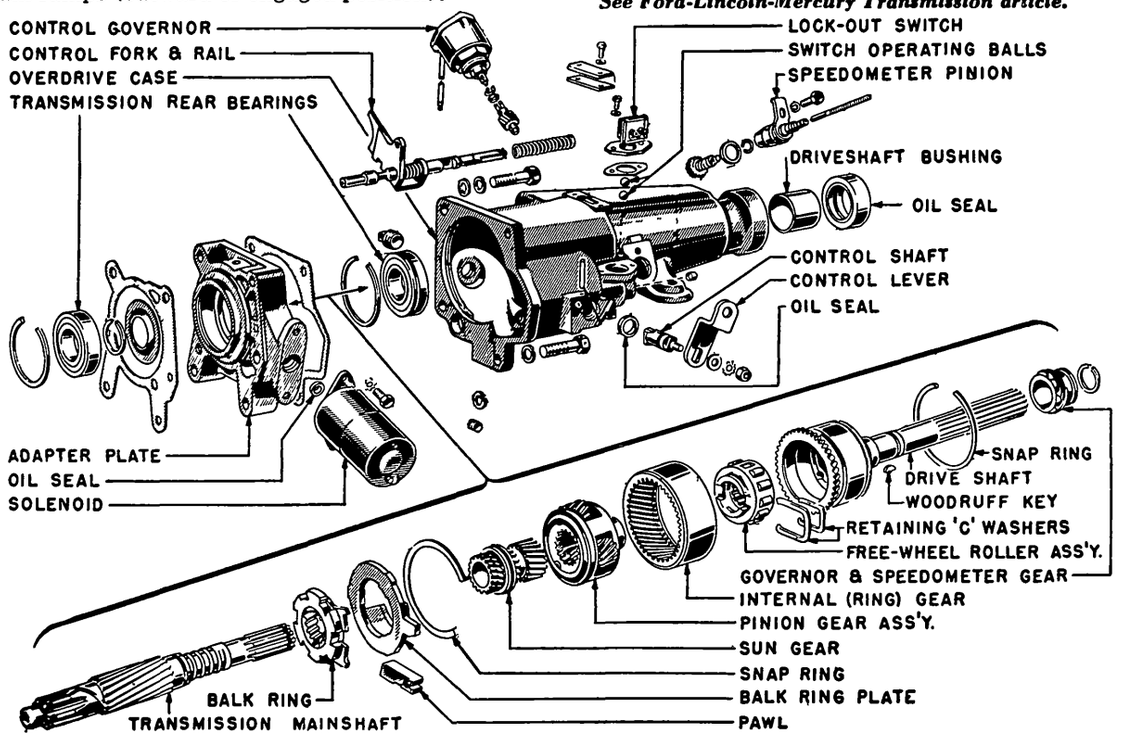
Overdrive Pinion & Free-wheel Assemblies: With these parts installed and retaining clips in place, insert free-wheel rollers in retainer and use rubber band to hold them while mainshaft installed.

Overdrive Mainshaft: Bearing should be installed on shaft with snap ring groove toward front (Ford & Mercury), toward rear (Lincoln), speedometer and governor drive gear must be keyed on shaft and placed with long shoulder on gear toward bearing (Ford & Mercury only—gear installed separately on Lincoln). Snap ring behind gear (directly behind bearing on Lincoln) must be tight fit and prevent all endplay in shaft. This snap ring furnished in four thicknesses for selective fit. When installing shaft over free-wheel cam & roller assembly, rotate shaft counter-clockwise to move rollers to low or disengaged position.

Overdrive Case & Control Mechanism: Install bearing outer snap ring in groove in case with lugs on ring toward slot in housing and expand ring with pliers inserted through slot while case is being pushed on over mainshaft. Insert control shaft in case before case installed on shaft but do not install shaft lock-pin until after assembly completed and cam on shaft engaged in slot in shift rail. Install new oil seal on control shaft and position control lever upward (Ford & Lincoln), downward (Mercury).

OVERDRIVE CONTROL: *See Warner Type R10 Overdrive Controls for complete data.*

TRANSMISSION DISASSEMBLY & REASSEMBLY: *See Ford-Lincoln-Mercury Transmission article.*



1949-55 FORD & MERCURY WARNER OVERDRIVE (LINCOLN SIMILAR)

1948-55 FORD TRUCK 3-SPEED (LIGHT DUTY)

1948-52—F-1, ½ Ton Truck (Std.)

1953-55 F-100 (Std.)

F-1 Optional Equipment—4-Speed Spur Gear Trans., and 3-Speed Heavy Duty Trans.

F-100 Optional Equipment—4-Speed Synchro-Silent Trans., 3-Speed Heavy Duty Trans., Overdrive (with 3-Speed H.D. Trans.), & Fordomatic Drive Trans.

►*1948-53 TRANSMISSION SHIFTER FORK CAM INTERLOCK CHANGE (To prevent possibility of shifting into two gears at once):* Interlock Pin, Part No. 01A-7235 can be installed inside Interlock Plunger Spring between shifter cams.

►*1955 TRUCKS (WITH 239" ENGINE) HARD SHIFTING CORRECTION:* If hard shifting occurs with the truck standing and the clutch completely disengaged, the pilot bearing bore in the crankshaft may not be deep enough. To correct this condition, grind approximately ⅛" off the pilot bearing end of transmission input shaft to provide clearance between end of shaft and counterbore in crankshaft.

DESCRIPTION: Constant-mesh, synchro-mesh, all helical gear.

REMOVAL OF TRANSMISSION: *See "Transmission" on truck model page.*

DISASSEMBLY: Remove gearshift housing and gasket. Remove screws which secure front bearing retainer to transmission case, tap retainer lightly, then slide retainer and gasket off main drive gear shaft. Remove lockpin securing countershaft and reverse idler gear shaft in case. Remove capscrews and lockwashers which attach extension to transmission case. Turn extension ¼ turn counter-clockwise to expose end of countershaft. Drive countershaft to rear until clear of front of case. Push countershaft out through rear of case with dummy shaft cut to length of countershaft cluster gear. Leave cluster gear and dummy shaft in case. Pull extension and mainshaft assembly out through rear of transmission case. Remove snap ring from main drive gear bearing. Tap gently on end of shaft with lead hammer until bearings free. Place one hand over gear end of main drive gear to prevent loss of or damage to main shaft pilot bearings, then lift main drive gear out of transmission case. Lift cluster gear assembly out of case, remove thrust washer and thrust plates located at each end of cluster gear. Remove two roller bearing (or needle bearing) assemblies and spacer from inside cluster gear. Drive reverse idler shaft toward front of case until free, then lift idler gear and shaft out of case.

Main Shaft: Remove snap ring that holds main shaft assembly in extension. Tap main shaft out of extension, using soft hammer. Remove transmission main shaft synchronizer snap ring, then pull or press synchronizer assembly and second speed gear off main shaft. Slide low and reverse gear off mainshaft. Remove snap ring that secures speedometer driving gear on main shaft, then remove gear. Press

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1948-55 FORD TRUCK 3-SPEED (LIGHT DUTY) (Cont.)

main shaft rear bearing off main shaft. Remove oil seal from transmission extension.

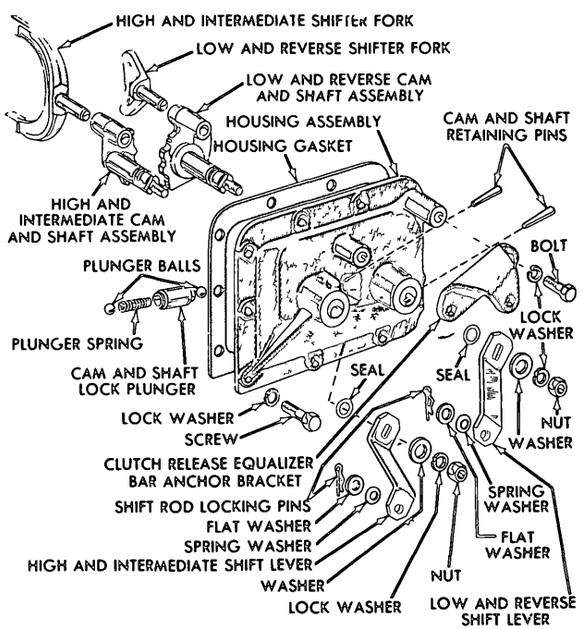
Synchronizer: Slide synchronizer hub assembly out of sleeve. Remove snap rings located on each side of hub, then remove inserts. NOTE—Blocker rings are removed separately from assembly. One ring is removed with second speed gear, and other is removed with main drive gear.

Main Drive Shaft: Remove synchronizer ring, then remove roller bearing assembly or needle bearings from inside drive gear. Remove snap ring from end of shaft. Using an arbor press or puller, remove bearing from shaft and take off oil baffle.

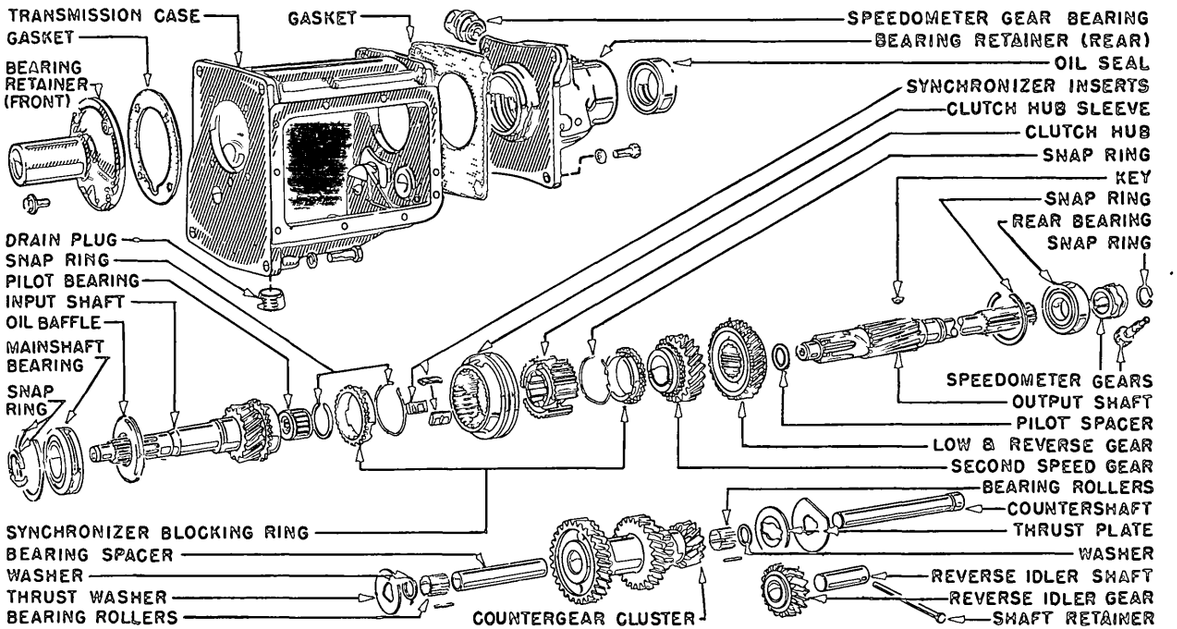
Gearshift Housing: Remove shift lever retaining pins and levers from camshaft. Pull shifter fork and cams out of gearshift housing. With cams removed the interlock balls, retainer, and spring will fall out of gearshift housing. Pull shifter forks out of shifter cam and shaft assemblies. Remove oil seals from shifter cam and shaft assemblies.

REASSEMBLY (Of Component Assemblies): All parts should be cleaned and inspected before assembly.

Main Shaft: Slide second speed gear onto front end of shaft. Coat synchronizer ring with grease, then install ring on shaft. Install synchronizer assembly on shaft, making sure the cutouts on synchronizer ring mate with inserts in hub, then install snap ring. Check endplay between second speed gear and shaft



3-SPEED (LIGHT DUTY) SHIFT ASSEMBLY



1948-55 FORD TRUCK 3-SPEED (LIGHT DUTY) TRANSMISSION

spline shoulder with a feeler gauge. Endplay should not exceed .020". Install first and reverse sliding gear on rear end of shaft. Press main shaft rear bearing on shaft. Install speedometer drive gear and snap ring. Press new oil seal in transmission extension on shaft until bearing is seated in bore of extension, then install bearing snap ring.

Synchronizer: Install inserts in hub, then position two snap rings on each side of hub. Slide hub assembly into sleeve.

Main Drive Gear: Install oil baffle, bearing and bearing snap ring (small) on shaft. Coat cavity in rear end of shaft with grease, then install roller bearing assembly (or needle bearings).

Cluster Gear: Install spacer and front and rear roller bearing assemblies (or needle bearings) in cluster gear. Place thick coating of grease on thrust washer and thrust plates, then position two rear thrust plates on rear end of cluster gear.

Gearshift Housing: Install new oil seals on shifter cam and shaft assemblies. Place one shifter cam and shaft assembly in position in gearshift housing. Assemble interlock spring and balls in retainer, then install interlock assembly in gearshift housing. Place other cam and shaft assembly in position in gearshift housing. Install gearshift levers on camshafts, then install retaining pins. Assemble shifter forks in cam and shaft assemblies.

TRANSMISSION ASSEMBLY: Lubricate all parts with transmission lubricant. Position reverse idler gear in case, then install idler shaft. Drive idler shaft into case until retainer pin hole in shaft is aligned with hole in case. Install countershaft gear front thrust washer with tip on washer hooked into groove on inside of case. Position cluster gear assembly in case with larger gear toward front. Make sure thrust washer and plates remain in position. Coat synchronizer blocker ring. Place ring on front end of main drive gear, install main drive gear assembly in case. Install snap ring in groove on main drive gear bearing, making sure that snap ring is flush with side of case. Position new gasket on transmission case, then install main drive gear bearing retainer on case. Tighten capscrews securely. Position new gasket on extension, then position main shaft and extension assembly in transmission case. Raise cluster gear assembly until bore of gear is aligned with countershaft holes in transmission case. Make sure that thrust washer and plates are also in alignment. Insert end of countershaft in hole in rear end of case. Push shaft forward until retainer pin hole in shaft is aligned with retainer pin hole in case. Install retainer pin. Install capscrews and lockwashers which attach extension to case, then tighten screws securely. Position new gasket on case, then place shift forks in neutral position. Place housing assembly on case making sure shift forks are located in proper channels on sliding gear and synchronizer sleeve.

▷*CAUTION—Position low and reverse fork with smooth side of fork toward gear, or transmission will not shift into first speed.*

Install capscrews and lockwashers that secure gearshift housing to case. Install drain plug. Turn main drive gear by hand to make sure the gears do not bind and that shift forks are in proper position.

1948-55 FORD TRUCK 3-SPEED (HEAVY DUTY)

Standard Equipment

1948-52—F-3 & F-5 Parcel Delivery①

1953-55—F-250 & F-350 Series Trucks①
1953-55—P-350 & P-500 Series Parcel Delivery①

Optional Equipment

1948-52—F-1 through F-5 Series Trucks②
1953—F-100 & F-500 Series Trucks①
1953—B-500 School Bus①

1954-55—F-100 Series Trucks①

①—Remote Shift Control.
②—Center Shift Control.

►***1953-55 HARD SHIFTING DURING COLD WEATHER CORRECTION (MODELS WITH 3-SPEED HEAVY DUTY TRANS.):*** Longer shift levers and stronger shift rods have been released for service replacement as follows: Lever (B5C-7285-B); Lever (B5C-7290-B); Lever (B5C-7303-A); Rod (B5C-7236-A); Rod (B5C-7328-A).

►***1955 TRUCKS (WITH 239" ENGINE) HARD SHIFTING CORRECTION:*** If hard shifting occurs with the truck standing and the clutch completely disengaged, the pilot bearing bore in the crankshaft may not be deep enough. To correct this condition, grind approximately ⅛" off the pilot bearing end of transmission input shaft to provide clearance between end of shaft and counterbore in crankshaft.

DESCRIPTION: Constant-mesh, synchro-mesh, helical gear (2nd & high), spur gear (low & reverse).

REMOVAL OF TRANSMISSION: *See "Transmission" on truck model page.*

DISASSEMBLY: Remove gearshift housing and gasket. Remove screws that secure front bearing retainer to transmission case, tap retainer lightly, then slide retainer and gasket off main drive gear shaft. Remove parking brake assembly, then remove screws, countershaft locking plate and gasket located at lower rear end of case. Remove mainshaft rear bearing retainer, slide speedometer driving gear and spacer off shaft, then remove snap ring from bearing. Using a puller, remove bearing from main shaft, and take off the oil baffle. Drive the countershaft out through rear of case with a punch or dummy countershaft. Pull main drive gear as far forward as possible and lift main shaft assembly out of case. Remove snap ring from main drive gear bearing. Tap gently on end of shaft with a lead hammer until bearing is free. Place one hand over gear end of shaft to prevent loss or damage of roller bearings, and lift main drive gear out of case. Lift cluster gear assembly out of case, and remove thrust washer and thrust plate at each end of cluster gear. Remove the two roller bearing assemblies and spacer from inside cluster gear. Drive reverse idler shaft toward front of case until shaft is free, and remove from case.

Main Shaft: Slide first and reverse sliding gear off main shaft. Remove snap ring from synchronizer end of shaft and slide synchronizer off shaft together with second speed gear.

Synchronizer: Slide synchronizer hub assembly out of sleeve. Remove snap rings located on each side of hub, then remove the inserts. NOTE—Blocker rings are removed separately from assembly. One ring is removed with second speed gear, and other is removed with main drive gear.

Main Drive Shaft: Remove synchronizer ring, then remove roller bearings from inside drive gear. Remove snap ring from end of shaft. Using an arbor press or puller, remove bearing from shaft and take off the oil baffle.

Floorboard Shift: Remove lock wires and screws attaching shifter forks to shifter shafts. Insert a drift in lockscrew hole of one of the shafts and gently tap shaft and expansion plugs out of housing. Repeat with other shaft ***(CAUTION—While removing shaft, place one hand over plunger spring and ball hole to prevent these parts from flying out. Tag or mark each shaft and fork and side of housing as its position to assure correct reassembly).*** Remove expansion plug at opposite end of housing from which shafts removed, remove plunger plug and plunger.

REASSEMBLY (Of Component Assemblies): All parts should be cleaned and inspected before assembly.

Main Shaft: Slide second speed gear on to front end of shaft. Coat synchronizer ring with grease, then install ring on shaft. Install synchronizer assembly on shaft, making sure the cutouts on synchronizer ring mate with inserts in hub, then install snap ring. Check endplay between second speed gear and shaft spline shoulder with a feeler gauge. Endplay should not exceed .020". Install first and reverse gear on rear end of shaft.

Synchronizer: Install inserts in hub, then position the two snap rings on each side of hub. Slide hub assembly into the sleeve.

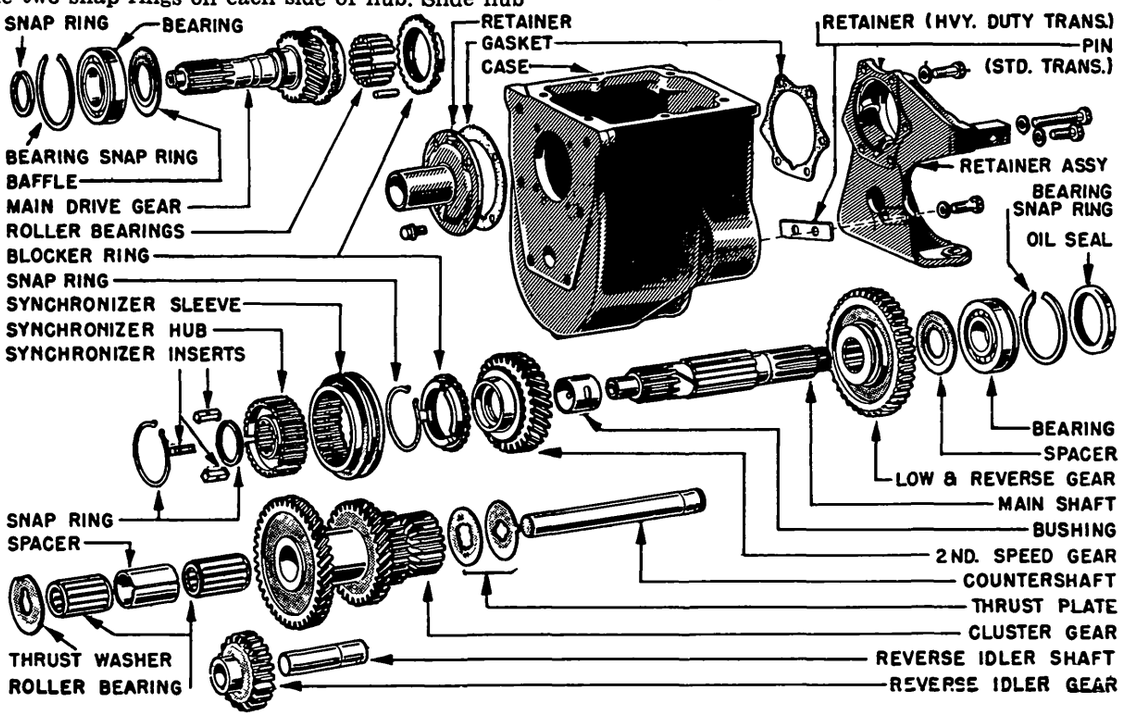
Main Drive Shaft (Gear): Install the oil baffle, bearing and bearing snap ring (small) on end of shaft. Coat roller bearing cavity in rear end of shaft with grease and install bearing rollers.

Cluster Gear: Install spacer and the front and rear roller bearings in cluster gear. Place a thick coat of grease on thrust washer and thrust plates, then position two thrust plates on rear end of cluster.

Floorboard Shift: Slide plunger in position in housing and install plunger plug. Drop a spring and ball into one of the holes in housing, then position the proper fork in place. Hold the ball down with a drift punch and slide the correct shaft into housing and shift fork. Install the capscrew to secure shaft on fork and secure with a lockwire. Install other shaft and fork in same manner. Install expansion plug at each end of each shaft.

Steering Column Shift (Parcel Delivery): Slide plunger into position in housing and install plunger plug. Install shifter shaft spring, shifter shaft inner lever and shifter shaft into housing. Press spring away from inner lever and insert key in inner lever, then force lever over key. Install one snap ring at each side of inner lever. Drop a shifter shaft lock plunger spring and ball through one of the housing holes, then place proper shift shaft in position. Move the ball down with a drift and slide correct shifter shaft into housing and shift fork. Install a shifter fork lockscrew, and secure screw with lockwire. Install remaining shaft in same manner. Install expansion plugs at each end of

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FORD TRUCK 3-SPEED (HEAVY DUTY) TRANSMISSION

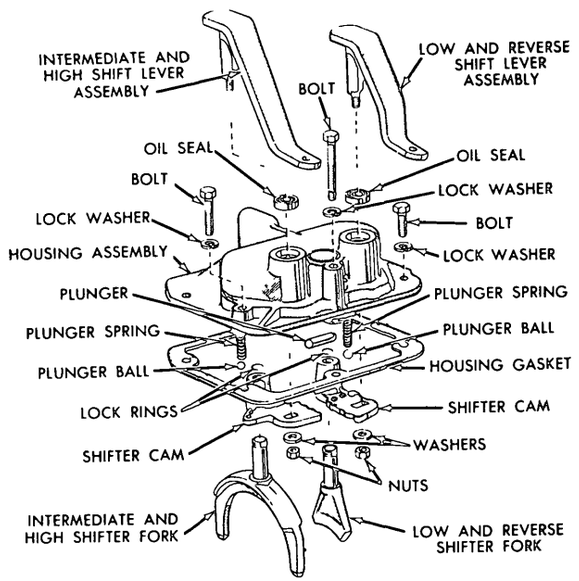
1948-55 FORD TRUCK 3-SPEED (HEAVY DUTY) (Cont.)

each shaft. Place selector lever assembly on stud in housing, then install spacer, lock washer, and nut. Position shifter shaft outer lever on shifter shaft, then install flat washer, lock washer and nut.

Steering Column Shift (F-1, F-100 Truck): Place one shifting cam in position in gear shift housing. Assemble interlock spring and balls in retainer and install interlock assembly in housing. Install oil seals in housing, then install gearshift levers on camshafts, install retaining pin. Assemble shifter forks.

Transmission: Lubricate all parts with transmission lubricant. Position reverse idler gear in case and install idler shaft, driving it into case until edge of lockplate notch in shaft is flush with rear face of case. Install countershaft gear front thrust washer with tip on washer hooked to groove on side of case. Position cluster gear assembly in case with larger gear toward front. Make sure thrust washer and plates remain in position. Coat synchronizer blocker ring with grease, and place on rear end of main drive gear, and install main drive gear in case. Install snap ring in groove, making sure that ring is flush with case. Position gasket on case, and install main drive gear retainer. Tighten capscrews securely. Place main shaft assembly in case, and install oil baffle or spacer on main shaft. Install snap ring in groove on rear bearing, then drive bearing on shaft until bearing snap ring is flush with side of case. Make sure synchronizer rings are free in synchronizer assembly. Raise cluster gear assembly until bore of gear is aligned with holes in case. Make sure thrust washers are in alignment, then insert end of countershaft through hole in rear end of case, pushing shaft forward until edge of notch in shaft is flush with case and notch is aligned with notch in idler gear shaft. Install locking plate and gasket, and parking brake assembly. Position new gasket on case, then place shifter forks in neutral. Place gearshift housing assembly on case, making sure shift forks are in proper channels on sliding gear and synchronizer sleeve.

CAUTION—Position low and reverse fork with smooth side of fork toward gear, or transmission will not shift into first speed. Install capscrews and lockwashers, securing gearshift housing to case. Install drain plug. Rotate main drive gear by hand to make sure gears free and shift forks properly installed.



3-SPEED (HEAVY DUTY) SHIFT ASSEMBLY

1941-52 FORD TRUCK 4-SPEED (SPUR GEAR)

Standard Equipment
1941-51—All Trucks (Exc. ½ & ¾ Ton Models)
1952—F-4, F-5, F-6 (Exc. F-5 Parcel Del. & F-6 Truck with 6 Cyl. "M" Engine)

Optional Equipment
1941-51—½ & ¾ Ton Models
1952—F-1, F-2, F-3 (Exc. Parcel Del.)

DESCRIPTION: Four-speed, sliding spur gear type.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY: Remove gearshift housing (transmission cover) assembly and gasket. Remove the clutch release bearing spring, release bearing, and retainer. Take out screws in bearing retainer on front end of case, remove retainer, withdraw clutch shaft main dive gear and bearing assembly (tap main drive gear with a brass hammer if required). Remove mainshaft front (roller) bearing and spacer from mainshaft. Take off nut on rear end of main shaft and remove universal joint flange and brake drum. Take out screws in bearing retainer on rear end of case, remove retainer, withdraw speedometer gear and spacer from shaft. Remove speedometer driven gear bearing and gear from retainer. Withdraw mainshaft and bearing out through rear of case (use brass hammer and tap on front end of shaft until bearing free of case) and remove sliding gears out through top of case. Take out cotter pin from front end of reverse idler, shifter shaft on left side of transmission and drive shaft out through rear of case and lift out shifter fork. Take off reverse idler retainer (lock plate) on rear of case and pry out reverse idler shaft with screwdriver engaging slot in end of shaft, lift out reverse idler gear. Drive countershaft out through rear of case, lift out cluster gear. Remove bearings and spacer from cluster gear.

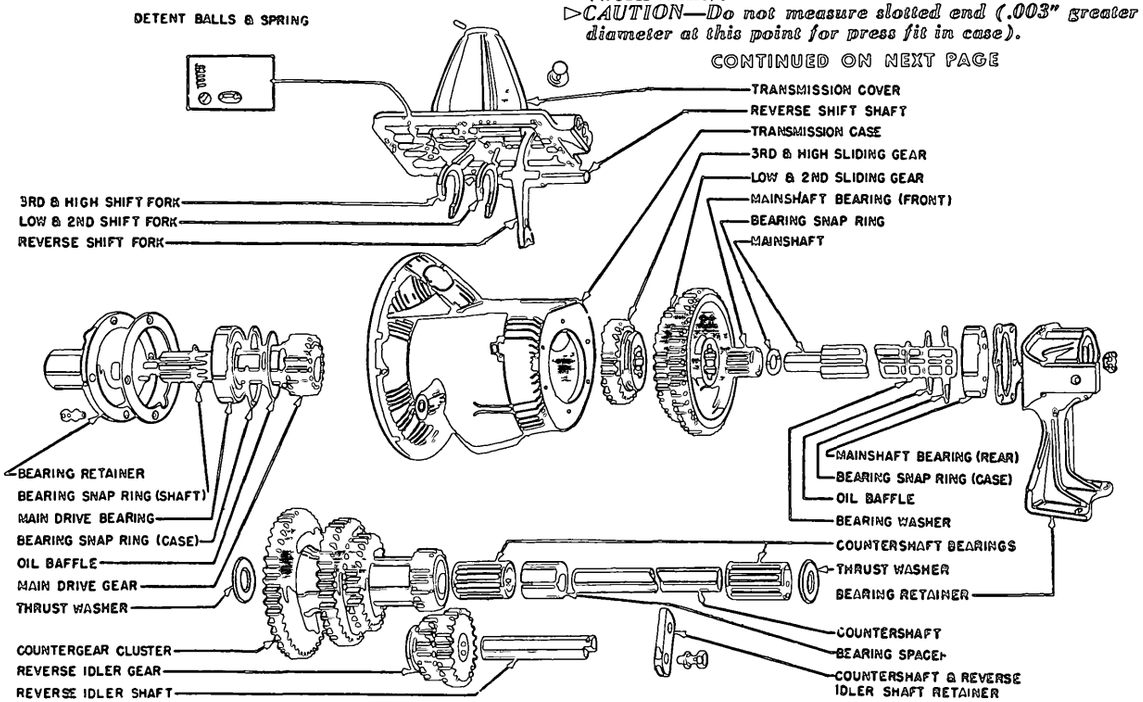
CLEARANCES & PARTS CHECK: Replace gears if worn excessively or teeth chipped or broken. Replace bearings discolored by overheating or if binding or looseness noted when rotating bearing on shaft by hand. Replace parts worn beyond the following limits:

Countergear Cluster: Endplay .009-.021" (new), .025" (worn limit). Measure between gear and case. Inside diameter 1.6255-1.6265" (new), 1.630" (worn).

Countershaft: Diameter .9995-1.0000" (new), .9945" (worn limit).

▷*CAUTION—Do not measure slotted end (.003" greater diameter at this point for press fit in case).*

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1941-52 FORD TRUCK 4-SPEED (SPUR GEAR) TRANSMISSION

1941-52 FORD TRUCK 4-SPEED (SPUR GEAR) (Cont.)

Reverse Idler Gear: Inside diameter .9890-.9900" (new), .991" (worn limit). If bushing worn, replace gear. Do not remove bushing from gear (gear furnished with bushing installed).

Reverse Idler Shaft: Diameter .9872-.9877" (new), .986" (worn limit).

Mainshaft Assembly: 3rd & High Gear—Fit to shaft correct if gear holds own weight on shaft splines.

First & Second Gear—Backlash limit .003".

Mainshaft—Pilot (front) end diameter .8110-.8115" (new), .806" (worn limit).

Main Drive Gear Assembly: Gear end inside diameter 1.312-1.313" (new), 1.316" (worn limit).

REASSEMBLY: Assemble in reverse order of disassembly (above) and note following points:

Mainshaft Assembly: Install first and second gear and third and fourth gear with shifter fork channels facing each other (first and second facing toward front, 3rd & 4th channel facing rear).

1951-55 FORD TRUCK 4-SPEED (SYNCHRO-MESH)

Standard Equipment

1951—F-6 Series (With 6 Cyl. "M" Engine)
1952—F-6 (With 6 Cyl. "M" Engine)
1953-55—F-500, F-600, F-700 Series (Exc. Par. Del.)

Optional Equipment

1951—F-4, F-5, F-6 (See F-6 Note below)
1952—F-4, F-5, F-6 & F-6 School Bus (With 8 Cyl. "R" Engine)
1952—F-4 Truck, F-5 School Bus (With 6 Cyl. "D" Engine)
1953-55—F-100, F-250, F-350 Conventional Trucks
1953-55—P-350, P-500 Parcel Delivery

►**F-6 Note**—With 8 Cyl. "R" or 6 Cyl. "H" Engine.

►CHANGES & CORRECTIONS

►***1953 GEAR SHIFTER SHAFT LOCK PLUNGER SPRING PRODUCTION CHANGE: Spring Part No. 8D-7234 with pressure of 8-9 lbs. against plunger balls has been replaced by spring Part No. BB-7234 with pressure of 22-26 lbs. Change provides additional security against transmission jumping out of gear.***

►***1953 DIFFICULT SHIFTING TO REVERSE CORRECTION***—May be caused by distortion of reverse gear shifter arm causing upper end of arm to not engage notch in reverse gear shifter shaft. To correct this condition, drain transmission and remove gear shift housing. Insert reverse gear shoe, installed in lower end of reverse gear shifter arm, in slot in reverse idler gear. Hold shifter arm against pivot shoulder in case and check distance between upper end of shifter arm and left side of case. Distance should be 4.42" to 4.45". If not correct, insert ¼" brass rod (not steel) shifter arm and gear teeth (to steady arm), and bend arm with crescent wrench until correct dimension obtained. When replacing shifter arm, make sure it enters slot in shifter shaft.

DESCRIPTION: Four-speed constant-mesh, synchro-mesh, helical gears (Second, Third & Fourth). Sliding spur gears (First & Reverse). Synchronizer assemblies are friction ring-and-sleeve type.

TRANSMISSION REMOVAL: *See "Transmission" on truck model page.*

TRANSMISSION DISASSEMBLY: Remove parking brake assembly. Remove speedometer driven gear retaining nut and the driven gear. Remove rear bearing retainer and gasket (noting location of longest retainer-to-case bolt). Remove reverse idler shaft and countershaft retainer plate from rear of case. Slide speedometer drive gear and spacer off main shaft. Remove gear shift housing assembly and gasket. Unhook clutch release bearing return spring and remove release bearing and hub assembly. Remove capscrews from front bearing retainer and the nuts from clutch housing-to-case attaching bolts then remove clutch housing and retainer from case. Remove snap ring from main drive gear bearing and from main drive gear and then remove the bearing using Tool 7025-C (Puller). Remove oil baffle and the snap ring from rear main shaft bearing and pull the bearing with Tool 7025-C. Drive countershaft from case, working from the front, using dummy shaft, Tool 7111-A. *(CAUTION*—Keep dummy shaft in contact with countershaft to avoid dropping needle bearings). Allow cluster to remain in bottom of case. Remove main drive gear through the front end of case, then remove synchronizer blocker ring and needle bearings from gear. Pull reverse idler shaft out of case, using Tool 7140. Slide reverse shifter fork off shaft and remove from case. Tilt main shaft assembly and remove through top of case. Take out reverse idler gear. Position case with power take-off side next to bench. Roll cluster gear assembly toward top of case until cluster gear small end can be pushed through main shaft bearing bore in case. Using extreme care not to disturb needle bearings, remove gear assembly out of case.

DISASSEMBLY OF COMPONENT PARTS:

Main Shaft: Remove third and high synchronizer snap ring from main shaft, then slide third and high speed synchronizer assembly and third speed gear off shaft. Remove second speed synchronizer snap ring and slide second speed synchronizer hub gear off synchronizer, using care not to lose balls, springs and plates. Pull synchronizer hub off shaft. Remove snap ring at rear of second speed gear and remove gear, spacer, rollers, and thrust washers.

Cluster Gear: Remove dummy shaft, 88 bearing rollers, bearing spacer washers and bearing spacer.

Reverse Idler Gear: Install reverse idler gear on shaft, check gear for smooth, free rotation on shaft. If any roughness noted, disassemble gear as follows: Remove snap ring from one end of gear, then remove idler gear bearing rollers, thrust washers, bearing spacer, and idler gear bushing from gear. Remove remaining snap ring from gear.

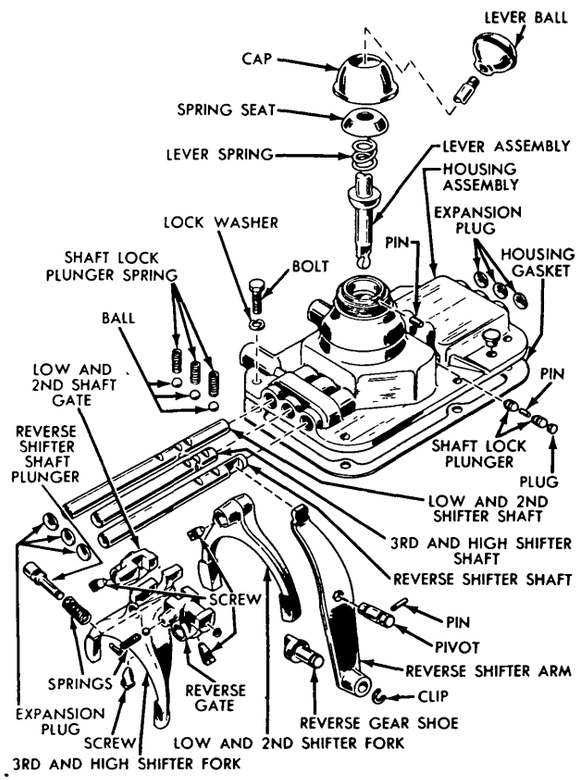
Gearshift Housing: Remove gearshift lever cap, then lift lever out of cover. Remove lock wires and lock screws, shifter forks and shifter shaft gates. Remove expansion plugs from front end of housing and tap shifter shafts out of housing while holding one hand over holes in housing to prevent loosing springs and steel balls. Remove two lock plungers.

REASSEMBLY OF COMPONENT PARTS:

Cluster Gear: Slide the long spacer into cluster gear and then insert dummy shaft into spacer. Hold cluster gear in a vertical position and install 22 bearing rollers. Install spacer washer on top of rollers and then install 22 bearing rollers and a spacer washer on top of rollers. Hold a large thrust washer against end of cluster gear to keep rollers from falling out, and invert the gear assembly. Install bearing rollers in opposite end (above).

Main Shaft: Install second speed gear thrust washer on main shaft. Hold shaft in vertical position and slide second speed gear on main shaft. Insert second speed gear bearing rollers in gear, then slide spacer into gear hub. Install spacer snap ring in groove of main shaft. *(CAUTION*—Do not invert shaft. Rollers will slide out of shaft). Press second speed synchronizer hub on shaft and install snap ring. Place main shaft in vertical position in a vice. Position synchronizer springs and plates in hub and place second speed synchronizer ring on hub. Hold ring above hub spring and ball holes and position one ball at a time in hub. Push down to depress ball into hole and slide ring down to retain ball in hub, then repeat the foregoing procedure and install remaining two balls. Remove main shaft from vice and install the third speed gear, and sychronizer

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4-SPEED SHIFT ASSEMBLY

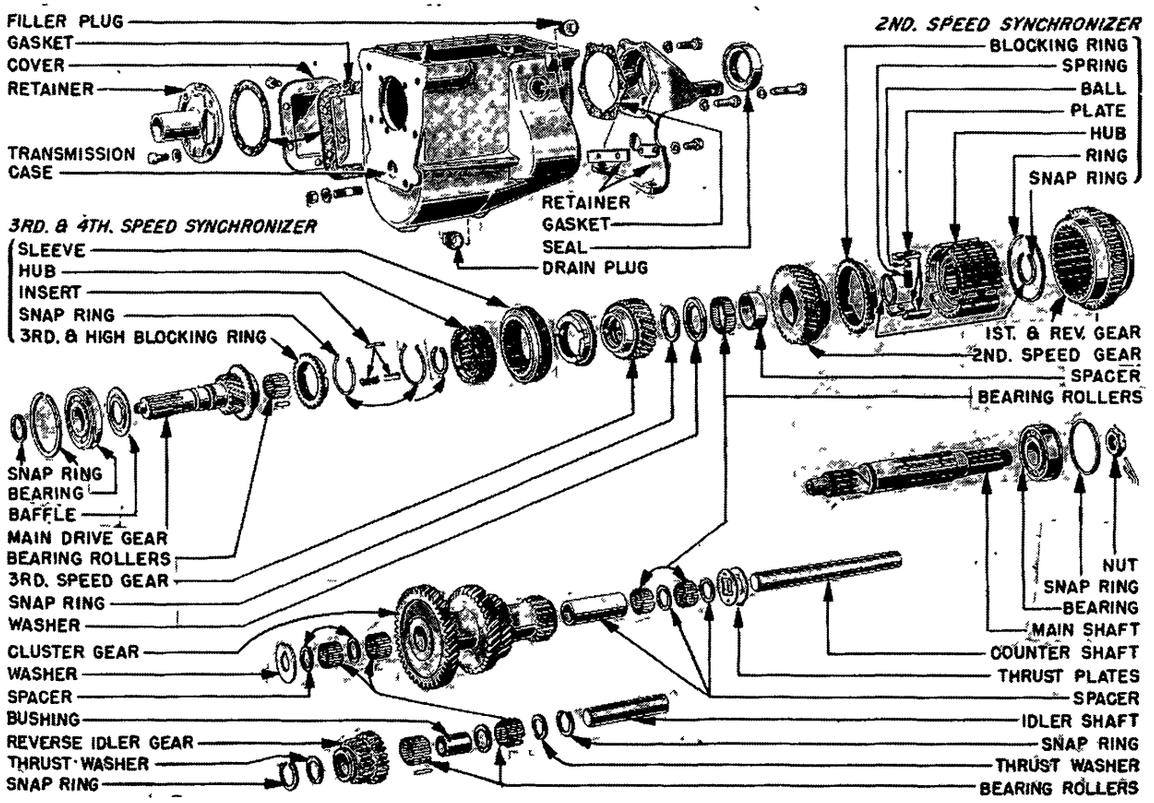
1951-55 FORD TRUCK 4-SPEED (SYNCHRO-MESH) (C nt.)

blocking ring on shaft. Install a snap ring at each end of hub with spring openings staggered. Place synchronizer inserts on sleeve and slide the assembly onto main shaft, making sure slots in blocker ring in line with inserts. Install front snap ring.

Reverse Idler Gear: Install snap ring in one end of reverse idler gear. Set gear on end with snap ring on bottom. Position a bearing roller thrust washer in gear on top of snap ring, then install idler gear bushing. Insert a row (37) of bearing rollers between bushing and bore of gear. Install bearing spacer, then install second row (37) bearing rollers. Position remaining thrust washer on rollers, install snap ring.

Gearshift Housing: Place spring on reverse gate plunger and install plunger and spring in reverse gate. Press plunger through the gate and secure it with the clip. Place reverse gate plunger ball and spring in poppet hole. Compress the spring and install cotter pin. Place shifter shaft lock plunger spring and steel ball into reverse shifter shaft hole in housing. Press down on ball with a long, narrow drift, then position reverse shifter shaft so reverse arm notch does not slide over the ball, and insert shaft part way into housing. Slide reverse shaft gate onto shaft, and drive shaft into housing until ball snaps into groove of shaft. Install lock screw and lock wire to secure gate to shaft. Insert the two interlock plungers into pockets between shifter shaft holes. Place the spring and a steel ball into the first and second shifter shaft hole. Press down on steel ball, then insert shifter shaft part way into housing. Slide first and second gear shifter fork onto shaft so the offset of fork is toward rear of housing. Push shaft all the way into housing until ball snaps into place in groove. Install lock screw and wire to secure fork. Install third and high shifter shaft in same manner, then install expansion plugs in shaft bores.

TRANSMISSION REASSEMBLY: Lubricate all parts with transmission lubricant. Enter countershaft into hole in rear of case and tap shaft until forward end is flush with inside of case. Slot in end of shaft must be at rear and faced toward idler gear shaft. Position case with power take-off plate downward. Hold the two thrust washers at each end of cluster gear and install gear in bottom of case, then install the third thrust washer between case and rear washer. Position idler gear shaft into case with slot at rear and faced toward countershaft and while holding reverse idler gear in position, tap shaft until slot is aligned with rear face of case. Align cluster gear with holes in case and push the dummy shaft out through front of case with countershaft. (*CAUTION*—Be sure to keep cluster gear in contact with dummy shaft to prevent bearing from dropping into gear). Align slot in countershaft with rear edge of case. Install main shaft pilot bearing rollers in main drive gear, and position gear in front bearing bore, working from inside the case. Position the stop yoke Tool No. 2025-D to prevent jamming synchronizer rings. Install oil baffle and main shaft bearing on shaft and drive bearing into position with Tool 7065-A, install snap ring. Using same tool, drive rear bearing on shaft and into rear bearing bore, then install rear bearing snap ring. Install main drive gear snap ring on shaft. Install front bearing retainer and clutch housing on front of transmission. Install gear shift housing and gasket. Install idler and countershaft retainer plate, securing with two capscrews. Install rear bearing retainer and new gasket making sure the longest screw is installed in correct hole. Install speedometer drive gear and spacer on end of main shaft and install driven gear and retaining nut. Install flange and parking brake drum and tighten nut, locking in place with cotter pin.



1951-55 FORD TRUCK 4-SPEED SYNCHRO-MESH TRANSMISSION

1941-47 HUDSON

Hudson 6 & 8, All Models (1941 to 1947)

DESCRIPTION: New constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse), all-helical gear type. Main drive gear is integral with clutch shaft and is mounted on ball bearing in front of case.

Transmission Controls—Steering column mounted gearshift is standard on all models. *Refer to separate Hudson Transmission Control article for adjustment and servicing data.*

Drive-master Transmission—Optional on all models. Consists of a special automatic gearshift mechanism mounted on the transmission case. Refer to separate Drive-Master article (preceding) for all data on this equipment.

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

OVERDRIVE DISASSEMBLY: On car models with overdrive, overdrive unit can be disassembled and serviced without disturbing transmission providing that adapter plate is not disturbed (must not be allowed to separate from transmission case). *See "Warner Type R9 Overdrive."*

DISASSEMBLY OF TRANSMISSION: On Vacumotive Drive cars unscrew the Governor from housing. Remove transmission cover screws, lift cover off carefully to prevent detent ball spring flying out, tilt transmission case to one side and remove spring and detent ball. Remove front universal joint companion flange nut, lockwasher, plain washer. Use puller J-820 to remove companion flange. Take out screws in speedometer gear housing (rear bearing retainer), remove housing and speedometer gear using care not to damage oil seal in housing. Remove low & reverse shift fork lockscrew and shifter lockscrew, slide low & reverse shift rail out through front of case, remove shift fork and reverse shifter from case. Tilt case and remove interlock plunger from hole in side of case. Remove second & high shift fork lockscrew and lock bolt and washer on left side (1942 on), slide shift rail out, lift fork out of case, tilt case and remove detent ball and spring. Slide mainshaft and

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1941-47 HUDSON (Cont.)

gear assembly back so that rear bearing is free of case, tilt front end of shaft up, remove snap ring in shaft directly in front of synchronizer inner clutch sleeve (use special pliers J-1575). Slide synchronizer unit, second speed gear, low speed gear, off shaft and remove through top of case, then withdraw mainshaft and bearing through rear of case. Remove countershaft lockplate screw on rear of case, drive out plate with a drift, drive countershaft out through rear of case using Driver J-1574, remove countergear cluster and thrust washers. Pull main drive gear out through front of case (use driver J-1574 if necessary—gear will be free with clutch housing and bearing retainer removed). Use driver J-1574 inserted through main drive gear bearing hole to drive out reverse idler gear shaft.

REASSEMBLY OF TRANSMISSION: Reverse disassembly directions given above and note following special instructions: Install sliding low speed gear on mainshaft with shift fork flange toward front and make certain that four oil holes in flange groove line up with grooves in shaft. Install second speed gear with tapered side of hub toward front, install synchronizer unit with tapered side of shift sleeve toward front, select lock ring of correct thickness (furnished .087", .090", .093", .097" thick) so that synchronizer has no appreciable endplay when lock ring installed. See that detent balls and springs correctly installed (low & reverse spring at top is heavier than second & high spring at bottom and springs must not be interchanged). Install second and high shift rail stop screw making certain that lockwasher in place under screw head (stopscrew used on 1942 and later cars only).

CAUTION—If lockwasher not used on stopscrew, screw will bottom on shift rail preventing gear engagement.

Mainshaft & Rear Bearing Assembly:—Use special puller J-1134H to remove bearing from shaft. To install bearing, see that locking ring on bearing is toward rear of shaft, use replacer tool J-1570 to drive bearing in place.

Main Drive Gear & Bearing Assembly:—To remove bearing, remove lock ring in groove in shaft with J1575 pliers, use puller J-1134-H to remove bearing from shaft (bearing will be damaged if driven off). When installing bearing, see that shielded side is toward gear (to rear when installed), use replacer tool J-1570 to drive bearing in place. Use lock ring of correct thickness (furnished in thicknesses of .090", .093", .096") so that lock ring is snug fit in groove and there is no appreciable endplay. Use grease to retain mainshaft bearing rollers in drive gear hub until mainshaft installed. If oil seal in bearing retainer being replaced, use remover J-1576 to tap old seal out, press new seal in place with J-1569 seal replacer tool. Use new gasket when installing retainer on case. NOTE—Retainer locating pin engages hole in clutch housing so that retainer can only be installed with throw-out bearing oil holes lined up properly.

Synchronizer Unit:—If synchronizer unit being dismantled, mark inner and outer clutch sleeves and rings to insure reassembly in same positions. Install struts with open face toward inner clutch sleeve, install springs with hooked end of each spring in same strut with free ends running in opposite directions. See that undercut on inner sleeve points toward rear of transmission and install synchronizer on mainshaft with tapered side of outer sleeve toward front.

IMPORTANT NOTE—Two types of synchronizer rings and sleeves used in production and must not be interchanged. Rings with 110° chamfer on face of teeth are marked '110' on flange face and must be used with 110° clutch sleeves which are marked by groove on outside face. 90° chamfer rings and sleeves not marked. CAUTION—90° parts must not be used with 110° parts.

Countergear Assembly: Countergear bushings can be renewed by using J-1573 puller to remove old bushings, J-1572 replacer to install new bushings, and then reaming bushing with KMO-338 bushing reamer (pilot reamer on guide installed in other end of gear cluster while reaming each bushing). When installing countergears in transmission, coat bronze thrust washers with chassis lubricant, install washers in case so that they engage retaining pins in case, install steel thrust washer between gear cluster and rear thrust washer. See that both countershaft and reverse idler shaft are locked in place by lockplate and that lockplate screw tightened securely.

Shifter Shafts & Levers:—Selector shaft can be removed from within case after taking off nut, washers, and lever on outer end of shaft. Bushing is withdrawn from outside after bushing setscrew has been loosened. When removing shift shaft, first punchmark inner lever and shaft to insure correct reassembly (if position lost, use indexing tool J-1571 to re-install inner lever). Remove nut on outer end of shaft, remove lever. Drive out pin in shaft boss on side of case, remove inner lever, withdraw shaft and felt seal. Install levers in same manner.

REASSEMBLY: Reverse the disassembly procedure in installing all units in transmission case.

HUDSON SUPER-MATIC DRIVE

Pacemaker, Model 500 (1950), 4A (1951) Optl.
Super Six, Model 501 (1950), 5A (1951) Optl.

DESCRIPTION: Super-Matic Drive consists of a three-speed transmission and overdrive unit with automatic shift mechanism and automatic clutch control. With this installation, whenever Super-Matic "On" button is pushed in, and Automatic 4th-Speed Button pushed in, operation is entirely automatic and controlled by the accelerator pedal (shifts up-and-down through 2nd-3rd-4th automatically and dependent on accelerator pedal position and car speed). An ultra-low gear is also provided and is engaged manually when required.

Upshift Speeds

2nd-to-3rd①	Above 14 MPH.
3rd-to-4th①	Above 22 MPH.

Downshift Speeds

4th-to-3rd (Normal)	18 MPH.
4th-to-3rd (Kick-down)	②
3rd-to-2nd	12 MPH.

①—Engaged by releasing accelerator pedal momentarily.

②—At any speed above 18 MPH. by fully depressing accelerator pedal.

DISASSEMBLY & OVERHAUL: Super-Matic Drive units can be serviced separately as follows:

Clutch Control: *See "Hudson Vacumotive Drive" in Clutch Section for data.*

Automatic Shift Control: *See "Hudson Drive-Master" for data.*

Transmission: *See "1948-Early 1952 Hudson Transmission" for data.*

Overdrive: *See "Warner Type R10" Overdrive for data.*

1948-EARLY 1952 HUDSON

Hudson 6 & 8, All Models (1948-Early 1952)—See Notes.

►*LATE 1952 TRANSMISSION PRODUCTION CHANGE: Warner Transmission used beginning in Late 1952. See "Warner" Transmissions for complete data.*

►**OVERDRIVE TRANSMISSION NOTE:** Optl. on all models. Consists of Warner Type R10D Overdrive used with Hudson transmission for which data is given below. *See Warner Type R10 Overdrive article*

►**HYDRA-MATIC DRIVE TRANSMISSION NOTE:** Optl. on 1950-52 models (except Pacemaker). *See "Hydra-Matic Transmission" for data.*

►CHANGES, CAUTIONS, CORRECTIONS

►**SLIPPING OUT OF GEAR CORRECTION (Second & High Shift Rail Production Change):** New type Shift Rail, Hudson No. 303832, and Lock Ball Spring, Hudson No. 303847, should be installed when overhauling transmission to correct slipping out of gear *NOTE*—These parts used in production beginning with Serial No. 500-26338.

►**INSTALLATION OF 1951 TYPE OVERDRIVE TRANSMISSION COVER ON 1948-50 CARS (to correct insufficient lubrication of Overdrive):** If insufficient lubrication noted in overdrive case, 1951 type Transmission Case Cover, Hudson No. 305424, should be used to replace original cover. This 1951 type has oil trough located so as to catch maximum oil spray from transmission gears and conducts lubricant to overdrive case opening.

DESCRIPTION: Three-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). Transmission is similar to design used on previous Hudson models.

OVERDRIVE SERVICING NOTE: On transmissions with Overdrive, overdrive unit can be disassembled and serviced separately without disturbing transmission.
See "Warner R10 Overdrive."

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

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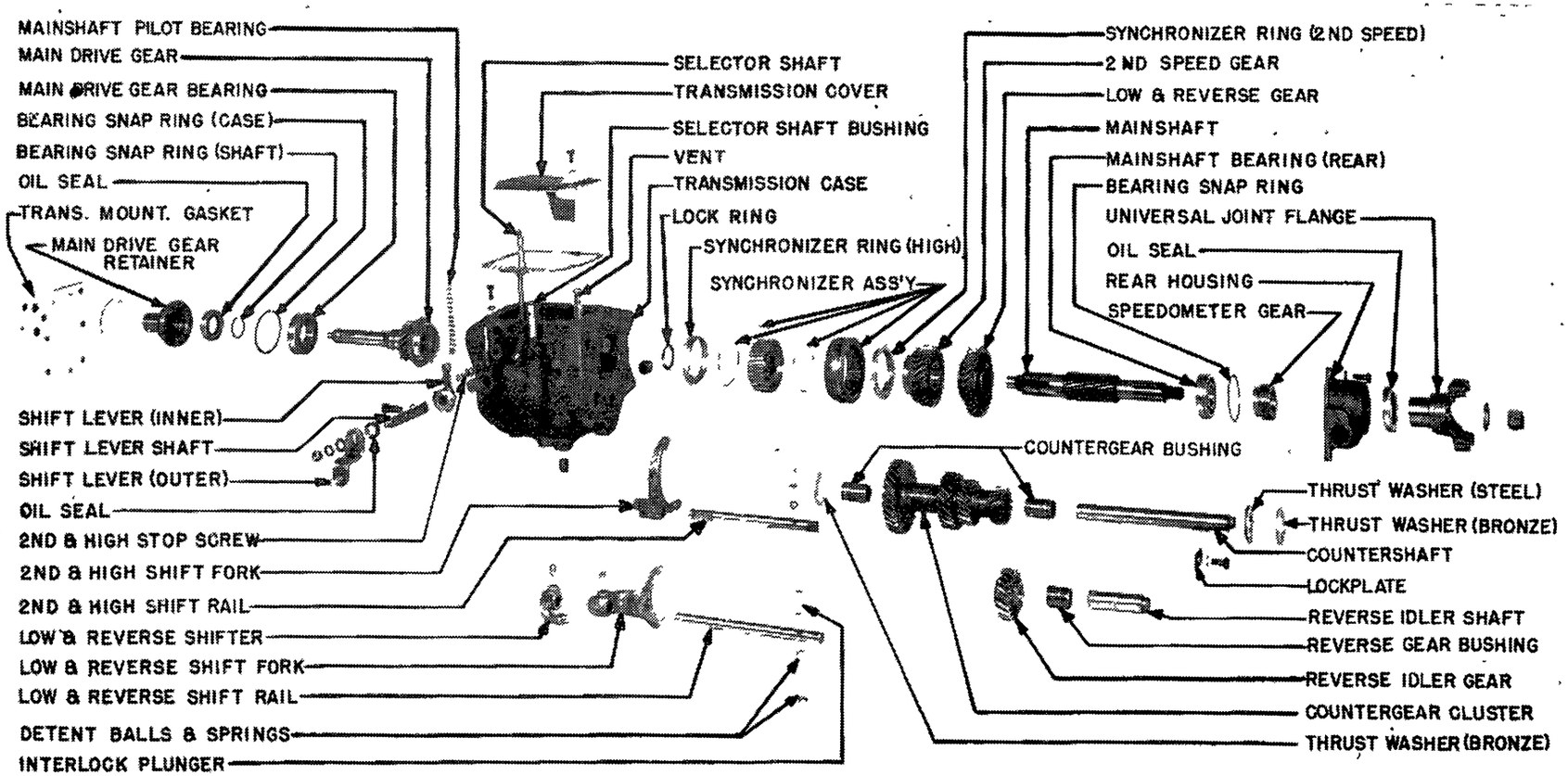
1948-EARLY 1952 HUDSON (Continued)

TRANSMISSION DISASSEMBLY: On cars with Governor (for Vacumotive Drive, Drive-Master, or Overdrive Control), remove governor from rear bearing retainer. Remove nut on end of driveshaft, pull universal joint flange. Take out capscrews in transmission cover, lift cover off carefully to prevent loss of shift rail spring (tip cover up on left side, remove spring and lock ball, lift cover off). Take out retaining capscrews and remove rear bearing retainer, slide speedometer drive gear off shaft. Remove 2nd & High shift rail stopscrew on left side of case. Remove lockscrew from Low Speed Shifter Fork and from Low Speed Shifter (use straight blade screwdriver which bottoms in screw slot—do not use taper blade screwdriver), slide shift rail out at front of case, lift out shift fork and shifter. Remove interlock plunger. Remove setscrew from 2nd & High Shift Fork, slide shift rail out through front of case. Remove spring and lock ball from case (tip case up). Take out retaining screw on rear of case, remove lock plate to free countershaft and reverse idler shaft. Drive countershaft out through rear of case, using bronze Driver J-1574, lower countergear cluster to bottom of case. Pull mainshaft rearward by hand until puller can be engaged behind bearing or snap ring (if necessary, re-install universal flange, tap on flange to move shaft). Remove bearing from shaft with Puller J-1134-H. Pull mainshaft to rear until forward end clears pilot bearing in main drive gear, then tilt forward end up, move synchronizer and sliding gear to rear as far as possible, remove mainshaft assembly through top of case. Pull main drive gear forward until bearing retainer snap ring is free, remove snap ring, tap drive gear into case and remove through top of case. Remove shift shaft inner lever, lift countergear cluster and thrustwashers out. Drive out reverse idler shaft (use driver J-1574 inserted through mainshaft bearing hole in front of case), lift reverse idler gear out. Remove nut and washer on upper end of shift selector shaft, lift off lever, take out setscrew in side of shaft, remove shaft from within case, pull bushing straight up and out. Remove nut and washers on outer end of shifter shaft, remove outer lever, drive out tapered lockpin in side of shaft (use pin punch, withdraw shifter shaft and seal. Disassemble all sub-assemblies as follows:

Mainshaft Assembly: Remove sliding gear, take out lock ring in groove ahead of synchronizer hub, slide synchronizer assembly and 2nd speed gear off shaft. When reassembling, make certain that oil holes in gear hub register with shaft spline oil channels (four splines have oil channel at front end). Install 2nd speed gear with the ground tapered hub end toward front of shaft, see that synchronizer struts engage slots in synchronizer rings, use new lock ring in shaft groove and carefully fit ring in groove. Check 2nd speed gear endplay which should be .003-.016".

Synchronizer Assembly: Need not be disassembled (can be removed as a unit by sliding it off front end of mainshaft). To disassemble, lift out synchronizer rings, slide outer sleeve off inner hub, lift out three synchronizer struts or plates and springs. When reassembling, place three struts in position in hub slots, install synchronizer springs with one end of each spring engaging same groove in strut and with springs extending around hub in opposite directions. Install outer sleeve with shifter fork groove toward undercut on hub, and install assembly on mainshaft with this end toward rear of transmission.

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HUDS N 6 & 8 TRANSMISSION (N VERDRIVE)

1948-EARLY 1952 HUDSON (Continued)

Countergear Cluster: Examine bushings for wear and replace if clearance greater than .005". Install new bushings with Replacer J-1572 (position bushings with annular groove nearest end of shaft, draw both bushings in until end .015" beyond thrust face of gears). Ream bushings to .865" using KMO-338 Reamer (pilot reamer in bushing at opposite end of gear and ream each bushing in succession). When installing assembly in case, place thin thrust washer in case at each end (bronze surface out toward gear, washers engaging retaining pins in case), place steel washer on rear face of cluster gear with tongue engaging slot in end of gear. Check end-play which should be .006-.016".

Reverse Idler Gear: Replace bushing if clearance exceeds .005". Install bushing with Replacer J-1572. Ream to inside diameter of .865" using Reamer KMO-338 and pilot. Clearance should be .001-.0025".

Main Drive Gear: To remove bearing, take out lock ring in shaft groove, use Puller J-1134-H. Install bearing with Replacer J-1570, install lock ring in shaft groove but do not install retainer ring in bearing groove until after assembly installed in transmission case.

TRANSMISSION REASSEMBLY: After all sub-assemblies completed, reassemble transmission by reversing disassembly directions except as noted below:

Main Drive Gear Installation: Insert gear and bearing assembly through cover opening in case, push through hole in front of case until retaining ring groove in bearing exposed at front of case, install retainer ring. Install pilot bearing rollers in recess in gear hub (use viscous grease to hold rollers until mainshaft installed).

Mainshaft Assembly Installation: With shaft in place in case, place rear bearing and bearing retainer on end of the shaft, use three special bolts ½" longer than regular capscrews to pull retainer up against housing and push bearing on shaft (draw bolts up evenly). Remove bearing retainer, use regular capscrews when retainer finally installed (after speedometer gear installed).

Countershaft Installation: After mainshaft installed, lift countergear cluster up in case (use care not to dislodge thrustwashers), insert beveled end of countershaft at rear of case, drive countershaft in with a soft hammer (coat last 1½" section with red lead for sealing) making certain that shaft turned so that locking plate can be engaged. Install locking plate to lock countershaft and reverse idler shaft.

Reverse Idler Shaft Installation: Make certain that shaft turned to proper position for lock plate engagement, tap shaft into case, coating outer section with red lead or other sealer, drive shaft into place with a soft hammer. Install locking plate (see Countershaft Installation).

Shifter Shaft: Two types of oil seal used—correct type must be used with each type case (see below). To install shift shaft, lubricate shaft with engine oil, insert shaft in case, lock in place by driving lock pin in hole in case (pin engages groove in shaft). Install rubber sealing washer, outer shift lever, plain washer, shakeproof washer, tighten nut securely. Check by rotating shaft. If more than slight drag noted, check oil seal for interference.

►**Oil Seal Change**—*Two types used. Not interchangeable. Correct type must be used as follows:*

	Shift Shaft Seal	Transmission Case
First Type①	163251	300423③, 300917④
Second Type②	301495	301841③, 301838④

①—(Cars without Overdrive with 15x7.10 Tires)—Before Serial No. 7354 & No. 7498 to 7603 incl. (Cars without Overdrive with 15x7.60 Tires)—Before Serial No. 6324. (Cars with Overdrive)—Before Serial No. 21666 & No. 21910 to 22052 incl.
②—Cars after above serial numbers.
③—Without Overdrive. ④—With Overdrive.

Shifter Rail Lock Balls & Springs: 2nd & High spring and lock ball should be inserted in case first, install 2nd & High shift rail, then insert interlock plunger, install Low & Reverse shift rail, finally insert Low & Reverse lock ball and spring. See spring data below.

►***CAUTION—Different type springs used in each type transmission—correct type spring must be used to insure transmission not jumping out of gear.***

Shift Rail Springs

	Low & Reverse	Second & High
Std. Trans.	9 lbs. (41151)	9 lbs. (41151)
With O.D.	30 lbs. (41236)	19 lbs. (163442)
With HDM	19 lbs. (163442)	19 lbs. (163442)
With O.D. & HDM	30 lbs. (41236)	19 lbs. (163442)

O.D.—Overdrive. **HDM**—Hudson Drive-Master.

1954-55 METROPOLITAN

Metropolitan, Nash & Hudson Models (1954-55)

DESCRIPTION: Three speed constant mesh, synchro-mesh (second & high), sliding gear (reverse).

REMOVAL OF TRANSMISSION: *See "Transmission" on car model pages.*

TRANSMISSION DISASSEMBLY: 1) Drain transmission and remove the clutch release bearing by prying the two retaining springs off bearing fork shaft. Lift bearing away from fork and slide it off shaft. Remove nut and lockwasher from throwout bearing fork taper pin and remove pin. Remove snap ring and flat washer from right side of clutch operating shaft and remove shaft from left side of case.

2) Remove nuts and lockwashers retaining front transmission cover to case (cover can be removed at this time, however, it is advisable to remove the cover when countershaft is removed). Remove capscrews from side cover and remove cover and shifter shafts as an assembly. Remove capscrews retaining rear cover to tap transmission main shaft with a plastic hammer to release rear cover from rear bearing retainer).

3) Tap countershaft slightly forward to release front cover and remove cover from case. Remove snap ring from second and high shifter rod located in front of fork. Tap the two shifter rods from front of case toward rear to release lock keys which keep rods from turning. Install dummy shaft (described below) into shifter rod forks from the rear, keeping dummy shaft tight against shifter rods as rods are being removed. This will retain the loaded ball and spring in the shifter fork (NOTE—When removing the second and third speed shifter rod, remove the spacer sleeve located on rod behind shifter fork). With the rods removed, forks can be lifted out of case.

►**Shifter Rod Dummy Shaft:** Use ½" round stock and cut to 3½" lengths (2 required). Chamfer one end 3/32" by grinding or filing.

4) Remove reverse idler gear and bracket (bracket is fastened to case by a hex head screw which also locks shaft in position). Bend lip on lockwasher, remove bolt and bracket, then tap reverse idler shaft out toward rear of case and remove gear. With a soft metal drift and hammer, tap countershaft forward. After countershaft is removed, the countershaft gears and two thrust washers will drop to bottom of case. The countershaft gears cannot be removed from case until mainshaft and clutch shaft assemblies are removed.

5) Remove mainshaft and gear assembly out of case, tipping the rear of the mainshaft down slightly to pass over countershaft gears. Before removing clutch shaft, tilt countershaft gear so it clears gear teeth on clutch shaft. With a soft metal drift and hammer, drive shaft forward and out of case. Remove countershaft gear and thrust washers out through rear of case, (the larger diameter thrust washer is located at front of case. The smaller thrust washer is located at rear of case and is supplied in various thicknesses to obtain proper end play).

Mainshaft Disassembly: Slide second and third speed synchro-clutch gear off main shaft. Depress the spring loaded thrust washer lock pin with a pointed tool. Then turn retaining thrust washer lock ring in line with the splines on mainshaft and remove washer, lock pin and spring. Remove second speed gear, bronze bushing, and bronze thrust washer from mainshaft. Remove first speed gear and bronze bushing and reverse speed sliding gear. The rear transmission ball bearing and speedometer drive gear are secured to main shaft by means of a nut and lockwasher. To remove these, place mainshaft in a vise after protecting the splines and finished surface with copper vise jaws. Remove nut and lockwasher and reposition shaft assembly in vise so bear-

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METROPOLITAN SYNCHRO-MESH (Continued)

ing retainer is supporting the assembly. Tap the long splined end of shaft with a soft hammer to release shaft from ball bearing and speedometer drive gear.

Clutch Shaft Disassembly: To remove bearing from shaft, bend lip lockwasher away from nut and place shaft assembly upright in a copper jawed vise. Remove nut *(CAUTION–NUT HAS A LEFT HAND THREAD).* Place bearing on the jaws of an open vise, rest the assembly on the snap ring, and tap shaft downward. *CAUTION–Use only a s ft hammer to prevent end of shaft from spreading.*

Rear Cover Disassembly: Remove dust shield by carefully hacksawing the three indentations in the shield and tapping it off cover. The oil seal is also indented but it can be driven off without removing indentations, Remove the oil seal gasket. Remove speedometer driven gear and breather.

Synchro-Clutch Gear Disassembly: Clutch contains five springs and balls located in inner gear and when disassembling, place assembly on a clean cloth to retain these parts when assem'ly is pulled apart.

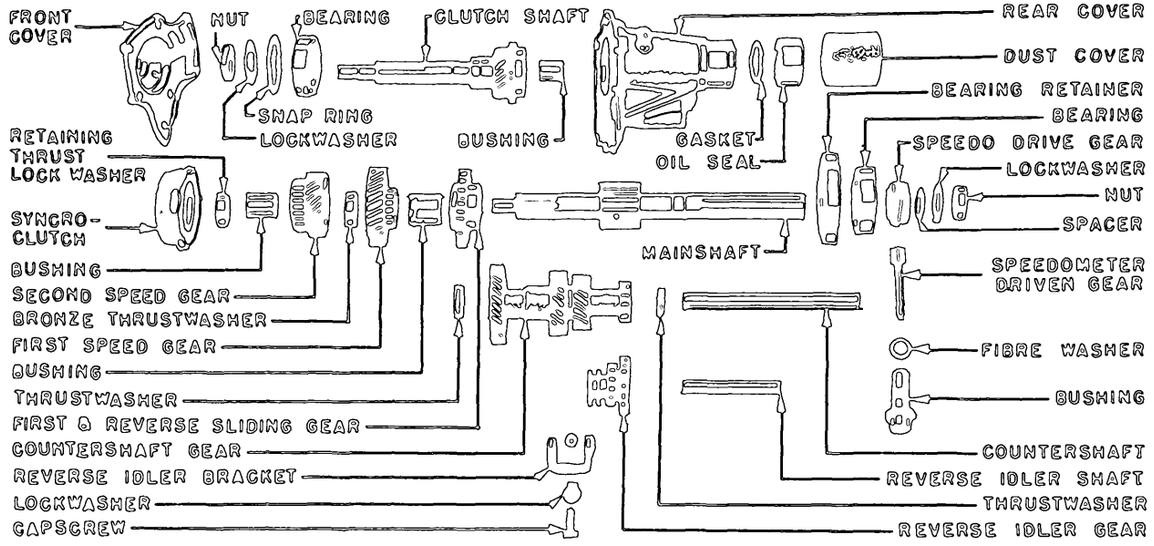
▷*ASSEMBLY NOTE–Lubricate all parts with engine oil before assembly.*

Synchro-Clutch Gear Reassembly: Install aligning sleeve J-5568 over inner gear and install each spring and ball through the drilled hole in the aligning sleeve, using a punch to depress the spring. Rotate tool until all five springs and balls are inserted. Slide outer gear over inner gear and snap into place.

Rear Cover Reassembly: Install speedometer driven gear, using a new fibre washer. Install breather assembly. Install cork gasket in end of cover and place new oil seal in position. Use extreme care when indenting the seal in three places to insure proper seating of seal against rear cover. Install a new dust seal locating it evenly to eliminate interference with propeller shaft. Indent it in three places to retain it in place.

Clutch Shaft Reassembly: Install new bearing with tool J-2995 and tighten left hand nut securely. Bend the lock washer lips on two sides of nut. Check main shaft fit in bushing in clutch shaft. This clearance should not exceed .003". If greater, replace bushing.

Main Shaft Reassembly: Install rear bearing retainer, bearing, speedometer drive gear, drive gear spacer, lockwasher, and nut on rear end of main shaft. Tighten nut securely and bend lips of lockwashers on two sides of nut. Install the low and reverse sliding gear on front end of mainshaft, positioning it against shoulder on shaft. Then install first speed gear bushing, first speed gear, bronze thrust washer, second speed gear, and second speed gear bushing. Place spring and plunger into hole in mainshaft and slide the retaining thrust lock washer into position. Depress plunger and slide



METROPOLITAN SYNCHRO-MESH TRANSMISSION ASSEMBLY

thrust lock washer over plunger. Rotate thrust washer to lock it in position with plunger engaged in groove in washer. At this point, measure the clearance between the second speed gear and the bronze thrust washer (located between first speed gear and second speed gear). This clearance should be .003-.006". Adjust by selecting a retaining thrust lock washer of correct thickness to provide this clearance. These washers are furnished in three sizes as follows: .2035-.2045" (Part No. 8110447), .2055-.2065" (Part No. 8110448), .2075-.2085" (Part No. 8110448). Install synchro-clutch gear assembly on mainshaft.

TRANSMISSION REASSEMBLY: 1) Install countershaft gear, countershaft and front and rear thrust washers (larger washer to the front and smaller one to rear). Countershaft gear endplay should be .001-.003". If not correct, replace rear thrust washer with one of correct thickness to obtain specified endplay. These washers are furnished in the following thicknesses: .156-.157", .163-.164"; .1585-.1595"; .1605-.1615" for selective fitting.

2) Remove countershaft and insert a thin rod so that countergears and thrust washers will be positioned in assembly sequence in bottom of transmission (this will allow clearance for replacing mainshaft gear assembly).

3) Install clutch shaft and front bearing assembly into case, driving it into place with tool J-2170 and an outer three inch Timken bearing race. The bearing snap ring must fit flush with recess in end of case. Insert clutch and mainshaft bushing in clutch shaft.

4) Install mainshaft gear assembly through rear of case and start forward end of shaft into clutch shaft bushing. Tap rear end of shaft with a plastic hammer until rear bearing retainer is flush with recess in the case Check for freeness of entire assembly. If binding occurs, tap clutch shaft slightly.

5) Install the countershaft with the lipped end to the front, and with the rear end flush with the case. The lipped end will fit into a recess in front cover when cover is installed. Install reverse idler gear, shaft and bracket securing bracket with the hex head capscrew and lock washer. Bend lip of lock washer against head of screw and case.

6) Insert the dummy shift rods in each shifter fork to retain preloaded spring and ball in place in fork until they are installed. Install second and third speed shifter fork in case, placing the fork in the synchro-clutch gear groove, place first and second fork over the teeth of the first and reverse sliding gear. Start the second and third speed shifter rod into case from the rear and place the limit sleeve on the rod. Push rod into the fork keeping the rod tight against the dummy shaft. Hold the shifter fork toward the rear and slide the rod through the fork, and remove the dummy shaft. Install snap ring in groove at front end of shifter fork on rod. Install first and reverse shifter fork in the same manner. Check to make sure ball in forks engage grooves in rods. Insert locks in slots at rear of case.

7) Align the dowel pin in the rear bearing retainer with the rear cover and install rear cover, gasket, and speedometer driven gear. Install front cover and gasket. Install side cover assembly and gasket aligning shifter shafts with shifter forks. Install shift levers. Install clutch operating shaft and bearing assembly, securing bearing assembly to yoke with a snap ring on each stub shaft.

NASH "600" STATESMAN & RAMBLER SYNCHRO-MESH

"600", All Series (1946-49)
Statesman, All Series (1950-55)
Rambler, All Series (Late 1953-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 NASH RAMBLER TRANSMISSION PRODUCTION CHANGE*—At 1953 Car Serial No. D-150580, "Warner Type" Transmission replaced by "Statesman" Series Standard Transmission.

►*1953 TRANSMISSION SYNCHRONIZER PRODUCTION CHANGE*—"Nash Type" Synchronizer Clutch replaced "Warner Type" temporarily between Car Serial Numbers K-611840 & K-613887 (Statesman); D-152241 & D-172945 (Rambler). **"Nash Type" & "Warner Type" synchronizer clutch parts are not interchangeable.** If it is necessary to change from one type to the other, it will be necessary to also change the following parts: Clutch Shaft, Second Speed Gear, Shifter Fork (Second & High), Shifter Fork Shoe, and the complete synchronizer clutch.

►**1946-47 TRANSMISSION SHIFT SHAFT & FORK CHANGE (To correct gear disengagement caused by distortion of Fork or Quadrant):** On cars before Serial No. K-140220, check clearance between rear face of synchronizer shift collar and front face of 2nd. speed gear with transmission 2nd. speed gear fully engaged. If clearance less than .028" (use feeler gauge), install new type Shifter Fork and Shaft Assemblies (forged quadrants pressed on steel shafts with larger pivots on forks and larger holes in shafts). New type parts replace original design (quadrants brazed on shafts).

►*NOTE—Only new type parts furnished for service. Install complete unit package (High & Second and Low & Reverse Shafts and Forks).*

►**1949 SYNCHRONIZER PRODUCTION CHANGE:** Beginning with Serial No. K-298081 on 1949 "600," Synchronizer Assy. changed to same type as used on Ambassador Six. *This new synchronizer requires different disassembly procedure (see below).*

►**1950 TRANSMISSION NOISE CORRECTION:** Noise in transmission or overdrive may be due to the following conditions caused by incorrect adjustment of the torque tube trunnion:
(1) Transmission rear bearing snap ring wrong size or incorrectly installed (furnished in four thicknesses and must be firmly seated in groove to control mainshaft endplay).
(2) Above snap ring broken by excessive loading due to incorrect torque tube trunnion adjustment causing propeller shaft to protrude more than ⅛-¼".
(3) Dust shield on propeller shaft scraping on trunnion bracket due to incorrect torque tube trunnion bracket adjustment.
See "Nash Hypoid (with Torque Tube Drive) Rear Axle" in Rear Axle Section for Torque Tube Trunnion adjustment.

OVERDRIVE TRANSMISSION NOTE: These transmissions serviced in same manner as standard type (below) except for Overdrive (Warner R10B). *See "Warner R10 Overdrive."*

DESCRIPTION: Three-speed, all helical gear type with constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse).

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

TRANSMISSION DISASSEMBLY: Remove transmission case cover and gasket. Remove shifter shaft nut, washer, and lever from Low & Reverse shifter shaft, drive lockpin out to free shaft (drive pin up), drive shaft out of case as far as possible (use brass drift on inner end) to provide clearance for gear removal (NOTE—Not necessary to drive out Second & High shifter shaft). Remove capscrews in rear bearing retainer, move retainer, mainshaft and gear assembly to rear until synchronizer unit completely disengaged from shaft, remove low & reverse shifter fork, then withdraw retainer and shaft through rear of case (on overdrive transmissions, lower left stud must be removed to permit complete assembly to be withdrawn). Drive the countershaft lock out to free shaft. Use Countershaft Aligning Tool J-2632 to drive countershaft out through rear of case allowing countergear cluster to drop down on small diameter of aligning tool. Take out capscrews in bearing retainer on front of case, remove retainer, withdraw main drive gear assembly through front of case, lift out front synchronizer ring through top opening of case. Turn synchronizer assembly at right angles and lift it from case (CAUTION—Shifter shoes will drop out as synchronizer removed from fork—remove shoes from case). If reverse idler gear being removed, drive shaft out through rear of case using a long punch (CAUTION—do not damage shaft or gear), lift gear out. Remove forks from shifter shaft quadrants. Remove lever on outer end of Second & High shift shaft, drive out lockpin. Remove both shifter shaft assemblies from within case. Remove Second & High speed finder poppet (plunger & spring) from within case, Low & Reverse speed finder poppet from plug hole at bottom of case. Remove Interlock poppet from boss in case between shifter shaft holes. Lift out countergear cluster and thrustwashers. Dismantle and service sub-assemblies as follows:

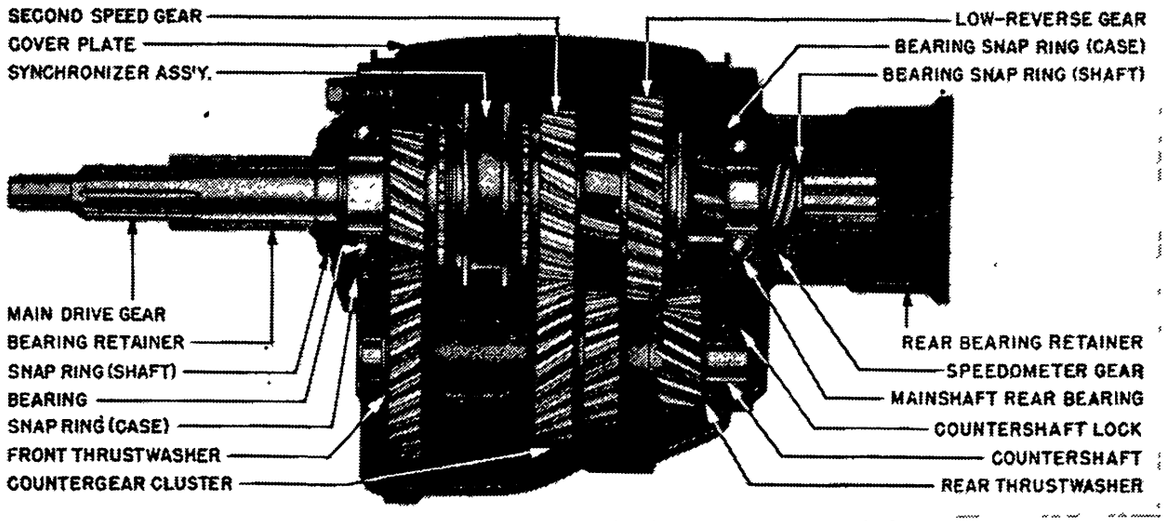
Main Drive Gear: Remove snap ring from shaft groove in front of bearing, press bearing off shaft. Check mainshaft pilot bearing rollers in gear recess for wear (jar gear lightly on block of wood, if rollers fall out, install new rollers and make certain that retainer ring installed in recess). Press bearing on shaft with snap ring groove toward front, install ring in this groove (.076-.0785" thick, not variable). Install snap ring in shaft groove making certain that snap ring is snug fit in groove (selective fit—this ring furnished .092", .095", .098" thick).

Mainshaft & Gears: Remove clutch ring driver from front end of shaft, rotate 2nd. speed gear thrust washer until tongues on washer line up with spline grooves, remove washer, slide synchronizer ring, 2nd. speed gear, and low-reverse sliding gear off shaft. Remove snap ring from rear bearing retainer (in front of bearing), tap shaft and bearing out of retainer toward front using a brass drift. To remove bearing, remove snap ring from shaft at rear of speedometer gear, remove gear, lift out gear woodruff key, press bearing off. Inspect all parts for wear.

Mainshaft Rear Bearing—Press bearing on shaft with closed end forward and tight against shoulder on shaft. Install speedometer gear (and woodruff key) install snap ring in shaft groove, selecting ring for snug fit (this ring furnished .087", .090", .093" thick). Install shaft and bearing assembly in rear bearing retainer with bearing seated firmly in retainer recess, install snap ring in retainer groove, selecting ring for snug fit so that shaft has no endplay (furnished .062", .065", .068", .071" thick).

Low-reverse Sliding Gear—Shift collar must be toward rear and gear must slide freely on splines.

Second Speed Gear—Gear synchronizer cone must be forward and gear turn freely on shaft. Push thrust washer on shaft against gear, revolve washer until tongues engage groove in shaft splines so that washer is locked in place (washer will be held in place by clutch ring driver). Check gear endplay



NASH '600" & STATESMAN TRANSMISSION (N OVERDRIVE)

CONTINUED ON NEXT PAGE

NASH "600" STATESMAN RAMBLER (Continued)

with feeler between rear face of gear and shoulder on shaft. Endplay should be .002-.010".

Synchronizer Assembly (1946-49): If these parts to be dismantled, mark the hub and sleeve to insure reassembly in same position, slide sleeve off hub being careful not to lose poppet balls and springs which will fly out of hub holes. When reassembling, use piston ring compressor to retain springs and balls in hub, slide sleeve on hub with chamfered side of sleeve toward long end of hub.

Synchronizer Ring & Driver—Engage synchronizer ring in gear cone (prongs forward), engage Clutch Ring Driver on shaft splines with short lugs toward 2nd. speed gear and in line with notches in gear thrust washer. Turn synchronizer ring so that prongs line up with notches in driver, push driver in place against gear (locks thrustwasher in place).

Synchronizer Assembly (1949 & Later): Hub and sleeve are marked by etched line to insure correct reassembly. If disassembled, install struts with open face toward inner clutch sleeve and with hooked end of each spring wire engaged in the same strut (free end of spring will be between this strut and next strut in a clockwise direction).

Rear Bearing Retainer Mainshaft Bushing & Oil Seal: Bushing and oil seal installed in rear end of retainer extension housing. Oilite bushing can be replaced with oil seal out as follows:

Bushing Replacement—Remove old bushing through rear of housing. Assemble felt oil ring on new bushing, press bushing in housing until shoulder on bushing is ¼" from shoulder in housing.

▷*CAUTION*—Felt oil ring must not be compressed.

Oil Seal Installation—Use driver J-1556 to install oil seal in recess at rear of housing.

▷*CAUTION*—Seal must be inserted with lip on leather toward front.

TRANSMISSION REASSEMBLY: After all sub-assemblies serviced as above, reassemble transmission by reversing disassembly directions and note the following important points:

Reverse Idler Gear: Beveled side of gear teeth must be forward. Drive the shaft in from rear until lock slot is flush with rear face of case (slot should face countershaft).

▷*CAUTION*—Low & Reverse Shifter Shaft must be installed before reverse idler gear installed.

Countergear Cluster: Use heavy lubricant on thrustwashers, insert gear cluster and front thrustwasher in case (lip on washer lined up with slot in case), install rear thrustwasher through hole in case, insert J-2632 aligning tool to retain parts while remainder of transmission assembled. After all parts installed, tap countershaft in through rear of case (take care not to damage thrustwashers) until lock slot flush with rear face of case, install lock plate in slots in countershaft and reverse idler shaft.

Shifter Shaft Assemblies: Inspect needle bearings in case before installing second-high shifter shaft, replace nedle bearings, if necessary, with special driver. After installing speed finder poppets and springs, and interlock poppet, insert shaft from inside case but do not install lock pins and levers until transmission completely reassembled. Install synchronizer assembly in second-high fork (use heavy grease to retain fork shoes).

Main Shaft & Rear Bearing Retainer: Place standard .010" shim (with gasket on each side) on face of rear bearing retainer, insert assembly through rear of case and work shaft through synchronizer assembly hanging in shift fork, being careful to line up clutch hub recesses with clutch ring driver prongs. Line up low & reverse shift fork with collar on low-reverse gear. After main drive gear installed, check mainshaft endplay (synchronizer ring clearance) and adjust as follows:

Mainshaft Endplay Adjustment—Controlled by shim thickness under rear bearing retainer. Check and adjust as directed below. *CAUTION—Each type synchronizer requires special gauge and different setting:*

With 1946-49 First Type Synchronizer—To check synchronizer ring clearance, insert special clearance gauge, Tool J-1542, at each end of synchronizer sleeve while holding rear bearing retainer tight against case. If clearance not equal to gauge thickness (.105"), adjust by increasing or decreasing shim thickness at rear bearing retainer. Rear bearing retainer capscrews can be installed after this adjustment completed. *CAUTION*—Gasket must be installed on each side of this bearing retainer shim.

With 1949 & Later Type Synchronizer—Use special clearance gauge, Tool J-1410 (.075"). Clearance should be .060-.080". Checking and adjusting procedure same as for first type synchroinzer (above).

Main Drive Gear: When installing gear in case, line up synchronizer ring prongs with slots in clutch ring driver. Install bearing retainer with new gasket and line up oil return holes in retainer and case. When tightening capscrews, note whether retainer contacts bearing before contacting case and correct this condition by installing additional gaskets under retainer. Main drive gear endplay must not exceed .005" and should preferably be .000".

Shifter Fork Alignment: After assembly completed, shift transmission into Second Gear and make certain that gear fully engaged. Measure clearance between rear face of synchronizer clutch shift collar and front face of second speed gear which must not be less than .028". If less, shifter fork or quadrant has been distorted and should be replaced.

Transmission Cover Plate: Install gasket on case with vent hole to rear (mark FRONT forward), install cover with vent hole forward and see that this vent is clean and open.

1941-49 NASH AMBASSADOR

Ambassador Six, All Series (1941 to 1948)
Ambassador Six, Series 4960 (Early 1949)
Ambassador Eight, All Series (1941-42)

▷CHANGES, CAUTIONS, CORRECTIONS

▷1949 TRANSMISSION CHANGE: This Nash transmission (with Optl. Warner Overdrive) used only on Early 1949 cars. Later cars have Warner Transmission.

See Warner Transmission data for later 1949 cars.

▷1947 TRANSMISSION SHIFTER SHAFT & FORK CHANGE After Serial No. R-444510 (Std. Trans), R-443972 (Overdrive Trans.): New type heavier Shifter Shafts, Forks, and Sleeves used beginning with above serial numbers. These new parts furnished for service on earlier cars and entire group of new parts must be installed as an assembly (cannot be installed singly on earlier cars).

▷*IDENTIFICATION NOTE*—New design parts have forged quadrants which are pressed on machined steel shafts.

▷1947 TRANSMISSION MAIN DRIVE GEAR, BEARING RETAINER & LOCK RING CHANGE (Starting Serial No. R-432468 Std. Trans., R-432167 Overdrive Trans.): Lock ring in bearing changed from .065" thick to .077" and new type main drive gear and bearing retainer used.

▷*CAUTION—New and previous design parts must not be interchanged and each type must be installed differently (see Transmission Asembly direction).*

OVERDRIVE TRANSMISSION NOTE: These transmissions serviced in same manner as standard type (below) except for Overdrive Unit which is Warner Type R7C (1941-46), Type R10 (1946-48).

See "Warner R6 & R7 Overdrive (With Kick-down)" and "Warner R10 Overdrive."

DESCRIPTION: Three-speed, all helical gear type. Constant-mesh, synchro-mesh (Second & High), sliding gear (Low & Reverse). Main drive gear mounted on ball bearing in front of transmission case (see Production Change above). Mainshaft is mounted on roller bearing in main drive gear (front), ball bearing in retainer cap on case (rear).

REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

TRANSMISSION DISASSEMBLY: Remove cover capscrews, lift off cover and baffle, remove mounting capscrew and lift oil trough out. Move both shifter shaft levers away from each other slightly so that speed finder plungers move out of notches in quadrants, tighten speed finder lockscrew (on outside of case between lever shafts) to hold plungers away from quadrants. Mark shift levers and shafts to insure correct reassembly, remove levers, drive shaft lockpins up and out of bosses in case. Use soft drift to drive shifter shafts toward outside of case as far as possible, lift off oil seals, retainers, and shaft sleeves which will be pushed out of case. Remove low-reverse shifter fork, remove interlock, remove second-high shifter fork (work pivot end toward rear as fork slips out of collar). Remove low-reverse shifter shaft (move sliding gear toward rear of case for clearance) and second-high shifter shaft (slide clutch sleeve to rear for clearance, turn shifter shaft so that pivot hole is downward, pass quadrant under synchronizer until end of shaft free from hole in case). Remove capscrew and washer on rear end of mainshaft, pull companion flange (Puller J-1412). Remove capscrews in rear bearing retainer and rotate retainer to expose countershaft hole in rear face of case (on Overdrive Transmissions, merely take out pipe plug at rear of overdrive case). Use Countershaft Aligning Tool J-1415-A to drive countershaft out at front of case so that countergear cluster drops down on small diameter of tool. Remove capscrews and nuts retaining rear bearing retainer cap (or adapter plate on overdrive transmissions), withdraw mainshaft and gears through rear of case as an assembly (CAUTION—On over-

CONTINUED ON NEXT PAGE

1941-49 NASH AMBASSADOR (C ntinued)

drive models, use extreme care that adapter plate does not separate from overdrive case which would require dismantling of overdrive to reassemble freewheel rollers—install one screw to hold adapter plate and overdrive case together while off transmission). To remove main drive gear, take out screws in bearing retainer on front of case, withdraw gear and bearing as assembly. Lift countergear cluster and thrust washers out of case. To remove reverse idler gear, use long brass drift inserted through front of case to drive shaft out toward rear. Dismantle and service sub-assemblies as follows:

Main Drive Gear: Remove snap ring from shaft, press bearing off in arbor plate using J-1298-N bearing plate. Check mainshaft pilot bearing rollers in recess for wear (jar gear lightly on block of wood, if roller falls out, install new rollers and make certain that retainer ring installed in recess). Press bearing on shaft with snap ring groove toward front, use tool J-1416 to install snap ring in shaft groove making certain ring is snug fit in groove (selective fit—furnished .087", .090", .092", .093", .096" thick). Large snap ring installed in bearing groove should be .065" thick (first type gear with oil hole in shaft), .077" (later type gear without oil hole).

See Production Change Note above for data on this parts change.

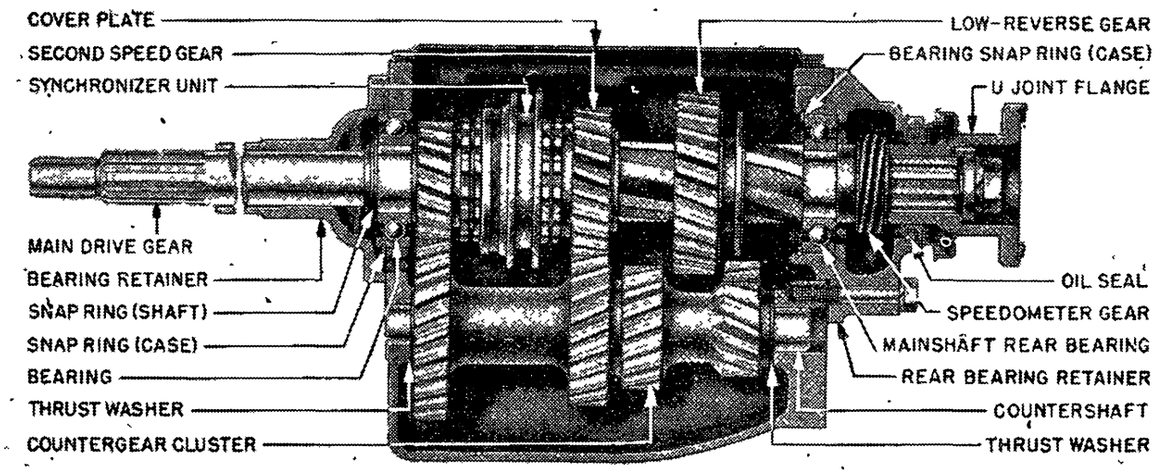
Synchronizer & Second Speed Gear:—To dismantle assembly, depress locking plunger under lock ring in front of synchronizer inner clutch sleeve with a sharp pointed tool, revolve lock ring one spline so that it is free and withdraw from shaft, remove synchronizer, bronze thrustwasher, second speed gear, steel thrustwasher. Sliding gear can then be removed from shaft. Install assembly in same manner selecting retainer washer of correct thickness so that second gear endplay is .002-.004" with retainer installed. See that retainer turned so that it is locked in place in mainshaft splines and that locking plunger prevents retainer from turning.

►*CAUTION*—Install second speed gear steel thrustwasher with chamfer toward rear end and tongue in line with notch on spline shaft, install bronze thrustwasher with tongues toward front of shaft and **rotate washer so that tongues engage notches in splines** (see that washer does not slip out of place when installing synchronizer).

Synchronizer Unit—Inner and outer clutch sleeves and rings should be marked before disassembly to insure reassembly in same positions. Install struts with open face toward inner clutch sleeve and hooked end of each spring wire engaged in the same strut (free end of this spring will be between this strut and next strut in clockwise direction).

Mainshaft Rear Bearing: Remove snap ring from recess in rear bearing retainer (in front of bearing), tap shaft and bearing out of retainer toward front using a brass drift. To remove bearing, slide speedometer gear off shaft, press bearing off. Install bearing with closed side forward. On overdrive cars, overdrive unit must be dismantled and snap ring on shaft behind overdrive sun gear removed, then press shaft out (will not disturb sun gear assembly).

Reverse Idler Gear:—Idler gear should be removed by driving shaft out toward rear. When installing idler gear, see that chamfered edge of gear teeth is toward front of case.



NASH AMB. 6 TRANSMISSION (NO OVERDRIVE)

Countergear Assembly:—When installing countergear cluster, install thrust washer at each end with tongue in line with slot in case (washers may be held by grease while installing gears. Allow gears to hang down on small diameter of tool J-1415-A while main drive gear and mainshaft are being assembled then push out tool by inserting countershaft at forward end of case. CAUTION—Use care not to damage thrust washers.

TRANSMISSION REASSEMBLY: After all sub-assemblies serviced as directed above, reassemble transmission by reversing disassembly directions and note the following important points:

Mainshaft Rear Bearing Retainer Installation: Install same number and thickness of shims (as removed when transmission disassembled) on face of retainer with new gasket on each side of shim pack. Bolt retainer in place and after assembly completed, check and adjust mainshaft endplay as follows:

Mainshaft Endplay—Controlled by thickness of shims between rear of transmission case and rear main bearing cap or overdrive adapter. With transmission assembled, install shift collar centering gauge tool J-1410 (.075" thick) between front face of high speed synchronizer ring and rear face of main drive gear, place second gauge similarly between second speed synchronizer ring and second speed gear. Gauges should slip into position freely and will center the synchronizer sleeve. Front gauge should be from a tight fit to .015" clearance (corresponding to .000-.015" endplay). Adjust by adding or removing shims from between rear bearing retainer and face of transmission case (above).

Main Drive Gear & Bearing Retainer Installation: ►*CAUTION—Make certain that correct type parts used together (see Production Change Note above).* Check thickness of snap ring in bearing groove (.065" thick for first type gear with oil hole in shaft, .077" thick for later type gear without oil hole), and make certain that correct type bearing retainer used for each type gear. Install main drive gear in front end of case, install each type bearing retainer exactly as follows:

First Type Retainer (with .078" deep lock ring counterbore)—This type retainer must be fitted when installed on case (inner face of counterbore contacts front face of bearing and forces lock ring against case). Press retainer firmly in place against bearing, use feeler gauge to measure clearance between face of retainer and transmission case, **install sufficient gasket thickness at this point to take up clearance** (gaskets furnished in various thicknesses). With retainer bolted in place, drive gear endplay must not exceed .015" (.000" preferred).

Later Type Retainer (with .064-.067" deep lock ring counterbore)—With this type retainer, lock ring is clamped between counterbore and face of transmission case. Use a new gasket under the retainer and make certain that oil return hole is at bottom with retainer installed on case. Drive gear endplay must not exceed .015" (.000" preferred).

Shifter Shafts: When installing shifter shaft forks, see that low and reverse fork installed with longer segment at top. Cork oil seals and retainers are installed on outer ends of shafts and shaft bushing retaining pins should be installed from the top.

NOTE—Use tool J-2633 to install oil seals.

Speed Finder Locating Screw—Located on side of transmission case between shifter shafts. Need not be disturbed to remove detent plungers but if removed, screw should be adjusted so that inner end engages flattened portion of plungers to prevent plungers turning but must not cause plungers to bind. Lock adjustment with locknut.

►*CAUTION*—After transmission assembly completed, screw should be backed off just enough so that speed finder plungers operate freely, lock adjustment by tightening locknut.

Transmission Cover: With oil trough installed in case and mounting capscrew tight, install baffle with vent louvre at rear of case, install cover with vent on right side. NOTE—Use gasket on each side of baffle.

PACKARD SYNCHRO-MESH

Packard (1946-55)

►*AUTOMATIC TRANSMISSION NOTE: See "Packard Ultramatic Drive" and "Packard Twin Ultramatic Drive."*

►**OVERDRIVE NOTE:** *Various Overdrive units used with this transmission as follows:*

1941-48 Warner Type R9—*See "Warner R9 Overdrive" for data.*
1949-55 Warner Type R11—*See "Warner R11 Overdrive" for data.*

DESCRIPTION: Constant-mesh, synchro-mesh (2nd. & High), constant-mesh (Low) helical gears, sliding spur gear (Reverse). Second-speed & Low-speed gears are mounted on special double-row ball bearings on mainshaft (furnished as assembly with shaft). Second and high are engeged by synchronizer unit on mainshaft, low speed gear by clutch teeth in sliding reverse gear which engage clutch teeth on low gear hub.

►**OVERDRIVE TRANSMISSION DISASSEMBLY:** *See Warner Overdrive data for disassembly of overdrive and note following important points:*

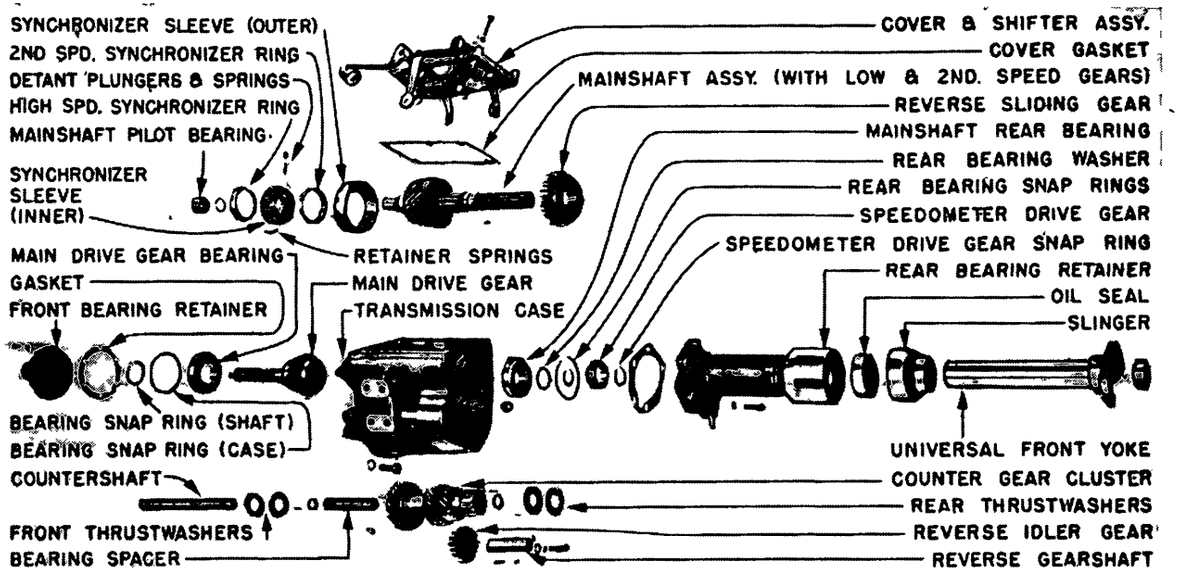
REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY OF TRANSMISSION: Take out mounting screws and lift off cover and shifter assembly. Remove nut on rear end of mainshaft at universal joint yoke and remove yoke from shaft (nut not used on later cars where yoke is free on mainshaft splines). Remove rear bearing retainer, take out snap ring and slide speedometer gear off Take out mounting screws and remove front bearing retainer. Drive countershaft out (see Note below), remove main drive gear and bearing through front of case. Move mainshaft assembly to rear until rear bearing free of case, tap bearing off shaft, then remove mainshaft through top of case. Lift counter gear cluster and thrustwashers out through top of case. To remove reverse idler gear, remove retaining capscrew and washers on rear end of shaft, drive shaft out through rear of case (use drift inserted through front of case), lift out reverse gear. Remove two countershaft thrust springs, use small punch to drive out thrust spring plugs.

C untershaft Note—Shaft must be driven out toward front (key in forward end of shaft engages slot in front end of transmission case). Use J-2559 countershaft assembly bar to drive shaft out and leave tool in counter gear cluster to retain bearing rollers until re-installed. Overdrive Model—Remove overdrive case drain plug (on rear end of case at bottom) and insert J-2559 tool through this hole to drive countershaft out.

OVERHAUL: Disassemble and overhaul all sub-assemblies as follows:

Synchronizer Unit: To disassemble, press outer sleeve off inner clutch hub by hand (CAUTION—use care not to lose detent plungers and springs which will fly out). Remove three retainer springs, lift out synchronizer rings. When reassembling, use Clamp J-2563 to hold plungers and springs in place, install synchronizer sleeve with wider shoulder of external groove on opposite end from extended hub of inner sleeve.



PACKARD TRANSMISSION

REASSEMBLY: After overhaul of sub-assemblies:

Synchronizer Travel Adjustment—Check clearance between lug on second-high shifter fork and stop on cover with shift lever in High Gear position. Clearance should be .005" min., .010" max. Adjust by bending lug. CAUTION—If clearance greater than .010", outer clutch sleeve may move too far forward which will allow synchronizer balls and springs to fly out (requiring removing cover & reassembling).

Mainshaft, Low & Second Speed Gear Assembly:—Both low and second speed gears are furnished as an assembly with the mainshaft and should not be removed. These gears are constant-mesh type and are mounted on double row ball bearings on shaft

Mainshaft Assembly: Install synchronizer on forward end of shaft with wider shoulder of external groove toward second speed gear, then install front bearing spacer on shaft. Install reverse gear on rear end of shaft with shifter groove toward rear or away from low speed gear.

Reverse Idler Gear: Align woodruff key in shaft with slot in case, tap shaft into case until it engages gear, install gear, drive shaft in until key is seated, secure shaft with plain washer, lockwasher, and capscrew.

Countergear Assembly: If roller bearings removed, first install assembly bar J-2559 in gear cluster, install bearing spacer, assemble 25 rollers in each end (use grease to retain rollers), install end plate and thrustwasher on each end of gear cluster. Install assembly in bottom of transmission case. **After main drive gear installed,** raise assembly up and insert countershaft through front of case aligning woodruff key with slot in case, drive shaft into place which will push assembly bar out at rear. Install two countershaft thrust springs in openings in case and install thrust spring plugs.

►*CAUTION*—Lips on countershaft thrustwashers must point upward and engage grooves in case.

Main Drive Gear Assembly: Install bearing and retaining ring on drive gear shaft, install snap ring. Install mainshaft pilot bearing in recess in rear end of gear.

Main Drive Gear & Mainshaft Installation: Place mainshaft assembly in case with rear end of shaft extending out through bearing hole, install rear bearing and retaining ring on shaft and tap bearing into place in case. Install main drive gear in case and enter mainshaft in front bearing. Install main drive gear bearing retainer using new gasket and aligning drain passage in cover with hole in case, tighten retainer capscrews. Install rear bearing plain washer, snap ring, speedometer drive gear (CAUTION—see that gear key in place), and gear snap ring.

►**Endplay Note**—Rear bearing and speedometer gear snap rings furnished in various thicknesses and should be selected to eliminate endplay.

Shifter Mechanism:—Yokes on horizontal shafts in cover engage synchronizer clutch sleeve (front shaft), low speed gear clutch and reverse gear (rear shaft) directly without intermediate linkage. Spring-loaded ball type detents are located in bracket on side of cover and engage sectors on shafts. Entire shifter mechanism located in cover and need not be dismantled when cover removed.

Interlock Assembly—If bracket removed, install parts as follows: Place interlock ball spacer and detent ball spring in bracket (interlock spacer toward center, detent ball spring toward outer edge of cover). Place cover on bench with top down, position forks so that center neutral grooves are in line, install bracket (CAUTION—hold detent and interlock balls in position in bracket, pull shoe ends of both forks together and push down on bracket at the same time so that balls engage center grooves. Install bracket retaining screw.

1948-52 BUICK DYNAFLOW

Series 40 & 50 (1949-52)—Optional
Series 70 (1948-52)—Standard

►CHANGES, CAUTIONS, CORRECTIONS

►**TRANSMISSION IDENTIFICATION (For Production Change & Parts Interchangeability Data):** Serial No. (first cars) or Identification No. (later cars) stamped on bottom face of transmission case on left side directly to rear of High Accumulator.

IDENTIFICATION NO. CAUTION—Where identification number used instead of serial number (prefix C, D, E and later), **the number following this letter (1, 2, 3, etc.) indicates manufacturing date and production changes** and is not a serial number.

1948 & Early 1949 Serial Numbers

Series 70	A-1 to A-98355
Series 50	B-1 to B-52325

Late 1949-52 Identification Numbers

Series 50 (Late 1949)	D-1, 2, 3, etc.
Series 70 (Late 1949-50)	C-1, 2, 3, etc.
Series 40 & 50 (1950)	E-1, 2, 3, etc.
Series 40 & 50 (1951-52)	F-1—F-999 & H-1—H-999
Series 70 (1951-52)	G-1—F-999 & J-1—J-999

►*1951 & LATER BAND ADJUSTMENT CAUTION*—Floor pan openings not provided and bands cannot be adjusted on the car (transmission must be out of the car for access to band adjustment screws). *CAUTION—Bands on these cars must be properly adjusted BEFORE transmission is installed in car.*

►**ENGINE & TRANSMISSION VIBRATION CORRECTION (When Repl. Crankshaft or Flywheel Installed):** If vibration due to change in balance by installation of new parts, correct by installing balance weights on primary pump cover *See instructions at end of TRANSMISSION INSTALLATION data.*

►**STARTING ENGINE BY TOWING OR PUSHING CAR:** On Dynaflow cars, place control lever in neutral "N" position until car reaches a speed of 15 MPH., then shift to Low "L" position and continue to increase speed until engine cranks (at approximately 25 MPH.). After engine starts, return lever to Neutral "N" position for engine warm-up

►**USE OF EMERGENCY LOW FOR ADDITIONAL BRAKING ON GRADES:** Car speed should be reduced to below 40 MPH before control lever is moved from Drive "D" to Low "L"

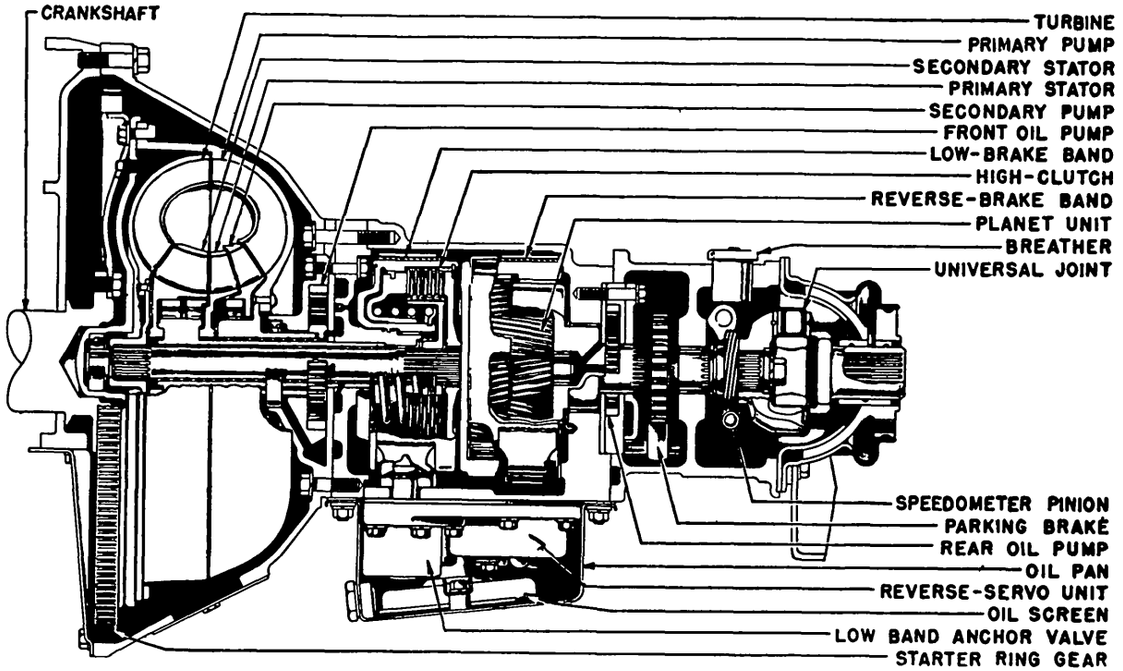
►**TOWING DYNAFLOW CARS:** If Dynaflow Drive disabled, **car must not be towed with control lever in any driving range.** Car can be towed with lever in Neutral "N" position only at speeds **under 30 MPH.** but long distance tows not recommended

Neutral Safety Strap Installation—Can be installed over shift lever to lock transmission in neutral for towing when neutral position cannot be obtained or held by means of regular transmission control.

►**FRONT OIL PUMP & RELATED CHANGES (Beginning Trans. No. A-56000 & B1):** New cast iron type pump cover (and shorter heavier pump body with two locating dowels) supersedes previous type with recessed steel cover. **When installing this new cast iron pump cover to replace recessed steel cover, install all related parts as follows:**

Converter Primary Pump—New shorter primary pump must be used with cast iron pump cover. Can be identified by length of 1 13/16" from FLAT face of flange to end (first type 1⅞" from STEP on flange to end).

Reaction Shaft Flange—New ⅛" longer studs must be used with cast iron pump cover. These longer studs can be used with recessed steel cover (added length will not cause interference). First type Reaction Shaft Flange can be used by installing new square head bolts. See Reaction Shaft Bolt change.



1948-52 BUICK DYNAFLOW DRIVE

►**FRONT PUMP INTERCHANGEABILITY:** Only new heavier pump body (see above) furnished for service in two types for all installations:

1) Without Dowels and Dowel Holes—Use with first type recessed steel pump cover.

2) With Dowels—Use with new cast iron pump cover.

►**REACTION SHAFT FLANGE BOLT CHANGE (Beginning Trans. No. A-86000 & B-29000):** First type pump mounting studs with welded nuts superseded by square head bolts. Bolts can be installed to replace studs by running a 5/16" drill through the tapped stud holes, reaming holes to 21/64", and pressing in new square head bolts.

CAUTION—Holes must not be reamed oversize and flange must be supported when pressing bolts in. **Bolts must be press fit in flange.**

►**REAR OIL PUMP CHANGE (Beginning Trans. No. A-36000 & B-1):** Pump changed from separate body-and-cover design to one-piece integral type. **This new one-piece pump can be used to replace original type.**

►**VALVE & SERVO BODY CHANGES:** ***Three types used in production and for leakage corrections:***

1) Trans. No. A-1 to A-2999—Has been replaced by second type (following) as service correction for oil leaks. **Install second type Valve & Servo Body with second type Anchor Piston whenever this first type removed for any reason.**

CAUTION—Change transmission number by adding "-3" to number when above parts installed.

2) Trans. No. A-3000 to A-41999—May be identified by added ribs, change of left center bolt to a stud, adding of stud at center lower flange, and adding of boss and screw on lower flange. These changes require change in spacer plate and gaskets, and longer bolts where ribbing added. Low Band Anchor Piston changed from servo body spacer plate to transmission case (diameter of holes in spacer plate and gasket increased) and width of piston top land increased.

3) Trans. No. A-42000 & B-1 Up—New type which can not be installed in earlier transmissions due to changes in transmission case. May be identified by change of left center stud back to a bolt (same as 1), addition of bolt and copper washer in center, and Allen head screw added between low band anchor and reverse servo pistons.

NOTE—Beginning Trans. No. C-5, D-5, E-5; servo body spacer plate upper gasket changed due to change in case at reverse band anchor (see Reverse Ring Gear and Reverse Anchor Change Note).

►**OIL PAN & OIL SCREEN CHANGES:** First type oil screen and integral suction pipe superseded by separate screen and suction pipe beginning Trans. No. C-1 & D-1. **New type screen can be used to replace earlier type** and has rubber grommet at center for

CONTINUED ON NEXT PAGE

BUICK DYNAFLOW DRIVE (Cont.)

snug fit on suction pipe. New type suction pipe has cork gasket and coil spring for sealing.

New Oil Pan & Filler Pipe (Beginning Trans. No. C-2 & D-2): Pan has filler pipe extending forward on right side of car so that oil level can be checked and oil added from under-hood. This pan and oil filler can be installed on early cars if second type oil screen and separate suction pipe also used.

CAUTION—Filler pipe connecting hose is neoprene type marked by red stripe to prevent confusion with regular hose used between thermostat housing and water pump.

▷TRANSMISSION CASE CHANGES: *Various types used which are interchangeable only when other changes made as follows:*

1) Beginning Trans. No. A-42000 & B-1—Two tapped holes added for additional valve and servo body bolts (see 3rd. type Valve & Servo Body data above).

2) Beginning Trans. No. C-2 & D-2—Oil filler base removed (used with new oil pan having extended under-hood filler pipe). See Oil Pan Changes.

3) Beginning Trans. No. C-5, D-5, E-5—Transmission case openings changed to fit new forged type reverse band anchor. See Reverse Band Anchor Changes (following).

▷*TRANSMISSION CASE REPLACEMENT CAUTION*—Only latest type case (3 above) furnished for service. May be used with either 2nd. or 3rd. type Valve & Servo Body but must be used with new type Oil Pan & Under-hood Filler Pipe and forged type Reverse Band Anchor.

▷REVERSE RING GEAR CHANGE (Beginning Trans. No. A-42275 & B-1): Separate front thrustwasher eliminated and reverse ring gear width increased 1/16" to compensate for this thickness. First type Narrow Ring Gear (2 11/16" overall) must never be used without thrustwasher. Later type Wider Ring Gear (2 3/4" overall) can be used in earlier transmissions by discarding original thrustwasher but thrustwasher must never be used with this wider ring gear.

▷REVERSE BAND ANCHOR CHANGE (Beginning Trans. No. C-5, D-5, E-5): New one-piece forged anchor superseded previous two-piece type and is used with new band which has full width ends. These new parts require use of new transmission case with enlarged opening and new servo body spacer plate upper gasket (see Transmission Case Changes above).

▷*REVERSE ANCHOR REPLACEMENT CAUTION—It is recommended that forged type anchor be used to replace earlier type whenever transmission disassembled for any reason.* Forged type anchor may be used with early type narrow-end reverse band but transmission case must be altered as directed below. NOTE—web by tapping on center with hammer. File all only forged type Reverse Anchor and corresponding type Reverse Band and Transmission Case furnished for service.

Transmission Case Alteration (for installation of Forged Reverse Band Anchor)—Remove solid web between two reverse anchor openings in case by cutting grooves approximately 1/32" deep with a chisel (leave semi-circular area around hole near edge of new opening—anchor has notch to clear this area) between the openings and then knocking out edges to remove burrs and ridges. (CAUTION—keep chips and filings out of case). Check to see that operating lever works freely between ears on anchor and that servo body spacer plate screws are securely tightened.

CAUTION—On Trans. No. A-1 to A-2999, install second type Valve & Servo Body when making above changes.

▷LOW ACCUMULATOR SPRING & CAP CHANGE (Beginning Trans. No. C-5, D-5, E-5): See illustration for latest type springs and cap used to provide softer engagement of Low Band and smoother Low Range Shift. These new parts can be used to replace earlier type parts.

▷PRIMARY PUMP COVER & FLYWHEEL BOLT CHANGE: Various types used as listed below and all primary pump-to-cover bolts must be of same length and installed in same locations as originally to maintain converter balance.

1) Trans. before No. C-3, D-3, E-3—Short bolts (15/16") used without balance weights and where balance weights thin enough to allow full thread engagement, longer bolts (1 5/32") used with thick balance weights.

2) Trans. beginning No. C-3, D-3, E-3—All bolts 1 5/32" (same bolts as used to attach converter to flywheel).

3) Trans. beginning No. C-4, D-4, E-4—New nuts 21/64" thick used (supersedes 17/64" nuts). Only these new thicker nuts furnished for service.

CAUTION—New 21/64" nuts cannot be installed individually. If one nut used to replace earlier 17/64" type, REPLACE ALL NUTS.

4) Trans. F-261 through F-265 & G-261 through G-265. Special nuts used on these transmissions (trial run) can be identified by the slotted portion being turned down leaving hexagonal portion below the slots.

CAUTION—If any of these nuts replaced by regular production type nut, the nut diametrically opposite should also be replaced to maintain proper balance.

▷LOW BAND ANCHOR PISTON PRODUCTION CHANGE (Beginning Trans. No. E-9 & C-9): Anchor piston not used on these and later transmissions and band strut is anchored by a shaft in the transmission case. *Disregard all Low Servo Anchor Piston data (in Valve & Servo Body Disassembly & Assembly section) when working on these later transmissions.*

▷HIGH CLUTCH PISTON PRODUCTION CHANGE (Beginning Trans. No. F-164 & G-164): New High Clutch Piston with redesigned ball check valve (ball changed to opposite side of piston, relief hole enlarged, relieved area provided on face of piston for oil discharge). This later type piston, Part No. 1343578, is interchangeable with previous type and will be furnished for service for all transmissions.

▷SECONDARY PUMP PRODUCTION CHANGE (Beginning Trans. No. F-168 & G-176): New secondary pump assembly with cast boss which bears directly on primary pump hub (eliminates thrust washer used at this point with previous type pump). This new Secondary Pump, Part No. 1341727 (40, 50), 1341725 (70), is interchangeable with previous type

▷PRIMARY PUMP PRODUCTION CHANGE (Beginning Trans. No. F-341 & G-341): New design Converter Primary Pump and Cover assemblies (has "O" sealing ring in place of flat gasket and chamfer on inside corner of cover mounting flange for this ring) provides more positive seal against oil leakage. New and previous type covers are not interchangeable and new type can be identified by having only 15 assembly bolts.

▷*PRIMARY PUMP REPLACEMENT CAUTION*—New type Primary Pump only will be furnished for service replacement and whenever pump replaced, new type Cover, Seal, and related parts must be installed also. First type Cover will be furnished and can be replaced separately on cars having previous type primary pump. New type Primary Pump and Cover require different installation instructions and clearance shimming data (see Reassembly data).

▷HIGH CLUTCH PLATE PRODUCTION CHANGE (Series 70 Trans. Beginning No. G-310): New internally splined clutch plates used which are not interchangeable singly with previous type plates. These new plates may be identified by facing material (on one side, outer diameter faced with cork, inner diameter with "Krafelt"; on opposite side, outer diameter faced with "Krafelt", inner diameter with cork).

▷*REPLACEMENT CLUTCH PLATE CAUTION*—Above type plates not furnished for service at this time. If replacement of plates required, install entire pack of regular service internally and externally splined clutch plates.

▷PARKING LOCK APPLY SPRING CHANGE (Beginning Trans. No. A-11064 & B-1): New 3-coil type spring used (supersedes earlier 2-coil type). New spring requires new parking lock operating lever assembly with 1/16" longer spring step. Only the new 3-coil spring is furnished for service.

▷*PARKING LOCK REPLACEMENT CAUTION*—Manufacturer recommends that new 3-coil spring be installed on early cars whenever it is necessary to repair parking lock pawl. New Parking Lock Operating Lever (with 1/16" longer spring step) must also be installed when spring changed.

DESCRIPTION

The Dynaflow Drive consists of: (1) Torque Converter Assembly mounted directly on the flywheel in the bell housing, and (2) Planetary Gear Unit mounted in the transmission case directly behind the torque converter. Torque Converter action is entirely automatic while the Planetary Unit is controlled by the driver through a Control Lever on the steering wheel (provides Emergency Low, Reverse, Neutral, and Parking. Transmission controlled by hydraulic system for which oil pressure is supplied by two oil pumps built in the transmission (forward pump in recess in rear face of bell housing, rear pump in recess at rear of transmission case). An oil cooler on the side of the transmission case maintains oil at operating temperature.

Torque Converter Description: Torque converter consists of the five independent rotating members listed and the operation of the unit varies in accordance with car speed and load conditions as described below (transition from one type of operation to another is gradual so these phases should not be considered as distinct "steps").

(1) Primary Pump (Driving Member). Integral with rear half of case bolted directly on flywheel. Pump is positively driven by the crankshaft at engine speed at all times.

(2) Turbine (Driven Member). Splined on converter shaft and transmits drive to transmission.

CONTINUED ON NEXT PAGE

BUICK DYNAFLOW DRIVE (Cont.)

(3) Secondary Pump. Mounted on primary pump hub with overrunning "free-wheel" clutch which allows this pump to rotate faster than primary pump when unit is operating as a torque converter.

(4 & 5) Primary & Secondary Stators. Mounted on stationary "reaction" shaft (tubular shaft fixed in transmission case) with overrunning "free-wheeling" clutch in each stator hub. Stators are locked or held stationary when unit is operating as a torque converter (reaction members) but free-wheel when torque multiplication not required.

Planetary Unit Description: Planetary unit consists of parts listed below. Operation of unit depends on the position of the Shift Control Valve (linked to control lever on steering column) which directs application of hydraulic pressure in the planetary unit hydraulic mechanism as described below.

(1) Sun Gears—Consist of two gears in tandem on drive (input) shaft. Front Sun Gear (Low Range Reaction Gear) is integral with the Direct Drive Clutch (locked to shaft when clutch engaged) and meshes with the Reverse Planet Pinions. Rear Sun Gear (Reverse Sun Gear) is splined on the drive shaft (acts as driving gear for Low & Reverse) and meshes with the Low Planet Pinions.

(2) Planetary Pinions—Consist of three Reverse Planet Pinions (larger short gears) and three Low Planet Pinions (smaller long gears) mounted alternately on the Planet Carrier and all meshing together. The Reverse Planet Pinions mesh with the forward sun gear (Low Range Reaction Gear) and with the Reverse Gear (large internal gear controlled by the Reverse Brake Band). The Low Planet Pinions mesh with the rear sun gear (Reverse Sun Gear). The Planet Carrier is integral with the output shaft.

(3) Low Range Drum & Clutch—Mounted on drive shaft in front of the planetary pinion. Inner clutch member is splined on drive shaft and rotates with the shaft. Outer clutch member incorporates the Low Range drum and front sun gear (Low Range Reaction Gear) as well as the clutch engaging hydraulic piston and disengaging spring. Clutch engagement is controlled by the High Accumulator which permits rapid initial movement and smooth final engagement. A ball check valve is built in the clutch piston to insure complete draining of oil from the chamber when clutch disengaged for Reverse and Neutral. Check valve is positively closed by contact between ball and steel clutch plate when clutch engaged.

(4) Low Range Brake Band & Engaging Mechanism—Band holds Low Range Drum and front sun gear (Low Reaction Gear) stationary when it is applied by the servo "apply" piston acting through the lever and strut engaging one end of the band (servo action is controlled by the Anchor Piston and "Lo" Accumulator). This action requires a boosted oil pressure of 180 lbs. (normal pressure 90 lbs.) which is secured by boosting the Pressure Regulator Valve spring pressure hydraulically. Low Range operation also requires that the clutch be disengaged and this disengagement is secured by opening the clutch pressure line (Anchor Piston acts in conjunction with Shift Control Valve).

(5) Reverse Brake Band & Engaging Mechanism—Band holds Reverse Gear (internal gear) stationary when it is applied by the servo "apply" piston acting through the lever and struts engaging both ends of the band.

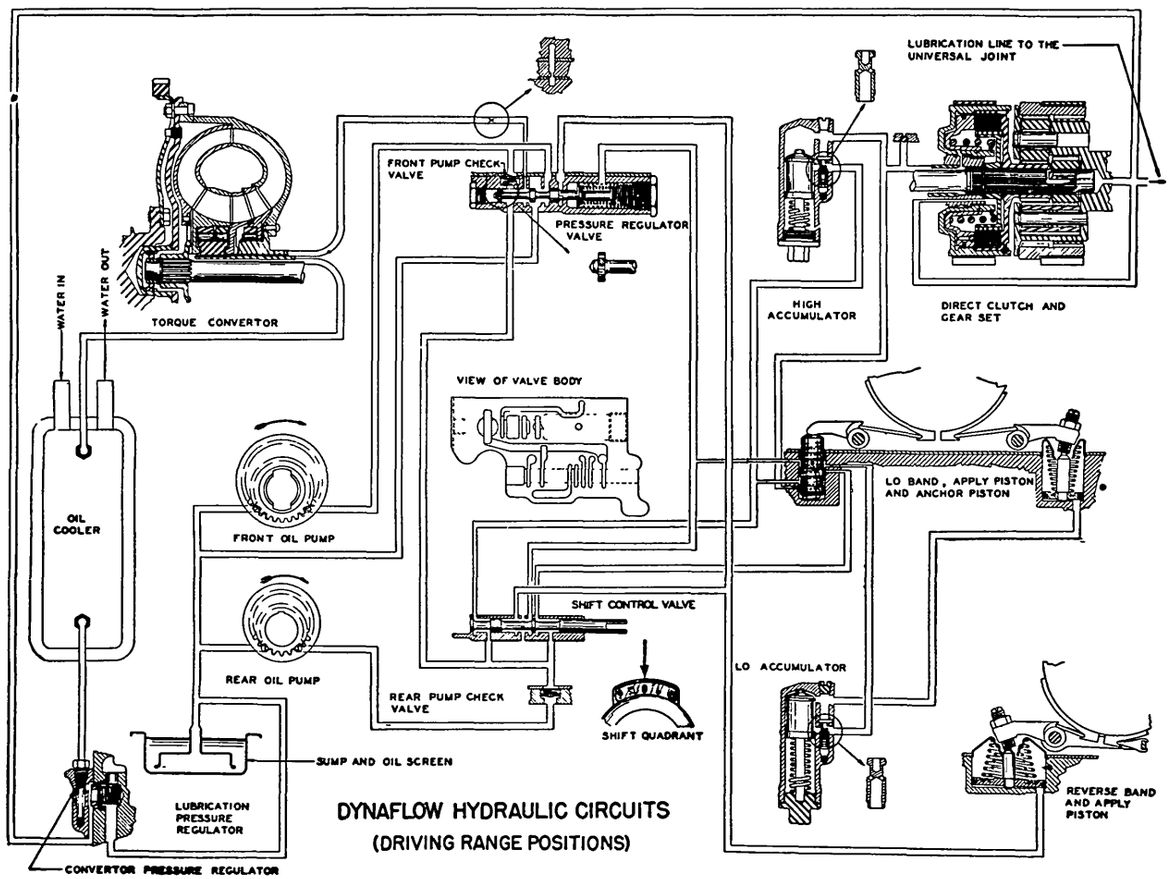
Oil Pumps & Hydraulic Control System: See the Hydraulic Circuit illustration for details of Dynaflow control units. These units operate as follows:

Front Oil Pump—This pump is driven by the engine and is of large capacity to provide necessary pressure and volume of oil for starting, low speed, and reverse operation. At car speeds above 45 MPH., rear pump takes over and front pump idles (oil bypassed back to suction side through oil pressure regulator). A check valve in the pump delivery line prevents oil bleeding back through the idling pump.

Rear Oil Pump—This pump driven from output shaft (driven by rear wheels when car pushed or towed) to operate direct drive clutch and fill torque converter when front pump not operating. Acts in conjunction with front pump at speeds below 45 MPH. and supplies all oil at speeds above 45 MPH. when front pump idles.

Pressure Regulator Valve—Controls pressure in main oil supply line (see Converter & Lubrication Pressure Regulator below) and limits pressure to 90 lbs. (80-90 lbs.) except when pressure boosted for Low Range operation. This boost is effected by supplementing regulator spring pressure with hydraulic pressure (acting on regulator stem piston) which increases pressure in system to 180 lbs. (160-180 lbs.).

Converter & Lubrication Pressure Regulator—Converter is filled with oil from metering orifice in Pressure Regulator Valve and returns to the oil sump through the Oil Cooler and Converter Pressure Regulator which maintains pressure in this circuit at 50 lbs. Oil is bled from this circuit at regulator for lubrication of transmission units (front oil line for Low Range Drum Bushing and Clutch Plates, rear oil line for Transmission Rear Bushing, Planetary Gears, Rear Bearing Retainer Bushing, and Universal Joint). Pressure in the lubrication circuits is maintained at 15 lbs. by the regulator.



1948-52 BUICK DYNAFLOW HYDRAULIC CIRCUIT—DRIVING RANGE POSITION

CONTINUED ON NEXT PAGE

BUICK DYNAFLOW DRIVE (C nt.)

Shift Control Valve—This valve is controlled by the lever on steering wheel and directs flow of oil for planetary unit operation (see Planetary Unit Operation above).

OPERATION

Dynaflow Drive Torque Converter automatically provides a torque multiplication ranging from an equivalent gear reduction of 2.24-2.4 to 1 (for Starting, Heavy Loads, and Acceleration) to an equivalent "High" 1 to 1 ratio (for Light Loads and Steady Driving when torque converter acts as a simple Fluid Coupling). The Planetary unit is controlled by the driver and provides definite gear ratios (in addition to the varying ratio of the torque converter) depending on the control lever position as follows:

Drive Range ("D" Lever Position)—Bands are released and clutch is engaged. This locks the front sun gear to the drive shaft, and as rear sun gear is splined on the drive shaft, no rotation of the gears is possible (both gears meshed with reverse pinions and tend to rotate pinions at two different speeds). The entire planetary gear assembly turns as a unit and the output shaft rotates at the same speed as the input shaft with resultant gear ratio of 1-1.

Low Range ("L" Lever Position)—Low Range Band is applied and clutch is disengaged (band holds front sun gear stationary). Drive shaft turns rear sun gear which meshes with Low Planet Pinions, and as these pinions also mesh with the Reverse Pinions which mesh with the stationary front sun gear, the reverse pinions "walk" around the sun gear rotating the Planet Carrier and output shaft in the same direction as input shaft but at slower speed to provide a gear reduction of 1.82-1.

Reverse ("R" Lever Position)—Reverse Band is applied and clutch is disengaged (band holds internal Reverse Gear stationary). Drive shaft turns rear sun gear which meshes with Low Planet Pinions, and as these pinions also mesh with the Reverse Pinions which mesh with the stationary internal gear, these Reverse Pinions move around the gear in a direction opposite to their direction of rotation, rotating the Planet Carrier and output shaft in opposite direction to input shaft and at slower speed to provide a gear reduction of 1.82-1.

Neutral ("N" Lever Position)—Both bands are released and clutch is disengaged. With all gears free to spin, no power is transmitted through the planetary unit and output shaft is stationary.

Parking Mechanism Operation: Control lever is linked to a stationary pawl anchored in the transmission case. Moving lever to park "P" position, engages pawl with ratchet wheel splined on output shaft in bearing retainer housing at rear of transmission and locks the drive shaft.

LUBRICATION

Check oil level at 1000 mile intervals and add oil as required. Drain and refill at 25000 mile intervals.

►***CAUTION—Oil must be warm and engine must be idling when checking oil level, warm up oil before draining.***

Checking Oil Level: With oil warm and engine idling with control lever in Parking "P" position, check oil level as indicated on dipstick in filler tube in engine compartment (on right side between battery and engine). If level more than 1" below FULL mark on rod, add recommended oil to bring level up to FULL mark *(CAUTION*—do not fill above the FULL mark). Distance between ADD OIL and FULL marks on rod is 1" or equal to approximately 1 pint of oil.

►***CAUTION—If oil level is consistently low when checked (indicating loss of 1 pint or more per 1000 miles), check transmission thoroughly for oil leaks.***

Oil Gauge Rod Location—Changed during 1949:

1948 & Early 1949 Cars—On right side of transmission case under floor, accessible by removing front floor pan cover.

Beginning 1949 Cars—In engine compartment, accessible by raising hood.

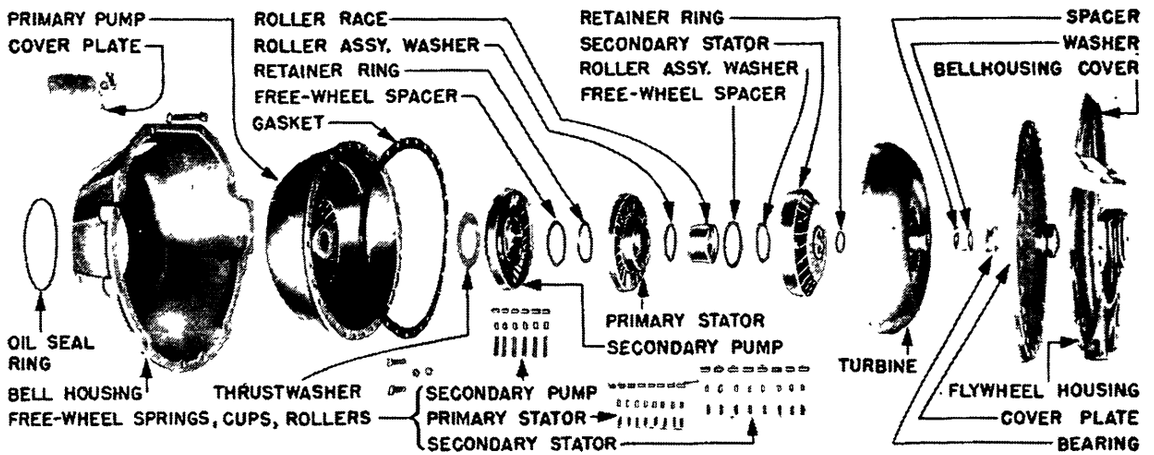
►***CAUTION—Do not confuse Dynaflow Oil Gauge Rod with Engine Oil Gauge Rod located near this same point.***

Draining & Refilling: With oil warm, drain transmission case by removing drain plug in oil pan, drain torque converter, after removing bell housing cover for access to drain plugs, by loosening one plug and turning converter until second plug is downward and removing this plug. Re-install and tighten all drain plugs. Install 3 quarts of recommended oil through filler opening in case. Start engine and allow it to idle with control lever in Parking "P" position, add additional oil to bring level up to point 1¾" below "FULL" mark on oil gauge rod. Recheck oil level after transmission warmed up. Oil level should then be at full mark on rod.

►***CAUTION—DO NOT FLUSH transmission when changing oil.***

Capacity—(40, 50) 8½ qts. (70) 10 qts. *NOTE*—1¾ pints additional required if transmission completely dry (after overhaul etc.).

Recommended Oil—Use only "Special Buick Oil for Dynaflow Drive" or "Automatic Transmission Fluid, Type A" with AQ-ATF number embossed on can.



DYNAFLOW DRIVE TORQUE CONVERTER & BELL HOUSING

LINKAGE ADJUSTMENT

LINKAGE ADJUSTMENT: Adjust all units in order and exactly as follows:

Manual Control Linkage: Transmission must be thoroughly warmed up (driven approximately 20 miles under traffic conditions with frequent starts and stops) and oil level must be correct. Then proceed as follows:

(1) Place shift control level in Neutral "N" with detent plunger centered in detent notch, move lever until stop pin is against stop in dial housing, note movement of dial pointer. Repeat this operation in Low "L" position. Dial pointer movement should be approximately equal in both positions. If not, loosen control detent mounting bolts on steering column jacket, shift detent until dial pointer travel is equal. Place lever in Low "L" position, carefully bend dial pointer, if necessary, so pointer is in line with "L" on dial.

(2) Check parking mechanism by placing car on ramp or steep grade with control lever in Parking "P". Parking lock should hold securely. Place control lever in Neutral "N" and allow car to roll. If "clicking" ratchet noise heard, or if parking lock did not hold car on grade, adjust as follows: Place control lever in Parking "P" position, disconnect shift rod from shift idler lever on steering column, pull forward on rod and move car slightly to make certain locking pawl fully engaged (CAUTION—do not jerk on rod). Check movement at lower end of shift lever on left side of transmission case by pressing forward on lever (against spring tension) until definite stop is felt. This movement should be 1/8-3/16" beyond the parking "P" position. If spring travel not within these limits, control valve is out of adjustment (requires removal of torque ball). If spring travel correct, pull shift rod forward against stop, adjust shift rod clevis until clevis pin can just be entered in hole in idler lever with control detent engaged in

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BUICK DYNAFLOW DRIVE (C nt.)

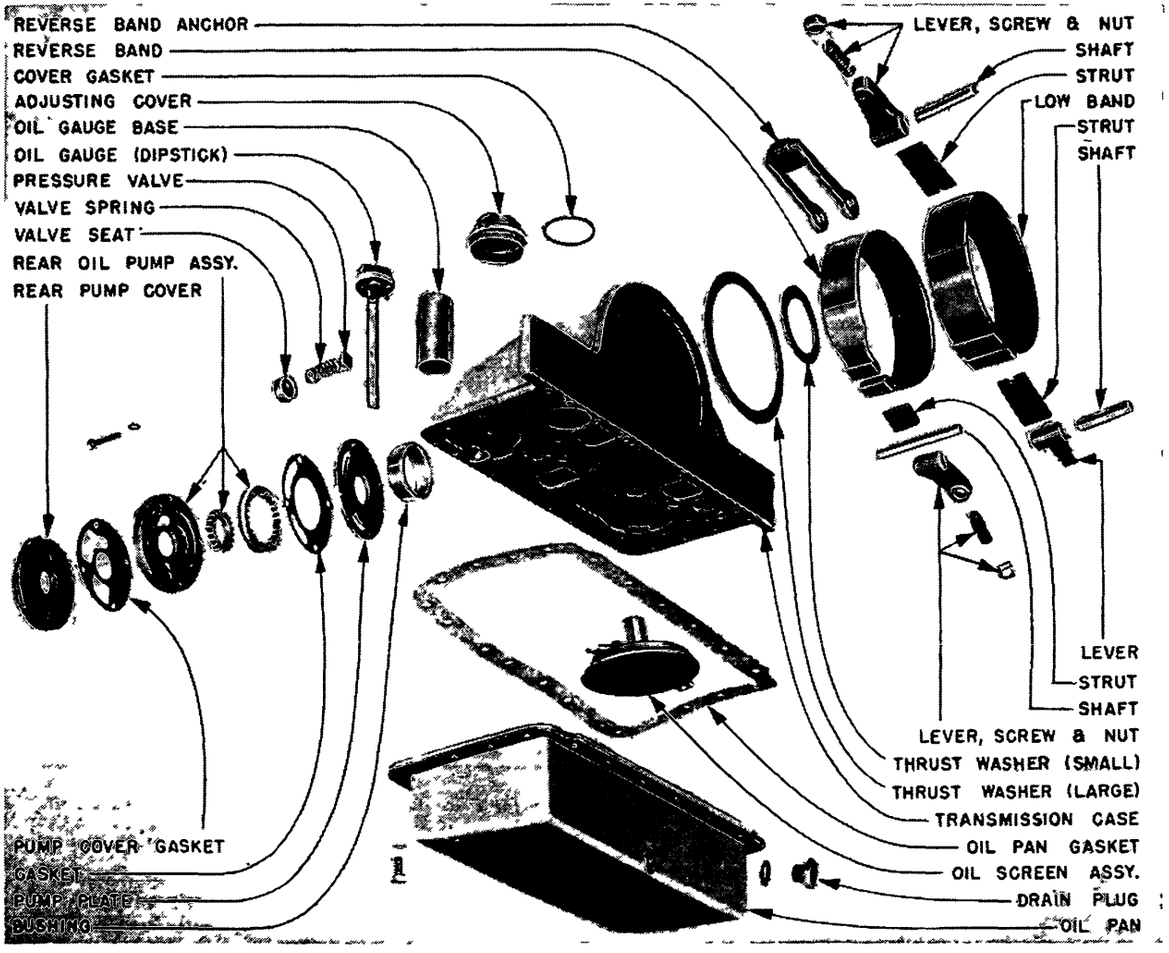
Parking "P" position, then lengthen rod by unscrewing clevis 3 full turns, connect rod temporarily (may require readjustment in next step).

(3) Place shift control lever in Neutral "N" position with detent fully engaged, install Shift Control Linkage Adjustment Gauge No. J3085 on dial housing with line under "N" centered on dial pointer. With transmission warm and engine idling at 600 RPM., move control lever from Neutral "N" to Drive "D" position slowly. Clutch should engage (noted by immediate decrease in engine speed) when tip of dial pointer is behind long gauge mark midway between "N" and "D" on speed ratio dial (width of mark is allowable variation in shift point). Move control lever from Drive "D" to Neutral "N" position slowly. Clutch should disengage (noted by immediate increase in engine speed) when tip of pointer is behind midway mark on gauge. If clutch engagement and disengagement points not correct, readjust clevis on shift rod at shift lever (see (2) above), being careful not to disturb Parking adjustment. Do not connect shift rod permanently until adjustment (4) completed.

►*CAUTION—When making above adjustment, do not change shift rod length so much that parking lock fails to hold or pawl contacts ratchet wheel in Neutral (check as directed in (2) above).*

(4) Check operation in Low "L" and Reverse "R" positions. Detents should be engaged and shift points should occur when tip of dial pointer is directly behind mark midway between "D" & "L" (Low), midway between "L" & "R" (Reverse). If shifts do not occur at correct points, check for bent transmission shift lever, bent valve operating upper lever, or lever loose or incorrectly seated on shaft.

(5) After above adjustments completed, tighten clevis nut on shift rod clevis and permanently install clevis pin with plain washer and spring washer on each side of clevis.



TRANSMISSION CASE, REAR OIL PUMP, & SERV BAND ASSYS.

►*CAUTION—Neutral Safety Switch and Back-up Light Switch must be checked after changing control detent and shift rod adjustments.*

Throttle Linkage & Dash Pot—Must work freely and smoothly. *See adjustment data under "Carburetor" on Buick car model pages.*

Starter Vacuum Switch: If operation not correct after carburetor linkage and dash pot adjustments made, *See "Stromberg Starter Switch" and "Carter Car Starter" in Electrical Equipment Section for checking and adjustment of these switches.*

Neutral Safety Switch: Located on control lever linkage at lower end of steering column and connected in starter control circuit so that starter operative only with Dynaflow control lever in Neutral "N" or park "P" position. Switch should be closed in neutral and should remain closed until lever moved toward Drive position enough to move outer end of control lever pointer 5/32" (if switch opens with less than ⅛" pointer travel, starter may not operate in neutral; if more than 3/16" pointer travel required to open switch, starter may operate in Drive "D" position and cause starter to move car). Check and adjust switch as follows:

Checking Neutral Switch—Ground coil terminal on distributor so that engine can be cranked without starting. Firmly set parking brake. Place Dynaflow control lever in neutral "N" position (check to see that detent firmly engaged). Install Shift Control Linkage Adjustment Gauge J3085 on dial housing so that short line under "N" is centered on dial pointer. Move control lever to Driving "D" position, turn ignition on, depress accelerator pedal to close starter vacuum switch. Move control lever slowly from "D" toward "N", note position of center of dial pointer at instant starter begins to operate, release accelerator pedal. Center of dial pointer should be within limits of short line to right of "N" mark on gauge (provides required limits of 1/8-3/16" out of neutral). If not within these limits, adjust as directed below.

Adjust Neutral Switch—Place control lever so dial pointer centered on short line to right of "N" mark on gauge J3085 and hold the lever in this position while adjusting. Loosen the two mounting bolts on switch bracket at lower end of steering column, raise switch up as far as possible. With ignition switch turned on and accelerator pedal depressed, tap switch down until starter just begins to operate, then tighten switch mounting bolts being careful not to change switch position. Recheck switch adjustment.

Back-up Light Switch: Check and adjust after transmission control detent adjusted as follows:

1948 Switch—Place control lever in Reverse "R" position, check clearance between switch operating arm and nearest edge of switch mounting bracket. If this clearance not 15/32", loosen two switch mounting screws and shift switch on bracket (screw holes are slotted).

1949 & Later—Place control lever in Low "L" position, check clearance between switch operating arm and lower edge of control shaft lower lever. If this clearance not 0" to 1/16", loosen two switch mounting screws and shift switch on bracket (screw holes slotted).

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BUICK DYNAFLOW DRIVE (Cont.)

BAND ADJUSTMENT

▷*BAND ADJUSTMENT CAUTION—Floor pan openings are not provided and Bands cannot be adjusted with transmission in car (bands must be correctly adjusted before transmission installed).*

LOW & REVERSE BAND ADJUSTMENT: Adjust only if chatter or slip in low and reverse severe or objectionable, (slight chatter as car starts in reverse, disappearing when car in motion, is normal). Adjust bands as follows:

(1) Remove front floor mat, insulation pad, and transmission opening cover from floor pan.

(2) Use tool J2655 to remove band adjusting cover and gasket (Covers are shallow sheet metal cups on upper right (Low), left (Reverse) of transmission case.

(3) Loosen locknut and turn adjusting screw clockwise until considerable resistance felt indicating that band in full contact with drum or ring gear.

(4) Back off screw until trace of endplay noted when prying up on locknut with screwdriver, then back off screw additional six complete turns, hold screw from turning and tighten locknut snug.

(5) Note position of adjusting screw slot, use torque wrench to tighten locknut to 20-25 ft. lbs., check screw slot to make certain that screw position not changed.

(6) Install band adjusting cover using new gasket.

NOTE—Both Low and Reverse Bands adjusted alike as directed above.

TESTING HYDRAULIC UNITS

If performance not satisfactory, make following tests with transmission thoroughly warmed up and at operating temperature:

Oil Level: Check oil level, add fluid as necessary to bring level up to FULL mark on dipstick, recheck performance with correct oil level. If car has been losing oil at rate of 1 pint or more each 1000 miles, make thorough check for oil leaks.

Manual Control Linkage: Check and adjust manual control linkage. See Linkage Adjustment.

Hydraulic Control System Pressures: Use Transmission Oil Pressure Gauge J-2575. Support rear end of car solidly with wheels off floor so that transmission can be operated. Remove transmission cover in floor pan for access to pressure take-off points. Connect gauge and make tests as follows:

Front Oil Pump—Connect pressure gauge at pipe plug opening on left side of reaction shaft flange. Run engine at 500 RPM., check pressure with selector lever in Low, Drive, and Reverse range. Repeat tests at 1000 RPM. and at 1800 RPM. in Low and Drive Range only. See table below for correct pressures. Low or erratic pump pressure indicates air leaks in suction line, improper pressure regulator valve action, or excessive pump clearances.

Front Oil Pump Pressures

Selector Lever—	Low	Drive	Reverse
500 RPM.	100 lbs.	90 lbs.	100 lbs.
1000 RPM.	160 lbs.	90 lbs.	
1800 RPM.	180 lbs.	90 lbs.	

Rear Oil Pump—Connect pressure gauge at pipe plug opening in lower flange at front end of rear bearing retainer. Run engine at 500 RPM., check pressure with selector in Low & Drive Range. Repeat test at 1000 RPM. and 1800 RPM. See table below for correct pressures. Low or erratic pump pressure indicates air leaks in suction line (this will affect both pumps), improper pressure regulator valve action, excessive pump clearances, or leak in valve and servo body passages between pump and regulator valve.

Rear Oil Pump Pressures

Selector Lever—	Low	Drive
500 RPM.	75 lbs.	90 lbs.
1000 RPM.	125 lbs.	90 lbs.
1800 RPM.	175 lbs.	90 lbs.

High Accumulator—Connect pressure gauge at pipe plug opening on top of accumulator body (left side of car). Place selector lever in Drive range. Run engine and check pressure at 500 RPM. (should be 80 lbs.), and at 1000 RPM. and 1800 RPM. (should be 85 lbs.). Low accumulator pressures may be caused by leakage past accumulator body gasket. If accumulator pressure more than 10 lbs. lower than front oil pump pressure, check for leakage between accumulator and multiple disc clutch and for restricted or plugged metering orifice in accumulator dump valve.

Low Accumulator—Connect pressure gauge at pipe plug opening on top of accumulator body (right side of car). Place selector lever in Low range. Run engine and check pressure at 500 RPM. (should be 90 lbs.), at 1000 RPM. (should be 150 lbs.), and at 1800 RPM. (should be 170 lbs.). Low accumulator pressures may be caused by leakage past accumulator body gasket. If accumulator pressure more than 10 lbs. lower than rear oil pump pressure, check for leakage between accumulator and low servo and for restricted or plugged metering orifice in accumulator dump valve.

TROUBLE SHOOTING

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With selector in any Range (rear wheels free).

If car will not move for 1-8 minutes after standing over night—Check front pump oil pressure (see Testing) after allowing car to stand for several hours. If zero pressure noted, check pump for excessive clearances allowing pump to lose its prime. Check alignment of bell housing and converter primary pump hub.

▷*CAUTION—If this condition found, inspect Clutch and Bands for excessive wear due to slippage caused by low oil pressure.*

If car will not move after extended operation in Reverse—Check for air leaks in pump suction line (at rear oil pump gaskets), or excessive clearance in front pump (at pump gears and cover). Check alignment of bell housing and converter primary pump hub.

2) With selector in any Range (rear wheels locked). Parking lock engaged. Broken parts in transmission or rear axle. Parking brake applied.

3) With selector in Drive Range. Check front oil pump pressure and High Accumulator pressure. If OK, check for sticking Low Band Anchor Piston, remove and inspect Clutch for worn or sticking clutch plates, leaking clutch seal rings. If High Accumulator pressure low, also check rear pump Check Valve for correct installation and proper seating, check for leaks at accumulator body gasket, reaction flange gasket, clutch piston outer seal and clutch ball check valve, and leaks at sealing rings on reaction shaft flange and low drum.

4) With selector in Reverse Range. Check reverse band for displaced operating strut caused by too loose adjustment, improper installation, or broken band anchor (indicated by free up and down movement of band operating lever). If band assembly OK (no free movement of lever), check servo operation by running engine and shifting into Reverse. Remove Valve & Servo Body and check for reverse servo piston seal leaks.

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, or poor acceleration).

1) In all Speed Ranges. Low oil level. Incorrect manual control linkage adjustment. Air leak in oil pump suction pipe at oil screen sealing ring. Low front oil pump pressure caused by wear or excessive clearances in pump. Leaks at front pump cover or reaction shaft flange, pressure regulator valve, Valve & Servo Body gasket. Pressure regulator valve defective.

2) In Drive Range. Incorrect manual control linkage adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, check for leaking clutch sealing rings, sticking clutch piston, worn or sticking clutch plates.

3) In Low Range. Incorrect manual control linkage adjustment. Incorrect low band adjustment. Low band and drum worn or scored. If Low Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, remove Valve & Servo Body and check for gasket leaks or leaks at low servo piston seal.

4) In Reverse Range. Incorrect manual control linkage adjustment. Reverse band out of adjustment, strut out of place, or anchor broken. If front oil pump pressure low, remove Valve & Servo Body and check for gasket leaks and leaking reverse servo piston seal.

CAR CREEPS (Forward or Backward).

1) Creeps forward with selector in Neutral. Incorrect manual control linkage adjusment. Sticking low servo piston (check by removing low band adjustment cover). Sticking clutch caused by warped, binding, or incorrectly assembled clutch plates (not stacked properly with "dish" in same direction).

If Car Creeps only when engine accelerated to 2500 RPM—Check clutch vent ball checks in clutch piston and reaction shaft flange.

2) Creeps forward with selector in Reverse or backward with selector in Low. Incorrect manual control linkage adjustment.

SHIFTS ARE ROUGH.

1) Low-to-Drive Shift. Incorrect Low Band adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket and for dump valve or accumulator piston sticking down (top land of piston should be visible through top port in body). Sticking low band anchor piston (remove Valve & Servo Body to check), or incorrect piston location (see piston shimming data in Valve & Servo Body Reassembly). Valve & Servo Body gasket leaks. Clutch plates worn or binding.

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BUICK DYNAFLOW DRIVE (C nt.)

EXCESSIVE CHATTER OR CLUNK WHEN STARTING

►*CAUTION—Slight "clunk" when shifting into Low or Reverse is normal, and slight chatter when car starting to move in reverse (disappearing as soon as car in motion) is also normal.*

1) In Low & Reverse Range. Incorrect Low or Reverse Band adjustment. Engine and transmission mountings loose or incorrectly adjusted, thrust pad at transmission mounting broken (see Engine Mountings in Buick Special Data). Clutch plates warped, sticking, or incorrectly assembled (not stacked properly with "dish" in same direction). Reverse ring gear bushing worn. Planet pinion needle bearing rough.

NOISE IN TRANSMISSION.

►*CAUTION—Hum or low whine in Neutral or Parking is normal (due to free rotation of all planetary gears) and slight hum in Low and Reverse may be expected.*

1) Buzzing Noise. Low oil level. Front pump check valve hanging up on edge of gasket between valve and servo bodies. If noise noticed in Parking or Neutral, pressure regulator valve clearance in body may be excessive or orifice in valve land oversize (correct by replacing valve and body).

2) Clicking Noise. If noticed in all ranges, may be caused by foreign material in converter. If noticed only when car in motion, may be caused by parking lock pawl contacting ratchet wheel due to incorrect manual control linkage adjustment.

3) Abnormal Hum or Whine (see Caution above). If noted in all ranges, may be caused by worn parts or excessive front pump clearances (front pump noise will increase in Low and decrease at car speeds above 45 MPH. in Direct Drive). Check front pump for excessive clearances by testing for low pump pressure. If noise noted in all ranges except Direct Drive, may be caused by trouble in planetary gears (gears locked out in Direct Drive).

4) Squealing or Screeching following installation of Front Oil Pump. Pump driving gear installed backward. On transmissions before Serial No. A-56000, may be caused by installation of thick front pump cover **without changing** converter primary pump (see Production Change note on Front Oil Pump & Related Changes).

►*CAUTION—Above condition must be corrected WITHOUT FURTHER OPERATION OF TRANSMISSION or severe damage will result.*

REMOVAL FROM CAR

Transmission and Torque Converter are removed as a unit as follows:

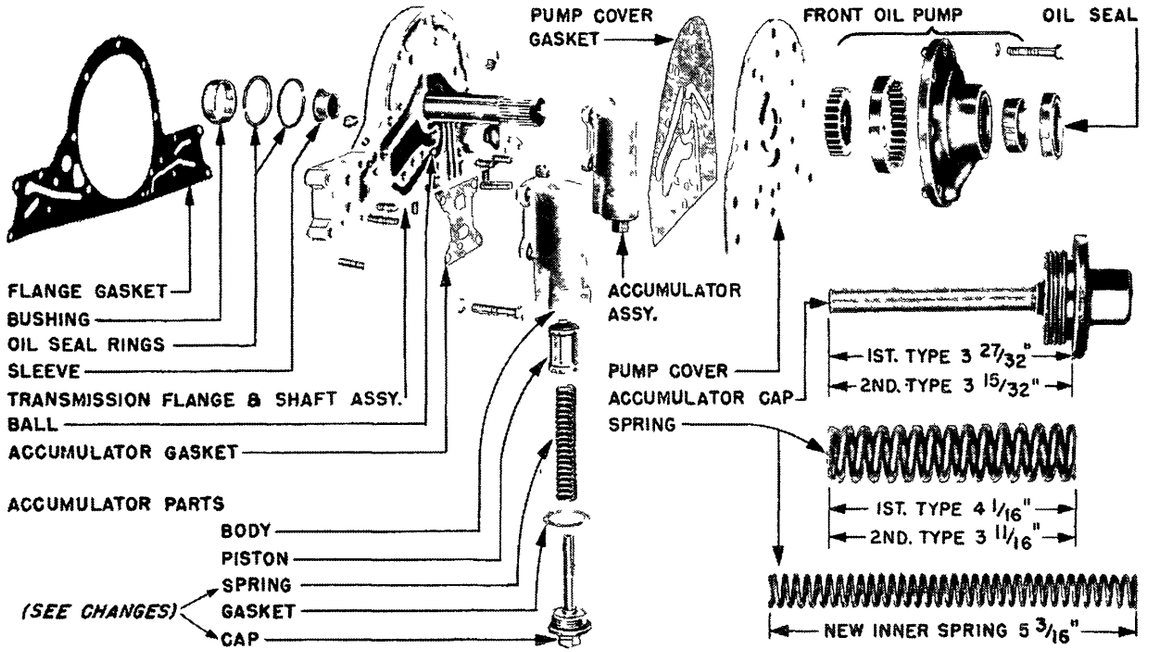
1) Remove bell housing dowel bolt to rear of starter solenoid using an offset brass drift and working from under the hood on the right side (this bolt cannot be removed from beneath car).

2) Support car securely on stands under frame with frame rails at least 20" above floor.

3) Disconnect torque tube at torque tube ball and move rear axle back to disengage propeller shaft from universal joint.

4) Remove bell housing cover and bell housing hand hole cover.

5) Drain converter and transmission oil pan (see draining data under LUBRICATION).



REACTION SHAFT FLANGE, ACCUMULATOR, & FRONT OIL PUMP ASSY. (SHOWING LOW ACCUMULATOR SPRING CHANGE)

6) Disconnect oil cooler pipes at transmission case connectors, free oil cooler bracket from transmission and tie oil cooler up to frame out of the way.

NOTE—Oil cooler can be removed by disconnecting water hose connections.

7) Disconnect oil filler pipe (later under-hood type) at hose connector. Disconnect transmission control rod at both ends and remove rod. Disconnect speedometer cable.

8) Disconnect thrust pad from transmission support by removing three nuts and taking out plate and adjusting shims. Remove two bolts and plate attaching mounting pad to transmission support.

9) Install engine support bar under rear end of engine oil pan, adjust support snugly under pan.

NOTE—Support bar can be made up of piece of 2x4 straight grain hardwood with 5/8" bolt at each end (bolts 25" center-to-center). Bolts should have 2½" hook at upper end to engage frame side rail and sufficient threaded length at lower end to allow support bar to be adjusted under oil pan.

10) Install hoist in front compartment (will require removal of floor pan opening cover) or transmission jack to support transmission weight.

11) Raise engine and transmission with engine support bar (9) and jack or hoist (10) to relieve load on transmission support. Remove support by taking out bolts in frame X-member, remove thrust pad from thrust plate on transmission.

12) Mark flywheel, converter primary pump, and cover with paint to insure reassembly in exact same relative positions.

CAUTION—This is necessary to maintain balance.

13) Disconnect converter from flywheel by taking off nuts on mounting bolts (nuts on front face of flywheel and are accessible through housing cover opening on front of bell housing).

14) Lower engine and transmission just enough so that top bolts in bell housing are accessible (can be removed from above if floor pan cover removed), disconnect bell housing by taking out all attaching bolts.

►*CAUTION—Make certain that both engine and transmission securely supported before loosening these bolts.*

15) Move transmission straight back to disengage converter pump cover from crankshaft, then lower transmission and remove from beneath car.

DISASSEMBLY

►**DISASSEMBLY CAUTION:** *CLEANLINESS IS EXTREMELY IMPORTANT when disassembling and working on transmission. Thoroughly clean exterior before disassembling, use CLEAN tools on a CLEAN workbench, provide CLEAN storage space for all parts, and separate parts to avoid nicking or burring of ground and polished surfaces.*

DISASSEMBLY OF TRANSMISSION (into Major Components): With transmission on bench, first remove shift lever by taking off retaining nut and lockwasher on shaft while holding lever forward (to avoid strain on linkage), remove oil cooler and pipes if this unit removed with transmission, remove both band adjustment covers and gaskets using Remover Tool J-2655, remove oil gauge rod (first

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BUICK DYNAFLOW DRIVE (Cont.)

type transmission). Remove both pipe plugs in primary cover to completely drain converter. Then place transmission on bench with oil pan upward and remove various sub-assemblies as follows:

Converter & Bell Housing Removal—Take out all primary pump cover nuts and bolts (CAUTION—insert punch in drive bolt holes through bell housing hand hole to keep cover from turning), screw three 5/16"-18 capscrews into tapped holes in pump cover to loosen cover, remove cover. Remove converter spacer and shim washers (on input shaft or in bearing recess in pump cover). Press on end of input shaft (to prevent shaft coming out) and withdraw converter turbine. Check stators for freewheel clutch slippage before removing these parts (stators should rotate freely in clockwise direction but lock when turned in opposite direction), use narrow pointed tool to remove retaining ring from reaction shaft, remove both stators as a single unit (CAUTION—separating stators will allow clutch parts to fly out). Check secondary pump for freewheel clutch slippage (pump should rotate freely in clockwise direction but lock when turned in opposite direction). Pull primary and secondary pumps off reaction shaft and immediately check for evidence of oil leakage (streaks of fresh oil on back of primary pump and fresh oil running down face of front oil pump indicate leakage past oil pump seal—if leakage noted, check for loose bell housing bolts) Take out bell housing attaching bolts, remove bell housing, check rubber oil seal for uniform compression (if seal not compressed uniformly, check around oil pump and in bell housing opening for burrs or foreign material preventing uniform seal compression). *See Overhaul data for disassembly of converter stators and pump.*

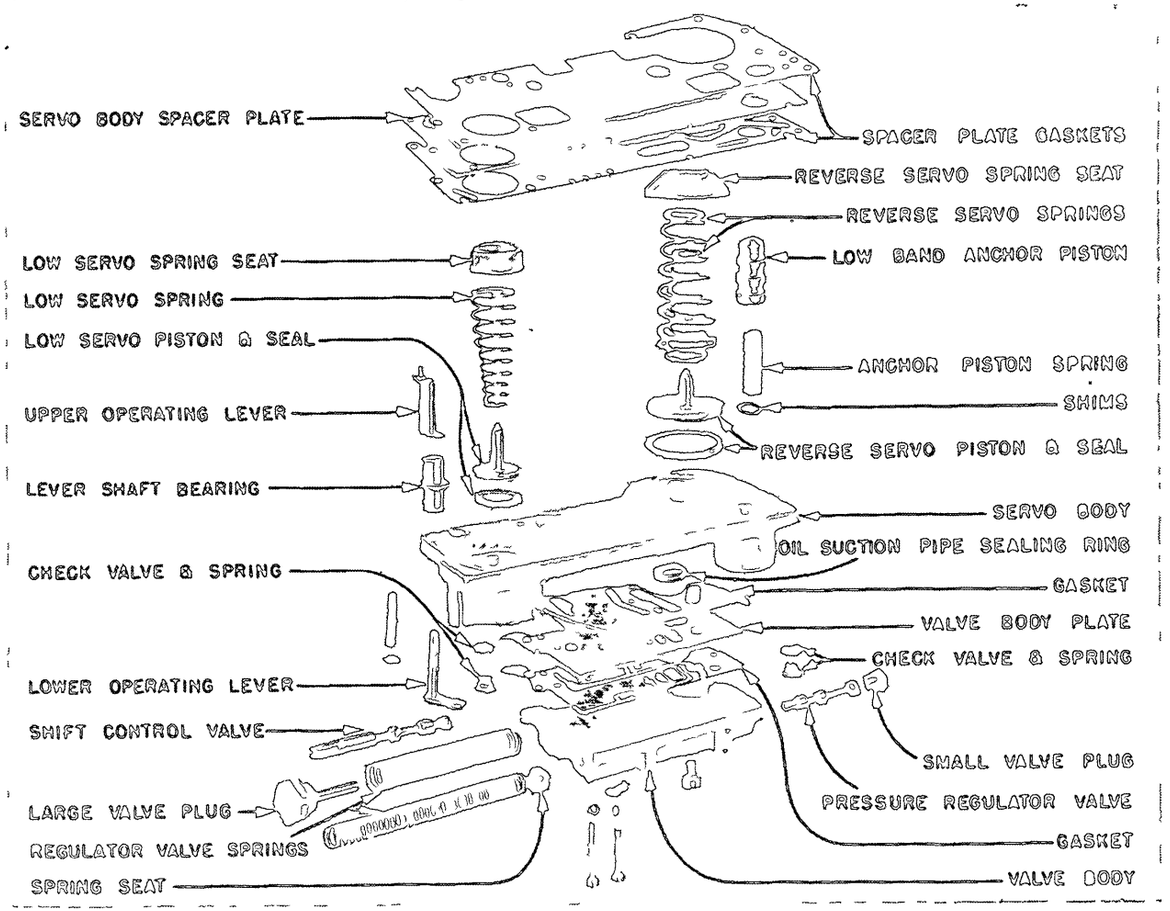
Oil Pan and Valve & Servo Body Removal—*Not necessary to remove other parts prior to this operation.* Remove oil pan and gasket. On transmissions with first type oil screen, examine oil screen suction pipe impression on sealing ring in servo body recess (ring should show full impression of end of suction pipe indicating no air leakage at this point), remove sealing ring. On transmissions with second type oil screen, lift screen away from suction pipe, remove suction pipe spring support and retaining spring, remove suction pipe and cork gasket from recess in servo body. Disconnect valve operating rod from upper valve operating lever by inserting screwdriver blade through hole in case and pressing rod away from lever (ball stud on lever engages spring socket in rod). Loosen all valve & servo body attaching screws slightly but do not loosen slotted safety nuts on valve-to-servo body studs, turn all screws out evenly to relieve anchor piston spring tension, (not necessary on C-9, E-9 and later transmissions), pry assembly upward lightly to free gasket, push shift control valve and lower operating lever inward to align lever with transmission case opening, lift assembly off while supporting anchor piston to prevent it falling out (piston not used on C-9, E-9 and later models). Use care to avoid slotted end of shift control valve which has sharp edges when lifting on assembly. Remove gasket and check for evidence of oil leaks. Remove reverse band operating strut (support strut with finger extended through adjustment hole to prevent it falling into case, release strut by raising operating lever). *See Overhaul data for disassembly of valve & servo body.*

Reaction Shaft Flange, Front Oil Pump, and Accumulator Removal—*Converter & Bell Housing and Oil pan must be removed first but Valve & Servo Body need not be disturbed.* Loosen but do not remove both accumulator body caps (will facilitate removal later). Remove three attaching capscrews from each accumulator body but do not disturb stud nut. Remove capscrews extending through front oil pump cover but do not remove stud nuts (first type has one capscrew and two stud nuts, later type has two capscrews and one stud nut). Tap lightly on rear of accumulator bodies with fiber hammer to loosen reaction shaft flange, remove assembly and gasket from case leaving input shaft in transmission. Examine gasket for uneven impression or other evidence of oil leaks.

Input Shaft, Clutch, & Low Range Band Removal: *All parts listed in preceding removal sections must be removed first.* Pull input shaft and clutch hub front thrustwasher out of transmission (thrustwasher will come out on shaft), then lift out clutch assembly. Use screwdriver to block low band anchor lever (transmissions C-8 & E-8 and earlier), compress the low band with the operating lever (later transmissions), install Band Installing Clip J-2595 across band strut flanges to keep band compressed, release the lever and lift band out of case, lift out band struts (will drop down in case when band removed). Remove the low band anchor lever and operating lever by threading a ¼-20 capscrew in end of each lever shaft and pulling shafts out of case. *See Overhaul data for clutch disassembly.*

Torque Ball & Universal Joint Removal: *Does not require removal of any other parts first.* Remove torque ball rubber boot. Take out attaching bolts in thrust plate, remove thrust plate and gasket, torque ball inner and outer retainers, and paper adjusting shims. Remove speedometer driven gear and sleeve assembly. Lock drive shaft by engaging parking lock pawl (use shift lever to press forward on shift lever shaft while turning universal joint until pawl engages), remove universal joint bolt, lockwasher, and flat washer, pull universal joint using puller J-882A (40, 50), J-859A (70).

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VALVE & SERVO BODY ASSY.
(ANCHOR PISTON NOT USED ON C9, E9, & LATER TRANSMISSIONS)

BUICK DYNAFLOW DRIVE (C nt.)

Rear Bearing Retainer & Parking Lock Ratchet Whe l Removal: ***Torque Ball, Universal Joint, and Oil Pan must be removed first.*** Disconnect valve operating rod from upper operating lever by inserting screwdriver through hole in case and pressing rod away from lever (ball stud on lever engages spring socket in rod). Remove universal joint retaining ring from slot in output shaft (use screwdriver and hammer to free ends of this lock ring). Take out retaining bolts and remove rear bearing retainer and gasket, check gasket for evidence of oil leakage. Take out ratchet wheel outer retaining ring (use snap ring pliers to free ring), slide ratchet wheel off output shaft, remove inner retaining ring. *See Overhaul data for disassembly of rear bearing retainer.*

Rear Oil Pump and Lubrication Oil Pressure Regulator Valve Removal: ***Rear Bearing Retainer (preceding) must be removed first.*** Take out retaining bolts and remove pump body and gears as an assembly (on first transmissions, separate cover and gasket used). Check gaskets for evidence of oil leakage. Remove pump drive key from shaft recess, remove rubber cushion located under drive key with a pointed tool. If possible, lift off rear pump plate and gasket (if plate sticks, tap plate out **after planetary gear set removed**). Check gasket for evidence of oil leakage. Remove lubrication pressure oil regulator valve seat from rear face of transmission case (use special drag link socket to turn valve seat out), remove valve and spring.

Planetary Gear Set, Reverse Ring Gear, and Reverse Brake Band Removal: ***All parts listed in preceding removal sections must be removed first.*** Pull planetary gear set out through front of transmission case. Lift out reverse ring gear and two planet carrier thrust washers (if these parts did not come out with planetary gear set). If rear oil pump plate and gasket not removed previously (see above), tap out with hammer handle inserted through front of case. Remove reverse band operating lever by threading a ¼"-20 capscrew into tapped hole in anchor shaft and pulling shaft out, then lift out lever. Rotate reverse band toward adjusting hole until anchor accessible, disengage and lift out anchor. Compress reverse band and install Band Installing Clip J-2595 across strut flanges to hold band compressed, lift band out. Remove reverse ring gear thrust washer from case. *See Overhaul data for disassembly of Planetary Gear Set.*

OVERHAUL

After all Converter and Transmission Major Components removed from transmission case, disassemble and overhaul these units as follows:

Converter Stators & Pump: Disassembly. Rotate primary and secondary stators in opposite directions while slowly pulling them apart (CAUTION—do not allow free-wheeling rollers and springs to fly out). Remove free-wheel race (may remain in either stator), remove roller spacer from secondary stator, remove all free-wheel rollers, springs, and spring cups, remove roller assembling washer from primary stator. Take out secondary pump retaining ring and free-wheel roller spacer, withdraw secondary pump from primary pump (rotate in clockwise direction to free the free-wheel rollers), remove free-wheel rollers, springs, and spring cups, lift out secondary pump thrust washer (see Note) which may be found in the primary pump or on the secondary pump.

►**Secondary Pump Thrustwasher Note**—This thrustwasher used only with first type Secondary Pump, not used with later type pump which has cast hub bearing directly against primary pump hub.

►*CAUTION—This thrustwasher must be used with first type pump but should be DISCARDED WHEN LATER TYPE SECONDARY PUMP INSTALLED AS REPLACEMENT.*

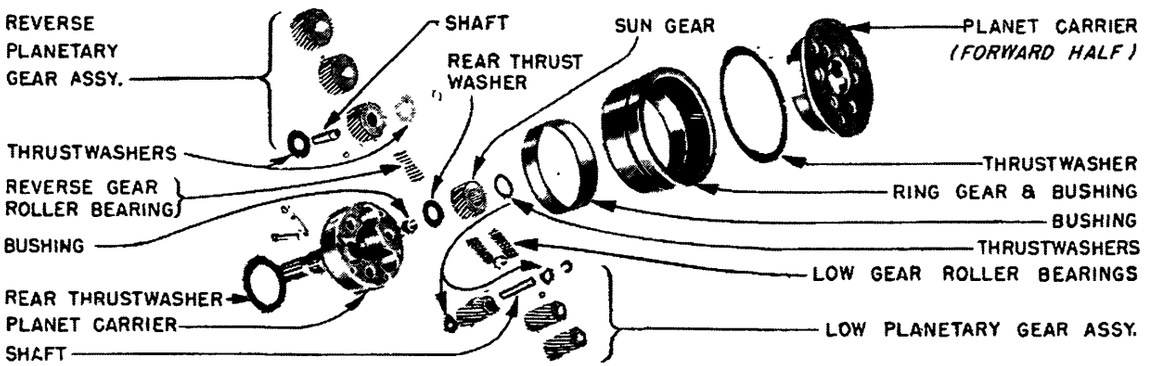
Inspection—Wash all parts in clean solvent and dry with air. Examine all parts for wear, scoring, nicks, or other damage. Replace input shaft pilot bearing if worn or rough. Remove small nicks on free-wheel rollers and race by stoning and polishing with crocus cloth. Remove nicks on pump and stator blades with a fine file.

Reassembly—Install secondary pump thrustwasher over primary pump hub (CAUTION—use this thrustwasher only with first type secondary pump, see Note under Disassembly above), insert free wheel springs and spring cups in secondary pump, install secondary pump over primary pump hub with springs outward (rotate pump clockwise to facilitate installation), compress springs with thin narrow tool and insert all free-wheel rollers. Install roller spacer and retaining ring to hold secondary pump in place. Check installation by rotating secondary pump (should turn freely in clockwise direction but lock in opposite direction). Install free-wheel springs, cups, and race in secondary stator (old race in same direction as before as indicated by wear pattern, new race either end first). Depress springs and cups with thin tool and install long rollers, then install roller spacer around race and over rollers. Install free-wheel springs and cups in primary stator, install Primary Stator Assembly Tool J-3081 (40, 50), J-2592 (70) in stator with three tool points between roller recesses, place roller assembly washer flat on tool. Depress springs and cups with thin tool, install **short** rollers (first roller next to one tool leg, next roller diametrically opposite, then alternate rollers until all installed). Remove assembly tool by turning tool until one end can be pushed into roller recess which will free other tool legs without disturbing assembling washer. Install primary stator on secondary stator by placing secondary stator on bench with rollers facing upwards, lower primary stator (rollers downward) squarely on secondary stator while twisting it in counter-clockwise direction.

Valve & Servo Bodies: Disassembly. ***On Trans. A-2999 and earlier, replace Valve & Servo Body with 2nd. type and install later type Anchor Piston also as described in Production Change notes.*** Lift low band anchor piston, spring and shims from servo body (not used on C-9, E-9 and later transmissions). Remove safety nuts and washers from body studs, lift off valve body and gasket, examine gasket for evidence of oil leakage. Remove shift control valve from valve body and rear pump delivery check valve and spring from servo body. Remove large pressure regulator valve plug from valve body (CAUTION—hold plug to prevent it flying off due to heavy spring pressure), remove springs and spring seat. Remove small valve plug and lift out pressure regulator valve. Remove valve body plate and gasket, examine gasket for evidence of oil leakage. Lift out front pump delivery check valve and spring. Take off nut and lockwasher attaching upper and lower valve operating levers in servo body and remove levers. Use wooden block placed across low and reverse servo spring seats to hold them in place with springs compressed while taking out spacer plate attaching screws, carefully relieve spring pressure (CAUTION—use care not to spring spacer plate or allow servo springs to fly out), lift off spacer plate and gasket, examine gasket for evidence of oil leakage. Lift out low and reverse servo spring seats, springs, and pistons. On early transmissions with low band anchor pistons which is retained by spacer plate, remove the piston, springs, and shims at this point. *NOTE*—On C-9 & E-9 and later transmissions, anchor piston not used and low band anchored to shaft in transmission case.

Inspection—Wash valve and servo bodies and parts with clean solvent, blow out all passages and dry parts with air. Inspect bodies for cracks, damaged gasket surfaces, and scored piston and valve cylinders. Inspect valves and pistons for nicks, scores, scratches, or rounded shoulders (edges must be sharp to keep out foreign material which might cause sticking). Replace worn or damaged piston seals.

►**Piston Seal Installation Caution—Lip on seal must fit over SMALLER diameter land on piston.**



PLANETARY UNIT ASSY.

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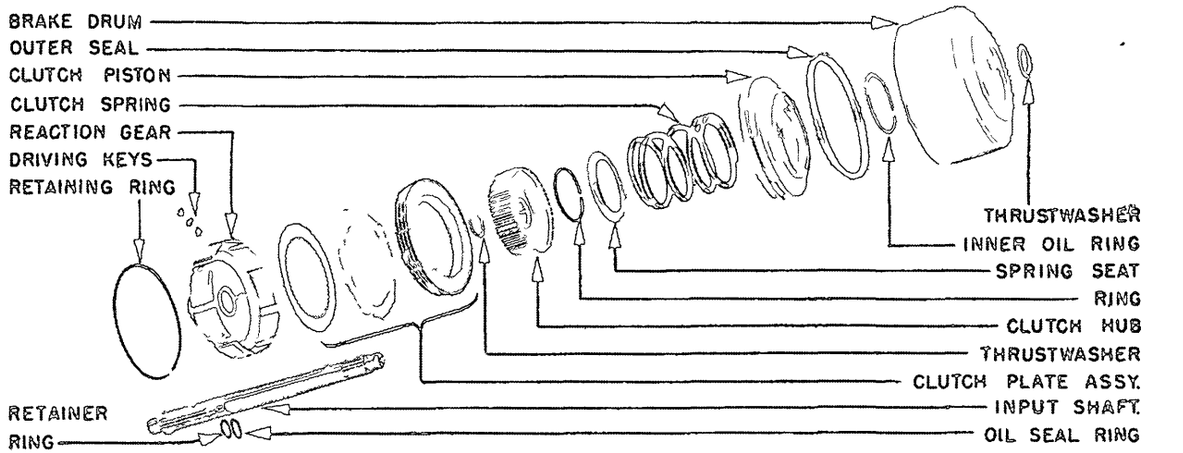
BUICK DYNAFLOW DRIVE (Cont.)

Reassembly—Install low and reverse servo pistons in servo body (CAUTION—use care not to damage seals), check to see that pistons move freely in body. Install piston springs and spring seats (small end of low servo spring in groove in piston, large end of both reverse servo springs in grooves in piston). Place check ball in the reverse servo feed channel. Use new spacer plate gasket, compress servo springs and tighten all spacer plate attaching screws uniformly. Check anchor piston for free movement (on C-8 & E-8 and earlier transmissions only) and if spacer plate or gasket interfere, loosen all spacer plate screws and tap plate to provide uniform clearance around piston, retighten screws uniformly). Check Anchor Piston Height (Trans. C-8 & E-8 and earlier models—see Anchor Piston Height Note below for data). Install both upper and lower operating levers with lower lever pointing to low servo cylinder and upper lever to reverse servo piston spring seat, tighten lever shaft nut to 5-7 ft. lbs. torque. Install front pump delivery check valve spring (large end down), and valve (ridged side up), then install valve body plate using new gasket and making sure that valve seats against plate (must not hang on gasket). Install pressure regulator spring seat, inner and outer springs, and valve plug in valve body, tighten plug to 20-25 ft. lbs. torque. Install pressure regulator valve (see that oil orifice in end land is clear and place this land outward), tighten valve plug to 20-25 ft. lbs. torque. Install shift control valve with slotted end of valve pointing toward large pressure regulator plug. Install rear pump delivery check valve (ridged face inward), and spring (large end upward). Install valve body on servo body using new gasket (CAUTION—see that pump delivery check valve spring below gasket), tighten all stud nuts to 11-15 ft. lbs. torque.

▷Anchor Piston Height Note (C-8 & E-8 & Earlier): Check anchor piston height with Anchor Piston Gauge J-2657 and a .010" feeler gauge (gauge made for first type pistons and is .010" too high). Distance from top face of spacer plate to top edge of top land on piston should be .080-.090" (equal to "Go" and "No Go" legs of gauge with .010" feeler between gauge and piston land). Adjust height by adding or removing shims between spring and piston (if height too great with all shims removed, grind off the end of the spring).

Oil Screen & Oil Pan: Mark first type screen (mounted in oil pan) to insure re-installation in same position. Clean screen and pan thoroughly, check for cracks or holes in screen and for bent pan flanges. When re-installing screen in pan, check oil suction pipe height by placing straightedge (Gauge J-2596 can be used) across pan flanges and measuring from lower edge of straightedge to top of pipe. If this distance not 17/32", adjust by bending screen mounting brackets.

Reaction Shaft Flange & Oil Pump: Disassembly. Remove high and low accumulators and gaskets using care not to drop retaining pin and check ball out of High Accumulator (not used in Low unit) Check gaskets for oil leakage. Check oil pump mounting nuts for tightness (loose nuts may have been causing oil leakage), remove nuts, take out pump body and gears (tap body lightly with soft hammer if necessary). Lift off pump cover and gasket, check gasket for evidence of oil leakage. Remove check ball from clutch feed passage in reaction flange if ball free to fall out (do not remove ball if retained by peened edges of hole).



DIRECT DRIVE CLUTCH ASSY.

Oil Pump Inspection & Repair—Clean pump parts with solvent and dry with air. Check pump gears and mounting faces of body and cover for excessive wear. Check front pump bushing for excessive wear or looseness which will require replacement of pump assembly (NOTE—Check flywheel and primary pump hub run-out and bell housing misalignment if bushing worn or loose). Check front oil pump seal and replace if damaged or any evidence of leakage noted. Drive out old seal, coat outside of new seal with Permatex #3, start seal in place with deep groove in retainer outward, tap seal into place with wood block and mallet. Check following clearances and replace pump parts if excessive:

Pump Gear Side Clearance—Place straightedge across face of pump body and gears. Clearance between face of gears and straightedge should be .001-.0025" (front pump), .001-.002" (rear pump).

Pump Gear Clearances—Check pump gears with feeler gauge between gear teeth and crescent while pressing gear away from crescent. Clearance should be .005-.009" (front pump driven gear), .0045-.007" (rear pump driven gear), .010-.016" (front pump driving gear), .006-.012" (rear pump driving gear).

Pump Cover Gear Wear—Replace cover if gear bearing area scored or worn to depth of more than .001".

Reaction Shaft Flange Inspection—Clean flange in solvent, blow out all passages and dry with air. Check mounting surface of flange for low spots with straightedge (Gauge J-2596) and feeler gauge, replace if out more than .002". Inspect mating face of transmission case similarly and replace case if it cannot be trued up within .002". Check both surfaces for nicks and burrs, remove these with a mill file. Check bronze bushing on reaction flange rear hub and cast iron sleeve within hub, replace reaction shaft flange if these parts scored or worn excessively. Check oil sealing rings and replace if damaged (rings have interlocked ends and are released by compressing ring and depressing one end while raising the other). Check all studs for tightness, replace if threads damaged or stripped (step studs furnished—can be installed by tapping out hole). When replacing oil pump attaching studs on transmission before No. A-86000 and B-29000, install later type square head bolts.

Reassembly—Install pump cover on reaction flange using new gasket (make certain that check ball in clutch feed passage first). Lubricate pump gears and install in pump body with beveled side of driving gear outward so that it will be against cover when pump installed (CAUTION—reversal of gear will cause severe damage to transmission). Install oil pump on reaction shaft flange, seating pump body squarely in recess in cover (first type) or engaging locating dowels in dowel holes (second type), use lockwashers under nuts, tighten nuts (or new type bolts) to 5 ft. lbs. torque in correct sequence (see note below), then fully tighten nuts to 25-30 ft. lbs. torque in same sequence, finally tighten cover attaching stud nut to 25-30 ft. lbs. torque.

▷Front Pump Tightening Sequence—Tighten nuts in following order: Top, Bottom, Right Center, Left Upper Center, Right Lower Center, Left Lower Center, Right Upper Center.

High & Low Accumulators: Disassembly. *See illustration and Production Change Notes for various types of Accumulator Springs and Caps used.* Remove retaining pin and check ball from High Accumulator body (not used in Low Accumulator). Remove the pipe plug, cap, gasket, spring and piston from each accumulator body keeping these parts separated so that same parts will be re-installed in same body.

Inspection—Clean all parts with solvent, blow out all passages and dry with air. Check parts for excessive wear, scoring, nicks, burrs, and other damage. Remove nicks and burrs from pistons and valves by stoning but do not round off sharp edges of pistons and valves (edges must be sharp to keep out foreign material which might cause sticking). Check mounting face of acumulator body for flatness with

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BUICK DYNAFLOW DRIVE (C nt.)

a straightedge (face can be trued up by using emery cloth on a surface plate but all traces of emery must be removed). Replace accumulator assembly if body, or piston worn (these parts not furnished separately). Check piston for wear by placing it in cylinder (all parts clean and dry). Piston should slide freely as body is tilted back and forth.

Reassembly—Lubricate all parts before installation. Install each piston in same cylinder from which removed, install springs (see illustration and Spring Note below), use new gasket on cap and tighten cap finger tight—DO NOT attempt to tighten caps fully at this time (caps will be tightened to 40-50 ft. lbs. torque **after** reaction flange assembly re-installed in transmission).

►**Accumulator Spring Note**—Springs can be identified by free lengths as listed below (early transmissions have single spring only in Low Accumulator).

Low Accumulator Springs

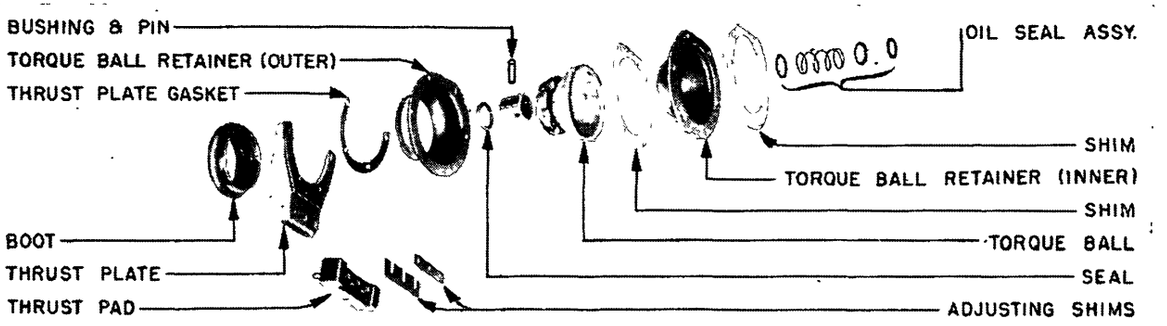
	Free Length	Part No.
Trans. before C-6, D-6, E-6	4 1/16"	1333426
After above Nos. (Inner)	5 3/16"	1339495
(Outer)	3 11/16"	1339496

High Accumulator Spring

All Transmissions	4 5/16"	1331461

Multiple Disc Clutch & Input Shaft: Disassembly. Remove retainer ring from reaction gear flange, use pointed tool to remove three flange driving keys. Lift out Low Range Reaction Gear, Thrustwasher, Clutch Hub, and all 10 Clutch Plates. Install Clutch Spring Compressor J-2590 in clutch drum placing slot in compressor ring over ends of spring seat retainer ring, compress spring sufficiently to remove retainer ring, release clutch spring pressure (CAUTION—use care that spring seat does not hang up in retainer ring groove in drum). Remove compressor, lift out spring seat and spring. Tap drum, open end down, on block of wood to dislodge clutch piston (CAUTION—if check ball in piston unseated during this operation, snap ball back in place).

Inspection—Wash parts in solvent and dry with air (CAUTION—use only gasoline or kerosene on clutch bands and plates—do not use chemical degreasers or commercial solvents). Inspect and replace all clutch plates which are worn, scored, burred, or warped (CAUTION—new plates must slide freely on clutch hub—tight plates will prevent full disengagement). Inspect oil seal ring on clutch hub and replace if damaged (ring has interlocked ends and is released by compressing ring and depressing one end while raising the other). Replace clutch piston outer seal if hardened, broken, or with turned lip (install new seal with lip extending over smaller diameter piston land). **See Piston Seal Note below.** Inspect Low Range Band and replace if worn smooth without visible grooves. Inspect oil seal ring and replace if damaged (same type ring with interlocked ends as used on clutch hub). Check to make sure retaining ring in place in shaft groove. See that small bleed hole in piston is open and that check ball is staked in place (CAUTION—ball must be free to move in recess).



TORQUE BALL ASSY.

►**Piston Seal Note**—When replacing piston seal on transmission below No. A-3000, it will be necessary to **replace piston also** since only later type wider seal furnished for service (seal width increased from .104" to .113" and piston groove increased from .112" to .116").

Reassembly—Lubricate piston seal and inner surface of drum with light oil, install piston using extreme care not to distort or turn lip of seal. Top of piston should be approximately even with shoulder in drum when installed. Install clutch spring, use Compressor J-2590 to compress spring, install spring retaining ring in groove in drum, remove compressor. Place reaction gear on bench with flange upward and install all clutch parts in following order: Clutch Hub Thrustwasher, Clutch Hub (open end upward), and all clutch plates (see Clutch Plate Caution below). Bottom clutch plate should be internally splined (faced) type and top clutch plate externally splined (plain steel) type with the two types alternating in the assembly. Install drum and clutch piston assembly over reaction gear and clutch assembly with driving key recesses in drum and gear flange aligned. After drum pressed evenly in place, fully align driving key recesses by tapping reaction gear flange, install three driving keys and flange retainer ring.

Clutch Plate Caution—Externally splined (plain steel) clutch plates are concave or "dished" and **these plates must all be installed with "dished" face in same direction** (either up or down). Check each plate with a straightedge and stack plates with dished faces in the same direction before beginning installation. *NOTE*—Internally splined clutch plates are flat and can be installed in either direction.

►**Clutch Plate Caution (Series 70 Trans. No. G-310 & Later)**—New type clutch plates used (see Production Change Note). Until these type plates furnished for service, it will be **necessary to install entire pack of regular service internally and externally splined clutch plates** if any replacement required.

Rear Bearing Retainer, Universal Joint, & Torque Ball: Disassembly. Disconnect valve operating rod clevis from valve operating cross-shaft inside retainer housing (clevis pin on transmissions before No. C-1 & D-1, snap fastener on later cars), withdraw rod through forward end of housing. Disconnect parking lock operating rod from cross-shaft by unscrewing rod end from lever. Remove cross-shaft bearing using a box wrench (CAUTION—loose fitting socket or end wrench will distort bearing), remove cross-shaft. Remove parking lock pawl shaft by screwing ¼"-20 capscrew into shaft and pulling shaft out. Tap parking lock operating lever toward front of retainer (use long punch), remove operating lever shaft, operating lever, lever and pawl assembly, and apply spring from the retainer.

Rear Bearing Retainer Inspection—Wash parts in solvent and dry with air. Check parking brake pawl, pawl locking link, and ratchet wheel for worn teeth, cracks, or other damage preventing positive locking. Check valve operating cross-shaft and bearing for wear, remove and discard rubber seal in bearing. Inspect ouput shaft bushing in retainer for wear scoring, check clearance by inserting output shaft in bushing. Clearance should be .001-.006". Replace bushing with Bushing Remover & Replacer Tool J-2997 (not necessary to ream new bushing).

Universal Joint Inspection—Check for wear and excessive play between spider pins and bushings (should be .002-.004"). Check yokes for wear on shaft splines. Front yoke must be tight fit on output shaft (play will allow "snap" between forward and reverse), rear yoke backlash on propeller shaft should be .0005-.0045". Rear yoke clearance in torque ball bushing should be .004-.006" and bearing surfaces must not be scored.

Torque Ball Inspection—Replace torque ball and retainers if bearing surfaces scored or pitted. Inspect oil seal and replace if worn (use seal which has been soaked in neatsfoot oil, press seal squarely into place until flush with torque ball flange and with feather edge of seal pointing into torque ball. Check universal rear yoke for excessive wear at point where seal bears.

Reassembly—Assemble locking pawl and lever, apply spring, and parking lock operating lever & rod using a dummy shaft for this purpose (dummy shaft can be made up of 7/16" round stock, 1½" long, with ⅛" chamfer on one end), place this assembly in position in bearing retainer and install operating shaft through retainer and lever. Install parking lock pawl shaft through bearing retainer and lock

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BUICK DYNAFLOW DRIVE (Cont.)

pawl with tapped end outward. Install valve operating cross-shaft and cross-shaft bearing with new rubber seal in bearing (grooved side inward). Connect parking lock operating rod to cross-shaft lever (use lockwasher on threaded rod end) but do not connect valve operating rod and lever to cross-shaft until rear bearing retainer being assembled to transmission case.

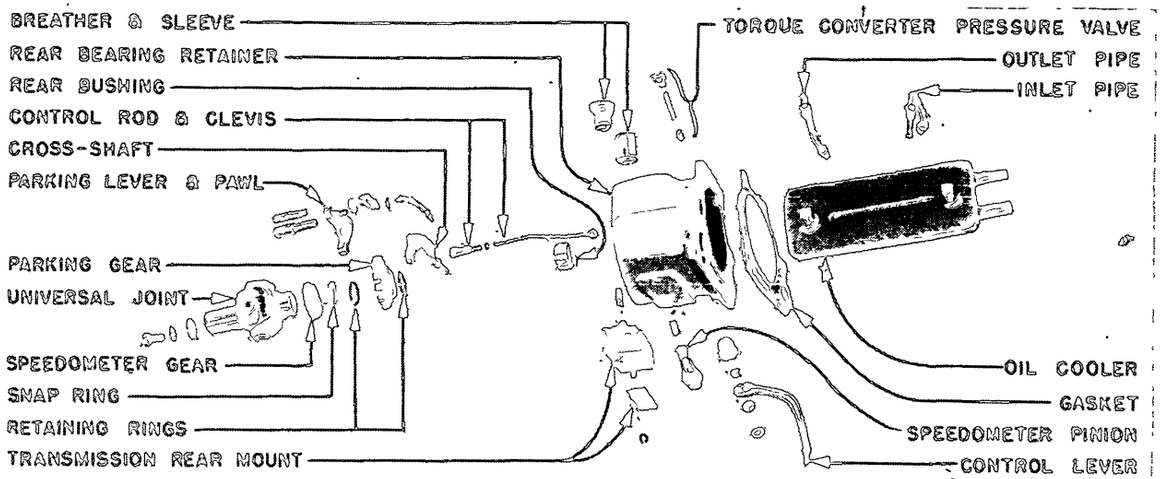
Planetary Gear Set: Disassembly. Remove reverse ring front thrustwasher (not used on later transmissions beginning with No. A-42475 & B-1—see Production Change Notes for interchangeability of first and later type reverse gears). Take out three planet carrier screws and special lockwashers (use 7/32" Allen wrench), separate front and rear halves of planet carrier (hold carrier by output shaft, tap down on flange on front end). Lift out sun gear rear thrustwasher and reverse sun gear. Remove all planet pinion assemblies (three long low pinions, three short reverse pinions) by tapping shaft out of front half of carrier using care not to lose steel ball imbedded in end of each shaft to prevent shaft rotating in carrier. Disassemble pinion assemblies by removing thrustwashers and shafts from pinions and then taking out bearing rollers (long pinions have two sets of rollers separated by spacer, short pinions have one set of rollers).

Inspection: Wash all parts in solvent and dry with air. Inspect planet pinion shaft and rollers, replace if worn. Inspect all gear teeth for wear, remove all nicks and burrs by stoning. Replace bushing in rear end of planet carrier if worn or scored (use Bushing Remover J-3197, Bushing Replacer J-2996—new bushing may be installed either end first and need not be reamed). Inspect reverse band anchor for cracks. If anchor is first two-piece type, rework transmission case and install later forged type anchor (see Production Change notes). Replace reverse band if cracked or the lining worn smooth.

Reassembly—Assemble each planet pinion with its bearing rollers, thrust washers, and shaft (24 rollers in each reverse pinion, 20 rollers at each end of low pinion and separated by a spacer). Make certain that thrustwasher installed at each end of each pinion (lower washer against retaining ring on shaft, upper washer on outer end of shaft). Install planet pinion assemblies in carrier making certain that steel ball imbedded in lower end of each shaft (necessary to prevent shafts turning). Install reverse sun gear with bronze thrustwasher on top of gear, align assembly marks on both planet carrier halves when installing upper half (numbers stamped on dividing line during production), make certain that special lockwasher used on each carrier screw, tighten screws evenly to 25-30 ft. lbs. torque. Install reverse ring gear thrustwasher (first transmissions only—see Production Change notes for gears on which thrustwasher must be used), install reverse ring gear.

Transmission Case (Cleaning & Inspection): Wash case and blow out all passages. Inspect for cracks, and stripped bolt threads. Check machined surfaces for nicks and burrs and clean these up with a mill file. Check bushing in case for wear by inserting planet carrier in bushing and checking clearance with a feeler gauge. Clearance should be .002-.004". Replace bushing if clearance excessive or if scored.

Bushing Replacement—To remove old bushing, support case with rear end down, drive bushing out with tool J-3175-1 (part of replacer set). To install new bushing, place pilot J-3175-2 (part of replacer set) in rear oil pump recess in case, slip bushing over J-3175-1 and drive bushing into case from front side until bushing is flush with front surface of case wall which supports the bushing. Bushing must be installed with wide deep ends of oil grooves toward rear of case.



REAR BEARING RETAINER ASSY.

Flywheel & Primary Pump Run-out and Bell Housing Alignment Check: *Make this check if front oil pump noisy, bushing and oil seal worn, or if oil leakage noted at Converter or Front Oil Pump Body.*

Flywheel Run-out—Remove all burrs from around drilled holes in face of flywheel, mount dial indicator on flywheel housing with strip of .005" shim stock between dial indicator and face of flywheel (clamp shim stock under a flywheel housing bolt so that it covers bolt holes and provides smooth surface for dial indicator pick-up. Turn flywheel holding end thrust in one direction. Run-out should not exceed .008". If excessive run-out cannot be corrected by tapping high side with mallet or by removing flywheel and cleaning up burrs at crankshaft flange mounting holes, install new flywheel and re-check run-out.

Primary Pump Hub Run-out—With converter primary pump and bell housing installed, mount dial indicator on bell housing so that it bears against primary pump hub. If run-out exceeds .012" when flywheel turned, mark flywheel and primary pump, remove and re-install pump at point 180° from first position. If pump run-out still exceeds .012", install new primary pump and recheck run-out. When position found where run-out is less than .012", mark flywheel and pump with paint and align these marks when transmission is finally re-installed.

Bell Housing Alignment—Mount dial indicator on oil pump driving lug on rear end of converter primary pump hub (CAUTION—do not clamp indicator on bearing surface) so that it bears against rear face of bell housing at 3¾" radius. Rotate flywheel holding end thrust in one direction. Run-out should not exceed .005". Mount dial indicator so as to bear against inner edge of pilot hole in bell housing and repeat test. Run-out should not exceed .004". Correct by installing paper shims of correct thickness between flywheel housing and engine crankcase (use shellac to hold shims in place).

REASSEMBLY

After overhaul of Major Components, make certain that all parts absolutely clean, oil moving parts with 10-W engine oil before installation, use ALL NEW GASKETS & SEALS. Tighten all parts evenly to specified torque and in correct sequence (see illustrations). Proceed in reverse order of disassembly directions and note all of following points:

Planetary Gear Set Installation: After reverse ring gear thrustwasher and reverse band installed in case (with Installing Clip J-2595 on band), rotate band 45° toward servo opening, insert anchor and engage hooked end of band, then rotate assembly back into position. Position band operating lever in place with strut shoulder toward inside of case, install anchor shaft with tapped end outward. If installation correctly made, adjustment screw will be centered in servo opening (lever has offset end). See that planet carrier front (steel) thrustwasher installed on carrier with three tangs engaging holes in carrier, install rear (bronze) thrustwasher in case with three tangs engaging holes in case, then install planet carrier. If correctly installed, chamfer on output shaft journal will be flush with rear end of transmission case bushing.

Rear Oil Pump & Lubrication Oil Pressure Regulator Valve Installation: Install rear gasket (gasket with LARGER hole—do not confuse with cover gasket) and plate on transmission case with bolt holes aligned, install drive key cushion and key in output shaft, then install driving gear to engage key (old gear should face in same direction as before, new gear with either face in). On first transmissions with

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BUICK DYNAFLOW DRIVE (C nt.)

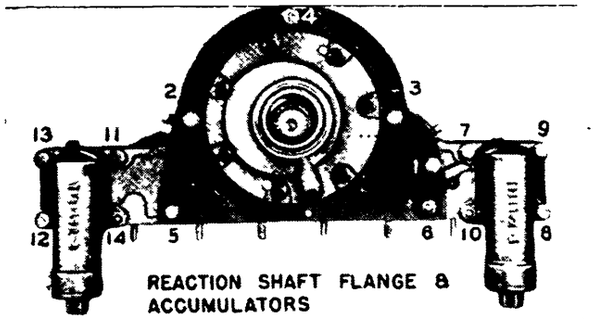
separate cover, use cover gasket (with SMALLER hole) under cover. Tighten attaching bolts to 5 ft. lbs. torque in following sequence: Top, Bottom, Right, Left; then retighten bolts to 25-30 ft.lbs. torque in same sequence. Check pump for free operation by rotating output shaft. Install lubrication oil check valve assembly in case.

►*CAUTION—On first transmissions with separate pump cover, cover must be centered on body to allow rear bearing retainer to be installed.*

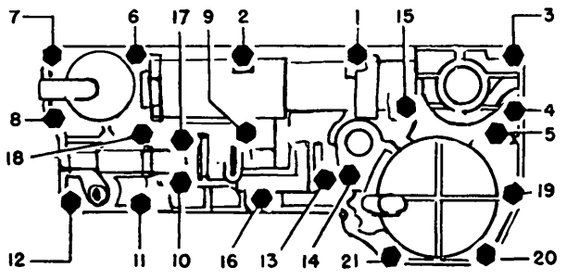
Parking Lock Ratchet Wheel & Rear Bearing Retainer: Make certain that retaining ring installed on each side of ratchet wheel on output shaft, insert valve operating rod through square hole in front face of bearing retainer and connect rod to cross-shaft lever, then install rear bearing retainer and gasket, tighten attaching bolts evenly to 35-40 ft.lbs.

Low Brake Band, Clutch, & Input Shaft Installation: Install low band operating lever and anchor lever with strut shoulders of levers toward inside of case and tapped ends of shaft outward (operating lever on side of case having large servo opening, anchor lever on opposite side). Install low band struts in ends of levers with notched ends together using two wooden blocks (1" x 2" x 3½") to support struts and band while assembling. Install low band with J-2595 band installing clip holding band compressed (CAUTION—used band must be installed in original position with point of heavier wear at anchor end, new band can be installed either way). With struts engaging ends of band (notches on struts must straddle pins on band), apply operating lever and remove clip. Place bronze reaction gear thrust-washer on sun gear, install clutch assembly (use wire hook to lift low band if clutch does not go down fully), place bronze thrustwasher on front face of clutch hub. Install input shaft (make certain that oil seal ring ends properly locked and that retaining ring installed in shaft groove). If shaft does not go down into place, make certain all four thrust-washers are properly centered.

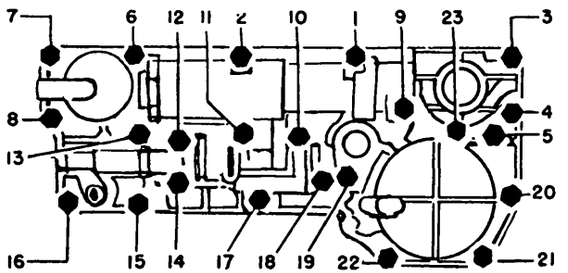
Reaction Shaft Flange, Front Oil Pump, & Accumulator Installation: Install special guide pin (see Guide Pin Note below) in accumulator bolt hole at each end of flange on transmission case. Install new gasket over guide pins so that **all holes in gasket and case aligned** (CAUTION—gasket can be installed incorrectly). Check oil seal rings on reaction shaft flange for correct installation with ends locked, install flange using care not to damage these seal rings. Install low accumulator (on same side as low band operating lever), and high accumulator (opposite side) making certain that **holes in gasket and flange match.** Coat accumulator bolt threads lightly with Permatex #3, install bolts and nuts with lockwashers but **do not tighten,** remove guide pins. Install three special bolts (⅜"-16 x 2") with plain washers in #2, 3, 4 positions (see Tightening Sequence illustration) for assembly purposes (these bolts removed after assembly completed), install regular pump cover bolts, nuts, and lockwashers at positions #1, 5, 6 (CAUTION—Coat #5 bolt threads with Permatex #3). Tighten all bolts and nuts (1-14) to 5 ft.lbs. torque in sequence shown in the illustration, then tighten #1 through #4 to 35-40 ft.lbs. and all remaining nuts and bolts to 20-25 ft.lbs. torque in the same sequence. Remove the three special bolts (#2, 3, 4). Tighten accumulator body caps to 40-50 ft.lbs. torque. Check flange gasket and trim lower edge flush with bottom face of transmission case if it projects.



REACTION SHAFT FLANGE & ACCUMULATORS



SECOND TYPE VALVE & SERVO BODY



THIRD TYPE VALVE & SERVO BODY

BOLT TIGHTENING SEQUENCES

►**Guide Pin Note**—These 5/16" guide pins can be made up from 5/16" round stock, 2½" long, with 5/16"-18 thread-½" long on one end and screwdriver slot on opposite end (chamfer this end slightly).

Valve & Servo Body Installation: With transmission inverted on bench, raise reverse band operating lever and insert strut between lever and end of band (CAUTION—rounded ends of strut must be against band and lever). After strut installed, **do not raise lever while installing valve and servo body** (will allow strut to fall into case). Install two 5/16" guide pins (same pins as used for reaction shaft flange—see above) in case to guide each end of servo body, install spacer plate gasket over guide pins. Install valve and servo body on case (hold anchor piston from falling out and move shift control valve and lower operating lever inward to align upper lever with opening in case). Engage control valve pin in slot in operating lever. Install correct length bolts and lockwashers in all mounting holes *using copper washer on #10 bolt on 3rd type body* (see Tightening Sequence illustration for **ach type** valve & servo body), remove guide pins. Install operating lever stop (used only with first type oil screen). Tighten all attaching bolts and nuts to 5 ft.lbs. torque in **correct sequence for particular type valve & servo body used** (see illustration), then fully tighten all ¼" bolts and nuts to 11-15 ft.lbs. and all 5/16" bolts to 15-20 ft.lbs. torque in same sequence (CAUTION—when tightening nuts and bolts adjacent to shift control valve, operate valve to make sure that it does not bind—if necessary, readjust bolts to lower torque limit to correct binding). On transmissions with second type oil screen, remove bolt #18 and stud nut #9, install cork gasket, oil suction pipe, retaining spring and spring support, tighten this #18 bolt and #9 nut to 11-15 ft. lbs. Connect valve operating rod to upper operating lever by reaching into case with Linkage Hook-up Finger J-2591 and pulling upward on rod to engage ball in socket. Install shift lever on cross-shaft temporarily to check and adjust linkage. Valve linkage must operate freely. Move lever toward front of transmission to engage parking lock. Pawl must fully engage ratchet wheel and pawl lock must be in full contact with pawl in this position. Push shift control valve away from stop pin until all play in linkage is just taken up, check clearance between end of valve and stop pin with feeler gauge. Clearance should be .030-.040" and spring travel at end of shift lever should be 1/8-3/16". Adjust by turning clevis on end of valve operating rod. After adjusting, make certain clevis locknut tightened and that clevis pin secured with cotter pin (first type—snap fastener used on later transmissions).

Oil Pan Installation: If first type oil screen used, check suction pipe fit in servo body (see below). Coat area on transmission case where case cut away under oil pan gasket thinly with Permatex #3. Install 5/16" guide pin at each end (same pins as used for reaction shaft flange—see note above), install new oil pan gasket over guide pins. Install oil pan (use heavy-duty internal tooth lockwashers on bolts and stud nuts), tighten all bolts and nuts evenly to 15-18 ft. lbs. torque.

Oil Screen Suction Pipe Check—*Required for first type oil screen only.* Install new sealing ring in servo body recess, coat upper edge of suction pipe with red lead, install oil pan with new gasket using two 5/16" guide pins (same pins used for reaction shaft flange installation—see above) in case to guide each end of pan. Install two oil pan bolts and two stud nuts, tighten securely. Remove pan and check pipe contact impression on sealing ring. Pipe must have full 100% contact to prevent air leaks at this point. Adjust by adjusting screen mounting brackets.

►*CAUTION—Do not change oil pip height setting (17/32" below top edge of pan flange) when making above adjustments.*

Universal Joint Installation: Make certain that joint retaining ring fully seated in groove in output shaft before installing universal joint. If universal cannot

CONTINUED ON NEXT PAGE

BUICK DYNAFLOW (C nt.)

be seated firmly against retaining ring by hand, use Replacer J-865 (40, 50), J-855 (70) to press universal on shaft. Tighten universal joint bolt to 30-35 ft.lbs.

►*CAUTION—Oil passage in bolt must be clear (for universal joint lubrication).*

Torque Ball Installation & Adjustment: *See "Torque Ball Adjustment" in Buick Special Data in Car Model Section for complete data and also note:*

Bell Housing & Torque Converter Assy. Installation:

►*CAUTION—Different converter clearance checking procedure required for transmissions beginning with Nos. F-341 & G-341 (requires reworked gauges and different shimming chart as listed below).*

►**Checking Tool Note**—Converter Clearance Gauges J-3045 (40, 50), J-2596 (70) as designed for early transmissions must be reworked for use on transmissions F-341 & G-341 and later (with redesigned primary pump and cover) by having a cut-out made at each end of the tool immediately inside the stepped ends so that the tool will clear the bulge on the inside of the cover adjacent to the mounting flange face.
Install parts (and check and adjust converter clearance) exactly as follows:

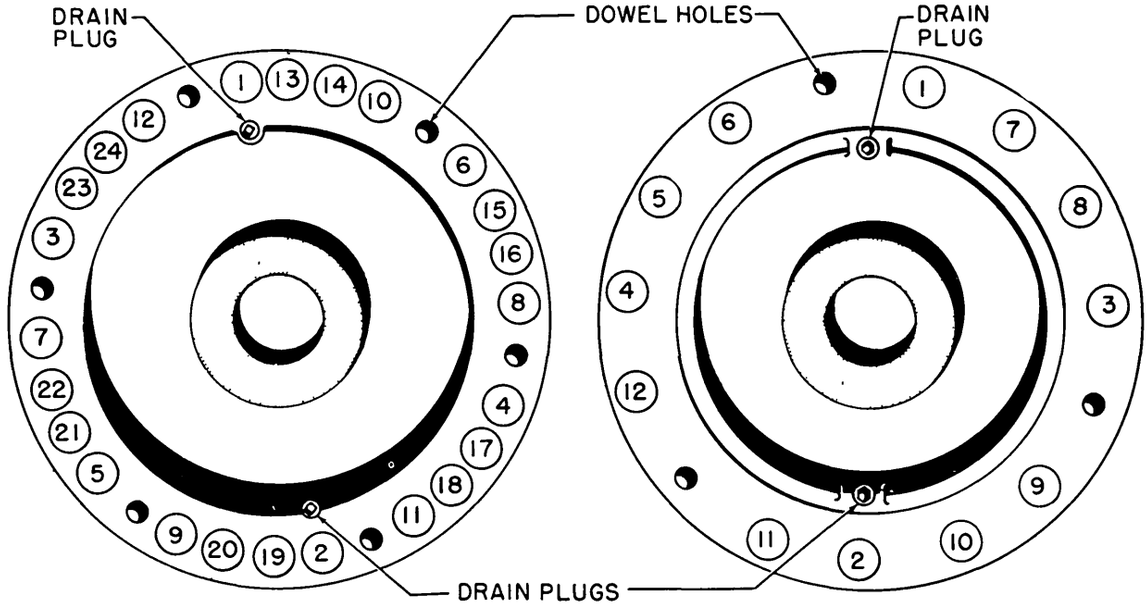
1) See that front oil pump seal ring installed around pump body on pump cover. Install bell housing (use lockwashers on bolts & stud) coating threads of lower right bolt lightly with Permatex #3 (this bolt hole opens into transmission), tighten all bolts evenly to 35-40 ft.lbs. torque.

2) Support primary pump cover firmly on blocks, install bearing plug of Converter Clearance Gauge (see Checking Tool Note above) in pump cover ball bearing, place gauge bar on cover with stepped ends resting on flat surface of cover flange between bolt holes but **do not exert pressure on bar,** carefully measure clearance between gauging step at center of bar and top of plug with a feeler gauge. Rotate gauge bar 90° around pump cover and repeat clearance check. **Averag** these two clearances and **make a record of this figure** for use in step (5) below.

3) Place stators and turbine in position in primary pump, place assembly on bench with turbine hub up. Place gauge bar on assembly with stepped ends resting on flat surface of pump flange between bolt holes, measure clearance between gauge step at center of bar and top edge of turbine hub, **make a record of this figure** for use in step (5) below.

4) Install primary and secondary pump assembly on transmission reaction shaft (rock pump to engage pump hub lugs with oil pump driving gear slots), install primary and secondary stator assembly on shaft, install retaining ring in shaft groove. Install converter turbine on input shaft.

5) **Add the two clearance figures** obtained in steps (2) and (3) above and note this "total clearance" in the **correct** Converter Clearance Shimming Chart below (CAUTION—different chart required for earlier and later transmissions as noted). Select the correct .018" Shim Washer and .060" Spacer combination as listed for this total clearance and use this in step (6) below.



BEFORE Nº F-341 & Nº G-341

AFTER Nº F-341 & Nº G-341

PRIMARY PUMP COVER

BOLT TIGHTENING SEQUENCES

CONVERTER CLEARANCE SHIMMING CHART

Series 40 & 50

Trans. before No. F-341① "Total Clearance"	Shims Req'd.③ .060"	.018"	Trans. beginning No. F-341② "Total Clearance"	Shims Req'd.③ .060"	.018"
.014" to .031"	0	1	.010" to .027"	0	0
.032" to .049"	0	2	.028" to .045"	0	1
.050" to .055"	0	3	.046" to .063"	0	2
.056" to .073"	1	0	.064" to 069"	0	3
.074" to .091"	1	1	.070" to .087"	1	0
.092" to .109"	1	2	.088" to .105"	1	1
.110" to .115"	1	3	.106" to .123"	1	2
.116" to .133"	2	0	.124" to .129"	1	3
			.130" to .147"	2	0

Series 70

Trans. before No. G-341① "Total Clearance"	Shims Req'd.③ .060"	.018"	Trans. beginning No. G-341② "Total Clearance"	Shims Req'd.③ .060"	.018"
.016" to .033"	0	1	.012" to .029"	0	0
.034" to .051"	0	2	.030" to .047"	0	1
.052" to .057"	0	3	.048" to .065"	0	2
.058" to .075"	1	0	.066" to .071"	0	3
.076" to .093"	1	1	.072" to .089"	1	0
.094" to .111"	1	2	.090" to .107"	1	1
.112" to .117"	1	3	.108" to .125"	1	2
.118" to .135"	2	0	.126" to .131"	1	3
			.132" to .149"	2	0

①—With FLAT type Pump Cover Gasket.
②—With "O" RING type Pump Cover Gasket.
③—.060" Spacer & .018" Washer.

6) Install the correct shim washer and spacer combination as selected in 5 (above) on the input shaft.

7) **On transmission before No. F-341 & G-341** (with FLAT type pump cover gasket), install primary pump cover with **new** gasket. Insert pump cover bolts beginning with the two holes directly in line with the drain plugs and **omit the bolt in every fifth hole** clockwise around the cover (see Tightening Sequence diagram). Install bolts from primary pump side with plain washers and safety nuts on cover side but do not tighten bolts until cover has been aligned.

On Transmissions beginning F-341 & G-341 (with "O" RING type pump cover gasket), install primary pump cover with **new** "O" sealing ring, making certain that ring has not been twisted. Insert bolts in following order: With drain plug which is between two bolt holes upward, insert first bolt in hole to right of drain plug, install bolts in clockwise direction around cover **omitting the bolt in every fifth hole** (see Tightening Sequence diagram). Install bolts from primary pump side with plain washers

CONTINUED ON NEXT PAGE

BUICK DYNAFLOW DRIVE (C nt.)

and safety nuts on cover side but do not tighten bolts until cover has been aligned.

►*CAUTION—All bolts must be same length and have bolt heads of same length. See Primary Pump Cover & Flywheel Bolt Production Change Note.*

8) After cover bolts have been installed, align cover by inserting shank of 11/32" drill through one bolt hole to align all bolt holes, then tighten all bolts to approximately 5 ft. lbs. in correct sequence (see Tightening Sequence diagram for each type pump and cover assembly) **using a wide screwdriver inserted between flat side of bolt head and primary pump to prevent bolt digging into pump,** finally tighten all bolts in same sequence to 30-35 ft. lbs. torque. Install converter drain plugs.

Band Adjustment: Adjust Low and Reverse Bands. *See Band Adjustment.*

Shift Lever Installation: Hold lever forward while tightening nut on cross-shaft to prevent damaging internal linkage.

Oil Cooler Installation: Install oil cooler on right side flange of transmission case, install oil pipes and tighten securely.

Transmission Breather Installation: Make certain that "U" shaped steel baffle is correctly installed in breather body (baffle legs should be aligned with centerline of transmission when breather installed), install breather with tube extending over right rear end of rear bearing retainer, tap breather firmly into opening in bearing retainer.

INSTALLATION IN CAR

After transmission and torque converter completely assembled, install unit in reverse order of removal procedure and note following important points:

Alignment of Parts—See that flywheel, converter primary pump, and converter cover positioned so that paint marks (as made for removal) will be aligned when transmission installed.

►*CAUTION—This alignment necessary to maintain converter assembly balance.*

Bell Housing Mounting Bolt Installation—Install the two bell housing dowel bolts first, then install remaining bolts and tighten evenly to 45-55 ft. lbs. torque tightening the lower right hand bolt last (CAUTION—tightening this bolt first may cause misalignment of the bell housing). Install lockwasher and nut on right hand bell housing dowel bolt from under the engine hood after the car has been lowered to the floor (oil pipe spring bracket is also retained by dowel bolt nut).

NOTE—Crankcase ventilator outlet pipe support is attached to lower right bolt. On cars where exhaust pipe hanger attached to lower left bolts, install and tighten regular bolt nuts, then use additional nuts to attach exhaust pipe hanger.

Transmission Support & Thrust Pad Installation & Adjustment—*See ENGINE MOUNTING in Buick Special Data.*

Converter Mounting Bolt Installation—Use correct type bolts and nuts (see Primary Pump Cover & Flywheel Bolt Change) and make certain that balance weights (if used) correctly located under bolt heads, use shank of 11/32" drill to align bolt holes in flywheel and converter, install bolts and tighten evenly to 25-30 ft.lbs. torque.

Final Road Test—After transmission installed and all adjustments made, road test car by driving approximately 20 miles with frequent starts and stops to duplicate heavy traffic conditions. After transmission thoroughly warmed up, check transmission and all oil lines and connections for leaks. If vibration noted due to unbalance of replacement parts, correct this condition as follows:

►**ENGINE & TRANSMISSION VIBRATION CORRECTION:** Remove bell housing cover and bell housing hand hole cover for access to converter primary pump-to-cover bolts, determine location and weight of necessary balance weights as follows:

1) Place car solidly on work stands for access to underneath of car.

2) Connect tachometer to engine. Start engine, place selector lever in Park "P" position, increase speed gradually until speed reached at which vibration is definite. Note this speed for later rechecking, then stop engine.

3) Install one .060" balance weight (see table below) under the head of one primary pump cover bolt and tighten bolt to 25-30 ft.lbs. torque. *CAUTION*—DO NOT place weight at flywheel-to-converter driving bolt since these bolts are not long enough to take the balance weight. Run engine at critical speed as noted in (2) above with selector lever in Parking "P" position and compare performance. Stop engine, remove balance weight, retighten bolt to 25-30 ft.lbs. torque.

4) Repeat entire procedure (3 above) with balance weight installed at other primary pump cover bolts equally spaced around cover and compare performance at critical speed for greater or lesser vibration.

5) At the location where the least vibration noted in above tests, install balance weights of correct thickness to eliminate objectionable vibration.

Part No.	Balance Weights	Thickness
1341420		.0345"
1341419		.060"
1341418		.120"

6) After balance weights finally installed and cover bolts tightened to correct 25-30 ft. lbs. torque, spot the center of hole in each weight with 5/32" drill, then use No. 32 (.116") drill to drill hole ⅜" deep in pump flange. Install drive screw (No. 145067—⅜" long or No. 450543—½" long depending on weight thickness) in this hole to permanently attach weight to pump flange.

►*IF VIBRATION CAN NOT BE ELIMINATED by above procedure, replace new part which caused the unbalance and repeat balancing procedure.*

Shift Rod Installation—Check and adjust linkage when installing shift rod. **See LINKAGE ADJUSTMENT.**

Filling Transmission—See LUBRICATION.

Road Testing Car—After installation completed, road test car by driving approximately 20 MPH. with frequent starts and stops (heavy traffic conditions) to thoroughly warm up transmission. Check transmission carefully for oil leaks, recheck oil level.

1953-54 BUICK "TWIN TURBINE" DYNAFLOW DRIVE

Buick, Series 40 & 50 (1953-54)—Optl.
Buick, Series 60 (1954)—Optl.
Buick Series 70 (1953-54)—Std.
Cadillac, Series 63, 60S, & 86 (1953)—Std.
Oldsmobile, All Series (1953)—Optl.

▷CHANGES, CAUTIONS, CORRECTIONS

▷*STARTING ENGINE BY PUSHING CAR:* Place shift control lever in Neutral "N" position until car reaches a speed of 15 MPH., then move control lever to Low "L" position and continue to increase speed until engine starts (at approximately 25 MPH.). After engine starts, return lever to "N" position for engine warm-up.

▷*DYNAFLOW INTERCHANGEABLE PARTS CAUTION (Between Buick Type and Cadillac, Oldsmobile Type)*—Dynaflow parts (Converter & Transmission) are the same for all cars EXCEPT AS NOTED BELOW:

Converter Pump Cover Assembly—Cadillac & Oldsmobile are the same, and are interchangeable. Buick Converter Front Cover has a higher hub and cannot be interchanged with Cadillac & Oldsmobile.

Converter Pump Cover Plug, Main Shaft Pilot Bearing Retainer Bolt, Retainer & Bearing—Buick parts are DIFFERENT and cannot be used on Cadillac & Oldsmobile. Cadillac & Oldsmobile parts can be interchanged between the two. NOTE—There is not a lockwasher under Main Shaft Pilot Bearing Retainer Bolt on Cadillac & Oldsmobile as in the Buick Assembly.

Twin Turbine Assembly—Twin Turbine Gears used on Buick & Oldsmobile are the same, and are NOT INTERCHANGEABLE with turbine gears used on Cadillac.

Bell Housing—Cadillac & Oldsmobile housings are the same, and are NOT INTERCHANGEABLE with housing used on Buick. Cadillac & Oldsmobile housing is about one-half the length of the Buick housing.

Transmission Case Oil Pan Assembly—Not interchangeable between cars due to differences in oil pan lower pipe.

Rear Bearing Retainer—Oldsmobile bearing retainer is same as used on Buick Series 50 & 70. Cadillac bearing retainer is different and is not interchangeable with Buick & Oldsmobile.

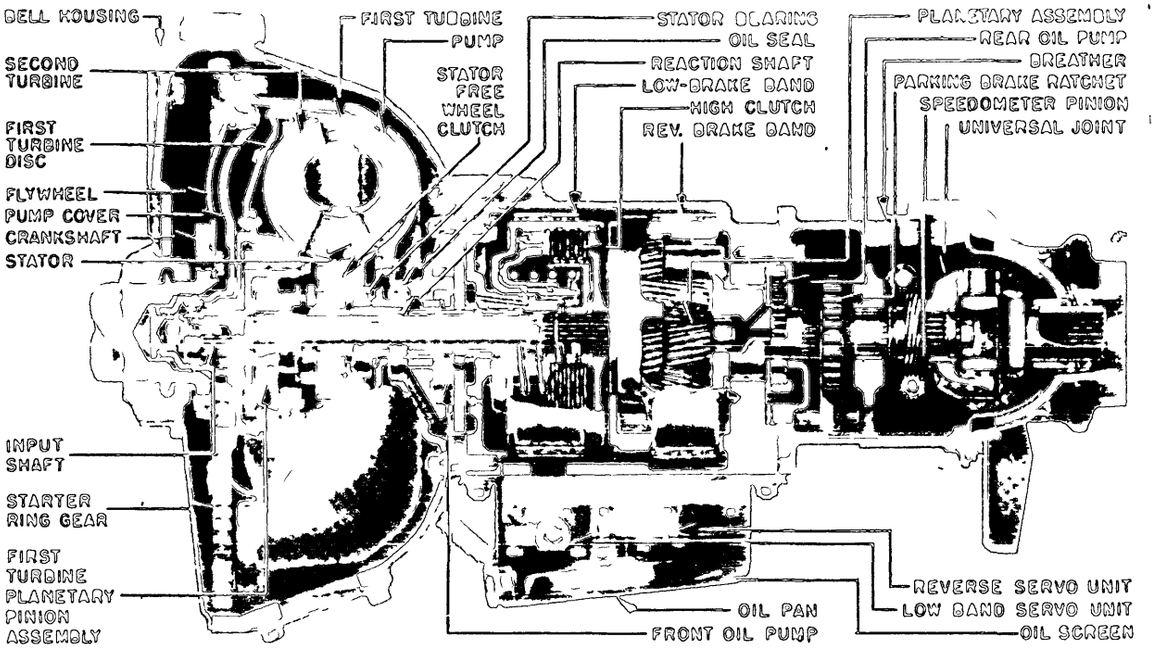
▷*CAUTION—Rear Bearing Retainer internal parts for all cars are different and are not interchangeable.*

DESCRIPTION

"Twin Turbine" Dynaflow Drive has a completely new Torque Converter unit used with a planetary gear transmission of same design as used with previous Dynaflow Drive Transmission (except for modifications on Buick Series 50 & 70 with V8 engine, and the adaption to Cadillac & Oldsmobile, as described below).

Torque Converter Description: Converters used on all models are identical except for the Stator (see Stator below). Converter consists of a Pump (similar to type used previously), First Turbine, Second Turbine, and Single Stator (replacing previous Primary and Secondary Stators and Secondary Pump).

First Turbine—Located directly forward of the converter pump and has narrow band of vanes which receive all oil flow from pump. This turbine is mounted on a disk and hub assembly bearing on the turbine carrier hub and is geared to the second turbine (internal gear of planetary gear set is mounted on the disk hub).



DYNAFLOW SECTIONAL VIEW

Second Turbine—Located within first turbine case with broad band of vanes which receive all oil flow from first turbine and directs the oil flow back into the stator. This turbine is bolted to a turbine carrier which is splined on the input shaft. The planet pinions of the turbine gears are mounted on carrier and mesh with the internal gear on the first turbine disk hub and with the sun gear which is mounted on a bearing on the input shaft and coupled to stator free-wheel cam (gears are always in mesh but operate only when sun gear and stator are held stationary for torque converter action). With the stator unlocked and free-wheeling (when torque converter operating as a fluid coupling, sun gear is likewise free to rotate which allows all units to rotate at nearly the same speed as the converter pump.

Stator—Located directly behind inner end of second turbine vanes. Receives oil from second turbine and redirects oil back into pump. Stator is mounted on reaction shaft by means of a free-wheeling unit similar to that used with previous stators. The free-wheeling cam is coupled to the sun gear of the turbine planetary gear set and controls the geared action of the first and second turbines (see Second Turbine above). Different stators used for each type engine as follows:

Buick, Series 40 Stator No. 1318718 with 12 broad vanes.

Buick, Series 50, 60, 70 Stator No. 1318759 with 20 narrow vanes.

OPERATION

OPERATION: Planetary unit and controls operate in exactly same manner as on previous Dynaflow Drive. New Torque Converter operates as follows: Torque Converter Operation—When the car is started up, the stator and turbine sun gear will be locked and held stationary. This results in First and Second turbine operation as a geared unit with a ratio of 1.6-1 (first turbine rotating faster). This provides a maximum torque multiplication of 2.54-1 under stall conditions. As the car speed increases, the torque reaction against the sun gear and the back pressure on the stator decreases and when this ceases, the stator free-wheels and the sun gear is released. With the sun gear free, the speed of the second turbine increases until both turbines and the stator are rotating at approximately converter pump speed. At this point the torque converter operates as a fluid coupling with a 1-1 torque ratio. The car speed at which this change occurs depends entirely on the torque requirements and is determined by the car operating conditions.

LUBRICATION

Check oil level at 1000 mile intervals and add oil as required. Drain and refill at 25,000 mile intervals.

▷*CAUTION—Oil must be warm and engine must be idling when checking oil level, warm up oil before draining.*

Checking Oil Level: With oil warm and engine idling with control lever in Parking "P" position, check oil level as indicated on dipstick in filler tube in engine compartment (on right side between battery and engine). If level more than 1" below FULL mark on rod, add recommended oil to bring level up to FULL

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

mark *(CAUTION*—do not fill above the FULL mark). Distance between ADD OIL and FULL marks on rod is equal to approximately 1 pint of oil.

►***CAUTION—If oil level is consistently low when checked (indicating loss of 1 pint or more per 1000 miles), check transmission thoroughly for oil leaks.***

Draining & Refilling: With oil warm, drain transmission case by removing drain plug in oil pan, drain torque converter, after removing bell housing cover for access to drain plugs, by loosening one plug and turning converter until second plug is downward and removing this plug. Re-install and tighten all drain plugs. Install 3 quarts of recommended oil through filler opening in case. Start engine and allow it to idle with control lever in Parking "P" position, add additional oil to bring level up to point 1¾" below "FULL" mark on oil gauge rod. Recheck oil level after transmission warmed up. Oil level should then be at full mark on rod.

►***CAUTION—DO NOT FLUSH transmission when changing oil.***

Capacity—10 qts. *NOTE*—1¾ pints additional required if transmission completely dry (after overhaul, etc.).

Recommended Oil—Use only "Special Buick Oil for Dynaflow Drive" or "Automatic Transmission Fluid, Type A" with AQ-ATF number embossed on can.

LINKAGE ADJUSTMENT

BUICK LINKAGE ADJUSTMENT: ***Make adjustments in order and exactly as follows:***

Manual Control Linkage: Transmission must be thoroughly warmed up (driven approximately 20 miles under traffic conditions with frequent starts and stops) and oil level must be correct. Then proceed as follows:

(1) Place shift control lever in Neutral "N" with detent plunger centered in detent notch, move lever until stop pin is against stop in dial housing, note movement of dial pointer. Repeat this operation in Low "L" position. Dial pointer movement should be approximately equal in both positions. If not, loosen control detent mounting bolts on steering column jacket, shift detent until dial pointer travel is equal. Place lever in Low "L" position, carefully bend dial pointer, if necessary, so pointer is in line with "L" on dial.

(2) Check parking mechanism by placing car on ramp or steep grade with control lever in Parking "P". Parking lock should hold securely. Place control lever in Neutral "N" and allow car to roll. If "clicking" ratchet noise heard, or if parking lock did not hold car on grade, adjust as follows: Place control lever in Parking "P" position, disconnect shift rod from shift idler lever on steering column, pull forward on rod and move car slightly to make certain locking pawl fully engaged (CAUTION—do not jerk on rod). Check movement at lower end of shift lever on left side of transmission case by pressing forward on lever (against spring tension) until definite stop is felt. This movement should be 1/8-3/16" beyond the parking "P" position. If spring travel not within these limits, control valve is out of adjustment (requires removal of torque ball). If spring travel correct, pull shift rod forward against stop, adjust shift rod clevis until clevis pin can just be entered in hole in idler lever with control detent engaged in Parking "P" position, then **lengthen rod by unscrewing clevis 3 full turns,** connect rod temporarily (may require readjustment in next step).

(3) Place shift control lever in Neutral "N" position with detent fully engaged. With transmission warm and engine idling at 600 RPM., move control lever from Neutral "N" to Drive "D" position slowly. Clutch should engage (noted by immediate decrease in engine speed) when tip of dial pointer is midway between "N" and "D" on speed ratio dial. Move control lever from Drive "D" to Neutral "N" position slowly. Clutch should disengage (noted by immediate increase in engine speed when tip of pointer is midway between "D" and "N" on dial. If clutch engagement and disengagement points not correct, readjust clevis on shift rod at shift lever (see (2) above), being careful not to disturb Parking adjustment. Do not connect shift rod permanently until adjustment (4) completed.

►***CAUTION—When making above adjustment, do not change shift rod length so much that parking lock fails to hold or pawl contacts ratchet wheel in Neutral (check as directed in (2) above).***

(4) Check operation in Low "L" and Reverse "R" positions. Detents should be engaged and shift points should occur when tip of dial pointer is midway between "D" & "L" (Low), midway between "L" & "R" (Reverse). If shifts do not occur at correct points, check for bent transmission shift lever, bent valve operating upper lever ,or lever loose or incorrectly seated on shaft.

(5) After above adjustments completed, tighten clevis nut on shift rod clevis and permanently install clevis pin with plain washer and spring washer on each side of clevis.

►***CAUTION—Neutral Safety Switch and Back-up Light Switch must be checked after changing control detent and shift rod adjustments.***

Throttle Linkage: Make sure accelerator pedal is in good condition and that floor mat is properly installed, then tighten pedal mounting screws. Check throttle linkage for proper lubrication, make sure pedal rod does not bind in its seal, and make sure that return spring is strong enough to fully close throttle valve. Adjust throttle stop screw for proper HOT idling speed of 450 RPM. With engine shut off and throttle closed to hot idling position check clearance between rear leg of accelerator lever (bell crank) and front face of stop lug on lever mounting bracket. Clearance should be .040 (3/64") to permit proper closing of throttle valves to hot idle position. Disconnect upper end of vertical throttle operating rod and adjust rod as required to obtain specified clearance. Make sure throttle is fully open with accelerator striking floor mat rather than having stop on throttle lever strike against boss on throttle body. Check linkage for smooth operation.

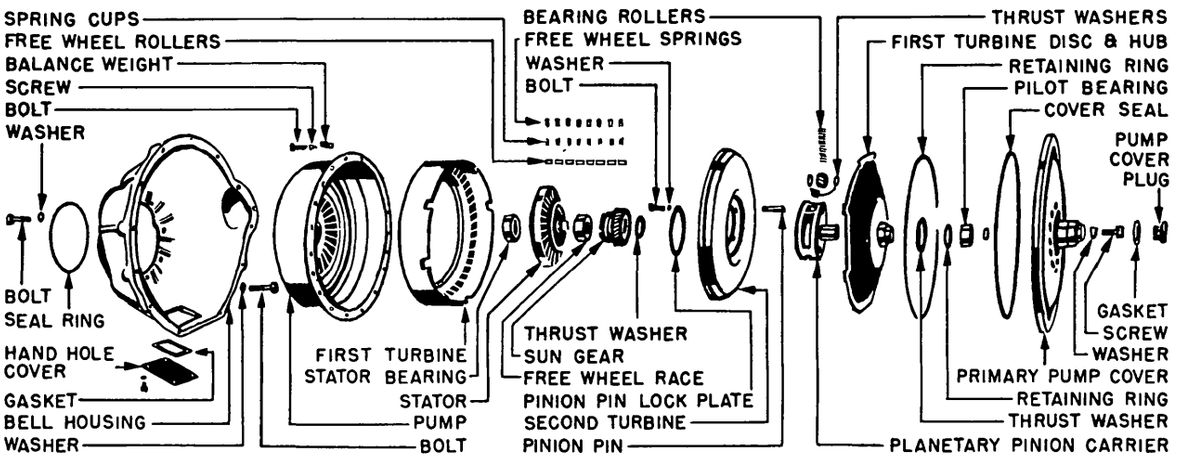
Dashpot Adjustment (1953): Adjust after the throttle linkage is adjusted and engine is at normal operating temperature. With throttle valve closed to hot idling position, back off dash pot until it is clear of lever and equalizer shaft, then adjust it down to touch lever. With transmission in Direct Drive and brakes firmly applied, speed engine up to about 1400 RPM and immediately release accelerator pedal. If engine stalls from too rapid closing of throttle, move dash pot down until its action prevents engine stalling, then lock it in position with the lock nut.

Dashpot Adjustment (1954): Adjust after the throttle linkage has been adjusted and engine is at normal operating temperature. Rotate fast idle cam to extreme cold idle position (choke closed), hold throttle lever closed against a .030" feeler gauge placed between stop screw and highest step of fast idle cam. Adjust dashpot until it just clears arm of throttle lever, tighten locknut. Final setting of dashpot should result in engine returning to idle promptly without engine stalling. If engine stalls when returning to idle, dashpot should be moved forward. Rearward movement will reduce time required to idle engine. Tighten locknut after each adjustment. If proper control cannot be obtained by adjustment. replace dashpot.

Starter Vacuum Switch: If operation not correct after carburetor linkage and dash pot adjustments made,

See Carburetor Equipment Section for complete data.

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DYNAFLOW TORQUE CONVERTER & BELL HOUSING (TYPICAL)

DYNAFLOW DRIVE (Cont.)

Neutral Safety Switch & Back-up Light Switch (1953 Series 40): Separate switches used. Both switches are mounted on lower end of steering column. Switch should be closed in neutral and should remain closed until lever moved toward Drive position enough to move outer end of control lever pointer 5/32" (if switch opens with less than ⅛" pointer travel, starter may not operate in Neutral; if more than 3/16" pointer travel required to open switch, starter may operate in Drive "D" position and cause starter to move car). Check and adjust switch as follows:

Checking Neutral Switch—Ground coil terminal on distributor so that engine can be cranked without starting. Firmly set parking brake. Place Dynaflow control lever in neutral "N" position (check to see that detent firmly engaged). Install Shift Control Linkage Adjustment Gauge J3085 on dial housing so that short line under "N" is centered on dial pointer. Move control lever to Driving "D" position, turn ignition on, depress accelerator pedal to close starter vacuum switch. Move control lever slowly from "D" toward "N", note position of center of dial pointer at instant starter begins to operate, release accelerator pedal. Center of dial pointer should be within limits of short line to right of "N" mark on gauge (provides required limits of 1/8-3/16" out of neutral). If not within these limits, adjust as directed below.

Adjust Neutral Switch—Place control lever so dial pointer centered on short line to right of "N" mark on gauge J3085 and hold the lever in this position while adjusting. Loosen the two mounting bolts on switch bracket at lower end of steering column, raise switch up as far as possible. With ignition switch turned on and accelerator pedal depressed, tap switch down until starter just begins to operate, then tighten switch mounting bolts, being careful not to change switch position. Recheck switch adjustment.

Back-up Light Switch (1953 Series 40)—Check and adjust after transmission control detent has been adjusted. Place control lever in Low "L" position, check clearance between switch operating arm and lower edge of control shaft lower lever. If this clearance not 0" to 1/16", loosen two switch mounting screws and shift switch on bracket (screw holes slotted).

Neutral Safety Switch & Backup Light Switch (1953 Series 50 & 70, and 1954-55 All Series): Located on steering column jacket under instrument panel.

▷*CAUTION: Switch must be wired correctly and control lever stop plate must be correctly positioned for correct switch operation as follows:*

Neutral Safety Switch Adjustment: With manual control linkage properly adjusted, ground primary terminal of distributor so that engine can be cranked without firing. Fully apply parking brake and place transmission control lever in "N" (Neutral) position. Place a narrow strip of masking tape on speed ratio dial so that upper end of dial pointer is visible. Make two marks on masking tape at ⅛" and 3/16" from center of pointer. Move control lever to "D" (Driving) position, turn ignition on and depress accelerator pedal to close accelerator vacuum switch. Slowly move dial pointer from "D" to "N" and note position of center of pointer at instant cranking motor just starts to operate. Release accelerator pedal. The center of the pointer should be between the two marks made on masking tape. If switch does not cut in within the specified limits, loosen switch mounting screws and move switch sideways as required for proper timing. Tighten mounting screws.

▷*BACKING SWITCH NOTE*—No separate adjustment required (switch operation will be correct when neutral safety switch properly adjusted).

Switch Wiring—Check wire connections on switch terminals for correct wiring (incorrect wiring may allow starter to crank with lever in other positions than Neutral or Park—may engage when shifting from Low to Drive during heavy pull), or backing lights may operate with shift lever in other than Reverse. Switch connections from Right to Left (viewed from driver's seat) should be:

No. 1 (Right)—Black wire (to Backing Lights).
No. 2—Brown wire (to #1 terminal on fuse block).
No. 3—Natural wire with Red Cross Tracer (to Ignition Switch).
No. 4 (Left)—Natural wire with Red Parallel Tracer (to starter switch on carburetor).

Control Lever Stop Plate Checking & Adjustment: Stop plate is mounted on column jacket directly below control shaft lower lever and engages a tongue on the lever to limit lever movement (lever must be raised against return spring pressure to free lever tongue from stop plate slot for shift into Reverse, Neutral, Parking). Two clearance checks are required as follows: .010-.020" clearance between tongue on lever and nearest edge of large hole in stop plate with control lever in "Drive" position, .120-.130" (⅛") between lower face of lower lever and upper face of stop plate with control lever in "Drive" position. Adjust by loosening stop plate clamp bolt and shifting the plate as required for above clearances. *Make certain that lower lever does not ride over the top of the stop (switch lever will then act as the stop and will be damaged or broken. REPLACE STOP PLATE IF CORRECT ADJUSTMENT CANNOT BE SECURED.*

▷*CAUTION—Excessive bending of the stop plate or lever tongue may cause breakage of these parts.*

CADILLAC LINKAGE ADJUSTMENT: *Make adjustments in order and exactly as follows:*

Manual Control Linkage: (1) Place selector lever in "Park" (P) position. Disconnect manual rod at shift lever.

(2) Shift lever on transmission should be in the "Park" position. Make sure that parking pawl is completely engaged in ratchet wheel (this can be done by raising rear of car and rotating propeller shaft by hand until a definite "click" can be heard as the pawl is engaged).

(3) Loosen mounting screw on detent roller bracket and position bracket so that the roller is in parking notch on quadrant. From this position it should be possible to move shift lever forward 1/8" to 3/16" as measured at clevis pin hole. Hole in manual rod trunnion should line up with hole in shift lever. If not, adjust trunnion on the manual rod to assure correct alignment. Connect manual rod to shift lever.

(4) Place selector lever in "Reverse" (R) position and note position of roller on detent quadrant. Roller should be in reverse notch of quadrant.

Throttle Return Check Adjustment (Carter & Rochester): Check alignment of throttle return check adjusting screw with contact on secondary throttle lever. If necessary, bend the return check bracket to center adjusting screw on radius of the contact lever. Place selector lever in "Drive" (Dr.) or "Low" (L) range and apply hand and foot brakes to prevent car movement. With throttle valves in hot idle position, adjust throttle return check by turning adjusting screw until ⅛" (Rochester Carburetor); .047" (Carter Carburetor) is obtained between throttle lever and plunger when plunger diaphragm is fully compressed. *(CAUTION—To prevent diaphragm damage, hold flats on screw shaft with 5/16" wrench while adjusting screw is being turned).* Open throttle half way (DO NOT STALL TEST), then quickly release accelerator pedal. If engine does not stall, the adjustment is correct.

Neutral Safety & Back-up Light Switch: *Switches are combined, and mounted on steering column directly below floor.*

Adjustment—Adjust switch by loosening mounting bolt and rotating switch in bracket so that engine will start when shift lever is in "Park" (P), and "Neutral" (N) positions only, and the Back-up Lights operate only in "Reverse" (R) position.

▷Backing Switch Note—No separate adjustment required (switch operation will be correct when neutral safety switch properly adjusted).

OLDSMOBILE MANUAL LINKAGE ADJUSTMENT:

(1) Place selector lever in "Park" (P) position. Disconnect relay rod clevis from relay bell crank. Place adjusting tool J-5615 on relay bell crank, then adjust shift rod clevis until tool just touches rear face of engine mount. Install clevis pin and wave washer in shift rod clevis, then tighten jam nut.

▷*CAUTION—Shift rod and relay rod clevis pin heads must face each other.*

(2) Hold transmission shift lever forward and rotate propeller shaft until parking pawl engages (It will be possible to pull the lever forward ⅛" to 3/16" beyond this point which winds up a spring on parking pawl).

(3) With a light tension forward on relay rod, so that parking pawl spring is not wound up, adjust the rod length to obtain a free fit. Then shorten relay rod clevis 1½ turns.

(4) Finally check, with wheels moving, hold shift lever firmly against Neutral stop and listen for ratchet noise. If noise exists, lengthen clevis by ½ turn.

Stop Plate Adjustment—Stop plate is located on lower end of mast jacket in a position to engage a lug on shifter tube lower lever. With selector lever in Reverse, Neutral ,or Parking positions, lug on shifter lever must be flush with bottom surface of stop plate. Stop plate can be adjusted after loosening the clamp bolt.

Throttle Return Check: With throttle valve in hot idle position, adjust throttle return check by turning adjusting screw until 1/16" clearance between throttle lever and plunger when plunger diaphram is fully compressed.

Neutral Safety & Back-up Light Switch: If Back-up Lights used, Back-up Light Switch is combined with Neutral Safety Switch.

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DYNAFLOW DRIVE (C nt.)

Adjustment—Place selector lever in "Drive" (Dr) position Hold ignition key in start position and then slowly move selector lever toward "Neutral" until starter operates With selector held in this position, engine should be free to rev-up without producing drive through transmission If car moves, adjust switch as follows Place selector lever in "Neutral" (N) position Loosen switch mounting bolt and move switch until 3/32" drill shank inserted in lever hole indexes with hole in switch bracket Tighten mounting bolt and recheck switch operation as outlined above.

BAND ADJUSTMENT

►*BAND ADJUSTMENT CAUTION—Bands cannot be adjusted with transmission in car and adjustment ordinarily required only when transmission overhauled. BANDS MUST BE CORRECTLY ADJUSTED BEFORE TRANSMISSION INSTALLED IN CAR.*

LOW & REVERSE BAND ADJUSTMENT: Both bands are adjusted alike as follows

(1) Remove band adjusting covers and gaskets from upper right (Low), and left (Reverse) of transmission case

(2) Loosen locknut and turn adjusting screw clockwise until considerable resistance felt indicating that band in full contact with drum or ring gear

(3) Back off screw until trace of endplay noted when prying up on locknut with screwdriver, **then back off screw additional six turns,** hold screw from turning and tighten locknut snug

(4) Note position of adjusting screw slot, use torque wrench to tighten locknut to 20-25 ft lbs, check screw slot to make certain that screw position not changed

(5) Install band adjusting cover **using new gasket.**

TESTING

If performance not satisfactory, make following tests **with transmission thoroughly warmed up and at operating temperature:**

Oil Level: Check oil level, add fluid as necessary to bring level up to FULL mark on dipstick, recheck performance with correct oil level If car has been losing oil at rate of 1 pint or more each 1000 miles, make thorough check for oil leaks

Manual Control Linkage Check and adjust manual control linkage See Linkage Adjustment.

Hydraulic Control System Pressures: Use Transmission Oil Pressure Gauge J-2575 Support rear end of car solidly with wheels off floor so that transmission can be operated Remove transmission cover in floor pan for access to pressure take-off points

Connect gauge and make tests as follows:

Front Oil Pump—Connect pressure gauge at pipe plug opening on left side of reaction shaft flange Run engine at 500 RPM, check pressure with selector lever in **Low, Drive, and Reverse range.** Repeat tests at 1000 RPM and at 1800 RPM in **Low and**

Drive Range only See table below for correct pressures Low or erratic pump pressure indicates air leaks in suction line, improper pressure regulator valve action ,or excessive pump clearances

1953 Buick Front Oil Pump Pressures

Selector Lever—	Low	Drive	Reverse
500 RPM	100 lbs	90 lbs	100 lbs
1000 RPM	160 lbs	90 lbs	
1800 RPM	180 lbs	90 lbs	

1954 Buick Front Oil Pump Pressures

Selector Lever—	Low	Drive	Reverse
500 RPM	120 lbs	90 lbs	100 lbs
1000 RPM	180 lbs.	90 lbs	
1800 RPM	180 lbs	90 lbs.	

Cadillac Front Oil Pump Pressures

Selector Lever—	Low	Drive	Reverse
500 RPM	110 lbs	100 lbs	110 lbs
1000 RPM	180 lbs	100 lbs	
1800 RPM	200 lbs	100 lbs	

Oldsmobile Front Oil Pump Pressure

Selector Lever—	Low	Drive	Reverse
500 RPM	110 lbs	100 lbs	110 lbs
1000 RPM	175 lbs	100 lbs	
1800 RPM	200 lbs	100 lbs	

Rear Oil Pump—Connect pressure gauge at pipe plug opening in lower flange at front end of rear bearing retainer Run engine at 500 RPM, check pressure with selector lever in **Low & Drive Range.** Repeat test 1000 RPM and 1800 RPM See table below for correct pressures Low or erattic pump pressures indicate air leaks in suction line (this will affect both pumps), improper pressure regulator valve action, excessive pump clearances or leaks in valve and servo body passages between pump and regulator valve.

1953 Buick Rear Oil Pump Pressures

Selector Lever—	Low	Drive
500 RPM	75 lbs.	90 lbs
1000 RPM	125 lbs	90 lbs.
1800 RPM	175 lbs	90 lbs.

1954 Buick Rear Oil Pump Pressures

Selector Lever—	Low	Drive
500 RPM	90 lbs	90 lbs
1000 RPM	180 lbs	90 lbs.
1800 RPM	180 lbs	90 lbs

Cadillac Rear Oil Pump Pressures

Selector Lever—	Low	Drive
500 RPM	85 lbs	100 lbs
1000 RPM	140 lbs	100 lbs
1800 RPM	190 lbs	100 lbs

Oldsmobile Rear Oil Pump Pressures

Selector Lever—	Low	Drive
500 RPM	80 lbs	100 lbs
1000 RPM	135 lbs	100 lbs.
1800 RPM	190 lbs	100 lbs

High & Low Accumulator—Connect pressure gauge at pipe plug opening on top of accumulator body (**High**—left side of car); (**Low**—right side of car). Place selector lever in **Drive Range** (High Accumulator Test); **Low Range** (Low Accumulator Test). Run engine and check pressures at speeds indicated in tables below. Low accumulator pressure may be caused by leakage past accumulator body gasket If accumulator pressure more than 10 lbs lower than front pump pressure, check for leakage between accumulator and multiple disc clutch and for restricted or plugged metering orifice in accumulator dump valve

1953 Buick Accumulator Pressures

Selector Lever—	Low	Drive
500 RPM	90 lbs	80 lbs
1000 RPM	150 lbs	85 lbs
1800 RPM	170 lbs	85 lbs.

1954 Buick Accumulator Pressures

Selector Lever—	Low	Driv
500 RPM	115 lbs	80 lbs
1000 RPM	175 lbs	85 lbs
1800 RPM	175 lbs	85 lbs

Cadillac Accumulator Pressures

Selector Lever—	Low	Drive
500 RPM	100 lbs	90 lbs.
1000 RPM	165 lbs.	95 lbs.
1800 RPM	185 lbs	95 lbs

Oldsmobile Accumulator Pressures

Selector Lever—	Low	Drive
500 RPM	100 lbs	85 lbs.
1000 RPM	165 lbs	90 lbs.
1800 RPM	185 lbs	90 lbs.

TROUBLE SHOOTING

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With selector in any Range (rear wheels free). If car will not move for 1-8 minutes after standing over night—Check front pump oil pressure (see Testing) after allowing car to stand for several hours If zero pressure noted, check pump for excessive clearances allowing pump to lose its prime Check alignment of bell housing and converter primary pump hub.

►*CAUTION—If this condition found, inspect Clutch and Bands for excessive wear due to slippage caused by low oil pressure.*

If car will not move after extended operation in Reverse—Check for air leaks in pump suction line (at rear oil pump gaskets), or excessive clearance in front pump (at pump gears and covers). Check alignment of bell housing and converter primary pump hub

2) With selector in any Range (rear wheels locked). Parking lock engaged Broken parts in transmission or rear axle Parking brake applied

3) With selector in Drive Range. Check front oil pump pressure and High Accumulator pressure If OK, check for sticking Low Band Anchor Piston, remove and inspect Clutch for worn or sticking clutch plates, leaking clutch seal rings If High Accumulator pressure low, also check rear pump Check Valve for correct installation and proper seating, check for leaks at accumulator body gasket, reaction flange gasket, clutch piston outer seal and clutch ball check valve, and leaks at sealing rings on reaction shaft flange and low drum

4) With selector in Reverse Range. Check reverse band for displaced operating strut caused by too loose adjustment, improper installation, or broken band anchor (indicated by free up and down movement of band operating lever) If band assembly OK (no free movement of lever), check servo operation by running engine and shifting into Reverse Remove Valve & Servo Body and check for reverse servo piston seal leaks

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DYNAFLOW DRIVE (Cont.)

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, or poor acceleration).

1) In all Speed Ranges. Low oil level. Incorrect manual control linkage adjustment. Air leak in oil pump suction pipe at oil screen sealing ring. Low front oil pump pressure caused by wear or excessive clearances in pump. Leaks at front pump cover or reaction shaft flange, pressure regulator valve, Valve & Servo Body gasket. Pressure regulator valve defective.

2) In Drive Range. Incorrect manual control linkage adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, check for leaking clutch sealing rings, sticking clutch piston, worn or sticking clutch plates.

3) In Low Range. Incorrect manual control linkage adjustment. Incorrect low band adjustment. Low band and drum worn or scored. If Low Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, remove Valve & Servo Body and check for gasket leaks or leaks at low servo piston seal.

4) In Reverse Range. Incorrect manual control linkage adjustment. Reverse band out of adjustment, strut out of place, or anchor broken. If front oil pump pressure low, remove Valve & Servo Body and check for gasket leaks and leaking reverse servo piston seal.

CAR CREEPS (Forward or Backward).

1) Creeps forward with selector in Neutral. Incorrect manual control linkage adjustment. Sticking low servo piston (check by removing low band adjustment cover). Sticking clutch caused by warped, binding, or incorrectly assembled clutch plates (not stacked properly with "dish" in same direction).

If Car Creeps only when engine accelerated to 2500 RPM—Check clutch vent ball checks in clutch piston and reaction shaft flange.

2) Creeps forward with selector in Reverse or backward with selector in Low. Incorrect manual control linkage adjustment.

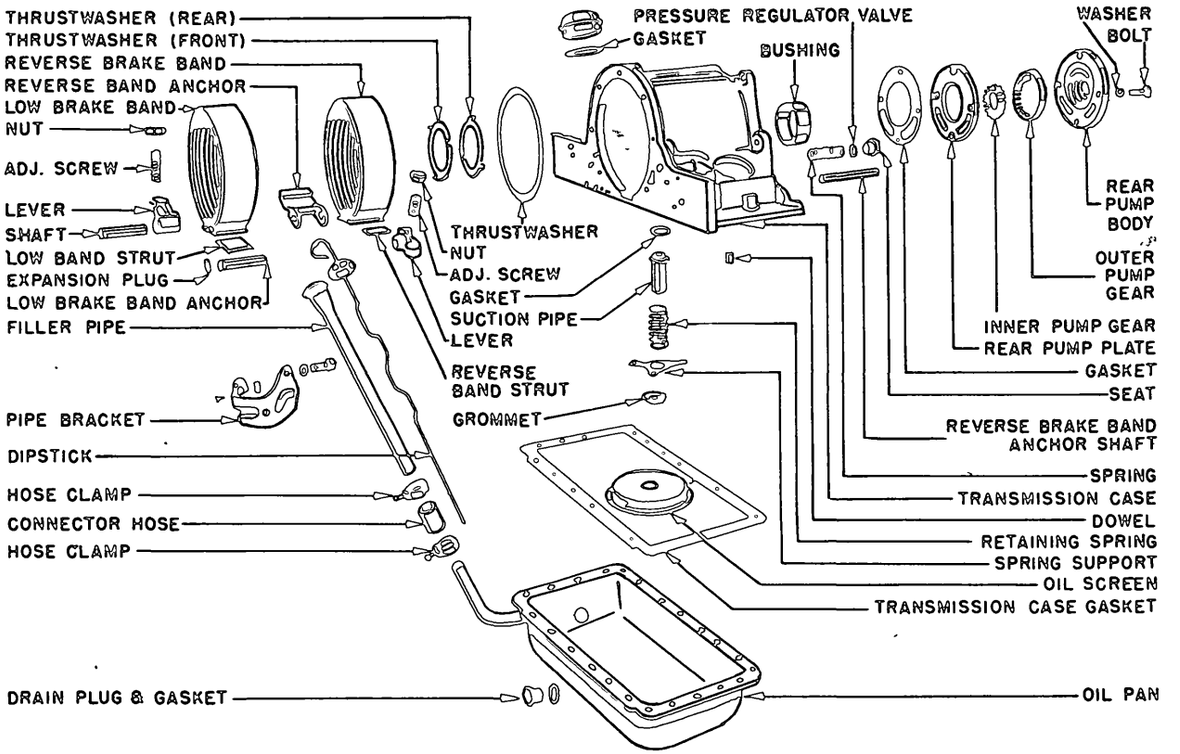
SHIFTS ARE ROUGH.

1) Low-to-Drive Shift. Incorrect Low Band adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket and for dump valve or accumulator piston sticking down (top land of piston should be visible through top port in body). Sticking low band anchor piston (remove Valve & Servo Body to check), or incorrect piston location (see piston shimming data in Valve & Servo Body Reassembly). Valve & Servo Body gasket leaks. Clutch plates worn or binding.

EXCESSIVE CHATTER OR CLUNK WHEN STARTING

▷*CAUTION—Slight "clunk" when shifting into Low or Reverse is normal, and slight chatter when car starting to move in reverse (disappearing as soon as car in motion) is also normal.*

1) In Low & Reverse Range. Incorrect Low or Reverse Band adjustment. Engine and transmission mountings loose or incorrectly adjusted, thrust pad at transmission mounting broken (see Engine Mountings in Buick Special Data). Clutch plates warped, sticking, or incorrectly assembled (not stacked properly with "dish" in same direction). Reverse ring gear bushing worn. Planet pinion needle bearing rough.



DYNAFLOW TRANSMISSION CASE, OIL PUMP, & SERVO BAND ASSYS.

NOISE IN TRANSMISSION.

▷*CAUTION—Hum or low whine in Neutral or Parking is normal (due to free rotation of all planetary gears) and slight hum in Low and Reverse may be expected.*

1) Buzzing Noise. Low oil level. Front pump check valve hanging up on edge of gasket between valve and servo bodies. If noise noticed in Parking or Neutral, pressure regulator valve clearance in body may be excessive or orifice in valve land oversize (correct by replacing valve and body).

2) Clicking Noise. If noticed in all ranges, may be caused by foreign material in converter. If noticed only when car in motion, may be caused by parking lock pawl contacting ratchet wheel due to incorrect manual control linkage adjustment.

3) Abnormal Hum or Whine (see Caution above). If noted in all ranges, may be caused by worn parts or excessive front pump clearances (front pump noise will increase in Low and decrease at car speeds above 45 MPH. in Direct Drive). Check front pump for excessive clearances by testing for low pump pressure. If noise noted in all ranges except Direct Drive, may be caused by trouble in planetary gears (gears locked out in Direct Drive).

4) Squealing or Screeching following installation of Front Oil Pump. Pump driving gear installed backward.

▷*CAUTION—Above condition must be corrected WITHOUT FURTHER OPERATION OF TRANSMISSION or severe damage will result.*

REMOVAL FROM CAR
BUICK

Transmission and torque converter are removed as an assembly as follows:

1) Raise car so that frame side rail is at least 20" off floor and place stands at front and rear to support car.

2) Disconnect torque tube from torque ball and move rear axle back to disengage propeller shaft from universal joint. Remove cranking motor splash pan, bell housing cover and bell housing hand hole cover.

3) Drain converter and transmission. Mark position of converter on flywheel to assure installation in same position and remove bolts attaching converter to flywheel. Disconnect pipes from oil cooler and disconnect cooler from transmission from rear mounting thrust plate. Remove cooler. Disconnect oil filler pipe at rubber hose and disconnect exhaust pipe hanger at right accumulator. Disconnect shift rod and speedometer cable at transmission.

4) Support transmission with a jack or hoist and remove four bolts attaching thrust plate to rear bearing retainer, then remove two nuts and plate which attach mounting pad to transmission support.

5) Raise engine and transmission just enough to relieve load on transmission support. Remove bolts attaching both ends of support to frame, then re-

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DYNAFLOW DRIVE (C nt.)

move support and thrust plate as an assembly. *CAUTION*—If shims are found at this point, note their number and location so they can be reinstalled in the same position.

6) Support engine at rear end of lower crankcase so it will be supported while transmission is removed. ***CAUTION—Do not use bar with hooks placed over frame side rail. Brake lines will be damaged.***

7) On cars with air-conditioning, disconnect discharge and suction lines at compressor. This will avoid damaging flexible couplings when engine is raised and lowered.

8) Lower the transmission just enough so that bell housing bolts can be reached, then remove bell housing to crankcase bolts. Move transmission rearward to disengage hub of converter pump from crankshaft, lower transmission and remove it from beneath car.

CADILLAC

Transmission and Torque Converter are removed as a unit as follows:

1) Place car on stands with all four wheels approximately 12" above floor. Disconnect propeller shaft at rear universal joint flange and remove shaft with front universal and yoke.

2) Disconnect battery and remove starter motor from lower flywheel housing. Remove lower flywheel housing cover and upper portion of oil filler pipe with dipstick at rubber connector.

3) Turn flywheel until one converter drain plug can be loosened sufficiently to provide air vent. Then turn flywheel until opposite drain plug is straight down. Remove this plug and allow oil to drain from converter. Remove plug from oil pan and drain oil from transmission.

4) Drain radiator and remove two hoses from oil cooler. Disconnect transmission manual shift rod and speedometer cable.

5) Place jack under engine at rear of oil pan using a wood block to prevent damage to oil pan, or use special engine support stand (J-3068). Place Hydra-Lift under car and raise transmission just enough to take strain off rear engine support.

6) Disconnect engine rear support at transmission rear bearing retainer. Remove bracket cross member that carries support.

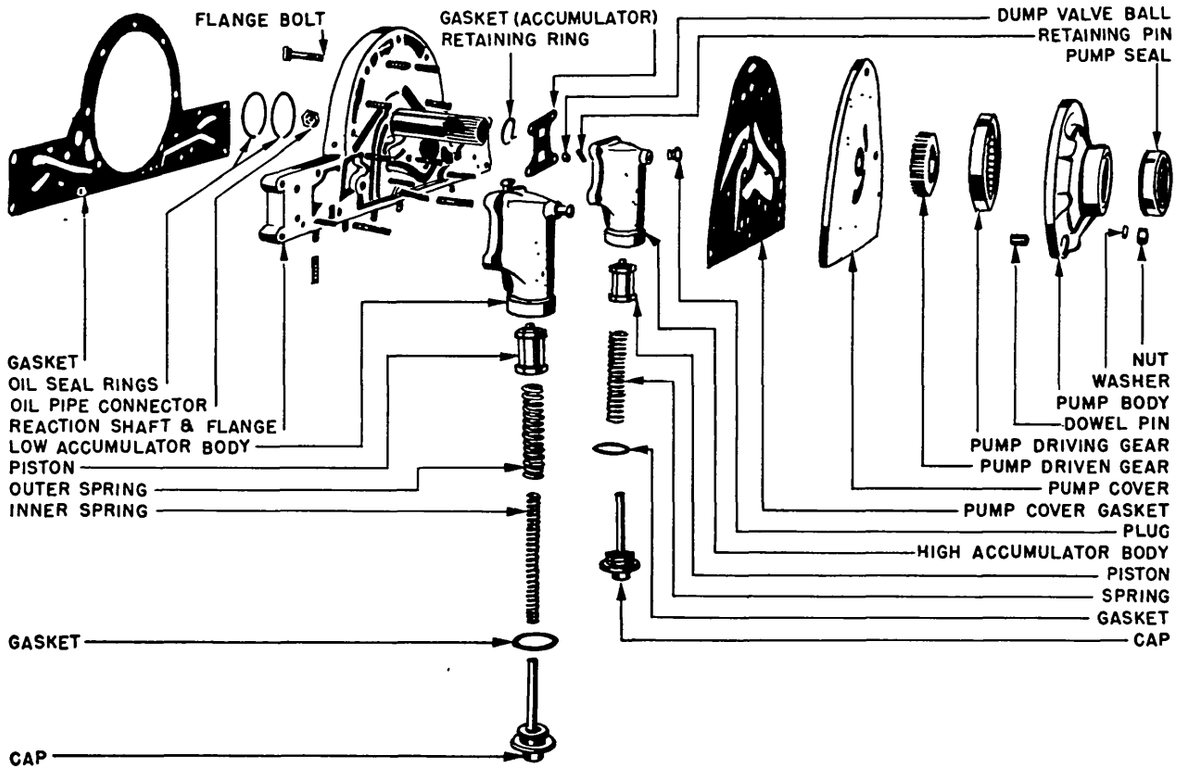
7) Mark flywheel, converter primary pump, and cover, with daubs of paint so pump can be reinstalled in same position on flywheel. Disconnect converter from flywheel by removing three attaching screws.

8) Lower jack or engine support stand (J-3068), under engine pan until top of bell housing clears floor pan. Remove screws holding bell housing to engine crankcase. Remove transmission and bell housing as a unit by moving assembly back toward rear of car, and at same time lowering assembly to floor.

OLDSMOBILE

Transmission and Torque Converter are removed as a unit as follows:

1) Disconnect positive battery cable from battery, then hoist car. Remove engine filler plates and disconnect battery cable and lead wires from starting motor. Remove lower flywheel housing and starting motor.



DYNAFLOW REACTION SHAFT FLANGE, ACCUMULATORS, & FRONT OIL PUMP ASSY.

2) Turn flywheel until one converter plug can be loosened to provide air vent, then turn flywheel until opposite plug is straight down. Remove this plug and drain oil from converter. Remove plug from oil pan and drain oil from transmission.

3) Remove right hand exhaust pipe and loosen hose clamp on oil filler tube, then push tube up out of the way. Place drain pan under extension housing and remove propeller shaft.

4) Place a drain pan under oil cooler and disconnect external lines from cooler, then remove two cooler attaching nuts at rear bearing retainer and permit oil to drain from cooler. Place cooler to left side of frame with hoses attached.

5) Disconnect speedometer cable and remove relay rod from relay bell crank and shift lever, at side of transmission. Remove frame cross member.

6) Mark flywheel, converter pump and cover with daubs of paint so they can be reinstalled in the same position. Remove three flywheel to converter attaching bolts.

7) Support transmission with Hydro-Lift and Dynaflow adapter. Remove left rear engine mount and disconnect the right rear mount at frame support.

Lower transmission ½", then install engine support bar.

8) Remove six bell housing-to-cylinder block attaching bolts, then place adapter chain over top of transmission and secure.

9) Pull transmission assembly back until converter pump is against flywheel housing and turn flywheel until converter cover hub will clear flywheel-to-crankshaft bolts, then lower transmission assembly.

DISASSEMBLY

►**DISASSEMBLY CAUTION:** ***CLEANLINESS IS EXTREMELY IMPORTANT when disassembling and working on transmission. Thoroughly clean exterior before disassembling, use CLEAN tools on CLEAN workbench, provide CLEAN storage space for all parts, and separate parts to avoid nicking or burring of ground and polished surfaces.***

DISASSEMBLY OF TRANSMISSION (into Major Components): With transmission on bench, first remove shift lever by taking off retaining nut and washer on shaft while holding lever forward (to avoid strain on linkage), remove oil cooler and pipes if this unit removed with transmission, remove both band adjusting covers and gaskets using Remover Tool J-2655. Remove both pipe plugs in primary cover to completely drain converter, then place transmission on bench with oil pan upward and remove various sub-assemblies as follows:

Converter & Bell Housing Removal: (1) Remove large hex plug and gasket from hub of converter pump cover, then remove the socket head set screw and lockwasher located in hub, using a hex wrench 5/16" across flats).

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DYNAFLOW DRIVE (Cont.)

2) Remove all nuts, plain washers, and bolts attaching cover to converter pump. Insert a punch through bell housing hand hole and into a drive bolt hole to hold pump from turning.

3) Remove cover from pump, tapping or prying against edge to loosen it. Check seal for damage or evidence of oil leakage before removing cover.

4) Insert a screw driver into a hole in the first turbine disk to aid in removing the twin turbine assembly from input shaft. Push inward on shaft to avoid withdrawing it. Remove bronze thrust washer from turbine hub.

5) Remove retaining ring from groove in input shaft, using snap ring pliers, then remove bronze thrust washer and the sun gear.

6) Remove retaining ring from groove in reaction shaft and slide converter stator and free wheel roller race from reaction shaft. Remove stator bearing from reaction shaft if it did not come out with stator.

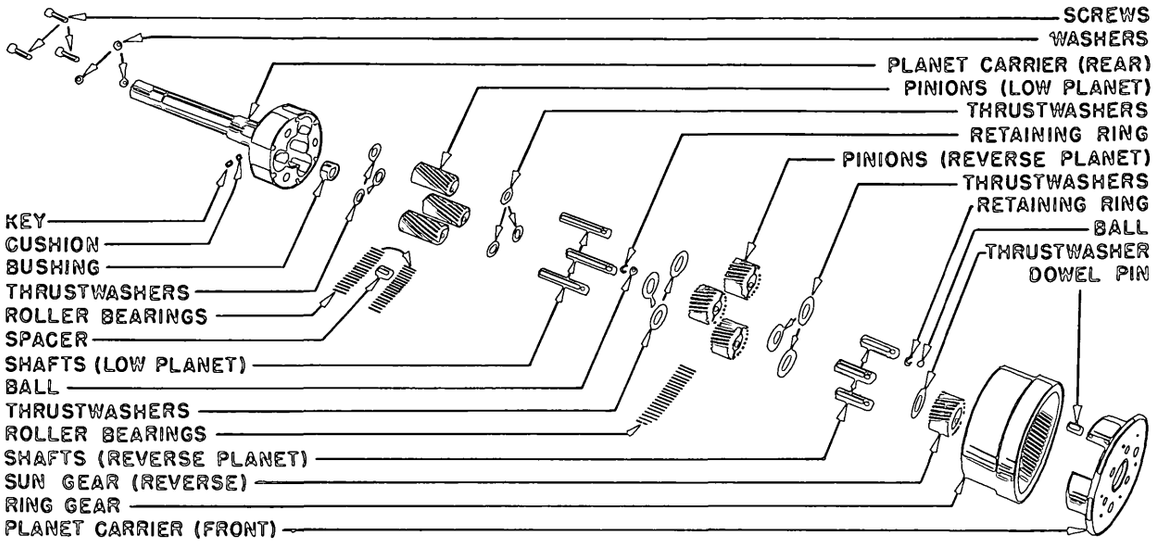
7) Pull converter pump forward from reaction shaft and immediately check for evidence of leakage.

Radial streaks of fresh oil on back of pump and fresh oil streaks on face of pump body indicate leakage past oil pump seal. Before removing bell housing, check to see that all attaching bolts are tight. Loose bolts may be cause of oil leakage at this point.

8) Place transmission so that bell housing is over edge of bench. Take out bell housing attaching bolts, remove bell housing, check rubber oil seal for uniform compression (if seal not compressed uniformly, check around oil pump and in bell housing opening for burrs or foreign material preventing uniform seal compression). *See Overhaul data for disassembly of converter stators and pump.*

Oil Pan and Valve & Servo Body Removal: *Not necessary to remove other parts prior to this operation.* Remove oil pan and gasket. Lift oil screen away from suction pipe to which it is held by a rubber grommet snapped into hole in screen body. Remove suction pipe spring support, retaining spring, suction pipe, and cork gasket which seats in recess in servo body. Disconnect valve operating rod from valve operating lever (upper) by placing screw driver on rod close to lever and exerting slight pressure, (spring loaded socket on rod engages a ball stud on lever). Loosen all valve and servo body attaching screws slightly but do not loosen slotted safety nuts on valve-to-servo body studs, pry assembly upward slightly to free gasket, push shift control valve and lower operating lever inward to align lever with transmission case opening, lift assembly off. Use care to avoid slotted end of shaft control valve which has sharp edges, when lifting on assembly. Remove gasket and check for evidence of oil leaks. Remove reverse band operating strut (support strut with finger extended through adjusting hole to prevent it falling into case, release strut by lifting on operating lever). *See Overhaul data for disassembly of valve and servo body.*

Reaction Shaft Flange, Front Oil Pump, and Accumulator Removal—*Converter & Bell Housing and Oil pan must be removed first but Valve & Servo Body need not be disturbed.* Loosen but do not remove both accumulator body caps (will facilitate removal later). Remove three attaching capscrews from each accumulator body but do not disturb stud nut. Remove capscrews extending through front oil pump cover but do not remove stud nuts. Tap lightly on rear of accumulator bodies with fiber hammer to loosen reaction shaft flange, remove assembly and gasket from case leaving input shaft in transmission. Examine gasket for uneven impression or other evidence of oil leaks.



DYNAFLOW TRANSMISSION PLANETARY ASSEMBLY

Input Shaft, Clutch, & Low Band Removal: *All parts listed in preceding removal sections must be removed first.* Pull input shaft and clutch hub front thrustwasher out of transmission (thrustwasher will come out on shaft), then lift out clutch assembly. Compress low band with the operating lever, install Band Installing Clip J-2595 across band strut flanges to keep band compressed, release the lever and lift band out of case, lift out band struts, (will drop down in case when band removed). Remove the low band anchor lever and operating lever by threading a ¼"-20 capscrew in end of each lever shaft and pulling shafts out of case. *See Overhaul data for clutch disassembly.*

Torque Ball & Universal Joint Removal (Buick): *Does not require removal of any other parts first.* Remove torque ball rubber boot. Take out attaching bolts in thrust plate, remove thrust plate and gasket, torque ball inner and outer retainers, and paper adjusting shims. Remove speedometer driven gear and sleeve assembly. Lock drive shaft by engaging parking pawl (use shift lever to press forward on shift lever shaft while turning universal joint, until pawl engages), remove universal joint bolt, lockwasher and flat washer, pull universal joint using puller J-682A (40, 50), J-859A (70).

Extension Housing & Shaft Removal (Cadillac & Oldsmobile): Remove six screws attaching extension housing to rear bearing retainer flange. Remove extension housing and discard gasket.

Rear Bearing Retainer & Parking Lock Ratchet Wheel Removal: Universal Joint, Oil Pan, and (Buick) Torque Ball must be removed first. Disconnect valve operating rod from upper operating lever by inserting screw driver through hole in case and pressing rod away from lever (ball stud on lever engages socket in rod). (On Buick, remove universal joint retaining ring from slot in output shaft, using a screw driver and hammer to free ends of this lock ring). Take out retaining bolts and remove rear bearing retainer and gasket, check gasket for evidence of oil leakage. Take out ratchet wheel outer retaining ring (use snap ring pliers to free ring). *See Overhaul data for disassembly of rear bearing retainer.*

Rear Oil Pump and Lubrication Oil Pressure Regulator Valve Removal: *Rear Bearing Retainer (preceding) must be removed first.* Take out retaining bolts and remove pump body and gears as an assembly. Check gaskets for evidence of oil leakage. Remove pump drive key from shaft recess, remove rubber cushion located under drive key with a pointed tool. If possible, lift off rear pump plate and gasket (if plate sticks, tap plate out after planetary gear set removed). Check gasket for evidence of oil leakage. Remove lubrication pressure oil regulator valve seat from rear face of transmission case (use special drag link socket to turn valve seat out), remove valve and spring.

Planetary Gear Set, Reverse Ring Gear, and Reverse Brake Band Removal: *All parts listed in preceding removal sections must be removed first.* Pull planetary gear set out through front of transmission case. Lift out reverse ring gear and two planet carrier thrust washers (if these parts did not come out with planetary gear set). If rear oil pump plate and gasket not removed previously (see above), tap out with hammer handle inserted through front of case. Remove reverse band operating lever by threading a ¼"-20 capscrew into tapped hole in anchor shaft and pulling shaft out, then lift out lever. Rotate reverse band toward adjusting hole until anchor accessible, disengage and lift out anchor. Compress

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DYNAFLOW DRIVE (C nt.)

reverse band and install Band Installing Clip J-2595 across strut flanges to hold band compressed, lift band out. *See Overhaul data for disassembly of Planetary Gear Set.*

OVERHAUL

►***PARTS INTERCHANGE CAUTION: The following parts are NOT interchangeable between 1953 and 1954 torque converters. 1st Turbine Disc & Hub Assembly, 2nd Turbine, Planet Carrier, Planet Pinions, and Sun Gear and Yoke***

►*1954 FRONT PUMP PRODUCTION CHANGE:* A new oil pump, Part No. 1391884, with blind bolt holes (bolt holes not drilled all the way through flange), entered production with Dynaflow Transmission No. .070. **This later type pump is not interchangeable with previous pump.**

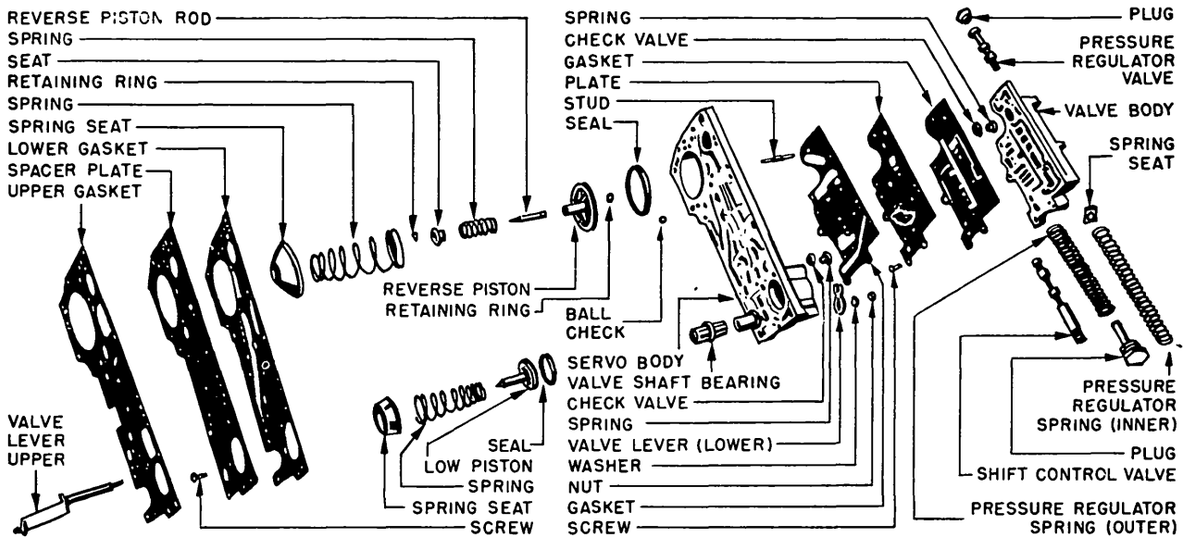
►***REACTION FLANGE TO FRONT PUMP BOLT PRODUCTION CHANGE:*** A longer mounting bolt is now being supplied for service replacement on both early and late type front oil pumps. Later type bolt is ⅛" longer (1½") than early type and can be used with both type pumps. *CAUTION*—When installing this longer bolt on early pumps it will be necessary to use a bottoming tap so that depth of threads will be .562" (approximately one full turn of tap past the old thread depth).

►***OIL COOLER & RETAINING BOLT PRODUCTION CHANGE***—A new type oil cooler and oil cooler retaining bolt (attaching oil cooler to rear bearing retainer) will be used making it unnecessary to remove the two lower bolts holding transmission rear bearing retainer to transmission. New bolt is "stud bolt" type having a threaded section on both sides of hex head.

After all Converter and Transmission Major Components removed from transmission case, disassemble and overhaul these units as follows:

Converter Stators & Pump: Disassembly—Pry retaining ring out of groove in first turbine, insert screw driver in hole in disc and lift disc and hub assembly out of first turbine. Lift second turbine and carrier assembly out of first turbine. Remove four bolts with lockwasher and pinion pin lock plate from second turbine. It is not necessary to lift turbine from carrier at this time. Remove pins, then remove the four planet pinions and thrust washers from turbine carrier. Remove bearing rollers (22) from each pinion. Remove ball bearing from rear side of converter stator, push the free wheel roller race out of free wheel cam in front side of stator, then remove all rollers, cups, and springs from the cam. Pry the pilot bearing retaining ring out of its groove in hub of converter pump cover, then push pilot bearing and bearing retainer out of the hub.

Inspection—Wash all parts in clean solvent and dry with air. Inspect all planetary gear teeth, thrust washers, bushings, and related bearing surfaces for excessive wear, scoring or other damage. Inspect free wheel roller springs for distortion and check rollers and race for nicks or burrs. Small nicks or burrs should be removed with an Arkansas stone and polished with crocus cloth. Inspect converter pump, turbines, and stator for damaged or cracked vanes. Inspect rear edge of first turbine hub (at ring gear) and the mating thrust surface



DYNAFLOW VALVE & SERVO BODY ASSEMBLY

on second turbine (around carrier) for wear, scoring or other damage. Inspect turbine carrier for excessive wear or other damage. ***(If second turbine or the carrier must be replaced, use care in separating them to avoid damage to the good part).*** Inspect converter pump hub for scores and for wear caused by the front pump seal.

►*INSPECTION CAUTION*—Converter oil leaks, oil pump body leaks, front oil pump noise, and excessive wear of front pump bushing and oil seal may be caused by (1) Excessive runout of converter pump hub; (2) Excessive runout of flywheel face; (3) Misalignment of bell housing. When any of these conditions are encountered and there is any doubt as to their true cause see Alignment of Converter and Bell Housing (below).

Assembly—***(CAUTION—If stator was replaced, make certain that new stator has correct number of vanes—12 vanes, Buick 40; 20 vanes, all others).***

1) Place input shaft pilot bearing retainer in hub of converter pump cover with shouldered side upward, push the pilot bearing into hub of cover until outer race bears against shoulder in hub, then install retaining ring.

2) Install springs and cups on free-wheel roller race in cam on front side of converter stator, then use a suitable thin blade to depress the cup and spring while inserting each of the free wheel rollers.

3) Install the ball bearing in rear side of stator, using care to start it squarely into place. The bearing must be fully seated in counter-bored recess and outer race must be free to turn.

4) If second turbine was separated from carrier, make sure that counter-bored recess in turbine and mating surfaces of carrier are free of burrs and clean, then apply a thin film of oil to these surfaces.

5) Support carrier on suitable blocks, install several pinion pins to serve as pilots, then place turbines in position so that carrier is started squarely into recess in turbine. Use a hammer and hardwood dowel or other soft punch to tap turbine down over carrier. ***Avoid distortion of turbine by using light blows applied midway between holes and alternated from side to side to keep parts square with each other.***

►***CAUTION—If turbine cannot be assembled on carrier with moderate force, remove it and check for burrs in counter-bored recess.***

6) With turbine and carrier supported on wood blocks, hub side down, assemble and install the four pinions as follows: Place planet pinion on thrust washer, install 22 needle bearing rollers in pinion and place a thrust washer on top of pinion. ***(NOTE—A loading tool can be made by using a piece of steel rod ⅜" in diameter by 11/16" long. Place tool in center of pinion and install needle bearings around tool).*** Place assembled pinion in carrier and install a pinion pin with notched end up. After loading tool is pushed out of carrier, slide block under pinion pin to hold it in place. Turn all pins so that notch faces center of carrier.

7) Install pinion pin lock plate so that it enters notches in all pins, then install the four turbine-to-carrier bolts with lockwashers. Place second turbine and carrier assembly in first turbine, then install first turbine disc and hub assembly over second turbine.

8) Rotate disc until ring gear meshes with carrier pinions, then align driving lugs on disc with notches in first turbine and push the assembly all the way into turbine.

9) *CAUTION—Turbine disc retaining ring is installed exactly as follows:* Place the ring in position with "dished" side upward so that the inner edge will bear firmly against disc when ring is engaged in groove in first turbine. Start one end of ring into grove in turbine, then twist ring upward in order to lay ring flat on disc so that it can be progressively entered into groove all the way around.

10) Make certain that ring is fully seated in groove and that inner edge bears against turbine disc. Tap inner edge down against disc if it has raised up.

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DYNAFLOW DRIVE (Cont.)

Valve & Servo Bodies: Disassembly—Remove safety nuts and washers from body studs, lift off valve body and gasket, examine gasket for evidence of oil leakage. Remove shift control valve from valve body and rear pump delivery check valve and spring from servo body. Remove large pressure regulator valve plug from valve body *(CAUTION*—hold plug to prevent it flying off due to heavy spring pressure), remove springs and spring seat. Remove small valve plug and lift out pressure regulator valve. Remove valve body plate and gasket, examine gasket for evidence of oil leakage. Lift out front pump delivery check valve and spring. Take off nut and lockwasher attaching upper and lower valve operating levers in servo body and remove levers. Use wooden block placed across low and reverse servo spring seats to hold them in place with springs compressed while taking out spacer plate attaching screws, carefully relieve spring pressure *(CAUTION*—use care not to spring spacer plate or allow servo springs to fly out), lift off spacer plate and gasket, examine gasket for evidence of oil leakage. Lift out low and reverse servo spring seats, springs and pistons. Remove check valve from reverse servo feed channel.

Inspection—Wash valve and servo bodies and parts with clean solvent, blow out all passages and dry parts with air. Inspect bodies for cracks, damaged gasket surfaces, and scored piston and valve cylinders. Inspect valves and pistons for nicks, scores, scratches, or rounded shoulders (edges must be sharp to keep out foreign material which might cause sticking). Replace worn or damaged piston seals.

▷Piston Seal Installation Caution—Lip on seal must fit over SMALLER diameter land on piston.

Reassembly—Install low and reverse servo pistons in servo body (CAUTION—use care not to damage seals), check to see that pistons move freely in body. Install piston springs and spring seats (small end of low servo spring in groove in piston, large end of both reverse servo springs in grooves in piston). Place check ball in reverse servo feed channel. Use new spacer plate gasket, compress servo springs and tighten all spacer plate attaching screws uniformly. Install both upper and lower operating levers with lower lever pointing to low servo cylinder and upper lever to reverse piston spring seat, tighten lever shaft nut to 15-20 ft. lbs. torque. Install front pump delivery check valve spring (large end down), and valve (ridged side up), then install valve body plate using new gasket and making sure that valve seats against plate (must not hang on gasket). Install pressure regulator spring seat, inner and outer springs, and valve plug in valve body, tighten plug to 20-25 ft. lbs. torque. Install pressure regulator valve (see that oil orifice in end land is clear and place this land outward), tighten valve plug to 20-25 ft. lbs. torque. Install shift control valve with slotted end of valve pointing toward large pressure regulator plug. Install rear pump delivery check valve (ridged face inward), and spring (large end upward). Install valve body on servo body using new gasket *(CAUTION*—see that pump delivery check valve spring below gasket), tighten all stud nuts to 11-15 ft. lbs. torque.

High & Low Accumulators: Disassembly—Remove retaining pin and check ball from High Accumulator body (not used in Low Accumulator). Remove the pipe plug, cap, gasket, spring and piston from each accumulator body keeping these parts separated so that same parts will be re-installed in same body.

Inspection—Clean all parts with solvent, blow out all passages and dry with air. Check parts for excessive wear, scoring, nicks, burrs, and other damage. Remove nicks and burrs from pistons and valves by stoning but do not round off sharp edges of pistons and valves (edges must be sharp to keep out foreign material which might cause sticking). Check mounting face of accumulator body for flatness with a straightedge (face can be trued up by using emery cloth on a surface plate but all traces of emery must be removed). Replace accumulator assembly if body, or piston worn (these parts not furnished separately). Check piston for wear by placing it in cylinder (all parts clean and dry). Piston should slide freely as body is tilted back and forth.

Reassembly—Lubricate all parts before installation. Install each piston in same cylinder from which removed, install springs (see illustration and Spring Note below), use new gasket on cap and tighten cap finger tight—DO NOT attempt to tighten caps fully at this time (caps will be tightened to 40-50 ft. lbs. torque after reaction flange assembly re-installed in transmission).

Reaction Shaft Flange & Oil Pump: Disassembly. Remove high and low accumulators and gaskets using care not to drop retaining pin and check ball out of High Accumulator (not used in Low unit). Check gaskets for oil leakage. Check oil pump mounting nuts for tightness (loose nuts may have been causing oil leakage), remove nuts, take out pump body and gears (tap body lightly with soft hammer if necessary). Lift off pump cover and gasket, check gasket for evidence of oil leakage. Remove check ball from clutch feed passage in reaction flange if ball free to fall out (do not remove ball if retained by peened edges of hole).

Oil Pump Inspection & Repair—Clean pump parts with solvent and dry with air. Check pump gears and mounting faces of body and cover for excessive wear. Check front pump bushing for excessive wear or looseness which will require replacement of pump assembly *(NOTE*—Check flywheel and primary pump hub run-out and bell housing misalignment if bushing worn or loose). Check front oil pump seal and replace if damaged or any evidence of leakage noted. Drive out old seal, coat outside of new seal with Permatex #3, start seal in place with deep groove in retainer outward, tap seal into place with wood block and mallet. Check following clearances and replace pump parts if excessive:

Reassembly—Install pump cover on reaction flange using new gasket (make certain that check ball in clutch feed passage first). Lubricate pump gears and install in pump body with beveled side of driving gear outward so that it will be against cover when pump installed *(CAUTION*—reversal of gear will cause severe damage to transmission). Install oil pump on reaction shaft flange, engaging locating dowels in dowel holes in flange, then install nuts with lock washers. Tighten nuts to 5 ft. lbs. in correct sequence (see note below), then fully tighten nuts to 25-30 ft. lbs. torque in same sequence, finally tighten cover attaching stud nut to 25-30 ft. lbs. torque.

▷Front Pump Tightening Sequence—Tighten nuts in following order: Top, Bottom, Right Center, Left Upper Center, Right Lower Center, Left Lower Center, Right Upper Center.

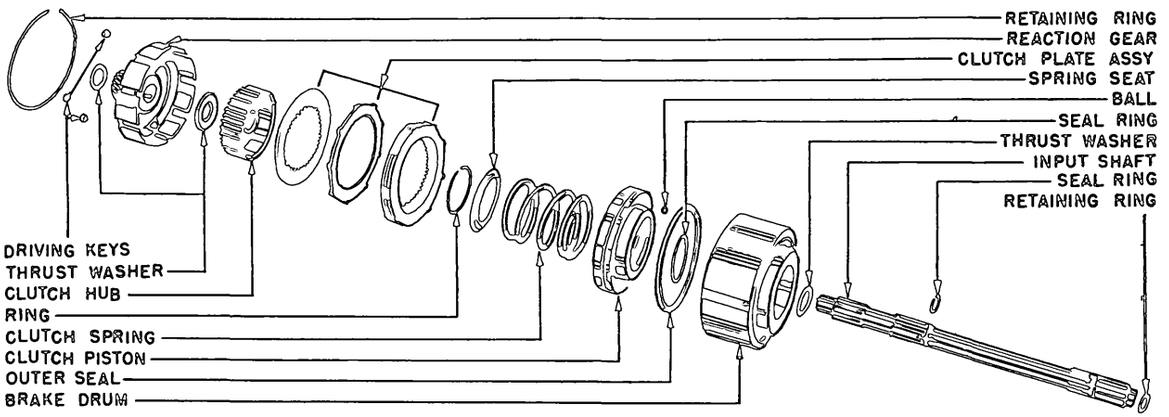
Pump Gear Side Clearance—Place straightedge across face of pump body and gears. Clearance between face of gears and straightedge should be .001-.0025" (front pump), .001-.002" (rear pump).

Pump Gear Clearances—Check pump gears with feeler gauge between gear teeth and crescent while pressing gear away from crescent. Clearance should be .005-.009" (front pump driven gear), .0045-.007" (rear pump driven gear), .010-.016" (front pump driving gear), .006-.012" (rear pump driving gear).

Pump Cover Gear Wear—Replace cover if gear bearing area scored or worn to depth of more than .001".

Reaction Shaft Flange Inspection—Clean flange in solvent, blow out all passages and dry with air. Check mounting surface of flange for low spots with straightedge (Gauge J-2596) and feeler gauge, replace if out more than .002". Inspect mating face of transmission case similarly and replace case if it

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DYNAFLOW DIRECT DRIVE CLUTCH ASSEMBLY

DYNAFLOW DRIVE (C nt.)

cannot be trued up within .002". Check both surfaces for nicks and burrs, remove these with a mill file. Check bronze bushing on reaction flange rear hub and cast iron sleeve within hub, replace reaction shaft flange if these parts scored or worn excessively. Check oil sealing rings and replace if damaged (rings have interlocked ends and are released by compressing ring and depressing one end while raising the other). Check all studs for tightness, replace if threads damaged or stripped (step studs furnished—can be installed by tapping out hole).

Accumulator Spring Note—Springs can be identified by free lengths as listed below.

Low Accumulator Springs

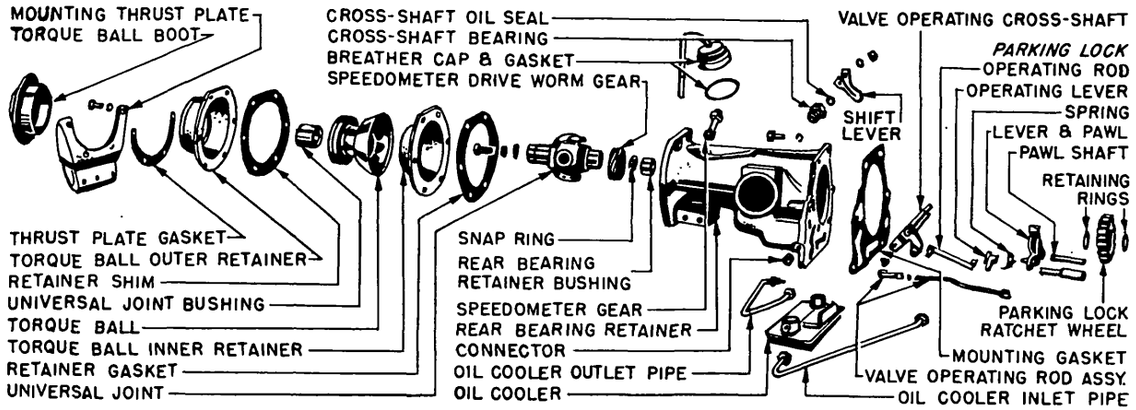
	Free Length	Part No.
Inner Spring	5 3/16"	1339495
Outer Spring	3 11/16"	1339496

High Accumulator Spring—Part No. 1331461. Length 4 15/16".

Multiple Disc Clutch & Input Shaft: Disassembly. Remove retainer ring from reaction gear flange, use pointed tool to remove three flange driving keys. Lift out Low Range Reaction Gear, Thrustwasher, Clutch Hub, and all 10 Clutch Plates. Install Clutch Spring Compressor J-2590 in clutch drum placing slot in compressor ring over ends of spring seat retainer ring, compress spring sufficiently to remove retainer ring, release clutch spring pressure *(CAUTION*—use care that spring seat does not hang up in retainer ring groove in drum). Remove compressor, lift out spring seat and spring. Tap drum, open end down, on block of wood to dislodge clutch piston *(CAUTION*—if check ball in piston unseated during this operation, snap ball back in place).

Inspection—Wash parts in solvent and dry with air *(CAUTION*—use only gasoline or kerosene on clutch bands and plates—do not use chemical degreasers or commercial solvents). Inspect and replace all clutch plates which are worn, scored, burred, or warped *(CAUTION*—new plates must slide freely on clutch hub—tight plates will prevent full disengagement). Inspect oil seal ring on clutch hub and replace if damaged (ring has interlocked ends and is released by compressing ring and depressing one end while raising the other). Replace clutch piston outer seal if hardened, broken, or with turned lip (install new seal with lip extending over smaller diameter piston land). Inspect Low Range Band and replace if worn smooth without visible grooves. Inspect oil seal ring and replace if damaged (same type ring with interlocked ends as used on clutch hub). Check to make sure retaining ring in place in shaft groove. See that small bleed hole in piston is open and that check ball is staked in place *(CAUTION*—ball must be free to move in recess).

Reassembly—Lubricate piston seal and inner surface of drum with light oil, install piston using extreme care not to distort or turn lip of seal. Top of piston should be approximately even with shoulder in drum when installed. Install clutch spring, use Compressor J-2590 to compress spring, install spring retaining ring in groove in drum, remove compressor. Place reaction gear on bench with flange upward and install all clutch parts in following order: Clutch Hub Thrustwasher, Clutch Hub (open end upward), and all clutch plates (see Clutch Plate Caution below). Bottom clutch plate should be internally splined (faced) type and top clutch plate externally splined (plain steel) type with the two types alternating in the assembly. Install drum and clutch piston assembly over reaction gear and clutch assembly with driving key recesses in drum and gear flange aligned. After drum pressed evenly in place, fully align driving key recesses by tapping reaction gear flange, install three driving keys and flange retainer ring.



BUICK REAR BEARING RETAINER & TORQUE BALL ASSEMBLY

►**Clutch Plate Caution**—Externally splined (plain steel) clutch plates are concave or "dished" and these plates must be installed with "dished" face in same direction (either up or down). Check each plate with straightedge and stack plates with dished faces in same direction before beginning installation. *NOTE*—Internally splined clutch plates are flat and can be installed in either direction.

Rear Bearing Retainer: Disassembly—Disconnect valve operating rod clevis from valve operating cross-shaft inside retainer housing, withdraw rod through forward end of housing. Disconnect parking lock operating rod from cross-shaft by unscrewing rod end from lever. Remove cross-shaft bearing using a box wrench *(CAUTION*—loose fitting socket or end wrench will distort bearing), remove cross-shaft. Remove parking lock pawl shaft by screwing ¼"-20 capscrew into shaft and pulling shaft out. Tap parking lock operating lever toward front of shaft, operating lever, lever & pawl assembly, and apply spring from retainer.

Rear Bearing Retainer Inspection—Wash parts in solvent and dry with air. Check parking brake pawl, pawl locking link, and ratchet wheel for worn teeth, cracks, or other damage preventing positive locking. Check valve operating cross-shaft and bearing for wear, remove and discard rubber seal in bearing. Inspect output shaft bushing in retainer for wear scoring, check clearance by inserting output shaft in bushing. Clearance should be .001-.006". Replace bushing with Bushing Remover & Replacer Tool J-2997 (not necessary to ream new bushing).

Universal Joint Inspection—Check for wear and excessive play between spider pins and bushings (should be .002-.004"). Check yokes for wear on shaft splines. Front yoke must be tight fit on output shaft (play will allow "snap" between forward and reverse), rear yoke backlash on propeller shaft should be .0005-.0045". Rear yoke clearance in torque ball bushing should be .004-.006" and bearing surfaces must not be scored.

Torque Ball Inspection—Replace torque ball and retainers if bearing surfaces scored or pitted. Inspect oil seal and replace if worn (use seal which has been soaked in neatsfoot oil), press seal squarely into place until flush with torque ball flange and with feather edge of seal pointing into torque ball. Check universal rear yoke for excessive wear at point where seal bears.

Reassembly—Assemble locking pawl and lever, apply spring, and parking lock operating lever & rod using a dummy shaft for this purpose (dummy shaft can be made up of 7/16" round stock, 1½" long, with ⅛" chamfer on one end), place this assembly in position in bearing retainer and install operating shaft through retainer and lever. Install parking lock pawl shaft through bearing retainer and lock pawl **with tapped end outward**. Install valve operating cross-shaft and cross-shaft bearing with **new rubber seal** in bearing (grooved side inward). Connect parking lock operating rod to cross-shaft lever (use lockwasher on threaded rod end) but do not connect valve operating rod and lever to cross-shaft until rear bearing retainer being assembled to transmission case.

Extension Case: Disassembly—(Cadillac) Remove large extension shaft bearing retainer ring from front end of housing. Carefully remove extension shaft, with speedometer drive gear, sleeve, oil pipe, and bearing. Using an arbor press, remove speedometer gear and sleeve from extension shaft. Remove small bearing retainer from extension shaft and press bearing off of shaft. Remove small oil pipe from extension shaft, and remove oil seal from extension housing.

Oldsmobile—Remove seal from rear of housing, and remove inner snap ring from extension shaft through seal end of housing. Tap extension shaft with soft hammer until bearing free on extension

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (Cont.)

shaft, then remove extension shaft assembly from front of housing. Remove large snap ring from bearing housing using Tool J-5172, then remove bearing. Remove snap ring from shaft. Press off sleeve using Tools J-358-1, J-4390, J-1184; then remove speedometer gear from sleeve by pressing sleeve out of gear.

Inspection—Wash all parts in cleaning solvent, and inspect extension shaft for excessive wear and nicks or burrs on splines. Check bearing for pitting or galling. Inspect extension housing for cracks.

Reassembly—Reverse the Disassembly instructions given above.

Planetary Gear Set: Disassembly—Take out three planet carrier screws and special lockwashers (use 7/32"Allen wrench), separate front and rear halves of planet carrier (hold carrier by output shaft, tap down on flange on front end). Lift out sun gear rear thrustwasher and reverse sun gear. Remove all planet pinion assemblies (three long low pinions, three short reverse pinions) by tapping shaft out of front half of carrier using care not to lose steel ball imbedded in end of each shaft to prevent shaft rotating in carrier. Disassemble pinion assemblies by removing thrustwashers and shafts from pinions and then taking out bearing rollers (long pinions have two sets of rollers separated by spacer, short pinions have one set of rollers).

Inspection: Wash all parts in solvent and dry with air. Inspect planet pinion shaft and rollers, replace if worn. Inspect all gear teeth for wear, remove all nicks and burrs by stoning. Replace bushing in rear end of planet carrier if worn or scored (use Bushing Remover J-3197, Bushing Replacer J-2996—new bushing may be installed either end first and need not be reamed). Inspect reverse band anchor for cracks. Replace reverse band if cracked or the lining worn smooth.

Reassembly—Assemble each planet pinion with its bearing rollers, thrust washers, and shaft (24 rollers in each reverse pinion, 20 rollers at each end of low pinion and separated by a spacer). Make certain that thrustwasher installed at each end of each pinion (lower washer against retaining ring on shaft, upper washer on outer end of shaft). Install planet pinion assemblies in carrier making certain that steel ball imbedded in lower end of each shaft (necessary to prevent shafts turning). Install reverse sun gear with bronze thrustwasher on top of gear, align assembly marks on both planet carrier halves when installing upper half (numbers stamped on dividing line during production), make certain that special lockwasher used on each carrier screw, tighten screws evenly to 25-30 ft. lbs. torque. Install reverse ring gear thrustwasher.

Transmission Case (Cleaning & Inspection): Wash case and blow out all passages. Inspect for cracks, and stripped bolt threads. Check machined surfaces for nicks and burrs and clean these up with a mill file. Check bushing in case for wear by inserting planet carrier in bushing and checking clearance with a feeler gauge. Clearance should be .002-.004". Replace bushing if clearance excessive or if scored.

Bushing Replacement—To remove old bushing, support case with rear end down, drive bushing out with tool J-3175-1 (part of replacer set). To install new bushing, place pilot J-3175-2 (part of replacer set) in rear oil pump recess in case, slip bushing over J-3175-1 and drive bushing into case from front side until bushing is flush with front surface of case wall which supports the bushing. Bushing must be installed with wide deep ends of oil grooves toward rear of case.

Flywheel & Primary Pump Run-out and Bell Housing Alignment Check: *Make this check if front oil pump noisy, bushing and oil seal worn, or if oil leakage noted at Converter or Front Oil Pump Body.*

Flywheel Run-out—Remove all burrs from around drilled holes in face of flywheel, mount dial indicator on flywheel housing with strip of .005" shim stock between dial indicator and face of flywheel (clamp shim stock under a flywheel housing bolt so that it covers bolt holes and provides smooth surface for dial indicator pick-up). Turn flywheel holding end thrust in one direction. Run-out should not exceed .008". If excessive run-out cannot be corrected by tapping high side with mallet or by removing flywheel and cleaning up burrs at crankshaft flange mounting holes, install new flywheel and re-check run-out.

Primary Pump Hub Run-out—With converter primary pump and bell housing installed, mount dial indicator on bell housing so that it bears against primary pump hub. If run-out exceeds .012" when flywheel turned, mark flywheel and primary pump, remove and re-install pump at point 180° from first position. If pump run-out still exceeds .012", install new primary pump and recheck run-out. When position found where run-out is less than .012", mark flywheel and pump with paint and align these marks when transmission is finally re-installed.

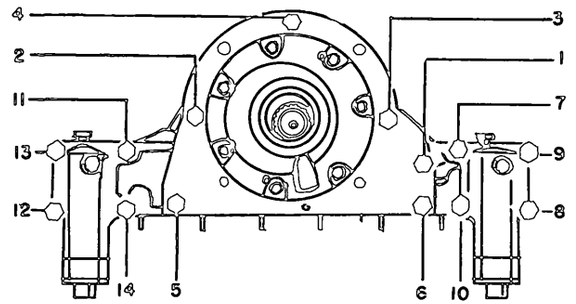
Bell Housing Alignment—Mount dial indicator on oil pump driving lug on rear end of converter primary pump hub (*CAUTION*—do not clamp indicator on bearing surface) so that it bears against rear face of bell housing at 3¾"" radius. Rotate flywheel holding end thrust in one direction. Run-out should not exceed .005". Mount dial indicator so as to bear against inner edge of pilot hole in bell housing and repeat test. Run-out should not exceed .004". Correct by installing paper shims of correct thickness between flywheel housing and engine crankcase (use shellac to hold shims in place).

REASSEMBLY

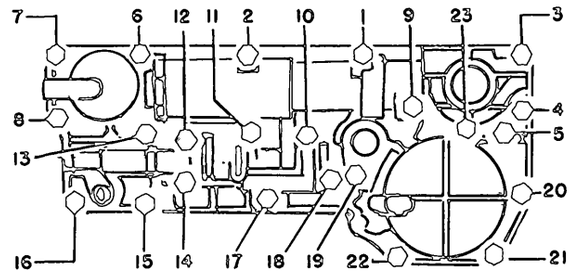
After overhaul of Major Components, make certain that all parts absolutely clean, oil moving parts with 10-W engine oil before installation, use ALL NEW GASKETS & SEALS. Tighten all parts evenly to specified torque and in correct sequence (see illustrations). Proceed in reverse order of disassembly directions and note all of following points:

Planetary Gear Set Installation: After reverse ring gear thrustwasher and reverse band installed in case (with Installing Clip J-2595 on band), rotate band 45° toward servo opening, insert anchor and engage hooked end of band, then rotate assembly back into position. Position band operating lever in place with strut shoulder toward inside of case, install anchor shaft with tapped end outward. If installation correctly made, adjustment screw will be centered in servo opening (lever has offset end). See that planet carrier front (steel) thrustwasher installed on carrier with three tangs engaging holes in carrier, install rear (bronze) thrustwasher in case with three tangs engaging holes in case, then install planet carrier. If correctly installed, chamfer on output shaft journal will be flush with rear end of transmission case bushing.

Rear Oil Pump & Lubrication Oil Pressure Regulator Valve Installation: Install rear gasket (gasket with LARGER hole—do not confuse with cover gasket) and plate on transmission case with bolt holes aligned, install drive key cushion and key in output shaft, then install driving gear to engage key (old gear should face in same direction as before, new gear with either face in). Tighten attaching bolts to 5 ft. lbs. torque in following sequence: Top, Bottom, Right, Left; then retighten bolts to 25-30 ft. lbs. torque in same sequence. Check pump for free operation by rotating output shaft. Install lubrication oil check valve assembly in case.



REACTION SHAFT FLANGE & ACCUMULATOR BOLT TIGHTENING SEQUENCE



VALVE & SERVO BODY BOLT TIGHTENING SEQUENCE

Parking Lock Ratchet Wheel & Rear Bearing Retainer: Make certain that retaining ring installed on each side of ratchet wheel on output shaft, insert valve operating rod through square hole in front face of bearing retainer and connect rod to cross-shaft lever, then install rear bearing retainer and gasket, tighten attaching bolts evenly to 35-40 ft. lbs.

Low Brake Band, Clutch, & Input Shaft Installation: Install low band operating lever and anchor lever with strut shoulders of levers toward inside of case and tapped ends of shaft outward (operating lever on side of case having large servo opening, anchor lever on opposite side). Install low band struts in ends of levers with notched ends together using two wooden blocks (1" x 2" x 3½") to support struts and band while assembling. Install low band with J-2595 band installing clip holding band compressed (*CAUTION*—used band must be installed in original position with point of heavier wear at anchor end,

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

(new band can be installed either way). With struts engaging ends of band (notches on struts must straddle pins on band), apply operating lever and remove clip. Place bronze reaction gear thrustwasher on sun gear, install clutch assembly (use wire hook to lift low band if clutch does not go down fully), place bronze thrustwasher on front face of clutch hub. Install input shaft (make certain that oil seal ring ends properly locked and that retaining ring installed in shaft groove). If shaft does not go down into place, make certain all four thrustwashers are properly centered.

Reaction Shaft Flange, Front Oil Pump, & Accumulator Installation: Install special guide pin (see Guide Pin Note below) in accumulator bolt hole at each end of flange on transmission case. Install new gasket over guide pins so that **all holes in gasket and case aligned** *(CAUTION*—gasket can be installed incorrectly). Check oil seal rings on reaction shaft flange for correct installation with ends locked, install flange using care not to damage these seal rings. Install low accumulator (on same side as low band operating lever), and high accumulator (opposite side) making certain that **holes in gasket and flange match.** Coat accumulator bolt threads lightly with Permatex #3, install bolts and nuts with lockwashers but **do not tighten,** remove guide pins. Install three special bolts (⅜"-16 x 2") with plain washers in #2, 3, 4 positions (see Tightening Sequence illustration) for assembly purposes (these bolts removed after assembly completed), install regular pump cover bolts, nuts, and lockwashers at positions #1, 5, 6 *(CAUTION*—Coat #5 bolt threads with Permatex #3). Tighten all bolts and nuts (1-14) to 5 ft. lbs. torque in sequence shown in the illustration, then tighten #1 through #4 to 35-40 ft. lbs. and all remaining nuts and bolts to 20-25 ft. lbs. torque in the same sequence. Remove the three special bolts (#2, 3, 4). Tighten accumulator body caps to 40-50 ft. lbs. torque. Check flange gasket and trim lower edge flush with bottom face of transmission case if it projects.

►**Guide Pin Note**—These 5/16" guide pins can be made up from 5/16" round stock, 2½" long, with 5/16"-18 thread ½" long on one end and screwdriver slot on opposite end (chamfer this end slightly).

Valve & Servo Body Installation: With transmission inverted on bench, raise reverse band operating lever and insert strut between lever and end of band *(CAUTION*—rounded ends of strut must be against band and lever). After strut installed, **do not raise lever while installing valve and servo body** (will allow strut to fall into case). Install two 5/16" guide pins (same pins as used for reaction shaft flange—see above) in case to guide each end of servo body. Install spacer plate gasket over guide pins. Install valve and servo body on case (hold anchor piston from falling out and move shift control valve and lower operating lever inward to align upper level with opening in case). Engage control valve pin in slot in operating lever. Install correct length bolts and lockwashers in all mounting holes using copper washer on #10 bolt (see Tightening Sequence illustration), remove guide pins. Tighten all attaching bolts and nuts to 5 ft. lbs. torque in **correct sequence** (see illustration), then fully tighten all ¼" bolts and nuts to 11-15 ft. lbs. and all 5/16" bolts to 15-20 ft. lbs. torque in same sequence *(CAUTION*—When tightening nuts and bolts adjacent to shift control valve, operate valve to make sure that it does not bind—if necessary, readjust bolts to lower torque limit to correct binding). Remove #18 and stud nut #9, install cork gasket, oil suction pipe, retaining spring and spring support, tighten this #18 bolt and stud nut #9 to 11-15 ft. lbs. Connect valve operating rod to upper operating lever by reaching into case with Linkage Hook-up Finger J-2591 and pulling upward on rod to engage ball in socket. Install shift lever on cross-shaft temporarily to check and adjust linkage. Valve linkage must operate freely. Move lever toward front of transmission to engage parking lock. Pawl must fully engage ratchet wheel and pawl lock must be in full contact with pawl in this position. Push shift control valve away from stop pin until all play in linkage is just taken up, check clearance between end of valve and stop pin with feeler gauge. Clearance should be .030-.040" and spring travel at end of shift lever should be 1/8-3/16". Adjust by turning clevis on end of valve operating rod. After adjusting, make certain clevis locknut tightened and that clevis pin secured with snap fastener.

Oil Pan Installation: Coat area on transmission case where case cut away under oil pan gasket thinly with Permatex #3. Install 5/16" guide pin at each end (same pin as used for reaction shaft flange—see note above), install new oil pan gasket over guide pins. Install oil pan (use heavy-duty internal tooth lockwashers on bolts and stud nuts), tighten all bolts and nuts evenly to 15-18 ft. lbs. torque.

Buick Universal Joint Installation: Make certain that joint retaining ring fully seated in groove in output shaft before installing universal joint. If universal cannot be seated firmly against retaining ring by hand, use Replacer J-865 (40, 50), J-855 (70) to press universal joint on shaft. Tighten universal joint bolt to 30-35 ft. lbs. torque.

►***CAUTION—Oil passage in bolt must be clear (for universal joint lubrication).***

Buick Torque Ball Installation & Adjustment: *See "Torque Ball Adjustment" in Buick Special Data in Car Model Section for complete data.*

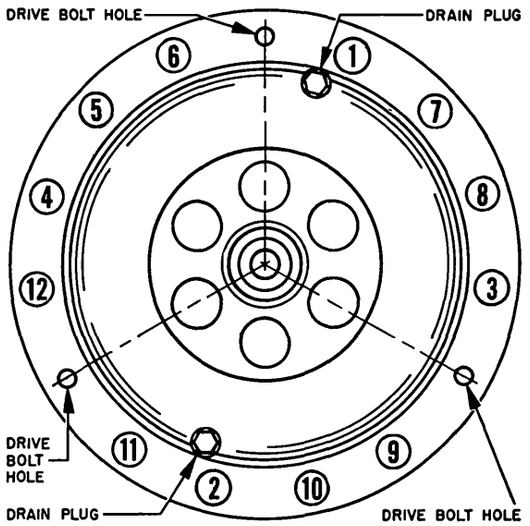
Bell Housing & Torque Converter Assembly Installation:

1) Install front oil pump seal ring around pump body against pump body. Install bell housing, using lockwashers on bolts and stud. Sparingly coat threads of lower right side bolt with Permatex #3 (bolt hole opens into transmission case). Tighten bolts and stud nut evenly to 35-40 ft. lbs. torque.

2) Install converter pump on reaction shaft, turning it until lugs on pump hub enter the slots in front oil pump driving gear. Make sure that the ball bearing is properly seated in converter stator, then install this unit on reaction shaft while pushing against the roller race to keep it from sliding out of place. Install stator retaining ring in groove in reaction shaft.

3) Install sun gear on input shaft and mesh it with free wheel cam in stator, then install bronze thrust washer on shaft. Place second retaining ring in groove in shaft, using Expander J-5338-2 on end of input shaft, and Driver J-5338-1 to push retaining ring over end of shaft.

4) Support twin turbine assembly so that all weight rests on a block placed under center of second turbine.



PUMP COVER TIGHTENING SEQUENCE

5) Attach Extension J-5339 to plunger of Dial Indicator KMO-30-B, then mount indicator on Support J-1013 with Sleeve KMO-30-K. Place indicator support on the protruding hub of turbine carrier, adjust dial indicator so that extension bears against ground surface on first turbine hub, then SET DIAL INDICATOR AT ZERO.

6) Support converter pump cover on blocks in a horizontal position, lightly tap the input pilot bearing down against shoulder in hub of cover, and place a bronze thrust washer in recess at center of pump cover.

7) Remove dial indicator and support from turbine assembly and set it firmly on the thrust washer on pump cover so that indicator plunger extension bears against inner race of pilot bearing. *CAUTION —use care to avoid changing the zero setting of dial indicator.*

8) The dial indicator should read between .002" and .010" CLOCKWISE from ZERO because the distance measured in Step 7 must be .002" to .010" LESS than the distance measured in Step 5. This difference is required to give the first turbine proper endplay or operating clearance in its position between the pump cover and second turbine.

9) If indicator does not read within specified limits, select another washer of proper thickness, which are furnished in the following sizes:

Thrust Washers

Part No.	Thickness	①Marked
1318799	.052-.055"	5
1318458	.060-.063"	6
1161654	.068-.071"	7

①—Thrust washer marked on flat surface.

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DYNAFLOW DRIVE (C nt.)

10) Install twin turbine assembly on output shaft, turning it as required to mesh planet pinions with sun gear.

11) Looking at front face of converter pump cover, select the three bolt holes that are aligned with the center of the hub and one of the counterbored recesses adjacent to hub (see illustration). Mark these holes for later installation of flywheel-to-pump driving bolts.

12) Install a new O-ring seal on pump cover, making sure that surfaces are clean and that seal has even tension all around and is not twisted.

13) Grease the selected thrust washer so it will adhere and place it in recess in cover, then install cover on pump so that the three marked driving bolt holes are not aligned with any hole in pump rim at which a balance weight is located.

14) Install bolts with plain washers and special nuts in all but the three driving bolt holes, insert shank of a 11/32" drill through one bolt hole to align all holes, then tighten bolts approximately 5 ft. lbs. torque in numerical sequence shown in illustration. Finally tighten bolts in same sequence to 25-30 ft. lbs. torque.

►*CAUTION—When tightening bolts, insert a wide screwdriver blade between flat side of bolt head and pump to prevent a corner of bolt from digging into pump casting.*

15) Screw the socket setscrew with lockwasher into input shaft through opening in pump cover hub.

16) Remove reverse band adjustment cover and shift into "P" (Parking). Pry up on reverse band operating lever with screwdriver to lock input shaft then tighten socket setscrew to 25-30 ft. lbs. torque. Install large hex plug with gasket in hub of pump cover and tighten securely. Install adjustment cover and gasket.

INSTALLATION IN CAR

After transmission and torque converter completely assembled, install unit in reverse order of removal procedure and note following important points:

Alignment of Parts—See that flywheel, converter primary pump, and converter cover positioned so that paint marks (as made for removal) will be aligned when transmission installed.

►*CAUTION—This alignment necessary to maintain converter assembly balance.*

Bell Housing Mounting Bolt Installation—Adjust lifting equipment so that bell housing meets engine crankcase squarely and engages the two dowels, then install all bell housing bolts with lockwashers. Tighten all bolts to 45-55 ft. lbs. torque.

Transmission Support & Thrust Pad Installation & Adjustment—*See ENGINE MOUNTING in Buick Special Data.*

Converter Mounting Bolt Installation—Use the shank of a 11/32" drill to align bolt holes in flywheel and converter, install bolts and tighten to 25-30 ft. lbs. torque.

Final Road Test—After transmission installed and all adjustments made, road test car by driving approximately 20 miles with frequent starts and stops to duplicate heavy traffic conditions. After transmission thoroughly warmed up, check transmission and all oil lines and connections for leaks. If vibration noted due to unbalance of replacement parts, correct this condition as follows:

Shift Rod Installation—Check and adjust linkage when installing shift rod. *See LINKAGE ADJUSTMENT.*

Filling Transmission—*See LUBRICATION.*

Road Testing Car—After installation completed, road test car by driving approximately 20 MPH. with frequent starts and stops (heavy traffic conditions) to thoroughly warm up transmission. Check transmission carefully for oil leaks, recheck oil level.

ENGINE BALANCING

►*IF VIBRATION NOTED AFTER INSTALLATION OF CRANKSHAFT, FLYWHEEL, AND OTHER ROTATING PARTS, CORRECT THIS UNBALANCED CONDITION AS FOLLOWS:*

►*CAUTION:* Procedure below will correct minor unbalance caused by replacement of individually balanced parts. Extreme vibration caused by parts abnormally out of balance, or different in weight from corresponding parts, should be corrected by replacement of these parts.

Critical Speed of Vibration—Determine speed at which vibration is most evident (use tachometer) and operate engine at this speed to check results from the following corrective procedures.

1)—Remove bell housing cover and bell housing hand hole cover for access to flywheel.

2)—Install one .060" balance weight of correct type (see Balance Weight Note following step 5 below) under the head of one of the primary pump cover bolts, tighten bolt to 25-30 ft.lbs. torque.

►*CAUTION—DO NOT install weight at flywheel-to-converter driving bolt (bolts are too short for addition of weights).*

3)—Operate engine and check for vibration. Mark location of balance weight on converter pump, then remove weight and tighten cover bolt to 25-30 ft.lbs. torque.

4) Repeat entire procedure (3 above) with balance weight installed at other primary pump cover bolts equally spaced around cover and compare performance at critical speed for greater or lesser vibration.

5) At the location where the least vibration noted in above tests, install balance weights of correct thickness to eliminate objectionable vibration.

Part No.	Balance Weights	Thickness
1341420		.0345"
1341419		.060"
1341418		.120"

6) After balance weights finally installed and cover bolts tightened to correct 25-30 ft. lbs. torque, spot the center of hole in each weight with 5/32" drill, then use No. 32 (.116") drill to drill hole 3/8" deep in pump flange. Install drive screw (No. 145067—3/8" long or No. 450543—1/2" long depending on weight thickness) in this hole to permanently attach weight to pump flange.

►*IF VIBRATION CAN NOT BE ELIMINATED by above procedure, replace new part which caused the unbalance and repeat balancing procedure.*

Shift Rod Installation—Check and adjust linkage when installing shift rod. See LINKAGE ADJUSTMENT.

Filling Transmission—See LUBRICATION.

Road Testing Car—After installation completed, road test car by driving approximately 20 MPH. with frequent start and stops (heavy traffic conditions) to thoroughly warm up transmission. Check transmission carefully for oil leaks, recheck oil level.

1955 BUICK "VARIABLE PITCH" DYNAFLOW DRIVE

Buick, Series 40, 50, 60 (1955)—Optional.
Buick, Series 70 (1955)—Standard.

►CHANGES, CAUTIONS, CORRECTIONS

►*STARTING ENGINE BY PUSHING CAR:* Place shift control lever in Neutral "N" position until car reaches a speed of 15 MPH., then move control lever to Low "L" position and continue to increase speed until engine starts (at approximately 25 MPH.). After engine starts, return lever to "N" position for engine warm-up.

DESCRIPTION

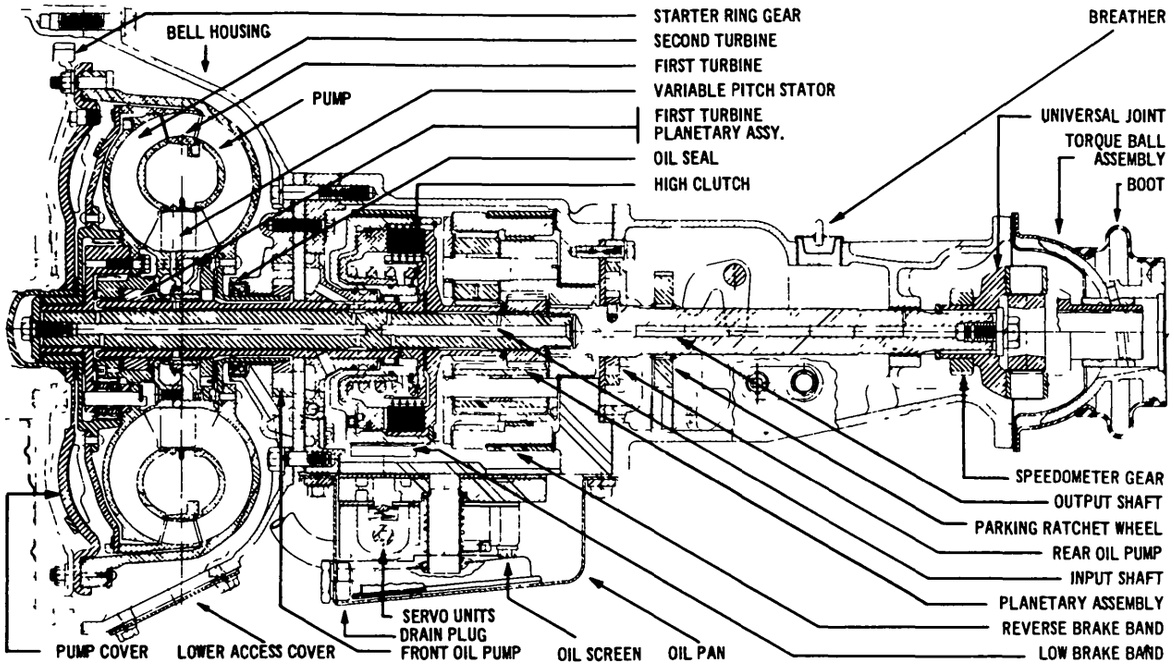
"Variable Pitch" twin-turbine torque converter of a new design, and a hydraulically operated planetary transmission similar in design to previous models.

Torque Converter Description: Converter consists of a first turbine, second turbine, pump, and "variable pitch" stator. The converter used on all models is identical.

First Turbine—Located directly forward of the converter pump and has narrow band of vanes which receive all oil flow from pump. This turbine is mounted on a disk and hub assembly bearing on the turbine carrier hub and is geared to the second turbine (internal gear of planetary gear set is mounted on the disk hub).

Second Turbine—Located within first turbine case with broad band of vanes which receive all oil flow from first turbine and directs the oil flow back into the stator. This turbine is bolted to a turbine carrier which is splined on the input shaft. The planet pinions of the turbine gears are mounted on carrier and mesh with the internal gear on the first turbine disk hub and with the sun gear which is mounted on a bearing on the input shaft and coupled to stator free-wheel cam (gears are always in mesh but operate only when sun gear and stator are held stationary for torque converter action). With the stator unlocked and free-wheeling (when torque converter operating as a fluid coupling, sun gear is likewise free to rotate which allows all units to rotate at nearly the same speed as the converter pump.

"Variable Pitch" Stator—The single variable pitch stator is located directly behind inner end of second turbine vanes and receives oil from second turbine and redirects it back into pump. Stator is mounted on a reaction shaft by means of a free wheeling unit similar to that used on previous models. Each of the twenty stator blades is mounted on an individual control crank which is supported at its outer end by the carrier ring and which is free to turn in its bearing in the stator carrier. The carrier contains a piston which actuates all blades through the control cranks when oil pressure is applied to one or both sides of piston. It is by this means that stator can be set at "high" or "low" angle as desired for rapid acceleration or for normal cruising.



VARIABLE PITCH DYNAFLOW SECTIONAL VIEW

OPERATION

OPERATION: Planetary units and controls operate in same manner as on previous Dynaflow Drive. The Torque Converter operates as follows:

Torque Converter Operation—When car is started up, the stator (in "low" angle) and turbine sun gear will be locked and held stationary. This results in First Turbine and Second Turbine as a geared unit with a ratio of 1.6-1 (first turbine rotating faster). This provides a maximum torque multiplication of 2.10-1 under stall conditions. As car speed increases, the torque reaction against the sun gear and the back pressure on the stator decreases and when this ceases, the stator free wheels and the sun gear is released. With sun gear released, the speed of the second turbine increases until both turbines and the stator are rotating at approximately converter pump speed. At this point the torque converter operates as a fluid coupling with a 1.0-1 torque ratio. The operation described has occurred without reaching wide open throttle operation, therefore the stator blades have remained in the "low" angle cruising position. If accelerator pedal is pressed to floor mat at any time in "D" range, the stator blades will be shifted to "high" angle performance position. In this position, the stall speed and torque multiplication of converter are increased.

LUBRICATION

Check oil level at 1000 mile intervals and add oil as required. Drain and refill at 25,000 mile intervals.

►***CAUTION—Oil must be warm and engine must be idling when checking oil level, warm up oil before draining.***

Checking Oil Level: With oil warm and engine idling with control lever in Parking "P" position, check oil level as indicated on dipstick in filler tube in engine compartment (on right side between battery and engine). If level more than 1" below FULL mark on rod, add recommended oil to bring level up to FULL mark *(CAUTION*—do not fill above the FULL mark). Distance between ADD OIL and FULL marks on rod is equal to approximately 1 pint of oil.

►***CAUTION—If oil level is consistently low when checked (indicating loss of 1 pint or more per 1000 miles), check transmission thoroughly for oil leaks.***

Draining & Refilling: With oil warm, drain transmission case by removing drain plug in oil pan, drain torque converter, after removing bell housing cover for access to drain plugs, by loosening one plug and turning converter until second plug is downward and removing this plug. Re-install and tighten all drain plugs. Install 3 quarts of recommended oil through filler opening in case. Start engine and allow it to idle with control lever in Parking "P" position, add additional oil to bring level up to point 1¾" below "FULL" mark on oil gauge rod. Recheck oil level after transmission warmed up. Oil level should then be at full mark on rod.

►***CAUTION—DO NOT FLUSH transmission when changing oil.***

Capacity—10 qts. *NOTE*—1¾ pints additional required if transmission completely dry (after overhaul, etc.).

Recommended Oil—Use only "Special Buick Oil for Dynaflow Drive" or "Automatic Transmission Fluid, Type A" with AQ-ATF number embossed on can.

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DYNAFLOW DRIVE (Cont.)

LINKAGE ADJUSTMENT

►*THROTTLE LINKAGE ADJUSTMENT NOTE:* The throttle operating rod contains an adjustable spring loaded stretch link which may be optionally adjusted to provide "overtravel" for delayed action of the variable pitch stator In production the stretch link is locked solid to eliminate overtravel and the throttle linkage is adjusted so the stator shifts to high angle performance position just as wide open throttle is reached If car is operated consistently at high speed it may be preferred to have the high angle shift occur after wide open throttle is reached In this case, "overtravel" may be obtained as outlined in "Adjustment with Overtravel" below ***CAUTION—Adjust throttle linkage WITHOUT overtravel on all Synchro-mesh cars.***

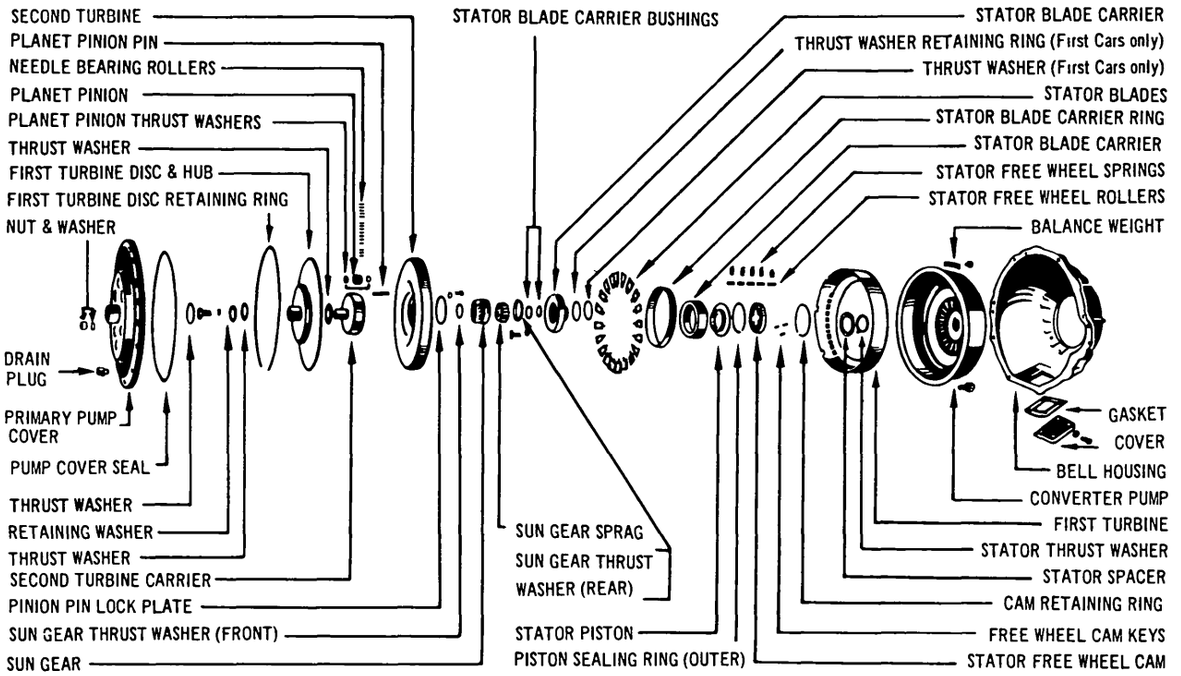
►*SHIFT CONTROL VALVE ADJUSTMENT CHANGE* The method of adjusting the shift control valve has been changed *See "Reaction Shaft Flange, Front Pump & Accumulator Installation" under Reassembly.*

►*STEERING COLUMN (SHIFT CONTROL) RATTLE CORRECTION*· Adjust manual shift control linkage EXACTLY as indicated in "Manual Shift Control Linkage Adjustment" below, to obtain a clearance of 035- 050" between stop screw and upper edge of large opening in stop plate If a "buzzing" sound or rattle continues to persist it may be caused by control shaft return spring vibrating and can be detected by moving transmission control lever toward steering wheel If this stops the "buzzing" or rattle, while lever is raised the trouble is in the spring and can be corrected by coating the spring with underbody sealer using a stiff bristle brush

BUICK LINKAGE ADJUSTMENT: ***Make adjustments in order and exactly as follows:***

Manual Shift Control Linkage Adjustment: 1) With shift control lever released, the stop screw in control shaft lower lever must be flush (± 010") with upper surface of stop plate Adjust as required
2) With shift control lever in "D" (drive) position, 035- 050" clearance must exist between lower lever stop screw and upper edge of large opening in stop plate (since this clearance cannot be readily checked, because of location, it may be assured by carefully performing the following adjustment)
(a) Disconnect lower shift rod clevis from idler lever and make sure that transmission shift lever is firmly held by detent in "D" position
(b) With shift control lever on steering column in "D" position, push upward on the lever to hold stop screw in contact with stop plate, then adjust clevis in shift rod so that clevis pin will freely enter clevis and lever
(c) Shorten length of rod by turning clevis 2 to 3 turns up on rod, then install clevis pin with anti-rattle washers and tighten clevis locknut The number of turns at the clevis provides a specified clearance at the stop pin
3) Park car on ramp or other slight grade with the control lever in "P" (parking) position to determine whether parking lock holds securely Then let car roll with control lever in "N" (neutral) position and listen for a clicking or ratchet noise which indicates that the parking lock pawl is contacting the parking lock ratchet wheel If parking lock fails to hold or ratchet noise exists, jack car up so that a wheel may be turned to rotate propeller shaft
4) Loosen linkage adjusting lever lock bolt on side of rear bearing retainer With transmission in "N" (neutral), tap rear end of lever upward until a slight ratchet noise is heard when propeller shaft is turned, then tap lever down just enough to eliminate the noise Tighten lock bolt securely making certain that lever does not change position
5) Set parking brake to prevent rear wheels from turning then start engine, with car still safely jacked up
6) With transmission warmed up and engine idling at approximately 600 RPM, slowly move control lever from "N" to "D" position The clutch should engage, as indicated by an immediate decrease in engine speed when center of dial pointer is midway between "N" and "D" on dial
7) Slowly move control lever from "D" to "N" position Clutch should disengage, as indicated by an immediate increase in engine speed, when center of dial pointer is midway between "D" and "N" on dial
8) If points of clutch engagement and disengagement are not as specified, and all preceding linkage adjustments have been made correctly, it will be necessary to remove transmission oil pan, suction screen, and adjust position of shift control valve as described in "Valve & Servo Body Installation" under "Reassembly" below

Throttle Linkage Adjustment: With floor mat properly installed and all throttle linkage well lubricated and operating freely, adjust throttle stopscrew for proper HOT idling speed of 450 RPM Turn engine off and check operation of unloader (adjust if necessary), proceed as follows
1) Disconnect throttle return spring and throttle operating rod from lever on equalizer shaft Back off stator pick-up lever adjusting screw until screw end is flush with lever surface
2) Adjust throttle operating rod in rod end at carburetor so that approximately ⅝" of thread is exposed, then tighten locknut
3) **For Adjustment Without Over-travel**—Turn rear end of throttle operating rod until stretch link is locked While another person presses accelerator pedal firmly against the floor mat, hold throttle lever in wide open position and hold rear end of operating rod at hole in throttle lever Rod must be approximately 1/16" **short** of entering hole in lever Change position of lever on shaft as required to obtain this condition, then tighten clamp bolt securely
4) **For Adjustment With Over-travel**—Turn rear end of throttle operating rod until rod can be stretched approximately 7/16" against tension of stretch link spring, measured at forward end of link While another person holds throttle UPWARD as far as possible, hold throttle lever closed to HOT idle position and hold rear end of throttle operating rod at hole in throttle operating lever Rod must extend 1/16" BEYOND hole in lever Change position of lever on shaft as required to obtain this condition, then tighten clamp bolt securely
5) Connect operating rod to operating lever, snap retaining clip over rod and connect return spring



VARIABLE PITCH DYNAFLOW TORQUE CONVERTER & BELL HOUSING

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

With throttle closed to HOT idle position, check clearance between equalizer shaft lower lever and the stop lug in the shaft-to-cowl mounting bracket. A minimum clearance of 1/16" must exist at this point.

6) Hold choke valve closed while accelerator pedal is pressed to floor mat to check operation of unloader. If clearance between lower lever and stop lug is less than 1/16", or choke unloader does not operate properly, readjust the operating rod length at rod end on throttle lever or change position of upper lever on equalizer shaft one serration at a time until proper settings are obtained.

7) Depress accelerator pedal firmly against floor mat, then turn stator pick-up lever adjusting screw against stator operating lever, raising lever until all vertical play is removed from stator operating control rod. Turn screw back ½ turn to provide a slight clearance between stator control valve operating lever and its stop on high accumulator.

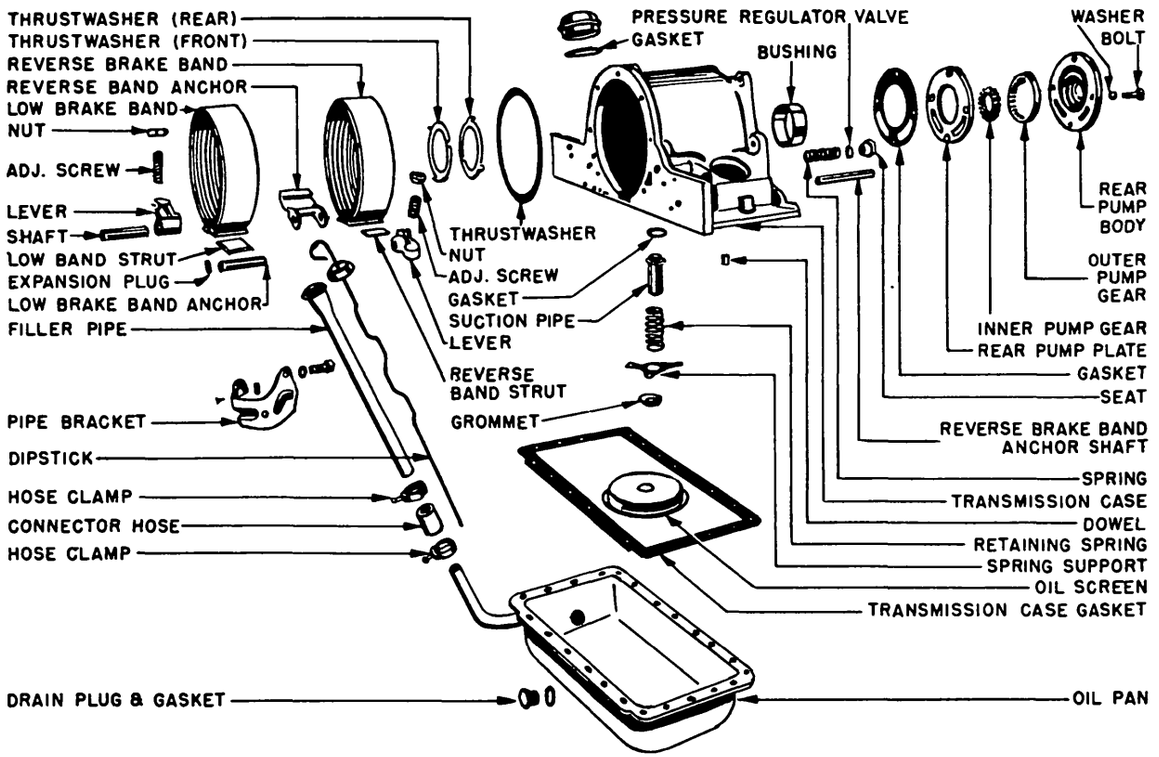
8) Finally check for smooth operation of linkage from fully closed to wide open position of throttle valve. Make sure that throttle closes firmly against stop screw. ***NOTE—On Dynaflow Cars (Without Over-travel), and on Synchro-mesh Cars, throttle valve should be wide open when accelerator pedal strikes floor mat. On Dynaflow Cars (With Over-travel), the stop on throttle lever must strike boss on throttle body before accelerator pedal can be pressed to floor against tension of stretch spring.***

Dashpot Adjustment: Adjust dash pot only after throttle linkage has been adjusted and engine is at normal operating temperature. Rotate fast idle cam to extreme cold idle position (choke closed), hold throttle lever against a .030" feeler gauge placed between stop screw and highest step of fast idle cam. Adjust dash pot until it just clears arm of throttle lever, tighten lock nut. With transmission in Direct Drive and brakes firmly applied speed engine up to about 1500 RPM and immediately release throttle, noting engine operation as throttle valves close. If engine stalls from too rapid closing of throttle valves, move dash pot forward until its action prevents engine stalling. If excessive time is required for throttle valves to reach closed position, move dash pot rearward. Tighten lock nut after each adjustment. If proper control cannot be obtained by adjustment, replace dash pot.

Starter Vacuum Switch: If operation not correct after carburetor linkage and dash pot adjustments made, *See Carburetor Equipment Section for complete data.*

N utral Safety Switch & Back-Up Light Switch: Located on steering column jacket under cowl and is actuated by transmission control shaft.

N utral Safety Switch Adjustment: With manual control linkage properly adjusted, ground primary terminal of distributor so that engine can be cranked without firing. Fully apply parking brake and place transmission control lever in "N" (Neutral) position. Place a narrow strip of masking tape on speed ratio dial so that upper end of dial pointer is visible. Make two marks on masking tape at ⅛" and 3/16" from center of pointer. Move control lever to "D" (Driving) position, turn ignition on and depress accelerator pedal to close accelerator vacuum switch. Slowly move dial pointer from "D" to "N" and note position of **center** of pointer at instant cranking motor just starts to operate. Release accelerator pedal. The **center** of the pointer should be between the two marks made on masking tape. If switch does not cut in within the specified limits, loosen switch mounting screws and move switch sideways as required for proper timing. Tighten mounting screws.



VARIABLE PITCH DYNAFLOW TRANSMISSION CASE, OIL PUMP, & SERVO BAND ASSY.

►***BACKING SWITCH NOTE***—No separate adjustment required (switch operation will be correct when neutral safety switch properly adjusted).

Switch Wiring—Check wire connections on switch terminals for correct wiring (incorrect wiring may allow starter to crank with lever in other positions than Neutral or Park—may engage when shifting from Low to Drive during heavy pull), or backing lights may operate with shift lever in other than Reverse. Switch connections from Right to Left (viewed from driver's seat) should be:

►***SWITCH WIRING CAUTION: Switch must be wired correctly and control lever stop plate must be correctly positioned for correct switch operation as follows:***

No. 1 (Right)—Black wire (to backing lights).

No. 2—Light Blue wire (to #1 terminal on fuse block).

No. 3—Pink wire (to Ignition Switch).

No. 4 (Left)—Yellow (to starter switch on carburetor).

BAND ADJUSTMENT

►***BAND ADJUSTMENT CAUTION—Bands cannot be adjusted with transmission in car and adjustment ordinarily required only when transmission overhauled. BANDS MUST BE CORRECTLY ADJUSTED BEFORE TRANSMISSION INSTALLED IN CAR.***

LOW & REVERSE BAND ADJUSTMENT: Both bands are adjusted alike as follows:

(1) Remove band adjusting covers and gaskets from upper right (Low), and left (Reverse) of transmission case.

(2) Loosen locknut and turn adjusting screw clockwise until considerable resistance felt indicating that band in full contact with drum or ring gear.

(3) Back off screw until trace of endplay noted when prying up on locknut with screwdriver, **then back off screw additional six turns,** hold screw from turning and tighten locknut snug.

(4) Note position of adjusting screw slot, use torque wrench to tighten locknut to 20-25 ft. lbs., check screw slot to make certain that screw position not changed.

(5) Install band adjusting cover **using new gasket.**

CONTINUED N NEXT PA E

DYNAFLOW DRIVE (Cont.)

TESTING

If performance not satisfactory, make following tests with transmission thoroughly warmed up and at operating temperature:

Oil Level: Check oil level, add fluid as necessary to bring level up to FULL mark on dipstick, recheck performance with correct oil level. If car has been losing oil at rate of 1 pint or more each 1000 miles, make thorough check for oil leaks.

Manual Control Linkage: Check and adjust manual control linkage. See Linkage Adjustment.

Hydraulic Control System Pressures: Use Transmission Oil Pressure Gauge J-2575. Support rear end of car solidly with wheels off floor so that transmission can be operated. Remove transmission cover in floor pan for access to pressure take-off points.

Connect gauge and make tests as follows:

Front Oil Pump—Connect pressure gauge at pipe plug opening on left side of reaction shaft flange. Run engine at 500 RPM., check pressure with selector lever in Low, Drive, and Reverse range. Repeat tests at 1000 RPM. and at 1800 RPM. in Low and Drive Range only. See table below for correct pressures. Low or erratic pump pressure indicates air leaks in suction line, improper pressure regulator valve action ,or excessive pump clearances.

Front Oil Pump Pressures

Selector Lever—	Low	Drive	Reverse
500 RPM	120 lbs.	90 lbs.	120 lbs.
1000 RPM	180 lbs.	90 lbs.	
1800 RPM	180 lbs.	90 lbs.	

Rear Oil Pump—Connect pressure gauge at pipe plug opening in lower flange at front end of rear bearing retainer. Run engine at 500 RPM., check pressure with selector lever in Low & Drive Range. Repeat test 1000 RPM. and 1800 RPM. See table below for correct pressures. Low or erattic pump pressures indicate air leaks in suction line (this will affect both pumps), improper pressure regulator valve action, excessive pump clearances or leaks in valve and servo body passages between pump and regulator valve.

Rear Oil Pump Pressures

Selector Lever—	Low	Drive
500 RPM	90 lbs.	90 lbs.
1000 RPM	180 lbs.	90 lbs.
1800 RPM	180 lbs.	90 lbs.

High & Low Accumulator—Connect pressure gauge at pipe plug opening on top of accumulator body (High—left side of car); (Low—right side of car). Place selector lever in Drive Range (High Accumulator Test); Low Range (Low Accumulator Test). Run engine and check pressures at speeds indicated in tables below. Low accumulator pressure may be caused by leakage past accumulator body gasket. If accumulator pressure more than 10 lbs. lower than front pump pressure, check for leakage between accumulator and multiple disc clutch and for restricted or plugged metering orifice in accumulator dump valve.

Accumulator Pressures

Selector Lever—	Low	Drive
500 RPM	115 lbs.	80 lbs.
1000 RPM	175 lbs.	85 lbs.
1800 RPM	175 lbs.	85 lbs.

Stator—Connect pressure gauge at pipe plug opening on left end of reaction shaft flange. Test pressure in Drive range at 500 RPM, 1000 RPM, and 1800 RPM.

Stator Pressures

Selector Lever—	Drive
500 RPM	70 lbs.
1000 RPM	75 lbs.
1800 RPM	75 lbs.

TROUBLE SHOOTING

▷*EXCESSIVE DYNAFLOW WHINE CORRECTION: (This condition is usually the result of excessive clearance between input shaft and bearing in the reaction shaft).* If transmission is to be disassembled to correct whine, perform the following:

1) Remove converter cover, twin turbine assembly, and sun gear, then mount dial indicator on end of input shaft with indicator button contacting reaction shaft. Position indicator button 90° to left of top center (facing end of shaft) then move input shaft away from and toward indicator while noting the gauge reading. Repeat this check at 45° to left of top center. If dial reading exceeds .005", excessive clearance exists between input shaft and bearing in reaction flange.
2) Before replacing bearing, remove reaction flange assembly and input shaft and observe the following: (a) Inspect bearing surface on input shaft. If surface appears abnormally rough or scored, replace input shaft; if not, polish journal area with crocus cloth. (b) Inspect the two oil seal rings toward rear of input shaft and the mating surface in the reaction shaft for scoring or other damage. If reaction shaft or input shaft shows evidence of scoring or other damage, replace worn or damaged parts.
3) If inspection reveals that condition of reaction shaft and input shaft are satisfactory, replace only the input shaft bearing (see Overhaul data).
4) If input shaft, reaction flange, or the bearing requires replacement, it will be necessary to replace the converter sun gear and planet pinions. *NOTE*—When installing reaction flange service bushing, be sure the assembly is supported on rear end of reaction shaft to prevent distortion of aluminum reaction flange.

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) With selector in any Range (rear wheels free). If car will not move for 1-5 minutes after standing over night—Check front pump oil pressure (see Testing) after allowing car to stand for several hours. If zero pressure noted, check pump for excessive clearances allowing pump to lose its prime. Check alignment of bell housing and converter primary pump hub.

▷*CAUTION—If this condition found, inspect Clutch and Bands for excessive wear due to slippage caused by low oil pressure.*

If car will not move after extended operation in Reverse—Check for air leaks in pump suction line (at rear oil pump gaskets), or excessive clearance in front pump (at pump gears and covers). Check alignment of bell housing and converter primary pump hub.
2) With selector in any Range (rear wheels locked). Parking lock engaged. Broken parts in transmission or rear axle. Parking brake applied.
3) With selector in Drive Range. Check front oil pump pressure and High Accumulator pressure. If OK, check for sticking Low Band Anchor Piston, remove and inspect Clutch for worn or sticking clutch plates, leaking clutch seal rings. If High Accumulator pressure low, also check rear pump Check Valve for correct installation and proper seating, check for leaks at accumulator body gasket, reaction flange gasket, clutch piston outer seal and clutch ball check valve, and leaks at sealing rings on reaction shaft flange and low drum.
4) With selector in Reverse Range. Check reverse band for displaced operating strut caused by too loose adjustment, improper installation, or broken band anchor (indicated by free up and down movement of band operating lever). If band assembly OK (no free movement of lever), check servo operation by running engine and shifting into Reverse. Remove Valve & Servo Body and check for reverse servo piston seal leaks.

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, or poor acceleration).
1) In all Speed Ranges. Low oil level. Incorrect manual control linkage adjustment. Air leak in oil pump suction pipe at oil screen sealing ring. Low front oil pump pressure caused by wear or excessive clearances in pump. Leaks at front pump cover or reaction shaft flange, pressure regulator valve, Valve & Servo Body gasket. Pressure regulator valve defective.
2) In Drive Range. Incorrect manual control linkage adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, check for leaking clutch sealing rings, sticking clutch piston, worn or sticking clutch plates.
3) In Low Range. Incorrect manual control linkage adjustment. Incorrect low band adjustment. Low band and drum worn or scored. If Low Accumulator pressure low, check for leak at accumulator body gasket; if gasket OK, remove Valve & Servo Body and check for gasket leaks or leaks at low servo piston seal.
4) In Reverse Range. Incorrect manual control linkage adjustment. Reverse band out of adjustment, strut out of place, or anchor broken. If front oil pump pressure low, remove Valve & Servo Body and check for gasket leaks and leaking reverse servo piston seal.

CAR CREEPS (Forward or Backward).
1) Creeps forward with selector in Neutral. Incorrect manual control linkage adjustment. Sticking low servo piston (check by removing low band adjustment cover). Sticking clutch caused by warped, binding, or incorrectly assembled clutch plates (not stacked properly with "dish" in same direction).
If Car Creeps only when engine accelerated to 2500 RPM—Check clutch vent ball checks in clutch piston and reaction shaft flange.
2) Creeps forward with selector in Reverse or backward with selector in Low. Incorrect manual control linkage adjustment.

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

SHIFTS ARE ROUGH.

1) Low-to-Drive Shift. Incorrect Low Band adjustment. If High Accumulator pressure low, check for leak at accumulator body gasket and for dump valve or accumulator piston sticking down (top land of piston should be visible through top port in body). Sticking low band anchor piston (remove Valve & Servo Body to check), or incorrect piston location (see piston shimming data in Valve & Servo Body Reassembly). Valve & Servo Body gasket leaks. Clutch plates worn or binding.

EXCESSIVE CHATTER OR CLUNK WHEN STARTING

►*CAUTION—Slight "clunk" when shifting into Low or Reverse is normal, and slight chatter when car starting to move in reverse (disappearing as soon as car in motion) is also normal.*

1) In Low & Reverse Range. Incorrect Low or Reverse Band adjustment. Engine and transmission mountings loose or incorrectly adjusted, thrust pad at transmission mounting broken (see Engine Mountings in Buick Special Data). Clutch plates warped, sticking, or incorrectly assembled (not stacked properly with "dish" in same direction). Reverse ring gear bushing worn. Planet pinion needle bearing rough.

NOISE IN TRANSMISSION.

►*CAUTION—Hum or low whine in Neutral or Parking is normal (due to free rotation of all planetary gears) and slight hum in Low and Reverse may be expected.*

1) Buzzing Noise. Low oil level. Front pump check valve hanging up on edge of gasket between valve and servo bodies. If noise noticed in Parking or Neutral, pressure regulator valve clearance in body may be excessive or orifice in valve land oversize (correct by replacing valve and body).

2) Clicking Noise. If noticed in all ranges, may be caused by foreign material in converter. If noticed only when car in motion, may be caused by parking lock pawl contacting ratchet wheel due to incorrect manual control linkage adjustment.

3) Abnormal Hum or Whine (see Caution above). If noted in all ranges, may be caused by worn parts or excessive front pump clearances (front pump noise will increase in Low and decrease at car speeds above 45 MPH. in Direct Drive). Check front pump for excessive clearances by testing for low pump pressure. If noise noted in all ranges except Direct Drive, may be caused by trouble in planetary gears (gears locked out in Direct Drive).

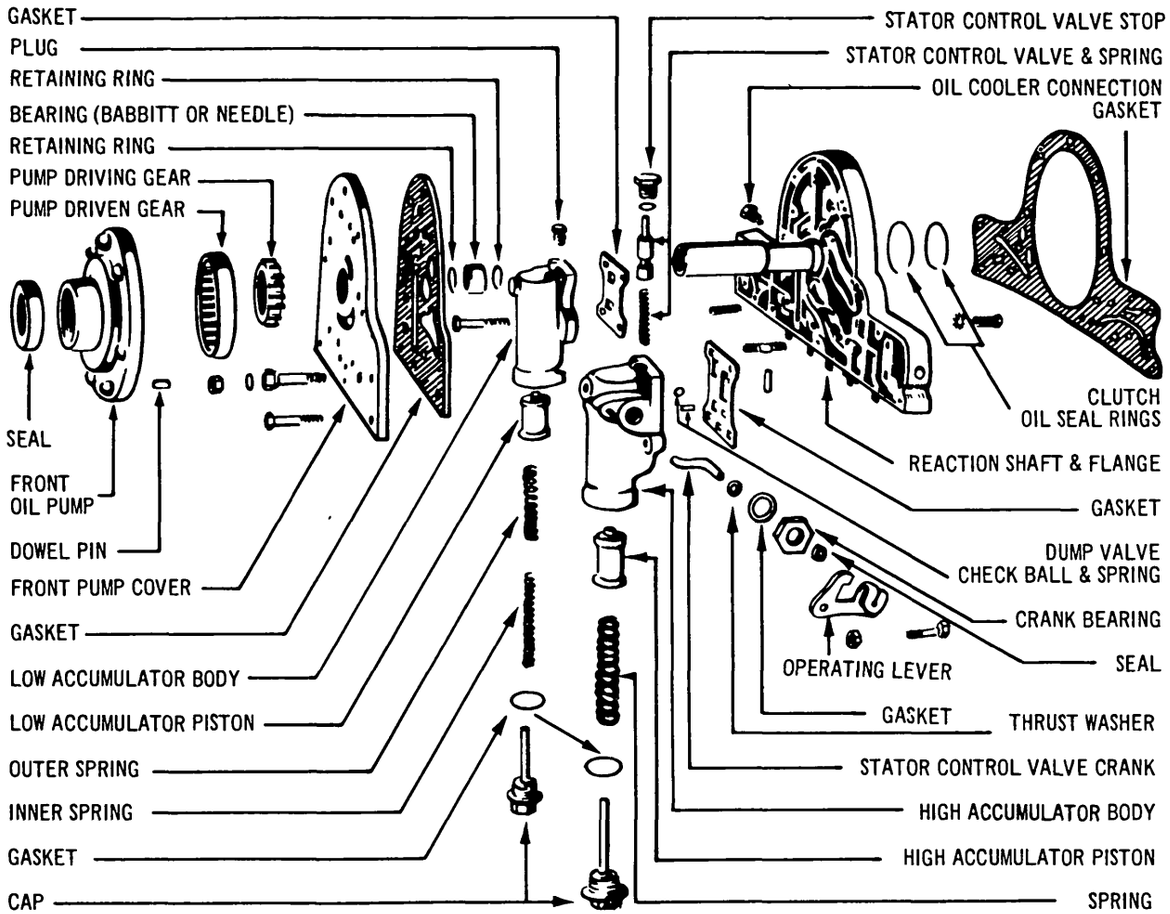
4) Squealing or Screeching following installation of Front Oil Pump. Pump driving gear installed backward.

►*CAUTION—Above condition must be corrected WITHOUT FURTHER OPERATION OF TRANSMISSION or severe damage will result.*

REMOVAL FROM CAR

Transmission and torque converter are removed as an assembly as follows:

1) Raise car so that frame side rail is at least 20" off floor and place stands at front and rear to support car.



VARIABLE PITCH DYNAFLOW REACTION SHAFT FLANGE, ACCUMULATORS, & FRONT OIL PUMP ASSY.

2) Disconnect torque tube from torque ball and move rear axle back to disengage propeller shaft from universal joint. Remove cranking motor splash pan, bell housing cover and bell housing hand hole cover.

3) Drain converter and transmission. Mark position of converter on flywheel to assure installation in same position and remove bolts attaching converter to flywheel. Disconnect pipes from oil cooler and disconnect cooler from transmission from rear mounting thrust plate. Remove cooler. Disconnect oil filler pipe at rubber hose and disconnect exhaust pipe hanger at right accumulator. Disconnect shift rod and speedometer cable at transmission.

4) Support transmission with a jack or hoist and remove four bolts attaching thrust plate to rear bearing retainer, then remove two nuts and plate which attach mounting pad to transmission support.

5) Raise engine and transmission just enough to relieve load on transmission support. Remove bolts attaching both ends of support to frame, then remove support and thrust plate as an assembly. *CAUTION*—If shims are found at this point, note their number and location so they can be reinstalled in the same position.

6) Support engine at rear end of lower crankcase so it will be supported while transmission is removed. *CAUTION—Do not use bar with hooks placed over frame side rail. Brake lines will be damaged.*

7) On cars with air-conditioning, disconnect discharge and suction lines at compressor. This will avoid damaging flexible couplings when engine is raised and lowered.

8) Lower the transmission just enough so that bell housing bolts can be reached, then remove bell housing to crankcase bolts. Move transmission rearward to disengage hub of converter pump from crankshaft, lower transmission and remove it from beneath car.

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (Cont.)

DISASSEMBLY

▷**DISASSEMBLY CAUTION:** ***CLEANLINESS IS EXTREMELY IMPORTANT when disassembling and working on transmission. Thoroughly clean exterior before disassembling, use CLEAN tools on CLEAN workbench, provide CLEAN storage space for all parts, and separate parts to avoid nicking or burring of ground and polished surfaces.***

DISASSEMBLY OF TRANSMISSION (into Major Components): With transmission on bench, first remove shift lever by taking off retaining nut and washer on shaft while holding lever forward (to avoid strain on linkage), remove oil cooler and pipes if this unit removed with transmission, remove both band adjusting covers and gaskets using Remover Tool J-2655. Remove both pipe plugs in primary cover to completely drain converter, then place transmission on bench with oil pan upward and remove various sub-assemblies as follows:

Converter & Bell Housing Removal: 1) Remove all nuts, plain washers, and bolts attaching cover to converter pump then remove cover Check cover seal for damage or evidence of oil leakage before removing it from cover Shift into "Parking" and pry up on reverse band operating lever with a screw driver to lock input shaft while removing the bolt, lockwasher, retainer washer and thrust washer from front end of input shaft

2) Insert a screwdriver into the first turbine disc to aid in removing the twin turbine assembly from input shaft Remove bronze thrust washer from turbine hub

3) Turn sun gear clockwise to make sure it free wheels, then turn it counter-clockwise to make sure it locks in this direction Remove sun gear assembly with thrust washer from reaction shaft

4) Install tool J-5806 over input shaft with beveled end outward Pull stator forward on reaction shaft, grasp thrust washer located behind stator to retain all free wheel parts in stator, then slide the assembly forward on the tool and remove from input shaft Pull converter pump forward from the reaction shaft and immediately check for evidence of oil leakage Radial streaks of fresh oil on back of pump and fresh oil streaks on face of front oil pump body indicate leakage past the oil pump seal

5) Before removing bell housing check to see whether all attaching bolts are tight Loose bolts may be cause of oil leakage at this point Put bell housing over edge of bench and remove it Examine rubber oil seal located around front oil pump to see whether it has been uniformly compressed by the bell housing, if not, check for any obstacle that may be around the oil pump or opening in bell housing that would prevent compression of the seal *See Overhaul data for disassembly of converter stator and pump.*

Oil Pan and Valve & Servo Body Removal: *(For removal of only the valve and servo body assembly, the converter and bell housing need not be removed. The following procedure also may be used with transmission in car).*

1) Remove shift lever to avoid damage to valve operating lever Hold lever forward while removing the retaining nut and lock washer so that linkage will not be strained, then remove lever from cross shaft Remove both band adjustment covers and gaskets using tool J-2655 (if not already done)

2) Turn transmission bottom side up, rolling it over on left side to avoid damage to oil pan filler pipe Remove oil pan and gasket Lift oil screen away from the suction pipe to which it is held by a rubber grommet snapped into hole in screen body Remove suction pipe spring support, retaining spring, suction pipe and cork gasket which seats in recess in servo body

3) Disconnect valve operating rod from valve operating lever (upper) by placing a screwdriver on rod close to lever and exerting slight pressure A spring loaded socket on rod engages a ball stud on lever Slightly loosen all valve and servo body attaching bolts, then remove bolts and lockwashers *CAUTION —Do not loosen or remove the slotted safety nuts on valve-to-servo body studs.*

4) Lightly pry upward on assembly to free gasket between servo body and transmission case Push shift control valve and lower operating lever inward to align lower lever with opening in transmission case, then remove the assembly *(CAUTION —Do not grasp slotted end of control valve because sharp edges may cut hand).* Remove gasket and check for indications of oil leakage

5) Remove reverse band operating strut by extending fingers through adjustment hole to prevent strut falling into transmission case, then release strut by raising the operating lever *See Overhaul data for disassembly of valve and servo body.*

Reaction Shaft Flange, Front Oil Pump and Accumulator & Clutch Removal: *(Converter and bell housing and the valve and servo body must be removed first).*

1) Remove retaining ring from groove in input shaft Loosen, but do not remove caps on both accumulators Remove bolts which attach accumulators and oil pump cover but do not remove the stud nuts which attach these parts

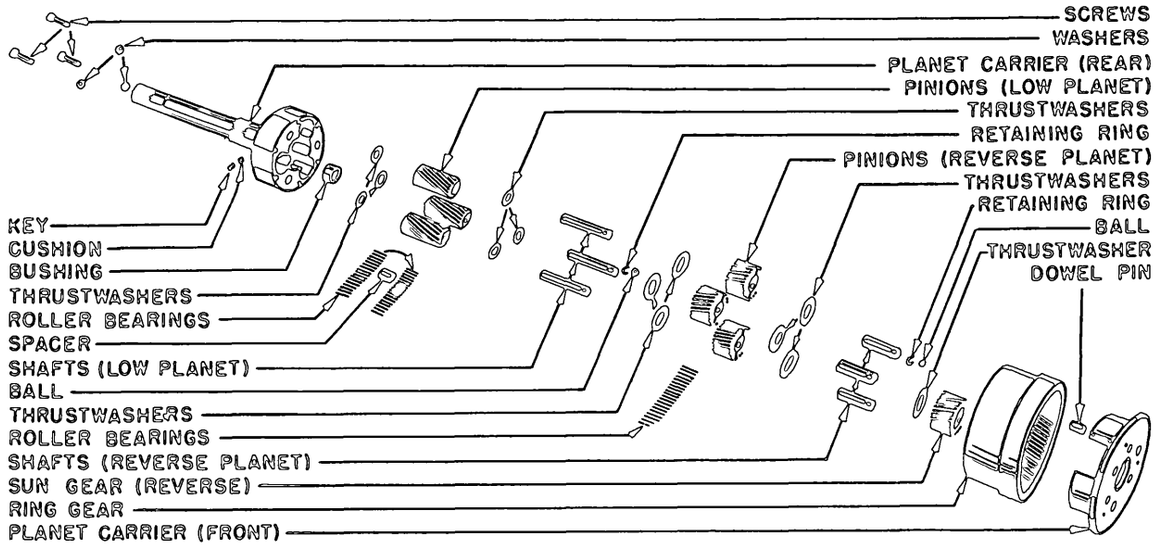
2) Tap very lightly on rear of accumulator bodies with fiber hammer to loosen reaction shaft flange, then remove the assembly and gasket Leave input shaft in place in transmission Check reaction flange gasket for good imprint and freedom from damage which would cause oil leak at this point

3) Pull input shaft and clutch hub front thrust washer from clutch assembly, then remove clutch assembly

4) Compress low band with operating lever while applying Band Clip tool J-2595 across strut flanges of band Release lever and remove low band, then remove struts which will drop into case Remove low band operating lever by threading a ¼"—20 capscrew into lever shaft and pulling shaft from case *See Overhaul for disassembly of above parts.*

Torque Ball & Universal Joint Removal: *(Does not require removal of any other parts first).* Remove torque ball rubber boot Take out attaching bolts in thrust plate, remove thrust plate and gasket, torque ball inner and outer retainers, and paper adjusting shims Remove speedometer driven gear and sleeve assembly Lock drive shaft by engaging parking pawl (use shift lever to press forward on shift lever shaft while turning universal joint, until pawl engages), remove universal joint bolt, lockwasher and flat washer, pull universal joint using puller J-682A

Rear Bearing Retainer & Parking Lock Ratchet Wheel Removal: *(Universal Joint, Oil pan, and Torque Ball must be removed first).* Disconnect valve operating rod from upper operating lever by inserting screwdriver through hole in case and pressing rod away from lever (ball stud on lever engages socket in rod) Remove universal joint retaining ring from slot in output shaft using a screwdriver and hammer to free ends of this lock ring Take out retaining bolts and remove rear bearing retainer and gasket and check gasket for evidence of oil leakage Take out ratchet wheel outer retaining ring (use snap ring pliers to free ring) *See Overhaul data for disassembly of rear bearing retainer.*



VARIABLE PITCH DYNAFLOW TRANSMISSION PLANETARY ASSEMBLY

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

Rear Oil Pump and Lubrication Oil Pressure Regulator Valve Removal: ***Rear Bearing Retainer (preceding) must be removed first.*** Take out retaining bolts and remove pump body and gears as an assembly. Check gaskets for evidence of oil leakage. Remove pump drive key from shaft recess, remove rubber cushion located under drive key with a pointed tool. If possible, lift off rear pump plate and gasket (if plate sticks, tap plate out **after planetary gear set removed**). Check gasket for evidence of oil leakage. Remove lubrication pressure oil regulator valve seat from rear face of transmission case (use special drag link socket to turn valve seat out), remove valve and spring.

Planetary Gear Set, Reverse Ring Gear, and Reverse Brake Band Removal: ***All parts listed in preceding removal sections must be removed first.*** Pull planetary gear set out through front of transmission case. Lift out reverse ring gear and two planet carrier thrust washers (if these parts did not come out with planetary gear set). If rear oil pump plate and gasket not removed previously (see above), tap out with hammer handle inserted through front of case. Remove reverse band operating lever by threading a ¼"-20 capscrew into tapped hole in anchor shaft and pulling shaft out, then lift out lever. Rotate reverse band toward adjusting hole until anchor accessible, disengage and lift out anchor. Compress reverse band and install Band Installing Clip J-2595 across strut flanges to hold band compressed, lift band out. ***See Overhaul data for disassembly of Planetary Gear Set.***

OVERHAUL

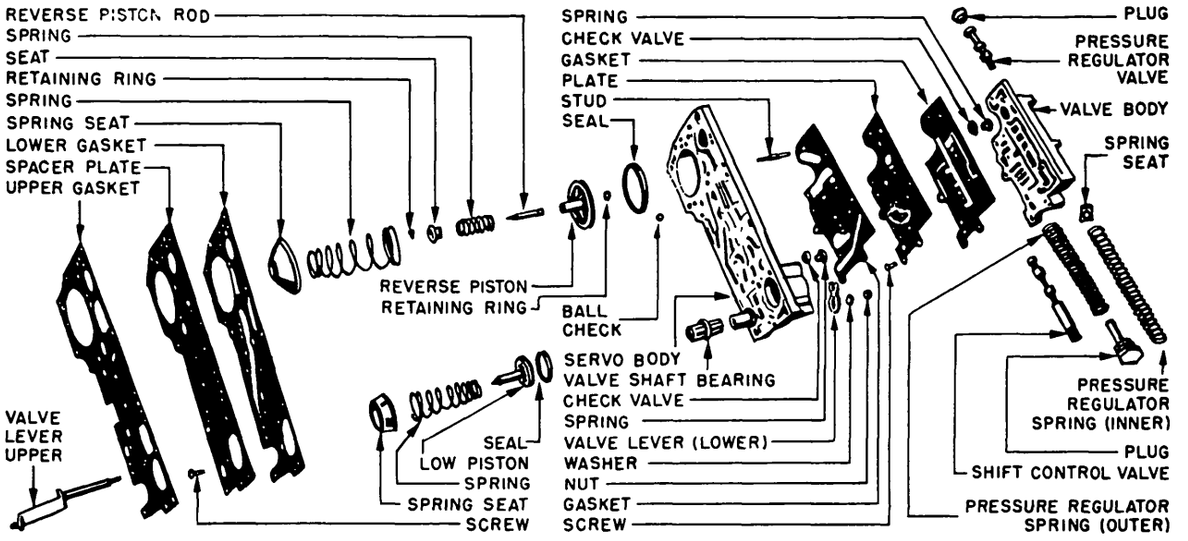
►***SHIFT CONTROL VALVE PRODUCTION CHANGE:*** Three control valves have been used in production, all of which are interchangeable. The valves are identified as follows: First (no extension), Second (plain extension), Third (grooved extension).

►***EXCESSIVE DYNAFLOW WHINE CORRECTION: (This condition is usually the result of excessive clearance between input shaft and bearing in the reaction flange). See "Trouble Shooting" above.***

►***CONVERTER COVER PRODUCTION CHANGE:*** A later type converter primary pump cover having three impeller blades replaces the former type having impeller ribs completely around the cover. Either type can be used for service replacement.

►***REACTION SHAFT & FLANGE, INPUT SHAFT, AND FRONT END REACTION SHAFT BEARING PRODUCTION CHANGE & SERVICE REPLACEMENT CAUTION:*** A new needle bearing is now used in production in the front end of the reaction shaft. The new type bearing has a larger inside and outside diameter and cannot be used as a service replacement for the babbit type bearing used in early production. The needle type bearing made necessary a change in reaction shaft & flange, and input shaft. In order to service a first type transmission to use the new bearing it will be necessary to replace the above parts. ***See Overhaul data below for removal and installation of the later type bearing.***

►***PRIMARY PUMP COVER SEAL NOTE: Both a .120" and a .135" diameter oil seal have been used in production. Either type may be used for service replacement.***



VARIABLE PITCH DYNAFLOW VALVE & SERVO BODY ASSEMBLY

►***VARIABLE PITCH STATOR PISTON PRODUCTION CHANGE:*** The crank thrust washer and retaining ring have been eliminated in later production which necessitates the use of a special fixture (made locally) for reassembly. ***See Overhaul data below for assembly procedure and fabrication of fixture.***

Converter Twin Turbine & Sun Gear: Disassembly—Pry retaining ring out of groove in first turbine, insert screwdriver in hole in the disc and lift disc and hub assembly out of first turbine. Lift second turbine and carrier out of first turbine. Remove four bolts and lockwashers and the pinion pin lock plate from second turbine (it is not necessary to remove turbine from carrier at this time). Remove pins, then remove the four planet pinions and thrust washers from turbine carrier. Remove bearing rollers from each piston. Remove thrust washer (with tangs) from front face of sun gear and carefully tap the cupped thrust washer from other end. Remove the sprag (free wheel clutch) from inside of sun gear.

Converter Variable Pitch Stator: Disassembly—Remove stator thrust washer and selective spacers from rear side of stator, remove tool J-5806 (installed on input shaft when converter removed from transmission), then remove free wheel rollers and springs from the cam. Pry retaining ring from groove in stator blade rear carrier, and remove free wheel cam and three driving keys. Use screwdriver, tool J-5826 to remove stator blade front carrier screws and lockwashers, then remove front carrier which is also held to rear carrier by two dowels. Remove retaining ring and thrust washer (on early cars), from hub of stator piston. Remove stator blade carrier ring and all stator blades from rear carrier. Remove stator piston with sealing ring from rear carrier.

Inspection (All Converter Parts)—Wash all parts in clean solvent and dry thoroughly. Inspect converter pump hub for scores and for wear caused by front pump seal. (If pump is suspected of leaking oil, it may be tested as described below). Inspect converter pump and turbines for cracked or damaged vanes. Inspect turbine carrier, planetary gear teeth, thrust washers, bushings and related bearing surfaces for wear, scoring or damage. Inspect stator free wheel rollers and cam for nicks or burrs, which should be removed with an Arkansas stone, and polished with crocus cloth. Discard any roller springs that are damaged or distorted. Inspect stator blades for distortion, cracks, loose on cranks, or other damage. Inspect piston oil seal ring and bore of blade carrier for scoring or wear. If bushings of carrier are worn, they should be replaced, using installer tool J-5913. If second turbine or the carrier must be replaced, use care in separating them to avoid damage to the good part With second turbine suitably supported, tap carrier free of counter-bore in turbine, using a hammer and a hardwood dowel or other soft punch ***CAUTION—Do not drive against surface of thrust boss in carrier.***

Testing Converter Pump for Leakage: ***(NOTE***—Prepare a special stopper to close opening in converter pump for testing, as follows: Using ¼" steel plate, cut a disc 3¼" in diameter and drill a ¼" hole in the center. Install a ¼" x 2¾" bolt thru hole and braze head of bolt to plate to seal bolt hole. From a piece of ⅛" rubber, make a gasket 3¼" O.D. x 1⅞" I.D. and cement this gasket to side of disc from which the bolt protrudes. Drill a ¼" hole in a piece of plate ¼" x 1" x 2" and install this on bolt, retaining it in place with a nut). To test pump, install the plate (with rubber washer) over inside surface of pump hub, securing it in place with the ¼" x 1" x 2" plate against outside surface of pump hub. Tighten clamp nut sufficiently to make stopper air tight. Install pump cover with seal and tighten all bolts to 25-30 ft. lbs., in same sequence as used for installation of torque converter (see Reassembly of Transmission below). Install one drain plug, and install a Barrett fitting No. 365 in other drain hole.

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DYNAFLOW DRIVE (C nt.)

Tighten parts securely Attach air hose to Barrett fitting and fill pump with compressed air at 80 to 100 lbs per sq in Submerge pump in water tank and check for leaks *CAUTION—After pump cover seal is used for this test, it should not be used when rebuilding the transmission.*

►*VARIABLE PITCH STATOR PISTON PRODUCTION CHANGE: The crank thrust washer and retaining ring have been eliminated in later production which necessitates the use of a special fixture (made locally) for reassembly.*

Variable Pitch Stator (First Type): Reassembly—1) Install oil sealing ring in stator piston, then tilt piston slightly to install it in bore of rear carrier, placing piston so that hub extends through flanged end of carrier Mount piston on a suitable support (such as ring of spring compressor J-2590) so that piston is held up against flange of carrier

2) With stator blade carrier ring resting on bench with holes upward, insert stator blades with concave sides upward and cranks toward center of ring Blades should be in the nearly closed position Carefully place the carrier ring with blades in position on rear carrier so that all cranks engage the groove in carrier Install thrust washer over cranks and install retaining ring in groove of piston hub

3) Place front carrier over rear carrier so that screw holes are aligned when dowels enter their holes, then install screws with countersunk external tooth lockwashers After screws are turned down snug with screwdriver tool J-5826, check stator blades and piston for smooth operation Blades should move throughout range without binding If they do not, check for misalignment of cranks in carrier grooves Tighten screws to 10-12 ft lbs , and make sure that blades still operate freely

4) Install free wheel cam with three driving keys and retaining ring in carrier Check free wheel springs and alter length as necessary to assure equal length of all springs Place free wheel rollers and springs in cam, with rollers at rounded ends of cam recesses

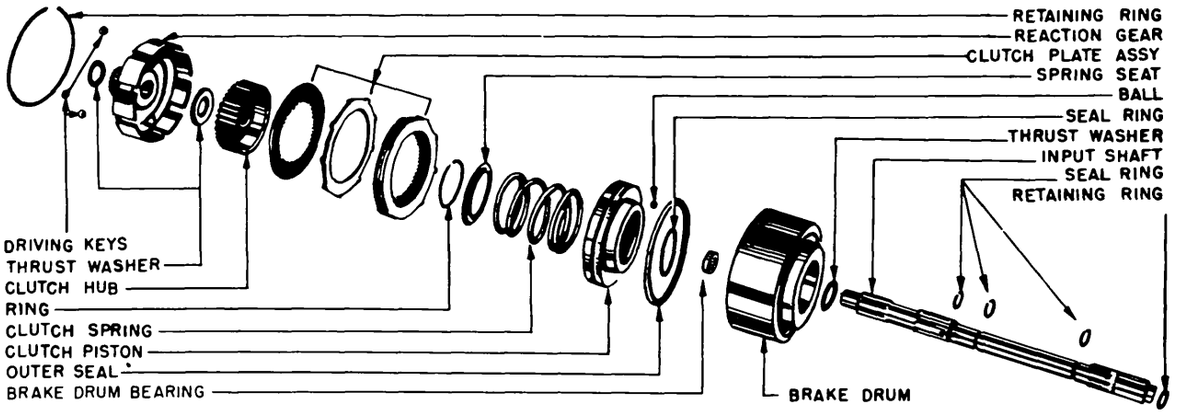
5) Install tool J-5806 through free wheel rollers by turning it slightly clockwise so that flat end of tool is flush with rollers and cam Make certain that surfaces of cam, spacers and thrust washer are free of grease and dirt, then install spacers and washer with tangs of washer extending through holes in spacers and cam

Variable Pitch Stator (Second Type): Reassembly—*NOTE—A special fixture which can be made locally is required for reassembly of the second type stator. See Stator Fixture Note below.*

1) Insert stator piston and oil seal in rear carrier and push it to the extreme forward position Place rear carrier on center block of fixture to hold piston in position

2) Place stator outer ring on two outer blocks of fixture with crank pin up Holding the blade in the approximate "low pitch" position insert the crank pin in the outer ring Then rotate the blade to bring the crank throw into the piston groove Hold the piston, blades, and outer ring together while installing the blades

3) Install the remainder of the blades, working in a clockwise direction To insert the last blade it will be necessary to tilt the adjacent three blades



VARIABLE PITCH DYNAFLOW DIRECT DRIVE CLUTCH ASSEMBLY

4) Install the front carrier and bolt into place Be sure that blades operate freely in carrier Complete the assembly of stator as indicated for first type stator (above)

►**Stator Fixture Note**—The fixture is composed of four blocks of wood as follows One piece ¾" x 3½" x 11" (base piece) One piece ¾" x 3" x 2" (center piece) Two pieces 1⅛" x 3½" x 2¼" (end pieces) Place base piece on bench and position center piece in center of base piece so that each end of center piece is ¼" from edge of base Position the two end pieces on extreme ends of base piece so they lay lengthwise across base piece flush with end and sides Stator hub will rest on center piece and ring will rest on the two end pieces for installation of the blades

Converter Twin Turbine & Sun Gear: Reassembly—1) Install sprag in bore of sun gear with shouldered end outward then carefully press the cupped thrust washer over end of gear Use a smooth flat plate or block of wood to press against washer to avoid damaging its surface

2) Install tanged thrust washer on opposite end of sun gear If second turbine was separated from the carrier, make certain that counterbored recess in turbine and mating surfaces of carrier are clean and free of burrs, and apply a film of lubricant to these surfaces

3) Support carrier on suitable blocks, install several pinion pins to serve as pilots, then place turbine in position so that carrier is squarely started into recess in turbine Use a hammer and hardwood dowel or other soft punch to tap turbine down over the carrier *CAUTION—Avoid distortion of turbine by using light blows applied midway between holes and alternated from side to side to keep parts square with each other.*

►*NOTE If turbine cannot be assembled on carrier with moderate force, remove it and check for burrs in counterbore recess.*

4) With turbine and carrier supported on wood blocks, hub side down, assemble and install the four pinions as follows Place planet pinion on a thrust washer, install 22 needle bearing rollers in pinion and place a thrust washer on top of pinion *(NOTE* —A loading tool can be made from a piece of ⅜" steel rod 11/16" long which will simplify loading and installation of pinion) Place assembled pinion in carrier and install a pinion pin with notched end up After loading tool is pushed out of carrier, slide a block under pinion pin to hold it in place Turn all pins so that notches face center of carrier

5) Install pinion pin lock plate so that it engages the notches of all pins, then install the four turbine-to-carrier bolts with lockwashers Place second turbine and carrier assembly in first turbine and install the first turbine disc and hub assembly over the second turbine

6) Rotate disc until the ring gear meshes with carrier pinions, then align driving lugs on disc with notches in first turbine and push the assembly all the way down into turbine

7) Note that turbine disc retaining ring is "dished " Place ring in position with "dish" upward so that inner edge will bear firmly against disc when ring is engaged in groove in first turbine Start one end of ring into groove in turbine, then twist ring upward to lay ring flat on disc so that it can be progressively entered into groove all the way around *NOTE—Inner diameter of ring must lay against disc.*

Valve & Servo Bodies: Disassembly—Remove safety nuts and washers from body studs, lift off valve body and gasket, examine gasket for evidence of oil leakage. Remove shift control valve from valve body and rear pump delivery check valve and spring from servo body. Remove large pressure regulator valve plug from valve body *(CAUTION*—hold plug to prevent it flying off due to heavy spring pressure), remove springs and spring seat. Remove small valve plug and lift out pressure regulator valve. Remove valve body plate and gasket, examine gasket for evidence of oil leakage. Lift out front pump delivery check valve and spring. Take off nut and lockwasher attaching upper and lower valve operating levers in servo body and remove levers. Use wooden block placed across low and reverse servo spring seats to hold them in place with springs compressed while taking out spacer plate attaching screws, carefully relieve spring pressure *(CAUTION*—use care not to spring spacer plate or allow servo springs to fly out), lift off spacer plate and gasket, examine gasket for evidence of oil leak-

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DYNAFLOW DRIVE (C nt.)

age. Lift out low and reverse servo spring seats, springs and pistons. Remove check valve from reverse servo feed channel.

Inspection—Wash valve and servo bodies and parts with clean solvent, blow out all passages and dry parts with air. Inspect bodies for cracks, damaged gasket surfaces, and scored piston and valve cylinders. Inspect valves and pistons for nicks, scores, scratches, or rounded shoulders (edges must be sharp to keep out foreign material which might cause sticking). Replace worn or damaged piston seals.

►**Piston Seal Installation Caution**—Lip on seal must fit over SMALLER diameter land on piston.

Reassembly—Install low and reverse servo pistons in servo body (CAUTION—use care not to damage seals), check to see that pistons move freely in body. Install piston springs and spring seats (small end of low servo spring in groove in piston, large end of both reverse servo springs in grooves in piston). Place check ball in reverse servo feed channel. Use new spacer plate gasket, compress servo springs and tighten all spacer plate attaching screws uniformly. Install both upper and lower operating levers with lower lever pointing to low servo cylinder and upper lever to reverse piston spring seat, tighten lever shaft nut to 15-20 ft. lbs. torque. Install front pump delivery check valve spring (large end down), and valve (ridged side up), then install valve body plate using new gasket and making sure that valve seats against plate (must not hang on gasket). Install pressure regulator spring seat, inner and outer springs, and valve plug in valve body, tighten plug to 20-25 ft. lbs. torque. Install pressure regulator valve (see that oil orifice in end land is clear and place this land outward), tighten valve plug to 20-25 ft. lbs. torque. Install shift control valve with slotted end of valve pointing toward large pressure regulator plug. Install rear pump delivery check valve (ridged face inward), and spring (large end upward). Install valve body on servo body using new gasket *(CAUTION*—see that pump delivery check valve spring below gasket), tighten all stud nuts to 11-15 ft. lbs. torque.

►**Front Pump Tightening Sequence**—Tighten nuts in following order: Top, Bottom, Right Center, Left Upper Center, Right Lower Center, Left Lower Center, Right Upper Center.

High & Low Accumulators: Disassembly—Remove retaining pin and check ball from high accumulator body (low accumulator does not have the check ball) Remove the pipe plug, cap, gasket, spring (2 in low accumulator) and piston from accumulator body. *(NOTE—Keep parts separated so same parts will be installed in same body).* On high accumulator body only, remove clamp bolt, lever, bearing with seal, gasket, thrust washer and control valve crank, then remove valve stop with gasket, control valve and spring

Inspection—Clean all parts with solvent, blow out all passages and dry with air. Check parts for excessive wear, scoring, nicks, burrs, and other damage. Remove nicks and burrs from pistons and valves by stoning but **do not round off sharp dges of pistons and valves** (edges must be sharp to keep out foreign material which might cause sticking). Check mounting face of accumulator body for flatness with a straightedge (face can be trued up by using emery cloth on a surface plate but all traces of emery must be removed). Replace accumulator assembly if body, or piston worn (these parts not furnished separately). Check piston for wear by placing it in cylinder (all parts clean and dry). Piston should slide freely as body is tilted back and forth.

Reassembly—Lubricate each piston and install it in the accumulator body from which it was removed *(CAUTION—Start piston squarely into body, do not tap or force it).* Install proper piston springs in each body The high accumulator uses one heavy spring approximately 4 5/16" The low accumulator uses one shorter heavy spring and one inner spring Install caps with new gaskets (do not tighten caps at this time) On high accumulator only, install spring, control valve and stop, then install crank with thrust washer, bearing with new gasket and seal (grooved side inward), operating lever and clamp bolt Adjust operating lever on crank so that lever contacts its stop and the crank contacts the valve without depressing the spring, then tighten clamp bolt Install pipe plugs in both accumulators and install check ball and retaining pin in high accumulator body *NOTE—Accumulator body caps will be tightened at time transmission is reassembled.*

►*REACTION SHAFT & FLANGE, INPUT SHAFT, AND FRONT END REACTION SHAFT BEARING PRODUCTION CHANGE & SERVICE REPLACEMENT CAUTION:* A needle bearing (replacing babbitted bearing) is now used in production in front end of the reaction shaft The later type bearing has a larger inside and outside diameter and cannot be used as a service replacement for the early type bearing The use of the needle bearing made necessary a change in reaction shaft and flange, and input shaft In order to service a first type transmission to use the new bearing it will be necessary to replace Reaction Shaft & Flange, Input Shaft, and Reaction Shaft Bearing

Reaction Shaft Flange & Oil Pump: Disassembly—Remove high and low accumulators from reaction shaft flange, using care to prevent the retaining pin and check ball from dropping out of high accumulator and being lost Check gaskets for indications of oil leakage Inspect input shaft bearing in front end of reaction shaft (see Production Change above) If bearing is damaged or excessively worn, remove outer bearing ring and then remove bearing, using Remover J-5822 installed on Remover J-1436 *(NOTE—Both types of bearings are removed in the same manner).* Oil pump must be in place to support the reaction flange during bearing removal If inner retainer ring remained in place in shaft make sure it is firmly seated in its groove, otherwise replace it Check front oil pump bolts to make sure they are tight (loose bolts would be the cause of oil leakage around pump) Remove front oil pump body and gears, tapping body lightly with a mallet to free it Remove front oil pump cover and gasket from reaction shaft flange, and check gasket for evidence of oil leakage If the check ball located in clutch feed passage is free to drop out, remove ball to avoid loss in handling parts. Do not remove if securely retained by peened edge of hole

Oil Pump Inspection & Repair—Clean pump parts with solvent and dry with air. Check pump gears and mounting faces of body and cover for excessive wear. Check front pump bushing for excessive wear or looseness which will require replacement of pump assembly *(NOTE*—Check flywheel and primary pump hub run-out and bell housing misalignment if bushing worn or loose). Check front oil pump seal and replace if damaged or any evidence of leakage noted. Drive out old seal, coat outside of new seal with Permatex #3, start seal in place with deep groove in retainer outward, tap seal into place with wood block and mallet. Check following clearances and replace pump parts if excessive:

Pump Gear Side Clearance—Place straightedge across face of pump body and gears. Clearance between face of gears and straightedge should be .001-.0025" (front pump), .001-.002" (rear pump).

Pump Gear Clearances—Check pump gears with feeler gauge between gear teeth and crescent while pressing gear away from crescent. Clearance should be .005-.009" (front pump driven gear), .0045-.007" (rear pump driven gear), .010-.016" (front pump driving gear), .006-.012" (rear pump driving gear).

Pump Cover Gear Wear—Replace cover if gear bearing area scored or worn to depth of more than .001".

Reaction Shaft Flange Inspection—Wash flange in clean solvent and blow out all passages with air Inspect surfaces of reaction shaft flange and transmission case for nicks or burrs and remove with a mill file Inspect race for clutch drum roller bearings on rear end of reaction shaft If this bearing is worn excessively or scored, replace reaction shaft flange *(NOTE—If reaction shaft flange is replaced, stamp transmission identification number in lower edge of new part in same place as on original flange).* Check all studs for tightness and replace any with damaged threads If stud threads are stripped in reaction shaft flange, it will be necessary to tap out the hole for installation of step studs which are available for service replacement *(The 5/16"—18 step studs have a ⅜"—16 thread on flange end).* Inspect the oil seal rings on hub of reaction shaft flange and replace if damaged in any way

Reaction Shaft Flange & Oil Pump: Reassembly—*(NOTE—Early type Reaction Shaft Flange Front Bearing is babbitted type. Later bearing is needle bearing type. See procedure below for installation of both types).*

Babbitted Bearing Installation—Make sure that inner retaining ring is firmly seated in groove in reaction shaft, then install a new bearing using Installer J-5816. Support shaft on wooden block to avoid damage and drive bearing into place with a light hammer until shoulder of tool contacts reaction shaft Install outer retainer ring

Needle Bearing Installation—To install new bearing in reaction shaft, tool J-6248 must be used because of the 15° angle step which presses against the hardened outer circumference of the bearing to prevent damage to the needle bearing rollers *NOTE* —The needle bearing has a rounded shoulder on one side and a flat surface with the manufacturers markings on the other To install the bearing, support reaction shaft vertically on a block of wood Place flat side of bearing (with markings) against driving surface of the tool, then press into place

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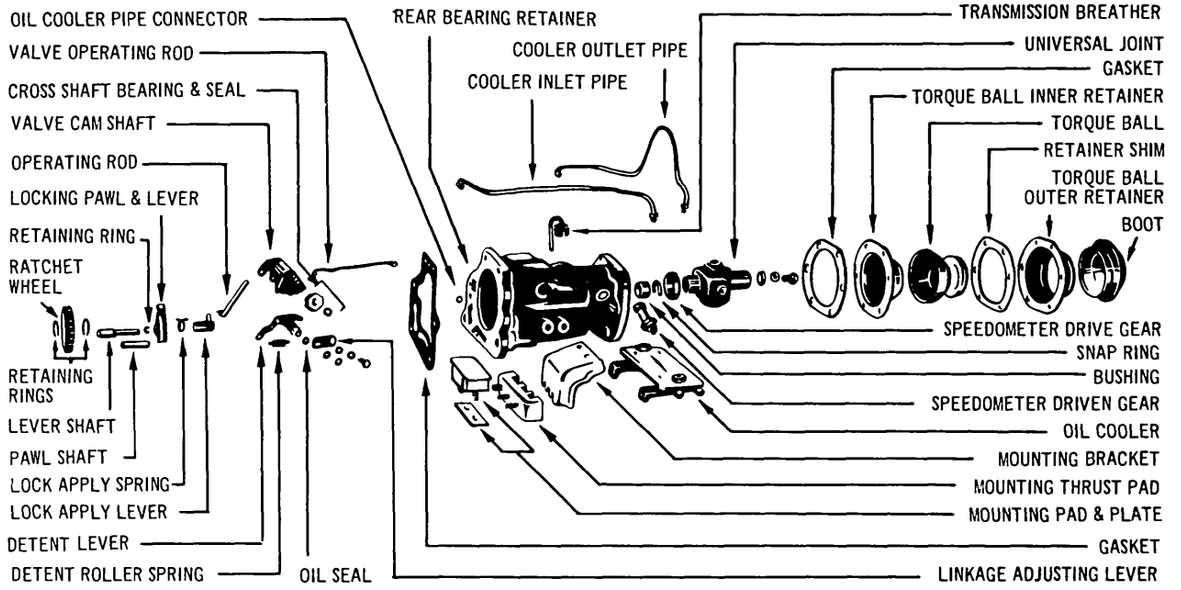
DYNAFLOW DRIVE (C nt.)

until tool bottoms on reaction shaft. ***CAUTION—Bearing can be installed either way, but damage to the needles will result if not installed as directed above.*** Complete reassembly as follows Install check ball in clutch feed passage if ball was removed, then install a new gasket and the pump cover on reaction shaft flange Lubricate and install gears in front pump body The driving gear must be installed with the beveled side outward so that this side will be against cover when pump is installed ***(CAUTION—Reversing this gear in pump body will result in severe damage to transmission).*** Install oil pump on cover so that the two dowel pins and the bolt holes match holes in cover, then install bolts with lockwashers Tighten bolts to 5 ft lbs in the sequence shown in illustration, and then tighten in same sequence to 25-30 ft lbs Bend a tang of each lockwasher up against flat of bolt head Tighten cover attaching stud nut to 25-30 ft lbs

Multiple Disc Clutch & Input Shaft: Disassembly. Remove retainer ring from reaction gear flange, use pointed tool to remove three flange driving keys. Lift out Low Range Reaction Gear, Thrustwasher, Clutch Hub, and all 10 Clutch Plates. Install Clutch Spring Compressor J-2590 in clutch drum placing slot in compressor ring over ends of spring seat retainer ring, compress spring sufficiently to remove retainer ring, release clutch spring pressure ***(CAUTION—use care that spring seat does not hang up in retainer ring groove in drum).*** Remove compressor, lift out spring seat and spring. Tap drum, open end down, on block of wood to dislodge clutch piston ***(CAUTION—if check ball in piston unseated during this operation, snap ball back in place).***

Inspection—Wash parts in solvent and dry with air ***(CAUTION—use only gasoline or kerosene on clutch bands and plates—do not use chemical degreasers or commercial solvents).*** Inspect and replace all clutch plates which are worn, scored, burred, or warped ***(CAUTION—new plates must slide freely on clutch hub—tight plates will prevent full disengagement).*** Inspect oil seal ring on clutch hub and replace if damaged (ring has interlocked ends and is released by compressing ring and depressing one end while raising the other). Replace clutch piston outer seal if hardened, broken, or with turned lip (install new seal with lip extending over smaller diameter piston land). Inspect Low Range Band and replace if worn smooth without visible grooves. Inspect oil seal ring and replace if damaged (same type ring with interlocked ends as used on clutch hub). Check to make sure retaining ring in place in shaft groove. See that small bleed hole in piston is open and that check ball is staked in place ***(CAUTION—ball must be free to move in recess).*** If needle bearing in drum is excessively worn or scored, carefully remove it and install a new one using tool J-5191 This tool will locate bearing flush with shoulder drum Place numbered end of bearing, which is hardened, toward shoulder of tool to avoid distortion of cage

Reassembly—Lubricate piston seal and inner surface of drum with light oil, install piston using extreme care not to distort or turn lip of seal Top of piston should be approximately even with shoulder in drum when installed. Install clutch spring, use



VARIABLE PITCH DYNAFLOW REAR BEARING RETAINER & TORQUE BALL ASSY.

Compressor J-2590 to compress spring, install spring retaining ring in groove in drum, remove compressor. Place reaction gear on bench with flange upward and install all clutch parts in following order: Clutch Hub Thrustwasher, Clutch Hub (open end upward), and all clutch plates (see Clutch Plate Caution below). Bottom clutch plate should be internally splined (faced) type and top clutch plate externally splined (plain steel) type with the two types alternating in the assembly. Install drum and clutch piston assembly over reaction gear and clutch assembly with driving key recesses in drum and gear flange aligned. After drum pressed evenly in place, fully align driving key recesses by tapping reaction gear flange, install three driving keys and flange retainer ring.

►**Clutch Plate Caution**—Externally splined (plain steel) clutch plates are concave or "dished" and these plates must be installed with "dished" face in same direction (either up or down). Check each plate with straightedge and stack plates with dished faces in same direction before beginning installation. ***NOTE***—Internally splined clutch plates are flat and can be installed in either direction.

Rear Bearing Retainer: Disassembly—Remove spring from detent roller lever and support inside rear bearing retainer, remove adjusting lever on outside of retainer, then remove lever and support assembly Disconnect parking lock operating rod from cross shaft by unscrewing rod end from cross shaft lever Push clip from valve operating rod to remove clip and rod from cross shaft. Screw a ¼"—20 bolt into parking lock operating lever shaft and the lock pawl shaft and pull these parts from bearing retainer, then remove lock pawl and lever assembly Remove cross shaft bearing, using a box wrench (a socket that does not fully engage bearing, or an end wrench will distort the bearing) remove cross shaft

Rear Bearing Retainer Inspection—Wash parts in solvent and dry with air. Check parking brake pawl, pawl locking link, and ratchet wheel for worn teeth, cracks, or other damage preventing positive locking. Check valve operating cross-shaft and bearing for wear, remove and discard rubber seal in bearing. Inspect output shaft bushing in retainer for wear scoring, check clearance by inserting output shaft in bushing. Clearance should be .001-.006". Replace bushing with Bushing Remover & Replacer Tool J-2997 (not necessary to ream new bushing).

Universal Joint Inspection—Check for wear and excessive play between spider pins and bushings (should be .002-.004"). Check yokes for wear on shaft splines. Front yoke must be tight fit on output shaft (play will allow "snap" between forward and reverse), rear yoke backlash on propeller shaft should be .0005-.0045". Rear yoke clearance in torque ball bushing should be .004-.006" and bearing surfaces must not be scored.

Torque Ball Inspection—Replace torque ball and retainers if bearing surfaces scored or pitted. Inspect oil seal and replace if worn (use seal which has been soaked in neatsfoot oil), press seal squarely into place until flush with torque ball flange and with feather edge of seal pointing into torque ball. Check universal rear yoke for excessive wear at point where seal bears.

Reassembly—Install valve operating cross shaft, and cross shaft bearing Install a new seal in bearing, with grooved side facing inward. Install parking lock pawl and lever assembly in rear bearing retainer, then install lock pawl shaft and operating lever shaft with tapped ends outward. Attach valve operating rod with retainer clip to cross shaft lever

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DYNAFLOW DRIVE (C nt.)

and snap clip into place over rod. Connect parking lock operating rod to cross shaft lever, using a lockwasher on threaded end of rod. Install detent lever and support assembly with a new seal in groove of shaft, then install linkage adjusting lever on shaft with nut and lockwasher. Attach adjusting lever to bearing retainer with bolt, plain washer and lockwasher, but do not tighten until the following detent adjustment is made.

Parking Pawl Adjustment—Temporarily install shift lever on cross shaft and shift parking pawl into parking position. Shift linkage adjusting lever at slotted end until pawl lock contacts the parking pawl, then tighten adjusting lever lock bolt, being certain to maintain contact between lock and pawl. Move shift lever back and forth to check detent adjustment. Parking lock must contact parking pawl when detent roller in deepest portion of parking notch of detent lever and should break contact at same instant that detent roller starts to move toward neutral position.

Planetary Gear Set: Disassembly—Take out three planet carrier screws and special lockwashers (use 7/32"Allen wrench), separate front and rear halves of planet carrier (hold carrier by output shaft, tap down on flange on front end). Lift out sun gear rear thrustwasher and reverse sun gear. Remove all planet pinion assemblies (three long low pinions, three short reverse pinions) by tapping shaft out of front half of carrier using care not to lose steel ball imbedded in end of each shaft to prevent shaft rotating in carrier. Disassemble pinion assemblies by removing thrustwashers and shafts from pinions and then taking out bearing rollers (long pinions have two sets of rollers separated by spacer, short pinions have one set of rollers).

Inspection: Wash all parts in solvent and dry with air. Inspect planet pinion shaft and rollers, replace if worn. Inspect all gear teeth for wear, remove all nicks and burrs by stoning. Replace bushing in rear end of planet carrier if worn or scored (use Bushing Remover J-3197, Bushing Replacer J-2996—new bushing may be installed either end first and need not be reamed). Inspect reverse band anchor for cracks. Replace reverse band if cracked or the lining worn smooth.

Reassembly—Assemble each planet pinion with its bearing rollers, thrust washers, and shaft (24 rollers in each reverse pinion, 20 rollers at each end of low pinion and separated by a spacer). Make certain that thrustwasher installed at each end of each pinion (lower washer against retaining ring on shaft, upper washer on outer end of shaft). Install planet pinion assemblies in carrier making certain that **steel ball imbedded in lower end of each shaft** (necessary to prevent shafts turning). Install reverse sun gear with bronze thrustwasher on top of gear, align assembly marks on both planet carrier halves when installing upper half (numbers stamped on dividing line during production), make certain that special lockwasher used on each carrier screw, tighten screws evenly to 25-30 ft. lbs. torque. Install reverse ring gear thrustwasher.

Transmission Case (Cleaning & Inspection): Wash case and blow out all passages. Inspect for cracks, and stripped bolt threads. Check machined surfaces for nicks and burrs and clean these up with a mill file. Check bushing in case for wear by inserting planet carrier in bushing and checking clearance with a feeler gauge. Clearance should be .002-.004". Replace bushing if clearance excessive or if scored.

Bushing Replacement—To remove old bushing, support case with rear end down, drive bushing out with tool J-3175-1 (part of replacer set). To install new bushing, place pilot J-3175-2 (part of replacer set) in rear oil pump recess in case, slip bushing over J-3175-1 and drive bushing into case from front side until bushing is flush with front surface of case wall which supports the bushing. **Bushing must be installed with wide deep ends of oil grooves toward rear of case.**

Flywheel & Primary Pump Run-out and Bell Housing Alignment Check: ***Make this check if front oil pump noisy, bushing and oil seal worn, or if oil leakage noted at Converter or Front Oil Pump Body.***

Flywheel Run-out—Remove all burrs from around drilled holes in face of flywheel, mount dial indicator on flywheel housing with strip of .005" shim stock between dial indicator and face of flywheel (clamp shim stock under a flywheel housing bolt so that it covers bolt holes and provides smooth surface for dial indicator pick-up). Turn flywheel **holding end thrust in one direction.** Run-out should not exceed .008". If excessive run-out cannot be corrected by tapping high side with mallet or by removing flywheel and cleaning up burrs at crankshaft flange mounting holes, install new flywheel and re-check run-out.

Primary Pump Hub Run-out—With converter primary pump and bell housing installed, mount dial indicator on bell housing so that it bears against primary pump hub. If run-out exceeds .012" when flywheel turned, mark flywheel and primary pump, remove and re-install pump at point 180° from first position. If pump run-out still exceeds .012", install new primary pump and recheck run-out. When position found where run-out is less than .012", mark flywheel and pump with paint and **align these marks when transmission is finally re-installed.**

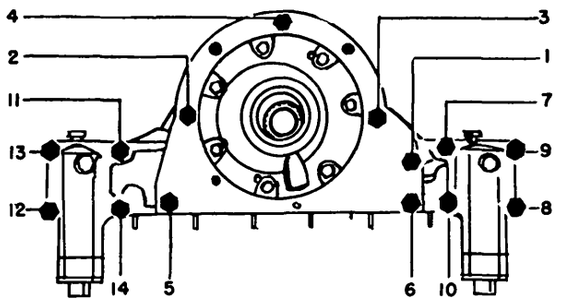
Bell Housing Alignment—Mount dial indicator on oil pump driving lug on rear end of converter primary pump hub (*CAUTION*—do not clamp indicator on bearing surface) so that it bears against rear face of bell housing at 3¾"" radius. Rotate flywheel **holding end thrust in one direction.** Run-out should not exceed .005". If run-out of bell housing face exceeds .005", cement paper shims of proper thickness to rear face of crankcase to bring run-out to .005" or less, with all bolts securely tightened.

Pilot Hole Run-out—Mount dial indicator and Hole Attachment KMO-30-F to bear against inner edge of pilot hole in bell housing. Run-out of pilot hole should not exceed .004". If run-out greater, remove bell housing and remove the two dowels, and reinstall bell housing, leaving bolts just loose enough to permit shifting housing by tapping with a lead hammer. Set up dial indicator as indicated above and bring pilot hole of bell housing within .004" run-out by tapping in required direction with a lead hammer. If it is not possible to move housing far enough, remove housing and drill bolt holes with a ½" drill. When bell housing is placed so that run-out is .004" or less, tighten all bolts securely. Ream the two dowel holes through housing and crankcase using Reamer J-2548-3 (17/32"), until this reamer bottoms in hole, then finish with bottoming Reamer J-4710-6 to provide full size to bottom of hole. Remove bell housing and install oversize dowels J-808-5 in crankcase.

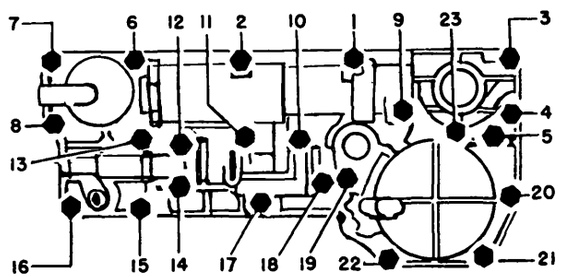
REASSEMBLY

After overhaul of Major Components, make certain that all parts absolutely clean, oil moving parts with 10-W engine oil before installation, use ALL NEW GASKETS & SEALS. Tighten all parts evenly to specified torque and in correct sequence (see illustrations). Proceed in reverse order of disassembly directions and note all of following points:

Planetary Gear Set Installation: After reverse ring gear thrustwasher and reverse band installed in case (with Installing Clip J-2595 on band), rotate band 45° toward servo opening, insert anchor and engage hooked end of band, then rotate assembly back into position. Position band operating lever in place with strut shoulder toward inside of case, install anchor shaft **with tapped end outward.** If installation correctly made, adjustment screw will be centered in servo opening (lever has offset end). See that planet carrier front (steel) thrustwasher installed on carrier with three tangs engaging holes in carrier, install rear (bronze) thrustwasher in case with three tangs engaging holes in case, then install planet carrier. If correctly installed, chamfer on output shaft journal will be flush with rear end of transmission case bushing.



REACTION SHAFT FLANGE & ACCUMULATOR BOLT TIGHTENING SEQUENCE



VALVE & SERV BODY BOLT TIGHTENING SEQUENCE

Rear Oil Pump & Lubrication Oil Pressure Regulator Valve Installation: Install rear gasket (gasket with LARGER hole—do not confuse with cover gasket) and plate on transmission case with bolt holes aligned, install drive key cushion and key in output

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (Cont.)

shaft, then install driving gear to engage key (old gear should face in same direction as before, new gear with either face in). Tighten attaching bolts to 5 ft. lbs. torque in following sequence: Top, Bottom, Right, Left; then retighten bolts to 25-30 ft. lbs. torque in same sequence. Check pump for free operation by rotating output shaft. Install lubrication oil check valve assembly in case.

Parking Lock Ratchet Wheel & Rear Bearing Retainer: Make certain that retaining ring installed on each side of ratchet wheel on output shaft, insert valve operating rod through square hole in front face of bearing retainer and connect rod to cross-shaft lever, then install rear bearing retainer and gasket, tighten attaching bolts evenly to 35-40 ft. lbs.

Low Brake Band, Clutch, & Input Shaft Installation: Install low band operating lever and anchor lever with strut shoulders of levers toward inside of case and tapped ends of shaft outward (operating lever on side of case having large servo opening, anchor lever on opposite side). Install low band struts in ends of levers with notched ends together using two wooden blocks (1" x 2" x 3½") to support struts and band while assembling. Install low band with J-2595 band installing clip holding band compressed *(CAUTION*—used band must be installed in original position with point of heavier wear at anchor end, (new band can be installed either way). With struts engaging ends of band (notches on struts must straddle pins on band), apply operating lever and remove clip. Place bronze reaction gear thrustwasher on sun gear, install clutch assembly (use wire hook to lift low band if clutch does not go down fully), place bronze thrustwasher on front face of clutch hub. Install input shaft (make certain that oil seal ring ends properly locked and that retaining ring installed in shaft groove). If shaft does not go down into place, make certain all four thrustwashers are properly centered.

Reaction Shaft Flange, Front Oil Pump, & Accumulator Installation: Install special guide pins (see Guide Pin Note below) in accumulator bolt hole at each end of flange on transmission case, then proceed as follows:

1) Place reaction shaft flange gasket in position on case so that holes in gasket and case are aligned *(CAUTION—It is possible to install this gasket incorrectly).* Make certain that oil seal rings are on flange hub, then install flange assembly on case using care to avoid damaging oil seal rings.

2) Install three special bolts (⅜" - 16 x 2") with plain washers in #2, 3, 4 positions (see Tightening Sequence illustration) for assembly purposes (these bolts removed after assembly completed). Install regular pump cover bolts, nuts and lockwashers at positions marked #1, 5, 6 *(CAUTION—Coat threads of #5 bolt with Permatex No. 3).*

3) Tighten bolts in #1 through #4 positions to 35-40 ft. lbs., and bolt in #5 position to 20-25 ft. lbs., in numerical sequence.

4) Thread Endplay Gauge J-5804 into rear end of output shaft and thread Extension Rod J-5808 into bolt hole in rear bearing retainer. Tighten both tools firmly. Use Clamp KMO-30-G and Sleeve KMO-30-K to mount Dial Indicator KMO-30-B and Extension J-5339 so that extension bears squarely against end of Gauge J-5804.

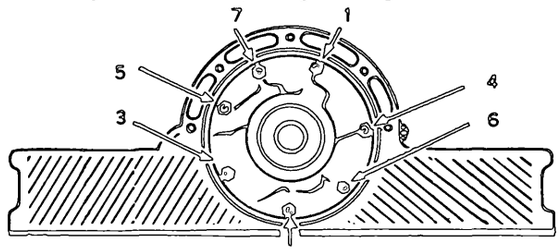
5) Push Gauge J-5804 as far forward as possible, set dial indicator at zero, then pull gauge rearward toward indicator with sufficient force to remove all endplay from input shaft. Note indicator reading, which will be between .020" and .034" if output shaft endplay is within proper limits. If endplay not within proper limits, remove reaction shaft flange, clutch assembly, and the thrust washer located between reaction gear and reverse sun gear.

6) Measure thickness of washer and substitute another one of proper thickness to bring output shaft endplay within specified limits. If endplay less than .020", use a thinner washer, and if greater than .034", use a thicker washer. Reinstall parts and recheck for correct endplay.

7) Place accumulator gaskets in position so that holes match holes in reaction shaft flange. Install low accumulator on same side as low band operating lever and install high accumulator on opposite side of flange, first making sure that check ball and retaining pin are in place in high accumulator body.

8) Coat accumulator bolt threads with Permatex No. 3 (non-hardening) and install bolts and stud nuts with lockwasher, but do not tighten. Tighten all bolts and nuts in positions #1 through #14 to 5 ft. lbs., in numerical sequence. Following the same sequence again, tighten bolts #1 through #4 to 35-40 ft. lbs., and the remaining bolts and nuts to 20-25 ft. lbs.

9) Remove the three special bolts from positions #2, 3, 4, and tighten accumulator body caps to 40-50 ft. lbs. CAUTION—If edge of flange gaskets project beyond bottom surface of transmission case, carefully trim it flush, using a sharp knife.



FRONT OIL PUMP TIGHTENING SEQUENCE

▷Guide Pin Note—These 5/16" guide pins can be made up from 5/16" round stock, 2½" long, with 5/16"-18 thread ½" long on one end and screwdriver slot on opposite end (chamfer this end slightly).

▷*SHIFT CONTROL VALVE ADJUSTMENT CHANGE:* The previous valve adjustment procedures included a clearance check between the shift control valve and stop pin which have been superseded by the instructions outlined below. The following adjustment applies whether the adjustment is made with the transmission in the car or during transmission assembly.

Valve & Servo Body Installation: With transmission inverted on bench, raise reverse band operating lever and insert strut between lever and end of band *(CAUTION*—rounded ends of strut must be against band and lever). After strut installed, do not raise lever while installing valve and servo body (will allow strut to fall into case). Install two 5/16" guide pins (same pins as used for reaction shaft flange—see above) in case to guide each end of servo body. Install spacer plate gasket over guide pins. Install valve and servo body on case (hold anchor piston from falling out and move shift control valve and lower operating lever inward to align upper level with opening in case). Engage control valve pin in slot in operating lever. Install correct length bolts and lockwashers in all mounting holes using copper washer on #10 bolt (see Tightening Sequence illustration), remove guide pins. Tighten all attaching bolts and nuts to 5 ft. lbs. torque in correct sequence (see illustration), then fully tighten all ¼" bolts and nuts to 11-15 ft. lbs. and all 5/16" bolts to 15-20 ft. lbs. torque in same sequence *(CAUTION*—When tightening nuts and bolts adjacent to shift control valve, operate valve to make sure that it does not bind—if necessary, readjust bolts to lower torque limit to correct binding). Remove #18 and stud nut #9, install cork gasket, oil suction pipe, retaining spring and spring support, tighten this #18 bolt and stud nut #9 to 11-15 ft. lbs. Connect valve operating rod to upper operating lever by reaching into case with Linkage Hook-up Finger J-2591 and pulling upward on rod to engage ball in socket. Install shift lever on cross-shaft temporarily to check and adjust linkage. Valve linkage must operate freely. Move lever toward front of transmission to engage parking lock. Pawl must fully engage ratchet wheel and pawl lock must be in full contact with pawl in this position. Place transmission in "D" (Drive) range, and note position of land on end of control valve in relation to hole in valve body. The edge of the land on shift control valve must be flush with edge of hole in valve body *(NOTE*—Do not confuse an extension on end of valve with the valve land. Three different valves have been used in production as follows: First (no valve extension), Second (plain extension), Third (grooved extension), all of which are interchangeable). If edge of valve land does not line up with edge of hole in valve body, loosen the adjusting lever locknut and properly position shift control valve, then securely tighten locknut.

Oil Pan Installation: Coat area on transmission case where case cut away under oil pan gasket thinly with Permatex #3. Install 5/16" guide pin at each end (same pin as used for reaction shaft flange—see note above), install new oil pan gasket over guide pins. Install oil pan (use heavy-duty internal tooth lockwashers on bolts and stud nuts), tighten all bolts and nuts evenly to 15-18 ft. lbs. torque.

Universal Joint Installation: Make certain that joint retaining ring fully seated in groove in output shaft before installing universal joint. Install universal joint using Replacer Tool J-855 to draw universal joint snug against retaining ring. Install plain washer, lockwasher, and bolt and tighten bolt to 30-35 ft. lbs. *(CAUTION—Make certain that oil passage in gear is clear).* Install speedometer driven gear and sleeve assembly in rear bearing retainer.

Torque Ball Installation & Adjustment: *See "Torque Ball Adjustment" in Buick Special Data in Car Model Section.*

Bell Housing & Torque Converter Assembly Installation: 1) Install front oil pump seal ring around pump body against pump cover. Install bell housing, using lockwashers on bolts and stud. Sparingly coat threads of lower right side bolt with Permatex No. 3 (because bolt hole opens into transmission case). Tighten bolts and stud nut evenly to 35-40 ft. lbs.

CONTINUED ON NEXT PAGE

DYNAFLOW DRIVE (C nt.)

2) Support converter pump firmly on blocks and carefully place stator in proper position, with original selective spacers and the thrust washer between stator and pump hub *CAUTION—Do not use grease to hold spacers in place.*

3) Place sun gear on stator with tanged thrust washer up, then carefully lower twin turbine assembly into place, making sure that planet pinions enter and mesh properly with sun gear Install Converter Gauge J-5899 on converter pump flange, making sure that indicator post does not contact turbine Loosen wing screw, firmly press gauge plunger down against first turbine hub and tighten wing screw

4) Support converter pump cover firmly on blocks with inner side up and place bronze thrust washer in its recess Remove Gauge J-5899 from pump, **invert it,** and center it on cover so that it rests squarely on the gasket surface

►*CONVERTER COVER PRODUCTION CHANGE:* A later type converter primary pump cover having three impeller blades replaces the former type having impeller ribs completely around the cover Either type can be used for service replacement

5) Use Sleeve KMO-30-K to mount dial indicator KMO-30-B on the adjustable post of clearance gauge so that indicator button bears squarely against upper end of clearance gauge plunger **Set dial at zero.**

6) Loosen plunger wing screw, firmly press plunger down against the thrust washer and note dial reading The dial reading is clearance that will exist between turbine pump and pump cover when parts are installed, and should be 018- 029" If dial reading not within specified limits, change the total thickness of selective spacers located under the stator *Increasing* spacer thickness will *decrease* clearance at cover and *decreasing* spacer thickness will *increase* the clearance

Part No.	Spacers	Thickness
1167710		013- 010"
1167711		023- 020"
1167712		033- 030"

7) Install converter pump on reaction shaft, turning it until lugs on pump hub enter slots in front pump driving gear Coat selective spacers and thrust washers with petroleum jelly so they will adhere to stator during installation Make sure that all rollers and springs are in place and held in stator with tool J-5806

8) While holding thrust washers and spacers to rear side of stator, slide stator off of installing tool onto the reaction shaft Make certain that washer and spacers remain in place as stator is pushed back against converter pump Install converter sun gear with the tanged thrust washer outward If sprag is properly installed, the sun gear may be turned on reaction shaft in clockwise direction only

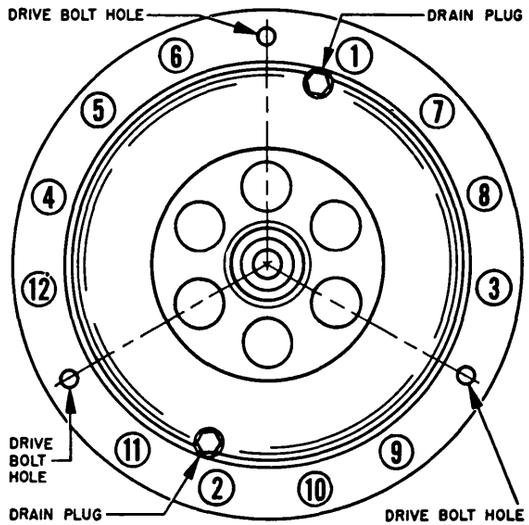
9) Make sure that retaining ring is seated in groove of input shaft, then install the twin turbine assembly, turning it as required to mesh planet pinions with sun gear Install selective thrust washer, retaining washer and bolt, with external tooth lockwasher on front end of input shaft Shift into "P" (parking) and pry up on reverse band operating lever with a screwdriver to lock input shaft, then tighten bolt to 30-35 ft lbs

10) Check clearance between selective thrust washer and first turbine hub, using feeler gauges Clearance should be 002- 009" If clearance not correct, substitute another thrust washer of proper size Two sizes furnished for selective fitting (Part No 1166113, 063- 060" Part No 1166112, 070- 067")

11) Looking at front face of converter pump cover, select the three bolt holes used for pump to flywheel drive bolts (see illustration) Install a new "O" ring seal on pump cover, making sure that surfaces are clean and that seal has even tension all around and is not twisted

►*FRONT PUMP COVER OIL SEAL NOTE: Both a .120" and .135" diameter oil seal has been used in production. Either type may be used for service replacement.*

12) Grease the selected thrust washer so it will adhere and place it in recess in cover, then install cover on pump so that the three marked driving bolt holes are not aligned with any hole in pump rim at which a balance weight is located Install bolts with plain washers and special nuts in all but the three driving bolt holes, insert shank of a 11/32" drill through one bolt hole to align all bolt holes, then tighten bolts to approximately 5 ft lbs in numerical order (see sequence in illustration) Finally tighten bolts in same sequence to 25-30 ft lbs *NOTE—When tightening bolts, insert a wide screwdriver between flat side of bolt head and the pump to prevent a corner of bolt from digging into casting.*



CONVERTER PUMP COVER TIGHTENING SEQUENCE

INSTALLATION IN CAR

After transmission and torque converter completely assembled, install unit in reverse order of removal procedure and note following important points:

Alignment of Parts—See that flywheel, converter primary pump, and converter cover positioned so that paint marks (as made for removal) will be aligned when transmission installed.

►*CAUTION—This alignment necessary to maintain converter assembly balance.*

Shift Rod Installation—Check and adjust linkage when installing shift rod. *See LINKAGE ADJUSTMENT.*

Filling Transmission—*See LUBRICATION.*

Bell Housing Mounting Bolt Installation—Adjust lifting equipment so that bell housing meets engine crankcase squarely and engages the two dowels, then install all bell housing bolts with lockwashers. Tighten all bolts to 45-55 ft. lbs. torque.

Transmission Support & Thrust Pad Installation & Adjustment—*See ENGINE MOUNTING in Buick Special Data.*

Converter Mounting Bolt Installation—Use the shank of a 11/32" drill to align bolt holes in flywheel and converter, install bolts and tighten to 25-30 ft. lbs. torque.

Final Road Test—After transmission installed and all adjustments made, road test car by driving approximately 20 miles with frequent starts and stops to duplicate heavy traffic conditions. After transmission thoroughly warmed up, check transmission and all oil lines and connections for leaks. If vibration noted due to unbalance of replacement parts, correct this condition as follows:

ENGINE BALANCING

►*IF VIBRATION NOTED AFTER INSTALLATION OF CRANKSHAFT, FLYWHEEL, AND OTHER ROTATING PARTS, CORRECT THIS UNBALANCE AS FOLLOWS·*

►*CAUTION·* Procedure below will correct minor unbalance caused by replacement of individually balanced parts Extreme vibration caused by parts abnormally out of balance, or different in weight from corresponding parts, should be corrected by replacement of these parts

Critical Speed of Vibration—Determine speed at which vibration is most evident (use tachometer) and operate engine at this speed to check results from the following corrective procedures

1)—Remove bell housing cover and bell housing hand hole cover for access to flywheel

2)—Install one 060" balance weight of correct type (see Balance Weight Note following step 5 below) under the head of one of the primary pump cover bolts, tighten bolt to 25-30 ft lbs torque

►*CAUTION—DO NOT install weight at flywheel-to-converter driving bolt (bolts are too short for addition of weights).*

3)—Operate engine and check for vibration Mark location of balance weight on converter pump, then remove weight and tighten cover bolt to 25-30 ft lbs torque

4)—Repeat steps (2) and (3) at other converter pump cover bolts and compare engine vibration noted at each location

5)—At point where balance weight results in smoothest engine operation, vary weight thickness (see Balance Weight Note following), until vibration has been eliminated After balance weights selected and installed, tighten cover bolts to 25-30 ft lbs torque, attach weights permanently as follows Use 5/32" drill to spot center of both holes in weights, then drill pump flange with #32 (116") drill to depth of ⅜", use correct length drive screws ⅜" long (No 145067) or ½" long (No 450543) depending on the weight thickness to permanently attach weights to pump cover

Balance Weight Note—Balance weights furnished in three thicknesses as follows:

Thickness	Balance Weight Part Nos.	Part No.
0345"		1166600
.060"		1166601
120"		1166602

1950-52 POWERGLIDE

Chevrolet Pass. Cars (1950-52)

▷CHANGES, CAUTIONS, CORRECTIONS

▷STARTING ENGINE BY PUSHING CAR: Pushing recommended rather than towing car. Place selector lever in Neutral "N" position. When car reaches speed of approximately 15 MPH., move lever to "L" position to crank engine, then move lever to "N" position to warm up engine.

Wet or Icy Road Caution—Push car until speed of 20 MPH. reached, then place lever in "D" position to crank engine (do not use "L" position).

▷TOWING POWERGLIDE CARS: Do not tow car with rear wheels on ground EXCEPT with selector lever in "N" (Neutral) and at speeds less than 45 MPH. (if transmission in good condition) If selector lever cannot be placed in Neutral, transmission can be placed in neutral as follows: Disconnect long control rod from idler lever on left side of transmission case, push idler lever toward rear of car as far as possible, then move lever toward front of car to third detent position which is neutral.

▷TRANSMISSION LOCKING OR SLIPPING OUT OF PARK "P" POSITION: Correct as follows:

Locking in "P" Position—May be caused by slight depression at top of cam ramp on parking pawl which makes disengagement of cam roller difficult. Correct by disassembling transmission and replacing parking pawl. See Disassembly data.

Slipping out of "P" Position—May be caused by weak apply spring on parking lock lever shaft which allows detent pin to ride out of detent in parking lock pawl. Correct by disassembling transmission and replacing Parking Lock Lever Shaft & Apply Spring Assembly. See Disassembly data.

Difficulty in Engaging "P" Position—Difficulty in moving control lever far enough into Park position to allow control shaft lever to pass upper tang of lower support may be corrected by new linkage setting. *See Linkage Adjustment.*

▷UNIVERSAL JOINT & PROPELLER SHAFT BUSHING LUBRICATION CAUTION ON POWERGLIDE CARS: These parts lubricated from transmission output shaft through drilled passage in special universal joint retaining bolt No. 3690869 (bolt drilled completely through and has special flat head nail in hole to keep oil passage open). If universal or bushing lubrication trouble experienced, make certain that drilled bolt used and that nail is free in oil passage (1/32-1/16" clearance between head of nail and head of bolt).

CAUTION—Plain bolt used for transmission run-in at factory must be replaced by this special drilled bolt when transmission installed in car.

▷PUMP CHECK VALVE CHANGE: New valve assembly with changed contour of tab ends which cover pump inlet ports now used to insure proper installation of valve in body. This valve interchangeable with first type.

CAUTION—When installing check valve, see that tab end of valve does not extend beyond face of valve body (turn valve over and re-install, or grind edge of tab off slightly to prevent interference with valve body gasket).

▷REPLACEMENT LOW SERVO PISTON CAUTION: Both stamped metal pistons and cast iron pistons will be found in transmissions in service. Cast iron piston has thicker head and special Piston Return Spring must be used for each type as listed below. *NOTE*—Cast type piston, No. 3694460, is furnished as service replacement for all transmissions.

Low Servo Piston Assemblies

Piston Part No.	Type	Return Spring No.
3689820	Stamped	①3689840
3694460	Cast	②3694463

①—1 11/64" O.D.
②—1 29/64" O D.

▷CLUTCH ASSY. PRODUCTION CHANGE (Beginning Trans. No. JT-232315-D-23-D): Redesigned clutch with cast iron piston used in transmissions after this number to prevent possibility of partial clutch engagement due to centrifugal force under certain conditions. This clutch has relief valve located in piston (instead of cylinder) and individual *parts are not interchangeable with 1st type parts.*

▷REPLACEMENT LOW & REVERSE BAND CAUTION: Bands furnished for service have increased thickness at strut slots and correct type Struts must be used with these bands as listed below. *CAUTION*—When replacing bands in 1950 transmission, all three parts must be installed as a unit. When replacing bands in 1951-52 transmission, make certain that struts are correct type for use with new type band.

Low Band Assemblies

Low Band Part No.	Apply Strut	Anchor Strut
3694493 ('50-52)①	②3697562	③3697564
5454217 ('50-53)	3702910	3702911

Reverse Band Assemblies

Reverse Band Part No.	Apply Strut
3694493	(1950) 3689827
	(1951-53) 3694491

①—Superseded by Part No 5454217.
②—Supersedes No 3694496.
③—Supersedes No 3694498

▷CONVERTER OIL LEAK (INTO TRANSMISSION HOUSING) CORRECTION: Correct by replacing primary pump "O" ring seal. See Turbine Disassembly for data.

CAUTION—Primary pump and pump hub balanced as an assembly and must be marked first and reassembled to these marks to maintain balance.

▷POWERGLIDE OIL COOLER CAUTION: Whenever broken parts or other foreign material found in transmission oil, or if transmission temperatures excessive, check oil cooler and lines for clogged passages. Replace cooler if circulation restricted.

▷REPLACEMENT TRANSMISSION CASE CAUTION If 1952 production case, No. 3701156, is used for 1950-51 replacement purposes, the following precautions must be noted. *NOTE*—1950-51 type case, No. 3694354, is also furnished for service.

Rear Mounting Holes—Two sets of holes provided; two forward holes must be used for 1950-51 cars (rear holes used for 1952 cars only).

Spacer Installation—⅛" spacer furnished with case must be used on 1950-51 cars (due to differences in machining at rear transmission support).

Servo Cover Replacement—1952 type Servo Cover No. 3697554 must be installed with this case on 1950-51 cars (required by change in location of rear pump pressure checking hole which is now located on servo cover assembly).

▷TURBINE BOLT PRODUCTION CHANGE & REPLACEMENT CAUTION: Beginning Trans. No. KT-22574A-15-D, new Torque Converter Flanged Nut No. 3697544 was used in production to replace Bolt No. 3694455. If this new flanged nut used for replacement on earlier transmissions, other parts must also be installed as follows:

Trans. Prior to KT-22574A-15-D—Flanged nut must be used with special 5/16"-24 x 3/4" bolt No. 181595 and special lock No. 3697543.

Trans. Prior to HT-29008-C-17—In addition to special bolt and lock (above), turbine front washer must be replaced with new type No. 3691817 which has larger chamfer on inside diameter.

▷REPLACEMENT VALVE BODY CAUTION: Some 1952 transmissions used a valve body with a .006" oversize manual valve bore and corresponding .006" oversize manual valve. Only the .006" Oversize Valve Part No. 3697567 is furnished for service. If oversize valve body requires replacement, use new standard size valve body and new standard size manual valve.

These oversize parts can be identified as follows:

Valve Body—No. 3697568. Stamped +6 between suction and lubrication ports where body-to-case gasket installed.

Manual Valve—No. 3697567. Stamped or etched +6 on idler lever end of valve.

▷PRIMARY PUMP HUB & BUSHING ASSEMBLY REPLACEMENT PART: Hub & Bushing Assembly No 3692982 furnished for service. When this assembly used, it will not be necessary to replace entire Pump, Housing, & Cover Assembly to correct worn bushing or damaged hub or bushing. *See OVERHAUL data for installation of this assembly and new parts which must be used.*

▷TRANSMISSION GASKET CAUTION: Gasket Kit 3701030 should be stored flat in warm dry place to insure gaskets fitting properly when installed This is important for Servo Cover Gasket No 3697556 and Valve Body Gasket No. 3693098.

DESCRIPTION

Powerglide transmission is an automatic type and consists of a Torque Converter and a Planetary gear unit providing automatic operation in the Drive range, and additional Low, Reverse, Neutral, and Parking positions controlled by the operator.

Torque Converter: This assembly mounted in a housing which replaces the flywheel used on cars with conventional transmission and consists of the units listed below. Torque converter operation is entirely automatic and unit operates as a torque converter (for starting and low speed operation) or as a fluid coupling (at higher car speeds). The change from one type of operation to the other, and also the operational phases of each unit as described below, are governed entirely by the car operating conditions and do not occur at any set car speed.

CHEVROLET POWERGLIDE (C nt.)

Primary Pump (Driving Member): Mounted directly on engine crankshaft (bolted within turbine cover) and rotates at engine speed to transmit engine power to the turbine through the oil.

Turbine (Driven Member): In converter housing directly ahead of primary pump and driven by oil flow from the pump. Turbine hub is splined on input shaft through which power is transmitted into the planetary gear unit (for Low and Reverse operation), or directly through to the propeller shaft (for Drive Range operation).

Primary & Secondary Stators: Two similar units consisting of sets of curved vanes located between inner ends of turbine and secondary pump vanes. Each stator is mounted on a free-wheeling unit on a stationary stator support. Stators are locked or held stationary when unit is operating as a torque converter and act to redirect the oil flow from the turbine to the secondary pump thus supplying the torque multiplication. When the turbine speed becomes equal to the pump speed, stators rotate freely with the other members (rotation permitted by free-wheel units) without torque multiplication and the converter operates as a simple fluid coupling.

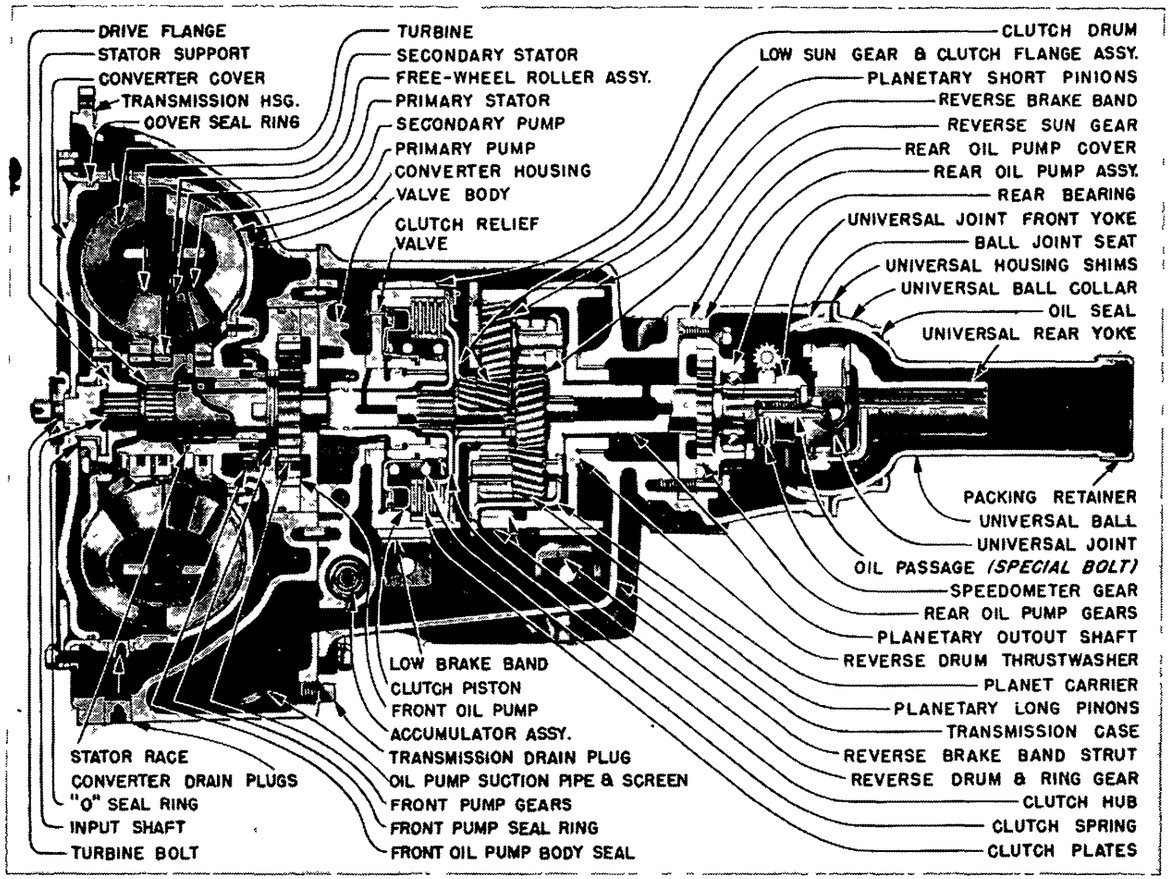
Secondary Pump: Consists of a set of curved vanes mounted on a free-wheel unit on the primary pump hub just ahead of the inner end of the primary pump vanes (between pump and primary stator). Secondary pump overruns the primary pump when unit operating as a torque converter but is locked to the primary pump and operates with it to provide greater capacity when operating as fluid coupling.

Planetary Transmission: Consists of a double planetary gear set, controlling bands, servo mechanisms, and disc clutch located in transmission case.

Planetary Sun Gears: Two separate gears, Front (Low) Sun Gear and Rear (Reverse) Sun Gear are mounted in tandem within the planetary unit. Front sun gear is part of the clutch flange assembly (locked to input shaft when clutch engaged) and meshes with the short planetary pinions. Rear sun gear is splined on rear end of input shaft (acts as driving gear for Low & Reverse) and meshes with the long planetary pinions.

Planetary Pinions: Assembly consists of three short (Reverse) pinions and three long (Low) pinions mounted alternately in the Planet Carrier and all meshing together. The short Reverse Pinions mesh with the front Low Sun Gear and with the Reverse Ring Gear (internal gear controlled by the reverse brake band). The long Low Range Pinions mesh with the rear Reverse Sun Gear.

Multiple Disc Clutch & Low Range Drum: This assembly mounted on input shaft ahead of planetary pinion assembly. Clutch hub (inner member) is splined on input shaft and rotates with the shaft. Clutch drum (outer member) is locked to the front Low Sun Gear. Clutch is engaged by a hydraulic piston within the clutch drum and locks the Low Sun Gear to the input shaft. Clutch is disengaged by a spring and allows the sun gear to revolve freely (except when sun gear held stationary by application of the Low Brake Band). A relief valve is located in front face of clutch drum (first type), clutch piston (later type), to insure complete drainage of oil from clutch cylinder when clutch is disengaged.



POWERGLIDE TRANSMISSION ASSEMBLY

Low Range Brake Band & Servo Mechanism: Band holds front sun gear stationary when it is applied on the clutch drum by the Low Servo which consists of a hydraulic piston linked to one end of the band by a strut. The opposite end of the band is held stationary by a strut and anchor which has an adjusting screw for band adjustment.

Reverse Brake Band & Servo Mechanism: Band holds the Reverse Ring Gear stationary when it is applied on the reverse drum (integral with the gear) by the Reverse Servo which consists of a hydraulic piston linked to the band by a lever-and-link mechanism. One end of the band is held stationary by a strut and anchor which has an adjusting screw for band adjustment.

Oil Pumps: Two pumps used to supply oil pressure for hydraulic controls, oil supply for torque converter and transmission lubrication.

Front Pump—Internal-external gear type mounted between the transmission and torque converter and driven directly by the converter primary pump through a tongue-and-slot coupling. This operate as soon as the engine started, supplying oil to the torque converter and for transmission lubri- pump has relatively large capacity and begins to cation. It also supplies oil pressure for hydraulic control for idling, low speed, and reverse.

Rear Pump—Internal-external gear type mounted in rear end of transmission case and driven by the output shaft. Pump operates whenever rear wheels are turning and supplies oil pressure for transmission operation when pushing car to start engine. At car speeds above 15 MPH., rear pump normally supplies all oil pressure for transmission operation and front pump idles (pressure regulator valve bypasses front pump output by connecting output line to pump suction line).

Hydraulic Controls: Consist of manual and automatic Control Valves, Accumulator, and Vacuum & Hydraulic Modulator.

CONTINUED ON NEXT PAGE

CHEVROLET POWERGLIDE (Cont.)

Manual Valve—Linked to transmission selector lever on steering column and controls oil pressure supply to servo mechanisms, multiple disc clutch, and modulator as required for operation in each range (Park, N, D, L, R depending on selector lever position).

Pressure Regulator Valve—Spring-loaded type with extended stem contacting modulator lever. Valve has following functions: 1) Controls maximum pressure of both oil pumps (and allows front pump to by-pass when rear oil pump takes over), 2) Controls oil pressure requirements for transmission operation (modulator acting on this valve "boosts" oil pressure as required for Low & Reverse Band application), 3) Supplies oil to Converter and prevents oil draining out of converter case when engine not running.

Vacuum & Hydraulic Modulator—Vacuum modulator consists of a spring-loaded, diaphragm type vacuum unit mounted on the transmission case with the vacuum chamber connected to the engine intake manifold. Diaphragm is connected to a lever bearing on the pressure regulator valve stem so that diaphragm movement tends to modify the action of the regulator valve springs in accordance with load requirements which affect engine vacuum. With light loads and high vacuum, no pressure is exerted on the valve stem and valve is controlled entirely by the valve springs. With increase in load and decrease in manifold vacuum, modulator lever exerts pressure on the valve stem and assists the valve springs which has the effect of increasing hydraulic pressures within the transmission. Hydraulic modulator is built-in the vacuum modulator diaphragm plunger (hydraulic plunger and body assembly). Oil pressure expands this plunger and body assembly and increases modulator pressure when selector lever placed in Low or Reverse position (manual valve directs oil pressure to hydraulic modulator).

Accumulator—Consists of a surge chamber in the hydraulic line between the manual valve and the hydraulic modulator. Accumulator cushions the band application when shifting into Low or Reverse.

Pump Check Valve—This valve controls oil delivery from each pump and prevents oil from the operating pump bleeding back through the pump that is not operating (cuts off rear pump at low speed and when operating in reverse).

By-Pass & Lubrication Check Valve—By-pass valve controls oil flow from converter to oil cooler. With oil temperature below 240°F., by-pass valve remains open so that oil goes directly to transmission lubrication system (through lubrication check valve) without passing through oil cooler. When oil temperature reaches 240°F., by-pass valve closes and oil flows through oil cooler and then returns to the lubrication check valve for use in the transmission lubrication system.

Parking Mechanism: Consists of a pawl controlled by the transmission selector lever which engages gear teeth cut on edge of planet carrier and locks the planet carrier to the transmission case when selector lever placed in Park position.

OPERATION

Powerglide Torque Converter automatically provides a torque multiplication ranging from 2.2-1 (maximum for starting and acceleration) to 1-1 (normal driving range with torque converter acting as a fluid coupling). This torque multiplication is supplemented by the planetary gears when selector lever placed in Low or Reverse range (gears provide 1.82-1 reduction). Transmission operation in each range is as follows:

Neutral "N" Position—Multiple disc clutch, Low Brake Band, and Reverse Brake Band are all released so that gears are free to spin. Drive is not transmitted through transmission and this "N" position can be used to start and warm up engine with car standing still.

Low Range "L" Position—Multiple Disc Clutch is released and Low Brake Band is applied so that the front sun gear is held stationary. Power is transmitted through the reverse sun gear to the planetary pinions which "walk" around the stationary sun gear. This results in a 1.82-1 gear reduction between the input and output shafts.

Drive Range "D" Position—Multiple Disc Clutch is engaged and both brake bands are released. In this position both of the sun gears are locked to the input shaft so that the entire planetary gear system is locked and revolves as a unit. Power is then transmitted straight through from input shaft to output shaft with no gear reduction.

Reverse Range "R" Position—Multiple Disc Clutch and Low Brake band are released, Reverse Brake Band is applied. Power is transmitted through the Reverse Sun Gear to the planetary pinions which "walk" around the stationary Reverse Ring Gear. This results in reverse rotation and a 1.82-1 gear reduction between the input and output shafts.

Parking "Park" Position—Parking pawl engages gear teeth cut on edge of planet carrier and locks carrier to transmission case. Planet carrier is integral with output shaft so that shaft and rear wheels are held stationary.

CAUTION—Park position of selector lever should never be engaged when car is in motion.

LUBRICATION

The transmission oil level should be checked at 1000 mile intervals and oil should be changed at 25,000 mile intervals.

Recommended Oil—Use only Automatic Transmission Oil Type "A" (in sealed containers with "AQ-ATF" number).

Capacity—Approximately 9 qts. (refill), 10 qts. (dry—after overhaul and reassembly).

Checking Oil Level—Check only with transmission warm and engine idling with selector lever in "N" position (NOTE—this procedure supersedes original recommendation that selector lever be placed in "D" drive position). Check with dipstick located on right side in engine compartment. Add fluid only when level falls to "ADD ONE QUART" mark on dipstick, fill only to "FULL" mark on stick.

▷*CAUTION—High fluid level (above FULL mark) will cause foaming and loss of fluid.*

▷*LOW OIL LEVEL CAUTION: If oil level in transmission is consistenly low, check for internal and external oil leaks. See "OIL LEAKAGE OR HIGH OIL CONSUMPTION" in TROUBLE SHOOTING.*

Draining & Refilling—Warm up transmission. Drain transmission by removing drain plug in rear face of transmission housing under case. On first cars with converter lubrication check valve, fold back floor mat, remove toe pan plate, turn engine over until one converter drain plug is at top, remove this plug (later cars have only one drain plug). Then drain converter by taking out plug on bottom of housing, turning converter until drain plug visible through hole, and removing drain plug. Clean dirt away from filler tube housing cover on right side of transmission, remove this side cover, remove oil suction screen and seal and clean thoroughly in cleaning solvent. Replace screen and side cover using new pipe seal and gasket. Replace all drain plugs. Install 3 qts. new fluid through filler tube (Oil Filler Tube and Funnel J-4264 will facilitate filling, since this assembly vented and transmission case is not). Start engine and allow it to idle with selector lever in N (Neutral), add additional 6 qts. fluid. Allow engine to idle for several moments. Check oil level (see above), make certain that oil level is up to "FULL" mark on dipstick.

LINKAGE ADJUSTMENT

LINKAGE ADJUSTMENT: Adjust as follows:

Control Lever Clearance: 3/32-1/8" clearance between lower edge of control lever and top upper support cover. To adjust, remove screws attaching upper support to mast jacket, screw support up or down, as necessary, until clearance correct, re-install support screws.

Control Lever Position: 1 1/2" ± 5/16" between upper face of control lever knob and lower face of steering wheel with selector lever in "R" reverse position. To adjust, loosen lower support clamp bolts, move lower support up or down, tighten clamp bolts.

▷*CAUTION—Dowel in support must be located in slot in mast jacket.*

Reverse Stop Clearance: .090" clearance between Reverse Stop on control shaft lower support and lower lever with selector lever in "R" reverse position. To adjust, loosen control rod swivel, make certain that manual control valve lever on left side of transmission is in top detent position, and selector lever in "R" position, move selector lever as necessary for correct clearance, then tighten control rod swivel.

▷*REVERSE STOP SETTING CHANGE*—Above setting of .090" supersedes previous recommendation of 3/64" or .045" and will tend to prevent difficulty of moving selector lever into Park position.

CAUTION—Short connector rod (bellcrank-to-parking lock lever) must be correctly installed with arrow pointing UP.

Neutral Safety Switch: Located on bracket on lower end of lower support assembly on steering column.

CONTINUED ON NEXT PAGE

CHEVROLET POWERGLIDE (C nt.)

To adjust, loosen two switch assembly mounting screws. Place selector lever in neutral, make certain that switch clip is over flats on end of shifter shaft. Insert locating pin through holes in switch mounting bracket and locating plate. Tighten switch mounting screws, remove locating pin.

BAND ADJUSTMENT

BAND ADJUSTMENT: Not ordinarily required in service. Use adjusting tool J-4277 (combination screwdriver and locknut wrench) to adjust bands.

►*REVERSE BAND ADJUSTING NOTE*—Reverse band ordinarily adjusted when reassembling transmission (requires removal of transmission). *See "TRANSMISSION REASSEMBLY" data.*

Low Servo Band—Adjusting screw located on left side of transmission case. Tighten adjusting screw until band is tight, then back screw off 3 turns, tighten locknut.

Reverse Band—Adjusting screw located on right side of case under servo cover. With servo cover removed, turn adjusting screw in slowly and at the same time check endplay in linkage by pushing and pulling on servo return spring directly below adjusting screw. Continue to turn screw in until endplay is just taken up (at this point band must be free on drum so that drum can be easily rotated by hand), then **back adjusting screw off ⅛-¼ turn** and tighten locknut.

►***CAUTION—Above procedure supersedes previous instructions and will provide sensitive adjustment without possibility of false settings.***

TROUBLE SHOOTING

OIL LEAKAGE OR HIGH OIL CONSUMPTION: If oil level in transmission case consistently low, and to correct complaints of oil leakage or high oil consumption, check for external and internal leaks as follows:

External Oil Leaks—Make thorough inspection of entire transmission, check mating surfaces of servo case, modulator housing and cover, universal joint ball collar, transmission case, converter housing and side covers for signs of leakage. Check and tighten all test plugs.

Internal Leak in Vacuum Modulator—Disconnect vacuum line from vacuum modulator to intake manifold and check for transmission lubricant in this line which would indicate a torn or fractured modulator diaphragm. Replace diaphragm.

Internal Leak to Rear Axle—Inspect rear axle lubricant level. A too high level indicates a leak at the universal joint shaft seal allowing transmission lubricant to leak back through torque tube to rear axle, or plugged drain-back hole from universal joint to transmission case. Make certain this hole open and replace universal joint seal.

CAUTION—DO NOT re-use rear axle lubricant which has been diluted with transmission lubricant.

Internal Leak to Flywheel Housing—If oil leakage noted at front of flywheel housing, remove plug from bottom of transmission housing. If oil found in housing, check for oil leaks at the following points: "O" Ring Seal between primary pump and primary pump hub, Front Pump oil seal or "O" ring seal, Front Pump oil drain plugged, Converter Cover "O" ring seal, Turbine Bolt "O" ring seal, or sand hole in transmission housing allowing leaks between oil sump and converter cavity.

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, poor acceleration, or engine runs away on turns).

1) In all Speed Ranges—Low oil level. Incorrect control linkage adjustment. Air leak in oil pump suction pipe. Low front oil pump pressure.

2) In Drive Range—Incorrect control linkage adjustment. Damaged or leaking clutch piston seal (worn or burned clutch plates resulting from partially engaged clutch).

3) In Low Range—Incorrect control linkage adjustment. Low Band out of adjustment. Sticking accumulator valve, modulator lever, or modulator valve. Damaged or worn Low Servo Piston Ring resulting in poor band application or excessive oil leakage into clutch apply circuit causing partial clutch application and possibly burned clutch plates Check this condition by connecting pressure gauges to Low Servo Apply and to High Clutch test points (see Pressure Tests) and proceed as follows: Set brakes securely, place selector lever in "L" low range, accelerate engine to stall speed of 1560-1610 RPM., note pressure indicated on both gauges. Low servo apply gauge should indicate 160-200 lbs. and High Clutch gauge should read zero. If pressure registered on High Clutch gauge, oil leakage into clutch apply circuit is indicated.

CAR CREEPS (Forward or Backward).

1) With Control Lever in Neutral—Incorrect control linkage adjustment. Clutch piston vent valve stuck closed. Clutch plates sticking or incorrectly assembled (not "stacked" in correct order).

2) Creeps forward with Control Lever in Reverse or backward with Lever in Low—Incorrect control linkage adjustment.

CAR WILL NOT MOVE (Wheels may be locked or free):

1) With Control Lever in any range (rear wheels free). If this occurs at other times than after reversing car, see causes listed under EXCESSIVE SLIPPAGE above. If this occurs only after reversing car (indicating loss of front pump pressure) check: Rear pump air leakage into front pump suction line (causing front pump to lose its prime). Rear pump gasket leakage. Front pump clearance excessive.

2) With Control Lever in any range (rear wheels locked). Parking pawl lock engaged. Broken parts in transmission. Parking brake applied.

3) With Control Lever in Drive Range (rear wheels free). If engine runs away and transmission is hot, check for: Low radiator water level, clogged oil cooler, sticking thermostatic valve, or dragging Low Range Band (causing over-expansion of clutch parts due to excessive heat).

SHIFTS ARE ROUGH.

1) Low-to-Drive Shift (car in motion). Incorrect Low Band adjustment. Clutch plates worn or binding. Modulator control lever or piston sticking (will cause excessive pressures). Accumulator dump valve orifice plugged.

If engine speeds up during this shift—Check for incorrect low band adjustment and worn or binding clutch plates.

2) Drive-to-Low Shift. Incorrect Low Band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

3) Neutral-to-Reverse. Incorrect reverse band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

CHATTERS WHEN STARTING.

1) In Low Range. Incorrect Low Band adjustment. Worn or rough band, scored drum. Clutch not disengaging properly due to distorted or binding plates, sticking clutch piston, sticking piston vent valve, or damaged or worn Low Servo Piston Ring allowing oil leakage into clutch apply circuit and causing partial clutch application (see tests for Excessive Slippage in Low Range above).

2) In Drive Range. Incorrect Low Band or Reverse Band adjustment. Bands worn or rough, drums scored.

3) In Reverse Range. Incorrect Reverse Band adjustment. Worn or rough band, scored drum. Reverse ring gear and drum bushing worn or damaged.

REVERSE OPERATION JERKY OR DRAGGING.

1) Clutch plates are incorrectly assembled (not "stacked" properly) or sticking. Clutch piston vent valve stuck closed.

REVERSE CAN NOT BE ENGAGED WITH ENGINE RUNNING: If reverse can only be engaged when engine not running, check for accumulator snap ring being out of place (allowing accumulator valve and body to be forced against clamp nut on parking lock lever shaft and apply spring assembly, blocking shift into reverse). *NOTE*—Above condition will not prevent shift into Low Range).

DRIVE-TO-LOW OR LOW-TO-DRIVE SHIFT DIFFICULT: May be caused by improperly drilled high clutch feed orifice in valve body resulting in slow clutch application in Drive Range and slow clutch release when shifting from Drive to Low (restricted orifice will cause slow oil flow). Check by connecting pressure gauges to Low Servo Apply and to High Clutch (low servo release side) and noting pressures as follows:

1) Move selector from Neutral to Drive with engine idling. If pressure builds up much more rapidly on Low Servo Apply gauge than on High Clutch gauge, a restriction in the passage (undersized orifice) is indicated.

2) Move selector from Drive to Low. If pressure in High Clutch gauge drops slowly, oil drainage from clutch is restricted. NOTE—This will result in slow Low Band application and clutch drag (may cause burned clutch plates).

HIGH CLUTCH PLATES BURNED OR CLUTCH FAIL

►***CAUTION—When High Clutch failure noted, following tests should be made before transmission removed, and transmission should also be carefully examined after removal and disassembly.***

1) Connect pressure gauges to Low Servo Apply, High Clutch (low servo release side), and to Reverse Servo points. Operate engine to supply oil pressure.

2) Place selector lever in Drive position and note pressure build-up in High Clutch gauge. Slow build-up indicates restriction in high clutch apply orifice resulting in clutch slippage and burned plates.

3) Place selector lever in Low position. High Clutch gauge should not show any pressure. Pressure at

CONTINUED ON NEXT PAGE

CHEVROLET POWERGLIDE (Cont.)

this point indicates leakage past Low Servo Piston Ring resulting in partial clutch application and burned clutch plates.

4) Place selector lever in Reverse position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage between the converter "out" and low servo "release" channels in valve body or damaged Housing-to-Valve Body gasket. Also check valve body for porosity or sand holes permitting leakage. *NOTE*—even a slight clutch drag will cause clutch to burn out (clutch plates rotate in opposite directions in Reverse).

NOISE IN TRANSMISSION.

1) Buzzing Noise (All Ranges). Low oil level. Pump gear interference with crescent in pump. Pump check valve not seating.

2) Ringing Noise in Converter. Low oil level. Air leak in pump suction line (pipe not seated properly) resulting in low oil level in converter. Pressure regulator valve stuck (closing converter inlet port). Leakage in oil line between front pump and regulator valve.

3) Clicking Noise. Incorrect manual linkage adjustment (causing interference between parking lock pawl and gear).

4) Whining Noise. Transmission gear teeth worn. Pump gear clearance excessive or pump gear bushings worn.

FUEL CONSUMPTION EXCESSIVE.

1) Transmission Causes. Converter stator or secondary pump free-wheeling cams and roller incorrectly assembled. Converter secondary pump locked to primary pump hub. Clutch piston vent valve stuck open.

TRANSMISSION OIL BEING FORCED OUT OF FILLER PIPE: Caused by aeration and foaming of the oil due to one or more of the following:

NOTE—This condition may also cause Loss of Power and Lower Stall Speed (due to converter turbulence and lower pressures in control circuits).

1) Oil level too high allowing planet carrier to revolve in oil and aerate it. Correct by lowering oil level to correct point (see LUBRICATION) and driving car for 5 miles to work out air bubbles.

2) Oil suction pipe split, seal damaged, bore for suction pipe in housing too deep, or suction pipe retainer ears bent (preventing proper compression of the seal) resulting in air leaks in oil suction line.

3) Sand hole in suction bore of transmission case or housing or in suction cavity in valve body resulting in air leaks in oil suction line.

TESTING

▷*TESTING CAUTION*—Transmission oil level must be checked and corrected (see LUBRICATION) and *transmission must be warmed up before tests made.*

Warming Up Transmission: Transmission must be warmed up by road driving or in the shop exactly as follows before checking for oil leaks or trouble.

Road Warm Up—Drive car for approximately 5 miles with frequent starts and stops to approximate heavy-traffic conditions.

Shop Warm-Up—Set hand brake tight to hold car, place selector lever in "D" range, start engine and run for 15 minutes at 750 RPM. At end of 15 minutes, transmission will be warmed up sufficiently for testing regardless of initial temperature.

▷*CAUTION—Recheck oil level after warm-up and before making following tests.*

▷*NOTE—Above supercedes original procedures for shop warm-up of transmission.*

STALL TEST: Connect accurate tachometer to engine, set brakes firmly to hold car, test as follows:

▷*CAUTION—Do not test longer than 10 seconds in each range and allow at least 2 minutes between tests to prevent overheating of converter oil.*

Place selector lever in each range in turn as noted below. Depress accelerator and run engine speed up until maximum speed reached in each range. Maximum stall speed should be between 1560 RPM. and 1610 RPM. and should be almost identical in each range. If engine speed not within this range, following trouble is indicated:

Engine Speed Low (During Stall Test)—If several hundred RPM., less than minimum stall speed, secondary pump may be frozen on its hub or stators may not be "locking up" for converter operation.

Engine Speed varies or exceeds maximum (During Stall Test)—May be caused by insufficient oil pressure (see test below) or slippage in following units:

Slippage in "D" Range—Multiple disc clutch.

Slippage in "L" Range—Low Band.

Slippage in "R" Range—Reverse Band.

PRESSURE TESTS: Support rear of car on stands so that rear wheels will be free to turn during tests. Connect pressure gauges at the following points and make the tests listed below (special test gauge assembly of four gauges on a mounting plate recommended to allow complete testing without changing gauge connections):

1) Low Servo Apply (at plug on lower front of servo cover on right side of transmission. *CAUTION—do not confuse this plug with Modulator Lever Pivot Pin Retaining Plug which is slightly to rear of this Low Servo Apply Plug.*

2) High Clutch (Low Servo release side).

3) Reverse Servo (at reverse servo apply outlet plug on bottom of transmission case at right rear).

4) Rear Pump (at rear pump outlet plug on rear of transmission case to right of universal joint ball housing) or on Rear Servo Cover on 1952 transmissions.

Drive Range Test: Check and adjust the engine idling speed to 430-450 RPM. Place selector lever in Drive "D" range and proceed as follows:

1) Note pressure with engine idling (see Gauge Note below). This pressure should be 40-45 lbs.

2) Increase speed to approximately 30 MPH. and note pressure. Then load engine several times by applying brakes while maintaining 30 MPH. speed. Pressure should rise each time load increased (see Gauge Note below). If no rise noted, check vacuum lines for leaks and if no leaks found, check for defective Vacuum Modulator.

▷Gauge Note—In above tests, check pressures indicated on both Low Servo Apply gauge and High Clutch (low servo release side). Pressures shown on both gauges should be approximately the same with selector lever in "D" position.

3) Apply brakes and accelerate engine to normal stall speed (1560-1610 RPM.). Check pressure which should be 75-100 lbs. If pressure within these limits, but engine speed exceeds 1610 RPM., high clutch slippage is indicated. If pressure below 75 lbs. with engine at full throttle and brakes locked, check for: Oil Suction Screen plugged, Oil Suction Line leaking air, Pressure Regulator Valve stuck, Clutch Piston Seals or Clutch Drum Oil Seal Rings leaking, Valve Body-to-Case Gasket leaking or leaks between valve body and housing, Front Pump clearances excessive.

Low Range Test: Place selector lever in Low "L" range and proceed as follows:

1) Note pressure on Low Servo Apply gauge with engine idling. This pressure should be 125-150 lbs.

2) Apply brakes and accelerate engine to normal stall speed (1560-1610 RPM.). Pressure reading should be 160-200 lbs. If pressure within these limits but engine speed exceeds 1610 RPM., adjust Low Band (see Band Adjustment) and recheck pressure. If pressure is below 160 lbs., check Hydraulic Modulator and Accumulator (see Hydraulic Modulator Testing below). If pressure is below 125 lbs. and the same at both the Low Servo Apply and the Modulator test points, check for: Oil Suction Screen plugged, Low Servo Ring damaged or broken, Pressure Regulator Valve stuck, Valve Body-to-Case Gasket leaking or leakage between valve body and housing, Servo Cover leaking, Front Pump clearances excessive, Modulator Control Lever or Piston stuck, leakage between modulator and servo cover.

Hydraulic Modulator Testing—Connect pressure gauge at modulator test point (plug at top of modulator housing). Repeat low range idling test (1 above). If pressure is zero or very low, check for defective accumulator. If pressure is below 125 lbs. but the same as shown on Low Servo Apply gauge, see 2 (above) for possible troubles.

Reverse Range Test: Place selector lever in Reverse "R" position and proceed as follows:

1) Note pressure on Reverse Servo gauge with engine idling. This pressure should be 125-150 lbs.

2) Apply brakes and accelerate engine to normal stall speed (1560-1610 RPM.). Pressure reading should be 160-200 lbs. If pressure within these limits but engine speed exceeds 1610 RPM., adjust Reverse Band (requires removal of transmission—see Band Adjustment). If pressure is below 160 lbs., check for: Oil Suction Screen plugged, Reverse Servo Piston Ring damaged or broken, Pressure Regulator Valve stuck, Valve Body-to-Case Gasket leaking or leakage between valve body and housing, Front Pump clearances excessive, Modulator Control Lever or Piston stuck, leakage between modulator and servo cover.

Rear Pump Test: Place the selector lever in Drive "D" range and release parking brake so that rear wheels are free to turn. Then proceed as follows:

CONTINUED ON NEXT PAGE

CHEVROLET POWERGLIDE (C nt.)

1) Accelerate engine to 30 MPH. speed (as registered on speedometer), note pressure on Rear Pump gauge. This pressure should be 50-75 lbs.

2) Move selector lever to Low "L" range and again check pressure at 30 MPH. speed. This pressure should be 140-180 lbs.

3) If pressures low in (1) and (2), check for: Leaks at Servo Cover, Valve Body-to-Case Gasket, or between valve body and housing. Check for excessive rear pump clearances.

REMOVAL FROM CAR

Transmission & Torque Converter are removed as an assembly:

1) Raise car and support securely on jack stands. Remove floor mat and transmission cover plate, remove toe pan plate.

2) Take out three top turbine housing attaching bolts (through toe pan hole).

3) Disconnect speedometer cable at transmission and hand brake rod from cross-shaft. Drop cross-shaft, brake cables, and spring.

4) Free universal joint collar by taking out cap screws on back of transmission case, slide ball and collar back on shaft. Support propeller shaft with jack, take out front universal trunnion bearing cap screws, split universal, lower front end of propeller shaft.

5) Remove the two upper transmission-to-converter housing bolts, install lift sling (J-4262) and attach cable of J-4279 hoist positioned in front compartment. Attach lift chain (part of hoist assembly) to two top universal joint collar screws at rear of transmission.

6) Drain transmission and turbine (see Draining instructions). Disconnect transmission oil cooler lines and vacuum line.

7) Take out two lower turbine housing attaching bolts. Remove flywheel cover and flywheel underpan extension.

8) Remove all spark plugs. Disconnect exhaust pipe at manifold, disconnect muffler support. Tie exhaust pipe and muffler to left frame side member out of the way.

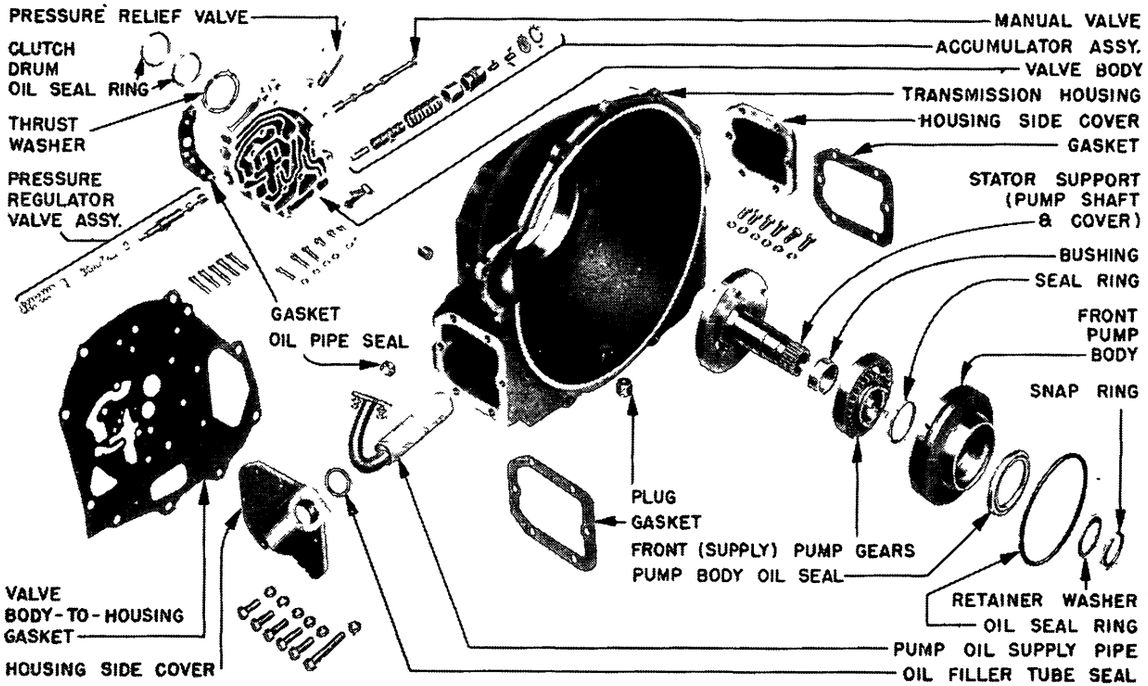
9) Disconnect both short and long shift rods at transmission levers, tie long shift rod up out of the way. Remove bell crank lever and stud from transmission case.

10) Remove all six flywheel-to-converter bolts working through housing opening on left side (use tool J-4281 to turn engine crankshaft and align each bolt with housing opening for access).

11) Clean all dirt from around filler tube and dipstick fitting on transmission side cover, remove housing bolt holding filler tube, remove filler tube and dip stick.

►*CAUTION—Cover the filler tube opening with masking tape or plug with rubber stopper to keep out dirt.*

12) Support engine with jack under oil pan. Remove transmission-to-rear support bolts, remove the transmission support.



TURBINE HOUSING, FRONT OIL PUMP, & VALVE BODY ASSEMBLY

13) Take out all remaining turbine housing bolts (lift or lower engine, as necessary, for access to bolts).

14) Move transmission straight back to clear flywheel pilot from flywheel.

►*CAUTION—Use extreme care not to damage flywheel pilot.*

15) Lower transmission slightly, lift rear end as far as possible and secure by hooking lift chain in notch on back of hoist. Use pry bar between transmission and right side of floor opening to clear servo cover bolts. Repeat this process (lowering front end of transmission and lifting rear end) until lubrication by-pass valve plug clears floor opening.

16) Lower transmission and remove from beneath car.

►*CAUTION—Transmission must not be allowed to strike against flywheel.*

DISASSEMBLY—TRANSMISSION

►**DISASSEMBLY & REASSEMBLY CAUTION:** *CLEANLINESS IS EXTREMELY IMPORTANT when opening up transmission. Thoroughly CLEAN exterior of case first, CLEAN each part as removed with cleaning solvent or gasoline and dry with air—do not use wiping cloths which will leave lint on parts. Store all parts in clean storage bins.*

DISASSEMBLY OF TRANSMISSION (Into Major Units): With transmission on bench (fixture J-3361 recommended for holding transmission), remove all units from transmission case as follows:

1) Take out right side cover attaching bolts, remove side cover and oil suction screen.

2) Install locking strap on turbine to hold unit stationary (install bolt in one flywheel attaching hole to hold strap). Remove all turbine cover bolts. Thread three 10/32x2" T-screws (part of J-3387 Pilot Stud Set) into three tapped holes in turbine cover to loosen cover, remove cover and turbine assembly. Remove primary and secondary stators as a unit, test for slippage of free-wheel clutches by rotating units by hand (should rotate freely in one direction but lock when turned in opposite direction). Check secondary pump free-wheeling clutch for slippage in same manner as stators. Take out converter retaining ring and washer. Slide primary pump from stator support and examine pump hub for bearing surface damage.

3) Take out Modulator assembly attaching bolts on right side of case, lift Modulator assembly off.

►*CAUTION—Use care that hydraulic plunger and body do not fall out of modulator when it is removed.*

4) Loosen all servo cover bolts slightly and break servo cover loose if it sticks to case (reverse servo spring and pressure regulator spring bear against cover) using care not to allow cover to tip which

C NTINUED N NEXT PAGE

CHEVROLET POWERGLIDE (Cont.)

may damage or break tip of pressure regulator valve. Use guide bolts to maintain cover alignment or turn all cover bolts out evenly while exerting pressure on cover, then lift cover and gasket straight off until cover clears tip of pressure regulator valve. Remove reverse servo spring and pressure regulator springs, lift regulator valve out.

▷*CAUTION—Handle valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.*

5) Loosen low band adjusting screw locknut and tighten adjusting screw until low band grips clutch assembly to hold it in place. Take out transmission-to-turbine housing bolts, separate turbine housing from transmission.

6) Remove manual valve from valve body on rear of turbine housing, remove manual valve lever, remove bronze thrustwasher from valve body delivery sleeve. Take out bolts attaching valve body to turbine housing and also pump-to-valve body bolts, remove valve body and gasket.

▷*CAUTION—Handle manual valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.*

7) Remove front pump from turbine housing using J-4263 pump driver tool.

8) Loosen low servo band adjusting screw to free clutch assembly, lift input shaft and clutch assembly out of transmission case.

9) Back off low servo band adjusting screw until band is free, lift out servo band and strut assembly, remove low servo piston and release spring.

10) Take out universal joint retainer bolt on rear end of output shaft, remove lockwasher and plain washer, slide universal joint yoke off shaft.

11) Install Mainshaft Removing & Replacing Tool J-938 (see Tool Note below) on rear face of transmission case and engage planet carrier output shaft. Turn puller handle clockwise to force planet output shaft out of rear bearing, disconnect and remove tool, remove planet carrier assembly through front of case. Remove reverse brake drum.

▷Mainshaft Removing & Replacing Tool J-938 Note: This tool designed for use on 3-speed Synchromesh Transmission and must be reworked for use on Powerglide Transmission as follows: Enlarge two attaching bolt holes in tool yoke to ½" and elongate overall hole span to 6" to permit tool to be mounted on rear face of Powerglide case.

12) Loosen reverse servo locknut, back off reverse band adjusting screw until band is free, remove band assembly and reverse servo piston.

13) Take out rear pump mounting screws, remove rear pump assembly and gasket.

14) Use Tool J-3383 engaged in parking lock pawl spring to rotate spring so that end can be unhooked from case, remove spring and parking lock pawl from case. Remove parking lock lever and steel washer, then remove parking lock lever shaft and apply spring assembly from case. *NOTE—Parking Lock Lever Shaft No. 3697552 (used on later transmissions) does not have spring and this later type shaft can be used on all previous transmissions.*

▷*For disassembly of all above units, see OVERHAUL data*

OVERHAUL

▷"O" RING SEAL CAUTION: *These seals must be discarded when removed and a new seal installed exactly as directed below.* "O" ring rubber seals are special design and are installed with side clearance in ring groove so that oil pressure on seal deforms the rubber and extrudes a portion of the rubber into the clearance space between the mating parts to provide a positive seal against loss of oil pressure. Seals must not be re-used.

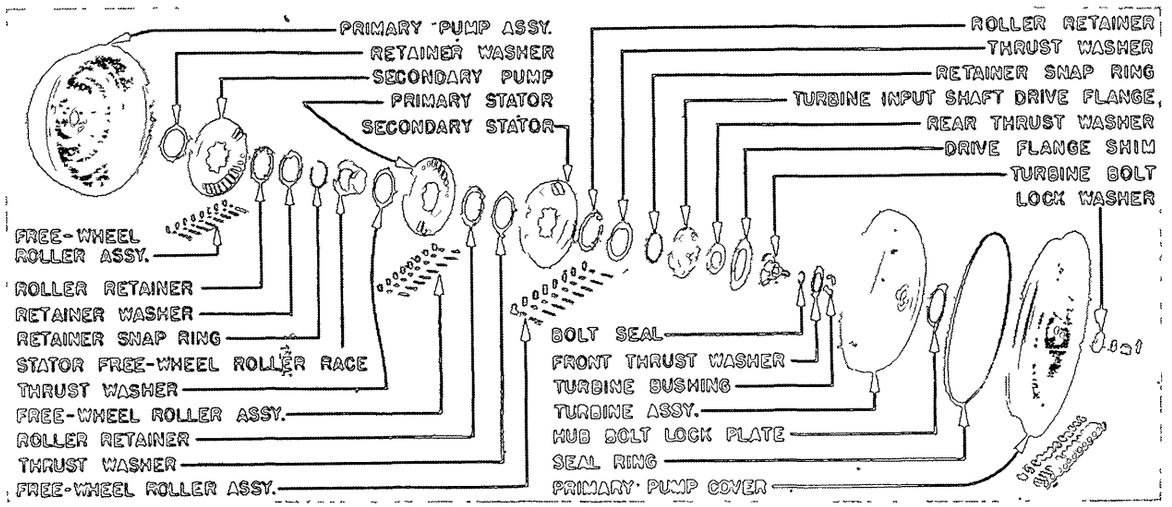
"O" Ring Seal Installation—Make certain that parts are clean and that burrs and sharp edges are removed. Seal must be free of any twists (place ring on flat surface and allow it to assume natural position) and must not be twisted during installation. Engage one side of ring in groove, pull other side straight back until it can be fitted in groove without twisting. Work ring against trailing edge of groove (last side to enter when parts assembled) using flat tool entered between ring and leading edge of groove to move ring without twisting. Lubricate "O" ring and parts with transmission oil.

Converter Primary Pump: Disassembly. Remove stator race thrust snap ring (use snap ring pliers KMO-410), remove thrustwasher. Rotate secondary pump clockwise to release free-wheel clutch, withdraw secondary pump. Remove free-wheel cam roller and spring retainer, remove cam rollers, spring retainers, springs, and thrustwasher.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect cam rollers and inner and outer primary pump hubs for scoring or galling. Inspect bushing for damage or wear. NOTE—Special Primary Hub & Bushing Assembly No. 3692982 furnished for use if hub damaged or bushing damaged or worn. See Note below for installation cautions for this assembly. Check roller springs for distortion, spring retainers for wear or damage, check primary and secondary pump vanes for looseness or damage. If pump disassembled to correct oil leak between primary pump and primary pump hub, install new "O" ring seal as follows:

▷Replacement Primary Pump Hub & Bushing Assembly Installation Caution—When installing this assembly DO NOT install dowels as used in production. Dowel holes in service hub are unfinished and not to size. IT IS IMPORTANT THAT NO ATTEMPT BE MADE TO INSTALL DOWELS IN THESE HOLES. Install NEW Primary Hub "O" Ring Seal, Part No. 3692860, when assembling hub and bushing assembly to primary pump (See "O" Ring Seal Replacement Data following but DISREGARD all data on dowel pin installation). Install NEW Converter Cover "O" Ring Seal, Part No. 3689754, when reassembling converter unit.

▷Primary Pump "O" Ring Seal Replacement—Mark both primary pump hub and pump with a center-punch to insure reassembly in same relative position (*CAUTION*—Assembly is balanced and balance will be disturbed if relative position of parts changed). Remove six screws attaching pump to hub. Support pump on two wooden blocks and use ⅛" pin punch on tops of three dowels to remove hub from assembly (dowels are swaged or peened over during assembly). Remove "O" ring seal from hub. Inspect pump and hub mating surfaces, clean up tops of screw holes with a burring tool to remove all burrs that might prevent seating of pump on hub, remove all chips and burrs from mating surfaces with an Arkansas stone, remove burrs from ends of dowels. Wash all parts in solvent and dry with air. Inspect hub and pump for galling or scoring, inspect bushing for excessive wear, check fit of pump hub in pump, make certain "O" ring groove is not nicked and is free from chips and dirt. Install new "O" ring seal in groove (*CAUTION*—Select "O" ring that remains in groove—some rings may have tendency to roll out of groove). Place pump hub on bed of arbor press, position primary pump on hub (*CAUTION*—line up marks made before disassembly), use a piece of thin wall pipe (3½" I.D., square at both ends and approximately 4" long) to carefully press



TORQUE CONVERTER

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CHEVROLET POWERGLIDE (C nt.)

pump over hub. Install six attaching screws and lockwashers, tighten screws evenly to 4½ ft. lbs. torque. Use a small punch to peen dowel holes around ends of the three dowels to prevent possibility of dowels working out into converter. **Check pump run-out** as follows: Install primary pump assembly on stator support with front pump drive gear tangs aligned with drive slots in pump hub (*CAUTION*—face of pump must be flush with face of bell housing). Mount dial indicator on transmission mounting fixture so that indicating button contacts forward face of primary pump, check pump run-out. Run-out must be less than .010". If run-out excessive, check for burrs or dirt between mating faces of pump and hub or "O" ring seal not seated in groove.

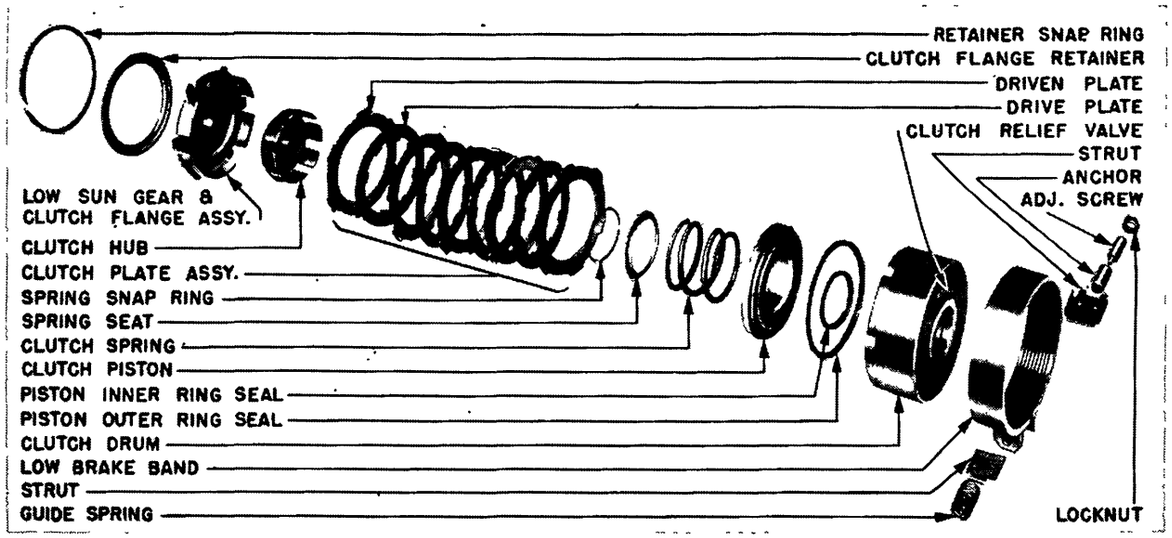
Reassembly—Install free-wheel cam roller and spring retainer with prongs to rear. Assemble rollers, spring retainers, and springs in cam pockets with spring retainer curvature fitting curvature of unit, then install cam thrustwasher (CAUTION—hold retainer on opposite side to prevent its being pushed out of position). Use loading tool J-3362 to install secondary pump on primary pump hub. Check installation (should turn freely in clockwise direction and lock in opposite direction). Remove loading tool. Install stator race thrustwasher and snap ring.

Primary & Secondary Stators: Disassembly. Remove stator race snap ring and thrustwasher, rotate secondary stator clockwise and withdraw from stator race, then remove stator race similarly from primary stator (CAUTION—use care not to lose cam rollers and springs). Remove cam roller and spring retainer from stators, remove cam rollers, springs, and spring retainers.

Inspection—Wash all parts in solvent and dry with air. Check cam rollers and stator hub for galling or scoring, check roller springs and retainers for distortion or damage. Check stators for loose or damaged vanes.

Reassembly—Install cam rollers and spring retainer in secondary stator (this retainer has LONG tabs), then install cam rollers, springs, and spring retainers with retainer curvature corresponding to hub curvature. Install cam thrustwasher. Repeat this entire procedure for primary stator. Place loading tool J-3362 on stator race, slide primary stator over tool and onto race with thrustwasher down, rotating stator clockwise during installation to prevent pushing cam rollers out of position; install secondary stator, with thrustwasher down, following same procedure. Install bronze thrustwasher and snap ring. Check assembly by rotating stators. Both stators should turn freely on race in clockwise direction but lock in opposite direction.

Converter Turbine: Disassembly. Remove "O" seal ring from converter cover. On transmissions before No. KT-22574A-15-D, remove turbine bolt cotter key, nut, flat washer, and slotted washer. On transmissions after above number, bend down ears on special lock plate, remove the center bolt, special lock plate, and slotted washer. On all models, lift turbine cover from special bolt (first type), flanged nut (later type). Bend down lockplate ears and remove three turbine drive flange-to-turbine capscrews. Remove turbine drive flange and the special bolt or flanged nut from the turbine, then remove the special bolt or flanged nut and thin thrustwashers from the flange. Remove "O" ring seal from the special bolt or flanged nut.



MULTIPLE DISC CLUTCH & LOW BAND ASSEMBLY

Inspection—Discard seal rings, wash all parts in solvent and dry with air. Check bolt, hub and thrustwasher for scoring or wear. Check turbine for loose or damaged vanes. Check turbine hub bushing for excessive wear and replace bushing as follows:

Turbine Hub Bushing Replacement—Precision type bushing, No. 3689929, furnished for service. Press old bushing out of turbine hub with tool J-4375, use same tool set to install new bushing. Support turbine on special collar of tool set (has three locating pins to center turbine) on arbor press with turbine vanes downward, place new bushing on small end of driver and press bushing in place in turbine hub. New bushing need not be reamed.

Reassembly—Install new "O" seal on turbine bolt (see "O" ring installation note). Install thick thrustwasher (with lugs engaging holes in turbine), install turbine bolt (first transmissions) or flanged nut (later transmissions), thin thrustwasher, turbine hub (three dowels engaging holes in turbine) in this order. Install new lockplate and three input shaft drive flange-to-turbine capscrews, tighten these screws evenly to 12½-15 ft. lbs. torque and lock the screws. Install turbine cover, assemble slotted washer with nibs engaging locating holes in pilot. On transmissions before No. KT-22574A-15-D, install flat washer and nut, tighten nut to 12½-15 ft. lbs. minimum (if cotter pin hole does not line up, tighten nut until holes line up). On transmissions after above number, install special lockplate and center bolt, tighten bolt to 12½-15 ft. lbs. and lock the bolt by bending up lockplate ears. Install new "O" ring seal on converter cover.

Turbine Bolt Endplay Adjustment—Check endplay with dial indicator mounted on end of bolt after bolt assembled in turbine. Endplay should be .002-.016". Adjust by installing shims (No. 3691922—.014", No. 3691923—.019") between turbine and input shaft drive flange, as required, for this endplay.

►*CAUTION—Transmissions beginning No. HT-19226-B24 do not use above shims but endplay limits for these transmissions are also .002-.016".*

Multiple Disc Clutch: *CAUTION—New design clutch with cast piston used beginning Trans. No. JT-232315-D-23-D.* Both types serviced alike except that parts not interchangeable and relief valve on later type located in piston (ball seating in relief hole and retained by staking of the piston metal around the hole) instead of being located in clutch drum.

Disassembly—After converter removed, remove clutch flange retainer ring and retainer, low sun gear and clutch flange assembly, thrustwasher, hub, and clutch plates from clutch drum. Place clutch drum in arbor press (CAUTION—on early transmissions, use care not to damage pressure relief valve on end of drum), install piston spring compression tool No. J-3364 (Transmissions before No. JT-232315D-23-D) No. J-5133 (Transmissions after above number), compress clutch release spring, remove clutch spring snap ring using KMO-410 snap ring pliers, relieve spring pressure, remove spring seat and spring. Remove clutch piston by rapping the drum face down on a wood block. Remove piston outer seal ring from piston and inner seal from clutch drum hub.

Inspection—Wash all parts in solvent and dry with air. Inspect drum brake band surface for excessive scoring or burring, and drum bushing for scoring or wear. Examine clutch hub and clutch flange for galling (see Note below for installation of special thrustwasher to prevent this trouble developing in service). Slight galling can be cleaned up with emery cloth. See that clutch flange has no radial play in drum slots and that plates are free fit over clutch hub and in clutch flange. Check clutch plates for burning and wear. Check low sun

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CHEVROLET POWERGLIDE (Cont.)

gear for nicked, burred, or scored teeth. Check relief valve for free operation. If necessary to replace valve, proceed as follows:

▷Relief Valve Replacement (First Type—on clutch drum)—Use sharp chisel to cut off heads of valve spring retainer rivets, drive rivets out with a small punch, remove old valve spring and valve. Install new relief valve and valve spring with two new rivets, support drum carefully and peen over ends of rivets securely. Check valve for free operation.

▷Relief Valve Replacement (Later Type—in clutch piston)—Remove old ball from hole in piston, make certain that all burrs removed from ball retaining hole and that ball seat is not burred or nicked, see that orifice leading to rear of piston is open and clean. Place new steel ball in retaining hole and carefully stake edges of hole to prevent ball falling out. Make certain that ball is free to move after staking completed.

▷Clutch Hub Thrustwasher Note—New .020" thick spring-steel thrustwasher, No. 3694444, now installed between clutch hub and clutch flange to prevent galling. This washer can be installed on earlier transmissions if galling noted at this point when transmission being overhauled. Install washer with four equally spaced tabs engage slots in clutch hub which will prevent washer riding on mainshaft.

▷*CAUTION*—Following parts not interchangeable between first and later (cast piston) type clutches: Clutch Piston, Drum and Bushing Assy., Spring, Spring Seat, and Snap Ring.

Reassembly—Install new outer ring seal on piston (lip of seal toward oil pressure end of piston) and new inner ring seal on clutch drum inner hub (lip in toward bottom of clutch chamber). Lubricate inner diameter of clutch drum and seals with transmission oil, install piston (CAUTION—use feeler gauge to seat outer seal ring in drum without damaging seal lip). Install clutch spring and spring seat, compress spring using proper tool in press (*CAUTION*—see that spring seat does not hang up in snap ring groove), install snap ring. Place clutch hub thrustwasher on hub with four tabs engaging slots in clutch hub, place clutch hub and thrustwasher on clutch flange with open side of hub up. Install clutch plates, starting with steel plate concave "dished" side down toward clutch flange, and alternating steel and composition plates. Install clutch drum assembly over flange assembly, invert and install clutch flange retainer and retainer ring. Check endplay with feeler gauge inserted in drive slot in drum below clutch flange drive lug. Maximum allowable endplay is .013" and is adjusted by selecting clutch flange retainer of correct thickness (.055" .064", .073").

Modulator: Disassembly. First lift out hydraulic plunger and body assembly (CAUTION—do not allow plunger to drop out or assembly to be damaged). Take out outer cover attaching screws while holding cover down against spring pressure, lift off cover, diaphragm spring, and diaphragm.

Inspection—Wash all parts in solvent, blow out all passages and dry with air. Check diaphragm and outer cover for cracks. Check diaphragm spring for distortion or loss of tension. Inspect hydraulic plunger and body for wear, nicks, or scoring. See that plunger operates freely in body and that body is free in modulator bore.

Reassembly—Place assembly tool J-4261 (centering plug) in modulator body in place of hydraulic plunger and body, assemble diaphragm and spring, install two 10-24x3" guide pins in opposite cover holes, install attaching screws and tighten evenly and securely, remove guide pins and install screws in these holes. Remove assembly tool, install hydraulic plunger and body (body against diaphragm, plunger pointing out so that it will engage modulator lever when assembly completed).

Servo Cover: Disassembly. Take out retaining screw and remove lubrication valve bi-metal strip and retainer. Take out lubrication by-pass valve plug and copper gasket, remove by-pass ball spring and ball. Do not remove modulator control lever.

Inspection—Wash all parts in solvent, blow out all passages and dry with air. Inspect cover for cracks and nicks or burrs on mounting face. Check by-pass ball spring and valve bi-metal strip for distortion. See that modulator lever operates freely without binding. *CAUTION—Lever must not bind on guide pin.*

Reassembly—Install valve by-pass ball, spring, and plug (use new gasket), tighten plug to 17-20 ft. lbs. torque. Install bi-metal strip retainer, bi-metal, and retaining screw, tighten screw securely.

Front Oil Pump: Disassembly. Remove stator support from pump body, lift out pump gears (CAUTION—gears not heat-treated and must be handled carefully to avoid nicking or marring). Remove seal ring from drive gear (compress one end into groove and push other end out to free interlocked ends). Remove and discard "O" seal ring on pump body.

Inspection—Wash all parts with solvent, blow out all passages and dry with air. Check drive gear oil ring and ring groove for nicks and burrs (ring must be free in groove), and check ring in pump body bore (hooked ring ends must have clearance). Inspect pump body and face of stator support for nicks, burrs, or scoring. Inspect oil seal in pump body and replace if worn or damaged (pry out old seal, use Driver J-4240 to install new seal). Install pump gears and check all clearances with feeler gauges:

Driven Gear Clearance—.0025-.0055" clearance between outer diameter of gear and pump body.

Gear-and-Crescent Clearance—Check by pressing gear away from crescent and inserting feeler gauge between end of gear teeth and face of crescent. Should be .003-.009" (Internal Gear).

Gear End Clearance—Check with feeler gauge inserted between gear face and straightedge on face of pump housing. Should be .0005-.0015".

Reassembly—Install new "O" seal ring in pump body (see "O" Ring Installation Note), install drive gear seal ring and pump gears (lubricate gears with transmission oil—insert drive gear with drive lugs extending through oil seal). Assemble stator support on body and align mounting holes.

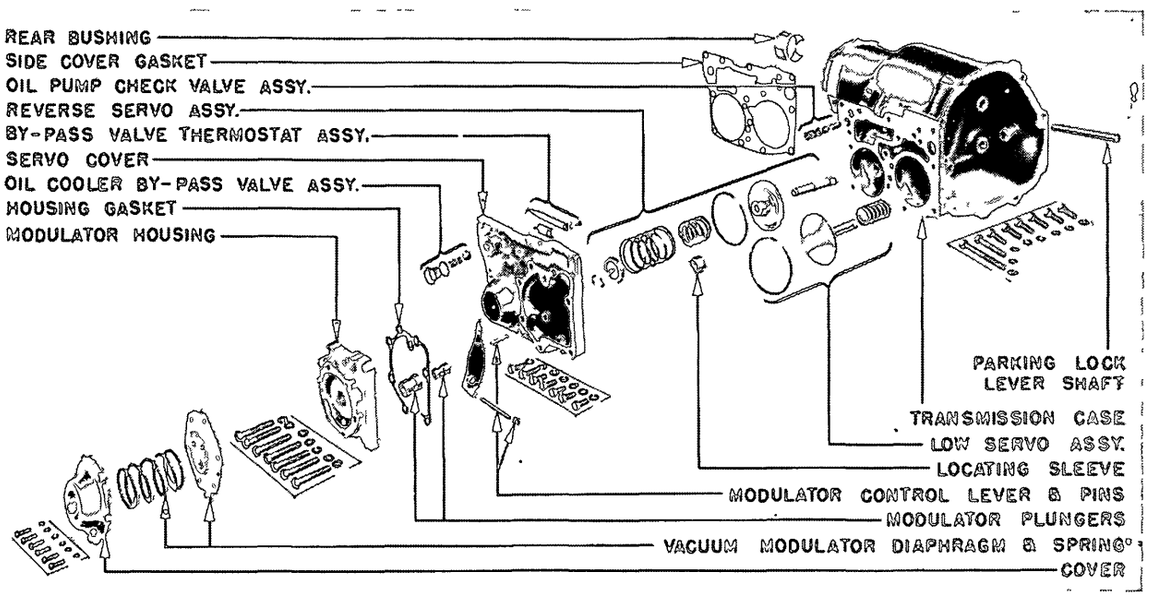
Rear Oil Pump: Disassembly. Take out two flat head screws in pump body plate, remove plate, lift out pump gears. Do not remove ball bearing unless new bearing to be installed.

Inspection—Wash parts in solvent, blow out oil delivery holes and dry parts with air. Inspect rear bearing for roughness but do not remove bearing unless replacement required (see Bearing Installation below). Inspect pump body and cover for nicks or burrs. Inspect gears and check gear clearances with feeler gauge as follows:

Driven Gear Clearance—.003-.007" clearance between outer diameter of gear and pump body.

Gear & Crescent Clearance—Check by pressing gear away from crescent and inserting feeler gauge be-

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TRANSMISSION CASE, SERVO COVER, & MODULATOR ASSEMBLY

CHEVROLET POWERGLIDE (Cont.)

tween end of gear teeth and crescent. Clearance should be .002-.009" (Internal Gear).

Gear End Clearance—Check with feeler gauge inserted between gear face and straightedge placed across face of pump housing. Clearance should be .0005-.0015".

►**Pump Bearing Replacement**—Remove three retaining capscrews, lockwashers, and lockplate. Drive out old bearing. Press new bearing in place, install lockplate, and retaining capscrews with lockwashers, tighten screws securely. *NOTE—Lockplate not used on first transmissions, but should be installed on these models when pump being reassembled.*

Reassembly—Lubricate gears with transmission oil and install in body. Install pump body plate and tighten the two flat head screws securely.

Valve Body: Disassembly. Use special pliers J-4245 to remove special snap ring in end of accumulator cylinder, remove accumulator valve spring washer and all accumulator valve parts from valve body. Remove two oil seal rings from valve body hub (rings have interlocking ends, released by pressing one end into groove and pushing other end out). Unscrew and remove pressure relief valve assembly. *NOTE*—Beginning with late 1951 production, pressure relief valve was replaced by a dryseal pipe plug.

Inspection—Wash all parts in solvent, blow out all passages and dry with air. Check accumulator body, piston, and body for scoring, see that these parts operate freely. Check small fibre valve in accumulator valve body for free operation. Check springs for distortion. Inspect oil seal rings for nicks and burrs, see that rings are free in grooves and that hooked ends have clearance in clutch drum bore (check by installing rings in drum).

Reassembly—Install all accumulator parts in valve body (CAUTION—accumulator piston must seat over inner and outer accumulator springs and special snap ring must seat firmly in snap ring groove in valve body). Install both oil seal rings in hub grooves. Install pressure relief valve assembly or dryseal pipe plug and tighten securely.

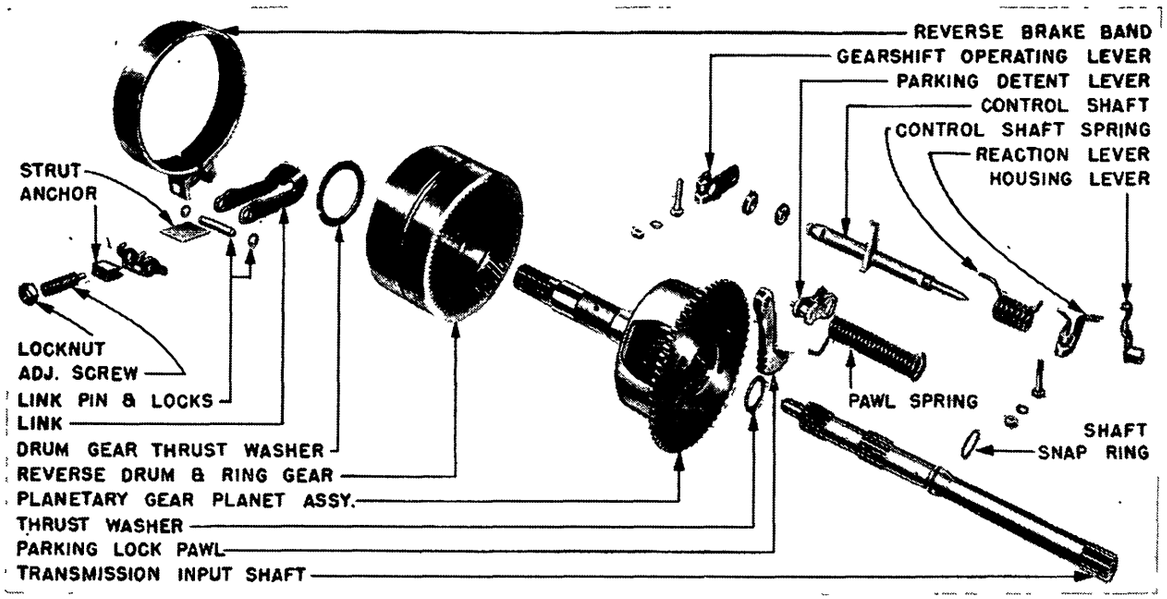
Low Servo Piston: Low servo piston and spring can be lifted out after servo cover removed. Check piston ring gap by installing ring in cylinder. Gap should be .005-.010".

Reverse Servo Piston: Disassembly. Place assembly in bench press with spring end up, use tool J-3377 to compress spring (position tool legs on spring retainer), remove retainer key locks. Release spring tension, lift off retainer, springs, and piston.

Checking & Reassembly—Check piston ring gap by installing ring in cylinder. Gap should be .005-.010". Assemble parts on piston stem and use tool J-3377 to compress springs. Make certain key locks fully engaged in groove in stem.

Planet Carrier Assembly: *Furnished as an assembly and should not be disassembled unless inspection procedure below indicates overhaul required. See Planet Carrier Overhaul below.*

Inspection—Wash in solvent, blow out all passages and dry with air. Inspect all gear teeth for nicks, scoring, or other damage. Check end clearance of planetary pinions with feeler gauge (endplay should be .006-.030"). Check reverse sun gear rear thrustwasher for wear and damage. Inspect drum bushing for wear, scoring, or damage; check outer diameter of drum for scoring or burning. Check output shaft bearing surface for wear, nicks, or scoring. Check input pilot bushing for wear or scoring.



PLANET CARRIER ASSEMBLY, REVERSE BAND, & PARKING LOCK MECHANISM

Planet Carrier Overhaul: *If inspection (above) indicates that parts require replacement, proceed as follows:*

Disassembly—Place assembly in holding fixture or clamp in a vise with front end upward. Mark each pinion shaft and also mark planet carrier (use prick punch or other means) so that shafts can be re-installed in same position *(CAUTION*—pinion shafts are selective fit in carrier and location must not be changed). Then proceed as follows:

1) Remove pinion shaft lockplate screws, rotate plate counter-clockwise until it is free and remove the plate.

2) Starting with one short planet pinion, use a soft steel drift to drive on lower end of pinion shaft until shaft raised above the press-fit area of the output shaft flange, then insert tool J-4599 (one piece only—second piece of tool set used for reassembly) into short planet pinion from lower end and push shaft out until tool is centered in the pinion and shaft is removed. Remove short planet pinion from assembly. Remove tool from pinion, remove needle bearings and needle bearing spacer *(CAUTION*—use care not to lose any of the needle bearings).

3) Remove **adjacent** long planet pinion (paired to the just-removed short pinion by using same thrustwashers) by repeating procedure in step (2) above. Then remove the pinion upper and lower thrustwashers.

4) Remove all remaining planet pinions **in pairs** (short pinion first, followed by long pinion) by following procedures in steps (2) and (3) above.

5) Remove reverse sun gear and sun gear thrustwasher.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect all pinion gears and reverse sun gear for nicked or otherwise damaged teeth, inspect all thrustwashers for wear, nicks, or scores. Inspect needle bearings for wear and replace **all** needle bearings if worn excessively.

Reassembly—*CAUTION—Pinion shafts must be reinstalled in accordance with marks made before disassembly (shaft is selective fit in particular hole in carrier).* Assemble and install parts as follows:

1) Install tool J-4599 in one long planet pinion, assemble needle bearing spacer and needle bearings in pinion (20 at each end) using cup grease to hold needle bearings in position.

2) Install pinion assembly in planet carrier with tool centered in assembly and with thrustwasher at each end of pinion. *NOTE*—Long pinions are located opposite closed portion of carrier, short pinions are located opposite carrier openings. Feed the second part of tool J-4599 in from the top of the planet carrier *(CAUTION*—make certain tool picks up thrustwasher) and push first part of tool down and out at the lower end *(CAUTION*—make certain this tool picks up thrustwasher as it is pushed down). Lubricate correct pinion shaft (see Reassembly Caution above) and install it from top pushing the assembling tools out ahead of it. Turn shaft so that slot in upper end faces toward center of assembly, tap shaft down with a brass or soft steel drift until lower end is flush with lower face of carrier.

3) Assemble and install **adjacent** short planet pinion (paired with just-installed long planet pinion by using same thrustwashers) by repeating procedure in steps (1) and (2) above.

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CHEVROLET POWERGLIDE (Cont.)

4) Install reverse sun gear thrustwasher and reverse sun gear.

5) Install all remaining planet pinions in pairs (long pinion first, followed by short pinion) by following the procedure in steps (1), (2), (3) above.

6) Check end clearance of planet pinions using feeler gauge inserted between end of pinion and thrustwasher. This clearance should be .006-.030".

7) Install pinion shaft lock plate with extended portions in line with pinion shaft slots, rotate plate clockwise until plate locks all pinion shafts and attaching screw holes line up. Install lock plate attaching screws and tighten to 2½-3 ft. lbs.

Input Shaft: Inspect shaft splines for wear, nicks, or other damage; check spline fit in clutch hub, reverse sun gear, and turbine hub. Inspect oil seal ring for wear and free fit in shaft groove, remove ring (compress one end and expand the other to free interlocked ends), install ring in valve body bore and check clearance of hooked ends, re-install ring on shaft.

Transmission Case & Rear Bushing: Check case for cracks, inspect rear bushing for wear or damage and replace if necessary.

Bushing Replacement—Press old bushing out using tool J-4275 in an arbor press (place case on press with rear end upward). Install rear oil pump in case so that rear bearing can be used as a pilot in installing new bushing. Place case on press with front end upward, assemble bushing on Installer Tool J-4276 (square end of bushing against shoulder on tool), enter tool pilot in rear bearing, press new bushing into place. Bushing is precision type and does not require reaming.

Low & Reverse Brake Bands: Inspect bands for wear, cracks, and scored or burnt lining. Lining is bonded to band. Inspect linkage for wear.

REASSEMBLY

After all Major Units reassembled (see OVERHAUL), make certain that all parts and units are absolutely clean and all moving parts lubricated, use all NEW GASKETS & SEALS, and tighten all parts evenly to specified torques. Proceed in reverse order of disassembly directions and note the following important points:

Valve Body & Front Oil Pump Installation: Install suction screen in converter housing oil sump. Install two ¼-20 x 3½" guide pins in valve body attaching holes in housing, install valve body and new gasket over guide pins, tighten attaching bolts evenly (in criss-cross pattern) to 10 ft. lbs. torque EXCEPT bolt over pressure regulator valve tightened to 8 ft. lbs, torque (CAUTION—check manual valve and pressure regulator valve for free operation after all bolts tightened). Align bolt holes in stator support and front pump body assembly, install two ¼-20 x 3½" guide pins through pump body, then use driver J-4263 to seat assembly in converter housing (CAUTION—See "O" Ring installation note) and make certain pump suction and delivery holes on left side of pump are lined up. Install five self-locking bolts through valve body and into pump, tighten the bolts directly above and below regulator valve to 8 ft. lbs. torque, tighten remaining bolts to 10 ft. lbs. torque.

▷*CAUTION—Check pressure regulator valve, manual valve, and front pump for free operation after all bolts tightened.*

Rear Oil Pump, Planet Carrier & Output Shaft, Reverse Servo Installation: Install two 5/16-18 x 3" guide pins in two rear pump attaching bolt holes in rear end of transmission case, install pump and new gasket over guide pins aligning oil suction and delivery holes, tighten all pump mounting bolts evenly to 12½-15 ft. lbs. Install reverse servo piston (use Compressor J-3365 to avoid damage to piston ring) with notch on shaft toward front of transmission. Install reverse brake band and strut assembly in case with thin end of band away from piston, thread adjusting screw in case until it indexes with hole in anchor. Place bronze thrustwasher on reverse drum hub, install drum within reverse band in case. Position rear pump drive gear with lug at top, install planet carrier assembly in case with slot in shaft aligned with pump gear lug. Check planet carrier for correct position and seating of pump gear lug by measuring output shaft for ⅞" minimum protrusion through rear bearing. Install shaft of tool J-938 into threaded end of planet carrier output shaft and bolt tool yoke on rear face of transmission case, turn tool handle counter-clockwise to seat output shaft in rear bearing, then remove tool. Install universal joint front yoke, washer, lockwasher, and bolt, tighten bolt to 25-30 ft. lbs. torque.

Reverse Servo Band Adjustment: Use tool J-4277 (combination screwdriver and locknut wrench). Tighten adjusting screw slowly and at the same time, check endplay in linkage by pushing and pulling on servo return spring. Continue to turn screw in until endplay is just taken up (at this point band must be free on drum and drum should be easily rotated by hand), then back adjusting screw off ⅛-¼ turn and tighten locknut.

▷*CAUTION—Above procedure supersedes previous instructions and will provide sensitive adjustment.*

Sun Gear Endplay Adjustment: After planet carrier assembly installed in case, determine thickness of sun gear thrustwasher needed for correct transmission endplay of .007-.035" as follows:

(1) Measure distance from face of transmission case flange to face of reverse sun gear in planetary unit with tool J-4260 by placing bar of tool against case flange and extending tool stem until it contacts face of gear, tighten thumbscrew to retain this tool setting.

(2) Install bronze thrustwasher and clutch assembly on oil delivery sleeve on rear of converter housing.

(3) Without disturbing tool setting secured in step 1 above, place .120" steel washer over tool pilot (short plug on tool bar), install tool over clutch assembly with tool pilot entered in low sun gear and tool stem against gasket on rear face of housing. Measure clearance between face of low sun gear and steel washer on tool pilot with a feeler gauge. If clearance not within .007-.035", repeat this procedure with .095" or .145" steel washer on tool pilot (see Note below on .070" washer). On transmissions before No. HT-3837-A3, if .070" washer required to bring clearance within limits of .007-.035", replace Low Sun Gear and Flange Assembly with later type parts and repeat above procedure (these later parts will not require less than .095" thick washer).

▷Tool Washer Note—This tool originally furnished with three washers—.070", .095", .120" thick. The .070" washer is now obsolete (.070" bronze thrustwashers not furnished) and tool sets now furnished with .145" washer instead (.095" and .120" washers continued). This .145" washer is available to replace .070" washer on early tool sets.

(4) When correct clearance of .007-.035" obtained in step (3), note thickness of steel washer used on tool and select bronze thrustwasher of same thickness for installation on input shaft splines when this shaft installed (see below). Remove clutch assembly and thrustwasher from oil delivery tube.

▷Low Sun Gear Thrustwasher Note—This bronze thrustwasher now furnished in three thicknesses as follows: Part No. 3694467—.095", No. 3694468—.120", No. 3694469—.145". *NOTE*—.070" thrustwasher is no longer furnished.

▷*EARLY TRANSMISSION CAUTION*—On Transmissions before No. HT-3837-A3, if .070" thrustwasher required for correct clearance (3 above), replace Low Sun Gear and Flange Assembly with later type parts (new parts will not require less than .095" thrustwasher).

Parking Lock Mechanism Installation: Install parking lock lever shaft and apply spring assembly in case, place small seal over end of shaft and into counterbore in case with small lip on seal toward inside of case, install flat washer and lever on shaft pressing lever in until clearance between lever and washer is .000" to .010", then tighten lever clamp-screw to 8-12 ft. lbs. Install parking lock pawl over pawl support rod and install parking pawl spring. Use tool J-3383 to wind up spring until end of spring catches on inside of case.

NOTE—Latest type Parking Lock Lever Shaft (used in production after approximately March 1952 and furnished for replacement on earlier cars) has a redesigned parking lock detent lever and does not require a parking lock lever apply spring.

Low Servo & Input Shaft Assembly Installation: Install input shaft in clutch assembly, place bronze thrustwasher of correct thickness (as selected in "Sun Gear Endplay Adjustment" above) on rear end of input shaft aligning missing spline opening on washer with oil hole in splines on shaft and flat side of washer toward reverse sun gear. Install the entire input shaft and clutch assembly in the case, indexing input shaft pilot with pilot in output shaft and meshing low sun gear with short pinions in planet carrier. Assemble low servo piston release spring on servo piston shaft, install assembly in case (CAUTION—use Ring Compressor J-3365 to avoid damage to piston ring). Install low brake band over clutch drum with thin end of band toward piston, place strut guide spring over end of piston stem, install strut with one end engaging slotted end of piston stem and other end engaging brake band. Install second strut similarly with one end engaging band and opposite end engaging slotted anchor with anchor fitted over end of adjusting screw in transmission case. Install speedometer driven gear and tighten to 40-45 ft. lbs. Do not adjust low band at this time.

Transmission & Turbine Housing Assembly: Install manual valve in valve body, install manual valve inner lever in turbine housing and engage lever pin in valve slot, position valve so that outer end is

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CHEVROLET POWERGLIDE (C nt.)

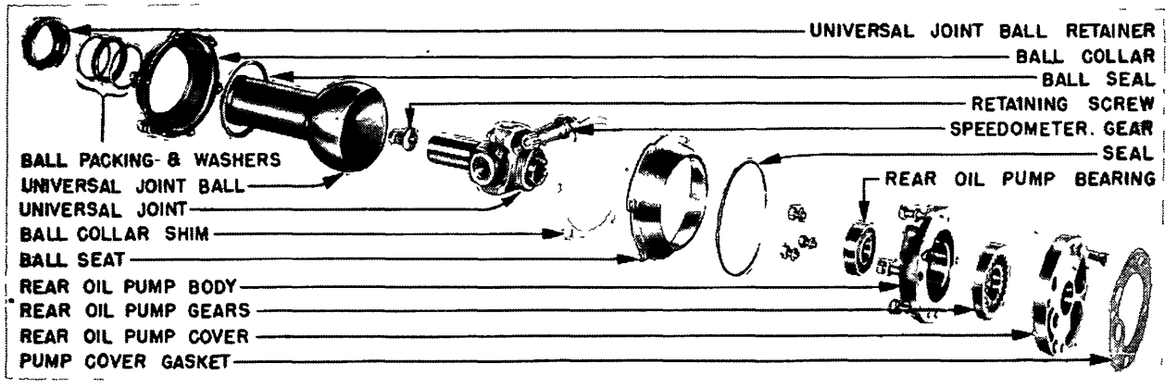
1½" from face of valve body (reverse position). Install new valve body-to-case gasket on valve body. Raise transmission manual valve lever to top detent position (reverse) to align reaction lever with manual valve inner lever. Install clutch drum thrust-washer over oil delivery sleeve. Install two ⅜"-16 x 3¾" guide pins in turbine housing, install transmission assembly over guide pins, making certain that reaction lever engages manual valve inner lever properly (CAUTION—remove left hand sump cover to check this engagement). Install transmission case-to-turbine housing bolts and tighten evenly to 25-30 ft. lbs. torque.

Servo Cover Installation: Install lubrication check valve parts: spring, ball, ball seat (with radius toward ball), lubrication sleeve. Install two 5/16"-18 x 3" guide pins in servo cover mounting bolt holes, install new gasket over guide pins. Install pressure regulator valve and assemble inner and outer valve springs on valve stem. Install large return spring on reverse servo piston rod. Install servo cover over guide pins (CAUTION—see that regulator and servo springs seat properly in pockets in cover), apply pressure to cover to compress springs, install and tighten all servo cover bolts to 12½-15 ft. lbs. torque. Install new modulator cover gasket and modulator cover, tighten attaching bolts to 12½-15 ft. lbs. torque.

Low Servo Band Adjustment: Using tool J-4277 (combination screwdriver and locknut wrench), tighten adjusting screw until band is tight, then back screw off 3 complete turns, tighten adjusting locknut and install adjusting screw cap.

Converter Assembly: Align front oil pump drive gear tangs with drive slots in primary pump hub, install primary pump in turbine housing (CAUTION—see that drive tangs and slots engaged—face of primary pump will be flush with face of bell housing if properly installed), install retaining washer and snap ring in stator support. Install stator assembly (CAUTION—smaller primary stator must be to rear). Install two 5/16"-24 x 1½" guide pins in primary pump bolt holes, align dowel pin hole in cover with dowel in primary pump, install turbine cover on primary pump, remove guide pins and install cover capscrews, installing one capscrew on each side of dowel, then skipping one hole (for flywheel attaching bolt), and installing screws in next two holes, repeating this order around cover rim. This will leave six evenly spaced holes around cover for flywheel attaching bolts (when transmission installed in car). Tighten capscrews evenly to 15-20 ft. lbs. torque. Install sump cover using new gasket and tightening attaching screws securely.

Universal Joint Ball Adjustment: Before installing transmission, determine thickness of shims required for universal ball adjustment: Install ball seat and "O" ring seal. Install universal joint ball and collar with four new ball shims (*CAUTION*—DO NOT install cork collar oil seal at this time), tighten collar attaching bolts to 8-12 ft. lbs. Ball should be a firm



REAR OIL PUMP, UNIVERSAL JOINT, & JOINT BALL ASSEMBLY

smooth fit. If ball cannot be moved by hand, add additional ball shim and repeat test; if ball moves freely by hand, remove one ball shim and repeat test. After correct shim pack determined, remove universal joint ball, collar, and seat; place shims aside for use when transmission installed in car. Install universal ball, collar oil seal, and collar on end of propeller shaft.

Bench Testing of Overhauled Transmission: Transmissions can be tested and checked for oil leakage before installation in the car. Proceed as follows:

1) Use ½" or ⅝" electric drill to drive converter at 300 RPM. or greater (J-4920 Transmission Torque Converter Cover Turning Tool and ¾" drive socket and extension will be required to hook up drill to converter).

2) Replace drilled universal joint yoke attaching bolt with plain undrilled bolt to prevent oil loss at this point during test.

CAUTION—Special drilled bolt must be replaced after testing completed (drilled passage in bolt provides lubrication for universal joint and propeller shaft bushing).

3) Disconnect oil cooler line fittings at rear of transmission and install pipe plugs at these points.

4) Connect four pressure gauges at following points: (1) Front Pump; (2) Low Servo Apply; (3) High Clutch (release side of Low Servo); (4) Reverse Servo.

5) Fill transmission with 8 qts. of Automatic Transmission Fluid Type A. *CAUTION*—Use electric drill to rotate transmission while adding last 5 qts. of fluid (necessary to fill converter and oil passages).

6) Rotate transmission with electric drill and note pressures indicated on gauges with selector lever in each position as follows:

Neutral—150-160 lbs. (higher than for regular operation because Vacuum Modulator not operating).

Drive—80-100 lbs. (higher than for regular operation because Vacuum Modulator not operating).

Low & Reverse—125-130 lbs. in each position.

7) Check for oil in converter housing indicating leakage at primary pump hub "O" ring seal, front pump oil seal, front pump "O" ring seal, or at sand hole in converter housing. Also check for leakage at Converter Cover or Turbine Bolt "O" ring seals.

8) Check for leakage at servo cover and housing side covers, check vacuum line connection in modulator cover.

9) If transmission checks OK., drain transmission, remove drill and drive attachment tool, re-install special drilled universal joint yoke bolt, remove pipe plugs and re-install oil cooler line fittings.

INSTALLATION IN CAR

Reverse the Transmission Removal procedure and note the following important points:

►**Balance Mark Caution**—When installing transmission on car, "X" mark stamped on front face of torque converter cover (lightest point of assembly) must be lined up with "X" mark stamped on face of flywheel (heaviest point) to nearest bolt hole.

Flywheel Pilot Caution—Lubricate pilot with Lubri-plate and use extreme care not to damage pilot by bumping or scratching when raising transmission into place.

Flywheel Attaching Bolt Installation—Turn flywheel until one bolt hole visible in bell housing opening, install one 5/16"-24 guide pin in corresponding hole in turbine cover, carefully guide pin through flywheel hole as transmission raised into position, install all turbine housing-to-bell housing bolts, tighten bolts evenly and securely. Remove guide pin, install all six flywheel-to-turbine cover bolts (rotate flywheel with J-4281 indexing tool for access to bolt holes), tighten bolts evenly and securely.

1953-54 POWERGLIDE TRANSMISSION

Chevrolet "210" (1953)
Chevrolet "Bel Air" (1953)
Chevrolet, All Models (1954)
Pontiac 6 & 8 (Late 1953)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*STARTING ENGINE BY PUSHING CAR (Pushing recommended rather than Towing):* Place selector lever in Neutral "N" position. When car reaches speed of approximately 16 MPH. (20 MPH. if road wet or icy with resultant poor traction), move selector lever to Low "L" position to crank engine. After engine started, move lever to "N" for engine warm-up.

(CHEVROLET)

▷*1953 PRESSURE REGULATOR VALVE PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Beginning with 1953 transmissions having serial number prefix "M27D," a Two-Piece Pressure Regulator Valve is used with a plunger in the inner (governor pressure) end of valve which cushions the assembly and prevents excessive pulsation. First and later type Main Pressure Regulator Valves and Valve Bodies *ARE NOT INTERCHANGEABLE* and correct type parts must be used together as follows:

Service Parts:	First Type	①Later Type
Valve Body Assembly	3702337	3703238
Pressure Regulator Valve	3702808	②3705486

①—Transmission with serial no. suffix "M27D."
②—Unit including valve and plunger.

▷*1953 CONVERTER PRESSURE REGULATOR VALVE PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Converter pressure regulator valve and spring changed in production so that new type valve seals converter up to pressure of approximately 10 lbs., to aid in preventing converter drain-down when car standing (previous type valve merely restricted converter return line). ***First and later type valves and springs are interchangeable, but the above sealing action will only be secured when new type valve and spring used with new type valve body (see "Pressure Regulator Valve Production Change" above).***

Service Parts:	First Type	Later Type
Converter Press. Reg. Valve	3702058	③3703243
Valve Spring	3702059	③3703242

③—Must be used with Valve Body Assy. 3703238 for above-mentioned converter "sealing" action.

▷*1953 "RAPPING" NOISE WHEN ENGINE FIRST STARTED (Early Transmission):* Caused by Main Pressure Regulator Valve pulsating when converter is filling with oil. ***This is not detrimental and should be of short duration.*** This noise should not be noted in later transmissions with new type regulator valve.

▷*1953 SHIFT LEVER RATTLE CORRECTION:* Rattle may be caused by hour-glass shaped spring in lever working loose from ball on end of gear shift control lever. To correct, remove shift lever and spring, install a #6x½" sheet metal screw in lower side of lever at point 3 3/16" from pivot hole toward outer end of lever. Screw will provide seat for spring and prevent disengagement. *NOTE*—Gear shift lever on later cars has metal tang at this point to provide a spring seat.

▷*1953 CONVERTER DRAIN PLUG ELIMINATION:* On Powerglide Transmissions after April 7, 1953 (Serial Suffix D-7-D), Converter Drain Plug has been eliminated. Only the Transmission Case need be drained at 25,000 mile intervals.

▷*1953 PLANETARY CLUTCH & SPRING PRODUCTION CHANGES & REPLACEMENT PARTS CAUTION:* Three different clutch springs have been used in 1953 production as listed below. Only the third type spring is furnished for service and this spring (together with new type spring seat) should be installed in all transmissions prior to serial suffix C-2-D whenever these transmissions disassembled.

1st Type Spring (Trans. before serial suffix C-2-D)—No. 3702827. Has right hand helix.

2nd Type Spring (Trans. serial suffix C-2-D to D-10-N)—No. 3703427. Same as 1st type except diameter at center is .040" less (hour-glass type).

3rd Type Spring (Trans. serial suffix D-10-N and later)—No. 3703248. Same as 2nd type except left hand helix. Use this spring for all replacements.

Clutch Piston Assy. Change—Spring seat area changed to prevent possibility of spring hanging up in seat (used beginning with B-21-D).

Clutch Spring Seat Change—No. 3692699. Size changed to provide better pilot for spring (used in all trans. beginning serial suffix B-17-N). Use this seat with 3rd type spring for replacements.

▷*1953 LOW CLUTCH GEAR & CLUTCH FLANGE ASSEMBLY CAUTION:* 1953 Flange, Part No. 3703220 (identified by "220" stamped in flange hub), has different flange depth and is not interchangeable with 1952 type. Do not use 1952 part in 1953 transmissions.

▷*1953 (FIRST TRANSMISSIONS) GOVERNOR GEAR FAILURE CORRECTION (Transmissions before Serial No. LT-97500 C-23-N):* May be caused by bore in case not being deep enough to clear inner end of bearing diameter causing thrust to be taken on this shoulder instead of end of gear. Correct as follows:

1) If Transmission not removed—Grind back end of bearing diameter of governor for distance of 1/16" to a diameter of 7/8" (same as inner end of shaft) finishing with a slight chamfer at upper end and polishing with crocus cloth.

2) If Transmission removed or disassembled—Use 1" expansion reamer (king pin reamer, etc.) or small grinding stone in drill chuck to deepend governor bore (grind floor of case) until governor bottoms on gear thrust face and turns freely. *CAUTION* DO NOT enlarge size of governor mounting hole.

▷*1953 ACCUMULATOR ELIMINATION ON LATE TRANSMISSIONS:* Beginning Transmission No. C-725-D, new Valve Body No. 3703296 was used (superseding No. 3703237. New valve body is same as previous type except that accumulator feed and hydraulic link channel is blocked and a .061-.071" hole is drilled to connect these channels. The accumulator bore in the casting is not finished.

▷*LATE 1953 FLYWHEEL & CONVERTER PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Starting with Engine Serial No. LAQ-49336 (Approx. Sept. 15, 1953), a Spoke Type Flywheel (with three 3/8" converter mounting holes) was used and converter attachment to flywheel was changed from six 5/16"-24 bolts to three 3/8"-24 bolts. Service Flywheel will be furnished with three 5/16" holes and three 3/8" holes spaced alternately. *See "INSTALLATION IN CAR" for instructions on use of old and new flywheel and converter combinations.*

▷*1954 CORVETTE TORQUE CONVERTER-TO-FLYWHEEL DRIVE LUG PRODUCTION CHANGE:* Three additional drive lugs have been added to torque converter for attaching converter to flywheel. This change entered production with Corvette Powerglide Transmission No. C-409-D. These additional drive lugs can be installed on earlier cars as follows:

1) Remove transmission, being careful not to drop torque converter. Loosely attach drive lugs, Part No. 3713602 to the converter cover under the converter cover attaching nuts. Remove flywheel from engine, or take flywheel from stock and fasten flywheel to converter, using all the drive bolts, and tighten bolts securely. Tighten lug retaining nut (converter cover nuts) and remove flywheel. *NOTE—It is necessary to install flywheel to converter to assure centering of the drive lugs and the flywheel attaching bolt holes. Do Not disturb drive lugs after removing flywheel.*

2) Reinstall flywheel to engine and transmission to car, making sure that "X" mark on converter cover and "X" mark on flywheel are aligned.

(PONTIAC)

▷*FLYWHEEL AND CONVERTER FRONT PLATE & FRONT COVER BALANCE CAUTION:* Mark these parts BEFORE disassembly to insure re-installation in orignal positions. If noticeable vibration or unbalance noted, *see "INSTALLATION IN CAR" for recommended procedure.*

▷*POWERGLIDE TRANSMISSION - TO - FLYWHEEL HOUSING ATTACHING BOLT CAUTION:* FOUR different length bolts required which must be installed in correct mounting holes. *See "INSTALLATION IN CAR" data for bolt specifications and locations.*

▷*POWERGLIDE CONVERTER PLATE-TO-FLYWHEEL ATTACHING BOLT CAUTION:* Converter plate has six lugs but only THREE 3/8" bolts are used. These bolts should be installed in the 3/8" bolt holes in the flywheel (alternate bolt holes in flywheel are 5/16" size and are not used). *DO NOT attempt to install additional bolts in the unused converter plate lugs.*

▷*PONTIAC ENGINE ROUGHNESS CORRECTION (POWERGLIDE CARS):* Roughness may be caused by incorrectly adjusted engine side supports. Check and adjust as follows: 1) Make sure that side support frame brackets are in the lowest position in the elongated holes in frame and that all support bracket bolts are tight. 2) Loosen upper support bracket-to-frame bracket bolts on both sides. With engine supported by front and rear mounts only, hold engine in a vertical position by blocking between manifold and right fender (with car on a level floor, a spirit level can be used across cylinder head to determine when engine is vertical). 3) Using shims, Part No. 378005, shim as required (3 shims maximum top and bottom), fill up the space between cushion and brackets on right side plus one shim (to obtain a one shim compression on right side support assembly). Engine can be moved to left to install the additional shim.

4) Fill in the space on the left side in same manner as for right side, and remove one shim (to obtain a one shim clearance on left side). Tighten all bolts and remove block from between manifold and right fender.

DESCRIPTION

The 1953-54 Powerglide Transmission with Automatic Shift differs from previous type transmission in having a new Control System to provide automatic shifting, new torque converter, and other changes as follows:

CONTINUED ON NEXT PAGE

POWERGLIDE (C ntinu d)

Control System: The following new control units have been added to provide automatic shifting (starting and accelerating in Low Range with selector lever in Drive Range):

Throttle Linkage System—Consists of control rods and bellcranks linking the throttle control to a throttle lever on the side of the transmission case which controls the Low & Drive Valve Assembly.

Low & Drive Valve Assembly—This unit is mounted on the left side of the converter housing (replaces sump cover used on previous transmissions). See illustration for valve parts. Valve assembly is controlled by accelerator pedal (through throttle linkage) and by the hydraulic governor as explained under Operation.

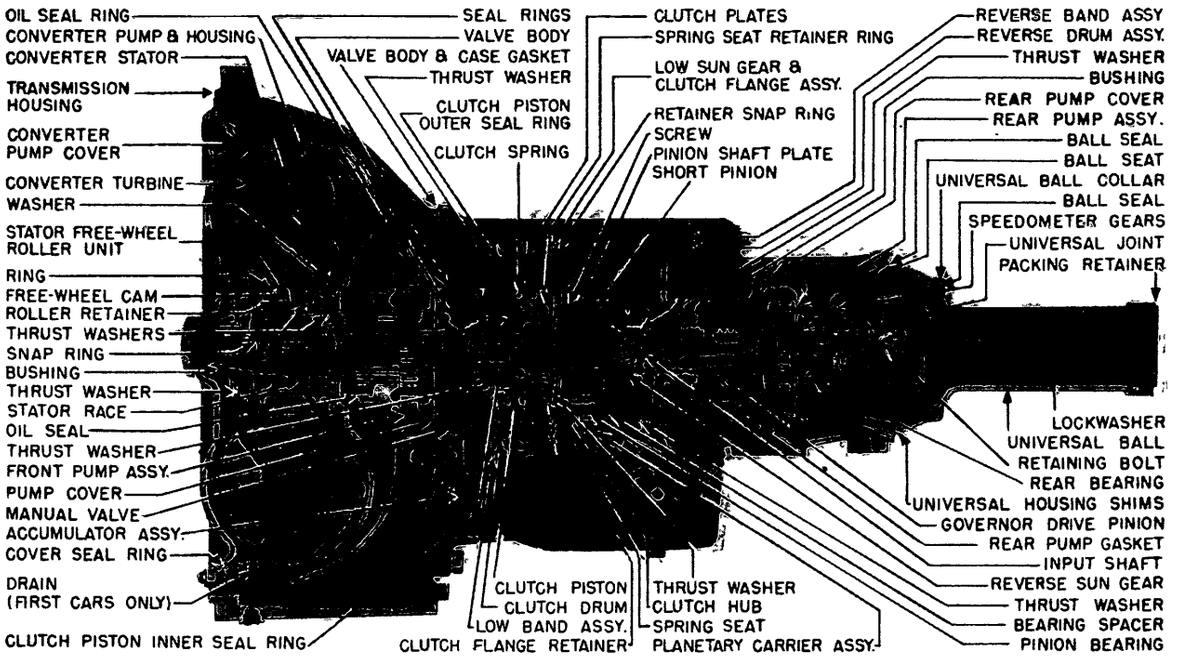
Hydraulic Governor—Mounted under cover on left side of transmission case and gear-driven from the transmission output shaft. Governor is two-stage, fly-ball type controlling a plunger type valve which regulates oil pressure to Low & Drive Valve Assembly as explained under Operation. Governor also controls oil pressure to Pressure Regulator Valve (through Pressure Regulator Governor Valve) to assist regulation in "D" range (pressure directed to end of pressure regulator valve keeps line pressure at minimum in "D" range). In low and Reverse Range, this governor action is cut off by the governor valve so that the higher normal oil pressure prevail in the system.

High Clutch Low Servo Valve—Consists of a spring-loaded valve with a fixed orifice in the release side of the low servo (valve is located in channel on front side of valve body). At pressures under 65 lbs., the orifice retards the servo release and allows for a soft initial band application upon down-shifts. At pressures greater than 65 lbs., valve lifts off its seat and allows quick servo release. ***See Valve Body illustration.***

Converter Pressure Regulator Valve—Consists of a spring loaded valve controlling the converter outlet orifice (through which converter oil is returned to oil cooler and transmission lubricating system). On first transmissions, this valve acted as a restriction in the line until the pressure reached 43-58 lbs. when the valve opened to prevent any greater pressure increase within the converter. On later transmissions, the valve seals the converter off when it is closed to aid in preventing converter oil drain-down when the car is standing and the engine is not running. When converter pressure reaches 10 lbs., valve opens slightly to permit a restricted flow to the oil cooler and transmission lubrication lines, and at 43-58 lbs., the valve opens fully to prevent any greater pressure increase within the converter.. ***See Valve Body Illustration.***

Lubrication Pressure Relief Valve—Consists of a spring-loaded disc type valve assembly located at the rear of the transmission and within the case. Valve connects with lubrication oil feed line and opens at 16-22 lbs. (by-passes oil back into the case) to prevent back-pressure build-up in converter.

Torque Converter: Simplified design with a single stator (former primary and secondary stators and secondary pump not used). Stator is located between inner rim of pump and turbine and is mounted in similar manner as former types (on stator support with free-wheeling device in hub). See Converter Pressure Regulator Valve and Lubrication Pressure Relief Valve (above) also.



POWERGLIDE TRANSMISSION ASSEMBLY

Clutch & Planetary Unit: Similar to previous type except that clutch piston is ¼" less in diameter (to provide smoother downshift) and new type clutch plates are used: **Steel Driven Plates**—waved type (instead of "dished"), **Drive Plates**—Have new type combination paper-and-cork facing.

OPERATION

Operation of the Torque Converter and Transmission is similar to the previous type except for automatic shifting in "Drive Range" as follows:

Starting in Drive Range—With the selector lever in Drive "D" position, the manual valve is positioned to direct oil pressure to apply side of the Low Servo and to the Low Drive Valve Body so that the car starts out in low range (torque converter plus planetary gear) providing an equivalent gear reduction of 2.2-1 (torque converter) plus 1.82-1 (gears). Depressing the accelerator pedal applies throttle valve pressure behind the shifter valve in the low drive valve body which assists the spring in keeping the shifter valve closed and the transmission in low range. As soon as the car begins to move, the rear pump begins to operate and to supply oil pressure to the governor which controls the upshift as follows:

Normal Upshift—When the rear pump pressure balances the force of the centrifugal weights in the governor, the governor valve directs oil pressure to the Shifter Valve in the low drive valve body and moves the valve to the drive position. This directs main line pressure to the clutch assembly and to the release side of the low servo piston (balancing of low servo pressures allows spring to release band). Application of the clutch and release of the band places the transmission in Drive Range (converter drops out independently when reversal of pressure on stator vanes causes stator to "free-wheel" so that torque converter acts merely as a fluid coupling). Upshift can be delayed by greater throttle opening as follows:

Delayed Upshift—The shift from Low to Drive Range is dependent on the extent to which the accelerator pedal is depressed and will occur at a higher car speed with greater throttle opening. In addition, if the accelerator pedal is depressed beyond the "detent point" (this point reached just before throttle is wide open and will be noted as a definite resistance to further movement of the accelerator pedal), this movement of the pedal compresses the detent spring in the low drive valve body and moves the Detent Valve which then directs throttle valve pressure to the large plunger which assists in holding the shifter valve in the low range position (see Forced Downshift operation below). This delays the upshift to drive range until the car speed reaches 42 MPH. when the governor pressure becomes great enough to move the shifter valve to the high position regardless of the accelerator pedal position (governor pressure increases with car speed until it equals main line pressure).

Normal Downshift—With closed throttle, transmission remains in drive range until car speed drops to approximately 9 MPH. and shifts down to low range at this point. However, transmission can be downshifted at will at higher car speeds to provide greater torque for rapid acceleration as follows:

Forced Downshift—At car speeds below 37 MPH., the transmission can be downshifted from drive to low range for rapid acceleration by depressing the accelerator pedal. The amount of pedal movement required, and the resulting action of the transmission control depends on car speed as follows:

CONTINUED ON NEXT PAGE

POWERGLIDE (Continued)

Car Speed under 16½ MPH.—Depressing the pedal to the detent point (almost to the floor) increases the throttle valve spring pressure and the resulting increased throttle valve pressure on the shifter valve unbalances the valve (increased throttle valve pressure with no increase of governor pressure) and the shifter valve moves to the low range position. At speeds greater than 16½ MPH. the governor pressure prevents this action occurring.

Car Speed Under 37 MPH (1953); 50 MPH (1954, Exc. Corvette); 40.3 MPH (Corvette)—Depressing the accelerator pedal to the floor (through detent) compresses the detent spring in the Low Drive Valve Body and moves the detent valve which then directs the throttle valve pressure to the large plunger which assists moving the shifter valve to the low range position. At speeds greater than those indicated above, the governor pressure is sufficient to prevent this action occurring. *NOTE*—In this detent position, if transmission in low range, the upshift will not occur until car speed reaches approximately 42 MPH (1953); 47½ MPH (1954).

1953 AUTOMATIC SHIFT SPEEDS
(In Drive Range)

Throttle Position	①Upshift	②Downshift
Light Throttle	10-20 MPH	8-10 MPH
Open to detent	23-33 MPH	13-17 MPH
Open thru detent③	④37-44 MPH	⑤32-37 MPH

①—From Low to Drive Range.
②—From Drive to Low Range.
③—Accelerator pedal depressed as far as possible (beyond point of detent resistance).
④—Slightly higher on first Chevrolet units.
⑤—Slightly higher on first Chevrolet units.

1954 AUTOMATIC SHIFT SPEEDS (Exc. Corvette)
(In Drive Range)

Throttle Position	①Upshift	②Downshift
Light Throttle	10-20 MPH	8-10 MPH
Open to Detent	23-33 MPH	13-16½ MPH
Open thru Detent③	46-53 MPH	46-50 MPH

1954 AUTOMATIC SHIFT SPEEDS (Corvette)

Throttle Position	①Upshift	②Downshift
Closed Throttle	11.3-13.1 MPH	6.7-8.7 MPH
Open to Detent	27.2-37.1 MPH	
Open thru Detent③	50.8-57.8 MPH	35.3-40.3 MPH

①—From Low to Drive Range.
②—From Drive to Low Range.
③—Accelerator pedal depressed as far as possible (beyond point of detent resistance).

LUBRICATION

Check oil level at 1,000 mile intervals, drain and refill transmission at 25,000 mile intervals.

▷*CONVERTER DRAIN NOTE*—Converter drain plug provided only on first Chevrolet units (omitted on later Chevrolet and all Pontiac units). Oil trapped in converter need be replaced only when transmission disassembled for overhaul.

Recommended Oil—Use only Automatic Transmission Oil Type A (as furnished in containers bearing "AQ-ATF" number).

Capacity—Approximately 5 qts. (refill after transmission case only drained), 11 qts. (after overhaul with transmission case and converter dry).

▷Warming Up Transmission (For Checking or Draining)—Drive car approximately 5 miles with frequent starts and stops OR warm up transmission in shop as follows: Run engine for 15 minutes at 750 RPM with selector lever in "Dr" position. *CAUTION*—Set hand brake tightly to prevent car moving.

Checking Oil Level—Check only with transmission warm and engine idling with selector lever in Neutral "N" position. Remove dipstick from filler tube in engine compartment on right side. Add oil only if level down to "ADD ONE QUART" mark on stick, fill only to "FULL" mark on stick. *CAUTION—High oil level (above "FULL" mark) will cause foaming and loss of fluid.*

▷*OIL FILLER NOTE*—Use of Oil Filler Tube & Funnel No. J-4264 recommended to facilitate filling. This assembly is vented (transmission not vented and may blow back causing oil spillage if vented filler not used).

▷*PONTIAC OIL FILLER NOTE*—Use Funnel & Filler Tube J-4264A. On cars with windshield washer, it will be necessary to remove washer jar to permit oil funnel and filler tube to be installed.

▷*LOW OIL LEVEL CAUTION—If oil level in transmission found consistently low, check for internal and external oil leaks. See "OIL LEAKAGE OR HIGH OIL CONSUMPTION" in TROUBLE SHOOTING.*

Draining & Refilling—Transmission must be warm. Remove drain plug in rear face of transmission housing under the case to drain the transmission. *NOTE*—It is not necessary to drain converter. Replace and tighten drain plug. Install 5 qts. of new fluid through filler tube on right side of engine (see Oil Filler Notes above). Idle engine with selector lever in "N" until transmission warm, check fluid level and add additional fluid, as required, to bring level up to "Full" mark on dipstick. *CAUTION—Do not overfill (will cause foaming).*

Filling (After Overhaul)—Install 3 qts. of fluid through filler tube, start engine and allow it to idle with selector lever in "N", install additional 8 qts. of fluid. Run engine until transmission warm and check fluid level.

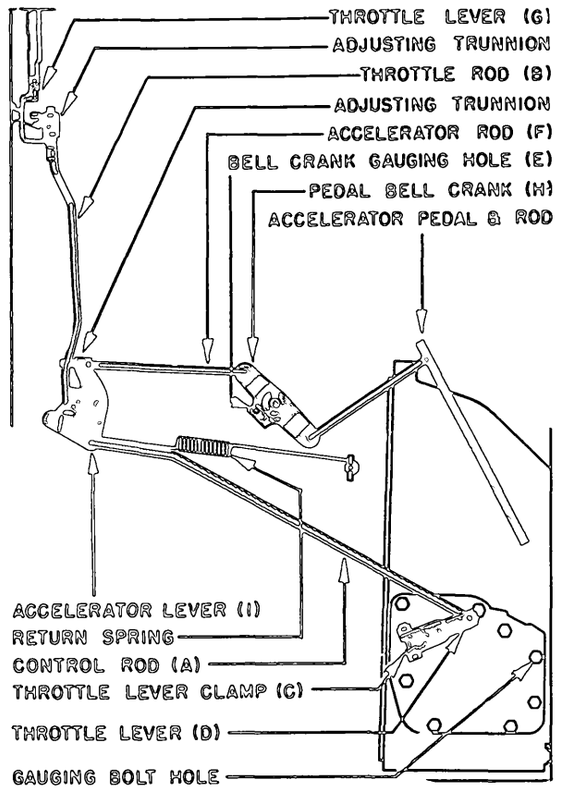
LINKAGE ADJUSTMENT

CHEVROLET LINKAGE ADJUSTMENT:

Throttle Linkage: *CAUTION—Engine must be at normal operating temperature and transmission warm (choke valve wide open and fast idle inoperative with throttle stopscrew against low step of fast idle cam) when adjustments are made. Proceed as follows:*

1) Adjust engine speed to 425 RPM. with selector lever in "D" range (set hand brake firmly to hold car while making this adjustment).

2) Disconnect control rod (A) from transmission throttle lever (D). Remove lower right side cover bolt from transmission (marked "Gauging Bolt Hole" in illustration). Hold clamp (C) back lightly against stop in transmission, install Throttle Lever Positioning Gauge J-5391 (1953); J-5588 (1954 Exc. Corvette); J-5391 (Corvette) on lever with one gauge pin in hole on lever. If second gauge pin does not enter bolt hole in cover *(see "Gauging Bolt Hole" in Throttle Linkage illustration)*, loosen lever-to-clamp attaching bolt and position lever so that gauge pin enters hole freely. *(CAUTION*—Hold adjustment clamp (C) back against its stop while making this adjustment). Tighten lever-to-clamp bolt securely, remove gauge, replace cover bolt. Connect throttle rod (A) to lever.



CHEVROLET THROTTLE LINKAGE

3) 1953 Models—Disconnect rod (B) from throttle lever (G), press control rod (A) lightly back against its stop in the transmission (this is the closed throttle position), adjust trunnion on upper end of rod (B) until trunnion pin freely enters hole in throttle rod, then shorten rod by turning trunnion upper check nut down three full turns, tighten lower check nut securely and connect rod to throttle lever.

3) 1954 Models—Rotate engine bellcrank clockwise to set transmission lever (D) in full detent (this is wide open throttle position, and adjust trunnion on upper end of rod (B) to length required for free entry of swivel pin into throttle lever when throttle lever is held at wide open (upper position), tighten lower check nut securely and connect rod to throttle lever.

4) Install 3/16" gauge pin through gauging hole (E) in pedal bell crank(H) and through hole in bracket to lock bell crank. With throttle rod (B) held up so that throttle lever is against idle stop in carburetor, adjust trunnion on forward end of rod (F) until trunnion pin freely enters hole in accelerator lever (I), tighten trunnion check nuts securely and connect rod. Remove gauge pin from bell crank (H).

Manual Control Linkage: Adjust in following order:

CONTINUED ON NEXT PAGE

POWERGLIDE (C ntinued)

Control Lever—1½ ± 5/16" (1953); 1 11/16" (1954 Exc. Corvette) between upper face of control lever knob and lower face of steering wheel with selector lever in Reverse "R" position. To adjust, loosen lower support clamp bolts, move lower support up or down as necessary. Tighten clamp bolts securely.

►*CAUTION—Dowel in support must be located in slot in mast jacket.*

Reverse Stop Clearance— .090" clearance between Reverse Stop on control shaft lower support and lower lever with selector lever in Reverse "R" position. To adjust, loosen control rod swivel, make certain that manual control valve lever on left side of transmission is in top detent position and that selector lever is in Reverse "R" position, move selector lever as necessary for correct clearance, tighten control rod swivel.

►*CAUTION—Short connector rod (bellcrank-to-parking lock lever) on transmission must be correctly installed with arrow pointing UP.*

Manual Control Linkage (Corvette): Set control rod bell crank (A) on transmission to reverse position (extreme rearward position). Place transmission selector lever (B) in reverse position (extreme forward position). Adjust rod (C) connecting lower end of selector lever with control rod bell crank so that rod will enter hole in lower end of selector lever (D) freely.

Neutral Safety Switch: Located on bracket on lower end of lower support assembly on steering column. To adjust, loosen two switch assembly mounting screws. Place selector lever in neutral, make certain that switch clip is over flats on end of shifter shaft. Insert locating pin through holes in switch mounting bracket and locating plate. Tighten switch mounting screws, remove locating pin.

PONTIAC LINKAGE ADJUSTMENT: *CAUTION—First make certain that linkage operates freely without binding or excessive looseness due to wear. Then proceed as follows:*

Throttle Linkage: Adjust with transmission warm and control lever in Neutral "N".

1) Disconnect throttle rear rod from throttle control (outer) lever on transmission. Adjust engine idle speed to 410-430 RPM with engine at normal operating temperature (150-160°F).

2) With engine not running, install gauge pin J-2544 through holes in lever and bracket at left end of carburetor throttle rod (6 Cyl.), at left end of cross-shaft (8 Cyl.) to lock the lever. With carburetor throttle closed and idle speed adjusting screw against its stop, adjust trunnion at rear end of carburetor throttle rod so that gauge pin is free in hole in lever, tighten trunnion locknuts and connect rod. **Do not remove gauge pin.**

3) Check position of lower idler lever on left side of crankcase by inserting second gauge pin J-2544 through hole in lever and hole in bracket. If pin does not enter both holes freely, adjust trunnion on upper end of throttle front rod (at upper idler lever). Tighten trunnion locknuts securely. **Remove both gauge pins.**

4) Remove upper rear side cover bolt on left side of transmission. Hold throttle valve outer lever lightly against its rear stop and check lever position with special gauge J-5525. With one pin of gauge entered in bolt hole in side cover, second pin of gauge should freely enter hole in lever. If lever position incorrect ,loosen lever-to-clamp attaching bolt and adjust lever position. Tighten clamp bolt, remove gauge, re-install side cover bolt.

5) Hold carburetor throttle in full open position, move transmission throttle valve outer lever to forward position against inner stop, adjust trunnion on rear end of throttle rear rod so that trunnion pin enters hole in lever freely, then **lengthen rod by turning forward locknut one complete turn,** tighten both locknuts securely and connect rod. Install two return springs.

6) Check accelerator pedal clearance with throttle in full open position. Adjust trunnion at forward end of pedal rod so that pedal clears floor mat by approximately ¼" at closest point.

Manual Control Adjustment: Disconnect control rod from shift lever on left side of transmission case. Adjust linkage as follows:

1) Place transmission case shift lever in "DR" position (second detent position from rearmost or reverse position).

2) Place selector lever on steering column in "DR" position and against the stop which prevents shifting into low without raising the lever.

3) Connect shift control rod to transmission lever and to lower control lever on steering column leaving both locknuts loose at adjusting trunnion on rod.

4) Adjust rear locknut finger-tight against trunnion to remove clearance from linkage, then tighten both locknuts securely.

Starter Neutralizer Switch: Place selector lever in "DR" position. Adjust neutralizer switch bracket so that starter will not operate when ignition key turned to start position, tighten switch mounting screws securely. Check to make certain that starter does operate with selector lever in "P" and "N" positions.

BAND ADJUSTMENT

►*BAND ADJUSTING NOTE—Band adjustment not ordinarily required in service (bands adjusted when reassembling transmission). Reverse Band adjustment requires removal of Servo Cover Assembly (see Disassembly data).*

Low Servo Bands—Adjusting screw located on left side of transmission case (under a cover). To adjust band, remove adjusting screw cover. Use tool J-4277 (see Tool Modification Note below), loosen adjusting screw locknut, turn adjusting screw in solidly, **then back screw out exactly four complete turns,** tighten locknut taking care not to allow screw to turn, replace adjusting screw cover.

►**Tool J-4277 Modification (for Low Servo Band Adjustment)**—Adjusting screw has recessed head for ¼" Allen wrench. To use tool, remove screwdriver retainer and special screwdriver from tool, use ¼" Allen Wrench in place of the screwdriver in the tool.

Reverse Servo Band—Adjusting screw located on right side of case **under servo cover.** With servo cover removed, install tool J-4277 on adjusting screw, loosen locknut. Turn adjusting screw in slowly and **at same time** check endplay in linkage by pushing-and-pulling on servo return spring directly below adjusting screw, continue to turn screw in until endplay is just taken up (at this point band must be free on drum so that drum can be rotated easily by hand), **then back adjusting screw out ⅛-¼ turn,** tighten locknut taking care not to allow adjusting screw to turn.

►*CAUTION—This reverse band adjustment is very sensitive and must be done carefully.*

TROUBLE SHOOTING

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, poor acceleration, or engine runs away on turns).

1) **In all Speed Ranges**—Low oil level. Incorrect control linkage adjustment. Air leak in oil pump suction pipe. Low front oil pump pressure.

2) **In Drive Range**—Incorrect control linkage adjustment. Damaged or leaking clutch piston seal (worn or burned clutch plates resulting from partially engaged clutch).

3) **In Low Range**—Incorrect control linkage adjustment. Low Band out of adjustment. Sticking accumulator valve, modulator lever, or modulator valve. Damaged or worn Low Servo Piston Ring resulting in poor band application or excessive oil leakage into clutch apply circuit causing partial clutch application and possibly burned clutch plates (check by connecting pressure gauges to Low Servo Apply and to High Clutch test points—there should be no pressure indicated at High Clutch point with selector lever in "L").

CAR CREEPS (Forward or Backward).

1) **With Control Lever in Neutral**—Incorrect control linkage adjustment. Clutch piston vent valve stuck closed. Clutch plates sticking or incorrectly assembled (not "stacked" in correct order).

2) **Creeps forward with Control Lever in Reverse or backward with Lever in Low**—Incorrect control linkage adjustment.

CAR WILL NOT MOVE (Rear wheels may be locked or free).

1) **With Control Lever in any rang (rear wheels free).** If this occurs at other times than after reversing car, see causes listed under EXCESSIVE SLIPPAGE above. If this occurs only after reversing car (indicating loss of front pump pressure) check: Rear pump air leakage into front pump suction line (causing front pump to lose its prime). Rear pump gasket leakage. Front pump clearance excessive.

2) **With Control Lever in any rang (rear whe ls locked).** Parking pawl lock engaged. Broken parts in transmission. Parking brake applied.

3) **With Control Lever in Drive Range (rear wheels free).** If engine runs away and transmission is hot, check for: Low radiator water level, clogged oil cooler, sticking thermostatic valve, or dragging Low Range Band (causing over-expansion of clutch parts due to excessive heat).

SHIFTS ARE ROUGH.

1) **Low-to-Drive Shift (car in motion).** Incorrect Low Band adjustment. Clutch plates worn or binding. Modulator control lever or piston sticking (will cause excessive pressures). Accumulator dump valve orifice plugged.

If engine speeds up during this shift—Check for incorrect low band adjustment and worn or binding clutch plates.

2) **Drive-to-Low Shift.** Incorrect Low Band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

CONTINUED ON NEXT PAGE

POWERGLIDE (C ntinu d)

3) **Neutral-to-Reverse.** Incorrect reverse band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

CHATTERS WHEN STARTING.

1) **In Low Range.** Incorrect Low Band adjustment. Worn or rough band, scored drum. Clutch not disengaging properly due to distorted or binding plates, sticking clutch piston, sticking piston vent valve, or damaged or worn Low Servo Piston Ring allowing oil leakage into clutch apply circuit and causing partial clutch application (see tests for Excessive Slippage in Low Range above).

2) **In Drive Range.** Incorrect Low Band or Reverse Band Adjustment. Bands worn or rough, drums scored.

3) **In Reverse Range.** Incorrect Reverse Band adjustment. Worn or rough band, scored drum. Reverse ring gear and drum bushing worn or damaged.

REVERSE OPERATION JERKY OR DRAGGING.

1) Clutch plates are incorrectly assembled (not "stacked" properly) or sticking. Clutch piston vent valve stuck closed.

REVERSE CAN NOT BE ENGAGED WITH ENGINE RUNNING: If reverse can only be engaged when engine not running, check for accumulator snap ring being out of place (allowing accumulator valve and body to be forced against clamp nut on parking lock lever shaft and apply spring assembly, blocking shift into reverse). *NOTE*—Above condition will not prevent shift into Low Range).

DRIVE-TO-LOW or LOW-TO-DRIVE SHIFT DIFFICULT: May be caused by improperly drilled high clutch feed orifice in valve body resulting in slow clutch application in Drive Range and slow clutch release when shifting from Drive to Low (restricted orifice will cause slow oil flow). Check by connecting pressure gauges to Low Servo Apply and to High Clutch (low servo release side) and noting pressures as follows:

1) Move selector from Neutral to Drive with engine idling. If pressure builds up much more rapidly on Low Servo Apply gauge than on High Clutch gauge, a restriction in the passage (undersized orifice) is indicated.

2) Move selector from Drive to Low. Pressure in High Clutch gauge drops slowly, oil drainage from clutch is restricted. NOTE—This will result in slow Low Band application and clutch drag (may cause burned clutch plates).

HIGH CLUTCH PLATES BURNED OR CLUTCH FAIL

►***CAUTION—When High Clutch failure noted, following tests should be made before transmission removed, and transmission should also be carefully examined after removal and disassembly.***

1) Connect pressure gauges to Low Servo Apply, High Clutch (low servo release side), and to Reverse Servo points. Operate engine to supply oil pressure.

2) Place selector lever in Drive position and note pressure build-up in High Clutch gauge. Slow build-up indicates restriction in high clutch apply orifice resulting in clutch slippage and burned plates.

3) Place selector lever in Low position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage past Low Servo Piston Ring resulting in partial clutch application and burned clutch plates.

4) Place selector lever in Reverse position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage between the converter "out" and low servo "release" channels in valve body or damaged Housing-to-Valve Body gasket. This condition will cause partial clutch application and burned clutch plates.

NOISE IN TRANSMISSION.

1) **Buzzing Noise (All Ranges).** Low oil level. Pump gear interference with crescent in pump. Pump check valve not seating.

2) **Ringing Noise in Converter.** Low oil level. Air leak in pump suction line (pump not seated properly) resulting in low oil level in converter. Pressure regulator valve stuck (closing converter inlet port). Leakage in oil line between front pump and regulator valve.

3) **Clicking Noise.** Incorrect manual linkage adjustment (causing interference between parking lock pawl and gear).

4) **Whining Noise.** Transmission gear teeth worn. Pump gear clearance excessive or pump gear bushings worn.

FUEL CONSUMPTION EXCESSIVE.

1) **Transmission Causes.** Converter stator freewheeling cams and roller incorrectly assembled. Clutch piston vent valve stuck open.

TRANSMISSION OIL BEING FORCED OUT OF FILLER PIPE: Caused by aeration and foaming of the oil due to one or more of the following:

NOTE—This condition may also cause Loss of Power and Lower Stall Speed (due to converter turbulence and lower pressures in control circuits).

1) Oil level too high allowing planet carrier to revolve in oil and aerate it. Correct by lowering oil level to correct point (see LUBRICATION) and driving car for 5 miles to work out air bubbles.

2) Oil suction pipe split, seal damaged, bore for suction pipe in housing too deep, or suction pipe retainer ears bent (preventing proper compression of the seal) resulting in air leaks in oil suction line.

3) Sand hole in suction bore of transmission case or housing or in suction cavity in valve body resulting in air leaks in oil suction line.

TESTING HYDRAULIC UNITS

►*TESTING CAUTION*—Transmission oil level must be checked and corrected (see LUBRICATION) and ***transmission must be warmed up before tests made.***

Warming Up Transmission: Transmission must be warmed up by road driving or in the shop exactly as follows before checking for oil leaks or trouble.

Road Warm-Up—Drive car for approximately 5 miles with frequent starts and stops to approximate heavy-traffic conditions.

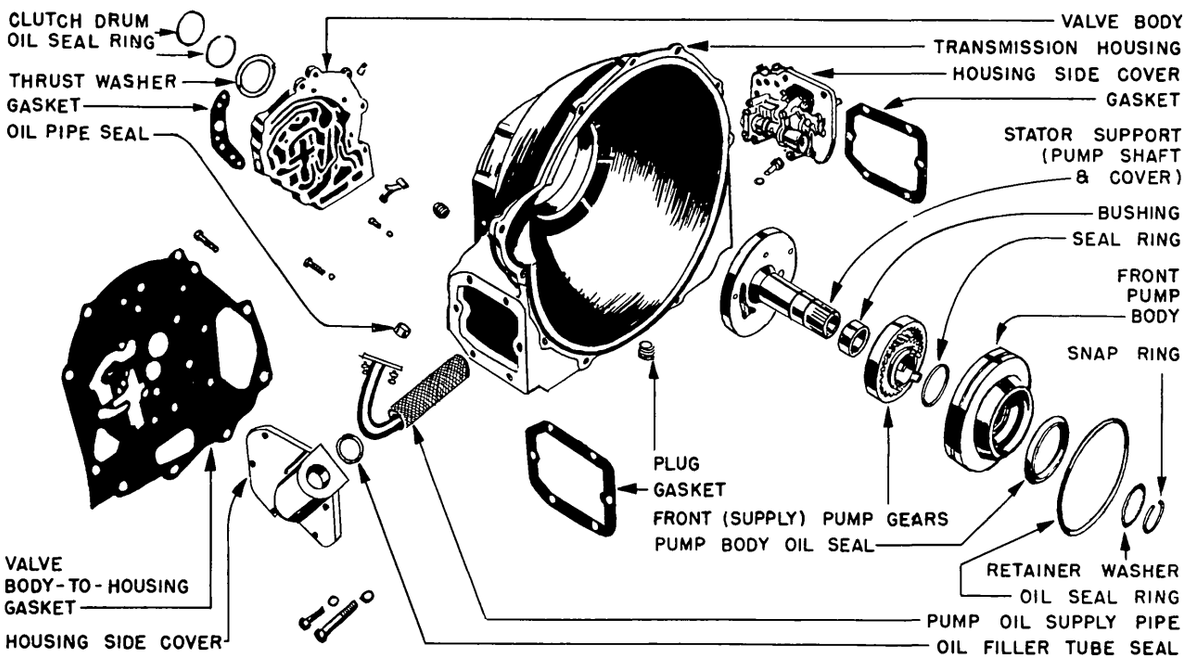
Shop Warm-Up—Set hand brake tight to hold car, place selector lever in "D" range, start engine and run for 15 minutes at 750 RPM. At end of 15 minutes, transmission will be warmed up suffcientl-ly for testing regardless of initial temperature.

►***CAUTION—Recheck oil level after warm-up and before making following tests.***

Pressure Tests: Correct pressure gauges at the following points and make the tests listed below.

►*TEST GAUGE NOTE*—Five gauges are required. The

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POWERGLIDE TURBINE HOUSING & FRONT OIL PUMP

POWERGLIDE (C ntinued)

previous four-gauge panel, No. J-4872, can be modified for use on 1953 transmissions by installing additional gauge furnished in conversion package No. J-5491 (reverse original gauges on panel, drilling additional hole to mount new gauge on lower edge of panel).

Gauge Connections—Connect gauge at each of the following points:

1) **Low Servo Apply Pressure**—Plug on lower front of servo cover on right side of transmission. *CAUTION—Do not confuse this plug with Modulator Pivot Pin Retaining Plug which is slightly to rear of this Low Servo Apply Plug.*

2) **Clutch Apply Pressure (Low Servo Release)**—On bottom of transmission case at center and adjacent to servo mounting flange.

3) **Reverse Servo Apply Pressure**—On bottom of transmission case at rear and adjacent to servo mounting flange.

4) **Throttle Valve Pressure**—At hex-head plug in center of Low and Drive Valve Body Cover on left side of converter housing.

5) **Governor Pressure**—At plug on side or at upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (upper plug is between second and third top cover screws (counting from top front corner of cover).

6) **Main Line Pressure**—At plug on upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (plug is between third and fourth top cover screws (counting from top front corner of cover).

7) **Clutch Apply or Main Line Pressure**—At plug at outer end of channel in Low and Drive Valve Body Cover on left side of converter housing (this plug is at lower rear corner of cover).

Test Pressures—*CAUTION—Representative pressures listed below may vary 5% (higher or lower).*

LOW RANGE (MANUAL)

Idling at 450 RPM.

Pressure Point	Pressure
Main Line (Frt. Pump)	140 lbs.

At 30 MPH.

Pressure Point	Part Throttle (Road Load)	Full Throttle (Thru Detent)
Low Apply	160 lbs.	190 lbs.
Governor①	60 lbs.	60 lbs.

DRIVE RANGE (AUTOMATIC)

Transmission in Low Range

Pressure Point	Light Throttle (10 MPH.)	Thru Detent (30 MPH.)
Low Apply	70 lbs.	115 lbs.
Clutch Apply	0	0
Governor①	10 lbs.	60 lbs.
Throttle Valve	0-5 lbs.	45 lbs.

Transmission in High Range

Pressure Point	Light Throttle (30 MPH.)	To Detent (40 MPH.)
Low Apply	55 lbs.	120 lbs.
Clutch Apply	55 lbs.	120 lbs.
Governor①	60 lbs.	75 lbs.
Throttle Valve	45 lbs.	58 lbs.

①—To check governor pressure only, vacuum line to modulator must be disconnected.

REMOVAL FROM CAR

Transmission & Torque Converter are removed as an assembly. *CAUTION—Torque converter is not retained in housing as on previous transmission and special holding tool must be used to prevent converter falling out when transmission assembly removed.*

CHEVROLET TRANSMISSION ASSY. REMOVAL:

1) Raise car and support securely on jack stands. Remove floor mat and toe pan plate.
2) Take out three top turbine housing attaching bolts (through toe pan hole).
3) Disconnect speedometer cable at transmission and hand brake rod from cross-shaft. Drop cross-shaft, brake cables, and spring.
4) Free universal joint collar by taking out cap screws on back of transmission case, slide ball and collar back on shaft. Support propeller shaft with jack, take out front universal trunnion bearing cap screws, split universal, lower front end of propeller shaft.
5) Take out two upper right transmission-to-converter housing bolts. Use Adapter No. J-5214 and Adapter Plate No. J-5526 mounted on a standard hydraulic floor jack to support transmission weight.
6) Drain transmission case (see Lubrication). Disconnect transmission oil cooler lines and vacuum line.
7) Take out two lower turbine housing attaching bolts. Remove flywheel cover and flywheel underpan extension.
8) Remove all spark plugs. Disconnect exhaust pipe at manifold, disconnect muffler support. Tie exhaust pipe and muffler to left frame side member out of the way.
9) Disconnect throttle control rod from control lever on left side of transmission case. Disconnect both long and short selector control rods from levers on left side of transmission, tie throttle control rod and long selector rod up out of the way. Remove bell crank lever and stud from transmission case.
10) Remove all six flywheel-to-converter bolts working through housing opening on left side (use tool J-4281 to turn engine crankshaft and align each bolt with housing opening for access).
11) Clean all dirt from around filler tube and dipstick fitting on transmission side cover, remove housing bolt holding filler tube, remove filler tube and dip stick.

►*CAUTION—Cover the filler tube opening with masking tape or plug with rubber stopper to keep out dirt.*

12) Support engine with a jack under the oil pan. Remove transmission-to-rear support bolts, remove the transmission support and cross-member.
13) Take out all remaining turbine housing bolts (lift or lower engine for access to bolts).
14) Move transmission straight back to clear flywheel pilot from flywheel. Install converter assembly holding tool J-5384 (attach tool with one converter turbine housing bolt). *NOTE—this tool will prevent converter assembly falling out while transmission being removed.*

►*CAUTION—Use care not to damage flywheel pilot.*

15) Lower the transmission and remove it from beneath the car.

►*CAUTION—Transmission must not be allowed to strike against flywheel.*

PONTIAC TRANSMISSION ASSY. REMOVAL:

1) Raise the car and support securely on jack stands or hoist.
2) Disconnect propeller shaft at rear universal joint, slide propeller shaft to rear to disengage front yoke from transmission, remove assembly.
3) Disconnect speedometer cable. Remove hand brake intermediate lever. Remove #2 pan screws (right and left) and remove crankcase ventilator pipe.
4) Install engine support tool. Disconnect right engine side support upper bracket at flywheel housing. Loosen engine left side support-to-shim and cushion assembly bolt and disconnect two engine side support upper bracket attaching bolts, swing side motor mount support forward so that it will clear starter motor when engine and transmission assembly lowered. *CAUTION*—DO NOT disassemble side motor mounts (would require alignment and shimming procedure when reassembled).
5) Disconnect manual shift rod and throttle rear rod from levers on left side of transmission. Disconnect modulator vacuum pipe at transmission
6) Drain transmission case. See Lubrication data.
7) Disconnect oil cooler lines at transmission. Remove transmission oil filler tube, take out exhaust pipe support bolt.
8) Remove rear motor support assembly (first take out two support-to-transmission bolts), then remove four lower engine support-to-frame bolts.
9) Remove flywheel housing inspection hole cover. Remove three converter-to-flywheel attaching screws (equally spaced around flywheel).
10) Install transmission jack under transmission case.
11) Lower engine and transmission assembly until top flywheel housing bolts are accessible. Remove all transmission-to-flywheel housing screws, noting location of each length screw *(CAUTION*—4 different length screws used—screws must be replaced in original positions).
12) Move transmission straight back to clear pilot from flywheel, install converter assembly holding tool J-5384 (attach tool with one converter housing bolt). *CAUTION—Use of tool necessary to prevent converter assembly falling out during removal.*
13) Lower transmission and remove from beneath car.

DISASSEMBLY—TRANSMISSION

►**DISASSEMBLY & REASSEMBLY CAUTION:** *CLEANLINESS IS EXTREMELY IMPORTANT when opening up transmission. Thoroughly CLEAN exterior of case first, CLEAN each part as removed with cleaning solvent or gasoline and dry with air—do not use wiping cloths which will leave lint on parts. Store all parts in clean storage bins.*

DISASSEMBLY OF TRANSMISSION (Into Major Units): With transmission on bench (fixture J-3361 recommended for holding transmission), remove all units from transmission case as follows:

1) Remove converter assembly holding tool J-5384 from housing, remove converter assembly by pulling it straight out of housing.
2) Take out right side cover attaching bolts, remove side cover and gasket, remove oil pump suction screen.

CONTINUED ON NEXT PAGE

POWERGLIDE (Continued)

3) Take out Low & Drive Valve Body attaching bolts on left side of transmission (replaces side cover used on previous transmissions), remove valve drive body assembly and gasket. CAUTION—do not remove outer lever assembly from valve body (this retains inner lever assembly in cover).

4) Take out Modulator assembly attaching bolts on right side of case, lift Modulator assembly off.

▷*CAUTION—Use care that hydraulic plunger and body do not fall out of modulator when it is removed.*

5) Loosen all servo cover bolts slightly and break servo cover loose if it sticks to case (reverse servo spring and pressure regulator spring bear against cover) using care not to allow cover to tip which may damage or break tip of pressure regulator valve. Use guide bolts to maintain cover alignment or turn all cover bolts out evenly while exerting pressure on cover, then lift cover and gasket straight off until cover clears tip of pressure regulator valve. Remove reverse servo spring and pressure regulator springs, lift regulator valve out.

▷*CAUTION—Handle valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.*

6) Remove low band adjusting screw cover on left side of transmission case, use tool J-4277 (see Tool Modification Note below) to loosen adjusting screw locknut, tighten adjusting screw so that low band grips clutch assembly to hold it in place.

▷Tool J-4277 Modification Note—Low band adjusting screw has recessed head for Allen wrench. To use tool, remove screwdriver retainer and special screwdriver from tool, use ¼" Allen wrench in place of screwdriver in tool.

7) Remove one converter housing-to-transmission case self-locking bolt from within the converter housing. Remove all transmission-to-converter housing bolts and lockwashers, carefully separate transmission from converter housing, remove valve body-to-transmission case gasket.

8) Remove manual valve from valve body on rear of converter housing, remove manual valve lever from housing, remove bronze thrustwasher from valve body oil delivery sleeve.

▷*CAUTION—Handle manual valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.*

9) Take out all bolts and lockwashers attaching valve body to converter housing and front pump to valve body. Remove valve body and gasket.

▷*CAUTION—Handle valve body and valves carefully to protect them from damage.*

10) Use Front Pump Driver Tool J-4263-5 to remove pump assembly from converter housing.

11) Loosen low servo band adjusting screw to free clutch assembly, remove input shaft, clutch assembly, and low sun gear thrustwasher from transmission case.

12) Remove low servo band, strut assembly, low servo piston and piston return spring from transmission case.

13) Remove speedometer driven gear assembly. Take out universal joint retainer bolt and lockwasher on rear end of output shaft, slide universal joint yoke off end of shaft.

14) Take out attaching bolts and remove governor cover on left side of transmission case, remove gasket. Remove governor assembly (allow governor to turn in clockwise direction while withdrawing it from case).

15) Use tool J-3383 to rotate parking lock pawl spring until end unhooked from case, remove spring and parking lock pawl. Remove parking lock lever and steel washer, parking lock lever shaft assembly, and oil seal from case.

16) Install tool J-938 on rear face of transmission case and engaging end of output shaft. Turn tool handle clockwise to force output shaft forward out of rear bearing. Remove tool. Remove planet carrier and output shaft assembly out through front of case.

17) Remove reverse brake drum from case. Use tool J-4277 to loosen reverse servo adjusting screw locknut and back off the adjusting screw, remove reverse brake band assembly and reverse servo piston from case.

18) Take out rear pump attaching bolts and lockwashers, remove pump assembly and gasket.

19) Remove lubrication pressure relief valve from within transmission case.

▷*For DISASSEMBLY of above units, see OVERHAUL data following.*

OVERHAUL

▷"O" RING SEAL CAUTION: *These seals must be discarded when removed and a new seal installed exactly as directed below.* "O" ring rubber seals are special design and are installed with side clearance in ring groove so that oil pressure on seal deforms the rubber and extrudes a portion of the rubber into the clearance space between the mating parts to provide a positive seal against loss of oil pressure. Seals must not be re-used.

"O" Ring Seal Installation—Make certain that parts are clean and that burrs and sharp edges are removed. Seal must be free of any twists (place ring on flat surface and allow it to assume natural position) and must not be twisted during installation. Engage one side of ring in groove, pull other side straight back until it can be fitted in groove without twisting. Work ring against trailing edge of groove (last side to enter when parts assembled) using flat tool entered between ring and leading edge of groove to move ring without twisting. Lubricate "O" ring and parts with transmission oil.

CONVERTER OVERHAUL (Unit on bench—after removal from transmission):

Disassembly: 1) Remove all converter cover attaching bolts and locknuts, use small punch to drive out two split dowel pins in cover, lift cover off.

2) Remove turbine assembly, stator assembly, stator thrustwashers, and pump thrustwasher. Remove thrustwasher from turbine hub. Remove "O" ring seal from converter cover.

3) Remove stator race from stator assembly, remove snap ring and over-run cam retaining thrustwasher, remove cam rollers, springs, and guides (8 each).

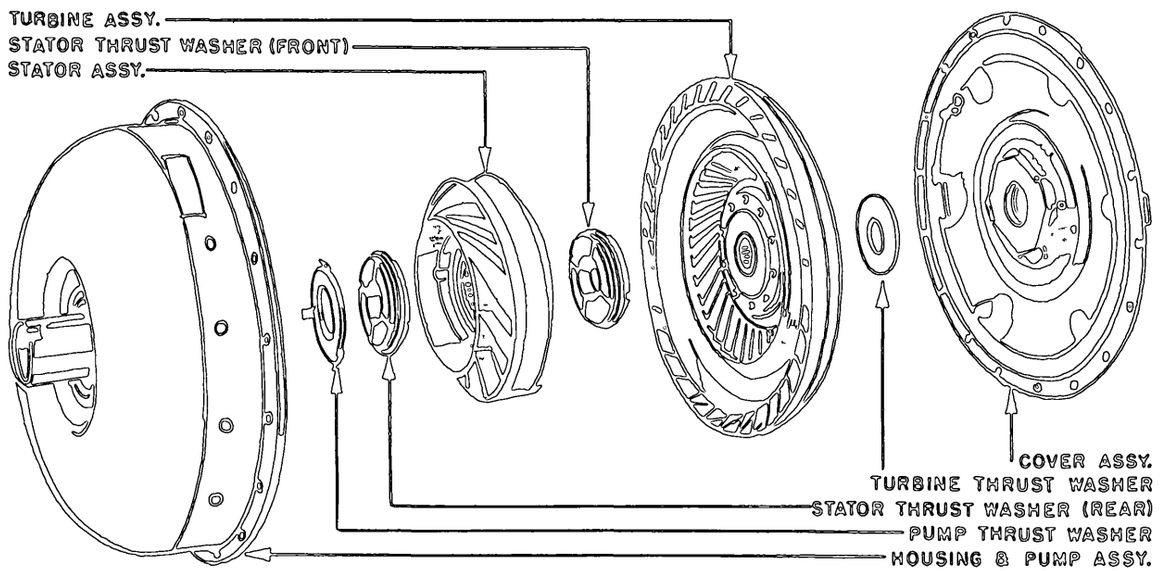
▷*CAUTION—Use care when separating parts so that cam rollers, springs, and guides do not fall out and become lost.*

4) Remove snap ring on opposite end of stator and remove over-run cam roller and spring retainer.

▷*CAUTION—Use care to prevent damage to over-run cam and see that cam does not become disengaged from stator hub.*

Inspection: Wash all parts in cleaning solvent and dry with air. Inspect converter pump hub, turbine hub, and converter cover bushing for galling, scoring, or excessive wear. Inspect all thrustwashers for galling, scoring, or excessive wear. Check turbine vanes and stator vanes for looseness or damage. Inspect stator race and cam rollers for galling or scoring. Inspect cam springs for distortion. Check spring guides for wear or damage. Inspect over-run cam roller and spring retainer for wear or damage.

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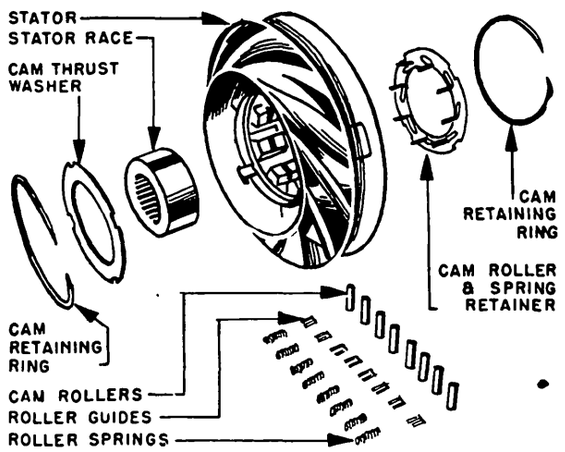
POWERGLIDE TORQUE CONVERTER

POWERGLIDE (C ntinu d)

If bushing in converter cover worn or damaged, install new bushing as follows:

Converter Cover Bushing Replacement: Precision type bushing, No. 3702078, furnished for field installation. Use bushing remover tool J-5381 to remove old bushing from cover. Place new bushing on pilot end of Bushing Replacer Tool J-5382 and press bushing into place in cover using an arbor press. *NOTE—Bushing is finished to size and does not require reaming.*

Reassembly: 1) Install over-run cam roller and spring retainer in stator with retainer prongs pointing toward **rear** of stator. *NOTE*—Stator has word "Front" cast in and stator vanes are thicker at front end.



TORQUE CONVERTER STATOR ASSY.

2) Assemble cam rollers, springs, and guides in cam pockets *(CAUTION*—Guides are curved and this curvature must follow curvature of cam). Install over-run cam thrustwasher and retaining snap ring.

3) Coat stator race and loading tool J-5930 with light film of oil, place stator race on pilot end of loading tool and carefully rotate the stator over the tapered end of the loading tool and the stator race *(CAUTION*—rotate stator in clockwise or freewheeling direction and use great care not to dislodge cam rollers). Check operation of stator. Stator should turn freely in clockwise direction viewed from front end.

4) Place converter pump on bench, open end up. Install thrustwasher on converter pump hub making certain that tabs are engaged in the hub flange notches. Assemble **both** thrustwashers on stator and install stator assembly on converter pump.

►*CAUTION—Make certain that cut-outs in over-run cam roller and spring retainer are facing upward or toward converter turbine.*

5) Install thrustwasher on turbine hub and assemble turbine on converter pump.

6) Install NEW "O" ring seal on converter cover, align dowel pin holes in cover with dowel pins in converter pump, install cover assembly. Install all cover attaching bolts and lockwashers and tighten evenly to 15-20 ft. lbs.

TRANSMISSION OVERHAUL: *After removal from case, overhaul sub-assemblies or units as follows:*

Planetary Unit Clutch: Place unit on bench with clutch flange upward.

Disassembly—1) Remove clutch flange retainer ring, lift out clutch flange retainer. Remove clutch flange assembly from clutch drum. Remove clutch hub thrustwasher, hub, and all clutch plates from clutch drum.

2) Place clutch drum in bench press, install spring compresion tool J-5133 and compress spring enough to remove snap ring, use KMO-410 pliers to remove snap ring. Relieve spring pressure, remove tool, lift out clutch spring seat and spring.

3) Rap clutch drum face down on a wood block to dislodge clutch piston, lift piston out, remove outer seal ring from piston and inner seal ring from clutch drum hub.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect drum brake band surface for scoring or burning, check drum bushing for scoring or excessive wear. See that clutch flange does not have any appreciable play in drum slots. Check all clutch plates for burning or galling, see that composition plates are free fit on clutch hub and that steel plates are free fit in clutch flange. Check low sun gear for nicked or burred teeth. Inspect relief valve steel ball in clutch piston and make certain that ball is free to move in hole and that orifice to rear of piston is open. If necessary, replace ball as follows:

Relief Valve Check Ball Replacement—Remove staking and remove ball. Inspect hole and ball seat and make certain it is free from burrs or nicks, see that new ball seats perfectly. Insert ball and carefully stake around edges of hole so that ball cannot fall out. *CAUTION—Ball must be free to move in hole after staking completed.*

►*REPLACEMENT PARTS CAUTION: See Chevrolet Changes, Cautions, Corrections for clutch production changes and latest type replacement parts.*

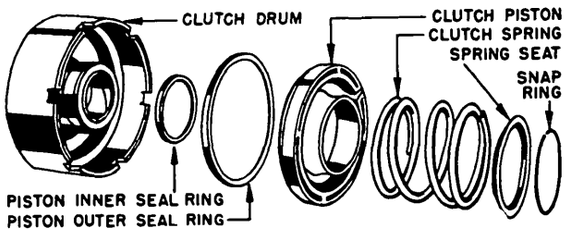
Reassembly—1) Install new outer seal ring on clutch piston with lip of seal toward pressure side of piston *(CAUTION*—use care not to stretch seal). Install new inner seal ring on inner hub of clutch drum with lip of seal toward bottom of clutch pocket.

2) Lubricate inner diameter of clutch drum and both seals with transmission oil, carefully install piston in clutch drum using a piece of feeler stock to insure seating of outer seal ring in clutch drum.

3) Install clutch spring and spring seat, use tool J-5133 in an arbor press to compress spring *(CAUTION*—Make certain spring does not hang up in snap ring groove which would damage spring seat and groove), install snap ring. Release pressure, remove tool.

4) Install thrustwasher on clutch hub *(CAUTION*—see that four tabs on washer fit into slots in clutch hub), install clutch hub and thrustwasher on clutch flange with open side up. Install five steel and four composition clutch plates, starting with a steel plate and alternating plates *(NOTE*—Steel plates are "waved" and can be installed either side up). Install clutch drum assembly on clutch flange assembly, then invert entire unit, install clutch flange retainer and flange retainer ring.

5) Check endplay using a feeler gauge inserted between clutch flange drive lug and drive slot in drum. This endplay must not exceed .013". Adjust by installing retainer ring of correct thickness to provide correct endplay. *NOTE*—Retainer ring furnished .055", .064", .073" thick.



POWERGLIDE CLUTCH PISTON ASSY.

Modulator: Disassembly—Carefully lift out hydraulic pistons and place in safe position so they will not be damaged. Take out outer cover attaching screws **while holding cover down** against the spring pressure, lift off cover, remove diaphragm spring and diaphragm.

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Check modulator cover for cracks, check diaphragm for wear or cracks, check diaphragm spring for distortion or loss of tension. Inspect hydraulic pistons for nicks or wear, see that pistons operate freely in modulator bore.

Reassembly—Place assembly tool J-5389 in hydraulic piston bore in modulator, assemble diaphragm and diaphragm spring. Install two 10—24 x 3" guide pins (part of Pilot Stud Set J-3387) in modulator body and install cover over guide pins. Install attaching screws and tighten securely. Install hydraulic pistons with crowned end toward modulator lever and diaphragm.

Servo Cover: Disassembly—Take out retaining screw and remove lubrication valve bi-metal strip and retainer. Remove lubrication by-pass valve plug and copper gasket, remove by-pass ball spring and ball. Do not remove modulator control lever.

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Inspect cover for cracks, nicks, or burrs on mounting face. Check by-pass ball spring and valve bi-metal strip for distortion. See that modulator lever operates freely without binding. *CAUTION—Lever must not bind on guide pin.*

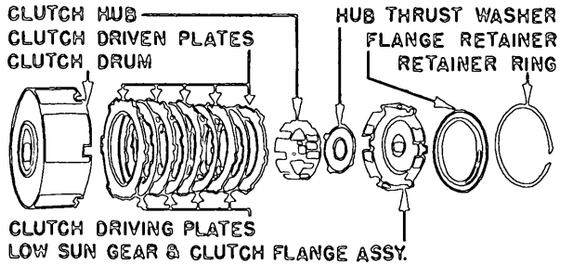
Reassembly—Install valve by-pass ball, spring, and plug (use new gasket), tighten plug to 17-20 ft.lbs. torque. Install bi-metal strip retainer, bi-metal, and retaining screw, tighten screw securely.

Front Pump: Disassembly—Slide stator support out of pump body, lift out pump gears (CAUTION—use extreme care not to drop or nick gears), remove and discard "O" ring seal.

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POWERGLIDE (Continued)

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect pump gears for wear, nicks, or other damage. Inspect pump body and pump face of stator support for nicks and scoring. Inspect pump body oil seal for excessive wear, damage, or evidence of leaking (see Oil Seal Replacement below). Inspect pump body bushing for galling or scoring, check bushing wear or clearance as directed below. Check pump gear clearances as follows:



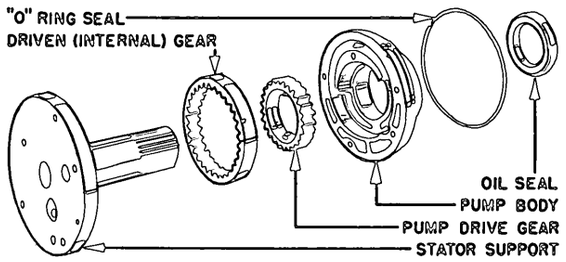
POWERGLIDE MULTIPLE DISC CLUTCH

1) Pump Gear Clearances—Install clean, dry gears in pump body, check clearances with feeler gauge:

Drivem Gear Clearance—.0025-.0055" clearance between outer diameter of gear and pump body.

Driving Gear Clearance—.003-.009" clearance between end of gear teeth and crescent.

Gear End Clearance—Place scale across face of pump body, measure clearance between scale and face of gears. This clearance should be .0005-.0015".



POWERGLIDE FRONT OIL PUMP

2) Pump Body Bushing Clearance—Temporarily install pump body on converter pump hub, measure bushing-and-hub clearance with a feeler gauge. This clearance should be .0005-.0025".

3) Oil Seal Replacement—Pry out old seal, use special driver J-5386 to press new seal in place in pump body.

Reassembly—Install new "O" ring seal in pump body, oil pump gears thoroughly with transmission oil and install in pump body, install stator support through pump body and driving gear and line up attaching bolt holes.

Rear Pump: Disassembly—Take out two screws and remove pump body plate, lift out pump gears.

Inspection—Wash all parts in cleaning solvent, blow out all oil delivery holes, dry with air. Inspect pump body for nicks and scoring, inspect gears for wear, nicks, or other damage. Check gear clearances (clearances are same as for front pump—see Pump Gear Clearances above). Inspect rear bearing for roughness but do not remove bearing unless replacement required (see Bearing Installation below).

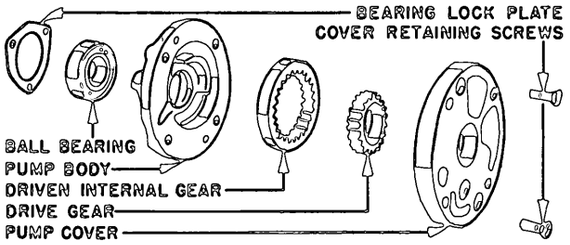
Pump Bearing Replacement—Remove three retaining capscrews, lockwashers, and lockplate. Drive old bearing out. Press new bearing in place, install lockplate and retaining screws and lockwashers, tighten screws securely.

Reassembly—Oil pump gears thoroughly with transmission oil and install in pump body. Install pump body plate and two slotted attaching screws, tighten screws to 3½-5 ft.lbs. torque.

Valve Body: *NOTE—Accumulator not used on late 1953 & 1954 transmissions (see Production Change Note above). When overhauling late 1953 & 1954 valve body, disregard the following Accumulator data.*

▷*VALVE BODY CAUTION: Handle all valves with care to avoid damage, keep valve and spring assemblies separate to avoid confusion and interchange of parts.*

Disassembly—1) Use Pliers J-4245 to remove the special snap ring retaining accumulator valve, remove accumulator parts: Valve Spring Washer, Valve Spring, Valve, Valve Body Assembly, Piston, Inner and Outer Springs, and Piston Stop.



POWERGLIDE REAR OIL PUMP

2) Remove Clutch Low Servo Valve Assembly (located in inner face of valve body).

3) Support valve body on wooden blocks (face down), use a small pin punch to drive out pressure regulator governor valve retaining pin from body, withdraw pressure regulator governor valve spring and valve.

4) Drive out converter pressure regulator valve retaining pin (same procedure as 3 above), withdraw converter pressure regulator valve spring and valve.

5) Remove the two clutch drum oil seal rings from oil delivery sleeve of the valve body (*NOTE*—rings have interlocking ends which must be freed by pressing one end into the groove and pushing opposite end out until ends are unlocked).

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Inspect valve body for nicks or burrs on mounting face, check all valve bores for scoring. Inspect all valves for wear, scoring, or galling, make certain valves operate freely in valve body bores. Inspect all valve springs for distortion or damage. See that small fibre valve in accumulator valve body assembly and bakelite valve in low servo valve assembly operate freely. Inspect oil seal rings for nicks or burrs, see that rings are free in ring grooves. Install rings in clutch drum bore and make sure hooked ends have clearance.

Reassembly—Install all parts in reverse order of disassembly (above) with particular attention to following points:

Accumulator Installation—Install inner and outer springs and piston stop in accumulator piston and then install this assembly in the valve body bore.

NOTE—Accumulator not used on later Chevrolet and Pontiac transmissions.

Converter pressure regulator valve and pressure regulator governor valve retaining pins—After each valve and spring installed in valve body, place body face down on wooden block and drive retaining pin in hole in body so that it retains the spring and valve.

Low-and-Drive Valve Body: *CAUTION—Do not disturb Throttle Valve Adjustments (two adjusting screws—one in boss on valve body and one in throttle valve inner lever) unless required by installation of new parts. THROTTLE VALVE MUST BE ADJUSTED IF THESE SETTINGS DISTURBED (see Throttle Valve Inner Lever Adjustment).*

Disassembly—1) Remove valve body-to-side cover attaching bolts and lockwashers. While holding detent valve in place, use soft hammer to carefully tap inner face of side cover until it is free of the locating pins (*CAUTION*—Use care to keep parts from falling out and being lost or damaged while performing this opertion).

2) Withdraw detent valve, spring, spring seat, and throttle valve spring regulator assembly from valve body. Remove throttle valve spring and throttle valve.

3) Use Pliers J-5403 to remove special snap ring retaining low-and-drive regulator valve cap, then remove the valve parts as follows: Valve Cap, Sleeve and Valve (as an assembly), Inner and Outer Springs, and Valve.

4) Take out two attaching screws and remove clutch exhaust cover plate ("L" shaped strip) from the side of the valve body.

5) Take out three attaching screws and lockwashers in end plate (CAUTION—exert pressure on plate while removing screws to prevent parts flying out), remove plate, remove valve parts as follows: Clutch Exhaust Secondary Control Valve, Spring, Stop (from upper valve bore), Clutch Exhaust Primary Control Valve Spring, Stop, Valve (from center valve bore).

6) Remove throttle valve outer lever assembly, shield, and inner lever assembly (CAUTION—do not disturb adjusting screw in inner lever unless required by parts replacement). Remove throttle valve lever shaft seal.

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Inspect all valves for nicks, burrs, scoring, or galling. Check all valves for free operation in their respective bores. Inspect all valve springs for distortion or damage. Inspect throttle lever assembly shaft for wear, scoring, or galling, see that shaft operates freely in side cover and that inner lever is tight on shaft. Inspect detent valve stop in side cover for distortion or dam-

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POWERGLIDE (C ntinued)

age, install new stop if necessary. Inspect locating pins in valve body and side cover for distortion or damage (one pin should be in side cover, other pin in valve body), replace pins if necessary. Inspect mating surfaces of valve body and side cover and make certain they are free of nicks or burrs.

Reassembly—1) Install low-and-drive valve in body bore (CAUTION—valve must be guided to prevent damage to the bore—use a piece of brake tubing inserted in valve shank bore at rear of valve body, engage nib on valve in end of tubing, move valve into position slowly). Install remaining low-and-drive valve parts in reverse order of disassembly (install regulator valve and cap on valve sleeve first and then install in valve bore as an assembly making certain inner spring is seated on sleeve). Compress assembly in valve bore while installing special snap ring, make certain ring properly seated in groove in valve body.

2) Install clutch exhaust secondary and primary valve assemblies (CAUTION—use care not to confuse these valve parts—primary control valve stop is the longer of the two stops, and primary control valve spring is the shorter of the two springs). Install throttle valve spring and valve in valve body, then install end plate and hold plate in position while tightening end plate attaching screws, tighten these screws to 2½-3½ ft.lbs. torque.

3) Install throttle valve spring regulator assembly in valve body and see that it is seated on throttle valve spring. Install detent valve spring seat, valve spring, and valve (thread pin of the throttle valve spring regulator assembly through the opening in the spring seat and valve).

4) Clamp side cover in a vise (face upward), align locating pin in side cover with hole in valve body, exert pressure on valve body to keep locating pin in the hole and at the same time compress detent valve in valve body bore and rotate valve body counter-clockwise until the locating pin in the valve body enters the locating hole in the side cover (CAUTION—make certain face of detent valve is resting against stop pin in side cover). Install attaching bolts and lockwashers, tighten bolts evenly to 3½-5 ft.lbs. torque.

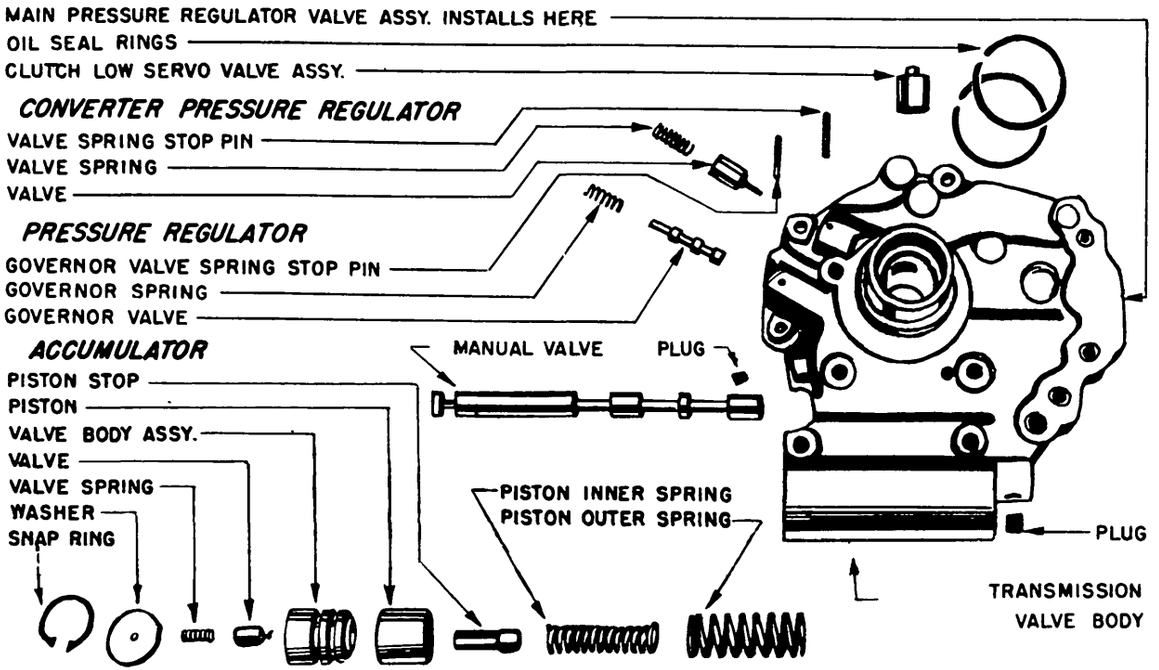
5) Install throttle valve inner lever assembly in side cover, install new seal on shaft and into counterbore in cover, install shield. Install outer lever assembly on inner lever shaft, install outer lever attaching bolt from underside, tighten nut securely.

If lever adjustments disturbed during overhaul, readjust throttle valve as follows:

►**1953 Throttle Valve Inner Lever Adjustment:** *CAUTION—Two adjustments required. Adjust valve in the following order.*

1) Rotate throttle valve inner lever until it just contacts face of detent valve, **hold lever in this position,** turn long adjusting screw (in boss in valve body) in until it just contacts the flat surface of the step on the lever, then **back screw out one complete turn** and lock screw in this position by tightening the locknut securely.

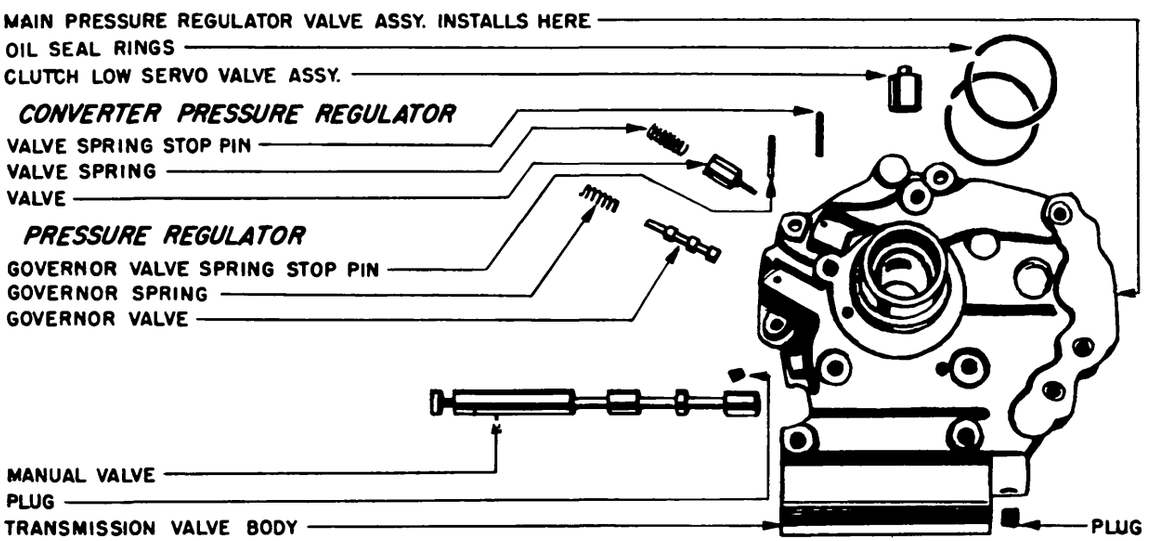
2) Install Throttle Valve Inner Lever Positioning Gauge J-5385 between the face of the detent valve and the throttle valve inner lever. Hold gauge in this position and turn the shorter adjusting screw (in end of inner lever) in until it just contacts the threaded body of the longer adjusting screw, lock the adjusting screw by tightening the locknut securely.



EARLY 1953 POWERGLIDE VALVE BODY ASSEMBLY

►**1954 Throttle Valve Inner Lever Adjustment:** Rotate throttle valve inner lever until it just contacts face of detent valve. Hold lever in this position and turn adjusting screw until it just contacts

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LATE 1953 & 1954 POWERGLIDE VALVE BODY ASSEMBLY

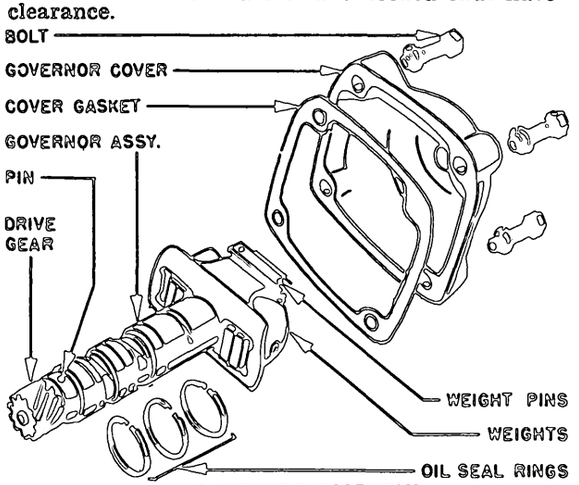
POWERGLIDE (Continued)

flat surface of the step in the lever. Back off one complete turn and lock in this position by tightening the adjusting screw locknut securely.

Governor: *CAUTION—Governor oil seal rings are only parts furnished for service (other than Governor Assy.) so that governor should not require disassembly except for cleaning and removal of foreign material causing incorrect operation. All parts are calibrated and selective fit.*

Disassembly—Cut off one crimped end of each governor weight pin and remove pins *(CAUTION—* Pin diameter should be measured with micrometer so that same gauge piano wire can be used when reassembling governor—calibration will be upset if other size wire used). Lift off governor thrust cap and weight assemblies, withdraw governor valve from sleeve, remove oil seal rings from governor sleeve *(NOTE—*rings have interlocked ends which must be freed by pressing one end into groove and pushing other end out until ends are unlocked).

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Inspect governor sleeve and governor valve for nicks, burrs, scoring, or galling; see that sleeve is free in transmission case bore and that valve operates freely in sleeve. Inspect driven gear for wear, nicks, burrs, or other damage and make certain gear is tight on sleeve. Inspect weights for free operation in their retainers and see that springs are not distorted or damaged *(CAUTION—*DO NOT disassemble weights). Inspect oil seal rings for damage, make certain rings are free in grooves, install rings in governor bore in transmission case and see that hooked ends have clearance.



GOVERNOR ASSEMBLY

Reassembly—Install oil rings on governor sleeve and make certain ring ends are properly hooked together. Install governor valve, weight assemblies, and thrust cap, install new pins using same gauge piano wire as original pins, crimp both ends of pins to retain them in place. Make certain weight assemblies operate freely on pins.

Low Servo Piston: Disassembly—Place piston assembly in bench press supporting notched end of shaft on wooden block, install tool J-3377 (same tool used for Reverse Servo) on top of piston, compress spring sufficiently to enable rod retainer "C" washer to be removed from end of rod, relieve spring pressure, remove piston, spring, and washer from piston rod. Remove piston ring from piston.

Inspection—Wash all parts in cleaning solvent, dry with air. Inspect all parts for wear or damage. Install piston ring in low piston bore and check ring gap with feeler gauge. Gap should be .005-.010".

Reassembly—Assemble all parts on piston rod, compress spring in bench press and install piston rod retainer making certain that it is properly seated in groove. *CAUTION—Spring pressure is 150 lbs. and assembly must be handled carefully.*

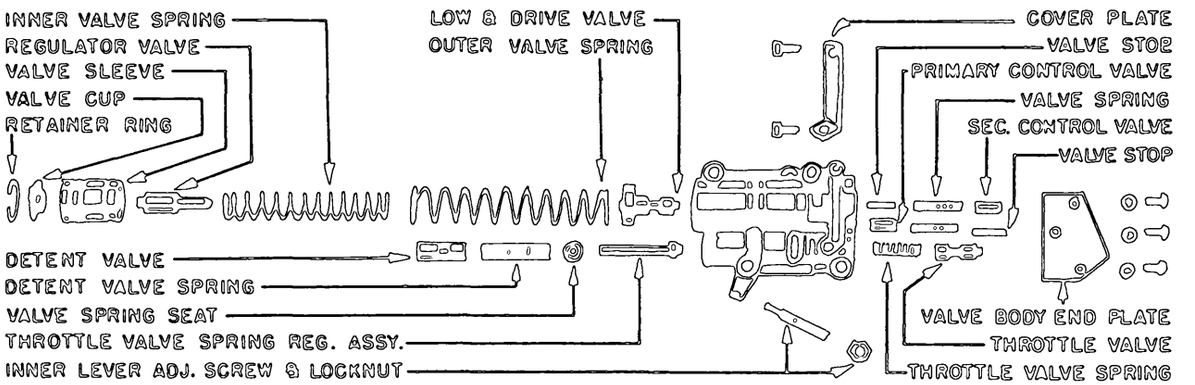
Reverse Servo Piston: Disassembly—Place assembly in bench press with spring end up, install tool J-3377 on spring retainer, compress spring sufficiently to enable retainer key locks to be removed, relieve spring pressure, lift off retainer, springs, and piston. Remove piston ring from piston.

Inspection—Wash all parts in cleaning solvent, dry with air. Inspect all parts for wear or damage. Install piston ring in reverse piston bore and check ring gap with feeler gauge. Gap should be .005-.010".

Reassembly—Assemble all parts on piston rod, compress spring in bench press and install retainer locks, make certain locks seated properly in rod groove.

Planet Carrier Assembly: *Should not be disassembled unless inspection below indicates overhaul required. See Planet Carrier Overhaul below.*

Inspection—Wash in cleaning solvent, blow out all passages, dry with air. Inspect all gear teeth for nicks, scoring, or other damage. Check end clearance of planetary pinions with feeler gauge inserted between ends of pinion and thrustwasher. This clearance should be .006-.030". Check reverse sun gear rear thrustwasher for wear or damage. Inspect drum bushing for wear, scoring, or damage; inspect outer diameter of drum for scoring or burning. Check output shaft bearing surfaces for wear, nicks, or scoring. Check input pilot bushing for wear or scoring.



POWERGLIDE LOW & DRIVE VALVE BODY ASSY.

Planet Carrier Overhaul: *If inspection (above) indicates that parts require replacement, proceed as follows:*

Disassembly—Place assembly in holding fixture or clamp in a vise with front end upward. Mark each pinion shaft and also mark planet carrier (use prick punch or other means) so that shafts can be re-installed in same position *(CAUTION—*pinion shafts are selective fit in carrier and location must not be changed). Then proceed as follows:

1) Remove pinion shaft lockplate screws, rotate plate counter-clockwise until it is free and remove the plate.

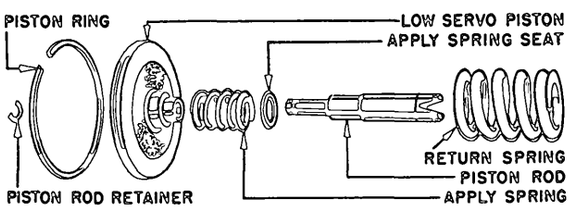
2) Starting with one short planet pinion, use a soft steel drift to drive on lower end of pinion shaft until shaft raised above the press-fit area of the output shaft flange, then insert tool J-4599 (one piece only —second piece of tool set used for reassembly) into short planet pinion from lower end and push shaft out until tool is centered in the pinion and shaft is removed. Remove short planet pinion from assembly. Remove tool from pinion, remove needle bearings and needle bearing spacer *(CAUTION—*use care not to lose any of the needle bearings).

3) Remove adjacent long planet pinion (paired to the just-removed short pinion by using same thrustwashers) by repeating procedure in step (2) above. Then remove the pinion upper and lower thrustwashers.

4) Remove all remaining planet pinions in pairs (short pinion first, followed by long pinion) by following procedures in steps (2) and (3) above.

5) Remove reverse sun gear and sun gear thrustwasher.

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POWERGLIDE LOW SERVO ASSY.

POWERGLIDE (C ntinu d)

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect all pinion gears and reverse sun gear for nicked or otherwise damaged teeth, inspect all thrustwashers for wear, nicks, or scores. Inspect needle bearings for wear and replace all needle bearings if worn excessively.

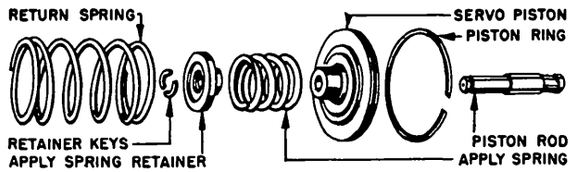
Reassembly—***CAUTION—Pinion shafts must be reinstalled in accordance with marks made before disassembly (shaft is selective fit in particular hole in carrier).*** Assemble and install parts as follows:

1) Install tool J-4599 in one long planet pinion, assemble needle bearing spacer and needle bearings in pinion (20 at each end) using cup grease to hold needle bearings in position.

2) Install pinion assembly in planet carrier with tool centered in assembly and with thrustwasher at each end of pinion. *NOTE*—Long pinions are located opposite closed portion of carrier, short pinions are located opposite carrier openings. Feed the second part of tool J-4599 in from the top of the planet carrier *(CAUTION*—make certain tool picks up thrustwasher) and push first part of tool down and out at the lower end *(CAUTION*—make certain this tool picks up thrustwasher as it is pushed down). Lubricate correct pinion shaft (see Reassembly Caution above) and install it from top pushing the assembling tools out ahead of it. Turn shaft so that slot in upper end faces toward center of assembly, tap shaft down with a brass or soft steel drift until lower end is flush with lower face of carrier.

3) Assemble and install **adjacent** short planet pinion (paired with just-installed long planet pinion by using same thrustwashers) by repeating procedure in steps (1) and (2) above.

4) Install reverse sun gear thrustwasher and reverse sun gear.



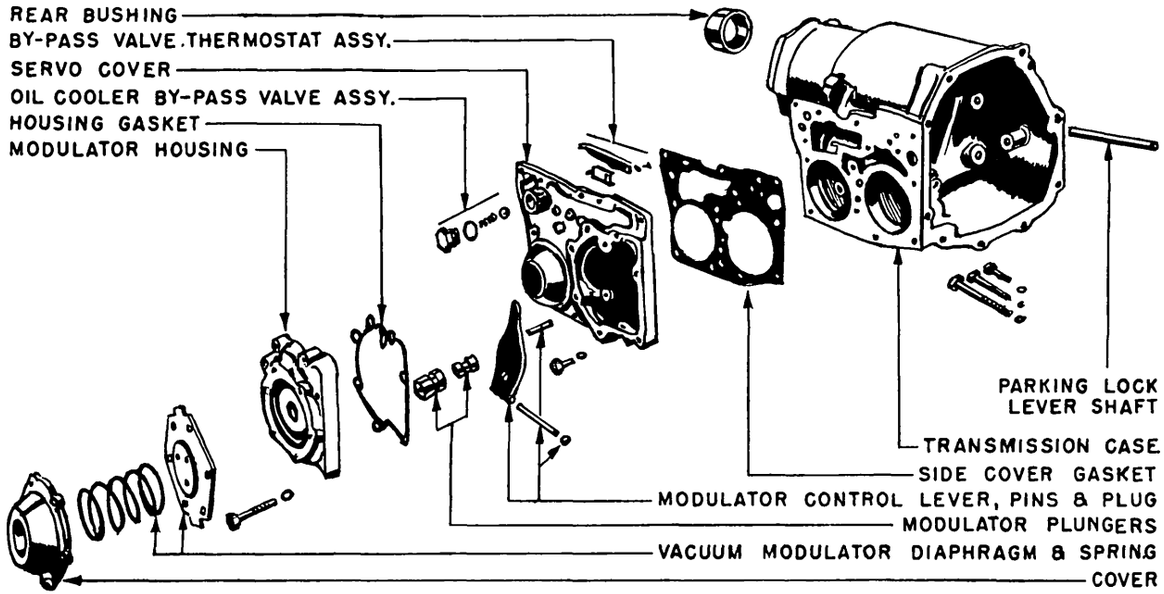
POWERGLIDE REVERSE SERVO ASSY.

5) Install all remaining planet pinions in pairs (long pinion first, followed by short pinion) by following the procedure in steps (1), (2), (3) above.

6) Check end clearance of planet pinions using feeler gauge inserted between end of pinion and thrustwasher. This clearance should be .006-.030".

7) Install pinion shaft lock plate with extended portions in line with pinion shaft slots, rotate plate clockwise until plate locks all pinion shafts and attaching screw holes line up. Install lock plate attaching screws and tighten to 2½-3 ft.lbs.

Input Shaft: Inspect shaft splines for wear, nicks, or other damage. Check spline fit in clutch hub, reverse sun gear, and converter hub. Inspect oil seal ring for wear and free fit in groove, remove ring (compress one end, push other end outward to free locked ends) and install ring in valve body bore to make certain hooked ends have clearance, then reinstall ring on shaft. Check snap ring in groove at forward end of shaft (this ring first used in 1953 transmissions and prevents shaft floating forward), replace if worn or damaged using snap ring pliers KMO-410.



POWERGLIDE TRANSMISSION CASE, SERVO COVER, & MODULATOR ASSY.

Transmission Case & Rear Bushing: Check case for cracks, inspect rear bushing for wear or damage and replace if necessary.

Bushing Replacement—Press old bushing out using tool J-4275 in an arbor press (place case on press with rear end upward). Install rear oil pump in case so that rear bearing can be used as a pilot in installing new bushing. Place case on press with front end upward, assemble bushing on Installer Tool J-4276 (square end of bushing against shoulder on tool), enter tool pilot in rear bearing, press new bushing into place. Bushing is precision type and does not require reaming.

Low & Reverse Brake Bands: Inspect bands for wear, cracks, and scored or burnt lining. Lining is bonded to band. Inspect linkage for wear.

REASSEMBLY

AFTER ALL MAJOR UNITS REASSEMBLED (See Overhaul above), install units as directed below using ALL NEW GASKETS AND SEALS and tightening all parts evenly to SPECIFIED TORQUES.

CONVERTER HOUSING ASSEMBLY: *Install units:*

Valve Body: First install suction screen in oil sump *(CAUTION*—screen must be thoroughly cleaned), see that sealing ring is in place. Install two ¼—20 x 3½" guide pins (part of Pilot Stud Set J-3387) in two valve body attaching bolt holes, place new valve body gasket in position over guide pins, install valve body assembly. Install all attaching bolts *(CAUTION*—lower left bolt over accumulator bore is special self-locking type and must be installed in this position), tighten all bolts evenly in a criss-cross pattern to 7½-10 ft.lbs. torque. **Check manual valve and pressure regulator valve for free operation after all bolts tightened.**

Front Pump: Align holes in stator support with mounting holes in pump body, install two ¼—20 x 3½" guide pins (part of Pilot Stud Set J-3387) in pump mounting holes, use Driver J-4263-5 to install pump in converter housing *(CAUTION*—line up suction and oil delivery holes on left side of pump). Install five self-locking bolts through valve body and into pump, tighten all bolts evenly to 7½-10 ft.lbs. torque. ***CAUTION—Check pressure regulator valve for free operation after bolts tightened and make certain that pump operates freely.***

Low-and-Drive Valve Body: Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in two valve body mounting bolt holes on left side of converter housing, place new gasket in position over guide pins, install valve body assembly. Install attaching bolts and lockwashers, tighten bolts evenly to 12½-15 ft.lbs. torque.

TRANSMISSION CASE ASSEMBLY: Install units·

Rear Pump: Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in pump attaching bolt holes, place new gasket in position over guide pins, install pump *(CAUTION*—align oil suction and delivery holes), tighten pump mounting bolts evenly to 12½-15 ft.lbs. torque.

Lubrication Pressure Relief Valve: Make certain that valve is clean and openings free from obstructions, see that valve disc and spring operate freely. Install relief valve in mounting hole in rear of transmission case and tighten securely.

Reverse Servo Piston, Band, & Drum: Compress piston ring with Ring Compressor J-3365, install servo piston in case with notch in shaft toward front of case. Install reverse brake band and strut assem-

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POWERGLIDE (Continued)

bly with thin end of band away from piston, thread adjusting screw in until it indexes with hole in anchor. Install bronze thrustwasher on reverse drum hub, install drum in case and into brake band. *DO NOT adjust band at this point.*

Planet Carrier Assembly: Rotate rear pump so that drive lug is at top of pump, install planet carrier assembly in case aligning slot on carrier shaft with pump drive gear lug *(CAUTION*—Shaft must protrude out of rear bearing a minimum of 7/8" indicating proper seating of drive lug in carrier shaft slot). Install tool J-938 on rear of transmission case (thread shaft tool into rear end of output shaft, bolt tool yoke on rear face of case), turn tool handle counter-clockwise to seat output shaft in rear bearing, then remove tool. Install universal joint front yoke, washer, lockwasher, and bolt; tighten bolt to 25-30 ft.lbs. torque.

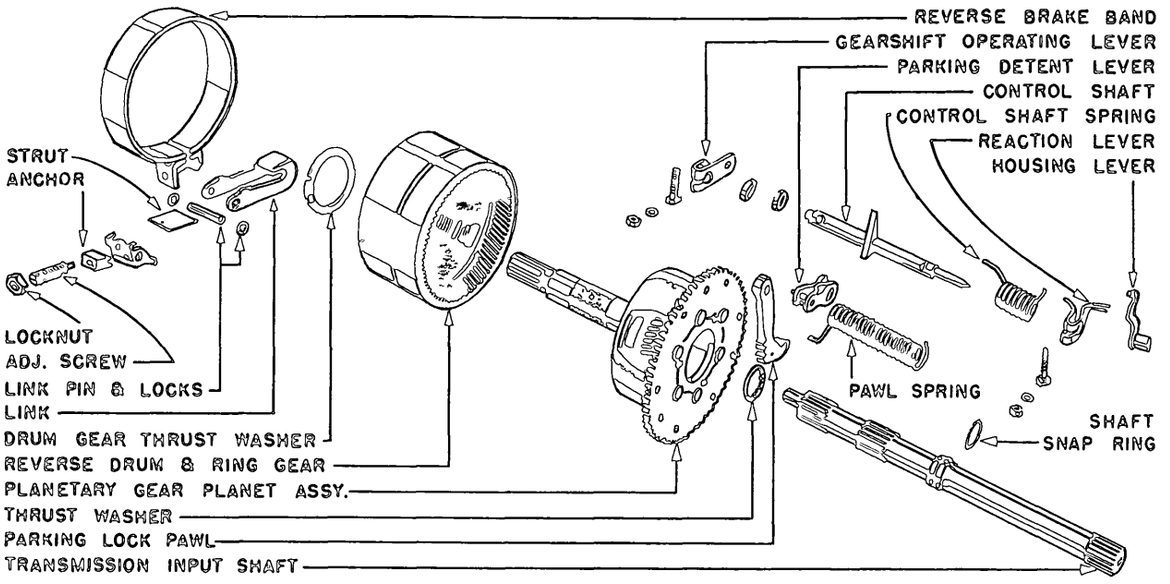
Reverse Band Adjustment: Adjust band at this point. *See BAND ADJUSTMENT.*

Transmission Endplay Check & Adjustment: After planet carrier assembly installed in case, the correct thickness of the low sun gear-to-reverse sun gear thrustwasher must be determined for the correct transmission endplay of .007-.035" as follows:
(1) Use Tool J-4260 to measure distance from face of transmission case flange to face of reverse sun gear in planetary unit (place tool bar against case flange, extend tool stem until it contacts gear face), tighten thumbscrew to retain this tool setting.
(2) Install bronze thrustwasher and clutch assembly temporarily on oil delivery sleeve.
(3) Without disturbing tool setting obtained in step 1 (above), place .120" steel washer over tool pilot (short plug on tool bar), install tool over clutch assembly with tool pilot entered in low sun gear and tool stem against gasket on rear face of housing. Use feeler gauge to measure clearance between face of low sun gear and steel washer on tool pilot. If clearance not within .007-.035", repeat this procedure with .095" or .145" steel washer on tool pilot.
(4) When correct clearance of .007-.035" secured in step 3 (above), note thickness of steel washer used on tool and select bronze thrustwasher of same thickness for installation on input shaft splines at final installation (below). Remove clutch assembly and thrustwasher from oil delivery tube.

▷Thrustwasher Note—This bronze thrustwasher furnished in three thicknesses as follows: Part No. 3694467—.095", No. 3694468—.120", No. 3694469—.145".

Parking Lock Mechanism: Install parking lock lever shaft assembly in case, install seal over end of parking lock lever shaft and into counterbore in case with lip seal toward inside of case. Install flat washer and parking lock lever on end of shaft, push lever on shaft for clearance of .000-.010" between lever and washer, tighten clampscrew to 8-12 ft.lbs. Install parking lock pawl over pawl support rod, install parking lock pawl spring, wind up pawl spring (tool J-3383) until spring catches on case.

Input Shaft & Clutch Assembly: Install input shaft in clutch unit. Install bronze thrustwasher selected in "Transmission Endplay Check & Adjustment" (above) on reverse sun gear splines of input shaft *(CAUTION*—flat side of washer must be toward reverse sun gear). Install assembly in case indexing input shaft pilot with pilot in output shaft and mesh low sun gear with short planetary pinions.



POWERGLIDE PLANET CARRIER ASSY., REVERSE BAND, & PARKING LOCK

Low Servo Piston & Band Assembly: Install release spring on servo piston rod, use Ring Compressor J-3365 to compress piston ring and install assembly in transmission case. Install low brake band over the drum. Install apply strut guide spring over piston rod, engage apply strut in piston rod slot and engage opposite end of strut in the band. Engage anchor strut assembly in band groove and locate opposite end of anchor over the adjusting screw. *DO NOT adjust the band at this point.*

Governor: Install governor assembly in bore in transmission case *(CAUTION*—Governor must be allowed to rotate counter-clockwise as gear teeth mesh and care must be taken not to damage gear teeth). Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in governor cover mounting holes, place new gasket in position over guide pins, install governor cover, attaching bolts and lockwashers. Tighten cover bolts evenly to 6½-8½ ft.lbs. torque. Install speedometer driven gear assembly and tighten to 45-50 ft.lbs. torque.

TRANSMISSION & CONVERTER HOUSING ASSEMBLY:
1) Install manual valve in valve body and manual valve inner lever in converter housing. Index lever pin with pick-up slot in valve, set manual valve so that it protrudes 1½" out from face of valve body *(NOTE*—This is Reverse position).
2) Install new valve body-to-transmission case gasket.
3) Place transmission manual valve lever in top detent position *(NOTE*—this is Reverse position and will align reaction lever so that it will index with manual drive inner lever in converter housing).
4) Place clutch drum thrustwaher in position on oil delivery sleeve.
5) Install two ⅜—16 x 3¾" guide pins (part of Pilot Stud Set J-3387) in two opposite converter housing mounting bolt holes, carefully bring transmission case and converter housing together making certain that reaction lever indexes properly with manual valve inner lever. Install all case-to-housing bolts and tighten evenly to 25-30 ft.lbs. Install special self-locking bolt through front face of converter housing and tighten this bolt to 25-30 ft.lbs.
6) Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in two servo cover attaching bolt holes, place new gasket in position over guide pins. Install pressure regulator valve and inner and outer valve springs (see Note below) through servo and into case, install reverse servo return spring. Install servo cover over guide pins *(CAUTION*—see that pressure regulator springs and reverse servo spring seat properly in pockets in cover), maintain pressure on cover while installing and tightening cover bolts, tighten bolts evenly to 12½-15 ft.lbs.
7) Install modulator cover with a new gasket, tighten attaching bolts to 12½-15 ft.lbs.
8) Adjust Low Servo Band. *See BAND ADJUSTMENT.*
9) Install converter assembly in converter housing making certain that front pump drive lugs aligned with drive slots in converter pump hub (see Installation Check below). Install converter holding tool J-5384 using one housing bolt to hold tool (tool will prevent converter falling out while being installed on engine).

▷*CONVERTER INSTALLATION CHECK*—Check assembly for proper engagement of front pump drive lugs in converter pump hub slots by placing scale on one converter cover-to-flywheel mounting brac-

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POWERGLIDE (C ntinu d)

ket and measuring from edge of scale to face of mounting flange on converter cover. This dimension must not exceed 9/16".

10) Check and adjust position of throttle valve outer lever. *See step 2 (Chevrolet), step 4 (Pontiac) of THROTTLE LINKAGE ADJUSTMENT.*

CHEVROLET UNIVERSAL JOINT BALL ASSEMBLY: Install new "O" ring seal on universal joint ball seat. Temporarily install universal joint ball seat, **four** new ball shims, ball and collar but **do not install the cork ball joint collar oil seal.** Check and adjust the ball joint (see below). Then remove universal joint ball, collar, and seat and replace these parts together **with collar oil seal** on end of propeller shaft.

►**Universal Joint Ball Adjustment**—With all parts except collar oil seal installed on rear of transmission, ball should have a smooth firm adjustment. If ball cannot be moved by hand, add a shim and recheck adjustment. If ball moves freely by hand, remove one shim and recheck adjustment. After correct number of shims determined, place these shims to one side for later use when installing transmission.

INSTALLATION IN CAR

Install transmission in each car model as follows:

CHEVROLET TRANSMISSION INSTALLATION:

►*1953 FLYWHEEL & CONVERTER CAUTION:* First type flywheel & converter attachments consist of SIX 5/16"-24 bolts, later type with spoke type flywheel consisted of THREE 3/8"-24 bolts. Service flywheels furnished with three 5/16" holes and three 3/8" holes spaced alternately. When using old and new flywheel and converter combinations, install bolts as follows:

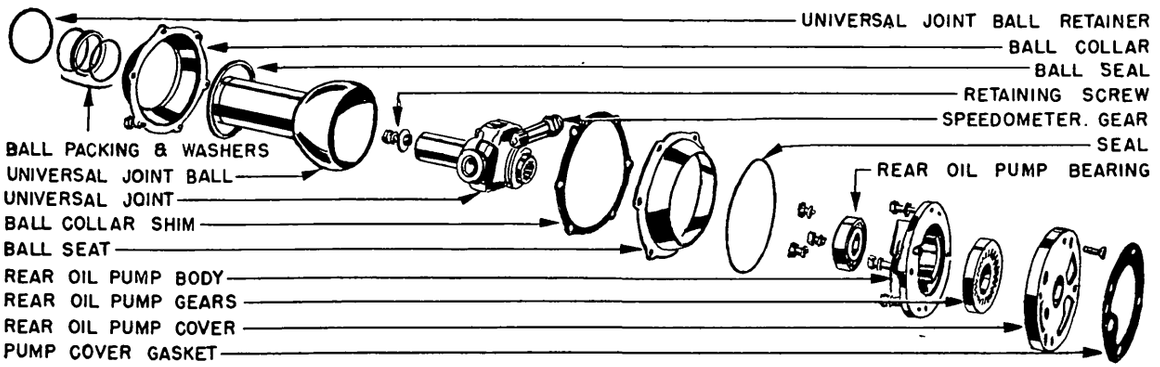
New Converter & Old Type Flywheel—Enlarge alternate holes in flywheel from 5/16" to 3/8" to take new 3/8"-24 bolts.

Old Converter & New Type Flywheel—Use six old type 5/16"-24 bolts.

1) Lubricate flywheel pilot with Lubriplate.

2) Raise transmission in place under car while lifting up on rear end, use pry bar if necessary to gain clearance at servo cover. *Use extreme care not to bump or damage flywheel pilot.*

3) Turn torque converter until "X" mark on turbine cover is lined up with "X" mark on flywheel as nearly as possible (to nearest bolt hole). *CAUTION—Alignment of marks is necessary to maintain balance.*



REAR OIL PUMP, UNIVERSAL JOINT, & JOINT BALL (CHEVROLET)

4) Remove converter holding tool. *CAUTION—After tool removed, use extreme care not to allow converter to move forward which would disengage pump drive lugs from converter hub slots.*

5) Using guide pin installed in converter cover (pin can be made up by cutting head off a 5/16" or 3/8" bolt), carefully enter guide pin in flywheel hole, raise or lower transmission to align flywheel pilot, enter pilot in flywheel. *CAUTION—DO NOT force transmission in place. guide transmission by hand until pilot enters and housings come together.*

6) Install transmission housing-to-bell housing bolts and tighten securely.

7) Remove guide pin and install flywheel-to-turbine bolts using 5/16"-24 or 3/8"-24 bolts as required. *See Flywheel & Converter Caution above.*

8) Install universal ball seat on rear of transmission case using a new "O" ring seal, connect universal joint, slide universal ball and collar forward on propeller shaft and fasten to case **using shim thickness determined in "Universal Joint Ball Adjustment" above** (under CHEVROLET UNIVERSAL JOINT BALL ASSEMBLY).

9) Connect linkage and other attachments. Fill transmission with lubricant (see LUBRICATION), adjust linkage (see LINKAGE ADJUSTMENT).

PONTIAC TRANSMISSION INSTALLATION:

1) Raise transmission into place from beneath car, removing converter holding tool J-5384. *CAUTION—After holding tool removed, use care that converter does not move forward which would disengage front pump drive lugs.*

2) Carefully align marks (as made before disassembly) on flywheel and converter front plate and front cover. *CAUTION—This is necessary to maintain balance (see VIBRATION OR UNBALANCE CORRECTION below).*

3) Install all flywheel housing-to-transmission bolts using correct bolt in each hole (see Note below), tighten bolts evenly to 25-30 ft. lbs. torque.

►**Flywheel Housing-to-Transmission Bolt Note**—All bolts are 5/16"-18 type but FOUR different lengths used as follows. **1 3/8" (4 used)** in topmost holes in housing, **7/8" (3 used)** two behind starter, one through oil pipe clip (two on right and one on left side directly below the above 1 3/8" bolts), **2 1/2" (2 used** one on each side directly below the above 7/8" bolts), **1 7/8" (2 used)** in bottom holes of housing. Use 5/16" heavy lockwashers on all bolts.

4) Install converter-to-flywheel attaching bolts working through hole in flywheel front housing, tighten these bolts evenly to 15-20 ft. lbs. torque. *CAUTION—Three 3/8" bolts are used and should be installed in the three 3/8" holes in the flywheel (other three holes in flywheel are 5/16" size and are not used). DO NOT attempt to install additional bolts in these flywheel bolt holes or in unused converter plate lugs.*

5) Install engine rear cross-member, and engine side support bracket attaching bolts, tighten left side support bracket-to-cushion and shim the assembly attaching bolt.

6) Connect linkage and other attachments. Fill transmission with lubricant (see LUBRICATION), adjust linkage (see LINKAGE ADJUSTMENT).

►*VIBRATION OR UNBALANCE CORRECTION:* If noticeable vibration or unbalance condition noted, remove converter front plate-to-flywheel attaching bolts, rotate converter assembly 120° on flywheel and re-install bolts. Check performance.

CHEVROLET POWERGLIDE TRANSMISSION

Chevrolet Pass. Cars (1955)
Chevrolet Corvette (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►***STARTING ENGINE BY PUSHING CAR (Pushing recommended rather than Towing):*** Place selector lever in Neutral "N" position. When car reaches speed of approximately 16 MPH. (20 MPH. if road wet or icy with resultant poor traction), move selector lever to Low "L" position to crank engine. After engine started, move lever to "N" for engine warm-up.

►***CONTROL VALVE & GASKET PRODUCTION CHANGE AND SERVICE REPLACEMENT NOTE (To eliminate a harsh closed throttle downshift):*** A new control valve assembly, Part No. 3719234 (see "Later Type Control Valve Identification Note" below) entered production at Transmission Serial C-103-D. ***(NOTE*** —The later type control valve assembly is also furnished as a service replacement for transmissions before the above serial number). The later Valve Body & Case Gasket, Part No. 3719232 is NOT INTERCHANGEABLE with the early type gasket.

►**Later Type Control Valve Identification Note:** Transmissions between Serial Numbers C-103-D and C-128-N will be identified by an "X" stamped adjacent to Casting No. 3709023 on rear surface. After Transmission Serial No. C-128-N will have Casting No. 3719221 on rear surface.

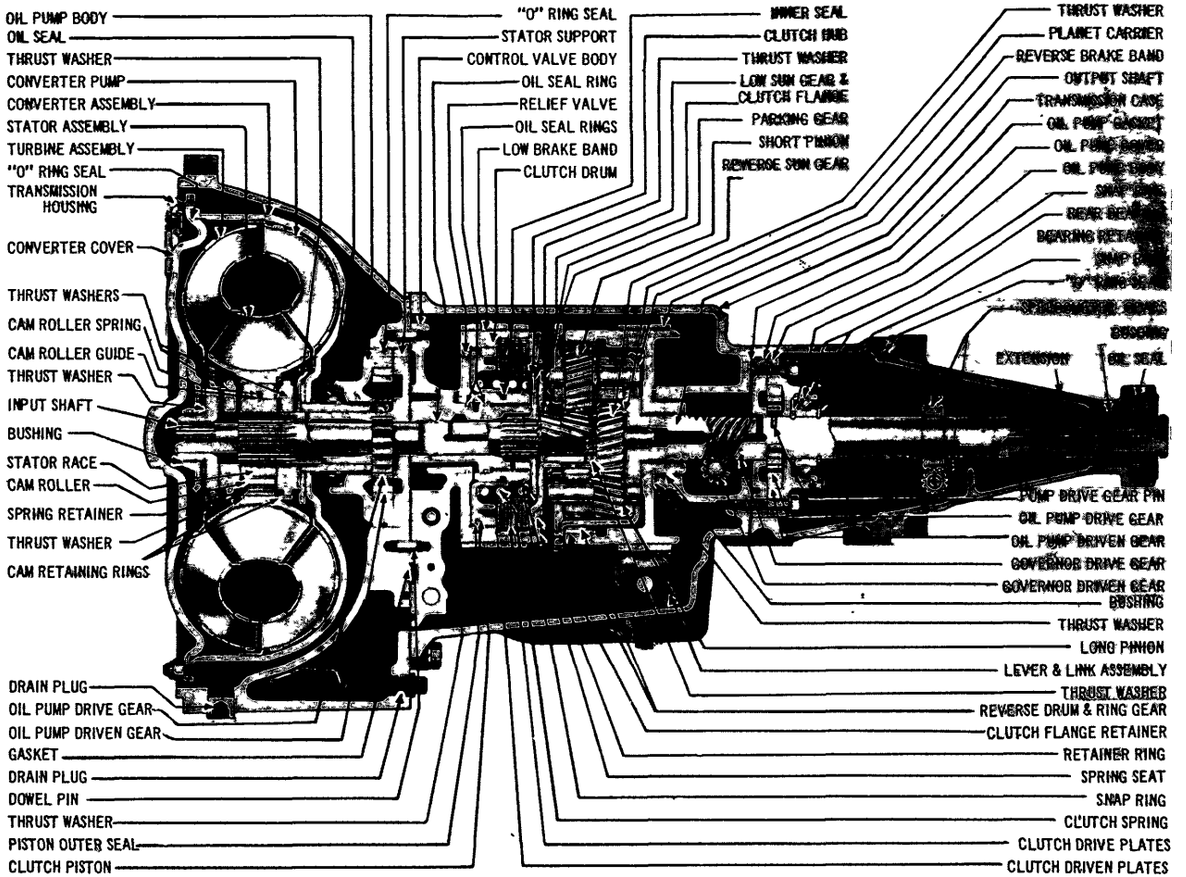
►***CONTROL VALVE BODY & CASE GASKET CAUTION: Early and late type gaskets are not interchangeable. These gaskets are identical except for an additional elongated hole in the later gasket.***

►***CLOSED & FORCED THROTTLE VALVE SPRING RETAINER PRODUCTION CHANGE (To prevent retainer breakage):*** Spring retainers are increased in size from .134" to .148" beginning with Transmission Serial No. C-128-N. The larger retainers can be installed in valve bodies prior to the above serial number by drilling out the retainer hole with a 5/32" drill. Both retainers can be checked for being in the proper position by removing the right hand side cover. ***See "Trouble Shooting" (below) for conditions resulting from broken valve spring retainers.***

►***TRANSMISSION PLANET REVERSE RING GEAR & DRUM ASSEMBLY PRODUCTION CHANGE (to accommodate a new .020" steel thrust washer):*** Beginning in production with transmission serial number C-128-D, a new steel thrust washer is used between planet carrier and reverse gear and drum to prevent galling of thrust surfaces. A service package, Part No. 3721564, consisting of a Planet Reverse Ring and Drum Assembly, Part No. 3720472, and an Output Shaft Thrust Washer, Part No. 3720474, is available for service replacement on 1953-54 & Early 1955 models.

►***GOVERNOR PRESSURE TEST PLUG PRODUCTION CHANGE:*** Test plug on side of left hand side cover has been eliminated beginning in production with Trans. Serial No. C-428-D. Earlier model side covers will retain this plug.

►***CHECKING FLUID LEVEL & FILLING TRANSMISSION NOTE (AIR CONDITIONED CARS):*** A filler plug has been added to transmission side cover for use in checking fluid level and adding fluid to transmission. This change is made necessary because filler tube and dipstick is not accessible from under hood on air conditioned cars.



POWERGLIDE TRANSMISSION SECTIONAL VIEW

►***6 CYL. POWERGLIDE LINKAGE ADJUSTMENT PRODUCTION CHANGE:*** On later cars the part throttle upshift has been lowered to 12-18 MPH by changing the angle of the transmission throttle control outer lever, and shortening the throttle valve control rod. **Throttle Linkage Adjustment differs from early cars** as indicated in "Throttle Linkage Adjustment" below.

►***DECREASING PART THROTTLE UPSHIFT ON EARLY 6 CYL. MODELS):*** If it is desired to decrease the part throttle upshift from 26-28 MPH to 12-18 MPH, replace the early type Throttle Valve Outer Lever, Part No. 3710634, with the later type Part No. 3720323. Replace early type Throttle Valve Control Rod, Part No. 3710632 with later type, Part No. 3715711. Adjust throttle linkage as indicated below for later type cars.

1) Adjust engine idle speed to 425 RPM with Selector lever in "D" range (set hand brake firmly to hold car while making adjustments).

2) Disconnect control rod from throttle lever on transmission cover. On early type cars (see Production Change above), remove the extra lower rear transmission side cover bolt. On later cars remove the top bolt at rear edge of transmission side cover. Rotate throttle valve control outer lever assembly counter-clockwise to the open throttle position

3) Hold lever in this position and with throttle valve outer lever positioning gauge J-5906 (see "Rework of Transmission Outer Lever Positioning Gauge J-5906" below) set at 6⅜" (early cars), 6" (later cars), measure distance between bolt hole in side cover and hole in throttle lever. If pins of gauge will enter holes, adjustment is correct. If necessary to adjust, loosen lever to clamp attaching bolt and adjust lever on throttle shaft as necessary.

►***REWORK OF TRANSMISSION OUTER LEVER POSITIONING GAUGE J-5906 (So tool may be used on both 6 Cyl. & V8 Models):*** Remove bolt hole locating pin (larger pin) from gauge, pressing pin from back of lever leg to remove. Cut 5/16" from pin and replace pin in lever leg, pressing it into place to allow

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POWERGLIDE (C ntinued)

apex of pin to project ¾" above lever leg surface. Stake pin in place securely. Separate lever legs and place a 3/16" spacer between legs. Reassemble lever legs. *NOTE*—In some cases it may be necessary to grind a beveled radius on the outer end of bolt lever leg as required.

DESCRIPTION

The 1955 Powerglide Transmission is similar to 1954 design, consisting of a torque converter and a hydraulic operated transmission.

OPERATION

Operation of the 1955 Powerglide Transmission is the same as 1954. *See 1953 Annual Data or later Manual editions.*

LUBRICATION

Check oil level at 1,000 mile intervals, drain and refill transmission at 25,000 mile intervals.

Recommended Oil—Use only Automatic Transmission Oil Type A (as furnished in containers bearing "AQ-ATF" number).

Capacity—Approximately 5 qts. (refill after transmission case only drained), 11 qts. (after overhaul with transmission case and converter dry).

►**Warming Up Transmission (For Checking or Draining)**—Drive car approximately 5 miles with frequent starts and stops OR warm up transmission in shop as follows: Run engine for 15 minutes at 750 RPM with selector lever in "Dr" position. *CAUTION*—Set hand brake tightly to prevent car moving.

Checking Oil Level—Check only with transmission warm and engine idling with selector lever in Neutral "N" position. Remove dipstick from filler tube in engine compartment on right side. Add oil only if level down to "ADD ONE QUART" mark on stick, fill only to "FULL" mark on stick. *CAUTION—High oil level (above "FULL" mark) will cause foaming and loss of fluid.*

►*OIL FILLER NOTE*—Use of Oil Filler Tube & Funnel No. J-4264 recommended to facilitate filling. This assembly is vented (transmission not vented and may blow back causing oil spillage if vented filler not used).

►*LOW OIL LEVEL CAUTION—If oil level in transmission found consistently low, check for internal and external oil leaks. See "OIL LEAKAGE OR HIGH OIL CONSUMPTION" in TROUBLE SHOOTING.*

Draining & Refilling—Transmission must be warm. Remove drain plug in rear face of transmission housing under the case to drain the transmission. *NOTE*—It is not necessary to drain converter. Replace and tighten drain plug. Install 5 qts. of new fluid through filler tube on right side of engine (see Oil Filler Notes above). Idle engine with selector lever in "N" until transmission warm, check fluid level and add additional fluid, as required, to bring level up to "Full" mark on dipstick. *CAUTION—Do not overfill (will cause foaming).*

Filling (After Overhaul)—Install 3 qts. of fluid through filler tube, start engine and allow it to idle with selector lever in "N", install additional 8 qts. of fluid. Run engine until transmission warm and check fluid level.

LINKAGE ADJUSTMENT

Throttle Linkage Adjustment (6 Cyl. Cars): *Engine must be at normal operating temperature and transmission warm (choke valve wide open and fast idle inoperative with stop screw of throttle against low step of fast idle cam), when adjustments made.*

►*EARLY 1955 (WITH FIRST TYPE THROTTLE VALVE LEVER) THROTTLE LINKAGE PRODUCTION CHANGE (To improve shift control characteristics):* Outer Lever Positioning Gauge J-5906 should be set at 7 3/32" instead of 6⅜" as originally recommended. See adjustment data below. In addition to reworking the gauge for use with V8 Cars (see "Rework of Outer Lever Positioning Gauge" above), the pivot hole of gauge will have to be elongated slightly to provide the necessary extension of the tool.

►*POWERGLIDE LINKAGE ADJUSTMENT PRODUCTION CHANGE:* On later cars the part throttle upshift has been lowered to 12-18 MPH by changing the angle of the transmission throttle control outer lever, and shortening the throttle valve control rod

Throttle Linkage Adjustment differs from early cars as indicated in the procedure following. To identify early and later type cars it will be necessary to check the part throttle upshift speed. Early cars will be 26-28 MPH, and later cars will be 12-18 MPH.

►*DECREASING PART THROTTLE UPSHIFT ON EARLY CARS:* If it is desired to decrease part throttle upshift speed from 26-28 MPH to 12-18 MPH, replace the early type Throttle Valve Outer Lever, Part No. 3710634, with later type Part No. 3720323. Replace early type Throttle Valve Control Rod, Part No. 3710632 with later type Part No. 3715711. Adjust throttle linkage as indicated below.

1) Adjust engine idle speed to 425 RPM with Selector lever in "D" range (set hand brake firmly to hold car while making adjustments).

2) Disconnect control rod from throttle lever on transmission cover. On early cars (see Production Change above), remove the extreme lower rear transmission side cover bolt. On later cars remove the top bolt at rear edge of transmission side cover. Rotate throttle valve control outer lever assembly counter-clockwise to the open throttle position.

3) Hold lever in this position and with throttle valve outer lever positioning gauge J-5906 (see "Rework of Transmission Outer Lever Positioning Gauge J-5906 (above) set at 7 3/32" (cars with first type throttle lever *(NOTE—This setting supersedes the 6⅜" setting formerly recommended. See production change above)*, 6" (cars with second type throttle lever), measure distance between correct hole in side cover (see above) and hole in throttle lever. If pins of gauge will enter holes, adjustment is correct. If necessary to adjust, loosen lever clamp attaching bolt and adjust lever on throttle shaft as necessary. Reconnect control rod.

4) Disconnect bellcrank-to-carburetor throttle rod at throttle valve lever. Disconnect accelerator-to-bellcrank rod at bellcrank.

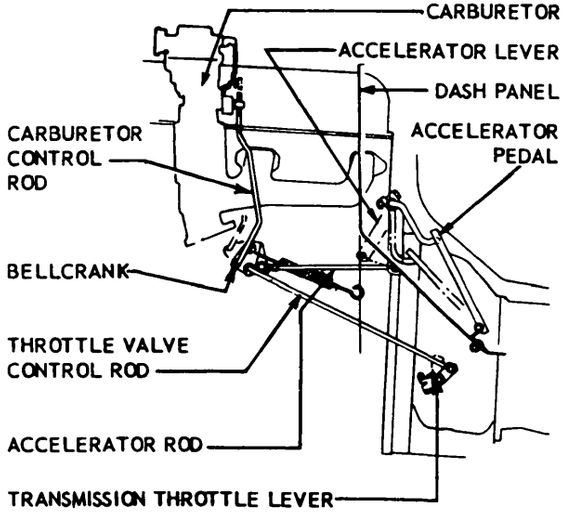
5) Force bellcrank-to-transmission throttle lever rod forward against its stop in transmission (open throttle position) and adjust bellcrank-to-carburetor throttle rod for free entry of swivel pin in throttle valve lever, with carburetor throttle valve in wide open position.

6) With carburetor throttle valve held in wide open position and accelerator fully depressed, adjust accelerator-to-bellcrank rod for free entry of swivel pin into hole in bellcrank.

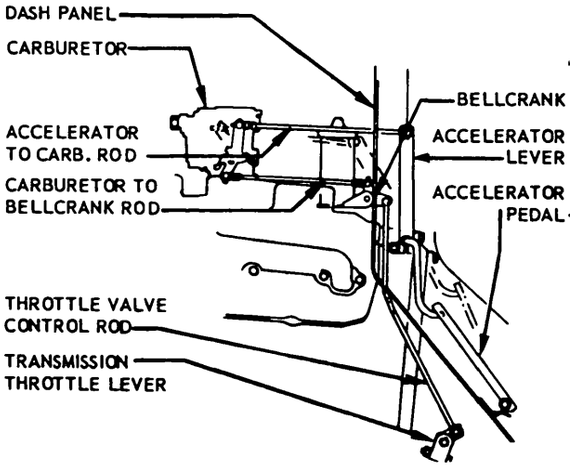
Throttle Linkage Adjustment (V8 Cars): *NOTE—Adjust Transmission Throttle Control Linkage BEFORE adjusting Carburetor Throttle Linkage (see below).*

Carburetor Throttle Linkage—With accelerator pedal depressed fully and with throttle valve wide open, adjust accelerator-to-throttle lever rod (upper throttle rod) swivel for free entry into throttle lever. Then lengthen throttle rod by turning swivel **two full turns.** Connect rod to throttle lever.

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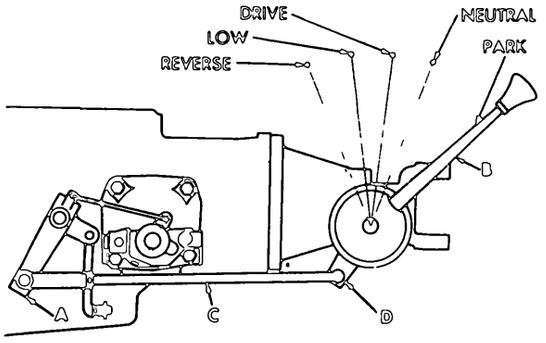
CHEVROLET 6 CYL. THR TTLE LINKAGE



CHEVROLET V8 THR TTLE LINKAGE

POWERGLIDE (Continued)

Transmission Throttle Lever Adjustment—1) With selector lever in "D" (Drive) range and with hand brake applied, adjust engine idle speed to 425 RPM (engine and transmission at normal operating temperature). Turn engine off and check choke valve to make sure it is fully open and that stop screw is against low step of fast idle cam.
2) Disconnect transmission throttle rod at lever on transmission. Remove extreme lower rear bolt in side cover on transmission. Rotate transmission throttle valve outer lever assembly clockwise to open throttle position (against stop). Hold in this position and with throttle valve outer lever positioning gauge J-5906 set to 2⅞", measure the distance between the bolt hole in side cover and hole in throttle lever. If pin of gauge enters hole, adjustment of lever is correct.
3) If necessary to adjust, loosen lever to clamp attaching screw and adjust outer lever to obtain correct adjustment. Install bolt in side cover and attach throttle rod to transmission lever.
4) Disconnect upper and lower rods from carburetor throttle lever. Force transmission throttle control rod forward against its stop in transmission (open throttle position) and adjust lower rod on carburetor throttle lever for free entry of swivel pin into carburetor throttle lever, with carburetor throttle valve in wide open position. Adjust upper control rod as outlined in Carburetor Throttle Linkage (above).



CORVETTE MANUAL CONTROL LINKAGE

Manual Control Linkage (Except Corvette): Loosen shifter tube lever clamp nut sufficiently to allow upper control rod to move freely in the swivel. Push control rod bellcrank (on left side of transmission case) toward front of car as far as it will go, placing transmission in "Park" position. Place shift control lever on steering column in "P" (Park) position. With both the control rod bellcrank and selector lever held in the "P" (Park) position, tighten shifter tube lever clamp nut securely.

Manual Control Linkage (Corvette): Set control rod bell crank (A) on transmission to reverse position (extreme rearward position). Place transmission selector lever (B) in reverse position (extreme forward position). Adjust rod (C) connecting lower end of selector lever with control rod bell crank so that rod will enter hole in lower end of selector lever (D) freely.

Neutral Safety Switch: Located on bracket on lower end of lower support assembly on steering column. To adjust, loosen two switch assembly mounting screws. Place selector lever in neutral, make certain that switch clip is over flats on end of shifter shaft. Insert locating pin through holes in switch mounting bracket and locating plate. Tighten switch mounting screws, remove locating pin.

BAND ADJUSTMENT

▷*BAND ADJUSTING NOTE—Band adjustment not ordinarily required in service (bands adjusted when reassembling transmission). Reverse Band adjustment requires removal of Servo Cover Assembly (see Disassembly data).*

Low Servo Bands—Adjusting screw located on left side of transmission case (under a cover). To adjust band, remove adjusting screw cover. Use tool J-4277 (see Tool Modification Note below), loosen adjusting screw locknut, turn adjusting screw in solidly, then back screw out exactly four complete turns, tighten locknut taking care not to allow screw to turn, replace adjusting screw cover.

▷Tool J-4277 Modification (for Low Servo Band Adjustment)—Adjusting screw has recessed head for ¼" Allen wrench. To use tool, remove screwdriver retainer and special screwdriver from tool, use ¼" Allen Wrench in place of the screwdriver in the tool.

Reverse Servo Band—Adjusting screw located on right side of case under servo cover. With servo cover removed, install tool J-4277 on adjusting screw, loosen locknut. Rotate reverse drum to center it in the reverse band. Tighten adjusting screw until all endplay between linkage and band is removed without compressing the band. The reverse drum must be free to rotate after this adjustment. If reverse drum is not free to rotate, back the adjusting screw ¼ turn at a time until drum is free to rotate. *(CAUTION—This is a sensitive adjustment and must be done carefully).* Tighten locknut taking care not to allow adjusting screw to turn.

TROUBLE SHOOTING

SEVERE CLOSED THROTTLE DOWNSHIFT "CLUNK": May be caused by a broken closed throttle cushion valve spring retainer. Check this condition by removing right hand side cover and inspecting retainer. *See "Closed & Forced Throttle Valve Spring Retainer Production Change" above.*

MOMENTARY RUN AWAY IN LOW UP TO 30 MPH (WIDE OPEN THROTTLE ACCELERATION): May be caused by a broken forced throttle cushion valve spring retainer. Check mainline pressure which will be lower just prior to shift, and the stall pressure will be low if the faulty transmission operation is caused by a broken retainer. *See "Closed & Forced Throttle Valve Spring Retainer Production Change" above.*

EXCESSIVE SLIPPAGE (High engine speed in relation to car speed, poor acceleration, or engine runs away on turns).
1) In all Speed Ranges—Low oil level. Incorrect control linkage adjustment. Air leak in oil pump suction pipe. Low front oil pump pressure.
2) In Drive Range—Incorrect control linkage adjustment. Damaged or leaking clutch piston seal (worn or burned clutch plates resulting from partially engaged clutch).
3) In Low Range—Incorrect control linkage adjustment. Low Band out of adjustment. Sticking accumulator valve, modulator lever, or modulator valve. Damaged or worn Low Servo Piston Ring resulting in poor band application or excessive oil leakage into clutch apply circuit causing partial clutch application and possibly burned clutch plates (check by connecting pressure gauges to Low Servo Apply and to High Clutch test points—there should be no pressure indicated at High Clutch point with selector lever in "L").

CAR CREEPS (Forward or Backward).
1) With Control Lever in Neutral—Incorrect control linkage adjustment. Clutch piston vent valve stuck closed. Clutch plates sticking or incorrectly assembled (not "stacked" in correct order).
2) Creeps forward with Control Lever in Reverse or backward with Lever in Low—Incorrect control linkage adjustment.

CAR WILL NOT MOVE (Rear wheels may be locked or free).
1) With Control Lever in any range (rear wheels free). If this occurs at other times than after reversing car, see causes listed under EXCESSIVE SLIPPAGE above. If this occurs only after reversing car (indicating loss of front pump pressure) check: Rear pump air leakage into front pump suction line (causing front pump to lose its prime). Rear pump gasket leakage. Front pump clearance excessive.
2) With Control Lever in any range (rear wheels locked). Parking pawl lock engaged. Broken parts in transmission. Parking brake applied.
3) With Control Lever in Drive Range (rear wheels free). If engine runs away and transmission is hot, check for: Low radiator water level, clogged oil cooler, sticking thermostatic valve, or dragging Low Range Band (causing over-expansion of clutch parts due to excessive heat).

SHIFTS ARE ROUGH.
1) Low-to-Drive Shift (car in motion). Incorrect Low Band adjustment. Clutch plates worn or binding. Modulator control lever or piston sticking (will cause excessive pressures). Accumulator dump valve orifice plugged.
If engine speeds up during this shift—Check for incorrect low band adjustment and worn or binding clutch plates.
2) Drive-to-Low Shift. Incorrect Low Band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).
3) Neutral-to-Reverse. Incorrect reverse band adjustment. Accumulator piston stuck closed. Modulator control lever or piston stuck (will cause excessive pressure).

CHATTERS WHEN STARTING.
1) In Low Range. Incorrect Low Band adjustment. Worn or rough band, scored drum. Clutch not disengaging properly due to distorted or binding plates, sticking clutch piston, sticking piston vent valve, or damaged or worn Low Servo Piston Ring allowing oil leakage into clutch apply circuit and causing partial clutch application (see tests for Excessive Slippage in Low Range above).
2) In Drive Range. Incorrect Low Band or Reverse Band Adjustment. Bands worn or rough, drums scored.

CONTINUED ON NEXT PAGE

POWERGLIDE (C ntinu d)

3) **In Reverse Range.** Incorrect Reverse Band adjustment. Worn or rough band, scored drum. Reverse ring gear and drum bushing worn or damaged.

REVERSE OPERATION JERKY OR DRAGGING.
1) Clutch plates are incorrectly assembled (not "stacked" properly) or sticking. Clutch piston vent valve stuck closed.

REVERSE CAN NOT BE ENGAGED WITH ENGINE RUNNING: If reverse can only be engaged when engine not running, check for accumulator snap ring being out of place (allowing accumulator valve and body to be forced against clamp nut on parking lock lever shaft and apply spring assembly, blocking shift into reverse). *NOTE*—Above condition will not prevent shift into Low Range).

DRIVE-TO-LOW or LOW-TO-DRIVE SHIFT DIFFICULT: May be caused by improperly drilled high clutch feed orifice in valve body resulting in slow clutch application in Drive Range and slow clutch release when shifting from Drive to Low (restricted orifice will cause slow oil flow). Check by connecting pressure gauges to Low Servo Apply and to High Clutch (low servo release side) and noting pressures as follows:
1) Move selector from Neutral to Drive with engine idling. If pressure builds up much more rapidly on Low Servo Apply gauge than on High Clutch gauge, a restriction in the passage (undersized orifice) is indicated.
2) Move selector from Drive to Low. Pressure in High Clutch gauge drops slowly, oil drainage from clutch is restricted. NOTE—This will result in slow Low Band application and clutch drag (may cause burned clutch plates).

HIGH CLUTCH PLATES BURNED OR CLUTCH FAIL
►*CAUTION—When High Clutch failure noted, following tests should be made before transmission removed, and transmission should also be carefully examined after removal and disassembly.*
1) Connect pressure gauges to Low Servo Apply, High Clutch (low servo release side), and to Reverse Servo points. Operate engine to supply oil pressure.
2) Place selector lever in Drive position and note pressure build-up in High Clutch gauge. Slow build-up indicates restriction in high clutch apply orifice resulting in clutch slippage and burned plates.
3) Place selector lever in Low position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage past Low Servo Piston Ring resulting in partial clutch application and burned clutch plates.
4) Place selector lever in Reverse position. High Clutch gauge should not show any pressure. Pressure at this point indicates leakage between the converter "out" and low servo "release" channels in valve body or damaged Housing-to-Valve Body gasket. This condition will cause partial clutch application and burned clutch plates.

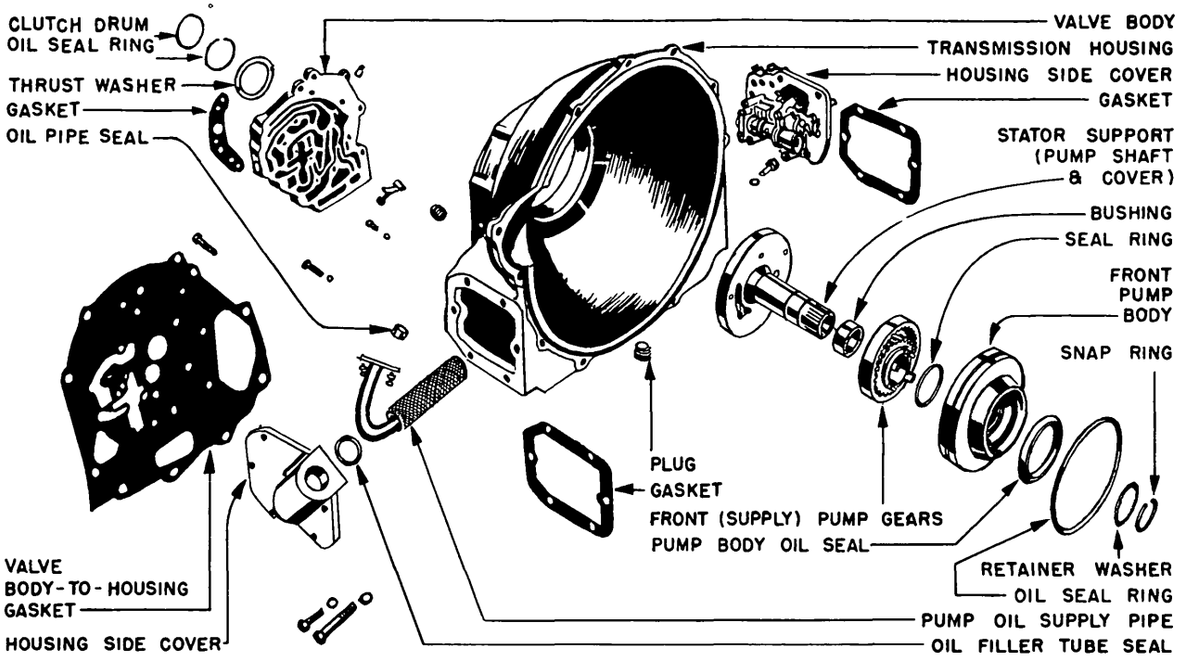
NOISE IN TRANSMISSION.
1) **Buzzing Noise (All Ranges).** Low oil level. Pump gear interference with crescent in pump. Pump check valve not seating.
2) **Ringing Noise in Converter.** Low oil level. Air leak in pump suction line (pump not seated properly) resulting in low oil level in converter. Pressure regulator valve stuck (closing converter inlet port). Leakage in oil line between front pump and regulator valve.
3) **Clicking Noise.** Incorrect manual linkage adjustment (causing interference between parking lock pawl and gear).
4) **Whining Noise.** Transmission gear teeth worn. Pump gear clearance excessive or pump gear bushings worn.

FUEL CONSUMPTION EXCESSIVE.
1) **Transmission Causes.** Converter stator freewheeling cams and roller incorrectly assembled. Clutch piston vent valve stuck open.

TRANSMISSION OIL BEING FORCED OUT OF FILLER PIPE: Caused by aeration and foaming of the oil due to one or more of the following:

NOTE—This condition may also cause Loss of Power and Lower Stall Speed (due to converter turbulence and lower pressures in control circuits).

1) Oil level too high allowing planet carrier to revolve in oil and aerate it. Correct by lowering oil level to correct point (see LUBRICATION) and driving car for 5 miles to work out air bubbles.
2) Oil suction pipe split, seal damaged, bore for suction pipe in housing too deep, or suction pipe retainer ears bent (preventing proper compression of the seal) resulting in air leaks in oil suction line.
3) Sand hole in suction bore of transmission case or housing or in suction cavity in valve body resulting in air leaks in oil suction line.



POWERGLIDE TURBINE HOUSING & FRONT OIL PUMP

TESTING

►*TESTING CAUTION*—Transmission oil level must be checked and corrected (see LUBRICATION) and *transmission must be warmed up before tests made.*

Warming Up Transmission: Transmission must be warmed up by road driving or in the shop exactly as follows before checking for oil leaks or trouble.

Road Warm-Up—Drive car for approximately 5 miles with frequent starts and stops to approximate heavy-traffic conditions.

Shop Warm-Up—Set hand brake tight to hold car, place selector lever in "D" range, start engine and run for 15 minutes at 750 RPM. At end of 15 minutes, transmission will be warmed up suffcient-ly for testing regardless of initial temperature.

►*CAUTION—Recheck oil level after warm-up and before making following tests.*

ROAD TEST: Road test car when endeavoring to determine the reasons for the following difficulties:

Clutch Slippage: Connect gauges to the test points of the low servo apply and high clutch (release side of low servo). Position selector lever in "D" range and when car starts to move on acceleration, carefully check the pressure readings. Before the upshift takes place, the gauge connected to the low servo apply test point should record between 85 and 95 lbs. After a normal upshift takes place and the high clutch has time to become fully engaged, both gauges should record 85-95 lbs. If on this type of shift, the gauge on the high clutch (release side of

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POWERGLIDE (C ntinu d)

low servo) test point records 85-95 lbs., and the clutch slips or does not fully engage, it indicates a mechanical fault in the clutch. If the gauges do not record between 50-60 lbs. with engine idling at 425 RPM, or from 85 to 95 lbs. upon acceleration, the following items will require checking as it indicates leakage in the oil circuits. (a) Pressure regulator valve stuck, (b) Leak at low servo piston ring (between bore and ring), (c) Leak at low servo piston rod (between bore and rod), (d) Leak at valve body to case gasket, (e) Leak between valve body and housing, (f) Front pump clearances not correct, (g) Leak at low drive valve body (check gaskets and shifter valve), (h) Check passages in transmission housing for porosity, (i) Loose suction screen connection.

Closed Throttle Downshift "Clunk": High engine idle speed, or Closed Throttle Downshift Cushion Valve stuck.

Harsh Abrupt Upshift Above 25 MPH: Forced downshift cushion valve stuck closed.

Improper Upshifts and Downshifts: Refer to "Shift Patterns" below. Connect gauges to throttle valve and governor test points *(NOTE—See "Governor Pressure Test Plug Production Change" above).* Throttle valve pressure ranges from 0 to 62 lbs, depending to what extent the accelerator is depressed. Governor pressure is governed by road speed. If difficulty is experienced with the "Shift Patterns" it is recommended that the governor pressure be checked first to determine whether the pressure is within proper range, for if not, it will effect the "Shift Patterns" and the governor assembly is the first thing that should receive attention. Throttle valve pressure is another thing that effects "Shift Patterns" and if governor pressure is correct it is indicative that trouble is in the low drive valve body, provided the positive linkage and throttle valve linkage is in proper adjustment

SHIFT PATTERNS
Drive Range—Automatic

Throttle Position	①Upshift	②Downshift
Light Throttle③	12-14 MPH	④10-13 MPH
To Detent	30-45 MPH	14-18 MPH
Through Detent	48-53 MPH	45-50 MPH

①—From Low to Drive Range.
②—From Drive to Low Range.
③—Light Throttle on Upshift
④—Closed Throttle on Downshift.

STALL TEST: Check coolant level in radiator as a safety precaution. With tachometer connected to engine and service brakes securely locked, open throttle wide, with transmission in "D" (Drive) range, then in "L" (Low) range, and then in "R" (Reverse) range. Note maximum speed attained in each range and record. Speed should be almost identical in all ranges and be between 1560 and 1610 (6 Cyl.), 1600 and 1700 (V8). ***(CAUTION—Do not maintain stall condition longer than 10 seconds at one time to avoid overheating transmission fluid).*** If engine fails to attain minimum stall speed by several hundred RPM, it is likely that the stator is not locking up on the stator hub. If stall speed varies much between ranges or exceeds the maximum in all ranges, there is slippage which may be due to insufficient oil pressure or to a mechanical fault of clutch or bands.

PRESSURE TESTS: Connect pressure gauges at the following points and make the tests listed below.

►***TEST GAUGE NOTE:*** Five gauges are required. The four-gauge panel, No. J-4872, can be modified for use by installing an additional gauge furnished in conversion package No. J-5491 (reverse original gauges on panel, drilling additional hole to mount new gauge on lower edge of panel).

Gauge Connections—Connect gauge at each of the following points:

1) Low Servo Apply Pressure—Plug on lower front of servo cover on right side of transmission. ***CAUTION—Do not confuse this plug with Modulator Pivot Pin Retaining Plug which is slightly to rear of this Low Servo Apply Plug.***

2) Clutch Apply Pressure (Low Servo Release)—On bottom of transmission case at center and adjacent to servo mounting flange.

3) Reverse Servo Apply Pressure—On bottom of transmission case at rear and adjacent to servo mounting flange.

4) Throttle Valve Pressure—At hex-head plug in center of Low and Drive Valve Body Cover on left side of converter housing.

►***GOVERNOR PRESSURE TEST PLUG PRODUCTION CHANGE: Test plug on side of left hand side cover has been eliminated beginning in production with Trans. Serial No. C-428-D. Earlier model side covers will retain this plug.***

5) Governor Pressure—At plug on side or at upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (upper plug is between second and third top cover screws (counting from top front corner of cover).

6) Main Line Pressure—At plug on upper end of channel in Low and Drive Valve Body Cover on left side of converter housing (plug is between third and fourth top cover screws (counting from top front corner of cover).

7) Clutch Apply or Main Line Pressure—At plug at outer end of channel in Low and Drive Valve Body Cover on left side of converter housing (this plug is at lower rear corner of cover).

Test Pressures—***CAUTION—Representative pressures listed below may vary 5% (higher or lower).***

FRONT PUMP PRESSURE

	Pressure
Idle (425 RPM)	50-60 lbs.
Above Idle	85-95 lbs.
Reverse (Idle 425 RPM)	50-60 lbs.
Reverse (Above Idle)	165-195 lbs

DRIVE (AUTOMATIC)
Transmission in Low Range

	Light Throttle (10 MPH)	Through Detent (45 MPH)
Low Apply	85-95 lbs	85-95 lbs.
Clutch Apply	0 lbs.	0 lbs.
Governor	8-13 lbs.	72½-76½ lbs.
Throttle Valve	①	①

Transmission in High Range

	Light Throttle (30 MPH)	To Detent (45 MPH)
Low Apply	85-95 lbs.	85-95 lbs.
Clutch Apply	85-95 lbs.	85-95 lbs.
Governor	52-56 lbs.	72½-76½ lbs.
Throttle Valve	①	①

①—Throttle valve pressure will vary from 0 to 62 lbs., depending on throttle position. At wide open throttle (through detent) pressure should read 61 to 63 lbs., on acceleration.

REMOVAL FROM CAR (EXCEPT CORVETTE)

Transmission & Torque Converter are removed as an assembly. ***CAUTION—Torque converter is not retained in housing as on previous transmission and special holding tool must be used to prevent converter falling out when transmission assembly removed.***

TRANSMISSION ASSEMBLY REMOVAL: (1) Raise car and install jack stands front and rear. Turn back floor mat and remove toe pan plate.
2) Remove spark plug wires on all models. Disconnect ground strap from battery and wires from starting motor solenoid on eight cyl. models only. Disconnect oil cooler lines retaining clip bolt from right side cover and disengage lines from retaining clip on engine. Move lines away from transmission and tie to right frame side rail.
3) Disconnect throttle valve control rod from throttle valve control outer lever and manual shift control rod (long rod) from bellcrank. Split rear universal joint. Then remove propeller shaft and front universal joint as an assembly by sliding it rearward until front joint is free of transmission output shaft.
4) Remove drain plug from rear of converter housing and drain transmission. Clean dirt from around filler tube, dipstick and transmission cover and remove side cover bolt retaining filler tube in position. Remove filler tube and dipstick. ***(CAUTION—Use masking tape or rubber stopper to cover filler tube opening.***
5) On V8 cars only, remove starter, and disconnect exhaust pipe from crossover pipe. On 6 Cyl. cars disconnect exhaust pipe from exhaust manifold.
6) Disconnect muffler from muffler support bracket and move the exhaust pipe and bracket as an assembly to the left and tie it to left frame side member.
7) Remove flywheel inspection hole cover and remove the three flywheel to converter attaching bolts through the opening that is adjacent to the starting motor, (opening on six cylinder cars is on left side of engine).
8) Remove all converter housing to flywheel housing attaching bolts except the top three. Install engine support bar or cradle to support engine. Position jack under transmission (using a suitable transmission handling device). Remove both rear engine mountings making sure that engine is properly supported before removing mountings
9) Remove the three upper converter housing to flywheel housing attaching bolts through opening in toe pan Move transmission to rear slightly and install converter holding tool J-5384. Lower transmission on jack and remove from under car.

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POWERGLIDE (C ntinu d)

DISASSEMBLY—TRANSMISSION

►**DISASSEMBLY & REASSEMBLY CAUTION:** ***CLEANLINESS IS EXTREMELY IMPORTANT when opening up transmission. Thoroughly CLEAN exterior of case first, CLEAN each part as removed with cleaning solvent or gasoline and dry with air—do not use wiping cloths which will leave lint on parts. Store all parts in clean storage bins.***

DISASSEMBLY OF TRANSMISSION (Into Major Units): 1) Place transmission on bench (use holding fixture J-3361) and remove all units as indicated below.

2) Remove converter assembly holding tool J-5384 from housing, remove converter assembly by pulling it straight out of housing.

3) Take out right side cover attaching bolts, remove side cover, gasket, and oil pump suction screen.

4) Take out Low & Drive Valve Body attaching screws on left side of transmission, remove valve drive body assembly and gasket. CAUTION—Do not remove outer lever assembly from valve body (this retains inner lever assembly in body).

5) Loosen all servo cover bolts slightly and break servo cover loose if it sticks to case (reverse servo spring and pressure regulator spring bear against cover) **using care not to allow cover to tip** which may damage or break tip of pressure regulator valve. Use guide bolts to maintain cover alignment or turn all cover bolts out evenly while exerting pressure on cover, then lift cover and gasket straight off until cover clears tip of pressure regulator valve. Remove reverse servo spring and pressure regulator springs, lift regulator valve out.

►***CAUTION—Handle valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.***

6) Remove low band adjusting screw cover, loosen low band adjusting screw locknut using tool J-4277 (see Tool Modification below), and tighten low band adjusting screw to hold clutch assembly in place.

►***CAUTION—Make sure low piston assembly does not fall out of bore and become damaged.***

►**Tool J-4277 Modification Note**—Low band adjusting screw has recessed head for Allen wrench. To use tool, remove screwdriver retainer and special screwdriver from tool, use ¼" Allen wrench in place of screwdriver in tool.

7) Working from inside of converter housing, remove the converter housing-to-transmission case self locking bolt. Remove the converter housing-to-transmission bolts and lockwashers and install two ⅜"—16 x 3¾" guide pins (part of Pilot Stud Set J-3387). Shift transmission into Reverse and then carefully separate transmission from converter housing. Remove valve body to transmission case gasket.

8) Remove manual valve from valve body on rear of converter housing, remove manual valve lever from housing, remove bronze thrustwasher from valve body oil delivery sleeve.

►***CAUTION—Handle manual valve carefully to prevent damage and store it by itself to avoid nicking or scratching of the polished surfaces.***

9) Take out all bolts and lockwashers attaching valve body to converter housing and front pump to valve body. Remove valve body and gasket.

►***CAUTION—Handle valve body and valves carefully to protect them from damage.***

10) Use Front Pump Driver Tool J-4263-5 to remove pump assembly from converter housing.

11) Loosen low servo band adjusting screw to free clutch assembly, remove input shaft, clutch assembly, and low sun gear thrustwasher from transmission case.

12) Remove low servo band, strut assembly, low servo piston and piston return spring from transmission case.

13) Remove speedometer driven gear assembly. Take out universal joint retainer bolt and lockwasher on rear end of output shaft, slide universal joint yoke off end of shaft.

14) Take out attaching bolts and remove governor cover on left side of transmission case, remove gasket. Remove governor assembly (allow governor to turn in clockwise direction while withdrawing it from case).

15) Use tool J-3383 to rotate parking lock pawl spring until end unhooked from case, remove spring and parking lock pawl. Remove parking lock lever and steel washer, parking lock lever shaft assembly, and oil seal from case.

16) Remove transmission oil seal using tool J-5859 and remove transmission assembly and "O" ring seal. Remove speedometer drive gear from output shaft with tool J-5814.

►***CAUTION—Do not attempt to remove planet carrier assembly until transmission rear bearing locating snap rings, retainer and bearing are removed.***

17) Remove the three bearing retainer screws and lockwashers and remove rear bearing retainer. Remove rear bearing locating snap ring from output shaft. Remove rear bearing from output shaft with tool J-5814, then remove bearing locating front snap ring from output shaft.

18) Working from front of transmission case, position the arrow on face of external gear of the planet carrier assembly at top center (this aligns the drive pin in output shaft with the eyebrow opening in the rear oil pump cover). Planet carrier assembly can now be removed through front of case. Do not lose rear oil pump drive pin.

►***CAUTION—Do not drive on end of output shaft.***

19) Remove reverse drum and thrust washer. Using tool J-4277, loosen reverse servo adjusting screw locknut, back off adjusting screw and remove reverse brake band assembly and reverse servo piston. Remove rear pump attaching bolts and lockwashers and remove rear pump assembly and gasket. Remove lubrication pressure relief valve from transmission case.

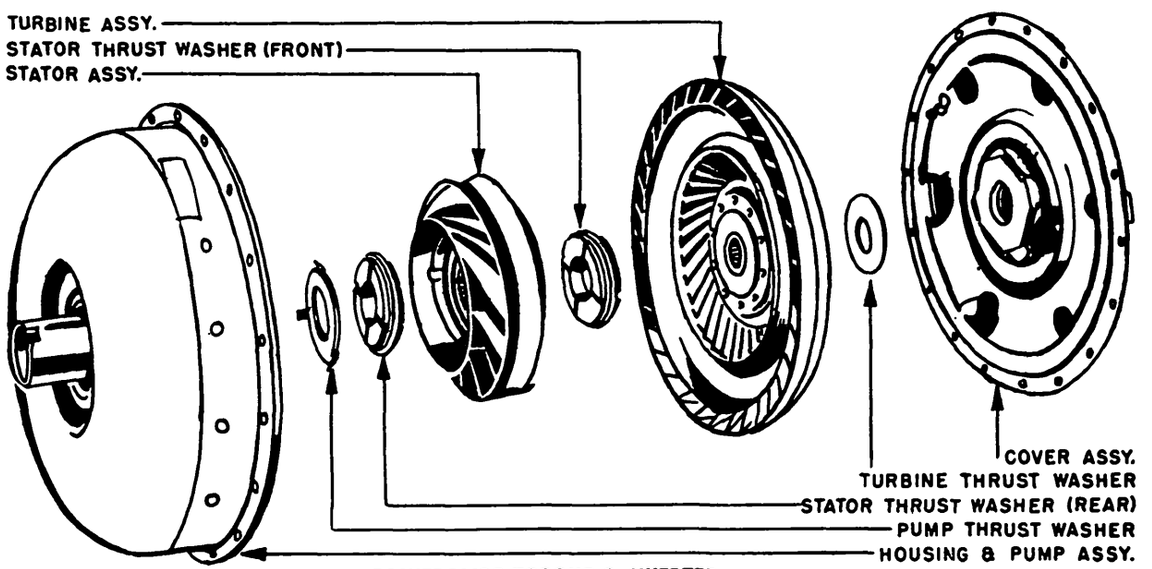
►***For DISASSEMBLY of above units, see OVERHAUL data following.***

OVERHAUL

►**"O" RING SEAL CAUTION:** ***These seals must be discarded when removed and a new seal installed exactly as directed below.*** "O" ring rubber seals are special design and are installed with side clearance in ring groove so that oil pressure on seal deforms the rubber and extrudes a portion of the rubber into the clearance space between the mating parts to provide a positive seal against loss of oil pressure. Seals **must not be re-used.**

"O" Ring Seal Installation—Make certain that parts are clean and that burrs and sharp edges are removed. Seal must be free of any twists (place ring on flat surface and allow it to assume natural position) and **must not be twisted during installation.** Engage one side of ring in groove, pull other side straight back until it can be fitted in groove

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POWERGLIDE TORQUE C NVERTER

POWERGLIDE (Continued)

without twisting. Work ring against trailing edge of groove (last side to enter when parts assembled) using flat tool entered between ring and leading edge of groove to move ring without twisting. Lubricate "O" ring and parts with transmission oil.

CONVERTER OVERHAUL (Unit on bench—after removal from transmission):

Disassembly: 1) Remove all converter cover attaching bolts and locknuts, use small punch to drive out split dowel pin in cover, lift cover off.

2) Remove turbine assembly, stator assembly, stator thrustwashers, and pump thrustwasher. Remove thrustwasher from turbine hub. Remove "O" ring seal from converter cover.

3) Remove stator race from stator assembly, remove snap ring and over-run cam retaining thrustwasher, remove cam rollers, springs, and guides (8 each).

▷*CAUTION—Use care when separating parts so that cam rollers, springs, and guides do not fall out and become lost.*

4) Remove snap ring on opposite end of stator and remove over-run cam roller and spring retainer.

▷*CAUTION—Use care to prevent damage to over-run cam and see that cam does not become disengaged from stator hub.*

Inspection: Wash all parts in cleaning solvent and dry with air. Inspect converter pump hub, turbine hub, and converter cover bushing for galling, scoring, or excessive wear. Inspect all thrustwashers for galling, scoring, or excessive wear. Check turbine vanes and stator vanes for looseness or damage. Inspect stator race and cam rollers for galling or scoring. Inspect cam springs for distortion. Check spring guides for wear or damage. Inspect over-run cam roller and spring retainer for wear or damage. If bushing in converter cover worn or damaged, install new bushing as follows:

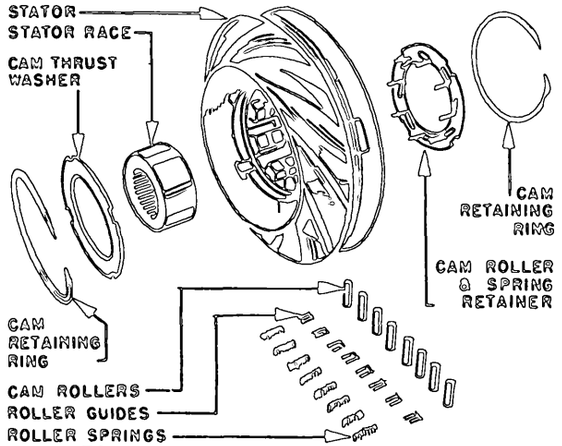
Converter Cover Bushing Replacement: Precision type bushing, No. 3702079, furnished for field installation. Use bushing remover tool J-5381 to remove old bushing from cover. Place new bushing on pilot end of Bushing Replacer Tool J-5382 and press bushing into place in cover using an arbor press. *NOTE—Bushing is finished to size and does not require reaming.*

Reassembly: 1) Install over-run cam roller and spring retainer in stator with retainer prongs pointing toward rear of stator. *NOTE*—Stator has word "Front" cast in and stator vanes are thicker at front end.

2) Assemble cam rollers, springs, and guides in cam pockets (*CAUTION*—Guides are curved and this curvature must follow curvature of cam). Install over-run cam thrustwasher and retaining snap ring.

3) Coat stator race and loading tool J-5930 with light film of oil, place stator race on pilot end of loading tool and carefully rotate the stator over the tapered end of the loading tool and the stator race (*CAUTION*—rotate stator in clockwise or freewheeling direction and use great care not to dislodge cam rollers). Check operation of stator. Stator should turn freely in clockwise direction viewed from front end.

4) Place converter pump on bench, open end up Install thrustwasher on converter pump hub making certain that tabs are engaged in the hub flange notches. Assemble both thrustwashers on stator and install stator assembly on converter pump.



TORQUE CONVERTER STATOR ASSY.

▷*CAUTION—Make certain that cut-outs in over-run cam roller and spring retainer are facing upward or toward converter turbine.*

5) Install thrustwasher on turbine hub and assemble turbine on converter pump.

6) Install NEW "O" ring seal on converter cover, align dowel pin holes in cover with dowel pins in converter pump, install cover assembly. Install all cover attaching bolts and lockwashers and tighten evenly to 15-20 ft. lbs.

TRANSMISSION OVERHAUL: *After removal from case, overhaul sub-assemblies or units as follows:*

Planetary Unit Clutch: Place unit on bench with clutch flange upward.

Disassembly—1) Remove clutch flange retainer ring, lift out clutch flange retainer. Remove clutch flange assembly from clutch drum. Remove clutch hub thrustwasher, hub, and all clutch plates from clutch drum.

2) Place clutch drum in bench press, install spring compresion tool J-5133 and compress spring enough to remove snap ring, use KMO-410 pliers to remove snap ring. Relieve spring pressure, remove tool, lift out clutch spring seat and spring.

3) Rap clutch drum face down on a wood block to dislodge clutch piston, lift piston out, remove outer seal ring from piston and inner seal ring from clutch drum hub.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect drum brake band surface for scoring or burning, check drum bushing for scoring or excessive wear. See that clutch flange does not have any appreciable play in drum slots. Check all clutch plates for burning or galling, see that composition plates are free fit on clutch hub and that steel plates are free fit in clutch flange. Check low sun gear for nicked or burred teeth. Inspect relief valve steel ball in clutch piston and make certain that ball is free to move in hole and that orifice to rear of piston is open. If necessary, replace ball as follows:

Relief Valve Check Ball Replacement—Remove staking and remove ball. Inspect hole and ball seat and make certain it is free from burrs or nicks, see that new ball seats perfectly. Insert ball and carefully stake around edges of hole so that ball cannot fall out. *CAUTION—Ball must be free to move in hole after staking completed.*

▷*REPLACEMENT PARTS CAUTION: See Chevrolet Changes, Cautions, Corrections for clutch production changes and latest type replacement parts.*

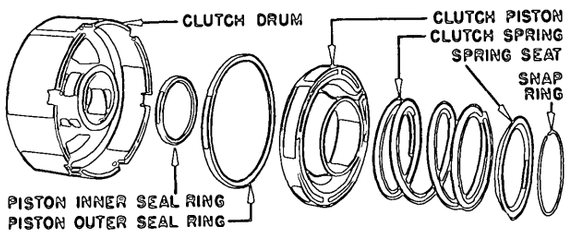
Reassembly—1) Install new outer seal ring on clutch piston with lip of seal toward pressure side of piston (*CAUTION*—use care not to stretch seal). Install new inner seal ring on inner hub of clutch drum with lip of seal toward bottom of clutch pocket.

2) Lubricate inner diameter of clutch drum and both seals with transmission oil, carefully install piston in clutch drum using a piece of feeler stock to insure seating of outer seal ring in clutch drum.

3) Install clutch spring and spring seat, use tool J-5133 in an arbor press to compress spring (*CAUTION*—Make certain spring does not hang up in snap ring groove which would damage spring seat and groove), install snap ring. Release pressure, remove tool.

4) Install thrustwasher on clutch hub (*CAUTION*—see that four tabs on washer fit into slots in clutch hub), install clutch hub and thrustwasher on clutch flange with open side up. Install five steel and four composition clutch plates, starting with a steel plate and alternating plates (*NOTE*—Steel plates are "waved" and can be installed either side up). Install clutch drum assembly on clutch flange assembly, then invert entire unit, install clutch flange retainer and flange retainer ring.

5) Check endplay using a feeler gauge inserted between clutch flange drive lug and drive slot in



POWERGLIDE CLUTCH PISTON ASSY.

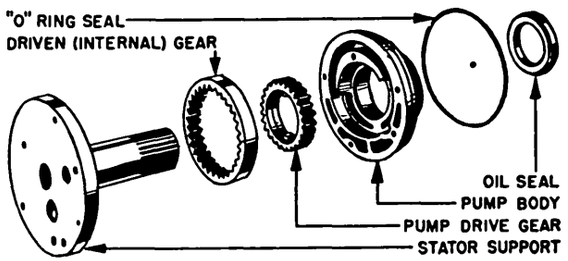
drum. This endplay must not exceed .013". Adjust by installing retainer ring of correct thickness to provide correct endplay. *NOTE*—Retainer ring furnished .055", .064", .073" thick.

Servo Cover: Disassembly—Remove pressure regulator reverse booster valve and booster valve guide and seal assembly by holding servo cover in a stationary position and pulling on protruding end of booster valve. Remove booster valve spring and booster valve spring and seat.

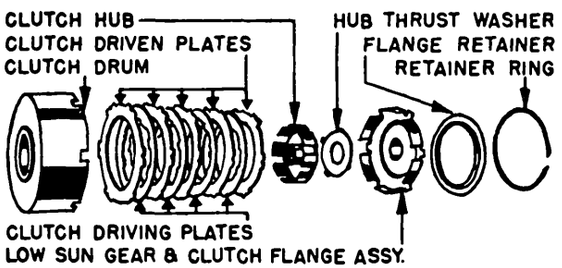
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POWERGLIDE (C ntinu d)

Inspection—Inspect cover for nicks or cracks Using a small punch or similar tool, and working through the opening in the by-pass disc seat, exert pressure on the disc to make sure disc and spring are free and that disc is seating properly *(NOTE*—Do not remove disc seat unless there is evidence of damage) Inspect pressure regulator reverse booster valve springs for distortion or damage Inspect pressure regulator reverse booster valve for galling or scoring and make sure it operates freely in bore in guide Inspect snap ring for loose fit in groove Inspect bore in valve guide for galling or scoring and check seal for distortion or damage Check valve guide bore in servo cover for roughness or burrs and make sure that valve spring and guide spring and seat will seat properly in bottom of bore

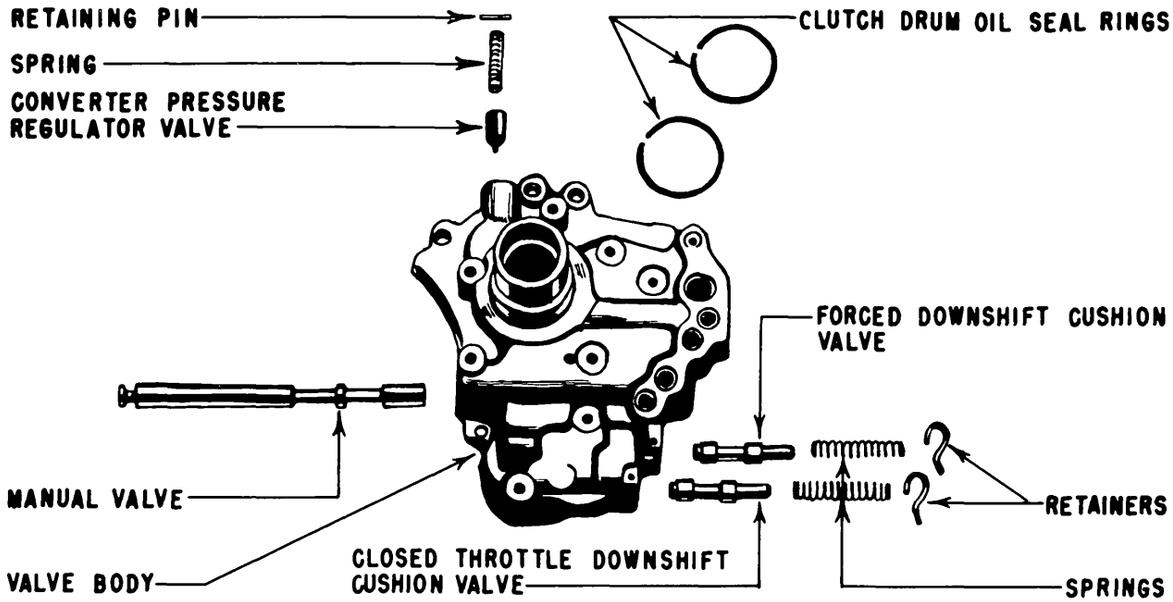


POWERGLIDE FRONT OIL PUMP



POWERGLIDE MULTIPLE DISC CLUTCH

Lubrication By-Pass Valve Assembly Replacement—If during inspection it is evident that the lubrication by-pass valve assembly is not functioning properly, correct as follows Using a suitable tool remove the nylon by-pass disc seat, then remove disc and spring Inspect disc for burrs, and spring for distortion Inspect wall of by-pass valve cavity for roughness, nicks or burrs Insert by-pass disc in its cavity to make sure its movement is not restricted Remove disc from cavity Replace any part that is defective Install by-pass spring in its cavity in servo cover and install by-pass disc With servo cover inner surface facing upward, position a new disc seat over its opening in cavity and press into place using a socket of proper size It should be flush to 005" below inner surface of servo cover *CAUTION—Under no circumstances should the by-pass disc seat that was removed be re-installed.*



POWERGLIDE CONTROL VALVE ASSEMBLY

Reassembly—Install pressure regulator reverse booster valve spring seat in bottom of bore in servo cover, then install valve and valve guide springs Assemble booster valve and valve guide with the double seat of guide toward special snap ring on valve Place valve and guide into bore in servo cover, then with thumb and finger, press valve guide and seal into bore until guide is flush with surface of cover or slightly below *(CAUTION—Do not press booster valve guide too far below surface of servo cover as this would place heavy spring pressure on guide).*

Front Pump: Disassembly—Slide stator support out of pump body, lift out pump gears (CAUTION—use extreme care not to drop or nick gears), remove and discard "O" ring seal.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect pump gears for wear, nicks, or other damage. Inspect pump body and pump face of stator support for nicks and scoring. Inspect pump body oil seal for excessive wear, damage, or evidence of leaking (see Oil Seal Replacement below). Inspect pump body bushing for galling or scoring, check bushing wear or clearance as directed below. Check pump gear clearances as follows:

1) Pump Gear Clearances—Install clean, dry gears in pump body, check clearances with feeler gauge:

Driven Gear Clearance—.0025-.0055" clearance between outer diameter of gear and pump body.

Driving Gear Clearance—.003-.009" clearance between end of gear teeth and crescent.

Gear End Clearance—Place scale across face of pump body, measure clearance between scale and face of gears. This clearance should be .0005-.0015".

2) Pump Body Bushing Clearance—Temporarily install pump body on converter pump hub, measure bushing-and-hub clearance with a feeler gauge. This clearance should be 0005- 0015"

3) Oil Seal Replacement—Pry out old seal, use special driver J-5386 to press new seal in place in pump body.

Reassembly—Install new "O" ring seal in pump body, oil pump gears thoroughly with transmission oil and install in pump body, install stator support through pump body and driving gear and line up attaching bolt holes.

Rear Pump: Disassembly—Take out two screws and remove pump body plate, lift out pump gears.

Inspection—Wash all parts in cleaning solvent, blow out all oil delivery holes, dry with air. Inspect pump body for nicks and scoring, inspect gears for wear, nicks, or other damage. Check gear clearances (clearances are same as for front pump—see Pump Gear Clearances above). Inspect rear bearing for roughness but do not remove bearing unless replacement required (see Bearing Installation below).

Pump Bearing Replacement—Remove three retaining capscrews, lockwashers, and lockplate. Drive old bearing out. Press new bearing in place, install lockplate and retaining screws and lockwashers, tighten screws securely.

Reassembly—Oil pump gears thoroughly with transmission oil and install in pump body. Install pump body plate and two slotted attaching screws, tighten screws to 3½-5 ft.lbs. torque.

Valve Body: ***CAUTION—Handle all valves with care to avoid damage, keep valve and spring assemblies separate to avoid confusing or interchanging parts.***

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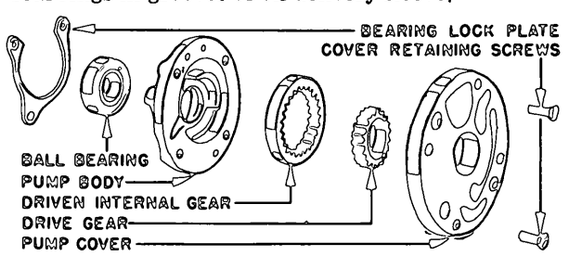
POWERGLIDE (Continued)

▷*VALVE BODY PRODUCTION CHANGES: See production and service replacement changes above.*

Disassembly—Using needle nose pliers remove the forced downshift cushion valve retainer from valve body and take cushion valve and spring from bore. Remove closed throttle downshift cushion valve in the same manner. Place valve body assembly, face down, on two wooden blocks of equal thickness and with a small pin punch drive out the converter pressure regulator valve retaining pin and remove spring and valve from bore. Remove the two clutch drum oil seal rings from oil delivery sleeve. Remove front and rear oil pump check valve from valve body.

Inspection—Wash all parts in clean solvent and blow dry with air. Do not use a rag to dry these parts. Check all springs for distortion or damage, and all valves for nicks, scores, burrs or galling, and for free movement of valves in their respective bores. Check oil seal rings for nicks or burrs and make sure that they are free in the ring grooves. Install rings in clutch drum and make sure that hooked ring ends have clearance.

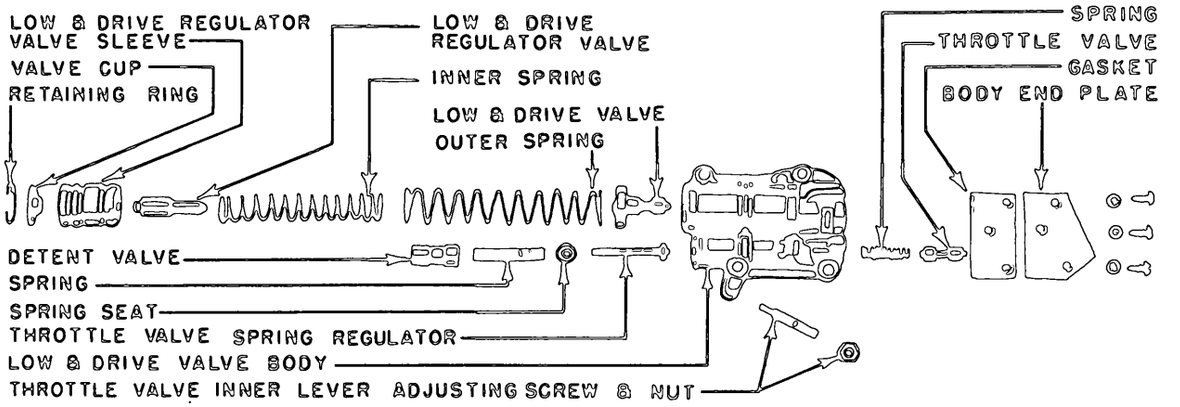
Assembly—Place valve body, face down, on wood blocks. Assemble converter pressure regulator valve spring in valve and then, as an assembly, install in valve body bore. Install retaining pin. Assemble forced downshift cushion valve spring to valve and then as an assembly, install in valve body *(CAUTION*—Do not confuse the forced downshift cushion valve spring with the closed throttle downshift cushion valve spring. *The forced downshift cushion valve spring is the shorter of the two and is made of heavier gauge wire).* Assemble and install closed throttle downshift cushion valve spring in the same manner. Install front and rear oil pump check valve in valve body making sure it is flush with or below valve body face. Install the two clutch drum oil seal rings in grooves of oil delivery sleeve.



POWERGLIDE REAR OIL PUMP

Low-and-Drive Valve Body: *CAUTION—Do not disturb Throttle Valve Adjustments (two adjusting screws—one in boss on valve body and one in throttle valve inner lever) unless required by installation of new parts. THROTTLE VALVE MUST BE ADJUSTED IF THESE SETTINGS DISTURBED (see Throttle Valve Inner Lever Adjustment).*

Disassembly—1) Remove valve body-to-side cover attaching bolts and lockwashers. While holding detent valve in place, use soft hammer to carefully tap inner face of side cover until it is free of the locating pins *(CAUTION*—Use care to keep parts from falling out and being lost or damaged while performing this operation).



POWERGLIDE LOW & DRIVE VALVE ASSEMBLY

2) Withdraw detent valve, spring, spring seat, and throttle valve spring regulator assembly from valve body. Remove throttle valve spring and throttle valve.

3) Use Pliers J-5403 to remove special snap ring retaining low-and-drive regulator valve cap, then remove the valve parts as follows: Valve Cap, Sleeve and Valve (as an assembly), Inner and Outer Springs, and Valve.

4) Take out two attaching screws and remove clutch exhaust cover plate ("L" shaped strip) from the side of the valve body.

5) Take out three attaching screws and lockwashers in end plate (CAUTION—exert pressure on plate while removing screws to prevent parts flying out), remove plate, remove valve parts as follows: Clutch Exhaust Secondary Control Valve, Spring, Stop (from upper valve bore), Clutch Exhaust Primary Control Valve Spring, Stop, Valve (from center valve bore), and throttle valve and spring (NOTE—some early cars used two springs, one inside the other).

6) Remove throttle valve outer lever assembly, shield, and inner lever assembly (CAUTION—do not disturb adjusting screw in inner lever unless required by parts replacement). Remove throttle valve lever shaft seal.

Inspection—Wash all parts in cleaning solvent, blow out all passages, dry with air. Inspect all valves for nicks, burrs, scoring, or galling. Check all valves for free operation in their respective bores. Inspect all vaive springs for distortion or damage. Inspect throttle lever assembly shaft for wear, scoring, or galling, see that shaft operates freely in side cover and that inner lever is tight on shaft. Inspect detent valve stop in side cover for distortion or damage, install new stop if necessary. Inspect locating pins in valve body and side cover for distortion or damage (one pin should be in side cover, other pin in valve body), replace pins if necessary. Inspect mating surfaces of valve body and side cover and make certain they are free of nicks or burrs.

Reassembly—1) Install low-and-drive valve in body bore (CAUTION—valve must be guided to prevent damage to the bore—use a piece of brake tubing inserted in valve shank bore at rear of valve body, engage nib on valve in end of tubing, move valve into position slowly). Install remaining low-and-drive valve parts in reverse order of disassembly (install regulator valve and cap on valve sleeve first and then install in valve bore as an assembly making certain inner spring is seated on sleeve). Compress assembly in valve bore while installing special snap ring, make certain ring properly seated in groove in valve body.

2) Install clutch exhaust secondary and primary valve assemblies (CAUTION—use care not to confuse these valve parts—primary control valve stop is the longer of the two stops, and primary control valve spring is the shorter of the two springs). Install throttle valve spring and valve in valve body, then install end plate and hold plate in position while tightening end plate attaching screws, tighten these screws to 2½-3½ ft.lbs. torque.

3) Install throttle valve spring regulator assembly in valve body and see that it is seated on throttle valve spring. Install detent valve spring seat, valve spring, and valve (thread pin of the throttle valve spring regulator assembly through the opening in the spring seat and valve).

4) Clamp side cover in a vise (face upward), align locating pin in side cover with hole in valve body, exert pressure on valve body to keep locating pin in the hole and at the same time compress detent valve in valve body bore and rotate valve body counter-clockwise until the locating pin in the valve body enters the locating hole in the side cover (CAUTION—make certain face of detent valve is resting against stop pin in side cover). Install attaching bolts and lockwashers, tighten bolts evenly to 3½-5 ft.lbs. torque.

5) Install throttle valve inner lever assembly in side cover, install new seal on shaft and into counterbore in cover, install shield. Install outer lever assembly on inner lever shaft, install outer lever attaching bolt from underside, tighten nut securely.

If lever adjustments disturbed during overhaul, readjust throttle valve as follows:

Throttle Valve Inner Lever Adjustment: Rotate throttle valve inner lever until it just contacts face of the detent valve. Hold lever in this position and turn adjusting screw until it just contacts flat surface of

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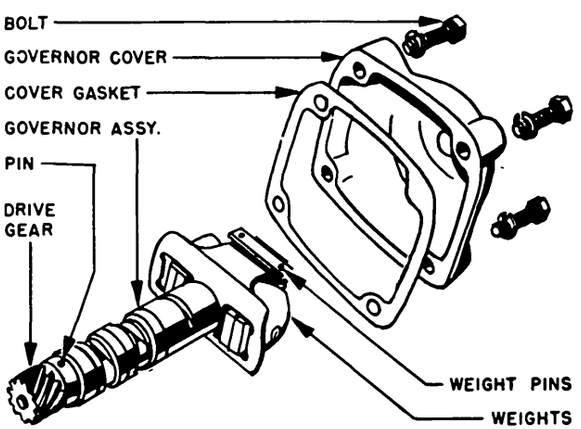
POWERGLIDE (C ntinu d)

the step in the lever. Back off one complete turn and lock in this position by tightening adjusting screw lock nut securely.

Governor: ***CAUTION—The only parts serviced for replacement are the governor assembly (complete), and driven gear. Governor should not require disassembly except for cleaning and removal of foreign material causing improper operation. See "Governor Driven Gear Replacement" below for disassembly & reassembly.***

Governor Driven Gear Replacement: A unit package containing a governor driven gear and pin, and two governor weight pins is available for service replacement. ***(CAUTION—The 1955 driven gear is not interchangeable with gears on previous models).*** Install new gear and pins in the following manner:

Installation—Cut off ends of governor weight pins and remove weights and governor valve. ***(NOTE***—Carefully protect governor valve to prevent damage. Weights are interchangeable from side to side). Drive out governor gear retainer split pin using a small punch. Support governor on 3/16" plates installed in exhaust slots of governor sleeve, place in arbor press and with a long punch, press gear out of sleeve. Carefully clean governor sleeve of chips and reinstall in arbor press. Position new gear in sleeve and with a suitable socket, press gear into sleeve until nearly seated. Then remove any chips that may have shaved off the gear hub and press gear in until it bottoms on shoulder. ***(CAUTION—It is important that a socket be used to prevent damage to thrust button on end of gear).*** Drill a new hole through sleeve and gear locating it 90° from existing hole, using a No. 24 (.152") drill. Install split pin retainer. Wash governor assembly thoroughly. Install governor valve and make sure that it operates freely. Install governor valve in bore of governor sleeve. Align governor weight pin holes in the governor thrust cap, governor weight assemblies and governor sleeve and install new pins. Crimp both pins to prevent them becoming dislodged. Check governor weight assemblies for free operation on pins.



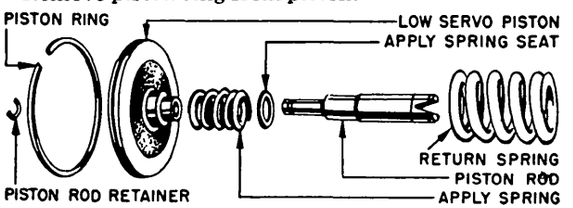
GOVERNOR ASSEMBLY

Low Servo Piston: Disassembly—Place piston assembly in bench press supporting notched end of shaft on wooden block, install tool J-3377 (same tool used for Reverse Servo) on top of piston, compress spring sufficiently to enable rod retainer "C" washer to be removed from end of rod, relieve spring pressure, remove piston, spring, and washer from piston rod. Remove piston ring from piston.

Inspection—Wash all parts in cleaning solvent, dry with air. Inspect all parts for wear or damage. Install piston ring in low piston bore and check ring gap with feeler gauge. Gap should be .005-.010".

Reassembly—Assemble all parts on piston rod, compress spring in bench press and install piston rod retainer making certain that it is properly seated in groove. ***CAUTION—Spring pressure is 150 lbs. and assembly must be handled carefully.***

Reverse Servo Piston: Disassembly—Place assembly in bench press with spring end up, install tool J-3377 on spring retainer, compress spring sufficiently to enable retainer key locks to be removed, relieve spring pressure, lift off retainer, springs, and piston. Remove piston ring from piston.



POWERGLIDE LOW SERVO ASSY.

Inspection—Wash all parts in cleaning solvent, dry with air. Inspect all parts for wear or damage. Install piston ring in reverse piston bore and check ring gap with feeler gauge. Gap should be .005-.010".

Reassembly—Assemble all parts on piston rod, compress spring in bench press and install retainer locks, make certain locks seated properly in rod groove.

Planet Carrier Assembly: ***Should not be disassembled unless inspection below indicates overhaul required. See Planet Carrier Overhaul below.***

►*PLANET REVERSE RING GEAR AND DRUM ASSEMBLY PRODUCTION CHANGE (to accommodate a new .020" steel thrust washer):* Beginning with transmission serial number C-128-D, a new steel thrust washer is used between planet carrier and reverse gear and drum to prevent galling of thrust surfaces. A service package, Part No. 3721564, consisting of a Planet Reverse Ring & Drum Assembly, Part No. 3720472, and an Output Shaft Thrust Washer, Part No. 3720474, is available for service replacement on 1953-54 & Early 1955 cars.

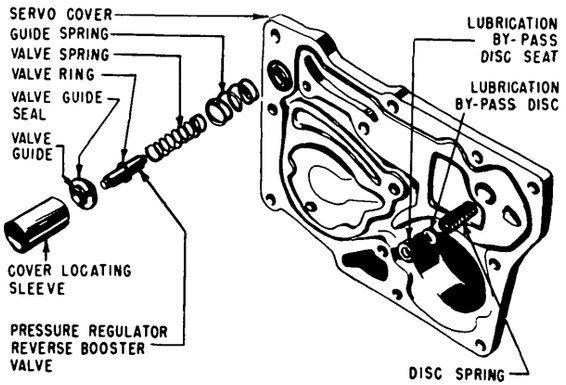
Inspection—Wash in cleaning solvent, blow out all passages, dry with air. Inspect all gear teeth for nicks, scoring, or other damage. Check end clearance of planetary pinions with feeler gauge inserted between ends of pinion and thrustwasher. This clearance should be .006-.030". Check reverse sun gear rear thrustwasher for wear or damage. Inspect drum bushing for wear, scoring, or damage; inspect outer diameter of drum for scoring or burning. Check output shaft bearing surfaces for wear, nicks, or scoring. Check input pilot bushing for wear or scoring.

Planet Carrier Overhaul: ***If inspection (above) indicates that parts require replacement, proceed as follows:***

Disassembly—Place assembly in holding fixture or clamp in a vise with front end upward. Mark each pinion shaft and also mark planet carrier (use prick punch or other means) so that shafts can be re-installed in same position ***(CAUTION***—pinion shafts are selective fit in carrier and location must not be changed). Then proceed as follows:

1) Remove pinion shaft lockplate screws, rotate plate counter-clockwise until it is free and remove the plate.

2) Starting with one short planet pinion, use a soft steel drift to drive on lower end of pinion shaft until shaft raised above the press-fit area of the output shaft flange, then insert tool J-4599 (one piece only —second piece of tool set used for reassembly) into short planet pinion from lower end and push shaft out until tool is centered in the pinion and shaft is removed. Remove short planet pinion from assembly. Remove tool from pinion, remove needle bearings and needle bearing spacer ***(CAUTION***—use care not to lose any of the needle bearings).



POWERGLIDE SERVO COVER ASSEMBLY

3) Remove **adjacent** long planet pinion (paired to the just-removed short pinion by using same thrustwashers) by repeating procedure in step (2) above. Then remove the pinion upper and lower thrustwashers.

4) Remove all remaining planet pinions **in pairs** (short pinion first, followed by long pinion) by following procedures in steps (2) and (3) above.

5) Remove reverse sun gear and sun gear thrustwasher.

Inspection—Wash all parts in cleaning solvent and dry with air. Inspect all pinion gears and reverse sun gear for nicked or otherwise damaged teeth, inspect all thrustwashers for wear, nicks, or scores. Inspect needle bearings for wear and replace **all** needle bearings if worn excessively.

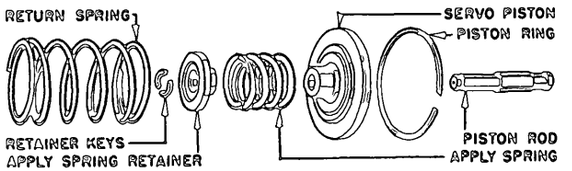
Reassembly—***CAUTION—Pinion shafts must be reinstalled in accordance with marks made before disassembly (shaft is selective fit in particular hole in carrier).*** Assemble and install parts as follows:

1) Install tool J-4599 in one long planet pinion, assemble needle bearing spacer and needle bearings in pinion (20 at each end) using cup grease to hold needle bearings in position.

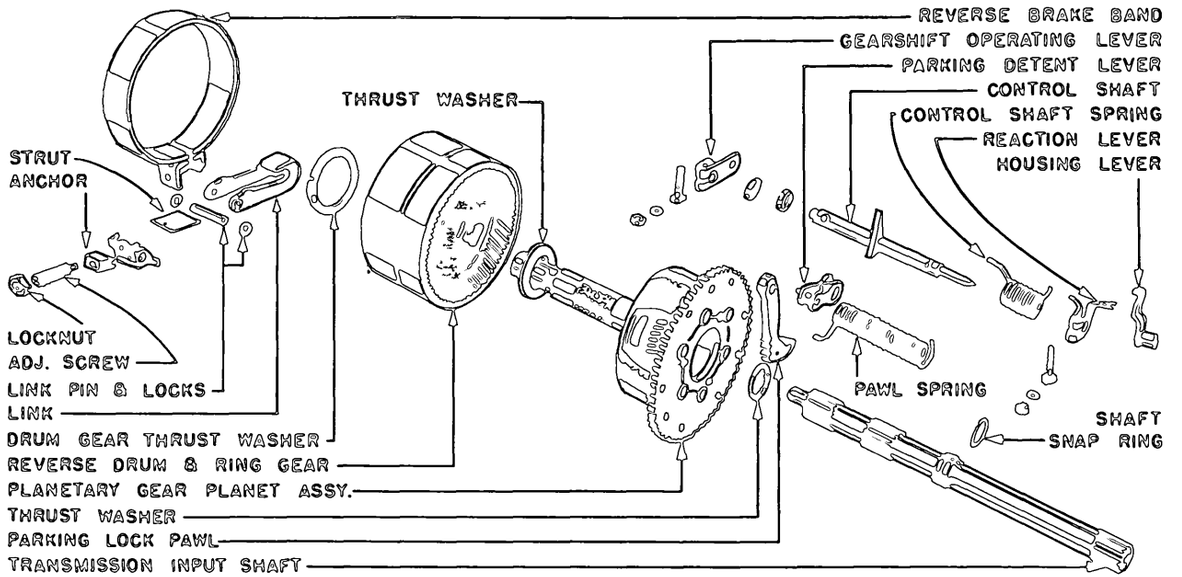
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POWERGLIDE (Continued)

2) Install pinion assembly in planet carrier with tool centered in assembly and with thrustwasher at each end of pinion. *NOTE*—Long pinions are located opposite closed portion of carrier, short pinions are located opposite carrier openings. Feed the second part of tool J-4599 in from the top of the planet carrier *(CAUTION*—make certain tool picks up thrustwasher) and push first part of tool down and out at the lower end *(CAUTION*—make certain this tool picks up thrustwasher as it is pushed down). Lubricate correct pinion shaft (see Reassembly Caution above) and install it from top pushing the assembling tools out ahead of it. Turn shaft so that slot in upper end faces toward center of assembly, tap shaft down with a brass or soft steel drift until lower end is flush with lower face of carrier.



POWERGLIDE REVERSE SERVO ASSY.



POWERGLIDE PLANET CARRIER, REVERSE BAND, & PARKING LOCK

3) Assemble and install adjacent short planet pinion (paired with just-installed long planet pinion by using same thrustwashers) by repeating procedure in steps (1) and (2) above.
4) Install reverse sun gear thrustwasher and reverse sun gear.
5) Install all remaining planet pinions in pairs (long pinion first, followed by short pinion) by following the procedure in steps (1), (2), (3) above.
6) Check end clearance of planet pinions using feeler gauge inserted between end of pinion and thrustwasher. This clearance should be .006-.030".
7) Install pinion shaft lock plate with extended portions in line with pinion shaft slots, rotate plate clockwise until plate locks all pinion shafts and attaching screw holes line up. Install lock plate attaching screws and tighten to 2½-3 ft.lbs.

Input Shaft: Inspect shaft splines for wear, nicks, or other damage. Check spline fit in clutch hub, reverse sun gear, and converter hub. Inspect oil seal ring for wear and free fit in groove, remove ring (compress one end, push other end outward to free locked ends) and install ring in valve body bore to make certain hooked ends have clearance, then reinstall ring on shaft. Check snap ring in groove at forward end of shaft (this ring first used in 1953 transmissions and prevents shaft floating forward), replace if worn or damaged using snap ring pliers KMO-410.

Transmission Case & Rear Bushing: Check case for cracks, inspect rear bushing for wear or damage and replace if necessary.

Bushing Replacement—Place transmission case in an arbor press with rear end up. Using a cape chisel, cut bushing and remove from bore in case. Install rear bearing in its bore in rear oil pump assembly and install rear oil pump in case to serve as a pilot when installing new bushing. Place transmission case in an arbor press with front end up. Place new bushing on bushing installer J-4276, with the square end of bushing against shoulder of installer. Insert in case, entering pilot of tool into rear bearing. and press bushing into place. Bushing is precision type and does not require reaming.

Low & Reverse Brake Bands: Inspect bands for wear, cracks, and scored or burnt lining. Lining is bonded to band. Inspect linkage for wear.

REASSEMBLY

AFTER ALL MAJOR UNITS REASSEMBLED (See Overhaul above), install units as directed below using ALL NEW GASKETS AND SEALS and tightening all parts evenly to SPECIFIED TORQUES.

CONVERTER HOUSING ASSEMBLY: *Install units:*

Valve Body: First install suction screen in oil sump *(CAUTION*—screen must be thoroughly cleaned), see that sealing ring is in place. Install two ¼—20 x 3½" guide pins (part of Pilot Stud Set J-3387) in two valve body attaching bolt holes, place new valve body gasket in position over guide pins, install valve body assembly. Install all attaching bolts *(CAUTION*—lower left bolt over accumulator bore is special self-locking type and must be installed in this position), tighten all bolts evenly in a criss-cross pattern to 7½-10 ft.lbs. torque. Check manual valve and pressure regulator valve for free operation after all bolts tightened.

Front Pump: Align holes in stator support with mounting holes in pump body, install two ¼—20 x 3½" guide pins (part of Pilot Stud Set J-3387) in pump mounting holes, use Driver J-4263-5 to install pump in converter housing *(CAUTION*—line up suction and oil delivery holes on left side of pump). Install five self-locking bolts through valve body and into pump, tighten all bolts evenly to 7½-10 ft.lbs. torque. *CAUTION—Check pressure regulator valve for free operation after bolts tightened and make certain that pump operates freely.*

Low-and-Drive Valve Body: Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in two valve body mounting bolt holes on left side of converter housing, place new gasket in position over guide pins, install valve body assembly. Install attaching bolts and lockwashers, tighten bolts evenly to 12½-15 ft.lbs. torque.

TRANSMISSION CASE ASSEMBLY: Install units:

Rear Pump: Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in pump attaching bolt holes, place new gasket in position over guide pins, install pump *(CAUTION*—align oil suction and delivery holes), tighten pump mounting bolts evenly to 12½-15 ft.lbs. torque.

Lubrication Pressure Relief Valve: Make certain that valve is clean and openings free from obstructions, see that valve disc and spring operate freely. Install relief valve in mounting hole in rear of transmission case and tighten securely.

Reverse Servo Piston, Band, & Drum: Compress piston ring with Ring Compressor J-3365, install servo piston in case with notch in shaft toward front of case. Install reverse brake band and strut assembly with thin end of band away from piston, thread adjusting screw in until it indexes with hole in anchor. Install bronze thrustwasher on reverse drum hub, install drum in case and into brake band. *DO NOT adjust band at this point.*

Planet Carrier Assembly: Rotate rear pump drive slot to top of pump. Fill drive pin hole in output shaft of planet carrier with cup grease and install drive pin. *(CAUTION—Make sure that drive pin does not fall out of shaft during assembly).* Install planet carrier assembly in drum positioning the arrow on face

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POWERGLIDE (C ntinu d)

of the external gear of planet carrier assembly at top center *(NOTE*—On late 1955 transmissions a steel thrust washer is used between planet carrier and reverse ring gear & drum *See "Planet Reverse Ring Gear and Drum Assembly Production Change" above).* Install rear bearing locating front snap ring in its groove in output shaft and install rear bearing using tool J-5814 *(NOTE*—Groove in outer diameter of rear bearing should be to rear of transmission) Install rear bearing retainer in groove in outer diameter of rear bearing and attach to rear oil pump with screws and lockwashers Tighten to 7-8½ lbs Install rear bearing rear locating snap ring in its groove in output shaft Using tool J-5814, install speedometer gear on output shaft Center raised ground surface of output shaft so that it will mesh properly with the speedometer driven gear Install new "O" ring seal on speedometer driven gear fitting Assemble driven gear in fitting and then install as an assembly in bore in extension Install retainer, attaching screw and lockwasher Tighten to 3½-5 ft lbs

Reverse Band Adjustment: Adjust band at this point *See BAND ADJUSTMENT.*

Transmission Endplay Check & Adjustment: After planet carrier assembly installed in case, the correct thickness of the low sun gear to-reverse sun gear thrustwasher must be determined for the correct transmission endplay of 007- 035" as follows

(1) Use Tool J-4260 to measure distance from face of transmission case flange to face of reverse sun gear in planetary unit (place tool bar against case flange, extend tool stem until it contacts gear face), **tighten thumbscrew to retain this tool setting.**
(2) Install bronze thrustwasher and clutch assembly temporarily on oil delivery sleeve
(3) Without disturbing tool setting obtained in step 1 (above), place 120" steel washer over tool pilot (short plug on tool bar), install tool over clutch assembly with tool pilot entered in low sun gear and tool stem against gasket on rear face of housing Use feeler gauge to measure clearance between face of low sun gear and steel washer on tool pilot If clearance not within 007- 035", repeat this procedure with 095" or 145" steel washer on tool pilot
(4) When correct clearance of 007- 035" secured in step 3 (above), note thickness of steel washer used on tool and **select bronze thrustwasher of same thickness** for installation on input shaft splines at final installation (below) Remove clutch assembly and thrustwasher from oil delivery tube

►**Thrustwasher Note**—This bronze thrustwasher furnished in three thicknesses as follows Part No 3694467— 095", No 3694468— 120", No 3694469— 145".

Parking Lock Mechanism: Install parking lock lever shaft assembly in case, install seal over end of parking lock lever shaft and into counterbore in case **with lip seal toward inside of case.** Install flat washer and parking lock lever on end of shaft, push lever on shaft for clearance of 000- 010" between lever and washer, tighten clampscrew to 8-12 ft lbs Install parking lock pawl over pawl support rod, install parking lock pawl spring, wind up pawl spring (tool J-3383) until spring catches on case

Input Shaft & Clutch Assembly: Install input shaft in clutch unit Install bronze thrustwasher **selected in "Transmission Endplay Check & Adjustment" (above)** on reverse sun gear splines of input shaft *(CAUTION*—flat side of washer must be toward reverse sun gear). Install assembly in case indexing input shaft pilot with pilot in output shaft and mesh low sun gear with short planetary pinions

Low Servo Piston & Band Assembly: Install release spring on servo piston rod, use Ring Compressor J 3365 to compress piston ring and install assembly in transmission case Install low brake band over the drum Install apply strut guide spring over piston rod, engage apply strut in piston rod slot and engage opposite end of strut in the band Engage anchor strut assembly in band groove and locate opposite end of anchor over the adjusting screw ***DO NOT adjust the band at this point.***

Governor: Install governor assembly in bore in transmission case *(CAUTION*—Governor must be allowed to rotate counter-clockwise as gear teeth mesh and care must be taken not to damage gear teeth) Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in governor cover mounting holes, place new gasket in position over guide pins, install governor cover, attaching bolts and lockwashers Tighten cover bolts evenly to 6½-8½ ft lbs torque

Extension Housing Position new 'O" ring seal on transmission extension Then carefully install extension on transmission case Install attaching capscrews and lockwashers and tighten to 12-15 ft lbs Install transmission extension oil seal using tool J-5154

TRANSMISSION & CONVERTER HOUSING ASSEMBLY:

1) Install manual valve in valve body and manual valve inner lever in converter housing. Index lever pin with pick-up slot in valve, set manual valve so that it protrudes 1 11/16 out from face of valve body This places valve in Reverse position

2) Install new valve body-to-transmission case gasket

►*CAUTION* Two different valve body-to-case gaskets are used with the early and late type valve bodies THESE GASKETS ARE NOT INTERCHANGEABLE *See "Control Valve & Gasket Production Change and Service Replacement Note" above for control valve identification and gasket differences*

3) Place transmission manual valve lever in top detent position *(NOTE*—this is Reverse position and will align reaction lever so that it will index with manual drive inner lever in converter housing).

4) Place clutch drum thrustwaher in position on oil delivery sleeve

5) Install two ⅜—16 x 3¾" guide pins (part of Pilot Stud Set J-3387) in two opposite converter housing mounting bolt holes, carefully bring transmission case and converter housing together making certain that reaction lever indexes properly with manual valve inner lever Install all case to-housing bolts and tighten evenly to 25-30 ft lbs. Install special self-locking bolt through front face of converter housing and tighten this bolt to 25-30 ft lbs

6) Install two 5/16—18 x 3" guide pins (part of Pilot Stud Set J-3387) in. two servo cover attaching bolt holes, place new gasket in position over guide pins Install pressure regulator valve and inner and outer valve springs (see Note below) through servo and into case, install reverse servo return spring. Install servo cover over guide pins *(CAUTION*—see that pressure regulator springs and reverse servo spring seat properly in pockets in cover), maintain pressure on cover while installing and tightening cover bolts tighten bolts evenly to 12½-15 ft lbs.

7) Adjust Low Servo Band *See Band Adjustment*
8) Install converter assembly in converter housing making certain that front pump drive lugs aligned with slots in converter pump hub Install converter holding tool J-5384 using one housing bolt to hold tool (tool will prevent converter falling out while being installed on engine)
9) Check and adjust position of throttle valve outer ever *See Throttle Linkage Adjustment*

INSTALLATION IN CAR

TRANSMISSION ASSEMBLY INSTALLATION: 1) Install assembly in handling fixture on hydraulic jack and roll into position under car Raise transmission until converter housing is in approximate alignment with flywheel housing
2) Remove converter assembly holding tool from converter housing Then carefully align "X" mark on converter cover with "X" mark on flywheel

►***CAUTION—After removing converter holding tool be careful that converter does not move forward causing disengagement of the pump hub drive slots from lugs of the front pump drive gear***

3) Install one 5/16 —24 guide pin in converter cover Rotate converter assembly until guide pin is in alignment with opening in flywheel housing Maneuver transmission assembly until converter housing-to-flywheel housing bolt holes are in alignment and the flywheel pilot enters flywheel
4) Install all but the uppermost three converter housing-to-flywheel housing attaching bolts Through the opening in flywheel housing, remove guide pin from converter cover and install three flywheel-to-converter bolts, rotating flywheel as necessary Tighten bolts to 25-30 ft lbs
5) Install filler tube and measuring dipstick Install flywheel inspection hole cover Install rear engine mountings (both sides) Remove engine support bar or cradle Disconnect hydraulic jack handling fixture from transmission and remove jack
6) On V8 cars, install starting motor On all models, connect oil cooler lines and engage them in retaining clip on right side cover Connect throttle valve control rod to throttle valve control outer lever and manual shift control rod (long rod) to bellcrank On V8 cars, install breather pipe in cylinder block
7) Engage internal splines of front yoke of front universal joint with external splines of transmission output shaft Then slide front universal joint and propeller shaft as an assembly forward enough to connect rear universal joint
8) Connect speedometer cable to transmission On V8 cars, connect exhaust pipe to exhaust crossover pipe On 6 Cyl cars, connect exhaust pipe to exhaust manifold Connect muffler to muffler support
9) Lower car to floor and install the three remaining upper converter housing-to-flywheel housing attaching bolts through opening in toe-pan Restore floor mat to its original position Install spark plugs on all models On V8 cars, connect battery ground strap and wires to starter solenoid
10) Fill transmission with Automatic Transmission Fluid Type A *See "Lubrication" above.*

1946-48 CHRYSLER HYDRAULICALLY OPERATED & DE SOTO TIP-TOE SHIFT

Chrysler 6, Model C38 (1946-47-48)
Chrysler 8, Models C39 & C40 (1946-47-48)
DeSoto, Model S11 (1946-47-48)

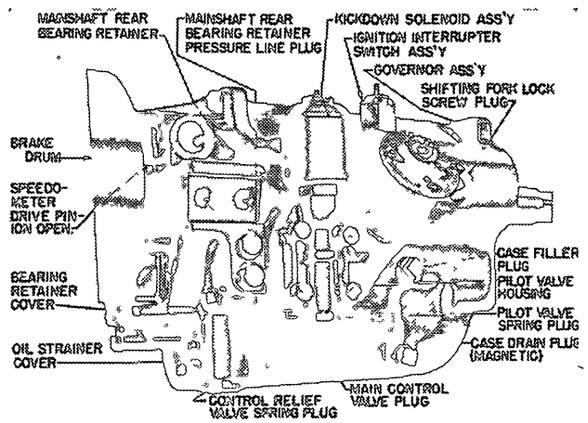
▷KICK-DOWN SWITCH CHANGE (For Improved Transmission Operation): *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equip. Section.*

DESCRIPTION: Own Make, semi-automatic, 4-speed transmission with hydraulic actuation and electrical (governor switch and throttle "kick-down" switch) control. Transmission has "Low Range" and "High Range" controlled by Shift Lever on steering column and two speeds within each range (First & Second in Low Range, Third and Fourth or Direct Speed in High Range) engaged automatically by the hydraulic shift mechanism. Automatic shifting is dependent on car speed and throttle position. Except for new automatic hydraulic shifting mechanism, transmission design is similar to the Vacamatic and Simplimatic "Underdrive" transmission used on previous Chrysler & DeSoto models.

Free-Wheel Control—Consists of a sleeve on the countergear cluster which is shifted forward by the movement of the Direct Speed clutch (Second and Fourth Speed position). Sleeve engages a lug on the free-wheel roller cage and rotates rollers to a disengaged position (cage is spring-loaded and returns to normal position when released). This action prevents roller engagement if the Direct Speed Clutch should happen to remain in the engaged (forward) position when the car is stopped.

Hydraulic Shift Mechanism: Consists of a spring-loaded hydraulically actuated piston mounted concentrically on the Direct Speed shift rail. This piston merely compresses the return spring and the engaging spring which perform the actual shifting operation (both springs compressed by initial movement of the piston, expansion of engaging spring moves Direct Speed Clutch forward for Second or Fourth, expansion of return spring moves clutch to rear for First or Third Speeds).

Control Units: Consist of hydraulic system units (Oil Pump, Pressure Regulator, Pilot Valve, and Main Valve), and electrical control units (Relay, Governor, Pilot Valve Solenoid, Ignition Interrupter Switch, Throttle Kick-down Switch).



1946-48 CHRYSLER, DE SOTO HYDRAULIC TRANSMISSION

Oil Pump—Pump is "Gerotor" type (same as engine oil pump) located under rear cover plate in transmission case and is driven from the mainshaft (operates whenever rear wheels are turning). Pressure should be 40 lbs. to approximately 60 lbs. at 15 MPH. (pressure drops when upshift starts).

Oil Pressure Regulator—In transmission case on right side. Set to maintain pump pressure at approx. 50 lbs. Regulator by-passes oil back to inlet side of pump when pressure exceeds this figure.

Pilot Valve Solenoid—Auto-Lite No. SSS-4002. Solenoid pushes pilot valve down when energized. Pilot valve should be in upper position with solenoid inactive or removed and should move freely.

Control Relay—Auto-Lite No. HRM-4102. Relay has two sets of contacts which open and close together (contacts closed when relay coil energized). Fuse on relay is 30 ampere capacity.

Governor Switch—Auto-Lite No. TG-4202R or TG-4203R. Governor contacts are closed (completing circuit to ground) with car at rest and are opened by action of the centrifugal weights at a car speed of 6-7 MPH (Low Range), 12-14 MPH (High Range).

Accelerator Pedal Kick-down Switch—Built in the carburetor. *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

OPERATION: Manual control (Shift Lever on steering column) operates in the usual manner by shifting the "Manual Clutch Sleeve" on the transmission mainshaft. The automatic (hydraulically operated) control operates as follows:

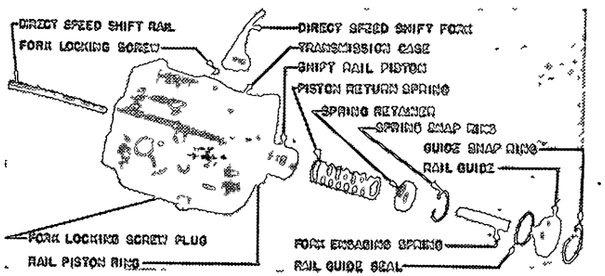
Automatic Upshift—Governor switch contacts open at car speed of 6-7 MPH. (Shift Lever in "Low Range"), 12-14 MPH. (Shift Lever in "High Range"), de-energizing the control relay and pilot valve solenoid. The pilot valve actuates the main valve which admits oil under pressure from transmission oil pump to the hydraulic cylinder causing the piston in the cylinder to move forward which compresses the return spring and the engaging spring on the shift rail. When the throttle is released momentarily, the engaging spring causes the Direct Speed Clutch to engage the higher gear (Second in "Low Range," Fourth in "High Range").

NOTE—Hydraulic piston actuates Interrupter Switch in moving forward but ignition is not interrupted because circuit is open at upper relay contacts (no interruption required for shifting since transmission "free-wheels" before shift occurs.

Automatic Downshift—When car speed drops to 6-7 MPH ("Low Range"), 12-14 MPH ("High Range"), governor switch contacts close, energizing control relay and pilot valve solenoid. The pilot valve causes the main valve to close, shutting off oil pressure (oil is by-passed into transmission case through pump pressure relief valve) and opening a passage to the case for oil drainage from the hydraulic cylinder. The return spring in the cylinder moves the piston backward and when the piston strikes the shoulder on the shift rail, the rail and Direct Speed Clutch are moved back into the lower gear position (First in "Low Range," Third in "High Range"). NOTE—During the initial movement of the piston, a shoulder on the piston causes the Interrupter Switch to close momentarily, grounding the ignition coil, and interrupting the ignition to relieve the engine torque and allow the shift to occur. Further movement of the piston opens the Interrupter Switch and restores the ignition.

Accelerator Pedal "Kick-down" Downshift—At car speeds under approximately 27 MPH (Low Range), 53 MPH (High Range), the transmission can be shifted down from Second to Low (Low Range), Fourth to Third (High Range) by fully depressing the accelerator pedal which causes the kick-down switch contacts on the carburetor to close and provides an alternative ground for the control relay circuit (governor switch contacts open) and energizes the relay. The downshift then occurs in exactly the same manner as for the Automatic Downshift (above). NOTE—The transmission can not be "kicked-down" at higher speeds since the kick-down contact plunger is held up out of engagement by manifold vacuum.

LUBRICATION: Check oil level in the transmission case every 1000 miles or 30 days, drain and refill with new oil every 10,000 miles or yearly. To check oil level, remove plug on right front side of case (to rear of lower transmission mounting bolt), maintain oil level even with bottom of filler plug hole. CAUTION—Clean magnetic plug (drain plug) and oil pump screen (under cover on lower left rear corner of transmission case) when transmission case drained. *Keep dirt out of transmission.*



DIRECT SPEED & KICKDOWN MECHANISM

Recommended Lubricant—Use only No. 10-W engine oil in this transmission. Capacity 3 pints.

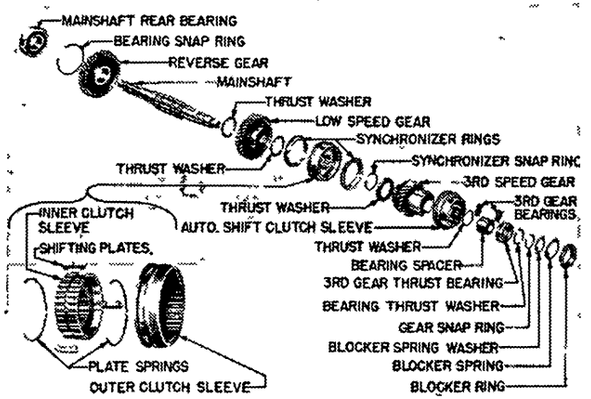
REMOVAL OF TRANSMISSION: *See "Transmission" on car model page.*

DISASSEMBLY OF TRANSMISSION: With transmission off car and Governor assembly and solenoid removed, lift out governor pinion (use long-nosed pliers), remove ignition interrupter switch. Make certain manual gear shift controls in Neutral (selector shaft and gear engagement shaft), remove gearshift housing assembly from left side of case. Move reverse idler gear and clutch gear sleeve back so as to lock mainshaft, remove mainshaft flange nut, brake drum and flange (tool C-452). Take out rear bearing retainer mounting screws, pull out retainer and mainshaft assembly as a unit. Remove main drive gear bearing retainer on front end of case, remove snap ring and withdraw direct speed rail guide (in recess to right of bearing retainer). Remove main control valve plug and gasket, withdraw valve and spring. Remove pilot valve and spring. Remove shifting fork lock screw plug, loosen shifting fork locking screw so that fork is loose on rail (use screwdriver with ¼" blade or tool C-738 inserted through plug hole). Push direct speed gear-

CONTINUED ON NEXT PAGE

1946-48 CHRYSLER HYDRAULICALLY OPERATED AND DE SOTO TIP-TOE SHIFT (Cont.)

shift rail out through rear of case, remove fork, clutch sleeve and engaging spring and direct speed blocker ring. Push countershaft out through rear of case with arbor, C-716, allowing countershaft gear assembly to drop down in case (arbor remains in gear cluster to retain bearing rollers). Remove main drive gear assembly (pack recess in gear with grease to retain mainshaft front bearing rollers). Lift countershaft gear assembly out of case (CAUTION—use care that free-wheeling gear does not fall off). Remove reverse idler shaft through rear of case (Puller C-604), lift idler gear out. Remove oil strainer cover and strainer from case. Use Tool C-714 to compress direct speed rail return spring, remove snap ring from case in front of spring, slowly release spring tension, remove tool, lift out spring



MAINSHAFT DISASSEMBLED

retainer, spring, piston, and piston ring through front of case. This completes transmission disassembly. Disassemble sub-assemblies as required.

REASSEMBLY OF TRANSMISSION: Note the following points when installing transmission parts and sub-assemblies:

Free-wheeling Gear Assembly on Countershaft Gear Cluster—Install control sleeve key and slide control sleeve on countershaft gear. Hook anchor ends of two free-wheeling cam roller retainer springs in holes in countershaft gear so that springs wrap around gear in clockwise direction from anchor end. Install free-wheeling cam roller retainer with lugs over spring anchors, rotate retainer clockwise until lugs are over slots in control sleeve, make certain that spring ends are snapped into grooves in retainer, then press retainer in until lugs fully engage slots in control sleeve. Install free-wheeling cam rollers and thrust washer, then place free-wheeling gear on countershaft gear and install the 45 bearing rollers.

Mainshaft Manual Shift Clutch (Synchronizer) Installation—Install on front of mainshaft with long portion of hub toward rear of shaft, use thickest snap ring which can be installed to retain the clutch (snap rings furnished .087" and .090" thick). Install shifter plate spring and three shifter plates, then install clutch sleeve with taper of sleeve toward front end of shaft.

Mainshaft Third-and-Direct Speed Gear Installation—Install rear thrust washer with recess side toward rear end of shaft. Assemble bearings in Third Speed Gear as follows: Insert thrust bearing race (one with larger hole) in gear with groove toward forward end of shaft, assemble one set of 36 bearing rollers in forward end of gear, insert bearing spacer, insert second set of 36 bearing rollers in rear end of gear, install needle bearing thrust washer. Install the gear and bearing assembly on mainshaft, install ball thrust bearing and thrust bearing washer, then install gear snap ring using thimble and driver (Tool C-717). Check gear endplay which should be .003-.008". Adjust by installing snap ring of correct thickness (furnished .087", .092", .097", .101" thick).

Main Drive Gear Installation—With main drive gear assembly installed in case, install the bearing retainer **without a gasket** and secure it in place with regular mounting capscrews. Check clearance between bearing retainer flange and front of case with a feeler gauge. Select a gasket of same thickness as feeler gauge clearance (or nearest oversize) and **install this gasket under the bearing retainer.**

Mainshaft Assembly Installation—Use aligning studs (C-730) in case to align mainshaft gear assembly. Mesh gear teeth of Third-and-Direct speed gear hub with center space of each set of teeth on direct speed clutch sleeve. CAUTION—Do not force mainshaft assembly into place. Shaft will enter easily if main drive gear is turned in both directions until lugs on direct speed clutch blocker ring index with slots in direct-and-third speed gear.

NOTE—When installing mainshaft rear bearing retainer screws, use rubber gasket on middle screw on left hand side.

Countershaft Gear Assembly—Make certain that ridge on free-wheeling control sleeve engages groove in direct speed clutch sleeve when raising countergear cluster in position, install bronze thrust washer next to gear and steel thrust washer next to case at each end of gear cluster, check endplay which should be .002-.008". Adjust by selecting bronze thrust washer of correct thickness for installation at rear end of gear cluster (furnished .087", .090", .093", .096" thick).

TESTING (ELECTRICAL CONTROL UNITS): First check oil level in transmission, remove right side of front floor mat and floor panel cover for access to transmission. Inspect wiring and tighten all connections, make certain that engine properly tuned up so that it idles smoothly at 450-475 RPM. Use test lamp and test leads to make following tests in order as given:

Control Relay: (1) Connect one test lamp lead to relay "BAT" terminal, other lead to ground, turn on ignition. Lamp should light. If not, check for open-circuit between ignition switch and relay. (2) With engine idling, connect test lamp between relay "SOL" terminal and ground. Lamp should light. If not, check for blown fuse, or poor fuse contacts. Then ground relay "TH" terminal. If lamp does not light relay is defective. (3) With test lamp connected between relay "SOL" terminal and ground, increase engine speed. Lamp should go out. If lamp remains on, relay contacts are not opening. Disconnect lead at relay "TH" terminal. If lamp does not go out, relay contacts are sticking. (4) With engine idling, ground relay "INT" terminal. Engine should stall. If not, ground "PRI" terminal. If this causes engine to stall, relay contacts are not operating properly If engine does not stall, check for open-circuit between "PRI" terminal and ignition coil.

Relay Specifications

Auto-Lite Model HRM-4102. Both sets of contacts open and close together but circuits are independent (each set of contacts insulated from other).

Winding Resistance—17.6-19.4 ohms (measured between terminals #1 and #2).

Closing Voltage—3.0-4.0 volts (adjust both sets of contacts to open and close simultaneously). Adjust by bending lower spring hanger.

Armature Sealing to Core—5.0 volts maximum. Adjust by bending lower spring hanger.

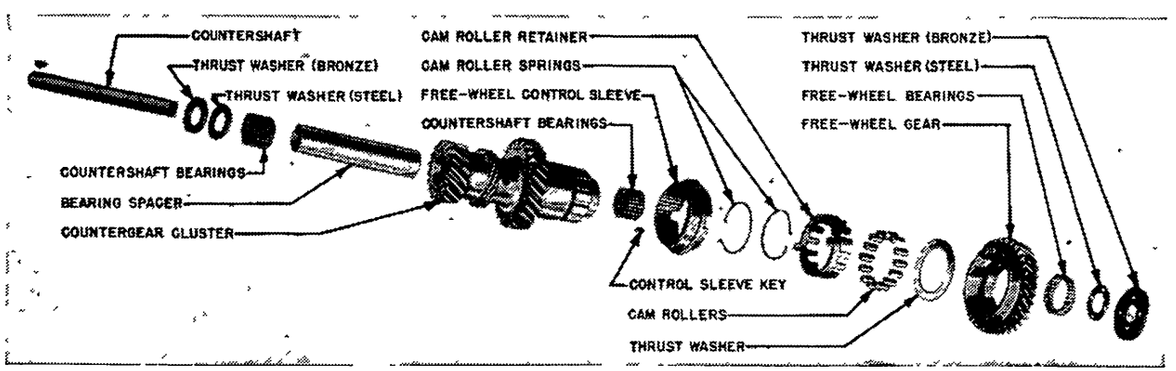
Opening Voltage—1.1-2.5 volts. Adjust by raising or lowering stationary contact.

Armature Air Gap—.031-.036". Adjust by bending armature stop.

Fuse Capacity—30 amperes.

Governor & Kick-down Switch: Connect test lamp between relay "SOL" terminal and ground. Idle en-

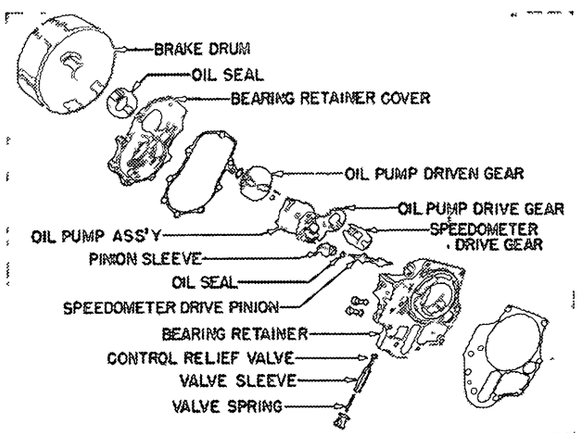
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C UNTERSHAFT GEAR ASSEMBLY

1946-48 CHRYSLER HYDRAULICALLY OPERATED AND DE SOTO TIP-TOE SHIFT (Cont.)

gine. Lamp should be lighted. If not, ground governor terminal. If lamp lights, governor contacts are sticking open and governor should be replaced or serviced. If lamp does not light, check for open-circuit between relay and governor. Increase engine speed. Lamp should go out. If lamp remains lighted, disconnect lead at kick-down switch on carburetor. If lamp is still lighted, governor contacts are not opening and governor should be replaced or serviced. If governor operation satisfactory with kick-down switch lead disconnected (lamp lighted at idle speed indicating governor contacts closed, lamp out at higher engine speed indicating governor contacts open), kick-down switch is defective and should be repaired or replaced. To check kick-down switch operation, with test lamp connected between relay "SOL" terminal and ground, increase engine speed to point where lamp goes out, depress kick-down switch plunger by hand. Lamp should light with switch plunger pressed in and should go out when plunger released.



MAINSHAFT REAR BEARING RETAINER

Governor Specifications

Auto-Lite Model TG-4202R or TG-4203R (Early 1946), TG-4204R (1946-48). Rotation clockwise viewed from the top (all models).

Contact Closing (on deceleration)—(TG-4202R and TG-4203R) 450-550 RPM., (TG-4204R) 385-450 RPM. Difference between Closing & Opening—40-150 RPM. (all models).

Endplay—.005-.010" (all models).

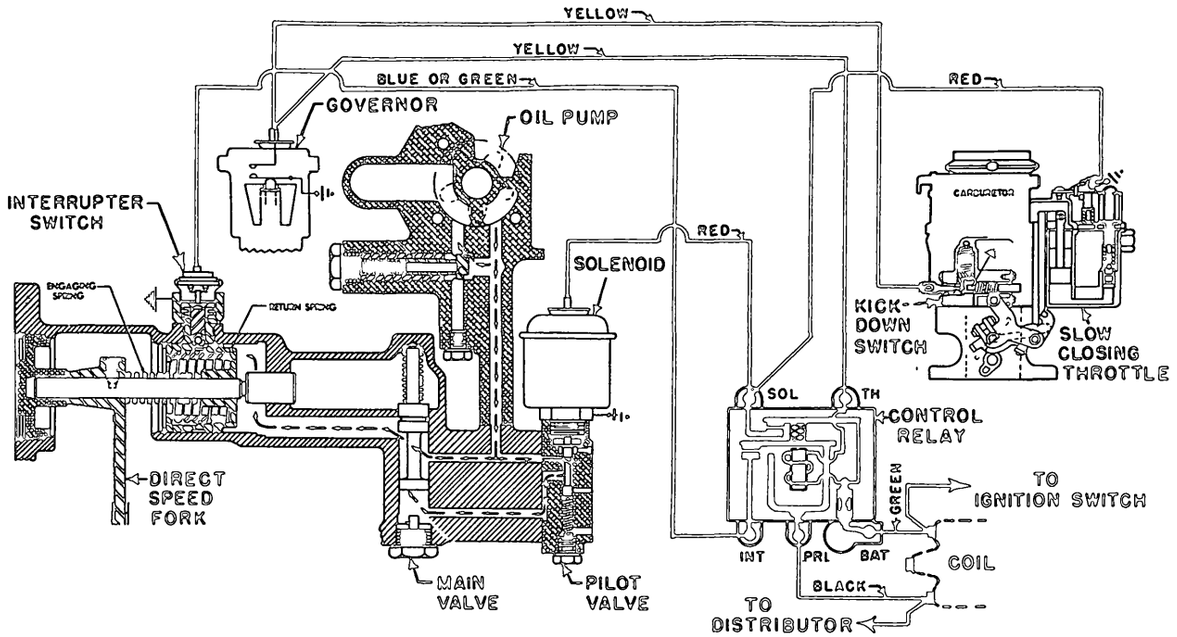
Kick-down Switch: *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

Slow-Closing Throttle: *Different type on Chrysler 8.*

Chrysler 6 & DeSoto—*See "Chrysler, DeSoto, Dodge Slow-Closing Throttle" in Carburetion Equipment Section.*

Chrysler 8—*See "Chrysler Eight Throttle Guard" in Carburetion Equipment Section.*

Transmission Valve Solenoid: With engine idling slowly, and with test lamp connected between solenoid terminal and ground, lamp should be lighted and distinct magnetic attraction noted at solenoid cap (test with small steel tools or other objects). If lamp not lighted, check for open-circuit in solenoid lead. If lamp lighted but no magnetic pull noted, solenoid coil is open and should be replaced. To check solenoid, remove solenoid, reconnect lead, turn ignition on, invert solenoid and ground it on transmission. Plunger should snap out. If not, replace solenoid.



1946-48 TRANSMISSION CONTROL UNIT WIRING DIAGRAM

Solenoid Specifications

Auto-Lite Model SSS-4002. Single winding type.

Winding Resistance—1.8-2.1 ohms measured between terminal and ground on base.

Plunger Position—At Rest—.632" maximum from mounting face to end of plunger rod. Energized—.778-.793" from mounting face to end of plunger rod. Load—Plunger force should be 6 lbs. minimum with 4 volts applied to coil at 77°F. Measure with plunger in "at rest" position.

Ignition Interrupter: Block rear wheels securely, run engine with transmission in third gear. Disconnect lead from "INT" terminal on relay. Connect test lamp between relay "BAT" terminal and interrupter switch terminal. Lamp should flash when engine speed increased. If lamp does not flash, replace interrupter switch. If lamp remains lighted more than momentarily, interrupter switch is sticking (would cause engine to stall).

TESTING (HYDRAULIC UNITS): Check transmission oil level and fill to filler plug hole level. Then test hydraulic system as follows:

Hydraulic Oil Pressure: Remove "Mainshaft Rear Bearing Retainer Pressure Line Plug" on right side of transmission (see illustration), connect test oil pressure gauge at this point. Block up rear wheels securely, run engine with transmission in high range. Oil pressure should be 40-60 lbs. at 15 MPH. If pressure less than 40 lbs., inspect and service oil pump, check oil pressure relief valve for sticking open, check for dirty or clogged oil pump screen and oil pressure leaks.

NOTE—Pressure will drop momentarily when transmission upshift occurs.

Automatic Shift Action: With rear wheels blocked up and engine running with transmission in gear, remove interrupter switch so that movement of hydraulic piston shift rail can be noted. Increase speed above 15 MPH. Piston should move forward and close off interrupter switch hole. If piston does not move forward, check hydraulic valves (see below). If piston moves forward but upshift does not occur, check hydraulic shift mechanism for binding. Stop engine and note if piston is in rear position (interrupter switch hole uncovered). If piston in rear position but transmission does not downshift, check for loose shift fork. If piston does not move to rear (hole remains covered), check for binding of shift rail, direct speed sleeve, or free-wheel control sleeve.

Hydraulic Valves: Check each valve as follows:

Pilot Valve—Remove solenoid assembly. Pilot valve should be up against upper stop and should work freely. If not, remove and clean valve and valve chamber.

Main Control Valve—Remove valve plug on right side of transmission (see illustration). Valve should work freely against spring tension. If not, remove and clean valve and valve chamber.

Control Relief Valve—Remove plug on right side of transmission (see illustration). Check valve for free movement. If valve is sticking or sluggish check for weak or broken spring, clean valve.

CHRYSLER PRESTOMATIC & FLUID-MATIC, DE SOTO TIP-TOE SHIFT, DODGE GYROMATIC

Chrysler 6, C45 (1949), C48 (1950), C51 (1951)
Chrysler 8, C46 & C47 (1949), C49 & C50 (1950)
Chrysler 8, Models C52, C53 C54, C55 (1951)
Chrysler 6, C51 (1952)
Chrysler 8, C52, C53, C54, C55 (1952)
Chrysler 6, C60-1, C60-2 (1953)
Chrysler 8, C56, C58, C59 (1953)
De Soto, Model S13 (1949), S14 (1950), S15 (1951)
DeSoto 6, S15 (1952)
DeSoto 8, S17 (1952)
DeSoto 6, S18 (1953)
DeSoto 8, S16 (1953)
Dodge, Model D30 (1949), D34 (1950), D42 (1951)
Dodge 6, D42 (1952)
Dodge 6, D46 (1953)
Dodge 8, D44, D48 (1953)

►CHANGES, CAUTIONS, CORRECTIONS

►**FLUID-TORQUE DRIVE**—*See "Chrysler Fluid-Torque Drive" article for complete data.*

►**PARTS INTERCHANGE CAUTION**—Drive pinion and free wheeling gears in transmissions with Fluid-Matic are different than gears used in transmissions with Torque-Converter. Also the cluster gear and third speed gear is different in transmissions used with Fluid-Matic. DO NOT INTERCHANGE THESE PARTS.

►**STARTING ENGINE BY PUSHING OR TOWING CAR:** Turn ignition on, place gearshift lever in Low Range, disengage clutch and do not engage clutch until car speed is approximately 10 MPH. At this speed, transmission will automatically shift into 2nd Speed and engine will be cranked.

►**KICK-DOWN SWITCH CHANGE (For Improved Transmission Operation):** *See "Chrysler, DeSoto, Dodge Kick-down Switch" in Electrical Equipment Section.*

►**MANUAL CLUTCH GEAR SYNCHRONIZER PRODUCTION CHANGE:** "Plate Type" Synchronizer used on first transmissions, superseded by "Pin Type" Synchronizer on later transmissions. See illustrations and disassembly data for each type. *NOTE*—Transmissions with Pin Type Synchronizer marked by four-leaf clover on model number pad on transmission case cover face.

►**INTERRUPTER SWITCH MOUNTING PRODUCTION CHANGE:** On later transmissions, interrupter switch relocated toward rear of transmission and operated by pin located in rear end of direct speed rail (first type operated directly by piston skirt).

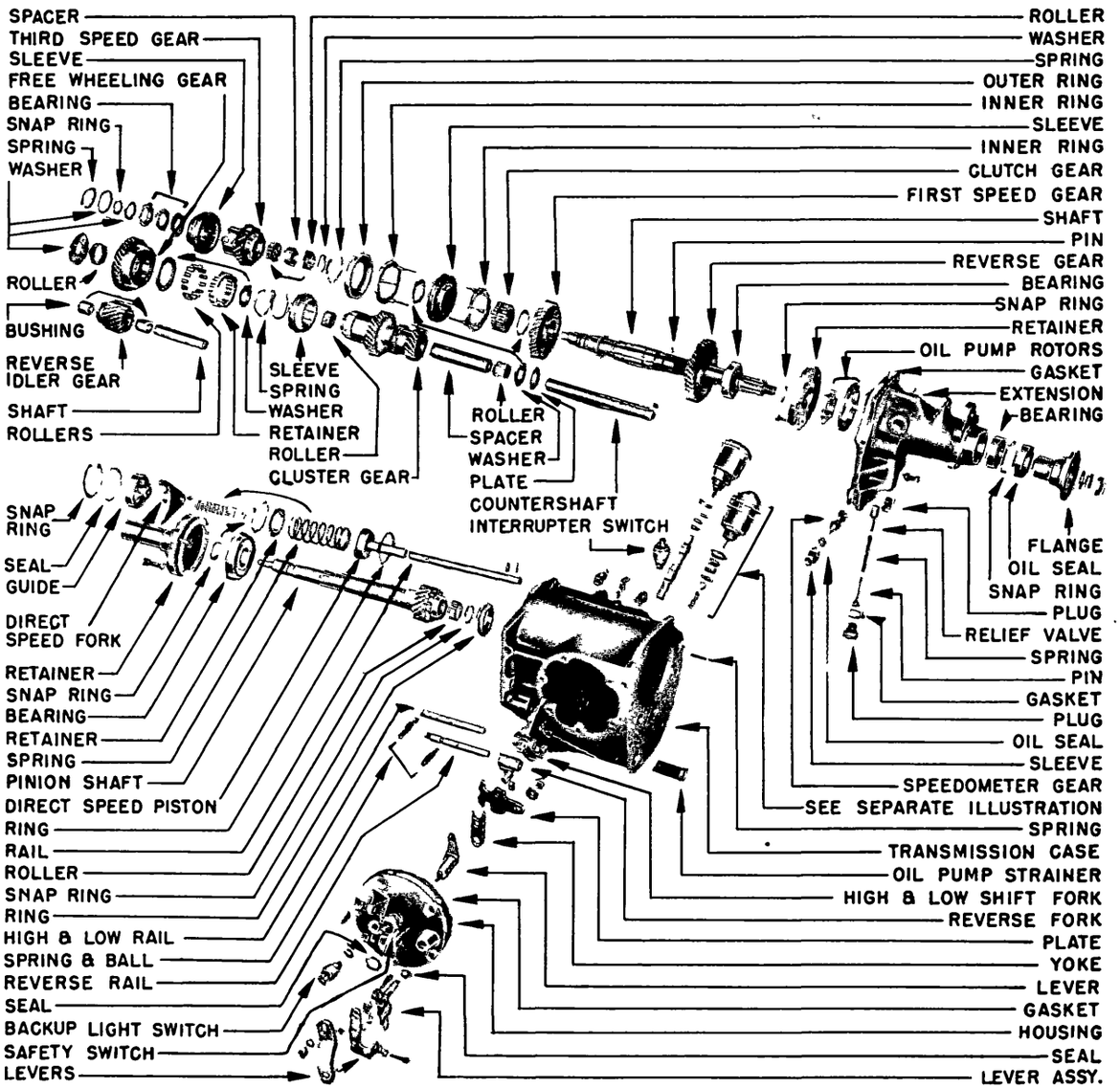
►*SWITCH TESTING CAUTION*—Manufacturer recommends that Interrupter Switch NOT BE REMOVED to check operation of hydraulic mechanism (new switch location may allow oil to spurt out over interior of car).

►*1952 PRODUCTION CHANGE (Direct Speed Clutch Sleeve Fork Engaging Spring)*—A new spring, Part No. 1530758 entered production to improve direct speed sleeve engagement. New spring can only be used on the later type transmissions having Ignition Interrupter Switch located near rear of transmission.

►*TRANSMISSION SELECTOR LEVER ADJUSTMENT (To correct difficult shifting): See "Transmission Selector Lever Adjustment" (below).*

DESCRIPTION

DESCRIPTION: Own make, semi-automatic, 4-speed transmission with hydraulic actuation and electrical control. Transmission is similar in design to transmissions used on corresponding previous models.



CHRYSLER, DESOTO, DODGE AUTOMATIC TRANSMISSION (WITH PIN TYPE SYNCHRONIZER)

LUBRICATION

LUBRICATION: Check oil level in transmission every 1,000 miles or 30 days, drain and refill every 10,000 miles or once a year, maintain oil level even with bottom of filler plug hole.

►*RECOMMENDED OIL CAUTION*—Lubricant installed at factory is special. Should it be ncessary to remove oil from transmission during first 10,000 miles of operation, the original oil should be saved, filtered and then used in the repaired or replacement assembly. Maintain proper level during the first 10,000 miles using SAE 10-W engine oil.

Recommended Oil—Use only SAE 10-W Engine Oil.
Capacity—3 pints (refill).

►*CAUTION—Add additional ½ pint (3½ pints total),*

C NTINUED ON NEXT PAGE

CHRYSLER PRESTOMATIC & FLUID-MATIC, DE SOTO TIP-TOE SHIFT, DODGE GYROMATIC (Cont.)

whenever transmission extension housing removed and drained (additional oil will work back into extension housing in service).

REMOVAL

See TRANSMISSION on individual car model pages.

TESTING

Ignition Switch to Circuit Breaker Check: Connect test light to coil side of circuit breaker, and the other wire of test light to ground. Turn ignition switch on. Test light should go on. If it does not, wires are faulty (loose or dirty). Correct as necessary.

Circuit Breaker Check: Connect test light to solenoid side of circuit breaker, and the other wire of test light to ground. Turn ignition switch on. Test light should go on. If it does not, circuit breaker connections are loose or dirty, or circuit breaker should be replaced. If circuit breaker is clicking, there is a short in the red solenoid wire or brown anti-stall wire. Determine cause and correct condition.

Circuit Breaker to Solenoid Check: Connect test light to red wire terminal of solenoid, and the other wire of test light to ground. Turn ignition switch on. Test light should go on. If it does not, the wire or corrections are faulty. Determine cause and correct.

Circuit Breaker to Anti-Stall Check: Connect test light to brown wire terminal of anti-stall control, and the other wire of test light to ground. Turn ignition switch on. Test light should go on. If it does not, the wire or connections are faulty. Determine cause and correct.

Anti-Stall Check: Turn igition switch on. Place a steel screw driver on the peened rivet head of coil which is located on top of anti-stall cover. A magnetic pull should be felt on screw driver (be sure screw driver has not been previously magnetized). If no magnetic pull felt, anti-stall control is at fault and should be replaced.

Solenoid Check: Hold a soft steel tool to solenoid body. Turn switch off and on. A definite magnetic pull should be left when ignition switch is on (be sure tool has not been previously magnetized). With ignition switch on, connect a test light across solenoid terminals. If no magnetic pull is felt, but light is on, the solenoid is at fault and should be replaced.

Governor & Kickdown Switch Check: Connect one wire of test light to governor terminal, and the other wire of test light to red wire terminal on solenoid. Turn ignition switch on. Test light should go on, indicating governor points are closed. If points are at fault, clean or replace them. Start engine and with transmission in neutral, accelerate engine speed to approximately 14 miles per hour. The test light should go out and then go on again when car speed is reduced to approximately 12 MPH., indicating governor is operating satisfactorily. If governor faulty remove and inspect. Clean points or replace parts as necessary. Accelerate car speed between 15 and 40 MPH., push in kickdown switch by hand. The test light should go on again, indicating kickdown switch operating satisfactorily.

Imterrupter Switch Check: With engine running, ground blue wire on the resistor or at interrupter switch. This should stall engine. If engine continues to run, either the blue wire from interrupter switch to resistor, or blue wire from resistor to coil is at fault.

▷*CAUTION—Do not remove interrupter switch with engine running. Oil may be forced out and damage car interior.*

Hydraulic Test: Make sure that transmission has correct amount and proper grade of lubricant.

1) Jack up car so rear wheels are off floor. Then raise floor mat and remove floor board access cover.

2) Remove transmission case shifting fork lock screw plug. Start engine and engage the shift lever in forward speed (low range). Using the eraser end of a pencil, insert it in the shifting fork lock screw plug hole so it is resting against shifting fork. Accelerate engine to approximately 6 to 8 MPH. The pencil being positioned as described above will move forward as the direct speed shift rail and fork move forward, this can be readily felt while holding the pencil. This movement indicates hydraulic pressure is correct, which is 38 to 40 psi. If fork and rail does not move forward between the specified speeds, piston is either stuck, worn, or pump is faulty.

▷*CAUTION—It is no longer recommended to remove interrupter switch to make the above hydraulic check. Oil forced out under pressure may damage car interior.*

Governor Specification

Auto-Lite No.	Model Year
TG-4205R	1949-50
TGG-4001	1951-53

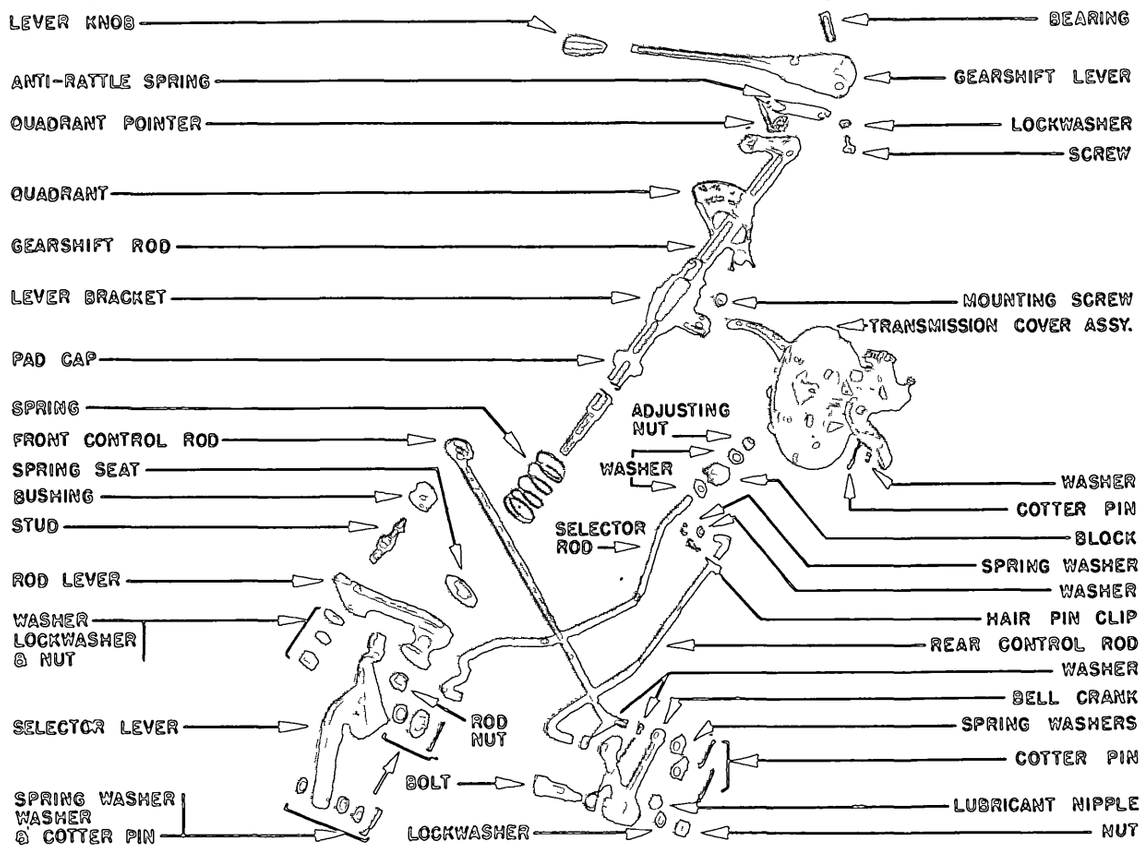
Contacts Open (On Acceleration)—575 RPM. max.
Contacts Close (On Deceleration)—390-455 RPM.
Range Between Opening & Closing—40-150 RPM.
Governor Endplay—.005-.010".

▷Replacement Governor Note—Cover and switch assembly furnished separately for replacement.

1952-53 TRANSMISSION CONTROL

▷*TRANSMISSION SELECTOR LEVER ADJUSTMENT (To Correct Difficult Shifting):* Disconnect selector rod from outer selector lever on transmission cover. Loosen the outer lever adjusting screw lock nut and back off adjusting screw as far as possible. Check tension of outer lever spring between inner and outer levers. Outer lever spring should have sufficent tension to hold outer lever firmly against inner lever. If tension not sufficent, replace spring. Reconnect selector rod to outer lever. Place transmission in high range position by moving gearshift control lever on housing to rear until gears are

CONTINUED ON NEXT PAGE



TYPICAL 1951-53 AUTOMATIC TRANSMISSION CONTROL

CHRYSLER PRESTOMATIC & FLUID-MATIC, DE SOTO TIP-TOE SHIFT, DODGE GYROMATIC (C nt.)

fully meshed. Thread outer selector lever adjusting screw inward until screw end just contacts inner selector lever pad. Lock adjusting screw with lock nut. ***(CAUTION—Do not turn adjusting screw inward beyond the point given above, or difficult shifting will result.)*** Hook both ends of outer lever spring over inner and outer selector levers in their respective positions. Check shifting operation, and if shifting is still difficult, see "Gearshift Lever Yoke" following.

►**Gearshift Lever Yoke Bushing Replacement**—If yoke or bushing is damaged, it will be indicated by a loose feeling at shift lever, and gear shifting may also be difficult.

1) Remove horn blowing ring and steering wheel. Remove transmission position indicator lamp housing by removing the two small crosshead screws. Remove snap ring retaining the turn signal housing to column jacket. Carefully work the turn signal housing upward until it is free of column jacket.

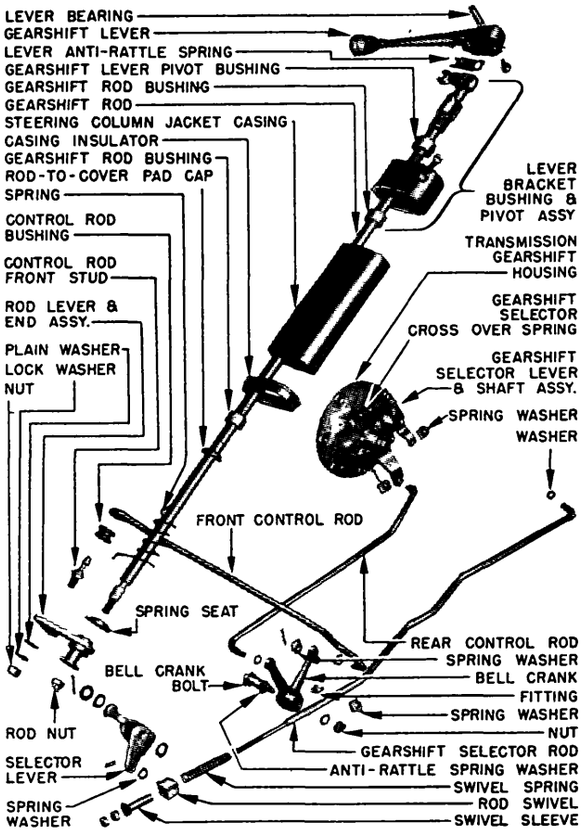
2) Remove the four crosshead screws retaining upper half of shifting yoke housing to jacket assembly and lift off upper half.

3) Very carefully remove the large diameter Oilite bushing from steering column tube. ***(CAUTION—Use care in removing bushing as it is easily broken.)*** Remove snap ring retaining shifting yoke and bushings in shifting tube.

4) Lift shifting tube upward and out of housing, using care not to drop bushings into tube, otherwise column jacket assembly must be disassembled to remove them.

5) Install new shifting yoke into position in housing with the lugged surface of yoke facing downward. Install the two Oilite bushings over shifting yoke pins with the flanged surface to the outside. Be sure bushings are properly positioned in shifting tube recess.

6) Install upper half of shift yoke retaining housing and tighten the four crosshead screws into position. Install bushing retaining snap ring with open ends away from shift yoke. After yoke bushing snap ring has been properly positioned, tap snap ring retaining lugs on tube downward slightly so ring will not become disengaged. Install turn signal housing and snap ring, steering wheel, and horn blowing ring. Install transmission position indicator lamp housing. Adjust transmission selector levers (above).



TYPICAL 1949-50 AUTOMATIC TRANSMISSION CONTROL

Gearshift Neutral Position Adjustment: Make certain transmission is in neutral position. Loosen remote control rod stud nut on shifting lever at base of steering column. Move gearshift lever until indicator pointer centers on "N" position on indicator dial. Retighten control rod stud nut securely.

►**Crossover Spring Installation (For Improved Operation of Selector Levers):** Crossover spring Part No. 1120874 can be installed to improve selector lever operation as follows. Hook large loop on end of spring over top of outer lever spring on transmission outer selector lever. If car does not have a torque converter, hook other end of spring through hole in lug on transmission cover. If equipped with torque converter, hook spring behind upper left hand cover attaching capscrew.

DISASSEMBLY

►*DISASSEMBLY CAUTION*—Before disassembling transmission, clean outside of transmission case thoroughly to prevent dirt and foreign material from entering case or getting on transmission parts.

DISASSEMBLY OF TRANSMISSION: With transmission off car and Governor, Solenoid, and Interrupter Switch removed, proceed as follows:

1) Make certain that governor drive pinion removed from case (can be lifted out with long-nosed pliers), remove speedometer drive gear and sleeve assembly.

2) Place gearshift control levers in neutral, remove gearshift housing assembly by taking out attaching capscrews.

3) If brake drum and propeller shaft flange not removed previously, lock mainshaft by moving the manual clutch gear sleeve and the reverse idler gear backward so that both gears are engaged, then remove nut, lockwasher, and plain washer from rear end of shaft, use Puller C-452 to remove propeller shaft flange and brake drum assembly.

4) Take out capscrews attaching extension housing on back of transmission case, remove extension housing and mainshaft as an assembly (Direct Speed Clutch will slide off Third & Direct Speed Gear and remain in case—note that sleeve and gear are paint-marked to insure correct reassembly), remove housing gasket.

5) Use Puller C-604 to remove reverse idler gear shaft through rear of case (CAUTION—do not lose shaft key), lift gear out.

6) Remove direct speed blocker ring from forward end of direct speed clutch sleeve. Remove snap ring in forward end of case retaining direct speed gearshift rail guide, remove guide and guide seal from case. Take out upper plug on right side of transmission case, insert a screwdriver in this hole and pry shifting fork backward just enough to allow direct speed clutch sleeve to be withdrawn through side opening in case.

7) Using screwdriver inserted through plug hole on right side of case, loosen locking screw in direct speed gearshift fork until the fork is forced forward by the engaging spring, then cock the fork on the shaft and pull the fork toward the rear of the case which will move the direct speed gearshift rail to the rear. Repeat this procedure (hold rail while moving fork forward for additional travel) until the rail is free, then remove rail, spring, and fork from the case using care not to lose interrupter switch operating pin (see Caution).

►***CAUTION—Later transmissions have loose fitting taper pin hole in rear end of direct speed gearshift rail for interrupter switch operation and this pin must not be lost when rail removed.***

8) Use Tool C-714 to compress direct speed piston spring (insert tool through gearshift rail hole from front of case), remove spring retaining snap ring (use long-nosed pliers inserted through guide hole in front of case), relieve spring tension, remove tool, withdraw spring retainer, spring, piston, and piston ring through front of case.

9) Drive countershaft out through rear of case using Arbor C-716 **leaving arbor within the countergear** cluster to retain the countergear bearing roller assemblies (CAUTION—do not lose woodruff key in rear end of shaft which locks shaft in case). This will allow countergear assembly to drop down in bottom of transmission case to allow main drive gear to be removed.

10) After countergear cluster lowered in case, take out attaching screws and remove drive gear bearing retainer and gasket on front end of transmission case. Use puller to remove drive gear and bearing assembly through front of case.

11) After drive gear removed, lift countergear cluster assembly up and remove from case using care not to lose thrustwashers (CAUTION—note location of bronze and steel washers to insure correct reinstallation), or disturb arbor within cluster which would allow bearing rollers to fall out.

12) Disassemble all sub-assemblies as follows:

Extension Housing & Mainshaft Disassembly: Remove speedometer drive pinion and sleeve assembly. Use Puller C-748 to remove oil seal from rear end of housing. Press mainshaft assembly out of housing (see below for mainshaft disassembly).

Extension Housing—Remove capscrews holding mainshaft bearing retainer in front face of housing, lift off bearing retainer and oil pump inner and outer rotors. Remove shuttle valve retainer plug (on bottom of housing), withdraw valve parts

CONTINUED N NEXT PAGE

CHRYSLER PRESTOMATIC & FLUIDMATIC, DESOTO TIP-TOE SHIFT, DODGE GYROMATIC (Cont.)

(guide spring, pin, and valve). Remove oil seal, take out rear bearing snap ring, drive rear bearing out through rear of housing.

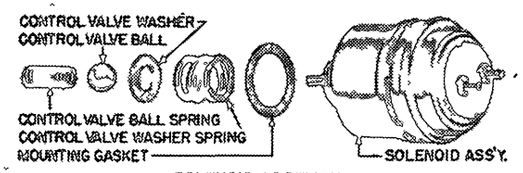
Mainshaft Disassembly: *CAUTION—Mainshaft with Plate Type Synchronizer serviced differently than later type with Pin Type Synchronizer:*

Mainshaft Disassembly (Plate Type Synchronizer Remove direct speed blocker spring and washer from forward end of shaft, remove snap ring, slide 3rd and direct speed gear off end of shaft (Caution —Use care not to lose bearing rollers, spacer, bearing front thrust washer, and needle bearing washer), remove rear thrust washer. Remove clutch gear synchronizer snap ring and front stop ring, remove clutch gear sleeve assembly as a unit, remove rear stop ring. Remove 1st speed gear front thrustwasher, slide gear off, remove rear thrustwasher. Remove oil pump drive pin from rear end of shaft, remove bearing snap ring from rear end of shaft, press bearing and reverse gear off rear end of shaft.

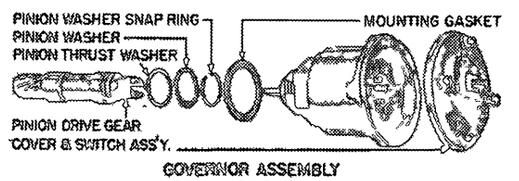
Mainshaft Disassembly (Pin Type Synchronizer): Remove 3rd and Direct speed gear blocker ring spreader spring, washer, snap ring, and the thrust bearing washer (CAUTION—this washer must be removed first or it will prevent removal of 3rd and direct speed gear). Use a clean pan to catch all parts when removing the 3rd and direct speed gear, remove the gear assembly (thrust bearing assembly, 72 bearing rollers, and bearing roller spacer). Remove the bearing roller steel thrustwasher and the thick direct speed rear thrustwasher. Remove outer synchronizer stop ring and front inner stop ring assembly (CAUTION—use care not to damage threads on either of the cone faces on this stop ring). Remove clutch gear sleeve and rear inner synchronizer stop ring (CAUTION—use care not to damage threads on either of the cone faces on this stop ring). Remove the clutch gear hub (may be tight enough to require a puller). Remove low and 2nd speed gear front thrustwasher, gear, and rear thrustwasher.

▷*CAUTION—Do not change relative position of these thrust washers. These washers are not identical and MUST BE REASSEMBLED IN THE SAME POSITION.*

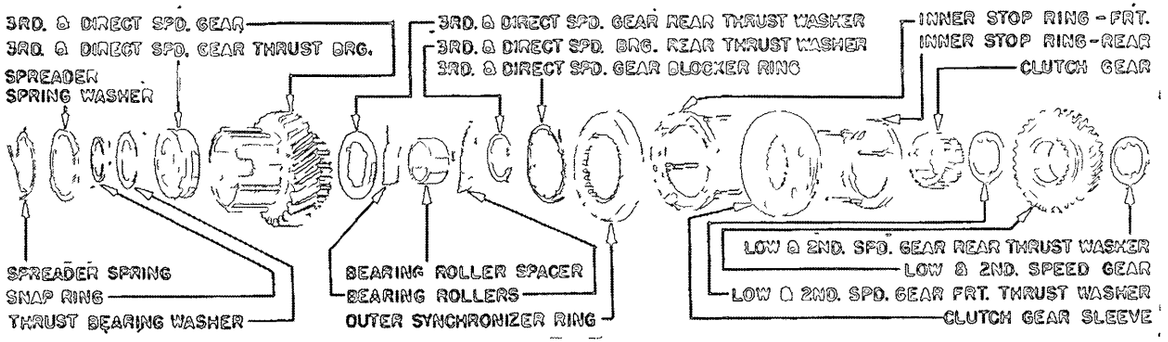
Countergear Cluster Disassembly: Stand the assembly on end with free-wheeling gear upward. Remove bronze thrust washer and steel bearing washer. Slide free-wheeling control sleeve up and remove



SOLENOID ASSEMBLY



SOLENOID & GOVERNOR ASSEMBLY



PIN TYPE MANUAL CLUTCH GEAR SYNCHRONIZER

gear. Remove cam roller thrust washer, gear bearing rollers and free-wheeling cam rollers, cam roller retainer, and retainer springs *(CAUTION—*Use care not to distort springs), free-wheeling control sleeve and key. If countergear bearing rollers being replaced, remove arbor from within gear cluster, remove front and rear bearing rollers and bearing spacer.

REASSEMBLY

Reassemble all sub-assemblies as directed below and install these in transmission case in reverse order of disassembly procedure given above.

Countershaft Free-wheeling Gear Assembly: Install the key and free-wheeling control sleeve on forward end of gear cluster, hook anchor ends of both springs in holes in gear cluster so that springs wrap around in right hand direction from anchor end. Place roller cage over gear with lugs over spring anchors, rotate cage clockwise until lugs are over slots in control sleeve, make certain that spring ends have snapped into grooves in cage. Slide control sleeve forward until cage lugs fully engage sleeve. Install free-wheeling rollers (use cup grease to hold rollers in position), install thrustwasher, slide free-wheeling gear on gear cluster, install gear bearing rollers (45 rollers), install steel thrustwasher and bronze thrustwasher (steel washer next to gear).

Countergear Cluster Bearing Assembly—If bearing rollers removed from gear cluster, assemble bearings as follows: Install special arbor in gear cluster and stand assembly on bench with free-wheeling gear upward. Install several bearing rollers to position bearing spacer, install spacer, then install set of 27 bearing rollers, bearing washer (steel), and thrustwasher (bronze) in that order. Invert assembly and install 27 bearing rollers in opposite end of cluster, install steel and bronze thrustwashers in that order. Assembly is then ready for installation in case.

Countergear Cluster Installation: Place the assembly in bottom of case making certain that steel and bronze thrustwashers in place at each end of assembly (steel washer next to gear, bronze washer next to case). After main drive gear has been installed, lift assembly up and insert countershaft from rear (pushing arbor out through front of case), make certain that thrustwashers in place and that countershaft locking key installed in slot in rear end of shaft. Check gear cluster endplay which should be .002-.008". Adjust by installing bronze thrustwashers of correct thickness (furnished .097", .102", .107", .112", .117" thick).

Main Drive Gear Installation: Install the main drive gear assembly in case, then install bearing retainer without any gasket, tighten retainer capscrews. Measure clearance between retainer flange and face of case with a feeler gauge, select a gasket of same thickness as measured clearance (or nearest oversize), remove retainer and re-install with this gasket under the flange, use rubber gasket on each retainer capscrews, tighten these screws to 10-15 ft. lbs.

▷*CAUTION—Rubber gaskets must be used on retainer capscrews and these screws securely tightened to prevent oil leaks at this point.*

Mainshaft Assembly: Install all parts on shaft in following order:

Reverse Gear & Rear Bearing—Install reverse gear on rear end of shaft, press bearing in place, select and install thickest snap ring which will fit groove in back of bearing (furnished .088", .091", .095", .097" thick). Install oil pump rotor drive pin.

Low & Second Speed Gear—Install parts on front end of shaft in following order: Rear Thrustwasher, Low & Second Speed Gear, Front Thrustwasher.

Manual Clutch Gear Synchronizer—*CAUTION—First "Plate Type" and later "Pin Type" synchronizers are installed differently as follows:*

Plate Type Synchronizer Assembly—Clutch gear, sleeve, shifting plates (3), and springs (2) are removed and installed as an assembly (see illustration for assembly of these parts). First install rear synchronizer stop ring, then slide synchronizer assembly on shaft, install snap ring, then install front synchronizer stop ring.

Pin Type Synchronizer Assembly—Install inner (rear) synchronizer stop ring. Index the grind mark on the clutch gear teeth with paint mark on clutch gear teeth *(CAUTION—*this alignment necessary to insure free sliding fit between these parts), install this assembly on shaft with extended portion of sleeve hub and shoulder side of gear facing forward, install inner (front) synchronizer stop ring with the pins extending through the second set of three holes

CONTINUED ON NEXT PAGE

CHRYSLER PRESTOMATIC & FLUID-MATIC, DE SOTO TIP-TOE SHIFT, DODGE GYROMATIC (C nt.)

in the clutch sleeve. Install outer synchronizer stop ring. *NOTE*—Outer synchronizer stop ring spreader spring (blocker ring) should be assembled on rear of 3rd and direct speed gear and installed with the gear.

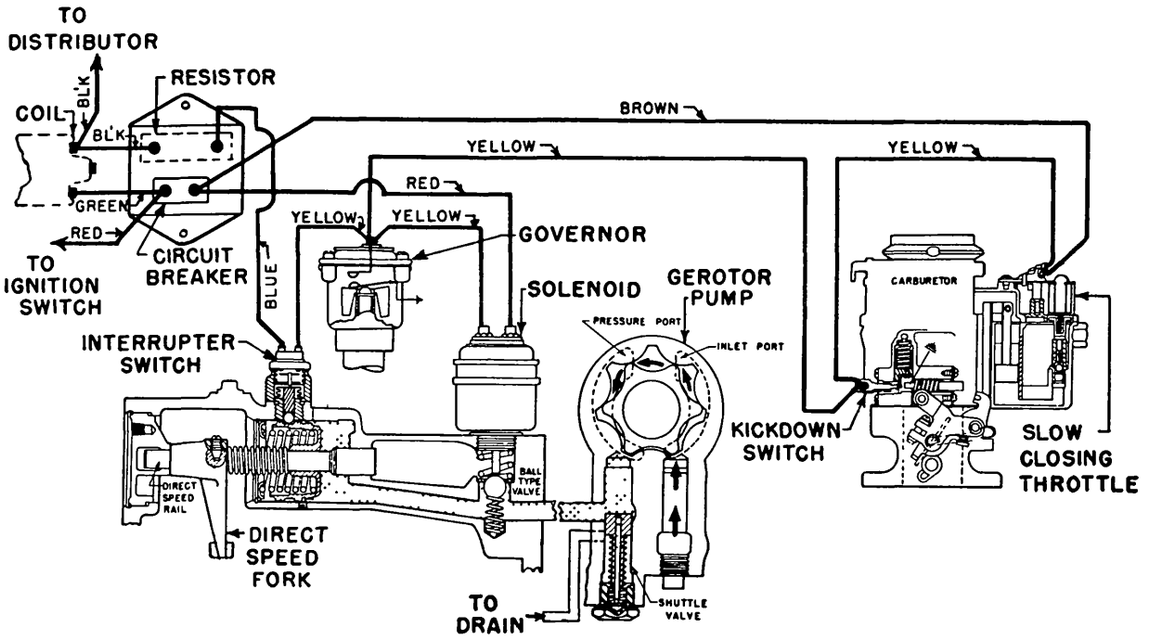
3rd & Direct Speed Gear Assembly—Install thick rear thrustwasher on shaft (recess side toward rear) and make certain that it is indexed with shaft splines. Assemble bearings in 3rd and direct speed gear as follows: Insert thrust bearing in forward end of 3rd and direct speed gear (end with largest hole first and grooved end toward front of gear), install one set of 36 bearing rollers (use cup grease to hold rollers in place), bearing spacer, second set of 36 bearing rollers, and bearing roller thrustwasher. Install this gear assembly on shaft (CAUTION—If Pin Type synchronizer used, make certain that synchronizer outer stop ring spreader spring is in place on rear end of 3rd and direct speed gear when gear installed). Install thrust bearing washer. Use thimble, Tool C-717, to install snap ring in shaft groove ahead of 3rd and direct speed gear (drive it into position with driver portion of tool and soft mallet). Check gear endplay (see Endplay note below) and adjust by selecting snap ring of correct thickness. On later transmissions with Pin Type synchronizer, install spreader spring washer and spreader spring on shaft using cup grease to hold these parts in place (*CAUTION*—these parts must not be allowed to drop down into case when installing mainshaft assembly). *NOTE*—On early transmissions with Plate Type synchronizer, blocker ring, blocker spring, and blocker spring washer are installed in direct speed clutch sleeve.

3rd.-&-Direct Speed Gear Endplay—Check clearance between bearing thrust washer and snap ring with a feeler gauge. If not within .003-.008", select snap ring of correct thickness to give this endplay. This snap ring furnished in thicknesses of .083", .088", .093", .098", .102".

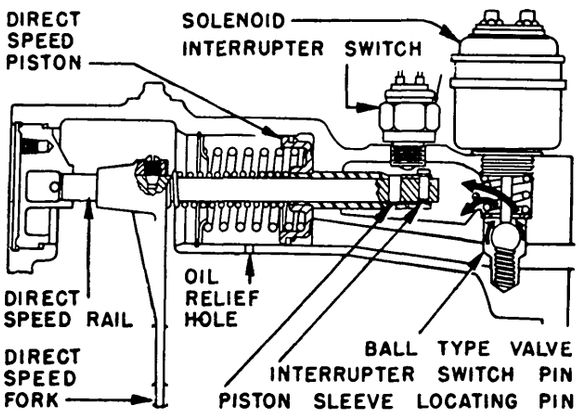
Extension Housing Assembly: Make certain that small hole in top of shuttle valve is open, install shuttle valve assembly (valve, spring, guide pin), then install and tighten valve retainer plug and gasket. Install oil pump inner and outer rotors, mainshaft bearing retainer, extension housing bearing, and bearing snap ring. Use Driver C-850 to install oil seal in rear end of housing (leave 3/32" of seal protruding beyond rear machined face of housing). Install mainshaft assembly in extension housing (CAUTION—line up pump drive pin in shaft with slot in oil pump inner rotor before inserting shaft in housing), pressing the shaft bearing in the bearing retainer in the housing.

Propeller Shaft Flange Nut Note—When installing flange and brake drum assembly, tighten flange nut to 95-105 ft. lbs. torque.

Mainshaft & Extension Housing Installation: See that free-wheel control sleeve is back toward rear of case and engaged in groove of direct speed clutch sleeve. On first transmissions with Plate Type synchronizer, place blocker ring in direct speed clutch sleeve with large end of taper forward and anchor lugs back, install blocker spring and blocker spring washer (coat lightly with grease to hold in place). Insert mainshaft assembly through rear of case, align paint marks on clutch sleeve and gear (see Note below), and index teeth on gear hub with center tooth in sleeve. See that lugs on blocker ring are aligned with slots in gear hub. Tighten capscrews to 30-35 ft. lbs. torque.



TRANSMISSION CONTROL UNIT WIRING DIAGRAM (FIRST TYPE INTERRUPTER SWITCH)



CONTROL UNIT WITH LATER TYPE INTERRUPTER SWITCH

►*CAUTION—Do not force extension housing against transmission case, as blocker ring might become damaged. If housing does not move freely into position, the blocker ring is not indexed in 3rd speed gear slots. This ring should be properly indexed before housing is installed.*

►**Direct Speed Clutch Sleeve & Gear Marks—These marks are made in production after selective matching for approximately .005" min. backlash.**

NOTE—If new parts being installed, match parts for correct backlash and mark them to insure correct installation.

Direct Speed Gearshift Rail Installation: On early transmissions with Interrupter Switch mounted above hydraulic piston, install direct speed rail with offset screwdriver slot (in rear end of rail) horizontal and smallest shoulder toward side of case (this will position the setscrew hole for the gearshift fork properly in line with hole in case). On later transmissions with Interrupter Switch mounted to rear of hydraulic piston, make certain that loose taper pin in hole in rear end of shaft is in place and that pin points upward toward switch.

Gearshift Housing Installation: Before installing this assembly, position manual clutch gear sleeve in neutral and move reverse idler gear to fully disengaged position (*CAUTION*—shifting forks in housing assembly will not enter grooves properly unless parts positioned as above).

INSTALLATION

Install transmission assembly in car by reversing the removal instructions (see data on individual car model pages). Tighten transmission-to-clutch housing nuts and bolts to 45-50 ft. lbs. See control unit wiring diagram and individual car wiring diagrams for control unit wiring connections.

FLUID TORQUE DRIVE (COMBINED OIL SYSTEM)

Chrysler 6, C51 (1952) Optl.
Chrysler 6, C60 (1953) Optl.
DeSoto V8, S17 (1952) Optl.
DeSoto V8, S16 (1953) Optl.
Dodge D44, D48 (1953) Optl.
Plymouth, P24 (1953) Optl.

▷*IDENTIFICATION NOTE—This type Fluid-Torque Drive can be readily identified by absence of oil reservoir under clutch housing (plain lower pan used) and lack of oil cooler (at front of engine).*

DESCRIPTION: This Fluid Torque Drive (Torque Converter) consists of four basic elements—an impeller, turbine and two stators, which provide a maximum torque multiplication of 2.5-1 (Plymouth 2.6-1) starting torque to 1-1 driving torque. The oil system of the converter is COMBINED with that of the engine (see below). This method of circulating engine oil through the converter provides an adequate oil supply and efficient cooling without a separate oil pump and cooling system. On Plymouth cars the converter is used with a synchro-mesh transmission. On the others a modified hydraulically operated transmission is used.

Oiling System—Engine oil at normal pressure is fed through an opening in the engine main oil gallery at the rear of the block into the converter housing oil inlet passage and is routed through the reaction shaft and into the converter. Pressure is maintained at approximately 20 lbs. by a ball type regulator valve in the turbine shaft (excess oil flows through return passage in housing to an opening in the block through which it flows into the crankcase oil pan). Regulator valve also acts as a check valve to prevent oil in converter draining back into the crankcase when the engine is not running. *See LUBRICATION data below.*

OPERATION: *Similar to Fluid Torque Drive with SEPARATE oil system. See "Chrysler Fluid Torque Drive (Separate Oil System)" following.*

LUBRICATION: Check engine oil level in regular manner. Drain and refill twice a year or more often if required by seasonal temperatures (see Recommended Oil below).

▷*OIL FILTER CHANGE CAUTION*—Filter element should be changed at least every 5000 miles (or more often if required by operating conditions).

Capacity—(Plymouth) 10 qts. (Others) 12 qts. Add 1 additional quart if filter changed.

Recommended Oil—Use SAE grades of oil as follows:
Not Lower than +32°F.—SAE No. 30.
As Low as +10°F.—SAE No. 20-W.
As Low as —10°F.—SAE No. 10-W.
Below—10°F.—SAE No. 5-W.

Draining & Refilling—Drain crankcase by removing oil pan drain plug, drain torque converter by removing drain plug in converter housing (accessible through inspection hole in bottom of torque converter housing after removing inspection hole cover plate). Tighten both drain plugs and replace inspection hole cover plate. Install proper amount of oil through crankcase filler pipe. Run engine at moderate speed for approximately 5 minutes and check for oil leaks *(CAUTION*—Oil pressure should be higher than 20 lbs.). After 5 minutes run, stop engine, check oil level, add oil as required to bring level up to "Full" mark on indicator.

REMOVAL: Disconnect battery cable, then remove floor board solenoid cover, disconnect ignition interrupter, governor, solenoid lead wires, and safety or back up light switch (if so equipped). Raise car off floor and support it securely. Then proceed as follows:

1) Drain oil from engine crankcase and converter. See Draining data under LUBRICATION. *CAUTION—Oil in converter will be very hot if unit has been in operation.*

2) Remove transmission. *See Transmission Removal on individual car model pages.*

3) Remove clutch housing-to-exhaust pipe bracket bolt and shift bracket away from clutch housing. Disconnect and remove clutch fork pull-back spring and clutch fork rod assembly, *push pedal in until over-center spring holds pedal against floor board* (will prevent accidental movement of pedal during removal operation). Remove pivot bracket assembly and clutch release torque shaft. Remove release bearing but do not remove clutch fork *(CAUTION*—to avoid spreading the release bearing pull-back springs, pivot release bearing away from clutch fork enough to slide bearing off fork prongs—spreading of spring will cause lost motion between fork and bearing when unit reassembled).

4) Remove starter (turn wheels to extreme right for clearance).

5) Install engine support fixture Tool C-3162 to support rear end of engine (or use jack under engine with wood block approximately 12" square between jack and oil pan to prevent damage to pan).

6) Take out rear engine-to-cross-member support bolts, remove cross-member.

7) Lower engine approximately 3" for access to clutch housing upper attaching bolts.
CAUTION—DO NOT lower engine more than 3" to avoid damage to radiator hoses and other engine attachments.

8) Take out clutch housing-to-torque converter housing attaching bolts and remove clutch housing. *CAUTION—Do not use tools to pry or pound between clutch housing and converter housing flanges.*

9) Mark clutch cover and clutch driving plate to insure re-installation in same position, remove clutch assembly and driven member. *NOTE*—This will prevent getting oil or grease on clutch facings.

10) Take out converter housing-to-housing adapter bolts, remove complete assembly by pulling it straight back and away from converter unit *(CAUTION*—use extreme care not to damage flange surface of housing, torque converter impeller hub oil seal, or turbine shaft oil seal ring). Note "0" ring oil seals and sleeves in passages between the converter housing and engine adapter plate.

▷*CAUTION—Use care not to damage seal aligning sleeves in oil inlet and outlet passages in converter housing.*

11) Remove converter assembly from crankshaft by taking out attaching bolts in crankshaft flange.

12) Remove housing adapter plate from engine (three bolts on rear of plate, one bolt on front). Note "0" ring oil seals at oil inlet and oil return passages in engine block and in adapter plate. *NOTE*—Not necessary to remove adapter plate unless an oil leak is present between plate and cylinder block, or, the block is being changed.

DISASSEMBLY: *CAUTION—Crankshaft flange run-out and converter hub run-out must be checked whenever converter unit removed. See Installation data below.*

1) Take out capscrews in converter impeller hub oil seal retainer in converter housing, remove retainer and gasket.

2) Remove reaction shaft from converter housing by screwing two capscrews into threaded holes in shaft flange *(CAUTION*—pull shaft out evenly to prevent it binding in housing), remove gasket from beneath shaft flange and housing.

3) Remove snap ring from turbine shaft using pliers C-484, remove turbine shaft from bearing and housing using puller tool C-3182 *(CAUTION*—tighten side puller screws in housing thoroughly to prevent damaging threads).

4) Remove turbine shaft bearing from housing using tool C-3184 (insert puller body through inner diameter of bearing, then place cupped part of puller over outside of bearing and tighten puller nut to remove bearing).

5) Drive turbine shaft seal out of housing using a blunt drift *(CAUTION*—use care not to damage housing).

6) Remove turbine shaft-to-clutch drive plate capscrews and separate these parts. *NOTE*—This operation not necessary unless either part being replaced.

7) Take out regulator valve spring plug from clutch drive plate end of turbine shaft by screwing ¼" threaded part of tool C-3179 into plug and then installing puller cup and nut and tightening nut to remove plug from shaft. Remove regulator valve spring and ball from shaft.

INSPECTION: Inspect all parts for wear or damage. See that regulator ball in good condition and that valve seat smooth and free from nicks. Inspect spring for distortion and collapsed coils. Clean valve passage in shaft thoroughly. Thoroughly clean out all oil passages in converter housing, turbine shaft, and reaction shaft. Inspect oil seal rings on turbine shaft and reaction shaft and replace if worn or damaged (compare rings with new rings). Inspect mating surfaces of converter housing and adapter plate for nicks, burrs, or other damage which would prevent proper sealing at "0" rings.

OVERHAUL: *NOTE—except for items listed below, overhaul will be limited to replacement of worn or damaged parts when unit reassembled.*

▷*TORQUE CONVERTER UNIT REPAIR NOTE—Torque converter unit is sealed and no repair operations are required. Replace complete converter unit if repairs indicated.*

Starter Ring Gear Replacement (on Converter Drive Plate): With converter assembly removed from crankshaft, proceed as follows:

Removing Old Ring Gear—Remove staking lugs retaining ring gear on drive plate using a file. Use blunt chisel or drift to tap ring gear off drive plate. Use a file to remove all burrs and raised spots left on ring gear contact surface of drive plate.

Installing New Ring Gear—Heat new ring gear (see Heating Note below), place gear over flange surface of drive plate making certain that rear face

CONTINUED ON NEXT PAGE

FLUID TORQUE DRIVE (COMBINED OIL SYSTEM) (Continued)

of gear contacts drive plate flange evenly around entire circumference. Weld gear to drive plate spacing welds evenly and using approximately same amount of metal at each weld.

►**Ring Gear Heating Note**—Ring gear can be heated by any of the following methods: 1) Use C-794 Oven, setting temperature at 150°F. and allowing gear to remain in oven for 15-20 minutes, 2) Place ring gear in shallow container of water, allow it to remain in water for 8 minutes after water comes to a boil, 3) If steam used, direct steam flow around gear for approximately 2 minutes, 4) If direct flame used, direct slow flame around outer rim of gear using care to direct flame away from gear teeth, check heat with few drops of water on face of gear, gear should be hot enough when water boils.

Transmission Drive Pinion Pilot Bushing Replacement: Remove old bushing from turbine shaft by threading puller tool C-3185 into bushing. Clean all metal cuttings from shaft after removing bushing. Install new bushing with tool C-3181 as follows: Install spacer washer SP-1615 over drift, then slip new bushing over ground end of tool, use tool as a driver to install bushing in shaft *(CAUTION*—spacer washer is required to position bushing to proper depth). Install outer sleeve and nut on driver part of tool, tighten nut to withdraw tool which will BURNISH bushing to proper size.

REASSEMBLY: *CAUTION—Use NEW shaft seals, "O" ring oil seals, gaskets, and snap rings when reassembling the unit.*

1) Install regulator valve ball and spring in turbine shaft, install NEW regulator valve plug using tool C-3178 to drive plug into shaft recess until tool bottoms on shaft.

2) Install turbine shaft on clutch drive plate (if these parts separated during disassembly).

3) Install turbine shaft bearing in converter housing using tool C-3186 to drive bearing in until it is seated in housing (insert guide portion of tool from rear of housing, place bearing in housing recess and insert driving tool). Install NEW turbine shaft seal in housing using tool C-3187.

4) Install converter housing and bearing assembly on turbine shaft using tool C-3183 to seat bearing on shaft *(CAUTION*—use care not to damage turbine shaft seal rings when installing tool). Install NEW turbine shaft snap ring using thickest ring possible to obtain zero backlash. *NOTE*—This snap ring is selective fit and furnished .086-.088", .089-.091", .092-.094", .095-.097".

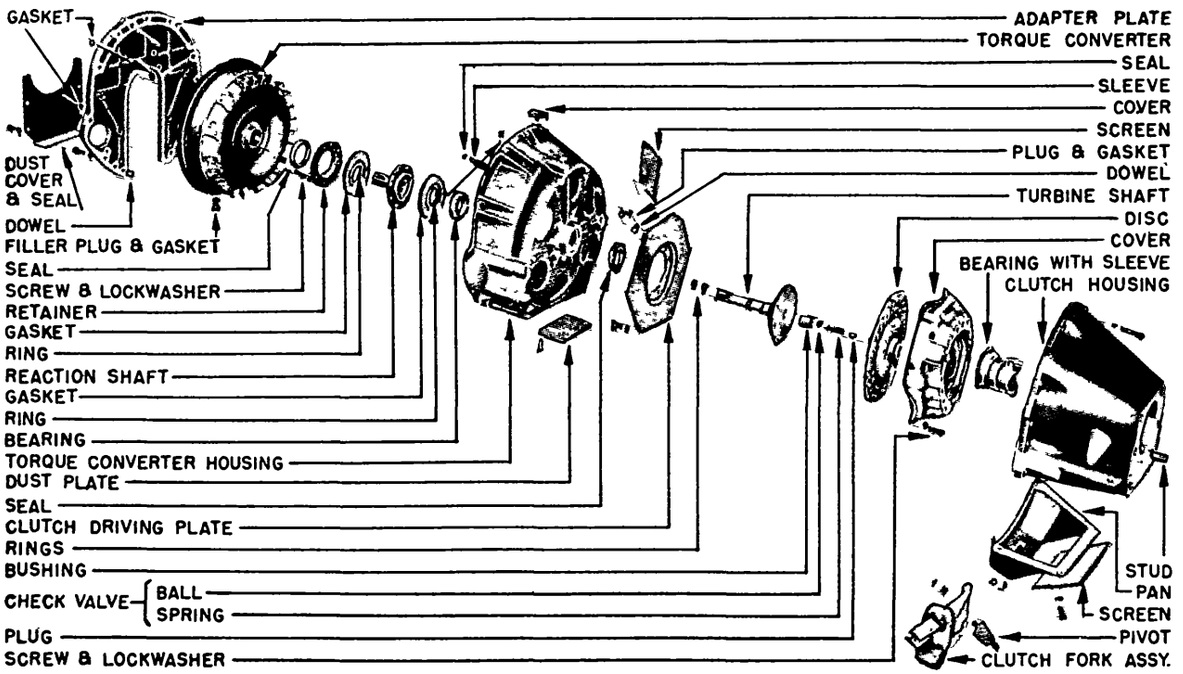
5) Position NEW gasket in converter housing and install reaction shaft *(CAUTION*—use extreme care not to damage turbine shaft seal rings when sliding reaction shaft over turbine shaft). Align capscrew holes in reaction shaft flange with holes in converter housing, drive shaft into place using tool C-3192 *(NOTE*—These holes spaced so that they will line up in one position only, use two capscrews to maintain alignment while driving shaft into place).

6) Install NEW impeller hub oil seal in retainer plate using tool C-3180 *(CAUTION*—Install seal with rubber-coated end toward converter).

7) Position NEW gasket on reaction shaft flange, install impeller hub oil seal retainer plate, install capscrews and lockwashers, tighten screws evenly to 15 ft. lbs. torque.

8) Install clutch assembly and driven member on clutch drive plate *(CAUTION*—align marks on cover and driving plate as made during disassembly).

ASSEMBLY IS NOW READY FOR INSTALLATION ON ENGINE.



CHRYSLER, DESOTO, DODGE, PLYMOUTH FLUID TORQUE DRIVE (COMBINED OIL SYSTEM)

INSTALLATION: *CAUTION—Crankshaft flange run-out must be checked before converter installed, and converter hub run-out checked after converter installed. See installation data below.*

1) Check rear face of engine block and mating face of adapter plate for burrs or other foreign material which would prevent good contact between these parts. Install NEW "O" ring seals at oil passage holes in engine block (use heavy grease to retain seals), install adapter plate and tighten attaching bolts securely.

2) Check crankshaft flange run-out as follows: Mount dial indicator on adapter plate so that indicating button bears on outer machined surface of flange. Set dial indicator at zero and rotate crankshaft (will be facilitated by removing spark plugs). Run-out should not exceed .002".

3) Check mating surfaces of crankshaft flange and converter drive plate for burrs or foreign material. Install converter unit and tighten attaching bolts evenly and securely. Check converter hub run-out as follows:

Converter Hub Run-out Check—Mount dial indicator on adapter plate so that indicating button contacts outer surface of converter hub. Set dial indicator at zero and rotate converter to check run-out. Run-out should not exceed .004". Excessive run-out will probably be due to dirt or burrs at converter mounting face.

4) Make certain that mating surfaces of adapter plate and converter housing are free from burrs and foreign material, install NEW "O" ring seals on converter housing oil passage sleeves, install converter housing assembly on adapter plate using extreme care not to damage oil passage sleeves and reaction shaft seal rings or displace gaskets.

►*INSTALLATION CAUTION*—Make certain that reaction shaft aligned with converter hub opening, use only slight pressure to push assembly forward on converter until seal ring has entered hub. When housing flange is flush with adapter plate, install attaching bolts and tighten securely.

5) Install clutch housing, clutch release linkage, engine support cross-member, and other parts removed or disturbed during removal procedure by reversing the removal order (see Removal data above).

6) Fill engine and converter with oil. *See LUBRICATION data above.*

FLUID TORQUE DRIVE (SEPARATE OIL SYSTEM)

Chrysler 8, C52, C53, C54 (1951)
Chrysler 8, C52, C53, C54, C55 (1952)
Chrysler 8, C56, C58, C59 (1953)
DeSoto V8, S17 (1952)

▷*FLUID-TORQUE IDENTIFICATION:* This type Fluid-Torque Drive with SEPARATE oil system can be identified by presence of Oil Reservoir on bottom of clutch housing. Fluid-Torque Drive with COMBINED Engine oil system does not have this oil reservoir. *See separate data (preceding) for Fluid-Torque Drive with COMBINED Oil System.*

▷CHANGES, CAUTIONS, CORRECTIONS

▷*OIL PUMP RELIEF VALVE CHANGE* (To Improve performance and correct oil loss on first cars). New type Relief Valve (used in production beginning Eng. No. C51-8-19615) can be installed on earlier cars to correct loss of fluid due to one of the following causes: (1) First type valve sticking open, allowing oil to become overheated and expand out through vent to rear engine crankcase breather. (2) First type valve sticking closed, allowing pressure to develop within unit and causing noise in pump gears and displacing impeller hub seal and turbine shaft seal. (3) Leakage around holes in reservoir due to "O" rings on connectors between reservoir and torque converter not seating properly (will be corrected by installation of new rings furnished in Relief Valve Service Pkg. 1450072 containing all new relief valve parts). *See OVERHAUL data for Relief Valve Installation instructions.*

▷*RATCHETING & SIREN NOISE CORRECTION (Cars before Engine No. C52-8-3881):* On cars before No. C52-8-3178, improved Oil Pump Body, Pinion Gear, and Transfer Plate (as used in production on later cars—see Production Change Notes below) may be installed to correct a ratcheting sound in neutral or when driving car which may also be noted as a siren sound at higher speeds. On cars between No. C52-8-3178 and C52-8-3881, above condition can be corrected by installing later type Transfer Plate only (these cars have other later parts installed in production).

PARTS CHANGE NOTE—Parts required for above change are contained in Torque Converter Oil Pump Housing and Seal Service Package, No. 1450206. *See OVERHAUL data for disassembly and installation of these new type parts.*

▷*OIL PUMP BODY & PUMP PINION GEAR PRODUCTION CHANGE (Beginning Engine No. C52-8-3178):* Pinion gear changed to "Oilite" material with gear hub piloted in pump body. Body bore was increased to receive gear hub (no bushing required).

▷*TRANSFER PLATE PRODUCTION CHANGE (Beginning Engine No. C52-8-3881):* Transfer plate was revised and wall between inlet and outlet sides of plate reduced in thickness to approximately ¼". Internal passages were changed and steel valve sleeve and spacer eliminated (oil flow into converter controlled by metered passage cast in plate, and pressure relief ball seated directly on machined opening in plate). *NOTE*—Plate also has outlet (closed by ⅛" pipe plug) which can be used to check Oil Pressure. *See CHECKING OIL PRESSURE.*

DESCRIPTION: The "Fluid-Torque Drive" (Torque Converter) consists of four elements: an impeller (driving member), a turbine (driven member) and two reaction members (stators), which provide a maximum torque multiplication of 2.34-1 (starting torque) to 1.0-1 (driving torque). The converter housing is attached to the rear end of the crankshaft through a flexible steel disc which permits some flexibility. The starter ring gear is mounted on the rim of the flexible disc. The turbine shaft is connected through a splined shaft to the clutch driving plate.

Oiling System—SEPARATE type (self-contained). Oil from the reservoir is delivered to converter housing under approx. 30 lbs. pressure by a geared pump and control valve body mounted on the converter stationary support plate. The oil is drawn from the oil reservoir (mounted under clutch housing) and delivered to converter housing and then to the oil cooler (mounted at the water pump flange) where it is cooled by water from the radiator and an air blast from the fan, before its return to the reservoir.

OPERATION: The impeller being integral with the converter housing and driven by the engine forces oil toward the turbine causing it to rotate in the same direction. The turbine is mounted on a forged steel hub which is splined to the turbine shaft and clutch drive plate transmitting power to the transmission. The two stators are mounted between the impeller and turbine and are provided with overriding clutches that allow them to rotate only in the direction of impeller travel. At low car speeds (maximum torque) both stators remain stationary and control the direction of oil flow toward the turbine. When turbine speed approaches impeller speed (low torque) both stators 'free-wheel' in the direction of rotation and all elements in the converter rotate as a unit.

LUBRICATION: Check oil level in reservoir every 1000 miles, drain and refill unit every 20000 miles (see procedure below).

Capacity—10½ qts. Add 1 additional quart when filter changed.

Recommended Oil—Use "Mopar Fluid Drive Fluid" or high quality SAE. No. 10W Engine Oil.

Checking Oil Level—Oil level should be even with bottom of filler plug hole on left side of reservoir below clutch housing.

Draining—Drain reservoir by taking out drain plug in bottom. Drain Fluid-Torque unit by taking out converter oil plug (accessible after removing flywheel access plate). On engines without access plate, remove clutch pan and rotate converter until oil plug is accessible. Remove plug and drain oil.

Refilling—Replace plugs in converter. Fill oil reservoir to level of hole with MOPAR Fluid Drive Fluid. Start engine and run between 500 and 700 RPM. with transmission in neutral. With engine running, continue adding fluid to reservoir until oil level remains at bottom of filler opening. Replace filler plug in reservoir. To eliminate air bubbles from oil, shift transmission into high range and apply parking brake. Then run engine between 500 and 700 RPM. for not over two minutes. Check oil level and replenish to bring oil level up to bottom of filler hole.

CHECKING OIL PRESSURE: On cars after Engine No. C52-8-3881 (and earlier cars with later type transfer plate—See Production Change above), remove ⅛" pipe plug from support boss (above oil outlet and inlet to cooler lines) on transfer plate, connect pressure gauge C371 or equivalent at this point. Run engine until converter has been warmed to normal operating temperature. With engine running at 60 RPM pressure should be 30 lbs.±5 lbs.

TROUBLE DIAGNOSIS: Check as follows:

Car Creeps when idling—Throttle opening excessive. Check and adjust engine idle speed to 450-500 RPM.

Slippage—Check following conditions:

(1) With car parked, apply parking brakes, place transmission in direct speed, operate engine at 500-700 RPM. If slippage noted, check for oil leakage from converter onto clutch assembly. Correct oil leaks, clean oil from clutch assembly, replace clutch driven disc.

(2) If slippage noted with car in motion, check for low oil level in reservoir or low oil pressure. Overheating—Check for low oil level or lack of oil in converter, low water level or no water in radiator, fan belt loose or broken, water pump defective or water passages clogged, converter oil lines or cooler unit clogged, engine overloaded due to dragging brakes, etc.

REMOVAL & DISASSEMBLY: *For disassembly of Support Plate & Oil Pump (removed as an assembly), see OVERHAUL data below.*

1) Remove transmission. *See Transmission Removal on individual car model pages.*

2) Remove clutch housing-to-exhaust pipe bracket bolt and shift bracket away from housing. Remove breather oil line from right side of oil reservoir. Disconnect oil lines from torque converter support plate on left side of clutch housing.

3) Remove clutch release fork pull-back spring, remove clutch fork rod (disconnect front and rear ends of rod by removing cotter pins and washers), *push clutch pedal in until over-center spring holds pedal against floor board* (will prevent accidental movement of pedal during removal operations), remove pivot bracket assembly and clutch torque shaft, remove release bearing *(CAUTION*—to avoid spreading the release bearing pull-back springs, pivot release bearing assembly away from fork enough to slide bearing off fork prongs—spreading of spring will cause lost motion between fork and bearing when unit reassembled).

4) Remove starter (turn front wheels to extreme right), remove bracket holding oil cooler lines on cylinder block.

5) Remove rear engine-to-cross-member support bolts, install engine support fixture C-3082 and adjust to support weight of engine, take out cross-member attaching bolts and remove cross-member.

6) Remove torque converter oil reservoir from bottom of clutch housing.

7) Lower engine approximately 3" for access to clutch housing upper bolts *(CAUTION*—do not lower engine more than 3" without disconnecting radiator hoses and other engine attachments). Remove clutch housing using care not to damage inlet or outlet oil tubes (from converter plate to oil cooler).

▷*CLUTCH HOUSING REMOVAL CAUTION*—when removing lower half of clutch housing, install two of the flywheel housing bolts to hold the converter

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FLUID TORQUE DRIVE (SEPARATE OIL SYSTEM) (Continued)

plate in position while the lower half of the housing is being removed.

8) Drain oil from converter assembly by taking out drain plug *(CAUTION*—oil will be very hot if converter has been in operation).

9) Remove converter support plate-to-housing bolts, remove converter plate assembly by working assembly off dowel pins and lifting it **straight off converter hub to avoid damage to pump body oil seal.**

►*CAUTION—Use extreme care when removing converter plate from flywheel housing and DO NOT use tools to pry or pound between flange faces.*

10) If work to be performed on converter support plate, remove clutch cover and driven member assembly from clutch driving plate to avoid getting oil or grease on clutch facings.

INSPECTION: Examine hub of converter assembly. If hub deeply scored or burned, replace converter and drive plate as an assembly *(NOTE*—Light scuffing at base of drive lugs may be polished out with crocus cloth). *See Installation data for Converter replacement.*

OVERHAUL: *CAUTION—Converter hub run-out should be checked and corrected whenever any part of converter assembly has been removed from crankshaft drive flange. See Converter Hub Run-out data below.*

►*TORQUE CONVERTER UNIT REPAIR NOTE*—Torque converter unit is sealed and no adjustments or repairs are necessary except periodic draining and refilling. Replace complete converter unit if repairs are required.

Oil Pump Relief Valve Installation (New Type Relief Valve): Remove reservoir from bottom of clutch housing, take out three connectors in bottom of torque converter support plate. Remove relief valve plug and gasket from valve chamber in support plate. Withdraw and discard the **old type** relief valve assembly (valve, spring, spring damper, and horseshoe lock). Install new type relief valve (see note below). Re-install valve plug and gasket, connectors (CAUTION—use new rubber seal "O" rings furnished in valve package and lubricate seals with chassis lubricant), and reservoir. Refill torque converter (see LUBRICATION data).

Relief Valve Installation Note—New type valve should be installed in following order: Slide valve sleeve into valve chamber with slotted side first, slide valve spacer in with two tongues on end of spacer bearing against bottom of valve sleeve, install valve ball through spacer and follow with valve spring so that spring holds ball against its seat on bottom of valve sleeve, install retaining plug.

►*VALVE SPRING CAUTION*—Spring used in new type relief valve is longer but has less tension than first type valve spring. Old type spring MUST NOT BE USED with new valve assembly (valve could not open).

Pump Housing & Pinion Installation (New Type Parts furnished in Pkg. No. 1450206): *NOTE*—New type Pump Housing can be identified by larger diameter bore (1 7/8" O.D.) and fact that no bushing used, new type Pump Pinion can be identified by hub integral with gear (11/16" long) and "Oilite" material. Use new Transfer Plate No. 1323727 with above parts. *Install these parts as directed under Reassembly in "Support Plate & Oil Pump Overhaul" data below.*

Replacing Starter Ring Gear (on Converter Drive Plate): Remove converter and drive plate assembly from crankshaft (see Removal above). Take out six converter-to-drive plate bolts and separate drive plate from converter. Then service ring gear as follows:

Removing Ring Gear—Support the drive plate in vise and carefully remove staking lugs retaining ring gear with a file (CAUTION—use care not to distort drive plate when clamping it in vise). Support drive plate on 6" blocks of wood and use a blunt chisel or drift to tap ring gear off support plate. Use a file to remove all burrs or raised spots on gear contact surface of plate (CAUTION—do not remove any more metal than necessary to clean up this surface).

Installing Ring Gear—Heat new ring gear (see Heating Note below), place gear over flange surface of drive plate with rear face of gear contacting flange evenly around entire diameter. Weld gear to plate, spacing welds evenly and using same amount of metal at each weld to maintain balance. Clean surfaces of drive bosses on converter and mating surfaces on drive plate (CAUTION—Dirt or burrs on these surfaces will cause converter hub to run out of true and create converter unbalance). Install converter to drive plate bolts (CAUTION—check length of each bolt against bottoming in converter and use shorter bolts if bolts bottom before coming up against lockwashers). Check and correct converter hub run-out as directed below.

►**Ring Gear Heating Note**—Ring gear can be heated by any of the following methods: (1) Use C-794 oven, setting temperature at 150°F. and allowing gear to remain in oven for 15-20 minutes. (2) Place ring gear in shallow container of water and allow it to remain for 8 minutes after water has come to a boil. (3) If steam used, direct steam flow around gear for approximately 2 minutes. (4) If direct flame used, place support plate on flat surface with ring gear squarely on plate, direct slow flame around outer rim of gear using care to direct flame away from gear teeth and not at support plate, check heat with few drops of water on face of gear, gear should be hot enough when water boils.

Support Plate & Oil Pump Overhaul: *CAUTION—Support plate must be heated to remove or install oil pump in pump body recess (if not heated, recess will be scored or scuffed necessitating replacement of the support plate).*

Disassembly: Take out the six oil pump-to-support plate bolts. Place support plate on level surface with turbine and stator shafts upward, heat the plate (see Heating Note below). **After support plate heated** properly, install tools C-3126 (hex-head studs) in threaded holes in pump body until they bottom in support plate, turn these pulling tools in evenly until pump body is free of support plate. Grasp stator at splines and lift straight upward which will remove stator plate and shaft, transfer plate, and oil pump body and gears as an assembly. *CAUTION—DO NOT cock asembly and do not use excessive force in removing it.* Remove pump body and gears from stator plate and shaft. Take out turbine shaft snap ring (Tool C-484), install Tool C-3121 in pump recess and press shaft from bearing (leaving bearing in support plate). If bearing to be replaced, use Tool C-484 to remove snap ring and pull bearing out with Tool C-3138 *(CAUTION*—DO NOT drive bearing out of support plate—this would damage the plate). Remove turbine shaft seal from support plate using a suitable drift.

►**Support Plate Heating Note**—Support plate may be heated by any of the following methods: (1) Use three or four 125 watt or 250 watt infrared or heat lamps placed 2-3" from plate (not touching) and rotate plate to provide even heating. If four 250 watt lamps used, time required should be approximately 15 minutes. (2) If oven C-794 used, set temperature to 160-170°F. and heat plate for approximately 20 minutes. (3) If gas torch used, make certain all converter oil removed from support plate, direct flame at immediate area of pump body. Temperature when heated should be 160-170°F. (above that which can be held with bare hand).

Inspection—Inspect oil pump recess in support plate for scoring or scuff marks on inner diameter of recess *(NOTE*—light scuff marks may be polished out with crocus cloth, replace support plate if recess deeply scored to prevent oil leaks at pump body seal ring). Inspect oil pressure relief valve and make certain this is latest ball type valve (see Oil Pump Relief Valve Installation data). Check support plate-to-flywheel housing and support plate-to-clutch housing mating faces for burrs or uneven surfaces which would prevent securing oil-tight joint. Inspect turbine shaft oil seal ring and replace if broken or damaged. Clean support plate thoroughly and blow out all passages *(CAUTION*—protect bearing in support plate from dirt and foreign material during cleaning). Inspect oil pump outer gear (gear may be re-used if teeth not scored or chipped). Make certain that latest type oil pump body and pinion gear are used (see Pump Housing & Pinion Installation data above).

Reassembly—Position new bearing squarely over bore in support plate and drive bearing into position in housing using Drift C-3123 (CAUTION—plate must be supported on opposite side when driving bearing in place), install large turbine shaft bearing snap ring. Install new seal in opposite side of housing using Drift C-3122. Replace support plate and bearing on turbine shaft using Drift C-3124, install small turbine shaft bearing inner snap ring using ring which provides best fit in slot (this snap ring furnished in three thicknesses). Make certain that pump body recess free from scores and burrs and that recess and passages are clean. Install new impeller hub seal in pump body (Tool C-3125), install new seal ring on outer diameter of pump body. Install oil pump outer gear and inner gear (hub of inner gear entered in body) in pump body, use transfer plate as surface plate on face of pump body and check clearance between pump body face and face of gears. This clearance should be .001-.003". Install transfer plate on stator shaft and plate with large counterbore in transfer plate facing stator shaft plate. Hold pump body upright, pour fluid drive oil or SAE 10W engine oil in gear recess (to facilitate priming of pump), invert stator shaft and plate assembly and insert shaft through pump pinion gear hub, turn assembly over and align holes in pump body, transfer plate, and stator plate (holes will line up in only one position). Coat seal ring on pump body with SAE 10W engine oil. **After heating support plate** (see Heating Note above), position pump body and stator shaft assembly over support plate recess with the six holes in both parts aligned

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FLUID TORQUE DRIVE (SEPARATE OIL SYSTEM) (C ntinued)

and lower assembly into pump recess (CAUTION—use care to position oil seal ring on impeller shaft). Pump assembly should slip into recess easily, **if force required, oil seal ring on impeller shaft is not entering hub and stator shaft or support plate has not been heated sufficiently.** Start several of pump body-to-support plate bolts to serve as guides but **do not tighten** these bolts. Use light hand pressure to seat pump body in recess (only slight resistance of outer seal ring compressing against body in recess should be noted). Install all pump body-to-support plate bolts using **new** copper gaskets, tighten all bolts evenly to 17 ft. lbs. torque (CAUTION—make certain that bolts do not bottom in plate).

Converter Installation: Before installing converter, make certain that mating surfaces of crankshaft flange and drive plate are clean and free from burrs or rough surfaces. Tighten the six drive plate-to-converter capscrews to 17 ft.lbs. *(CAUTION*—make certain these screws do not bottom in converter before tightening against drive plate). Install converter and drive plate assembly and tighten the drive plate-to-crankshaft nuts evenly and securely. ***Check converter hub run-out as follows:***

Converter Hub Run-out: Check run-out after drive plate and converter assembly mounted on flywheel. Use dial indicator mounted on flywheel housing with plunger against converter hub (CAUTION—plunger must clear oil pump drive lugs). Rotate torque converter two complete turns while checking run-out. Maximum allowable run-out is .005". If run-out greater than .005", mark high point, turn converter until high point on same side of flywheel housing as dial indicator (to prevent damage to indicator) with one of the drive plate-to-converter bolts about 3" down from flywheel housing, use pry bar between flywheel housing and bolt to "flex" the drive plate sufficiently to reduce run-out (flexing the plate 7/64" will reduce run-out .001"). Recheck run-out and repeat this operation as necessary until run-out reduced to less than .005".

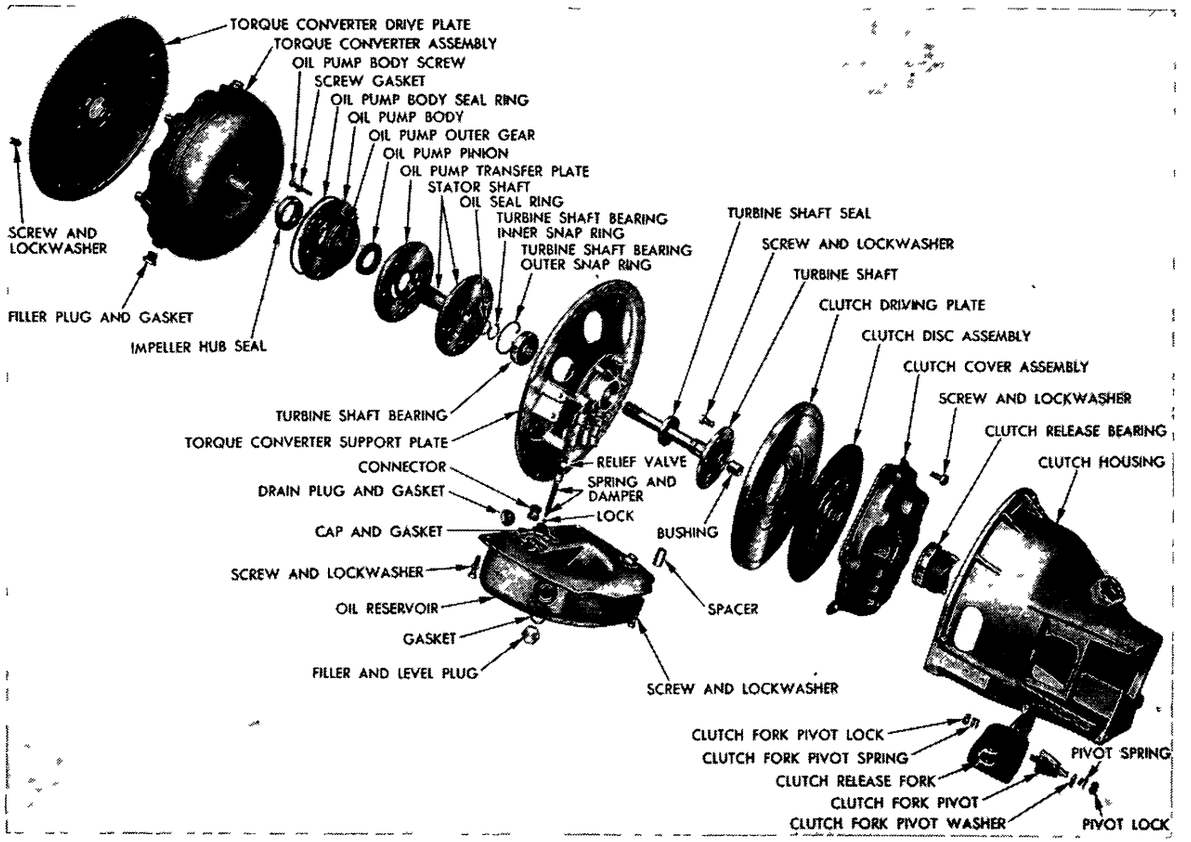
Transmission Drive Pinion Bushing Replacement: Use tool C-41 to remove bushing from turbine shaft. Check hole in shaft for metal chips and cuttings after bushing removed. Use tool C-3077 to install new bushing (tool will install and burnish bushing in one operation). Slip new bushing over ground end of tool (after removing outer sleeve and nut), use tool as driver to install bushing in shaft, then place outer sleeve and nut on tool and tighten nut to withdraw tool which will burnish bushing at same time.

Oil Cooler: ***NOTE—Cooler is mounted at front of engine and is serviced separately from torque converter.***

Removal—Drain radiator, remove battery and battery pan, remove lower radiator-to-oil cooler water hose. Remove inlet and oulet tubes from cooler. Take off nuts on oil cooler-to-water pump flange studs, remove cooler.

Installation—Clean mounting flange faces thoroughly, use new gasket, install cooler in reverse order of removal (above).

INSTALLATION: ***After converter assembly has been installed and converter hub run-out corrected (see above), install support plate assembly as follows:***



CHRYSLER & DE SOTO FLUID TORQUE DRIVE (SEPARATE OIL SYSTEM)

1) Carefully support the support plate assembly *(CAUTION*—weight of support plate assembly must not be allowed to rest on converter hub), enter the splined turbine and stator shafts into hub of converter (see Shaft Meshing Note below) and turn converter slowly to facilitate engaging pump gear on hub *(NOTE*—at point where dowel pins on flywheel housing enter support plate holes, driving lugs on converter hub should be entering driving surface of pump pinion gear). With all parts properly meshed, **face of support plate should be flush with face of flywheel housing.** ***CAUTION—DO NOT use force to bring support plate up to flywheel housing face.***

►***SHAFT MESHING NOTE***—When entering support plate assembly shafts into turbine hub, **three** distinct stages or mating of shaft splines will occur and following procedure should be used to accomplish these engagements: 1) Exert pressure on support and driving plate while rotating driving plate to allow external splines on turbine shaft to index with internal splines of turbine (when this occurs, a distinct forward give will be noted as the splines engage), 2) Turn entire assembly until splines on stator shaft index with internal splines of stator, 3) Position support plate so that dowel pin holes in plate line up with dowels on flywheel housing and rotate torque converter until driving sleeve indexes with oil pump pinion.

2) Install clutch assembly on clutch driving plate (if not installed previously).

3) Install clutch housing on support plate and flywheel housing, install attaching capscrews and tighten securely.

4) Install all clutch release parts and linkage by reversing removal procedure (see above).

5) Make certain that all burrs removed from holes in support plate and reservoir that might damage oil seals, install new "O" ring seals (Part No. 1323747) and connectors in holes in converter reservoir (lubricate seals with chassis lubricant), install reservoir on bottom of clutch housing (NOTE—install two short capscrews at front and two long capscrews with spacers at rear).

6) Connect oil cooler lines at rear support plate.

7) Re-install engine support cross-member and transmission, install and connect other parts disturbed during removal procedure (see Removal data above).

8) Fill converter and reservoir (see Lubrication data above).

POWERFLITE (CHRYSLER, DE SOTO, DODGE, PLYMOUTH)

Chrysler, DeSoto, Dodge, Plymouth (1954-55)

►CHANGES, CAUTIONS, CORRECTIONS

►***STARTING ENGINE BY PUSHING CAR:*** Pushing recommended rather than towing. Turn ignition switch "on," place selector lever in "N." When car speed of approximately 25 MPH. reached, move selector lever to Low "L" position and car will crank engine.

►***TOWING POWERFLITE CARS:*** Following procedure recommended:
Transmission Operating—Place selector lever in "N" and secure in this position by wiring lever in the gate on the lower end of the steering column. Tow car at moderate speeds. NOTE—For long distance towing (100 miles or over), propeller shaft should be removed.
Transmission Inoperative—Tow the car with rear end lifted or remove propeller shaft.

►***1953 MODEL NOTE: PowerFlite Transmission also used on late 1953 Chrysler Crown Imperial & Custom Imperial.***

►***1954 THROTTLE CONTROL CHANGE NOTE:*** Two types of throttle controls have been used and different throttle linkage adjustments are necessary. *See "Throttle Linkage Adjustment" below.*

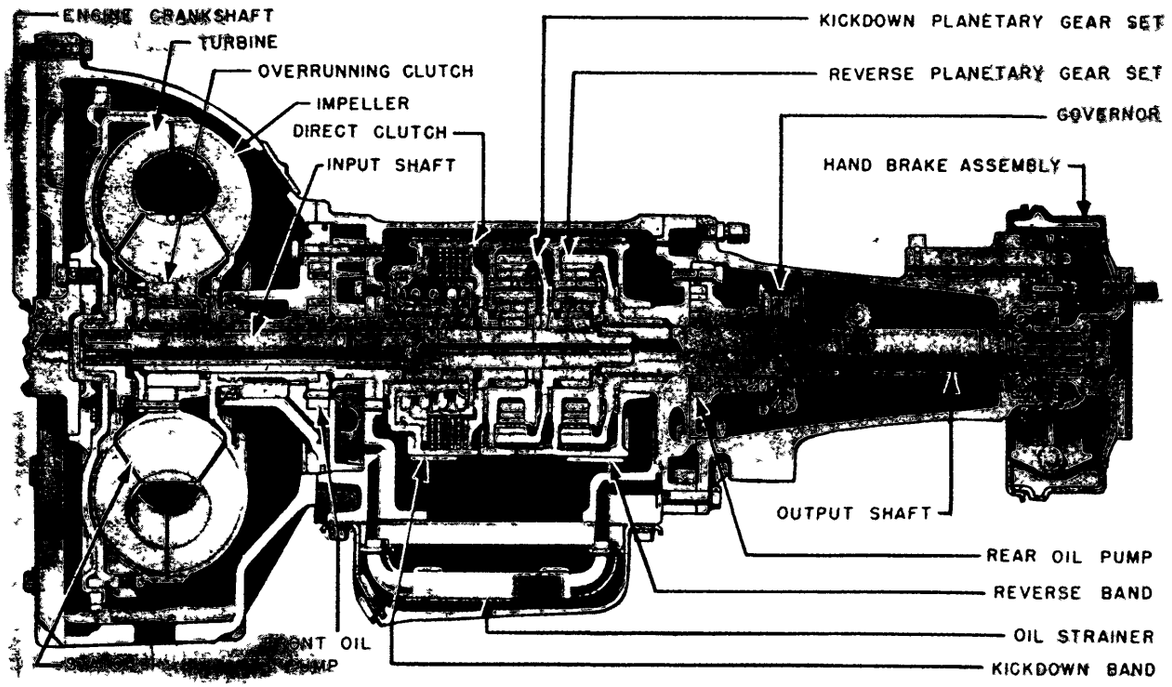
►***1954 GOVERNOR PRODUCTION CHANGE:*** A later type governor which provides a lower wide open throttle upshift and lower kickdown limit entered production approximately April 26, 1954. Shift patterns with the new governor are changed as indicated in "Transmission Shift Pattern" tables below. The later type governor can be installed on earlier cars and is available in replacement kits, Part No. 1450993 (6 Cyl. Cars), No. 1450994 (8 Cyl. Cars). *NOTE—Also see "1955 Governor Production Change"*

►***1954 DIRECT CLUTCH PRESSURE TESTING POINT PRODUCTION CHANGE:*** a ⅛" take-off plug has been added to the bottom of the kickdown servo boss which can be used for checking direct clutch pressure. *See "Hydraulic Pressure Tests & Trouble Shooting" below.*

►***1954 SHUTTLE VALVE PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE:*** A later type shuttle valve, Part No. 1643118 is used for production and can be used for service replacement. *CAUTION*—The adjustment screw is pre-set at the factory and MUST NOT BE CHANGED IN THE FIELD. *When replacing the older type valve with the later one, DO NOT install the old spacer and spring.*

►***1954 TRANSFER PLATE COVER PRODUCTION CHANGE:*** A cast iron cover replaces the aluminum cover formerly used. This change was made to prevent possible warpage due to heat. The new cover plate, Part No. 1559108 can be installed on all previous transmissions.

►***1955 TORQUE CONVERTER OUTLET VALVE PRODUCTION CHANGE (To prevent loss of torque converter pressure under severe operating conditions):*** A later type valve, Part No. 1630871 located in forward end of oil passage on left side of transmission case above line pressure take-off plug prevents loss of torque converter pressure. This valve can be installed on all early transmissions. *NOTE*—When installing the valve, make sure that the ball end of the valve is toward center of transmission. *Also see "Regulator Valve Body Production Change" below for later changes affecting the torque converter outlet valve.*



POWERFLITE TRANSMISSION SECTIONAL VIEW

►***1955 REGULATOR VALVE BODY PRODUCTION CHANGE (Converter pressure regulated at input, not at outlet):*** The torque converter outlet valve has been eliminated by a change in the regulator valve body, the torque converter control valve and spring. The later type regulator valve body is identified by a letter "D" at end of the part number. The later Regulator Valve Package, Part No. 1643243 can be installed on early transmissions. *CAUTION*—The Torque Converter Outlet Valve must be removed to insure proper lubrication when the later type Regulator Valve is installed.

►***1955 INPUT SHAFT PRODUCTION CHANGE (To provide better sealing and bearing support):*** A later type input shaft having a large area bushing (integral with shaft) replaced the former input shaft (three seal rings) at Transmission No. J-14-54 (stamped on lower right front corner of transmission case). The large area bushing is a press fit on the output shaft and is not serviced separately. When installing the later shaft in earlier transmissions, it will also be necessary to install a new reaction shaft.

►***1955 PLYMOUTH GOVERNOR PRODUCTION CHANGE (3-stage type replacing the 2-stage type):*** A later type governor, Part No. 1653463 (V8 Cars), 1653464 (6 Cyl. Cars) provides a closer control of shift speeds. The wide open throttle upshift limit is decreased and the low kickdown limit is increased (see "Transmission Shift Speeds" below). The later type governor can be used on earlier transmission for service replacement provided the complete package is installed. *NOTE*—Transmissions equipped with the new governor are identified by the letter "H" following the part number.

►***PLYMOUTH DIRECT CLUTCH DISC & PLATE REPLACEMENT CAUTION:*** Six discs and six plates are included in Disc & Plate Package, Part No. 1450209 (for use on all PowerFlite Transmissions). On Plymouth 6 Cyl. & V8 Models, use only 5 discs & 5 plates. Installation of six of each part will not provide adequate clearance and may burn the discs and plates.

DESCRIPTION

DESCRIPTION: PowerFlite transmission consists of a torque converter and a two-speed hydraulically controlled planetary gear type automatic transmission. The entire transmission has a single independent oil system (front and rear pumps in transmission circulating oil through transmission, converter, and oil cooler with oil carried in transmission case oil pan). Hydraulic control consists of valve assemblies in the transmission and a hydraulic governor on the output shaft within the transmission extension housing which control the operation of the planetary gear sets (see OPERATION following). Torque converter is similar to unit used previously in "Fluid-Torque" Drive and operates independently.

Torque Converter: Provides a torque converter ratio of 2.6-1 for starting, acceleration, or heavy pulling whenever a torque gain is required. At cruising speeds above 45-50 MPH., the torque converter acts

CONTINUED N NEXT PAGE

POWERFLITE (Cont.)

as a fluid coupling with no torque multiplication.

Planetary Gears: Consist of a "Kick-down" (Low Range) planetary gear set providing a gear ratio of 1.72-1, and a Reverse planetary gear set providing a reverse drive with a gear ratio of 2.39-1. The actual effective gear ratio depends on selector lever position and car speeds as follows:

OPERATION

OPERATION: Transmission operation in each position of the selector lever is outlined below. In Drive "D" position (normal driving position), operation varies in accordance with the car speed and operating conditions. *See Shifting Speed tables below.*

Drive "D" Position: This is normal driving position.

Breakaway (Starting & Accelerating)—Transmission is down-shifted so that kick-down (low range) planetary gear set is in operation. The car starts and accelerates with both the torque converter providing a torque increase of 2.6-1 and the gears providing a torque increase of 1.72-1 for a total ratio of 4.47-1. At a car speed of 15-75 MPH. (depending on throttle position), the transmission automatically upshifts (locking out the planetary gears) so that all torque multiplication is provided by the torque converter. See Direct Drive.

Direct Drive—After the transmission upshifts, the only torque multiplication is provided by the torque converter (2.6-1) and this gradually diminishes as the car speed increases until at approximately 50 MPH. the ratio is 1-1 and the torque converter operates as a fluid coupling.

Kickdown (Forced Downshift)—At car speeds below 45-60 MPH., depressing accelerator pedal to the wide-open position will cause the transmission to downshift and drive through the kick-down planetary gear set. This provides the same torque multiplication as in "Breakaway" above. When the accelerator pedal is partially released, or when the car speed reaches 60-75 MPH., the transmission automatically upshifts (kick-down not operative above 60-75 MPH.).

Low "L" Position: Operation is the same as in Drive "Breakaway" above except that no upshift occurs and the planetary gear ratio of 1.72-1 remains in action regardless of the car speed.

Reserve "R" Position: This engages the reverse band (kick-down band and direct clutch disengaged) so that the engine drives through the torque converter and the reverse planetary gear set to provide a reverse drive with a torque multiplication of 2.6-1 (torque converter) and 2.39-1 (reverse planetary).

Neutral "N" Position: The transmission is completely disengaged (both bands and direct clutch disengaged) so that there is connection between the engine and the rear wheels. The Starter Neutral switch contacts are closed which permits the starter to operate to crank the engine.

LUBRICATION

Checking Fluid Level (Engine Hot)—With engine idling oil level should not be above the "full" mark on dipstick after car has been driven sufficiently to bring engine and transmission up to operating temperature. If oil is slightly below desired level, add a little oil at a time and recheck. *Do not add a full quart unless check indicates that it is required.*

Checking Fluid Level (Engine Cold)—Start engine, set hand brake and shift selector lever through all ranges. Allow engine to run approximately two minutes. Move selector lever to "N" (neutral) and check oil level with engine idling. Oil level should not be higher than ½" above the "low" mark on dipstick, and it should not be below the "low" mark on dipstick.

Draining & Refilling—Drain transmission case by removing drain plug from oil pan. Drain torque converter by removing drain plug from converter housing (remove access plate from bottom of flywheel housing, rotate torque converter until drain plug is down). Replace both drain plugs using new gaskets, if necessary, tighten oil pan plug to 20-25 ft. lbs. and torque converter plug to 45-50 ft. lbs. Install 5 qts. new fluid through transmission filler tube. Start engine and add approximately four quarts more while engine is running. Allow engine to idle for two minutes, then shift selector lever through all positions and return it to neutral. Add sufficient fluid to bring fluid level to "low" mark on dipstick (approx. 1 quart).

Recommended Fluid—Automatic Transmission Fluid Type A.

LINKAGE ADJUSTMENT

1954 CHRYSLER, DESOTO, DODGE

Gearshift Linkage: Place manual control lever at the transmission in "D" position which is the third detent from front of car (Chrysler & DeSoto); "N" position which is the second detent from rear of car (Dodge). Check angle of gearshift control bellcrank upper lever in relation to frame line. This should be 24-29° (Chrysler & DeSoto); 40-45° (Dodge) to the horizontal above the frame line and pointing slightly toward rear of car. If not at the correct angle, adjust as follows:

1) Disconnect front and rear gearshift control rods at gearshift control bell crank. Locate gearshift control bell crank as described above and adjust the rear gearshift control rod to the required length for a free fit in the bell crank lower lever, reinstall rod.

2) Place selector lever pointer in the "N" (neutral) position on the indicator dial at the top of steering column. Check clearance between the gearshift tube lever gate neutral stop land at bottom of steering column and the gearshift tube lever. This clearance should be .015" to .017" with .015" to .030" clearance between the gate and the wide flat face portion of the lever (see illustration), with gearshift tube in its normal fully returned position. To adjust, loosen the three attaching screws (on Chrysler & DeSoto), clamp (on Dodge) and move the gate to the desired position for correct clearance. Tighten attaching screws or clamp.

3) Make sure selector lever is in "D" position (Chrysler & DeSoto); "N" position (Dodge) and adjust the front gearshift rod to the desired length for a free fit to the upper lever of bellcrank. Reinstall rod.

4) Operate lever through all detent positions and check position of pointer on indicator dial.

▷*CAUTION: If control does not operate properly or indicator does not indicate correctly, recheck the assembly and adjustment. DO NOT FORCE movement of selector lever.*

1954 PLYMOUTH

Gearshift Linkage: Measure distance between center of gearshift selector lever bearing bolt and gearshift rod bracket on steering column with a steel scale. Adjust to 49/64" (to get an accurate scale reading it may be necessary to force quadrant slightly away from rod bracket). Adjust as follows:

1) Remove steering column bracket assembly at selector lever and the bracket cap at the dash. Lower column enough to gain access to the cross head screw beneath selector lever. Remove lever, spring, and pointer.

2) Slide bracket assembly down on gearshift rod far enough to rotate and adjust bracket sleeve to 49/64" distance from center of hole to edge of bracket. This will provide approximately 3/16" minimum steering gear gearshift rod lever overlap on gate at lower end of steering column for "N" and "D" positions. Reinstall lever, spring, and pointer, then bracket assembly and bracket cap. Adjust gearshift rod lever stud to center of gearshift rod lever slot.

3) Raise car on hoist. Loosen the two nuts holding gearshift control rod to the swivel block attached to gearshift control bell crank mounted on transmission. Remove swivel block and control rod from bell crank. Move manual control lever on the transmission toward rear of car to place transmission in reverse gear, then move it one detent toward front of car which will place transmission in "N" (neutral). Reinstall swivel block in bell crank, leaving the control rod nuts still loose. Hold gearshift rod lever on steering column in "N" (neutral) position and draw up the front nut on the control rod to within 1/16" of the swivel block. Tighten nut to rear of swivel block, locking assembly in position.

4) Shift transmission through all gears and check for full engagement, making sure that the gearshift rod lever does not ride against control gate in any position. Readjust if necessary. Lower car and check position of selector lever pointer at "D" position. If necessary, bend pointer to locate it exactly at center of the letter.

1954 ALL MODELS

Throttle Linkage & Throttle Pressure: *CAUTION—Transmission throttle oil pressure must be checked and carefully adjusted when the throttle linkage is adjusted. This is important for proper operation.*

Chrysler, DeSoto & Dodge—

1) Check accelerator pedal released position. Included angle from face of pedal to floor at rear of pedal should be 118° (Chrysler & Dodge), 120° (DeSoto). Adjust length of accelerator bell crank to carburetor rod at carburetor throttle lever for correct pedal position.

Plymouth—

1) Measure distance between two anchor points of the throttle return spring. This distance should be 5⅝". To obtain the correct length, adjust throttle rod between carburetor lever and bell-crank.

All Models—Proceed as follows:

2) Operate linkage through entire travel to make certain there is no bind in any position, see that carburetor throttle valves closed with accelerator in released position and that pedal has sufficient travel to fully open throttle valves and operate

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

kick down valve (opening of valve should be felt just as the wide open throttle position is reached).

3) Set engine idle at 475-500 RPM., with engine at normal operating temperature and with selector lever in "N" (neutral) position. ***CAUTION—Correct engine idle speed setting is very important when adjusting linkage and accurate tachometer should be used.***

4) With engine not running, remove Throttle Pressure Take-off Plug on right side of transmission case (⅛" pipe plug between reverse and kick down servos), connect 100 P.S.I. Pressure Gauge (Tool C-3292) at this point.

5) Start engine and place selector lever in "D" position ***(CAUTION—Set hand brake firmly).*** Disconnect the throttle linkage at transmission throttle control lever and operate the throttle valve several times by hand. Observe pressure reaction to lever movement to make sure throttle valve is not sticking.

►***THROTTLE CONTROL CHANGE NOTE:*** Two types of throttle controls have been used. The first type has no return spring on throttle lever and no positive stop for the throttle valve cam. The second type has a return spring located on transmission throttle lever and a positive stop for the throttle valve cam. These two types are not interchangeable and different adjustment procedures are required as follows:

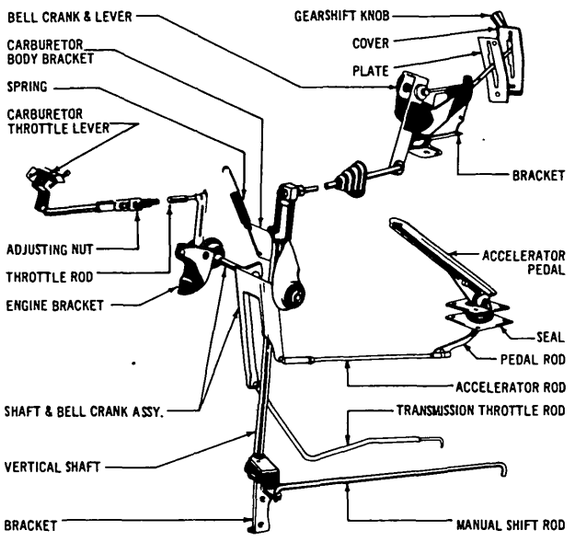
6) Position throttle control lever so it is approximately 30° toward front of car from a right angle to the transmission center line (this procedure is not necessary on the second type control valve having the return spring, as the positive stop within the transmission positions control valve at the closed throttle position). Check throttle oil pressure which should be 13-15 P.S.I. If not within this range, adjust throttle pressure by removing throttle valve adjusting screw plug (on left side of transmission slightly forward and below Back-Up Light Switch). ***Approximately one quart of fluid will drain out when plug removed.*** Using Throttle Screw Adjusting Wrench C-3279, adjust throttle pressure to 14 P.S.I. Turn screw counter-clockwise to increase pressure and clockwise to decrease pressure. Replace plug and tighten to 20-25 ft. lbs.

7) Reconnect throttle linkage to throttle valve lever on transmission. To check throttle linkage adjustment pull slightly on accelerator pedal lever from below car. The throttle pressure should read 14 P.S.I. at idle speed and **rise 8 P.S.I. immediately** when accelerator depressed. If pressure rise not immediate with throttle opening, proceed as follows:

►**Cars With First Type Control Valve—**

8) Loosen lock screw on throttle control rod swivel, disconnect clip from throttle control rod and move swivel and throttle lever as far forward as possible. Next, slowly move throttle and swivel rearward until a slight resistance is felt. At this point, with very slight additional travel of lever toward rear, the throttle oil pressure should suddenly rise 8 P.S.I.

9) Holding swivel and throttle lever at exact position where the slight resistance noted, push slightly forward on the throttle rod to remove free play in connections, and while holding the rod and swivel in this position, connect swivel clip and tighten lock screw, securing swivel to correct position on



1955 POWERFLITE LINKAGE (TYPICAL)

throttle control rod. Recheck adjustment as in (7) above. Remove pressure gauge, replace throttle oil pressure take-off plug and torque to 10-12 ft. lbs.

►**Cars With Second Type Control Valve—**

8) Disconnect throttle control linkage at transmission throttle lever. Operate lever several times by hand. With control lever pointing toward front of car, move it rearward until a slight resistance is felt. Pressure at this point should suddenly rise 6 to 8 lbs. Return lever to a position approximately 1/16" toward front of car. With lever held in this position, install control rod, clamp and nut. Tighten nut just enough so rod can be moved through the clamp by tapping the lever slightly. Pull the accelerator pedal lever until engine speed just begins to indicate rise on tachometer. At this point tap transmission throttle lever into position which will allow the throttle pressure to rise from the 14 lb. mark. With slight additional throttle lever travel, the oil pressure should suddenly rise approximately 8 lbs. When pedal lever is released the throttle pressure should return to 14 lbs. Tighten the nut at point where the pressure starts to rise.

1955 CHRYSLER, DESOTO, DODGE

Gearshift Linkage Adjustment: Hold lever in gate (between neutral "N" and drive "D" positions) under tension (which is adjustable by a bracket to which it is attached behind instrument panel). With spring scale, tool C-394, pull out from selector lever knob. This should require 1-2 lbs., pull to break contact between selector lever and gate. If it does not, then adjust by loosening bracket attaching screws and sliding bracket to obtain the proper tension. Tighten screws and recheck tension ***(NOTE*** —If correct tension cannot be obtained by adjusting bracket, it can be corrected by removing the selector lever and mounting bracket assembly and bending the tension spring. Bend tension spring away from gate to ***decrease*** and toward to ***increase*** tension). Raise hood and inspect selector lever to torque shaft rod for interference where it goes through firewall. If necessary, bend rod to provide clearance at this point. Disconnect selector lever to torque shaft control rod at upper torque shaft rod (adjustment end). Make sure manual control lever located on side of transmission is in the neutral detent position (second detent from rear, all the way to rear and then one notch forward) by shifting it out of neutral and in again. With selector lever in neutral "N" position, push control rod toward firewall until instrument panel selector lever strikes the neutral stop land on gate. Adjust control rod swivel to a free fit in torque shaft upper lever. Clamp swivel in place with the two locknuts and check for free fit. Shift selector lever through all ranges ***CAUTION—The selector lever must go into gate without interference when shifting. Do not use force. Recheck assembly and adjustment.***

►***EARLY 1955 DESOTO THROTTLE LINKAGE ADJUSTMENT CAUTION:*** Approximately the first 2000 cars had a throttle control the same as the late 1954 models, and requires a different throttle linkage adjustment than later cars. The first type control can be identified by throttle Control Lever (on transmission) not having a positive stop at 30° forward movement of throttle lever. Adjust throttle linkage and throttle pressure on early cars in same manner as for late 1954 models. *See "1954 Throttle Linkage Adjustment" above.*

Throttle Linkage & Throttle Pressure: ***CAUTION—Transmission throttle oil pressure must be checked and carefully adjusted when the throttle linkage is adjusted. This is important for proper operation.*** With engine at operating temperature, remove air cleaner and check choke valve for wide open position. Connect tachometer leads to coil and ground and adjust engine idle speed to 475-500 RPM, with selector lever in "N" (neutral). Stop engine. Loosen throttle linkage adjusting screw (located on accelerator-to-carburetor rod) and move rear portion of accelerator shaft shaft-to-carburetor rod rearward until it butts against stop. (Preload lightly.) With rods in line and rear portion of rod lightly preloaded, lock throttle linkage adjustment screw by tightening it to 10-15 ft. lbs. Start engine and recheck idle setting. With transmission in "N" (neutral) and hand brake set, raise car on hoist. Remove throttle oil pressure take-off plug (⅛" pipe plug) located between reverse and kick down servos on right side of transmission case. Connect 100 lbs., pressure gauge C-3292. Shift manual lever on left side of transmission case to "D" (drive) range and check throttle pressure which should be 13-15 lbs. (if necessary to readjust, set pressure to 14 lbs.). ***(NOTE—When manual control lever is moved into "D" range, the engine speed will drop approximately 50 RPM).*** If pressure is not within specifications remove throttle valve adjusting screw plug (⅜" pipe). ***(NOTE***—About one quart of transmission fluid will drain out). Insert adjusting screw wrench C-3279A or C-3279 and adjust throttle pressure to 14 lbs. Turn screw OUT to increase pressure and IN to decrease pressure. Open and release throttle several times to check for proper setting. Throttle pressure should return to 14 lbs. Replace throttle valve adjusting screw plug and tighten to 25 ft. lbs. With accelerator fully released and engine at 475-500 RPM, the pressure should read 14 lbs. Very slowly

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POWERFLITE (Cont.)

move the accelerator pedal or lever from underneath. With throttle and pressure properly adjusted, the throttle pressure should rise immediately with an increase in RPM *(NOTE—Do not use throttle rod when making this check)*. Remove oil pressure gauge and install pipe plug. Tighten to 12 ft. lbs. *(CAUTION —Replace any fluid that drained out during the adjustment)*.

Checking & Adjusting Accelerator Pedal Height: At wide open throttle the tip of the pedal must be approximately ⅛" from the floor mat. To adjust, disconnect accelerator rod from bellcrank under the floor pan. Loosen locking nut and screw the connector counterclockwise on the shaft to raise pedal and clockwise to lower pedal. Reconnect rod to pedal bellcrank, lock with nut and turn down the connector nut.

1955 PLYMOUTH

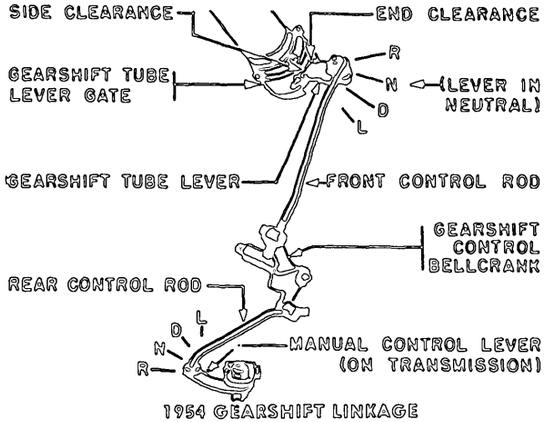
Gearshift Linkage Adjustment: There should be 1/32" clearance between selector lever and the gate at instrument panel, with transmission in neutral. Adjustment is made at end of gearshift lever rod on engine side of firewall. Loosen adjusting nuts and place the transmission shift lever in neutral position. Tighten front adjusting nut to provide clearance on the instrument panel, then tighten rear nut. Check for full detent engagement at transmission.

Throttle Linkage & Pressure Adjustment: *(NOTE—To obtain correct relationship between throttle linkage and engine speed, throttle pressure as well as throttle linkage should be checked. Check linkage for possible binding and make sure lever returns to its stop)*. With selector lever in neutral "N" position, start engine and bring to normal operating temperature. Make sure carburetor is not on fast idle. Adjust engine idle speed to 475-500 RPM. in Neutral. Stop engine. Install tachometer leads for use under the car, start engine, then raise car on a hoist. Remove throttle oil pressure take-off plug (⅛" pipe plug) located between reverse and kickdown servos on right side of transmission. Connect the 100 lbs., pressure gauge C-3292. Move gearshift control lever on transmission one detent toward front of car to put transmission into "D" (drive) range. Disconnect throttle linkage at transmission throttle control lever and operate the throttle control lever several times by hand. Pressure should return to 13-15 lbs., with throttle lever returned to its stop. If it does not, adjust as follows: Remove the ⅜" pipe plug throttle valve adjusting screw plug on left side of transmission case (about one quart of fluid may drain out). Using throttle adjusting screw wrench C-3279A adjust the throttle pressure to 14 lbs. (Turn screw counterclockwise to increase pressure, clockwise to decrease). Shift transmission several times between "N" (neutral) and "D" (drive). Pressure should return to 14 lbs., when lever is returned to "D" (drive). Reinstall plug and tighten to 20-25 ft. lbs. *NOTE*—After throttle pressure is adjusted, adjust throttle control linkage:

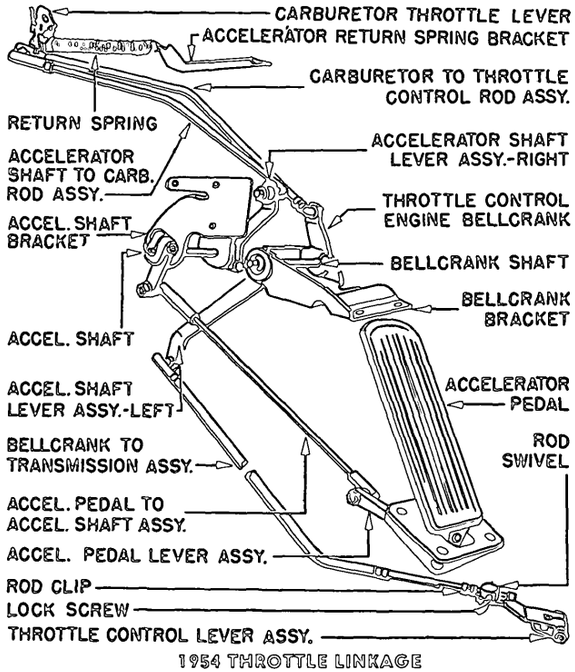
V8 Engine Models—Loosen the clamp nut on throttle control rod (midway between carburetor throttle lever and cross shaft lever), and slide rear part of rod toward rear of car to take up all slack. Tighten clamp nut and make sure that carburetor is off fast idle.

6 Cyl. Engine Models—Loosen vertical clamp bolt at rear of engine and adjust the carburetor throttle lever rod to provide 5 7/16" distance between the anchor points of the throttle return spring. Then, with engine idling (off fast idle), take up slack at the vertical rod and tighten clamp nut.

On All Models—After adjustment is made, move gearshift control lever on transmission one detent toward rear of car to put transmission into "N" (neutral). Remove pressure gauge and reinstall plug. Tighten to 10-12 ft. lbs.



1954 GEARSHIFT LINKAGE



1954 THROTTLE LINKAGE

(CHRYSLER & DE SOTO SHOWN—DODGE & PLYMOUTH SIMILAR)

BAND ADJUSTMENT

BAND ADJUSTMENT: *Kick-down (Front) Band can be adjusted externally, Reverse (Rear) Band adjustment requires removal of transmission case oil pan.*

Kick-down (Front) Band: *NOTE—Some models do not have band adjusting access hole in front floor pan (on left side of tunnel adjacent to accelerator pedal) and adjustment must be made differently from beneath car.*

Adjustment using Tool C-3291 (Cars with access hole in front floor). Remove accelerator pedal from hinged section of accelerator assembly, remove floor mat and access hole cover (on left side of tunnel immediately adjacent to accelerator pedal location). Then proceed as follows: Use Tool C-3291 (combination wrench and counter) to loosen adjusting screw locknut, check to see that adjusting screw is free in transmission case. Use Inch-pound reading torque wrench (Tool C-3380 or C-685) to tighten band adjusting screw to 60-72 In. Lbs. torque, then using counter on tool, back off the adjusting nut exactly 3 turns, hold the adjusting screw stationary and tighten the locknut securely.

Adjustment (cars without access hole in front floor)—Tool C-3291 cannot be used. Working from underneath car use a box wrench to loosen the band adjusting screw locknut (adjusting screw located on upper left side of transmission case in front of control lever assembly), back off locknut 4 turns (Chrysler & DeSoto), 9 turns (Dodge & Plymouth). Check to see that adjusting screw is free in transmission case. Use Inch-Pound reading torque wrench (Tool C-3380 or C-685) to tighten band adjusting screw to 60-72 In. Lbs. torque, mark adjusting screw position for reference and back adjusting screw off exactly 3 turns, hold adjusting screw stationary and tighten locknut securely.

Reverse (Rear) Band: Drain transmission case and remove oil pan. Remove locknut from reverse band adjusting screw (in reverse band lever at right rear within transmission case). Use Inch-Pound reading torque wrench (Tool C-3380 or C-685) to tighten adjusting screw to 20-25 In. Lbs. torque, then back adjusting screw off 10 turns. Install adjusting screw locknut, hold adjusting screw stationary and tighten locknut to 30-35 Ft. Lbs. Replace oil pan and refill transmission with fluid (see LUBRICATION).

ROAD TESTING TRANSMISSION: If transmission operation not satisfactory, following complete procedure is recommended to check performance and diagnose trouble:

FIRST—Make certain that engine properly tuned, idle speed correctly set at 475-500 RPM. with engine at normal operating temperature and selector lever in Neutral "N" position, and that transmission fluid level is correct. *CAUTION*—If throttle linkage disturbed in tuning engine, linkage must be adjusted before making following tests.

1) Move selector lever through all positions and check pointer with reference to gate and transmission detent positions. See LINKAGE ADJUSTMENT.

2) Start engine. Increase engine speed up to 800 RPM. checking for gear noise and dragging.

3) Move selector lever to "R" and check the shift for speed and smoothness. Back the car and check

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POWERFLITE (C nt.)

for gear noise and dragging. ***CAUTION—do not use wide open throttle in Reverse.***

4) Make a Stall Test to check for band slippage (see STALL TEST below). If band slippage indicated, adjust bands before proceeding with the test (see BAND ADJUSTMENT).

NOTE—Refer to "Transmission Shifting Speed" data for correct upshift and downshift speeds when making the following tests:

5) Accelerate car with very light throttle. Note speed at which upshift occurs and check smoothness of the shift. Slow the car to approximately 15 MPH. and rapidly accelerate to wide-open throttle **without going into the kick-down position.** Check for clutch slippage. Transmission should not downshift.

6) With car operating 15-20 MPH., make a kick-down shift by opening throttle to kick-down position, then release accelerator to approximately the half-throttle position so that transmission upshifts. Check smoothness of each shift.

7) With car operating at 35-40 MPH., make a kick-down shift by opening throttle to kick-down position, then release accelerator to closed-throttle position. Check smoothness of each shift.

8) With car operating at 45 MPH., make a kick-down shift by opening throttle to kick-down position, then accelerate car with transmission kicked down until transmission upshifts. Check this shift speed and smoothness of both shifts.

9) Slow car speed to 65 MPH. (Chrysler & DeSoto), 50 MPH. (Dodge & Plymouth) and attempt to make a kick-down shift at this speed. Transmission should not downshift (this speed is above kick-down limit).

10) Slow car to 40-50 MPH., move selector lever to "L." Transmission should downshift. Check for gear noise.

11) Increase car speed to approximately 20 MPH. and move selector lever to "D." Transmission should upshift. Coast car to a stop and check speed at which transmission downshifts. Check smoothness of shift.

TESTING

TRANSMISSION SHIFT SPEEDS

1954 Chrysler 6 & 8

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	60-75	10-14
Light	15-20	10-12
Kickdown Limit		45-60

1955 Chrysler C-67

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open ①	52-69	
Wide Open ②	51-61	
Light	13-16	10-12
Kickdown Limit		42-58

1955 Chrysler C-68, C-70

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open ①	56-74	
Wide Open ②	55-65	
Light	15-18	10-12
Kickdown Limit		45-63

1955 Chrysler C-69

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open ①	54-71	
Wide Open ②	53-63	
Light	14-17	10-12
Kickdown Limit		43-60

①—With 2-stage governor. See *Production Change* above.
②—With 3-stage governor. See *Production Change* above.

1954 DeSoto 6

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	49-63	
Light	13-18	
Closed		9-11
Kickdown Limit		34-48

1954 DeSoto 8

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	60-75	
Light	15-20	
Closed		10-12
Kickdown Limit		45-60

1955 DeSoto S-21

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	62-69	
Light	17-20	
Closed		10-12
Kickdown Limit		42-58

1955 DeSoto S-22

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	43-66	
Light	17-20	
Closed		9-11
Kickdown Limit		40-55

1954 Dodge 6 & 8

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	58-71	9-14
Light	14-19	9-11
Kickdown Limit		43-48

1955 Dodge 6

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	31-54	9-16
Light	12-15	9-11
Kickdown Limit		28-43

1955 Dodge 8

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	51-68	9-17
Light	13-16	9-11
Kickdown Limit		41-58

Early 1954 Plymouth ①

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	48-61	
Light	13-18	9-13
Kickdown Limit		33-46

Late 1954 Plymouth ①

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	43-55	
Closed	13-18	9-13
Kickdown Limit		28-40

Early 1955 Plymouth 6 ②

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	39-54	9-16
Closed	12-15	9-11
Kickdown Limit		28-43

Late 1955 Plymouth 6 ③

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	41-46	9-16
Closed	12-15	9-11
Kickdown Limit		34-44

Early 1955 Plymouth 8 ②

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	50-67	9-17
Closed	13-16	9-11
Kickdown Limit		40-56

Late 1955 Plymouth 8 ③

Throttle Position	Upshift (MPH)	Downshift (MPH)
Wide Open	50-59	9-17
Closed	13-16	9-11
Kickdown Limit		40-56

①—See *1954 Governor Production Change* above.
②—With early type 2-stage governor. See *Production Change* above.
③—With later type 3-stage governor. See *Production Change* above.

STALL TEST: Use an accurate tachometer to check the engine speed. With engine idling, move selector lever to "D" and note smoothness and speed of the shift. Set hand brake firmly and apply foot brakes to hold car, accelerate engine to wide-open throttle and check engine speed. Speed in excess of maximum RPM as indicated below may be caused by band slippage See "Band Adjustment."

1954 Stall Performance ①

Car Model	②Engine RPM
Plymouth, Dodge 6, DeSoto 8	1275-1375
Dodge 8	1400-1500
Chrysler C-63-2 & C-64	1400-1500
Chrysler C-63-1	1450-1550
Chrysler 6	1200-1300
DeSoto 6	1150-1250

1955 Stall Performance ①

Car Model	②Engine RPM
Chrysler C-67	1380
Chrysler C-68, C-69, C-70, C-300	1540
DeSoto S-21	1585
DeSoto S-22	1490
Dodge 6 Cyl.	1330
Dodge Royal	1450
Dodge Custom Royal	1465
Plymouth 6 Cyl	1330
Plymouth 157 HP. V8	1395
Plymouth 167 HP V8	1435

①—Wide open throttle, selector lever in "D" range, at sea level
②—Plus or minus 50 RPM

►***CAUTION—When making stall test do not hold throttle wide-open for more than a few seconds. If engine speed excessive and is not corrected by band adjustment. make additional checks as listed below.***

If excessive engine speed not due to incorrect band adjustment, check for: incorrect Gearshift Linkage or Throttle Linkage Adjustment; leakage at Valve Body mating surfaces; defective Throttle Valve, Shuttle Valve, or Valve Body End Cover Plug; defective Kick-down Servo parts (piston, guide, band, lever, strut, etc.).

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POWERFLITE (Cont.)

HYDRAULIC PRESSURE TESTS & TROUBLE SHOOTING: *CAUTION—Pressure difference from 15 lbs. to 250 lbs., will be found in making following tests and correct pressure gauge must be used.*

C-3292 (100 P.S.I.) Gauge—Use for Throttle Pressure, Governor Pressure and Lubrication Pressure checks.

C-3293 (300 P.S.I.) Gauge—Use for Line Pressure check.

Line Pressure: Remove ⅛" pipe plug from line pressure take-off hole (front left side of transmission case), install C-3293 (300 P.S.I.) pressure gauge at this point. Check Reverse oil pressure first (brakes off), then apply brakes to hold car and check the other points. Run engine at speed indicated in table below, check line pressure for each selector lever position as indicated.

Line Pressure

Gearshift Position	Engine RPM.	Pressure (P.S.I.)
R	1600	225-275
N	800	85-95
D	800	85-95
L	800	85-95

If line pressure not correct, check for: Low oil level or clogged oil strainer; defective Regulator Valve and Spring, Manual Valve and Lever, Throttle Valve, Cam, and Spring; Oil Leakage at Valve Body or Regulator Body mating surfaces; defective Kick-down Piston and related parts; defective Reverse Piston and related parts; Worn Front Pump or defective pump drive sleeve or pinion.

Direct Clutch Pressure: *(NOTE—Check line pressure before checking direct clutch pressure as any deviation in line pressure will affect direct clutch pressure).* Remove ⅛" pipe plug from direct clutch pressure take-off hole located at bottom of kickdown servo boss on right side of transmission (directly above filler tube connection on side of transmission). Connect a 300 lb. pressure gauge at this point. With rear wheels raised and free to turn, accelerate engine slowly until an upshift occurs. During the upshift, the pressure should rise rapidly from 0 to 90 lbs. pressure in 1½-2 seconds. With an engine speed of not less than 650 RPM, and transmission upshifted, the direct clutch pressure should read within 10 lbs. of line pressure. *If direct clutch pressure not correct*, refer to "Shift Quality", and "Excessive Engine Speed on Upshifts" in "Trouble Shooting & Diagnosis" below.

Throttle Pressure: Remove ⅛" pipe plug from throttle pressure take-off hole (right center of transmission case between the servos), install C-3292 (100 P.S.I.) gauge at this point. Apply brakes to hold car, place selector lever in "D" position, run engine at speed indicated in table below and note throttle pressure at each speed.

Throttle Pressure

Throttle Opening	Engine RPM.	Pressure (P.S.I.)
Closed	Idle	13-15
Wide-open	Stall	80-90

▷*CAUTION—When making above test do not hold throttle wide-open for more than a few seconds. If engine speed exceeds 1500 RPM. (indicating band slippage), refer to STALL TEST above for recommended checks.*

If throttle pressure not correct, check Line Pressure (above), and also check for: incorrect Throttle Linkage adjustment; leakage at Valve Body mating surfaces; defective Throttle Valve, Cam, and Spring; defective Throttle Pressure Check Ball or Kick-down Valve Ball and Rod; defective kick-down piston or related parts.

Governor Pressure: Remove ⅛" pipe plug from governor pressure take-off hole on lower left side of output shaft support (plate between transmission case and extension housing), install C-3292 (100 P.S.I.) gauge at this point. Support car securely with rear wheels off the floor so that they are free to turn, place selector lever in "D" position, run engine at car speed indicated (as noted on speedometer), note governor pressure in each speed range.

Governor Pressure

1954 Chrysler

Car Speed (MPH)	Pressure P.S.I.
14-17	15
24-27	45
58-65	60

1955 Chrysler C-67

Car Speed (MPH)	Pressure P.S.I.
13-15	15
23-32	45
51-61	60

1955 Chrysler (Except C-67)

Car Speed (MPH)	Pressure P.S.I.
14-16	15
25-34	45
55-65	60

1954 DeSoto S-20

Car Speed (MPH)	Pressure P.S.I.
12-14	15
22-26	45
46-53	60

1954 DeSoto S-19
1955 DeSoto S-21 & S-22

Car Speed (MPH)	Pressure P.S.I.
14-17	15
24-27	45
56-63	60

1954-55 Dodge

Car Speed (MPH)	Pressure P.S.I.
13-16	15
23-26	45
55-62	60

Early 1954 Plymouth①

Car Speed (MPH)	Pressure P.S.I
14-17	15
24-27	45
58-65	60

Late 1954 Plymouth②

Car Speed (MPH)	Pressure P.S.I.
12-14	15
19-23	45
41-48	60

①—With early type governor. See *Production Change* above.
②—With later type governor. See *Production Change* above.

1955 Plymouth 6

Car Speed (MPH)	Pressure P.S.I.
12-14	15
19-23	45
41-48	60

1955 Plymouth 8

Car Speed (MPH)	Pressure P.S.I.
13-16	15
23-26	45
55-62	60

If governor pressure not correct, check for: leakage at Valve Body mating surfaces or Output Shaft Support gaskets, defective Governor assembly, defective Rear Pump.

Lubrication Pressure: Check only when there is reason to suspect that it is incorrect. Connect gauge in oil cooler return line as follows: Disconnect cooler return line from flared tube connector fitting at upper left side of output shaft support (between transmission case and extension housing), install a ⅛" short pipe nipple and ⅛" pipe tee at this point, connect the flared tube connector fitting which was removed from the transmission into the tee, connect C-3292 (100 P.S.I.) gauge to the other side of the tee, connect oil cooler return line to the flared tube fitting *(CAUTION—always place a flared tube nut in the flared tube fitting when screwing it in or out to prevent crushing the fitting).* Run the engine at 800 RPM. with selector lever in "N" and note lubrication pressure which should be 10-20 P.S.I.

If lubrication pressure is not correct, check for: leakage at Regulator Body mating surfaces or at Output Shaft Support gaskets; defective Converter Control Valve; defective Front Pump Drive Sleeve; defective Reaction Shaft seals or worn reaction shaft bore; defective Input Shaft seal rings; plugged lubrication holes

TROUBLE SHOOTING & DIAGNOSIS

EXCESSIVE SLIPPAGE:

All Ranges—Inspect oil level. Adjust gearshift linkage Check oil pressure; if low, inspect regulator valve and torque converter control valve for sticking Inspect valve body in transmission case mating surfaces for evidence of oil leakage

Kickdown—Readjust throttle linkage and kickdown band Inspect valve body to transmission case mating surfaces for evidence of oil leakage. Check operation of throttle valve and note wear of valve bore and cam Check spring. Check valve body end cover for oil leakage Check shuttle valve for free movement. Inspect kickdown piston and guide for binding Inspect spring Inspect band lining for wear and band lever for free movement

Kickdown (Over 25 MPH)—Inspect valve body end cover for oil leakage. Inspect shuttle valve and plug for free movement. Inspect spring

Direct—Inspect valve body to transmission case mating surfaces for evidence of oil pressure leakage. Check kickdown piston for binding. Check shaft seal rings and clutch retainer bushing for wear. Check clutch discs, piston and clutch check valve

Reverse—Check reverse band adjustment Inspect transmission case to valve body mating surfaces for evidence of oil pressure leakage. Inspect

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

reverse servo assembly for wear or binding Inspect reverse lever and linkage for free movement

Hill Climbing—Insufficient oil will result in low pressures to kickdown servo or direct clutch if oil level is low

SHIFT PATTERN:

No Upshift—Check oil level and gearshift linkage adjustment Check governor and throttle pressure If there is no pressure rise when accelerating engine in direct drive, governor valve may be stuck closed Check valve body to transmission case for parallelism Check manual valve and lever for correct detent engagement Check shift valve for free operation and shift valve spring for breakage Check kickdown piston assembly Check rear pump drive pinion Drive pinion ball may be cracked or broken, permitting pinion gear to slip Inspect clutch ball check for proper operation Ball check valve must operate freely and seat properly

No Shift in "D" (Drive) Range and an Upshift In Low Range—The cause is the governor valve sticking open This can be verified by checking governor pressure (see "Governor Pressure Test" above) If governor pressure exceeds the pressures indicated in table, governor valve is possibly stuck and in most cases can be corrected in the following manner Clean off area around governor pressure take-off plug and remove plug Cover oil filler tube with a cloth or plug and hold firmly to prevent air from forcing transmission oil out through filler tube Screw a piece of ⅛" pipe into hole to help direct air into unit Apply clean filtered air to pipe in short blasts, tapping parking brake drum at same time with a rubber hammer just enough to jar governor After applying air pressure, recheck governor pressure and see if valve has been freed up In cases where governor pressure is still to high, it will be necessary to remove transmission extension case for further inspection

Low Upshift Pattern—Readjust throttle linkage Check governor pressure Governor valve may be binding or sticking Inspect the rear pump assembly Check valve body to transmission case for parallelism Check operation of throttle valve and inspect cam and spring Check shift valve for free operation and spring for breakage

Low Upshift Pattern at Heavy Throttle—Inspect regulator valve, throttle valve, and governor for burrs or dirt which may cause binding or sticking Inspect the regulator spring

High Upshift Pattern—Readjust throttle linkage and check both throttle and governor pressures Adjust throttle pressure if necessary If throttle pressure does not rise according to speeds on chart (see "Throttle Pressure" above), throttle valve may be sticking Inspect for dirt or burrs Inspect throttle cam for wear Check valve body to transmission case for parallelism Check shift valve spring If governor pressure does not correspond to pressures indicated in "Governor Pressure" table above, remove governor and inspect valve for sticking Check rear pump gears for wear, broken teeth or excessive clearance Inspect pump drive pinion ball

All Upshifts Below 14 MPH—Inspect throttle valve, cam and spring Check throttle pressure check ball Check governor valve for sticking

Erratic Shifting—Check oil level Inspect valve body to transmission case for parallelism Check action of shift valve Inspect governor support gaskets for oil leakage

No Downshift—Check governor pressure High initial pressure indicates valve is stuck open Remove governor and inspect Inspect shift valve action, check spring

Low Downshift Speed—Governor valve is stuck open Remove and clean and check for burrs and dirt

High Downshift Speed—Readjust gearshift linkage Inspect valve body to transmission case for parallelism Inspect manual valve and lever Inspect kickdown valve and ball

No Kickdown—Adjust throttle linkage Inspect valve body to transmission case for parallelism Inspect throttle valve, cam and spring Also inspect kickdown valve and shift valve components

Low Kickdown Limit—Check governor pressure Governor valve may be sticking due to dirt Inspect regulator valve and spring for proper operation Inspect rear pump gears and drive pinion ball Check valve body cover plate for parallelism

SHIFT QUALITY:

Harsh Shift from Neutral to Reverse—Adjust engine idle speed Readjust rear band Inspect condition of the reverse band, strut and linkage Inspect the reverse servo piston, spring valve and rings

Harsh Shift from Neutral to Drive—Adjust engine idle speed Adjust throttle linkage Inspect kickdown servo pistons, springs, guide, rod and piston rings

Delayed Shift from Neutral to Drive—Adjust kickdown band Inspect condition of band, strut, lever and lever shaft

Excessive Engine Speed Increase on Upshifts—Check oil level and adjust throttle linkage Inspect regulator valve and spring and check operation of valve in regulator body Check valve body mating surface for parallelism Inspect throttle valve, cam and spring Check operation of valve in valve body Inspect kickdown piston components Check mating surfaces of regulator valve body and transmission for parallelism Inspect reaction shaft seal ring for deterioration Inspect input shaft oil seal rings for wear or breakage and condition of reaction shaft bore Inspect clutch retainer bronze bushing If worn below bronze surface, replace retainer Inspect condition of reaction shaft oil seal rings for wear or broken ends Inspect condition of clutch plate and condition of friction material on seal ring Check clutch check valve ball

Excessive Engine Speed Increase on Upshifts at Light Throttle—Check line pressure Inspect front oil pump gears for wear and excessive clearance

Harsh Upshift—Adjust throttle linkage Inspect regulator valve and spring Check for sticking shuttle valve Check valve body mating surfaces for parallelism Inspect throttle valve, cam and spring Inspect kickdown piston components Check regulator valve body mating surfaces for parallelism Inspect direct clutch spring, spring retainer, and snap ring

Harsh Lift Foot Shift—Adjust throttle linkage Check valve body mating surface Check operation of throttle valve Inspect valve, valve bore, cam and spring Inspect servo pressure bleed valve for dirt Check operation of shuttle valve Inspect shuttle valve, plug, inner and outer springs, and guide pin

Excessive Engine Speed Increase on Downshift at Part Throttle—Check oil level and adjust throttle and gearshift linkage Check valve body mating surface Check operation of manual valve and valve lever Inspect servo restrictor valve and operating plug Check plug for free operation Check valve spring for distortion or looseness

Harsh Downshift—Adjust engine idle speed and throttle linkage Inspect valve body mating surface Inspect throttle valve, cam and spring for proper operation Inspect for dirt, burrs or wear, or breakage Inspect servo restrictor valve for proper operation Inspect clutch plates and disc friction material Inspect the piston for wear or scoring Check seal for wear or deterioration which would result in leakage Inspect thrust washers for excessive wear

Excessive Increase in Engine Speed on Kickdown—Readjust kickdown band Check regulator valve and spring for proper operation Inspect for dirt wear or breakage Check valve body mating surface for nicks, burrs and trueness, which would cause leakage Check operation of servo restrictor valve and shuttle valve Inspect valve and plug for dirt, burrs or wear Inspect all parts of kickdown piston assembly Inspect piston rings for excessive wear or broken ends Check governor valve for wear, dirt binding or sticking Inspect rear pump gears for excessive wear or broken teeth Check pump clearance, drive pinion gear and pinion ball

Harsh Kickdown—Adjust kickdown band Inspect regulator valve and spring Inspect for dirt burrs or breakage Inspect servo pressure bleed valve for dirt Check operation of shuttle valve Check valve and plug for burrs, dirt or excessive wear Inspect all parts of kickdown piston assembly Inspect piston rings for scoring, wear or broken ends Inspect regulator valve body mating surface for nicks, burrs and trueness which would cause leakage Inspect reaction shaft neoprene seal for deterioration Inspect governor valve for free operation Check for dirt which would cause sticking Inspect rear pump gears for excessive clearance, worn or chipped teeth Inspect drive pinion gear and drive pinion ball Inspect the input shaft seal rings for excessive wear or broken ends and reaction shaft bore for scoring Inspect all parts of the direct clutch assembly

OIL PRESSURE:

No Governor Pressure—Governor valve may be stuck in closed position due to dirt To free valve, apply a short spurt of high air pressure (90 lbs) to governor pressure take-off hole and at same time tap transmission extension housing with a rubber mallet Before applying air pressure, cover filler tube with a cloth In addition, drain two or three quarts of oil from transmission oil pan After air is applied, reinstall governor pressure take-off plug and run transmission in Reverse a few seconds Recheck governor pressure This corrective procedure may not be permanent If valve becomes stuck again, remove governor for servicing If pressures do not correspond to those indicated in "Governor Pressure" table above, the governor may need service However, before servicing governor, check the other points in the transmission that could

CONTINUED ON NEXT PAGE

POWERFLITE (Cont.)

cause low pressure as follows: Check the valve body mating surface for trueness, nicks or burrs. These could cause oil leakage. Check both output shaft support gaskets for evidence of internal leakage. Check operation of governor valve and inspect for foreign matter. Check the rear pump gears for broken teeth, wear, and excessive clearance. Check the mating surface of output shaft for trueness, burrs or nicks.

High Initial Governor Pressure—High governor pressure at low engine speeds is due to the governor valve being stuck in the open position, usually caused by dirt *(see "No Governor Pressure" above)*, for clearing with air pressure.

Line Pressure—If line pressure does not correspond to pressures indicated in "Line Pressure" table above, it will be necessary to investigate and make the following adjustments or corrections: Check transmission oil level. Inspect regulator valve for free operation, dirt or burrs, and condition of valve spring. Check valve body mating surface for trueness, nicks or burrs. Check operation of manual valve and lever. Inspect front pump gears for worn or chipped gears. Check clearance between gears and face of housing.

Throttle Pressure—If throttle pressures do not correspond to pressures indicated in "Throttle Pressure" table above, check line pressure and make the following adjustments and corrections: Adjust throttle linkage. Inspect operation and condition of regulator valve and spring. Check valve body mating surfaces for nicks, burrs and trueness. Check operation and condition of throttle valve, cam and spring. Check throttle pressure check valve ball for nicks and dirt. Inspect condition of kickdown rod and ball.

Direct Clutch Pressure—Direct clutch pressure should be approximately 10 lbs. lower than line pressure with transmission upshifted and engine speed not lower than 650 RPM. If not, refer to "Excessive Engine Speed on Upshifts" above. A pressure drop between line pressure and direct clutch pressure as high as 25 lbs. may be due to broken or damaged seal rings in the direct clutch circuit. These are: three interlocking type input shaft seal rings; the direct clutch piston retainer seal ring, direct clutch piston neoprene seal ring, the neoprene reaction shaft seal ring, and the two interlocking type reaction shaft seal rings.

Lubrication Pressure—Lubrication pressure is checked at the upper left side of the output shaft support, Remove the ⅛" pipe plug and use 100 lbs., pressure gauge C-3292 to check pressure. Lubrication pressure should be 35 to 50 lbs. pressure with transmission in neutral and engine speed at fast idle. If pressure readings are incorrect, check line pressure and inspect torque converter control valve. Low pressures may be due to internal oil leakage at the following points: drive sleeve seal ring, regulator valve body mating surface, reaction shaft seal ring, output shaft support gaskets, input shaft seal rings, and reaction shaft bore. Low oil pressure may also be caused by plugged lubrication lines.

IMPROPER RESPONSE TO GEARSHIFT SELECTOR LEVER POSITIONS:

Moves Forward in "N" (Neutral)—Adjust gearshift linkage. Adjust kickdown band. Inspect manual valve lever assembly. Check valve body mating surface for nicks, burrs and trueness which would cause leakage. Check operation of manual valve. Inspect all parts of kickdown piston. Check regulator body mating surface for nicks, burrs and trueness. Check clutch discs and plates for warpage which would cause dragging. Inspect clutch ball check.

Car Moves Forward in "N" (Neutral) at High Engine Speed—Clutch check valve ball bleed hole may be plugged causing centrifugal oil pressure to partially engage the direct clutch. A slight surge which is not continuous is normal.

Car Moves Backward in "N" (Neutral)—Readjust gearshift linkage and inspect manual valve and valve lever for proper engagement. Adjust reverse band, levers, strut, and shaft. Check for binding, dirt, excessive wear.

MISCELLANEOUS DIAGNOSIS PROCEDURES:

Starter Will Not Energize—Adjust gearshift linkage. Test neutral starter switch. Inspect manual valve lever for proper engagement.

Hard Shifting Into "N" (Neutral)—Check operation of neutral starter switch and inspect manual valve lever.

Hard Shifting Into "R" (Reverse)—Check operation of backup light switch and manual valve lever.

Oil Foams From Filler Tube—Check fluid level in transmission. Inspect transmission breather vent.

PARTS REMOVAL & INSTALLATION (TRANSMISSION IN CAR)

▷*NOTE: Transmission must be removed from vehicle for the removal and replacement of parts other than those listed below.*

Oil Pan: Remove oil pan filler tube, drain transmission and remove oil pan attaching screws and oil pan. When installing pan, tighten screws evenly and torque to 12-17 ft. lbs.

Governor Servicing: *NOTE—It is necessary to remove transmission extension to remove governor assembly. See "Transmission Overhaul" below for Extension Housing Removal, Governor Removal, Overhaul & Installation.*

Valve Body & Transfer Plate Assembly (Removal): Remove oil pan and disconnect throttle and manual control lever linkage from levers. Loosen throttle and manual control lever assembly locking screws. Slide throttle valve operating lever assembly off shaft and remove throttle valve camshaft felt retainer and felt. Slide manual valve lever assembly off shaft and remove valve lever shaft seal cover. Remove the two oil strainer support screws and washers and take the strainer assembly off valve body and plate assembly. Remove transfer plate screws and lock washers and remove valve body and transfer plate assembly. For overhaul. *See "Valve Body Overhaul" below.*

Installation—Clean mating surfaces and check for burrs on both transmission case and valve body transfer plate. Place valve body and transfer plate assembly into position and install plate screws and lockwashers *(CAUTION—The two 1⅝" screws go through transfer plate cover on valve body. The three 1⅛" are used in the other holes)*. Tighten evenly to 12-17 ft. lbs. torque. Make sure the two oil strainer tube seals are in position over oil strainer and place oil strainer assembly into position on transfer plate. *(CAUTION—Check to see that oil tubes on strainer properly enter valve body)*. Install the two oil strainer support screws and torque to 12-17 ft. lbs. Place manual lever shaft seal cover over manual valve lever shaft and slide into position on transmission case. Install manual lever (arm side of lever against cover) on manual valve lever shaft, and tighten locking screw. Place throttle valve camshaft felt and retainer over throttle valve shaft. Install throttle valve lever assembly on throttle camshaft and tighten locking screw. Check operation of control by shifting into all positions. Check kickdown operation and manual lever contact on neutral safety and back-up light switches. Install oil pan and adjust throttle linkage and gearshift linkage.

Manual Control Valve Lever Shaft Oil Seal Removal & Installation: Remove oil pan, valve body and transfer plate assembly. Using a suitable brass drift, drive seal out of transmission case from below. To install, use tool C-3277. Start seal squarely into bore and tighten tool C-3277 until it is flush with the case. This properly positions seal. Install valve body and plate assembly and oil pan.

Kickdown Piston (Removal): Remove oil pan, valve body and transfer plate assembly. Loosen kickdown band adjusting screw locknut and back adjusting screw out sufficiently to permit kickdown band strut to be removed by compressing band ends. With kickdown band lever hanging down, install tool C-3289 on transmission case. Apply sufficient pressure on kickdown rod guide to permit easy removal of the snap ring. Loosen compressing portion of tool and remove piston rod guide, piston spring and kickdown piston rod assembly (the kickdown piston cushion spring will fall out of piston when rod assembly is removed). Using snap ring pliers, inserted inside of kickdown piston, remove piston from transmission case. *See "Overhaul" below, for disassembly and inspection.*

Installation—Make sure the two interlocking seals are locked in position and all seals are coated with Lubriplate, then place kickdown piston into transmission case. With one hand apply pressure to piston and at the same time carefully compress bottom seal and push piston into case. *(CAUTION—*After bottom seal has entered, piston will seem to hang at two different locations while being pushed into case. This is due to seals entering cylinder, do not use extreme force. If any rings should be broken when piston assembly is being installed, transmission will not operate properly.) Slide piston spring over kickdown piston rod assembly then balance piston cushion spring on rod assembly (Lubriplate may be used to help hold cushion spring in position on rod assembly), and install in piston. Holding it in this position, install kickdown piston rod guide assembly on piston rod assembly. Using tool C-3289, and extreme care, compress the kickdown piston spring to the point that piston guide seal slightly binds on transmission case. Work seal into position and gradually compress spring until seal enters case and snap ring can be installed. Install kickdown piston rod guide snap ring, making sure it is properly seated. Loosen compression portion of tool and remove tool from transmission case.

CONTINUED ON NEXT PAGE

POWERFLITE (Cont.)

With one end of band fit over adjusting screw, compress the other end sufficiently to install the kickdown band strut between kickdown band and band lever *(CAUTION—Make sure band strut slot engages with kickdown band strut pin in band end)*. Install valve body, plate assembly and oil pan. Adjust kickdown band.

Reverse Servo (Removal): Remove oil pan, valve body and transfer plate assembly. Loosen reverse servo adjusting screw locknut and back adjusting screw out sufficiently to permit reverse band strut to be removed by compressing band ends. Remove reverse servo piston sleeve. Mount tool C-3289 on transmission case and compress reverse piston spring retainer. Using a screwdriver, remove the reverse servo piston and valve assembly spring retainer snap ring and loosen compressing part of tool (Spring retainer may require guiding out of transmission case). Remove spring retainer, spring, reverse servo piston and valve assembly from transmission case. Using C-3229 pliers, remove the reverse servo piston valve spring snap ring, and remove spring and valve from piston. *See "Overhaul" below, for disassembly and inspection.*

Installation—Place reverse servo piston valve and spring in reverse servo piston (shaft on valve protruding through hole in bottom of piston). Using snap ring pliers C-3229, install reverse servo piston valve spring snap ring, making sure it is properly seated. Coat reverse servo piston ring (neoprene) with Lubriplate. Insert reverse servo piston and valve assembly into transmission case in a cocked position, then by rotating piston, the ring will enter case without being damaged. Place reverse servo piston spring over piston and position spring retainer over spring. Using tool C-3289, compress spring sufficiently to install snap ring. Make sure retainer is correctly installed, and snap ring seated. Remove tool C-3289 from transmission case and install reverse servo piston sleeve. Make sure piston sleeve slides freely on piston by working it up and down. Hook one end of reverse band assembly in reverse link assembly, compress other end sufficiently to install reverse strut in slots of reverse band assembly and reverse band lever assembly. Adjust reverse band. Install valve body, transfer plate and oil pan.

Speedometer Pinion (Removal & Installation): Disconnect speedometer cable and housing from sleeve assembly on transmission, and remove speedometer pinion and sleeve. When installing sleeve and pinion assembly, torque it to 40-45 ft. lbs.

Neutral Safety and Back-Up Light Switch Removal & Installation Note: It is not necessary to drain transmission to remove these switches. A small amount of lubricant will drain from transmission when these switches are removed. When installing, tighten switches to 15-20 ft. lbs.

Transmission Output Shaft Rear Bearing Oil Seal (Removal): Disconnect the front universal joint and secure shaft to frame out of the way. Apply hand brake and remove propeller shaft flange nut and washers. Release hand brake and install puller C-452. Remove propeller shaft flange and drum assembly. Remove transmission support grease shield spring (small one). Remove brake support grease shield from extension housing *(CAUTION—If screwdriver or sharp instrument used to remove shield, do not damage the neoprene sealing surface at bottom of shield)*. Install puller C-748 and remove rear bearing oil seal.

Installation—Install rear bearing oil seal with tool C-3205. Install brake support grease shield on extension housing *(CAUTION—Indent on grease shield must match groove in housing for correct positioning. Install grease shield far enough on housing to permit installation of spring)*. Install brake support grease shield spring with opening in spring toward adjusting sleeve. Make sure spring is properly seated in groove. Make sure brake adjustment is backed off and install drum assembly (In some instances it may be necessary to use tool C-496 to press drum assembly on output shaft). Install propeller shaft flange washer, shakeproof washer and nut. Adjust hand brake. Apply hand brake and torque propeller shaft flange nut to 140-160 ft. lbs. Connect front universal joint.

Transmission Regulator Valve Assembly (Removal): Remove transmission regulator valve spring retainer, gasket, and spring. Using a mechanical retriever or a piece of welding rod inserted in end of valve, remove valve.

Installation—Place valve in position in valve body. Install regulator valve spring, gasket, and retainer and tighten to 45-50 ft. lbs. torque.

Torque Converter Control Valve Assembly (Removal): Remove control valve spring retainer, gasket, and spring. Using a mechanical retriever or a piece of welding rod inserted in end of valve, remove valve.

Installation—Reverse removal procedure.

Oil Cooler (Removal): Drain radiator, remove battery and battery pan. Remove lower radiator-to-cooler hose. Remove inlet and outlet oil tubes. Remove oil cooler to water pump flange bolts.

Installation—Clean mating flanges thoroughly and install new flange gasket. Install cooler to water pump and tighten flange bolts. Install inlet and outlet oil tubes. Install lower radiator-to-cooler water hose. Install battery and battery pan. Refill radiator and start engine. Check carefully for water and oil leaks.

TRANSMISSION REMOVAL

1) Disconnect battery and raise car off floor. Drain transmission and torque converter. When fluid has drained, replace drain plug. Disconnect oil pan filler tube from oil pan. Disconnect front universal joint and secure shaft to frame out of the way.
2) Remove adjusting screw cover plate and cable clamp bolt from hand brake support. Disconnect speedometer cable from transmission extension. Disengage ball end of cable from hand brake operating lever and remove cable from brake support.
3) Disconnect neutral safety and back-up light switch wires at switches and unclip wires from crossmember. Disconnect manual and throttle control linkage from levers. If car equipped with oil cooler, disconnect cooler lines from transmission case and remove bracket holding lines to cylinder block. On all models remove screws holding exhaust pipe bracket to transmission case.
4) Remove bracket holding oil cooler lines to cylinder block. Remove nuts and lockwashers holding engine rear support insulator to cross-member, leaving insulator attached to transmission.
5) Install engine support fixture tool C-3245, insert hooks of fixture firmly into holes in side of frame member with support ends up; against the underside of oil pan flange. Adjust fixture to support weight of engine. Raise engine slightly, remove cross-member to frame bolts and remove crossmember.

▷*CAUTION—When using tool C-3245, do not lower engine more than three inches from floor boards to avoid disrupting the set position of water hoses and other engine attachments.*

6) Remove the two upper transmission-to-adapter screws and lockwashers and install guide studs C-3276. Remove the lower screws and slide transmission straight back to avoid damage to converter driving sleeve, then lower transmission to floor.
7) If front oil pump drive sleeve remained in the torque converter hub when transmission removed, remove the sleeve and inspect. Check driving lugs and machined surfaces for burrs and wear. Check ring for broken ends and freeness in ring groove.

TRANSMISSION INSTALLATION

1) Install guide studs C-3276 in the two upper transmission case-to-adapter screw holes. Lubricate front oil pump drive ring sleeve and bearing surface with Lubriplate and install in torque converter hub making sure drive lugs are properly engaged. Note position of driving lugs on front oil pump drive sleeve, then position front oil pump pinion in same way to aid in proper engagement when transmission installed.

2) Slide transmission over guide studs and into position. Make sure drive lugs on front oil pump drive sleeve properly engage front oil pump pinion. *(CAUTION—To avoid damage to front oil pump, do not attempt to use transmission-to-adapter screws to bring transmission and adapter together. If oil pump drive sleeve and input shaft have been properly aligned, the transmission should slide into position relatively easy. DO NOT FORCE.)*
3) Install the two lower transmission-to-adapter screws and lock washers, do not tighten. Remove guide studs and install the two upper transmission case-to-adapter screws and lock washers, then draw all four down evenly and tighten to 45-50 ft. lbs. torque.
4) Place cross-member into position and install crossmember-to-frame bolts, tightening them to 50-55 ft. lbs. torque. Lower engine and at same time align mounting holes in extension of transmission with holes in crossmember. Install the two nuts and lockwashers that hold engine rear support insulator to crossmember and tighten to 30-35 ft. lbs. torque. Remove support fixture from side of frame member.
5) From this point, reverse the removal procedure as indicated above. Refill transmission and adjust manual and throttle control linkage. *See "Manual & Throttle Control Linkage" above.*

TORQUE CONVERTER REMOVAL

1) With transmission removed, turn front wheels to extreme right and remove starter motor. Remove the transmission case adapter screws and lockwashers and remove transmission from car. Remove Remove lower half of flywheel housing.

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

►*NOTE*: If torque converter being removed because of excessive runout damage, check by using dial indicator on hub and mark the highest point of runout on both converter and crankshaft flange. The reason for this is so it may be determined later if runout was caused by the converter or crankshaft, after crankshaft has been checked in the same manner.

2) Using tool C-811, remove the eight torque converter stud nuts and lockwashers from crankshaft flange. Remove torque converter from crankshaft.

►*NOTE*—Check crankshaft flange runout. Maximum is .002".

STARTER RING GEAR REPLACEMENT (REMOVAL): Support torque converter assembly in a vise and carefully remove staking lugs, retaining ring gear to torque converter, with a file *(CAUTION*—Be careful when supporting torque converter in vise to avoid distortion). Place torque converter on blocks of wood, and using a blunt chisel or drift, tap around ring gear until it comes off converter.

Installation of Ring Gear—Remove burrs or raised spots on torque converter with a file, being careful not to remove more metal than is necessary. Any of the following methods for expanding the ring gear can be used in the manner outlined.

Oven—Set temperature at 150° and allow ring gear to remain for 15 to 20 minutes.

Boiling Water—Place ring gear in shallow container, add water and heat for approximately two minutes.

Flame—Place ring gear on a flat surface. Using a medium size tip, direct a slow flame around inner rim of gear, being careful not to direct flame onto teeth of ring gear. Place a few drops of water on face of gear at short intervals during heating process. When gear is hot enough to boil the drops of water, installation of gear to torque converter can be made.

When gear properly expanded, proceed as follows: Place starter ring gear over flange surface of torque converter, making sure that rear face of gear contacts flange on torque converter evenly around the entire diameter. Reweld ring gear to torque converter, *using extreme care to place as nearly as possible the same amount of metal in exactly the same locations as original assembly.* This is necessary to maintain proper balance of the unit. Place weld alternately on opposite sides of the converter to mimimize distortion. Clean thoroughly before installing in car.

►*RING GEAR WELDING NOTE:* Use a welding current of 200 amps. and 5/32" Fleet-Weld No. 27, or General Electric No. W28 rod, or their equivalent.

►*WELDING CAUTION:* To prevent burning through the torque converter, the arc should be directed at the intersection of gear and housing from an angle of approximately 45° from the face of the gear. DO NOT GAS WELD.

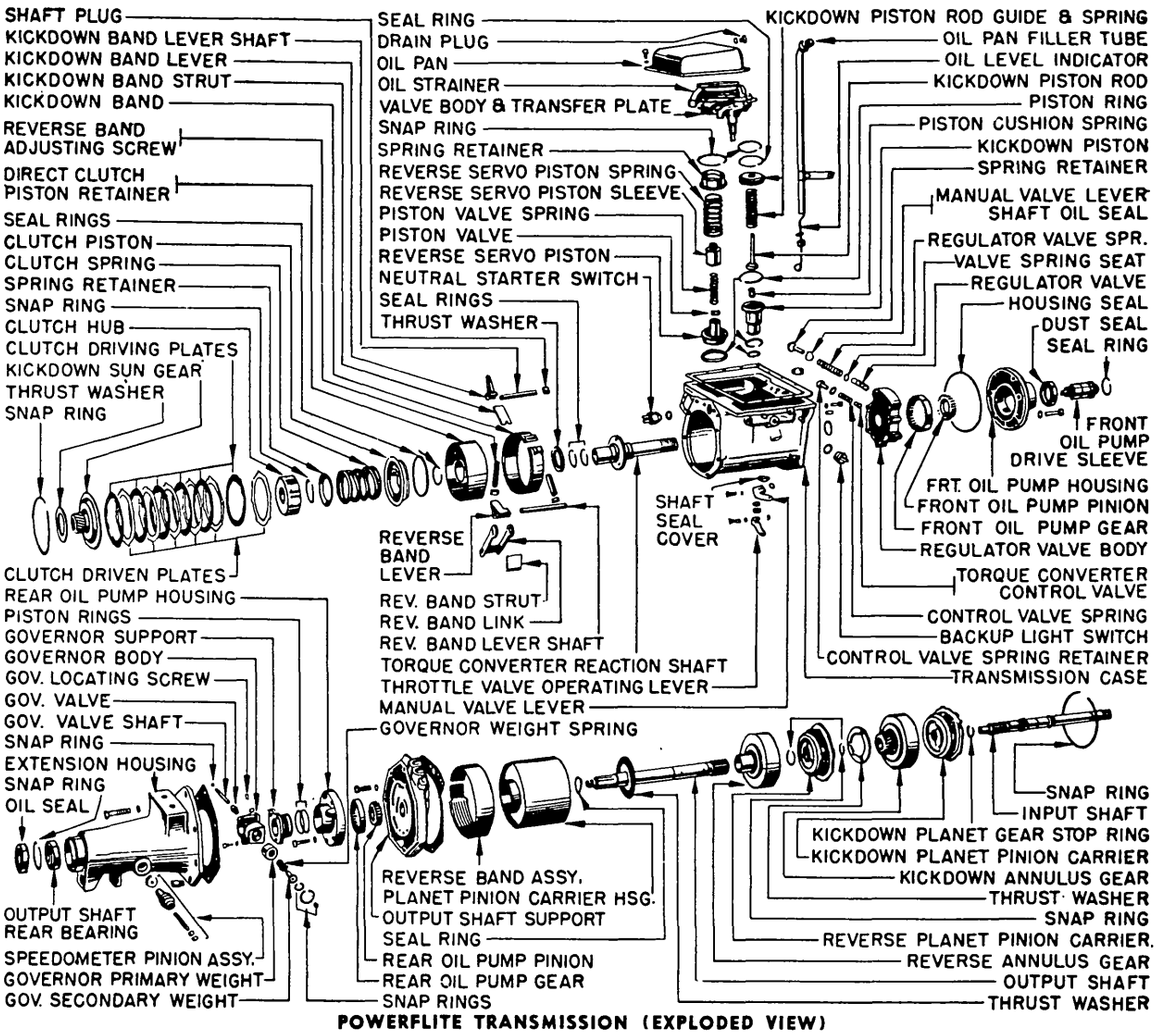
TORQUE CONVERTER INSTALLATION

►*TORQUE CONVERTER HUB RUNOUT NOTE:* When torque converter assembly is removed for any reason from crankshaft drive flange, the converter assembly runout should be checked when reinstalled. There are two methods for adjusting the hub runout. *See "Torque Converter Hub Runout Adjustment" below.*

1) Inspect mating surfaces of torque converter and crankshaft flange for burrs and dirt. Install torque converter on crankshaft flange. Install eight torque converter stud nuts and draw down evenly and tighten. Install lower half of flywheel housing and starter motor.

2) Install transmission case adapter on flywheel housing and tighten to 25-30 ft. lbs. torque. Install transmission (see above). Refill torque converter as follows:

3) Fill transmission with Automatic Transmission Fluid (Type A) to "full" mark on dipstick. This will take approximately 5 qts. Run engine at idle speed in neutral for approximately two minutes, then add 8 qts. of fluid to bring oil level to "full" mark on dipstick. Allow engine to run until normal operating temperature is reached. Set handbrake and shift selector lever through all ranges and return it to "N", recheck level and add fluid to bring level to "full" mark. *CAUTION—Fluid should NOT BE ABOVE THE FULL MARK.*



POWERFLITE TRANSMISSION (EXPLODED VIEW)

TORQUE CONVERTER RUN-OUT ADJUSTMENT

►*NOTE—Two methods, as follows, can be used to adjust torque converter run-out.*

Heat Method: *(CAUTION—When using this method, extreme caution must be used to prevent burning the metal and causing irreparable damage. Sufficient heating of this unit, to cause the necessary drawing of metal required, is accomplished in just a few seconds. DO NOT OVERHEAT).* Remove transmission, torque converter housing and dust shield. Mount Torque Converter Hub Alignment Indicator C-430 on adapter plate. Rotate converter through 360° and mark high point on converter with chalk, then rotate converter to move the high point to the top. Apply heat 180°

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POWERFLITE (C nt.)

from the high point at opposite side of converter shell at **high point of radius**. Use a No. 3 acetylene torch burner, moving the flames at all times in a circular motion about the size of a dime. When the spot begins to change color remove the flame and quench the converter with a water soaked rag. Change rags several times (the more quickly converter is cooled, the greater the drawing on the metal). Before checking hub runout make certain that both sides of the converter are the same temperature. If runout exceeds .004" at the same point, repeat operation. *(CAUTION—*It is possible to draw the metal excessively, thus causing runout at opposite side. If this occurs, reheat converter 180° from original point).

Shim Method: Determine hub runout in the same manner as for "Heat Method" above. Loosen converter drive flange nuts sufficiently to insert shims of proper thickness 180° from indicated high point. The thickness of shims used should equal half the total indicator reading, shim thickness not exceeding .008". New shims are furnished in the following sizes. Part No. 1610442 (.002"), 1610443 (.003), No. 1610444 (.005").

TRANSMISSION OVERHAUL DISASSEMBLY

1) Place transmission assembly in stand C-3280 and turn upside down. Remove oil pan and gasket. Loosen throttle and manual control lever locking screws and slide levers off shafts. Remove throttle valve camshaft felt retainer and felt and manual valve lever shaft seal cover. Inspect these parts for wear.
2) Remove oil strainer support screws and remove oil strainer assembly. Inspect ring seals located at both outlet sides of strainer. Remove transfer plate screws and take off valve body and transfer plate assembly. *See "Valve Body & Transfer Plate Overhaul" below.*

►*CAUTION: Mating surfaces are machined and extreme care must be used to avoid damage to these parts.*

3) Remove neutral safety switch and back-up light switch and gaskets.
4) Check transmission end clearance with a dial indicator or feeler gauge by prying direct clutch assembly toward rear and measuring the distance between direct clutch and carrier housing. Pry direct clutch forward and again measure the distance between direct clutch and carrier housing. Clearance should be .043-.069". If not within limits, record the measurement for reference at reassembly.

Hand Brake Assembly: Using tool C-3281 to hold transmission to flange, remove transmission flange nut and washers. Attach puller C-452 and remove brake drum assembly. Inspect oil sealing surfaces, and lining surfaces on drum for scoring or wear. Remove transmission brake support grease shield spring (NOTE—this spring acts as a guide for the brake shoes and retains the brake support grease shield to transmission extension housing). Place a rubber band around brake shoes to hold them in position and remove brake shoe return spring. Remove brake anchor shoe washer and brake shoe guide. Remove both brake shoe assemblies, adjusting sleeve, nut, screw and brake shoe operating lever link. Remove brake support grease shield from extension housing. *(CAUTION—*If a screwdriver or sharp instrument is used to remove the shield, care must be taken not to damage neoprene sealing surface at bottom of shield). Slide brake support assembly from rear extension housing and anchor. Inspect neoprene spacer for deterioration and note the steel sleeve used between spacer and extension housing.

Transmission Extension: Remove speedometer drive pinion. *(CAUTION—Nylon gear can be damaged if extension housing is removed without first removing the speedometer drive pinion).* Using puller C-748, remove the output shaft rear bearing oil seal and remove any burrs from counterbore of extension housing. Remove the transmission-to-extension screws and lockwashers. Install guide studs C-3283 and attach puller C-3282. Pull extension housing from output shaft support assembly and remove extension gasket. *(CAUTION—*Use care when removing extension housing to prevent damage to governor housing). Inspect extension housing for cracks in casting and remove burrs from gasket surface. Clean output shaft rear bearing and dry with compressed air. Check bearing for rough spots but do not remove from housing unless it is found to be defective. Using a pair of long nose pliers, remove output shaft rear bearing snap ring. Using driver C-3275, drive output shaft rear bearing out rear of extension housing. Remove vent from top of extension housing and make sure it is clear of foreign matter and is open.

Governor: Using a sharp instrument, remove either of the governor valve snap rings. Remove governor valve shaft and valve from governor body. With snap ring-pliers, remove governor weight assembly snap ring (large), and remove governor weight assembly from governor body. Using C-3229 pliers, remove governor secondary weight snap ring. *(CAUTION—*Keep thumb pressure against secondary weight when removing snap ring as it is spring loaded). Remove secondary weight and spring. Inspect all parts for burrs or wear. Check secondary weight for free movement in primary weight by placing secondary weight in primary weight without spring. Primary weight should fall freely when both parts are clean and dry. Check spring for distortion. Remove governor locating screw from governor body and output shaft *(make sure that screwdriver used fits slot in screw perfectly to avoid damage to governor body).* Slide governor body and support from output shaft. Remove the two governor support piston rings and inspect closely. *(CAUTION—*Governor support has pressed in steel sleeve which routes oil through the support. Make sure these passages are open. Do not attempt to replace sleeve if damaged, replace support). Clean passages with air and inspect valve and governor body for slight scores. Remove the four governor body-to-support screws and lockwashers and separate body from support.

Rear Oil Pump: Remove oil pump housing-to-output shaft support screws and lockwashers and remove housing and oil pump gear. Use prussian blue to mark front side of gear in housing *(DO NOT USE A SCRIBE).* Inspect machined surfaces for nicks and burrs, oil pump gear and housing for being scored or pitted, and pump housing plug for leaks. Remove rear oil pump pinion from output shaft and mark front side with prussian blue *(CAUTION—*Oil pump pinion keyed to shaft by a small ball. Use care when removing pinion not to lose ball). Check pinion keyway and ball pocket for pitting or scoring. Using tool C-3335 and feeler gauge, check clearance between pump housing face and face of gears. Clearance limits are from .001-.003".

Center Assembly (Output Shaft Support, Planet Pinion Carriers, and Direct Clutch Assemblies): Remove output shaft support-to-transmission case screw and washer. With one hand, work output shaft up and down, and at the same time apply pressure with the other hand to the input shaft. Slide output shaft rear support assembly, planet gear housing assembly and gasket from rear of transmission case. If rear support is stuck to transmission case and cannot be removed as just described, then proceed as follows: Install one of the oil pan screws into transmission case and with the aid of a pry bar, pry against support sufficiently to separate support from case. Remove direct clutch piston retainer assembly from torque converter reaction shaft. Remove direct clutch piston retainer thrust washer from torque converter reaction shaft. This washer is a select fit and controls end clearance between direct clutch assembly and carrier housing. Inspect washer for cracks, burrs and wear.

►*1955 INPUT SHAFT PRODUCTION CHANGE: Seal rings not used in late production. See Production Change above.*

Planet Pinion Carrier Removal from Housing Assembly: Place unit in an upright position in tool C-3285. Using a feeler gauge, check clearance between kickdown planet pinion carrier housing snap ring and kickdown planet pinion carrier assembly. This clearance should be .012-.038". If within these limits, then identify each thrust washer as it is removed. Using a screwdriver, remove transmission kickdown planet pinion carrier housing snap ring. Identify snap ring to aid in assembly (ring is not a selective fit). Proceed as follows:
1) Remove input shaft, kickdown planet pinion carrier assembly and kickdown annulus gear from carrier housing. Remove reverse planet pinion carrier thrust washer and inspect for cracks, burrs and wear. Remove kickdown annulus gear snap ring. Remove kickdown annulus gear from input shaft and inspect for worn, cracked or broken teeth.
2) Remove kickdown planet pinion carrier assembly from input shaft and carefully inspect stop ring on end of shaft which controls position of annulus gear on input shaft. Check all oil passages in both gear and shaft for obstructions. Inspect splines and bearing surfaces for burrs and wear. On early cars, inspect the three seal rings on input shaft for broken ends and make sure they are free to rotate in grooves.
3) Inspect planet pinion carrier for scores on thrust surfaces, broken and worn teeth. Using a feeler gauge, check end clearance on individual planet gears, clearance should be .006-.017". Inspect pinion shafts for tight fit in carrier and make sure pinions are free to rotate on shafts. Check oil holes in gears and shafts for obstructions. Inspect oil holes in the thrust washer of the kickdown carrier to make certain they are open *(NOTE—Do not replace planet pinion carrier assembly unless the above inspection indicates that it is necessary. This assembly is serviced only as a complete unit).*
4) Remove reverse planet pinion carrier assembly from planet pinion carrier housing. Inspect in the same manner as for planet pinion carrier (3 above).

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POWERFLITE (Cont.)

Remove output shaft and reverse annulus gear assembly from carrier housing and output shaft support. Remove reverse annulus gear snap ring and remove annulus gear from shaft. Inspect thrust surfaces, journals and inner bushings for scores. Check annulus gear for worn or broken teeth. Inspect ring grooves for burrs and ring for broken ends. Inspect splines on both shaft and gear for burrs and wear. Check speedometer pinion gear and gear output shaft, and shaft bushing for burrs, wear and scoring.

5) Remove planet pinion carrier housing thrust washer and check for cracks or wear. Remove planet pinion carrier housing from output shaft support and inspect driving lug slots inside of housing for wear. Inspect bearing and thrust surfaces for scores and burrs. Closely inspect band contacting surface for burned spots and scoring, especially if lining has worn excessively. Inspect all oil passages in output shaft and support for obstructions. Check rear oil pump mating surface for burrs and scores, and check for stripped threads in support.

Direct Clutch Piston Retainer: 1) Using a screwdriver remove kickdown sun gear snap ring. Identify this ring so it can be returned to the same position (selective fit). Lift out sun gear assembly. Check for clutch material obstructing oil passages and slinger and remove any metal pickup which might have accumulated on front side. Inspect for cracked or broken teeth.

2) Lift out direct clutch hub from center of direct clutch piston retainer. Inspect driving lugs for wear and remove any metal pickup accumulated on either side of hub. Invert the direct clutch piston retainer and remove clutch plates (steel) and driving disc assemblies (five or six of each used, depending on car model), noting position in which these parts were assembled. *(CAUTION*—If assembly was started with cork portion on outer top, the same sequence will follow all through the assembly and when unit is reassembled the same sequence should be followed to assure smooth operation). Inspect driving discs for evidence of wear, burning, glazing, and flaking off of facing material. Check discs by scratching with finger nail and if material collects under nail, replace discs. Inspect splines in discs, replacing any that are damaged. Inspect steel plates for burning, scoring, or damaged splines.

3) Using tool C-3302, compress direct clutch spring sufficiently to unseat clutch spring retainer snap ring. Release tool C-3302, and remove direct clutch spring retainer snap ring, spring retainer and spring from direct clutch piston retainer. Using a twisting motion remove direct clutch piston assembly from clutch retainer. Air pressure may be used to blow piston out if it is tight.

4) Inspect ball check in clutch retainer housing to make sure it is free. The bearing used in direct clutch piston retainer is a steel back bronze type and is not replaceable. If torque converter reaction shaft seal rings have worn or grooved the bearing so that bronze is no longer visible at that point replace the direct clutch piston retainer. Inspect band contacting surfaces for deep scores and burns, especially if band lining is worn to point where steel band has been contacting direct clutch piston retainer. *(CAUTION—Do not turn clutch piston retainer in lathe to remove score marks).* Inspect steel clutch plate contacting surfaces for deep scores, replace as needed. Make sure clutch driving lugs will slide freely into retainer. Inspect inside bore for score marks, and if light, remove with crocus cloth, if heavy, replace piston.

5) With tool C-3286, unlock direct clutch piston retainer seal ring and remove from retainer. Inspect for wear and broken ends. Remove direct clutch piston seal ring (neoprene) from piston. Inspect for deterioration and hardness.

Reverse & Kickdown Band Assemblies: Mark reverse band for installation purposes, then compress ends of band sufficiently to remove reverse band strut. Unhook reverse band assembly from link assembly and remove by rotating band ends through rear opening in transmission case. Repeat with kickdown band, noting that strut is grooved to act as a guide to strut pin on band end. Remove from case in same manner as for reverse band. Inspect linings for wear and bonding to metal band. If lining is worn to point where grooves are no longer visible, replace band. *(CAUTION—Do not attempt to reline bands.)* Check bands for distortion and cracked ends.

Reverse & Kickdown Band Lever Assemblies: *(CAUTION—Inspect these link assemblies and levers for cracks or wear, making sure they have side clearance and are free to turn on shafts. Do not remove these assemblies unless inspection reveals that it is necessary).* If necessary to remove, proceed as follows: Insert finger in back of reverse band and link assembly lever shaft, and holding the reverse band lever and link assembly with the other hand, push shaft out rear opening in transmission case. Remove kickdown band lever shaft plug in front of transmission case and remove kickdown band lever in same manner as for reverse band, except that shaft is removed from front of transmission case.

Front Oil Pump: 1) Remove transmission regulator valve spring retainer, spring, gasket and valve. Remove torque converter control valve spring retainer, spring, gasket and valve.

2) Remove front oil pump-to-transmission case screws and washers (discard aluminum or copper sealing washers, new ones must be used at reassembly). Remove housing by tapping gently with a fibre hammer (if front pump housing has two threaded holes, attach puller C-3287 and guide studs C-3288 and pull housing and gears from transmission case). Use prussian blue to mark front side of gears *(CAUTION—Do not scribe gears for identification).*

3) Remove front oil pump housing seal (large neoprene) from housing, and inspect for deterioration and hardness. Using a brass drift, drive housing dust seal out front of housing. Inspect housing bushing for scores. Remove light scores with crocus cloth and if bushing scored heavily, replace housing (bushing is not replaceable). Check housing and gears for scores.

4) Using tool C-3335 and feeler gauge, check clearance between pump housing face and face of gears. Clearance limits are from .0012-.0022". Make sure all oil passages are clear by blowing out with compressed air.

Regulator Valve Body: Using the two holes provided in regulator valve body, attach puller C-3287, and install guide pins C-3288. Pull regulator body off torque converter reaction shaft. Place body and both valves in pan containing clean solvent, wash thoroughly and dry with compressed air. Check valves for free movement in body, these valves should fall in and out of bores when both valves and body are dry. *(CAUTION*—If crocus cloth is used to polish valves, care must be taken not to round off the sharp edges of valve.) Check for all passages for obstructions and all mating surfaces for burrs or distortion. If body has a slight nick or raised portion on a mating surface, it can be removed with a surface plate and crocus cloth. Check regulator valve spring seat (snap ring) for proper seating. Wrap valves and body in separate cloths until ready for installation.

Reverse Servo Piston: Lift out reverse servo piston sleeve. Inspect inside bore, lever, and contacting surface on piston sleeve for scores and wear. Make sure the two bleeder holes are open. Install tool C-3289 on transmission case and compress reverse piston spring retainer. Using a screwdriver, remove the reverse servo piston and valve assembly spring retainer snap ring, and loosen compressing portion of tool. Remove spring retainer, spring, servo piston and valve assembly. Remove servo piston ring (lip type neoprene) from piston and inspect for distortion and hardness. Remove reverse servo piston valve snap ring. Remove spring and valve from piston. Inspect servo bore for scores and remove light scores with crocus cloth.

Kickdown Piston: Using tool C-3289, apply sufficient pressure on kickdown piston rod guide and remove the snap ring. Loosen compressing portion of tool and remove tool from transmission case. Remove piston rod guide, piston spring, kickdown piston rod assembly, and kickdown piston cushion spring. Inspect riveting of kickdown piston rod to kickdown piston spring retainer. Remove seal ring from guide and inspect for light scores and wear on piston rod and guide. Using C-484 pliers, remove kickdown from transmission case. Remove the three snap rings (two locking and one open type) from kickdown piston. Inspect rings for scores or broken ends, and piston for wear.

Torque Converter Reaction Shaft: *(CAUTION—Inspect shaft seal rings (interlocking type) for broken ends and make sure they are free to rotate in grooves. Inspect inside of shaft for burrs, and splines for burrs and wear. Check thrust surfaces for wear and slight scores. Do not remove reaction shaft from case unless inspection reveals that it is necessary).* If shaft must be removed, proceed as follows: Remove shaft seal (neoprene). Using a suitable brass drift, remove shaft dowel pin from shaft flange and transmission case. Remove transmission case-to-reaction shaft screws and using tool C-3297, press shaft out of transmission case. Remove the two shaft seals (interlocking).

Manual Control Valve Lever Shaft Oil Seal: Drive seal out of case with a suitable drift.

Kickdown Band Adjusting Screw: Loosen locking nut and remove kickdown band adjusting screw and locknut. *CAUTION—When locknut is loosened, the adjusting screw must be finger free. If not, inspect screw and nut for pulled threads or foreign material on threads. Freeness of this screw is very important to adjustment.*

Transmission Case Inspection: Inspect case for cracks, sand holes and stripped threads. Check for burrs on mating surfaces. Blow compressed air

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POWERFLITE (Cont.)

through all passages to make sure they are open. Check oil hole plugs for tightness.

REASSEMBLY

Kickdown Band Adjusting Screw: Install adjusting screw in transmission case until there is approximately 1" of screw left outside case. Do not lock screw into position at this time.

Manual Control Valve Lever: Using tool C-3277, start seal squarely and tighten until seal is flush with case.

Torque Converter Reaction Shaft: *(NOTE—Reaction shaft should only be removed if inspection indicates that it is faulty).* Heat front face of transmission case to 170-190°, using sun lamps for the purpose.

1) Coat the two shaft interlocking seal rings with Lubriplate and install on shaft and lock in place. Make sure the rings are free to rotate in lands. Coat the portion of shaft that presses into case with Lubriplate and position shaft into front of transmission so holes in shaft line up with screw holes in case.

2) Place a 5/16" (.308-.311" outside diameter in unthreaded section), 2¼" long bolt through dowel guide pin holes in case and reaction shaft to act as guide, install nut. Using tool C-3297 press shaft into place. Do not remove 5/16" bolt at this time. Start the three transmission case-to-reaction shaft screws and washers and tighten slightly, but do not torque.

3) Remove 5/16" bolt from dowel hole and install the reaction shaft dowel from inside case. Torque the case-to-reaction shaft screws to 10-15 ft. lbs. Coat neoprene reaction shaft seal and install on shaft.

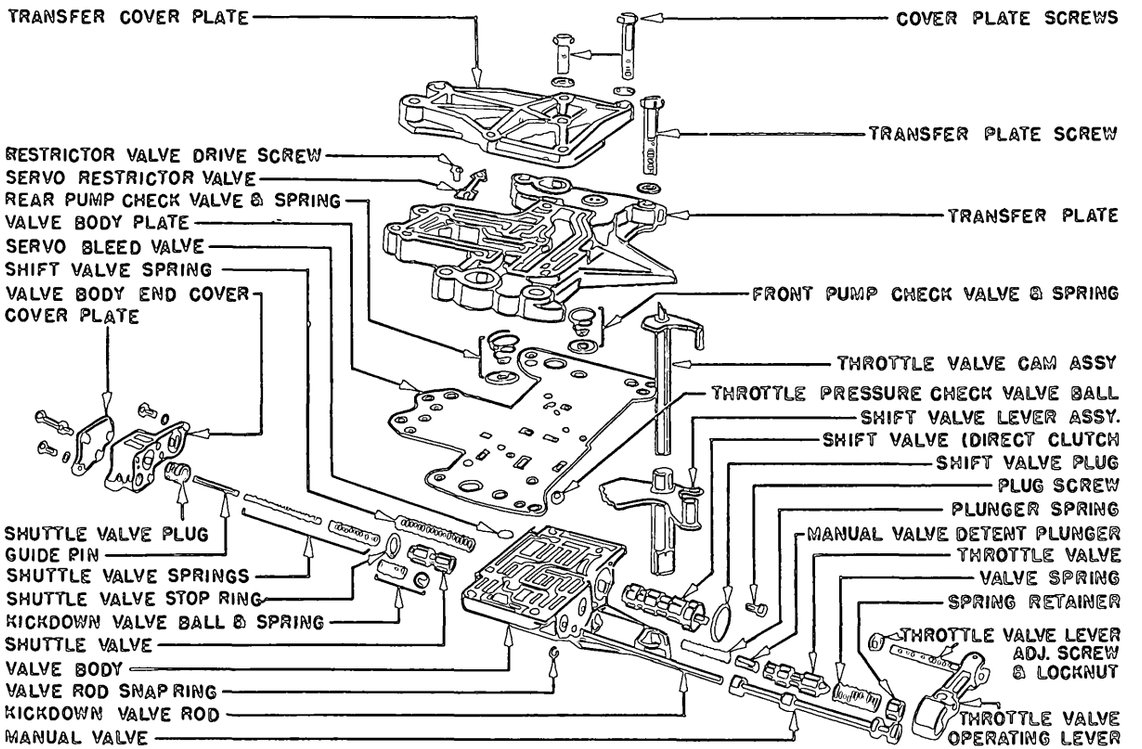
Kickdown Piston: 1) Coat the three kickdown piston rings (two locking and one open type) with Lubriplate and install on piston. Lock into position and make sure they are free to rotate in lands. Place kickdown piston assembly into transmission case, compress bottom ring with a brass rod (flatten end), and push piston into place.

▷*CAUTION: After bottom ring has entered, piston will seem to hang at two different locations while being pushed into case. This is due to rings entering cylinder. If any of the rings should be broken when piston assembly is being installed, transmission will not operate properly.*

2) Place cushion spring in piston and install tool C3289 on transmission case. Place piston rod assembly in piston and slide piston spring over piston rod assembly. Coat piston rod guide seal ring with Lubriplate and install on rod guide. Make sure ring rotates in groove.

3) Place piston rod guide assembly on piston rod assembly and using extreme care, compress the kickdown piston spring to the point where piston guide seal ring slightly binds on case. Using a piece of brass rod (flattened on end), work seal into position, gradually compressing spring until seal ring enters case and snap ring can be installed. Install snap ring, making sure it is properly seated.

Reverse Servo Piston: 1) Place reverse servo piston valve and spring in reverse servo piston, with shaft protruding through hole in bottom of piston. Using pliers C-3229, install reverse servo piston valve spring snap ring and make sure it is seated.



EARLY 1954 POWERFLITE VALVE BODY & TRANSFER PLATE ASSEMBLY

2) Coat servo piston ring with Lubriplate and install on piston. Insert piston and valve assembly into transmission case in a cocked position, then by rotating piston, the piston ring will enter case without damage.

3) Place servo piston spring over piston and position spring retainer over spring. Compress spring with tool C-3289 sufficiently to install snap ring, making sure it is seated. Inspect interior of servo sleeve for burrs, then place sleeve over piston, making sure sleeve slides freely on piston by working it up and down. Remove installing tool from transmission.

Regulator Valve Body: 1) Inspect regulator valve body and valves to make sure that no damage has occurred since disassembly and blow out passages with air.

2) Coat reaction shaft seal (neoprene) with Lubriplate if not already done, and place regulator valve and torque converter control valve in regulator valve body. Install guide studs C-3288 in front transmission case.

3) Place regulator valve body assembly, with oil passages to rear, over reaction shaft and onto guide studs *(CAUTION—When reaction shaft seal enters regulator body use care to prevent shaft screws damaging passages on regulator body)*, seat firmly to front of transmission case.

Front Oil Pump: 1) Position front oil pump housing dust seal in oil pump housing with metal portion of seal down. Using driver C-3278, bottom seal in housing. Coat housing seal (large neoprene seal) with Lubriplate and install on housing.

2) Place front oil pump gear and pinion (driving lugs on pinion facing up, and prussian blue marks made at time of disassembly toward front) in pump housing. *(CAUTION—Oil pump pinion must be installed correctly or damage will result when installed in transmission.)* Lubricate pump gears with transmission fluid.

3) Place pump housing assembly over reaction shaft and slide into position over guide studs until pump housing seal is flush with transmission case. Using new aluminum or copper washers on screws, start five of the screws and draw housing down evenly until it is seated into transmission case. Remove guide studs and install two remaining screws and washers. Torque all screws to 12-17 ft. lbs. *NOTE—After all screws have been installed and torqued, engage driving lugs of oil pump pinion to determine if pinion turns freely. Use the oil pump drive sleeve for this check. If not free, remove pump and check for foreign matter between gears and housing.*

4) Using a new gasket, install torque converter control valve spring and retainer. Torque to 35-40 ft. lbs. Install regulator valve spring and retainer, using a new gasket, and torque to 45-50 ft. lbs.

Reverse Band, Kickdown Band & Lever Assemblies: *NOTE—If lever assemblies were not removed, omit the operations covering their installation.*

1) Place kickdown band lever assembly in trans-

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

mission case and slide band lever shaft into position from front of case, making sure it operates freely. Install band lever shaft plug and torque to 30-35 ft. lbs. Place kickdown band assembly into transmission case by rotating ends of band through opening in case. Fit proper end of band over adjusting screw and compress band sufficently to install band strut between other band end and band lever. ***CAUTION—Make sure band strut slot engages with kickdown band strut pin in band end.***

2) Place reverse band lever assembly in reverse band link assembly and position into transmission case, aligning holes in lever and link assemblies to holes in transmission case. Slide band lever shaft into position from rear of transmission case. Shaft is held in position by rear output shaft support.

3) ***(NOTE—If new reverse band is to be installed, back adjusting screw out until approximately 1" of screw is above lever on locknut side.)*** Place reverse band assembly into transmission case by rotating ends of band through rear opening in case. Hook correct end of band (previously identified when band removed) in link assembly. Compress band sufficiently to install band strut in slots of reverse band and band lever assembly.

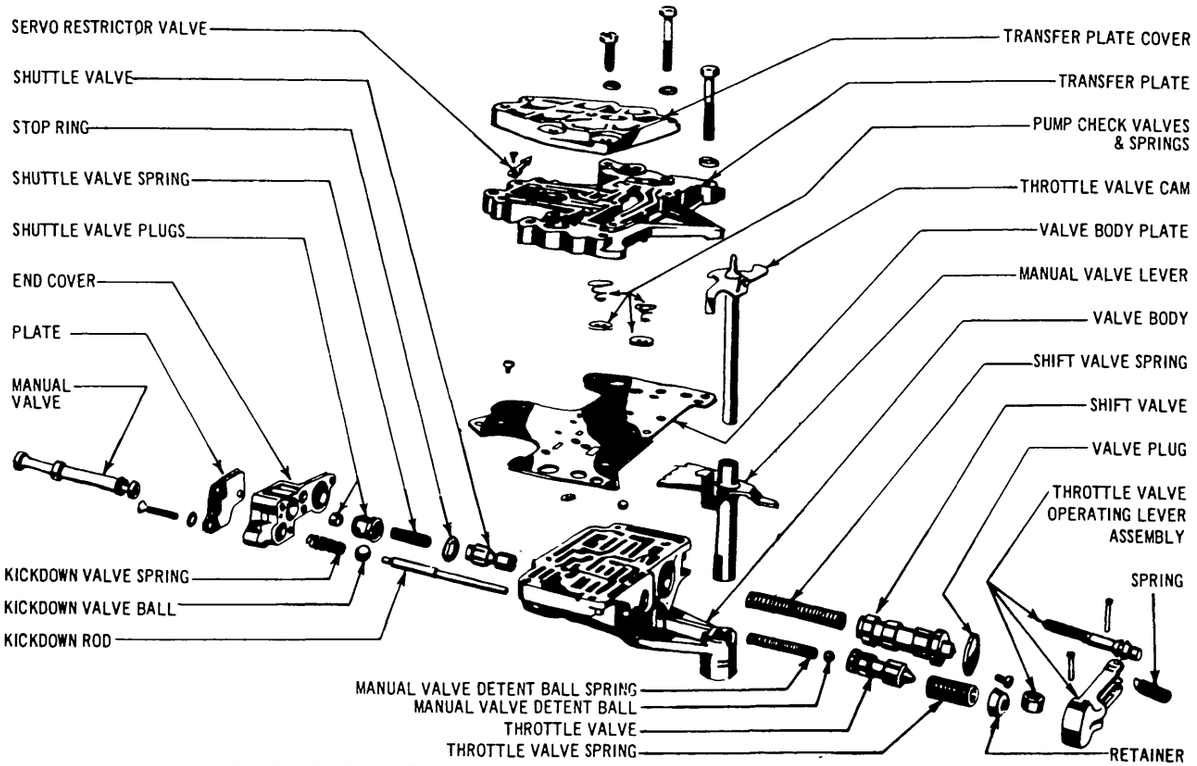
Direct Clutch Piston Retainer: 1) Coat direct clutch seal ring with Lubriplate and install on piston, with lip of ring facing away from the flange. Coat clutch piston retainer seal ring with Lubriplate and install on retainer hub. Using tool C-3286, lock seal into position and make sure it is free to rotate in lands. Place piston assembly in clutch retainer, and with a twisting motion, seat piston in bottom of retainer, being careful not to damage lip of seal.

2) Seat clutch spring into piston retainer and position spring retainer and snap ring on spring. Using tool C-3302, compress clutch spring sufficiently to seat the snap ring. *NOTE*—Piston spring retainer may require guiding past the snap ring grooves. Make sure snap ring properly seated.

3) Place clutch hub in center of clutch piston retainer. Lubricate all clutch plates and driving discs with automatic transmission fluid and assemble by placing one of the clutch plates in clutch piston retainer, followed by a driving disc. ***(NOTE—Install discs in the same manner they were removed. If first driving disc was installed with cork portion on outer top, then the remaining discs must be installed in the same manner, or vice versa. Repeat this procedure until all six discs and plates have been installed.)***

4) Place kickdown sun gear assembly in direct clutch piston retainer and install snap ring (this ring is a selective fit and must be checked as follows): Using a feeler gauge, check clearance under kickdown sun gear snap ring. Clearance limits should be as close to zero as possible. Rings are furnished in three sizes for selective fitting. Part No. 1327729 (.059-.061"), No. 1327730 (.062-.064"), No. 1327731 (.065-.067").

Planet Pinion Carriers: 1) Place output shaft support in tool C-3285 with bearing surface up. Lubricate bearing surface of planet pinion housing and place bearing surface of housing over output shaft support bearing surface. Place reverse annulus gear on output shaft and install snap ring. (Output shaft may be placed in vise, providing vise is clean and equipped with brass jaws). ***(CAUTION—Reverse annulus gear must be tight fit on shaft. End clearance is controlled by various snap rings which are furnished in the following three thicknesses: Part No. 1329608 (.078-.080"), No. 1329609 (.082-.084"), No. 1329610 (.086-.088"). Make sure that snap ring is properly seated.)***



LATE 1954 & 1955 POWERFLITE VALVE BODY & TRANSFER PLATE ASSEMBLY

2) Coat output shaft seal ring with Lubriplate and install on shaft. Lock into position and make sure ring rotates freely in groove. Coat planet pinion carrier housing thrust washer with Lubriplate, slide over output shaft and into position in reverse annular gear. Place output shaft and reverse annulus gear in position in carrier housing and through output shaft support, being careful not to damage shaft seal ring as it enters shaft support. ***Check to see that planet pinion carrier thrust washer seats properly between annular gear and carrier housing.***

3) Lubricate thrust surfaces and gear teeth of reverse planet pinion gear and carrier assembly, and place carrier assembly in reverse annulus gear. ***(CAUTION—Make sure driving lugs on carrier assembly properly engage slots in planet pinion housing.)***

4) On early cars, coat input shaft seal rings with Lubriplate and lock into position, making sure rings rotate freely in lands. (Later cars have a large bearing area (bushing) on shaft replacing the three seal rings. ***See "Input Shaft Production Change" above for installation of later type shaft in early cars). (CAUTION—Inspect stop ring for proper position in input shaft groove).*** Lubricate thrust surfaces and gear teeth on kickdown planet pinion gear and carrier assembly. Slide assembly with collector ring up, carefully down on rear end of input shaft and over stop ring. Lubricate teeth and thrust surfaces and install kickdown annular gear onto input shaft, down to stop ring. Install kickdown annulus gear snap ring and make sure it is seated (Input shaft can be installed in vise providing it is clean and equipped with brass jaws).

5) Engage teeth of kickdown planet pinion gears with teeth on kickdown annulus gear. Slide pinion gear and carrier assembly into position in kickdown annulus gear. Coat reverse planet pinion carrier thrust washer with Lubriplate and install on kickdown annulus.

6) Place kickdown planet pinion carrier assembly, annulus gear and input shaft into position in planet carrier housing. Make sure planet pinion carrier thrust washer remains on annulus, and driving lugs on carrier assembly properly engage slots in planet pinion housing. Install planet pinion housing snap ring (not selective fit), making sure it is positioned and seated properly. Lubricate gears and splines.

7) Using a feeler gauge, check clearance between kickdown planet pinion carrier housing snap ring and the kickdown planet pinion carrier assembly. Limits are .012-.038". If not within these limits disassemble and recheck reverse planet pinion carrier and planet pinion carrier housing thrust washers.

Center Assembly (Output Shaft Support, Planet Pinion Carriers, and Direct Clutch Assemblies): 1) Coat kickdown planet pinion thrust washer with

CONTINUED ON NEXT PAGE

POWERFLITE (C nt.)

Lubriplate, place over kickdown sun gear and on to thrust surface of direct clutch piston retainer assembly. Place direct clutch piston retainer assembly over input shaft, engaging sun gear with kickdown planet pinion gears and engaging splines of input shaft with direct clutch hub. Make sure kickdown planet pinion carrier thrust washer remains in position.

►*DIRECT CLUTCH PISTON RETAINER THRUST WASHER CAUTION:* This thrust washer controls transmission endplay clearance and is a selective fit. After transmission is reassembled, except for hand brake assembly, the endplay clearance must be checked and corrections made in the washer thickness as necessary. *See "Checking Transmission Endplay" below.*

2) Coat direct clutch piston retainer thrust washer with Lubriplate and install on torque converter reaction shaft inside transmission case. Use care when sliding washer over rings to prevent damage.

3) Install guide studs C-3283 in rear of transmission case, position new output shaft support gasket over guide studs and on to case. Place tool C-3306 over splines on front of input shaft.

4) Insert input shaft, with direct clutch assembly, planet pinion carrier housing, output shaft support and output shaft attached, through rear of transmission case and through transmission reaction shaft. Then guide assembly through bands and over guide studs into position in transmission case. Remove tool C-3306 from front of input shaft.

►***CAUTION: Do not force assembly into case. Avoid damage to seal rings on torque converter reaction shaft.***

5) Install one output shaft support-to-transmission case screw and lockwasher finger tight.

Rear Oil Pump: 1) Coat oil pump pinion ball with Lubriplate and insert in ball pocket in output shaft. Lubriplate oil pump drive pinion, place over shaft and slide into position, aligning keyway in pinion with ball in shaft. ***Make sure pinion is installed with side marked with prussian blue at disassembly, is toward front.***

2) Slide pump housing assembly over output shaft and into position against output shaft support. Install five rear oil pump housing-to-output shaft support screws and lockwashers. ***(CAUTION—There are two extra holes in housing which are used for vents. Make sure screws are not installed in these holes. Check each screw hole before installing screws).*** Draw screws down evenly and tighten to 15-20 ft. lbs. torque. When screws have been properly tightened, check output shaft for free rotation of pump gears. If not free, disassemble pump to determine cause.

Governor: 1) Coat the two governor support piston rings with Lubriplate and install on governor support. Stagger rings and make sure they are free. Position governor body on support, install the four screws and lockwashers ***but do not tighten at this point.***

2) Slide governor support and body assembly over output shaft and into position in rear pump housing, compressing governor support piston rings with fingers as support enters oil pump housing.

3) Align locating hole in output shaft to locating screw hole in governor body and install governor locating screw, tighten to 3½-4 ft. lbs. torque. ***NOTE—Holes can be easily aligned by turning output shaft and holding governor body. Make sure screw driver attachment fits the screw slot when tightening locating screw.***

4) Tighten the four governor body screws to 5-10 ft. lbs. torque.

5) Dry governor parts with compressed air but do not lubricate when assembling. Place governor weight spring over secondary weight and position both in primary weight, making sure springs seat properly. Guide secondary weight, and compress governor weight spring sufficiently to install snap ring. Make sure ring is properly seated. Place governor weight assembly, with secondary weight snap ring up, into governor body and install snap ring, making sure it is seated.

6) Slide governor valve, with small end up, over governor valve shaft. Slide governor shaft into governor body through output shaft and governor weight assembly, at same time positioning valve into body. Install governor shaft snap ring and make sure it is securely locked to shaft. Check operation of governor weight assembly and valve by turning output shaft. Both should fall freely in body.

Transmission Extension: ***NOTE—If output shaft rear bearing was not removed, omit operation covering its installation.***

1) Using driver C-3204, install output shaft rear bearing in extension housing. Make sure it is properly seated then lubricate with automatic transmission fluid. Install output shaft bearing snap ring, bevel side up, making sure it is properly seated.

2) Replace extension breather and tighten to 10-12 ft. lbs. torque. Install new transmission extension gasket over guide studs and into position against output shaft support. ***Do not use sealing material on gasket.*** Using care not to damage governor housing, place extension housing over output shaft and onto guide studs. Using tool C-496 with adapter C3284, press extension housing into position against output shaft support.

3) Start the seven transmission extension-to-case screws and lockwashers, then draw down evenly and tighten to 25-30 ft. lbs. torque. Tighten output shaft support-to-case screw to 25-30 ft. lbs. torque. ***Check to see that output shaft turns freely.***

4) Coat nylon gear and threads on speedometer drive pinion with Lubriplate and install in extension. Tighten to 40-45 ft. lbs. torque.

Checking Transmission Endplay: Using dial indicator C-430 or feeler gauge, measure the distance between direct clutch assembly and carrier housing when clutch is in **rearward** position. Using a screwdriver inserted between the direct clutch assembly and carrier housing, carefully pry direct clutch **forward.** Remove screwdriver and measure again. The difference in measurements is the end clearance and must be .043-.069". If it does not fall within these limits, proceed as follows:

1) Remove the seven screws and lockwashers from transmission extension and install guide studs C-3283. Then remove the one output shaft support-to-case screw and washer, and remove extension housing, output shaft, support, and planet pinion carrier housing assembly as a unit.

2) Slide direct clutch piston retainer from torque converter reaction shaft and remove direct clutch piston thrust washer. Using a micrometer, measure thickness of the washer and then select a washer to give correct clearance. These washers are available in the following five thicknesses: Part No. 1406442 (.125-.130"), No. 1406443 (.135-.140"), No. 1406444 (.145-.150"), No. 1406445 (.155-.160"), No. 1406446 .164-.170").

3) To install, reverse removal procedure. Using driver C-3205, install output shaft rear bearing oil seal.

Hand Brake Assembly: 1) With brake support spacer in position on back of brake support and spacer sleeve in center of support, slide brake assembly over rear extension housing and anchor pin. Make sure spacer sleeve remains in center of support. Install brake support grease shield on extension housing. ***NOTE—Indent in shield for correct positioning on extension housing. Shield must be located on housing far enough to permit installation of spring later.***

2) Place both anchor brake washers on brake shoe anchor and install locking washer. Place both shoe assemblies with adjusting sleeve nut and screw into position on anchor. Make sure brake shoes are between the anchor washers. Use a rubber band around shoes to help hold them in position.

3) Install operating link (marked for correct installation), and brake shoe support grease shield spring (with opening in spring toward adjusting sleeve). Make sure spring is properly seated in groove. Slide brake shoe return spring behind grease shield spring and hook into position in holes in brake shoes.

4) Make sure adjustment is loose enough and install brake drum assembly. If necessary, use tool C-496 to press brake drum on output shaft. Install transmission flange washer, shakeproof washer and nut, and tighten to 140-160 ft. lbs. torque.

Kickdown Band Adjustment: Turn transmission on side and using tool C-3291, loosen locknut and tighten kickdown adjusting band adjusting screw to 60-72 inch lbs. torque. With the counter on C-3291, **back adjusting screw out 3 turns,** then holding adjusting screw stationary with short handle, tighten locknut securely. ***Use extreme care to assure correct adjustment.***

Reverse Band Adjustment: Remove reverse band adjusting screw locknut and tighten adjusting screw to 20-25 inch lbs. torque, then back out adjusting screw 10 turns. Holding adjusting screw in this position, replace adjusting screw locknut and tighten to 30-35 ft. lbs.

Valve Body & Transfer Plate: 1) Install neutral safety switch, back-up light switch and gasket, and tighten to 15-20 ft. lbs. torque. Clean mating surfaces and check for burrs on transmission case and valve body. Place valve body and transfer plate into position on transmission case and install five transfer plate screws and lock washers ***(Install the two 1⅝" long screws through transfer plate cover on valve body),*** tighten to 12-17 ft. lbs. torque. Make certain the two oil strainer tube seals are in position on oil strainer, and place oil strainer in position on valve body. Install oil strainer support screws and lock washers and tighten to 12-17 ft. lbs.

2) Place manual valve lever shaft seal cover over manual shaft and install manual control lever with arm side of lever against cover, on manual valve shaft. Tighten locking screw. Place throttle valve camshaft felt and retainer over throttle valve shaft. Install lever assembly on throttle camshaft, and

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POWERFLITE (Cont.)

tighten locking screw. Check operation of controls by shifting manual control into the four operating positions.

3) Check throttle cam position in throttle operating lever assembly and throttle camshaft assembly for kickdown operation. Visually check manual lever contact on neutral safety and back-up light switches.

4) Install oil pan, using a new gasket, and tighten attaching screws to 12-17 ft. lbs., drawing screws down evenly. Tighten drain plug to 20-25 ft. lbs. torque.

VALVE BODY OVERHAUL

Valve Body & Transfer Plate Disassembly: *(NOTE—Two different throttle valve assemblies used in production. Overhaul procedures are the same except as noted below).*

▷*1954 SHUTTLE VALVE PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE:* A later type shuttle valve, Part No. 1643118 is used for production and can be used for service replacement. *CAUTION—* The adjusting screw on the later type shuttle valve is pre-set at the factory and *MUST NOT BE CHANGED IN THE FIELD.* When replacing the older type valve with the later one, DO NOT install the spacer and spring.

▷*OVERHAUL CAUTION:* Place valve body and plate assembly in holding fixture C-3294. *DO NOT USE VISE TO HOLD TRANSFER PLATE ON VALVE BODY.*

1) Remove two of the long transfer plate cover screws and lock washers and install guide studs C-3295. Keeping finger tight pressure against transfer plate, remove the three remaining transfer plate cover screws, (two long & one short), and remove transfer plate cover. Using care not to lose the servo restrictor valve operating plug from transfer plate, remove transfer plate from valve body plate. *NOTE—Rear pump check valve has metering hole in it. Note position of this valve in relation to the front pump check valve (without metering hole).*

2) Remove valve body plate from valve body, noting position of throttle pressure check valve ball, and servo bleed valve (servo bleed valve may stick to valve body plate). Remove these parts and place in clean container. On later type valve assemblies remove throttle valve cam spring from cam and operating lever. On early and later type assemblies, compress the throttle valve operating lever assembly against throttle valve spring and slide throttle valve cam assembly from manual lever assembly. *(CAUTION—Remove any burrs from throttle valve camshaft and manual valve lever shaft before sliding them from valve body).*

3) Swing throttle valve operating lever out of way and remove throttle valve spring and retainer from throttle valve. Remove throttle valve from valve body core. Check distance from valve body to end of throttle valve operating lever adjusting screw. This distance should be 1 11/16". Using tool C-3279, remove throttle valve adjusting screw, lock nut and throttle valve operating assembly. *NOTE—It is not necessary to remove throttle valve operating assembly unless parts are to be replaced.*

4) Remove the four (three long and one short) valve body end cover plate screws and lock washers and remove valve body end cover plate. Remove valve body and cover screw, keeping pressure against cover to avoid losing the four springs (early type), three springs (late type) behind it. Carefully remove valve body cover so as not to lose any of the springs or kickdown valve ball. Remove shuttle valve plug *(CAUTION—Later type shuttle valve assembly has an adjustment screw. DO NOT CHANGE THIS ADJUSTMENT as it is pre-set at the factory).* Remove kickdown valve ball from body. Remove shuttle by using shuttle valve spring, and related parts (see illustration for parts in early and late type assemblies).

5) Remove direct clutch shift valve spring from valve body. Mark the direct clutch shift valve plug with prussian blue (in order to reinstall with right side out), then loosen plug screws sufficiently to allow removal of plug by pushing on open end of shift valve with finger. Remove shift valve, and remove valve body from tool C-3294. Place valve body on clean paper. On early type assemblies, remove kickdown rod snap ring and kickdown rod from valve body. On later type assemblies, remove kickdown rod from cover end of valve body.

▷*MANUAL VALVE AND LEVER ASSEMBLY NOTE—It is not necessary to remove this assembly unless damaged parts are to be replaced. If assembly must be removed, proceed as follows:*

6) Place manual control valve lever on lever assembly and turn it counter-clockwise until manual control valve is in low range position (last detent). Using a screwdriver, compress detent plunger and spring and continue to turn manual valve lever assembly until manual valve becomes disengaged from manual valve lever assembly. Remove manual valve from valve body bore. Remove manual control lever and slide manual lever assembly from valve body. Remove manual valve lever detent plunger and spring from valve body.

Valve Body & Transfer Plate Inspection: Wash all parts in clean solvent and dry with compressed air. Check all passages for obstructions and check for porous coating. Inspect all mating surfaces for burrs and scratches. Light scratches and burrs can be removed with crocus cloth. With a light, check bores in valve body for pits and scores. Check springs for distortion and collapse. Check mating surfaces on a surface plate for distortion. Check all moving parts for free operation, and valves for freeness in body bores. Inspect servo restrictor valve in transfer plate to make sure it is seating properly. If valve is defective, carefully remove drive screw. Install new valve and new drive screw, making sure drive screw is tight, and being very careful not to distort transfer plate when installing drive screw. Check all points in valve for wear and replace defective parts.

Valve Body & Transfer Plate Reassembly: *CAUTION—When assembling valve body and transfer plate assemblies, handle parts carefully to avoid damage, such as nicks, etc., to mating surfaces. Use a twisting motion when placing valves in their respective bores.*

1) Place manual valve lever detent plunger spring and plunger into place in valve body. Slide manual valve lever assembly into valve body. Using a twisting motion place manual valve into valve body sufficiently to engage manual valve with manual valve lever pin. Then using valve lever assembly, turn slowly in clockwise direction and at the same time using a twisting motion, guide manual valve into valve body to low range position. Make sure detent plunger is seated.

2) Place kickdown rod (small end toward end cover) into valve body, making sure it is properly seated. Place valve body in tool C-3294 and install direct clutch shift valve. Place direct clutch shift valve into position (same as when removed, and with marks made at disassembly in correct position) in valve body. Draw the two screws down evenly and torque to 24-30 inch lbs. Install direct clutch shift valve spring in valve.

3) Install shuttle valve in valve body. Coat stop ring lightly with Lubriplate and place into recess in valve body. On early type assemblies place shuttle valve spring guide pin in shuttle valve and install both inner and outer spring over guide pin. On later type assembly place shuttle valve spring in valve. On both assemblies, install kickdown valve ball into valve body.

4) Place valve body end cover plate on end cover. Install one short screw and lock washer. Tighten securely. Place shuttle valve plug into position in end cover, and install kickdown valve spring. Install valve body end cover onto valve body. *CAUTION—* Make sure direct clutch shift valve, shuttle valve and kickdown valve spring are in correct position and properly seated when cover is being installed. Install valve body end cover screw and lock washer, but do not tighten.

5) Install the three (long) valve body end cover plate screws and lock washers. Draw down evenly and tighten to 24-30 inch lbs. Tighten valve body end cover screw and the remaining end cover plate screw to 24-30 inch lbs.

6) Using tool C-3279, install throttle valve adjusting screw, locknut and throttle valve lever assembly. Adjust to where there is approximately 1 11/16" distance between valve body and end of throttle valve operating adjusting screw. Install throttle valve (point outward) in valve body. Place throttle valve spring and retainer over throttle valves. Swing throttle valve operating lever over spring and retainer. Compressing the throttle valve lever assembly against throttle valve spring, slide throttle valve cam assembly into manual lever assembly, indexing cam portion on throttle valve in slot of operating lever. On later type assemblies, install throttle valve cam spring to cam and operating lever.

7) Install servo bleed valve and throttle pressure check valve ball into position in valve body and install guide studs. Position transfer plate cover on transfer plate and install the center screw (short) and lock washer finger tight. Install the servo restrictor valve operating plug (long end first) into transfer plate.

8) Make sure pump check valves and springs are properly positioned in transfer plate. The pump check valve with the metering hole should be toward the rear of transmission. Place valve body plate flush into position on transfer plate by compressing pump check valve springs. *CAUTION—Be sure pump check valves enter transfer plate, otherwise valve body plate will be damaged when assembly drawn down.*

9) Keep sufficient pressure on transfer plate and valve body to hold them together. Place over guide studs and into position on valve body, and install two of the transfer plate cover screws and lockwashers (one on each side) finger tight. Recheck to see that pump check valves remained in position in valve body plate. Remove guide studs and install two remaining transfer plate cover screws and lock washers. Draw transfer plate down evenly and torque all five screws to 45-50 inch lbs. torque.

FORDOMATIC & MERCOMATIC TRANSMISSION

Ford 6 & 8 Cyl. (1951-53)
Mercury V8 (1951-53)
Ford Truck, F-100 (1953)

▷CHANGES, CAUTIONS, CORRECTIONS

▷TRANSMISSION IDENTIFICATION NOTE: Transmission Model No. and Serial No. on name plate on left side of case must be used to identify individual units for parts replacement etc.

Model No.—On left hand boss on plate (prefix indicates year and model).

Serial No.—On right hand boss on plate (prefix indicates manufacturing plant).

▷STARTING ENGINE BY TOWING OR PUSHING CAR: Pushing is recommended. Place selector lever in Neutral "N" position. When car speed reaches 20 MPH., turn on ignition, move selector lever to "LO", depress accelerator pedal to half-throttle position until engine begins to run. *NOTE*—In ice or snow where traction not good, move selector lever to "DR" position to crank engine.

▷TOWING CAR: *Do not tow car at speed greater than 40 MPH. and observe following precautions:*

If Transmission Operating Properly—Place selector lever in Neutral "N" position. Car can be towed normally for distances not to exceed 3 miles. For greater distances, use same procedure as for inoperative transmission.

If Transmission Inoperative—Tow car with rear wheels lifted off road, or disconnect and remove propeller shaft and protect rear end of transmission from entry of dirt (U-joint Knuckle 1M-4841 can be installed and wired in place for this purpose).

▷*1951 MERCURY ENGINE STALLING AT IDLE SPEED (After Engine Idle Speed and Anti-Stall Dashpot properly adjusted):* May be caused by excessive tension of torsion spring on accelerator cross-shaft (Z-bar) preventing proper operation of dashpot which should retard closing of the carburetor throttle to prevent stalling. Correct by bending tail or straight portion of torsion spring DOWN (at point midway between spring coil and bracket on firewall) to lessen spring load. NOTE—Spring can be bent UP to increase spring load if tension not sufficient to return cross-shaft to off position when accelerator released (see rattle correction following).

▷*1951 MERCURY ACCELERATOR SHAFT RETRACTING SPRING RATTLES:* If cross-shaft spring rattles (see stalling correction above), correct by lifting spring tail from notch in bracket on firewall and position it on left side of bracket. This will place enough tension on spring to prevent rattles.

1951 MERCURY ENGINE REAR LEFT SUPPORT BOLT CHANGE (to correct loosening of bolt in service): Where loose bolt is encountered, check for use of first type 1" long bolt (which may bottom in hole) and replace with later type ¾" long bolt No. 24348-S8 (use with ⅜" external tooth lockwasher). NOTE—This ¾" long bolt used in production after Sept. 1951.

▷*1951 FORD THROTTLE LINKAGE PRODUCTION CHANGE:* Original design throttle linkage has been revised to provide quieter and more efficient operation. *New design throttle linkage requires different adjustment procedure. See Linkage Adjustment.*

▷*1952 FORD PRESSURE REGULATOR CHANGE (New Front Pump Check Valve to prevent valve sticking):* Regulator Cover Assembly, No. 1P-77451-C, used with new Front Pump Check Valve, No. 1P-77709-B, and Check Valve Spring, No. 1P-77455-A. The valve is piloted by the spring and the staked pin which served as a pilot in previous type No. 1P-77450-B Regulator cover is not used.

▷*FORD SHIFT TUBE VIBRATION DAMPER (Installation on 1952 & early 1953 Cars):* This damper used in production on later 1953 cars and can be installed on earlier cars to reduce selector lever shake. Install as follows: Loosen two nuts on selector tube bracket "U" bolt on steering column, raise gear shift tube bracket assembly, "U" bolt, and lower end of gear shift tube and socket asembly away from steering column. Coat top and bottom of spring damper with lubricant and insert damper between shift tube and steering column tube. Reposition bracket and tighten "U" bolt. Check and adjust linkage. *NOTE*—If interference noted where gear shift tube and socket assembly passes through steering column to instrument panel bracket, enlarge hole in bracket for clearance.

▷*1953 FORD SHIFT LEVER ASSEMBLY PRODUCTION CHANGE & LINKAGE ADJUSTMENT CAUTION:* New Gearshift Lever Assy. No. AB-7302-D (with nylon bushing in insulator) used on later cars and furnished as service replacement to supersede previous type lever No. AB-7302-C. New type insulator and nylon bushing are furnished separately and can be installed in previous type lever in the field. *WHENEVER NEW LEVER (or new insulator and nylon bushing) USED, SPECIAL LINKAGE SETTING REQUIRED. SEE LINKAGE ADJUSTMENT.*

▷*1953 FRONT DRUM AND SECONDARY SUN GEAR ASSEMBLY PRODUCTION CHANGE:* New assembly No. 1P-77530-C used in production and is available for service replacement of previous types. This new assembly has a needle bearing in place of front bushing used on previous types and MUST BE USED WITH NEW TYPE PRIMARY SUN GEAR SHAFT (see below).

▷*1953 PRIMARY SUN GEAR SHAFT PRODUCTION CHANGE:* Primary Sun Gear Shaft Assembly Part No. 1P-77530-C used in production and can be used to replace previous types in service. The later type shaft can be identified by groove machined in center of front clutch hub section of shaft and MUST BE USED WITH NEEDLE BEARING TYPE FRONT DRUM AND SECONDARY SUN GEAR ASSEMBLY (See Production Change above). This new shaft assembly can also be used with previous bushing type Front Drum and Secondary Sun Gear assembly.

CAUTION—Previous type Primary Sun Gear Assemblies Nos. 1P-77530-A or 1P-77530-B should only be used with bushing type Front Drum and Secondary Sun Gear Assembly.

▷*1953 REAR CLUTCH PISTON SPRING & SEAT PRODUCTION CHANGE & SERVICE REPLACEMENT:* New Spring No. 1P-77515-B and spring seat used in later transmissions provides greater clearance between spring and clutch cylinder and these parts SHOULD BE USED IN ALL TRANSMISSIONS WHENEVER TRANSMISSION DISASSEMBLED (NOTE—Old spring seat may be used with new spring if new type seat not available).

Spring Identification—New spring No. 1P-77515-B is .050" smaller diameter and has left-hand coils (reversed from previous type 1P-77515-A).

▷*1952 CONVERTER COVER, GASKET, & IMPELLER PRODUCTION CHANGE:* Converter cover and impeller changed from 34 bolt type with flat gasket to an 18-bolt type with "O" ring type seal (see Impeller Note—below). Correct type parts must be used together as listed below and converter drive plate must be properly installed to maintain balance. *See "Converter Overhaul" and "Installation in Car" data.*

Impeller Note—Revised type impeller is also 34-bolt type (to facilitate lining up balance marks) but is used with 18-bolt cover. Impellers can be identified by the absence of sealing lands on revised type (first type had three lands formed by two concentric grooves in raised section on inner edge of cover mounting face).

Ford 6 Cyl.

Part & No.	①First Type	②Later Type
Converter Cover	1P-7950-B	1P-7950-D
Impeller	1P-7908-B	1P-7908-D
Gasket	1P-7963-C③	1P-7963-B
Bolts	1P-7964-E③	1P-7964-E

Ford V8 & Mercury

Part & No.	①First Type	②Later Type
Converter Cover	1P-7950-A	1P-7950-C
Impeller	1P-7908-B	⑤1P-7908-D, C
Gasket	1P-7963-C③	1P-7963-B
Bolts	1P-7964-D④	1P-7964-D

①—34-bolt type. ②—18-bolt type.
③—Supersedes Gasket No. 1P-7963-A.
④—New "Coned" head type (superseding previous type bolts).
⑤—1P-7908-D (Ford). 1P-7908-C & D (Mercury).

▷*CONVERTER COVER & IMPELLER HOUSING BOLT CHANGE ("Coned" bolts to eliminate possibility of leakage):* These bolts No. 1P-7964-D (Ford V8 & Mercury), 1P-7964-E (Ford 6 Cyl.) used on later transmissions will retain tightness more effectively and prevent leakage at converter cover flange. These bolts can be identified by slight "coning" on bottom face of head (this surface .007-.012" concave —previous bolts were flat). *See "Overhaul—Torque Converter" for bolt installation.*

CAUTION—Old and new type bolts must not be used together.

▷*CONVERTER COVER LEAKAGE CORRECTION:* If leakage not corrected by proper tightening of converter cover bolts, install new type "coned-head" bolts (see above), and tighten bolts as directed in "Overhaul—Torque Converter."

▷*FRONT PUMP & IMPELLER HUB PRODUCTION CHANGE:* Front Pump Assembly No. 1P-77820-D with bushing in front pump drive gear (bearing on stator support assembly) has been released and is interchangeable with previous type pump except that it MUST BE USED WITH NEW SHORTER CONVERTER HUB as follows:

Part & No.	First Type	Later Type
Front Pump Assy.	1P-77820-A,B,C	1P-77820-D
Converter Hub Assy	1P-7915-B①	②1P-7915-C

①—Length 2.06" (used with 1P-7908-C impeller).
②—Length 1.66" (used with 1P-7908-D impeller).

▷*1952 FRONT CLUTCH PLATE PRODUCTION CHANGE & EARLIER MODEL SERVICE REPLACEMENT CAUTION*—Current type Front Clutch Plates No. 1P-77519-C (supersedes previous type 1P-77519-B) should be used for all front clutch service replacements. These plates have improved friction material bonding and should be installed in all trans-

CONTINUED ON NEXT PAGE

FORDOMATIC & MERCOMATIC
►CHANGES, CAUTIONS, CORRECTIONS (C ntinued)

missions not so equipped whenever transmission being overhauled. Discard previous type plates.

Front & Rear Clutch Plates

Type of Spline	Front	Rear
External (Steel)	1P-77573-A	①1P-77518-A
Internal (Bronze)	1P-77519-C②	1P-77519-A

①—CONED type (.010" minimum).
②—Superseding Nos. 1P-77519-A & 1P-77519-B.

Clutch Plate Identification—

No. 1P-77518-A (Rear Clutch Steel Plates): Are coned and have four teeth omitted at two points diametrically opposite.

No. 1P-77519-B—Have two partially removed teeth 180° apart and letter "R" stamped on one tooth midway between these two teeth.

No. 1P-77519-C—Same as above except letter "C" stamped on tooth midway between the two partially removed teeth.

NOTE—These new 1P-77519-C clutch plates used in production beginning Trans. Serial No. 3-48845 and 4-43004.

►*1951 REAR PUMP PRODUCTION CHANGE & REPLACEMENT CAUTION (Transmissions beginning Nos. 1-84567 and 2-83007):* Cast iron type oil pump used optionally on these transmissions and is interchangeable with previous type aluminum pump but **correct type pump cover and output shaft thrustwasher must be used** with each type as follows:

	Rear Oil Pump	
	Aluminum Pump	Cast Iron Pump
Pump Body	1P-77850-A	1P-77850-C
Pump Cover	①1P-77860B	②1P-77860-C
Thrustwasher	1P-77066-A	1P-77066C-

①—Phosphate-coated.
②—Plain (not phosphate-coated).
See Rear Oil Pump Reassembly data for correct use and installation of above parts.

►*1951 CONTROL VALVE PRODUCTION CHANGE & REPLACEMENT CAUTION:* First type 1P-77700-A control valve body superseded by later 1P-77700-C which has changes to insure smoother performance and lessen possibility of leakage. Later type control valve body can be used to replace first type by reworking front servo release tube as follows:

Installation of 1P-77700-C Control Valve Body (when replacing first type 1P-77700-A body): Cut 7/32" off end of longer (4 21/32") front servo release tube, remove all burrs, chamfer cut end to 1/64" x 30°, make certain that all chips removed before installing tube and control valve body. *NOTE*—After this rework, both tubes will be same length (4 7/16").

►*FORD 6 CYL. THROTTLE LINKAGE BIND (Causing faster-than-normal engine idle speed): See Ford 6 Cyl. Throttle Linkage Adjustment for possible causes and corrective procedure.*

►*FORD ANTI-STALL DASHPOT PRODUCTION CHANGE FOR IMPROVED PERFORMANCE:* Late 1952 cars have new dashpot assembly with neoprene boot type dust shield to protect control rod and prevent sticking due to dirt or foreign material. These new dashpot assemblies interchangeable with previous type and will be furnished for service as follows:

Dashpot Assembly	First	Later Type
Ford 6 Cyl.	1BA-99560-A	EAA-99560-A
Ford V8	1BA-99560-A	EAB-99560-A

►*MERCURY DASHPOT ASSEMBLY PRODUCTION CHANGE (for improved Performance):* Late 1952 cars have new type Dashpot Assembly No. EAC-99560-B which has nylon check ball and spring in dashpot body. (This check ball and spring located in carburetor with previous type dashpot). *CAUTION*—When this new EAC-99560-B dashpot installed to replace previous type, CHECK BALL, SPRING, AND RETAINER MUST BE REMOVED FROM CARBURETOR AND DISCARDED.

►*FORD 1951-52 TRANSMISSION CASE REPLACEMENT OIL PAN CAUTION:* 1953 type Oil Pan No. 1P-77472-B (with outlet for under-hood filler) furnished for these models. When installing this pan on 1951-52 cars, use plug No. 1P-77492-A to close this pan opening.

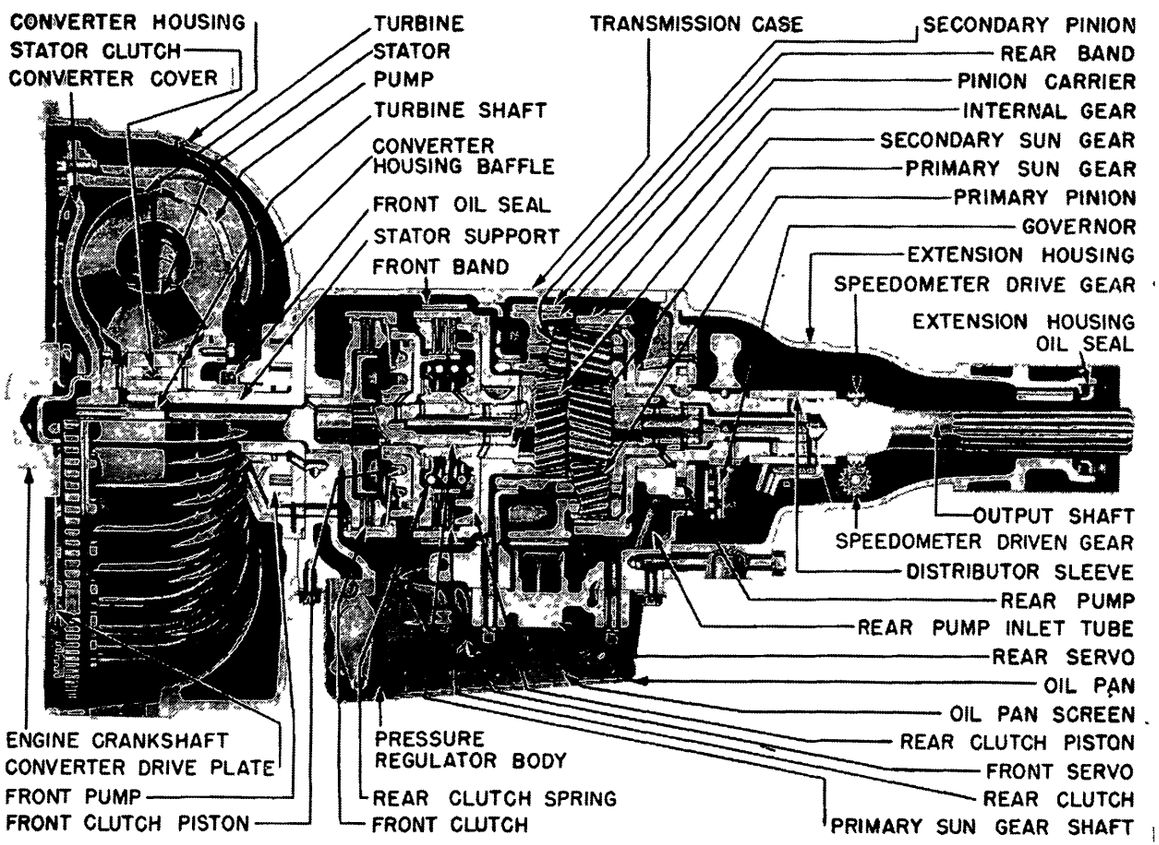
►*FORD 1951-53 REPLACEMENT TRANSMISSION CASE CAUTION:* 1953 type Transmission Case No. 1P-7005-C furnished for these models. This case has two plugged holes on right side (for oil cooler connections when used on 1953 Ford F-100 Truck) and these PLUGS MUST BE TIGHT TO PREVENT OIL LEAKAGE. This case also has provision for underhood oil filler tube. *See REPLACEMENT OIL PAN CAUTION above.*

►*TRANSMISSION "BUZZING" SOUND:* May be caused by undersize or worn bleed flats on Main Oil Pressure Regulator Valve Assembly. Correct by rotating the valve 90° in its bore. *See "Minor Repairs (Transmission in Car)" for disassembly directions.*

►*CONVERTER INSTALLATION CAUTION (To Prevent Damage to Front Pump):* Converter pilot bore in crankshaft must be clean and relatively free of lubricant and without burrs or scratches which would prevent pilot entering bore freely (lubricate pilot with Lubriplate). If converter does not have slight endplay (before drive plate connected), converter assembly may be forced back so that converter hub presses against front pump drive gear causing damage to front pump. *See Transmission & Converter Installation data.*

►*MERCURY INABILITY TO SECURE FORCED 3-2 DOWNSHIFT: See Mercury Throttle Linkage Adjustment for recommended change in carburetor rod assembly setting to correct this condition.*

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FORDOMATIC & MERCOMATIC TRANSMISSION (SECTIONAL VIEW)

FORDOMATIC & MERCOMATIC
(Continued)

DESCRIPTION

The Ford and Mercury automatic transmission consists of a hydraulic torque converter and an automatic transmission which provides automatic operation in the "Dr" range and additional Low, Reverse, Neutral and Parking positions controlled manually.

Torque Converter: Mounted in a housing and connected to rear end of crankshaft in place of the conventional flywheel, and consists of the Torque Units listed below Torque converter is fully automatic in its operation, acting as torque converter for low speed and starting operations (when input torque is less than output torque), and as a fluid coupling at higher car speeds (when input and output torque are equal) The change from torque converter to fluid coupling and the operating phases of the torque converter unit is governed by the car operating conditions and do not occur together or at any particular time

Pump (Driving Member)—Mounted on engine crankshaft and bolted to converter cover Pump rotates at engine speed to transmit engine power to turbine thru the medium of converter oil

Turbine (Driven Member)—Splined to output shaft forward of converter pump and driven by oil flow from converter pump Turbine transmits power to the planetary gears (Low, Intermediate & Reverse) and to the propeller shaft (Driving Range)

Stator—Consists of reaction blades and a one way clutch mounted on the converter cover hub The stator redirects the fluid flow to turbine, increasing torque for low and starting speeds (when input torque is less than output torque) being held from rotating in a direction opposite to pump and turbine by the one way clutch At higher speeds (when input torque equals output torque) the Stator rotates in the same direction and at the same speed as the pump and turbine causing the torque converter to automatically become a fluid coupling

Planetary Transmission: Hydraulically controlled planetary transmission employs a gearset of the compound type consisting of long and short pinions, two sun gears and a single internal gear, providing three forward speeds and one reverse Controlling bands, multiple disc clutches and servo mechanisms are within the transmission case

Planetary Pinion Assembly—Consists of three Primary Pinions (short) and three Secondary Pinions (long) mounted in a pinion carrier The Primary Pinion is driven by the Primary Sun Gear and drives the Secondary Pinion which is meshed with the Secondary Sun Gear and the Internal Gear The pinion carrier is controlled by the Rear Servo and the Rear Band

Primary Sun Gear—Integral with Primary Sun Gear shaft which is splined to the driven flange of the Front Clutch unit Power is transmitted thru this gear to the Pinion assembly (Low & Intermediate Range)

Secondary Sun Gear—Located forward of the Primary Sun Gear and in mesh with the Secondary (Long) Pinions Mounting is on a hub connected to the driven flange of the Rear Clutch Power transmitted from the Rear Clutch to Secondary Pinions (Reverse)

Front Clutch—Front (input) member of clutch is integral with Turbine Shaft and is splined to Front Clutch drum The Front Clutch drum is formed so that it is also the inner (input) member of the Rear Clutch Front Clutch hub (output) is splined to the Primary Sun Gear Shaft The Front Clutch is engaged by a hydraulic piston within the clutch drum and locks the Primary Sun Gear Shaft to the Turbine Shaft Clutch is engaged for all forward speeds and is disengaged by an internal spring for neutral and reverse

Multiple Rear Clutch—Clutch Drum (output) is integral with the Secondary Sun Gear and is provided with a brake band and operating servo Clutch Hub (input) member is integral with the front clutch drum When clutch is engaged, the Secondary Sun Gear is locked to the Turbine Shaft Clutch engagement is by a hydraulic piston within the unit A coil spring between the hub and the drum provides the release

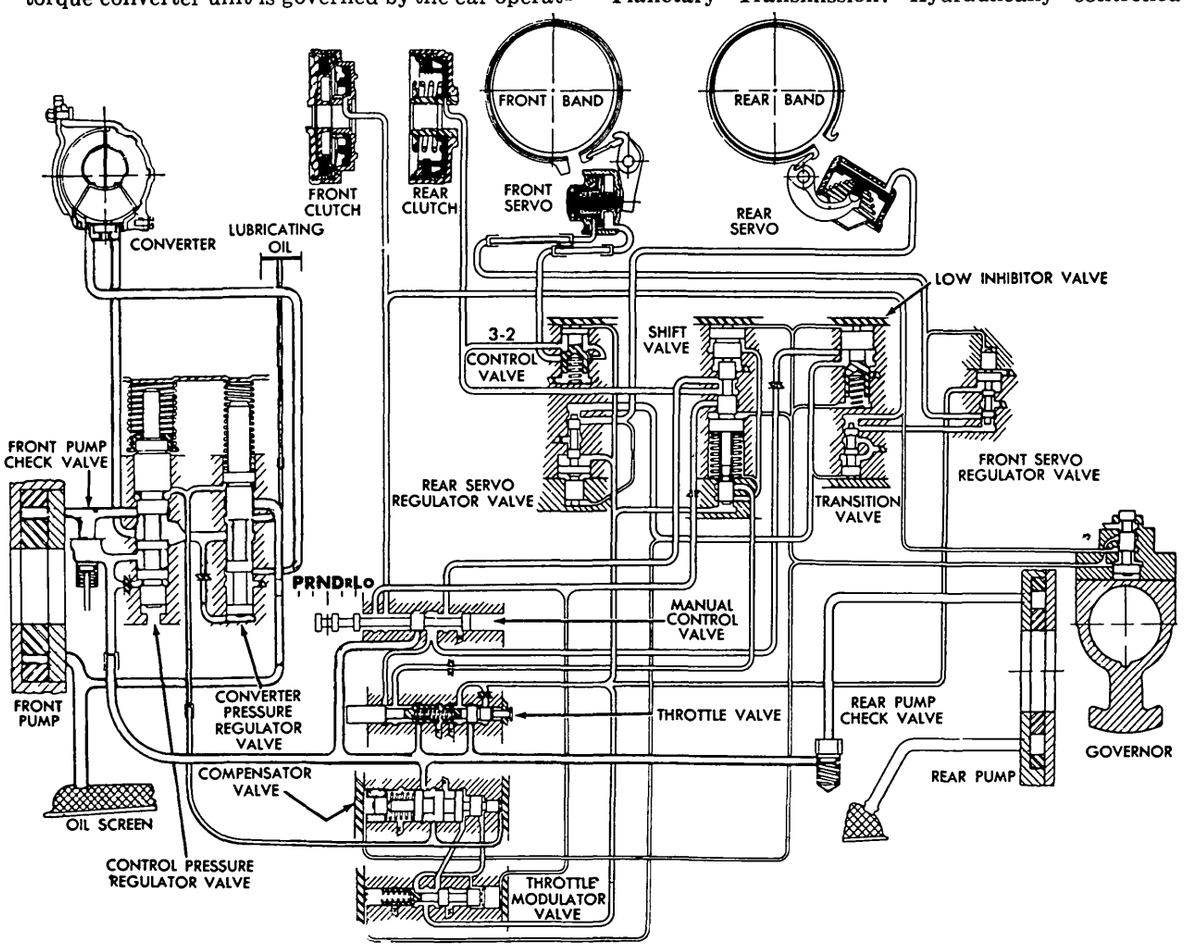
Front Brake Band and Servo Assembly—Band holds the Secondary Sun Gear stationary when it is applied on the clutch drum by the Servo which consists of a hydraulic piston linked to band One end of the band is held stationary by a strut and anchor which has an adjusting screw for band adjustment Servo is fluid applied and spring released

Rear Brake Band and Servo Assembly—Band holds planet carrier stationary when it is applied by the rear Servo which consists of a hydraulic piston linked to one end of the brake band The opposite end is held stationary by a strut and anchor

Oil Pumps: Two pumps used to supply oil pressure for hydraulic controls, oil supply for converter and transmission lubrication

Front Pump—Internal-External gear type mounted between the transmission and torque converter and driven by the converter pump through a tongue and slot coupling This pump has a large capacity and begins to operate as soon as the engine is started, supplying oil to the torque converter and for transmission lubrication and hydraulic controls

Rear Pump—Internal-External gear type mounted



FORDOMATIC & MERCOMATIC TRANSMISSION HYDRAULIC CIRCUITS

CONTINUED ON NEXT PAGE

FORDOMATIC & MERCOMATIC (Continued)

at the rear of transmission and driven by the output shaft. Pump operates whenever rear wheels are turning and supplements the front pump volume. When car reaches sufficient speed, two ball check valves open and allow the oil from the rear pump to enter the hydraulic system.

Hydraulic Controls: Consist of manual and automatic valves, controlling the operation of the transmission servos and clutches.

Control Pressure Regulator—As pump speed varies, spring loaded valve maintains constant pressure. Excess volume is returned to oil pan.

Manual Valve—Control pressure is directed to manual control valve for proper distribution to accomplish the performance desired. Valve is actuated from the selector lever on the steering column.

Throttle Valve—Actuated by the accelerator through linkage. Control Pressure is directed to the throttle valve from the Control Pressure Regulator Valve. As the accelerator is depressed, moving the Throttle Valve towards the open position modifies the Control Pressure in proportion to the degree of throttle opening.

Shift Valve—Automatically changes the speed from Intermediate to High. Valve is spring loaded and is controlled by Governor Pressure and Throttle Pressure.

Hydraulic Governor—Mounted on output shaft at rear of transmission. Rotation of the Governor Valve causes centrifugal force to act on the valve plunger and regulate the pressure in direct proportion to the car speed.

Front Servo Apply Regulator Valve—Provides for smooth changes between Intermediate and High speed, by controlling the flow of oil to the Front Servo. Valve is controlled by throttle pressure.

3-2 Control Valve—Provided for Down-Shifting from High to Intermediate on either open or closed throttle.

Down-Shift Valve—Operated by accelerator pedal. Allows speed change from High to Intermediate by depressing the accelerator pedal past it's fully open position.

OPERATION

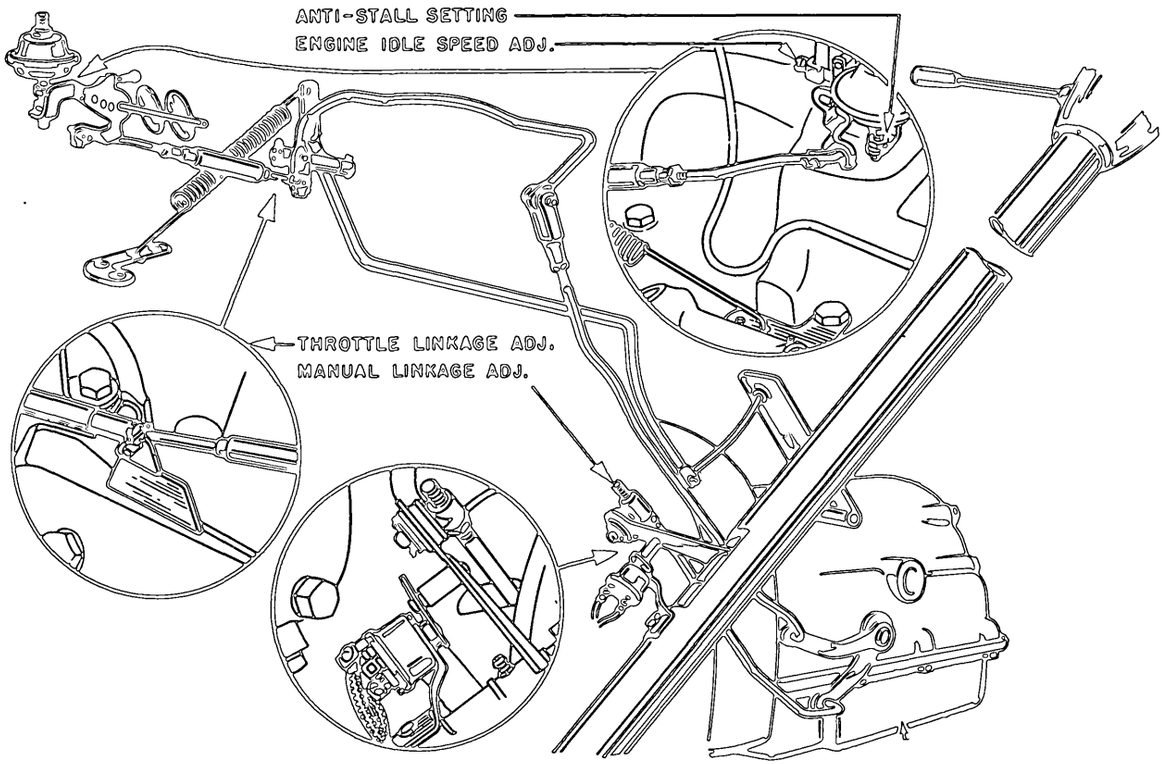
Torque converter automatically provides a torque multiplication ranging from 2.1-1 (maximum for starting and acceleration) to 1.0-1 (normal driving range with torque converter acting as fluid coupling) This torque multiplication is supplemented by the planetary gears when selector lever placed in "Drive," "Low" and "Reverse" Range. Transmission operates in each range as follows:

Neutral Range—Front and Rear Clutches fully released, and Front and Rear Brake Bands fully released so that gears are free to turn. Drive is not transmitted through transmission and this "N" position can be used to start and warm up engine.

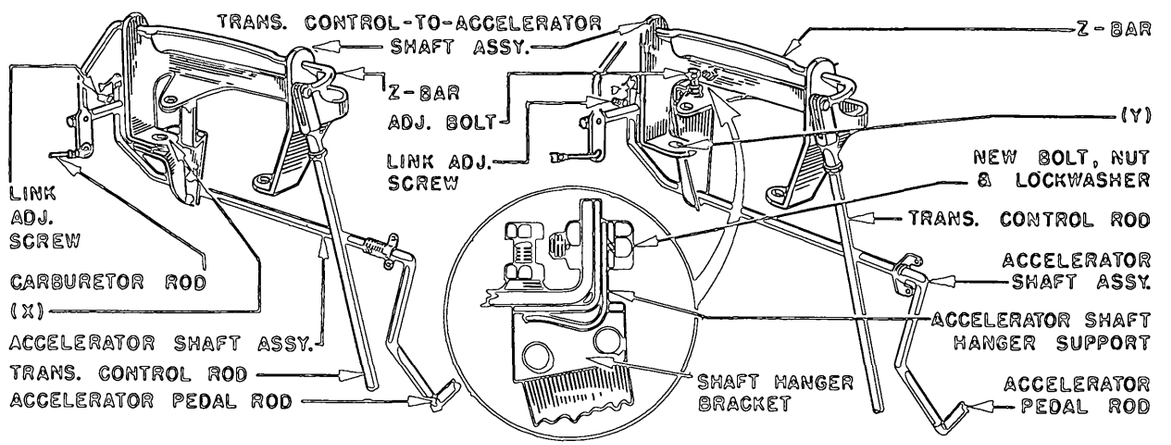
Drive Range—Car starts in Intermediate Gear with Front Clutch applied locking the Primary Gear to the Turbine Shaft and the Front Band applied, holding Secondary Sun Gear stationary, the power flow is from the Turbine Shaft through the Front Clutch to the Primary Pinion to the Secondary Pinions to the Internal Gear to the Output Shaft. As car speed is increased to a certain point, the Front Band is released and the Rear Clutch is applied automatically causing the transmission to change to direct (1.0—1) drive. The power flow in "High" is from the Turbine Shaft through the Front and Rear Clutches to the Planetary Gear which are locked together and rotates as a unit, causing the Output Shaft to rotate at engine speed.

Low Range—Front Clutch applied, locking the Turbine Shaft to the Primary Sun Gear, and the Rear Band applied, holding the Pinion Carrier sta-

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8 CYL. FORDOMATIC TRANSMISSION CONTROL LINKAGE



EARLY 1951 THROTTLE LINKAGE

LATE 1951-53 THROTTLE LINKAGE

FORD V8 THROTTLE LINKAGE

FORDOMATIC & MERCOMATIC (Continued)

tionary, the flow of power is from the Turbine Shaft through the Front Clutch to the Primary Pinions, to the Secondary Pinions, to the Internal Gear and out the Output Shaft at the ratio of 2.44-1.

Reverse Range—Rear Clutch applied, locking the Turbine Shaft to the Secondary Sun Gear and the Rear Band applied, holding the Pinion Carrier stationary, the flow of power is from the Turbine Shaft through the Rear Clutch to the Secondary Sun Gear, to the Secondary Pinions, to the Internal Gear. The Secondary Pinions acting as idlers on stationary axis, drive the Internal Gear in a reverse direction.

LUBRICATION

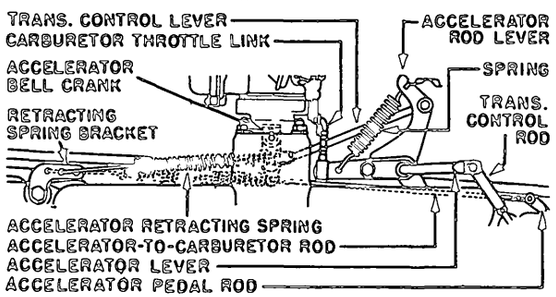
▷*CAUTION:* Transmission oil level should be checked at 1000 mile intervals and should be changed at 15000 mile intervals.

Recommended Oil—Part No. 8L-19582-C, Automatic Transmission Oil "A", in sealed containers.

Capacity—Approximately 9 qts.

Checking Fluid Level—Apply hand brake, place selector lever in Neutral "N" position, run engine at idle speed for approximately four minutes, then move selector lever to Park "P" position. When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission, return lever to "P" position. Raise engine hood, clean all dirt from around filler cap at right rear corner of engine. Check fluid level on dipstick in filler tube (*CAUTION*—make certain dipstick pushed all the way down in the filler tube when checking fluid level). Add fluid as necessary to bring level up to "F" full mark on dipstick.

▷Check for Oil Leaks—Inspect the bottom of the floor pan at the rear of the transmission for evidence of fluid. If fluid is found here, the rear extension housing seal is leaking between the two sections of the telescopic shield. Replace the seal. Check the speedometer cable connection at the transmission and replace the rubber seal if necessary. Check the governor inspection plate and install a new gasket if necessary. Leaking around the oil pan gasket generally can be stopped by tightening the attaching screws to proper 10-13 ft. lbs. torque. If necessary install a new gasket. Check filler tube connection at transmission oil pan. If leakage is evident, tighten the connection. If leakage is evident at either the throttle lever shaft or manual lever shaft, replace either of the seals. Inspect the two hexhead pipe plugs at each side of the transmission case at the front. If either plug shows leakage, tighten to 7-15 ft.lbs. torque. Inspect the discharge air duct for evidence of fluid. If transmission fluid is found, make certain that converter cover bolt nuts tightened to 25-28 ft. lbs. torque, and drain plugs tightened to 7-10 ft. lbs. torque.



FORD 6 CYL. FORDOMATIC LINKAGE

▷*CAUTION—Fluid found in the discharge air duct may be engine oil that has leaked past the rear main bearing. Be sure to determine which type of leak exists.*

Drainage and Refilling—Remove converter housing lower plate and drain converter by removing one drain plug, then rotate the engine 180° and remove the second drain plug. Disconnect filler tube from transmission oil pan to drain fluid from transmission. Tighten converter drain plugs to 7-10 ft. lbs. Tighten filler tube connection. Install 5 quarts of automatic transmission fluid, start engine and allow to idle two minutes. Add 4 qts. of fluid and bring transmission to operating temperature. Place selector lever in parking (P) position and check oil level. If level is not up to dip stick level mark, add additional fluid as required.

▷*TRANSMISSION CASE VENT CHANGE NOTE:* New type Vent Assembly No. 1P-7034-B (identifed by rounded cap) used on later 1953 transmissions and can also be installed on 1951-52 transmissions to provide faster filling when changing transmission fluid.

▷*CAUTION—Correct fluid level should be determined by dipstick reading rather than actual number of qts. installed.*

LINKAGE ADJUSTMENT

▷*FORD THROTTLE LINKAGE ADJUSTMENT CAUTION: Different type linkage used on 6 and V8 cars. See special procedure for each model below.*

MAKE ADJUSTMENTS IN FOLLOWING ORDER:

CARBURETOR IDLE SPEED: With engine at normal operating temperature (choke valve wide open and fast idle inoperative) and selector lever in Neutral "N" position, set throttle stopscrew for idle speed 440-460 RPM. (6 Cyl. Cars), 415-425 RPM. (Ford V8 and Mercury. Shut off engine for Dashpot adjustment.

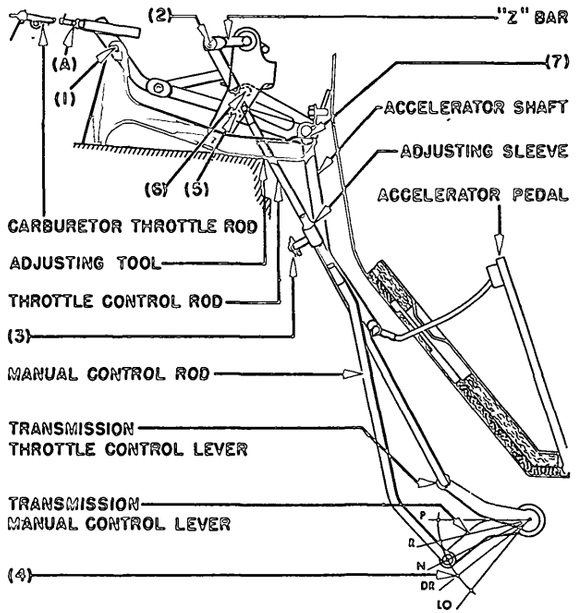
ANTI-STALL DASHPOT: *CAUTION—Ford and Mercury adjusted differently as follows:*

Ford 6 Cyl. & V8—After engine idle speed correctly set (above), loosen the dashpot adjusting screw locknut (on throttle lever), hold throttle lever in closed position, turn adjusting screw out (counter-clockwise) until the screw causes the dashpot rod to bottom in the dashpot (additional movement of screw will cause throttle valve to open), then turn the adjusting screw in 1½-2 turns and tighten the locknut. This will provide correct clearance of .045-.064" between dashpot rod and adjusting screw (apparent only when rod bottomed in dashpot).

Mercury Adjustment—After engine idle speed correctly set (above) and with engine at normal operating temperature so that fast idle cam in slow idle position, first make certain that dashpot adjusting screw does not contact dashpot rod, then loosen locknut and turn adjusting screw until gap between head of screw and dashpot rod is .020" (check with a feeler gauge), tighten locknut and recheck for .020" gap.

THROTTLE LINKAGE: *CAUTION—Each model adjusted differently as follows:*

Ford 6 Cyl. (1952-53) Throttle Linkage: *CAUTION—Check linkage for free operation and correct any binding BEFORE making adjustments—*



MERCURY MERCOMATIC LINKAGE

▷*LINKAGE BINDING CORRECTION*—If engine idles at faster-than-normal speed, check accelerator pedal rod for interference with floor mat or at floor pan opening, check all linkage pivot points and carburetor Dashpot shaft for binding. Correct any binds, lubricate all pivot points with engine oil and recheck linkage for free operation. If engine does not return to normal idle speed after Linkage Adjustments properly made, increase accelerator retracting spring tension by hooking forward end of spring in front hole of spring bracket and hook rear end of spring to end of accelerator rod at accelerator bellcrank. *CAUTION—Changing spring location without removing all binding from linkage will result in excessive pedal pressure.*

Linkage Adjustment: Adjust in following order:

1) Measure distance from top surface of accelerator pedal to FLOOR PAN (not floor mat) which should be 4 5/16" (necessary to insure correct kickdown). If distance not correct, adjust threaded trunnion at rear end of carburetor throttle rod (at accelerator pedal rod connection) for correct pedal height.

2) Disconnect transmission throttle rod by removing clevis pin at forward end (at lever on left side of cylinder head), pull upward gently but firmly on rod to insure transmission lever being against its stop, adjust clevis on rod until clevis pin freely enters holes in clevis and lever, then lengthen rod by turning clevis 2½ turns, connect rod and tighten clevis locknut.

3) Assemble throttle control rod to accelerator assembly shaft with the clevis pin and cotter pin, then tighten locknut. Lubricate throttle linkage, and check and relieve any binding conditions. Road test car. If band or clutch slippage is evident, increase length of rod to 3 turns but do not exceed 3½ turns.

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FORDOMATIC & MERCOMATIC (Continued)

Ford V8 (Early 1951), Mercury (1951) Throttle Linkage Adjustment: *CAUTION—On Mercury, Z bar-to-Carburetor rod must be connected at FORWARD hole in carburetor throttle lever. If rod connected at rear hole, disconnect and lengthen rod as necessary to connect at forward hole when making the linkage adjustment.*

1) Disconnect rod and remove the clip from the carburetor to Z-bar rod at the Z-bar end. Reinsert the rod in the Z-bar lever, place tool No. 77230M (Mercury), tool No. 77230F (Ford), on the end of the rod. With the tool resting on the finished surface of the cylinder block (CAUTION—tool must rest on clean finished surface of block, not on manifold gasket or foreign material), adjust the rod length so that carburetor throttle lever is held against the idle stop. Remove the tool and assemble the rod to the Z-bar with the clip.

▷*CAUTION*—If above setting results in insufficient accelerator pedal travel and prevents high-to-intermediate kick-down with normal throttle linkage setting (2 below), adjust carburetor-to-Z-bar rod so that tool is .125" away from surface of engine block and adjust linkage to 2½-3½ turns off stop (below).

2) At the Z-bar, remove cotter pin and clevis pin from the upper end of the Z-bar-to-transmission rod and pull upward gently but firmly on the rod from the transmission throttle lever to hold the lever against the stop. Adjust the clevis so that the clevis pin will freely enter the clevis and Z-bar hole. Lengthen the rod by turning the clevis counter-2 full turns (Mercury), 2½ full turns (Ford) except as noted in CAUTION below, then assemble the rod to the Z-bar with the clevis pin and cotter pin. Lock the clevis on the rod with the locknut while holding the clevis in alignment (necessary to prevent binding of the linkage).

▷*CAUTION*—If clutch or band slippage noted with above setting, or if setting in (1) above varied to secure correct kick-down operation, the rod setting should be lengthened to 3 full turns but must not exceed 3½ turns.

Ford V8 (Late 1951-53) Throttle Linkage Adjustment *NOTE—Adjusting Tool 77230-FA must be modified for use in adjusting 1952-53 Models (Slot in tool should be used only when adjusting 1951 linkage). Make adjustments in following order.*

1) Check position of accelerator Z-bar-to-carburetor connecting link. If link is not parallel to centerline of engine, loosen locknut and turn link adjustment screw (see illustration) until link position is correct, tighten locknut while holding the screw.

2) Check position of accelerator shaft hanger support in relation to accelerator shaft. If support is not perpendicular to shaft, loosen bolt securing support to engine bracket and move top of support to correct position, tighten the bolt while holding two horizontal legs of bracket together with vise-grip pliers.

3) Late 1951 Cars Only—Install special adjusting tool 77230-FA (Either Modified as noted below, or not modified) on rear end of carburetor-to-Z bar rod with SLOT in tool engaging end of rod and leg at rear of tool behind accelerator shaft and make certain that tool rests on finished surface of cylinder block (CAUTION—See that block is clean and that gauge is not resting on manifold gasket). Hold the rod at the bottom of the slot in the gauge, loosen locknut on adjustment bolt in Z-bar bracket, turn adjusting bolt until tool leg just touches accelerator shaft, tighten locknut.

3) 1952-53 Cars Only—Install modified Adjusting Tool 77230-FA (see Tool Modification Note below) on rear end of carburetor-to-Z-bar rod with end of rod resting in adapter on tool and leg at rear of tool behind accelerator shaft. Make certain that tool rests on clean finished surface of cylinder head (CAUTION—tool must not rest on manifold gasket). Hold rod against adapter on tool, loosen locknut on adjusting bolt in Z-bar bracket, turn adjusting bolt until tool leg just touches accelerator shaft, tighten locknut.

4) With tool in place on carburetor-to-Z-bar rod, loosen the locknut on the rod, turn barrel on rod until idle adjustment screw (throttle stopscrew) just touches its stop when rod is held against adapter on tool, then tighten the locknut. Remove the adjusting tool.

5) Remove cotter pin and clevis pin from upper end of Z-bar-to-transmission rod, pull gently but firmly upward on rod to hold transmission lever against its stop, adjust clevis on rod until clevis pin freely enters holes in clevis and Z-bar, then lengthen rod by turning clevis 2½ full turns counter-clockwise (off) rod. Assemble rod to Z-bar with clevis pin and cotter pin, tighten clevis locknut.

6) Lubricate all bearing points in linkage and check for free operation throughout entire range without binding. Check and reset engine idle speed.

Check operation of car after all adjustments completed. If clutch or band slippage occurs at part throttle, increase transmission-to-Z-bar rod adjustment (5 above) to 3 full turns but do not exceed 3½ turns. If accelerator pedal height not sufficient for correct kick-down operation with above settings, adjust carburetor rod length with rod end positioned in top of slot of adjusting tool (step 3 above).

▷*ADJUSTING TOOL 77230-FA MODIFICATION (for use on 1952-53 Ford V8 Cars)*—Special adapter must be sweated on side of gauge to provide lower adjusting point for carburetor-to-Z-bar rod. Make up adapter from ⅛" flat stock .44" square with cutout in one corner so resulting "L" is .12" wide on vertical leg and .25" wide on horizontal leg with .03" radius in corner. Position adapter on right side of gauge with vertical leg .12" to rear and horizontal leg .12" below lower end of gauging slot in tool (this will provide new gauging point .12" below and to rear of slot).

Mercury (1952-53) Throttle Linkage Adjustment: See illustration for adjustment points. Adjust as follows:

1) Disconnect transmission throttle rod by taking out clevis pin at forward end of rod (point "2"), loosen two bolts in accelerator rod link bracket (points "5" and "6").

2) Position Tool 77230-MAA on finished face of engine block (see illustration). Adjust accelerator shaft so that it contacts upper face of rear end of tool (point "7"), then tighten the two bolts (points "5" and "6").

3) Make certain that engine idle speed correctly set at 425 RPM. maximum slow or hot idle speed, adjust accelerator shaft-to-carburetor rod (point "A") so that rod enters carburetor throttle arm freely, connect rod. *See "No 3-2 Forced Downshift Correction" below.*

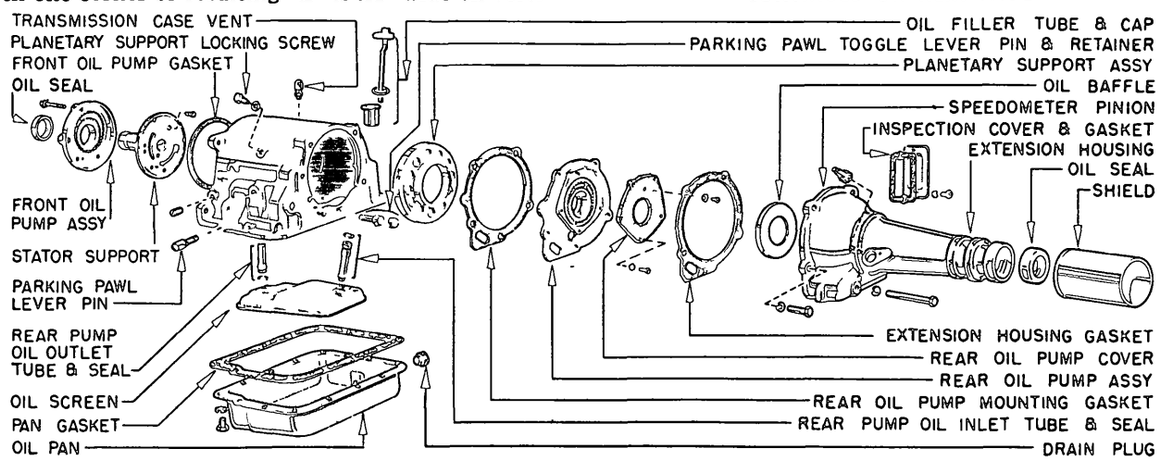
4) Hold carburetor throttle lever in slow idle position, pull transmission throttle lever rod upward gently but firmly so that lever is in the "stop" position, adjust clevis at upper end of rod (point "2") so that clevis pin enters clevis and control shaft freely, then lengthen rod by turning clevis 2½ turns counter-clockwise, connect rod.

NOTE—If above setting does not give satisfactory operation, rod can be lengthened ½ turn for 3-turn setting. DO NOT exceed 3½ turns from the stop position.

▷*NO 3-2 FORCED DOWNSHIFT AFTER COMPLETING ADJUSTMENT:* If forced 3-2 downshift cannot be secured after linkage has been properly adjusted (above), disconnect accelerator shaft-to-carbureor rod and shorten the rod one complete turn (see step 3 above). *CAUTION*—Over-run spring in assembly must allow for free movement of the ball in its socket.

Ford Truck (1953): Throttle and Manual Control Linkage Adjustment same as for corresponding Pass. Car Models except that distance between ac-

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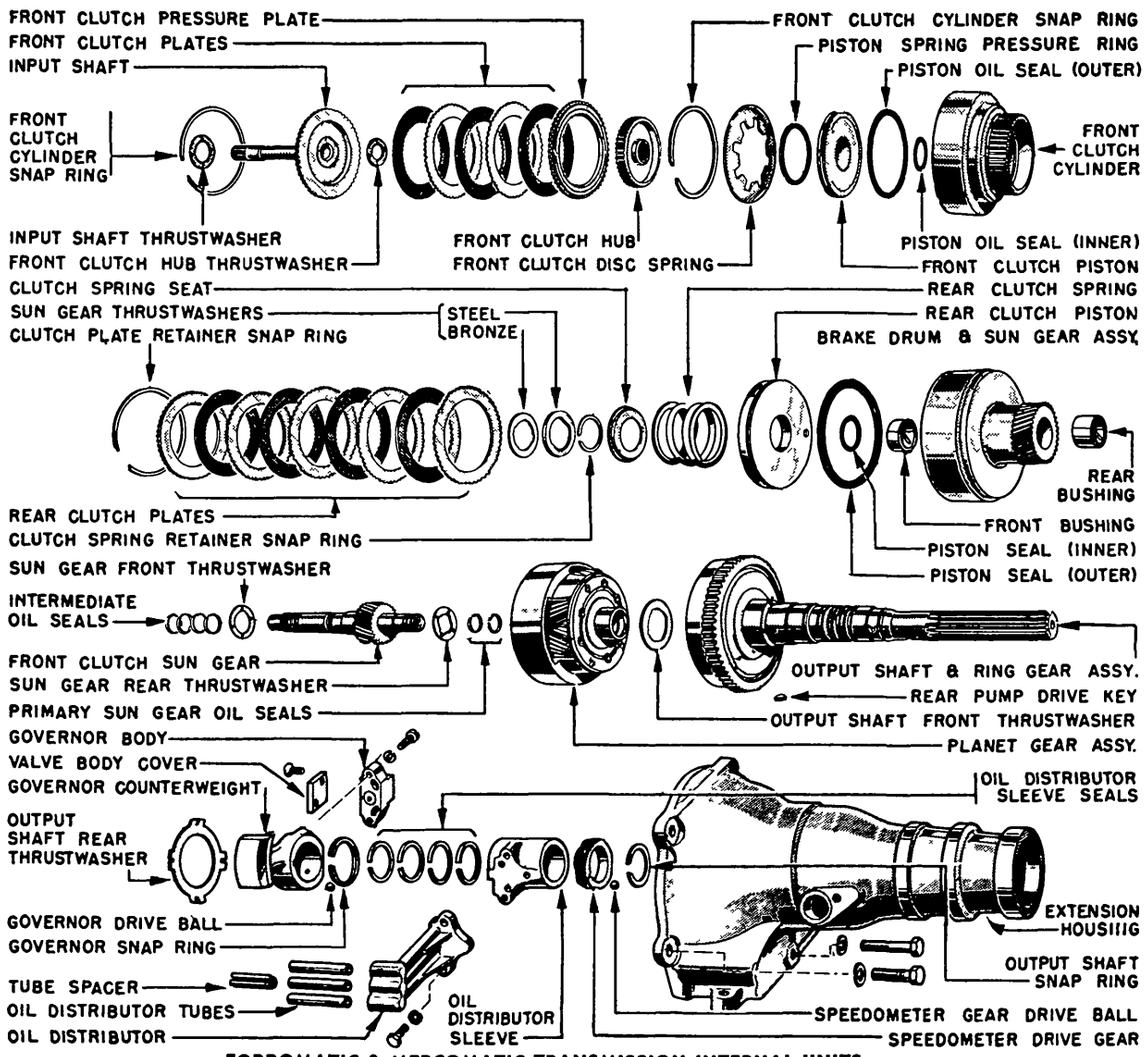
TRANSMISSION CASE AND EXTENSION HOUSING ASSEMBLY

FORDOMATIC & MERCOMATIC (Continu d)

celerator pedal pivot point (where accelerator cross shaft connects to pedal) and floor pan (not mat) is 2⅝". Adjust carburetor connecting link to obtain correct height of pedal.

MANUAL LINKAGE: Disconnect the manual rod from the transmission selector arm at the upper end. Position the selector lever so that the indicator at the steering wheel is down against the stop in the drive position. Position the transmission manual lever in the drive (Dr) position (second position from the bottom). Adjust the rod length so that the sleeve trunnion freely enters the grommet in the selector arm. Lengthen the rod by turning the sleeve one full turn counter-clockwise (except on later 1953 Fords with new type Gear Shift Lever Assembly—see Changes & Corrections) or earlier cars with the same new Insulator and Nylon Bushing in the old arm in which cases rod should be lengthened two full turns. Reassemble rod to selector arm and tighten the locknut to hold the adjustment. Check alignment of the pointer for all positions of the selector lever.

STARTER NEUTRAL SWITCH: Loosen the neutral switch to steering column attaching screws. Position the switch so that the starter circuit is closed when the selector lever is in the neutral (N) position. Check the starter circuit in all selector lever positions. NOTE—The circuit must be open in all positions except neutral.



FORDOMATIC & MERCOMATIC TRANSMISSION INTERNAL UNITS

BAND ADJUSTMENT

►*Band Adjustment is recommended to be made at 15000 mile intervals when transmission fluid is changed (pan should be removed and cleaned at this time).*

FRONT BAND ADJUSTMENT: Drain fluid from pan using a drain can with a fine mesh screen, remove pan. Remove fluid screen from transmission and loosen the front servo adjusting screw locknut TWO FULL TURNS, using a 11/16" wrench. Using front band adjusting tool No. 7225, insert gauge block between servo piston and adjusting screw and tighten adjusting screw until wrench overruns. Back off adjusting screw exactly ONE COMPLETE TURN and remove gauge block. While holding adjusting screw stationary, tighten locknut clockwise (20-25 ft.lbs.). Install fluid screen and install pan using new gasket. Install the drain plug and refill transmission to "Full" mark using fluid drained from transmission unless fluid being changed. Check fluid level (see LUBRICATION).

►*CAUTION—Severe damage may result if adjusting screw not backed off exactly 1 full turn.*

REAR BAND ADJUSTMENT: Fold back floor mat to expose right side of floor pan and remove access hole cover on right side of transmission floor pan. Using rear band adjusting tool No. 7195, loosen rear band adjusting screw locknut. Using "T" handle of tool No. 7195, tighten rear band adjusting screw until wrench overruns. (If screw was found to be tighter than wrench capacity (10 ft. lbs.), loosen several turns and retighten until wrench overruns). Back off adjusting screw exactly 1½ COMPLETE TURNS. While holding adjusting screw stationary, tighten adjusting screw locknut to 35-40 ft. lbs.

►*CAUTION—Severe damage may result if adjusting screw not backed off exactly 1½ turns.*

TESTING & TROUBLE SHOOTING

►*CAUTION—While making the test never hold the throttle open longer than 5 seconds and RELEASE THROTTLE IMMEDIATELY if speed exceeds 1565 RPM. (indicating band or clutch slippage).*

STALL TEST: The stall test is made in the drive range and the reverse range. The test determines whether the bands and clutches are holding properly. Connect a tachometer to read on the high scale, and make sure the engine is idling properly (425 RPM) at normal operating temperature. Firmly apply the brake pedal with the left foot, place the selector lever in drive (Dr) range, and press the accelerator all the way down to the floor. The engine speed should be 1365-1565 RPM. (Ford), 1400-1600 RPM. (Mercury). If engine speed is below this lower RPM., tune up the engine and repeat test. If engine speed exceeds the higher figure, release the accelerator immediately because it indicates the front band or clutch is slipping. Repeat the test with the selector lever in reverse (R) position. If slippage occurs, it is the rear band or rear clutch. Release the accelerator immediately. If the stall test shows proper band and clutch operation, proceed with the shift point test. If slippage is evident, make a pressure test.

SHIFT TEST: Select a smooth level road for the test. First check the shift from intermediate to high with a light throttle. Place the selector in drive (Dr) position and starting from a standstill, apply the accelerator lightly but steadily. The shift from intermediate-to-high should occur at the correct

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FORDOMATIC & MERCOMATIC (Continued)

MPH. Allow the car to decelerate until downshift from high-to-intermediate occurs. See table for correct shifting speeds. With the selector lever still in drive (Dr) position, press down hard on the accelerator until the car shifts from intermediate to high. See table for correct shifting speeds. Reduce the car speed to a point below 50 MPH., then press the accelerator pedal quickly to the floor. This action engages the kickdown valve which shifts the transmission from high to intermediate. The kickdown shift occurs only with the car in high gear and at a speed below the full throttle (kick-down) point as shown in the table below.

FORD & MERCURY SHIFT SPEEDS

	Min. Throttle	Full Throttle
Automatic Shifts		
2-3 Upshift	14-19 MPH	64-69 MPH.
3-2 Downshift	7-3 MPH	①Below 55 MPH.
Manual Shift ("Dr" to "Lo")		
3-2 (Intermediate)		Above 23-27 MPH.
3-1 (Low)		Below 23-27 MPH.

①—Forced downshift or "kick-down."

OPERATING PRESSURE TEST: Set the parking brake firmly and hoist the car until the rear wheels clear the floor. Remove the converter air intake duct and screen. Disconnect the throttle linkage at the outer throttle lever. Remove the ¼" pipe plug located near throttle levers, then connect pressure gauge No. 77820 and mount gauge so that it can be read under the car. Position the throttle lever protractor gauge No. 77270A (Ford), 77270 (Mercury) on the throttle lever shaft (see Gauge Note below if gauge will not fit over shaft), locating large elongated hole in gauge over the large shaft to rear of control lever. Set gauge indicator to 0° and lock in place with knurled thumbscrew. Hold throttle lever against stop (up), insert gauge pin 7000-B-1 through the small elongated hole in the gauge and the hole in the throttle lever. If the gauge pin enters these two holes freely the throttle mechanism has not been distorted and need not be replaced. Replace the throttle control mechanism if it is distorted. With the throttle lever still held against the stop (up), lock the throttle lever to the gauge by tightening the thumb screw on the gauge. Remove the gauge pin, then loosen the knurled screw and advance the lever fully (down). The lever should travel 28°-33°. Use an engine tachometer and set the engine idle speed to 600 RPM. by adjusting the idle adjusting screw. Make tests in Reverse "R" and Drive "DR" positions as directed below.

▷Protractor Gauge Installation Note—If gauge can not be installed on shaft due to flow of brazing metal on end of shaft, remove this metal by reducing shaft to original diameter for distance of ¼" from end. Do not rework the gauge.

Reverse Test—With engine idling at 600 RPM., place selector lever in Reverse "R" position. Observe the pressure at 0° throttle lever position. The pressure should be 60-80 p.s.i. From underneath the car advance the throttle lever slowly and observe the angular reading at the point the pressure begins to rise. Pressure rise should begin between 3½-4½° throttle advance. Continue to advance the throttle lever slowly until maximum pressure is indicated (should be 140-165 lbs.) and observe angular reading which should be 4½-7½°. If above points not correct, adjust by changing throttle valve stop position (see Throttle Valve Stop Adjustment below).

Drive Test—Place selector lever in Drive "Dr" position and repeat above test procedure. Maximum pressure should be 120-145 lbs. with angular reading of 7-10½°. If above points not correct, adjust by changing throttle valve stop position.

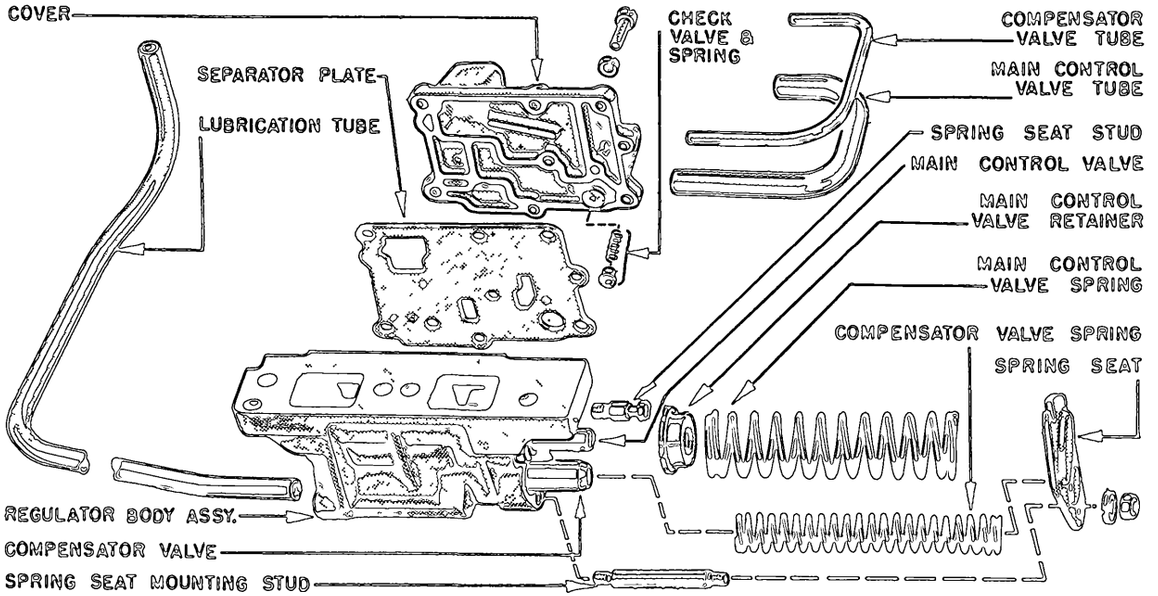
Throttle Valve Stop Adjustment—This adjustment requires draining transmission and removing oil pan. Use Bending Tool No. 77763 to bend the throttle valve stop within transmission case as follows:

If Pressure Rise Start is over 4½° (in Reverse "R" Range)—Hold outer throttle lever against its stop, clamp protractor gauge on lever and set to read 0°, then advance lever to maximum travel. Install bending tool over throttle valve stop, bend stop TOWARD valve body to advance the stop position the required number of degrees to bring the pressure rise start to 4° in "R" range. Check by returning the lever to stop position and reading protractor gauge (reading will indicate change in stop position).

If Pressure Rise Start is under 3½° (in Reverse "R" Range)—Bend stop AWAY from valve body, following same procedure as above except that protractor gauge must be set at some positive reading such as 5° (instead of zero). Final gauge reading subtracted from initial gauge reading will indicate change in stop position.

After making above adjustment, re-install oil pan, fill transmission with fluid, recheck pressure rise start in "R" range.

After completing above tests—Remove protractor gauge and pressure gauge, re-install pipe plugs and tighten to 7-15 ft. lbs. Connect link to throttle lever using a new cotter pin. Install converter air intake and duct. Reset engine idle speed to 425 RPM. Adjust throttle linkage. *See Linkage Adjustment.*



FORDOMATIC & MERCOMATIC PRESSURE REGULATOR ASSY.

MINOR REPAIRS (TRANSMISSION IN CAR)

The following transmission units can be removed for repairs while the transmission remains in the car. Raise car on hoist for these operations.

▷NOTE: For disassembly and overhaul of the following units, see "Overhaul (All Transmission Units)."

Governor Removal: Remove governor inspection cover from extension housing. Rotate the drive shaft to bring governor body in line with inspection hole. Remove the two screws that secure governor body to sleeve. Remove governor.

▷*CAUTION—Use care not to drop balls or governor valve into housing.*

Installation—Lubricate governor valve with transmission fluid and install valve in governor body (CAUTION—valve must move freely in body). Install governor body on counterweight with the side plate forward (CAUTION—fluid passages in governor body and counterweight must be aligned), install governor body attaching screws. Install inspection cover with NEW gasket, tighten cover screws to 4-6 ft. lbs. torque.

▷NOTE: For the following operations, remove transmission fluid level indicator. Remove transmission filler tube and drain the fluid into clean container using a fine mesh wire screen for straining. (fluid may be re-used). Then remove transmission oil pan and screen.

Front Servo Removal: Loosen lubrication tube from pressure regulator and rear pump and remove. (NOTE—If necessary, tap tube with soft hammer to remove—*CAUTION*—Do not bend or distort tube). Loosen control valve body attaching bolts. Remove servo attaching bolt and while holding servo strut with fingers, remove servo assembly.

Installation—Position servo band forward in case with band ends down. Position servo strut with

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FORDOMATIC & MERCOMATIC (Continued)

large end indexing with servo actuating lever and small end indexing with band end. Rotate band, strut and servo into position, indexing tubes from valve body to servo, and anchor end of band with anchor in case. Install attaching bolt, tightening to 30-35 ft.lbs. Tighten control valve attaching bolts to 8-10 ft.lbs. Install lubrication tube and adjust servo band. See "Front Band Adjustment." Install screen, install oil pan using NEW gasket, tighten oil pan screws to 10-13 ft.lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

Rear Servo Removal: Remove lubrication tube from rear pump and regulator. (NOTE—If necessary tap tube with soft hammer to remove). Remove rear pump intake tube. Remove front servo (see above). Take out rear servo attaching bolts, hold actuating and anchor struts with the fingers, remove rear servo assembly.

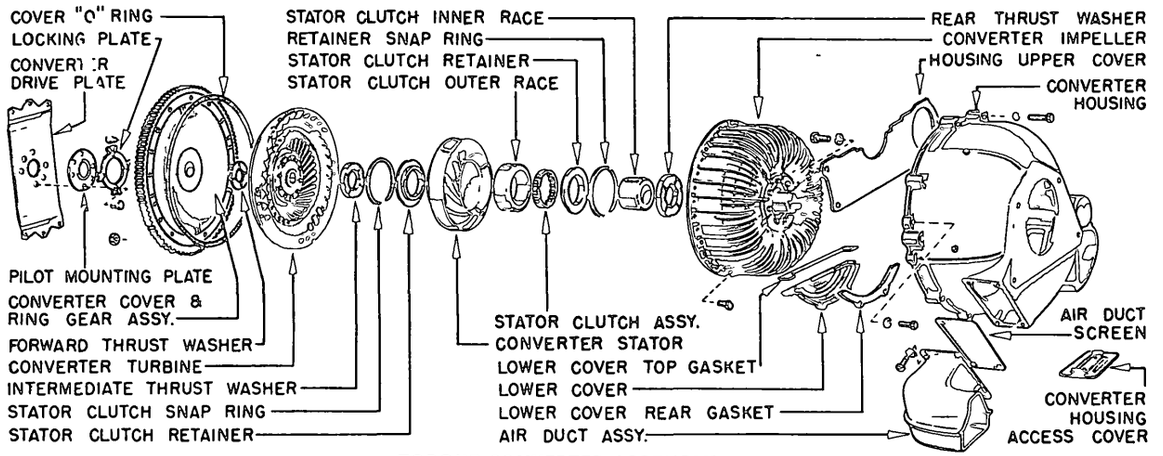
Installation—Position servo anchor strut and rotate servo band to engage strut. Hold in position with fingers. Position actuating lever strut and install servo and install servo attaching bolts, tightstall servo, install servo attaching bolts (CAUTION—Longer attaching bolt must be installed in forward bolt hole), tighten attaching bolts to 40-45 ft. lbs. torque. Install front servo (see above). Install rear pump intake tube and lubrication tube. Adjust rear band (see BAND ADJUSTMENT). Install oil pan with NEW gasket, tighten oil pan screws to 10-13 ft.lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

Control Valve Body Removal: Remove two "U" tubes from pressure regulator and control valve body. Loosen front servo attaching bolt three turns. Take out three valve body attaching bolts, lower the valve body and pull it off the servo tubes.

▷*CAUTION—Use extreme care when removing valve body to prevent damage to body and attached parts.*

Installation—Align servo tubes with holes in control valve body, position manual lever in neutral, position inner throttle lever between stop and downshift valve and at the same time push the throttle valve in to clear the transmission case making certain that manual valve engages actuating pin manual detent lever. Install control valve body attaching bolts but do not tighten the bolts. Install two "U" tubes in pressure regulator and control valve body. Tighten control valve body attaching bolts to 8-10 ft. lbs. torque. Tighten front servo attaching bolt to 35-40 ft. lbs. torque. Adjust front and rear bands (see BAND ADJUSTMENT). Install oil screen, install oil pan using NEW gaskets, tighten oil pan screws to 10-13 ft.lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used), recheck fluid level with transmission at normal operating temperature.

Pressure Regulator Removal: Remove lubrication tube. Remove control pressure tube and compensator tube from valve body and regulator. Remove pressure regulator spring retainer. *(CAUTION—Maintain pressure on retainer to prevent springs flying out).* Remove the control pressure and converter pressure valves. Take out pressure regulator attaching bolts and washers, remove regulator.



TORQUE CONVERTER ASSEMBLY

▷*MAIN OIL PRESSURE REGULATOR VALVE INSTALLATION CAUTION:* If regulator removed to correct transmission "buzzing" noise, examine valve for undersize bleed flats and rotate valve 90° in bore from original position when re-installing it. This should correct the noise.

Installation—Install regulator body and attaching bolts and tighten to 17-22 ft.lbs. Install converter pressure and control pressure valves and make certain valves operate freely in bore, then install valve springs and retainer. Install large control pressure tube, small compensator tube, and lubrication tube. Install oil screen, install oil pan using NEW gaskets, tighten pan screws to 10-13 ft.lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used), recheck fluid level with transmission at normal operating temperature.

Manual & Throttle Lever Seal Replacement: Remove control valve body (see above), disconnect manual and throttle linkage rods at transmission levers. Remove nut on inner throttle lever shaft and remove inner throttle lever. Remove outer throttle lever and shaft, remove throttle shaft seal from counterbore in manual lever shaft. Take out cotter pin in each end of parking pawl torsion lever rod and remove the rod, rotate manual lever shaft until detent lever clears detent ball (CAUTION—do not allow detent ball to fly out), remove detent ball and spring. Remove manual lever shaft nut, remove detent lever, remove outer manual lever and shaft assembly. Remove manual shaft seal.

Installation—Coat outer diameter of new seal with Permatex #3, install seal in case using tool No. 77288. Install outer manual lever and shaft, rotate shaft until manual lever points downward, place detent lever on inner end of shaft, install attaching nut and tighten nut to 35-40 ft. lbs. torque. Place detent spring and ball in hole in case (use piece of thin wall tubing to depress ball and spring), rotate detent lever until detent ball is held in place. Install parking pawl torsion lever rod and cotter pins. Install new throttle shaft seal, outer throttle lever and shaft, inner throttle lever and attaching nut, tighten nut to 25-28 ft. lbs. Connect manual and throttle rods to outer levers. Check linkage for free movement. Install control valve assembly and other parts. *See Control Valve Assembly Installation (above).*

REMOVAL FROM CAR

▷*TRANSMISSION OR CONVERTER REMOVAL NOTE:* Transmission and converter can be removed as an assembly, or transmission can be removed separately (without disturbing converter) as follows:

TRANSMISSION & CONVERTER ASSEMBLY REMOVAL:

▷*FORD 6 CYL. TRANSMISSION REMOVAL CAUTION:* The procedure below is recommended by manufacturer and requires modification of transmission jacks as explained below. *This procedure will allow transmission to be removed without removing engine from chassis.*

Ford 6 Cyl. Transmission & Converter Removal: Place car on hoist or support car on jack stands with tires at front and rear at least 10" above floor. Then proceed as follows:

1) Fold back front floor mat, remove rubber plugs in dash panel assembly, work through these holes, remove two top converter housing-to-engine bolts.
2) Remove all lower converter housing-to-engine bolts EXCEPT one located over starter and one located over exhaust pipe. DO NOT remove these bolts until later.
3) Remove transmission linkage splash shield, and converter air duct assembly, then disconnect rods from both levers on transmission case. Disconnect speedometer cable assembly. Remove starter.
4) Disconnect propeller shaft at rear universal joint flange, remove shaft by pulling it to rear to disengage forward end from transmission.
5) Drain transmission case fluid by disconnecting filler tube at transmission oil pan connection.
6) Remove two transmission housing-to-engine rear support bolts.
7) Position transmission jack under transmission (see Fordomatic Transmission Jack Note below), raise transmission slightly to remove load from rear support.
8) Disconnect and remove engine rear support.
9) Remove converter housing lower access cover and oval cover on engine rear plate. Disconnect

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FORDOMATIC & MERCOMATIC (Continued)

driving flex plate from converter cover, position flex plate horizontally.

CONVERTER DRAINAGE NOTE—Converter can be drained after transmission removed from car, or it can be drained at this point as follows: Remove one converter housing drain plug, then rotate converter 180°, remove second drain plug and allow converter to drain.

10) Install engine support bar to support engine weight and adjust tightly to engine oil pan flanges.

11) Remove two remaining converter housing-to-engine attaching bolts (2 above), slide transmission assembly to rear sufficiently to disengage it from engine. Wedge converter assembly in place (piece of strap iron can be bolted across lower part of converter housing) to prevent assembly sliding out when transmission tipped. Lower transmission assembly slightly and tilt front end downward and toward the right. Raise engine rear plate and move it forward, then continue to lower and tilt the transmission until it clears the engine rear plate. Remove transmission from beneath car.

▷*FORDOMATIC TRANSMISSION JACK NOTE—Jacks must be modified for above use as follows:*

Lo-Jack 5000-304—Set of spacing bars, No. 30403, should be installed to move Fordomatic Adapter 2½" to rear to relocate center of balance and provide better tilting action as required for transmission removal on 1952 cars.

Hi-Jack 3000-304 & 3200-304—Install set of spacing bars (as for Lo-Jack above) and also install new Tilt Screw Assy. No. 7036 to allow for greater tilting angle required for 1952 transmission removal.

Ford V8 & Mercury Transmission & Converter Removal: Place car on hoist or support it on jack stands with all four wheels at least 10" above the floor. Then proceed as follows:

1) Fold front floor mat back, remove two rubber plugs in toepan, work through these openings and remove two top converter housing-to-engine bolts.

2) Remove starter. Remove converter housing front plates. Drain converter if desired (converter can be drained after assembly removed from car).

CONVERTER DRAINAGE NOTE—Remove one converter drain plug, rotate converter 180° and remove second drain plug, allow converter to drain.

3) Drain transmission case by disconnecting filler tube at oil pan connection.

4) Remove converter housing lower access cover, remove six converter-to-flex drive plate bolts, position flex plate horizontally for clearance, replace lower converter housing front plate (to prevent converter sliding out of housing during removal).

5) Position Engine Support Bar under rear end of crankcase so that engine can be lowered ¾" below normal position.

6) Disconnect manual control rod and throttle control rod from levers on transmission case. Disconnect speedometer cable. Disconnect accelerator pedal shaft at accelerator cross-shaft.

7) Disconnect propeller shaft at rear axle, remove shaft assembly by pulling it to rear to disengage forward end from transmission.

8) Disconnect parking brake assembly at cross-member and move cable and equalizer to one side and out of the way.

9) Remove two engine rear support-to-transmission bolts. Position transmission jack under transmission case and raise transmission just enough to remove weight from cross-member. Remove attaching bolts at each end of cross-member and remove cross-member.

10) Lower transmission until engine is supported by support bar (at point approximately ¾" below normal height).

11) Remove all remaining converter housing-to-engine bolts. Move transmission straight back far enough to clear converter pilot, then lower transmission and remove from beneath car.

TRANSMISSION REMOVAL (WITHOUT DISTURBING CONVERTER ASSEMBLY): Place car on hoists or support car securely on jack stands with all wheels approximately 12" above floor. Then proceed as follows:

1) Drain transmission case by disconnecting filler tube at transmission oil pan connection.

2) Disconnect manual control rod and throttle control rod from levers on transmission case. Disconnect speedometer cable. Disconnect parking brake cable assembly at cross-member and move cable and equalizer to one side out of the way.

3) Disconnect propeller shaft at rear universal joint flange, remove shaft assembly by pulling it to rear to disengage forward end from transmission.

4) Remove engine rear support-to-transmission bolts, install transmission jack under transmission, raise engine and transmission just enough to install engine support bar under rear end of crankcase.

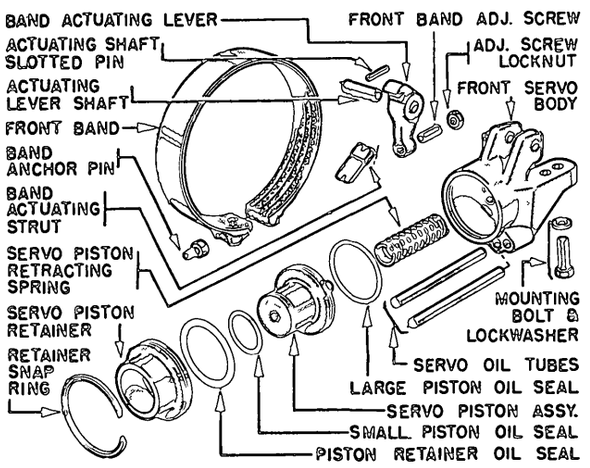
5) With engine weight on support bar, raise transmission just enough to remove weight from cross-member, take out attaching bolts at each end and remove the cross-member.

6) With transmission securely supported by jack, remove four transmission-to-converter housing bolts.

7) Slide transmission straight back to disengage the turbine shaft, then lower transmission and remove it from beneath car.

OVERHAUL—TORQUE CONVERTER

▷*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first, clean each part as removed.*

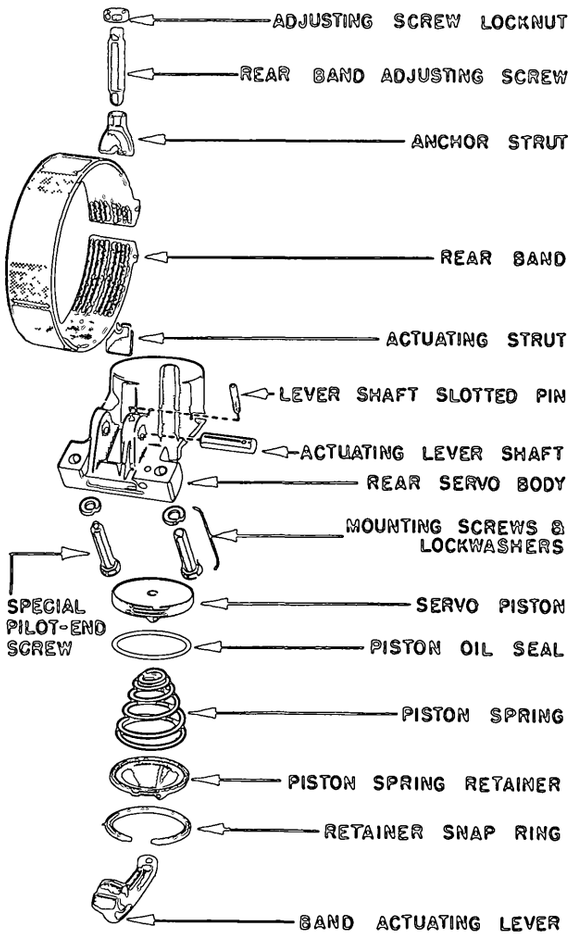


FRONT SERVO & BAND ASSY.

TORQUE CONVERTER REMOVAL (From Transmission): Grasp converter cover with both hands and pull straight out. *(CAUTION*—To prevent damage to front seals, do not rock assembly from side to side). Remove converter housing attaching bolts and remove housing from transmission.

DISASSEMBLY: Remove converter cover attaching bolts and nuts. Remove cover and gasket. Remove bronze thrust washer from turbine and lift turbine out of pump housing: Lift stator out of pump housing. *(CAUTION*—Note position of stator when removing so that it can be installed in the same manner). Remove thrust washers from pump hub and from turbine hub. Remove the one way clutch inner race from stator and take out the snap ring retaining outer hub to stator. *(CAUTION*—Do not burr snap ring groove). Remove outer hub, sprag assembly and outer race. Remove snap ring retaining inner hub to stator and remove inner hub. Take

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REAR SERVO & BAND ASSY.

FORDOMATIC & MERCOMATIC (C ntinu d)

out bolts attaching pump hub to pump and remove hub. Remove seal from groove in hub.

INSPECTION: Inspect converter blades for looseness, and check thrust surfaces for scores and splines for burrs and wear. Inspect seal surfaces and front pump driving lugs for wear. Inspect sprag assembly for worn or broken sprags or broken or distorted spring. Inspect bushings for wear or scoring (if bushings worn, polish bearing surface of journal with crocus cloth to eliminate possibility of wear having been caused by rough bearing surface). Wear limits for bushing inside diameters are: Stator Support Assy. Bushing .906-.910", Stator Clutch Retainer Assy. Bushing 2.1573-2.1603".

►*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

REASSEMBLY: Install stator inner hub and snap ring. Turn assembly over, install outer race in stator. Install sprag assembly in the outer race (*CAUTION*—Make sure sprags are pointed in the right direction). Install outer hub and outer hub snap ring. Insert the tool 7946, tapered side first, into sprag assembly while rotating tool counterclockwise to position sprags. Install inner race with spline section up. Guide tool IP-7946 with hand while pushing inner race into position. Check stator for clockwise rotation while holding the inner race. Install new seal in pump hub, install hub in pump, tighten hub capscrews to 8-10 ft. lbs. torque. Install thrust washer into hub of converter pump and install stator with "Front" (Stamped into face of stator) up. Install thrust washer into hub of turbine and install turbine. Install bronze thrust washer on turbine hub. Position converter cover on pump housing with new gasket, properly align balance marks on cover and housing (see Converter Balance Mark Caution below), install all converter bolts (see Cover Bolt Installation Caution below for proper location of several types used), tighten bolt nuts evenly to 25-28 ft. lbs. Install converter housing on transmission case and tighten attaching bolts to 40-45 ft. lbs. Install converter assembly and press it firmly in position on turbine shaft.

►*CAUTION—Do not "rock" converter assembly while installing it on shaft (will damage oil seals).*

►**Converter Balance Mark Caution**—Converter cover stamped with "0" at point directly below one of the drain plugs, pump housing stamped similarly between cooling vanes on outer diameter of housing. When installing cover, these marks must be lined up with each other to maintain balance.

►*CONVERTER COVER PRODUCTION CHANGE & INSTALLATION CAUTION: See "Changes, Cautions, Corrections" for cover and gasket change and note the following cautions when installing each type:*

34-Bolt Cover used with FLAT Gasket—Inspect flange faces of converter cover and impeller for smoothness and freedom from deep nicks or scratches. Make certain that sealing lands (between concentric grooves) on impeller flange are free from nicks and are continuous without any breaks. Lands must have minimum width of 1/32" at top and must have minimum height of .008". Remove any burrs by light stoning. Use only improved gasket No. 1P-7963-C (13 27/32" O.D., 12 1/8" I.D.) and do not remove gasket from waterproof envelope until ready for use (if gaskets oversize due to moisture absorption, dry out in oven at 150-200°F). Tighten bolts in sequence noted below. *THIS PROCEDURE IMPORTANT TO PREVENT LEAKS AT COVER FLANGE.*

18-Bolt Cover used with "0" Ring Seal—Always use NEW "0" ring seal. Tighten bolts in sequence noted below. *THIS PROCEDURE IMPORTANT TO PREVENT LEAKS AT COVER FLANGE.*

►*"CONE HEAD" COVER BOLTS: See "Changes, Cautions, Corrections" for cone-head bolts (used on later transmissions, can be installed on earlier models). These bolts retain tightness more effectively than previous type flat-head bolts.*

►*COVER BOLT TIGHTENING SEQUENCE (To prevent leaks):* Tighten two nuts directly opposite each other just snug, tighten two nuts 90° from first two similarly, tighten two nuts 45° from first four nuts similarly. Continue this sequence until all nuts have been tightened just snug, then torque all nuts in same sequence to 25-28 ft. lbs. torque.

DISASSEMBLY—TRANSMISSION

►*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first. CLEAN each part as removed with cleaning fluid or gasoline and dry with air—wiping cloths will leave lint on parts.*

DISASSEMBLY OF TRANSMISSION (Into Maj r Units): With transmission on bench fixture, (tool No. 7000-C-D recommended for holding transmission), remove all transmission units as follows:

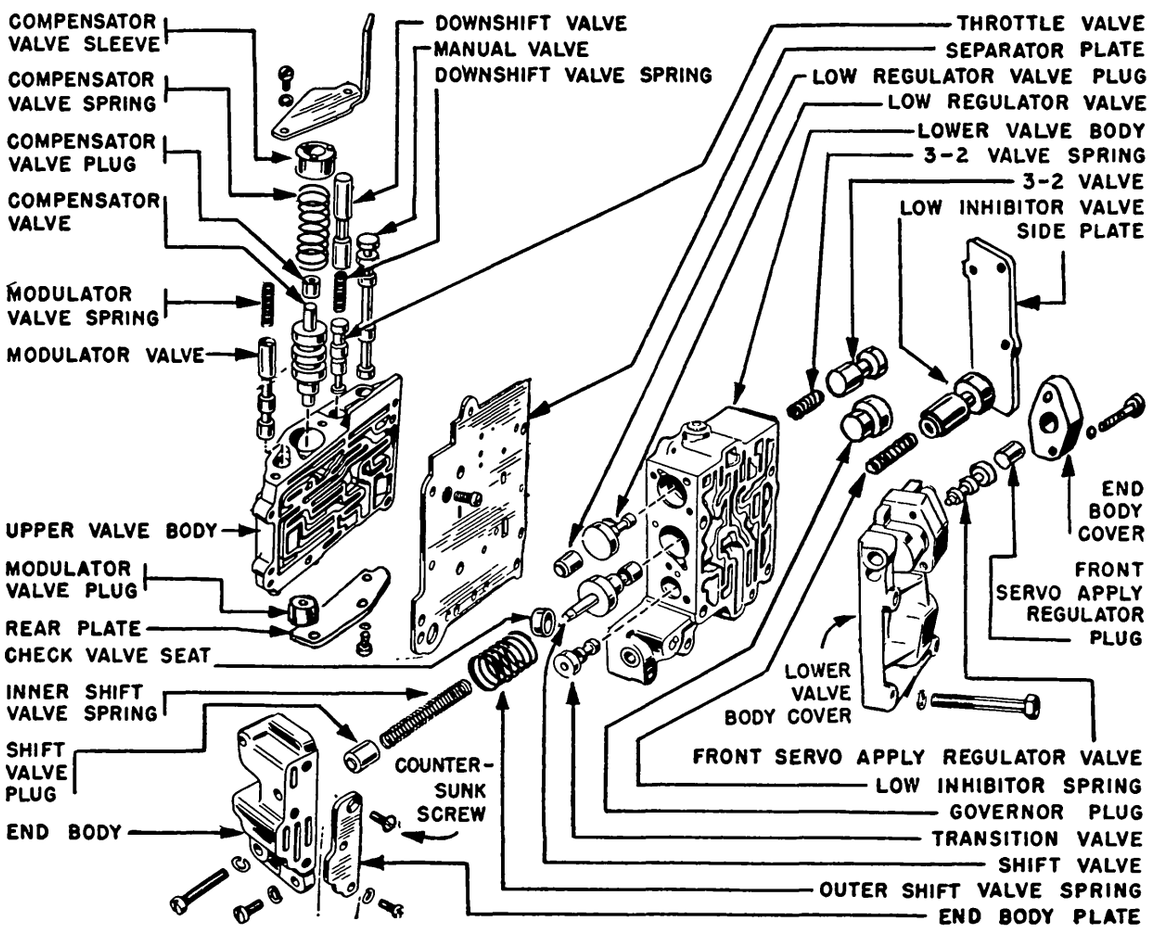
1) Remove pan and gasket and take out fluid screen.

2) Remove pressure regulator spring retainer, regulator springs, control pressure and converter pressure regulator valves.

►*CAUTION—Maintain pressure on retainer to prevent valve springs from flying out.*

3) Loosen pressure regulator and valve body attaching bolts, and remove lubrication tube from pressure regulator and rear pump. NOTE—If necessary tap

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FORDOMATIC & MERCOMATIC CONTROL VALVE ASSEMBLY

FORDOMATIC & MERCOMATIC (Continued)

tube with soft hammer. *CAUTION—do not bend or distort tube.*

4) Remove rear pump intake tube, being careful not to bend or distort it.

5) Remove compensator pressure tube (small) and control pressure tube (large) from pressure regulator and valve body. NOTE—If necessary, tap tube with a soft hammer. *CAUTION—do not bend or distort tube.*

6) Loosen front and rear servo band adjusting screws five turns and loosen front servo attaching bolt three turns. Remove valve body attaching bolts and raise valve body to clear case and disengage valve body servo tubes. Remove valve body.

7) Remove regulator body attaching bolts and washers, remove regulator body from case. Insert control pressure valve and regulator valve in regulator body bore to prevent damage to valves.

8) Remove front servo apply and release tubes by twisting and pulling on tubes. Take out front servo attaching bolt, hold front servo strut with the fingers, lift servo assembly out.

9) Remove rear servo attaching bolts and while holding actuating and anchor struts with fingers, lift servo from case. *(CAUTION—Do not permit struts to drop into case).*

10) CHECK TRANSMISSION ENDPLAY before proceeding with disassembly: Remove one front pump attaching bolt and mount Dial Indicator & Support Tool 77067 in this bolt hole so that contact button rests on end of turbine shaft. Install Extension Housing Seal Replacer Tool 7657 on output shaft to provide support for shaft. Pry front clutch cylinder toward rear of transmission using a large screwdriver and set dial indicator at Zero while maintaining silght pressure on clutch cylinder. Then remove screwdriver and pry units toward front of transmission by inserting screwdriver between large internal gear and case. Record indicator reading (endplay) for use in step 17 (below). This endplay should be .010-.029". Remove dial indicator and support, remove tool from output shaft.

11) Remove front pump attaching bolts and remove front pump assembly. (NOTE—If pump is tight in case, use soft hammer to loosen pump). Remove pump to case gasket. *CAUTION—Pull pump off shaft carefully to avoid damaging oil seal.*

12) Remove five extension housing-to-transmission bolts (these bolts also hold rear oil pump on case), withdraw extension housing carefully while holding rear pump in place. *CAUTION—pull housing off output shaft carefully to avoid damaging rear oil seal.*

13) Remove speedometer drive gear snap ring from output shaft and take off the speedometer drive gear. *(CAUTION—Do not lose drive ball).*

14) Remove fluid distributor attaching bolts and slide distributor and tube from transmission. Remove distributor sleeve from output shaft. Carefully remove the four seal rings from the output shaft with the fingers *(CAUTION—use care not to damage these rings).*

15) Remove governor snap ring from shaft and slide governor assembly from output shaft. *(CAUTION—Use care so as not to damage seal rings on output shaft. Do not lose governor drive ball).*

16) Remove rear pump discharge tube using tool IP-77869 and remove pump from case. Remove extension housing and pump gaskets. Remove rear pump drive key from output shaft. Remove bronze thrust washer from output shaft. (NOTE—Washer may come off with pump). Hold rear drum forward and remove the output shaft.

17) Remove selective thrust washer from rear of pinion carrier. If endplay as recorded in step 10 (above) was not within limits of .010-.029", replace this washer with one of proper thickness to give desired endplay. This washer furnished in following sizes: .063-.061", .069-.067", .076-.074", .083-.081".

18) Remove two seal rings from primary sun gear shaft. *CAUTION—use care not to distort rings.*

19) Remove pinion carrier from case and remove bronze thrust washer from sun gear shaft.

20) Mark rear band position so that it can be assembled in the same position. Remove band by squeezing ends together and tilting band forward.

21) Remove two center support bolts (on outside of case—one on each side). Press on end of turbine shaft to force clutch units toward rear of transmission and remove center support from case.

22) Remove rear and front clutch assemblies from transmission case as a unit. Install clutch assembly into bench fixture, tool No. IP-77530 and remove thrust washer from front of turbine shaft. Remove the front band from case. Lift front clutch assembly from primary gear shaft. *(CAUTION—Do not rock assembly while lifting to prevent damage to seal rings).*

23) Remove bronze and steel thrust washers from primary sun gear shaft and then remove the front clutch seal rings from primary sun gear shaft. Lift rear clutch assembly from shaft. *(CAUTION—Do not rock assembly while lifting to prevent damage to seal rings).* Remove rear clutch seal rings and thrust washers from shaft.

OVERHAUL (ALL TRANSMISSION UNITS)

▷*DISASSEMBLY & CLEANING CAUTION:* Handle all parts carefully to avoid nicking or burring bearing surfaces and mounting faces. Clean all parts with clean solvent and dry with air. DO NOT use wiping cloths which may leave lint which would interfere with proper operation. Minor scores or burrs may be removed with crocus cloth. *CAUTION*—when polishing valves, use extreme care not to round edges of valve lands.

▷*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

▷*REASSEMBLY CAUTION:* Use all NEW gaskets when assembling units or installing units in transmission. Lubricate all internal parts with TRANSMISSION FLUID TYPE A (vaseline can be used to retain gaskets and thrustwashers). Tighten all bolts and screws to correct torque as listed.

Primary Sun Gear Shaft: Remove rear clutch seal rings (see Note below) from shaft, then remove thrustwasher from thrust face of primary sun gear. Seal Ring Note—New "hooked type" seal rings used on later transmissions. To remove these rings, apply pressure on one end and at back of ring forcing ring into groove at these two points, other end of ring will spring out and free the hook. Ring can then be removed from shaft. Install rings similarly, pressing free end in to engage hook and releasing pressure at back of ring first which will prevent hook disengaging.

Inspection—Inspect all thrust surfaces and journals for wear or scores. Inspect sun gear for broken, chipped, or worn teeth. Inspect shaft splines and ring grooves for wear or burrs. Check all fluid passages for evidence of leakage and make certain passages are clean and free from obstructions. Check seal rings for wear by installing rings in bore and measuring end gap which should be .002-.009", check rings for free fit in groove (must not bind).

▷*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

▷*CAUTION—Latest type Primary Sun Gear Shaft requires use of NEEDLE BEARING type Front Clutch Drum. See "Front Clutch" data below.*

Assembly—Install bronze thrustwasher against thrust face of primary sun gear, install seal rings in shaft grooves (see Seal Ring Note above).

Rear Clutch Disassembly. Use an arbor press and tool 77515 to compress clutch release spring, remove release spring snap ring. Relieve spring pressure *(CAUTION*—guide spring retainer while releasing press to prevent retainer interfering with snap ring groove). Remove retainer, release spring, pressure plate snap ring, and pressure plate. Remove the four bronze and four steel clutch plates from the drum. Place splined end of primary sun gear shaft in clutch piston bore, entering it as far as it will go, apply air pressure to hole in end of shaft which will force clutch piston out of cylinder *(CAUTION*—hold hand over piston to prevent it flying out and being damaged). Remove outer seal ring from groove in piston and inner seal ring from clutch drum. Discard these seals (do not re-use).

Inspection—Inspect clutch cylinder, thrust surfaces, piston bore and clutch plate serrations for scores or burrs. Check fluid passages for obstructions. Check clutch release spring for distortion and cracks. Inspect bronze clutch plates for scored bearing surfaces, and fit on clutch hub serrations. Inspect steel plates for scored surfaces, and fit of serrations in the clutch drum. Check pressure plate for scored bearing surfaces. Check clutch hub thrust surfaces and bronze thrust washers for scored surfaces. Check clutch hub splines and turbine shaft splines for wear. Inspect clutch cover bearing surfaces and bushings for wear and scoring. Wear limit for bushing inside diameters are Rear Drum & Planetary Gear Assy. Bushing 1.000-1.004". These bushings are serviced and can be replaced as follows:

▷Rear Clutch Drum & Sun Gear Bushing Replacement: Bushings furnished for service (No. 1P-77507-B Front, No. 1P-77508-B Rear) and can be renewed if oil seal ring bore between bushings not worn excessively (if bore between bushings shows heavy wear or ring wear grooves, replace assembly). Remove and install bushings as follows:

Rear Bushing Removal—Use Tool 77508-A. Place tool mandrel in counterbore, install Truarc Retaining Ring behind bushing, press bushing out in an arbor press. DO NOT drive bushing out.

Front Bushing Removal—Use Tool 77507-A. Place tool mandrel in counterbore, install Truarc Retaining Ring behind bushing, press bushing out in an arbor press. DO NOT drive bushing out.

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FORDOMATIC & MERCOMATIC (Continued)

Bushing Installation—Use special installing Tool 77507-B in an arbor press to press new bushing into place. Tool is double-ended and will install both bushings to proper depth. Inspect bushings for chips, burrs, or other foreign material after installation and clean assembly thoroughly in solvent.

►**Rear Clutch Plate Checking (External Spline Steel Plates)**—These clutch plates are "coned" or dished on one side. Check plates for correct coning by placing each plate on flat surface with dished side down. Clearance between inner edge of plate and flat surface should be .010" minimum measured with a feeler gauge. Discard plates if not sufficiently coned, if badly scored, or if not free on hub serrations.

►*REPLACEMENT CLUTCH PLATE CAUTION: See "Changes, Cautions, Corrections" for clutch plate changes and identification of various types used.*

►*REAR CLUTCH PISTON SPRING & SEAT RECOMMENDED CHANGE: See "Changes, Cautions, Corrections" for new type spring and seat which should be installed in all transmissions not so equipped.*

Assembly—Install inner seal ring in groove in drum and outer seal in groove in piston. Install piston in clutch drum using automatic transmission fluid as a lubricant to facilitate assembly. *(CAUTION*—Make sure seals are not twisted or distorted during assembly). Install four steel and four bronze clutch plates alternately, starting with a steel plate convex side up. (NOTE—Lubricate plates as they are installed). Install clutch pressure plate with bearing surface down. Install snap ring making sure it is fully seated in groove. Install clutch release spring and position retainer on spring. Using tool IP-77515 in arbor press, compress clutch spring and install snap ring. *(CAUTION*—While compressing spring, guide retainer to avoid interference of retainer with snap ring groove). Make sure snap ring is fully seated in groove.

Front Clutch: Disassembly. Remove clutch cover snap ring and remove turbine shaft (input shaft) from clutch drum. Remove thrustwasher and clutch hub. Remove three bronze and two steel clutch plates and pressure plate. Using arbor press and tool IP-77565 depress clutch release spring and remove snap ring. Release spring pressure, remove clutch release disc spring from drum. Install special nozzle tool 7000-DD on an air hose and place nozzle against one clutch apply hole in front clutch housing and cover the second hole with a finger so that air pressure forces piston out of housing. (NOTE—if nozzle not available, place splined end of primary sun gear shaft in clutch piston bore, entering shaft as far as it will go, apply air pressure to opposite end of primary shaft which will force piston out). Remove piston inner seal from clutch housing and outer seal from groove in piston.

Inspection—See "Rear Clutch Inspection" above. Follow same procedure except that all front clutch plates are FLAT (not coned). Wear limits for bushing inside diameters are: Input Shaft Assembly Bushing 0.875-0.879", Front Drum & Secondary Sun Gear Assy. Bushings 1.062-1.068" (front—first type only, needle bearing used at this point on later transmissions), 1.2495-1.2555" (rear).

►*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

Assembly—Install a NEW piston inner seal ring in clutch cylinder, and NEW outer seal ring in piston groove, install piston in clutch housing *(CAUTION*—make certain steel bearing ring is in place on piston). Position release spring in cylinder with **concave side up**, place spring compressor tool on spring and compress spring in an arbor press to enable snap ring to be installed *(CAUTION*—see that snap ring fully seated in its groove).

Primary Sun Gear Shaft & Clutch Reassembly: After individual units assembled (see above), complete reassembly of this sub-assembly as follows: Place primary sun gear shaft assembly in bench fixture, install rear clutch assembly on the shaft *(CAUTION* —center seal rings on shaft to prevent breakage as clutch assembly installed). Install steel and bronze thrustwashers on shaft in that order. Install two seal rings in shaft grooves. Install front clutch housing on primary gear shaft while rotating clutch units to mesh rear clutch plates with serrations on clutch hub *(CAUTION*—use care to avoid breaking seal rings when installing clutch assembly). Install clutch hub in clutch cylinder with deep counterbore down. Install bronze thrustwasher on clutch hub. Install pressure plate in clutch cylinder with bearing surface up, then install three bronze and two steel clutch plates alternately starting with a bronze plate and lubricating all plates as they are installed *(CAUTION*—See "Front & Rear Clutch Plate Caution" for identification of plates and various types used). Install turbine shaft in clutch cylinder, install snap ring (CAUTION—make certain snap ring fully seated in its groove). Install bronze thrustwasher on turbine shaft. Assembly is then ready for installation in transmission case. *See "Reassembly—Transmission."*

Front Pump Disassembly: Remove pump cover attaching screws and remove cover with stator support. Mark the driven gear with Prussian Blue to assure correct assembly and remove drive and driven gears from pump body. To remove seal from pump body, mount the pump body on transmission case, use puller Tool 1175-AE to remove seal.

►*CAUTION*—Extreme care must be taken not to scratch or mar pump gears or bearing surfaces.

Inspection—Inspect bushing, gear pockets and crescent for scores. Inspect front cover, pump body, gear teeth and stator support splines for burrs. Check pump for evidence of contact between outside diameter of drive gear and crescent. Replace pump if such contact noted. Check bushing for wear and scoring. Wear limits for bushing inside diameters are: Pump Drive Gear Bushing 1.812-1.815" (Later type pump only—this bushing not used on first type pump), Pump Body Assy. Bushing 1.940-1.943". *CAUTION*—Check pump for evidence of contact between outside diameter of drive gear and crescent in pump and REPLACE PUMP if such contact noted (even if pump bushings within service limit).

►*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

Assembly—Use tool 1P-77837 to install new seal in pump body (CAUTION—coat outside diameter of seal with Permatex No. 3 before installation to prevent fluid seepage). Install pump driven gear in pump body in accordance with marks made before disassembly, install drive gear. Install pump cover and attaching screws **without** lockwashers, tighten cover screws evenly to 25-35 **In.lbs.** Check pump for free movement after assembly completed.

Rear Pump Disassembly: Remove screws and lockwashers securing pump cover to pump body and remove cover. Using Prussian Blue, mark pump drive and driven gears to assure correct assembly, and remove gears from body.

►*CAUTION—Handle pump parts with care to avoid scratching or marring.*

Inspection—Inspect all pump parts for excessive wear, scores or burrs. Check fluid passages for obstructions. Check pump for evidence of contact between outside diameter of drive gear and crescent, replace pump if such contact noted. Check bushing for wear and scoring. Wear limit for bushing inside diameter is: Rear Pump Body Assy. Bushing 2.061-2.065". *CAUTION*—Check pump for evidence of contact between outside diameter of drive gear and crescent in pump and REPLACE PUMP if such contact noted (even if pump bushings within service limit).

►*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

Assembly—Install pump driven gear into pump body, positioning gears as marked on disassembly. Install drive gear into position as marked. Install pump cover (see Pump Change Caution Note below), install cover screws with lockwashers, tighten screws evenly to 80-90 **In. lbs.** (¼" type), 25-35 **In.lbs.** (#10-24 type). Check pump for free movement after assembly completed.

►**Pump Change Caution**—Two different types of interchangeable pumps used (aluminum & cast iron) and **correct type cover must be used with each type pump** as follows: Phosphate coated cover (Aluminum Pump), Plain cover (Cast Iron Pump).

Pressure Regulator Body Disassembly: Remove valves from regulator body. Take out cover attaching screws, remove cover, remove separator plate.

Inspection—Inspect regulator body and cover mating surfaces. Check fluid passages in body and fluid passage holes in separator plate for obstructions. Inspect valves and valve bores for scoring and check freedom of valves in valve bores. Check regulator valve springs for distortion. Wash thoroughly in clean solvent and blow dry with air.

Assembly—Position separator plate on regulator body, install regulator cover and attaching screws, tighten screws evenly to 20-30 **In.lbs.** Insert valves.

►*CAUTION*—If regulator valve disassembled to correct "buzzing" noise, inspect main oil pressure regulator valve assembly for undersize bleed flats and install valve in a position rotated 90° from original position which should correct this condition.

Control Valve Disassembly: Remove manual valve. Take out one screw attaching separator plate to valve body. Remove upper body front plate. (NOTE —Plate is spring loaded, apply pressure to plate while removing attaching screws). Remove compensator sleeve, plug, compensator spring, compensator valve, modulator valve spring and valve, downshift valve and spring. Take out two screws

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FORDOMATIC & MERCOMATIC (Continued)

attaching throttle valve return spring to upper body, remove the spring. Take out remaining screw attaching upper valve body rear plate and remove the plate *(CAUTION—*Plate is spring loaded—apply pressure to plate while removing screws). Remove 3-2 control valve and spring, low inhibitor valve and spring, and governor plug. Remove the end body. *(CAUTION—*End body is spring loaded—apply pressure while removing screws.) Remove low regulator plug and shift valve plug from end body, then remove end body plate. Remove shift valve outer and inner springs and shift valve, low regulator valve, and transition valve. Remove attaching bolts and separate valve bodies. Remove cover end body. Remove front servo apply regulator valve from cover. Remove separator plate from upper body. Remove check valve seat.

Inspection: *CAUTION—Handle all parts carefully to avoid scoring, burrs, and distortion.* Clean all parts thoroughly in clean solvent and blow dry with air. DO NOT USE CLOTH FOR WIPING PARTS (lint left by a cloth may cause poor valve operation). Inspect all mating surfaces for burrs, scratches, and flatness. Check all passages for obstructions. Inspect all valves and valve bores for scoring and check valves for free movement in bores (valves should slide in bore of own weight). Valves can be polished with crocus cloth.

▷*CAUTION—Do not round the sharp edges of valves and plugs.*

▷*REPLACEMENT PARTS CAUTION: See "Changes, Cautions, Corrections" for production changes and revised design parts which must be used together.*

Assembly: *CAUTION—Use care when installing valves and plugs in their bores not to shear soft body castings* (rotate valves and plugs as they are entered so that sharp edges will not be damaged or cut into the valve body castings). Install the separator plate on upper valve body, install but do not tighten separator plate screws. Install check valve seat in lower valve body, install front servo apply regulator valve in cover and plug in cover end body. Install cover end body on cover but do not tighten attaching screws. Position lower body on upper body, install lower body cover and attaching bolts. Tighten the bolts evenly to 4-6 ft. lbs. torque, tighten separator plate screws to 20-30 in. lbs. torque. *(CAUTION—*excessive tightening of these bolts may distort valve body and cause valves and plugs to stick). Tighten cover and body screws to 20-30 in. lbs. torque. Check for free movement of front servo apply regulator valve by shaking valve body. Install plate on lower end body and make certain that countersunk head screw installed in correct hole. Install low regulator and shift valve plugs in end body. Install transition valve, low regulator valve, and shift valve in lower body. Install shift valve inner and outer springs. Install end body on lower body, install governor plug in lower body. Install low inhibitor valve spring and valve, 3-2 control valve spring and valve, then install lower body side plate. Install modulator plug in upper body, install throttle valve, position upper body rear plate on upper body with plate between end lands of throttle valve, install one screw in hole next to throttle valve, position throttle valve return spring on plate and install remaining plate-to-valve body screws. Install compensator valve and spring, downshift spring and valve, and modulator valve and spring. Install plug in compensator valve sleeve (castellated end out) and install assembly in body. Install upper body front plate, install separator plate-to-lower body screw, install manual valve.

Governor Disassembly: Remove governor body side plate attaching screws, remove plate. Remove governor body attaching screws and remove body from counterweight. Remove governor valve from body.

Inspection—Inspect valve and valve bore for scores and check free movement of valve in bore Inspect all fluid passages for obstructions. Inspect mating surfaces for burrs and distortion.

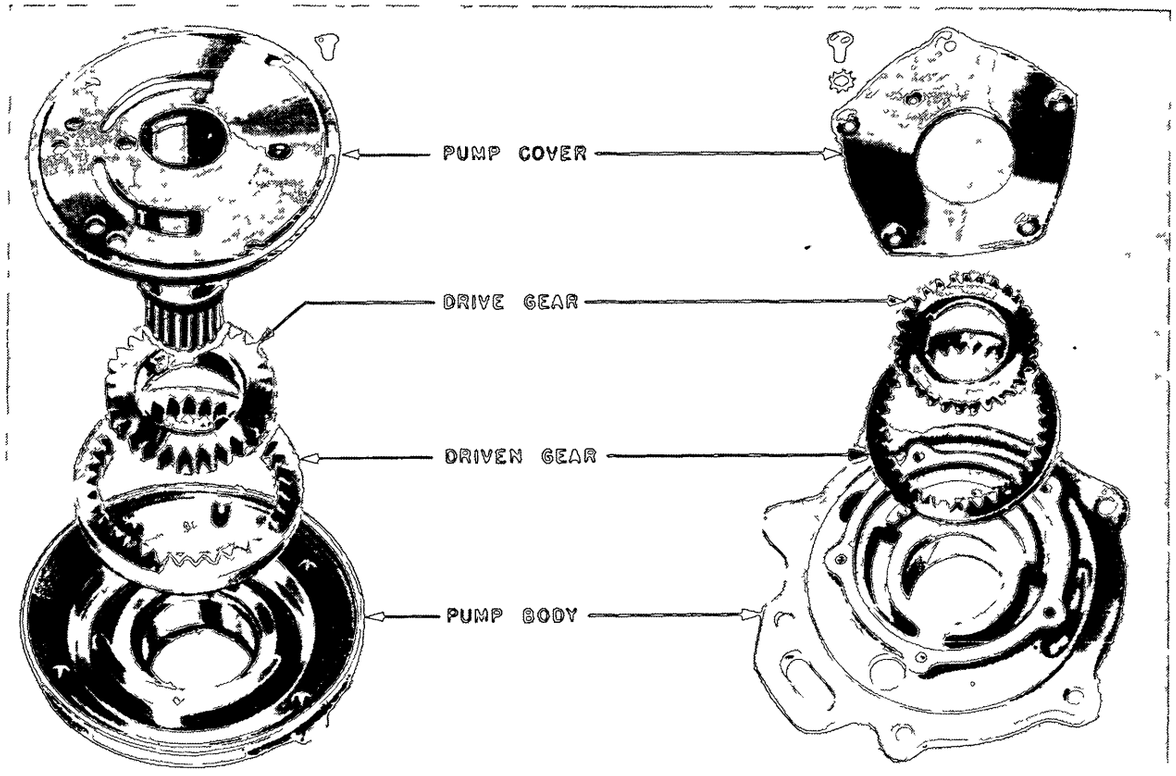
Assembly—Install governor valve in bore of governor body and install body cover plate and attaching screws. Mount governor body on counterweight. (NOTE—Make sure fluid passages in body line up with passages in counterweight). Install body attaching screws. Tighten body-to-counterweight screws to 50-60 In.lbs. and valve body cover screws to 20-30 In.lbs.

Front Servo Disassembly: Remove servo piston guide snap ring. *(CAUTION—*Servo piston is spring loaded, apply pressure to piston when removing snap ring). Remove servo piston and guide from servo body. (NOTE—If necessary, tap servo piston guide slightly with soft hammer to remove from servo body). Remove servo spring, servo guide and seal rings from piston and guide.

Inspection—Inspect servo body for cracks. Inspect piston and piston bore for scores. Check fluid passages for obstructions. Check actuating lever for free movement and inspect for wear. (NOTE—If necessary to replace actuating lever or shaft, remove retaining pin and push shaft out of bracket). Inspect threads in lever and on adjusting screw. Check servo spring and servo band for distortion. Inspect servo band lining for excessive wear and bond to metal band. (NOTE—Band should be replaced if worn to a point where grooves are not evident). Inspect bands for cracks and distortion.

Assembly—Install servo spring in body. Install new, large and small seal rings on servo piston and new seal rings on servo guide. Install guide on servo piston. *(CAUTION—*Use care not to distort seals). Install piston and guide assembly into piston body. (NOTE—Lubricate parts to facilitate assembly). Install adjusting screw and locknut in actuating lever if previously removed. Press cover down and then install snap ring. *(CAUTION—*Make sure snap ring is fully seated in groove).

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FORDOMATIC & MERCOMATIC HYDRAULIC PUMPS

FORDOMATIC & MERCOMATIC (Continu d)

Rear Servo Disassembly: Using ⅛" pin punch, remove servo actuating lever shaft retaining pin and remove shaft and actuating lever. While pressing down on servo spring retainer, remove snap ring. NOTE—Release pressure on retainer slowly, to avoid snap ring from flying out. Remove retainer and servo spring. Use air pressure to force piston out of servo body. *(CAUTION*—Hold hand over piston to prevent damage). Remove piston seal ring.

Inspection—See "Front Servo Inspection."

Assembly—Install new seal ring on servo piston and install piston into servo body. (NOTE—Lubricate parts to facilitate assembly). Install servo spring with small coiled end against servo piston. Install spring retainer and compress spring and install snap ring. *(CAUTION*—Make sure snap ring is fully seated in groove). Install actuating lever with socket in lever bearing on piston stem and install lever shaft, aligning the retainer pin holes, and install pin. Check actuating lever for free movement.

Distributor Sleeve Inspection—Inspect all passages for obstructions. Inspect sleeve bore for scores or excessive ring wear. Inspect mating surfaces for burrs and flatness. Check fit of fluid tubes. NOTE—Make sure spacer is on center tube.

Pinion Carrier Inspection—Inspect servo band surface for scores. Inspect inner bushing for scores. Check free movement of pinions on pins and inspect for worn or broken teeth. Check pinion end play. Should be .010 to .020". Pinion pins should be a tight fit in carrier. NOTE—The planet carrier is serviced as an assembly.

Output Shaft Inspection—Inspect external parking gear teeth for damage. Inspect ring grooves and splines for burrs and wear. Inspect all thrust surfaces, journals, and inner bushing for wear or scores. Inspect aluminum sleeve for leakage or scores and for correct position in shaft *(NOTE*—On later transmissions, sleeve is staked in place in shaft to eliminate possibility of it rotating out of position). Inspect ring grooves, keyway, and drive ball pocket for wear and burrs. Wear limit for bushing inside diameter is: 1.500-1.505".

NOTE—Output shaft is two-piece assembly but is serviced as a unit.

Extension Housing Inspection—Inspect housing for cracks and inspect drive shaft slip yoke bearing surface for scores. Inspect gasket surfaces for burrs. To remove rear seal, use Tool 1175-AE *(NOTE*—Rear seal may be replaced without removing the transmission from car). Use Tool 7657 to install new seal in extension housing, coating outer diameter of seal with Permatex No. 3 (to prevent fluid seepage around seal), and positioning seal with felt side to rear. Remove inspection cover and gasket and inspect fluid baffle for tight fit in housing.

►**Extension Housing Change Note**—Two optional types of extension housings used: 1P-7650-A (aluminum) and 1P-7650-B (cast iron). Later type cast iron housing requires bushing No. 8M-7041-B (same as type used in standard transmission). Bushing wear limit (inside diameter) is 1.4995-1.5045".

Transmission Case Linkage Disassembly: Remove throttle lever nut and take off inner and outer throttle levers. Remove throttle lever shaft seal from counterbore in manual lever shaft. Remove parking mechanism actuating rod, detent ball and spring. Remove manual lever shaft nut, detent and outer manual lever and shaft. Remove torsion lever retainer clip and take off torsion lever assembly. Disassemble torsion lever assembly by rotating lever while holding spring. Disengage pawl return spring from toggle link pin and remove pin. Remove pawl pin by working pawl fore and aft until pin protrudes from case. Remove toggle pin retainer clip, toggle pin, pawl return spring, spring retainer and link. Remove toggle lever pin by tapping lever toward rear of case, then remove plug, toggle lever pin and lever (NOTE—toggle lever pin is held in place by the plug). Remove manual shaft seal and transmission vent from case.

Inspection—Inspect each part of parking mechanism for wear, distortion, or other damage.

Assembly—Assemble toggle lever, link, pawl return spring and pawl and install assembly in transmission case. Install toggle lever and pawl pins. Install torsion lever assembly. (NOTE—Use screwdriver to position spring on torsion lever). Install washer and retainer clip. Coat outer diameter of new manual shaft seal with Permatex #3 and use Tool 77288 to install seal in case. Install manual lever and shaft in case, mount detent lever and tighten attaching nut to 35-40 ft. lbs. torque. Install detent spring and ball *(NOTE*—use a piece of thin tubing to depress ball and spring while rotating detent). Position ends of parking pawl torsion lever rod in detent lever and torsion lever and secure with cotter pins. Install new seal on throttle lever shaft, install outer throttle lever and shaft in case, install lever on inner end of shaft and tighten attaching nut to 17-20 ft.lbs. torque. Check linkage for free operation without binding.

Transmission Case Inspection: Inspect case for cracks and stripped threads. Inspect all gaskets and mating surfaces for burrs. Inspect all bearing surfaces for wear, scores, and burrs. Wear limit for bushing inside diameters are: Front Bushing 1.375-1.379", Center Support Assy. Bushing 3.1795-3.184".

►*REPLACEMENT CASE & OIL PAN CAUTION: See "Changes, Cautions, Corrections" for 1953 type parts and necessary cautions when these parts used on earlier transmissions.*

REASSEMBLY—TRANSMISSION (AFTER OVERHAUL OF UNITS)

►*REASSEMBLY CAUTION—Use Automatic Transmission Fluid Type A only to lubricate parts on assembly. DO NOT use any other lubricants. Use all new gaskets on assembly and tighten all bolts and screws to correct torque specifications. DO NOT USE FORCE WHEN ASSEMBLING PARTS. If parts do not assemble freely, examine parts for cause of difficulty.*

Clutch & Shaft Assembly and Front Servo Band: Install front servo band in transmission case indexing anchor end with index in case. Insert front and rear clutch assembly into transmission case from the rear while positioning servo band on drum. *(CAUTION*—Hold units together while making installation). Install center support into case, aligning the support with the mounting bolt holes in right and left side of case, install special support bolts and lockwashers from outside of case *(CAUTION*—rolled edge of lockwashers must be toward case to insure a tight seal). Tighten bolts evenly to 20-25 ft.lbs. torque.

Rear Servo Band: Position rear servo band in case, according to indicating mark made at disassembly, with strut ends up. Install bronze thrust washer behind primary sun gear.

Pinion Carrier: While meshing planet pinions on sun gears, position rear band over carrier drum. Install two seal rings on sun gear shaft and check for free movement. Install selective thrust washer (see note) on rear of pinion (hold in place with fluid).

►**Thrust Washer Note**—This selective thrust washer controls endplay (.010-.029") and should be selected during transmission disassembly (see step 10 of "Disassembly of Transmission into Major Units."

Output Shaft: Install output shaft, carefully meshing internal gears with pinions. *(CAUTION*—Position seal rings on primary shaft with gaps up to prevent breakage during installation of output shaft).

Rear Pump: Install four rings into distributor sleeve and check ring gap. Position rear pump drive key in keyway on output shaft. Position new front and rear gaskets on pump body. Install thrust washer on pump body with bronze side up. Make sure to index thrust washer tangs with bosses on pump body (see Pump & Thrust Washer Change Caution below). Install rear pump (CAUTION—use care to index drive key with keyway in pump drive gear).

►**Pump & Thrust Washer Change Caution**—Two types of pumps used which require **different thrust washers.** Thrust washer used with first type aluminum pump has four sets of lugs on outer diameter which engage four lugs on pump cover, thrust washer for second type cast iron pump has two lugs on outer diameter which engages recesses in cover.

►*CAUTION—Correct type thrust washer must be used with each type pump cover.*

Governor: Position governor drive ball in pocket in output shaft. Retain in place with fluid. Install governor assembly, indexing groove with ball in output shaft. (NOTE—Governor installed with body plate toward front of transmission). Install snap ring.

Distributor: Install rings in grooves of output shaft and make certain rings rotate freely. Install distributor sleeve on output shaft with chamfer forward. Install distributor and tubes on distributor sleeve *(CAUTION*—make certain that fluid passages in sleeve and distributor are aligned). Install attaching bolts and lockwashers and tighten finger-tight. Insert distributor tubes into transmission case until spacer on center tube is against case, then tighten distributor attaching bolts to 8-10 ft. lbs. torque.

Extension Housing: Place speedometer drive gear ball in pocket of output shaft, install speedometer drive gear with chamfered side toward front of transmission, install snap ring to retain gear. Position Extension Housing Oil Seal Replacer & Pilot Tool 7657 in extension housing, then install housing on transmission. Install attaching bolts and external-tooth lockwashers *(CAUTION*—lockwashers must be installed with rolled edge toward case to insure a tight seal), tighten bolts finger-tight. Install new seal ring on rear pump discharge tube and install tube using Tool 77869 *(CAUTION*—make certain tube is correctly positioned and below upper surface of transmission case). Tighten extension housing

CONTINUED ON NEXT PAGE

FORDOMATIC & MERCOMATIC (Continued)

attaching bolts evenly to 28-33 ft.lbs. torque. Install governor inspection cover on housing using a new gasket, tighten cover screws to 50-60 In.lbs.

Front Pump: Install new front pump gasket into counterbore in transmission case and install front pump. Line up dowel hole in pump with dowel in case. Install three pump attaching bolts and lockwashers (do not install fourth bolt until endplay has been checked as directed below), tighten bolts evenly to 17-22 ft. lbs. *Check Transmission Endplay before proceeding with assembly.*

Transmission Endplay Check & Adjustment: Mount extension tool 1P-77067 and dial indicator on front pump (use hole from which pump attaching bolt omitted for this purpose) with dial indicator resting on end of turbine shaft. Insert tool 1P-7657 in end of transmission extension housing. Use large screwdriver to pry front clutch drum toward rear of transmission, set dial indicator at zero. Remove screwdriver and pry units toward front of transmission (insert screwdriver between large internal gear and transmission case). Indicator reading will be the endplay and should be .010-.029". If reading within these limits, proceed with reassembly. If endplay not within limits, it will be necessary to change selective thrust washer on rear of planetary pinion (see Pinion Carrier assembly above). Remove checking tools, install remaining front pump attaching bolt and tighten to 17-22 ft. lbs.

Front Servo: Position front band forward in case with band ends up. Position servo strut with slotted end indexing with servo actuating lever and small end indexing with band end. Rotate band, strut and servo into position engaging anchor end of band with anchor pin in case. Locate servo on dowel in case and install attaching bolt. (NOTE—tighten bolt only two or three threads). Install servo tubes.

Rear Servo: Position servo anchor strut and rotate rear band to engage strut. Hold in position with fingers. Position servo actuating lever strut and install servo, tighten bolts to 40-45 ft. lbs.

Pressure Regulator Body: Install pressure regulator body and attaching bolts. Tighten to 17-22 ft.lbs. Install control and converter pressure regulator valves in valve body. Install control and converter valve springs, retainer and retainer attaching nut and lockwasher, tighten nut to 40-50 In.lbs. Install new seal ring on rear pump intake tube and install tube in case.

Control Valve: Install control valve assembly using care to index servo tubes with control valve (see Control Valve Body Change note below), also index inner throttle lever between throttle lever stop and downshift valve—and at the same time push throttle valve in to clear transmission case. *(CAUTION*—Make sure manual valve indexes with actuating pin in manual detent lever). Install large tube into valve body and regulator. Install control pressure compensator tube and lubrication tube. Install control valve body attaching bolts. Tighten to 8-10 ft.lbs. Tighten front servo attaching bolts to 30-35 ft. lbs. torque. Adjust both bands. *See BAND ADJUSTMENT.*

▷Control Valve Body Note—See "Control Valve Body Production Change & Replacement Caution" for instructions on reworking Front Servo Release Tube required when installing later type 1P-77700-C Control Body to replace first type No. 1P-77700-A.

Fluid Screen and Pan: Position fluid screen over inlet tubes of front and rear pumps. Mount pan on transmission case using a new gasket and tightening attaching bolts to 10-13 ft.lbs. NOTE—1953 type oil pan does not have drain plug (transmission is drained by disconnecting oil filler tube from oil pan connection). This opening must be closed by plug when pan used on earlier transmission without under-hood filler tube, and drain plug on earlier type oil pan should be tightened to 20-25 ft.lbs.

INSTALLATION IN CAR

▷*INSTALLATION CAUTION:* Rotate converter until flex driving plate bolt holes are horizontal, wedge converter in place so that it will not slip out during installation. Clean out all dirt, grease, and burrs from pilot bore in crankshaft, lubricate converter pilot bearing surface with heavy film of special lubricant M-4648-A.

▷*CAUTION*—Excess lubricant or foreign material in pilot bore may force converter assembly back so that converter hub presses against front pump drive gear causing damage to front pump.

1) Mount transmission and converter assembly on a lift, under the car, raise assembly and carefully move it forward into position *(CAUTION*—guide assembly to avoid damage to flexible drive plate and converter pilot).

2) Install four lower converter housing bolts, tighten evenly to 40-45 ft. lbs. torque.

3) Check converter endplay to make certain that pilot is free in bore by moving converter back and forth before flexible drive plate is bolted to converter. This endplay should be 1/32" minimum.

4) Raise the engine and replace the cross-member, tighten cross-member attaching bolts to 25-32 ft.lbs. Tighten rear support-to-crossmember bolts to 40-45 ft.lbs., then lower engine and transmission onto rear support and tighten support-to-transmission case bolts to 20-25 ft.lbs. Remove engine support bar.

5) Position the flex drive plate correctly for each model (see Notes below), install flex plate attaching bolts, tighten bolts evenly to 25-28 ft.lbs. torque.

▷*FLEX DRIVE PLATE POSITIONING CAUTION*—Plate must be correctly positioned on converter cover to maintain balance and avoid interference with ring gear welds on cover. Position plate so that center bolt hole at end of plate is lined up with following bolt hole on cover:

Ford 6 Cyl. (First 34-Bolt Converter Cover)—Center hole at either end of plate exactly 10 bolt holes in either direction from bolt hole in line with drain plug on converter cover (sides of plate will be approximately parallel to ring gear retainers on cover).

Ford 6 Cyl. (Later 18-bolt Converter Cover)—Same as first type except center hole at end of plate should be 6 bolt holes from bolt hole in line with drain plug.

Ford V8 & Mercury (First 34-Bolt Converter Cover)—Center bolt hole at either end of plate exactly 6 bolt holes in either direction from bolt hole in line with drain plug on converter cover.

Ford V8 & Mercury (Later 18-Bolt Converter Cover)—Center bolt hole at either end of Plate exactly 3 bolt holes from bolt hole adjacent to drain plug on cover (drain plugs are midway between two bolt holes).

6) Coat universal joint knuckle with transmission fluid, install driveshaft assembly.

7) Install parking brake assembly, connect speedometer cable.

8) Connect manual and throttle linkage rods to transmission levers.

9) Install converter housing lower plates and tighten bolts to 10-15 ft.lbs. Install starter and tighten attaching bolts to 15-20 ft.lbs.

10) Install remaining converter housing to engine bolts and tighten evenly to 40-45 ft. lbs. torque (install two upper bolts through access holes in front compartment and close these holes with the rubber plugs).

11) Connect filler tube at oil pan connection, fill transmission and check for leaks. Adjust linkage. Recheck fluid level after transmission reaches normal operating temperature.

TRANSMISSION (Converter in Car): Install two guide pins, ST-0711, into top transmission-to-converter housing attaching bolt holes. Mount transmission on lift and position under car. Rotate engine to position front pump drive lugs, on converter pump housing in a vertical position. Rotate transmission front pump to position slots in pump drive gear in a vertical position. Apply lubriplate to seal surface on converter pump cover hub and raise transmission and move towards front of car. *(CAUTION*—Use care to index turbine shaft splines with splines in turbine hub, and lugs on converter pump with slots in front pump drive gear). Install two lower transmission to converter housing attaching bolts, then remove guide pins and install two upper bolts, tighten all four bolts to 40-45 ft. lbs.

REMAINDER OF INSTALLATION PROCEDURE IS SAME AS FOR "TRANSMISSION & CONVERTER ASSEMBLY above beginning with step (6).

1954-55 FORDOMATIC, MERCOMATIC & TURBO-DRIVE

Ford Pass. Cars, All Models (1954-55)
Ford Thunderbird (1955)
Ford Trucks F-100, F-250, F-350, P-350 (1954-55)
Lincoln, All Models (1955)
Mercury, All Models (1954-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*TRANSMISSION IDENTIFICATION NOTE:* Transmission Model No. and Serial No. on name plate on left side of transmission case must be used to identify individual units for parts replacement etc.

►*STARTING ENGINE BY TOWING OR PUSHING CAR:* Pushing is recommended. Place selector lever in Neutral "N" position. When car reaches 20 MPH speed, turn on ignition, move selector lever to "LO", depress accelerator pedal to half throttle position until engine begins to run. *NOTE–On ice or snow where traction not good, move selector lever to "DR" position to crank engine.*

►*TOWING CAR CAUTIONS: Do not tow at speed greater than 40 MPH and observe following precautions:*
If Transmission Operating Properly–Place selector lever in Neutral "N" position. Car can be towed normally for distances not to exceed 12 miles. **For greater distances, use same procedure as for inoperative transmission.**
If Transmission Inoperative–Tow car with rear wheels lifted off road, or disconnect and remove propeller shaft and protect rear end of transmission from entry of dirt (U-joint Knuckle, Part No. 1M-4841 can be installed and wired in place for this purpose).

►*TRANSMISSION "BUZZING" SOUND:* May be caused by undersize or worn bleed flats on Main Oil Pressure Regulator Valve Assembly. Correct by rotating the valve 90° in its bore. *See "Minor Repairs (Transmission in Car)" for disassembly directions.*

►*1954 FORDOMATIC PRODUCTION CHANGE (PARTIAL PRODUCTION) & PARTS INTERCHANGEABILITY CAUTION:* Special transmission assemblies were installed in some production cars manufactured at the Dearborn Plant starting in August 1954. These assemblies are identified by the Model No. IP-7003-T and Serial No. Prefix 23D. A black stripe, 1" wide, located 4¾" from end of extension housing shield also identifies the assembly. The following parts are NOT INTERCHANGEABLE with parts in the regular production transmission: Primary Sun Gear Assembly (B5A-77530-C); Planet Assembly (B5A-77162-C); Output Shaft Thrust Washer (B5A-77067-E,F,G,H); Output Shaft Assembly (B5A-77059-C); Drum & Secondary Sun Gear Assembly (B5A-77502-A).

►*1954 FORDOMATIC WHISTLING NOISE CORRECTION:* This whistling noise may be noticed during normal operation and can be corrected as follows: Inspect converter housing casting for metal flash at junction of inner surface of housing with exhaust air passage. Grind metal flash from casting until surface is smooth. Check diameter of front opening on casting against specified diameter of 15.13". If diameter is less, grind front of opening adjacent to lower cover plate and air inlet on right side, smoothly to specified diameter. Check lower left inspection cover retaining bolt hole. In some cases this hole has been drilled completely through the housing where it should actually be a blind hole. Correct by replacing the ½" long screw with a 1" long screw. In some cases it may be necessary to run a 5/16" tap through to clean the threads.

►*1954 FORDOMATIC INDICATOR DIAL BREAKAGE CORRECTION:* This breakage may be due to a binding condition between selector lever tang and plastic indicator dial. Correct by grinding approximately 1/16" off tang at point on corner of tang nearest pivot pin. Length of grind should be approximately halfway between lower edge of tang and shift lever. Check for clearance between tang and indicator dial.

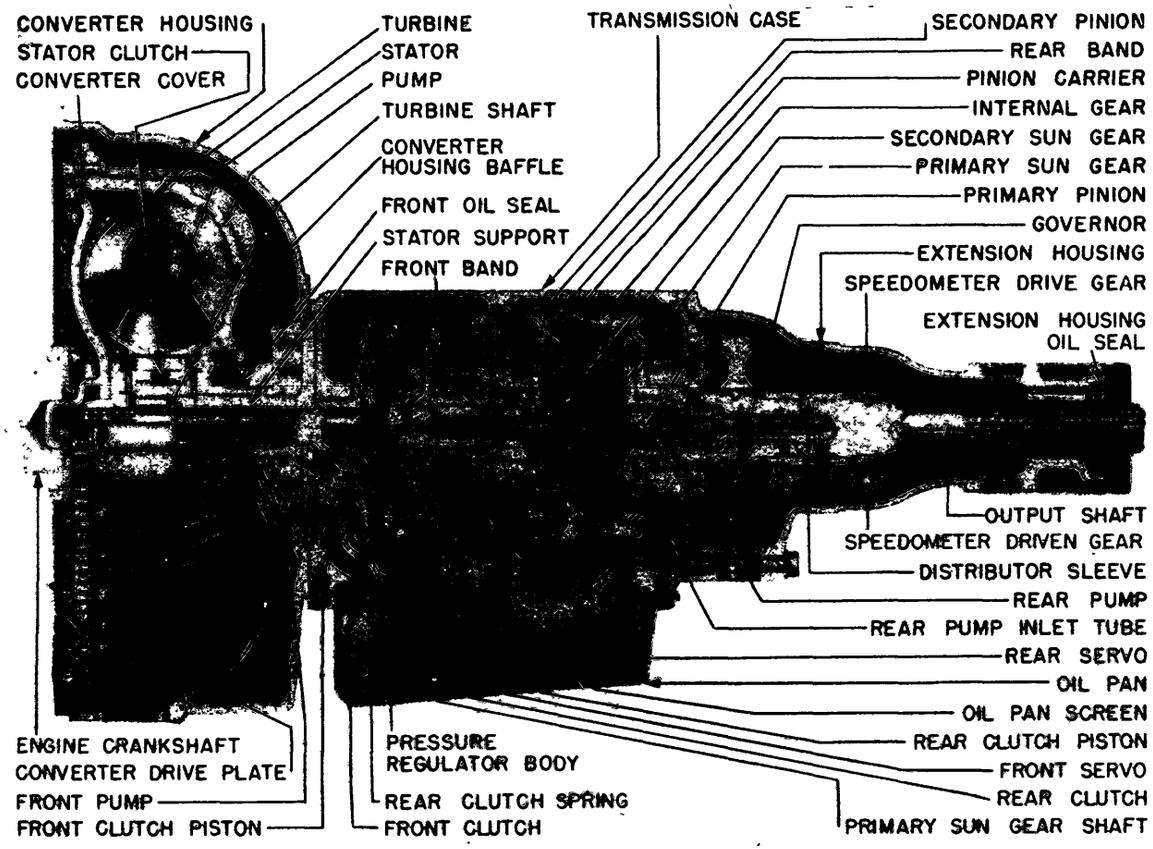
►*1954 FORDOMATIC BINDING OR STICKING IN "PARK" POSITION CORRECTION:* Check for a burr or step in the park detent of manual control detent lever assembly (located inside transmission). To correct, remove detent lever from transmission and grind or hone burr or step from lever *(CAUTION–Lever is case hardened to a depth of .008-.012" and care must be taken when grinding or honing).* Check the surface finish of the parking pawl and if found to be rough, grind or hone to a smooth finish.

►*1955 FORDOMATIC LOW SPEED (UNDER 28 MPH) LOW & HIGH "LOCK-UP" CORRECTION:* May be caused by improper torquing of control valve body bolts. *See "Control Valv " in Transmission Overhaul.*

►*1955 F-100 TRUCK FORDOMATIC OIL COOLER PRODUCTION CHANGE:* The oil cooler assembly and attaching parts have been discontinued on later 1955 production trucks. A by-pass tube is being used in place of the oil cooler.

►*1955 FORDOMATIC MAIN CONTROL ASSEMBLY PRODUCTION CHANGE-EXC. POLICE INTERCEPTOR & SPECIAL 8 CYL. CARS–(To eliminate "slipping" or "long servo fill-up time" in manual shift from Drive or Neutral to Low):* A new Main Control Assembly, Part No. B5A-77700-E, incorporating a new transition valve spring, replaced the early assembly, Part No. B5A-77700-C. *NOTE*–Control Assembly, Part No. B5A-77700-C will continue to be used on the Police Interceptor and the Special V8, and for identification

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FORDOMATIC, MERCOMATIC, & TURBO-DRIVE (SECTIONAL VIEW)

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

purposes, the part number will be changed to B5A-77700-D, with the letter "M" stamped on the lower valve body cover

►*1955 FORDOMATIC "SLIPPING" IN MANUAL SHIFT FROM "N" OR "D" TO "LOW" CORRECTION (EXCEPT POLICE INTERCEPTOR & SPECIAL V8)*· On cars and trucks having the early type Main Control Assembly Production Change above), a new transition valve spring, Part No B5A-77741-A has been released for service replacement (this spring is incorporated in later type main control assembly, Part No B5A-77700-E) If changing the main control assembly or installing the later type transition valve spring does not correct the "slipping" condition, check the main pressure regulator spring free length of 4 08", and spring shut length of 1 84" with a 20 75 to 21 75 pound load

►*1955 FRONT CLUTCH ASSEMBLY PRODUCTION CHANGE (ALL TRANSMISSIONS)* To prevent gear noise or clutch "roll over" during manual shift from "D" to "N" Front Clutch Plate (Bronze) Part No B5A-77519-A is used to replace two of the original four bronze plates Install one later type plate, identified by additional grooves on both sides, next to clutch pressure plate and the other installed on top of the balance of plates These later type plates can be used to correct the above condition in early 1955 transmissions

►*1955 FORDOMATIC SELECTOR LEVER INDICATOR VISIBILITY IMPROVEMENT* Cover front edge and both sides of indicator with red reflective tape Align indicator in "LO" range, adjusting position of indicator as necessary to provide clearance between it and the dial

►*1955 MERCOMATIC & TURBO-DRIVE BAND OR CLUTCH FAILURE CORRECTION (When caused by improper control valve assembly operation)* Thoroughly clean and inspect control valve assembly making sure that all passages and orifices are clean and free of foreign material Check length of Shift Valve which should be 3 3/16" long Check Transition Valve and be sure that hole in valve is deep enough to accomodate entire spring when compressed *See "Trouble Shooting" for other possible causes*

►*1955 MERCOMATIC THROTTLE LINKAGE ADJUSTMENT CHANGE (To improve the 2-3 upshift in the 20-30 MPH range)*· The Mercomatic Throttle Linkage has been changed and is recommended for all 1955 cars, superseding the previous specifications *See "Throttle Linkag Adjustment" below*

►*1955 MERCOMATIC & TURBO-DRIVE PRESSURE REGULATOR VALVE SPRING SEAT & SPACER INSTALLATION CAUTION* It is extremely important that the spring seat and spacer be installed so that the cupped end fits over the end of the control pressure valve, and the stem fits down through the control pressure spring Two types of spacers are used in production, one having the small diameter end closed, and the other with the end open Install either spacer as indicated above

►*1955 MERCOMATIC & TURBO-DRIVE ROUGH 3-2 DOWN SHIFT AT CLOSED THROTTLE CORRECTION & PRODUCTION CHANGE*· A lighter Shift Valve Outer Spring, Part No B5A-77721(Mercury), B5A-77721-A (Lincoln) is used in production and for service replacement The new spring is identified by a wire thickness of 042" (earlier spring had a wire thickness of 049").

►*1955 MERCOMATIC & TURBO-DRIVE MAIN CONTROL ASSEMBLY PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE (To eliminate slip in manual shift from "Drive" to "Low")*: A new Main Control Assembly, Part No. B5A-77700-F which has a new Transition Valve Spring, Part No. B5A-77741-A is used in production and for service replacement on early 1955 transmissions. The later type Transition Valve Spring can also be used to service early 1955 Main Control Assemblies to eliminate complaints of this slipping condition.

►*1955 MERCOMATIC TRANSMISSION THROTTLE CONTROL INNER LEVER PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE (To eliminate excessive endplay)* Throttle Control Inner Lever, Part No. B5A-77283-A, identified by the letter "0" stamped on lever is used in production and can be used for service replacement on 1954-55 transmissions. When installing the later type lever, the letter "0" must be installed toward inside of transmission.

DESCRIPTION

Fordomatic, Mercomatic, & Turbo-Drive Automatic Transmissions consist of a hydraulic torque converter and an automatic transmission which provides automatic operation in "DR" range, and additional "LO", "R", & "P" ranges which are controlled manually

Torque Converter: Mounted in a housing and connected to rear end of crankshaft in place of the conventional flywheel, and consists of the Torque Units listed below Torque converter is fully automatic in its operation, acting as torque converter for low speed and starting operations (when input torque is less than output torque), and as a fluid coupling at higher car speeds (when input and output torque are equal) The change from torque converter to fluid coupling and the operating phases of the torque converter unit is governed by the car operating conditions and do not occur together or at any particular time

Pump (Driving Member)—Mounted on engine crankshaft and bolted to converter cover Pump rotates at engine speed to transmit engine power to turbine through the medium of converter oil

Turbine (Driven Member)—Splined to output shaft forward of converter pump and driven by oil flow from converter pump Turbine transmits power to the planetary gears (Low, Intermediate & Reverse) and to the propeller shaft (Driving Range).

Stator—Consists of reaction blades and a one way clutch mounted on the converter cover hub. The stator redirects the fluid flow to turbine, increasing torque for low and starting speeds (when input torque is less than output torque) being held from rotating in a direction opposite to pump and turbine by the one way clutch . At higher speeds (when input torque equals output torque) the Stator rotates in the same direction and at the same speed as the pump and turbine causing the torque converter to automatically become a fluid coupling

Planetary Transmission: Hydraulically controlled planetary transmission employs a gearset of the compound type consisting of long and short pinions, two sun gears and a single internal gear, providing three forward speeds and one reverse. Controlling bands, multiple disc clutches and servo mechanisms are within the transmission case.

Planetary Pinion Assembly—Consists of three Primary Pinions (short) and three Secondary Pinions (long) mounted in a pinion carrier The Primary Pinion is driven by the Primary Sun Gear and drives the Secondary Pinion which is meshed with the Secondary Sun Gear and the Internal Gear The pinion carrier is controlled by the Rear Servo and the Rear Band

Primary Sun Gear—Integral with Primary Sun Gear shaft which is splined to the driven flange of the Front Clutch unit Power is transmitted through this gear to the Pinion assembly (Low & Intermediate Range)

Secondary Sun Gear—Located forward of the Primary Sun Gear and in mesh with the Secondary (Long) Pinions Mounting is on a hub connected to the driven flange of the Rear Clutch Power transmitted from the Rear Clutch to Secondary Pinions (Reverse)

Front Clutch—Front (input) member of clutch is integral with Turbine Shaft and is splined to Front Clutch drum The Front Clutch drum is formed so that it is also the inner (input) member of the Rear Clutch. Front Clutch hub (output) is splined to the Primary Sun Gear Shaft The Front Clutch is engaged by a hydraulic piston within the clutch drum and locks the Primary Sun Gear Shaft to the Turbine Shaft Clutch is engaged for all forward speeds and is disengaged by an internal spring for neutral and reverse.

Multiple Rear Clutch—Clutch Drum (output) is integral with the Secondary Sun Gear and is provided with a brake band and operating servo Clutch Hub (input) member is integral with the front clutch drum When clutch is engaged, the Secondary Sun Gear is locked to the Turbine Shaft Clutch engagement is by a hydraulic piston within the unit A coil spring between the hub and the drum provides the release

Front Brake Band and Servo Assembly—Band holds the Secondary Sun Gear stationary when it is applied on the clutch drum by the Servo which consists of a hydraulic piston linked to bank One end of the band is held stationary by a strut and anchor which has an adjusting screw for band adjustment Servo is fluid applied and spring released

Rear Brake Band and Servo Assembly—Band holds planet carrier stationary when it is applied by the rear Servo which consists of a hydraulic piston linked to one end of the brake band The opposite end is held stationary by a strut and anchor

Oil Pumps: Two pumps used to supply oil pressure for hydraulic controls, oil supply for converter and transmission lubrication

Front Pump—Internal-External gear type mounted between the transmission and torque converter and

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

driven by the converter pump through a tongue and slot coupling This pump has a large capacity and begins to operate as soon as the engine is started, supplying oil to the torque converter and for transmission lubrication and hydraulic controls

Rear Pump—Internal-External gear type mounted at the rear of transmission and driven by the output shaft Pump operates whenever rear wheels are turning and supplements the front pump volume When car reaches sufficient speed, two ball check valves open and allow the oil from the rear pump to enter the hydraulic system

Hydraulic Controls: Consist of manual and hydraulic valves, controlling the operation of the transmission servos and clutches

Control Pressure Regulator—As pump speed varies, spring loaded valve maintains constant pressure Excess volume is returned to oil pan

Manual Valve—Control pressure is directed to manual control valve for proper distribution to accomplish the performance desired Valve is actuated from the selector lever on the steering column

Throttle Valve—Actuated by the accelerator through linkage Control Pressure is directed to the throttle valve from the Control Pressure Regulator Valve As the accelerator is depressed, moving the Throttle Valve towards the open position modifies the Control Pressure in proportion to the degree of throttle opening

Shift Valve—Automatically changes the speed from Intermediate to High Valve is spring loaded and is controlled by Governor Pressure and Throttle Pressure

Hydraulic Governor—Mounted on output shaft at rear of transmission Rotation of the Governor Valve causes centrifugal force to act on the valve plunger and regulate the pressure in direct proportion to the car speed

Front Servo Apply Regulator Valve—Provides for smooth changes between Intermediate and High speed, by controlling the flow of oil to the Front Servo Valve is controlled by throttle pressure

2-1 Shift Valve (1955 Models)—Provided for starting in "Low" ratio for rapid acceleration, with selector lever in "DR" position. This shift will occur only with car speed below approximately 16 MPH., and with accelerator pedal fully depressed

3-2 Control Valve (1954 Models)—Provided for downshifting from "High" to "Intermediate" on either open or closed throttle.

Downshift Valve (1955 Models)—Operated by accelerator pedal Allows for speed change from "High" to "Intermediate" ratio by depressing the accelerator pedal past its fully open position with car speed above approximately 16 MPH.

OPERATION

Torque converter automatically provides a torque multiplication ranging from 2 1-1 (maximum for starting and acceleration) to 1 0-1 (normal driving range with torque converter acting as a fluid coupling) This torque multiplication is supplemented by the planetary gears when selector lever placed in "DR", "LO", and "R" ranges Transmission operates in each range as follows

Neutral Range—Front and Rear Clutches fully released, and Front and Rear Brake Bands fully released so that gears are free to turn Drive is not transmitted through transmission "N" range is used to start and warm up engine

Drive Range—Car starts in Intermediate Gear (except when accelerator pedal depressed to floor when car will start in Low gear) with a gear ratio of 1.48-1 (1954 Models), 1.467-1 (1955 Ford), 1 46-1 (1955 Mercury & Lincoln), with Front Clutch applied locking the Primary Gear to the Turbine Shaft, and the Front Band applied, holding Secondary Sun Gear stationary. The power flow at this point is from Turbine Shaft through Front Clutch to Primary Pinion, to Secondary Pinion, to Internal Gear, to Output Shaft. As car speed increases (depending on throttle pressure) to a certain point, the Front Band is released and the Rear Clutch is applied, automatically causing transmission to change to direct (1.0-1) drive. The power flow in "High" gear is from the turbine shaft through the Front and Rear Clutches to the Planetary Gears which are locked together and rotate as a unit, causing the Output Shaft to rotate at engine speed.

Low Range—Front Clutch applied, locking the Turbine Shaft to Primary Sun Gear, and the Rear Band applied, holding Pinion Carrier stationary The flow of power is from the Turbine Shaft through the Front Clutch, to Primary Pinions to Secondary Pinions, to Internal Gear and out the Output Shaft at a ratio of 2.44-1 (1954). 2.40-1 (1955).

Reverse Range—Rear Clutch applied, locking the Turbine Shaft to Secondary Sun Gear, and the Rear Band applied, holding the Pinion Carrier stationary The flow of power is from the Turbine Shaft through the Rear Clutch, to Secondary Sun Gear, to Secondary Pinions, to Internal Gear The Stationary Pinions acting as idlers on a stationary axis drive the Internal Gear in a reverse direction at a ratio of 2 0-1

LUBRICATION

►*CAUTION Transmission oil level should be checked at 1000 mile intervals and should be changed at 15,000 mile intervals*

Recommended Oil—Automatic Transmission Fluid Type "A" only

Capacity—Approximate capacities are as follows

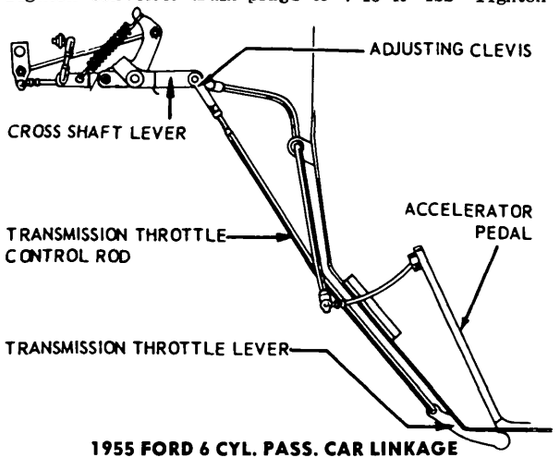
1954 Ford & Mercury (All Models)—9 qts.
1955 Ford (6 Cyl Pass. Cars & All Trucks)—9 qts.
1955 Ford 8 Cyl Pass. Cars exc those listed below)—9½. qts.
1955 (Ford Thunderbird & Police Interceptor)—10½ qts.
1955 Lincoln (All Models)—10 qts.
1955 Mercury (All Models)—10½ qts.

Checking Fluid Level—Apply hand brake, place selector lever in Neutral "N" position, run engine at idle speed for approximately four minutes, then move selector lever to Park "P" position When engine and transmission have reached normal operating temperature, move selector lever through all positions to assure fluid distribution throughout transmission, return lever to "P" position Raise engine hood, clean all dirt from around filler cap at right rear corner of engine. Check fluid level on dipstick in filler tube *(CAUTION—make certain dipstick pushed all the way down in the filler tube when checking fluid level)* Add fluid as necessary to bring level up to "F" full mark on dipstick

►**Check for Oil Leaks**—Inspect the bottom of the floor pan at the rear of the transmission for evidence of fluid If fluid is found here, the rear extension housing seal is leaking between the two sections of the telescopic shield Replace the seal Check the speedometer cable connection at the transmission and replace the rubber seal if necessary Check the governor inspection plate and install a new gasket if necessary Leaking around the oil pan gasket generally can be stopped by tightening the attaching screws to proper 10-13 ft lbs torque If necessary install a new gasket Check filler tube connection at transmission oil pan If leakage is evident, tighten the connection If leakage is evident at either the throttle lever shaft or manual lever shaft, replace either of the seals Inspect the two hexhead pipe plugs at each side of the transmission case at the front If either plug shows leakage, tighten to 7-15 ft lbs torque Inspect the discharge air duct for evidence of fluid If transmission fluid is found, make certain that converter cover bolt nuts tightened to 15-28 ft lbs (Fordomatic), 25-28 ft lbs (Mercomatic & Turbo-Matic), and drain plugs tightened to 7-10 ft lbs torque.

►*CAUTION Fluid found in the discharge air duct may be engine oil that has leaked past the rear main bearing Be sure to determine which type of leak exists*

Drainage and Refilling—Remove converter housing lower plate and drain converter by removing one drain plug, then rotate the engine 180° and remove the second drain plug Disconnect filler tube from transmission oil pan to drain fluid from transmission Tighten converter drain plugs to 7-10 ft lbs Tighten



1955 FORD 6 CYL. PASS. CAR LINKAGE

filler tube connection Install 5 quarts of automatic transmission fluid, start engine and allow to idle four minutes Add 4 qts, of fluid and bring transmission to

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

to operating temperature. Place selector lever in parking (P) position and check oil level. If level is not up to dip stick level mark, add additional fluid as required.

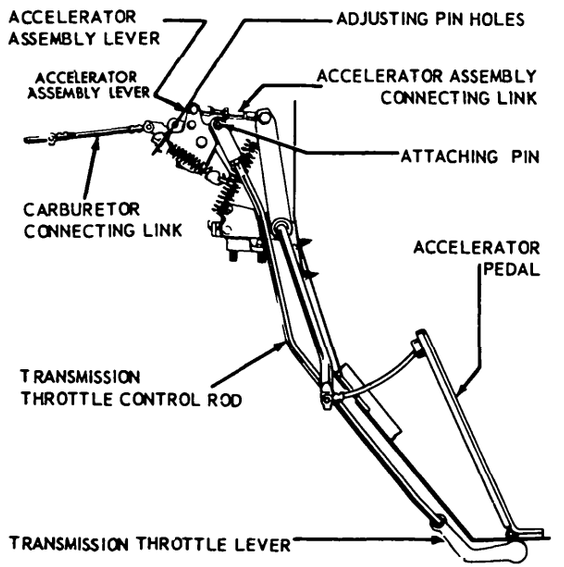
►*CAUTION–Correct fluid level should be determined by dipstick reading rather than actual number of qts. installed.*

LINKAGE ADJUSTMENT

►*FORD THROTTLE LINKAGE ADJUSTMENT CAUTION: Different type linkages used on the various models. See sp cial procedure for each model.*

ANTI-STALL DASHPOT ADJUSTMENT (ALL CARS & TRUCKS): After engine idle speed adjusted and with engine at normal operating temperature and with transmission selector lever in "N" (Neutral) position, loosen dashpot adjusting screw locknut. Hold throttle in closed position and turn dashpot adjusting screw out (counterclockwise) until head of screw pushes dashpot rod up to the end of its travel. Turn dashpot adjusting screw in (clockwise) 1½-2 turns to obtain a clearance of .045-.064" between rod and screw head. Tighten adjusting screw locknut.

►*1955 FORD INTERCEPTOR & SPECIAL 8 CYL. FORDOMATIC CONTROL LINKAGE CHANGE (To improve "kickdown" from "High" to "Intermediate" and from "Intermediate" to "Low"):* New Shaft & Bracket Assembly, Part No. B5A-77230-G; Bellcrank-to-Carburetor Rod, Part No. B5A-9772-C; and Accelerator-to-Transmission Rod, Part No. B5A-9784-G are being used in production and can be used for service replacement on earlier cars. *NOTE–When using these parts on cars b fore May 1955, all the parts listed must be used.*



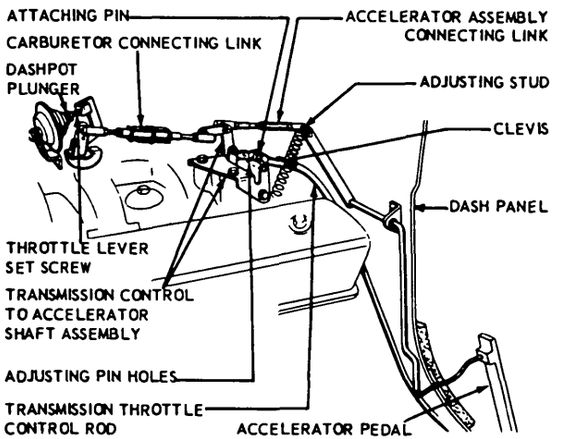
1955 FORD V8 PASS. CAR LINKAGE

Ford 6 Cyl. Pass. Cars (1954-55) Throttl Linkage: With selector lever in "N" and engine at normal operating temperature, set engine idle speed to 440-460 RPM (1954); 450-475 RPM (1955). Adjust Anti-Stall Dashpot, then turn engine off. Remove clevis pin from upper end of transmission throttle control rod (at cross shaft). Pull upward gently on throttle control rod to hold transmission lever against its internal stop. Rotate rod clevis for free entry of clevis pin into holes in clevis and cross shaft lever. Lengthen control rod by rotating clevis 2½ turns (1954); 3 turns (1955) counter-clockwise. Connect control rod to cross shaft lever. Road test car and if band or clutch slippage is evident, **increase rod length to 3 turns (1954); 3½ turns (1955) of clevis but do not exceed 3½ turns (1954); 4 turns (1955).** Check transmission for kickdown action and if found to be incorrect, disconnect accelerator connecting link from cross shaft lever and adjust pedal height by turning the threaded trunnion on connecting link until top surface of accelerator pedal is 4 5/16" (1954); 4 9/16" (1955) from floor pan.

Ford 8 Cyl. Pass. Car (1954) Throttle Linkage: Adjust engine idle speed to 445-455 RPM with engine at normal operating temperature and transmission selector lever in "N". Adjust Anti-Stall Dashpot, then turn engine off. Position Throttle Lever Adjusting Tool T54L-77230-A on surface of accelerator shaft and bracket assembly (on engine). The upper pin of the tool should enter gauge hole (a hole directly below connecting hole for accelerator link on flat accelerator lever). If pin does not enter hole in lever, loosen the carburetor connecting link barrel lock nut. Rotate barrel until pin enters hole freely (make sure carburetor idle adjustment screw is against its stop). Tighten connecting link barrel locknut and remove adjusting tool. Remove clevis pin from upper end of throttle control rod and accelerator assembly lever, then pull up gently on rod to hold transmission lever against its internal stop. Rotate clevis until clevis pin freely enters holes in clevis and accelerator assembly lever. **Lengthen the throttle control rod by rotating the clevis 2½ turns counter-clockwise.** Assemble throttle control rod to accelerator assembly lever and tighten locknut. Road test car and if clutch or band slippage evident, increase length of throttle rod to 3 turns, but do not exceed 3½ turns. Check transmission for kickdown action and if found to be incorrect, loosen accelerator cross shaft-to-accelerator assembly lever connecting link locknut and rotate barrel as necessary to provide a distance of 3 13/16" from floor pan to center of accelerator pedal rod ball.

Ford 8 Cyl. Pass. Cars (1955), (Except Thunderbird) Throttle Linkage: With selector lever in "N" position and engine at operating temperature, set idle speed to 450-475 RPM (Exc. Interceptor), 475-500 RPM (Interceptor). Adjust Anti-Stall Dashpot, then turn engine off. Disconnect transmission throttle control rod from accelerator assembly lever on engine and insert a locking pin (¼" drill rod) through adjusting holes in lever and assembly. Adjust length of link between assembly and carburetor throttle valve lever to close lever against its stop. Adjust accelerator assembly connecting link (assembly-to-cross shaft link) to obtain a pedal height of 3 11/16" (Exc. Interceptor & Special), 3 9/16" (Interceptor & Special). Remove locking pin and pull up gently on transmission throttle control rod to hold transmission lever against its internal stop. Rotate clevis on upper end of rod until clevis fits freely on pin on accelerator assembly lever, then lengthen rod by turning clevis 3 turns counter-clockwise. Install throttle control rod on lever. Hold lever in alignment to prevent binding, and tighten locknut. Road test car and if band or clutch slippage evident, **increase rod length to 3¼ turns of clevis but do not exceed 4 turns.** *NOTE–* Connecting link between cross shaft and lever must be parallel to centerline of engine. Adjust as necessary by rotating adjusting screw in lever.

Ford Thunderbird Throttle Linkage: With selector lever in "N" position and engine at normal operating temperature, set engine idle speed at 475-500 RPM. Adjust Anti-Stall Dashpot, then turn engine off. Disconnect



1955 THUNDERBIRD LINKAGE

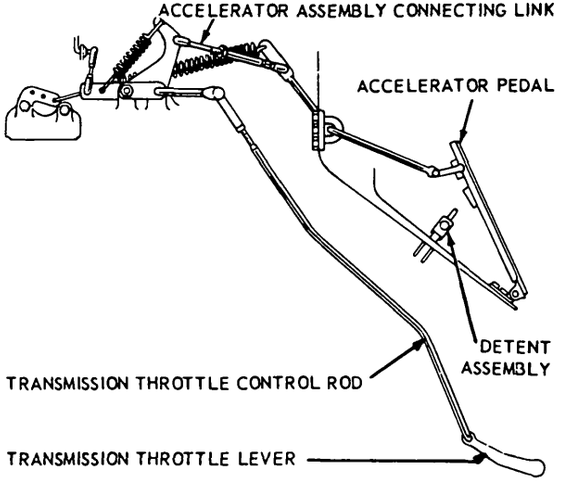
transmission throttle control rod from accelerator assembly lever on engine and insert a lock pin (¼" drill rod) through adjusting holes in lever and assembly. Adjust length of link between assembly and carburetor throttle valve lever to close lever against its stop. Adjust accelerator assembly connecting link (assembly-to-cross shaft link) to obtain a pedal height of 4¼". Remove lock pin and pull up gently on transmission throttle control rod to hold transmission lever against its internal stop. Rotate clevis on upper end of rod until clevis fits freely on pin on accelerator assembly lever, **then lengthen rod by turning clevis 3 turns counter-clockwise.** Install throttle rod on lever. Hold lever in alignment to prevent binding and tighten locknut. Road test car and if band or clutch slippage evident, **increase rod length to 3¼ turns of clevis but do not exceed 4 turns.** *NOTE–*Connecting link between cross shaft and lever must be parallel to centerline of engine. Adjust as necessary by rotating adjusting screw in lever.

Ford 6 Cyl. Truck (1955) Throttl Linkag : With selector lever in "N" position, engine at operating temp-

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

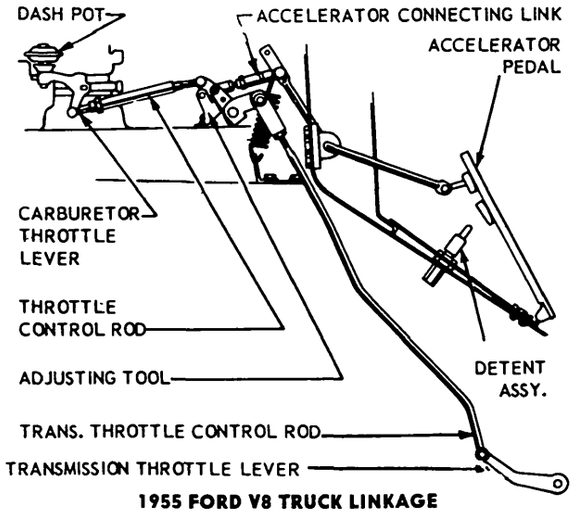
erature, set engine idle speed at 450-475 RPM. Adjust Anti-Stall Dashpot, then turn engine off. Remove clevis pin from upper end of transmission throttle control rod (at cross shaft). Pull gently upward on throttle control rod to hold transmission lever against its internal



1955 FORD 6 CYL. TRUCK LINKAGE

stop. Rotate rod clevis for free entry of clevis pin in holes in clevis and cross shaft lever. **Lengthen control** rod by rotating clevis 3 turns counter-clockwise.

Connect control rod to cross shaft. Adjust accelerator pedal height so that pedal just touches detent stem on floorboard when throttle lever on carburetor hits its wide open stop. Road test car and if band or clutch slippage is evident, **increase rod length to 3½ turns of clevis, but do not exceed 4 turns.**



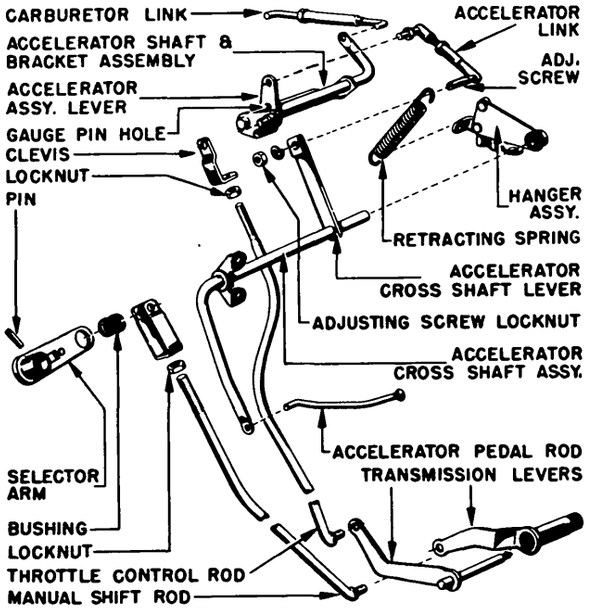
1955 FORD V8 TRUCK LINKAGE

Ford 6 & 8 Cyl. Trucks (1954) Throttl Linkage: The throttle linkage adjustment is the same as for passenger cars except as noted below:

Accelerator Pedal Height—Check transmission for kickdown action. If there is no action, loosen the accelerator stop bolt lock nut located under the accelerator pedal and adjust the stop bolt height until kickdown action is obtained.

See MANUAL LINKAGE ADJUSTMENT below.

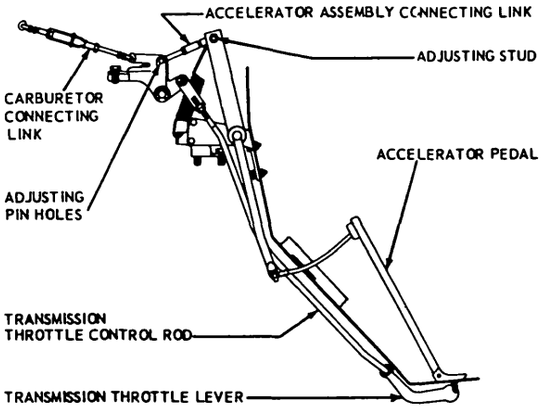
Ford 8 Cyl. Trucks (1955) Throttle Linkage: Adjust idle speed and Anti-Stall Dashpot. Position Throttle Linkage Adjusting Tool T54L-77230-A on surface of accelerator mounting bracket. Lower pin of tool should freely enter hole in accelerator assembly lever. If pin does not enter hole in lever, loosen carburetor connecting link barrel locknut and rotate barrel until pin enters hole freely (with carburetor throttle valve lever



1954 FORD V8 THROTTLE LINKAGE

against its stop). Tighten link barrel locknuts. Remove clevis pin from upper end of transmission throttle control rod at cross shaft. Pull gently upward on throttle control rod to hold transmission lever against its internal stop. Rotate rod clevis for free entry of clevis pins into holes in clevis and cross shaft lever. **Lengthen control rod clevis 3 turns counter-clockwise.** Connect control rod to cross shaft. Road test car and if band or clutch slippage evident, **increase rod length to 3½ turns of clevis but do not exceed 4 turns.** *NOTE*—Connecting link between cross shaft and lever must be parallel to centerline of engine. Adjust as necessary by rotating adjusting screw in lever.

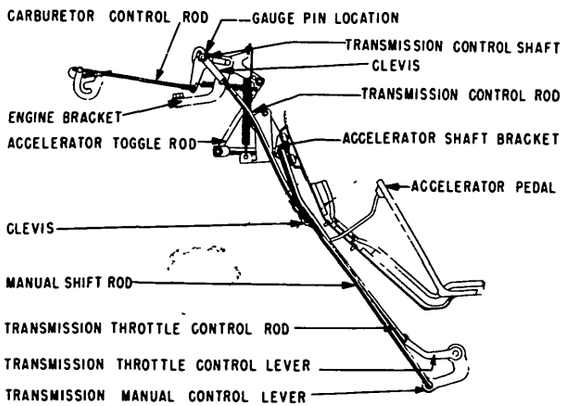
Linc ln Throttl Linkag : Disconnect carburetor to throttle rod at carburetor. Adjust engine idle speed to 425-450 RPM with selector lever in "DR" position then turn ignition off. Adjust Anti-Stall Dashpot. Re-



1955 FORD V8 INTERCEPTOR & SPECIAL LINKAGE

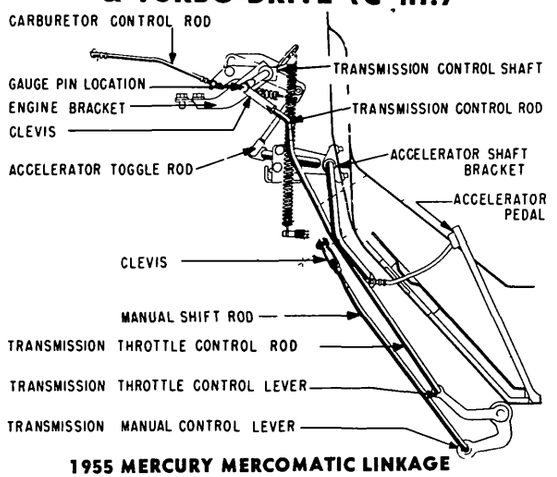
move clevis pin securing transmission control rod to transmission control shaft. Insert gauge pin Tool 77230-MB through control rod and shaft bracket. With engine at operating temperature and on slow idle, adjust carburetor to control shaft rod so that it enters hole in carburetor freely. If rod is too long shorten one full turn and assemble into hole in carburetor. Remove positioning gauge pin. While holding carburetor throttle in slow idle position, hold the control shaft to transmission rod up against its stop, and adjust length of rod to allow a free entry of clevis pin in hole in shaft of transmission control shaft, **th n l ngth n rod by turning clevis three compl t turns in ac unt r-cl ckwise direction.** Install clevis pin and tighten locknut. *(NOTE*—If, after making this adjustment, clutch or band slippage is still indicated, the rod may be lengthened another complete turn, **but th c mplet adjustm nt must never exceed a total of four turns fr m "St p" p siti n).** With ignition off and accelerator pedal depressed, adjust the length of the toggle rod assembly so that nylon bushing has a clearance of .100" from top of slot in accelerator shaft assembly (see Throttle Linkage illustration).

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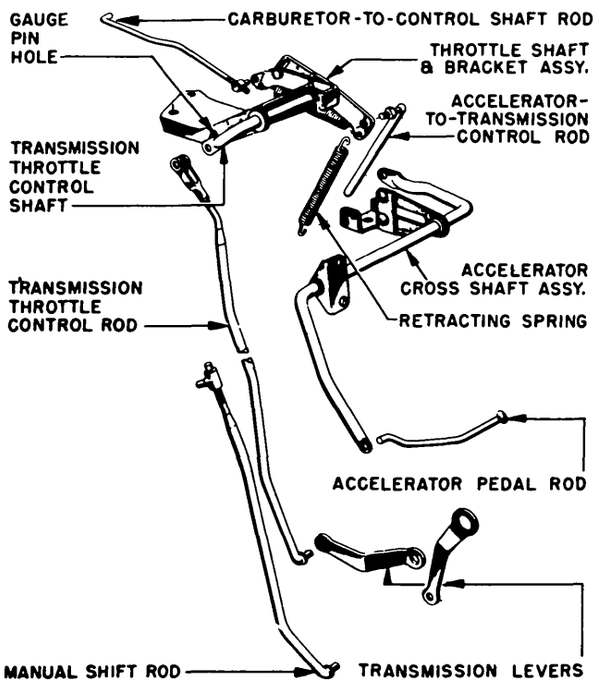
1955 LINCOLN TURBO-DRIVE LINKAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

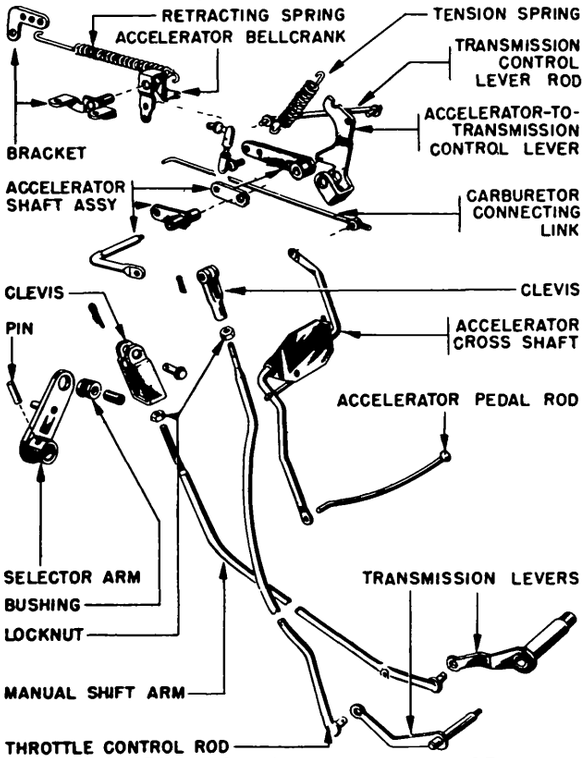


1955 MERCURY MERCOMATIC LINKAGE

Mercury (1954-55 Thr ttle Linkage): Disconnect carburetor-to-control shaft rod at carburetor. Adjust engine idle speed to 425-450 RPM with selector lever in "Dr" position, then turn engine off. Adjust Anti-Stall Dashpot. Remove clevis pin securing transmission control rod to transmission control shaft. Insert Gauge Pin Tool 77230-MB through control rod and shaft bracket. With engine at normal operating temperature and on slow idle, adjust carburetor-to-control shaft rod so it enters hole in carburetor rod freely. On 1955 Models, **lengthen th rod two full turns.** Remove positioning pin. While holding carburetor throttle in the slow idle position, hold control shaft-to-transmission rod up against its stop and adjust length of rod to allow free entry of clevis pin in hole in clevis and hole in transmission control shaft. **Lengthen rod by turning clevis three full turns in a counter-clockwise direction.** If it is not possible to obtain a forced downshift with this adjustment, control shaft should be lengthened an additional 1½ turns. Install clevis pin and tighten clevis locknut.



1954 MERCURY MERCOMATIC LINKAGE



1954 FORD 6 CYL. FORDOMATIC LINKAGE

Manual Linkage Adjustment (All Models): Disconnect upper end of manual shift rod from selector arm. Position selector lever, with the indicator in the quadrant down against its stop in the "DR" position Place manual lever at transmission in the drive "DR" detent (second from bottom) Rotate manual shift rod clevis until clevis pin fits freely into holes in clevis and selector arm Lengthen rod assembly 2 complete turns (Ford, All Models), 1 complete turn (Lincoln & Mercury), counter-clockwise Install clevis pin and check pointer alignment in all positions.

STARTER NEUTRAL SAFETY SWITCH: *(NOTE–Neutral Safety Switch is located at lower end of steering column (1954-55 Ford, 1954 Mercury), on steering column, inside passenger compartment (1955 Lincoln & Mercury).*

BAND ADJUSTMENT

►*Band Adjustment is recomm nded to be made at 15000 mile intervals when transmission fluid is changed (pan should be removed and cleaned at this time)*

FRONT BAND ADJUSTMENT: Drain fluid from pan using a drain can with a fine mesh screen, remove pan. Remove fluid screen from transmission and loosen the front servo adjusting screw locknut TWO FULL TURNS, using a 9/16" wrench Using front band adjusting tool No. 7225, insert gauge block between servo piston and adjusting screw and tighten adjusting screw until wrench overruns. Back off adjusting screw exactly ONE COMPLETE TURN and remove gauge block. While holding adjusting screw stationary, tighten locknut clockwise (20-25 ft lbs) Install fluid screen and install pan using new gasket Install the drain plug and refill transmission to "Full" mark using fluid drained from transmission unless fluid being changed Check fluid level (see LUBRICATION).

►*CAUTION–Severe damage may result if adjusting screw not backed off exactly 1 full turn*

REAR BAND ADJUSTMENT: Fold back floor mat to expose right side of floor pan and remove access hole cover on right side of transmission floor pan Using rear band adjusting tool No. 7195, loosen rear band adjusting screw locknut Using "T" handle of tool No. 7195, tighten rear band adjusting screw until wrench overruns. (If screw was found to be tighter than wrench capacity (10 ft lbs), loosen several turns and retighten until wrench overruns). Back off adjusting screw exactly 1½ COMPLETE TURNS. While holding adjusting screw stationary, tighten adjusting screw locknut to 35-40 ft. lbs

►*CAUTION–Severe damage may result if adjusting screw not backed off exactly 1½ turns.*

TESTING

►*1955 FORD INTERCEPTOR & THUNDERBIRD, MERCURY & LINCOLN PRESSURE TAKE-OFF HOLE RELOCATION* Later cars will have the pressure take-off hole located on the rear face at the left hand corner near bottom of case (looking toward front of case).

►*CAUTION: While making the Stall Test never hold the throttle open longer than 5 seconds*

STALL TEST: The stall test is made in "D", "LO" & "R" ranges to determine if bands or clutches are slipping Connect a tachometer to engine and set it to read on the "high" scale Make sure engine is idling properly at normal operating temperatures. Start engine, then firmly apply parking brake and service brake. Place selector lever in "D" range, then press accelerator slowly all the way to the floor without going into "low gear" kickdown. The engine speed should be as indicated in the "Stall Speed Table" below. If engine speed is below minimum limit, tune the engine and repeat test If engine speed exceeds maximum limit, release accelerator immediately because front band or clutch slippage is evident. To determine whether the front band or front clutch is causing slippage, move lever to "LO" range and repeat the test. If slippage

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

is evident in "LO" range also, the front clutch is slipping If slippage is found in "DR" range, but not in "LO" or "R" ranges, the front band is causing the the slippage If engine exceeds the maximum limit with selector lever in "R" range, the rear band or rear clutch is slipping To determine which of the two is faulty, move selector lever to "LO" range If slippage is evident in "LO" and "R" ranges, but not in "D" range, the rear band is slipping When slipping is noted in "R" range but not in "LO" or "D", the rear clutch is causing the slippage

ENGINE STALL SPEEDS

Car Model	Low Limit - Engine RPM -	High Limit
1954 Ford, All Models	1365	1565
1954 Mercury, All Models	1400	1600
1955 Ford 6 Pass. Car	1380	1580
1955 Ford V8 Pass. Car①	1450	1650
1955 Ford Thunderbird	1550	1750
1955 Ford Interceptor	1510	1710
1955 Ford 6 Truck	1380	1580
1955 Ford V8 Truck	1440	1640
1955 Lincoln	1525	1725
1955 Mercury②	1510	1710
1955 Mercury Montclair	1550	1750

①—Special 182 HP V8 Engine included.

②—Except Montclair.

SHIFT TESTS: Select a smooth road for tests. Make tests as outlined below and see 1954 or 1955 "Shift Point Table" for correct speed where shifts should occur.

2-3 Upshift (Minimum Throttle): Place selector lever in "DR" range, and starting from a standstill, apply accelerator lightly but steadily

3-2 Downshift (Minimum Throttle): Permit car to decelerate (from speed attained in above test) until downshift occurs from high to intermediate

3-2 Downshift (Forced): Reduce car speed below 45 MPH (Ford), 50 MPH (Mercury & Lincoln) Press accelerator pedal to floor Transmission should shift from high to intermediate This shift should occur only with car in high gear

2-3 Upshift (Maximum Throttle): Place selector lever in "DR" range, and starting from a standstill, press accelerator to the floor Full throttle upshift should occur as indicated in 1954 or 1955 "Shift Point Table".

2-1 Downshift (Forced)—1955 Models Only: With selector lever in "DR" range and car speed below 18 MPH (Ford), 19 MPH (Mercury & Lincoln), quickly press accelerator fully to floor. This action shifts transmission from high, to intermediate, or low.

1-2 Upshift (Maximum Throttle)—1955 Models Only: With accelerator pressed to floor for above test (2-1 Downshift, Forced), transmission should upshift from low to intermediate when car speed indicated in 1955 "Shift Point Table" is reached. The 2-3 Upshift will occur at the speed indicated in table.

"DR" to "LO" Manual Shift: With car speed between 40-45 MPH (Ford), 45-50 MPH (Mercury & Lincoln), Manually shift selector lever from "DR" to "LO" Instead of shifting to low gear, the transmission should shift from high to intermediate When car speed is reduced within the range indicated in 1954 or 1955 "Shift Point Table", the transmission should shift into low range.

"R" Shift: Bring car to a stop and place selector lever in "R" range The car should move in reverse direction smoothly, upon light throttle pressure

OPERATING PRESSURE TEST: Set parking brake firmly and raise rear wheels off floor Disconnect throttle at outer throttle lever on transmission

Pressure Gauge Installation: *NOTE—See "1955 Ford Interceptor & Thunderbird, Mercury & Lincoln Pressure Take-off Hole Relocation" above.* Remove pipe plug from side of transmission near throttle lever (or on rear face of transmission case), then connect pressure gauge No. 77820 so it can be read from under car.

Throttle Lever Protractor Gauge Installation (1954 Models): Position throttle lever protractor gauge No. 77270-A (Ford), 77270 (Mercury) on the throttle lever shaft, locating the large elongated hole in gauge over the large shaft to rear of control lever. Set gauge indicator to 0° and lock in place with knurled thumbscrew Hold throttle lever against stop (up), insert gauge pin 7000-B-1 through the small elongated hole in gauge and the hole in throttle lever If gauge pin enters these two holes freely the throttle mechanism has not been distorted and need not be replaced **Replace the throttle control mechanism if it has been distorted.**

Throttle Lever Protractor Gauge Installation (1955 Models): Position gauge T55L-77270-C (Ford), 77270-C (Mercury & Lincoln) over throttle lever shaft Rotate gauge on shaft until gauge pin passes through hole in oil pan flange and contacts bottom machined surface of transmission case Tighten gauge set screw to hold gauge firmly on throttle lever shaft Rotate throttle lever up against its internal stop in transmission, then insert gauge pin through small elongated hole in gauge and hole in throttle lever Check position of protractor gauge pointer If pointer is at zero, the throttle mechanism is not distorted **If throttle lever distorted, replace it with a new one.**

Pressure Rise Point ("R" Reverse Range) 1954 Models: With throttle lever pin through the elongated hole in gauge and hole in throttle lever, advance the throttle fully (down) The lever should travel 28° to 33° Connect a tachometer and set engine idle speed at 600 RPM with selector lever in "R" (reverse) range Observe pressure at 0° throttle lever position The pressure should be 60-80 lbs (Ford), 76-96 lbs (Mercury) From underneath the car advance throttle lever slowly and observe the angular reading at the point where pressure starts to rise Pressure rise should begin between 3½-4½° throttle advance Continue to advance throttle lever slowly until maximum pressure is indicated, which should be 140-165 lbs (Ford), 154-186 (Mercury), and observe angular reading which should be 4½-7½° If above points not correct, adjust by changing throttle valve stop position (see Throttle Valve Stop Adjustment below)

Pressure Rise Point ("R" Reverse Rang) 1955 Models: With pin through the elongated hole in gauge and hole in throttle lever, advance the throttle lever fully (down) The lever should travel 28° to 33° Connect a tachometer and set engine idle speed at 600 RPM with selector lever in "R" (reverse) range. Observe pressure at 0° throttle lever position The pressure should be 50-63 lbs (All cars & trucks except 6 Cyl Pass Car), 47-60 lbs, (Ford 6 Cyl. Pass. Cars) From beneath car, advance throttle lever slowly and note angular reading at moment pressure begins to rise (3½° to 4½°) Continue to advance throttle lever slowly until maximum pressure is indicated on gauge. This pressure should be 175-190 lbs, (All cars & trucks except Ford 6 Cyl Pass Cars), 166-182 (6 Cyl. Pass Cars). Maximum pressure should occur at 9½° to 11½° throttle lever advance

Pressure Rise Point ("DR" Range) 1954 M d ls: Move selector lever to "DR" (drive) range and repeat the above procedure Maximum pressure should occur at 7° to 10½° throttle advance Maximum pressure should be 120-145 lbs

Pressure Rise Point ("DR" Drive Range) 1955 M dels: Move selector lever to "DR" (drive) range and repeat the above procedure Maximum pressure should be 130-150 lbs (All Cars & Trucks except 6 Cyl Pass Cars), 122-142 lbs

►*NOTE—If pressure regulation is not within above specifications, leave gauges attached (for a recheck after repairs) and adjust pressure as indicat d below.*

Throttle Valve Stop Adjustment: This adjustment requires draining transmission and removing oil pan Use bending tool No 77763 to bend the throttle valve stop within transmission case as follows

If pressure Rise Start is Over 4½° (in R v rs Rang)— Hold throttle outer lever against its stop, clamp protractor gauge on lever and set to read 0°, then advance lever to maximum travel Install bending tool over throttle valve stop, bend stop **toward** valve body to advance the stop position the number of degrees to bring the pressure rise to 4° in "R" range Check by returning the lever to stop position and reading protractor gauge (reading will indicate change in stop position)

►*CAUTION: Do not attempt to correct the stop setting if the pressure rise point is more than 4° ut of limits, since extreme bending of the stop can distort valve body plate and result in leakage. Replace stop plate (upper valve body front plate).*

If Pressure Rise Point is Und r 3½ ° (in R v rs Range)— Hold throttle lever against its stop and note protractor gauge reading Advance throttle lever to maximum travel and place throttle valve stop bending tool over stop Bend stop **away** from valve body far enough to bring pressure rise to 4° in "R" range (For example If pressure rise point was 2°, the required correction is 2° To make this correction, bend the stop an estimated amount, then remove tool and move

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

throttle lever against its stop. Subtract previously noted protractor gauge reading from present reading to determine amount of change). Repeat procedure as necessary to bring pressure rise to 4°. Install oil pan and fill transmission with Automatic Transmission Fluid type A.

AIR PRESSURE TESTS (WITH TRANSMISSION IN CAR): Raise car on hoist and remove transmission oil pan, and control valve assembly. Proceed as follows:

Front Clutch: Apply pressure to front clutch and governor input passage (see illustration). Listen for dull thud which indicates that clutch is operating. Keep air pressure in passage for several seconds to check for leaks in this part of system.

Governor Valve: Remove governor inspection cover. Apply air pressure to the same passage as for front clutch (above). Listen for a click and also watch valve snap inward.

Rear Clutch: Apply air pressure to rear clutch oil passage (see illustration). Listen for a dull thud to indicate clutch is operating Check for leaks in same manner as for front clutch (above).

Rear Band & Servo: Apply pressure to rear servo oil passage (see illustration), and observe band application.

Front Band & Servo: Apply pressure to front servo apply tube (rear tube), and observe band application.

▷*TESTING NOTE: If servos, bands, clutches, and governor operate with air pressure, then the no drive problems, erratic shift, or no upshift conditions indicate that the control valve assembly is the cause of the trouble. See "Control Valve" in OVERHAUL BELOW.*

TROUBLE SHOOTING & DIAGNOSIS

HIGH UPSHIFT (Intermediate-to-High): Throttle linkage is too short or throttle lever is bent. Valves sticking in governor or improper valve travel (check with air pressure). Governor oil delivery pipe leaking at connections (air pressure will indicate leak). Valve sticking in control valve assembly.

LOW UPSHIFT (Intermediate-to-High): Throttle linkage too long or throttle lever bent. Valves sticking in control valve assembly. Internal leak in control valve assembly (possible loose screws or mating surfaces require lapping).

ROUGH UPSHIFT (Intermediate-to-High): Throttle linkage not correct length or throttle lever bent. Bands require adjusting to factory specifications. Hydraulic operating pressures not correct. Valve sticking in control valve assembly. Internal leak in control valve assembly (possible loose screws or mating surfaces require lapping).

SLIPS (Light Throttle Upshifts): Throttle linkage too long, or bands out of adjustment.

SLIPS (Heavy Throttle Upshifts): Throttle linkage too long or throttle lever bent. Bands out of adjustment. Hydraulic operating pressure not correct. Valves sticking in control valve assembly. Internal leak in control

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1954 TRANSMISSION SHIFT SPEEDS

	SHIFT SPEED (MPH)				MANUAL SHIFT (MPH)	
SHIFT	2-3		3-2		3-2	3-1
THROTTLE	MIN.	MAX.	MIN.	MAX.		
MODEL Ford	14-19	64-69	7-3	Below 55 MPH	Above 23-27 MPH	Below 23-27 MPH
Mercury	15-20	57-67	11-3		Above 21-27 MPH	Below 21-27 MPH

1955 TRANSMISSION SHIFT SPEEDS

	AXLE RATIO	TIRE SIZE	SHIFT SPEEDS (MPH)						①MAN. SHIFT (MPH)	
SHIFT			2-3		3-2		2-1	1-2	3-2 & 2-1	2-1
THROTTLE			MIN.	MAX.	MIN.	FORCED	FORCED	MAX.	MAX.	MIN.
MODEL Ford 6 Cyl. Pass. Car	3.55-1	670x15	13-18	53-63	10-4	59-19	17-15	26-32	21-27	22-16
		710x15	13-18	53-64	10-4	60-19	17-15	26-32	21-27	22-16
	3.30-1	670x15	14-19	56-67	10-4	62-20	18-16	28-34	22-28	23-17
		710x15	14-19	57-68	10-4	63-20	18-16	28-34	22-28	23-17
Ford 8 Cyl. Pass. Car. Thunderbird & Police Interceptor	3.55-1	670x15	13-18	55-66	9-4	61-20	17-15	27-33	21-27	23-17
		710x15	14-19	59-71	10-4	62-21	17-15	27-33	21-27	23-17
	3.30-1	670x15	14-19	58-70	10-4	65-21	18-16	28-34	22-28	24-18
		710x15	13-18	59-71	11-4	62-21½	18-16	29-35	23-29	24-18
Ford F-100 Truck	3.92-1	600x16	12-17	50-60	8-3	57-18	16-14	24-29	21-25	21-16
		650x16	12-17	50-60	8-3	57-18	16-14	24-29	21-25	21-16
Ford F-250 Truck	4.86-1	650x16	9-14	33-39	8-3	37-13	12-10	17-21	14-18	15-11
		700x16	9-14	35-42	8-3	39-14	13-11	18-22	15-20	16-12
		750x16	10-15	36-43	8-3	40-15	14-12	18-23	15-20	17-12
		700x17	11-16	38-45	8-3	42-15	14-12	19-24	16-21	18-13
		750x17	11-16	39-46	8-3	43-16	15-13	20-25	17-22	19-14
Ford F-350 Truck	5.14-1	700x16	9-14	34-41	8-3	38-13	12-10	17-21	15-19	15-11
		750x16	9-14	35-42	8-3	39-14	13-11	18-22	15-20	16-12
		700x17	10-15	36-43	8-3	49-15	14-12	18-23	15-20	17-12
		750x17	11-16	37-44	8-3	41-15	14-12	19-24	16-21	18-13
Ford P-350 Truck	4.86-1	700x16	9-14	36-43	8-3	40-15	13-11	18-23	15-20	17-20
		750x16	10-15	37-44	8-3	41-15	14-12	19-24	16-21	18-13
		700x17	11-16	38-45	8-3	42-15	14-12	19-24	16-21	18-13
		750x17	11-16	39-46	9-3	43-16	15-13	20-25	17-22	19-14
Lincoln	All	All	15-21	65-77	11-3	66-20	②	30-36		25-19
Mercury	All	All	15-20	58-70	11-3	62-20	②	27-33		23-17

①–If manual shift made above speed indicated, transmission will shift from high to intermediate. If made below these speeds, transmission will shift from high to intermediate or low.

②–19 MPH or below.

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

valve (possible loose screws or mating surfaces require lapping).

SLIPS (2-3 Upshift): Same possible conditions as for "SLIPS (Heavy Throttle Upshifts)" above.

ROUGH 3-2 DOWNSHIFT (Closed Throttle): Same possible conditions as for "SLIPS (Heavy Throttle Upshifts)" above.

NO FORCE DOWNSHIFT: Throttle linkage too long, or throttle lever bent. Accelerator pedal height not correct. Valves sticking in control assembly.

NO 2-1 KICKDOWN SHIFT (1955 MODELS): Throttle linkage too short. Throttle lever bent. Valves sticking in control valve assembly.

SLIPS 3-2 FORCED DOWNSHIFT: Bands out of adjustment.

NO 2-3 UPSHIFT: Valve sticking governor (check with air pressure). Governor oil delivery pipe leaking at connections (check with air pressure). Valves sticking in control valve assembly. Rear clutch inoperative (check with air pressure).

ROUGH REVERSE START: Engine idle incorrect. Throttle linkage not of correct length or throttle lever bent. Bands out of adjustment. Hydraulic operating pressures not correct. Valve sticking in control valve assembly. Internal leak in control assembly (possible loose screws or mating surfaces require lapping).

SLIPS IN INTERMEDIATE RATIO: Throttle linkage not adjusted properly. Bands out of adjustment. Hydraulic pressures not correct. Improper front servo travel (check with air pressure). Internal leak in control valve assembly (possible loose screws or mating surfaces require lapping).

SLIPS IN LOW OR REVERSE RATIO: Same as for "SLIPS IN INTERMEDIATE RATIO" above, except that rear servo travel should be checked with air pressure.

NO DRIVE IN "DR" RANGE: Bands out of adjustment. Front servo not releasing (check with air pressure). Front clutch not operating properly (check with air pressure).

NO DRIVE IN "LO" RANGE: Bands out of adjustment. Rear servo not operating correctly (check with air pressure). Front clutch not operating properly (check with air pressure). Valves sticking in control valve assembly.

NO DRIVE IN "R" RANGE: Same as for "NO DRIVE IN LO RANGE" above.

NO DRIVE IN ANY RANGE: Fluid level incorrect. Shift linkage not adjusted correctly. Hydraulic pressure not correct. A broken or improperly assembled front clutch will cause loss of drive in all positions except Reverse. Improperly assembled control valve assembly.

LOCKS UP IN REVERSE: Front clutch not releasing (check with air pressure). Shift linkage not adjusted correctly or not operating properly. Leak in rear servo apply passage (check with air pressure and make certain servo applies and releases freely without tendency to stick or chatter).

LOCKS UP IN "LO" OR "DR": Rear clutch is applied and not releasing (check with air pressure).

UNABLE TO START ENGINE BY PUSHING: Rear pump inoperative or a defective pressure regulator valve.

ROUGH 2-1 FORCED DOWNSHIFT (1955 MODELS): Rear servo sticking. Rear servo accumulator sticking.

ROUGH 1-2 UPSHIFT, THROUGH DETENT (1955 MODELS): Engine idle incorrect. Throttle linkage too short. Rear servo accumulator sticking or broken spring. Valves in valve body sticking.

MINOR REPAIRS (TRANSMISSION IN CAR)

The following transmission units can be removed for repair without removing transmission assembly from car. Raise car on hoist for these operations, then drain fluid from transmission and remove oil pan.

►*NOTE: For Disassembly & Overhaul of the following units, see OVERHAUL (TRANSMISSION UNITS) below.*

Governor Removal: Remove governor inspection cover from extension housing. Rotate the drive shaft to bring governor body in line with inspection hole. Remove the two screws that secure governor body to sleeve. Remove governor.

►*CAUTION: Use care not to drop bolts or governor valve into housing.*

Installation–Lubricate governor valve with transmission fluid and install valve in governor body (*CAUTION*–valve must move freely in body). Install governor body on counterweight with the **side plate forward** (*CAUTION*–fluid passages in governor body and counterweight must be aligned), install governor body attaching screws. Install inspection cover with NEW gasket, tighten cover screws to 4-6 ft. lbs. torque.

►**NOTE:** For the following operations, remove transmission fluid level indicator. Remove transmission filler tube and drain the fluid into clean container using a fine mesh wire screen for straining. (Fluid may be re-used). Then remove transmission oil pan and screen.

Front Servo Removal: Loosen lubrication tube from pressure regulator and rear pump and remove. (NOTE–If necessary, tap tube with soft hammer to remove. *CAUTION*–Do not bend or distort tube). Loosen control valve body attaching bolts. Remove servo attaching bolt and while holding servo strut with fingers, remove servo assembly.

Installation–Position servo band forward in case with band ends down. Position servo strut with large end indexing with servo actuating lever and small end indexing with band end. Rotate band, strut and servo into position, indexing tubes from valve body to servo, and anchor end of band with anchor in case. Install attaching bolt, tightening to 30-35 ft. lbs. Tighten control valve attaching bolts to 8-10 ft. lbs. Install lubrication tube and adjust servo band. See "Front Band Adjustment". Install screen, install oil pan using NEW gasket, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

Rear Servo Removal: Remove lubrication tube from rear pump and regulator. (*NOTE*–If necessary tap tube with soft hammer to remove). Remove rear pump intake tube. Remove front servo (see above). Take out rear servo attaching bolts, hold actuating and anchor struts with the fingers, remove rear servo assembly.

Installation–Position servo anchor strut and rotate servo band to engage strut. Hold in position with fingers. Position actuating lever strut and install servo, install servo attaching bolts (*CAUTION*–Longer attaching bolt must be installed in forward bolt hole), tighten attaching bolts to 40-45 ft. lbs. torque. Install front servo (see above). Install rear pump intake tube and lubrication tube. Adjust rear band (see BAND ADJUSTMENT). Install oil pan with NEW gasket, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid can be re-used), recheck fluid level with transmission at operating temperature.

Control Valve Body Removal: Remove two "U" tubes from pressure regulator and control valve body. Loosen front servo attaching bolt three turns. Take out three valve body attaching bolts, lower the valve body and pull it off the servo tubes.

►*CAUTION–Use extreme care when removing valve body to prevent damage to body and attach d parts.*

Installation–Align servo tubes with holes in control valve body, position manual lever in neutral, position inner throttle lever between stop and downshift valve and at the same time push the throttle valve in to clear the transmission case **making c rtain that manual valve engages actuating pin manual detent l ver.** Install control valve body attaching bolts but do not tighten the bolts. Install two "U" tubes in pressure regulator and control valve body. Tighten control valve body attaching bolts to 8-10 ft. lbs. torque. Tighten front servo attaching bolt to 35-40 ft. lbs. torque. Adjust front and rear bands (see BAND ADJUSTMENT). Install oil screen, install oil pan using NEW gaskets, tighten oil pan screws to 10-13 ft. lbs. Connect filler tube. Fill transmission to correct level (old fluid may be re-used) recheck fluid level with transmission at normal operating temperature.

Pressure Regulator Removal: Remove lubrication tube. Remove control pressure tube and compensator tube from valve body and regulator. Remove pressure regulator spring retainer. (*CAUTION*–Maintain pressure on retainer to prevent springs flying out). Remove the control pressure and converter pressure valves. Take out pressure regulator attaching bolts and washers, remove regulator.

►*MAIN OIL PRESSURE REGULATOR VALVE INSTALLATION CAUTION:* If regulator removed to correct transmission "buzzing" noise, examine valve for undersize bleed flats and rotate valve 90° in bore from original position when re-installing it. This should correct the noise.

Installation–Install regulator body and attaching bolts and tighten to 17-22 ft. lbs. Install converter pressure and control pressure valves and make certain valves

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

operate freely in bore, then install valve springs and retainer Install large control pressure tube, small compensator tube, and lubrication tube Install oil screen, install oil pan using NEW gaskets, tighten pan screws to 10-13 ft lbs Connect filler tube Fill transmission to correct level (old fluid may be re-used), recheck fluid level with transmission at normal operating temperature

Manual & Throttle Lever Seal Replacement Remove control valve body (see above), disconnect manual and throttle linkage rods at transmission levers Remove nut on inner throttle lever shaft and remove inner throttle lever Remove outer throttle lever and shaft, remove throttle shaft seal from counterbore in manual lever shaft Take out cotter pin in each end of parking pawl torsion lever rod and remove the rod, rotate manual lever shaft until detent lever clears detent ball (*CAUTION*—do not allow detent ball to fly out), remove detent ball and spring Remove manual lever shaft nut, remove detent lever, remove outer manual lever and shaft assembly Remove manual shaft seal

►*1955 MERCOMATIC TRANSMISSION THROTTLE CONTROL INNER LEVER PRODUCTION CHANGE & SERVICE REPLACEMENT NOTE (To eliminate excessive ndplay)* Throttle Control Inner Lever Part No B5A-77283-A identified by the letter "0" stamped on lever is used in production and can be used for service replacement on 1954-55 transmissions When installing the later type lever the letter "0" must be installed toward inside of transmission

Installation—Coat outer diameter of new seal with Permatex No 3, install seal in case using tool No 77288 Install outer manual lever and shaft, rotate shaft until manual lever points downward, place detent lever on inner end of shaft, install attaching nut and tighten nut to 35-40 ft lbs torque Place detent spring and ball in hole in case (use piece of thin wall tubing to depress ball and spring), rotate detent lever until detent ball is held in place Install parking pawl torsion lever rod and cotter pins Install new throttle shaft seal, outer throttle lever and shaft, inner throttle lever and attaching nut, tighten nut to 25-28 ft lbs Connect manual and throttle rods to outer levers Check linkage for free movement Install control valve assembly and other parts *See Control Valve Assembly Installation (above)*

TRANSMISSION & CONVERTER REMOVAL

►*TRANSMISSION & CONVERTER REMOVAL NOTE Transmission and converter can be removed as an assembly, or transmission can be removed separately (on most models) without disturbing converter*

1954 FORD 6 & V8

1) Raise car on hoist or place on jack stands with wheels at least 10" off the floor Fold back floor mat then remove the two rubber plugs covering the floor access holes Remove the two top converter housing to-engine bolts On V8 models remove the starter On V8 models remove the starter On 6 cyl models remove the access plate Remove one of the converter drain plugs Rotate converter 180° and remove the other drain plug *(NOTE—Converter can be drained after removal from car if desired)*

2) On 6 cyl models remove all the lower converter housing-to-engine bolts except one located over the starter and the one located over the exhaust pipe Remove transmission linkage splash shield Remove converter air duct assembly then disconnect throttle and manual control rods from transmission Remove starter assembly drain transmission then remove drive shaft assembly

3) On V8 models disconnect the fluid filler tube at transmission oil pan and drain transmission Remove converter housing upper cover (V8) then remove the six converter-to-flywheel drive plate bolts *(CAUTION—Take precautions to prevent converter from slipping out of housing when transmission removed)*

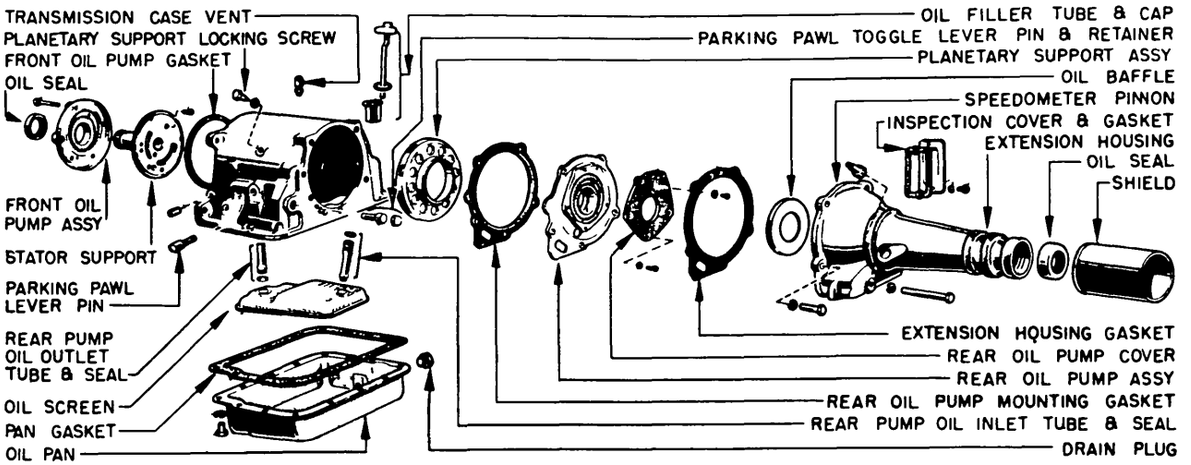
4) Position engine support bar to permit lowering the V8 engine ¾" below normal position Disconnect throttle and manual linkage at transmission levers Disconnect accelerator pedal shaft at cross shaft Disconnect drive shaft at rear axle and remove drive shaft Remove speedometer cable then disconnect parking brake assembly at cross member and move equalizer to one side

5) Remove the two engine rear support-to-transmission bolts Position a transmission jack under transmission and raise transmission slightly to take weight off crossmember Remove crossmember Lower transmission until engine is supported firmly on support bar With the transmission resting on transmission jack remove remaining converter housing-to-engine attaching bolts

6) On 6 cyl models remove the oval cover on engine rear plate Remove six flywheel-to-converter cover bolts Install engine support bar and adjust tightly to oil pan flanges Remove the two remaining converter housing-to-engine attaching bolts

7) On V8 models move the jack supporting the transmission and converter assembly toward the rear sufficiently to clear the converter pilot Remove the six flywheel-to-engine crankshaft flange attaching bolts then remove flywheel assembly

8) On 6 cyl models tilt the converter and transmission assembly slightly and remove transmission assembly toward rear sufficiently to remove the six fly wheel-to-engine crankshaft attaching bolts Remove flywheel to provide sufficient clearance then lower converter and transmission assembly



TYPICAL TRANSMISSION CASE & EXTENSION HOUSING ASSEMBLY

1955 FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD)

1) Place car on hoist On truck models, drain radiator, fold front of floor mat back and remove covers from converter housing access bolt holes Loosen water inlet and outlet hose clamps at oil cooler and pull hoses off cooler On all cars and trucks, remove the two upper converter-to-engine bolts and lockwashers then raise vehicle with the hoist

2) Disconnect oil filler tube at oil pan and drain transmission Remove converter housing front plates (8 Cyl) or the access plate (6 Cyl) Remove one of the converter housing drain plugs Rotate converter 180°, then remove second drain plug Drain converter

►*NOTE Converter may be drained after it is removed from car.*

3) Disconnect drive shaft at rear axle and remove shaft. On F-250, F-350, or P-350 trucks, remove the four bolts attaching drive shaft coupling yoke at parking brake assembly

4) Remove the six flywheel-to-converter drive plate bolts Position the drive plate horizontally, and install the lower converter housing front plate (8 Cyl), or wedge the converter from sliding out of housing when transmission is removed

5) Disconnect starter cable at starter, then disconnect transmission-to-frame ground cable at transmission and remove starter On truck models, remove bolts attaching oil cooler to support brackets, dis-

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

connect oil cooler inlet and outlet hoses at transmission and remove oil cooler Remove converter air duct and linkage splash shield (cars) or the exhaust duct shield (trucks)

6) Disconnect manual and throttle linkages at transmission Disconnect speedometer cable at transmission On Pass. Cars, remove the two engine rear support-to-transmission bolts Position a transmission jack under transmission and raise it slightly to take weight off crossmember. On trucks, with the transmission jack in place remove the converter housing crossmember bolts. On all vehicles, then remove the two lower converter housing-to-engine bolts

7) Tilt rear of converter and transmission assembly upward slightly, then move assembly toward rear of vehicle sufficiently to remove the six engine crankshaft flange-to-flywheel attaching bolts Remove flywheel to provide sufficient clearance, then lower converter and transmission assembly

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below*

THUNDERBIRD

►*NOTE The converter and transmission assembly cannot be removed with engine in the car. Either the engine can be removed first, or transmission, converter and engine can be removed as an assembly*

1) Remove engine *(see "Engine Removal" in Ford Special Data)* If converter and transmission have been removed with the engine, they can be removed from the engine by removing the six converter-to-flywheel drive plate bolts, then removing the four converter housing to engine attaching bolts

2) To remove converter and transmission after the engine has been removed separately, remove the two transmission extension housing-to-rear engine support attaching bolts Remove speedometer cable at transmission Disconnect the manual shift control lever at transmission Move transmission forward and remove forward drive shaft, then remove converter and transmission from car

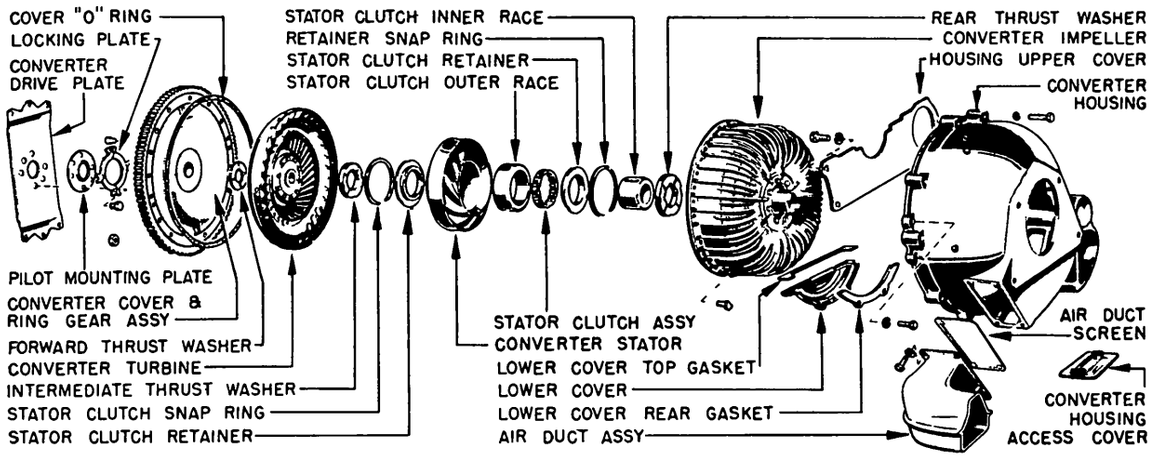
Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

1954-55 LINCOLN & MERCURY

1) Remove ground strap from battery Remove bolts and nuts securing throttle linkage bar bracket to engine and body Place car on support stands with all four wheels approximately 12' off ground On Mercury models with single exhaust pipe, remove nuts securing muffler inlet and cross over pipe to exhaust manifolds Remove manifold outlet pipe from mounting bracket at rear of manifold and move exhaust system away from working area.

2) Disconnect manual linkage and throttle linkage at transmission Disconnect speedometer cable at extension housing Disconnect drive shaft at rear universal joint and remove drive shaft from transmission output shaft Remove air duct from converter housing

3) Remove splash deflector, and converter housing lower plate Drain converter by removing one drain plug, then rotate engine 180° and remove second drain plug



1954 TORQUE CONVERTER ASSEMBLY

Drain fluid from transmission

4) Remove engine rear mount-to-frame crossmember bolts Position transmission lift under transmission and raise engine and transmission sufficiently to install support tool Remove rear engine mount from transmission On 1954 Mercury & 1955 Lincoln, remove the detachable frame crossmember (1955 Mercury models have a tubular crossmember with brackets welded to the crossmember) Lower lift under transmission to allow engine to rest on support tool Reposition transmission lift under transmission assembly and raise lift just enough to relieve weight of transmission on engine

5) Remove starter and upper converter housing plate with seal Remove six bolts securing converter to flexible drive plate. Remove the bolts securing converter housing to engine block

6) Remove transmission and converter assembly by sliding assembly toward rear of car sufficiently to disengage converter housing dowels and converter cover pilot Secure converter to converter housing to prevent damage to converter. Lower the assembly and remove from under car

Torque Converter Removal (from Transmission): *See "Torque Converter Overhaul" below.*

TRANSMISSION REMOVAL (WITHOUT CONVERTER)

►*NOTE: On most cars and trucks, the transmission can be removed without removing the converter assembly.*

1954 FORD 6 & V8

1) Place car on hoist or support car securely on jack stands with all wheels approximately 12" off the floor Drain transmission case by disconnecting filler tube at transmission oil pan connection Disconnect manual control rod and throttle control rod from levers on transmission case Disconnect speedometer cable Disconnect parking brake cable assembly at crossmember and move cable and equalizer to one side

2) Disconnect propeller shaft at rear universal joint flange remove shaft assembly by pulling it to rear to disconnect forward end from transmission Remove engine rear support-to-transmission bolts Install jack under transmission and raise engine and transmission just enough to install engine support bar under rear end of crankcase

3) With engine weight on support bar raise transmission just enough to remove weight from crossmember take out attaching bolt at each end and remove cross member

4) With transmission securely supported by jack remove four transmission-to-converter housing bolts and slide transmission straight back to disengage the turbine shaft then lower transmission and remove it from beneath car

1955 FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD & SUNLINER)

1) Raise vehicle with a hoist and drain fluid from transmission Disconnect drive shaft at rear axle and remove drive shaft

2) On trucks, disconnect oil cooler-to-transmission fluid inlet and outlet lines at transmission Remove bolts holding oil cooler on support brackets, then move cooler to one side

3) Remove converter air duct from pass cars, and remove exhaust duct splash shield from trucks

4) Disconnect manual control and throttle linkage at transmission Disconnect speedometer cable at extension housing. On pass. cars, remove the two rear support-to-transmission bolts Position a transmission jack under transmission and raise it slightly to take weight off crossmember Remove crossmember bolts and crossmember

5) On all vehicles, with transmission jack in place, remove the four transmission-to-converter housing attaching bolts On trucks, remove oil cooler from front support bracket Tilt rear of transmission slightly upward and move assembly toward rear, with a jack, until clear of turbine shaft Lower assembly and move it from under vehicle

1954-55 MERCURY 1955 LINCOLN

1) Place car on support stands with all four wheels

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

approximately 12" off floor. On Mercury models with single exhaust pipe, disconnect muffler pipes at exhaust manifold and the outlet pipe at support bracket, and move complete exhaust system away from work area.

2) Drain fluid from transmission and disconnect manual and throttle linkage at transmission. Disconnect speedometer cable at extension housing. Disconnect drive shaft at rear universal joint and remove drive drive shaft from transmission output shaft.

3) Remove rear engine mount to frame crossmember bolts. (Mercury models have a tubular crossmember with brackets welded to crossmember). Position lift under transmission and raise engine and transmission and raise engine and transmission sufficiently to install engine support tool. Remove rear engine mount from transmissions. On 1954 Mercury & 1955 Lincoln, remove the detachable crossmember from frame (1955 Mercury models have a tubular crossmember with brackets welded to the cross member).

4) Lower lift under transmission and allow engine to rest on support tool. Reposition transmission lift to relieve the weight of transmission. Remove four bolts securing transmission to converter housing.

5) Remove transmission by sliding assembly toward rear of car sufficiently to disengage the turbine shaft. Lower the assembly and remove from under car.

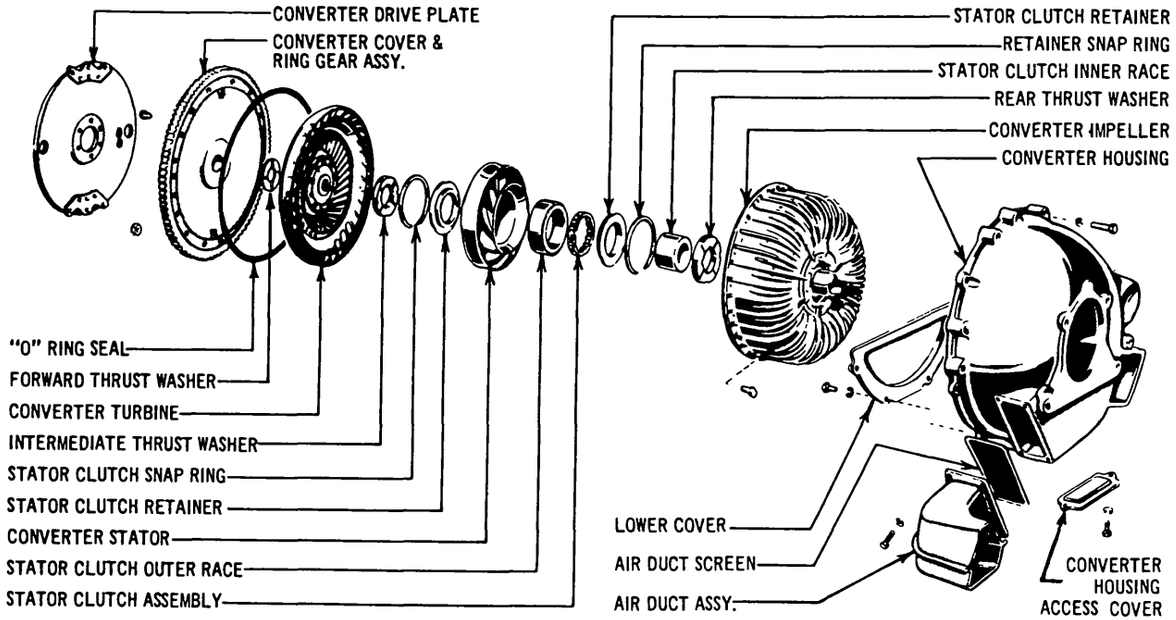
TORQUE CONVERTER OVERHAUL

►*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first, clean each part as removed.*

►*1955 FORDOMATIC CONVERTER BALANCE MARK IDENTIFICATION:* Balance marks are identified by a metal strap on the impeller cover and an inked stamp on the impeller casting. After car has been in service the inked mark may be difficult to see, therefore, it is recommended that before the cover is removed from the impeller, both parts should be marked with aligned dots of prussian blue *(CAUTION–Do not prick punch).*

TORQUE CONVERTER REMOVAL (From Transmission): Grasp converter cover with both hands and pull straight out. *(CAUTION–*To prevent damage to front seals, do not rock assembly from side to side). Remove converter housing attaching bolts and remove housing from transmission.

DISASSEMBLY: Remove converter cover attaching bolts and nuts. Remove cover and "O" ring seal. Remove bronze thrust washer from turbine and remove turbine. Remove stator from pump housing *(CAUTION–Check and locate the balancing marks on cover and stator so they may b replaced in the exact same position).* Remove thrust washer from pump hub and from turbine hub. Remove sprag clutch inner race and remove snap ring retaining outer hub to stator *(CAUTION–Do not burr snap ring groove).* Remove outer hub, sprag assembly, outer race and inner hub as an assembly. Separate hubs and sprag assembly from outer race. Remove snap ring retaining inner hub to stator.



1955 TORQUE CONVERTER ASSEMBLY

INSPECTION: Inspect converter blades for looseness, and check thrust surfaces for scores and splines for burrs and wear. Inspect seal surfaces and front pump driving lugs for wear. Inspect sprag assembly for worn or broken sprags or broken or distorted spring. Inspect bushings for wear or scoring (if bushings worn, polish bearing surface of journal with crocus cloth to eliminate possibility of wear having been caused by rough bearing surface).

REASSEMBLY: Install stator inner hub and snap ring. Turn assembly over, install outer race in stator. Install sprag assembly in outer race making sure that sprags are pointed in the right direction. Install outer hub and outer hub snap ring. Insert Tool No. 7946, tapered side first, into sprag assembly while rotating tool counter-clockwise to position sprags. Install inner race with spline section up. Guide tool No. 7946 with hand while pushing inner race into position. Check stator for clockwise rotation while holding the inner race. Install new seal in pump hub and install hub in pump. Tighten hub capscrews to 8-10 ft. lbs. Install thrust washer into hub of converter pump and install stator with the word "front" (stamped into face of stator) upward. Install thrust washer in hub of turbine and install turbine. Install bronze thrust washer on turbine hub. Position converter cover on pump housing with new "O" ring seal and properly align balance marks on cover and housing *(CAUTION–Cover and housing must be installed in the same position noted when these parts disassembled).* Install all converter bolts and tighten to 25-28 ft. lbs. in the sequence indicated below. Install converter housing on transmission case and tighten attaching bolts to 40-45 ft. lbs. Install converter assembly and press it firmly into position on turbine shaft. *(CAUTION–Do not "rock" converter assembly while installing it on shaft (will damage oil seals).*

►*COVER BOLT TIGHTENING SEQUENCE (To prevent leaks):* Tighten two nuts directly opposite each other just snug, tighten two nuts 90° from first two similarly, tighten two nuts 45° from first four nuts similarly, Continue this sequence until all nuts have been tightened **just snug,** then torque all nuts in same sequence to 25-28 ft. lbs. torque.

TRANSMISSION DISASSEMBLY

►*DISASSEMBLY & REASSEMBLY CAUTION: CLEANLINESS IS EXTREMELY IMPORTANT WHEN OPENING UP TRANSMISSION. Thoroughly clean outside of case first. CLEAN each part as removed with cleaning fluid or gasoline and dry with air–wiping cloths will leave lint on parts.*

DISASSEMBLY OF TRANSMISSION (Into Major Units): With transmission on bench fixture, (tool No. 7000-C-D recommended for holding transmission), remove all transmission units as follows:

1) Remove pan and gasket and take out fluid screen.

2) Remove pressure regulator spring retainer, regulator springs, control pressure and converter pressure regulator valves.

►*CAUTION: Maintain pressure on retainer to prevent valve springs from flying out.*

3) Loosen pressure regulator and valve body attaching bolts, and remove lubrication tube from pressure

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

regulator and rear pump. NOTE—If necessary tap tube with soft hammer. *CAUTION—do not bend or distort tube.*

4) Remove rear pump intake tube, being careful not to bend or distort it.

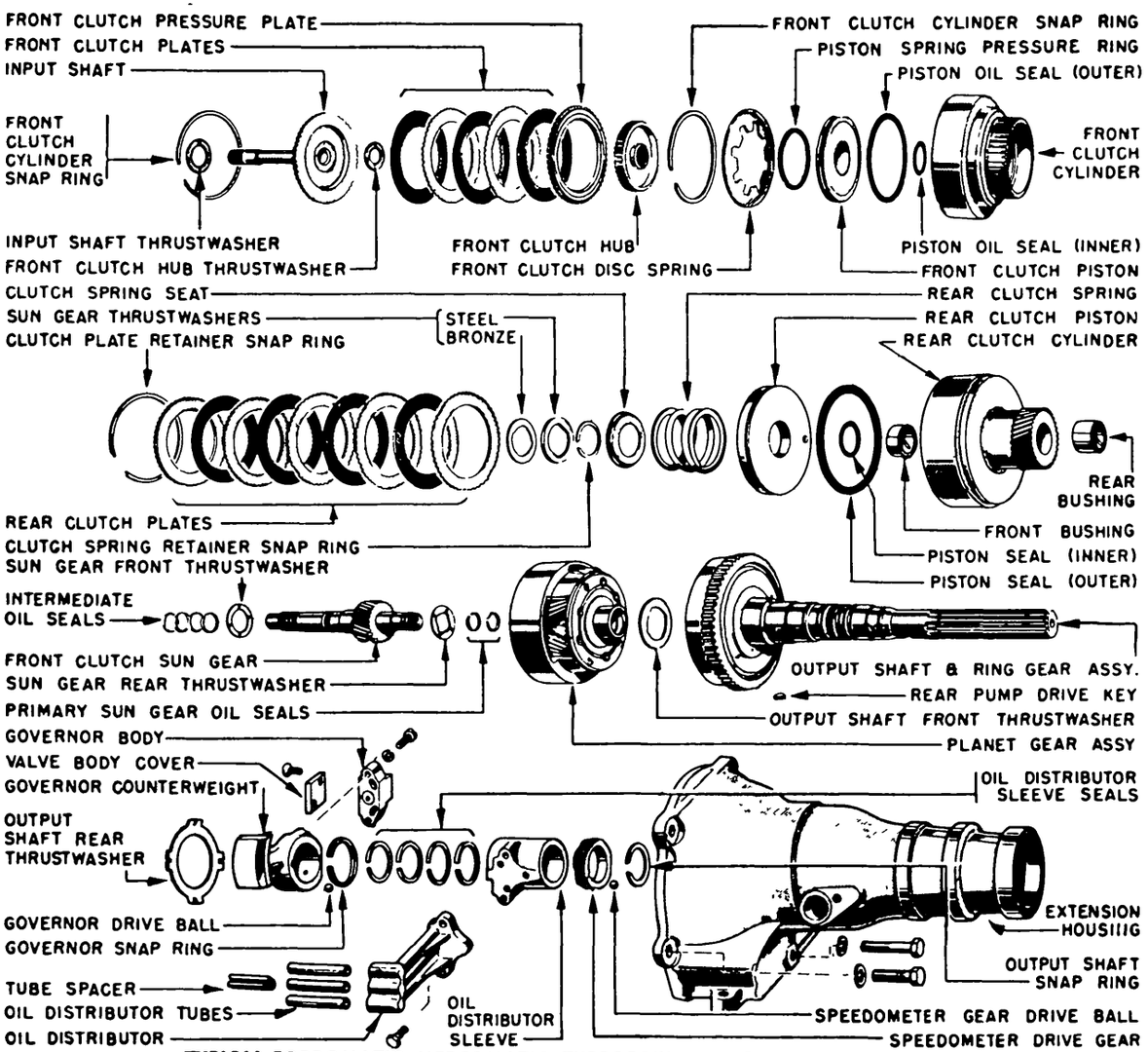
5) Remove compensator pressure tube (small) and control pressure tube (large) from pressure regulator and valve body. NOTE—If necessary, tap tube with a soft hammer. *CAUTION—do not bend or distort tube.*

6) Remove pressure regulator spring retainer, pressing it inward toward regulator to release. Remove pressure regulator springs, control pressure and converter pressure regulator valve. Remove regulator body attaching bolts and washers and remove body from case. NOTE—After removing regulator body from case, replace valve in body to protect them.

7) Loosen front and rear servo band adjusting screws five turns and loosen front servo attaching bolts three turns. Remove valve body attaching bolts and raise valve body to clear case and disengage valve body to clear case and disengage valve body to servo tubes and remove valve body.

8) Remove front servo apply and release tubes by twisting and pulling tubes. Take out front servo attaching bolt, hold front servo strut with fingers, lift servo out.

9) Remove rear servo attaching bolts and while holding actuating and anchor struts with fingers, lift servo from case (*CAUTION—Do not allow struts to drop into case*).



TYPICAL FORDOMATIC, MERCOMATIC, TURBODRIVE TRANSMISSION INTERNAL UNITS

10) *CHECK TRANSMISSION ENDPLAY before proceeding with disassembly, as follows:* Remove one front pump attaching bolt and mount dial indicator & support tool No. 77067 in this bolt hole so that contact button rests on end of turbine shaft. Install Extension Housing Seal Replacer 7657 (1954); 7657-D (1955) on output shaft to provide support for shaft. Pry front clutch cylinder toward rear of transmission using a large screwdriver, and set dial indicator to zero while maintaining a slight pressure on clutch cylinder. Remove screwdriver and pry units forward (toward front of transmission) by inserting screwdriver between large internal gear and case. Record indicator reading (endplay) for use in step 17 (below). This endplay should be .010-.029". Remove dial indicator and support and remove tool from output shaft.

11) Remove front pump attaching bolts and remove front pump assembly. (NOTE—If pump is tight in case, use soft hammer to loosen pump). Remove pump to case gasket. *CAUTION—Pull pump off shaft carefully to avoid damaging oil seal.*

12) Remove five extension housing-to-transmission bolts (these bolts also hold rear oil pump on case), withdraw extension housing carefully while holding rear pump in place. *CAUTION—Pull housing off output shaft carefully to avoid damaging rear oil seal.*

13) Remove speedometer drive gear snap ring from output shaft and take off the speedometer drive gear. (*CAUTION*—Do not lose drive ball).

14) Remove fluid distributor attaching bolts and slide distributor and tube from transmission. Remove distributor sleeve from output shaft. Carefully remove the four seal rings from the output shaft with the fingers (*CAUTION*—use care not to damage these rings).

15) Remove governor snap ring from shaft and slide governor assembly from output shaft. (*CAUTION*—Use care so as not to damage seal rings on output shaft. Do not lose governor drive ball).

16) Remove rear pump discharge tube using tool 77869 and remove pump from case. Remove extension housing and pump gaskets. Remove rear pump drive key from output shaft. Remove bronze thrust washer from output shaft. (NOTE—Washer may come off with pump). Hold rear drum forward and remove the output shaft.

17) Remove selective thrust washer from rear of pinion carrier. If endplay as recorded in step 10 (above) was not within limits of .010-.029", replace this washer with one of proper thickness to give desired endplay. This washer furnished in following sizes: .063-.061", .069-.067", .076-.074", .083-.081".

18) Remove two seal rings from primary sun gear shaft. *CAUTION—use care not to distort rings.*

19) Remove pinion carrier from case and remove bronze thrust washer.

20) Mark rear band position so that it can be assembled in the same position. Remove band by squeezing ends together and tilting band forward.

CONTINUED ON NEXT PAGE

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

21) Remove two center support bolts (on outside of case-one on each side). Press on end of turbine shaft to force clutch units toward rear of transmission and remove center support from case.

22) Remove rear and front clutch assemblies from transmission case as a unit. Install clutch assembly into bench fixture, tool No. IP-77530 and remove thrust washer from front of turbine shaft. Remove the front band from case. Lift front clutch assembly from primary gear shaft. *(CAUTION–*Do not rock assembly while lifting to prevent damage to seal rings)

23) Remove bronze and steel thrust washers from primary sun gear shaft and then remove the front clutch seal rings from primary sun gear shaft. Lift rear clutch assembly from shaft. *(CAUTION–*Do not rock assembly while lifting to prevent damage to seal rings). Remove rear clutch seal rings and thrust washers from shaft.

TRANSMISSION OVERHAUL (TRANSMISSION UNITS)

►*DISASSEMBLY & CLEANING CAUTION:* Handle all parts with care to avoid nicking or burring bearing surfaces and mounting faces. Clean all parts with clean solvent and dry with air. DO NOT use wiping cloths which might deposit lint and interfere with proper operation of transmission. Minor scores or burrs may be removed with crocus cloth. *CAUTION–When polishing valves use extreme care not to round edges of valve lands.*

►*REASSEMBLY CAUTION. Use all new gaskets when assembling or installing units in transmission. Lubricate all internal parts with Automatic Transmission Fluid Type "A" (vaseline may be used to retain gaskets and thrust washers). Tighten all bolts, nuts, and screws to correct torque.*

PRIMARY SUN GEAR SHAFT (Disassembly): Remove rear clutch seal rings by applying pressure on one end and at back of ring forcing ring into groove at these two points. Other end will spring out and free the hook. Remove thrust washer from thrust face of primary gear.

Inspection: Inspect all thrust surfaces and journals for wear or scores. Inspect sun gear for broken, chipped, or worn teeth. Inspect shaft splines and ring grooves for wear or burrs. Check all fluid passages for evidence of leakage and make certain passages are clean and free from obstructions. Check seal rings for wear by installing rings in bore and measuring end gap which should be .002-.009", check rings for free fit in groove (must not bind) If front clutch lubrication valve not operating properly, repair it by installing a new kit.

Reassembly: Install bronze thrust washer against thrust face of primary sun gear, install seal rings in shaft grooves. Seals can be installed in the same manner in which they were removed (see Disassembly above)

REAR CLUTCH (Disassembly): Using arbor press and tool No. 77515, remove clutch release spring snap ring *(CAUTION–*Guide spring retainer while releasing press to prevent retainer interfering with snap ring groove. Remove retainer, release spring, pressure plate snap ring, and pressure plate. Remove the four bronze and four steel clutch plates (Ford & Mercury), Five bronze and Five steel plates (Lincoln), from the drum. Place splined end of primary sun gear shaft in clutch piston bore, entering it as far as it will go, apply air pressure to hole in end of shaft which will force clutch piston out of cylinder *(CAUTION–*Hold hand over piston to prevent it flying out and being damaged) Remove outer seal ring from groove in piston and inner seal ring from clutch drum. Discard these seals (do not re-use).

Inspection: Inspect drum band surface, the bushing, and thrust surfaces for scores. Remove minor scores with crocus cloth. Replace badly scored parts. Inspect needle bearings for worn or loose rollers. Inspect gear teeth for burrs or wear. Inspect clutch piston bore and piston inner and outer bearing surfaces for scores. Check fluid passages for obstructions, making sure that they are free and clear. Inspect clutch plates for scores, and check plates for fit on clutch hub serrations. Replace all plates that are worn or do not fit properly *(CAUTION–*Front clutch plates differ from rear clutch plates and are not interchangeable). Check coning of the steel plates. Position plates on a flat surface, then check coning with a feeler gauge. Plates are coned to .010" clearance and should be checked on the inside diameter. Inspect clutch pressure plate for scores on clutch plate bearing surface. Replace plate if deeply scored. Check clutch release spring for distortion and discard if badly bent.

Reassembly: Lubricate all parts with Automatic Transmission Fluid Type "A". Install clutch piston inner seal ring in groove in drum. Install a new outer seal ring on piston and install piston in clutch drum. Install four steel and four bronze clutch plates (Ford & Mercury), five steel and five bronze (Lincoln), alternately, starting with steel plate, convex side up (Ford & Early 1954 Mercury), concave side up (Late 1954 Mercury & 1955 Lincoln & Mercury) Install clutch pressure plate with bearing surface down, and install snap ring Make sure snap ring is fully seated in groove. Install clutch release spring, then position retainer on spring Position the clutch assembly in an arbor press using Tool No 77515 positioned on spring retainer and compress clutch spring. Install snap ring *CAUTION–While compressing the spring, guide retainer to avoid interference with snapring groove. Make sure snap ring is fully seated in groove*

FRONT CLUTCH: Disassembly–Remove clutch cover snap ring and remove turbine shaft (input shaft) from clutch drum Remove thrust washer and clutch hub Remove three bronze and two steel clutch plates (1954), four bronze and three steel (1955) and pressure plates Using arbor press and tool No 77565 depress clutch release spring and remove snap ring Release spring pressure, remove clutch release disc spring from drum Using air pressure and a piece of 3/16" tubing, (bend at end for entry into hole in clutch bore) force piston out of cylinder *(CAUTION–Hold hand over piston to prevent damage)* Remove piston inner seal from clutch cylinder and remove piston outer seal from groove in piston

Inspection: See "Rear Clutch Inspection" above and follow the same procedure except that all front clutch plates are flat. *CAUTION–Front and rear clutch plates are not interchangeable.*

►*FRONT CLUTCH ASSEMBLY PRODUCTION CHANGE (ALL TRANSMISSION):* To prevent gear noise or clutch "roll over" during manual shift from "D" to "N", Front Clutch Plate (bronze). Part No. B5A-77519-A is used to replace two of the original four bronze plates. Install one later type plate identified by additional parallel grooves on both sides, next to clutch pressure plate, and the other installed on top of the balance of the plates. These later type plates can be used to correct the above condition in early 1955 transmissions

Reassembly: Install a new piston inner seal ring in clutch cylinder and a new outer seal ring in piston groove. Install piston in clutch housing. *(CAUTION–Make certain that steel bearing ring is in place on piston).* Position release spring in cylinder with **concave side up,** place spring compressor tool on spring and compress spring in an arbor press to enable installation of snap ring, make sure that snap ring is fully seated in groove. *NOTE–Complete reassembly of front clutch after rear clutch assembly has been installed on primary sun gear shaft as indicated below.*

PRIMARY SUN GEAR SHAFT & CLUTCH (Reassembly): After individual units assembled (Shaft and Front & Rear Clutches), place primary sun gear shaft assembly in bench fixture and install rear clutch assembly on sun gear shaft *(CAUTION–Center seal rings on shaft to prevent breakage as clutch assembly installed).* Install steel and bronze thrust washers on shaft in that order. Install two seal rings in shaft grooves. Install two seal rings in shaft grooves. Install front clutch housing on primary gear shaft while rotating clutch units to mesh rear clutch plates with serrations on clutch hub being careful not to damage seal rings as clutch assembly being installed. Install clutch hub in clutch cylinder with deep counterbore down. Install bronze thrust washer on clutch hub. Install pressure plate in clutch cylinder with bearing surface up then install three bronze and two steel (1954), four bronze and three steel (1955), clutch plates alternately, starting with a bronze plate *(CAUTION–Lubricate all plates with Automatic Transmission Fluid Type "A" as they are installed)* Install turbine shaft in clutch cylinder and install snap ring in groove, making sure that it is fully seated Install bronze thrust washer on turbine shaft Assembly is now ready for installation in transmission case *See "Transmission Reassembly" below*

FRONT PUMP (Disassembly): Remove pump cover attaching screws and remove cover with stator support. Mark the driven gear with Prussian Blue to assure correct assembly and remove drive and driven gears from pump body. To remove seal from pump body, mount the pump body on transmission case, use tool No. 1175-AB to remove seal

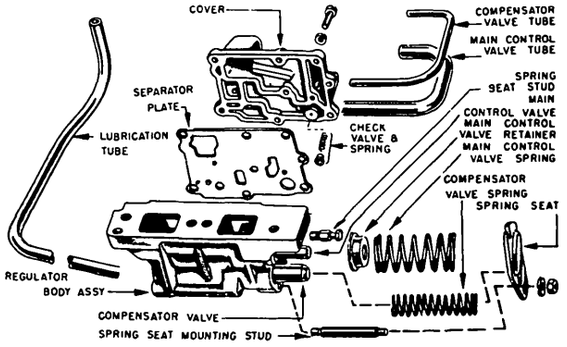
►*CAUTION: Extreme care must be taken not to scratch or mar pump gears or bearing surfaces*

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

Inspection: Inspect bushing, gear pockets and crescent for scores. Inspect front cover, pump body, gear teeth and stator support splines for burrs. Check pump for evidence of contact between outside diameter of drive gear and crescent. REPLACE PUMP if such contact noted. Check bushing for wear and scoring.

Reassembly: Use tool No. 77837 to install new seal in pump body *(CAUTION–*coat outside diameter of seal with Permatex No. 3 before installation to prevent fluid seepage). Install pump driven gear in pump body in accordance with marks made before disassembly, install drive gear. Install pump cover, attaching screws, lockwashers, and tighten cover screws evenly to 1-3 ft. lbs. Check pump for free movement.



1954 PRESSURE REGULATOR ASSEMBLY

REAR PUMP: (Disassembly): Remove screws and lockwashers securing pump cover to pump body and remove cover. Using Prussian Blue, mark pump drive and driven gears to assure correct assembly, and remove gears from body.

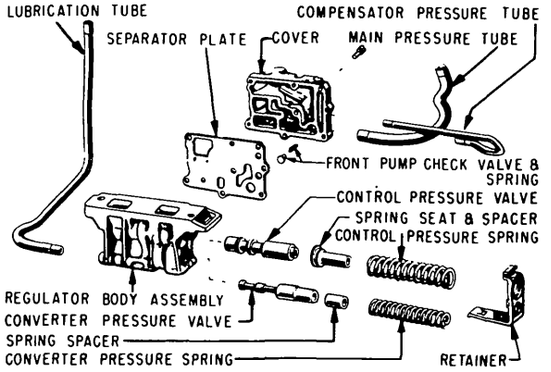
►*CAUTION–Handle pump parts with care to avoid scratching or marring.*

Inspection: Inspect all pump parts for excessive wear, score, or burrs. Check fluid passages for obstructions. Check pump for evidence of contact between outside diameter of drive gear and crescent. REPLACE PUMP if such contact noted. Check bushing for wear or scoring.

R assembly: Install pump driven gear into pump body, positioning gears as marked on disassembly. Install drive gear into position as marked. Install pump cover, install cover screws with lockwashers, tighten screws evenly to 50-60 inch lbs. (¼"), 20-30 inch lbs.,(10-24 screws). Check pump for free movement of gears.

PRESSURE REGULATOR BODY (Disassembly): Remove valves from body. Take out cover attaching screws, remove cover and separator plate.

Inspection: Inspect regulator body and cover mating surfaces. Check fluid passages in body and fluid passages in separator plate for obstructions. Inspect valves and valve bores for scoring and check freedom of valves in valve bores. Check regulator valve springs for distortion. Wash thoroughly in clean solvent and blow dry with air.



1955 PRESSURE REGULATOR ASSEMBLY

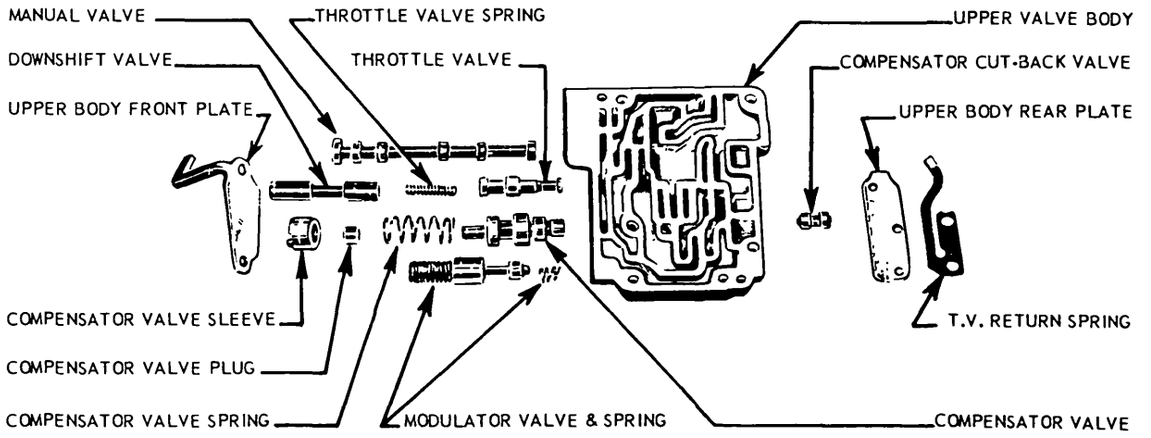
Reassembly: Install check valve spring in regulator cover and position valve on spring *(see "Pressure Valve Installation Caution" below).* Position separator plate on regulator cover. Hold regulator and cover together and check for free movement of valve. Place regulator body in position on separator plate and install attaching screws. *NOTE–Do not install valves at this time as they should be installed after regulator assembly is installed in transmission. See "Transmission Reassembly" below.*

►*MERCOMATIC & TURBO-DRIVE PRESSURE REGULATOR VALVE SPRING & SPACER INSTALLATION CAUTION:* It is extremely important that the spring seat and spacer be installed so that the cupped end fits over the end of the control pressure valve, and the stem fits down through the control pressure spring. Two types of spacers are used in production, one having the small diameter end closed, and the other with the end open. Install either spacer as indicated above.

CONTROL VALVE (Disassembly): 1954 Models–Remove manual valve. Take out one screw attaching separator plate to valve body. Remove upper body front plate *(NOTE–Plate is spring loaded, apply pressure to plate while removing attaching screws).* Remove compensator sleeve, plug, compensator spring, compensator valve, modulator valve spring and valve, downshift valve and spring. Take out two screws attaching throttle valve return spring to upper body, remove the spring. Take out remaining screw attaching upper valve body rear plate and remove the plate *(CAUTION–Plate is spring loaded, apply pressure while removing screws).* Remove 3-2 control valve and spring, low inhibitor valve and spring and governor plug. Remove the end body *(CAUTION–End body is spring loaded, apply pressure while removing screws).* Remove low regulator plug and shift valve plug from end body, then remove end body plate. Remove shift valve inner and outer springs and shift valve, low regulator valve and transition valve. Remove attaching bolts and separate valve bodies. Remove cover end body. Remove front servo apply regulator valve from cover. Remove separator plate from upper body. Remove check valve seat.

CONTROL VALVE (Disassembly): 1955 Models–During disassembly of valve avoid damage to valve parts and keep valve parts clean. Place valve assembly on a clean cloth while performing the disassembly operation. *(NOTE–Do not separate the valve bodies until after valves have been removed).* Remove manual valve and remove one screw attaching separator plate to lower valve body. Remove upper body front plate *(NOTE–The plate is spring loaded. Apply pressure to plate while removing the attaching screws).* Remove compensator spring and plug, remove valve spring and valve. Remove modulator valve retainer, both large and small springs and valve. Remove downshift valve and spring. Remove two screws attaching throttle valve return spring to upper body, then remove spring. Remove the remaining screw attaching upper valve body rear plate to valve body, then remove plate. Remove throttle valve, then the compensator cut back valve. Remove lower body side plate *(apply pressure to plate while removing as it is spring loaded).* Remove the 2-1 shift valve spring and valve, low inhibitor valve and spring, then remove the 2-3 shift valve

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1955 CONTROL VALVE UPPER B DY ASSEMBLY

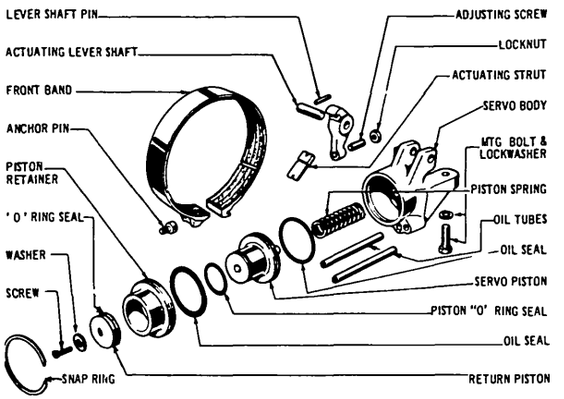
FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

and governor plug. Remove the end body *(End body is spring loaded. Apply pressure while removing attaching screws).* Remove orifice control valve plug and 2-3 shift valve plug from end body and remove end body plate. Remove 2-3 shift valve outer and inner springs, then remove shift valve. Remove orifice control valve and transition valve and spring. Remove attaching bolts and screws and separate bodies. Remove separator plate from upper body and remove check valve seat, valve and spring from lower body

Inspection: *(CAUTION–Handle all parts carefully to avoid scoring, burrs and distortion).* Clean all parts thoroughly in clean solvent and blow dry with air. DO NOT USE CLOTH FOR WIPING PARTS (lint left by a cloth may cause poor valve operation). Inspect all mating surfaces for burrs, scratches, and flatness. Check all passages for obstructions. Inspect all valves and valve bores for scoring and check valves for free movement in bores (valves should slide in bore of own weight). Valves can be polished with crocus cloth.

►*CAUTION–Do not round the sharp edges of valves and plugs.*

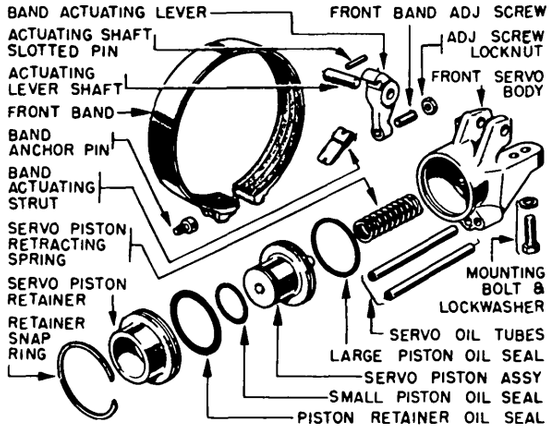
Reassembly (1954 Models): *(NOTE–Arrange parts in correct position. Rotate valves and plugs when inserting them in bores, to avoid shearing of soft body castings).* Install separator plate on upper valve body, install but **do not tighten** separator plate screws Install check valve seat in lower valve body, install front servo apply regulator valve in cover and plug in cover end body Install cover end body on cover but **do not tighten** attaching screws Position lower body on upper body install lower body cover and attaching bolts



TURBODRIVE FRONT SERVO & BAND ASSY.

Tighten the bolts evenly to 4-6 ft. lbs , tighten separator plate screws to 20-30 inch lbs *(CAUTION–Excessive tightening of these bolts may distort valve body and cause valves or plugs to stick)* Tighten cover and body screws to 20-30 inch lbs Check for free movement of front servo apply regulator valve by shaking valve body Install plate on lower end body and make certain that countersunk head screw installed in correct hole Install low regulator and shift valve plugs in end body Install transition valve, low regulator valve, and shift valve in lower body. Install shift valve inner and outer springs. Install end body on lower body, install governor plug in lower body. Install low inhibitor valve spring and valve, 3-2 control valve spring and valve, then install lower body side plate Install modulator plug in upper body, install throttle valve, position upper body rear plate on upper body with plate between end lands of throttle valve, install one screw in hole next to throttle valve, position throttle valve return spring on plate and install remaining plate-to-valve body screws. Install compensator valve and spring, downshift spring and valve, and modulator valve and spring. Install plug in compensator valve sleeve (castellated end out) and install assembly in body. Install upper body front plate, install separator plate-to-lower body screw, install manual valve.

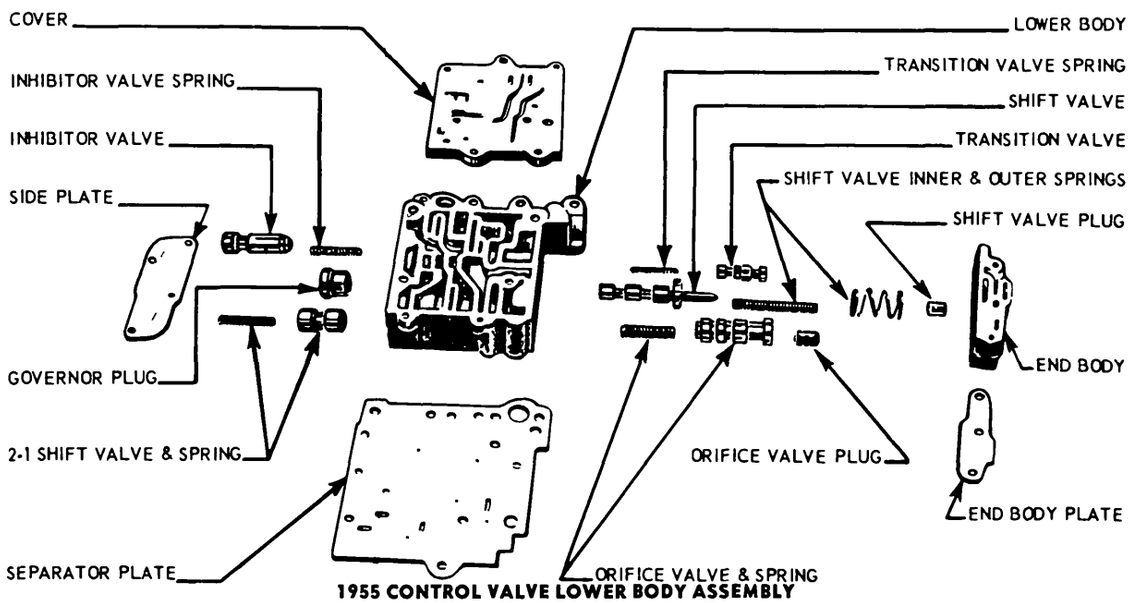
Reassembly (1955 Models): *(NOTE–Arrange parts in correct position. Rotate valve and plugs when inserting them in bores, to avoid shearing of soft metal castings).* Install separator plate on upper body (do not tighten screws). Install check valve spring, valve, and seat in lower body Position lower body on upper body. Install lower body cover and tighten attaching bolts finger tight. Align the valve body attaching bolt



TYPICAL FORDOMATIC & MERCOMATIC FRONT SERVO & BAND ASSEMBLY

holes in the separator plate and lower body. Tighten the four valve body bolts to 4-6 ft. lbs. *(CAUTION–Excessive tightening of these bolts may distort valve bodies, causing valves or plugs to stick).* Install the three lower cover to lower body screws and tighten to 20-30 inch lbs.• Install the plate on lower end body and tighten attaching screws. Install orifice control and shift valve plugs in end body. Install transition valve and spring, the orifice control valve and spring, 2-3 shift valve in lower body. Install shift valve inner and outer springs, and install end body on lower body, *(CAUTION–Make sure that inner spring is piloted on shift valve regulator plug).* Install governor plug in lower body. Install low inhibitor valve spring in valve, and install spring and valve. Install 2-1 shift valve spring in valve, and install valve and spring. Install lower body side plate. Install compensator cut-back valve in upper body. Install throttle valve and position upper body rear plate on upper body with the plate between end lands of throttle valve. Install one plate to body screw in hole next to throttle valve. Position throttle valve return spring on plate, and secure plate in place with the remaining plate to valve body screws. Install compensator valve and spring and downshift

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1955 CONTROL VALVE LOWER BODY ASSEMBLY

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

spring and valve. Install modulator small spring, valve, spring, and retainer as an assembly. Install the plug in the compensator valve sleeve, castellated end out, and install assembly in body, with smooth end toward body. Install upper body front plate. Install separator plate to lower body screw and install manual valve.

GOVERNOR (Disassembly): Remove governor body side plate attaching screws, remove plate. Remove governor body attaching screws and remove body from counterweight. Remove governor valve from body.

Inspection: Inspect valve and valve bore for scores and check free movement of valve in bore. Inspect all fluid passages for obstructions. Inspect mating surfaces for burrs and distortion.

Reassembly: Install governor valve in bore of governor body and install body cover plate and attaching screws. Mount governor body on counterweight, making sure that fluid passages line up with passages in counterweight. Install body attaching screws. Tighten body-to-counterweight screws.

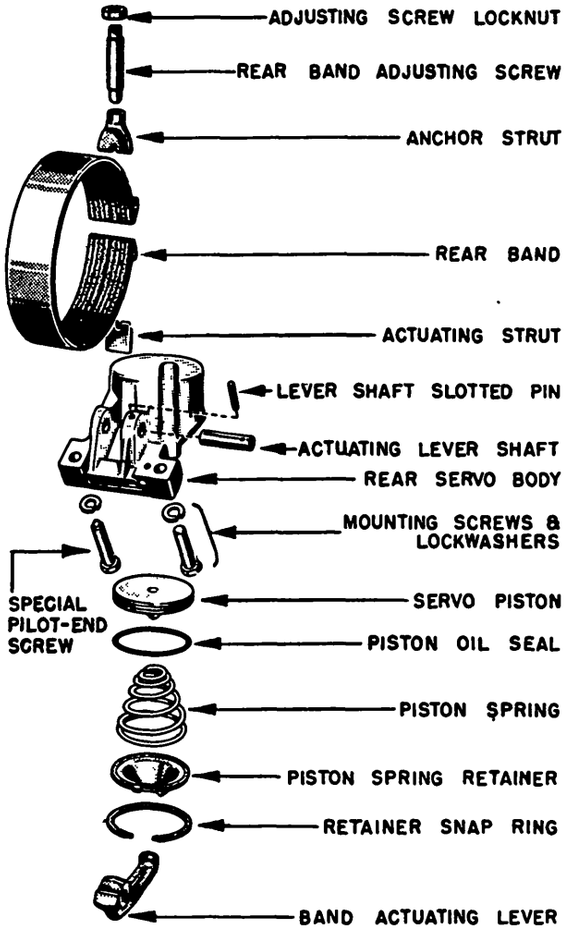
FRONT SERVO (Disassembly–Ford & Mercury): Remove piston retainer snap ring *(CAUTION–Servo piston is spring loaded. Apply pressure to piston when removing snap ring).* Remove servo piston and retainer from servo body (NOTE–If necessary, tap servo piston guide lightly with soft hammer to remove from servo body). Remove servo spring, and remove retainer from piston and seal from retainer.

Disassembly (Lincoln): Proceed as with Ford & Mercury (above), then loosen to one half its length the screw that secures servo piston release piston to servo piston stem. Tap screw head with soft hammer until stem is forced from release piston. Separate release piston, piston retainer and piston. Remove seal from release piston. Remove "O" ring seals from piston.

Inspection: Inspect servo body for cracks. Inspect piston and piston bore for scores. Check fluid passages for obstructions. Check actuating lever for free movement and inspect for wear. (NOTE–If necessary to replace actuating lever or shaft, remove retaining pin and push shaft out of bracket). Inspect threads in lever and on adjusting screw. Check servo spring and servo band for distortion. Inspect servo band lining for excessive wear and bond to metal band. (NOTE–Band should be replaced if worn to a point where grooves are not evident). Inspect bands for cracks and distortion.

Reassembly (Ford & Mercury): Install new "O" ring seals on piston, and new oil seal on piston retainer. Lubricate seals and install retainer on piston. Position servo spring in servo body. Lubricate and install piston and retainer assembly in servo body. Press retainer into servo body and install snap ring. *(CAUTION–Make sure snap ring is fully seated in groove).* Install adjusting screw and locknut in actuating lever if previously removed. Check operation by applying air pressure to apply hole.

Reass mbly (Lincoln): Install new "O" ring seals on piston, and install new seal on piston retainer. Lubricate seals and install retainer on piston. Install new oil seal on release piston and retainer piston and



1954 REAR SERVO & BAND ASSEMBLY

piston retainer. Install new "O" ring seals on piston. Install piston in retainer and move piston to full release position in retainer. Place piston release piston in position, concave side toward stem and press into place. Install screw retaining release piston to piston stem. Complete reassembly in same manner as for Ford & Mercury (above).

REAR SERVO (Disassembly): *(NOTE–Ford & Mercury Rear Servo is smaller in diameter than that used on Lincoln).* With a 1/8" pin punch, remove servo actuating lever shaft retaining pin, and remove shaft and operating lever *(CAUTION–Use care when removing actuating lever to avoid losing needle bearings).* While pressing down on servo spring retainer, remove snap ring (release pressure on retainer slowly). Remove retainer and servo spring. Hold hand over piston to prevent damage and force piston from servo body with air pressure. Press down on accumulator piston and hold in this position while removing "cir-clip" type lock ring with lock ring pliers. With lock ring removed, gradually release accumulator piston until all tension has gone from spring. Remove piston seal ring from servo piston.

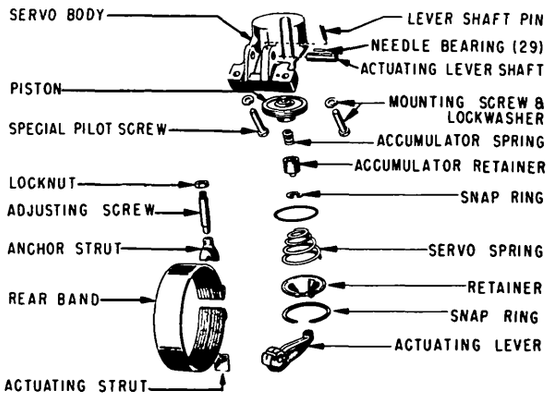
Insp cti n: Inspect servo body for cracks, and piston bore for scores. Inspect servo body-to-transmission case mating surface for burrs. Check fluid passages for obstruction and passage plugs for tightness in body. Inspect piston stem for scores. Inspect accumulator bore and piston for scores and wear, and accumulator spring for distortion. Inspect actuating lever, socket, and shaft for scores and wear. Check needle bearings for wear and distortion. Inspect servo spring for distortion. Inspect servo band lining for excessive wear and bond to metal band. (Band should be replaced if worn to point where grooves are not clearly evident). Inspect band and struts for distortion and band ends for wear.

Reassembly: Install new seal ring in servo piston. Install accumulator spring and piston in servo piston and retain with lock ring. Install piston in servo body (lubricate parts to facilitate assembly). Install servo spring with small end against servo piston and install retainer. Compress spring and install snap ring, making sure that snap ring is fully seated in groove. Place needle bearings in actuating lever shaft hole. With a pencil, position needle bearings around hole. Lock bearings in place by placing thumb over bearings and rotating clockwise. Install actuating lever with socket in lever bearing on piston stem. Needle bearing retainers at each side of actuating lever shaft hole must be installed with actuating lever. Install actuating lever, aligning the retaining pin holes and bearing retainers, and install pin. Check lever for free movement and then check operation of servo by applying air pressure to apply hole.

DISTRIBUTOR SLEEVE (Inspection): Inspect all passages for obstructions. Inspect sleeve bore for scores or excessive ring wear. Inspect mating surfaces for burrs and flatness. Check fit of fluid tubes. *NOTE–* Make sure spacer is on center tube.

PINION CARRIER (Inspection): Inspect servo band surfaces for scores. Inspect inner bushing for scores. Check free movement of pinions on pins and inspect

CONTINUED ON NEXT PAGE



1955 REAR SERVO & BAND ASSEMBLY

FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

for worn or broken teeth. Check pinion endplay (.010-.020"). Pinion pins must be a tight fit in carrier. Check all fluid passages. Check journal bushing for scores. *NOTE*–Planet carrier is serviced only as an assembly.

OUTPUT SHAFT (Inspection): Inspect thrust surfaces and journals for scores. Inspect internal gear for broken or worn teeth. Inspect aluminum sleeve for scores and check ring grooves for burrs. Inspect keyway and drive ball socket for wear. Inspect splines for burrs or wear. Inspect external parking gear teeth for damage and speedometer drive gear for burrs

EXTENSION HOUSING (Inspection): Inspect housing for cracks and drive shaft slip yoke bearing surface for scores. Inspect gasket surface for burrs. If inspection reveals it necessary to remove rear seal, use tool No. 1175-AB. (NOTE–Rear seal may be replaced without removing transmission from car). Use tool No. 7657 (1954), No 7657-D (1955) and install new seal in extension housing Remove inspection cover and gasket and check fluid baffle for tight fit in housing

TRANSMISSION CASE LINKAGE (Disassembly): Remove throttle lever nut and take off inner and outer throttle levers. Remove throttle lever shaft seal from counterbore in manual lever shaft. Remove parking mechanism actuating rod, detent ball and spring. Remove manual lever shaft nut, detent and outer manual lever and shaft. Remove torsion lever retainer clip and take off torsion lever assembly. Disassemble torsion lever assembly by rotating lever while holding spring. Disengage pawl return spring from toggle link pin and remove pin. Remove pawl pin by working pawl fore and aft until pin protrudes from case. Remove toggle pin retainer clip, toggle pin, pawl return spring, spring retainer and link. Remove toggle lever pin by tapping lever toward rear of case, then remove plug, toggle lever pin and lever (NOTE–toggle lever pin is held in place by the plug). Remove manual shaft seal and transmission vent from case.

Inspection: Inspect each part of parking mechanism for wear, distortion or other damage.

Reassembly: Assemble toggle lever, link, pawl return spring and pawl and install assembly in transmission case. Install toggle lever and pawl pins. Install torsion lever assembly. (NOTE–Use screwdriver to position spring on torsion lever). Install washer and retainer clip. Coat outer diameter of new manual shaft seal with Permatex No. 3 and use Tool 77288 to install seal in case. Install manual lever and shaft in case, mount detent lever and tighten attaching nut to 35-40 ft. lbs. torque. Install detent spring and ball *(NOTE–* use a piece of thin tubing to depress ball and spring while rotating detent). Position ends of parking pawl torsion lever rod in detent lever and torsion lever and secure with cotter pins. Install new seal on throttle lever shaft, install outer throttle lever and shaft in case, install lever on inner end of shaft and tighten attaching nut to 35-40 ft. lbs. Check linkage for free operation without binding.

TRANSMISSION CASE (Inspection): Inspect case for cracks and stripped threads. Inspect all gasket and mating surfaces for burrs. Inspect all bearing surfaces for wear, scores, and burrs.

TRANSMISSION REASSEMBLY

►*REASSEMBLY CAUTION: Use Automatic Transmission Fluid Type "A" only to lubricate parts for assembly. DO NOT use any other form of lubricant. Use all new gaskets and tighten all bolts and screws to correct torque specifications. DO NOT USE FORCE WHEN ASSEMBLING PARTS. If parts do not assemble freely, examine parts for cause of difficulty.*

CLUTCH ASSEMBLIES: Install front band in transmission case so that anchor end aligned with anchor in case. Install clutch assemblies into transmission case from the rear *(CAUTION–Do not allow clutches to separate)*, while positioning servo band on drum. Hold units together while making installation. Position center support in case, aligning hole in center support with hole in right hand side of case. Install right and left hand center support outer bolts and external tooth lockwashers *(CAUTION–Lockwashers must be installed with the rolled edge toward transmission case to insure tight seal).*

PINION CARRIER & OUTPUT SHAFT: Position rear servo band in transmission case, with the strut ends up. Place anchor end (identified by a depression in center of strut retainer), toward adjusting screw. Install a bronze thrust washer on thrust face inside pinion carrier. To install pinion carrier assembly, position rear band over drum while meshing the planet pinions. Install two seal rings on primary sun gear shaft, and check rings for free movement in grooves. Install selective thrust washer on rear of planet carrier, retaining it in place with the transmission fluid. *(NOTE–If endplay was not within specifications, when checked prior to disassembly, replace washer with one of proper thickness).* Install output shaft, carefully meshing internal gear with pinions.

REAR PUMP: Position rear pump drive key in keyway on output shaft. Position new front and rear gaskets on pump body, retaining gaskets with transmission fluid. Install thrust washer on pump body with the bronze side up. Align thrust washer tangs with bosses on pump body, then install the rear pump *(CAUTION–* Be sure drive key is aligned with keyway in pump drive gear).

GOVERNOR: Position governor drive ball in the pocket in output shaft. Retain ball with transmission fluid. Install governor assembly aligning groove with ball in output shaft. Install governor snap ring. *NOTE–Install governor with the governor body plate toward front of transmission.*

DISTRIBUTOR: Place the four seal rings in distributor sleeve, and check ring gap. Check fit of seal rings in grooves of output shaft. Install distributor sleeve on output shaft, chamfer forward (lubricate parts to aid assembly) Install distributor and tubes on sleeve, making sure passages in sleeve and distributor are aligned. Install attaching bolts and lockwashers. Tighten bolts finger tight. Insert distributor tubes in transmission case, until spacer on center tube is against case, then tighten distributor attaching bolts to 8-10 ft. lbs. Install a new seal on rear pump outlet tube and install tube in transmission case and rear pump body.

EXTENSION HOUSING: Position speedometer drive gear ball in pocket in output shaft, retaining it with fluid. Install speedometer drive gear, and gear snap ring. Insert extension housing oil seal replacer and pilot in housing, then install extension housing on transmission case. Install attaching bolts and external tooth washers. *(CAUTION–Washers must be installed with rolled edge toward transmission case to insure a tight seal).* Tighten extension housing attaching bolts to 28-30 ft. lbs. Install governor inspection cover and a new gasket on housing.

FRONT PUMP: Position a new front pump gasket in counterbore of transmission case. Install front pump, aligning pump bolt holes with holes in case. Install three of the pump attaching bolts and tighten them to 17-22 ft. lbs.

TRANSMISSION ENDPLAY (Checking): Mount a dial indicator support on front pump bolt hole. Mount dial indicator on support so that contact rests on end of turbine shaft. Use a large screw driver to pry front clutch drum toward rear of transmission. Set dial indicator to zero. Remove screw driver and pry units toward front of transmission case by inserting the screw driver between large internal gear and transmission case. Note indicator reading. Endplay should be .010-.029". Remove indicator and remove tool from extension housing. Install the one remaining front pump attaching bolt and tighten it to 17-22 ft. lbs

FRONT SERVO: Position front band forward in case with band ends up. Position servo strut with the slotted end aligned with servo actuating lever and the small end aligned with band end. Rotate band, strut, and servo into position engaging anchor end of band with anchor end in case. Locate servo on dowel in case, then install attaching bolt (or bolts), tightening them only two or three turns. Install servo tubes

REAR SERVO: Position servo anchor strut, then rotate rear band to engage the strut. Position servo actuating lever strut with a finger, then install servo and attaching bolts. Tighten bolts to 40-45 ft. lbs

PRESSURE REGULATOR BODY: Install pressure regulator body and attaching bolts and tighten bolts to 17-22 ft. lbs. Install control and converter valve guides and springs and install spring retainer. Install a new seal ring on rear pump intake tube, then install tube in case. *NOTE–On 1955 models when installing spring retainer be sure that both tangs attach at the same time.*

CONTROL VALVE BODY: Install control valve assembly, using care to align servo tubes with control valve. Align the inner throttle lever between throttle lever stop and downshift valve, and at the same time push the throttle valve in to clear transmission case. *(CAUTION–Align manual valve with actuating pin in the manual detent lever. Do not tighten attaching bolts).* Install the large control pressure tube in valve body and regulator. Install small control pressure compensator tube in valve body and regulator. Install lubrication tube in rear pump and regulator body.

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (C nt.)

Tighten control valve body attaching bolts to 8-10 ft. lbs. Tighten front servo attaching bolts or bolt to 30-35 ft. lbs.

ADJUSTMENT (Front Servo): Loosen front servo adjusting screw locknut, then back nut off three turns. Loosen adjusting screw five complete turns. Using the front band adjusting wrench, tool No. 7225, insert a ¼" spacer between lever and stem, then tighten the screw until ratchet overruns. **Back the adjusting screw ne complete turn,** then tighten locknut to 20-25 ft. lbs.

ADJUSTMENT (Rear Servo): Loosen adjusting screw locknut three turns with a ¾" socket of the rear band adjusting wrench. Back off the adjusting screw until free travel is obtained. Using tool No. 7195, tighten adjusting screw until ratchet overruns, then back off the adjusting screw 1½ turns. Hold rear servo adjusting screw stationary, and tighten the locknut to approximately 40 ft. lbs.

FLUID SCREEN & PAN: Position fluid screen over rear pump inlet tube then over front pump inlet tube. On 1955 models press screen down firmly and install screen retaining clip. In trucks, position the oil cooler (if so equipped) to sump discharge tube in case. Place a new gasket on transmission case, then install the pan Install attaching bolts and lockwashers and tighten to 10-13 ft. lbs

TRANSMISSION & CONVERTER INSTALLATION

1954 FORD 6 & V8

1) Position converter assembly in transmission housing *(CAUTION–Make sure that converter does not slip from housing during installation).* Raise assembly on a jack until transmission extension housing can slide back over frame crossmember (on 6 cyl models) Install flywheel assembly on engine crankshaft flange and tighten bolts to 75-85 ft lbs

2) Remove all dirt, grease and burrs from converter pilot bore in flywheel Apply a heavy film of white lubricant evenly on converter bearing surface *(NOTE–Excessive lubricant in pilot bore will prevent proper entry of converter pilot into bore, and will force converter rearward, scoring the front pump)*

3) Move the assembly forward and properly align converter pilot and housing dowel holes Install the four lower converter housing-to-engine attaching bolts **but do not tighten at this time.** Align both of the flywheel access holes with drain plugs in converter cover then tighten the converter housing-to-engine attaching bolts to 40-45 ft lbs *(CAUTION–If converter housing-to-engine bolts are tightened when converter cover and flywheel are not properly aligned, it will be necessary to check flywheel for distortion, and housing and impeller flange for cracks or damage Front pump will also have to be checked for damage).* Check converter assembly for binding by shifting the assembly back and forth by hand If no binding exists, install the six flywheel-to-converter bolts and tighten them to 25-28 ft lbs If a binding condition exists, converter and housing must be realigned

4) Raise engine and replace the crossmember, then install the crossmember bolts. Lower the assembly onto crossmember and install engine rear support bolts. Remove engine support bar. Apply a coating of Automatic Transmission Fluid to universal joint knuckle, and install drive shaft Install parking brake and speedometer cable.

5) Connect manual and throttle linkage to transmission levers. Install the converter housing cover (V8 models) or the access plate (6 cyl. models). Then install the starter Install the fluid filler tube to transmission oil pan and tighten securely Install remaining converter housing-to-engine attaching bolts Lower car to floor

6) Install the two top converter housing-to-engine bolts and tighten to 40-45 ft. lbs., and replace the two rubber access hole plugs. Fill transmission with Automatic Transmission Fluid Type "A" Check converter and transmission assembly for fluid leakage, then adjust the manual and throttle linkages.

1955 FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD & SUNLINER)

1) If converter has been removed from converter housing, position converter in housing, then install converter housing lower cover plate (8 Cyl.), or wedge converter in places (6 Cyl.) to prevent converter slipping out of housing. Rotate converter until drive plate bolt holes are in horizontal position (8 Cyl), or in the vertical position (6 Cyl.). Position flywheel on crankshaft flange, then install attaching bolts

2) Move converter and transmission assembly forward into position, using care not to damage converter drive plate and converter pilot. Install lower converter housing to engine bolts and tighten them to 40-45 ft. lbs. Install crossmember on pass. cars. Lower transmission until extension housing rests on crossmember and install extension housing to crossmember bolts.

3) On trucks, install converter housing to crossmember bolts. On all vehicles position flywheel drive plates, and install drive plate attaching bolts. Tighten drive plate bolts to 28 ft. lbs. Install converter drain plugs and access plates. On trucks, position the oil cooler on support brackets, then install cooler. Connect oil inlet and outlet lines to transmission.

4) Coat universal joint knuckle with transmission fluid, then install drive shaft. Connect speedometer cable at transmission. Connect manual linkage at transmission manual lever. Install converter air duct and the linkage splash shield (pass. cars), exhaust duct shield (trucks).

5) Install starter motor and connect transmission to frame ground strap at transmission. Connect fluid filler tube to oil pan. Lower hoist, then position water inlet and outlet lines on oil cooler. Tighten hose clamps securely. Install the upper two converter housing to engine bolts and tighten to 40-45 ft. lbs. Replace covers on converter housing access holes and floor mat. Fill radiator with water.

6) Fill transmission with Automatic Transmission Fluid Type "A" *(see "Lubrication" above).* Check transmission and converter assembly for fluid leaks, adjust manual and throttle linkages *(see "Linkage Adjustment" above)*

THUNDERBIRD

►*INSTALLATION NOTE: Converter and transmission assembly must be installed b fore engine installed in chassis. The converter and transmission assembly can be installed in the chassis separately before engine is installed, or converter, transmission, and engine may be installed together as a unit*

1) To attach converter and transmission to engine before assembly into chassis as a unit, first align converter pilot, housing dowel holes, and drive plate holes. Remove all foreign material from converter pilot bore in crankshaft. Apply a heavy film of lubricant evenly on converter pilot bearing surface. *(CAUTION–Excessive lubricant in pilot bore will prevent proper entry of converter pilot into bore, forcing converter rearward and scoring front pump)*

2) Install pilot studs in two of the converter housing to engine bolt holes. Remove converter housing lower front cover plate. Move converter and transmission forward into position using care not to damage converter drive plate and converter pilot. Install four converter housing to engine bolts, remove pilot studs, then tighten bolts to 40-45 ft. lbs

3) If engine has been removed separate from converter and transmission assembly, mount transmission on a transmission floor jack and position assembly in car. Connect drive shaft to transmission output shaft. Install the two extension housing to rear engine support bolts. Connect speedometer cable and manual linkage at transmission. Install engine lifting sling and lower engine carefully into engine compartment, starting converter pilot into crankshaft. Make sure studs on manifold are aligned with holes in muffler inlet pipe, and dowels in block engage holes in converter housing. Raise car and position jack stands. Install engine front insulator bolt, and right and left hand insulator support bolts. Connect exhaust pipe to manifold and lower car to floor

4) Install two lower converter housing to engine bolts and tighten them to 40-45 ft. lbs. (Tighten bolts slowly and evenly to avoid binding on dowel pins). Install converter housing to engine bolts, and tighten them to 40-45 ft lbs. Align flywheel and drive plate bolts with converter. Install the six bolts and tighten them to 25-28 ft. lbs. Complete engine installation.

1954-55 MERCURY 1955 LINCOLN

1) Position transmission and converter assembly under car, raise it into position and move it forward to engage converter pilot with hole in crankshaft *(CAUTION–Guide assembly carefully to avoid damage to flexible drive plate and converter pilot).*

2) Install converter housing attaching bolts and tighten to 40-45 ft. lbs. Install six bolts securing converter to flexible drive plate and tighten to 25-28 ft. lbs. (On 1954 Mercury & 1955 Lincoln, install detachable frame crossmember to "X" member) Install engine rear mount to transmission Remove engine support tool, lower engine and install rear engine mount to crossmember bolts and remove lift Connect speedometer cable at extension housing

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FORDOMATIC, MERCOMATIC & TURBO-DRIVE (Cont.)

3) Connect throttle and transmission manual linkage to transmission levers. Adjust linkage (see "Linkage Adjustment" above). Install converter housing upper plate with new seal. Install starter, converter drain plugs, and place fluid filler tube on pan and tighten filler hex nut to 40-50 ft. lbs.

4) Install converter housing lower plate. Install duct on converter housing and deflector between frame and housing. Install drive shaft, (lubricate front universal slip yoke to aid installation). (On 1955 Mercury with single exhaust, install exhaust system). Check operation of neutral switch. Install throttle linkage brackets to engine and body using original nuts and bolts. Install battery ground cable. Fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above).

TRANSMISSION INSTALLATION (WITHOUT CONVERTER)

1954 FORD 6 & V8

1) Install two special guide pins in the top transmission-to-converter housing attaching bolt holes. mount transmission jack and position it under car. Rotate the engine to position front pump drive lugs on converter pump assembly in a vertical position. Rotate front pump to position the slots in the pump assembly in a vertical position. Apply lubriplate to seal the surface on converter pump cover hub. Raise transmission and move it toward front of car.

2) *(CAUTION–Be sure to align turbine shaft splines with turbine hub splines and the converter pump lugs with slots in front pump drive gear).* Install the two lower transmission-to-converter housing attaching bolts. Remove the two guide pins and install the two upper attaching bolts. Tighten bolts to 40-45 ft. lbs.

3) Raise engine and install frame crossmember, then install crossmember bolts Lower engine onto crossmember and install engine rear support-to-transmission bolts. Remove engine support bar and install drive shaft Install parking brake assembly and speedometer cable. Connect manual & throttle linkage to transmission levers

4) Install transmission drain plug. Fill transmission with Automatic Transmission Fluid Type "A". Check transmission for indications of leakage.

1955 FORD PASS. CARS & TRUCKS (EXCEPT THUNDERBIRD & SUNLINER)

►*NOTE: On Thunderbird and Sunliner it is not possible to remove the transmission (without converter) due to limited clearance.*

1) Install guide pins in the two top transmission to converter housing bolt holes. Mount transmission on jack and position it under vehicle. Rotate engine to position the front pump drive lugs on converter impeller housing in a vertical position. Rotate front pump to position slots in front pump drive gear in a vertical position. Apply lubriplate to seal the surface on the converter impeller cover hub. (If a new transmission is being installed, position a new rubber extension housing duct shield over end of housing)

2) Raise transmission and move it toward front of vehicle *(CAUTION–*Be sure to align the turbine shaft splines with turbine hub splines and the converter impeller lugs with slots in front pump drive gear)

3) On trucks, position the oil cooler front support bracket on case. On all vehicles, install the lower transmission to converter housing attaching bolts. Remove the two guide pins and install the two upper attaching bolts. Tighten bolts to 40-45 ft. lbs.

4) On cars, install the frame crossmember and bolts. Lower transmission onto crossmember and then install engine rear support to transmission bolts. On trucks, position the oil cooler on the support bracket and install attaching bolts. Connect oil cooler to transmission oil lines at transmission. Tighten fittings securely. Install universal joint yoke onto transmission output shaft and connect drive shaft

5) On F-250, F-350 & P-350 trucks, coat universal joint knuckle with transmission fluid. Install the four bolts attaching drive shaft coupling yoke at the parking brake assembly, then connect drive shaft at rear axle. Connect speedometer cable at extension housing.

6) Connect manual linkage and throttle linkage to transmission levers and adjust the linkage (see "Linkage Adjustment" above). Connect fluid filler tube to oil pan and tighten fitting securely. Lower vehicle to floor and fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above).

1954-55 MERCURY

1955 LINCOLN

1) Install guide pins, tool No. ST-0711 into top transmission to converter housing attaching bolt holes. Mount transmission on lift and position under car. Rotate engine to position front pump drive lugs on converter pump housing in a vertical position. Rotate transmission front pump to position slots in pump drive gear in a vertical position. Apply lubriplate to seal surface on converter pump cover hub.

2) Raise transmission and move toward front of car *(CAUTION–*Use care to index turbine shaft splines with turbine hub, and lugs on converter pump with slots in front pump drive gear). Install two lower transmission to converter housing attaching bolts. Remove the two guide pins and install two upper attaching bolts and tighten to 40-45 ft. lbs.

3) On 1954 Mercury & 1955 Lincoln, install detachable crossmember to "X" member. Install rear engine mount to transmission.

4) Raise engine and transmission sufficiently to remove engine support fixture. Lower unit to crossmember and install rear engine mount to crossmember bolts. Install drive shaft. (Lubricate front universal joint yoke with transmission fluid to aid assembly).

5) Connect speedometer cable at extension housing. Connect manual and throttle linkage to transmission levers. Adjust linkage (see "Linkage Adjustment").

6) On 1955 Mercury with single exhaust system, install exhaust system. Place fluid filler tube in position on pan and tighten filler tube hex nut to 40-50 ft. lbs. Remove support stands and lower car to floor. Fill transmission with Automatic Transmission Fluid Type "A" (see "Lubrication" above). Road test car.

HYDRA-MATIC DRIVE DRAINING & REFILLING

ALL 1946-51 HYDRA-MATIC CARS

Lubrication Intervals: (All Cars)—**Check Fluid** every 2000 miles. **Drain & Refill** every 25,000 miles.

CAUTION—This 25000 mile interval supersedes earlier specified intervals.

►**Oil Level Indicator Air Cleaner**—Clean the mesh type air cleaner (in dipstick cap) every 10000 miles or twice each year.

Checking Fluid Level: Check only with engine warm and idling at hot or slow idle speed (choke valve open, fast idle inoperative).

1) With transmission oil hot, run engine for at least 2 minutes with selector lever in "N" (to insure fluid coupling being filled so that true oil level reading will be secured).

2) Turn back floor mat and remove cover over dipstick location (right front of transmission). Clean all dirt and lint from around opening and dipstick to prevent this dirt entering transmission when dipstick removed.

3) With engine idling, and selector lever in "N", check fluid level reading on dipstick.

4) Add fluid as required to bring level up to full "F" mark on dipstick. *NOTE*—Approximately 1½ pints required to raise level from "L" to "F".

►*CAUTION—Do not fill above "F" mark on dipstick (may cause foaming when oil is hot).*

Draining & Refilling: Drain oil only when transmission warm (immediately after operation).

1) Remove flywheel housing lower cover (or hand hole cover on Cadillac), turn fluid coupling until drain plug in torus cover points downward, remove plug and drain fluid coupling.

2) Remove drain plug at rear end of transmission oil pan and drain transmission case.

3) **Replace both drain plugs and tighten securely.**

4) Install 8 qts. new Hydra-Matic fluid (7 qts. on Frazer, Kaiser, Nash) through dipstick opening on top of case.

5) Start engine and run it at speed equivalent to 20 MPH. for at least 1½ minutes with selector in "N" (to fill fluid coupling). Return engine to slow idle speed.

6) Check fluid level (see above), add fluid to bring level up to "F" mark on dipstick (approximately 3-4 qts. required).

►*CAUTION—Correct level should be determined by dipstick reading rather than exact amount of fluid added* and level must always be checked.

Fluid Capacity: Approximately 11 qts. (refill), 12 qts. (after transmission disassembled).

Recommended Fluid: Hydra-Matic Fluid as furnished by car manufacturer or Automatic Transmission Fluid Type "A" as furnished in containers bearing "AQ-ATF" symbol.

►*FLUSHING CAUTION—Flushing of the unit is not required. Use only regular Hydra-Matic fluid for this purpose.*

LINKAGE ADJUSTMENT

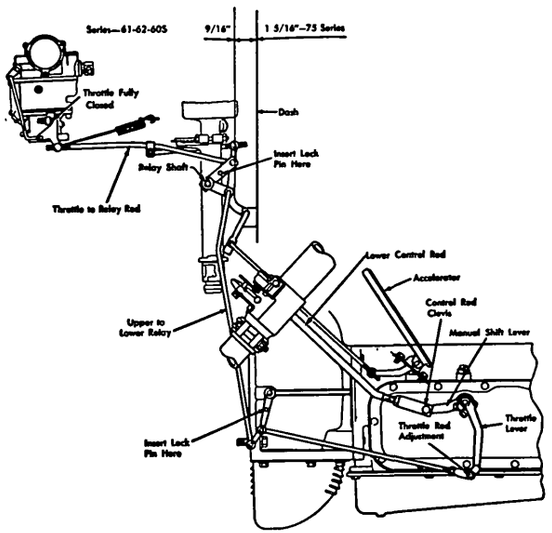
ALL 1946-51 HYDRA-MATIC CARS

►*LINKAGE ADJUSTMENT CAUTION: Adjustments must be made in correct order and exactly as shown below for each car model.*

1946-48 CADILLAC

(1) Manual Control Linkage—Disconnect manual control rod from control lever on transmission case, move control lever to extreme rearward (reverse) position (lever will be held in this position by detent ball). Move Selector Lever on steering column to the Reverse "R" Position. Adjust the clevis on the lower end of control rod until clevis pin can just be inserted freely through clevis and control lever, tighten clevis locknut and install clevis pin.

(2) Throttle Control Rod—Set engine idling speed at 375 Engine RPM. with engine warm (fast idle inoperative). Disconnect throttle rod trunnion at carburetor by removing forward end of retracting spring, install gauge pin in holes in upper relay lever and distributor housing so that lever is locked in position, adjust trunnion on throttle connector rod so that it slides freely into throttle lever without disturbing slow idle position of throttle, install retracting spring and adjust position of spring clip so that center line of spring hole in clip is exactly 5 15/64" from throttle lever trunnion.



1946-48 CADILLAC CONTROL LINKAGE

(3) Throttle Control Lower Relay Lever—With upper relay lever locked by gauge pin inserted through lever into hole in distributor housing, disconnect clevis at throttle lever on transmission case and disconnect lower end of vertical rod connecting upper and lower relay levers. Install second gauge pin through hole in lower relay lever and hole in bell housing so that lever is locked in position, adjust vertical rod by bending rod forward or backward at original bend in rod (use Bending Tool J-2029) until it can be connected to lower relay lever freely (use care to maintain original alignment of rod). Connect vertical rod. With correct adjustment, gauge pin in lower relay lever should be free in lever and housing holes. NOTE—Do not remove gauge pins until following adjustments have been made.

(4) Throttle Lever Position—Install special Throttle Lever Checker (Tool J-2239) on rear face of transmission case. Insert clevis pin in end of throttle lever. Pin should enter hole in checking tool marked "46, 47, 48" freely. Bend lever (up to ½") using Tool J-2029 to secure correct position (replace lever if more than ½" bend required). Check center-to-center distance between upper and lower holes on lever. This must be 4¾".

(5) Throttle Lever Linkage—With gauge pins installed in upper and lower relay levers and with throttle rod disconnected from throttle lever on transmission case, use Spring Scale, Tool J-544, to pull throttle lever against its stop in Reverse (extreme rear) position **using a load of ⅜-½ lb.** as measured by the spring scale. Hold throttle lever in this position, pull lower horizontal rod back to remove all play from lower relay lever, adjust clevis on rod so that pin freely enters holes in clevis and throttle lever, **then screw clevis three compl te turns forward on rod,** connect rod, remove gauge pin from lower relay lever.

(6) Upper Relay Lever Position—With upper relay lever locked by gauge pin, disconnect trunnion on horizontal rod connected to upper relay upper lever, adjust trunnion until it will slide freely into relay upper lever when center of hole in lever is exactly 9/16" (Series 60S, 61, 62), 1 5/16" (75, 76) from face of dash (measure from a straightedge placed across pocket in dash—do not measure to bottom of this pocket). Remove gauge pin from relay lever.

(7) Accelerator Pedal Rod—With upper relay lever free (gauge pin removed), disconnect accelerator pedal rod from lower lever of upper relay lever, hold carburetor throttle valve in wide open position and depress accelerator pedal to floor, adjust accelerator pedal rod by turning rod in trunnion until nd of rod slips freely into upper relay lower lever, connect rod. CAUTION—Recheck adjustment to mak certain that carburetor throttle lever is against its wide open stop when pedal depressed to floor.

Neutral Switch—Mounted on lower end of steering column. Adjust position of switch so that starter operative (switch closed) only when selector lever is in Neutral position. NOTE—When installing switch, make certain that operating pin engages slot in switch lever.

1949-51 CADILLAC

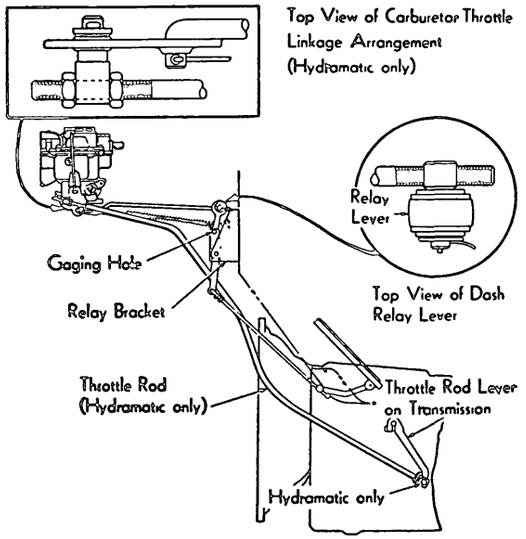
(1) Manual Control Linkage—Disconnect manual control rod from control lever on transmission case. Move control lever to drive position (move lever fully forward, then move lever toward rear until first detent position is reached). Place slecetor lever on steering column against stop in "DR" position. Adjust clevis on transmission end of control rod until clevis pin can just be inserted freely through clevis and lever. Connect control rod.

(2) Throttle Lever P sition—Disconnect throttle rod at throttle lever on transmission case. Check lever

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HYDRA-MATIC LINKAGE ADJUSTMENT (Continued)

position by installing checking gauge, Tool J-3065, (see Tool Revision Note below) on rear face of transmission case with long leg of tool extending forward along left side of transmission case. Move throttle lever to extreme rear position. Insert clevis pin through hole in lever and correct hole in checking gauge (holes in gauge marked for use with individual model transmissions). If pin does not enter hole in gauge freely, bend lever as required, using tool J-2029. Remove gauge and reconnect throttle rod to throttle lever.



1949-51 CADILLAC CONTROL LINKAGE

▷*TOOL J-3065 (THROTTLE LEVER GAUGE) REVISION FOR USE WITH LATE 1950-51 CARS:* Two modifications required to adapt tool for use on later model transmissions. (1) Drill a 9/32" hole in long leg of tool at a point 9/16" from lower edge (tool in correct position on transmission), and 4.271" from contacting face of short leg of tool. Mark this hole "L50-51". The other hole in gauge nearest short leg, should be marked "49E50", and should be used for 1949 & Early 1951 transmissions. (2)—Cut off narrow end of short leg so that total overall length is 4 5/16" to provide clearance on transmission case.

(3) Throttle Control Linkage—Disconnect carburetor throttle rod at dash relay lever by removing spring clip and freeing trunnion from lever. Install ¼" drill rod through hole in relay lever and hole in bracket to position lever. See that carburetor throttle lever in correct hot or slow idle position (stopscrew against stop and set for correct 375 RPM. idling speed), adjust trunnion on rear end of throttle rod until trunnion enters relay lever freely, connect trunnion and install spring clip. Back off both nuts on throttle rod at carburetor throttle lever, push on end of rod so that transmission throttle lever and valve is against its stop, turn rear nut on throttle rod up against the carburetor throttle lever trunnion, then back the nut off 3 complete turns (1946-48), 4 turns (1950), 3½ turns (1951), finally tighten front nut on rod securely against trunnion. Check to see that linkage moves freely. Remove drill rod from relay lever. Check and adjust accelerator pedal position.

(4) Accelerator Pedal Position—Depress pedal fully and see that it touches floor mat with slight pressure when carburetor throttle valve wide open (NOTE—if floor mat removed, allow ½" clearance between pedal and floor in wide open position). Adjust pedal position, as required, by changing length of pedal to relay lever rod (adjusting trunnion located at pedal end of rod).

(5) Neutral Switch—Adjust position of switch so that starter operative (switch closed) only when selector lever in "N" position.

▷*CAUTION*—Do not move switch so far in neutral position that travel of lower lever is limited by switch arm in the reverse position.

1951 FRAZER & KAISER

Throttle Control Linkage:

1) Disconnect rear throttle rod from throttle lever (longer lever) on left side of transmission.

2) Carburetor Rod—Loosen carburetor extension shaft lock bolt in slot in upper bellcrank on left side of cylinder head, install Linkage Adjustment Pin KF-91 through holes in bellcrank and bracket. With engine temperature at 150-160° (choke valve wide open, fast idle inoperative) and transmission warm, set engine idle speed at 425-450 RPM. with selector lever in N. Tighten carburetor extension shaft lock bolt so that shaft is locked to bellcrank. Do not remove adjustment pin at this time.

3) Front Throttle Rod—Check alignment of holes in lower bellcrank and bracket on left side of crankcase below starter. If Linkage Adjustment Pin KF-91 can not be inserted freely through both holes, disconnect front throttle rod from lower bellcrank and adjust length of rod so that pin can be inserted after rod connected. Connect rod and install pin. Do not remove adjustment pins until all adjustments completed.

4) Transmission Throttle Lever—Tighten clamp bolt on throttle lever on transmission case to 12-15 ft. lbs. torque. Check lever position by installing Throttle Lever Checking Gauge KF-78 flat against machined surface on back of case with gauging leg extending forward along transmission side cover (CAUTION—clean transmission case surface before installing gauge). Move throttle lever to rear position against stop and install clevis pin in hole in lever as gauging point, move gauge upward toward lever. Notch in gauge should align with pin in lever and inner face of lever should just touch outer face of gauge. Bend lever with Bending Tool KF-79 to secure this position. Remove gauge.

5) Rear Throttle Rod—Connect rear rod to throttle lever on transmission (loosen trunnion nuts to align rod and lever) with anti-rattle spring between rod and lever. Adjust trunnion on rod to rear (turn front nut against trunnion) until throttle lever seats lightly against stop in rear position, then shorten rod by backing off trunnion front nut two full turns, lock adjustment by turning rear nut up securely against trunnion. Remove Linkage Adjustment Pins from the upper and lower bellcranks.

6) Accelerator Pedal Rod—Hold carburetor throttle valve in wide open position. Adjust accelerator pedal rod (turn adjusting sleeve on rod to rear of upper bellcrank on cylinder head) so that clearance between pedal and floor mat is approximately ¼".

Selector Lever (Manual Control) Linkage:

1) On Kaiser cars, hold selector lever firmly down in "Lo" position and tighten control shaft upper bracket clampscrew securely.

NOTE—Not required on Frazer cars.

2) Back off both locknuts at control rod trunnion (at control shaft lever on steering column on Kaiser, at idler bellcrank lever below starter on Frazer). Tighten shift lever clamp bolt on left side of transmission case to 10-13 ft. lbs. torque.

3) Place selector lever in "Lo" position, move shift lever on transmission to extreme rear position and then move lever forward to first detent position (this is Lo). Turn forward locknut finger tight against trunnion, then lengthen rod by turning locknut one additional full turn, tighten both locknuts against trunnion securely (CAUTION—do not change trunnion position on rod).

Neutral Safety Switch (Kaiser only):

NOTE—Switch on Frazer is non-adjustable).

1) Place selector lever in "Dr" position. Loosen lockscrew on neutral safety switch bracket (screw hole slotted to permit adjustment), adjust switch position so that starter will not operate when starting button pressed.

2) Place selector lever in "N" position. Check clearance between neutral safety switch arm and stop on switch bracket. Clearance should be 1/16" and starter should operate when starting button is pressed.

3) Tighten lockscrew securely.

1950-51 HUDSON

Throttle Control Linkage:

1) Check engine idle speed and set at 480-520 RPM. with engine at normal operating temperature (fast idle inoperative), transmission warm, and selector lever in neutral "N" position.

2) Carburetor Throttle Rod—Make certain carburetor throttle closed with stopscrew against stop in hot or slow idle position. Adjust length of accelerator cross shaft operating rod (connecting carburetor extension shaft lever on left side of cylinder head to bellcrank on left rear side of engine) by backing off one trunnion nut and tightening opposite nut on forward end of rod until gauge pin J-2544 can be entered freely through hole in bellcrank and hole in cylinder block boss (6 Cyl.) or hole in throttle support assembly (8 Cyl.) at rear end of rod. Tighten both trunnion nuts securely and recheck setting. Remove gauge pin.

3) Transmission Throttle Lever—Disconnect throttle rod at throttle lever (outer longer lever) on side of transmission case. Tighten lever clamp bolt to 10-15 ft. lbs. torque. Check lever position by installing Throttle Lever Checking Fixture J-2195 on back of case with gauging leg extending forward along transmission side cover (CAUTION—clean transmission case surface before installing gauge). Move throttle lever to extreme rear position against its stop. Gauge pin should enter hole in throttle lever freely and inner face of lever should be against larger diameter of gauge rod. Bend lever, as required, to secure this position using bending tool J-3310. Remove gauge and connect rod to lever.

4) Transmission Throttle Rod—Disconnect rod by removing trunnion cotter pin and washer from accelerator pedal link bellcrank on left rear side of cylinder block. Position bellcrank by inserting gauge pin J-2544 through hole in accelerator bellcrank

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HYDRA-MATIC LINKAGE ADJUSTMENT (C ntinu d)

and hole in cylinder block boss (6 Cyl.) or hole in throttle support assembly (8 Cyl.). Move transmission throttle lever to rear position against stop by pressing back on rod. Adjust trunnion position on rod (back off one nut, tighten opposite nut) until trunnion pin freely enters hole in bellcrank. Connect trunnion to bellcrank, then **shorten rod by backing off rear nut exactly 1½ turns,** tighten front nut securely. Remove gauge pin from bellcrank.

5) Accelerator Pedal Rod—Back off trunnion nuts on accelerator pedal rod at accelerator pedal link bellcrank on left side of cylinder block. Hold carburetor throttle valve in wide open position, depress accelerator pedal fully against its stop, turn rear nut up against trunnion, **then lengthen rod by turning nut up ¼" further,** tighten front nut against trunnion. This will provide approximately 1/16" clearance between accelerator pedal and its stop.

Manual Control Linkage:

1) Tighten upper and lower control tube brackets on steering column securely. Disconnect transmission shift rod at lower lever on steering column.

2) Position transmission shift lever in "Lo" by pressing backward on shift rod until lever is in extreme rear position against stop and then pulling rod forward until lever reaches **first detent position** (this is "Lo").

3) Place selector lever on steering column in "Lo" position by pulling lever toward reverse as far as possible without lifting the lever.

4) Adjust length of shift rod by turning clevis on forward end of rod until clevis pin hole aligned with hole in steering column lever without disturbing position of either lever, then **increase length of rod by turning clevis one complete turn** off rod, connect rod to lever and tighten clevis locknut. Check all positions of selector lever to make certain that each position indexes properly on dial.

Neutral Safety Switch:

1) Place selector lever in neutral "N" position.

2) Loosen safety switch mounting bracket screw, shift safety switch and bracket (screw hole is slotted to permit this adjustment) until clearance between switch lever and stop on bracket is 1/16", tighten mounting screw.

3) Check operation of switch. Starter should operate when ignition switch turned on and starter button depressed. **Starter should not operate** with selector lever in any other position (check in the "Dr" position).

1949-51 LINCOLN

Throttle Control Linkage:

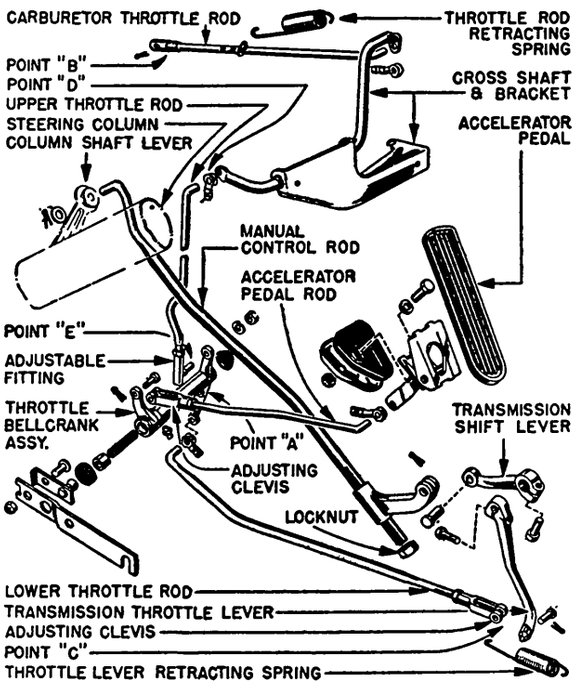
1) Check and adjust engine idle speed to 375-400 RPM. with engine at normal operating temperature (fast idle inoperative), transmission warm, and selector lever in neutral "N" position. Shut engine off.

2) Disconnect retracting spring hooked to carburetor throttle rod, disconnect rod at carburetor throttle lever. Disconnect upper throttle rod at bellcrank lever (lower end). Disconnect lower throttle rod at throttle lever on left side of transmission case.

3) Transmission Throttle Lever—Check lever position by installing Gauge J-3298 on back of case with gauging leg extending forward along transmission side cover. Move lever to extreme rear position against its stop. Clevis pin in lever hole should align with notch in gauge and inner face of lever should just touch outer face of gauge. Bend lever with tool J-3310 to secure this position.

4) Install Gauge Pin J-2544 through hole in bellcrank lever and bracket (see illustration) to align lever. Leave pin in place while making following adjustments.

5) Carburetor Throttle Rod—Connect rod to carburetor throttle lever (adjust ball socket by turning screw in until snug on carburetor lever ball, then back off 1-2 cotter pin holes and install cotter pin). Connect retracting spring from dash to nearest nib on carburetor rod.



LINCOLN HYDRA-MATIC CONTROL LINKAGE

6) Upper Throttle Rod—With gauge pin inserted in bellcrank lever on left side of engine, hold carburetor throttle lever in closed position with stopscrew on low point of fast idle cam (hot or slow idle position), adjust fitting on lower end of upper throttle rod so that rod can be connected to bellcrank lever without disturbing throttle position. Connect rod.

7) Lower Throttle Rod—With gauge pin inserted in bellcrank lever on left side of engine, connect retracting spring at transmission throttle lever and frame cross-member (spring will hold lever in rear position while making adjustment). Adjust clevis on rear end of lower throttle rod until clevis pin will just enter clevis and hole in throttle lever freely, **then shorten rod by turning clevis 6 turns on the rod.** Connect rod and tighten clevis locknut.

8) Accel rator Pedal Rod—With gauge pin inserted in bellcrank lever on left side of engine, adjust clevis on forward end of pedal rod so that tip of accelerator pedal pad is exactly 3⅞" *from top of the floor carpet,* connect rod and tighten clevis locknut. Remove gauge pin from bellcrank lever.

9) Check entire throttle linkage for free operation without binding. Make certain that carburetor throttle rod returns throttle valves to hot or slow idle position against stop with engine at normal operating temperature.

10) 3-4 Shift Point—Check shift point by operating car on level road with minimum throttle. **This 3-4 shift must occur at 25 MPH on cars having transmissions before Serial No. L50-4549, and 23 MPH on cars having transmissions after this Serial Number.** Adjust by making slight readjustment of lower throttle rod clevis at transmission throttle lever. Increase length of rod to lower the 3-4 shift point, decrease length to raise shift point.

►***CAUTION—Throttle rod clevis must not be turned more than 7 turns (one turn more than standard setting of 6 turns) from point where throttle lever is against its stop.***

Manual Control Linkage:

1) Disconnect manual control rod from shift lever (short lever) on side of transmission case, place shift lever in "Lo" position (move lever to extreme rear position, then move lever forward to **first** detent position which is Lo).

2) Place selector lever in "Lo" against the low range stop.

3) Loosen locknut and adjust clevis on rear end of manual control rod until clevis pin can just be inserted freely through clevis and hole in lever without disturbing the rod or lever positions, **th n lengthen rod by turning clevis on complete turn,** connect rod and tighten clevis locknut.

Neutral Safety Switch:

1) Loosen switch bracket mounting screws (on steering column directly below column shaft lever).

2) Place selector lever in "Dr" position. Rotate switch and bracket assembly (mounting screw holes are slotted) so that starter circuit is open. Then move selector lever to "N" position and make certain that starter circuit is closed. Tighten switch mounting screws.

►***CAUTION—Starter circuit must be open in all selector positions except neutral "N".***

1950-51 NASH

►***1951 ADJUSTMENT CAUTION:*** **A single Throttle Control Rod is used (instead of Upper & Lower rods with connecting bellcrank on left side of crankcase) and step (4) is not required when adjusting throttle control linkage on 1951 cars.**

Throttle Control Linkage:

1) Disconnect throttle rod (rear rod on 1950 cars) from throttle lever on left side of transmission.

2) Check engine idle speed and set to 375 RPM. with engine warm (fast idle inoperative), transmission warm, and selector lever in neutral "N" position.

3) Carburetor Throttle Link Rod—Disconnect link rod at upper bellcrank on left side of cylinder head. Install adjusting pin J-4158 through holes in the upper bellcrank and the mounting bracket. Adjust clevis on bellcrank end of carburetor throttle lever link so that clevis pin enters clevis and bellcrank

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HYDRA-MATIC LINKAGE ADJUSTMENT (Continued)

without moving throttle lever stopscrew away from its stop, tighten locknut and connect rod. Do not remove adjusting pin from bellcrank.

▷1951 Note—Disregard step (4) on these cars (single throttle rod is adjusted in same manner as Rear Throttle Rod in step (6) below.

4) Front Throttle Rod—With the upper bellcrank locked by adjusting pin, check position of lower bellcrank on left side of crankcase below starter by inserting a second J-4158 adjusting pin through holes in bellcrank and support bracket. If pin does not enter holes freely, disconnect throttle rod at upper bellcrank, install adjusting pin in lower bellcrank, adjust rod length by loosening locknut and turning trunnion end on upper end of rod. Tighten locknut and connect rod. Do not remove adjusting pins until following adjustments have been completed.

5) Transmission Throttle Lever Position—See that clamp bolt on throttle lever on transmission case is tight, place Throttle Lever Checking Gauge J-2545 flat against machined surface on back of case with gauging leg extending forward along transmission side cover. Install clevis pin in hole at outer end of throttle lever, hold lever against stop in extreme rear position. Move gauge upward. Notch on gauge should pass over pin in lever and inner face of lever should just touch outer face of gauge. Bend lever as required using Bending Tool J-3310.

▷*CAUTION—Do not twist lever or spring shaft when adjusting.*

6) Rear Throttle Rod—With bellcranks locked by the adjusting pins, hold throttle lever on transmission case in extreme rear position against the stop, adjust trunnion on transmission end of rear throttle rod by backing off one trunnion nut and tightening opposite nut until trunnion pin enters hole in throttle lever freely, then back off forward trunnion nut two complete turns, tighten rear nut securely (this will "shorten" rod), connect rod to throttle lever, remove adjusting pins from upper and lower bellcranks.

Starter Switch:

1) Place selector lever in Neutral "N" position. Check alignment of operating plunger (spring-loaded pin) on side of operating lever on steering column and starting switch plunger (must be in line so that switch plunger depressed by operating plunger when selector lever lifted upward in "N" position).

2) Adjust switch to align plunger by loosening switch bracket mounting screws and shifting switch bracket on steering column (holes are slotted to permit this adjustment).

Manual Control (Selector Lever) Linkage:

1) Place steering wheel selector lever in "Lo" position and see that operating lever on steering column is against low range stop (right side) of notch in starter switch bracket.

2) Disconnect control rod at shift lever on left side of transmission case.

3) Move transmission shift lever to "L" position (place lever in extreme rear "R" position, then move lever forward until next detent position is reached), adjust clevis on transmission end of control rod until clevis pin enters hole in lever freely, then lengthen rod by turning clevis off one complete turn, tighten locknut and connect rod.

1946-48 OLDSMOBILE 6 & 8

Manual Control—Disconnect lower control relay rod at lever on side of transmission case and lower control rod at intermediate lever on cross-member bracket (remove clevis pins and spring washers, loosen clevis locknuts). Move manual control lever on transmission to reverse position (all the way back against stop—rotate propeller shaft by hand until anchor engages and lever is against stop). Position intermediate lever so that gaging hole lines up with hole in bracket, insert locking pin (Tool J-1469) through both holes to lock lever in position. Adjust clevis on lower control relay rod so that rod can be connected without disturbing position of transmission lever, connect rod (CAUTION—use spring washer on clevis end to prevent rattles), remove locking pin from intermediate lever. Move manual lever on transmission to "LO RANGE" position (move lever all the way forward to "Neutral", then move lever back to second detent position). Place Selector lever against stop which prevents shifting into reverse (without raising lever) by pulling down on lower control rod until stop is felt. Adjust clevis on lower end of control rod so that clevis pin can be inserted without disturbing position of selector lever or intermediate lever, then lengthen rod by turning clevis one full turn, connect rod to intermediate lever (CAUTION—use spring washer on clevis end to prevent rattles).

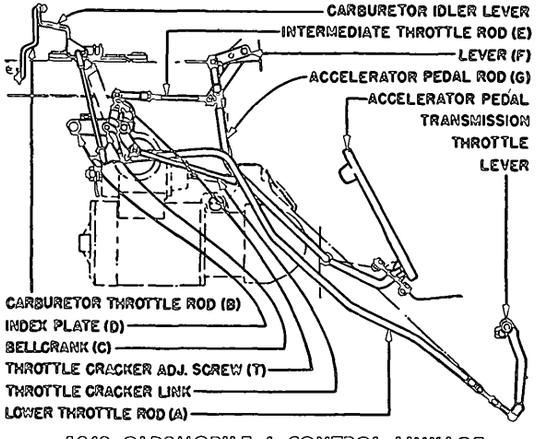
Throttle Control (1946 & Early 1947)—Adjust with engine idling speed properly set at 375 RPM (slow idle speed) and with transmission in Neutral. Remove small spring lock from trunnion on idler lever (on cylinder head above oil filler cap), adjust length of carburetor rod by turning trunnion adjusting nut until locking pin (Tool J-1469) slips freely through holes in bell-crank (on side of engine block below trunnion) and indexing plate with carburetor throttle lever in slow-idle position, tighten trunnion locknut and position adjusting nut so that trunnion spring lock can be replaced. CAUTION—If tightening trunnion locknut changes alignment of gaging holes (recheck alignment with Tool J-1469), loosen locknut and lengthen rod one-half turn, tighten locknut and recheck alignment. Make sure carburetor rod moves freely in idle and full-throttle positions. Install trunnion spring lock.

Throttle Control (Late 1947 & 1948)—Adjust with idling speed properly set at 375 RPM. (slow idle speed with engine warm and selector lever in Neutral). Disconnect throttle control rod at auxiliary bellcrank on cylinder head (6 cyl. cars), at cross-shaft (8 cyl. cars), adjust rod by bending the rod until locking pin (Tool J-1469) slips freely through holes in bellcrank and indexing plate (on side of engine) with rod connected and carburettor throttle closed. Check to see that carburetor rod moves freely throughout travel from idle to full throttle position.

Throttle Lever Position—Position of hole in end of throttle lever on transmission case may change (if valve body, inner throttle lever and shaft assembly, or outer lever replaced) and should be checked. Install Gauge J-2195 (against machined surface on back of case with gauging rod extending forward to throttle lever), disconnect rod at throttle lever on transmission case. Tip of gauge rod should enter hole in end of throttle lever freely. If lever position incorrect, remove lever and bend, as required, for correct position.

Throttle Lever Control Linkage—Disconnect the rod at throttle lever on side of transmission case, move throttle lever all the way back against stop, make certain that carburetor throttle in slow-idle position and adjust clevis on rod so that it can be connected to throttle lever on transmission without disturbing position of lever and linkage, then shorten rod by turning clevis one full turn, connect rod to lever. Adjust accelerator pedal rod so that idler lever under toeboard (to which pedal rod connected) will have 3/32-5/32" clearance between lever and rib in body toe pan. CAUTION—This clearance necessary to allow carburetor to return to slow idle position.

Throttle Cracker Adjustment (6 Cyl.)—Must be correctly set for starting. .0325" to .0351" (1/16") clearance between throttle stopscrew and highest step of fast idle cam with starting pedal fully depressed (starter pinion fully meshed). Adjust by loosening locknut and turning adjusting screw on accelerator bellcrank (screw contacts lug on lever linked to starter pinion shift lever).



1949 OLDSMOBILE 6 CONTROL LINKAGE

Throttle Cracker Adjustment (8 Cyl.)—Set for correct throttle opening for starting. To adjust, disconnect starter cable at starter switch (for foot operated starters), disconnect coil lead to distributor (for solenoid operated starters), depress starter pedal or pushbutton to full down position (engine will be turning over on solenoid starter cars) to fully mesh starter pinion, loosen locknut and turn adjusting screw on accelerator bell-crank (screw contacts lug on lever linked to starter pinion shift lever) so that clearance between throttle stopscrew and highest step of fast idle cam is .105-.125" (⅛").

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HYDRA-MATIC LINKAGE ADJUSTMENT (C ntinu d)

Fourth-to-Third Throttle Downshift—Should be checked whenever linkage adjusted to insure proper operation and prevent damage to linkage. To adjust with engine stopped, pull transmission throttle rod all the way forward until throttle lever on transmission is against stop, hold in this position and bend stop lip on indexing plate (at bell-crank on side of engine) for clearance of 1/16-3/32" between lip and stop on bell-crank.

Safety Switch Adjustment—Clearance between switch and stop should be 1/16-3/32" between lever and stop with selector lever in "Neutral" position. To adjust, loosen switch bracket locking screw, adjust switch (bracket is slotted). NOTE—With correct adjustment starter operative only when selector lever placed in Neutral "N" position.

1949-50 OLDSMOBILE 6

(1) Manual Control Linkage—Same as for 8 Cyl. models (following).

(2) Throttle Control Linkage—See that carburetor set for correct hot or slow idle speed of exactly 350 RPM. with selector lever in "DR" position. Use safety lock tool J-4396 installed on accelerator pedal to prevent accidentally racing engine when warming up engine and transmission prior to setting idle speed. Then adjust linkage in following order:

Transmission Throttle Lever—Disconnect lower throttle rod from lever on side of transmission case. Install checking tool J-2195 on machined surface on rear face of transmission case with gauging rod extending forward toward lever. Hold throttle lever back against stop. If small end of tool does not enter hole in lever freely in this position, bend lever as required using tool J-2029. Do not connect throttle rod to lever at this point.

Carburetor Throttle Rod (B)—Disconnect rod (B) at carburetor throttle valve lever. Align bellcrank (C) with index plate (D) by inserting Gauge BT-25 through holes in lever and plate. Hold carburetor throttle lever in slow idle position, bend rod (B) using tool GA-38 so that it can be connected without disturbing lever positions. Connect rod. Gauge BT-25 should now slip in and out of holes in lever and index plate freely. Remove gauge.

Lower Throttle Rod (A)—See that carburetor in slow idle position (throttle lever against stop), hold transmission throttle lever fully back against its stop, adjust length of rod (A) by loosening locknut and turning clevis until clevis pin enters hole in lever freely, then **shorten rod by one full turn of the clevis**, tighten locknut and connect rod.

1949 Intermediate Throttle Rod (E)—Disconnect accelerator spring, disconnect rod (E) by removing clevis pin at forward end. Insert Gauge BT-25 through hole in lever (F) and hole in bracket. Adjust clevis on forward end of rod (E) so that gauge BT-25 will enter holes in lever and bracket freely with rod connected. Connect rod and remove gauge.

1950 Intermediate Throttle Rod (E)—Disconnect rod (E) from bellcrank lever by taking out cotter pin at forward end, install special "U" gauge on accelerator pedal rod to prevent pedal bottoming on grommet retainer on floor (make gauge up from piece of 3/8" flat stock). Pull rod (E) forward until accelerator pedal pad rests firmly on gauge (floor mat must be away from pedal), hold carburetor throttle wide open, adjust rod by turning it in or out of clevis on rear end until it can be just entered in bellcrank, connect rod, tighten clevis locknut, remove gauge.

1949 Accelerator Pedal Rod (G)—***This rod not adjustable on 1950 cars.*** First disconnect accelerator pedal rod (G) by removing clevis pin at lever (F). Hold carburetor throttle lever in wide open throttle position, push down lightly on rod (G) so that pedal stop touches floor mat (CAUTION—floor mat must be flat against floor cover). Adjust clevis on end of rod (G) so that clevis pin enters hole in lever (F) freely, then **shorten clevis by six full turns**, connect rod. This will provide approximately 1/4" clearance between pedal stop and floor mat when carburetor throttle in wide open position.

(3) Throttle Cracker Linkage—Disconnect coil to distributor lead (to prevent starting engine), press starter button to fully engage starter drive (solenoid pinion shift). With starter fully engaged, loosen locknut and turn adjusting screw (T) on lever on side of engine for clearance of .062-.085" between carburetor throttle stopscrew and high step of fast idle cam (cam turned to cold or fast idle position).

(4) Bellcrank & Index Plate Clearance—Bend stop lug on index plate (D) so that clearance between lug and lip on bellcrank (C) is 1/32-1/16" with bellcrank in full open position as limited by transmission throttle lever.

(5) Starter Safety Switch Adjustment—Same as for 8 cyl. models (following).

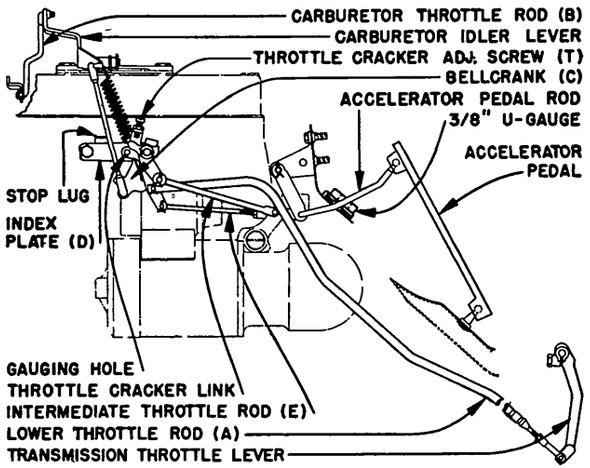
1949-51 ODSMOBILE 8

(1) Manual Control Linkage—Loosen clevis locknut at rear end of lower control rod (from steering column to intermediate lever on frame cross-member). On 1949 cars, loosen clevis locknut at rear end of lower control relay rod (from intermediate lever to transmission control lever) and disconnect rods at intermediate lever and transmission. Adjust Lower Control Relay Rod on 1949 cars only ***(CAUTION—this rod not adjustable on 1950-51 cars).***

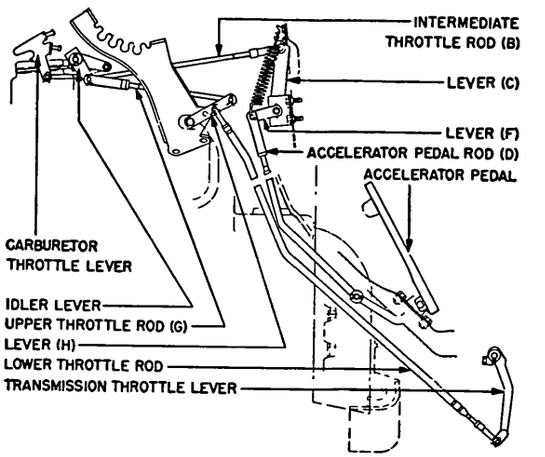
Lower Control Relay Rod (1949 Cars). ***This rod not adjustable on 1950-51 cars.*** Move the transmission control lever all the way back into Reverse position (rotate propeller shaft by hand until reverse anchor engages and lever is against stop). Position intermediate lever on cross-member so that gauging hole in lever lines up with hole in bracket, insert Gauge BT-25 through both holes to maintain lever position. Adjust clevis on rear end of relay rod so that rod can be connected without disturbing position of levers. Connect rod and remove gauge from intermediate lever.

Lower Control Rod—Place transmission control lever in "LO" position (move lever all the way forward to Neutral, then move lever back to the second detent "LO" position). Place steering column selector lever at end of Lo range against stop which prevents movement into Reverse without raising lever (pull down on lower control rod until stop is felt). Adjust clevis on lower end of lower control rod until pin can just be slipped freely through clevis and intermediate lever without disturbing lever positions, **then lengthen rod by turning clevis one full turn (1949-50), two full turns (1951)**, tighten locknut and connect rod.

(2) Throttle Control Linkage—See that carburetor set for correct hot or slow idle speed of exactly 350 RPM. with selector lever in "DR" position. Use safety lock tool J-4396 installed on accelerator pedal to prevent accidentally racing engine when warming up engine and transmission prior to setting idle speed. Then adjust linkage in following order:



1950 OLDSMOBILE 6 CONTR L LINKA E



1949-51 OLDSMOBILE 8 CONTROL LINKAGE

Transmission Throttle Lever—Disconnect lower throttle rod from lever on side of transmission case. Install checking tool J-2195 on machined surface on rear face of transmission case with gauging rod extending forward toward lever. Hold throttle lever back against stop. If small end of tool does not enter hole in lever freely in this position, bend lever as required using tool J-2029. Do not connect rod to lever at this point.

Upper Throttle Rod (G)—Disconnect rod (G) from lever (H). Insert gauge BT-25 through three holes in cross shaft assembly. Adjust rod (G) in

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HYDRA-MATIC LINKAGE ADJUSTMENT (Continued)

or out of clevis at forward end until rod can be connected without moving carburetor throttle lever from its hot or slow idle position. Tighten clevis locknut, connect rod, remove gauge from lever.

▷*CAUTION—If clevis at forward end of rod (C) disconnected, this clevis must be installed with open side facing away from engine.*

Lower Throttle Rod—See that carburetor is in slow idle position (throttle lever against stop), hold transmission lever fully back against its stop, adjust length of the rod by loosening locknut and turning clevis until clevis pin enters hole in lever freely, then shorten rod by one full turn of the clevis, tighten locknut and connect rod.

Intermediate Throttle Rod (B)—Disconnect rod at lever (C) on dash. See that carburetor throttle lever in hot or slow idle position (throttle lever against stop), adjust clevis on rod so that distance from rear face of lever (C) to bottom of depression in dash is 5/16-3/8" (88), 7/32-9/32" (98), tighten clevis locknut and connect rod.

1949 Accelerator Pedal Rod (E)—Unhook accelerator spring, disconnect rod (E) at lever (F) by sliding clevis off lever pin. Hold accelerator pedal down lightly against floor mat but do not push down on rod (CAUTION—floor mat must be flat on floor). Adjust clevis on upper end of rod (E) until it just slides freely on lever pin, then shorten clevis by six full turns, connect rod, install spring. This will provide approximately ¼" clearance between pedal stop and floor mat when carburetor throttle in wide open position.

▷*CAUTION—Clevis on upper end of rod (E) must be installed with open side facing toward engine.*

1950 88 Accelerator Pedal Rod (E)—This model has idler lever on dash and additional short adjustable rod between this lever and lever (C). Install special "U" gauge on accelerator pedal rod to prevent pedal bottoming on grommet retainer on floor (make gauge up from piece of ⅜" flat stock). Disconnect this short rod from lever (C), depress accelerator pedal until it bottoms on gauge (floor mat must be away from pedal), hold carburetor throttle wide open, adjust clevis on upper end of rod until it can just be connected to pin on lever (C), tighten clevis locknut, connect rod, remove gauge.

▷*CAUTION—Clevis on upper end of rod must be installed with open face toward engine.*

1951 88 Accelerator Pedal Rod (E)—Same design as 1950 88 but adjusted differently: Disconnect short rod from lever (C), depress accelerator pedal until clearance between face of rod boss on underside of pedal and floor mat is ¼" (CAUTION—floor mat must be in place), hold carburetor throttle valve in wide open position, adjust clevis on upper end of short rod so that it just slides over pin on bracket, tighten clevis locknut and connect rod.

▷*CAUTION—Clevis on upper end of rod must be installed with open face AWAY from engine.*

1950-51 98 Accelerator Pedal Rod (E)—See illustration. Disconnect accelerator pedal rod (D) from lever on dash. Depress accelerator pedal until clearance between tip of pedal and floor mat is ¼" (CAUTION—floor mat must be in place), hold carburetor throttle valve in wide open position, adjust clevis on upper end of rod (D) until it slides over pin in bracket, tighten clevis locknut and connect rod.

▷*CAUTION—Clevis on upper end of rod must be installed with open face AWAY from engine.*

▷Throttle Cracker Note—No throttle cracker (as used on 6 cyl. cars) is used. When starting cold engine, first opening of throttle allows fast idle cam to rotate so that special starting step of cam holds throttle open for starting. When starting hot engine, open throttle approximately 1/3 by depressing accelerator pedal.

(3) Starter Safety Switch Adjustment—Loosen switch bracket locking screw just enough so that slotted bracket can be moved. Place selector lever on steering wheel in "N" neutral position. Adjust switch by moving bracket so that clearance between lever and stop is 1/16-1/32", tighten bracket screw.

1948 PONTIAC

1. Carburetor Throttle Rod—Disconnect control rod at throttle lever (outer lever) on side of transmission case. Check to make certain that engine idle speed correctly set at 365-385 RPM. hot or slow idle (with engine at 150-160°F., transmission warm, selector lever in Neutral). Disconnect carburetor throttle rod from throttle control intermediate lever (6 cyl.) or from lever on cross-shaft (8 cyl.) on cylinder head. Install Adjusting Pin J-2544 through holes in lever and bracket to position lever. Adjust trunnion on carburetor rod so that trunnion pin will just enter hole in lever without moving carburetor throttle lever stopscrew from against its stop. Tighten trunnion locknut, connect rod. Do not remove Adjusting Pin until following adjustments made:

▷*CAUTION—On 6 Cyl. cars, position carburetor throttle rod upward away from ignition wires before tightening locknut.*

2. Throttle Control Rear Rod (Acelerator Pedal Intermediate Rod)—With adjusting pin J-2544 installed in lever on cylinder head (1. above), check position of accelerator pedal lever on dash. If second Adjusting Pin J-2544 cannot be inserted freely through holes in levers and bracket, disconnect rod at throttle control idler lever (on side of engine), adjust trunnion on rod until adjusting pin can be inserted freely with rod connected, tighten locknut and connect rod. Leave this adjusting pin in the ped al lever while following adjustments made:

3. Transmission Throttle Lever Front Rod—With Adjusting Pins in place in lever on cylinder head and in accelerator pedal lever on dash (1. & 2. above), check position of transmission throttle idler lever on lower edge of crankcase under starter. If third Adjusting Pin J-2544 cannot be inserted freely through holes in lever and bracket, disconnect rod at cylinder head lever, adjust rod length by turning upper end fitting until adjusting pin can be inserted freely with rod connected, tighten end fitting locknut. Remove all three adjusting pins.

4. Transmission Throttle Lever Position—See that clamp bolt in transmission lever (outer lever on side of case) is securely tightened. Check position of lever by installing Throttle Lever Checking Gauge J-2545 flat against rear surface of transmission case with edge of gauge against side cover. With clevis pin installed in lever, hold lever in rear position against stop, move gauge upward. Notch in gauge should pass over pin in lever and inside face of lever should just touch outer face of gauge. Bend lever, as required, using tool J-2807, to secure this position. Recheck lever position.

▷*CAUTION—Use extreme care not to twist lever or spring shaft when bending lever for correct position. Check rod alignment with lever for free action without binding.*

5. Transmission Throttle Lever Rod—Hold transmission throttle lever in extreme rear position against stop (see 4. above), adjust clevis on rear end of throttle rod so that clevis pin can just be inserted freely through clevis and hole in lever, then shorten rod by turning clevis up one full turn, tighten clevis locknut and connect rod.

6. Manual (Shift Control) Linkage—Hold selector lever down firmly in "Lo" position, tighten control shaft upper bracket clampscrew securely. Move selector lever to Reverse "R" position. Loosen locknuts on trunnion at forward end of forward control rod (at lower end of selector lever shaft), tighten control shaft lower bracket securely. Disconnect rear rod at shift lever (inner lever) on transmission case, tighten shift lever clampscrew securely. Install Adjusting Pin J-2544 through holes in lower control relay lever (to which lower end of forward rod connected) and bracket to lock lever. Move transmission shift lever to extreme rear (Reverse) position (NOTE—rotate propeller shaft by hand to insure reverse engagement). Adjust clevis at lever end of rear rod so that rod can be connected to shift lever without disturbing lever position, connect rod. Remove adjusting pin from relay lever. Move transmission shift lever to "Lo" position (move lever forward until next (Lo) detent is felt to engage). Move selector lever to "Lo" position against stop which prevents further lever movement into reverse (without raising lever). Turn lower locknut on forward control rod (under control shaft lever trunnion) up until it contacts trunnion, then turn locknut up one additional turn. Tighten upper locknut securely against trunnion.

7. Throttle Cracker Adjustment—Important for satisfactory starting operation. *See "Accelerator Linkage Adjustment" under CARBURETOR on each car model page for complete instructions.*

8. Starter Interlock Adjustment—Must be adjusted so that depressing starter pedal to start engine (with Hydra-Matic selector lever in any other position than Neutral), will move selector lever to Neutral "N" position. To adjust, disconnect battery cable at starter (to prevent starter operating while adjusting), tighten neutralizer lever attaching bolts on starter shift lever. Depress starter pedal fully. Adjust length of interlock rod by turning locknuts at trunnion on lower end of neutralizer lever so that selector lever indicator is in exact neutral "N" position, then lengthen rod by turning trunnion nuts one additional full turn. Lock trunnion nuts securely. Check operation by placing selector lever in various positions and noting action when starter pedal depressed fully.

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HYDRA-MATIC LINKAGE ADJUSTMENT (C ntinued)

1949 PONTIAC

(1) Carburetor Throttle Rod—Disconnect control rod at throttle lever (outer lever) on side of transmission case. Check engine idle speed and set for 365-385 RPM. hot or slow idle speed with engine temperature at 150-165°F., transmission warm and selector lever in neutral "N". Loosen checknuts at trunnion on carburetor throttle rod at throttle control intermediate lever (6 cyl.), cross-shaft lever (8 cyl.) on cylinder head, install adjusting pin J-2544 through holes in lever and bracket on left side of cylinder head. Tighten trunnion checknuts being careful not to move carburetor throttle stopscrew away from its stop. Do not remove adjusting pin.

►*CAUTION—On 6 cyl. cars, position carburetor throttle rod upward and away from ignition cables.*

(2) Transmission Throttle Front Rod—Check adjustment by inserting second adjusting pin J-2544 through holes in transmission throttle idler lever and bracket (on left side of crankcase below starter). If pin does not enter both holes freely, adjust rod length by disconnecting rod at upper (cylinder head lever) end of rod and screwing end fitting in or out Connect rod but do not remove adjusting pins.

(3) Throttle Control (Accelerator Pedal) Rear Rod—Loosen front checknut at trunnion on forward end of rod (at idler lever on left side of crankcase above starter), tighten rear checknut until accelerator pedal rocker lever lug just contacts lever bracket on dash, then back off rear checknut three full turns, tighten front checknut so that trunnion is locked on rod. Remove adjusting pins from intermediate lever on cylinder head and idler lever on left side.

(4) Transmission Throttle Lever Position—See that clamp bolt on transmission throttle lever securely tightened, check position of lever by installing Checking Gauge J-2545 flat on machined rear face of transmission case with edge of gauge against side cover. Install trunnion pin in lever, hold lever in extreme rear position. Move gauge upward. Notch in gauge should pass over pin in lever and inside face of lever should just touch outer face of gauge. If not, bend lever with tool J-2807, and recheck lever

(5) Transmission Throttle Rear Rod—Hold transmission throttle lever in rear position against stop, adjust trunnion position on rod by backing off one checknut and tightening opposite nut until trunnion pin enters hole in lever freely, then shorten rod one full turn (back off front nut, tighten rear nut one turn), connect rod.

(6) Manual Control Linkage—Hold selector lever under steering wheel down in "LO" position firmly, tighten control shaft upper bracket clampscrew securely. Back off both trunnion checknuts at forward end of manual control rod (at steering column control shaft lever), place manual control lever on transmission case in "LO" (move lever forward from extreme rear to second position where detent is felt to engage). With both levers held in "LO" position, tighten rear (lower) nut against trunnion finger tight, then lengthen rod by turning nut up one additional turn, tighten forward checknut against trunnion securely.

(7) Starter Neutralizer Switch—Place selector lever in "DR" position. Loosen switch bracket clampscrew (on steering column at lower end of selector shaft), shift switch and bracket (screw hole is slotted) until starter does not operate when starter button depressed. Move selector lever to "N" position. Check to see that switch arm does not touch stop on switch bracket, and that starter operates when starter button depressed. Tighten bracket clampscrew.

►**Neutralizer Switch Replacement (first cars)**—On cars before Serial No. P6RH-1063 (6 Cyl.), P8RH-1384 (8 Cyl.), if backing light terminal posts pushed into switch case and interfering with operation of switch arm, install new No. 1997846 switch which has posts staked to prevent this occurrence.

1950-51 PONTIAC

(1) Carburetor Throttle Rod—Disconnect throttle rod at throttle lever (outer lever) on left side of transmission case. Check and adjust engine idle speed to 365-385 RPM. hot or slow idle with engine at 150-160°F., transmission warm, and selector lever in Neutral "N". Install adjusting pin through holes in carburetor intermediate lever on left side of cylinder head and lever bracket. Adjust nuts at trunnion on carburetor throttle rod (back off one nut, tighten opposite nut) until adjusting pin is free with carburetor throttle lever stopscrew against its stop. Tighten trunnion nuts but do not remove adjusting pin.

(2) Transmission Throttle Front Rod—Check adjustment by inserting second J-2544 adjusting pin through holes in idler lever (left side of crankcase below starter) and lever bracket. If pin does not enter both holes freely, adjust length of transmission throttle front rod at trunnion on upper end of this rod (back off one nut, tighten opposite nut), then tighten both nuts securely, remove both adjusting pins (intermediate lever and idler lever).

(3) Accelerator Pedal Rod—Loosen front locknut on pedal rod at throttle control idler lever on left side of engine, depress accelerator pedal until carburetor throttle is just wide open, check clearance between lower face of accelerator pedal and floor mat. If clearance not ¼" at closest point, adjust pedal by turning rear nut at trunnion on forward end of rod in or out as required, then tighten front nut securely.

(4) Transmission Throttle Lever Position—With rear rod disconnected at transmission case throttle lever, check tightness of lever clamp bolt (12-15 ft. lbs. torque), check lever position by installing Checking Gauge J-2545 flat against machined rear face of transmission case with edge of gauge against side cover flange. Install trunnion pin in lever, hold lever in extreme rear position, move gauge upward, align gauge with trunnion pin. Inside face of throttle control lever should just touch outer side face of gauge and pin in lever should enter slot in gauge freely. Adjust by bending lever with tool J-2807.

(5) Transmission Throttle Rear Rod—After checking and adjusting transmission throttle lever, connect rear rod trunnion at lever, loosen rear locknut on trunnion, adjust rod length by turning front locknut toward trunnion until throttle lever is just back against its stop, then shorten rod by backing off front nut one turn, tighten rear nut securely.

(6) Manual Control Linkage—Hold selector lever under steering wheel down in "LO" position firmly, tighten control shaft upper bracket clampscrew securely. Back off both trunnion checknuts at forward end of manual control rod (at steering column control shaft lever), place manual control lever on transmission case in "LO" (move lever forward from extreme rear to second position where detent is felt to engage). With both levers held in "LO" position, tighten rear (lower) nut against trunnion finger tight, then lengthen rod by turning nut up ne additional turn, tighten forward checknut against trunnion securely.

(7) Starter Neutralizer Switch—Place selector lever in "DR" position. Loosen switch bracket clampscrew (on steering column at lower end of selector shaft), shift switch and bracket (screw hole is slotted) until starter does not operate when starter button depressed. Move selector lever to "N" position. Check to see that switch arm does not touch stop on switch bracket, and that starter operates when starter button depressed. Tighten bracket clampscrew.

HYDRA-MATIC BAND ADJUSTMENT

ALL 1946-51 HYDRA-MATIC CARS

►*EXTERNAL BAND ADJUSTMENT PRODUCTION CHANGE (EXC. OLDSMOBILE):* Front band adjustment specifications have been changed to 7.7 turns tight (except Oldsmobile). This supersedes previous instructions. Rear band adjustment remains the same.

►***BAND ADJUSTMENT CAUTION: Do not attempt to adjust bands EXTERNALLY (without removing oil pan) unless Adjusting Tool J-2681 (or Kaiser-Frazer No. KF-96) and accurate Tachometer are used. Otherwise remove oil pan and use special servo gauges.***

ADJUSTMENT—EXTERNALLY using Adjusting Tool J-2681 (or Kaiser-Frazer KF-96) and Tachometer:

1) Block front wheels securely and set hand brake firmly to prevent car moving while adjusting.

2) Remove front floor mat and adjusting hole cover over adjusting screws on left side of transmission.

3) Run engine until temperature is normal and engine idles at hot or slow idle speed of 375-400 RPM.

4) Connect and adjust tachometer for accurate recording of engine speed.

5) Place selector lever in "DR" position ("LO" position on Oldsmobile Whirlaway).

6) Adjust carburetor throttle stopscrew so that engine idles at exactly 700 RPM. Then adjust bands:

Front Band (After steps 1 through 6):

7F Install the adjusting tool on front band adjusting screw, loosen adjusting screw locknut (turn long handle while holding short handle stationary).

8F) Loosen band adjusting screw (turn sh rt handle) until engine speed increases to 900-1000 RPM. (800-900 RPM. on Hudson—this will make it unnecessary to back adjusting screw all the way out).

►*NOTE*—If no increase in engine speed noted when adjusting screw loosened, band has probably been slipping in service. Remove oil pan and inspect band and drum. With pan off, adjust bands as directed in ADJUSTMENT—WITH PAN OFF below and disregard following steps.

9F) Tighten band adjusting screw slowly until engine speed drops to 700 RPM., loosen adjusting screw

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HYDRA-MATIC BAND ADJUSTMENT (Continued)

until engine speed increases, then tighten adjusting screw until engine speed again drops to exactly 700 RPM., watch tachometer for 30 seconds to note any increase in engine speed. If increase noted, tighten adjusting screw 1/10 turn. Repeat this procedure until engine speed remains at 700 RPM. for at least 30 seconds,

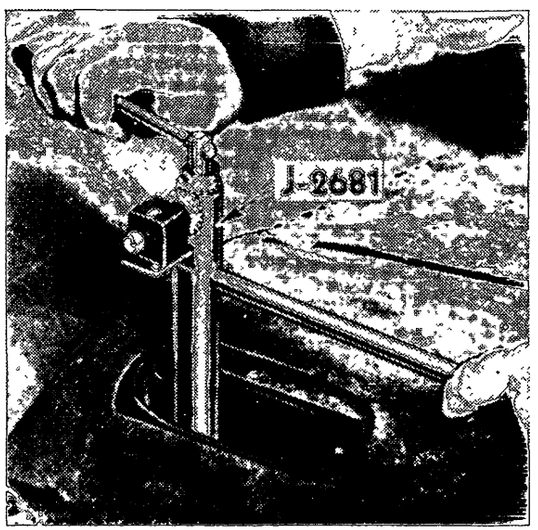
10F) Set counter on adjusting tool to 00. Hold locknut stationary, tighten adjusting screw exactly 7.7 turns (supersedes previous settings) so that counter reads 7.7 on all models except Oldsmobile (See Oldsmobile Note below). Hold adjusting screw from turning, tighten locknut.

OLDSMOBILE NOTE—On "Whirlaway" cars where transmission has been modified to start in 1st gear, band should be adjusted to 6½ turns tight rather than 5½ turns previously specified for all transmissions.

Rear Band (After steps 1 through 6):

7R) Install the adjusting tool on rear band adjusting screw, loosen adjusting screw locknut (turn long handle while holding short handle stationary).

8R) Loosen band adjusting screw (turn short handle) until engine speed increases to 900-1000 RPM. (800-900 RPM. on Hudson—this will make it unnecessary to back adjusting screw all the way out).



HYDRA-MATIC BAND ADJUSTING TOOL J-2681

NOTE—If no increase in engine speed noted when adjusting screw loosened, band has probably been slipping in service. Remove oil pan and inspect band and drum. With pan off, adjust bands as directed in ADJUSTMENT—WITH PAN OFF below and disregard following steps.

9R) Tighten band adjusting screw slowly until engine speed drops to 700 RPM., loosen adjusting screw until engine speed increases, then tighten adjusting screw until engine speed again drops to exactly 700 RPM., watch tachometer for 30 seconds to note any increase in engine speed. If increase noted, tighten adjusting screw 1/10 turn. Repeat this procedure until engine speed remains at 700 RPM. for at least 30 seconds.

10R) Place selector lever in "N" position.

11R) Set counter on adjusting tool to 00. Hold locknut stationary, tighten band adjusting screw exactly 2 turns until tool counter reads 2.0.

12R) Place selector lever in "DR" position. Hold band adjusting screw from turning, tighten locknut securely.

After Front & Rear Bands Adjusted.

Reset engine idle speed as follows:

Car Model	Idle Speed	Selector Lever
Cadillac	375 RPM.	"Dr"
Frazer & Kaiser	425-450 RPM.	"N"
Hudson	480-520 RPM.	"N"
Lincoln, Nash	375 RPM.	"N"
Oldsmobile (exc. Whirlaway)	375 RPM.	"Dr"
Oldsmobile (Whirlaway)①	350 RPM.	"Dr"
Pontiac	365-385 RPM.	"N"

①—When Whirlaway transmissions modified to start in 1st gear, set idle speed at 375 RPM. in "Dr".

ADJUSTMENT—WITH OIL PAN OFF Using Servo Gauges J-1693 & J-5071 (Kaiser-Frazer KF-92 & KF-77): Drain transmission case by removing plug at rear of oil pan, remove pan, remove front compartment floor mat and floor hole cover over band adjusting screws. Adjust each band:

Front Band (Gauge J-1693 or Kaiser-Frazer KF-92):

1) Loosen locknut and back off front band adjusting screw approximately 5 turns. Make certain that band is centered on drum.

2) Remove pipe plug from bottom of front servo.

3) Loosen hexagonal headed adjusting screw on gauge by hand until approximately ⅛" of adjusting screw threads are exposed above gauge body. Screw gauge into pipe plug hole in front servo by hand

4) Tighten hexagonal adjusting screw on gauge by hand until gauge stem is felt to just touch piston in servo, then continue to tighten adjusting screw with a wrench exactly 6 full turns (see Oldsmobile Note below) from point where stem first contacted piston.

OLDSMOBILE WHIRLAWAY NOTE—On cars where transmission has been modified to start in 1st gear, band should be adjusted to 5 turns tight rather than 6 turns as above.

5) Tighten front band adjusting screw until knurled washer on gauge (at upper end of hexagonal adjusting screw) is just free to turn. Hold band adjusting screw from turning and securely tighten adjusting screw locknut.

6) Loosen gauge adjusting screw at least six turns, remove gauge from servo. Install pipe plug in servo and tighten securely.

Rear Band (Gauge J-5071 or Kaiser-Frazer KF-77):

1) Place the gauge on the finished surface of the Accumulator body with leg of gauge resting on rear servo stem.

2) Loosen locknut and back off rear band adjusting screw until face of actuating lever (which contacts servo stem) is well away from the face of the gauge.

3) Tighten band adjusting screw until face of band actuating lever just contacts gauge.

▷*CAUTION—If adjusting screw turned too far when making this adjustment, back screw off SEVERAL TURNS and repeat adjustment.*

4) Hold band adjusting screw from turning and tighten adjusting screw locknut securely. Remove gauge.

HYDRA-MATIC TESTING
ALL 1946-51 HYDRA-MATIC CARS

For test and repair purposes, the first basic types of Hydramatic Transmissions are identified below.

Hydra-Matic Types

1—Not Modulated Pressure. Mechanical Reverse.
2—Modulated Pressure. Mechanical Reverse.
3—Not Modulated Pressure. Hydraulic Reverse.
4—Modulated Pressure. Hydraulic Reverse.
5—"WHIRLAWAY" Either Type 2 or Type 4).

WHIRLAWAY TRANSMISSION NOTE—This transmission is basically the same as other Hydra-Matic Transmissions except for arrangement of shifts in "Dr" Range ("Lo" Range—1 & 2, "Dr" Range—1, 2, 3). *CAUTION*—Some Whirlaway Transmissions may be found which have been modified to start in 1st gear in "Dr" Range.

MODULATED PRESSURE: Main line or throttle pressure is regulated by the pressure regulator valve, depending on throttle pressure. This throttle pressure acts upon a throttle valve pressure plug house within pressure regulator. Inner end of plug bears against pressure regulator which controls main line pressure, adding force to the pressure regulator spring thus adding to main line pressure. (See illustrations).

HYDRAULIC REVERSE: Consists of a cone clutch arrangement within the reverse unit and allows for "Rocking" the car without danger of clashing gears. Transmisisons with hydraulic reverse can be identified by trying to shift into reverse with the car moving forward. Gears will clash and resistance will be apparent on cars without hydraulic reverse.

▷*CAUTION—Before performing any Hydramatic tests check fluid level in transmission and bring up to "FULL" mark on indicator, using recommended fluid only. Check engine idle and set at recommended speed.*

ROAD TEST: If possible, choose a route that includes a hilly section to test for open throttle upshift, slippage and throttle downshift points, and a level section for upshift point tests. Refer to Hydramatic Shift Point table for correct shift speeds.

STALL TEST: This test can be made to determine engine performance, transmission band slippage or damaged torus member. Engine speed must remain between test limits for normal engine and transmission operation (See Table below.) Bring engine to normal operating temperature and connect electric tachometer. Place selector lever in "Dr" position, set hand and foot brakes securely and depress accelerator pedal to floor. *(CAUTION—Extreme care must be used in making this test. NEVER HOLD THROTTLE OPEN MORE THAN ONE MINUTE. If engine speed EXCEEDS maximum limit by more than 200 RPM, close throttle immediately).*

STALL TEST LIMITS

Car	Minimum RPM	Maximum RPM
Cadillac	1500	1700
Hudson	1450	1650
Kaiser-Frazer	1450	1650
Lincoln	1350	1600
Nash	1450	1650
Oldsmobile "6"	1500	1600
Oldsmobile "8"	1700	1800
Pontiac	1400	1600

Engines operating within test limits indicate transmission and engine are normal.

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HYDRA-MATIC TESTING (Cont.)

If engine speed is BELOW MINIMUM limit, engine needs tune-up. (NOTE—Low engine RPM will result if torus members are damaged and are locked together). If engine speed goes ABOVE MAXIMUM limit, bands are slipping, fluid level low, or torus check valve or front pump relief valve sticking or missing. Before adjusting bands make valve check (below).

Checking Valves—Set hand brake and run engine for 1½ minutes, then with engine idling check fluid level (Selector lever in "N" position), see that fluid is at "FULL" mark on indicator. Shut off engine and wait ten minutes. Re-check fluid level with engine off. If the fluid level has not raised more than ½", torus check valve and front pump relief valve are operating satisfactorily. Test shift points (See Hydramatic Shift Points).

MAIN OIL PRESSURE (Cars WITHOUT Modulated Pressure): Remove front floor mat and hole cover plate over band adjusting screw. Remove plug from transmission case (between band adjusting screws), using 7/16" six point socket. Install Pressure Gauge (Kent-Moore No. J-2540). With transmission oil warm, start engine and run at 1000 R.P.M. Oil pressure should be 75 to 90 lbs. Apply both hand and foot brakes and move selector lever from "N" to "Dr", "Lo" and "R". Oil pressure should remain equal at all positions.

►*NOTE*—Rear Oil Pump may be checked separately by driving the car at 30 to 40 M.P.H. in Third speed in "Dr" range. Move selector lever to "N" and turn the ignition key off. Pressure on gauge should not be less than 55 lbs.

MAIN OIL PRESSURE (Cars WITH Modulated Pressure, except Oldsmobile "Whirlaway" Tranmission).

Zero Throttle Pressure—At 30 M.P.H. in fourth speed, with Zero Throttle, oil line pressure should be 55 to 72 lbs. (Cadillac 60-72 lbs..)

Full Throttle Pressure—Full throttle pressure in fourth speed at 30 M.P.H. (full throttle without going thru detent) should be between 75 and 105 lbs. (Cadillac 20 to 35 lbs. higher than zero throttle pressure test reading). Use brake to hold car at 30 M.P.H.

►*NOTE*—Rear oil Pump may be checked in the same manner as cars without Modulated Pressure.

Oldsmobile "Whirlaway" Transmission Cars: Place selector lever in "Dr" and set engine idle speed at exactly 350 RPM (375 RPM if Whirlaway transmission modified to start in 1st gear). Pressure should not be less than 35 lbs.

Line Pressure Modulation Test (Oldsmobile)—With selector lever in "Dr" and car traveling at 30 M.P.H. in third gear, pressure on gauge should not be less than 60 lbs., and should increase at least 20 lbs., as throttle position is changed from zero to full throttle.

REVERSE PRESSURE (Cars WITH Hydraulic Reverse): Install pressure gauge (see Main Oil Pressure above). Make sure Pressure Regulation is normal in forward speeds, then note pressure in "Dr" and "Lo" with engine idling at normal speed. Move lever to "R". Pressure should be as high or higher than in "Dr" or "Lo". Apply brakes and accelerate engine to half throttle. The pressure should gradually increase to 125 lbs., minimum. If the pressure does not check satisfactorily, a leak in the reverse oil system or a poorly operated pressure regulator is indicated.

HYDRA-MATIC SHIFT POINTS IN M.P.H.
(Selector Lever as Indicated)

CADILLAC 60S, 61, 62

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	5-7	11-14	16-20
Full Throttle	("Dr")	9-15	26-35	59-67
Minimum Throttle	("Lo")	7-14		
Full Throttle	("Lo")	21-27		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle ①	("Dr")	17-13		
Full Throttle	("Dr")	20-17	13-10	9-5
Closed Throttle	("Lo")			10-8
Full Throttle	("Lo")			15-11
Forced	("Dr")	62-13		

①3-1 Closed Throttle Downshift, 9-3 M.P.H.
Lockout—4-2 Shift, 49-39 M.P.H.

CADILLAC 75, 85, 86

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	5-6	10-13	15-19
Full Throttle	("Dr")	9-14	25-33	55-63
Minimum Throttle	("Lo")	7-13		
Full Throttle	("Lo")	20-25		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle ①	("Dr")	16-12		
Full Throttle	("Dr")	19-16	12-10	9-5
Closed Throttle	("Lo")			10-8
Full Throttle	("Lo")			14-10
Forced	("Dr")	58-12		

①3-1 Closed Throttle Downshift, 9-3 M.P.H.
Lockout—4-2 Shift, 47-37 M.P.H.

HUDSON

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	4-8	10-14	15-20
Full Throttle	("Dr")	10-15	27-35	58-66
Full Throttle	("Lo")	22-27		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle	("Dr")	15-11	8-5	5-3
Full Throttle	("Dr")	19-16	14-10	10-5
Forced Throttle	("Dr")	60-15		
Closed Throttle	("Lo")			9-5
Full Throttle	("Lo")			14-10

Lockout—4-2 Shift, 48-38 M.P.H.

FRAZER & KAISER

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	4-8	10-14	15-20
Full Throttle	("Dr")	14-18	27-35	58-66
Full Throttle	("Lo")	22-27		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle	("Dr")	15-11	8-3	3-1
Full Throttle	("Dr")	19-16	13-10	9-5
Forced Throttle	("Dr")	60-15		
Closed Throttle	("Lo")			9-5
Full Throttle	("Lo")			14-10

Lockout—4-2 Shift, 48-39 M.P.H.

LINCOLN

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	5-7	11-17	19-25
Full Throttle	("Dr")	10-18	26-35	62-67
Full Throttle	("Lo")	24-28		
Light Throttle	("Lo")	9-14		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle ①	("Dr")	17-13		
Full Throttle	("Dr")	20-17	13-10	9-5
Forced Throttle	("Dr")	62-19		
Closed Throttle	("Lo")			10-8
Full Throttle	("Lo")			15-11

①3-1 Closed Throttle Downshift, 9-3 M.P.H.
Lockout—4-2 Shift, 47-37 M.P.H.

NASH

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	4-8	10-14	15-20
Full Throttle	("Dr")	14-18	27-35	58-66
Minimum Throttle	("Lo")	14-17		
Full Throttle	("Lo")	22-27		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle ①	("Dr")	15-11		
Full Throttle	("Dr")	19-16	13-10	9-5
Forced Throttle	("Dr")	60-15		
Closed Throttle	("Lo")			9-5
Full Throttle	("Lo")			14-10

①—3-1 Closed Throttle Downshift, 7-2 M.P.H.
Lockout—4-2 Shift, 48-39 M.P.H.

OLDSMOBILE ALL SERIES (1946-49), 76 (Early 1950)

UPSHIFTS:	1-2	2-3	3-4
"Dr"① exc. 88	5-15	10-30	22-68
"Dr"① 88 only	5-15	10-34	25-76
"Lo"① exc. 88	17-30		
"Lo"① 88 only	19-34		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle②	("Dr")	15-12		
Full Throttle	("Dr")	③	12-10	8-6
Closed Throttle	("Lo")			6-3
Full Throttle	("Lo")			12-10
Forced	("Dr")	63-13		

①Dependent on throttle pressure.
②3-1 Closed Throttle Downshift, 4-2 M.P.H.
③—19-17 MPH. (exc. 88), 21-19 MPH. (88 only).
Lockout—4-2 Shift, 40-44 MPH. (exc. 88), 45-50 (88).

OLDSMOBILE 98 (1950-51) & 76 (Lat 1950)

UPSHIFTS:	1-2	2-3
"Dr"①	10-30	22-68
"Lo"①	13-23	

DOWNSHIFT:		3-2	2-1
Closed Throttle	("Dr")	15-12	10-2
Full Throttle	("Dr")	19-17	12-10
Closed Throttle	("Lo")		6-3
Full Throttle	("Lo")		12-10
Forced	("Dr")	58-13	

①Dependent on throttle pressure.
Lockout—3 ("Dr"), 2 ("Lo"), 40-44 M.P.H.

OLDSMOBILE 88 (1950-51)

UPSHIFTS:	1-2	2-3
"Dr"①	10-32	25-72
"Lo"①	13-23	

DOWNSHIFT:		3-2	2-1
Closed Throttle	("Dr")	15-12	10-2
Full Throttle	("Dr")	21-19	12-10
Closed Throttle	("Lo")		6-3
Full Throttle	("Lo")		12-10
Forced	("Dr")	60-13	

①Dependent on throttle pressure.
Lockout—3 ("Dr"), 2 ("Lo") 43-48 M.P.H.

PONTIAC

UPSHIFTS:		1-2	2-3	3-4
Minimum Throttle	("Dr")	4-8	9-13	14-18
Full Throttle	("Dr")	9-14	25-35	60-75
Minimum Throttle	("Lo")	16-21		
Full Throttle	("Lo")	19-24		

DOWNSHIFTS:		4-3	3-2	2-1
Closed Throttle	("Dr")	14-10		
Full Throttle	("Dr")	18-14	12-9	8-4
Closed Throttle	("Lo")			6-3
Full Throttle	("Lo")			14-10
Forced	("Dr")	60-15		

Lockout—4-2 Shift, 48-40 M.P.H.

HYDRA-MATIC TROUBLE SHOOTING & DIAGNOSIS

ALL 1946-51 HYDRA-MATIC CARS

▷*NOTE—75% of all troubles can be corrected by external adjustments and oil level. Over 80% of the remainder of troubles can be corrected with transmission in the car. See "HYDRA-MATIC OVERHAUL" following.*

LIGHT THROTTLE SHIFT POINTS HIGH: (With Full Throttle Shift points normal)—Throttle linkage adjusted incorrectly. Adjust throttle linkage and check for worn or loose control rods.

FULL THROTTLE SHIFT POINTS: (Either too high or too low or do not occur)—Governor valves not operating properly, leakage at governor assembly, broken oil rings or missing governor balancing plug. Governor ring lands might be worn. Correct by freeing valves, check for warped surfaces. Replace parts as necessary.

NO THROTTLE DOWNSHIFT IN "Dr" RANGE: (From 4 th to 3rd (3rd to 2nd Oldsmobile) above 20 M.P.H.)—Insufficient accelerator travel due to interference of throttle linkage or at floor carpet. Throttle controls improperly adjusted or lever bent or loose on shaft. Spring lock in downshift valve may be missing.

TRANSMISSION DOES NOT RESPOND TO SHIFT LEVER POSITION: Pin which picks up manual valve in valve body is not operating in groove in manual valve. To check, shift selector lever into reverse. If severe clashing results or if lever goes into reverse but car locks up and fails to move backwards, pickup pin is not operating manual valve. Remove side cover and engage pin.

TRANSMISSION FAILS TO DRIVE CAR: Usually caused by failure of one or both bands to be applied. Check for low oil pressure. Front or rear band adjustment incorrect. Manual valve mispositioned, or sticking torus check valve. See Oil Pressure Tests.

ERRATIC RESPONSE TO SHIFT LEVER: Inner manual control valve lever loose on shaft. Replace lever assembly.

ERRATIC TRANSMISSION OPERATION (Slipping and jerking during Light Throttle acceleration): May be caused by improper governor operation due to ring land on governor having been worn off by ring. To check for this condition, first make certain Linkage Adjustment and Band Adjustment are correct, warm up transmission thoroughly, check performance on light to medium acceleration for following conditions: (1) First shift point occurs at approximately 5 MPH. and there is considerable slippage above this point, (2) Shift into high occurs at higher than normal speed, (3) Car jerks when starting after stopping in reverse. If above conditions noted, remove and inspect the governor for worn ring land. *See Hydra-Matic Overhaul data.*

SHIFT LEVER STICKS IN REVERSE OR PARK POSITION (When parked on steep hill): Caused by rough surface on face of tooth on parking pawl engaging reverse internal gear. Replace parking pawl with new part having smooth surface (no tool marks). Pawl cannot be reworked (special shape and case-hardened).

HUNTING: Adjust throttle linkage, check valve assembly and clean thoroughly and reface.

HAS SECOND AND FOURTH SPEED ONLY: (1st & 3rd speed Oldsmobile)—Clean and reface valve assembly. Check front unit for possible locking.

ALL SHIFTS ROUGH: Adjust throttle linkage and servo bands. Clean and reface valve assembly. Check transmission passages for leaks. Check oil pressure.

TWO-THREE SHIFT ROUGH: *(1-2 shift Oldsmobile Whirlaway)*—Follow instructions under ALL SHIFTS ROUGH and also check front and rear servos.

NO FOUR-THREE DOWNSHIFT: *(3-2 Oldsmobile Whirlaway)*—Adjust throttle linkage. Inspect, clean and reface control valve assembly.

SLIPS AFTER FOUR-THREE DOWNSHIFT: *(3-2 Oldsmobile Whirlaway)*—Check front servo.

WILL NOT SHIFT, STAYS IN SAME GEAR: Check valve assembly and governor. Front or rear units not operating properly. Check for possible locking.

SHIFTS ABOVE SECOND SPEED (IN LOW RANGE): Adjust manual linkage. Check control valve assembly and governor.

SLIPS IN VARIOUS SPEEDS: Check fluid level and oil pressure. Adjust servo bands, clean control valve

SLIPS OUT OF REVERSE: (Except cars with hydraulic type reverse). Overhaul reverse anchor.

LOCKS UP ON REVERSE COAST: Check oil pressure. Clean and reface control valve assembly. Rear servo not operating properly.

CREEPS FORWARD WHEN IN "R" POSITION: Rear unit not operating correctly. Excessive drag in rear clutch.

CLASHES WHEN PROPERLY SHIFTED TO "R": Engine idle speed too fast. Control valve plugged or dirty. Reverse anchor not operating correctly.

NO DRIVE WHEN ENGINE IS FIRST STARTED: Check fluid coupling and front pump. Test oil pressure.

CREEPS EXCESSIVELY IN "Dr": Engine idle speed too high.

CAR WILL NOT BACK UP: (Unless throttle is opened excessively)—Rear band not released due to low oil pressure caused by leakage or compensator valve auxiliary plug pin missing.

BANDS APPLIED VIOLENTLY, ENGINE SPEEDS UP: Low oil pressure or level. Pressure regulating valve sticking. Front pump may not be operating properly or there is a bad oil leak in the system. Check oil pressure and oil level. Free up pressure regulator valve or install new valve.

SEVERE "CLUNK" ON 3-2 DOWNSHIFT AT HIGH SPEED WITH CLOSED THROTTLE: *(2-1 downshift Oldsmobile Whirlaway)*—Rear check valve is not operating properly. Check valve may be broken. Stuck or broken ring in accumulator piston. Rear clutch piston may also be binding on its pilot.

SELECTOR LEVER RATTLES (Caused by loosening of lever or breaking of Retainer Spring): To correct, check retainer nut and tighten if found loose. If nut tight and lever is loose and rattles, check for broken retainer spring or missing anti-rattle spring and spring stop. Install special retaining spring which has ⅛" slot to allow installation on lever and make certain that spring does not hang up on threads during installation of lever.

TRANSMISSION RATTLES (Oldsmobile Whirlaway Transmissions): "Tip In" Rattles (noted when car idling with selector lever in "Dr" or just as accelerator pedal is depressed) or "Float" Rattles (noted when car creeping at 2-3 MPH. on level road with selector lever in "Dr"—noise will be accentuated by rough engine). If tuning up engine does not eliminate this complaint, transmission can be modified to start in first gear in Drive Range. *See "Oil Control Valve Assembly" Note under Assembly of Units in Hydra-Matic Overhaul data in this section.*

CAUTION—See Linkage Adjustment and Band Adjustment data for special settings when above modification made.

CARS WITH HYDRAULIC REVERSE

CLICKING OR RATCHETING NOISE: (With selector lever in Reverse and car moving forward 2 to 4 M.P.H.).—This condition is due to parking pawl trying to engage reverse internal gear. This condition is usually the result of a sharp drop in line pressure. Check as follows:

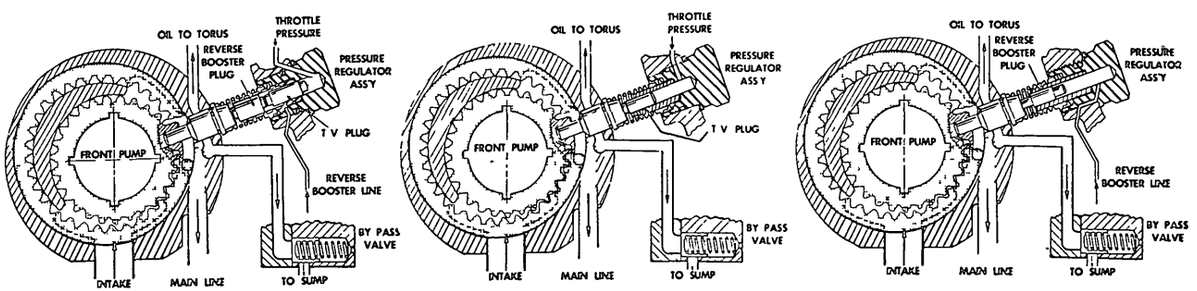
1) Check line pressure in reverse (see Testing). If pressure too low, check reverse clutch apply oil pipe and reverse booster apply oil pipe for leaks, inner and outer cone clutch piston seals for leakage, valve body sealing surfaces for flatness (check on surface plate), and leakage between extension housing and transmission case.

2) Check engine idle speed and tune engine (rough engine may cause this condition).

3) Reverse check valve located in detent plunger housing should be firmly attached to retainer by rivet, opposite end should extend ¼" above face of retainer in free position, .062" hole should line up with hole in detent plunger spacer. Valve face should be flat against spacer when installed. Replace assembly if necessary.

4) Parking block piston return spring stop seat should be ½" to 17/32" from face of bracket. The parking blocker spring should never be altered. If distorted, it should be replaced.

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MODULATED PRESSURE & HYDRAULIC REVERSE

MODULATED PRESSURE & MECHANICAL REVERSE

NOT MODULATED PRESSURE & HYDRAULIC REVERSE

HYDRA-MATIC PRESSURE REGULATOR VALVE ASSEMBLY

HYDRA-MATIC TROUBLE SHOOTING & DIAGNOSIS (C nt.)

►*NOTE*—A second type spring stop and a new spring are now being used. The stop has a fixed setting and is mounted under both bracket bolts. The new spring has a free length of 1".

NO DRIVE IN REVERSE: This condition will occur if front servo exhaust body spacer is installed in reverse. Under this condition oil pressure does not increase when selector lever is placed in Reverse position. Pressure will increase to 150-170 lbs. when transmission shifts from 1 to 2.

SLIPPING IN REVERSE ONLY: Check for Low Oil Pressure in Reverse, Inoperative Front Servo Exhaust Valve, Key missing or defective in stationary cone, Stationary Cone or Cone Clutch Piston worn excessively, Front Servo & Band operation not operating properly, Valve Body Assembly dirty (sticking valves or oil leaks), Stationary cone distorted by handling when disassembled.

SELECTOR LEVER WILL NOT GO INTO REVERSE: Check for: Governor G-1 weight stuck wide open or broken governor ring (separating main line pressure from G-1 pressure to reverse blocker piston), Governor ring groove or gap clearances incorrect, Governor sleeve defective, Parking Pawl Crank bent, Detent Plunger in inner control lever stuck, Reverse Blocker Piston sticking or piston spring weak or broken.

EXCESSIVE SQUAWK IN REVERSE (May occur when selector lever out of Reverse if reverse unit not fully disengaged): Check for low oil pressure and galling of stationary cone and cone clutch piston. If reverse not fully disengaged also check for: Check Valve in detent plunger retainer in valve body plugged, Reverse Clutch Spring inoperative or weak, High spot or galling of stationary cone and cone clutch piston, cone clutch piston release springs defective or weak, Rear Bearing Dowels too high.

LOW OIL PRESSURE, SLIPPAGE, DELAYED AND ERRATIC UPSHIFTS: These conditions will exist when one or the other of the two ¼" cup shaped plugs are missing from the parking bracket. (CAUTION—These plugs are not service parts and should never be removed). If plugs are loose or missing, replace assembly.

REVERSE CONE ENGAGES WHEN IN DRIVE: This condition can occur when there is excessive leakage into the reverse apply circuit. Check for leakage as follows:

1) Check front servo exhaust valve for proper fit in exhaust body. Clearance should be .002".
2) Inspect detent retainer spacer and valve body surfaces that contact spacer. Replace control valve if necessary.
3) Check Throttle Valve plug in Pressure Regulator for excessive clearance. If greater than .002" replace Regulator plug assembly.
4) Neoprene seal on Pressure Regulator Plug defective. Use extreme caution when installing plug not to damage seal (remove all sharp corners or burrs in transmission case with round hone, place small amount of grease on seal before installing assembly, DO NOT use wrench to start pressure regulator plug in housing).

HYDRA-MATIC REMOVAL & INSTALLATION

ALL 1946-51 HYDRA-MATIC CARS

1946-51 CADILLAC

Removal: Support car with all wheels approximately 12" above floor. Remove floor carpet & pads, front seat cushion, and center floor pan. Disconnect propeller shaft at rear universal joint, remove shaft and front universal joint and yoke, remove flywheel housing pan. Drain transmission and fluid flywheel by taking out both drain plugs. Support rear end of engine with jack under oil pan (use block of wood on jack or use special Engine Support Stand Tool. Install Transmission Hoist, Tool J-1636B, in front compartment over floor pan opening, screw eyebolt securely into top of transmission, attach hoist cable hook to eyebolt, lift transmission just enough to take strain off rear support. Disconnect rear support at transmission extension housing, remove the bracket cross-member carrying the support. Remove throttle rod and manual shift rod from levers on the transmission case, remove both levers and the lower relay lever from flywheel housing. Disconnect speedometer cable at rear of transmission. Remove spark plugs and starter from engine. Remove 30 capscrews holding fluid coupling cover to flywheel, push cover toward rear of car to disengage flywheel dowels (CAUTION—Do not pry cover away from flywheel). Lower the jack under the engine until top of bell housing is flush with top of opening in floor pan. Remove the bolts holding bell housing to engine crankcase. Remove transmission and bell housing as a unit by moving it to the rear and lowering it to the floor.

Installation: Make certain that face of flywheel and torus cover are clean and free from all nicks or burrs, install NEW gasket on face of flywheel (use grease to retain gasket—do not use shellac or sealing compounds). Raise transmission in place carefully, make certain that mainshaft enters pilot bearing and that dowels in crankcase enter holes in housing squarely, align flywheel and torus cover so that large dowel pin and large dowel hole (marked by yellow paint) are at top and small dowel pin and small hole at the bottom. Install four flywheel housing-to-crankcase screws and tighten evenly to 45-50 ft. lbs. Install one torus cover screw adjacent to each dowel pin and tighten these screws just snug, install two more cover screws (90° from first two screws) and tighten these just snug (CAUTION—this procedure necessary to insure evenly applied pressure which will prevent leaks). Install all remaining torus cover screws, tighten all screws evenly to 20-25 ft. lbs. torque. Check torus cover drain plug tightness before installing flywheel lower cover. Raise engine approximately 1" (use jack and wooden block under oil pan), install engine rear support bracket, lower engine, connect support. Install and connect propeller shaft, speedometer cable, starter, spark plugs, transmission throttle lever and manual control lever. Fill transmission with Hydra-Matic fluid and adjust linkage. *See separate instructions.*

1951 FRAZER & KAISER

Removal: Raise car and support it on stands. Drain transmission case (remove oil pan drain plug). Disconnect speedometer cable and housing at rear bearing retainer, rear throttle rod and manual control rods at levers on transmission case. Disconnect propeller shaft at center bearing (Frazer), rear universal joint yoke (Kaiser), remove shaft by sliding front universal yoke out of transmission case. Install Support Fixture KF-104 under rear of engine and turn up support studs to remove engine weight from cross-member (CAUTION—do not raise engine more than enough to take weight off cross-member). Disconnect hand brake cable from bracket on cross-member, free engine from support cushions, remove cross-member with engine support cushions attached. Take off flywheel lower cover, drain fluid coupling by removing drain plug in torus cover. Remove throttle lever (Long lever) from transmission case. Mark torus cover and flywheel to insure reassembly in same position (CAUTION—necessary to maintain balance), remove all torus cover-to-flywheel attaching bolts. Lower engine slightly so that upper housing attaching bolts are accessible. Use transmission support jack (KF-106) under transmission to support transmission weight and remove strain from mounting bolts, remove all housing mounting bolts. Thread one 9/16"-12 bolt into housing bolt hole directly above dowel pin on each side of housing, turn up bolts evenly until dowel pins are freed from front housing, then remove these bolts. Move transmission straight back until it is free, then lower it carefully (CAUTION—turn flywheel so that end of mainshaft passes between two bolts), remove transmission from beneath car.

Installation: See that face of flywheel and torus cover mounting flange are clean and free from nicks or burrs, install NEW gasket on face of flywheel (use grease to retain gasket—do not use shellac or sealing compounds). Turn flywheel so that one dowel pin approximately 4" below edge of front flywheel housing. Carefully raise transmission in place and guide mainshaft pilot into pilot bearing in crankshaft. Align torus cover and flywheel marks (made at removal), push transmission forward until dowels in flywheel rear housing enter holes in front housing. Install attaching bolts and lockwashers in rear flywheel housing and tighten securely. Install all (30) torus cover-to-flywheel bolts and tighten finger tight (CAUTION—these are special alloy steel bolts), tighten these bolts in following order to insure even pressure and prevent leaks:

(1) Tighten one bolt adjacent to each dowel to 12-15 ft. lbs. torque.
(2) Tighten two bolts located 90° from dowels (evenly spaced between first two bolts) to 12-15 ft. lbs. torque.
(3) Tighten all bolts in rotation to 20-25 ft. lbs.
(4) Retighten all bolts in rotation to 30-35 ft. lbs.

Check tightness of torus cover and transmission oil pan drain plugs, install flywheel housing lower cover. Install engine support cross-member and connect engine support cushions. Install and connect transmission throttle lever, connect manual control rod. Connect speedometer cable and hand brake cable. Fill transmission with Hydra-Matic fluid and adjust linkage. *See separate instructions.*

1950-51 HUDSON

R moval: Disconnect battery ground cable first.

1) Disconnect starter cable and remove starter.
2) Take out bolt attaching breather pipe to valve

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HYDRA-MATIC REMOVAL & INSTALLATION (Cont.)

chamber cover and bracket-to-flywheel housing bolt, remove breather pipe.
3) Turn back floor mat to expose two upper floor opening covers and remove covers for access to top flywheel housing-to-engine bolts, remove these two bolts.
4) Raise car and support securely on jack stands.
5) Disconnect propeller shaft at rear universal joint and at front universal joint (CAUTION—tape journal bearing cups to universal journal to avoid losing bearings). Take out center bolt attaching center bearing support and slide propeller shaft to rear to provide clearance at transmission.
6) Disconnect speedometer cable at transmission rear bearing retainer. Disconnect rear throttle rod and manual control rod from levers on side of transmission case.
7) Remove left hand engine side rear stone guard by taking out 4 self-tapping screws.
8) Disconnect return spring at hand brake cable lever and cable clevis at pull rod slide link, remove cable retainer clip at engine support cross-member, pull cable forward and through the cross-member.
9) Take out two bolts attaching each engine rear support insulator to cross-member. Install transmission support jack under transmission case (hydraulic hoist with transmission cradle), raise transmission just enough to remove weight from cross-member. Disconnect and remove cross-member (4 screws on bottom and 3 on top at each end).
10) Install Engine Holding Fixture J-4651 to support engine weight (holes provided in frame side rail just below steering housing support and in same location on opposite side for engagement of support hooks), adjust support hooks so that front end of engine clears center tie rod by approximately ½" and weight of engine is supported by fixture.
11) Remove flywheel housing lower dust cover, drain fluid coupling by removing drain plug in torus cover.
12) With engine supported by fixture and transmission supported by jack, remove all torus cover attaching screws, remove flywheel housing lower right hand bolt (use ⅝" universal socket and 14" extension) leaving the bolt in the hole, remove lower left hand bolt (use 9/16" universal socket and 14" extension).
13) Pull transmission straight back until transmission shaft pilot clears pilot bushing in flywheel, then lower transmission carefully (CAUTION—use care that shaft does not strike flywheel bolts).

Installation: Reverse the removal procedure above and note the following important points:
Torus Cover & Flywheel Gasket—Make certain face of flywheel and torus cover mounting flange are clean and free from nicks and burrs. Use petrolatum to hold NEW gasket on face of flywheel (DO NOT use shellac or sealing compounds).
Flywheel Housing Bolts—Tighten all four bolts evenly to 40-50 ft. lbs. torque.
Torus Cover Bolts—After all bolts have been installed, tighten bolts in following order to insure even pressure and to prevent leaks:
(1) Tighten one bolt adjacent to each dowel pin to 12-15 ft. lbs. torque.
(2) Tighten two bolts located 90° from dowel pins (equally spaced between first two bolts) to 12-15 ft. lbs. torque.
(3) Tighten all bolts in rotation to 20-25 ft. lbs.
(4) Retighten all bolts in rotation to 26-31 ft. lbs.
Engine Support Cross-member—Install and tighten bolts in engine rear support insulators first, then install screws mounting cross-member on frame.
Filling Transmission with Fluid—*See REFILLING.*
Transmission Linkage—Connect throttle and manual control rods and adjust linkage. *See separate instructions.*

1949-51 LINCOLN

Removal: Support car securely with all four wheels approximately 8" off floor.
2) Remove front seat and front floor carpet, disconnect throttle rod at accelerator pedal, remove front floor pan cover.
3) Disconnect propeller shaft at rear universal joint, remove propeller shaft and universal joint from transmission spline shaft.
4) Remove flywheel housing pan and engine plate. Drain transmission case (drain plug at rear of pan) and fluid coupling (drain plug in torus cover).
5) Disconnect rear motor mount from frame cross-member and remove the bottom half of the rubber mount.
6) Place jack under rear end of engine oil pan with wooden block on jack to prevent damage to pan, raise engine sufficiently to install engine support.
7) Remove detachable cross-member from frame X-member. Lower jack under engine until engine rests on support.
8) Install transmission lifting hoist over floor pan opening in front compartment (adjust legs of hoist to fit car and attach cables to floor pan to prevent tipping of hoist). Screw eyebolt securely in tapped hole in top of transmission case, attach cable hook, take up slack in cable so that weight of transmission and fluid coupling taken off engine support.
9) Disconnect manual control rod and lower throttle rod at levers on side of transmission case, remove throttle lever (longer lever) to prevent damaging lever during removal of transmission. Disconnect speedometer cable at rear of transmission.
10) Remove spark plugs from engine. Disconnect and remove starter motor.
11) Take out 30 5/16" capscrews mounting torus cover on flywheel, push cover toward rear of car to disengage locating dowel pins.
▷*CAUTION—Do not pry cover away from flywheel (will damage gasket surface on cover and flywheel).*
12) Take out 6 bolts mounting flywheel housing on engine.
13) Remove transmission and flywheel housing as an assembly by moving unit toward rear of car until flywheel housing dowels and main shaft are disengaged, then lower assembly (tilt front end down and move it forward to free transmission bearing extension from frame cross-member) and remove from beneath car.

Installation: Make certain that face of flywheel and torus cover mounting flange are clean and free of all nicks and burrs.
1) Install NEW gasket on face of flywheel using grease to retain gasket (DO NOT use shellac or sealing compounds).
2) Raise transmission in place carefully, make certain that mainshaft enters pilot bearing and that dowels in engine enter holes in housing squarely, align flywheel and torus cover so that large dowel pin and large dowel hole are at the top.
3) Install six flywheel housing-to-engine bolts and tighten evenly to 45-50 ft. lbs. torque.
4) Install one torus cover screw adjacent to each dowel pin in flywheel and tighten these screws just snug, then install two more screws (at 90° from first two) and tighten these just snug (CAUTION—this procedure necessary to insure evenly applied pressure which will prevent leaks). Install remaining torus cover screws, tighten all screws evenly to 20-25 ft. lbs. torque.
5) Check torus cover drain plug tightness, install flywheel housing pan and engine plate.
6) Raise engine approximately 1" (use jack and wooden block under oil pan), install frame cross-member, lower engine into place, install engine mount.
7) Install and connect propeller shaft, speedometer cable, starter, spark plugs, transmission throttle lever. Connect manual control lever rod.
8) Fill transmission with Hydra-Matic fluid and adjust linkage. *See separate instructions.*

1950-51 NASH

Removal: Raise car and support securely on stands (support rear of car at body side sills and place hydraulic jack under rear axle assembly).
2) Drain transmission case and fluid coupling (remove flywheel lower cover for access to drain plug.
3) Remove accelerator pedal and front compartment floor mat, take out screws in floor hole cover and remove cover.
4) Disconnect hand brake cable at adjusting yoke, disconnect speedometer cable and housing at transmission adapter, disconnect rear throttle rod and manual control rod at levers on left side of transmission case, remove rear brake hydraulic hose bracket from floor pan to prevent damage to lines.
5) Disconnect torque tube from rear bearing retainer by taking out flange mounting bolts, disconnect propeller shaft by sliding universal joint yoke to rear and free of transmission driveshaft, move torque tube out of the way.
6) Place jack under rear end of engine oil pan (use block of wood on jack to prevent damage to pan), or use special Engine Support Fixture J-4179 installed under engine to support engine so that all weight removed from rear engine support cross-member.
▷*CAUTION—Do not raise engine more than necessary to remove engine support cross-member.*
7) Remove rear engine support cross-member (take out bolts in rear bearing retainer so that rubber cushion removed as unit with cross-member).
8) Loosen clamp bolt and remove throttle control lever (longer lever) from left side of transmission
9) Remove 30 capscrews and lockwashers mounting torus cover on rear face of flywheel.
10) Lower engine slightly so that upper housing attaching bolts accessible through floor pan opening. Install special transmission holding tool J-2803 on hydraulic jack (CAUTION—tool must be securely fastened to jack pad), place jack under transmission with tool securely engaging transmission case oil pan, lift transmission just enough to remove weight from mounting bolts in flywheel housing.

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HYDRA-MATIC REMOVAL & INSTALLATION (Cont.)

11) Remove attaching bolts, nuts, and lockwashers holding rear flywheel housing on front housing, take out upper rear stud on each side, use two 9/16" USS bolts to disengage dowels (screw one bolt evenly into each of above stud holes until dowels are free of front housing, then remove bolts).

12) Move transmission to rear until it is free, then lower assembly (CAUTION—turn flywheel so that end of mainshaft passes between two of the flywheel-to-crankshaft bolts), remove transmission from beneath car.

Installation: Reverse the removal procedure above and note the following important points:

Torus Cover & Flywheel Gasket—Make certain that face of flywheel and mounting flange on torus cover are clean and free from all nicks and burrs. Install NEW gasket on face of flywheel (use petrolatum to hold gasket—DO NOT use Shellac or sealers).

Transmission Alignment—Turn flywheel so that one dowel pin is approximately 4" below lower edge of front housing (so that mainshaft will pass between two crankshaft bolts) and turn torus cover so that dowel pin hole is in corresponding position. Lift transmission into place carefully, guide mainshaft pilot into pilot bushing and push transmission forward so that dowels in rear flywheel housing enter holes in front housing squarely.

Flywheel Housing Bolts—Install all rear flywheel housing-to-front housing bolts and stud nuts and tighten evenly and securely (NOTE—Rear engine mountings must be installed on lower studs before nuts are tightened).

Torus Cover Bolts—Install all bolts and tighten finger tight, then tighten these bolts in following order to insure even pressure and avoid leaks:

(1) Tighten one bolt adjacent to each dowel pin to 12-15 ft. lbs. torque.

(2) Tighten two bolts located 90° from dowel pins (equally spaced between first two) to 12-15 ft. lbs.

(3) Tighten all bolts in rotation to 20-25 ft. lbs.

(4) Retighten all bolts in rotation to 30-35 ft. lbs.

Filling Transmission with Fluid—*See REFILLING.*

Transmission Linkage—Connect manual control rod. Install throttle lever and connect rear throttle rod. Adjust linkage. *See separate instructions.*

1946-48 OLDSMOBILE

Removal: Support car with all four wheels approximately 8" above floor. Remove foot accelerator pad, floor mat, center floor pan. Disconnect speedometer cable. Disconnect propeller shaft at rear universal joint, remove by sliding shaft out at splined joint. Remove flywheel housing pan. Drain transmission and flywheel by taking out both drain plugs. Remove outer throttle lever from transmission case, disconnect control rod from manual shift lever. Remove two upper rear engine mounting bolts, remove master cylinder to brake shaft bracket, disassemble strut from shaft, remove clevis pin from lower control relay rod. Raise engine approximately ½" off mountings with jack just forward of crankcase drain plug (use block of wood on jack). Remove 3 bolts from each side of cross-member at frame side rail, remove cross-member by tipping top toward front of car and moving cross-member forward. Install transmission lifting tool J-1502 in front compartment over floor pan opening. Thread special eye-bolt, Tool No. J-1636SA-5, in tapped hole in top of transmisssion case and attach cable hook to eye-bolt. Lift transmission just enough to take strain off mounting bolts, remove 30 bolts holding fluid flywheel cover on flywheel, remove five bolts holding rear half of bell housing to front half. Lower engine slightly until top of bell housing is flush with top of opening in floor pan, thread two standard transmission bolts into bell housing (on each side just above dowel pins) to force bell housing from dowel pins, then remove these bolts. Remove transmission and rear bell housing by moving it to rear and downward.

CAUTION—Do not allow end of mainshaft to strike crankshaft bolts (turn flywheel so that shaft passes down between two bolts).

Installation: Reverse the removal procedure above and note the following important points:

Torus Cover & Flywheel Gasket—Make certain face of flywheel and torus cover mounting flange are clean and free from nicks and burrs. Use vaseline to hold NEW gasket in place on face of flywheel (DO NOT use shellac or sealing compounds).

Torus Cover Alignment & Tightening—Align torus cover over dowel pins in flywheel(just start the flywheel capscrews by hand to align torus cover (CAUTION—these capscrews are special type). AFTER rear bell housing mounting bolts have been tightened, tighten all torus cover screws evenly to 30 ft.lbs. torque.

Filling Transmission with Fluid—*See REFILLING.*

Transmission Linkage—Install throttle lever and rod, connect manual control rod., Adjust linkage. *See Linkage Adjustment.*

1949 OLDSMOBILE

Removal: *CAUTION—Rocket engine requires different removal procedure as follows:* Disconnect accelerator pedal rod at bellcrank, remove floor mat and center floor pan. Remove upper transmission to bell housing capscrews. Raise car approximately 8" off floor and securely support all four wheels. Drain fluid coupling and transmission case. On 8 cyl. cars, remove engine side pans, disconnect starter wiring, remove starter, remove lower flywheel housing (necessary to remove exhaust pipe bracket and crankcase ventilator bracket from housing first). Install Rear Engine Support, Tool No. BT-28, to support rear end of engine. Remove engine mount to cross-member bolts (left side), capscrews (right side), and two capscrews attaching engine mount to flywheel housing (right side only). Remove bolts attaching intermediate lever bracket to cross-member, and bolts attaching cross-member to frame (3 bolts on each side). Lift engine approximately ½" and remove cross-member (CAUTION—do not lift engine more than necessary to remove cross-member). Then remove transmission in same manner as on previous Oldsmobile models.

Installation: Reverse the removal procedure above and note the following important points:

Torus Cover & Flywheel Gasket—Make certain face of flywheel and torus cover mounting flange are clean and free from nicks and burrs. Use vaseline to hold NEW gasket in place on face of flywheel (DO NOT use shellac or sealing compounds).

Torus Cover Alignment & Tightening—When installing transmission align torus cover over dowel pins in flywheel *(CAUTION*—On 8 Cyl. cars, one dowel is larger than standard and torus cover must be turned to align the larger dowel with the larger dowel pin hole). After transmission rear bell housing attaching bolts tightened, install torus cover capscrews and tighten snugly, then tighten all screws to 30 ft.lbs. torque.

Filling Transmission with Fluid—*See REFILLING.*

Transmission Linkage—Install throttle lever and rod, connect manual control rod., Adjust linkage. *See Linkage Adjustment.*

1950-51 OLDSMOBILE

Removal: Use twin-post hoist to raise car, or support car securely on jack stands.

1) Remove transmission oil pan plug and drain transmission case.

2) On 8 Cyl. cars only, disconnect engine side pans at rear and drop these down for access to starter, disconnect starter wiring and remove starter.

3) On 8 Cyl. cars only, free exhaust pipe bracket and crankcase ventilator bracket from lower flywheel housing and remove housing. Remove flywheel housing pan.

4) Drain fluid coupling by removing drain plug from torus cover.

5) Disconnect propeller shaft at rear universal joint, pull shaft to rear to disengage forward end from transmission.

6) Disconnect speedometer cable at transmission case. Free intermediate lever bracket from frame cross-member by taking out two bolts.

7) Install special transmission lift (hydraulic jack and transmission cradle) under transmission and raise transmission and engine just enough to remove weight from engine support cross-member.

8) Free engine mounts from cross-member by taking out two bolts (left side), two capscrews (right side). Take out three cross-member to frame bolts at each side. Lift engine approximately ½" and remove cross-member (CAUTION—do not lift engine more than necessary to remove cross-member). Then lower engine just enough (approx. 1½") for access to upper rear bellhousing-to-front bellhousingcapscrews (CAUTION—do not lower engine more than 1½" unless upper radiator hose and exhaust pipe-to-manifold connections are loosened).

9) Disconnect manual control rod and throttle rod from levers on side of transmission case, remove throttle lever to prevent damaging lever during transmission removal.

10) Remove all torus cover-to-flywheel capscrews

11) Install Rear Engine Support BT-28 to support engine when transmission taken out. Remove rear bell housing-to-front bellhousing capscrews.

12) Move transmission to rear and lower it to the floor. CAUTION—Turn flywheel so that end of mainshaft passes between two flywheel bolts.

Installation: Reverse the removal procedure above and note the following important points:

Torus Cover & Flywheel Gasket—Make certain face of flywheel and torus cover mounting flange are clean and free from nicks and burrs. Use vaseline to hold NEW gasket in place on face of flywheel (DO NOT use shellac or sealing compounds).

Torus Cover Alignment & Tightening—On 6 Cyl. cars, engage paint-marked dowel pin in flywheel with dowel pin hole in cover which is also paint-

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HYDRA-MATIC REMOVAL & INSTALLATION (Cont.)

marked (both dowel pins are same size but original paint-marked position must be maintained for correct run-out and balance). On 8 Cyl. cars, one dowel pin is larger than the other and this larger dowel must engage the larger dowel pin hole. Install all torus cover screws and tighten snugly, then tighten all screws evenly to 30 ft. lbs. torque.

Filling Transmission with Fluid—*See REFILLING.*

Transmission Linkage—Connect manual control rod. Install throttle lever and connect rear throttle rod. Adjust linkage. ***See separate instructions.***

1948-51 PONTIAC

Removal: Support car on stands with all wheels 8" above floor. Drain transmission oil pan. Remove accelerator pedal, front floor mat, and transmission hole cover in floor. Disconnect speedometer cable and housing at transmission. Disconnect propeller shaft at rear universal and remove by sliding it to rear and free of transmission output shaft. Remove flywheel housing bottom cover (remove crankcase ventilator outlet pipe and loosen exhaust pipe bracket to aid cover removal). Drain fluid coupling by removing plug in cover. Disconnect hand brake cables at idler lever and remove lever (not required on Convertibles). Disconnect shift lever control rod from inner lever on transmission case, remove throttle control (outer) lever. Remove all (30) torus cover-to-flywheel bolts and lockwashers (work through pan opening in housing). Disconnect two rear engine mountings and reinforcing plates from cross-member, disconnect shift control lever bracket from cross-member. Use a jack under the rear end of the engine oil pan (place 4x4x10" wood block on jack to prevent damage to pan), raise rear end of engine until rear mountings ½" above cross-member (CAUTION—do not raise engine more than necessary for cross-member removal). Take out three cross-member mounting bolts on each side of car, remove reinforcing plates from inside frame side rails, remove cross-member (tap down at both ends until right end rests on exhaust pipe, tap left end down clear of side rail, lift right end over exhaust pipe). Lower rear end of engine until rear flywheel housing attaching bolts accessible through hole in floor. Use hydraulic jack and tool J-2808 (special transmission mounting fixture —fixture must be securely fastened on jack pad) and lift transmission slightly to remove stress on mounting bolts. Take out six rear housing-to-front flywheel housing bolts (two lower bolts on each side also retain engine rear mountings). Thread a 9/16"-12 bolt in center hole in each side of housing (directly above dowel pins) to remove dowel pins from rear housing (remove bolts when dowels are free). On all models except Convertibles (see Convertible Note below), remove transmission by moving it toward the rear and lowering it to the floor (CAUTION—to prevent mainshaft striking flywheel mounting bolts when lowering transmission, turn flywheel so that shaft passes down between two bolts).

Convertible Transmission Removal Note—Use a rope looped around rear end of transmission and extending through floor pan hole to inside of car to guide transmission. Remove speedometer driven gear, shaft, and sleeve assembly. With transmission moved to rear to clear engine, raise rear end of engine as high as possible (CAUTION—do not allow end of transmission main shaft to scrape on face of flywheel). Tilt transmission down at front (lift rear end with guide rope), and remove from beneath car.

Installation: Reverse the removal procedure given above and note the following important points:

Torus Cover & Flywheel Gasket—Make certain face of flywheel and torus cover mounting flange are clean and free from nicks or burrs. Install NEW gasket on face of flywheel (use petrolatum to hold gasket—DO NOT use Shellac or sealers).

Transmission Alignment—Turn flywheel so that one dowel pin is approximately 4" below left side of front flywheel housing (so that mainshaft will pass between two crankshaft bolts), turn torus cover so that dowel pin hole is in corresponding position. Lift transmission into place carefully guiding mainshaft into pilot bearing (CAUTION—see that pilot bearing spacer in place on end of mainshaft).

Flywheel Housing Bolts—Install and tighten all six bolts securely **with rear engine mountings installed on lower bolt on each side.**

Torus Cover Bolts—Install all bolts and tighten finger-tight, then tighten these bolts in following order to insure even pressure and avoid leaks:

(1) Tighten one bolt adjacent to each dowel pin to 12-15 ft. lbs. torque.

(2) Tighten two bolts located 90° from dowel pins (equally spaced between first two) to 12-15 ft. lbs.

(3) Tighten all bolts in rotation to 20-25 ft. lbs.

(4) Retighten all bolts in rotation to 30-35 ft. lbs.

Filling Transmission with Fluid—*See REFILLING.*

Transmission Linkage—Connect manual control rod. Install throttle lever and connect rear throttle rod. Adjust linkage. ***See separate instructions.***

HYDRA-MATIC OVERHAUL

►CHANGES, CAUTIONS, CORRECTIONS

►*1946-50 GEAR TYPE FRONT PUMP REPLACEMENT (Cars with Mechanical Type Reverse):* A variable delivery (rotor type) front pump as used in 1952 and later production is available for service replacement on earlier cars with Gear Type Front Pumps and Mechanical Type Reverse. Replacement pumps are furnished in complete kits consisting of Pump Assembly, Gasket, Intake Pipe, and Oil Screen Assembly. *CAUTION—When Rotor Type Pump is installed a new Pressure Regulator MUST ALSO BE INSTALLED.*

►*1951 PRESSURE REGULATOR VALVE SERVICE REPLACEMENT: (To eliminate "Clicking" noise when operating and surge noted when engine started).* New type valve with rubber cushions on contact areas. Used in later production and may be installed on early transmissions to correct above complaints. See disassembly data for valve removal and installation. New and old type valves are interchangeable.

►*1946-52 REAR CLUTCH HUB SERVICE REPLACEMENT (CADILLAC & PONTIAC):* New clutch hub is relieved approximately .030" in front face of hub to allow space for thrust washer. New design eliminates wear between hub face and snap ring. Cadillac Service Kit Part No. 8615418, and Pontiac Part No. 8615451, is available for service replacement.

►**ELIMINATION OF DOWEL PIN IN REAR PLANETARY UNIT DRUM (1951 Production Change):** Late 1951 transmissions do not have dowel pin between rear unit internal gear and rear unit drum (pin and pin hole discontinued). Early and new type parts furnished for service and **both parts must be of same type.**

►**1951 FRONT SERVO EXHAUST VALVE ASSEMBLY CHANGE (to eliminate buzzing noise when shifting into Reverse):** This new assembly used in production on late 1951 cars and can be installed on earlier cars (assemblies are interchangeable).

DISASSEMBLY OF TRANSMISSION

Torus, Torus Cover, Bell Housing. Move manual control lever on side of transmission toward rear to reverse position and remove oil level indicator from case. Straighten main shaft nut lock plate (using a chisel and light hammer) and remove the main shaft nut. Slide driven torus member off transmission shaft *(CAUTION:—If torus member sticks, tap end of mainshaft with rawhide hammer while pulling torus on hub).* Remove driving torus snap ring and driving torus assembly. Torus cover member plate can then be removed.

►*CAUTION:* Do not attempt to remove torus cover and driving torus by pulling and pushing on torus cover in a rough manner as this will possibly result in a broken oil seal ring. Instead, work hub of torus cover back thru oil seals gently, and then pull torus cover forward with a quick jerk.

Take out the four capscrews and lock washers holding the flywheel housing to front of transmission case. Remove flywheel housing. On Oldsmobile take out ⅛" oil pressure line plug from transmission case, and place transmission case in holding fixture.

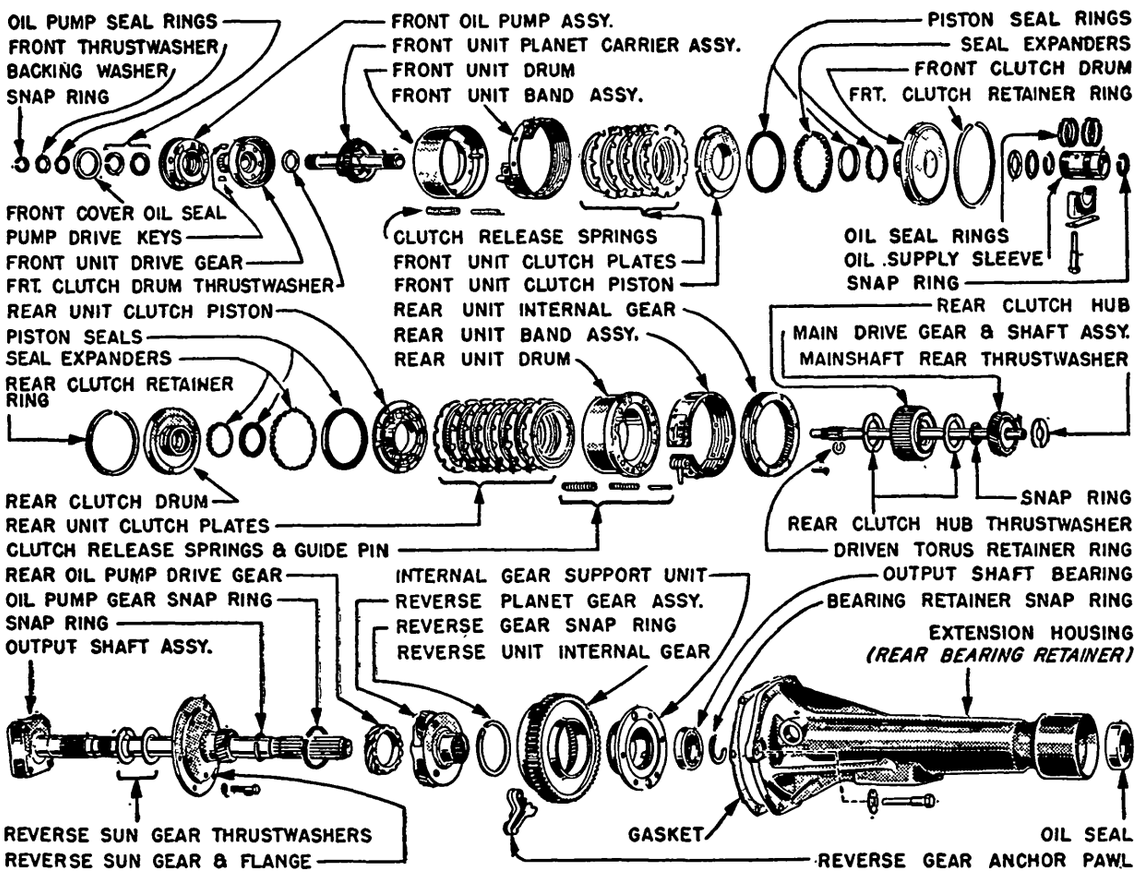
Manual Lever, Oil Pan and Side Cover. Loosen lock screw holding manual lever to shaft and remove lever. Drive out open type driven torus retainer ring from main shaft using Tool J-1458, being careful main shaft is not damaged. Remove all capscrews from oil pan and side cover and remove oil pan and side cover from transmission. Lift oil pump screen from rear pump intake pipe. Straighten two front intake pipe bolt locks and loosen the two capscrews while lifting slightly on the pipe to avoid dropping capscrews into transmission case. Remove intake pipe from case.

Parking Brake Bracket and Control Valve (Cars with Hydraulic Type Reverse): Back off front and rear band adjusting screws at least 5 turns and remove parking brake pawl support bolt from rear of case and position anchor down in case as far as possible (Pawl can not be removed at this time). Remove pressure regulator reverse oil pipe (Do not bend pipe). Loosen two bolts holding parking brake bracket assembly to transmission case and place detent control lever in "L" position. Unhook parking brake release spring from pin assembly and inside oil pipe. Remove four bolts holding control valve assembly to transmission case and work control valve assembly toward front of case to remove governor pipes and reverse clutch pipe. Remove bolts from brake bracket assembly and remove piston release spring and stop. Carefully remove sleeve from governor to avoid damage to oil rings. Remove parking pawls from case.

Servos and Rear Oil Pump (Cars with Hydraulic Type Reverse). Remove front and rear servo attaching bolts and rear oil pump attaching bolts. Separate front and rear servo at oil transfer pipe by moving rear servo toward rear of transmission, then remove servo and rear pump discharge pipe. Remove front pump delivery pipe by pulling straight up from front pump. Position governor so that large round end is toward front of transmission and position one reverse drive flange attaching bolt up. Remove rear pump and governor by moving toward control valve assembly side of transmission base.

Servos and Control Units. Hold rear pump discharge pipe brass fitting in front serv and loosen pipe nut. (Do not remove pipe from coupling). Loosen front and rear band adjusting lock nuts, then loosen adjusting screws approximately five turns each. Re-

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HYDRA-MATIC FRONT UNIT, REAR UNIT, & REVERSE DRIVE ASSY. (WITH UT HYDRAULIC REVERSE)

HYDRA-MATIC OVERHAUL (Cont.)

move front and rear servo attaching screws and take both servos out as a unit. NOTE:—As servos are lifted from the case, the rear pump discharge pipe will rotate in the coupling and fall free without bending the pipe. (The pipe is connected in the same manner when installing the servos to the transmission case). Remove the rear pump discharge pipe from the pump, then remove the front delivery pipe.

Main Oil, Control Valve Body. *NOTE:*—Governor runout may be checked at this point before removal of oil control body. (See "Governor Runout Check" instructions). Position manual control detent lever so steel ball is in the "LO" range detent position, then remove four valve body mounting screws. Remove control body by sliding forward along transmission case. Oil delivery pipes from valve body to governor sleeve may come off with valve body. If they do not come off with valve body, they should be pulled out of governor sleeve at this time.

Reverse Shifter Bracket Assembly. Remove mounting bolts and take off the reverse shifter bracket, being careful not to lose the shims, spring or roller.

Rear Oil Pump and Governor Assembly. Remove the two screws holding the rear oil pump and governor to transmission case. Rear oil pump and governor can be removed as an assembly by positioning one reverse drive flange attaching screw up. Governor must be rotated so that the large round governor weight is toward the front of the transmission while removing the assembly. Take the assembly from the case by moving it toward control valve assembly side of the case and raising rear of pump to clear case.

Pressure Regulator Assembly. Remove pressure regulator plug, spring and valve from side of transmission case, holding it under pressure during removal as it is under spring tension.

Front Oil Pump and Front Unit Drive Gear. Remove snap ring holding front unit drive gear on front end of intermediate shaft and remove steel and bronze thrustwashers from shaft. (NOTE:—These washers have a smaller diameter than similar washers used in the transmission and should be kept separate). Remove front pump retaining screws and copper washers from its counterbore. Snap ring pliers can be used for this. Front pump, gasket and front unit drive gear will now come off as an assembly. Remove bronze thrustwasher in front of planet carrier.

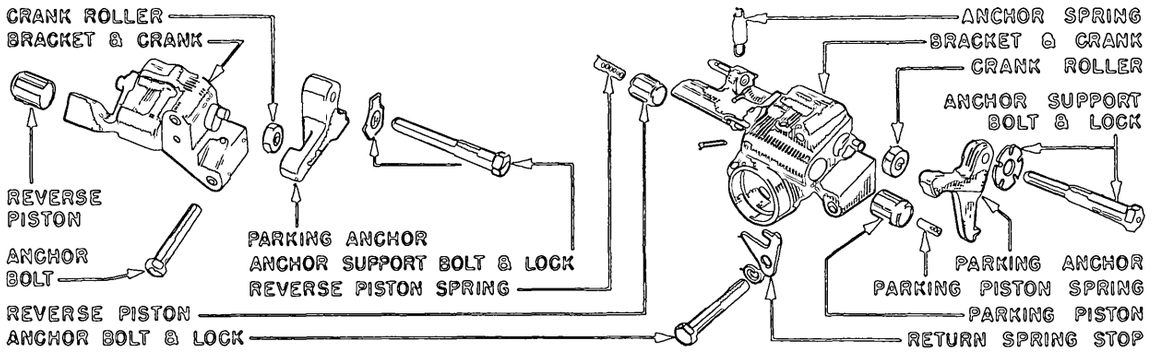
Check End Clearance of Main Shaft. Install main shaft End Play Guide J-2587 over main shaft and front planet carrier and set up dial indicator on transmission case using Tool J-1465. Insert screwdriver between front clutch drum and center bearing cap, holding front planet unit forward. The screwdriver should be placed at an angle to prevent damage to oil delivery sleeve. Move shaft back and forth. End Clearance should be .004" to .005". Be sure to get just the float in the shaft. Do not force hard enough to compress clutch release springs. (NOTE:—Record amount of end clearance so the proper size washer can be installed when transmission is reassembled). Remove indicator and special tools.

Reverse Gear Assembly and Main Shaft (Cars without Hydraulic Type Reverse): Loosen rear bearing retainer to reverse internal gear support attaching bolts. This aids in the disassembly after removal of rear bearing retainer from transmission case. Remove reverse drive flange attaching bolts and straighten reverse anchor support bolt lock. Then remove the reverse anchor support bolt and reverse anchor. Remove rear bearing attaching bolts and remove reverse assembly from transmission case. If assembly sticks, tap front end of main shaft with soft hammer.

▷*CAUTION:* The selective washer may stick to the main shaft or it may remain in the counterbore of the output shaft. Be sure to remove this washer when reverse assembly is removed.

Reverse Assembly and Main Shaft (Cars with Hydraulic Type Reverse): Remove rear bearing retainer oil seal and take out six center gear and drive flange attaching bolts. (Drive flange can be held from turning by bracing screw driver under drive flange bolt head). Install Tool J-2173 between center bearing cap and rear clutch drum to prevent drum from moving forward. Remove five bolts attaching rear bearing retainer to transmission case and carefully remove reverse assembly from transmission case. (If shaft sticks, tap on front end of drive shaft with rawhide hammer. *CAUTION*—The selective washer may stick to the main shaft or it may remain in the counter bore of the output shaft. Be sure to remove this washer when reverse assembly is removed. Remove stationary cone lock key).

Front and Rear Units. Install rear hub holding Tool J-2174 to rear unit drum, using a reverse drive flange attaching screw. Bend back edges of lock plate under two center bearing cap mounting screws, remove screws and bearing cap. Lift both front and rear planetary assemblies, with bands, from transmission case.



MECHANICAL REVERSE TYPE — HYDRAULIC REVERSE TYPE

REVERSE BLOCKER ASSEMBLY

OVERHAUL OF UNITS

OVERHAUL: Transmission Units.

Front Servo Unit, Disassembly. Separate front and rear servos from oil delivery pipes, then remove two capscrews holding front band release band to servo body, and remove front band release cylinder. Booster spring, retracting spring retainer and retracting spring can now be removed. Take front band release piston from cylinder and remove servo piston from servo body.

Remove pipe plug and lock wire holding 4 to 3 valve in place, and take valve from servo body.

Rear Servo Unit, Disassembly. Place rear servo in press and bring ram down to rest on spring retainer. Remove two retainer screws and lockwashers holding spring retainer to servo body. Release press slowly until servo springs are released, then remove servo from press. Take out servo spring retainer, accumulator spring, compensator piston and two compensator springs. Remove accumulator body and piston assembly from servo body. Rest the accumulator body on a vise with copper jaws and tap accumulator piston thru spring and accumulator body. Booster spring and booster piston can be taken from body.

▷*NOTE:* To replace a broken or leaking check valve in the accumulator, drive out the rivet holding check valve in place and remove check valve and plunger. Clean body and passages and install plunger. Install check valve, inserting the notch in the valve under the shoulder at the small end of the plunger. Insert new rivet thru valve and into body. Peen the rivet.

▷*NOTE:* Small bleed hole in valve must be over hole in body.

Oil Control Valve Body, Disassembly. (*CAUTION:*—Manual lever detent ball is under tension and may become lost unless care is taken to remove detent spring and steel ball). Move manual control lever slowly past reverse position while holding fingers around casting to catch spring and ball. Remove seal and two springs from manual control shaft. Remove the two screws holding inner and outer valve body castings together. Separate castings and remove separator plate. Remove three screws holding governor pipe end casting to valve body and take off the pipe end casting and separator. Remove cover plate from regulator plug casting. Take out the three screws holding regulator plug end casting to inner casting and remove end casting. Hold regulator casting and inner valve body together while removing screws to avoid springs jumping out of place. Remove 1st and 2nd regulator plug spring, 2nd to 3rd shifter valve spring and 3rd to 4th shifter valve spring. Remove the three shifter valves. Valves should be free to move from body by pushing on opposite ends against governor plugs with fingers. Remove three governor plugs. Take off detent ball and spring retainer and remove steel plate over compensator valve and throttle detent

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HYDRA-MATIC OVERHAUL (C nt.)

plug in outer body. Remove compensator valve, spring, and detent plug from outer valve body. Double transition valve will now slide out. Remove "T" valve, throttle valve spring and throttle valve. Remove the spring holding compensator valve auxiliary plug in place. Compensator valve can now be removed by inserting a 1/8" punch into hole in plug and using another punch to push valve from body.

Rear Oil Pump and Governor Assembly, Disassembly. Remove plug from governor oil delivery sleeve and pull sleeve off governor body. Mark edge of governor body and edge of governor drive flange so they may be reinstalled in the same position. Remove governor body from drive flange and remove oil seal rings from governor body, being very careful not to damage rings while they are being removed.

►*CAUTION:* Do not attempt to remove the governor weights.

Remove two screws retaining small governor plunger and bushing, and take out small governor plunger stop. Pull governor plunger and bushing assembly from body. Remove the four bolts holding rear pump cover to pump body and take off cover, internal tooth oil pump can then be removed.

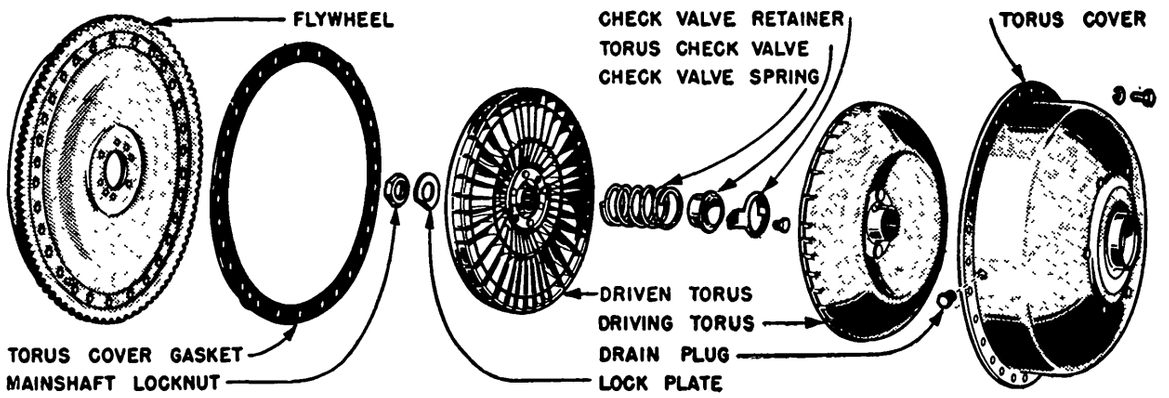
Front Oil Pump Unit Drive Gear, Disassembly. Remove front pump from front unit drive gear; tap gear with composition hammer if necessary. Hold front pump assembly with Tool J-2184-1. (*CAUTION:*—No attempt should ever be made to hold pump body by inserting bar into the intake bore or pressure regulator piston bore.) Remove two 1" long and one 5/8" long screws and copper washers from front pump cover, using an offset screwdriver. Remove one 1 3/8" screw and copper washer from rear of pump. Take front pump cover from body. (*CAUTION:*—Tap lightly with a soft hammer at dowel area but *DO NOT PRY WITH A SCREWDRIVER AS THIS WILL DAMAGE THE LAPPED SURFACE.)* Use care not to drop gears out of gear pocket when cover is removed. Remove by-pass valve and spring from pump body and take out both internal and external pump gears. Remove oil seal from pump cover and take two oil seal rings from front cover.

Reverse Gear and Main Shaft Disassembly (Cars without Hydraulic Type Reverse): Remove the speedometer driven gear and sleeve assembly from rear bearing retainer. Take out the five internal gear-support bolts and copper washers. Lift up rear bearing and remove by tapping end of output shaft with soft hammer. Remove open type snap ring from back of output shaft ball bearing. Lift gear, support and output shaft as an assembly and bump end of output shaft on block of wood. This will allow weight of internal gear and support to bump speedometer drive gear off end of output shaft. Remove reverse internal gear support snap ring and internal gear. With a soft hammer tap the ball bearing from internal gear support.

►*CAUTION:*—Do not disassemble the reverse center gear and drive flange assembly as this is serviced as a complete unit.

Remove steel and bronze thrustwashers from output shaft and remove bearing retainer seal.

Revers Gear and Main Shaft Disassembly (Cars with Hydraulic Reverse): Remove stationary cone lock key and speedometer driven gear and sleeve assembly from rear bearing retainer. Remove snap ring on output shaft inside of rear bearing retainer at



HYDRA-MATIC TORUS ASSEMBLY

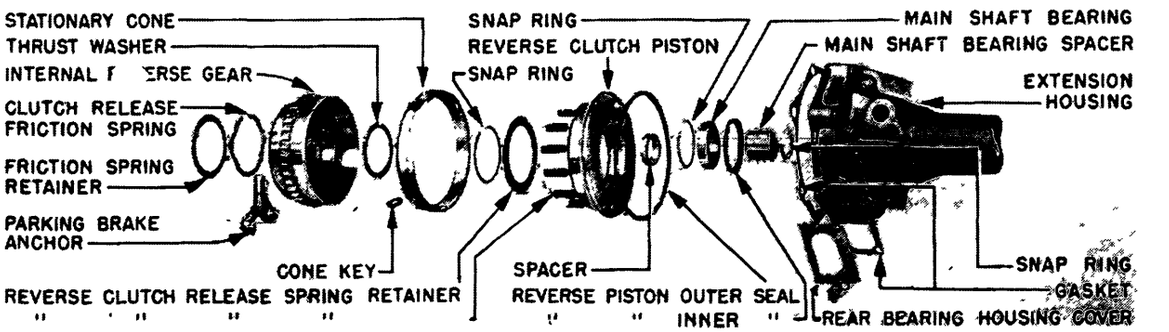
ball bearing. (This snap ring is smaller than other snap rings used in transmission). With output shaft standing on carrier end, remove bearing retainer from output shaft (It may be necessary to tap output shaft with soft hammer while holding rear bearing retainer to separate units). Remove reverse internal gear and stationary cone from rear bearing retainer by compressing stationary cone by hand. Remove snap ring locating ball bearing in rear bearing retainer. (Install new snap ring when assembling). Remove ball bearing from retainer and with Tool J-4670, compress reverse cone clutch release coil springs and remove large snap ring. Take out spring retainer and coil springs (6). Pull reverse piston straight out (do not attempt to turn piston as it is located by four dowel pins). Remove outer oil seal from reverse piston and inner oil seal from hub of rear bearing retainer and take large thrust washer from reverse intenal gear. By using large snap ring pliers, expand stationary cone and remove from internal gear, then remove clutch release flat spring and retainer. Remove snap ring holding planet carrier to output shaft and remove carrier, now remove the remaining snap ring and remove sun gear and drive flange assembly from output shaft.

Rear Unit and Front Unit from Intermediate Shaft. Remove both bands and place intermediate shaft with front and rear planet assemblies into holding fixture J-2190. Remove rear clutch hub snap ring lift rear unit and rear clutch hub as an assembly from intermediate shaft. Remove rear clutch hub front snap ring from intermediate shaft and take off oil delivery sleeve. Remove snap ring back of front unit center gear. (*CAUTION:*—Hold snap ring open to avoid damaging bearing surface on shaft.) Front unit can now be taken from shaft. Remove steel and bronze thrustwashers from drum back of front unit center gear. (NOTE: These washers are similar to those used ahead of the front unit and should not become mixed.)

Front Unit, Disassembly. Place front unit in press and apply enough pressure to allow the snap ring to be removed. Take assembly from press and separate the drums by tapping front face of center gear with soft hammer. (*CAUTION:* Use care not to lose springs.) Remove annular piston from clutch drum by bumping front face of center gear on soft wood block. Take out the inner and outer clutch release springs and remove composition and steel clutch plates. (NOTE—The number of clutch plates vary with transmission models). With a blunt edge screw driver, remove rubber seal and brass liner from annular piston and clutch drum piston.

Rear Unit, Disassembly. Remove rear clutch hub Tool J-2174, and take clutch hub and front thrustwasher from drum. Place rear unit in press and remove drum retainer snap ring. Remove the assembly from press and separate the drums by tapping lightly on rear thrust face of drum with block of wood and light hammer. Tap clutch drum on block of wood and remove annular piston. Remove inner and outer clutch release spring and guide pins. (NOTE—Front

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HYDRAULIC TYPE REVERSE ASSEMBLY

HYDRA-MATIC OVERHAUL (Cont.)

and rear clutch release springs are interchangeable but guide pins are used only in rear unit). Remove composition and steel clutch plates. (NOTE—The number of clutch plates vary with transmission models). Remove two filister head cap screws that retain rear unit internal gear to drum and remove internal gear by tapping lightly with a soft hammer. Remove seals and brass liner from piston.

ASSEMBLY OF UNITS

ASSEMBLY: Before assembly of transmission and the component units is attempted, a thorough inspection should be made of each part. It is very important to distinguish between parts that are simply "worn in" and those worn to the extent they effect the operation of the unit. Only worn, broken or damaged parts should be replaced.

Pressure Regulator Valve. Inspect pressure regulator valve, spring and gasket for damage. Valve must have free fit in front pump body and end coils of spring must fit freely over valve.

▷Modulated Pressure Regulator Assembly. Overhaul of this unit is the same as for previous models. A modulated oil line valve has been added to this assembly, fitting into the plug, which is now sealed with a neoprene gasket. Do not use this type regulator valve on earlier models.

Front Unit Assembly: Inspect both bands for burned or worn lining and check steel bands for distortion or cracks, inspect strut on rear band for alignment and free pivoting. The rear band is furnished with strut attached. Inspect anchor ends of front band for broken welds or worn sockets.

CAUTION: Do not pry either band open or distort band in any manner as they are surface ground at the factory for drum fit.

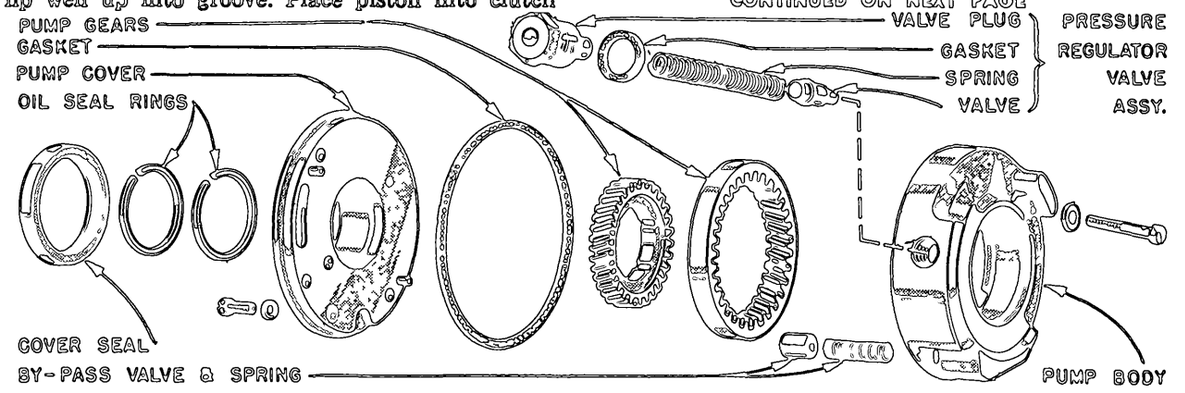
Place intermediate shaft assembly in holding fixture J-2187 with clutch hub up. Place front unit drum over hub to rest on pinion gears with drive pin up. Install clutch into front drum, alternating plates, beginning with a composition (drive) plate and finish with a steel (driven) plate. Assemble the driven plates with square notches over the drive pins. (*NOTE:* Apply Hydra-Matic oil to face of each plate surface as assembled.) Install inner and outer clutch release springs thru plates into holes in drum unit. Now take the clutch drum and install new inner brass expander into ring groove in clutch drum, with expanding ring down. While holding brass expander in position, work new inner piston rubber seal into ring groove with lip down, over brass expander. (*CAUTION:* Work expander well back into position under seal so brass edges are not exposed.) Place new large rubber seal over front piston beyond seal groove. Install new large brass expander in piston, work seal well into groove. Install piston into clutch drum resting on large outer seal. Align square notches in piston with holes in drum. While applying pressure slightly to piston, guide seal into bore with flat side of blunt screwdriver. Install front clutch drum and piston assembly over intermediate shaft into front drum assembly. (*CAUTION:* Be sure clutch release springs enter into recesses of clutch piston.) Lift front unit assembly off intermediate shaft, place in press and press clutch drum below snap ring groove. Install clutch drum snap ring, positioning gap of snap ring between two snap ring holes. (*CAUTION:* Snap ring must be well seated into groove to prevent interferance with ledge on drum.) Release assembly from press and tap face of sun gear with a soft hammer so the clutch drum will seat against the snap ring. Remove intermediate shaft from holding fixture and insert hub into drive plates and drum by rolling drum on bench while pressing firmly into position. Place assembly into holding fixture and install bronze, then steel thrustwasher over intermediate shaft. NOTE: Locating lug on steel washer must fit over flat portion of shaft. Install snap ring.

▷*CAUTION:* If flakes of facing material can be removed by scratching the surface with thumbnail, the plate should be replaced. Discoloration is not an indication of failure.

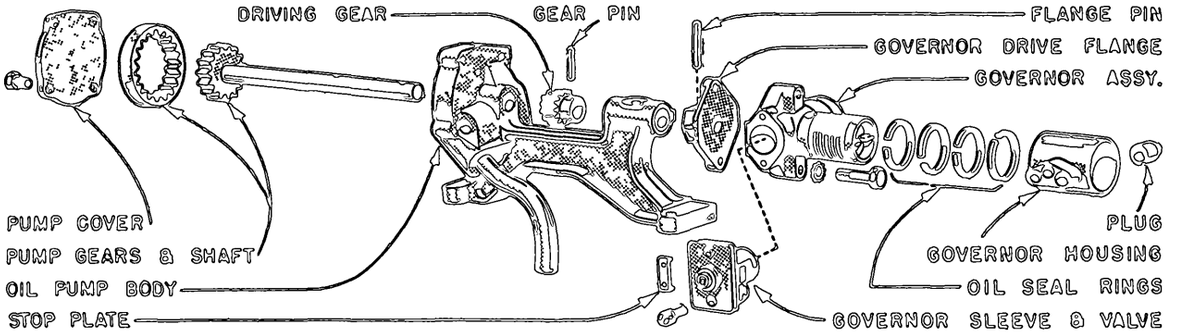
Rear Unit, Assembly. Place rear unit drum, less internal gear, on the bench with drive pin up and install the drive and driven plates into drum beginning with a composition (drive) and finish with a steel (driven) plate. Assemble driven plate with square notches over drive pins. (NOTE: Apply Hydra-Matic oil to face of each plate as assembled.) Position new inner rubber seal on clutch drum above groove. Install new small brass expander into ring groove of clutch drum with expander ring down. While holding the brass expander in position, work the rubber seal into ring groove with lip down over brass expander. (*CAUTION:*—Work brass expander well back into position under seal so brass edges are not exposed.) Place new large rubber seal over rear piston beyond ring groove and install new large brass expander in piston with lips up. While holding expander in position, work rubber seal with lip well up into groove. Place piston into clutch drum resting on outer rubber seal. Align square notches in piston with holes in drum. While applying alight hand pressure to piston, guide seal into bore with a blunt screwdriver. Install rear clutch drum and piston assembly over drive pins into drum unit. Install clutch drum snap ring, positioning gap of ring between two drive pin holes. (NOTE: With a wooden block and hammer, tap clutch drum until clutch seats against snap ring.) Install inner and outer clutch release springs and guide pins. Assemble rear unit inernal gear to rear drum, locating on dowel, and install and tighten two filister head screws. Install front bronze thrustwasher into deep counterbore in rear clutch hub and retain with grease. Install rear hub and thrustwasher into clutch drive plates. Rotate hub and drum on bench to mesh splines with teeth of plates. Install rear clutch hub holding Tool J-2174 on rear drum to hold hub in place. Install oil delivery sleeve over intermediate shaft with long bearing up. Compress exposed oil delivery sleeve rings with ring compressor J-1537 and tap oil delivery sleeve into bore of front clutch drum with soft hammer. Install rear clutch hub front snap ring into second groove on intermediate shaft, and install snap ring.

Reverse Unit Reassembly (Cars without Hydraulic Reverse): Install the steel then the bronze thrust washer into thrust washer retainer on reverse sun gear and flange assembly. Retain in place with grease. Install output shaft into reverse sun gear and drive flange assembly, seating shaft firmly against washers, then holding shaft firmly against washers, stand

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HYDRA-MATIC FRONT OIL PUMP & PRESSURE REGULATOR VALVE

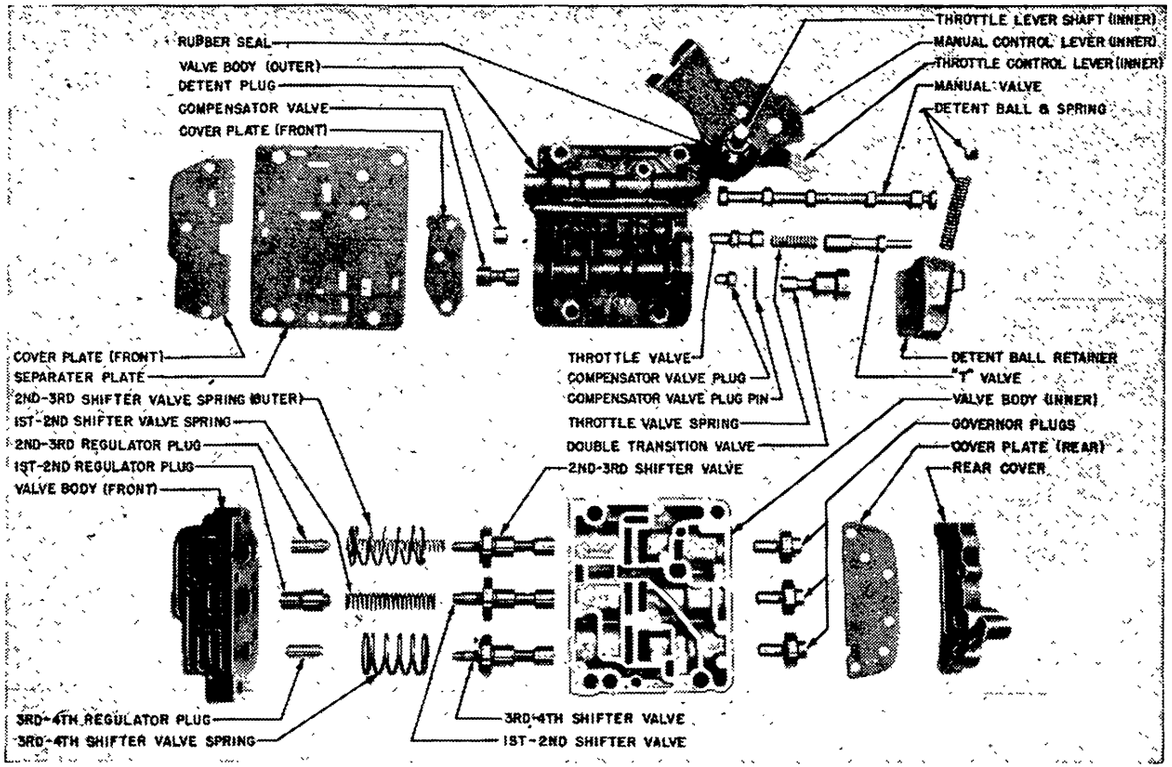


HYDRA-MATIC REAR OIL PUMP & GOVERNOR

HYDRA-MATIC OVERHAUL (C nt.)

shaft on pinion end. Install sun gear snap ring. Place reverse planet carrier over output shaft with bronze oil pump gear down, meshing pinion with sun gear. Assemble reverse internal gear on gear support and install large snap ring. Place internal gear and support over output shaft meshing internal teeth with pinions. Place ball bearing over output shaft and tap into counterbore of internal gear support. Install open type snap ring in groove of output shaft behind inner race of ball bearing. Install a new bearing retainer seal. Slide rear bearing over output shaft and line up attaching bolt holes in retainer with bolt holes in internal gear support. Tap housing in place with a soft hammer. Dip threads of five attaching bolts, and copper washers in Permatex No. 3. Install bolts and tighten finger tight. Final tightening is done with retainer in case.

Reverse Unit Reassembly (Cars with Hydraulic Type Reverse): Hold reverse center gear in left hand with drive flange up; install the steel thrust washer, and then the bronze thrust washer in drive flange recess. Still holding reverse center gear in left hand, insert output shaft end through drive flange and center gear until carrier bottoms on the two thrust washers. Hold drive flange and center gear tightly against the carrier to keep thrust washers from moving and set assembly on the bench with carrier end down. (*CAUTION*—Do not pick up this assembly until completely assembled to prevent washers from slipping out of place). Install reverse planet carrier over output shaft with bronze drive gear down, meshing pinions with the sun gear. (Be certain unit is bottomed against reverse planet carrier snap ring). Install snap ring on output shaft to position planet carrier. Install reverse clutch release flat spring and spring retainer on internal gear side of reverse internal gear. Make certain spring is in recess. If retainer tips are misaligned, preventing centering, use new retainer. Install reverse stationary cone on reverse internal gear cone, using large snap ring pliers to spread stationary cone. (*CAUTION*—Do not spread cone more than necessary.) Install large bronze thrust washer over collar of internal gear. Install outer seal on cone piston with seal lip toward flat side of piston, and work well into groove. Install inner seal with lip down and work well into groove. Install reverse cone piston in rear bearing retainer (using Tool J-4752) so it rests on the four dowel pins. Turn the reverse cone piston until the four dowel pins are aligned with holes in piston and carefully push piston into retainer. (*CAUTION*—Use extreme care when installing, to prevent damage to seal). To make certain piston is fully seated, lay a straight edge across face of piston and measure from straight edge to face of rear bearing retainer. The measurement should be 3/8" to 13/32". Install the six clutch coil springs and spring retainer. Compress springs with Tool J-4670 and install large snap ring, holding retainer in place, and remove tool. Install ball type bearing in rear bearing retainer, making sure bearing is fully and squarely seated. Install new large special type snap ring in rear bearing retainer, locating ball bearing. Install internal gear and stationary cone into rear bearing retainer, compressing cone by hand (Position keyway of stationary cone so it will line up with keyway in case when installed.) With output shaft standing on carrier end, place rear bearing retainer over ouptput shaft and mesh carrier gears with internal gear. (*CAUTION*—Use care to prevent damage to bushing and ball bearing in rear bearing retainer. Install snap ring on output shaft, locking rear bearing retainer to output shaft (This snap ring is smaller than other snap rings used in transmission). Install speedometer gear in rear bearing retainer and install retainer gasket. Install stationary cone to case lock key, holding in place with petrolatum until installing in case.



HYDRA-MATIC DRIVE CONTROL VALVE ASSY. (FIRST TYPE)

Front Pump Assembly. Inspect pump drive and driven gears for damaged teeth or scored end surfaces. Inspect pump body for scored gear pockets and check all passages for obstruction. Be sure small drilled hole at end of pressure regulator valve bore is open. Inspect bushing in body for wear or scores. Slight wear of the bushing in the front pump body is permissable as long as the wear is not sufficient to effect the operation of the transmission. If excessive wear is present on one side of the pump bushing, a careful check should be made of the torus cover runout at the hub which must not exceed .005" total dial indicator reading. Inspect pump cover for scored surfaces, loose dowels, or obstructed passages. Check oil seals for damage and freedom in grooves, and inspect front drive gear for scored surfaces, worn bushings, or damaged teeth. Relief valve must be free in bore and free length of spring must be 1-25/64".

If necessary, install new oil seal rings in pump cover. *CAUTION:* Check new ring gap in torus cover before installing rings in pump cover. (Gap .001" to .007".) New seal in pump cover must be installed with step side up. Drive seal into place with Tool J-2170. Apply sealing compound around edge of cover and seal. Using Permatex No. 3. Lubricate both pump gears with Hydra-Matic fluid and install both gears in gear pockets of body. (Be sure Prussian Blue side of driven gear is up.) Install the relief valve spring, and relief valve into pump body. Press down on valve and insert feeler stock in slot to hold valve down. Install pump body, locating over dowels. Apply sealing compound under heads of screws. Install screws and new copper washers. Hold pump with Tool J-2184-1 and tighten screws to 12-15 lbs. ft. torque. Remove feeler stock from relief valve. Turn pump assembly over and install screw using a new copper washer. Torque to 12-15 lbs. ft. Assemble the front pump over front drive gear, aligning keys to keyway.

Governor and Rear Pump, Assembly. Inspect pump gears for damaged teeth and check cover and gear pockets in body for scores. Inspect ring lands and rings for freedom in grooves. If lands are damaged or worn thin replace the complete governor assembly. Inspect both G-1 (round shaped) and G-2 (square shaped) governor valves for free movement. Both plungers should have a free movement of from .118" to .148". Inspect oil delivery sleeve for ring scores and governor plug for freedom in its bore. In-

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HYDRA-MATIC OVERHAUL (C nt.)

stall pump driven gear (inner) and shaft with (inner) drive gear in pump body, sliding (outer) driven gear on shaft. Install pump cover. Install governor drive flange on pump shaft. Line up holes in gear and drive flange within pump shaft and install new pins. Peen ends of pins using Tool J-2183-1 and S-2183-2. (*CAUTION:* Height of peened end of pins must not exceed .070".) Install G-2 governor plunger and bushing assembly in governor body, with slot in bushing for governor plunger stop, up. Install and tighten G-2 governor plunger and bushing assembly attaching screws and lock washers. While holding G-2 plunger in, install the plunger stop with the two small holes up. (*CAUTION:* Be sure stop does not extend above surface of governor body.) If needed, install governor oil seal rings on governor body. Check ring gap in oil delivery sleeve (Gap .001" to .007"). Install oil delivery sleeve with chamfer next to governor body; use care not to damage rings while compressing them into oil delivery sleeve. Position governor assembly on drive flange, lining up locating marks. Install governor body to flange bolts and lockwashers. Tighten to 6 to 8 lbs. ft. torque. Install governor sleeve plug.

Front Servo, Assembly. Inspect all parts for scores, broken rings, freedom of ring in grooves and dirt in passages. Inspect servo springs for distortion of collapsed coils Booster Spring length 61/64", Retracting Spring length 1 33/64", Release Spring length 1 29/32" Install and tighten brass fitting into servo body Install 4 to 3 valve into bore of body and align slot with hole for valve retainer and install retainer Install screw plug over 4 to 3 valve and install dowel pin if removed from servo body Install servo piston into body and align slot in sleeve over dowel pin Install front band release piston into cylinder, using care when compressing spring Place booster spring over front band release piston and place retracting spring retainer over piston stem on booster spring Place retracting spring over piston stem Place band release cylinder assembly on servo body Cylinder should seat squarely on body before bolts are installed Insert and tighten attaching bolts and lockwashers

►**Modulated Front Servo Assembly.** Apply piston increased in size, and ball check replaced with a flat valve. **Do not use on earlier models.**

Rear Servo, Assembly. Inspect actuating lever for free operation and worn socket. Check servo body, pistons, and accumulator body for scores. Clean all passages. Be sure check valve is not broken and the check valve plunger is free. Inspect all servo springs for damage or collapsed coils. Free length of springs in the rear servo are Rear Servo Main Spring 4 11/32", Accumulator Apply Spring 1 15/64", Booster Spring 1 17/32", Compensator Outer Spring (To Early 1951) 3 15/32", (Late 1951) 3 59/64", Compensator Inner Spring (To Early 1951) 3 25/32', (Late 1951) 3 15/32" Install accumulator piston in accumulator body, using care not to damage piston ring Install accumulator apply spring over stem with small tapered end seated against shoulder Install boooster spring in booster piston Make sure spring fits snugly in recess in bottom of booster piston Install booster piston in accumulator body Install accumulator assembly in servo body, using care not to break the booster piston ring Place two compensator springs in bore of accumulator piston and install compensator piston over springs Place servo spring and retainer with attaching bolts and lockwashers in position and place complete assembly into press Slowly compress springs while tightening mounting screws (CAUTION—Use extreme care to avoid breaking oil seal rings on compensator piston) Test operation by applying air to rear band release passage

►**Modulated Rear Servo Assembly.** New "Quick Dump" feature eliminates long pause shifting to reverse **Do not use on earlier models.**

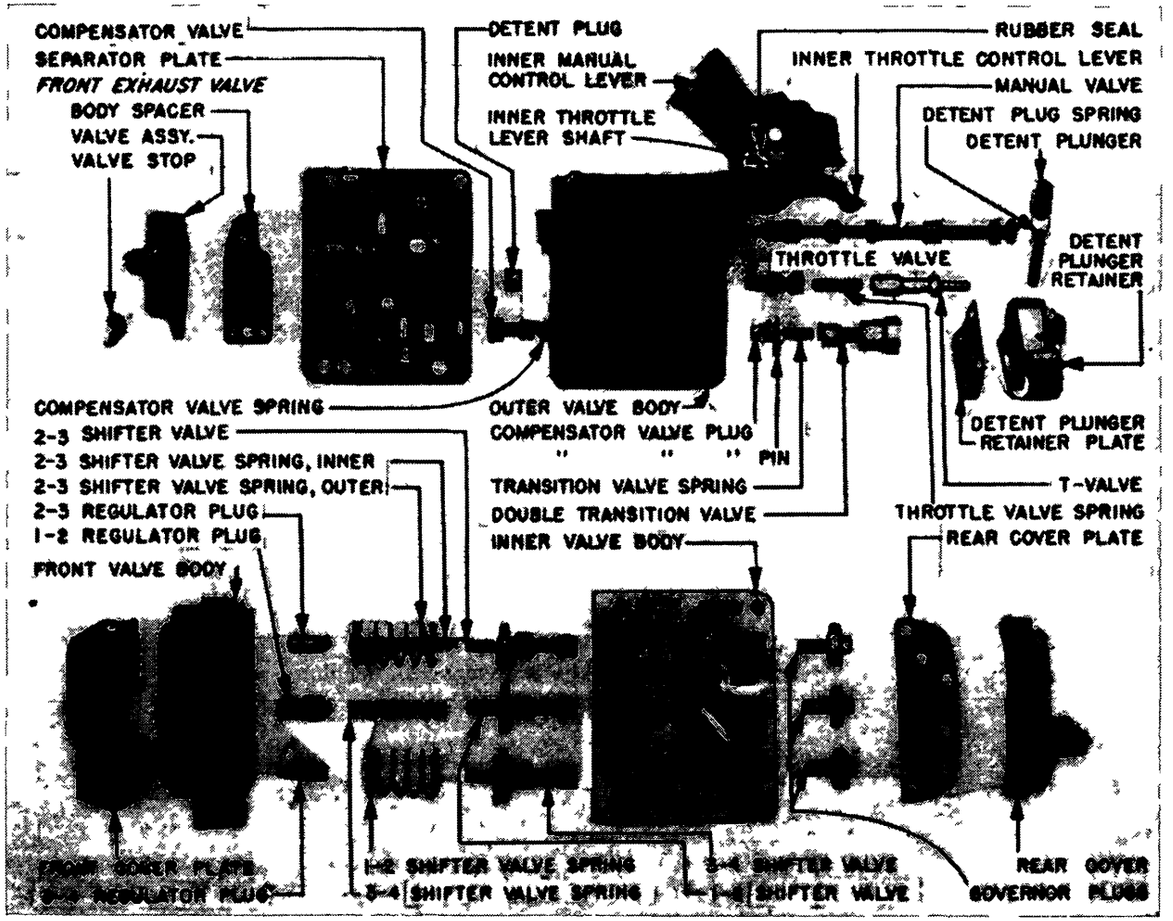
Driven Torus Check Valve, Assembly. Position torus check valve spring over hub of driven torus member and place check valve over hub. Place check valve retainer over valve and press assembly against torus hub and tighten in place with attaching bolts. Bend ends of retainer against flats of bolts. Press down on valve to check for free movement.

Oil Control Valve: ***CAUTION—See Oldsmobile Whirlaway Transmission Note (at end) for modtifications which may have been made in control valve to permit the transmission to start in first gear with selector lever in "Dr".***

Assembly—Clean valves and bodies thoroughly with gasoline and inspect carefully to see they are not damaged and are free from burrs. Burrs can be removed by using fine crocus cloth. (*CAUTION:*—This type of valve has sharp edges to prevent dirt from wedging between valve and body. Therefore, when removing burrs, do not round off corners and edges.) Check all moving parts of valve for free movement in their bores and operating positions.

►*NOTE:*—The manual control valve is the only valve furnished separately. If it becomes necessary to replace one of the other valves or one of the bodys, a complete front or rear valve body assembly may be replaced. The spacer plate between the inner and outer body assemblies is also furnished separately. Check the fit of the throttle valve inside lever and shaft in hub of the inside manual control lever on the outer valve body. If the shaft binds in the hub or is excessively worn, or if the oil seal is missing or damaged, repairs are necessary. Proceed as follows: Drive out throttle valve shaft pin. Replace the throttle valve inside lever and shaft and oil seal. To assemble control valve, carefully assemble compensator auxiliary plug into the outer valve body, using a punch to hold plug. Install plug pin. Install throt-

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HYDRA-MATIC DRIVE C NTR L VALVE ASSY. (LATER TYPE)

HYDRA-MATIC OVERHAUL (C nt.)

tle valve, throttle valve spring, "T" valve and detent plug. Install compensator valve and spring and double transition valve. Check for freeness. Install outer valve body front plate on outer valve body being sure the inner throttle lever is inside of stop, and install screws holding retainer to valve body. Install the manual control lever. To do this: Rotate inside manual control lever counterclockwise past the reverse position. Insert manual valve detent spring in bore of detent ball retainer. Insert detent ball over spring. Push ball and spring into bore with fingers while rotating manual control lever clockwise into "LO" position. Install manual shaft seal inner washer with small inside diameter over manual control shaft, dish up. Install manual shaft seal outer washer with large inside diameter over manual control shaft, dish down. Install the rubber manual shaft seal over the shaft with lip extending into the inside diameter of outer washer. *(See Control Valve Assembly Illustration.)* Install regulator plugs 1-2, 2-3, and 3-4 in front valve body and check for freeness. Install the three governor plugs in inner valve body. Install shifter valves 1-2, 2-3 and 3-4 in inner valve body and check for freeness. Install inner valve body plate and valve body rear cover on body. Install 1-2 regulator plug spring in valve body. 2-3 valve spring, 2-3 regulator plug spring and 3-4 valve spring can be installed. Lay front valve body and inner valve body on clean surface, line up regulator springs in inner body with regulator plugs in front body. Compress springs with front body and install attaching screws. Position front body plate on front body and install screws. Be sure plate does not extend over face of inner body. Position the valve body spacer plate on the inner body, position outer body on spacer plate and insert the four valve body to transmission case attaching bolts through valve bodies and spacer plate to hold spacer plate in position while tightening the inner and outer valve body attaching screws.

►**Modulated Oil Control Valve Assembly.** Identified by three attaching bolts instead of two.

CAUTION—Previous type oil control valve assemblies must not be used on modulated pressure transmissions.

►*OLDSMOBILE WHIRLAWAY TRANSMISSION NOTE*—Some transmissions have been modified to permit car starting in first gear with selector lever in "Dr" position: (1) 1-2 Governor Plug Spring removed and discarded (accessible by removing governor plug end casting from valve body). (2) Special Bushing No. 562189 inserted in oil orifice behind 1-2 shifter valve to reduce diameter of orifice to .078" (bushing should be driven into hole with punch and light hammer so that top is flush with casting). See Linkage Adjustment and Band Adjustment for special settings used when these modifications made.

REASSEMBLY OF TRANSMISSION (INSTALLATION OF UNITS)

INSTALLATION OF UNITS IN TRANSMISSION CASE.

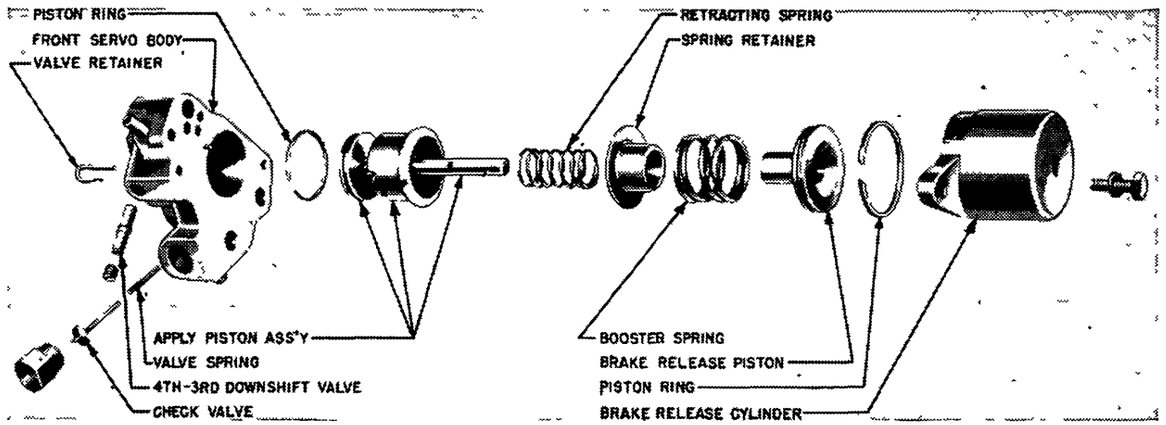
Front and Rear Units. Remove front and rear units from holding stand and position front band over front unit drum so short anchor end will be positioned to fit over adjusting screw when units are placed in case. Install suitable spring or wire to hold front band on front drum. Install front and rear units in case by lowering front end of intermediate shaft into case first. Remove spring and position anchor end of band over adjusting screw. Position center bearing cap over oil delivery sleeve. Lightly tap bearing cap in place. Install a new center bearing cap lock plate under attaching bolts and tighten to 40-50 lbs. ft. torque. Bend lock plate up around bolts, using large pliers. (*CAUTION:* Do not use screwdriver to pry corners of lockplate up, as this may damage lapped edge of transmission case.) Install screwdriver between center bearing cap and rear clutch drum to keep drum from moving forward. Remove rear clutch hub holding tool from drum. Position rear clutch hub rear thrustwasher in the counterbore of rear hub and retain with grease. Install correct size washer in counterbore of output shaft and retain in place with grease. (NOTE: If main shaft did not have correct end clearance prior to disassembly, select proper washer to bring end clearance within limits of .004-.015".) Selective washers are furnished in the following six sizes:

Mark	Size	Mark	Size
1	.055-.059	4	.079-.083
2	.063-.067	5	.087-.091
3	.071-.075	6	.095-.099

Install a new rear bearing retainer to transmission case gasket on retainer, align holes and retain in place with grease. Install main shaft in output shaft and position reverse assembly into rear end of transmission case so mounting bolt holes aligned.

►*NOTE:* Revolve output shaft to facilitate meshing planet gears with rear unit internal gears.

Position reverse anchor in transmission case and install reverse anchor support bolt and lock. Do not tighten bolt. Start rear bearing retainer to case attaching bolts and lockwashers. Align holes in reverse flange and rear durm and install reverse drive flange bolts and lockwashers. After two bolts are entered finger tight, remove screwdriver. Tighten bolts to 10-13 lbs. ft. torque. (*CAUTION:* Tighten the six bolts evenly without distorting flange.) Push rear bearing retainer against case, then tighten mounting bolts and rear anchor support bolts evenly to 28-33 lbs. ft. torque. Turn up anchor support bolt locks. Tighten rear bearing retainer to reverse internal gear support bolts to 28-33 lbs. ft. torque. Test for freeness by turning mainshaft, output shaft and front and rear drum units.



HYDRA-MATIC DRIVE FRONT SERVO

Front Pump and Front Drive Gear. Position bronze thrustwasher over intermediate shaft and place pump cover gasket over front pump cover. Install front pump and front drive gear assembly over intermediate shaft. Align locating counterbore in pump cover with counterbore in case. Install pump locating washer in counterbore and install pump attaching bolts (with flat copper washer) finger tight. (NOTE: These bolts will be tightened after front servo is installed.) Install the bronze, then the steel thrustwasher over intermediate shaft against front end of front drive gear. Install snap ring holding thrustwashers in place. Install open type snap ring in groove on main shaft.

Governor and Rear Pump Assembly (Cars with Hydraulic Type Reverse): Before installing the rear pump, make certain the pump to case mating surface is free of nicks and burrs, and that attaching bolt holes in the case have a good chamfer. Position large round governor weight to front of transmission and locate one reverse drive flange attaching bolt up, to provide clearance for pump and governor assembly to slide into case.

Governor and Rear Pump. Position the large round governor weight to the front of transmission and locate one reverse flange attaching bolt up, to provide clearance for pump and governor assembly to slide into transmission case. Slide the pump and governor assembly into position in case and install and tighten attaching bolts and lockwashers to 15-18 lbs. ft. torque.

Oil Control Valve. Install three oil delivery pipes into holes in governor oil delivery sleeve and pull oil delivery sleeve out ⅛". With inside manual lever in "LO" position, push control valve assembly onto oil delivery pipes. Lower control valve assembly into position and push delivery sleeve in to bring control valve assembly against case. Install attaching bolts and lockwashers and tighten to 6-8 lbs. ft. torque. (NOTE:—Be sure governor oil delivery sleeve plug is in place.)

Check Governor Runout. Mount dial indicator on side of transmission case so that point of indicator rests against governor oil delivery sleeve. Rotate main shaft several revolutions and note runout of sleeve as measured on indicator. Total runout should not exceed .005". If within this limit, check no further.

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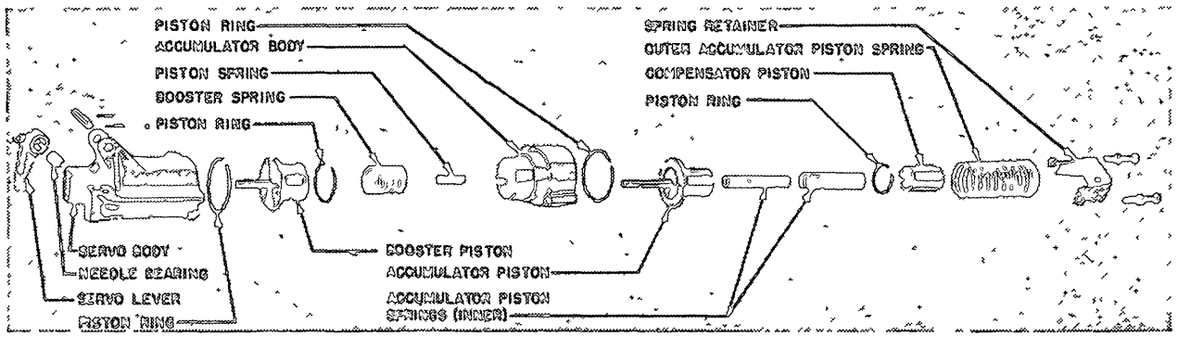
HYDRA-MATIC OVERHAUL (Cont.)

If runout exceeds .005", mark position of governor body on drive flange. Remove control valve assembly and remove bolts holding governor body to drive flange. Rotate main shaft and note runout of drive flange as measured on dial indicator. This should not exceed .002". If runout exceeds this limit, replace governor drive flange, gear set, or complete rear pump assembly. If runout of flange is less than .002", rotate governor body 180° from original position and reinstall governor body on flange. Recheck for runout, and if limit is still exceeded, replace governor and sleeve.

Reverse Shifter Bracket Installation (Cars without Hydraulic Reverse): Position retracting spring & roller on bracket assembly and assemble bracket and shims to transmission case. Tighten bolts to 15-18 lbs. ft. torque. Check backlash between reverse internal gear and anchor as follows: Install reverse gear backlash gauge J-2650 and dial indicator. Place inside manual lever in reverse position and hold reverse anchor against bolt with screwdriver to remove float. Rock reverse gear with Gauge and take reading on dial indicator. Remove or install shims between reverse bracket and transmission case to obtain correct backlash of .016" to .049". To increase backlash add shims.

Front & Rear Servo Installation (Cars without Hydraulic Reverse): Install front pump discharge pipe in front pump body and insert plain end of rear pump discharge pipe into hole in rear pump. Position front servo with piston stem in socket on end of front band, place servo on front pump discharge pipe, enter rear pump discharge pipe into brass fitting in servo. Lower servo on case. Enter front servo attaching bolts and lockwashers. Do not enter more than 2 or 3 turns. Place rear servo in position engaging rear band strut with actuating lever while entering oil transfer pipe from front servo. Enter rear servo attaching bolts, then tighten all four servo bolts to 23-28 lbs. ft. torque. Tighten coupling end of rear pump discharge pipe in front servo. Install front pump intake pipe to front pump, using a new gasket and attaching bolt locks. Tighten bolts to 10-12 lbs. ft. torque and bend locks up against flat of bolts. Tighten front pump attaching bolts, with copper washers to 10-13 lbs. ft. torque. (NOTE:—Cover should protrude .003" to .015" out of case. If cover protrudes less than .003" add a pump cover gasket to allow cover to protrude within limits.

Front and Rear Servos (Cars with Hydraulic Reverse): Install front pump delivery pipe in front pump body and position front servo with piston stem in slot on end of front band; place serve on front pump delivery pipe and push servo into position against case. Enter front servo attaching bolts and lock washers about three threads. Enter rear pump discharge pipe into passage in front servo and rear pump. Place rear servo in position, engaging rear band strut with actuating lever while entering oil transfer pipe from front servo. Enter rear servo attaching bolts and tighten. Install rear pump bolts and tighten. Check governor runout (see below). Install front pump intake pipe to front pump, using a new gasket and attaching bolt locks. Tighten attaching front pump intake pipe bolts and secure [illegible] by bending against bolt heads. Tighten the front pump attaching bolts. NOTE—Cover should protrude .003" to .015" out of case. If less than .003", add a pump cover gasket.



HYDRA-MATIC DRIVE REAR SERVO

Parking Brake Bracket and Control Valve (Cars with Hydraulic Type Reverse): Remove parking brake pawl support bolt from case (this bolt was previously installed to insure alignment of threads). Install pawl into position in case, but let pawl slide down as far as possible. DO NOT INSTALL PARKING BRAKE PAWL SUPPORT BOLT. Install three oil delivery pipes into parking brake bracket assembly, then place chamfered side of oil delivery sleeve over end of the governor and press gently on, guiding rings into the oil delivery sleeve. Install blocker piston spring, piston release spring stop and start bracket to case bolts into case. Install roller on pawl crank, raise pawl to position and install support bolt and lock plate. Tighten bolt and bend lock plate over flat of bolt. Install pawl return spring over inside oil delivery pipe and hook other end over parking brake lever pin. Install reverse clutch pipe with "L" end in rear of transmission case, then install control valve assembly over three oil delivery pipes and reverse clutch pipe and start bolts. Press valve body and bracket assembly against case and tighten the bolts evenly. Torque to 6-8 ft.lbs. With the rear pump bolts and parking bracket bolts loose, install governor to sleeve aligning tool J-4731 over governor. Turn rear pump to several positions and rotate the tool in each position to be certain no bind exists. Shift the rear pump or parking bracket slightly if necessary to relieve bind. Tighten the rear pump and parking bracket bolts to 15-18 ft. lbs. Install pressure regulator reverse oil pipe.

Adjust Front Band. Remove the pipe plug from front servo. Loosen adjusting screw of Gauge J-1693, until ⅛" of threads are exposed above gauge body. Install gauge, tightening by hand only. Tighten the gauge adjusting screw with fingers until the stem of the gauge is felt to just touch piston in front servo. (NOTE:—While tightening screw, be sure band is lined up over drum.) Tighten adjusting screw on gauge, six complete turns from the point where it was felt by hand that stem just touched piston. Tighten front band adjusting screw until knurled washer on top of adjusting gauge is just free to turn. Hold band adjusting screw and tighten band adjusting screw lock nut securely to 40-50 lbs. ft. torque. Loosen gauge adjusting screw at least six full turns, remove gauge, install pipe plug.

Adjust Rear Band. With rear band centered on drum, tighten band adjusting screw until actuating lever contacts face of Gauge J-5071. (*CAUTION:* Do not go beyond adjustment. If adjusting screw is accidentally turned beyond adjustment, loosen two or three turns and repeat adjustment.) Hold band adjusting screw and tighten lock nut to 40-50 lbs. ft. torque.

Pressure Regulator and Pressure Line Plug. Place a new gasket over pressure regulator plug. With regulator valve and guide assembled into spring, locate valve on seat in front pump. Apply pressure on regulator plug and tighten in transmission case to 40-50 lbs. ft. torque. Apply sealing compound (Permatex No. 3) to threads of oil pressure line pipe plug and install plug between band adjusting screws.

Transmission Oil Screen and Pan. Slide oil screen over front pump intake pipe and position over rear pump intake pipe. Install oil pan on transmission case, using a new gasket, and tighten attaching bolts to 10-13 lbs. ft. torque. Install new drain plug screw gasket and tighten plug to 35-45 lbs. ft. torque.

Flywheel housing, Torus Cover and Members. Position housing on front of transmission and install attaching bolts and lockwashers. Tighten to 80-90 lbs. ft. torque. Apply light film of Lubriplate to seal surface on torus cover and install torus on splines of front drive gear. Push on cover evenly, without rocking, to prevent damage to oil seal rings. Install drive torus on intermediate shaft and install snap ring. Install driven torus on main shaft against open snap ring. Move manual lever into reverse position and install new main shaft lockplate with ear over flat on torus hub. Install main shaft nut and tighten to 15-20 lbs. ft. torque. Bend lockplate up against nut. Install oil level indicator.

INSTALLATION IN CAR

See REMOVAL & INSTALLATION data

DUAL-RANGE HYDRA-MATIC DRAINING & REFILLING

Lubrication Intervals: Check fluid level every 1000 miles (Hudson, Lincoln, Nash, Oldsmobile); 2000 miles (Cadillac, Kaiser, Pontiac); every day (Chev. Truck). Drain and Refill every 25,000 miles.

►**Oil Level Indicator or Vent Air Cleaner**—Clean the mesh type air cleaner (in cap on right top side of transmission case) every 10000 miles or twice each year.

Checking Fluid Level: Check only with engine warm and idling at hot or slow idle speed (choke valve open, fast idle inoperative).

1) With transmission oil hot, run engine for at least 2 minutes with selector lever in "N" (to insure fluid coupling being filled so that true oil level reading will be secured).

2A) On cars with dipstick in filler cap on transmission case (see Note below), turn back floor mat and remove cover over dipstick location (right front of transmission case). Clean all dirt and lint from around opening and filler cap to prevent dirt entering transmission when cap and dipstick removed.

2B) On cars with dipstick in filler tube in engine compartment (at right rear corner of engine), raise hood for access to filler cap and dipstick.

►*OIL FILLER & DIPSTICK LOCATION:* Located in transmission case on 1954-55 Chev. Truck; 1952-54 Hudson, Nash, & Pontiac; 1952-55 Kaiser & Willys. Located in engine compartment on right side 1952-55 Cadillac,. Lincoln & Oldsmobile. 1955 Hudson, Nash, & Pontiac.

3) With engine idling and selector lever in "N" (Neutral) 1952-55 Cadillac, Hudson, Kaiser, Nash, Pontiac, & Willys; 1953-55 Oldsmobile; 1954-55 Chev. Truck. "LO" (Low) 1952 Oldsmobile; "DR" (Drive) 1952-54 Lincoln, check fluid level as indicated on dipstick.

4) Add fluid as required to bring level up to full "F" mark on dipstick. *NOTE*—Approximately 1½-2 pints required to raise level from "L" to "F".

►***CAUTION—Do not fill above "F" mark on dipstick (may cause foaming when oil is hot.)***

Draining & Refilling: Drain oil only when transmission warm (immediately after operation).

►***OLDSMOBILE DRAINING NOTE: Oil drain hole in Hydra-Matic oil pan discontinued during 1953 and is not used on later models. Drain the oil by placing a pan as close under the point where filler tube enters oil pan. Loosen and remove retaining collar and rotate tube out of the way. Fluid coupling will continue to be drained in the usual manner.***

►***NASH STATESMAN & RAMBLER HYDRAMATIC OIL DRAIN HOLE PRODUCTION CHANGE***—A ¾" hole has been drilled in rear cross member directly under torus cover drain plug. To position torus drain hole for draining, line up timing mark on crankshaft dampener in a horizontal position, either right or left. See following for drilling hole in early production cars.

►**Drilling Drain Hole in Crossmember (Nash Statesman & Rambler)**—Drill a ¾" hole in rear cross member (center of hole to be 1" forward of edge of large center hole stamped in cross member). ***CAUTION—Extreme are must be taken so that drill does not damage torus cover.***

1) Remove flywheel housing lower cover (or hand hole cover), turn fluid coupling until drain plug in torus cover points downward, remove plug and drain fluid coupling.

2) Remove drain plug at rear end of transmission oil pan and drain transmission case.

3) Replace both drain plugs and tighten securely.

4) Install 8 qts. 1952-55 Cadillac, Kaiser, Lincoln, & Nash Ambassador; 1952-54 Hudson (Exc. Jet), Oldsmobile, & Pontiac. 5 qts. 1952-55 Nash Rambler, Nash Statesman, & Willys; 1953-55 Hudson Jet; 1954-55 Chev. Truck; 1955 Hudson Hornet, Hudson Wasp, Oldsmobile, & Pontiac.

5) Start engine and run it at speed equivalent to 20 MPH. for at least 1½ minutes with selector in "N" (to fill fluid coupling). Return engine to slow idle speed.

6) Check fluid level (see above), add fluid to bring level up to "F" mark on dipstick (approximately 3-4 qts. required).

►***CAUTION—Correct level should be determined by dipstick reading rather than exact amount of fluid added.***

Recommended Fluid: Hydra-Matic Fluid as furnished by car manufacturer or Automatic Transmission Fluid Type "A" as furnished in containers bearing "AQ-ATF" symbol.

►***FLUSHING CAUTION—Flushing of the unit is not required. Use only regular Hydra-Matic fluid for this purpose.***

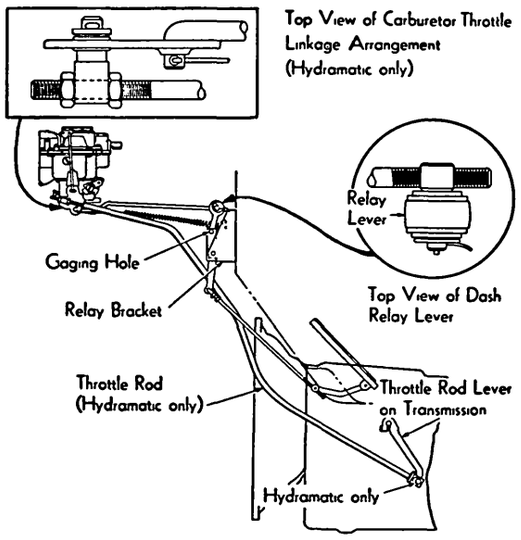
DUAL-RANGE HYDRA-MATIC LINKAGE ADJUSTMENT

1952-54 CADILLAC

LINKAGE ADJUSTMENT: ***CAUTION—Make adjustments in correct order and exactly as follows:***

(1) Manual Control Linkage—Disconnect manual control rod from control lever on transmission case. Move control lever to drive position (move lever fully forward, then move lever toward rear until first detent position is reached). Place selector lever on steering column against stop in "DR-4" position. Adjust clevis on transmission end of control rod until clevis pin can just be inserted freely through clevis and lever. Connect control rod.

(2) Throttle Lever Position—Disconnect throttle rod at throttle lever on transmission case. Check lever position by installing checking gauge, Tool J-3065-A on rear face of transmission case with long leg of tool extending forward along left side of case. Move throttle lever to extreme rear position. Insert clevis pin through hole in lever and hole in checking gauge. If pin does not enter hole in gauge freely, bend lever as required using bending tool J-2029. Remove gauge, connect throttle rod to lever.



1952-55 CADILLAC HYDRA-MATIC LINKAGE

(3) Throttle Control Linkage—Disconnect carburetor throttle rod at dash relay lever by removing spring clip and freeing trunnion from lever. Install ¼" drill rod through hole in relay lever and hole in bracket to position lever. See that carburetor throttle lever in correct hot or slow idle position and set for correct idle speed of 375 RPM. (1952), 400 RPM (1953-54). Adjust trunnion at rear of throttle rod until trunnion enters relay lever freely, connect trunnion and install spring clip. Back off both nuts on throttle rod at carburetor throttle lever, push on end of rod so that transmission throttle lever and valve is against its stop, turn rear nut on throttle rod up against the carburetor throttle lever trunnion, **then back the nut off 3 complete turns,** finally tighten the front nut on the rod securely against trunnion. Check to see that linkage moves freely. Remove drill rod from relay lever. Check and adjust accelerator pedal position.

(4) Accelerator Pedal Position—Depress pedal fully and see that it touches floor mat with slight pressure when carburetor throttle valve wide open. (NOTE—If floor mat removed, allow ½" clearance between pedal and floor in wide open position). Adjust pedal position as required, by changing length of pedal to relay lever rod (adjusting trunnion located at pedal end of rod).

(5) Neutral Switch—Adjust position of switch so that starter operative (switch closed) only when selector lever in "N" position.

►***CAUTION***—Do not move switch so far in neutral position that travel of lower lever is limited by switch arm in the reverse position.

1955 CADILLAC

Manual Control Linkage: Disconnect manual control rod from control lever on transmission case Move control lever to drive position (move lever fully forward, then toward rear until first detent position is reached). Place selector lever on steering column against stop in "DR-4" position Adjust clevis on transmission end of rod until clevis can just be inserted freely through clevis and lever Connect control rod.

Neutral Safety Switch Adjustment: Adjust position of switch on steering column so that switch is "off" when manual valve is in a position to move the car. ***CAUTION—Do not move the switch so far in the neutral direction that the travel of the lower lever in the reverse direction is limited by the switch arm.***

►*THROTTLE LEVER POSITION PRODUCTION*

CONTINUED ON NEXT PAGE

LINKAGE ADJUSTMENT

1955 CADILLAC (Continued)

CHANGE: On cars after Serial No. 67273 *(Last 5 digits of complete serial Number—See "Model Identification" on Car Model page)*, a new throttle lever is used which requires that a measurement of 4½" from rear machined surface of transmission case to hole in lever be used for setting lever position instead of using Gauge J-3065-C as on earlier transmissions.

Throttle Linkage Adjustment: *CAUTION—On cars with Rochester Carburetors and Air-Conditioning, the engine must be running when throttle linkage is adjusted.* 1) Remove throttle control lever clevis pin at transmission and check lever position with Tool J-3065-C *(See "Throttle Lever Production Change" above for checking lever position on later cars)*. Fit tool on rear face of transmission case and insert clevis pin through lever and hole in gauge marked "49E 50," while lever is in its rearward position If throttle lever is misaligned, correct by bending lever with Tool J-2029. Assemble linkage to transmission throttle lever and install cotter pin

2) Disconnect spring between carburetor and relay rod at trunnion and remove trunnion from dash relay lever. Place a ¼" drill shank through gauging hole in dash relay lever and into dash relay bracket. Set carburetor throttle in fast idle position with transmission in "DR" range (400 RPM—Std. Engine. 480 RPM—Eldorado Engine).

3) Adjust carburetor-to-dash relay rod trunnion to allow free entry into dash relay lever. Connect spring in trunnion.

4) On Cars With Single Carburetor—Back off both jam nuts on throttle valve rod at carburetor to allow free movement of rod in trunnion. Push end of throttle valve rod to position transmission throttle valve against its stop. Bring rear jam nut up against trunnion and back off 9 flats (1½ turns). *(NOTE—This adjustment may be changed to improve shift characteristics after road test).* Tighten front jam nut, check to be sure there is no bind in linkage

5) On Cars With Two Carburetors—Remove locknut, adjusting nut and spring from forward end of throttle valve control rod. Back off rear locknut and adjusting nut on throttle valve rod to permit free movement of rod in trunnion. Push on end of throttle valve rod to position throttle valve in transmission against its stop. Bring rear adjusting nut up against trunnion and back off 3 turns (18 flats), then tighten locknut. Install spring and adjusting nut on front end of throttle valve rod. Adjust nut until the distance between the front face of the trunnion and the rear face of the adjusting nut is 1 13/32". Hold adjusting nut in this position and install locknut. Recheck above dimension.

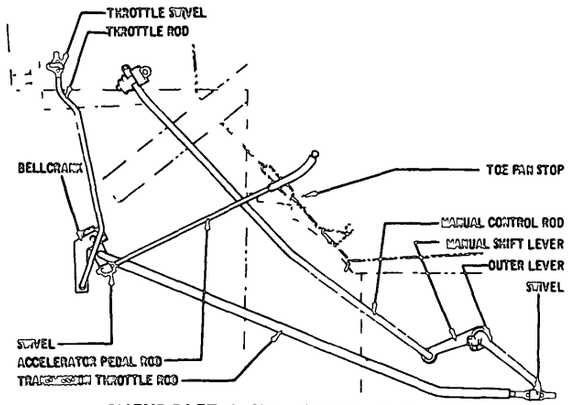
6) Remove ¼" drill rod from dash relay and check position of accelerator pedal with wide open throttle. Pedal should touch floor mat with light pressure (allow ½" clearance if floor mat has been removed) when throttle is wide open. Adjust accelerator pedal position at pedal end of dash relay-to-accelerator pedal rod. Road test car to insure proper shifting characteristics.

1954 CHEVROLET TRUCKS

Manual Control Linkage: (All Models)—Move shift control lever from "N" position to first detent that is felt. In this position indicator should line up with symbol "1-4." Check control lever in each of the other positions for indicator alignment. If adjustment is not satisfactory, proceed as follows: If gearshift control shaft upper support bracket is loose, tighten the clamp screw while holding control lever firmly against stop between "1-3" position and "1-2." While holding lever in "1-3" against the stop which prevents accidental shift into "1-2," loosen gearshift control rod swivel. Make sure transmission outer lever is in the three speed drive position "1-3" (third position from front or rear). With control lever in "1-3" position and held against stop, and with transmission outer lever in the three speed drive position, tighten gearshift control rod swivel.

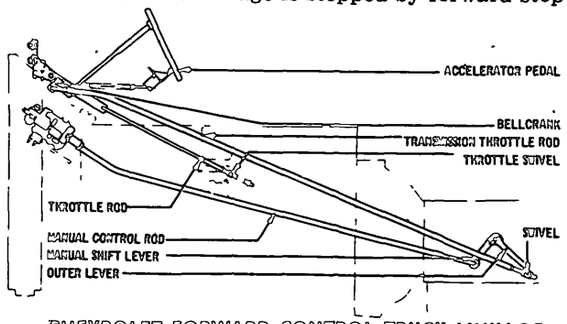
Neutral Safety Switch Adjustment: Place control lever in "1-4" position. With ignition off, operate starter control. Starter should not operate. If it does, check the other positions in the same manner. If starter operates in any position except "N," adjust as follows: Loosen two switch assembly mounting screws. Place selector lever in "N," and with clip over flats on end of shifter shaft, insert pin into mounting bracket of switch and locating plate. Tighten screws to secure switch in this position and remove locating screws.

Throttle Linkage Adjustment: (6 Cyl. Hydra-Matic Drive Trucks, except Forward Control)—With engine at normal operating temperature and idle speed set at 400-450 RPM, remove lower end of carburetor throttle lever-to-bell crank rod from lever on bell crank. Install Lever positioning Gauge J-5609 in hole in lever and gauge hole in pan rail of engine block (hole is located toward rear of bell crank position), and leave gauge in this position. Remove swivel from bell crank-to-transmission outer lever at transmission and move transmission outer lever back against stop. Check distance from hole in outer lever to back of transmission with Gauge J-2545-C. Bend lever as necessary for free entry of gauge in lever hole using tool J-5260 *(CAUTION—Do not apply force to stops at either end of lever travel).* Hold outer lever back against stop and adjust swivel position on bell crank-to-transmission rod so it just enters hole in transmission lever. Remove Positioning Gauge from bell crank and reinstall throttle rod Recheck engine idle speed with idle screw against stop on carburetor, and adjust carburetor throttle-to-bell crank rod so swivel at upper end freely enters hole in throttle lever. At this point, shorten bell crank-to-transmission outer lever by turning swivel lock nuts two full turns. Remove bell crank-to-carburetor throttle rod upper swivel from lever and pull rod upward until linkage is stopped by forward stop in transmission. Hold in this position and adjust accelerator-to-bell crank rod swivel until accelerator pedal is against floor stop, then shorten rod one full turn. Replace upper end of throttle-to-bell crank rod in throttle lever.



CHEVROLET 6 CYL. TRUCK LINKAGE
(EXCEPT FORWARD CONTROL)

Throttle Linkage Adjustment: (Hydra-Matic Drive Forward Control Models)—With engine at normal operating temperature and idle speed set at 400-450 RPM, remove accelerator pedal-to-bellcrank rod and install Carburetor Control Lever Adjusting Gauge J-5629 with slotted end resting on inside shoulder of hex head brass fitting on intake manifold and pin end in rod hole in lever on bell crank. Leave gauge in this position. Remove swivel from bell crank-to-transmission outer lever rod at transmission and move lever back against stop. Check distance from hole in outer lever to back of transmission with Gauge J-2545-C. Bend lever as necessary for free entry of gauge in lever hole using tool J-5260 *(CAUTION—Do not apply force to stops at either end of lever travel).* Hold outer lever back against stop and adjust swivel position on bell crank-to-transmission rod so it just enters hole in transmission lever, then shorten bell crank-to-transmission outer lever rod two full turns. Recheck engine idle speed with idle screw against stop on carburetor. Adjust carburetor throttle-to-bell crank rod so swivel at lower end freely enters hole in throttle lever. Remove Positioning Gauge from bell crank lever. Remove carburetor throttle-to-bell crank rod from throttle lever and pull bell crank-to-transmission outer lever rod up toward floorboard until linkage is stopped by forward stop



CHEVROLET FORWARD CONTROL TRUCK LINKAGE

in transmission. Hold rod in this position and install accelerator pedal-to-bell crank rod in bell crank lever, and adjust swivel so accelerator pedal is against toe board stop. Install carburetor throttle-to-bell crank rod, then shorten accelerator pedal-to-bell crank rod one full turn.

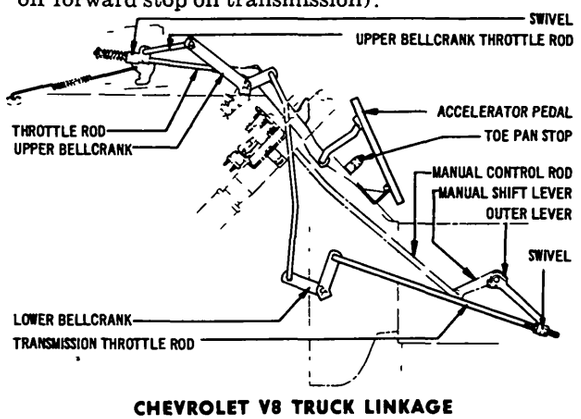
Throttle Linkage Adjustment: (V8 Hydra-Matic Drive Trucks)—Back out throttle valve adjusting screw so throttle valve is in the tightly closed position and swivel on end of throttle rod is against lug on upper bellcrank throttle rod. Remove swivel from

CONTINUED ON NEXT PAGE

LINKAGE ADJUSTMENT

1.54 CHEVROLET TRUCKS (Con..)

transmission throttle lever and move lever back against its internal stop. Check distance from hole in lever to rear face of transmission case with Throttle Lever Checking Gauge J-2545-C. Bend transmission lever with Tool J-5260, if necessary, to allow entry of gauge into hole *(CAUTION—Do not apply force against stop at either end of lever travel)*. Adjust length of transmission throttle rod so swivel just enters hole in transmission throttle lever. Adjust engine idle speed to 425 RPM with selector lever in "N" position. This adjustment will move transmission throttle lever off its internal stop. Depress accelerator pedal to obtain 5/8" distance between toe pan stop and bottom of pedal, then adjust length of throttle rod to give full open throttle. Depress pedal until transmission throttle lever is tight against forward stop on transmission and turn screw on toe pan stop up against accelerator pedal. Release pedal and turn screw upward **two full turns** and secure screw with jam nut (transmission throttle lever will be moved slightly off forward stop on transmission).



CHEVROLET V8 TRUCK LINKAGE

1952 HUDSON

LINKAGE ADJUSTMENT: *Adjust exactly as follows:*
►*1952 HYDRA-MATIC THROTTLE LEVER CONNECTION CAUTION:* New No. 307556 lever with **two** holes at outer end for throttle rod connection used on later cars. Connect rod as follows:

Inner Hole—5B & 6B with Twin Carburetors.

Outer Hole—All other models (including 5B & 6B with single carburetor).

LEVER CHECKING CAUTION—When using Gauge J-2195 to check lever position, apply gauge rod to lower (outer) hole in lever.

Throttle Control Linkage: Make certain that throttle return spring hooked in lower hole of cross-shaft lever. Then proceed as follows:

1) On all models, set carburetor idle speed at 490-510 RPM. with engine at normal operating temperature (choke wide open, fast idle not operating), transmission warm, selector lever in Neutral "N."

2) On Model 4C only, with throttle lever stopscrew against its stop, adjust throttle control bellcrank-to-carburetor rod so that gauge pin J-2544 freely enters two holes in bellcrank and slotted hole in bellcrank support bracket, then remove pin.

3) On all models, with carburetor throttle lever stopscrew against its stop, adjust throttle bellcrank shaft operating rod (by backing off one trunnion nut and tightening opposite nut) until gauge pin J-2544 freely enters notch or hole in accelerator pedal link bellcrank lever and hole in cylinder block. Tighten trunnion nuts securely, recheck bellcrank position, remove adjusting pin.

4) On all models, check position of outer throttle lever on transmission case as follows: Install Checking Gauge J-2195 flat against back surface of transmission case (CAUTION—clean machined surface to insure correct seating of gauge) with leg of gauge extending forward along side cover. Hold transmission throttle lever back against its stop in rear position. Hole in outer end of lever should center on small diameter of gauge pin and inner face of lever should just touch larger diameter of gauge rod. **Do not** force lever against its stop. Bend lever as required **using Bending Tool J-3310.** Reconnect throttle rod to lever.

5) On all models, disconnect transmission throttle rod from accelerator pedal link bellcrank lever by taking out trunnion pin, position bellcrank by inserting gauge pin J-2544 through notch or hole in bellcrank and into hole in cylinder block. Push transmission throttle lever to rear and against its stop lightly, adjust rod by backing off one trunnion nut and tightening opposite nut until trunnion pin enters hole in bellcrank lever freely, connect rod to bellcrank lever, then back off rear trunnion nut approximately 1¾ turns (or clearance between nut and trunnion is 1/16"—check with 1/16" shim), tighten front locknut securely to bring trunnion up against rear nut. **This will shorten the rod by this 1¾ turns of the nut.** Adjust accelerator pedal trunnion by loosening one trunnion nut and tightening opposite nut until clearance between accelerator pedal and the pedal stop is 1/64-1/16" with carburetor throttle valves wide open.

Manual Control Linkage: Disconnect transmission shift rod at manual control lower lever on steering column. Position transmission shift lever on side of transmission case in "DR-3" by moving lever to rear as far as it will go (Reverse position) and then moving lever forward **two** detents (to third or middle position). Move selector lever on steering column to "DR-3" position (move lever toward reverse as far as possible without lifting selector lever). Adjust shift rod by turning clevis on forward end of rod until clevis pin holes line up with hole in manual control lower lever, then **lengthen rod by turning clevis one full turn on rod,** connect rod and tighten clevis locknut. Operate selector lever in all positions to make certain that lever indexes properly with indicator dial.

Neutral Safety Switch: Place selector lever in Neutral "N" position, loosen mounting screw in safety switch mounting bracket, adjust switch to close approximately midway between "N" and "DR" on indicator dial, tighten mounting screw securely. Check to make certain that starter operates only when selector lever in "N" position.

1953-54 HUDSON

LINKAGE ADJUSTMENT: *Adjust exactly as follows:*

Transmission Throttle Lever Adjustment—On all models, check position of outer throttle lever on transmission as follows: Install Checking Gauge J-2195 flat against back surface of transmission case (CAUTION—clean back surface of transmission case and machined surface to insure correct seating of gauge) with leg of gauge extending forward along side cover. Hold transmission throttle lever back against its stop in rear position. Hole in outer end of lever should center on small diameter of gauge pin and inner face of lever should just touch large diameter of gauge rod. **Do not force** lever against its stop. **Bend lever as required using Bending Tool J-3310.** Reconnect throttle rod to lever.

Throttle Control Linkage: *NOTE—Adjustment of Transmission Throttle Lever should be made BEFORE transmission throttle control levers are adjusted. See Transmission Throttle Lever Adjustment above.*

Engine Idle Adjustment—On all models, adjust engine idle speed to 490-510 RPM with engine at normal operating temperature, transmission warm and selector lever in "N" (Neutral) position.

1) **Models 1C, 1D, 2C, 2D With Single Carbs.**—Install throttle gauge pin J-2544 in lower bell crank, and adjust throttle bell crank operating rod (rod from lower bell crank to upper bell crank) to 2 9/32", measured from centerline of throttle control bell crank-to-carburetor rod clevis pin, and the top of the machined surface of cylinder head. Tighten jam nut securely. With throttle return spring attached and idle adjusting screw against its stop, and the gauge pin J-2544 still in place in lower bell crank, adjust throttle control bell crank-to-carburetor rod until clevis pin slides freely into holes in clevis and hole in bell crank. Tighten jam nut. With gauge pin in place in lower bell crank, and transmission throttle lever (on transmission case) back against its rear stop, adjust length of transmission throttle rdo (rod from transmission lever to lower bell crank) so that it is 3/32" **shorter** than the actual distance between the holes. Tighten jam nut. Remove gauge pin from lower bell crank and adjust length of accelerator pedal-to-bell crank rod to give full throttle, with 1/64" to 1/16" clearance between accelerator pedal and pedal stop.

2) **Models 1C, 1D, 2C, 2D With Twin Carbs.**—Install gauge pin J-2544 in lower bell crank and in upper bell crank holes, then adjust length of throttle bell crank operating rod (rod from lower bell crank to upper bell crank) so that operating rod trunnion pin enters bell crank. Tighten jam nut. With gauge pins still in place, and both carburetors off fast idle (choke open) and with throttle return spring attached, adjust both bell crank-to-carburetor rods so clevis pin slides freely through clevis and lever. Tighten jam nuts. *Complete adjustment as indicated for models with Single carburetor (above).*

3) **Models 4C, 4D, 5C, 5D With Single Carbs.**—With Carburetor throttle idle screw against its stop and carburetor off fast idle, adjust throttle bell crank-to-carburetor rod so that gauge pin J-2544 will freely enter gauge pin holes in throttle bell crank and the slotted hole in throttle control bell crank support bracket. After making adjustment, remove gauge pin. Adjust throttle bell crank operating rod (rod between upper and lower bell cranks) until gauge pin will freely enter seat in accelerator pedal link bell crank lever and gauge hole in cylinder block, (located at end of starter motor). Tighten jam nut. With gauge pin remaining in place in lower bell crank, disconnect transmission throttle rod

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LINKAGE ADJUSTMENT

1953-54 HUDSON (Cont.)

at accelerator bell crank lever. Lightly push transmission throttle valve lever rearward against its stop, and adjust the throttle rod so that the trunnion pin will slide freely into accelerator pedal bell crank lever. Install trunnion pin, flat washer and cotter pin. With trunnion pin in position, loosen rear adjusting nut approximately 1¾ turns or until a 1/16" shim can be installed between rear lock nut and trunnion; remove shim and tighten locknut (front) without turning rear lock nut. This will pull throttle lever forward off stop. Remove gauge pin.

4) Models 4C, 4D, 5C, 5D With Twin Carbs.—Insert gauge pin J-2544 through lower bell crank lever and into hole in cylinder block. Adjust length of throttle shaft operating rod (rod between lower and upper bell crank) so distance between center of clevis pin hole in throttle shaft lever (this lever connects with rod actuating throttle valve on carburetor) and top of cylinder block (machined surface) is 1.789". With gauge pins still in position, and with throttle return springs attached, adjust length of each throttle rod (rod between operating shaft and carburetor) so clevis pin slides freely through clevis and bell crank lever. Tighten jam nut securely. With gauge pin still in position, move transmission lever to rear stop, then adjust transmission throttle rod (rod between transmission throttle lever and lower bell crank) so that it is 1/16" shorter than the actual distance between trunnion (on lower bell crank) and clevis pin hole in transmission lever. Lock trunnion jam nuts. Remove gauge pin and adjust length of accelerator-to-bell crank rod assembly, to give a full throttle, with 1/64" to 1/16" clearance between accelerator pedal and pedal stop.

5) Model 7C & 7D With Single Carb.—With carburetor throttle idle screw against its stop and carburetor off fast idle, adjust accelerator cross-shaft, operating rod trunnion nuts (located adjacent to bracket on left side of cylinder head) until gauge pin J-2544 can be installed freely into accelerator pedal bell crank lever (ahead of starter on left side of engine crankcase), and the hole in cylinder block boss. Tighten trunnion nuts securely. Disconnect transmission throttle rod trunnion from accelerator pedal link bell crank lever. With gauge pin still in position in bell crank, hold transmission throttle lever back against its stop, then adjust transmission throttle rod so trunnion pin will slide freely into accelerator pedal link bell crank lever. Install trunnion pin, flat washer and cotter pin, and with trunnion pin in position, loosen rear adjusting nut (nearest transmission) approximately 1¾ turns or until a 1/16" shim can be installed between rear lock nut and trunnion. Remove shim and tighten front lock nut without turning rear lock nut. Remove gauge pin. Hold throttle wide open, and with accelerator pedal against its stop, adjust lower lock nut on accelerator pedal-to-bell crank rod until it touches trunnion, then increase adjustment ¼" further. This will give approximately 1/16" clearance between accelerator and stop.

6) Model 7C & 7D With Twin Carbs.—Throttle linkage adjusted in same manner as for models with Single Carburetor, except that both carburetor rods (from operating shaft to carburetor) must be adjusted alike.

Manual Control Linkage: Disconnect transmission shift rod at manual control lower lever on steering column. Position transmission shift lever on side of transmission case in "DR-3" by moving lever to rear as far as it will go (Reverse position) and then moving lever forward two detents (to third or middle position). Move selector lever on steering column to "DR-3" position (move lever toward reverse as far as possible without lifting selector lever). Adjust shift rod by turning clevis on forward end of rod until clevis pin holes line up with hole in manual control lower lever, then lengthen rod by turning clevis one full turn on rod, connect rod and tighten clevis locknut. Operate selector lever in all positions to make certain that lever indexes properly with indicator dial.

Neutral Safety Switch: Place selector lever in Neutral "N" position, loosen mounting screw in safety switch mounting bracket, adjust switch to close approximately midway between "N" and "DR" on indicator dial, tighten mounting screw securely. Check to make certain that starter operates only when selector lever in "N" position.

1955 HUDSON

(EXCEPT RAMBLER)

Manual Control Linkage: (All Models)—Place selector lever in "D-3" position and set operating lever against the stop on housing bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever. Place transmission lever in "D-3" position and adjust clevis so pin passes freely through hole in clevis and in lever *(NOTE*—Be sure that operating lever is against stop on housing bracket). After adjustment has been completed, lengthen the control rod two full turns and replace clevis and cotter pin.

Throttle Linkage Adjustment: Adjust idle speed to 490-510 RPM (on cars with air conditioning, compressor must be running), engine at normal operating temperature, transmission warm and selector lever in "N" position.

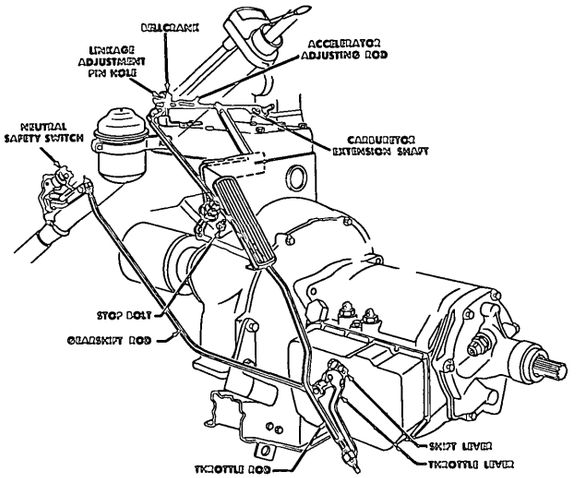
Wasp—Adjust carburetor rods and install aligning pins J-2544 so that both pins index at rear upper throttle lever and lower bellcrank and hole in boss on cylinder block.

Hornet—Aligning pin J-2544 should fit freely in bellcrank lever and hole in boss on cylinder block. If alignment pin does not index, remove carburetor-to-throttle rod lever clevis pins and readjust rods.

All Models—After aligning pins installed, recheck and adjust carburetor idle adjusting screws. Disconnect throttle rod at left side of transmission case, clean machined surface of case and check lever position using Tool J-2915. Place gauge flush against machined end surface of case, with edge of gauge against transmission side cover. Gauge should fit freely in hole of throttle valve lever. If gauge does not fit through lever hole freely, use Bending Tool J-3310 and bend lever to proper location. Adjust trunnion on transmission throttle rod so rod fits freely in hole in lever. Then shorten rod 1/16" (two full turns) and connect rod to lever.

1952-55 KAISER

▷*FULL-THROTTLE SETTING NOTE*—If wide open throttle at carburetor can not be secured AFTER Throttle Linkage adjusted, bend lower end of bellcrank on left side of cylinder head (to which transmission rod attached) away from engine just enough to permit full throttle opening (CAUTION —do not bend offset portion of bellcrank further



TYPICAL KAISER HYDRA-MATIC LINKAGE

than parallel with upper portion of bellcrank and prevent throttle control extension shaft from bending by wedging screwdriver under shaft).

LINKAGE ADJUSTMENT: *Adjust exactly as follows:*

Selector Linkage (1952-53): Place selector lever in right hand drive position (DR-3), back off both nuts on control rod trunnion at control shaft lever on steering column. Make certain that outer shift lever on transmission case is in 3rd. speed position (third position from front or rear), turn lower trunnion nut up against trunnion finger tight to remove all play from linkage, then lengthen rod by turning the nut one full turn, tighten upper trunnion nut.

Selector Linkage (1954-55): Check clamp bolt on the shift lever at transmission and tighten if necessary. Proceed as follows: Place shift lever at transmission in intermediate position (intermediate is the center position or second detent from either end of shift lever travel). Back off both control rod trunnion lock nuts. Make sure the bolts securing gearshift shaft bearing to steering column are tight. Move lower gearshift lever to a position of 1/16" clearance between lower gearshift lever and intermediate stop on the gearshift shaft bearing support bracket. Tighten trunnion lock nuts. Operate linkage with upper gearshift lever a number of times, then shift transmission into intermediate position at transmission, and recheck allowable clearance between lower lever and intermediate stop. Check position on indicator at steering wheel and bend indicator as necessary to line it up with correct mark on quadrant.

Neutral Safety Switch: Place transmission in drive position. Loosen bolts holding neutral safety switch to gearshift shaft bearing support bracket. Rotate switch to a position where starting motor will not operate when key is turned to starting position. Hold switch in selected position, shift transmission

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LINKAGE ADJUSTMENT

1952-55 KAISER (C nt.)

to neutral and starter should then operate when key is turned on. If so, tighten bracket bolts. If necessary, the elongated adjustment bolt holes in the switch bracket can be enlarged.

Throttle Control Linkage: Disconnect rod at throttle control lever (long lever) on transmission case. Loosen carburetor extension shaft lock bolt, install Linkage Adjustment Pin (KF-91) through alignment holes in bellcrank and bracket on cylinder head. Make certain that carburetor idle speed correctly set at 425-450 RPM. *(CAUTION*—make this setting with engine at operating temperature of 150-160°F, choke valve wide open and fast idle not operating, transmission warm and selector lever in N), then tighten carburetor extension shaft lock bolt but **do not remove adjustment pin.** Check tightness of transmission throttle control lever clamp bolt (12-15 ft. lbs. torque). Check lever position by placing Throttle Lever Checking Gauge KF-146 on back of transmission case (CAUTION—clean machined surface on case to insure correct gauge positioning) with gauge leg extending forward on side of case. Clevis pin in lever should fit into forward slot in gauge. Bend lever as required for this position using Bending Tool KF-79. Connect throttle rod to lever (CAUTION—anti-rattle washer must be installed between trunnion and lever). Adjust throttle rod trunnion (back off one nut and tighten opposite nut) until control lever seats lightly against stop in transmission, then **shorten rod by backing off forward nut at trunnion 3 full turns,** tighten rear trunnion nut securely. NOTE—If shifts do not occur at correct speeds with minimum throttle with above setting, this control rod setting can be changed slightly. Remove Adjusting Pin from bellcrank on cylinder head, move carburetor throttle to wide open position, adjust turnbuckle on accelerator pedal rod (at bellcrank on cylinder head) so that accelerator pedal just touches the stop bolt.

1952-54 LINCOLN

►*1953 DIFFICULT FORCED DOWNSHIFT NOTE*—If difficulty encountered in obtaining a forced downshift, check length of accelerator-to-transmission rod. Rod assembly No. LA-9784-D, is a 1952 rod, and is shorter than 1953 rod, No. LA-9784-E. 1952 rod is 5.27" overall length, and 1953 rod is 5.44" overall length. If replacement of rod does not correct difficulty, see following correction.

►*1953 FORCED DOWNSHIFT (Early Cars)*—Some early cars prior to Serial No. 53WA-12789-H (Wayne Plant), 53LA-7013-H (Los Angeles Plant) had transmission control shaft assembly Part No. LA-77230 shimmed up to eliminate toe-board interference with accelerator shaft, Part No. 9725-F. If difficulty is encountered in obtaining a forced downshift on these cars, replace Part No. 9725-F with accelerator shaft assembly Part No. 9725-G. When new part is installed, remove shims from underside of transmission control shaft assembly.

LINKAGE ADJUSTMENT: ***Adjust exactly as follows:*** **First check and adjust engine idle speed to 375-400 RPM. with engine at normal operating temperature (choke valve wide open and fast idle inoperative), transmission warm, and selector lever in "N".**

Throttl Linkage: Disconnect transmission throttle rod at forward end by taking out clevis pin "D".

1) Adjust carburetor throttle rod (between "A" and "B") by loosening locknuts and turning adjusting clevis on rod so that carburetor throttle lever stop-screw is against stop (Point "A") and control shaft assembly is against its stop (Point "C"). Tighten locknuts against adjusting clevis.

CAUTION—Throttle rod ends must be in alignment to prevent binding.

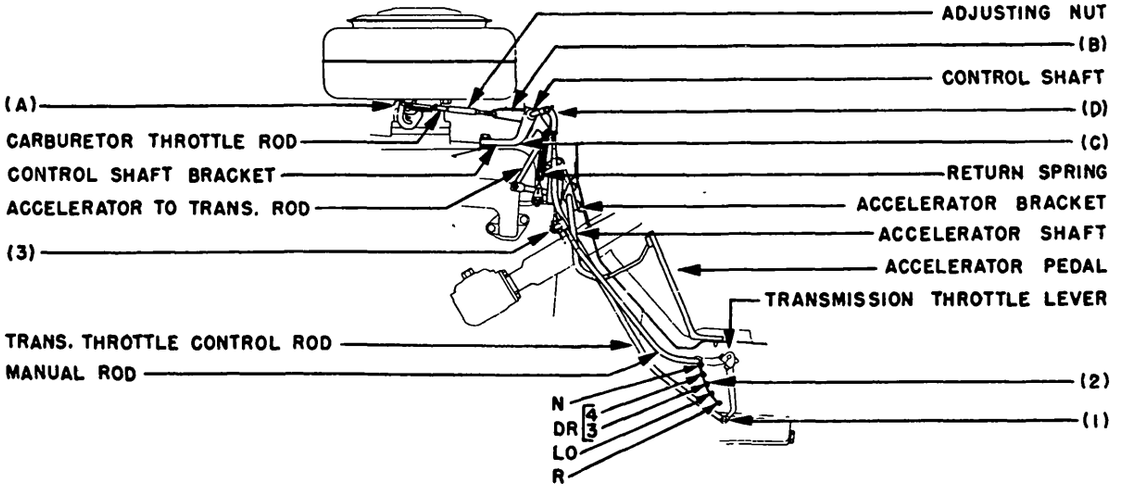
2) Hold throttle lever in slow idle position (stop-screw against stop at point "A"), push down firmly on transmission throttle rod so that lever is in its stop position, adjust clevis on forward end of rod (point "D") so that clevis pin can be entered freely, then remove pin and **shorten the rod by three full turns of the clevis.** Connect rod and tighten clevis locknut. Check shift points by road-testing car.

Manual Control Linkage: Disconnect manual control rod from lever on steering column (point "1").

1) Position selector lever under steering wheel in "Dr" position against its stop.

2) Position manual lever on transmission case in second position from top ("Dr" position—point "2").

3) Adjust manual control rod by turning adjusting trunnion on forward end until sleeve enters grommet hole freely, **then lengthen rod by turning trunnion one full turn,** connect rod. Check position of selector lever in all positions.



1952-54 LINCOLN HYDRA-MATIC LINKAGE

1952-54 NASH & RAMBLER

LINKAGE ADJUSTMENT: ***Adjust exactly as follows:***

Throttle Control Linkage: Check and adjust engine idle speed to 375 RPM (Except "Dual Jetfire"), 500 RPM ("Dual Jetfire"), with engine temperature at 150-160°, transmission warm, selector lever in neutral. Disconnect transmission throttle rod, at throttle lever on side of transmission. Clean machined surface at back of transmission case and place throttle lever checking gauge J-2545-A flush against surfaces with edge of gauge against transmission side cover. The throttle lever stud should fit freely in notch in gauge. Bend to proper location with tool J-3310 if gauge does not pass over throttle lever stud freely. Adjust transmission throttle rod (which is threaded into upper throttle rod yoke) to fit freely on throttle lever stud; **then shorten the rod approximately 2 turns (Except "Dual Jetfire"), 3 turns ("Dual Jetfire").** Install rod on stud and replace wave washer, flat washer and cotter pin.

Selector Lever Linkage: Place selector lever under steering wheel in the "D-3" position and set the operating lever against the stop on the starter switch bracket. Remove the clevis pin from the gear shift control rod at side of transmission case and remove clevis from shift lever. Place the transmission outer shift lever in the "D-3" range position. Adjust the clevis so the pin passes through hole in lever. (NOTE—Be sure the operating lever is against the stop on the starter switch bracket). After the adjustment has been completed, lengthen the control rod **two full turns** and replace the clevis pin and cotter key.

Starter Switch: ***Adjustment required only if control disassembled and switch location disturbed.***

1) Place selector lever in Neutral "N" position and check alignment of operating plunger on control lever on steering column with switch plunger (must be aligned so that switch plunger depressed by operating plunger when selector lever lifted upward in "N").

2) Adjust switch to align plunger by loosening switch bracket mounting screws and shifting switch and bracket on steering column (holes are slotted to permit this adjustment).

1955 NASH & RAMBLER

Manual Control Linkage: (All Models)—Place selector lever in "D-3" position and set lever against stop on starting switch bracket. Remove clevis pin from gear shift control rod at side of transmission case and remove clevis from shift lever. Place transmission shift lever in the "D-3" position and adjust clevis so pin passes freely through hole in clevis and in lever. *(NOTE*—Be sure that operating lever is against stop on housing bracket). After ad-

CONTINUED N NEXT PAGE

LINKAGE ADJUSTMENT

1955 NASH & RAMBLER (Cont.)

justment has been completed, lengthen the control rod two full turns and replace clevis and cotter pin.

Throttle Linkage Adjustment: Adjust engine idle speed at 450 RPM (500 RPM air conditioned cars, with compressor running), with engine and transmission at normal operating temperature and selector lever in "N" position. Disconnect throttle rod at throttle lever at side of transmission. Clean machined surface at rear of transmission case and place throttle lever checking gauge J-2545-C flush with case surface with edge of gauge against transmission side cover. The throttle lever stud should fit freely in notch in gauge. If gauge does not pass over throttle lever stud freely, use Bending Tool J-3310 and bend lever to proper position. Gauge notch must slide freely on stud pin. Adjust transmission throttle (which is threaded into upper throttle rod yoke) to fit freely on throttle lever stud; then shorten rod approximately two turns. Install rod on stud and replace wave washer, flat washer and cotter pin.

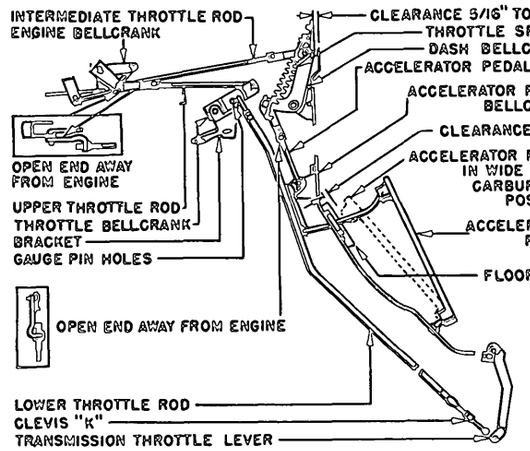
1952-53 OLDSMOBILE

LINKAGE ADJUSTMENT: *CAUTION—Series with 4-barrel carburetors have different throttle linkage. Make adjustments in following order.*

Adjustment Note—Poor engine performance affects Hydra-Matic Transmission operation; be sure engine is functioning properly before adjustments are made.

Manual Control Linkage (1952)—Loosen clevis locknut at rear end of lower control rod (from steering column to intermediate lever on frame cross-member) and disconnect this rod at the intermediate lever (relay rod from intermediate lever to transmission is non-adjustable). Adjust as follows:

Lower Control Rod—Place transmission control lever in "S" position (move lever all the way forward to neutral, then move lever back to the second detent "S" position). Place steering column selector lever at end of "S" range against stop which prevents movement into reverse without raising lever



OLDSMOBILE LINKAGE (2-BARREL CARB.)

(pull down on lower control rod until stop is felt). Adjust clevis on lower end of lower control rod until pin can just be slipped freely through clevis and intermediate lever without disturbing lever positions, then tighten rod by turning clevis one full turn, tighten locknut and connect rod.

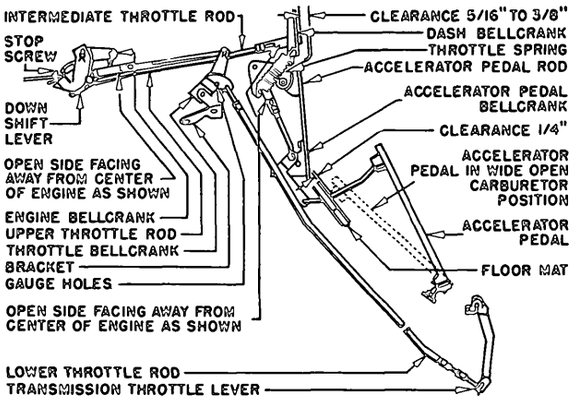
Manual Control Linkage (1953): Loosen jam nut on shift rod clevis and neutral safety switch. Remove clevis pin from shift rod. Move manual control lever at side of transmission all the way forward into "N" position. Then raise and hold shift lever beyond "N" position against side of opening in jacket. Adjust shift rod clevis so that end of clevis contacts outside diameter of bushing in lower shift lever. Return lower shift lever to "N" position, insert clevis pin through clevis and bushing, assemble cotter pin to clevis pin. NOTE—Adjustment properly positions selector lever in relation to manual valve in valve body and assures correct pointer positioning in all selector lever positions. Adjust neutral safety switch as follows:

Neutral Safety Switch Adjustment (1952-53): Set Transmission in "N" detent. With switch assembled to steering gear and link connected to shift lever, insert .090" pin through switch lever and bracket. Tighten mounting bolt and withdraw .090" pin. Check setting by applying handbrake firmly, placing shift lever in "Dr" range, and turning ignition switch to "Start." While holding switch on "Start," slowly move shift lever toward "Neutral" until engine cranks and starts. Without moving shift lever after engine starts, accelerate to determine whether transmission is in gear. If switch properly adjusted transmission will not be in gear and car will not move.

Throttle Control Linkage (Series 88—2-barrel Carburetors): Apply hand brake firmly, warm up engine so that it idles at hot or slow idle speed.

1) With engine warm, disconnect upper throttle rod from bellcrank on engine (*CAUTION*—do not disconnect intermediate throttle rod to which upper throttle rod is connected at the bellcrank). Adjust engine idle speed to 400 RPM. with selector lever in "Dr" range, then turn off engine.

2) After setting idle speed, adjust length of intermediate throttle rod (free clevis from bellcrank on engine, turn rod in or out of clevis) until clearance between rear face of lever to which rod is connected



OLDSMOBILE LINKAGE (4-BARREL CARB.)

and depression in dash is 5/16-3/8", tighten clevis locknut and connect the rod.

3) Disconnect throttle return spring from bellcrank on dash, open carburetor throttle valves to wide open position, adjust clevis at bellcrank end of accelerator pedal linkage so that clearance between lower face of boss on underside of pedal and top of floor mat is ¼", tighten clevis locknut and connect rod (*CAUTION*—open side of clevis must be facing AWAY from engine).

4) Disconnect lower throttle rod from lever on left side of transmission case. Hold carburetor throttle lever in slow idle position against its stop, adjust length of upper throttle rod so that Pin Gauge BT-25 freely enters holes in bellcrank and hole in bracket on engine. Tighten clevis locknut and connect rod at bellcrank). *CAUTION*—open side of clevis must be AWAY from engine.

5) With lower throttle rod disconnected from transmission lever, check position of lever as follows: Install checking tool J-2195 on machined surface on rear face of transmission case with gauging rod extending forward toward lever. Hold throttle lever back against stop. If small end of tool does not enter hole in lever freely in this position, bend lever as required using tool J-2029. Do not connect rod to lever at this point.

6) After adjusting lever position, see that carburetor is in slow idle position (throttle lever against stop), hold transmission lever fully back against its stop, adjust length of the rod by loosening locknut and turning clevis until clevis pin enters hole in lever freely, then shorten rod by one full turn of the clevis, tighten locknut and connect rod.

Throttle Control Linkage (Super 88 & 98—4-barrel Carburetors): Disconnect accelerator pedal from accelerator rod (in front compartment), disconnect lower throttle rod (between bellcrank on engine and transmission case lever) at bellcrank, disconnect intermediate throttle rod at bellcrank on dash. Then proceed as follows:

1) Hold carburetor throttle valves in slow idle position, adjust intermediate throttle rod (turn clevis on rear end of rod) until clearance between rear face of bellcrank and depression in dash is 5/16-3/8" when rod connected. Tighten clevis locknut and connect rod (*CAUTION*—open side of clevis must face AWAY from center of engine).

2) Start engine and allow it to warm up (*CAUTION*—apply hand brake firmly to hold car). Adjust engine idle speed to 400 RPM. with selector lever in "Dr" range, then turn off engine.

3) Hold carburetor throttle valves in slow idle position, check alignment of two holes in bellcrank at rear of engine with hole in bellcrank bracket. If Gauge Pin BT-25 does not enter all three holes freely, adjust as follows: Disconnect upper throttle rod from bellcrank, adjust rod length (turn rod in or out of clevis at forward end) as necessary to line up bellcrank and bracket holes, tighten clevis locknut and connect rod.

4) Connect lower throttle rod to this bellcrank at rear of engine, disconnect lower end of rod from lever on left side of transmission.

5) Check and adjust transmission lever (see step 5 in Series 88 2-barrel carburetor adjustment above).

6) After adjusting lever position, see that carburetor is in slow idle position (throttle lever against

CONTINUED ON NEXT PAGE

LINKAGE ADJUSTMENT

1952-53 OLDSMOBILE (Cont.)

stop), hold transmission lever fully back against the stop, adjust length of lower throttle rod by loosening locknut and turning clevis on rear end of rod until clevis pin enters hole in lever freely, then **shorten rod by three full turns of the clevis,** tighten locknut and connect rod.

7) Hold carburetor choke valve completely open, move intermediate throttle rod (from bellcrank on dash to bellcrank on engine to rear of carburetor) forward until carburetor throttle valves are in wide open position and throttle linkage has moved transmission lever fully forward and against its stop (through detent positions). Hold linkage in this position and turn stopscrew (on bellcrank just to rear of carburetor) down until it just contacts the downshift lever assembly (to which transmission throttle rod connected). Release linkage, then **back stopscrew off one complete turn** and tighten locknut. This will provide 1/32" clearance between stopscrew and downshift lever with transmission lever against its forward stop.

8) Connect accelerator pedal to accelerator rod inside car. Adjust clevis at upper end of accelerator pedal linkage (at bellcrank on dash) so that clearance between boss on underside of pedal and floor mat is ¼" with carburetor throttle valves in wide open position. *CAUTION*—Open side of clevis at bellcrank end of accelerator pedal linkage must face AWAY from center of engine.

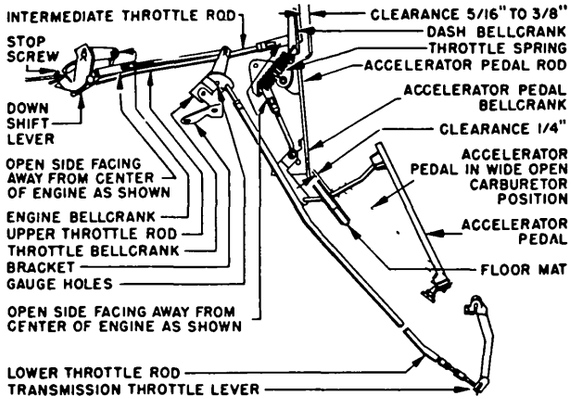
1954-55 OLDSMOBILE

►*1955 TRANSMISSION MANUAL & THROTTLE LEVER PRODUCTION CHANGE:* Beginning with Car Serial No R55-76159 stamped on levers replace the former forged type The later throttle lever is not interchangeable with the forged type on earlier cars. The later stamped manual lever can be used for service replacement on 1954-55 models. Throttle Lever Bending Tool must be reworked for use with the stamped levers. See below.

►*THROTTLE LEVER BENDING TOOL J-2029 REWORK (For use with early & late type levers):* Grind a flat surface (⅛" deep) on left hand pivot pin adjacent to opposite pin (left hand pin is directly above movable lever of tool) The flat surface should be parallel to tool handle

Manual Control Linkage (All Models): Loosen jam nut on shift rod clevis and neutral safety switch Remove clevis pin from shift rod Move manual control lever at side of transmission all the way forward into "N" position Then raise and hold shift lever beyond "N" position against side of opening in jacket Adjust shift rod clevis so that end of clevis contacts outside diameter of bushing in lower shift lever Return lower shift lever to "N" position, insert clevis pin through clevis and bushing, assemble cotter pin to clevis pin

Neutral Safety Switch Adjustment: Set transmission in "N" detent With switch assembled to steering column and link connected to shift lever, insert .090" pin through switch lever and bracket Tighten mounting bolt and withdraw .090" pin Check setting by applying hand brake firmly, placing shift lever in "DR" position, and turning ignition switch to "Start" While holding switch on "Start," slowly move shift lever toward "N" until engine cranks



OLDSMOBILE LINKAGE (TYPICAL)

and starts Without moving shift lever after engine starts, accelerate to determine whether transmission is in gear If switch properly adjusted transmission will not be in gear and car will not move

Throttle Control Linkage (All Series with 2-Barrel & 4-Barrel Carburetors): 1) Remove throttle rod from transmission throttle lever and move throttle lever to the rear against its stop, and with Throttle Lever Gauge J-5605 placed flat against rear face of transmission case, rod on gauge should just enter hole in throttle lever The distance from rear face of transmission case to hole in throttle lever should be 6¾". Adjust by bending lever with tool J-2029 Attach throttle rod to transmission lever

2) Apply hand brake and allow engine to warm up. Place throttle lever in "Dr" position and adjust engine idle speed to 400 RPM Turn off engine Disconnect upper throttle rod from engine bellcrank Check clearance between end of intermediate throttle rod assembly and dash This distance should be 5/16" to 3/8" with carburetor on slow idle Adjust intermediate throttle rod assembly as necessary to obtain the specified clearance (NOTE—On 4-Barrel carburetors, open side of rod end should face away from center of engine, and toward center of engine on 2-Barrel carburetors)

3) Loosen jam nut and remove pin from lower throttle rod at throttle bellcrank, and with bellcrank against stop and intermediate throttle rod against its stop, the clevis pin should enter holes in clevis of lower throttle rod and hole in throttle bellcrank freely Adjust clevis on end of lower throttle rod so pin enters hole freely *CAUTION—Do not shorten or lengthen rod after this setting is obtained.*

4) With upper throttle rod assembly held rearward with light pressure to remove lash, the clevis pin should just touch gauge point on throttle bellcrank (gauge point is a curved projection above clevis pin hole in bellcrank) Adjust by rotating clevis so clevis pin just touches, or is within ½ turn short of gauge point Replace clevis pin and tighten jam nut

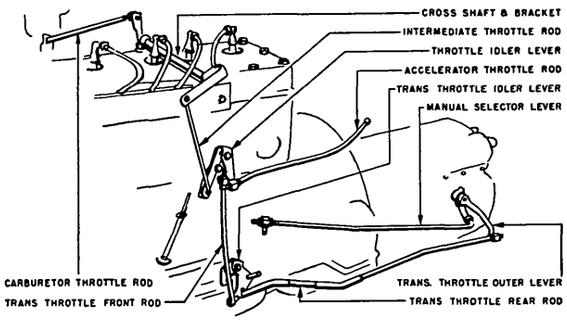
5) Hold choke completely open and move upper throttle rod assembly forward until throttle is wide open Continue pushing upper throttle rod until transmission throttle lever just stops at its forward position (Repeat this procedure several times until the exact forward position is distinctly felt) Do not force linkage beyond this point With linkage in this position there should be zero clearance between throttle bellcrank stopscrew and downshift lever With linkage held forward as outlined, loosen locknut on setscrew and adjust setscrew until it just contacts the downshift lever Release lever and tighten jam nut

6) Place a wood block 3⅞" long on top center of floor mat retainer and bring bottom of accelerator pedal down to rest on block With carburetor in slow idle position (choke completely off) pedal should just touch gauge block If necessary adjust accelerator position by disconnecting accelerator pedal rod from accelerator bellcrank on dash, and adjust accelerator pedal rod so that clevis just slides over pin with wood block in position and carburetor on slow idle Reassemble rod, making sure open side of rod end is facing away from center of engine Remove wood gauge block

1952-54 PONTIAC

LINKAGE ADJUSTMENT: ***Adjust exactly as follows:***
Throttle Control Linkage:

(1) Carburetor Throttle Rod—Disconnect throttle rod at throttle lever (outer lever) on left side of transmission case. Check and adjust engine idle speed to 365-385 RPM hot or slow idle with engine at 150-160°F., transmission warm, and selector lever in Neutral "N". Install adjusting pin through holes in carburetor intermediate lever on left side of cylinder head and lever bracket. Adjust nuts at trunnion on carburetor throttle rod (back off one nut, tighten opposite nut) until adjusting pin is free with carburetor throttle lever stopscrew against its stop. Tighten trunnion nuts but **do not remove adjusting pin.**



1952-54 TYPICAL PONTIAC HYDRA-MATIC LINKAGE

(2) Transmission Throttle Front Rod—Check adjustment by inserting second J-2544 adjusting pin through holes in idler lever (left side of crankcase **below** starter) and lever bracket. If pin does not enter both holes freely, adjust length of transmission throttle front rod at trunnion on upper end of this rod (back off one nut, tighten opposite nut), then tighten both nuts securely, remove both adjusting pins (intermediate lever and idler lever).

(3) Accelerator Pedal Rod—Loosen front locknut on pedal rod at throttle control idler lever on left side of engine, depress accelerator pedal until carburetor throttle is just wide open, check clearance between lower face of accelerator pedal and floor mat. If clearance not ¼" at closest point, adjust pedal by

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LINKAGE ADJUSTMENT

1952-54 PONTIAC (Cont.)

turning rear nut at trunnion on forward end of rod in or out as required, then tighten front nut securely.

(4) Transmission Throttle Lever Position—With rear rod disconnected at transmission case throttle lever, check tightness of lever clamp bolt (12-15 ft. lbs. torque), check lever position by installing Checking Gauge J-2545 flat against machined rear face of transmission case with edge of gauge against side cover flange. Install trunnion pin in lever, hold lever in extreme rear position, move gauge upward, align gauge with trunnion pin. Inside face of throttle control lever should just touch outer side face of gauge and pin in lever should enter slot in gauge freely. Adjust by bending lever with tool J-2807.

Manual Control Linkage: *CAUTION.* If gearshift control shaft upper bracket is found to be loose, tighten the clampscrew while holding selector lever firmly against the stop between the right hand "Dr" position and "Lo".

Manual Control Linkage Adjustment—Place the selector lever in right hand "Dr" position against the stop which prevents accidental shift to "Lo". Back off both control rod trunnion lock nuts at lever on steering column. See that the transmission outer shift lever is in the three-speed drive position (third position from front or rear). Turn lower trunnion nut against trunnion (finger tight) to remove clearance in linkage. Then lengthen rod by turning rear trunnion one full turn. Tighten upper locknut securely.

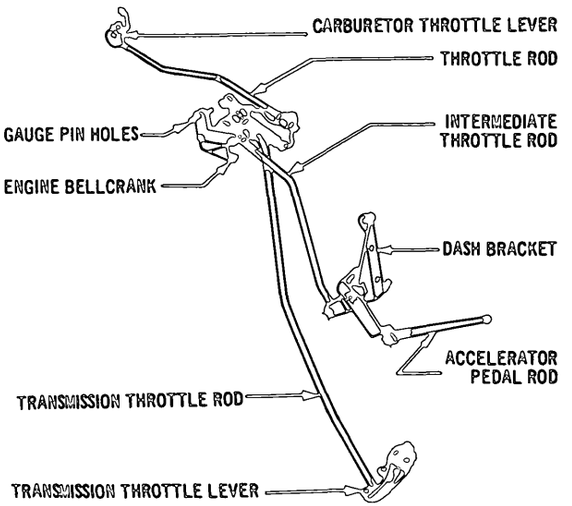
Neutralizer Switch Adjustment: Place selector lever in four speed range (left arrow) position. Loosen switch bracket clampscrew (on steering column at lower end of selector shaft), shift switch and bracket (screw hole is slotted) until starter does not operate when starter button depressed. Move selector lever to (N) neutral position. Check to see that switch does not touch stop on switch bracket, and that starter operates when starter button depressed. Tighten bracket clampscrew.

1955 PONTIAC

Manual Control Linkage: Place selector lever in "D" (right) position against stop which prevents accidental shift into low range. Loosen both front and rear trunnion locknuts and remove trunnion from transmission outer shift lever. Make sure that transmission outer shift lever is in "D" (right), which is second detent from front. Install trunnion (with locknuts loose) in outer shift lever, tighten front locknut against trunnion finger tight to remove clearance in linkage, tighten front locknut one complete turn to lengthen rod. Tighten rear locknut.

Neutral Safety Switch Adjustment: Place selector lever in "D" (left) position. Loosen switch mounting screw and adjust switch bracket to a position where starter will not operate when ignition key is turned to the start position. Place manual control lever in "N" position. Make certain that switch arm does not touch stop on switch bracket. Tighten mounting screw.

▷*PONTIAC THROTTLE LINKAGE PRODUCTION CHANGE:* The transmission throttle rod is now installed in lower hole of transmission throttle lever. When installing rod in lower hole on early cars it



1955 PONTIAC V8 HYDRA-MATIC LINKAGE

is very important that rod not touch left rear engine mount during any part of its travel.

Throttle Linkage Adjustment: With engine at normal operating temperature idle speed set at 390-410 RPM, and with selector lever in "N" position, install linkage adjustment pin J-2544 through holes in lever and bracket at rear of engine left block. Pin should fit free in holes without lever movement. If free fit not obtained, adjust trunnion nuts on carburetor throttle rod until pin is free, then lock nuts securely. Leave gauge pin in hole. Loosen trunnion nuts on transmission throttle control rod and push rod downward until control outer lever is felt to touch end of its travel (top nut must not be touching trunnion). Shorten throttle control rod two full turns by loosening lower nut two turns and tightening upper nut two full turns. Remove gauge pin. With carburetor throttle at full open position accelerator pedal should be at least ¼" from floor mat. If not, adjust as necessary at intermediate control rod trunnion.

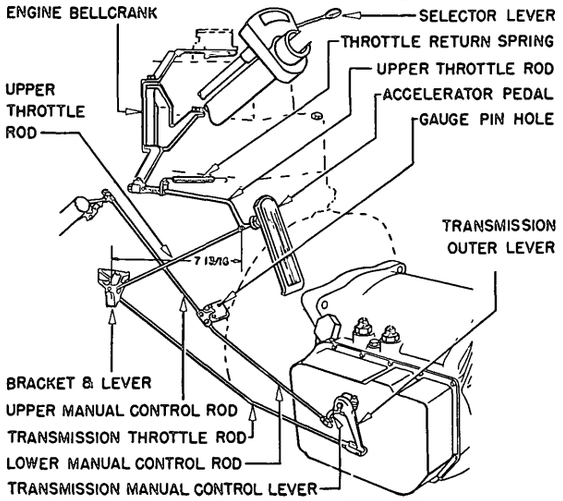
1953-55 WILLYS

LINKAGE ADJUSTMENT: Before making adjustments, block rear wheels and set hand brake. Adjust idle speed to 575 RPM with engine and transmission at normal operating temperature, and with selector lever in "N" (Neutral).

Throttle Linkage: 1) Adjust upper throttle rod (rod from accelerator pedal to engine bell crank) so that when accelerator pedal fully depressed, carburetor throttle valve is in wide open position, and when accelerator is fully released, throttle valve is fully closed and engine is idling at 575 RPM. Adjustment is made at trunnion adjusting block at engine bell crank.

2) Adjust lower throttle rod (rod from accelerator pedal to bracket and lever on lower side of engine) at the trunnion so that the distance from hole in upper throttle rod (where lower throttle rod connects) to center of trunnion on lower throttle rod measures 7 13/16".

3) Disconnect transmission throttle rod (rod connecting throttle lever on transmission to bracket and lever on lower side of engine) clevis at transmission throttle lever. Insert clevis pin in hole in transmission lever and then place lever against rear stop. Place Tool No. 146 against machined surface on rear of transmission case. Clevis should fit freely in second notch of tool. If necessary use Bending Tool No. 1194 to bend lever to fit freely in this notch. (NOTE—If Tool No. 146 is not available, distance from center of clevis pin to machined surface on rear of case, with lever against rear stop, should be 3 9/16" to 3-⅝"). Adjust clevis on transmission throttle rod so clevis pin freely enters hole in transmission lever and holes in clevis, then shorten rod by two full turns of clevis, and attach clevis to lever. Check shift points by road testing



1953-55 WILLYS HYDRA-MATIC LINKAGE

Manual Control Linkage: 1) Place selector lever in "Dr. 3" position. Place a .184" diameter (min.) pin, or use a No. 14 drill, through hole in idler bell crank lever and bracket mounted on toe board panel (if hole is too small or constricted for the pin or drill, grind a pin to size making sure it is a snug fit). Adjust upper control rod (rod connected between bell crank and steering column lever), so that arrow on selector indicator is exactly under the "Dr. 3" mark on indicator quadrant. Make sure all play is eliminated, then tighten nut.

2) Loosen trunnion nuts on lower transmission control rod (rod between bell crank and transmission lever). Place transmission lever in "Dr. 3" position (this is the second detent forward from the rear stop, or the second detent backward from the front stop). Adjust lower rod so that all free play is eliminated, then shorten rod by one complete turn of the front trunnion nut. Lock trunnion by tightening both trunnion nuts, and remove aligning pin from idler bracket.

Neutral Safety Switch Adjustment: Place selector lever in "Dr. 4" position. Turn on starter switch, and if starter operates, loosen switch attaching screws on steering column and turn switch clockwise (facing toward rear of car) until starter no longer operates in "Dr. 4" position. Retighten switch on steering column.

Back-up Light Switch: Part of neutral safety switch, and no additional adjustment required.

DUAL-RANGE HYDRA-MATIC TROUBLE SHOOTING

►*NOTE—Most Hydra-Matic troubles can be corrected by external adjustments and correct oil level. See following table for trouble and possibe causes. See also "HYDRA-MATIC OVERHAUL."*

LIGHT THROTTLE SHIFT POINTS HIGH: (With Full Throttle Shift point normal)—Throttle linkage adjusted incorrectly. Adjust throttle linkage and check for worn or loose control rods.

FULL THROTTLE SHIFT POINTS: (Either too high or too low or do not occur)—Governor valves not operating properly, leakage at governor assembly, broken oil rings. Governor ring lands might be worn. Correct by freeing valves, check for warped surfaces. Replace parts as necessary.

NO THROTTLE DOWNSHIFT IN "Dr" RANGE: (From 4th to 3rd above 20 M.P.H.)—Insufficient accelerator travel due to interference of throttle linkage or at floor carpet. Throttle controls improperly adjusted or lever bent or loose on shaft. Spring lock in downshift valve may be missing.

TRANSMISSION DOES NOT RESPOND TO SHIFT LEVER POSITION: Pin which picks up manual valve in valve body is not operating in groove in manual valve. To check, shift selector lever into reverse. If severe clashing results or if lever goes into reverse but car locks up and fails to move backwards, pickup pin is not operating manual valve. Remove side cover and engage pin.

TRANSMISSION FAILS TO DRIVE CAR: Usually caused by failure of one or both bands to be applied. Check for low oil pressure. Front or rear band adjustment incorrect. Manual valve mispositioned, or torus check valve sticking. Front oil pump inoperative. See Oil Pressure Tests.

NO 3RD. OR 4TH. SPEED DRIVE (Drive normally in 1st. & 2nd. Speed): Rear clutch not applying due to: Leakage in line to clutch or in valve body, hole in transmission case to oil delivery sleeve or sleeve passage clogged, oil delivery sleeve incorrectly installed or oil rings broken, clutch oil seal leaking or clutch piston sticking.

SLIPS IN 1ST. 3RD, & REVERSE (Operation normal in 2nd. & 4th. Speed): Front band slipping due to: Leakage in valve body, passages in case, or in servo. Servo pistons sticking. Band incorrectly adjusted. Valves in valve body sticking. Throttle linkage incorrectly adjusted or not operating correctly.

SLIPS IN 1ST. OR 2ND. SPEED (Operation normal in 3rd. 4th., & Reverse): Rear band slipping due to: Leakage in valve body, passages in case, or in servo. Servo piston sticking. Band incorrectly adjusted. Valves in valve body sticking. Throttle linkage incorrectly adjusted or not operating correctly.

SLIPS IN "LO" RANGE (Operation normal in Reverse): Rear band slipping or not operating (see causes in 1st. & 2nd. Speed Slip above).

SLIPS OR CHATTERS ON 3-2 DOWNSHIFT: Rear band slipping or not operating (see causes in 1st. & 2nd. Speed Slip above). Rear servo operation incorrect due to: weak or broken servo springs or accumulator check valve stuck closed. Insufficient compensator pressure due to: Throttle linkage operating incorrectly or compensator valve stuck.

THROTTLE DOWNSHIFT FROM 3RD. SPEED DELAYED OR REQUIRES EXCESSIVE THROTTLE OPENING (May not occur until car stopped, usually occurs when transmission cold): Governor or valves in valve body sticking.

CLOSED THROTTLE 3-2 DOWNSHIFT OCCURS AT EXCESSIVELY HIGH SPEED (with severe "clunk"): Rear servo check valve not operatng correctly, accumulator piston rings stuck or broken, valves in valve body sticking, rear clutch piston binding on its pilot, governor operation incorrect, governor oil seal rings broken, or oil leak at governor assembly.

LIGHT THROTTLE DOWNSHIFT TO 3RD. SPEED OCCURS ABOVE 20 MPH. IN DRIVE RANGE (Or transmission "hunts" between 4th. & 3rd. Speeds): Throttle linkage adjustment incorrect or valves in valve body sticking.

UPSHIFTS ERRATIC OR MISSING (Starts in 3rd. or 4th. Speed in "Dr" Range, Starts in 2nd. Speed in "Lo" Range, May shift to 3rd. Speed in "Lo" Range or miss 3rd. Speed in "Dr" Range, May operate only in 2nd. Speed or only in 3rd. & 4th. Speeds in "Dr" Range): Governor valves sticking or valves in valve body sticking.

NO 4TH. SPEED UPSHIFT (2nd. & 3rd. Speed Upshifts normal): Governor valves sticking or valves in valve body sticking.

LIGHT THROTTLE UPSHIFT SPEEDS EXCESSIVELY HIGH (with violent band application when shifting from "N" to "Dr" when car standing): Governor valves sticking or valves in valve body sticking.

TRANSMISSION JUMPS OUT OF REVERSE: Manual control linkage rod adjusted too short.

SHIFT OUT OF REVERSE DIFFICULT: Inside manual cam lever surface rough or detent plunger rough.

ERRATIC RESPONSE TO SHIFT LEVER: Inner manual control valve lever loose on shaft. Replace lever assembly.

HUNTING: Adjust throttle linkage, check valve assembly and clean thoroughly and reface.

ALL SHIFTS ROUGH: Adjust throttle linkage and servo bands. Clean and reface valve assembly. Check transmission passages for leaks. Check oil pressure.

CREEPS FORWARD WHEN IN "R" POSITION: Rear unit not operating correctly. Excessive drag in rear clutch.

NO DRIVE WHEN ENGINE IS FIRST STARTED: Check fluid coupling and front pump. Test oil pressure.

CREEPS EXCESSIVELY IN "Dr": Engine idle speed too high.

CAR WILL NOT BACK UP: (Unless throttle is opened excessively)—Rear band not released due to low oil pressure caused by leakage or compensator valve auxiliary plug pin missing.

BANDS APPLIED VIOLENTLY, ENGINE SPEEDS UP: Low oil pressure or level. Pressure regulating valve sticking. Front pump may not be operating properly or there is a bad oil leak in the system. Check oil pressure and oil level. Free up pressure regulator valve or install new valve.

NO DRIVE IN REVERSE: This condition will occur if front servo exhaust body spacer is installed in reverse. Under this condition oil pressure does not increase when selector lever is placed in Reverse position. Pressure will increase to 150-170 lbs. when transmission shifts from 1 to 2.

SLIPPING IN REVERSE ONLY: Check for Low Oil Pressure in Reverse, Inoperative Front Servo Exhaust Valve, Key missing or defective in stationary cone, Stationary Cone or Cone Clutch Piston worn excessively, Front Servo & Band operation not operating properly, Valve Body Assembly dirty (sticking valves or oil leaks), Stationary cone distorted by handling when disassembled.

SELECTOR LEVER WILL NOT GO INTO REVERSE: Check for: Governor G-1 weight stuck wide open or broken governor ring (separating main line pressure from G-1 pressure to reverse blocker piston), Governor ring groove or gap clearances incorrect, Governor sleeve defective, Parking Pawl Crank bent, Detent Plunger in inner control lever stuck, Reverse Blocker Piston sticking or piston spring weak or broken.

EXCESSIVE SQUAWK IN REVERSE (May occur when selector lever out of Reverse if reverse unit not fully disengaged): Check for low oil pressure and galling of stationary cone and cone clutch piston. If reverse not fully disengaged also check for: Check Valve in detent plunger retainer in valve body plugged, Reverse Clutch Spring inoperative or weak, High spot or galling of stationary cone and cone clutch piston, cone clutch piston release springs defective or weak, Rear Bearing Dowels too high.

LOW OIL PRESSURE, SLIPPAGE, DELAYED AND ERRATIC UPSHIFTS: These conditions will exist when one or the other of the two ¼" cup shaped plugs are missing from the parking bracket. (CAUTION—These plugs are not service parts and should never be removed). If plugs are loose or missing, replace assembly.

REVERSE CONE ENGAGES WHEN IN DRIVE: This condition can occur when there is excessive leakage into the reverse apply circuit. Check for leakage as follows:

1) Check front servo exhaust valve for proper fit in exhaust body. Clearance should be .002".

2) Inspect detent retainer spacer and valve body surfaces that contact spacer. Replace control valve if necessary.

3) Check Throttle Valve plug in Pressure Regulator for excessive clearance. If greater than .002" replace Regulator plug assembly.

4) Neoprene seal on Pressure Regulator Plug defective. Use extreme caution when installing plug not to damage seal (remove all sharp corners or burrs in transmission case with round hone, place small amount of grease on seal before installing assembly, DO NOT use wrench to start pressure regulator plug in housing).

1952-53 DUAL-RANGE HYDRA-MATIC SHIFT POINTS

1952 CADILLAC

UPSHIFTS:①	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5-9	10-14	18-21
(Full Throttle)	16-19	32-36	65-72
"Dr. 3" (Min. Throttle)	5-9	10-14	②
(Full Throttle)	16-19	32-36	②
"Lo" (Full Throttle)	16-19		

DOWNSHIFTS:①	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	15-12	11-7	7-4
(Full Throttle)	26-24	10-7	9-6
(Forced)	65-60	27-23	10-7
"Dr. 3" (Min. Throttle)	②	11-7	7-4
(Full Throttle)	②	10-7	9-6
(Forced)		27-23	10-7
"Lo" (Full Throttle)			9-6

Lockout (in "Lo"): 3-2 Shift, 48-43 MPH.

1953 CADILLAC

UPSHIFTS:①	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5.5-8.2	11.5-16	21-26
(At Detent)	14.5-18	33-38	68-75
(Full Throttle)	20-23	36-41	73-79
"Dr. 3" (Min. Throttle)	5.5-8.2	11.5-16	73-79
(At Detent)	14.5-18	33-38	73-79
(Full Throttle)	20-23	36-41	73-79
"Lo" (Min. Throttle)	5.5-8.2	⑯	
(At Detent)	14.5-18	⑯	
(Full Throttle)	20-23	⑯	

DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	14.5-17.2	8.5-11.8	4.0-6.6
(At Detent)	27-31	7-10	6-9
(Full Throttle)	70-75	21-24	8.5-11
"Dr. 3" (Min. Throttle)	70-77	8.5-11.8	4.0-6.6
(At Detent)	72-79	7-10	6-9
(Full Throttle)	72-79	21-24	8.5-11
"Lo" (Min. Throttle)	⑰		4.0-6.6
(At Detent)	⑰		6-9
(Full Throttle)	⑰		8.5-11

1952 HUDSON (H-52 & J-52 TRANSMISSION)

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	6-9	11-14	20-23
(Full Throttle)	17-20	32-36	63-69
"Dr. 3" (Min. Throttle)	6-9	11-14	
(Full Throttle)	17-20	32-36	
"Lo" (Full Throttle)	17-20		

DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Closed Throttle)	16-14	11-8	7-5
(Full Throttle)	21-17	10-7	10-7
(Forced)⑧	20-60	10-22	0-10
"Dr. 3" (Closed Throttle)		11-8	7-5
(Full Throttle)		10-7	10-7
(Forced)⑨		10-22	0-10
"Lo" (Full Throttle)			10-7

Lockout in "Lo"—3-2 or 4-2 Shift, 49-41 MPH.

1953 HUDSON (H-53 & J-53 TRANSMISSION)

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	6-9	13-17	22-26
(Full Throttle)	17-20	⑱32-37	65-71
"Dr. 3" (Min. Throttle	6-9	13-17	70-76
(Full Throttle)	17-20	32-37	⑲72-78
"Lo" (Full Throttle)	17-20		

DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	17-14	11-8	8-4
(Full Throttle)	⑳27-23	㉑11-7	㉑ 8-5
(Forced)	62-56	25-21	10-7
"Dr. 3" (Min. Throttle	69-63	11-8	8-4
(Full Throttle)	78-72	㉑11-7	㉑ 8-5
(Forced)	78-72	㉒25-21	10-7
"Lo" (Forced			10-7

Lockout in "Lo"—4-2 or 3-2 shift, 46-42 MPH.

1953 HUDSON JET (Z-52 & Z-53 TRANSMISSIONS)

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	4-7	9-14	19-25
(Full Throttle)	14-18	23-32	53-62
"Dr. 3" (Min. Throttle	4-7	9-14	57-67
(Full Throttle)	14-18	26-32	65-75
"Lo" (Full Throttle)	14-18		

DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	15-11	19-14	55-46
(Full Throttle)	10-6	9-6	19-15
(Forced)	7-3	9-6	9-6
"Dr. 3" (Min. Throttle)	61-52	10-6	7-3
(Full Throttle)	68-59	9-6	9-6
(Forced)	68-59	19-15	9-6
"Lo" (Full Throttle)			9-5

Lockout in "Lo"—4-2 or 3-2 shift, 40-34 MPH.

1952-53 KAISER

UPSHIFTS: ⑬	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	6-8	10-13	18-21
(Full Throttle)	16-19	29-33	62-69
"Dr. 3" (Min. Throttle)	6-8	10-13	②
(Full Throttle)	16-19	29-33	②
"Lo" (Full Throttle)	15-19		

DOWNSHIFTS :⑬	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	15-12	10-7	7-4
(Full Throttle)	20-16	9-6	9-6
(Forced)⑪	55-18	20-10	9-4
"Dr. 3" (Min. Throttle)	②	10-7	7-4
(Full Throttle)	②	9-6	9-7
(Forced)⑫		20-10	9-4
"Lo"(Forced)			9-0

1952 LINCOLN

UPSHIFTS⑭	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5-9	10-13	20-24
(Full Throttle)	19-24	34-37	66-74
"Dr. 3" (Min. Throttle)	5-9	10-13	②
(Full Throttle)	19-24	34-37	②
"Lo" (Min. Throttle)	9-14		
(Full Throttle)	24-28		

DOWNSHIFTS:⑭	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	16-13	10-7	6-3
(Full Throttle)	27-23	11-8	10-7
(Forced)	63-59	28-25	10-7
"Dr. 3" (Min. Throttle)	②	10-7	6-3
(Full Throttle)	②	11-8	10-7
(Forced)		28-25	10-7
"Lo" (Min. Throttle)			10-8
(Full Throttle)			15-11

Lockout in "Lo"—4-2 Shift, 47-37 MPH.

1953 LINCOLN

UPSHIFTS: ⑭	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	6-9	11-13	19-22
(Full Throttle)	13-17	30-34	50-57
"Dr. 3" (Min. Throttle)	6-9	11-13	19-22
(Full Throttle)	13-17	30-34	50-57
"Lo" ⑮			

DOWNSHIFTS: ⑭	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	15-13	10-8	6-4
(Full Throttle)	27-23	9-8	8-6
"Dr. 3" (Min. Throttle)	15-13	10-8	6-4
(Full Throttle)	27-23	9-8	8-6
"Lo" (Min. Throttle)			10-8
(Full Throttle)			15-11
(Forced)			10-7

Lockout in "Lo"—4-2 Shift, 41-38. 2-1 Shift, 9-6

1952-53 NASH AMBASSADOR

UPSHIFTS:	1-2	2-3	⑩3-4
"Dr" (Min. Throttle)	6-9	10-14	19-24
(Full Throttle)	17-21	31-37	62-69
"Lo" (Full Throttle)	17-21		

DOWNSHIFTS:	⑩4-3	3-2	2-1
"Dr" (Closed Throttle)	16-12	11-7	7-4
(Full Throttle)	21-16	10-6	10-6
(Forced)	62-16	20-16	
"Lo" (Full Throttle)			11-7

Lockout in "Lo"—4-2 Shift, 48-39 MPH.

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1952-53 DUAL-RANGE HYDRA-MATIC SHIFT POINTS (C ntinued)

1952 NASH STATESMAN
1953 NASH STATESMAN & RAMBLER

UPSHIFTS:	1-2	2-3	⑩3-4
"Dr" (Min. Throttle)	5-9	9-13	18-22
(Full Throttle)	13-17	27-32	55-61
"Lo" (Full Throttle)	13-17		
DOWNSHIFTS:	⑩4-3	3-2	2-1
"Dr" (Closed Throttle)	15-12	10-7	7-5
(Full Throttle)	19-13	9-5	9-5
(Forced)	55-15	19-15	
"Lo" (Full Throttle)			9-6

Lockout in "Lo"—4-2 Shift, 48-39 MPH.

1952-53 OLDSMOBILE

UPSHIFTS:	1-2	2-3	3-4
"Dr."③	④5-19	13-38	21-75
"S"	5-21	13-18	②
"Lo"	5-21		
DOWNSHIFTS:	4-3	3-2	2-1
"Dr" (Closed Throttle)	15-13	10-8	6-4
(Full Throttle)	21-19	12-9	10-8
(Forced)⑤	65-18	18-8	10-8
"S" (Closed Throttle)	②	10-8	6-4
(Full Throttle)	②	12-9	10-8
(Forced)⑤		18-8	10-8
"Lo" (Closed Throttle)			6-4
(Full Throttle)			10-8

1952-53 PONTIAC

UPSHIFTS:	1-2	2-3	3-4
Left "Dr" (Min. Throttle)	7-10	12-16	20-24
(Full Throttle)	19-23	35-40	69-75
Right "Dr" (Min. Throttle)	7-10	12-16	②
(Full Throttle)	19-23	35-40	②
"Lo" (Full Throttle)	19-23		
DOWNSHIFTS:	4-3	3-2	2-1
Left "Dr" (Closed Throttle)	17-14	12-9	8-5
(Full Throttle)	22-19	11-8	11-8
(Forced)⑥	20-63	7-24	0-11
Right "Dr" (Closed Throttle)	②	12-9	8-5
(Full Throttle)	②	11-8	11-8
(Forced)⑦		7-24	0-11
"Lo" (Full Throttle)			11-8
(Forced)			0-11

Lockout in "Lo"—3-2 or 4-2 Shift, 53-48 MPH.

1953 WILLYS

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5-8	9-12	19-20
(Full Throttle)	10-12	23-27	49-54
"Dr. 3" (Min. Throttle)	5-8	9-12	
(Full Throttle)	10-12	23-27	60-64
"Lo" (Full Throttle)	13-16		
DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	15-13	10-7	6-4
(Full Throttle)	24-21	9-7	7-4
(Forced)	53-13	19-17	8-5
"Dr. 3" (Min. Throttle)		10-7	6-4
(Full Throttle)		9-7	7-4
(Forced)		19-17	8-5
(Forced)			9-0

①—Based on 3.07-1 Axle Ratio.
②—Occurs at very high car speeds only (75 MPH.).
③—Dependent on Throttle position.
④—5-22 MPH. with throttle in Detent Position.
⑤—Downshifts 4-2, 20-15 MPH. 3-1, 11-8 MPH.
⑥—3-1 Downshift, 11-8 MPH.
⑦—Downshifts 4-2, 20-10 MPH. 3-1, 10-7 MPH.
⑧—3-1 Downshift, 10-7 MPH.
⑩—In "Dr. 4" position only.
⑪—Downshifts 4-2, 18-12 MPH. 3-1, 9-7 MPH.
⑫—3-1 Downshift, 9-7 MPH.
⑬—Correct for 15x6.70 Tires & 3.31-1 Axle Ratio.
⑭—For cars with 3.07-1 Axle Ratio.
⑮—Starts in Second Speed. Possible to start in First Speed by depressing throttle fully to floor.
⑯—2-4 Upshift (42 MPH).
⑰—4-2 Downshift (42 MPH).
⑱—31-36 (J-53 Trans.).
⑲—79-85 (J-53 Trans.).
⑳—21-18 (J-53 Trans.).
㉑—10-7 (J-53 Trans.).
㉒—12-18 (J-53 Trans.).

1954 DUAL-RANGE HYDRA-MATIC SHIFT POINTS

CADILLAC
3.07-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	5-8	11-16	21-26
(At Detent)	14-18	33-38	68-75
(Full Throttle)	20-23	36-41	73-79
"Dr. 3" (Min Throttle	5-8	11-16	73-79
(At Detent)	14-18	33-38	73-79
(Full Throttle)	20-23	36-41	73-79
"Lo" (Min Throttle)	5-8		⑯
(At Detent)	14-18		⑯
(Full Throttle)	20-23		⑯
DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min Throttle)	14-17	8-12	4-7
(At Detent)	27-31	7-10	6-9
(Full Throttle)	70-75	21-24	8-11
"Dr. 3" (Min. Throttle)	70-77	8-12	4-7
(At Detent)	72-79	7-10	6-9
(Full Throttle)	72-79	21-24	8-11
"Lo" (Min Throttle)	⑰		4-7
(At Detent)	⑰		6-9
(Full Throttle)	⑰		8-11

CADILLAC
3.36-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5-8	10-15	19-24
(At Detent)	13-17	30-35	62-68
(Full Throttle)	18-22	33-37	67-72
"Dr. 3" (Min. Throttle)	5-8	10-15	67-72
(At Detent)	13-17	30-35	67-72
(Full Throttle)	18-22	33-37	67-72
"Lo" (Min. Throttle)	5-8		①
(At Detent)	13-17		①
(Full Throttle)	18-22		①
DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min Throttle)	13-16	7-11	3-6
(At Detent)	25-28	6-9	5-8
(Full Throttle)	64-69	19-22	7-10
"Dr. 3" (Min. Throttle)	64-70	7-11	3-6
(At Detent)	66-72	6-9	5-8
(Full Throttle)	66-72	19-22	7-10
"Lo" (Min Throttle)	㉓		3-6
(At Detent)	㉓		5-8
(Full Throttle)	㉓		7-10

CADILLAC
3.77-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	4-7	8-13	17-21
(At Detent)	12-15	27-31	55-61
(Full Throttle)	16-19	30-34	60-64
"Dr. 3" (Min Throttle)	4-7	8-13	60-64
(At Detent)	12-15	27-31	60-64
(Full Throttle)	16-19	30-34	60-64
"Lo" (Min Throttle)	4-7		㉔
(At Detent)	12-15		㉔
(Full Throttle)	16-19		㉔
DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min Throttle)	12-14	7-8	3-5
(At Detent)	22-25	5-8	5-8
(Full Throttle)	57-61	17-20	7-9
"Dr. 3" (Min Throttle)	57-63	7-8	3-5
(At Detent)	58-64	5-8	5-8
(Full Throttle)	58-64	17-20	7-9
"Lo" (Min Throttle)	㉕		3-5
(At Detent)	㉕		5-8
(Full Throttle)	㉕		7-9

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1954 DUAL-RANGE HYDRA-MATIC SHIFT POINTS (C ntinu d)

CADILLAC

4.27-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	4-6	8-12	15-18
(At Detent)	10-13	24-28	49-55
(Full Throttle)	15-17	26-32	53-58
"Dr 3" (Min Throttle)	4-6	8-12	53-58
(At Detent)	10-13	24-28	53-58
(Full Throttle)	15-17	26-32	53-58
"Lo" (Min Throttle)	4-6		㉕
(At Detent)	10-13		㉖
(Full Throttle)	15-17		㉖
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	10-13	6-9	3-5
(At Detent)	19-23	5-7	4-7
(Full Throttle)	51-55	15-17	6-8
"Dr 3" (Min Throttle)	51-56	6-9	3-5
(At Detent)	51-56	5-7	4-7
(Full Throttle)	51-56	15-17	6-8
"Lo" (Min Throttle)	㉗		3-5
(At Detent)	㉗		4-7
(Full Throttle)	㉗		6-8

HUDSON

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	6-9	13-17	22-26
(Full Throttle)	17-20	⑱32-37	65-71
"Dr 3" (Min Throttle	6-9	13-17	70-76
(Full Throttle)	17-20	32-37	⑲72-78
"Lo" (Full Throttle)	17-20		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min. Throttle)	17-14	11-8	8-4
(Full Throttle)	⑳27-23	㉑11-7	㉑ 8-5
(Forced)	62-56	25-21	10-7
"Dr. 3" (Min Throttle	69-63	11-8	8-4
(Full Throttle)	78-72	㉑11-7	㉑ 8-5
(Forced)	78-72	㉒25-21	10-7
"Lo" (Forced			10-7

Lockout in "Lo"—4-2 or 3-2 shift, 46-42 MPH.

HUDSON JET

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	4-7	9-14	19-25
(Full Throttle)	14-18	23-32	53-62
"Dr. 3" (Min. Throttle	4-7	9-14	57-67
(Full Throttle)	14-18	26-32	65-75
"Lo" (Full Throttle)	14-18		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min. Throttle)	15-11	19-14	55-46
(Full Throttle)	10-6	9-6	19-15
(Forced)	7-3	9-6	9-6
"Dr. 3" (Min. Throttle)	61-52	10-6	7-3
(Full Throttle)	68-59	9-6	9-6
(Forced)	68-59	19-15	9-6
"Lo" (Full Throttle)			9-5

Lockout in "Lo"—4-2 or 3-2 shift, 40-34 MPH.

KAISER

UPSHIFTS: ㉓	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	6-8	10-13	18-21
(Full Throttle)	16-19	29-33	62-69
"Dr. 3" (Min. Throttle)	6-8	10-13	②
(Full Throttle)	16-19	29-33	②
"Lo" (Full Throttle)	15-19		
DOWNSHIFTS :㉓	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min Throttle)	15-12	10-7	7-4
(Full Throttle)	20-16	9-6	9-6
(Forced) ⑪	55-18	20-10	9-4
"Dr. 3" (Min Throttle)	②	10-7	7-4
(Full Throttle)	②	9-6	9-7
(Forced) ⑫		20-10	9-4
"Lo"(Forced)			9-0

LINCOLN

UPSHIFTS: ⑭	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	6-9	11-13	19-22
(Full Throttle)	13-17	30-34	50-57
"Dr. 3" (Min. Throttle)	6-9	11-13	19-22
(Full Throttle)	13-17	30-34	50-57
"Lo" ⑮			
DOWNSHIFTS: ⑭	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min. Throttle)	15-13	10-8	6-4
(Full Throttle)	27-23	9-8	8-6
"Dr. 3" (Min. Throttle)	15-13	10-8	6-4
(Full Throttle)	27-23	9-8	8-6
"Lo" (Min. Throttle)			10-8
(Full Throttle)			15-11
(Forced)			10-7

Lockout in "Lo"—4-2 Shift, 41-38. 2-1 Shift, 9-6

NASH AMBASSADOR

UPSHIFTS:	1-2	2-3	⑩3-4
"Dr" (Min. Throttle)	6-9	10-14	19-24
(Full Throttle)	17-21	31-37	62-69
"Lo" (Full Throttle)	17-21		
DOWNSHIFTS:	**⑩4-3**	**3-2**	**2-1**
"Dr" (Closed Throttle)	16-12	11-7	7-4
(Full Throttle)	21-16	10-6	10-6
(Forced)	62-16	20-16	
"Lo" (Full Throttle)			11-7

Lockout in "Lo"—4-2 Shift, 48-39 MPH.

NASH STATESMAN & RAMBLER

UPSHIFTS:	1-2	2-3	⑩3-4
"Dr" (Min. Throttle)	5-9	9-13	18-22
(Full Throttle)	13-17	27-32	55-61
"Lo" (Full Throttle)	13-17		
DOWNSHIFTS:	**⑩4-3**	**3-2**	**2-1**
"Dr" (Closed Throttle)	15-12	10-7	7-5
(Full Throttle)	19-13	9-5	9-5
(Forced)	55-15	19-15	
"Lo" (Full Throttle)			9-6

Lockout in "Lo"—4-2 Shift, 48-39 MPH.

OLDSMOBILE

UPSHIFTS:	1-2	2-3	3-4
"Dr."③	④5-19	13-38	21-75
"S"	5-21	13-18	②
"Lo"	5-21		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr" (Closed Throttle)	15-13	10-8	6-4
(Full Throttle)	21-19	12-9	10-8
(Forced) ⑤	65-18	18-8	10-8
"S" (Closed Throttle)	②	10-8	6-4
(Full Throttle)	②	12-9	10-8
(Forced) ⑤		18-8	10-8
"Lo" (Closed Throttle)			6-4
(Full Throttle)			10-8

PONTIAC

UPSHIFTS:	1-2	2-3	3-4
Left "Dr" (Min. Throttle)	7-10	12-16	20-24
(Full Throttle)	19-23	35-40	69-75
Right "Dr" (Min. Throttle)	7-10	12-16	②
(Full Throttle)	19-23	35-40	②
"Lo" (Full Throttle)	19-23		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
Left "Dr" (Closed Throttle)	17-14	12-9	8-5
(Full Throttle)	22-19	11-8	11-8
(Forced) ⑧	20-63	7-24	0-11
Right "Dr" (Closed Throttle)	②	12-9	8-5
(Full Throttle)	②	11-8	11-8
(Forced) ⑦		7-24	0-11
"Lo" (Full Throttle)			11-8
(Forced)			0-11

Lockout in "Lo"—3-2 or 4-2 Shift, 53-48 MPH.

WILLYS

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5-8	9-12	19-20
(Full Throttle)	10-12	23-27	49-54
"Dr. 3" (Min. Throttle)	5-8	9-12	
(Full Throttle)	10-12	23-27	60-64
"Lo" (Full Throttle)	13-16		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min. Throttle)	15-13	10-7	6-4
(Full Throttle)	24-21	9-7	7-4
(Forced)	53-13	19-17	8-5
"Dr. 3" (Min. Throttle)		10-7	6-4
(Full Throttle)		9-7	7-4
(Forced)		19-17	8-5
(Forced)			9-0

CONTINUED ON NEXT PAGE

1955 DUAL-RANGE HYDRA-MATIC SHIFT POINTS

CADILLAC

3.07-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-8	11-16	21-26
(At Detent)	14-18	33-38	68-75
(Full Throttle)	20-23	36-41	73-79
"Dr 3" (Min Throttle	5-8	11-16	73-79
(At Detent)	14-18	33-38	73-79
(Full Throttle)	20-23	36-41	73-79
"Lo" (Min Throttle)	5-8		⑯
(At Detent)	14-18		⑯
(Full Throttle)	20-23		⑯
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	14-17	8-12	4-7
(At Detent)	27-31	7-10	6-9
(Full Throttle)	70-75	21-24	8-11
"Dr 3" (Min Throttle)	70-77	8-12	4-7
(At Detent)	72-79	7-10	6-9
(Full Throttle)	72-79	21-24	8-11
"Lo" (Min Throttle)	⑰		4-7
(At Detent)	⑰		6-9
(Full Throttle)	⑰		8-11

3.36-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-8	10-15	19-24
(At Detent)	13-17	30-35	62-68
(Full Throttle)	18-22	33-37	67-72
"Dr 3" (Min Throttle)	5-8	10-15	67-72
(At Detent)	13-17	30-35	67-72
(Full Throttle)	18-22	33-37	67-72
"Lo" (Min Throttle)	5-8		①
(At Detent)	13-17		①
(Full Throttle)	18-22		①
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	13-16	7-11	3-6
(At Detent)	25-28	6-9	5-8
(Full Throttle)	64-69	19-22	7-10
"Dr 3" (Min Throttle)	64-70	7-11	3-6
(At Detent)	66-72	6-9	5-8
(Full Throttle)	66-72	19-22	7-10
"Lo" (Min Throttle)	㉓		3-6
(At Detent)	㉓		5-8
(Full Throttle)	㉓		7-10

3.77-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	4-7	8-13	17-21
(At Detent)	12-15	27-31	55-61
(Full Throttle)	16-19	30-34	60-64
"Dr 3" (Min Throttle)	4-7	8-13	60-64
(At Detent)	12-15	27-31	60-64
(Full Throttle)	16-19	30-34	60-64
"Lo" (Min Throttle)	4-7		㉔
(At Detent)	12-15		㉔
(Full Throttle)	16-19		㉔
DOWNSHIFTS.	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	12-14	7-8	3-5
(At Detent)	22-25	5-8	5-8
(Full Throttle)	57-61	17-20	7-9
"Dr 3" (Min Throttle)	57-63	7-8	3-5
(At Detent)	58-64	5-8	5-8
(Full Throttle)	58-64	17-20	7-9
"Lo" (Min Throttle)	㉕		3-5
(At Detent)	㉕		5-8
(Full Throttle)	㉕		7-9

4.27-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	4-6	8-12	15-18
(At Detent)	10-13	24-28	49-55
(Full Throttle)	15-17	26-32	53-58
"Dr 3" (Min Throttle)	4-6	8-12	53-58
(At Detent)	10-13	24-28	53-58
(Full Throttle)	15-17	26-32	53-58
"Lo" (Min Throttle)	4-6		㉖
(At Detent)	10-13		㉖
(Full Throttle)	15-17		㉖
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	10-13	6-9	3-5
(At Detent)	19-23	5-7	4-7
(Full Throttle)	51-55	15-17	6-8
"Dr 3" (Min Throttle)	51-56	6-9	3-5
(At Detent)	51-56	5-7	4-7
(Full Throttle)	51-56	15-17	6-8
"Lo" (Min Throttle)	㉗		3-5
(At Detent)	㉗		4-7
(Full Throttle)	㉗		6-8

CHEVROLET TRUCK

HALF-TON—3 09-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-7	8-10	16-18
(At Detent)	10-13	22-25	43-48
"Dr 3" (Min Throttle)	5-7	8-10	
(At Detent)	10-13	22-25	
"Lo" (Forced)	12-16		
DOWNSHIFTS.	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	11-13	6-8	3-5
(At Detent)	19-22	5-7	4-6
(Forced)	45-49	16-18	5-7
"Dr 3" (Min Throttle)		6-8	3-5
(At Detent)		5-7	4-6
(Forced)		16-18	5-7

¼ & 1-TON—4 5-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	4-6	8-10	15-17
(At Detent)	8-11	20-23	39-44
"Dr 3" (Min Throttle)	4-6	8-10	
(At Detent)	8-11	11-13	
"Lo" (Forced)	11-13		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	7-10	5-7	2-4
(At Detent)	18-21	5-7	3-5
(Forced)	41-25	15-17	4-6
"Dr 3" (Min Throttle)		5-7	2-4
(At Detent)		5-7	3-5
(Forced)		15-17	4-6

¼ & 1-TON—5.1-1 AXLE

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	3-5	7-9	13-15
(At Detent)	7-10	18-21	35-40
"Dr 3" (Min Throttle)	3-5	7-9	
(At Detent)	7-10	18-21	
"Lo" (Forced)	10-18		
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Min Throttle)	6-9	4-6	1-3
(At Detent)	16-19	4-6	3-5
(Forced)	36-40	13-15	3-5
"Dr 3" (Min Throttle)		4-6	1-3
(At Detent)		4-6	3-5
(Forced)		13-15	3-5

HUDSON HORNET

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	6-9	12-17	21-34
(Full Throttle)	21-25	36-39	66-76
"Dr 3" (Min Throttle)	6-9	12-17	
(Full Throttle)	21-25	36-39	76-81
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	17-14	10-17	6-3
(Part Throttle)	31-15		
(Full Throttle)	31-28	10-7	5-3
(Forced)	66-15	24-8	
"Dr 3" (Closed Throttle)	80-75	10-7	6-3

HUDSON WASP

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	3-7	10-13	18-21
(Full Throttle)	17-21	30-35	61-65
"Dr 3" (Min Throttle)	3-7	10-13	
(Full Throttle)	17-21	30-37	65-70
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	14-11	9-6	4-2
(Part Throttle)	25-11		
(Full Throttle)	55-21	9-7	4-2
(Forced)	55-12	21-7	
"Dr 3" (Closed Throttle)	68-63	9-6	4-2

KAISER

UPSHIFTS: ㉒	1-2	2-3	3-4
"Dr. 4" (Min Throttle)	6-8	10-13	18-21
(Full Throttle)	16-19	29-33	62-69
"Dr 3" (Min Throttle)	6-8	10-13	②
(Full Throttle)	16-19	29-33	②
"Lo" (Full Throttle)	15-19		
DOWNSHIFTS :⑬	**4-3**	**3-2**	**2-1**
"Dr. 4" (Min Throttle)	15-12	10-7	7-4
(Full Throttle)	20-16	9-6	9-6
(Forced)⑪	55-18	20-10	9-4
"Dr 3" (Min Throttle)	②	10-7	7-4
(Full Throttle)	②	9-6	9-7
(Forced)⑫		20-10	9-4
"Lo"(Forced)			9-0

NASH AMBASSADOR

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	6-9	11-15	19-24
(Full Throttle)	20-23	32-33	70-78
"Dr 3" (Min Throttle)	6-9	11-15	
(Full Throttle)	20-23	32-38	80-85
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	17-13	11-7	6-3
(Part Throttle)	28-17		
(Forced)	63-17	23-19	
"Dr 3" (Closed Throttle)	71-73	11-7	6-3
(Forced)		23-19	
"Lo" (Full Throttle)			11-7

Lockout in "Lo"—4-2 shift, 53-49 MPH

CONTINUED N NEXT PAGE

1955 DUAL-RANGE HYDRA-MATIC SHIFT POINTS (C ntinued)

NASH STATESMAN

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-9	9-13	18-22
(Full Throttle)	13-17	27-32	55-63
"Dr 3" (Min Throttle)	5-9	9-13	
(Full Throttle)	13-17	27-32	68-73
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	12-8	8-4	5-3
(Part Throttle)	27-12		
(Forced)	55-15	19-15	
"Dr 3" (Closed Throttle)	67-71	8-4	5-3
(Forced)		19-15	
"Lo" (Full Throttle)			9-6

Lockout in "Lo"—4-2 shift, 50-41 MPH

OLDSMOBILE

UPSHIFTS:	**1-2**	**2-3**	**3-4**
"Dr."③	④5-19	13-38	21-75
"S"	5-21	13-18	⑧
"Lo"	5-21	.	
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr" (Closed Throttle)	15-13	10-8	6-4
(Full Throttle)	21-19	12-9	10-8
(Forced)⑤	65-18	18-8	10-8
"S" (Closed Throttle)	⑧	10-8	6-4
(Full Throttle)	⑧	12-9	10-8
(Forced)⑤		18-8	10-8
"Lo" (Closed Throttle)			6-4
(Full Throttle)			10-8

PONTIAC

UPSHIFTS:	1-2	2-3	3-4
Left "Dr" (Min Throttle)	7-10	12-15	21-25
(Full Throttle)	20-23	36-40	68-73
Right "Dr" (Min Throttle)	7-10	12-15	71-76
(Full Throttle)	20-23	36-40	73-78
"Lo" (Full Throttle)			

PONTIAC (Cont.)

DOWNSHIFTS:	4-3	3-2	2-1
Left "Dr" (Closed Throttle)	18-15	13-10	8-6
(Full Throttle)	31-18	13-10	13-10
(Forced)	66-31	26-13	13-10
Right "Dr" (Closed Throttle)	72-67	13-10	8-6
(Full Throttle)	78-73	13-10	13-10
(Forced)	78-73	26-13	13-10
"Lo" (Full Throttle)	59-54	53-48	
(Forced)			11-0

RAMBLER

UPSHIFTS:	1-2	2-3	3-4
"Dr 4" (Min Throttle)	5-9	9-13	18-22
(Full Throttle)	13-17	27-32	55-63
"Dr 3" (Min Throttle)	5-9	9-13	
(Full Throttle)	13-17	27-32	68-73
DOWNSHIFTS:	**4-3**	**3-2**	**2-1**
"Dr 4" (Closed Throttle)	12-8	8-4	5-3
(Part Throttle)	27-12		
(Forced)	55-15	19-15	
"Dr 3" (Closed Throttle)	67-71	8-4	5-3
(Forced)		19-15	
"Lo" (Full Throttle)			9-6

Lockout in "Lo"—4-2 shift, 50-41 MPH

WILLYS

UPSHIFTS:	1-2	2-3	3-4
"Dr. 4" (Min. Throttle)	5-8	9-12	19-20
(Full Throttle)	10-12	23-27	49-54
"Dr. 3" (Min. Throttle)	5-8	9-12	.
(Full Throttle)	10-12	23-27	60-64
"Lo" (Full Throttle)	13-16	.	.

WILLYS (Cont.)

DOWNSHIFTS:	4-3	3-2	2-1
"Dr. 4" (Min. Throttle)	15-13	10-7	6-4
(Full Throttle)	24-21	9-7	7-4
(Forced)	53-13	19-17	8-5
"Dr. 3" (Min. Throttle)		10-7	6-4
(Full Throttle)		9-7	7-4
(Forced)		19-17	8-5
(Forced)			9-0

①—Upshifts 2-4 (38 MPH).
②—Occurs at very high car speeds only (75 MPH.).
③—Dependent on Throttle position.
④—5-22 MPH. with throttle in Detent Position.
⑥—Downshifts 4-2, 20-15 MPH. 3-1, 11-8 MPH.
⑦—3-1 Downshift, 11-8 MPH.
⑧—Downshifts 4-2, 20-10 MPH. 3-1, 10-7 MPH.
⑨—3-1 Downshift, 10-7 MPH.
⑩—In "Dr. 4" position only.
⑪—Downshifts 4-2, 18-12 MPH. 3-1, 9-7 MPH.
⑫—3-1 Downshift, 9-7 MPH.
⑬—Correct for 15x6.70 Tires & 3.31-1 Axle Ratio.
⑭—For cars with 3.07-1 Axle Ratio.
⑮—Starts in Second Speed. Possible to start in First Speed by depressing throttle fully to floor.
⑯—2-4 Upshift (42 MPH).
⑰—4-2 Downshift (42 MPH).
⑱—31-36 (J-53 Trans.). ⑲—79-85 (J-53 Trans.).
⑳—21-18 (J-53 Trans.). ㉑—10-7 (J-53 Trans.).
㉒—12-18 (J-53 Trans.).
㉓—Downshifts 4-2 (37 MPH).
㉔—Upshifts 2-4 (34 MPH).
㉕—Downshifts 4-2 (33 MPH).
㉖—Upshifts 2-4 (30 MPH).
㉗—Downshifts 4-2 (29 MPH).

DUAL-RANGE HYDRA-MATIC BAND ADJUSTMENT

►*1953 CADILLAC REAR BAND SLIPPAGE CORRECTION: See "Overhaul" following.*

►*BAND ADJUSTMENT NOTE:* Internal Band Adjustments must be made on the following models: 1954-55 Cadillac; 1953-55 Oldsmobile; 1955 Pontiac. External Adjustments may be made on all other models.

►*1953 BAND ADJUSTMENT SPECIFICATION PRODUCTION CHANGE:* Front band adjustment specifications have been changed from 6.5 tight to 7.7 turns tight. *This change applies to all previous models except Oldsmobile.*

EXTERNAL ADJUSTMENT

►*ADJUSTING TOOL NOTE: DO NOT make an external adjustment if Adjusting Tool J-2681, J-2861-A or Kaiser-Frazer Tool No. KF-96, and an accurate tachometer are not available.*

1) Block front wheels securely and set hand brake firmly to prevent car moving while adjusting.

2) Remove front floor mat and adjusting hole cover over adjusting screws on left side of transmission.

3) Run engine until temperature is normal and engine idles at hot or slow idle speed of 375-400 RPM.

4) Connect and adjust tachometer for accurate recording of engine speed.

5) Place selector lever in "Dr" position ("Dr. 4"). except 1952 Oldsmobile (lever in "Lo" position).

6) Adjust carburetor throttle stopscrew so that engine idles at exactly 700 RPM. Then adjust bands:

Front Band (After steps 1 through 6):

7F) Install the adjusting tool on front band adjusting screw, loosen adjusting screw locknut (turn long handle while holding short handle stationary).

8F) Loosen band adjusting screw (turn short handle) until engine speed increases to 900-1000 RPM., (800-900 Hudson. This makes it unnecessary to back adjusting screw all the way out).

►*NOTE*—If no increase in engine speed noted when adjusting screw loosened, band has probably been slipping in service. Remove oil pan and inspect band and drum. With pan off, adjust bands as directed in ADJUSTMENT—WITH PAN OFF below and disregard following steps.

9F) Tighten band adjusting screw slowly until engine speed drops to 700 RPM., loosen adjusting screw until engine speed increases, then tighten adjusting screw until engine speed again drops to exactly 700 RPM., watch tachometer for 30 seconds to note any increase in engine speed. If increase noted, tighten adjusting screw 1/10 turn. Repeat this procedure until engine speed remains at 700 RPM. for at least 30 seconds.

10F) Set counter on adjusting tool to "OO". Hold locknut stationary and tighten adjusting screw exactly 7.7 turns (6.5 turns Chev. Truck). Hold adjusting screw from turning and tighten locknut.

Rear Band (After steps 1 through 6):

7R) Install the adjusting tool on rear band adjusting screw, loosen adjusting screw locknut (turn long handle while holding short handle stationary).

8R) Loosen band adjusting screw (turn short handle) until engine speed increases to 900-1000 RPM., (800-900 Hudson. This makes it unnecessary to back adjusting screw all the way out).

NOTE—If no increase in engine speed noted when adjusting screw loosened, band has probably been slipping in service. Remove oil pan and inspect band and drum. With pan off, adjust bands as directed in ADJUSTMENT—WITH PAN OFF below and disregard following steps.

9R) Tighten band adjusting screw slowly until engine speed drops to 700 RPM., loosen adjusting screw until engine speed increases, then tighten adjusting screw until engine speed again drops to exactly 700 RPM., watch tachometer for 30 seconds to note any increase in engine speed. If increase noted, tighten adjusting screw 1/10 turn. Repeat this procedure until engine speed remains at 700 RPM. for at least 30 seconds.

10R) Place selector lever in "N" position.

11R) Set counter on adjusting tool to 00.Hold locknut stationary, tighten band adjusting screw exactly 2 turns until tool counter reads 2.0

12R) Return selector lever to "Dr" position. Hold band adjusting screw from turning, tighten locknut securely.

Idle Speed Adjustment (After Bands Adjusted): *See Car Model pages for settings and procedure.*

INTERNAL ADJUSTMENT

►*ADJUSTING TOOL NOTE:* DO NOT make an internal adjustment if Front Servo Adjusting Gauges J-1693, J-1693A or Kaiser-Frazer Tool KF-92; Rear Band Adjusting Tool J-1460-A, J-5071 or Kaiser-Frazer Tool KF-77 is not available.

Front Band Adjustment (With Gauge J-1693, J-1693-A or KF-92):

1) Loosen locknut and back off front band adjusting screw approximately 5 turns. Make certain that band is centered on drum.

2) Remove pipe plug from bottom of front servo.

3) Loosen hexagonal headed adjusting screw on gauge by hand until approximately ⅛" of adjusting screw threads are exposed above gauge body. Screw gauge into pipe plug hole in front servo by hand.

4) Tighten hexagonal adjusting screw on gauge by hand until gauge stem is felt to just touch piston in servo, then continue to tighten adjusting screw with a wrench exactly five full turns from point where stem first contacted piston.

5) Tighten front band adjusting screw until knurled washer on gauge (at upper end of hexagonal adjusting screw) is just free to turn. Hold band adjusting screw from turning and securely tighten adjusting screw locknut.

6) Loosen gauge adjusting screw at least six turns, remove gauge from servo. Install pipe plug in servo and tighten securely.

Rear Band Adjustment (With Gauge J-5071, J-1470-A or KF-77):

1) Place the gauge on the finished surface of the Accumulator body with leg of gauge resting on rear servo stem.

2) Loosen locknut and back off rear band adjusting screw until face of actuating lever (which contacts servo stem) is well away from the face of the gauge.

3) Tighten band adjusting screw until face of band actuating lever just contacts gauge.

►*CAUTION—If adjusting screw turned too far when making this adjustment, back screw off SEVERAL TURNS and repeat adjustment.*

4) Hold band adjusting screw from turning and tighten adjusting screw locknut securely. Remove gauge.

DUAL-RANGE HYDRA-MATIC TESTING

►*"DUAL-RANGE" HYDRA-MATIC TESTING NOTE:* These transmissions have MODULATED PRESSURE and HYDRAULIC REVERSE and following test procedure will apply to all transmissions:

ROAD TEST: Operate the car over a test route and note performance and shift speeds. Select a test route that will provide for all types of operation: Hilly section to check full-throttle upshifts, slippage, and throttle downshifts; a level section to check closed throttle upshifts; and a quiet section to check for noise. *See Hydra-Matic Shift Point table for correct shift speeds.*

STALL TEST: Can be used to check engine and transmission performance. Connect accurate electric tachometer to check engine speed. Start engine and warm up engine and transmission to operating temperature. Apply foot brake firmly and set hand brake tight. Set selector lever in "Dr. 4" position. Depress accelerator pedal to the floor and NOTE ENGINE RPM. If engine speed not within limits shown in table, make further tests as indicated below.

►*CAUTION—Use extreme care in making this test and NEVER HOLD THROTTLE OPEN MORE THAN ONE MINUTE (15-20 seconds preferably). If engine speed exceeds maximum figure shown in table, CLOSE THROTTLE IMMEDIATELY to avoid possible damage to transmission.*

STALL TEST LIMITS

Model	Min. RPM	Max. RPM
1952-55 Cadillac	1700	1900
1954-55 Chevrolet Truck	1400	1600
1952-54 Hudson Jet	1600	1900
1952-54 Hudson Six ①	1300	1600
1952-54 Hudson Six ②	1450	1750
1952-54 Hudson Six ③	1600	1900
1955 Hudson Wasp.	1600	1800
1955 Hudson Hornet	1700	1900
1952-55 Kaiser	1450	1650
1952-54 Lincoln	1350	1600
1952-54 Nash Ambassador	1600	1800
1955 Nash Ambassador	1550	1650
1952-55 Nash Statesman	1600	1800
1952-53 Oldsmobile	1750	1850
1954-55 Oldsmobile	1750	1875
1952-54 Pontiac	1400	1600
1955 Pontiac	1600	1800
1952-55 Rambler	1600	1800

①—232" Engine. ②—262" Engine.
③—308" Engine.

If engine speed below minimum—Engine requires tune-up, or front unit is locked up.

CONTINUED ON NEXT PAGE

TESTING (Cont.)

If engine speed above maximum—Bands are slipping, Torus check valve leaking or missing, or torus members damaged. Localize the trouble by making the following tests before adjusting the bands:

Check to determine which band slipping—Repeat the stall test (above) with selector lever in Revere "R" position. If engine speed still excessive, Front Band or Front and Rear Bands are slipping. If engine speed within limits, Rear Band only is slipping. Adjust bands.

Check for Missing or Leaking Torus Check Valve: Set hand brake lever securely, start engine and run at speed of 20 MPH. for approximately 1½ minutes. Reduce engine speed to normal idle speed, check fluid level and make certain that it is at "Full" mark on dipstick. Shut off engine and allow car to stand for 10 minutes. Recheck fluid level without starting engine. If level has not raised more than ½", torus check valve is operating satisfactorily and slipping bands or damaged torus members are indicated.

MAIN LINE OIL PRESSURE: *CAUGE CAUTION*—It is recommended that new 300 lb. gauge (J-2540-A) be used for making these pressure checks. Gauge used on previous Hydra-Matic transmissions (J-2540—160 lb. gauge) will not handle oil pressures under all conditions on these transmissions.

Checking Main Line Oil Pressure—Connect gauge at main oil line plug hole on top of case between band adjusting screws (accessible by lifting floor mat and removing metal plate over band adjusting screw hole). Make the following tests on the road (or with car up on jacks so that engine can be run to simulate road performance) after engine has been run sufficiently so that engine and transmission at operating temperature:

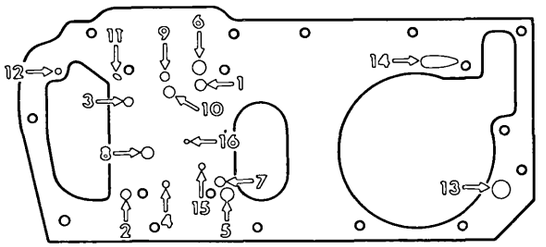
Idling Oil Pressure—With engine running at normal idling speed, note gauge pressure with selector lever in each position. In general, pressure should be equal in N, Dr. 4, Dr. 3, and Lo (10 lbs. maximum variation), and higher in R (reverse). *See table for specified pressures.*

Zero Throttle Pressure—With selector lever in "Dr. 4" position operate car at speed higher than 30 MPH *(See Chevrolet Truck Note below)*, close throttle and note gauge reading just as car speed drops to 30 MPH. *See Pressure Table.*

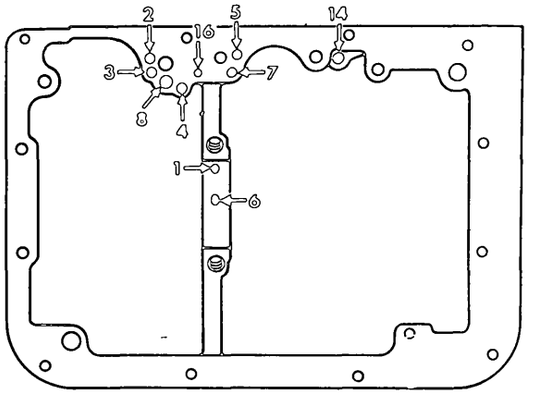
Full Throttle Pressure—With selector lever in "Dr. 4" position operate car at approximately 25 MPH (17 MPH on Chev. Truck), depress accelerator pedal to point where resistance of detent is felt but DO NOT go through detent (4-3 forced downshift), note gauge reading just as car speed reaches 30 MPH (19-22 MPH on Chev. Truck). *See Pressure Table for Specified pressures.*

SHOP TEST NOTE—If above test being made in the shop (with car on stands), this full throttle position of the control valve can be secured by disconnecting throttle control rod at lever on side of transmission case and moving the lever to the full throttle position (DO NOT move lever through detent), then note gauge reading.

Reverse Pressure—With car standing, place selector lever in Reverse "R", apply foot brake firmly to hold car stationary, accelerate engine to half-throttle position, note gauge reading. *See table for specified pressures.*



PRESSURE TEST POINTS
(SIDE OF TRANSMISSION CASE)



PRESSURE TEST POINTS
(BOTTOM OF TRANSMISSION CASE)

1952-54 Main Line Oil Pressures
(Pounds Per Square Inch)

Car	Idl'g	Zero Thtl.	Full Thtl.	Rev.
Cadillac		64-72	84-105	145-210
Hudson	40-68	60-68	85-93	125 Min.
Kaiser	55 Min.	55-72	80-95	125 Min.
Lincoln	50 Min.	64-72①	90-98③	145-185④
Nash	45-72②	45-72	75-105	125 Min.
Oldsmobile	50 min.	60 Min.	80 Min.	
Pontiac	50 Min.	65-72	90-98	145-210

①—AT 1200 RPM. ②—At 375 RPM.
③—At 1200 RPM. (below 80 lbs. indicates slipping).
④—At 2000 RPM.

1955 Main Line Oil Pressures
(Pounds Per Square Inch)

Car Model	Idling	Zero Thtl.	Full Thtl.	Rev.
Cadillac		64-72	104-112	145-210
Chev. Truck	50 Min.	60-68	85-93	135 Min.
Hudson	50 Min.①	60 Min.	80 Min.	125 Min.
Kaiser	55 Min.	55-72	80-95	125 Min.
Nash	50 Min.①	60 Min.	80 Min.	125 Min.
Oldsmobile	50 Min.②	60 Min.	85 Min.	150 Min.③
Pontiac	50 Min.	64-72	101-109	145-185
Rambler	50 Min.①	60 Min.	80 Min.	125 Min.

①—60 lbs. maximum in all ranges.
②—Idling at 400 RPM.
③—Idling at 600 RPM.

▷*CHECKING REAR OIL PUMP*—Operation of rear pump alone can be checked by following procedure (Idling test above will check operation of front pump alone, road tests involve front and rear pumps together): Operate car on the road in 4th speed (selector lever in Dr.4) at speed shown in table below, move selector lever to Neutral, turn ignition OFF (this will stop front pump operating so that all pressure will be supplied by rear pump), note gauge reading (see table below). *CAUTION—IF REAR PUMP NOT WORKING (NO PRESSURE) DISCONTINUE TEST IMMEDIATELY.* If low oil pressure indicated when testing both pumps, oil leak in system is indicated. If one pump alone has low oil pressure, trouble in this pump is indicated.

Rear Oil Pump

Car	Operating Speed	Pressure
Cadillac	40-45 MPH	75 lbs. Min.
Hudson	45 MPH	60 lbs. Min.
Kaiser	45 MPH	60 lbs. Min.
Oldsmobile①	30 MPH. Min.	55 lbs. Min.

①—Selector lever in "Dr 3" position.

TESTING HYDRA-MATIC OPERATION WITH AIR PRESSURE: *Following procedure can be used to check operation before disassembling transmission and can also be used after overhaul to insure proper operation before transmission installed in car.* Drain transmission, remove oil pan and screen. Remove side cover, control valve assembly, and reverse oil pipe. Use air line fitted with special air nozzle (Tool J-4353-1 etc.) so that air can be applied to oil passage holes on side of transmission case. Use approximately 80 lbs. air pressure and make tests listed below.

▷*See illustration for location of oil passage holes in transmission case.*

1) Front Clutch. Pressure at this point should actuate front clutch (piston movement will be audible if air applied intermittently, or can be felt if front drum held firmly by hand). *NOTE*—If large amount of air escapes around oil delivery sleeve area, recheck after servos removed to note point of leakage. If oil fog and large amount of air emitted from inside front end of front drum, faulty front clutch seal is indicated. Leakage from any other drilled passages inside case is indication of defective case or oil delivery sleeve.

2) Front Band Apply. Pressure at this point should actuate servo and apply front band. No appreciable air escape should be noted at servo mounting face on case (small amount of leakage at 4-3 valve exhaust hole and also front band release hole is permissible) (front band release hole leakage should only be leakage past ring gap, not blow-by).

3) Front Band Release. Pressure at this point will not actuate servo (piston held in released position by retracting spring) but air escape between servo body and case, or around band release cylinder should only be normal leakage past piston ring gap.

4) Governor Pressure (G1 to 4-3 Valve). Pressure at this point will leak around 4-3 valve retainer wire. No air should be noted between servo body and transmission case or from any other passage (small amount of air from Front Band Apply and Compensator passages).

5) Rear Band Release. Pressure at this point will release rear servo and band with no large escape

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TESTING (C nt.)

of air (small amount will escape through piston ring gaps but should not impede normal servo operation) and no appreciable amount of air should escape between servo mounting face and transmission case. No air escape should be noted from any other passage hole (except slight amount at Compensator hole—see item 7).

6) Rear Clutch. Pressure at this point should actuate rear clutch (piston movement will be audible if air applied intermittently, or can be felt if rear drum held firmly by hand). *NOTE*—If large amount of air escapes around oil delivery sleeve area, recheck after servos removed to note point of leakage. If oil fog and large amount of air emitted from inside rear drum assembly, faulty rear clutch seal or oil delivery sleeve rear ring is indicated. Leakage of air from any other passage hole on side of case indicates interconnected passages (defective case) or damaged oil delivery sleeve.

7) Compensator (to Front & Rear Servos). Pressure at this point should actuate rear servo to tighten rear band (band applied by spring) and to actuate front servo to apply band. No appreciable air escape should be noted (other than normal leakage through piston ring gaps) and no air should be noted at any other passage hole on side of case.

8) Main Line (Pump Feed): Pressure at this point should be an open blow-by due to fact that main line exhaust valve is in exhaust position.

9) Pressure Gauge Hole to Top of Case. Pressure at this point should produce NO evidence of air escape if pressure line plug (on top of case between band adjusting screw) is tight.

10) Exhaust (Port for Valve Body). Pressure at this point should blow freely through to inside of case. Make visual inspection of this hole to see that it is completely open for entire length (*CAUTION*—any obstruction of this hole will cause poor shifting).

11) T.V. Pressure to Regulator. Not necessary to check this passage (this is modulating pressure line to T.V. pressure plug in pressure regulator).

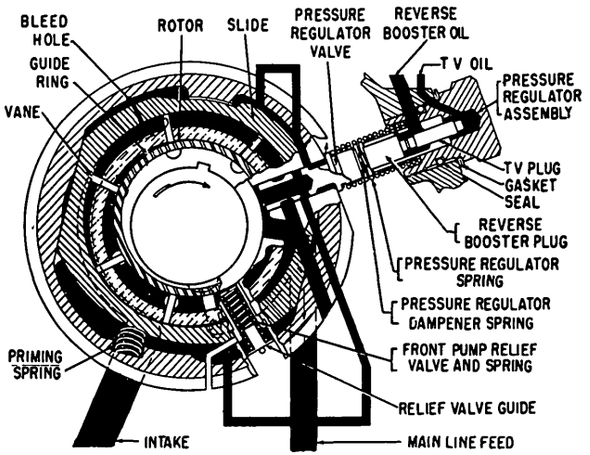
12) Reverse Booster to Pressure Regulator. Not necessary to check this passage (this is booster pressure line to reverse booster plug in regulator).

13) Reverse Pressure. Pressure at this point should actuate reverse cone clutch piston (piston movement should be audible if air applied intermittently, or can be felt if reverse internal gear grasped with the hand). If large amount of air escapes around cone clutch piston, outer and inner oil seal leakage in reverse cone assembly is indicated.

14) Governor Feed. Not necessary to check this passage (directs main line pressure to governor).

15) Line Exhaust. Not necessary to check this passage (passage exhausts main line pressure when engine is turned off and car is standing).

16) Low Rang (Manual Low Oil). Not necessary to check this passage (passage directs main line pressure oil to fast dump valve in rear servo).



1952-55 DUAL-RANGE HYDRA-MATIC, FRONT PUMP & PRESSURE REGULATOR

DUAL-RANGE HYDRA-MATIC REMOVAL & INSTALLATION

►***REMOVAL & INSTALLATION NOTE—Procedure on all cars is generally the same, however special points to be observed on each car model are listed under each step***

REMOVAL: Support car or truck securely on four jack stands so wheels are at least 12" off the floor or use a twin-post hoist). On all Nash Models and 1955 Hudson Models, place rear jack stands under rear of car at body sills and support rear axle with a jack.

1) Perform following operations noting special points to be observed on each car model as listed.

1952-55 Cadillac—Disconnect battery and remove starter. Remove slush deflector from lower flywheel housing. On 1952-53 models, remove spark plugs. On models with oil cooler, hoses at cooler must first be disconnected and hose ends plugged. When removing the oil pan, exercise caution when disconnecting the oil pump feed line from cooler valve in the oil pan.

1952-54 Hudson—Disconnect battery, remove starter, remove breather pipe, and remove two upper floor opening covers for access to upper flywheel housing bolts and remove these bolts. From underneath car, remove rear stone guard assembly on left side of engine. Disconnect hand brake cable lever return spring and disconnect cable at pull rod slide link, free cable clip at No. 3 crossmember and pull cable through crossmember toward front of car.

1955 Hudson (Except Rambler)—Disconnect hand brake cable at bellcrank and brake cable housing at bellcrank bracket.

1952-55 Kaiser—Disconnect hand brake cable from bracket on No. 2 crossmember (when removing this crossmember, leave engine support cushions attached to crossmember).

1952-54 Nash (Statesman with 12" Torus, and Ambassador)—Disconnect hand brake cable at bellcrank bracket, remove brake hose bracket from floor pan.

1952-54 Nash (Statesman & Rambler with 11" Torus)—Disconnect throttle rod at bellcrank. Disconnect hand brake from bracket below voltage regulator. Turn bracket toward front of car and position hand brake cable below steering gear housing. Remove distributor cap and oil filler dipstick.

1955 Nash (Except Rambler)—Disconnect hand brake cable at bellcrank and brake cable housing at bellcrank bracket.

1952-53 Oldsmobile—Disconnect side pan at rear and drop pan down (for access to starter), disconnect starter wiring and remove starter. Remove exhaust pipe bracket and crankcase ventilator bracket from flywheel housing.

1954-55 Oldsmobile—Disconnect starter cable assembly from junction block, then disconnect purple lead from safety switch, and black lead from main wiring harness. Free starter cable assembly from clip on fender.

1952-54 Pontiac—Remove accelerator pedal and front compartment mat, remove two upper hole covers in floor for access to upper flywheel housing bolts. Remove crankcase ventilator outlet pipe and loosen exhaust pipe bracket to aid removal of flywheel housing bottom cover. Disconnect hand brake cables at cross lever and remove cross lever. On cars with underseat heater, drain radiator and block, then remove clamp in X-member holding heater-to-radiator rear tube and defroster-to-heater tube, remove heater-to-radiator tube.

1955 Rambler—Support rear of body at side sills. Disconnect rear shock absorbers at rear axle tube and hand brake at yoke.

2) Drain transmission case by removing drain plug at rear end of transmission oil pan.

3) Remove flywheel housing lower cover or pan, drain torus by removing pipe plug from torus cover.

4) Disconnect speedometer cable at transmission.

5) On all transmissions with under-hood transmission filler tubes, disconnect tube at oil pan and remove tube.

6) Disconnect propeller shaft at rear universal and free shaft from transmission. Note following:

1952-54 Hudson—Disconnect propeller shaft at rear universal companion flange and at front universal, take out center bolt attaching center bearing housing to center bearing support. Slide propeller shaft to rear to allow clearance for transmission removal.

1955 Hudson (Except Rambler)—Disconnect torque tube from rear bearing retainer, then move rear axle and torque tube assembly to rear and separate by sliding the universal joint to rear off transmission output shaft.

1952-54 Nash (Statesman with 12" Torus, and Ambassador—Disconnect torque tube from rear bearing retainer on transmission, slide universal joint to rear off splines of transmission output shaft.

1952-54 Nash (Statesman & Rambler with 11"

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DUAL-RANGE HYDRA-MATIC REMOVAL & INSTALLATION (Continued)

Torus)—Disconnect torque tube at rear of transmission; then remove rear spring clamps from rear axle. Lower rear axle far enough to withdraw front universal joint from transmission output shaft.

1955 Nash (Except Rambler)—Disconnect torque tube from rear bearing retainer, then move rear axle and torque tube assembly to the rear and separate by sliding the universal joint to rear off transmission output shaft.

1955 Pontiac—Loosen exhaust pipe at cross over pipe flange.

1955 Rambler—Remove rear spring from front bracket attaching nuts and lower rear axle assembly, thus lowering the rear spring front brackets from floor pan. Slide rear axle and propeller shaft assembly to the rear, sliding universal joint from output shaft.

7) Disconnect throttle rod and manual control rods from levers on side of transmission case, remove throttle control lever (outer) from shaft to avoid damaging lever during transmission removal.

8) Install special engine Rear Support Bar (see note below) or support the engine with a hydraulic jack placed under the rear end of the oil pan.

▷*CAUTION—Use wooden block on jack to avoid damage to oil pan.*

Rear Support Bar Note—This tool consists of some type of cross-bar with end fittings that engage the frame side rails so that the rear end of the engine is supported by the frame. Tool is furnished under following part numbers: J-3068 (Cadillac), J-4651 (Hudson), KF-104 (Kaiser), BT-28 with Adaptors BT-42 (Oldsmobile).

9) Use transmission lift (Tool J-2808 and hydraulic jack, etc.) to lift transmission just enough to remove engine weight from rear supports.

10) Remove rear engine support cross-member:

1952-55 Cadillac—Disconnect engine rear support at extension housing, remove crossmember bracket on which support is mounted.

1952-54 Hudson—Remove engine rear support bolts attaching rear insulators to No. 3 crossmember, remove mounting screws at each end of crossmember.

1955 Hudson (Except Rambler)—Remove rear engine support crossmember, cushion, and bracket.

1952-55 Kaiser—Remove the No. 2 (engine support) crossmember leaving engine support cushions attached to crossmember.

1952-55 Nash & Rambler—Remove the rear engine support crossmember, cushion, and bracket.

1952-55 Oldsmobile—Disconnect engine mounts from crossmember and remove crossmember.

1952-55 Pontiac—Disconnect both rear engine mountings and reinforcing plates from crossmember, take out all crossmember-to-frame side rail bolts, tap both ends down until right end rests on exhaust pipe, then tap left end down until it clears frame side rail, slide crossmember out.

10) Make certain that torus cover and flywheel marked to insure re-installation in same position (NOTE—Some models have one large and one small dowel pin so that cover can only be installed in one position), remove all (30) torus cover-to-flywheel capscrews (accessible from below by turning flywheel), push cover back to clear flywheel dowels.

11) Lower engine and transmission just enough to provide access to flywheel housing upper bolts (*NOTE*—On Hudson, these bolts removed previously; on Oldsmobile, do not lower engine more than 1½" without removing upper radiator hose and loosening exhaust pipe to manifold connection).

12) Take out four flywheel housing bolts (*NOTE*—On 1952-54 Hudson, lower right hand bolt cannot be removed and should be left in bolt hole), move transmission and flywheel housing to the rear as a unit (see Dowel Disengaging Note below), until transmission shaft clears pilot bushing in flywheel, lower transmission to floor.

▷*CAUTION—To prevent end of mainshaft striking flywheel mounting bolts when lowering transmission, turn flywheel so end of mainshaft passes between 2 bolts.*

FLYWHEEL HOUSING DOWEL DISENGAGING NOTE—Housing can be freed from dowel pins in front housing by threading two 9/16"—12 bolts in center holes on each side of rear housing (directly above dowel pins), and turning these bolts in evenly until housing is free, then remove the bolts.

INSTALLATION: Before installing transmission, make certain that flywheel attaching bolts are tight and that pilot bearing is in good condition, clean face of flywheel thoroughly around entire bolt circle, make certain that grooves are clean and that mating faces of flywheel and torus cover are free from nicks or burrs (might prevent an oil-tight seal).

1) Install a NEW gasket on the face of the flywheel (use vaseline to hold gasket in place). Make certain that gasket is in good condition, free from tears and creases, and that it fits properly.

2) Raise transmission into position from beneath car making certain that flywheel turned to align marks on flywheel and torus cover (or that large dowel aligned with large dowel pin hole) and that transmission mainshaft enters pilot bearing squarely, push transmission forward into place so that flywheel housing engages dowels squarely.

3) Install flywheel housing attaching bolts (if engine lowered to permit access to upper bolts, it must be raised after bolts installed for cross-member installation). Tighten bolts evenly to 40-50 ft. lbs.

4) Install all flywheel-to-torus cover bolts and tighten finger-tight (CAUTION—these are special alloy-steel bolts and other types must not be substituted), tighten bolts exactly as follows:

Cadillac—Install one screw adjacent to each dowel pin and tighten until just snug, then install screws 90° from these screws and tighten just snug, install remaining torus cover screws and tighten all screws evenly to 40 ft.lbs. AFTER transmission installation completed, run engine up to 3500 RPM. and retighten all cover screws.

Hudson, Kaiser, Nash, Pontiac—Tighten two bolts adjacent to dowel pins to 12-15 ft.lbs. torque, tighten two bolts 90° from dowels to 12-15 ft.lbs. torque, then tighten all bolts in rotation to 20-25 ft.lbs. torque, finally tighten all bolts in rotation to 30-35 ft.lbs. torque (except Hudson—26-31 ft.lbs.).

▷Pontiac Torus Cover-To-Flywheel Lockwasher Production Change—Lockwashers have been eliminated at this point (not required in service).

Lincoln—Install cover screw adjacent to each dowel pin and tighten just snug, install screw 90° from each of these screws and tighten just snug, install remaining torus cover screws and tighten all screws evenly to 20-25 ft.lbs. torque.

Oldsmobile—Tighten all screws evenly, then torque screws evenly to 30 ft.lbs.

5) Install engine rear support cross-member, install and connect all parts disconnected or removed during transmission removal (see Removal data).

6) Make certain that torus cover and transmission oil pan drain plugs tight, fill transmission with fluid (see Draining & Refilling data), adjust linkage (see Linkage Adjustment).

DUAL-RANGE HYDRA-MATIC OVERHAUL

▷CHANGES, CAUTIONS, CORRECTIONS

▷*MAINSHAFT ENDPLAY TOLERANCE SPECIFICATION CHANGE: Mainshaft endplay tolerance has been increased from .004-.015" to .004-.018".*

▷*1952 PRESSURE REGULATOR VALVE CHANGE* (To eliminate "Clicking" noise when operating and surge noted when engine started). New type valve with rubber cushions on contact areas. Used in later production and may be installed in early transmissions to correct above complaints. See disassembly data for valve removal and installation. *New and Old type valves are interchangeable.*

▷*1952 FRONT PUMP CHANGE TO PREVENT BREAKAGE*—New pump assembly with improved rotor used in later transmissions (see Identification Note below for car markings when this pump installed).

Only NEW TYPE PUMPS SHOULD BE USED FOR SERVICE REPLACEMENT and transmission should be disassembled and thoroughly cleaned whenever a broken pump is found in service (CAUTION—Oil screen should be replaced and rear pump, parking brake bracket, and governor should be checked for possible damage caused by metal particles).

Pump Identification—New type pumps marked by letter "S" on face of pump opposite dowel pin.

Transmission Identification (with New Type Pump)—Transmission serial number plate will be marked by "X" stamped directly after serial number (Cadillac transmissions marked by daub of white paint—paint mark will be found above body identification plate on cowl). *NOTE*—Transmissions and cars should be marked in this manner when new type pump installed.

▷*1952 FRONT SERVO PISTON ASSEMBLY CHANGE* (to provide better oil seal within release cylinder): Two distinct production changes made: 1) Gasket used between release cylinder and servo body on later transmissions and this gasket should be installed in first transmission whenever servo disassembled. 2) Improved piston assembly with longer shoulder diameter to provide better oil seal within release cylinder used on later transmissions. This later type assembly interchangeable with first type but DIFFERENT SERVO SPRING USED WITH EACH TYPE CYLINDER. *See Front Servo Overhaul Data for gasket installation and spring identification.*

▷*1952 OVERRUN CONTROL VALVE CHANGE* (to cor-

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HYDRA-MATIC OVERHAUL
►CHANGES, CAUTIONS, CORRECTIONS (Continued)

rect slippage in "Dr. 3" when using engine as a brake): New type valve used in later transmissions to prevent possibiilty of valve sticking under above conditions due to force of front band apply pressure against side of valve. New type valve has groove on side near domed end and is furnished for service under same part number as previous type. *See Front Servo OVERHAUL data for Overrun Valve installation. Car can be checked for slippage as follows:*

Slippage in "Dr. 3" Position—Check by running car up to 60 MPH. in "Dr. 4," then shift to "Dr. 3." Car should slow down and engine speed increase as engine acts as a brake. If compression braking not noted under these circumstances, slippage is indicated.

►*1952 REAR SERVO EXHAUST VALVE CHANGE:* New type valve used in later transmissions has shoulder cut in "Lo" oil apply end of valve to eliminate possibility of valve hanging up on servo body gasket. ***Either type valve may be used for service but gasket must be check for alignment when first type valve used to prevent valve hanging up on gasket.***

►*1952 MAIN LINE EXHAUST VALVE CHANGE:* **Two different types** used WHICH ARE NOT INTERCHANGEABLE. Valves are different length and must be used with correct length spring. See Line Exhaust Valve Removal (under Transmission Disassembly), and Installation (under Transmission Reassembly) for valve and spring identification. ***CAUTION—Same type Line Exhaust Valve and Spring must be used for replacement as were originally installed in transmission.***

►*1952 GOVERNOR PRODUCTION CHANGE:* Two types used in production: 1) Cast-iron, 2) Die-cast. Governors are interchangeable but cast-iron type is preferred as replacement unit.

►*NASH 1952 HYDRA-MATIC TRANSMISSION JUMPING OUT OF REVERSE CORRECTION* **(Cars before Serial R-656747):** To correct complaints of jumping out of reverse to low when accelerating rapidly, or backing up an incline, remove control valve detent plunger retainer and install a 3/16" ball bearing in the retainer under the plunger spring to increase the spring tension to hold the inside detent control lever in the reverse position. *See Control Valve Assembly Overhaul data.*

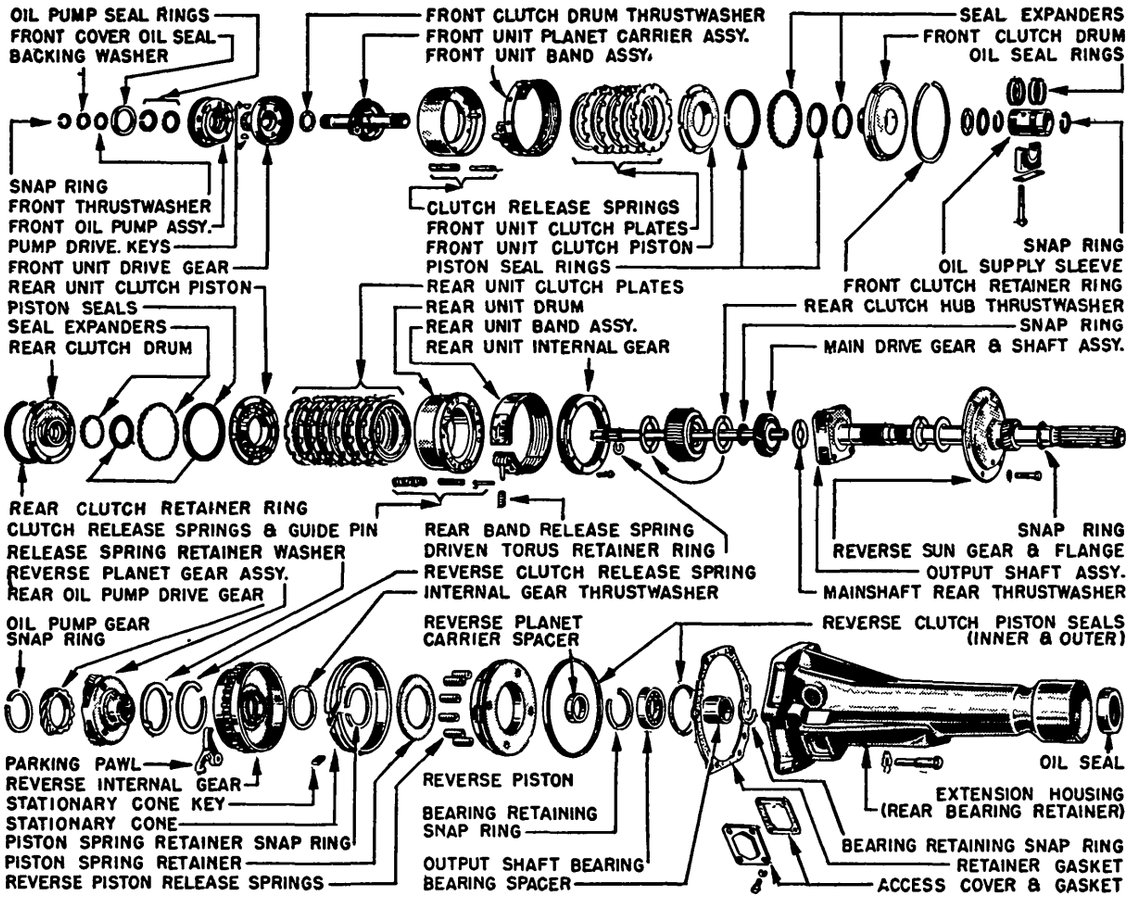
►*1953 TRANSMISSION CASE CHANGE:* Line exhaust valve now located in small valve body attached to front servo and is no longer located in case. Service of this valve is simplified as valve sleeve and special tool not required.

►*1953 FRONT SERVO CHANGES:* Front servo redesigned to include a valve body, one additional release cylinder attaching bolt, new piston assemblies, and a new 4-3 downshift valve.

Front Servo Valve Body Change—New valve body added to front servo contains the line exhaust valve formerly located in case, and overrun control valve formerly located in servo body.

Front Servo Releasing Cylinder—Three bolts are used to attach release cylinder to servo body and no gasket required.

Front Servo Piston Assembly Change—Assembly now consists of apply piston and compensator piston. Release piston is now separate. A booster spring has been added which acts on release piston to improve band release and clutch apply action.



1952-55 DUAL-RANGE HYDRA-MATIC TRANSMISSION

►*1953 CONTROL VALVE BODY CHANGE:* Valve body has been changed and is not interchangeable with previous model cars.

►*1953 PARKING BRAKE BRACKET SHIMS:* Shims used between transmission case and parking brake bracket on some early 1953 cars to insure correct alignment. DO NOT INSTALL SHIMS IF ORIGINAL TRANSMISSION CASE REPLACED.

►*1953 CENTER BEARING CAP PRODUCTION CHANGE:* Dowel pin hole has been drilled all the way through and dowel pin is press fitted so that upper end is flush with top of cap. If dowel pin is not indexed with hole in oil delivery sleeve, the dowel pin will push through rather than damage oil delivery sleeve when cap is tightened. CAUTION—Bearing cap lockplate must be flat with top of bearing cap after cap is tightened. **If it is raised up (over dowel pin), dowel pin is not indexed with oil delivery sleeve.**

►*1953 & EARLIER HYDRA-MATIC TORUS CHECK VALVE REPLACEMENT:* The check valve retainer and bolts are not necessary, and if desired, can be eliminated as follows: Slide torus check valve over driven hub to check freeness, then remove torus check valve from driven hub and install it and torus check valve spring over hub of driven torus. Locate driven torus against snap ring and install lock plate and locknut. Tighten locknut to 50-60 ft. lbs.

►*1953 CADILLAC REAR BAND SLIPPAGE CORRECTION (ON 3-2 DOWNSHIFT):* On a few early cars, slippage may be noted on the 3-2 downshift, when accelerating from speeds below 10 MPH. To correct, remove and disassemble the rear servo, and check rear servo check valve orifice. If found to be less than .048" diameter, enlarge orifice to .052" with a No. 55 size drill. This hole may be drilled without removing check valve from accumulator valve body, providing drill runs true and is held at right angles to valve. Clean unit thoroughly after drilling. Check accumulator check valve plunger for correct operation and full travel. Plunger travel should be 3/64" after it makes initial contact with check valve. If not correct, install a new accumulator body with

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OVERHAUL (Continued)

check valve. Check large servo spring for operating clearance within retainer. All pistons and pins should operate freely within their bores. Later production rear servo assemblies have a check valve orifice of .048-.052".

▷*1953 NASH—NO SHIFT TO REVERSE (AFTER WARM-UP) WITH ENGINE RUNNING:* Shift lever cannot be moved to Reverse with engine running, but can be shifted with ignition turned off. This condition can be caused by oil pressure passing rings in governor which is due to misalignment of governor in relation to parking brake bracket. Check ring travel in parking brake bracket. If ring travel indicates to outer or left side of oil hole in bracket, bracket must be shimmed away from case, using one or two shims Part No. 3113600 (See Parking Brake Shim Note above). If ring travel is to inner or right side of oil hole, then governor must be moved out (indicating that flange on rear oil pump not machined correctly or is too far on the shaft) in which case it will be necessary to install new oil pump assembly.

▷*1953 PONTIAC TORUS COVER-TO-FLYWHEEL LOCKWASHER PRODUCTION CHANGE:* Lockwashers have been eliminated at this point in production and are not required in service. Lockwashers may also be eliminated during service in all previous models.

▷*1953 PONTIAC THROTTLE VALVE REGULATOR SPRING CHANGE:* Regulator valve spring has been changed slightly and is no longer copper colored. Throttle valve spring can be distinguished from the double transition valve spring by the slightly heavier wire and 1/32" larger diameter.

▷*1953 PONTIAC CONTROL VALVE BODY PLATE CHANGE:* Early cars had a ⅛" thick plate attached to front valve body with four bolts. Later valve plate is 5/32" thick and attached with three bolts. When installing the early type plate make sure the shorter (⅜" long) screw is installed in the one middle hole closest to center of control valve body, otherwise it will interfere with front valve body to inner valve body attaching screw directly below it and cause a leak.

▷*1953 REAR CLUTCH HUB PRODUCTION CHANGE:* On the following cars (see below) a new clutch hub entered production as indicated. The new hub is relieved approximately .030" in front face of hub to allow space for thrust washer. New design eliminates possibility of wear between hub face and snap ring.

Cadillac—New type hub entered production in August 1953. A service kit, Part No. 8615451, containing Part No. 8615418 (Hub), and Part No. 8615419 (Thrust Washer) is available for service replacement on all 1946-53 cars.

Pontiac—New type clutch hub used beginning with Transmission Serial No. P53-271455. A Service Kit, Part No. 8615451 contains hub and thrust washer.

▷*1946—EARLY 1953 CADILLAC REAR CLUTCH HUB SERVICE REPLACEMENT:* Rear Clutch Hub changed in 1953 production and new clutch hub should be used for service replacement on earlier cars. See "1953 Rear Clutch Hub Production Change" above.

▷*1953 REVERSE INTERNAL GEAR PRODUCTION CHANGE:* On the cars indicated below, the Reverse internal Gear has been redesigned to provide a new retainer washer and spring. Later type spring retainer washer has four tangs instead of two on earlier type. Gap of later type spring is ¼" compared to ½" on earlier type.

Cadillac—Beginning with Hydra-Matic Transmission Serial No. 83012 later type Reverse Internal Gear used. Service Replacement Kit Part No. 8615449, consisting of gear, washer, and spring furnished for service replacement on all 1951-53 model cars. CAUTION—Washer and spring are NOT interchangeable and must be used with their respective early and late type internal gears.

Oldsmobile—Late 1953 production cars incorporated the later type Reverse Internal Gear Assembly consisting of Gear Part No. 8615326, Retainer Part No. 8615316, Spring Part No. 8615314. Early and late type assemblies are interchangeable in complete assemblies only. Individual parts are NOT interchangeable.

Nash—Beginning with Hydra-Matic Serial Nos. NA-1001, NA-7001, E-1001, E-5001, Y-1001, Y-6001, later type Reverse Internal Gear used. Service Package Part No. 3114770, containing new gear, retainer, and spring is supplied for service replacement. Early type washers and spring are not interchangeable with later type.

▷*1951-53 REVERSE INTERNAL GEAR SERVICE REPLACEMENT: See "Reverse Internal Gear Production Change" above.*

▷*1953 & EARLIER LINCOLN THROTTLE SHAFT OIL SEAL SERVICE REPLACEMENT:* To improve seal between throttle shaft and detent lever, a new Inner Control Levers Service Kit, Part No. HEK-77211 containing a pin, seal and washer should be used to replace earlier type.

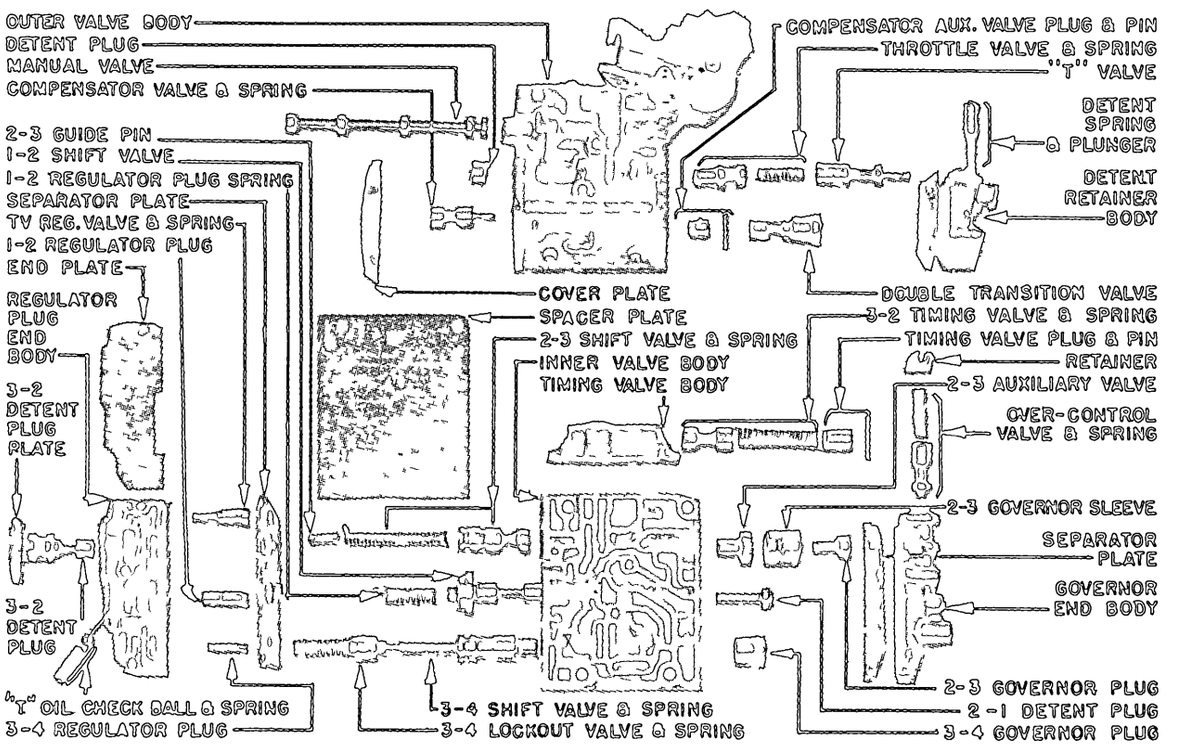
▷*1953 OLDSMOBILE TRANSMISSION CASE & FRONT PUMP GASKET PRODUCTION CHANGE:* Beginning with August Production the transmission case was changed to include the use of an "O" ring seal at the front pump instead of a flat gasket. "O" ring seal must be used with all later type cases. The front pump will fit either early or late type transmission case.

▷*1952-53 HUDSON 3-4 SHIFT VALVE SPRING INSTALLATION (to correct vibration and noise when accelerating from 16 to 20 MPH in 4th Gear):* Install new spring Part No. 307927 (not necessary to drain fluid or remove transmission) as follows: Raise car, disconnect TV line and control lever, remove side cover and control body assembly, remove front body and separator plate, install spring, reassemble transmission.

▷*1954 FRONT PUMP PRIMING SPRING PRODUCTION CHANGE:* Two pump priming springs are now being used. All previous models with vane type pumps can use the two springs for service replacement.

▷*1954 CADILLAC TRANSMISSION VENT LEAK (Caused by an Undersize or Out-of-round Pressure Regulator Valve):* Check this condition by transmission shift lever in "R" position, and with engine idling, observe breather vent hole. If oil appears, replace the

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DUAL-RANGE HYDRA-MATIC 1952 CONTROL VALVE (TYPICAL)

OVERHAUL (C ntinu d)

Pressure Regulator Valve. Before installing new valve, check dimensions of the three wide valve lands, these should be .4990-.4985" in diameter. Do not install an undersize or out-of-round valve.

►*1954 OLDSMOBILE OVERRUN CONTROL VALVE CHANGE:* A later type overrun control valve with an increased diameter of the large shank end is now being used to avoid the possibility of installing the valve incorrectly.

►*1954 OLDSMOBILE REAR PUMP CHANGE (To eliminate noise in light throttle reverse operation):* This later pump, Part No. 8615329 can be used for service replacement to correct noise, as noted above, on earlier transmissions.

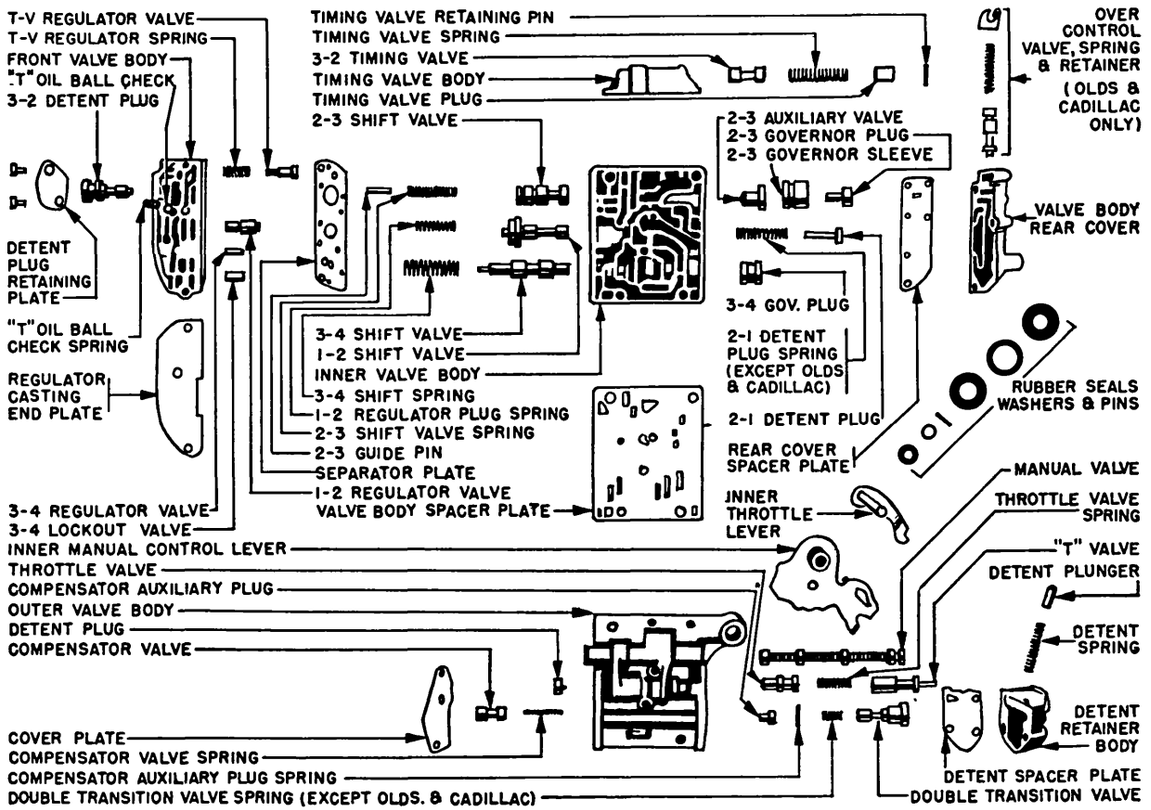
►*1954 PONTIAC GOVERNOR ASSEMBLY PRODUCTION CHANGE:* A new governor assembly having a relocated exhaust hole is being used in late 1954 production and as a service replacement on all 1952-54 transmissions.

►*1955 CADILLAC FRONT & REAR CLUTCH PRODUCTION CHANGE (Cars With Eldorado Engine):* Beginning with transmission Serial No. CE-6336, front and rear clutch drive and driven discs are thinner and an extra driving disc has been installed in both units. Due to this change, new front and rear clutch annular pistons are also used. If the later type discs are to be installed in transmissions before the above serial number, all clutch discs must be replaced and the new type annular piston must be used. The later type parts are as follows: Driven Disc (No. 8615593). Drive Disc (No. 8617317). Front Clutch Annular Piston (No. 8617332). Rear Clutch Annular Piston (No. 8615377).

►*1955 CADILLAC OIL LEAK CORRECTION (Oil Pan Drain Plug and Transmission Oil Cooler Fitting):* A new fibre gasket, Part No. 1307237 is available for service replacement. New gaskets should be placed in hot water a few minutes before installation.

►*1955 CADILLAC ROUGH SHIFTING CORRECTION (Usually encountered when accelerator pedal is pressed as the 3-2 shift occurs):* If correct throttle linkage adjustment and correct internal band adjustment fails to correct the condition, install a more flexible rear servo accumulator check valve, Part No. 8617281, with rivet, heavier rear servo spring, Part No. 8617217, and front servo unit booster spring, Part No. 8617274.

►*1955 HUDSON & NASH REVERSE OIL FEED SEAL PRODUCTION CHANGE:* In addition to the rear bearing retainer gasket, a new rubber "0" ring seal, Part No. 3117223, has been added to the rear of the transmission case to eliminate possibility of an oil leak at the reverse oil feed passage. Transmission case requiring this "0" ring seal can be identified by the counterbore around reverse oil feed hole in side of transmission. See "Pressure Test Point" illustration for location of hole.



1953-55 DUAL-RANGE HYDRA-MATIC CONTROL VALVE (TYPICAL)

►*1955 HUDSON & NASH REAR SERVO PRODUCTION CHANGE:* Starting with transmission Serial No. 55H-7460 (Hudson); 55N-12346 (Nash), the rear servo body was changed to incorporate a rear servo compensator pipe.

►*1955 HUDSON & NASH ROUGH 2-3 UPSHIFT CORRECTION:* After correct linkage and band adjustment, the rough 2-3 upshift condition remains, install Service Spring, Part No. 3119206 in the front servo body 4-3 downshift valve *(NOTE*—On Wasp models, it is also necessary to replace the pressure regulator spring, Part No. 3115705 which is identified by blue paint).

►*1955 OLDSMOBILE REAR PUMP DISCHARGE PIPE RETAINER:* A retainer bracket, Part No. 8615556, has been released for production and service on transmissions starting with Serial No. 55-R-65474. The new retainer is installed under the rear servo retainer attaching bolt, and replaces the pipe retainer clip formerly used.

►*1955 TRANSMISSION LEVER PRODUCTION CHANGE & 1954 REPLACEMENT PARTS NOTE:* A new "stamped" manual shift lever, Part No. 567316 is used in production and for service replacement on 1954-55 transmissions. A new "stamped" throttle lever is used in production and for service replacement on 1955 transmissions after Serial No. 55-R-76159. Do not use on transmissions before the above serial number as a longer throttle shaft is required for use with this lever.

DISASSEMBLY OF TRANSMISSION

►***TRANSMISSION DISASSEMBLY NOTE:*** ***Instructions below cover removal of sub-assemblies from transmission case. See "OVERHAUL OF UNITS" for disassembly, inspection, and reassembly of these sub-assemblies.***

Torus, Torus Cover, & Flywheel Housing: Remove oil level indicator (breather cap) from top of transmission case. With transmission on the bench, proceed as follows:

1) Move manual control lever on side of transmission case to Reverse (rear) position.
2) Straighten lockplate lip on mainshaft nut using a chisel and light hammer, remove mainshaft nut.
3) Slide torus driven member off front end of shaft. *CAUTION*—If torus member sticks, tap end of shaft with rawhide hammer while pulling on torus hub.
4) Remove driving torus snap ring, then remove torus driving member from shaft.

►***CAUTION—DO NOT attempt to remove driving torus and cover as a unit.***

5) Remove torus cover by working cover hub back through oil seals gently and then pulling cover off with quick jerk.

►***CAUTION—DO NOT pull or push on cover in rough manner which may cause broken or damaged oil seal ring.***

6) Remove four capscrews and lockwashers holding flywheel rear housing on transmission case, remove housing and gasket.

Manual Lever, Oil Pan, Oil Screen, & Side Cover:

1) Move shift lever on side of transmission case to "Lo" (next detent position forward from "R").

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OVERHAUL (Continued)

2) Loosen clamp bolt retaining shift lever on shaft, remove lever.
3) Remove snap ring from groove at forward end of mainshaft using snap ring pliers.
4) Take out oil pan capscrews and lockwashers, remove oil pan and gasket. Lift oil pan screen and front pump intake pipe straight off as a unit (pipe will come out of front pump body and screen will pull off rear pump intake pipe).
5) Take out all side cover capscrews, remove side cover and gasket.

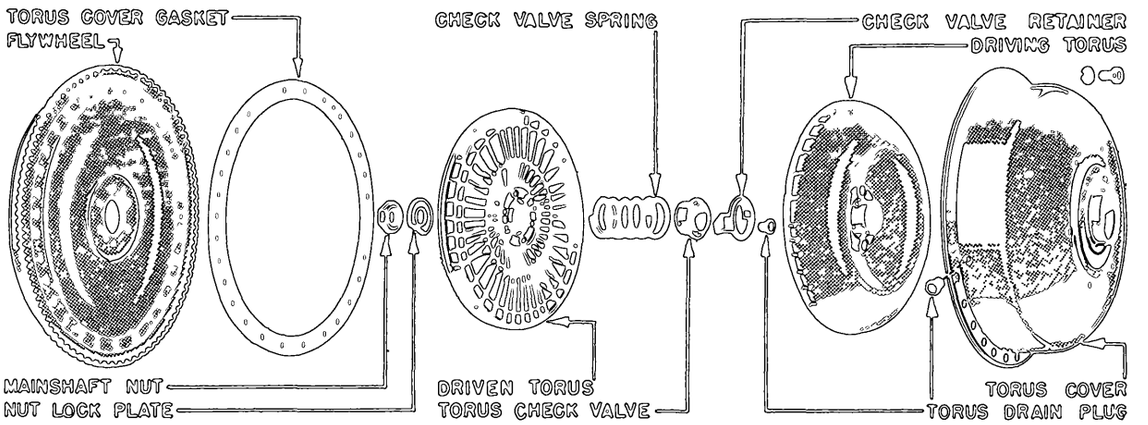
Control Valve & Parking Brake Bracket: Place inner detent lever in "Lo" position, loosen locknuts and back off front and rear band adjusting screws 5-6 turns. Then proceed as follows:
1) Remove pressure regulator reverse oil pipe by prying ends out evenly from control valve and case *(CAUTION—use light pressure to avoid bending pipe).*
2) Remove parking brake pawl support bolt (one of the rear bearing retainer mounting bolts on back of case), position pawl down in case as far as possible *(NOTE—pawl cannot be removed at this time).*
3) Unhook parking brake release spring from pin at front of parking brake bracket and remove spring.
4) Loosen two bolts mounting parking brake bracket on side of transmission case but DO NOT remove bolts at this time. *NOTE—Lockplate on lower mounting bolt also serves as parking blocker piston pin retainer.*
5) Take out four bolts mounting control valve assembly on side of transmission case, work control valve assembly toward front of case sufficiently to disengage two governor pipes and reverse clutch pipe *(CAUTION—Governor pipes may remain in either part but should be removed to prevent their being damaged),* lift control valve assembly out. Remove reverse clutch oil delivery pipe by pulling rear end out of hole in case.

▷*CAUTION—Control valve assembly should be kept wrapped in clean cloth or paper to prevent dirt entering valve body passages.*

6) Remove the two parking bracket mounting bolts (these bolts loosened in step 4 above), remove bracket by carefully sliding sleeve off governor *(CAUTION—Use extreme care not to damage governor oil rings when removing sleeve).* Do not lose roller from end of reverse shifter crank.
7) Lift parking brake pawl out of case.

Front & Rear Servos: *CAUTION—Front and rear band adjusting screws must be backed off approximately 5-6 turns to relieve servo spring tension before servos can be removed.*

1) Remove governor oil delivery pipe by carefully prying both ends up evenly out of front servo and governor.
2) Take out front and rear servo mounting bolts, lift out both servos as a unit *(CAUTION—rear pump discharge pipe will rotate in front fitting and slide free as units lifted off),* separate servos at oil transfer pipe leaving the pipe in one unit. Servos can be removed separately as follows: Move rear servo toward rear to disengage oil transfer pipe, lift servo off, then lift front straight up to disengage it from front pump oil delivery pipe. Remove rear pump discharge pipe and front pump oil delivery pipe by pulling pipe straight out.



DUAL-RANGE HYDRA-MATIC TORUS ASSEMBLY

Line Exhaust Valve: *(1953 & Later Note—This valve located in valve body attached to front servo unit and special tools are not required for its removal. Some early 1953 cars were same as 1952 models and are removed as follows:).*

1952 Line Exhaust Valve—This valve located in hole in case at front servo mounting face. Use special tool J-5177 (Manzell No. 77447 for Lincoln) to remove sleeve from hole (enter tool in sleeve with handle end facing nearest side of case and when tool bottoms against end of sleeve, rotate handle 180° to engage tool in sleeve, pull sleeve out). Then remove exhaust valve and spring (these parts can be popped out by applying air pressure at main line oil hole passage on side of case, or they will fall out if case inverted). *See Overhaul data (following) for inspection and re-installation of the valve.*

Governor & Rear Oil Pump: If these parts not to be removed, check governor run-out to make certain it is within limits. *See Transmission Reassembly data for procedure.* To remove assembly, proceed as follows (run-out is checked when unit re-installed):
1) Position governor so that large round governor weight is toward front of transmission, position reverse drive flange so that one attaching bolt is directly up.
2) Take out two bolts and lockwashers mounting assembly on transmission case.
3) Lift the assembly out by moving it toward the control valve side of the case and lifting pump end up to clear the case.

▷*MAINSHAFT ENDPLAY CHECK CAUTION—Mainshaft endplay should be checked at this point BEFORE removing drive units from transmission case to determine correct thrustwasher to be used when reassembling transmission. Check endplay as follows:*

Mainshaft Endplay Check—Install mainshaft endplay guide J-2587 (1952-53), J-2587-B (1954-55) over forward end of mainshaft and front planet carrier. Use special mounting fixture tool J-1465 to mount dial indicator on front of transmission case so that it contacts front face of guide tool. Insert a screwdriver between front clutch drum and center bearing cap to hold front planet unit forward, *(CAUTION—Place screwdriver at an angle to avoid damage to oil delivery sleeve).* Move mainshaft back and forth and record endplay as noted on dial indicator for use in selecting correct thrustwasher when assembling transmission. Endplay should be .004-.018". *See "Mainshaft Endplay Change" above.*

CAUTION—DO NOT force mainshaft when measuring endplay which will give inaccurate reading (the FREE endplay is the desired measurement).

Pressure Regulator: *CAUTION—This assembly is under spring pressure and should be held in while being unscrewed to prevent parts flying out.* Loosen regulator valve plug, unscrew plug by hand while holding pressure against outer end. Remove plug and valve assembly (plug, reverse booster plug, T.V. plug, spring, and valve should withdraw as an assembly).

Front Oil Pump & Drive Gear: Remove snap ring from front end of front planet carrier shaft, remove steel and bronze thrustwashers *(CAUTION—these are special washers with smaller O.D. and should be kept separately to insure re-installation at this point).* Take out two front pump mounting screws (in front face of case at edge of pump cover), remove locating washer from screw hole counterbore. Remove front pump, gasket and drive gear as an assembly *(NOTE—tap rear of pump with light hammer and brass drift if necessary).*

Reverse Assembly & Mainshaft Removal: Remove oil seal from rear bearing retainer. Take out six reverse center gear-and-drive flange attaching bolts *(NOTE—drive flange can be held from turning by wedging screwdriver under one drive flange bolt head).* Install screwdriver between center bearing cap and rear clutch drum to prevent drum moving forward *(CAUTION—place screwdriver at an angle to avoid damage to oil delivery sleeve),* take out all rear bearing retainer-to-transmission bolts, carefully withdraw bearing retainer and reverse assembly from rear end of case (if assembly sticks, tap on front end of mainshaft using rawhide or other soft hammer). Remove mainshaft endplay thrustwasher *(CAUTION—this washer may stick to mainshaft in case or remain in output shaft counterbore).* Remove stationary cone lock key (this key fits in keyway in cone and keyway in case). Remove mainshaft through rear end of case, remove bronze thrustwasher from rear clutch hub (this washer may come out on mainshaft). Install rear hub retainer tool J-2174 on rear face of rear clutch hub

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OVERHAUL (C ntinued)

(use one reverse drive flange attaching bolt to hold tool in place). Remove screwdriver from in front of rear unit.

Front & Rear Unit Removal: ***CAUTION—Make certain rear hub retainer tool J-2174 installed on rear unit to prevent parts coming out while units being removed.*** Straighten lockplate ears at center bearing cap attaching bolts using a chisel and light hammer, remove bearing cap bolts and lockplate (NOTE—if necessary, use blunt screwdriver between bearing cap or front and rear drum to equalize drum distances and permit socket wrench to be used on bearing cap bolts). Remove rear band and strut assembly (CAUTION—do not lose rear band release spring located between ends of band), wire ends of front band together to retain band on drum (brake wheel cylinder clamp can be used for this purpose). Lift entire assembly out of transmission case. Remove front band from front unit drum. Front and rear units can be separated for overhaul as follows:

Front & Rear Unit Disassembly—*Holding Fixture J-2187 will facilitate work on these units* (fixture engages front end of intermediate or planet carrier shaft and holds assembly vertical on bench). Remove rear clutch hub rear snap ring from groove at rear end of shaft, lift rear unit assembly off shaft. Remove rear clutch hub front snap ring from groove in shaft. Remove center bearing cap from oil delivery sleeve, lift sleeve and oil ring assembly off shaft. Remove snap ring from recess in front unit *(CAUTION—*hold snap ring open while removing it from shaft so that it does not score or otherwise damage bearing surface on shaft). Lift front unit assembly off shaft, remove bronze and steel thrustwashers from recess in front unit. ***See OVERHAUL data (following) for disassembly of each unit.***

DISASSEMBLY & REASSEMBLY OF UNITS

FRONT PLANETARY UNIT: Disassembly. Place front unit in arbor press with ram resting on block on front cover, apply just enough pressure to enable cover retaining snap ring to be removed from clutch drum, remove ring, remove unit from press. Separate drums by tapping front face of center gear using a rawhide or other soft hammer, remove front cover. Remove front clutch annular piston from cover by bumping front face of center gear on soft wood block. Remove clutch spring (six outer and six inner springs) and clutch plates (composition drive plates and steel driven plates—number varies on different transmissions) from the drum. Remove rubber piston seals and brass expanders from annular piston and clutch drum piston *(1955 CADILLAC NOTE—*Outer clutch piston seal is cast iron and can be removed by expanding slightly), using a blunt screwdriver to avoid damaging these parts.

Inspection: Clean all parts thoroughly. Inspect clutch drive pins and replace drum and drive pin assembly if pins scored, loose, distorted, or worn excessively (pins not furnished separately). Inspect drum for deep grooves or scoring on band surface or clutch plate surfaces; check piston bore, oil delivery sleeve bore and oil seal grooves for scoring; inspect gear teeth and thrust surfaces for wear or damage. Inspect clutch release springs for distortion or collapsed coils (free length should be 2 15/64"—slight wear as indicated by bright spots on side of outer springs where springs have contacted drums is permissible). Inspect clutch drive plates for damaged or loose facings (discoloration is permissible but plates should be replaced if flakes of facing material can be removed by scratching with the thumbnail), worn teeth, or lack of waving (these plates must be waved). Inspect clutch driven plates for scored or warped surfaces (these plates must be flat), or excessive wear. Inspect annular clutch piston for scoring and make certain oil seal grooves are thoroughly clean. Inspect planet carrier gears for damaged teeth or excessive roller bearing wear, inspect bearing surfaces of planet carrier shaft. Inspect all thrust washers for wear or damage.

Reassembly: *NOTE—*Clutch parts can be installed in front drum with drum on bench (driving pins upward) but assembly will be facilitated if planet carrier assembly placed vertically in fixture and front drum placed on planet carrier so that drum flange rests on pinion gears with drive pins upward. Install parts in following order:

1) Install driving (composition faced) and driven (steel) clutch plates alternately in that order *(CAUTION—*Engage **square** notches of driven plates over drum pins) and apply hydra-matic fluid to face of each plate as it is installed.

►***FRONT CLUTCH ANNULAR PISTON REPLACEMENT CAUTION—***Annular piston used with three composition and three steel plate clutch assembly is THICKER than piston used on four composition and four steel plate assembly. **Do not interchange pistons between the two types of assemblies.**

►***CLUTCH PLATE NOTE—***Clutch plate assemblies (equal number of drive and driven plates) differ on individual transmissions as follows:

►***1955 CADILLAC ELDORADO CLUTCH PLATE PRODUCTION CHANGE:*** Thinner plates used after Transmission Serial No. CE-6336, and one additional drive plate has been added. ***See "Cadillac Front & Rear Clutch Production Change" above, for installation of later type plates in early transmissions.***

Front Clutch—

3 Drive & 3 Driven Plates—Hudson (Exc. Hornet and 1954 Super Wasp); Kaiser; Nash (Exc. 1955 Ambassador); Rambler; and Willys.

4 Drive & 4 Driven Plates—Cadillac ***(See 1955 Cadillac Eldorado Note above)***; Hudson Hornet, 1954 Hudson Super Wasp; Lincoln; 1955 Nash Ambassador; Oldsmobile; and Pontiac.

2) Install six outer and six inner clutch release springs through plates and into spring holes in drum (install outer springs first).

3) Install new inner brass expander in ring groove in clutch drum with **expanding lips down,** then work new inner piston rubber seal into ring groove with lip down over brass expander *(CAUTION—*work expander well back into position so that brass edges are not exposed). Check installation by installing piston into clutch drum to insure proper seating of the seal and expander, inspect inner seal after piston removed.

4) On models with rubber outer seal on annular piston, place new rubber seal over annular piston with **lip up** so that it is beyond the seal groove, install new large brass expander in piston groove with **lips up,** work rubber seal up into groove and over brass expander, finally work expander well down into position under seal so that brass edges are not exposed. On models with cast iron outer seal on annular piston, slightly expand seal and slip into groove of piston. *(CAUTION—*Before installing seal on piston, check ring gap by inserting oil seal squarely into clutch drum assembly and checking with a feeler gauge. Clearance should be .001-.006" at O.D. of ring, and should not exceed .007" at I.D. of ring. File ring ends as necessary for correct gap).

5) Install annular piston and seal assembly on clutch drum by placing piston on drum so that it rests on outer seal (on pistons with cast iron seal ring, use Ring Compressor J-5608 to compress seal ring until assembly is positioned in clutch cover). Align square notches in piston with holes in drum. then apply slight hand pressure to piston and guide seal into drum with the flat side of a blunt screwdriver.

6) Install clutch drum and piston assembly in front drum with gear end in *(CAUTION—*make certain that springs enter recesses in annular piston). Place the assembly in a press with ram resting on block on top face of clutch drum, press clutch drum down to fully expose snap ring groove. Install snap ring in drum with open ends equally spaced between two drive pin holes *(CAUTION—*ring must be fully seated in groove). Release pressure slowly so that clutch drum seats solidly against snap ring, remove unit from press. Tap front face of center gear lightly with rawhide hammer to insure clutch drum seating properly against snap ring.

7) Install planet carrier assembly in drum assembly by rolling the drum assembly on the bench while pressing planet carrier firmly in place (NOTE—this will align clutch drive plate teeth and hub teeth). Place entire assembly in holding fixture which will support it vertically on bench with clutch drum end upward.

8) Install bronze thrustwasher and steel thrustwasher (in that order) on planet carrier shaft and seat the washers in the clutch drum recess (CAUTION—locating lug on steel washer must fit over flat portion of shaft). Install snap ring in ring groove on shaft directly above steel washer.

►***CAUTION—Use snap ring pliers to keep ring open while moving it down over shaft. DO NOT allow ring to score bearing surface of planet carrier shaft.***

9) Assembly is then ready for installation of rear unit assembly. ***See Front & Rear Unit Assembly below.***

OIL SLEEVE & OIL RING: Inspection. Inspect oil sleeve and babbitt bearing for scored surfaces or excessive wear, see that oil passages in sleeve are clean and not restricted. Check oil seal ring gaps with rings installed in bore of clutch drum. Gaps should be .001-.007".

REAR PLANETARY UNIT: Disassembly. Remove rear clutch hub retainer tool J-2174 (as used to hold parts together during removal from transmission case), lift out rear clutch hub and bronze thrustwasher. If rear internal gear to be replaced, take out two fillister-head screws retaining gear on rear drum and remove gear *(NOTE—*gear need not be disturbed unless replacement necessary). Place rear unit in arbor press with ram resting on wood block on clutch drum, apply just enough pressure to enable snap ring to be removed from groove in drum,

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OVERHAUL (Continued)

remove snap ring, relieve pressure and remove unit from press. Remove clutch drum from rear drum by inserting wood block through clutch and against rear thrust face of clutch drum and tapping on block lightly *(CAUTION*—use care not to damage clutch plate gear teeth). Remove clutch release springs and spring guide pins (six outer and six inner springs with guide pin in each spring group). Remove all clutch plates (composition drive plates and steel driven plates—number varies on different transmissions). Remove annular piston from clutch drum by tapping rear thrust face of drum on block of wood, remove rubber piston seals and brass expanders *(1955 CADILLAC NOTE*—Outer clutch piston seal is cast iron and can be removed by expanding slightly), from annular piston, and clutch hub drum.

Inspection: Clean all parts thoroughly. Inspect as for front planetary unit parts (see above) and also make following additional inspections: Inspect babbitt bushing in clutch drum for wear or scoring. Check spring guide pins for distortion and correct length (1⅝" ± .010"). Blow out drilled passages in clutch hub and see that they are not restricted.

Reassembly: If rear internal gear has been removed, install gear on drum with dowel pin properly engaged and tighten attaching screws securely. Place drum on bench with driving pins upward, install parts:

1) Install driving (composition faced) and driven (steel) clutch plates alternately in that order *(CAUTION*—Engage square notches of driven plates over drum pins) and apply hydra-matic fluid to face of each plate as it is installed.

▷*REAR CLUTCH ANNULAR PISTON REPLACEMENT CAUTION*—Pistons are different for the four types of clutch assemblies, and are not interchangeable.

▷*CLUTCH PLATE NOTE*—Clutch plate assemblies (equal number of drive and driven plates) differ on individual transmissions as follows:

▷*1955 CADILLAC ELDORADO CLUTCH PLATE PRODUCTION CHANGE:* Thinner plates used after Transmission Serial No. CE-6336, and one additional clutch plate is used. *See "Cadillac Front & Rear Clutch Plate Production Change" above for installation of later type plates in early transmissions.*

Rear Clutch—

5 Drive & 5 Driven Plates—Hudson Jet; Nash Statesman; Rambler; and Willys.

6 Drive & 6 Driven Plates—Hudson (Exc. Jet, Hornet, and 1954 Super Wasp); Kaiser; and 1952-54 Nash Ambassador.

7 Drive & 7 Driven Plates—Hudson Hornet and 1954 Super Wasp; 1955 Nash Ambassador; and Pontiac.

8 Drive & Driven Plates—Cadillac (See 1955 Cadillac Eldorado Note above); Lincoln; Oldsmobile.

2) Install six outer clutch springs, six inner springs, and six guide pins through rounded slots in clutch plates and into holes in drum.

3) Position new rubber seal with lip down on inner piston of clutch drum just above groove, install new brass expander in groove with expanding lips down, work rubber seal into groove with lip down over the expander and work expander well back under seal so that brass edges are not exposed.

4) On models with rubber outer seal on annular piston, place new rubber seal over annular piston with lip up so that it is beyond the seal groove, install new brass expander in piston groove with lips up, work rubber seal up into groove and over brass expander, finally work expander well down into position under seal so that brass edges are not exposed. On models with cast iron outer seal on annular piston slightly expand seal and slip into groove of piston.

5) Install annular piston and seal assembly on clutch drum by placing piston on drum so that it rests on outer seal (on pistons with cast iron seal ring, use Ring Compressor J-5608 to compress seal ring until assembly is positioned in clutch cover) Align square notches in piston with holes in drum, then apply slight hand pressure to piston and guide seal into drum with the flat side of a blunt screwdriver.

6) Install clutch drum and piston assembly over drive pins in rear drum. Place assembly in a press with ram resting on wood block on top of face of clutch drum, press clutch drum down until snap ring groove fully exposed. Install snap ring in drum with open ends equally spaced between two drive pin holes *(CAUTION*—ring must be fully seated in groove). Release pressure slowly so that clutch drum seats slodily against snap ring, remove unit from press. Tap front face of clutch drum (use light hammer on wood block inserted through internal gear and clutch assembly) to insure clutch drum seating properly against snap ring.

7) Install front bronze thrustwasher in deep counterbore of rear clutch hub (use vaseline to retain washer), install hub in drum assembly by rolling the drum on the bench while pressing hub firmly in place *(NOTE*—this will align clutch plate teeth and hub teeth).

8) Install holding tool J-2174 on drum to hold hub in place (use one reverse flange attaching screw to attach tool to drum).

9) Assembly is then ready for installation on front unit assembly. *See Front & Rear Unit Assembly (following).*

Front & Rear Unit Assembly: With front unit assembled on intermediate shaft (front planet carrier shaft) and mounted vertically in fixture, proceed as follows: Install oil rings on oil delivery sleeve *(CAUTION*—space oil ring gaps 180° apart to minimize oil leakage), install sleeve over intermediate shaft with long bearing upward, use Ring Compressor Tool J-1537 to compress lower oil rings and tap sleeve down into bore of front unit clutch drum using a rawhide or other soft hammer. Install rear unit clutch hub front snap ring in second groove of intermediate shaft. Compress upper oil rings with tool J-1537, install rear unit assembly over shaft (withdraw ring compressor after rings enter bore of rear unit clutch drum). Install rear unit clutch hub rear snap ring in groove in shaft. Assembly is then ready for installation in transmission case.

▷*CAUTION—Both front drum and rear drum should rotate freely when slight force applied. If either drum binds, disassemble unit and correct trouble before installing assembly in transmission.*

REVERSE UNIT: *NOTE—Various types of rear bearing retainers or extension housings (part of reverse unit assembly) used on these transmissions but data below applies to all types:*

Disassembly: Remove speedometer driven gear and sleeve assembly, remove retainer gasket and stationary cone lock key (flat key in cone gap). Remove oil seal from rear end of rear bearing retainer or extension housing, if not removed previously (use special puller). Remove snap ring from output shaft at rear of ball bearing within bearing retainer (on extension housing types, snap ring is "open" type and accessible through access cover opening on side of housing). On all models except Oldsmobile, remove bearing retainer or extension housing from output shaft by lifting on retainer while tapping end of shaft with rawhide hammer *(See OLDSMOBILE CAUTION below)*. Compress reverse stationary cone by hand and remove internal gear and stationary cone. On all models except Oldsmobile, remove rear bearing snap ring from within bearing retainer, remove bearing by tapping it out. Use Clutch Spring Compressor Tool J-4670 or J-4670-A mounted on front face of bearing retainer to compress clutch release springs, remove large snap ring from groove in end of retainer hub, relieve spring pressure, remove tool. Remove spring retainer and lift out the six clutch release springs. Lift reverse piston straight out *(CAUTION*—piston is located by four dowels and cannot be turned). Remove outer oil seal ring from reverse piston and inner oil seal ring from hub (remove inner ring by lifting lip up with the fingers and then using needle-nosed pliers). Lift large bronze thrustwasher from reverse internal gear. Remove reverse stationary cone from internal gear cone by expanding stationary cone slightly with snap ring pliers *(CAUTION*—do not expand cone more than necessary for removal), remove reverse clutch flat spring retainer and waved release spring by lifting straight out of reverse internal gear (to avoid damaging retainer tangs). Remove snap ring holding reverse planet carrier on output shaft (not used on all transmissions), remove carrier from shaft, remove planet carrier locating snap ring from shaft, then remove following parts: Sun gear and drive flange, steel thrustwasher, bronze thrustwasher.

▷*OLDSMOBILE REAR BEARING RETAINER REMOVAL CAUTION*—To avoid damage to bronze bushing, remove output shaft from rear bearing retainer as follows: Remove small snap ring from output shaft and large snap ring from groove in bearing retainer back of rear bearing. Tap output shaft out toward front of retainer until planet pinions just disengage from internal gear *(CAUTION—do not tap shaft any further from retainer)*. Remesh planet pinions in reverse gear and tap or push shaft back into retainer until bearing is moved back flush with retainer counterbore. Hold assembly vertically with bearing up and remove bearing with tool J-5139 (hooked wire which can be inserted in splines to engage bearing inner race). Remove lower snap ring from output shaft, re-install bearing on output shaft to protect bronze bushing, compress stationary cone and carefully remove retainer from reverse unit and output shaft, remove bearing from retainer.

Inspection: Clean all parts thoroughly. Oil the ball bearing and check for roughness by rotating it by hand *(CAUTION*—do not spin bearing with air). Inspect reverse internal gear for damaged teeth (including parking teeth), scored or damaged inside bearing surface, scored or burned cone surface Inspect planet carrier for worn or damaged teeth worn roller bearings, worn or damaged splines. In-

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OVERHAUL (C ntinued)

spect bronze oil pump drive gear for excessive wear or damaged teeth, see that gear is tight on carrier and that drive ball is in place. Inspect reverse center gear and flange assembly for damaged teeth or worn bushing *(NOTE—these parts must be replaced as an assembly)*. Inspect output shaft assembly for scored or worn thrust and bearing surfaces, nicked or burred splines, worn or damaged speedometer drive gear teeth (cut directly in shaft). Inspect all thrustwashers for excessive wear and scoring. Inspect clutch release spring and retainer for damage or burning. Check stationary cone for burning, excessive wear or worn keyway. Inspect reverse piston for scores, burned cone surface, see that oil seal grooves are clean, inspect piston seal inner and outer rubbing surfaces for scoring or roughness. Check piston guide pins in bearing retainer for distortion, looseness, and scores, inspect bushing for scoring or excessive wear and make certain that oil holes in retainer are clean and open. Inspect mainshaft for damaged gear teeth and worn or scored thrust surfaces. Check piston release springs for distortion or collapsed coils (free length of springs should be 1 11/32").

Reassembly: ***CAUTION—Parts must be installed exactly as follows and clearances checked as indicated:***

1) Hold reverse center gear with drive flange up, install steel and bronze thrustwashers in that order in drive flange recess, then insert output shaft through drive flange and center gear so that planet carrier bottoms on thrustwashers, **hold assembly tightly together** to keep thrustwashers from slipping out of place and invert assembly on the bench so that it rests on carrier with shaft upward.

►***CAUTION—Do not pick up this unit until it has been completely assembled and is being installed in rear bearing retainer (step 8 below) to prevent thrustwashers slipping out of place.***

2) Install reverse planet carrier locating snap ring in groove in shaft, install planet carrier over shaft with bronze pump drive gear **down** and mesh pinions with the sun gear *(CAUTION—make certain carrier bottoms against snap ring)*. On Cadillac and Lincoln, install small spacer on shaft. On all other models, install snap ring in shaft groove to position carrier (this snap ring not used on Cadillac and Lincoln).

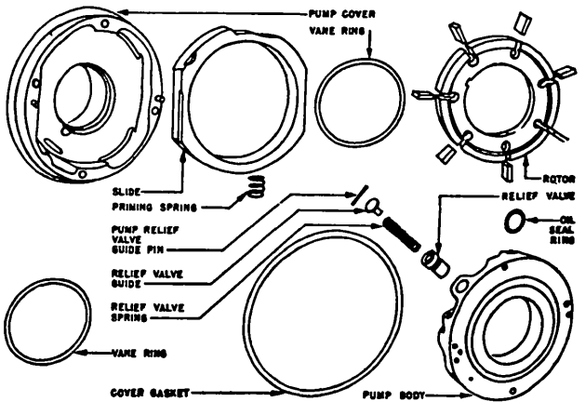
3) Install clutch release wave spring and spring retainer on internal gear side of reverse internal gear, install stationary cone on internal gear cone using large snap ring pliers to spread cone just enough to permit installation *(CAUTION—do not spread cone more than necessary and see that small dowel on cone points toward gear teeth)*. Install large bronze thrustwasher over collar of reverse internal gear.

4) Install piston inner seal in groove in hub of bearing retainer or extension housing with lip inward, and outer seal in groove on outer rim of piston with lip down away from cone. Apply light coat of hydra-matic fluid to outer surface of seals.

5) Install the clutch piston in rear bearing retainer or extension housing so that it rests on the dowel pins *(CAUTION—do not align piston holes with dowels)*, insert Outer Seal Compressor Tool J-4752 (.025" shim stock) around seal and down against ledge in counterbore in retainer, rotate piston until holes line up with dowel pins and push piston into retainer using extreme care to avoid damage to seal, remove tool. Install six piston release springs and spring retainer, compress springs with Tool J-4670 or J-4670-A, install retainer snap ring, remove tool. Check for correct assembly and seating of the piston as follows:

Piston Assembly Check—Place a straightedge across the face of the piston and measure distance from straightedge to face of rear bearing retainer or extension housing on each side. This distance should be 3/8" to 13/32". **If less than 3/8",** dowel pins are too short and unit should be replaced. **If more than 13/32",** disassemble unit and make certain dowel pins pressed in fully (check in an arbor press). If height still greater than 13/32" when reassembled, replace rear bearing retainer.

►***OLDSMOBILE REASSEMBLY CAUTION:*** On these models, disregard steps 6 through 9 and use special reassembly procedure as follows: Install reverse internal gear and stationary cone assembly in rear bearing retainer, compressing stationary cone by hand and positioning cone keyway so that it will line up with keyway in case when assembly is installed later (CAUTION—use care that thrustwashers do not slip out of place). Position ball bearing in retainer counterbore to act as a guide, install rear bearing retainer over output shaft (CAUTION—use extreme care to prevent shaft damaging bushing and bearing in retainer). Remove ball bearing from retainer (use tool J-5139). Install inner snap ring in LOWER groove of output shaft, reinstall ball bearing using tool J-5138 to drive bearing in solidly against snap ring, install large snap ring in retainer groove to retain bearing, on 1952-54 models install outer snap ring in groove in output shaft back of bearing. On 1955 models place "O" ring around sleeve and slide sleeve on output shaft just past the snap ring groove in shaft; then using a small bladed screwdriver slide "O" ring from sleeve. Remove sleeve and push "O" ring against inner race of bearing. Slide sleeve into position over "O" ring *(NOTE—If sleeve not a free slide fit, tap sleeve into position using Tool J-5138. Install snap ring into groove in output shaft next to sleeve. Then proceed with step 10 below.*



DUAL-RANGE HYDRA-MATIC FRONT OIL PUMP ASSY.

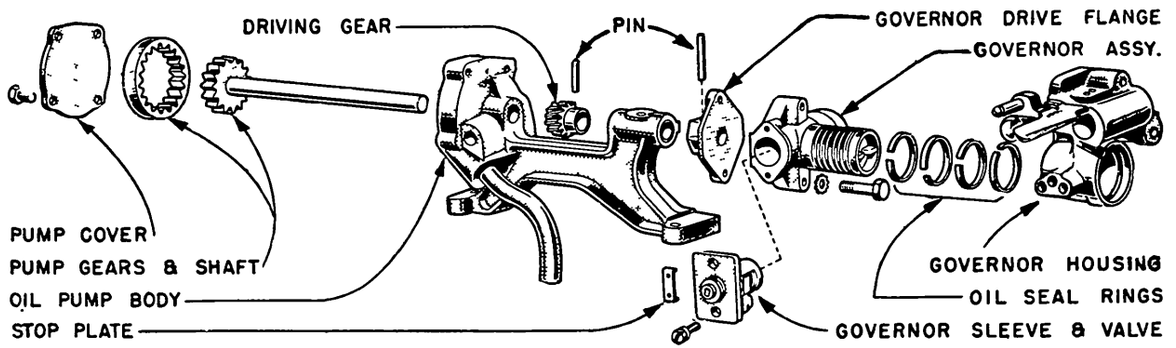
6) On all models except Oldsmobile, install ball bearing in rear bearing retainer or extension housing using special installing tool to tap bearing in so that it is fully seated. Install NEW special snap ring in retainer to retain bearing.

7) On all models except Oldsmobile, install reverse internal gear and stationary cone assembly in rear bearing retainer, compressing the stationary cone by hand and positioning keyway in cone so that it will line up with keyway in transmission case when the assembly is installed later ***CAUTION—use care that thrustwashers do not slip out of place while installing this assembly.***

8) On all models except Oldsmobile, carefully install output shaft assembly in rear bearing retainer or extension housing, meshing the reverse planet gears with the internal gear and that bearing is fully seated on output shaft.

►***CAUTION—Use extreme care not to damage bushing and bearing when inserting output shaft through these parts.***

9) On Cadillac and Lincoln, install rear bearing spacer over end of ouput shaft so that it seats against bearing inner race, install open type snap ring in groove in output shaft to retain spacer and bearing (work through access opening on side of housing—then install gasket and cover to close this opening). On all other models except Oldsmobile, install special snap ring in output shaft groove directly back of bearing (no spacer used on these models).



DUAL-RANGE HYDRA-MATIC REAR OIL PUMP & GOVERNOR

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OVERHAUL (Continued)

10) Install NEW rear oil seal in rear end of rear bearing retainer or extension housing using special tool to seat the seal (seal not used on all models). Install speedometer gear assembly. Place new gasket on mounting face of retainer. Install key in stationary cone keyway using Lubriplate to hold key in position until assembly installed in transmission case.

FRONT PUMP: *CAUTION—If pump rotor found to be broken when disassembled, completely disassemble and thoroughly clean transmission to remove all metal particles (may cause breakage of rear pump, parking brake bracket, and governor) and use NEW oil screen when reassembling transmission (all particles of metal cannot be removed from old screen).*

▷*1952-53 REPLACEMENT PUMP CAUTION:* Use only later type pump with improved rotor (as identified by "S" on face of pump opposite dowel pin. Mark "X" following serial number on transmission plate indicates later type pump used. *NOTE*—When installing later type pump on earlier cars, place an "X" following serial number (on Cadillac, place a daub of white paint on name plate and above body identification plate on cowl).

▷*PRIMING SPRING (FRONT PUMP) NOTE:* Two priming springs are used, replacing the single spring previously used. When overhauling earlier vane type pumps, replace single spring with later type springs.

Disassembly: Remove front pump from drive gear (tap gear out with rawhide hammer if necessary), remove gasket from pump cover. Take out four pump cover-to-body screws using J-2184-A pump holder *(CAUTION—Do not clamp pump in vise)*, carefully lift front pump cover from body, using care not to drop any of the internal parts. Mark face of rotor with prussian blue to be sure it will be reassembled properly. Remove upper vane ring and rotor, and remove vanes. Remove lower vane ring, slide, and two springs. Remove intake pipe rubber seal from pump body using a sharp awl. Compress pump relief valve spring with a screwdriver and remove retaining pin. Remove pump relief valve guide, spring and valve.

Inspection: Clean entire unit and make certain that all passages are clean and free from obstructions (run tag wire through two bleed holes in slide to make certain they are open). Check parts for scoring. See that slide is free in pump cover and does not bind. Check key in drive gear and key slot in rotor for burrs or wear. Check vanes for free movement in rotor slots and make certain they are not scored or burred. Check pump body bushing for scoring, flaking, or excessive wear (slight wear permissible). Check oil seal ring in pump cover to make certain it is free in groove and not broken or worn. Check oil seal in cover hub for wear or distortion. Make certain that relief valve and pressure regulator valve are free in pump body.

Reassembly: Reverse the disassembly sequence (above) and note the following important points:

Oil Seal Ring Replacement—If ring in groove on cover hub requires replacement, check gap of new ring in bore of torus cover before installing ring on pump cover. Gap should be .001-.007" with ring installed in torus cover.

Oil Seal Replacement—If oil seal in cover hub requires replacement, remove old seal with a small chisel, use special tool to install new seal with spring-loaded lip toward rear. Permatex #3 or similar sealer may be used to seal area between seal and cover.

▷*OIL SEAL CAUTION*—Two types used optionally. Seals differ in appearance but either type may be used and must be installed with lip toward rear.

Priming Spring & Slide—Spring must be properly installed under slide so that slide bottoms against lower stop in cover when spring compressed.

Rotor Vanes—Vanes should be installed in rotor after one guide ring and rotor installed (CAUTION—install rotor in accordance with marks made during disassembly). Install vanes with full polished edge facing slide (opposite edge will be polished only at points where vane contacts guide rings). Check rotor clearance with both guide rings installed by using feeler gauge between each vane and inside diameter of slide with vanes on opposite side contacting slide. Clearance must not exceed .003" (0-.003"), replace pump if excessive.

Pump Cover & Body Assembly—Lubricate all parts in cover with Hydra-Matic fluid before installing pump body. Body should fit freely over dowel pins in cover. Use holding tool J-2184-A and tighten cover-to-body screws to 12-15 ft.lbs. torque.

Final Assembly Check—With pump completely assembled, move rotor by hand to make certain that rotor, vanes and slide move freely. Priming spring should return slide to priming position after slide moved down to compress spring.

Drive Gear Assembly—Pump should be assembled to drive gear before assembly installed in transmission. Index rotor key slot with key on drive gear and slide pump on drive gear. *DO NOT FORCE PUMP ON DRIVE GEAR.*

REAR OIL PUMP & GOVERNOR: *GOVERNOR CHANGE NOTE*—Both die-cast and cast-iron governors have been used. Both types interchangeable but cast-iron type should be used for replacement.

▷*DISASSEMBLY CAUTION—Mark edge of governor body and drive flange before removing governor to insure re-installation in same position.*

Disassembly: Remove governor assembly from drive flange (two screws in governor body). Do not disassemble governor further except for cleaning or Oil Ring Replacement *(NOTE*—Governor serviced as complete unit except for Oil Rings). Remove pump cover (four screws), remove pump outer gear from body. This completes disassembly unless replacement of governor drive flange, pump and governor driven gear or shaft, or pump body is necessary in which case proceed as follows:

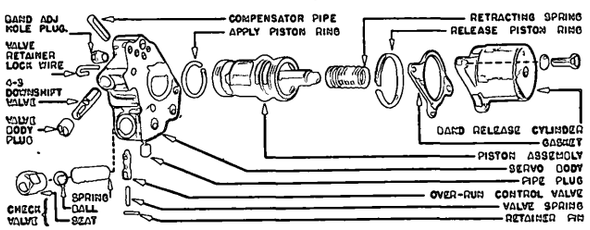
Replacement of Governor Drive Flange, Pump & Governor Drive Gear or Shaft, or Pump Body—Grind off end of lock pin in governor drive flange and in driven gear, drive pins out (use tool J-2183-1 clamped in vise to support shaft), remove burrs from shaft at pin holes, remove shaft through gear and body. Assemble parts in same manner using tool J-2183-1 to support shaft and peening tool J-2183-2 to peen ends of new locking pins to fill holes in shaft and gear or drive flange *(CAUTION*—height of peened end of pins must not exceed .070"). *See Transmission Reassembly data for governor drive flange run-out check (run-out must not exceed .002").*

Governor Disassembly (for cleaning or Oil Ring replacement)—Remove oil seal rings from governor body. Withdraw G1 and G2 stop plates from slots in body casting *(CAUTION*—do not attempt to remove G1 or G2 valves from body casting).

Inspection: Check governor G1 and G2 valves for free operation (if valves cannot be freed by operating them with governor immersed in cleaning fluid, replace governor assembly). Check governor oil rings for free movement in grooves, inspect ring lands and replace governor assembly if lands worn or damaged. Make certain all passages in governor body are clean and open. Check governor mounting face for nicks, burrs, or warped surface which would prevent securing oil-tight joint. Check pump body and cover for scoring or wear, check pump gears for wear or damaged teeth.

Reassembly: If new governor oil seal rings being installed, check ring gaps with rings installed in bore of parking bracket assembly. Gap should be .001-.007" and ring clearance in groove should be .001-.003". Install rings in governor grooves carefully. Install G1 and G2 stop plates in governor body grooves *(CAUTION*—valves must be correctly positioned so that stop plates enter freely without striking and damaging shoulders on valves). Install governor on drive flange with locating marks lined up, tighten two body-to-flange screws to 6-8 ft.lbs. Install oil pump driven gear in pump body, install cover and tighten cover screws securely.

FRONT SERVO: *(NOTE—1952 servos are not interchangeable with later type servos because of the addition of a Line Exhaust Valve & Overrun Control Valve Body. Some early 1953 models may have the same type servo as used in 1952 models).*



1952 DUAL-RANGE HYDRA-MATIC FRONT SERVO ASSEMBLY

▷1952 Front Servo Production Change—(To provide better oil seal within release cylinder)—Two distinct production changes made: (1)—Gasket used between release cylinder and servo body on later transmissions and this gasket should be installed in first transmissions whenever servo disassembled. (2)—Improved piston assembly with longer shoulder diameter to provide better oil seal within release cylinder used on later transmissions. This later type assembly interchangeable with first type but DIFFERENT SERVO SPRING USED WITH EACH TYPE CYLINDER.

Disassembly (1952): Remove capscrews in front band

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OVERHAUL (C ntinu d)

release cylinder, remove cylinder and servo spring from servo body. Remove servo release-and-apply piston assembly *(NOTE*—do not disassemble this unit—it is serviced as a complete assembly). Remove pipe plug and retainer spring holding 4-3 valve in place, remove valve. Remove rear pump check valve seat, ball, and spring. Clean up peened end of over-run control valve pin with a file, remove pin with pliers *(CAUTION*—keep finger over port to prevent spring flying out when pin removed), remove spring and over-run control valve. Remove compensator pipe from servo if this part loose. Take out ⅛" pipe plug from servo body (adjacent to over-run control valve port).

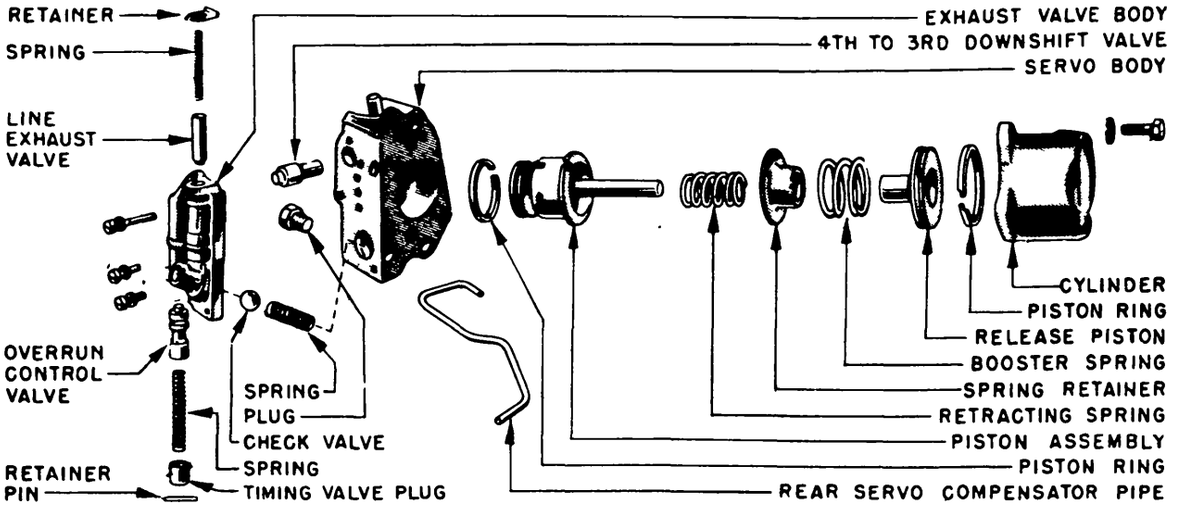
Disassembly: (1952-54 All Models. 1955 Chevrolet Truck, Hudson, Kaiser, Nash Rambler, & Willys)—Remove release cylinder to servo body attaching screws and lockwashers. Remove release cylinder, booster spring, retracting spring retainer, retracting spring and apply piston assembly. Remove release piston from cylinder. Remove three valve body to front servo body attaching screws and lockwashers and remove valve body. *(CAUTION*—Use care not to lose rear pump ball check spring from valve body). Remove rear pump ball check spring from servo. Remove 4-3 downshift valve by turning servo body over and catching valve in hand. Work overrun control valve pin out with needle nose pliers. Use care when removing pin to avoid losing overrun control valve spring plug. Remove spring and overrun control valve. Depress line exhaust valve spring and slide retainer out of valve body. Remove spring and line exhaust valve.

Disassembly: (1955 Cadillac, Oldsmobile & Pontiac)—Remove front band adjusting screw. Remove valve body to front servo attaching bolts and remove valve body and spacer plate. Remove front servo valve body cover plate attached to valve body by three screws. Remove 4-3 downshift valve and spring, and control valve and spring from valve body. With aid of needle nose pliers remove line exhaust valve retaining pin from servo body and remove spring and valve. Remove screws and lockwashers holding front servo apply cylinder. Remove servo retracting spring, retainer, booster spring and ban release piston. Remove piston assembly from apply cylinder.

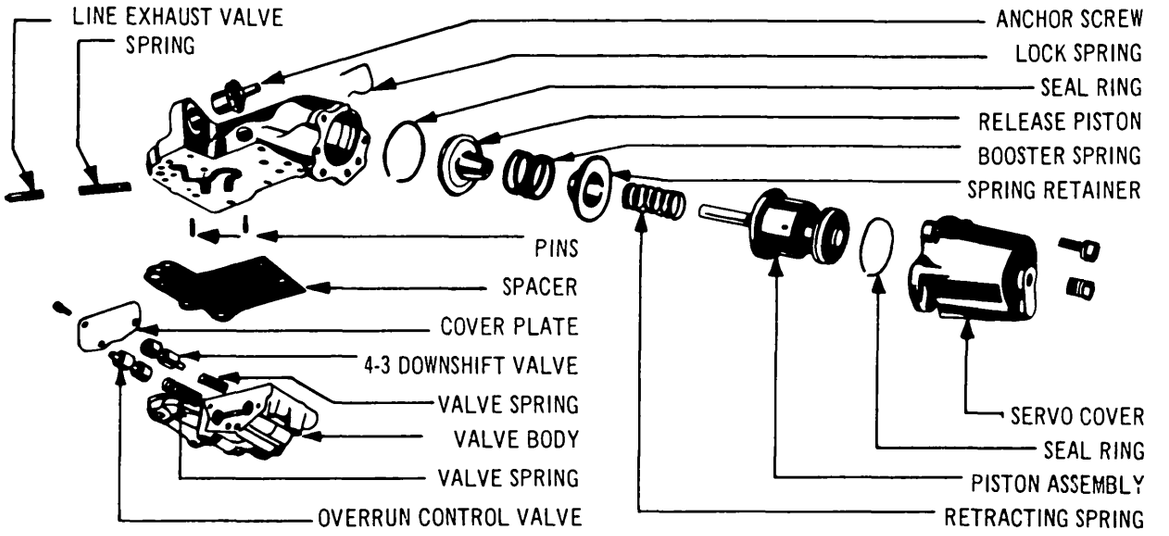
Inspection: Inspect servo body and front band release cylinder for wear and scoring. See that all passages in servo body are clean and not obstructed and that two steel plugs which seal oil passages are tight and staked in place. See that servo piston locating pin in servo body is in place and tight and that outer end of pin is just below face of servo body. Check 4-3 valve and over-run control valve for wear and scoring and make certain valves are free in bore. Orifice in 4-3 valve must be clean and not obstructed. Inspect servo piston assembly for wear or scoring, obstructed passages, and worn or broken rings. Make certain rings are free in grooves and that compensator piston works freely in bore in servo piston. Check springs for distortion or collapsed coils by checking approximate free length. *See Control Valve Spring illustration.*

Reassembly (1952): Reverse disassembly procedure and particularly note following production change and other important points:

Servo Retracting Spring Note—Make certain that correct type spring used with first or later type piston assemblies.



TYPICAL FRONT SERVO UNIT (1953-54 ALL MODELS; 1955 ALL MODELS EXC. CADILLAC, LDSMOBILE & PONTIAC)



TYPICAL FRONT SERVO UNIT (1955 CADILLAC, OLDSMOBILE & PONTIAC)

4-3 Valve Installation—After installing valve in body, align valve slot with spring retainer hole and install retainer. Check the valve for free operation after retainer installed.

Overrun Control Valve Installation—Use only latest type valve (with groove on side at domed end) for replacement. *(NOTE—This valve will correct slippage in "Dr 3" when using engine as a brake).* Use new pin to retain valve and spring, peen end of pin to prevent it working out in service.

Servo Piston & Release Piston Installation—Compress oil seal rings and start these into body carefully to avoid breaking or damaging rings. Make certain that groove in servo piston engages locating pin in servo body.

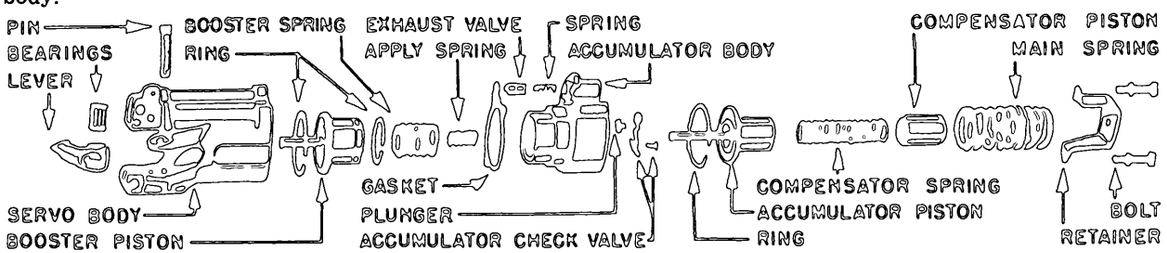
Reassembly: (1953-54 All Models. 1955 Chev. Truck, Hudson, Kaiser, Nash, Rambler, Willys—*NOTE—Lubricate parts as installed.* Install ⅛" plug in bore of front servo body. If oil transfer pipe was previously removed, reinstall pipe in servo body bore, tapping

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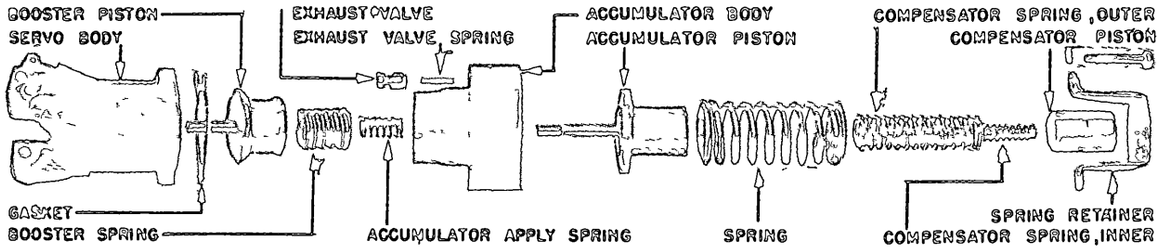
OVERHAUL (Continued)

into place with a plastic hammer. Install oil rings on front servo piston and front band release piston. Insert stem of front servo piston assembly through bottom side (small hole) of band release cylinder. Stem of piston is to serve as a guide to install front band release piston in band release cylinder. Carefully compress oil ring on release piston; then install release piston in release cylinder over stem used as a guide. Push release piston and stem down evenly until piston is seated against bottom of cylinder. Remove servo piston and stem used as a guide. While carefully compressing oil seal ring on front servo piston, work piston into front servo body. Be sure groove in piston sleeve locates on positioning pin in servo body. Position retracting spring, release spring retainer, and booster spring over stem of front servo piston. Align drilled bosses in band release cylinder with tapped holes in servo body, then carefully guide band release cylinder down over piston stem, booster spring, spring retainer and retracting spring. Make sure band release cylinder seats squarely on servo body. Install three bolts and lockwashers. Tighten to 6-8 ft. lbs. Insert 4-3 valve in bore in servo body, small diameter of valve into body first. Install overrun control valve, spring and plug in bore of front servo valve body; then while compressing overrun control valve spring with a blunt screwdriver, press against plug and install new overrun control valve retainer pin. Install line exhaust valve in valve body. Compress spring and slide line exhaust valve spring retainer into slot in valve body. Position rear pump check valve ball in seat, and spring in bore of servo body. Make sure 4-3 valve is in bore of servo body; then align front valve body and check valve ball with servo body and check valve spring. Install and tighten three front valve body to servo body attaching screws.

Reassembly: (Cadillac, Oldsmobile, & Pontiac)—Install front servo piston assembly into front servo apply cylinder. Be sure to align slot in sleeve over the small dowel pin in cylinder. Install front servo band release piston into front servo valve body, being careful not to damage ring. Install booster spring over front band release piston. Place retracting spring retainer over piston stem, down onto booster spring. Place retracting spring in retainer. Position front servo apply cylinder and piston assembly on servo body and tighten in place with attaching screws and lockwashers. Install line exhaust valve, spring and pin retainer into servo body. Install 4-3 downshift valve and spring. Overrun control valve and spring, into respective bores in servo valve body. Attach valve body and plate to servo body. Install band adjusting screw into servo body.



1953-55 TYPICAL REAR SERVO ASSEMBLY



TYPICAL 1952 DUAL-RANGE HYDRA-MATIC REAR SERVO ASSEMBLY

▷*RELEASE CYLINDER-TO-SERVO BODY GASKET CAUTION*—Use a gasket at this point on ALL transmissions (this gasket not used on first transmissions but should be installed whenever servo disassembled to reduce oil leakage between machined surfaces of servo).

REAR SERVO: *CAUTION—Servo must be disassembled and reassembled in arbor press to control spring pressures.*

Disassembly: Place servo in arbor press with spring retainer up, bring ram down to rest on retainer. Take out two screws and lockwashers holding retainer on servo body, release press slowly until servo spring pressure relieved, remove assembly from press. Remove spring retainer, accumulator spring, compensator piston, spring, and accumulator body and piston assembly from servo body. Remove gasket, exhaust valve, and spring from accumulator body, then rest accumulator body on vise with copper jaws, tap accumulator piston through spring and body. Remove booster piston and spring from servo body. Take out cotter pin in each end of band actuating lever pivot pin on servo body bracket, push pin out (*CAUTION*—use care not to lose bearing needle rollers from lever), remove lever and needle bearings.

Inspection: Wash all parts in cleaning solvent and dry thoroughly with compressed air. Inspect parts and check clearances as follows:

Spring Retainer—Check for bending or distortion indicating severe strain, reshape retainer as required.

Compensator Piston—Piston clearance in accumulator piston bore should be .003-.005". Check with feeler gauge. Inspect compensator piston for wear, scores, nicks, or burrs which might interfere with free operation or cause oil leakage.

Servo Body & Accumulator Body—Inspect for nicks, burrs, scoring, wear, obstructed passages, and all conditions which might cause oil leakage or prevent free operation. Inspect accumulator check valve and make certain that rivet is tight, valve seats flat on accumulator body, hole in valve is open, and that check valve plunger is free. If required, replace check valve as follows:

Check Valve Replacement—Drive out rivet, remove check valve and plunger from accumulator body. Clean body and passages. Install plunger and check valve (engage plunger groove in notch in valve) so that bleed hole in valve is directly over hole in body, insert rivet through valve and into body. Support rivet head on steel bar clamped in vise and peen rivet securely. Make certain that plunger and valve work freely.

Accumulator Piston & Piston Rod—Inspect piston and rod for nicks, burrs, scoring, wear which might cause oil leakage or sticking. Check piston clearance in accumulator body with feeler gauge (with oil ring removed). Clearance should be .005-.009". Check piston ring gap (ring inserted in body) and side clearance in ring groove. Gap should be .010" maximum and side clearance .0005-.0025".

Booster Piston—Check piston clearance in accumulator body (use micrometer and telescopic gauge), and clearance in servo body (remove oil ring, insert piston in servo body, use feeler gauge to check clearance). Both clearances should be .006-.010". Check large piston ring gap (with ring inserted in servo body) and ring side clearance in groove (with ring installed on piston). Gap should be .010" maximum and side clearance .0005-.0025". Check booster piston rod for free operation in servo body.

Servo Exhaust Valve—*NOTE—Two types used but valves are interchangeable* (later type has shoulder at "Lo" oil apply end to eliminate possibility of valve hanging up on servo body gasket). Inspect valve and valve bore in accumulator body for scoring, make certain that valve operates freely. Check valve spring for distortion or collapsed coils.

Servo Springs—Inspect all springs for damage, distortion, or collapsed coils. *NOTE*—Double compensator springs (inner and outer) used on some models.

Reassembly: Lubricate pistons and rings with clean hydra-matic fluid before installing and use extreme care not to damage oil rings when inserting pistons in bore of accumulator and servo bodies. Install all parts in reverse order of disassembly sequence (above) and note following important points:

Servo Lever Needle Bearing Assembly—Use heavy grease to hold needle rollers in lever while installing lever and pivot pin.

Booster Piston Springs—Install smaller booster spring (accumulator apply spring) on accumulator piston rod with smaller tapered end of spring to-

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Form 568—1956-M

OVERHAUL (C ntinu d)

ward accumulator body and tap spring on rod until small end seats against shoulder.

Final Assembly—After all parts installed in servo and accumulator bodies, install gasket on accumulator body (use petrolatum to hold gasket) and position accumulator assembly on servo body in an arbor press with ram resting on spring retainer, compress spring to enable retainer screws to be tightened.

►*SERVO EXHAUST VALVE CAUTION*—If first type valve used (without shoulder at "Lo" oil apply end), make certain that gasket aligned so that valve will not hang up on edge of gasket when servo assembled.

PARKING BRAKE BRACKET: Disassembly—Compress the parking blocker piston spring and remove retaining pin with needle nose pliers *(CAUTION*—use care that spring does not fly out), withdraw spring and parking blocker piston. Round off peened head of reverse blocker piston stop pin with a file, pull pin out of bracket *(CAUTION*—use care that spring does not fly out), withdraw spring and reverse blocker piston. This completes disassembly (do not disturb welded crank assembly).

Inspection: Clean all parts thoroughly. Inspect both blocker pistons for scores, burrs, or excessive wear. Check fit of pistons in bores (slight vacuum should be created when piston pulled out with oil hole to sleeve closed by a finger). Check piston springs for distortion or collapsed coils (see spring specifications below). Check bracket mounting face for nicks, burrs, or warped surface which would allow oil leakage, make certain that ¼" plugs are in place in drilled blocker piston passages and that center hole of oil delivery sleeve is plugged and that plug is tight. Make certain governor feed passage is clean and open by running tag wire through passage. Check oil delivery sleeve for scoring or excessive wear. Inspect bracket and crank assembly for free operation of the crank without excessive wear, check crank roller and parking pawl for wear, check for cracks at point where pawl is welded.

Reassembly: Install both blocker pistons and springs (slotted end of piston out), peen both ends of reverse blocker piston stop pin securely. *NOTE*—do not peen end of parking blocker piston retaining pin (this pin retained by pin retainer on lower mounting bolt when unit installed in transmission, pin retainer also seals off oil pressure in bolt hole).

CONTROL VALVE: *(DISASSEMBLY & REASSEMBLY NOTE): Service procedures on all control valves are similar. Refer to notes and production changes below for differences.*

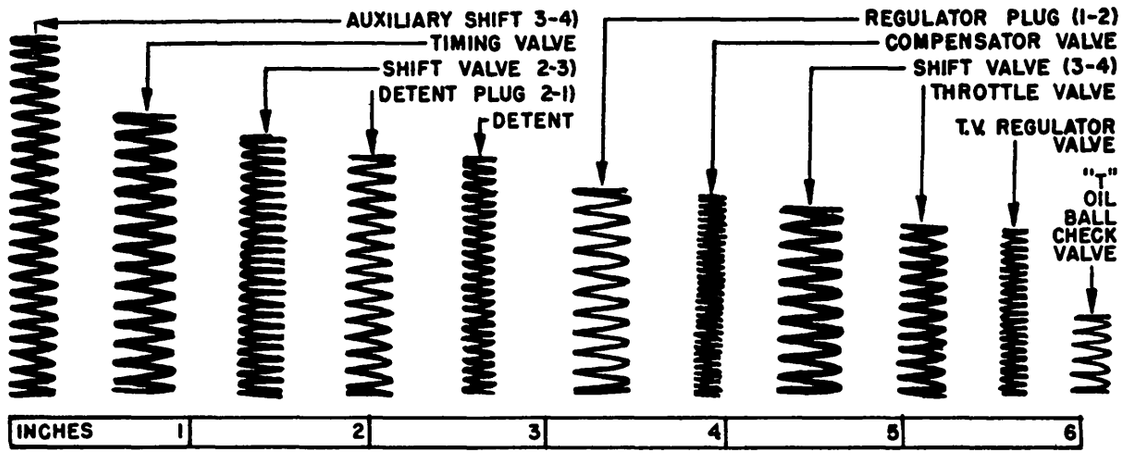
►*EARLY 1953 CONTROL VALVE ASSEMBLY IDENTIFICATION CAUTION*—1952 type control valve assemblies used on Early 1953 transmissions may be identified by a daub of yellow paint on transmission throttle lever shaft.

►*1954 & LATER CONTROL VALVE NOTE: "O" ring type seal used on throttle shaft.*

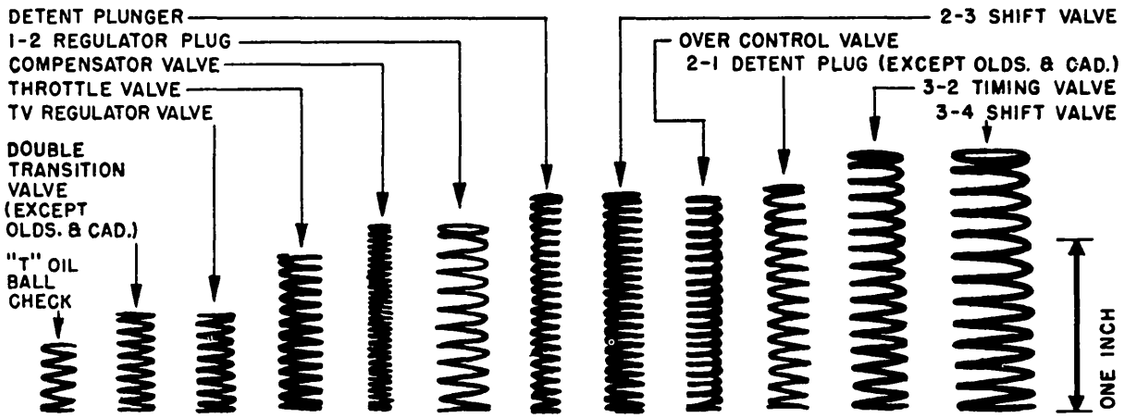
►*1955 CADILLAC, HUDSON, NASH CONTROL VALVE NOTE:* 1-2 regulator plug spring has been eliminated and a 1-2 shift valve spring has been added to the control valve assembly.

►*1955 CADILLAC, OLDSMOBILE, PONTIAC CONTROL*

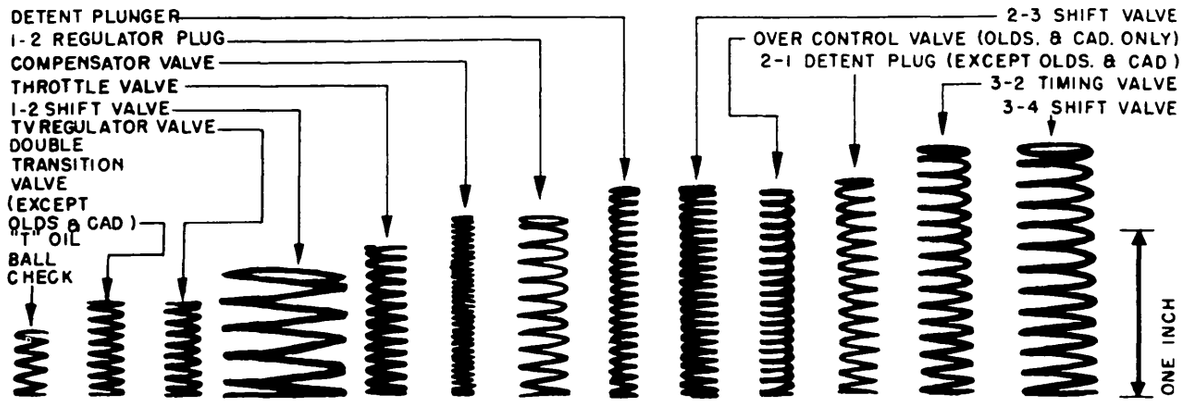
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1952 DUAL-RANGE HYDRA-MATIC CONTROL VALVE SPRINGS



1953-54 DUAL-RANGE HYDRA-MATIC CONTROL VALVE SPRINGS



1955 DUAL-RANGE HYDRA-MATIC CONTROL VALVE SPRINGS

OVERHAUL (Continued)

VALVE NOTE: The 3-2 detent plug is located between front valve body and inner valve body and is not accessible by removing the detent plug plate as on other models.

Disassembly: *See illustration for identification and location of valve parts.*

1) Remove two screws holding inner and outer valve body together. Remove washer on manual control shaft. Separate inner and outer valve bodies and remove spacer plate. Place outer valve body on bench with inside face up. Remove timing valve body assembly from inner valve body by removing two screws and lockwashers.

2) Compress spring and remove timing valve retainer pin, plug, spring and valve. Remove three governor end casting retaining screws and remove end casting, and separator plate. Compress over-control valve spring and remove retainer, spring and valve from governor end casting.

3) Remove 2-1 detent plug, 2-3 governor plug, sleeve, and auxiliary valve and the 3-4 governor plug. Remove front valve body plate (regulator plug end casting plate), "T" oil ball check valve and spring. (*CAUTION*—Front valve plate on some early production cars required four attaching screws, one being 1/16" shorter. Note location of this shorter screw, as a longer screw in its place will interfere with front valve body to inner valve body attaching screw, causing a leak).

4) Remove detent plug retaining plate from regulator plug end casting and remove the 2-3 detent plug, 2-3 shift valve spring and guide pin (On 1952-53 Oldsmobile and Cadillac, loosen the three regulator plug end casting screws approximately 3/16" to allow installation of Tool J-5157 over separator plate to hold springs compressed, then complete removal of regulator and casting. Remove tool by pressing down on spacer plate and sliding tool off to allow springs to expand gradually). On other cars remove three screws holding front valve body assembly to inner valve body and remove front valve body assembly and separator plate.

5) Remove following parts from inner valve body: 3-4 shift valve spring, 3-4 lockout valve assembly, 3-4 auxiliary shift spring, 3-4 shift valve, 1-2 regulator plug spring, 1-2 shift valve, 2-3 shift valve spring, 2-3 spring guide pin, 2-3 shift valve, 2-3 governor sleeve and 2-3 auxiliary valve (push these two parts out with pencil or wooden rod).

6) Remove manual valve from outer valve body. Remove detent plunger retainer from outer valve body (three screws), remove retainer plate. Then remove following parts from outer valve body: "T" valve, throttle valve spring, throttle valve, and double transition valve (NOTE—Double transition valve spring not used on 1953-55 Cadillac & Oldsmobile, 1955 Chevrolet Truck, & Pontiac.

7) Remove front plate from outer valve body (three screws, and remove compensator valve, spring and detent plug. Remove compensator auxiliary plug stop pin (needle bearing roller) holding compensator auxiliary plug in outer body. Remove compensator auxiliary plug by inserting 1/8" welding rod in hole in plug and using another rod, push plug from body. *CAUTION*—Because plug is short, be very careful not to drop it from between rods and have it become lodged in valve body.

Inspection: Clean valve body castings and valve parts in clean solvent (*CAUTION*—clean each valve singly using care not to nick or burr the valves). Inspect all valves carefully for burrs, scores, scratches, and wear. Burrs can be removed with a fine stone or crocus cloth (*CAUTION*—use care not to round off edges, these valves have sharp edges to prevent dirt wedging between valve and body). Inspect valve body castings for nicks, scratches, or warped mating surfaces (check for flatness on surface plate). Check valves and plugs for clearance in body by inserting in proper bore in body (both parts must be clean and dry). Valves should fall through bore of own weight when body tilted and shaken slightly. Check all valves springs for distortion (*NOTE—see illustration for identification of springs*). Check throttle valve inside lever and shaft for correct fit in hub of inside detent control lever on outer valve body. If shaft excessively worn, binds on shaft, or if oil seal damaged, replace parts.

▷*REPLACEMENT VALVE NOTE—Only the manual valve is furnished for service. If other valves or body casting being replaced, install new Control Valve Assy.*

Reassembly: 1) Install compensator auxiliary valve in outer valve body using 1/8" punch or rod to guide valve into place (*CAUTION*—use extreme care not to allow valve to drop down and lodge in body casting). Install pin to hold valve in place.

2) Insert compensator valve, spring, and detent plug in outer valve body, install front plate and secure with three attaching bolts.

3) Insert double transition valve, transition valve spring (spring not used on 1952-55 Cadillac & Oldsmobile, 1955 Chevrolet Truck & Pointiac), throttle valve, throttle valve spring, and "T" valve in outer valve body, install plate and detent plunger retainer and secure with three attaching screws.

4) Insert manual valve in outer valve body and detent spring and plunger in retainer, align manual valve with inside detent control lever and rotate control lever clockwise to index plunger on detent control lever assembly with groove in manual valve. Install manual shaft inner seal washer with small inside diameter over manual control shaft, dish up. Install manual shaft outer washer with large inside diameter over manual control shaft, dish down. Install rubber manual shaft seal over shaft with lip extending into inside of outer washer. Check to see that by-pass valve on inside of outer valve body seats against spacer plate. Visually perform this by placing plate on edge over by-pass valve.

5) Install following parts in inner valve body: 2-3 auxiliary valve and 2-3 governor sleeve (*CAUTION*—work valve stem into bore carefully so that it does not hang up on sleeve counterbore, check by shaking body assembly to make certain valve is free in bore), 3-4 governor plug (use brass rod in plug hole to assist in installation), 2-3 governor plug, 2-1 detent spring (not used on all transmissions), and 2-1 detent plug. On models with over-control valve, insert the over-control valve and spring in rear valve body and install retainer clip. On all models, install spacer plate and rear valve body on inner valve body and secure with three attaching screws. *CAUTION—Detent plug can be held in position against the spring tension with the spacer plate while starting the attaching screws.*

6) Complete assembly of inner valve body parts as outlined below. Assembly Clamp, Tool J-5157, will facilitate assembly as follows:

With Tool J-5157—Insert 2-3 shift valve, 1-2 shift valve, 3-4 shift valve, 3-4 auxiliary spring, 3-4 lock-out valve, and 3-4 shift valve spring. Depress 3-4 shift valve spring and install tool J-5157 over inner valve body, insert front valve body separator plate under tool tangs and carefully position plate on inner valve body. Insert 2-3 shift valve spring and spring guide pin, and 1-2 regulator plug spring through holes in separator plate. Assembly is then ready for front valve body installation (step 9).

Without using Tool J-5157—Insert 2-3 shift valve, spring, and spring guide pin; 1-2 shift valve and spring, 3-4 shift valve, 3-4 auxiliary shift valve spring, 3-4 lock-out valve, and 3-4 shift valve spring. Lay assembly on clean flat surface until front valve assembly has been completed.

7) Insert 3-2 detent plug in front valve body. On control valve assemblies with 3-2 detent plug plate, install plate and attach with two screws, making sure plate is installed correctly to cover bore in valve body.

8) Insert following parts in front valve body: "TV" regulator spring and valve, 1-2 regulator plug, 3-4 regulator plug, "T" oil ball check and spring, install cover plate and secure with three screws (CAUTION—Front valve plate on some early cars had four attaching screws, one being 1/16" shorter. This short screw must be installed in the one middle hole closest to center of control valve body, otherwise it will interfere with front valve body to inner valve body attaching screw directly below it and cause a leak). If Tool J-5157 not used, install separator plate on front valve body and insert three screws which attach front valve body to inner valve body. These two assemblies are now ready for joining as follows:

9) Place front valve assembly on clean flat surface in line with inner valve body assembly (see step 6 above) and bring the two assemblies together, aligning the springs protruding from the inner valve body with corresponding plugs in front valve body, start the attaching screws into the inner valve body to maintain alignment. If tool J-5157 being used, slide the tool off the inner valve body at this point. Tighten screws alternately to bring the two valve body assemblies together evenly.

▷*CAUTION—Make certain that 3-4 lock-out valve enters inner valve body and that all springs line up with their respective valves and plugs before tightening the screws. Tighten screws alternately and evenly to secure good alignment and contact of the valve bodies.*

10) Insert following parts in timing valve body: 3-2 timing valve, timing valve spring, and timing valve plug. Compress assembled parts and install plug retainer pin. Install timing valve body assembly on inner valve body assembly and secure with two attaching screws.

11) Install spacer plate and outer valve body assembly on inner valve body assembly. Align these parts by inserting four control valve-to-transmission mounting bolts, install and tighten the two attaching screws in the valve body assembly to 3-4 ft.lbs. Remove mounting bolts.

12) Install washers and seal on manual shaft in following order: Inner Spring Washer (washer with large hole—dished side out), Outer Spring Washer

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OVERHAUL (C ntinu d)

(washer with smaller hole—dished side in), Shaft Seal (lip in toward washers).

PRESSURE REGULATOR VALVE: *See Front Pump & Pressure Regulator illustrations for identification of valve parts.*

Disassembly: Separate regulator valve, plugs, and spring from regulator plug.

Inspection: Inspect reverse booster plug and T.V. pressure plug for nicks or scores and see that these plugs have free movement in regulator plug. Check regulator spring for distortion or collapsed coils. Check pressure regulator plug seal and gasket and replace if damaged or worn. Blow out passages in regulator plug with air to make certain these passages clean and open.

Reassembly: Install regulator valve in regulator spring with **small end of spring fitting in groove on valve.** Install T.V. pressure plug and reverse booster plug (chamfered end in) in regulator plug spring and install valve assembly in plug.

LINE EXHAUST VALVE (1952 CARS): *VALVE CHANGE CAUTION—Two different types used (different length valves and springs) and CORRECT type valve and spring must be used in each transmission (valve bore in case also changed so that VALVE ASSEMBLIES ARE NOT INTERCHANGEABLE). Replacement valve and spring must be same type as removed.*

Exhaust Valve Assemblies

	Valve Length	Spring Free Length
First Type	1 9/16"	2 27/64"
Later Type	1"	1 49/64"

Inspection: Inspect valve and valve bore in case for nicks or scores, check to make certain valve works freely in bore of case. Inspect valve sleeve for damage or distortion resulting from sleeve removal. Inspect valve spring for distortion or collapsed coils and make certain spring is correct type for valve (see spring data above).

Reassembly: *CAUTION—Install same type valve and spring as used originally (see Change Caution above).* After transmission case has been inspected (below), install valve spring and valve in valve bore in case, make certain that valve works freely and bottoms in valve bore by using ⅛" rod to work valve up and down. Install exhaust valve sleeve with flat on sleeve toward servo side of case (to provide clearance for servo attaching bolt) and tap sleeve in with a clean soft hammer until it bottoms in bore with edge of sleeve just below machined surface of case.

►*CAUTION—DO NOT force sleeve in deeper than bottoming shoulder in case (will interfere with valve operation).*

LINE EXHAUST VALVE (1953-55 CARS): Valve is located in valve body attached to front servo unit. *(NOTE*—Some early 1953 cars had same type valve as 1952 cars, above). *See "Front Servo Assembly" for installation of Line Exhaust Valve.*

TRANSMISSION CASE: Inspection—First remove band adjusting screws and oil pressure line plug on top of transmission case, clean case thoroughly with clean solvent. Blow out all oil passages (from underside of case to outside of case). Inspect case for cracks, restricted oil passages, nicked or burred mounting surafces. Check fit of oil delivery sleeve in center bearing cap (sleeve must be tight when bearing cap bolts tightened).

►*See "Pressure Test Point" illustration in TESTING for location of oil passages in case.*

FRONT & REAR BANDS: *CAUTION—DO NOT pry bands open or distort them in any manner. Bands are surface-ground for drum fit and will be damaged by rough treatment.*

Inspection—Inspect both bands for worn or burned linings, distorted or cracked bands, broken welds at anchor ends, or misaligned strut (rear band only—strut furnished as assembly with band and must pivot freely). Check band adjusting screws and screw hole in case for damaged threads, check adjusting screw locknuts for damage.

TORUS CHECK VALVE: *This assembly located in hub of driven torus.*

Disassembly (1952-53): Bend down ears on retainer at two torus check valve attaching bolts in driven torus hub, remove bolts, take out retainer, check valve and valve spring.

Disassembly (1954-55): *NOTE*—Torus check valve retainer and attaching screws no longer used.

Inspection: Clean all parts thoroughly. Inspect face and inside bearing diameters of check valve for scoring or nicks and make certain valve works freely on driven torus hub. Check valve spring for distortion or collapsed coils. Check end of planet carrier shaft for nicks or burrs that would restrict valve operation.

Reassembly (1952-53): Reverse disassembly procedure (above), tighten attaching bolts to 6-8 ft. lbs. and see that bolts are locked to prevent loosening. Check for free movement of valve.

Reassembly (1954-55): Slide torus check valve over driven hub to check freeness, then remove Torus Check Valve and Spring. Install Torus Check Valve onto mainshaft and at the same time locate Torus Check Valve Spring over hub of driven torus. Locate driven torus against snap ring and install lock plate and locknut. Tighten locknut to 50-60 ft. lbs.

TORUS COVER: *REPLACEMENT CAUTION—Before replacing cover to correct ring wear in torus cover neck, check the amount of wear as directed below.*

Inspection: Inspect inner and outer diameter of oil seal hub in cover for scoring, inspect grooved gasket surface for nicks or burrs (two continuous ridges should appear on sealing surface). Inspect splines in torus hub for wear or damage. Check for ring wear in hub, and check hub run-out as follows:

Torus Cover Ring Wear Check—Install a set of NEW front pump oil rings in the torus cover. If end gap of these new rings is NOT MORE THAN .025", cover is serviceable and can be re-installed.

Torus Cover Hub Run-out Check—Mount torus cover on flywheel without gasket using four attaching bolts evenly spaced (two adjacent to dowels and two between these points and 180° apart). Mount dial indicator so that indicating button contacts hub approximately ¼" from edge. Rotate flywheel and check run-out which should not exceed .005". If run-out greater than .005", rotate torus cover 180° on flywheel and recheck. If run-out still excessive, check flywheel run-out (if flywheel run-out less than .005", install new torus cover.

REASSEMBLY OF TRANSMISSION (INSTALLATI N OF UNITS)

AFTER SUB-ASSEMBLIES OVERHAULED (above) reassemble units in transmission cas in following order:

Front & Rear Units: With front band installed on front unit drum (band can be retained with wire or brake cylinder clamp), install assembly in case by lowering front end of planet carrier into case first. *CAUTION*—**Center hole in oil delivery sleeve must be centered between center bearing cap bolt holes and pointing upward. Remove clamp from front band and position anchor end of band over front adjusting screw. Install rear band on rear unit drum and position anchor end of band over rear adjusting screw. Install center bearing cap over oil delivery sleeve with dowel r gistering with dow l hole in sleeve, use new lockplate and tighten bearing cap bolts to 40-50 ft.lbs., secure bolts by bending lockplate up against bolt head (CAUTION—DO NOT pry lockplate corners up with a screwdriver which may damage edges of case).**

►*CENTER BEARING CAP PRODUCTION CHANGE:* Dowel pin hole has been drilled all the way through and dowel is press fitted so that upper end is flush with top of cap. If dowel pin is not indexed with hole in oil delivery sleeve, the dowel pin will push through rather than damage oil delivery sleeve when cap is tightened. *CAUTION*—Bearing cap lockplate must be flat with top of bearing after cap tightened. **If it raised up (over dowel pin), dowel pin is not indexed with oil delivery sleeve.**

Mainshaft Installation & Endplay Adjustment: Install correct thickness selective washer in counterbore of output shaft. If mainshaft had correct endplay of .004-.015" as measured before disassembly (see disassembly data), **use washer of same thickness as removed from this point. If mainshaft endplay was not correct,** select washer (see table below) **which will provide correct endplay of .004-.015". Use vaseline to retain washer. Install mainshaft in output shaft and mesh center gear with planet pinions.**

Mainshaft Selective Washer

Mark	Size	Mark	Size
1	.055-.059"	5	.087-.091"
2	.063-.067"	6	.095-.099"
3	.071-.075"	7	.103-.107"
4	.079-.083"	8	.111-.115"

Reverse Unit & Mainshaft Assembly Installation: Remove rear hub holding tool J-2174 from rear face of rear unit. Install rear clutch hub rear thrust washer in counterbore of rear hub (use vaseline to retain this washer). Install special tool or wedge screwdriver between center bearing cap and rear clutch drum to prevent drum moving forward *(CAUTION*—**insert screwdriver at an angle to prevent damage to oil delivery sleeve). See that new gasket in place on mounting face of rear bearing retainer or extension housing (gasket can be retained by vaseline) and that key is in place in keyway of stationary cone (key can be retained with lubriplate). Install the reverse unit and mainshaft assembly in rear end of transmission engaging the stationary cone key in keyway in case and meshing rear planet gears in rear unit (NOTE—revolving**

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OVERHAUL (Continued)

output shaft will facilitate meshing the gears). Align rear bearing retainer bolt holes with holes in case and just start the six bolts to align the assembly. Install the six reverse flange attaching bolts and lockwashers (remove wedging screwdriver after bolts finger-tight), tighten these bolts evenly to 10-13 ft.lbs. *(CAUTION*—use care not to distort flange and check for binding by holding output shaft and turning mainshaft). Tap or push rear bearing retainer solidly against case, tighten five rear bearing retainer bolts evenly to 28-33 ft.lbs. *(NOTE*—bolt which mounts parking pawl in case need not be torqued at this point). Check entire assembly for free operation by turning mainshaft, output shaft, and front and rear unit drums.

▷*MAINSHAFT ENDPLAY CAUTION—Check mainshaft endpay at this point BEFORE proceeding with reassembly:*

▷*NASH ENDPLAY GUIDE TOOL REWORK (For use with Statesman & Rambler 11" Torus)*—Revise the Endplay Guide Tool J-2587 for use with all Nash Transmissions as follows: Shorten tool 23/32" (from 5" to 4 9/32") by cutting off the necessary amount from mainshaft-bore end of tool, then deepen bore to 1 3/32", and chamfer sharp outer edge of tool.

Mainshaft Endplay Check—Install special tool or wedge screwdriver between center bearing cap and front clutch drum to hold front unit forward *(CAUTION*—insert screwdriver at an angle to prevent damage to oil delivery sleeve). Install mainshaft endplay guide J-2587 over forward end of mainshaft and front planet carrier. Use special mounting fixture tool J-1465 to mount dial indicator on front of transmission case so that it contacts front face of guide tool. Move mainshaft back and forth *(CAUTION*—do not force shaft) and note endplay. If endplay correct (.004-.018"), remove tool and install snap ring in forward end of shaft. If endplay not within limits, remove reverse unit assembly and change selective washer. *See Mainshaft Installation & Endplay Adjustment above.*

Front Pump & Drive Gear: Make certain that bronze thrustwasher in place on intermediate shaft against front planet carrier. Position front oil pump "O" ring seal in case and install pump and drive gear assembly on intermediate shaft (CAUTION—Align pump cover locating slot with locating washer counterbore in case), install locating washer in counterbore, install attaching bolts and tighten to 10-13 ft. lbs. Cover should protrude .003-.015" out of case. If pump cover protrudes less than .003", remove pump and add one of the earlier type gaskets (gaskets were replaced by "O" ring seals in 1954 transmissions). Install special bronze and steel thrust washers in that order over intermediate shaft and against front end of front drive gear, install snap ring to retain these washers.

Rear Pump & Governor Assembly Installation: Position reverse drive flange so that one attaching bolt is straight up, turn governor so that large round weight is forward, slide assembly into place in transmission entering governor end first through bottom of case and meshing driven gear with bronze drive gear on reverse planet carrier. Install attaching bolts and lockwashers and tighten to 15-18 ft.lbs. Check governor run-out (see below), then loosen attaching bolts (to assist in aligning governor and oil delivery sleeve during parking brake bracket installation below).

Governor Run-out Check—Mount dial indicator on side of transmission case so that indicating button contacts oil delivery sleeve approximately ¼" from end. Rotate transmission driven shaft by hand and note governor run-out. If run-out is less than .005", installation is OK. If run-out exceeds .005", remove governor assembly and check run-out at face of drive flange. If drive flange run-out is less than .002", re-install governor with body rotated 180° from previous mounting location and recheck governor run-out. If run-out still excessive, replace governor and sleeve. If drive flange run-out exceeds .002", one or more of following parts require replacement: governor drive flange, gear set, or complete rear oil pump assembly.

Parking Brake Bracket Installation: Remove rear bearing retainer bolt which mounts parking pawl (do not re-install this bolt until later), install parking pawl and position pawl as far down in case as possible. Turn rings so that gaps are aligned and pointing up. Install two oil delivery pipes in parking brake bracket and install assembly by rotating it back and forth as it is pushed on governor. *(CAUTION—Use care not to damage oil rings on governor).* Start bracket to case screws but DO NOT tighten screws at this point.

▷Parking Brake Bracket Shims—Shims used between transmission case and parking brake bracket on some early 1953 cars to insure correct alignment. DO NOT INSTALL SHIMS IF ORIGINAL TRANSMISSION CASE REPLACED.

(CAUTION—special parking blocker piston retainer must be used on lower screw). Install roller on parking brake pawl crank, raise pawl in position and install pawl support bolt with special lockplate under bolt head, tighten this bolt to 23-28 ft.lbs. and bend lockplate against bolt flat. Install parking pawl return spring *(CAUTION*—spring must be placed OVER inside oil delivery pipe to provide additional spring tension on manual lever when in reverse position). Install reverse clutch pipe with "L" end of pipe in rear of transmission case. Install special Governor Alignment Tool J-4731 between governor and sleeve and tighten the bracket screws (15-18 ft.lbs.) and rear pump attaching bolts (15-18 ft.lbs.) while turning the aligning tool to check for binding. Tool should turn freely and governor should rotate freely (within backlash limits). Check alignment at four points (turn output shaft to rotate governor shaft ¼ turn each time). If governor or tool binds at any point, loosen bracket and pump attaching screws and repeat tightening procedure. If free operation cannot be secured, check governor and drive flange run-out (above).

Control Valve Assembly Installation: Engage control valve on oil delivery and reverse clutch pipes by sliding valve assembly forward on transmission case. Set inner detent lever in "Lo" range, install four attaching bolts and lockwashers and tighten to 6-8 ft.lbs. Install pressure regulator reverse oil pipe in control valve and case.

Pressure Regulator Assembly Installation: Use new gasket on pressure regulator plug (install gasket with seam toward threaded end of plug) and new neoprene rubber seal, insert assembly in transmission case using extreme care not to damage rubber seal, tighten plug to 40-50 ft.lbs. If oil pressure line pipe plug not previously installed in hole between band adjusting screws, install plug using sealing compound (Permatex #3 etc.) on plug threads.

Front & Rear Servo Installation: Install front pump delivery pipe in front pump body and rear pump discharge pipe in hole in rear pump. Position front servo with piston stem in socket on end of front band, engage servo on front pump delivery pipe, insert end of rear pump discharge pipe in servo, lower servo into position on case, insert attaching screws and lockwashers *(CAUTION*—do not turn screws in more than 2-3 threads at this time). Install rear band release spring (between ends of rear band). Place rear servo in position on case, entering transfer pipe in servo and engaging actuating lever with rear band strut. Install two rear servo attaching bolts, then tighten all front and rear servo bolts evenly to 23-28 ft.lbs. Adjust front and rear bands *(see BAND ADJUSTMENT)*. After servos installed, tighten front pump attaching bolts to 10-13 ft.lbs. torque. Install front pump intake pipe (this pipe can be installed with oil screen later).

Side Cover & Outer Shift Lever Installation: Install side cover with new gasket over manual shaft, install side cover attaching screws and washers using NEW COPPER WASHERS on lower screws, tighten screws finger-tight, shift cover as necessary to centralize manual shaft in hole, then tighten screws to 10-12 ft.lbs. Install outer shift lever and tighten clamp bolt to 10-13 ft.lbs. *NOTE*—Outer throttle control lever will be installed after transmission installed in car.

Oil Screen & Oil Pan Installation: Install oil screen and front pump intake pipe as an assembly, entering pipe through "O" seal ring in front pump body and positioning screen on rear pump intake pipe. Install oil pan with new gasket, enter all oil pan screws to line up pan, tighten screws to 10-13 ft.lbs. Install drain plug with new gasket and tighten plug to 35-45 ft.lbs.

Torus Member Assembly & Rear Flywheel Housing Installation: Position rear flywheel housing on front of transmission case and tighten attaching bolts to 40-50 ft.lbs. torque. Install torus cover with splines in torus hub aligned with splines on front drive gear, push torus cover evenly into place *(CAUTION*—do not rock cover or handle it roughly which will damage oil seal rings). Install drive torus, aligning splines with splines on front planet carrier, install snap ring. Install driven torus on main shaft and make certain that it seats against snap ring. Use NEW lockplate under mainshaft nut, place shift lever in Reverse "R" position (extreme rear position), tighten nut to 50-60 ft.lbs. (except Cadillac 30-35 ft.lbs.), bend lockplate ears up against nut flats. Install oil filler cap (or breather where separate filler pipe used).

INSTALLATION IN CAR

TRANSMISSION IS NOW READY FOR INSTALLATION IN CAR. See Removal & Installation data.

1949-54 PACKARD ULTRAMATIC

All Models (1949-54)—See Note.

►*NOTE—Ultramatic is not standard equipment on all models.*

►CHANGES, CAUTIONS, CORRECTIONS

►*1953 BELL HOUSING-TO-TRANSMISSION BOLT PRODUCTION CHANGE (To Correct Leakage)*—The four lower bell housing-to-transmission attaching bolts have CONCAVE heads, and are used **without** lockwashers.

►*1953 DIRECT DRIVE CLUTCH PISTON PRODUCTION CHANGE (To Correct Clutch Slippage)*—Length of bore in piston (where it slides over housing hub and ring) increased from .281" to .406". Former piston allowed a drop-off in pressure to approximately 20 lbs., as clutch engaged, causing clutch to slip when engine accelerated. New type piston, Part No. 423413, will be furnished for service replacement.

►*1952 (25th SERIES) REVERSE NOISE CORRECTION*—Caused by vacuum in rear pump (when car operated in reverse), plus air admitted by governor vent valve. Correct by drilling 3/32" hole in rear half (flat side) of rear pump check valve. Drill hole directly in center, and remove all burrs. New type check valve Part No. 434527 has this hole drilled in it.

►*REVERSE BRAKE PISTON OIL PRESSURE NOTE*—Transmissions with 3/32" hole drilled in rear check valve (see Reverse Noise Correction above), will indicate a drop of approximately 20 to 30 lbs., in reverse brake piston oil pressure (130-150 lbs., instead of 150-180 lbs.).

►*1953 ULTRAMATIC SERIAL NUMBER NOTE—A new "block" of numbers starting with 20,001 used on 2611 Series only.*

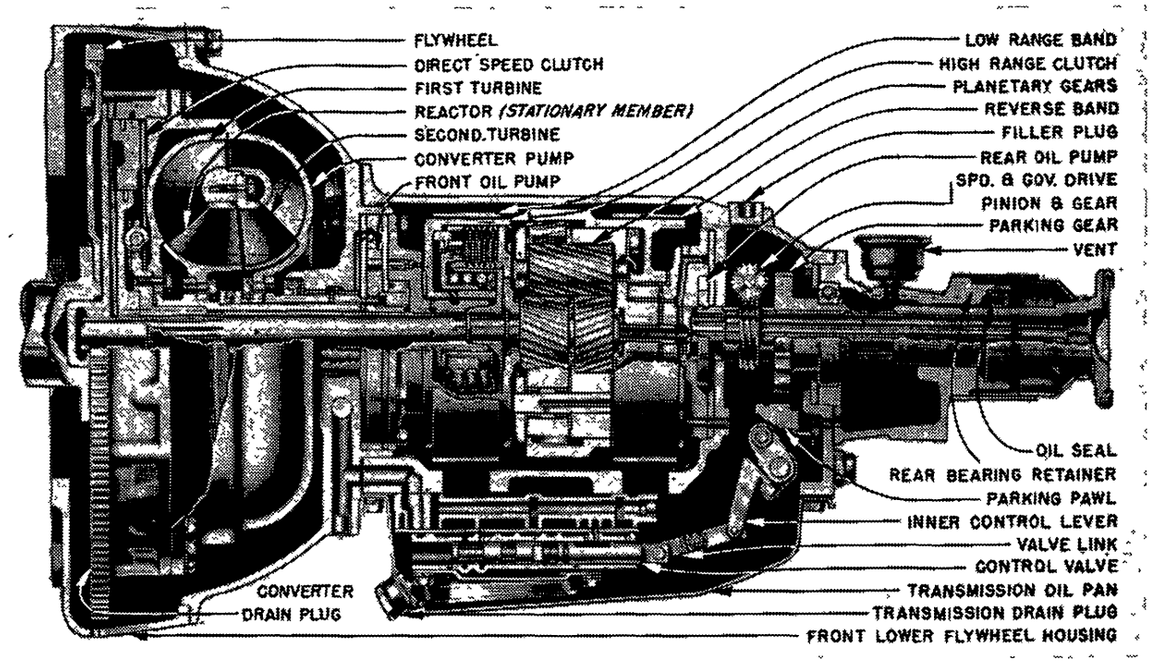
►*1953 (Series 2611) SERVICE REPLACEMENT TRANSMISSION CAUTION—When installing service replacement transmission on 2611 Series cars, remove old speedometer drive gear and install it in new transmission.*

►*1951 CONTROL VALVE LINKAGE PRODUCTION CHANGES*—Following changes made in production require new settings and linkage adjustment procedures as detailed under LINKAGE ADJUSTMENT.

Control Valve Lever & Link Change—First type two-piece adjustable link superseded by one-piece solid link. With first type link, rear land of control valve should be ¾" out of control valve lower body. With second type solid link, rear land of control valve should be 5/16" out of control valve lower body with detent lever in reverse position. *See Control Valve Link Adjustment under Transmission Reassembly.*

Throttle Valve Lever Change—Beginning with Transmission unit No. 106958 (Eight), 6486 (Super & Cust. 8), woodruff key previously used to locate throttle valve outer lever on shaft in transmission case was eliminated to allow lever to be rotated on shaft for adjustment. On earlier transmissions, this key can be removed and discarded if new Throttle Valve Lever Adjusting Gauge PU-334 used to adjust lever. *See Throttle Linkage Adjustment.*

►**REACTOR SHAFT ENDPLAY CHANGE:** Original endplay setting of .018-.022" changed to .010-.015" to provide more running clearance for direct drive clutch driven plate and prevent any tendency of clutch to "hang on." Thrust washers for control of shaft endplay now furnished in .005" steps from .070" to .115" (superseding washers in .010" steps from .060" to .090"). *See Converter reassembly data.*



PACKARD ULTRAMATIC DRIVE SECTIONAL VIEW

►**REPLACEMENT OIL COOLER FITTING CAUTION (Early Custom Eight Cars):** Original 90° type elbow fittings not furnished for service (later 45° type, Part No. G444184, furnished for all cars) and following precautions must be observed when replacing flexible hose between oil cooler and intake and return lines on these cars: Turn a new 45° fitting into original 90° elbow at cooler (if necessary to replace oil cooler fitting, solder 45° elbow into cooler tank). Slack off the two forward tubing support brackets, force forward end of tubing back and fix its position so that flexible hose connections are as straight as possible (keep rear tubing brackets tight so that slack taken up by tubing without changing position of rear hose connections), tighten forward tubing support brackets.

►**PLANETARY ASSEMBLY PRODUCTION CHANGE**—Beginning with serial numbers 84130, 221200, & 26331, planetary assembly is balanced as a unit. Two sizes of weights spot welded to planetary cage bolt backplate. (If no weights required, a STAR is stamped on outside of cage). When unit disassembled, mark backplate with prick punch or scribber, and reassemble unit in same location.

►**STARTING ENGINE BY PUSHING CAR:** If this procedure required for Ultramatic cars, place selector lever in neutral "N" position, turn on ignition. When car has attained sped of 25 MPH., move selector lever to high range "H" position. The car will then crank the engine.

►**TOWING ULTRAMATIC DRIVE CARS:** Cars can be towed with selector lever in Neutral "N" position, **providing Ultramatic Drive unit is not damag d and oil level in unit is normal.** Car should not be towed at speed greater than 30 MPH., and should not be towed for any great distance (less than 300 miles). **If selector lever cannot be placed in Neutral,** or if transmission oil level low, disconnect drive shaft at rear end and securely fasten it up to frame so that it cannot move to the rear (CAUTION—rearward movement will allow front end to slip off transmission mainshaft splines and drop down).

►**GOVERNOR REMOVAL CAUTION:** Governor cannot be removed from Ultramatic transmission on car **as a unit** due to small clearance between governor and frame "X" member. Remove governor as follows: Take out governor housing-to-driveshaft retaining screws, remove housing. Then remove adapter by taking out retaining screws and maneuvering adapter out of transmission case. Install adapter and governor housing in same manner. Tighten adapter screws to 7½-8½ ft.lbs. and housing screws to 6-7½ ft.lbs. Pull screws up evenly and check valves in governor housing for free movement after screws tightened.

DESCRIPTION

Ultramatic Drive is a Torque Converter and Planetary Gear type transmission consisting of the following units:

Torque Converter & Direct Speed Clutch: This assembly is contained in a case mounted on the rear face of the flywheel and consists of the units listed below. Torque converter and direct speed clutch action is automatic and is controlled by the hydraulic system (see Operation—below, and Hydraulic Circuit illustration).

Converter Pump (Driving Member)—Integral

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PACKARD ULTRAMATIC (Cont.)

with rear section of torque converter case bolted directly on flywheel and positively driven at crankshaft speed. Pump is supported at rear end on hollow shaft carried in babbitted bearing in the bell housing (front oil pump is splined on rear end of shaft and shaft is grooved to provide oil channel into converter).

Turbine (Driven Member)—Two-section type consisting of a First Turbine bolted on a flanged hub which is splined on forward end of converter shaft (direct speed clutch driven member also bolted to this flanged hub), and a Second Turbine bolted to the first turbine with clearance between the two in which the Reactor is located.

Reactor (Stationary Member)—Consists of a set of curved vanes placed between the first and second turbines. Reactor is mounted on a short tubular shaft with an overrunning clutch in the mounting flange at the rear end of the shaft. Reactor is locked or held stationary when unit is operating as a Torque Converter but the overrunning clutch allows the reactor to "free-wheel" or rotate freely at steady car speeds so that the torque converter acts as a fluid coupling except when Direct Drive Clutch locks the entire unit for positive drive.

Direct Speed Clutch—Consists of a hydraulically operated oil-cushioned single plate clutch in forward section of torque converter housing. Clutch driven member is bolted to turbine mounting flange and clutch driving plates are locked in torque converter housing (lugs on plates engage slots in housing), so that the torque converter pump and turbine are positively locked together for positive drive when clutch is engaged. Clutch is engaged hydraulically by admitting oil into housing in front of forward driving plate (plate acts as a hydraulic piston).

Planetary Gear Unit: This assembly is contained in the transmission case directly behind the torque converter and is controlled by the driver through a selector lever directly below the steering wheel. It provides Emergency Low, Reverse, Neutral, and Parking (see Operation below). Operation and control of the transmission is through a hydraulic system for which oil pressure is supplied by two oil pumps built in the transmission (forward oil pump in recess in bell housing and driven by converter pump shaft, rear oil pump in recess at rear of transmission case and driven by output shaft). An oil cooler built in the lower tank of the radiator controls the temperature of the oil. Planetary assembly consists of the following units:

Sun Gears—Consist of two helical gears in tandem on drive (input) shaft with a ball thrust bearing between the gears. Front Sun Gear (Low Range Reaction Gear) is integral with a flange splined in the Low Range Drum so that the gear is locked to the shaft when the clutch is engaged (High Range) and is held stationary to serve as a reaction member for the short planetary pinoins which mesh with it when the low range drum band is applied (Low Range). Rear Sun Gear (Driving Sun Gear) is splined directly on the input shaft and meshes with the long planetary pinions.

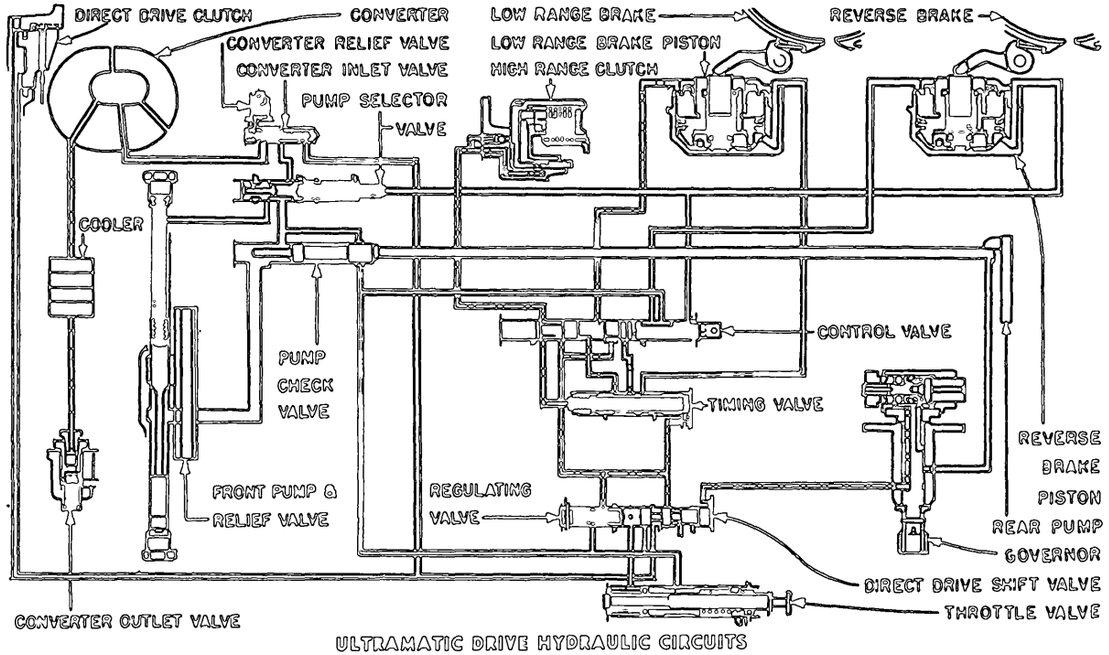
Planetary Pinions—Consist of three short large gears and three long smaller gears mounted alternately around the planetary cage and all meshing together. The short pinions mesh with the forward sun gear (Low Range Reaction Gear) and with the Planetary Ring Gear which is integral with the Reverse Drum. The long pinions mesh with the rear sun gear (Driving Sun Gear). Planetary cage is integral with the output shaft.

Low Range Drum & High Range Clutch Assembly—Mounted on input shaft directly in front of planetary pinion cage. Inner clutch member is splined on input shaft and rotates with the shaft. Outer clutch member incorporates the Low Range Drum and front sun gear as well as the clutch engaging hydraulic piston and disengaging spring. Clutch driving plates (with facings) are waved to assist disengagement and spring-controlled oil vents in the hydraulic piston are also uncovered when clutch is disengaged.

Low Range Brake Band & Engaging Mechanism—Band holds Low Range Drum and front sun gear stationary when it is applied by the Low Range Brake Piston acting through a lever and strut engaging one end of the band. Opposite end of band is anchored by adjusting screw on side of case.

Reverse Drum Band & Engaging Mechanism—Same design as Low Range Band (above). Band holds reverse drum and Planetary Ring Gear Stationary when it is applied.

Parking Brake Mechanism: Consists of a gear splined on the transmission output shaft at the rear of the transmission case and a pawl which engages the gear to prevent rotation of the shaft when the selector lever placed in "P" parking position. Pawl is operated by a locking lever actuated by the control valve cross-shaft and lever in the transmission case.



ULTRAMATIC DRIVE HYDRAULIC CIRCUITS

OPERATION

The torque converter assembly automatically provides a torque multiplication ranging from approximately 2 1/3 to 1 (for Starting & Heavy Loads) to an equivalent "High" 1 to 1 ratio (for Steady Driving & Light Loads) and is locked out by the Direct Speed Clutch at speeds above 15 MPH. In High Range operation under normal driving conditions (can be unlocked or "kicked down" at car speeds under 50 MPH. at the will of the operator). Planetary Unit is controlled by the operator and provides definite gear ratios (in addition to the varying ratio of the Torque Converter) depending upon the selector lever position. This control is effected through the hydraulic control system (see illustration) by means of oil pressure supplied by the two oil pumps in the transmission case.

LUBRICATION

Check transmission fluid level every 1000 miles and add fluid as required to maintain level at FULL mark on dip stick. Drain and replace fluid at 25000 mile intervals (CAUTION—this 25000 mile interval supersedes original recommendation of 10000 or 15000 mile periods).

▷*CAUTION—Fluid must only be checked at normal operating temperatures and within 1 minute after engine has been idling at 800 RPM. for 1 minute with selector lever in Neutral "N" position.*

Checking Fluid Level—With fluid at normal operating temperature, place selector lever in "N" position, idle engine at 800 RPM. for at least 1 minute, check level by removing dip stick from filler hole on left side of transmission (accessible from beneath car—turn cap ½ turn counter-clockwise before withdrawing it). Add fluid as required to bring level up to FULL mark on stick.

▷Transmission Filling Note—Fluid can be installed through filler tube (from beneath car) if oil gun

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PACKARD ULTRAMATIC (C nt.)

or pump with flexible hose or curved spout used. If this equipment not available, fold back rear corner of front floor mat, remove filler hole cover from transmission cover in floor, and remove filler hole plug in upper rear end of transmission case. Fluid can be poured in through this opening.

Draining & Replacing Fluid—Remove front lower flywheel housing. Loosen one converter drain plug (to act as vent), then rotate flywheel 180° to bring second drain plug to lowest point, remove this plug and drain converter case. Remove transmission case drain plug (at forward end of transmission oil pan), drain case. Replace and tighten all drain plugs, replace flywheel housing. Install 7 qts. of fluid through dipstick opening using curved oil gun (or through plug hole in top of case at rear, accessible by removing cover in transmission floor cover). Idle engine at 800 RPM for at least two minutes with selector lever in "N" neutral (to fill converter case). Check fluid level as directed above, add sufficient fluid to bring level up to FULL mark on dipstick (capacity is approximately 12 qts.). Run engine at 800 RPM for one minute, recheck level.

►***CAUTION—Amount of fluid installed should be determined by dipstick reading rather than actual number of quarts.***

Recommended Fluid—Packard Ultramatic Drive Fluid or any "Type A" Automatic Transmission Fluid which has an AQ-ATF number embossed on container.

LINKAGE ADJUSTMENT

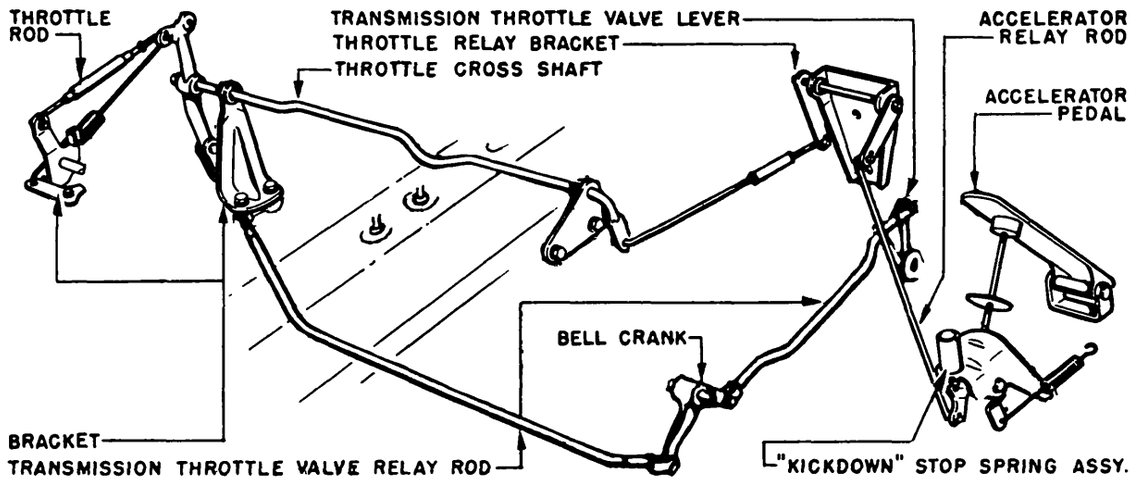
►***ADJUSTMENT CAUTION***—Before adjusting linkage, check the transmission control and throttle linkage for free operation without binding or lost motion due to wear. Warm up engine and transmission. Set engine idle speed at 375 RPM. with choke valve wide open and fast idle inoperative and selector lever in "H" high range. Set hand brake to hold car. Then adjust linkage as follows:

Selector Control (All Models): Place selector lever in "L" Low Range position, see that detent plunger engages notch in sector (can be determined by feel). Adjust control rod by loosening locknuts and turning turnbuckle on rod until clearance between the steering column lever stop and the stop on the bracket is .030-.040" (measure with feeler gauge), tighten turnbuckle locknuts. Check adjustment by moving selector lever to other positions. Shifts to Neutral "N", Reverse "R", and Park "P" should be possible without permanent over-travel when contacting the stops.

1949-50 Throttle Linkage ("2300" & "2300-5" Series): ***CAUTION—Different checking gauges and special procedures required for some cars as follows:***

1) **Throttle Cross Shaft-to-Carburetor Rod**—Install Checking Gauge PU-333 (Eight), PU-332 (Super 8—see Note below), PU-312 (Custom Eight) over throttle cross shaft and end of carburetor rod. Adjust rod length by loosening locknut and turning the spring-loaded throttle override until forward end of gauge rests on upper milled surface of carburetor throttle body. Tighten locknut and remove gauge. This adjustment will provide correct angle of cross shaft lever.

►**Super 8 Gauge PU-332 Note—If gauge does not fit** properly due to interference between gauge and starter switch on carburetor, grind off inner edge of square end of gauge at 45° angle to distance of ⅛" from corner on each side.



ULTRAMATIC THROTTLE LINKAGE

►**Throttle Valve Lever Adjustment Note**—Procedure below is new and when applied to cars before Trans. No. 106958 (Eight), No. 6486 (Super & Cust.), it will be necessary to **remove and discard** the Woodruff key which positioned the throttle valve outer lever on shaft on right side of transmission case. This key is omitted on transmissions after above numbers.

2) **Throttle Valve Lever**—***CAUTION—First cars must be modified as follows before adjustment can be made:***

Adjustment—Use new Lever Adjusting Gauge No. PU-334 and proceed as follows: Disconnect both front and rear rods from relay lever on right side of transmission bell housing by taking out clevis pin. Move rear rod toward rear of car until throttle valve lever reaches rear limit of travel. Hold lever back against the stop in this position, install gauge over end of rod and relay lever, note whether pin on gauge enters these holes freely. If not, on first transmissions with woodruff key in valve lever shaft (see Note above), remove lever and discard key, replace lever. On all models, tighten lever clampscrew just enough so that lever will rotate with shaft until stop is reached and will then slip on shaft. Rotate lever toward front until stop is reached, **continue to rotate lever toward front ⅛ turn,** then rotate lever toward rear until stop is reached. Check lever position with gauge and continue to rotate lever toward rear until gauge pin enters lever rod hole freely, tighten lever clampscrew to 80 ft. lbs. torque, remove gauge, connect both rods to relay lever. Check throttle cross-shaft to throttle valve rod and adjust as follows:

Carburetor Throttle Rod—Adjust throttle cross-shaft to carburetor rod by loosening locknut and turning the spring-loaded throttle over-ride until cross-shaft bellcrank at manifold end of shaft leans forward 13½° at top from perpendicular through the shaft center-line. On Eight and Super Eight models, special gauges available for this adjustment: PU-333 (Eight), PU-332 (Super 8).

3) **Throttl Cross Shaft-to-Throttle Valve Rod**—Disconnect rod at upper (cross shaft) lever end, push rod downward lightly to seat transmission throttle valve plunger against stop. Adjust clevis on rod so that rod is **5/32" short** (pin hole in rod clevis 5/32" short of alignment with pin hole in lever—can be checked with Gauge PU-326). Tighten clevis locknut and connect rod. NOTE—The 5/32" movement of rod necessary to align holes for installation of clevis pin will move throttle valve plunger .050" from its stop.

4) **Relay Lever-to-Cross Shaft Rod**—Depress accelerator pedal until carburetor throttle is just wide open, check clearance between accelerator pedal push rod lever and spring-loaded stop on left side of engine. This clearance should be .050". Adjust by turning adjusting sleeve on relay lever end of rod.

1951-54 Throttle Linkage: Adjust linkage in following order.

►***CHECKING GAUGE (PU-364) CAUTION***—.050" has been added to Gauge PU-364 without changing gauge number. Identify gauges by measuring from base or lower flat surface to center of hole in gauge. **Early Type** will be 2 45/64". **Later Type** will be 2 3/4". If early type gauge used, lay a piece of shim stock .050" thick on each of the two milled surfaces on top of cylinder head and directly ahead of the bracket supporting throttle cross-shaft. Later type gauge has two holes, lower hole is used only for RHD cars.

1) Throttle Cross Shaft-to-Carburetor Rod—Install Checking Gauge PU-364 (all models) on milled surfaces on top of cylinder head directly ahead of cross shaft bracket. Adjust cross shaft lever-to-carburetor rod by loosening locknut and turning the spring-loaded throttle override until short bend at rear of rod protrudes through hole in lever and enters hole in gauge (upper hole in later type gauge). Tighten locknut and remove gauge. This adjustment will provide correct angle of cross shaft lever.

2) Throttle Valve Lever. Disconnect relay rod from throttle valve lever on right side at rear of transmission by taking out clevis pin. Loosen lever clampscrew just enough so that lever will rotate with shaft until stop is reached and will then turn

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PACKARD ULTRAMATIC (Cont.)

on shaft. Rotate lever forward until it is horizontal, then rotate lever in opposite direction toward rear until valve is closed against the throttle valve spring but without compressing the spring. Using care not to compress the spring, continue to rotate lever toward rear until piece of 3/16" rod can be inserted through holes in lever and relay rod and when this rod is snug in both holes, tighten lever clampscrew to 80 inch pounds, or 6-7 ft. lbs. torque. Remove the 3/16" rod, connect relay rod to lever with regular clevis pin.

3) Accelerator Relay Rod-to-Cross Shaft Lever. Adjust rod length so that kick-down can only be accomplished when accelerator is pressed hard to floor.

Starter Safety Switch: Mounted on left side of transmission case. Circuit through switch should be completed (so that starter can be operated) with gearshift selector lever in "N" or "P" position.

BAND ADJUSTMENT

▷*ADJUSTMENT NOTE*—Adjusting screw and locknut for each band are located on outside of transmission case—left side (Low Range Band), right side (Reverse Band). Both bands are adjusted alike.

Adjustment—Loosen locknut on band adjusting screw, use Torque Wrench to tighten adjusting screw (clockwise rotation) to 20 ft. lbs. torque, then back off adjusting screw 1¾ complete turns, tighten locknut to torque of 25-30 ft. lbs.

TROUBLE SHOOTING

CAR FAILS TO MOVE (At all times or with selector lever in certain Ranges):

1. With Selector Lever in any position (appears to be in Neutral—rear wheels are free).

1) Low oil level in transmission or clogged oil inlet screen. Check oil level. Check front pump pressure (see Testing Hydraulic Units).

2) Front Oil Pump Relief Valve or Pump Selector valve sticking open. Check front pump pressure (see Testing Hydraulic Units).

3) Selector control linkage broken or disconnected.

4) Transmission output shaft broken at planetary unit in transmission case. Check by operating engine with selector lever in High Range and rear wheels jacked up. If engine accelerates and propeller shaft does not turn, broken output shaft is indicated (grating noise will be noted in transmission).

5) Rear axle shaft broken or other broken parts in rear axle (propeller shaft will turn but car will not move).

2. With Selector Lever in any position (Rear Wheels are Locked).

1) Parking gear lever spring broken (allowing pawl to remain engaged in parking gear).

2) Low & Reverse Bands adjusted too tight.

3) Bushing or bearings seized or other broken parts in transmission case.

4) Hand brake not released.

5) Broken parts in Rear Axle causing axle to be locked.

3. With Selector Lever in High Range (operation in Low and Reverse Ranges satisfactory).

1) Low oil level in transmission case.

2) Selector control linkage disconnected or out of adjustment (check by moving lever slightly to either side of "H" detent position).

3) High Range Clutch pressure low (may be caused by worn or sticking clutch piston rings or sticking or inoperative Modulating Valve). Check high range clutch pressure (see Testing Hydraulic Units).

4) High range clutch plates worn or burned.

4. With Selector Lever in Low Range (operation in High and Reverse Ranges satisfactory).

1) Selector control linkage out of adjustment (check by moving lever slightly to either side of "L" detent position).

2) Low Range Band worn, band end broken, or band strut dropped out of position (check Low Band adjustment, this trouble indicated if screw goes in too far).

3) Low Range Apply Piston jammed (check for loose Low Band adjusting screw with engine running and selector lever in "L", this trouble indicated if screw is found to be loose).

4) Low Range Fast Acting Piston Vent closed (check by running engine with selector lever in "L", this trouble indicated if car has tendency to move after several minutes operation).

5) Timing Valve stuck in "High Range" position (car will appear to be in neutral). Check as follows: disconnect carburetor throttle link rod from cross-shaft bellcrank, start and operate engine at 800 RPM., place selector lever in "L" range, depress accelerator pedal to floor to increase modulating pressure (to free timing valve). Reconnect carburetor throttle link rod and check operation in Low Range. If car now operates in Low Range, a sticking timing valve is indicated.

5. With Selector Lever in Reverse Range (operation in Low and High Ranges satisfactory).

1) Selector control linkage out of adjustment (check by moving lever slightly to either side of "R" detent position).

2) Reverse Band worn, band end broken, or band strut dropped out of position (check Reverse Band adjustment, this trouble indicated if screw goes in too far).

3) Reverse Apply Piston jammed (check for loose Reverse Band adjusting screw with engine running and selector lever in "R", this trouble indicated if screw is found to be loose).

EXCESSIVE SLIP WHEN TRANSMISSION OPERATING (At all times or with selector lever in certain Ranges):

1. In all Ranges (selector lever in "H", "L", or "R").

1) Low oil level in transmission case.

2) Selector control linkage out of adjustment.

3) Front Oil Pump Relief Valve or Pump Selector Valve faulty (valve sticking open, worn, or spring broken). Check Front Pump Relief Valve Boost Pressure (see Testing Hydraulic Units).

4) Front Oil Pump defective (check for worn or scored pump rotors).

2. In High "H" Range only (operation satisfactory in Low "L" and Reverse "R").

1) Control Valve Link out of adjustment.

2) High Range Clutch pressure low due to oil leakage in pressure passages, at low range drum bushing, check valve in reactor clutch housing, or at clutch piston rings. Check high range clutch pressure (see Testing Hydraulic Units).

3) High Range Clutch piston stuck in cylinder, piston rings broken or worn.

4) High Range Clutch plates worn, burned, or sticking on their splines.

3. In Low "L" Range only (operation satisfactory in High and Reverse Ranges).

1) Control Valve Link out of adjustment.

2) Timing Valve sticking. Check Low Range Application Pressure (see Testing Hydraulic Units). If pressure builds up slowly, this trouble is indicated.

3) Low Range Fast Acting Piston Vent closed (check by running engine with selector lever in "L", this trouble indicated if slippage disappears after several minutes).

4) Low Range Piston sticking or piston seals worn.

5) Low Range Band out of adjustment. Band or drum worn, burned, or scored.

4. In Reverse "R" Range only (operation satisfactory in High and Low Ranges).

1) Control valve link out of adjustment.

2) Reverse piston pressure low due to leakage in reverse hydraulic circuit.

3) Pump Selector Valve Boost Pressure low or lacking. Check Front Pump Relief Valve Boost Pressure (see Testing Hydraulic Units) in Reverse. Pressure should be 155 lbs. at 800-1000 RPM. If pressure low, check for obstruction or leak in boost passage.

4) Reverse Fast Acting Piston Vent closed (check by running engine with selector lever in "R", this trouble indicated if slippage disappears after several minutes).

5) Reverse Piston sticking or piston seals worn.

6) Reverse Band out of adjustment. Band or drum worn, burned, or scored.

EXCESSIVE DRAG WHEN TRANSMISSION OPERATING:

1. In High "H" Range or Reverse (operation satisfactory in Low "L").

1) Low Range Band adjusted too tight, low range piston jammed in "on" position, or band strut out of position. Check by loosening low range band and operating car in High "H" Range.

2) Timing Valve stuck in low range position (check by operating car below 15 MPH. in Low range, and shift into High range. If drag noted in High range, a stuck timing valve is indicated).

2. In High "H" Range and Low "L" Range (operation satisfactory in Reverse).

1) Reverse Band adjusted too tight, reverse piston jammed in "on" position, or band strut out of position. Check by loosening reverse band and operating car in reverse.

CAR CREEPS WHEN STANDING WITH ENGINE RUNNING:

1. With selector lever in Neutral "N".

1) Control valve link out of adjustment.

2) Low Range Band adjusted too tight.

3) High Range Clutch Pressure Line Vent stuck (ball check in reactor clutch housing). Creeping generally occurs only when engine speeded up.

4) High Range Clutch Plates sticking or binding on their splines.

2. With selector lever in High "H" Range (at Idle Speed).

1) Engine idling too fast. Set engine idle speed at 375 RPM. (hot or slow idle), 800 RPM. (fast idle).

3. With selector lever in Reverse "R" (creeps forward), or in Low "L" Range (creeps backward).

1) Control valve link out of adjustment.

CONTINUED ON NEXT PAGE

PACKARD ULTRAMATIC (C nt.)

EXCESSIVE LAG OR DELAY IN SHIFTING:

1. Low Range-to-High Range Shift Lag.

1) Timing Valve sticking or obstruction in metering passage at rear end of timing valve (causes slow release of low band so that band acts as a brake) Make pressure test (see Testing Hydraulic Units) and check time delay between high range engagement and low range release

2) Low Range Piston sticking in "on" position Install new seals after freeing piston.

3) Low Range Fast Acting Piston Vent Valve stuck (preventing dumping pressure as soon as pressure is cut off).

2. High Range-to-Low Range Shift Delayed.

See (1), (2), (3) under low-to-high shift lag above

4) Low Range Band out of adjustment

SHIFTS ARE SEVERE OR ROUGH:

1. Low Range-to-High Range Shift Severe at Light Throttle only (normal with greater throttle opening).

1) Throttle Valve Linkage out of adjustment (see Linkage Adjustment).

2) Throttle Valve sticking in bore in valve body.

2. Low Range-to-High Range Shift Severe regardless of throttle position.

1) Throttle valve linkage out of adjustment (see Linkage Adjustment).

2) Throttle Valve sticking open or Modulating Valve defective Check throttle valve pressure (see Testing Hydraulic Units).

3) Low Range Band out of adjustment

4) High Range Clutch plates worn, scored, or damaged.

5) Cover at rear end of timing valve in control valve body loose.

3. High Range-to-Low Range Shift Severe.

1) Low Range Band out of adjustment.

2) Timing Valve sticking. Make Low Range Application Pressure test (see Testing Hydraulic Units) and note pressure build-up rate of low range piston.

3) Cover at rear end of timing valve loose.

4) Low Range Band or drum worn, scored, or rough.

CHATTERS WHEN STARTING:

1. When starting in Low "L" or High "H" Range.

1) Low Range Band out of adjustment (dragging band will cause High Range chatter).

2) Reverse Band out of adjustment and dragging.

3) Low Range Band or Drum worn, scored, or rough.

4) High Range Clutch plates worn, scored, burned, or sticking. Clutch Piston sticking.

2. When starting in Reverse "R".

1) Reverse Band out of adjustment.

2) Low Range Band dragging.

3) Reverse Band or Drum worn, scored, or rough.

4) Reverse Drum Bushing or Thrustwasher worn or scored.

5) High Range Clutch plates worn, scored, burned, or sticking. Clutch Piston sticking.

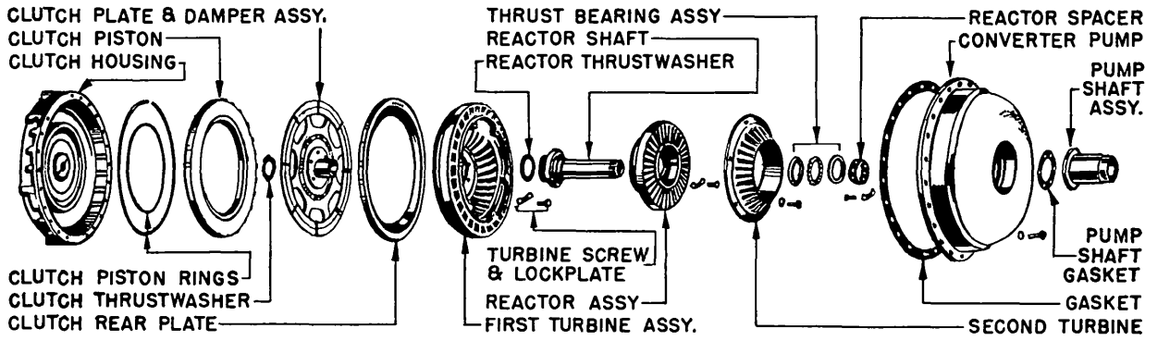
TRANSMISSION "CLUNKS" WHEN CAR STOPPED:

1. Direct Drive Clutch Disengagement Noisy.

1) Direct Drive Shift Valve sticking Check Direct Drive Clutch Pressure (see Testing Hydraulic Units).

2) Governor Vent Valve sticking or defective. Check Hydraulic Governor Pressure (see Testing Hydraulic Units). Governor pressure should cut off at 11 MPH. or above on deceleration.

3) Direct Drive Clutch Moveable Driving Plate sticking or facing groove too shallow in driven plate facing (facing should have groove .062" wide through the full depth of the facing).



PACKARD ULTRAMATIC TORQUE CONVERTER ASSEMBLY

ENGINE STALLS WHEN CAR STOPPED:

1. Direct Drive Clutch fails to disengage.

1) Governor defective. Check Hydraulic Governor pressure (see Testing Hydraulic Units).

2) Direct Drive Shift Valve sticking.

3) Converter Inlet Valve or Converter Relief Valve sticking. Check Converter Inlet Pressure (see Testing Hydraulic Units) and also check converter pressure when operating in direct drive.

4) Direct Drive Clutch Moveable Driving Plate sticking or Driven Plate facings broken or torn.

NO "DIRECT DRIVE" (or Direct Drive operation erratic or noisy):

1. Direct Drive Clutch fails to engage (or engages and disengages erratically).

1) Governor defective, Vent Valve sticking or clogged, Governor Drive Pinion teeth worn or chipped (causing erratic operation of the governor). Check Hydraulic Governor Pressure (see Testing Hydraulic Units).

2) Direct Drive Shift Valve sticking. Check Direct Drive Clutch Pressure (see Testing Hydraulic Units).

3) Direct Drive Clutch Moveable Drive Plate sticking. Install new piston rings after freeing up plate.

NO "KICK-DOWN":

1. Direct Drive Clutch fails to disengage.

1) Throttle Valve Linkage out of adjustment (see Linkage Adjustment).

2) Throttle Valve Piston stuck. Check Throttle Valve Pressure (see Testing Hydraulic Units).

3) Governor defective, or governor pressure too high. Check Hydraulic Governor Pressure (see Testing Hydraulic Units).

4) Direct Drive Shift Valve sticking. Check Direct Drive Clutch Pressure (see Testing Hydraulic Units). Pressure should cut off on kick-down if shift valve operating correctly.

5) Throttle Rod Operating Bellcrank (on bell housing) incorrectly installed or reversed. Check and adjust throttle linkage (see Linkage Adjustment).

OVERHEATING ON HILLS (Converter and Transmission).

1. Insufficient oil flow through Converter and Oil Cooler.

1) Converter Inlet Valve or Relief Valve sticking, oil cooler clogged, or Converter Outlet Valve stuck Check Converter Inlet Pressure (see Testing Hydraulic Units). If pressure OK. when converter operating, check flow through converter as follows: Disconnect hydraulic line at converter outlet valve, use clean container to catch oil flowing through line. Operate engine at 600 RPM. for 15 seconds. Oil flow should be 1¾ quarts in 15 seconds.

NOISE IN TRANSMISSION OR CONVERTER:

1. Scraping Noise in Converter.

1) Broken Direct Drive Clutch driven plate (will also cause faulty direct drive clutch disengagement).

2) Reactor Shaft Bearings or Thrustwashers worn or broken (allowing converter parts to rub or scrape together).

2. Rattle in Transmission (in Neutral or High "H" Range).

1) Rough engine performance (noticeable at idle speed).

2) Low Range or Reverse Band Struts rattling due to bands being too loose. Adjust bands.

3. Vibration in Drive Line (at 20 MPH. or higher speeds in Direct Drive).

1) Direct Drive Clutch Driven Plate friction lag incorrect (replace driven plate).

2) Extension Housing Bearing worn, scored, or burned out.

4. Excessive backlash (noticeable when accelerating or decelerating in Direct Drive).

1) Transmission Thrust Bearings and Thrustwashers worn.

2) Drive line or rear axle backlash excessive.

5. Knock or grating noise (in Neutral, Low Range, or Reverse).

1) Planetary Unit Gears chipped or broken. Pinion roller bearings broken.

6. Whine in Planetary Unit (below 35 MPH.).

1) In Low Range or Reverse—Planetary gears and pinions worn, scored, or burned. Pinion endplay excessive.

2) In Neutral or High Range below 35 MPH. (disappears at higher speeds)—Air leak in front oil pump intake line, front oil pump rotors noisy, oil foaming in transmission.

7. Whine r Hum in transmission (above 30 MPH.).

1) Front Oil Pump Relief Valve stuck (preventing front pump from idling normally). Check Front Pump Regulated Pressure (see Testing Hydraulic

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PACKARD ULTRAMATIC (Cont.)

Units) at speeds above 30 MPH. If pump does not cut out, free up relief valve.

2) Rear oil pump noisy due to worn or scored pump rotors.

TESTING HYDRAULIC UNITS

▷*CAUTION*—Before making following tests, check fluid level in transmission, road test car by driving under conditions simulating heavy traffic and highway operation, (frequent stops and starts, low speed, medium speed, and accelerating). If transmission does not operate satisfactorily after engine and transmission thoroughly warmed up, make the hydraulic test outlined below exactly as directed.

NOTE—Hydraulic pressure gauge with 0-100 psi. scale and flexible line 48" long with ⅛" male pipe fitting are required for these tests (except Reverse Application Test for which 0-200 or 0-300 psi. gauge MUST BE USED. Pressure Test Set No. PU-300, provides all gauges needed for these tests.

Front Pump Regulated Pressure: Remove floor mat and inspection cover in floor panel, remove pipe plug on lower left side of transmission bell housing, install ⅛" pipe reducer and connect gauge line, support gauge in front compartment so that it can be read while running engine. Start engine and operate it at 600 RPM. Gauge reading should be 80-90 lbs. If pressure correct, disconnect gauge, remove reducer, replace pipe plug.

If pressures not correct, check the following: Front Pump Relief Valve or Selector Valve sticking or valve spring broken, Pump Check Valve not seating (front pump pressure will be lost through rear pump), Air Leak in pump intake passage, Bore in control valve body at Control Valve, Modulating Valve, or Throttle Valve worn or scored or has excessive clearance allowing pump pressure to be lost, Piston Seals in control valve upper body worn or leaking allowing pump pressure to be lost at release side of low or reverse piston.

▷Gauge Fitting Note—Pipe plug (above) is ¼" (first cars), ⅜" (later cars), and the correct ¼" to ⅛" or ⅜" to ⅛" reducer must be used to connect gauge.

High Range Clutch Pressure: Remove ⅛" pipe plug at center of lower rear end of transmission bell housing (just to right of front pump outlet passage plug), connect gauge at this point. Test car on road with gearshift lever in "H" High Range. Pressure should be approximately 35-43 lbs. (throttle closed), and approximately 85 lbs. with throttle wide open. Repeat test with gearshift lever in Low Range, then shift to High Range and again repeat test. If pressures correct, disconnect gauge and replace plug.

If pressures not correct, check the following: Throttle Valve Linkage out of adjustment, Throttle Valve or Modulating Valve sticking, Ball Check Valve in high range pressure passage (in reactor housing) sticking, High Range Clutch Piston Rings worn or leaking, Low Range Drum Bushing worn or scored.

Direct Drive Clutch Pressure: Remove ⅛" pipe plug just to right of center on lower rear end of transmission bell housing (just to right of high range passage plug), connect gauge at this point. Test car on road with gear shift lever in High Range. Accelerate car slowly with light throttle opening. At speed of 15 to 18 MPH, with light engine load and steady driving, clutch should engage and gauge reading should be approximately 33-41 lbs. at this point (See "Direct Drive Clutch Piston Production Change" following). With full throttle, clutch should engage at 56 MPH and gauge reading should be approximately 85 lbs. If pressure correct, disconnect gauge and replace plug.

▷DIRECT DRIVE CLUTCH PISTON PRODUCTION CHANGE (To correct clutch slippage)—Length of bore in piston (where it slides over housing hub and ring) increased from .281" to .406". Former piston allowed a drop-off in pressure to approximately 20 lbs., as clutch engaged, causing clutch to slip when engine accelerated. New type piston, Part No. 423413 will be furnished for service replacement.

If pressures not correct, check the following: Throttle Valve Linkage out of adjustment, Throttle Valve or Modulating Valve sticking, Direct Drive Clutch Piston Rings worn or leaking, Input Shaft Pilot Bushings worn, Reactor Shaft and Reactor Over-running Clutch Housing Bushings worn.

Front Oil Pump Relief Valve Boost Pressure: Remove ⅛" pipe plug, at lower right rear end of transmission bell housing, connect gauge at this point. Start engine and run at 600-1000 RPM. Gauge reading should be 65-75 lbs. If pressure correct, disconnect gauge and replace plug.

If pressures not correct, check the following: Front Pump Relief Valve or Pump Selector Valve sticking or valve spring broken.

Hydraulic Governor Pressure: Remove ⅛" pipe plug at right rear end of transmission case (just to rear of governor housing), connect gauge at this point. Test car at road speeds above 15 MPH. Gauge reading should be in direct proportion to car speed and range from 31 lbs. at 15 MPH. to 65 lbs. at 56 MPH. If pressure in proportion to car speed, disconnect gauge and replace plug.

If pressures not correct, check the following: Governor Valve or Vent Valve sticking, Governor Housing loose on shaft (attached by two cap-screws), Valves or Valve Support worn.

Converter Inlet Pressure: Remove the ⅛" pipe plug at upper left side of bell housing, connect gauge at this point. Start engine and operate it at 600 RPM. Gauge reading should be 65-80 lbs. If pressure correct, disconnect gauge and replace plug.

If pressures not correct, check the following: Converter Pump Shaft Bushings (in bell housing) worn or clearance excessive. Converter inlet valve sticking or defective (if pressure exceeds 22 lbs. when operating in direct drive, sticking valve is indicated and may be accompanied by slipping direct drive clutch).

▷*CAUTION FOR MAKING FOLLOWING TESTS: Gauge must be connected within transmission case as follows:* Drain oil from case, remove oil pan, insert flexible gauge line through oil filler opening on left side of case, connect gauge at correct plug hole for each test, reinstall oil pan, fill transmission case with fluid so that car can be operated. After tests completed, pan must be removed to disconnect gauge.

▷*NOTE—Following three tests can be made at one time if three gauges used.*

Throttle Valve Pressure: See Caution above. Remove ⅛" pipe plug from throttle valve body (right side of control valve lower body in transmission case), connect gauge at this plug hole. Test car on road at various throttle openings. Gauge reading should be in direct proportion to throttle opening and should range from 24-28 lbs. at closed throttle to 55-63 lbs. at full or wide open throttle. If pressure correct and in proportion to throttle opening, disconnect gauge and replace plug.

If pressures not correct, check the following: Throttle Valve Linkage out of adjustment, Throttle Valve sticking.

Low Range Application Pressure: See Caution above. Remove ⅛" pipe plug from low range cylinder body (right front end of control valve upper body in transmission case), connect gauge at this plug hole. Test car on road under heavy traffic conditions (frequent stops, starts in Low Range, acceleration, and shifts to High Range). Gauge reading should be approximately 35-45 lbs. when low band application starts at light throttle and 80-90 lbs. at full throttle. If pressures correct, disconnect gauge and replace pipe plug.

If pressures not correct, check the following: Leaks in low range pressure passages (entire passage from timing valve to low range cylinder body), Loose Range Cylinder Body, Low Range Piston Rings worn or leaking.

Reverse Application Pressure: *CAUTION—0-200 psi. gauge required for this test.* See gauge connection Caution above. Remove ⅛" pipe plug from reverse cylinder body (at left rear end of control valve upper body), connect gauge at this point. Test car on road by making frequent stops and engaging Reverse in normal manner. Gauge reading should be 160-180 lbs. (with early type rear pump check valve without 3/32" hole in flat side of valve); 130-150 lbs. (with later type valve with 3/32" hole in flat side of valve), with gearshift lever in Reverse and car moving backwards with engine speed of 1500 RPM. If pressure correct, disconnect gauge, replace plug.

If pressures not correct, check the following: Leak in reverse pressure passages (entire pressure system from control valve to reverse cylinder), Loose Reverse Cylinder Body or Upper & Lower Valve Bodies, Reverse Piston Rings worn or leaking, Pump Selector Valve sticking (see Note).

▷Pump Selector Valve Sticking Note—Check for sticking valve by checking Front Pump Relief Valve Boost Pressure (see above) in Reverse at 1500 RPM. Boost pressure should be 135-165 lbs. and low boost pressure indicates that pump selector valve is at fault.

▷*If above tests indicate that transmission not operating satisfactorily, see Disassembly data.*

REMOVAL FROM CAR

NOTE—The Transmission and Converter assembly are removed from the car as an assembly. Proceed as follows:

1) Place control lever in "N" Neutral position, remove front seat cushion, install cover on front seat back and door trim panels, remove front floor mat and floor transmission inspection cover.

2) Raise both ends of car and support it securely at all four wheels.

3) Remove lower flywheel housing and drain both Torque Converter and Transmission case (see Draining Data) under "Lubrication" above

4) Disconnect gear selector linkage and transmission throttle linkage, oil cooler lines, speedometer cable, and starter safety switch leads.

5) Disconnect propeller shaft at front and rear universal joints, remove propeller shaft assembly.

CONTINUED ON NEXT PAGE

PACKARD ULTRAMATIC (C nt.)

6) Support rear end of engine with a hydraulic jack placed under rear end of oil pan (CAUTION—use block of wood on jack to prevent damage to oil pan), or use auxiliary support beam (hung under frame side rails with engine support studs located on each side to rear of oil pan flange). Raise engine and transmission just enough to remove load from engine rear mounting and remove the mounting as follows:

1949-50—Disconnect and remove engine rear support channel and bracket assembly, remove transmission steady rest and insulator, remove both support insulators from transmission case by taking out attaching screws in mounting bosses on case.

1951-54—Remove nuts on insulator studs (on lower face of support cross-member), remove engine support cross-member by taking out attaching screws in frame cross-member.

7) Lower engine and transmission assembly until universal joint flange almost rests on lower face of frame X-member, remove the two extreme upper bell housing-to-upper flywheel housing screws, then raise engine and transmission to normal position.

8) Place transmission lift under transmission or use special hoist (see note), make certain that lift adapter fits properly around transmission oil pan. Take up transmission weight on lift or hoist.

►**Transmission Hoist Note**—If the special hoist is used, install special lift bracket on transmission case or use sling around case, install lifting hoist over opening in floor panel, connect hoist cable to bracket or sling, take up transmission weight with hoist by tightening cable just enough until cable is taut.

9) Mark flywheel and converter housing to insure re-installation in same relative positions, remove flywheel-to-direct drive clutch housing bolts, tap clutch housing to loosen it from flywheel and slide transmission to rear.

10) Remove transmission bell housing-to-flywheel housing bolts. Secure converter to bell housing to prevent it falling out during transmission removal. Slide transmission to rear until clutch housing is clear of flywheel.

11) Lower transmission and at the same time tilt front end down until transmission bell housing is clear of flywheel and housing, then move transmission forward until universal joint flange clears frame X-member, lower transmission to floor.

12) Remove converter assembly from transmission.

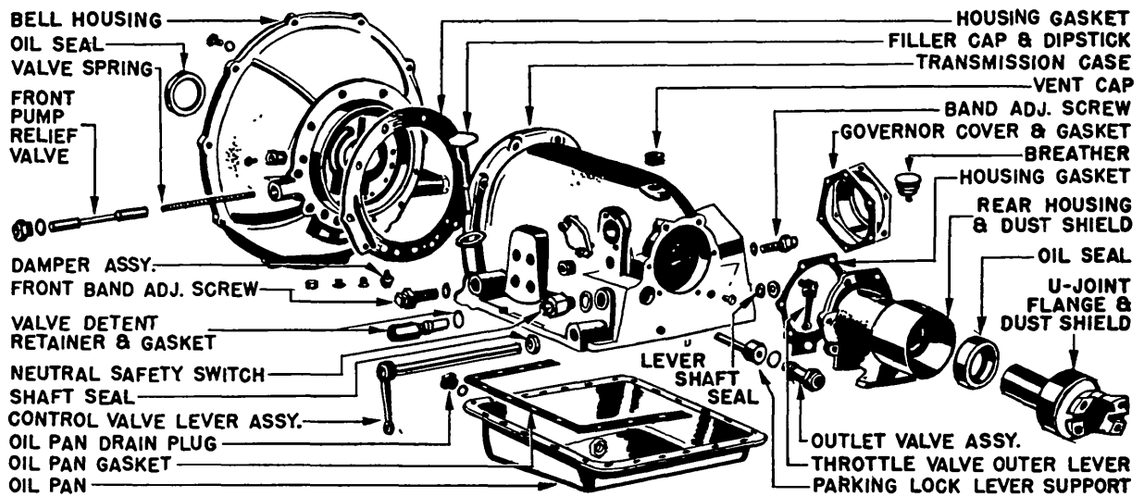
OVERHAUL—TORQUE CONVERTER

►***TRANSMISSION OVERHAUL NOTE***—**Converter and transmission are disassembled and serviced separately as follows:**

►***CAUTION—Check Reactor Shaft Endplay before disassembling converter to determine if new Thrust Washer needed for reassembly.***

Reactor Shaft Endplay Check: With converter on bench pump end up, mount dial indicator on pump (use special clamp PU-306) with pointer contacting end of reactor shaft, measure reactor shaft endplay. Should be .010-.015". Note actual endplay for use in selecting thrust washer of correct thickness for installation between reactor and front turbine when reassembling converter.

►***BALANCE LUG CAUTION***—Balance lugs (flat plates under converter pump-to-clutch housing capscrews) are not attached by drive screws (except on replacement converter pumps) and should be marked by scribed line or paint mark to insure re-installation in exact same position. ALL BALANCE LUGS MUST BE RE-INSTALLED IN CORRECT LOCATION TO MAINTAIN BALANCE.



PACKARD ULTRAMATIC TRANSMISSION CASE ASSEMBLY

Disassembly: ***See balance lug caution above.*** Take out all converter pump-to-clutch housing capscrews *(CAUTION*—These are special capscrews and must not be interchanged with others of same size). Loosen pump by tapping with plastic hammer, lift off converter pump and thrust spacer. Take out all second turbine-to-first turbine bolts, loosen second turbine by tapping it with a plastic hammer and lift it off. Remove reactor and shaft assembly, ball thrust bearing, and reactor thrust washer *(NOTE*—this is the selective washer which controls reactor endplay). Lift first turbine and hub assembly off splines of clutch driven plate. Mark face of direct drive clutch stationary plate and clutch housing (use paint or scratch-awl) to insure re-installation in same position. Take out capscrews and washers attaching stationary plate and clutch piston to bosses in clutch housing, remove stationary driving plate and clutch driven plate. Mark one lug of direct drive clutch piston and clutch housing (use paint or scratch-awl) to insure re-installation in same position, remove the piston. Remove spacers from bosses in clutch housing *(NOTE*—spacers used at four mounting screw locations to compensate for drive strap height at other mounting screw holes).

►***CAUTION—Use care not to damage piston rings located on inner diameter of clutch housing and on outer diameter of piston.***

Cleaning & Inspection: Wash all parts in clean gasoline or kerosene and dry with compressed air. Inspect all contact and mounting surfaces for nicks, burrs, distortion, warping or low spots. Inspect all bolts and capscrews for worn threads, see that bolt holes not worn or cracked. Inspect machined area around vanes, torus ring, and turbine hub for wear or rubbing condition indicating worn bearings or thrust plates. Check clutch driven plate for worn facing, loose springs, worn splines or thrust bearing. Inspect clutch movable plate and piston ring. Check ring gap with feeler gauge (gap should be .002-.016", with .012" preferred). Inspect all bearing surfaces for wear, pits, and scores. Clean and inspect oil passages leading from input shaft bearing to direct drive clutch piston.

Reassembly: Place clutch housing on bench with rear open face upward, check rings in housing and piston to make certain they are free, install clutch piston in housing *(CAUTION*—align marks made before disassembly). Use five pilot studs (5/16" x 18) inserting one stud in each of the threaded holes in the housing bosses adjacent to holes where piston driving straps are attached, install one stud through piston driving strap and into housing boss hole to prevent piston moving out of position. Install special spacer on each of the four studs which do not pass through driving straps. Install clutch driven member. Install stationary driving plate over studs in housing *(CAUTION*—align marks made before disassembly). Remove all studs *(CAUTION*—use care not to disturb spacers or to move piston and driving plate out of position), install capscrews and washers (total of eight) and tighten evenly to 20-25 ft. lbs. torque. Centralize clutch driven member housing, install first turbine and hub and engage hub in splines of clutch driven plate. Coat reactor thrust washer with cup grease and install it in turbine hub *(CAUTION*—If new washer being installed this should be selected on basis of endplay noted before disassembly—See washer data below). Install reactor and shaft assembly. Install second turbine and tighten mounting capscrews evenly to 12-15 ft.lbs. torque. Lubricate ball thrust bearing with Ultramatic Drive fluid and install it on reactor shaft, coat bearing spacer with clean cup grease and install it in forward end of converter pump shaft. Place a new converter pump gasket on pump flange (use film of cup grease to hold gasket in place), install converter pump *(CAUTION*—Make certain that balance lugs installed in same position from which removed), install four converter pump

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PACKARD ULTRAMATIC (Cont.)

mounting capscrews and washers and recheck shaft endplay (see above). If endplay is correct (.010-.015"), install remaining capscrews and washers and tighten all screws evenly to 20-25 ft. lbs. torque. Check assembly for free movement of the clutch driven plate by spinning it with a dummy input shaft. Plate must rotate freely without any drag.

▷Converter Pump-to-Pump Shaft Screw-Tightening Note—If converter pump shaft removed from converter pump, tighten screws (5/16") to 20-25 ft. lbs. torque when shaft reinstalled on converter pump.

▷Reactor Shaft Thrustwasher Note—This washer furnished in .005" thickness steps from .070" to .115". (Part Nos. 423190 to 423199 inclusive).

▷Converter Pump & Clutch Housing Clearance Check: With converter pump installed on clutch housing without the gasket, measure clearance between pump mounting flange face and face of clutch housing around entire circumference with a feeler gauge. Clearance must be .007" or less and uniform within .002" all around the flange. If clearance varies more than .002", rotate cover ¼ turn and recheck clearance. When a point is found where clearance is within these limits, mark both the pump and clutch housing with a centerpunch on the edge of the flange between the bolt hole bosses (CAUTION—use only a centerpunch or paint for marking—DO NOT use a chisel, and use great care not to mar the bolt hole bosses). If no position can be found where clearance is uniform and within limits, clearance can be reduced on the high side by carefully dressing down pump shoulder with a mill file. If clearance is uniform but greater than .007", dress the pump shoulder down carefully around entire circumference.

DISASSEMBLY—TRANSMISSION

Disassembly: Remove oil pan and gasket. Install hold-down tool PU-308 on Low and Reverse band levers (will prevent band struts dropping when valve assembly is removed), then remove oil screen. Disconnect control valve link, remove control valve lower body, separator, and upper body as an assembly (this assembly need not be disassembled further unless required). Take out 8 capscrews and remove bell housing and gasket. Loosen low range band adjusting screw, remove high range clutch assembly, remove front sun gear thrust bearing. Remove the hold-down fixture from low range band lever (CAUTION—use care that struts do not drop down in case), remove low range band struts, then remove low range band. Remove governor cover on right side of case, take out governor adapter attaching screws, remove governor assembly. Remove speedometer drive pinion and retainer. Take out rear bearing retainer capscrews, and remove housing and extension shaft as an assembly. Remove converter outlet valve. Remove parking gear, speedometer drive gear and spacers (note position of spacers to insure correct installation—spacer with grooved face at rear). Remove entire planetary unit and output shaft assembly through front end of transmission case. Loosen reverse band adjusting screw, lift out reverse drum and planetary ring gear. Remove hold-down fixture from reverse band lever, lift out reverse band struts, remove reverse band. Take out attaching capscrews and remove rear oil pump from recess in rear of case. This completes routine removal of units from case (see Transmission Case data under Overhaul if case is to be stripped). For further disassembly and overhaul of units, proceed as follows:

OVERHAUL (ALL TRANSMISSION UNITS)

After disassembling transmission (above), the various units can be disassembled for inspection and overhaul as follows:

▷*DISASSEMBLY CAUTION—Cleanliness is extremely important when disassembling and overhauling transmission. Make certain that workbench, tools, parts containers, and cleaning solvent are CLEAN.*

▷*PLANETARY ASSEMBLY PRODUCTION CHANGE*—Beginning with serial numbers 84130, 221200, &26331, planetary assembly is balanced as a unit. Two sizes of weights spot welded to planetary cage bolt backplate. (If no weights required, a STAR is stamped on outside of cage). When unit disassembled, mark backplate with prick punch or scriber, and reassemble unit in same location.

Planetary Unit—Remove ring gear *(CAUTION*—use care not to lose dampers or springs which may fly out as ring gear removed). Remove capscrews attaching forward and rear halves of planetary cage, remove forward half of cage by tapping it sharply with a plastic hammer. Move short planetary pinion shaft to rear and remove locking woodruff key. Remove the three short planetary pinions, shafts, thrust washers, and roller bearings as an assembly. Remove rear (driving) sun gear and thrust washer. Move long planetary pinion shaft to rear and remove locking woodruff key. Then remove the long planetary pinions, shafts, thrust washers, and roller bearings as an assembly.

High Range Clutch—Remove large snap ring from low range drum, remove low range reaction sun gear and flange from drum. Remove clutch hub and input shaft, and clutch plates (see Note below). Use Tool PU-304 to compress clutch piston return spring, remove retaining snap ring, relieve spring tension, remove spring and seat. Dislodge and remove clutch piston by bumping low range drum on a wooden block (piston side down). Remove outer piston ring from piston and inner piston ring from inner hub of low range drum. Remove snap ring on input shaft at rear of clutch hub, remove clutch hub from shaft.

▷*HIGH RANGE CLUTCH PLATE CAUTION—10 Plate clutch used on Series 2601 & 2633. All other series use 12 plate type, which is also furnished for service replacement. 12 plate clutch can be used to replace 10 plate type, but DO NOT USE 10 plate type to replace 12 plate type.*

Bell Housing—Take out eight capscrews, remove front oil pump and reactor overrunning clutch housing assembly (CAUTION—do not disassemble the overrunning clutch). Remove front pump relief valve and spring, and oil pressure passage plugs (threaded plugs).

Front Oil Pump—Take out two screws retaining pump on reactor overrunning clutch housing. Remove front cover plate, pump body, and rotors. Separate pump body and rotors, separate pump rear plate from reactor housing.

Rear Oil Pump—Remove cover plate, lift out inner and outer rotors (CAUTION—Keep these rotors separate from front pump parts, rear pump rotors are smaller and are not interchangeable).

Reactor Overrunning Clutch—Do not disassemble this unit (replace if worn or inoperative). See Inspection data.

Control Valve—CAUTION—use extreme care to keep working area and all parts CLEAN when working on control valve assembly. Separate lower valve body, separator, and upper valve body (CAUTION—do not clamp valve body or parts in a vise which may mar contact surfaces or crack body). Remove throttle valve piston spring seat screws, remove the throttle valve, piston, spacer, spring, and seat. Remove control valve and link using slight twisting motion. Remove plate at rear end of timing valve bore, remove timing valve and spring. Remove plate at rear end of direct drive shift valve bore, remove shift valve piston. Remove pins at the forward end and at the center of the modulating valve bore, remove modulating valve, guide, and direct drive shift valve. Remove low range and reverse cylinder bodies, and pistons from the upper valve body. Remove plate at forward end of upper valve body, remove the two pump check valves from slots in valve bore in lower side of upper valve body, remove converter relief valve and valve springs.

Hydraulic Governor—Take out two capscrews attaching governor housing to drive shaft flange, separate housing from flange. Check governor drive shaft-to-adapter endplay which should be .0005-.002". If clearances not correct, disassemble driveshaft by driving out pin in driving gear, press gear off, remove shaft from adapter. Check governor valves for free operation by pressing valve in to inner limit of travel and noting whether spring pushes it out to outer limit of travel without drag when released. If valves stick or excessive looseness noted, disassemble valves as follows: Pull vent valve to outer limit of travel, remove small snap ring, remove flyweight. Remove valve support snap ring, remove valve support, outlet valve and springs, lift governor valve out through vent valve support opening.

Transmission Case—If case being stripped for cleaning or replacement, remove starter safety switch and selector detent. Loosen lockscrew on selector detent sector and remove lockscrew from control valve inner lever, then slip control valve outer lever and cross-shaft from the case (CAUTION—use care not to damage oil seal), lift out detent sector, inner lever, and parking lock operating lever. Low Range and Reverse Band Levers can be removed by driving out lever pivot pins and lifting out the levers, then remove pivot pin and lift out parking gear pawl and lever.

Extension Housing: *CAUTION—Different type housing and bearing assembly with extension shaft used on 1951 and later models.*

1949-50 Bearing Retainer & Extension Housing: Retainer has oil seal at rear end which can be replaced by pulling old seal with a seal puller and driving new seal into place.

1951-54 Extension Housing—To disassemble, clamp housing in a vise, remove universal joint flange nut, pull flange, tap rear end of shaft with soft hammer to free shaft from ball bearing and remove shaft through front end of housing. Remove oil seal using a seal puller or drive seal out with a drift inserted through forward end of housing. Remove snap ring at rear of ball bearing, press bearing out of housing toward rear. If babbitt bearing

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PACKARD ULTRAMATIC (C nt.)

in forward end of housing requires replacement, remove old bearing with puller PU-335 (used with adapter PU-357). Press new bearing in place with tool PU-357.

Cleaning: Clean all transmission parts (except the ball bearing) in solvent cleaner such as clear gasoline or naptha. Wash all valve parts in separate container. Dry all parts with compressed air, and blow out all valve passages (CAUTION—Do not use wire or drills to clean out passages and ports which would damage metering openings and change calibrations).

Inspection: Inspect all parts for wear and defects with special attention to the following:

Gears—Inspect teeth for wear, scores, nicks, burrs, pits, and chipped teeth. Inspect bearing surfaces and splines for wear and scoring.

Bearings & Thrust Washers—Check for roughness, flat spots, pits, and scores. Check bearings for excessive looseness due to wear. See Reassembly data for selection of thrust washers for correct clearances or endplay.

Drums & Bands—Check for wear, scoring, nicks, or out-of-round. Check low range drum clutch plate splines and inner hub surfaces.

Pistons & Rings—Inspect pistons and rings for wear, scores, nicks, and burrs. Check ring gap of all piston rings with **rings in full contact with cylinder walls.** Rings can be filed if gaps too small.

Piston Ring Gaps

High Range Inner Ring	①.007-.012"
High Range Outer Ring	②.007-.012"
Direct Drive Rings (Inner & Outer)	③.002-.016"

①—Supersedes previous gap of .007-.015".
②—Supersedes previous gap of .010-.020".
③—.012" or less preferred.

Valve Body & Valves—Check all valve body bores for wear with plug gauges PU-324. Check mating surfaces of lower body, separator plate, and upper body for evidence of oil leakage caused by low spots or unevenness (lap on a surface plate using 4OOA wet or dry sandpaper and kerosene). Valves should be free from scores, must not bind, or be excessively loose (valves should move through entire travel in bore of own weight).

High Range Clutch—Inspect clutch plates for wear, scores, nicks, burrs, and for correct "wave."

►***CLUTCH ASSEMBLY CAUTION—10 plate clutch (Series 2601 & 2633); 12 plate clutch (all other series), used in production. 12 plate type clutch used for service replacement on all series cars. 10 PLATE TYPE MUST NOT BE USED TO REPLACE 12 PLATE TYPE.***

►**Clutch Identification Note**—10 plate type assembly marked with a star. 12 plate type unmarked.

Reactor Overrunning Clutch—Inspect condition of sprags and clutch races (slip circular coil spring from front end of sprags and withdraw one sprag with long-nosed pliers to make this inspection). If worn, pitted, or brinelled, install new assembly.

Reassembly of Parts: Reassemble all sub-assemblies by reversing disassembly directions and note following important details:

►***OIL SEAL & GASKET CAUTION***—Use all new seals and gaskets. **Do not open** gasket package until ready to install (gaskets will absorb moisture and expand so they will not fit). If gaskets have absorber moisture, dry them out in an electric oven at 175° to 200° F. (do not use gas oven which emits moisture from combustion).

Transmission Case—Install following parts in case before installing sub-assemblies: Parking gear lever, pawl, and linkage; low range band lever and pivot pin; reverse band lever and pivot pin. Install throttle valve operating cross-shaft seal in case, then install throttle valve inner operating lever and shaft, woodruff key and outer lever, lock lever with clamp bolt. Install new control valve operating cross-shaft seal in case, then install cross-shaft, (CAUTION—work shaft through oil seal carefully so that seal not damaged). Install selector detent sector, control valve inner lever, and parking lever spring-loaded cam. Lock inner operating lever in place with lockscrew and nut. Install selector detent. Install starter safety switch. Install converter outlet valve.

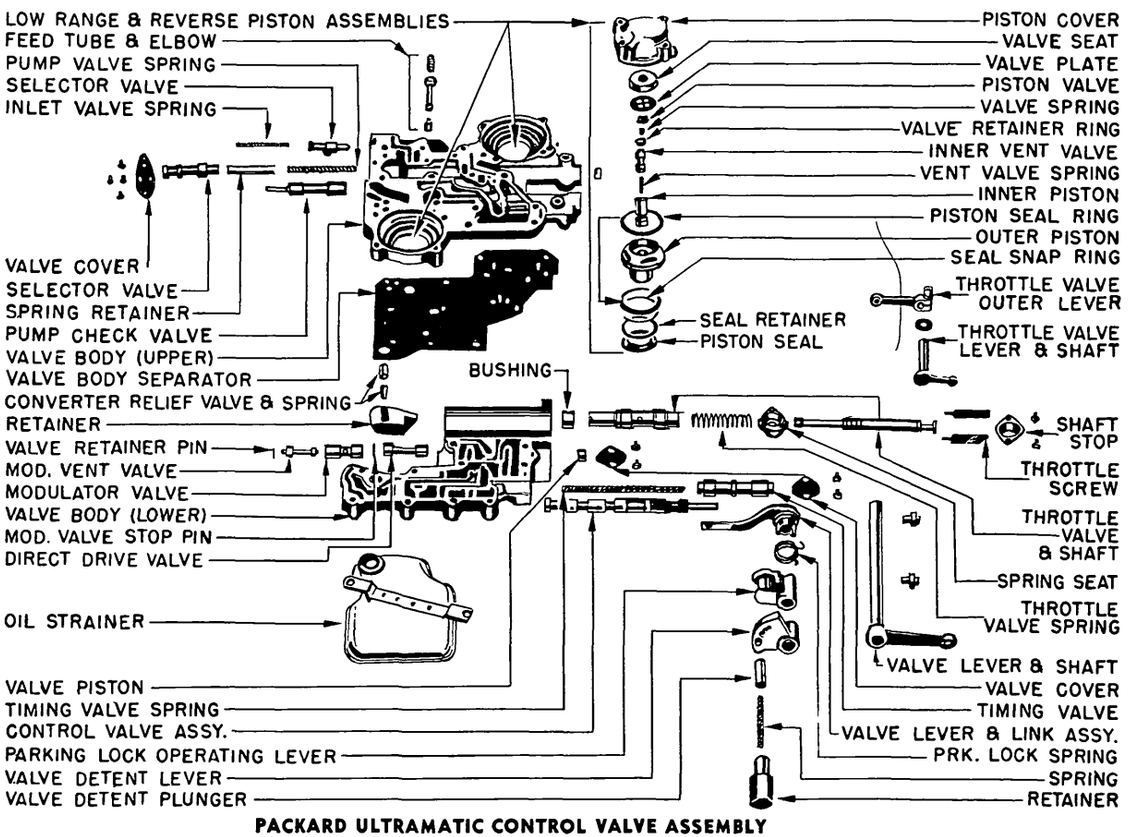
Hydraulic Governor—If new shaft being installed, insert shaft and flange in adapter, press on driving gear until endplay between gear and adapter is .010-.018", drill ⅛" hole in shaft and press in new pin to retain gear. After all parts installed, see that valves operate freely (see disassembly check). Make certain housing seats firmly and evenly on drive shaft flange, tighten the two attaching screws evenly to 6 ft. lbs.

Control Valve Assembly—Install converter inlet valve and spring, pump selector valve and spring, and pump check valve in forward end of upper valve body; install retaining plate and screws. Install direct drive clutch shift valve through the rear end of bore in lower valve body, install stop pin at center of bore; install modulating valve and guide, install retaining pin, install direct drive shift valve piston at rear of bore, install retaining plate and screws. Install timing valve and spring, install retaining plate and screws. Install control valve and link (use slight twisting motion). Install throttle valve, piston, spacer, spring and seat, tighten seat attaching screws evenly. Assemble upper and lower valve bodies and separator plate (CAUTION—make certain correct length screws installed in each position), tighten all screws to 5 ft. lbs. torque. Install the low range and reverse piston upper seals and retaining rings, assemble fast-acting pistons, seats and retainers in the low range and reverse pistons and install seals on both pistons, then install these assemblies in cylinder body (CAUTION—moisten seals with Ultramatic fluid). Assemble pistons and cylinder bodies on control valve upper body (CAUTION—see that piston does not damage upper seal) using round-headed Phillips screws.

►***NOTE*—All valves not spring-loaded should move within control valve body of own weight.**

Reactor Overrunning Clutch—***See Bushing production change & replacement bushing note.*** If clutch dis-

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PACKARD ULTRAMATIC CONTROL VALVE ASSEMBLY

PACKARD ULTRAMATIC (Cont.)

assembled, install in following order: Hold inner race facing the front face, install the sprags with curved side at top toward left, and curved side at bottom toward right (use rubber band to hold them in place) and see that sprags lean counter-clockwise or toward left at top. Install coil spreader spring at each end of sprags. Install assembly in housing allowing housing to slip off rubber band (CAUTION—make certain that spreader springs remain in place). Check for correct assembly by making certain that inner race will rotate in clockwise direction (viewed from front) but locks when turned in counter-clockwise direction.

▷Reaction Clutch Housing Bushing Note—*Three types of Housing & Bushing Assemblies have been used as follows:*

1—No. 421641 with non-replaceable thin wall bushings. This type superseded by No. 423220.

2—No. 423220 with non-replaceable thin wall bushings (housing bore less than 1.250"), and replaceable thick-wall bushings furnished under Part No. 410989 and can be replaced with bushing tools. This bushing, Part No. 423220 superseded by No. 410986.

3—No. 410986 with replaceable thick-wall bushings. Bushings are No. 410989 (same as second type housing) and can be replaced with bushing tool.

Front Oil Pump—Assemble pump rear plate on the reactor overrunning clutch housing (journal end of reactor cluch housing down), install pump body in correct position on rear plate (CAUTION—make certain all oil passages are aligned), install outer and inner rotors in pump body (CAUTION—make certain that centering ring in place and that inner groove in inner rotor is DOWN). Check rotors for correct assembly (rotors should mesh at the bottom), install pump front plate (CAUTION—align oil passages), use two reactor clutch housing capscrews to hold parts in alignment, install two pump attaching screws and tighten evenly to 8-9 ft. lbs.

Rear Oil Pump—Install outer and inner rotors in pump body (output shaft will line up inner rotor), install rear plate, install two attaching screws and tighten evenly to 8-9 ft. lbs.

Bell Housing—*CAUTION*—Do not tip assembly down after overrunning clutch installed (will allow assembly to fall out). Install front pump relief valve and check for free operation in valve bore, then install valve retaining plug, valve spring, and plug. Install front oil pump and reactor overrunning clutch assembly (CAUTION—make certain that oil passages line up), install eight attaching screws and tighten evenly to 15-18 ft. lbs. Install oil passage plugs and tighten securely, install new converter pump shaft seal in housing.

▷Bell Housing-to-Transmission Bolt Production Change (To correct leakage)—The four LOWER bell-to-transmission attaching bolts have CONCAVE heads, and are used without lockwashers.

High Range Clutch—*See the Bushing Production Change & Replacement Bushing Note below.* Install outer piston ring on piston and inner ring on drum journal and centralize inner ring on hub, use ring compressor PU-314 to guide outer ring and install high range clutch piston in cylinder of low range drum. Install clutch release spring with one end seating in piston. Use tool PU-304 to compress the spring, install spring retainer and snap ring. Coat clutch hub thrustwasher with cup grease before installing, install snap ring on input shaft ahead of clutch hub, then install clutch hub, thrust washer, and rear snap ring. Install clutch hub and input shaft in low range drum. Install clutch plates (start with steel plate, install driving and driven plates alternately). Install front sun gear and flange, and retaining snap ring (CAUTION—make sure snap ring seated in groove).

▷High Range Clutch Housing Note—*Two types of Housing and Bushing Assemblies (requiring different Clutch Piston Inner Ring) have been used as follows:*

1—No. 421638 Housing Assembly (with replaceable thick-wall bushings) used with Piston Inner Ring No. 421072. If bushing wear excessive, replace above parts with Kit No. 410987 (consists of second type housing No. 423366 and later design Piston Ring No. 423367).

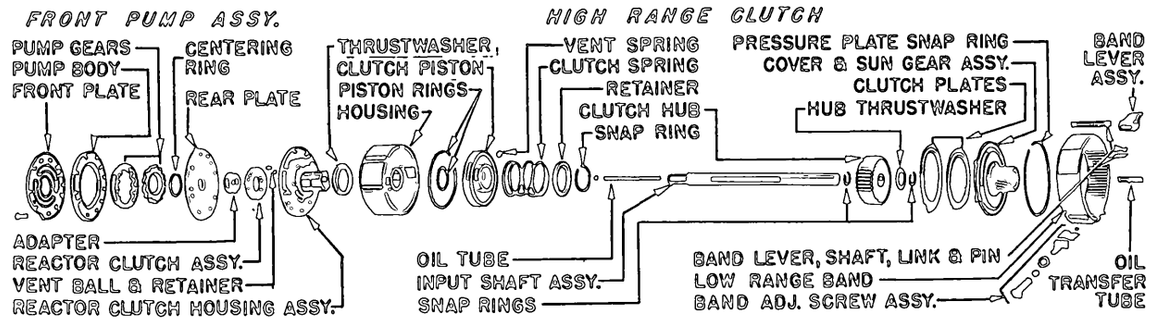
2—No. 423366 Housing Assembly (with replaceable thick-wall bushings) *used with new No. 423367 Clutch Inner Piston Ring* (this ring can also be used with first type housing but first No. 421072 ring must not be used with the second type housing). This housing has bushing bore of 2.000" ± .0005" (.062" larger than first type). Replacement bushings are furnished (No. 410990) and can be installed with regular bushing tools.

Planetary Unit—Assemble each planetary pinion with spacer, roller bearings, and thrust washers on its shaft (spacer at center, 19 rollers and thrust washer at each end—use clean cup grease to hold rollers and thrust washers in place). Hold output shaft horizontal, install long planetary pinion assemblies in planetary cage with chamfered end of each pinion to the front, push shafts far enough in to insert woodruff key, then push shafts forward so that they are locked by keys. Install rear thrust washer in cage (hold in place with clean cup grease) and then install rear sun gear (CAUTION—see that thrustwasher seats in cage). Install short planetary pinion assemblies with chamfered end to front and lock shafts with woodruff keys in same manner as long pinions. Make certain that all thrustwashers are in place, then install front half of planetary cage (CAUTION—line up marks on both halves). Tighten attaching capscrews to 25-30 ft. lbs. (large screws), 15-18 ft. lbs. (small screws), lock all screws by bending up tabs on lock plate. Install damper and spring assemblies exactly as follows:

▷*DAMPER ASSEMBLY INSTALLATION*—Assembly must be made with ring gear supported on flat surface over 2" hole which will allow planetary cage shaft to pass through as cage is assembled to ring gear (bore hole in bench or in piece of 4x4" clamped in vise). Position ring gear directly above this 2" hole, position Planetary Cage Installer PU-371 in ring gear. Assemble springs and dampers in planetary cage as follows: Install two springs (bowed-out center of springs outward) in the side of the "V" groove in the planetary cage (on side which has a lip), position bronze damper on springs with widest side of damper facing outward, use rubber band to hold assembly in place. Install remaining spring and damper assemblies similarly. Position planetary cage assembly in ring gear with dampers lined up with legs of Damper Installer. Tap dampers with a soft hammer until planetary unit starts downward into tool sleeve, then remove rubber band. If necessary, rotate planetary cage slightly to line up pinion clearance recesses in retaining collar of tool with pinions and to mesh pinion teeth with ring gear teeth, slide planetary unit down in ring gear.

Extension Housing & Shaft—Press the rear ball bearing in rear end of housing, install bearing snap ring, press rear oil seal in, install extension shaft in housing making certain that shaft pressed in until shoulder on shaft is against bearing inner race. Install universal joint flange, washer, and nut. Tighten nut securely to 90 ft. lbs. torque. Lubricate parking gear hub with film of Ultramatic Drive Fluid, install parking gear in forward end of housing temporarily with thrust spring omitted (necessary for measurement of endplay to determine correct thrustwasher thickness between high range clutch housing and reactor clutch housing).

▷*CAUTION—Parking Gear Thrust Spring must be installed in final assembly (after endplay adjustment).*



PACKARD ULTRAMATIC FRONT PUMP & CLUTCH PISTON ASSEMBLY

REASSEMBLY—TRANSMISSION (AFTER OVERHAUL OF UNITS)

Reassembly of Transmission: Reverse disassembly procedure and note the following:

Rear Oil Pump: Install pump in case, line up all oil passages, tighten capscrews evenly to 15-18 ft.lbs.

Planetary Unit Installation—Coat reverse drum thrust washer with cup grease and place it on rear oil pump body journal. Install reverse band and struts, install band lever holding fixture PU-308 to retain these parts. Install reverse drum using care not to score the drum bushing. Install new seal ring on output shaft and lubricate seal and shaft with Ultramatic Drive Fluid. Install the planetary unit through the front of the case using care not to

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PACKARD ULTRAMATIC (C nt.)

score the drum bushing (CAUTION—make certain that seal ring enters front bore of rear pump body and that planetary unit is all the way back against the reverse drum thrust surface). Install speedometer driving gear parts (see Note below for production changes). Install rear bearing retainer (1949-50) or rear housing assembly (1951-54 parking gear thrust spring must be **omitted**) with new gasket, tighten attaching capscrews evenly to 12-15 ft. lbs. (1949-50), 15-18 ft. lbs. (1951-54). Install hydraulic governor and tighten attaching screws in governor adapter to 8-9 ft. lbs., then install governor cover with new gasket and tighten cover screws to 8-9 ft. lbs. Install speedometer drive pinion and retainer.

►**Speedometer Drive Gear Assembly Note**—Different type assemblies (gear, spacers, washers, etc.) used which must be correctly installed as follows:

1949-50—Install parts on rear end of output shaft in following order: Speedometer driving gear spacer, parking gear spacer, parking gear, output shaft rear bearing, parking gear snap ring.

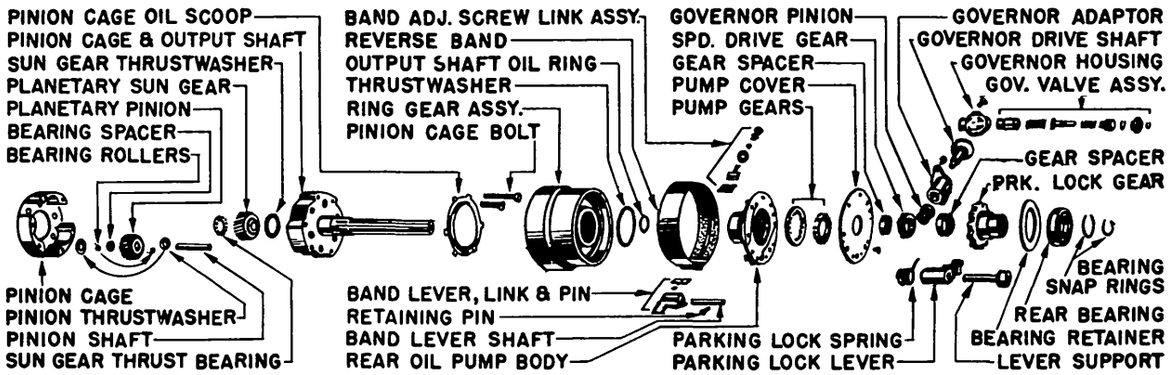
1951-54—Install parts on rear end of output shaft in following order: Speedometer drive gear sleeve, spring, spacer (smooth face against gear), speedometer driving gear, rear spacer (grooved face against gear).

Extension Housing & Shaft Assembly and Installation—Press rear bearing into rear end of housing, install retaining snap ring, press oil seal into rear end of housing, insert extension shaft through front end of housing and press shaft through bearing until shoulder on shaft is seated against bearing inner race. Install universal joint flange, washer, and nut, tighten nut securely to 90 ft.lbs. torque. Coat parking gear hub with film of Ultramatic Fluid, install parking gear in forward end of housing OMITTING THE THRUST SPRING TEMPORARILY (this spring must not be installed until after endplay adjusted as directed below). Install housing assembly on rear of transmission case using a new gasket and tightening attaching capscrews to 15-18 ft.lbs. torque. Install hydraulic governor and tighten adapter attaching screws evenly to 8-9 ft.lbs. torque. Install governor cover using new gasket, tighten cover attaching screws to 8-9 ft.lbs. Install speedometer drive pinion and retainer.

High Range Clutch Installation & Endplay Adjustment—Install low range band, and driving sun gear front thrust ball bearing (use cup grease to hold bearing in place). Install high range clutch unit through front of case and make certain that it is seated against thrust bearing with sun gear in mesh with planetary pinions. Install low range band struts and install band lever holding fixture PU-308 to retain parts. **Then check and adjust endplay:**

►*CAUTION—On 1951 & Later cars, extension shaft and rear housing MUST BE INSTALLED and planetary unit and output shaft must be solidly up against end of extension shaft when following measurements are taken (false reading will be obtained if measured otherwise).*

(1) Mount gauge PU-302 on transmission mounting face of bell housing **with gask t removed,** set gauge



PACKARD ULTRAMATIC PLANETARY & OUTPUT SHAFT ASSEMBLY

to measure distance from milled rear face of bell housing to milled surface at rear face of reactor overrunning clutch cylinder, lock gauge cylinder. (2) Invert gauge on front face of transmission case, measure distance from forward face of low range drum thrust surface to milled front face of transmission case. Gauge micrometer reading will indicate endplay which must be adjusted by installing thrustwasher of correct thickness (this washer furnished in .010" steps from .085" to .135" thick). **From the gauge reading (above),** select a thrustwasher .010" less in thickness than gauge reading, coat thrust washer with cup grease to hold it in place, install bell housing on transmission using a NEW GASKET (see gasket caution below). Install all attaching capscrews and tighten evenly to 55-60 ft.lbs. torque. Remove rear extension housing, **install parking gear thrust spring** on end of extension shaft (to rear of parking gear), re-install rear housing and tighten attaching screws to 15-18 ft.lbs.

►*BELL HOUSING GASKET CAUTION*—End clearance is controlled by the thickness of this gasket (in conjunction with thrust washer) and should be .018-.028". NEW GASKET AND CORRECT THICKNESS THRUST WASHER MUST BE USED WHEN ASSEMBLING TRANSMISSION.

Control Valve Assembly—Install control valve assembly (CAUTION—Make certain that control valve collar engages valve operating lever), using correct length capscrews in each hole and omitting the two which attach the oil screen, tighten all screws (except brake piston screws) to 9 ft. lbs. Tighten brake piston screws to 15-18 ft. lbs. Connect control valve link to inner lever, install the spring lock. Adjust control valve (see below). **After control valve adjusted,** install oil screen, tighten attaching capscrews to 15-18 ft. lbs. Remove holding fixture PU-308 from low range and reverse band levers.

Control Valve Link Adjustment (1949 & Early 1950 Type Two-Piece Adjustable Link): Place selector control valve inner lever in Reverse "R" position and make certain that detent fully engaged in detent well. Use Gauge PU-316 installed on rear land of control valve, adjust link (loosen clamp bolt holding link sections together), so that rear land of valve is ¾" out of control valve lower body. In this position, distance from center of link pin to control valve lower body should be 1.28". Make certain that link clamp bolt is securely tightened.

Control Valve Adjustment (Late 1950-54 Type Solid Link): Place selector control valve inner lever in Reverse "R" position and make certain that detent fully engaged in detent well. Use Gauge PU-316B installed on the control valve, loosen detent lever capscrew, position control valve so that distance from face of valve body to shoulder on valve is exactly 5/16", tighten lever clampscrew to 50 ft. lbs. torque. Control lever shaft should have approximately .045" endplay (controlled by detent lever position on shaft). If necessary to adjust endplay, loosen detent lever clampscrew and move lever, using care **not to disturb valve setting of 5/16".**

Oil Pan Installation—Use new gasket, tighten attaching capscrews evenly to 10-12 ft. lbs.

Band Adjustment—See Adjustment data.

INSTALLATION IN CAR

After transmission completely assembled, install converter on transmission input shaft and **fasten** converter to bell housing to prevent it falling off while transmission being installed. Install transmission and converter assembly by reversing the removal procedure and note the following:

Transmission Pilot Studs—Use two pilot studs in clutch housing to guide it into place.

►*CAUTION—Make certain that converter drain plug lined up with opening in flywheel.*

Tightening Torques—Tighten clutch housing-to-flywheel capscrews to 25-30 ft. lbs. Tighten transmission bell housing-to-flywheel housing capscrews to 25-30 ft. lbs. (CAUTION—bell housing must be held tightly against flywheel housing while tightening these screws).

Filling Transmission—See Lubrication data.

►*CAUTION—Transmission must have at least 7 qts. of fluid before engine is started.*

Adjusting Linkage—See Linkage Adjustment.

TWIN ULTRAMATIC DRIVE

Packard (Lat 1954-55). *See Note below.*
Huds n H rn t V8 (1955).
Nash Ambassad r V8 (1955).

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 PACKARD TWIN ULTRAMATIC NOTE. Twin Ultramatic Transmission replaced previous type in production beginning in August. The control valve assembly in the first 1954 cars with Twin Ultramatic differs from that used in Late 1954 and 1955 cars. See "Control Valve" below for identification and service procedures.*

►*SLIPPAGE OR DELAYED LOW RANGE BRAKE APPLICATION (after coming to a stop or after shifting to either "D" or "L" position).* May be caused by a distortion of the low range brake assembly cap. Part No. 6470266, Low Range Brake Housing Cap (made of heavy machined aluminum stock) replaced the earlier stamping. This change effective on Hudson & Nash at Transmission No. 5-A-11289. *See "Trouble Shooting" below for other causes of excessive slippage.*

►**TOWING TWIN ULTRAMATIC TRANSMISSION CARS:** Cars can be towed with selector lever in Neutral "N" position providing the Twin Ultramatic unit is not damaged and oil level in unit is normal. **Do not tow car at a sp ed great r than 30 MPH., or for any great distanc .** If selector lever cannot be placed in Neutral, or if transmission oil level low, disconnect drive shaft at rear end and securely fasten to frame so it cannot move to the rear *(CAUTION*—Rearward movement will allow front end to slip off transmission main shaft splines and drop down).

►**STARTING ENGINE BY PUSHING CAR:** If this procedure required for Twin Ultramatic Cars, place selector lever in Neutral "N" position and turn on ignition. When car has attained a speed of 25 MPH., move selector lever to LEFT HAND "D" position. Engine will then crank.

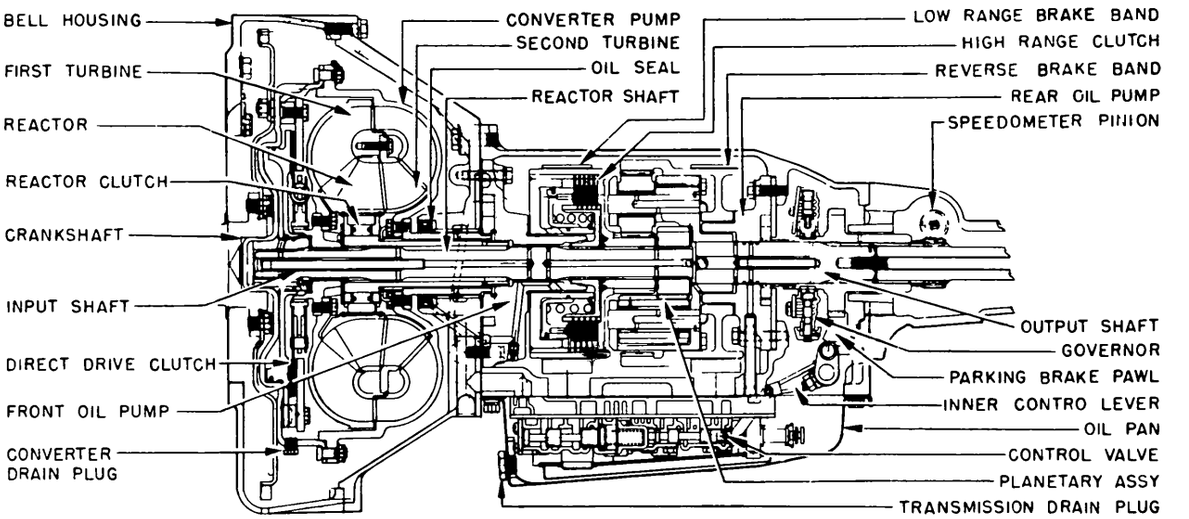
DESCRIPTION

Twin Ultramatic Transmission consists of a torque converter, direct drive clutch, and a hydraulic operated planetary transmission. Transmission assembly components are as follows

Torque C nv rter & Direct Speed Clutch: This assembly is mounted on rear face of flywheel and consists of the units indicated below. Torque converter and direct speed clutch is automatic and is controlled by the hydraulic system *(see "Operation", and the Hydraulic Circuit Illustration below).*

C nv rt r Pump (Driving Member)—Integral with rear section of torque converter case bolted directly on flywheel and driven at crankshaft speed. Pump is supported at rear end on hollow shaft carried in bearing in bell housing (front oil pump is splined on rear end of shaft and shaft is grooved to provide oil channel into converter).

Turbine (Driven M mb r)—Two-section type turbine. First section is bolted on a flange hub splined on forward end of converter shaft (direct speed clutch driven member also bolted to this flange hub). Second turbine bolted to first turbine with clearance between the two in which the Reactor is located.



TWIN ULTRAMATIC DRIVE SECTIONAL VIEW

Reactor (Stationary Member)—Reactor consists of a set of curved vanes placed between the first and second turbines and is mounted on a short tubular shaft with an overrunning clutch in the mounting flange at rear end of shaft. Reactor is locked or held stationary when unit is operating as a torque converter but the overrunning clutch allows reactor to free wheel or rotate freely at steady car speeds so the torque converter acts as a fluid coupling except when the direct drive clutch locks the entire unit for positive drive.

Direct Speed Clutch—Single plate clutch hydraulically operated located in forward section of torque converter housing. Clutch driven member is bolted to turbine mounting flange and clutch driving plates are locked in torque converter housing (lugs on plate engage slots in housing) so that torque converter pump and turbine are locked together for positive drive when clutch is engaged. Clutch is engaged hydraulically by admitting oil into housing in front of forward driving plate (plate acts as hydraulic piston).

Planetary Gear Unit: In transmission case directly behind torque converter and is controlled by driver through a selector lever. This assembly consists of the following units

Sun Gears—Two helical gears in tandem on drive (input) shaft with a ball thrust bearing between the gears. Front Sun Gear (Low Range Reaction Gear) is integral with flange splined in Low Range Drum so that gear is locked to the shaft when the clutch is engaged (High Range) and is held stationary to serve as a reaction member for the short planetary pinions which mesh with it when the low range drum band is applied (Low Range). Rear Sun Gear (driving sun gear) is splined directly on the input shaft and meshes with the long planetary pinions.

Planetary Pinions—These pinions are three short (large diameter) gears and three long (small diameter) gears mounted alternately around planetary cage (in mesh with pinion on each side). The short pinions mesh with forward sun gear (Low Range Reaction Gear) and with the Planetary Ring Gear which is integral with the Reverse Drum. The long pinions mesh with the rear sun gear (Driving Sun Gear). Planetary cage is integral with the output shaft.

Low Range Drum & High Range Clutch Assembly—Mounted on input shaft directly in front of planetary pinion cage. Inner clutch member is splined on input shaft and rotates with shaft. Outer clutch member includes the Low Range Drum and front sun gear as well as the clutch engaging hydraulic piston and disengaging spring. Clutch driving plates (with facings) are waved to assist disengagement, and when clutch is disengaged, allows the spring controlled oil vents in the hydraulic piston to be uncovered.

Low Range Brake Band & Engaging Mechanism—This band holds Low Range Drum and front sun gear stationary when it is applied by the Low Range Brake Piston acting through a lever and strut engaging one end of the band. Opposite end of band is anchored by adjusting screw in side of case.

Reverse Drum Band & Engaging Mechanism—Same design as Low Range Band (above). Band holds reverse drum and Planetary Ring Gear stationary when applied.

Parking Brake Mechanism: Consists of a gear splined on transmission output shaft at rear of transmission case and a pawl which engages gear to prevent rotation of shaft when selector lever is placed in "P" parking position. Pawl is operated by a locking lever actuated by the control valve cross-shaft and lever in the transmission.

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TWIN ULTRAMATIC (C nt.)

OPERATION

The torque converter assembly automatically provides a torque multiplication ranging from approximately 2-1/3 to 1 (for starting and heavy loads) to a 1 to 1 ratio (for steady driving and light loads) and is locked out by the Direct Speed Clutch at speeds above 15 MPH in High Range operation under normal driving conditions (can be "Kicked down" at car speeds under 60 MPH). Planetary unit is manually controlled and provides definite gear ratios (in addition to the varying ratios of the Torque Converter) depending on selector lever position. This control is effected through the hydraulic control system by means of oil pressure supplied by front and rear oil pumps in transmission case.

LUBRICATION

Check transmission fluid level every 1000 miles and add fluid as required to maintain level at FULL mark on dipstick. Drain and replace fluid at 25,000 mile intervals.

►*CAUTION: Fluid must only be checked at normal operating temperatures after 1 minute operation at 800 RPM with selector lever in "N" position.*

Checking Fluid Level–With fluid at normal operating temperature, place selector lever in "N" position, idle engine at 800 RPM to fill system, then run engine at low idle while level is being checked, using dipstick in engine compartment on left side.

►*NOTE:* If fluid level doubtful due to bent or distorted dipstick tube, check actual fluid level in transmission as follows: Place car on level floor and allow engine to run at idle speed for five minutes in "N" (Neutral). Place a pan under rear of transmission and remove plug in rear of transmission case. If no oil runs out of opening, add oil until it begins to run out, install plug, then ADD ONE QT. If oil does run out when plug removed at rear of transmission, allow to drain to level of hole, then ADD ONE QT.

Draining & Refilling–Remove flywheel housing lower cover and turn flywheel to bring a converter drain plug to the bottom. Place a container under converter and transmission oil pan and then loosen but do not remove converter drain plug. Rotate flywheel to bring the other drain plug to the bottom and remove this drain plug and also the oil pan drain plug and drain fluid. Remove oil filler tube, oil pan, and strainer and thoroughly clean and dry these parts (use compressed air to dry). Reinstall strainer, pan, and tube using new gaskets. Reinstall and tighten converter and oil pan drain plugs (make sure that the drain plug previously loosened is also tightened securely). Install flywheel housing lower cover and tighten retaining screws to 15-18 ft. lbs. (1954 cars), 25-30 ft. lbs. (1955 cars). Pour seven qts. of Automatic Transmission Fluid Type A through filler tube in engine compartment. Start engine and allow to run at HIGH IDLE speed for five minutes with transmission selector lever in "N" (Neutral) position. Bring engine to slow idle speed and add approximately two to three qts. of fluid, and then continue to add only enough to bring level to FULL mark on dipstick.

►*CAUTION: Determine amount of fluid installed by mark on dipstick rather than by number of qts. installed.*

Recommended Fluid–Packard Twin Ultramatic Transmission Fluid or any Automatic Transmission Fluid Type "A" having an AQ-ATF number and symbol embossed on the container.

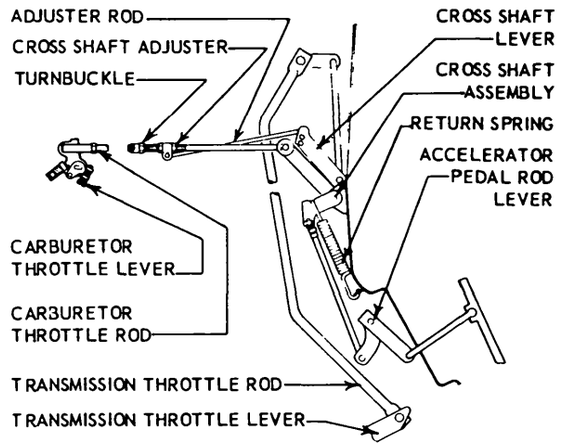
LINKAGE ADJUSTMENT

►*ADJUSTMENT NOTE:* Before adjusting linkage, check transmission control and throttle linkage for free operation without binding or lost motion due to wear. Warm up engine and transmission. Adjust engine idle speed to 400 RPM with choke valve wide open and selector lever in a "D" (Drive) position (Block choke valve wide open with a piece of cardboard after engine is stopped to prevent linkage returning to fast idle position while adjustments are being made).

HUDSON & NASH

Selector Control Linkage Adjustment (Hudson & Nash V8): Place selector lever in "R" (Reverse). Disconnect transmission control lever from control rod at rear of transmission. Move transmission control lever to rear as far as it will go (do not force lever as it may bend stop plate within transmission). Adjust clevis on transmission control rod so that clevis pin fits freely in hole of clevis and transmission lever. Replace cotter key and tighten locknuts on control rod. *NOTE*– If necessary to align selector lever point on steering column, place selector lever in "N" (Neutral) position (noting position of pointer). Remove shroud from jacket tube by removing retaining screw at lower end of shroud and sliding shroud downward and turning upper end toward the right. Lift out of jacket tube. Hold pointer shaft with pliers and move pointer toward right or left on shaft to line it up directly under center of letter "N".

Throttle Linkage Adjustment (Hudson & Nash V8): (Before adjusting transmission throttle rod, check the distance between hole centers (in a straight line). This distance should be 25-15/16". If necessary, bend rod at first bend forward of transmission connecting hole to obtain correct length. Disconnect transmission throttle rod at throttle valve shaft outer lever at side of transmission. Hold a straightedge across milled surface at rear of transmission case. The taper end of the lever should just contact straightedge. If adjustment is necessary loosen the clamp screw nut and turn shaft to left (counter-clockwise) until valve has reached its stop. With shaft held in this position, rotate lever on shaft so that taper on shaft lines up with milled surface on transmission case when checked with a straightedge. Tighten clamp screw nut and reconnect rod to lever. Raise hood and remove carburetor air cleaner. Disconnect upper throttle rod from center hole in throttle cross shaft lever. Lightly hold cross shaft lever forward so that throttle lever in transmission is against its stop (do not spring linkage). Adjust rod by loosening the nuts at each end of throttle rod adjuster so that end of rod will enter center hole in cross shaft lever, then reconnect rod in center hole of lever. Tighten adjuster locknuts. Adjust accelerator rod at forward end (turnbuckle) so that rod is 15½" (measured in a straight line) between



1955 PACKARD THROTTLE LINKAGE

ball joint at carburetor throttle lever and hole in bellcrank where rod is attached. Tighten locknuts on turnbuckle.

Neutral Safety Switch Adjustment: Adjust switch so starter is operative only in "N" and "P" position.

PACKARD

Selector Control Linkage Adjustm nt (All Packard): Disconnect forward end of transmission control rod at bellcrank (attached to frame side rail). Pull control rod to its full forward limit which will place the control manual valve in the reverse position. Pull lever at lower end of selector shaft downward to its full limit of travel so it contacts stop on lever bracket. Adjust turnbuckle in lower lever to bellcrank link so that the forward end of the control rod will enter bellcrank, and secure in this position.

Throttle Linkage Adjustment (1954 Packard): Disconnect rod at throttle valve shaft outer lever at right rear side of transmission. Move lever rearward to its stop. Hold a straightedge across milled surface at rear of transmission case. The taper end of the lever should just contact the straightedge. If adjustment is necessary, loosen the lever clamp screw nut and turn shaft to the left (counter-clockwise) until valve has reached its stop. With shaft held in this position, rotate lever on shaft so that taper end on lever lines up with the milled surface on case when checked with a straightedge, and then tighten clampscrew nut. Reconnect rod to lever. Disconnect upper end of throttle cross shaft return spring on left side of engine. Disconnect rear end of carburetor throttle rod from cross shaft lever on right side of engine. Lightly hold the cross shaft lever in a forward position so that throttle valve in transmission is against its stop (do not spring the linkage). Adjust length of throttle rod at over-ride spring housing (in center of carburetor throttle rod) so that end of rod will enter center hole in cross shaft lever and then **l ngth n throttl rod 1/2 turn** and reconnect it to center hole in cross shaft lever. Adjust turnbuckle in accelerator pedal-to-cross shaft rod on left side of engine so that clearance of 1/2" to 9/16"

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TWIN ULTRAMATIC (C nt.)

exists between lower section of accelerator rod and hinge pin in accelerator lever bracket. Reconnect cross shaft return spring in rear hole in cross shaft.

Thr ttl Linkag Adjustm nt (1955 Packard): Disconnect rod at throttle valve shaft outer lever at right rear side of transmission. Move lever rearward to its stop. Hold a straightedge across milled surface at rear of transmission case. The taper on the end of the lever should just contact the straightedge. If necessary, loosen lever clamp screw nut and turn shaft to left (counterclockwise) until valve has reached its stop. With shaft held in this position, rotate the lever on the shaft so that taper on lever lines up with the milled surface on the case when checked with a straightedge and then tighten clamp screw nut. Reconnect rod to lever. Loosen both locknuts positioning the carburetor-transmission cross shaft adjuster and make sure the adjuster is free to move back and forth. Make sure the adjuster rod is in the upper hole of cross shaft lever. With carburetor idle adjusting screw against the stop, adjust carburetor throttle rod turnbuckle so that accelerator pedal rod lever just touches underside of toe board. Re-adjust turnbuckle by turning it out one full turn to prevent accelerator pedal rod lever touching toe board. Tighten lock nut on turnbuckle. Apply a light rearward pressure on cross shaft adjuster rod and move up the rear adjuster locknut to the adjuster then move up the front locknut to the adjuster and tighten securely. Make certain that alignment of adjuster does not cause lever to bind.

Neutral Saf ty Switch Adjustment: Adjust switch so starter is operative only in "N" and "P" position.

BAND ADJUSTMENT

ADJUSTMENT NOTE: Adjusting screw and locknut for each band are located on left side of transmission case (Low Range Band), right side (Reverse Band). Both bands are adjusted alike as follows:

Adjustment: Loosen locknut on band adjusting screw and use a torque wrench to tighten adjusting screw (clockwise) to 20 ft. lbs. torque, then **back off adjusting screw 1-3/4 turns.** Tighten locknut.

TROUBLE SHOOTING & DIAGNOSIS

CAR FAILS TO MOVE (Under conditions indicated bel w):

1) Car fails t m v r gardless of selector lever position.
(a) Insufficient oil or clogged inlet screen.
(b) Converter valve stuck or pump valve stuck.
(c) Selector control linkage disconnected.
(d) Transmission output shaft broken loose from planetary cage.
( ) Parking gear lever broken which may allow pawl to remain engaged in parking gear.
(f) Low and reverse bands adjusted too tight.
(g) Bushings or bearings seized in the transmission. Noise may or may not be present.

2) Car fails t m ve in "D" (Drive) rang with s l ctor l v r in th gear starting p sition.
(a) Insufficient oil or clogged inlet screen. Loss of pressure to apply side of low range brake.
(b) Selector control linkage disconnected or out of adjustment.
(c) Low range brake band strut out of position or low range brake band badly worn.

3) Car fails to move in "D" (Drive) range with selector lever in high range clutch start position.
(a) Rubber lip seal on high range clutch piston out of position causing piston to leak.
(b) Shift regulator valve stuck or clutch plates worn or burned.
(c) Selector control linkage disconnected or out of adjustment.

4) Car fails to move with selector lever in "L" (Low) position.
(a) Selector control linkage disconnected or out of adjustment.
(b) Worn low range band or band strut out of position.
(c) Low range brake piston jammed or insufficient oil supply to apply side of low range brake.

5) Car fails to move with selector lever in "R" (Reverse) position.
(a) Selector control linkage disconnected or out of adjustment.
(b) Worn reverse brake band or strut out of position.
(c) Manual valve stop inside transmission not adjusted properly allowing the manual valve to over-travel.
(d) Lack of oil to apply side of reverse brake piston caused by a stuck reverse shuttle valve.
(e) Reverse brake piston stuck in housing.

6) Excessive slippage in all driving ranges.
(a) Insufficient oil or low front pump pressure due to sticking pump valve.
(b) Low front oil pump pressure due to ball plugs being out of low range and reverse brake housings, or worn or badly scored pump rotors.
(c) Low oil pressure to the converter caused by a stuck converter valve.

7) Excessive drag in "D" (Drive) range using high range clutch start. Also drags in reverse but is all right on "L" (Low) range.
(a) Low range brake band too tight, or low range brake piston stuck and holding brake partly applied.
(b) Transfer tube to release side of low range brake out of position.

8) Excessive drag in both "D" (Drive) ranges. All right in "R" (Reverse) range.
(a) Reverse brake band too tight, or reverse brake piston stuck holding brake partly applied.

9) Car creeps forward in "N" (Neutral).
(a) Low range brake band too tight, or High range clutch plates sticking on splines.
(b) High range clutch piston rubber lip seal out of position causing piston to stick and partly engage clutch.
(c) Low range brake piston stuck holding brake partly applied.

10) Car creeps excessively in any driving range with the engine idling.
(a) Engine idling too fast.

11) Car cre ps forward wh n s l ct r l v r is in "R" (Rev rs).
(a) Manual valve linkage out of adjustment.

12) Car d s n t m v with th s l ct r l v r in "R" (Rev rs) p sition.
(a) Reverse shuttle valve stuck preventing the oil above the reverse brake piston from venting.
(b) Reverse brake band strut out of position.

13) Chatter when starting in "D" (Drive) range using high clutch start.
(a) Low range band dragging, or reverse band dragging.
(b) Worn, burned, or distorted high range clutch plates. Could also be caused by sticking plates or piston.

14) Chatter when starting in "L" (Low) range.
(a) Low range brake band out of adjustment, or reverse range band dragging.
(b) Sticking high range clutch plates or pistons.

15) Chatter when starting in "R" (Reverse) range.
(a) Reverse brake band out of adjustment, or low range band dragging.
(b) Reverse drum (ring gear) bushing badly worn.

16) Drive Clutch fails to engage.
(a) Sticking high speed governor valve, low speed governor valve or direct shift valve. Could also be caused by direct shift throttle valve sticking.
(b) Direct drive clutch piston sticking.

17) Direct drive clutch "hangs on" or fails to releas on deceleration.
(a) Sticking direct shift valve or low speed governor valve.

18) Direct drive clutch engages late and disengages early.
(a) Direct shift valve spring "cocked" in valve bore.
(b) Direct shift throttle valve sticking open.

19) Direct drive clutch slips.
(a) Excessive slippage in direct drive clutch circuit.
(b) Sticking converter valve resulting in high converter pressure while in direct drive.

20) Transmission remains in low range using gear start "D" (Drive) position. Will not upshift from low range converter to high range converter.
(a) Sticking low-high shift valve or sticking governor valves.
(b) Sticking throttle valve.

21) Incorrect front oil pump pressure.
(a) Low oil level or sticking pump valve.
(b) Ball plugs missing in reverse brake housing.
(c) Sticking pump check valves, or incorrect valve spring. Sticking modulator valve.

22) Incorrect high range clutch pressure.
(a) Sticking shift regulator valve, or sticking low-high shift valve. Incorrect pump pressure.

23) Incorrect low range brake top pressure.
(a) Ball plug missing in low range brake housing.
(b) Sticking low-high shift valve, or incorrect pump pressure.
(c) Threaded plug missing in low range brake housing.

24) Incorrect converter "IN" pressure.
(a) Incorrect front pump pressure.
(b) Sticking converter valve.
(c) Loss of pressure in the converter circuit caused by loose or worn bushings.

25) Incorrect direct drive clutch pressure.
(a) Sticking low or high speed governor valves.
(b) Worn or leaking direct drive clutch piston rings.
(c) Loss of pressure through direct drive clutch circuit caused by loose or worn bushings.

26) Incorrect g vernor pressure.
(a) Sticking low or high speed governor valves.

CONTINUED ON NEXT PAGE

TWIN ULTRAMATIC (C nt.)

(b) Governor plate not properly installed

27) Incorrect throttle pressure.

(a) Throttle pressure adjusting screw not properly set.
(b) Throttle linkage not properly set or is binding.
(c) Throttle valve sticking.

HYDRAULIC PRESSURE TESTS

►*NOTE:* Before making following tests, check fluid level in transmission. Road test car by driving under conditions simulating heavy traffic and highway operation (frequent stops and starts, low speed, medium speed, and accelerating). If transmission does not operate satisfactorily after engine and transmission thoroughly warmed up, make hydraulic tests as outlined below.

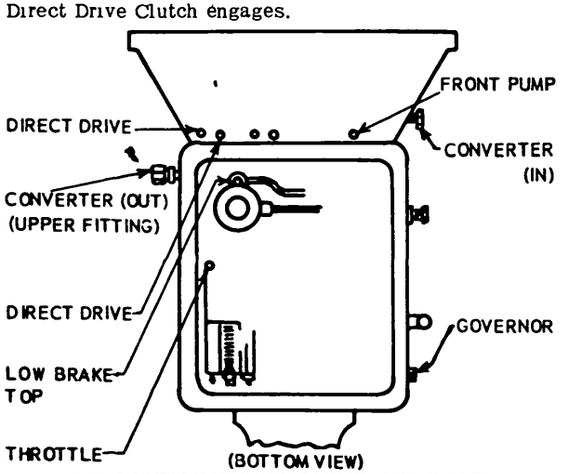
►*SPECIAL HYDRAULIC TESTING TOOL NOTE:* For Nash & Hudson, use Tool Set J-5975. For Packard models, use Tool Set PU-300, and Pan Adapter PK-23. These tool sets are comprised of gauges, fittings, flexible tubing, and special pan adapters.

TEST GAUGE INSTALLATION (HUDSON & NASH): Fold floor mat away from left side of front seat to uncover floor hole cover. Remove cover and insert flexible pressure gauge lines supplied with Tool J-5875 to the transmission. Remove plug in transmission and connect line fitting to correct passage for desired hydraulic test (see Test Plug Location in illustration)

TEST GAUGE INSTALLATION (PACKARD): Remove flexible tubing from left hand fresh air duct and thread gauges through the fresh air grille, out of air duct and down to transmission. Attach hoses to desired points on transmission (see Test Plug Location in illustration).

FRONT PUMP PRESSURE: Connect gauge to front pump test point at front of transmission case (left side). On all models, operate engine at 400 RPM. Normal oil pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others), with selector lever in all positions.

With Selector Lever in •D Range—Drive car at 15-20 MPH. Maximum pressure should be 150-160 lbs. (1954 Packard). 150-170 lbs. (Others), at full throttle before Direct Drive Clutch engages.



TWIN ULTRAMATIC HYDRAULIC TEST P INTS

With S l ct r L v r in D• Rang—Maximum pressure should be 140-150 lbs. (1954 Packard). 80-120 lbs. (1955 Packard). 140-160 lbs. (Nash & Hudson), at full throttle before Direct Drive Clutch engages.

With Selector Lever in L Range (1955 Packard): Drive car at 25 MPH. Pressure should be 120-130 lbs., at full throttle.

HIGH RANGE CLUTCH PRESSURE: *(NOTE—Leave gauge connected for "Front Pump Pressure" test above).* Connect another gauge to high range clutch pressure point at front of transmission (right side). In the following tests, High Range Clutch Pressure should be the same or not more than 10 lbs. under Front Pump Pressure.

With Selector Lever in •D Range: Operate engine at 400 RPM. High Range Clutch Pressure should be 75-90 lbs. (1954 Packard). 70-100 lbs. (1955 Packard). 70-110 lbs. (Hudson & Nash). Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others).

With Selector Lever in •D Range: Drive car at 15-20 MPH (Converter Drive). High Range Clutch Pressure should be 145-155 lbs. (1954 Packard). 145-165 lbs. (Others). Front Pump Pressure should be 150-160 lbs. (1954 Packard). 150-170 lbs. (Others).

With Selector Lever in D• Range: Operate engine at 400 RPM. High Range Clutch Pressure should be at Zero pressure. Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others).

With Selector Lever in D• Range: Drive car at 20 MPH (Direct Drive) with a steady throttle. High Range Clutch Pressure should be 55-65 lbs. (All Models).

LOW BRAKE TOP PRESSURE: *(NOTE—The pressure point for this test and for Throttle Pressure is located on the control valve assembly. A special oil pan adapter is used and a special procedure is required. Connections for both tests should be made at the same time. See "Low Brake Top Pressure & Throttle Pressure Test Connection Note" below).* Pressure should be the same or not more than 10 lbs. under Front Pump Pressure.

With Selector Lever in •D Range: Operate engine at 400 RPM. Low Brake Top Pressure should be 75-90 lbs. (1954 Packard). 70-100 lbs. (Others). Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 (Others).

With Selector Lever in D• Range: Operate engine at 400 RPM. Low Brake Top Pressure should be at Zero pressure. Front Pump Pressure should be 80-95 lbs. (1954 Packard). 80-110 lbs. (Others).

With Selector Lever in D• Range: Immediately after upshift, Low Brake Top Pressure should be 40-65 lbs. (All Models). Front Pump Pressure should be 50-70 lbs. (All Models).

CONVERTER "IN" PRESSURE: Connect gauge to converter "in" test point at left side of converter housing.

With Selector Lever in D• Range: Operate engine at 400 RPM. Pressure should be 60-70 lbs. (1954 Packard). 30-50 lbs. (Others).

With Sel ctor Lever in D• Range: Drive car at 15 MPH., (before Direct Drive). Pressure should be 70-80 lbs. (1954 Packard). 55-80 lbs. (Others).

With S l ctor L v r in D• Range: Drive car at a speed to engage Direct Speed Clutch. Pressure should be 15-25 lbs. (All Models) with Direct Drive engaged.

With S lect r L ver in D Range: In "kickdown" position, converter pressure should be 70-80 lbs. (1954 Packard). 70-85 lbs. (Others).

CONVERTER "OUT" PRESSURE: To check converter "out" pressure a special tee connection is required (install and braze a 1/8" nipple into one end of the 1/8" tee). Remove upper oil cooler tube adapter from side of bell housing. Install oil cooler tube adapter in the tee and reconnect cooler tube. Connect gauge to tee connection.

With Selector Lever in D• Range: Drive car at 15-18 MPH. In "Converter Drive" pressure should be 30-40 lbs. (1954 Packard). 25-40 lbs. (Others). In "Direct Drive" pressure should be 10-20 lbs. (All Models).

DIRECT DRIVE PRESSURE: Connect gauge to direct drive test point at front of transmission (right side), and another gauge to front pump test point at front of transmission (left side). Direct drive pressure should be the same or not more than 10 lbs. under front pump pressure.

With Selector Lever in D• Range: Drive car at 15-18 MPH. Front Pump Pressure should be at Zero pressure (All Models), before Direct Drive Clutch engagement. Front Pump Pressure should be 80-95 lbs. (1954 Packard). 70-100 lbs. (Others). After Direct Drive Clutch engagement, pressure should be 55-65 lbs. (All Models). After "kickdown", Direct Drive Pressure should be at Zero pressure. Front Pump Pressure should be 140-160 lbs. (All Models).

GOVERNOR PRESSURE: Connect gauge to governor pressure test point on left side of transmission case (rear). Pressures should be as follows:

1954 Packard, Hudson & Nash—15-20 lbs. at 13 MPH. 30-35 lbs. at 28 MPH. 55-65 lbs. at 56 MPH.

1955 Packard—15-18 lbs. at 13 MPH. 35-40 lbs. at 28 MPH. 62-69 lbs. at 56 MPH.

THROTTLE PRESSURE: *(NOTE—The pressure point for this test and for Low Brake Top Pressure is located on the control valve assembly. A special pan adapter is used and a special procedure is required. Connections for both tests should be made at the same time. See "Low Brake Top Pressure & Throttle Pressure Test Connection Note" below).* Operate engine at 400 RPM. Throttle pressure should be 20-25 lbs. (1954 Packard). 23-26 lbs. (Others). At Full Throttle, pressure should be 65-72 lbs. In "kickdown" (before downshift), pressure should be 80-95 lbs. (All Models).

Throttle Pressure Adjustment: Before adjusting throttle pressure, check all of the throttle linkage adjustments (see "Throttle Linkage Adjustment" above). The throttle pressure adjusting screw can be reached from the right side of the transmission case with the Oil Pan Adapter, PK-23 (Packard), or Oil Pan Adapter, J-5975 (Nash & Hudson) in place as described in "Low Brake Top Pressure & Throttle Pressure Test Connection Note" below. Use two wrenches through opening. Loosen locknut and turn adjusting screw to obtain correct throttle pressure (see "Throttle Pressure" above). Be sure to recheck throttle pressure after locknut is tightened.

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TWIN ULTRAMATIC (C nt.)

►*LOW BRAKE TOP PRESSURE & THROTTLE PRESSURE TEST CONNECTION NOTE:* These two connections are located on the throttle control valve assembly within the transmission oil pan. Drain transmission fluid and remove transmission oil pan and screen. Install special test pan adapter, PK-23 (Packard), J-5975 (Nash & Hudson), with the adapter tube on the left side and toward front of car. Thread two of the gauge hoses through elbow tube on the adapter. Remove the 1/8" pipe plug from bottom of low brake housing and install a 1/8" elbow. Connect gauge hose. Remove 1/8" pipe plug from throttle valve body, install a 1/8" elbow and connect other gauge hose. On Packard, install the two oil suction tube extensions to suction tubes, install oil pan and gasket and replace transmission fluid.

TRANSMISSION REMOVAL

HUDSON & NASH

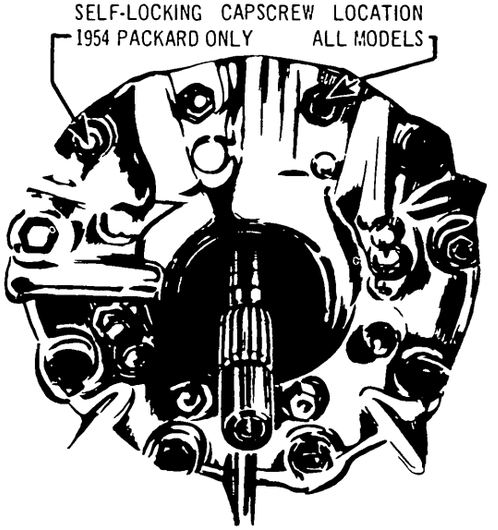
►*NOTE: The transmission and converter are removed from the chassis as an assembly.*

1) Raise car on lift or raise car at both ends and support it with jack stands under side sills. Drain fluid from transmission and converter assembly *(see "Draining & Refilling" above).*

2) Disconnect torque tube and propeller shaft from transmission. Disconnect throttle valve linkage and selector control linkage at transmission. Disconnect speedometer cable and cooler lines at transmission.

3) Support engine at rear using a support beam across frame channels or with a large block and hydraulic jack under rear end of engine oil pan. Raise engine and transmission just enough to take load off rear support under transmission rear housing. Remove the insulator to support nuts and washers and then remove the support to cross member bolts and remove support.

4) Place a transmission lift under transmission with the lift adapter properly positioned around oil pan.



TWIN ULTRAMATIC BELLHOUSING TO TRANSMISSION ATTACHING SCREWS

Pick up transmission load by slightly raising the lift.

5) Remove direct drive clutch housing to flywheel retaining nuts and slide converter assembly toward transmission. Remove the bell housing to flywheel capscrews and then move transmission rearward until the direct drive housing is clear of the flywheel. Wire converter assembly to bell housing so that it cannot accidentally slide off the input shaft.

6) Lower transmission lift and pull it from under car. Transfer transmission assembly to a reconditioning stand.

PACKARD

►*NOTE: Transmission and converter are removed from chassis as an assembly.*

1) Raise car on lift or raise car at both ends and support with jack stands under side sills. *(CAUTION– Do not place jack or other lifting device under rear load arms or any other part of Torsion Level Suspension assembly).*

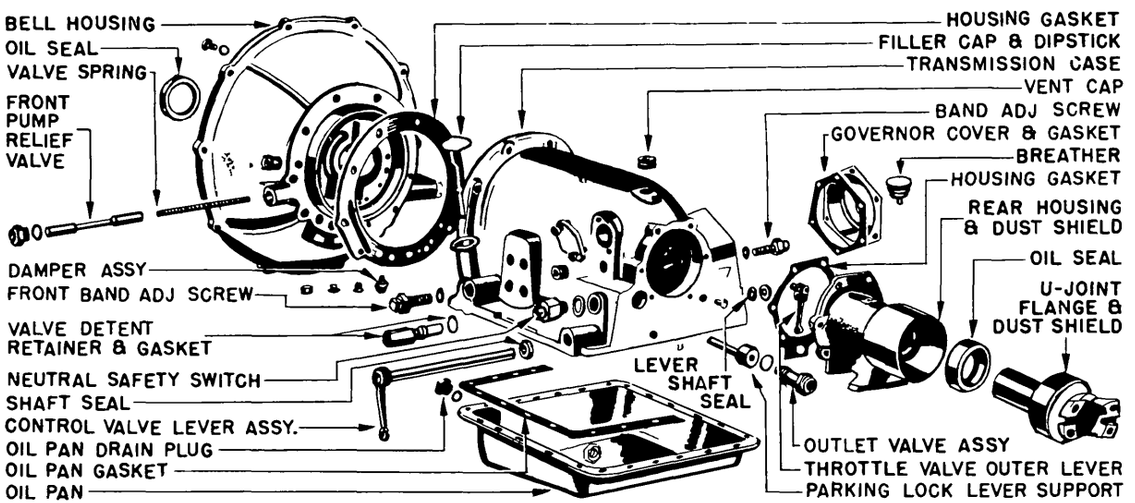
2) Disconnect propeller shaft at both ends and remove shaft. Disconnect throttle valve linkage and selector control linkage at transmission. Disconnect speedometer cable and cooler lines at transmission.

3) Support engine at rear using a support beam across frame channels or with a large block under rear of engine oil pan and a hydraulic jack. Raise engine and transmission just enough to take the load off rear support under transmission rear housing. Remove insulator to support nuts and washers and then remove the support to "X" member bolts and remove the support.

4) Place a transmission lift under transmission with lift adapter properly positioned around the oil pan. Pick up the transmission load by slightly raising the lift. Remove direct drive clutch housing to flywheel retaining nuts and slide converter assembly toward transmission.

5) Remove the bell housing to flywheel housing capscrews and then move transmission rearward until the direct drive clutch housing is clear of flywheel. Wire the converter assembly to bell housing so it cannot accidentally slide off input shaft.

6) Lower transmission lift and pull it from under the car.



TWIN ULTRAMATIC TRANSMISSION CASE ASSEMBLY

TORQUE CONVERTER OVERHAUL

►*TORQUE CONVERTER OVERHAUL CAUTION: This unit is accurately balanced at the factory by welding lugs to the direct drive clutch housing. It is very important that the original balance be maintained at overhaul by marking the various parts of the converter during disassembly to insure their being installed in the same relative position at reassembly.*

►*SERVICE REPLACEMENT CONVERTER CLUTCH BALANCING NOTE:* These units are individually balanced and may or may not have balance lugs attached to the flange with drive screws. A new pump with a balance lug may be installed with the balance lug at any position in relation to the lug on the direct drive clutch housing without affecting converter assembly balance.

►*REACTION SHAFT ENDPLAY CAUTION:* Before disassembling torque converter, check the reaction shaft endplay to determine if a new thrust washer is needed for reassembly.

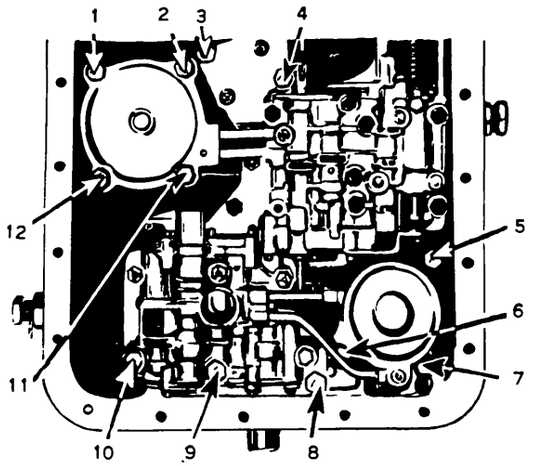
Reaction Shaft Endplay Check: With converter on bench, measure reaction shaft endplay. On Packard, use Dial Indicator and Special clamp, PK-306 along with Reactor Checking Tool PK-27. Insert tool PK-27 through reactor shaft and expand tool so it grips the first turbine hub. Attach clamp and indicator, then raise the checking tool and note indicator reading. Make a note of the indicator reading to be used as reference when reassembling the unit. The specified endplay is .010" to .017".

Disass mbly: Scribe a line on converter pump and clutch housing. Remove converter pump to direct drive clutch

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TWIN ULTRAMATIC (C nt.)

housing nuts, washers and bolts. Tap the pump with a plastic tipped hammer to loosen it, then lift off pump and remove the reactor thrust spacer. Remove large rubber "O" ring from pump. Remove the second turbine to first turbine capscrews and washer and lift off second turbine. Remove the reactor thrust washer from shaft and lift out the reactor shaft and reactor as an assembly. Remove the reactor shaft front thrust washer. Lift out the first turbine and the first turbine hub thrust washer. Using a scratch-awl, scribe marks on the clutch housing and the pressure plate to insure reassembly in the same position, and then remove the plate retaining screws and lift out the pressure plate and driven plate. Scribe a mark on clutch piston to line up with the mark made on the clutch housing. Lift out four pressure plate spacers and lift out the clutch piston. Remove the four large piston rings from piston and also remove the small inner ring from hub

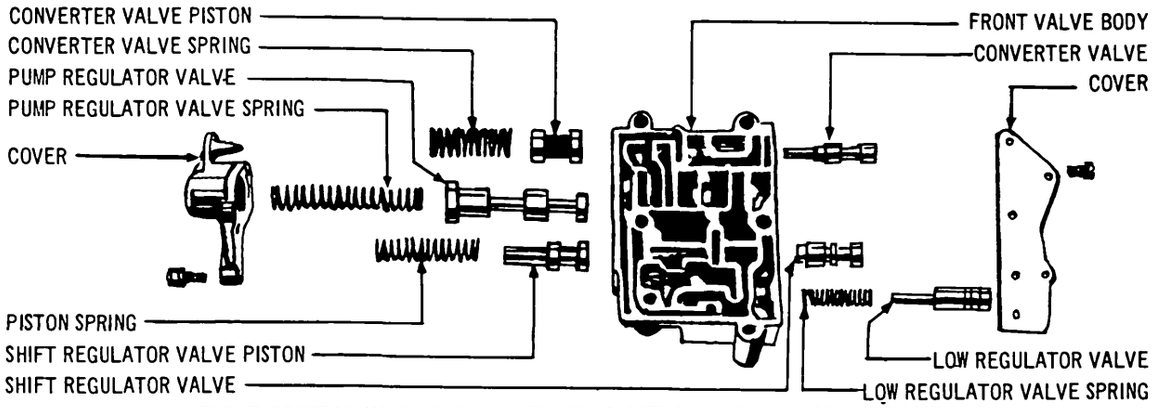


CONTROL VALVE ASSEMBLY RETAINING SCREW DIAGRAM

of clutch housing. Lift reactor shaft out of reaction clutch in hub of reactor. Remove reaction clutch bearing plate and a retaining ring. Remove reaction clutch bearing plates, washers, springs and sprags and then lift the reaction clutch outer race out of hub of reactor.

Cleaning & Inspection: Wash all parts in clean solvent and dry with compressed air. Inspect all contact and mounting surfaces for nicks, burrs, distortion, warping or low spots. Inspect all bolts and capscrews for worn threads and see that bolt holes not worn or cracked. Inspect machined area around vanes, torus ring, and turbine hub for wear or rubbing conditions indicating worn bearings or thrust plates. Check clutch driven plate for worn facing, loose springs, worn splines or thrust bearing. Inspect clutch movable plate and piston ring. Inspect all bearing surfaces for wear, pits, or scores. Clean and inspect all oil passages leading from input shaft bearing to direct drive clutch piston.

Reassembly: 1) Install reaction clutch bearing plate and a retaining ring in hub of reactor at coned or forward end. Place reactor on bench with coned end downward



FRONT CONTROL VALVE BODY (LATE 1954 & 1955 PACKARD, HUDSON & NASH)

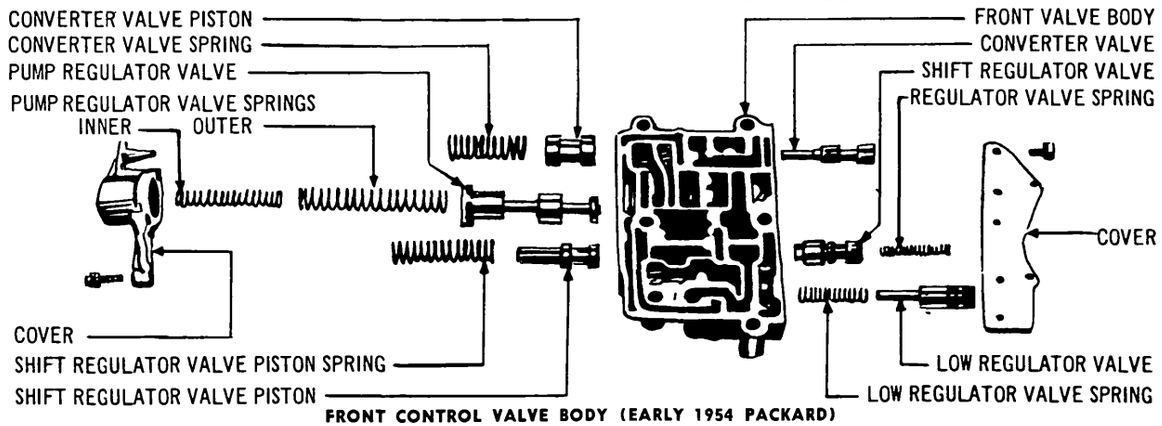
and insert the outer race. Place one of the washers in the race and then place one of the circular springs on top of the washer. *(NOTE–*Before installing the sprags check direction of groove as follows: The centerline of the spring groove in the sprag is at an angle less than 90° in relation to the flat back portion of the sprag. In other words, the groove is pointing toward the left when viewed facing the flat back portion of the sprag. Sprags must be installed in the correct direction for proper operation). Place the first sprag in the race at approximately the three o'clock position, with the bottom groove over the spring, the top groove pointing inward toward the left or center and the nose of the sprag pointing in a counter-clockwise direction. Follow this procedure to install the rest of the sprags *(CAUTION–The reactor must be on the bench with the coned side down when installing the sprags as described above).* Install circular spring in the sprag grooves and place the large washer over the sprags. Install bearing plate and lock ring.

2) Insert the reactor shaft into the overrunning clutch with smooth bearing surface of shaft in contact with the sprags *(NOTE–If shaft cannot be inserted into the clutch, one or more of the sprags have been installed incorrectly).* When shaft has been installed, hold the reactor and rotate the shaft. The shaft should turn freely when rotated clockwise and should lock up when rotated counter-clockwise.

3) Insert the direct drive clutch piston inner ring into the piston bore and check the gap. Specified ring gap is .005-.010". Install the ring in its groove on the hub of the direct drive clutch housing and make certain it is free in the groove. Install the four piston outer rings on the piston and rotate them on installation so that the gaps are 90° apart. Centralize the inner ring in its groove in hub of the clutch housing and then push the piston into housing lining up the marks scribed at disassembly. Place the four spacers in the clutch housing locating them on the bosses provided. Place the driven plate on the piston lining up the marks scribed at disassembly (make certain that the spacers have not been knocked off the bosses). Install and tighten the retaining screws to 18-20 ft. lbs.

4) Place first turbine hub thrust washer on hub of direct drive clutch housing *(CAUTION–This thrust washer controls reactor shaft endplay. Seven thrust washer sizes are available in .008" graduations ranging from .062" to .110" in thickness. Ref r to reactor endplay note made on disassembly and select a washer to provide .010" to .017" endplay).* Centralize the driven plate in clutch housing and insert the first

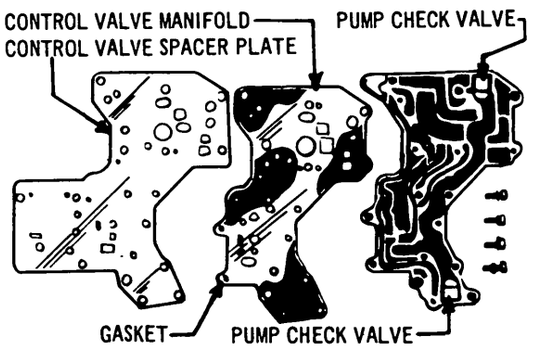
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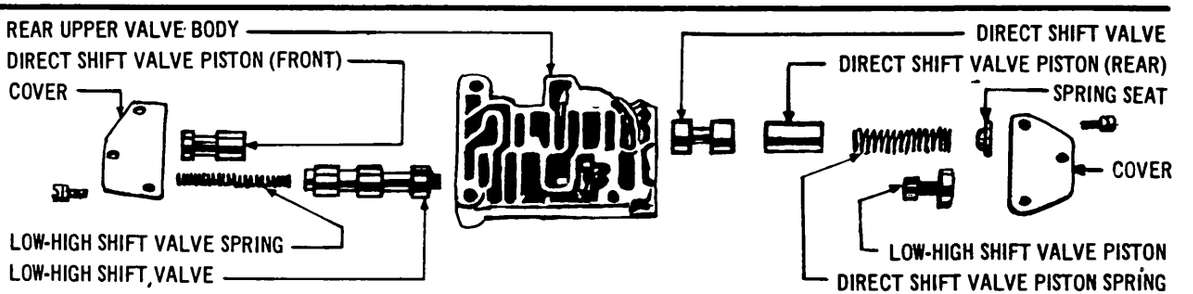
FRONT CONTROL VALVE BODY (EARLY 1954 PACKARD)

TWIN ULTRAMATIC (C nt.)

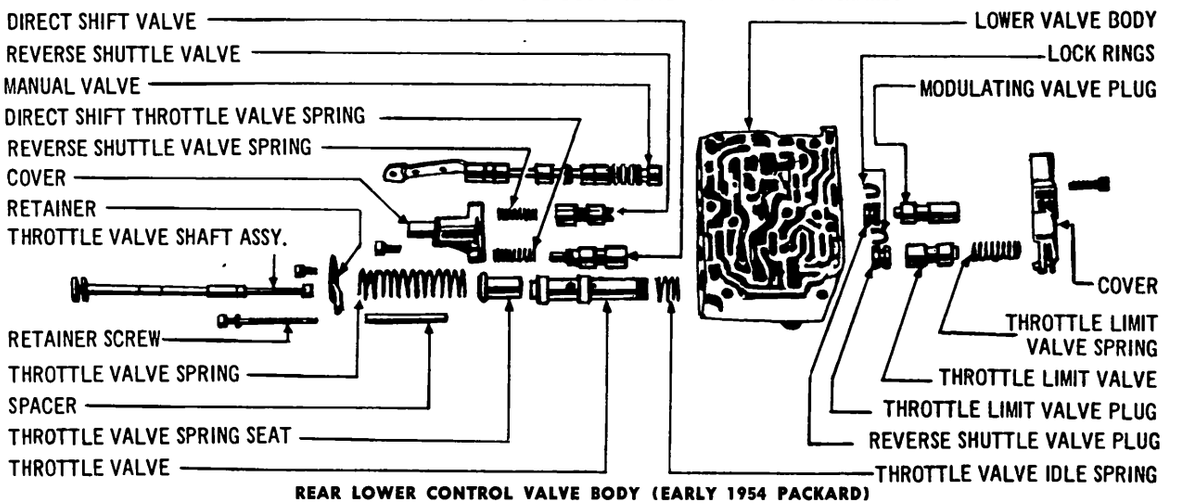
turbine splined hub into driven plate hub. Place reactor shaft front thrust washer on hub of first turbine and install reactor shaft and reactor as an assembly. Install second turbine, attaching screws and washers and tighten screws to 12-15 ft. lbs. Install reactor rear thrust washer. Place a new "O" ring around pump flange and install converter pump on clutch housing lining up the marks scribed in housing and pump at disassembly. Install four retaining bolts, nuts and washers approximately 90° apart and finger tighten the nuts. Using a wrench, tighten the nuts 1/4 turn at a time until pump flange is fully seated on the clutch housing flange *(NOTE–It is important that the above tightening proc dure be followed to prevent undue str ss b ing placed on pump flange at any one point).* Check reactor shaft endplay and if not within limits of .010-.017", a new first turbine hub thrust washer of the proper thickness must be installed to bring endplay within correct limits. When endplay is correct, install the remaining bolts, washers, and nuts and torque tighten evenly to 20-25 ft. lbs.



MANIFOLD BODY ASSEMBLY



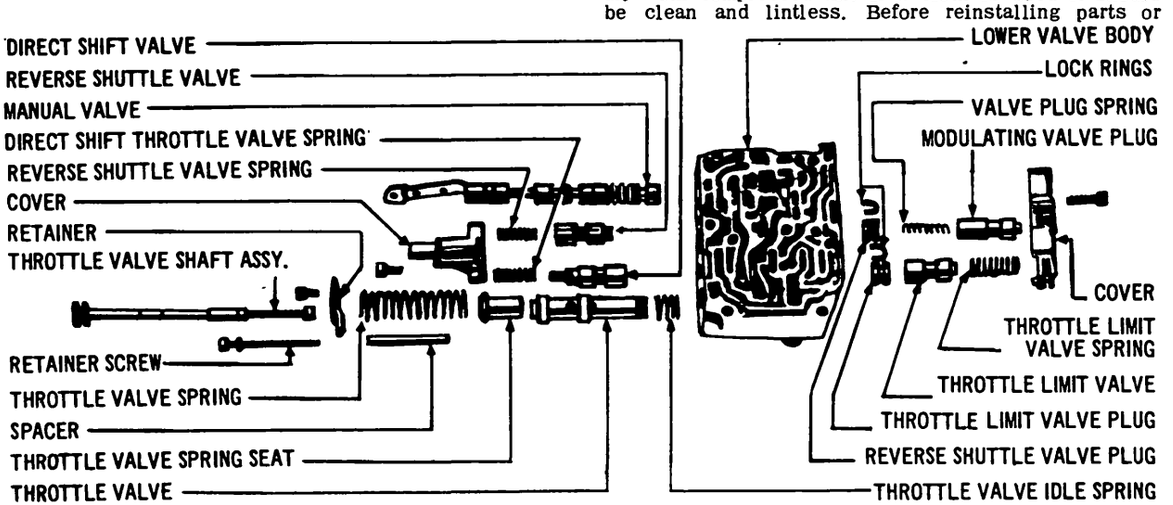
REAR UPPER CONTROL VALVE BODY (LATE 1954 & 1955 PACKARD)



REAR LOWER CONTROL VALVE BODY (EARLY 1954 PACKARD)

TRANSMISSION DISASSEMBLY

►*TRANSMISSION CLEANING & INSPECTION CAUTION:* When a part of assembly is removed or disassembled it should be thoroughly cleaned in solvent and blown dry with compressed air. If a cloth is used it should be clean and lintless. Before reinstalling parts or reassembling units, all parts should be thoroughly inspected. When inspecting gears, pinions, or splined shafts, check all teeth for nicks or burrs and clean up as necessary, using an abrasive stone having a fine grit. Check the fit of all mating parts. Excessive clearance should not exist nor should parts be excessively tight. When inspecting any part having oil passages, blow compressed air through these passages. The friction facings and linings in clutch plates and brake bands should not be loose, have excessive wear, or be improperly bonded. Areas in contact with facings and linings should be inspected for scores or distortion. Check all castings for cracks or sand holes. Gasket contact area should be clean, smooth and free from deep scratches which would permit oil to pass gasket. Use new gaskets when reassembling transmission. Control valves should be very closely inspected for nicks and burrs and if necessary, cleaned up with a fine abrasive stone. Check to see that each valve moves freely of its own weight in its respective bore.



REAR LOWER C NTR L VALVE B DY (LATE 1954 & 1955 PACKARD, HUDSON & NASH)

TRANSMISSION OVERHAUL (TRANSMISSION UNITS)

1) Invert transmission and remove oil pan. Remove oil cooler tube adapter and then extract oil transfer tubes from side of transmission housing. Remove the transmission to bell housing retaining bolts and remove bell housing and front oil pump assembly.

CONTINUED ON NEXT PAGE

TWIN ULTRAMATIC (Cont.)

2) Place selector lever on side of transmission in "Park" position to lock output shaft then remove the long through bolt from end of output shaft. Remove the six rear housing to case retaining screws and washers and remove the rear housing assembly. Extract rear housing spacer from inside parking gear hub.

3) Rotate parking gear so that governors are in line with openings in case and then lift out parking gear and governors as an assembly. Loosen brake band screw lock nuts and then back out and loosen both the low and reverse band adjusting screws. Pull out the rear oil pump suction jumper tube.

4) Remove manual valve lever to link pin. Remove the five capscrews holding control valve assembly to case, and the seven screws holding the low range brake and reverse range brake to case. Lift control assembly and brakes out of case as an assembly.

5) Remove high range clutch assembly working it out through front of transmission case. Remove low range brake band through front of case. Using a dummy input shaft, lift the planetary assembly out through front of case and remove the reverse range brake band.

6) Extract rear oil pump governor jumper and discharge jumper oil tube from case with long nose pliers. Remove rear oil pump retaining screws and lock washers and lift out the pump noting the planetary ring gear thrust washer on pump hub. With a small punch, tap out the parking lock operating lever index pin.

7) Remove manual valve inner lever set screw locknut, remove stop plate, and then back out setscrew. Loosen manual valve outer lever setscrew locknut at end of shaft on outside of case, then back out setscrew and nut and remove lever. Using a long punch, tap inner end of manual valve lever shaft to start shaft and seal out of case. Hold inner lever, spring and operating lever and pull shaft, seal, washer, and retaining ring out of case.

8) If parking lock lever is to be removed, work through front of case and release lever support retaining ring using a pair of tru-arc pliers. With a long punch, tap front end of lever support to start it out of case and then remove the support, lever, and spring. Tap inner end of throttle valve inner lever to push seal out of case, and remove seal, washer and retaining ring. Slide lever out of case. Back out brake band adjusting screws and pull out anchor pins from inside of case. Remove breather from side of case.

CONTROL VALVE

►*CONTROL VALVE ASSEMBLY NOTE: Valve assemblies for 1954 Packard, 1955 Packard, Hudson & Nash are different. Appearance and service procedures are similar, the difference being in the valves, valve springs and passages.*

Disassembly: Remove front valve body assembly retaining screws, washers and lockwashers and remove body assembly. Remove rear lower body to rear upper body and to manifold screws, washers and lockwashers and remove the two body assemblies. Remove separator plate to manifold screws and washers and lift off plate and gasket (Note front & rear pump check valves in manifold).

►*THROTTLE VALVE ADJUSTING SCREW CAUTION: The setting of this screw should never be changed and should be left intact in the detent housing when disassembling and assembling the control valve assembly. Special equipment is required to set the throttle pressure which must be adjusted with transmission in the car and operating. If adjustment made necessary by removal, see adjusting procedure outlined in "Hydraulic Pressure Test" above.*

►*NOTE:* It is not necessary to remove the Reverse Shuttle Valve Plug and Throttle Limit Valve Plug in Rear Lower Valve Body. These plugs are held in place with lock rings located in elongated holes.

Valve & Valve Spring Removal (from the three valve housings): It is recommended that each control valve sub-assembly be disassembled, thoroughly cleaned, inspected and reassembled one at a time. To facilitate reassembly, the sub-assembly details should be placed on the bench in the order in which they were removed. See Control Valve Assembly illustrations for location of valves and springs.

Late 1954 & 1955 Packard
Rear Upper Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Direct Shift Valve Piston	2-5/64"	16-1/2	.440"
Low High Shift Valve	2-5/64"	33	.250"

Hudson & Nash
Rear Lower Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Reverse Shuttle	1-3/32"	13	.330"
Direct Shift Throttle	1-13/32"	13-1/2	.412"
Throttle Valve Idle	21/32"	5	.654"
Throttle Valve	2-25/32"	14	.784"
Throttle Limit Valve	1-7/32"	9-1/2	.550"
Modulating Valve	1-3/32"	13	.330"

Hudson & Nash
Front Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Converter Valve	1-3/4"	11-1/2	.580"
Pump Regulator Valve	3-21/32"	19	.650"
Shift Regulator Valve Piston	2-3/16"	16	.477"
Low Regulator Valve	1-17/32"	16	.400"

Hudson & Nash
Rear Upper Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Direct Shift Valve (Early)	2-5/32"	17	.440"
Direct Shift Valve (Late)	1-27/32"	13-1/2	.440"
Low High Shift Valve	2-5/64"	33	.250"

►*DIRECT SHIFT VALVE PISTON SPRING PRODUCTION CHANGE: The Direct Shift Valve Spring Part No. 6470186 replaced in production and for service by Part No. 6470055.*

CONTROL VALVE ASSEMBLY SPRINGS: The springs used in the various valve housings are different and are identified as follows:

1954 Packard (Early)
Rear Lower Valve Body

Valve Spring	①	Free Length	No. Coils	O.D.
Reverse Shuttle		1-3/32"	13	.330"
Direct Shift Throttle		1-17/32"	15	.400"
Throttle Valve Idle		21/32"	5	.654"
Throttle Valve		2-25/32"	14	.784"
Throttle Limit Valve		1-7/32"	9-1/2	.550"

1954 Packard (Early)
Front Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Converter Valve	1-3/4"	11-1/2	.580"
Pump Regulator Valve ②	2-7/32"	19	.400"
Pump Regulator Valve ③	3-1/4"	19	.525"
Shift Regulator Valve Piston	2-3/16"	16	.477"
Shift Regulator Valve	1-1/2"	24	.250"
Low Regulator Valve	1-17/32"	16	.400"

① —Approx. ② —Inner Spring. ③ —Outer Spring.

1954 Packard (Early)
Rear Upper Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Direct Shift Valve Piston	2-5/32"	17	.440"
Low High Shift Valve	2-5/64"	33	.250"

Late 1954 & 1955 Packard
Rear Lower Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Reverse Shuttle	1-3/32"	13	.330"
Direct Shift Throttle	1-13/32"	13-1/2	.412"
Throttle Valve Idle	21/32"	5	.654"
Throttle Valve	2-25/32"	14	.784"
Throttle Limit Valve	1-9/32"	9-1/2	.550"
Modulating Valve	1-3/32"	13	.330"

Late 1954 & 1955 Packard
Front Valve Body

Valve Spring	Free Length	No. Coils	O.D.
Converter Valve	1-3/4"	11-1/2	.580"
Pump Regulator Valve	3-21/32"	19	.650"
Shift Regulator Valve Piston	2-3/16"	16	.477"
Low Regulator Valve	1-17/32"	16	.400"

Reassembly: Place check valves in the manifold (if removed) and then assemble gasket and separator plate to manifold. Assemble valve, plugs and springs to the valve bodies. Assemble valve bodies to manifold but do not tighten retaining screws at this time as they will be torqued when assembled to the transmission case.

REVERSE BRAKE

Disassembly: Remove brake housing cap retaining ring with a screw driver and lift out cap, piston, seal and guide pin as an assembly. If cap sticks in housing, invert and support assembly on blocks and lightly tap end of guide pin with a fibre or brass drift. Using a sleeve approximately 7/8" long and 1" inside diameter, clamp piston and guide pin in a vise to compress the spring washer and then remove retaining snap ring. Remove from vise and take out piston and ring

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TWIN ULTRAMATIC (C nt.)

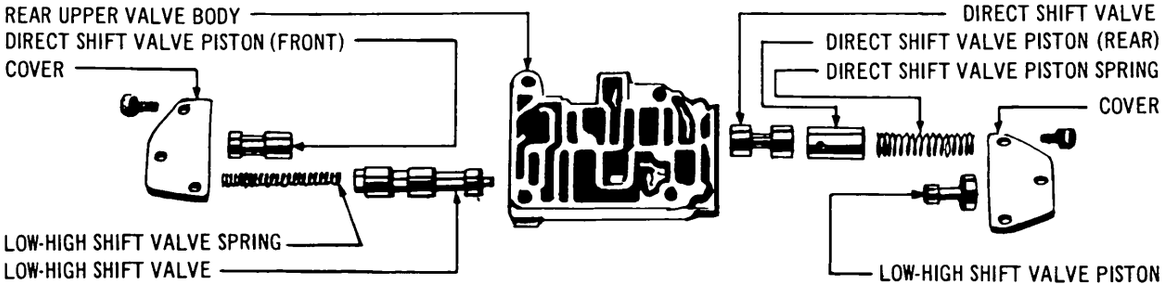
assembly and dished spring washer

Reassembly: Place piston seal or ring in housing bore and check ring gap (Packard 002" to 007"), (Nash & Hudson 002" to 014") Drop the spring washer in the housing with the concave or "dished" side upward Place the ring on the piston and make certain the ring is free in ring groove Install piston and ring in housing by tilting piston to compress ring while pushing piston downward Using the same sleeve used for removal, compress spring washer in a vise and install retaining ring

LOW RANGE BRAKE

Disass mbly: Position Piston Remover & Replacer Tool PK25 (Packard), J-5977 (Hudson & Nash) so that open lower end of tool clears forward edge of bench Drill two holes in bench and attach tool Place low range brake in tool and secure it with the two special screws Place cupped adapter on the center of brake housing cover turn down the adjusting screw making sure that the lower end enters hole in adapter Tighten adjusting screw a turn or two to relieve the pressure on the retaining ring and then remove retaining ring with a screw driver Slowly loosen adjusting screw taking particular note that brake piston cover raises as adjusting screw is loosened If cover is sticking in brake housing, use a punch and hammer and tap lower end of piston shaft upward to loosen cover Slowly loosen screw until brake piston and springs are free Remove assembly from tool and take out cover, piston, seal, washer, shaft and inner and outer springs

R ass mbly: Place piston ring in housing bore and check the gap (Packard 002" to 007"), (Nash & Hudson 002") Place the low range brake housing in tool and secure it in place with the two allen screws Install the two springs in the housing and make sure they are level and on their seats Place the ring compressor in top of brake housing and install piston, piston ring and rod assembly on top of springs Place the cupped adapter on top of piston and turn down adjusting screw of tool, make sure that lower end enters hole in adapter Slowly turn adjusting screw to compress springs, and guide piston and ring into ring compressor while tightening screw Be careful when tightening the screw to make sure that lower end of piston shaft enters freely into small bore in brake housing Tighten adjusting screw until springs are compressed and piston is at bottom of brake housing Install brass clamp on the section of piston shaft extending below brake housing Push clamp upward as far as it will go and securely tighten the clamp screw This is important as the clamp holds the piston down while releasing the tool to install cover and retaining ring Back off the adjusting screw and remove ring compressor Install piston cover, place cupped adapter on top of cover and tighten screw to hold cover in place Install retaining ring After making sure retaining ring is properly installed, loosen screw in clamp and release piston Remove brake assembly from tool



REAR UPPER CONTROL VALVE BODY (EARLY 1954 PACKARD, HUDSON & NASH)

HIGH RANGE CLUTCH

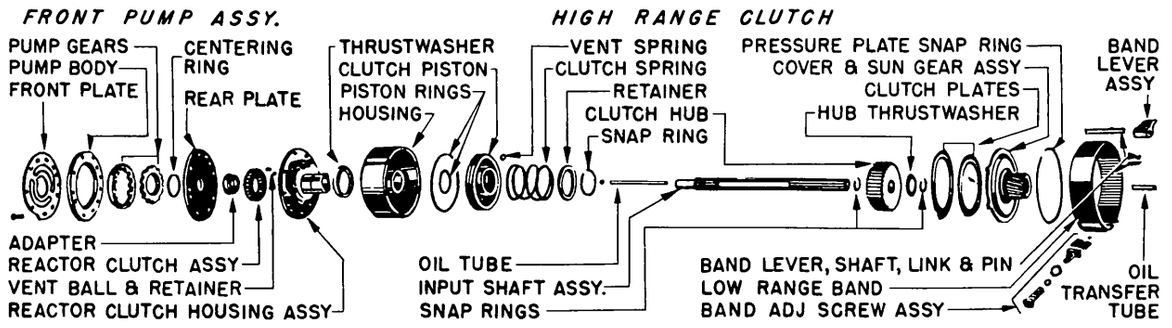
Disassembly: *(NOTE*—A 1-1/2" hole drilled in a bench will facilitate servicing the high range clutch. If a vise is used, lead jaws should also be used to prevent marring the input shaft) Remove planetary sun gear thrust bearing Remove plate snap ring with a screwdriver and remove plate and sun gear assembly Lift out the input shaft along with the clutch hub Invert clutch housing to permit the clutch plates to drop out Using Clutch Spring Compressor PK-304 (Packard), J-5943 (Hudson & Nash), compress clutch spring and release the spring retainer snap ring using expander snap ring pliers Back off compressor screw stem and remove the tool, snap ring, retainer and spring. Sharply rap or drop the housing on the bench, open end downward to dislodge piston In the event the rubber seal has swelled, it may be necessary to rap housing on bench more than once Remove lip seal from piston and also remove piston inner ring from clutch housing hub Clamp input shaft in a vise and remove clutch hub snap ring with snap ring pliers Remove hub thrust washer, hub and rear snap ring

Reassembly: Insert piston inner ring into bore of piston and check ring gap 004" to 018" (Early 1954 Packard), .007" to .015" (Late 1954 & 1955 Packard), .005" to 0085" (Hudson & Nash). Place the ring in groove in hub of clutch housing and make certain it is free in groove. Place a new piston lip seal on piston with the lip toward front face of piston. Centralize piston inner ring in its groove in hub of clutch housing. Lubricate lip seal and piston bore with Ultramatic oil and lower piston into housing. Push piston downward to start it over the inner ring and then use a feeler gauge to start lip seal into its bore while pushing downward on the piston. Care should be exercised so as not to tear or cut lip while performing this operation. Using Clutch Spring Compressor PK-304 (Packard), J-5943 (Hudson & Nash), install piston return spring, retainer and snap ring. Remove tool. Install clutch hub snap ring on input shaft and then slide hub on shaft with open end of hub toward snap ring. Slide clutch hub thrust washer on the shaft and against hub and then install the rear snap ring. Place the input shaft in the clutch housing and then install the driven and driving plates. When installing plates, first install a steel driven plate and then a waved, friction faced driving plate and continue installing the plates in this manner. Install sun gear and plate assembly and then lock the snap ring in place. Install planetary sun gear thrust bearing on shaft.

PLANETARY UNIT

Disassembly: With assembly on bench, shaft end upward, slowly lift off planetary ring gear *(CAUTION—This should be done slowly so that the three cage dampers and six damper springs are not scattered and lost).* Scribe alignment marks on the planetary cage and on the oil scoop. This must be done to insure installing scoop in its correct position on reassembly to maintain proper planetary balance. Remove planetary cage bolts then remove the end plate. Using a dummy planetary pinion pin, butt one end of the pin against a pin which carries a short pinion. Hold thrust washers the pinion and slide pinion, bearings and washers onto dummy shaft. Slide these parts off dummy shaft

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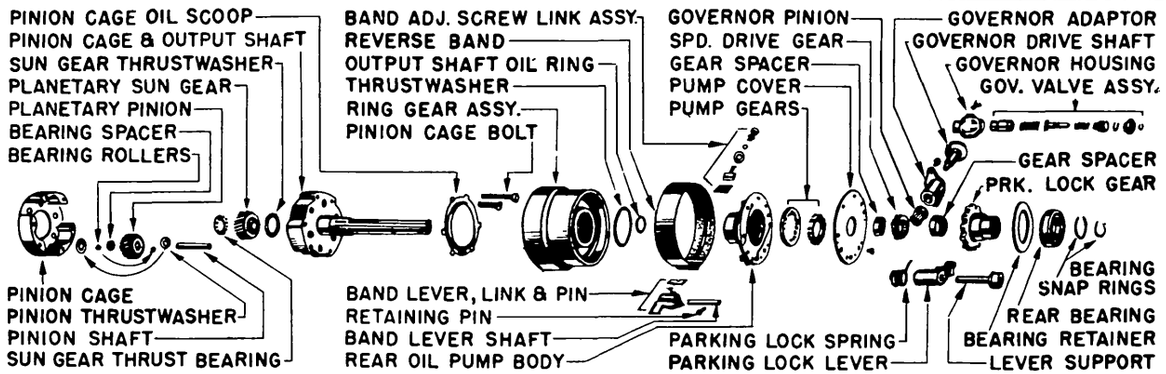


TWIN ULTRAMATIC FRONT PUMP & CLUTCH PISTON ASSEMBLY

TWIN ULTRAMATIC (C nt.)

into a clean container exercising care not to lose any rollers. Remove the other two pinions in the same manner. Pull out planetary sun gear and lift out rear thrust washer. Remove the planetary long pinions following the same procedure outlined for removing the short pinions. Using a pointed tool, unhook interlocking ends of the oil ring and slide rings off the shaft. It is seldom necessary to remove the pinion shaft from the cage; however they can be removed by tapping the shaft and woodruff keys out toward splined shaft.

Reassembly: Slide planetary cage shaft oil rings on shaft and into ring grooves. To lock ends of rings, push one end down into groove and push upward on opposite side of ring to raise other end while pushing inward toward shaft. Assemble planetary pinions and bearing rollers and install on their shafts in cage. A dummy pinion shaft and a dummy long pinion bearing spacer can be used to aid assembly of rollers into pinions *(NOTE–38 bearing rollers are used in each pinion.* The long pinions have 19 rollers at each end separated by a spacer. No spacer is used with the short pinions in Early 1954 Series. In Late 1954 & 1955 Packard, Hudson & Nash, some units have a spacer between the bearings in the short pinions while other units have no spacer. When a spacer is used in the short pinions, the bearings are not as long as when used without a spacer). Insert the dummy pinion shaft and two spacers into the long pinion and then insert 19 rollers. Install a small washer *(NOTE–There are a total of 12 washers required for the pinion shaft, 9 small size and 3 large size. Each long pinion uses a small washer at both ends. Each short pinion uses a small washer at the forward end of cage, and a large washer at rear or cage end).* After the 19 rollers have been installed, remove dummy spacer and insert 19 rollers. Add another small washer at this end. While holding the small washers against the ends of the pinion, butt end of dummy shaft against a long pinion shaft in cage and slide pinion, rollers, and washers onto pinion shaft *(NOTE–Beveled ends of pinion teeth should be toward the plate or cover end of the cage).* Assemble the two remaining long pinions in the same manner as described above. Place the rear sun gear thrust washer in the cage with oil grooves in washer toward front or open end of cage. Install rear sun gear in cage with the end of the sun gear having the teeth ground flush with the gear, toward front or open end of cage. Use the dummy shaft and spacer and insert 19 rollers in each end of the short pinions. A small washer is used at beveled end of pinion and a large washer is used at opposite end. Install short pinions with the beveled end toward plate or cover end of cage. Line up the alignment marks (small "O" on each part) on cage and end plate and install end plate onto pinion shafts. Position oil scoop on cage so that previously scribed marks on scoop and cage are in register. Start planetary cage into ring gear (note that planetary cage damper groove has a lip on one side). Place two damper springs into lip side of the groove. Tilt planetary cage and slide a damper into the groove and on top of the springs. Install remaining springs and dampers in the same manner. After all springs and dampers are installed, place the assembly on the bench, shaft upward and rotate the ring gear to engage pinions and seat the ring gear.



TWIN ULTRAMATIC PLANETARY & OUTPUT SHAFT ASSEMBLY

GOVERNOR

Disassembly: Remove low speed and high speed governors from parking gear assembly using an Allen wrench. Remove high speed governor plate. Press inward and tilt spring seat to release it and remove spring and seat. NOTE–The low speed governor is serviced as an assembly and should not be disassembled if the valve works freely in the body. If valve is sticking because of dirt, remove plate, and wash out passages.

Reassembly: Slide high speed governor valve into its bore in body and make sure it moves freely. Install valve spring and seat and attach plate. Assemble governors to parking gear.

FRONT & REAR OIL PUMPS

Disassembly: Remove rear oil pump cover plate and rotors. Remove front oil pump cover plate, rotors, and outer rotor spacer ring. Also remove two oil rings from the high range clutch journal of front pump.

Reassembly: Place the rear oil pump rotors in the rear pump body and check rotor tooth nose clearance (One side of rear pump inner rotor has an undercut and this should be installed toward front or hub end of pump body). Tooth nose clearance should not exceed .008". Check side clearance between outer rotor and the pump body bore. This clearance should not exceed .011". Check rotor end clearance using a straightedge placed across face of pump body. Clearance between straightedge and rotors should not exceed .006". If clearances not within these specifications, install a new pump assembly. Install the front pump rotors and spacer ring in front pump body and repeat the clearance checks that were made for the rear pump. Clearances are the same. Place rotors in the pump bodies in the same position in which clearances were checked and then install the cover plates. When assembling the front pump, install two oil rings on high range clutch journal.

REAR HOUSING

NASH & HUDSON

Disass mbly: Remove speedometer driving gear spring from forward end of output shaft. Remove speedometer adapter snap ring from transmission rear housing. then remove speedometer pinion gear and adapter assembly. Remove output shaft snap ring from rear of output shaft and remove shaft from rear ball bearing by tapping end of shaft with a plastic hammer. Remove speedometer drive gear from output shaft. Remove rear ball bearing snap ring from transmission rear housing using Tru-Arc pliers. Tap bearing out of housing with the handle end of plastic hammer. Remove transmission rear housing spider front bushing by tapping with hammer handle. Slide speedometer drive gear off splines of output shaft and remove snap ring.

Reassembly: Install rear ball bearing and Tru-Arc snap ring with flat side of snap ring against bearing outer race. Install speedometer drive gear snap ring on output shaft. With a plastic hammer tap the output shaft in the ball bearing through front end of the housing, then install rear bearing snap ring and output shaft. Install rear housing oil seal using Oil Seal Installer J-1354. Tap front spider bushing retainer assembly in front end of housing. The transmission rear housing spider retainer has the word "top" cast on retainer: this end faces toward front of transmission and to top of case. Install speedometer drive gear and spring on front end of output shaft. Install the speedometer pinion and adapter lining up notch in adapter with index pin in housing. Install speedometer adapter retaining ring with ring gap toward top of housing.

PACKARD

Disassembly: Slip speedometer driving gear and spring from forward end of output shaft and remove adapter retaining ring with snap ring pliers. Remove adapter and speedometer pinion assembly. Install universal joint flange plate (part of Tool PK-22), place assembly in arbor press and press out the input shaft. Remove rear housing seal with Tool PK-352 and PK-361. Remove rear bearing retaining ring and press or knock out the rear bearing.

Reassembly: Press rear bearing onto output shaft and press this assembly into rear housing. Install rear bearing retainer ring. Install a new rear housing oil seal and drive into place with Tool PK-367. Place the rear housing assembly in an arbor press with Housing Support (part of Tool PK-22) under housing. Start universal joint flange on output shaft splines. Place Installing Tool (part of Tool PK-22) and press flange onto output shaft. Install speedometer pinion

CONTINUED ON NEXT PAGE

TWIN ULTRAMATIC (Cont.)

and adapter, lining up notch in adapter with index pin in housing. Install speedometer adapter retaining ring with the ring gap toward top of housing. Install speedometer driving gear and spring on forward end of output shaft.

TRANSMISSION REASSEMBLY

1) Install breather in side of case with breather cap toward top of case. Place new "O" rings on brake band anchor pins and slide pins into case from inside and then start adjusting screws into case.

2) Install throttle valve inner lever and add the retainer ring and washer. Slide the oil seal over outer end of shaft with lip of seal toward case. Using a 1/2" socket, tap seal into case until it bottoms. Install outer lever but do not tighten clamp bolt nut.

3) Install parking lock lever with end of spring hooked over the operating lever stop pin and push lever support into case. Install lever support retaining ring. Install retaining ring and washer on outer end of manual lever shaft and then slide new oil seal onto shaft so that lip of seal will be toward case. Start shaft through case and add the parking lock lever, spring and manual valve inner lever. Tap operating lever index pin into shaft and then line up the setscrew in manual valve lever with the hole in the shaft and install setscrew, stop plate and locknut. Using a 11/16" deep socket, bottom the oil seal in the case. Attach manual valve outer lever to shaft so that the offset in lever is toward the case.

4) Place planetary ring gear thrust washer on hub of rear oil pump and place pump in case. Install rear pump retaining screws and washers with the long screw at upper left hand position on pump flange (looking through case from front to rear). Tighten capscrews to 15-18 ft. lbs. Install new "O" ring seals on rear oil pump governor jumper and discharge jumper oil tubes, lubricate seal rings with Ultramatic oil and press tubes into pump and case.

5) Place reverse brake band in case with the band strut with the notch in it on the same side as band operating lever. Engage band struts in operating lever and in the anchor pin and tighten adjusting screw just enough to hold band in place. Using a dummy input shaft, install planetary assembly. Exercise care to avoid breaking the planetary shaft sealing rings when they enter bore in rear pump.

6) Place low range brake band in case with the band strut with the notch in it on the same side as band operating lever. Engage band struts in operating lever and in anchor pin and tighten adjusting screws just enough to hold band in place. Install high range clutch assembly.

7) Assemble front oil pump to bell housing and tighten the retaining screws to 15-18 ft. lbs. Place high range clutch thrust washer on hub of pump with ball indentations in washer against rear face of pump.

8) Lightly apply clean cup grease in three or four places around transmission case side of bell housing-to-case gasket. Line up capscrew holes in gasket with those in the case and stick gasket to case. Assemble bell housing and front pump assembly to case and tighten screws to 55-60 ft. lbs. *(NOTE–On 1954 Packard, two self-locking screws are used. On 1955 Packard, Hudson & Nash one self-locking screw is used. The remaining attaching screws are standard type with lockwashers. See illustration for location of self-locking screws).*

►*PARKING GEAR NOTE: If a new parking gear is to be installed, transfer the snap ring from inside of parking gear hub to the new gear.*

9) Insert parking gear lug ring into hub of parking gear and install parking gear and hub assembly on end of planetary gear shaft being sure to line up index pin in end of planetary shaft with missing tooth in parking gear hub. Rotate planetary cage shaft so that parking gear assembly can slide onto shaft when governors are lined up with openings in transmission case. Place rear housing spacer in hub of parking brake. Using a new gasket, assemble complete rear housing assembly to case and install and tighten two or three retaining screws. Insert long bolt into end of output shaft and tighten bolt.

10) Attach dial indicator to input shaft with the indicator against bell housing flange. Check high range clutch and planetary endplay by using a screwdriver behind high range clutch housing. Push input shaft toward the rear and set indicator dial and then pry clutch housing forward noting the endplay, which should be .023-.036". If endplay not within these specifications it will be necessary to change the rear housing spacer located in hub of parking gear assembly. Spacers are available in thicknesses ranging from .020" to .085" in .013" graduations. Select and install a spacer which will bring endplay within specified limits and recheck endplay.

11) Install all rear housing retaining screws and lockwashers and torque tighten screws to 15-18 ft. lbs. On Hudson & Nash tighten the long output shaft bolt to 35-40 ft. lbs. On Packard, remove the long output shaft bolt and inspect threaded end of bolt. If bolt does not incorporate a nylon plug, install a new bolt with a nylon plug. Tighten bolt to 35 ft. lbs., then back off bolt one or two turns and then re-tighten it to 50 inch lbs.

12) Install control valve assembly to case and just start the five capscrews. Insert oil jumper tubes into their respective openings in valve bodies. Push reverse brake band operating lever down so that the jumper tubes can enter brake housing, then push the brake assembly into position and start the capscrews. Repeat the foregoing operation to attach low range brake assembly (NOTE—It may be necessary to slightly raise or tilt the control assembly to engage the jumper tubes when installing low range brake assembly.

13) Tighten the five capscrews in control valve assembly to **nine ft. lbs.**, and the remaining screws in the two brake assemblies to **five ft. lbs.** *CAUTION–It is very important that capscrews in the control valve assembly be tightened evenly and to nine ft. lbs. torque to prevent distortion of control valve assembly.*

14) Tighten both reverse and low range brake band adjusting screws to 20 ft. lbs., then back screws out 1-3/4 turns and tighten locknuts. Connect manual valve link to shaft inner lever. Lubricate "O" ring on rear oil pump suction jumper tube and install the tube. Install the oil strainer. Using a new gasket, install the oil pan and tighten retaining screws to 10-12 ft. lbs.

15) Install the front oil pump transfer tubes and tube adapters. The adapter with the small metering hole should be installed in the opening toward top of case. Using a screwdriver in the end of the throttle valve shaft, rotate shaft counter-clockwise until valve reaches its stop. With valve against its stop, use a straightedge to position angled end of lever flush with machined rear face of transmission case.

TRANSMISSION INSTALLATION

HUDSON & NASH

1) Wire converter assembly to bell housing to prevent it from slipping off input shaft while moving transmission. Install transmission on lift or jack. Place under car and raise it until pilot at front of direct drive clutch housing is in a line with bore in crankshaft. Move transmission forward so that pilot enters crankshaft while at the same time the four studs on clutch housing enter holes in flywheel. Start two of the converter to flywheel retaining nuts and remove wire holding converter to bell housing.

2) Raise transmission until pilot around top of bell housing flange is right to top of flywheel housing. Install the lower flywheel housing cover and starting motor. Install all bell housing to flywheel housing retaining bolts and tighten to 25-30 ft. lbs. Install the other two converter to flywheel nuts and tighten to 25-30 ft. lbs.

3) Attach rear cross member to the engine supports and side sills. Connect torque tube and universal joint to rear transmission housing and output shaft. Remove the support from under engine and lower the jack from under transmission.

PACKARD

1) Wire converter assembly to bell housing to prevent it from slipping off input shaft while moving transmission. Using a jack or other lifting device, place transmission under car and raise it until the pilot on front of direct drive clutch housing is in direct line with bore in crankshaft. Move transmission forward so pilot enters the crankshaft while at the same time the four studs on clutch housing enter holes in flywheel. Start two of the converter to flywheel retaining nuts and remove wire holding converter to bell housing.

2) On 1954 models, raise transmission until the pilot around top of bell housing flange is tight to the top of flywheel housing. On 1955 models, the dowel in the flywheel housing positions the bell housing properly in relation to flywheel housing. Install all bell housing to flywheel housing retaining bolts and tighten to 25-30 ft. lbs. Install the two remaining converter to flywheel retaining nuts and tighten to 25-30 ft. lbs.

3) Assemble flywheel housing lower cover to flywheel housing and tighten the bolts to 15-18 ft. lbs. (1954 Packard), 25-30 ft. lbs. (1955 Packard). Attach engine rear support to "X" members. Lower transmission lift and the jack supporting the engine and then install transmission rear housing insulator to support nuts and washers. Remove jack from under engine and the lift from under transmission.

STUDEBAKER AUTOMATIC TRANSMISSION

Studebaker Champion (1950-55)
Studebaker Commander (1950-55)
Studebaker Land Cruiser (1950-54)
Studebaker President (1955)
Hudson (Exc. Jet) (1954)

►CHANGES, CAUTIONS, CORRECTIONS

►*AUTOMATIC TRANSMISSION MODEL IDENTIFICATION & APPLICATION (Different transmission models used as follows):*

Car Model	①Trans. Model
Champion (1950-Early 1955)②	DG-150
Champion (Late 1955)③	DG-150M
Commander (1950-Early 1955)④	DG-200
Commander (Late 1955)⑤	DG-200M
Commander (1955 2nd Series)⑥	DG-250M
President (1955)	DG-250M
Hudson (1954)	DG-200

①—On model plate on left side of transmission case.
②—Before 1955 Engine No. 1,147,699.
③—After 1955 Engine No. 1,147,699.
④—Before 1955 Engine No. V-318,899 (Early 1st Series).
⑤—After 1955 Engine No. V-318,899 (Late 1st Series).
⑥—1955 2nd Series. *See "Starting Engine Numbers" for 2nd Series on Car Model pages.*

►**STARTING ENGINE BY PUSHING CAR: Turn ignition key ON, depress and release accelerator pedal once (to set automatic choke), place transmission selector lever in Neutral "N" position. Push car until speed of 15-20 MPH. is reached, then move selector lever to Drive "D" or Low "L" position.**
CAUTION—Pushing to start engine recommended rather than towing (car may overtake tow car).

►**TOWING CARS WITH AUTOMATIC TRANSMISSION: Place transmission selector lever in Neutral "N" position and do not tow car in excess of 30 MPH.**

►**TRANSMISSION SERIAL NO. NOTE—Separate Torque Converter Nos. and Transmission Nos. used:**

Torque Converter—Stamped on engine side of flywheel adjacent to flywheel ring gear.

Transmission—On metal plate on left side of transmission case below oil level gauge.

►*1951 COMMANDER ACCELERATOR LINKAGE CHANGE (Serial No. 8133626 Up):* Following parts changed to provide smoother accelerator operation: Accelerator Bell-Crank Lever & Bracket Assembly, Accelerator Bell-Crank Lever-to-Transmission Rod, Accelerator Cross Shaft Assembly.

►*CAUTION—See Linkage Adjustment Directions for connection at this lever (rod must be connected in proper hole and all cars not connected alike).*

►*1951 TRANSMISSION OIL PAN PRODUCTION CHANGE:* Beginning Champion Serial No. 20171, Commander No. 45792, oil pan reinforced flange used. This pan requires ⅛" longer oil pan screws and can be installed on earlier cars if Kit No. 529975 used (includes 14 new longer screws No. 31-0510).

►*1951-52 REPLACEMENT TRANSMISSION DESIGN CHANGES*—Several changes have been made in design and should be noted when installing these assemblies:

Parking Brake Pawl Pivot Pin Case Change Beginning Trans. Serial No. SCO-124103 (1951-52 Commander), No. SCO-1715R (1950 Commander), No. SCH-35085 (1950-52 Champion). As follows:

(1) Parking pawl pivots provided with 5/16" x 24 tapped hole in end to facilitate removal.
(2) Extension cases which have through pivot pin hole in case have blind bushing installed on open side.
(3) "O" ring omitted from parking pawl pivot pins ("O" ring groove retained for interchangeability of parts).

NOTE—Complete extension case assemblies are interchangeable regardless of above changes.

Parking Pawl Toggle Arm Fiber Washer—Beginning Trans. Serial Nos. SCO-124523 (1951-52 Commander), No. SCO-1804R (1950 Commander), No. SCH-35086 (1950-52 Champion). A fiber washer is installed on parking pawl toggle arm splined shaft (between pawl and rear of extension case) to align linkage and prevent bindings. ***CAUTION—This washer must be re-installed in all transmissions in which it is found on disassembly (see NOTE following for use of STEEL washer).***

Parking Pawl Toggle Arm Steel Washer—Beginning Trans. Serial No. SCO-133019 (1951-52 Commander), No. SCO-2119R (1950 Commander), No. SCH-37545 (1950-52 Champion). STEEL washer used in place of fiber washer (above). This steel washer or similar washer .067-.071" thick must be used on parking pawl toggle arm splined shaft on these transmissions.

CAUTION—Steel washer cannot be used to replace fiber washer used in previous transmissions.

►*STUDEBAKER ERRATIC MULTIPLE CLUTCH ACTION CORRECTION:* May be caused by oil distributor tube being loose or improperly located. This aluminum distributor tube is located behind the bronze lubricator valve in the main shaft. Check by visual inspection and if found to be loose or improperly located, replace main shaft assembly. Distributor tube is not serviced separately.

►*STUDEBAKER FAILURE TO MOVE FORWARD (AFTER REVERSE OPERATION) CORRECTION:* May be caused by loss of front oil pump prime. The loss of front oil pump prime is caused by rear pump blowing air out of rear pump inlet hole and at the same time blowing oil away from front pump inlet hole. To check and correct this condition, take front pump pressure after a long reverse operation. If pressure is zero, remove rear oil pump cover and idler gear. Reinstall rear pump cover and again operate car in reverse. After stopping, shift to "D" or "L" position. Car should now move forward under acceleration. This will confirm that the condition described above is the cause of the forward operation condition. Reinstall rear oil pump idler gear. To correct, remove transmission oil pan and screen and install a new screen with baffle. Before replacing oil screen shroud, drill a ⅛" hole at a point ½" above and slightly to the left of the smaller of the two rectangular holes in the shroud (this will place the hole approximately in the corner of the shroud near flanged edge).

►*HUDSON "BUZZING" CORRECTION:* Increasing the amount of fluid in the transmission *(See "Oil Level Change" below)*, will in most cases correct this condition. On transmissions with Serial No. HA-4275 and lower, where the increased oil capacity does not correct the condition, it will be necessary to install the later type Front & Rear Pump Relief Valve *(See "Front & Rear Pump Relief Valve Production Change" below).*

►*OIL LEVEL CHANGE (ALL HUDSON AUTOMATIC TRANSMISSIONS):* Increase the oil capacity from 11 qts. to 12 qts. A new dipstick, with revised markings has been released for service replacement and later production cars.

►*HUDSON BAND ADJUSTING SCREW PRODUCTION CHANGE:* Beginning with transmission Serial No. HA-9930, a new band adjusting screw is being used in production and for service replacement on older transmissions. The brake anchor strut has also been revised to use the new screw. When replacing the adjusting screw with the later type, it will be necessary to also use the revised anchor strut. The early type adjusting screw can be used with the revised anchor strut. Later type adjusting screw is identified by the ½" radius between threaded portion and screw head.

►*HUDSON DETENT SPRING PRODUCTION CHANGE:* Beginning with transmission Serial No. HA-10109, a new detent spring, Part No. 311892, is used to provide a more positive selector lever positioning.

►*HUDSON FRONT OIL PUMP COLLECTOR RING PRODUCTION CHANGE:* A one-piece alloy iron collector ring replaces the two-piece type formerly used in production and for service replacement.

►*HUDSON REAR PLANET CARRIER PRODUCTION CHANGE & REPLACEMENT PARTS CAUTION:* Beginning with transmission Serial No. HA-6005 a new rear planet carrier assembly entered production. The new planet carrier, Part No. 311406, can be used for service replacement on earlier transmissions when Spacer Washer, Part No. 311412 is also used. The later type carrier can be identified by the machined counterbore in rear hub face to receive the spacer washer.

►*TRANSMISSION ASSEMBLY SERVICE REPLACEMENT CHANGE (1951 TO 1953 COMMANDER)*—Service replacement transmission assembly (with "Part Throttle Downshift") Part No. 533568 used on 1953 Commander Models, replaces service transmission Part No. 529973 previously furnished for replacement on 1951 & 1952 Commander Models.

►*EXTENSION CASE ASSEMBLY REPLACEMENT NOTE (COMMANDER)*—Extension Case assembly, Part No. 529984 is furnished as service replacement for all 1951 to 1953 Commander models. *See "Part Throttle Downshift" option (with service replacement extension case) following.*

►*"PART THROTTLE DOWNSHIFT" OPTIONAL WITH SERVICE REPLACEMENT EXTENSION CASE (1951-52 COMMANDER MODELS)*—Extension case assembly can be installed to provide "Part Throttle Downshift" if desired. Extension case is furnished with the direct drive lock-pawl in place, and to prevent "Part Throttle Downshift," install extension case exactly as received. To retain, or convert to "Part Throttle Downshift," remove the Direct Drive Lock-up Pawl (located directly below transmission main shaft bearing bore on machined face of extension assembly).

►*EXTENSION CASE REPLACEMENT (1953 COMMANDER)*—Direct Drive Lockup Pawl must be re-

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

moved before installation of extension case assembly service replacement (see "Part Throttle Downshift Option" above).

▷*1955 SLOW REVERSE ENGAGEMENT CORRECTION (When shifting from either "D" or "L" range to "R" range):* There are two possible causes for the condition, both of which require rework of valve block assembly. *See "Sub-Assembly Overhaul" below.*

▷*1955 REMOTE CONTROL SHIFT LEVER ENDPLAY & LOOSENESS CORRECTION:* A new spacer is available for replacement in the remote control gearshift lever spring housing. Installation of this later type spacer will reduce endplay and looseness, and will make it easier to make proper adjustment.

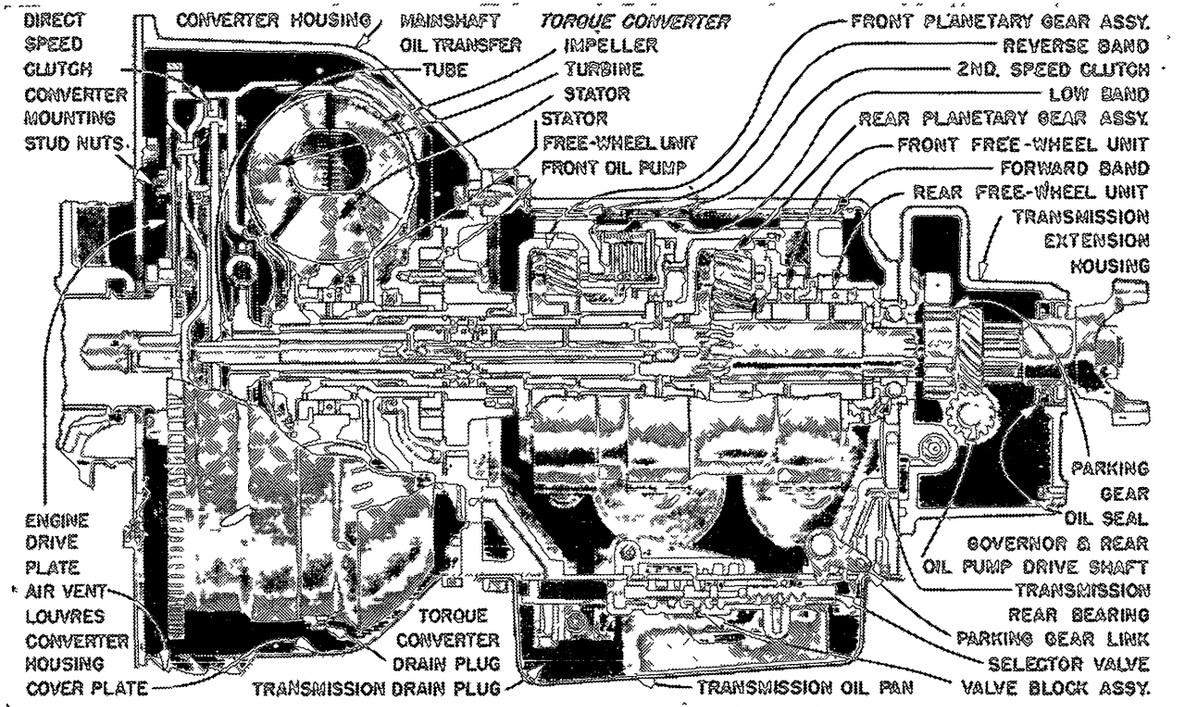
▷*1950-55 MULTIPLE DISC CLUTCH SERVICE REPLACEMENT CAUTION & 1955 PRODUCTION CHANGE:* Sintered friction discs and flat separator plates are used in 1955 production and for service replacement on all 1950-55 models. Previously the separator plates were slightly "dished." The early type friction discs were thicker, therefore when installing the new type discs in early transmissions it is necessary that Spacer Plate, Part No. 537720 be used. When it is necessary to replace either a disc or a disc plate, all discs and plates should be replaced in complete sets.

▷*1955 CONVERTER VALVE PRODUCTION CHANGE:* Starting with the following transmission serial numbers, the converter valve was changed so that the shuttle valve is regulated by the multiple disc clutch pressure instead of direct drive clutch pressure. Serial numbers SCH-2101 (DG-150M Trans.), SP-10801 (DG-250M Trans.), this change made to provide a more positive shift from drive-intermediate into direct drive. The converter pressures with the later type valve is 50-70 lbs., in low gear, and 20-30 lbs., in drive-intermediate or direct drive.

▷*1955 COMMANDER & PRESIDENT LOW UPSHIFT & LOW "KICK-DOWN" SPEED CORRECTION:* If transmission has a low upshift speed (approx. 60 MPH) from drive-intermediate to direct drive at full throttle "kickdown" or a low maximum "kickdown" speed from direct drive to drive-intermediate (approx. 48 MPH) check accelerator-to-governor linkage adjustment and inspect governor spline shaft and governor valve for burrs or roughness, smoothing up parts as necessary. *NOTE*—If correction cannot be made as indicated above, install a new governor tension spring, Part No. 537066 (free length 2 21/32").

DESCRIPTION

Transmission consists of Torque Converter Assembly (torque converter and Direct Speed Clutch) and a planetary type transmission (3-speed and Reverse) which is hydraulically controlled. Transmission has a pawl-and-gear Parking lock mechanism (Studebaker models are fitted with an electrically controlled, solenoid operated "Anti-Creep" device by which the brakes are held "ON" while car is standing. This unit is operative whenever ignition switch turned on). Direct drive clutch is hydraulically operated, and consists of driven member, backing plate and a hydraulically operated pressure plate. Oil pressure to direct drive clutch, locks these three units together allowing engine torque to be transmitted directly to rear wheels.



STUDEBAKER AUTOMATIC TRANSMISSION SECTIONAL VIEW

▷Champion & Commander Differences: Transmissions are similar but have following differences:

Torque Converter—11" diameter (Champion), 12" (Comm.). Direct Drive Clutch is also proportionately smaller on Champion. Torque converter cooling air intake has screened opening on left side (Champion), flexible air duct (Comm.).

Transmission Oil Capacity—Approx. 9½ qts. (Champion), 11½ qts. (Comm.). *See Lubrication data.*

Low Band Servo—Single piston type (Champion), double piston type (Comm.).

Planetary Multiple Disc Clutch—Three-disc type (Champion), four-disc type (Comm.).

Extension Housing—Champion governor extension housing does not have direct drive latching mechanism (used on Comm.), and has heavier governor spring. Speedometer pinion has 27 teeth (Champion), 24 teeth (Comm.).

Torque Converter & Direct Speed Clutch: Assembly is mounted in a case which replaces the flywheel used on cars with standard transmission and consists of the units listed below. Torque converter is air-cooled by air drawn in through duct on left side of case (vanes on outer surface of converter case circulate air) and discharged through louvres on bottom of housing. Torque converter and direct speed clutch action is automatic and controlled by the hydraulic system (see Operation—below, and Hydraulic Circuit illustration).

Converter Impeller (Driving Member)—Integral with rear section of converter case bolted on engine drive plate on end of crankshaft. Impeller is supported at rear end by sleeve extending through bushing in forward end of front oil pump housing (behind oil seal). This sleeve engages the inner gear of the front oil pump and drives the pump. Impeller rotates at engine speed.

Turbine (Driven Member)—In converter case directly in front of impeller and driven by oil flow from the impeller. Turbine hub is splined on tubular driveshaft which is integral with the front planetary ring gear so that power is transmitted to this unit when the converter is operating.

Stator (Stationary Member)—Consists of a set of curved vanes placed between the inner ends of the turbine and impeller vanes. Stator is mounted on a free-wheeling unit which is mounted on a stationary shaft carried in the front retainer of the transmission case. Stator is locked or held stationary when unit is operating as a torque converter and acts to "boost" the oil returned to the impeller thus supplying the torque multiplication. When turbine speed equals impeller speed, stator rotates freely with the other members (rotation permitted by free-wheel unit) without any torque multiplication.

Direct Drive Clutch—Consists of a hydraulically operated single plate clutch in forward end of torque converter housing. Clutch driven member is splined on forward end of transmission mainshaft and clutch driving plates are locked in converter housing (plates engage dowels and studs in housing), so that the transmission mainshaft is driven directly by the crankshaft when the clutch is engaged, thus locking out the torque converter. Clutch

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STUDEBAKER AUTOMATIC TRANSMISSION (C nt.)

is engaged hydraulically by oil under pressure in chamber in front of forward pressure plate (oil enters and leaves this chamber through oil channel in hollow mainshaft).

Planetary Transmission: Consists of planetary gear sets, bands, and servo mechanisms, multiple disc clutch, free-wheeling units, governor, oil pumps, and control valves located in transmission case.

Front Planetary Unit & Clutch—Gears are conventional (inner sun gear, planetary pinion assy. and outer ring gear) with outer ring gear driven by torque converter turbine, planetary pinion assembly driving rear planetary ring gear, and sun gear controlled by Low Band and Multiple Disc Clutch. Sun gear is held stationary by the Low Band (in Low position) so that power is transmitted through the gears, or is locked to the planetary pinion assembly by the multiple disc clutch (in Intermediate and Direct positions) so that the entire planetary unit revolves as an assembly to transmit power directly without gear reduction. In reverse position, the planetary pinion assembly is held stationary by the Reverse Band and power is transmitted through the gears and in a reverse direction.

Rear Planetary Unit—Gears are conventional (inner sun gear, planetary pinion assy. and outer ring gear) with outer ring gear driven by front unit planetary pinion assembly, planetary pinion assembly driving transmission mainshaft (pinion plate splined on shaft), and sun gear controlled by the Low Band or Forward Band through free-wheel units on the gear hub. Sun gear is held stationary by the Forward Band in all forward speeds (Low, Intermediate, and Direct positions) so that power is transmitted through the gears with these modifications: In Intermediate position, the forward free-wheel unit permits the front planetary unit (which is locked out) to over-run the rear planetary sun gear (which is held stationary). In Direct drive position, gears are by-passed by the engagement of the Direct Speed Clutch and the sun gear turns freely with the other gears although the Forward Band is applied (this rotation permitted by the rear free-wheel unit in the forward band drum hub). In Reverse position, the sun gear is driven by the front planetary unit and the ring gear is held stationary by the Reverse Band (along with the front planetary pinion assy.) so that power is transmitted through the planetary pinion assembly.

Parking Brake Mechanism—Consists of a pawl controlled by the transmission selector lever which engages a gear on the rear end of the transmission mainshaft and locks the shaft when selector lever is placed in Parking "P" position. An interlock piston (see illustration) operating from oil pressure supplied by the rear oil pump prevents engagement of the pawl if car is moving forward at speed greater than 3-5 MPH. to prevent accidental engagement of the parking lock.

Anti-Creep System (Studebaker Only): Consists of a solenoid controlled valve in the hydraulic brake line to the rear wheels which is controlled by the pressure switch in the transmission and an Idle Adjustment Screw Switch on the carburetor (replaces regular throttle stopscrew) or on accelerator across shaft bracket.

See "ANTI-CREEP" in Brake Section for data.

Oil Pumps: Two pumps used to provide oil pressure for hydraulic controls, oil supply for torque converter, and transmission lubrication:

Front Pump—External-internal gear type, in front of transmission case and driven by the engine. Pump starts to operate as soon as engine started and supplies oil to torque converter and for transmission lubrication. Also supplies oil pressure for hydraulic controls during Idling, Low Speed, and Reverse operation. Pump pressure is controlled by Front Pump Relief Valve.

Rear Pump—Mounted externally on right side of transmission extension housing and driven from same cross-shaft as governor. Pump is driven from the propeller shaft and operates whenever rear wheels are turning. Supplies oil pressure for transmission operation when pushing car to start engine, and at higher car speeds (when rear pump takes over, rear pump relief valve by-passes front pump output to oil pan so that front pump idles).

Hydraulic Controls: Consist of a governor in the transmission extension housing, and a valve assembly contained in the Valve Block mounted on lower face of transmission case within oil pan.

Governor—Fly-ball type. Actuates governor valve to control Direct Speed Clutch operation. A governor lever is linked to the accelerator linkage so that governor action can be overridden for "kick-down" to intermediate gear, or upshift to Direct speed delayed by the operator.

Front Pump Relief Valve—Regulates front pump pressure at 80 lbs. for all forward driving ranges (P, N, D, L) and boosts pump pressure to 200 lbs. for reverse (R) operation.

Rear Pump Relief Valve—Regulates rear pump pressure at 80 lbs. Also by-passes front pump output to oil pan (so that front pump idles) when rear pressure sufficient to operate transmission.

Converter Valve—Supplies oil to converter assembly at pressure of 27 lbs. to maintain oil level.

Selector Valve—Linked to transmission selector lever on steering column and controls oil pressure supply to servo mechanisms, multiple disc clutch, and direct drive clutch as required for operation in each range (P, N, D, L, R depending on selector lever position).

Reverse Shuttle Valve—Provides for smooth engagement of reverse band. *NOTE*—Reverse shuttle valve is not used on 1954-55 Champion models. An orifice in the reverse servo plate provides the smooth engagement of the reverse band.

Reverse Interlock Valve—Prevents application of reverse band when car is moving forward.

Parking Interlock Piston—Blocks engagement of parking gear pawl when car is moving forward and prevents accidental engagement of parking lock.

OPERATION

Torque Converter Assembly automatically provides a torque multiplication ranging from 2.16-1 (maximum when turbine stationary and impeller turning at 1450 RPM. or normal stall speed) to 1-1 (when turbine and impeller speeds approximately equal. At car speed of 18 MPH. (depending on throttle position—see table), engagement of Direct Speed Clutch locks out the torque converter completely. The planetary transmission is controlled by the operator and provides the following gear ratios:

Neutral "N" Position—All bands and clutches are released so that no power is transmitted through transmission. Car can be moved freely if brakes not applied (will be held on by Anti-creep after they have once been applied but can be released by turning ignition off or by opening the throttle).

Low "L" Position (used primarily for extra power on steep grades, engine braking when descending grades, fast acceleration from standing start, or "rocking" car out of sand or snow). The Low and Forward bands are applied and power is transmitted through both planetary gear sets in tandem providing a total ratio of approximately 4.6-1 (converter torque multiplication of approximately 2-1 plus gear reduction of 2.3-1).

►***OPERATION CAUTION*—When Low used for engine braking on grades, car speed should b brought below 40 MPH. before moving selector lever to "L" position. When Low used for fast starts, selector lever should be moved to "D" position bef re reaching car speed of 40 MPH. and without releasing acc lerator.**

Drive "D" Position (Model DG-200 Trans.)—Provides two ratios depending on car speed and throttle position as follows: ***(Intermediate)*—**Forward Band & Multiple Disc Clutch applied so that forward planetary gear set is locked out and power is transmitted through rear planetary gear set providing a total ratio of approximately 2.9-1 (converter torque multiplication of approximately 2 to 1, plus gear reduction of 1.4-1). ***(Direct)*—**The Direct Speed Clutch engages and this locks out the Torque Converter and also the Planetary Gear unit to provide positive drive of 1 to 1. ***(Direct-to-Intermediate Downshift)*—**At car speeds below approximately 60 MPH, the transmission can be "Kicked-Down" from Direct to Intermediate for additional power for hill climbing on passing by fully depressing accelerator pedal. Transmission will remain in Intermediate until throttle released momentarily or Lockout Speed reached.

Drive "D" Position (Models DG-150 & DG-150M Trans.)—Provides for three automatic forward drive range as follows: ***(Low)*—**Forward Band applied, locking forward drive drum to transmission case. All other units free to rotate. ***(Intermediate)*—**Forward Band & Multiple Disc Clutch applied. ***(Direct)*—**Direct Speed Clutch engages and this locks out the Torque Converter and also the Planetary Gear unit to provide a direct drive. ***(Direct-to-Intermediate Downshift)*—**At car speeds below approximately 60 MPH, the transmission can be "Kicked-Down" from Direct to Intermediate for additional power by fully depressing the accelerator pedal. Transmission will remain in Intermediate until throttle released momentarily or Lockout Speed reached.

Drive "D" Position (Models DG-200M & DG-250M Trans.)—Provides for three automatic forward drive ranges as follows: ***(Low)*—**Forward Band & Low Band applied. ***(Intermediate)*—**Forward Band & Multiple Disc Clutch applied so that forward planetary set is locked out and power is transmitted through rear planetary gear set. ***(Direct)*—**Forward Band, Multiple Disc Clutch & Direct Drive Clutch applied locking out the Torque Converter and forward planetary set to provide a direct drive. ***(Direct-***

CONTINUED ON NEXT PAGE

STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

to-Intermediate Downshift)—At car speeds below approximately 60-64 MPH, the transmission can be "Kicked-Down" from Direct to Intermediate for additional power. Transmission will remain in Intermediate until accelerator pedal momentarily released or Lockout Speed reached. *(Low-to-Intermediate Downshift)*—At car speeds below 10-12 MPH, the transmission can be "Kicked-Down" from Intermediate to Low by fully depressing the accelerator pedal. Transmission will remain in Low until pedal momentarily released or car speed exceeds Lockout speed.

Reverse "R" Position—Reverse band is applied in two stages ("boosted" oil pressure of 200 lbs. on servo inner piston applies band, shuttle valve then directs oil pressure to servo outer piston also to assist band in absorbing the high reaction torque). Power is transmitted through both planetary units in tandem to provide reverse rotation and a total ratio of approximately 4-1 (converter torque multiplication of 2-1 plus gear reduction of 2-1). *(1954-55 Champion Note*—Shuttle valve not used. A restriction in reverse servo plate replaces the shuttle valve).

Parking "P" Position—Similar to neutral position (all bands and clutches released) and in addition the parking pawl (linked to selector lever) is engaged in parking gear on rear end of mainshaft so that propeller shaft and rear wheels locked.

▷Holding on Hills Note—With selector lever in Drive "D" Position and engine running, the transmission prevents rollback when car is stopped on normal upgrades. This is due to action of free-wheeling units which prevent reverse rotation of transmission main shaft when multiple disc clutch and forward band are engaged.

Anti-Creep System—System consists of Solenoid valve (located on brake master cylinder), which holds pressure on rear wheel brake whenever anti-creep circuit is closed. A Pressure Control Switch (located on rear of transmission extension case), which is operated by rear pump pressure to open anti-creep circuit when car is moving forward and to close this circuit when car is stationary or moving in reverse. The anti-creep Release Switch (located in engine compartment, adjacent to throttle linkage), opens and closes anti-creep circuit as accelerator pedal is depressed or released.

LUBRICATION

Check transmission fluid every 1000 miles and add fluid as required to maintain level at "Full" mark on dipstick. Drain and refill every 15,000 miles.

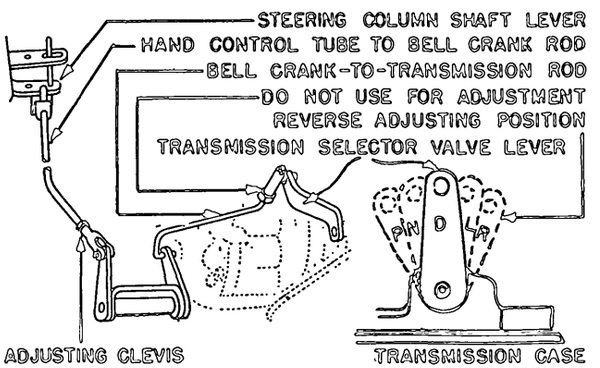
▷*FLUID LEVEL CHECKING NOTE (To obtain accurate level reading): To prevent oil spray and torque converter drain-back, causing inaccurate dipstick reading, fluid level must be checked as indicated below, immediately after engine stopped.*

Checking Fluid Level—With car on a level floor, set hand brake firmly. Place selector lever in "L" position and allow engine to warm up to normal operating temperature and then run engine at idle speed. Clean area around inspection hole and top of fluid level gauge. Remove gauge and wipe it dry. *Stop engine and immediately insert and withdraw gauge.* If any additional fluid is required, add it and then repeat the checking procedure. Use only Automatic Transmission Fluid Type "A," bearing an AQ-ATF symbol on container.

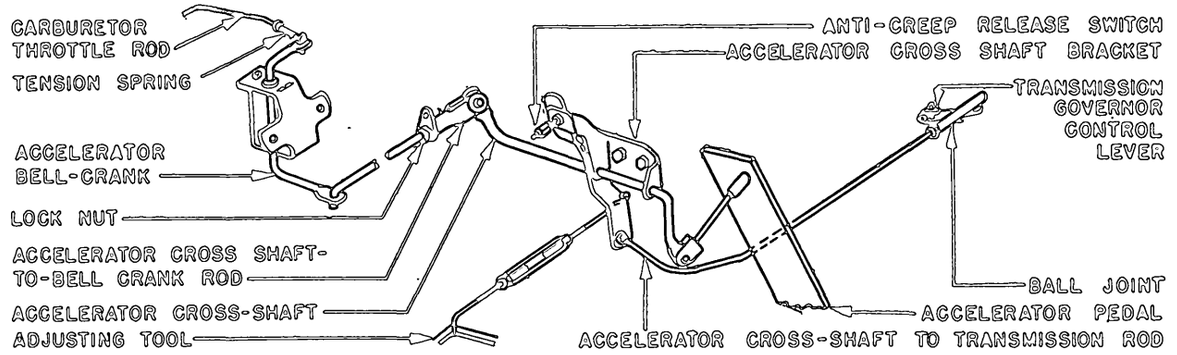
▷*CAUTION: Under no circumstances should transmission be filled above "Full" mark on dipstick.*

Draining & Refilling—Oil must be warm (set parking brake, place selector lever in "L" position, idle engine until normal operating temperature reached). Stop engine, remove inspection hole cover in front floor carpet, clean all dirt from around inspection hole, remove oil level gauge dipstick. Drain transmission oil pan by removing drain plug at left front corner of pan. Remove converter housing lower cover plate, turn converter until drain plug down, drain converter by taking out this plug (draining facilitated by removing converter pressure take-off plug on left side of transmission case. If two plugs on case (early type), remove upper plug. If only one plug (later type) located at bottom of boss, remove this plug. Re-install all drain plugs, install converter housing plate. Install 5 quarts oil (all models), through the dipstick hole in top of transmission case. Start engine and allow to idle for approximately 1 minutes with selector lever in "L" position to fill converter housing, then add 3 additional quarts of oil, finally check oil level with engine idling and selector lever in "L" position, add oil to bring level up to FULL mark on dipstick.

Oil Pan & Oil Screen Removal & Installation: Drain transmission case (see above).



SELECTOR CONTROL LINKAGE (ALL MODELS)



CHAMPION ACCELERATOR LINKAGE

Removal & Cleaning—Remove parking brake bellcrank from crossmember under transmission case (not necessary on Champion). Remove all oil pan capscrews, remove oil pan. Remove spring clip holding oil screen in screen housing on bottom of valve block assembly, remove screen and clean with compressed air.

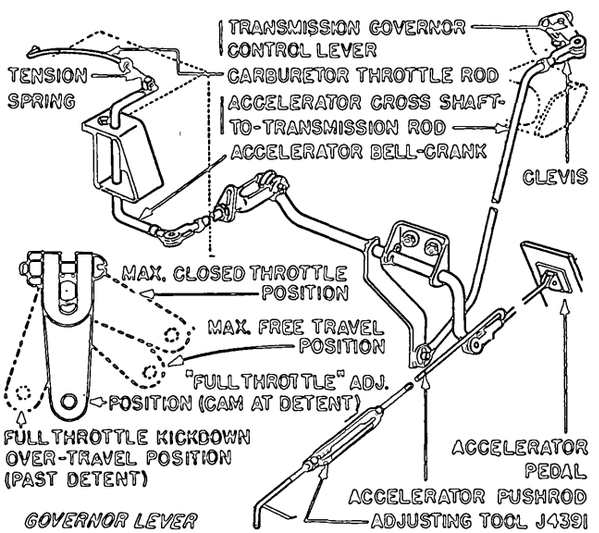
Installation—Install oil screen in housing and see that spring clip installed properly to hold screen in place. Use a new pan gasket but DO NOT use any type of sealing compound when installing pan (heavy mineral grease or Lubriplate may be used to hold gasket in place). Tighten all oil pan mounting screws to 10-13 ft.lbs. Install parking brake bellcrank.

LINKAGE ADJUSTMENT

▷*LINKAGE ADJUSTMENT CAUTION—Champion and Commander Accelerator Linkage adjusted differently as follows:*

Accelerator-To-Carburetor Linkage Adjustment (Champion 1950-55): Make certain that engine idle

CONTINUED ON NEXT PAGE



1950 COMMANDER ACCELERATOR LINKAGE

STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

speed set at 500-550 RPM (engine at normal operating temperature with choke valve wide open and fast idle inoperative).

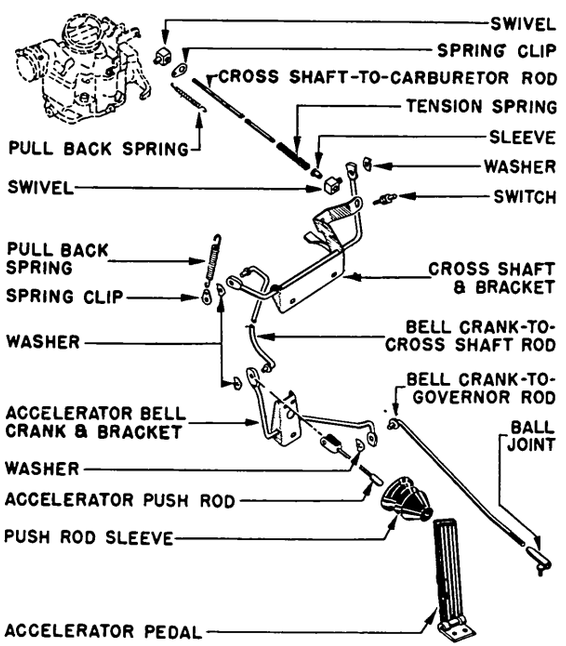
1) Disconnect accelerator cross shaft-to-bellcrank rod by removing clevis pin at cross shaft end of rod. Disconnect wire at Anti-creep Switch on cross shaft bracket.

2) Hold contact plate on cross shaft lever firmly against end of Anti-creep Switch, measure distance between contact plate and cross shaft bracket. If this measurement not ¼", adjust switch by loosening locknut and turning switch in or out of bracket, tighten locknut after correct ¼" clearance secured.

NOTE*—If ¼" clearance cannot be secured by adjusting switch, disconnect accelerator cross shaft-to-transmission rod at transmission end and check push rod and cross shaft for interference. *Do not bend contact plate or cross shaft bracket to secure correct switch setting.

3) Connect accelerator cross shaft-to-bellcrank rod by installing clevis pin but do not install cotter pin at this time. Make certain that carburetor throttle valve in fully closed position (stopscrew on low end of fast idle cam and choke valve wide open).

4) With accelerator control fully released, and carburetor throttle in fully closed slow idle position, check position of spring-loaded swivel on accelerator bellcrank end of carbureor throttle rod. Swivel should be close to but not touching the swivel sleeve on the carburetor side of the rod. If swivel position not correct, disconnect accelerator cross shaft-to-bellcrank rod by removing clevis pin, loosen locknut on bellcrank rod clevis, adjust clevis on rod until carburetor rod swivel position is correct, tighten clevis locknut, connect bellcrank rod and install clevis cotter pin.



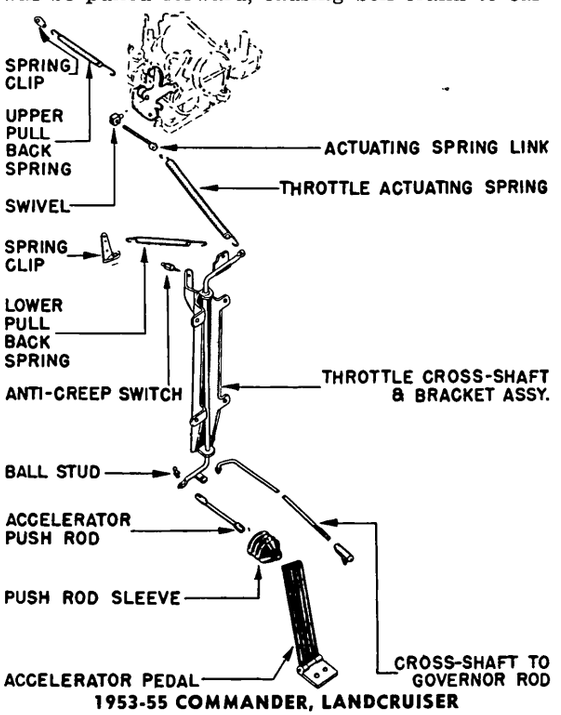
1951-52 COMMANDER THROTTLE LINKAGE

5) Place selector lever in Park "P" position. Set Adjusting Tool J-4391 at maximum length, hook one end of tool over cross shaft lever to which the transmission rod is connected, hook opposite end of tool over upper right rear corner of battery box (this will rotate lever and partially open carburetor throttle). Shorten tool length by turning the turnbuckle until carburetor throttle valve is just wide open (at this point further movement will compress spring on throttle rod without changing throttle position). Leave tool in place to hold throttle linkage in this position while making adjustments outlined under "Accelerator-To-Governor Linkage Adjustment" below.

Accelerator-To-Carburetor Linkage Adjustment (Commander 1950): Set engine idle speed to 500-550 RPM. (Warm engine with choke valve wide open and fast idle inoperative). Then proceed as follows:

1) With accelerator pedal fully released, measure distance between the center of the clevis pin at accelerator cross-shaft and flat portion of the firewall (not at the rib). This distance should be 3 1/16". Adjust the distance, if necessary, by turning clevis at accelerator pedal lever.

2) With Accelerator-to-Transmission Control Adjusting Tool No. J-4391 at its maximum length, install the tool between lower end of accelerator push rod just above the fixed clevis and lower right rear corner of battery box. In doing so, the push rod will be pulled forward, causing bell crank-to-carburetor throttle rod to partially open carburetor throttle valve.



1953-55 COMMANDER, LANDCRUISER & PRESIDENT THROTTLE LINKAGE

3) Adjust length of tool by turning turnbuckle until accelerator push rod is brought forward just enough to put carburetor throttle valve in its wide open position. This position is the point at which the bell crank-to-carburetor throttle rod reaches the end of its travel and any further forward motion of pushrod only results in compressing the overtravel spring on bell crank-to-carburetor rod. NOTE—Accelerator linkage must be held exactly at this position to allow a correct setting of accelerator cross shaft-to-governor control linkage. Leave tool in place while making adjustments outlined under "Accelerator-To-Governor Linkage Adjustment" below.

Accelerator-To-Carburetor Linkage Adjustment (Commander 1951-52): Loosen anti-creep release switch locknut. Disconnect wire from switch and back off switch a few turns. Adjust engine idle speed to 500-550 RPM (Warm engine with choke valve wide open and fast idle inoperative).

1) With accelerator fully released and throttle stop screw on low step of cam, check clearance between end of cross shaft-to-carburetor rod and the firewall. This clearance should not be less than ⅛" and not more than ¼". This measurement must be made between end of rod and reinforcing rib of firewall. If clearance is not within limits, loosen locknut and adjust length of rod.

2) After making linkage adjustment, adjust position of the anti-creep release switch. Screw switch into bracket until plunger just contacts the plate when accelerator pedal is fully released. Install wire, turn on ignition, and adjust the switch as required until a click is heard in the solenoid. Tighten locknut.

3) Use special tool hooked over accelerator pedal shaft and into hole in cowl flange directly above wiring harness to hold carburetor throttle valve in wide open position (this tool must be made up in shop) or hold accelerator linkage in this wide open position as follows: Disconnect accelerator pull back springs, place sufficient weight on accelerator pedal to fully open carburetor throttle valve but make certain over-travel spring on cross-shaft-to-carburetor rod not compressed (swivel sleeve on rod should just start to move away from washer).

NOTE—Leave tool in this position while making adjustments outlined under "Accelerator-To-Governor Linkage Adjustment" below.

Accelerator-To-Carburetor Throttle Linkage Adjustment (Commander & Landcruiser 1953-54): Adjust engine idle speed to 500-550 RPM (engine at normal operating temperature with choke valve wide open and fast idle inoperative).

►***ACCELERATOR CROSS SHAFT-TO-CARBURETOR ACTUATING SPRING PRODUCTION CHANGE (To Correct Unintentional Engagement of Kickdown):*** A new stiffer spring Part No. 534230 (painted green) will be used in production, and can be used on earlier models to assure proper "feel" of accelerator pedal and prevent unintentional kickdown. New spring has a load of 9-11 lbs., at 9" length.

1) Place the idle adjusting screw on the fourth step of the fast idle cam (the lowest step being the first step) .Adjust throttle check screw until it just contacts the pad on the throttle shaft lever.

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

2) Disconnect anti-creep release switch wire at switch. Remove anti-creep release switch from accelerator bellcrank bracket. Leave all three springs attached.

3) Loosen the two threaded locknuts (for adjusting throttle actuating spring tension) several turns. Hold cross-shaft arm against bracket and at the same time tighten forward locknut on threaded rod until spring is taut. The idle adjusting screw will just start to break contact with lower step of fast idle cam. Back off forward threaded rod lock nut just enough to let the idle adjusting screw lightly contact low step of fast idle cam.

4) Install anti-creep release switch in cross shaft bracket. Turn it in until idle adjusting screw again starts to break contact with low step of fast idle cam. Back off anti-creep switch 3 complete turns and secure with locknut.

5) Back off the forward threaded rod locknut 3 complete turns. This will allow approximately ⅛" to 3/16" sag in throttle actuating spring. Tighten the rear threaded rod locknut.

6) Throttle valve must be held in the wide open position for Accelerator-to-throttle linkage adjustment (following). Use a piece of ½" x ¾" angle iron 15¼" long. Pull hand brake control handle out 4 or 5 inches. Position the angle iron between hand brake plunger, just forward of handle, and the accelerator pedal. Then slowly push hand brake in until carburetor throttle valve is just to its wide open position. This is the point where any further movement of accelerator pedal will only result in operating the overtravel spring. The angle iron will now hold linkage in this position while governor linkage is adjusted (following).

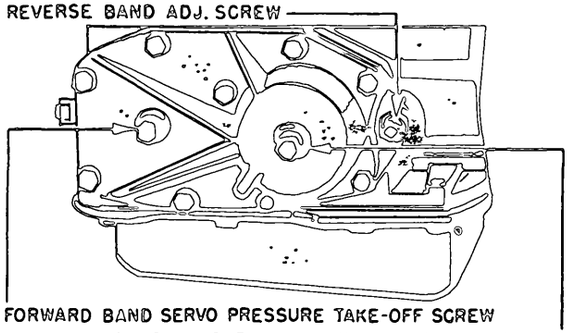
Accelerator-To-Carburetor Throttle Linkage Adjustment (Commander & President 1955): Disconnect anti-creep release switch wire at switch and remove switch from bracket (leave all three springs attached).

1) With selector lever in "P" or "N" position, adjust engine idle speed to 550 RPM with the choke valve wide open. Make sure throttle return check is operating correctly.

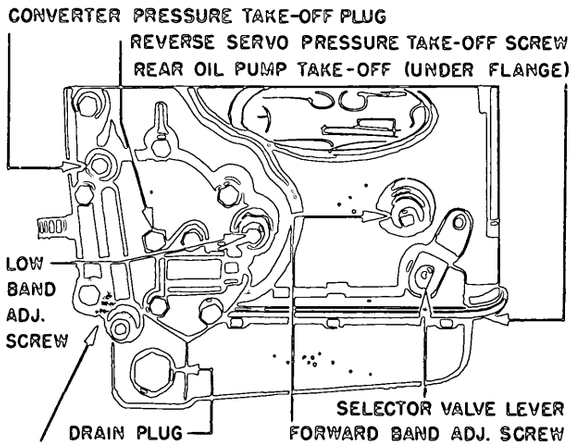
2) Install Anti-creep switch and adjust it in the bracket so throttle actuating spring is taut and the idle adjusting screw just breaks contact at the wide open choke position. Back off Anti-creep switch one-half turn.

3) Loosen throttle return check assembly locknut and adjust assembly in bracket until the plunger just breaks contact with tab on throttle lever. Mark position of the check assembly relative to the bracket, then turn the check assembly 1¾ to 2 complete turns toward the lever. Tighten locknut.

4) Throttle valve must be held in the wide open position for Accelerator-to-Governor Linkage Adjustment (following). Use a piece of ½" or ¾" angle iron 13½" long to hold throttle valve in its wide open position. Pull hand brake control handle out 4" or 5". Position angle iron between hand brake plunger, just forward of the handle, and accelerator pedal. Depress accelerator pedal to near the wide open position and at the same time slide the lower end of the angle iron up near top of accelerator pedal. Then slowly push hand brake in until the carburetor throttle valve is just to its wide open position (this is the point where any further movement of the accelerator pedal will result in operating the over-travel spring). The angle iron will now hold the linkage in this position while accelerator cross shaft-to-governor linkage is adjusted (following).



LEFT SIDE OF TRANSMISSION CASE
CHECKING & ADJUSTING POINTS



RIGHT SIDE OF TRANSMISSION CASE
CHECKING & ADJUSTING POINTS

Accelerator-To-Governor Linkage Adjustment (All Studebaker Models): Disconnect accelerator rod ball joint from governor lever (note whether it is taken from inner or outer hole if lever has two holes). *CAUTION—Ball joint must be installed in OUTER hole on all models, except Commander models prior to 1951 Serial No. 8133626, where the inner hole is used.*

1) Turn governor control lever (on transmission) forward or clockwise until resistance of the detent is felt, then check adjustment of the rod. If the linkage is correctly adjusted, the stud of the ball joint will easily slip into the proper hole of governor lever. If adjustment is required, loosen ball joint locknut and turn ball joint until stud is aligned with proper hole in lever. Make sure that lever is still at point where resistance of detent is felt. After making adjustment, tighten locknut securely. **Do not install ball joint stud at this time.**

3) Remove tool from accelerator pedal, then check linkage as follows:

(a) With floor mat properly in place and accelerator pedal fully depressed (kickdown position), slip ball joint stud out of governor lever and check to make sure that governor lever is at end of its forward travel.

(b) With the accelerator fully released check to make sure there is at least ¼" of free travel of governor lever before spring pressure is felt as it is turned forward. If adjustment is correct, install and tighten ball joint stud.

(c) If full forward travel or the correct amount of free travel of governor control lever is not obtained, recheck linkage adjustment. If proper travel is still not obtained, check for and eliminate any bind, distortion or interference in linkage which would affect proper operation or adjustment. A possible point of interference could be between accelerator bellcrank-to-transmission rod and the car floor pan. Remove front splash pan from frame side rail by removing the small screw and loosening the body bolt, and check for this condition. Correct by bending floor pan out of the way; **do not bend linkage.** Check all linkage mounting bolts for tightness.

Accelerator-to-Governor Linkage Adjustment (Hudson): Set engine idle speed to 490-510 RPM. With carburetor linkage properly adjusted and with engine shut off, hold the throttle control bell crank operating rod so that throttle is wide open. This is point where any further movement would only result in operating the throttle rod over travel spring. Adjust length of governor control rod so when governor lever is held at detent, the trunnion pin will enter bell crank freely (this detent is located approximately 1½" of rod travel from the rear, the resistance felt at ¼" to ½" of travel is the governor spring pick-up and not the detent). Tighten lock nut securely, but do not install cotter pin at this time.

2) Hold accelerator pedal against its stop with pedal jack or other means. With governor control rod pulled forward until governor lever bottoms against its stop in transmission, adjust the accelerator pedal rod length until the governor rod trunnion pin can be entered freely into throttle bell crank. (NOTE—On some Hornet models, it may be necessary to release the accelerator to facilitate adjustment; however, final check should be made with accelerator pedal against its stop, at which time the governor control lever should be at maximum travel). Tighten all lock nuts securely and install cotter pins. Do not make any readjustment of the governor control rod trunnion to accommodate pedal rod adjustment.

Selector Hand Control Linkage (1950-52 Champion & Commander): Adjust as follows:

1) Place selector lever in Reverse position. Remove clevis pin from bellcrank end of steering column tube-to-bellcrank rod.

2) Measure length of bellcrank lever-to-transmission rod. This length must be 7 5/16" (all 1950 cars); 7 9/16" (1951 & 1952 cars—See Note below) measured from center of fixed end of bellcrank (forward end of rod) to center of adjustable joint at trans-

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

mission (rear) end of rod. Adjust by loosening locknut and turning adjustable joint on rod.

►*1951-52 SETTING NOTE*—This 7 9/16" setting supersedes specifications on earlier 1951 cars. Tool J-4602 (for 7 9/16" setting) can be used to make this adjustment if ball joint is turned back one full turn after having been set to 7⅝" with the tool (this will give 7 9/16" setting).

►***CAUTION—After rod length correctly set (above), DO NOT change rod length when making adjustments.***

3) Disconnect steering column tube-to-bellcrank rod by taking out clevis pin at bellcrank, move valve selector lever on transmission case to reverse (extreme rear position). Adjust length of steering column tube-to-bellcrank rod by turning clevis on bellcrank end of rod until clevis pin enters hole in clevis and bellcrank freely (CAUTION—Do not change length of bellcrank-to-transmission lever rod). Do not install clevis at this time.

4) Set selector lever on steering column in Parking "P" position, move selector lever on transmission case to park (extreme forward position) and check to see that parking pawl engaged (propeller shaft should be locked). Check adjustment by slipping clevis pin through clevis at rear end of steering column tube-to-bellcrank rod and bellcrank. If pin enters both holes freely, connect rod. If not, readjust as follows:

5) If adjustment not correct in parking position (4 above) after having been set in reverse position (3 above), readjust rod by turning clevis **not more than ½ turn** in either direction for best possible compromise in both reverse and park position. If satisfactory setting not possible within these limits, check entire linkage for wear, looseness, or distortion.

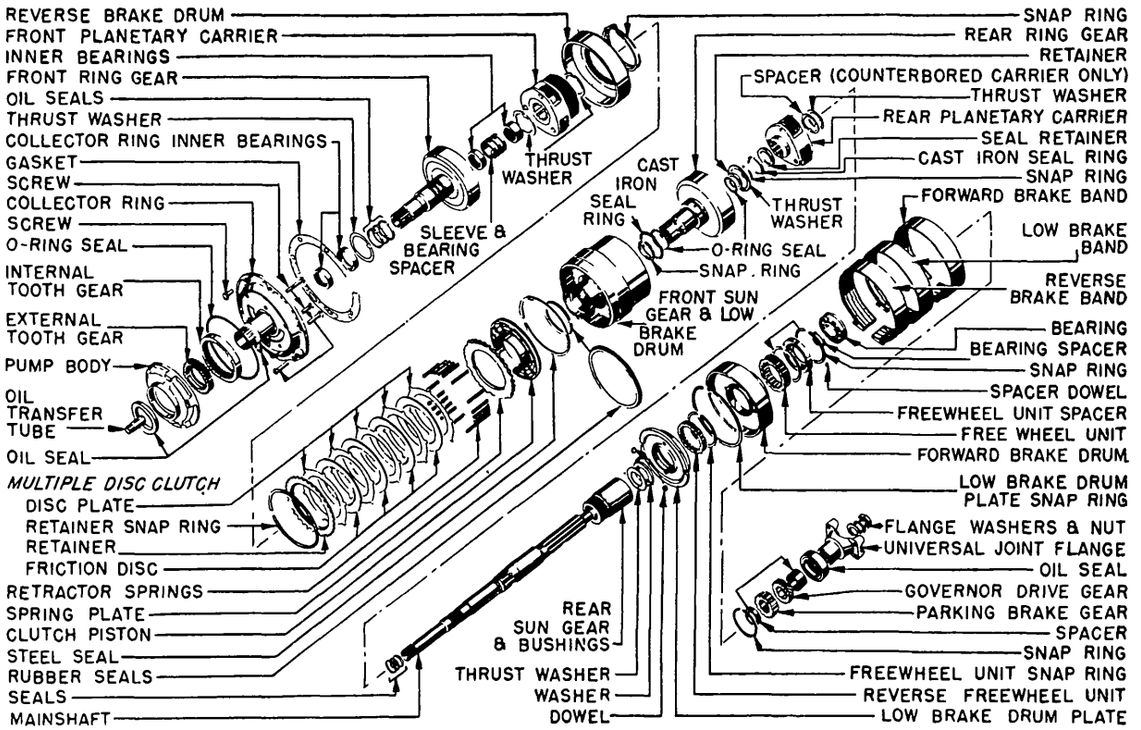
Selector Hand Control Linkage (All Studebaker Models 1953-55): Adjust as follows:

1) Disconnect hand control bellcrank-to-transmission rod from bellcrank and selector control shaft lever.

2) Measure the diagonal distance from center of cotter pin hole at the bellcrank end, to center of ball at the ball joint end. This measurement should be 10 13/16" (for all 2-Door, 4-Door, and Land Cruiser models); 14 7/16" (for all Hard Top Convertibles, and 5-Passenger Coupes). On cars equipped with power steering, measurement should be 10 9/16" (for all 2-Door, 4-Door, and Land Cruiser Models); 14 3/16" (for all Hard Top, and 5-Passenger Coupes). After rod is adjusted, tighten the locknut and install rod. Once set, adjustment of the rod must not be changed during subsequent linkage adjustments.

►***CAUTION—After rod length correctly set (above), DO NOT change rod length when making adjustments.***

3) Disconnect steering column tube-to-bellcrank rod by taking out clevis pin at bellcrank, move valve selector lever on transmission case to reverse (extreme rear) position. Adjust length of steering column tube-to-bellcrank rod by turning clevis on bellcrank end of rod until clevis pin enters hole in clevis and bellcrank freely (CAUTION—do not change length of bellcrank-to-transmission lever rod). Do not install clevis pin at this time.



TRANSMISSION INTERNAL PARTS ASSEMBLY

4) Set selector lever on steering column in Parking "P" position, move valve selector lever on transmission case to park (extreme forward) position and check to see that parking pawl engaged (propeller shaft should be locked). Check adjustment by slipping clevis pin through clevis at rear end of steering column tube-to-bellcrank rod and bellcrank. If pin enters both holes freely, connect rod. If not, readjust as follows:

5) If adjustment not correct in parking position (4 above) after having been correctly set in reverse position (3 above), readjust rod by turning clevis not more than ½ turn in either direction for best possible compromise in both reverse and park position. If satisfactory setting not possible within these limits, check entire linkage for wear, looseness, or distortion.

Selector Hand Control Linkage Adjustment (Hudson): Check upper and lower control tube brackets and make sure they are securely tightened on steering column jacket tube and that selector lever tube is parallel with the jacket tube. Disconnect the transmission shift rod at the selector tube lower level. Place selector control lever against the stop in the "D" position on the quadrant and the selector control shaft outer lever at the transmission in the "D" position (No. 3 detent on the selector valve) and adjust the transmission shift rod until the clevis pin freely enters the clevis of the selector rod and the hole in the selector control lower lever

ANTI-CREEP ADJUSTMENT: For adjustments other than Release Switch (part of linkage adjustment above), *see "Anti-Creep" in Brake Section.*

►***ANTI-CREEP RELEASE SWITCH REPLACEMENT CAUTION—When switch is replaced for any reason, the accelerator-to-transmission control linkage must be checked and adjusted (see Adjustment above).***

BAND ADJUSTMENT

►***CLIMATIZER DUCT INTERFERENCE (Low Band Adjustment) NOTE***—If Band Adjusting Tool J-4285 cannot be used for low band adjustment, because of interference with Climatizer duct, make adjustments as follows: Loosen and back off low band adjusting screw nut. Using a small wrench approximately 5" long, turn adjusting screw in until snug. Then back screw out FOUR COMPLETE TURNS. Tighten adjusting screw locknut securely, making sure that adjusting screw does not turn.

BAND ADJUSTMENT: Check and adjust all bands (Forward, Low, Reverse) in same manner using Band Adjusting Tool J4285 (plug gauge) to check the band setting before making adjustments.

Checking Bands—Remove capscrew and copper gasket from pressure take-off hole in servo mechanism of band being checked (see illustration). Insert tool J4285 into the pressure take-off hole as far as it will go and exert slight pressure to start tool threads in hole (see Caution below if threads do not start readily), screw tool into the hole until tool shoulder rests against transmission case noting that indicator plug in tool handle moves outward as tool is turned in (if plug reaches a position flush

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

with tool handle BEFORE tool turned in fully, see Caution below). Indicator should be FLUSH with end of tool handle when tool fully installed if bands correctly adjusted. If not, adjust bands as directed below.

►*CAUTION*—If tool threads cannot be readily engaged in the Forward Band Servo pressure take-off hole, or if indicator plug reaches a position flush with tool handle before adjusting tool fully screwed into transmission case, **BACK OFF band adjusting screw on opposite side of case 2 turns** before screwing tool fully into position. This is an indication that the band adjustment was too tight and tool will be damaged if indicator plug forced out beyond end of tool handle.

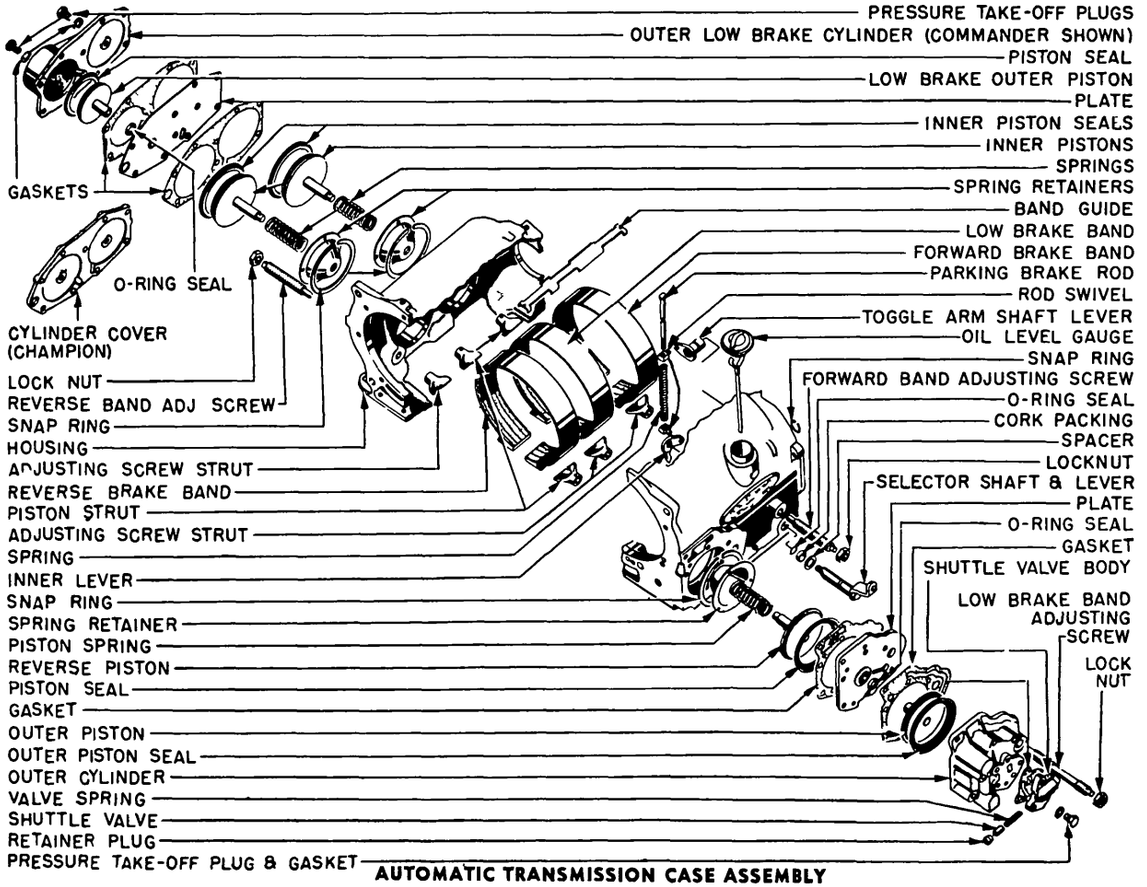
Adjusting Bands—With adjusting tool in place to check band setting (above), loosen locknut on band adjusting screw (see illustration), turn adjusting screw in until indicator plug in adjusting tool handle is just flush with end of handle, tighten locknut being careful that adjusting screw does not turn. Remove adjusting tool and replace capscrew using new copper gasket under screw head.

►***CAUTION—Do not use any type of sealing compound on this capscrew.***

TESTING TRANSMISSION OPERATION

►***CAUTION—When testing with transmission selector lever in one of the driving positions, and with rear wheels held stationary, ENGINE MUST NOT BE OPERATED AT HIGH SPEED for more than 10 seconds, or for a TOTAL time more than ONE MINUTE in any half hour period.***

Hand Control Linkage: With engine running at a speed slightly greater than idle speed, set the hand brake, then place selector lever in "D" position Slowly move selector lever from "D" position to "N" position, noticing change in engine speed The shift to neutral will be accompanied by a sudden increase in engine speed, and should take place just before selector lever reaches detent of "N" position Shift lever to "L" position, then slowly move selector lever to "R" position An increase in engine speed, indicating the shift out of low, should occur when selector lever has moved approximately two-thirds of distance from "L" to "R" Then, when selector moved slightly closer to "R" position detent, the shift into reverse should take place, accompanied by a decrease in engine speed For adjustment see "Selector (Hand Control) Linkage" above.



AUTOMATIC TRANSMISSION CASE ASSEMBLY

1950-EARLY 1954 CHAMPION & 1950-EARLY 1955 COMMANDER

Stall Speed Test: With engine in good operating condition, connect tachometer to engine. Set hand brake, start engine, then move selector lever to "D" position Apply the service brakes, and operate the engine at full throttle and note tachometer reading. Repeat this procedure with selector lever in "L" position and in "R" position. ***(CAUTION—Do not operate engine with wheels held stationary and selector lever in one of the driving positions for more than 10 seconds at a time, or for a total time more than one minute in any half-hour period).*** With engine in good operating condition, normal stall speeds are as follows:

Stall Speeds

Car Model	①Stall Speed
Studebaker Champion (1950-55)	1500-1600
Studebaker Commander (1950)	1400-1500
Studebaker Commander (1951-55)	1550-1650
Studebaker President (1955)	1550-1650
Hudson 232" Engine	1350-1600
Hudson 263' Engine	1450-1700
Hudson 308" Engine	1600-1900

①—A lower stall speed (900-1000 RPM), is caused by slippage of torque converter stator free-wheel unit. A higher speed indicates slipping in transmission

1950-53 Transmission Shift Speeds

Champion Models—	①1950-51	②1952-53
Light Throttle Upshift	21-23 MPH	18-20 MPH
Full Throttle Upshift	40-42 MPH	36-38 MPH
Kickdown Upshift	62-65 MPH	57-60 MPH
Closed Throttle Downshift	17-19 MPH	15-17 MPH
Limit of Kickdown Downshift	52-55 MPH	49-50 MPH
Commander Models—	**① 1950**	**①1951-53**
Light Throttle Upshift	18-20 MPH	18-20 MPH
Full Throttle Upshift	34-36 MPH	39-41 MPH
Kickdown Upshift	55-58 MPH	67-70 MPH
Closed Throttle Downshift	12-14 MPH	13-15 MPH
Limit of Kickdown Downshift	48-51 MPH	57-60 MPH

①—With 3 54-1 Rear Axle Ratio
②—With 4 10-1 Rear Axle Ratio

1954 Transmission Shift Speeds

Studebaker Champion	①2 to 3
Light Throttle Upshift	18-20 MPH
Full Throttle Upshift	36-38 MPH
Kickdown Upshift	57-60 MPH
Closed Throttle Downshift	15-17 MPH
Limit of Kickdown Downshift	49-50 MPH
Studebaker Commander	**①2 to 3**
Light Throttle Upshift	18-20 MPH
Full Throttle Upshift	39-41 MPH
Kickdown Upshift	67-70 MPH
Closed Throttle Downshift	13-15 MPH
Limit of Kickdown Downshift	57-60 MPH

Hudson (All Models)	②1 to 2	①2 to 3
Light Throttle Upshift	10-12 MPH	22-24 MPH
Full Throttle Upshift	31-34 MPH	48-52 MPH
Kickdown Upshift	43-46 MPH	70-75 MPH
Closed Throttle Downshift	20-19 MPH	8-7 MHP
Limit of Kickdown Downshift	65-60 MPH	72 MPH

①—Intermediate to Direct Drive
②—First speed to Intermediate

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

1955 Transmission Shift Speeds

Champion (DG-150 & 150M Trans.)	**MPH**
Light Throttle Upshift (1-2)	8-10
Light Throttle Upshift (2-3)	17-20
Full Throttle Upshift (1-2)	19-22
Full Throttle Upshift (2-3)	32-34
Kickdown Upshift (1-2)	33-35
Kickdown Upshift (2-3)	62-65
Closed Throttle Downshift (3-2)	15-17
Closed Throttle Downshift (2-1)	7-9
Kickdown Downshift Limit (3-2)	54-57
Part Throttle Kickdown Downshift Limit	30
Commander (DG-200 Trans.)	**MPH**
Light Throttle Upshift (2-3)	18-20
Full Throttle Upshift (2-3)	39-41
Kickdown Upshift (2-3)	67-70
Closed Throttle Downshift (3-2)	13-15
Limit of Kickdown Downshift (3-2)	57-60
Commander (DG-200M & 250M Trans.)	**MPH**
Light Throttle Upshift (1-2)	8-10
Light Throttle Upshift (2-3)	22-24
Full Throttle Upshift (1-2)	25-28
Full Throttle Upshift (2-3)	44-47
Kickdown Upshift (1-2)	37-40
Kickdown Upshift (2-3)	68-72
Closed Throttle Downshift (3-2)	18-20
Closed Throttle Downshift (2-1)	9-11
Kickdown Downshift Limit (3-2)	62-66
Kickdown Downshift Limit (2-1)	14-16
Part Throttle Kickdown Downshift Limit	35-38
President (DG-250M Trans.)	**MPH**
Light Throttle Upshift (1-2)	7-9
Light Throttle Upshift (2-3)	20-22
Full Throttle Upshift (1-2)	23-26
Full Throttle Upshift (2-3)	40-43
Kickdown Upshift (1-2)	34-37
Kickdown Upshift (2-3)	66-70
Closed Throttle Downshift (3-2)	17-19
Closed Throttle Downshift (2-1)	5-7
Kickdown Downshift Limit (3-2)	60-64
Kickdown Downshift Limit (2-1)	10-12
Part Throttle Kickdown Downshift Limit	31-34

TESTING HYDRAULIC UNITS

If transmission operation not satisfactory, check operation of oil pumps and control units by testing hydraulic control pressures.

Testing Tool Note—Pressure gauge and fittings for connecting gauge at various points on transmission are required for these tests. This equipment furnished as Tool No. J4270 (gauge & fittings).

►***CAUTION—When testing with transmission selector lever in one of the driving positions, and with rear wheels held stationary, ENGINE MUST NOT BE OPERATED AT HIGH SPEED for more than 10 seconds or for a TOTAL time more than ONE MINUTE in any half-hour period.***

Front Oil Pump Pressure: With engine stopped, remove Allen-head pipe plug in oil pan flange on front of transmission case, install pressure gauge fitting and connect gauge at this point. Connect electric tachometer to engine. Place selector lever in "P" or "N" position and bring speed up to 1000 RPM. At this speed gauge reading should be 60 lbs. min (DG-150, 150M, 200, 200M transmissions). 15-25 lbs. (DG-250M transmission). On DG-250M transmission, apply parking brake and foot brake firmly. Move hand control lever to "D" or "L" position. At 1000 RPM, gauge should show 60-90 lbs. pressure. Place selector lever in "R," and at 1000 RPM, the gauge reading should be 160-250 lbs pressure Stop engine. Remove test equipment and reinstall plug. Tighten to 15-18 ft lbs

►***CAUTION—Do not use white lead or any type of sealing compound on these plugs.***

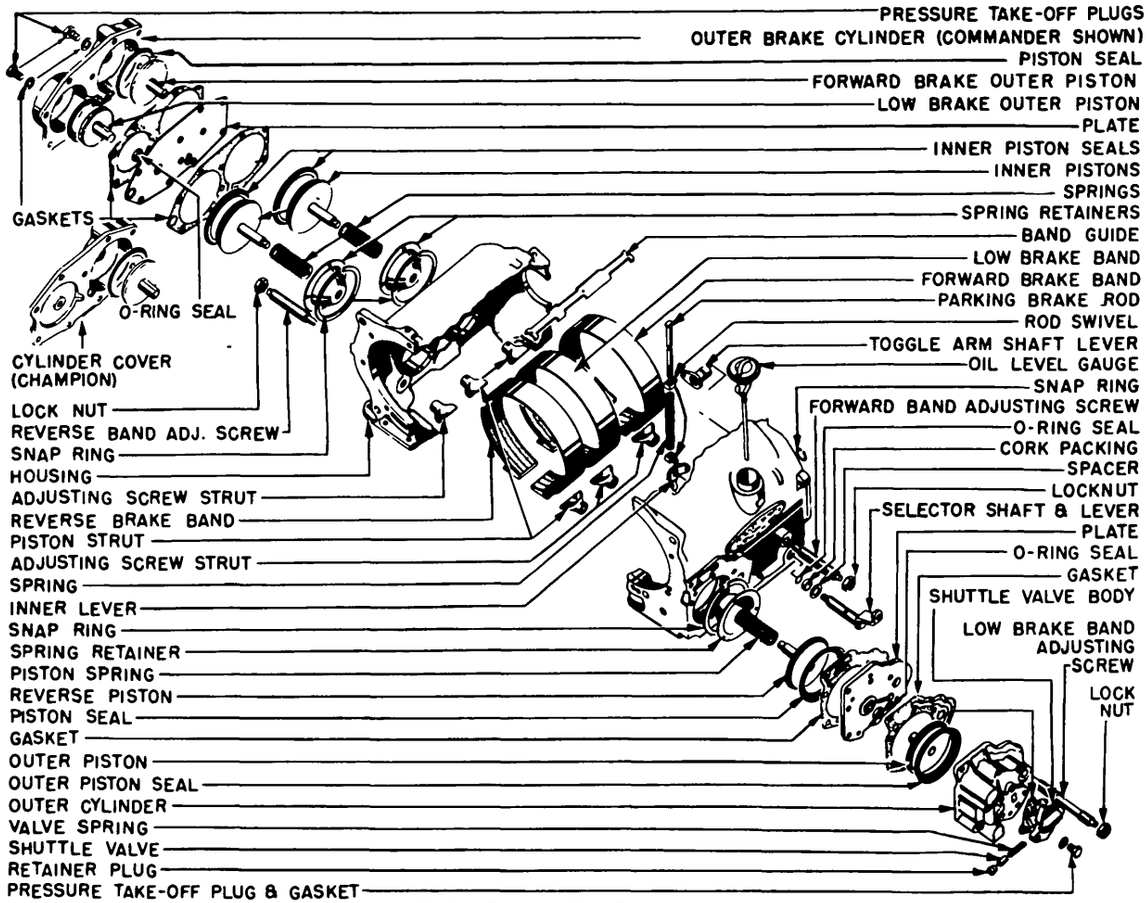
Forward Band Servo Pressure: With engine stopped, remove capscrew and copper washer from forward band servo coverplate (see illustration). Install pressure gauge fitting and connect gauge at this point. Connect electric tachometer to engine. With engine running, apply foot brake and hand brake firmly to hold car, move selector lever to "D" position. Gradually increase engine speed to 1000 RPM. At this speed gauge reading should be 60 lbs. (Studebaker), 70 lbs (Hudson) minimum Stop engine, disconnect gauge, replace capscrew, using a new copper gasket, tighten screw to 28-33 ft lbs.

►*See TESTING CAUTION above.*

Reverse Band Servo Pressure: With engine stopped, disconnect bellcrank-to-transmission selector valve lever rod at bellcrank, move selector valve lever on transmission to reverse "R" position. Remove capscrew and copper washer from reverse band servo cover (see illustration), install pressure gauge fitting and connect gauge at this point. Connect electric tachometer to engine. Apply foot brake and hand brake firmly to hold car before starting engine. Start engine and increase speed to 1000 RPM. At this speed gauge reading should be 160 lbs. (Studebaker), 180 lbs. (Hudson) minimum. Stop engine, disconnect gauge, replace capscrew, using a new copper gasket, tighten screw to 28-33 ft. lbs.

►*See TESTING CAUTION above.*

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AUTOMATIC TRANSMISSION CASE ASSEMBLY (DG-150, DG-150M, DG-250M)

STUDEBAKER AUTOMATIC TRANSMISSION (Con..)

Low Band S rvo Pressure: With engine stopped, remove capscrew and copper gasket from low band servo cover (see illustration), install pressure gauge fitting and connect gauge at this point. Connect electric tachometer to engine. With engine running, apply foot brake and hand brake firmly to hold car, move selector lever to "L" position. Increase engine speed to 1000 RPM. At this speed gauge reading should be 60 lbs. (Studebaker), 70 lbs. (Hudson) minimum. Stop engine, disconnect gauge, replace capscrew, using a new copper gasket, tighten screw to 28-33 ft. lbs.

Multiple Disc Clutch Pressure (Studebaker)—With engine stopped, remove ⅛" pipe plug from mounting flange on rear end of extension housing on transmission case, install pressure gauge fitting and connect gauge at this point. Connect electric tachometer to engine. With engine running, apply foot brake and hand brake firmly to hold car, move selector lever to "D" position. Increase engine speed to 1000 RPM. At this speed, gauge reading should be 60 lbs. minimum. Stop engine, disconnect gauge, replace pipe plug, tighten plug to 15-18 ft. lbs.

►*See TESTING CAUTION above.*

Multiple Disc Clutch Pressure (Hudson)—With engine stopped remove the ⅛" pipe plug from transmission extension case and install the pressure gauge fitting. Connect tachometer to engine. Place car on jacks and speed up to 15 MPH. At this speed, gauge reading should be 70 lbs. minimum. Stop engine, disconnect gauge, replace pipe plug and tighten to 15-18 ft. lbs.

►*See TESTING CAUTION above.*

►*1955 TORQUE CONVERTER VALVE & PRESSURE CHANGE:* Beginning with the following transmission serial numbers, the converter shuttle valve is regulated by multiple disc clutch pressure instead of direct drive clutch pressure. Serial Numbers SCH-2101 (DG-150 Trans.), SP-10801 (DG-250M Trans.). This change was made to provide a more positive shift from drive-intermediate to direct drive. The converter pressures with the later type converter valve is 50-70 lbs. in low gear, and 20-30 lbs. in drive-intermediate or direct drive.

Torque Converter Pressure: With engine stopped, remove ¼" pipe plug at torque converter pressure take-off point (early transmissions have two plugs, later transmissions have one plug). On transmissions with two plugs connect to upper hole, and on transmissions with one plug located at bottom of boss, connect to this point. (NOTE—selector valve lever rod may be disconnected for ease in making this connection). Connect electric tachometer to engine. Place selector valve lever in neutral "N" position. Run engine at 1000 RPM. At this speed, gauge reading should be 25-35 lbs. For further check, jack up wheels so they are free to rotate, place selector lever in drive "D" position, run engine at 1500 RPM. At this speed, gauge reading should be the same (25-35 lbs.). Stop engine, disconnect gauge, replace pipe plug, tighten to 6-7 ft lbs.

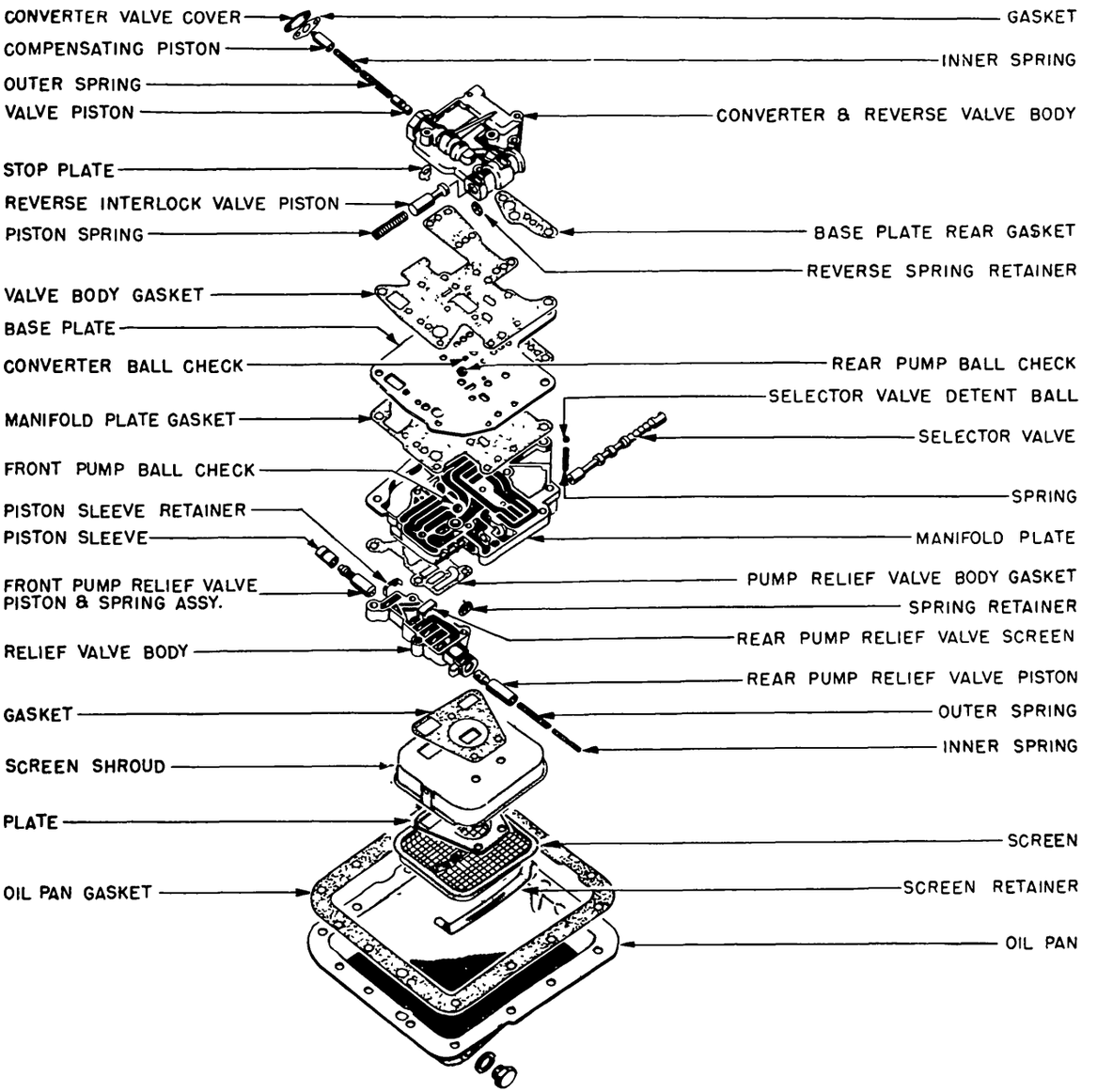
►***CAUTION—Do not use white lead or any type of sealing compound on these plugs.***

Direct Drive Clutch Pressure: With engine stopped, remove Allen-head pipe plug in oil pan flange on rear of transmission case, install pressure gauge fitting and connect gauge at this point. Connect electric tachometer to engine. Block up rear end of car securely so that wheels are free to rotate. Run engine at idle speed, place selector lever in "D" position. Gauge reading should be 0 lbs. Increase engine speed to 1500 RPM. while watching the gauge. At approximately 1200 RPM., gauge should indicate rapid pressure rise (shift to direct drive) and gauge reading should be 60 lbs. (Studebaker), 70 lbs. (Hudson) minimum. Decrease engine speed and again watch gauge. When speedometer indicates 10-12 MPH, gauge reading should drop to 0 (downshift to intermediate drive). Stop engine, disconnect gauge, replace pipe plug, tighten plug to 15-18 ft. lbs.

►***CAUTION—Do not use white lead or any type of sealing compound when installing pressure switch.***

Rear Pump Pressure: With engine stopped, disconnect leads and remove Anti-Creep Pressure Switch (Studebaker), or remove ¼" pipe plug (Hudson) at rear of transmission. Install pressure gauge fitting

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AUTOMATIC TRANSMISSION CONTROL VALVE ASSEMBLY (DG-150, DG-200)

STUDEBAKER AUTOMATIC TRANSMISSION (C nt.)

and connect gauge at this point Run engine with brakes set to hold rear wheels stationary Gauge reading should be 0 lbs with rear wheels not turning Block up rear of car securely so that rear wheels are free to rotate With engine idling, place selector lever in "D" position, increase engine speed while watching gauge Pump pressure should build up steadily as indicated by increasing gauge pressure, and should be 60 lbs (Exc Hudson & DG-250M Trans), 70 lbs. min (Hudson & DG-250M Trans), at 20 MPH Stop engine, disconnect gauge, install Anti-Creep Switch

►*CAUTION—Do not use white lead or any other type of sealing compound when installing pressure switch.*

TROUBLE SHOOTING & DIAGNOSIS

SLIPPING EXCESSIVELY (Or Not Operative, in All Ranges Below 25 MPH): 1) Low front oil pump pressure caused by Sticking front pump relief valve Leakage in valve block assembly Excessive wear of front pump or damaged front pump drive fingers Excessive oil leakage in passage from front pump-to-valve block oil passage Rear oil pump check valve out of position Blocked oil passage from valve block-to-front pump 2) Broken fins in converter, indicated by noisy converter operation

SLIPPING EXCESSIVELY (Or Not Operative, in Low & Intermediate Drive): 1) Forward band slippage caused by Incorrect band adjustment Damaged or worn lining Low pressure at forward servo because of blocked passage Stuck forward brake piston Broken forward band 2) Forward free-wheel unit slipping

SLIPPING EXCESSIVELY (Or Not Operative, in Reverse): 1) Reverse band slipping caused by Incorrect band adjustment Damaged or worn lining Low pressure at reverse servo because of blocked passage Broken reverse band or stuck reverse brake piston 2) Reverse free-wheel unit slipping (NOTE—Transmission will slip in reverse and will also lose its hill-holding characteristic

NO ENGINE BRAKING (Deceleration in Low): Low band slipping caused by Incorrect band adjustment or worn or damaged lining Low pressure at low servo because of blocked passage Stuck low brake piston or broken brake band

SLIPPING EXCESSIVELY (During Acceleration in Intermediate Drive and Loss of Hill-Holding): Multiple disc clutch slipping caused by Damaged or worn disc facings Blocked oil passage to multiple disc clutch Stuck multiple disc clutch piston NOTE —Retractor spring retainer may have been used to replace retractor spring plate at rear of multiple disc clutch assembly when transmission overhauled

FAILURE TO SHIFT TO DIRECT DRIVE (Or Slips After Direct Drive Clutch Is Engaged): 1) Improper governor operation caused by Damaged governor Governor sticking on governor shaft Governor valve sticking closed 2) High converter pressure preventing engagement of the direct drive clutch caused by Sticking converter valve Leaking direct drive clutch piston seals Main shaft lubricator valve assembly loose and twisted out of correct location Leaking transfer tube "O" ring seal 3) Leakage in direct drive clutch passage 4) Blocked direct drive oil passage in collector ring

ENGINE WILL NOT START BY PUSHING (Also Reverse and Park Interlocks Inoperative): Rear pump pressure low caused by Damaged or worn rear pump parts Damaged rear pump drive gear Sheared rear pump drive gear pin Valve block assembly incorrectly assembled Leaking valve block assembly gaskets Porous valve block castings Leaking extension case gaskets Porous extension case castings Blocked rear pump passage-to-valve block

CAR ROLLS (With Selector Lever in "P" Position): 1) Parking pawl does not engage, caused by Incorrect adjustment of hand control linkage or parking pawl linkage Extension case misaligned on transmission case Parking pawl interlock piston stuck in locked position Parking pawl linkage binding or broken

ENGINE STALLS OR LABORS (When Selector Lever Shifted to "D" Range): 1) Incorrect adjustment of accelerator-to-transmission control linkage 2) Improper governor valve operation, caused by Governor binding Governor sticking on governor shaft Governor valve sticking open because of governor control detent piston sticking or installed backwards, or by a blocked governor drain passage Accelerator control plunger and linkage binding Check governor sleeve for correct position in extension case 3) Damaged main shaft oil seal rings or front planetary set ring gear oil seal rings.

ENGINE SHUDDERS OR STALLS (When Car Is Stopped While Selector Lever is in "D"): 1) Incorrect adjustment of accelerator-to-transmission control linkage 2) Improper governor valve operation caused by Damaged governor or governor sticking on governor shaft Governor valve sticking open (This condition can be caused by governor control detent piston sticking or installed backwards—governor valve sleeve out of position—blocked governor drain passage—damaged main shaft oil seal rings or front ring gear oil seal rings—no groove on end of transfer tube or main shaft lubricator valve assembly out of position) 3) Sticking or damaged direct drive clutch plate or clutch piston

NO DOWNSHIFT AT KICKDOWN (Or Kickdown Shift Speed Range Incorrect): 1) Incorrect accelerator-to-transmission control linkage adjustment 2) Interference between ball joint nut at the governor control lever and extension case 3) Improper governor valve operation (see "Engine Shudders or Stalls" above) 4) High oil level.

TRANSMISSION SHIFTS TO REVERSE (Immediately When Selector Shifted to "R", Above 5 MPH): 1) Rear pump inoperative 2) Reverse interlock inoperative caused by Blocked reverse interlock valve oil passage Interlock valve sticking

PARKING PAWL ENGAGES IMMEDIATELY (When Selector Lever is Shifted to "P", Above 10 MPH): 1) Rear pump inoperative 2) Parking pawl piston inoperative, caused by Oil passage to parking pawl interlock piston blocked or not drilled Parking pawl interlock piston sticking.

ENGINE LABORING & TRANSMISSION OVERHEATING IN FORWARD RANGES (Reverse Operation Normal, but Car Creeps Rearward in Neutral When Anti-Creep Released): Reverse band dragging, caused by Incorrect band adjustment Leaking valve block assembly gaskets Porous casting in valve block assembly Reverse brake piston sticking or reverse band damaged or distorted

ENGINE LABORING & TRANSMISSION OVERHEATING IN ALL RANGES EXCEPT "L" RANGE: Low band dragging, caused by Incorrect band adjustment Leaking valve block assembly gaskets or porous castings in valve block assembly Low brake piston sticking or low band damaged or distorted Leaks between Low and Forward brake cylinders in Low brake cylinder or Forward and Low brake cylinder cover Leaks between Low and Forward brake cylinders in transmission case

ENGINE LABORING & TRANSMISSION OVERHEATING IN REVERSE RANGE (Low & Forward Operating Normal, but Car Creeps Forward in Neutral When Anti-Creep Released): Forward band dragging, caused by Incorrect band adjustment Leaking valve block assembly gaskets or porous castings in valve block assembly Forward brake piston sticking or forward band damaged or distorted

ENGINE LABORING & TRANSMISSION OVERHEATING IN ALL RANGES EXCEPT "D" RANGE· Multiple disc clutch dragging caused by Leaking valve block assembly gaskets or porous castings in valve block assembly Multiple disc clutch piston sticking Improper operation of main shaft assembly. Broken or damaged multiple disc clutch release springs

NORMAL OPERATION IN DIRECT DRIVE (Poor Performance With Transmission Overheating, in Other Ranges—Low Stall Speed): Caused by torque converter free-wheel unit slipping.

NORMAL OPERATION AT LOW SPEEDS (Poor Performance with Transmission Overheating in Direct Drive): Torque converter free-wheel unit sticking

TRANSMISSION NOISY (With Selector Lever in "D", "L", or "R", and Car Standing Still): 1) Low fluid level 2) Fluid intake screen clogged 3) Damaged front pump fingers, or worn or damaged front pump parts 4) Air leaks in front pump intake passages in transmission case or front pump and collector ring assembly 5) Improper valve action 6) Broken connector fins 7) Loose direct drive clutch backing plate or drive fingers on converter.

TRANSMISSION NOISY (When Car Is Moving): 1) Damaged or worn rear pump parts or drive gear 2) Damaged or worn speedometer drive gear or pinion (not to be confused with drive line or rear axle noise). 3) Damaged or worn rear planetary gears (if only in low, front planetary gear is bad) 4) Damaged governor assembly.

FLUID LEAK (Between Torque Converter and Transmission): 1) Front pump oil seal damaged by front pump drive fingers 2) Leaking collector ring gasket or leaking pump-and-collector ring assembly 3) Leaking torque converter

FLUID LEAK (At Brake Cylinders): Damaged gaskets, uneven or warped gasket surfaces Sand holes in castings

FLUID LEAK (At Extension Case): Damaged gaskets or warped or uneven gasket surfaces Sand holes in castings Improperly seated governor control shaft bushing Leaking governor control cam stopscrew. Damaged "O" ring seal on parking pawl pivot pins

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

FLUID LEAK (At Selector Control Shaft): Damaged control shaft "O" ring seal Bore out-of-round or too large diameter Damaged selector control shaft packing

FLUID LEAK (At Transmission Oil Pan): Damaged gasket Damaged or warped gasket surfaces Interference between oil pan and pressure take-off plugs

TRANSMISSION REMOVAL

1950-55 CHAMPION
1950-54 COMMANDER
1955 COMMANDER (FIRST SERIES)

▷*CAUTION—Transmission Assembly and Torque Converter Assembly are removed SEPARATELY as follows:*

1) Drain oil from transmission case and torque converter housing. See LUBRICATION data.

2) Disconnect propeller shaft at front and rear ends by taking out bearing cup U-bolts (CAUTION—wire bearing cups in place to prevent them dropping off), and removing nuts from center bearing support-to-crossmember studs. Move entire propeller shaft assembly to the rear and out of the way.

3) On Champion, disconnect parking brake, cable clevis at parking brake bellcrank. On Commander, disconnect parking brake forward cable from bellcrank on cross member, disconnect bellcrank bracket by taking out mounting bolts, move bellcrank and cable assembly to rear and fasten up out of the way.

4) Disconnect transmission control rods by taking out clevis pins at selector valve lever and governor control lever on transmission case.

5) Remove speedometer cable and pinion assembly from transmission. Disconnect Anti-creep cables from solenoid switch on rear of transmission, free Anti-creep harness from clip on transmission case.

6) Remove converter housing lower cover plate. Remove nuts from two lower transmission case-to-converter housing studs (accessible from within converter housing with cover off).

7) Place transmission lift with adapter in position under transmission case (see NOTE). Do not disturb adapter adjustment knobs after saddle-to-transmission oil pan flange alignment has once been set.

Lift & Adapter Note—Two types available: Model 63 (Lift Type Hoist J4385 & Adapter J4287), and Model 27 (Floor Type Hoist J3389 & Adapter J4287). This tool essential to maintain transmission alignment during removal and installation and to handle transmission weight of approximately 220 lbs.

8) Take out two upper transmission case-to-converter housing capscrews, install Pilot Studs No. J4284 in these holes.

9) Slide transmission assembly to rear out of converter housing and torque converter, then lower transmission and remove from beneath car.

NOTE—If main shaft oil transfer tube (in forward end of transmission mainshaft) does not come out with transmission, remove tube from converter using a long-nosed pliers.

1955 COMMANDER (SECOND SERIES)
1955 PRESIDENT

▷*CAUTION: Transmission Assembly and Torque Converter Assembly are removed SEPARATELY as follows:*

1) Drain transmission and torque converter assemblies On 5 Pass Coupe and Convertible models, remove body front pillar post cross-member assembly Remove complete propeller shaft

2) Disconnect hand control bellcrank-to-transmission rod from selector control shaft lever Disconnect accelerator cross shaft-to-transmission rod ball joint from the governor control lever Remove speedometer cable retaining screw and remove cable and pinion

3) Disconnect Anti-Creep cables from Anti-Creep Pressure Switch and remove wiring harness from clip holding the harness to transmission Remove the two lower transmission case-to-converter housing stud nuts using tool J-5413

4) Place transmission lift, with the transmission adapter as far forward in tracks as possible Adjust knobs on the adapter to align the saddle to transmission oil pan flange

5) Remove the two upper transmission case-to-converter housing capscrews Remove transmission assembly by sliding it rearward on the saddle out of converter housing and torque converter assembly If mainshaft oil transfer tube does not come out with the transmission, remove it from torque converter assembly with long nose pliers

▷*NOTE*—If converter is to be removed, remove pilot studs from converter housing

1954 HUDSON

1) Raise car and drain transmission and converter Remove cotter pin and disconnect governor control rod at governor control lever Disconnect speedometer cable at speedometer gear housing and remove driven gear

2) Remove attaching nuts, washers and "U" bolts and disconnect propeller shaft from transmission companion flange (wire propeller shaft to frame out of the way)

3) Place hydraulic hoist with transmission adapter in position under transmission oil pan and adjust fixture knobs on adapter to align the saddle-to-transmission oil pan flange so that the weight of the transmission case is supported by hoist

4) Remove the two transmission case-to-converter housing upper bolts and install two pilot studs, J-4284 into capscrew holes Remove the two lower transmission case-to-converter housing stud nuts With hydraulic hoist cradle adjusted so transmission case is in alignment with converter housing, pull transmission with hydraulic hoist rearward to disengage transmission from converter housing and converter assembly *CAUTION*—If transmission sticks to converter housing, do not rock the transmission case A small pry bar between rear end of oil pan flange and converter housing can be used to carefully pry the two units apart

5) The mainshaft oil transfer tube must be removed from the converter if it does not come out with the transmission

TRANSMISSION INSTALLATION

ALL MODELS

1) Place transmission selector valve lever in "Neutral" position Align splines on transmission shafts with Spline Alignment Fixture J-4283 Loosen fixture thumbscrew, install fixture over shaft splines on front end of transmission case, inserting fixture as far as possible into transmission and aligning positioning arm sector with one of the transmission lower mounting studs, move arm and shaft (turn universal joint companion flange) until positioning pin slips easily over mounting stud, tighten thumbscrew to lock positioning arm in place on sector Remove fixture from transmission case carefully and without moving shaft splines out of position. Install oil transfer tube in end of mainshaft

2) Align splines in Torque Converter Assembly by installing alignment fixture (after positioning arm has been set in (1) above), working the fixture into the converter until all splines are lined up on the fixture Rotate torque converter members and spline alignment fixture until positioning pin slips easily into transmission mounting stud hole corresponding to same lower transmission case stud on which fixture was aligned in (1) above. Remove fixture carefully and without moving splines out of position.

3) Install two Transmission Pilot Studs J4284 in upper transmission mounting screw holes in converter housing. Raise transmission assembly to correct height and angle (on special hoist), carefully slide transmission into place using pilot studs as a guide and using care not to disturb spline alignment (CAUTION—do not disturb universal joint companion flange position).

▷*CAUTION* Do not force transmission into converter by using transmission retaining screws to draw transmission into position as this may cause damage to converter or front pump Make sure that transmission fits firmly against converter housing If transmission stops at a distance greater than ¼" from converter housing, turn companion flange a little in each direction and at the same time apply pressure to rear of transmission If transmission stops less than ¼" from converter housing, turn converter a little in each direction and at the same time apply pressure to rear of transmission

4) Remove pilot studs and install two upper mounting capscrews, tighten to 23-28 ft lbs (Studebaker), 40-50 ft lbs (Hudson) Install nuts on lower mounting studs and tighten these to 23-28 ft lbs (Studebaker), 35-40 ft lbs (Hudson)

5) On Studebaker, install Anti-Creep wiring harness and connect wires to pressure switch on transmission Install speedometer pinion and cable assembly Install parking brake bellcrank on crossmember and connect parking brake cable Install propeller shaft, connect front and rear universal joints and center bearing support stud nuts

6) On Hudson, install speedometer driven gear and speedometer cable, making sure that cable is entered over the rear motor support, between support and converter housing Move propeller shaft into position and attach to transmission companion flange, installing U-bolts and lockwashers and nuts

7) On all cars, install transmission control rods

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STUDEBAKER AUTOMATIC TRANSMISSION (C nt.)

(selector valve lever rod and governor control lever rod) and adjust linkage *See LINKAGE ADJUSTMENT data.*

8) Fill transmission with oil *See LUBRICATION.* Check transmission operation

TORQUE CONVERTER REMOVAL

1950-53 STUDEBAKER

1) On all Champion Models and 1950 Commander, remove converter housing bolt hole cover and remove housing-to-block screws Raise car On 1951-53 Commanders, remove starter On 1950 Commander, loosen screws holding converter housing air intake hose clamp to frame side rail and pull hose free of clamp

2) Remove clevis pin holding hand control tube-to-bellcrank rod to bellcrank On 1950 Commander, disconnect parking brake conduit from conduit hook On 1950 Commander and 1950-53 Champion, disconnect exhaust pipe from engine manifold and loosen bolts and nuts from clamp holding the exhaust pipe to converter housing bracket

3) On 1951-53 Commander, disconnect tail pipe supports and remove U bolt from exhaust pipe support at converter housing Then disconnect rear exhaust pipe from front right exhaust pipe and pull muffler and pipe assembly rearward After disconnecting pipe, move assembly to side out of the way

4) The engine rear support must be removed to permit removal of torque converter housing, but before removing cross member engine weight must be lifted off cross member Place engine support saddle (see Note below) under engine approximately 3-5" forward of rear engine plate, support engine weight with jack under support saddle (hydraulic jack should be used to permit engine lowering for converter removal)

►**Support Saddle Note**—Saddle can be made up from iron or wood block capable of supporting 600 lbs Dimensions of wood saddle made from 4" plank Width 14½", Height 9¼" at front edge, 8¾" at rear (top surface should slant down ½" from front to rear) Center cut-out 9" wide and 7" high (so that saddle clears oil pan and weight is carried on oil pan flanges)

5) Remove engine rear insulator stud nuts and raise engine just enough to have separation between insulators and cross members Remove engine rear support cross member bolts and, on 1950 Commander, disconnect fender-to-cross member brace Remove cross member

6) On all models remove converter housing-to-engine capscrews On All Champions and 1950 Commander, remove the small filler plate On 1951-53 Commander, remove converter housing front plate Remove converter housing from dowels, taking care not to damage or distort converter housing dowels or converter blower

7) Lower rear of engine approximately 3" to provide clearance for converter housing removal

►***CAUTION*—Do not allow oil pan to strike steering bellcrank and tie rod ends. If additional clearance required, loosen nuts holding bellcrank to engine front crossmember, drop bellcrank down.**

8) Remove the nuts and plain washers holding torque converter assembly to crankshaft-to-converter drive plate and remove converter assembly

1954-55 STUDEBAKER

1) With transmission removed, proceed as follows On Champion, remove converter housing bolt hole cover and remove housing-to-block screws, raise car On other models, remove starter, then raise car

2) Remove clevis pin holding hand control tube-to-bellcrank rod to bellcrank On Commander & President, disconnect tail pipe support and remove U-bolt from exhaust pipe support at converter housing Then disconnect rear exhaust pipe from front right exhaust pipe and pull muffler and pipe assembly rearward After disconnecting pipe, move assembly to the side out of way On Champion, disconnect exhaust pipe from engine manifold and loosen bolts and nuts from clamp holding exhaust pipe-to-converter housing bracket

3) On all models the engine rear support must be removed to permit removal of torque converter housing, but before removing cross-member engine weight must be lifted off cross-member Place engine support saddle (see below) under engine approximately 3-5" forward of rear engine plate, support engine weight with jack under support saddle (hydraulic jack should be used to permit engine lowering for converter removal)

►**Support Saddle Note**—Saddle can be made up from iron or wood block capable of supporting 600 lbs Dimensions of wood saddle made from 4" plank Width 14½", Height 9¼" at front edge, 8¾" at rear (top surface should slant down ½" from front to rear) Center cut-out 9" wide and 7" high (so that saddle clears oil pan and weight is carried on oil pan flanges)

4) Remove engine rear insulator stud nuts and raise engine just enough to have separation between insulators and cross-member. Remove engine rear support cross-member bolts.

5) On all models, remove converter housing-to-engine capscrews On Champion, remove the filler plate On Commander & President, remove converter housing front plate Remove converter housing from dowels, taking care not to damage or distort converter housing dowels or converter blower Lower rear of engine approximately 3" to provide clearance for converter housing removal

►***CAUTION*—Do not allow oil pan to strike steering bellcrank and tie rod ends. If additional clearance required, loosen nuts holding bellcrank to engine front crossmember, drop bellcrank down.**

6) Remove the nuts and plain washers holding torque converter assembly to crankshaft-to-converter drive plate and remove converter assembly

1954 HUDSON

HUDSON TORQUE CONVERTER REMOVAL (With Transmission Removed From Car): 1) Install engine holding fixture J-4651, positioning the "U" shaped section around engine oil pan and enter one adjusting hook in the frame just below steering gear housing support and the other hook in the corresponding hole on the opposite frame side rail This will place the fixture approximately 5" from rear end of engine oil pan Raise engine so that rear motor supports are raised ½" above the brackets on No 3 cross-member Make sure that engine weight is supported by holding fixture Remove nuts and washers attaching No 3 cross-member to frame

***CAUTION*—Cross-member will drop out when bolts removed.**

2) With cross-member removed, lower engine approximately 1" by backing off engine holding fixture This will make the upper converter housing bolts accessible from below car NOTE—These upper converter housing bolts can also be removed from the front driving compartment by removing the two floor opening covers under the floor mat

►***CAUTION*—The amount the engine can be moved depends on the clearance between oil pan and center steering arm and tie rod ends. Do not allow weight to rest on center steering arm.**

3) Remove converter housing right hand lower bolt first, then with a ⅝" socket and universal with a 10" extension remove converter to engine bolts

►***CAUTION*—Converter housing is doweled to cylinder block and should be pulled rearward carefuly to avoid damage to dowels during removal.**

4) Remove converter drain plug and drain converter assembly (if not already done) Remove the six nuts and plain washers attaching converter assembly to flywheel

TORQUE CONVERTER INSTALLATION

►**NEW TORQUE CONVERTER HOUSING INSTALLATION:** If new housing installed, bore and face run-out must be checked and corrected BEFORE torque converter assembly installed. Install the housing on the dowels in the flywheel housing and tighten all mounting bolts and capscrews. Use Clutch Aligning Gauge J-2045 installed in end of crankshaft to mount a dial indicator, check and correct run-out as follows:

Bore Run-out—Revolve crankshaft slowly and check total run-out. If run-out exceeds .004", housing must be repositioned and dowels relocated as follows: Remove housing, remove dowel pins, reinstall housing and tighten mounting bolts just enough to hold housing in position. Recheck bore run-out and use a lead hammer to shift housing, as required until run-out is less than .004", then tighten all mounting bolts and capscrews securely to hold this position and make final run-out check. If run-out within limits, drill a new dowel hole through the thin section of the flange near each production dowel hole using a 11/32" drill and then reaming holes to .376-.377". Install service dowels in these holes.

***NOTE*—Above instructions supersede earlier dowel installation data on Champion & Commander H Models.**

Face Run-out—With housing installed on dowels and all mounting bolts and capscrews securely tightened, use Clutch Aligning Gauge J-2045 to mount dial indicator, check face run-out at a 4¼" radius throughout entire revolution of the crankshaft. If total indicated run-out exceeds .006", replace housing.

Torque Tightening—Tighten converter housing-to-engine bolt nuts and capscrews to 28-32 ft. lbs.

1950-53 STUDEBAKER

1) On 1950 Commander, be sure that one of the

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

aligning marks (0) on torque converter is aligned with the aligning mark (0) on crankshaft-to-converter drive plates. Install torque converter assembly on the crankshaft-to-converter drive plate and loosely install the plain washers and nuts.

2) Clean engine rear plate and the mating surface of converter housing and install converter housing, taking care not to damage dowel or the converter blower. Be sure converter housing is installed on dowels. Install lower converter housing capscrews. If engine has been lowered, raise it to normal position.

3) Position Converter Aligning Flange J-4286 into bore of converter housing and over pump drive fingers on torque converter assembly. Install two top transmission capscrews to hold aligning flange in position and rotate torque converter assembly through two complete revolutions to center torque converter assembly.

4) Tighten converter-to-drive plate nuts to 28 ft. lbs. On all models except 1951-53 Commander, install converter filler plate. On 1951-53 Commander, install converter housing front plate.

5) Install the cross member and on 1950 Commander connect the fender-to-cross member braces and install parking brake conduit. On all models connect hand control tube-to-bell crank rod.

6) On 1950 Commander and all Champions, connect the exhaust pipe to engine manifold and tighten exhaust pipe to converter housing bracket bolts and nuts. On 1951-53 Commander, install exhaust pipe muffler and tail pipe assembly, making sure that proper alignment exists between assembly and supports.

7) On 1950 Commander, install converter housing air intake hose in clamp at frame side rail and tighten clamp screws.

1954-55 STUDEBAKER

1) On all models, install converter assembly on crankshaft-to-converter drive plate and loosely install plain washers and nuts. Clean engine rear plate and the mating surface of converter housing and install converter housing, taking care not to damage dowels or the converter blower. Be sure converter housing is installed on dowels. Install lower capscrews in converter housing. If engine has been lowered, raise it to normal position.

2) Position Converter Aligning Flange J-4286 into bore of converter housing and over pump drive fingers on torque converter assembly. Install two transmission top capscrews to hold aligning flange in position and rotate torque converter through two complete revolutions to center torque converter assembly. Tighten converter-to-drive plate nuts to 28 ft. lbs. On Champion, install converter filler plate. On Commander & President, install converter housing front plate.

3) On all models, install the frame crossmember and connect hand brake control tube-to-bellcrank rod. On Champion, connect the exhaust pipe to engine manifold and tighten exhaust pipe to converter housing bracket bolts and nuts.

1954 HUDSON

1) Install torque converter assembly on flywheel and loosely install attaching plain washers and nuts. Clean cylinder rear support plate and machined faces of converter housing. Install converter housing and engage dowels, using care not to damage dowels or converter. Install right and left hand lower capscrews and tighten finger tight.

2) Position Converter Aligning Flange J-4286 into bore of converter housing and over converter hub (front pump drive fingers on converter assembly). Install the two transmission upper attaching bolts to hold aligning flange. With aligning flange in position, tighten converter-to-flywheel attaching nuts to 23-28 ft. lbs. Install remaining converter housing capscrews, and tighten all capscrews.

3) Install converter housing dust pan (if previously removed). Raise engine approximately 1" with Engine Holding Fixture J-4651. Position the No. 3 cross-member and install all attaching screws before tightening any screws to assure proper alignment. Then tighten all screws to 25-30 ft. lbs.

4) Lower engine and install rear engine support bolts at the No. 3 cross-member. Remove engine holding fixture.

OVERHAUL

▷*1951-52 COMMANDER "PART THROTTLE DOWNSHIFT" OPTION (WITH SERVICE REPLACEMENT EXTENSION HOUSING)*—Extension case assembly can be installed to provide "Part Throttle Downshift" if desired. Extension case is furnished with the direct drive lock pawl in place, and to prevent "Part Throttle Downshift," install extension case exactly as received. To retain, or convert to "Part Throttle Downshift," remove the Direct Drive Lockup Pawl (located directly below transmission mainshaft bearing bore on machined face of extension assembly).

▷***1955 SERVO INNER & OUTER PISTON NOTE:** Arrangement of servo pistons (double & single piston units) vary with the different transmission models. See Overhaul data below for removal & installation procedures for the different types.*

TORQUE CONVERTER: *CAUTION—Torque Converter (and Direct Drive Clutch) serviced as an assembly and cannot be disassembled for parts replacement.*

TRANSMISSION DISASSEMBLY: Install transmission in Transmission Holding Fixture J-5484, and proceed as follows:

▷*TRANSMISSION DISASSEMBLY NOTE—Transmission sub-assemblies that can be removed and re-installed without removing complete transmission from car are indicated below.*

Front Pump & Collector Ring Removal: Place Ring gear Retaining Clip J-4668-3 on main shaft and secure it in place with a rubber band (clip prevents movement of gear and eliminates possibility of dislocating thrust washers in the gear train). Remove capscrews in the front pump flange, and tap front pump housing loose from transmission case and slide assembly forward off main shaft. Remove front ring gear front thrust washer from rear face of front pump-and-collector ring assembly.

Extension Case Removal: Remove universal joint flange, lock washer and tongued washer. Punch mark one spline of main shaft and corresponding groove of the flange to insure correct reassembly. Using Companion Flange Puller J-2046, remove flange. Shift selector control lever out of "Park" position. Place an oil drain pan under extension case and remove the six capscrews holding extension housing to transmission case, and slide extension housing rearward, being careful not to drop gears and spacers that may slide off main shaft during case removal.

▷*CAUTION—Do not allow main shaft to move toward the rear which would cause dislocation of thrust washers in the gear train.*

Removal (With Transmission in Car)—Disconnect universal joint, drain oil, control arms and wiring, then proceed as above.

Valve Block Removal: Remove capscrews attaching oil pan to transmission case and remove oil pan and gasket. Remove the seven screws attaching valve block to transmission. Remove the valve block base plate rear gasket.

▷*CAUTION—Care must be taken to see that selector valve is not moved out of its normal operating range.*

Removal (With Transmission in Car)—Drain oil from transmission case, then proceed as above.

Main Shaft Removal (Studebaker): Remove flange spacer, governor drive gear, parking brake gear, from main shaft, then remove main shaft rear bearing lock ring. Using Bearing Puller Plate J-1298 with Adapter Rings J-1298-3 and Universal Puller HM-925, remove rear bearing. Install J-2204-4 spacer and J-2204-3 sleeve on rear end of main shaft, and secure it in place with the universal joint companion flange, flat washer and nut. Make sure the Ring Gear Retainer Clip J-4668-3 is securely in place on front end of main shaft. Pull assembly forward, being careful not to disengage ends of bands from struts or dislodge bands from guide at top of transmission case. Any cocking of the bands will hinder removal of the assembly. Then remove assembly from case.

Main Shaft Removal (Hudson): Remove transmission companion flange spacer, governor drive gear. parking brake gear, and governor drive gear spacer from main shaft. Grasp mainshaft and front ring gear shaft and while holding the mainshaft assembly compressed, move the main shaft assembly towards front of case. The main shaft rear bearing should be removed with the main shaft assembly to assist in holding the main shaft together as an assembly. If bearing sticks in case bore, use a piece of pipe with a 1.195" I.D. and 1.500" O.D., 7" long. Drive against inner race of bearing to move bearing and main shaft forward and out of case bore. (*CAUTION*—Make sure Ring Gear Retainer Clip J-4668-3 is still in place on front end of main shaft). Pull main shaft forward and out of case, being careful not to disengage the ends of the bands from guide at top of transmission case, as any cocking of bands will restrict removal of main shaft assembly.

▷*REAR BEARING REMOVAL NOTE—Rear bearing may be removed with transmission in car by first removing extension case. See "Extension Case Removal" above.*

Brake Band Removal: Remove brake anchor side strut from forward brake band by pulling the band shoe away from adjustment screw, disengaging pin from notch in strut, and then removing strut from end of the adjustment screw. Disengage other end of band from piston strut, and lift band out of band guide. Move band to rear of transmission case. Disengage low band in same manner as forward band and move it to rear of case. Disengage the re-

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STUDEBAKER AUTOMATIC TRANSMISSION (C nt.)

verse band shoe from anchor side strut and remove strut from screw. Disengage reverse band shoe from piston strut, turn the band 90°, spread it slightly, and slip end of band out of case and over flange, then roll top of band forward out of case. **Do not distort band during removal.** Remove low and forward brake bands in same manner as reverse band.

Brake Band Strut Removal: All three brake band struts are removed in the same manner. Loosen band adjustment screw locknut. Hold shoes of band together, being careful not to disengage band from piston strut, and back off adjustment screw until strut can be slipped off screw and past brake band shoe.

Removal (With Transmission in Car)—Drain oil from transmission unit only, remove oil pan, and remove valve block assembly, then proceed as above.

REVERSE SERVO UNIT: Located on left side of transmission and consists of inner and outer piston assemblies, remove as follows:

►*1953 OUTER CYLINDER PRODUCTION CHANGE:* Two types of cylinders used. First type has two plugs (square head pipe plug in upper hole, and an Allen type pipe plug in lower hole). Later type has one plug (square head) located in bottom side of lower casting boss. Both types of cylinders are interchangeable, and service procedures are the same. When draining converter or checking converter pressure on the later type, remove plug in bottom of lower casting boss. On earlier type, remove upper plug.

Outer Cylinder Removal: Hold low brake band adjustment screw and remove the adjustment screw locknut. Place a clean pan under the cylinder, and remove the seven capscrews holding unit to transmission case. Remove the low brake band outer cylinder from case, being careful not to damage threads of low band adjustment screw. Remove cylinder inner gasket from transmission case.

►***CAUTION—Do not allow the inner brake piston to come out of the inner cylinder and drop into transmission case.***

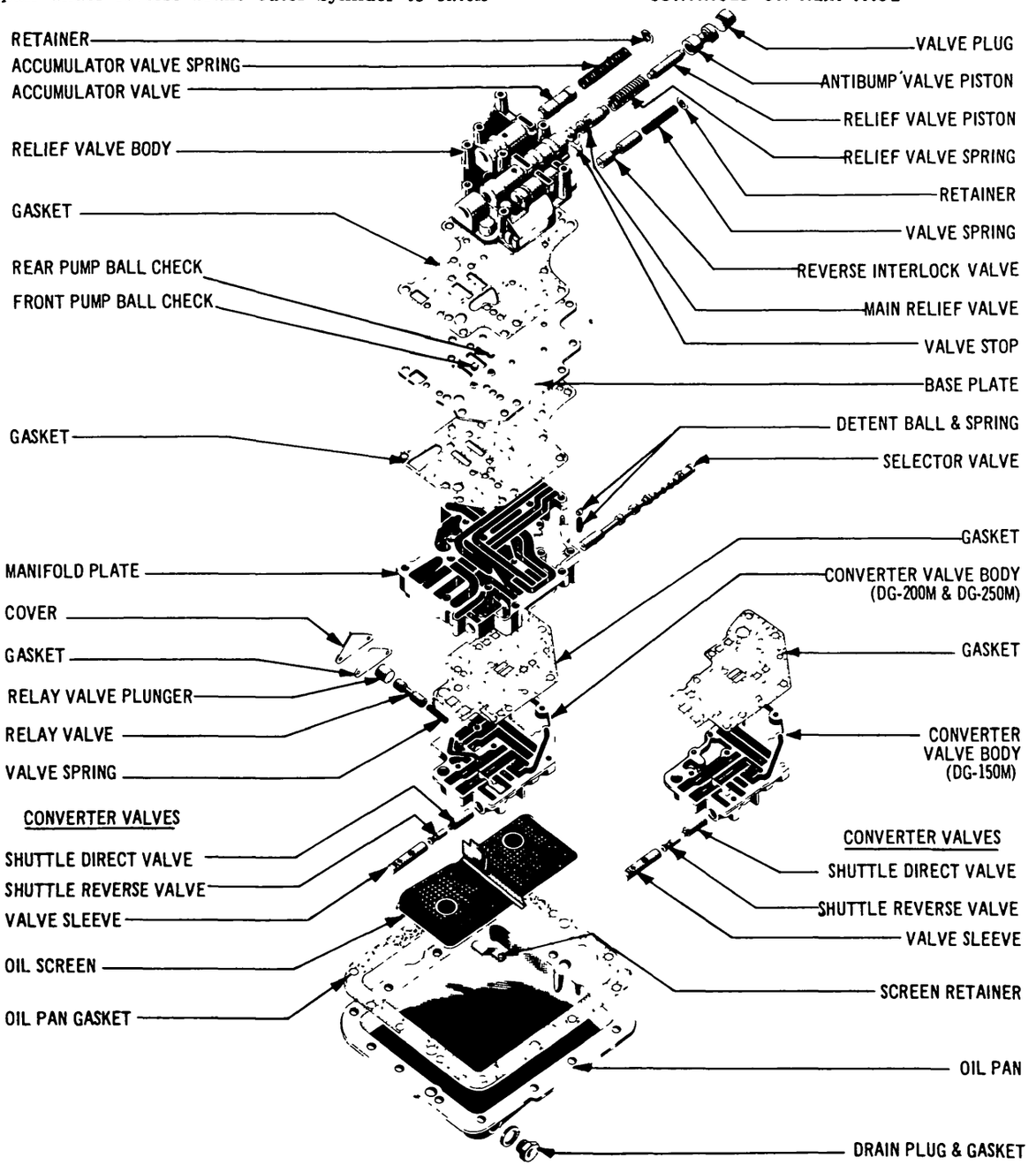
Removal (With Transmission in Car)—Clean off side of case thoroughly. Disconnect accelerator-to-transmission rod at governor lever. Disconnect bellcrank-to-transmission rod at selector control shaft lever. Remove clevis pin holding hand control tube-to-bellcrank rod to the bellcrank and then remove the bolts holding bellcrank to cross-member and remove bell crank. Complete the removal as indicated above. ***(CAUTION—If inner brake piston drops into transmission case, it will be necessary to remove oil pan and valve block to recover piston).***

Reverse Brake Inner Piston Removal: Place thumb against piston spring retainer, and the fingers on top of piston to prevent dropping the assembly as it is removed. Then, with the thumb, push the assembly outward, disengaging the strut from brake band shoe, and remove piston assembly from transmission case. Lift piston seal out of groove in piston, then bring it over top of piston and pull it the rest of the way out of groove. Discard seal.

Removal (With Transmission in Car)—Drain fluid from transmission unit only, remove oil pan and gasket. Remove valve block assembly, and remove reverse brake outer cylinder assembly, then proceed as above.

Reverse Shuttle Valve Removal (Exc. 1954-55 Champion)—(With Transmission in Car): Place a clean pan under reverse brake outer cylinder to catch fluid as valve is removed. Remove three capscrews attaching shuttle valve to reverse brake cylinder and remove shuttle valve assembly and gasket. Re-

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AUTOMATIC TRANSMISSION CONTROL VALVE ASSEMBLY (DG-150M, DG-200M, DG-250M)

STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

move valve cover plug with an Allen wrench, then remove valve and spring.

LOW & FORWARD SERVO UNIT: Located on right side of transmission case.

Low Brake Outer Cylinder Removal (Exc. 1950-54 Champion): Hold reverse band adjusting screw, then loosen and remove locknut. Remove nine capscrews attaching unit to transmission case and remove the unit, being careful not to damage threads of reverse band adjusting screw. Remove cylinder plate gasket.

Removal (With Transmission in Car)—Clean side of transmission case thoroughly. Drain transmission unit only, then proceed as above.

▷*CAUTION—Do not allow forward brake piston or low brake inner piston to come out of the case. If this occurs, it will be necessary to remove oil pan and valve block assembly.*

Low & Forward Inner Pistons Removal: To remove low brake piston (1950-54 Champion) or low brake inner piston (other models), place thumb against piston spring retainer and the fingers over top of piston to prevent dropping the assembly as it is removed. Then with thumb, push assembly outward, disengaging strut from brake band shoe and remove assembly from case. Remove forward brake piston assembly in the same manner. Remove seals from both pistons by lifting seals from groove, then over top of piston. Discard seals.

Removal (With Transmission in Car)—Drain fluid from transmission, remove oil pan and valve block assembly. On 1950-54 Champion, remove low & forward brake cylinder cover. Complete removal as indicated above.

Selector Control Shaft & Lever Removal: Remove nut, washer, and flat washer which hold selector control shaft inner lever to selector control shaft. Pull shaft outward and slip control shaft inner lever off shaft, then pull shaft assembly out of case. Remove the "O" ring seal from groove in selector shaft and then remove flat washer from shaft.

Removal (With Transmission in Car)—Drain fluid from transmission only, and remove oil pan. Disconnect hand control bellcrank-to-transmission rod from selector control shaft outer lever, then complete removal as indicated above.

Parking Brake Actuating Rod Removal: Remove snap ring from toggle shaft sleeve, slip toggle shaft sleeve out of case, then remove complete assembly.

Removal (With Transmission in Car)—Remove main shaft assembly. Disconnect control shaft inner lever from control shaft. Disengage forward brake band from the struts and move it forward. Complete removal as indicated above.

TRANSMISSION REASSEMBLY: Clean case thoroughly and blow out all oil passages with air, making sure they are open.

Parking Brake Actuating Rod Installation: Install with Selector Control Shaft & Lever (below):

Installation (with Transmission in Car)—Insert toggle shaft sleeve in case, align flats of selector control shaft and inner lever, and install inner lever on shaft. Make certain that inner lever is in slot of selector valve. Install flat washer, lock washer, and nut and tighten nut securely. Install snap ring on toggle shaft sleeve. Install forward brake band in position in struts and band guide. Install main shaft assembly.

Selector Control Shaft & Lever and Parking Brake Actuating Rod Removal: Round off sharp corner of selector shaft bore at base of counterbore to prevent scuffing of "O" ring oil seal during installation. Clean selector shaft bore and lubricate with automatic transmission fluid, then install a new cork packing. Install the flat washer on selector control shaft, lubricate shaft and new "O" ring with automatic transmission fluid and install seal in groove of selector control shaft. Apply coat of fibre grease to shaft between "O" ring seal and outer lever. With a twisting motion, install selector control shaft outer lever so that it points toward top of transmission. Align flats of selector shaft and selector control shaft inner lever and install lever on shaft. Install flat washer, lock washer, and nut and tighten nut securely.

Installation (with Transmission in Car)—Proceed as above, then connect hand control bellcrank-to-transmission rod to selector control shaft outer lever. Install oil pan, with new gaskets, and tighten capscrews to 10-13 ft. lbs.

Low & Forward Servo Unit Installation: (Low & Forward Inner Pistons)—Install both pistons in same manner. Hold piston so offset notch of strut is to front and insert assembly in bore of case. Push assembly into bore, being careful not to turn seal over or damage lip of seal.

Installation (with Transmission in Car)—Proceed as above, except that notch in strut must be aligned with pin in brake band shoe before piston assembly pushed into bore.

Low Brake Band Outer Cylinder Installation (Exc. 1950-54 Champion): Apply thin coat of petroleum jelly to transmission case and place a new brake cylinder plate gasket in position on case, making certain that holes in gasket are aligned with holes in case. Slip the low band cylinder assembly over reverse band adjusting screw, position it on case and install retaining capscrews. Tighten capscrews to 15-18 ft. lbs. Install reverse band adjusting capscrew locknut.

Low & Forward Brake Cylinder Cover Installation (1950-54 Champion): Install in same manner as plate for other models (above).

Reverse Servo Unit Installation: (Reverse Brake Inner Piston)—Install inner piston in same manner that Low & Forward Inner Pistons installed.

Reverse Brake Outer Cylinder Installation: Apply thin coat of petroleum jelly to transmission case and place a new cylinder plate gasket in position on case. Slip reverse brake outer cylinder assembly over low band adjusting screw. Position it in case and install retaining cap screws. Tighten the 5/16" x2¼" and 5/16"x1" capscrews to 15-18 ft. lbs. torque, and the 3" screws to 10-13 ft. lbs. torque. Install low band adjusting screw locknut.

Installation (with Transmission in Car)—Proceed as above, then check adjustment of band and adjust if necessary. Retorque reverse cylinder retaining capscrews. Install bell crank on cross member and connect hand control tube-to-bell crank rod.

Brake Band Strut Installation: All three struts are installed in the same manner. Slip strut over end of adjustment screw, with adjustment screw backed off.

Installation (with Transmission in Car)—Hold ends of band together and slip struts over end of adjustment screws. Screw in adjustment nut and make sure that all struts are properly seated in ends of band.

Brake Band Installations: *(NOTE—Low & Forward bands are lighter than the reverse band and are interchangeable. DO NOT INTERCHANGE REVERSE BAND WITH LOW OR FORWARD BAND.)* To install bands, select one of the lighter bands and slip one end over flange of transmission case as during removal. Then turn band so that end of band which has the offset pin is toward the low & forward piston side of case. Move band to rear of case. Install the other light band in same manner and move it to rear of case. Install the reverse band in the same manner except that band must be turned so end of band having offset pin is toward reverse piston side of case. Place all three bands in position as follows: Set band into band guide strap at top of case. Engage band on piston side of case with the piston strut, making sure pin is in notch of strut. Pull shoes of band together, without disengaging piston strut and slip anchor side strut on end of adjustment screw. Then release band and allow shoe to engage anchor side strut. Make sure that all pins of the brake band shoes properly engage notches of their respective struts, and that guides are properly positioned in guide straps.

Main Shaft Installation (Studebaker): With Retaining Clip J-4668-3 in position on front end of main shaft, and that Spacer J-2204-4, and Sleeve J-2204-3, flat washer, and nut are securely in position on rear end of main shaft. Support main shaft assembly with one hand under low drum, insert the assembly in transmission case, thread it through brake bands, and seat bearing in bore of rear face of case. *(CAUTION—*Make sure brake bands and anchor struts have not been moved out of position). Remove Sleeve & Spacer Tools from end of main shaft. Make sure rear bearing spacer is in position on main shaft. Install rear bearing using J-2204-A Pusher Assembly, sleeve and spacer. (Do not remove the pusher at this time.) Install rear bearing snap ring, then push against rear face of case. Remove pusher tool. Install Extension Case (see instructions following).

Main Shaft Installation (Hudson): With Retaining Clip J-4668-3 in position on front end of main shaft and main shaft rear bearing in position on rear of main shaft, insert main shaft assembly into transmission case, threading it through bands and seating the rear bearing in bore of rear face of case. Install main shaft rear bearing lock ring, then push mainshaft forward until lock ring seats against transmission case. Install Extension Case. (See instructions following.)

▷NEW MAIN SHAFT ASSEMBLY INSTALLATION CAUTION—With a new main shaft assembly, it will be necessary to check endplay and determine thickness of the front ring thrust washer. With main shaft installed in case, install universal joint companion flange and tighten nut to 60-80 ft. lbs. torque. Move mainshaft toward rear as far as possible, and install Endplay Gauge J-4668 over the main shaft and ring gear shaft and fit gauge to

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

front of transmission case. Use three of the front pump retaining capscrews to hold gauge to face of case. Turn hub of gauge so indicator is over the start step. Rotate hub counterclockwise while pushing hub inward, maintaining a steady pressure on hub. The step, over which the indicator is stopped by the next higher step, represents the thrust washer to be used. Code number and thickness in thousandths, of thrust washer, is stamped on face of ring opposite the step. ***(CAUTION—If indicator stops over either the high "no-go" step, or the low "no-go" step, the mainshaft assembly cannot be used in that particular transmission case, and another mainshaft assembly must be tried.***

►*NOTE*—If indicator stops over the high "no-go" step, measure distance from end of ring gear shaft to end of main shaft. If measurement less than 3/16" check ring gear thrust washer to see if it has slipped out of place.

Extension Case Installation: Before installing extension case, check the following points and make the necessary corrections.

1) Ball check valve on machined surface of extension case, below main shaft bore, must be free and seating properly. NOTE—This valve will not be found on all extension cases.

2) Check both end brackets of governor assembly for free operation on governor shaft.

3) On models with direct drive pawl, check operation by positioning pawl so it locks governor. With a spring scale, check amount of pull required to release governor valve. If more than 9 ozs. pull required, make necessary corrections.

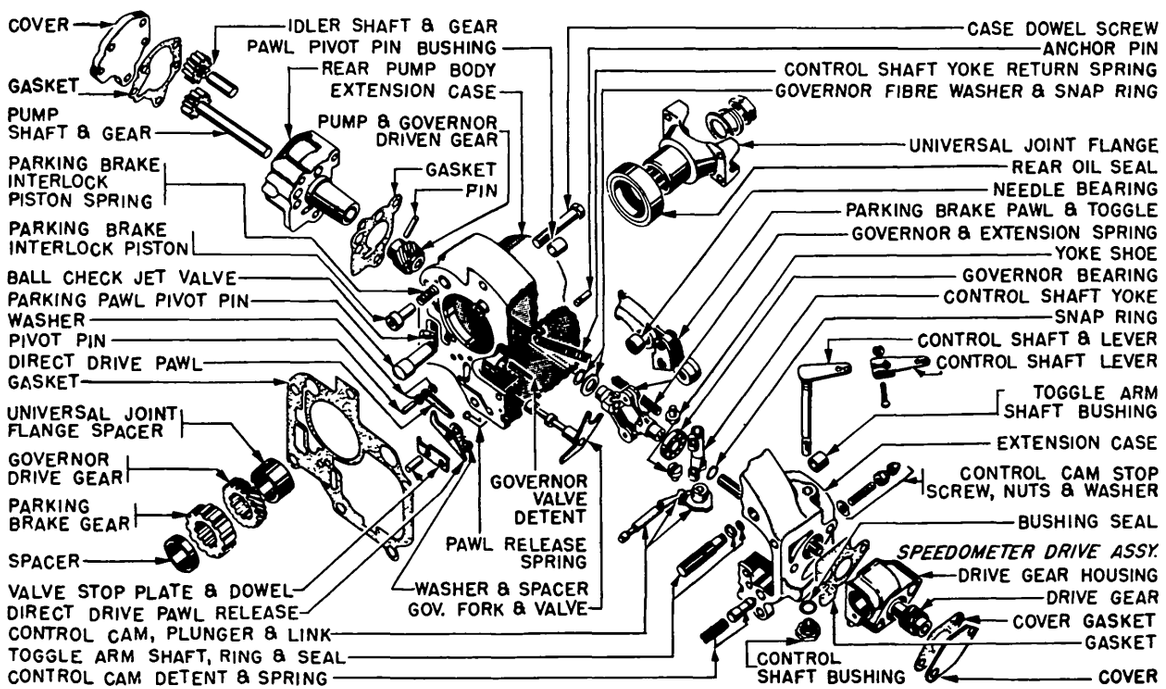
4) Check governor fork endplay in groove of governor end bracket. If clearance greater than .030", replace governor assembly.

►***NOTE*—If new extension case being installed, see below.** To install extension case, apply a thin coating of petroleum jelly to machined face of transmission case and install a new gasket, making sure holes in gasket are aligned with holes in case. Shift selector control shaft lever on transmission to LOW position by pulling lever as far rearward as possible, then moving it forward one detent. Install governor drive gear spacer, parking brake gear, governor drive gear, and universal joint spacer flange, **in that order,** on main shaft ***CAUTION—beveled side of parking brake gear must be toward rear.*** Lubricate all parts with automatic transmission fluid type A, then turn toggle splined shaft so that its wide spline is to the left. ***(CAUTION*—On cars with direct drive pawl, position pawl against governor valve fork, holding governor valve in direct drive position. Be careful not to dislocate pawl during installation of extension housing). Lift extension case into position on shaft and engage splines of toggle arm shaft sleeve splines (move selector lever slightly to aid the engagement), and push case forward against transmission case. Install capscrews and tighten finger tight (so case can be centered with companion flange), and then push selector control shaft lever on transmission forward to PARK position. Align punch marks of universal join flange and main shaft and install flange. Install tongued washer, lock washer, and nut and tighten to 60-80 ft. lbs. torque. ***(CAUTION*—Correct torqueing is very important since endplay is controlled by companion flange). Tighten extension case-to-transmission case capscrews to 28-33 ft. lbs. torque.

►***NEW EXTENSION CASE INSTALLATION NOTE*—If** extension case being replaced, remove parking brake interlock piston and spring from case being replaced and install them in new case. Insert spring in bore and slip stem of piston into spring and push piston into bore of case. Check fit of piston in bore to make sure it moves freely. Also, remove governor control detent spring and detent and install in new case with tapered end first, and place the spring in bore on top of detent.

►**Centering New Extension Case Caution**—A special capscrew is furnished with each new extension case, which must be installed in TOP HOLE of new case to insure proper centering.

Front Pump & Collector Ring Installation: Apply thin film of petroleum jelly to collector ring flange and install a new gasket. Align all holes and oil passages. Coat hub of collector ring and place front ring thrust washer on rear face of assembly, fully engaging tongues of washer in slots. **Steel face of washer must be toward hub of assembly.** Inspect the three seal rings on mainshaft and replace if broken or damaged. Install a 1½" long starting stud in top hole of transmission case, then hold pump so elongated oil inlet hole and round oil outlet hole in flange are at bottom. Check to see that all oil passages are properly indexed with corresponding holes in case, then slip assembly on main shaft. Using the starting stud, position assembly on case and install retaining capscrews. Replace starting stud with capscrew and tighten all screws to 15-18 ft. lbs. torque. Remove ring gear retaining clip from main shaft, and make sure that main shaft assembly turns freely in both directions while holding ring gear shaft.



TYPICAL EXTENSION CASE ASSEMBLY

SUB-ASSEMBLY OVERHAUL

EXTENSION CASE DISASSEMBLY:

Governor Removal: Remove the two speedometer gear housing cover screws, cover and gasket (NOTE—The extension case may be equipped with either a one piece speedometer drive gear and governor shaft assembly, or the speedometer drive gear and governor shaft may be separate pieces with the gear splined to shaft). If equipped with the one piece assembly, pull gear housing away from extension case and withdraw governor shaft and gear assembly from governor assembly, then remove shaft and gear assembly from speedometer gear housing. If equipped with separate gear and shaft, slip gear off shaft and remove speedometer gear housing. Then remove shaft from governor assembly. Disengage governor end bracket from governor valve fork. Slide governor bearing out of governor control shaft yoke shoes and remove governor from case. Remove yoke shoes and governor spring.

Inspection—Inspect governor shaft and make sure it is free of burrs and that splines are not scored. (NOTE—Burrs on shaft can be caused by governor spring not seating properly in governor end brackets). Check governor valve for free operation within valve sleeve. Make sure that hydraulic

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

detent piston is in place in governor valve sleeve (NOTE—If detent is the stepped type, the step end should be inserted in cylinder first, and the long plain end out) Check length of governor spring to make sure the proper spring is used, as follows

▷*LATE 1954-55 GOVERNOR SPRING CAUTION (Cars with "Low Speed Start" Except Early 1955 Champion)* Two governor springs are used and it is very important to use the correct governor tension and booster springs to maintain the proper shift speeds Booster and Tension springs must be in matched sets as indicated in Governor Spring Specification Table (below)

Governor Spring Specifications

Trans.	Booster Spring Part No.	Booster Spring Free Lgth.	Tension Spring Part No.	Tension Spring Free Lgth.
DG-150①			529969	3 1/32"
DG-150②	536484	1 7/8"	537422	3"
DG-150M③	537065	1 11/16"	537066	2 21/32"
DG-200④			529827	2 3/4"
DG-200⑤			529980	2 27/64"
DG-200⑥			⑨311682	2 1/2"
DG-200M⑦	537065	1 11/16"	537066	2 21/32"
DG-250M⑧	537065	1 11/16"	537066	2 21/32"

①—1950-Early 1954 Before Transmission Serial No SCH-60,000 (With second gear start)
②—Early 1954 Champion After Transmission Serial No SCH-60,000 and before Serial No SCH-66,199 (with first gear start)
③—Late 1954-55 Champion (with first gear start)
④—1950 Commander
⑤—1951-Early 1955 Commander (with second gear start)
⑥—1954 Hudson (with second gear start)
⑦—Late 1955 Commander, First Series (with first speed start)
⑧—1955 President & Late 1955 Commander, Second Series, (with first speed start)
⑨—Hudson Part No

▷*CAUTION—Under no circumstances cut or stretch a spring to obtain desired length.*

Governor Control Shaft & Lever Removal: Unhook governor return spring from governor adjusting yoke. Hold shaft in position using Wrench J-5482, loosen set screw, and withdraw shaft from the assembly. Remove governor control shaft yoke and governor control detent cam and plunger assembly (if so equipped), from case If equipped with direct drive lockup, remove governor control detent cam and plunger assembly, swing cam and link toward governor return spring anchor pin, push plunger into case, and remove assembly

Governor Control Direct Drive Lockup Mechanism Removal: To remove pawl, remove cotter pin and flat washer and slip pawl and spacer washer off pivot pin Remove rocker arm spring by slipping the end out of hole in rocker arm and then removing other end from hole in case To remove rocker arm remove retaining plate screw, retainer plate and spacer washer, then remove flat washer and rocker arm from pin To remove plunger, follow procedure outlined under "Governor Control Shaft And Lever" above

Governor Valve & Detent Piston Removal: Turn governor fork so end of fork is out of notch of direct drive rocker arm retaining plate and slide valve out of sleeve Remove hydraulic detent piston If detent piston is stuck in bore, position governor fork so that it contacts the stop on retainer plate Cover the valve body-to-governor passage and the multiple disc clutch passage with fingers, then using compressed air, blow into direct drive passage This will force piston out of bore against fork of governor valve.

Parking Brake Pawl & Toggle Removal: Using a small drift, loosen pivot pin and toggle shaft by tapping pin and shaft forward Remove pawl & toggle assembly from case (NOTE—On some transmissions, pivot pin and toggle shaft do not extend through case Pivot pin is internally threaded and can be removed by inserting a screw, and pulling pin from case) Toggle shaft can be removed with a pair of pliers). *(CAUTION—On some extension cases, a steel or fibre washer is used on toggle shaft back of the toggle lever. Do not interchange washers, use only the same type washer at reassembly.)* Remove the "O" rings from toggle shaft and pivot pin ("O" rings are used to prevent leakage where pin and shaft holes extend through case.)

Extension Case Rear Oil Seal Removal: Drive rear oil seal rearward out of case using a brass drift Do not damage rear pump drive gear or bore of extension case.

Rear Oil Pump Removal: *(CAUTION—Rear oil pump can be removed from extension case without removing case from transmission, if extension case is equipped with one-piece governor shaft and speedometer drive gear assembly. If equipped with the two-piece type, extension case must be removed. To distinguish between the two types, remove speedometer gear housing cover and check position of shaft. If shaft is flush with outer end of gear when gear is held in operating position in housing, it is a two-piece type. If shaft is ½" to ¾" short of being flush, it is one-piece assembly.)* Remove the three screws (two at top, and one at bottom) attaching pump to case, and slip pump out of case. (If two-piece speedometer drive gear and shaft assembly used, hold shaft to prevent removing it with pump)

Rear Oil Pump Gasket Replacement—Rear oil pump is serviced only as an assembly. If leak occurs between pump body and cover, the gasket can be replaced Gaskets are available in five thicknesses. The three thinner gaskets are identified by color only. 002" (red), 003" (green or clear), .005" (blue). Sizes 006" & .009" are black and the size is stamped on face of gasket. There is also an extra ⅛" hole in long ear of the .009" gasket.

▷*CAUTION—Always use a gasket of the same thickness as the one replaced.*

EXTENSION CASE REASSEMBLY:

Rear Oil Pump Installation: Apply a thin film of petroleum jelly to machined face of extension case and position a new gasket on case Make sure gasket does not obstruct governor drain hole. Insert end of pump through opening in case, and install pump retaining screws. Tighten screws to 15-18 ft. lbs .torque.

Installation (With Transmission on Car)—Proceed as above, except that when pump is installed on case, hold face of pump parallel to face of case, push pump into case and engage splines of pump gear and governor shaft. It may be necessary to turn pump slightly to engage splines. If equipped with two-piece speedometer drive gear and shaft assembly, hold shaft to prevent moving governor assembly and yoke out of position.

Extension Case Rear Oil Seal Installation: Coat outer surface of seal with suitable sealer, and place seal in counterbore driver J-2038 (used with Handle J-270-1), with the felt part of seal (lettered side) toward driver. Using an arbor press, start seal into case making sure that seal is not cocked, and enters bore squarely. Remove handle and install it on other side for driver and press the seal in until it is flush with case.

Parking Brake Pawl & Toggle Installation: If "O" rings used, apply automatic transmission fluid to them and install on pivot pin and toggle shaft Position pawl & toggle assembly in case with dog of pawl pointing downward. Align pivot pin hole of pawl with hole in case and install pivot pin Swing end of pawl & toggle assembly into position in case, align wide splines of toggle shaft and toggle lever, and install toggle shaft If equipped with a spacer washer between pawl & toggle assembly and rear of case, be sure this washer is installed and positioned correctly.

▷*CAUTION—If necessary to replace the washer, use only same type washer as used originally. DO NOT INTERCHANGE STEEL AND FIBRE WASHERS.*

Governor Valve & Detent Piston Installation: *(CAUTION—Two types of pistons used; stepped type and straight type. It is very important that stepped piston is installed with the step end inserted in cylinder first.)* Apply automatic transmission fluid to governor valve and hydraulic detent and carefully insert valve and detent in sleeve and place end of the fork in position in notch of direct drive rocker arm retaining plate.

Governor Control Direct Drive Lockup Mechanism Installation: Install plunger by following procedure outlined under "Governor Control Shaft and Lever Installation " Place flat washer on rocker arm pivot pin and install rocker arm on pin Place retainer plate on rocker arm over the pin, slip spacer washer between plate and case, align spacer washer and install retaining screw Install rocker arm spring, making sure upper end of spring is in hole of rocker arm Place flat washer on pawl pivot pin and install the pawl and another flat washer on pin and secure with a cotter pin Check pawl to see that it will drop of its own weight

Governor Control Shaft & Lever Installation: If extension case equipped for direct drive lockup, insert the plunger in hole in case (from inside case) slipping the rocker arm out of way to allow plunger to come through case Make sure that key is properly installed in governor control shaft and insert end of shaft in case Hold governor control shaft yoke in position and slip the shaft onto yoke Align key in shaft with keyway in cam, and insert shaft in cam Fully seat shaft in cam and tighten set screw securely Hook governor return spring to governor control shaft.

Governor Installation: Insert one end of governor spring in governor, compress spring and install the other end *(CAUTION—correct governor spring must be installed. See "Governor Spring Specifications" in "DISASSEMBLY" above.)* Install governor shaft yoke shoes Align slots of shoes and slide governor bearing into position in shoes, then engage groove of governor inner bracket with governor

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

fork. Apply a thin coating of petroleum jelly to machined surface on side of extension case and install a new speedometer housing gasket. If equipped with one-piece shaft, insert governor shaft and speedometer drive gear assembly into gear housing. Align the shaft and governor end bracket and insert shaft in governor. With the shaft through governor assembly, hold governor inner end bracket in on governor fork and engage shaft in splines of rear oil pump gear. If equipped with a two-piece assembly, insert the shaft in governor end brackets and insert shaft in rear oil pump gear. Install speedometer drive gear and housing. Align mounting holes of gear housing with holes in case. Position a new housing cover gasket, making certain that cover and gasket are aligned with housing. (The center opening in gasket is offset and improper installation will damage gasket). Install retaining screws and tighten to 10-13 ft. lbs. torque.

►**New Governor Installation Note**—If installing a new governor, check clearance **between** governor end brackets when governor valve is in its full open position and the governor control lever is in its full forward position. Clearance should be approximately .010". If clearance is not correct, remove acorn nut located on rear of extension case, loosen the locknut and turn screw (clockwise) until proper clearance is obtained.

►*CAUTION*—If after road testing car, and kickdown upshift speed is too high, turn screw (clockwise) a little at a time until proper kickdown upshift speed is obtained *(See "Transmission Shift Speeds" above).*

FRONT PUMP & COLLECTOR RING DISASSEMBLY: Remove the five capscrews attaching front pump to collector ring and remove front pump. Lift pump gear from housing and check them for wear or damage. If gears or casting are found to be worn, replace pump body and gears. Drive the oil seal out of housing using a drift punch. Be careful not to damage pump bushing.

FRONT PUMP & COLLECTOR RING REASSEMBLY: Clean oil seal bore of pump to remove all of the old sealer, then apply a thin coat of suitable sealer to oil seal and, using an arbor press, install seal in housing, with lettered side of seal toward outside. After making sure that interior of pump is clean, place the inner gear in position ,with the side of the gear having drive lugs toward outside. Lubricate gears with automatic transmission fluid Type A. Clean collector ring face and align front pump with collector ring. Install retaining capscrews and tighten to 10-12 ft.lbs. (¼"-20); 15-18 ft.lbs. (5/16"-18).

►*1955 SLOW REVERSE ENGAGEMENT CORRECTION (When shifting from either "D" or "L" range to "R" range):* There are two possible causes for the condition, one being insufficient diameter of the selector valve bleed hole, and the other being overtravel of the selector valve in the reverse position. Both causes result in slow bleed of low and forward servos. *NOTE*—The larger bleed hole entered production with Transmission Serial Nos. SP-24369 (DG-250M Trans.), SCH-3805 (DG-150M Trans.), ST-1547 (DG-250TM Trans.). It is suggested that both corrections be made when valve removed.

1) Remove valve block assembly and remove selector valve (be sure selector valve is turned so that detent ball does not stick in valve lever slot). Enlarge the present 7/64" bleed hole in selector valve housing to 5/32". Coat drill with petroleum jelly to trap aluminum chips.

2) Grind the detent flats (four) on selector valve down to the detent root diameter. The flats must be ground in the same plane as the previous flats and the selector lever milled slot. *CAUTION—Do not nick lands on the valve or touch them with the grinding wheel. Do not overheat valve while grinding.*

VALVE BLOCK DISASSEMBLY: (1) Remove the two capscrews holding relief valve body to valve block assembly and remove relief valve body and gasket. Remove rear pump relief valve screen, then remove valve block oil screen retainer and screen, and the three shroud-to-block capscrews, which permit removal of shroud reinforcing plate and shroud. Remove oil screen shroud gasket.

2) Turn valve block assembly over and remove capscrew holding control valve body to valve block, and very carefully lift converter valve body from base plate. *(CAUTION—Hold valve body level while removing converter valve body to avoid losing converter ball check and rear pump ball check).* Remove the two ball checks and converter valve body gasket from base plate. Separate base plate from valve block manifold and remove valve manifold plate gasket and front pump ball check. Remove the front pump relief valve sleeve retainer from valve manifold, then slip front pump relief valve piston sleeve and valve piston-and-spring assembly out of manifold.

3) Using the spring compressor of Valve Spring Unloader J-4547, compress rear pump relief valve springs, then position spring retainer tool of J-4547 between spring and spring retainer. Remove spring compressor and slip spring retainer out of manifold body. Install spring compressor again to remove retainer tool, then remove compressor and the two valve springs, and piston.

4) Remove converter valve cover plate screws and remove converter cover plate and gasket. Remove compensating piston, springs, stop plate, and valve piston. Using Valve Spring Unloader J-4547 in the same manner as outlined for removal of rear pump relief valve spring retainer, remove reverse interlock valve spring retainer, then remove reverse interlock valve spring and valve piston.

5) Turn selector valve (in valve block manifold) so the milled slot is away from selector valve detent ball and spring housing. Push selector valve into valve block manifold past the detent ball and spring *(CAUTION—Hold hand over opening in manifold so that detent ball which is spring loaded, will not be lost),* and remove ball and spring. Remove selector valve from either end of valve block manifold.

Inspection: Inspect all valve bores and valves in their respective valve bodies for scratches or scoring and for free movement. Small scratches may be polished out to provide free operation. If scoring or scratching is excessive, replace the valve body. Make sure passages in valve block manifold have no obstructions and are not porous. Front and rear pump ball check seats must be tight in manifold and plate. Clean rear pump relief valve intake screen.

VALVE BLOCK REASSEMBLY: Before reassembly, clean all parts of valve block in solvent and dry with air. Take all precautions to keep valve block clean during reassembly.

1) Install front pump relief valve piston and spring assembly, and sleeve in relief valve manifold. Install piston sleeve retainer, and retain it in position with petroleum jelly. Install rear pump relief valve piston and springs in manifold. Using the spring compressor of Valve Spring Unloader J-4547, compress the spring. Slip spring retainer tool in position, withdraw spring compressor, and install the spring retainer. Insert spring compressor, remove retainer tool, then remove compressor.

2) Install reverse interlock valve piston in converter valve body. Use Valve Spring Unloader J-4547 and install reverse interlock valve spring retainer in the same manner as for rear pump relief valve spring retainer. Install converter valve piston, stop plate, springs and the compensating piston. Place a new gasket in position and install cover plate and retaining screws.

3) Install selector valve in valve block manifold, with the milled slot at the detent housing, and with valve slot away from detent housing. Position valve so that end of valve clears opening in detent housing, then install spring and detent ball. With a small screw driver, force ball down into opening, and carefully move selector valve over ball, pushing screw driver off ball. Move valve out until detent ball locks up in first groove of valve. Turn selector valve so that milled slot is toward valve block manifold .

4) Install front pump ball check in valve manifold (check ball check seat to make sure that it is tight). Place manifold plate gasket in position, making sure all holes are aligned, then carefully place the base plate over gasket.

5) Place converter control valve body in position on base plate ,and install converter ball check, and rear pump ball check in the proper holes (converter ball check is the larger of the two). Carefully place converter control valve body over the ball checks and position converter body on base plate. Install a capscrew in hole near valve-end of reverse interlock valve piston housing, and tighten finger tight (converter control valve body is also held to valve block by shroud retaining capscrews and relief body capscrews). It may be necessary when installing other parts of the assembly to shift converter valve body for alignment.

6) Turn valve block over and place relief valve gasket in position. Insert rear pump relief valve screen in passage, making sure that screen is fully seated and is flush with, or below surface of body. Place relief valve body on valve body and align mounting holes. Install two retaining capscrews (in holes toward inside of valve block), and shift relief valve body as far as possible away from end of selector valve housing, to side opposite selector valve housing. Tighten capscrews finger tight.

7) Place oil screen shroud gasket on valve block manifold, making sure all openings are aligned. Install shroud and shroud reinforcing plate, and the three 1¼" retaining capscrews, finger tight.

8) After making certain that all parts are properly positioned by inserting the valve block-to-transmission case screws in holes of valve body, tighten all capscrews to 6-8 ft. lbs. torque.

MAIN SHAFT DISASSEMBLY: *(NOTE*—To provide a means of holding main shaft assembly for overhaul, drill a 2½" hole in a piece of wood 2"x4"x24"

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

and secure this to work bench with a large "C" clamp. The main shaft assembly can then be placed upright with end of main shaft through hole).

1) Slide front ring gear forward, disengaging it from front planetary carrier pinions ,and remove it from the shaft. Remove front ring gear thrust washer from planetary carrier.

▷*RING GEAR OIL SEAL CAUTION—It is not necessary to remove ring gear oil seals unless they are to be replaced. If only one of the rings are broken, all rings ahead of the broken ring MUST BE REPLACED.*

2) To remove ring gear oil seal rings, turn ring so that split is at top, then hold ring tight in groove at one side and press against lower part of ring at other side, causing ring to raise, with end separated. Spread ring just enough to permit removal from groove.

▷Front Ring Gear Needle Bearings & Bushings Note—Needle bearings and bushings are not serviced separately, but are available only as part of the ring gear assembly.

3) Remove reverse drum-and-front planetary carrier by sliding it forward off mainshaft. Remove front sun gear thrust washer from within front sun gear or from hub of front planetary carrier.

4) If necessary to remove planetary carrier from reverse drum, first remove the snap ring by inserting a small screw driver in the slot provided, lifting end of ring out of groove, and then pulling ring completely out of groove. Support drum on arbor press and press carrier out of drum.

▷Planetary Carrier & Pinion Note—Serviced as an assembly only. Separate parts not available.

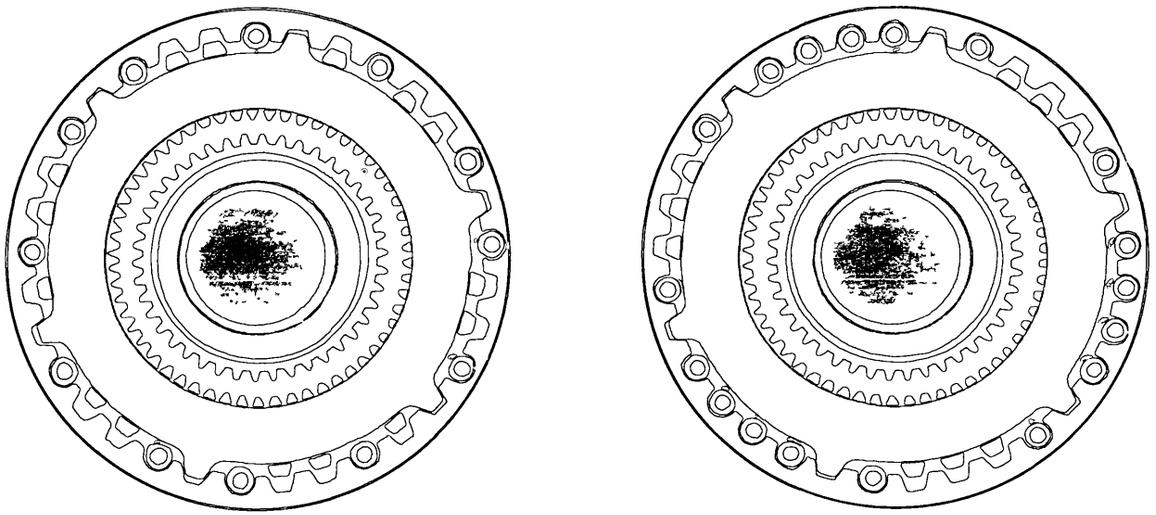
5) Remove sleeve and spacer of Tool J-2204 (installed for removal from transmission case), and remove rear bearing spacer. Slip the forward speed brake drum assembly rearward and remove from shaft. Using a small screw driver, remove the forward speed free wheel unit spacer snap ring, and remove spacer plate from drum. Remove spacer dowel, and the free wheel unit snap ring, then remove the forward speed free wheel unit from drum.

▷Forward Speed Brake Drum Bushing Note—Bushing not serviced separately. Available only as part of forward speed drum assembly.

6) Remove rear sun gear rear spacer washer retainer, and thrust washer from main shaft. Move the low brake drum plate snap ring so that end of ring is above one of the plate slots. Using a small screw driver, lift end of ring and remove it from groove, then pick the two dowels out of plate slots. Remove plate assembly and rear sun gear as an assembly. Slip rear sun gear out of reverse free wheel unit. Remove free wheel unit snap ring and lift free wheel unit out of plate.

▷Bushing Note—Rear sun gear bushing and low brake drum plate bushing not serviced separately.

7) Pull main shaft rearward and remove main shaft and rear planetary carrier as an assembly from the low brake drum assembly. Remove rear planetary carrier front thrust washer, and carrier oil seal retainer snap ring. The rear planetary carrier is not pressed on splines of main shaft, but is held in position by planetary carrier oil seal ring retainer and snap ring. Place the assembly in an arbor press and press shaft out of seal retainer and carrier. Remove seal retainer, rear planetary carrier, and rear sun gear front thrust washer from main shaft.



12 SPRING TYPE — 18 SPRING TYPE

MULTIPLE DISC CLUTCH RETRACTOR SPRING ASSEMBLY

▷*REAR PLANETARY CARRIER CAUTION*—Two types used; one counter-bored at the thrust washer position, and the other not counter-bored. *If carrier is counter-bored type, a steel spacer must be used in addition to thrust washer.*

▷Planetary Carrier Oil Seal Ring Note—Same type as used on main shaft, and are removed in same manner.

8) Slide rear ring gear out of low brake drum, and with a sharp pointed tool, pick the inner "O" ring seal out of retainer and remove it from inside bore of ring gear. Pick outer "O" ring seal out of hub and slip it off hub of ring gear. If necessary, remove oil seal ring and planetary carrier snap ring.

9) Place the low brake drum assembly in an arbor press and place Multiple Disc Clutch Fixture J-5478 on multiple disc clutch retractor spring retainer. Place steel plate on fixture and then apply sufficient pressure to retainer to relieve pressure of retainer against snap ring. Remove snap ring with a small screw driver, then slowly release arbor press to gradually relieve retractor spring pressure. Remove retractor spring retainer, and retractor springs. Remove clutch disc plates, and discs, and retractor spring plate out of drum.

10) To facilitate removal of clutch piston, insert Piston Installing Pins J-5487 in grooves of drum, equally spacing the pins about five grooves apart. Pins will permit seal to slip past circular grooves inside drum. (CAUTION—To prevent damage to multiple disc clutch piston inner bore during removal of piston, place two layers of masking tape over teeth of front sun gear). Lift piston out of drum. To remove piston inner seal, squeeze seal to one side and pull it completely out of groove.

▷*CLUTCH PISTON REPLACEMENT CAUTION—Champion clutch piston has rubber outer seal, while Commander models have a cast iron seal. If clutch piston having rubber seal is to be replaced, use CAST IRON RING SEAL KIT for repalcement.*

▷*LOW BRAKE DRUM REPLACEMENT (1950-51 MODELS)*—Service replacement low brake drums have a centrifugal check (bleed) valve installed in back wall of multiple disc clutch cylinder in the low brake drum. Valve is adaptable for service replacement only when new low brake drum assembly installed.

▷Low Brake Drum Bushing Note—Bushing is not serviced separately. Available only as part of low brake drum assembly.

Inspection: Inspect all carriers, pinion ring gear, and sun gear teeth, oil seal rings, and free wheel unit sprags for wear or damage. Check thrust washers for wear or scoring. Inspect the lining of multiple disc clutch friction discs, and check the clutch disc plates for "dishing." Place a plate on a flat surface, and using a feeler gauge, check clearance at inner diameter of disc plate. If dish is more than .010", plate must be replaced. Inspect brake drums for scoring, and make sure that check valve in multiple disc clutch cylinder is free. Test the tightness of lubrication valve in end of main shaft with Test Rod J-5481.

MAIN SHAFT REASSEMBLY: (1) Lubricate new clutch piston inner seal with Automatic Transmission Fluid Type A, and hold seal so that lip of seal is toward drum. Stretch seal just enough to slip it over sun gear and place it in groove.

2) Two different seals used on clutch piston, requiring different installation procedures. Coat inside of low brake drum and piston seal with Automatic Transmission Fluid Type A, then proceed as follows:

Cast Iron Piston Seal—Install seal in ring groove of piston, and place Piston Installing Pins J-5487 in grooves of drum as during piston removal. Compress clutch piston ring and slip piston into cylinder.

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STUDEBAKER AUTOMATIC TRANSMISSION (Cont.)

Rubber Piston Seal—Use a piece of .002"x3"x18" steel shim stock (hone all edges to prevent cutting rubber seal). Coat shim stock with transmission fluid and place shim stock around inside bore of multiple disc clutch cylinder (make sure that shim stock is down to bottom of clutch cylinder), then slip piston and seal assembly into sleeve formed by shim stock, and push piston down into position. Make sure piston is to bottom of cylinder, and remove shim stock.

►*1950-55 MULTIPLE DISC CLUTCH SERVICE REPLACEMENT CAUTION & 1955 PRODUCTION CHANGE:* Sintered friction discs and flat separator plates are used in 1955 production and for service replacement on all 1950-55 models. Previously the separator plates were slightly "dished." The early type friction discs were thicker, therefore when installing the new type discs in early transmissions it is necessary that Spacer Plate, Part No. 537720 be used. When it is necessary to replace either a disc or a disc plate, all discs and plates should be replaced in complete sets.

3) Slip multiple disc clutch retractor spring plate into drum with spring recesses upward. Lubricate clutch friction discs and plate with transmission fluid, and starting with a disc, place plates and discs alternately in the drum *(CAUTION*—Disc plates are dished, and can be installed with the dish to either front or rear, but **all disc plates must have dish in same direction).** Since lugs on disc plates are not evenly spaced, make sure that lugs are in the same grooves with master lugs of retractor spring plate. *(CAUTION—Studebaker Commander and Hudson Model transmissions multiple disc clutch has FIVE disc plates, and FOUR friction discs. Studebaker Champion has FOUR disc plates, and THREE friction discs).*

4) Center friction discs around sun gear and align teeth of the friction discs. *(CAUTION*—If centrifugal check valve in multiple disc clutch cylinder, **12 retractor springs are used.** If centrifugal check valve NOT used, **18 retractor springs are used.** SEE ILLUSTRATION FOR CORRECT PLACEMENT OF RETRACTOR SPRINGS.) Place retractor springs in groove as indicated in illustration, then place retractor spring retainer over the springs. Using an arbor press as used during disassembly, compress springs so retainer is just below snap ring groove in drum. Install snap ring making sure it is fully seated in groove, and remove assembly from arbor press.

►*RETRACTOR SPRING RETAINER CAUTION—A thinner retainer is used on Commander models than the retainer used on Champion models.*

5) Lubricate rear ring gear inner and outer "O" ring seals with automatic transmission fluid and install the seals *(CAUTION*—Do not stretch outer seal any more than is necessary to slip seal over ring gear shaft). If ring gear oil seal ring and the front planetary carrier snap ring were removed, use a pair of snap ring pliers and install parts on ring gear shaft. Coat oil seal ring and outer "O" ring seal with petroleum jelly and install rear ring gear in the low brake drum.

6) Place rear planetary sun gear front thrust washer on main shaft with the steel face of washer to front of shaft and engage washer with splines of shaft. If carrier is counter-bored, install carrier spacer washer in same manner *(spacer washer not used if carrier NOT counter-bored).* Slip rear planetary carrier on front end of main shaft, engage splines, and seat carrier against shoulder on splines. Install planetary carrier oil seal ring in the retainer and slip retainer on main shaft. Place assembly in an arbor press and press shaft into seal retainer just enough to install snap ring. *(CAUTION*—Care must be taken to press on the inner portion of retainer to prevent damage to seal lands, and binding of ring). Make sure ring is free in groove, and install retainer snap ring. If there is clearance between retainer and snap ring, press retainer back against snap ring.

7) Place rear planetary carrier front thrust washer over shaft and on rear planetary carrier with steel face of washer against carrier. Apply a light coat of petroleum jelly to hold it in place. Install main shaft-and-rear carrier assembly in rear ring gear and low brake drum assembly. Install reverse free-wheel unit in low brake drum plate, making sure side of unit which has the ARROWS is upward. Install unit snap ring in groove. Lubricate rear sun gear bushings and outside of rear sun gear with automatic transmission fluid and install sun gear on shaft.

8) Place low brake drum assembly over end of sun gear with flat side of plate toward drum. Tilt assembly slightly and slip the free-wheel sprags down over edge of sun gear on one side. With a small screw driver, move each sprag outward, slipping it over edge of gear and at the same time holding free-wheeling unit against sun gear. Seat low brake drum plate in drum. Align slots of plate and drum and place the dowels in position in openings. Install snap ring making sure it is seated securely in groove. Place the forward free-wheel unit in forward brake drum, making sure that the side with ARROWS is downward, and install snap ring in groove.

9) Place forward brake drum assembly over rear sun gear. Tilt assembly slightly and slip free-wheel sprags down over edge of sun gear at one side. With a small screw driver, move each sprag outward, slipping it over edge of gear and at the same time holding free-wheel unit against sun gear. After all the sprags are outside edge of gear, rotate the unit clockwise and slide assembly down on sun gear. Slip the rear sun gear rear thrust washer on the shaft with bronze face of washer toward sun gear and place it on rear face of gear. Install spacer washer.

10) Insert the free-wheel unit spacer dowel in hub of forward brake drum and position the spacer within drum, then install spacer snap ring securely in groove of hub. Install rear bearing spacer on main shaft. Install Tools J-2204-4 (spacer), & J-2204-3 (sleeve), companion flange, flat washer and nut on rear end of main shaft and tighten securely.

11) Align splines of front planetary carrier and reverse brake drum. Using an arbor press, press the carrier into drum. Install snap ring, being careful not to distort snap ring. Coat front sun gear thrust washer with petroleum jelly and install the washer within front planetary carrier hub with the tangs in slots, and with steel face against hub.

12) Install reverse drum-and-front planetary carrier assembly. After engaging carrier splines with rear ring gear splines, it may be necessary to turn the assembly to engage the clutch friction disc teeth. **Do not force the assembly into position as this may result in damage to teeth of discs.** Apply petroleum jelly to front planetary carrier thrust washer and place it in position on rear ring gear shaft splines with steel face of washer against front planetary carrier.

13) If front ring gear or main shaft oil seal rings have been removed, install new rings. Spread the rings just enough to permit slipping it over shaft, and install it in groove. Then hold ring tight in groove at one side and press against lower part of ring at other side. This will cause end of ring to lift, then slide finger toward end of ring and lock ends of ring together. Coat main shaft oil seal rings with petroleum jelly and install the front ring gear. Install Retaining Clip J-4668-3 on front end of main shaft to hold assembly in position.

REVERSE SERVO OUTER CYLINDER DISASSEMBLY: Separate reverse brake cylinder plate from cylinder, lift plate off piston rod and remove it from cylinder. Remove reverse brake outer cylinder from gasket. Grasp reverse brake outer piston rod and pull piston out of cylinder. Use a pointed tool and pick the "O" ring seal out of groove in plate and discard seal. Lift piston seal out of groove on one side, then bring it over top of piston and pull it out of groove. Discard the seal.

Inspection: Clean all parts and check gasket surface of cylinder for warpage. Check cylinder plate for warpage, and bore of cylinder for pits or scoring.

REVERSE SERVO OUTER CYLINDER REASSEMBLY: Lubricate a new piston seal with Automatic Transmission Fluid Type A and slip edge of seal into groove of piston at one point, making sure that lip of seal is toward outer face of piston, away from piston rod. Work progressively around piston and seat seal in groove. *(CAUTION*—Avoid stretching seal any more than is necessary to install it on piston.) Lubricate a new "O" ring seal with automatic transmission fluid, and install seal in groove of cylinder plate. Holding piston at an angle, insert it in cylinder, being careful not to damage lip of seal. After top edge of piston is below bottom edge of cylinder, straighten piston and push it into cylinder. Apply a thin coat of petroleum jelly to machined surface of cylinder and place a new outer gasket in position on cylinder, making sure that holes of gasket and cylinder are aligned. Carefully slip cylinder plate over rod of outer piston and position plate on cylinder.

LOW SERVO OUTER CYLINDER DISASSEMBLY & REASSEMBLY: Commander models have two low servo pistons instead of the single piston used on Champion models. Disassembly and reassembly procedure is the same as for Reverse Outer Piston (above).

WATER PUMP INDEX

CAR APPLICATION

BUICK Page
1946-55 2902

CADILLAC
1946-55 2903

CHEVROLET
1946-54 2903
1955 2904

CHRYSLER
1946-55 6 Cyl. 2904
1946-50 8 Cyl. 2905
1951-55 V8 2906

DESOTO
1946-55 6 Cyl. 2904
1953-Early 1954 V8 2904
Late 1954-55 2906

DODGE
1946-55 6 Cyl. 2904
1953-Early 1955 V8 2904
Late 1955 V8 2906

FORD
1946-51 4 & 6 Cyl. 2907
1952-55 6 Cyl. 2906
1948-53 V8 (With Oil Cup) 2908
1946-48 V8 2909
1948-55 V8 (Without Oil Cup) 2908

FRAZER
1947-51 2909

HENRY J
1951-54 4 Cyl. 2909
1951-54 6 Cyl. 2910

HUDSON
1946-47 2910
1948-55 2911

KAISER Pag
1947-50 2909
1951-55 2910

LINCOLN
1946-51 2911
1952-55 2912

MERCURY
1946-48 2909
1948-53 (With Oil Cup) 2908
1948-55 (Without Oil Cup) 2908

NASH
1946-55 Exc. 1955 V8 2912
1955 V8 2911

OLDSMOBILE
1946-49 2913
1949-55 V8 2914

PACKARD
1946-54 2914
1955 2911

PLYMOUTH
1946-55 6 Cyl. 2904
Early 1955 V8 2904
Late 1955 V8 2906

PONTIAC
1946-54 2913
1955 2914

STUDEBAKER
1946-55 (Packless Type) 2915
1951-55 Commander V8 2916

WILLYS
1946-55 2916

1939-48 BUICK

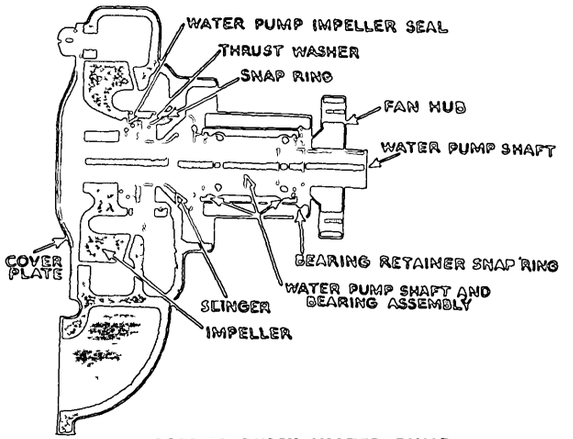
All Series (1939 to 1947)

①All Series except Dynaflow (EARLY 1948)

①—Pump body casting no. 1330139 (on left front face).

REPLACEMENT PUMP NOTE: Replacement parts not furnished for this pump. Latest type pump can be installed as a complete assembly.

TYPE: Ball bearing, packless type. Seal consists of spring-loaded rubber seal and carbon block assembled in impeller hub and retained by snap ring. Bearing consists of a double row ball bearing permanently assembled on shaft (shaft serves as inner race and cannot be removed), factory lubricated and sealed (requires no attention in service). Bearing and shaft assembly retained in pump body by snap ring at forward end of bearing hub.



1939-48 BUICK WATER PUMP

OVERHAUL: Disassembly. Remove fan and fan pulley use special puller to remove fan hub, take out rear cover screws and remove cover, remove bearing snap ring at forward end of pump body. Support pump in arbor press, press shaft out of impeller, lift impeller out, press shaft and bearing assembly out of pump body toward front.

Seal Assembly. Manufacturer recommends that seal not be disassembled (seal and impeller serviced as assembly). Carbon disc is ground convex on one surface and assembled with this face toward body.

Assembly. See that face of pump which contacts carbon seal is smooth (replace pump body if rough or burred). Use arbor press to install bearing and shaft assembly supporting pump body on press and applying pressure to bearing outer race only (do not press on shaft or bearing seal), install bearing snap ring. Press fan hub on shaft (support impeller end of shaft allowing pump to float on shaft so that bearings will not be damaged) until shaft projects beyond front face of hub exactly 3/8" (Series 40 '39-40, 50 '40), 3/16" (60,80,90 '39-40, 70 '40), 13/64" (All 1941-48). Apply cup grease lightly on the impeller end of shaft, face of pump body and face of carbon disc, press impeller on shaft so that it is flush with end of shaft (support shaft at fan hub end allowing pump to float on shaft while installing impeller).

1948-53 BUICK (EXC. V8)

①All Roadmaster Dynaflow Series 70 (1948)

①All Series with Synchro-Mesh Trans. (LATE 1948)

All Series (1949-52)

Series 40 (1953)

①—Pump casting no. 1336756 (on left front face).

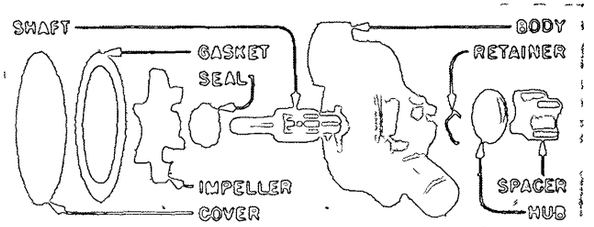
TYPE: Similar to preceeding type except seal assembly:

Seal Assembly. Consists of brass sleeve, helical spring, rubber bellows, and carbon washer. Sleeve is pressed in hub of pump body with spring pressing end of bellows against sleeve (at front) and opposite end of bellows and carbon washer against impeller hub. Inner diameter of sleeve notched which engage similar notches on carbon washer to hold washer stationary.

REPLACEMENT PUMP: This type pump furnished for replacement of other types used on earlier cars.

DISASSEMBLY: For Renewing Seal. Take pump off engine. Remove fan blade and pulley from pump shaft hub. Take off pump cover. Pull impeller off shaft using 2 hook or 3 hook puller with puller screw contacting end of pump shaft. Take out carbon washer, spring, and bellows from brass sleeve (NOTE—If sleeve in good condition, do not remove sleeve). Sleeve can be removed by driving sharp punch through bottom and prying out. Clean pump body (*CAUTION—Pump should not be soaked in gasoline—may destroy lubricant in sealed bearing*).

REASSEMBLY: Installing New Seal. Install sleeve as an assembly using a thick walled tube to press on flange of sleeve. If old sleeve not removed, soak new seal assembly in hot water to separate parts. Install bellows, spring, and carbon washer (low shouldered side to outside). Two notches in washer must engage dents in sleeve. Coat face of washer and impeller hub with rust preventive (or Seco Oil). Press impeller on end of shaft until rear face flush with end of shaft (support pump on fan end of shaft). Use new cover gasket and install pump cover. Install pump on engine.



1948-53 BUICK WATER PUMP

1953-55 BUICK V8

Series 50 & 70 (1953)

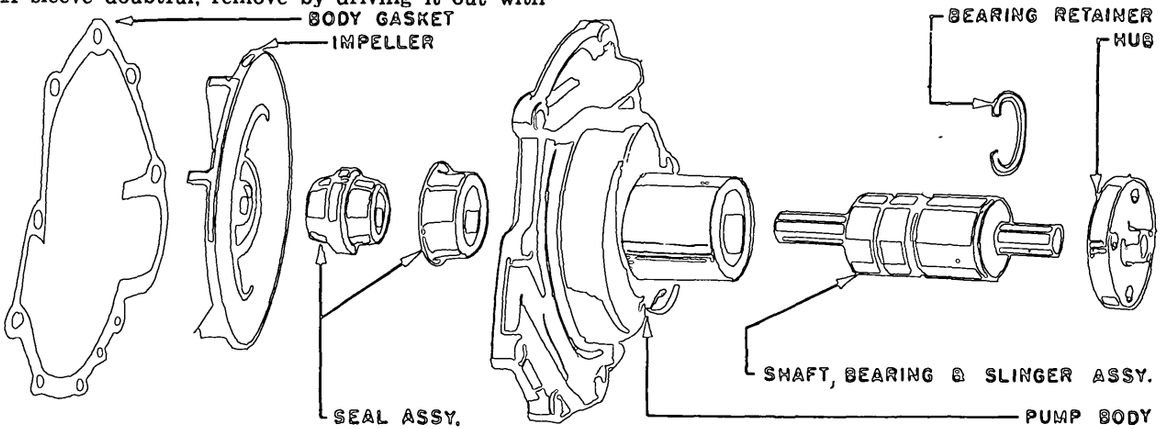
Series 40, 50, 60 & 70 (1954-55)

TYPE: Ball bearing, packless type. Non-adjustable seal consists of a rubber bellows and spring which bears against a sleeve in pump body. Bearing consists of a double row ball bearing held on shaft by a bearing retainer. Bearing is factory lubricated and sealed so that no lubrication required in service.

OVERHAUL: Disassembly—Remove pump cover assembly and gasket from timing chain cover. Remove impeller from pump shaft, using suitable puller (*NOTE*—Puller with two hooks preferred, one with three hooks may be used). Remove carbon washer, rubber bellows and spring from brass sleeve that is pressed into pump housing. It is not necessary to remove brass sleeve if in good condition. If sleeve doubtful, remove by driving it out with punch inserted through vent hole in pump body. Thoroughly clean pump cover to remove rust, old gasket, etc. ***Do not soak in cleaning solvent as this may leak into pump shaft bearing and destroy lubricant.*** Check pump shaft bearing for endplay, or roughness in operation. If bearing not serviceable, press fan hub off shaft, remove bearing retainer, then press bearing out toward FRONT of pump cover.

Reassembly: If old pump shaft bearing removed, press new bearing in against shoulder in pump cover, long end first, then install bearing retainer. Use care to start fan hub squarely on front end of bearing shaft and press it into position 13/64" from end of shaft. If brass seal sleeve removed from pump body, carefully press sleeve of new seal into place

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1953-55 BUICK V8 WATER PUMP

1953-55 BUICK V8 (C nt.)

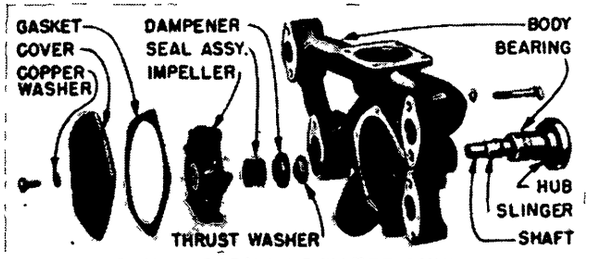
with thick-walled tube that bears fully against sleeve flange. *(NOTE*—External spring seal used alternately in production or service). If old sleeve not removed, separate new seal sleeve from seal bellows by soaking in hot water to soften cement used to hold seal parts together for ease of handling. Install carbon washer, bellows and spring assembly in old sleeve in pump body, being careful to engage the two notches in washer with driving dents in brass sleeve. Coat face of carbon washer and impeller hub with rust preventative or Seco oil, then support pump on fan end of shaft, press impeller on shaft until rear face of impeller is flush with end of shaft. Install pump cover with new gasket. Tighten pump cover bolts with lockwashers uniformly.

1949-55 CADILLAC

Cadillac V8, All Series (1949-55)

►*WATER PUMP REPLACEMENT NOTE:* Use water pump assembly Part No. 3630518 as replacement for all 1949-55 cars. Also use for replacement of 1949-54 water pump bodies. This water pump will improve cooling of older models. It may be identified by figures "C55" on upper left hand leg of pump body. Use nipple Part No. 1462815 for heater hose take-off on 1954 cars, plus Tee Part No. 1455348 in right hand heater hose between pump and Ranco valve for left hand Ranco valve hose.

DESCRIPTION: Ball bearing packless type with plastic impeller.



1949-55 CADILLAC WATER PUMP

OVERHAUL: Disassembly. Remove fan blades and pulley. Take off pump cover and remove plastic pump impeller, using tool J-3211A. (Early type pump bearing retainer ring must be removed and shaft and bearing assembly removed from pump housing before impeller is taken off shaft). Remove seal assembly, and inspect housing seal seat for wear. Do not remove shaft assembly from housing unless inspection indicates roughness or end play.

Reassembly. If new shaft and bearing assembly is to be installed, replace by pressing into pump housing with tool J-3249. Install seal thrust washer, dampener and neoprene shaft seal over driving lugs of shaft slinger. Press impeller on shaft until outer face is .005 to .010 inches below back face of pump. Press new fan hub on shaft, using tool J-3249, until tool bottoms on shaft. Cement gasket and install cover. Spin pump shaft to be sure impeller has clearance. (Install bearing retainer snap ring on early 1949 pump).

CAUTION—Support end of shaft so that press load will not be exerted on bearing.

1939-48 CADILLAC

Cadillac V8, All Series (1939-48)

TYPE: Self-adjusting type (no packing adjustment required in service). Packing rings installed at each end of rear bushing with packing spring located between bushing and front packing ring. Shaft mounted on bushing at rear and sealed type ball bearing at front end.

Lubrication. Grease fitting provided for rear bushing and packing assembly. Should be filled with water pump grease (G-13) every 1000 miles (front bearing requires no attention).

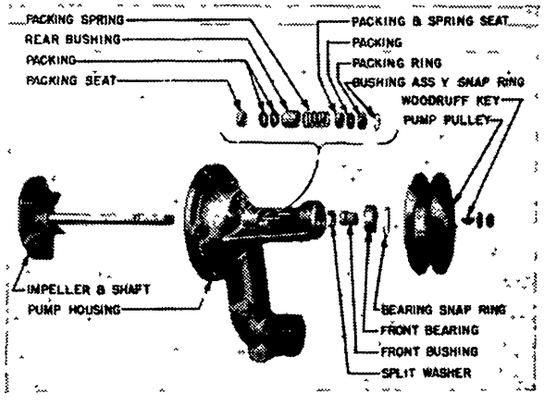
OVERHAUL: Disassembly. Remove nut and lockwasher on front of pump pulley, remove pulley and woodruff key in shaft. Remove bearing snap ring in front end of housing, push impeller to rear to expose split washer in back of front bearing, remove washer. Remove snap ring at forward end of rear bushing assembly, withdraw impeller and shaft through rear end of housing. Remove rear bushing assembly toward front noting location of spring, spring seats, bushing and packing rings to insure correct reassembly. If necessary, press front bearing out of housing toward front, press bushing out of bearing.

Bushing & Packing Assembly. To assemble packings on shaft, install special pilot, No. J-831, on end of shaft, insert shaft in pump housing, wind washer groove on shaft with string to avoid damage to packing rings. Coat packing rings with water pump grease, install packing, spring, and bushing parts in same order as removed from pump (make certain that bushing installed with grooved side toward rear packing rings).

Packing Spring—Spring free length should be 1¼" and spring should show no set when compressed so that coils touch.

Pump Assembly. Reverse disassembly directions given above. Make certain that split washer and snap rings correctly installed and that fan pulley key is in place in shaft before tightening pulley nut.

Clearances—Shaft clearance in bushing should be .0010-.0025" (new), .0035" (worn limit). Impeller clearance in pump body should be .050-.092".



1939-48 CADILLAC WATER PUMP

1946-54 CHEVROLET

Chevrolet, All Models (1946-54)

TYPE: Ball bearing, packless type. Seal consists of a spring-loaded rubber seal and thrust washer assembled in impeller hub (spring and spring cups are integral part of rubber seal). Bearing consists of a double row ball bearing permanently assembled on shaft (shaft serves as inner race and cannot be moved), factory lubricated and sealed. Assembly retained in housing by cap press fit on forward end of housing. The pump has two outlets (water is discharged along both sides of cylinders.

►*1953 & LATER NOTE:* These pumps have a by-pass to provide circulation even though the thermostat is closed.

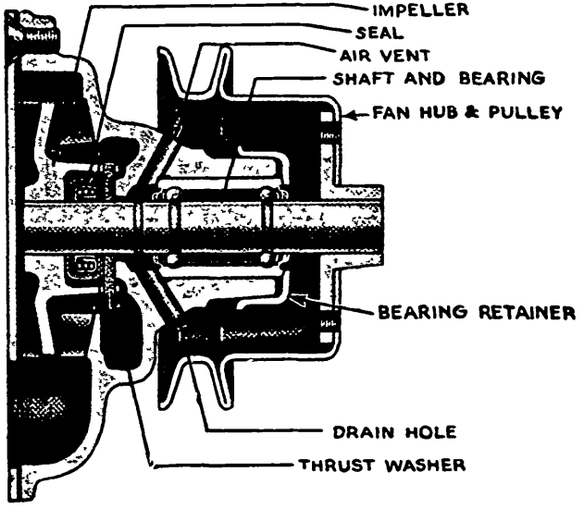
OVERHAUL: Disassembly—Remove screws and rear cover plate. Use puller to remove fan pulley from shaft, remove bearing retainer cap. Support pump housing in arbor press, press bearing and shaft assembly out of impeller and housing toward forward end, lift off impeller and remove thrust washer and rubber seal from impeller recess. Do not attempt to remove bearing from shaft.

NOTE—Puller tool J-1226 used for removal of fan hub and pulley.

Seal Assembly—Install rubber seal in impeller hub (spring is integral part f seal), place thrust washer on seal with lugs on washer engaging slots in impeller so that washer bears against ground face of pump housing when impeller installed.

Assembly—Reverse removal procedures.

NOTE—When installing impeller, pump to impeller clearance should be .010-.035".

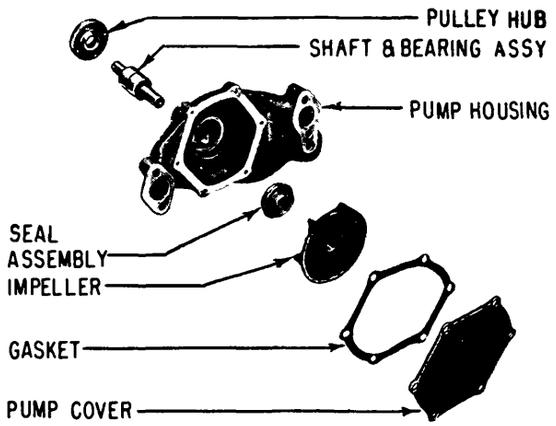


CHEVROLET PACKLESS BALL-BEARIN PUMP

1955 CHEVROLET

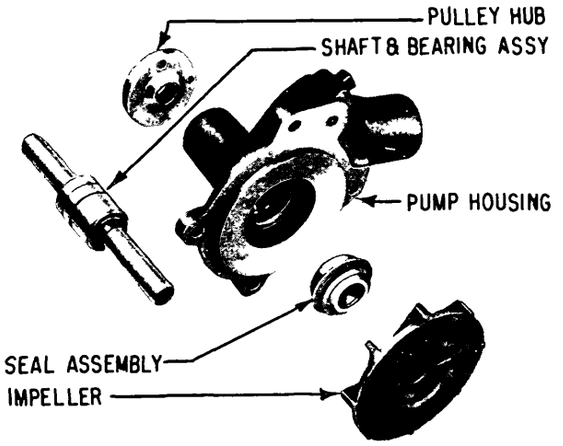
Chevrolet, 6 Cyl. & V8 Models (1955)

►*WATER PUMP & FAN PULLEY REINFORCEMENT (6 Cyl. Cars):* Part No. 3720 616 has been released for installation on engines where greater pulley durability is required. On early type pumps, when this reinforcement is installed, a slight fan belt misalignment will result. In all cases, clearance between pulley and pump body should not be less than .065".



1955 CHEVROLET V8 WATER PUMP

TYPE: Ball bearing, centrifugal vane impeller type. Keep air vent (top) and drain (bottom) holes open at times. Drive shaft and bearing are integral, prelubricated at time of assembly. Pump shaft seal, a combination of rubber and plastic is retained in housing by a metal seal housing pressed into pump body. 6 Cyl. and V8 pumps are basically similar.



1955 CHEVROLET 6 CYL. WATER PUMP

►*CAUTION:* On 6 Cyl. models, pull pump straight out of cylinder block to avoid damage to impeller or shaft.

OVERHAUL: Disassembly - V8 Models - Remove back plate screws, plate, and gasket.

All Models - Support fan hub in arbor press and press pump shaft out of hub. Support pump in arbor press on the face that attaches to cylinder block. Press shaft and impeller assembly out of pump, applying pressure on outer race of shaft bearing only *(CAUTION* - pressure on shaft will cause damage to bearing). Support impeller on seal surface, using press plate J-5855, Generator Bearing Remover and Installer, in an arbor press, and press shaft out of impeller. Discard seal.

►*CAUTION:* Do not wash permanently sealed and lubricated pump shaft bearing in cleaning solvent.

Assembly - Press on bearing outer race only to install shaft and bearing in pump housing until flush with front of pump body. Press new seal into place (with sealing compound on outer diameter only) until it bottoms with outer flange against pump body. Press on fan hub. Install fauge J-5775 in one of bolt holes from rear of pump. Place a straight edge on front face of hub with head of gauge held firmly against body, straight edge should lightly contact **short** step on gauge for **6 Cyl. models** and **end** of gauge for **V8 models.** A tolerance of ± .005" is permitted. Support pump on front or hub end of shaft and press on impeller, to obtain .010" - .035" clearance between impeller vanes and pump body. *NOTE* - On V8 models it will be necessary to put bend about ½" from end of feeler gauge to measure clearance.

CHRYSLER 6, DE SOTO 6 & V8, DODGE 6 & V8, PLYMOUTH

Chrysler 6, DeSoto 6, Dodge 6, Plymouth 6 (1939-55).
DeSoto V8 (1953, 1954 early).
Dodge V8 (1953-55 early).
Plymouth V8 (1955 early).

TYPE: Packless type. Shaft mounted on two bushings in front of impeller.

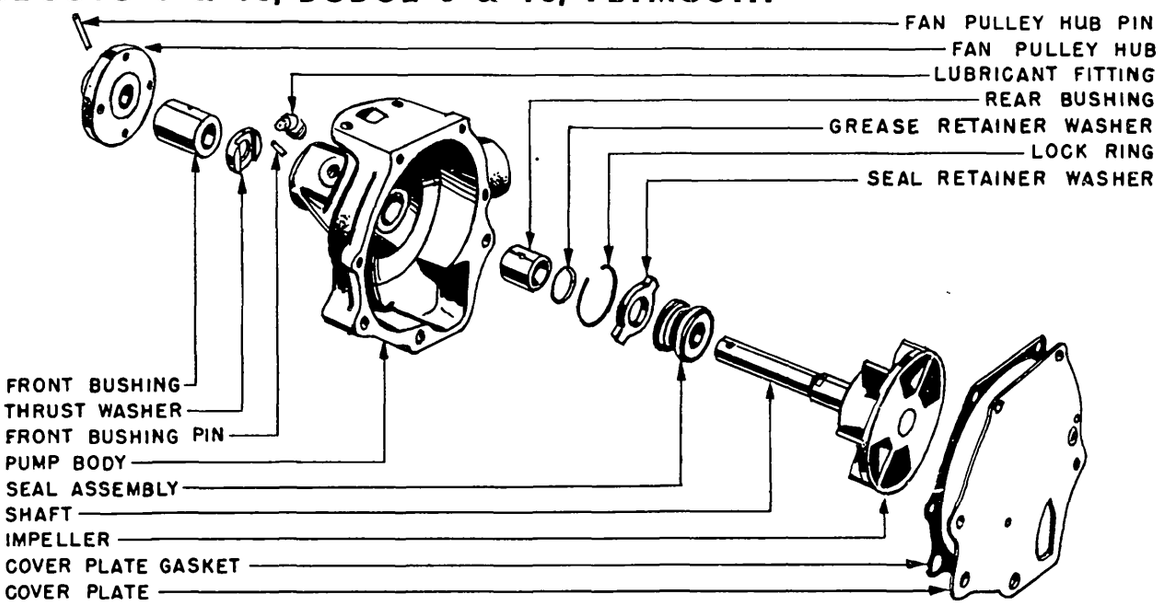
1942 & Later Seal Thrust Spring Note—Spring is installed with large end in toward impeller (reversed from 1941 and previous types).

Chrysler C38 and DeSoto S11 Seal Change— Bellows type seal (similar to 1946 Chrysler 8) used after engine no. C38-26622 and S11-29106. Separate seal thrust spring and seal retainer are not used with this new seal.

SERVICING: Lubrication—Single grease fitting provided on lower left side of pump body. Keep reservoir filled with water pump grease (lubricate at 2000 mile intervals).

OVERHAUL: Disassembly—Drive out fan pulley hub pin, pull hub (use puller C-412), remove capscrews on rear cover plate and remove cover, pull impeller and shaft assembly out of pump. Drive out pin holding impeller on shaft, remove impeller and dismantle seal assembly. To remove bushings, drive front bushing pin into shaft hole to free bushing in housing, use puller C-373 (6 Cyl.), C-3208 (V8) and pull bushings and thrust washer out at forward end.

CONTINUED ON NEXT PAGE



CHRYSLER 6, DE SOTO 6, DODGE 6, PLYMOUTH PUMP
(IMPELLERS ARE 2- OR 6-BLADED)

CHRYSLER 6, DE SOTO 6 & V8, DODGE 6 & V8, PLYMOUTH (Continued)

Servicing—If new bushings installed, use special tool C-373 (same puller used when removing bushings) to press bushings in place. See that thrust washer installed between bushings with slotted side or large diameter hole toward rear of pump. Install locking pin in hole in pump body and make certain that pin engages hole in front bushing to prevent bushing turning in service. Burnish bushings and reface pump body with special tool C-384. Insert tool through rear end of pump, turn tool evenly in clockwise direction until cut has been taken on rear face of pump body, withdraw tool while it is still being turned (this is important to prevent tool leaving ridge on housing).

Tool C-373 Note—When using this tool to install new pump bushings, clamp puller screw upright in vise, install special tool bushing No. 3 with the large diameter against the small hexagonal nut on the puller screw, start rear bushing in pump body, assemble the complete body on the puller screw, install pump thrust washer on puller screw with flat side up (toward front of pump), assemble pump front bushing, install tool thrust bearing and large hexagonal nut on puller screw, tighten the nut to draw pump bushings into place until top face of nut lines up with lower edge of groove in puller screw which will give required 3/32" clearance between face of seal thrust washer and snap ring when pump is assembled (see Assembly directions below for directions on checking this clearance).

No Tool Note—When special tool C-373 not available, press rear bushing into bore .130-.150" beyond seal seat surface (6 Cyl. & V8), press front bushing (6 Cyl.) in until distance from outer surface of bushing to rear seat of pump housing face is 2.782-2.787", (V8) in until bushing shoulder contacts housing, using suitable washer to prevent damage to front face of bushing.

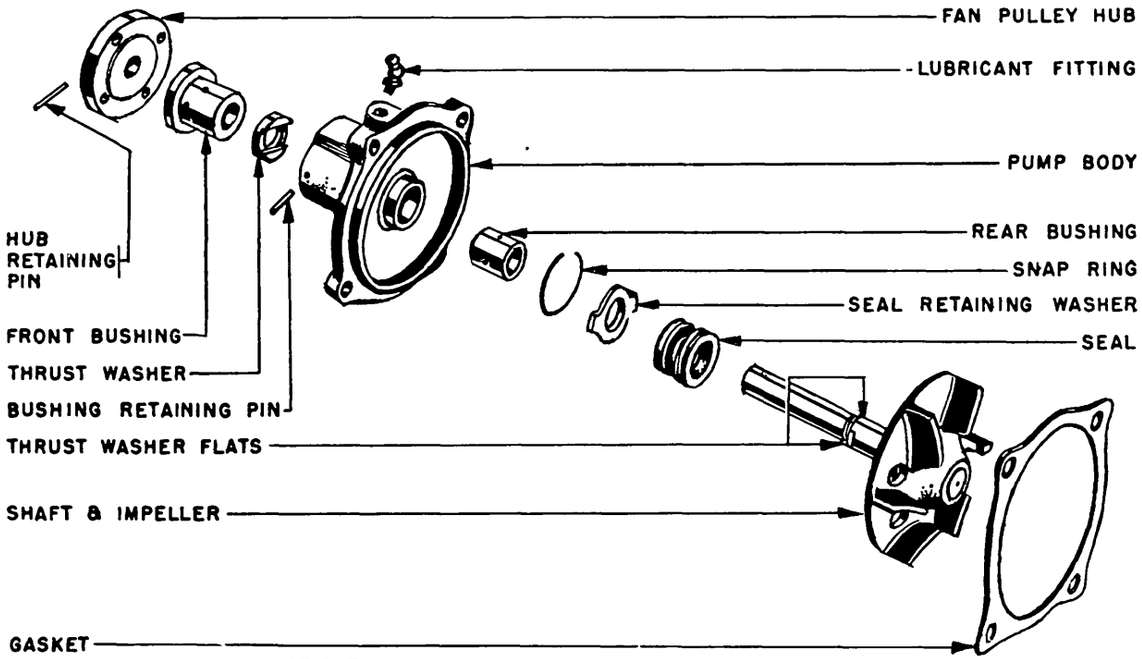
Bushing Pin Drill Note—Use No. 13 drill (.185") to drill front bushing for pin using hole in body as guide for drill. Remove drill burr from inside of bushing and install pin so that outer end is flush with pump body.

Seal Assembly—Install seal parts on shaft within impeller hub in following order: Thrust Spring with small end in toward impeller ('41 and previous car models), large end toward impeller ('42 & later car models), seal retainer (not used with bellows type seal), seal using tool C-528 to install seal on shaft, seal retainer washer (with ears on washer engaging notches in impeller hub), and locking ring. Place grease retainer washer against rear bushing and install impeller assembly in pump housing.

Seal Note—When installing seal retainer (not used with bellows type seal), solid end of retainer should be toward spring and cupped end toward seal.

Assembly—Press impeller on shaft so that back of impeller is flush with end of shaft but do not install pin (assembly must be checked in housing first). Install seal assembly (see data above), slide impeller and shaft assembly into place in pump body, aligning the shaft and washer. Push shaft assembly into pump body firmly so as to compress seal and spring. Sight through water inlet and note clearance between face of seal retainer washer and lock ring in impeller hub. If clearance less than 3/32", remove assembly and press impeller further on shaft, recheck clearance. When correct clearance of not less than 3/32" secured, drill shaft and install impeller pin. Install impeller and shaft assembly. When installing new fan hub (below), press hub on shaft, leaving .0005-.005" (.003" preferred) clearance between front bushing and hub for shaft end play.

Fan Hub Installation—New fan hub must always be used when pump overhauled (old hub will not have satisfactory tight fit on shaft after having been removed. Mark location of old fan hub pin hole on end of shaft before installing new hub, drill new pin hole at right angles to old hole through both hub and shaft, install new pin (pin should not project from hub at either end). Use No. 22 drill.



DE SOTO 8, DODGE 8 & PLYMOUTH 8 WATER PUMP

1946-50 CHRYSLER EIGHT

Chrysler 8 (1946-50)

TYPE: Packless type with ball bearing shaft. Bearings are new type (two individual ball bearings) which can be removed from shaft and serviced separately. Seal is bellows type. Pumps fitted with lubricant fitting (for seal lubrication), grease fitting (for bearing lubrication).

SERVICING: Lubrication—Two lubricant fittings provided (rear fitting for seal lubrication, front fitting for bearing lubrication). **Lubricate with Water Pump Grease at 1000 mile or 30 day intervals.**

OVERHAUL: With pump removed from engine (spacer or back cover remains on engine block), disassemble and service pump as follows:

Disassembly: Drive out fan pulley hub pin, pull hub using special puller C-412. Remove bearing snap ring (in groove in housing ahead of front bearing) with special pliers C-760. Remove impeller and shaft assembly through rear of pump housing. Remove seal washer lock ring from groove in impeller hub, remove seal parts from impeller. Drive out impeller pin, press impeller off shaft. Withdraw ball bearing assemblies and bearing spacer from pump housing.

CAUTION—Fan pulley hub and impeller must not be re-used after having been removed from shaft.

Reassembly: Reface seal seat in pump body with cutter tool C-551 (use pilot DD-811 to insure cutter forming a perfectly flat seal bearing surface). Install bearings in pump body with spacer between bearings, install front bearing snap ring. Press new impeller on shaft (if old impeller removed), install impeller lock pin. Install seal parts in impeller hub, install seal lock ring. Insert impeller and shaft assembly in pump. Press new fan pulley hub on forward end of shaft, install hub lock pin. Check pump assembly for free rotation by spinning shaft.

CAUTION—Lubricate pump seal and bearing fittings while spinning shaft.

1951-54 CHRYSLER V8 & LATE 1954-55 DE SOTO V8

Chrysler V8 (1951-54)
DeSoto (Late 1954-55)

►*1951 IMPELLER NOTE:* Use 8-bladed impeller when replacing 6-bladed impeller used in 1951 pumps.

TYPE: Packless, Ball bearing type. Bearings can be removed from shaft and serviced. Seal is bellows type.

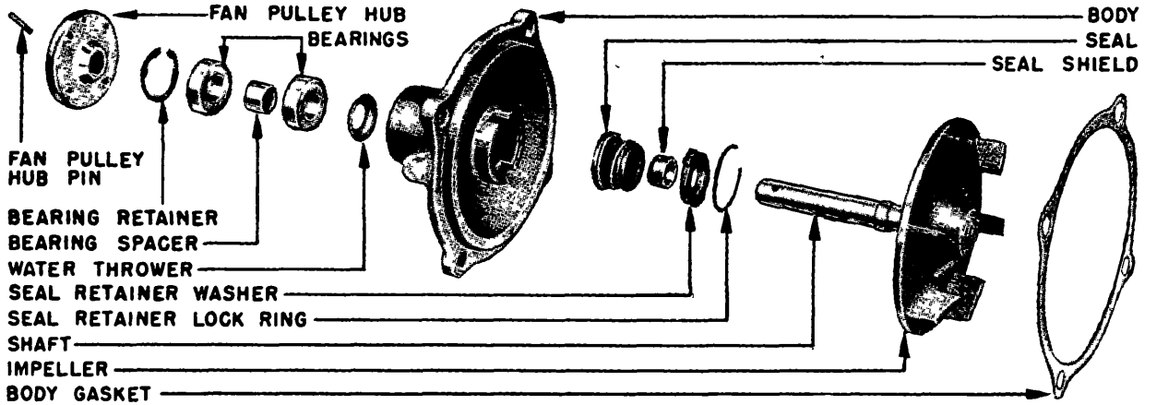
LUBRICATION: Pump is lubricated through a grease fitting in housing, using water pump lubricant.

OVERHAUL: With pump removed from engine, disassemble and overhaul pump as follows:

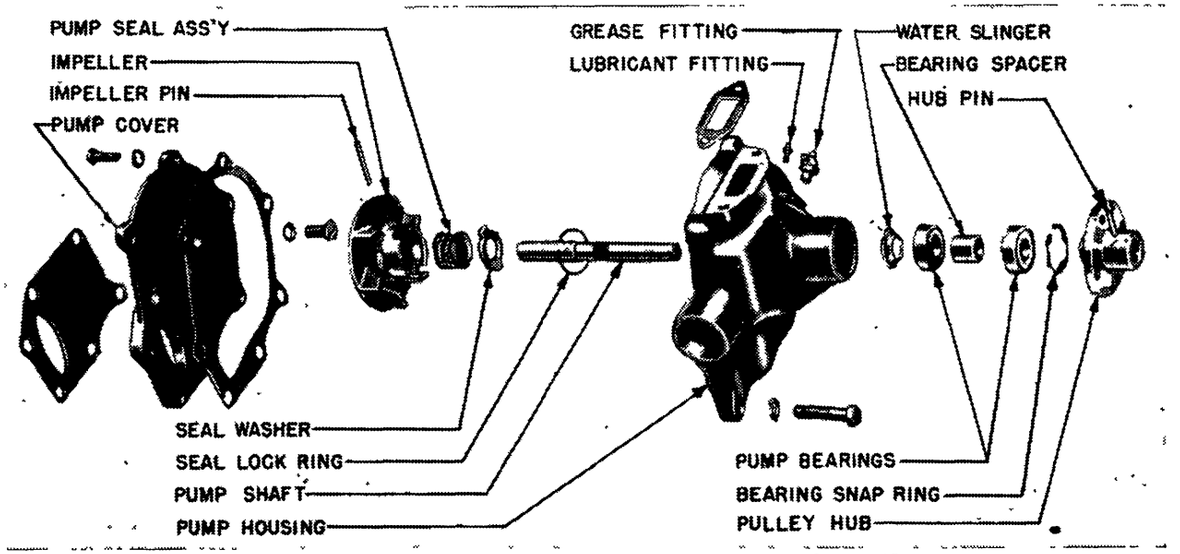
Disassembly: Drive out the fan hub pin and remove fan hub using Tool C-412. Remove bearing retainer with snap ring pliers and remove the impeller and shaft assembly through rear of body. Remove seal retainer washer lock ring, seal retainer washer and seal. Withdraw the outer shaft bearing, spacer, inner shaft bearing and water thrower.

Checking Pump Seal—Distance between shoulder on shaft & impeller hub face should be 1⅛-1 3/16". If not within these measurements, or if impeller seal face is scored or damaged, replace impeller.

Reassembly: Install seal, retainer, and lock ring. Install impeller shaft. Install water thrower, inner bearing, spacer, outer bearing and bearing retainer. Drill hole through fan hub and shaft and insert new pin. (If the old shaft has been used, drill a new hole at right angles to the old hole.) Remove all traces of old gasket and install a new one. Lubricate with water pump lubricant and check pump shaft for free rotation.



1951-54 CHRYSLER V8 & LATE 1954 DESOTO V8 TYPE PUMP



CHRYSLER 8 (1946-50) PACKLESS, BALL-BEARING TYPE PUMP

1955 CHRYSLER, DODGE & PLYMOUTH V8

Chrysler V8 (1955)
Dodge V8 (Late 1955)
Plymouth V8 (Late 1955)

TYPE: Packless type. Double row ball bearing and pump shaft serviced as a unit.

NOTE—Replace shaft with bearing when overhauling as shaft removal operation usually damages bearing.

SERVICING: **Disassembly**—Remove bearing lock spring, cover plate screws, plate and gasket. Press pump shaft and bearing (down) out through impeller and housing, using arbor press to support housing with impeller side up. ***CAUTION—To press shaft and bearing out in opposite direction will cause damage to housing.*** Lift out impeller, remove seal retaining washer lock ring, washer and seal assembly.

Assembly—*NOTE*—Always replace seal and seal washer, pump shaft and bearing, whenever disassembling water pump. Install fan pulley hub on new pump shaft (Hub must be tight fit), install water thrower. Install seal assembly in impeller with lock ring, place impeller in housing. Support housing (impeller side down) on press and press shaft and bearing into impeller with tool C-3468. Install cover using new gasket. Special sealing washers are used on cover plate.

1952-55 FORD 6 CYLINDER

Ford, 6 Cylinder (1952-55)

TYPE: Packless type with sealed double row ball-bearing shaft.

OVERHAUL: Disassembly—Press shaft out of hub, remove snap ring retaining bearing in housing. Press shaft out of impeller and pump body. Press out pump seal.

Reassembly: Clean off any gasket material on mounting face of pump. Install a new seal in pump housing. Coat seal with light coating of waterproof sealer. Use the seal installing tool marked 8501-DD-17 (for seal Part No. 7RA-8564-B). Coat bearing outer diameter lightly with grease and press shaft and bearing into pump housing, applying pressure to outer shell of bearing. Check impeller thickness at hub. If thickness is 1.252-1.257", shim up impeller adapter ring with three equally spaced .020" shims between the ring and counter-bored tool base. Do not allow shim stock to protrude into space where impeller is to be placed. If impeller thickness is 1.232-1.237", no shims are required. Coat seal rubbing face of impeller lightly with grease. Press shaft into impeller. *(CAUTION*—Press shaft into impeller just far enough so pump housing lightly touches face of insert ring. If excessive pressure exerted on shaft after rear face of housing contacts insert ring, pump bearing will be damaged). Impeller to pump body clearance should be .020-.030" after pressing on impeller. Tighten set screw in bottom of fixture plate until screw touches end of shaft. Do not lift pump body off fixture plate. Install snap ring in housing. Press water pump hub on shaft until dimension from inner hub face to machined surface of pump housing is 4.24" (1952-54), 4.36" (1955).

1941-47 FORD 4 & 6 CYL.

FORD NO. 9N-8501

Ford 4 Cyl., Comm'l & Truck (1941-42)

FORD NO. 2GA-8501

Ford 6 Cyl. "G", All Models (1941-42)

FORD No. 5GA-8501

Ford 6 Cyl. "G", All Models (1946-47)

TYPE: Ball bearing, packless type with non-adjustable seal assembled on shaft within impeller hub. Pump on 4 Cylinder models is same design in 1941 and 1942. 6 Cylinder pump design is different in 1941 than on 1942 and later models (1942 and 1946 types similar except for pump pulley and hub). These pumps have following features:

4 Cyl. Pump—Pump is ball bearing type (similar to '79' type) and is mounted on front end of engine block with a back cover plate mounted on the pump body by capscrews. Fan is bolted on shaft in front of water pump pulley. This pump serviced in same manner as '79' type except that screws must be taken out and cover removed for access to impeller.

1941 6 Cyl. Pump—Pump same design as '78' type used on V8 Engines with shaft mounted on porous bronze bushing and seal assembled in impeller hub recess. This pump not lubricated from engine oiling system and reservoir in pump body should be kept filled with oil.

1942-47 6 Cyl. Pump—Bearing is integral with shaft and furnished as an assembly. Pulley hub is retained on shaft by snap ring on forward end of shaft with pulley and fan blades bolted to hub by four capscrews. Seal is similar to type used on Ford V8 models.

SERVICING: Lubrication (6 Cyl. Pump only)—Keep oil reservoir in pump body filled with engine oil through oiler on top of body behind pulley.

OVERHAUL: Disassembly (6 Cyl.)—Take out capscrews and remove fan blades and pulley from pulley hub, remove snap ring on forward end of pump housing, press impeller off shaft, press shaft and bearing assembly out of housing. Remove bearing snap ring from shaft, press shaft and bearing assembly out of pulley hub. Remove snap ring from impeller hub, withdraw seal parts.

CAUTION—Do not attempt to remove bearing from shaft. These parts are furnished as an assembly.

Seal Assembly—Install seal parts in impeller hub in following order: Seal Spring (large end out toward spring guide), Seal Clamp Ring, Spring Guide (tangs out toward seal), Seal (smaller end in and lugs engaged in slots in impeller hub), Seal Washer (lugs engaging slots in impeller hub), install snap ring to retain seal assembly.

Pump Assembly—Press shaft and bearing assembly into housing. Assemble seal in impeller hub (see above), press impeller on shaft until it is flush with end of shaft. Place bearing snap ring on pulley hub, press pulley hub on shaft until groove in shaft is flush with end of hub. Install bearing snap ring on end of shaft, install snap ring in housing.

Pump Installation—Use new gasket when installing pump back cover (4 Cyl.), use new gasket when installing pump on engine (all models).

1947-51 FORD 6 CYLINDER

Ford, 6 Cyl. Pass. Cars & Trucks (1947-51)

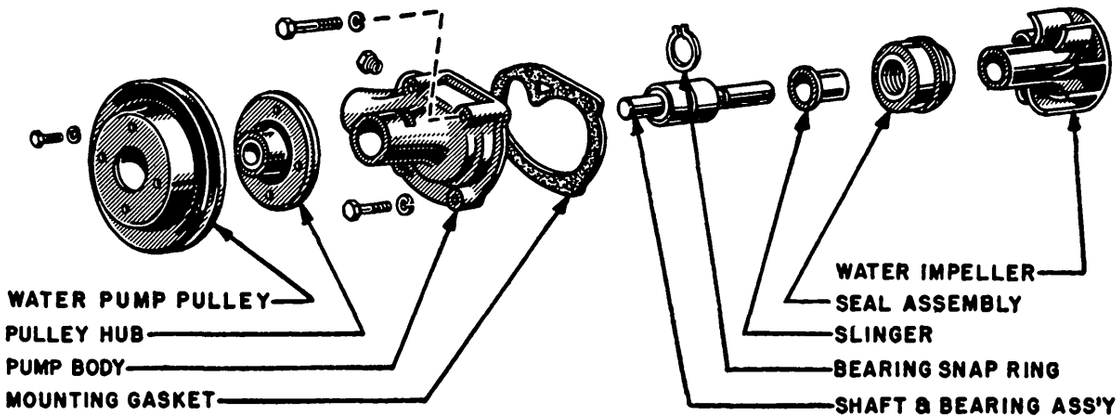
TYPE: Packless type with sealed double row ball-bearing shaft (shaft serves as inner race for bearing).

Model	Replacement Pump	Ford Part No.
1947 Pass. Cars, 1947-53 Trucks		7HA-8501
1948-51 Pass. Cars		OHA-8501-B

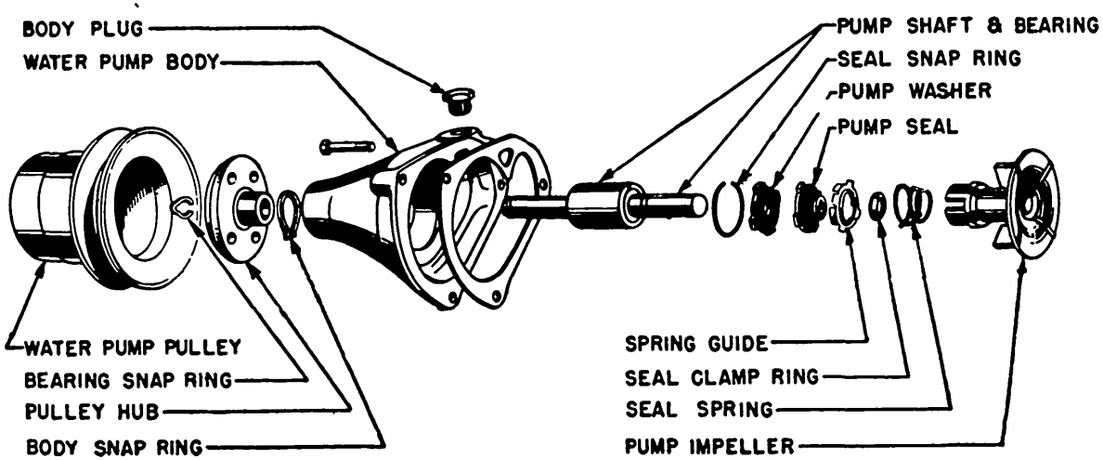
►*CAUTION*—Impeller-to-pump body clearances are different See Reassembly following.

OVERHAUL: Disassembly. Take off fan blades and pulley from hub. Pull hub with puller off front end of shaft. Take out bearing snap ring from slot in pump body. Press shaft and bearing assembly out through rear of pump body. Use care when pressing shaft and bearing out, if assembly not being replaced. Press shaft out of impeller exposing seal assembly.

Reassembly: Carefully press new seal assembly (with slinger) in pump body. Press shaft and bearing into pump body from front until groove in bearing aligned with slot in pump body, and insert bearing snap ring. Press pulley hub on front end of shaft until flush with end of shaft. Press impeller on rear end of shaft to the proper position (clearance between impeller and body face) as follows: .020-.044" (7HA-8501), .024-.034" (OHA-8501).



FORD SIX CYLINDER PUMP (LATE 1947-51 TYPE)



F RD 6 CYLINDER PUMP (1942-47 TYPE)

1948-53 FORD V8 & MERCURY (WITH OIL CUP)

No. 8RT-8501-A (R.H.), 8RT-8502-A (L.H.)
Ford Trucks, F-1, 2, 3, 4, 5, 6 (1948-50)
No. 8BA-8501-B (R.H.), 8BA-8502-B (L.H.)
Ford Passenger Cars, 8BA (Early 1949)
No. 8CM-8501-B (R.H.), 8CM-8502-B (L.H.)
Mercury, 9CM (Early 1949)

NOTE—Replacement for above pumps are without oil cup. *See 1948-53 Ford V8 & Mercury following.*

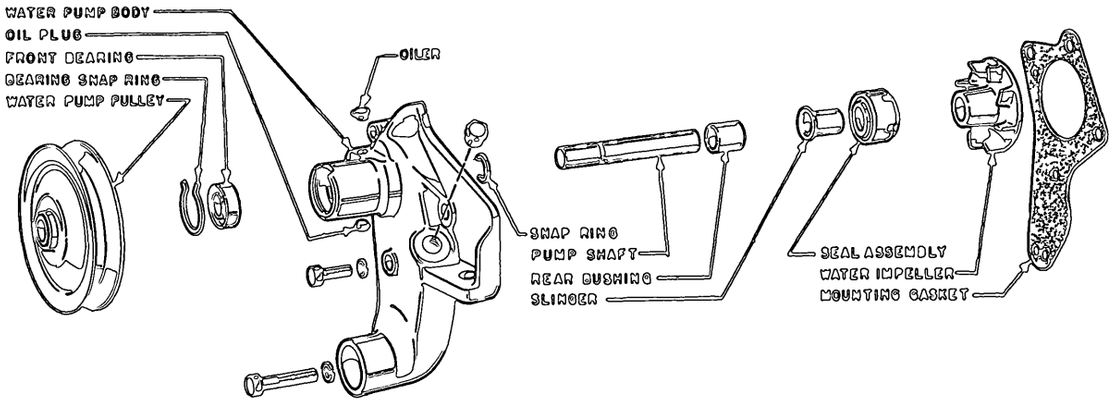
TYPE: Packless type with sealed single row ball-bearing in forward end of pump body with bronze bushing pressed in body next to seal. Front bearing retained by snap ring in groove in shaft on rear side, and by snap ring installed in front end of pump body on front side. Bushing lubricated by means of oil reservoir in pump body with oil cup at top. Seal seats in recess in pump body.

LUBRICATION: *CAUTION—When installing new pump on engine, fill oil reservoir with SAE #20 engine oil. Use a piece of wire inserted in oil cup to allow air trapped in reservoir by wicking to escape.*
Regular Lubrication—Fill oil reservoir through oil cup at top of pump (SAE 20 oil every 1000 miles).

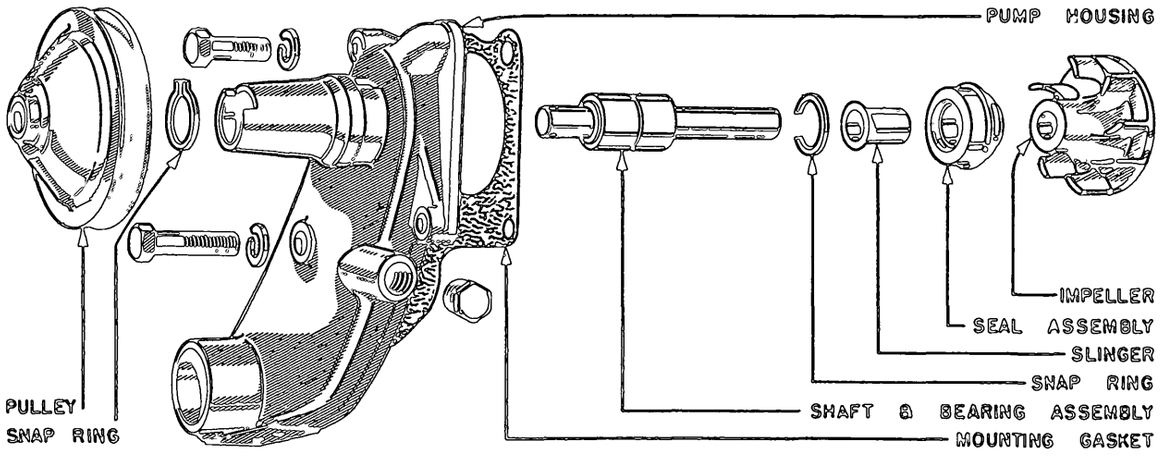
OVERHAUL: Disassembly. Remove pulley from shaft (use Puller Tool No. 8505-N). Remove bearing snap ring from front of pump body. Remove impeller from shaft (use Puller Tool No. 8505-N). Press shaft and bearing out through front of pump body, and press bushing and seal out through rear of pump If required, press ball-bearing off shaft.

▷*CAUTION—Use new impeller, seal, shaft, and bearing whenever water pump disassembled.*

Reassembly: Press new bushing in pump body with .5925" arbor (inside diameter of bushing installed should be .5920-.5925"). Press new seal in pump body with Tool No. 8564-P. Insert bearing snap ring on shaft and install bearing. Use Tool No. 8530 and press shaft and bearing into pump body (must press on outer race of bearing to avoid damaging bearing). Insert bearing snap ring in front of pump body. Support rear end of shaft and press pulley on front end until it bottoms against inner race of ball-bearing. Press impeller on rear end of shaft (clearance between impeller blades and pump body must be .030-.040"). Fill oil reservoir with #20 engine oil.



MERCURY PUMP WITH OIL CUP (FORD V8 SIMILAR)



FORD V8 PUMP WITHOUT OIL CUP (MERCURY SIMILAR)

1948-55 FORD V8 & MERCURY (WITHOUT OIL CUP)

No. 8BA-8501-D, F (R.H.), 8BA-8502-D, F (L.H.)
Ford Passenger Cars (Late 1949-53)

No. B4A 8501-A Ford Pass. Car (1954)

No. B5A 8501-A Ford Pass. Car (1955)

No. 8BA-8501-B, G
Ford Trucks, F-1, 100 through F-6, 600 (1948-53)

No. EAT 8501-B
Ford Trucks, F1, 100 through F6, 600 (1954)

No. B5C 8501-C All 8 Cyl. Trucks (1955)

No. OCM-8501 & EAB-8501-A (R.H.), OCM-8502 & EAB-8502-B (L.H.)
Mercury Passenger Cars (Late 1949-53)

No. B4A 8501-A, B4A 8501-C Mercury (1954)

No. B5A 8501-C Mercury (1955)
NOTE—Above pumps replacement for pumps with oil cup.

▷*TEMPERATURE GAUGE FALSE READING CORRECTION (1954 8 Cyl. Engines):* In cases where heat indicator shows a reading higher than actual water temperature, check water temperature gauge bulb on engine to see that it is not contacting a casting flash inside cylinder head. Remove flashing with a rat tail file.

▷*RESTRICTED WATER BY-PASS CAUTION (1954 8 Cyl. Engines):* A restricted or blocked passage caused by casting flash will decrease flow of water in engine when thermostat is closed. Check for this condition by listening for gurgling sound when engine is stopped after short period of operation. If noise is heard, remove water by-pass tube and inspect for restricted opening in water pump housing. If necessary remove pump and drill opening with a 19/32" drill.

▷*1952 COOLING SYSTEM CHANGE FOR IMPROVED COOLING—See "Cooling" on 1952 Car Model Pages.*

DESCRIPTION: Pre-packed, double row ball bearing type requiring no additional lubrication. Shaft and bearing assembly is held in position with snap rings at front and rear of housing. Seal assembly is a unit containing graphite seal washer and neoprene shaft seal and spring. (Seal assembly cannot be disassembled and must be replaced each time pump is disassembled). A slinger is also provided to further protect the bearing assembly.

OVERHAUL: Disassembly. Remove pulley from shaft using tool 8505N or suitable puller. Remove bearing retainer snap ring from pump housing and press the shaft and bearing assembly out through the rear of the pump housing. Press shaft from impeller. Examine shaft and bearing assembly for roughness or excessive end play. Replace if necessary.
Assembly. Press new seal assembly into pump housing, using tool 8564P to prevent damaging seal. Press shaft and bearing assembly into front end of housing, positioning bearing so groove in bearing lines up with groove in housing and then install snap ring. Press shaft into impeller to give .030-.040" clearance between impeller and pump housing. Press hub onto shaft to give 4.480" (Ford), 3.9375" (Mercury), between outer face of hub and inner machined surface of housing.

1939-48 FORD V8 & MERCURY

No. 78-8501 (R.H.), 78-8502 (L.H.)
Ford V8 '90' & '100' Pass. Cars (1939-48)
Ford V8 '90' Comm'l. Models (1939-41)
Ford V8 '90' Truck Models (1940-41)
Ford V8 '90' & '100' Truck Models (1942 to 1947)
Mercury, All Models (1939 to 1948)

No. 79-8501 (R.H.), 79-8502 (L.H.)
Ford V8 '90' Truck Models (1939)
Ford V8 '100' Truck Models (1939-40-41)
Ford V8 Cab-over-Engine Trucks (1940-41)

►*CAUTION—These 78-8501, 2 pumps must not be used on 1948 8RT V8 Truck Engine or 1949 8BA Pass. Car Engines. No means for lubricating pumps.*

OVERHAUL: Disassembly. Place pump in arbor press, press impeller and shaft assembly out of pulley (see note below for '79' types), lift off pulley and front thrust washer, remove impeller and shaft through rear of housing. Press old bushing out of housing. To dismantle seal, remove snap ring within impeller hub at forward end, remove seal parts (note order and assemble in same positions).

NOTE FOR '79' PUMPS. Shaft and bearing assembly must be pressed out of housing toward forward end (bearing seats against shoulder in housing at rear).

Seal Assembly. When installing seals, install parts in following order: Spring (small end in toward

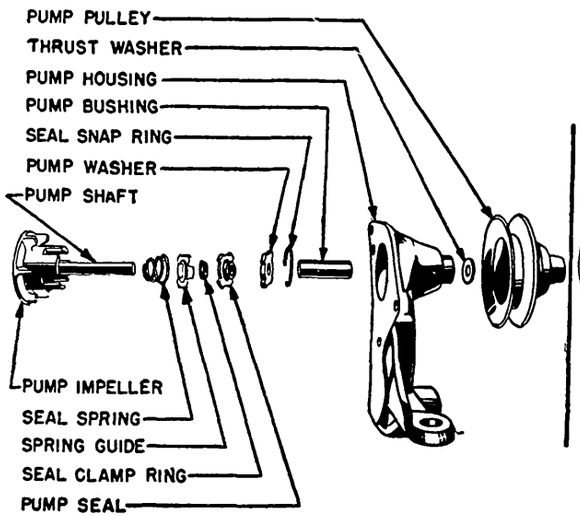
FORD TRUCK MODEL NOTE: This 78-8501 & 2 type pump is used on 1942 Cab-over-Engine models only. 1941 and previous Cab-over-Engine Trucks are equipped with 79-8501 & 2 type pumps.

4 & 6 Cyl. Models—Refer to separate article.

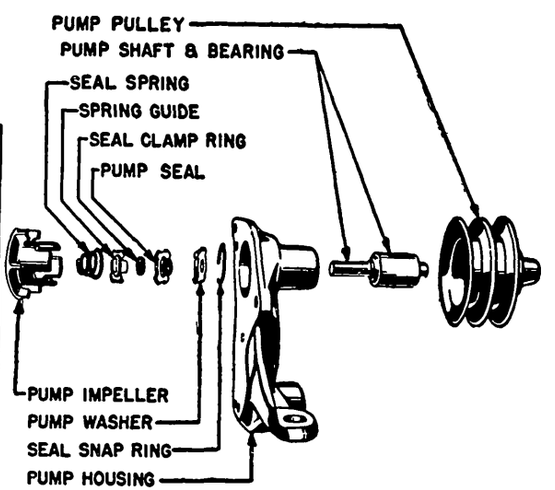
TYPE: Packless type with shaft mounted on bronze bushing ('78' types), sealed ball bearings packed with grease ('79' types).

impeller), Spring Guide (tangs out), Seal Clamp Ring, Seal (with projecting face in, and lugs engage lugs in impeller hub slots), Snap Ring.

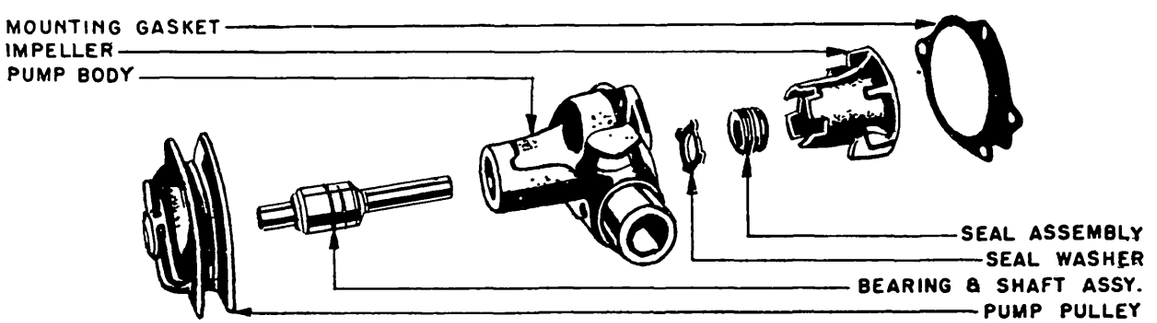
Pump Assembly—Use special tool V-247 to reface front and rear thrust faces of pump housing (necessary to prevent excessive thrust washer wear). Assemble pump by reversing disassembly instructions. gaging slots in impeller hub), Thrust Washer (en-



FORD V8 & MERCURY '78' TYPE PUMP



FORD V8 TRUCK '79' TYPE PUMP



HENRY J 4 CYL. WATER PUMP

HENRY J 4 CYLINDER

All 4 Cylinder Series (1951-54)

DESCRIPTION: Packless type with double row ball bearing integral with pump shaft.

OVERHAUL: Disassembly—Remove fan from pulley and hub. Remove bearing retainer snap ring. Remove pump impeller with Puller W-116. If pump body properly supported, an arbor press can be used to press pump shaft out of both impeller and pump body. Remove seal and carbon washer. Remove drive shaft assembly from pump body by driving or pressing with arbor. Remove pulley and hub from drive shaft with Puller W-115.

Seal Seat Refacing: Reface as required.

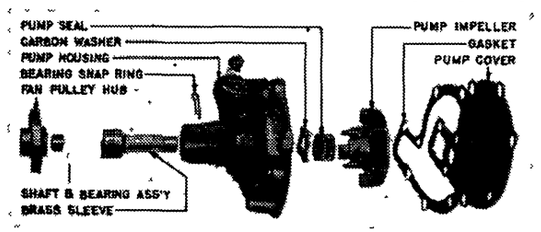
Reassembly: Press pump drive shaft assembly into pump body just far enough to insert snap ring. Insert snap ring. Apply oil or fine graphite to carbon washer and to its seat on pump body, then install carbon washer and seal onto shaft. Press impeller onto shaft until flush with end of shaft. Make sure "ears" of carbon washer are properly entered into impeller hub slots. Check impeller position to assure clearance with pump body. Press pulley and hub assembly onto shaft until center of pulley V-grove is 3 9/32" from mounting face of pump body. Install fan to pulley and hub assembly.

1947-51 FRAZER & KAISER

Frazer (1947-51)
Kaiser (1947-50)

TYPE: Packless type with special double row ball bearing shaft (shaft serves as inner race, bearing is sealed type and packed with lubricant at assembly).

OVERHAUL: Disassembly. Take off fan blades and pulley. Remove pump cover and gasket. Take out bearing snap ring from slot in top of pump body.



FRAZER & KAISER PUMP

If brass impeller blades used, drill two ¼" holes in hub next to shaft, spread hub and remove with puller (if necessary use torch and separate blades from impeller and then pull impeller hub off shaft). If cast-iron impeller used, press shaft out of impeller. Then take out pump seal and washer. Drive out shaft and bearing assembly.

Seal Seat Refacing: Reface as required.

Reassembly: If new shaft, bearing and sleeve assembly being installed, use new fan hub and press on shaft until hub 5/64" beyond end of shaft. Apply cup grease on shaft, sleeve, carbon washer, and seal surface in pump body. Install shaft assembly in pump body and lock in place with bearing snap ring. Place washer and seal on shaft, press impeller on flush with end of shaft. Impeller to pump body clearance should be 1/16". Install cover with new gasket.

HENRY J 6 CYLINDER

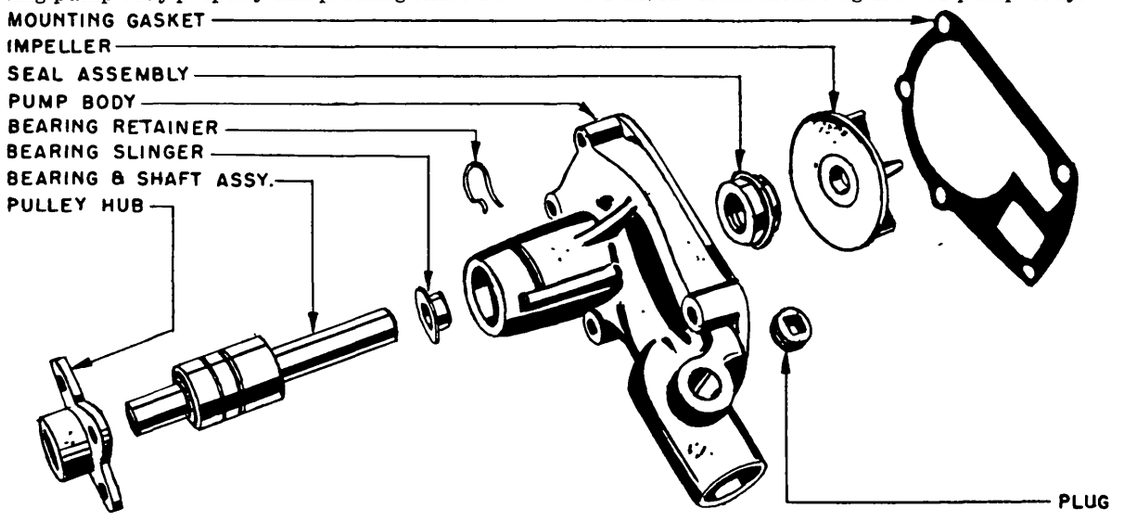
All 6 Cylinder Series (1951-54)

DESCRIPTION: Similar to 4 cylinder type except for seal assembly as follows:

Seal Assembly—Consists of sleeve seated in recess in pump body with a rubber seal ('U' section with spring within 'U') and seal washer between seal impeller. Slinger is used on shaft

OVERHAUL: Disassembly—Remove fan and pulley from hub. Remove bearing retainer snap ring. Remove shaft from impeller and pump body by supporting pump body properly and pressing shaft free from both impeller and pump body. Remove hub from shaft with Puller W-115. Press or drive seal assembly out front end of pump body.

Reassembly: Carefully seat new seal assembly in pump body. Press shaft assembly into pump until front face of bearing aligned with front end of pump. See that seal washer in place and press impeller on rear end of shaft until flush with end of shaft. Install bearing snap ring in pump body (align groove in bearing with slot in pump body). Press hub onto shaft until center of pulley V-groove is 2 11/32" from mounting face of pump body.



HENRY J 6 CYL. WATER PUMP

1951-55 KAISER & 1954-55 WILLYS

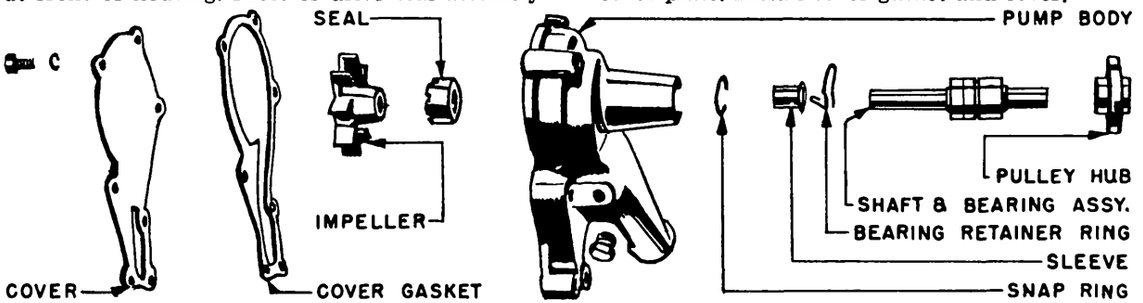
Kaiser (1951-55), Willys, 6 "226" (1954-55)

DESCRIPTION: Packless type with double row ball bearing. Pump shaft and bearing assembly are integral and cannot be disassembled. Seal assembly is a self contained unit pressed into pump body.

OVERHAUL: Disassembly—Remove fan and pulley from pulley hub. Remove pump cover and gasket. With Puller KF-29 and adapter, KF-113, remove impeller from pump shaft. Remove bearing retainer ring from slot in housing and press shaft assembly out front of housing. Press or drive seal assembly from pump body.

Reassembly: Press seal assembly carefully into pump housing. Apply oil or graphite to face of carbon seal washer. Press pump shaft and bearing assembly into pump housing just far enough to insert retaining ring, insert ring. Press impeller on until flush with shaft end. Check impeller position to be sure it clears cover.

Pulley Hub Installation—Press hub on shaft so fan mounting face is 5 7/32" from rear face of rear cover plate. Install cover gasket and cover.



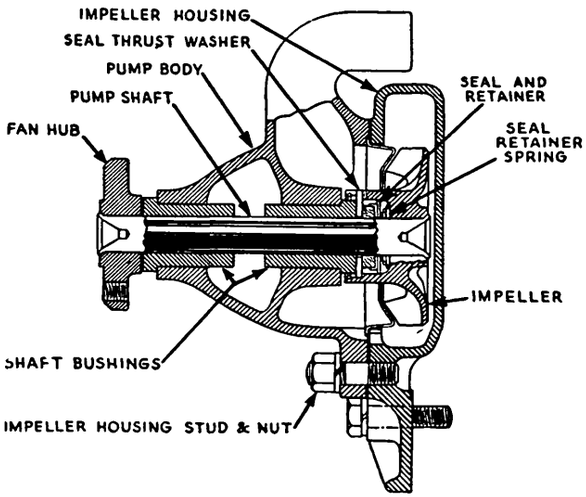
1951-55 KAISER & 1954-55 WILLYS PUMP

1939-47 HUDSON

Hudson 6 & 8, All Models (1939-47)

TYPE: Packless type. Requires no adjustment in service. **Pumps with By-Pass—Pumps on cars with by-pass (for water re-circulation during warm-up) have a** 2nd water inlet with hose to cylinder head outlet.

SERVICING: Lubrication—Water pump grease fitting is special type with spring-loaded plunger which cuts off grease inlet when reservoir is filled to prevent overfilling. Lubricate at 1000 mile intervals using only an aluminum soap base grease.



HUDSON PUMP

OVERHAUL: Disassembly—Remove fan, pulley, impeller housing screws and housing. Clamp pump **upright in vise (grip fan hub in vise jaws), mount tool set body on pump, assemble cutter and thumbscrew and cut burr off shaft at impeller end (turn cutter with wrench while applying pressure with thumbscrew). Install driver and press shaft through impeller, remove shaft from forward end. Lift off impeller and baffle plate, pull old bushings (rear bushing toward rear, front bushing toward front). Take out seal lock ring, remove seal.**

Bushing Installation—New bushings have inside diameter of .6205-.6206" which is reduced to .6185-.6190" when bushing pressed in place. Bushings cannot be reamed and special bushing pilot must be used to press bushings in (driving bushings with hammer cause bushings to collapse). Shaft clearance .0015-.0025" if bushings properly installed.

NOTE—Thrust face of rear bushing must be burnished smooth and flat to prevent thrust washer wear (Tool J-733A-8).

Assembly—Press new bushings into place. Assemble seal in following order: compression spring, seal retainer, seal, thrust washer, locking ring (see that it engages groove in impeller hub). Install shaft assembly, place baffle and new impeller assembly on shaft, peen impeller end of shaft (use ball peen hammer) until endplay as measured between pulley flange and front bushing face is .005-.009" (first type impeller), .010-.014" (1939 and later type impeller). Assemble impeller housing on pump body, fill reservoir with aluminum soap base grease.

1948-55 HUDSON

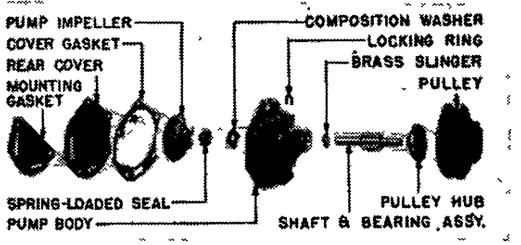
Hudson, All Models Exc. V8 (1948-55)
Hudson Jet & Super Jet (1953-54)

►*WATER PUMP LUBRICATION CHANGE:* Starting with 1955 engine number H-57911, the Rambler water pump lubrication fitting was eliminated and prelubricated water pump seal cartridge was used.

TYPE: Packless type with special double-row sealed ball-bearing shaft held by locking ring in housing. Bearing and shaft must be replaced as an assembly.

OVERHAUL: Disassembly. Remove locking ring from slot in housing, pump rear cover and gasket. Place pump assembly in "Water Pump Holding Fixture J-2778," and using shaft driver, press out pump shaft and bearing assembly with pulley hub attached. Check pump body bore with an inside micrometer. If this dimension greater than 1.1015", replace water pump body. Also check pump body and if impeller has been scraping body, it indicates excessive end thrust (replace complete pump).

Reassembly: Assemble the shaft and bearing in pump



HUDSON 6 & 8 PUMP

body. Bearing should be slight press fit into pump body, and assembled so that the groove on outer race is aligned with locking ring slot in pump body bore. When pressing bearing and shaft in housing, press against face of outer race, not against shaft. Install fan pulley hub. Proper pulley spacing should be. (Hudson Line 8) 4 27/32"; (Hudson 6) 5 5/32" (less Pwr. Strg.), 5 5/16" (Pwr. Strg.); Jet 5 1/64", from front face of **HUB** to cover face on rear of pump body. Assemble seal, combination washer and brass slinger in impeller and install impeller. **Impeller must extend out .007-.017" beyond cover face of pump body.** Install bearing locking ring, new cover gasket and install pump cover.

1955 HUDSON, NASH & PACKARD

Hudson, Nash & Packard V8 (1955)

TYPE: Centrifugal type, with non-adjustable packless type seal. Shaft and sealed double row ball bearing are integral assembly, prelubricated in assembly.

OVERHAUL: Disassembly—Remove bearing lock ring, press hub, shaft and bearing assembly out of impeller and cover. Press shaft and bearing assembly out of hub. Remove seal assembly.

Assembly—Install new seal assembly, new hub on shaft flush with end of shaft. Install shaft and bearing assembly in housing and install lock ring. Press impeller on shaft until flush with end of shaft. Clearance between impeller and cover must not exceed .090".

1940-48 LINCOLN

Lincoln, Zephyr & Cont'l 06H (Early 1940)
Lincoln, All Models (1941 to 1948)
(R.H.)—Right hand pump. (L.H.) Left hand pump.

TYPE: Packless type. Shaft mounted on ball bearing (front) and bronze bushing (rear).

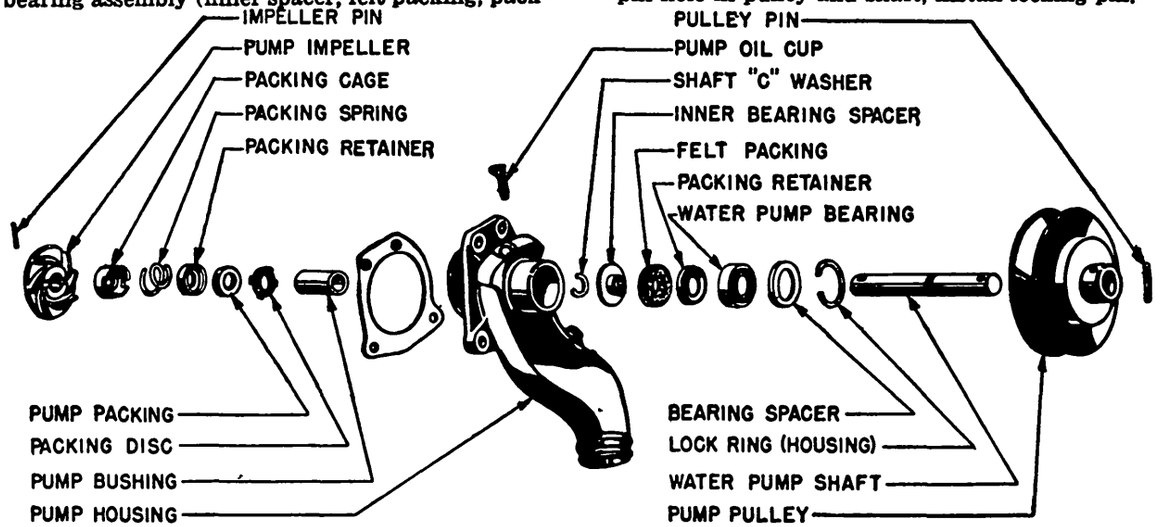
SERVICING: Lubrication—Oiler provided for rear bushing. Lubricate with engine oil each 1000 miles.

OVERHAUL: With pumps removed from engine, disassemble and service both pumps as follows:

Disassembly: Press out pin in impeller hub, press impeller off pump shaft, remove seal cage and seal parts (spring, packing retainer, packing, packing disc) from shaft. Press locking pin out of pump pulley, press pulley off shaft. Press shaft and bushing out at rear of housing ("C" washer in shaft groove will push bushing out). Remove bearing retainer snap ring from within forward end of housing, press bearing assembly (inner spacer, felt packing, packing retainer, bearing, and bearing spacer out at forward end of housing.

Seal Assembly—Seal is assembled in cage which fits on shaft in front of impeller. To assemble seal, install parts in cage in following order: Packing Spring (large end seated in cage), Packing Retainer Washer or cup (cupped end out to receive packing), Seal Packing (fits in cupped end of retainer), Disc or thrust washer.

Reassembly: Install inner bearing spacer, felt packing, and packing retainer in bearing recess in housing, press bearing and bearing spacer in housing, install bearing snap ring. Install "C" washer in groove on shaft, press shaft and bushing in pump housing. Install seal assembly on shaft (see seal data above), press impeller on shaft until locking pin hole in impeller and shaft are aligned, install locking pin. Press pulley on shaft and align locking pin hole in pulley and shaft, install locking pin.



LINCOLN 1940-48 PUMP (EARLIER ZEPHYR PUMP SIMILAR)

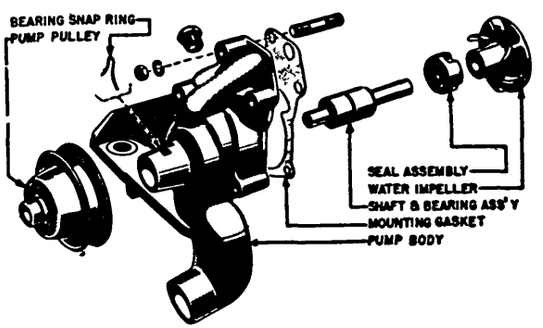
1949-51 LINCOLN

Lincoln & Cosmopolitan (1949-51)

TYPE: Packless type with sealed double row ball-bearing shaft (shaft serves as inner race for bearing). Bearing and shaft furnished as an assembly and cannot be dismantled.

OVERHAUL: Disassembly—Remove pulley from shaft (use Puller Tool No. 8505-N). Remove bearing snap ring from slot in pump body. Press shaft and bearing out through rear of pump body (use Tool No. 8564-N). Press impeller off shaft and take off seal assembly.

Reassembly: Carefully press new seal assembly in pump body (use Tool No. 8564-P). Press shaft and bearing into pump body from front (use Tool No. 8564-N) until groove in bearing aligned with slot in pump body, insert bearing snap ring. Press pulley on front end of shaft until pulley flush with end of shaft. Press impeller on rear end of shaft, impeller must be flush to .010" under pump body rear face.



1949-51 LINCOLN V8 PUMP

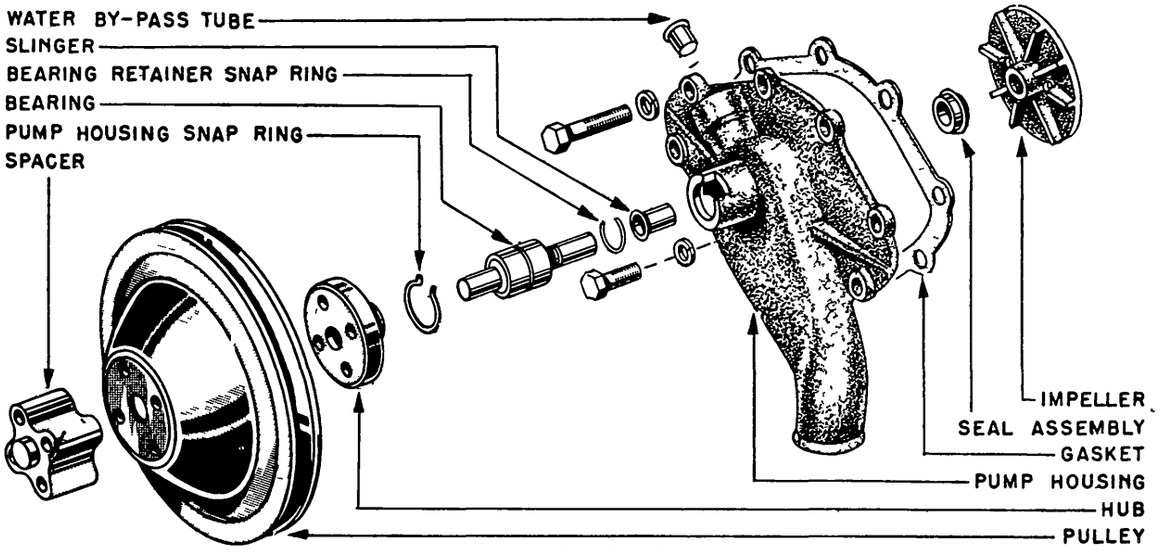
1952-55 LINCOLN

Lincoln, All Models (1952-55)

TYPE: Packless type with sealed double row ball-bearing shaft (shaft serves as inner race for bearing). Bearings are permanently lubricated and require no additional attention in service. Shaft retained by locking ring in slot in pump body.

OVERHAUL: Disassembly—Remove snap ring from groove in front of pump housing, directly behind pulley (NOTE—If pump has pressed steel pulley, remove pulley first, then remove snap ring). Using arbor press, piece of bar stock having smaller diameter than pump shaft, and Tool 8501-DD-21 with three pins installed in tool, press shaft and bearing assembly and pulley from impeller. Remove impeller. Press shaft and bearing assembly and pulley from housing. Using Tool 8501-DD-16 and piece of bar stock, press shaft and bearing assembly from pulley. With Tool 8501-DD-19 press seal and sleeve assembly from pump housing. NOTE—It is not necessary to remove snap ring in center of pump housing.

Reassembly: Coat all surfaces of pump lightly with cup grease. Install shaft and bearing assembly in pump housing using Tool 8501-DD-19. *(CAUTION—* When pressing shaft into housing, stop applying pressure when resistance is felt or the snap ring inside housing will be broken). Install snap ring at front of housing to retain shaft and bearing assembly. Using Tool 8501-DD-17 or DD-18, depending on type of seal and sleeve assembly used, and Tool 8501-DD-16, install seal and sleeve assembly into housing. Remove pins from Tool 8501-DD-21, and turn tool upside down. Place Tool 8501-DD-22 in center of Tool 8501-DD-21 and place both tools on arbor press. Lower adjusting screw in center of tool by turning counter-clockwise. Install impeller on shaft assembly and set pump on tool so impeller is on tool recess. Press downward until pump body makes light contact with tool. This automatically sets impeller-to-housing clearance. Turn screw in Tool 8501-DD-21 clockwise until it contacts the shaft assembly. Using Tool 8501-DD-19, install water pump pulley hub. NOTE—It is necessary that the distance from the lower surface of the pump pulley to the machined surface of the housing be maintained as near to 3 15/16" as possible. This will assure correct pulley alignment.



1952-55 LINCOLN PUMP

1939-49 NASH

Nash Six, All Models (1939-48), "600" (1949)

Nash Eight, All Models (1939-42)

NOTE: Pumps on all models are similar design but **have slight differences in construction (cover plate at rear n some models, at front on shaft on others). All models serviced in same manner.**

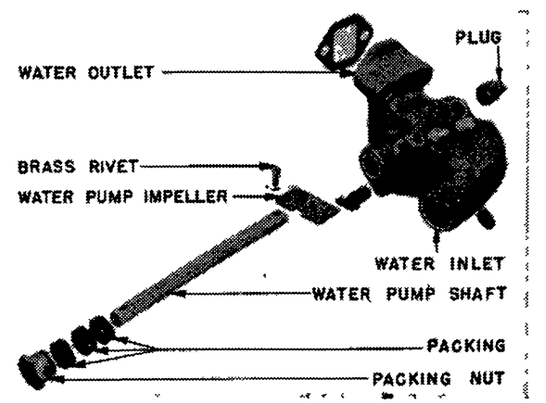
TYPE: Adjustable packing type with 'floating impeller'. **Pump is mounted on side of engine block and driven by flexible coupling from generator armature shaft. Packing adjusting nut provided on** shaft on forward end of pump. Shaft operates in bronze bushing pressed in pump body.

SERVICING: Packing Adjustment. Adjusted in usual **manner by turning up packing adjusting nut. Make adjustment with engine running and turn up nut only enough to stop leaks.**

Lubricati n. Pressure fittings on housing at rear of packing nut. Lubricate with water pump grease at 2000 mile intervals (1942 and earlier cars), 3000 mile intervals (1946-47-48 cars). CAUTION—Lubricate sparingly—do not use high pressure grease gun.

OVERHAUL: Disassembly. Remove impeller by taking out plug in pump and drive out brass rivet while supporting shaft through water outlet. Remove packing nut and withdraw shaft. If bushing removal required, use Water Pump Bushing Remover and Replacer Tool J-1419.

Reassembly: If new bushing being installed, use Replacer Tool J-1419 and ream bushing with Bushing Reamer KMO-314. Install shaft in pump, place impeller on shaft with rivet holes aligned, peen rivet (supporting shaft through water outlet). Install packing rings (3 total) one at a time and draw each one down with packing nut (do not set packing nut tight until pump on engine and allowed to run in).

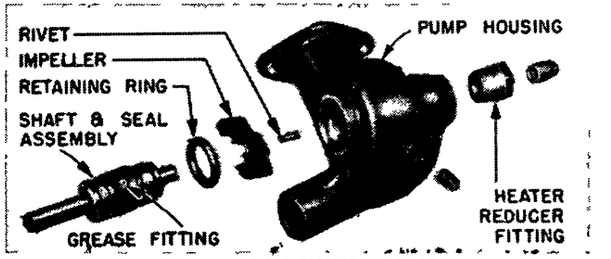


1939-49 NASH WATER PUMP

1949-55 NASH

Nash, All Models Exc. 1949 "600" & 1955 V8

DESCRIPTION: Centrifugal blade type, with a sealed-in shaft sealing assembly. This is of the cartridge



1949-55 NASH WATER PUMP

in shaft sealing assembly (cartridge type, factory sealed and lubricated. Cannot be dismantled). Held in pump body by flexible rubber ring.

OVERHAUL: Disassembly. Remove plug in pump body and drill or drive out rivet holding impeller to shaft. Support shaft through water outlet hole during this operation. Seal and shaft assembly can then be removed from pump body.

Assembly. Insert new rubber retainer in pump body, then apply a small amount of soapy water to the inner part of the rubber ring. Install new shaft and seal assembly. Install impeller using a new rivet to fasten impeller to shaft. Lubricate with chassis lubricant.

1939-54 OLDSMOBILE & PONTIAC

Oldsmobile 6 (1939-50)
Oldsmobile 8 (1939-49)
Pontiac 6 & 8, All Models (1939-54)

►*LATE 1951 PONTIAC PRODUCTION CHANGE*—Pump provided with seal lubrication. Drain hole has been eliminated so oil will be retained in seal cavity. Fill through upper vent hole.

►*LUBRICATING WATER PUMPS ON EARLIER CARS*—If pump has a drain hole, plug hole with a bottle cork and then fill through upper vent hole.

SPECIAL SERVICE NOTES: 1941 Pontiac Pump Shaft & Bearing Assemblies—1941 pumps serviced by 1942 type shaft and bearing assembly which is furnished with brass moisture slinger (as used in 1942 pumps) installed on shaft. When installing this type shaft in 1941 pump, remove brass moisture slinger from shaft (use pliers) and install neoprene bearing shield (included separately in all service packages) in pump instead. CAUTION—1941 pumps not counter-bored for brass slinger clearance and slinger must not be used in these pumps.

TYPE: Packless type with special factory-lubricated ball bearing shaft. No adjustment or lubrication required. *See NOTE above.*

1940-50 Oldsmobile—New type Brass Moisture Slinger used instead of Neoprene bearing shield. See special Moisture Slinger service data below. Fan pulley hub is ⅛" shorter than type used on 1939 cars and earlier type cannot be used on these cars. NOTE—By-pass to cylinder head is not used on 1942 Eight Cylinder models (by-pass on all 1942 models is similar to type used on 1941 and previous Six Cylinder Models). See Installation Note below for new type gaskets required for 1942 Eights.

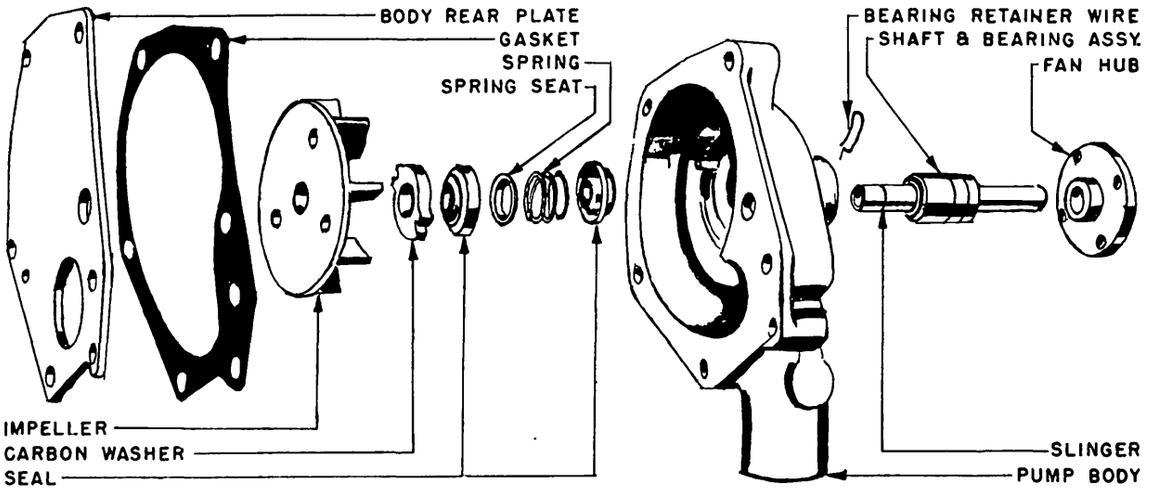
1940-41 Pontiac—All models have same type Neoprene bearing shield as used on late 1939 pumps. See Bearing Shield service data below.

1942 Pontiac—Neoprene bearing shield is not used and new type brass moisture slinger is installed on all 1942 Pontiac Pumps (similar to type used on Oldsmobile). All service shaft and bearing assemblies are furnished with brass moisture slinger installed. Refer to Special Service Note above for removal of slinger when using 1942 type shafts for replacement on 1941 Pontiac Pumps.

1946-53 Pontiac—Brass moisture slinger on shaft (see 1942 data above) is longer and extends through the seal and carbon washer to protect surface of shaft from corrosion. Service shaft and bearing assemblies are furnished with the moisture slinger installed.

OVERHAUL: Disassembly. Remove fan and pulley and cover plate on rear of pump housing. Take out shaft retainer wire (bearing lock ring) in slot at top center of bearing hub on housing. Support front face of pump housing in arbor press, press shaft and bearing assembly out of impeller and housing toward front end. Remove seal assembly from housing (On Oldsmobile models, first take out locking ring in seal recess at rear of housing). If shaft and bearing assembly being replaced, press fan hub off old shaft and install on new shaft.

Servicing—If bearing retainer wire worn (indicating that bearing rotates and has excessive end thrust), or if impeller scrapes on housing due to excessive end thrust, pump assembly should be replaced. If bearing is rough or bearing seals loose in outer race so that they can be turned by hand, replace bearing and shaft assembly. Carbon washer, rubber seal, and spring are furnished as a package unit.



1939-54 OLDSMOBILE & PONTIAC WATER PUMP

Neoprene Bearing Shield (1939 Oldsmobile, 1939-40-41 Pontiac)—Install shield in bearing bore in pump housing with smaller diameter end toward impeller and larger diameter end toward bearing before installing shaft and bearing assembly in housing.

Brass Moisture Slinger (1942-53) Pontiac—Service shaft and bearing assemblies are furnished with this slinger installed and there should be no occasion to remove slinger unless shaft is being used for replacement on 1941 Pumps (refer to Special Service note above). **NOTE**—Slinger on 1946-50 pumps is longer type and extends through washer and seal.

Brass Moisture Slinger (1940-50) Oldsmobile. Install slinger on shaft before shaft and bearing assembly installed in pump housing. Start slinger on shaft with flared end toward bearing, stand shaft and bearing assembly in arbor press with slinger end up, use special tool J-1446 to press slinger down on shaft until slight drag felt on .025" feeler placed between end of bearing and slinger, then install assembly in pump housing. CAUTION—This .025" clearance between slinger and bearing necessary for proper protection of bearing without danger of slinger dragging on bearing which will cause noise.

Seal Assembly—Machined seal seat in pump housing must be smooth and clean to insure good seating of seal. Clean seat with thinner to remove all dirt and gum and wipe dry (seal seat inthe pump body can be cleaned by using special Pump Body Cleaning Reamer No. J-1455). Install seal assembly in pump housing in following order: Inner Spring Cup (cupped side out), Spring, Outer Spring Cup (flanged end out toward seal), Rubber Seal (smaller diameter out—make certain that flared portion of inner spring cup enters seal so that it is retained in housing when installed), Graphite Seal Washer (polished side toward impeller). On Oldsmobile models, install locking ring in groove in housing to retain seal parts. Make certain that all seal parts are properly seated and do not hang up on sides of casting. On Pontiac, make certain that ears on graphite washer engage slots in body (1939-42), or that notches in ears of graphite washer engage the pins in body (1946-53).

NOTE—On Oldsmobile models, tool #J-1456 should be used to install seal. Installation will be facilitated by wetting housing with soap solution.

Pump Assembly—Insert shaft and bearing from front, lining up retainer grooove with slot in housing (if bearing is press fit in housing, remove fan hub install bearing in arbor press applying pressure on outer race only, re-install fan hub applying pressure to impeller end of shaft and allowing housing to float on bearing so that no pressure exerted on bearing or races). Press impeller on shaft (support assembly on fan end of shaft) until clearance between rear face of impeller and face of cover plate flange on housing is 1/32" (Oldsmobile), 3/64" (Pontiac). Install shaft retainer wire through slot in housing, use new gasket when installing pump rear cover plate.

Installation (Oldsmobile only)—Use new rubber grommet between water pump and by-pass port in cylinder head to prevent leaks at this point when pump installed on engine. NOTE—This bypass not used on 1939-42 Six Cylinder or 1942 Eight Cylinder Models. Refer to following note for 1942 Eight Cylinder Gasket data.

Oldsmobile 1942 Pump Note—New type by-pass on 8 cylinder models consists of hole in rear cover plate opening into hole in front face of block. Requires new type gaskets as follows:
Pump Cover Gasket (1942 6 & 8).....No. 416432①
Pump-to-Block Gasket (1942 6 & 8).....No. 416433②
①—May be used on all 1939-40-41-42 6 & 8 cylinder models. Previous type gasket No. 411045 may be used on 1942 8 cyl. cars by punching hole for by-pass.
②—May be used on all 1939-40-41-42 6 & 8 cylinder models. Previous type gasket No. 411046 may be used on 1942 6 cyl. cars but cannot be used on 1942 8 cyl. cars.

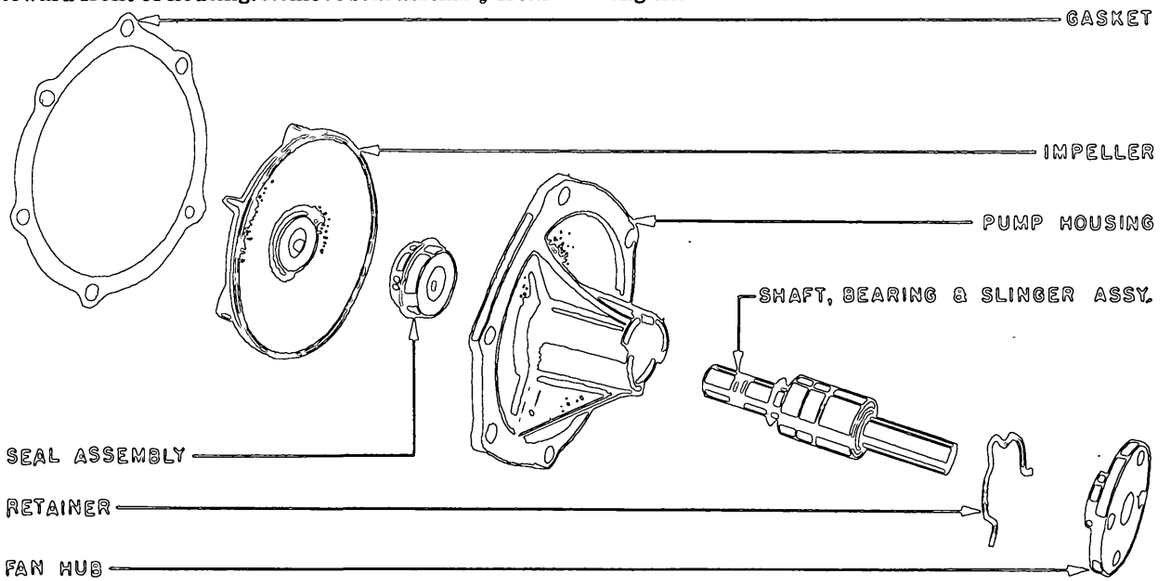
1949-55 OLDSMOBILE & 1955 PONTIAC

Oldsmobile V8, (1949-55)
Pontiac V8, (1955)

DESCRIPTION: Permanent seal, permanently packed double row ball bearing type. The permanent seal consists of a graphite washer (against which the impeller turns) backed with a neoprene seal and spring assembled in a sealed housing. This seal cannot be disassembled and must be replaced each time the pump is disassembled.

OVERHAUL: Disassembly. Remove fan and two fan pulleys. Remove six water pump attaching bolts and take pump from engine. Remove bearing housing from front of pump and remove snap ring bearing retainer. Support bearing housing in arbor press and press shaft through impeller and housing with a ½" x 2½" drift, pressing on impeller end of shaft toward front of housing. Remove seal assembly from housing by driving against inside of seal with a drift punch. Clean housing and impeller seal seat.

Assembly: Press bearing shaft, (end with two small grooves toward impeller) slinger and shaft assembly into bearing housing, using tool BT-16. (In the event that new shaft and bearing assembly is used, it will be necessary to assemble slinger and hub to shaft before pressing into housing). Install seal in housing, pressing into place with tool BT-16, until shoulder of seal is in positive contact with housing. Support impeller (Bt-15) and press bearing shaft through impeller until bottom edge of vanes are 13/16" from machined face at edge of housing. Install bearing retainer snap ring. Install new gasket using cement on one side and mount bearing housing on pump housing. Four mounting bolts should be dipped in CP-9 Sealer. Install pump on engine.



1949-55 OLDSMOBILE & 1955 PONTIAC WATER PUMP

1951-54 PACKARD

TYPE: Packless type with ball-bearing shaft. No lubrication required in service.

OVERHAUL: Disassembly—Using screwdriver, pry out bearing retainer lock. Remove pump rear cover plate and gasket by taking out screws and bolts. Support the pump body securely and press shaft out of impeller (NOTE—Shaft and bearing assembly consists of shaft, bearing and brass bushing which is pressed on long end of shaft). Press seal assembly out of water pump body. Press fan hub off shaft.

Reassembly: Press fan hub on shaft and bearing assembly. Install this assembly into pump body with groove in center of bearing and shaft assembly lined up with slotted opening in water pump body. Insert bearing lock through this opening and spring end of bearing lock over pump body hub. Support pump body and press seal into bore until it bottoms against shoulder in pump body. Support pump body and press impeller onto shaft, leaving a clearance of .030" plus or minus .010" between face of impeller and pump body. Coat cover gasket with Perfect Seal Grade A paste or its equivalent, install gasket on body. Assemble pump cover plate with the attaching screws and tighten. Coat smaller gasket (water pump assembly gasket) with Perfect Seal Grade A paste or its equivalent, then position it on body. Install pump cover attaching bolts and nuts and torque tighten to 15-18 ft. lbs.

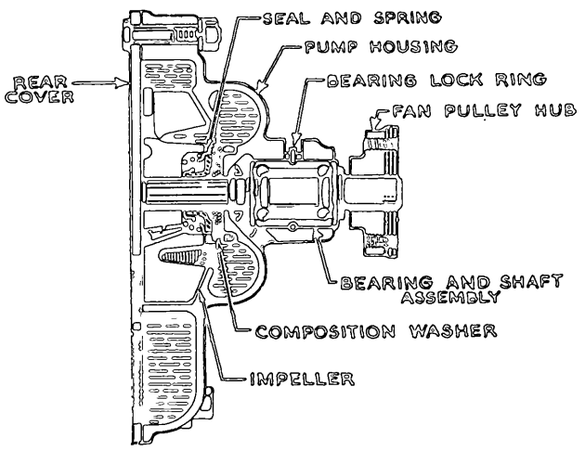
1939-50 PACKARD

Packard 6 & 8, All Models (1939-50)

TYPE: Packless type with ball-bearing shaft. No lubrication required in service.

OVERHAUL: Note—Rebuilt pumps available from factory on 'exchange' basis. To service pumps proceed as follows:

Disassembly—Remove fan and pulley, take out bearing locking ring in slot in bearing hub on housing. Support pump housing in arbor press, press impeller off shaft, remove shaft and bearing assembly through front of housing. To remove seal, take out locking ring in impeller hub, withdraw composition thrust washer, rubber seal, spring cup and spring. NOTE—Do not remove fan pulley hub or attempt to remove bearing from shaft. Shaft, bearing, and pulley hub serviced as an assembly.



PACKARD PACKLESS, BALL-BEARING PUMP

Seal Assembly—When installing seal in impeller, make certain that small end of spring in toward impeller, coat inner surface of seal with glycerine and install with larger flanged face out toward composition washer, install composition thrust washer with smooth (convex) face out toward pump housing, install locking ring.

NOTE—Machined face of pump body on which seal washer bears must be smooth and flat. If this surface rough or scored, resurface face or replace pump body.

Assembly—Install shaft and bearing assembly in pump housing making certain that locking ring groove in bearing lines up with slot in pump housing. Coat impeller end of shaft with glycerine (to prevent damage to seal when impeller pressed on. Heat impeller in water just under boiling point for 1½ minutes, press impeller on shaft until clearance between impeller vanes and housing is .012-.074". Coat pump cover gaskets with Perfect Seal Grade A gasket paste when installing cover. Make certain that bearing locking ring installed in pump housing slot.

1939-55 STUDEBAKER (PACKLESS TYPE)

Champion, All Models (1939-55)
Commander, All Models (1947-50)
President, (1941-42)

TYPE: Packless type with spring loaded rubber seal and fiber thrust washer assembled within recess in impeller. Shaft mounted on special sealed double row ball bearing which is an integral assembly with the shaft (bearing cannot be removed and assembly serviced as a unit). Pump requires no lubrication in service.

Champion 1947-53. New seal used, consisting of a rubber bellows with a spring installed on the outer circumference and bearing on the ends of the seal to maintain seal contact on impeller and thrust washer faces.

President 1941-42. This pump new packless type with ball-bearing shaft. Similar to design used on Champion except that impeller located within pump housing. Serviced in same manner as Champion pump except that rear cover plate must be removed from housing before pump can be disassembled. Use new gasket when replacing cover plate.

Commander 1947-50. Seal is shown in illustration below. Pump has rear cover (adapter plate).

OVERHAUL: Disassembly. Remove bearing lock ring from slot in housing hub at center of bearing. Support housing in arbor press, press shaft and bearing assembly out of impeller and housing toward front end, lift off impeller and remove seal and thrust washer from impeller recess. Support fan hub in arbor press and press shaft out of hub (new hub must be used when reassembling pump—old hubs will not be sufficiently tight fit on shaft).

Servicing—Impeller assembly must be replaced as a unit. If seal thrust washer bearing surface in pump body is rough or scored, resurface with special Pump Facing Tool J-1501.

Seal Assembly (1939-40)—Spring and cups are located within rubber seal. Install rubber seal in impeller hub and place fiber thrust washer on rubber seal so that ears engage slots in impeller and washer contacts face of water pump housing when impeller installed.

Seal Assembly (1941-42)—Install seal parts in impeller hub in same order as removed. See that ears on spring plate, seal, and thrust washer engage slots in impeller hub, install locking ring in hub and see that ring properly seated in grooves.

Seal Assembly (1946-53)—See that spring properly installed on seal, install seal and thrust washer within impeller hub making certain that thrust washer ears engage slots in hub, install locking ring to retain seal assembly in hub.

Pump Assembly—Press new fan hub on shaft so front face is flush with end of shaft, install shaft and bearing assembly in pump housing so that groove in bearing lines up with locking ring notch in housing, install locking ring. Press impeller on shaft until clearance between edge of impeller vanes and the pump body is .015-.031". On the Commander & President models, use new gasket when installing pump rear cover plate (no cover used on Champion).

STUDEBAKER (ADJUSTABLE PACKING TYPE)

Commander, All Models (1939-42)

TYPE: Adjustable packing type. Packing located under adjusting nut at forward end of rear bushing. Shaft mounted on two bushings in pump housing (front bushing within fan pulley).

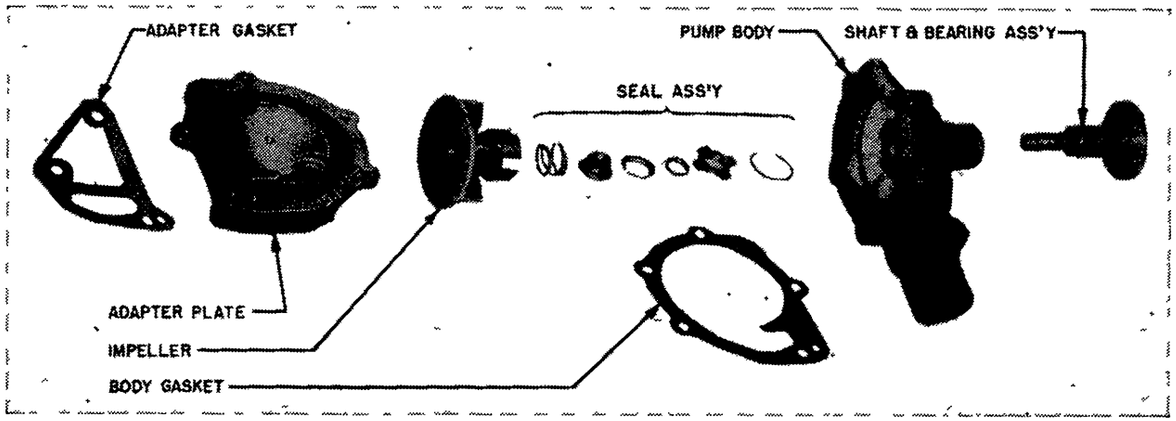
ADJUSTMENT: Adjust packing by turning up adjusting nut (insert screwdriver between pulley and pump housing). Packing is grapho-metal ring type and requires more pressure than ordinary packing. To renew packing, thoroughly clean out old packing, install four new packing rings, one at a time, tightening adjusting nut down on each ring as it is installed. This special ring packing prevents shaft scoring (with more than ordinary adjusting nut pressure) and gives longer service.

OVERHAUL: Disassembly. Remove fan and pulley (on models where these are mounted directly on water pump shaft), take off rear cover plate on pump housing, drive out pin on the fan hub (Dictator 1936-37), press fan hub or coupling off shaft. Withdraw impeller and shaft through rear of pump housing (impeller pinned to shaft). Remove packing nut and packing, press rear bushing out to rear (see Note), front bushing out toward front end.
NOTE—On President 1936-37 models, rear bushing is inserted in blind hole in pump rear cover behind impeller.

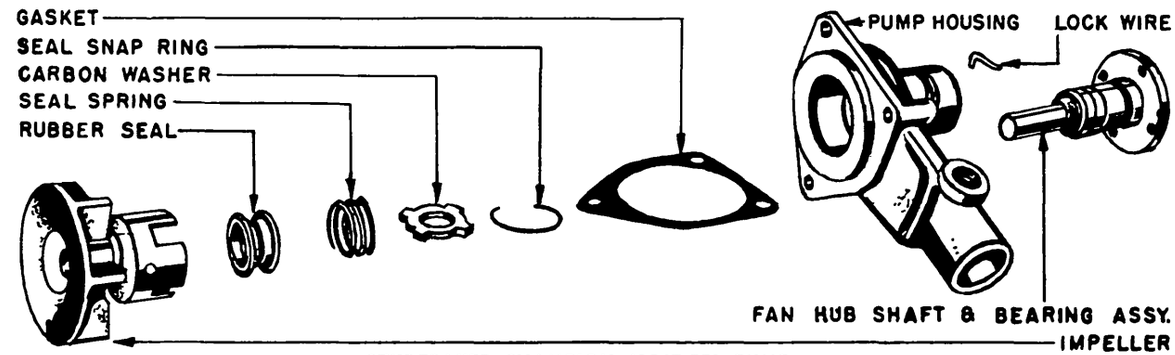
Bushing Installation—Press new bushings in and check clearance on shaft. Should be .001-.003" (bushings need not be reamed if clearance is correct).

Assembly—Reverse disassembly directions. Make certain that thrust washer installed on shaft next to impeller before installing in pump housing. When pressing fan hub on shaft, see that clearance between hub and flange on forward bushing is .003-.005" for correct endplay. See Packing renewal instructions under Adjustment above.

Fan Hub Servicing—New fan hub should be installed whenever hub removed from water pump shaft. Hub must be tight fit on serrated end of shaft and will be loosened by removal so that tight fit cannot be secured if hub re-installed.



STUDEBAKER COMMANDER (1947-50) PUMP



STUDEBAKER CHAMPION (1947-55) PUMP

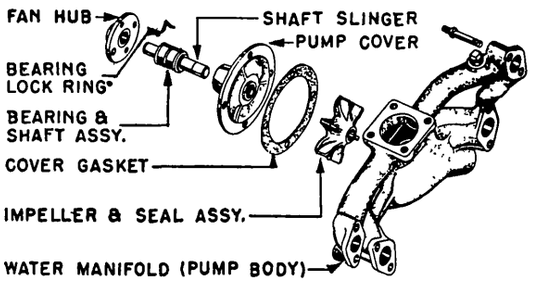
1951-55 STUDEBAKER COMMANDER V8

Commander, All Models (1951-53)
Commander & President, All Models (1954-55)

TYPE: Pump has ball-bearing shaft. Bearings are pre-lubricated and pump packings are non-adjustable.

OVERHAUL: Disassembly—Remove four capscrews which retain cover to pump housing. Remove cover and impeller assembly from pump. Remove bearing lock ring. Place assembly in arbor press and press hub, shaft, and bearing assembly out of impeller and cover. Press shaft and bearing assembly out of hub. Remove four capscrews which retain water outlet to pump housing. Remove outlet, gasket, and thermostat.

Reassembly: Press a **new** fan hub on shaft so that it is flush with end of shaft. Insert shaft in housing, install bearing lock ring. Then install **new** seal assembly in impeller and press impeller on shaft so that impeller is flush with end of shaft. Clearance between impeller and cover must **not** exceed .090". Position assembly on pump housing, aligning holes of cover and housing. Place **new** copper gaskets on cover retaining screws and install screws securely.



1951-55 STUDEBAKER V8 PUMP

WILLYS 6 CYLINDER

Willys, All Models (1948-55)
Willys, 6 "226" Eng. See 1951-55 Kaiser

TYPE: Similar to 4 cylinder type except for seal assembly (See 6 Cyl. Note under Willys 4 Cyl).

OVERHAUL: Disassembly. Take out bearing snap ring from hole or slot in pump body (pulley may have to be removed for access to snap ring). Pull impeller off shaft. Take out seal washer. Press shaft and bearing assembly out through forward end of pump.

Reassembly: Carefully seat new seal assembly in pump body. Press shaft assembly into pump until front face of bearing aligned with front end of pump. See that seal washer in place and press impeller on rear end of shaft until flush with end of shaft. Install bearing snap ring in pump body (align groove in bearing with slot in pump body). Press pulley on front end of shaft if removed.

WILLYS 4 CYLINDER

Willys, All 4 Cyl. Models (1940-55). See 4 Cyl. Note below.

TYPE: Packless type with special double row ball bearing shaft (shaft serves as inner race, bearing is **sealed type and packed with lubricant at assembly). Shaft and bearing cannot be dismantled and serviced as an assembly. No lubrication required in service.** Various type seals used (See Notes below).

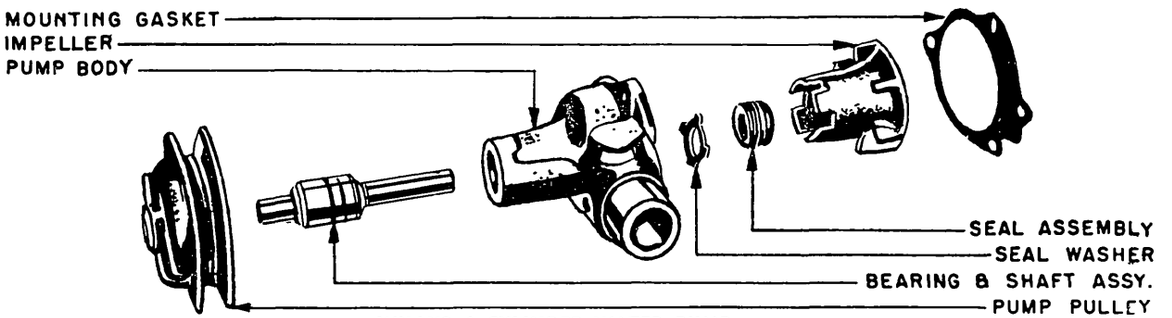
4 Cylinder Seal Note—Seal is one of two types, either "U" shaped with spring within seal or bellows type with spring assembled on outer circumference of seal.

6 Cylinder Seal Note—Seal assembly consists of sleeve seated in recess in pump body with a rubber seal ("U" Section with spring within "U") and seal washer between seal and impeller. A slinger is used on shaft just behind bearing.

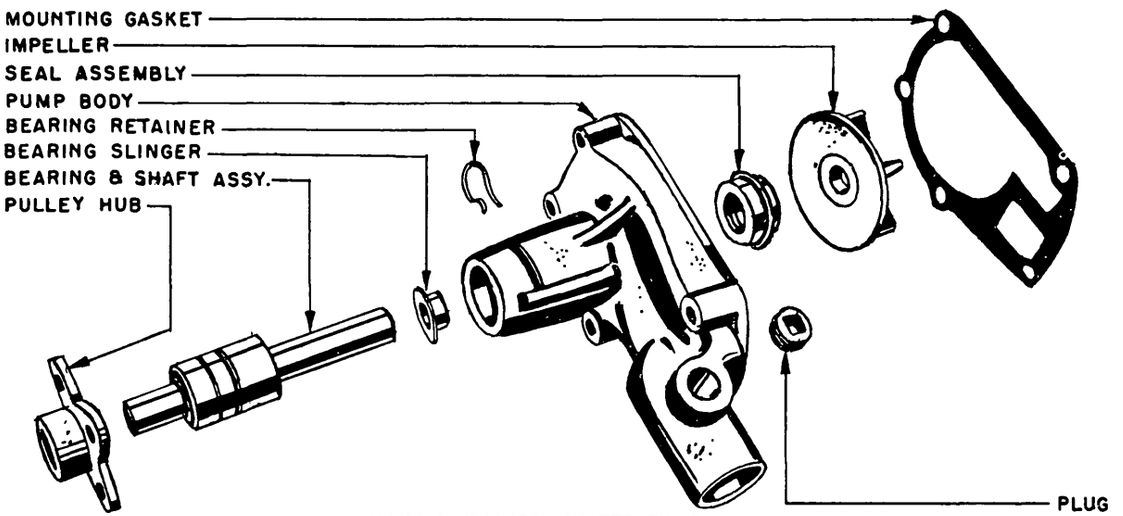
OVERHAUL: Disassembly—Use special W-116 puller **and pull impeller off shaft, lift out bakelite seal washer. Remove bearing lock ring from slot in bearing hub on pump housing, support pump housing in arbor press, press shaft and bearing assembly out of pump housing toward forward end. To remove fan pulley from shaft, use any regular puller (special W-115 puller furnished for this purpose) to pull pulley off shaft. Do not attempt to remove bearing from shaft (shaft and bearing serviced as assembly).**

Servicing—If rear face of pump housing is not smooth and flat, resurface with special Tool C-551 or install new pump body.

Pump Reassembly: Install shaft and bearing assembly in pump housing (long end of shaft to rear) so that outer end of bearing is flush with front end of housing. Install seal assembly in impeller (dip seal parts in brake fluid before installing), press impeller on shaft until end of shaft is flush with face of impeller hub. Press fan pulley on forward end of shaft until end of shaft is flush with face of pulley. Check location of locking ring groove in bearing with respect to slot in housing, align groove and slot, install bearing locking wire.



WILLYS 4 CYLINDER WATER PUMP



WILLYS 6 CYLINDER WATER PUMP

MISCELLANEOUS SECTION INDEX

AIR CONDITIONING — Pag

- Buick 1953 (Frigidaire) ... 3007
- 1954-55 (Frigidaire) ... 3012
- Cadillac 1953 (Frigidaire) ... 3007
- 1954-55 (Frigidaire) ... 3012
- Chevrolet 1955 (Frigidaire) ... 3012
- Chrysler 1953-54 (Airtemp) ... 3002
- 1955 (Airtemp) ... 3004
- DeSoto 1953-54 (Airtemp) ... 3002
- 1955 (Airtemp) ... 3004
- Dodge 1953-54 (Airtemp) ... 3002
- 1955 (Airtemp) ... 3004
- Ford 1955 (Selectaire) ... 3020
- Hudson 1955 ... 3023
- Lincoln 1953-55 ... 3029
- Mercury 1955 ... 3029
- Oldsmobile 1953 (Frigidaire) ... 3007
- 1954-55 (Frigidaire) ... 3012
- Packard 1953 (Frigidaire) ... 3007
- 1954-55 (Frigidaire) ... 3012
- Pontiac 1954-55 ... 3035
- 1955 (Late) ... 3012
- Studebaker 1955 ... 3042

OIL PRESSURE GAUGES

- King Seeley Electric (Not "CV") ... 3045
- King Seeley Electric ("CV") ... 3047

TEMPERATURE GAUGES

- AC (Electric) ... 3044
- AC (Not Electric) ... 3045
- Auto-Lite (Electric) ... 3043
- King-Seeley (Not Electric) ... 3044
- King-Seeley (Electric -Not "CV") ... 3046
- King-Seeley (Electric - "CV") ... 3047

POWER SEATS

- Buick 1946-54 ... 3048
- 1954-55 ... 3072
- Cadillac 1946-53 ... 3048
- 1954-55 ... 3072
- Chevrolet 1954-55 ... 3072
- Chrysler 1955 ... 3069
- DeSoto 1955 ... 3069
- Dodge 1955 ... 3069
- Ford 1954-55 ... 3070
- Lincoln1952-55 ... 3070
- Mercury 1952-55 ... 3070

POWER SEATS (C nt.) — Pag

- Oldsmobil 1946-54 ... 3048
- 1954-55 ... 3072
- Packard 1946-54 ... 3048
- 1955 ... 3069
- Plymouth 1955 ... 3069
- Pontiac 1954-55 ... 3072
- Studebaker 1955 ... 3072

POWER TOPS

- Buick 1946-54 (Hydro-Lectric) ... 3062
- 1954-55 (Hydro-Lectric) ... 3064
- Cadillac 1946-53 (Hydro-Lectric) ... 3062
- 1954-55 (Hydro-Lectric) ... 3064
- Chevrolet 1946-50 (Hydro-Lectric) ... 3062
- 1951-55 (Hydro-Lectric) ... 3064
- Chrysler 1941-48 (Electric) ... 3065
- 1951-55 (Hydro-Lectric) ... 3064
- DeSoto 1941-48 (Electric) ... 3065
- 1951-55 (Hydro-Lectric) ... 3064
- Dodge 1941-48 (Electric) ... 3065
- 1951-52 (Hydro-Lectric) ... 3064
- 1952-54 (Electric) ... 3067
- 1955 (Hydro-Lectric) ... 3064
- Ford 1941-48 (Electric) ... 3065
- 1946-50 Sportsman (Hydro-Lectric) ... 3062
- 1951 (Hydro-Lectric) ... 3064
- 1951-53 (Electric) ... 3068
- 1953-55 (Hydro-Lectric) ... 3064
- Hudson 1948-54 (Hydro-Lectric) ... 3062
- Lincoln 1941-48 (Electric) ... 3065
- 1949-51 (Hydro-Lectric) ... 3062
- 1952-55 (Electric) ... 3068
- Mercury 1941-48 (Electric) ... 3065
- 1949-51 (Hydro-Lectric) ... 3062
- 1952-55 (Electric) ... 3068
- Oldsmobile 1946-51 (Hydro-Lectric) ... 3062
- 1952-55 (Hydro-Lectric) ... 3064
- Packard 1948-54 (Hydro-Lectric) ... 3062
- 1955 (Hydro-Lectric) ... 3064
- Plymouth 1949-50 (Hydro-Lectric) ... 3064
- 1951-54 (Electric) ... 3067
- 1955 (Hydro-Lectric) ... 3064
- Pontiac 1946-50 (Hydro-Lectric) ... 3062
- 1951-55 (Hydro-Lectric) ... 3064
- Rambler 1951-54 ... 3067
- Studebaker 1947-52 ... 3066

POWER WINDOWS — Page

- Buick 1946-54 (Hydro-Lectric) ... 3048
- 1954-55 (Electric) ... 3053
- Cadillac 1946-53 (Hydro- Lectric) ... 3048
- 1954-55 (Electric) ... 3053
- Chevrolet 1955 (Electric) ... 3053
- Chrysler 1946-50 (Hydro-Lectric) ... 3048
- 1950-53 (Electric) ... 3055
- 1954 (Electric) ... 3056
- 1955 (Electric) ... 3051
- DeSoto 1951-53 (Electric) ... 3055
- 1954 (Electric) ... 3056
- 1955 (Electric) ... 3051
- Dodge 1955 (Electric) ... 3051
- Ford 1946-48 Sportsman (Hydro-Lectric) ... 3048
- 1954 (Electric) ... 3059
- 1955 (Electric) ... 3061
- Hudson 1946-54 (Hydro-Lectric) ... 3048
- 1955 (Electric) ... 3057
- Lincoln 1946-51 (Hydro-Lectric) ... 3048
- 1952-54 (Electric) ... 3059
- 1955 (Electric) ... 3061
- Mercury 1946-51 (Hydro-Lectric) ... 3048
- 1952-54 (Electric) ... 3059
- 1955 (Electric) ... 3061
- Nash 1953-55 (Electric) ... 3057
- Oldsmobile 1946-54 (Hydro-Lectric) ... 3048
- 1954-55 (Electric) ... 3053
- Packard 1948-54 (Hydro-Lectric) ... 3048
- 1955 (Electric) ... 3051
- Plymouth 1955 (Electric) ... 3051
- Pontiac 1954-55 (Electric) ... 3053
- Studebaker 1955 (Electric) ... 3051

WINDSHIELD WIPERS (ELECTRIC)

- Auto-Lite:
- EPF, EBP, (Single End Motor) ... 3078
- EMD, EMU (Single End Motor) ... 3077
- EME, EMF, EMG, EMK (Double End) ... 3074
- EMU, EMZ (Single End Motor) ... 3078
- EWD, EWE, EWH ... 3072
- EWJ (Double End Motor) ... 3074
- EWR, EWY (Single End Motor) ... 3077
- Chevrolet (1955) ... 3079
- Redmond ... 3076

WINDSHIELD WIPERS (VACUUM)

- Link & Crank Arm Drive ... 3080
- Link & Chain Drive ... 3081
- Cable Drive ... 3082

1953-54 CHRYSLER, DESOTO, DODGE AIRTEMP

Chrysler, DeSoto, Dodge (1953-54)

DESCRIPTION

Compression process cycle type, using Freon as refrigerant. System consists of basic groups of elements as follows:

Refrigerating: Compressor—4 cylinder, V-type piston compressor, located at right front corner and above engine. Operated by wedge belt from pulley on water pump through idler pulley which provides for belt tension adjustment. Operation causes and maintains necessary high pressure in system needed to increase Freon vapor temperature.

Condenser—Split type. Upper section of condenser located in front of radiator, lower section fills entire space between bottom edge of radiator and front stone shield. Condenses and cools refrigerant vapor discharged from compressor, through action of fast moving air over metal surfaces of condenser.

By-Pass Valve—Automatic. Between the compressor and evaporator. By-passes hot refrigerant gas directly from compressor to evaporator when temperature falls to preselected minimum. By-passed hot gases raise temperature of evaporator coils and car cooling air; also prevents ice forming on coils when blowers stopped, and maintains sufficiently rapid circulation of refrigerant to carry entrained oil back to compressor. A thermal bulb, located in return air stream on right side of car, is the valve's sensing element through reaction to changing temperatures within car.

Receiver—Located at outside edge of car frame below right front door. Stores liquid refrigerant, more than that needed for normal operation, and assures an uninterrupted supply of liquid refrigerant to expansion valve.

Sight Glass—In evaporator-blower in trunk of car between receiver and strainer-dryer. Provides means for determining adequacy of refrigerant charge.

Strainer-Dryer—In evaporator-blower housing in trunk of car between sight glass and expansion valve. Filters and dehydrates Freon as it passes through system.

Expansion Valve—In evaporator-blower housing in trunk of car. Supplies liquid to evaporator coils at same rate that refrigerant is removed from it in a vaporous state.

Evaporator—In evaporator-blower housing in trunk of car. Container for refrigerant which readily absorbs heat from surrounding area when temperature of refrigerant liquid is reduced. In cooling coils of the evaporator refrigerant is changed from liquid to vapor.

Air Circulating: Blowers—In evaporator-blower housing in trunk of car. Consists of two centrifugal blowers driven by a single electric motor mounted between them. Force air from refrigerated area in evaporator-blower housing to interior of car.

Air Circuits—Warm air from inside car is drawn into evaporator-blower housing through grilles on either side of rear seat shelf, cooled air is delivered into car through a center outlet. Fresh air is drawn in from each side of car through 3 holes. All inlets and outlets are connected to evaporator-blower housing through ducts. Fresh air ducts are fitted with dampers to seal them off during cold weather.

Control: Single instrument panel control is switch located at extreme left below car light switch. Switch has four positions "OFF," "LOW," "MED.," and "HIGH." Its various positions regulate blower speed and hence rate at which cooling air is circulated through car. The automatic by-pass valve (see above) provides additional control of minimum interior temperatures.

OPERATION

With Air Conditioner Control Switch in any of the three "ON" positions and engine and compressor operating, heat laden, low pressure Freon is compressed by the compressor and discharged into condenser where it is cooled to remove the "sensible" heat of compression. The Freon is forced into the receiver under pressure when by-pass valve is closed. After passing through sight glass and strainer-dryer Freon enters the expansion valve. At orifice in expansion valve high pressure liquid Freon changes to low pressure liquid, then enters evaporator coils through distributor tubes. The "boiling" Freon, while in the evaporator coils, absorbs heat from the surrounding air and vaporizes. The vapor is drawn through the low pressure line to compressor where cycle is repeated.

PRECAUTIONS, LEAK TESTING & TROUBLE SHOOTING

See "Air Conditioning Service Cautions," "Trouble Shooting" and "Leak Tests."

ADJUSTMENTS

DRIVE PULLEY BELT: Two type belts used, single and double. Adjust as follows:

Single Type Belt: A deflection of ¼" should result when a load of 6 to 8 lbs. is applied at center of longest belt span (compressor to fan, or generator to fan).

Double Type Belt: A deflection of ¼" should result when a load of 9 to 11 lbs. is applied to each individual belt at the center of longest span (fan to idler).

TEMPERATURE: Temperature range can be varied 10 degrees either way by means of adjusting screw on automatic by-pass valve. Each full turn changes range 2½°.

FAST IDLE (If So Equipped): *See "Adjustments" under 1955 Chrysler, DeSoto, Dodge "Airtemp."*

DISCHARGING THE SYSTEM

1) Install Gauge Set Manifold C-3354. Fully backseat both discharge and suction service valves (counter-clockwise). Connect 6-foot test hose to manifold center fitting. Insert free end of hose into exhaust suction system and turn exhaust system blower on. *NOTE*—Although Freon is non-toxic unless released in or near an open flame, expelling Freon gas into the exhaust system is recommended as a safety precaution.

2) Open discharge and suction service valves ½ turn. Then, crack manifold gauge set discharge hand valve a fraction of a turn counter-clockwise to allow gas to escape. *CAUTION*—Opening manifold discharge hand valve too much in order to more quickly discharge system will draw compressor lubricant off with the Freon.

3) As pressure on manifold discharge gauge drops near zero, open manifold suction hand valve. *NOTE*—If brazing or some similar repair is to be made on system, leave system open to atmospheric pressure. After service work has been completed, the system must be evacuated, partially charged and leak tested before final charge.

EVACUATING & CHARGING THE SYSTEM

See 1955 Chrysler, DeSoto, Dodge "Airtemp" and note the following:

1) FREON-22 is used in the 1953-54 systems.

2) Freon-22 capacity of 1953-54 systems is 5 lbs.

3) Do not permit suction pressure to EXCEED 90 lbs. when controlling Freon-22 entry into system with Freon-22 tank valve.

CHECKING & LUBRICATION

See 1955 Chrysler, DeSoto, Dodge "Airtemp" and note the following:

1) Correct oil level should be 1⅛-1½" on 1953-54 systems.

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

COMPRESSOR: Removal—Start engine and operate at fast idle until compressor is warm. Shut off engine. Remove valve stem protective caps from both discharge and suction service valves. Close off both valves by rotating valve stems clockwise with Tool C-3361 until they are fully seated. Loosen port caps on both discharge and suction service valves two turns to gradually release Freon gas pressure from the compressor. Loosen oil filler plug on side of compressor to release gas pressure from compressor crankcase. (*NOTE*—It is not necessary to remove oil filler plug. Loosen about one full turn. This precaution will prevent dirt from entering crankcase). Remove compressor drive belt or belts. Clean dirt away from both discharge and suction service valves with a suitable solvent and blow dry with compressed air. Remove discharge and suction service valve attaching bolts. Gently move valves and tubes away from compressor. Cover ports in valves and compressor openings with masking tape. Tighten port caps and oil filler plug. Replace service valve protective caps to prevent air, moisture or dirt from entering system. (*CAUTION*—Care must be taken not to force valves and tubes out of alignment too far or the vibration eliminator may be damaged). Remove compressor-to-mounting bracket bolts and nuts. Lift compressor from engine and set it on bench with pulley hanging over side of bench. *CAUTION*—Never rest weight of compressor on pulley, otherwise shaft seal may become damaged.

Installation: Reverse removal procedure using new valve gaskets coated with Mopar Air Conditioning Compressor Oil. Torque all bolts evenly to 20 ft. lbs. Purge air from compressor as follows: Loosen oil filler plug one or two turns. Loosen discharge service valve port cap ½ turn, slightly open suction service valve with Tool C-3361 by turning stem counter-clockwise. Let gas drift slowly through

CONTINUED ON NEXT PAGE

AIR CONDITIONING SERVICE CAUTIONS

HANDLING FREON: Though considered the safest and best refrigerant for use in Air Conditioning systems, the following precautions must be observed to avoid serious accidents or damage to the system

Drum: 1) Do not leave drum uncapped (metal cap furnished with drum is for protection of valve and safety plug) It should be replaced after each use of drum
2) Do not carry drum in passenger compartment of car Place drum in luggage compartment or, if in an open truck, cover drum to protect it from radiant sun heat If precaution not taken, resultant increase in pressure may cause safety plug to release or drum to burst
3) When charging system, do not subject drum to high heat Use water no warmer than 125°F (Hot rags will suffice) *Never place drum on radiator, stove, or use torches for heating during charging.* Keep drums upright
4) Never permit a drum to be dropped or strike another drum violently
5) Do not fill drum completely (when filling one drum from another) Leave space above liquid for expansion

Personal: 1) Do not discharge Freon into room with exposed flame because concentrations of this gas in contact with open flame will produce a toxic gas
2) Do not expose eyes to liquid, *USE GLASSES OR GOGGLES Liquid Freon will freeze anything with which it comes in contact* If Freon should strike eyeballs, splash water to area of eye to gradually get temperature above freezing point, apply a few drops of sterile mineral oil to eyes as an irrigator If irritation continues wash eyes with a weak solution of boric acid *DO NOT RUB EYES See an eye specialist at once*
3) Do not inhale large quantities of Freon vapor as it will act an an anesthetic
4) If Freon comes in contact with skin, injury should be treated for frostbite

HANDLING REFRIGERANT LINES: 1) Keep refrigerant lines dry and clean Whenever a connection or joint is broken, clean all dirt from joint or connection
2) Parts from stock are capped and dehydrated Caps should only be removed just prior to installation Lines removed from system to be used again, should be capped immediately, to prevent dirt and moisture from entering lines
3) Lines should be free of kinks, and should be carefully stored to avoid crushing or bending
4) Proper size wrenches should be used when tightening fittings Always use two wrenches to prevent twisting copper tubing
5) Tubing that is left free to vibrate will harden and crystallize the area of the tubing at flare sections so that it may become brittle and break
6) When using paint drying lamps, ovens, steam cleaners, or other heat producing devices, avoid heating any part of system If sufficient heat applied, pressure will increase to a point where some part of system will rupture
7) When undercoating, use care to see that undercoating does not plug evaporator drain Do not coat air conditioning joints and connections
8) Keep gauge set and lines free of moisture
9) Compressor lubricant container must not be left open longer than necessary as the special oil is moisture free and will absorb moisture from air if left uncapped

AIR CONDITIONING LEAK TESTS

LEAK TESTING CONFINED AREAS: For leak testing confined areas, such as sections of evaporator and condenser, a torch or flame type detector must be used Two types are available One type uses anhydrous methyl alcohol, under pressure for producing the testing flame The cylinder is refillable and must be preheated to pressurize cylinder The other type uses propane gas, under pressure, to produce the testing flame The cylinder is replaceable and comes already pressurized, making it unnecessary to pre-heat cylinder in order to produce testing flame Instructions for use of the detectors are furnished with the detector

Leak Testing: With flame adjusted, explore for leaks by moving end of hose or sampling tube around all points where a leak may be Especially check around bottom of connections, since Freon is heavier than air and will be more apparent at bottom of fitting Color of flame will turn to a yellow-green when a small leak is detected Large leaks will be indicated by a change in color to bright or brilliant blue or purple When hose or tube is moved away from leak, flame will clear to an almost colorless pale-blue or green *CAUTION*—Do not use lighted detector in any place where combustible or explosive gases, dust or vapors may be present Do not breathe fumes and black smoke that are produced if leak is a big one Before leak testing be sure car is thoroughly aired (particularly if Freon tank used or if system opened for any reason) and moved to a Freon-free area in order that false readings may be prevented

PIN-POINTING LEAKS: There are a number of fittings and places throughout the air conditioning unit where a leak detector solution or detergent may be used to pin-point leaks Apply solution to suspected area with with swab that is attached to bottle cap Bubbles will will form, within seconds if there is a leak

AIR CONDITIONING TROUBLE SHOOTING

►*CAUTION· Do not disconnect refrigerant lines, replace parts, or attempt adjustments without complete instructions. See "Air Conditioning Service Cautions".*

POOR COOLING: 1) Blowers Not Operating—Fuse blown or faulty circuit breaker, switch in "Off" position, defective switch, switch resistors or blower rheostats inoperative, broken wire or loose connections, blower motor defective, blower fans or motor improperly installed
2) Restricted Air Flow—Filters clogged, dirt or other obstructions in air ducts, evaporator fins or coils clogged or restricted with frost or ice
3) Refrigerant Flow to Cooling Coils or Fins Incorrect—Expansion valve improperly adjusted or defective, power element or temperature bulb does not contact pressure line properly, restriction in liquid line between receiver and cooling coils or fins, power element or temperature bulb discharged, insufficient refrigerant, by-pass valve, thermostatic switch or solenoid (if so equipped) not properly set or inoperative, modulator valve (if so equipped) defective, break in any part of closed refrigeration system
4) Refrigerant Not Condensing Properly—Air flow through condenser, restricted, high engine operating temperatures, air or excess refrigerant in system, restriction in high pressure side of compressor and condenser
5) Clutch (If So Equipped) Does Not Engage—Defective coil or relay, clutch plate lining worn or saturated with oil causing slippage, air conditioning "On" switch defective, thermostat inoperative, clutch adjustment incorrect
6) Compr ssor—Belts not adjusted properly, worn, or broken, operating above normal pressures, disconnect pulley bolts not in place, valves faulty, service valves not fully open
7) El ctrical—Loose connections or broken wires between electrical units, blown fuses or faulty circuit breakers

TOO COLD: 1) Clutch (If So Equipped) Do s N t Disengage—Thermostat inoperative, relay stuck closed, air conditioning "On" switch inoperative
2) Blower Speed Cannot be Reduced—Defective blower switch

VIBRATION—NOISE: 1) Blow rs—Loose on shaft, striking housing, foreign material, motor bearings or mounts loose or worn
2) Compressor—Mounting brackets loose, loose internal parts, insufficient oil, too much refrigerant
3) Air Flow—Foreign material in air system, small slits or openings in ducts

INCORRECT OPERATING PRESSURE: 1) Exc ssiv Pressure on High Pressure Sid—Air or excess refrigerant in system, air flow through condenser core restricted, kinks or restrictions in line on high pressure side, high engine temperature, shut-off valve on high pressure side of compressor not fully open, insufficient air flow through cooling coil, defective expansion valve or incorrect adjustment
2) Insufficient Pressure on High Pressure Side—Shortage of refrigerant, defective expansion valve or incorrect adjustment, leaky or broken compressor valves
3) Excessive Pressure on L w Pressure Sid—Power element or temperature bulb not making correct contact with pressure line, expansion valve needle stuck open or leaking
4) Insufficient Pressure on L w Pressur Sid—Restriction in lines, shortage of refrigerant, expansion valve needle stuck shut, expansion valve not open far enough, plugged, or defective, dehydrator-filter (strainer-drier) plugged, power element or temperature bulb charge lost or line plugged, compressor valves faulty, blower fans inoperative, temperature control thermostat does not cut out, moisture or freeze-up

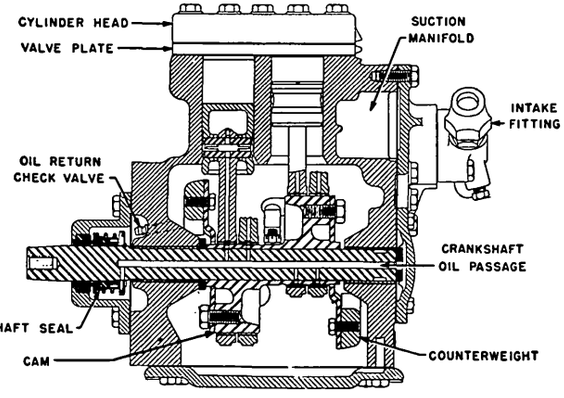
1953-54 AIRTEMP (C nt.)

compressor for about ten seconds. Tighten port cap and oil filler plug. Open both discharge and suction service valves all the way by turning stems counterclockwise until fully back-seated. Replace protective caps on discharge and suction service valves. Install compressor drive belts and adjust.

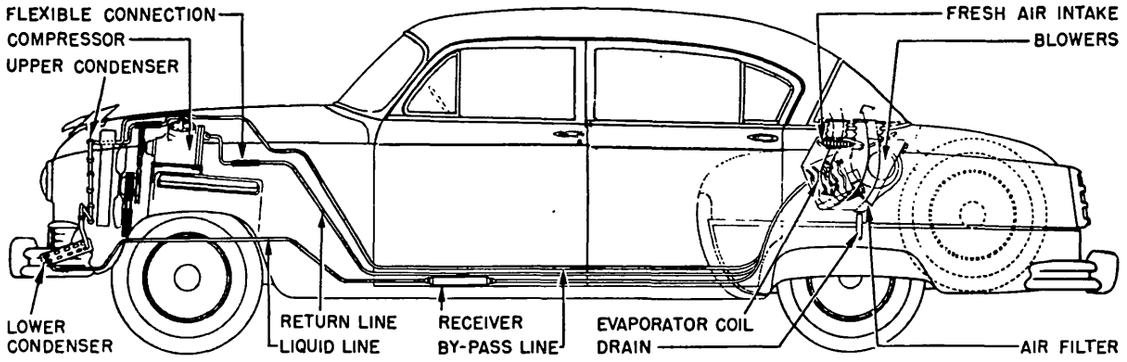
UPPER CONDENSER: Discharge system. Using flare nut wrench disconnect upper and lower flared fittings on upper condenser. ***(CAUTION—Use two wrenches on fitting when loosening to prevent damage to tubing.)*** Remove four upper condenser to radiator yoke screws and lockwashers, remove condenser. To install, reverse removal procedure. Charge system, test for leaks.

LOWER CONDENSER: Discharge system. Using flare nut wrenches, disconnect lower condenser inlet manifold tube flare nut located between upper and lower condensers, disconnect lower condenser outlet manifold tube connector on tubing located between lower condenser and receiver. Remove four front sway eliminator nuts, lockwashers and screws, move sway eliminator out of way. ***(CAUTION—Lower condenser mounting brackets held in position by sway eliminator mounting bolts.)*** Remove condenser. To install, reverse removal procedure. Charge system, test for leaks.

DRIVE PULLEY: Loosen drive belt idler pulley adjusting screws, remove belt from compressor pulley. Remove compressor pulley shaft screw and washer. Using Tool C-3351, remove pulley from crankshaft. NOTE—Pulley keyed to crankshaft by Woodruff key. Inspect keyway in crankshaft and pulley for wear. To install, place compressor pulley key into position in crankshaft. Align keyway in pulley with key in crankshaft, install pulley on shaft. Install compressor pulley shaft washer and screw, tighten to 20 ft. lbs. torque.



COMPRESSOR SECTIONAL VIEW



CHRYSLER, DE SOTO & DODGE AIRTEMP SYSTEM

►***CAUTION: The compressor oil seal and thrust bearings are made partly from a carbon-like material which is subject to damage from impact. Consequently, a hammer should never be used to loosen or remove the seal from the shaft as this shock may crack or shatter the carbon bearings. Always use a puller to remove the pulley from the shaft.***

CRANKSHAFT OIL SEAL: Remove compressor, and pulley from compressor (see above). Remove eight seal housing bolts, then seal housing from compressor. Press seal floating seat out of housing from pulley end of seal housing. Remove neoprene seal ring and bellows assembly. Assembly is held tightly to shaft by neoprene sleeve of seal. Pry it off in such a manner so as not to scratch shaft. Wash seal housing with solvent. Dry and coat counterbore with film of refrigerant oil. To install seal, coat sealing surfaces and neoprene rings with refrigerant oil. Start seal seat into counterbore of housing. Using thumbs only, press seal seat and ring to bottom of housing counterbore. Wipe shaft clean and apply coat of refrigerant oil, dip new shaft seal into refrigerant oil and press on shaft. Dip housing cover gasket in refrigerant oil, align its holes with compressor housing holes and smooth out any wrinkles. Hold seal housing with left hand, put right forefinger through opening in seal housing and against end of shaft. Using forefinger as guide, carefully slide seal housing into place without letting end of shaft touch capped surface. Install two bolts, center clearance between housing and shaft, tighten bolts to bring housing to compressor. Install remaining bolts and tighten finger tight. Check and align clearance between housing and shaft with feeler gauge or piece of paper to obtain equal clearance at all points. Tighten all housing bolts to 20 ft. lbs. Replace compressor pulley, check and add oil as required (compressor on bench) to bring level to 1⅛-1½" when measured with dipstick and compressor in normal operating position. Install compressor (see above).

RECEIVER FUSIBLE PLUG: *See "Parts Replacement" under 1955 Chrysler, DeSoto, Dodge "Airtemp."*

VALVE PLATE ASSEMBLY: Run engine a few minutes to warm compressor. Stop engine, remove caps from compressor discharge and suction service valves, close both valves by turning clockwise as far as they will go. ***(CAUTION—Do not run engine with valves closed.)*** Carefully loosen cap on service port fitting of discharge valve approximately ¼ turn to gradually relieve pressure in compressor, remove dirt from around cylinder heads. Remove ten cylinder head screws, carefully lift cylinder head from compressor, remove cylinder head gasket. Lift valve plate assembly from compressor, remove valve plate gasket. ***(CAUTION—Valve plate assembly is dowelled on compressor by four small pins. Pins also retain reed valves in position. Make sure reed valves do not fall into cylinders when valve plate assembly removed.)*** Clean gasket mating surfaces, make sure they are free from dirt, nicks, and burrs. NOTE—Valve plate serviced as assembly only. If any part damaged, entire valve plate assembly must be replaced. To install, reverse removal procedure. Tighten cylinder head screws to 15-20 ft. lbs.. Purge air from system (see above). Open both service valves by turning stems clockwise as far as they will go. Start engine and run for few minutes to warm compressor. Check Freon charge, then oil level (see above). Replace caps on discharge and suction service valves. Test for leaks (see above).

1955 CHRYSLER, DESOTO, DODGE AIRTEMP

Chrysler, Imperial, DeSoto, Dodge (1955)

►CHANGES & CORRECTIONS

►*1955 COMPRESSOR SHAFT SEAL PRODUCTION CHANGE:* Replacement of new type seal for old type seal includes seal and bearing end plate. Replacement of new type seal with seal of same type requires seal only.

DESCRIPTION & OPERATION

Similar in design and operation to 1953-54 Airtemp Air Conditioning system. 1955 changes over previous models are as follows:

Refrigerant: Freon-12 replaces Freon-22 as refrigerant.

Compressor: A 2-cylinder reciprocating compressor replaces V-type, 4-cylinder compressor.

Condenser: A single unit condenser replaces two-unit condenser used previously.

Receiver & Strainer-Drier: Strainer-drier has been combined with receiver. Unit is located near bottom of condenser.

Control Units: A magnetic clutch has been added on some models, permitting pulley to free-wheel when system is not in operation. Some models also incorporate a fast idle device which operates when transmission control lever is in neutral. A temperature control switch connected in series with a thermal switch (attached to suction pressure line at evaporator outlet manifold) and the solenoid by-pass winding, regulates temperature of air delivered to passenger compartment.

PRECAUTIONS, TROUBLE SHOOTING & LEAK TESTING

See "Air Conditioning Service Cautions", "Trouble Shooting" and "Leak Tests".

ADJUSTMENT

ADJUSTMENTS: Compressor Belt–Adjust tension of each compressor belt so that a pull of 9-12 lbs. at center of longest span will provide a ¼" deflection at that point.

Fast Idle Device (If so Equipped): Back off round adjusting nut on diaphragm shaft away from pawl. Start engine, attach tachometer, and with transmission control lever in "Neutral" position and engine at operating temperature, adjust engine idle to 475-500 RPM. Turn blower control switch to first position, and temperature control switch to second position. Adjust round adjusting nut on fast idle diaphragm shaft to increase engine RPM to 700-800 RPM. With hand brake on, move transmission control lever to "Drive" range and then back to neutral. Readjust fast idle if necessary. Lock round nut with hex nut.

Expansion Valve: No adjustment. Replace as necessary.

Magnetic Clutch (If so Equipped): Measure air gap between drive plate electromagnet and drive plate. Air gap should measure .025"-.035". To adjust,turn screws located in center of three hexagon headed nuts on front face of drive plate. Adjust all three screws to obtain evenly spaced air gap, Measure air gap with long feeler that will reach into gap at hub.

DISCHARGING THE SYSTEM

See 1953-54 Chrysler, DeSoto, Dodge "Airtemp".

EVACUATING & SWEEPING THE SYSTEM

Before evacuating the system, sweep system in order to remove as much moisture as possible. Proceed as follows:

SWEEPING THE SYSTEM: Charge discharged system with one lb. of Freon-12 (Freon-22 used in 1953-54 systems); or until a pressure of 100 lbs. registers on discharge gauge. Operate system for 5 minutes and again discharge.

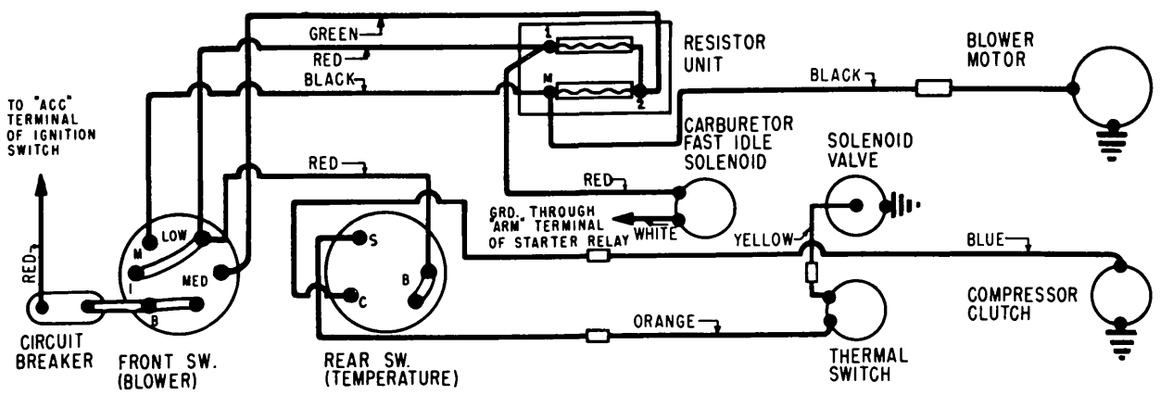
EVACUATING THE SYSTEM: Connect Gauge Manifold Set C-3354 to compressor. Discharge system if not previously discharged, sweep the system (see above). *(CAUTION*–Be sure pressure has dropped to zero before attaching hose to vacuum pump). Connect 6-foot test hose to center fitting of gauge set and to connection on vacuum pump(Tool C-3372). Open both discharge and suction service valves about one turn, rotating both valve stems clockwise. Open both gauge manifold set hand valves (counter-clockwise). Start vacuum pump and observe compound gauge. Operate pump until gauge registers 26 to 28 inches of vacuum. for five minutes. *(NOTE*–Failure to obtain 26 to 28 inches of vacuum would indicate a leak in system. Close both gauge set manifold hand valves by turning clockwise. Turn off vacuum pump and remove long test hose from pump. Charge system with one lb. of Freon (see below). Start engine and adjust speed to 1200 RPM. Turn blower control to high and temperature control to cold. Operate in this manner for five minutes and test for leaks. Discharge system which will sweep out any remaining moisture). Again evacuate system at 26 to 28 inches of vacuum for 30 full minutes. Recharge system.

CHARGING THE SYSTEM

►*NOTE:* If only a partial charge of refrigerant is required, the following "Adding Partial Charge of Freon-12 (Using Gauge Set Manifold Tool C-3354)" method can be used providing unit is equipped with a sight glass. If not so equipped the entire system will have to be discharged, swept, evacuated and recharged with a full charge following directions given under "Adding Complete Charge of Freon-12 (Using Gauge Set Manifold Tool C-3354)". **The above is applicable to 1953-54 units except that Freon-22 is used, Freon-22 capacity is 5 lbs., and allowable pressure when controlling Freon-22 entry into system with Freon-22 tank valve is 90 lbs. instead of 60 lbs. Since there is no temperature control switch on 1953-54 units blowers are operated on "High" when operating engine during the adding of a partial charge of Freon-22.**

ADDING PARTIAL CHARGE OF FREON-12 (Using Gauge Set Manifold Tool C-3354): Remove protective caps from compressor discharge and suction service valves. Using Tool C-3361, make sure both valves are completely back-seated (counter-clockwise). Remove protective caps from discharge and suction service ports. Install 4-foot test hose from 600 lb. gauge fitting on gauge manifold to discharge service port fitting. Install other 4-foot test hose from 300 lb. gauge fitting on gauge manifold to suction service port fitting. Turn both valve handles on gauge manifold clockwise as far as they will go. Connect 6-foot test hose to center fitting of gauge manifold and to connection on Freon-12 tank. Be sure both gauge manifold valves are fully closed (clockwise). Open valve on Freon-12 tank slightly and loosen 6-foot test hose at gauge manifold for about one second to purge air from hose. Close Freon-12 tank valve. Start engine and operate at 1200 RPM. Turn blower control to "Low" position and temperature switch to "Cold". Rotate both suction and discharge service valve stems one turn (clockwise). *(NOTE*–If discharge gauge hand fluctuates whenengine and compressor are running, close discharge valve

CONTINUED ON NEXT PAGE



CHRYSLER, DESOTO DELUXE, DODGE AIR CONDITIONING CONTROL DIAGRAM
(CARBURETOR FAST IDLE SOLENOID NOT USED ON DODGE)

1955 AIRTEMP (C nt.)

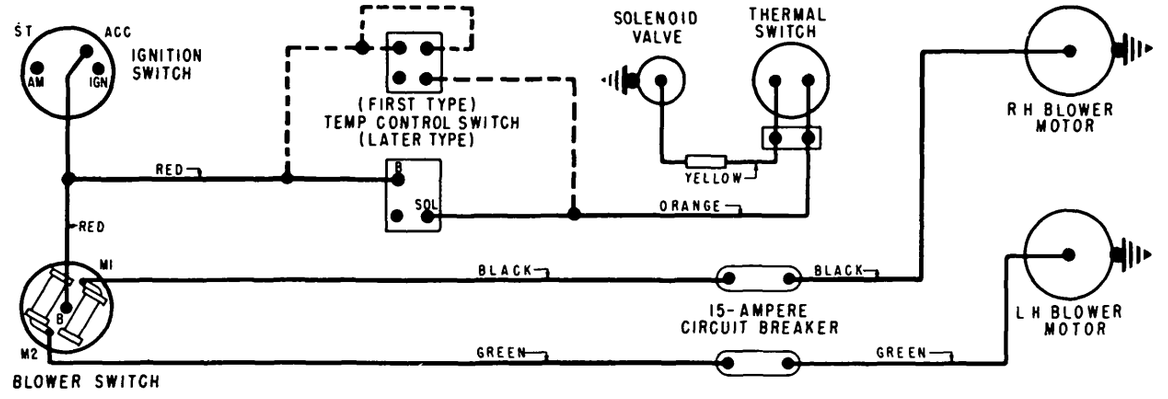
slowly (counter-clockwise) until gauge hand steadies). Open Freon tank valve ½ turn. Open suction valve on gauge manifold slightly (counter-clockwise). Control Freon entering system with this valve. *DO NOT ALLOW SUCTION PRESSURE TO EXCEED 60 LBS.* Carefully watch sight glass. The moment sight glass is clear of bubbles, **close** gauge manifold suction valve (clockwise). *(CAUTION*–Stopping flow of Freon into system as soon as sight glass is clear (free of bubbles) is important. Too much Freon in system can cause damage). Operate system for 5 minutes and again observe sight glass for presence of bubbles. If bubbles still evident carefully continue to charge until sight glass is clear, repeat 5 minute run. Where no bubbles are present after 5 minutes of operation, charge system with additional Freon for 10 seconds. Close Freon tank valve. Loosen hose connection at tank to gradually release Freon from hose. Disconnect hose after Freon has escaped. Back-seat suction and discharge service valves (counter-clockwise). Remove gauge manifold and install service valve and port protective caps

►*ADDING COMPLETE CHARGE OF FREON (Using Gauge Set Manifold Tool C-3354): (NOTE*–When completely charging system on 1953-54 units do not operate blowers during operation, on 1955 units operate blowers on "Low" and set temperature switch to "Cold"). Follow preliminary steps for adding partial charge of refrigerant. Place Freon drum in pail of warm water (temperature not to exceed 125°F). Then set pail and Freon tank on accurate scale (bath scales not accurate below 100 lbs.) and weigh assembly. Open Freon tank valve ½ turn, and suction valve on gauge manifold slightly (counter-clockwise). Control Freon entering system with this valve. DO NOT allow suction pressure to exceed 60 PSI (1955 Freon-12), 90 PSI (1953-54 Freon-22). Be sure both suction and discharge valves are open about one turn clockwise. Carefully watch scale and shut Freon tank valve off when system has absorbed 4 lbs. of Freon-12 (1955), 5 lbs. of Freon-22 (1953-54). Close suction valve on gauge manifold (clockwise). To disconnect Freon tank, loosen six-foot test hose and allow Freon in hose to escape slowly, then remove hose from tank.

CHECKING & LUBRICATION

►*NOTE:* There is no temperature control switch nor thermal switch on 1953-54 units.

CHECKING: Bubbles in Sight Glass–Connect a tachometer to engine, start and adjust engine speed to 1200 RPM. Turn blower control to full speed and temperature control to maximum cold. Open car windows and allow engine to operate at 1200 RPM to clear sight glass. Observe sight glass. Sight glass should be perfectly clear (no bubbles) within 3-5 minutes after system started operation (system not by-passing). If not, thermal switch and by-pass valve should be tested, and if found satisfactory, system should be partially charged to remove bubbles (see below). *NOTE*–A system that is low on Freon-12 should be tested for leaks, leaks corrected, and system charged.



DE SOTO (STD.) AIR CONDITIONING CONTROL DIAGRAM

►*NOTE:* Correct oil level for 1953-54 units is 1 1/8-1½" and capacity is 32 ozs. of 300 Saybolt refrigerant (1¾" on dipstick).

Compressor Oil Level & Adding Oil: *(NOTE*–An oil sight glass is provided in compressor crankcase so that oil splash may be observed while compressor is in operation. If a splash is observed while compressor is operating, it indicates **only** that there is oil in the compressor, and **not how much**). To check for proper oil level, start engine and run at moderate speed (air conditioning turned on) until compressor is warm. Stop engine, remove protective caps from compressor discharge and suction valves, close both valves by turning valve stems clockwise until they seat firmly. *(CAUTION*–Never start engine with discharge valve closed, drive belts connected to engine when magnetic clutch is engaged). Clean dirt away from compressor oil filler plug with solvent and blow dry with compressed air. Carefully loosen cap on service port of discharge valve approximately ¼ turn and gradually release gas pressure from compressor. When gas pressure in head decreases, loosen, but do not remove oil filler plug on side of compressor. This will allow pressure in compressor crankcase to drop. *(NOTE*–If oil level is checked immediately after a trip–driven at high speeds–level will be slightly higher than normal). Remove oil filler plug and, using a dry, clean plunger type rod (1/8" welding rod), measure oil level. Correct level is ¾" to 1". After oil level has been checked, siphon off excess oil or add Mopar Air Conditioning Compressor Oil (300 Saybolt at 100°F), replace filler plug **but do not tighten at this time.** To purge air out of compressor cylinder and crankcase, make sure cap on discharge valve service port is loosened approximately ½ turn, and oil filler plug on side of compressor a full turn. Slightly open suction service valve by turning valve stem counter-clockwise. Let gas drift slowly through compressor for about 10 seconds. First tighten filler plug and then cap on discharge service port. Backseat both discharge and suction service valves by turning counter-clockwise, replace protective caps.

►*REPLACEMENT COMPRESSOR OIL LEVEL CAUTION:* New compressors are fully equipped with exception of drive pulley and magnetic clutch assembly. Compressors are charged with treated dry air to prevent moisture or dirt from entering, and contains 12 ozs. of 300 Saybolt refrigerant (oil level at center of sight glass, compressor horizontal on bench). When compressor replac- for any reason, oil level in compressor must be corrected to proper amount. Even though compressor had no oil when removed, some oil may still remain in system. When old compressor is found to have no oil, or where oil level is very low or is too high, oil must be siphoned off to the minimum lever of ¾". After installation completed, system should be operated for 10 minutes, engine stopped, and oil level rechecked and adjusted to ¾-1", if required. Use suction gun if oil level too high. Repeat procedure several times until level remains at ¾-1".

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

COMPRESSOR REMOVAL (To Work on Engin): *(NOTE*–On DeSoto, split muffler bracket with hacksaw). Start engine, operate at fast idle until compressor is warm. Remove valve stem protective caps from discharge and suction service valves. Close both valves (clockwise) with Tool C-3361. Loosen port caps on both service valves about two turns to gradually release Freon gas, pressure from compressor. Loosen oil filler plug a few turns. Remove drive belts and belt tension adjusting strap from compressor. Disconnect magnetic clutch electrical lead (if so equipped). Disconnect discharge tube flared connection at discharge (lower) muffler and cap tube nut and male connector. Remove Allen screws from suction service valve. Remove upper muffler bracket-to-compressor attaching bolt and gently lay the suction valve, muffler and tube assembly to one side. Do not bend vibration eliminator excessively or it may become damaged. Cover suction port in compressor and suction valve with masking tape. Remove compressor-to-mounting bracket and support bracket bolts, remove compressor.

COMPRESSOR INSTALLATION: 1) Place compressor on mounting bracket and start bolts, tightening them finger

CONTINUED ON NEXT PAGE

1955 AIRTEMP (C nt.)

tight Remove masking tape from suction service valve and compressor port, being sure surfaces are clean Coat a new suction service valve gasket with refrigerant oil and place over valve port Install suction service valve and tighten Allen screws to 15-20 ft lbs Install muffler bracket bolt (DeSoto) and tighten to 15-20 ft lbs Tighten compressor mounting bracket-to-compressor and support bracket attaching bolts to 20-25 ft lbs

2) Remove caps from discharge tube nut and muffler connector Insert new copper washer and connect flared connection, tightening securely Install compressor rive belts and belt tension adjusting strap Adjust belts (see ADJUSTMENTS above) Install magnetic clutch electrical lead (if so equipped)

3) Install manifold gauge set (Tool C-3354) First remove valve stem protective caps from compressor discharge and suction service valves Using Tool C-3361, make sure both valves are completely back-seated (counter-clockwise) Remove protective caps from discharge and suction service port caps Install 4-ft test hose from 600 lb gauge fitting to discharge service valve port fitting Install other 4-ft test hose from 300 lb gauge fitting to suction service valve port fitting Turn both handles of manifold gauge clockwise as far as they will go Crack suction service valve open (counter-clockwise) and tighten oil filler plug Crack suction gauge hand valve **for an instant** to purge air from compressor and suction tube Close suction gauge hand valve and open discharge service valve (counter-clockwise) slightly Crack discharge gauge hand valve **for an instant** to purge air from discharge side of compressor Rotate both gauge set hand valves (clockwise) until they are fully seated Rotate both discharge and suction service valve stems until they are fully back-seated

4) Start engine and turn blower and temperature controls to "High" and "Cold" Operate engine for 5 minutes, stop engine, and test for leaks Test system for operation If satisfactory, remove gauge set and replace protective caps

CONDENSER REMOVAL & INSTALLATION: Discharge system (see above) Disconnect discharge and by-pass tubes from discharge valve and liquid line to receive and cap tubes Remove hood lock plate and support bracket Remove four bolts that attach condenser brackets to radiator support and lift condenser from car To install reverse removal procedure Partially charge system, test for leaks correct leaks evacuate and charge system

RECEIVER STRAINER-DRIER REMOVAL & INSTALLATION: Discharge system (see above) Lift car with hoist Disconnect receiver flare connections at both ends of receiver (*CAUTION*–Wear goggles) Cap ends of receiver if unit to be used again Leave caps on connections until ready to make connections To install reverse removal procedure Partially charge system, check for leaks and correct as necessary evacuate and charge system

PARTS REPLACEMENT

RECEIVER FUSIBLE PLUG: A fusible plug is installed in receiver as a safety device This plug has a standard pipe plug thread and contains a core of material which will blow at approximately 210°F If the refrigeration unit is damaged or some component fails to function properly and a temperature is built up in the receiver sufficiently high to blow the fusible plug, the Freon charge will escape (*NOTE*–Occasionally a fusible plug might blow if the system is subject to extreme conditions such as prolonged idling of motor or in very hot weather) Whenever plugs blow following steps should be taken to put system in operation.

1) Locate and repair damage or improperly functioning part causing fusible plug to blow Replace fusible plug in receiver *NOTE*–A pipe joint sealer should always be used when replacing fusible plugs Torque to 20 ft lbs

2) Discharge and recharge system, check for leaks and for sufficient oil supply in compressor

3) Inspect condensers for cleanliness and plugged passages

COMPRESSOR SHAFT SEAL: (*NOTE*–Two types used Replacement of new type seal for old type seal includes bearing end plate Replacement of new type seal with seal of same type requires seal only) Start engine and operate at fast idle with temperature control switch at "Cold" and blower switch set to "High" speed until compressor is warm Shut off engine Remore valve stem protective caps from both discharge and suction service valves Close both valves by rotating valve stems clockwise (Tool C-3361) until they are fully seated Gradually loosen oil filler plug a few turns to release pressure from compressor Remove upper right-hand radiator fan shroud Remove self-locking bolt and washer from compressor shaft at front center of magnetic clutch While supporting pulley and clutch assembly with one hand, tap pulley with a soft hammer to jar hub from tapered shaft and remove assembly from compressor *Be careful not to damage brushes when removing pulley and clutch assembly* Remove brush holder assembly

Neoprene Type Seal Removal: Push seal ring towards compressor and remove snap ring with snap ring pliers, Then pull seal assembly from shaft It may be neces sary to pry bellows from front bearing end plate with a screwdriver

Metal Bellows Type Seal Removal: Remove compressor front bearing end plate screws Install special puller C-3473 Screw in on alignment screws until inner steps on puller contact bellows evenly Hold compressor shaft from rotating by placing screwdriver in shaft keyway slot and allow it to rest against puller leg while turning puller screw When bellows have compressed far enough to clear the snap ring retainer, remove snap ring with snap ring pliers Change puller screw in center of puller Turn in on center screw and remove compressor front bearing end plate and seal assembly Remove puller from end plate Remove carbon seal and "O" ring from bearing end plate

Metal Bellows Type Seal Installation: 1) Coat new bearing end plate and large "O" ring with refrigerant oil Install "O" ring in front bearing end plate Install gasket, end plate and two long screws at opposite sides of end plate *Be sure that oil pocket is up* Start end plate squarely, and tighten screws evenly finger tight Install puller While holding compressor shaft with a screwdriver, turn puller screw to pull bearing end plate into compressor housing Remove puller and install end plate screws Tighten screws evenly to 15-20 ft lbs

2) Coat carbon seal with refrigerant oil and place over shaft, positioning tangs on carbon in recesses in bearing end plate Lubricate "O" ring in bellows with refrigerant oil and place bellows and snap ring over compressor shaft Install puller Compress bellows with puller and, at same time, rotate bellows assembly to insure proper alignment This will prevent pinching "O" ring which would result in a leaky seal Install snap ring retainer when bellows clear groove in shaft Remove puller Check snap ring to be sure that it is securely seated in shaft groove Otherwise it may slip out and result in a leaky seal Install brush holder assembly, pulley, and magnetic clutch assembly, lining up key and keyway Push assembly over shaft and install washer and self-locking nut Tighten bolt to 15-20 ft lbs Backseat both service valves and bleed air from compressor Tighten oil filler plug Install protective caps, check for leaks *NOTE*–Leaks are more noticeable when new seals are first installed than after system has been in operation for a while and parts are worn in

MAGNETIC CLUTCH: Service is limited to drive plate, pulley and electromagnet assembly snap rings bearing and brush holder assembly

Clutch Assembly Removal: See "COMPRESSOR SHAFT SEAL" above

Drive Plate Removal & Installation: Remove drive plate retaining snap ring hub with Tool C-3301 Place suitable sleeve against hub and remove drive plate by tapping against sleeve with a hammer Inspect springs for loss of tension and cracks Inspect lining on face of plate Replace drive plate if liner is worn, springs are weak or broken, or if drive plate is warped (*NOTE*–A sintered iron liner impregnated with fibrous material is bonded to the drive plate If this liner is worn through, replace drive plate) Start drive plate hub squarely into inner bearing race Place a brass drift against drive plate inner hub and tap plate hub into bearing by tapping on brass drift with a hammer Install snap ring on drive plate hub Adjust (see Adjustments)

Brush Assembly Replacement: Remove ground brush lead screw from compressor Disconnect insulated lead from Wade connector Remove screws attaching brush holder to compressor and remove brush holder assembly Clean collector rings in clutch assembly with carbon tetrachloride and wipe surplus grease from around clutch bearing Install new brush holder assembly *Use care not to break brushes If brushes ar allowed to snap to the end of their travel, they may break*

►*ELECTROMAGNETIC COIL CAUTION:* Do not attempt to remove electromagnet coil from pulley assembly The coil is held in place by a special adhesive material Once this bond is broken coil cannot be reattached

1953 FRIGIDAIRE

Buick, Cadillac, Oldsmobile, Packard (1953)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*CADILLAC AIR CONDITIONER CAP SCREW REPLACEMENT:* Cars factory equipped with Air Conditioners prior to Engine No. 29000 and field installation kits prior to March 12, 1953 have twelve-sided cap screws which should be replaced by hexagonal cap screws, Part No. 5915222. To replace, close high and low pressure shut-off valves tightly (use Tool No. J-5427). ***(CAUTION—Do not operate compressor with high pressure line closed).*** Replace cap screws, one at a time (momentary release of vapor normal). Open shut-off valves, then leak test. If leaks at shut-off valve replace valve "O" ring, Part No. 5887997 and flange gasket, Part No. 5888680 by first closing shut-off valve and removing valve attaching screws. Apply Frigidaire Oil to "O" ring before installing fitting into bore.

▷*SOLENOID BY-PASS VALVE REWORK (For Improper Seating due to Presence of Foreign Particles):* See "Solenoid Valve" under CHECKING for proper corrective procedures. NOTE—Solenoid valves with screens installed are marked with stamped "S" or a daub of red paint on housing. When screen is installed daub of red paint should be placed on housing.

▷*SOLENOID BY-PASS VALVE DIAPHRAGM POOR SEATING CORRECTION (Causing Poor Cooling):* To correct, install new tube and bonnet assembly, Part No. 566259, which has a shoulder to maintain proper diaphragm alignment. At same time install new by-pass valve screen, Part No. 5915508, if not already in place. In some cases it may also be necessary to install a new diaphragm, Part No. 5883746.

DESCRIPTION

Compression process cycle type, using Freon as refrigerant. System consists of following elements:

Refrigerating: Compressor—Located directly above generator on right side of engine. Operation causes and maintains necessary high pressure in system needed to increase Freon vapor temperature.

Condenser—Located in front of radiator. Condenses refrigerant vapor discharged from compressor, through action of fast moving air over metal surfaces of condenser.

By-pass Solenoid—In engine compartment between condenser and receiver. When cooling system is in "Off" position valve operated by solenoid is open, thereby removing restriction between high and low pressure sides of system, and preventing compressor from reducing pressure in cooling coil necessary to permit vaporization of Freon.

Check Valve—Located between condenser and receiver. Prevents liquid refrigerant from entering by-pass and low pressure lines when solenoid valve is open. Protects compressor against possible damage caused by liquid entering compressor.

Receiver—Located in front of radiator and beneath condenser. Stores liquid refrigerant and maintains supply more than that needed normally.

Sight Glass—Located in engine compartment between receiver and dehydrator-filter (under car). Provides means for determining adequacy of refrigerant charge.

Dehydrator-Filter—Located under car to right rear. Filters and dehydrates circulating Freon.

Expansion Valve—Part of evaporator assembly located in trunk of car. Supplies liquid to cooling coils at same rate that refrigerant is removed from it in a vaporous state.

Cooling Coils—Part of evaporator assembly located in trunk of car. Container for refrigerant which readily absorbs heat from surrounding area when temperature of refrigerant liquid is reduced. In cooling coils refrigerant is changed to vapor.

Air Circulating: Blowers—Located in evaporator assembly in trunk of car. These squirrel cage type fans, two in number, on each side of car, force air from refrigerated area in evaporator assembly to ducts leading to car interior.

Discharge Air Ducts—Connected to grille located at each end of package shelf. Entry point of refrigerated air to interior of car.

Return Air Duct—Located near center of package shelf. Air is filtered through this duct and returned from interior of car to refrigerating area in evaporator assembly.

Outside Air Ducts—Located to rear on each side of car. Manually controlled damper controls amount of air admitted from outside to refrigerating area in evaporator assembly.

Control: Various methods used to control degree of coldness are as follows:

Buick & Oldsmobile—Two knobs control fan speed and coldness. Left hand knob controls fan speed and right hand knob degree of coldness. Turning knob all the way to right gives maximum coldness.

Cadillac—Control panel consists of 3-way toggle switch and control lever. Three-way toggle switch has positions marked "Vent" (for normal ventilation, blowers operating), "On" which causes Air Conditioner to operate, and "Off" which makes blowers and Air Conditioner inoperative. Lever controls degree of coolness when Air Conditioner is "On," position farthest to right providing maximum coolness.

Packard—Control panel consists of three knobs. Center knob controls degree of coldness. By turning knob all the way to right maximum coldness is obtained. The two outer knobs regulate speed of right and left blower fans independently.

All Cars—Mercury Thermostat & Control Relay—With Air Conditioner "On" and temperature control lever all the way to right, full line voltage is directed to heating element of thermostat. Resulting heat keeps mercury at higher position than at other positions of lever when heat on mercury column is less. Relay that energizes by-pass solenoid is grounded through mercury thermostat. If mercury column is below upper contact, relay coil cannot be grounded and solenoid by-pass valve cannot be energized. This means there is no refrigeration unless temperature at thermostat increases sufficiently to provide current to the relay. The amount of heat applied to the thermostat determines length of time current is supplied to the relay and consequently time Air Conditioner is operative. The heat supplied the thermostat may be the temperature within the car itself or that artifically supplied to the heater element of the thermostat.

OPERATION

With Air Conditioner Control Switch "On" and engine and compressor operating, heat laden, low pressure Freon is compressed by compressor and discharged into condenser where it is cooled to remove the "sensible" heat of compression. The Freon is forced into receiver under pressure when by-pass solenoid is energized and closed. After passing through sight glass and dehydrator-filter, Freon enters expansion valve in evaporator assembly. At orifice in expansion valve, high pressure liquid Freon changes to low pressure liquid, then enters cooling coils through distributor tubes. The "boiling" Freon, while in the cooling coils, absorbs heat from the surrounding air and vaporizes. The vapor is drawn through the low pressure line to compressor.

PRECAUTIONS, LEAK TESTING & TROUBLE SHOOTING

See "Air Conditioning Service Cautions," "Trouble Shooting" and "Leak Tests."

MAINTENANCE & INSPECTION

SEASONAL OPERATION: Winter—On Buick and Cadillac, remove longer compressor drive belts, install standard generator belt. On Oldsmobile and Packard remove compressor belts.

Summer—To start Air Conditioner after the winter season, reinstall compressor drive belts, open outside intake ducts, then proceed as directed under Preliminary Check (see above). Check unit outlet air differential with temperature outside car.

FILTER RECONDITIONING: Filter should be cleaned regularly during season of operation. This should be every two months or 2,000 miles, and more frequently in extremely dusty areas. To clean filter, wash in warm water, shake out excess moisture. *CAUTION—Do not use air hose*

FUSES: 15 ampere (Buick), 20 ampere (Cadillac, Oldsmobile), 30 ampere (Packard), in lead near ignition switch. 3 ampere (Packard), 2 ampere (Others) in line from thermo gauge to solenoid valve.

ADJUSTMENT

BELT ADJUSTMENT: Buick—Adjust belt by moving generator so that there is a ⅜" deflection between the fan and compressor pulleys.

Cadillac—Loosen generator mounting bolts three or four turns, loosen generator adjusting strap screw. Place Fan Belt Adjusting Tool, No. J-3046 over head of front mounting bolt and rotate tool until arm on tool contacts edge of generator drive end plate. Place ⅞" socket over tool, place 50 ft. lb. torque wrench in socket. Pull outward on torque wrench until 24 pounds torque is indicated on scale. Tighten generator adjusting strap screw. Remove tool and tighten mounting bolts to 15-18 ft. lbs.

Oldsmobile—Loosen compressor bracket adjusting bolt. Using Tool J-5394 and a torque wrench, torque tighten belts to 50 ft. lbs.

Packard—Loosen compressor bracket adjusting bolt. Using Tool J-5577 and a torque wrench, torque tighten belts to 58 ft. lbs.

EXPANSION VALVE: Remove access plate located centrally on evaporator housing. Using 1" socket, while supporting mating parts (to prevent distortion), remove cap nut from expansion valve. Using 3/16" valve key, Tool J-5426, on adjusting stem of expansion valve, first CLOSE valve completely, then OPEN (counter-clockwise) 5-6 complete turns. If the above does not correct ineffective cooling, proceed with alternate adjustment below:

Alternate Adjustment—Connect high and low pressure gauge set to compressor, remove spare tire, and cover plate from high and low pressure lines at cooling unit. Attach thermometer to low pressure line

CONTINUED ON NEXT PAGE

1953 FRIGIDAIRE (C nt.)

with mercury bulb in contact with tubing. Tape securely, pack insulation around tubing and thermometer bulb (extremely important since air currents or poor contact affect thermometer reading). Start engine, operate at 1300 RPM for 15 minutes. Sight glass should contain no bubbles. Read low pressure gauge and low pressure line temperature at cooling unit simultaneously. For any given low pressure, line temperature should be within following limits:

Low Pressure Line

Pressure	Line Temp.
5 lbs. per sq. in.	2°-17° F.
10 lbs. per sq. in.	15°-30° F.
15 lbs. per sq. in.	25°-40° F.
20 lbs. per sq. in.	34°-49° F.
25 lbs. per sq. in.	41°-56° F.
30 lbs. per sq. in.	48°-60° F.

If low pressure line temperature below limits at cooling unit, expansion valve must be closed ½ turn at a time until both temperature and pressure readings agree with above table. If above limits at cooling unit, expansion valve must be opened ½ turn at a time until readings agree with table above. Sufficient time (20 minutes) must be allowed between adjustments for temperatures and pressures to stabilize. High and low pressures, indicated on gauge set at compressor should be within limits shown in following table according to outside air temperature at time test is being performed.

Temp of Surrounding Air	Low Pressure Lbs. per Sq. In.	High Pressure Lbs. per Sq. In.
65° F.	1-8	100-110
70° F.	2-11	105-125
75° F.	4-13	115-140
80° F.	6-16	125-155
85° F.	8-18	135-175
90° F.	10-21	140-190
95° F.	12-23	150-205
100° F.	14-26	155-220

IDLE SPEED-UP CONTROL (Cadillac): Start engine, allow to warm up, then turn Air Conditioner "ON." With transmission shift lever in neutral position, adjust serrated nut on rod to maintain idle speed at 750-800 RPM.

CHECKING

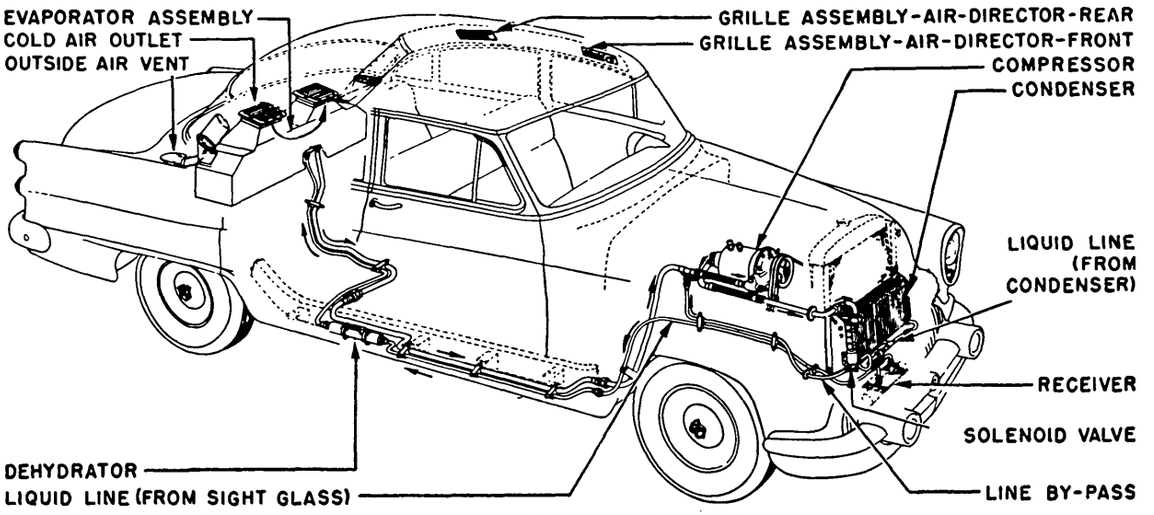
BUBBLES IN SIGHT GLASS: Appearance of bubbles in sight glass when engine idling or when solenoid valve is open is not unusual, and does not indicate a shortage of refrigerant. To check, operate engine at 1300 RPM for 15 minutes with Air Conditioner switch "ON", blowers operating, and jumper wire connected between battery and solenoid wire to close solenoid valve. If bubbles are still present after above tests, proceed to check as follows:

Solenoid Valve—Check for leaks by feeling the pipes on both sides of the valve. If there is any difference in temperature between the two pipes, the solenoid coil is burned out, solenoid plunger is sticking open and not seating on valve stem, refrigerant is leaking past valve seat. Check in following sequence:

Coil—Disconnect solenoid valve lead-in wire at junction, connect one end of jumper wire to valve lead-in wire. Touch other end of jumper wire to positive post of battery. If coil operating, a "thump" will be heard as neoprene end of valve plunger contacts valve stem. When jumper wire is removed from battery post, a "click" is heard as valve plunger rises under spring pressure. If movement of valve plunger cannot be heard, replace coil. To replace coil, disconnect ground wire at bottom of solenoid, remove self locking nut from top of solenoid. Remove tube cup, coil housing, sleeve, and spring washer. Remove and replace coil, reassemble. After replacing coil, check operation of valve plunger as described above. If plunger travel still cannot be heard, cause is not in coil.

NOTE—In some cases plunger can be freed up by opening and closing the circuit at the battery a few times. If plunger still inoperative, disassembly of the solenoid valve is necessary. For Removal and Installation of Solenoid Valve see REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT following.

►**SOLENOID BY-PASS VALVE REWORK:** Remove two Allen head screws from base of valve body, remove base. Remove neoprene valve seat from body. Mark with a pencil the location of the four staking points, then clamp valve body lightly in a bench vise on flat faces near center of casting. *(CAUTION —Extreme care must be used to prevent scratches or nicks on flange face of body or surface of ring seat in center of casting, as any damage to these surfaces could result in refrigerant leaks after assembly).* Inspect valve body for evidence of foreign material. Similarly inspect inlet pipe. If no evidence found, solenoid valve assembly must be replaced. If foreign material found, clean valve body with Frigidaire oil. Install new screen, Part No. (G.M.) 5915508, in valve body with dished face on top side and flanged edge down. Hold staking tool (Can be made from standard 5/32" pin punch) at pencil scribe marks in a vertical position, with ground surface of shank toward center of valve. (NOTE—Round side of pin should be against wall of casting). With a ½ lb. ballpeen hammer, strike a light blow at each of the four staking points. This will prevent screen from shifting position or becoming dislodged. Assemble valve and replace in car. Note—Place daub of red paint on valve body next to name plate to indicate screen has been installed.



FRIGIDAIRE AIR CONDITIONING SYSTEM (TYPICAL)

Lines—Check for kinks in liquid line between sight glass and receiver, and also high pressure line from compressor to condenser and from condenser to receiver. Replace any kinked or damaged lines. Leak test system. If **no** leaks are found, **do not** add refrigerant.

Expansion Valve—Check expansion valve power element for full contact with low pressure line. Be sure bulb does not contact the liquid line or cover. Add insulating material where required. Adjust expansion valve to 5-6 turns open *(a change over previously recommended 10 turns).*

Receiver—If bubbles remain after adjustment of expansion valve, it is an indication that there is a restriction or a mispositioned pick-up tube in receiver. Replace receiver.

PUMPING DOWN THE SYSTEM

To replace many components of the system refrigerant must be pumped into receiver in order to save as much refrigerant as possible. To Pump Down the System proceed as follows:

►*CAUTION—When attempting to remove or replace flare fittings or any component, extreme care should be taken to give support to mating member to avoid distortion.*

1) Connect lines of gauge set to high and low pressure connections on compressor.
2) Remove cap from shut-off valve at receiver.
3) With ¼" valve key (Tool J-5427), close liquid line shut-off valve at receiver.
4) Remove caps from high and low pressure shut-off valves on compressor. *NOTE—Purpose of this step is to facilitate closing off lines quickly if necessary.*
5) Energize solenoid (close valve) by disconnecting solenoid wire at connector and connecting it to battery with jumper wire.
6) Remove plug from center fitting on gauge set.
7) Purge air from gauge lines by slightly cracking low and high pressure valves on gauge set, then close valves.
8) Turn ignition on, operate engine at low idle

CONTINUED ON NEXT PAGE

1953 FRIGIDAIRE (C nt.)

speed, then turn air conditioning control switch to "ON" position.

►*CAUTION*—Since receiver will not hold entire charge of refrigerant, it may be necessary to discharge some during the operation. **If pressure reaches 275 lbs.** turn off ignition, then discharge refrigerant by opening valve on high pressure side of gauge set to atmosphere.

9) Allow compressor to operate until low pressure gauge reads "O", stop engine, remove ignition key. With valve key (Tool J-5427) close high pressure shut-off valve at compressor.

10) Low pressure gauge shows more than "O" lbs. Purge remaining refrigerant from low pressure side by opening valve on that side. Allow 1 or 2 lbs. pressure to remain.

11) Shut low pressure gauge valve for 5 minutes. If pressure builds up above 5 lbs. repeat 10) above. With valve key (Tool J-5427) close low pressure shut-off valve on compressor.

EVACUATING THE SYSTEM

Evacuation of the System is required when system is opened for any reason. For this operation use Vacuum Pump, Tool J-5428. Proceed as follows:

1) Connect lines of gauge set to high and low pressure connections on compressor.

2) Install gauge line from center connection of gauge set to tee connector (Tool J-5462-2).

3) Install female connector (Tool J-5462-7) at inlet side of vacuum pump.

4) Insert flare seat (Tool J-5462-8) in connector (Tool J-5462-7) at vacuum pump.

5) Install hand shut-off valve (Tool J-5462-1) to connector at vacuum pump.

6) Install gauge line from one side of tee connector to valve at vacuum pump. Valve should be closed.

7) Install connectors (Tools J-5462-4, 6) on one end of a gauge line (J-5418).

8) Insert lead washer (Tool J-5462-3) in large end of drum connector (Tool J-5462-4).

9) Insert a gauge line from remaining tee connection to drum of Freon.

NOTE—Whenever gauge lines installed for purpose of adding refrigerant or checking pressure AIR MUST BE REMOVED BY PURGING (allowing refrigerant pressure to force air out to atmosphere). This is accomplished by slightly opening and closing valves on gauge set.

Evacuating Low Pressure Side of System:

1) Open low pressure valve at compressor, close liquid shut-off valve at receiver and high pressure valve at compressor.

2) Open low pressure valve at gauge set (high pressure valve remains closed).

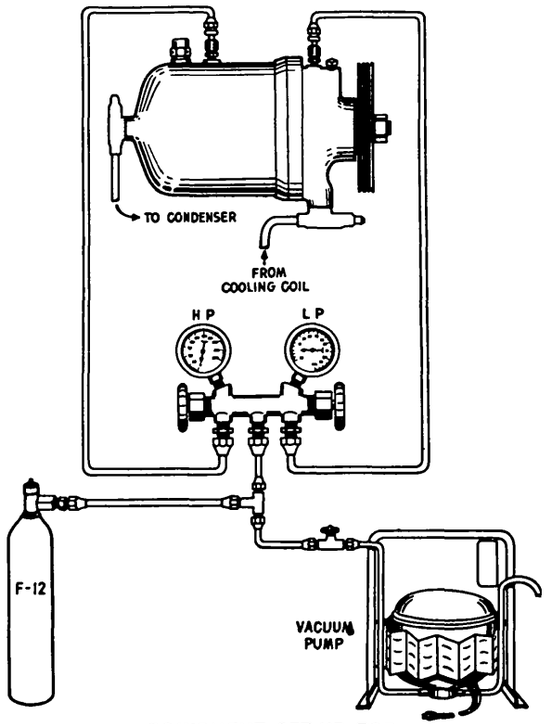
3) Connect and start vacuum pump.

4) Slowly open two-way shut-off valve at vacuum pump to avoid forcing oil out of pump.

5) Operate pump to obtain 28" vacuum for 10 minutes. Close shut-off valve at pump, stop pump. Check gauge to see if vacuum holds. NOTE—If vacuum of 28" cannot be obtained proceed with 6) following for leak test.

6) Open Freon drum valve, allow system to come to drum pressure. Close drum valve. Leak test complete low side of system, including gauge fittings, with Leak Detector J-5419. If leak cannot be found vacuum pump may be faulty.

►*NOTE*—If oil blown out of vacuum pump, refill to proper level with Frigidaire 75 viscosity oil.



EQUIPMENT SET-UP FOR EVACUATION OF SYSTEM

7) If leak found, fix leak and operate pump to obtain vacuum as in step 5). Watch gauge to see if vacuum will hold 3-5 minutes. If not, repeat 6).

8) With all leaks eliminated, open Freon drum and bring system to drum pressure again. Both gauges should equalize. Close drum valve.

9) Repeat evacuation procedures to pick up any air or moisure remaining in system.

10) System is now ready for **partial** charge of refrigerant.

Evacuating Entire System:

1) Make certain low pressure shut-off valve at compressor is open. The liquid shut-off valve at receiver and high pressure shut-off valve at compressor must also be open.

2) Open low and high pressure gauge valves on gauge set.

3) Perform operations outlined in steps 3) through 9) in "Evacuating Low Pressure Side of System" above.

4) System is now ready for **complete** charge of refrigerant.

ADDING REFRIGERANT

►***CAUTION—Never add refrigerant until system has been leak tested and properly evacuated. Refrigerant is always added to low pressure side of compressor*** **in a vaporous state.**

Preparation of Freon for Charging: Place drum in bucket of hot water. Temperature of water should not exceed 125°. Since temperature of water and drum will decrease as vapor leaves drum, drum pressure may decrease to point where it will be necessary to replenish or reheat water. Place Freon-12 drum and bucket of hot water on scales so it can be determined when complete charge of 7 lbs. of refrigerant has been added to system.

►*CHARGING CAUTIONS*—Whenever compressor is in operation during charging observe the following:

1) Wear goggles when handling Freon or breaking line connections.

2) High pressure **should not exceed 275 lbs.**

3) Close low pressure hand shut-off valve on gauge set completely at frequent intervals in order to maintain pressure on low side of compressor **above 12 lbs.** NOTE—When valve closed, pressure on low side of compressor is indicated; when open, drum pressure is indicated.

)4 Drum pressure minimum should be 12 lbs., maximum 90 lbs.

5) Close solenoid by connecting jumper wire from battery to solenoid wire at connector.

Adding Partial Charge: Evacuate low pressure side of system. ***See Evacuating The System above.*** Then proceed as follows:

1) Open high pressure valve at compressor (low pressure valve at compressor and valve at receiver must also be open).

2) Operate engine and compressor at slow idle speed.

3) Open low pressure valve on gauge set (high pressure valve on set must be closed).

4) Open drum valve slightly (90 lbs. max.), watch sight glass until solid column of liquid appears.

5) Note scales and allow compressor to operate until 1 additional lb. of Freon-12 has been charged into system.

6) Close drum valve, then close low pressure hand shut-off valve on gauge set.

7) Make certain compressor valves open, then operate engine at speed corresponding to 35-40 MPH. Observe gauges, sight glass, and entire system for proper performance.

8) After 5 minutes operation, should bubbles appear, add 1 more lb. of refrigerant.

9) When satisfied with operation, remove gauge connections on compressor, disconnect Freon drum, then cap gauge connections on compressor with flare nuts.

Adding Complete Charge: Evacuate complete system. ***See Evacuating The System above.*** Then proceed as follows:

1) Open both hand shut-off valves on compressor and low pressure valve on gauge set.

2) Freon-12 vapor will flow into system **without** operating compressor. **Amount should not exceed 7 lbs. by weight.**

►*NOTE*—If not possible to charge total of 7 lbs. by this method, it is permissible, after 1½-2 lbs. have been forced into system, to operate compressor and engine at slow idle speed. Hand shut-off valve on high pressure side of gauge set should be closed. Continue to operate engine and compressor at slow idle until 7 lbs. total is charged into system.

3) Close drum valve, then close low pressure valve on gauge set.

4) Operate engine and compressor at speed corresponding to 35-40 MPH. Observe high and low pressure gauges, sight glass, and general performance of system.

CONTINUED ON NEXT PAGE

1953 FRIGIDAIRE (Cont.)

5) When satisfied with operation, stop engine, remove gauge line connections at compressor and cap with flare nuts. Remove drum from water.

CHECKING & ADDING OIL

Checking Oil Level: From point in front of grille of car direct flow of air from a 12" or 15" fan at condenser (to keep engine temperature down and provide for more efficient functioning of condensing unit), operate engine at fast idle or speed corresponding to 35-40 MPH for 10 minutes with cooling control switch "ON" and blowers operating at High Speed. Stop engine. Remove flare nut and deadhead from Schrader valve on underside of compresser housing. Depress Schrader valve core, allowing first surge of oil to escape. If oil continues to escape with the Freon vapor, oil level is to be considered satisfactory. Add oil if oil does not continue to escape with Freon vapor.

Adding Oil (Minor Loss): Use 525 viscosity Frigidaire Oil. Proceed as follows:

1) Shut high and low pressure hand shut-off valves at compressor, depress Schrader valve core on high pressure test connection to purge Freon until low audible hiss is heard. Allow to stand a few minutes, then repeat purging. Remove high pressure relief valve.

2) From graduated bottle, pour 4 ozs. of oil into high pressure relief valve opening. Replace high pressure relief valve using new copper gasket.

3) Open high pressure hand shut-off valve, purge air from compressor by depressing Schrader valve core on high side gauge connection of compressor.

4) Recheck oil level. Shut-off valves at compressor must be open. *See "Checking Oil Level" above.*

5) If oil still low, continue to add 4 ozs. at a time until satisfactory level reached, following steps outlined above.

6) Make sure high and low pressure shut-off valves are completely open, replace protective caps over valve stems. Replace flare nuts and deadhead on both oil test fitting and high pressure gauge fitting connections. Leak test all connections that have been disturbed.

Adding Oil (Major Loss): Use 525 viscosity Frigidaire Oil. Proceed as follows:

1) Close both high and low pressure hand shut-off valves at compressor, depress Schrader core on high pressure gauge connection of compressor. Purge pressure until only slight audible hiss is heard. Repeat, if necessary, to be sure pressure is at a minimum.

2) Remove valve flange mounting screw and hand shut-off valves from bore of compressor. Remove belts and compressor from mounting brackets, place compressor on work bench. Remove high pressure relief valve.

3) Invert compressor, drain oil into clean container.

▷*NOTE*—Examine oil for foreign material, such as metal chips, water and sludge. This oil should be discarded. If excessive amount of water found, install new liquid dehydrator-filter in high pressure liquid line. *See "Replacing Dehydrator-Filter" following.*

4) From graduated bottle, pour 16 ozs. of oil into high pressure relief valve opening in compressor. Replace high pressure relief valve using new copper gasket.

5) Reinstall compressor on mounting brackets, connect high and low pressure hand shut-off valves using new "O" rings and gaskets. Reinstall belts.

6) Open high pressure hand shut-off valve and, by depressing Schrader core on high pressure gauge connection, purge air from compressor. Open low side hand shut-off valve.

7) Leak test all connections that have been disturbed.

PURGING AIR FROM SYSTEM

To determine presence of, and remove air and excess refrigerant from system proceed as follows:
1) Connect high side of gauge set to high pressure gauge connection on compressor. With compressor not operating, open high pressure valve on gauge set slightly, allow vapor and air mixture to exhaust SLOWLY through center connection of gauge set to atmosphere, then close valve.

▷*NOTE*—To determine if all air exhausted, place small flame (cigar lighter or match) at point of discharge. Freon vapor will put out flame. Air will cause flame to move but not put it out.

2) Clip ⅝" thermo-well (Tool J-5422) on inlet tube of condenser. Fill well cavity with water and insert 0-225° F. thermometer (Tool J-5421) in cavity.

3) Operate engine and compressor at fast idle or speed approximately 35-40 MPH for 5 minutes.

▷*CAUTION—Do not allow high pressure to exceed 275 lbs. See Pumping Down The System above.*

4) Stop engine, allow system to attain room temperature, observing high pressure gauge and thermometer.

▷*NOTE*—If high pressure gauge reading reduces as condenser cools and conforms to pressure-temperature relationship of Freon 12 (See Chart below), difficulty was due to overcharge of refrigerant and not air. If pressure does not reduce as condenser cools in conformity with pressure-temperature relationship of Freon 12 there is air in system. In either case high pressure side of system must be purged.

Pressure-Temperature Relationship—Freon 12

°F.	Lbs. Press.	°F.	Lbs. Press.	°F.	Lbs. Press
0	9.2	40	37.0	80	84.1
10	14.6	50	47.0	90	99.6
20	21.0	60	58.0	100	117.0
30	28.5	70	70.0	110	136.0

5) Open high pressure valve on gauge set SLOWLY, allow vapor to exhaust at center connection on gauge set.

▷*CAUTION—Cover connection with cloth to prevent oil and refrigerant from contacting persons or objects.*

6) Repeat 5) at frequent intervals, observing pressure gauge and thermometer, until both correspond to temperature-pressure relationship of Freon 12.

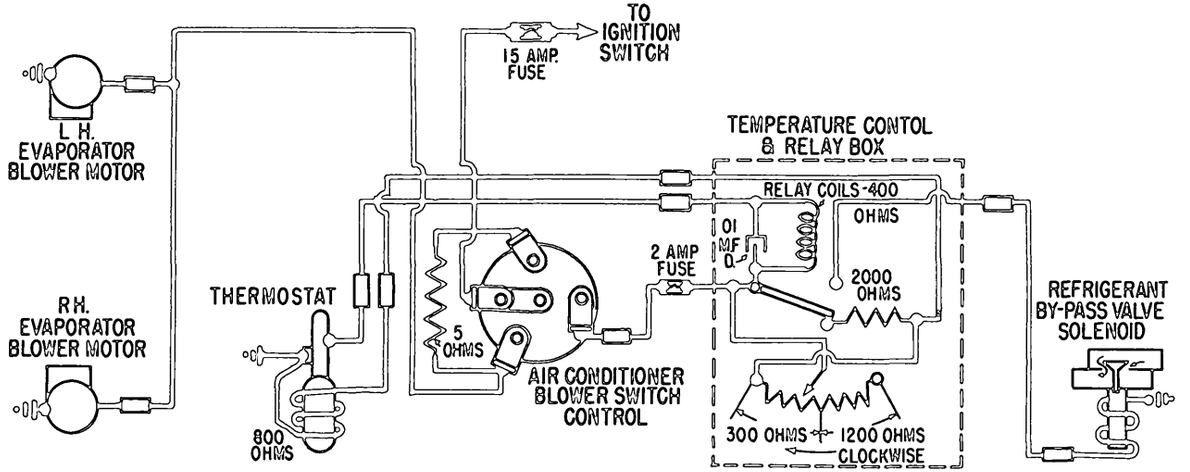
▷*NOTE*—If cause of difficulty was overcharge of refrigerant, it is necessary to purge excessive Freon to point where high side pressure does not build up rapidly when engine operating.

7) Open low side hand shut-off valve on compressor and valve on receiver, operate engine at fast idle or speed corresponding to 35-40 MPH for about 5 minutes. Check operating pressures and sight glass. When satisfied with operation of system, disconnect gauge set, replace flare nuts, tighten all fittings.

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

▷*CAUTION—Refrigerant in the system is under high pressure at all times. Loosening any fitting in the system will release Freon under pressure. ALTHOUGH FREON IS NOT HARMFUL AS A VAPOR, IT COULD CAUSE SERIOUS DAMAGE IF IT REACHED THE EYES IN LIQUID FORM. CONNECTIONS SHOULD NOT BE LOOSENED UNTIL PRESSURES HAVE BEEN REDUCED, AND PROTECTIVE GOGGLES PLACED OVER THE EYES.*

COMPRESSOR: Located directly above generator on right side of engine, is driven by two "V" belts from crankshaft pulley. Two lines connect refrigerating system to compressor. High pressure line connects at rear of compressor body, and low pressure line at front. Each line contains a shut-off valve at point where line attaches to compressor. Valves are operated with a ¼" key (Tool J-5427) after hexagonal



CONTROL SYSTEM WIRING (BUICK—TYPICAL OF CADILLAC & OLDSMOBILE)

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1953 FRIGIDAIRE (C nt.)

caps are removed from valves. Closing these valves shuts off system from compressor.

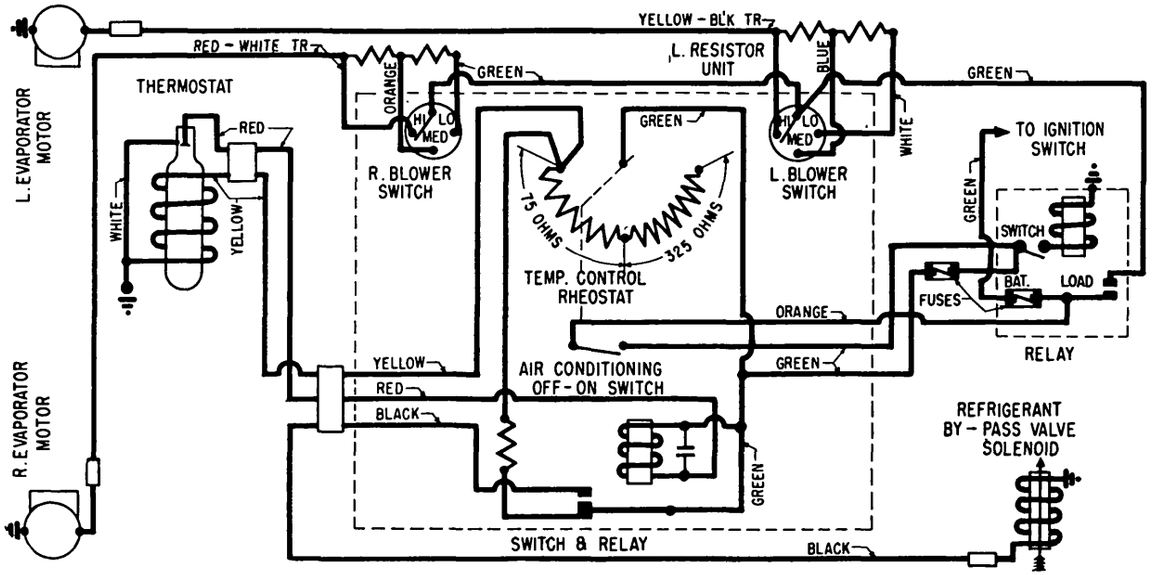
►*CAUTION—Compressor should not be operated with high pressure line valve closed.*
In addition to manual valves there are Schrader type valves in compressor at points of line attachment. Valves automatically close, sealing compressor when lines are removed from compressor body. On top of compressor body are high and low gauge line fittings. Fittings are capped and contain Schrader type valves which seal compressor from outside air.

Removal—Remove covers from high and low line valves at compressor. Using ¼" key or square socket, close valves tightly by turning clockwise. Remove protective covers from high and low pressure gauge fittings (on top of compressor). NOTE—Hold fitting with wrench to prevent its turning.

►*CAUTION—Wear protective goggles as some fluid may escape under pressure left in compressor.*
Drape clean wiping cloth over a small brass rod and depress Schrader valve in high pressure gauge line fitting. Allow pressure to escape until there is no audible hissing sound (caused by escaping pressure). Repeat this bleeding procedure on low pressure gauge fitting. *NOTE—Cloth will deflect gas. Be sure face is not in path of escaping gas.* Remove high and low pressure lines by removing two bolts attaching each fitting to compressor. Cover compressor and pressure line openings with masking tape. Remove compressor adjusting bracket bolt, then belt from compressor pulley. Remove compressor from bracket by removing two attaching bolts and nuts.

Installation—Reinstall compressor to bracket, assemble and tighten belts (See Belt Adjustment under Maintenance and Inspection). Install new "O" ring seals on high and low pressure line fittings. Carefully insert high and low line fittings into their respective bores in compressor, being careful not to damage "O" ring seals. Tighten lines evenly to compressor body. Crack open high pressure line valve (rear valve) with valve key. Depress Schrader valve in low pressure gauge line fitting for a few seconds to allow pressure to escape (purges any air from compressor). Open high and low pressure line valves all the way by turning counterclockwise. NOTE—Valves must come against their seats in open position as they seat against a seal. Replace protective covers on line valves and gauge fittings. Test for leaks at compressor fittings, using Leak Detector J-5419 in accordance with instructions furnished with detector.

SOLENOID VALVE: Removal—Close hand shut-off valve at receiver. Discharge high and low sides of system. NOTE—If compressor already removed discharge system through hand shut-off valves at point of connection to compressor. If compressor not removed discharge through gauge set connections on top of compressor. *Use cloth to deflect escaping Freon.* (The closed shut-off valve and check valve at receiver will prevent Freon present in receiver from escaping). Disconnect wiring leads, remove solenoid valve from line by disconnecting flare nuts at valve.



PACKARD CONTROL SYSTEM WIRING

Installation—If no parts other than compressor and solenoid removed reinstall solenoid valve (and compressor—See Compressor Installation above) making sure refrigerant flow is in direction of arrow on valve, toward rear of car. Reconnect wiring to valve. Open hand shut-off valve at receiver and make sure hand shut-off valves at compressor are open. Allow system to build up pressure to between 35-40 lbs. Close valve and test for leaks. If no leaks found, leave receiver valve closed and evacuate system after attaching gauge set. Open hand shut-off valve at receiver and recharge system with refrigerant *(See Adding Refrigerant above).*

ENGINE COMPARTMENT ASSEMBLY: In order to work on engine and units around radiator it may be necessary to remove the compressor, solenoid valve, condenser and receiver assembly. Proceed as follows:

Removal—Discharge complete system through Schrader valves at test fittings on compressor. *Use cloth to deflect escaping Freon.* Remove hood lock plate and baffle. Disconnect high pressure line (flared connection at condenser inlet), outlet lines at flared connection alongside condenser and at inlet elbow on receiver. Remove condenser mouting bolts, remove condenser. Disconnect high pressure inlet flare at receiver and high pressure outlet line from shut-off valve at receiver. Remove receiver mounting bolts, then receiver. Remove brackets holding connecting tubing. Remove Compressor and Solenoid Valve, if necessary *(See Compressor & Solenoid Valve Removal above).*

Installation—Reverse removal procedures above. Evacuate entire system and recharge with refrigerant. Test for leaks (Tool J-5419).

PARTS REPLACEMENT

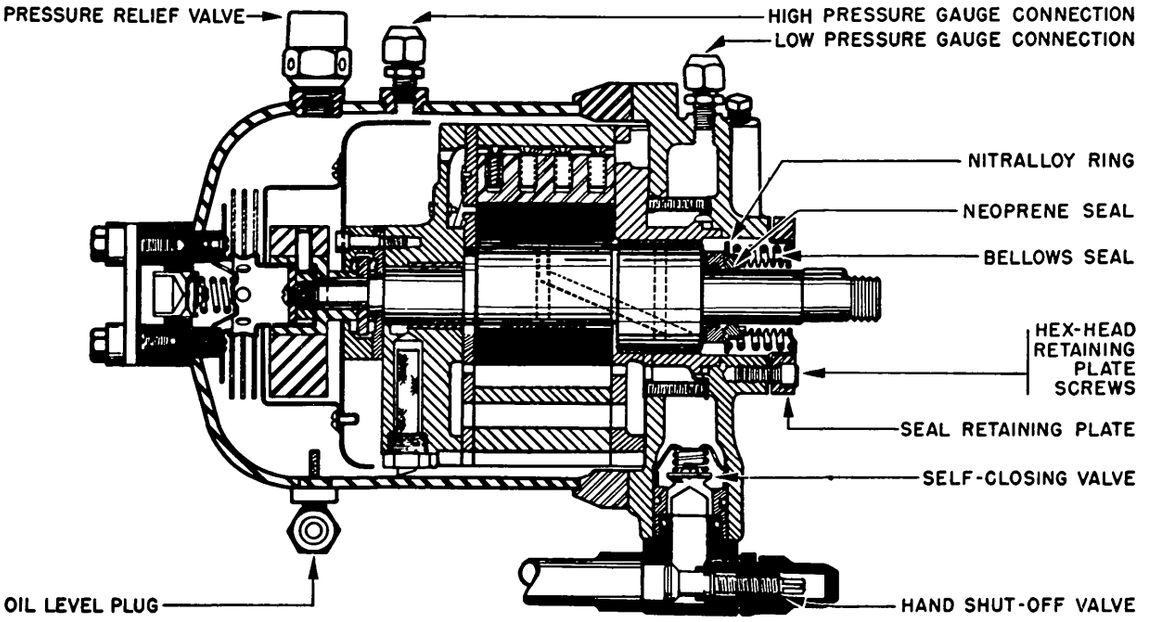
COMPRESSOR: Connect gauge set to high and low gauge connections on compressor. Close high pressure hand shut-off valves at compressor and receiver. Energize solenoid, closing valve by connecing jumper wire to battery. Discharge low pressure side of system through gauge set. Close low pressure hand shut-off valve at compressor. Disconnect dehydrator-filter in liquid line (See Dehydrator-Filter Replacement following). Disconnect gauge set, high and low pressure valves from compressor, remove compressor from mountings. Open hand shut-off valve at receiver, allow refrigerant in high side to escape at open dehydrator-filter connection (Catch Freon with rags or container). NOTE—If system completely discharged due to compressor failure, flush with Freon-12 from drum. Proceed as follows: Remove Schrader core from self-closing valve in header inlet of condenser. Install charging line to this connection and Freon drum containing no more than 5 lbs. of Freon-12. Invert drum and with valve open wide allow liquid Freon to flush through condenser, receiver, and line to dehydrator-filter open connection. *(CAUTION—Use goggles).* Close drum valve, disconnect charging line from drum and condenser, replace core in Schrader valve. Install new dehydrator-filter in liquid line. Remove cone screen from liquid inlet of expansion valve, install new screen cone. Install new compressor in mounting, install and tighten belts. Install hand shut-off valves at compressor, using new "O" rings and gaskets. De-energize solenoid by removing jumper wire to battery. Install gauge set, open hand shut-off valves on compressor. Evacuate system, test for leaks, and recharge system with refrigerant.

COMPRESSOR SHAFT SEAL: With ignition off, close high and low pressure shut off valves at compressor,

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1953 FRIGIDAIRE (C nt.)

relieve remaining pressure in compressor by depressing Schrader valve cores in gauge connections on compressor to 2-5 lbs. Remove shut-off valve fittings from compressor. *Wear goggles.* Loosen compressor pulley lock-nut (Tool J-5454). Loosen generator belt adjusting strap, remove compressor belts, then compressor. Remove pulley from shaft (Do not hammer off). Remove seal retaining plate, Nitralloy ring (Tool J-5425). Install new ring (Tool J-5425) making sure neoprene seal rests evenly and firmly against shaft shoulder (Keep fingers off polished ring seat which makes contact with bellows seat). Apply clean Frigidaire oil to ring and seat and first three turns of bellows seal. With Tool J-5425 install seal and gasket. Install retainer plate, tighten bolts alternately to insure even pressure against seal. Do not remove tool until all bolts tight. Add oil as required (See Adding Oil above). Install compressor, pulley and belts. Tighten belts. Install low and high pressure valves in compressor, using new "O" ring seals and gaskets. Open high pressure shut-off valve at compressor, purge air from compressor by depressing Schrader core in high pressure gauge connections for few seconds. Open low pressure shut-off valve on compressor, start engine and allow it to operate for several minutes, repeat purging to remove air that has entered during seal replacement. Recap high pressure gauge connection. Leak test compressor shaft seal and connections that were disturbed.



FRIGIDAIRE COMPRESSOR SECTIONAL VIEW

1954-55 FRIGIDAIRE & HARRISON AIR CONDITIONING

Buick (1954-55)
Cadillac (1954-55)
Chevr l t V8 (1955)
Oldsmobile (1954-55)
Packard (1954-55)
P ntiac (Lat r 1955) ①

①—For first 800 cars in 1955 see "1954-Early 1955 Pontiac" Air Conditioning.

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 BUICK CLUTCH BEARING INSTALLATION CAUTION:* Compressor clutch bearings installed on compressors prior to Compressor No. 64MB060 were slip fit. Clutch bearings installed on later compressors were pressed on, due to increase in diameter of shaft to give a press fit of .002-.0005". It will be necessary to use a suitable puller to remove pulley from compressor.

►*1954-55 CLUTCH LUBRICATION CAUTION:* When assembling compressor clutch it has been found advisable to lubricate between outer bearing and pulley, between inner bearing and shaft, and between hub and spline. Use high pressure grease, preferably one with a melting point above 250°F. Apply grease sparingly to prevent transfer of grease to clutch plates, due to centrifugal force. It is suggested that lubricant be applied by first spreading it in a transparent film on a clean, flat surface, such as a piece of glass or paper. Then, wipe a brush over the film to pick up the lubricant and apply it to clutch parts. Be sure to wipe brush longitudinally on splines as any crosswise motion would deposit an excessive amount of lubricant.

►*1955 CHEVROLET THERMOSTATIC SWITCH ADJUSTMENT (To Provide Full Temperature Control):* An adjustment of the thermostatic switch is now included in adjustment procedures to correct frosting or icing condition in evaporator (results in poor or no cooling). See "Thermostatic Switch Adjustment (Chevrolet)" under ADJUSTMENTS below.

►*1954 EXPANSION VALVE PRODUCTION CHANGE:* Approximately June 1, 1954 a new smaller thermostatic expansion valve was incorporated in evaporator assemblies on air conditioning units in production. Evaporator assemblies beginning with Serial No. 511B852 will have new expansion valve. Part No. 5440860 will continue to be released for service until stock is exhausted, at which time new valve will be released for service replacement on both 1953 and 1954 models. The factory setting of the *new smaller expansion valve is approximately 5 turns counter-clockwise from fully closed position. Factory setting on early type is approximately ten turns from fully closed position.*

►*1954 CADILLAC FAN SHROUD VIBRATION CORRECTION:* A roaring noise may be noted on some early production air-conditioned cars (18-20 M.P.H. in second gear, 35 M.P.H. in third gear, or 50 M.P.H. in fourth gear) due to vibration of fan shroud. To correct, reposition fan shroud-to-radiator support bracer so that long, flat portion of spacer is below attaching screws, parallel to ground.

►*1954 CLUTCH SOLENOID GROUNDING CAUTION:* Clutch solenoid used on some early cars equipped with Air Conditioner has, in some instances, become inoperative due to inadequate grounding. To correct, install kit, Part No. 3630558, containing ground wire and lock nut.

►*1955 MAGNETIC CLUTCH PRODUCTION CHANGE:* Effective with Compressor, Serial No. 16XB275, tear drop depression on both clutch plates has been changed, and clutch activating coil has been redesigned (new plates identified by letter "O" stamped on inner face of each clutch plate, new coil by an orange ground lead). When necessary to replace either of two old type clutch plates, replace **both** old plates with new type and new coil (*NOTE*—New coil should always be used with new plates).

Part	New Part N .
Coil	5912343
Plate & Counterweight	5912346
Plate & Armature	5912345

►*1955 CLUTCH PLATE ACTUATING BALL REPLACEMENT CAUTION:* When replacing actuating balls in 1955 Compressors, be sure to use **nylon** type, Part No. 5917481 (1954 type was steel).

►*1955 CLUTCH ACTUATING COIL RETAINER PRODUCTION CHANGE (To Correct Compressor Noise & Failure of Clutch to Disengage):* Effective with Compressor, Serial No. 44XB653, a more positive means of retaining coil has been incorporated in production. Kit,

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1954-55 FRIGIDAIRE & HARRISON (Continued)

Part No. 5876681, contains parts necessary for service replacement on all 1955 compressors. To install kit, remove compressor, then compressor pulley. Remove and discard coil retainer and outer insulating gasket. Disconnect leads and remove coil, then discard inner insulating gasket. Drill three holes (No. 24 drill) in seal housing 9/64" down from outer face of housing. One hole must be diametrically opposite coil lead part, others at 120° intervals along diameter of housing. Place new inner gasket (one with holes) in bottom of seal housing. Replace actuating coil, connect leads, then place new outer gasket and retainer ring over coil. With two 3" C-clamps and two ½" lengths of 5/16" round rod as dowels (placed on outer edge of retainer ring) force coil and retainer ring snugly into seal housing applying pressure evenly on both C-clamps. While coil is held by C-clamps, insert the three self-tapping screws in holes drilled previously and tighten until heads snug against housing. Remove clamps and rods. Blow chips from tapped holes with compressed air. *CAUTION*–No portion of screw heads should extend beyond face of seal housing.

►*1955 COMPRESSOR DUST CAP (ON END OF COMPRESSOR SHAFT) PRODUCTION CHANGE:* Effective with Compressor, Serial No. 31XB936, compressor dust cap has been replaced by a washer assembly, Part No. 5912455. Torque for tightening bolt holding washer assembly is 5-7 ft. lbs. (previously 10-15 ft. lbs.).

►*1955 COMPRESSOR FREON OR OIL LEAK CAUTION:* Leaks between compressor head and shell flange **can t** be corrected by tightening mounting bolts. Replace compressor.

►*1955 CLUTCH COIL INSULATOR INSTALLATION CAUTION:* Insulators, used on each side of clutch coil, should be located with glazed surface **away** from coil.

►*1955 CLUTCH SNAP RING INSTALLATION CAUTION:* Snap ring must be installed so radius on inner diameter of one side of ring faces compressor pulley to insure that it will not slip out of groove.

►*CAR UNDERCOATING CAUTION:* Make certain that undercoating does not plug evaporator drain.

►*1955 CADILLAC COMPRESSOR VIBRATION CORRECTION (Due to Incorrect Pulley Installation):* Splined end has one spline cut down to mate with corresponding spline in compressor pulley. Unless installed in this **one** position, it will throw compressor out of balance, resulting in vibration when compressor is operating.

►*1955 CADILLAC ROOF DUCT AIR NOZZLE BIND CORRECTION:* To correct, remove retaining spring and file off sharp edges.

►*1955 PONTIAC RECEIVER & DEHYDRATOR-FILTER PROD. CHANGE:* Combination unit (after first 800 cars in 1955) replaces two units used previously. Combination type has no shut-off valve. Freon capacity of system with combination type is 3¾ lbs. instead of 5¼ lbs. with early type unit with separate receiver.

►*1955 PONTIAC AUTOMATIC FAST IDLE CHANGE:* Automatic fast idle, which was actuated by placing selector lever in neutral, is not used in 1955.

►*1955 PONTIAC AIR RECIRCULATION PROD.CHANGE:* An air recirculation system has been included to increase cooling capacity or eliminate outside odors when necessary. Exclusive use of outside air or recirculation of air within car may be selected by movement of one push-pull control. When pulled out, air in the car and system is recirculated, with a small amount of outside air still being admitted to pressurize the inside of the car. Pressure prevents warm air from entering any openings in body. With control button pushed in, only outside air passes through system into car. Positions between full out and in will give mixed outside and recirculated air. Fan must be on full speed (switch fully down) when recirculation is used. Recirculation should only be used after car has started to cool.

►*1955 PONTIAC COMPRESSOR BELT MISALIGNMENT CORRECTION:* To correct, elongate the two front inner insulator bracket (Part No. 521086) bolt holes by ¼" back toward compressor mounting flange, then place a 1/16" thick flat washer at each of the two insulator bolts to space bracket out from rubber insulator. Bend outer end of front outer insulator bracket back and in towards compressor 1/8". Condition has in later production.

DESCRIPTION & OPERATION

Similar in design and operation to 1953 Frigidaire (G.M.) unit with changes over previous models as noted below:

1954 Cadillac: Temperature control lever, solenoid bypass valve, relay, shut-off valve at receiver, check valve, and by-pass line were eliminated. Blower switch rheostats were changed to provide slower blower speeds. Temperature control is maintained by varying blower speed. A magnetic clutch is used in conjunction with the compressor.

1955 Cadillac: Same changes as in 1954 except that temperature control lever and a new type temperature control thermostat and compressor are used.

1954 Buick, Oldsmobile, Packard: Shut-off valve at receiver and check valve were eliminated. Magnetic clutch is used in conjunction with compressor.

1955 Buick, Oldsmobile, Packard: New type temperature control thermostat and compressor used. On Oldsmobile, all elements of system are located on dash and in engine compartment.

1955 Chevrolet: Shut-off valve at receiver, solenoid valve, and check valve not used. Temperature control is maintained through a temperature control lever and magnetic switch. Magnetic clutch is used in conjunction with compressor. All elements of system are located on dash and in engine compartment.

1955 Pontiac (After First 800 Cars): Similar in design and operation to 1954 Air Conditioning unit. Shut-off valve at receiver and fast idle diaphragm and solenoid have been eliminated.

PRECAUTIONS, TROUBLE SHOOTING & LEAK TESTING

See "Air Conditioning Service Cautions", "Trouble Shooting" and "Leak Tests".

MAINTENANCE & INSPECTION

MAINTENANCE & INSPECTION: Preliminary Check– High and low pressure shut-off valves at compressor must be fully open. Drive belts must be properly installed to prevent slippage. Make certain clutch is engaging and disengaging. Using leak detector, test entire system for leaks. If there is evidence of oil leaks, check oil level. Check operation of blower fans at all control positions. Check operation of temperature control lever or knob, relay, and thermostat.

Seasonal Operation: Winter– Close outside air intake ducts. *NOTE*–It is advisable to operate compressor for a few minutes each month during winter season.

Summer– Leak test entire system. If leaks found, check oil level. Check belts for proper tension. See that clutch engages and disengages. Make certain clutch is not slipping by observing dust cover or washer assembly bolt at center of pulley. Bolt should be turning at same speed as pulley. Operate system, with control set at maximum cooling, for 10 minutes at fast idle. Check sight glass for absence of bubbles which would indicate system has sufficient Freon charge. Open outside air intake ducts. Check blower fans for variable speeds.

2000 Mile Inspection: Check unit for evidence of leaks. If there is evidence of oil leakage, check compressor for proper oil level. Tighten compressor mounting brackets, check belt tension. Check sight glass for absence of bubbles indicating proper Freon charge (after running engine at fast idle for 10 minutes with Air Conditioning "ON" and compressor clutch engaged).

Filters: Air filters should be cleaned regularly during season of operation. This should be every two months, or 2000 miles, or more frequently in those areas which are extremely dusty. To clean filter, use solvent or soapy solution made with household detergent. After filter has been cleaned, rinse and blow dry with compressed air, then spray a light coating of SAE 30 detergent free, non-odorous, engine oil or RP filter coat on entire filter surface.

ADJUSTMENTS

COMPRESSOR BELTS: Adjust as follows:

Buick: Adjust drive belts to ½" deflection midway between fan and compressor pulleys.

Cadillac: Loosen generator pivot bolts and adjust strap screw, pull generator out until belt is just tight enough to drive generator and compressor without slip.

Chevrolet V8: Loosen compressor brace bolt and bracket pivot bolt. Check to see that lower brace bolt and compressor bracket-to-engine mounting bolts are drawn up tight. Assemble belt tensioning tool J-6212 to torque wrench J-4435 or similar 0-50 ft. lb. torque wrench. Position tool on seal and coil housing with lug on tool facing toward rear of car and inserted into unused hole

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1954-55 FRIGIDAIRE & HARRISON (Continued)

in compressor mounting flange on battery side of electrical connector (*NOTE*–It may be necessary to shift connector in clip slightly to obtain clearance for proper engagement of tool). Apply 30-40 ft. lbs. torque to compressor, tighten brace and bracket pivot bolts.

Oldsmobile: Loosen generator bolts, place tool J-4170 against generator between bracket and generator housing. Attach torque wrench to tool and apply a torque of 20 ft. lbs. Tighten attaching bolts while holding tension on belt.

Packard: Using tool J-5577 and a torque wrench, tighten belts to 58 ft. lbs. Tighten compressor-to-mounting bracket bolts while maintaining this 58 ft. lbs. torque.

P ntiac: Loosen three bolts retaining idler pulley to mounting bracket (pump support bracket on power steering equipped cars). (*NOTE*–Heads of bolts are behind pulley). Insert torque wrench in square hole at end of bracket and apply 60 ft. lbs. torque to tighten belt. While holding 60 ft. lbs. torque, tighten retaining bolts securely.

CLUTCH LEVER ADJUSTMENT (1954): Turn cooling switch "ON" to energize clutch solenoid. Loosen clutch lever adjusting nut jam nut, and adjust to obtain .015-.020" (.015-.025" on Buick) clearance between clutch lever and pin. Tighten jam nut. Start engine and check to be sure clutch drives compressor when solenoid is energized (switch on), and that clutch is fully released (pulley free-wheeling) when clutch is de-energized.

MAGNETIC CLUTCH (1955): Energize clutch coil from battery, check clearance between clutch plate armature (not rear pulley cover ring) and coil housing at three different positions. The clearance should be .025-.035". If clearance not correct, it will be necessary to remove pulley and add or remove shims accordingly. Shims are available in following sizes: .015", .020", .025". By proper selection of shims, .005" variance in clearance can be obtained.

VALVE ADJUSTMENTS: Proceed as follows:

Expansi n Valv (Except Chevrolet & Pontiac): Remove cap nut from expansion valve making certain that expansion valve is supported by a second wrench to prevent damage to line and fittings. Use tool J-5426 (3/16" Valve Key), first close valve completely, then open counter-clockwise approximately 5 complete turns (4½-4¾ turns on Oldsmobile). If this does not eliminate ineffective cooling condition, replace expansion valve, assuming that remainder of system is in good operating condition.

Expansi n Valve (Ch vrolet & Pontiac): If refrigerant flooding through valve in abnormal quantity (heavy sweating or frosting may occur), close valve adjusting stem ½ turn clockwise. If insufficient refrigerant being supplied to cooling coils, open valve ½ turn counter clockwise. If necessary, repeat above operation by turning valve in ½ turn increments at a time (should not exceed one full turn).

Automatic By-Pass Valve (1955 Oldsm bil & P ntiac): Turn screw clockwise to increase pressure, counter-clockwise to decrease pressure (*NOTE*–By-pass valve should not open until low pressure or suction reading is below 15 PSI. and ambient (surrounding air) temperature is below approximately 85°F.).

THERMOSTATIC SWITCH (Chevrolet): If icing or frosting conditions exist in evaporator (results in poor or no cooling) thermostatic switch is probably set too cold. To adjust, remove fiber cover from end of switch assembly and turn adjusting screw one turn clockwise (raises temperature 3°F). Test operation of unit and check for icing, repeating adjustment as required. Reinstall fiber cover.

CONTROLS: Adjust as follows:

Chevrolet: Fast Idle–Adjust hand throttle wire guide stop to limit engine speed to 900 RPM with control pulled out and transmission in neutral. Check to see that fast idle control linkage does not interfere with normal operation of carburetor linkage when fast idle is not in operation.

Outside-Inside Air–Adjust cable so that door is open with control set at "Outside Air" or closed with control set at "Inside Air".

By-Pass (Air Duct): Adjust controls for maximum nozzle flow by pulling by-pass control to full out position and securing cable to door control rod with rod positioned at end of travel nearest driver's side of car.

Thermostatic Switch: If icing or frosting condition exists in evaporator (results in poor or no cooling) thermostatic switch is probably set too cold. To adjust, remove fiber cover from end of switch assembly and turn adjusting screw one turn clockwise (raises temperature 3°F). Test operation of unit and check for icing, repeating adjustment as required. Reinstall fiber cover.

Pontiac: Air Valve Control Cable - First move air conditioning control lever to "OFF" position. Loosen air valve control cable at hood hinge attaching screw. Clamp must be loose enough to allow cable housing to slide freely. Hold cable and housing so that cable cannot move inside housing and slide cable assembly through clamp toward center of car until valve is tightly closed. While holding cable in this position, tighten clamp.

Air Temperature Valve Control Cable–Move air conditioning control lever all the way to "COLD" position. Loosen air temperature valve control cable clamp on side of evaporator housing. Hold cable and housing assembly so cable cannot move inside housing and slide cable assembly toward rear of car to close valve against sealing lip. While holding in this position, tighten cable clamp. *NOTE*–Excessive tightening can force valve past its sealing lip.

Air Recirculation Valve Control Cable: Push recirculation knob all the way in to close recirculation valve, then pull out 1/8". Remove right kick pad to gain access to cable clamp. Loosen cable clamp. Hold cable and housing so that cable cannot move inside housing and move cable assembly down through clamp to tightly close valve (Recirculation is closed off when valve is vertical). While holding cable assembly in this position, tighten cable clamp.

CHECKING

BUBBLES IN SIGHT GLASS: Appearance of bubbles in sight glass when engine idling or by-passing (if equipped with by-pass valve) is not unusual and does not indicate a shortage of refrigerant. Operate engine at fast idle for at least five minutes with air conditioning "ON", blowers operating. If bubbles still appear, check lines for kinks and leaks. If no leaks found, **do not** add refrigerant. Check expansion valve power element for full contact with low pressure line. Be sure bulb does not contact liquid line or cover. Add insulating material when required. Adjust expansion valve. If bubbles remain after adjustment of expansion valve, it is an indication that there is a restriction or a mis-positioned pick-up tube in receiver. Replace receiver- dehydrator.

OPERATION OF COMPRESSOR DISCHARGE VALVE REEDS: Connect gauge set to compressor (see Installation of Gauge Set to "Check Operation of System" below). Connect jumper wire from positive battery post to magnetic clutch coil. Operate engine and compressor at slow idle for five minutes. Slowly close low side valve on compressor until low side gauge reads between 5-10 lbs. pressure. Stop engine and immediately close low side valve on compressor. Allow system to remain idle for approximately five minutes. At the end of this time, low side gauge should not show any rapid rise of pressure, nor should the low pressure gauge have equalized to the high side pressure. If this has occurred, it is evident that the discharge valve reeds are leaking and the compressor should be replaced. If the low side pressure did not show a rapid rise, the compressor can be considered satisfactory as the discharge reeds were holding properly. Open low side valve on compressor, remove gauge set from compressor.

GAUGE SET INSTALLATION

TO CHECK OPERATION OF SYSTEM: With gauge set valves closed, connect gauge line to high pressure Schrader type gauge fitting at compressor. (*NOTE*–Make certain center connection of gauge set is plugged). Open both valves on gauge set ¼ turn counter-clockwise, purging Freon and air from lines and, at same time, install low pressure gauge line to gauge fitting at compressor. Close gauge valves. Leak test all gauge connections. If no leaks are found proceed as follows: Position temperature control to extreme "Cold" position to energize clutch. Turn Air Conditioner switch "ON" and operate blowers at full speed. A check of the system pressures can now be made. After completing check, remove gauge lines and replace caps.

TO PURGE THE SYSTEM: Remove caps from high and low pressure gauge connection fittings at compressor. Connect gauge lines. Make certain gauge valves are closed tightly. Connect gauge line to center connection of gauge set, removing plug from end of line.

TO EVACUATE & CHARGE THE SYSTEM: Remove caps from high and low pressure gauge fittings at compressor. Connect gauge lines to fittings. Make certain gauge set valves and shut-off valve at vacuum pump are closed tightly. Remove valve caps from compressor hand shut-off valves and make certain valves are fully open.

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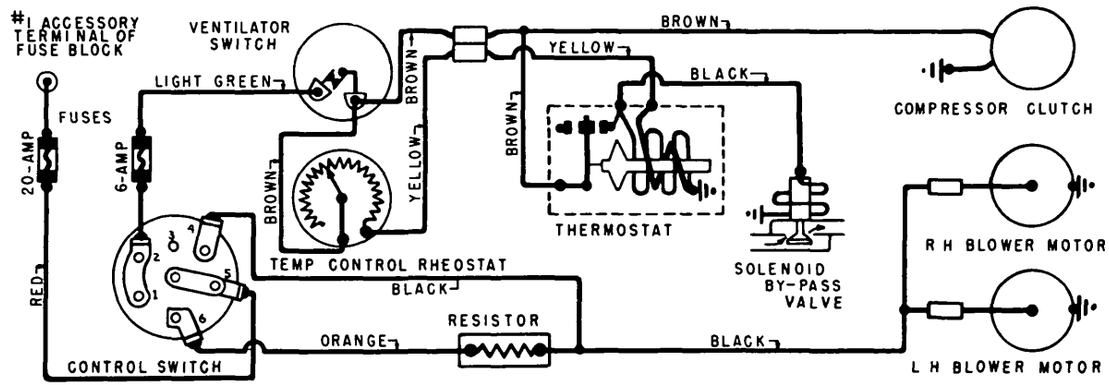
1954-55 FRIGIDAIRE & HARRISON (Continued)

PURGING THE SYSTEM

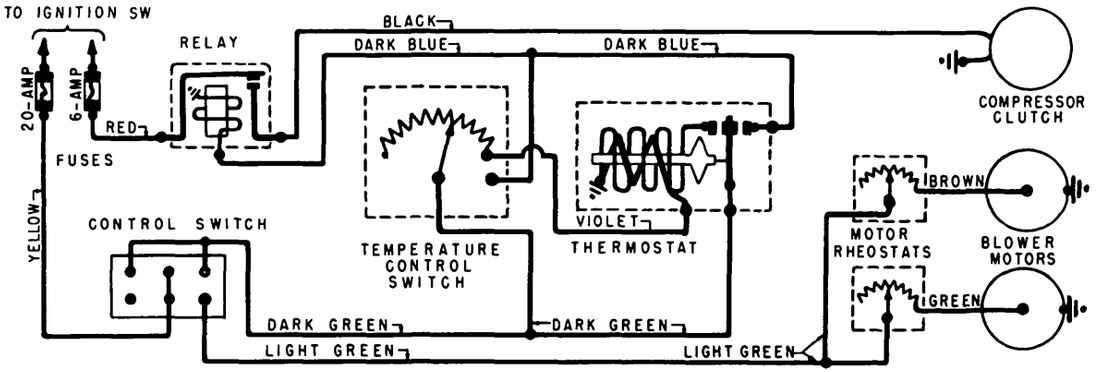
In replacing any of the air conditioning components (except compressor) the system must be completely drained of refrigerant. The purpose is to lower the pressure inside the system so that a component part can be removed safely. To purge system, connect gauge set to compressor (See "To Purge the System" above). Purge refrigerant from system through center connection of gauge set by first opening high pressure valve on gauge set. (*NOTE*–Do not open valve wide until pressure in system has been lowered, as refrigerant under pressure will force oil out of compressor). Close valve on gauge set from time to time for the purpose of allowing 1-2 lbs. of refrigerant pressure to remain in system, then close both valves on gauge set. (*NOTE*–Allowing 1-2 lbs. of refrigerant pressure to remain in the system will prevent air and dirt from entering system when a part is replaced). Leave gauge set connected in preparation for evacuating and recharging.

EVACUATING THE SYSTEM USING VACUUM PUMP

Whenever system is opened for any reason, it should not be put into operation again until it has been evacuated. For this operation use Vacuum Pump. Tool J-5428, to remove air and moisture which may have entered the system when it was opened to replace a part. Make sure dust cap on discharge side of vacuum pump has been removed. Check fluid level. This should be between the high and low screws in the side of the pump. Add Frigidaire viscosity 75 oil to bring to proper level (*NOTE*–Change oil in pump every 250 hours of operation by removing top and laying pump on side with discharge oil trap up. Hold rotor firmly in position to prevent its coming out while draining oil. A small amount of oil may be drawn into pump occasionally to insure protection of internal parts during periods of disuse). If pump should fail to start; check capacitor, relay, or remove the top and turn rotor by hand to relieve a temporary stuck condition. (*CAUTION*–Do not use vacuum pump as an air compressor as it will not receive proper lubrication under such usage. Keep suction and discharge fittings capped when not in use). Connect gauge lines (See "To Evacuate & Charge The System" above) if not installed previously. Open high and low pressure valves on gauge set. Connect and start vacuum pump. Slowly open the shut-off valve at the vacuum pump to avoid forcing oil out of pump. This will permit drawing of a vacuum on both the high and low pressure sides of system at same time. Operate to obtain approximately 28" of vacuum for ten minutes. If sufficient vacuum cannot be obtained, vacuum pump or gauge may be faulty. Close shutoff valve at pump and then stop pump. Check gauge to see if vacuum holds for at least three minutes. If not, open Freon drum valve and allow system to reach drum pressure. Close drum valve. Leak test complete system, including gauge fittings, with leak detector, Tool J-5419; if leak cannot be found, the vacuum pump or gauge may be faulty. (*NOTE*–If oil is blown out of vacuum pump, it should be filled to proper level with Frigidaire 75 oil). Correct all leaks, then operate pump to obtain vacuum of 28". Watch gauge and see if vacuum will hold for ten minutes. With all leaks eliminated, open Freon drum and bring system to drum pressure. Close drum valve. Evacuate the system again as previously described for purpose of picking up any air or moisture that may have remained in the system. Close gauge valves. System is now ready for a complete charge of refrigerant.



BUICK AIR CONDITIONING CONTROL DIAGRAM



CADILLAC AIR CONDITIONING CONTROL DIAGRAM

ADDING REFRIGERANT

Refrigerant should always be added to low pressure side of the compressor in a vaporous state and the amount added, under any condition, should not exceed that prescribed. Do not add a complete charge of refrigerant until system has been leak tested and properly evacuated. In order to charge refrigerant in a vaporous state, Freon-12 drum should be heated by placing drum in a container of hot water. The temperature of the hot water should not exceed 125°F. Since temperature of water and drum will decrease as the vapor leaves the drum, drum pressure may be reduced to a point where it will be necessary to replenish or reheat the water. Both Freon drum and container of hot water should be placed on suitable scales, with drum in upright position. Note scale reading before opening valve on drum so that it can be determined when a complete charge of refrigerant has been added to the system.

►*CAUTION: Always wear goggl s wh n ver handling Freon-12, and when breaking lin conn ctions. Th high pressure should not xc d 275 lbs. Drum pr s- sure should not exceed 90 lbs.*

ADDING COMPLETE CHARGE: Evacuate complete system (see above). With gauge set connected as when evacuating system, open low pressure valve on gauge set. Open drum valve to obtain maximum pressure of 90 lbs. Freon vapor under pressure will flow into system without operating compressor. This amount should not exceed 2½ lbs. (Chevrolet), 3¾ lbs. (Oldsmobile & Pontiac), 5 lbs. (Others). (*NOTE*–If it is not possible to charge system with the total by the mothod just described, it is permissible after about 1 lb. has been forced into the system, to operate the engine and compressor at slow idle. Hand shut-off valve on

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1954-55 FRIGIDAIRE & HARRISON (Continued)

high pressure side of gauge set should be **closed.** Continue to operate engine and compressor at slow idle until total has been charged into the system). Close drum valve and low pressure shut-off valve on gauge set. Operate engine at 1500 RPM with compressor clutch engaged to observe high and low pressure gauges as well as sight glass and general performance of system. Stop engine and remove gauge set.

►*NOTE:* Jumper wire between battery positive terminal and clutch coil will insure continuous operation of compressor during period engine and system are operating at maximum output (system stabilizing).

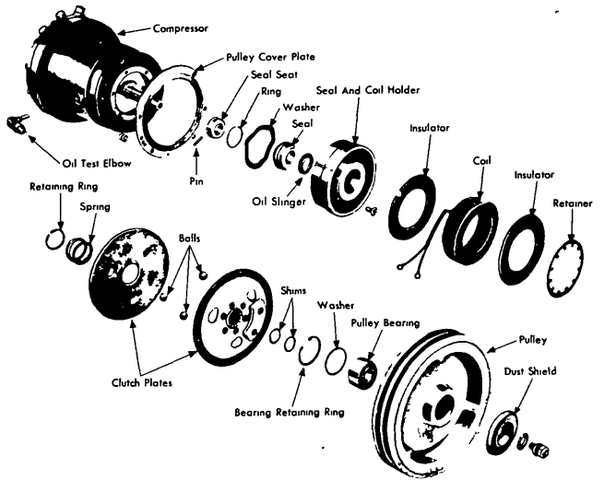
ADDING PARTIAL CHARGE OF REFRIGERANT: Remove caps from compressor suction and discharge valve gauge fittings and valve stems. Attach gauge set J-5725 to gauge fittings. Attach flexible hose from center fitting of gauge set loosely to Freon drum. Crack compressor suction and discharge valve stems slightly to purge gauge lines of air. Tighten fittings on Freon drum when all air has been removed from gauge lines. Close both hand shut-off valves of gauge set. Start engine, set controls to "COLD" and turn blower on high speed. Operate engine for 10 minutes at 1200 RPM to stabilize system. Open compressor suction valve gauge fitting by turning valve stem 1½ turns clockwise. Turn compressor discharge valve ¼ turn clockwise so high pressure gauge can be observed. Place Freon drum on scales, note weight, and open low pressure valve only on gauge set. With compressor operating, allow Freon to flow into system until liquid indicator clears and **immediately** shut off valve on Freon drum. Check weight of Freon drum and pail of water. Then open valve on Freon drum and add Freon-12 as follows: (Chevrolet) ½ lb., (Oldsmobile & Pontiac) ½ lb. if room temperature is below 85°F., or 1 lb. if room temperature is above 85°F., (Others) 1 lb. Note total amount of freon added. Close drum valve. Close low pressure valve on gauge set. Operate engine at fast idle, compressor clutch engaged (controls set for maximum cold or jumper wire attached to clutch coil from battery). Observe gauges, sight glass, and entire system for performance. After 5 minutes, should bubbles reappear at sight glass (system not by-passing), add same amount of Freon added above. If bubbles still appear, check operation of system. Adequate cooling may be obtained even when a few bubbles are evident. Remove gauge set, install gauge fitting caps. Remove jumper wire from clutch coil if installed above. *CAUTION*–Do not charge more than 2½ lbs. (Chevrolet), 3¾ lbs. (Oldsmobile & Pontiac), 5 lbs. (Others) into system at any time.

CHECKING & ADDING OIL

CHECKING & ADDING OIL (1954): *See "1953 Frigidair "*

CHECKING OIL LEVEL (1955): Operate the air conditioning system for 10 minutes at fast idle, then turn off engine. Remove nut and "dead head" assembly from oil test elbow on bottom of compressor. Depress Schrader valve core in oil test elbow for several seconds and allow Freon and oil to escape. Oil will invariably appear the first time valve is depressed, regardless of oil level. Again depress Schrader valve core. If oil continues to be ejected with Freon second time valve is depressed, oil level in compressor is satisfactory. (*NOTE*–A positive check for oil in vapor can be made by allowing vapor to come in contact with a clean white rag). If no oil escapes second time valve is depressed, oil level is low and oil will have to be added.

►*NOTE:* Compressors with Serial Nos. between 12XB756 and 14XB771 do not have a standpipe to permit oil level checking as above. In order to check oil level on these compressors, it will be necessary to remove compressor and follow procedure outlined for "Adding Oil–Major or Minor Loss (Without Gauge Set)" below.



FRIGIDAIRE COMPRESSOR ASSEMBLY

ADDING OIL (1955)-Major or Minor Loss (Without Gauge Set): Remove compressor (see below). Purge pressure from compressor by depressing Schrader valve at gauge fittings on compressor until low audible hiss is heard. Remove oil test elbow from compressor. Invert compressor and drain oil into clean container. (*NOTE*–Examine condition of oil to determine whether or not it is contaminated with any foreign material. If so, this oil should be discarded and new oil used. If excessive amount of water found, install a new liquid dehydrator-receiver assembly in high pressure liquid line). Pour nine ozs. of 525 viscosity Frigidaire oil into compressor at oil fitting opening (*NOTE*–Do not add oil at relief valve opening). Install oil test elbow. Install compressor, using new "O" ring seals at hand shut-off valves.

ADDING OIL (1955)–Minor Loss (Using Gauge Set J-5725):

►*EARLY 1955 PONTIAC ACCESS HOLE NOTE:* If compressor mounting bracket does not have access hole for oil test elbow, it will be necessary to cut a hole. Drill a 7/8" hole 3/16" in from engine side of bracket with centerline of hole in same plane as perpendicular line through center of oil test elbow. Drill another 7/8" hole 1/16" from the first (in same plane and on fender side of first hole). Cut web from between holes to form a slot-shaped hole.

1) Connect high pressure line from gauge set to high pressure fitting on compressor. Cap center connection on gauge manifold with gauge fitting cap from compressor discharge valve. Attach adapter J-5420 to low pressure line and start adapter on oil test elbow (*NOTE*–Do not screw on far enough to depress valve stem).

2) Crack open high pressure valve on gauge manifold and discharge valve on compressor. Slowly open low pressure valve on gauge manifold (This will purge air from low side line). While Freon is escaping from low side line, tighten gauge adapter J-5420 on compressor oil test elbow.

3) Close high and low pressure valves on gauge manifold. Close low pressure valve on compressor (turn until seated).

4) Attach ¼" oil charging tube to center connection on gauge manifold (*NOTE*–Oil charging line can be made from piece of clean, dry ¼" tubing by flaring one end and installing a flare nut (flared end of piece of brake line can be used together with a flare nut). Pipe should be long enough to reach bottom of oil bottle). Secure a **graduated** bottle of Frigidaire 525 viscosity oil. Leave capped until needed.

5) Crack open high pressure valve at gauge manifold to purge air from oil charging line. While vapor is still slowly escaping from oil charging line, insert tube to bottom of oil bottle and allow vapor to bubble slowly through oil. Close high pressure valve at gauge manifold. Leak test all connections that have been made. Position gauge manifold and oil charging line, while still inserted in bottom of bottle, so that they will not be disturbed during following procedure.

6) Operate engine at slow idle, observe low side gauge until approximately 10" vacuum is obtained. Stop engine and observe gauge to see if vacuum will still hold. There should not be any fast rise of pressure.

7) Open low pressure valve on gauge set about 1½ turns. Vacuum in compressor should now draw oil from bottle. Allow level of oil in bottle to reduce so that 2 ozs. are drawn into compressor. Close low pressure valve on gauge manifold, remove oil charging line from center connection on gauge manifold and replace cap (Loosen oil charging line while still in bottle so that oil from line will drain back into bottle).

8) Open high pressure shut-off valve on gauge manifold. Open low pressure shut-off valve slowly to allow high side pressure to force oil remaining in gauge manifold and low pressure gauge line into compressor. Also allow pressure to break the vacuum and pressurize compressor to approximately 5 lbs. Close both high and low pressure valves on gauge manifold. Remove gauge adapter connection from oil test elbow.

9) Recheck oil level. Continue to add oil in 2 oz. quantities until a satisfactory level is obtained. Open high and low pressure valves (fully counter-clockwise), remove high pressure gauge line, replace high pressure

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1954-55 FRIGIDAIRE & HARRISON (Continued)

gauge fitting cap, valve stem cap, and oil test elbow nut and "dead head".

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

►*NOTE:* If it is necessary to remove parts other than the compressor (involving the breaking of refrigerant lines), it will be necessary to purge, evacuate, and completely recharge the system (see above).

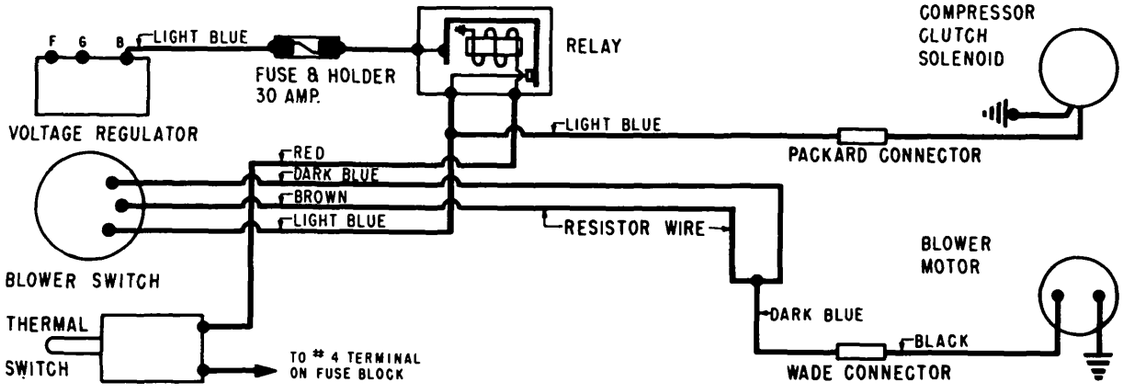
1954 BUICK, CADILLAC, OLDSMOBILE, PACKARD

COMPRESSOR REMOVAL & INSTALLATION: Same as "1955 Buick, Cadillac, Packard" below except high and low pressure valve fittings are held to compressor by two screws. Each pair of screws should be loosened about 7 turns and the valve fitting backed firmly against the head of the screws to permit automatic shut-off valve in compressor to close quickly.

1955 BUICK, CADILLAC, PACKARD

COMPRESSOR REMOVAL: Remove shut-off valve caps from ends of both pressure lines. Using Tool J-5427, close both hand shut-off valves at compressor. *(CAUTION–Do not operate compressor with shut-off valves closed. REMOVE IGNITION KEY).* Remove high and low pressure valve fitting center bolt, remove fitting from compressor. *(NOTE–*A momentary release of vapor can be expected as fitting leaves bore. If vapor continues to escape, the spring-loaded automatic valve in compressor is not seating properly. If this is the case, purge Freon vapor pressure by depressing Schrader core in the high pressure gauge connection until a low audible hiss is heard. Any air in compressor must be forced out when unit is reinstalled). Cover pressure openings in both compressor and compressor line fitting with masking tape to keep out dirt. Disconnect clutch coil wires and drive belts. Remove compressor from mounting bracket.

COMPRESSOR INSTALLATION: Check clutch adjustment (see ADJUSTMENTS above). Install compressor on bracket. Place belt on pulley and adjust tension (see ADJUSTMENTS above). Connect clutch coil wires. Install new "O" rings and flange gaskets on high and low pressure line valve fittings. Apply a slight amount of Frigidaire oil to *"O" ring* before installing fitting into bore. Insert pressure line fitting into bore in compressor and tighten securely. Use care to see that "O" ring seals are not damaged. Using ¼" key, Tool J-5247, open both high and low pressure line valves all the way (counter-clockwise). *(NOTE–*These valves open against a seal type seat, and must be turned open all the way against stops to prevent leaks). Depress Schrader valves to purge air from low and high sides of compressor. Test for leaks at all connections on compressor (Tool J-5419 or J-6084). If leaks are indicated, connection must be removed and "O" rings and gaskets replaced. *(CAUTION–*It is very important that all leaks be repaired. Under no conditions should compressor be run when a leak exists, as a complete loss of refrigerant would damage compressor). Connect gauge set and check clutch operation and general performance of system. Remove gauge set and install caps on fittings.



PONTIAC AIR CONDITIONING CONTROL DIAGRAM

1955 CHEVROLET, OLDSMOBILE, PONTIAC

COMPRESSOR REMOVAL (OLDSMOBILE & PONTIAC):

Intake Manifold Not Removed: Remove power steering pump and bracket assembly with lines attached and lay it aside. Remove compressor from its mounting bracket, with lines attached, and lay it aside. Remove generator from mounting bracket and lower it onto upper control arm. Mounting bracket can then be removed from engine.

COMPRESSOR REMOVAL (CHEVROLET, OLDSMOBILE & PONTIAC):

Intake Manifold to be Removed: Operate air conditioning system for 10 minutes at 1200 RPM to stabilize system. Return engine to normal idle speed, then close compressor suction valve (all the way in) with compressor operating. **Immediately** disconnect clutch wire to stop compressor. Connect and disconnect clutch wire at 5 second intervals four times to pump all Freon out of compressor. *(CAUTION–*Be careful wire does not touch metal while disconnected since it is still energized). Close compressor discharge valve (turn all the way in) and shut off engine. Remove compressor belt. Very slowly loosen screw retaining valve body to compressor. As screw is loosened, work valve body back and forth to break seal and bleed off pressure. *(CAUTION–*High pressure will still exist at discharge valve. If pressure released too rapidly there will be a considerable discharge of Freon and oil). When all pressure has been relieved, remove screw and remove valve body and "O" ring seals. Immediately cover compressor openings. Remove compressor from mounting bracket.

COMPRESSOR INSTALLATION (Valve Body with Lines Not Removed): Reverse removal procedures given for "Removal (To Work on Engine–Intake Manifold Not Removed)" above.

COMPRESSOR INSTALLATION (Valve Body with Lines Removed): Attach compressor to mounting bracket. *(NOTE–*Rear insulator and insulator-to-compressor bracket, and front outer insulator should be in place on mounting bracket. Front inner insulator and front outer insulator bracket should be attached to compressor). Attach ground strap under front outer insulator bracket-to-insulator attaching screw. Remove cover over compressor openings very slowly to bleed off pressure *(CAUTION–*New compressors are charged with a mixture of nitrogen and Freon and 9 ozs. of Frigidaire 525 viscosity oil. If cover removed too rapidly, oil will be blown out violently). Attach valve body to compressor using new "O" ring seals and new 3/8" plain lockwasher on screw (tighten attaching screw to 10-12 ft. lbs.). *(NOTE–*3/8" lockwasher was not used in early production, but should always be used when valve body is re-attached). Install and adjust compressor belt (see ADJUSTMENTS above). Connect compressor clutch wire. Evacuate compressor as follows:

Compressor Evacuation (Using Gauge Set J-5725): With compressor still sealed from system (suction and discharge valve stems turned all the way in) proceed as follows: Remove high pressure relief valve and connect tube and rubber hose in place of relief valve so that oil that pumps out of compressor during evacuation can be collected. Place clean, dry container under end of hose to collect oil *(NOTE–*Tube to be inserted into compressor can be made from a 3/8"-24 bolt by cutting head off and drilling a hole through it). Connect low pressure line of gauge set to gauge fitting on suction valve, Run compressor until gauge shows 28" vacuum, then continue to run for 5 minutes. At end of 5 minutes, with compressor still operating, replace and tighten relief valve. Purge air from compressor head by backing compressor suction valve out (counter-clockwise) and loosening pressure relief valve for approximately 15 seconds. Completely back-seat both compressor suction and discharge valves (back valve stems out). Make Operational Test (see below), add oil and Freon as required.

Compressor Evacuation (Gauge Set Not Available): Turn suction valve stem completely counter-clockwise to open suction hose to compressor and replace cap. Loosen pressure relief valve for approximately 30 seconds to purge air from compressor, then tighten

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1954-55 FRIGIDAIRE & HARRISON (Continued)

relief valve. (*CAUTION*–If air is not bled out of compressor, performance of system will be affected and excessive head pressure may result). Turn compressor discharge valve completely counter-clockwise and replace cap. Install compressor belt and adjust (see ADJUSTMENTS above). Connect compressor clutch wire. Clip clutch and blower wires to compressor bracket.

PARTS REPLACEMENT

DAMAGED COMPRESSOR (1954): Remove compressor (see REMOVAL & INSTALLATION above), remove pulley-clutch assembly and reinstall on replacement compressor.

Pulley-Clutch Removal & Installation: (*CAUTION*–Use only a clean, dry cloth to wipe off clutch parts. Do not use any type of solvent. Do not clean pulley bearing with any type of solvent as it will wash grease out of bearing (factory lubricated and requires no further lubrication). Prevent fingers, dirt, grease, oil, or any foreign matter from coming in contact with ball bearings, frictional or mating surfaces of clutch plates. Do not attempt to dress off frictional lining material on clutch plates). Disconnect and remove clutch actuating arm at compressor and solenoid. Remove clutch cover plate screws, then plate. Pull out two clutch plates, being careful not to lose the three actuating steel balls. Using Truarc pliers No. J-4880, remove snap ring retaining pulley housing on shaft. Remove pulley from compressor shaft. If pulley housing requires replacement, remove Truarc snap ring, using Tool J-4245. Remove bearing from pulley housing. To install, clean all clutch parts. Using a socket or short length pipe, carefully press new bearing into pulley hub and install snap ring with beveled side out. Install pulley and bearing assembly in position on shaft. Install pulley housing snap ring on compressor shaft with concave side of ring out. With compressor upright, install counterweight clutch plate on splined shaft, frictional lining toward compressor. To do this, position the one blind spline of shaft with open spline of inner clutch plate hub. Place three steel balls in tear drop depressions of counterweight plate. Insert teaser spring in bore of compressor shaft. With frictional lining outward, place actuator plate on top of steel balls, making certain balls are located in tear drop depression of both plates. Plates and steel balls can be installed as an assembly if compressor is not removed. Install clutch cover plate, being sure that the two small holes in cover plate line up with the two locating dowel pins in pulley. Install cover plate-to-pulley lockwashers and screws and tighten to 12-14 ft. lbs. (*NOTE*–Make sure all lockwashers are in place to assure proper balance). Install clutch actuating arm bracket to compressor. Install compressor on car. Adjust clutch (see ADJUSTMENTS).

COMPRESSOR SEAL REPLACEMENT (1954): Remove compressor (see REMOVAL & INSTALLATION). Relieve pressure in compressor through two gauge connections to 2 to 5 lbs. or until a low audible hiss is evident. Remove clutch and pulley assembly from compressor (see above). Remove seal retaining plate and bellows seal. Remove nitralloy ring from shaft using Tool J-5425. Check shaft to see that it is polished and free of paint, corrosion, nicks, burrs, tooling marks, and the like. Flush seal cavity with Frigidaire oil. Wet a cleaning tissue with a good grade of lighter fluid and allow tissue to dry. Then remove any trace of oil or lint. Shaft and shoulder, also, must be clean and dry. Insert nitralloy ring in Seal Centering Tool J-5425 so that synthetic rubber is visible. (*CAUTION*–Do not handle surfaces of nitralloy ring with fingers). Using cleaning tissue wetted with lighter fluid, wipe entire rubber surface, including inner diameter and radius of seal, until all protective oil coating is removed and the rubber is completely clean and dry. Install nitralloy ring on shaft, making certain that neoprene rests evenly and firmly against shaft shoulder (*NOTE*–This can be done by reversing tool so that small tubular end is pressed firmly by hand against inner ring of synthetic rubber). Apply clean Frigidaire oil to nitralloy ring, seat bronze seal that contacts nitralloy ring, and first three turns of bellows seals. Using Seal Centering Tool J-5425, install new bellows seal and gasket. Install retainer plate and screws, tightening screws alternately to insure even pressure against seat. Do not remove centering tool until all screws are tightened. If a major loss of oil has occurred, add oil (see CHECKING & ADDING OIL above). Reinstall compressor, after assembling and installing clutch on compressor. Purge air from compressor by depressing valve stem in high pressure gauge connection for a few seconds. Start engine and, after several minutes, repeat purging operation.

DAMAGED COMPRESSOR (1955): (*NOTE*–If damaged compressor is replaced, replacement compressor name plate must be stamped with numeral 1/8" high indicating Freon capacity of system and is required by law in some states). Remove shut-off valve caps from ends of both pressure lines. Using Tool J-5427, close both hand shut-off valves at the compressor (*CAUTION*–Do not operate compressor with shut-off valves closed. REMOVE IGNITION KEY). Remove high and low pressure valve fitting center bolt and remove fitting from compressor. (*NOTE*–A momentary release of vapor should be expected as the fitting leaves its bore in the compressor. If vapor continues to escape, the spring loaded automatic valve in the compressor is not seating properly. If this is the case, purge Freon vapor pressure by depressing Schrader core in high pressure gauge connection until a low audible hiss is heard (1 or 2 lbs. pressure). Any air in the compressor must be forced out when the unit is reinstalled). Cover pressure openings in both compressor and compressor line fitting with masking tape to keep out dirt. Disconnect clutch coil wires and drive belts. Remove compressor from mounting brackets. (*NOTE*–Gauge Set J-5725 may be used for this operation. If used, purge vapor from compressor until 1 or 2 lbs. remain, allow to stand for about five minutes, observing gauges for any pressure build-up. If build-up occurs, repeat purging operation until there is no longer a build-up). Remove clutch and pulley assembly and clutch coil, reinstall on new compressor.

▷*CAUTION:* If there is any possibility that broken parts from the compressor got into the discharge line, condenser should be cleaned and a new dehydrator, filter and receiver assembly should be installed. If condenser cleaned or a new dehydrator, filter and receiver assembly was installed it will be necessary to purge, evacuate, and completely recharge system.

Pulley-Clutch Assembly Removal & Installation: Remove compressor and follow steps outlined under "Compressor Seal Replacement" below.

Clutch Parts or Coil Replacement: Remove compressor and follow steps outlined under "Compressor Seal Replacement" below.

Compressor Seal Replacement: Remove compressor, then proceed as follows:

1) Remove pulley screw, lockwasher and dust cover from end of shaft. Remove pulley from shaft, using a puller such as harmonic balancer puller, J-2582-A (Install retaining screw in shaft so that end of large puller screw will bear against head of pulley retaining screw. *CAUTION*–Make certain the puller does not damage the internal threads of the shaft or the inner race of the bearing).

▷*NOTE:* Three types of dust covers have been used at the front of the pulley. First type is a metal cap retained by pulley retaining screw. Second type is a rubber cap held in place by a retaining ring. Third type is a felt and steel washer which seats in the counterbore of the pulley and is held in place by the pulley retaining screw and washer.

2) Remove clutch actuating coil retainer.

▷*NOTE:* Two types of coil retainers used. On early compressors (prior to 44XB653), remove clutch coil retainer by bending retainer teeth forward with a small screwdriver. The retainer should be discarded and replaced by same type retainer used on later compressors. On later compressors, back out alternately the three retaining screws until threaded end of screws are flush with inside face of coil housing. Remove coil retainer ring.

3) Remove and discard outer gasket from front of coil. Disconnect coil leads and remove coil from cavity. Remove and discard inner gasket from coil cavity.

▷*NOTE:* On early compressors, prior to compressor 44XB653, drill three holes in seal and coil housing. First hole should be diametrically opposite the coil lead port; the two remaining holes should be located one on either side approximately 120° from the first. Holes should be accurately located 9/64" from front face of housing. Use a No. 24 drill.

4) Remove the 6 Phillips head screws that were behind inner gasket and pull seal and coil holder from the compressor (loosen screws by tapping with punch). Press defective seal assembly from holder cavity. Thoroughly clean seal cavity and replace internal "O" ring with a new one coated with clean Frigidaire oil. Press new seal assembly into cavity using Seal Installer J-5922. Replace large external "O" ring seal with a new one coated with clean Frigidaire oil.

5) Force retainer from groove to the rear area of rotating seal seat ring, using small screwdriver. Exercise care not to mar oil pump cover. Remove drive pin from seal seat groove using needle nose pliers. Pull seal seat from shaft and wipe shaft clean with tissue furnished in seal package.

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1954-55 FRIGIDAIRE & HARRISON (Con.inued)

6) Check shaft spline for burrs or sharp edges. Remove burrs or sharp edges using India Stone No. FT-134 and then clean shaft to remove all stoning or metal dust.

7) Install new "0" ring seal inside the new seal seat and place the seat face down on a piece of oil soaked wiping tissue so as to protect polished face. Force retainer down over seal seat to forward area (Use 1¼" socket to push ring on). Install new seal seat after coating the internal "0" ring gasket with clean Frigidaire oil. *(CAUTION–*Use extreme care not to damage "0" ring when starting seal seat over splined end of shaft. Also keep fingers off seal surface). Align hole in seal seat with one in shaft and insert drive pin. Force retainer into groove.

8) Examine oil pump cover plate to make certain small dowel pin is in proper place, and flush with outer cover. Make certain wave washer is in place.

9) Install housing for seal and coil holder, using care not to damage large "0" ring. Replace 6 Phillips head retaining screws. *(NOTE–*If heads of screws become burred or damaged in removal, install new screws to prevent damage to coil). Install oil slinger with flange outward leaving approximately .010" clearance between seal and slinger. Use Tool J-6086-A to positively position slinger .010" from seal.

10) Place a new inner gasket (neoprene cork with holes) in bottom of seal and coil housing. Install actuating coil and connect leads. Place new outer gasket (fish paper without holes) over coil.

11) Discard clutch coil retainer if removed from early type compressor and procure later type retainer used on compressors after No. 44XB653. Position this retainer over outer gasket. Use two ½" lengths of 5/16" round rod and two 3" "C" clamps to force coil and retainer ring snugly into coil housing. Apply pressure evenly on both "C" clamps. *(CAUTION–*No portion of coil housing-to-compressor screw heads should extend beyond inner face of coil housing). While coil and retainer are being held in place by the "C" clamps and 5/16" round rods (used as dowels), insert the three No. 8 self-tapping screws removed from later production compressors (or furnished in service package) into holes in housing. Tighten screws until heads are snug against side of seal housing. In this position the threaded end of each screw will press on the tapered portion of the coil retainer ring and secure parts in their proper position. Remove "C" clamps and 5/16" rods. Blow out tapping chips with compressed air. Fill coil lead wire port with caulking compound to seal against entry of dirt, grease, oil vapors, and the like.

12) Remove clutch ring by removing the 6 screws and lockwashers. Examine frictional surface for dirt, scoring or other damage. Replace if necessary.

13) Remove clutch assembly from pulley *(NOTE–*Spacer shims will be found between clutch assembly and pulley. These should be inspected and placed aside for later reassembly).

14) Disassemble clutch plate using Tool J-4880 (No.2 Truarc pliers) to remove retaining ring. Inspect all parts of assembly for wear and replace if necessary. Inspect pulley bearing for wear or tightness. Replace if necessary.

15) Reassemble clutch. To install retaining ring, place ring on spring, expand ring with Tool J-4880 and force downward on ring and spring until ring engages groove. Place clutch ring over coil and seal holder with ground surface facing pulley end of shaft.

16) Install clutch plate assembly on splined shaft locating pin in hub spline in cut-off spline on shaft, and with clutch spring toward seal cavity. Install spacer shims on shaft using the original shims removed during disassembly.

17) Install pulley. Exert pressure on inner race of bearing only, when pressing pulley on shaft. Install dust cover and retaining screw with lockwasher. Torque screw to 5-8 ft. lbs. Install clutch ring to pulley using 6 screws and lockwashers.

18) Adjust clutch. See ADJUSTMENTS above.

FORD "SELECTAIRE" AIR CONDITIONING

Ford V8 (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*1955 FORD SOLENOID BY-PASS VALVE CAUTION:* When air conditioner is serviced, the four Allen head screws at base of solenoid by-pass valve should be checked for tightness. Screws must be snug to insure proper sealing. Do not overtighten.

►*1955 OIL BAFFLE INSTALLATION (To Facilitate Checking Compressor Oil Level):* Oil baffle is available for installation on all 1955 Air Conditioning units. *See "Checking Compressor Oil Level" below.*

►*1955 COMPRESSOR PULLEY-TO-SHAFT LOCKING CORRECTION (Early Cars):* Some early production compressor units were not provided with a positive lock between compressor pulley and shaft. Compressors should be checked and, if necessary, modified as follows: Secure large flat washer (Part No. EAA-6278-B) to face of pulley and pulley shaft by screwing bolt 20348-S8, with lockwasher 34807-S8 in place, into tapped hole in end of compressor shaft. Torque to 23-28 ft. lbs.

►*1955 FORD SOLENOID BY-PASS VALVE INTERFERENCE WITH HOOD CORRECTION:* If condition encountered it can be corrected, in some instances, by adjustment of rubber bumpers on either side at front of hood. If hood bumper adjustment does not provide needed clearance, and less than 1/8" is needed, remove nut on top of by-pass valve and grind off some of bolt and bottom of nut. If adjustment of hood bumpers interferes with satisfactory hood-to-fender line, or if grinding nut and bolt will not provide clearance needed, it will be necessary to remove condenser assembly and elongate holes in mounting brackets to obtain proper clearance.

DESCRIPTION

Compression process cycle type, using Freon-12 as refrigerant. The evaporator assembly and allied parts are mounted on the dash. A solenoid valve functions automatically and is controlled by the setting of a thermostatic switch. *For functioning of the various components of the system listed below (except controls, solenoid by-pass and check valves) see "1953-55 Lincoln & Mercury" Air Conditioning.*

Refrigerating: Consists of compressor, condenser, solenoid by-pass valve, check valve, receiver, dehydrator, sight glass, expansion valve and evaporator unit.

Solenoid By-Pass Valve–By-pass valve is located in line between condenser and compressor inlet line. When solenoid is energized (air conditioning "ON"), valve is closed, and compressor will develop maximum pressure difference between high and low sides of compressor, and maximum cooling at the particular compressor speed will be provided. Valve is held in closed position, giving full possible refrigeration, until a car speed of approximately 40 MPH is reached, then the by-pass valve begins to control the cooling, depending on the surrounding temperature and humidity. With valve open (solenoid de-energized) pressure on both sides of the compressor will be approximately equal, no refrigerant will flow through the system, and no cooling will result.

Check Valve–Check valve is located in high pressure line connecting condenser outlet to receiver inlet. Prevents reverse surges of liquid Freon-12 from receiver into condenser, due to opening and closing of by-pass valve. It also maintains high pressure at expansion valve when by-pass opens, to prevent too great an unbalance in system pressures.

Air Circulating: Consists of blowers and discharge, return and outside air ducts.

Control: Consists of control panel (air conditioning and heater controls combined), compressor clutch, thermostatic and control cut-out switches to control cooling.

OPERATION

See "1953-55 Lincoln & Mercury" Air Conditioning. Solenoid valve performs same functions as the modulator valve on Lincoln & Mercury cars.

PRECAUTIONS, TROUBLE SHOOTING & LEAK TESTING

See "Air Conditioning Servic Cautions", "Troubl Shooting", and "Leak Tests".

CHECKING & ADJUSTMENT

SEASONAL OPERATION: Cooling system may be permanently shut down by removing two compressor disconnect pulley bolts. This allows pulley to rotate on

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FORD "SELECTAIRE" (Cont.)

an integral ball bearing in the pulley, and the compressor will not operate.

ADJUSTMENTS: Compress r Belt—Adjust compressor belt (and generator belt) by loosening generator-to-bracket bolt and pulling out on generator so there is approximately ¼" deflection at point midway between water pump and compressor pulley with normal thumb pressure.

Control Cabl Adjustments (Ford): Air Duct Valve—Set temperature control lever at its extreme left position. With lever in this position, adjust cable leading to right air duct valve so that valve is in the completely closed position (maximum counter-clockwise).

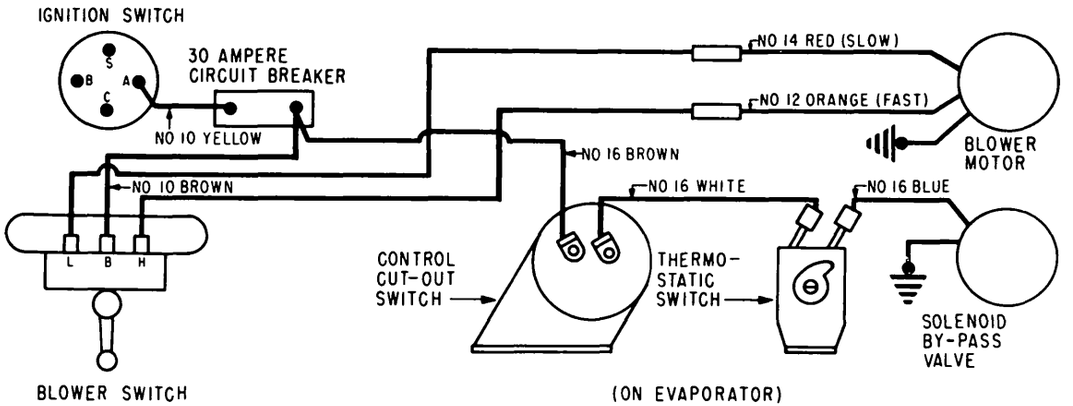
Louvre—Adjust evaporator louvre cable so that the louvres are completely closed when the temperature control lever is in center position (directly under the dot). If evaporator unit has been removed, it will be easier to adjust cable at the evaporator end before installing the evaporator. Only a slight adjustment of the louvre cable is possible at the control unit.

H ater Th rm stat—With temperature control lever at the center position, adjust heater thermostat cable until heater thermostat is in the closed position (thermostat lever all the way to right).

Evap rat r Th rm static Switch Adjustment: Proceed as follows: *(NOTE*—Adjusted at time of installation and generally requires no further adjustment. However, in very dry climates such as the Death Valley area, the switch can be set to its very lowest temperature position. In higher humidity areas, set switch at index lines to prevent evaporator from icing and clogging air passages. Factory setting of control is at scribe mark on control, representing a temperature setting of 28°F. Control may be adjusted to maintain an evaporator temperature of 24-45°F. The thermostatic switch operating differential is 6°F. at any one setting). To adjust control, remove glove box to gain access to the adjusting screw. Turn thermostatic switch adjusting screw clockwise to lower temperature and counter-clockwise to raise it.

CHECKING: Bubbles in Sight Glass—Appearance of bubbles in sight glass when engine idling or by-passing is not unusual and does not indicate a shortage of refrigerant. Remove cover from sight glass. Run engine and compressor for 5-10 minutes, with engine at fast idle, temperature control at maximum cold, then observe sight glass for one minute. If no bubbles appear in sight glass (system not by-passing) it may be assumed that there is sufficient Freon-12 in the system, providing cooling system is in working order. If bubbles appear, add Freon-12 to system until bubbles disappear, then add one lb. additional as a safety factor. See "Adding Partial Charge of Refrigerant" following.

Compr ssor Oil Level & Adding Oil (With ut Oil S parator): *(CAUTION*—Under no circumstances should oil filler plug on compressor be removed to check oil level **as a maint nanc pr c dur** . Should any portion of system be removed and reinstalled or replaced, oil level should be checked **nly** at time of reinstallation



FORD AIR CONDITIONING CONTROL DIAGRAM

or replacement). To check oil level and add oil, operate system for 30-35 minutes. Turn off engine, and turn both service valves clockwise until seated. Loosen high pressure service valve gauge port cap slightly to to let compressor gas pressure reduce to air pressure (observe "Service Precautions"). Remove oil filler plug, insert a 1/8" diameter rod (do not use coated welding rod) in the oil filler plug hole until it bottoms **holding rod vertically. Rod should show ¾". Add Suniso 4-G Refrigerant Oil as required. Replace oil filler plug, then evacuate and purge compressor (see below).**

Compressor Oil Level & Adding Oil (With Oil Separator): Make sure compressor pulley disconnect bolts are in place. Run engine at approximately 1500 RPM, full air conditioning, for 15 minutes in 60°F. ambient (surrounding air) temperature or above. Check evaporator sight glass for bubbles (see above) to determine if Freon-12 charge is sufficient (save for future reference). Shut engine off and isolate compressor by turning both service valve stems fully clockwise until seated. Loosen high pressure service valve gauge port cap slightly to **let compressor pressure bleed off. Next, remove the** cap from drain hose fitting in compressor. Insert a clean 1/8" diameter rod (flat on one side for approximately 3" at bottom end—do not use coated welding rod) into compressor crankcase through fitting until it bottoms (approximately 8" will be required to reach bottom). *(NOTE*—Compressor crankshaft may have stopped with counterweights in position to prevent rod from bottoming on compressor base. If so, remove rod and tap starter to rotate compressor slightly. Try dipstick rod again. Repeat, if necessary, until rod bottoms, being careful never to rotate compressor with rod inserted). Oil level, measured from bottom of dipstick **rod, should be 2-2¼".**

(NOTE—This represents 8-12 ozs, of oil). Add oil, as necessary, to bring oil level to maximum amount specified (Suniso 4-G). If level above normal, foaming of oil may be causing a false reading. Allow open compressor to set for 15 minutes and recheck. If still high, remove enough oil to bring oil level to maximum amount **specified. Replace cap on drain hose fitting in compressor, using new ¼" gasket under cap. Evacuate and purge compressor (see below).**

Evacuating & Purging Compressor—*(NOTE*—Since only Freon vapor is present in the compressor, very little Freon is lost when checking and adding oil, or when compressor only is removed and reinstalled to work on engine. Normally, it will be necessary to purge air and moisture from the compressor and hoses but not evacuate and add Freon-12 (partial charge) unless there is evidence of a low charge of Freon, as shown by checking liquid sight glass for bubbles (see CHECKING above). If additional charge of Freon required, see "Evacuating Compressor & Adding Partial Charge of Refrigerant" below). To purge compressor of air and moisture loosen cap on service port of high pressure valve, open low pressure valve slightly and allow Freon to purge suction hose, compressor, and discharge hose. Tighten service port cap. Open both service valves fully. Run engine at fast idle for at least five minutes (air conditioning fully on) and make "Bubbles in Sight Glass" check (see CHECKING above). If Freon charge low follow procedures under "Evacuating Compressor & Adding Partial Charge of Refrigerant" (see below).

MANIFOLD GAUGE SET INSTALLATION

Attach Gauge Manifold to hood lock support panel mounting bracket. Remove service valve stem covers and make sure both service valves are at the maximum counter-clockwise position. Remove service valve gauge port covers, and attach the flexible hoses to the gauge ports and to a tank of Freon-12. Turn both Manifold Gauge valves to the maximum clockwise position. *NOTE*—**The manifold valves are so arranged that when they are in the maximum or closed position, the center manifold connection is shut off from the gauges.**

TESTING THE SYSTEM

TESTING SYSTEM PRESSURES: Attach manifold gauge set. It will not be necessary to attach the Freon-12 tank unless refrigerant is to be added to the system. Set both gauges valves at the maximum clockwise, or

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FORD "SELECTAIRE" (C nt.)

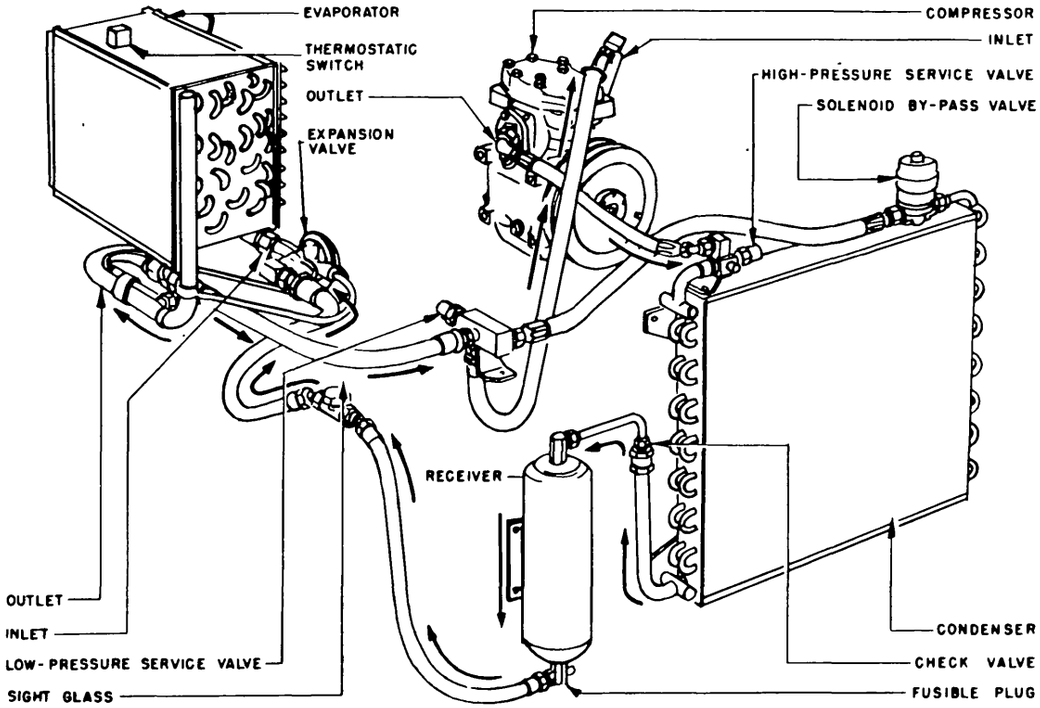
closed, position. Set both service valves at the center position. Run engine at 1500 RPM. Set temperature control lever at the maximum cooling position and turn blower to the "High" position. The actual pressures indicated on the gauge will depend on the temperature of the surrounding air. Higher air temperatures will give higher system pressures. The figures given are for an ambient (surrounding air) temperature of 75°F. For every 10°F increase in ambient air temperature, the pressures will increase approximately 17 lbs. The low pressure gauge should indicate a pressure of 16-25 lbs. at 75°F. The high pressure gauge should indicate a pressure of from 100-165 lbs. at 75°F.

TESTING COMPRESSOR PRESSURES: Attach manifold gauge set as indicated for checking system pressures above, but turn low pressure service valve to maximum clockwise position. Run engine at 1500 RPM for a short time. Observe both high and low pressure gauges. Low pressure gauge should indicate a vacuum of 24" minimum. Stop engine and continue to observe gauge pressures. The gauge should hold for several minutes. If the pressures equalize rapidly, the compressor discharge valves are defective. If both gauges hold their indication but values indicated are not normal (vacuum of 24" minimum and high pressure of 60-100 lbs.), the compressor intake screen is probably clogged. If no further work is to be done on the system after making the pressure check, close both service valves by setting them at the maximum counter-clockwise position. Remove manifold gauge set, and replace the service valve gauge port and valve stem caps.

TESTING SYSTEM TEMPERATURES: Place temperature control lever at maximum cooling position. Open one of the instrument panel outlet air valves by pushing on the valve control knob. Place the stem of a thermometer through the right outlet air vent door as far as it will go. Run engine at 1500 RPM. Turn blower switch to "High" position. The thermometer should indicate a temperature of approximately 40°F. with a room temperature of 75°F. and a relative humidity of 50%. The outlet air temperature should be about 35°F. below the surrounding air temperature with 50% relative humidity. In case the humidity is higher than 50%, the temperature differential will be somewhat less. If the humidity is less than 50%, the air outlet temperature will approach closer to the evaporator temperature setting of 32°F.

DISCHARGING THE SYSTEM

Discharge refrigerant from system before replacing any part of the system except compressor or its two connecting hoses. To discharge the system, connect manifold gauge set to system. **Do n t c nnect manif ld c nt r c nn ction hos t Freon tank.** Place open end of this hose in a garage exhaust outlet. Set high pressure gauge valve at maximum counter-clockwise or open position. Open the high pressure service valve a slight amount, and allow the refrigerant to discharge from the system. *CAUTION–Do not allow refrigerant to rush out, as the oil in the compressor will be forced out along with it.*



FORD AIR CONDITIONING SYSTEM

EVACUATING THE SYSTEM

Attach manifold gauge set, a tank of Freon-12, and a vacuum pump to the system. Set both service valves to the mid-position. Open both manifold valves. Run vacuum pump until low pressure gauge reads at least 25", and as close to 30" of vacuum as possible. Continue vacuum pump operation 15 minutes to boil any moisture out of system. Close pump valve, turn off pump.

EVACUATING COMPRESSOR & ADDING PARTIAL CHARGE OF REFRIGERANT (After Checking & Adding Oil or After Re-installation of Compressor): Attach manifold gauge set, tank of Freon-12, and a vacuum pump to the system as follows: Remove service valve stem covers and make sure that both service valves are at maximum counter-clockwise position. Remove service port gauge port covers, and attach flexible hoses of gauge set to gauge ports and to a tank of Freon-12 (center line). Turn both manifold gauge valves to the maximum clockwise position. Attach vacuum pump to center connection of gauge manifold. Place both service valves at maximum clockwise position, and both gauge valves at maximum counter-clockwise position. Run vacuum pump until low pressure gauge indicates as close to 30" of vacuum as possible. Close pump valve, turn off pump. Open Freon-12 tank valve, then check all compressor connections for leaks. Shut Freon tank valve. Turn both service valves to maximum counter-clockwise position. Check quantity of Freon-12 in system (see "Bubbles in Sight Glass" under CHECKING above). Add partial charge of refrigerant as follows:

Adding Partial Charge of R frigerant: With manifold gauge set attached, open Freon-12 tank valve. Purge air from high pressure hose by loosening high pressure hose at service valve. Tighten connections and set high pressure gauge valve at maximum clockwise position. Set low pressure gauge valve at maximum counter-clockwise position. Loosen low pressure gauge hose slightly at low pressure service valve to purge air from hose. Tighten connection. Set both service valves at center position. Run engine at 1500 RPM with temperature control knob at maximum cold position. Charge system until liquid sight glass shows no bubbles. Continue to charge system until one additional lb. of Freon-12 has been removed from tank. It may be necessary to place Freon-12 tank in a container of hot water (not to exceed 125°F.) to force gas from tank. *(CAUTION–Never heat Freon-12 tank with torch. A dangerous explosion may result).* Set both service valves at maximum counter-clockwise position. Remove gauge set, cap service valve gauge ports and valve stems.

►*CAUTION:* If system is low on Freon and cannot be recharged, disconnector bolts should be removed from

CONTINUED ON NEXT PAGE

FORD "SELECTAIRE" (C nt.)

pulley so that system cannot be operated until proper amount of Freon-12 has been added. *Do not disconn ct lines, except as described above, without complete instructions.* Should any part of system become damaged, Freon and lubricating oil will escape. Seal any openings caused by damage with masking tape to prevent entrance of dirt and moisture. Do not steam clean any portion of car adjacent to refrigeration units or lines. Abnormal heat will cause Freon to "boil" resulting in excessive pressure.

ADDING COMPLETE CHARGE OF REFRIGERANT

Evacuate the system. Leave both service valves at the mid-position. Leave low pressure gauge valve at the maximum counter-clockwise or open position. Set high pressure gauge valve at the maximum clockwise or closed position. Set temperature control lever to maximum cold position. Open Freon-12 tank valve. Run engine at 1500 RPM. Weigh 4½ lbs. of Freon-12 into the system. During the charging, the high pressure may build up to an excessive value. This can be caused by an overcharge of refrigerant, an overheated engine or air in system. Never allow the high pressure to exceed 240 lbs. Stop engine, determine cause, and correct it. When the proper charge has entered the system, no bubbles will be seen in the sight glass. The bubbles will begin to disappear when approximately 3½ lbs. of refrigerant are in the system. After the proper charge has been made, close the Freon-12 tank valve, and check the system pressures for proper operation. Set both service valves at the maximum counter-clockwise position. Remove the gauge set, and cap the service valve gauge ports and valve stems.

BLEEDING AIR FROM SYSTEM

Air trapped in the system will cause high pressure to build up excessively. To bleed air from system, attach manifold gauge set to system, set both service valves at center position. Run engine at 1500 RPM with temperature control lever at maximum cold position. If air is trapped in the system, the high pressure may exceed 150-200 lbs., depending on the surrounding air temperature and the amount of air in the system. Turn engine off. Let system stand for 10 or 15 minutes to allow air to collect at the high pressure service valve. Loosen high pressure gauge hose at high pressure service valve slightly, and allow the gas and air to escape for 5-10 seconds. Tighten the connection, start the car, and check the pressure again. Repeat procedure if necessary. After bleeding, check the liquid sight glass to make certain that too much refrigerant was not removed. Put partial charge of Freon-12 in system if necessary (See "Adding Partial Charge of Refrigerant" above).

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

COMPRESSOR REMOVAL (To W rk n Engin): Isolate compressor by turning both high and low pressure service valves to extreme clockwise position, then loosen cap on high pressure service valve gauge port, and allow gas to escape until compressor and attaching hoses are relieved of refrigerant pressure. *(CAUTION–* Loosen cap a small amount only, and do not remove it until pressure is completely relieved). Raise car on hoist or jacks and remove splash pan From underneath car, remove generator adjusting bracket bolt. Loosen generator-to-compressor mounting bolts, swing generator inward, and disengage the two belts from generator and compressor pulleys. Disconnect generator leads, remove generator mounting bolts and remove generator from car. Remove generator-to-cylinder block bolt and compressor-to-lower bracket bolt. Lower car and complete operation in engine compartment. Disconnect high and low pressure hoses from compressor. Remove compressor mounting bolts. Loosen angle bracket bolt and remove compressor from engine.

COMPRESSOR INSTALLATION: Reverse removal procedure. Adjust compressor belts (see ADJUSTMENTS above). Connect high and low pressure hoses *(NOTE–* Be sure to replace metal gaskets in hose connections). Evacuate compressor and attaching hoses (see "Evacuating Compressor & Adding Partial Charge of Refrigerant" above).

CONDENSER, RECEIVER & RELATED PARTS: *(NOTE–* Removal and installation of these parts requires that the system be discharged before removal and recharged after the parts are reinstalled).

Condenser: Condenser can be removed without removing grille assembly or lock support plate. To remove condenser, disconnect solenoid hot lead from connector. Disconnect lines at four fittings and remove four mounting bolts. Remove condenser by lifting it straight up. To install, reverse removal procedure *(NOTE–* Make sure metal gasket is replaced in high pressure service valve connection).

Receiver: Removal of receiver requires removal of right-hand grille bar; however, it is not necessary to remove the lock support plate. Disconnect copper tube from top of receiver, and disconnect hose from fitting at the bottom of the receiver. Remove the four mounting bolts and the receiver from the right-hand side air deflector. Install caps on the two receiver fittings and plugs in the tube and hose fittings to prevent air from entering the receiver and the refrigeration system. To install, reverse removal procedure.

PARTS REPLACEMENT

With the exception of the compressor, replacement rather than repair of the individual unit is recommended by the manufacturer. In the case of the compressor, replacement kits for certain components are available. When such kits are unable to eliminate the trouble, the compressor must be replaced.

COMPRESSOR REPLACEMENT: Isolate compressor. Rause car on hoist or on jacks, and remove splash pan. From underneath car, remove generator adjusting bracket bolt. Loosen two generator-to-compressor mounting bolts, swing the generator inward, and disengage the two belts from the generator and compressor pulleys. Disconnect the three leads from the generator, remove the two generator mounting bolts, and remove the generator from the car. Remove the generator-to-cylinder block bolt and the compressor-to-lower bracket bolt. Lower the car and complete the operation in the engine compartment. Disconnect the suction and discharge hoses from the compressor. Remove the compressor mounting bolts. Loosen angle bracket bolt and remove compressor from engine. With compressor on work bench, remove suction and discharge fittings. Mark the position of each fitting, and remove two retaining screws at each fitting. Remove two pulley disconnect screws, install a puller to pulley, attaching puller to the two disconnect holes. Remove pulley from shaft, then remove key from shaft. Remove retaining bolt and the "S" shaped bracket from compressor. Invert compressor, remove twelve retaining bolt, compressor adapter plate, and gasket. Scrape old gasket from adapter plate. Remove shipping base and screws from replacement compressor, position gasket, and install adapter plate with twelve retaining screws. Install "S" shaped bracket to new compressor (loose). Install suction and discharge fittings (with new gaskets) to compressor. Mount fittings in positions that correspond to the markings on the old compressor, then secure each fitting with two screws. Lubricate shaft and pulley bore with compressor lubricating oil, then install key to compressor shaft. Force pulley on shaft with bolt and large washer by screwing bolt into center of shaft. Install two pulley disconnect bolts. Position new compressor to engine block, and install two compressor mounting bolts. Tighten mounting bolts and angle bracket bolt. Raise car on hoist or jacks, install compressor ty cylinder block bolt and to lower bracket bolt. Connect three leads to generator, mount generator to mounting brackets on compressor, and install bolts (loose). Install generator adjusting bracket bolt but do not tighten. Engage two belts with generator and compressor pulleys, and adjust belt tension. Tighten generator adjusting bracket bolt, then tighten two generator-to-compressor mounting bolts. Install splash pan, and attach generator leads to clip. Lower car, connect suction and discharge hoses to fittings on compressor. Be sure to replace metal gaskets in hose connections. Evacuate compressor and attaching hoses, then cut compressor back into system.

COMPRESSOR BELT REPLACEMENT: Raise car on jacks or hoist, remove splash pan. From underneath car, loosen but do not remove the two generator-to-compressor mounting bolts. Remove, generator adjusting bracket bolt and swing generator inward. Disconnect the two belts from compressor, generator, crankshaft, and water pump pulleys. *(NOTE–The two belts must always be replaced in matched pairs).* Install new belts around compressor, generator, crankshaft, and water pump pulleys. Install generator adjusting bracket bolt, adjust belt tension, then tighten bolt. Tighten generator-to-compressor mounting bolts, install splash pan, and lower car.

COMPRESSOR SHAFT SEAL, VALVE PLATE, SUCTION & DISCHARGE LINE FITTINGS, SUCTION STRAINER SCREEN, OIL SIGHT GLASS REPLACEMENT: S *"1954-55 Parts R plac ment" und r "1953-55 Lincoln & M rcury" Air C nditi ning.*

1954-55 HUDSON & NASH AIR CONDITIONING

Hudson (1955)
Nash (1954-55)
Rambler (1954-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 EVAPORATOR MOISTURE SPILL-OVER CORRECTION*–Effective Serial No.R-735750 "Ambassador" and No. K-630592 "Statesman" Evaporator Core Water Seal & Retainer Assembly Part No. 3141479, Drain Pan Seal Part No. 3141476, and Drain Pan Seal Retainer No. 3141475, have been added in production and *must be installed* on all air-conditioned cars prior to these serial numbers.

►*1954 EVAPORATOR HOUSING CONDENSATION CORRECTION*–Effective Serial No. R-735074 "Ambassador" and No. K-630270 "Statesman", Insulation Part No. 3141290, has been added in production (on inside of evaporator cover) and *must be installed* on cars built prior to these serial numbers. Weatherstrip Cement, Part No. 4990086, is used to cement this insulation to inside of cover.

►*1954 RADIATOR CAP PRODUCTION CHANGE*–Effective Serial No. R-735973 "Ambassador", No. K-630767 "Statesman" and D-193935 "Rambler", 14 lb. radiator cap, Part No. 3141371, is installed in production on all air-conditioned cars.

►*1954 AIR-CONDITIONING SWITCH PRODUCTION CHANGE*–Effective Serial No. R-735892 "Ambassador," No. K-630739 "Statesman", and No. D-196405 "Rambler", an improved Air-Conditioning Switch, Part No. 4383893, is installed on all air-conditioned cars and *must be installed* on all cars built prior to these serial numbers. Permits blowers to have two speeds instead of one. Resistor, Part No. 3142128, is also being installed on blower motor housing on Rambler models.

►*1955 HUDSON & NASH EVAPORATOR COVER DRAIN TUBE & SEALING PRODUCTION CHANGE (To Prevent Condensation On Evaporator Dripping Onto Floor Mat):* Following parts have been incorporated in production to correct above condition and may be installed on earlier models not so equipped: Evaporator Cover Upper Gasket, Part No. 3143397, is used in addition to Seal, Part No. 3146246; Evaporator Cover Lower Gasket, Part No. 3146404, replaces Part No. 3143397 as a lower gasket; Evaporator End Gaskets (2), Part No. 3146405, replace Part No. 3143396. A larger diameter drain tube, Part No. 3147430, replaces old type and includes an adapter, Part No. 3147429, and a prestite washer, Part No. 4363633, which is installed on the flared portion of the adapter. Adapter is installed into drain hole in evaporator cover in place of original drain tube and retained in position with a stud type ratchet plate. Drain tube hole in floor panel must be enlarged to accommodate the larger hose.

►*1955 DEFECTIVE COMPRESSOR REPLACEMENT CHANGE:* In case of failure of shaft seals, valves, or gasket leaks it is no longer necessary to replace compressor. Compressor can be repaired with kits listed below:

Kit	Part No.
Seal Kit	See below
Valve Plate Kit	3118919
Gasket Kit	3118920

Seal Kits–Three different kits used during production. Their applications are as follows:

Car Model	To Car Serial No. ©	Seal Kit Part No.
Rambler	D-239276	②3119125
Hudson Hornet 6	X-4478	3119056
Hudson Hornet V8	Y-4609	3119056
Hudson Wasp	W-4385	3119056
Nash Amb. 6	R-746827	3119056
Nash Amb. V8	V-5948	3119056
Nash Statesman	K-639472	3119056

©–Cars built effective with above serial numbers use Seal, Part No. 3119126 (bearing housing cover and seal face assembly not included in kit with seal, as proper type assembly is on compressor and seal only is required).

②–Supersedes Seal Kit, Part No. 3118918.

Kit Installation Note–Compressor need not be removed when replacing valve plate and valves, but should be removed when replacing the seal or a gasket. In either case, compressor should be evacuated after installation made by leaving service valves closed to lines. Leave suction service valve port cap closed and remove discharge service port cap. Run compressor 2 to 5 minutes to pump out air that may have entered the compressor. Shut off compressor and engine. Crack suction service valve to allow Freon-12 to drift through compressor and bleed out of open discharge service valve port. This will force out air in cylinder head. Install discharge service valve port cap after gas has been allowed to escape for a brief interval. Back-seat both service valves, attach gauge set, operate system and check pressures and for normal operation.

►*1955 RAMBLER DISCHARGE FLEXIBLE HOSE CLAMP CAUTION (Early Cars):* Clamp fastening discharge flexible hose to front engine crossmember was inadvertently omitted on cars built prior to Serial No. D-239769. Hose may be damaged by idler pulley if clamp not installed. Parts required are: Clamp, Part No. 3138580; Screw, Part No. GM 180018, Nut, Part No. GM 120375; Lockwasher, Part No. GM 120380.

►*1955 EVAPORATOR SEALING CAUTION:* Whenever system checked, check seal around evaporator cover. At lower left and right hand corner of evaporator retainer housing, it is possible that flanged edges leave an opening. Seal with suitable waterproof sealer. Sealer installed over top edge of bottom seal will also aid in preventing air and water leakage.

►*1955 V8 COMPRESSOR BRACE PRODUCTION CHANGE (To Correct Vibration when Compressor Operating):* Compressor Brace, Part No. 3146385, became effective at Nash Ambassador V8 Serial No. V-10150 and Hudson Hornet V8 Serial No. Y-6448 and is available for installation on cars prior to the above serial numbers. Brace is installed with large mounting hole of brace to the tapped hole in front side of compressor cylinder head. Use screw, Part No. 3109944, and lockwasher, Part No. GM 120384, to secure this end of brace. Opposite end of brace is attached with bolt that retains idler pulley or power steering pump bracket to cylinder head.

►*1955 COMPRESSOR CLUTCH BRUSH ASSEMBLY PRODUCTION CHANGE:* An improved clutch brush assembly, Part No. 3146691, has been incorporated in production and is available to replace original brush assembly, Part No. 3143945. New assembly is identified by a daub of green paint located between screw mounting holes on top side of brush mounting bracket.

DESCRIPTION

The All Season Air Conditioning System is designed to cool, heat, and defrost with basically the same unit. Basically, the function of the unit as an air conditioner is to filter, cool, dehumidify, and circulate the air within the car. The air conditioner is the compression cycle type, using Freon 12 as refrigerant. The air conditioning part of the All Weather Eye System consists of the following elements:

Refrigerating: Compressor–2 cylinder, reciprocating type, located at right side of engine. Operation causes and maintains necessary high pressure in system needed to increase Freon vapor temperature.

Condenser–Located in front of radiator. Condenses refrigerant vapor discharged from compressor, through action of fast moving air over metal surfaces of condenser.

Solenoid By-pass Valve–In engine compartment between condenser and receiver. When cooling system is "off" the valve operated by the solenoid is open, thereby removing the restriction between high and low pressure sides of system, and preventing compressor from reducing pressure in cooling unit necessary to permit vaporization of Freon.

Check Valve–Located between condenser and receiver. Prevents liquid refrigerant from entering by-pass and low pressure lines when solenoid valve is open. Protects compressor against possible damage caused by liquid entering compressor.

Receiver–Located at bottom and to right of condenser. Stores liquid refrigerant and maintains supply more than that needed normally.

Sight Glass–Located in right side of engine compartment adjacent to filter. Provides means for determining adequacy of refrigerant charge.

Filter–Located in right side of engine compartment. Filters the circulating Freon.

Expansion Valve–Part of evaporator assembly located beneath dash on right side. Supplies liquid to cooling unit at same rate that refrigerant is removed from it in a vaporous state.

Cooling Coils–Part of evaporator assembly located beneath dash on right side. Container for refrigerant which readily absorbs heat from surrounding area when temperature of refrigerant liquid is reduced. Refrigerant is changed to vapor in cooling coils.

Air Circulating: Blowers (1954)– Two used on Nash, one on Rambler. One blower (All Models) is located directly over evaporator core. The other (Ambassador & Statesman) is at left hand side of dash and is connected to the evaporator unit by a duct. Fans are squirrel cage type.

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1954-55 HUDSON & NASH (C nt.)

Blow rs (1955)—One blower is used on all models

Dischargr Air Ducts—In dash directly above blowers. Ducts have two open positions, "high" or completely open, and "low".

R turn Air Duct—At bottom of evaporator housing. Fresh outside air entering through cowl vent mixes with air returning from car interior.

Outside Air Duct—Outside fresh air is admitted to evaporator housing through vent in cowl.

Control: Nash & Hudson means for controlling fresh air inlet and recirculation of air differ from that used by the Rambler Series

Nash Amb. & Stsmn. (1954)—A single knob control operates both heater and air conditioning systems. The cooling system is placed in operation by having the water valve control knob in the far left or 'OFF" position, and by rotating the knob counter-clockwise to the "Low" and "High" position, "Low" being the first position. The cowl air intake ventilator damper is in closed position as control knob marked "Heat or Vent ' is pushed in. Damper in heater and return air duct is in straight up and down position. This is controlled by knob marked "Pull-Defroster". During air conditioning this knob is pushed in. Windows and ventilators should be closed during time air conditioner is in operation.

Nash & Huds n Mod ls (1955)—Lever control is used Control panel is marked "Air Cond ", "Vent-Heat", "Defrost", and "Forced Heat" from left to right Movement of lever control knob to each position will place dampers in correct position for each operation

Rambler—When controls are adjusted for air conditioning the left knob or knob marked "A.C.-Vent" is pushed in (opens damper door located under left smaller shroud and permits air in car to be recirculated through system). The right hand knob or knob marked "A.C.-Def." should be pulled out (closes damper control in heater cover and prevents ram air through cowl vent from entering and passing through heater and evaporator core). Turn fan knob counter-clockwise to operate fan and refrigerating unit. Windows and ventilators should be closed during time air conditioner is in operation.

T mperatur Control Th rmostat (All Models)—Located at top of evaporator housing. Controls cycling operation of air conditioning system. By cycling the refrigeration, the evaporator core is allowed to warm up during "OFF" cycles Thermostat cuts out at 32°F on Nash & Hudson models, and at 34°F, on Rambler, as sensed by the capillary tube and current to the solenoid by-pass valve is closed off and valve de-energized. The by-pass circuit is opened permitting high pressure refrigerant to by-pass the expansion valve and cooling coils and return to compressor. As this continues, pressure on high and low sides of system partially equalizes Thermostat cuts back in at 37°F on Nash & Hudson models and at 39°F, on Rambler, and solenoid by-pass valve is again energized and closed Normal cycle is again in operation until temperature in evaporator core reaches 32°F (Hudson & Nash Models), and 34°F (Rambler)

Magnetic Clutch (All Models)—Mounted on crankshaft of compressor. Clutch permits compressor to free-wheel when air conditioning system is not in operation. With Air Conditioning Switch "ON", current is directed to electro-magnet on forward face of pulley and clutch plate is held in contact with compressor pulley. Clutch plate drives compressor. In the "OFF"position of Air Conditioning Switch, electro-magnet is not energized and clutch plate does not contact pulley permitting compressor to free-wheel.

OPERATION

With Air Conditioner Switch "ON" and engine and compressor operating, heat laden, low pressure Freon is compressed by compressor and discharged into condenser where it is cooled to remove the "sensible" heat of compression. The Freon is forced into receiver under pressure when solenoid by-pass valve is energized and closed. After passing through filter and sight glass Freon enters expansion valve in evaporator housing. At orifice in expansion valve, high pressure liquid Freon changes to low pressure liquid, then enters cooling coils. The "boiling" Freon, while in the cooling coils, absorbs heat from the surrounding air and vaporizes. The vapor is drawn through the low pressure line to compressor where cycle is repeated.

MAINTENANCE & INSPECTION

►*NOTE*—Manufacturer recommends that any part or unit found faulty in operation be replaced as a unit. No attempt should be made to adjust any of the units except as noted below Compressors may be repaired as indicated in "Changes Cautions Corrections" above and in "Parts Replacement" below

SEASONAL OPERATION: Winter—It is not necessary to remove air conditioner pully belt. Magnetic clutch prevents operation of compressor when air conditioner is "OFF '.

Summer—Keep condenser core clean of bugs, leaves, dirt, or anything that may catch in condenser core.

Operation With Car Standing—Under conditions where system is operated with car standing, for more efficient cooling, run engine well above idle speed, preferably at 750-800 RPM.

ADJUSTMENTS: Compressor Belt—The idler shaft or power steering pump (if so equipped), is adjustable by a slotted link to engine Some models require that compressor mounting bracket be adjusted in addition to idler shaft Belts require a tight adjustment Reduce "flex" to a minimum

Dampers (1955): (Except Rambler)—Place damper control knob in "Air Cond" position Close cowl ventilator damper Move inlet damper control arm to upper position of travel The defroster control arm is moved to the right (*NOTE*—Each cable has a specific length and the end loop diameters will only fit damper control arm which it operates) After dampers are placed in position, place Boden wire loops on damper control arms Install cable housings in clip brackets, allowing enough room for each control arm to complete arc of travel

Rambler—Push "A C -Vent" control knob in Place recirculation damper in open position Insert and tighten cable in damper arm Pull knob and check to see that damper closes completely (*NOTE*—Knob should not be pulled out farther than lower edge of air conditioning control escutcheon on instrument panel) Place cowl ventilator damper in closed position, close evaporator shroud damper Place right hand control knob marked "A C -Def ")even with left hand knob when it is pulled out Insert cable to the cowl ventilator damper arm and tighten Insert and tighten evaporator shroud damper cable to opposite end of cowl ventilator control arm Place Boden wire loop on evaporator shroud damper Dampers should be open when control knob is pushed in

Magnetic Clutch (All Models): Shims are available (010" thick) to adjust the air gap between the clutch plate and pulley to 010- 040 Later type clutch plates have three adjusting screws and locknuts to accomplish this adjustment Torque tighten clutch plate capscrew to 18-20 ft lbs and lock in place with lock plate

PRECAUTIONS, LEAK TESTING & TROUBLE SHOOTING

See "Air Conditioning Service Cautions", "Trouble Shooting", and "Leak Tests"

CHECKING

BUBBLES IN SIGHT GLASS: Bubbles of vapor passing through sight glass indicate a low or short charge of refrigerant. There is no actual way of determining how much refrigerant is required if sight glass is checked and vapor bubbles are present.

CHECKING PRESSURE-GAUGE MANIFOLD SET (TOOL J-5725): 1) Close both hand valves on gauge manifold set.

2) Attach a gauge line to high pressure connection on manifold.

3) Open discharge service valve, remove cap from gauge port, and attach gauge line.

4) Cap center connection.

5) Attach a gauge line to low pressure connection on manifold set.

6) Open suction service valve, remove cap from the gauge port and attach gauge line. "Crack" service valves.

7) Without system operating, both gauge readings should be the same. System is in by-pass cycle and pressures on high and low side are equalized. For example, if ambient temperature is 70°, pressure readings on both gauges should read 70 lbs. gauge pressure. Reference to temperature-pressure table below will give readings for other temperatures.

Temp. of Surrounding Air	Gauge Press. Both Gaug s
65°	63 lbs.
70°	70 lbs.
75°	76 lbs.
80°	83 lbs.
85°	90 lbs.
90°	98 lbs.
95°	106 lbs.
100°	115 lbs.
105°	124 lbs.
110°	133 lbs.
115°	143 lbs.
120°	155 lbs.

CONTINUED ON NEXT PAGE

1954-55 HUDSON & NASH (C nt.)

CHECKING COMPRESSOR OPERATION: Run compressor so that crankcase is thoroughly warmed and comparatively free of refrigerant. Run engine at slow idle; close suction service valve by turning valve stem until it seats. Suction pressure should show 12-18" vacuum in a short time. Shut off compressor and engine. Suction vacuum will rise a few inches quickly if discharge valves are not holding. The above vacuum cannot be reached if suction valves are not holding

CHECKING SYSTEM OPERATION: *(NOTE*–Test is made on road. Long copper tubes to replace gauge lines on Gauge Set J-5725 should be fabricated to enable operator to have gauge set in car). Remove gauge port caps from compressor. Close both hand valves on Gauge Manifold Set (J-5725). Connect gauge lines to Gauge Set and compressor gauge ports. "Crack" service valves. Place thermometers at air discharge outlets. Road test system, operating car at **30 MPH.** Temperatures at air discharge outlets and pressures of system should be as shown in following chart *(NOTE*–Should temperature vary between those given in chart, a mean average should be worked out).

Hudson Hornet & Nash Ambassador

Ambient Temp. °F.	Average Disch. Air Temp. °F.	Head Press. PSI	Suct. Press. PSI
80	47	148	22
85	48	150	22
90	50	155	22

Hudson Wasp & Nash Statesman

80	52	160	22
85	53	180	22
90	54	200	22

Rambler

80	45	148	20
85	48	160	20
90	53	175	20

DISCHARGING THE SYSTEM

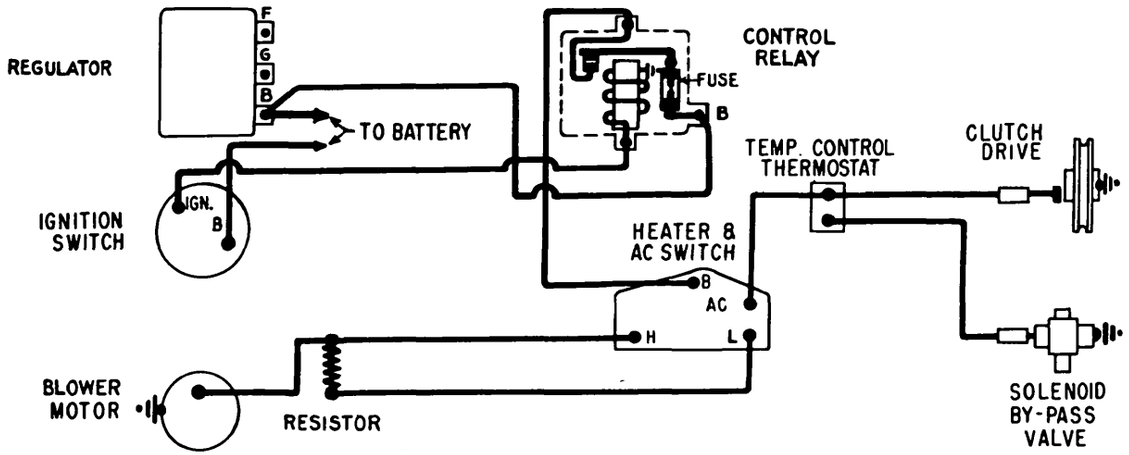
This procedure should be followed in service operations where components are removed. In subsequent service operations, "Discharging The System" will be mentioned as a step in the procedure.

1) Open discharge service valve by backing stem out all the way.

2) Remove cap from gauge connection. Open system to atmosphere by turning valve stem in one to three turns. *NOTE–Rapid release will cause oil to foam up out of the compressor and should be avoided.*

►*CAUTION*–Compressor lubricant is soluble in Freon-12. To prevent pulling too much oil out of system, release charge slowly so that oil remains as the Freon vaporizes into atmosphere. If there is no oil foaming out with the Freon, valve may be opened wider to allow gas to escape more rapidly. *It is advisabl to r l as charge in an pen area, th r than area in which subs qu nt s rvic p rati ns, such as t sting for leaks, would tak plac . This prev nts contamination of th ar a with Freon gas and erroneous and false leak detection.*

3) Repeat above operation on suction service valve to assure complete release of charge in system.



1954-55 RAMBLER AIR CONDITIONING WIRING DIAGRAM

EVACUATING THE SYSTEM

The system should be evacuated every time it has been opened for a service operation such as replacement of a part or line. Air and moisture may have entered the system when it was opened. It is advisable to evacuate the system every time a part has been removed from the system; also, whenever a charge has been lost through a leak or loose connection. System should be evacuated prior to charging if it has been standing for a period of time without a charge. To evacuate the system proceed as follows:

1) *CAUTION*–Compressor may be used to evacuate the system. Procedures given below must be followed very carefully to avoid damage to the compressor and its parts. Make certain that system is completely discharged; no Freon gas should be present during this operation.

2) Remove protective caps from both service valve stems. Open suction and discharge service valves to the gauge port fittings by backing the stem out all the way. Remove protective caps from gauge port fittings.

3) Install gauge line, Tool J-5418, from suction service valve port to compound gauge fitting on gauge manifold set (Tool J-5725).

4) Install gauge line from discharge service valve port fitting to high pressure gauge fitting on gauge manifold set.

5) Install gauge line to center connection on gauge manifold set.

6) Close hand valve on compound gauge between gauge and center connection on gauge manifold set (compound gauge will still register low side pressure).

7) Open hand valve on pressure gauge between gauge and center connection on gauge manifold set.

8) Move suction service valve to "cracked" position by turning valve stem in two or three turns.

9) Close discharge service valve by turning valve stem in all the way. Open discharge service valve gauge port to atmosphere by turning hand valve on gauge manifold set. Gauges should register "O" at this time as there is no pressure present in the system.

NOTE–With discharge service valve closed and gauge port open, air pumped out by the compressor is exhausted through open gauge line attached to center connection. With discharge service valve closed, the system is closed off so that as the compressor pumps the system is evacuated back to the closed valve.

10) Check oil level in compressor.

11) Start engine and operate compressor a minute or two at a time for three or four times to slowly reduce internal pressure. Then run continuously, observing the compound gauge. If compressor is operating satisfactorily, it should pump down to 12-18" vacuum quickly. If not, compressor is defective or there is a leak in the system.

►*CAUTION–Do not run compressor m re than 10-15 minutes as it is possible to damag compr ssor.*

12) After pumping a good vacuum for 10-15 minutes, close hand valve on high pressure gauge on gauge manifold set. Immediately shut system off and stop engine. There should only be a brief interval between these two operations.

13) Return discharge service valve to "cracked" position by turning valve out two or three turns. Both hand valves on the gauge manifold set remain turned off. Vacuum reading on the compound gauge should remain constant at 12-18" or better vacuum.

14) Let system stand for about 10-15 minutes and, if vacuum remains constant, the system is sealed from the atmosphere. If vacuum drops off, there is probably a loose connection or leak in the system. Correct by tightening or replacing and repeat the procedure.

15) Heat a Freon-12 drum with a four pound charge in a container of hot water (125°F) or with rags soaked in hot water. Then attach the drum to the center connection gauge line.

16) Loosen the gauge line fitting to center connection slightly. Crack the drum valve, purging air from the gauge line with Freon vapor. Tighten the gauge fitting

CONTINUED ON NEXT PAGE

1954-55 HUDSON & NASH (Cont.)

and close drum valve.
17) Open the hand valve on the pressure gauge side of the gauge manifold. With the drum in an upright position, crack the drum valve slightly to admit the vaporized Freon gas from top of drum into system. Close drum valve.
18) Note internal pressures which should correspond with that given in table under "Checking" (preceding).
19) Test system for leaks. If leaks found, repeat procedure above after corrections made.
20) Recharge system. See "Adding Refrigerant—Complete Charge" following.

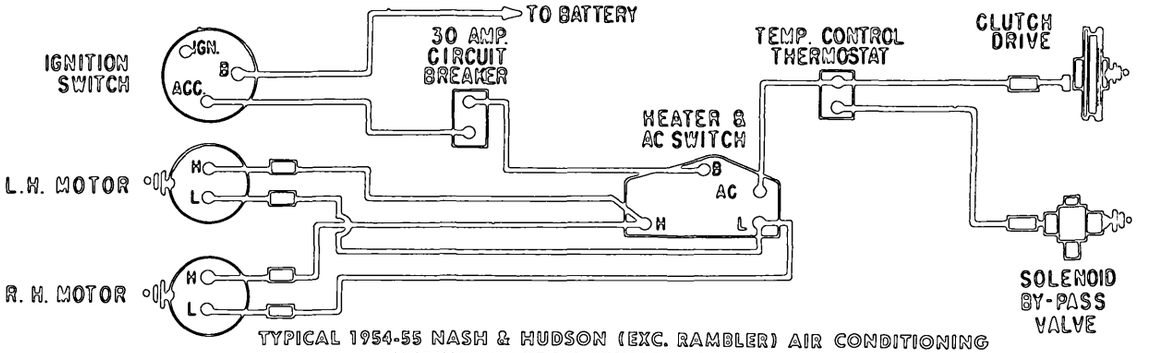
EVACUATING COMPRESSOR

Remove gauge port caps and attach gauge manifold set and lines. Close hand valve on compound gauge and open hand valve on pressure gauge. Start engine and run compressor for 1 or 2 minutes to pump air out of compressor through open hand valve and center gauge line. Stop compressor and engine. "Crack" suction service valve slightly to force air in cylinder head out of compressor with Freon gas. Close hand valve on pressure gauge. "Crack" both service valves; operate and check system for pressures and normal operation. After running compressor for 10 to 15 minutes, shut off system and check for leaks. Oil around seal at this time does not indicate a seal leak since there is a considerable amount on the new parts when installed. *CAUTION*—Do not put pressure on the crankcase unless pulley and clutch are held firmly in place by spacer, capscrew, and lock plate. Excessive crankcase pressure and a defective snap ring will allow seal to be blown out of compressor.

CHARGING THE SYSTEM

▷*NOTE:* Normal charge of Freon-12 for system is 4 lbs. (Nash & Hudson Models), 3½ lbs. (Rambler). For each lb. 2 c.c. of Methanol are added to lower freezing point of any moisture that may be in the system. Without Methanol, moisture would freeze and block the system, particularly at the expansion valve orifice. *See "Moisture & Air in System" following for additional information.* The Anhydrous Methanol is added to the compressor crankcase at oil filler plug prior to evacuation in cases where it is not already added to Freon in drum.

Adding Partial Charge: Proceed as follows:
1) Leak test system. Correct conditions as required.
2) Open both suction and discharge service valves to service port fittings by backing valve stem out all the way.
3) Remove cap from discharge service valve port fitting and install gauge line, Tool J-5418, to the fitting and to the high pressure gauge fitting on the gauge manifold set, Tool J-5725.
4) Remove cap from suction service valve port fitting and install a gauge line to the fitting and to the compound gauge fitting on the gauge set.
5) Close gauge hand valves to center gauge fitting.



TYPICAL 1954-55 NASH & HUDSON (EXC. RAMBLER) AIR CONDITIONING WIRING DIAGRAM (SINGLE BLOWER IN 1955)

6) Install a gauge line to center fitting on gauge set.
7) Install gauge line to Freon drum. Check all connections to see that they are tight.
8) Heat Freon drum in bucket of hot water (125°F.) or hot rags wrapped around the drum to vaporize Freon.
9) With drum in upright position, open drum valve slightly.
10) Open gauge hand valves on gauge set; this will open center charging line to each charging line to the compressor.
11) With both service valves to gauge fittings closed, loosen flare nut connections of charging lines at service valves to purge air from lines and gauge set. These should be cracked open only momentarily. Retighten connections.
12) Close hand valve on high pressure gauge (of gauge set) to close gauge to center fitting (gauge will still record pressure on high side when compressor is running and charge installed).
13) Open discharge service valve on compressor by turning valve stem in three or four times to "cracked" position. Open suction service valve to "cracked" position in same manner.
14) Freon drum valve has been cracked slightly until this time. With drum in upright position open valve completely.
15) Operate engine and compressor at slow idle speed.
16) Observe sight glass until a solid liquid column appears. Then add approximately ½ lb. additional refrigerant. Close drum valve.
17) Operate engine for five minutes at approximately 1500-1800 R.P.M.
18) Observe gauges, sight glass, and entire system for proper performance.
19) After unit operates satisfactorily, stop engine, close service valves to service valve port fittings by backing stems out all the way. Disconnect lines, cap fittings, and leave service valves in this position.

Adding Complete Charge: Proceed as follows:
1) Check all connections to see that all flare nuts are tight.
2) Open both suction and discharge service valves to the service port fittings by backing the valve stem out all the way.
3) Remove cap from discharge service valve port fitting and install a gauge line, Tool J-5418, to the port fitting and to the high pressure gauge fitting on gauge manifold set, Tool J-5725.
4) Remove cap from suction service valve port fitting and install a gauge line to the fitting and to compound gauge fitting on the gauge set. Close gauge valves to the center gauge manifold fitting.
5) Install a gauge line to the center fitting on the gauge manifold.
6) Evacuate the system. See "Evacuating The System".
7) After evacuation, install gauge line to Freon drum. Check all connections to see that they are tight.
8) Place drum in upright position; open drum valve slightly.
9) Open gauge hand valves on gauge manifold set. This will open the center gauge line to each gauge line to compressor.
10) Close service valves to gauge port fittings. Loosen flare nut connections of the gauge lines at gauge port fittings on both service valves. This will serve to purge the air from gauge lines and gauge set. These should be cracked open only momentarily. Retighten connections.
11) Close hand valve on compound gauge of gauge set. This will close the gauge to center fitting and to high pressure gauge. The gauge will still record pressure when compressor is running.
12) Open discharge service valve to "cracked" position. Suction service valve remains closed.
13) Full open valve on Freon drum. Heat drum in hot water (125°F.) or with hot rags wrapped around the drum.
14) Charging with liquid refrigerant is done at the high pressure side of the compressor at the discharge service valve. *After heat has been applied to drum, turn off compressor.* Invert drum (vapor in drum will force liquid refrigerant into the system).
15) Close drum valve after complete charge is in system. This can be readily determined by the stopping of the hissing noise as refrigerant is fed into system. Close hand valve on high pressure gauge on gauge set. *NOTE*—Normal charge of system is 4 lbs. (Nash & Models), 3½ lbs. (Rambler).
16) Open suction valve to "cracked" position.
17) Turn air conditioner on "High" blower. Run engine at 1500-1800 R.P.M. Observe the sight glass and the high and low pressure gauges. The engine should run

CONTINUED ON NEXT PAGE

1954-55 HUDSON & NASH (Cont.)

10-15 minutes to normalize system. If no bubbles appear at the sight glass and pressures are normal, shut off engine. NOTE—Head pressure on high pressure side should not exceed 275 lbs. at normal room temperatures, Excessive pressure would indicate air or excessive charge in system. Purge air from system or release excessive charge. See "Air & Moisture in System" for procedures.

18) Leak test system. Correct as required.

19) If system operates normally, close service valves to gauge port fittings. Remove gauge lines and cap gauge port fittings.

CHECKING & ADDING OIL

In normal operation, a small amount of oil is always circulating throughout the refrigeration system. An oil sight glass is provided in the compressor so that splashing oil can be seen when compressor is running. It does not indicate oil level when compressor is stopped. Oil level is determined by stopping compressor and closing suction and discharge service valves to lines. This isolates compressor from rest of system and seals system from atmosphere.

1) Loosen gauge port cap on discharge service valve slightly and let gas in compressor purge to the air slowly until suction pressure gauge shows 0 lbs. Relieve crankcase pressure by loosening oil filler plug slowly. Remove it when the oil has stopped foaming. Using a straight piece of wire as a dipstick, check at oil filler hole, keeping dipstick as near vertical as possible.

2) Add oil to bring it to the recommended level. Use refrigerant type oil of 280 to 300 Seybolt. To avoid adding too much oil, add slowly and check with dipstick; take 2 or 3 readings, each time wiping the dipstick dry. Correct oil level with compressor warm and stopped should be:

Engine	Amount of Oil	Dipstick Reading
6 Cyl.(Compr.Vertical)	9-10 ozs	1 1/8-1½"
V8(Compr.Horizontal)	9-10 ozs	1¼-1 9/16"

Replace filler plug.

3) Open suction service valve slightly for a few seconds until hissing sound is heard from valve. This allows system to purge air from compressor through discharge service port. Tighten discharge service valve port cap. Open service valves.

4) Install valve stem caps, then operate system for a few minutes. Observe oil splash in sight glass of compressor. There should be oil splash if there is sufficient oil in system.

5) Check refrigerant charge.

►*CAUTION*—Oil in container originally is packed moisture-free and every effort should be made to keep it moisture-free. The oil will quickly absorb moisture with which it comes in contact. Container should not be opened until ready for use, and recapped immediately after use. Tools, tubes, gauge sets, and replacement parts should be kept clean. System should not be open any longer than necessary.

Oil Level When Replacing Compressor: Precautions should be taken to prevent an over or under charge of oil when compressor is replaced. The oil charge in a new compressor is sufficient for the entire system. In a system that has been running, there is always some oil circulating through it. When compressor replaced proceed as follows:

1) Purge gas pressure in crankcase of original compressor to 0 lbs. pressure slowly after line valves are closed.

2) Check oil level without running compressor. Running compressor will cause a sudden drop in pressure in crankcase and may cause oil pumping. Oil pressure in crankcase would then be temporarily lowered putting an over charge of oil in the evaporator and giving an erroneous reading when oil level checked.

3) Check oil level in new compressor and add or remove oil from it until oil level is same as it is in compressor to be replaced.

4) Run new compressor 10-15 minutes,recheck oil level.

MOISTURE & AIR IN SYSTEM

Moisture In System: An excessive amount of moisture in the system, above that which can be handled by the Methanol injected into the Freon-12 will cause intermittent refrigeration and quick and serious corrosion of metals used in the system. Too, moisture mixes with oil causing "sludging" which seriously affects the lubricating ability of the oil. The best assurance against moisture is to prevent its entry into the system. This can be done by keeping all components sealed prior to installation and during repair procedures. Should the system be opened, seal openings and lines with plastic caps. If symptoms of moisture are evident in an unopened system, release charge, evacuate system, and recharge.

Air In System: Air which consists of gases that cannot be condensed in the refrigeration system causes excessively high head pressures in the high side of the system and reduces operating efficiency. Install gauge set to determine pressures. The presence of air is always indicated by high head pressure.(NOTE— High head pressure caused by air in system could be confused with an excessive amount of refrigerant which also causes high head pressure; although an excessive amount of refrigerant would still give adequate cooling effect). If system is known to have correct amount of refrigerant, but during operation and using the gauge set the head or high pressure builds up, air is certain to be in the system.

PURGING AIR FROM SYSTEM

Allow system to remain idle for several minutes after compressor has been operating. The air can then be discharged through discharge service valve on compressor. This is done by first making sure that the valve is shut off to the gauge port. Then remove gauge connections. Turn valve stem in toward the "cracked" position for a few moments, thus allowing air to escape through the gauge port. *Cover port opening with a cloth when purging system of air to prevent refrigerant and oil from contacting persons or car.* Repeat procedure if necessary. (*CAUTION*–Care should be exercised to be sure that purging is done slowly to prevent drawing oil out of system). Check oil level after bleeding. Air may also be bled from system at receiver. Crack top connection flare nut slightly for a few moments. Close connection and operate engine and compressor. Observe sight glass, and gauges. Check system for satisfactory performance. If operation unsatisfactory, repeat operation.

PURGING EXCESS REFRIGERANT

Install gauge set and operate system to determine pressures. Excessive amount of refrigerant will be indicated by high head pressure although the cooling effect is adequate. Place hand on receiver while system is operating. If entire receiver is cold, the indication is that receiver is filled with liquid refrigernat. Open hand valve to pressure gauge. This will open discharge valve to center gauge line. Freon-12 will vaporize upon entering the atmosphere. *Bleed slowly to prevent oil in the system from foaming and b ing pulled out of system.* After it is felt that proper amount of refrigerant has been bled off to bring it to normal charge, close hand valve on pressure gauge. Operate system again and observe sight glass and gauge. If not satisfactory, repeat process. *CAUTION*–When bleeding off excess refrigerant, place cloth over gauge line opening to prevent refrigerant or any oil from coming in contact with car or persons.

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

COMPRESSOR: Proceed as follows:

To Perform Engine Repairs: Clean dirt, oil,or any foreign matter from around service valves. Close both service valves. Loosen gauge port cap on discharge service valve and allow gas to escape from compressor slowly. Remove service valve assemblies from compressor. The lines, both high and low pressure, remain attached to service valves. Shift service valves with lines attached carefully to one side. Loosen compressor belt adjusting lever screw and idler shaft adjusting link screw. (If equipped with power steering, the adjusting link is the same as for the idler shaft). Remove compressor belt from compressor pulley and idler shaft or power steering pump pulley. Remove compressor from compressor mounting bracket. The compressor and idler shaft or power steering bracket can be removed from the engine. Upon installation, new gaskets are necessary between service valve assembly bodies and compressor. After compressor is reinstalled, operate system. Purge air from compressor. Check oil level and the charge. Add charge as necessary. CAUTION—Close service valve openings on compressor while it is off car (use platic plugs or tape) to prevent air, moisture, or dirt from entering system.

CONDENSER: Clean all connections of dirt and oil, then discharge system. Drain cooling system and remove radiator from car. Disconnect high pressure line from compressor to inlet connection of condenser (at top of condenser). Use two wrenches of proper size on these connections to prevent twisting of copper lines. Remove splash pan assembly. Disconnect outlet connection from condenser outlet-to-check valve manifold line. Remove condenser from its mounting on radiator air baffles. Remove condenser from below car. Upon reinstallation, install gauge manifold set, evacuate, leak test, and charge the system. Run engine at idle for

CONTINUED ON NEXT PAGE

1954-55 HUDSON & NASH (C nt.)

10-15 minutes to normalize system. High pressure should not exceed 275 lbs. Should the pressure exceed 275 lbs., there is air in the system. Purge air from system by cracking or slightly opening high pressure gauge to the center connection of the gauge manifold set and *bleed air to atmosphere with system shut down and not op rating.*

RECEIVER: Clean all connections of all dirt and oil, discharge system. Disconnect connection from check valve manifold line to receiver inlet. Disconnect connection from receiver outlet. Remove receiver from front engine cross-member. Upon replacement, install gauge manifold set, leak test, and charge system. Start engine and operate at idle for 10-15 minutes to normalize system. Observe gauges. High pressure should not exceed 275 lbs. Should it exceed this amount, purge air from system.

PARTS REPLACEMENT

COMPRESSOR: Follow procedure outlined for "Compressor" under "Removal & Installation To Work In Engine Compartment" above Purge air from new compressor, check oil level, and charge

MAGNETIC CLUTCH & FLYWHEEL: Loosen compressor adjusting lever screw and idler shaft, remove compressor belt Remove compressor mounting bolts and move compressor without shutting off lines or otherwise disturbing remainder of system Movement required should be sufficient to allow removal of magnetic clutch assembly, remove clutch assembly *NOTE*– Pulley and center bearing are a tight fit on compressor crankshaft Brush holder bracket of the magnetic clutch is mounted on front bearing and seal plate of compressor For adjustment of clutch see "Adjustments" above Clutch plate cap screw is torque tightened to 18-20 ft lbs and locked in place with the lock plate

COMPRESSOR VALVE PLATE & VALVE: *(NOTE*– Compressor need not be removed when replacing valve plate and valves) Close discharge and suction line valves to isolate compressor Loosen gauge port cap on discharge service valve and slowly release gas in compressor to atmosphere until there is no pressure present Remove cylinder head bolts and tap cylinder head and valve plate to loosen and remove Remove and discard all gaskets and clean gasket surfaces Examine cylinder walls and top of pistons if there has been any valve breakage Compressor should be replaced if there are any scores or marks Always use new gaskets Before reassembling, dip gaskets in clean refrigerant oil Replace suction valve leaves (included in replacement kit) Dip valve leaves in clean refrigerant oil Install suction valve leaves on pins on bottom side of new valve plate Discharge valves are furnished installed on valve plate *(NOTE*–Due to position of compressor in the V8 Series, it is necessary to assemble the parts on a bench and install to the compressor Be sure suction valves are in place on pins of valve plate when installed) Install valve plate gasket Install valve plate with suction valves in place on compressor Install cylinder head gasket, cylinder head, and cylinder head bolts Torque tighten cylinder head bolts to 15-20 ft lbs Suction and discharge valves remain closed Evacuate compressor See "Evacuating Compressor Only" above *NOTE*– Although a test indicates a leaky valve plate, unless valve plate has been damaged or has been in service a long time, dirt or foreign particles in the system will cause valve plates to appear faulty Check system to see if oil is clean Dirt small enough to go through the suction screens can cause valve trouble Valve plates that appear good may be made to function properly by washing in clean solvent and drying with dry air or clean cloth

COMPRESSOR SHAFT SEAL: 1) *(NOTE*–A small amount of oil around the seal bearing is normal and does not indicate a seal leak When seal was originally assembled, all parts were dipped in oil and operation may only be forcing out surplus oil) Run compressor for a short time to warm up compressor and allow the crankcase oil to contain a minimum amount of refrigerant Shut off system and engine Close service valves, stems all the way in, to isolate compressor Loosen gauge port cap on discharge service valve and bleed refrigerant vapor from compressor, leaving line valves on their respective lines Move lines aside, remove compressor and place on bench

2) Install plastic plugs in inlet and outlet holes in compressor, or cover with masking tape Remove clutch and pulley from compressor shaft Tilt compressor backwards to prevent loss of oil while performing following operations Remove shaft snap ring with "Truarc" pliers Remove seal ring seat either by hand or, if tight on shaft, pry off with a screwdriver Remove seal bellows by forcing a screwdriver behind brass stamped flange at various points and prying it out of seal plate Remove neoprene "O" ring from seal plate Discard seal bellows and "O" ring Wash seal plate and shaft with clean cloth and solvent, and coat both with clean refrigerator oil

3) Dip new "O" ring in clean refrigerant oil and install in seal plate Press seal bellows assembly into place It is not a metal-to-metal press fit but rests only on the neoprene "O" ring in the seal plate and must go in perfectly square and the flange must bottom all the way around against the seal plate Wash seal seat in clean solvent, dip in clean refrigerant oil with neoprene "O" ring in place Press onto shaft evenly with lapped surface toward compressor body After seal face is over spline of shaft, install snap ring over spline with "Truarc" pliers Do not spread snap ring more than necessary Slide seal ring and snap ring together only shaft until snap ring snaps into its groove in the shaft Install flywheel and clutch plate The capscrew lock plate is installed behind flat washer in clutch hub Tighten capscrew to 18-22 ft lbs and lock in place with lock plate

4) Install compressor on mounting bracket, connect magnetic clutch wire lead Install belts and adjust brackets and idler shaft or power steering pump to tighten belt tension Install suction and discharge service valves with flexible lines intact to compressor using new gaskets Torque valve body capscrews to 12-15 ft lbs The suction and discharge service valve remain closed Evacuate compressor See "Evacuating Compressor Only" above

COMPRESSOR GASKETS: Follow removal and installation procedures outlined above in pars 1) and 4) for "Compressor Shaft Seal"

OTHER SYSTEM PARTS OTHER THAN COMPRESSOR (Involving Breaking of Refrigerant Lines): Removal and installation of these parts involves discharging, evacuating and recharging system (see procedures above)

1953-55 LINCOLN & MERCURY AIR CONDITIONING

Lincoln (1953-55)
Mercury (1955)

►CHANGES & CORRECTIONS

►*1954 FAN & AIR COMPRESSOR BELT DESIGN CHANGE (To Reduce Noise):* Steel Core Belts, Part Nos. EAD-8620-F and EAD-2890-C, are now being cogged with unequal spaces between notches to reduce or eliminate noise. NOTE—New belts will carry same part numbers as the old type but can be identified by a 1" wide red band across back side. Modified belts are available for service.

►*1954 EVAPORATOR DRAIN CORRECTION (To Minimize Possibility of Wet Luggage Compartment):* It is recommended that the three drain traps be removed. These traps are accessible from underneath car and can be removed by merely pulling them off the drain tubes.

►*1954 COMPRESSOR PULSATING NOISE CORRECTION:* Larger internal diameter flexible low pressure valve-to-compressor line, Part No. LE-19971-B, and compressor-to-condenser inlet line, Part No. LE-19972-B, are available to correct above complaint on 1954 models. New lines are installed on 1955 models.

►*1954-55 COMPRESSOR REPAIR CHANGE:* Later 1954 and all 1955 Compressors may be serviced as indicated under "Parts Replacement" below Those 1954 compressors that may be serviced are identified by a 3/8" diameter tapped hole drilled in the end of the compressor pulley shaft The decal on the head of 1954 Compressors prohibiting repair may be ignored to the extent indicated above.

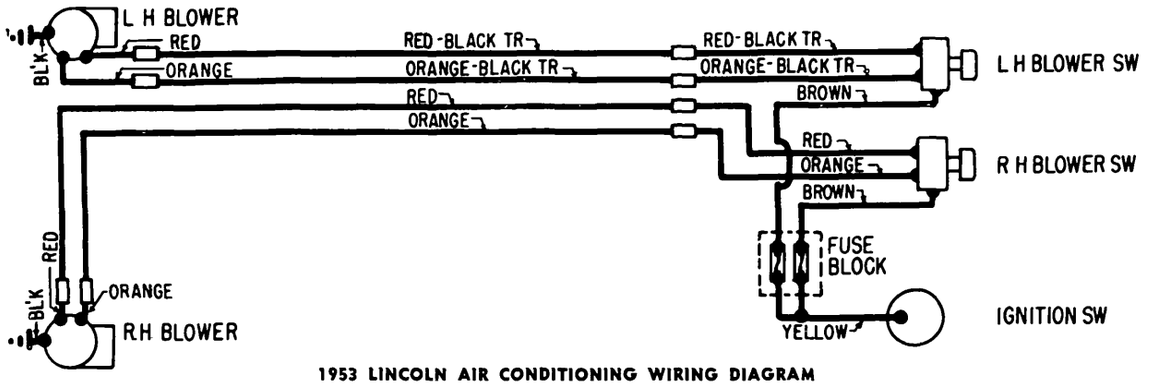
►*1955 OIL BAFFLE INSTALLATION (To Facilitate Checking Compressor Oil Level):* Oil baffle is available for installation on all 1955 Air Conditioning units *See "Checking Compressor Oil Level" below.*

►*1955 COMPRESSOR PULLEY-TO-SHAFT LOCKING CORRECTION (Early Cars)·* Some early production compressor units were not provided with a positive lock between compressor pulley and shaft Compressors should be checked and, if necessary, modified as follows Secure large flat washer (Part No EAA-6278-B) to face of pulley and pulley shaft by screwing bolt 20348-S8, with lockwasher 34807-S8 in place, into tapped hole in end of compressor shaft Torque to 23-28 ft lbs

►*1955 LINCOLN DESIGN CHANGE (High Pressure Service Valve):* Position of valve has been changed over that of 1954 The 1955 High Pressure Valve has been inverted and, for this reason, direction which valve stem must be turned during service operations will be reversed

DESCRIPTION

Compression process cycle type, using Freon as refrigerant. System consists of basic groups of elements as follows



1953 LINCOLN AIR CONDITIONING WIRING DIAGRAM

Refrigerating. Compressor—Located to right front side of engine. Operation causes and maintains necessary high pressure in system needed to increase Freon vapor temperature.

Condenser—Located in front of radiator. Condenses refrigerant vapor discharged from compressor, through action of fast moving air over metal surfaces of condenser.

Modulator Valve—Located on top left of condenser. Controls compressor pressure by maintaining a uniform inlet or "low pressure side pressure" by bypassing "high pressure side pressure" to low pressure side of compressor, thereby preventing compressor from reducing pressure in evaporator necessary to permit the vaporization of Freon. Manual control of valve from lever on dash provides temperature control.

Receiver—Mounted to floor pan beneath rear of car. Stores liquid refrigerant and maintains supply more than that needed for normal operation.

Sight Glass—Located in evaporator assembly above expansion valve. Provides a means for determining adequacy of refrigerant charge.

Dehydrator—Mounted beside receiver on floor pan beneath rear of car. Filters and dehydrates Freon as it passes through system.

Expansion Valve—Part of evaporator assembly located in trunk of car. Supplies liquid to evaporator core at same rate that refrigerant is removed from it in a vaporous state.

Evaporator—Part of evaporator assembly located in trunk of car. Container for refrigerant which readily absorbs heat from surrounding area when temperature of refrigerant liquid is reduced. In the core of the evaporator refrigerant is changed from liquid to vapor.

Air Circulating: Blowers—Located in evaporator assembly in trunk of car. These squirrel cage type fans, two in number, are located on each side of car, and force air from refrigerated area in evaporator assembly to ducts leading to car interior.

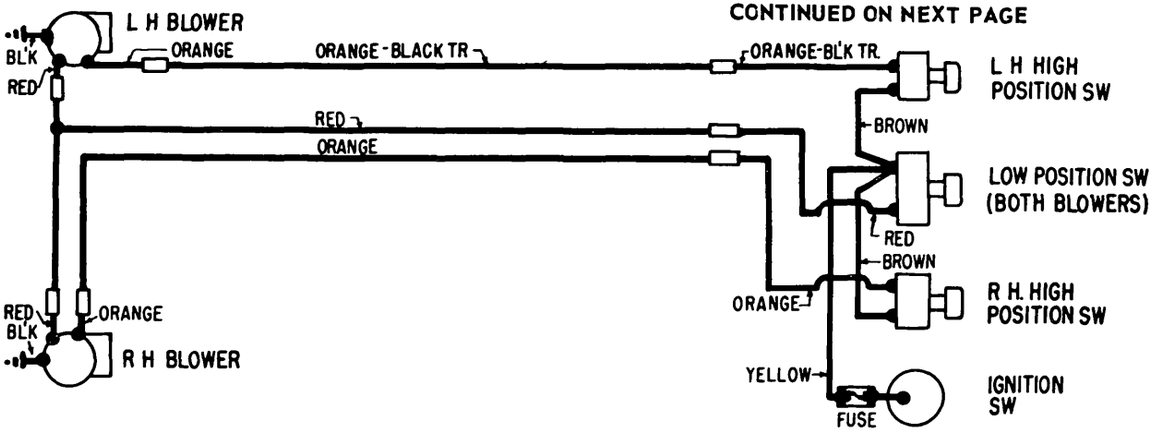
Discharge Air Ducts—Connected to grille, located on each end of package shelf. Entry point of refrigerated air to interior of car.

Return Air Ducts—Located on either side, at bottom of rear seat. Return point of air to evaporator.

Air Filter—Located on evaporator assembly front. In normal operation air returning to evaporator for recooling causes electrostatic pick up of dust particles.

Control—Control panel consists of two 2-speed controls, one for each blower motor, and a modulator

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1954-55 LINC LN AIR C NDITI NING WIRING DIAGRAM

1953-55 LINCOLN & MERCURY (C ntinued)

valve control lever. Modulator valve control lever determines degree of coolness when Air Conditioner is "On," position farthest to right providing maximum coolness. Another control element is:

T mp ratur Tube—Located between expansion valve and outlet of evaporator (low pressure side). If temperature at evaporator outlet falls below predetermined value, substance in temperature tube contracts. This reduces pressure on expansion valve diaphragm which in turn permits a coil spring to force needle towards its seat. This action reduces flow of liquid into evaporator. Result is a slowing up of refrigerating action and a rise in temperature of evaporator. The tube serves to check liquid state Freon to build up in low pressure side with possible resultant damage to compressor. With valve closed the build up of Freon on the high pressure side would result in no refrigeration.

OPERATION

With Air Conditioner "On" and engine and compressor operating, heat laden, low pressure Freon is compressed by the compressor and discharged into the condenser where it is cooled to remove the "sensible" heat of compression. The Freon is forced into receiver under pressure when modulator valve is closed. After passing through dehydrator and sight glass Freon enters expansion valve in evaporator assembly. At orifice in expansion valve high pressure liquid Freon changes to low pressure liquid, then enters evaporator core. The "boiling" Freon, while in the evaporator core, absorbs heat from the surrounding air and vaporizes. The vapor is drawn through the low pressure line to compressor where cycle is repeated.

PRECAUTIONS, LEAK TESTING & TROUBLE SHOOTING

Se "Air Conditioning S rvice Cautions", "Trouble Shooting", and "Leak Tests".

CHECKING & ADJUSTMENT

CHECKING: Bubbles in Sight Glass—Appearance of bubbles in sight glass when engine idling or by-passing is not unusual and does not indicate a shortage of refrigerant. Remove cover from sight glass. Run engine and compressor for 5-10 minutes, with engine at fast idle, temperature control at maximum cold, then observe sight glass for one minute. If no bubbles appear in sight glass (system not by-passing) it may be assumed that there is sufficient Freon-12 in the system, providing cooling system is in working order. If bubbles appear, add Freon-12 to system until bubbles disappear, then add one lb. additional as a safety factor. See "Adding Partial Charge of Refrigerant" following.

C mpr ss r Oil L vel & Adding Oil (1953): Pump system down (see below). Loosen compressor crankcase filler plug and release pressure slowly. Remove filler plug, check and add oil as necessary *(CAUTION*—Use special compressor lubricant only). Replace filler plug. Release "Pumped Down" pressure by opening shut-off valves counter-clockwise in following order: Receiver shut-off valve, then, when no more liquid Freon is flowing past sight glass open low pressure valve. Open high pressure valve.

Compressor Oil Level & Adding Oil (Without Oil Separator—1954-55): *(CAUTION*— Oil filler plug on compressor should never be removed to check the oil level **as a maintenance procedure.** Should any portion of system be removed and reinstalled or replaced, oil level should be checked **only** at time of reinstallation or replacement). To check oil level and add oil, operate system for 30-35 minutes. Turn off engine, and turn both service valves clockwise until seated. Loosen high pressure service valve gauge port cap slightly to to let compressor gas pressure reduce to air pressure (observe "Service Precautions"). Remove oil filler plug, insert a 1/8" diameter rod (do not use coated welding rod) in the oil filler plug hole until it bottoms, holding rod vertically. Rod should show ¾" (Mercury, 7/8" (Lincoln). Add Suniso 4-G Refrigerant Oil as required. Replace oil filler plug, then evacuate and purge compressor (see below).

Compressor Oil Level & Adding Oil (With Oil Separator): Make sure compressor pulley disconnect bolts are in place. Run engine at approximately 1500 RPM, full air conditioning, for 15 minutes in 60°F. ambient (surrounding air) temperature or above. Check evaporator sight glass for bubbles (see above) to determine if Freon-12 charge is sufficient (save for future reference). Shut engine off and isolate compressor by turning both service valve stems fully clockwise until seated. Loosen high pressure service valve gauge port cap slightly to let compressor pressure bleed off (observe "Service Cautions"). On Lincoln, disconnect compressor end of the oil separator drain hose. On Mercury, remove the cap from drain hose fitting in compressor. Insert a clean 1/8" diameter rod (flat on one side for approximately 3" at bottom end—do not use coated welding rod) into compressor crankcase through fitting until it bottoms (approximately 8" will be required to reach bottom). *(NOTE*—Compressor crankshaft may have stopped with counterweights in position to prevent rod from bottoming on compressor base. If so, remove rod and tap starter to rotate compressor slightly Try dipstick rod again. Repeat, if necessary, until rod bottoms, being careful never to rotate compressor with rod inserted). Oil level, measured from bottom of dipstick rod, should be 1½-2" (Lincoln), 2-2¼" (Mercury). *(NOTE*—This represents 8-12 ozs, of oil). Add oil, as necessary, to bring oil level to maximum amount specified (Suniso 4-G). If level above normal, foaming of oil may be causing a false reading Allow open compressor to set for 15 minutes and recheck. If still high, remove enough oil to bring oil level to maximum amount specified. On Lincoln, reconnect oil separator drain hose to compressor fitting, using new ¼" gasket. On Mercury cars, replace cap on drain hose fitting in the compressor, using new ¼" gasket under cap. Evacuate and purge compressor (see below).

Evacuating & Purging C mpressor—*(NOTE*—Since only Freon vapor is present in the compressor, very little Freon is lost when checking and adding oil, or when compressor only is removed and reinstalled to work on engine. Normally, it will be necessary to purge air and moisture from the compressor and hoses but not evacuate and add Freon-12 (partial charge) unless there is evidence of a low charge of Freon, as shown by checking liquid sight glass for bubbles (see CHECKING above). If additional charge of Freon required, see "Evacuating Compressor & Adding Partial Charge of Refrigerant" below . To purge compressor of air and moisture loosen cap on service port of high pressure valve, open low pressure valve slightly and allow Freon to purge suction hose, compressor, and discharge hose Tighten service port cap. Open both service valves fully. Run engine at fast idle for at least five minutes (air conditioning fully on) and make "Bubbles in Sight Glass" check (see CHECKING above). If Freon charge low follow procedures under "Evacuating Compressor & Adding Partial Charge of Refrigerant" (see below).

BELT ADJUSTMENT: Adjust compressor belt by pulling idler against belt to allow approximately 1/2" deflection at point midway between water pump and compressor pulley.

AUTOMATIC THROTTLE CONTROL: With engine warm, air conditioning system operating, and transmission in neutral, adjust knurled nut at end of operating rod of the control assembly to obtain idle speed of 800 RPM, tighten locknut. Check idle to make sure that it returns to normal whenever air conditioning is turned off or the transmission is shifted out of neutral. *NOTE*— Engine idle should be checked and set to specifications before attempting to adjust fast idle device.

Compressor Valve Operation (1954-55): Start engine and run with system set at maximum cooling for at least 15 minutes so that compressor crankcase is warm and comparatively free of refrigerant. Turn low pressure fender apron valve clockwise until seated. With engine running at slow idle, low pressure gauge reading should drop to at least 15" Hg. vacuum in a short period of time. *(CAUTION*—Compressor crankcase oil will be pumped out of compressor and into system if this test is unduly prolonged). If it is impossible to get this reading, it indicates that either the compressor intake, or the fender apron valve is at fault. To determine which valve is at fault, disconnect and cap flexible low pressure hose at fender apron valve fitting. With this line capped, again attempt to pump to 15" Hg. vacuum. If it is now possible to attain this reading, the fender apron valve is leaking; if not, the compressor intake valve or hose is leaking. When the engine is stopped, the low pressure gauge reading will jump several inches immediately if the discharge valves are not holding. The above vacuum reading cannot be reached if the suction valves are not holding.

PRESSURE TESTING SYSTEM

Place temperature control lever on instrument panel in full cold position. Shut off engine for at least 5 minutes before starting test. Check valves located on condenser and right front fender apron to make sure service ports are shut off. This is done by removing valve stem covers and turning stems counter-clockwise until valves seat. Remove protective caps from ser-

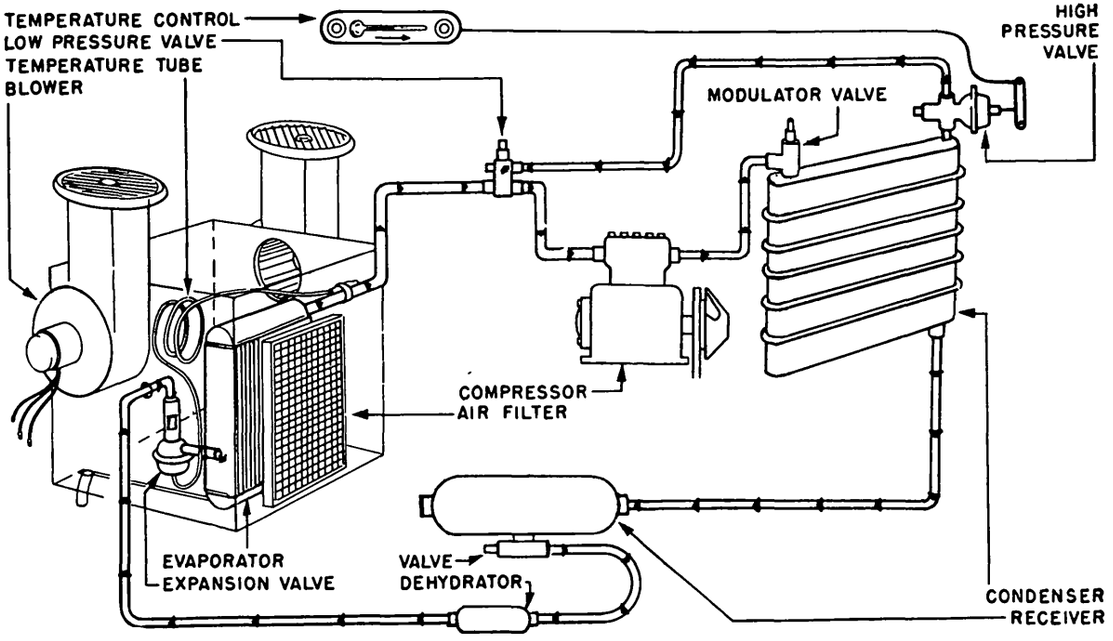
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1953-55 LINCOLN & MERCURY (Continued)

vice ports on condenser and fender apron valves. Clamp Pressure Test Gauge Manifold Tool ACL-53-3 to right hand side of radiator air deflector assembly. Attach high pressure gauge hose to service port on condenser valve, and low pressure gauge hose to fender apron valve service port. Turn both valves on gauge manifold clockwise until seated. Turn stems on both condenser and fender apron valves clockwise 1 1/2–2 turns. Both gauges should read neutral system pressure between 50-80 PSI depending on temperature of surrounding air. (High temperatures give higher readings). If gauge readings are below normal, check all connections and serviced parts for leaks. If system pressure is so low that it is impossible to detect leaks, increase system pressure as follows: Attach center hose of Test Gauge Manifold to a fully charged Freon tank. Open tank valve. Turn both valves on gauge manifold counter-clockwise one full turn. Freon will flow until system reaches tank pressure (approximately 50-80 lbs.). Shut off Freon tank valve and turn both manifold gauge valves clockwise until seated. Disconnect center hose from tank. Cap hose. Turn valve stems on both condenser and fender apron valves counter-clockwise until seated. Disconnect both gauge hoses from service ports, cap hoses and ports. Replace condenser and fender apron valve stem protector caps.

EVACUATING THE SYSTEM

If all pressure in system has been released, either for servicing or by accident, it will be necessary to completely evacuate to remove moist air and other contaminants which may have entered when fittings or assemblies were opened. Before evacuating make sure that all connections are tight so that no air will be drawn in. Before proceeding with the evacuation follow procedures under "Pressure Testing System" and "Leak Testing". Leave test gauge manifold attached, as it will be used in evacuating. Turn stems on condenser valve and right front fender apron valve 1 1/2–2 turns in a clockwise direction. Turn both gauge valves about one turn in a counter-clockwise direction and release all system pressure through center hose. When there is no more Freon flowing, connect center hose of gauge manifold to vacuum pump. *(CAUTION–Do not connect center hose to pump when there is still pressure in system. This could be harmful to pump).* Turn condenser valve counter-clockwise until it seats. Turn high pressure gauge valve clockwise until seated. Start vacuum pump and evacuate the system to a minimum of 24" Hg. in at least 20 minutes. This will be indicated on the low pressure gauge of the gauge manifold. Turn low pressure gauge valve clockwise and fender valve counter-clockwise until seated. Shut off vacuum pump and disconnect center hose at pump fitting. If it is necessary to remove Pressure Test Gauge Manifold, turn valve stems on both condenser and fender apron valves counter-clockwise until seated. Disconnect both gauge hoses from service ports. Cap hoses and ports. Replace condenser and fender apron valve stem protector caps.



LINCOLN & MERCURY AIR CONDITIONING SYSTEM

CHARGING THE SYSTEM

If gas pressure has been released either through accident or for servicing, it will be necessary to completely recharge the system. Before recharging system, follow procedures under "Pressure Testing System", "Leak Testing System", and "Evacuating System" in order given. Connect manifold center hose of Pressure Test Gauge Manifold to a charged Freon tank. Open tank valve. Loosen manifold center hose at manifold connection and allow Freon to escape for a few seconds. Retighten center hose connection. Turn low pressure gauge valve about two turns in a clockwise direction. Turn fender apron valve stem slowly about 1-1/2 turns in a counter-clockwise direction. When pressure neutralizes, place manual temperature control lever in full cold position. Start engine. Allow engine to run at fast idle. Place Freon tank on scale and charge until 7½ lbs. (1953), 6½ lbs. (1954-55) have passed into system. *(CAUTION–If pressure in Freon tank not sufficient to force total lbs. into system it may be necessary to stand tank in pail of hot water. Do not use excessive heat on tank as this could cause an explosion).* When system is fully charged there will be no bubbles visible in the evaporator sight gauge. The pressures will be between 25-40 (1953), 20-30 (1954-55) PSI on low side, 120-190 (1953), 135-160 (1954-55) on high side. To check high and low pressures, engine must be running on fast idle. Fender apron valve and condenser valve must be cracked open. Both valves on gauge manifold must be turned clockwise until seated. To remove Pressure Test Gauge Manifold, turn valve stems on both condenser and fender apron valves counter-clockwise until seated. Disconnect both gauge hoses from service ports. Cap hoses and ports. Replace condenser and fender apron valve stem protector caps.

PUMPING DOWN THE SYSTEM

1953 MODELS

1) Install Pressure Test Gauge Manifold, Tool ACL53-3 with both valves turned in full clockwise position, with high pressure gauge hose connected to high pressure valve service port, and low pressure hose to low pressure valve service port.

2) Turn low pressure valve located on right front fender apron and high pressure valve located on condenser, 1½ turns in clockwise direction, using Tool ACL53-5. Both gauges will read neutral system pressure (approximately 50-75 PSI at outside air temperature of approximately 70-75°F.).

3) Remove cap from shut-off valve on receiver and, using Tool ACL53-5 turn valve in full clockwise direction until seated. Start engine and run until there is no liquid visible in sight glass. Then run engine an additional 3 minutes. Turn low pressure valve clockwise until seated.

4) Shut off engine, then turn high pressure valve clockwise until seated. *CAUTION*–Never shut off high pressure valve with engine running. NOTE–When system is completely pumped down there is still approximately 15 PSI pressure in low pressure side. In pumped down condition high pressure gauge will read system pressure. The 15 PSI in low pressure side must be slowly exhausted when any low pressure fitting is opened.

CONTINUED ON NEXT PAGE

1953-55 LINCOLN & MERCURY (C ntinued)

1954-55 MODELS

When any assembly (except receiver tank or compressor) is to be replaced or serviced, most of Freon charge can be saved by pumping system down. This traps gas in receiver tank. Proceed as follows: Raise car and remove valve stem protector caps from both the receiver inlet and outlet valves. Turn stem on receiver outlet valve clockwise until seated. Lower car and start engine. Run engine on high idle for four minutes. At this point, there should be no more Freon visible in the evaporator sight gauge. While engine is still running, turn stem on receiver inlet valve clockwise until seated. Shut off engine. To release pumped down pressure turn receiver outlet valve counter-clockwise until seated. When system has neutralized, turn receiver inlet valve counter-clockwise until seated. Replace receiver valve stem protector covers.

ADDING PARTIAL CHARGE OF REFRIGERANT

Before adding a charge, follow procedures outlined under "Pressure Testing System", and "Testing for Leaks". Make sure both gauge valves are turned clockwise and condenser and fender apron valves counter-clockwise until seated. Connect center hose of gauge manifold to a charged Freon tank. Open tank valve. Loosen manifold center hose at manifold connection and allow Freon to escape for a few seconds. Retighten hose connection. Start engine and run at high idle. Turn fender apron valve about 1 1/2 turns in a clockwise direction. Place Freon tank on a scale. Turn low pressure gauge valve 1 1/2 turns in a counter-clockwise direction and add Freon 1/2 lb. at a time until sight glass remains clear at all engine speeds. At this point an additional lb. of Freon may be added as a safety factor. *(CAUTION–If pressure in Freon tank is not great enough to force gas into system, this pressure may be increased by standing tank in a pail of hot water. Do not use excessive heat on tank as this may cause an explosion).* Check system pressure. To check high and low pressures, run engine at fast idle. Open fender apron valve and condenser valve clockwise 1 1/2 turns. Turn both gauge valves clockwise until seated. Pressures should be 25-40 (1953), 20-30 (1954-55) PSI on low side, 120-190 (1953), 135-160 (1954-55) PSI on high pressure side. To remove Manifold, turn valve stems on both condenser and fender apron valves counter-clockwise until seated. Disconnect both gauge hoses from service ports. Cap hoses and ports. Replace condenser and fender apron valve stem protector caps.

EVACUATING A PUMPED DOWN SYSTEM

Clamp Pressure Test Gauge Manifold Tool 53-3 to radiator air deflector. Remove protector cap from condenser valve stem, and make sure stem is turned in the full counter-clockwise direction. Remove cap from condenser valve service port and low pressure service hose. Connect low pressure gauge hose to condenser valve service port. (NOTE–With system blocked at receiver, it will be necessary to evacuate from the high pressure side. The valve arrangement used in the compressor would block evacuation from the low pressure side. The low pressure gauge must be used, as it is the only one equipped to measure vacuum. Make sure high pressure gauge valve is turned in the full clockwise direction. Connect center hose of gauge manifold to vacuum pump. Start pump. Turn low pressure gauge valve counter-clockwise about two turns. Turn condenser valve stem clockwise about 1-1/2 turns. Evacuate system to a minimum of 24" Hg. after 20 minutes. Turn low pressure gauge clockwise until seated. Release pump down pressure by turning receiver outlet valve counter-clockwise until seated. When system pressure has neutralized, turn receiver inlet valve counter-clockwise until seated. Disconnect vacuum pump, and turn low pressure gauge valve counter-clockwise about 1/2 turn. Allow Freon from system to purge through gauge manifold for a few seconds to clear manifold of any air. Turn low pressure gauge clockwise until seated. Check system pressures and test for leaks (See "Pressure Testing System" and "Testing for Leaks"). If it is necessary to add to the charge of refrigerant, Follow procedures under "Adding A Partial Charge of Refrigerant". If Pressure Test Gauge Manifold is not going to be used further, it may be removed at this time. To remove, turn valve stems on both condenser and fender apron valves counter-clockwise until seated. Disconnect both gauge hoses from service ports. Cap hoses and ports. Replace condenser and fender apron valve stem protector caps.

EVACUATING COMPRESSOR & ADDING PARTIAL CHARGE OF REFRIGERANT

1954-55 MODELS

EVACUATING COMPRESSOR & ADDING PARTIAL CHARGE OF REFRIGERANT (After Checking & Adding Oil or After Re-installation of Compressor): Attach manifold gauge set, tank of Freon-12, and a vacuum pump to the system as follows: Remove service valve stem covers and make sure that both service valves are at maximum counter-clockwise position. Remove service port gauge port covers, and attach flexible hoses of gauge set to gauge ports and to a tank of Freon-12 (center line). Turn both manifold gauge valves to the maximum clockwise position. Attach vacuum pump to center connection of gauge manifold. Place both service valves at maximum clockwise position, and both gauge valves at maximum counter-clockwise position. Run vacuum pump until low pressure gauge indicates as close to 30" of vacuum as possible. Close pump valve, turn off pump. Open Freon-12 tank valve, then check all compressor connections for leaks. Shut Freon tank valve. Turn both service valves to maximum counter-clockwise position. Check quantity of Freon-12 in system (see "Bubbles in Sight Glass" under CHECKING above). Add partial charge of refrigerant as follows:

Adding Partial Charg f R frig rant: With manifold gauge set attached, open Freon-12 tank valve. Purge air from high pressure hose by loosening high pressure hose at service valve. Tighten connections and set high pressure gauge valve at maximum clockwise position. Set low pressure gauge valve at maximum counter-clockwise position. Loosen low pressure gauge hose slightly at low pressure service valve to purge air from hose. Tighten connection. Set both service valves at center position. Run engine at 1500 RPM with temperature control knob at maximum cold position. Charge system until liquid sight glass shows no bubbles. Continue to charge system until one additional lb. of Freon-12 has been removed from tank. It may be necessary to place Freon-12 tank in a container of hot water (not to exceed 125°F.) to force gas from tank. *(CAUTION–Never heat Freon-12 tank with torch. A dangerous explosion may result).* Set both service valves at maximum counter-clockwise position. Remove gauge set, cap service valve gauge ports and valve stems.

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

1953 MODELS

COMPRESSOR: Removal—Follow steps 1 and 2 under Pumping Down The System. If both gauges read neutral system pressure continue with following steps and pump down system. If system pressure low, or there is no pressure, remaining steps of pumping down system may be omitted. Drain coolant from radiator and cylinder block. Loosen valve fitting on flexible low pressure hose, allow refrigerant to exhaust, disconnect hose, cap hose and fitting immediately. Disconnect flexible high pressure hose at compressor, cap compressor fitting and hose fitting immediately. Disconnect defroster blower motor bullet connectors, heat delivery chamber clips, turn motor clockwise, remove assembly. Disconnect water by-pass tube at water outlet connection, oil filler cap and oil lever indicator, exhaust manifold cross-over pipe and heater hose clamp attached to lower right stud on right hand exhaust manifold. Remove cap screw from compressor which secures oil level indicator tube bracket to compressor, then cap screw from compressor which secures compressor to manifold bracket. Loosen compressor head cap screw sufficiently to remove bracket supporting heater hose, retighten cap screw to 20 ft. lbs. torque. Disconnect heater hose connection at water pump, move out of way. Remove compressor belt from compressor pulley, remove generator. Remove two cap screws securing compressor mounting pad to cylinder block, allow compressor to rest against cylinder block and upper front suspension arm. NOTE—One attaching stud taps into engine water jacket. Lift compressor, with high pressure hose attached, from engine compartment. NOTE—When replacing defective compressor, remove high pressure hose and install immediately on replacement compressor. Cap fitting on defective compressor.

Installation: Install 3/8-2" stud in compressor pad rear mounting hole in engine block (locating stud, to be removed later). Position compressor on locating stud, replace cap screw in forward mounting pad hole. Remove locating stud, replace rear cap screw. Torque screws to 23-28 ft. lbs. NOTE—Apply water sealer to rear cap screw before installation.

CONTINUED ON NEXT PAGE

1953-55 LINCOLN & MERCURY (Continued)

Install generator, then idler and support assembly. Install and adjust generator belt, then compressor belt by pulling idler against belt to allow approximately ½" deflection at point midway between water pump and compressor pulley. Install heater hose connection to water pump, then install heater hose bracket under compressor head cap screw (torque cap screw to 25-30 ft. lbs.). Install oil level indicator tube to compressor bracket, then compressor to manifold bracket. Install flexible low and high pressure hoses. Install exhaust manifold cross-over pipe, using new gaskets, then attach heater hose clamp to lower right stud on right hand exhaust manifold. Install water by-pass tube using new gasket, then defroster blower and inlet duct assembly. Tighten cylinder block and radiator drain cocks, replace coolant. If system has been pumped down open shut off valves in following order (turn valves full counterclockwise direction to open): Receiver shut off valve; when no more liquid Freon is flowing past sight glass, open low pressure valve, then high pressure valve. If system has been exhausted, evacuate and charge (see above).

CONDENSER ASSEMBLY WITH MODULATOR VALVE & HIGH PRESSURE VALVE ATTACHED: Removal—Follow steps 1 and 2 under Pumping Down The System. If there is pressure in the system, open low pressure valve of Manifold by turning stem counterclockwise, exhaust refrigerant through center Manifold hose until low pressure gauge reads "0" PSI, then close low pressure valve of Manifold by turning clockwise until seated, open high pressure valve of Manifold slightly by turning stem counterclockwise and very slowly exhaust refrigerant through center Manifold hose until high pressure gauge reads "0" PSI, Close high pressure valve of Manifold by turning stem clockwise until seated. Whether pressure or no pressure was in system disconnect high pressure hose at high pressure valve on condenser, cap hose and valve fittings. Disconnect by-pass hose at modulator valve located on condenser. Cap hose and valve fitting. Disconnect condenser outlet tube from high pressure tube leading to receiver tank, cap both line fittings. Disconnect Bowdin wire at manual control on condenser modulator valve, then remove four cap screws (2 per side) securing condenser assembly to condenser mounting brackets. Remove condenser assembly with modulator valve and high pressure valve attached. NOTE—When removing condenser assembly, lift assembly upward being careful not to damage condenser outlet line and fitting or radiator core. Do not attempt to transfer or replace condenser outlet line, high pressure valve or modulator tube. When replacing condenser assembly, transfer modulator valve and bracket assembly to replacement condenser.

Installation: Position condenser assembly with modulator valve and high pressure valve attached in condenser mounting bracket, using care not to damage radiator core or condenser outlet tube. Secure condenser to condenser bracket with four cap screws—two each side. Remove caps from condenser outlet tube and high pressure line to receiver and, using new copper seals, connect tubes and tighten fitting. Remove caps from flexible high pressure hose attached to compressor, and high pressure valve fitting. Connect hose to high pressure valve using new seal, tighten fitting. Remove caps from by-pass hose and modulator valve fitting, connect hose to modulator valve using new seal, tighten fitting. Connect Bowden cable wire to manual control on condenser modulator valve. With instrument panel selector lever half way between cold and warm, manual cam lever on modulator valve should be at 90° to valve body. Tighten modulator valve bracket set screw, locking cable housing in position. Check opening of valve by moving selector lever to right. Install new dehydrator assembly (see below). Pressure test, evacuate and charge system (see above). Test for leaks.

1954-55 MODELS

CONDENSER ASSEMBLY WITH MODULATOR VALVE ATTACHED: Removal—Clamp Pressure Test Gauge Manifold Tool 53-3 to radiator air deflector. Remove protector caps from valve stems on condenser valve and fender apron valve. Turn both valve stems counterclockwise until seated. Remove service port caps. attach high pressure gauge hose to condenser valve service port, and low pressure gauge hose to fender apron valve service port. Make sure both valves on gauge manifold are turned clockwise until seated. check system pressure by turning valve stems on condenser and fender apron valves 1 1/2–2 turns in a clockwise direction. Both gauges should read between 50-80 PSI. If there is pressure in system, pump down system. Disconnect by-pass line at modulator valve fitting, cap line and fitting immediately. Remove cap screw holding by-pass line clamp to top of condenser. Disconnect high pressure hose at condenser valve fitting. Cap hose and fitting immediately. Loosen clamp holding Bowden wire housing to modulator valve mounting bracket. Slip wire down off pin on modulator valve actuating arm. Disconnect high pressure line at fitting on lower right hand corner of condenser assembly. Cap line and fitting immediately. Remove two bolts, nuts and flat washers holding hood lock support to upper radiator braces. Remove four bolts, nuts and washers holding lower hood lock support braces to radiator support and four nuts, bolts and washers holding hood lock support to fender apron. Remove acorn nut holding hood lock support to its rod, then remove support with two lower braces attached. (NOTE—It will be necessary to slip head lamp wiring loom out of clips on the under side of the hood lock support). Remove six cap screws, 3 each side, holding condenser mounting brackets to radiator support assembly. Remove condenser assembly with modulator and condenser mounting brackets attached. (NOTE—When replacing condenser assembly, transfer modulator valve and condenser mounting brackets to new condenser). If it is necessary to remove Pressure Test Gauge Manifold, turn valve stems on both condenser and fender apron valves counter-clockwise until seated. Disconnect both gauge hoses from service ports. Cap hoses and ports. Replace condenser and fender apron valve stem protector caps.

Installation: If Pressure Test Gauge Manifold Tool 53-3 has been removed, install as follows: Clamp manifold assembly to radiator air deflector. Remove protector caps from valve stems on fender apron and condenser valves and turn both stems counter-clockwise until seated. Remove caps from service ports. Attach high pressure gauge hose to condenser valve service port, and low pressure gauge hose to fender apron valve service port. Make sure both valves on gauge manifold are turned clockwise until seated. Place condenser assembly, with mounting brackets and modulator valve attached, in position on radiator support and attach with six mounting cap screws. Place hood lock support, with two lower braces attached, in position on fender apron mounting brackets and install four attaching cap screws. Install acorn nut holding hood lock support to hood lock support rod. Install four bolts, nuts and washers holding lower hood lock support braces to radiator support. Install two bolts, nuts and washers holding hood lock support to upper radiator braces. Slip headlamp wiring loom into clips on underside of hood lock support. Remove caps from high pressure line and fitting on right hand corner of condenser assembly. Using new copper seal, connect line to fitting. Remove caps from modulator valve fitting, and by-pass line. Using new copper seal, connect line to fitting. Remove caps from flexible high pressure hose and condenser valve. Using new copper seal, connect hose to fitting. Secure by-pass line clamp to top of condenser with cap screw and lockwasher. Place manual temperature control in full cold position. Rotate modulator valve actuating arm as far as it will go towards the right hand side without forcing it, and slip Bowden wire loop up over end of actuating arm pin. Clamp Bowden wire housing to modulator valve mounting bracket. Replace dehydrator (see Removal & Installation of Dehydrator Assembly). If system was pumped down, first evacuate (see Evacuating a Pumped Down System). Release pumped down pressure by turning receiver outlet valve counter-clockwise until seated. When system pressure has neutralized, turn receiver inlet valve counter-clockwise until seated. Test entire system for leaks (see Leak Testing Procedure). If there was no system pressure, perform "Pressure Test", "Leak Test" "Evacuate", and "Charge" system in this order. Turn valve stems on condenser valve and fender apron valve counter-clockwise until seated. Remove Pressure Test Gauge Manifold, replace protector caps on condenser valves, fender apron valves, and both valves on receiver. Cap service ports, and manifold hoses.

COMPRESSOR ASSEMBLY: Removal—Drain radiator and engine block. Disconnect battery ground cable. Remove protector caps from valve stems on condenser valve and fender apron valve. Turn valve stems clockwise until seated. Disconnect water by-pass line at thermostat housing. Remove oil filler cap and oil level indicator. Remove exhaust crossover pipe. Disconnect heater outlet tube at water pump connection and remove cap screw securing heater tube clamp to compressor. Raise car and remove generator as follows: Remove radiator splash shield, loosen gener-

CONTINUED ON NEXT PAGE

1953-55 LINCOLN & MERCURY (C ntinued)

ator idler to remove belt tension, loosen generator mounting cap screws, remove generator drive belt. Remove arm, field, and ground wires from connections on generator, remove generator mounting cap screws and generator. Remove two cap screws securing compressor. Note wiring harness clip on rear cap screw. Lower vehicle and disconnect flexible high pressure hose and flexible low pressure hose at compressor fittings. Cap hoses and fittings immediately. Remove exhaust manifold crossover pipe extension. Loosen compressor belt idler arm and remove belt. Remove two cap screws holding compressor to compressor mounting bracket. *(CAUTION–Support compressor ass mbly to keep it from falling when cap screws are removed).* Remove compressor by lifting up around heater connections and out through engine compartment.

Installation: Place a headless stud in one of the mounting holes in compressor. Place compressor in position in engine compartment with stud through bracket for support. Replace one compressor-to-bracket attaching screw. Remove headless stud and replace second cap screw. (NOTE–Slip oil dipstick tube brace over rear cap screw before installing). Place compressor drive belt in position over compressor and crankshaft pulleys. Connect heater return line to water pump. Secure heater tube clamp to compressor. Connect flexible low and high pressure hoses to compressor. Use new copper seals. Replace exhaust manifold crossover pipe extension, using new gasket. Make sure heater supply line clamp is installed on lower stud before tightening nut. Connect water by-pass line to thermostat housing, using new gasket. Install oil filler cover, and oil level indicator. Raise vehicle and secure compressor idler bracket to compressor with attaching cap screw. Replace two compressor to engine block mounting cap screws. Make sure wiring harness clip is placed on rear cap screw before installing. Place compressor belt over idler wheel. Install generator as follows: Place in position in mounting bracket and install rear cap screw. Install front cap screw with spacer between generator and mounting bracket. Install field, arm, and ground wires. Place generator drive belt in position on pulleys and up over idler wheel. Tighten idler in position, and adjust belt tension by pulling down on generator assembly and tightening generator mounting screws. Replace generator splash shield. Lower car and adjust compressor belt tension by loosening idler arm attaching cap screws, and pulling idler pulley up against belt. Final adjustment is made by tightening idler arm attaching screws, and turning idler arm adjusting screw down until there is approximately 1/2" deflection of the belt when it is pushed at a point about half-way between the two pulleys. Turn the valve stems on both the condenser and fender apron valves counter-clockwise until seated. Install a new dehydrator assembly (see Removal & Installation of Dehydrator Assembly). Pressure test system (see Pressure Testing System). Leak test system. If bubbles or foaming can be seen in evaporator sight glass with engine running on high idle, add refrigerant (see Adding a Partial Charge of Refrigerant). If there is no charge in system, "Pressure Test", "Leak Test", "Evacuate", and "Charge" in order given.

PARTS REPLACEMENT

1954-55 MODELS

►*NOTE:* Later 1954 and all 1955 Compressors may be serviced as indicated below. Those 1954 Compressors that may be serviced are identified by a 3/8" diameter tapped hole drilled in the end of the compressor pulley shaft. Compressor decals prohibiting repair may be ignored to the extent given below. 1953 and Early 1954 Compressors are serviced by replacement only.

COMPRESSOR SHAFT SEAL: *(NOTE–*A small quantity of oil around the compressor shaft seal is normal. An excessive amount of oil (to the point where it drips) indicates a leak. Always confirm a seal leak by checking with a leak detector). To replace compressor shaft seal, remove compressor and proceed as follows:
1) Remove two 1/8" Allen set screws from pulley hub. Both set screws are in the same hole, one on top of the other. Remove pulley with gear puller. *(NOTE–*The disconnect bolts may be removed from the 1955 pulley and the holes used in conjunction with an appropriate puller. A puller used on a 1954 pulley must grip the rear face of the pulley to prevent damage to the belt surfaces). Remove woodruff key from shaft. Check for and remove any burrs existing on shaft surface.

2) Compress seal bellows to clear snap ring and remove snap ring. Position compressor with pulley shaft upright. Remove seal seat *(NOTE–*White lead is used by manufacturer in assembling pulley to shaft and excessive white lead may cause seal seat to stick. If such a condition exists the seal seat can usually be loosened by tapping lightly to break bond. If this fails, a small gear puller may be used).

3) Clean seal plate and shaft thoroughly with a suitable solvent using care to prevent dirt or solvent from entering compressor. Remove seal bellows assembly. It can be pried free of seal plate with two screwdrivers. Remove "0" ring from groove in seal plate. Using new "0" ring, coat with clean compressor oil and insert into groove in seal plate.

4) Coat mating surfaces of new seal bellows assembly and shaft with compressor oil and reassemble seal bellows to compressor *(NOTE–*Brass cartridge enclosing seal bellows is a light press fit in front plate. The pressure seal is accomplished by the large "0" ring in the seal plate. Brass cartridge must go into front plate perfectly square and the flange must bottom against front plate all the way around). Wet seal seat with clean compressor oil and install with lapped surface towards seal bellows. Replace snap ring. Place woodruff key in compressor shaft slot. Lubricate shaft and pulley bore. Install pulley on shaft so that outer face of pulley hub is flush with end of shaft *(NOTE–*This must be accomplished without putting any pressure on the rear compressor shaft bearing. A puller can be made by using a 3/8"-16x1½" capscrew, nut and large flat washer. Install nut and then washer on capscrew. With washer next to pulley hub, bottom capscrew in tapped hole of shaft and use nut to press pulley into place). Replace both Allen screws in pulley hub.

COMPRESSOR VALVE PLATE: *(NOTE–*Valve plate assembly may be serviced with compressor on or off car. If compressor is removed, it should be serviced in an upright position). Proceed as follows:
1) Isolate compressor and relieve compressor pressure. Remove compressor cylinder head and valve plate *(NOTE–*Cylinder head or valve plate may stick to compressor body. Loosen with hammer and drift. All blows should be in an upward direction to prevent damage to pins that protrude from lower face of valve plate). Inspect valve plate, suction valve leaves and pins carefully. Check to see if tab on valve plate gasket was bearing against bottom surface of leaf rather than top surface. When assembling, use all new gaskets. *(NOTE–*Most valve malfunctions are caused by dirt or foreign particles working their way under the valves, causing them to remain open. Valve plate assembly and suction valve leaves may be cleaned in solvent. After cleaning, inspect valves closely. If there appears to be no damage to the valve plate sealing surface or suction leaves, they may be thoroughly dried, coated with refrigerant oil and reassembled. Use new gaskets. The oil will hold the suction leaves in place on their pins while valve plate is being assembled to the compressor body. Replace any parts that appear damaged. If cylinders, or tops of pistons show damage, compressor must be replaced).
2) To reassemble, coat all pieces with refrigerant oil and assemble in the following order (compressor upright): Valve plate gasket, valve plate with leaves attached, head gasket, and head *(NOTE–*Order of reassembly is important, since tabs on valve plate gasket serve to anchor the suction leaves in place).

SUCTION & DISCHARGE LINE FITTINGS: Fittings are retained to compressor body with two Allen screws. A 7/32" Allen wrench is required to remove a fitting. Use new gaskets whenever a fitting is replaced. Wet gaskets with compressor oil.

SUCTION STRAINER SCREEN: Suction strainer is a finger strainer located in a recess under suction line fitting. After fitting and gasket have been removed, strainer and its gasket can be removed and replaced. Use new gaskets whenever a fitting is replaced. Wet gaskets with compressor oil.

OIL SIGHT GLASS: *(CAUTION–*If a broken or leaking oil sight glass is suspected, it should be thoroughly leak tested. This thorough check is recommended because a broken sight glass is rare and rather difficult to replace).

1954-EARLY 1955 PONTIAC AIR CONDITIONING

Pontiac (1954-Early 1955)①

①—See Production Changes below. For "Later 1955 Pontiac" see "1954-55 Frigidaire (G.M.)" Air Conditioning.

►CHANGES & CORRECTIONS

►*1954 PONTIAC COMPR. CLUTCH & PULLEY ASSEMBLIES PRODUCTION CHANGE:* After production of first 500 clutch and pulley assemblies, a change was made in the clutch plate and hub assembly. This change also made it necessary to change pulley, coil, and bearing assembly; and brush and bracket assembly. *New and old type parts are not interchangeable.* New type clutch plate can be identified by date stamped on clutch facing. New type pulley, coil, and bearing assembly has date stamped on coil. New brush and bracket assembly will be serviced in a dated bag. *Original or old type parts were not dated.*

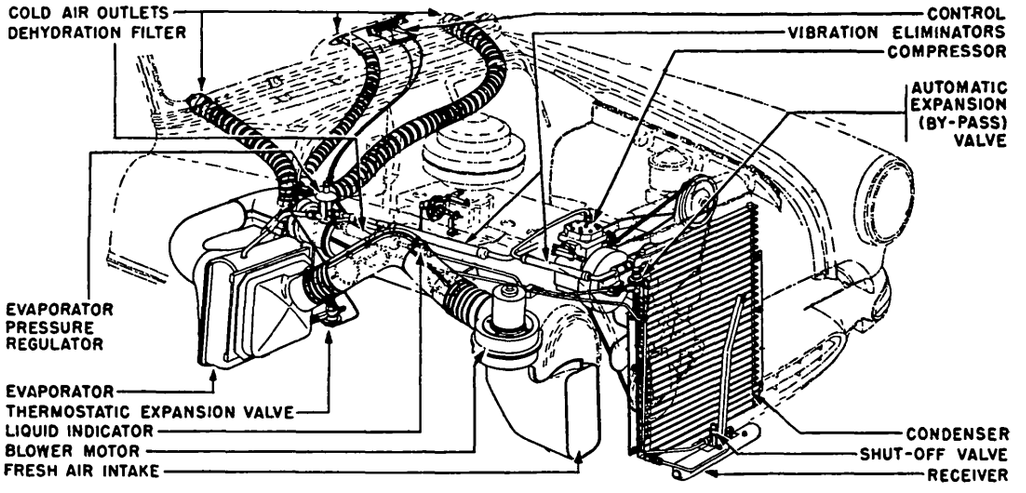
►*1954 PONTIAC HYDRA-MATIC IDLE SPEED CAUTION & CORRECTION:* With idle speed of 375 ± 10 RPM on cars equipped with Hydra-Matic and air conditioning, clutch plate has tendency to slip on pulley assembly which wears clutch plate facing and also heats up entire magnetic clutch assembly due to intermittent slippage because setting is not sufficient to operate compressor and still maintain a relatively smooth engine idle speed when the increased compressor head pressures are attained. To correct this condition, the idle speed should be set at 470 ± 10 RPM.

►*1954 PONTIAC CONDENSER CHANGE (To Eliminate Vibration):* New condenser is identical in design to that previously released except that condenser mounting support is now separated by rubber. Early and late type condensers are interchangeable except that new type mounting support (with rubber), Part No. 520219, must be used with late type condenser, Part No. 8522905.

►*1954 PONTIAC COMPR. CYLINDER HEAD PROD. CHANGE (To Dampen Compressor Pulsation and Smooth Out Operation of System):* A larger volume compressor cylinder head and some related parts have been released under Service Kit Package No. 3133304. It is necessary to install this kit on cars having the earlier type compressor cylinder heads. When installing the cylinder head spacer, during installation of the above kit, it is imperative that spacer be installed with smooth side up towards cylinder head. To reduce possibility of gasket leaks when installing kit, it is recommended that all gaskets used in kit be coated on both sides with refrigeration or compressor oil before installing. Use one of oils listed under Checking Compressor Oil Level & Adding Oil.

►*1954 PONTIAC COMPRESSOR CYLINDER HEAD TORQUE CHANGE:* Cylinder head bolts should be tightened to 25 ft. lbs. rather than 12-15 ft. lbs. originally specified.

►*1955 PONTIAC RECEIVER & DEHYDRATOR-FILTER PRODUCTION CHANGE:* A combination unit (after first 800 cars) replaces two units used previously. The combination unit has no shut-off valve at the receiver which changes certain service procedures. Freon capacity of system with combination type is 3¾ lbs. instead of 5¼ lbs. with early type unit with separate receiver. *For service procedures on later 1955 type see "1954-55 Frigidaire (G.M.)" Air Conditioning.*



1954 PONTIAC AIR-CONDITIONING INSTALLATION

►*1955 PONTIAC COMPRESSOR CHANGE:* A five cylinder, horizontal, reciprocating type compressor (Frigidaire), replaces the twin cylinder, vertical, reciprocating type used in 1954. *For service procedures on 1955 Compressor see "1954-55 Frigidaire (G.M.)" Air Conditioning.*

►*1955 PONTIAC OTHER CHANGES & CORRECTIONS: See "1954-55 Frigidaire (G.M.)" Air Conditioning.*

►*1955 AUTOMATIC FAST IDLE PRODUCTION CHANGE:* Automatic fast idle, which was actuated by placing selector lever in neutral, is not used in 1955.

►*1955 OUTSIDE AIR INTAKE PRODUCTION CHANGE:* Outside air is supplied to system through cowl air intake. All outside air passes through filter before entering evaporator, whether to be cooled or by-passed.

►*1955 AIR RECIRCULATION PRODUCTION CHANGE:* An air recirculation system has been included to increase cooling capacity or eliminate outside odors when necessary. Exclusive use of outside air or recirculation of air within car may be selected by movement of one push-pull control. When pulled out, air in the car and system is recirculated, with a small amount of outside air still being admitted to pressurize the inside of the car. Pressure prevents warm air from entering any openings in body. With control button pushed in, only outside air passes through system into car. Positions between full out and in will give mixed outside and recirculated air. Fan must be on full speed (switch fully down) when recirculation is used. Recirculation should only be used after car has started to cool.

►*1955 PONTIAC COMPRESSOR BELT MISALIGNMENT CORRECTION:* To correct, elongate the two front inner insulator bracket (Part No. 521086) bolt holes by ¼" back toward compressor mounting flange, then place a 1/16" thick flat washer at each of the two insulator bolts to space bracket out from rubber insulator. Bend outer end of front outer insulator bracket back and in towards compressor 1/8". Condition has in later production.

DESCRIPTI N

Compression process cycle type, using Freon-12 as refrigerant. System consists of following elements:

Refrigerating: Compressor—Located at top right front of engine is twin cylinder, vertical, reciprocating type with leaf type intake and discharge valves. Operation causes and maintains necessary high pressure in system needed to increase Freon vapor temperature.

►*NOTE: For Early 1955 Compressor, see "1955 Pontiac Compressor Change" above.*

Condenser—Located in front of radiator. Condenses refrigerant vapor discharged from the compressor, through action of fast moving air over metal surfaces of condenser.

Receiver—Located in front of radiator and beneath condenser. Stores liquid refrigerant. Stores liquid refrigerant and maintains supply more than needed normally.

Liquid Indicator—Located between receiver and dehydrator-filter. Provides means for determining adequacy of refrigerant charge.

Dehydrator-Filter—Located to rear of liquid indicator. Filters and dehydrates circulating Freon.

Thermostatic Expansion Valve-Located to left of evaporator. Supplies liquid to cooling core of evaporator at same rate that refrigerant is removed from it in a vaporous state.

Evap rat r (Boiler)—Located in rear of right front

CONTINUED ON NEXT PAGE

1954-EARLY 1955 PONTIAC (C ntinu d)

fender baffle. Container for refrigerant which readily absorbs heat from surrounding air when temperature of refrigerant liquid is reduced. In core of evaporator refrigerant is changed to liquid.

Evap rat r Inl t Ass mbly: In front of evaporator. Provides means for removing dust and other foreign material from air passing through evaporator core into car. Can be removed and cleaned.

Evap rat r Pressur R gulator Valve: Located above and forward of evaporator. Prevents evaporator pressure from falling below 30 psi. thereby keeping boiling temperature of Freon above 32° F.

By-Pass Valv –Located at top right of condenser. Provides automatic opening and closing of by-pass cycle. With evaporator pressure regulator valve closed, pressure in suction pipe drops rapidly until a pressure of 15 psi. is reached. At this point the by-pass valve opens permitting Freon flow to the compressor, and through system except that the evaporator is by-passed.

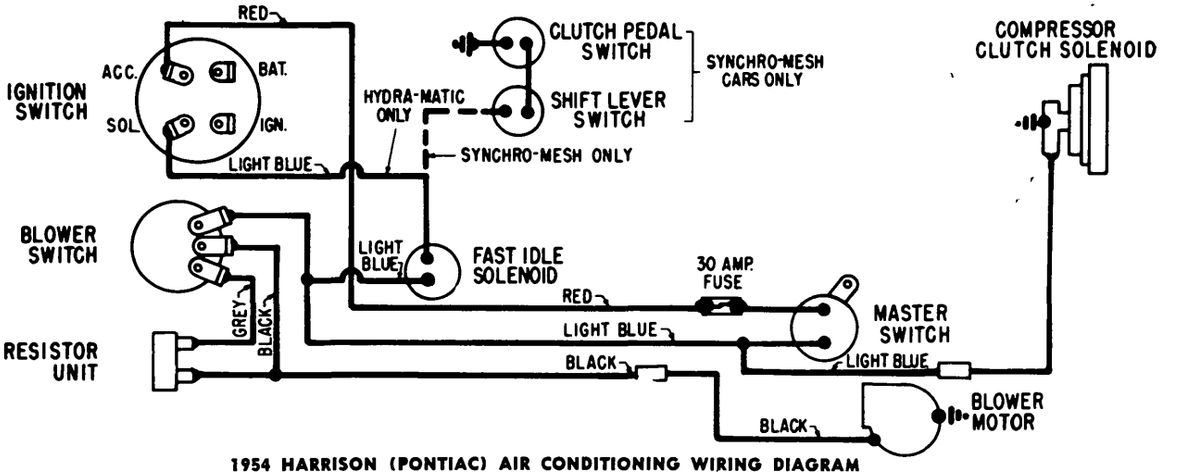
Vibrati n Eliminat rs–Enlarged flexible portions of compressor suction pipe and compressor-to-condenser pipe. Required because compressor is mounted on engine. The flexible portion of the compressor-to-condenser pipe also serves to reduce vibration caused by pressure pulsations of compressor. The vibration eliminator in compressor suction pipe is covered with rubber to prevent frosting which, if permitted to occur would cause serious damage to the copper bellows of the vibration eliminator.

Air Circulating: Bl w r–Located behind air intake at front of car. System can be operated without use of fan when car speed is sufficient to provide circulation.

Air Circuits–Warm air is drawn into car from outside through air intake at front of car, passes over evaporator core, and enters car through three adjustable air outlets mounted in dash of car.

Air Outl ts–There are three outlets located on the instrument panel of the car. Each of these outlets can be controlled to provide a direction of air flow desired. Center outlet contains a valve deflector plate which may be moved to shut off the air, or to change the vertical deflection of air flow. The others consist of adjustable nozzles mounted in ball sockets at each end of instrument panel.

C ntrol: R gulating–Mounted on instrument panel above heater controls. A sliding lever is the basic control. Movement of the control lever between "OFF" and "ON" activates a valve in the air duct permitting the entry of outside air. When position "ON" is reached, compressor is activated and circuit to blower is closed so that blower may be used if desired. Movement of the control lever between "ON" and "COLD" varies the amount of air traveling over the refrigerating coils of the evaporator, and as a result, varies the degree of cooling within the car according to the amount of cooled air mixed with uncooled air. A switch, marked "FAN", at right of control lever may be moved down to turn on the blower for forced ventilation. Two blower speeds are available–medium



1954 HARRISON (PONTIAC) AIR CONDITIONING WIRING DIAGRAM

when switch is horizontal, high when switch is full down.

►*NOTE: For Early 1955 Clutch, see "1954-55 Frigidaire" Air Conditioning.*

Compressor Clutch–Incorporated in compressor drive pulley assembly. When electrically energized by turning on the air conditioning, an electro-magnet in the pulley assembly locks the compressor drive plate to the pulley assembly. The drive plate which is fastened to the eccentric shaft then drives the compressor. When air conditioning is turned off, circuit to electro-magnet is broken and clutch releases. The compressor drive plate is pushed away from pulley assembly by release springs and thus, is no longer driven.

►*NOTE:* Fast Idle Diaphragm & Solenoid Assembly not used in 1955.

Fast Idle Diaphragm & Solenoid Assembly–An electrically controlled, vacuum operated mechanism that raises idle speed when car is in neutral and air conditioning is on. The fast idle mechanism is controlled so that it will operate only when transmission is in neutral with Hydra-Matic and only in neutral with clutch engaged with Synchro-mesh, and in both cases only when air conditioning control lever is open to, or past, the "ON" position. This control is accomplished by the starter neutralizer switch on Hydra-Matic. On Synchro-mesh cars two switches are required, a clutch pedal fast idle switch mounted on the dash-to-chassis frame brace directly under the clutch pedal, and a gear shift lower lever fast idle switch mounted at lower end of the steering column. When fast idle circuit is energized, fast idle solenoid opens vacuum passage to fast idle diaphragm. Diaphragm then moves inward and knurled adjusting nut on diaphragm stem contacts the carburetor throttle shaft lever, opening the throttle.

OPERATION

Freon gas under low pressure is drawn into the compressor, where it is compressed to high pressure. The process of compression also heats the gas. The hot Freon gas passes into the condenser where it cools by giving off heat to the air passing over the condenser surfaces. As the hot Freon gas is cooled it condenses into liquid at high pressure, and accumulates in the receiver below the condenser. Liquid Freon under high pressure passes to the expansion valve at the entrance to the evaporator. Freon passes through the expansion valve into the evaporator under a much lower pressure. Thus, due to the lowering of the pressure, Freon begins to boil, changing back to a gas. As the Freon passes through the evaporator, it continues to boil by absorbing heat from the air passing over the evaporator surfaces until by the time it leaves the evaporator, it is completely vaporized. From the evaporator the cool, low pressure Freon gas is drawn back to the compressor and the cycle repeated.

MAINTENANCE & INSPECTION

PRELIMINARY CHECK: Check compressor sight glass with compressor operating to see that compressor contains sufficient oil. Check compressor belt tension. Check operation of fast idle linkage. Check all air duct and hose connections for tightness. Operate system and check for correct operation in all control positions (*NOTE*–With control in "ON" position, clutch on front of compressor should engage). Check ambient air temperature and air temperature at outlets on instrument panel (See Table under Testing).

2,000 MILE INSPECTION: Check all connections for presence of oil which could indicate refrigerant leak. Check compressor belt tension and hose and air duct connections. Clean and recondition air filter. Check evaporator drain tube for dirt or restriction.

PERIODIC SERVICE: 1) Inspect condenser and radiator cores at 2000 mile intervals to be sure that they are not plugged with leaves or other foreign material.

2) Clean and recondition filter every 2000 miles or oftener in dusty areas.

3) Check evaporator drain tube for dirt or restrictions at 2000 mile intervals.

CONTINUED ON NEXT PAGE

1954-EARLY 1955 PONTIAC (Continued)

4) Every spring and fall or 10,000 miles give air conditioning unit a complete operational test (See Operational Test following).

AIR FILTER: Every 2000 miles, or more often in dusty areas, the filter should be cleaned and reconditioned as follows: Remove 5 access cover attaching screws and remove access cover from bottom of evaporator inlet behind right front wheel. Pull filter down out of evaporator inlet. (*NOTE*–In extreme cases where filter is lodged in place by an excessive accumulation of mud, it may be necessary to remove the evaporator inlet assembly to get the filter out. In such cases, some mud may have accumulated in the evaporator core and this should be flushed out with water). *CAUTION–Do not use steam or hot water since excessive pressure could be developed in the refrigeration system).* Clean filter by washing in a solution of water and any laundry detergent to remove the dirt laden filter conditioner oil. Re-coat filter by spraying with Pontiac Filter Conditioner. Spray both sides to make sure all of filter element is coated. (*NOTE*–Only Pontiac Filter Conditioner is recommended by manufacturer). Check drain tube in bottom of evaporator housing and clean out any mud which may have accumulated. Replace filter and install access cover.

TESTING

OPERATIONAL TEST: Remove caps from compressor gauge fittings and valve stems. Connect gauge set to compressor suction and discharge valve gauge fittings, then open suction and discharge valve gauge fittings by turning valve stems 1/4 turn clockwise. Purge gauge lines by cracking gauge set low and high pressure valves. Start engine, move air conditioning control lever to "COLD", and turn blower on high speed (Engine should be running at 1200 RPM.). Continue to run engine for ten minutes before checking for proper operation. While system is operating, check ambient (surrounding air) temperature. Also place fan in front of car to direct a stream of air against condenser and blower intake. After system has operated for ten minutes make following checks:

1) Observe liquid indicator to see that there is adequate Freon-12 in system. Bubbles may appear while system is by-passing, but liquid indicator should clear up when system is not by-passing.

2) Observe high pressure gauge. Compare pressure on gauge with pressure given in table below for the ambient temperature recorded above. It should be kept in mind that the head pressure (high pressure gauge) will increase as the temperature in the condenser increases. Thus, the pressure will increase as the car is run, but after 10 or 15 minutes should stabilize.

3) Observe low pressure gauge. With ambient air temperature below approximately 85° F. the system will by-pass periodically. The lower the ambient air temperature is, the more frequently the system by-passes. The pressure when the system is not by-passing will be as shown in table below. *NOTE*–When system by-passes, compressor suction pressure should drop to between 0-15 psi. The suction pressure will fluctuate somewhat if ambient air temperature is below 85° F. If pressure goes below 0 psi., remove cap from adjusting screw on by-pass valve and turn screw clockwise slightly to increase pressure to 0-15 psi. If pressure remains above 15 psi. when by-passing, turn screw counter-clockwise to decrease pressure to 0-15 psi. Proper setting should be obtained when top of adjusting screw is 1 9/64" above adjusting screw cap gasket.

4) Insert bulb of thermometer 1" inside either nozzle inside car. Hold there until temperature no longer drops (Be sure to read thermometer while bulb is 1" inside nozzle). Compare temperature of air leaving nozzle with temperature specified in table below.

1954 System Pressures & Temperatures ①

Ambient Temp. (°F.)	70	80	90	100
Compr. Discg. PSI	92-113	110-149	143-181	175-203
Compr. Suction PSI	5-7	5-16	5-25	12-25
Nozzle Max. Temp.	40	43	47	50
Evaporator Pressure	30	30	31	32

1955 System Pressures & Temperatures ①

Amb. Temp. (°F.)	70	80	90	100
Comp. Disch. (PSI)	140-170	150-200	180-240	230-290
Comp. Suct. (PSI)	10-25	11-29	17-34	25-42
Evap. (PSI-System By-passing)	23-28	23-28	23-28	23-28
Noz. Max. Temp. ②(RH)	50	53	58	64
Noz. Max. Temp. ②(LH)	49	52	56	61

①–With engine operating at 1200 RPM, hood open, recirculation knob pushed in, and after 10 minutes operation. Test to be made in a garage where sun load is not a factor and with auxiliary fan in front of radiator.

②–°F. measured 1" inside opening.

TEST & ADJUSTMENT OF EVAPORATOR PRESSURE: (NOTE–This test should be made with system operating and only after 10 minutes of operation). Remove protective cap from Schrader valve on side of pressure regulator. Assemble adapter J-5420 to end of low pressure gauge hose. Attach hose with adapter to Schrader valve on evaporator pressure regulator. Screw adapter on quickly to avoid excessive loss of Freon (Gauge shut-off valve should be closed). Observe pressure on gauge. If pressure does not agree with that given in table above, remove adjusting screw cap from top of evaporator pressure regulator valve. Adjust valve by turning clockwise to increase evaporator pressure, counter-clockwise to reduce evaporator pressure. *NOTE*–It is impossible to adjust evaporator pressure when compressor suction pressure is above 30 psi.

►**EVAPORATOR PRESSURE REGULATOR VALVE ADJUSTMENT NOTES:** In making adjustments of the Evaporator Pressure Valve note the following:

Extremely Warm Weather Adjustment–In extremely warm weather, it may be necessary to adjust the evaporator pressure regulator valve when ambient temperatures are in the vicinity of 100° F. or more. If the evaporator pressure regulator is adjusted to 30 psi. at these high temperatures, the actual evaporator pressure may drop to 27 or 28 psi. when the ambient temperatures fall to approximately 80° F. It is true that adjusting evaporator pressure at 30 psi. at 100° F. would give a little greater efficiency, but operation in slightly cooler weather would require a resetting or adjustment of the evaporator pressure regulator valve. If this is not done evaporator surface temperatures would be below 32° F. which would cause moisture deposits on the evaporator cooling surfaces to freeze rather than drain off, causing complaint of warm and cold air coming from the nozzles. To correct condition follow relationships in table above.

Slight Variation of Nozzle Temperature (Evaporator Freeze-Up)–Slight variation of the air temperature coming from the nozzles may be the result of a differential in the pressure between the chamber above the pressure regulator valve diaphragm (diaphragm to cap) and outside atmospheric pressure. This condition can be checked and corrected as follows: Attach low pressure gauge to the evaporator pressure valve, but **do not** remove the pressure regulator valve cap. Operate engine fast enough and long enough to insure the system is by-passing (blower motor must be set on low speed to perform this operational test). Check pressure reading and if pressure shows lower than 29 psi., watch gauge and remove cap over the adjusting screw. If no change in the gauge readings is noted, adjust pressure regulator valve in accordance with System Pressures & Temperatures table above. NOTE–In some cases removing the cap will correct the reading to 30 psi. (provided the valve was properly adjusted previously). This change in reading is the result of equalizing the pressure beneath the cap to that of atmospheric pressure. To guard against freeze-up condition, remove valve cap and drill a 1/16" diameter hole just off the center of the valve cap and also the valve cap gasket. (New valves presently in production now have this hole drilled in the cap and cap gasket.)

PRECAUTIONS, LEAK TESTING & TROUBLE SHOOTING

See "Air Conditioning Service Cautions", "Trouble Shooting" and "Leak Tests".

ADJUSTMENTS ON CAR

►*NOTE: For Early 1955 Adjustments, see "1954-55 Frigidaire (G.M.)" Air Conditioning*

COMPRESSOR BELT: Loosen two bolts retaining idler pulley support bracket (pump support bracket on power steering equipped cars). Insert torque wrench in square hole at end of bracket and apply 60 ft. lbs. torque to tighten belt. While holding 60 ft. lbs. torque, tighten retaining bolts securely.

FAST IDLE DIAPHRAGM & SOLENOID: Loosen lock nut on vacuum diaphragm stem. Set fast idle mechanism by turning knurled adjusting nut to give 750 RPM engine speed (hot) with transmission in neutral and air conditioning control lever in "COLD" position. Tighten lock nut.

FAST IDLE SWITCHES: On Hydra-Matic equipped cars the fast idle mechanism is controlled by the neutral-

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1954-EARLY 1955 PONTIAC (C ntinu d)

izer switch. On Synchro-mesh equipped cars the fast idle mechanism is controlled by a clutch pedal fast idle switch and a gearshift lower lever fast idle switch. For adjustment see Tune-Up on car model page.

CONTROL CABLES: Air Valve & Master Switch Control Cable—Move air conditioning control lever to "OFF" position. Loosen clamp which retains air valve and master switch control cable housing to bracket. Clamp should be loose enough to allow cable housing to slide freely. With another man holding control lever in "OFF" position, pull cable and control housing with control lever attached as far to the rear as possible. While holding in this position, tighten cable clamp. This will insure complete closing of the air valve in the "OFF" position.

Air Temperature Valve Control Cable—Move air conditioning control lever to full "COLD" position. Loosen clamp which retains air temperature valve control cable housing to bracket. Clamp should be loose enough to allow cable housing to slide freely. With another man holding control lever in "COLD" position, pull cable and housing with control lever connected as far to rear as possible. While holding in this position, tighten cable clamp. This will insure complete opening of air valve in duct to evaporator and oomplete closing of air valve in duct to air distributor in the "COLD" position.

PUMPING DOWN THE SYSTEM

When refrigeration pipes are to be disconnected on the low pressure side, the system can be pumped down to save the Freon. "Pumping Down" is the process of pumping all the Freon out of the low pressure side into the condenser and receiver, where it is stored while work is being performed. The evaporator pressure regulator valve, evaporator assembly, thermostatic expansion valve, dehydrator, liquid indicator, by-pass valve, and pipes connected to the above listed units can be removed after the system is pumped down. When compressor only is removed follow procedure outlined in "Pumping Down Compressor To Remove Compressor or Add Oil" below. To pump down system proceed as follows:

1) Close hand shut-off valves on gauge set by turning clockwise.

2) Remove caps from valve stems and gauge fittings on compressor suction and discharge valves. Connect hose from low pressure gauge to fitting on suction valve, and hose from high pressure gauge to fitting on discharge valve.

3) Open compressor discharge and suction valves by turning clockwise until they seat, then backing off one turn counter-clockwise. Use valve key J-5427.

4) Purge air from both gauge lines by cracking hand shut-off valves on gauge set. Close valves securely.

5) Remove valve cap and close valve on receiver outlet by turning clockwise.

6) Start engine, move air conditioning control lever to "COLD" and turn blower on (engine should be operating at 750 RPM). Operate air conditioning until low pressure gauge drops to "0" or below. Shut off air conditioning and observe low pressure gauge. Pressure will rise to some value and then stabilize. When low pressure gauge stops rising, move air conditioning control lever to "COLD" again (with engine running) and operate until pressure on low side again drops below zero. Shut off air conditioning and again allow pressure to rise until it stabilizes. Repeat this cycle until the pressure will no longer rise above zero. *CAUTION—Do not allow head pressure (high pressure gauge) to exceed 300 psi. If it does, shut off engine and wait for pressure to drop before proceeding.*

7) Shut off engine, immediately turn compressor suction and discharge valves clockwise as far as possible to close passage to suction and discharge pipes. The Freon has now been pumped into the receiver and condenser and is trapped in the high pressure side of the system. The low pressure side can be opened without loss of Freon.

8) Disconnect compressor clutch wire from connector on fender skirt so that compressor cannot be operated while system is pumped down.

PUMPING DOWN COMPRESSOR TO REMOVE COMPRESSOR OR ADD OIL: Operate engine at fast idle (750 RPM) and run air conditioning system for ten minutes. This will work Freon out of oil in compressor crankcase and stabilize system. After ten minutes stop compressor by disconnecting clutch wire at connector on fender skirt. Close suction valve on compressor by turning all the way clockwise. *(CAUTION—Engine should be turned off while closing valve to prevent possibility of injury and then started again).* Connect and disconnect compressor at 5 second intervals 4 times to pump all Freon out of compressor. That is; connect for 5 seconds, disconnect for 5 seconds, etc. Shut off engine and close compressor discharge valve by turning valve all the way clockwise. All Freon has now been pumped out of the compressor and it can be removed.

DEPRESSURIZING THE SYSTEM

When any of the units on the high pressure side of the system are to be replaced, it is necessary to release all the Freon from the system. The system must be depressurized to replace the compressor discharge valve assembly, compressor-to-condenser pipe, condenser, condenser-to-receiver pipe, and receiver. Proceed as follows: Remove caps from gauge fittings on compressor suction and discharge valves. Remove caps from valve stems. Crack both valves clockwise to allow slow escape of Freon from the system. If oil is noted around gauge fitting, Freon is escaping too rapidly. When hissing ceases (indicating all Freon has escaped) close off gauge fitting by turning discharge valve stem completely counter-clockwise.

EVACUATING THE SYSTEM

When the system is opened for service, some air will enter the pipes regardless of how quickly the pipes or openings are capped. *(CAUTION—Under no circumstances should alcohol be used in the system in an attempt to remove moisture).* When system has been depressurized, the complete system should be evacuated. When only the low pressure side had been opened, and the system has been pumped down to preserve the Freon, only the low pressure side should be evacuated.

EVACUATING LOW PRESSURE SIDE ONLY: Proceed as follows:

1) With system still pumped down, connect gauge set to compressor and close gauge valves.

2) Turn compressor suction valve completely counter-clockwise, then clockwise 1/4 turn to open passage to suction pipe. *CAUTION—Do not open compressor discharge valve or Freon will enter low side.*

3) Open high pressure valve on gauge set so that air pumped out of compressor discharge valve gauge fitting can pass out the center line of the gauge set. Place a clean, dry container under end of center line to collect any oil pumped out of compressor.

4) Start engine and turn on air conditioning system. Disconnect wire from fast idle diaphragm and solenoid assembly so engine will run at normal speed. Compressor will now evacuate the system, pumping the air out through the discharge valve gauge fitting and gauge set.

5) Observe low pressure gauge and operate compressor until gauge shows 26-28" vacuum. Continue to run compressor for 5 additional minutes. *NOTE*—If vacuum cannot be pulled to 26" or more, it indicates a leak in system or gauge connections, or a defective compressor. In this case it will be necessary to add a small amount of Freon to the low side of the system and check for leaks as follows:

a. Close high pressure valve of gauge set and turn off engine.

b. Open receiver shut-off valve momentarily to allow pressure to rise in low pressure side. *(NOTE*—Only a small amount of Freon should be passed into the low side to prevent wasting Freon).

c. Using leak detector J-5419, check all fittings in the low pressure side and on the gauge set for evidence of leakage. After leak has been found and corrected, evacuate the system again.

6) Close high pressure valve of gauge set and stop engine. Carefully check low pressure gauge to see that vacuum remains constant. If vacuum reduces, it indicates a leak in the system or gauge connections.

7) Check container placed under center line of gauge set to see that compressor has not pumped out an appreciable amount of oil. If more than one ounce of oil has been pumped out it should be poured back into the compressor following instructions for adding oil following.

8) If vacuum pulled down satisfactorily and held steady, (Steps 5 & 6 above), purge air from compressor head as follows: Open shut-off valve on receiver to allow Freon to enter low side. Open high pressure valve of gauge set for approximately 15 seconds to allow Freon to force air out of compressor discharge valve through gauge set. When air has been purged, close high pressure valve of gauge set.

9) Turn compressor discharge valve stem counter-clockwise to outlet to discharge pipe. Leave valve 1/4 turn clockwise for operational test.

CONTINUED ON NEXT PAGE

1954-EARLY 1955 PONTIAC (Continued)

10) Start engine, turn on air conditioning system and allow it to operate for ten minutes. While system is warming up, check for leaks with leak detector.
11) Check compressor sight glass to see that oil splashing is visible. If not, add oil.
12) After system has operated for ten minutes make operational test.

EVACUATING COMPLETE SYSTEM: Proceed as follows:
1) Connect gauge set to compressor the same as for pumping down system. Make sure shut-off valve on receiver is completely open (turned completely counter-clockwise).
2) Turn compressor suction valve 1-1/2 turns clockwise from full counter-clockwise position.
3) Turn compressor discharge valve all the way clockwise to seal passage to discharge pipe.
4) Open high pressure valve on gauge set so that air pumped out of compressor discharge valve gauge fitting can pass out center line of gauge set. Place a clean, dry container under end of center line to collect any oil pumped out of compressor.
5) Start engine and turn on air conditioning system. Disconnect wire from fast idle diaphragm and solenoid assembly so engine will run at normal idle speed. Compressor will now evacuate the system, pumping the air out through the discharge valve gauge fitting and gauge set.
6) Observe low pressure gauge and operate compressor until gauge shows 26-28" vacuum. Continue to run compressor for five additional minutes. *NOTE*–If vacuum cannot be pulled to 26" or more, it indicates a leak in the system or gauge connections, or a defective compressor. In this case it will be necessary to add a small amount of Freon to the low side of the system and check for leaks as follows:
a. Close high pressure valve of gauge set and turn off engine.
b. Connect flexible line from center of gauge set to Freon drum (drum should be at room temperature). See Step 2 under "Charging System" following for connecting Freon drum.
c. Open shut-off valve on drum and "crack" flexible line at center fitting on gauge set so that Freon will purge air from line. Retighten fitting when certain all air is purged from line.
d. Open both valves on gauge set. This will allow Freon to pass from the drum into the system. When pressure stops rising close both valves on gauge set (Since Freon drum is not heated, only a small charge will enter the system).
e. Using leak detector, check all fittings in the system for evidence of leakage. Also check compressor shaft seal. After leak has been corrected, evacuate the system again and charge as outlined under "Charging The System".
7) Close high pressure valve of gauge set and stop engine. Carefully check low pressure gauge to see that vacuum remains constant. If vacuum reduces, it indicates a leak in the system or gauge connections.
8) If vacuum pulled down satisfactorily above close valves tightly and turn off engine.
9) Check container placed under center line of gauge set to see that compressor has not pumped out an appreciable amount of oil. If more than one ounce of oil has been pumped out it should be poured back into compressor following instructions for adding oil following.
10) If vacuum remains constant after gauge valves are closed, purge air from compressor head as follows: With compressor discharge valve still turned completely clockwise, connect flexible line from center fitting of gauge set to Freon drum. Open valve on Freon drum and "crack" line at center fitting of gauge set to purge air from line. After air has been purged, tighten fitting. Open low pressure valve of gauge set to allow Freon to enter low side of system. When Freon stops entering system (only a small amount will enter since drum is not heated), close valve on Freon drum and low pressure valve of gauge set. Remove flexible line from Freon drum. Open high pressure valve of gauge set for approximately 15 seconds to purge air from compressor head (*NOTE*–Freon which has entered system will force air out of compressor head through compressor discharge valve gauge fitting and gauge set). When air has been purged, close high pressure valve on gauge set.
11) Turn compressor discharge valve stem completely counter-clockwise then clockwise 1 1/2 turns. System is now ready for charging. *NOTE*–System can be checked for leaks at this time by adding a small amount of Freon. This, however, will not eliminate the necessity of checking for leaks after system has been fully charged, since the low pressures obtained by adding a small amount of Freon at room temperature would show up only the relatively large leaks.

CHARGING THE SYSTEM

The system should be charged only after being evacuated as outlined above. To charge system proceed as follows:
1) See that both compressor valves are turned 1 1/2 turns clockwise and that both valves on the gauge set are closed.
2) Connect center flexible line of gauge set to Freon drum. It may be necessary to use reducer J-5462-4 with sealing washer J-5462-3 and fitting J-5462-9 to attach flexible line to Freon drum.
3) Place Freon in a pail of water which has been heated to 125° F. It may not be necessary to use hot water if a large drum is used (over approximately 100 lbs.) *Do not allow temperature to exceed 125° F. since high temperature will cause excessive pressure and possible softening of the fusible safety plugs in the Freon drum.*
4) Place Freon drum (in pail of water) on scales (bathroom or commercial scales) and weigh accurately.
5) Loosen line at center fitting on gauge set and "crack" valve on Freon drum to evacuate air from line. Retighten line at center fitting.
6) Open valve on Freon drum and both valves on gauge set to allow Freon to flow into system. Continue charging until scales show that 5 lbs. of Freon have been transferred from Freon drum to system. (*NOTE*–If full charge cannot be attained, close both valves on gauge set, start engine, and turn on air conditioning system to run compressor. Open low pressure valve on gauge set until full charge (5 lbs.) is taken in). *CAUTION–Observe high pressure gauge whil charging with compressor running, and do not let pressure exceed 300 psi.*
7) Close both valves on gauge set (high pressure valve will already be closed if charge was completed by running compressor) and close valve on Freon drum.
8) Operate engine at approximately 750 RPM with air conditioning control lever at "COLD" and blower on high speed. After at least 5 minutes of operation, observe appearance of Freon in liquid indicator. If bubbles are observed, open low pressure gauge valve and valve on Freon drum to allow more Freon to enter system. Close valves when liquid indicator clears up.(*NOTE*–If room temperature is below 75° F. when this check is made, bubbles may appear even though the proper amount of Freon is in system). Room temperature must be 75° F. or above to make an accurate check. It should also be observed that if suction pressure drops to 15 psi., the by-pass valve will open, allowing system to by-pass. (*NOTE*–When system is by-passing, outlet pipe leaving by-pass valve will be cold.) This may cause bubbles to appear in liquid indicator, but does not indicate an under-charge. If in doubt, remove cap from adjusting screw on by-pass valve and turn screw counter-clockwise until free, counting the number of turns. (Do not remove screw completely.) If bubbles still appear, add Freon until liquid indicator clears up, then turn adjusting screw clockwise, back to its original position. (See Operational Test preceding for proper adjustment of by-pass valve.) In no case should system be charged with more than 5 1/2 lbs. of Freon.
9) When Freon has been installed, continue to operate system and test for proper operation as outlined under "Operational Test" preceding.
10) When satisfied that air conditioning system is operating properly, stop engine, turn suction and discharge valve counter-clockwise securely to close gauge fittings, and remove gauge set. *NOTE*–A considerable amount of Freon will collect in the high pressure gauge line. Since some of this Freon will have condensed into liquid Freon, it will require an appreciable amount of time to allow pressure to bleed off. Open high pressure gauge valve slowly and let Freon out through center gauge line so that oil which has collected in lines can be directed onto floor.
11) Using leak detector, check complete system for leaks.

ADDING PARTIAL CHARGE OF REFRIGERANT

The following procedure should be used in adding small amounts of Freon that may have been lost due to leaks or while opening system for service. Before adding Freon to replace that lost by leaks, check compressor oil level and add oil if necessary (See Checking Compressor Oil Level & Adding Oil following). To add Freon proceed as follows:

CONTINUED ON NEXT PAGE

1954-EARLY 1955 PONTIAC (Con.inued)

1) Remove caps from compressor suction and discharge valve gauge fittings and valve stems. Attach gauge set to gauge fittings.
2) Attach flexible hose from center fitting of gauge set to Freon drum. With both valves on gauge set closed, open valve on Freon drum. "Crack" flexible line at center fitting of gauge set to allow Freon to expel air from line. Tighten fitting when satisfied that all air has been removed.
3) Start engine, move air conditioning control lever to "COLD" and turn blower on high speed. Operate for ten minutes to stabilize system.
4) Operate compressor suction valve gauge fitting by turning valve stem 1-1/2 turns clockwise. Turn compressor discharge valve 1/4 turn clockwise so high pressure gauge can be observed.
5) Place Freon drum on scales, note weight, and open low pressure valve only on gauge set.
6) With compressor operating, allow Freon to pump into system until liquid indicator clears up and immediately shut off valve on Freon drum. Check weight of Freon drum and pail of water. Then open valve on Freon drum and add 1/2 lb. of Freon if room temperature is below 85° F., or 1 lb. of Freon in temperature is above 85° F. Note total amount of Freon added.
7) Test for leaks and make operational check of system as outlined under "Operational Test" preceding.

CHECKING & ADDING OIL

The refrigeration system contains a total of 10 ozs. of oil. Originally all oil is in compressor, but after the system is once operated, a certain amount of the oil will circulate through the system with the Freon. For this reason it is impossible to merely drain the oil from the compressor and then add 10 ozs. of oil. The procedure outlined below must be used in order to assure the proper amount of oil in the compressor. It is never necessary to drain and refill the compressor since the system is sealed and therefore the oil cannot be contaminated. When adding oil use one of following refrigeration oils: Suniso 4G, Capella D, Ansul Chemical Co. #300, Frigidaire #300 or #300 LT. Refrigeration oil has an affinity for moisture and should be kept tightly capped when not in use to prevent absorption of moisture. No periodic check of oil level is necessary. As long as splashing of oil is visible in the sight glass, at each 2000 mile lubrication, no oil level check is necessary. Oil level should be checked at time Freon is added to system to replace that lost by leakage. This is necessary because some of the oil circulates through the system with the Freon and therefore, will be lost if a Freon leak develops. Always check oil level and add oil, if necessary, before adding Freon. To check oil level and add oil proceed as follows:

1) Operate engine and air conditioning system for ten minutes. This will remove Freon which mixes with oil in compressor crankcase when car is standing. If Freon is not pumped out of crankcase, it will boil out violently when oil filler plug is removed, causing excessive loss of oil.
2) Pump down compressor. See "Pumping Down Compressor To Remove Compressor or Add Oil " preceding.
3) Slowly remove oil filler plug from compressor. Any Freon left in compressor will escape when plug is being removed.
4) Insert a clean, black iron wire vertically in filler hole, until it bottoms in crankcase (Insert wire between compressor and suction pipe). Compressor shaft may be revolved to allow wire to clear oil slinger on shaft. Remove wire and measure height of oil from bottom of wire. Oil level should be 7/8" or more from bottom of compressor crankcase. If low, add recommended refrigeration oil to bring level to 7/8" from bottom of crankcase.
5) Install filler plug. While tightening filler plug, "crack" suction valve slightly to allow Freon to enter compressor. Freon, being heavier than air, will go to bottom of crankcase, expelling air through loose filler plug.
6) Turn compressor suction and discharge valve stems all the way counter-clockwise to open suction and discharge pipes and seal gauge fittings.
7) Replace valve stem caps. System is now ready for operation.

REMOVAL & INSTALLATION

►*NOTE: For 1955 Compressor Data, see "1954-55 Frigidaire (G.M.)" Air Conditioning.*

COMPRESSOR CLUTCH & PULLEY ASSEMBLY: Remove cap screw and lockwasher retaining clutch plate and hub assembly to compressor shaft. Slide clutch plate and hub assembly off shaft to remove. Remove retainer washer from hub of clutch plate (*NOTE*–if only clutch plate and hub assembly are to be replaced (which can be done only on dated assemblies), install new assembly as covered below). Loosen idler pulley or power steering pump retaining bolts to remove belt tension. Remove pulley, coil, and bearing assembly from compressor shaft. Remove clutch assembly spacer ring from compressor shaft, if it is to be replaced, and install new spacer ring. Install pulley, coil, and bearing assembly on compressor shaft, positioning belt on pulley as it is installed. Position retainer washer in hub of clutch plate, making sure it seats squarely against clutch hub (Be sure burred edge is against hub). Slide clutch plate and hub assembly onto compressor shaft. Make sure that retainer washer is still squarely in place against hub. Install plate and hub assembly to shaft retainer bolt with lockwasher and tighten securely. Rotate plate and hub assembly by hand to observe spacing between clutch plate and pulley. Clearance should be .015-.040". Adjust belt tension to 60 ft. lbs. torque.

COMPRESSOR BRUSHES: The positive (large) brush is available separately, but the ground brush is not since it is part of the brush and bracket assembly. Brushes should be replaced as follows: Remove compressor clutch plate and hub assembly as outlined above. Slide pulley, coil, and bearing assembly forward on shaft to provide access to brushes. Check to see if clutch plate and pulley are new type or old type. New type pulley and clutch plate must be installed when brushes are replaced. (See Changes, Cautions, Corrections). If brushes are dirty, but not worn excessively, clean brushes and contact surfaces on pulley with carbon tetrachloride or other suitable solvent. If brushes are worn, remove brush and bracket assembly, and install new assembly. NOTE–If only the positive (large) brush is worn, it can be removed from the bracket and replaced by unscrewing the plastic cap from the back of the bracket. Assemble brush and bracket assembly to compressor. Install pulley, coil, and bearing assembly and clutch plate and hub assembly as outlined under "Compressor Clutch & Pulley Assembly" above.

COMPRESSOR (TO PERFORM OTHER SERVICE): (*NOTE*–Do not use this procedure if new compressor is to be installed. See Installation of New Compressor following.) In order to remove engine cylinder head for various services, the compressor must be removed. To remove compressor and mounting bracket assembly, proceed as follows: (*CAUTION–Be sure all refrigeration fittings and connections are thoroughly cleaned before beginning to remove compressor.*) Pump down compressor to prevent loss of Freon or compressor oil. Loosen idler pulley attaching nuts and remove compressor belt. On cars equipped with power steering, remove power steering pump from bracket and lay on battery cover and fender skirt. Drain radiator core and remove upper radiator hose. Remove suction and discharge valves from compressor by removing two allen screws from each valve. Do not loosen pipe fittings on valves. Cover compressor and valve openings with masking tape. (*CAUTION–Loosen screws slowly in case there is pressure in crankcase. If pressure exists, allow pressure to bleed off slowly. Do not loosen screen from inlet beneath suction valve.*) Remove bolt from brace at bottom of compressor and bolt from brace at idler pulley end. Remove nuts holding compressor mounting bracket to cylinder head. Disconnect compressor clutch wire at connector on fender skirt. Remove compressor and bracket as an assembly. To install, reverse removal procedure using new gaskets on compressor suction and discharge valves (Make sure screen is in place in suction opening. CAUTION–Extreme care must be used to tighten valve attaching screws evenly to prevent distortion and resultant leakage between valve and seat.) Purge air from compressor as follows: After suction and discharge valves have been attached, open suction valve by turning all the way counter-clockwise. Loosen gauge fitting cap on discharge valve to allow air to escape. Air will pass out at this point since it is lighter than Freon. After air is purged approximately ten seconds, tighten gauge fitting cap. Open discharge valve by turning all the way counter-clockwise. Compressor is now ready for use.

INSTALLING NEW COMPRESSOR: New compressors are serviced with 10 ozs. of oil and charged with dry air. If all this oil is left in the compressor when it is installed, there will be an excessive amount of oil in the system. That is due to the fact that some of the oil from the original compressor has circulated in the system with the Freon. Even if system is de-

CONTINUED ON NEXT PAGE

1954-EARLY 1955 PONTIAC (Continued)

pressurized, oil will remain in system. Too much oil can cause damage to the compressor. To insure the proper amount of oil in the system use following procedure when replacing a compressor:

1) Pump down compressor unless low pressure side has been pumped down or system has been depressurized. (NOTE–If compressor is inoperative, it will be impossible to pump it down. In this case close passages to suction and discharge pipes by turning both compressor valves completely clockwise. Then bleed Freon from compressor by "cracking" gauge fitting caps on suction and discharge valves. Bleed pressure slow enough so that no compressor oil is lost).

2) Remove compressor with mounting bracket as outlined in "Compressor (To Perform Other Service)" above. This leaves suction and discharge valves attached to suction and discharge pipes.

3) Remove compressor from mounting bracket.

4) Remove oil filler plug and check oil level in compressor crankcase.

5) Remove drain plug from new compressor and empty enough oil from new compressor to provide same oil level as old compressor had (Oil should be poured into clean, dry container so it will be uncontaminated if some has to be poured back into the compressor). *NOTE*–If old compressor was known to have insufficient oil due to a Freon leak, pour sufficient oil into new compressor to bring level to 7/8" from bottom of compressor (See Checking Compressor Oil Level & Adding Oil). If old compressor was dry, and there was no evidence of leakage, proceed as follows:

a) Remove evaporator, dehydrator, receiver and compressor suction pipes.

b) Drain oil from each of above units. This will remove all oil from the system since these are the only units which can collect the oil which has been lost from the compressor.

c) Re-install evaporator, dehydrator, receiver and compressor suction pipes.

d) Since oil has been completely drained from the system by the above steps, leave all the oil in the new compressor when it is installed.

6) Position new compressor on mounting bracket, install mounting bolts with lockwashers and tighten securely.

7) Remove suction and discharge valves from new compressor and immediately cover openings in compressor with masking tape. Attach new valves to old compressor so that no oil will be lost and no moisture will enter compressor while it is being returned to factory.

8) Install compressor and mounting bracket and purge air from system as outlined under "Compressor (To Perform Other Service)" above. *NOTE*–If system has been pumped down or depressurized for other work in combination with compressor replacement, it will not be necessary to purge air from compressor. This air will be evacuated, in this case, when the system is evacuated.

9) After system has been operating for ten minutes, check compressor sight glass to see that oil splash is visible. If not, add oil as outlined previously.

CONDENSER: Depressurize system. Remove screws from radiator baffle, baffle support brace, and hood pilot bracket so that baffle can be moved out of way. To re-install, reverse removal procedure. *NOTE*–It is not necessary to remove radiator.

RECEIVER: Depressurize system. Remove receiver, pour any oil it contains into a clean, graduated beaker or similar measuring device. Measure out an equal quantity of new compressor oil and pour into receiver which is to be installed.

DEHYDRATOR-FILTER: If dehydrator-filter is warm on the entering end and cool at the outlet end, it indicates that it has become partially plugged and needs replacing. If the system is open for more than 15-20 minutes, as in the case of collision, the dehydrator-filter must be replaced when unit is repaired. Pump down system before replacing dehydrator-filter.

THERMOSTATIC EXPANSION VALVE: Pump down system. Carefully remove moulded fibreglass insulation from the thermostatic expansion valve and foam rubber insulation from capillary tube bulb on evaporator outlet pipe by using a knife to cut at cemented joint (to permit re-use). When installing insulation on new thermostatic expansion valve make sure valve is completely covered. Cement the seams and then tape them securely with water proof tape. Wrap capillary tube bulb and evaporator outlet pipe connection with foam rubber insulation and cement the seams. Wrap the insulation completely with water proof tape. *CAUTION–Be sure that capillary tube bulb is held securely and snugly to evaporator outlet pipe so that there is good thermal conductivity between the two parts.*

EVAPORATOR ASSEMBLY: When evaporator is to be replaced, remove the evaporator and thermostatic valve as an assembly. (The system should be pumped down before removing the evaporator and thermostatic expansion valve assembly.) After the evaporator is removed, transfer the thermostatic expansion valve to the new evaporator (See "Thermostatic Expansion Valve" above). To remove the evaporator, it is necessary to remove the evaporator inlet assembly from the front of the fender baffle, and disconnect the baffle so it can be moved forward. Extreme care should be exercised when replacing and removing the evaporator assembly to prevent damage to the thermostatic expansion valve or capillary tube. When evaporator is removed, drain any oil it contains into clean, graduated beaker. Measure out an equal amount of new compressor oil and pour into compressor through filler hole (See "Checking Compressor Oil Level & Adding Oil" for recommended oils). After new evaporator has been installed, seal outside of evaporator outlet pipe to evaporator pressure regulator fitting with "Press Tight Perma Gum" or similar non-hardening mastic. Perma Gum should be packed around connection to provide a water tight seal. If any water is allowed to contact both aluminum evaporator outlet pipe and brass flare nut, rapid corrosion will result.

COLLISI N SERVICE

Severity and circumstances of the collision will determine extent of repair work required. Good judgment must be used in deciding what steps are required to put system back in operation. Each part of system must be carefully inspected. No attempt should be made to straighten kinked pipes or repair any bent or broken units. Check especially for cracks at soldered connections. Broken pipes or units will allow air, moisture, and dirt to enter. These parts should be sealed as soon as possible until such time as they are replaced. If system is open for more than 15 or 20 minutes, the dehydrator-filter will absorb an excessive amount of moisture and should be replaced.

Inspecting Compressor: If there is no visible evidence of damage, rotate compressor shaft by hand to test for normal reaction. If shaft appears to rotate normally, remove drain plug and pour oil out into clean container. Inspect oil for foreign material which would indicate internal damage to compressor. If no foreign matter is found in oil, compressor can be used. Add the same amount of new compressor oil as was removed. See "Checking Compressor Oil Level & Adding Oil" for recommended oils.

1955 STUDEBAKER AIR CONDITIONING

Stud bak r, C mmand r & President (1955)

►CHANGES, CAUTIONS, CORRECTIONS

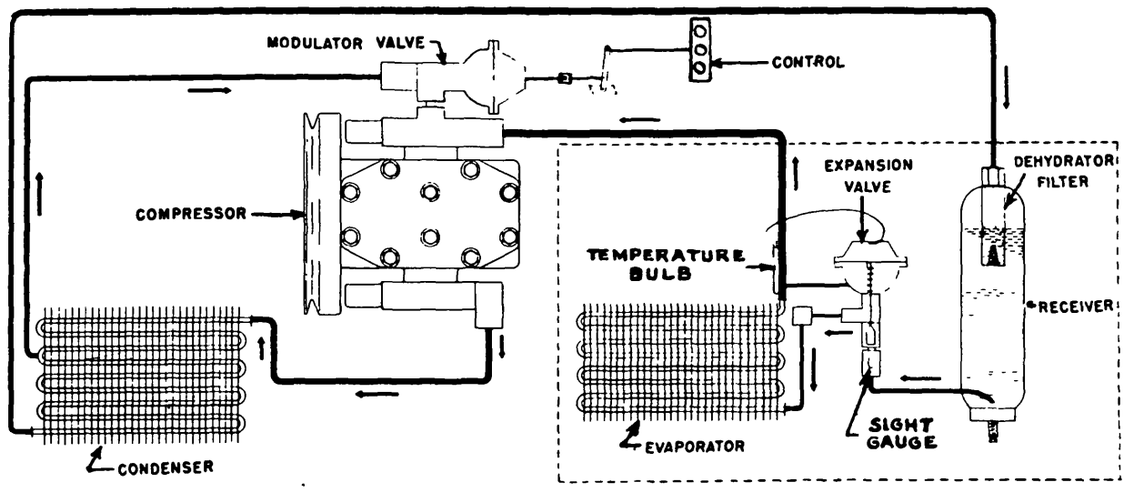
►*1955 STUDEBAKER COMPRESSOR SHAFT SEAL REPLACEMENT CAUTION:* Three types of compressor shaft seal kits are used for shaft seal replacement on 1955 Compressors. Proper kit to be used is given in table below.

Compressor Serial No.	Housing Flange Thick.	Bellows Seal Type	Studebaker Kit No.
BM9939-1	1/4"	Neoprene	1539718
BM9941-1, 2, 3	1/4"	Neoprene	1539718
BM9941-4, 5, 7, 8, 9	3/8"	Neoprene	1539719
BM9942-3, 4	1/4"	Neoprene	1539718
BM9945-1, 2, 4	1/4"	Neoprene	1539718
BM9948-1, 2, 3, 4	1/4"	Neoprene	1539718
BM9949-1	1/4"	Neoprene	1539718
BM9949-3	3/8"	Neoprene	1539719
BM9950-1	1/4"	Neoprene	1539718
BM9957-1	1/4"	Neoprene	1539718
BM9958-1, 2, 3	1/4"	Neoprene	1539718
BM9959-1	3/8"	Neoprene	1539719
BM9966-1	1/4"	Neoprene	1539718
S9960-1	1/4"	Neoprene	1539718
S9960-2	3/8"	Neoprene	1539719
S9961-1	1/4"	Neoprene	1539718
S9962-1	1/4"	Neoprene	1539718
S9963-1, 2	1/4"	Neoprene	1539718
S9964-1	1/4"	Neoprene	1539718
S9965-1	1/4"	Neoprene	1539718
S9970-1	1/4"	Neoprene	1539718
S9973-1	3/8"	Neoprene	1539719
Others		Metal	1539717

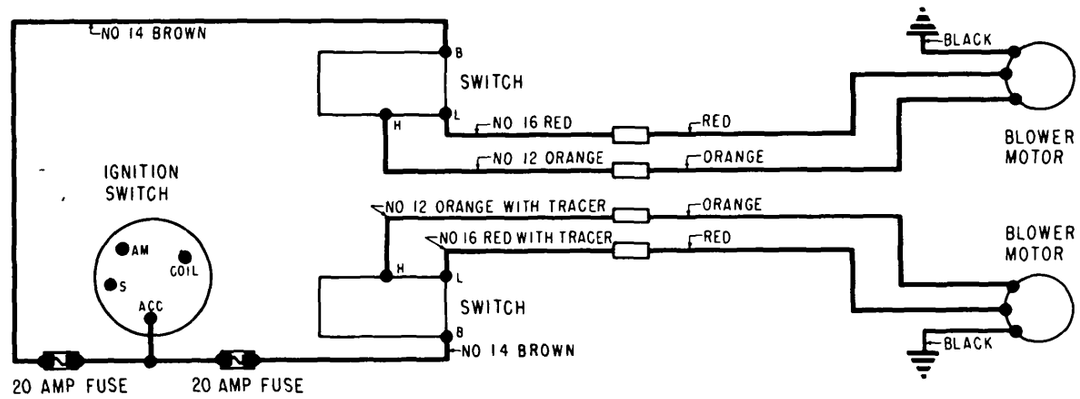
DESCRIPTION

Similar in design and operation to other systems using Freon-12 as a refrigerant. Air from inside car is led through two openings in the rear package shelf to refrigeration unit on ledge of trunk compartment. In the refrigeration unit air passes over the evaporator where it gives up much of its heat to the Freon-12 gas which is flowing through the evaporator coils. Humidity from the air condenses on the evaporator coils and drains away. The cooled, dried and filtered air is then forced by either or both blowers back into the car through two cold air outlets mounted on the package shelf.

C ntr ls: Control panel is mounted beneath and at center of the instrument panel. There are three controls on the panel. The center control, through a modulator valve, regulates the cooling action the system is to furnish; the farther out it is pulled, the cooler will be the air delivered from the outlets. The other two controls operate the blower motors. The push-pull switches have three positions: "In" is off, first position out is slow blower speed, second position out is high blower speed. Fresh outside air can be admitted by opening one of front window vents or right fender vent (Climatizer cars) with inside vent closed.



STUDEBAKER AIR CONDITIONING SYSTEM



STUDEBAKER AIR CONDITIONING CONTROL DIAGRAM

OPERATION

With engine and compressor operating, heat laden, low pressure Freon is compressed by the compressor and discharged into the condenser where it is cooled to remove the "sensible" heat of compression. The Freon is forced into the receiver under pressure when the modulator valve is closed. After passing through dehydrator and sight glass Freon enters expansion valve in evaporator assembly. At orifice in expansion valve high pressure liquid Freon changes to low pressure liquid, then enters evaporator coils. The "boiling" Freon, while in the evaporator coils, absorbs heat from the surrounding air and vaporizes. The vapor is drawn through the low pressure line to compressor where cycle is repeated.

PRECAUTIONS, TROUBLE SHOOTING & LEAK TESTING

See "Air Conditioning Service Cautions", "Trouble Shooting" and "Leak Tests".

CHECKING & ADJUSTMENT

MAINTENANCE & INSPECTION: Seasonal Operati n— Manufacturer recommends that compressor belt not be removed to assure that compressor seals do not dry out. To make system inoperative during winter months, make sure that center control on dash panel is all the way in (controls modulator valve).

Air Filter: Clean at regular intervals. To remove filter,

CONTINUED ON NEXT PAGE

1955 STUDEBAKER (Cont.)

first remove wing nuts and washers from studs near top of blower housing (in trunk compartment). Remove back panel and slide filter out of blower housing. Wash filter in cold, soapy water and rinse in clear water. When reinstalling filter, be sure it is properly positioned under spring clips before sliding it into place.

COMPRESSOR DRIVE BELT ADJUSTMENT: To adjust, use an open-end wrench on hexagonal part of left idler pulley shaft (right idler pulley is not adjustable) between pulley and pulley bracket. Loosen shaft slightly, and move pulley to loosen or tighten belt. Drive belt should have a 1/2" deflection midway between compressor and adjustable idler pulley when a force of 25 lbs. is exerted at that point with a spring scale, pulling outward.

CHECKING: Bubbles in Sight Glass–*(NOTE*–Before checking sight glass, in event blowers are operating properly and system is providing only partial cooling, check temperature control cable adjustment to make sure it provides full movement of lever on modulator valve on compressor). To check for possible refrigerant shortage, turn blower motors off and push temperature control all the way in. Run engine at fast idle for about 5 minutes at 1000 RPM. Pull temperature control all the way out, turn both blowers on high speed. Continue to run engine at fast idle. Check sight glass. If empty, or if bubbles are passing through it, system may be low on refrigerant. System should be checked for leaks and recharged.

Compressor Oil Level: There should be just enough oil in crankcase of compressor so that splash is visible in compressor sight glass whenever compressor is running. *CAUTION–If compressor filler plug is removed, entire system will have to be purged and recharged.*

REMOVAL & INSTALLATION TO WORK IN ENGINE COMPARTMENT

COMPRESSOR & BRACKET REMOVAL & INSTALLATION (To Work on Engine): *(CAUTION–Do not disconnect refrigerant hoses).* Drain radiator, loosen idler pulley (left) and remove compressor drive belt. Remove hand control cable at modulator valve. Remove two capscrews which hold compressor bracket to water pump manifold. The lower screw, which is longer, also retains idler pulley bracket. When screw is removed, do not remove spacer which is between brackets. Take out two Allen-head screws which hold compressor mounting bracket to water outlet fitting, and remove capscrew at base of oil filler pipe. Remove compressor and bracket with hoses still attached, and place assembly on front of right front fender. Keep unit as nearly as possible as when mounted, so that oil in compressor crankcase will not run up past compressor piston. When installing compressor, and before putting on belt, turn drive pulley several times by hand to pump out any excess oil that may have collected at top of piston. After system is in operation, check sight glass for bubbles. *NOTE*–If an excessive amount of bubbles appear in sight glass, system probably does not have sufficient Freon-12. *Do not operate system until proper amount of Freon has been added.*

AUTO-LITE ELECTRIC TEMPERATURE GAUGE

DESCRIPTION & OPERATION: This is a Gauge of the electric (or magnetic) type consisting of a Dash Unit which registers the temperature of the coolant in the engine and an Engine Unit which is installed in the coolant, and transmits coolant temperatures to the Dash Unit

Dash Unit–This unit has two magnetic poles. One winding is connected to "IGN" switch and to ground This winding holds a steady pull on gauge pointer to the left or "Cold" position The second winding connects to ground through the Engine Unit, and exerts a magnetic pull to the right or "Hot" side of Gauge. The strength of this magnet is determined by the amount of current allowed to pass through the Engine Unit resistor.

Engine Unit–This unit is equipped with flat disc that changes resistance as its temperature changes. The resistance is greatest when it is cold and resistance reduces as temperature rises. The reduction in resistance permits more current to flow to ground through the second winding of the Dash Unit, increasing the pull on the Gauge pointer toward the "Hot" position

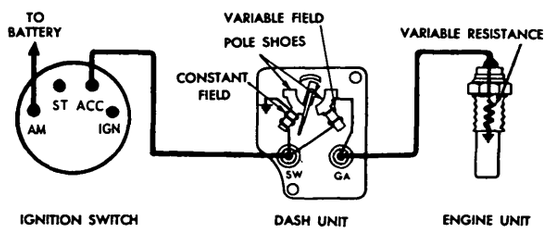
►*CAUTION: When gauge hand fails to move at all, Dash Unit is damaged or has been installed incorrectly. Reinstall correctly or replace as necessary.*

TROUBLE SHOOTING: Consists of testing circuits by elimination process. **Follow tests in sequence given and replace any unit found defective.** Turn *"IGN" on* and off for each test.

1) Remove wire at Engine Unit, gauge pointer should stay at left side (Cold) stop pin.

2) Remove ground wire from Engine Unit. Gauge pointer should move to right (Hot) stop pin.

3) In test (1) if gauge hand does NOT stay at left stop pin, wire is grounded between Dash Unit and Engine Unit, or Dash Unit is defective. Remove wire from "GA" terminal. Wire is defective if pointer now stays *at left stop pin, otherwise replace Dash Unit.*



AUTO-LITE ELECTRIC TEMPERATURE GAUGE

4) In test (2) should pointer not move to "Hot" position, there is an open circuit in wire between Dash Unit & Engine Unit, the Dash Unit is defective, or no power is reaching Dash Unit Ground "GA" terminal, if pointer now moves, replace wire. If it does not move, connect test lamp (6 or 12 volt as applicable) between Dash Unit "IGN" terminal and ground. Replace Dash Unit if lamp lights. Test the wire between "IGN" switch and Dash Unit by connecting test lamp to "Accessory" terminal at "IGN" switch and to ground Test lamp should light.

5) If gauge pointer operates correctly in test (1) & (2) but does not indicate temperature changes correctly, Engine Unit is defective or Dash Unit not calibrated correctly. Use Engine Unit known to be OK If Dash Unit still fails to indicate correctly, replace Dash Unit.

6) If the gauge pointer stays at right stop pin (maximum) at all times in test (1) & (2), wiring & Dash Unit are OK. Replace Engine Unit.

AC ELECTRIC TEMPERATURE GAUGE

SPECIAL SERVICE NOTE: 1939-40 Pontiac. When a sealed type pressure cooling cap installed on these cars, a thermogauge adapter (#1510965 resistor unit) is installed on 'ENG' terminal of dash unit. This unit lowers reading on temperature gauge 16° at 212° to compensate for increased boiling point caused by pressure cap. Temperature gauge will then indicate boiling point correctly. This adapter installed at factory on cars equipped with pressure type cap. On cars where pressure cap is installed in the field, this adapter is packaged with the replacement cap, and should be installed on thermogauge dash unit to avoid incorrect gauge reading (if this adapter not installed and a pressure cap is used, gauge will read 212° although cooling water will not be at boiling point).

DESCRIPTION: This is an electric gauge of the 'balanced coil' type and consists of a Dash Unit or recording gauge and an Engine Unit or temperature reacting unit mounted in the cylinder head or engine block in contact with the cooling water in the engine. Dash unit is connected to the 'Gauge' side of the ignition switch (controlled by switch and operative only with switch on) and to the engine unit and each unit is grounded (see wiring diagram). Dash unit consists of two coils at a 90° angle with an armature (on which the pointer is mounted) at the intersection of the coil axis. One coil is connected directly between the 'IGN' (feed) terminal and ground on the gauge case, the other coil being connected between the two gauge terminals (in series with the engine unit). Engine unit consists of a fixed resistance unit which has a high resistance value Cold and a relatively low resistance value Hot (gauge operated by this change in resistance due to temperature changes in the engine—gauge engine unit has no moving parts).

Pressure Cooling Note—Gauges used on cars with pressure cooling (pressure valve in radiator filler cap) are calibrated so that dash unit reads 212° (boiling point) when the cooling system water is actually at the temperature at which water boils with the pressure at which the system is designed to operate (boiling point increase with increase in pressure) which will be somewhat higher than 212°. This is done so that the dash unit will not indicate 'boiling' before the cooling water actually reaches the boiling point and must be kept in mind if the gauge is tested by immersing the engine unit in a heated pan of water.

OPERATION: When the ignition switch is turned on with the engine cold, current flows directly through coil 'A' to ground. The high resistance of the engine unit causes a relatively smaller current to flow through coil 'B' (which is connected in series with this resistance) so that the pointer is deflected toward the 'Low' or coil 'A' side of the scale. As the engine warms up, the resistance of the engine unit decreases, allowing an increasingly greater current flow through coil 'B' so that the pointer is drawn over toward the 'High' end of the scale. The balanced action of the two coils compensates for battery voltage variations and in addition an inertia dampener is built in the armature assembly to prevent pointer vibration on rough roads, etc.

SERVICING: All defective units should be replaced.

TROUBLE SHOOTING: If gauge operation not satisfactory, check as directed under correct heading in following table, being careful to turn ignition switch off when disconnecting or re-connecting leads on terminals and using extreme care not to reverse connections at dash unit terminals. Do not allow dash unit to be placed in strong electric field which will affect magnetic armature.

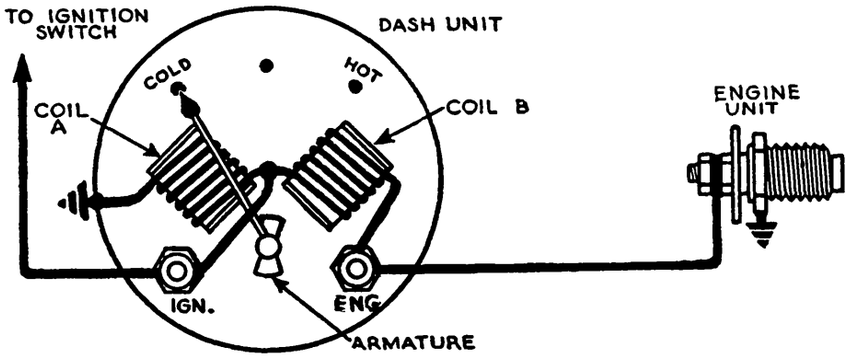
CONNECTION NOTE—Left hand (small diameter) terminal on dash unit should be connected to ignition switch, right hand (large diameter) terminal connected to engine unit. Terminals marked for identification.

Gauge does not register with Ignition Switch turned on:

1. Lead between Ignition Switch and Dash Unit broken or grounded (open or short-circuit). Check by connecting test lead between these two points with regular lead disconnected at both ends.

Gauge register 'Cold' under all conditions:

1. Lead between Dash Unit and Engine Unit broken (open-circuit). Check by connecting test lead between these two units.
2. Coil 'B' (right hand coil) in dash unit defective or lead to coil broken.



Gauge registers 'Hot' under all conditions:

1. Lead between Dash Unit and Engine Unit short-circuited. Check by disconnecting this lead at engine unit terminal and noting gauge reading. If gauge still reads high, this lead is shorted. If gauge reads low, engine unit is shorted and must be replaced.
2. Dash Unit not grounded. Clean all paint from under dash unit mounting flange, tighten mounting screws.
3. Engine Unit burned out. See check under (1) above or install replacement engine unit and note operation.
4. Coil 'A' (left hand coil) in dash unit defective or lead to coil broken.

Gauge registers Inaccurately:

To check, disconnect lead at engine unit terminal, remove engine unit, ground engine unit shell to car frame with test lead, re-connect engine unit, immerse inner end of unit in pan of water at known temperature (use reliable thermometer and heat water as required), note gauge reading.
CAUTION—When making this test, do not completely immerse engine unit in water which may allow leakage within shell or short-circuit lead on terminal.

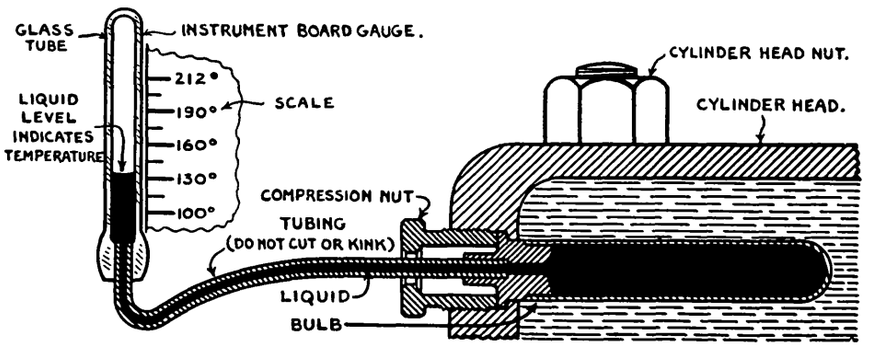
KING-SEELEY HEAT INDICATOR

DESCRIPTION: The K-S Heat Indicator or temperature gauge is a thermometer in which the glass tube or indicator (dash unit) and the bulb (engine unit) are connected by a sealed copper tube. The entire device is assembled as a unit and the copper tubing must not be cut or the joints broken.

OPERATION: The liquid with which the bulb and tubing are filled expands evenly with temperature increases and rises into the glass tube so that a reading is obtained when the engine warms up. The location of the bulb in the cylinder head is selected to accurately indicate the cooling water temperature and should not be changed.

SERVICING: No service operations are necessary. The entire unit must be replaced if found to be defective as a result of mutilation or breakage.

Removal of Bulb from Engine—To disconnect gauge when removing cylinder head, loosen corrosion or sediment around bulb by tapping on cylinder head with a ball-pein hammer, take out compression nut, withdraw bulb. If bulb cannot be withdrawn without great effort, pry gently with a screwdriver. Bulb must not be distorted and must retain its original round shape in order to read correctly.



AC TEMPERATURE GAUGE (NOT ELECTRIC)

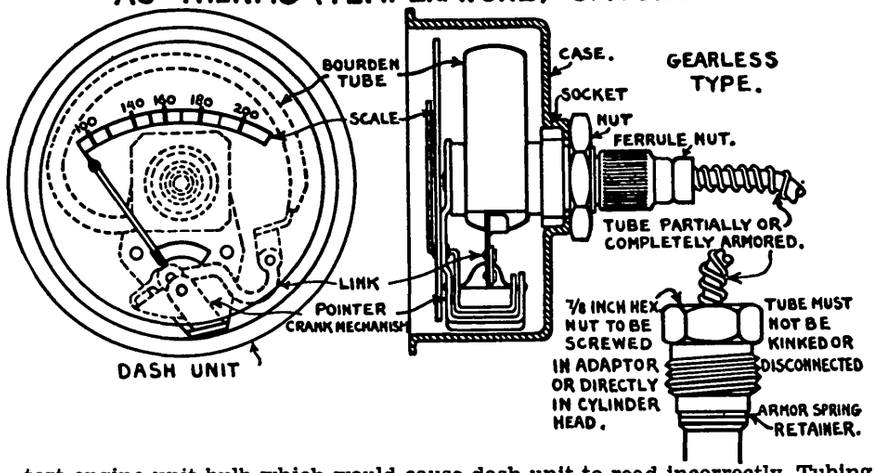
DESCRIPTION: A.C. Temperature Gauges are of the Bourdon tube type and consist of a dash unit in which the Bourden tube is mounted, together with the gauge pointer and connecting mechanism, and an engine unit or bulb. The units are connected by a hermetically sealed copper tube and the entire assembly is filled with a special liquid. The engine unit is mounted on the cylinder head and is immersed in the cooling water. As the temperature of the water increases the liquid in the bulb is vaporized causing a pressure to be exerted in the Bourden tube. The Bourden tube consists of a curved tube mounted rigidly at one end and connected to the gauge pointer through a crank mechanism or gear system at the other. The pressure within the Bourden tube results in a movement of the free end causing the pointer to move across gauge dial which is calibrated in degrees.

INSTALLATION: Gauges are made in three types; Gearless, in which the gauge pointer is connected to the Bourden tube through a simple crank mechanism; Gear Type,, employing a smaller Bourden tube which is connected to the pointer through a sector and pinion gear system to amplify the tube movement, and a Gear Type Heavy Duty design.

SERVICING: No service operations required and units cannot be repaired. Replace all defective gauges as an assembly (dash unit and engine unit).
CAUTION—Do not cut tubing or attempt to disconnect dash unit or engine unit. The entire assembly is a sealed unit and will not operate satisfactorily if disturbed.

REMOVAL & INSTALLATION: When removing gauge for work on engine or other parts of car, use extreme care not to kink or damage connecting tubing or to distort engine unit bulb which would cause dash unit to read incorrectly. Tubing should not be bent at sharp angles (loop tubing where change in direction required) and must not be flattened or kinked. When installing new gauge do not attempt to remove excess tubing (form tubing into fairly large loop).

AC THERMO (TEMPERATURE) GAUGES.



KING-SEELEY OIL PRESSURE GAUGES (NOT "CV" CONSTANT VOLTAGE TYPE)

DESCRIPTION: This is an electric oil pressure gauge comprising an engine unit, and a dash or recording unit connected by a wire. The dash unit is also connected to the ignition switch (gauge operative only with engine turned on) and the gauge circuit is completed to ground through the engine unit contacts. The dash unit consists of a thermostatic bi-metal arm linked to the instrument pointer around which is wound a heating coil. The engine unit has a similar bi-metal arm and heating coil.

►**NASH RAMBLER (1950) NOTE:** Engine unit consists of a switch which operates an instrument panel warning light. When engine oil pressure reaches 13 lbs., the circuit in the engine unit opens and warning light goes out.

OPERATION: When the engine is operated and oil pressure is built up, the pressure deflects the diaphragm in the engine unit and, with the contacts closed, a current flows through the heating coils of the dash and engine unit. The heating effect of the coil in the dash unit tends to bend the bi-metal arm which is linked to the pointer and record a reading on the gauge. At the same time, the heating coil in the engine unit causes the bi-metal arm to flex to a point where the contacts open and the current is interrupted. When this occurs the bi-metal arm in the engine unit flexes in the opposite direction and again closes the contacts. Contact pressure and length of time (amount of flexing necessary to open contacts) is directly proportionate to the oil pressure in the engine, and as this determines the amount of current flowing in the gauge circuit and the deflection of the bi-metal arm in the dash unit, the dash unit indicates the oil pressure. Contacts open and close at approx. 120 cycles per min. with 25 lbs. pressure.

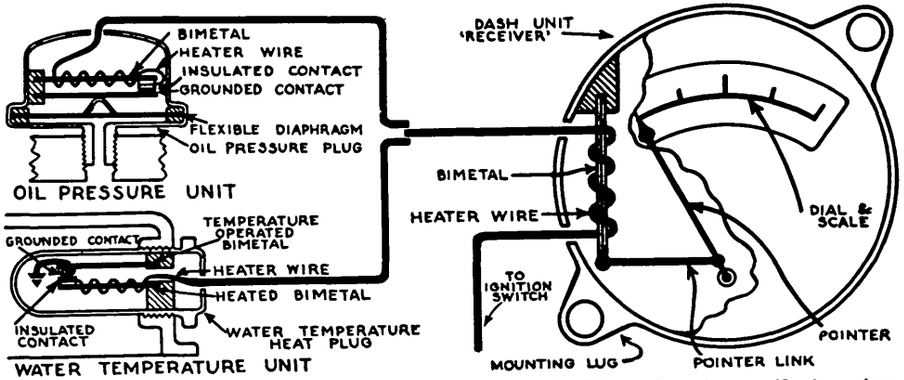
SERVICING: No service operations are necessary other than to see that connections are tight and that lead is properly connected to engine unit. If readings unsatisfactory, check Trouble Shooting Table and Testing (All Units).

Trouble Shooting Table

1. **Gauge pointer is erratic.** Engine unit probably defective.
2. **Gaug reading inaccurate.** Engine unit probably defective.
3. **Gauge does not register.** Engine unit defective or dash unit burnt out
4. **Gauge registers with ngine not running (ignition on).** Short-circuit in lead between dash unit and engine unit or short-circuit in dash unit (a short-circuit of this type will usually result in dash unit burning out, resulting in no reading).

TESTING (ALL UNITS):—Use a gasoline gauge tank unit which is known to be OK. for test purposes. Connect flexible test lead to terminal on this test unit and second lead to test unit mounting flange (for ground circuit). Make tests in order as given below before removing units from car.

Testing Dash Unit Receiver. Disconnect engine unit Sender, connect test unit terminal lead to this wire, ground test unit to engine block. Turn on ignition switch. With float of test unit at bottom (tank empty) position, dash unit receiver pointer should be even with lowest mark on dial. Move test unit float rod up to top position. Dash unit receiver pointer should move to top mark on dial (allow one minute for pointer to come to rest). If dash unit receiver does not operate satisfactorily, see that connections at receiver and ignition switch are tight, check line to ignition switch and line to engine unit, then replace receiver. NOTE—When testing temperature gauges, readings will be reversed (Hot reading with test unit float at bottom, Cold reading with float at top).



Testing Engine Unit Sender. If receiver tests OK. (above), see that motor unit is well grounded, disconnect and check radio condenser (shorted condenser will cause high reading on dash unit). Then replace engine unit sender.

KING-SEELEY ELECTRIC TEMPERATURE GAUGES (NOT "CV" CONSTANT VOLTAGE TYPE)

IMPORTANT PRODUCTION CHANGES: Engine Unit—Two different types of engine units have been used—**No. 7000—1939 & Later, Nos. 5700 & 6540—1938** and before. These units operate differently and must be used with the particular type of Dash Unit designed to be used with them. Earlier type engine units are not furnished for service and when it is necessary to replace them the new type (No. 7000) Engine unit must be installed. This requires installation of a ½"-⅜" No. 7113 adapter bushing. CAUTION—New type Dash Unit must be installed whenever the engine unit is changed to the new type. Service Kits are furnished which include a new type Dash Unit, replacement type Engine Unit, and Adapter Bushing.

IMPORTANT NOTE: 1939 & Later Models. Gauge will read "HOT" or 212° with the ignition switch turned off (engine not running). This reading does not mean that gauge is defective and is caused by the linkage design which is designed to conserve current (less current consumed when engine is at normal running temperatures). Gauge readings should only be taken with the ignition switch turned on.

Ford V8 & Mercury 1941 Models. A temperature switch King-Seeley No. 8355, Ford No. 01A-10990, is used in the temperature gauge circuit (between the dash unit and the engine unit) so that temperature can be measured in both engine blocks. The regular engine unit or heat plug King-Seeley No. 7000, Ford No. 99A-10884, is used in conjunction with this temperature switch.

Willys 48 1939. Temperature gauge on this model consists of a tell-tale light on the instrument panel which is controlled by a thermostatic type engine unit similar in appearance to those used on other King-Seeley gauges. This engine unit must never be used with regular thermostatic type dash units (as used on Willys Overland Model 39) as it will result in the dash unit burning out. NOTE—These engine units may be identified by groove around hexagonal head of the engine unit plug. Regular type engine unit for Willys-Overland Model 39 is not marked by these grooves.

DESCRIPTION: Dash unit or receiver same design as for Oil Pressure Gauge. Two types of Engine Units have been used. Both types consist of a heat bulb which is designed to be screwed in the engine block so that cooling water temperature actuates the bi-metal arms within the bulb. A heating coil (connected to dash unit) is wound on the bi-metal arm and connected to the insulated contact at the free end of the arm. The ground contact is mounted on the free end of a second bi-metal arm (Types 5700 & 6540), or on a stationary support (Type 7000). Contacts are normally closed (with arms not flexed) and gauge circuit is completed through heating coil and contacts to ground when the ignition is turned on.

OPERATION:—**Types 5700 & 6540.** When heating coil in engine unit is energized, the temperature rise tends to flex the arm and open the contacts. This interrupts current flow, allows bi-metal arm to cool off and flex back so that contacts are again closed. This action is extremely rapid and arm has a vibrating motion. Second bi-metal arm is longer and thinner than heater arm so that flexing action, as engine temperature increases, is greater and tends to increase contact pressure and length of time contacts are closed. Consequently current flow in gauge circuit increases in proportion to the rise in engine temperature and this increased current produces a greater deflection of the dash unit bi-metal arm so that a higher reading is indicated on the dial.

Type 7000. This type operates similarly to earlier types (above) except that contact pressure and current are at maximum when engine unit is cold. Increase in engine unit bulb temperature (as engine warms up) tends to flex the bi-metal arm away from the stationary contact support so that contact pressure and length of time contacts are closed tend to decrease. The consequent decrease of current in the gauge circuit causes the dash unit pointer to move toward the "hot" end of the scale.

TESTING & SERVICING:—Manufacturer recommends use of a regular Gasoline Gauge Tank Unit as a test "Sender" to check operation of units which do not operate satisfactorily. Make tests as directed below.

CAUTION—When testing later type temperature gauges (with No. 7000 Engine Unit), dash unit readings will be reversed (HOT with tank unit float in "empty" position, COLD with tank unit float in "full" position).

Testing Sender:—Disconnect lead of Sender unit on car, connect this lead to test Sender and ground this Sender to the car frame. Turn on ignition, move Sender float up to 'full' position and note reading on Receiver. If Receiver reading is correct (after 10-15 seconds time), check following points before replacing Sender unit:

1. **Ground.** Sender is grounded through case. See that all paint and grease are removed under flange and both surfaces make good contact.
2. **Radio By-pass Condenser Shorted.** If by-pass condenser is connected at Sender on cars with radio, test for short-circuit by disconnecting condenser and noting gauge operation. If gauge is satisfactory, replace condenser.

If reading secured with test Sender is same as that with Sender on car, check wire connecting Sender and Receiver. Replace if open-circuited or grounded.

Testing Receiver—Disconnect wires on Receiver on car and connect to same terminals on test Receiver. Turn on ignition switch and note reading on gauge. If test Receiver reading is correct, replace Receiver on car. If test Receiver reading is same as car Receiver, repeat tests on Sender and wiring.

SERVICING:—No service operations are required other than to see that wires are properly connected and terminals are tight. No repair operations are possible and defective Senders and Receivers should be replaced.

KING-SEELEY ELECTRIC TEMPERATURE GAUGE (FORD V8 & MERCURY) (NOT "CV" CONSTANT VOLTAGE TYPE)

NOTE: The Temperature Gauge Switch listed below was furnished as an accessory in Temperature Gauge Kit, King-Seeley No. 8464, Ford No. 11A-18381, and will be found installed on Ford and Mercury Pass. Cars and Ford Trucks. This Temperature Switch was Std. Equipment starting on late 1941 V8 models.

DESCRIPTION: This special Temperature Gauge installation is designed to detect overheating of the cylinder bank in which the regular temperature gauge Engine Unit is not installed (Engine Unit normally installed in one bank of Vee type engines and will not detect overheating occurring in the other cylinder bank only). Installation consists of a special Temperature Gauge Switch installed in one cylinder bank and connected in series with the regular Temperature Gauge Engine Unit installed in the other cylinder bank.

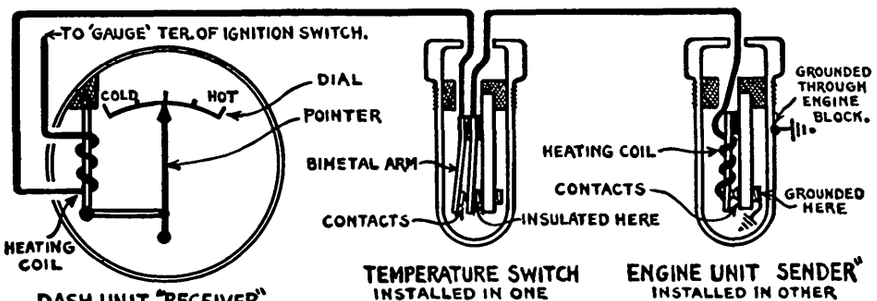
Temperature Gauge Switch—This unit resembles a conventional engine unit in appearance but differs in internal construction. One contact is mounted on a stationary insulated arm with the other contact mounted on a special bimetal insulated arm. A lead is connected to each arm so that the contacts are in series in the circuit between the Temperature Gauge Dash Unit and regular Engine Unit (see illustration).

Temperature Gaug Engine Unit—This unit is same type used on other gauges with movable contact mounted on bimetal arm on which the heating coil is wound and grounded contact mounted on a stationary arm.

OPERATION: At all normal temperatures, the contacts of the special Temperature Gauge Switch are closed and engine temperature is recorded by the regular Engine Unit in the usual manner. When the temperature in cylinder bank in which the Temperature Gauge Switch is mounted reaches the point for which the unit is set, the flexing of the bimetal arm opens the contacts and breaks the temperature gauge circuit. This causes the dash unit to read 'hot'. The switch is merely a circuit breaker which opens the circuit at this predetermined temperature so that the dash unit reads hot, it does not control dash unit operation at temperatures below this point.

Setting—Temperature Gauge Switch contacts open at 195°F. (plus or minus 5°). NOTE—A special switch designed for use with a special cooling liquid opens at 240°F.

SERVICING:—No servicing required. Replace defective units.



KING-SEELEY "CV" CONSTANT VOLTAGE OIL & TEMPERATURE GAUGES

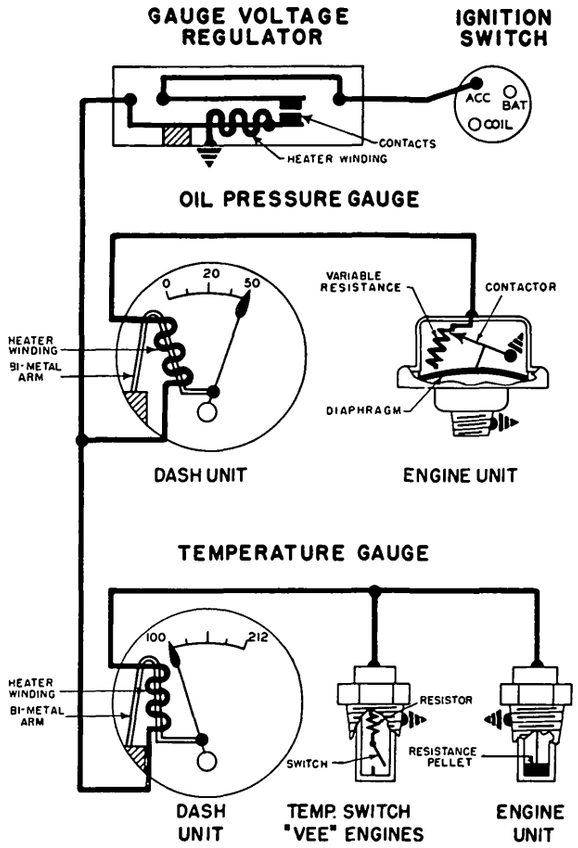
DESCRIPTION & OPERATION: King-Seeley "CV" or constant-voltage gauges differ from previous types in that "CV" engine gauge units (senders consist of variable resistances (rheostats) which regulate the current in the heating coil of the receivers (dash units) and control the deflection of the bi-metal arm linked to the gauge pointer. All dash units are of similar design. The feature of these gauges is the "Gauge Voltage Regulator" which regulates input voltage in the gauge circuits and insures accurate gauge readings regardless of the line voltage fluctuations.

Gauge Voltage Regulator: Consists of a vibrating unit (contacts controlled by bi-metal arm on which a heater winding is located) connected in the line between the ignition switch and the gauges. Regulator produces a pulsating voltage, at an effective constant amperage value, of 5.0 volts for all normal input voltage variations (between 5.6 and 8.0 volts). Input voltages lower than 5.0 volts will result in proportionately lower gauge readings while voltages greater than 8.0 volts will not affect gauge accuracy but will overload regulator contacts and may cause premature wear. Regulator is temperature compensated and is intended to be mounted near the gauge dash units and at approximately the same ambient temperature.

Gauge Indicators (Dash Units): All units are of similar design. Gauge pointer is linked to a bi-metal arm on which a heater coil is wound. This coil is connected in series with the tank or engine unit rheostat so that the gauge reading is in proportion to the current in the circuit (zero reading with maximum resistance and minimum current, high reading with minimum resistance and maximum current).

Oil Pressure Gauge Engine Unit—The rheostat contactor acts as a ground for the gauge circuit and is linked to a diaphragm which is deflected by the engine oil pressure so that it sweeps across the resistance as the diaphragm flexes with the engine oil pressure. When pressure is low, the entire resistance is in the gauge circuit and the current is at a minimum. When pressure rises, resistance is cut out of gauge circuit and the increase in current causes dash unit to read higher.

Temperature Gauge Engine Unit—New design (no moving parts). Gauge circuit is grounded through a small block of special sintered material which has a variable resistance in response to temperature changes. This block is sealed in the end of the engine unit bulb in close contact to the engine coolant. It has a comparatively high resistance when cold so that the current in the gauge circuit is at a minimum. This resistance decreases as the engine temperature increases and the consequent increase in current in the gauge circuit causes the dash unit to read higher.



KING-SEELEY "CV" GAUGES

►**Auxiliary Temperature Gauge Switch (for "V" Engines)**—The regular temperature gauge engine unit is mounted in one block of the engine, and the auxiliary switch is intended to be mounted in the other block as a warning of abnormal temperatures in this block. Switch is connected in parallel with the regular engine unit (see diagram) and consists of a switch (normally open) and resistance. At high temperatures, the switch closes and the resistance is shunted across the regular engine unit and causing the dash unit to read "hot."

TROUBLE SHOOTING: Units should not be removed from the car until testing has been done to determine which units are defective. See Testing (following).

All Gauges read Too High or Too Low—Voltage Regulator defective (see Regulator Test) or not properly grounded (regulator MUST be grounded). Battery voltage at regulator (or ignition switch) below 5.0 volts (check with voltmeter).

►***CAUTION—Gauge Voltage Regulator provides an intermittent voltage averaging 5.0 volts and regulator output voltage can not be tested with a voltmeter.***

One Gauge Reads Too High or Too Low—Test unit as directed below.

TESTING: Use a Fuel Level Gauge Tank Unit which is known to be OK. as a test unit. Connect one test lead to the terminal on the unit and a second test lead to the case to act as a ground wire (CAUTION—unit will not operate if not properly grounded). Make tests as follows:

Voltage Regulator: Requires use of an OK. dash unit also. Connect these test units together (dash unit and tank unit) in normal manner and ground tank unit, connect the other dash unit terminal to the output terminal of the voltage regulator. Check battery voltage (must be within operating limits). Hold tank unit float in Empty position, turn on ignition switch, note reading on test dash unit (should read at low end of scale). Start engine and run at faster than normal idle speed. Gauge reading should not change if voltage regulator functioning normally. Move tank unit to full position. Dash unit gauge should read at upper end of scale. If Voltage Regulator not operating correctly, replace original unit with correct type unit.

Gauge Units: Disconnect lead at engine (sender) unit on car and hook test unit in circuit at this point (CAUTION—make certain test unit is grounded.) Move test unit float to Empty position, turn on ignition switch, note dash unit reading (gauge pointer should be at lower end of scale—Empty, Zero, Cold, etc.). Move float to Full position, gauge pointer should then be at upper end of scale. If dash unit reads OK. in both positions, replace original tank or engine unit with correct type unit. If dash unit does not test OK., connect test unit directly to terminal on dash unit (eliminating the car wire). If dash unit then tests OK., check lead between dash unit and tank or engine unit for broken wire or shorted insulation and replace this wire. If dash unit still does not function correctly, replace original dash unit with correct type unit.

REPAIRING UNITS: Repair or calibration of units is not practical in the field and defective units should be replaced.

WINDOW & SEAT REGULATORS HYDRO-LECTRIC TYPE

1946-53 Buick, Cadillac, Oldsmobile
1954 Buick, Series 66C & 100 (Convertible)
1954 Oldsmobile, Early Super 88 & 98. See Note below.
1946-Early 1950 Chrysler Crown Imperial
1946-48 Ford & Mercury Sportsman
1948-53 Hudson
1954 Hudson 5D & 7D (Convertible)
1946-51 Lincoln
1949-51 Mercury
1948-54 Packard

▷**PRODUCTION CHANGE: Two different pumps have been used, a low pressure pump (200-210 p.s.i.), and a high pressure pump (250-260 p.s.i.). These pumps can be identified by relief valve plug at rear of pump: low pressure has cadmium plated plug, high pressure a copper plated plug.**

DESCRIPTION: This type control consists of an electric motor with direct-connected hydraulic pump which supplies fluid under pressure to a single acting power cylinder incorporated for each window regulator used (additional cylinder located under front seat for front seat adjustment on some models). Fluid is pumped into the cylinders by the motor to raise windows or move seat forward, but windows are lowered and seat moved backward by spring hooked to regulator (switch operates solenoid valve in cylinder only—the motors does not operate). When the switch is in the "off" or center position, the solenoid valve is closed and fluid is trapped in the cylinder to hold windows or seat in desired position. The system has the following control units:

Power Unit—Consists of motor, hydraulic pump, and fluid reservoir assembly. This unit is same as type used for Convertible Top Control on these same cars. *See "Power Operated Tops, Hydro-Lectric Type (With Window & Seat Control)."*

Control Switches—Consist of simple two-way switches (one for each window and one for seat adjuster—duplicate switches for rear window control located on left front door) Switch lever is normally in "off" or center position and must be held in the "up" or "down" ("forward" or "back" for seat adjustment) position while window (or seat) is operating.

Hydraulic Cylinders (Window Regulator & Seat Adjuster)—Single acting, solenoid valve controlled. Cylinders raise windows or move seat forward. When solenoid valve in cylinder is opened (to lower windows or move seat rearward) power unit does not operate and windows and seat are retracted by springs.

NOTE—This cylinder is a "vented" type, making the periodic changing of hydraulic fluid necessary. Water and other foreign matter will cause sludging and deterioration of fluid. (See Draining & Refilling).

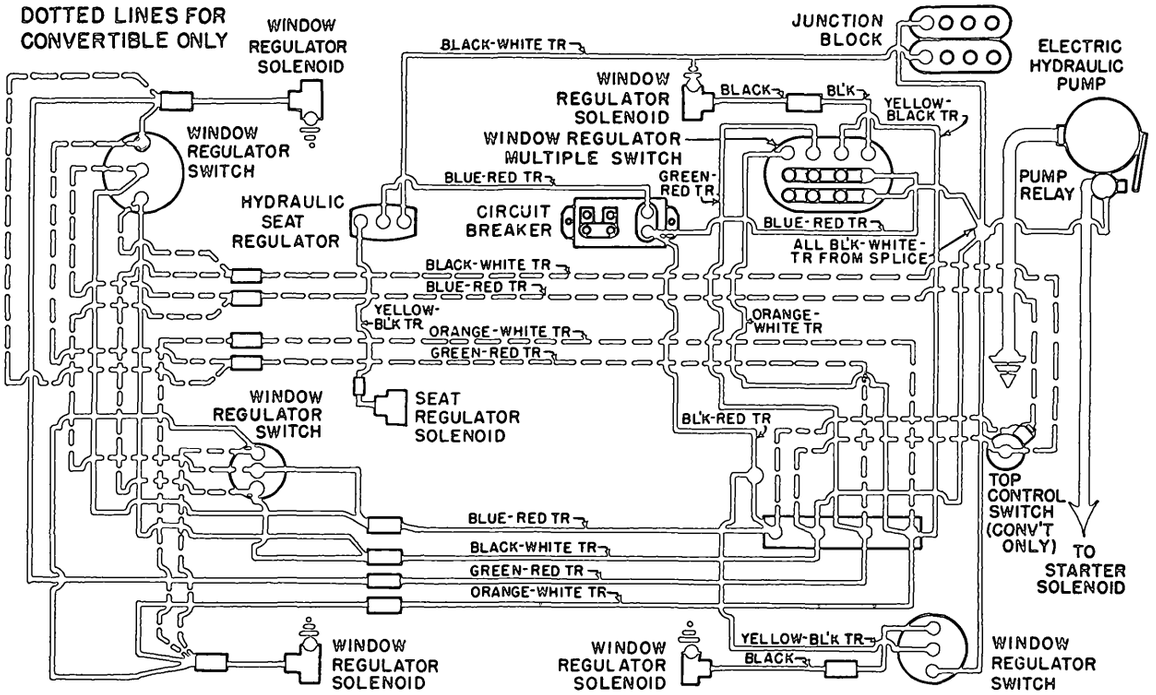
REMOVAL: Control units can be removed for servicing or replacement as follows:

▷*CAUTION*—Before any repairs are made to the regulators, hydraulic system or electrical system, battery terminal should be disconnected to avoid injury or damage to the car.

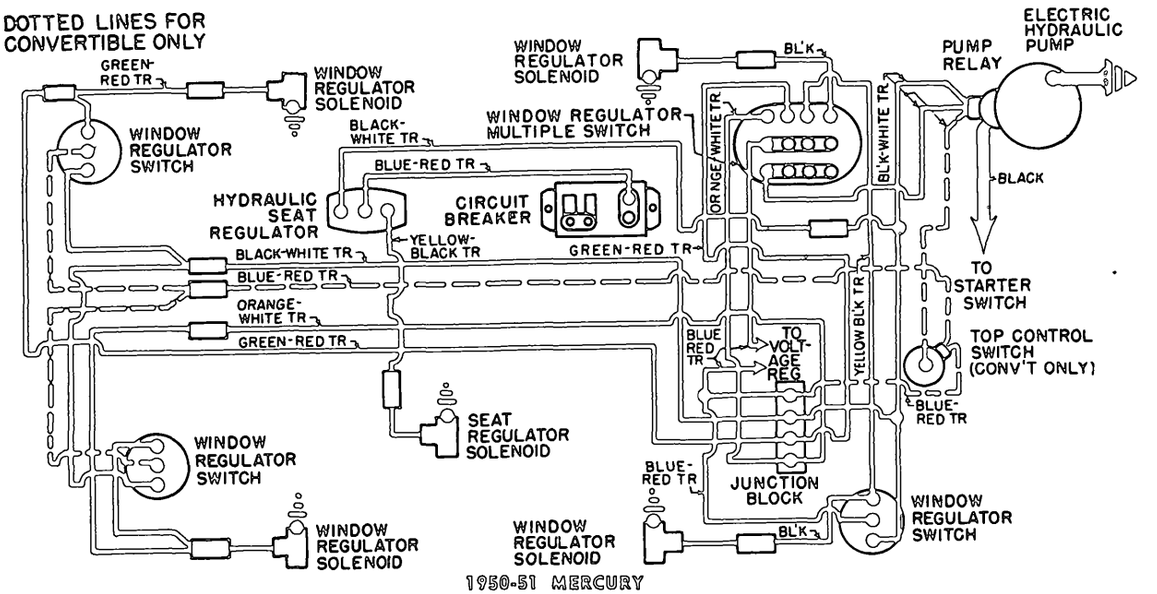
Power Unit: Disconnect battery cable as a safety precaution. Disconnect ground strap and wire at motor. Disconnect hydraulic tubing at pump and cap tubing ends. Remove bolts from rubber mounting, (it may be necessary to remove fluid reservoir for access to lower mounting bolts). Lift unit out.

Window Regulators: Lower window to extreme open

CONTINUED ON NEXT PAGE



1950-51 LINCOLN



1950-51 MERCURY

WINDOW & SEAT REGULATORS HYDRO-LECTRIC TYPE (C nt.)

position. Remove switch from trim panel and remove wires from switch (Mark wire to insure correct reassembly). Remove remote control handles and door trim panel. Remove wire from solenoid connection and disconnect fluid line at cylinder (care should be taken to catch any fluid remaining in cylinder), cap end of fluid line tubing. Loosen bolts holding glass channel to regulator arm and slide rollers out of channel. Raise window by hand and secure in raised position by wrapping several strips of masking tape over top of door and sticking ends to glass. Remove nuts securing regulator assembly to door panel. Regulator can be removed from door through the elongated hole provided.

Removal of Hydraulic Cylinder—Place regulator assembly firmly in vice. Remove lower cylinder retaining clip (Spring type clip or bolted clamp). Remove upper clip or clamp and take cylinder out of assembly. NOTE—Cylinder cannot be repaired, replace complete cylinder assembly if necessary.

►***CAUTION*—Two different valves used:** Check color of relief valve plug at rear of pump.

1—Cadmium plated plug. Valve set for maximum pressure of 210 lbs. for use with low pressure pump.

2—Copper plated plug. Valve set for maximum pressure of 260 lbs. for use with high pressure pump. See PRODUCTION CHANGE NOTE above.

These valves are not interchangeable.

NOTE—If plug removed and washers are used under plug, these same washers must be reinstalled on reassembling plug.

Seat Adjuster Regulator Assembly—With seat in extreme rear position, remove front seat cushion and disconnect positive terminal of battery. Disconnect solenoid valve wire at connector in lead from seat actuating switch. Remove nut and washer joining forward end of regulator to support on seat frame, then remove entire seat frame from body. Turn back rear floor carpet and remove screws and seat adjuster cover. Disconnect hydraulic lines from regulator and cap the ends. Remove nut and washer holding rear end of regulator to floor pan support brackets, then remove regulator.

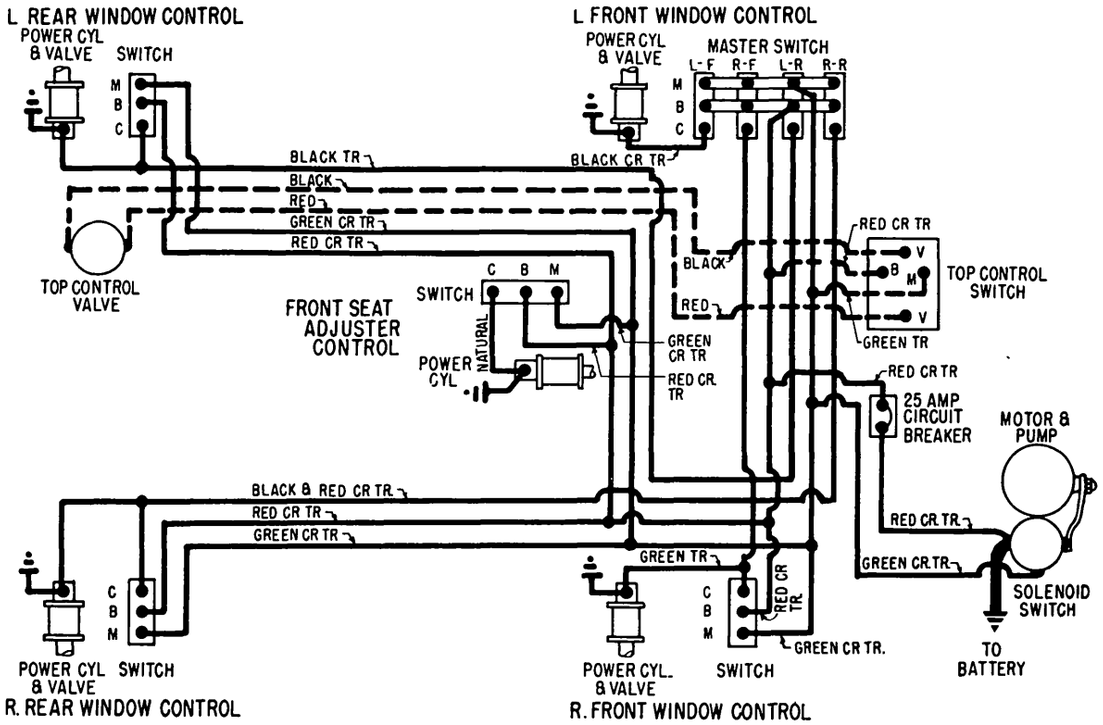
OVERHAUL

►**1952 PUMP UNIT PRODUCTION CHANGE**—Early production used same type pump rotor as for 1951 consisting of a 4-lobe inner (driving) rotor and a 5-lobe outer (driven) rotor. Later type pumps used a 10-lobe inner rotor and an 11-lobe outer rotor. At start of second type production, inner rotor was "one piece" type, later production was changed to a "split" or two piece rotor. First type 4-5 lobe rotors are of different thickness than 10-11 lobe rotors. Later type rotors can not be used in early type pump body. Later 10-11 lobe rotors, solid or "split" are interchangeable.

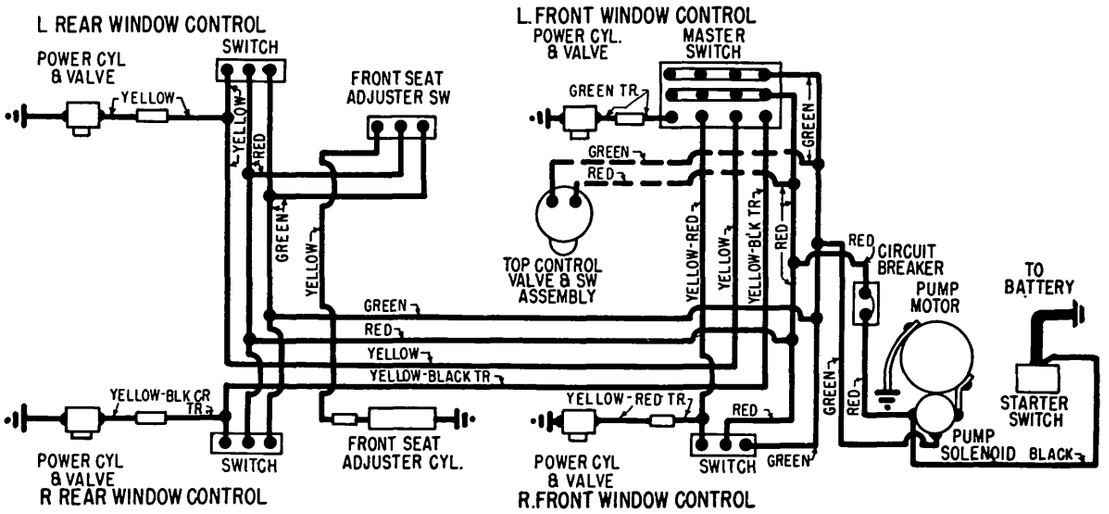
►**SPUR GEAR TYPE PUMP NOTE**—Disassembly and reassembly of this type pump is similar to rotor type. See procedure below.

PUMP UNIT DISASSEMBLY: Remove bail and pump reservoir from housing. Remove capscrew securing upper cushion bracket to motor frame and remove bracket. Loosen cover band and slide off end of motor frame. Remove field brush from holder and take out three cap screws securing motor frame to

CONTINUED ON NEXT PAGE



TPYICAL G.M. CONTROL WIRING DIAGRAM



TYPICAL PACKARD CONTROL WIRING DIAGRAM

WINDOW & SEAT REGULATORS HYDRO-LECTRIC TYPE (Cont.)

motor head. Remove motor head. Remove armature. Remove the four cap screws holding pump housing to motor frame and remove the pump. Remove reservoir fluid retainer and retainer plate by taking out two sheet metal screws in retainer. Remove the six cap screws securing pump bottom plate to pump housing and remove bottom plate, then remove rotor spring, plate, inner and outer rotors, port plate and bottom seal. Remove relief valve plug and plug washers (same number and size washers must be replaced when assembling pump), remove relief valve spring and relief valve.

PUMP UNIT REASSEMBLY: Wash all parts in alcohol and examine for wear, scoring and excessive play. Check relief valve for scores and free movement. Replace any parts that indicate wear. Blow all parts dry and blow out all passages in pump housing. Install port plate, inner and outer rotors and rotor plate. Install bottom seal and place rotor spring in position on rotor plate with nib of spring in hole in rotor plate. Place pump bottom plate in position and secure with six cap screws. Place fluid retainer plate in position between pump inlet tubes, and secure reservoir fluid retainer to retainer plate with two sheet metal screws. Install relief valve, spring, and valve plug with the same amount of washers that were removed. ***(CAUTION***—Do not drop or remove these washers as they were put there by the manufacturer to adjust the valve to a minimum fluid pressure of 250-265 lb., P.S.I. ***Under no circumstance should this pressure be changed to provide higher pressure).*** Place pump in position on motor frame with relief plug 180° from solenoid, and secure pump to frame with four cap screws. Install one fibre washer on commutator end of armature shaft and two washers on drive end and install armature in motor frame. Place motor head in position and secure with three cap screws. Lift ends of brush spring and install brushes in holders. Check action of brushes to make sure they move freely under spring tension. Install cover band and tighten band screw. Install upper cushion bracket on motor head, and install fluid reservoir. (See "Draining and Refilling").

INSTALLATION (Of above assemblies): Reverse the removal instructions. NOTE—Align window regulator assembly so that window glass is free in channel in all positions.

LUBRICATION

DRAINING AND REFILLING: Entire hydraulic system should be drained and refilled with clean fluid at least once each year. Use the best grade of hydraulic brake fluid or window regulator fluid recommended by the car manufacturer, and proceed as follows: Lower all windows to extreme bottom, (if car has seat adjuster, move seat to extreme rear position). Remove ground cable from battery. Remove fluid reservoir and wash with alcohol. (**For cars with hydraulic top lift units,** hold container under pump and manually lower and raise top, with top control knob in proper positions. This will drain both cylinders). **To Refill System**—Fill reservoir to fluid line with correct fluid, connect battery then operate the top up and down to pump fluid into cylinders (replenish fluid in reservoir frequently as top lift cylinders have a capacity about 2½ times greater than reservoir). With reservoir filled to level line, operate the top up and down until all air is exhausted from lines, (if air is present in lines, a chattering noise will be produced when top is operated). After all air is expelled from top hydraulic system, operate front seat and all windows until air has been exhausted from these systems. Remove reservoir and fill to fluid level line. Install reservoir making certain that gasket is in good condition and that reservoir makes contact all around.

HYDRAULIC UNIT MOTOR PERFORMANCE DATA

Auto-Lite Part Nos. MBL-4001, 4002, 4003, 4004.

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	4700	5.0	60
1.6 "	Lock	2.0	210

Air Gap—.026" to .048" between armature core and field pole shoes.

Delco-Remy No. 1108572.

Torque	R.P.M.	Volts	Amperes
0 ft. lbs.	5500	5.7	60
7.5 "	Lock	4.2	375

Delco-Remy No. 1108588.

0 ft. lbs.	5500	5.67	60
6 ft. lbs.	Lock	5.00	290

Delco-Remy No. 1108592. *12 Volt.*

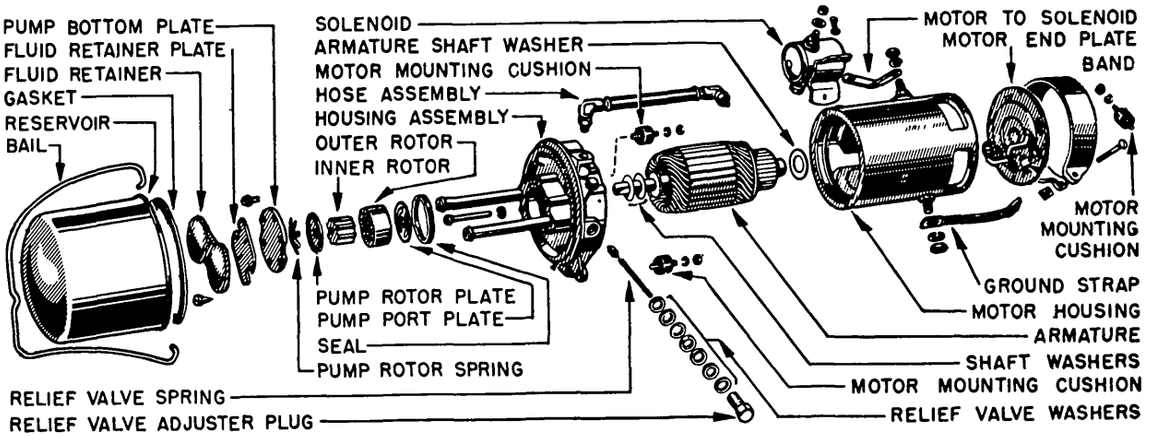
0 ft. lbs.	7000	11.75	25
6 ft. lbs.	Lock	10.50	150

Brush Spring Tension—(Delco-Remy) 24-28 ozs. (Auto-Lite) 42-53 ozs., with new brushes.

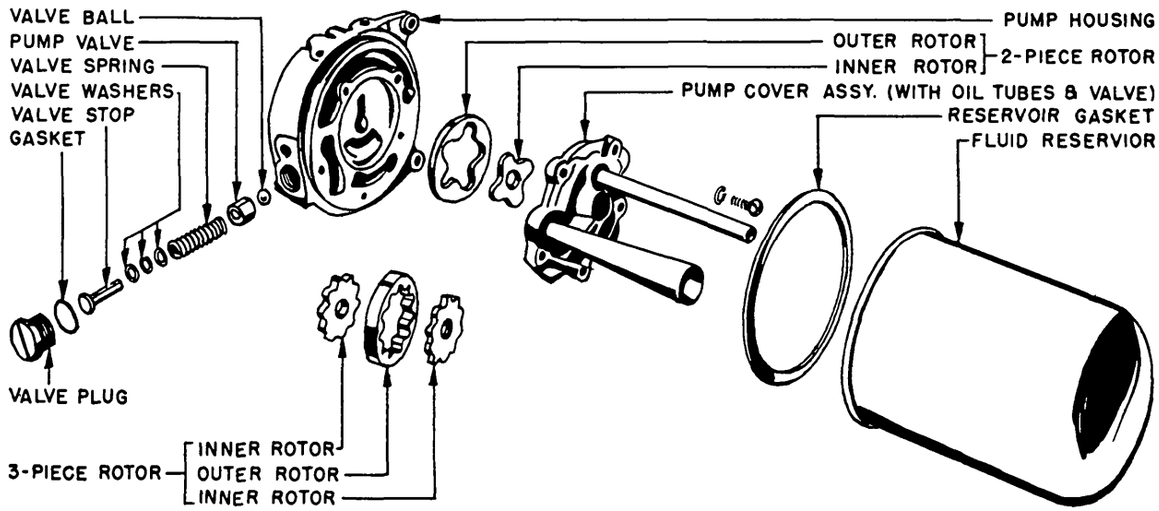
SERVICE PART NUMBERS: Numbers are as follows:

MOTOR	
Buick, Cadillac, Olds (1946-51)	D-R 1108572①
Buick, Cadillac, Olds (1952)	D-R 1108588①
Buick, Cad., Olds. (1953-54) 12V	D-R 1108592①
Hudson	Hudson BO-302323
Packard	Auto-Lite MBL-4004
Ford, Lincoln, Mercury (w/pump)	Ford OH-7353334
Ford (Late 1953-54)	Ford No. FAA-15667-B

①—Delco-Remy.



HYDRO-LECTRIC MOTOR & PUMP ASSEMBLY (DURA PUMP)



HYDRA-LECTRIC PUMP ASSEMBLY (MORAINE PUMP)

AUTO-LITE ELECTRIC

Chrysler & Imperial (1955)
DeSoto (1955)
Dodge (1955)
Packard (1955)
Plymouth (1955)
Studebaker (1955)

DESCRIPTION: Window regulators are individually powered by a reversible electric motor connected to a worm gear by a flexible shaft. Motor is controlled by a two-way switch (on trim panel) and a master switch (on left front door) operating through a relay or directly to the motor. 30-ampere circuit breakers are used with relay circuits and 20-ampere circuit breakers are used in circuits without relays.

REMOVAL & INSTALLATION: Proceed as follows:

Window Lift Motor (Except Studebaker): Remove door handle, escutcheon plate, garnish molding, arm rest and trim panel. Disconnect wires from motor. Remove attaching nuts that hold motor to gear box, pull motor down and away from drive shaft. To reinstall, reverse removal procedure.

Studebaker–Remove regulator assembly (see below). Remove motor-to-regulator bracket capscrews. Slip motor off bracket and disengage motor shaft from coupling. To install, make sure coupling fully engages gear shaft. Then align motor shaft and coupling, slip motor into position. Install retaining capscrews. Install regulator (see below).

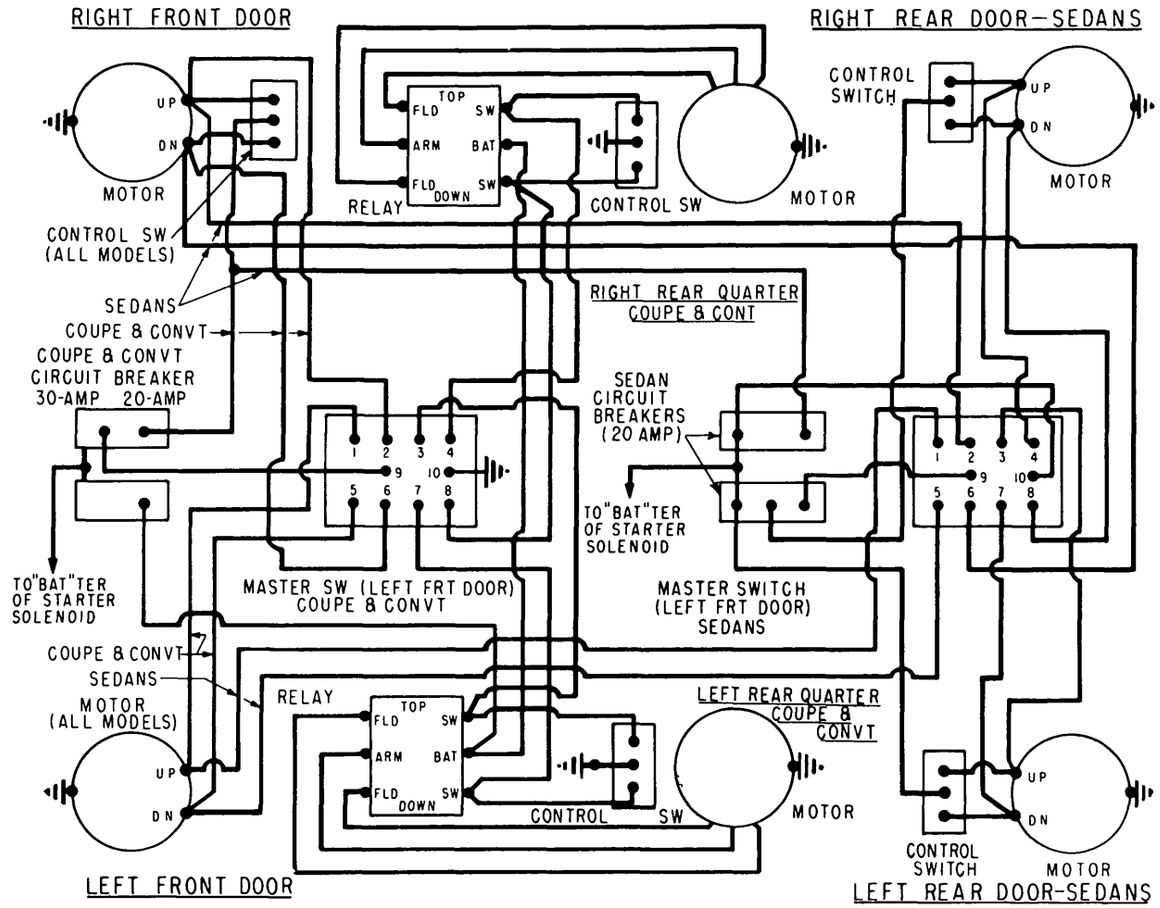
Window Lift Assembly (Except Studebaker): Removal–Disconnect battery, remove garnish molding, door handle and escutcheon plate. Remove arm rest and window lift control switch, then door trim panel. Remove wires from motor. Remove clips from regulator pins holding lower glass channel. Raise glass manually and prop the glass. Raise glass before loosening capscrews so that it is out of working area. Remove four regulator-to-door attaching screws. Remove pivot guide retaining pin. Lower motor and regulator assembly out through opening in door.

►*CAUTION:* If gear box is to be replaced, remove regulator counter balance spring before removing. Counter balance spring has 220° of wrap. Use large pliers when removing. Failure to remove spring before disassembly can result in personal injury.

Installation–Place motor and regulator assembly through opening in door, insert intermediate pivot arm pin into guide inside door shell **(there is no clip)**. Install four regulator attaching screws finger tight. *(NOTE*–After regulator screws installed, check to see that intermediate pivot arm did not slip out of guide during installation). Remove window prop, lower window and insert control arms into glass channel, using leather washer on each side of channel, secure with clip. Connect motor wires and battery cable, operate window up and down several times to help align glass in channel. Stop window half way and tighten regulator attaching screws. Check glass for alignment. Replace trim panel and other parts in reverse order of removal.

Wind w Lift Ass mbly (Stud bak r): R m val–Raise window, remove door handle and arm rest. Remove trim panel, disconnect wires from switch, then remove trim strip from door. Remove sealing tape from inspection holes and tape edges of large inspection hole with masking or friction tape. Remove window stop bracket bolts, turn bracket as required and remove from door. Remove relay bolts, and remove relay, leaving wires attached. If window is in up position, turn ignition switch on and lower window by holding ground wire to dark green wire at relay terminal. Lower window just enough to expose regulator arms and window lift channel. Turn ignition switch off. On all doors, except President 4-Door rear doors, remove hairpin clip and plain washer from each regulator arm guide pin, then disengage lift channel from guide pins. Lift glass all the way manually and insert a punch or small screwdriver through one of trim strip retainer holes to hold glass up in position. On the President rear door, remove ventilator window assembly on Y6 models, and window rear run on Y4 models. Remove window glass from door to provide clearance within door for regulator removal. Disconnect motor-to-relay wires at relay, remove relay. Loosen idler track rear screw just enough to keep it snug. With a hand inside door, hold idler track or end of regulator arm. *(NOTE*–Because regulator arm which engages idler track is springloaded make certain idler track or end of regulator arm is well supported). Remove idler track front screw and carefully lower arm and track until pivot point can be seen through access hole. Then, while holding end of track, remove track rear screw and lower track until it rests against regulator sector. Remove four regulator-to-door panel screws and lower regulator. Then, by revolving drive coupling, move sector to provide clearance required to permit tipping regulator for removal. On front door regulator, move sector to approximately the center position. On rear door regulator, move sector about 1/3 of its total travel from down position. Shift regulator assembly forward on all doors except President sedan rear door (on this model shift assembly forward). Keep motor end down. Turn and tip assembly and start reg-

CONTINUED ON NEXT PAGE



CHRYSLER, DE SOTO, DODGE, PLYMOUTH WINDOW CONTROL WIRING DIAGRAM

AUTO-LITE ELECTRIC
(Continued)

ulator arms out through inspection hole. Continue to turn and, at same time, lower ends of regulator arms and lift assembly out of door

Installati n—Apply Lubriplate or high melting point grease to sector gears, idler track, arm guide pins, and balance spring. Place sector in approximately same position as for removal (center position for front doors, 1/3 of its travel from down position for rear doors) Insert motor end through inspection hole Keep ends of regulator arms down, move assembly into door As mounting bracket clears edge of inspection hole, lower motor and move assembly forward (rearward on rear door of President). Turn assembly and insert regulator arms in door On front door, make sure sector clears window front guide channel. Sector must be positioned between guide channel and door inner panel. Position regulator on door panel and install retaining capscrews Swing idler track into position with arms nearly vertical but with front track screw clear, install but do not tighten front track screw. Lift idler track, using front screw as a pivot, align the bracket with hole in panel, install track rear screw. Tighten both front and rear track screws securely. Connect motor wires to relay Turn ignition switch on and lower sector and regulator arms by touching ground wire to dark green wire relay terminal. On President rear door, place window glass within door On Y6 model, install rear ventilator frame assembly, on Y4 model, install window rear run. On all models, except President, remove punch or screwdriver and lower glass carefully. Engage lift channel with regulator guide pins and install plain washers and retaining clips. Hold ground wire on upper terminal of relay and raise window. Position window stop bracket within door and install retaining bolts Loosen bolts and move stop and bumper down. Lower glass until top of glass is flush with bottom of window opening on all front doors and approximately 2" above bottom of opening on rear door of 4-Door models. Then raise stop until stop bumper contacts lift channel, tighten bolts. Make sure all connections on relay are tight and install relay within door. Install door panel trim strip, connect wires to switch in trim panel, and install trim panel.

OPERATIONAL TEST: Connect ammeter in electrical circuit and operate window. Ammeter reading should be constant and without fluctuation. If reading fluctuates, there is a bind in either glass or linkage

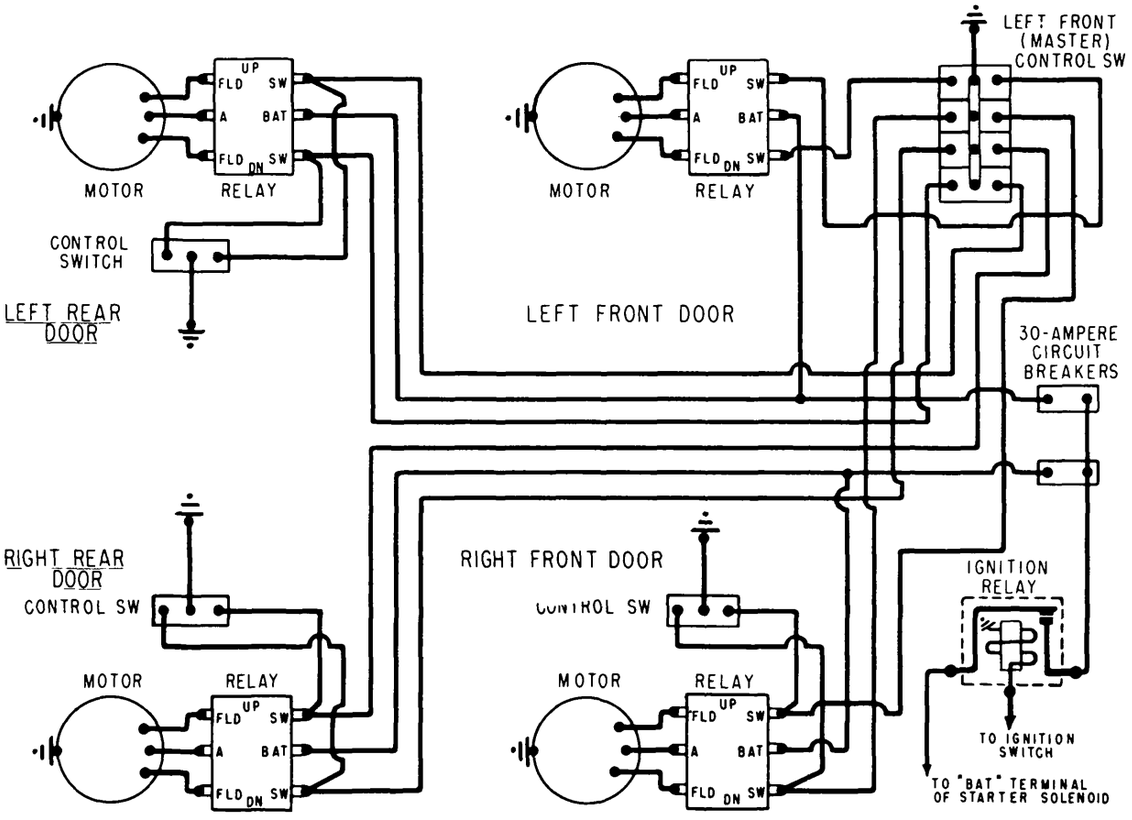
TROUBLE SHOOTING: Diagnose trouble as follows:

All Wind ws Inop rativ : Loose connection or break in wires from power source, defective ignition switch relay (Studebaker), all circuit breakers defecitve.

Both Right Windows or B th Left Windows Inoperative (Stud bak r 4-Do r Mod ls); Both Front Windows Or B th R ar Windows Inop rative (Others): Faulty circuit breaker or circuit breaker wire.

On Window Inop rative: Faulty relay (if so equipped) or operating switch; bind in regulator linkage or window glass; *motor burned out.*

Window Operable In One Dir cti n Only: Faulty relay (if so equipped) or operating switch; broken wire or loose connection; faulty motor.



STUDEBAKER WINDOW CONTROL WIRING DIAGRAM
(STUDEBAKER SEDANS SHOWN—PACKARD SIMILAR)

Window Operates In Wrong Direction From Master Or Door Switch: Field wires from motor reversed at relay (if so equipped).

Window Operates In Wrong Direction From Either Master Or Door Switch, Correctly From Other Switch: Operating wires reversed at switch.

Window Operates From One Switch Only: Defective switch, broken or grounded wire or loose connection.

Circuit Breaker Cuts In & Out Continuously—Window Will Not Operate: Grounded wires, relay (if so equipped) points stuck, faulty switch.

Window Operates Sluggishly Or Circuit Breaker Cuts In & Out When Window Is Operated: Bind in regulator assembly or window channel, broken wire, loose connection, or partial ground, defective motor.

SERVICE PARTS: Auto-Lite Part Nos as follows:

WINDOW LIFT MOTOR

Chrysler C67, C68, C69, DeSoto & Plymouth

Left Doors	EPA-4002
Right Doors	EPA-4001
Left Quarter (Conv. & Sp. Cl. Cpe.)	EWW-4001
Left Quarter (Others)	EPA-4001
Right Quarter (Conv. & Sp.Cl. Cpe.)	EWW-4001
Right Quarter (Others)	EPA-4002

Chrysler C70 (12 Volt)

Doors, Quarters	EMA-4002
Partition	EPG-4001

Dodge

Left Front Door	EPA-4002
Left Rear Door	EPA-4001
Right Front Door	EPA-4001
Right Rear Door	EPA-4002
Left Quarter (Conv. & Sp. Cl. Cpe.)	EWW-4001
Left Quarter (Others)	EPA-4001
Right Quarter (Conv. & Sp. Cl. Cpe.)	EWW-4001
Right Quarter (Others)	EPA-4002

Studebaker

Front & Rear Doors	EWW-4003

WINDOW LIFT RELAYS

Window Lift Motor Relay (Exc. Chrysler C70)	HRZ-4002
Window Lift Motor Relay, Chrysler C70 (12 Volt)	
Left Doors, Right Quarter	RAD-4002L
Right Doors, Left Quarter	RAD-4002R
Partition	RAD-4001
Ignition Switch Safety Relay (Studebaker)	HRM-4105

G.M. ELECTRIC

Buick (1954-55)
Cadillac (1954-55)
Chevrolet (1954-55)
Oldsmobile (1954-55)
Pontiac (1954-55)

►CHANGES, CAUTIONS, CORRECTIONS

►*1954 REGULATOR JAMMING CORRECTION (On Early Models):* If this condition is due to motor jumping at the end of up and down cycle, the condition can be corrected by replacing motor and gear assembly with a later type having a reduced operating speed, an additional bearing on armature shaft and a wider nylon gear.

►*1954-55 INOPERATIVE ELECTRIC WINDOW REGULATOR CAUTION:* First check electrical circuit (see "Trouble Shooting" below). If no defects found in electrical circuit, check regulator assembly installation to determine whether or not motor pinion gear is jammed at end of regulator sector gear. After motor pinion gear to regulator sector gear relationship has ben established, carefully remove regulator assembly from body (see below). Check regulator assembly as outlined under "Trouble Shooting" below.

►*1954-55 REPLACEMENT MOTOR & MOTOR MODIFICATION CAUTION:* (NOTE—Nos. 5, 6, 7, or 8 are stamped on motor gear housing web. These numbers are for identification but do not indicate sequence of issue). Service packages (see below) have been issued to modify the following motors by replacing nylon gear and pinion assembly with a gear and rubber pinion assembly.

1) Nos. 5, 7, and 8 motors which have jammed due to nylon gear binding on worm gear and those in stock to be used as replacement motors (modify at time of installation).

2) No. 5 motors which operate very slowly in cold weather.

3) No. 6 motors which require replacement of a defective gear and rubber coupling assembly.

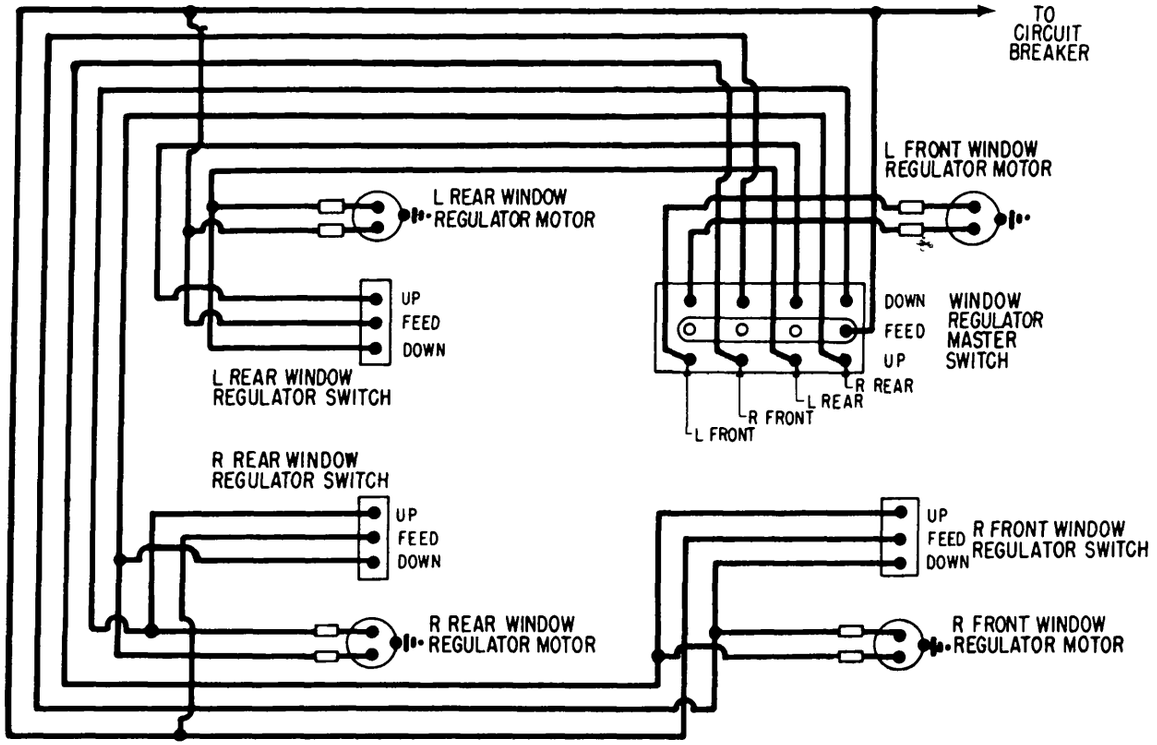
Year & Model	Window	Service Pkg. No.
1954-55 All	Door	5097959
1955 Sp. Cpe., 2-Dr. Sed.	Rr. Qrtr.	5097959
1955 Convertible	Rr. Qrtr.	5097960

Installation Note—With motor in upright position and gear housing positioned below motor, wash out gear housing and worm gear with a suitable solvent such as mineral spirits. Use a small brush to clean around worm gear. Relubricate with grease type lubricant furnished in service package.

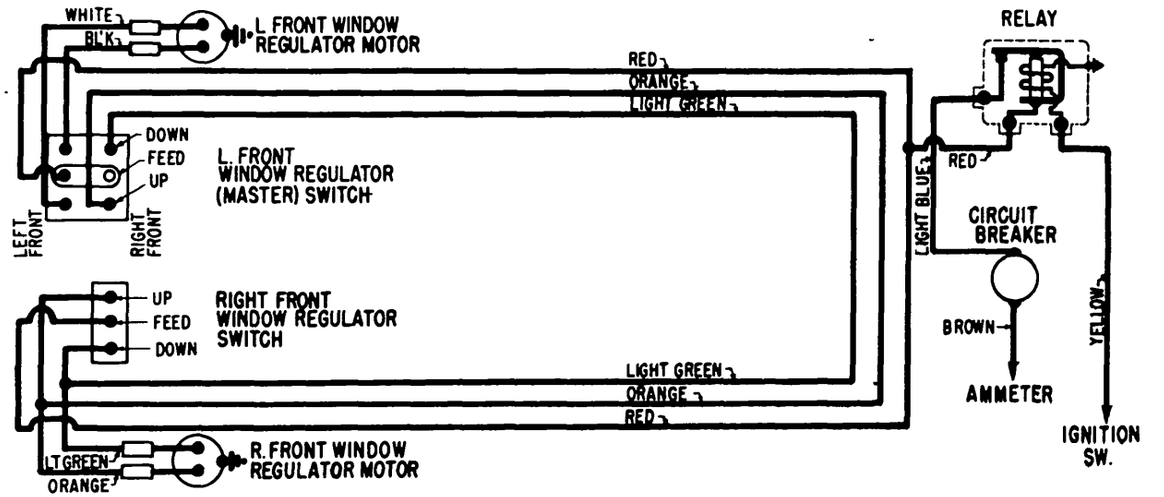
►*1954-55 FRONT DOOR WINDOW BUMPER CHANGE (Sedan Models):* Effective production of 1955 Models, a new, larger bumper approximately 1 5/16" square and ½" thick, Part No. 4609684, was used. On 1954 sedan models, front door window lower stop bumper should be checked whenever motor modification or replacement made. If bumper is approximately 1 3/16" square and ¼" thick, it should be replaced with new bumper.

DESCRIPTION: Door window regulators (and rear quarter windows on some cars) are individually powered with reversible motors geared directly to regulator assembly. A two-way switch on door trim panel and a master control switch (on left front door) control operation of windows. A circuit break-

CONTINUED ON NEXT PAGE



TYPICAL 1954-55 G.M. WINDOW CONTROL WIRING DIAGRAM (EXC. 1954 CHEVR LET & PONTIAC



1954 CHEVROLET & PONTIAC WIND W C NTR L WIRING DIAGRAM

G.M. ELECTRIC (Continued)

er built integral with the motor protects against overloading when up or down cycle is completed. Ignition switch must be "ON" or turned to the "accessory" position for window operation.

DOOR WINDOW REGULATOR ASSY. REMOVAL (Except Buick Mod. 43 & 63 Rear Windows): Operate window to down position. Remove door trim pad, loading hole covers and tape covering access hole, then disconnect motor leads from wire harness. Remove bolts securing window assembly to regulator cam. Disengage window assembly from regulator cam and prop window in "up" position (on Convertibles & Hardtop Models, remove window glass from door). ***(CAUTION—After window regulator assembly is disengaged from the regulator DO NOT OPERATE REGULATOR MOTOR).*** Remove ventilator division channel lower adjusting nut and stud (front windows). Remove stationery cam attaching screws and remove cam. Disengage cam from regulator and remove from between door panels. Remove regulator attaching screws and carefully remove regulator from between door panels. To install, reverse removal procedure. Seal door inner panel. *NOTE*—Regulator lift arm should be in "down" position when installing regulator.

REAR DOOR WINDOW REGULATOR ASSEMBLY REMOVAL (Buick Model 43 & 63): Remove door belt finishing molding, door trim assembly, regulator attaching screw (at access hole cover) and access cover. With windows in raised position, remove two window lower sash channel screws through access hole. Lower window. Mark location of radius arm screw on door inner panel, then remove screw. Remove two window lower sash channel cam screws, disengage cam from window frame and regulator arms ***(CAUTION—After window regulator assembly is disengaged from regulator DO NOT OPERATE REGULATOR MOTOR).*** Lift window and prop in "up" position. Remove regulator attaching screws, disconnect regulator lead wires, and remove attaching screws securing lift arms to door panel. Position regulator radius arm and balance arm so that regulator assembly can be removed from door through access hole. To install, reverse removal procedure.

REAR QUARTER WINDOW REGULATOR ASSEMBLY: Remove rear quarter window ***(CAUTION—After window regulator assembly is disengaged from regulator DO NOT OPERATE REGULATOR MOTOR).*** Disconnect motor leads from wire harness, remove regulator attaching screws. Remove regulator and motor assembly through access hole. To install, reverse removal procedure. Apply medium-bodied sealer around attaching holes on quarter inner panel side of regulator.

REGULATOR MOTOR REMOVAL (WITH REGULATOR ASSEMBLY REMOVED FROM CAR): ***(CAUTION—The regulator arm which is under tension from the counterbalance spring can cause serious injury if motor assembly is removed without locking sector in position).*** Clamp regulator assembly securely in a vise so that arm is free and motor is in an upward position. Drill a ¼" hole through regulator backplate and sector at a point which will miss motor housing and teeth in sector (not closer than ¾" to edge of backing plate or sector). Insert a ¼" bolt through holes in backing plate and sector. Install nut and run up to backing plate only (DO NOT TIGHTEN NUT). Remove the three bolts attaching motor to backing plate and remove motor from backing plate. To install, reverse the removal procedure and remove temporary nut and bolt before installing assembly in door.

►***CAUTION: Motor is a sealed unit and is serviced only as an assembly and should not be disassembled.***

DOOR SWITCH ASSEMBLY REMOVAL: Remove garnish or belt finishing molding and door inside handles. Disconnect terminal block with attached wires from switch assembly by carefully pulling block to disengage it from switch studs. With a suitable tool, pry open the retaining tabs at each end of switch and remove complete switch assembly from trim pad. Remove switch from escutcheon by depressing the four tabs with a sharp pointed tool inserted through holes in end of escutcheon and prying them free.

QUARTER WINDOW SWITCH ASSEMBLY REMOVAL: Remove garnish molding and pull trim panel out slightly, then proceed as outlined for "Door Switch Assembly Removal" above.

TROUBLE SHOOTING (ELECTRICAL):

Window Will Not Operate From Immediate Control Switch, But Will Operate From Master Control Switch: Check as follows:
1) Feed wire to immediate switch.
2) Immediate control switch.
3) Motor leads from intermediate switch to motor.

Window Will Not Operate From Master Switch But Will Operate From Intermediate Switch: Check as follows:
1) Operation of master switch.
2) Motor leads from master switch to motor.

Window Will Not Operate From Intermediate Nor Master Switch. Operation of Other Windows Is Satisfactory: Check as follows:
1) Operation of intermediate and master switches.
2) Motor leads from each switch to motor.
3) Operation of motor.

Windows Will Not Operate From Master Switch But Will Operate From Intermediate Switches: Check as follows:
1) Feed wire from circuit breaker to master switch.
2) Operation of master switch.

Windows Will Not Operate: Check as follows:
1) Battery.
2) Circuit from battery to circuit breaker.
3) Circuit breaker.
4) Feed wire from circuit breaker to switches.
5) Operation of all switches.

TROUBLE SHOOTING (MECHANICAL) & CORRECTIVE MEASURES: Diagnose trouble and correct as follows:

Evidence of Pinion Gear Overtravel on Sector Gear: If check of regulator assembly reveals that motor pinion gear jammed at end of regulator sector gear, extra teeth may be filed at end of sector gear. *CAUTION*—It is important that extra teeth conform to rest of teeth to prevent recurrence of condition. Carefully check added teeth for proper fit with pinion gear teeth

►*NOTE:* On car models and windows listed below, above operation is to be performed **only** if this one operation will make regulator standard. If regulator is found to have additional defects, it should be replaced with a new regulator (Part Nos. indicated below):

Car Model & Year	Window Regulator	Regulator No. Right	Left
1954 Buick Convt.	Rear Quarter	4157308	4157309
1954 Chevrolet	Front Dr.	4157312	4157313
1954 Pontiac	Front Dr.	4157312	4157313

Extreme Sideplay of Sector Gear: If backplate or side of sector gear next to backplate shows that surfaces are contacting on any portion of travel of sector gear, assembly should be replaced (paint will be scraped off at areas of contact).

Lift Arm Pins Too Loose: If any of the lift pins (studs which retain nylon roller to regulator assembly) are loose, they should be tightened to prevent pins from falling off and disengaging window from regulator during operation. Tighten by using normal riveting procedure. If they cannot be tightened satisfactorily, replace regulator.

Nylon Rollers Binding in Channels: If rollers do not slide easily in their channels, greater clearance can be obtained by filing edge of channel or aligning channel to roller with pliers.

Bent or Distorted Regulator Backplate: Replace regulator assembly.

Lubrication: If operation noisy due to lack of lubrication between coils of counter-balance spring, lubricate between coils with a graphite grease. Lubricate all studs with a medium grade oil.

1950-53 CHRYSLER & DE SOTO ELECTRIC WINDOW REGULATORS

Chrysler (1950-53)
DeSoto (1951-53)

DESCRIPTION: Window regulators are individually powered by a reversible electric motor connected to a worm gear by flexible shaft. The motor is controlled by a two-way switch (on trim panel) and a master switch (on left front door) operating through a relay circuit breaker mounted within the door panel.

REMOVAL & INSTALLATION: Proceed as follows

Window Lift Door Switch: Chrome bezel of each switch is held in place by four springs To release bezel, depress springs through notches on side of switch After removing bezel, remove switch wires and switch. To install, reverse removal procedure using care to make sure that wire terminals are positioned away from each other

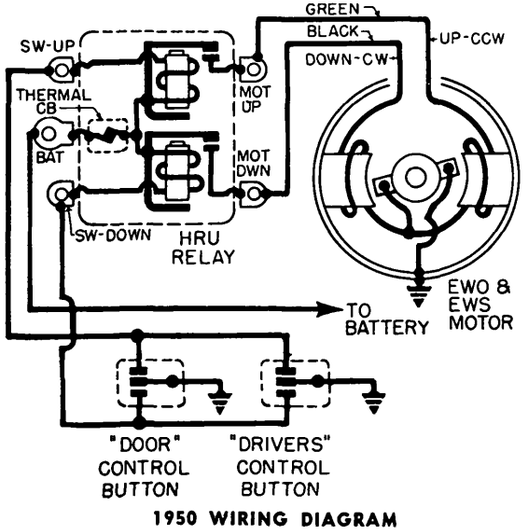
Window Lift (1950-51): Lower window and remove remote control handle, garnish moulding, arm rest & trim panel. Disconnect switch wires in trim panel, and disconnect battery terminal (NOTE—Mark wires and terminals to insure correct reassembly). Remove attaching screws and dismount relay circuit breaker bracket and relay, then disconnect the three wires from motor relay. Remove retainer and leather washer attaching regulator arm to glass channel and disconnect glass channel from regulator arm. Raise window and insert block in panel opening to retain window. Remove the four screws attaching regulator to inside of door panel and remove regulator through opening. On rear doors, remove adjusting screw from glass channel guide To re-install, install regulator assembly through door panel opening and attach regulator to inside of panel with four screws and lockwashers. On rear doors, install adjusting screw at bottom of window glass channel guide. Remove block from panel opening and lower glass. Connect regulator arm to glass channel and install retainer and leather washer. Connect RED motor lead wire to ARM terminal on relay and the GREEN and BLACK wires to FLD terminal on relay. Connect battery terminal and run window up and down using master switch on left front door. If direction of window travel does not correspond with direction indicated by switch, reverse GREEN and BLACK wires. Install relay circuit breaker and bracket in door panel opening Connect all wires to trim panel switch, connect battery terminal, install trim panel, arm rest, garnish moulding and remote control handle.

Window Lift (1952-53): Disconnect battery, remove garnish moulding, door handle control and escutcheon plate Remove arm rest and window lift control switch, then door trim panel **NOTE—Check control arm position. If control arm stud locking retainer cannot be easily reached, remove sector gear box. Lower or raise glass manually so that locking retainer can be positioned for removal. On rear doors, reach in through door lock opening, remove retainer.** Raise glass manually and prop glass so that it is out of working area. ***(CAUTION—To avoid personal injury and slipping of preload spring, install gear box to control unit immediately after lowering or raising glass.)*** Remove battery, armature and both field wires from relay, remove relay bracket attaching cap screws, remove relay Remove regulator-to-door attaching cap screws, remove regulator. To reinstall window lift, reverse removal procedure, with particular attention to following points

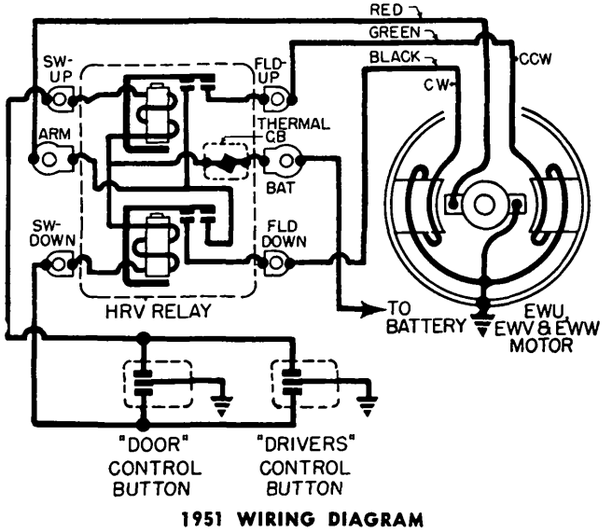
Relay—Be sure relay installed in position marked "down" to allow for proper drainage if water should seep under cover

Gear Box—Gear box should be reinstalled as soon as control arm clips are removed.

Pivot Arm Type Regulator—Glass and channel assembly should be perfectly lined up in glass run channel Raise and lower glass and channel assembly manually a couple of times to check for ease of operation and alignment, before control arm is finally assembled to window channel



1950 WIRING DIAGRAM



1951 WIRING DIAGRAM

WINDOW LIFT MOTOR

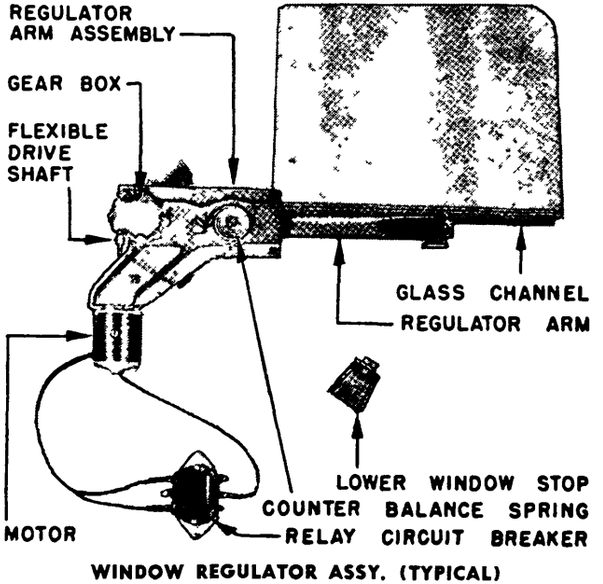
SERVICE PARTS: Auto-Lite Part numbers as follows:

1950 Models	
All Models (Early)	EWS-4001
All Models (Later)	EWO-4001
1951-52 Models	
C54 Models (Early 1951)	EWO-4001
Club & Special Coupes, Convertible	
Doors	EWV-4001
Quarters	EWW-4001
4-Door Sedan, Estate Wagon, 8-Pass	EWW-4001
Limousine	
Doors	EWW-4001
Quarters	EWW-4001
Partition	EWV-4001
1953 Models	
C56, C58, C60	
Doors	EWW-4002
Quarters (Exc Conv & Spec. Club Coupe)	EWW-4002
Quarters (Conv. & Spec. Club Coupe)	EWW-4001
Partition	EMC-4002
C59 (12 Volt)	
Doors	EMA-4001
Quarters	EMA-4001
Partition	EMB-4001

Performance Data—EWO-4001

Torque	R P M	Volts	Amperes
0 ft ozs.	5000 min	6 0	15 max.
15 ft ozs min	Lock	6 0	105 max.

CONTINUED ON NEXT PAGE



WINDOW REGULATOR ASSY. (TYPICAL)

1950-53 CHRYSLER & DE SOTO ELECTRIC (Cont.)

WINDOW LIFT MOTOR (Cont.)

Performance Data—EWV-4001

Torque	R.P.M.	Volts	Amperes
0 ft. ozs.	4070 min.	6.0	18 5 max.
9 ft. ozs. min.	Lock.	6 0	153 max.

Performance Data—EWW-4001, 2

0 ft. ozs.	3570 min	6 0	18 5 max.
6 ft. ozs. min.	Lock	6.0	82 max.

WINDOW LIFT RELAY

Car Model	Auto-Lite No.
All 1950, C54 (Early 1951)	HRU-4001
All 1951-52 (exc. Early 1951 C54)	HRV-4001
C56, C58, C60 (1953)	
Left Doors	HRZ-4001L
Right Doors	HRZ-4001R
Left Qtr. (Exc. Conv. & Spec. Cl. Cpe)	HRZ-4001R
Left Qtr. (Conv. & Spec. Cl. Cpe)	HRZ-4002
Rt Qtr. (Exc. Conv. & Spec. Cl. Cpe.)	HRZ-4001L
Rt Qtr. (Conv. & Spec Cl Cpe)	HRZ-4002
Partition	HRZ-4002
C59 (12 Volt)	
Doors	RAD-4001
Quarters	RAD-4001
Partition	RAD-4001

Relay Specifications—HRU, V, Z

HRU, V, Z Relays consist of two separate units, one controlling the "UP" operation and the other the "DOWN" operation. A 30 ampere thermal circuit breaker is connected between the battery terminal and relay yoke.

NOTE—HRU relay to be used with WL & WLA type window lift devices and HRV, Z relays to be used with WLB & WLC type window regulators.

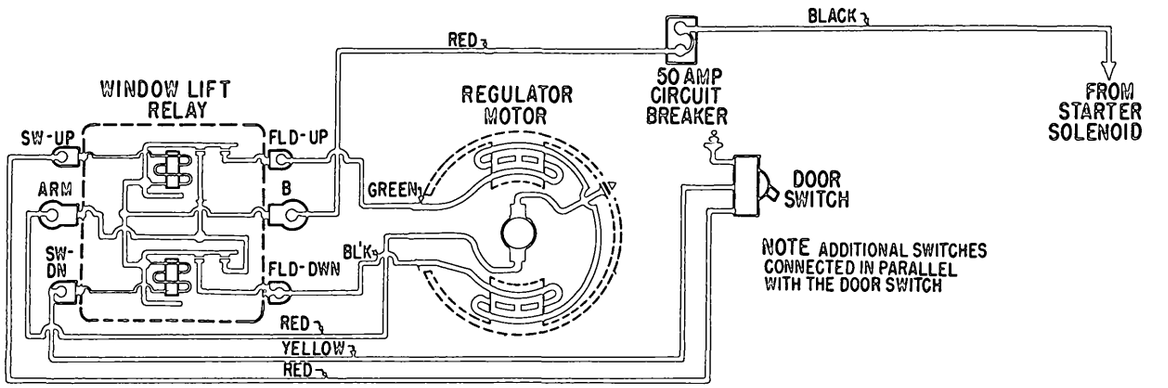
Contacts Open—0 5 volts min.

Contacts Close—1.5-3.0 volts. Set by bending hinge ear.

Contact Point Gap— 026". Adjust by bending armature stop.

Armature Air Gap—.016-.020". Have contacts closed but not sealed and adjust by varying height of stationary contact.

Armature Seals to Core—4.0 volts min. Set by bending hinge ear.



1952-53 WIRING DIAGRAM

1954 CHRYSLER & DESOTO WINDOW REGULATORS

Chrysler (1954)
DeSoto (1954)

DESCRIPTION: Window regulators are individually powered by a reversible electric motor connected to a worm gear by flexible shaft. Motor is controlled by a two-way switch (on trim panel) and a master switch (on left front door) operating through a relay circuit breaker mounted within the door panel.

REMOVAL & INSTALLATION: Proceed as follows:

Window Lift Door Switch: Chrome bezel of each switch is held in place by four springs. To release bezel, depress springs through notches on side of switch. After removing bezel, remove switch wires and switch. To install, reverse removal procedure using care to make sure that wire terminals are positioned away from each other.

Window Lift: Disconnect battery, remove garnish moulding, door handle control and escutcheon plate. Remove arm rest and window lift control switch, then door trim panel. NOTE—Check control arm position. If control arm stud locking retainer cannot be easily reached, remove sector gear box. Lower or raise glass manually so that locking retainer can be positioned for removal. On rear doors, reach in through door lock opening, remove retainer. Raise glass manually and prop glass so that it is out of working area. *(CAUTION—To avoid personal injury and slipping of preload spring, install gear box to control unit immediately after lowering or raising glass.)* Remove battery, armature and both field wires from relay, remove relay bracket attaching cap screws, remove relay. Remove regulator-to-door attaching cap screws, remove regulator. To reinstall window lift, reverse removal procedure, with particular attention to following points:

Relay—Be sure relay installed in position marked "down" to allow for proper drainage if water should seep under cover.

Gear Box—Gear box should be reinstalled as soon as control arm clips are removed.

Pivot Arm Type Regulator—Glass and channel assembly should be perfectly lined up in glass run channel. Raise and lower glass and channel assembly manually a couple of times to check for ease of operation and alignment, before control arm is finally assembled to window channel.

SERVICE PARTS: Auto-Lite Part numbers as follows:

WINDOW LIFT (Complete)

Chrysler C62, C63, C64 & DeSoto Models

Left Doors	WLB-4003L
Right Doors	WLB-4003R
Left Quarter	WLB-4006R
Right Quarter	WLB-4006L
Conv., Chrysler Spec. Club Coupe Right	WLB-4007R
Left	WLB-4007L
Partition	WLC-4003

Chrysler C66 (12 Volt)

Left Rear Door	WLD-4001L
Right Rear Door	WLD-4001R
Left Quarter	WLD-4002L
Right Quarter	WLD-4002R
Partition	WLE-4001

WINDOW LIFT MOTOR

Chrysler C62, C63, C64 & DeSoto Models

Doors and Quarters	EWW-4002
Conv., Chrysler Spec. Club Coupe	EWW-4001
Partition	EMC-4002

Chrysler C66 (12 Volt)

Doors and Quarters	EMA-4001
Partition	EMB-4001

WINDOW LIFT RELAY

Chrysler C62, C63, C64 & DeSoto Models

Left Doors	HRZ-4001L
Right Dors	HRZ-4001R
Left Quarter	HRZ-4001R
Right Quarter	HRZ-4001L
Conv., Chrysler Spec. Club Coupe	HRZ-4002
Partition	HRZ-4002

Chrysler C66 (12 Volt)

Doors, Quarters, Partition	RAD-4001

NASH & HUDSON ELECTRIC WINDOW REGULATORS

Hudson Wasp & Hornet (1955)
Nash Ambassador & Statesman (1953-55)

►CHANGES & CORRECTIONS

►*1955 WINDOW REGULATOR PRODUCTION CHANGE:* Effective with following listed model and body Nos., a new electric window regulator and cross arm assembly has been incorporated in production in front doors of 4-door models and doors of 2-door models. Rear door and quarter regulators remain unchanged over first production units. However, two separate electrical circuits are employed, using a new relay and wiring harness.

Car Model	Model No.	Body No. Hudson	Nash
Wasp & Statesman	35545-1, 2	1228	2983
Hornet 6 & Amb 6	35565-1, 2	1690	2123
Hornet 8 & Amb. 8	35585-1, 2	2248	2651
Wasp & Statesman	35547-2	1354	1356
Hornet 6 & Amb 6	35567-2	1237	1178
Hornet 8 & Amb. 8	35587-2	1549	1320

On later circuits (see "Changes & Corrections" above), all window switch circuits are directed through and protected by the 20 ampere accessory circuit breaker (30 ampere on cars with air conditioning). On these later circuits, window switches are energized by the ignition switch through the accessory circuit breaker.

DESCRIPTION: Window regulators are individually powered by a reversible electric motor connected to the window regulator and transmission assembly by a rubber coupling. The motor is controlled by a two-way switch (on trim panel) and a master multiple switch (on left front door) operating through a relay mounted within the door panel. Two 30 ampere circuit breakers, one mounted to left side of dash behind instrument panel, and the other to the right front body pillar, are in the circuits supplying current to the left and right windows respectively.

REMOVAL & INSTALLATION: Proceed as follows:

Window Lift Door Switch: Master multiple switch is held in mounting plate by four combination inner and outer retaining springs, one at top and bottom of each end switch unit. Single switches are held by two combination inner and outer retaining springs, one at top and bottom of switch. To remove, compress retaining springs by inserting pointed tools in notches between switch housing and mounting plate (on master switch—rear first then front) and with prying and pressure action remove switch. To install, insert switch springs in notches and press.

CAUTION—Inspect all terminals to see that they will not touch the door metal panel.

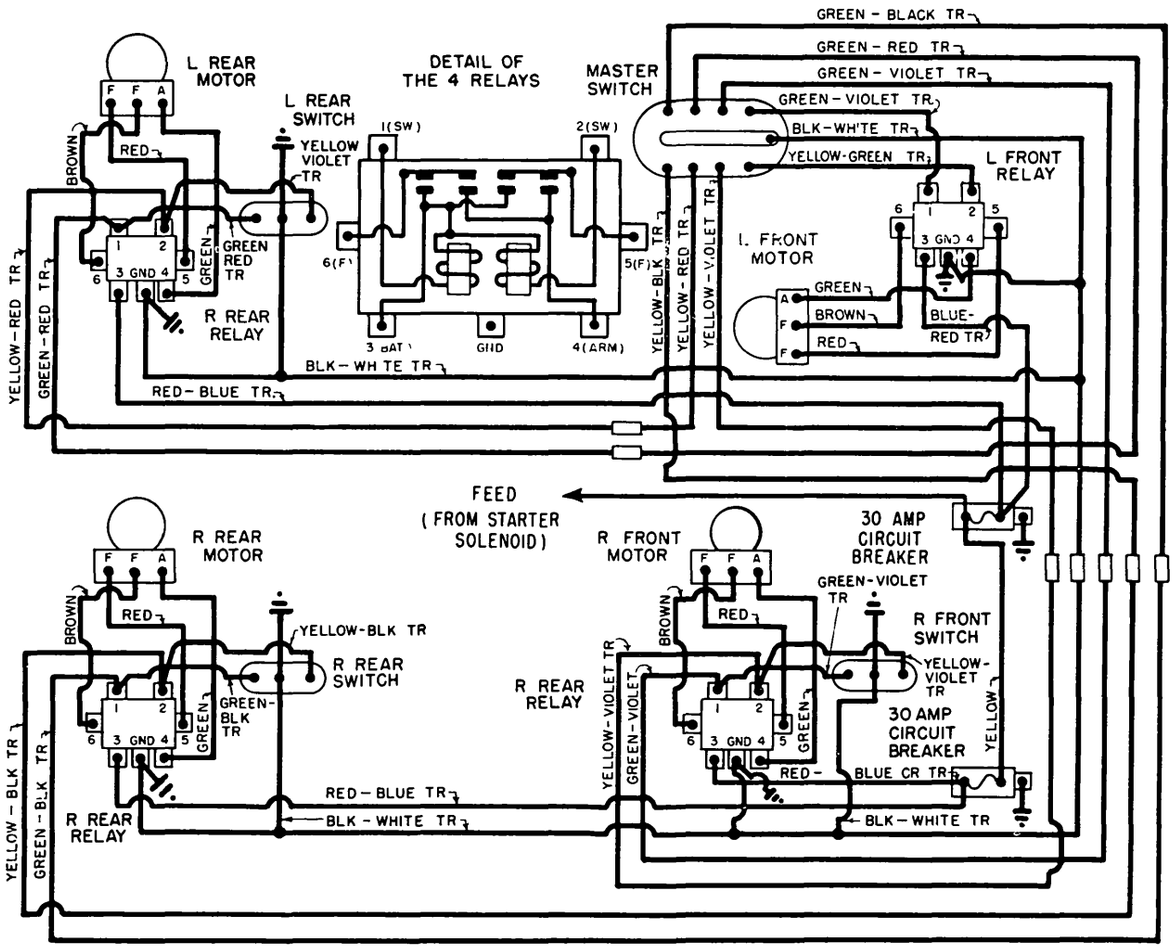
Individual Switches from Switch Housing—Remove ground bar from all switches in assembly. Insert pointed tool into spring retaining holes on each side of housing, compress springs, lift switch from housing. End switches can be removed in same manner by lifting end springs to expose hole. Individual door switches are retained in single housing in same manner as end switches of master control switches.

Window Regulator Assembly: *NOTE*—Procedures for removal and installation of all door window regulator assemblies on early cars differ from those for later front door (4-door models) and 2-door models. See "Changes & Corrections" above.

All Doors (Early Cars), Rear Doors (Later Cars)—Raise window (*NOTE*—If window cannot be raised automatically, raise it manually by turning the motor-to-transmission coupling (rubber). This operation can be performed by inserting hands through cut-outs in door panel after trim panel is removed). Disconnect battery, remove trim panel and window regulator arm-to-bottom channel retainers. Pull each arm from bottom channel and remove fibre and spring washer from arm stud. Set arm back into bottom channel (to prevent misplacement of parts). Insert wood block to support glass in raised position, remove window regulator arm screws ***(CAUTION—This arm is under spring tension and must be held firm while removing screws. Release arm carefully to prevent injury).*** Support window regulator and motor assembly to prevent falling and possible damage as regulator-to-door panel screws are removed. Door window regulator with arms in raised position can be removed or installed through front opening of door inner panel. To install, reverse removal procedure. ***CAUTION—Before regulator arms are attached to glass bottom channel, glass assembly should be raised and lowered by hand to insure free operation. Glass slide and adjusting screws control alignment of these units so that the glass will raise and lower without binding. Lubricate channel section of guide channels.***

Front Doors (Later 4-Door Models), Both Doors (Later 2-Door Models)—Disconnect battery, remove door trim panel. Disconnect regulator arm from cross arm assembly by removing key slotted retainer from grooved stud riveted in cross arm assembly. Move glass to fully raised position. Remove relay from door inner panel and disconnect motor-to-

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1953-EARLY 1955 NASH & EARLY 1955 HUDSON WINDOW REGULATOR WIRING DIAGRAM

NASH & HUDSON ELECTRIC (Cont.)

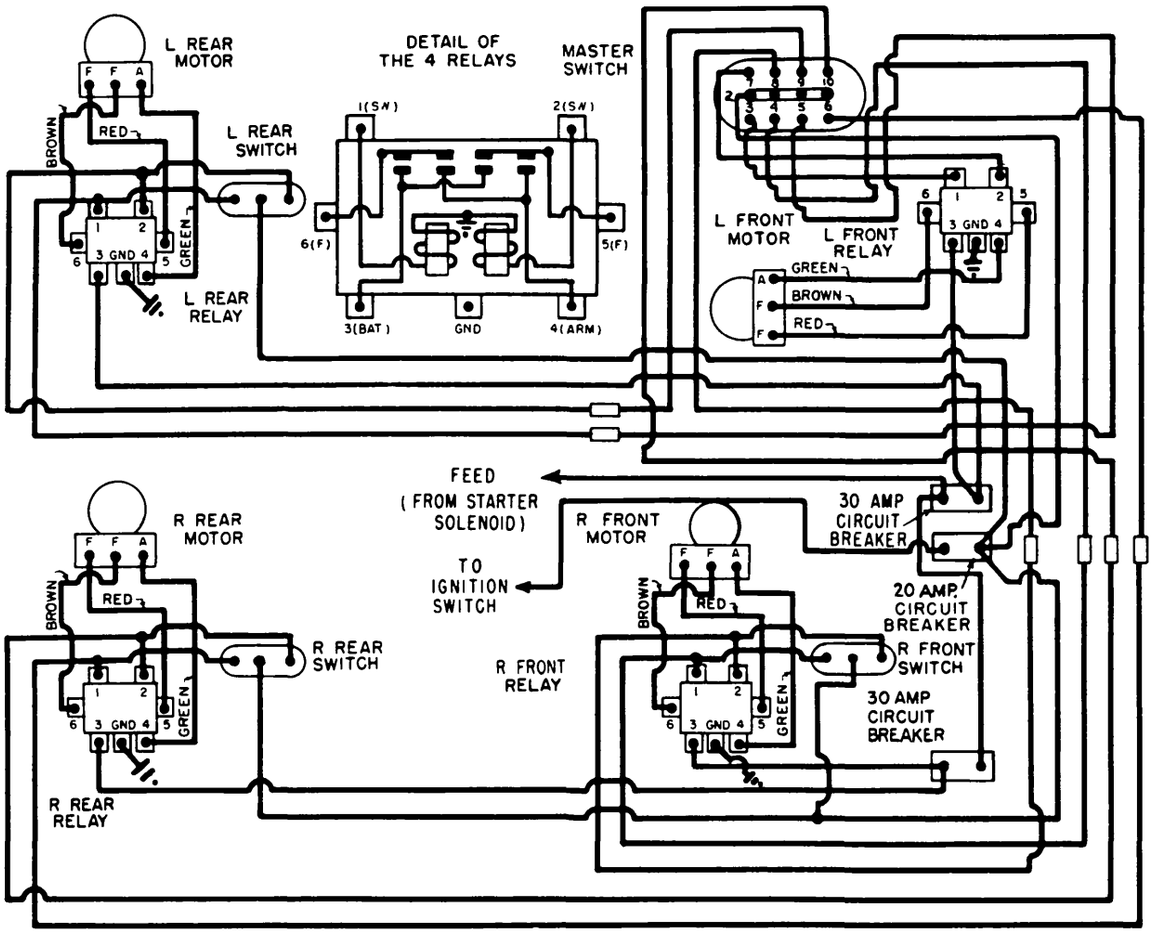
relay wires Remove regulator-to-door screws and remove assembly through large opening in panel To install, reverse removal procedure and note the following Before reinstalling, glass should be raised and lowered by hand to insure free operation, cross arm and regulator moving parts must be lubricated with Lubriplate Door glass should be moved down to align hole in end of regulator arm with stud in cross arm assembly. Install spring washer, then fibre washer to stud, install arm onto stud and fasten with retainer A rubber bumper is inserted into cross arm slide which acts as a glass stop when glass is in down position

Window Regulator Assembly (Rear Quarter): Disconnect battery, remove rear seat cushion and back assembly. Remove switch from trim panel and disconnect wires. Remove armrest trim panel and finish moulding. After trim panel parts removed, particular attention should be given to the removal of the sealing tape and putty so that when resealing is being done, no seams are left unsealed (to prevent entry of water). Mark window regulator panel and adjoining pillars at two or three places on each side and at bottom to permit ready adjustment of regulator at reinstallation. Remove guide channel fastening-to-body bracket screw and window regulator bracket-to-panel screws. Then remove all screws holding window regulator panel to body. Remove complete assembly after disconnecting relay wires (complete assembly can be turned around without disconnecting wires should operation of the regulator and the guide channel require inspection or the glass assembly be removed). To install, reverse removal procedure. NOTE—Regulator arms must move freely in bottom channel and regulator panel Also, bottom channel studs must move freely in the channel section of the guide channel. Check for proper clearances and lubricate with lubriplate.

Window Regulator Transmission Assembly: *NOTE*—Transmission assembly used on front doors of later 4-door models and doors of later 2-door models differs from that used on all doors of early models See "Changes & Corrections" above Quarter window transmission assemblies remain unchanged.

All Doors (Early Cars), Rear Doors (Later Cars), Quarter Windows (All Cars)—Remove the window regulator assembly, then move regulator arms to fully lowered position. Then remove three screws holding transmission assembly to window regulator assembly (screws are inserted through window regulator from gear side and screwed into threaded sections of transmission cover). NOTE—When window regulator-to-transmission screws are removed, transmission cover is loosened and may loosen cover gasket causing leakage of lubricant In this event, inspection should be made to see that all transmission gears have a coating of lubricant. When transmission is reinstalled to regulator, **a new cover gasket should be used.**

Front Doors (Later 4-Door Models), Both Doors (Later 2-Door Models)—(*NOTE*—Transmission housing is integral with motor housing). Remove window regulator assembly. Place regulator and motor assembly in a vise. Loosen three bolts that secure motor and transmission assembly to bracket on regulator assembly so that bolt ends do not protrude beyond anchor plate, to provide space for moving motor outward. (*CAUTION*—Regulator sector gear is under spring tension and must be held to prevent injury when disengaging pinion gear from sector). Hold regulator and move motor and transmission assembly away from regulator far enough to disengage pinion gear from sector ***Release spring tension gradually.*** Then remove cam plate assembly from regulator.



LATE 1955 HUDSON & NASH WINDOW CONTROL WIRING DIAGRAM

WINDOW LIFT MOTOR: Different motors used as follows.

Windows	Hudson & Nash Part No.
All—Early Cars①	4377198
Rear Doors & Quarters—Later Cars①	4377198
Front Doors—Later 4-Door Models①	4476024
Both Doors—Later 2-Door Models①	4476024

①—See "Changes & Corrections" above.

Specifications

Torque	R.P.M.	Volts	Amperes
35 ft .ozs. min.	3200	5 5	42 max.
90.02 ft. ozs. min.	Lock	5.5	115 min.

Shaft End Play—.005-.015".

Color Code—Red and Green Wire to one side of line with opposite side of line grounded for **clockwise rotation** (shaft end); Brown and Green Wire to one side of line with opposite side of line grounded for counter-clockwise rotation (shaft end).

Relay: Nash & Hudson No 4377101 (Early Cars), No 4382054 (Later Cars). See "Changes & Corrections" above.

1953-54 FORD, LINCOLN, MERCURY ELECTRIC TYPE

Ford (1954)
Mercury (1952-54)
Lincoln (1952-54)

►***WINDOW REGULATOR ASSEMBLY INTERCHANGEABILITY:*** Two types of electric window regulator assemblies used, "A" and "B." The two assemblies are interchangeable but "B" type only furnished for service. Installation of the two types is different (See Installation below). Arm and plate assembly not an integral part of "A" type but is integral on type "B".

DESCRIPTION: Window regulators are individually powered by a reversible electric motor which operates gear sectors through pinion or worm gears. Motor is controlled by a two-way switch (on trim panel) and a master switch (on left front door) operating through a relay circuit breaker mounted in door panel.

REPLACEMENT ELECTRICAL UNITS: As indicated below:

Window Lift Motor

	Part No.
Type "A"—Right Hand①	FAA-14549-A
Type "A"—Left Hand①	FAA-14553-B
Type "B"—Right & Left Hand②	FAA-14553-A

①—Bracket mounted on window regulator.
②—Stud mounted on window regulator.

Window Control Switches

Single	FAA-14529-A
Multiple	FAA-14540-A

Window Control Relay

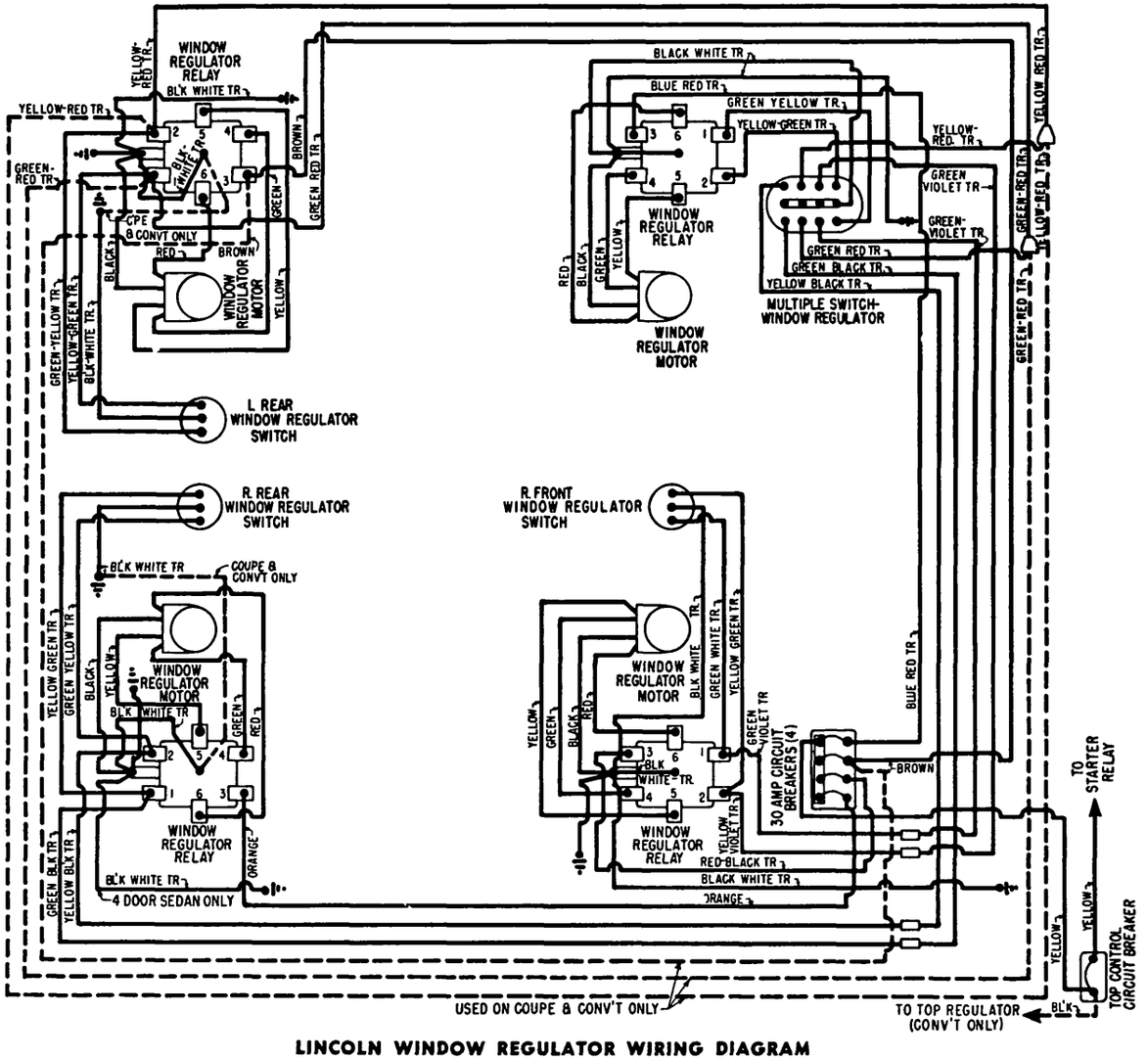
All Models	FAA-14512-A

REMOVAL: Proceed as follows:

Window Lift Door Switch: Lower window glass as far as possible by operating switch on door, then disconnect ground cable from positive battery terminal post. Pry switch from trim panel, remove wires from switch. To install reverse removal procedure.

Arm & Plate Assembly (Type A Front Door): Disconnect battery ground (positive cable) to prevent shorts. Remove two screws that secure arm rest to door panel, remove arm rest Remove inside handles by pressing escutcheon plate or trim panel inward exposing spring type retainer. While holding escutcheon plate or trim panel in this inward position, release the retainer with Tool 21812 and remove the handle. Remove inside lock button. (On Mercury Model 73B, remove the six sheet metal screws along upper edge of door that secure upper garnish moulding to door. Remove garnish moulding. ***Note order in which screws were removed and replace in same order.*** Then remove four sheet metal screws on front door, that secure lower garnish to door. Remove lower garnish moulding. ***Note order in which screws were removed and replace in same order).*** On other models remove garnish moulding. With window glass in closed position, disconnect ground cable from positive battery terminal post. Remove the wires from the switch, and remove switch from trim panel. Remove two sheet metal screws and washers from lower edge of trim panel, pry trim clips free along sides of door, lift up trim panel and remove. Remove inside panel cover plate. Remove two cap screws that secure window stop to inner door panel, remove stop. Lower window to open position, remove two spring type retainers that secure glass channel rollers to arms. Remove rollers from arms. Raise window glass to closed position; wrap several strips of masking tape over top of door and stick the ends to each side of the glass to hold glass in closed position. Remove spring retainer that retains regulator arm to arm and plate assembly. Remove three cap screws that secure arm and plate to inner door panel. Slide assembly toward

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LINCOLN WINDOW REGULATOR WIRING DIAGRAM

1953-54 FORD, LINCOLN, MERCURY ELECTRIC (Cont.)

regulator to release roller from guide on inner door panel. Lower assembly and remove through door access hole.

Window Regulator Assembly (Type A Front Door): Remove trim panel, inside panel cover plate, window stop, window glass, and spring retainer. Remove four cap screws that secure regulator assembly to inner door panel. Lower assembly and remove through access hole. Remove cover plate with relay attached and disconnect wires from motor to relay.

Motor & Bracket Support Assembly (Type A Front Door): Remove trim panel cover plate, window stop, window glass, spring retainer, and vent window glass. Remove window regulator assembly (above). Clamp window regulator assembly tightly in vise and unload spring by pulling hooked end away from, and up over stop. Remove three screws and lockwashers holding motor and bracket support to regulator assembly, remove motor and gasket. Remove cover and shaft from motor and bracket support. Remove coupling and pinion and shield assembly from regulator assembly.

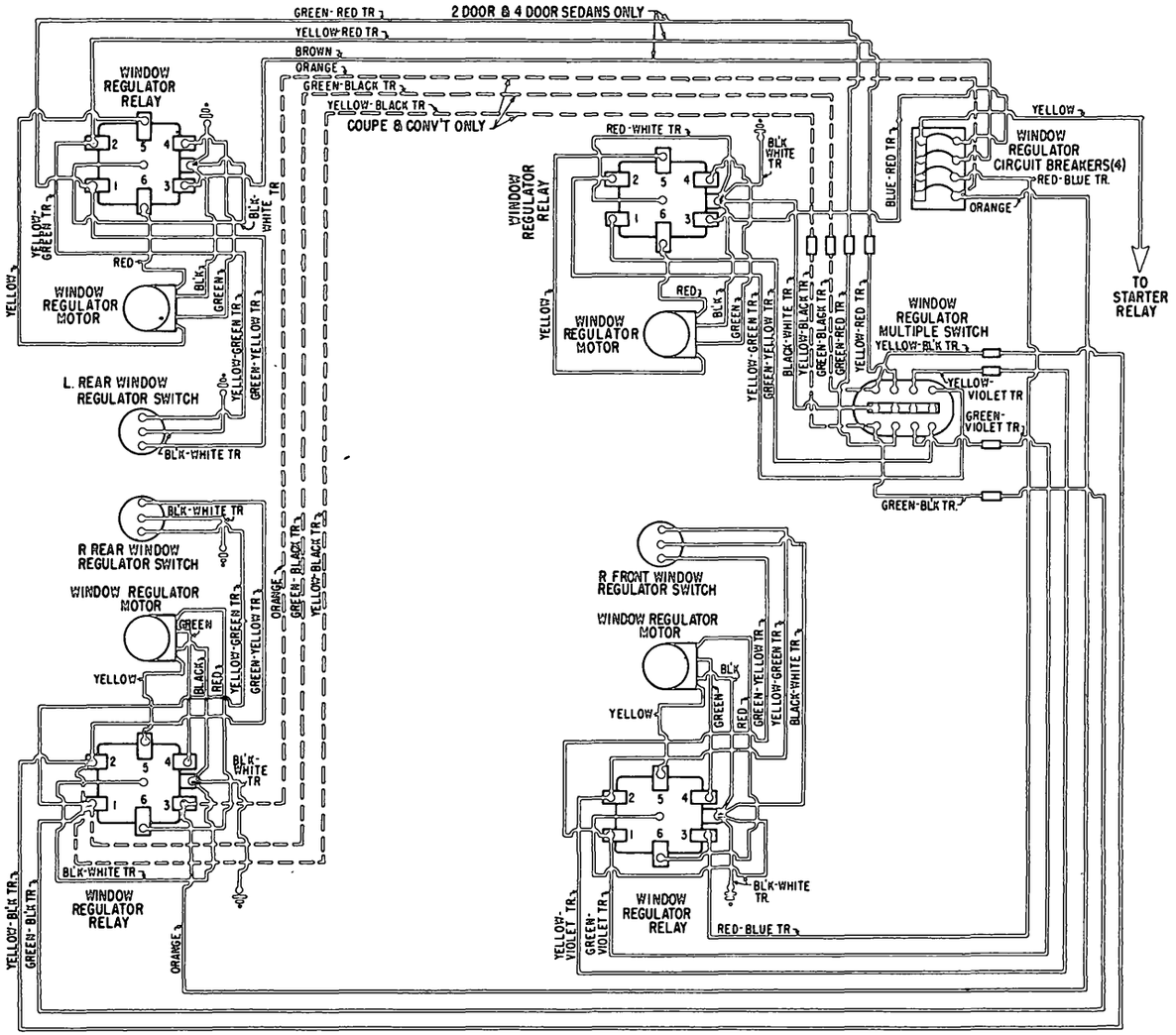
Window Regulator Assembly (Type B Front Door): Remove trim panel, inside panel cover plate, window stop, window glass, spring retainer, and vent window glass. Remove four cap screws that hold window regulator assembly to inner door panel. Lower assembly and remove through access hole. Remove cover plate with relay attached, disconnect wires from motor to relay.

Motor Assembly & Coupling (Type B Front Door): Remove trim panel and inside cover plate. Remove two attaching nuts and washers which hold motor to window regulator assembly. Remove motor and rubber drive coupling through access hole. Remove cover plate with relay attached and disconnect wires from motor to relay.

Drive Assembly (Type B Front Door): Remove trim panel, inside panel cover plate, window stop, window glass, spring retainer, and vent window glass. Remove three cap screws that hold window regulator assembly to inner door panel. Lower assembly and remove through door access hole. Remove cover plate with relay attached. Disconnect wires from motor to relay. Clamp window regulator assembly tightly in vise, and unload spring by pulling hooked end away from, and up over stop. Remove three cap screws and lock washers holding drive assembly to window regulator mechanism, remove drive assembly.

Window Regulator Mechanism (Type A Rear Door): Remove trim panel, inside panel cover plate, window stop and window glass. Remove six cap screws that secure window regulator to door panel. Remove bracket with relay attached. Lower assembly and remove through access hole. Disconnect wires from motor to relay. Clamp window regulator assembly tightly in vise, unload spring by pulling hooked end away from, and up over stop. On Mercury, remove three screws and lockwashers holding motor and bracket support to regulator assembly, remove motor and gasket. Remove coupling, and pinion-shield assy. from regulator assembly.

Window Regulator Mechanism (Type B Rear Door): Remove trim panel, inside panel cover plate, window stop, and window glass. Remove four cap screws that secure window regulator to door panel.



FORD & MERCURY WINDOW REGULATOR WIRING DIAGRAM

Slide regulator arm off track, lower assembly and remove through access hole. (NOTE—Position of wires connecting relay and door switch within door panel is for ease of assembly.) Remove bracket with relay attached. Disconnect wires from motor to relay. Clamp window regulator assembly tightly in vise, unload spring by pulling hooked end away from, and up over stop. Remove two attaching nuts and washers which hold motor to window regulator assembly. Remove motor and rubber drive coupling. (NOTE—Motor and drive coupling may be removed through access hole without removing window regulator assembly.) Remove three cap screws and lockwashers holding drive assembly to window regulator mechanism, remove drive assembly.

Quarter Window Regulator: Remove rear seat cushion, and rear seat back cushion. Pry cover off assist strap, remove assist strap screw, then assist strap. Remove seven sheet metal screws that secure garnish moulding to quarter panel, remove garnish moulding. Remove two screws that secure quarter arm rest, remove arm rest. Pry trim clips free along front edge of trim panel, remove trim panel. Remove two cap screws that secure quarter window stop to quarter window regulator panel, remove stop. Lower window as far as possible. Remove two spring type retainers that secure glass channel rollers to window regulator arms, remove rollers from arms. Window glass is now free and can be lowered to bottom of quarter panel. Remove four cap screws that secure regulator assembly to quarter window regulator panel. Disconnect wires from motor to relay, remove regulator assembly.

INSTALLATION: Reverse removal procedures.

1955 FORD, LINCOLN, MERCURY

Ford (1955)
Lincoln (1955)
Mercury (1955)
Thunderbird (1955)

►CHANGES, CAUTIONS, CORRECTIONS

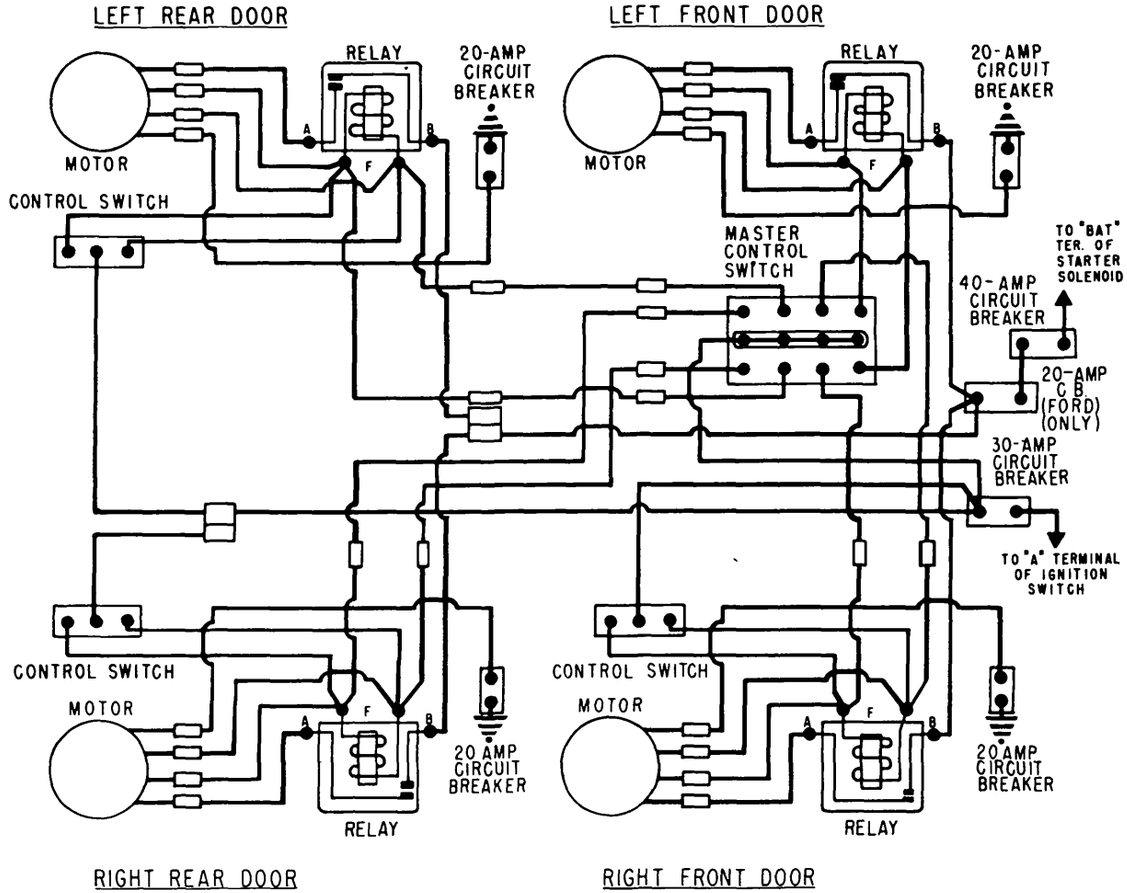
►*1955 CIRCUIT BREAKER PRODUCTION CHANGE (To Correct Overload Burn-out):* Circuit breakers, Part Nos. 1A-14526 or 1A-14526-A (40 amps.) and FDH-14526-A2 or B5A-14526-A (30 amps.) have been modified to include a copper-colored rivet in center of base between studs. This change will accommodate the necessary overloads of the system. Circuit breakers (Early type) with white (cadmium) colored rivets in stock should be checked before installation, as follows: Connect a pair of wire leads three feet long (10 gauge for 40 amp. circuit breaker, 12 gauge for 30 amp. circuit breaker) to terminals on circuit breaker. Connect other end of leads to terminals of a fully charged battery (80% charged throughout test). Defective breakers will fail within approximately ten seconds. Failure of breaker will be evidenced by an audible click and lack of sparking after jumper wires are touched to terminals. Failure may also be evident by a rattle of breaker arm inside case. A good circuit breaker will open and close repeatedly for a period of four hours minimum.

►*1955 WINDOW LIFT SWITCH REPLACEMENT CAUTION:* Window switches used on 1955 models are identical in appearance, but are constructed differently. Switches used in Ford and Mercury circuits have silver-plated points in order to provide a minimum resistance, while those used in Lincoln circuits have copper-plated points which, if used in Ford and Mercury circuits, would offer too great a resistance and greatly lower efficiency of the motor. See "Window Control Switches" table below.

►*1955 FORD & MERCURY WINDOW LIFT RELAY PRODUCTION CHANGE:* Window Lift Relay, Part No. B5A-14512-A, has been modified in production to include a molded plastic base. Part No. remains unchanged but new relay is identified by new base. Old relay had stamped base. Replacement should be with new type relay.

►*1955 FORD & MERCURY WINDOW LIFT RELAY & MOTOR FAILURE CORRECTION (When Due to Water Damage):* The following procedure should be used to correct replacement relays not dipped in waterproof plastic and motors not covered with a plastic shroud: On relays, place vinyl tape, No. M-6478-A, or a good grade of plastic electrical tape on lower edge of relay so that approximately ⅛" overlaps bottom face of the plastic base. The motor may be satisfactorily protected by wrapping it with plastic shroud, Part No. FDL-14484-A, and holding shroud in place with rubber band.

►*1955 FORD WIRING HARNESS INTERFERENCE WITH DOOR CHECK ARM CORRECTION:* On all cars, except Thunderbird, wiring harness leading to each front door should be checked for interference with door check arm inside door. If harness too close or resting on check arm, harness must be removed and moved away from check arm. Unclip harness at opening normally used for manually operated window. Raise harness to next hole and install clip.



FORD & MERCURY WINDOW CONTROL WIRING DIAGRAM

►*1955 FORD WINDOW LIFT RELAY "FLUTTER" CORRECTION:* If "flutter" or rapid clicking sound noted, proceed as follows: Check door glass alignment. If glass has noticeable sag at rear corner as glass is raised, adjust regulator in elongated holes in inner panel (three holes are on face of inner panel; other hole can be reached through access hole in inner panel) On some early production Thunderbirds it may be necessary to elongate four mounting holes approximately ¼" downward to eliminate sagging condition. If clicking noise continues, relay should be replaced.

DESCRIPTION: Window regulators are individually powered by a reversible electric motor which operates gear sectors through pinion or worm gears. Motor is controlled by a two-way switch (on trim panel) and a master switch (on left front door) operating through a relay circuit breaker mounted in door or quarter panel.

REPLACEMENT ELECTRICAL UNITS: As indicated below:

Window Lift Motor

	Part No.
Ford & Mercury, Type "B"	B5S-14553-A
Lincoln, Type "B"	FAA-14553-B

Window Control Switches

Ford & Mercury, Single	B5A-14529-A
Lincoln, Single	FAA-14529-A
Ford & Mercury, Multiple	B5A-14540-A
Lincoln, Multiple	FAA-14540-A

Window Control Relay

Ford & Mercury	B5A-14512-A
Lincoln	FAA-14512-A

TROUBLE SHOOTING: Diagnose trouble as follows:

Window Will Not Operate From Either Master or Window Switch: Shorted or open lead from starter solenoid; broken ground connection to relay; shorted or open armature or field coil windings.

Window Will Go Up But Not Down, or Down But Not Up When Either Switch Is Activated: Shorted or open coil in relay; loose connections or open motor control circuit.

CONTINUED ON NEXT PAGE

1955 FORD, LINCOLN, MERCURY (Continued)

Window Operation Is Sluggish & Noisy: Motor brushes chipped or improperly seated; excessive armature end play; insufficient clearance between armature and field coils.

REMOVAL: Proceed as follows:

Window Regulator Assembly (Type B Front Door): Remove trim panel, inside panel cover plate, window stop, window glass, spring retainer, and vent window glass. Remove four cap screws that hold window regulator assembly to inner door panel. Lower assembly and remove through access hole. Remove cover plate with relay attached, disconnect wires from motor to relay.

Motor Assembly & Coupling (Type B Front Door): Remove trim panel and inside cover plate. Remove two attaching nuts and washers which hold motor to window regulator assembly. Remove motor and rubber drive coupling through access hole. Remove cover plate with relay attached and disconnect wires from motor to relay.

Drive Assembly (Type B Front Door): Remove trim panel, inside panel cover plate, window stop, window glass, spring retainer, and vent window glass. Remove three cap screws that hold window regulator assembly to inner door panel. Lower assembly and remove through door access hole. Remove cover plate with relay attached. Disconnect wires from motor to relay. Clamp window regulator assembly tightly in vise, and unload spring by pulling hooked end away from, and up over stop. Remove three cap screws and lock washers holding drive assembly to window regulator mechanism, remove drive assembly.

Window Regulator Mechanism (Type B Rear Door): Remove trim panel, inside panel cover plate, window stop, and window glass. Remove four cap screws that secure window regulator to door panel. Slide regulator arm off track, lower assembly and remove through access hole. (NOTE—Position of wires connecting relay and door switch within door panel is for ease of assembly.) Remove bracket with relay attached. Disconnect wires from motor to relay. Clamp window regulator assembly tightly in vise, unload spring by pulling hooked end away from, and up over stop. Remove two attaching nuts and washers which hold motor to window regulator assembly. Remove motor and rubber drive coupling.

Quarter Window Regulator: Remove rear seat cushion, and rear seat back cushion. Pry cover off assist strap, remove assist strap screw, then assist strap. Remove seven sheet metal screws that secure garnish moulding to quarter panel, remove garnish moulding. Remove two screws that secure quarter arm rest, remove arm rest. Pry trim clips free along front edge of trim panel, remove trim panel. Remove two cap screws that secure quarter window stop to quarter window regulator panel, remove stop. Lower window as far as possible. Remove two spring type retainers that secure glass channel rollers to window regulator arms, remove rollers from arms. Window glass is now free and can be lowered to bottom of quarter panel. Remove four cap screws that secure regulator assembly to quarter window regulator panel.

INSTALLATION: Reverse removal procedures.

HYDRO-LECTRIC TOP CONTROL (WITH HYDRAULIC WINDOW & SEAT CONTROL)

1946-52 Buick, All Series
1953 Buick, 50 & 70 Series. See Note below.
1954 Buick, Series 66C & 100 (Convertible)
1946-53 Cadillac, All Series
1946-50 Chevrolet & Pontiac
1946-48 Ford & Mercury Sportsman
1949-50 Ford
1949-51 Lincoln, Mercury
1948-53 Hudson
1954 Hudson 5D & 7D (Convertible)
1946-51 Oldsmobile, All Series
1952-Early 1954 Oldsmobile, Super 88 & 98. See Note below.
1948-54 Packard

▷Oldsmobile Super 88 Note—*For type used without window and seat control see separate "Hydro-Lectric Type (Without Window & Seat Control)" for data.*

▷PRODUCTION CHANGE: Two different pumps have been used, a low pressure pump (200-210 p.s.i.), and a high pressure pump (250-260 p.s.i.). These pumps can be identified by relief valve plug at rear of pump: low pressure has cadmium plated plug, high pressure a copper plated plug.

DESCRIPTION: This type control consists of electric pump with direct-connected hydraulic pump which supplies fluid under pressure to two double-acting hydraulic cylinders which raise and lower the top. Motor operation and directional control (to raise or lower top) is controlled by a button on the instrument panel. Top design is conventional with top bows and side-irons modified for power actuation. On cars listed above, motor is not reversible and selective control (to raise or lower top) is secured by use of a hydraulic valve by which the fluid is directed to the bottom of the hydraulic cylinders (to raise the top), or to the top of the cylinders (to lower the top). Opposite end of cylinder is vented to fluid reservoir through valve.

Power Unit—Consists of motor, hydraulic pump, and fluid reservoir assembly on front of dash with magnetic motor switch on side of motor and thermostatic relay type circuit breaker (for motor circuit protection) is mounted near the motor. This unit is same as type used for Window & Seat Control on some of these cars.

Top Control Valve & Switch—Either a double solenoid type valve located under seat and controlled by self-centering switch located below instrument panel or a combination switch and distributing valve located on inside of dash panel. With the under-seat type valve solenoids operate valve to direct flow of fluid, under pressure, to either upper or lower ends of top lift hydraulic cylinders. Solenoid switch also actuates solenoid switch controlling power unit. With dash-mounted type valve, moving switch control from the center position starts power unit and directs flow of fluid to either top or bottom of hydraulic top lift cylinder.

Power Cylinders—Double acting type, two used. Mounted on each side of car body, at rear, with piston rod linked to top mechanism. Cylinders are mounted on pivot bracket to permit rocking action as top is raised and lowered and the hydraulic tubing is looped at the pivot to permit this movement. Cylinders are plain piston type and cylinder ends are crimped in place to provide a fluid tight assembly (upper end rubber piston rod seal and also provides bearing for piston rod).

NOTE—Cylinders are "vented" type, making the periodic changing of hydraulic fluid necessary. Water and other foreign matter will cause sludging and deterioration of fluid. (See Draining & Refilling.)

ADJUSTMENT (TOP CONTROL): No adjustment required other than adjustment of control rod to provide proper operation of the control valve.

Control Valve Rod Adjustment (Dash-mounted Valve Type)—Control valve rods should be set to provide 1/8" over-travel in each direction. To adjust, loosen setscrew holding control rod in control valve lever, position control rod so that distance from ferrule on control support bracket at instrument panel to forward end of control rod knob (this is distance along shaft from bracket ferrule to knob) is 1 3/32" maximum, tighten operating valve setscrew. NOTE—If control rod is not long enough to permit this adjustment, rod can be lengthened by removing retaining nut at bracket, and removing entire control rod assembly from the bracket. Clamp control rod securely in vise, loosen locknut and unscrew control knob assembly from rod as necessary.

ADJUSTMENT (CONVERTIBLE TOP) EXCEPT FORD, LINCOLN & MERCURY: If top not correctly positioned in up or down position, adjust as follows:

Forward-and-Backward Adjustment (Clearance at windshield header when top up)—If top is too far forward or does not move far enough forward to permit windshield header dowels to enter dowel holes in roof rail, adjust as follows: Raise top slightly above windshield header, loosen attaching bolts in corner braces at front end of side roof rail, move front roof rail forward or backward to align dowels and dowel holes (attaching bolt holes are slotted to permit this adjustment), tighten attaching bolts.

Up & Down Adjustment (Clearance at top of door and quarter window)—If side roof rail too high or too low when top is up, unlatch top at windshield and raise top approximately halfway. Remove rear seat cushion and back, and quarter trim panel, loosen three plate attaching screws in top adjusting plate at rear quarter section of body, move adjusting plate down to raise side roof rail or up to lower side roof rail (attaching screw holes are slotted to permit this adjustment).

PACKARD NOTE—For above adjustment, loosen 3 retaining nuts which are accessible without removing rear quarter trim panels.

Folded Top Position Adjustment—If top does not contact bumper in each side of top compartment when lowered, loosen attaching screws in top adjusting plate (see Up-and-down adjustment above), and move plate to rear slightly but do not raise or lower the plate. Moving plate to rear will allow top to lower further into the top compartment.

Side Rail Center Hinge Hump or Sag Adjustment (on Packard)—If side rail humped or sagged above door window, adjust by means of slotted screws at

CONTINUED ON NEXT PAGE

HYDRO-LECTRIC TOP CONTROL (WITH HYDRAULIC WINDOW & SEAT CONTROL) (Cont.)

rear quarter of body (provide stop for short curved arm at this point). Turning screws in moves top away from window, turning screws out removes gap at windows.

ADJUSTMENT (CONVERTIBLE TOP) FORD, LINCOLN & MERCURY: Adjust as follows:

Header Bracket Adjustment (Ford)—Raise top slightly to relieve strain on top material. Pry weatherstrip out of retainer along bottom of front side rail assembly. Remove screws at header bracket. Move header forward or backward to align header with windshield frame or to remove excess slack from top material. Tighten screws at header bracket. Re-install weatherstrip. NOTE—It may be necessary to relocate hole in front side rail at forward end of weatherstrip retainer in order to install self-tapping screw.

Header Bracket Adjustment (Lincoln & Mercury)—Loosen cap screws securing top slot iron side rail-to-header bracket to front side rail. With header assembly in proper position over dowels on windshield header, slide side rail forward or backward as required. Tighten cap screws. Then readjust tension of side rail by loosening nut and bolt passing through serrated nut at pivot bracket. Move balance link up or down as required, position serrated nut, tighten bolt and lock nut.

Front & Rear Side Rail Adjustment (Ford)—If top has sagged between front and rear side rails directly above door glass, it can be corrected as follows: First check stop screw at rear control link to make sure it is properly adjusted. This can be determined by fastening top down and checking position of stop screw. Assuming side rails are not sagged or bowed, stop screw should be adjusted so that it just contacts rear control link. If side rails are bowed, turn stop screw counterclockwise to lower side rails. If side rails sag, turn stop screw clockwise to raise side rails. *(NOTE—If side rails are sagged and the stop screw does not contact rear control link, it is necessary to adjust the balance link as follows).* Raise top above windshield until tension is removed from balance link. Place block between header and windshield frame to hold top in raised position. Loosen shoulder bolt at lower end of balance link, allowing balance link to slide downward in slot provided in main pivot bracket. If balance link does not move in slot of own weight, pull balance link down by hand about ¼", then tighten shouldler bolt, remove block and fasten top down. Check for sag at front and rear side rails after adjustment made. If necessary repeat above procedure until sag has been eliminated. *NOTE—Pay particular attention to stop screw at control link. If necessary, readjust after making balance link adjustment.*

Front & Rear Side Rail Adjustment (Lincoln & Mercury)—To obtain proper spacing between side rails and window frames, loosen locknut holding adjusting screw located at rear control link.. Turn screw counterclockwise to raise side rail or clockwise to lower rail.

Main Pivot Bracket Adjustment (To maintain Proper Clearance Between Pillar Rail and Quarter Window)—Proceed as follows:

Ford—If quarter window binds along top of pillar rail when it is lowered, loosen all screws that secure main pivot bracket to body. Raise main pivot bracket just enough to eliminate bind at quarter window. When raising main pivot bracket, use spacers under main pivot bracket at rear mounting screws to prevent tilting the bracket when tightening the screws. If necessary, repeat adjustment at other main pivot bracket. If complete top assembly requires shifting toward front or rear of body, loosen all the mounting screws at both main pivot brackets. Shift top assembly to desired position and tighten mounting screws. *CAUTION—Use care, when making above adjustment, to avoid disturbing "up" and "down" adjustment.*

Lincoln Model EL 76 & Mercury—Loosen cap screws (5) holding main pivot bracket to body. Move bracket forward or rearward as required to obtain proper spacing. If necessary, use shims at rear cap screws. Tighten cap screws securely.

Lincoln Model EH 76—Loosen lock nut securing adjusting screw located forward and at top of main pivot bracket. Turn adjusting screw clockwise to increase space between pillar rail and quarter window frame, and counterclockwise to decrease space. Tighten lock nut securely.

REMOVAL: Units can be removed for replacement or repair as follows:

Power Unit—(Removal, Disassembly, Reassembly & Installation)—*See "HYDRO-LECTRIC" WINDOW & SEAT REGULATORS.*

Control Valve—Disconnect battery cable as a safety precaution. Disconnect control rod at operating lever by removing setscrew. Disconnect two switch wires. Disconnect hydraulic tubing and cap ends of tubing (CAUTION—fluid is inflammable—soak up spilled fluid with absorbent cloths). Remove screws holding valve on mounting bracket.

Top Control Hydraulic Cylinders—Remove nut on bolt linking piston rod to top mechanism while top is up, but do not remove the bolt. Lower the top and disconnect battery cable. Remove rear seat cushion and back, remove rear quarter trim panel assemblies. Disconnect hydraulic tubing at hydraulic cylinder, and cap tubing ends. Remove bolt linking piston rod to top mechanism, take out clevis pin and remove lower mounting bolt from anchor plate. Work cylinder back and forth until free from mounting bracket, lift cylinders out.

NOTE—It may be necessary on some cars to disconnect hydraulic cylinder tubing at body "T" or at solenoid valve. In that case, remove cylinder and tubing as an assembly.

Top Control Hydraulic Valve (Under-seat Type)—Remove rear seat cushion, disconnect positive battery cable, and disconnect wiring at valve. Disconnect tubing at valve and cap the ends. Soak up any fluid that leaks out. Remove screws attaching valve to floor pan.

DRAINING AND REFILLING: *See "HYDRO-LECTRIC" WINDOW & SEAT REGULATORS.*

PRESSURE REGULATOR VALVE: Pressure in system controlled by combination maximum pressure relief and flow control valve in the power unit.

►*CAUTION*—**Two different valves used: Check color of relief valve plug at rear of pump.**
1—Cadmium plated plug. Valve set for maximum pressure of 210 lbs. for use with low pressure pump.
2—Copper plated plug. Valve set for maximum pressure of 260 lbs. for use with high pressure pump. See PRODUCTION CHANGE NOTE above.

These valves are not interchangeable.
NOTE—If plug removed and washers are used under plug, these same washers must be reinstalled on reassembling plug.

TROUBLE SHOOTING: Failure of any part of the power system can result from three major classes of failure, namely: Mechanical, Electrical or Hydraulic. Before doing any work on the electrical or hydraulic systems, it is advisable to make sure the fault is not mechanical.

Top Will Not Operate—
Mechanical interference due to luggage or other objects; hold-down straps not removed, or top not free from windshield header studs.
Electrical shorts or loose connections in control switch circuit; dirty control switch contacts; inoperative power unit motor.
Hydraulic fluid low; power unit pump inoperative; stoppage in fluid lines; faulty control valve; broken port plate in pump.

Top Operates in One Direction Only—
Mechanical interference, same as above.
Electrical shorts or loose connections in control switch circuit; dirty control switch contacts; improperly adjusted control rod (See Control Rod Adjustment).
Hydraulic power cylinder faulty; stoppage in fluid lines; faulty control valve.

HYDRAULIC MOTOR UNIT SPECIFICATIONS: *See "HYDRO-LECTRIC" WINDOW & SEAT REGULATORS.*

SERVICE PART NUMBERS & SPECIFICATIONS: *See "HYDRO-LECTRIC" WINDOW & SEAT REGULATORS.* Motors used by Chevrolet & Pontiac (not listed in above reference) are:
Chevrolet & Pontiac (1946-48).....Auto-Lite
Chevrolet & Pontiac (1949-50).....D-R 1108572①
①—Delco-Remy.

HYDRO-LECTRIC TOP CONTROL
(WITHOUT HYDRAULIC TYPE WINDOW & SEAT CONTROL)

1954 Buick, Series 46C, 56C, 76C
1955 Buick, Series 46C, 56C, 66C, 76C
1954-55 Cadillac
1951-55 Chevrolet
1951-55 Chrysler & DeSoto
1951-52 Dodge
1955 Dodge. See Note below.
1951 & Late 1953-55 Ford. See Note below
1952-53 Oldsmobile Super 88. See Note below
1954-55 Oldsmobile
1955 Packard
1949-50 Plymouth
1955 Plymouth. See Note below.
1951-55 Pontiac

▷*DODGE NOTE: For type used in 1953-54, see "Dodge & Plymouth Electric Top Control."*

▷*FORD NOTE: For top adjustment see "Ford, Lincoln, Mercury Top Control."*

▷*1952-EARLY 1953 FORD NOTE: For top control used on these models, see "Ford, Lincoln, Mercury Top Control.*

▷*OLDSMOBILE NOTE: On 1952-53 Models with hydraulic window & seat controls, see "Hydro-Lectric Type (With Hydraulic Window & Seat Controls)."*

▷*PLYMOUTH NOTE: For type used on 1951-54 models, see "Dodge & Plymouth Electric Top Control."*

▷CHANGES & CORRECTIONS

▷*1955 MOTOR & PUMP ASSEMBLY PRODUCTION CHANGE:* Early Motor & Pump Assembly was gear type, later assembly is rotor type. Later rotor type may be used to replace the early gear type, but special service adapter hoses must be used when making the installation.

DESCRIPTION: This unit used on convertible models not having hydraulic window regulators. Unit consists of reversible type motor directly connected to hydraulic spur gear type pump which supplies fluid under pressure to two double acting hydraulic cylinders which raise and lower the top. Motor and pump assembly are accessible through rear compartment after shield is removed. Fluid reservoir is mounted above pump and motor. Hydraulic system is not vented to the atmosphere and it is therefore not necessary to replace hydraulic fluid periodically.

Control Switch—Self-centering type directly connected to pump motor by two electrical leads. One lead provides current for raising top, and the other for lowering top. Switch mounted below instrument panel.

Power Cylinders—Two double acting hydraulic cylinders used. Mounted on each side of body at rear, with piston rod linked to top mechanism.

ADJUSTMENT (TOP CONTROL): No adjustment required.

CHECKING FLUID LEVEL: With top in raised position, disconnect battery ground cable. Remove pump and motor shield (in rear compartment on some models) and place absorbent material below reservoir. Remove filler plug. On horizontally installed unit, fluid level should be to lower edge of filler hole. On vertically installed units, fluid level should be 2" below top of reservoir. If fluid low, replenish with hydraulic brake fluid.

▷REFILLING (After Repairs) CAUTION—Cylinders and hydraulic system contain more fluid than one filling of reservoir will supply. It is important that reservoir be checked frequently during refilling of system. Air in system wil automatically bleed out with a few operations of top.

CHECKING HYDRAULIC PRESSURE: For an inoperative or slow operating top, check fluid pressure as follows:

Hydraulic Lines—With top in a raised position, install a standard pressure gauge between pump port and "T" of hydraulic lines leading to bottom of lift cylinders *(NOTE—In order to get necessary slack to connect gauge, remove all tubing retainers).* Check fluid level and replace filler plug. With top in the full "UP" position, push control switch knob and hold a few seconds. Pressure should read 220 to 260 lbs. per sq. in. *(NOTE—If top slow or inoperative in the "DOWN" cycle, connect gauge to lines leading to upper end of cylinder and place top in full "DOWN" position and make test as above).* If pressure indicated is below prescribed maximum range, pump is not delivering required pressure or there is fluid leakage past the piston in one or both cylinders.

Pump Pressure—Install gauge in hydraulic lines leading to bottom of cylinders, then pinch or "kink" the hydraulic tubing to completely shut off fluid to bottom of cylinder. Push switch knob forward and hold a few seconds. Pressure should be 220 to 260 p.s.i. Check fluid pressure to top of lift cylinders by connecting gauge to lines leading to top of cylinder, then make test as indicated above. If pressure reads below the maximum, pump must be repaired or replaced. If pressure is within the maximum range, fluid is leaking by cylinder pistons.

CHECKING CYLINDER PISTON LEAKAGE: With top in fully raised position and with gauge installed in lines leading to bottom of lift cylinder, test cylinder on right side of car by pinching lines leading to lower end of left hand cylinder. Push control switch forward and hold a few seconds. If pressure reads 220-260 p.s.i., then right hand cylinder is not defective, however, if pressure reads below maximum, cylinder must be replaced. Test left hand cylinder by pinching lines to right hand cylinder and make same test as with right hand cylinder. Lower top to full lowered position and install gauge in lines leading to upper end of cylinders. Repeat test as for lower end of cylinders (pull control switch rearward).

REMOVAL & INSTALLATION (Top Lift Cylinder): Raise top to full "UP" position. Disconnect battery positive cable or battery-to-top switch wire. Remove rear seat cushion and seat back *(CAUTION—* In addition to hangers and bend-over tabs, rear seat is secured with a screw at each upper corner). Remove nut and secure end of piston rod to top linkage. Push piston rod down into cylinder to full bottom limit. Remove all retainers from hydraulic tubing leading to cylinder. Remove cotter pin and clevis securing cylinder to floor bracket. Lift top cylinder up through access hole in top compartment and then out through cutout in rear seat back compartment panel. Remove filler cap from reservoir and disconnect tubing from top and bottom of cylinder. Cap ends of hydraulic lines to prevent dripping of fluid. To install, reverse removal procedure. Make sure piston is at bottom of travel when installing. Seal hydraulic fittings with a thread sealing compound, and check fluid level in reservoir.

Motor & Pump Assembly—Raise top to full "UP" position. Remove power unit cover plate shield and disconnect battery cable or battery-to-switch wire. Remove rear seat cushion and back and fold back the insulating pad on right side of body. From inside body, carefully pull wiring harness through cutout in seat frame. Remove insulation from "jack-knife" unions and disconnect red and green wires. Disconnect ground wire at floor panel screw. Remove the two hydraulic line retainers adjacent to power unit. Remove filler cap. Disconnect hydraulic lines at pump and cap open fittings. Loosen four rubber grommets securing power unit to floor pan and lift out power unit. To install, reverse removal procedure. Seal hydraulic fittings with a thread sealing compound and check fluid level in reservoir.

ADJUSTMENT (CONVERTIBLE TOP) BUICK, CHEVROLET, OLDSMOBILE & PONTIAC: Adjust as follows:

Forward & Backward Adjustment—If top needs adjustment forward or rear to permit windshield header dowels to enter dowel holes in roof rail, adjust as follows: Raise top slightly above windshield header, loosen attaching bolts in corner braces at front end of side roof rail, move front roof rail forward or backward to align dowels and dowel holes (attaching bolt holes are slotted to permit this adjustment) tighten attaching bolts.

Up & Down Adjustment—If side rail too high or low when top up unlatch top and raise approximately half-way. Remove rear seat cushion, back, and quarter trim panel, loosen three plate attaching screws in top adjusting plate at rear quarter section of body, move adjusting plate down to raise side roof rail or up to lower side roof rail (attaching screw holes are slotted to permit this adjustment).

Folded Top Position Adjustment—If top does not contact bumper in each side of top compartment when lowered, loosen adjusting screws in top adjusting plate (see Up-and-Down Adjustment above), and move plate to rear sligthly but do not raise or lower plate. Moving plate to rear will allow top to lower further into compartment.

ADJUSTMENT (CONVERTIBLE TOP) CHRYSLER, DESOTO, DODGE, PLYMOUTH MODELS (1949-54): Adjust as follows:

▷Chrysler, DeSoto, Dodge, Plymouth Note—Four adjustments are provided on each side of the top as follows: (1) Set screw at the first joint of top side rail to rear of windshield. (2) Set screw to rear of second joint of top side rail to rear of windshield. (3) At rear end of power guide link (power piston rod connects to this link), plate is movable in slotted holes. (4) Main control prop (link from body plate to top side rail) has slotted holes for adjustment.

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HYDRO-LECTRIC TOP CONTROL (WITHOUT HYDRAULIC WINDOW & SEAT CONTROL) (Cont.)

Clearance Between Side Rail and Door Glass—Close window. Loosen set screw locknut (adjacent to first joint of top side rail). Turn set screw in or out as required, so that top rail is true with top of door glass frame. Tighten set screw locknut.

Side Rail to Quarter Window Contour—Close quarter window. Loosen set screw locknut (adjacent to the second joint of top side rail). Turn screw in or out as required until top fits correctly over the quarter window.

►***NOTE—When making this adjustment, overall length of top may be affected by as much as ¼". After adjusting, check alignment of top locking pin holes and locking pins on header. If misaligned, see "Moving Top Ahead or Back" (below).***

Leveling Top Across Windshield—Close rear quarter windows, then raise top to allow two blocks 2½" wide to be inserted between rear quarter window and top side rail. Blocks must be positioned exactly the same on both side (about 1½" from leading edge of window). Lower top to rest on blocks. Loose main control prop anchor plate screws (see NOTE above). Raise or lower control prop until measurement of 6" is obtained on both sides. Tighten main control prop anchor screws securely. Remove blocks and lower top down on windshield. Locking pins should be aligned with holes and drop straight down for engagement.

Moving Top Ahead or Back—Loosen power guide link anchor plate bolts (one plate at a time). Move the top in the desired direction or until locking pin holes are in alignment with locking pins. Tighten guide link anchor plate bolts securely.

ADJUSTMENT (CONVERTIBLE TOP) CHRYSLER, DESOTO, DODGE, PLYMOUTH MODELS (1955): There are six adjustments on each side of the roof rail to control top alignment with windshield header, doors, roof rail and quarter windows. Adjust as follows:

►***BODY ADJUSTMENT NOTE:*** Before making top adjustments, tighten all body-to-frame bolts to 18 ft. lbs. Shimming the body to obtain proper top alignment should only be done in extreme cases where there is doubt of correct body-to-frame alignment.

Power Link Adjustment—With top and all door and quarter windows in raised position, check for correct fit at side rails and vertical seals. Increase or decrease clearance between quarter window glass and roof rail weatherstrip by loosening the power link adjustment bolts located in link above power cylinder and spread or shorten the link as required to obtain the desired clearance.

Roof Side Rail Alignment—The adjustment of the center side rail and header panel to windshield locking plunger cam and stops is controlled by the rear control link which is fastened to the quarter panel compartment. Also affecting the side rail weather strip sealing at the top of the door glasses are the front side rail hinge adjusting screws and the rear side rail hinge adjusting screws. If front side rail joints are fully open when the top is fully raised, turn the front side rail hinge adjusting screws counter-clockwise until the joints are closed. If, after making this adjustment, the clearance between door glass and side rail is increased or decreased, adjust the center side rail adjusting screw to obtain the desired clearance. Leveling the top can be accomplished by raising the rear control link bracket. When adjusting the rear control link, care should be taken to adjust both sides equally. Before making this adjustment, loosen the top header at the windshield to remove tension from linkage.

Top Header Panel—If header panel does not close easily on locking stops, loosen header panel-to-side rail screws and shift header panel forward or backward as required. If this is not possible, it will be necessary to adjust the power link to obtain desired clearance.

ADJUSTMENT (CONVERTIBLE TOP) 1951 FORD: Adjust as follows:

►***LATE 1953 FORD CONVERTIBLE TOP ADJUSTMENT NOTE—Adjustment of Late 1953 Ford Convertible Tops follows procedures outlined under "TOP MECHANISM ADJUSTMENTS" in "FORD, LINCOLN, MERCURY TOP CONTROL" Article following.***

Before attempting to align top, determine if any linkage is binding, and if necessary, faulty linkage should be replaced or freed from binds. After top is aligned, adjust door and quarter window to assure proper fit along top side rails. ***Do not adjust windows unless top has been aligned.***

Header Bracket Adjustment—***(NOTE—This adjustment is only minor and will not correct serious misalignment. If complete assembly requires shifting, it is necessary to adjust main pivot bracket as outlined below).*** To adjust header bracket, raise top about half-way to permit easy access to weatherstrip retaining nuts. Remove three retaining nuts and weatherstrip from front side rail. Lower top to a sligthly raised position to relieve strain on top material. Loosen two tapping plate screws. Move front side rail-to-header bracket either forward or backward. After making adjustment, tighten tapping plate screws. Position weatherstrip on front side rail, install flat washers, lockwashers, and nuts.

Balance Link Adjustment—***(NOTE—If side rails are sagged, it is necessary to adjust the balance link).*** To adjust balance link, raise top above windshield until tension is removed from balance link. Place a block between the header and windshield frame to hold top in raised position. Loosen balance link bolt nut. Bend tab of star washer up, then turn balance link adjusting bolt to either raise or lower the balance link. If balance link does not move in slot of its own weight, pull balance link down by hand about ¼", then bend down tab on star washer and tighten balance link bolt nut. Remove block previously installed under header. Fasten top down. Check for sag at front and rear side rails after adjustment made. If necessary, repeat above procedure until sag has been eliminated.

Main Pivot Bracket Adjustment—To provide proper clearance between pillar rail and quarter window or to shift complete top assembly proceed as follows: If quarter window binds along top of pillar rail when it is lowered, loosen all screws that secure main pivot bracket to body. Raise main pivot bracket just enough to eliminate the bind at the quarter window. When raising the main pivot bracket, use spacers under the main pivot bracket at rear mounting screws to prevent tilting the bracket when tightening the screws. If necessary, repeat the adjustment at the other main pivot bracket. If complete top assembly requires shifting toward the front or rear of the body, loosen all the mounting screws at both main pivot brackets. Shift top assembly to desired position, tighten mounting screws. ***NOTE—When making above adjustment use care to avoid disturbing "Up" and "Down" adjustment.***

POWER OPERATED TOPS AUTO-LITE ELECTRIC TYPE

Used On Convertible Models:
Chrysler, DeSoto, Dodge (1941-48)
Ford, Lincoln, Mercury ('41-48)—except Sportsman

CHRYSLER, DE SOTO, DODGE
(Auto-Lite Equipment List)

Year	Top Motor	Control Relay
1941	EWG-4002	HRF-4001
1942-46	EWG-4003	———
1947-48	EWG-4004	———
1947-48	EWG-4005, 6	①

①—Each motor grounded through separate 30-ampere thermal circuit breakers.

DESCRIPTION & OPERATION: This type of control consists of two electric motors each mounted as a unit with its worm-and-gear type power screw at sides of car with the power screw linked directly to the top frame (conventional top bows and braces are modified for this power connection).

Control Relay (for EWG-4002 motors). Two opposed windings, 1 connected in series with each top one of which is connected in series with each top control motor. This results in relay contacts remaining closed as long as load and current of each motor is equal. A differential of 20-30 amperes between the two motor circuits (caused by binding or obstruction on one side of top) causes relay contacts to open so that the motors stop.

SERVICING: To check operation of top, disconnect top from power screw, see that folding arm assembly works freely without binding at any point. Check control switch to make certain that circuits are completed through switch in 'up' and 'down' positions. To check power screw for sticking or binding, remove motor (see below) and operate screw by inserting screwdriver in slot in pinion shaft. Shaft should turn easily and freely. If it does not, check for bent power screw. See that power assembly is not binding on base pivot.

Power Unit—To replace power unit, remove trim side panels in rear seat compartment, disconnect motor wires, remove bolt linking power screw to top and pivot bolt in mounting bracket, lift out power screw and gear box assembly. Install new assembly in same manner, taking great care not to kink or bend the power screw and see that power screw installed in top bracket so that it is perfectly straight between top attaching bolt and body mounting pivot bolt. Connect motor leads and check top operation before replacing trim panels.

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POWER OPERATED TOPS AUTO-LITE ELECTRIC TYPE (Cont.)

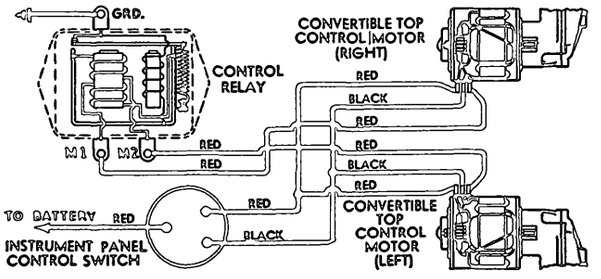
TESTING: If top control does not operate satisfactorily, test each unit as follows:

Control Switch—Disconnect motor leads at switch. Connect one test lamp lead to ground, touch other lead to switch 'up' terminal, place switch in 'up' position. Lamp should light. Test 'down' terminal in same manner.

Top Motor—Disconnect guide mechanism from top slat irons and operate motors. If motors do not run freely when disconnected, check motor brushes for sticking or wear, see that commutator clean check field coils for grounds and open-circuits.

Motor Performance

Torque	R.P.M.	Volts	Amperes
2 oz. ft.	4000-5000	6.0	29-34



EWG-4002 MOTORS WITH HRF-4001 RELAY

Control Relay—If motor does not operate with switch in up or down position, ground relay terminals. If motors run, check relay contacts. If contacts are open and motors run when contacts held closed, check motors for unequal load (relay should operate in this manner if motor loads unequal). If relay buzzes and contacts do not hold open, check relay voltage coil for open-circuit.

Relay Specifications (Auto-Lite HRF-4001)

Contacts Open—25-35 amperes through either series winding at 5.0 volts (or 20-30 ampere differential between both coils). Opening amperage for each coil must be equal within 2 amperes. Adjust by bending lower spring hanger.

Contacts Close—.2 volt minimum.

Air Gap—.030-.034" with contacts closed. Measure between current coil (series winding) core and armature. Adjust by shifting upper stationary contact up or down. CAUTION—See that both sets of contacts open and close simultaneously.

Contact Servicing—Clean contacts with strip of clean linen tape moistened with carbon tetrachloride and then rub with clean dry tape (draw tape through between contacts). If contacts burned or pitted, resurface by filing lightly with very fine contact file (ST-290) parallel and lengthwise of armature and then clean contacts as directed above. See that no lint is left on contact surfaces.

Voltage (Shunt) Winding—Winding resistance is 4.68-5.18 ohms. Measure between stationary contact and movable contact with contact points held open.

POWER OPERATED TOPS STUDEBAKER ELECTRIC TYPE

1947-52 Studebaker, Champion & Commander

DESCRIPTION: Consists of two worm-and-gear type power screws pivoted on floor brackets inside rear quarter panels, one on each side of car. Gear boxes coupled together through flexible drive shaft.

Motor—Reversible type. Drives left gear box through rubber and steel coupling with engaging slot in motor shaft and gear box shaft at right angles to each other.

Control Switch—Two-way type under left edge of instrument panel. Move lever to left to raise top, to right to lower.

Circuit Breaker—75 ampere. On engine side of dash.

REMOVAL OF POWER UNIT: Lower top. Disconnect battery ground. Remove rear seat (cushion and back) and trim panel. Remove spacer and bolt (secured by cotter pin and castellated nut) at upper end of lift shaft. Disconnect motor ground strap from body brace. Disconnect and remove flexible drive shaft from side of gear box. Take out clevis pin in floor bracket under gear box. Disconnect green and black wires from junction block on motor. Lift out power unit assembly.

INSTALLATION OF POWER UNIT: Reverse removal directions above, connecting green wires to top terminal and black wires to middle terminal on motor junction block.

▷*CAUTION—Check Worm Screw Adjustment, No. 3 under Top Adjustment (following) when Power Unit reinstalled.*

REMOVAL OF MOTOR: Disconnect battery ground. Remove rear seat (cushion and back) and trim panel. Take off two nuts and lock washer from each motor-to-gear box through bolts (2 used). Lift motor (with through bolts) off gear box.

MOTOR COUPLING REPLACEMENT: Remove motor (see above). Take out coupling. Install coupling with slot in gear box shaft at right angles to slot in motor shaft.

INSTALLATION OF MOTOR: Reverse removal directions above (align slot in motor shaft with coupling).

MOTOR JUNCTION BLOCK WIRE TERMINALS:
Top Terminal—Green wires.
Middle Terminal—Black wires.

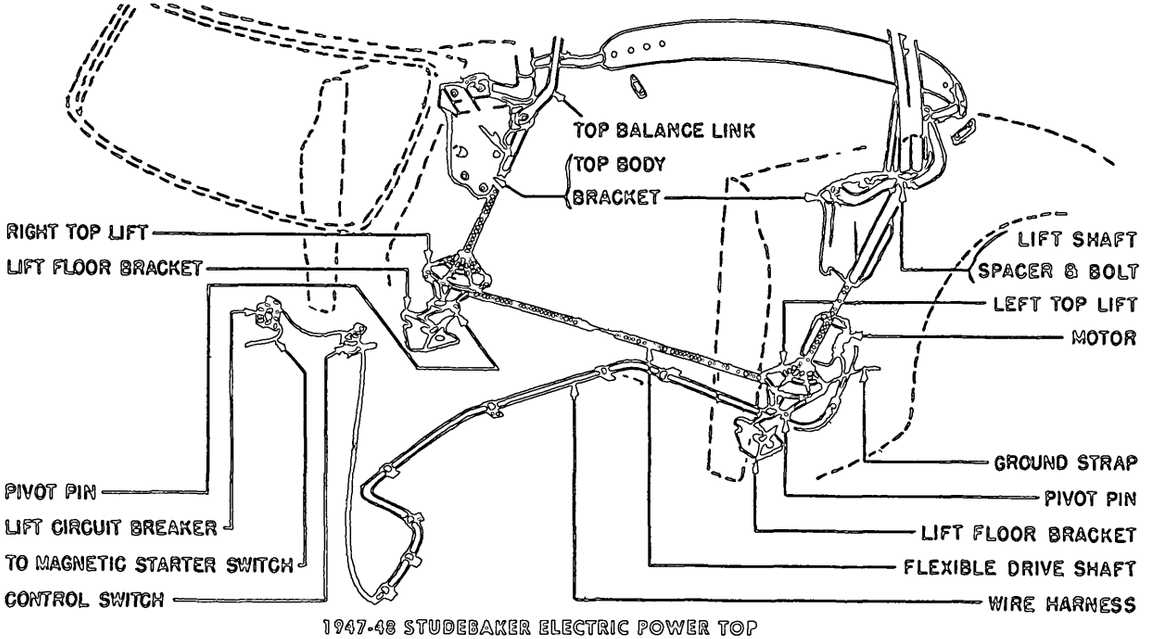
ADJUSTMENT OF TOP: Three adjustments provided:

1—Top Balance Link Adjustment (clearance at top of door and quarter windows and top tension). Support side rails, lift top off windshield header bolts, loosen master adjustment bolt (secured by serrated nut) at top balance link (see illustration). Move top toward front or rear for proper fit (bow assembly slotted to permit this adjustment).

2—Header Adjustment (clearance at top of windshield). 3 bolts in slotted holes at front end of side rail on each side. Loosen these bolts, move header to front or rear for proper fit.

3—Worm Screw Adjustment (one side rail higher than the other). Equalize worm screw length using special crank tool (see below) inserted in gear box at flexible drive shaft connection on side to be adjusted (requires removal of rear seat and back, and trim panel). Load must be equalized on each worm without putting a strain on top linkage.

Special Crank Tool. Use 3/16" rod stock, file one end to ⅛" male square, ¾" back from end. Bend 1" throw in rod about 2" long for handle. Use a 3/16" I.D. piece of tubing 2½" long, hammer over squared end of rod to give ⅛" square I. D. 1" long on one end of tube. Take tube off rod, insert round end of tube on opposite end of rod and weld in place. Over-all length of tool approx. 7".



1947-48 STUDEBAKER ELECTRIC POWER TOP

RAMBLER TOP CONTROL

Nash Rambler (1951-54)

DESCRIPTION: This type top control consists of a reversible motor, located behind rear seat back; two-way self-centering control switch connected to car battery through a resistor. The motor powers two flexible nylon covered cables that operate over four pulleys to raise and lower the top.

OPERATION: To Lower the Top. Check the top well in back of the rear seat and remove any article that might obstruct the movement of the top. Unzip the rear curtain and fold into the well. Release both toggle clamps that hold the front bow to the windshield header bar and pull out on the control switch, holding it in the out position until the top folds completely into the well. Install the top boot.

►*CAUTION:* The top should not be lowered when the material is damp.

REMOVAL OF TOP CONTROL SWITCH: Disconnect battery cable. Remove two bolts holding control switch to support bracket under instrument panel, disconnect wires. To remove switch from mounting bracket, loosen lock nut between switch and mounting bracket, unscrew switch. When installing, be sure knob and bracket are securely fastened to switch and wires installed to correct terminals.

REMOVAL OF POWER UNIT: Remove the right and left pulley guard screws and raise the guard upward to disengage the flange on the guard from the flange on the top well. Remove the rear seat cushion and from inside the car, push down on the bottom of the top well. This will release the ragboard panel covering the power unit. Tape the cables securely to the drum and loosen the right and left cable tensioners located at either side on the body braces. Remove the drum and cable assembly from the drum shaft by removing the retaining nut in the center of the drum. The power unit can then be taken out by removing the three cap screws holding the unit to the mounting bracket.

Installation: Reverse removal procedure.

►*NOTE:* Make sure thrustwasher lugs are in recess in the drum hub. Lubricate the worm and needle bearings with No. 110 Lubriplate before installing.

REMOVAL OF TOP AND BOW ASSEMBLY: Remove the four top boot fasteners, (two on either side) which hold the rear bottom of the top to the body and remove the screws under the rear of the top, holding the stay pads to the body. Unzip the back curtain from the stay pads. Release the front bow to windshield header toggles and lower the top just enough to turn up the front bow. Bend the retainer upward and remove the pellet and cable from the rear half of the front bow hinge. Remove all bows from the sliding channel by pushing each bow in at the roof rail at the same time spring the bows up at the center. The top can then be removed.

Installation: Reverse the removal procedure.

REMOVAL OF ONE CABLE: Remove the top and bow assembly from the body and remove the rear pulley guards. Remove the pulley mounting bracket guides from the rear pulleys and remove the rear cushion and ragboard panel covering the power unit. Pull the inside cable out of the cable guide channel to provide slack, then remove cable from drum by removing cable lock clip. Remove cable guard at front corner of body rail, then remove the cable from the pulley.

INSTALLATION OF ONE CABLE: Lubricate the front pulley and install on body then place the cable on the pulley with the pellet and short end of the cable in the outside cable guide channel. Replace the pulley guard. Place the pellet approximately 1" from the pulley guard, making sure the opposite cable pellet is in the same position. Keep both cables in the guide channels and place cables on rear pulleys. Replace rear pulley mounting bracket guides. Wind the outside cable 1½ turns around the drum and insert the pellet into the bottom hole and replace the lock clip. Keeping the inside cable taut, pull the control switch out; holding it until the pellets come within 2" of the rear pulleys. Wind the inside cable counterclockwise and insert the pellet into the top hole of the drum and replace the lock clip. (If additional slack is needed, pull the inside cable out of the cable guide channel). Tighten the rear pulley tensioners to take up cable slack. Push the control switch in until pellets come about 4" from the front pulley guards. Then replace the top. Be sure both pellets are the same distance from the front pulley guards.

►*CAUTION:* Do not run pellets around pulleys.

INSPECTION & ADJUSTMENTS: 1. Check cable tension and retighten tensioners if necessary, release toggle clamps.

2. Operate control switch, check for front header to drip rail clearance.

3. Lower top to see that bow strainer supports contact one another. If out of alignment, correct by bending into proper place.

4. Check bow strainer loop attached to front header hinge for free movement. If binding, release retaining tabs slightly.

5. Inspect cable guide channels for alignment. With block of wood and hammer, tap channels to inside or outside, as necessary, so that they line up with front and rear pulleys and cables.

6. Check front header hinge and cable guide support to which cable is attached. It must ride in outside of groove of cable guide channel. It can be bent to inside by using "C" clamps or vise grip pliers.

7. Lubricate front and rear pulleys with Lubriplate. Every spring Lubriplate power unit worm drive and power unit motor with light engine oil at 5000 mile intervals or twice a year.

SERVICE PARTS: Parts are as follows:

Motor: Nash No. 4356370.

Motor Specifications①

Torque	R.P.M.	Volt	Amperes
0 ft. ozs.	4700 min.	5.0	60 max.

①—Test in both directions of rotation.

Brush Spring Tension—42-53 ozs'

Resistor: Nash No. 4356759.

DODGE & PLYMOUTH ELECTRIC TOP CONTROL

Dodge (1952-54)
Plymouth (1951-54)

DESCRIPTION: This type top control consists of a reversible type motor, mounted on rear seat riser beneath cushion; a two-way, self-centering switch with circuit breaker, two flexible cables, and two mechanical screw jacks.

►*NOTE—Replacement parts and units are available.*

BROKEN CABLE REPLACEMENT: If cable breaks when top is partially raised or lowered, cycle cannot be completed until cable is replaced because screw jack on failed side will lock and bind. Method of replacement of broken cable varies with position of top at time of cable failure, and whether long or short cable is to be replaced.

Top Up—If short cable fails, remove broken cable. Attach new cable to transmission unit and leave motor end free. Synchronize cables. If long cable fails, remove broken cable. Install new cable and attach both ends. Disconnect short cable at motor. Synchronize cables.

Top Down—If either long or short cable fails, replace. Carefully raise top by momentarily applying power "on" and "off" (this avoids possibility of breaking cable). With locking handle in released position, let top lightly bottom so that dowel pins enter their mating holes. Disconnect short cable at motor end. Synchronize cables.

Top Partially Raised: If either long or short cable fails it will be necessary to raise top manually. Do not raise top with screw jacks connected to top linkage. Remove clevis bolts at top of each screw jack, Then raise top to complete "Up" position by hand. Rotate sleeves of screw jacks to their normally extended position. Reconnect with clevis bolts to top linkage. Replace broken cable. Synchronize cables.

TOP OPERATING CABLE SYNCHRONIZATION: Place top all the way up onto header. Disconnect short cable at motor end. Apply power momentarily in direction to raise top with top locking handle in released position. This takes slack out of long cable. Reconnect short cable. To recheck synchronization of cables, run top all the way down. Jack screw sleeves should seat on transmission units. If still not synchronized, repeat procedure.

TOP MECHANISM ADJUSTMENTS: ***NOTE—Correct fitting of top at header panel depends on proper alignment of doors in relation to header. If shimming is necessary to obtain proper door alignment, this should be done before making adjustments of top at side-rail screws.***

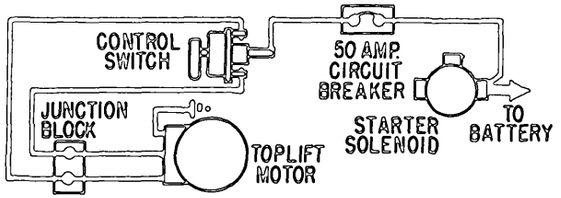
►**ADJUSTMENT POINTS**—Top adjustment points are as follows: (1) **Locking Pin and Dowel**—on windshield header. Draws top tight against windshield header. (2) **Front Side Rail Pivot Bracket**—between windshield and Front Side Rail Hinge. Small movement forward or backward for smooth raising or lowering of top, and fit on header bar.

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DODGE & PLYMOUTH ELECTRIC TOP CONTROL (Cont.)

(3) Front Side Rail Hinge—to rear of Front Side Rail Pivot Bracket. Stop screw permits proper alignment of Side Rails. (4) Rear Side Rail Hinge—on curve of Side Rail. Stop screw permits adjustment of side rails to fit quarter window. (5) Side Pivot Bracket—on body bracket ahead of rear wheel housing. Provides vertical adjustment for leveling and centering of top. (6) Rear Pivot Bracket—above rear wheel housing. Provides horizontal adjustment for forward and rear movement of top.

Top To Header Adjustment: Face slot on center dowel anchor pin toward back of car to assure locking of top. Side dowel pins should have large end of tapered hole facing centerline of car. Further adjustment of top can be made by adjusting stop screws on Front Side Rail Hinge and Rear Side Rail Hinge with top half open. Slight adjustment of forward part of Side Rail, forward or backward, can be made by loosening bolt through Front Side Rail Pivot and Side Rail. If dowel pins do not line up with locking pin, loosen screws which hold dowel and shim dowels so they will tilt toward outer edge of car.



DODGE & PLYMOUTH TOP CONTROL WIRING

Rear Pivot Brackets: About one inch fore-and-aft adjustment is provided to bring holes in header bar directly over dowels. Loosen bracket attaching bolts and pivot bolt. Move brackets forward to move header bar forward and backward to move it to rear. Adjust one or both brackets until dowels and header holes line up.

Side Pivot Brackets: If header bar is off center, side to side, to the right, and right corner is away from dowels, adjust bracket on right side. If to the left, adjust left bracket. Raise top. Loosen appropriate side bracket attaching bolts and pivot bolt. Move bracket up or down until header is level and centered from side to side. If adjusting one bracket does not level header, try adjusting both side brackets, raising one and lowering other until header is centered and level. Side Pivot Brackets should be adjusted with top in both raised and lowered positions.

▷*NOTE—To permit proper lowering and raising of top and to obtain a good fit at windshield and side windows, horizontal and vertical adjustments at Rear and Side Pivot Brackets should be made at same time. The distance between pivot pin center (at junction of linkage and screw jack connecting rod) and a straightedge placed on a line through centers of pivot pins on Rear Pivot Brackets and forward end of straight link (running from linkage-connecting rod junction) is approximately one inch.*

Front Side Rail Pivot Bracket: To correct stalling when header bar has lifted only five or six inches off windshield check spacing between ends of front top bar and top of side rail. If spacing is less than 5/16" pivot is probably adjusted too far forward. Loosen Front Pivot Bracket attaching screws and tap bracket to rear about 1/16". It may be necessary to adjust pivot bracket on other side.

SERVICE PART NUMBERS: Dodge and Plymouth numbers as follows:

MOTOR

Plymouth (1951-52) ..... Plymouth No. 1370585
Dodge (1952) ..... Dodge No. 1370585
Dodge & Plymouth (1953) ..... Dodge & Plymouth No. 1491035

FORD, LINCOLN, MERCURY ELECTRIC TOP CONTROL

Ford (1951-Early 1953). See Note below.
Lincoln & Mercury (1952-55)

▷*LATE 1953-55 FORD TOP CONTROL CHANGE:* Late 1953 and 1954-55 convertibles use Hydro-Lectric type control previously used in 1951. See instructions below for adjustment of convertible tops on these models. *See "Hydro-Lectric Top Control (Without Hydraulic Window & Seat Control" for data on items other than Top Mechanism Adjustment.*

▷*1953 IMPROPER RAISING OF TOP CORRECTION (Due to Disengagement of Flexible Shaft)*—Insert piece of wire, ¼" long and .145" in diameter, into the drive receptacle of the lift worm and housing assembly. This will act as stop and limit end travel of flexible drive shaft.

▷*1953 TOP CONTROL SWITCH PRODUCTION CHANGE:* Beginning approximately March 1, 1953, a Two-terminal Top Control Switch, Part No. FAA-15668-B, was used on convertible models and the Top Control Limit Switch discontinued.

REPLACEMENT SWITCH NOTE—The Three-terminal Top Control Switch, Part No. FAA-15668-C, can be used as a replacement for the two-terminal switch by attaching one end of an insulated 16-gauge wire to the single terminal on right hand side of the switch and grounding the opposite end of the wire to a convenient point.

DESCRIPTION: This type top control consists of a motor, relay, limit switch, and flexible drive cables that operate two lifting jacks. The reversible type motor has double driving ends to which are attached the drive cables. Each drive cable operates a lifting jack located at each side of the quarter panel. Motor and relay are mounted under rear seat. Motor is operated by switch on instrument panel. Lifting jacks have worm nuts which act as stops, at top and bottom, to limit length of travel. Limit switch, located on windshield header, prevents motor operation when top is locked to windshield header. Limit switch also breaks circuit when contacted with top.

REPLACEMENTS:

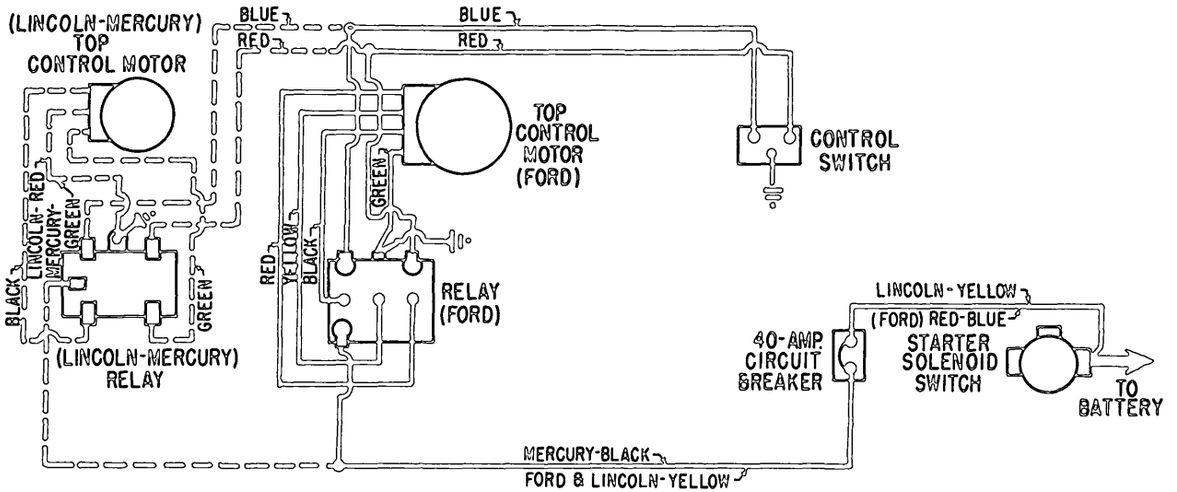
Top Control Switch: Disconnect battery cable. Remove knob and bezel. Remove control switch from mounting bracket. Disconnect wires at switch. Remove switch. Connect wires to new switch. Position switch on mounting bracket. Install bezel and control knob. Connect battery. Check top operation.

Circuit Breaker: Located on right front fender apron. Disconnect battery cable. Disconnect wires at circuit breaker. Remove retaining screws and circuit breaker. Position new circuit breaker on fender apron and install retaining screws. Connect wires to circuit breaker. Connect battery. Check operation.

▷*SEE LINCOLN & MERCURY TOP CONTROL SWITCH PRODUCTION CHANGE above.*

Limit Switch: Located along top of windshield header. Raise top off windshield header. Carefully pry limit

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1951-EARLY 1953 FORD & 1952-55 LINCOLN & MERCURY TOP CONTROL WIRING

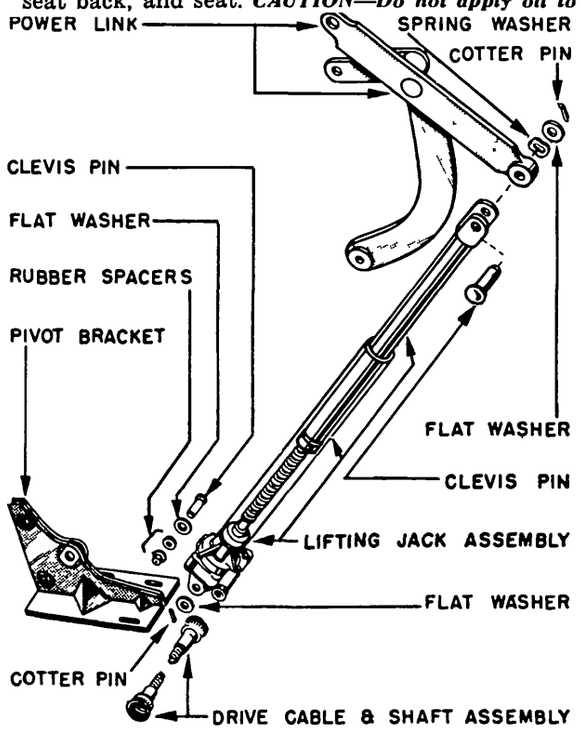
FORD, LINCOLN, MERCURY TOP CONTROL (Cont.)

switch out of hole with screwdriver. Disconnect wire and remove limit switch. Tape wire to prevent shorting. Connect wire to new limit switch. Insert switch on hole and press shoulder until it snaps firmly in hole. Check top operation.

Relay: Located on inner side of rear seat riser.

Top Operating Motor: Located under rear seat. Serviced as an assembly. No lubrication required on motor. Disconnect battery cable. Remove rear seat. Disconnect drive cables at each end of motor. Disconnect motor to relay wires at relay terminals. Remove motor mounting screws.

Top Lifting Jack: Raise and lock top header. Remove rear seat and seat back. Remove quarter trim panel. Disconnect drive cable at lifting jack. Remove clevis pin at upper and lower ends of lifting jack. Remove jack. Before installing lifting jack, place rubber spacers in each mounting hole at lower end of lifting jack. Shoulders on both rubber spacers must be on inner side of mounting holes. Align lifting jack with lower pivot bracket. Insert flat washer and clevis pin. Then install flat washer and cotter pin. Align upper end of lifting jack with power link by turning jack screws. Install clevis pin, spring washer, flat washer, and cotter pin. Connect drive cable at lifting jack. Check top operation before installing quarter trim. Install quarter trim panel, seat back, and seat. ***CAUTION—Do not apply oil to any points mounted in rubber. A light coat of vaseline is suggested.***



TOP CONTROL (ADJ. POINTS)

Drive Cable and Shaft Assembly: Drive cable and shaft similar to speedometer drive cable. Lubricate cable with graphite grease when service operations are performed. Loosen knurled retaining nut at each end of cable. Remove assembly. To reinstall, insert driving ends of cable into motor and lifting jack. Tighten knurled retaining nuts.

TOP MECHANISM ADJUSTMENTS:

Preliminary Inspection: Before attempting to align top, operate it to determine if any linkage is out of line or binding. Replace or free from binding any faulty linkage.

Header Bracket Adjustment: Loosen set screws on dowels, located along top of windshield. Rotate dowels to proper height. Tighten set screws, making sure screws are seated in slots on studs, locking dowels in position. If striker plates, on header, need alignment with side header dowels, loosen cap screws, position striker plates by hand, and tighten screws.

Balance Link Adjustment: Loosen six cap screws that secure pivot bracket support to quarter panel. Move pivot bracket up or down, fore or aft as required. Tighten cap screws. To correct sagging or excessive crowning of the side rails at front hinge point, loosen three cap screws that secure balance link adjusting bracket to main pivot bracket support. Turn vertical adjusting screw, on balance link bracket, in to reduce sag and out to reduce excessive crowning. Tighten cap screws securely.

Main Pivot Bracket Adjustment: Space between quarter window and rear side rail is adjusted by loosening two cap screws and bolt that secure header bracket to front side rail. Slide header fore or aft on side rails until arc of rail over quarter window is parallel with top edge of window. Tighten cap screws and bolt. Space between side rail and quarter panel at rear corner of quarter window is adjusted by loosening four cap screws that secure main pivot bracket to main pivot bracket support. Move main pivot bracket in or out as required to obtain proper spacing. To adjust top to stack, lower into folded position, loosen three cap screws that secure balance link adjusting bracket to main pivot bracket support. Turn diagonal adjusting screw, on balance link bracket, out or in to lower stacked position of header. Tighten cap screws.

AUTO-LITE ELECTRIC SEAT CONTROL

Chrysler C67, C68, C69 (1955)
DeSoto (1955)
Dodge (1955)
Packard (1955)
Plymouth (1955)

DESCRIPTION: Seat adjusting mechanism is electrically operated, using reversible type motors. Motors operate worm shaft and sleeve through a worm head. Fore-aft and up-down movements are controlled individually, each having a separate but similar system, including a switch, motor, and regulator.

REMOVAL & INSTALLATION: Proceed as follows:

Front Seat Assembly: Remove front cushion, disconnect battery. Disconnect seat adjuster control wires. Remove floor pan-to-seat guide attaching capscrews, remove guide from seat assembly. To install, reverse removal procedure.

Left Seat Guide & Vertical Power Unit: Remove front seat cushion. Disconnect battery and seat adjuster control wires to relay (*CAUTION*—To facilitate removal of vertical bar clevis pin, the front seat assembly should be elevated to highest position of travel and blocked before attempting removal of pin). Remove vertical bar pins attaching vertical power unit shaft and sleeve to front seat frame. Remove power link pin Disconnect motor lead wires to relay. Remove floor pan-to-seat guide attaching capscrews and remove guide from seat assembly. To reinstall, adjust power unit to the two pins (adjustment made by turning unit coupling) Install rear of unit on rear pin and secure. Raise seat manually, install front end of unit into torque bar, attach clevis pin, and secure(*NOTE*—Length of unit may be varied by turning coupling manually) Reinstall wires and reconnect battery. Check operation of seat and replace seat cushion.

Horizontal Power Unit & Shaft Assembly: Remove front seat cushion, disconnect battery and seat adjuster control wires to relay. Remove power unit retaining snap rings, and disconnect relay lead wires to motor. Remove horizontal power unit assembly. *NOTE*—To facilitate removal of horizontal bar clevis pins, lower seat to lowest point before attempting to remove unit. To reinstall, reverse removal procedure.

Seat Tracks: Remove jack assemblies and the two rear and front retaining bolts that hold seat track to floor pan. Slide seat track outward, causing it to disengage from two horizontal torque rods. When removing right track, it will be necessary to disengage one connecting link from a pivot pin. To reinstall, engage torque rods in track assembly. Install rear seat track retaining screws, but do not tighten Install jacks, operate seat in all directions to properly align seat tracks and torque rods. Tighten front seat track retaining screws, raise seat, and tighten rear seat track retaining screws. *NOTE*—Do not lubricate vertical power unit shaft ball and nut.

SERVICE PART NUMBERS: Indicated as follows.

	Auto-Lite No.
Seat Control Motor	
Chrysler, DeSoto, Dodge, Plymouth (Horiz. Only)	
Vertical	EMM-4002
Horizontal	EPC-4001
Packard	
Vertical (12 Volt)	EPE-4001
Horizontal (12 Volt)	EPD-4001
Seat Control Relay	
Chrysler, DeSoto, Dodge, Plymouth	HRZ-4004
Seat Control Regulator (Incl. Motor)	
Chrysler, DeSoto, Dodge, Plymouth (Horiz. Only)	
Vertical	SGA-4003
Horizontal	SGA-4004
Packard	
Vertical (12 Volt)	SGA-4005
Horizontal (12 Volt)	SGA-4006

FORD, LINCOLN, MERCURY SEAT CONTROLS

Ford (1954-55)
Lincoln (1952-55)
Mercury (1952-55)
Thunderbird (1955)

►CHANGES, CAUTIONS, CORRECTIONS

►*1955 MERCURY REGULATOR MOTOR WIRE CHAFING & SHORTING OUT CORRECTION:* To eliminate possibility of motor wires chafing and shorting out, rubber insulators should be cemented to the floor pan at points of wire contact. Insulators should be made from ¼" sponge rubber cut in 4" squares.

►*1955 THUNDERBIRD SEAT JAMMING IN EXTREME REAR POSITION CORRECTION & PRODUCTION CHANGE:* A change has been made in production to relocate seat track stop which restricts rearward travel and eliminates binding condition in power seat regulator shaft. To correct condition in field, raise seat to extreme upward and forward position. Locate and drill a 1/8" hole through seat track flange on both sides at a point 3 7/8" from forward end of track. *(NOTE*—Use a right-angle drive drill head to drill holes). Install a 1/8" x 1¼" pin (Part No. 353621-S100) through seat track flange. Pin must be installed so that it extends an equal distance on both sides of flange. Lubricate track and check seat operation.

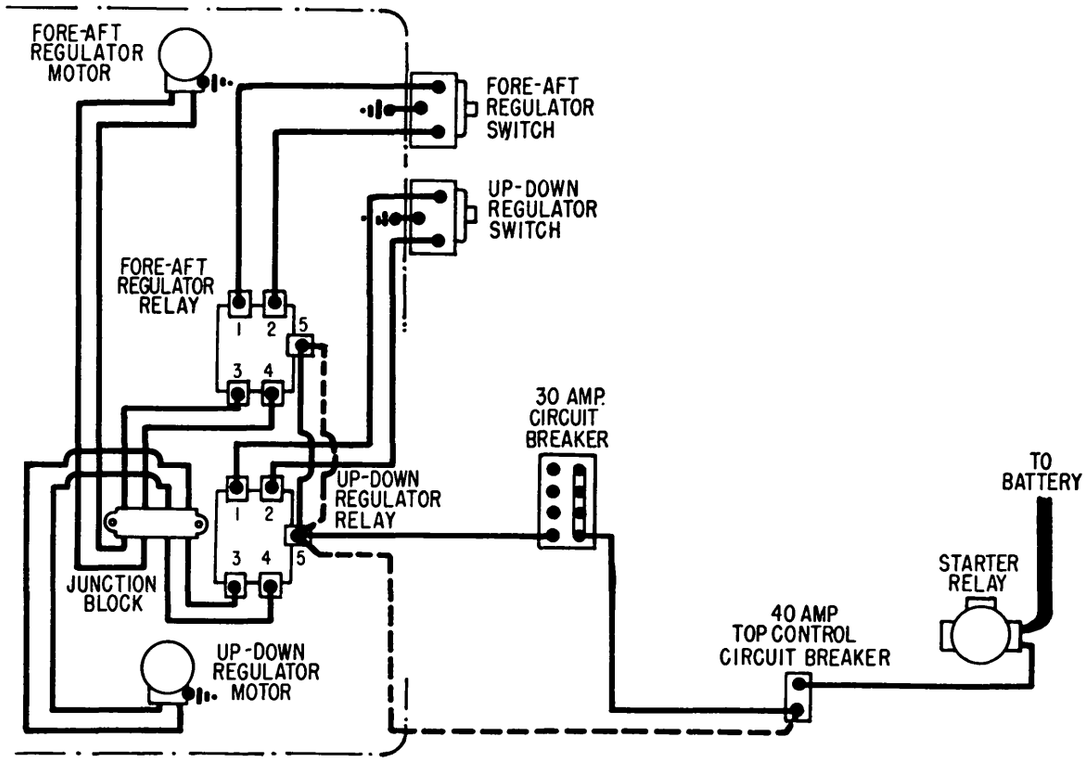
DESCRIPTION: This seat adjusting mechanism is electrically operated, with reversible type motors driving screw-jack type regulators. Fore-aft and up-down adjustments are controlled individually, each having a separate but similar system, including a switch, relay, motor, and regulator. Control switches are located on seat side shield to left of driver (Lincoln), front left side of seat frame (Mercury). Forward switch (Lincoln), left switch (Mercury) controls fore and aft movement, other switch controls up and down movement.

REMOVAL & INSTALLATION: Proceed as follows:

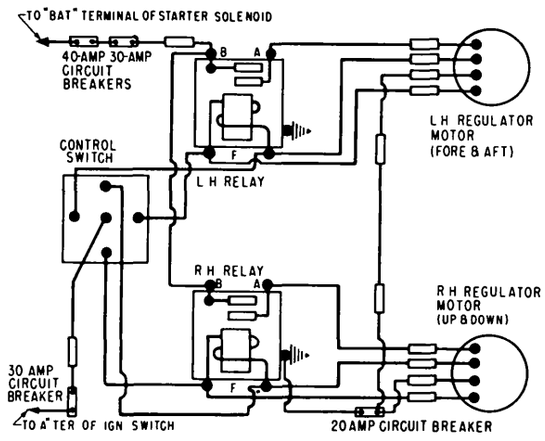
Lincoln Front S at Assembly: After removing the front seat cushion, pull courtesy lamp wires from connectors at transmission hump, disconnect lead-in wire from relays, then remove four nuts that secure seat tracks to floor pan. Note in which of the three holes of floor bracket the clevis pin is located, then remove self-locking pin and clevis pin that retain fore-aft regulator to floor bracket. Loosen regulator in floor bracket. Note which of mounting holes are positioned over retaining studs, remove seat assembly from car. To reinstall, position front seat so mounting studs are located in same seat track mounting holes as originally. Pin used to secure rear end of fore-aft regulator must be installed through proper bracket holes to insure correct operation of regulator. Center holes in bracket must be used when seat brackets are installed using center mounting holes. Rear holes are used when seat tracks installed using forward holes. Forward holes are used when seat brackets installed using rear holes.

Mercury Front Seat Assembly: (NOTE—Seat cushion is integral with front seat frame). Disconnect bat-

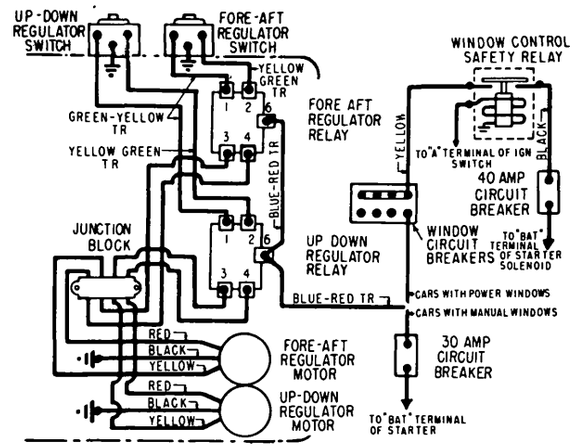
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1953-54 MERCURY SEAT CONTROL WIRING DIAGRAM (FORD SIMILAR)



FORD & MERCURY



LINCOLN

1955 FORD, LINCOLN, MERCURY SEAT CONTROL WIRING DIAGRAM

FORD, LINCOLN, MERCURY SEAT CONTROLS (Cont.)

tery ground cable to prevent shorts. Remove cap screws (one on each side of track assembly) holding front of seat track assembly to floor pan. Remove nuts and bolts (one on each side of track assembly) holding rear of seat track to floor pan. Remove clevis pin holding fore-aft regulator to floor bracket (may be done from rear and underneath front seat cushion). Tilt seat back, remove ground wires to relays, then remove seat track assembly with seat frame attached. To remove seat frame, remove four nuts, one on each side, front and rear, holding seat frame to seat track, then remove seat frame. To install, reverse removal procedure.

Ford & Thunderbird Front Seat Assembly: Disconnect battery ground cable and remove the two front seat shields. Remove seat track stud bolts from bottom side of floor pan. With the seats in forward position, remove the clevis pin holding fore-aft regulator to floor pan. Remove seat back and tilt the seat backward. Disconnect wire lead from circuit breaker-to-relay, at the relay. Remove seat track assembly with seat frame attached. To install, reverse removal procedure.

Fore-Aft Regulator: Follow Front Seat Assembly Removal procedures above, then disconnect motor field coil and ground wires from bullet connectors. Remove clevis pin holding regulator to seat frame assembly, remove regulator assembly. To install, reverse removal procedure.

Up-Down Regulator: Follow Front Seat Assembly Removal procedures above, then disconnect motor field coil and ground wires from bullet connectors. Pull large assist spring forward and unhook it from flange on regulator mechanism to release tension. Remove clevis pins holding regulator to seat track and seat frame, remove regulator assembly. To install, reverse removal procedure.

Activating Switches: Disconnect positive cable from battery to prevent shorts. Remove phillips head screws attaching switch mounting panel to seat frame assembly. Pull mounting panel with switches attached from seat frame, disconnect three wires from switch to be removed. Pinch metal clips together which hold switch assembly to mounting panel, pull switch assembly forward out of panel. To install, reverse removal procedure. See Wiring Diagram.

►*THUNDERBIRD ACTIVATING SWITCH NOTE:* Two separate switches are mounted on the floor panel instead of the four-way toggle switch used on conventional models.

Relay Assembly: Disconnect positive cable from battery to prevent shorts. Remove phillips head screws holding relay mounting to seat frame. Pull plate with relays attached forward and disconnect wires to relay which is to be removed. Remove two nuts and bolts holding relay to attaching plate, remove relay. To install, reverse removal procedure. See Wiring Diagram.

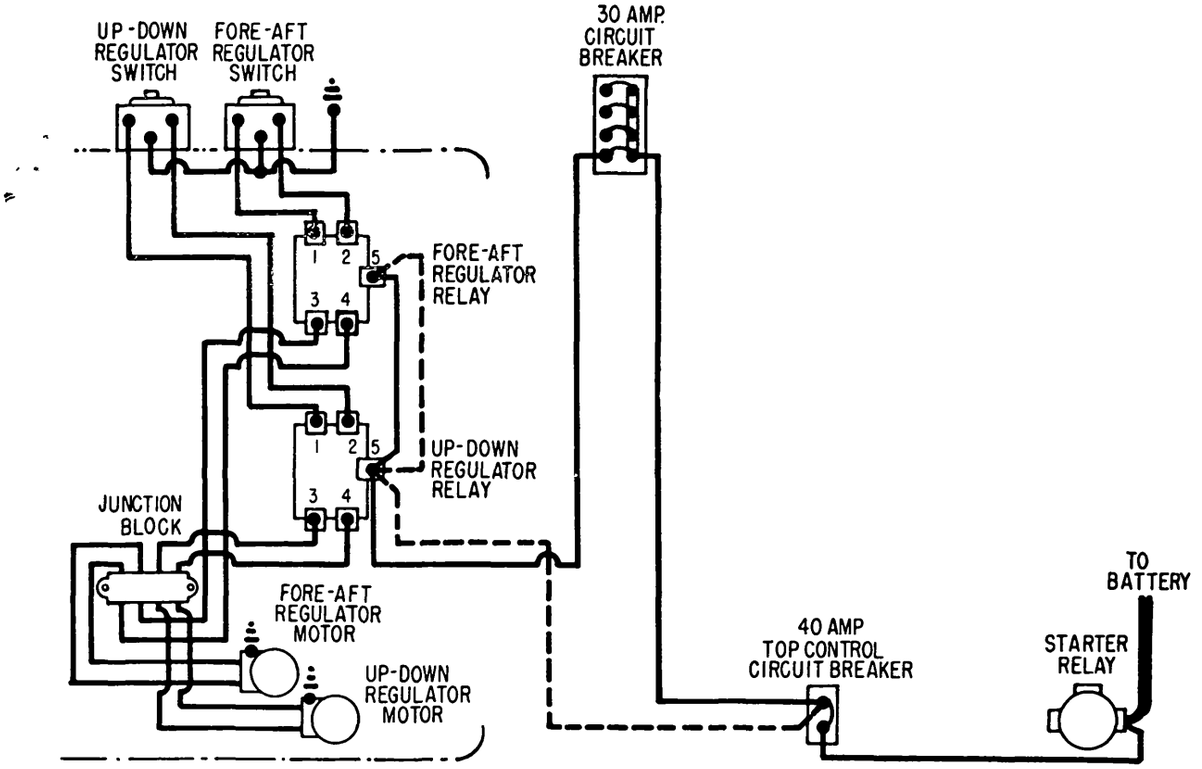
TROUBLE SHOOTING: Check as follows:

Seat Will Not Go Forward or Backward or Up or Down: Shorted or open lead from starter relay to circuit breaker.

Seat Will Go Forward or Backward But Not Up or Down (or vic versa): Shorted or open lead from relay to motor; shorted or open armature or field coil winding; open ground connection from motor; shorted or open seat regulator switch connections, or relay coil windings.

Seat Operation Sluggish or Noisy: Motor brushes chipped or improperly seated; excessive armature end play; insufficient clearance between armature and field coils; regulator mechanism binding or has chipped or broken threads.

SERVICE PART NUMBERS: Lincoln and Mercury numbers as follows:
Seat Control Motor—No. FAB-14547-A.
Seat Control Relay—No. FAA-14546-A.
Seat Control Switch—No. FAA-14545-A.



1953-54 LINCOLN SEAT CONTROL WIRING DIAGRAM

G.M. ELECTRIC SEAT CONTROL

Buick (1954-55)
Cadillac (1954-55)
Chevrolet (1954-55)
Oldsmobile (1954-55)
Pontiac (1954-55)

▷CHANGES & CORRECTIONS

▷*1955 CADILLAC REGULATOR PRODUCTION CHANGE (To Reduce Seat "Chuck"):* Effective with Engine No. 57610 (approx.), tensioner springs have been installed between seat frame and seat adjuster to minimize free movement in the seat assembly. These tensioners may be installed on earlier cars to eliminate objectionable noise due to movement of seat adjuster parts. To install tensioner springs, remove front seat assembly with seat adjusters attached, drill and chamfer holes in horizontal equalizing links as follows:

4-D r Sedans—Drill a 5/16" diameter hole 1¾" from arm and link pivot and on centerline of link. Chamfer both sides 1/16" x 45°.

2-D r (With Horizontal Seat Control Only)—Drill a 5/16" diameter hole 1¼" from arm and link pivot (measured on centerline of link) at a point 11/32" from top (widest) edge of link. Chamfer both sides 1/16" x 45°.

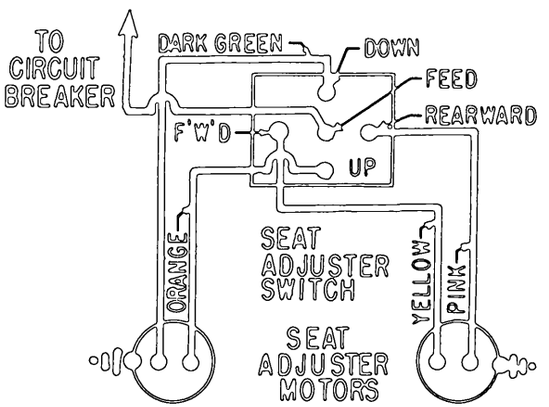
2-D r (With Horiz ntal & Vertical Seat Control)—Drill a 5/16" diameter hole 1¾" from arm and link pivot and on centerline of link. Chamfer both sides 1/16" x 45°.

On 4-Door Sedans, in addition to hole drilled above, drill another hole 11/32" in diameter in seat frame 1 5/16" rearward of the centerline of the rear attaching hole of the horizontal equalizing rod support. On all cars, install spring retainer, Part No. 4672117, on seat frame as follows: On 2-Door models, remove rear attaching screw of support and secure retainer to seat using same screw. On 4-Door models, secure retainer to frame at drilled hole, using a screw, Part No. 4561558, and nut, Part No. 120368. On all models, install tensioner spring, Part No. 4672116, using a suitable lubricant at spring attaching points. Install seat assembly.

DESCRIPTION: Separate horizontal and vertical seat regulators consist of "jack-screw" type actuators powered by individual reversible type motors which have built in circuit breakers to prevent overloading when operation cycle is completed.

HORIZONTAL SEAT REGULATOR REMOVAL & INSTALLATION: Operate seat to a raised and forward position and disconnect regulator lead wires at connectors. On sedan models, detach tensioner spring from equalizer rod on left side of seat. Turn back carpet, remove regulator floor pan support cover and remove support screws. On sedan models, detach horizontal regulator seat frame support at front of seat. On coupes, remove support screws in floor pan and retaining ring securing regulator to seat front frame rail.

VERTICAL SEAT REGULATOR REMOVAL & INSTALLATION: Operate seat to a raised and forward position and remove retaining ring attaching regulator to floor pan support. Lower seat and detach vertical regulator lead wire connectors and ground wire. From under front of seat, remove regulator support screws then carefully remove regulator from support pin at rear of seat.



(G.M.) SEAT CONTROL WIRING DIAGRAM

STUDEBAKER SEAT CONTROL

Studebaker (1955)

DESCRIPTION: Seat adjusting mechanism is electrically operated, using reversible type motor which turns screw jack. Control of system is through a switch and relay. Seat adjuster provides fore-and-aft movement.

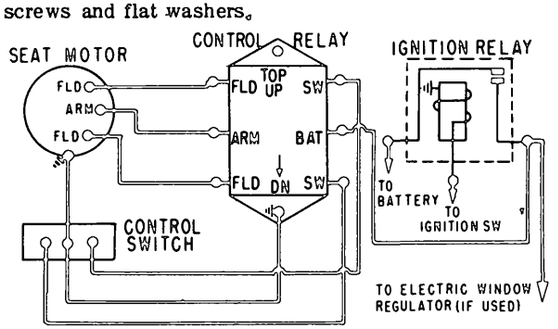
REMOVAL: Proceed as follows:

Torque Tube Assembly: Remove seat cushion. Remove cotter pins and take out clevis pins connecting torque tube arms with torque tube links. Remove torque tube clamps and remove torque tube.

Motor: Remove seat cushion and three motor operating wires at relay. Remove motor-to-adjuster bracket nuts and ground wire.

Seat Track: Remove seat cushion. Take out shoulder bolt fastening torque tube link to seat track support. Remove capscrews and washers holding seat track to floor pan. Support seat frame on wooden blocks, take out two seat frame-to-seat track screws, remove track.

Seat Frame: Remove seat cushion. Remove cotter pins and take out clevis pins connecting torque tube arms to torque tube links. Take out frame-to-seat track capscrews and flat washers.



STUDEBAKER SEAT CONTROL WIRING DIAGRAM

AUTO-LITE WINDSHIELD WIPER EWD, EWE, EWH TYPES

Car Model	Windshield Wiper No.
Chrysler 6 & 8 (1941)	①EWD-5001, EWD-5003
Chrysler 6 & 8 (1942-48)	①EWH-5001, EWH-5003
DeSoto S8 (1941)	①EWD-5001, EWD-5003
DeSoto All (1942-48)	①EWH-5001, EWH-5003
Dodge D19 (1941)	①EWD-5001, EWD-5003
Dodge All (1942-48)	①EWH-5001, EWH-5003
Plymouth P11, P12 (1941)	①EWD-5001, EWD-5003
Studebaker Comm. 11A (1941)	EWD-5002
Studebaker Pres. 7C (1941)	EWD-5003
Studebaker Comm. 12A, Pres. 8C (1942)	EWH-5004

①—EWD-5003, EWH-5003 used on Convertible Models only.

▷NOTE: EWD Type Windshield Wiper Motors. This motor may continue to operate indefinitely after the switch has been turned OFF. This condition can be corrected without removing motor from car. Run the wiper motor for ten or fifteen minutes before making any adjustments, then stop the wiper with the blades at the top of their sweep by either turning off the ignition switch or opening the line between the battery and the wiper control switch. Insert a screwdriver underneath the cam (after removing the inspection cover) and bend it out .004" to .006". Extreme care must be taken that the cam is not bent out too far or it will strike either the side of the switch plunger or the switch case. Check the motor operation after this adjustment. If it still continues to operate with the switch off, repeat the procedure.

DESCRIPTION & OPERATION: Two speed type of same general design as 'EWB' type used on 1940 car models except for new wiring diagram (see illustration) and new "Parking" mechanism as follows:

Parking Switch—Consists of a simple pushbutton type switch mounted on a bracket on the drive gear housing and actuated by a cam on one of the crankarm shafts. When control switch is turned 'off' motor circuit is completed through parking switch and motor continues to operate until the blades reach the parking position when the cam strikes the push button and opens the switch.

Motor Resistor—Consists of a carbon block resistor in the drive gear housing (see illustration) which is connected in the field circuit. In the low speed position, the resistor is short-circuited by the switch, while in the high speed position, the resistor is in series with the motor field.

CIRCUIT BREAKER: Chrysler, DeSoto, Dodge, Plymouth Models—Windshield wiper is protected by a thermostatic type circuit breaker mounted on the back of the control switch. Circuit breaker begins to operate when the current reaches 12 amperes and vibrates to prevent an excessive current flow.

Studebaker 1941 Models—Circuit breaker is not used. Windshield wiper is protected by a 14 ampere

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EWD, EWE, EWH TYPES (C nt.)

fuse in a connector in the feed wire between the control switch and the regular car fuse block.

Studebaker 1942 Models—Circuit breaker is same as on Chrysler models (above).

ADJUSTMENT:—Park Angle—Crank arms must stop at correct parking angle to insure wiper blades being parked in correct position on windshield. See illustration for 'park angle' measurement.

CarModel	Parking Angle
Chrysler, DeSoto, Dodge, Plymouth.....	26°
Studebaker	18°
EWE (12 volt Types)	26°

To Adjust—Remove motor cover, loosen adjusting screw (see illustration), turn parking switch bracket as required so that cam on crank arm opens switch contacts with crank arm in correct parking position, tighten adjusting screw securely.

SERVICING:—Armature & Gear Replacement—Complete armature and gear set must be installed together if either armature or gears requires replacement. Armature shaft worm gear and crank arm gears are run-in at the factory.

Crank Gear Assembly—When installing crank arms and gears, use Crank Aligning Tool ST-298 to insure correct position of crank arms. Turn crank arms so that they point toward each other, slip aligning tool over both arms so that pivot pins at ends of arms fit into holes in fixture, hold arms in this position and assemble gears on cross-shafts. See that gears are assembled with punchmark up and that the slot in the lockplate lines up with the flats on the side of the cross-shaft and that ears on ends of lockplate fit in holes in gears.

Bearing Alignment—After motor completely assembled (but before running), strike frame several sharp blows with rawhide hammer to insure correct alignment of bearings with armature shaft.

Armature Endplay—Must be .005" minimum, .010" maximum. To adjust endplay, remove gear housing cover, expand or contract armature stop button support arms (in housing at end of armature shaft).

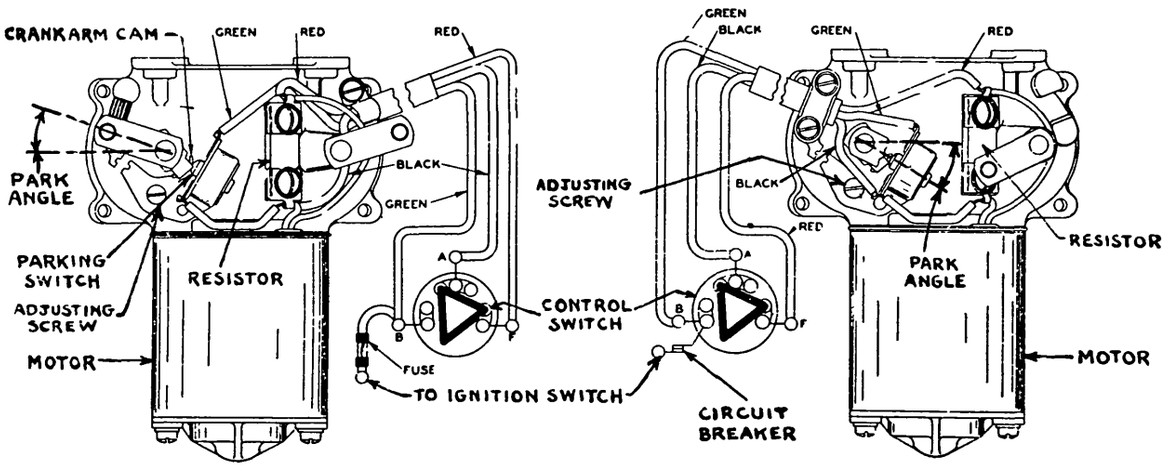
Motor Lubrication—No oilers provided and motor bearings do not require lubrication in service. Gear box should be filled ¾ full with special Auto-Lite ST-295 gear grease (do not use any other type) before assembly and both crank cross-shafts should be coated for entire length with this same grease before installed in housing. Use care not to get grease on motor commutator or control contacts. CAUTION—See that both crank arms are installed in correct position.

Motor Specifications

Starting (Under Load)—4.0 volts (6 volt units), 8.0 volts (12 volt units) with control switch in High Speed position.

Current Draw—Depends on motor speed (less at high speed) as follows:

		Amperes	
	Voltage	Low Speed	High Speed
6 Volt Units.....	7.0 volts.....	5.0 max.....	4.0 max.
12 Volt Units.....	14.0 volts.....	2.5 max.....	2.0 max.



Field Current—2.45-2.85 amperes at 6.0 volts (6 volt units), 1.25-1.45 amperes at 12 volts (12 volt units).

Motor Speed (Full Load)—32-40 crank RPM. (Low speed), 55-60 crank RPM. (High Speed).

TESTING:—Control Switch—Use a test lamp with one lead connected to a 'hot' terminal (such as the ammeter), connect other lead as follows: With all wires disconnected from control switch, and switch turned off, connect test lamp lead to switch 'A' terminal and ground 'F" terminal. Lamp should light. Turn switch to Low Speed position, connect test lamp lead to switch 'B' terminal. Lamp should light when either 'A' or 'F' terminal grounded. Turn control switch to High Speed position, connect test lamp lead to switch 'B' terminal and ground 'A' terminal. Lamp should light.

Parking Switch—With control switch wires disconnected, connect test lamp lead to park switch lead (green wire), ground other park switch lead (black wire on Chrysler—on Studebaker, touch ground wire to other park switch terminal). Lamp should go out when parking switch contact button is pressed in and should light when button released (crank arms must not be in park position when this test made).

Motor—Connect wire from negative terminal of 6 volt test battery to black wire disconnected from control switch, ground positive terminal of battery to motor frame. Motor should operate at full speed. If motor does not run, check for open armature or field circuit, worn or stuck motor brushes, binding or jammed armature or gears (armature and gears should turn freely by hand).

TROUBLE SHOOTING: If wiper action not satisfactory, check as follows:

Motor Will Not Start or Run

1. **Fuse Blown (When Fuse used).** Before replacing blown fuse, check following possible causes: Check all connections, check motor ground, check all motor leads for grounds and open-circuits.

2. **Loose Connections in Wiper Circuit.** Check all wiring. Tighten connections at Windshield Wiper, Control Switch, and Ignition Switch.

3. **Crank Arm Shafts Binding.** Make certain that cross shafts greased for entire length with special ST-295 grease before installing.

4. **Linkage Binding.** Make certain that linkage between crank arm and pivot arms is not binding and that wiper blades and pivot arms operate freely.

Motor Stops with Blades in Wrong Position

1. **Park angle incorrectly set.** See adjustment section above.

Motor Will Not Stop

1. **Parking mechanism out of adjustment.** Check Park adjustment (see Adjustment section above).

AUTO-LITE WINDSHIELD WIPER "DOUBLE-END" MOTOR

Car Model	Windshield Wiper No.
CHRYSLER	
1949-50 (Exc. Conv.)	EWJ-4001
1949-50 (Conv. & Spec. Club Cpe)	EWJ-4003
1951 (Exc. Limo., Subn., 8 Pass)	
Early	EWJ-4003
Later	EWJ-4001A
1951 (Limo., Subn., 8 Pass.)	EWJ-4001A
1952 (All Models) Early	EWJ-4001A
1952 (All Models) Later	EWJ-4007A
1953 (All Models Exc. C59)	
Early	EWJ-4008, EME-4001, EMG-4001, 4001, 4103
Later	EMG-4102
1953 (C59 12 V.) Early	EMF-4001, EMK-4001, 4102
1953 (C59 12 V.) Later	EMK-4101
1954 (C62, C63, C64) 12V.	EMG-4102
1954 (C66) 12V.	EMK-4101
DESOTO	
1949-50 (Exc. Conv.)	EWJ-4001
1949-50 (Conv. & Spec. Club Cpe)	EWJ-4003
1951 (Exc. Subn., 8 Pass.) Early	EWJ-4003
1951 (Exc. Subn., 8 Pass.) Later	EWJ-4001
1951 (Subn., 8 Pass.)	EWJ-4001
1952 (S15) Early	EWJ-4001
1952 (S15) Later	EWJ-4007
1952 (S17) Early	EWJ-4001A
1952 (S17) Later	EWJ-4007A
1953 (S16, S18)	
Early	EME-4001A, EMG-4001A, 4101A, 3A
Later	EMG-4102A
1954 (S19, S20)	EMG-4102
DODGE	
1949-50 (Exc. Conv.)	EWJ-4001
1949-50 (Conv. & Spec. Club Cpe)	EWJ-4003
1951 (Coronet, Early)	EWJ-4003
1951 (Coronet, Late)	EWJ-4001
1951 (8 Pass.)	EWJ-4001
1952 (Coronet, Early)	EWJ-4001
1952 (Coronet, Later)	EWJ-4007
1953 (D44, D48 & Spec. Eqpt. D46, D47)	EWJ-4008A, EME-4001A, EMG-4001A, 4101A, 2A, 3A
1953 (Spec. Eqpt. D43)	EMG-4001, EMG-4001B, EMG-4103B
1954 (Spec. Equip.)	EMG-4102A
FRAZER	
1951 (All Models)	EWJ-4004
KAISER	
1951-53 (All Models)	EWJ-4004
1954-55 (Exc. Darrin)	EWJ-4102
1954-55 (Darrin)	EWJ-4104
PLYMOUTH	
1953 (Spec. Eqpt. P24) Early	EMG-4001, 1B, 4103B
1953 (Spec. Eqpt. P24) Later	EMG-4102B
1954 (P25 Spec. Equip.)	EMG-4102B

▷*1951-53 DODGE & PLYMOUTH NOTE—See "Auto-Lite Windshield Wipers (Single End Motors)" and "Redmond Windshield Wipers" for other applications.*

▷*1953 WINDSHIELD WIPER PRODUCTION CHANGE & MODIFICATION OF EARLY UNITS:* Later windshield wipers have new design follower gears, crank and cross arm assemblies, pivot assemblies, and linkage. If trouble experienced with early units (bent linkage or hammered out grommets, broken or stripped gears, burned motors, or incorrect parking position not due to incorrect adjustment, *see Modification Data below.*

▷*FAILURE TO PARK CORRECTION ("EMG" TYPE WIPERS):* This condition is noticeable when load on wiper is decreased due to wet windshield and worn blades. Motor will coast past park position and continue to operate until ignition switch turned off. To correct, install a new cam, part of Kit STA-87, and adjust the gap to the maximum limit of .030" by bending the contact base plate (do not bend contact arm). Change both brush springs to Part No. EWF-18 to increase tension on armature. Install new wiper blades and wiper arm springs.

DESCRIPTION: Wiper assembly consists of a two speed shunt wound motor mounted between two gear assemblies, each driving a crank arm.

REMOVAL: Disconnect wires from switch. Disconnect linkage at each motor crank arm. Remove screws attaching wiper mounting bracket to body and remove wiper assembly.

▷*CAUTION—Do not move wiper blades across windshield manually. Damage to gear assemblies will result.*

DISASSEMBLY: Remove parking switch and gear case cover, gear retaining nuts, lockwashers, keys and plates. Then remove right and left hand worm follower gears by pressing the crank arm shafts out of heads. The long bolts through motor should be removed, thus allowing heads and armature to be disassembled, after unsoldering field coil lead wires.

INSPECTION: Inspect motor parts for wear or damage. Clean commutators with double or triple "O" sandpaper, or if necessary, turn down and undercut commutator. Undercut should be not deeper than 1/16". Use a very thin hack saw blade. Worn or oil soaked brushes must be replaced. Check the play of armature and crank arm shafts in their bushings and replace worn parts, if any looseness can be found. Replace any worn or damaged gears.

REASSEMBLY: Assemble motor frame, armature and heads, making sure field leads have been resoldered properly. Check armature end play, adjust by installing thrust washers inside head until desired clearance of .005-.010" is obtained. Rap motor frame sharply with a rubber hammer to align bushings, then check to see that armature turns freely. Slide washer over crank arm shaft and then apply a thin film of grease to shaft and install through head. Turn arms so that both point exactly toward the other, then place spring washer and thrust washer over shaft and install gears in position. The holes in the gears must be lined up with flats on shaft (NOTE —Have prick punch mark up, when gears are so marked). Fill gear housing ½ full with a light high temperature non-fibre grease. Install plates, gear case cover and parking switch. (CAUTION—When installing plate (with ramp), the ramp must be directly under plunger in the parking switch.

INSTALLATION: Reverse the Removal instructions given above.

PARKING ADJUSTMENT (Except EWJ Type): Adjust by moving arm extending from under parking switch cover. Operate wiper and note parking position when wiper is turned off. Obtain proper parking position by adjusting arm. *(CAUTION*—plate mounting rivet should be tight enough so that plate will not slip and will still allow movement of the adjusting arm.) Make certain that all parts are correctly assembled (see Reassembly above). Adjust switch so that cranks point outward on a line parallel to the motor centerline with tolerances as indicated in table below. Have motor cold and test with loads on each crank arm as indicated in table below.

PARKING ADJUSTMENT (EXC. EWJ TYPE)

Motor No.	Tolerances① Before	Tolerances① After	Crank Arm Load
EME-4001, A		17°	2 lbs.
EMF-4001		17°	2 lbs.
EMG-4001, A, B		17°	5 lbs.
EMG-4101, A, B		17°	5 lbs.
EMG-4102, A, B	11°	6°	3¾ lbs.
EMG-4103, A, B	11°	6°	3¾ lbs.
EMK-4001		17°	5 lbs.
EMK-4101	11°	6°	3¾ lbs.
EMK-4102	11°	6°	3¾ lbs.

①—Before or after point on line parallel to motor centerline.

PARKING ADJUSTMENT (EWJ Type): Loosen screw holding parking switch bracket in place. Turn bracket as required to obtain proper parking position, tighten screw.
Parking Angle (EWJ-4004)—17° ± 4° (angle between crank arm and centerline of motor). Crank arms park out away from motor.

PARKING SWITCH: Make sure both contact arms are in good condition and either straight or bent slightly toward each other, and that the spring washers have not been flattened or damaged. Nut on switch should be turned down until push rod just opens the contacts when it is on the high point of the cam. Check to make sure assembly is tight, then turn cam to close contacts. Adjust tension on contact arms to 1.5 to 3 ozs., by hooking scale to contact point and taking the reading just as points open. Adjust by bending contact arm, keeping points aligned.

LUBRICATION: At overhaul, add 10 drops of medium oil to the felts at armature shaft bearings. Drain off excess oil. At assembly, grease crank arm shafts and fill gear chambers ¾ full with ST-294A gear grease. Lubricate pivots with ST-294A grease at yearly intervals.

SPECIFICATIONS: Wiper Motor
Field Current Draw: (EWJ) 2.4-2.9 amperes at 6.0 volts, (EME, EMG) 2.3-2.5 amperes at 6.0 volts, (EMF, EMK) 1.1-1.3 amperes at 12.0 volts.

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AUTO-LITE "DOUBLE-END" (Cont.)

Low Speed

No-load Draw:	Amperes	Volts	R.P.M. (Approx.)
EWJ	5.0	7.0	
EME	4.0-4.6	6.0	40
EMF	1.9-2.3	12.0	40
EMG	4.4-4.8	6.0	46
EMK	1.9-2.3	12.0	44

High Speed①

EWJ	4.0	7.0	
EME	3.2-3.6	6.0	68
EMF	1.5-1.9	12.0	65
EMG	3.7-4.0	6.0	74
EMK	1.6-2.0	12.0	70

①—With resistors in field circuit as follows: (EWJ) 2.7-3.3 ohms, (EME) 3.5 ohms, (EMF) 14 ohms, (EMG) 2.8 ohms, (EMK) 12.5 ohms.

Endplay: .005-.010". Use EWJ-81, 81A or 81B thrustwashers as required to obtain this endplay. Place on drive end of armature shaft.

Parking Switch

Contact Pressure: 3-5 ounces.

MODIFICATION KITS: Furnished as follows:

Wiper No.	Chrysler Part No.
EMG-4001	1540494
EMG-4101	1540501

NOTE—Grommet and Nut Package, Chrysler Part No. 1450558 available for use when making above modifications.

Modification (Double End Motors except EWJ): Remove wiper motor, links and pivot from car, discard links and pivots, then proceed as follows:

End Head Modification—1) Remove thru bolt from crank side of motor only, **without disturbing other thru bolt.**

2) File sufficient material from screw bosses on end heads to provide clearance for new longer crank arms.

3) Countersink hole at switch end to receive new thru bolt, install new thru bolt and tighten securely.

Changing Gears & Crank Arms—1) Remove parking switch cover, lift switch and mounting bracket off end head. ***CAUTION—Do not lose parking switch plunger located on underside of switch plate.***

2) Remove cover from other end of wiper motor, save gaskets for re-use in assembly.

3) Take out old fibre gears by removing retaining nut, lockwasher, gear key and washer (at switch end parking cam used instead of washer).

4) Take out and discard crank arms but save two thrust washers and spring washer, clean out gear box. Assemble thrust washer on shaft of new crank arm, apply film of grease on crank arm shaft, insert shaft through end head.

5) Turn crank arms so that they point out and are parallel with frame, check gears to be sure which end of motor they fit (mesh gears with armature worm). Gear for switch end is to have parking cam between gear and gear lock, while other gear has plain washer between gear and gear lock. Tap gear lock into holes in gear.

6) Assemble spring washer and thrust washer on crank arm shaft, then, holding crank arm pointing out and parallel to frame, carefully assemble gear and gear lock by meshing gear teeth in worm and gear lock to flats on shaft. Be sure gear at switch end has cam with slots parallel to frame and raised portion facing gear lock. Recheck position of crank arms (must be in same relative position to within one gear tooth). Assemble lockwasher and nut, then tighten.

7) Fill gear housing ½ full with MoPar Speedometer Cable Lubricant (Part No. 1243632) or Auto-Lite Gear Grease (Part No. ST-294A), place gaskets on heads, reassemble covers. Be sure pin in parking switch is in position.

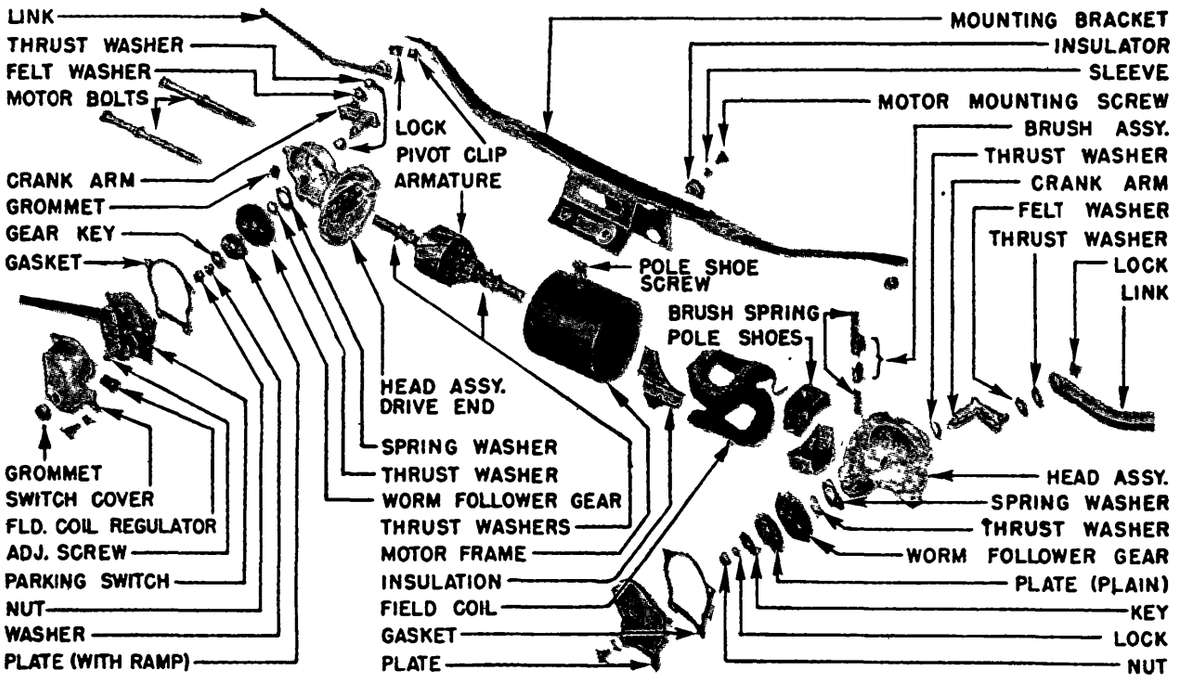
8) Run motor, check crank arm parking position. Arms should park so that they are approximately parallel with frame. Parking position can be adjusted by moving arm extending from under parking switch cover.

9) Install motor in car, tighten mounting nuts securely. ***CAUTION—Do not over-tighten to crush eyelets in mounting grommets.***

10) Install new pivots with new gaskets. Sponge rubber gasket is installed inside car and rubber coated paper gasket on outside. Tighten mounting screws temporarily.

11) Install new links, add drop of oil to felt washers, then run motor momentarily to be sure pivot crank arm swings centrally between rubber bumpers. If necessary to center crank arm swing, file off index on top of pivot and move pivot sideways to provide proper adjustment, tighten pivots securely, install arms and blades.

12) Check installation to be sure blades park properly. Parking position can be adjusted by moving the parking switch adjustment lever on wiper motor or by moving wiper arms on serrations on wiper pivot.



AUTO-LITE "DOUBLE END" MOTOR WINDSHIELD WIPER

REDMOND ELECTRIC TYPES

Dodge Six (1951-54)
Plymouth (1951-54)
Studebaker Commander (1952-55)
Studebaker Champion (1952-55). Optl.

►*DODGE & PLYMOUTH NOTE—See "Auto-Lite Windshield Wiper (Single End Motors) and (Double End Motors)" for other applications.*

►CHANGES, CAUTIONS, CORRECTIONS

1952 DODGE & PLYMOUTH IMPROVED LINKAGE ASSEMBLIES: Stronger linkage assemblies (Longer channel section on links, hardened links, and new design crank arms) furnished for service in special kit, Mopar Part No. 1479947. Install parts as follows: Remove drive gear housing cover for access to output shaft retaining snap ring, remove snap ring, remove crank arm assembly. ***(CAUTION—do not disturb position of drive gear in housing—if gear disturbed reset Parking Position as directed below).*** Install new longer crank arm and new crank lever. Connect links (NOTE—use felt washer on each side of link, install lockwasher under nut at crank arm, and plain washer under clip on crank lever stud). DO NOT use oil on felt washers (use graphite only). Make certain that nuts are tight and that snap ring and clip properly installed.

►***1953 STUDEBAKER WINDSHIELD WIPER RUNNING IN "OFF" POSITION (First Cars):*** On cars with windshield wiper motors made before Jan. 23, 1953 (code dated earlier than 23-X-1), if wiper motor continues to run after switch is turned off, replace motor with one of later manufacture (Code dated 23-X-1 or later). These later motors have been changed to eliminate possibility of this condition.

►***1953 STUDEBAKER WIPER BLADES LIFTING OFF GLASS AT HIGHER CAR SPEEDS:*** This condition can be helped by installing wiper arms having higher tension (as used in later production). These later type arms have 7¾-8¾ ozs. tension (increased from 6½-7½ ozs. tension on first type).

Higher Tension Wiper Arms

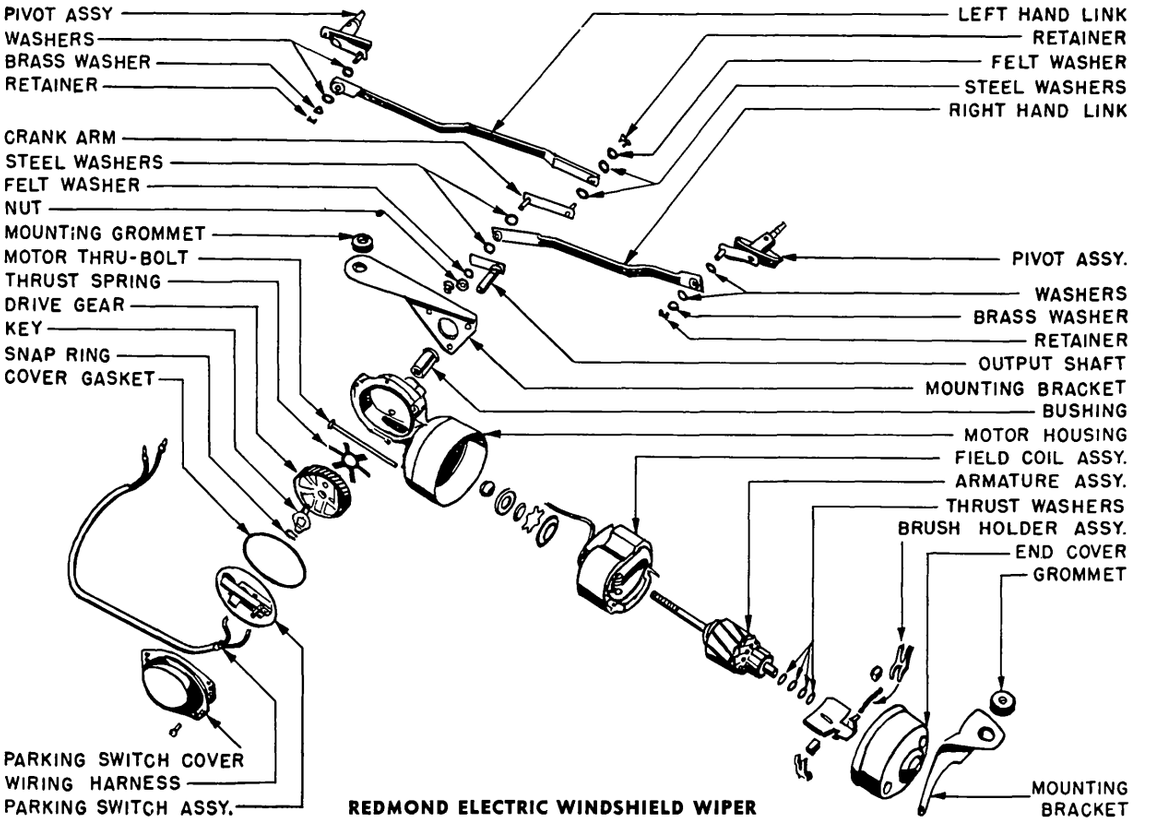
Model	Assy. Part No. (R&L)
All (exc. Coupe & Hard-Top)	290288-9x2
All (Coupe & Hard-Top)	290288-9x3

DESCRIPTION: Wiper consists of motor mounted on a single gear assembly which drives both wiper arms through a double crank. Parking switch is mounted on gear assembly housing. System is protected by circuit breaker in control switch.

PARKING ADJUSTMENT: ***Required when drive gear position in housing disturbed.*** Place shaft in housing so that crank arm points to left and downward at an angle of about 30° with crank lever horizontal or approximately parallel to center line of motor. With arm and lever in this position, high side of parking index cam must be toward left (viewing face of gear with housing cover removed). ***See Blade Adjustment also.***

BLADE ADJUSTMENT: Blades can be placed in proper operating position by loosening attaching nuts and moving arm on serrated mounting. A further MINOR adjustment can be made by moving the parking switch lever of the motor assembly DOWNWARD (this will park blades closer to the lower windshield moulding).

REMOVAL: Remove radio, disconnect wires from switch. Disconnect wiper linkage, using care not to damage it, then remove screws holding brackets to body and remove wiper assembly.



REDMOND ELECTRIC WINDSHIELD WIPER

►***CAUTION—Keep hands and fingers away from windshield wiper operating linkage when wiper motor is running. Power of wiper motor is sufficient to cause serious personal injury.***

TESTING WIPER MOTOR: With motor removed, ground case and connect one lead wire to a 6-volt battery. When one of wires is connected to battery, motor should run continuously; connecting other wire should cause it to complete one cycle and park.

RECONDITIONING WIPER MOTOR: Disassemble wiper motor, remove gear box cover. Inspect for wear, corrosion or damage. Clean armature commutator with 00 or 000 sandpaper or, if necessary, turn down commutator. Replace worn or oil soaked brushes. Check armature and crankshaft in their respective bushings, replace worn parts if any looseness detected. End play in armature shaft is controlled by a thin thrust washer in end plate. Inspect gears for worn or broken teeth and replace those showing damage or excessive wear. Be sure parking switch contact is clean and dry.

Refacing Commutator: If commutator rough, out-of-round, burned or bakelite is even with or extends above surface of commutator, commutator should be turned down. **Remove only enough metal to give smooth, clean surface.** Be sure commutator is clean and free from oil or grease. A dirty, greasy commutator will cause high resistance and greatly impair efficiency of wiper. Assemble frame, armature and head, being careful to raise brushes to allow entrance of commutator. Rap motor frame several times with rubber hammer to align brushes.

INSTALLATION: When installing motor be sure not to tighten attaching studs too tightly. Rubber mounting will be distorted and cause metal-to-metal contact resulting in wiper motor noise. Place drop or two of machine oil on each of felt washers in linkage assembly. Check to see that ground strap on housing and mounting bracket is in place. Be sure linkage is properly positioned when replacing motor. Each arm is identified as being either right or left (stamped "R" or "L").

TROUBLE SHOOTING: Check as follows:

Wiper Motor Will Not Run: Test for defective switch, inspect for binding linkage, defective motor, loose or defective wiring.

Wiper Operates Slowly: Check for high resistance in brush to commutator contact, or carbon deposits in slots, high resistance in ground connection, pivot shaft binding, defective control switch, worn or damaged motor.

Wiper Motor Runs and Stops: Inspect for faulty or defective wiring, check for linkage binding. Operating arm should be parallel with crank arm.

SERVICE PART NUMBERS:	Motor
Dodge & Plymouth (1951-52)	Mopar No. 1370014
Dodge & Plymouth (1953-55)	Mopar No. 1473226
Studebaker	Studebaker No. 297824

1951-54 AUTO-LITE WINDSHIELD WIPER "SINGLE-END" MOTOR

Car Model	Windshield Wiper No.
DODGE	
1951-Early 1952 D41 (Exc. Rdstr.)	EWR-5001D
1952 Late D41 (Exc. Rdstr.)	EWY-5001D
1951 D41 (Rdstr.)	EWR-5001E
1951-Early 1952 D42 (Meadowbrook)	EWR-5001D
1952 Late D42 (Meadowbrook)	EWY-5001D
1953 D43	EMD-4001, 1B, 2B, EWY-4003
1953 D46	EWY-4003A, EMD-4001A, 2A
1953 D47	EWY-4003, EMD-4001, 2
1954 D50, D51 (Std.)	EMD-4003A
1954 D52, D53 (Std.)	EMD-4003
PLYMOUTH	
1951-Early 1952 (Exc. Conv. & Spec. Cpe.)	EWR-5001A
1952 Late (Exc. Conv. & Spec. Cpe.)	EWY-5001A
1951-Early 1952 (Conv. & Spec. Cpe.)	EWR-5001B
1952 Late (Conv. & Spec. Cpe.)	EWY-5001B
1953 Early P24	EWY-4003, EMD-4001, EMD-4001B
1953 Late P24	EMD-4002B
1954 (P25 Early)	EMD-4003B
1954 (P25 Late)	EMU-4001

►*DODGE & PLYMOUTH NOTE—See "Auto-Lite Windshield Wipers (Double End Motors)" and "Redmond Windshield Wipers" for other applications.*

►CHANGES & CORRECTIONS

►*"EMU" TYPE WIPER PARKING ADJUSTMENT NOTE: Parking Switch is different than used on other type wipers. See "1955 Single End Windshield Wiper Motors."*

►*1952 DODGE & PLYMOUTH IMPROVED LINKAGE ASSEMBLIES:* Stronger linkage assemblies (Longer channel section on links, hardened links, and new design crank arms) furnished for service in special kit, Mopar No. 1479946 (exc. Convt. & Belvedere), No. 1479948 (Convt. & Belvedere). Install parts as follows: Remove drive gear housing cover (for access to output shaft), remove nut on end of shaft, remove crank arm assembly *(CAUTION*—do not disturb position of drive gear in housing—if gear disturbed, reset Parking Position as directed below). Install new longer crank arm and new crank lever. Connect links *(NOTE*—use felt washer on each side of link, install lockwasher under nut at crank arm, and plain washer under clip on crank lever stud). DO NOT use oil on felt washers (graphite only). Make certain that nuts are tight and that clip properly installed.

►*1953 DODGE & PLYMOUTH IMPROVED WINDSHIELD WIPER MOTOR DRIVE PARTS (For smooth operation of Two-Speed Motors):* Modify motors on first cars by installing all parts furnished in kits listed below (Crank Arms, Gears, Pivots).
CAUTION—DIFFERENT kit required for motors with ⅛" or 3/16" thick gears. Determine kit required by inspection of gears or note thickness of mounting grommet which will indicate gear thickness as follows: 5/16" grommet—⅛" gear, 7/16" grommet—3/16" gear.

Motor Type	Modification Kit Part No.
⅛" Thick Gears	1540496
3/16" Thick Gears	1540503

►*WINDSHIELD WIPER NOISE & VIBRATION:* If installation of improved drive parts (above) does not correct this condition, remove and discard rubber grommets, metal ferrules, and attaching nuts and washers from mounting brackets *(CAUTION*—ferrules must be removed from motor mounting studs). Install three new rubber grommets **without** ferrules (Part No. 1540181) in bracket mounting holes, install motor and bracket assembly on mounting studs, assemble new sleeve nuts (Part No. 1527832) and plain washers (Part No. 632258) on studs, tighten nuts securely *(CAUTION*—Do not overtighten these nuts).

DESCRIPTION: Wiper assembly consists of single speed motor mounted on a single gear assembly which drives both wiper arms through a double crank. Parking switch is mounted on gear assembly housing and is operated by plunger and gear plate with ramp.

REMOVAL: Disconnect wires from switch and disconnect wiper link assembly by removing nut from motor crank arm (see illustration) and pulling out link crank arm. Remove screws holding mounting brackets to body and remove wiper assembly.

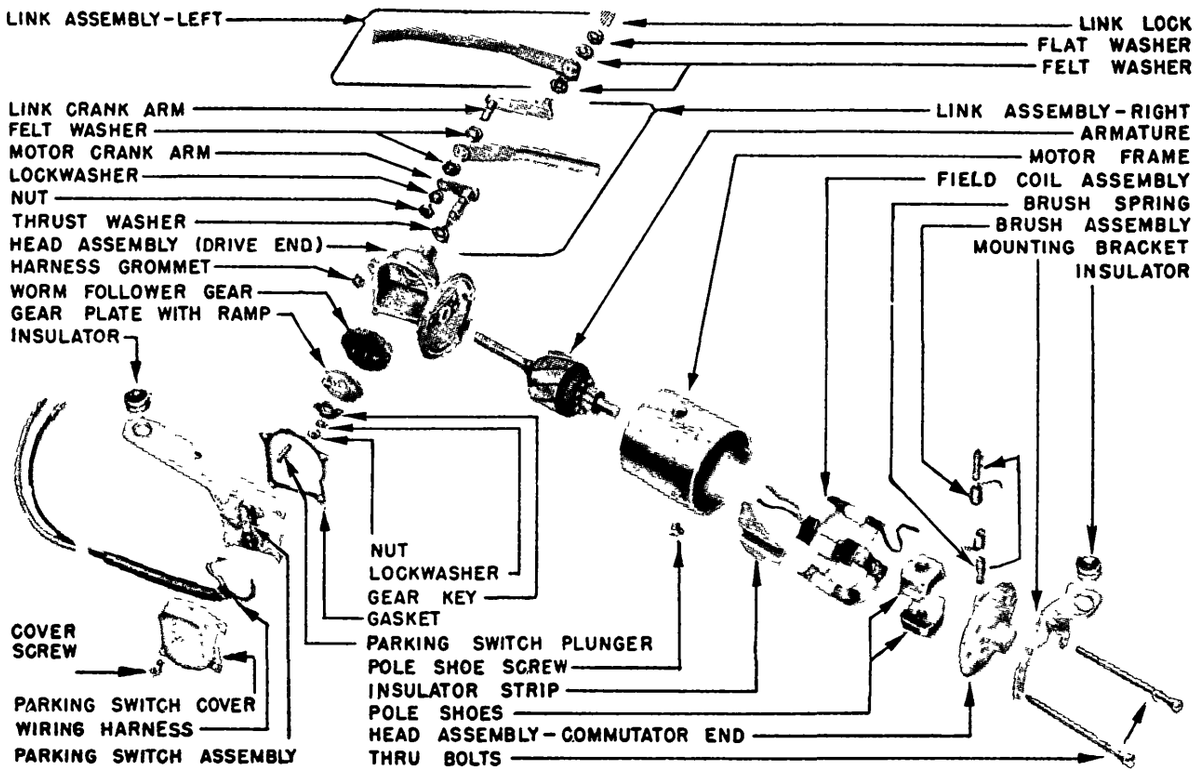
►***CAUTION—Damage to wiper assembly will result if wiper blades and arms are moved manually.***

DISASSEMBLY: Remove parking switch cover and take out parking switch assembly (part of mounting bracket) and lift out parking switch plunger. Remove nut from gear shaft and then take out lockwasher, gear plate (with ramp) and worm follower gear (see illustration). Carefully press motor crank arm and gear shaft out through front of gear housing. ***(CAUTION—Use care when handling the worm follower gears, these are easily damaged).*** Remove the long bolts through motor and take off both head assemblies (after unsoldering field coil leads).

INSPECTION: Inspect motor parts for wear or damage. Clean commutators with double or triple "O" sandpaper, or if necessary, turn down and undercut commutator. Undercut should not be deeper than 1/16". Use a very fine hack saw blade. Worn or oil soaked brushes must be replaced. Check play of armature and crank arm shafts in their bushings and replace worn parts. Replace any worn or damaged gears.

REASSEMBLY: Assemble motor frame, armature and heads, making sure field coil leads have been resoldered properly. Check armature endplay, if not .005-.032" (EWR), .015-.030" (EWY), .005-.015" (EMD with spring washer—installed between two bakelite washers—not compressed), adjust by installing correct thickness washer .023", 1/64", 1/32" thick, on armature shaft just inside drive end bearing. Rap the motor frame sharply with a rubber hammer to align bushings, then check to see that armature turns freely. Slide washer over crank arm shaft then apply a thin

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1951-54 AUTO-LITE "SINGLE END" MOTOR WINDSHIELD WIPER

1951-54 AUTO-LITE "SINGLE END" (C nt.)

coating of grease to shaft and install through head. Place spring washer and thrust washer over shaft and install gears in position. The holes in the gear must be lined up with flats on shaft (NOTE—Have prick punch mark up, when gears are so marked). Fill gear housing ½ full with a light high temperature non-fibre grease. Install plate (with ramp), then turn armature shaft until motor crank arm is pointing AWAY FROM MOTOR (ramp on gear plate should be directly under plunger position). Install gear key, lockwasher and nut. Install gasket, then insert plunger in switch assembly and install assembly on housing (make sure plunger is directly over ramp on plate). Install switch cover.

INSTALLATION: Reverse the Removal instructions given above. *See "Windshield Wiper Noise & Vibration" correction under Changes, Cautions, Corrections above.*

BLADE ADJUSTMENT: Wiper blades can be adjusted for position by removing the nut on the pivot shaft and moving the blade arm on the serrated pivot. Minor adjustment can be made by moving the parking switch lever on the motor assembly up which will cause the blades to park closer to the lower windshield moulding. *See Parking Adjustment.*

PARKING ADJUSTMENT: *Required whenever position of drive gear and contact switch contact plate disturbed.* Parking switch contact mounting plate can be turned to make adjustments *(CAUTION*—plate mounting rivet should be tight enough so that plate will not slip and will still allow movement of the lever at the side of the gear chamber). Make certain that all parts correctly installed (see Reassembly above), adjust switch so that crank angle and parking angle are correct as follows:

Model	Crank Angle①	②Parking Angle
EWR-5001A, B, D, E③	15° ± 0.5°	14.5°
EWY-4003④		9.5°
EWY-4003A④		4.5°
EWY-5001A, B, D④	15° ± 0.5°	14.5°
EMD-4001, B③		9.5°
EMD-4001A③		4.5°
EMD-4002, B③		10.0°
EMD-4002A③		5.0°
EMD-4003, 4003B		10° ± 7.5°
EMD-4003A		5° ± 7.5°
EMU-4001		5° ± 5°

①—Angle between crank arms and pivot.

②—Angle between crank arm and centerline of motor. Variation is plus or minus 7.5°.

③—Crank arm pointing out away from motor.

④—Crank arm pointing in toward motor.

LUBRICATION: Lubricate when overhauling and assembling unit. Put 10 drops medium engine oil on felts at armature bearings, drain off excess. Grease crank arm shaft and fill gear chamber ¾ full with light high-temperature non-fibrous grease (ST-294A). Lubricate pivots yearly with this ST-294A grease.

SPECIFICATIONS: **Wiper Motor**

No-Load Current Draw—(EWR) 3.5-5.0 amperes at 7.0 volts, (EWY) 4.0-5.5 amperes at 7.0 volts, (EMD) 5.7-6.1 amperes, (EMU) 5.8-6.3 at 6.0 volts (Cold—70°F).

Field Coil Draw—(EWR) 2.2-2.4 amperes, (EWY) 1.6-1.8 amperes, (EMD) 2.2-2.5 amperes (EMU) 3.2-3.5 amperes. All at 6.0 volts (Cold—70°F).

Parking Switch

Contact Pressure(EWR, EWY) 2-4 ozs.,(EMD) 3-5 ozs.

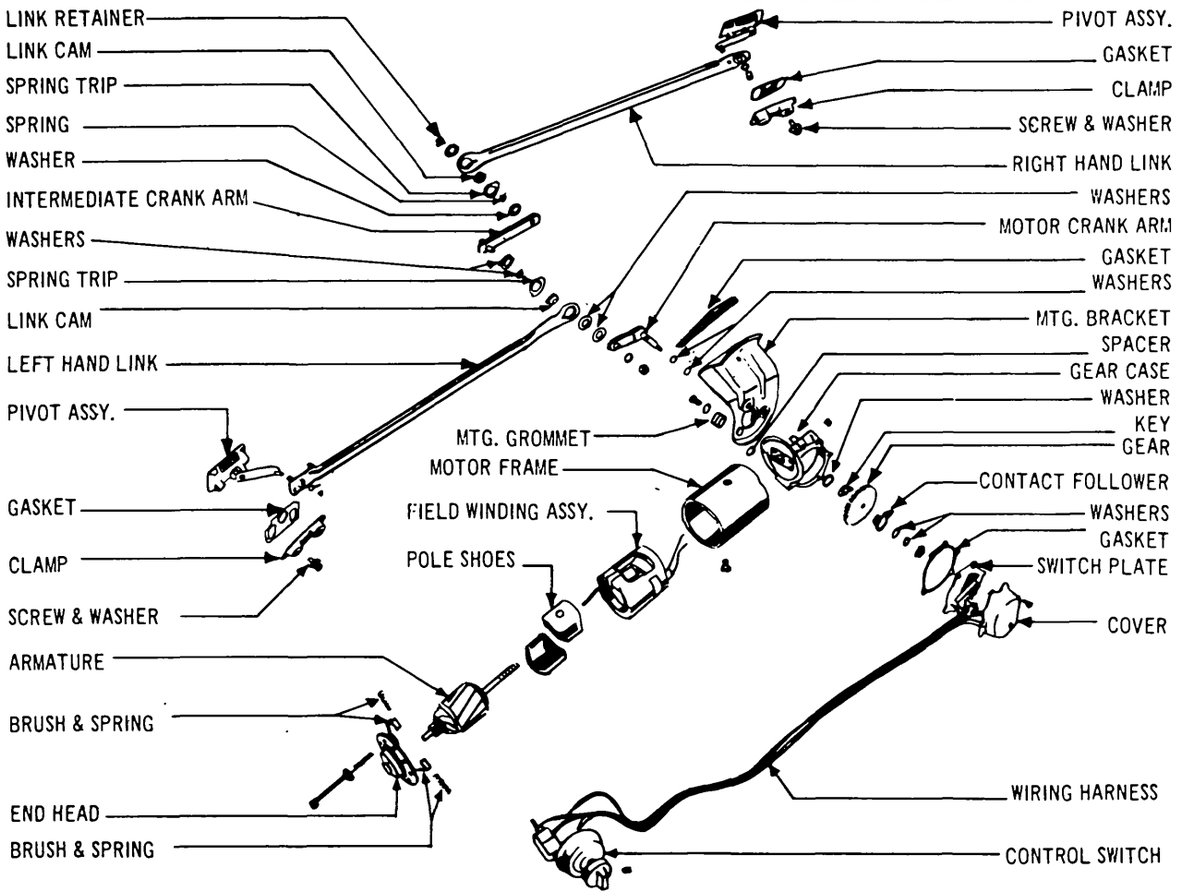
Contact Pressure—(EMU) 16-24 ozs. when pressed to ½" from switch plate.

Plunger Clearance—(EMD) .010-.020", (EWY-EWR) .020-.030" between contact spring arm and end of plunger with plunger in "down" position. Adjust by bending contact mounting bracket.

1955 AUTO-LITE WINDSHIELD WIPER "SINGLE END" MOTOR

	Auto-Lite Wiper Motor No.
CHRYSLER	
C67, 68, 69	EMZ-4001
C70 (12 Volt)	EPF-4001
DESOTO	
S21, 22	EMZ-4001
DODGE	
D56, 55-1 Standard	EMU-4101
Special	EMZ-4001
D55-2, 3	EMZ-4001
PLYMOUTH	
P26, 27 Standard	EMU-4101
Special	EMZ-4001
STUDEBAKER	
Commander, President	EBP-4001
Champion (Special)	EBP-4001

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1955 AUT -LITE ELECTRIC WINDSHIELD WIPER

1955 AUTO-LITE "SINGLE END" (C nt.)

DESCRIPTION: Wiper assembly consists of motor mounted on single gear assembly which drives both wiper arms through double crank arms. Parking switch is mounted on gear assembly housing and can be adjusted for properly parking the wiper blades. Constant and variable speed motors use same wiper blades, arm assemblies, and pivots. On Convertibles and Sport Coupes, arms (All Models) and pivots (Plymouth only) differ from other models. Reversible variable speed motor has "Off Glass Parking". When switch is turned "OFF", motor reverses direction and parking cams, at pivot pins of intermediate crank arm, rotate 180°, lengthening linkage slightly to park blades against moulding. Linkage shortens when motor runs in wiping direction.

►*CAUTION: To avoid damage to wiper motor gears, DO NOT move wiper blades to clean windshield glass. Lift wiper blade arm outward and away from glass against pivot spring mechanism.*

REMOVAL: Plymouth—Remove radio if so equipped. Disconnect wiper links at pivots, remove motor bracket nuts, lower motor, and remove right side. Use care so as not to bend links.

►*WIPER MOTOR REMOVAL CAUTION: (EMZ-4001)*—Wiper should be operated and shut off by disconnecting it at the circuit breaker, or by turning off ignition key. Damage to motor switch and spring parking cam, upon removal of switch cover will result if cranks are in parked position.

Chrysler, DeSoto, Dodge—Disconnect the wiper leads, remove radio if so equipped, remove right hand fresh air door. Remove clips from pivot cranks, (by lifting top tab and sliding sideways). Remove brass spacing washer, slip end of link containing nylon ball bushing off pivot crankpin, and remove three windshield wiper bracket retaining nuts. Remove motor and bracket with links as an assembly. Remove thick rubber gasket.

DISASSEMBLY (Chrysler, DeSoto, Dodge, Plymouth): Wiper Links (Constant Speed)—Remove clip that holds left link to crank pin, bevel washers and link. Right hand link removed in same manner. **(Variable Speed)**—Remove clip that holds left hand link to crank pin, remove bevel washers, link, cam and spring release. Note stop on pivot end of link. Spread ends of coil spring and remove from around pin, remove spring washer. Right hand link removed in same manner.

Variable Speed Wiper Switch—Remove switch cover plate. Note position of cam spring and remove it. Never attempt to disassemble switch while wiper is in parked position. *See "Wiper Motor Removal Caution (EMZ-4001)" above.*

Motor—Disassembly of the motor is accomplished in the same manner as other wipers of the single gear box type. *See "1951-54 Auto-Lite Windshield Wiper Single End Motor".*

REASSEMBLY (Chrysler, DeSoto, Dodge, Plymouth): Motor - *See "1951-54 Auto-Lite Windshield Wiper Single End Motor".*

Variable Speed Wiper Switch—Be sure gear box contains lubricant. Install parking switch cam spring so that it will engage with the nylon drive gear and the top end of spring points in same direction as the crank arm. Install switch plate and cover.

Wiper Links—(Constant Speed). Reverse removal procedure. **(Variable Speed).** Install spring washer, concave surface towards the crank arm. Compress ends of crank pivot coil spring to expand it, then install pivot and spring release. *NOTE*—Springs and spring releases are both interchangeable. Install parking cam so that it will index with spring release and engage ends of spring between the spring release and parking cam in openings at the point of index. *(See Parking Cam Installation Caution below).* Install spring washer, convex surface towards cam assembly, link arm with stop projection on link arms towards the cam assembly. Install retaining bolt and nut. Reassemble the left link and cam assembly in the same manner, locking in place with a clip in place of bolt and nut.

►*PARKING CAM INSTALLATION CAUTION:* Parking cam is interchangeable, but face of cam marked "L" must be away from the link when installed on left link, or face marked "R" must be away from link when installed on right link. When assembling to the left link, both the "L" on the left crank and on the parking cam should be seen. The same is true of the right link and the letter "R".

REINSTALLATION: Work the links up behind the dash panel and attach to pivot crank pins. Install brass spacing washer. Install lock clips on pivot crank pins and make sure wiper bracket to dash panel rubber gasket is in place, then install wiper motor and bracket assembly. *NOTE*—Do not over-tighten retaining nuts excessively compressing rubber gasket as it will permit transmission of wiper noise. Reinstall fresh air door and adjust. Adjust parking position (see below), reconnect wiper motor wires to wiper control switch.

PARKING ADJUSTMENT: Adjust parking cam at the motor switch plate so that blades park as low as possible. Then loosen the blade arms at the pivots. Position the blades against the windshield moulding on variable speed motors and tighten attaching nuts. Position blades on constant speed motors one inch from windshield moulding.

1955 CHEVROLET ELECTRIC WINDSHIELD WIPER

DESCRIPTION & OPERATION: Wiper assembly consists of a single electric motor, auxiliary drive and two transmissions (Electric motor interchangeable with Vacuum type). Transmission incorporates spring loaded pulleys for wiper adjustment. Motor auxiliary drive incorporates two drums to which cables are attached. Wiper motor and auxiliary drive assembly are mounted on engine side of dash and can be removed individually or as a single assembly. Motor controlled by knob on dash panel. Turn knob clockwise for "Low" or "High" speed positions, and counter-clockwise to park wipers.

►*CAUTION: Do not move wiper blades by hand through normal path of operation as damage to mechanism will result.*

►*INSTALLATION CAUTION:* Shims between motor unit and dash panel hold drive unit in proper alignment. Incorrect number of shims, or no shims at all, cause bind in drive resulting in sluggish operation or complete stoppage. *Note number of shims before removing motor.*

MOTOR REMOVAL & INSTALLATION: Loosen screw securing Bowden wire to motor and remove cable. Disconnect feed wire from under dash panel. Remove mounting screws. *NOTE*—Ground wire is attached under one mounting screw. To install, reverse above procedure, using exact number of shims removed.

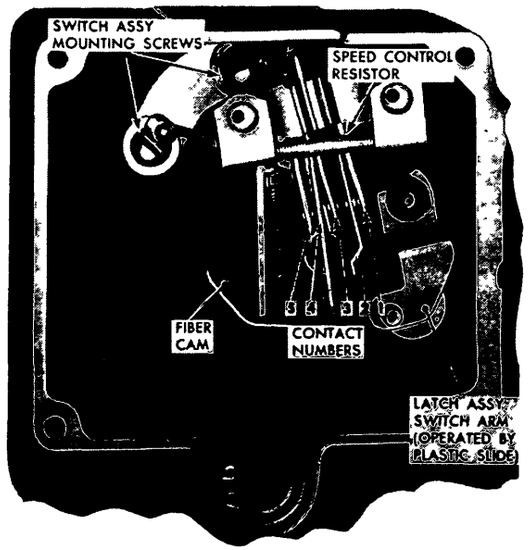
AUXILIARY DRIVE & TRANSMISSION REMOVAL: *See "Cable Operated Vacuum Windshield Wiper".*

TROUBLE SHOOTING: On the Car—Make the following inspections or adjustments before replacing motor unit.

Motor Unit Inoperative: Can result from any of the following:

1) ("IGN" Switch On). No voltage at motor terminal.

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CHEVROLET WINDSHIELD WIPER CONTROL

1955 CHEVROLET ELECTRIC WINDSHIELD WIPER (C nt.)

Check wiring.

2) Unit improperly grounded. Clean and tighten ground at auxiliary mounting screw.

►*Disconnect Bowd n wire and remove motor switch cov r b fore proc ding with 3, 4, 5, & 6.*

3) ("IGN" Switch On). Check voltage between contact No. 4 and ground. Contacts number from right to left. No reading indicates open internal motor circuit. Replace motor.

4) Check for loose connections in field leads to switch assembly. Correct defective soldering

5) Switch fiber cam not tripping contact No. 4 against contact No. 3. (Manually operate switch arm to turn unit on and observe action of fiber cam). Fiber cam must be in correct position, contact No. 4 toggle must bottom in fiber cam slot, toggle spring must be in position and coil spring connected.

6) Dirty contacts (No. 3 or No. 4). Clean contacts with crocus cloth.

Hard To Turn On: Can be caused by either of the following:

1) Bowden wire kinked or bent. Remove kink or replace wire.

2) Switch fiber cam not sliding up over oscillating shut-off arm when unit is turned on. Remove switch cover and operative unit to move oscillating arm away from switch fiber cam and polish end of switch fiber cam with crocus cloth.

Unit Will Not Shut Off: Caused by failure of oscillating shut-off arm not tripping contact No. 4 away from contact No. 3, or poor switch adjustment. Oscillating arm should come up and push against lower half of the end of the switch fiber cam. Adjust switch as follows: Loosen switch assembly mounting screws, move switch toward oscillating arm and tighten mounting screws. Test for slow, fast, and park positions.

No Fast Spe d: 1) Caused by No. 1 and No. 2 contacts not opening in fast speed switch position. Remove switch cover, manually switch arm that is normally moved by the plastic slide to the high speed position. Ear on switch fiber cam should move contact No. 2 away from contact No. 1, or adjust switch as follows: Loosen switch mounting screws, move switch assembly toward motor section of wiper unit and tighten mounting screws. Test for slow, fast, and park positions

2) Switch fiber cam slot not seated properly in contact No. 4 toggle blade. Position fiber cam slot in toggle blade.

3) Switch cover shorting on resistor terminal nearest motor. Bend down resistor terminal so that it will clear cover.

No Slow Speed: Contacts No. 1 and No. 2 not making contact at "Low" speed position. Check for dirty contacts and clean as necessary. If contact No. 1 and No. 2 seem to be separated in the "Low" speed switch position, it may be possible to bend contact No. 1 slightly so that it will make contact with No. 2.

Wip r Blad s N t Parking Against L wer Edg f Windshi ld, (jumps away from dg 30-45°): No slow speed. *S r m dy for "No Slow Speed" abov .*

High Speed Excessive (Contacts No. 1 and No. 2 Open): Excessive speed (above normal 160-180 wipes per minute) caused by switch assembly resistor mounting rivets loose or resistor open. Tighten rivets to make solid contact, replace motor unit if resistor open.

Excessive Speed Both "Low" & "High" Positions: Caused by defective soldering of the black shunt field lead to the switch assembly, Resolder lead to switch.

VACUUM WINDSHIELD WIPER LINK & CRANK ARM

Buick, Series 40 (1949-53)
Chevrolet, All Models (1949-1952)
Chevrolet Truck (1949-55)
Dodge, DeLuxe Models (1946-48)
Ford, All Models (1946-55)
Henry J (1951-54)
Hudson (1955)
Kaiser (1951-55)
Lincoln, Except Cosmopolitan (1949-51)
Mercury (1946-55)
Nash, All Models (1946-48)
Nash, Statesman & Ambassador (1952-55)
Oldsmobile, Series 76 & 88 (1949-51)
Oldsmobile, Super 88 (1951)
Oldsmobile, All Models (1952-53)
Plymouth, Exc. Conv. & Sta. Wgn. (1946-50)
Pontiac, All Models (1949-1952)
Rambler, Nash & Hudson (1953-55)
Studebaker, Champion (1946)
Studebaker, Champion (1952-55)
Willys Pass. Cars (1952-55)

DESCRIPTION: Wiper consists of a single motor unit connected to left and right hand wiper arm shafts by flat or round metal links. Motor control valve is built-in or separate.

Windshield Washer Connection—Vacuum line connection provided on some motors for washer operation (capped if washer not used).

Wiper Arm Shaft & Link Assembly—Left and right (non-interchangeable) assemblies consisting of arm shaft and crank connected to the motor arm by a flat metal link. Assembly is not adjustable.

Separate Control Valve—Mounted separately behind instrument panel and connected to motor by two vacuum lines (in addition to manifold vacuum line) as follows: 1) Running or operating vacuum line (large hose), 2) Parking vacuum line (small hose).

REMOVAL & INSTALLATION: Wiper units can be serviced separately as follows:

►**Ford & Mercury Design Change**—Mount arm, which formerly held wiper motor and two arm and pivot shaft assemblies, has been eliminated in later models.

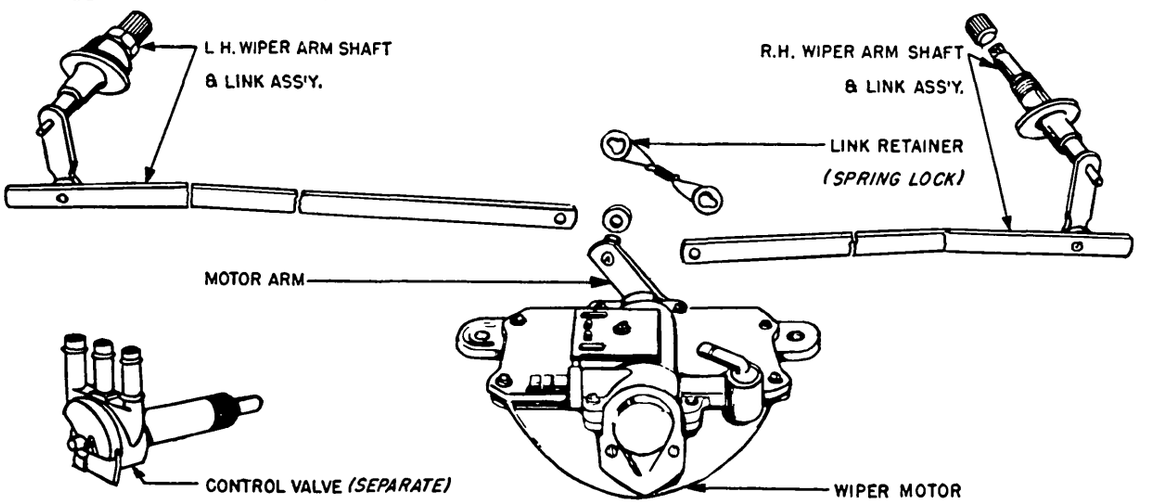
Wiper Arm: Various types of retainers used. Remove each type as follows:

Retainer Nut—Remove nut on arm at outer end of wiper shaft, pull arm off shaft.

Lock Wire—Disengage lock wire from recess in shaft at back of arm, pull arm off serrated end of shaft.

Flat Spring Lock—Pull blade end of arm out or away from windshield to disengage spring from recess in shaft, pull hub end of arm straight off serrated end of shaft.

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LINK-AND-CRANK ARM WINDSHIELD WIPER (WITH SEPARATE CONTR L VALVE)

VACUUM WINDSHIELD WIPER LINK & CRANK ARM (C nt.)

Wiper Arm Shaft & Link Assembly: *CAUTION—See special removal instructions required for cars listed below.*

Removal—See special car data below. Remove wiper arm (above), disconnect link at motor shaft arm (free spring lock or remove clip, pull link off motor arm pin). Unscrew retainer nut (remove driver or "burr" from end of shaft if nut will not clear), remove cover and gasket. Pull shaft and link assembly out to rear and remove from beneath instrument panel.

Buick, Series 40—Remove the defroster hose, glove box and defroster housing as required to reach the windshield wiper motor and the transmission to be removed. Disconnect transmission link at wiper motor. Remove screws holding motor to body.

Ford & Mercury (1948-51)—Do not disconnect motor links. After removing shaft retaining nuts and covers, **remove shafts and links as an assembly with the motor** (see Motor Removal below).

Lincoln (1949-51)—Same as Ford & Mercury (above).

Motor: *CAUTION—See special removal instructions required on cars listed below.*

Ford & Mercury (1946-47)—Do not remove motor mounting screws—take out bracket mounting screws and **remove motor and bracket as an assembly.**

Ford & Mercury (1948-51)—After removing wiper arm shaft retaining nuts (above), disconnect wiper motor vacuum hose, disconnect control valve cable (1949 models only), pull entire wiper assembly to rear (motor, links, shaft & arms, and mounting arm) until shafts clear cowl, then remove assembly from beneath instrument panel.

Lincoln (1948-51)—Same as Ford & Mercury (above).

Oldsmobile Super 88, 98 (1951-53)—Disconnect left defroster outlet from heater and the defroster duct from left defroster nozzle and from center clip on dash panel, then remove duct from body. Disconnect transmission arms from motor, then remove screws attaching motor to support, and then lower motor sufficiently to disconnect vacuum line and control cable; then remove motor from body.

Separate Control Valve: Removal—Disconnect all vacuum line hoses, remove control knob, use spanner wrench to remove nut and washer on valve stem, remove valve from behind instrument panel.

Installation—Make certain that vacuum line hoses are correctly connected at control valve.

►*CAUTION—Hose connections must not be interchanged.*

ADJUSTMENT: Wiper blades can be adjusted for correct "park" position and for desired sweep or travel of the blades on the windshield. Motor can be adjusted to correct uneven blade travel.

Park Position of Blades: Operate wiper with arms and blades removed (see Wiper Arm Removal), turn wiper off to establish the "off" or park position of arm shafts, install arm so that blade just clears molding at lower edge of windshield glass.

Sweep or Travel of Blades: If arm stroke not uniform (one blade has longer travel than other), loosen wiper motor mounting screws, shift motor in direction of arm which has shorter travel. If necessary, change arm position on shaft (see Park Adjustment above).

VACUUM WINDSHIELD WIPER LINK & CHAIN TRANSMISSION

Buick, All Series (1939-42), 40 (1946-48)
Cadillac, All Series (1938-47), 75 & 76 (1948)
Chevrolet, All Models (1939-48)
Hudson 6 & 8, All (1939-47)
①Lincoln (Zephyr), All Models (1939-48)
②Oldsmobile 6 & 8, All (1939-48)
Pontiac, 6 & 8, All Models (1939-48)
Plymouth Convt. & Sta. Wgn. (1941-50)

①—Except Stewart-Warner Electric on Zephyr (1941-42) and Custom (1941).

②—Except Cable Operated on Futuramic 98 (1948).

DESCRIPTION: Wiper consists of a single motor unit connected to left and right hand wiper arm shafts (Transmission Assemblies) by flat metal links. Motor control valve is built-in or separate (see illustrations).

Wiper Motor—Half-round type. Motors with built-in valve have single manifold hose connection, motors used with separate control valve have two hose connections (see illustrations).

►**Windshield Washer Connection**—Vacuum line connection provided on some motors for washer operation (capped if washer not used).

Transmission Assembly (Wiper Arm Shaft)—Left and right (non-interchangeable) assemblies with upper (wiper arm) and lower (link connector arm) sprockets connected by a chain which transmits power to the wiper arm. Adjustment provided to take up slack in chain (see ADJUSTMENT).

Separate Control Valve—Mounted separately behind instrument panel and connected to motor by two vacuum lines (in addition to manifold vacuum line) as follows: 1) Running or operating vacuum line (large hose), 2) Parking vacuum line (small hose).

►*CAUTION—These hose connections must not be interchanged.*

REMOVAL & INSTALLATION: Wiper units can be serviced separately as follows:

Transmission Assembly (Wiper Arm Shaft & Link):

►*CAUTION—See special removal instructions required on cars listed below.*

Removal—See special car data below. Remove wiper arm (above). Disconnect link at motor shaft arm (free spring lock, pull link off arm pin). Disconnect washer hose (if used) at transmission. Remove capscrew, lockwasher, and retainer from back of transmission assembly under cowl. Lift transmission and link assembly up and out of cowl from outside. Remove old gasket, thoroughly clean old gasket cement from cowl and transmission mounting flange.

Buick (1946-48)—For access to transmission mounting screw and retainer, remove screws in bottom section of garnish molding, pull molding away from glass, remove screw from defroster funnel, unhook opposite side and remove funnel.

Cadillac & Pontiac (1942-48), Oldsmobile (1946-48)—Same as Buick (above).

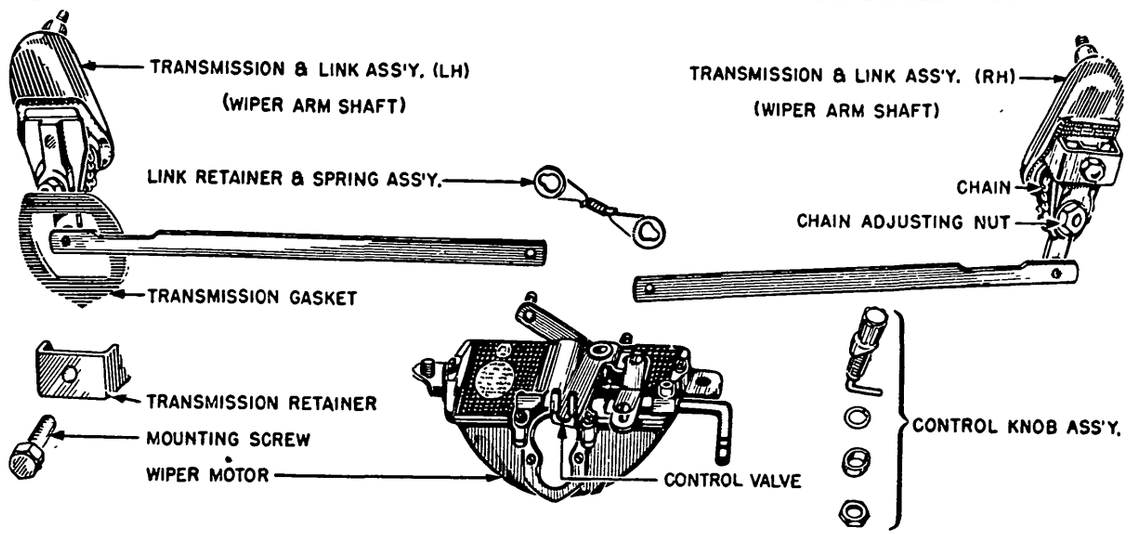
Installation—Coat mounting surfaces of cowl, new rubber gasket, and transmission assembly with rubber cement, install gasket on cowl, and use extreme care that gasket does not slip out of position while installing transmission.

►*CAUTION—Correct positioning and cementing of gasket important to prevent water leaks.*

Motor: *CAUTION—See special removal instructions required on cars listed below.*

Removal—See special car data below. Disconnect vacuum line hoses at motor, disconnect links at motor shaft arm (free spring lock, pull links off arm pin), take out motor mounting screws, lift motor out and disengage control valve link (types with built-in control valve).

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LINK-AND-CHAIN TRANSMISSI N WINDSHIELD WIPER (WITH BUILT-IN CONTR L VALVE)

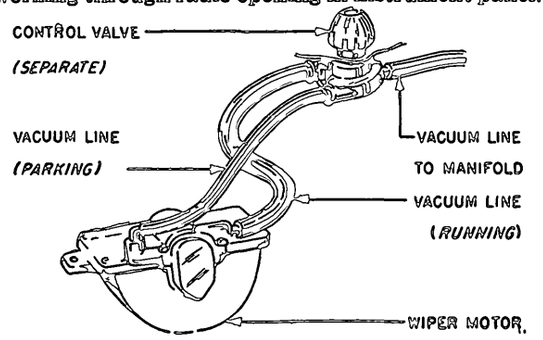
VACUUM WINDSHIELD WIPER LINK & CHAIN TRANS. (Cont.)

Installation—Install motor but do not fully tighten mounting screws, connect vacuum lines and links. With motor control "off", operate engine to supply vacuum which will cause wiper motor to centralize itself, then tighten motor mounting screws securely. Install the arms and blades, check operation (see Adjustment data below), adjust arms if required.

Separate Control Valve: *CAUTION—See special removal instructions required on cars listed below.*

Removal—See special car data below. Disconnect all vacuum line hoses, remove control knob, use spanner wrench to remove nut and washer on valve stem, remove valve from behind instrument panel.

Pontiac (1942-48) With Radio—Radio must be dropped for access to control valve as follows: Remove radio knobs, locknuts, and face plate. Loosen mounting bolts and tilt radio set back at the top, then remove windshield wiper control valve by working through radio opening in instrument panel.



WIPER MOTOR
SEPARATE CONTROL VALVE

Installation—Make certain that vacuum line hoses are correctly connected at control valve.

▷*CAUTION—Hose connections must not be interchanged.*

ADJUSTMENT: Wiper arms can be adjusted for correct "park" position and for desired sweep or travel of the blades on the windshield. Motor and transmission can be adjusted to correct uneven blade travel or short choppy strokes or noise caused by excessive play.

Park Position of Blades: Operate wiper with arms and blades removed (see Wiper Arm Removal), turn wiper off to establish "off" or park position of arm shaft, install arm so that blade just clears molding at lower edge of windshield glass.

Sweep or Travel of Blades: Check and adjust transmission chain (below). If arm stroke not uniform (one blade has longer travel than other), loosen wiper motor mounting screws, shift motor in direction of arm which has shorter travel. If necessary, change arm position on shaft (see Park adjustment above).

Transmission Chain: Loosen hexagonal nut on lower end of transmission assembly (accessible from under instrument panel—nut on back of transmission), move bolt and nut downward to take up play or slack in the transmission chain, tighten nut securely.

▷*CAUTION—Do not overtighten chain (nut can be moved upward to loosen chain).*

CABLE OPERATED VACUUM WINDSHIELD WIPER

Buick, Series 50 & 70 (1946-53)
Buick, All Models (1954-55)
Cadillac (1948-55 Exc. 1948 Series 75 & 76)
Chevrolet Pass. Cars (1953-55)
DeSoto Taxi (1946-50)
Frazer (1947-51)
Hudson (1948-54)
Hudson Jet (1953-54)
Kaiser (1947-50)
Lincoln Cosmopolitan (1949-51)
Lincoln, All Models (1952-55)
Nash (1949-51)
Oldsmobile, Series 98 (1948-51)
Oldsmobile, All Models (1954-55)
Packard (1948-55)
Pontiac (1953-55)
Rambler, Nash & Hudson (1950-52)

▷CHANGES, CAUTIONS, CORRECTIONS

▷*1953 CHEVROLET & PONTIAC DRIVE PRODUCTION CHANGE:* New auxiliary drive consisting of two drums (spiral drive) replaces auxiliary drive lever used on early cars.

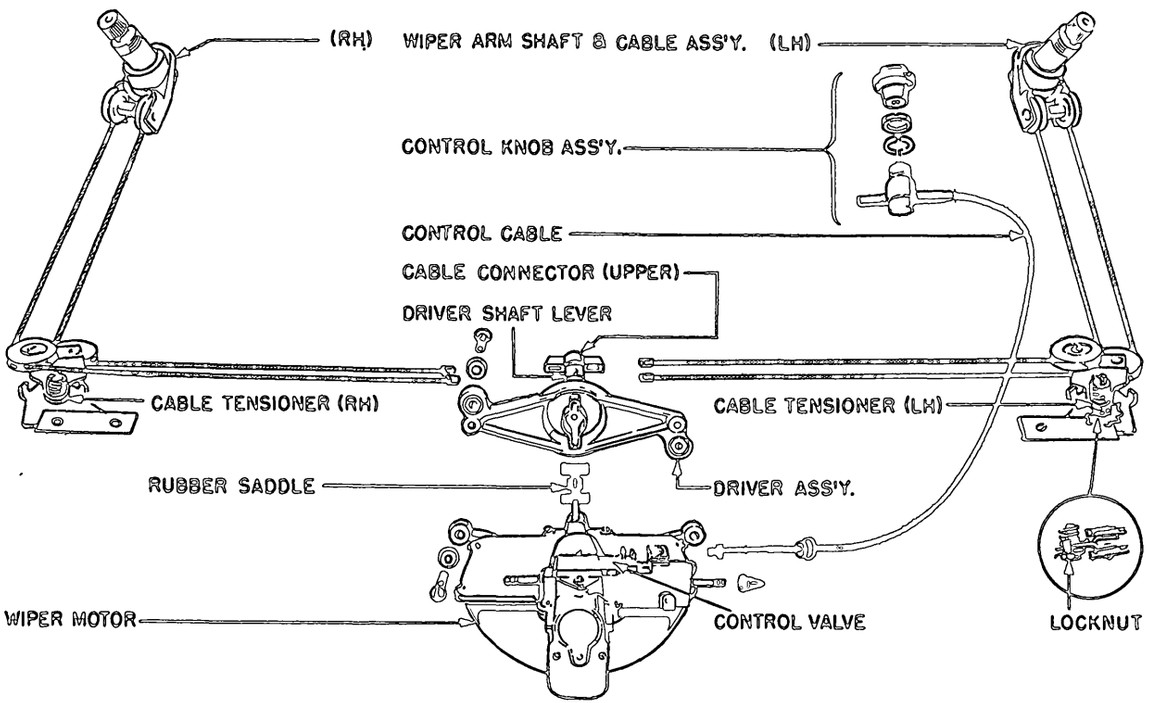
▷*1954 BUICK SLOW OPERATING WIPER MOTOR CORRECTION:* If wiper operates slowly with wiper control knob in full "on" position, and with glass wet, the condition may be caused by insufficient travel of control valve on wiper motor. Correct by loosening screw on housing which clamps outer control cable to motor housing, and with control knob in fully "on" position, adjust outer cable toward motor until plastic motor control valve seats against motor casting. Hold valve in this position and tighten clamp screw on housing.

▷*1954 BUICK SERIES 40, 60, 100 WIPER BLADE CHANGE: (To Reduce Racking at Outer End of Blades):* The condition can be corrected by installing new wiper blades, Part No. 566213.

▷*1954 CADILLAC WIPER BLADE TENSION ADJUSTMENT NOTE (To Prevent Damage to Glass):* Adjust cable tension as outlined below, then check for twisted wiper arm as follows: Wet windshield and operate wiper, stopping it when blades are in the straight up and down position. Remove wiper blade, allowing arm to rest against windshield glass. The end of the wiper arm must rest flat against the glass. If it does not, hold wiper arm close to inner end with pliers and twist outer end as necessary to make it lay flat. Install wiper blades and operate wiper, with the windshield wet, to be sure that metal portion of blade does not touch glass in any position.

▷*1954 BUICK WINDSHIELD WIPER OVERTRAVEL CORRECTION (To Prevent Damage to Glass):* Check wiper blade at "park" position and make sure it is resting against windshield rubber channel. With windshield wet, measure the distance of maximum travel of outer tip of blade. This distance should not be greater than 27¼" measured in a horizontal line from center-

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TYPICAL CABLE OPERATED WINDSHIELD WIPER

CABLE OPERATED VACUUM WINDSHIELD WIPER (Cont.)

of rear view mirror to tip of blade (do not follow curvature of windshield glass). If distance is greater, remove and reinstall wiper transmission in correct position.

▷*CHEVROLET TRANSMISSION TOOL CHANGE (For Use on 1955 Model Cars):* To use Tool J-5449 on 1955 models, it will be necessary to drill a 5/8" hole, 1-5/8" deep, from large end of tool, and relocate the 3/16" hole in handle to 1-7/8" from larger end of tool and at right angles to old hole. New Tool No. J-5449-A will remove wiper transmission spacer nut from outside transmission escutcheon on this model.

DESCRIPTION: Drive is through auxiliary pulleys and cable to windshield wiper transmission at each side of windshield (Except Chevrolet & Pontiac which have a drum or spiral drive to wiper transmission). Cable tensioners are located in pulley brackets on all models except 1953 and later Chevrolet & Pontiac, and 1954 and later Buick, Cadillac, Oldsmobile. Windshield washer connections and vacuum line connections are provided on some motors, and piping on some housings for windshield washer operation.

CABLE TENSION ADJUSTMENT: *NOTE - Three types of tensioners have been used and are adjusted as follows:*

Adjustable Type Tensioner: (1946-50 Models): Located in pulley brackets and identified by absence of spring and ratchet on tensioner. To adjust, loosen locknut under cable and tap bolt to loosen lockwasher which will permit spring to move pulleys away from center of car to take up cable slack *(CAUTION - Do not pry pulley mounting, which will cause over-tension).* Hold pulley mounting bracket in this position while tightening locknut. Repeat operation at other cable tensioner for other side of car. Cables must run in center of pulley groove and not contact any part of cowl.

Automatic Adjusting Type Tensioner (1950-55 Models Except 1953 & Later Chevrolet & Pontiac, and 1954 & Later Buick, Cadillac & Oldsmobile): Located in pulley brackets and identified by spring and ratchet on bracket assembly. Cable tension is automatically maintained and adjustment is not required.

Semi-Automatic Type Tensioner (1954-55 Buick, Cadillac & Oldsmobile, 1955 Chevrolet & Pontiac): On early 1954 models, remove windshield wiper blade and arm assemblies. Hold serrated transmission shaft and loosen screw in end of shaft 3/4 turn. Tap screw lightly. On later models (without screw in end of transmission shaft) push base of wiper arm inward, where it fits over end of transmission shaft. *(NOTE* - On cars with Cam-O-Matic Control, remove cam from beneath wiper arm so transmission shaft can be moved inward). Internal springs in transmission pulleys will automatically adjust cable tension.

1953-54 Chevrolet & Pontiac - On Early 1953 Models with arm type drive (later models have drum type drive) move the wiper arms by hand, midway in their travel arc. With the arms in this position, the motor auxiliary drive lever should be in vertical position *(NOTE* - it is not necessary to position blade and arm assemblies on later models with drum type drive). Remove arms and blades and loosen screw in end of transmission shaft 3/4 turn. Tap screw lightly to insure full tension. From under cowl, take cables between thumb and finger and increase finger pressure until one notch movement can be felt or heard. While holding cables in this position retighten the tension screw. *(NOTE* - Two men are required for this operation). Repeat the above operation on opposite wiper transmission.

CAM-O-MATIC CONTROL ASSEMBLY: Consists of a cam located on transmission shaft and cam follower on wiper arm, plus new control switch which operates both the wiping range and speed.

Wiper Arm Removal & Installation: Raise upper section of wiper arm and blade assembly to disengage cam follower from cam, carefully pry or pull arm from transmission shaft. Remove spanner nut, wiper arm cam, and transmission escutcheon from transmission shaft. To install, reverse removal procedure, making sure that key on bottom of wiper arm cam is located in keyway in bottom of transmission escutcheon.

Wiper Control Assembly Removal & Installation (1955 Buick & Cadillac): Detach wiper control cable from wiper motor at front of dash. Remove control knob by pulling it out from instrument panel, then remove "super-speed" control knob. Remove spanner nut from wiper control shaft, push wiper control forward through instrument panel. Tag hoses for proper replacement before removing them from the assembly. To install wiper control assembly, reverse above procedure. "Super-Speed" hose from vacuum line attaches to "steel" colored connector. Hose from motor attaches to "Copper" colored connector. Handles of both control knobs should be in vertical position when wiper is in "off" position and in normal speed range. *NOTE* - When removing wiper motor, the "Super-Speed" vacuum hose must be disconnected from front of motor, and reattached after installation of motor.

WIPER MOTOR REMOVAL & INSTALLATION: Disconnect vacuum tube (and washer tube if used) and control cable. Remove attaching screws and withdraw motor from auxiliary drive assembly. To install, reverse removal procedure.

WIPER TRANSMISSION & CABLE ASSEMBLY REMOVAL: On models with "Adjustable Type" tensioner, loosen locknut on bracket and move pulley mounting toward center of car. Hold in this position and tighten locknut. On models with "Automatic Type" tensioner, apply a slight pressure to ratchet spring and rotate upper section holding pulleys, until locking pin hole is in line with similar hole in lower section. Insert a pin punch in holes to hold tension in the slack position. On models with "Semi-Automatic Type" tensioner, loosen screw in end of transmission shaft (first type), or push in on transmission shaft (later type), have helper carefully pull on transmission cables to obtain slack, and while holding cables, tighten screw in transmission shaft or release pressure on shaft to lock tensioner in the slack position. Remove transmission. Before disconnecting cables from auxiliary drive, mark location of cables for correct reassembly. Note following for special procedures required on different models.

1948-53 Buick: Use Tool J-2682 to remove burr on end of transmission shaft. On early models, the transmission assembly is attached by two screws under the cowl. On later models, a single escutcheon nut is located near outer end of transmission housing. To remove the right hand transmission, remove the glove box for access.

1953-55 Chevrolet: Remove transmission shaft escutcheon nut using Tool J-5449 (1953-54), J-5449-A (1955). See Tool Modification Note above. Remove glove box and heater defroster duct.

1948-53 Cadillac: Use Tool J-2682 to remove burr on end of transmission shaft. On 1948 Models to remove right hand transmission, the lower right panel must be removed from instrument panel assembly, and the Ventilating DeFroster Heater must be removed. To remove left transmission, remove instrument panel cluster and also the small lower left panel. On 1949 Models, remove heater assembly for access to left hand transmission. Remove clock for access to right hand transmission. On 1950-53 Models remove hand brake handle bracket and instrument panel cluster for access to left transmission. Remove glove box for access to right transmission.

1954-55 Cadillac: Remove upper section of instrument panel for access to transmission. Remove transmission spanner nut using Tool J-5659.

1948-54 Hudson: Remove glove box for access to right hand transmission.

1949-51 Lincoln: Radio and heater chamber must be removed for access to transmissions and cables.

1952-55 Lincoln: For removal of right hand transmission, remove the defroster outlet.

1949-51 Nash (Exc. Rambler): For access to cable and transmission assemblies, remove the Weather-Eye heat deflector.

1948-51 Oldsmobile: Remove glove box for access to right hand transmission. Use Tool J-2682 to remove burr from end of transmission shaft.

1954-55 Oldsmobile: Remove glove box for access to right hand transmission. Use Tool J-5610 to remove escutcheon spanner nut and escutcheon.

1950-52 Rambler: Wiper motor must first be removed before removing either transmission.

WIPER TRANSMISSION & CABLE ASSEMBLY INSTALLATION: Reverse the removal procedure and note the following:

1953 Chevrolet & Pontiac (Early): On models without drum type auxiliary drive, the cables running to the left transmission are parallel, the cables to the right transmission are crossed.

1953 & Later Chevrolet & Pontiac: On models with a drum type auxiliary drive, rotate the drive counter-clockwise and attach right transmission cables, copper end to copper drum and steel colored to steel drum. Rotate drum auxiliary drive clockwise and attach left transmission cables to their respective drums. Adjust cable tension.

LUBRICATION: Use light oil on pulley bearings at tensioners and wiper housings. Coat cables with light grease only on portions travelling over pulleys or drums.